Part 1

Galaxy SCF Controller (SC Front Access) J85501F-1

Product Manual
Select Code 167-792-110
Comcode 107934499
Issue 8
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Notice:
Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

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1 Introduction

The Product

The J85501F-1 Galaxy SCF Controller, which is shown in Figure 1-1, is a modified front access version of the rear access Galaxy SC Controller. For more details on the rear access Galaxy SC Controller, see product manual 167-790-060.

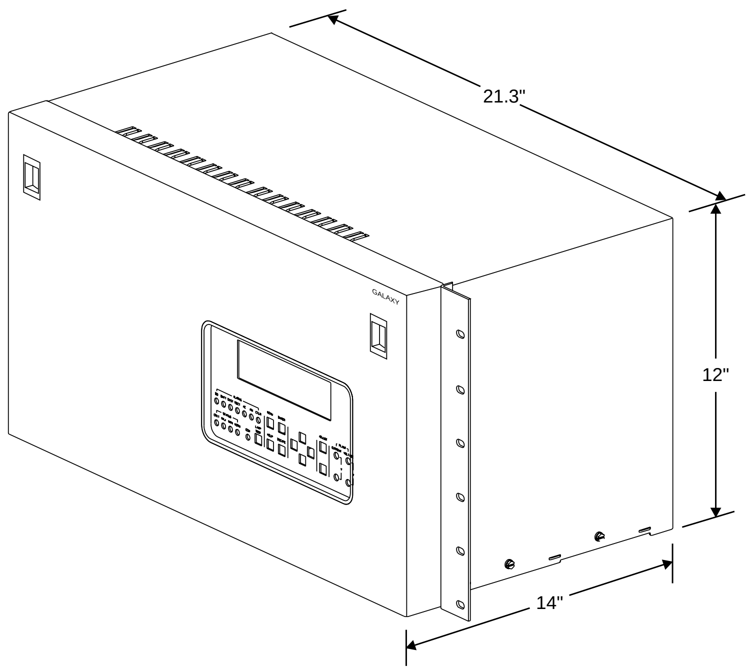


Figure 1-1: Galaxy SCF Controller

The Galaxy SCF Controller can control large battery plants containing up to 24 Galaxy serial rectifiers and up to 8 serial converters.

The front access board, located above the basic and controller sections of the controller, provides easy front access for making alarm wiring and signal input connections.

The Product Manual

This product manual (Select Code 167-792-110), which comes in two volumes: Parts 1 and 2, describes the Tyco Electronics Galaxy SCF Controller, Model J85501F-1. The manual is a user's guide to the product. The emphasis throughout is on step-by-step instructions for day-to-day use.

Included in this section are contact information for Technical Support, Product Repair and Return, and Customer Service.

Section 2 provides product information on the Galaxy SCF Controller, outlining its technical highlights, features, and applications.

Section 3 covers installation, giving information on wiring the controller and for adding, removing, or replacing circuit packs.

Section 4 shows how to integrate Galaxy into your plant and how to use the monitoring and controlling functions unique to your application. A tutorial section teaches you how to operate the Galaxy SCF Controller from its front panel, from a remote terminal, or from a personal computer that emulates a terminal.

Section 5 covers acceptance testing: what equipment is needed and step-by-step test procedures to insure that Galaxy is up and running properly.

Section 6 shows how to operate the common accessing and control functions once Galaxy has been initialized. The section includes instructions for both front panel and remote terminal access.

Section 7 describes all of the Galaxy features in detail.

Section 8 is a troubleshooting guide. Turn to this section any time Galaxy does not perform as expected.

Section 9 is the safety section. Read this section thoroughly before installing, maintaining, or repairing the Galaxy SCF Controller.

Section 10 is the Product Warranty.

Appendixes A through D provide information on the T1.317 user-interface language used for communication with Galaxy and the TL1 (Transaction Language 1) command interface available for use with private alarm networks.

Appendix E describes the Terminal Menu Interface feature.

Appendix F lists the Spare Parts available for the Galaxy SC Controller.

Appendix G is a Glossary of terms used throughout this manual.

Customer Service Contacts

Customer Service

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

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

Customer Training

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

Technical Support

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

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

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

Product Repair and Return

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

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

Warranty Service

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

On-Line Power Systems Product Manuals

Power Systems on-line product manuals are available at http://power.tycoelectronics.com/power/lineage.htm

EasyView Software

EasyView software is available on-line at http://power.tycoelectronics.com/software

2 Product Information

Function

The Galaxy SCF Controller represents a major advance in the ability to monitor and control telecommunications power equipment. It can control large battery plants containing up to 64 Galaxy serial rectifiers and up to 16 converters, and up to 32 bay interface cards, up to a maximum of 75 nodes on the rectifier serial bus.

The Galaxy SCF is the nerve center of a battery plant that utilizes serial rectifiers and serial converters. It monitors and controls the plant, its rectifiers, distribution, and batteries. It also monitors and controls peripheral power equipment, including standby generators, converter plants, and inverters.

Design

Structurally, the Galaxy SCF is a card cage that holds a number of circuit packs. It is designed specifically to make all wiring interfaces to external equipment from the front of the controller. It allows each user to combine several circuit packs in building-block fashion to put together a flexible system. It is divided physically and functionally into three sections: basic controller, intelligent controller, and front access board. Figure 2-1 shows the general layout of the controller.

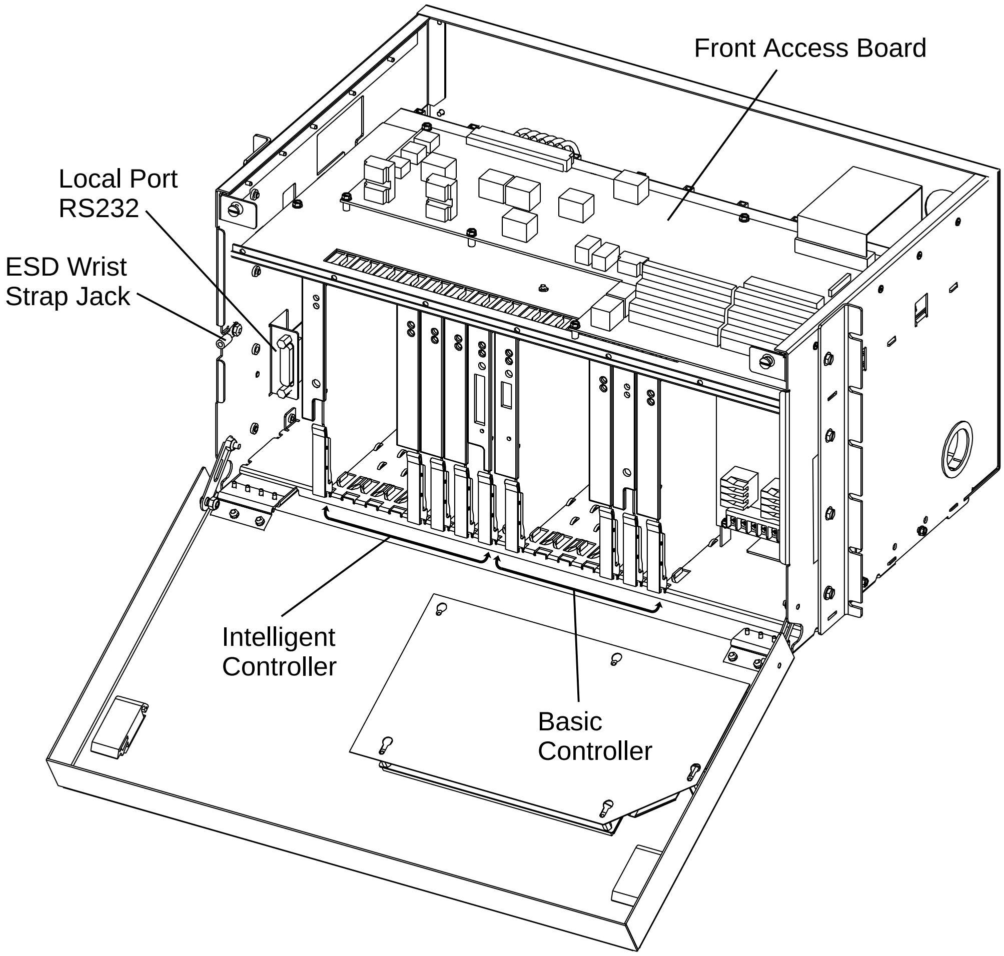


Figure 2-1: Galaxy SCF Controller with Door Open and Top Cover Removed

Basic Controller

The basic controller (sometimes referred to as “independent” controller) provides the basic local control and monitoring functions for the battery plant. User access is by front panel controls and display. It provides key battery plant alarms, high voltage shutdown, and plant voltage and current monitoring. The front panel includes an eight line, 40 character display, LEDs, switches, and jacks. The controller utilizes serial data communication between the controller and rectifiers to adjust and manage plant voltage and rectifier load.

Intelligent Controller

The intelligent controller adds many intelligent control and monitoring features:

- Plant features, including plant alarms and histories, load statistics, and auto boost.
- Rectifier features, including sequencing, energy management (efficiency) algorithm, remote rectifier on/standby, rectifier event histories.
- Battery prediction, an option that predicts reserve time for batteries made by Tyco Electronics.
- Data Switch, an optional interface with RS-232 devices such as XCS, ECS, RAS, and OMNIpulse units. Data Switch permits a single phone line to access four separate units in addition to the Galaxy SCF Controller.
- System features, including password security, dial-out on alarm, back up and restoration of configuration, serial system upgrade, and modem. Three password security levels are provided: User, with read-only privileges; Super-User, read/write privileges except for passwords; and Administrator, read/write including password setting and software updates. The system also provides a warning if passwords have been left at their factory default settings.
- Local and remote user access to intelligent features, including the enhanced front panel display, giving access to some of the intelligent features, dial-up by modem, and an RS-232 local port for a personal computer or terminal using ANSI T1.317 object oriented command language. The Galaxy also provides access for computer-to-computer interaction via an RS-485/232 port, using TL1 communications protocol.
- Remote peripheral monitoring using an optional intelligent circuit pack and remote peripheral modules (J85501G-1) provides two-way signaling and power for optional peripherals. Presently available are modules for dc voltage, shunt or temperature monitoring, binary port monitoring, and a relay module for Form-C alarming.

Front Access Board

This feature of the controller offers the customer easy front access for making alarm wiring and signal input connections.

Controller Circuit Packs

The building blocks of the Galaxy system are its various circuit packs, sometimes called circuit boards or cards. The circuit packs fit into the Galaxy card slots, as seen in Figure 2-1. The basic circuit packs are provided with every controller. The intelligent circuit packs are optional and may either be factory installed or field installed.

NOTE **In general, circuit boards on the basic side of the controller may be "hot inserted." Circuit boards on the intelligent side of the controller require that the Intelligent Controller Power Board (BJJ1 or BJJ2) be unseated before installation.**

Basic

- BJA1 or BJA2 (Basic Controller Power Board): This board provides the power required by the basic controller. BJA1 is for 48-volt systems, BJA2 is for 24-volt systems.
- BJB1 (Basic Controller Digital Board): The BJB1contains the microprocessor, memory, serial interface, and other digital and analog components used for the basic controller.
- BJC3 (Serial Rectifier Interface Board): BJC3 provides the circuitry to interface with Galaxy serial interface switchmode rectifiers and converters. The BJC3 can control up to 64 serial rectifiers, up to 16 converters, and up to 32 bay interface cards, up to a maximum of 75 nodes on the rectifier serial bus.
- BJE3 (Relay/Alarm/Display Driver Board): This board contains the remaining support circuitry required by the basic controller. The circuit pack has isolation circuits that receive contact closures from other parts of the plant such as external fuse alarms, TR leads, and external timer float and boost leads. It also contains the alarm output relays such as power major and power minor. The circuit pack provides the interface circuits to the front panel display board (BJG1). It also contains Form-C contacts that may be used for external contactor control. BJE1 and BJE2 are older versions of the board. If battery and load LVDs are used in a system without BICs, then the BJE3 board should be used.
- BJF3 or BJF4 (Termination Fuse Board): This board contains the input power terminal blocks and fuses for the controller. BJF3 is for negative voltage plants, BJF4 is for positive voltage plants.
- BLG1 (Front Access Board): This board mounts above the rest of the circuit packs internal to the chassis. It provides front access connections to all the customer's alarm wiring and signaling inputs.

- BJG1 (Display Board): This board, which is mounted inside the front door, contains the switches, LEDs, and the eight-line display control for the front panel, providing the primary user interface for the controller. The display is protected by a lexan cover to protect against high levels of electrostatic discharge (ESD).
- Galaxy Backplane: This backplane connects all basic and intelligent boards.

Intelligent

- BJJ1 or BJJ2 (Intelligent Controller Power Boards): Required for any intelligent features, this board provides power to the intelligent controller board and intelligent option boards. BJJ1 is for 48 volt systems, BJJ2 is for 24 volt systems.
- BJH (Intelligent Controller Board): This board is required for all the intelligent functions of the Galaxy SCF Controller. It contains the microprocessor, memory, real time clock, various serial interfaces, and interface circuitry to the other intelligent circuit packs. This board enables “intelligent” features, including alarm history, battery reserve time prediction, peripheral monitoring and control, etc. The BJH board also provides access to the TL1/X.25 interface.
- BJL2 (Modem Board): This board is required for data access over telephone lines. It provides the modem circuitry needed to interface the controller from a remote location over the switched telephone network at up to 14,400 baud.
- BJM1 (Peripheral Monitoring Board): This board is required for any peripheral monitoring or control. It provides interface circuitry for up to 255 remote monitoring modules, allowing connections to as many as 1,530 monitoring points.
- BJK1 (Data Switch): This board is required to operate the Data Switch, an optional interface with XCS, ECS, RAS, and OMNIpulse units. Data Switch allows call-in and call-out access to as many as four RS-232 devices via the Galaxy access ports.
- BJD1 (Galaxy Gateway Network Communications Card) This board allows users to access power plant and associated equipment using an Ethernet connection. Alarm and control information is viewed on standard Web browsers like Internet Explorer® or Netscape Navigator®.

User Interface and Display

The Galaxy SCF Controller's primary user interface is a panel that includes a backlit LCD front panel display, two rows of LEDs, two sets of test jacks, and an array of simple pushbutton controls. See Figure 2-2.

Contrast

The contrast for the front panel display is set by a thumb-wheel potentiometer marked "Display Contrast Adjust" located on the inside edge of the BJG Display Board.

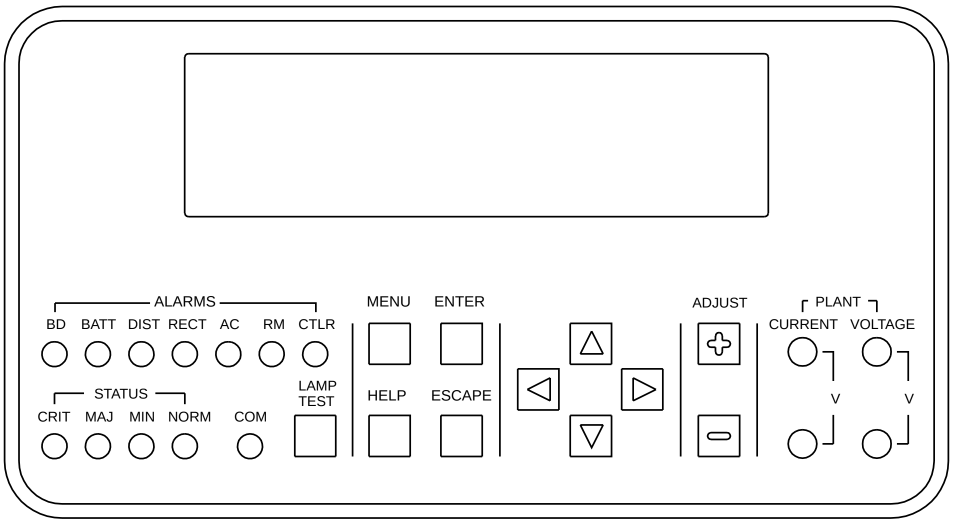


Figure 2-2: Galaxy SCF Controller Front Panel

LEDs

Two rows of LEDs at the left side of the interface board show the source and severity of various alarms.

An alarm may light two LEDs, one alarm LED and one status LED. More than one alarm LED may be on at the same time. The status LED that will be illuminated and the set of alarm relays that will be activated will be that of the highest severity active alarm.

The first row of seven LEDs, labeled ALARMS, indicate the source of the alarm (BD, battery on discharge; BATT, battery; DIST, distribution; RECT, rectifier; AC, ac power supply; RM, remote monitoring; and CTLR, controller). The user may reconfigure any of these alarms to signal on other conditions via the intelligent controller.

The second row includes five LEDs. The first four LEDs, labeled STATUS, indicate the severity of the reported alarms (CRIT, critical; MAJ, major; MIN, minor; and NORM, normal). Another LED, labeled COM, will be illuminated when the internal modem is in use. A pushbutton labeled LAMP TEST is located next to the COM LED. This button is used to test the Galaxy's circuit pack LEDs and front panel LEDs. It will also test the indicators of serially connected rectifiers and converters.

Test Jacks

Located to the far right of the front panel display are two sets of test jacks. One pair of test jacks is termed Plant Current and the other pair, Plant Voltage. Voltages measured at these test jacks are obtained from the two "Vsense" and two "Shunt" connections made to terminal block TB1, which is located on the BJF fuse termination board. See Figure 3-1. The voltages sent from TB1 to the front panel test jacks are current limited and ESD protected. The controller uses these voltages to determine and display the battery plant bus voltage and load current, as well as in many other controller features. There may be plant configurations, especially those in a distributed power architecture, that do not contain a single main battery or load shunt. In these cases, remote peripheral shunt modules are typically used to measure the many different battery string shunts. No wires will be attached to the "Shunt" connection on TB1, and no voltage will be present at the Plant Current test jacks.

In the bay configurations where the test jacks are not used, rivets (SR3555B, Comcode 405128638) should be inserted into the jacks to prevent unnecessary access.

Pushbutton Keys

A group of pushbutton keys beneath the backlit LCD display provides the primary method the user will use to interact with the Galaxy SCF Controller. These keys are used singly or in combination to navigate through Galaxy's menus. The following is the general description of all the keys.

- Up arrow key: Use to navigate the menu; press the key to move the cursor up one line.
- Down arrow key: Use to navigate the menu; press the key to move the cursor down one line.
- Left arrow key: Use to navigate the menu; press the key to move the cursor left one field.

- Right arrow key: Use to navigate the menu; press the key to move the cursor right one field.
- ADJUST Plus (+) key: Use to adjust (increase) the value of a field.
- ADJUST Minus (-) key: Use to adjust (decrease) the value of a field.
- MENU key: Press this key any time to bring the MAIN menu on line.
- HELP key: Press this key to display limited on-line help information.
- ENTER key: Use this key to save a value that has been changed, or to select a menu item.
- ESCAPE key: Use this key to abort a change, or to go back to the immediate higher level menu.

Display Language

You can view the information on the display in one of three languages:

1. The default choice, called Symbol, uses short versions or acronyms of English words.
2. The second choice is English, which uses longer English phrases.
3. The third option is reserved for Spanish.

To change the display language, first make sure that the default screen is on display (one quick way to get to the default screen is to press the <MENU> key to display the MAIN menu, then press the <ESCAPE> key). Then enter the following key sequence: <ESCAPE>, then <+> key, then <DOWN ARROW> key, then <ESCAPE> key, all within 10 seconds. Repeat this procedure to cycle through the three language selections.

Default Display

The default display shows basic plant status. Galaxy returns to this display three minutes after the last time a key is pressed. The default screen display is similar to the following: This screen shows the basic plant status. The first line shows the number of alarms (0) and warnings (0) present in the system, the date and time. The next two lines show the plant voltage (-52.08V) and the plant load (+478A). The last line shows the plant mode, which can be FLOAT, BOOST, STC (Slope Thermal Compensation) or BTP (Battery Thermal Protection, a boost mode that offers protection against thermal runaway). The information on the screen is updated automatically approximately every two seconds.

0 ALARM	**0 WARN**	**05/18/1995**	**11:12 AM**
-52.08			+478 A
		FLOAT	

Display Software Version

Use the following path to determine which version of Galaxy software is installed in the controller:

Default Screen→Main Menu→Help

Menu Organization

The front panel display offers you a series of menus.

Figure 2-3 is the hierachical overview of Galaxy's basic controller menu.

Figure 2-4 is the hierachical overview of the intelligent controller's menu.

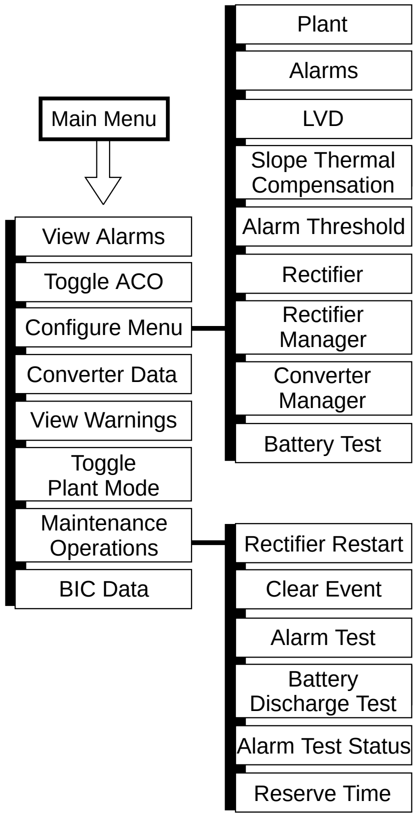


Figure 2-3: Hierachical Overview of Basic Controller Menu (Version 7.3.0)

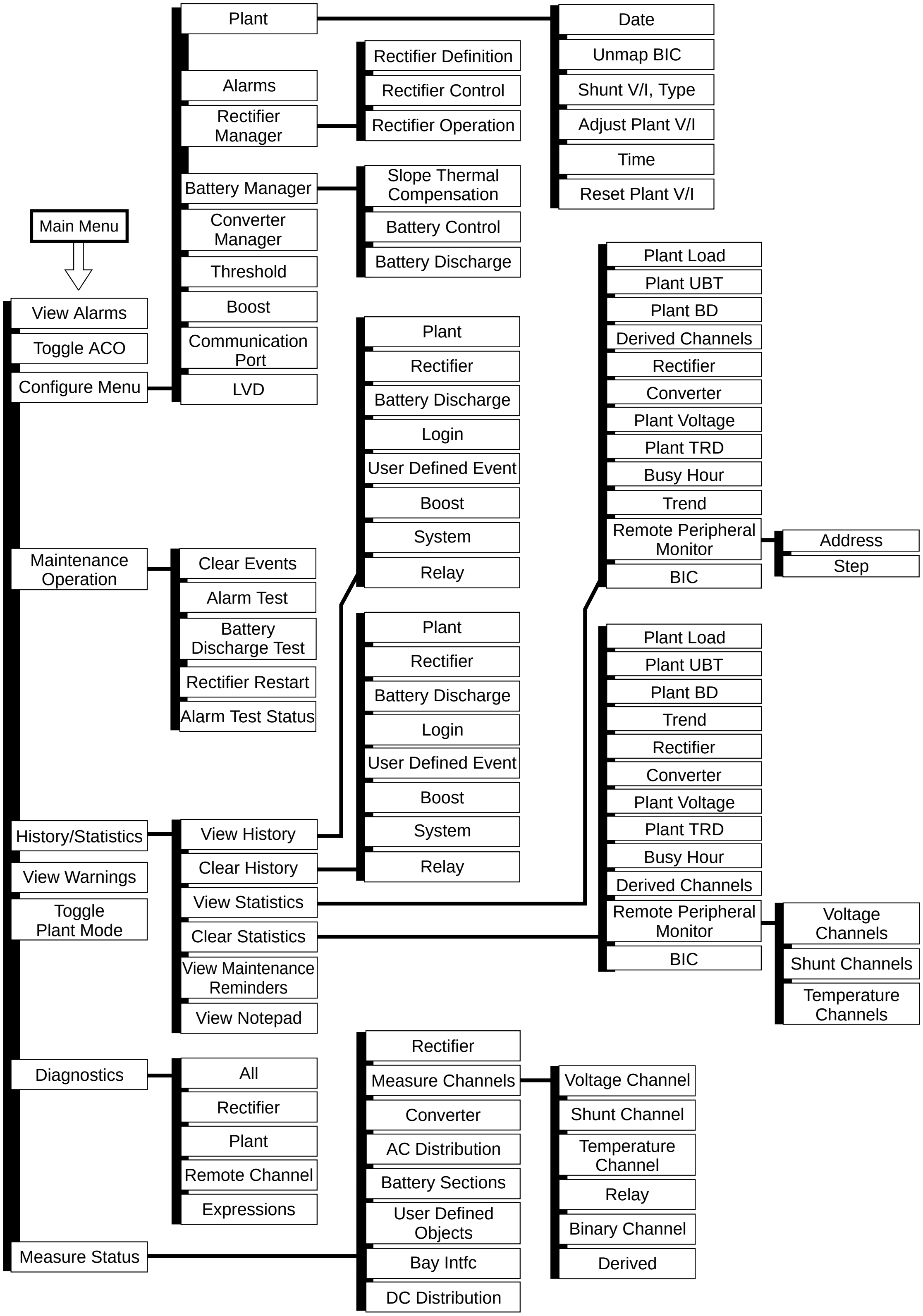


Figure 2-4: Hierarchical Overview of Intelligent Controller Menu (Version 7.3.0)

Menu Operations

This section provides the information on how to move from one screen to the others. From any screen, press the <MENU> key to bring up the MAIN MENU, which is the first menu in the series. In any menu screen, use the <UP>, <DOWN>, <LEFT>, and <RIGHT> ARROW keys to move among the menu items. When the cursor is on an item, that item blinks. From any lower level menu screen, press the ESCAPE key to bring up the immediate higher level menu screen. If a non-relevant key is pressed, the system will ignore that key.

Two types of screens are used on the front panel. The first is the menu screen, which has several fields that you can move among with the arrow keys. The field label will blink to show that it is the current field; to select that field, press the <ENTER> key. The second screen is the data screen, which may have many lines of information. These are read-only data, so there is no blinking cursor. The data screen displays eight lines, but more than eight lines of data may be available. Use the arrow keys to scroll up or down to read more lines.

Menu items that end with two dots (..) are menus themselves. Selecting any of these fields will bring you to the next lower level menu. Some of the menu items that are not currently supported are enclosed in the parenthesis. If you select any of these items, the front panel will display a message like “Feature is not available.”

On some menu screens, some items are read-only. You cannot move the cursor to those items. One example is the backup High Voltage alarm threshold (BACKUP) in the alarm threshold (THRESH) menu.

Most of menu screen items are value fields, which have a value displayed beside the field name. For these fields, you can change the value by using the <+> or <-> keys to increase or decrease the value (or toggle through a list). To save the changed value, press the <ENTER> key. If the user moves to other fields without saving the changes, the field’s original value will be restored.

Some of the menu fields refer to functions that can be enabled or disabled in hardware or software. These fields can have any of the following values: DIS(H), DIS(H,S), DIS(S), ENABLE. Each of these fields has a hardware switch and a software switch associated with it. The hardware switch value can be changed by toggling the DIP switch, located on the processor boards, between 0 and 1 (OFF and ON) position. The software switch value can be changed by using the <+> or <-> key. When the users change the hardware switch of a particular field, the display will be updated with the new value after about 2 seconds delay. The BOOST field in the PLANT configuration menu is one example of this type of menu field. The value of the menu field is displayed as the combination of hardware and software switches as shown in the table below.

Hardware SW	Software SW	Field Value
OFF (0)	OFF	DIS(H,S)
OFF (0)	ON	DIS(H)
ON (1)	OFF	DIS(S)
ON (1)	ON	ENABLE

Some of the fields act like a pushbutton. The ACO (Alarm Cut Off) and MODE fields in the MAIN menu are examples. When you select the ACO field, you can toggle between the On and Off states by pressing the ENTER key. Similarly, select the MODE field and press ENTER to switch the plant mode from FLOAT to BOOST (or BTP, if the Battery Thermal Protection is present and enabled).

Other menu fields display a system report. For example, the ALARM field in the MAIN menu displays the system alarm report. These data screens may hold more than eight lines of information. Use the <UP> or <DOWN> ARROW key to scroll the screen for more data. Press the <ESCAPE> key to go back to the parent menu screen. At any data screen, the system will revert back to the parent menu screen if you do not press a key within about three minutes. At any menu screen, if you do not press a key within about two minutes, the system will automatically revert to the DEFAULT screen.

Configuration from the Front Panel

The Galaxy SCF Controller is factory set for almost all required alarm and control functions, but you can change these settings and many others from the front panel. Turn to Section 4, *Configuration*, for detailed instructions.

3 Installation

Introduction

This chapter provides procedures for the proper addition, replacement, and removal of circuit packs in the Galaxy SCF Controller. It also describes the input and output wiring to the controller and the installation and wiring of optional features.

Preparation

The instructions in this section describe a Galaxy SCF Controller that has been factory installed in the initial bay of a new Galaxy Power System. Perform these procedures as part of the total plant installation effort **AFTER**:

- All the equipment frames (initial and supplemental bays, free-standing rectifiers, etc.) are anchored in place.
- The battery stands have been erected and the batteries installed.
- The overhead cable racks have been installed and the power cables have been run and terminated.
- The plant's charge and discharge bus bar assemblies have been installed.

but **BEFORE**:

- Connecting the batteries to the plant charge and discharge bus bars or turning up the plant rectifiers.

Precautions

- Always consider personal safety before beginning any procedure. Review Section 9, *Safety*.
- Be aware of the presence of unfused battery potential in the vicinity of the controller.
- Use only insulated tools.

- Wear grounded antistatic wrist straps when handling all circuit packs. The wrist strap must contact the skin and is not to be worn over clothing.
- Never hand a circuit pack from a grounded to a non-grounded person or vice-versa.

Installation Materials

- Jewelers screwdriver (Flat and Phillips).
- 18 to 22 AWG wire.

Circuit Pack Addition, Removal, and Replacement

Figure 3-1 shows the circuit pack layout in the controller. Table 3-A shows the installed locations for the **basic** and **intelligent** circuit packs. The basic circuit packs are provided with every controller. The intelligent circuit packs are optional and may either be factory installed or field installed.

Use the following procedure to install new or replacement circuit packs or to remove circuit packs from the Galaxy card cages. Observe the electrostatic discharge (ESD) recommendations provided at the beginning of this section. Refer to Figure 3-1 as necessary.

NOTE **A hardware reset can be accomplished by removing and re-inserting both power boards.**

1. Determine if the pack to be added, removed, or replaced is or will be located on the **intelligent** side (first eight positions from the left) or the **basic** side (first eight positions from the right).

   If the pack to be added, removed, or replaced is or will be located on the **intelligent** side, continue with Step 2.

   If the pack to be added, removed, or replaced is or will be located on the **basic** side, it may be "hot inserted" (installed without powering down the controller). Proceed to Step 3.

2. Identify the BJJ intelligent power board (far left position) and pull its circuit pack locking lever forward and downward to release it from the backplane. Slide the pack straight back until fully disengaged from the backplane.

Caution

Failure to power down the intelligent power board (BJJ) when installing or removing intelligent side packs may result in permanent damage to the Galaxy SCF Controller.

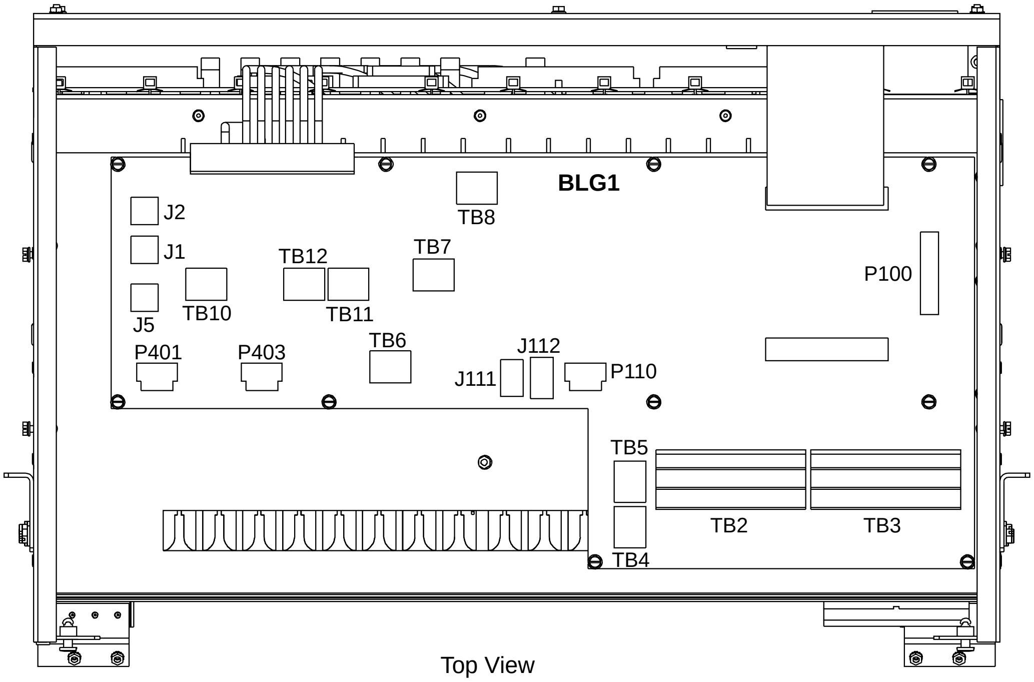
Powering down the intelligent side will cause all rectifiers previously held off through Energy Management or some other program to restart, will cause all communication underway through the Local, Aux, or Modem ports to cease, and cause the loss of history and statistics gathering during the power down period.

Also verify that the “Low Memory Battery” warning is not active and replace the memory battery in the BJH intelligent control board if necessary prior to continuing. See Section 8, *Troubleshooting*, for the memory battery replacement procedure.

3. If a circuit pack is being replaced, pull its locking lever forward and downward to unlock the pack. Then slide the pack straight back and out of the card cage.
4. Align the circuit pack to be installed with the circuit pack tracks and carefully slide the circuit pack into the card cage. Seat and lock the circuit pack into the card cage by lifting the circuit pack locking lever to the full upright position.

   If the new or replaced pack is located on the basic side, observe an active green pack LED after approximately 10 seconds. If the new or replaced pack is located on the intelligent side, proceed to Step 6.
5. Re-engage the BJJ intelligent power board into the backplane and lift its circuit pack locking lever into the full upright position. Observe active green LEDs on all packs after approximately one minute.

If, at the end of the procedure, all circuit pack green LEDs are not active, operate the reset switch of the appropriate controller pack: BJB for the basic controller or BJH for the intelligent controller. If the Front Panel interface is inoperative or scrambled, operate the reset switch of the BJB basic controller.



Top View

Front View

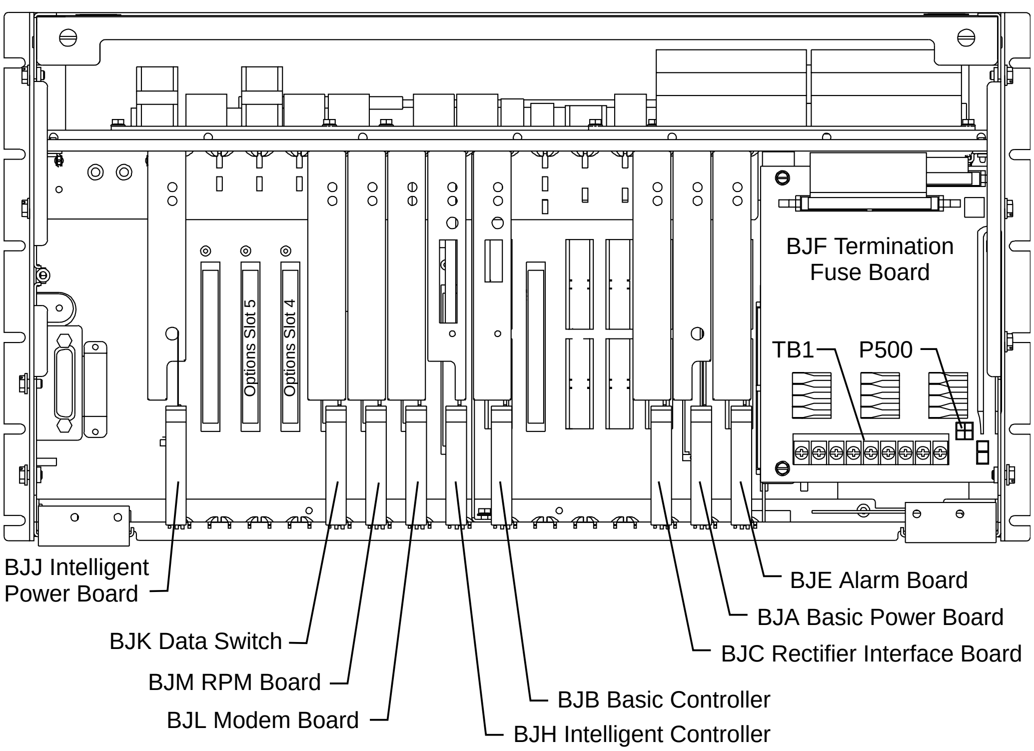


Figure 3-1: Details of Circuit Board Positions

Table 3-A: Circuit Pack Locations for Basic and Intelligent Boards

	Location	Board Code	Function
Basic Controller Board	Far Right	BJE	Relay/alarm
	2nd from Right	BJA	Basic Controller Power Board
	3rd from Right	BJC	Rectifier Interface
	6th from Right		Reserved for future development
	7th from Right	BJB	Basic Controller
Intelligent Controller Board	8th from Right	BJH	Intelligent Controller (if equipped)
	9th from Right	BJL	Modem Board (if equipped)
	Far Left	BJJ	Intelligent Controller Power Board (if equipped)
	10th from Right	BJM	Remote Monitoring (if equipped)
	11th from Right	BJK	Data Switch Board (if equipped)
	13th from Right	BJD	Galaxy Gateway Network Communication Card (if equipped)

Table 3-B: Switch Positions for Basic and Intelligent Boards

Circuit Pack	Switch Pos	Default	Description	Closed Is (1)	Open Is (0)
BJB Basic	SW202-8	1	Front panel configuration	Enabled	Disabled
	SW202-7	1	Auto rectifier restarts	Enabled	Disabled
	SW202-6	1	Operate major relays with critical relays	Enabled	Disabled
	SW202-5	1	Alarm test	Enabled	Disabled
	SW202-4	0	HV shutdown during alarm test	Enabled	Disabled
	SW202-3	0	Boost mode	Enabled	Disabled
	SW202-2	0	External timed boost	Enabled	Disabled
	SW202-1	0	Not used	Enabled	Disabled
BJH Intelligent	SW203-8	0	Remote rectifier in standby	Enabled	Disabled
	SW203-7	0	Remote rectifier turn on	Enabled	Disabled
	SW203-6	1	Full access through local port	Enabled	User Only
	SW203-5	1	Full access through auxiliary port	Enabled	User Only
	SW203-4	1	Full access through modem port	Enabled	User Only
	SW203-3	1	Modem/aux/local port setting configuration	Enabled	Disabled
	SW203-2	0	Local port:	Event Log	Terminal
	SW203-1	1	Auxiliary port	RS-232	RS-485
	SW204 4-8	0	Not used	Enabled	Disabled
	SW204-3	0	Enhanced remote security	Enabled	Disabled
	SW204-2	0	Remote alarm test	Enabled	Disabled
	SW204-1	0	Rectifier energy management algorithm	Enabled	Disabled

DIP Switch Settings

To determine the configuration of the controller, use Table 3-B as a reference and set DIP switch SW202 on the BJB (Basic Controller Board) and DIP switches SW203 and SW204 on the BJH (Intelligent Controller Board), if so equipped.

Memory Battery

The memory battery is furnished installed in the BJH (Intelligent Controller) circuit pack X201 battery holder (if equipped). to activate the battery, pull and remove the plastic tab marked “Do not pull until in service.” If the battery must be replaced, e.g., in response to a “memory battery backup low” warning, see Section 8, *Troubleshooting*.

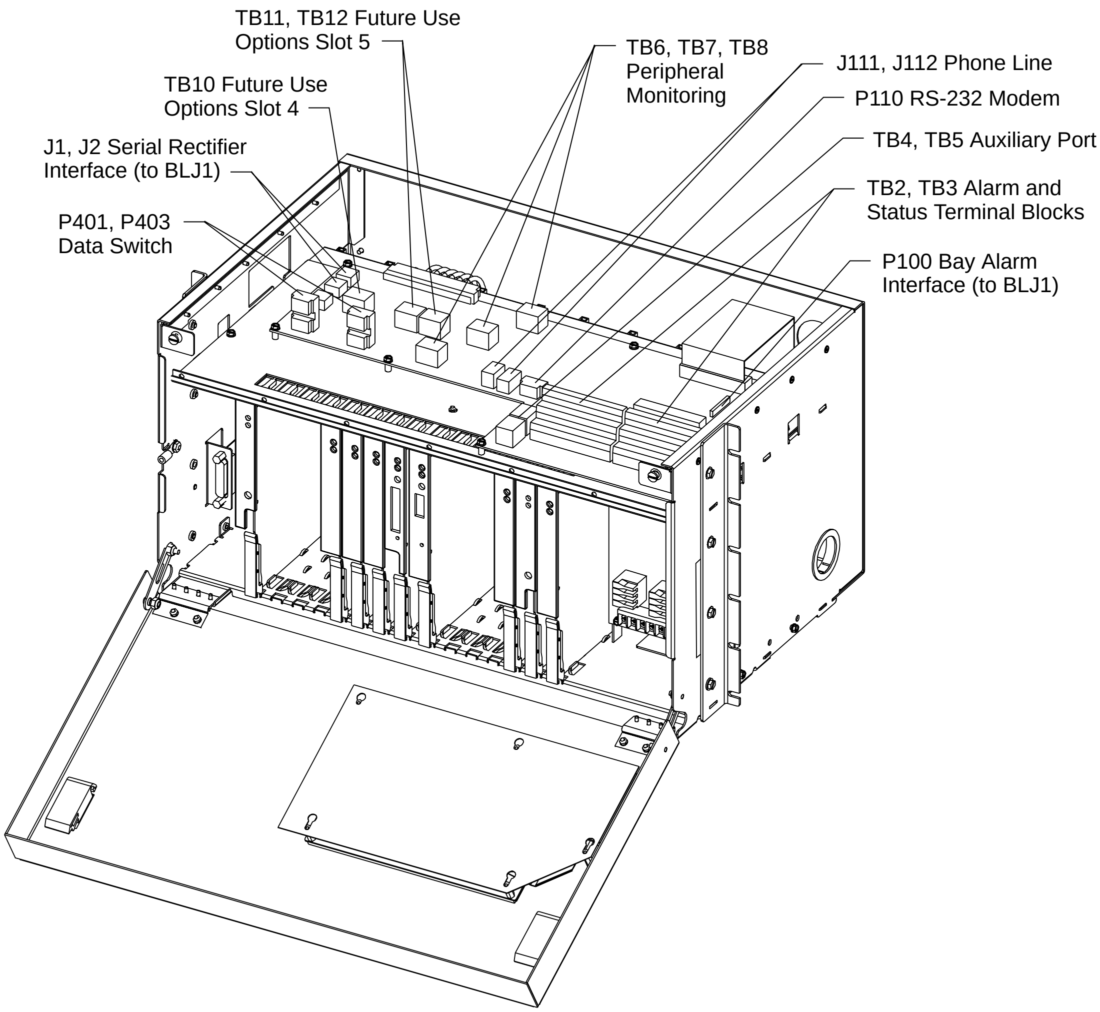


Figure 3-2: Input and Output Connections

Wiring the Basic Controller

Figure 3-2 shows the input and output wiring connection points. Each of these connections will be described in this section.

Power and Shunt Inputs

The BJF Fuse Termination Board is shown in Figure 3-1. Power and shunt inputs are connected to this board at TB1. Power is routed through fuses to different circuits in the controller. The shunt leads are used in some power systems that have a shunt measuring the total load current. The connections are factory wired in the Galaxy Power System.

Grounding

The Galaxy SCF Controller is connected to frame ground through its mounting brackets. All powered units should be grounded directly using 2-hole wiring termination. A terminal lug (WP91412 L-73, comcode 405356171) is provided that accepts 10-14 AWG and mounts in the upper right rear corner of the chassis.

Rectifier/Converter Interfaces

The Galaxy SCF Controller is capable of interfacing with up to 64 Tyco Electronics serial rectifiers and 16 converters.

The rectifiers and converters are controlled by a digital serial interface via an 8 wire standard communications cable plugged to J1 or J2 on the BLG1 board. Rectifiers are designated G-01 to G-64.

Alarms Outputs

Galaxy provides clean contact Form-C alarm indications for use by the customer to transmit its alarms to an office or remote alarm sensing circuit. These contacts are rated for 60 VDC maximum, at 0.3 amperes.

These alarms are accessed on terminal blocks TB2 and TB3 located on the BLG1 board. These terminal blocks can accommodate wire sizes 18 to 22 AWG. If you plan to use alarm cabling of less than 18 AWG, use multi-conductor cable for mechanical integrity. The recommended torque for TB2/TB3 is 4.5 in-lb.

Refer to Figure 3-3 and Table 3-C for lead designations for TB2/TB3 and their descriptions. These external alarms may be wired to customer external office alarms at their destination.

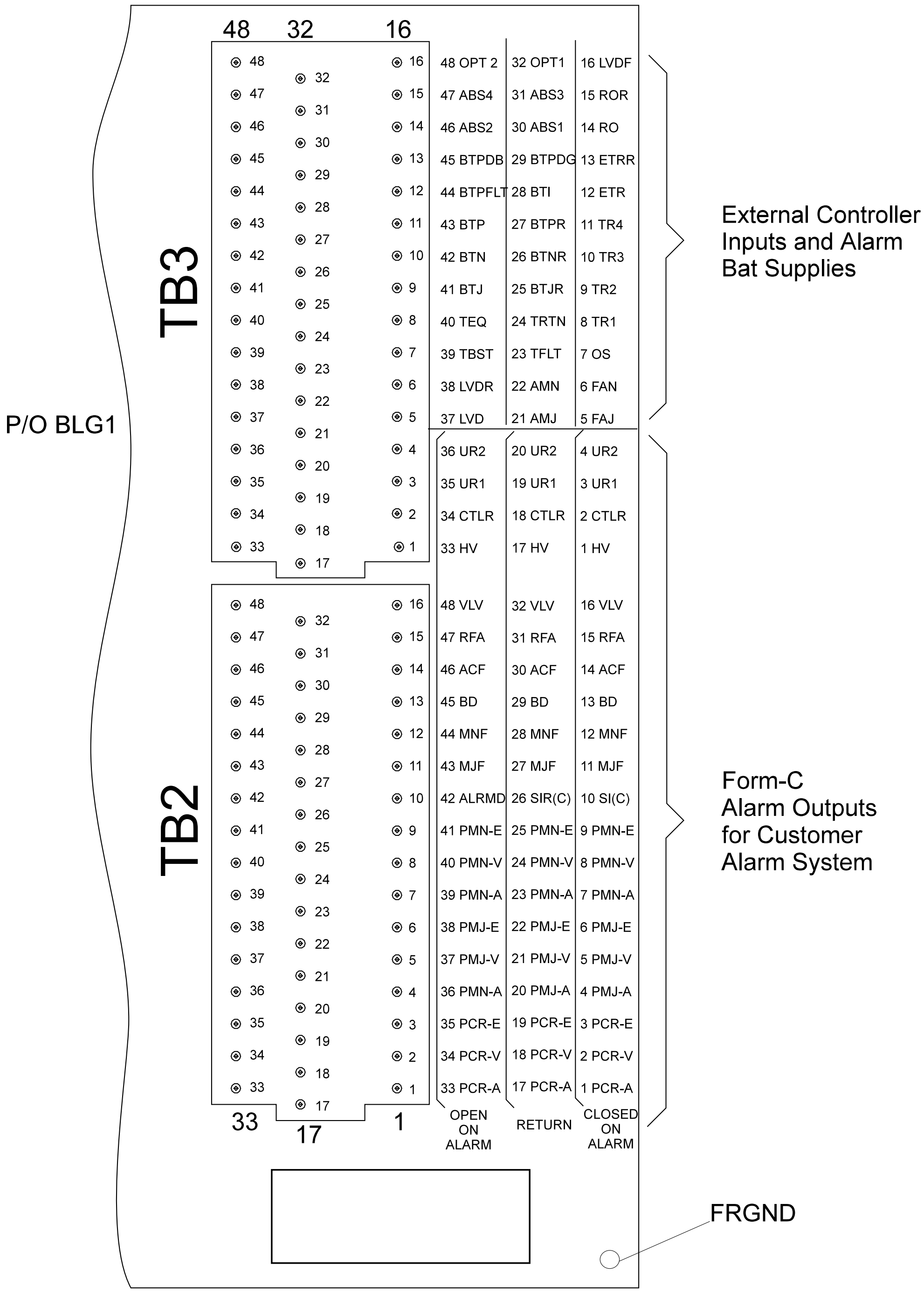


Figure 3-3: Alarm Signal Terminal Blocks

Table 3-C: Alarm Signal Outputs

Signal Name	Description	Alarmed Contact Condition	Signal Name	Description	Alarmed Contact Condition
PCREC PCRER PCREO	Power Critical Electrical	Closed Return Open	MJFC MJFR MJFO	Major Fuse	Closed Return Open
PCRAC PCRAR PCRAO	Power Critical Audio	Closed Return Open	MNFC MNFR MNFO	Minor Fuse	Closed Return Open
PCRVC PCRVR PCRVO	Power Critical Visual	Closed Return Open	VLVC VLVR VLVO	Very Low Voltage	Closed Return Open
PMJEC PMJER PMJEO	Power Major Electrical	Closed Return Open	HVC HVR HVO	High Voltage	Closed Return Open
PMJAC PMJAR PMJAO	Power Major Audio	Closed Return Open	BDC BCR BDO	Battery on Discharge	Closed Return Open
PMJVC PMJVR PMJVO	Power Major Visual	Closed Return Open	ACFC ACFR ACFO	AC Fail	Closed Return Open
PMNEC PMNER PMNEO	Power Minor Electrical	Closed Return Open	RFAC RFAR RFAO	Rectifier Fail	Closed Return Open
PMNAC PMNAR PMNAO	Power Minor Audio	Closed Return Open	CTLRC CTRLR CTRLO	Controller circuit pack	Closed Return Open
PMNVC PMNVR PMNVO	Power Minor Visual	Closed Return Open	UR1C UR1R UR1O	User Relay 1	Closed Return Open
SI (C) SIR (C)	Status Indicator C (PMN)	Closed Return Open	UR2C UR2R UR20	User Relay 2	Closed Return Open
D	Alarm D (PMJ)	Closure to DG (D is asserted when PMJ is asserted)			

AC Inputs and Fused Battery Supply

In addition to the 20 sets of Form-C alarm outputs available on the TB2 and TB3 terminal blocks, the following additional related alarm inputs may be wired at the customer's discretion.

TB3-5 FAJ: Fuse Alarm Major

A battery potential input is required, using an external 1K ohm, 2W current limiting resistor at the source. This circuit is usually wired into the Galaxy plant distribution fuse/circuit breaker alarm circuit. In some Galaxy Power Systems the FAJ is cabled bay to bay and enters the BLG1 front access board through P100.

TB3-6 FAN: Fuse Alarm Minor

A battery potential input is required, using an external 1K ohm, 2W current limiting resistor at the source.

TB3-7 OS: Open String Alarm

A battery potential input is required. This circuit is used to signal Galaxy that a battery string protective device or switch is in the open position. In some Galaxy Power Systems, the open string alarm informs the controller that a battery fuse has operated. in these systems, OS is cabled bay-to-bay and enters the BLG1 front access board through the P100 connector.

TB3-21 AMJ: Aux Major

A battery potential input is required, using an external 1K ohm, 2W current limiting resistor at the source. This circuit is used to allow Galaxy to monitor another power device and provide alarms for it.

TB3-22 AMN: Aux Minor

A battery potential input is required, using an external 1K ohm, 2W current limiting resistor at the source. This circuit is used to allow Galaxy to monitor another power device and provide alarms for it.

TB3-30, 46, 31, 47 ABS1, ABS2, ABS3, ABS4: Alarm Battery Supply 1 to 4

Plant voltage source for user alarm systems. This power is fused with a 1-1/3 ampere ABS fuse.

TB3-16 LVDF: Low Voltage Disconnect Fail

A battery potential input is required, using an external 1K ohm, 2W current limiting resistor at the source. This circuit is used to inform Galaxy that the monitoring circuit for an external Low Voltage Disconnect device has failed. In some Galaxy Power Systems, external BJN low voltage disconnect boards are used, LVDF and LVD/LVDR inform the controller that the contactor is open. In these systems, LVDF and LVD/LVDR are cabled bay to bay and enter the BLG1 front access board through the P100 connector.

TB3-37/38 LVD/LVDR: Low Voltage Disconnect Active

A closure between these points informs Galaxy that an external Low Voltage Disconnect contactor has opened. See previous item when external BJN LVD board is used.

TB3-32/48 OPT1/OPT2

Reserved for future use on the basic side of the controller.

External Boost Option

A variety of external devices may be used to initiate boost in Galaxy. Wiring is required from TB3-23/24/39 on the BLG1 front access board (see Figure 3-4) for operation of this feature. In addition SW202-2 and SW202-3 on the BJB board must be enabled. Boost mode use also requires that the HV and HFV Boost Thresholds in Galaxy be configured above the desired boost voltage level to avoid nuisance alarms and shutdowns while operating in the boost mode. Additional information on the External Boost feature can be found in the heading: “Boost Feature Overview” in Section 7.

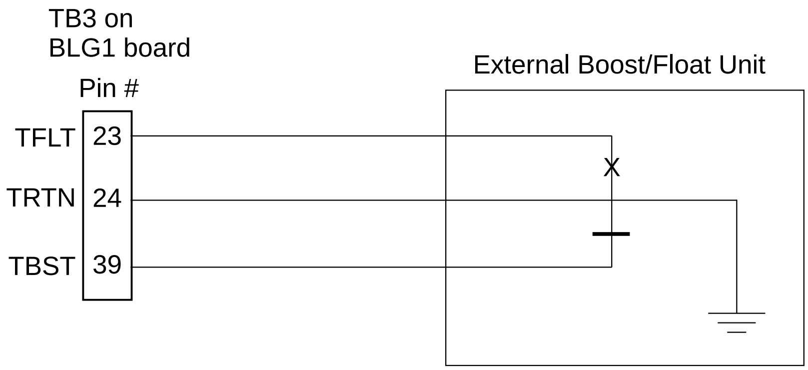


Figure 3-4: Wiring for External Boost Option

Battery Thermal Protection

Battery Thermal Protection (BTP) modules (J85501X-1) may be used with Galaxy to aid in the prevention of thermal runaway in valve regulated battery reserve systems. Refer to the BTP product manual, Select Code 157-010-200, for information on the installation of J85501X1 BTP modules and Figure 3-5 for their connection to TB3 on the BLG1 front access board of Galaxy. Note that the resistors are not to be mounted in the first BTP module when it is used with a Galaxy SCF Controller.

The BTP feature utilizes the "boost" feature in reverse to lower plant voltage whenever battery temperature increases above a set point. BTP mode use also requires that the BD Boost/BTP Threshold in Galaxy be configured below the desired BTP voltage level to avoid nuisance alarms while operating in the BTP Mode. Additional information on the Battery Thermal Protection feature can be found in the "Boost Feature Overview" in Section 7.

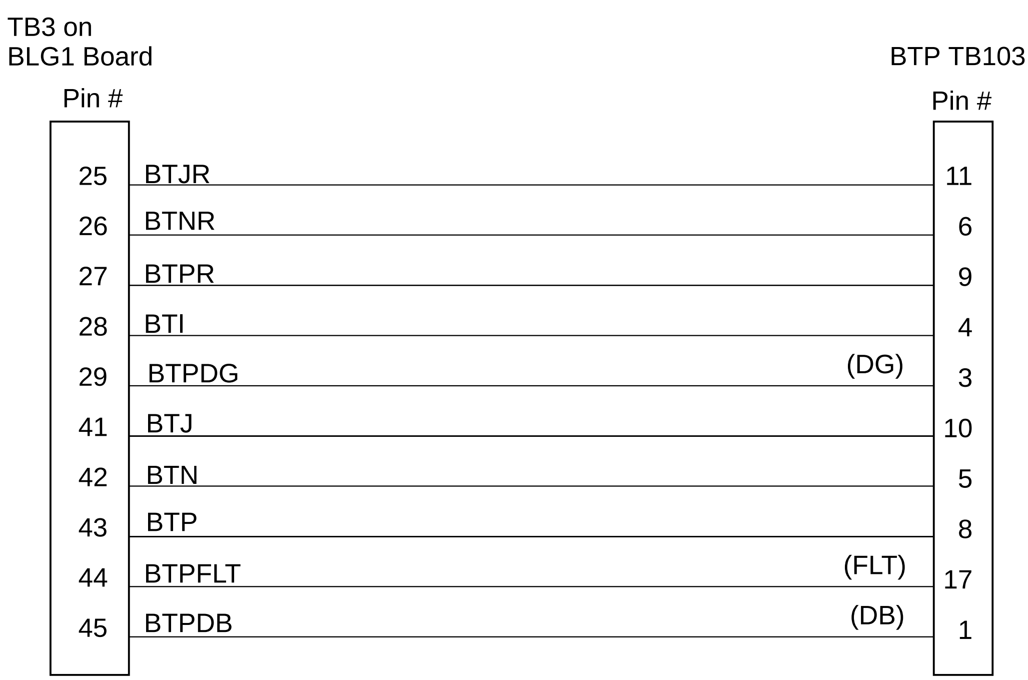


Figure 3-5: Connections for Battery Thermal Protection

Wiring Options

The following Galaxy optional features require the addition of external equipment or wiring. Install them as described below.

Intelligent Controller Option (J85501F1 L-FA, FB, FC, or FD)

The Intelligent Controller Option is required for any of the more advanced Galaxy features to function. This option provides both the microprocessor and the power for the Intelligent side of the Galaxy SCF Controller. No communication with the Galaxy except through the front display panel can be completed if this option is not equipped.

These items are included with the Intelligent Controller option:

- BJH Intelligent Control Board
- BJJ Intelligent Power Board
- EasyView Software and Product Manual

Optional RS-485 or RS-232 connections may be made to TB4 or TB5 terminal blocks on the BLG1 front access board. Refer to Figure 3-1 for front access connecting locations. Either the RS-485 or RS-232 jack is permitted to be active by positioning the SW203-1 switch on the BJH board. User authority access for this port is set by SW203-5. See Table 3-B. Complete the wiring of the RS-485 or RS-232 jacks in accordance with Table 3-D.

Refer to "Circuit Pack Addition/Removal/Replacement" for information on adding the BJH and BJJ packs into their assigned slots in the Intelligent half of the Galaxy card cage.

Refer to the EasyView Product Manual for instructions on use of the EasyView graphical interface software.

Table 3-D: RS-485 and RS-232 Pinouts

	Terminal	Name
RS-485	TB4-1	TXD+
	TB4-2	TXD-
	TB4-3	RXD+
	TB4-4	RXD-
RS-232	TB5-1	TXD
	TB5-2	RXD
	TB5-3	GND
	TB5-4	-

Modem Option (J85501F-1 L-FE)

The Modem option permits communication over the public network analog lines at baud rates of up to 14400. This option is necessary for Call Out on Alarm and to enable the Data Switch option to access the public network. The BJL Modem Board is located in the slot marked "MODEM BJL" on the intelligent side of the Galaxy Card Cage.

Included with the BJL Modem Board option is the BLG1 front access board, which contains two RJ11 telephone jacks: J111 and J112. Refer to Figure 3-1 for front access connecting locations. Connect J112 to the incoming analog phone line and use J111 if desired to extend this line to another phone or device.

NOTE **J111 & J112 are connected in parallel internally. The use of another phone or device on the same line as Galaxy may cause a "No Dial Tone Detected" warning should Galaxy attempt to call out while the line is in use.**

User authority access for this port is set by SW203-4 on the BJH pack. See Table 3-B. Refer to "Circuit Pack Addition/Removal/Replacement" for information on adding the BJL pack into its assigned slot.

Data Switch Option (J85501F1 L-FH)

The Data Switch option allows Galaxy to interface with up to four additional RS-232 devices, such as MCS, ECS, XCS, and other Galaxy SCF Controllers, and can also interface with the RAS (Remote Access System) and OMNIpulse remote monitoring and control units. When used with the BJL Modem option, the Galaxy and the four Data Switch ports can all be accessed over a single phone line and Galaxy will control Call Out on Alarm for all of the connected devices.

Included with the BJK Data Switch Board is the BLG1 front access board, which contains four DB9, 9-pin serial port plugs P401 and P403 (double stacked) for wiring to connecting devices. Refer to Figure 3-1 for front access connecting locations and Table 3-E for lead assignments. Complete wiring from this interface to the connected RS-232 device(s), as shown in Figures 3-6, 3-7, 3-8, and 3-9.

Table 3-E shows the signal descriptions wire colors, etc. for the cable assembly used to interface external equipment to the Data Switch option of the Galaxy SCF Controller. The cable assembly comcode is 847540416.

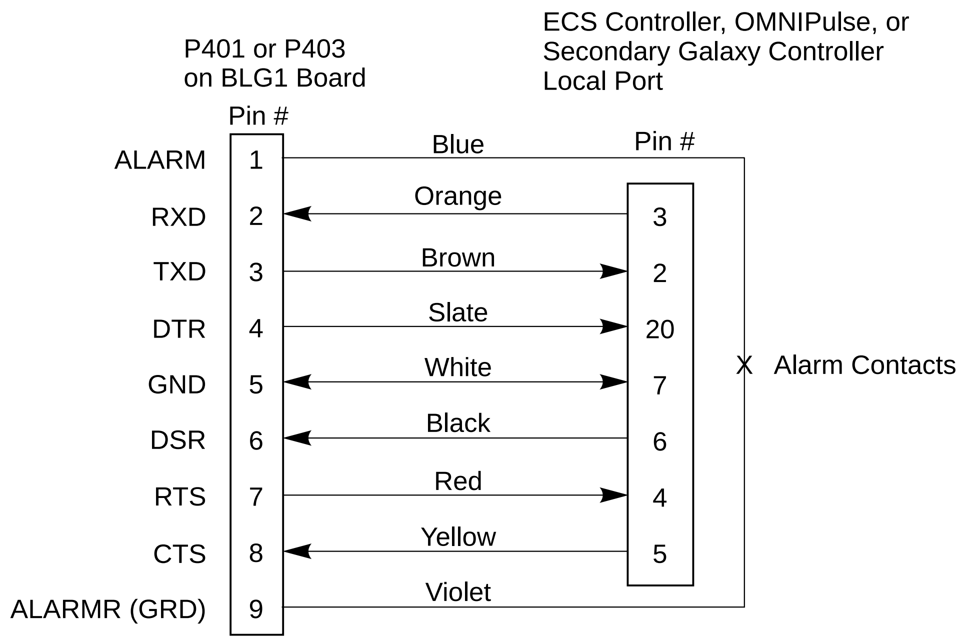


Figure 3-6: Connections from Galaxy Data Switch to ECS Controller, OMNIpulse, or Other Galaxy Controller

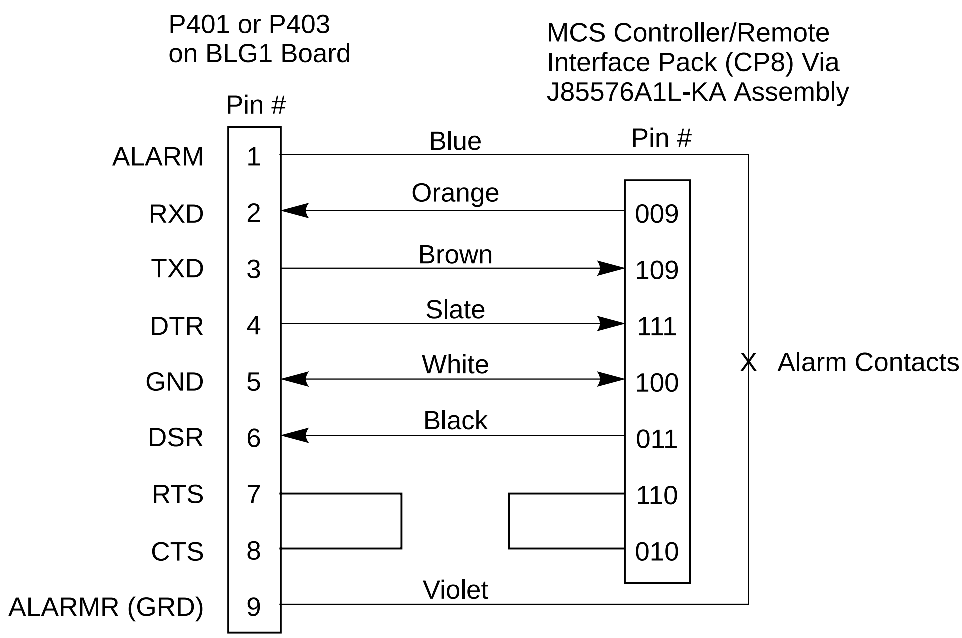
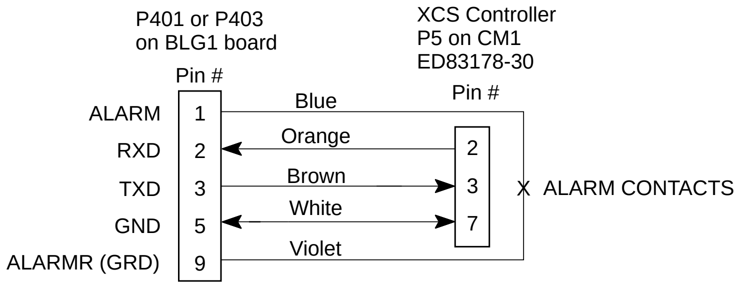
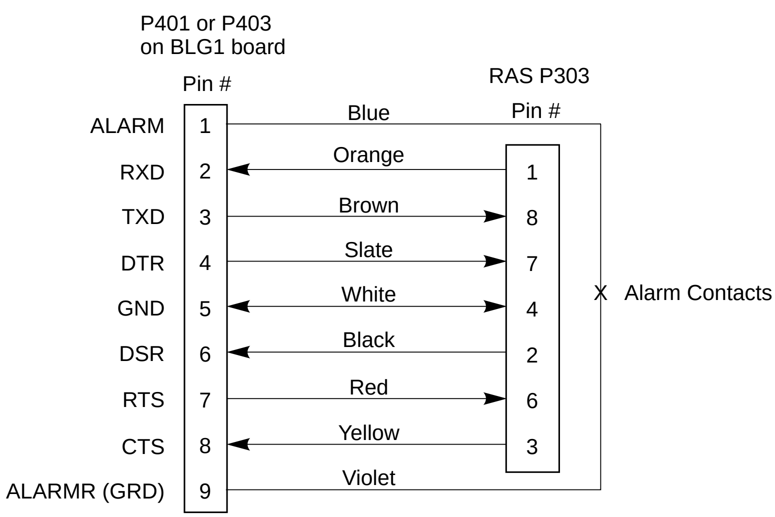


Figure 3-7: Connections from Galaxy Data Switch to MCS Controller Remote Interface Pack



XCS S2 Switch Settings
S2A - Not Used
S2B - Open
S2C - Closed
S2C - Closed
S2D - Closed
S2E - Closed
S2F - Open (48V) Closed (24V)
S2G - Open (48V) Closed (24V)
S2H - Open (48V) Closed (24V)

Figure 3-8: Connections from Galaxy Data Switch to XCS Controller



RAS SW301
1-Open
2-Open
3-Open
4-Closed
5-Open
6-Open
7-Open
9-Closed

Figure 3-9: Connections from Galaxy Data Switch to Remote Access System

Table 3-E: Data Switch Cable Interface

Pin #	Wire Color	Name	Function	Controller acts as:
1	blue	ALARM	alarm sense	see below
2	orange	RXD	receiver data	receiver
3	brown	TXD	transmit data	driver
4	slate	DTR	data terminal ready	driver
5	white	GND	signal ground	see below
6	black	DSR	data set ready	receiver
7	red	RTS	request to send	driver
8	yellow	CTS	clear to send	receiver
9	violet	ALARMR (GND)	alarm sense return (signal ground)	see below

Signal descriptions:

The **Alarm Sense and Alarm Sense Return** leads are used to sense an isolated alarm contact closure on the connected equipment. This is used to determine when an alarm is present on the connected equipment for dial out and history purposes. The alarm relay contact should be a “closed on alarm” type. The alarm sense return lead is connected to the controller’s ground, which is roughly earth ground. Power to sense the alarm contact is generated by the controller, so care must be taken to ensure no power is present on the connected equipment’s alarm relay contacts from any other source.

Receive Data is the RS-232 level serial data coming from the connected equipment to the controller.

Transmit Data is the RS-232 level serial data going to the connected equipment from the controller.

Data Terminal Ready is the RS-232 level signal to the connected equipment saying the controller is connected and functioning. This signal may not be required by the connected equipment, and a connection is not required by the controller.

Signal Ground is the normal ground or return signal on an RS-232 type interface. It is roughly at earth ground potential.

Data Set Ready is the RS-232 level signal from the connected equipment telling the controller it is connected and ready to accept data (within the confines of any hardware or software flow control). The controller can be configured to monitor or ignore this signal. If the connected equipment does not provide this signal, either configure the controller to ignore this signal or connect this lead to the Data Terminal Ready lead (pin 5). (Connecting DSR to DTR will ensure proper operation even if the controller is accidentally configured to monitor DSR).

Request To Send is the RS-232 level flow control signal to the connected equipment saying the controller is ready to send data. This signal is used when the controller is configured for hardware handshaking. It may not be required by the connected equipment, and a connection is not required by the controller.

Clear To Send is the RS-232 level flow control signal from the connected equipment telling the controller it is ready to receive data. This signal is used when the controller is configured for hardware handshaking. If hardware flow control is not required by the connected equipment, either configure the controller for software or no flow control, or connect this lead to the Request To Send lead (pin 8). (Connecting CTS to RTS will ensure proper operation even if the controller is accidentally configured to use hardware flow control.)

The BJK Data Switch board can only be located in the slot marked "DATA.SW BJK" in the Intelligent side of the Galaxy card cage. Refer to "*Circuit Pack Addition/Removal/Replacement*" for information on adding the BJK pack into its assigned slot.

Additional information on the Data Switch feature can be found under the heading "*Data Switch Feature Overview*" in Section 7.

Remote Peripheral Monitoring Option (J85501F-1 L-FG, J85501G-1)

The Remote Peripheral Monitoring Option of the Galaxy SCF Controller provides data acquisition capability far beyond that normally available in a power plant controller. Presently, the monitoring modules available from the J85501G-1 specification include several DC Voltage modules, a DC Shunt module, a binary input module, and a Form-C relay module. The voltage and shunt monitoring modules each have six input channels and a temperature channel. The relay module has 3 Form-C relays, while the binary module has 6 input channels and one temperature channel. These modules are meant to be located near the equipment being monitored and are daisy-chained together in a maximum of three 2-wire communication buses (maximum of 255 modules) for their connection into Galaxy. Refer to the J85501G-1 Remote Peripheral Monitoring System product manual, Select Code 167-790-063, for detailed instructions on wiring and functionality of each type of remote module.

Included with the Remote Peripheral Monitoring option are the following:

- BJM Remote Peripheral Monitoring Board
- Three 560 ohm, 10 watt Bus Termination Resistors
- Three Inductor Beads

1. Locate the 3 terminal blocks TB6, TB7, and TB8 on the BLG1 front access board. Refer to Figure 3-1 for front access connecting locations.

2. Mount, wire and set module addresses for all monitoring modules in accordance with information provided with their product manual. Note that three communication buses are available within Galaxy to simplify their installation if the points to be monitored are widely distributed throughout the office.

3. Equip the last module in each equipped bus with the 560 ohm, 10 watt Bus Termination Resistor across the X1/X2 terminals in the module.

   To connect additional modules to an existing installation, wire them first and then connect them into the daisy-chain from the last equipped module. Then move the Bus Termination Resistor assembly from the OLD last equipped module to the NEW last equipped module. The bus will be inactive (no monitoring) while the termination resistor is being relocated.

4. Wrap each bus wire twice through one of the supplied inductor beads. Place the bead as close to the controller as possible. Connect the bus wiring to the appropriate terminations (TB6, TB7. TB8) on the BLG1 board. Refer to Figure 3-10.

5. The BJM Peripheral Monitoring board is located in the slot marked “RPM BJM” on the Intelligent side of the Galaxy card cage. Refer to “Circuit Pack Addition/Removal/Replacement” for information on adding the BJM pack into its assigned slot.

6. Once they have been energized, the modules will begin their initialization sequence. This will take some time, depending on the number of modules equipped in the system. During initialization, Galaxy automatically senses and adds module and channel objects to the system. A rapid flashing green LED on the front of a module indicates that it is still being initialized. This LED will become a steady green, with an occasional short inactive period after initialization is complete.

7. Following initialization, configure the monitored channels within Galaxy, using either EasyView or T1.317 commands. EasyView command paths are shown here. Refer to Section 6 and Appendices A and B for information on T1.317 commands.

Configure → Monitoring → Shunt Channels / Temperature Channels / Voltage Channels / Binary Channels / Control Relay

Use this path to the appropriate channel type. For Shunt Channels, the Channel Description, Shunt Current (full scale) and Shunt Voltage (mV) fields must be configured. For Voltage Channels, the Channel Description and optionally Scale Factor and Offset fields need configuration. Temperature Channels and Binary Channels need only the Channel Description field completed. Control Relay Channels also need the Program Line field completed to control their state.

Note the Channel Identification Number while completing these configurations if it is desired to operate a User Defined event based on upper and/or lower limits on the values of these channels or if they will be included in any Derived channel program lines. An example of setting upper and lower thresholds for a Shunt Channel using a User Defined Channel follows:

Configure → Alarms → User Defined is the path. First choose the “Add User Event” button, then “Modify”. Fill in the Description, Severity, LED, Relay, Latched Alarm and Call Out fields as necessary. The following program line will activate this alarm when Shunt Channel C204 (perhaps a BDFB load) is not within its acceptable “window” of 5 to 150 amps:

C204 VAL < 5 | C204 VAL > 150   Note: | is the “pipe” symbol and designates “or” in this program line.

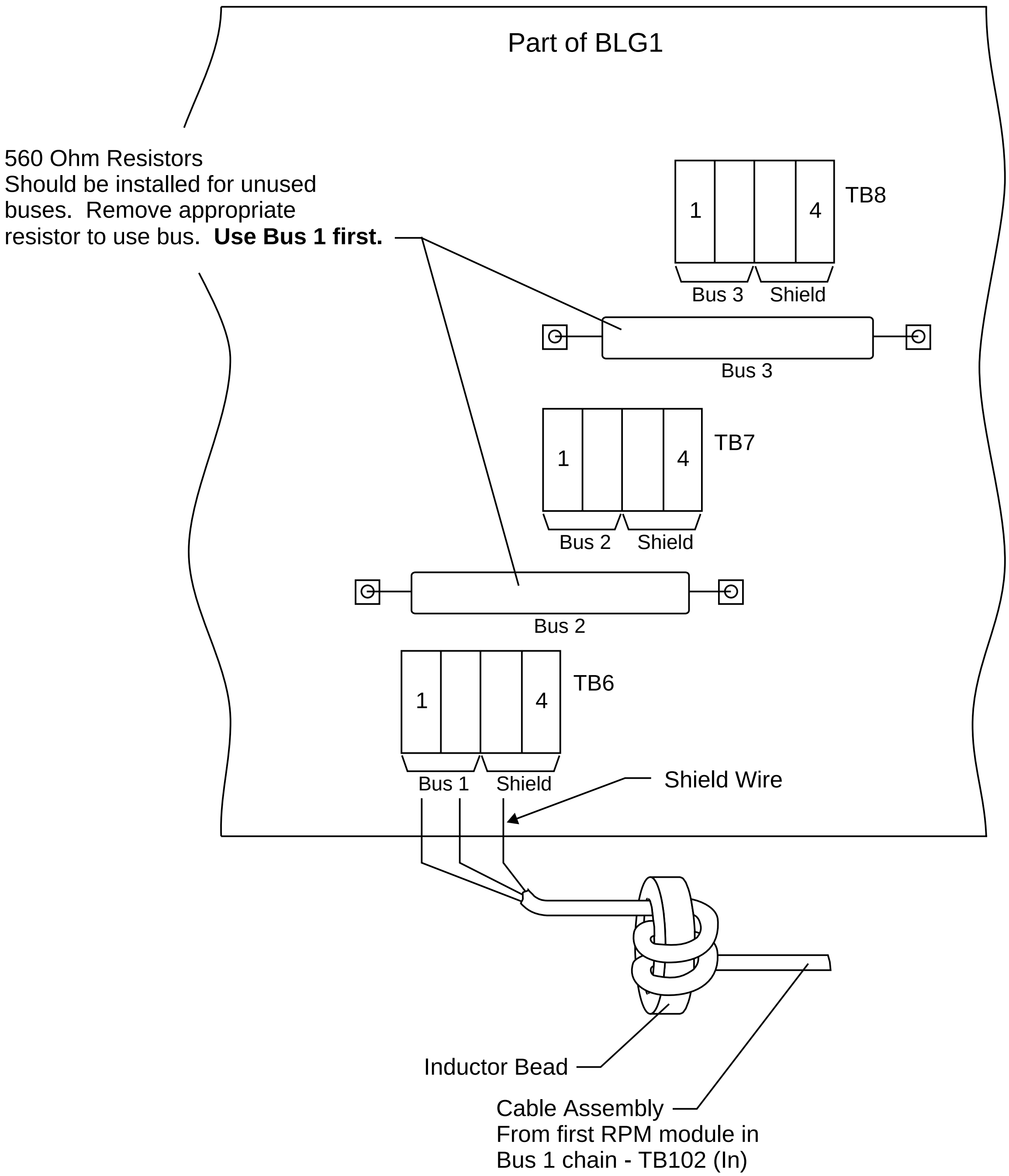


Figure 3-10: Connecting Remote Peripheral Interface Bus Wiring to BLG1

Battery Reserve Time Prediction Option (J85501F1 L-K1)

This optional feature requires no additional circuit packs, but does require that a temperature probe be added to provide Galaxy with the temperature of one of the plant battery strings. Once this probe is in place and wired, the feature is enabled through software.

Included with the Battery Reserve Time Prediction option are the following:

- Thermistor Assembly for mounting on a TR (Temperature Reference) cell of the battery.
- Cable assembly and plug for mounting at Galaxy BJF board.

1. Connect the cable assembly and plug into the Temp Probe Connector Jack, P500 of the Galaxy BJF board, routing it from the rear to the front of the Galaxy through the holes on the right side. See Figure 3-1.

2. Run and secure the assembly wiring from the Galaxy to the chosen Temperature Reference cell of a plant battery string. Terminate the thermistor assembly in a vacant hole of a battery post (KS20472 RoundCell) or wire tie the assembly close to a post or battery case for other styles of batteries. Protect against the possibility of shorting out a battery cell during this procedure.

Additional information on the Battery Reserve feature can be found in the heading “Universal Reserve Time Prediction” in Section 7.

Rectifier Sequence Option

Internal Rectifier Sequencing is a feature of the Intelligent Control board, but requires external wiring to ETR/ETRR (BLG1 TB3-12/13) and optionally RO/ROR (BLG1 TB3-14/15) in order to function. This wiring is explained below and shown in Figures 3-3 and 3-11.

ETR/ETRR: A closure on this pair causes the controller to Terminate (TR) all rectifiers. When this circuit again opens, the sequencing on of the plant rectifiers begins in the manner configured in software. This ETR/ETRR signal may be obtained off auxiliary contacts of the AC Power Transfer device or may optionally come off of contacts of an AC relay sensing the rectifier AC input bus.

RO/ROR: A closure on this pair informs Galaxy that the reserve AC generator is suppling the load and permits Galaxy to hold rectifiers which have been so configured off line while this condition exists. This feature is primarily designed for use at locations where the reserve AC power source is not sufficiently sized to support all the plant rectifiers.

Even without the intelligent control board, the basic controller can also accept ground signals onto TR1 to TR4 (BLG1 TB3-8 to 3-11) from an external device to control the sequencing of plant rectifiers in groups as follows:

TR1 G01, G02, G09, G10, G17, G18, G25, G26, G33, G34, G41, G42, G49, G50, G57, G58
TR2 G03, G04, G11, G12, G19, G20, G27, G28, G35, G36, G43, G44, G51, G52, G59, G60
TR3 G05, G06, G13, G14, G21, G22, G29, G30, G37, G38, G45, G46, G53, G54, G61, G62
TR4 G07, G08, G15, G16, G23, G24, G31, G32, G37, G40, G47, G48, G55, G56, G63, G64

Additional information on the Rectifier Sequence Options can be found in “External Rectifier Sequencer” and “Internal Rectifier Sequencer” in Section 7.

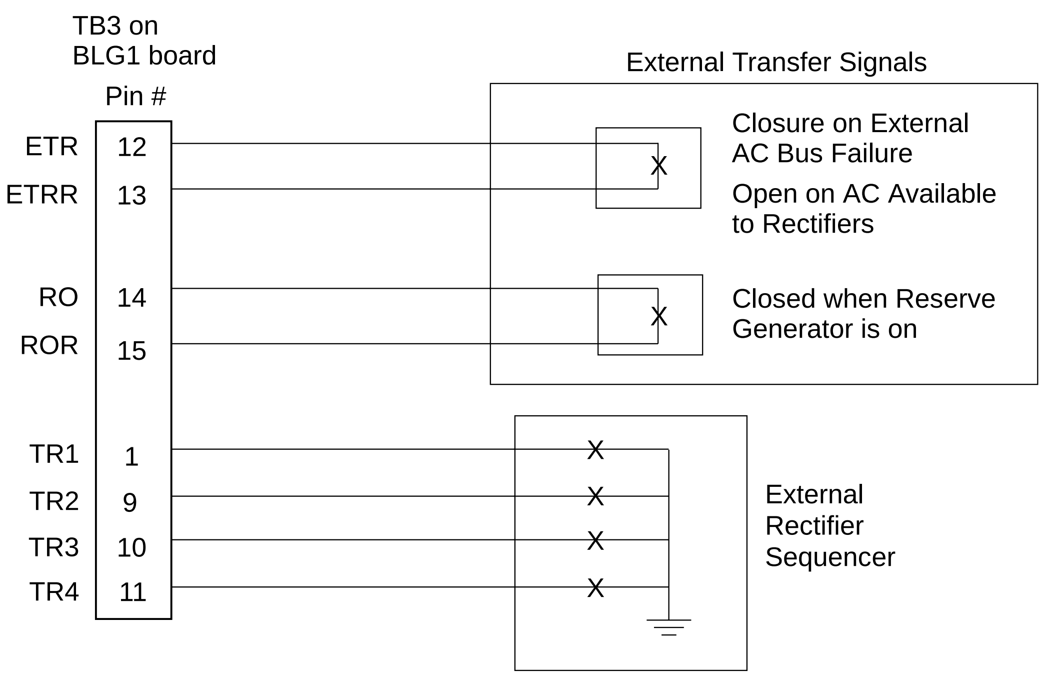


Figure 3-11: Wiring for Rectifier Sequencing

Powering Up the Galaxy SCF Controller

To power up the Galaxy, turn on the rectifiers of the Galaxy Power System and/or connect the batteries. After a brief delay (up to 1 minute), all green LEDs on all circuit packs should be active. Close the front cover and observe the default display on the controller. A number of alarms and/or warnings may be active at this point, along with the plant voltage and load display. The plant load will remain at 0A until the plant shunt is configured and distribution circuits are closed.

You may now complete Galaxy's initial configuration in accordance with Section 4.

4 Configuration

Introduction

At initial plant power-up, the Galaxy SCF Controller is factory-set for almost all required alarm and control functions, as depicted in Tables 4-A, 4-B, and 4-C. In addition to these parameters, the controller must be configured to set rectifier features, to set the plant voltage if different than the 52.08V (48V system) or 26.04V (24V system) default, to configure plant shunt information, to revise plant alarm thresholds (if different from the default settings in Table 4-A), and to configure information for optional features such as Boost Mode, Low Voltage Disconnect, Slope Thermal Compensation, and, if necessary, to make calibration adjustments to Front Panel Display voltage and load readings. Basic controller configuration provides the option of configuring the Battery Thermal Protection feature. Intelligent controller configuration will also include setting the Time and Date, Rectifier Control options, Battery Management options and Communication Port configuration, among others.

The defaults in Tables 4-B and 4-C may be user configured only through the **intelligent** controller.

Table 4-A: Voltage Threshold Ranges and Default Values

	Low	**High**	**Default**
Very Low Voltage (VLV)			
24V	20.00	25.00	23.00
48V	40.00	51.00	46.00
Battery on Discharge (BD)			
24V Float	23.00	28.00	25.00
24V Boost	23.00	28.00	25.00
48V Float	46.00	55.00	51.00
48V Boost	46.00	55.00	51.00
High Float Voltage (HFV)			
24V Float	24.75	29.75	26.50
24V Boost	25.75	31.75	26.50
48V Float	50.00	60.00	53.00
48V Boost	52.00	60.00	53.00
High Voltage Shutdown Alarm (HV)			
24V Float	24.75	29.75	26.8
24V Boost	25.75	31.75	26.8
48V Float	50.00	60.00	53.6
48V Boost	52.00	60.00	53.6
Rectifier On Threshold (ROT)			
24V	20.00	25.00	22.00
48V	40.00	50.00	44.00
Note: For explanation of typical settings, refer to Appendix F.			

Table 4-B: Plant Alarm Severity, LED, and Relay Defaults

Symbol	Default Designation	Default Severity	Default LED	Default Relay
AAC	ACO Active	RO	None	None
ABS	Alarm Battery Supply Fuse	Major	CTLR	CTLR
AMJ	Auxiliary Major	Major	None	None
AMN	Auxiliary Minor	Minor	None	None
ATA	Alarm Test Active	RO	None	None
ATB	Alarm Test Aborted	RO	None	None
ATF	Alarm Test Failed	Warning	None	None
BBL	Memory Backup Battery Low	Warning	None	None
BDA	Battery on Discharge	Major	BD	BD
BPF	Battery Power Fuse	Major	CTLR	CTLR
BTF	Battery Thermal Fuse	Major	CTLR	CTLR
BTJ	Battery Thermal Major	Major	BAT	None
BTN	Battery Thermal Minor	Minor	BAT	None
CCH	Configuration Changed	RO	None	None
CDFA	Converter Distribution Fuse	Major	RECT	MJF
CDID	Converter ID Conflict	Major	RECT	None
CFA	Converter Fail	Minor	RECT	None
CLC	Clock Changed	RO	None	None
CMFA	Multiple Converter Fail	Major	RECT	None
CNF1	Contactor 1 Failed	Major	BAT	None
CNF2	Contactor 2 Failed	Major	BAT	None
CN01	Contactor 1 Open	Major	BAT	None
CN02	Contactor 2 Open	Major	BAT	None
COF	Queue Overflow	Warning	None	None
COR	Number Did Not Respond	Warning	None	None
CPA	Circuit Pack Fail	Major	CTLR	CTLR
CRA	Controller Fail	Major	CTLR	CTLR
CRF	Controller Fuse	Major	CTLR	CTLR
DID	Rectifier ID Conflict	Major	RECT	None
EMD	Energy Management Disabled	Warning	None	None
EPD	Excess Plant Drain	Minor	RECT	None
EPR	External Password Reset	Warning	None	None
ERD	Excess Rectifier Drain	Minor	RECT	None

Table 4-B: Plant Alarm Severity, LED, and Relay Defaults

Symbol	Default Designation	Default Severity	Default LED	Default Relay
ETO	Engine Transfer Timeout	Minor	AC	None
EXL	Excessive Login Attempts	Warning	None	None
FAJ	External Fuse Major	Major	DIST	MJF
FAN	External Fuse Minor	Minor	DIST	MNF
HCL	History Cleared	RO	None	None
HFV	High Float Voltage	Minor	RECT	None
HVA	High Voltage	Major	RECT	HV
LMR	Limited Recharge	Minor	RECT	None
LVD	Low Voltage Disconnect	Minor	BAT	None
LVDA	Low Voltage Disconnect Fail	Minor	BAT	None
MDF	Module Failure	Minor	RM	None
MFA	Multiple Rectifier Fail	Major	RECT	RFA
MOR	Measurement Out Of Range	Minor	RM	None
MTC	Module Type Conflict	Warning	None	None
NNC	Number Not Configured	Warning	None	None
OSA	Open String	Minor	BAT	None
PCF	PC Power Fuse	Minor	CTLR	CTLR
PFD	Password At Default	Warning	None	None
PGI	Program Line Invalid	Major	None	None
PHT	Processor Halt	RO	None	None
POR	Number Did Not Respond	Warning	None	None
RBF	Regulation Battery Fuse	Minor	CTLR	CTLR
RIC	Rectifier Incomplete Config	Warning	None	None
RPF	Remote Peripheral Fuse	Major	CTLR	CTLR
RPI	Rectifier/Plant Inconsistency	Warning	None	None
RTL	Reserve Time Low	Minor	BATT	None
SNC	Shunt Not Configured	Warning	None	None
STF	Self Test Failed	Minor	CTLR	CTLR
URC	User Relay Conflict	Warning	None	None
VLA	Very Low Voltage	Critical	BATT	VLV
VSF	Sense/Control Fuse	Major	CTLR	CTLR
ZID	ID Not Configured	Major	RECT	None

Table 4-C: Rectifier Alarm Defaults

Symbol	Default Designation	Default Severity	Default LED	Default Relay
ACF	AC Fail	Minor	AC	ACF
ETS	External Transfer Shutdown	Minor	RECT	None
HPA	Half Power	Minor	RECT	None
LCA	Low Current Alarm	Minor	RECT	None
LSF	Load Share Fuse	Minor	RECT	None
MAN	Manual Off	Minor	RECT	None
PHA	Phase Or Low Output	Minor	AC	None
RFA	Rectifier Fail	Minor	RECT	RFA

Front Panel Access

The Galaxy SCF Controller's primary user interface is the front panel, which includes a backlit LCD display and an array of pushbutton controls.

You may make several changes in plant and rectifier configuration directly from the controller's front panel. In a basic controller (no intelligent features) only front panel interface is available. BJB (Basic Controller) SW202-8 must be closed (1) to enable configuration via the front panel.

Basic Controller Configuration

Use the PLANT menu to configure plant attributes. To reach the PLANT menu, press the <MENU> key to bring up the MAIN menu screen.

Main Menu

MAIN		
ALARM	WARN	
ACO: OFF	MODE:	FLOAT
CONFIG..	MAINT OPER..	
CONV DATA..	BIC DATA:	01

The ALARM field will be highlighted and blinking. Press the <DOWN> key several times until the cursor is on the CONFIG.. field (it will be highlighted and blinking). You will see the statement shown below:

CONFIGURATION

YOU ARE AUTHORIZED TO CHANGE
THE SYSTEM CONFIGURATION.

PRESS ENTER TO CONTINUE.
OR OTHER KEY TO ABORT.

Press <ENTER> to proceed to the CONFIG menu.

Configuration Menu

CONFIG		
PLANT..	THRESH..	
ALARM..	RECT..	01
LVD..	RECT MNGR..	
STC..	CONV MNGR.	
BAT TEST		

Use the <DOWN> key to move to PLANT.. and <ENTER> to view the PLANT menu.

Plant Menu

.

```
PLANT

EXT BOOST : DIS (H)       SHUNTmV      : 50
SHUNT I   : 0             SHUNT TYPE   : LOAD
AUTO RST  : EN            BTP          : DIS
BOOST     : DIS (H,S)     UNMAP BIC    : _
ADJ PLV   : -0.52.08V     RST PLV
ADJ PLI   : 0A            RST PLI
```

Use the arrow keys to move to the attribute to be configured.

SHUNT mV: The first item to configure is the Plant Voltage shunt. Make sure the cursor is on the SHUNT mV field and use the <+> or <-> key to step through the available values (25, 50, 60, 100, 150 mV). Select the one that best suits the application; press the <ENTER> key to save the change.

NOTE: Pressing the <ESCAPE> key will remove you from configuring the item.

SHUNT I: The second item to configure is the Plant Current shunt. Move the cursor to the SHUNT I field by using the <UP>/<DOWN>/<LEFT>/<RIGHT> ARROW keys. Use the <+> or <-> key to step through the available values (50, 100, 150, 200, 300, 400, 600, 800, 1000, 1200, 1300, 2000, 2400, 2600, 3000, 4000, 5000, 5200, 6000, 8000, 10000, 12000). Select the desired value; press <ENTER> to save the change.

SHUNT TYPE: This selection allows the operator to configure the type of shunt that is connected to the controller via the terminal block. Possible values are LOAD, BATTERY, or NONE. the configuration is determined by the plant architecture. If the plant is configured as centralized, either LOAD or BATTERY should be selected. A shunt type of LOAD means that a load shunt is connected. The load current displayed on the front panel is measured directly from the shunt. A shunt type of BATTERY means that a battery shunt is connected. The load current displayed on the front panel is derived from the battery current and the total rectifier output current. A shunt type of NONE is selected for distributed architectures where there is no shunt directly connected. Battery current may be measured via one or more shunts read by remote peripheral monitoring modules. The load current displayed on the front panel is derived from the battery current (if RPMs are used) and the total rectifier output current. Total rectifier output current is displayed if there are no battery shunts present. Use the <+> or <-> key to change the field values. Press <ENTER> to save the changes.

AUTO RST: This field enables or disables the Automatic Rectifier Restart field (AUTO RST). To enable or disable, be sure DIP switch 7 of SW202 on the BJB board is ON. Use the <+> or <-> key to change the value; press <ENTER> to save the change. **This field must be enabled for the AUTO RST field on the MAIN menu to work.**

BTP: The next field is the Battery Thermal Protection Enable/Disable switch. **This field must be enabled for the Battery Thermal Protection option to work.** Use the <+> or <-> key to change the field value. Press <ENTER> to save the change.

BOOST: The next field is the BOOST Enable/Disable switch. A hardware DIP switch (switch 3 of SW202 on the BJB board) and a software switch are associated with this field. **You must enable this field before you can switch the plant mode between the FLOAT and BOOST features.** To switch the plant mode, make sure the hardware DIP switch is ON, use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change. There are many types of boost modes, which are explained in detail in the feature descriptions in Section 7.

EXT BST: The next field is EXT BST (external timer boost). Like the BOOST field, this has a hardware switch (switch 2 of SW202 on the BJB board) and a software switch. EXT BST requires wiring from an external boost control unit to be terminated on BJT TB3-29 and 39. Configure the field as desired and press the <ENTER> key to save the change.

ADJ PLV: The next field, ADJ PLV, allows you to calibrate the plant voltage to the desired level. For example, if the controller shows that the plant voltage is 48.26V, and your meter reads 48.30V, you can use this field to adjust the controller plant voltage display to 48.30V to match your meter reading. You may change the voltage in steps of 0.01V. The maximum total change is 0.5V in either direction. The changed value entered will be used to compute other plant voltage readings, using a linear equation. Use the <+> or <-> key to change the field value; press <ENTER> to save it. The DEFAULT screen should show the new plant voltage value (assuming that in the mean time the input plant voltage has not changed).

RST PLV: The next field, RST PLV, allows you to neutralize the adjustment made to the plant voltage (using the ADJ PLV field). With the cursor on this field, pressing the <ENTER> key will zero out the calibration for the plant voltage. The plant voltage value displayed now is the true value as recognized by the controller.

ADJ PLI: The next field, ADJ PLI, allows you to calibrate the plant current to the desired level. For example, if the controller shows that the plant current is 297A, and your meter reads 300A, you can use this field to adjust the controller plant current display to 300A to match your meter reading. (Actually, what you read is the voltage across the shunt. Knowing the shunt size, you can compute the current.) The reading changes in steps of 1A, and the maximum total change is 10% of the shunt size in either direction. The delta value entered will be used to compute other reading plant current, using a linear equation with the delta value as an offset. Use the <+> or <-> key to change the field value; press <ENTER> to save it. The DEFAULT screen should show the new plant current value (assuming that the plant load has not changed). The plant should have a load of at least 10% of the total capacity when making this adjustment.

RST PLI: The next field, RST PLI, allows you to neutralize the adjustment made to the plant current (using the ADJ PLI field). When the cursor is on this field, pressing the <ENTER> key will zero out the delta for the plant current. The plant current value displayed now is the true value as computed by the controller from the shunt reading.

Alarm Thresholds Menu

From the **CONFIG** menu select **THRESH** to bring up the **THRESH** menu. :

THRESH

		FLOAT	BOOST	BACKUP
HV	:	53.60	53.60	53.60
HFV	:	53.00	53.00	
BD	:	51.00	51.00	
RO	:	44.00		
VLV	:	46.00		

This menu screen allows you to configure the alarm thresholds for the High Voltage alarm (HV), High Float Voltage alarm (HFV), Battery Discharge alarm (BD), Very Low Voltage alarm (VLV) and the Rectifier On Threshold for both FLOAT and BOOST mode. **The Backup High Voltage field is read-only, with its value defined by the setting of BJA DIP switches SW200 and SW201. However, this setting has no function in a plant utilizing serial rectifier interface and may be disregarded.** See Appendix F for additional information on configuration parameters for these fields.

HV (High Voltage) alarm threshold: There are two values for the High Voltage threshold alarm, one for the **FLOAT** mode, the other for the **BOOST** mode. When the plant voltage exceeds this threshold, the plant High Voltage Alarm (HVA) is turned ON, and the rectifier interface will send a signal to the rectifiers for shutting down according to an orderly and timely fashion. This will also light the Major (MJ) LED, activate the PMJ relay (assuming there is no alarm with CRITICAL severity level active). Move the cursor to the fields, and use the <+> or <-> key to adjust the High Voltage shut down alarm for both FLOAT and BOOST mode to the desired level. Press <ENTER> to save the change.

HFV (High Float Voltage) alarm threshold: There are two values for the High Float Voltage alarm threshold, one for the **FLOAT** mode, the other for the **BOOST/BTP** mode. When the plant voltage exceeds this threshold, the plant High Float Voltage Alarm (HFV) is turned ON. This will also light the Minor LED and activate the PMN contact closure (assuming there is no alarm with CRITICAL or MAJOR severity level active). The purpose of this alarm is to indicate that the plant voltage is high, probably due to an adjustment in the plant rather than due to a failure. This alarm allows the High Voltage (HV) shutdown threshold to be raised slightly, thus reducing the number of nuisance shutdowns without decreasing the plant reliability. Move the cursor to the fields, and use the <+> or <-> key to adjust the High Voltage shut down alarm for both FLOAT and BOOST mode to the desired level (normally smaller than the HV threshold). Press <ENTER> to save the changes.

BD (Battery Discharge) alarm threshold: There are two values for this alarm threshold, one for **FLOAT** and one for **BOOST/BTP** mode. If the plant voltage is smaller than the threshold value, the Battery Discharge alarm is turned ON. This in turn activates the PMJ and BD relay and lights the MAJ and

BD LEDs. Move the cursor to the fields, and use the <+> or <-> key to adjust the threshold to the desired level. Press <ENTER> to save the change.

RO (Rectifier On) alarm threshold: This is not an alarm threshold. This threshold value is for all the rectifiers in the plant. When the plant input voltage is lower than the threshold, the rectifiers will be turned ON in an orderly and timely fashion. Move the cursor to the field, and use the <+> or <-> key to adjust the threshold value. Press <ENTER> to save the change.

VLV (Very Low Voltage) alarm threshold: This alarm threshold is used to indicate that the voltage is very low, and that the battery discharge has occurred to a significant depth. When the plant voltage falls below this level, the Very Low Voltage (VLV) and Power Critical alarm will be generated. Move the cursor to the field, and use the <+> or <-> key to adjust the threshold value. Press <ENTER> to save the change.

Alarm Menu

From the **CONFIG** menu, select **ALARM** to bring up the **ALARM** menu. This menu allows you to enable or disable various alarm operations. The following shows the **ALARM** menu.

```
ALARM
CR = MJ    :  EN
TEST ALM   :  EN
TEST HV    :  DIS(S)
ACO CR     :  EN
ACO MJ     :  EN
ACO MN     :  EN
```

CR=MJ (Set Critical alarm equals Major alarm): A hardware DIP switch (switch 6 of SW202 on the BJB board) and a software switch are associated with this field. If this field is enabled, all the CRITICAL alarms in the system will behave as if they are at the MAJOR severity level. To enable this field, make sure the hardware DIP switch is ON, and use the <+> or <-> key to set the field value as ENABLE; press <ENTER> key to save the change. This option is useful for customer alarm systems which recognize only major and minor alarm levels and not the new third level, critical.

Test ALM (Test Alarm) enable/disable switch: A hardware DIP switch (switch 5 of SW202 on the BJB board) and a software switch are associated with this field. This field must be enabled to perform an alarm test. To enable this field, make sure the hardware DIP switch is ON, and use the <+> or <-> key to set the field value as ENABLE; press <ENTER> key to save the change.

TEST HV (Test High Voltage) enable/disable switch: A hardware DIP switch (switch 4 of SW202 on the BJB board) and a software switch are associated with this field. This field must be enabled to test the High Voltage shutdown of rectifiers during alarm test. To enable this field, make sure the hardware DIP switch is ON, and use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change. Enabling of this switch is not recommended with serial rectifiers.

ACO CR (Alarm Cut Off for Critical) alarm enable/disable switch: This field controls the Alarm Cut Off operation for the Critical severity level alarms. This field must be enabled for the ACO button field on the MAIN menu to have effect,. To enable this field, use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change.

ACO MJ (Alarm Cut Off for Major alarm) enable/disable switch: This field controls the Alarm Cut Off operation for the Major severity level alarms. This field must be enabled for the ACO button field on the MAIN menu to have effect. To enable this field, use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change.

ACO MN (Alarm Cut Off for Minor alarm) enable/disable switch: This field controls the Alarm Cut Off operation for the Minor severity level alarms. This field must be enabled for the ACO button field on the MAIN menu to have effect. To enable this field, use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change.

Rectifier Menu

From the **CONFIG** menu, select **RECT..** Select the number of an individual rectifier to bring up its menu:

```
RECT     01
MAN SWTCH: _
```

MAN SWITCH: The configuration of this field sets the value of the rectifier off alarm in commercial rectifiers. **It is not required with serial rectifiers and will not be monitored by the system software.**

Low Voltage Disconnect Menu

From the **CONFIGURATION** menu select **LVD** to bring up the **LOW VOLTAGE DISCONNECT** menu. This menu allows you to configure the various parameters for two optional low voltage disconnect contactors.

LOW VOLTAGE DISCONNECT
CONTACTOR 1..
CONTACTOR 2..
CONTACTOR 3..

Up to three optional LVD devices can be connected to a Galaxy and configured from this screen. For plants without any BIC card located on a GPS serial rectifier bay, LVD control is obtained via wiring off the UR1 (Contactor 1), UR2 (Contactor 2), or VLV/UR3 (Contactor 3) relays on TB2/3 of the BJT card. These relays cannot be configured as alarm relays if used for LVD contactor control. A “URC” User Relay Conflict alarm is activated if contactor programimg from this screen is attempted for a user relay that already has an alarm assigned to it or vice versa.

As soon as any BIC card is connected to a serial rectifier bus, the user relays are released from their use for LVD contactor control and this function is tranferred to the LVD control circuits of all BIC cards in the plant. Note that in a standard GPS configuration using BIC cards, Contactor 1 is wired to and controls all BATTERY contactors in the plant, while Contactors 2 and 3 are wired to and control only LOAD contactors.

Select the LVD contactor to be configured and press <ENTER>. The configuration screen for that contactor appears as follows:

```
CONTACTOR 1

STATE           :          CONNECT
TYPE:           :          NONE
CONNECT VOLT:              48.00
DISCON VOLT :              44.00
```

STATE: This field indicates the present state of the selected contactor. It is a read-ony field.

TYPE: This setting identifies the type of contactor, BAT, LOAD or NONE that has been installed in the plant. Be sure that the wiring for the contactor being configured matches the type chosen here. For standard GPS configurations using BIC cards, Contactor 1 is wired to and controls all BATTERY contactors in the plant. Contactors 2 and 3 are wired to and control only LOAD contactors. To toggle between the various contactor types, move the cursor to one of the fields and use the <+> or <-> key to select the desired type. Press <ENTER> to save the change.

CONNECT VOLT: This setting configures the plant voltage at which the contactor will reconnect to the bus. To prevent the contactor from re-operating when battery voltage increases due to load removal, a voltage several volts higher than the disconnect voltage is recommended. Use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

DISCON VOLT: This setting configures the plant voltage at which the contactor will disconnect from the bus. Use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

Rectifier Management Menu

From the **CONFIG** menu select **RECT MNGR** to bring up the **RECT MANAGEMENT** menu. This menu allows you to configure several rectifier parameters, which are discussed below.

```
RECT MANAGEMENT
                      FLOAT      BOOST
PLANT V      :        52.08      52.08
I LIMIT %    :        110.00     110.00
SHVSD        :        55.50      55.50
VOLT STEP    :        0.10
LD SHARE     :        EN
RMOVE RECT   :        _
```

PLANT V: This setting controls the plant voltage for float and boost modes. Move the cursor to one of the fields and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

I LIMIT %: This setting controls the current limit value of all serial rectifiers as a percentage of rectifier capacity. Use the <+> or <-> key to adjust the current limit value to the desired level. Press <ENTER> to save the change.

SHVSD: The configuration of this field sets the internal high voltage shutdown value of all serial rectifiers for both the Float and Boost plant modes - Note: this value is based on rectifier output voltage and not measured plant voltage. Move the cursor to one of the fields and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

VOLT STEP: The configuration of this field sets the increment of voltage change for the voltage settings above, in increments of 0.01, 0.1 or 1.0 volts. Use the <+> or <-> key to select the desired step change voltage increment level. Press <ENTER> to save the change.

LD SHARE: The configuration of this field enables or disables the rectifier load share feature. Use the <+> or <-> key to toggle between enable or disable. Press <ENTER> to save the change.

RMOVE RECT: May be used to remove a rectifier from the configuration. The rectifier number is selected using <+> and <-> keys; <ENTER> will remove the specified rectifier from the configuration. Removing a rectifier will cause all associated alarms generated by the rectifier to be filtered and ignored by the controller.

Converter Management Menu

From the **CONFIG** menu, select **CONV MNGR** to bring up the **CONVERTER MANAGEMENT** menu. This menu allows you to configure several converter parameters, which are discussed below.

```
CONVERTER MANAGEMENT

SET POINT       :   50.00
CONNEC VOLT     :   23.00
DISCON VOLT     :   25.00
LOW V DISCON    :   DIS
RMOVE CONV      :   __
ADJ PL VOLT     :   0.0        RST PL VOLT:
```

SET POINT: This setting controls the output voltage of the converter plant. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

CONNEC VOLT: This setting controls the voltage below which the converter will be placed into standby. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

DISCON VOLT: This setting controls the voltage above which the converter will be released from standby. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

LOW V DISCON: This setting controls whether the converter low voltage disconnect feature is enabled or disabled. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

RMOVE CONV: This field may be used to remove a converter from the configuration. The converter id number is selected using the <+> and <-> keys. <ENTER> will remove the specified converter from the configuration if it is no longer installed in the system. Removing a converter will cause all associated alarms generated by the missing converter to be retired by the controller.

ADJ PL VOLT: This field allows calibration of the converter output voltage. The displayed voltage should be adjusted using the <+> and <-> keys to reflect the reading displayed on a calibrated voltmeter measuring the converter output voltage.

RST PL VOLT: Pressing <ENTER> while this field is selected will cause the converter output voltage calibration to be reset to its nominal value.

Slope Thermal Compensation Menu

From the **CONFIG** menu select **STC** to bring up the **SLOPE THERMAL COMPENSATION** menu. This menu screen allows you to configure the various parameters for operation of the compensation of plant voltage due to battery temperature feature. Enabling STC allows plant voltage to respectively decrease or increase dependent upon increasing or decreasing battery temperature. The raising of voltage feature can be separately disabled. See Chapter 7 for additional information and requirements on the application of this feature.

SLOPE THERMAL COMPENSATION

STC	:	DIS	LOW TEMP	:	23
NOM TEMP	:	59	UP TEMP	:	86
STEP TEMP	:	113	RAISE V	:	DIS
DISC TEMP	:	167	TEMP UNIT	:	F

STC: The configuration of this field enables or disables Slope Thermal Compensation feature. Use the <+> or <-> key to toggle between enable or disable. Press <ENTER> to save the change.

LOW TEMP: The configuration of this field sets the temperature at which the plant voltage will have raised 0.1 volts x the number of cells. Valid range is 23° to 68° F or -5° to 20° C. Use the <+> or <-> key to adjust the temperature to the desired level. Press <ENTER> to save the change.

NOM TEMP: The configuration of this field sets the temperature at which the plant voltage is set to it's nominal value. Compensation begins at temperatures above or below this point. Valid range is 59° to 86° F or 15° to 30° C. Use the <+> or <-> key to adjust the temperature to the desired level. Press <ENTER> to save the change.

UP TEMP: The configuration of this field sets the temperature at which the plant voltage will have decreased 0.1 volts x the number of cells. Valid range is 86° to 122° F or 30° to 50° C. Use the <+> or <-> key to adjust the temperature to the desired level. Press <ENTER> to save the change.

STEP TEMP: The configuration of this field sets the temperature at which the plant voltage will be further decreased by a factor determined by multiplying the number of cells in the battery string by 0.17. For example in a 24 cell plant, battery voltage will be decreased by 4.08 volts (24 x 0.17 = 4.08).

RAISE V: The configuration of this field enables or disables the increase in plant voltage due to decrease in battery temperature. Use the <+> or <-> key to toggle between enable or disable. Press <ENTER> to save the change.

DIS TEMP: The configuration of this field will set the temperature at which the controller will disconnect a BAT type contactor. Use the <+> or <-> key to adjust the temperature to the desired level. Press <ENTER> to save the change.

TEMP UNIT: The configuration of this field sets the degree units to be utilized to either Fahrenheit - F or Celsius - C. Use the <+> or <-> key to toggle between F or C. Press <ENTER> to save the change.

Intelligent Controller Configuration

Plant attributes of the intelligent controller can also be configured from the front panel. Many of these fields appear identical to those for configuring the basic controller, but are repeated here.

Main Menu

Press the **MENU** key. This will bring up the **MAIN** menu.

```
MAIN

ALARM          CONFIG..
WARN           DIAG..
CLREVNT        MEAS/STAT..
ACO   :  OFF   MODE: FLOAT
REC RST        HIS/STATIS..
```

Configuration Menu

Use the <RIGHT> key to move to the **CONFIG..** field. (It should be blinking.)

Press <ENTER> to bring up the **CONFIGURATION** menu (The controller will determine if you are authorized to change system configuration. Press <ENTER> to continue):

```
CONFIGURE

     YOU ARE AUTHORIZED TO CHANGE
     THE SYSTEM CONFIGURATION

PRESS ENTER TO CONTINUE.
OR OTHER TO ABORT.
```

PPress <ENTER> to continue with the configuration.

```
CONFIGURATION

PLANT..             THRESH..
ALARM..             BOOST..
RECT MNGR..         PORT..
BATT MNGR..         LOW V DISC..
CONV MNGR
```

Make sure the cursor is at the PLANT CONFIGURATION.. field. Press <ENTER> to bring up the PLANT menu:

```
     PLANT CONFIGURATION

     DATE..                                TIME..
     UNMAP BIC :          __               SHUNT mV:     50
     SHUNT  I      :          0                SHNT TYPE:
LOAD
     ADJ  PLV      :          52.08V           RST PLV
     ADJ  PLI       :          0A                RST PLI
```

Note: Many of these fields appear identical for front panel basic controller programming. They will be repeated here.

DATE..: The sub menu to configure the date.

TIME..: The sub menu to configure the time.

UNMAP BIC: When the Galaxy SCF is used in systems with GPS serial rectifier cabinets, these cabinets contain another serial device called a BIC (Bay Interface Card). Each BIC has its own ID, just like the rectifiers on the serial bus, set by a DIP switch located on its termination board. If a BIC is removed or its ID is changed, Galaxy must be informed to cease attempting to communicate with it. Use the <+> or <-> keys in this field to bring up the BIC ID to be omitted from configuration and then press <ENTER>.

SHUNT mV: To configure the Plant Voltage shunt, make sure the cursor is on the SHUNT mV field. Use the <+> or <-> key to step through the available values (25, 50, 60, 100, 150 mV). Select the one that best suits the application and press the <ENTER> key to save the changes. Shunt millivolt value is embossed on the shunt.

Note that this field must only be configured when the Shunt Type for the plant is LOAD or BATTERY. IF SHUNT TYPE is set to NONE, this field has no function.

SHUNT I: To configure the Plant Current shunt, move the cursor to the SHUNT I field by using the <UP>/<DOWN>/<LEFT>/<RIGHT> ARROW key. Use the <+> or <-> key to step through the available values (50, 100, 150, 200, 300, 400, 600, 800, 1000, 1200, 1300, 2000, 2400, 2600, 3000, 4000, 5000, 5200, 6000, 8000, 10000, 12000). Shunt ampere value is embossed on the shunt. Select the desired value and press <ENTER> to save the change.

Note that this field must only be configured when the Shunt Type for the plant is LOAD or BATTERY. IF SHUNT TYPE is set to NONE, this field has no function.

SHUNT TYPE: This selection allows the operator to configure the type of shunt that is connected to the controller via the terminal block. Possible values are LOAD, BATTERY, or NONE. The configuration is determined by the plant architecture.

A shunt type of LOAD means that a load shunt is connected in a centralized architecture. All of the plant load must be directed through this single shunt and it is wired directly to the shunt terminations of TB1 on the BJF card of the Galaxy. A load type shunt may be located on either the "ground" side (preferred) or "hot" side of the plant output. The load current displayed on the front panel is measured directly form the mV signal across this shunt.

A shunt type of BATTERY means that a battery shunt is connected and wired directly to the shunt terminations of TB1 on the BJF card of the Galaxy. This shunt monitors only the charge or discharge current going into or being provided by the battery it is monitoring. A battery type shunt is only used in distributed architecture systems with a single battery shunt to monitor the currents of all the plant batteries. The load current displayed on the front panel is derived from the battery current and the total rectifier output current.

A shunt type of NONE is selected for distributed architectures where no shunt is directly connected to the shunt terminations of TB1 on the BJF card of the Galaxy. Battery charge and discharge current may be measured via one or more shunts read by either shunt channels of BIC cards (GPS systems) or remote peripheral monitoring modules. The load current displayed on the front panel is derived from the battery current and the total rectifier output current. Total rectifier output current only is displayed if there are no battery shunts present.

Use the <+> or <-> keys to change the field values. Press <ENTER> to save the changes.

ADJ PLV: The next field is the ADJ PLV which allows you to calibrate the plant voltage to the desired level. For example, if the Galaxy SCF shows a plant voltage reading of 48.26V, and your meter reads 48.30V, you can use this field to adjust the controller plant voltage display to 48.30V to match your meter reading. The voltage changes in steps of 0.01V, and the maximum total change is 0.5V in either direction. Press <ENTER> to save the changed value.

Plants with serial rectifiers will react slightly differently to this command. Because the controller is setting the voltage for the plant's serial rectifiers to the level defined by Rectifier Manager, the plant voltage reported by Galaxy after execution of the ADJ PLV command will NOT change to the adjusted value. Instead, the actual voltage of the plant will adjust by the difference between the value inputted and the level set in Rectifier Manager. To verify that the adjustment has been made, make the voltage reading at the plant jacks or batteries once again with a VOM and compare to Galaxy's displayed value.

RST PLV: The next field is the RST PLV which allows you to reset the display to factory calibration for plant voltage (using the ADJ PLV field). With the cursor on this field, pressing the <ENTER> key will zero out the calibration for the plant voltage. The plant voltage value displayed now is the true value as recognized by Galaxy SCF.

ADJ PLI: The next field is the ADJ PLI which allows you to calibrate the plant current to your desired level. For example, if the Galaxy SCF shows a plant current reading of 297A, and your meter reads 300A, knowing the shunt size you can compute the current); you can use this field to adjust the controller plant current display to 300A to match your meter reading. (Actually, what you read is the voltage across the shunt.) The change is made in steps of 1A, and the maximum total change is 10% of the shunt size in either directions. The delta value entered will be used to compute other reading plant current, using a linear equation with the delta value as an offset. Use the <+> or <-> key to change the field value; press <ENTER> to save it.The DEFAULT screen will show the new plant current value (assuming that in the mean time the plant load has not changed).

Please note that this command should only be used with plants utilizing a LOAD type shunt and centralized architecture. Be sure to verify the mV reading and size of the load type shunt when calculating the plant load that is to be displayed. To do this, first determine amps/mV by dividing the Shunt I value by the Shunt mV value. For a 2000A/50mV shunt this results in 40 amps/mV. Then multiply this value by the measured mV drop of the load type shunt.

RST PLI: The next field is the RST PLI which allows you to reset the display to factory calibration for plant current (using the ADJ PLI field). With the cursor is on this field, pressing the <ENTER> key will zero out the delta for the plant current. The plant current value displayed now is the true reading value as computed by Galaxy SCF from the shunt reading.

System Date Menu

DATE..: The sub menu to configure date.

The **DATE** menu is on the **PLANT** menu. From the **PLANT** menu move the cursor to the DATE.. field, press <ENTER> to bring up the **CONFIG DATE** menu:

```
CONFIG DATE

FORMAT  :   MM/DD/YY
MONTH   :   1
DAY     :   8
YEAR    :   1995
```

Date Format (FORMAT): This field allows you to select one of the following date formats: MM/DD/YY, DD/MM/YY, YY/MM/DD, MM/DD/YYYY, DD/MM/YYYY, YYYY/MM/DD. Use the <+> or <-> key to select the desired format and press <ENTER> to save the change.

Change the month (MONTH): Use this field to change the month; the possible value is from 1 to 12.

Change the day (DAY): Use this field to change the day of the month; the possible value is from 1 to 31.

Change the year (YEAR): Use this field to change the year; the possible value is from 1992 and up.

Please note that the system will validate the entries before the system date is modified.

System Time Menu

To set the time in EasyView follow the menu path: Configure → System → System Time.

TIME..: The sub menu to configure time.

The **TIME** menu is on the **PLANT** menu. From the **PLANT** menu move the cursor to the **TIME**.. field and press <ENTER> to bring up the **CONFIG TIME** menu:

```
CONFIG TIME

FORMAT    :   12HR
HOUR      :   1
MINUTE    :   28
```

Time Format (FORMAT): This field let the users configure the time format as 12HR or 24HR. Use the <+> or <-> key to select the right time format for the site and press <ENTER> to save the value.

Change the hour (HOUR): Use this field to change the hour; the possible value is from 0 to 24.

Change the minute (MINUTE): Use this field to change the minute; possible value is from 0 to 59.

SHUNT mV: The first item to configure is the plant shunt voltage. Make sure the cursor is on the SHUNT mV field. Use the <+> or <-> key to step through the available values (25, 50, 60, 100, 150 mV). Select the one that best suits the application and press the <ENTER> key to save the changes.

SHUNT I: The second item to configure is the plant shunt current. Move the cursor to the SHUNT I field by using the <UP>/<DOWN>/<LEFT></RIGHT> ARROW key. Use the <+> or <-> key to step through the available values (50, 100, 150, 200, 300, 400, 600, 800, 1000, 1200, 1300, 2000, 2400, 2600, 3000, 4000, 5000, 5200, 6000, 8000, 10000, 12000). Select the desired value and press <ENTER> to save the change.

SHUNT TYPE: This selection allows the operator to configure the type of shunt that is connected to the controller via the terminal block. Possible values are LOAD, BATTERY, or NONE. the configuration is determined by the plant architecture. If the plant is configured as centralized, either LOAD or BATTERY should be selected.

A shunt type of LOAD means that a load shunt is connected. The load current displayed on the front panel is measured directly form the shunt.

A shunt type of BATTERY means that a battery shunt is connected. The load current displayed on the front panel is derived from the battery current and the total rectifier output current.

A shunt type of NONE is selected for distributed architectures where there is no shunt directly connected. Battery current may be measured via one or more shunts read by remote peripheral monitoring modules. The load current displayed on the front panel is derived from the battery current (if RPMs are used) and the total rectifier output current. Total rectifier output current is displayed if there are no battery shunts present

Use the <+> or <-> keys to change the field values. Press <ENTER> to save the changes.

ADJ PLV: The next field is the ADJ PLV which allows you to calibrate the plant voltage to the desired level. For example, if the controller shows a plant voltage reading of 48.26V, and your meter reads 48.30V, you can use this field to adjust the controller plant voltage display to 48.30V to match your meter reading. The voltage changes in steps of 0.01V, and the maximum total change is 0.5V in either direction. Press <ENTER> to save the changed value.

RST PLV: The next field is the RST PLV which allows you to neutralize the adjustment made to the plant voltage (using the ADJ PLV field). With the cursor on this field, pressing the <ENTER> key will zero out the calibration for the plant voltage. The plant voltage value displayed now is the true value as recognized by the controller.

ADJ PLI: The next field is the ADJ PLI which allows you to calibrate the plant current to your desired level. For example, if the controller shows a plant current reading of 297A, and your meter reads 300A, knowing the shunt size you can compute the current); you can use this field to adjust the controller plant current display to 300A to match your meter reading. (Actually, what you read is the voltage across the shunt.) The change is made in steps of 1A, and the maximum total change is 10% of the shunt size in either directions. The delta value entered will be used to compute other reading plant current, using a linear equation with the delta value as an offset. Use the <+> or <-> key to change the field value; press <ENTER> to save it.The DEFAULT screen will show the new plant current value (assuming that in the mean time the plant load has not changed).

RST PLI: The next field is the RST PLI which allows you to neutralize the adjustment made to the plant current (using the ADJ PLI field). With the cursor is on this field, pressing the <ENTER> key will zero out the delta for the plant current. The plant current value displayed now is the true reading value as computed by the controller from the shunt reading.

Alarm Thresholds Menu

NOTE: Most of the alarm threshold configurations have been described previously under the basic controller. They are repeated here for convenience.

From the **CONFIGURATION** menu select **THRESH** to bring up the **ALARM THRESHOLD** menu. This menu screen lets you configure the alarm threshold for the High Voltage alarm (HV), High Float Voltage alarm (HFV), Battery Discharged alarm (BD), and Very Low Voltage alarm (VLV) for both FLOAT and BOOST mode. The Backup High Voltage field is read-only, with its value defined by the setting of BJA DIP switches SW200 and SW201. However, this setting has no function in a plant utilizing serial rectifier interface and may be disregarded. The **ALARM THRESHOLD** menu should look like this:

ALARM THRESHOLD CONF

	FLOAT	BOOST	BACKUP
HV :	53.60	53.60	54.00
HFV :	53.00	53.00	
BD :	51.00	51.00	
VLV :	46.00		

HV (High Voltage) alarm threshold: There are two values for this alarm, one for the FLOAT mode, the other for the BOOST/BTP mode. When the plant voltage exceeds this threshold, the plant High Voltage Alarm (HVA) is turned ON, and the rectifier interface will send a signal to the rectifiers to shut down in an orderly and timely fashion. This will also light the Major (MJ) LED, and activate the PMJ relay (assuming there is no alarm with CRITICAL severity level active). Move the cursor to the fields and use the <+> or <-> key to adjust the High Voltage shut down alarm for both FLOAT and BOOST mode to the desired level. Press <ENTER> to save the change.

HFV (High Float Voltage) alarm threshold: There are two values for this alarm, one for the FLOAT mode, the other for the BOOST/BTP mode. When the plant voltage exceeds this threshold, the plant High Float Voltage Alarm (HFV) is turned ON, and this will also light the Minor LED, activate the PMN contact closure (assuming there is no alarm with CRITICAL or MAJOR severity level active). The purpose of this alarm is to indicate that the plant voltage is high probably due to an adjustment in the plant rather than due to a failure. This alarm allows the High Voltage (HV) shutdown threshold to be raised slightly, thus reducing the number of nuisance shutdowns without decreasing the plant reliability. Move the cursor to the fields and use the <+> or <-> key to adjust the High Voltage shut down alarm for both FLOAT and BOOST mode to the desired level (normally smaller than the HV threshold). Press <ENTER> to save the change.

BD (Battery Discharge) alarm threshold: Again, there are two values for this alarm threshold, one for FLOAT and one for BOOST/BTP mode. If the plant voltage is smaller than the threshold value, the Battery Discharge alarm is turned ON, this in turn activates the PMJ and BD relay, light the MAJ and BD

LEDs. Move the cursor to the fields, and use the <+> or <-> key to adjust the threshold to the desired level. Press <ENTER> to save the change.

NOTE **Setting the boost BD threshold higher than the float voltage will cause a BD alarm when changing from boost to float mode due to the fact that the boost threshold is used for the first three minutes after the mode change.**

VLV (Very Low Voltage) alarm threshold: This alarm threshold is used in the FLOAT mode only. It is used to indicate that the voltage is very low, and that the battery discharge has occurred to a significant depth. When the plant voltage falls below this level, the Very Low Voltage (VLV) and Power Critical alarm will be generated. Move the cursor to the field and use the <+> or <-> key to adjust the threshold value. Press <ENTER> to save the change.

Alarm Menu

From the **CONFIGURATION** menu select **ALARM** to bring up the **ALARM** menu. This menu will allow you to enable or disable various alarm operations (The majority of these configurations are the same as for the basic controller. They have been repeated here for the convenience of the user):

```
ALARM

TEST ALM  :  EN
TEST HV   :  DIS (S)
RMT TEST  :  DIS (S)
ACO CR    :  EN
ACO MJ    :  EN
ACO MN    :  EN         CR = MJ:  EN
```

Test ALM (Test Alarm) enable/disable switch: A hardware DIP switch (switch 5 of SW202 on the BJB1 board) and a software switch are associated with this field. You must enable this field to perform an alarm test. Make sure the hardware DIP switch is ON and use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change.

TEST HV (Test High Voltage) enable/disable switch: A hardware DIP switch (switch 4 of SW202 on the BJB1 board) and a software switch are associated with this field. This field must be enabled in order to test the High Voltage shutdown of rectifiers during alarm test. To enable this field, make sure the hardware DIP switch is ON and use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change. Enabling of this switch is not recommended with serial rectifiers.

REM TEST (Remote Alarm Test) enable/disable switch: This field lets you enable or disable the remote test feature. The switch must be enabled for the feature to work. This field has a hardware DIP switch (SW204-2) and a software switch. To enable the field, turn on the DIP switch and use the <+> or <-> key to set the value; press <ENTER> to save the change.

ACO CR (Alarm Cut Off for Critical alarm) enable/disable switch: This field controls the Alarm Cut Off operation for the Critical severity level alarms. This field must be enabled for the ACO button field on the MAIN menu to have effect. To enable this field, use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change.

ACO MJ (Alarm Cut Off for Major alarm) enable/disable switch: This field controls the Alarm Cut Off operation for the Major severity level alarms. This field must be enabled for the ACO button field on the MAIN menu to have effect. To enable this field, use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change.

ACO MN (Alarm Cut Off for Minor alarm) enable/disable switch: This field controls the Alarm Cut Off operation for the Minor severity level alarms. This field must be enabled for the ACO button field on the MAIN menu to have effect. To enable this field, use the <+> or <-> key to set the field value as ENABLE; press <ENTER> key to save the change.

CR=MJ (Set Critical alarm equal Major alarm): A hardware DIP switch (switch 6 of SW202 on the BJB board) and a software switch are associated with this field. If this field is enabled, all the CRITICAL alarms in the system will behave as if they are at the MAJOR severity level. If you want to enable this field, make sure the hardware DIP switch is ON, and use the <+> or <-> key to set the field value as ENABLE; press <ENTER> to save the change. This option is useful for customer alarm systems which recognize only MAJOR and MINOR alarm levels and not the new third level, CRITICAL.

Converter Management Menu

From the **CONFIG** menu, select **CONV MNGR** to bring up the **CONVERTER MANAGEMENT** menu. This menu allows you to configure several converter parameters, which are discussed below.

```
SET POINT       :  50.00
CONNECT VOLT    :  25.00
DISCON VOLT     :  23.00
REMOVE CONV     :  __
ADJ PL VOLT     :  50.00 RST PL VOLT:
```

SET POINT: This setting controls the output voltage of the converter plant. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

CONNECT VOLT: This setting controls the voltage below which the converter will be placed into standby. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

DISCON VOLT: This setting controls the voltage above which the converter will be released from standby. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

LOW V DISCON: This setting controls whether the converter low voltage disconnect feature is enabled or disabled. Move the cursor to this field and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

REMOVE CONV: This field may be used to remove a converter from the configuration. The converter id number is selected using the <+> and <-> keys. <ENTER> will remove the specified converter from the configuration if it is no longer installed in the system. Removing a converter will cause all associated alarms generated by the missing converter to be retired by the controller.

ADJ PL VOLT: This field allows calibration of the converter output voltage. The displayed voltage should be adjusted using the <+> and <-> keys to reflect the reading displayed on a calibrated voltmeter measuring the converter output voltage.

RST PL VOLT: Pressing <ENTER> while this field is selected will cause the converter output voltage calibration to be reset to its nominal value.

Boost Menu

From the **CONFIG** menu, move the cursor to the **BOOST** field and press <ENTER> to bring up the **BOOST** menu:

```
BOOST

BOOST  :  EN
EXT    :  EN
BTP    :  DIS
AUTO   :  OFF
```

BOOST (Configure Boost) enable/disable switch: This field must be enabled before the plant can be switched from the FLOAT mode to BOOST mode; the MODE field in the MAIN menu does the actual switching. This field has a hardware DIP switch (SW202-3 on BJB board) and a software switch. To enable the field, use the <+> or <-> key to change the field value and press <ENTER> to save it.

EXT (Configure the External Boost) enable/disable switch: This field controls the external boost, which can be initiated via wiring to BJT TB3 23-39. This field has a hardware DIP switch (SW202-3 on BJB board) and a software switch. To enable the field, use the <+> or <-> key to change the field value and press <ENTER> to save the change.

BTP (Configure the Battery Thermal Protection Boost): This field controls the Battery Thermal Protection boost feature which can be initiated via wiring to BJT TB3 25-29 & 41-45. Use the <+> or <-> key to change the field value and press <ENTER> to save the change.

AUTO (Configure the Auto boost): This field must be enabled for the timed auto boost feature to work. Use the <+> or <-> key to change the field value and press <ENTER> to save the change.

Rectifier Definition Menu

Serial rectifiers are automatically recognized and configured in the system. Use this CONFIG menu to review the configuration. First move the cursor to the RECT DEF item and press <+>or <-> key to choose rectifier number:

```
RECT 01

TYPE      :  570A
SHNT mV   :  50.00
MAN SW    :  NONE
```

Communication Port (PORT) Menu

From the CONFIG menu, move the cursor to the PORT field; press <ENTER> to bring up the PORT menu. This menu controls the application setting for the serial communication ports in the controller. The following shows the menu:

```
PORT

LCL SET  :  TERM(SW)
CONFIG   :  EN
MODEM    :  RD_WR
AUX1     :  RD_WR
LOC RW   :  RD_WR
```

LOC SET (Configure the application for Local Port): The local port can be set to indicate it is connected to either a terminal (TERM) or another device (LOG_EVENT or such a device as a printer). This field has a hardware switch (switch 2 of DIP switch SW203 on the BJH board) and a software switch associated with it. To set the field value to LOG_EVENT, the hardware switch must be set to ON (1 position) and software switch must be enabled; all other positions of the switches will result in a TERM mode. The four possible values are: TERM(HW), TERM(HW,SW), TERM(SW), LOG_EVENT. Toggle the switch to change the hardware switch value or use the <+>, <-> keys to change the software switch value.

CONFIG (Enable/Disable ports communication parameters configuration): This menu item allows you to enable or disable changes to the communication parameters of the local, remote, and modem port. This field has a hardware switch (DIP switch 3 of SW203 on the BJH board) and a software switch associated with it. To set the field value to ENABLE, the hardware switch must be set to ON (1 position) and the software switch must be enabled; all other positions of the switches will set the value to DISABLE.

MODEM (Set the Read/Write permission for modem port): This field allows you to set the Read/Write permission for the modem port. The four possible values are: RD(HW), RD(HW,SW), RD(SW), RD_WR. The first three values are read-only permission, which means users can login through the modem and retrieve information. The fourth value (RD_WR) allow users who login through the modem to change the system configuration (Super-user or Administrator privileges). Again, this field has a hardware switch (switch 4 of DIP switch SW203 on the BJH board) and a software switch associated with it. To set the field value to RD_WR, the hardware switch must be set to ON (1 position) and software switch must be enabled; all other positions of the switches will disable the write privilege.

AUX (Set the Read/Write permission for Remote port): This field lets you set the Read/Write permission for the remote (auxiliary) port. It works the same way as the modem port; the hardware switch is switch 5 of SW203 on the BJH board.

LOC RW (Set the Read/Write permission for Local port): This field lets you set the Read/Write permission for the local port. It works the same way as the modem port; the hardware switch is switch 6 of SW203 on the BJH board.

Rectifier Control Parameters Menu

From the **CONFIG** menu, move the cursor to the **RECT CTR** field; press <ENTER> to bring up the **RECTIFIER CONTROL** menu. This menu lets you configure all the rectifiers connected to the controller. The following shows the menu:

```
RECTIFIER CONTROL

AUTO RST      :   EN
REMOTE ON     :   EN
REMOTE OFF    :   EN
SEQUENCE      :   EN
ON THRESH     :   44.00
EFFICIENCY    :   EN
```

AUTO RST (Enable/Disable Automatic Rectifier Restart): This field allows automatic restart of rectifiers after an RFA condition. This field has a hardware switch (switch 7 of SW202 on the BJB board) and a software switch associated with it. To set the field value to EN(able), the hardware switch must be set to ON (1 position) and software switch must be enabled; all other positions of the switches will result in a DIS(able) mode. The four possible values are: DIS(H), DIS(H,S), DIS(S), EN. Toggle the switch to change the hardware switch value, use the <+>, <-> key to change the software switch value.

REMOTE ON (Enable/Disable Remote Rectifier Turn ON): This field allows you to enable or disable the ability to turn on the rectifiers remotely. For example, if this field is enabled, you can login through the remote port and issue a command to turn on all the rectifiers. This field has a hardware switch (switch 7 of SW203 on the BJH board) and a software switch associated with it. To set the field value to EN(able), the hardware switch must be set to ON (1 position) and software switch must be enabled; all other positions of the switches will result in a DIS(able) mode. The four possible values are: DIS(H), DIS(H,S), DIS(S), EN. Toggle the switch to change the hardware switch value; use the <+>, <-> key to change the software switch value.

REMOTE OFF (Enable/Disable Remote Rectifier Turn OFF): This field allow the users to enable or disable the ability to turn OFF the rectifiers remotely, for example if this field is enabled, the users who login through the remote port can issue a command to turn OFF all the rectifiers. This field has a hardware switch (switch 8 of SW203 on the BJH board) and a software switch associated with it. To set the field value to EN(able), the hardware switch must be set to ON (1 position) and software switch must be enabled; all other positions of the switches will result in a DIS(able) mode. The four possible values are: DIS(HW), DIS(HW,SW), DIS(SW), EN. Toggle the switch change the hardware switch value; use the <+>, <-> key to change the software switch value.

SEQUENCE (Configure the Rectifier Sequencing): This field allows you to Enable or Disable the Rectifier turn-on sequencing procedure. Use the <+>, <-> key to set the value and press <ENTER> to save the change. Rectifier Sequencing requires that ETR & ETRR (BJT TB3 12-13) external wiring be brought to the GALAXY, and optionally RO & ROR (BJT TB3 14-15).

ON THRESH (Set the Rectifier turn ON threshold): This field allows you to set the rectifiers' turn-on threshold value. This value is applied to all the rectifiers in the system. If the voltage is below this threshold, the rectifiers will be turned ON automatically. Use the <+>, <-> key to change the value, the step is 0.10 Volt, press <ENTER> to save the value.

EFFICIENCY (Configure the Energy Management Algorithm): This field lets you Enable or Disable the energy management algorithm in the controller. If the field is set to Disable, the energy management algorithm will not be utilized. This field has a hardware switch (SW204-1 on BJH board). Use the <+>, <-> key to change the value; press <ENTER> to save the value. **Note: The energy management algorithm should not be used in batteryless plants since all spare/emergency rectifiers will be turned off by the algorithm. Refer to Section 7, "Energy Management Feature Overview," for more information about the energy management algorithm.**

Low Voltage Disconnect Menu

From the **CONFIGURATION** menu select **LVD** to bring up the **LOW VOLTAGE DISCONNECT** menu. This menu allows you to configure the various parameters for two optional low voltage disconnect contactors.

```
LOW VOLTAGE DISCONNECT

                  CONTACT  1:      CONTACT  2:
STATE          :  NONE             NONE
TYPE           :  NONE             NONE
CONNECT VOLT:     48.00            48.00
DISC VOLT      :  42.00            42.00
```

STATE: This field indicates the present state of contactors 1 & 2. If both contactors have been configured as type BAT, and both are in the CONNECT state, either of the contactors can be disconnected by toggling the state of the field. Only one contactor can be configured to be disconnected at a time, ensuring a battery string is always connected to the plant. To toggle the contactor state, move the cursor to one of the fields and use the <+> or <-> key to select the desired contactor state. Press <ENTER> to save the change.

TYPE: This setting identifies the type of contactor, BAT, LOAD or NONE that has been installed in the plant. To toggle between the various contactor types, move the cursor to one of the fields and use the <+> or <-> key to select the desired type. Press <ENTER> to save the change.

CONNECT VOLT: This setting configures the plant voltage at which the contactor will reconnect to the bus. To prevent the contactor from re-operating when battery voltage increases due to load removal, a voltage several volts higher than the disconnect voltage is recommended. Use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

DISC VOLT: This setting configures the plant voltage at which the contactor will disconnect from the bus. Use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

Rectifier Manager Menu

From the CONFIGURATION menu select RECT MNGR to bring up the RECTIFIER MANAGER menu. This menu allows you to configure several rectifier parameters discussed below.

```
RECTIFIER MANAGEMENT
                      FLOAT     BOOST
PLANT V        :      24.00     24.00
I LIMIT %      :      110.00    110.00
SHVSD          :      30.00     30.00
VOLT STEP      :      0.10
LD SHARE       :      EN
RMOVE RECT     :      __
```

PLANT V: This setting controls the plant voltage for float and boost modes. Move the cursor to one of the fields and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

I LIMIT: This setting controls the current limit value of all serial rectifiers as a percentage of rectifier capacity. Use the <+> or <-> key to adjust the current limit value to the desired level. Press <ENTER> to save the change.

SHVSD: The configuration of this field sets the internal high voltage shutdown value of all serial rectifiers for both the Float and Boost plant modes - Note: this value is based on rectifier output voltage and not measured plant voltage. Move the cursor to one of the fields and use the <+> or <-> key to adjust the voltage to the desired level. Press <ENTER> to save the change.

VOLT STEP: The configuration of this field sets the increment of voltage change for the voltage settings above, in increments of 0.01, 0.1 or 1.0 volts. Use the <+> or <-> key to select the desired step change voltage increment level. Press <ENTER> to save the change.

LD SHARE: The configuration of this field enables or disables the rectifier load share feature. Use the <+> or <-> key to toggle between enable or disable. Press <ENTER> to save the change.

RMOVE RECT: May be used to remove a rectifier from the configuration. Rectifier number is selected using <+> and <-> keys, enter will remove the specified rectifier from the configuration. This will only work if the rectifier is first physically removed from the system.

Battery Manager Menu

This menu selection is a sub menu for Slope Temp Comp, Battery Control, and Battery Discharge Test. To view it, move the cursor to the CONFIG menu selection, BAT MNGR and press <ENTER> to view the BATTERY MANAGER menu.:

```
BATTERY MANAGEMENT

STC..
BAT CONTROL..
BAT DISCH..
```

Slope Thermal Compensation Menu

From the **CONFIGURATION** menu select **STC** to bring up the **SLOPE THERMAL COMPENSATION** menu. This menu screen allows you to configure the various parameters for operation of the compensation of plant voltage due battery temperature feature. Enabling STC allows plant voltage to respectively decrease or increase dependent upon increasing or decreasing battery temperature. The raising of voltage feature can be separately disabled. See Chapter 7 for additional information and requirements on the application of this feature.

```
SLOPE THERMAL COMPENSATION

STC          :  DIS
LOW TEMP     :  -5
NOM TEMP     :  15
UPPER TEMP   :  30
STEP TEMP    :  45
RAISE VOLT   :  DIS
```

STC: The configuration of this field enables or disables Slope Thermal Compensation feature. Use the <+> or <-> key to toggle between enable or disable. Press <ENTER> to save the change.

LOW TEMP: The configuration of this field sets the temperature at which the plant voltage will have raised 0.1 volts x the number of cells. Valid range is 23° to 68° F or -5° to 20°

C. Use the <+> or <-> key to adjust the temperature to the desired level. Press <ENTER> to save the change.

NOM TEMP: The configuration of this field sets the temperature at which the plant voltage is set to it's nominal value. Compensation begins at temperatures above or below this point. Valid range is 59° to 86° F or 15° to 30° C. Use the <+> or <-> key to adjust the temperature to the desired level. Press <ENTER> to save the change.

UPPER TEMP: The configuration of this field sets the temperature at which the plant voltage will have decreased 0.1 volts x the number of cells. Use the <+> or <-> key to adjust the temperature to the desired level. Press <ENTER> to save the change.

RAISE VOLTS: The configuration of this field enables or disables the increase in plant voltage due to decrease in battery temperature. Use the <+> or <-> key to toggle between enable or disable. Press <ENTER> to save the change.

STEP COMPENSATION: The configuration of this field sets the temperature at which the plant voltage will be further decreased by a factor determined by multiplying the number of cells in the battery string by 0.17. For example in a 24 cell plant, battery voltage will be decreased by 4.08 volts (24 x 0.17 = 4.08).

Battery Management Menu

From the **CONFIGURATION** menu select **BATT MNGR** to bring up the **BATTERY MANAGEMENT** menu. This menu allows you to configure the various parameters for two optional low voltage disconnect contactors.

```
BATTERY MANAGEMENT

STEP            :  10
RCHG CURLIM     :  DIS
RCL THRESH      :  1000A
TEMP DISCON     :  75
TEMP UNITS      :  C
```

STEP: The configuration of this field sets the increment of current change for the RCL THRESH field, in increments of 1, 10, 50 and 100 amperes. Use the <+> or <-> keys to change the value. Press <ENTER> to save the change.

RCHG CURLIM: The configuration of this field enables the Recharge Current Limit feature. Use the <+> or <-> keys to toggle between enable or disable. Press <ENTER> to save the change.

RCL THRESH: The configuration of this field sets the total amount of current that will be allowed to recharge the batteries. Use the <+> or <-> keys to change the value. Press <ENTER> to save the change.

TEMP DISCON: The configuration of this field will set the temperature value at which the controller will disconnect a BAT type contactor. Use the <+> or <-> keys to change the value. Press <ENTER> to save the change.

TEMP UNITS: The configuration of this field sets the degree units to be utilized to either Fahrenheit - F or Celsius - C. Use the <+> or <-> key to toggle between F or C. Press <ENTER> to save the change.

Battery Discharge Test Menu

From the BATTERY MANAGEMENT menu select BAT DISCH to bring up the BATTERY DISCHARGE TEST menu. This menu allows you to configure the various parameters for the Battery Discharge Test and Reserve Time Predictor features of the controller. See Section 7 for additional information and requirements on the application of these features.

```
BATTERY DISCHARGE TEST

BAT TEST     : EN          ENHANCED     : EN
BAT TYPE     : EN          CELL STRNG   : 24
NUM STRNG: 2               END V/CELL   : 1.75
BAT CLASS    : FLOODED
```

BAT TEST: The configuration of this field enables or disables the Battery Test feature. Use the <+> and <-> keys to toggle between enable or disable. Press <ENTER> to save the change. Enabling the feature here allows the test to be initialized from the BAT DISCH TST field of the MAINT OPER screen, accessed from the MAIN menu screen.

BAT TYPE: The configuration of this field selects the installed battery type from a list of pre-defined battery types that is used in the Reserve Time Prediction and Enhanced Battery Test features. Use the <+> or <-> key to select the installed battery type. Press <ENTER> to save the change.

ENHANCED: The configuration of this field enables the intelligent controller reserve time prediction for battery discharges as well as during battery discharge tests. Use the <+> or <-> key to select Enabled or Disabled. Press <ENTER> to save the change.

NUM STRNG: The configuration of this field selects the number of battery strings installed in the system. This parameter is used in the Reserve Time Prediction and Enhanced Battery Test features. Use the <+> and <-> keys to toggle between the two types. Press <ENTER> to save the change.

BAT CLASS: The configuration of this field, used with the Battery Test feature, selects the battery type, flooded or sealed, that is used in the system. Use the <+> and <-> keys to toggle between enable and disable. Press <ENTER> to save the change.

CELL STRNG: The configuration of this field selects the number of installed cells in the battery string. This parameter is used in the Reserve Time Prediction and Enhanced Battery Test features. Use the <+> or <-> key to enter the number of installed cells. Press <ENTER> to save the change.

END V/CELL: The configuration of this field selects end voltages per battery cell that has been engineered to provide the anticipated reserve time. This parameter is used in the Reserve Time Prediction and Enhanced Battery Test features. Use the <+> or <-> key to enter the number of installed cells. Press <ENTER> to save the change.

Configuration from a Remote Terminal

If the controller is equipped with the intelligent controller, a remote terminal can be used to perform all of the plant configuration and data accessing requirements that were previously described for configuration using the front panel display. In fact, some of the more advanced intelligent features can only be done from a terminal.

All of the communication between the user and the controller over a remote terminal may be completed by directly accessing one of the controller's available ports and utilizing the T1.317 command language. Refer to Appendixes A and B for a complete review of T1.317 and this access mode and the last portion of Section 6 for specific T1.317 commands which can perform each of the controller's features.

The T1.317 command language is the "human to machine" interface used for this communication, but you may also operate the controller with a more user-friendly interface package, Lineage® 2000 EasyView Software, which combines both a communication package and an easy-to-use Microsoft® Windows interface. See "EasyView Software Communication Mode" for a description of this package.

Connecting a Terminal to the Controller

You may communicate with the controller using any ANSI (American National Standards Institute) character-based terminal, including terminal emulators for personal computers. Communication using the Lineage® 2000 EasyView Software (over the Local or Modem ports) requires a personal computer running Microsoft® Windows.

Local Port

Connect a terminal to the controller using a serial cable to the 25-pin RS-232 local port inside the front cover at the left side of the controller. Route this cable under the bottom of the front door to allow it to close with this cable connected. To use this port for configuration purposes, set DIP switch SW203 on the BJH intelligent controller as follows:

SW203-2	OPEN	Terminal Mode
SW203-3	CLOSED	Allows Configuration of Local/Aux/Modem Port
SW203-6	CLOSED	Full Access via Local Port

Auxiliary Port

The auxiliary port, located on terminal blocks TB4 and TB5 of the front access board, may also be used for RS-232 direct access from a “dumb” terminal by wiring the transmit and receive leads to TB1 as indicated in Figure 3-7. Only communication via the T1.317 language may be used over the Aux port when wired in this manner. In order to use this port for configuration purposes, DIP switch SW203 on the BJH intelligent controller must be set as follows:

SW203-1	CLOSED	RS-232 Aux Port Mode
SW203-3	CLOSED	Allows Configuration of Local/Aux/Modem Port
SW203-5	CLOSED	Full Access via Aux Port
SW204-3	CLOSED	Enhanced Remote Security. Prevents plant operation changes

If the J85501F1 Intelligent option has been provided, the Aux port is used for termination of the TL1 (Transaction Language) command interface feature to Galaxy, either via the RS232 or RS485 terminal block as depicted in Figure 3-7. Refer to Appendix D for a complete discussion of the TL1 interface.

Modem Port

The Modem port, accessed through J111 and J112 on the front access board, is the third means of communication with the controller from a remote terminal. The Modem option permits communications over the public network analog lines at a maximum of 14400 baud. Any of the common industry communication software packages will allow T1.317 communication over this port or the Lineage 2000 EasyView Communication software will allow a Windows graphical user communication interface with the controller.To use this port for configuration purposes, set DIP switch SW203 on the BJH intelligent controller as follows:

SW203-3	CLOSED	Allows Configuration of Local/Aux/Modem Port
SW203-4	CLOSED	Full Access via Modem Port
SW204-3	CLOSED	Enhanced Remote Security. Prevents plant operation changes

EasyView Software Communication Mode

Note: EasyView screens change with different versions of Galaxy and different versions of EasyView. The EasyView paths shown here are based on Version 7.3.0 of both Galaxy and EasyView.

Refer to EasyView Software User Manual, Select Code 193-104-105, for detailed instructions on setting up EasyView in a personal computer for access to the controller via the Local or Modem ports. EasyView is a Windows-compatible communications package designed specifically for use with the controller and is the recommended user interface for accessing, programming, and obtaining data from the controller. This software package is provided as part of the J85501F1 L-AA to L-AD intelligent controller specification.

Figure 4-1 shows the EasyView Main screen, which is accessed once the user has successfully made a connection with the controller. It includes a horizontal status bar at the bottom, which displays information regarding the present controller connection, including Plant Voltage and Load, the number of Alarms and Warnings, and the current time. The main section of the display contains a Site Description ID field, and fields containing detailed descriptions of active Alarms and Warnings. EasyView's main menu is located across the top of this screen.

EasyView Configuration

Refer to Figure 4-2 for the drop down box showing the Configure menu of EasyView. This menu contains all of the controller software configurations available through EasyView. The Configure menu choices described below are those most important for the initial configuration of the controller. Some selections, such as Data Switch or Monitoring, will only be used if these additional intelligent features have been equipped. All possible selections will not be covered in this manual, but help concerning any of the Configure selections may be obtained by selecting the Help choice of the Main Menu or by pressing <F1> at any time.

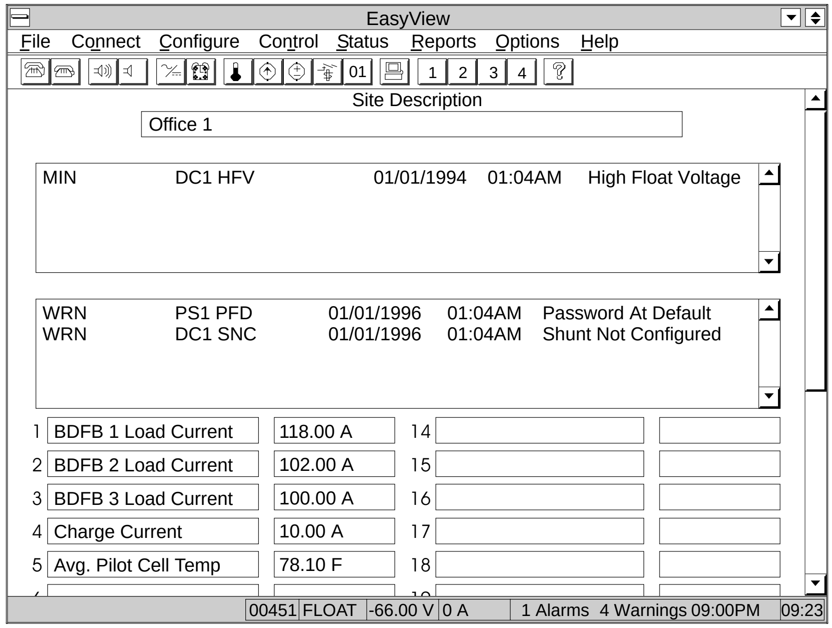


Figure 4-1: EasyView Main Screen

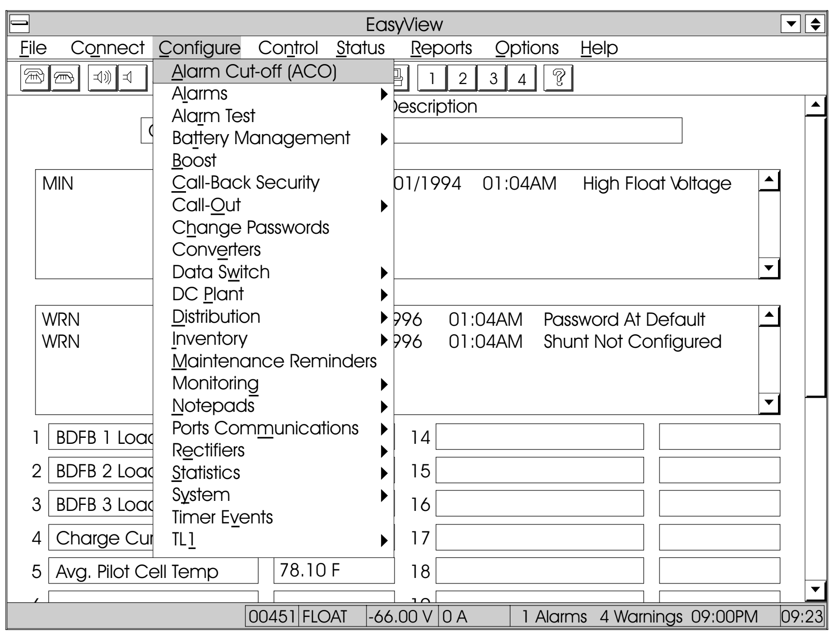


Figure 4-2: EasyView Configure Menu

Configure → Alarms → Standard

This selection allows you to modify the default or present Plant Alarm Severity level (Critical, Major, Minor, Record Only, Warning), front panel LED, and status indicating Relay which become active when the chosen Plant alarm is active. Included on this list are all Plant Alarms which are True/False type alarms (no thresholds).

One common application for this configuration path would be to change the “Passwords at Default” Plant indication from its default level of a “Warning” to a “Record Only Alarm” so that it is removed from the front panel and EasyView default screen active Alarm and Warning lists.

This path is also used to assign Dial-out on Alarm activity for each applicable alarm which may be used if the controller is equipped with the BJL Modem option. The Dial-out numbers themselves must be added under the Configure -> Call-Out path.

Configure → Alarms → Threshold

This path is similar to the Configure → Alarms → Standard path except that the alarms listed here all have upper and/or lower threshold limits which dictate when they are active. If the desired plant float voltage is other than the default 52.08V (48V) or 26.04 (24V) for which the default alarm threshold levels have been chosen, or if Boost or Battery Thermal Protection options are being utilized, these default threshold levels will require modification.

Configure → Change Passwords

The controller has three levels of software security for the normal user interface mode, plus a fourth password (default: LINEAGE) for the TL1 interface. The three normal user levels, their factory default passwords, and their privileges are:

- **User (default password: LINEAGE):**
  Read privileges for all settings and values in the system
  Turn rectifiers on but not off Enable alarm cutoff

- **Super-User (default password: SUPER-USER):**
  All privileges of a USER
  Change any setting in the system except passwords

- **Administrator (default password: ADMINISTRATOR):**
  All privileges of a SUPER-USER
  Change the passwords in the system

The controller is not case-sensitive. Passwords and commands may be entered in upper or lower case.

When initially setting up the site configuration in the path **Options** → **Set Up Sites**, the controller passwords and the login level are configured. Since you must be at the Administrator level in order to change passwords, the path **Reports** → **Who Is Logged In** can be used to determine your present security level at any time. If the controller passwords are changed, remember to also change them under the **Options** → **Set Up Sites** path for your next login attempt.

The **"Passwords at Default"** warning will not retire until all four default passwords have been changed or until it has been changed to a **"Record Only"** alarm as previously shown in the **Configure** → **Alarms** → **Standard** example. Many customers will want to leave the USER (read-only) password at LINEAGE to allow universal read access to the controller, but Tyco Electronics strongly suggests that both the SUPER-USER and the ADMINISTRATOR passwords be changed by the customer after initial configuration is complete.

Alarm Cut-off Feature

Configure → **Alarm Cut-Off (ACO)**
Controls which relays are allowed to be turned off by ACO, providing a time-out feature not configurable from the front panel. See Chapter 7 for additional information.

DES: Allows modification of the default designation.

Critical ACO: Enables or Disables the Critical relay ACO.

Critical ACO Time out: User defined time-out of 1 to 4 hours.

Major ACO: Enables or Disables the Major relay ACO.

Major ACO Time out: User defined time-out of 1 to 4 hours.

Minor ACO: Enables or Disables the Minor relay ACO.

Minor ACO Time out: User defined time-out of 1 to 72 hours.

Alarm Overview

All alarms in the system whether Standard, Threshold or User type can be configured to change their default parameters at the user's discretion. Each alarm can be individually configured to utilize the Call Out on Alarm feature of the controller, which is discussed in detail in Chapter 7. The following parameters are configurable

DES: Allows modification of the default designation.

Severity: Choice of: Critical, Major, Minor, Record Only or Warning. Critical, Major and Minor assert the corresponding alarm relay.

LED: Choice of: AC, BATT, BD, CTLR,DIST, RECT, RM LED's which illuminate when the alarm is asserted.

RELAY: Choice of ACF, BD, CTLR, HV, MJF, MNF, RFA, UR1, UR2 AND VLV which will operate when the alarm is asserted. UR1 and UR2 are not available when low voltage contactors are used in the system.

Call Out Notify On Occur: Enables or disables call-out upon the alarm assertion.

Call Out Notify On Retire: Enables or disables call-out upon the alarm retiring.

Nag On Occur: Enables or Disables the Nag feature which will consistently re-call the destination numbers if the alarm persists.

Notify Delay: Provides a delay time of 0 to 540 seconds before calling out. If the alarm retires prior to the delay period ending, no call is made.

Notify Destinations: User may select as many as four of the configured phone number destinations to report to.

Connected Equipment Alarms

Configure → Alarms → Connected Equipment Alarm
Configures the alarm parameters for up to four controllers or monitoring units that are optionally connected via an RS-232 link to the controller's Data Switch. The LED and Relay parameters are not configurable.

Standard Alarms

Configure → Alarms → Standard
Allows modification of the default configuration and call-out assignments for all alarms shown in Table 4-B and 4-C.

Threshold Alarms

Configure → Alarms → Threshold
Allows modification of the default configuration and call-out assignments for all voltage threshold alarms shown in Table 4-A. In addition several other alarms having different types of thresholds are shown below.

Excess Rectifier Drain: Default threshold is set at 1.18 times the rectifier capacity.

Engine Transfer Time out: Default threshold is 30 minutes for the ac transfer equipment to assert the ETR leads, holding the rectifiers off.

Limited Recharge: Default threshold is set at 80% of total rectifier capacity. Plant load exceeding this value, asserts the alarm.

Multiple Rectifier Fail: Default is set at 2 rectifiers failing simultaneously.

Rect / Plt Drain Inconsistency: Default is set at 1.05 times the total rectifier drain. If plant load exceeds this value the alarm is asserted.

Reserve Time Low: Default is set at 2 hours.

User Defined Alarms

Configure → Alarms → User Defined
There are no User Defined alarms pre configured in the system. The user must first add a “User Event” (U0001 to U1500), and then modify it. The alarms are most often associated with setting a threshold for a Remote Peripheral Monitor channel, but may be used with system alarm events as well. The additional parameters associated with these alarm type are shown below. All parameters shown in the “Configuring Alarms Overview” above, are also available.

Latched: Enables or Disables a feature where one asserted the alarm stays present in the system, even though the conditions that caused it have retired. Manual intervention is then required to clear the alarm.

Minimum Duration: Once the program line becomes true, sets a minimum period in minutes before the alarm is asserted. If the program line becomes false prior to the duration, there is no alarm generated.

Program Line: Sets the condition upon which the alarm will be asserted. The program line can have total of 40 characters having a total of 12 operators and operands.

Logical operators are: & AND, | OR, ^ XOR, and ! NOT.

Binary mathematical operators are: + plus, - minus, * times and / divide.

Unitary mathematical operators are: + Positive, - Negative

Comparator operators are: = equal, < less than and > greater than.

Parentheses are accepted.

Example: RPM channel C601 is monitoring a shunt for distribution circuit fused at 300 amps. An alarm is desired when the load on the circuit exceeds 200 amps. The program line is: C601 > 200.

Program lines can be can be as simple as the one above or much more difficult. In any case, the “Program Line Editor” which opens from the configuration dialog box in Easy View will assist. The program line can be tested prior to leaving the configuration.

Alarm Test

Configure → Alarms Test
Individually configures each of the controllers alarm relays for operation during an alarm test. Alarm Test and Remote Alarm Test are enabled in software at **Configure → DC Plant → Hardware & Software Configured.** The hardware switch for Alarm Test is SW 202-5 on the BJB pack. The Hardware switch for Remote Alarm Test is SW204-2 on the BJB pack. Each individual relay can be enabled or disabled for the test. Other configurable items are:

Description: Allows modification of the default designation of this feature.

Duration: Sets the time each successive relay will operate between 5 seconds and 5 minutes.

Battery Bay

Configure → Battery Management → Battery Bay
The user must add the Battery Bay to the system and then modify it. Once added the description can be changed and a link added to RPM channel assigned to monitor the temperature in the battery bay. The Battery Bay may also be associated with any Battery Section that has been configured

Battery Contactors

Configure → Battery Management → Battery Contactors
Displays the present state, (CONNECT, DISCONNECT, NONE) of up to two contactors that optionally can be configured in the system. If both contactors have been configured as type BAT, and both are in the CONNECT state, either of the contactors can be disconnected by toggling the state of the field. Only one contactor can be configured to be disconnected at a time, ensuring a battery string is always connected to the plant.

Contactor 1
Contactor 2

Configure → Battery Management → Contactor 1 / Contactor 2
The controller can support two optional contactors that are controlled through system software and the UR1 and UR2 relays. The following are configuration parameters.

Description: Allows modification of the default designation.

Type: This setting identifies the type of contactor, BAT, LOAD or NONE that has been installed in the plant.

Disconnect Threshold: This setting configures the plant voltage at which the contactor will disconnect from the bus.

Reconnect Threshold: This setting configures the plant voltage at which the contactor will reconnect to the bus. To prevent the contactor from re-operating when battery voltage increases due to load removal, a voltage several volts higher than the disconnect voltage is recommended.

Reserve

Configure → Battery Mgmt → Reserve
The parameters associated with limiting recharge current and disconnecting the batteries due to high temperature are configured here.

Description: Allows modification of the default designation.

High Temp Threshold: Sets a temperature at which contactors defined as battery type contactors will be disconnected from the system. If Battery Sections have been configured, RPM temperature channels and LVD contactors linked to different Battery Sections, the contactors will be independently controlled. One contactor can be linked to several Battery Sections. The highest temperature of all Battery Sections linked to the same contactor will be used

Current Limit: Enable / Disable

Current Limit Threshold: Sets the total amount of current that will be allowed to recharge batteries in any Battery Section.

End Volts Per Cell: Sets the minimum voltage the individual battery cell is intended to discharge to in the system design. Used with the Reserve Time Predictor algorithm.

Battery Section

Configure → Battery Mgmt → Battery Section

There are no Battery Sections configured in the system. The user must first add then modify it. Up to 32 Battery Sections can be added. Additional information regarding Battery Sections, can be found in Chapter 7. Each Battery Section added will have the following configurable parameters.

Description: Allows modification of the default designation.

Contactor: Assigns Contactor 1 (CN1) or Contactor 2 (CN2) to a Battery Section. The same contactor can be assigned in several Battery Sections.

Number of Strings: Number of strings in this Battery Section

Battery Type: Select from predefined list of Tyco batteries. Used in Battery Reserve Time Prediction.

Mid Point Voltage: An RPM voltage channel, monitoring the mid string voltage may be optionally linked.

Pilot Cell Voltage: An RPM voltage channel, monitoring the pilot cell voltage may be optionally linked.

DC Charge Current: An RPM shunt channel, monitoring the battery shunt may be optionally linked. If a uni-polar type RPM unit is used for the DC Discharge Current link, this item need not be configured.

DC Discharge Current: An RPM shunt channel, monitoring the battery shunt may be optionally linked.

Temp: An RPM temperature channel, monitoring the battery temperature may be optionally linked. Used in Battery Reserve Time Prediction Slope Compensation and high temperature disconnect of the LVD contactor assigned to this Battery Section.

Fuse Status Alarm: An RPM binary channel, monitoring the Battery Section fuse status may be optionally linked.

DC Voltage: An RPM voltage channel, monitoring the battery string voltage may be optionally linked. Used in Battery Reserve Time Prediction. If not present, plant voltage will be used.

Slope Thermal Compensation

Configure → Battery Management → Slope Thermal Compensation
Various parameters for operation of the compensation of plant voltage due battery temperature feature are configured here. Enabling STC allows plant voltage to respectively decrease or increase dependent upon increasing or decreasing battery temperature. The raising of voltage feature can be separately disabled. See Chapter 7 for additional information and requirements on the application of this feature.

STATE: Enables or disables Slope Thermal Compensation feature.

LOW TEMP THRESHOLD: Sets the temperature at which the plant voltage will have raised 0.1 volts x the number of cells. Valid range is 23° to 68°F or -5° to 20°C

NOM TEMP THRESHOLD: Sets the temperature at which the plant voltage is set to it's nominal value. Compensation begins at temperatures above or below this point. Valid range is 59° to 86°F or 15° to 30°C.

UPPER TEMP THRESHOLD: Sets the temperature at which the plant voltage will have decreased 0.1 volts x the number of cells.

RAISE VOLTAGE: Enables or disables the increase in plant voltage due to decrease in battery temperature feature.

STEP TEMP: Sets the temperature at which the plant voltage will be further decreased by a factor determined by multiplying the number of cells in the battery string by 0.17. For example in a 24 cell plant, battery voltage will be decreased by 4.08 volts (24 x 0.17 = 4.08).

Boost

Configure → **Boost**: The Boost (increase plant voltage) or BTP (decrease plant voltage) parameters are configured here. Boost voltage is configured at **Configure** → **Rectifier** → **Rectifier Manager**. Boost alarm thresholds are configured at **Configure** → **Alarms** → **Threshold Alarms**. The software switch for Boost Enable is configured at **Configure** → **DC Plant** → **Hardware and Software Configured**. The Hardware switch for Boost switch is SW202-3 on the BJB pack. See Chapter 7 for additional information on the Boost/BTP feature.

Description: Allows modification of the default designation.

Mode: Sets the mode: NONE,TIMED or QRCT.

Auto Mode: Enables or Disables the automatic application of Boost after a battery discharge. Boost duration is set by the Auto Mult Fact

Timed Man Duration: Sets the number of hours the plant will stay in the Boost mode when set to do so via Easy View path: **Control** → **Plant Mode** → **Boost**

Auto Mult Fact: Factor set here is multiplied by the length of battery discharge to obtain the length of time the plant will remain in boost.

Battery Thermal Protect: Enables or Disables this mode.

Voltage Threshold: Sets the voltage lever used as a qualifier for QRCT Boost entrance.

Current Threshold: Sets the charging current flowing into the battery as a qualifier for QRCT Boost entrance

Current/Time Ratio: Sets the absolute value of the gradient calculation, (change in charge current/change in time

Boost State Alarm: An UDE may optionally be linked indicating boost is active.

Call Back Security

Configure → Call Back Security
In this feature after the initial modem connection is made, the remote user designates which of the four possible configured numbers is to be called back. The controller disconnects, then calls back the requested number. The four numbers are configured here, the feature is enabled or disabled and the applicable baud rate is set.

Call-out Phone Numbers

Configure → Call-out → Call-Out Phone Number
Four possible phone numbers for the call out feature which will report on all designated alarms or periodically, are configured along with an alternate number that is called only when the others cannot be reached. The type can be set as either Data or Pager and a pager ID and delay are defined. Other fields set Parity, Baud Rate, Data Bits and Stop Bits for each number. Additional information regarding all Call-Out features, can be found in Chapter 7.

Call-out Nag Interval

Configure → Call-out → Nag Interval
Each system and user defined alarm can be individually configured to have a NAG interval. The controller will continuously call out at the interval set here while the alarm remains active.

Call-out and Periodic Call-out

Configure → Call-out → Periodic Status Call-Out
Configures the destination phone number and data parameters, baud rate etc., for having the controller call out to deliver the system status, histories and statistics. Intervals can be set as a specific day of the week, daily, weekly, monthly or quarterly. Up to ten T1.317 commands can be configured to report any of the available system data.

Passwords

Configure → Change Passwords
Allows changing of system passwords. The user must be logged in at the administrator level to change passwords.

Configuring Converters

Configuration → Converter Plants

Plant voltage setpoint and converter are configured here.

Description: Allows modification of the default designation.

Voltage Setpoint: Sets the converter output voltage.

Low Voltage Disconnect Threshold: Sets the voltage below which the converter will be placed into standby.

Low Voltage Reconnect Threshold: Sets the voltage above which the converter will be released from standby.

Low Voltage Disconnect: Controls whether the converter low voltage disconnect feature is enabled or disabled.

Data Switch

Configure → Data Switch 1 / 2/ 3 /4

Sets the parameters necessary to connect a remote RS-232 device to the optional Data Switch ports. See the Data Switch feature in Chapter 7 for additional information.

DC Plant Hardware and Software

Configure → DC Plant → Hardware and Software

Several plant features must be enabled both by Hardware switches located on circuit packs as well as in software. Both must be enabled for the feature to operate.

Restart: Enables or disables the auto rectifier restart feature. The associated hardware switch is SW202-7 on the BJB pack.

Boost: Enables or disables the Boost / BTP feature. The associated hardware switch is SW202-3 on the BJB pack.

Energy Management Algorithm: Enables or disables the Rectifier energy management algorithm feature. The associated hardware switch is 4-1 on the BJH pack.

External Timer Boost: Enables or disables the External Timer Boost feature. The associated hardware switch is SW202-2 on the BJB pack.

Alarm Test: Enables or disables the Alarm Test feature. The associated hardware switch is SW202-5 on the BJB pack.

Remote Alarm Test: Enables or disables the Remote Alarm Test feature. The associated hardware switch is SW204-2 on the BJH pack.

HV Shutdown During Alarm Test: Enables or disables the feature that will fail the rectifiers during an alarm test. Enabling this feature is not recommended with serial rectifiers. The associated hardware switch is SW202-4 on the BJB pack.

DC Plant Software

Configure → DC Plant
These are various plant features not associated with Hardware switches.

Description: Allows modification of the default designation.

Shunt Current: Ampere size of the plant shunt.

Shunt Voltage: Plant voltage in millivolts.

Shunt Type: Shunts installed in the plant can be:

- Load (most common), where current is directly displayed.
- Battery, where the current is derived from the battery current and rectifier outputs, and
- None, which requires shunts to be monitored by RPM channels and linked in software configuration to Battery Sections. In this arrangement current is derived from the total of shunt currents and the total of rectifier drains. If no RPM channels are configured, the total of rectifier output will be displayed.

Battery Type: Select from a list of Tyco battery types. Type selected is used in the Battery Reserve Time Prediction feature.

Installed Cells per String: Number of cells in the battery string is used in the Slope Thermal Compensation feature.

Installed Strings per Plant: Number of battery strings is used in the Slope Thermal Compensation feature.

All Rectifier On Threshold: Sets the voltage at which all rectifiers that are being held off by the plant are released to operate. (After the Rectifier On Delay, below.)

Rectifier On Delay: Sets the time delay after the Rectifier On Threshold above, is reached that all rectifiers that are being held off by the plant are released to operate.

Rectifier Sequencing: Enables or Disables the rectifier sequencing during ac transfer feature. This feature also requires connection to a contact closure transition (open, close, open) during the transfer at TB3 12/13.

Initial Engine Transfer Delay: Delay time (1 to 600 seconds), after the contact closure transition above, after which the rectifiers will begin to be released.

Transfer Sequence Interval: Delay time, (.1 to 600 seconds), between the release of each succeeding rectifier.

AC Distribution Links

Configure → Distribution → AC
This dialog allows the linking of RPM channels to pre-defined objects associated with the ac service.

PH1, PH2, PH3 Voltage: Voltage RPM channels (transducers required) can be linked to monitor the phase to neutral ac voltages.

PH1, PH2, PH3 Current: Voltage RPM channels (transducers required) can be linked to monitor the phase currents.

PH1-2, PH2-3, PH3-1 Voltage: Voltage RPM channels, (transducers required) can be linked to monitor the phase to phase ac voltages.

PH1, PH2, PH3 Fail: Binary RPM channels, can be linked to monitor the status of an external ac fail alarm device monitoring individual phases.

Master AC Sw Fail Alarm: Binary RPM channel, can be linked to monitor the status of an external ac fail alarm device.

DC Distribution Links

Configure → Distribution → DC
This dialog allows the linking of a binary RPM channel to a Fuse State object in the system. The RPM channel monitors the alarm associated with distribution fusing.

Maintenance Reminders

Configure → Maintenance Reminders
As many as 12, 60 character messages can be configured, each with an associated date and time for activation. Call out to any/all of the four configured call-out phone numbers can be selected.

Notepads

Configure → Notepads → User / Super User
Notepad for general purpose text, (15 lines of 60 characters). Notepads can be enabled so that a user logging on will be notified. The User notepad is read/write for all user. Super User notepad is read/write for the super user and administrator.

Controller Option Inventory

Configure → Inventory → Controller Options

Controller Distribution Inventory

Configure → Inventory → Distribution

Peripheral Monitor Inventory

Configure → Inventory → Peripheral Monitor

Plant Inventory

Configure → Inventory → Plant

Rectifier Inventory

Configure → Inventory → Rectifier

Reserve Inventory

Configure → Inventory → Reserve

Rectifier Bays

Configure → Rectifier → Rectifier Bays
There are no Rectifier Bays configured in the system. The user must first add then modify it. Up to 32 Rectifier Bays can be added. Additional information regarding Rectifier Bays can be found in Chapter 7. Each Rectifier Bay added will have the following configurable parameters.

DES: Allows modification of the default designation.

Bay Temperature: An optional link to an RPM temperature channel monitoring the bay temperature.

AC Circuit Breaker Alarm: An optional link to a binary RPM channel monitoring the status of the ac circuit breaker for the rectifier bay.

Rectifiers: Check boxes in the Modify section can be selected to associate individual rectifiers with the particular rectifier bay. **Note:** Configuring these check boxes tells the controller which bay alarm light to turn on in the event of a rectifier failure. Otherwise, only the bay alarm light in the main bay (the bay containing the BIC board with address #1) will be turned on.

Rectifiers

Configure → Rectifier → Rectifiers
Refer to the appropriate plant manual for a description of this feature.

Rectifier Manager

Configure → Rectifier → Rectifier Manager
Plant voltage, rectifier current limit, and load share are configured here.

Description: Allows modification of the default designation.

Load Share: Enables or Disables the rectifier's Load Share Feature

Float HVSD: Sets the rectifier's internal high voltage shutdown point during plant Float mode conditions.

Boost HVSD: Sets the rectifier's internal high voltage shutdown point during plant Boost mode conditions.

Float Set Point: Sets the plant voltage during plant Float mode conditions.

Boost Set Point: Sets the plant voltage during plant Boost mode conditions.

Float Current Limit: Sets the rectifier's current limit value as a percentage of rectifier capacity during plant Float mode conditions.

Boost Current Limit: Sets the rectifier's current limit value as a percentage of rectifier capacity during plant Boost mode conditions.

Statistics

Configure → Statistics → Busy Hour → BH1 to BH4 / DCBH1

Trend Studies

Configure → Statistics → Trend → TR1 to TR8 / DCTH1

System Hardware and Software

Configure → System → Hardware & Software Configure
Several plant features must be enabled both by Hardware switches located on circuit packs as well as in software. Both must be enabled for the feature to operate.

Local Port: Enables or Disables the Read/Write permissions for the port. The Hardware switch associated with this feature is SW203-6 on the BJH pack.

Modem Port: Enables or Disables the Read/Write permissions for the port. The Hardware switch associated with this feature is SW203-4 on the BJH pack.

Aux Port: Enables or Disables the Read/Write permissions for the port. The Hardware switch associated with this feature is SW203-5 on the BJH pack.

Local Port Mode: Select from Terminal, Event Log (printer), TL1.

Critical = Maj: If enabled all Critical alarms in the system will behave as though they were Major severity. The Hardware switch associated with this feature is SW202-6 on the BJB pack.

Configure via Front Panel: Sets the permission to change configurations from the front panel. The Hardware switch associated with this feature is SW202-8 on the BJB pack.

Serial Port Configure: Enables or Disables changes to the communication parameters of the local, remote and modem port. The Hardware switch associated with this feature is SW203-3 on the BJH pack.

Remote Rectifier On: Sets the permission to turn individual rectifiers On that are being held Off by the controller. The Hardware switch associated with this feature is SW203-7 on the BJH pack.

Remote Rectifier Off: Sets the permission to turn individual rectifiers Off. The Hardware switch associated with this feature is SW203-7 on the BJH pack.

System Software

Configure → System → Software Config
The following system parameters are configured here:

Equipment Description: Configurable System Description.

Software Version: Read Only display of the software versions of the BJB and BJH packs.

Site Description: Site Description that is displayed on the Main Easy View Screen.

Site ID: Site ID that is sent as the identifier for site that is sent with the Call-Out Feature.

Date Format: Selects several options for displaying the date, month, day or year first.

Time Format: Select from 12 or 24 hour clock.

Daylight Savings: Enables or Disables automatic time adjustment for daylight savings time.

Temp Units: Select all temperature displays to be shown in degree °F or °C

Front Panel Language: Select from English, Symbolic (abbreviated English) or Other (Spanish)

Ambient Temp: Allows a optional link to a RPM temperature channel.

System Time

Configure → System → System Time

Timer Events

Configure → Timer Events

5 Acceptance Testing

Introduction

The Galaxy SCF Controller is tested before it leaves the factory, but many users wish to add some test procedures as part of installation and turn-up. The tests described here will simulate various alarm conditions and verify that the controller functions properly as installed.

Tools and Test Equipment

You will need these tools to complete the tests described in this section:

- Digital Voltmeter (DVM) with a dc accuracy of at least 0.05%
- Short length of wire or clip lead for jumper
- Jeweler’s screwdriver

Test Sequences

Caution

> Before performing the test procedures, be sure that all rectifiers are functioning properly. Also, since some tests will cause a battery discharge to occur, insure that plant batteries have received their original charges and are ready to support a load.

In a new installation, begin the sequence with the rectifiers on and with a dummy load on the plant bus bar. Follow the steps in the procedures in the order they are given.

Lamp Test

Depress the LAMP TEST key on the controller front display. (See Figure 2-2.) All front panel and board LEDs will operate momentarily and then retire.

Alarm Test

Alarm Test provides a means of testing the operation of all or any of the plant alarm relays and their wiring to the connected alarm system. It cannot be done if any alarms are active. It may also be desirable to perform this test occasionally after the plant is in service to verify the integrity of the office alarm system for the power plant alarms.

Alarm Test may be performed locally or from a remote terminal.

Local Alarm Test:

SW202-5 on the BJB Basic Control Board must be enabled along with its associated software switch found on the Front Panel under the path: Main Æ Config Æ Alarm Æ Test ALM. If HVSD is desired during the test, SW202-4 on the BJB Basic Control Board must also be enabled, along with the appropriate software switch found on the Front Panel under the path: Main Æ Config Æ Alarm Æ Test HV.

For an intelligent controller, the alarm conditions tested during Alarm Test and their duration may be specified within EasyView with the path: Main Æ Configure Æ Alarm Test. As an alternative to the Front Panel Configuration of the Alarm Test software switch, it may be also configured within EasyView under the Path: Configure Æ DC Plant Æ Hardware & Software Configured.

Remote Alarm Test:

Remotely, Alarm Test may be performed in the same manner as that described for Local Alarm Test, but hardware dip switch BJH SW204-2 and the remote alarm test software switch in the EasyView path: Configure Æ DC Plt Æ Hardware & Software Config, must also be enabled. Initiate the test remotely with the EasyView path: ControlÆ Alarm Test.

The Alarm Test will operate in sequence. Each of the relays shown below will operate for approximately 60 seconds. **Alarm LEDs do not illuminate.**

The progress of the activated relays can be followed during the test by going straight down the TB2 and TB3 terminal blocks on the BLG1 front access board if the connected alarm system is not yet processing. The progress of relay activation may also be monitored in the ALM TST STAT field of the MEASURE/STATUS screen of an intelligent controller or the MAIN screen in the basic controller.

To monitor the ALM TST STAT field, prior to beginning the test, press the <MENU> key to bring up the MAIN screen. In an intelligent controller move the cursor to the MEAS/STAT field and press <ENTER> to access the MEASURE/STATUS screen. Initiate Alarm Test locally by momentarily pressing the Alarm Test switch on the BJB basic controller. Alarm Test events will occur in the following order:

1. Rectifier Fail Alarm Test - RFAT*
2. Power Critical - PCR
3. Power Major - PMJ
4. Power Minor - PMN
5. Major Fuse - MJF
6. Minor Fuse - MNF
7. Battery on Discharge - BD
8. AC Fail - ACF
9. Rectifier Fail Alarm - RFA
10. Very Low Voltage - VLV
11. High Voltage - HV
12. Controller - CTLR
13. User Relay 1 - UR1**
14. User Relay 2 - UR2**

* RFAT is an alarm test intended for use with non-serial type rectifiers and has no function in this test.

** UR1 and UR2 are inhibited if LVD Contactors have been configured.

Meter Calibration from the Front Panel

Follow these steps to calibrate the front panel meter display for Voltage and Current readings:

Voltage Calibration:

Using a calibrated DVM, measure the plant voltage from the front panel voltage test jacks. From the front panel press Menu

Æ Config Æ Plant. Using the Arrow keys, reset the plant voltage reading by selecting RST PLV. Press the Enter key to reset. This will remove any pre-existing user calibrated values if they exist. Press the <MENU> key, wait five seconds, and go back to the Config Æ DC Plt screen. Move to ADJ PLV on the menu and use the <ADJUST> keys to calibrate the plant voltage to match the reading of the DVM. Press <ENTER> to use the new calibrated plant voltage. Press the <ESCAPE> key until the default screen is displayed. Verify that the plant voltage reading reflects the new value.

Current Calibration:

Using a calibrated DVM, measure the plant load from the front panel current test jacks in mV.

To calculate the plant load, in amperes, as measured by the DVM, divide the mV DVM reading by the rated shunt mV value. Multiply this result by the shunt ampere rating. This value is the plant load measured by the DVM, in amperes.

From the front panel press Menu Æ Config Æ Plant. Using the Arrow keys, reset the plant current reading by selecting RST PLI. Press the <Enter> key to reset. This will remove any pre-existing user calibrated values if they exist. Press the <Menu> key, wait five seconds, and go back to the Config Æ Plant screen. Move to ADJ PLI on the menu and use the <ADJUST> keys to calibrate the plant load to match the calculated plant load value. Press <ENTER> to use the new calibrated plant load. Press the <ESCAPE> key until the default screen is displayed. Verify that the plant load reading reflects the new value.

High Float Voltage Alarm

The high voltage alarm test can be completed either raising the plant voltage above the threshold set for HFV (High Float Voltage) or by changing the threshold for this condition to make it active.

NOTE **Raising the plant voltage on a working system is left to the discretion of the user. This test could disrupt power to working equipment. If the test is performed, verify that the plant is in FLOAT mode and that rectifier voltage has been set to the normal level after completing the test.**

New Installations:

From the Front Panel follow the path <MENU> Æ CONFIG Æ THRESH and note the settings of both the HV and HFV Float alarms thresholds. HV must be at least ½ volt higher than HFV. Press the <ESC> key to return to the Configuration screen. Follow the path RECT MNGR Æ PLANT V (FLOAT) from the Configuration screen. Use the <ADJUST> keys to change the value of the plant voltage to a level above the HFV setting noted above but below the HV setting. Press ENTER to save the change.

Observe the plant voltage increases to the set voltage, initiating a Power Minor alarm (PMN) and illuminating the RECT and MIN LEDs.

Follow the path <MENU> Æ CONFIG Æ RECT MNGRÆPLANT V (FLOAT) and restore the voltage to it's original setting. Press <ENTER> to save the change.

Installations Serving an Active Plant Load:

Note the value of plant voltage from the Default screen. From the Front Panel, follow the path <MENU> Æ CONFIG Æ THRESH Æ HFV (FLOAT). Use the <Adjust> keys to change the value of the HVF threshold to a level below the plant voltage noted above. Press ENTER to save the change.

Observe that the controller initiates a Power Minor alarm (PMN) and illuminates the RECT and MIN LEDs.

Follow the path <MENU> Æ CONFIG Æ THRESH Æ HFV (FLOAT) and restore the threshold to it's original setting. Press <ENTER> to save the change.

High Voltage Shutdown - New Installations Only

The High Voltage Shutdown Test is recommended only for new installations where a dummy load is available prior to the application of office load. There are three requirements for a serial rectifier to shut down upon a controller initiated High Voltage Alarm:

1. The plant voltage must be above the level set for HV at the Front Panel path: <MENU> Æ CONFIG Æ THRESH.

2. The rectifier must be delivering a current exceeding 10% of it's capacity.

3. The rectifier's current output must be unbalanced by more than 10% from the average output currents of the other rectifiers.

Because Item 3 is difficult to achieve in a simulation test of properly functioning serial rectifiers, (even with load share disabled), rectifiers are tested one at a time, rather than as a group. Slightly different test procedures are used for special applications in batteryless plants.

Serial rectifiers have their own internal restart circuits that will function 3 times before the rectifier locks itself out and initiates a High Output Rectifier Fail Alarm to the controller. If there is a sufficient interval between restart and a subsequent shutdown the rectifier resets its restart counter.

The controller initiates a restart signal a few seconds after the first RFA (HO) alarm is received. After the second RFA (HO) is received, the controller waits 5 minutes before sending one additional restart signal.

Verify the Auto Restart hardware switch at SW202-7 on the BJB pack is set to 1 (Enabled). Verify the software switch for the Auto Restart feature is enabled from the Front Panel. MAIN Æ CONFIG Æ RECT CTR Æ AUTO RST

Battery Plant HVSD Test:

Turn off all rectifiers except the rectifier under test by operating their power switches to STBY. Adjust the dummy load to provide 10-30% of the rectifier's output capacity. From the Front Panel follow the path <MENU> Æ CONFIG Æ THRESH and note the value of the HV (FLOAT) threshold. Press the <ESC> key to return to the Configuration screen. Follow the path RECT MNGR Æ PLANT V (FLOAT) from the Configuration screen. Use the <ADJUST> keys to change the value of the plant voltage to a level above the HV (FLOAT) setting noted above. Press ENTER to save the change.

Observe the following:

- When the voltage increases to the HV (FLOAT) level the rectifier shuts down.
- The Green ON LED on the rectifier blinks, the ALM LED on the rectifier is not lit.
- After 5-6 seconds the rectifier initiates it's own restart signal again raising the plant voltage.
- The rectifier will shutdown and restart two additional times.
- Upon the third shutdown, the rectifier's ALM LED lights and the rectifier's display indicates "HO".
- The controller receives the RFA signal from the rectifier and initiates a restart signal 5-6 seconds later.
- The rectifier restarts again raising plant voltage.
- The rectifier shuts down and restarts 3 additional times.
- During these shutdowns the Green ON LED on the rectifier blinks and the ALM LED on the rectifier is not lit.
- Upon the fourth shutdown, the rectifier's ALM LED lights and the rectifier's display indicates "HO".
- Any external RFA office alarm has occurred.

  The controller will wait 5-6 minutes and issue one final restart signal initiating the final sequence of shutdown and restart events before the rectifier locks out, requiring personnel intervention. Prior to this occurring do the following: From the Front Panel follow the path <MENU> Æ CONFIG Æ RECT MNGR Æ PLANT V (FLOAT). Use the <ADJUST> keys to change the value of the plant voltage to it's normal level. Press ENTER to save the change. Press <MENU> and select REC RST. Press <ENTER> to restart the rectifier.

NOTE **Restarting the rectifier from the Front Panel in this manner, rather than toggling the rectifier’s ON/STBY switch, resets the HVSD timer so that another rectifier can be tested immediately. Testing of the additional rectifiers in the same manner is at the user’s discretion.**

Batteryless Plant HVSD Test:

Turn off all but two rectifiers by operating their power switches to STBY. Unplug the serial cable link of one rectifier at the controller. In some rectifiers, the air flow shield above the rectifier may need to be removed to access this plug. The ALM LED in the rectifier will blink. The rectifier “remembers” the last voltage control signal from the controller and will support plant voltage during the test. Adjust the dummy load to provide 10 to 30% of the rectifiers output capacity. From the Front Panel follow the path <MENU> Æ CONFIG Æ THRESH and note the value of the HV (FLOAT) threshold. Press the <ESC> key to return to the Configuration screen. Follow the path RECT MNGR Æ PLANT V (FLOAT) from the Configuration screen. Use the <ADJUST> keys to change the value of the plant voltage to a level above the HV (FLOAT) setting noted above. Press ENTER to save the change.

Observe the following:

- When the voltage increases to the HV (FLOAT) level the rectifier shuts down.
- The Green ON LED on the rectifier blinks, the ALM LED on the rectifier is not lit.
- After 5-6 seconds the rectifier initiates it's own restart signal again raising the plant voltage.
- The rectifier will shutdown and restart two additional times.
- Upon the third shutdown, the rectifier's ALM LED lights and the rectifier's display indicates "HO".
- The controller receives the RFA signal from the rectifier and initiates a restart signal 5-6 seconds later.
- The rectifier restarts again raising plant voltage.
- The rectifier shuts down and restarts 3 additional times.
- During these shutdowns the Green ON LED on the rectifier blinks and the ALM LED on the rectifier is not lit.
- Upon the fourth shutdown, the rectifier's ALM LED lights and the rectifier's display indicates "HO".
- Any external RFA and BD office alarms have occurred.

The controller will wait 5-6 minutes and issue one final restart signal initiating the final sequence of shutdown and restart events before the rectifier locks out, requiring personnel intervention. Prior to this occurring do the following: From the Front Panel follow the path <MENU> Æ CONFIG Æ RECT MNGR Æ PLANT V (FLOAT). Use the <ADJUST> keys to change the value of the plant voltage to it's normal level. Press ENTER to save the change. Press <MENU> and select REC RST. Press <ENTER> to restart the rectifier. Restore the serial cable plug disconnected in the beginning of the procedure.

NOTE **Restarting the rectifier from the Front Panel in this manner, rather than toggling the rectifier’s ON/STBY switch, resets the HVSD timer so that another rectifier can be tested**

immediately. Testing of the additional rectifiers in the same manner is at the users discretion.

Battery on Discharge Alarm

If the BD alarm was observed during the High Voltage Shutdown test this test can be disregarded. Otherwise, from the front panel follow the path <MENU> Æ CONFIG Æ THRLD and observe the setting of the BD (FLOAT) threshold. With a dummy load added to the plant, operate all rectifiers to STBY until the plant voltage drops below the BD (FLOAT) threshold. Observe the active BD and MAJ LED's and asserted PMJ and BD relays. Restart the rectifiers to retire alarms and return the plant voltage to float.

Rectifier Fail Alarm

The RFA alarm was observed during the High Voltage Shutdown Test so no separate test is required.

Terminate Rectifier (TR) Test

The TR test may be performed even if rectifier sequencing is not planned to be utilized, as it provides a convenient means of testing that the controller recognizes all plant rectifiers and is able to control each over their assigned ports. One at a time, connect a test lead on the TB3 terminal block of the BLG1 front access board, from position 13 (ETRR / Ground) to position 8 (TR1), 9 (TR2), 10 (TR3), and 11 (TR4). The rectifiers will shut down in groups as depicted below and remain off until the connection is removed at which time they automatically restart.

TR1:	G01, G02, G09, G10, G17, G18, G25, G26, G33, G34, G41, G42, G49, G50, G57, G58
TR2:	G03, G04, G11, G12, G19, G20, G27, G28, G35, G36, G43, G44, G51, G52, G59, G60
TR3:	G05, G06, G13, G14, G21, G22, G29, G30, G37, G38, G45, G46, G53, G54, G61, G62
TR4:	G07, G08, G15, G16, G23, G24, G31, G32, G39, G40, G47, G48, G55, G56, G63, G64

Major Fuse Alarm

Major Fuse Alarm may be tested by placing a blown fuse in the alarm fuse position of any distribution fuse position in the plant or by inserting a paper clip into the alarm indicating hole of its fuse holder. For distribution circuit breakers, temporarily connect the pins 8 and 9 of any KS22010 or KS22012 style circuit breakers) of any breaker together. This is accomplished on the ED83143-30 circuit breaker panels used on J85582B-1 and J85582C-1 by shorting the (-) panel bus to pin 1 on the P4 connector of its BNL1 alarm board.

The DIST and MAJ LEDs and Power Major and MJF alarm relays will be active. Alarms should be tested in each distribution bay of the plant to verify the integrity of the alarm bus throughout the plant. If the distribution bays are equipped with “Bay Fuse Alarm” indicating LEDs, also verify that this LED activates during these tests for the bay in which the alarm originates (and not in any other).

Minor Fuse Alarm

Minor Fuse Alarm may be tested by placing a blown fuse in the alarm fuse position of the plant Capacitor Charge circuit (if equipped) or by inserting a paper clip into the alarm indicating hole of its fuse holder. Alternately, replace one of the unused regulation fuses of the BJF fuse termination board with a blown GMT type fuse. In either case, the MIN and either DIST or RECT panel LEDs will activate, along with the Power Minor and MNF alarm relays.

Modem/Data Switch

If the Modem (L-FE) and/or Data Switch (L-FH) options have been provided, they can be tested after wiring and configuration is completed by dialing into the modem port and if equipped, passing through to the devices wired to the equipped Data Switch ports. Refer to Section 6 for the T1.317 Data Switch commands required.

Remote Peripheral Monitoring

If the Remote Peripheral Monitoring option (L-FG) and J85501G-1 monitoring units have been equipped, each channel configured should be tested for accuracy with a clamp-on ammeter (for Shunt Monitor channels), voltmeter (for Voltage Monitor channels), or thermometer (for Temperature channels). If alarms have been configured through the use of User Defined channels, they may also be tested by adjusting their program line to move the thresholds or by adjusting the channel programming to change the value reported for the channel. Refer to Section 7 for complete feature descriptions of each of these optional monitoring devices.

Rectifier Sequencing

If Rectifier Sequencing in an intelligent controller has been enabled (via EasyView path: Main Æ Configure Æ Rectifiers, testing can be completed by temporarily using a shorting clip across TB3 position 12-13 (ETR/ETRR)terminal block on the BLG1 board. This will cause all rectifiers configured for Rectifier Sequencing control to shut off. Releasing this clip will then cause the rectifiers to restart sequentially in the manner in which they have been programmed.

Energy Management

Energy Management is available only in the intelligent controller and must be enabled in both hardware and software. Enable the hardware switch by setting SW204-1 on the BJH pack to 1. From the Front Panel follow the path: <MENU> Æ CONFIG Æ RECT CTR Æ EFFIC to enable the software switch. Energy Management can be enabled in EasyView by following the path: Configure Æ Plant Æ Hardware and Software.

To test Energy Management, reset the BJH intelligent controller and stabilize the load at some level at which a rectifier becomes unnecessary. After 10 minutes, the first unneeded rectifier will be turned off by the controller. If additional rectifiers can be shut down, they will follow individually at 10 minute intervals. If the plant load can be varied, increase it to the point where another rectifier is necessary after the controller has completed its shutdowns. One (or more as required) of the rectifiers will be restarted immediately when the load exceeds the capacity of the current on-line rectifiers.

6 Operation

Introduction

This section tells you in detail how to operate the Galaxy SCF Controller. Topics include operation of both the basic and intelligent controllers from the controller's front panel and from a personal computer with the Windows-based EasyView software. Additional information regarding many of the features shown here can be found in Chapter 7, *Feature Descriptions*.

Appendix A covers operation of the controller using the T1.317 interface from a remote terminal. Appendixes B and C cover the T1.317 objects and attributes and error messages.

Basic Controller Front Panel Operation

This section tells you how to operate the basic functions of the Galaxy SCF Controller from its front panel.

Perform Alarm Cut Off

To perform the ACO (Alarm Cut Off) operation, first ensure that the ACO CR, ACO MJ, ACO MN in the ALARM menu is enabled. The ACO CR applies to alarms of CRITICAL severity only, the ACO MJ is for the MAJOR alarm only, and ACO MN is for the MINOR alarm only. You can selectively perform the ACO operation on each individual class of alarm. Press the <MENU> key to bring up the MAIN menu. Use the <UP>, <DOWN>, <LEFT>, <RIGHT> arrow keys to move the cursor to the CONFIG field. Press <ENTER> key to bring the CONFIG (configuration) menu up, move the cursor to ALARM field, press <ENTER> key to bring the ALARM menu up. If any of the ACO CR, ACO MJ, ACO MN fields need to be changed, move the cursor to that field, use the <+>, <-> key to change the field value and press <ENTER> each time to save each change.

Next, bring up the MAIN menu (press <MENU > key), move the cursor to the ACO field and press <ENTER> to perform the Alarm Cut Off. This will disengage the corresponding severity contact relay on the front panel. Please note that the ACO operation only affects the current active alarms. If new alarms of the same severity level occur, the associated contact relay will be engaged again; to cut these new alarms off, do the ACO operation again.

Change Plant Mode

To switch the plant mode between FLOAT and BOOST, first bring the MAIN menu up (press <MENU> key), move the cursor to MODE: field, press <ENTER> to switch the plant mode. After a few seconds delay, if the plant succeeded changing mode, the field value will indicate the new mode. To change the plant mode from FLOAT to BOOST, the BOOST field in the PLANT menu must be enabled before the plant can switch mode. Note that if the plant has the Battery Thermal Protection (BTP) feature, and if the BTP field (in the PLANT menu) is enabled, the plant mode will be displayed as BTP instead of BOOST.

Change Plant Voltage

To make adjustment to the plant voltage, first press the <MENU> key to bring up the MAIN menu, move the cursor to the Config field, press <ENTER> to bring up the Configuration menu, move the cursor to RECT MNGR to bring up the Rectifier Management menu, move the cursor to PLANT V (FLOAT or BOOST) as applicable. Use the <UP> <DOWN> arrow keys to change to the desired value. Press <ENTER> to save the change.

Display Alarm Data

To display the system alarms data, press <MENU> key to bring the MAIN menu up, move the cursor to ALARM field, press <ENTER>; this will display the alarms data one screen at a time. Use the <UP>, <DOWN> arrow keys to view additional data if there is more than one screen of data. Press <ESC> key to return to the parent menu.

Display Warning Data

To display the system warning data, press <MENU> key to bring up the MAIN menu. Move the cursor to WARN field and press <ENTER>; this will display the alarms data one screen at a time. Use the <UP>, <DOWN> arrow key to view additional data if there is more than one screen of data. Press <ESC> key to return to the parent menu which is MAIN menu in this case.

Perform Rectifier Restart

To perform the rectifier restart from the front panel. Press <MENU> key to bring up the MAIN menu, move the cursor to RECT RST field, press <ENTER> to perform the rectifier restart. The screen will display “REQUEST RECTIFIER RESTART.”

Remove Rectifier Configuration

Serial Rectifiers are automatically recognized by the system when plugged in and the ID number is configured at the rectifier. The system remains configured even if the rectifier should be removed or sent in for repair. This state causes an alarm to be initiated. To remove the rectifier configuration, first press the <MENU> key to bring up the MAIN menu, move the cursor to the Config field, press <ENTER> to bring up the Configuration menu. Move the cursor to RECT MNGR to bring up the Rectifier Management menu. Press <ENTER>. Move the cursor to the RECT OPER MENU item. Press <ENTER>. Move the cursor to RMOVE RECT field. Use the <UP> <DOWN> arrow keys to select the rectifier number to be removed. Press <ENTER> to save the rectifier number to be removed.

Intelligent Controller Front Panel Operation

This section tells you how to operate the intellligent functions of the Galaxy SCF Controller from its front panel. Paths shown here are as of Version 7.3.0.

Perform Alarm Cut Off

The steps to perform the ACO (Alarm Cut Off) operation on the system equipped with the intelligent controller are the same as the system equipped with the basic controller option. Please refer to the “Performing Alarm Cut Off” operation for the basic controller.

Change Plant Mode

The steps to perform the plant mode switching on the system equipped with the intelligent controller are similar to the system equipped with the basic controller option except that the Boost enable field is located in the Boost menu instead of the Plant menu. Path: Main › Config › Boost. See Change Plant Mode for the basic controller above.

Change Plant Voltage

The steps to perform the adjustment to plant voltage on the system equipped with the intelligent controller are the same as the controller equipped with the basic controller option. Please refer to “Change Plant Voltage” for the basic controller.

Clear Latched Events

Some events in the systems can only be cleared by the users. These are known as user clear-able events. Press the <MENU> key to bring up the MAIN menu, move the cursor to the CLREVNT field and press <ENTER> to start clear events. The system will respond with “CLEARING USER CLEARABLE EVENTS” message.

Clear History

To access the CLEAR HISTORY menu, press the <MENU> key to bring up the MAIN menu; move the cursor to the HIS/STATIS field, press <ENTER> to get to the HISTORY/STATISTICS menu; move the cursor to the CLR HIST field, press <ENTER> to bring up the CLEAR HISTORY menu:

CLEAR HISTORY	
PLANT	UDE
RECT	BOOST
BAT DIS	SYSTEM
LOGIN	RELAY

Move the cursor to the field for which you want to clear the history and press the <ENTER> key to clear the database.

Disable/Enable Efficiency

Disabling the efficiency feature will start all rectifiers. It may be done toggling the hardware switch at SW204-1 on the BJH pack or in software. From the Front Panel. press <ENTER> to bring up the Configuration menu, move the cursor to RECT CTR to bring up the Rectifier Control menu, move the cursor to the EFFICIENCY: field. Use the <UP> <DOWN> arrow keys to toggle to the desired value. Press <ENTER> to save the change.

Display Alarm Data

To display the system alarms data, press <MENU> key to bring the MAIN menu up, move the cursor to ALARM field, press <ENTER>; this will display the alarms data one screen at a time. Use the <UP>, <DOWN> arrow keys to view additional data if there is more than one screen of data. Press <ESC> key to return to the parent menu.

Display Warning Data

To display the system warning data, press <MENU> key to bring up the MAIN menu. Move the cursor to WARN field and press <ENTER>; this will display the alarms data one screen at a time. Use the <UP>, <DOWN> arrow key to view additional data if there is more than one screen of data. Press <ESC> key to return to the parent menu which is MAIN menu in this case.

Perform Rectifier Restart

For rectifier restart from the front panel, enable the REM RST field on the RECT CTRL menu. Go to the MAIN menu, move to the REC RST field, press <ENTER> to do the restart. The screen will display “REQUEST RECTIFIER RESTART.”

Remove Rectifier Configuration

The steps to remove a rectifier from the system equipped with the intelligent controller are the same as the controller equipped with the basic controller option. Please refer to “Remove Rectifier Configuration” for the basic controller.

View and Clear History/Statistics

To access the HISTORY/STATISTICS menu, press <MENU> key to bring up MAIN menu; move the cursor to HIST/STATIS field, press <ENTER> to bring up the following HIST/STATIS menu:

```
HISTORY/STATIS

VIEW HISTORY..
VIEW STATISTICS..
CLEAR HISTORY..
CLEAR STATISTICS..
```

View History

To access the VIEW HISTORY menu, press the <MENU> key to bring up the MAIN menu; move the cursor to the HIS/STATIS field, press <ENTER> to get to the HISTORY/STATISTICS menu; move the cursor to the VIEW

HIS field, press <ENTER> to bring up the VIEW HISTORY menu:

VIEW HISTORY	
PLANT	UDE
RECT	BOOST
BAT DIS	SYSTEM
LOGIN	RELAY

Move the cursor to the field for which you want to view the history and press the <ENTER> key to display data. If there is more than one screen of data (eight lines of text), use the <UP>, <DOWN> arrow key to display additional screens.

The PLANT field displays plant events history, the UDE field displays the User Define Event history, the RECT field displays the rectifier state history, the BOOST field displays the boost state history, the BAT DIS field displays the battery discharge history, the SYSTEM field displays the system alarms history, the LOGIN field displays the login history, and the RELAY field displays the relay state history.

View Statistics

To access the CLEAR STATISTICS menu, press the <MENU> key to bring up the MAIN menu; move the cursor to the HIS/STATIS field, press <ENTER> to get to the HISTORY/STATISTICS menu; move the cursor to the CLR STAT field, press <ENTER> to bring up the CLEAR STATISTICS menu:

VIEW STATISTICS	
PLANT LOAD	PLANT VOLT
PLANT UBT	PLANT TRD
PL BD	BUSY HR
DERV CHAN	TREND..
RECTIF	RPM

Move the cursor to the field that the users want to view the statistics and press the <ENTER> key to display data. If there are more than one screen data (eight lines of text), use the UP, DOWN arrow key to display additional screens. The PL LOAD field display the plant load statistics, the PL VOLT field displays the plant voltage statistics, the PL UBT field displays the plant Universal Temperature Probe reading statistics, the PL TRD field displays the plant total rectifier drain statistics, the PL BD field displays the plant Battery Discharge statistics, the BUSY HR field display the system Busy Hour statistics, the TREND field displays the system Trend statistics, the RECTIF.. is the sub menu to display the rectifiers statistics, the RPM.. field is a sub menu to display the Remote Peripheral Monitor channels statistics.

To view the rectifier statistics, on the VIEW STATIS menu select the RECTIF.. field, press <ENTER> to bring on the VIEW RECT STAT menu. In this menu, select the rectifier that user want to see the statistics and press <ENTER>. The following is the sub menu to display the rectifiers statistics:

VIEW RECT STATIS			
G01..	G02..	G03..	G04..
G05..	G06..	G07..	G08..
G09..	G10..	G11..	G12..
G13..	G14..	G15..	G16..
G17..	G18..	G19..	G20..
G21..	G22..	G23..	G24..

To view the Remote Peripheral Monitor Channels statistics, on the VIEW STATIS menu select the RPM.. field, press <ENTER> to bring on the VIEW RPM STATIS menu. In this menu, use the <+> or <-> keys to change the ADDRESS field to the one in which you want to view the statistics. The amount of change is controlled by the value in the STEP field; you can change the value of this field too. Note that the values in these two fields are in hexadecimal. Press <Enter> when the desired address is displayed. The following is the sub menu to display the RPM statistics:

VIEW RPM STATIS	
ADDRESS:	01
STEP:	01

To view the TREND statistics, on the VIEW STATIS menu select the TREND.. field, press <ENTER> to bring on the VIEW TREND STAT menu. In this menu, select the trend channel that user want to see the statistics and press <ENTER>. The following is the sub menu to display the trend statistics:

VIEW TREND STATIS	
PLANT	TREND 1
TREND 2	TREND 3
TREND 4	TREND 5
TREND 6	TREND 7
TREND 8	

View Measurement Data

You can view the status and values of many of the plants sub systems from the front panel. To access the MEASURE/STATUS menu, press the <MENU> key to bring up the MAIN menu, move the cursor to MEAS/STAT field, press <ENTER> to get to the MEASURE/STATUS menu:

MEASURE/STATUS	
RECTIFIER	BATTERY SEC
MEAS CHAN..	UDO..
AC DISTRIB	DC DISTRIB
ALM TST STAT	

Select the RECT field to display the type, state, load and capacity of all the rectifiers in the system, in addition to the total rectifier drain and capacity. Selecting AC DISTRIBUTION will display the values of ac phase voltages and currents that may have been optionally linked to Remote Peripheral Monitor channels. Selecting BATTERY SEC displays the reserve, voltage, charge current, discharge current, temperature, fuse state that may have been optionally linked to Remote Peripheral Monitor channels. Select DC DISTRIBUTION to display the state of a distribution fuse alarm that may have been optionally linked to a Remote Peripheral Monitor channel. The ALT TST STAT field will display the ongoing progress (alarm relay operations), of a real time Alarm Test. Selecting UDO will display the values of any user defined objects that have been optionally added to the system. Selecting MEAS CHAN displays the VIEW CHANNEL STATUS menu shown below.

Selecting any of the fields will display the values of Remote Peripheral Monitor channels that have optionally been added to the system and configured derived channels.

```
VIEW CHANNEL STATUS

VOLT CHAN
SHUNT CHAN
TEMP CHAN
RELAY CHAN
BIN CHAN
DERV CHAN
```

View User Notepad

To access the User Notepad, press the <MENU> key to bring up the MAIN menu; move the cursor to the HIS/STATIS field, press <ENTER> to get to the HISTORY/STATISTICS menu; move the cursor to the VIEW NOTEPAD field, press <ENTER> to bring up the Notepad display.

EasyView Common Access and Control Functions

This section tells you how to operate the the Galaxy SCF Controller using EasyView software.

ACO Operation (Alarm Cut Off)

ACO is initiated within EasyView with the following path from the Main Menu: Control Æ ACO. The action taken by the controller is controlled through the configuration of ACO, completed under Configure Æ Alarm Cut-Off (ACO). Refer to Section 7, Features, for a complete description of the ACO feature.

Alarm Test Operation

EasyView path: Control Æ Alarm Test. Again, the action taken is under control of the Alarm Test configuration, completed under Configure Æ Alarm Test. Refer to Section 7, Features, for a complete description of the Alarm Test feature.

Backup/Restore

EasyView path: File Æ Backup or File Æ Restore

The backup and restore feature allows the user to back up the system configuration to disk, in a series of T1.317 commands in the ASCII format. The user may edit the file before restoring it.

Boost / Float Mode Control

EasyView path: Control Æ Plant Mode Boost must be enabled in both hardware and software in order to initiate Boost. The matrix found under Main Æ Configure Æ Plant Æ Hardware & Software Config will define the configured state for Boost. Plant rectifiers must be able to accept the Boost signal and should have their Boost adjustment potentiometers set to the desired Boost voltage in order to utilize this feature. Also note that the Boost HV and HFV levels found under Main Æ Configure Æ Alarms Æ Thresholds must be higher than the desired Boost voltage level in order to avoid nuisance alarms and shutdowns.

Change Plant Voltage

Easy View Path: Configure Æ Rectifier Æ Rectifier Manager. This path allows adjustment to the plant voltage in the Float and Boost modes. The rectifiers current limits and HVSD set points are also configured here.

Clear Statistics

To access the CLEAR STATISTICS menu, press the <MENU> key to bring up the MAIN menu; move the cursor to the HIS/STATIS field, press <ENTER> to get to the HISTORY/STATISTICS menu; move the cursor to the CLR STAT field, press <ENTER> to bring up the CLEAR STATISTICS menu:

```
CLEAR STATISTICS

PL LOAD        PL VOLT
PL UBT         PL TRD
PL BD          BUSY HR
TREND          DR CHAN
RECTIF..       RPM..
```

Move the cursor to the field that the users want to clear the statistics and press the <ENTER> key, the system then ask for confirmation; press <ENTER> to clear the database; press ESC to cancel clearing.

To clear the Rectifier statistics, select the RECTIF.. field, press <ENTER> to bring up the CLEAR RECT STAT menu, the menu is the same as the VIEW RECT STAT. Select a rectifier and press <ENTER> to clear its statistics, the system then ask for confirmation; press <ENTER> to clear the database; press ESC to cancel clearing.

To clear Remote Peripheral Monitor Channels statistics, select the RPM.. field, press <ENTER> to bring up the CLEAR RPM STAT menu. Select the type of channel and press <ENTER> to clear statistics, the system then ask for confirmation; press <ENTER> to clear the database; press ESC to cancel clearing. Here is the menu:

CLEAR RPM STAT VOLT CHAN SHUNT CHAN TEMP CHAN

Diagnostics

You can view some diagnostic messages from the front panel. Press the MENU key to bring up the MAIN menu, move the cursor to DIAG field, press ENTER key to bring up the DIAG menu:

DIAG ALL RECT PLANT RPM EXPR

Selecting the RECT field displays rectifier diagnostics; the PLANT field is for system diagnostics; the RPM is for Remote Peripheral Monitoring modules; EXPR is for program lines in the UDEs, Derived Channel and Control Relay; ALL is for all diagnostics in the system. Move the cursor to the field for which you want to run diagnostics; press ENTER to proceed. If no problems are found, the front panel displays the “NO DIAGNOSTICS DATA” message. Otherwise it will list all problems found on the screen. For more than one screen of data (8 lines), use the UP and DOWN keys to display additional messages.

Clear Latched Events EasyView path: Main Æ Control Æ Clear Latched Events. Some events that occur remain on the active Alarm or Warning display after they have cleared to alert the user to their occurrence. These are known as “User-Clearable” or “Latched” events. This EasyView path can be used to clear these events after they have been investigated by the user.

Diagnostics EasyView path: Status Æ Diagnostics Æ All / Monitoring / Plant / Rectifiers. If an alarm is active, the user can select this path to obtain some help on what the trouble could be. “Plant” refers to system diagnostics while “Monitoring” refers to those associated with Remote Peripheral Monitors.

Disable/Enable Efficiency Disabling the efficiency feature will start all rectifiers. It may be done toggling the hardware switch at SW204-1 on the BJH pack or in software. In Easy View follow the path: Main Æ Configure Æ DC Plant (Hardware & Software Configured).

Display Alarms and Warnings Active Alarms and Warnings are always shown in their appropriate fields on the Main display. The controller and EasyView update every few seconds to keep this information current as long as the current session is active.

Display Alarm Test EasyView path: Status Æ Alarm Test. Information on the success or failure of the last Alarm Test that was performed is provided.

Display Battery Sections EasyView path: Status ¸ Battery Sections. Displays the present values of the reserve, voltage, charge current, discharge current, temperature and fuse state that may have been optionally linked to Remote Peripheral Monitor channels.

Display Converters EasyView path: Status Æ Converters. Displays the converter plant voltage setpoint, capacity, DC current, and DC voltage. Also displays individual converter states, type, DC current, and capacity.

Display DC Plant EasyView path: Status Æ DC Plant. Displays the present values of the plant voltage, current, total rectifier drain, ambient temperature, temperature probe present, reserve time, battery thermal integrity, transfer times and universal battery temperature. Many of these items are options within the plant and must be installed and enabled.

Display Distribution AC

EasyView path: Status ¸ Distribution AC. Displays the values of ac phase voltages and currents that may have been optionally linked to Remote Peripheral Monitor channels.

Display Distribution DC

EasyView path: Status ¸ Distribution DC. Displays the state of a distribution fuse alarm that may have been optionally linked to a Remote Peripheral Monitor channel.

Display Record Only Alarms

EasyView path: Status ¸ Record Only Alarms. Alarms designated as “Record Only” will not appear on the Main Menu display of EasyView or on the Front Panel interface of the controller.

Display Rectifier

EasyView path: Status ¸ Rectifier ¸ Rectifier. Displays the rectifiers output current, On/Off state, output current, state of it's DC breaker and the of state of the ac circuit breaker that may have been optionally linked to a Remote Peripheral Monitor channel.

Display Rectifier Bays

EasyView path: Status ¸ Rectifier ¸ Rectifier Bays. Displays the state of a ac circuit breaker and temperature value for a rectifier bay that may have been optionally linked to a Remote Peripheral Monitor channel.

History

A wealth of data is available under History. The EasyView path to this data is History ¸ Alarm Cut-Off / Alarm Test / All / Battery On Discharge / Battery Reserve / Boost / Control Relay / Call Out Manager / Log In / Periodic Status Call Out / Plant / Rectifiers / System / User Defined.

Measurements

Plant voltage and load values are constantly displayed and updated on the status bar at the bottom of the EasyView Main Menu. Rectifier current measurements are obtained through the path: Status ¸ Rectifier and Remote Peripheral Module measurements are obtained through Status ¸ Monitored Channels ¸ Shunt Channels / Temperature Channels / Voltage Channels.

Rectifier Control

EasyView path: Control ¸ Rectifiers / 1-8 / 9-16 / 17 -24. This menu shows the present state of the rectifiers and allow the user to toggle them ON / OFF individually. Rectifiers in the on state can be turned off, if the hardware switch SW203-8 on the BJH pack and software switch at Main ¸ Configure ¸ Hardware & Software Configured are enabled. Rectifiers turned off via the terminal or by the efficiency can be turned on if hardware switch SW203-7 on the BJH pack and the applicable software switch are enabled.

Rectifier Removal

EasyView path: Configure ¸ Rectifier ¸ Rectifier. Serial Rectifiers are automatically recognized by the system when plugged in and the RID is configured at the rectifier. The system remains configured even if the rectifier should be removed or sent in for repair. Changing the rectifier configuration to unconfigured after the rectifier is disconnected will remove the alarm from the system.

Rectifier Restart

EasyView path: Control ¸ Rectifier Restart. This path will be useful when completing high voltage shutdown testing of plant rectifiers. If the controller has shut down for the second time, and locked out the rectifier being tested, the restart timer will be cleared and testing can resume immediately without waiting for its 5 minute time-out to clear.

Statistics

Like History, a wealth of data is also available under Statistics. The EasyView path for basic statistics is: Reports Æ Statistics Æ Basic ¸ DC Current / DC Voltage / Rectifiers / Total Rectifier Drain / Universal Battery Temp / User Defined Objects. Other Statistics available include: Reports Æ Statistics Æ Battery on Discharge / Busy Hour / Derived Channel / Remote Peripheral Monitor / Trend.

T1.317 Interface Common Access and Control Functions

Terminal Mode commands for performing the common access and control functions within the controller without the benefit of the EasyView interface are provided in the following section. Refer to Appendixes A and B for a complete description of this interface language if you employ this means of communicating with the controller.

AC Distribution Management

The T1.317 interface allows the user to configure the AC Distribution object so that AC Distribution parameters may be viewed from either the T1.317 interface or the front panel.

Configuration involves setting scale factors and offsets on remote peripheral monitoring channels or program lines on derived channels or user-defined events, then linking these objects to the AC Distribution object. Please refer to the "T1.317 Remote Peripheral Monitor Management" section of this manual for instructions on configuring remote peripheral monitors, derived channels, and user-defined events. The examples below illustrate how to link monitors and alarm objects to the AC Distribution object:

LIN ACD1 PRV,C101	Link the voltage monitor C101 as the phase R voltage
LIN ACD1 RSV,DR01	Link derived channel DR01 as the voltage between phase R and phase S
LIN ACD1 PRF,U0001	Link user-defined event U0001 as the phase R fail alarm

Alarm Configuration

The T1.317 interface groups alarms into several types based on their configuration requirements. These types are listed below with the type identifier mnemonic and type description:

SDA	Standard alarms
THA	Threshold alarms
DTA	Dual threshold alarms
UDE	User-defined events
CEA	Connect equipment alarm (data switch)
MRM	Maintenance reminders

The user-defined events, connected equipment, and maintenance reminders are described in detail in another part of this manual.

To list the alarm objects of any of these alarm types the LIS command as shown in the following examples:

LIS SDA	List all standard alarms
LIS THA	List all the single threshold alarms
LIS DTA	List all dual threshold alarms

For most applications, the default alarm configurations will not need to be changed except for setting the thresholds to their desired states. However, the alarms in the controller can be customized by configuring the attributes of each alarm object if necessary. These attributes and their range of values are described in detail in the T1.317 object tables in the appendix of this manual. Listed below are examples illustrating how to configure the attributes of the rectifier fail alarm RFA1:

CHA RFA1,SEV=”MAJ”	Set the severity to be major
CHA RFA1,LED=”RECT”	Light the RECT LED on the front panel when RFA1 is active
CHA RFA1,ACC=”RFA”	Assert the RFA relay when RFA1 is active

In addition to the attributes listed above, the single threshold and dual threshold alarms have thresholds that will need to be configured. The commands below illustrate how this can be done for the very low voltage alarm and the battery on discharge alarm:

CHA VLA1,THR=46.1	Set very low voltage threshold to 46.1V
CHA BDA1,FTH=51.2	Set battery on discharge float threshold to 51.2V
CHA BDA1,BTH=51.2	Set battery on discharge boost threshold to 51.2V

For additional information on alarm attributes see the sections on data switch alarms, user-defined events, and maintenance reminders.

Alarm History Management

Alarm history data can be viewed and cleared from the T1.317 interface. Normally alarm history entries are reported in order from the newest entry to the oldest entry. However, options can be added to the T1.317 history command to modify the history report so that entries for the same alarm are grouped together, the report is limited to a specific range of dates, the entries are ordered oldest first, or the report is limited to specific alarms. See the history command in the T1.317 command description for details on these options. The following examples illustrate how to access the alarm history:

HIS	Report all alarm history
HIS DC1	Report plant alarm history
HIS PS1	Report system alarm history
HIS PS1 EXL	Report excessive logins system alarm history
HIS DC1,G=1	Report plant alarm history grouped by alarm
HIS DC1,O=4/4/1995	Report plant alarm entries on or after 4/4/1995
HIS I=”RFA,CPA”	Report only rectifier fail and circuit pack fail entries

Each line of the history report has the following format:

identifier,date,time,severity,description

The commands used to clear alarm history follow the same pattern as the commands that report alarm history. The following examples illustrate how to clear the alarm history:

CLH DC1	Clear plant alarm history
CLH PS1	Clear system alarm history
CLH DC1,N=4/4/1995	Clear plant alarm entries on or before 4/4/1995
CLH I=”RFA,CPA”	Clear only rectifier fail and circuit pack fail entries

Alarm Reporting Mode

Like pass-thru mode, for most applications, only the connected equipment ID needs to be configured for reporting mode. To enter reporting mode use the following command:

STA DS1,REN=1

If call out is required it will also be necessary to configure the connected equipment alarm. The following examples illustrate how this can be done for the connected equipment on data switch port 1:

CHA P2,PHN=”123-4567”	Configure call-out phone number 2
CHA CEA1,DES=”MCS Alarms”	Configure the alarm description
CHA CEA1,DST=”P2”	Configure alarm call-out destination to be P2
CHA CEA1,NOO=1	Configure the alarm to notify on occur

The call-out destination phone number may require additional configuration, see the section on call-out. For the other data switch ports substitute CEA2, CEA3, or CEA4 for CEA1. To see if any data switch connected equipment alarms are active use the following command:

ALA DSW

Alarm Test Management

From the T1.317 interface the alarm test can be viewed, configured, and initiated. See the T1.317 object tables in the appendix for attribute mnemonics and other details. To view the alarm test configuration reference the alarm test object in a STA (status) command as illustrated in the following command:

STA AT1	report the alarm test attribute values

Before using the alarm test feature it must be enabled and configured. The examples below demonstrate how to enable one of the software dip switches, configure the duration, and enable one of the relays to be included in the test:

CHA AT1, LTE=1	Enable the alarm test enable software DIP switch
CHA AT1,DUR=30	Set the contact duration to 30 seconds
CHA AT1,PCR=1	Enable the power critical relay test

Other attributes can be configured by replacing the attribute identifiers in the examples above with the proper attribute identifier. To initiate an alarm test from one of the access ports use the OPE (operate) command as shown in the example below:

OPE AT1,STT=1	Start an alarm test

To see if the alarm test active(ATA1), alarm test failed(ATF1), or alarm test aborted(ATB1) events are active use either the ALA, WAR, or REC commands. Which command you use will depend on the programmed severity of the alarm. The examples below illustrate how to check for active alarm test warnings and record-only events since these are the default severities of alarm test events:

WAR AT1	Retrieve active alarm test warnings
REC AT1	Retrieve active alarm test record-only events

Battery Discharge History Management

The battery discharge history can be viewed and cleared from the T1.317 interface. The following examples illustrate how to view and clear the battery discharge history:

HIS DC1,BOD
CLH DC1,BOD

Each line of the history report has the following format:

date,time,load,duration,reserve_time

Battery Management

The T1.317 interface allows full configuration and management of batteries as supported by the controller. Battery configuration is done in three steps:

1. Build the battery configuration
2. Link remote monitoring channels to battery attributes
3. Parameter configuration

Some configuration steps may be omitted depending on the needs of the system. For example, the first step, building battery configurations, serves as an organizational tool and is not necessary in most cases. If the SAPO interface is being used, however, this first step is essential.

Battery Parameter Configuration

Part of the battery parameter configuration is done at the plant level. The following commands configure these parameters:

CHA DC1,CPS=24	Change the cells per battery string to 24
CHA DC1,NST=2	Change the number of battery sections to 2
CHA DC1,BTY="VR-125"	Change the plant battery

type to VR-125

The following commands configure parameters that apply to battery management in general. The attributes are located in the Battery Reserve object.

CHA BR1,TTH=80	Change the high temperature threshold to 80 degrees
CHA BR1,CLE=1	Change the recharge current limit state to enabled
CHA BR1,CLT=800	Change the recharge current limit threshold to 800 A
CHA BR1,CEV=1.75	Change the end volts per cell to 1.75 V

The following commands configure battery section level parameters using battery section 1 as an example:

CHA B01,CON=CN1	Change the battery section contactor to CN1
CHA B01,NST=1	Change the number of strings in this section to 1
CHA B01,BTY="VR-125"	Change the plant battery type to VR-125

The T1.317 interface also allows the user to configure the battery slope thermal compensation feature. The follow commands demonstrate how to do this:

CHA SC1,STT=1	Change the slope thermal compensation state to enabled
CHA SC1,RVE=0	Change the reduce voltage enable state to enabled
CHA SC1,UTT=45	Change the upper temperature threshold to 45 degrees
ALA	Retrieve all active alarms in the system
WAR DC1	Retrieve all active warnings linked to the DC plant
REC PS1	Retrieve all active record-only events linked to the power system object

Boost State History Management

The boost state history can be viewed and cleared from the T1.317 interface. The following examples illustrate how to view and clear the boost state history:

HIS BS1,STT	Report boost history
CLH BS1,STT	Clear boost history

Each line of the history report has the following format:

date,time,start_mode,end_mode,duration

Boost Management

Managing boost mode from the T1.317 involves both the DC plant object identified as DC1 and the boost object identified as BS1. The examples below illustrate how to configure boost. See the boost section of this manual for an explanation of the boost feature:

CHA BS1,BSE=1	Enable the boost software dip switch
CHA BS1,ATM=”TIMED”	Change the auto mode to timed
CHA BS1,AMF=5	Change the auto multiplication factor to 5
STA BS1	Show the boost object attribute values

The other boost object attributes can be configured using these examples as a guide. See the T1.317 object tables in this manual for a complete list of the boost object attributes and range of values. Boost mode is entered from the T1.317 interface by using the OPE (operate) command to set the DC Plant state to BOOST. The example below shows how to do this:

OPE DC1,STT=”BOOST”

The boost state history is also available from the T1.317 interface. The HIS(history) command is used to retrieve the boost history as shown in the example below:

HIS BS1,STT

Building Battery Configurations

The T1.317 interface supports building battery configurations in bays and sections. The commands below show how to build a battery configuration made up of a single battery bay with two battery sections:

ADD BBY,BB01	Add battery bay BB01
ADD BAT,B01	Add battery section B01
ADD BAT,B02	Add battery section B02

LIN BB01 BAT, B01, B02	Link battery sections B01 and B02 to battery bay BB01

Call-back Security Management

Before using call-back security a phone number and baud rate must be configured for the location being called and call back security must be enabled. Call-back security is disabled by default and the baudrates are set to 2400 by default. The examples below illustrate how to configure call-back security:

CHA CB1,PH1=”123-4567”	Set the phone number for location 1 to 123-4567
CHA CB1,BR1=2400	Set the baud rate for location 1 to 2400
CHA CB1,STT=1	Enable call back security

Once call-back security is configured and enabled, the next access via the modem will require a call back sequence. To do this, configure your modem to auto answer and then call the controller via your modem. The controller will answer and prompt you for the location number you are calling from. Enter your location number and hang-up. After 5 seconds the controller will call your modem at the configured baud rate. Your modem will answer the call and the controller will then prompt for a password as it would for any normal login sequence.

Call-out Configuration

In order for the controller to call out on alarms, several parameters must be configured. A phone number to call must be configured, a nag interval must be configured, if required, and each alarm must be configured to call-out. This section describes the steps to take to do this and gives examples using the T1.317 interface.

Call-out Phone Number Management

From the T1.317 interface the call-out phone numbers can be viewed and configured. The T1.317 objects associated with call-out are:

- Call-out manager identified as CM1
- Call-out phone number identified as P1,P2,P3,P4, and A1.

See the T1.317 object tables in the appendix for attribute mnemonics and other details. The following example illustrates how to program phone number 1:

CHA P1,PHN="222-3333"	Change phone number to 222-3333
CHA P1,BDR=9600	Change baud rate to 9600
CHA P1,DBT=8	Change data bits to 8
CHA P1,PRY=N	Change parity to none
CHA P1,SBT=1	Change stopbits to 1

Clearing Active Alarms

Some alarms are latched, meaning that once they occur they must be cleared manually. These alarms can be cleared individually using the CLE command. Below is a list of these alarms:

- Standard alarms: EPR1, EXL1, CLC1, STF1, CCH1, HCL1, EPD1, COF1, COR1, POR1, ATF1, ATB1
- Threshold alarms: LMR1, ERD1, RPI1
- All maintenance reminders
- All user defined events with the latched attribute (LAT) equal to 1

Configuration Backup

To backup the system configuration from a T1.317 interface follow the procedure below:

1. Login as a super-user.
2. Enter the BACKUP command.
3. Select either Xmodem or ASCII transfer.
4. Start your terminal Xmodem or ASCII download program.
5. During an ASCII transfer, hit any key to indicate that you are ready for the data.

The backup session will terminate automatically with a message indicating that the backup was completed or not. Reference the T1.317 object tables in the appendix for details regarding which attributes are included in the backup and which are not. As a rule of thumb attributes that can be configured using the CHA command are included in the backup. Exceptions to this rule are the system date and time. All objects and linkable attributes added by the user are backed up. Any links created by the user are also backed up. Aliases defined by the user are also backed up. All configuration data is also permanently stored in the controller. This configuration will be used as the new default on subsequent power-on squences if the backup battery power is lost.

Configuration Restore

To restore a system configuration from a T1.317 interface follow the procedure below:

1. Login as a super-user.
2. Enter the RESTORE command.
3. Select either Xmodem or ASCII transfer.
4. Start your terminal upload program.

The restore session will terminate automatically with a message indicating that the configuration restore completed or not. The file being restored should be the one created during a configuration backup or one of a similar format. All configuration data is also permanently stored in the controller. This configuration will be used as the new default on subsequent power-on squences if the backup battery power is lost.

Configuring Alarms to Call-out

In order to call-out on an alarm condition, a phone number must be configured and the alarm must be configured to call-out on occur, retire, or both. See the call-out sections in this manual for details about configuring a phone number. Alarms that support call-out will have 5 attributes that allow the user to control how call out for that alarm behaves. The following example illustrates how to configure these attributes for the rectifier fail alarm RFA1:

CHA RFA1,DLY=10	Call-out if RFA is active for at least 10 seconds
CHA RFA1,NOO=1	Call-out when RFA occurs (0 for no Call-out on occur)
CHA RFA1,NOR=1	Call-out when RFA retires (0 for no call-out on retire)
CHA RFA1,NAG=1	Call-out periodically if alarm active (0 for no nag)
CHA RFA1,DST=”P1, P2”	Change call-out destination to phone number 1 and 2

Configuring Alarms to Call-out

Once a phone number is configured, alarms must be configured to call-out to that phone number. The following example illustrates how to do this for the rectifier fail alarm:

CHA RFA1,DLY=10	Call-out if RFA is active for at least 10 seconds
CHA RFA1,NOO=1	Call-out when RFA occurs
CHA RFA1,NOR=1	Call-out when RFA retires
CHA RFA1,NAG=1	Call-out periodically if RFA remains active
CHA RFA1,DST=”P1”	Change call-out destination to phone number 1

If an alarm is to be configured to nag, as this one is, the nag interval must be programmed. The nag interval is an attribute of the call-out manager object (CM1). The example below illustrates how to program the call-out nag interval:

CHA CM1,NGI=30	Change the nag interval to 30 minutes

Contactor Management

The T1.317 interface allows configuration and management of the low voltage disconnect contactors. The following commands show how to configure contactor 1 as a battery low voltage contactor:

CHA CN1,TYP=“BATTERY”	Change contactor type battery contactor
CHA CN1,DTH=44	Change the disconnect threshold to 44 V
CHA CN1,RTH=48	Change the reconnect threshold to 68 V

To operate a battery contactor use the following commands. Note that these commands will only work if both contactors are configured as battery contactors.

OPE CN1,STT=“DISCONNECT”	Operate the contactor to the disconnected state
OPE CN1,STT=“CONNECT”	Operate the contactor to the connected state

The following commands are useful for querying the state of the contactors:

ALA CNT	Report all contactor active alarms
STA CN1,STT	Report state of contactor 1
STA CN2,STT	Report state of contactor 2

See “Battery Management” for details on configuring a battery section to be associated with either contactor 1 or contactor 2 and to set the battery high temperature disconnect threshold.

Converter Management

The T1.317 interface allows configuration and management of converter parameters supported by the system. The information below provides examples of how to configure various converter parameters.

The following commands show how to configure the converter plant voltage and low voltage disconnect (standby) feature:

CHA CP1,VSP=50.5	Set the voltage to 50.5V
CHA CP1,DTH=22.8	Set the low voltage standby threshold to 22.8V
CHA CP1,RTH=24.8	Set the low voltage on threshold to 24.8V
CHA CP1,LVD=1	Enable converter low voltage standby

Individual converters may be placed in and out of standby using the following commands:

OPE C01,STT=”STANDBY”	Place converter 1 in standby
OPE C01,STT=”ON”	Turn converter 1 on

DC Distribution Management

The T1.317 interface allows the user to configure the DC Distribution object so that DC Distribution parameters may be viewed from either the T1.317 interface or the front panel.

Configuration involves configuring a user-defined event to become active when a DC distribution fuse is open and then linking that event to the DC Distribution object. Please refer to the section entitled “T1.317 User-Defined Event Management” in this manual for instructions on configuring user-defined events. The example below illustrates how to link a user-defined event to the DC Distribution object.

LIN LDA DFA,U0001	Link user-defined event U0001 as the DC distribution fuse alarm.

Derived Channel Management

Configuring derived channels from the T1.317 interface involves adding a derived channel followed by setting the program line and the units attributes. The examples below illustrate how this can be done:

ADD DRC,DR01	Add derived channel 1
CHA DR01,UNI="A"	Change the units to A for amps
CHA DR01,PRG="(G01 ADC + G02 ADC)/2"	Change the program line to calculate the average DC current of rectifiers 1 and 2

After configuring derived channel 1 as shown above the derived channel value will be equal to the average of the rectifier currents. The value can be viewed using either the STA (status) or MET(meter) commands. The examples below illustrate the use of these two commands:

STA DR01,VAL
MET DR01

Below are more examples of measurement attributes that may be included in the derived channel program line:

DC1 VDC	DC plant voltage
DC1 UBT	Universal battery temperature
DR04 VAL	Derived channel 4 value
C103 VAL	Peripheral monitoring value of channel 1 address 3

It may be useful to link a derived channel to another object. For example, if DR01 in the above example represents the average load of all rectifiers in the plant, it may be useful to have its value reported as a DC plant measurement. This can be done by linking DR01 to the DC plant. The example below illustrates how this is done:

ADD DC1,ARLOAD	Add a linkable attribute called ARLOAD to the DC plant
LIN DC1 ARLOAD,DR01	Link DR01 to ARLOAD on the DC plant

The commands above will cause the derived channel 1 value to be reported as DC1 ARLOAD when a report of the DC1 measurement values is requested. The examples below illustrate the commands that will do this:

MET DC1
MET DC1,ARLOAD

The STA command is not used in the previous example because it will report DR01, instead of the value of DR01, as the value of the ARLOAD attribute.

Energy Management

Managing energy management from T1.317 involves the energy management state attribute (EMS) and the energy management enable attribute (EME) of the DC plant. The CHA (change) command is used to enable or disable the software state of energy management and the STA (status) command is used to check whether energy management is currently on or off. The examples below illustrate how to use these two attributes:

CHA DC1,EME= 1	Enable the energy management software dip switch
STA DC1,EMS	Show the status of the energy management state

Inventory Management

The T1.317 interface can be used to view, change, add, and link inventories to the system. The following example illustrates the commands that will build a distribution bay inventory with one panel and one slot:

ADD DBI,DI1	Add distribution bay inventory 1 to the system
ADD DI1,PIN	Add a linkable attribute called PIN to the bay inventory
ADD PIN,PI01	Add panel inventory called PI01
LIN DI1 PIN,PI01	Link the panel inventory to the bay inventory at PIN
ADD PI01,SLI	Add a linkable attribute called SLI to the panel inventory
ADD SLI,SLI001	Add a slot inventory called SLI001
LIN PI01 SLI,SLI001	Link the slot inventory to the panel inventory at SLI

A similar set of commands would be needed to build the reserve battery inventory with battery strings. Use the following command to add a controller option inventory object to the system:

ADD COI

Because this command does not specify a specific controller option inventory object identifier, the command will respond with the identifier of the object added to the system. If this was the first controller option inventory to be added the identifier would be CI01. The following command sets the install date of the controller option to 05/20/95:

CHA CI01,IDT=”05/20/95”

Other attributes in the inventory can be changed by substituting CI01 with the inventory object’s identifier, IDT with the attribute mnemonic, and “05/20/95” with the desired text. Remember that all inventory attributes are text and should be enclosed in double quotes.

Linking Remote Monitoring Channels

The following command will cause the temperature measured by remote peripheral monitor channel C107 to be reported as the temperature for battery bay BB01.

LIN BB01 TMP,C701	Link temperature monitor C701 to the battery bay temperature attribute

The following commands will create the links needed for full battery management. The examples below are for reference only. Actual configuration depends on the remote peripheral monitors available in the system. For help in creating user defined events please see the section entitled “T1.317 User-Defined Event Management” in this manual.

LIN B01 VDC,C101	Link remote monitor C101 to the DC voltage attribute
LIN B01 ACH,C102	Link remote monitor C102 to the charge current attribute
LIN B01 ADS,C202	Link remote monitor C202 to the discharge current attribute
LIN B01 TPS,C702	Link remote monitor C702 to the battery section temperature at tribute
LIN B01 FST,U0001	Link user-defined event U0001 to the battery section fuse status alarm attribute

Login State History Management

The login history can be viewed and cleared from the T1.317 interface. The examples below illustrate how to access the login state history for each of the access ports:

HIS LP1,STT	Report local port login state history
HIS MP1,STT	Report modem port login state history
HIS AU1,STT	Report auxiliary port login state history

Each line of the history report has the following format:

access_port,date,time,application,status

The examples below illustrate how to clear the login state history for each access port:

CLH LP1,STT	Clear local port login state history
CLH MP1,STT	Clear modem port login state history
CLH AU1,STT	Clear auxiliary port login state history

Maintenance Reminder Management

From the T1.317 interface the maintenance reminders can be viewed and configured. Maintenance reminders are identified by the mnemonics MR01 through MR12. The following examples illustrate how to program a maintenance reminder:

CHA MR01,DAT=5/20/95	Change notification date to 5/20/95
CHA MR01,TIM=1:30am	Change notification time to 1:30am
CHA MR01,TXT=”Service the batteries”	Change the notification text

These commands will cause a maintenance reminder warning to occur at 1:30am on May 20, 1995. When the warning is reported by the WAR command, the text “Service the batteries” will be displayed in place of the warning description. To configure other maintenance reminders, replace MR01 with the proper identifier and change the date, time, and text accordingly. Warnings can also be configured to call out. See the object tables in the appendix for a complete list of maintenance reminder mnemonics including those programmed for call out.

To clear a maintenance reminder once it has occurred use the following command:

CLE MR01

Notepad Management

From the T1.317 interface both the user and super-user notepads can be viewed and configured. The mnemonic UNP is used to reference the user notepad and SNP is used to reference the super-user notepad. The notepad comment lines are configured a line at a time. The following examples illustrate how this can be done:

CHA UNP,CL01=”*** NOTIFICATION ****”

CHA UNP,CL02=”On Thursday the plant will be undergoing maintenance.”

These commands configure line 1 and 2 of the user notepad. To configure the super-user notepad, login as super-user and substitute UNP with SNP. The login header indicates whether there is a user or super-user notepad message that should be read. The header contains the lines:

UNP

STT=0
SNP
STT=0

These lines indicate the state of the user and super-user notepad state attribute identified as STT. To set the state to 1 use the following command:

CHA UNP,STT=1

The following command will display all the notepad attribute values including the comment lines:

STA UNP

Pass-through Mode

For most applications, only the connected equipment ID needs to be configured for pass-thru mode. When one of the standard equipment IDs is entered the rest of the parameters will be configured automatically. The following example illustrates how to configure the connected equipment ID:

CHA DS1,CID=”MCS”

This command identifies the connected equipment on data switch port 1 (DS1) as an MCS controller. For the other data switch ports substitute DS2, DS3, or DS4 for DS1. It may also be necessary to change the password used for the connected equipment. To do this, use the following command substituting your password for password:

CHA DS1,PWD=”password”

To enter pass-thru mode set the data switch port using the following command:

OPE DS1,STT=”PASS-THRU”

Periodic Status Call-Out Configuration

From the T1.317 interface the periodic status object, identified as PO1, can be viewed and configured. See the T1.317 object tables in the appendix for attribute mnemonics and other details. The following example illustrates how to configure periodic status call out:

CHA PO1,PHN=”222-3333”	Change phone number to 222-3333
CHA PO1,BDR=9600	Change baud rate to 9600
CHA PO1,DBT=8	Change data bits to 8
CHA PO1,PRY=N	Change parity to none
CHA PO1,SBT=1	Change stopbits to 1
CHA PO1,INT=”MONTHLY”	Change the interval to monthly
CHA PO1,TIM=”5:30am”	Change the time to 5:30am
CHA PO1,CL01=”HEADER”	Set the first command line to report the HEADER
CHA PO1,CL02=”ALA;WAR”	Set the second command line to report active alarms and warnings

Port Security Hardware/Software Switch Management

The state of both the hardware and software security switches can be viewed from the T1.317 interface. The software security switch can be set from the T1.317 interface. When viewing security switches from a T1.317 interface, the reason for limited access will be displayed in parenthesis as either HW for hardware switch, SW for software switch, or both. Listed below are the possible responses when viewing the state of the security switches.

0(HW,SW)	Access is limited by both hardware and software switches
0(HW)	Access is limited by the hardware switch
0(SW)	Access is limited by the software switch
1	Full access is allowed

The examples below illustrate commands that can be used to view security switch states or to change the software switch state:

STA MP1,WRE	View the modem access port security switch setting
STA LP1,WRE	View the local access port security switch setting
STA AU1,WRE	View the auxiliary access port security switch setting
CHA MP1,WRE=0	Set modem access port software switch to allow limited access.
CHA LP1,WRE=1	Set local access port software switch to allow full access.

The stae of the Enhanced Romote Security DIP switch can be viewed from software.

Rectifier Control Usage

To restart all rectifiers, issue the following command:

OPE DC1,RSS=1

To place a rectifier in the standby mode from the on mode, issue the following command:

OPE Gnn,STT=STANDBY

where nn = 01 to 64, identifying the particular rectifier to put in the standby mode

To place a rectifier in the on mode from the standby mode, issue the following command:

OPE Gnn,STT=ON

where nn=01 to 64, identifying the particular rectifier to put in the on mode.

To view the rectifier diagnostics, issue the following command:

DIA REC

To view the history of rectifier state changes, issue the following command:

HIS REC,STT

To clear the rectifier state history, issue the following command:

CLH REC,STT

To review the incidents of rectifier and plant alarms, issue the following command:

HIS DC1

To clear the rectifier and plant alarm history, issue the following command:

CLH DC1

Rectifier Management

The T1.317 interface allows configuration and management of all the rectifier parameters supported by the system. The information below provides examples of how to configure various rectifier parameters.

The following commands configure show how to configure rectifier 1 as a 570A serial rectifier and rectifier 9 as a commercial rectifier. Note that some of the commands are only needed when using the commercial rectifier interface.

Normal rectifier configuration:

CHA G01,TYP="570A"	Change rectifier 1 to a 570A type rectifier
CHA G01,SEQ=1	Enable rectifier 1 to be used when sequencing

Commercial rectifier configuration:

CHA G09,TYP="G400"	Change rectifier 9 to a 400A commercial rectifier
CHA G09,MNT="CC"	Change rectifier 9 manual off signal to a contact closure
CHA G09,SHV=50	Change rectifier 9 shunt voltage to 50 mV

Some rectifier parameters are configured at the plant level. The following commands illustrate how to configure some of these parameters:

CHA DC1,RSE=1	Enable automatic rectifier restart after RFA
CHA DC1,RSQ=1	Enable rectifier sequencing
CHA DC1,ROT=48	Change the all rectifier on threshold to 48 V
CHA DC1,ROD=10	Change the rectifier on delay to 10 minutes

The following commands are examples that illustrate how to configure the float mode thresholds for serial interface rectifiers and enables load sharing:

CHA GM1,LSE=1	Enable digital sharing state to enable
CHA GM1,FSD=60	Change the high voltage shutdown threshold to 60 V
CHA GM1,FSP=52.08	Change the float set-point to 52.08 V
CHA GM1,FCL=105	Change the float current limit threshold to 105%

In addition to configuring rectifier parameters, the T1.317 interface allows the user to organize rectifiers into bays. This is not necessary for normal rectifier operation except when using the SAPO interface.

The following commands show how to build a rectifier bay with 2 rectifiers. For help creating user defined events please see the section entitled "T1.317 User-Defined event Management" in this manual.

ADD RBY,RB1	Create a rectifier bay
LIN RB1 REC,G01,G02	Link rectifier 1 and 2 to the rectifier bay
LIN RB1 ICB,U0001	Link user-defined event 1 as the rectifier bay input circuit breaker

	state
LIN RB1 TMP,C701	Link a remote peripheral monitor as the bay temperature source

Rectifier State History Management

The rectifier state history can be viewed and cleared from the T1.317 interface. The following examples illustrate how to view and clear rectifier state history:

HIS DC1 REC G01,STT	Report rectifier 1 state history
HIS DC1 REC,STT	Report all rectifier state history
CLH DC1 REC G01,STT	Clear rectifier 1 state history
CLH DC1 REC,STT	Clear all rectifier state history

Each line of the history report has the following format:

identifier,date,time,status,description

Remote Peripheral Monitor Management

To support remote peripheral monitoring, the T1.317 interface provides module objects and channel objects. This section describes how to view and set some of the module and channel attributes. For a complete list of attributes see the object tables in the appendix of this manual. Listed below are identifiers of the remote peripheral module and channel object types:

VTM	Voltage Monitor Channels Types
SHM	Shunt Monitor Channels Types
TPM	Temperature Monitor Channels Types
BIM	Binary Monitor Channel Types
CRM	Control Relay Channel Types

The module object identifiers start with an M followed by two characters that indicate the module's address. For example, the identifier for the module at address 24 is be M24. The channel identifiers start with a C followed by a channel specifier and module address. For example, the identifier for channel 4 on the module at address 24 is C424. To view a list of the channels that exist in the system, it is useful to use the channel type specifier with the LIS (list) command as in the examples below:

LIS VTM	List the voltage monitor channels
LIS TPM	List the temperature monitor channels

The STA (status) command can also be used with the channel or module type identifier as in the following examples:

STA SHM,SHA,SHV	Show the shunt amps and shunt millivolt of all shunt channels
STA RPM,STT	Show the status of all peripheral monitoring modules

The channel values can be viewed by using either the STA (status) or MET(meter) commands. The examples below illustrate the use of these two commands:

STA C424,VAL	Show the value of shunt monitor C424
MET C424	Show the value of shunt monitor C424
MET SHM	Show the values of all shunt monitors

Module and channel objects are added to the system automatically when they are sensed. They will be deleted automatically if the module has not been locked. To force a module object and corresponding channel objects to be deleted simply detach the module and use the following command to unlock the module:

CHA M24,TLK=0	Change the type lock to 0 (disabled)

It may be useful to link a remote peripheral monitor channel to another object. For example, if C424 in the above example is connected to a rectifier shunt, it may be useful to have its value reported as a measurement of that rectifier. This can be done by linking C424 to that rectifier. The example below illustrates how this is done using rectifier 1 as an example:

ADD G01,LOAD	Add a linkable attribute called LOAD to rectifier 1
LIN G01 LOAD,C424	Link C424 to LOAD on rectifier 1

The commands above will cause the monitor channel's value to be reported as G01 LOAD when a report of rectifier G01 measurement values is requested. The examples below illustrate the commands that will do this:

MET G01
MET G01,LOAD

Reserve Time Prediction

This section describes how to configure and view the parameters that are related to the reserve time prediction algorithm. The reserve time parameters are all attributes of the DC Plant object identified as DC1. The examples below illustrate how to change and view these parameters:

STA DC1, RTM	Report the reserve time
CHA DC1,NST=4	Change the number of battery strings to 4
CHA DC1,CPS=24	Change the number battery cells per string to 24
CHA DC1,BTY=”IR-125”	Change the battery type to IR-125
STA DC1,TPP	Report if temperature probe is present (0:no 1:yes)
STA DC1,UBT	Report the universal battery temperature, if present
STA DC1,TRD	Report the total rectifier drain
STA DC1,VDC	Report the plant DC voltage
STA DC1,ADC	Report the plant DC current

The Reserve Time Too Low alarm is identified as RTL1 and is linked to the DC plant object. The example below illustrates how the alarm’s threshold can be set and how to check if the alarm is active:

CHA RTL1,THR=3	Change the reserve time too low threshold to 3 hours
ALA DC1	Report active DC plant alarms

To view the battery on discharge history, which includes the reserve time at the beginning of discharge, use the following command:

HIS DC1,BOD	Report the battery on discharge history

Security Event Management

The list below shows the three programmable events associated with security along with their mnemonic.

PFD1	Password At Default
EXL1	Excessive Login Attempts
EPR1	External Password Reset

All of these alarms are linked to the power system object PS1. The default severity of these events is warning. To see if any of these events are active use the command: WAR PS1. This command will report any active power system warnings. To clear these events use the commands:

CLE PS1 PFD or CLE PFD1
CLE PS1 EXL or CLE EXL1
CLE PS1 EPR or CLE EPR1

Security Level and Password Management

To change security levels from the T1.317 interface use the LOGIN command with either the user, super-user, or administrator passwords. Normally, only one login as the super-user or administrator level is allowed at a time. If an attempt is made to login as a super-user while someone else is logged in as a super-user or administrator this error message will be reported:

-226, ONE SUPER-USER/ADMINISTRATOR ALLOWED

To force a login as a super-user or administrator precede the password with an exclamation mark (!). The current security level is reflected by the command prompt as follows:

*	user security level
**	super-user security level
***	administrator security level

To change a password requires the administrator security level. To change a password login as the administrator and use the PAS command. See the T1.317 command description section of this manual.

Serial Access Port Management

The access ports are identified as LP1 for the local port, AU1 for the auxiliary port, and MP1 for the modem port. The commands listed below are examples that illustrate how to configure and view the access ports. For a complete list attributes see the object tables found in the appendix of this manual.

CHA LP1,BDR=2400	Change the local port baudrate to 2400
CHA LP1,HSH="SW"	Change the local port handshaking mode to software control

CHA LP1,APP=”EVENT LOG”	
	Change the local port application to event logging
STA LP1,APP	Check the status of the application attribute
STA LP1,STT	See if anyone is logged in to the local port

When viewing the application attribute of the local port the application will be indicated as well as the reason for that application. The table below defines the possible return values:

TERMINAL(HW,SW)	Set to terminal in software and hardware
TERMINAL(HW)	Set to terminal in hardware only
TERMINAL(SW)	Set to terminal in software only
EVENT LOG	Set to event log in both hardware and software

To access the login history log for any of the serial access ports use the commands listed below. For more information on the login history logs see the history section of this manual.

HIS LP1,STT	Report local port login history
HIS AU1,STT	Report auxiliary port login history
HIS MP1,STT	Report modem port login history

Statistics Usage

To view basic, trend, busy hour, or battery on discharge statistics, use the following command:

SUM <attribute name>

where <attribute name> is the name of the statistics set of entries. For example,

- SUM DC1,ADC displays the basic statistics for plant load
- SUM TR1 displays user configurable trend channel 1
- SUM BH3 displays user configurable busy hour channel 3
- SUM DC1,BOD displays the battery on discharge statistics

To clear basic statistics, use the following command:

CLS <attribute name>

To configure the source for the busy hour or trend statistics value (and clear the previous contents of the statistics channel, use the following command:

CHA <CHANNEL>,SRC=<SOURCE>

where <CHANNEL> is the name of the busy hour or trend statistics channel. Valid channel names are: TR1, TR2, TR3, TR4, TR5, TR6, TR7, TR8, BH1, BH2, BH3, and BH4 and <SOURCE> is the name of any instantaneous measured value.

To configure the busy hour statistics, in addition to the source, the following items must also be configured:

Starting date: any valid date in the future

Starting hour: starting hour in the range of 0 to 23

Timer Event Management

From the T1.317 interface timer events can be viewed and configured. Timer events are identified by the mnemonics T01 through T32. To use timer events they must be added and then configured: The following examples illustrate how this can be done:

ADD TME,T01	Add timer event 1
CHA T01,DAT=05/20/95	Change the event date to 5/20/95
CHA T01,TIM=1:30am	Change the time to 1:30am
CHA T01,DUR=60	Change the duration to 60 minutes

To add and configure other timer events replace T01 for the other timer event's identifier. To view the state of the timer event or any of the other attributes, use the STA (status) command as shown below:

STA T01,STT	Show the status of the timer event
STA T01,DAT,TIM	Show timer event date and time

To include the timer event in a user-defined event program line reference the timer event state as T01 STT when configuring the program line.

Upgrading the Intelligent Controller Software

To upgrade the intelligent software from the T1.317 interface, start by logging at the administrator security level. Then, enter the UPGRADE command and press the return key when the controller asks if you are sure you want to upgrade the software. The controller will then enter a special upgrade mode and respond with a press any key prompt. After a key press, the controller will display the following prompt:

A[bort] R[aw] X[modem]

Pressing A will abort the upgrade process by disconnecting the user. Pressing R will start an ASCII S-record upgrade session. When prompted to do so, start your local ASCII text upload session and send the .abs file from your software upgrade distribution disk. Pressing X at the prompt will start a binary Xmodem upload session. When prompted to do so, start your local Xmodem upload session and send the .bin file from your software upgrade distribution disk.

After the software upload has completed successfully the controller will begin reprogramming the EEPROM chips. Once reprogramming is completed the user is disconnected and the controller re-boots using the new software.

User-Defined Event Management

Configuring user-defined events from the T1.317 interface involves adding a user-defined event followed by setting the configurable attributes to their desired values. The examples below illustrate how this can be done:

ADD UDE,U0001	Add a user-defined event 1
CHA U0001,DES=”Upper Threshold Alarm”	Change the description
CHA U0001,LAT=1	Change the latched attribute to 1(yes)
CHA U0001,SEV=”MIN”	Change the severity to minor
CHA U0001,PRG=”C103 VAL > 54.00”	Change the program line

This example programs user-defined event 1 as a latched minor upper threshold alarm for peripheral monitor channel 1 at address 3. See the object tables in the appendix for a complete list of user defined event attributes and their acceptable values. The example below illustrates how to clear user-defined event 1:

CLE U0001

To clear other user-defined events simply replace U0001 with the event's identifier. It may be useful to link user-defined events to other objects. For example, if U0001 is a plant voltage alarm, it would be useful to have it reported as a DC plant alarm when the ALA command is used to report active DC plant alarms. This can be done by linking U0001 to the DC plant. The example below illustrates how this is done:

ADD DC1,VDCHI	Add a linkable attribute called VDCHI to the DC plant
LIN DC1 VDCHI,U0001	Link U0001 to VDCHI on the DC plant

The commands above will cause the active user-defined event U0001 to be reported as DC1 VDCHI.

Viewing Active Alarms

The T1.317 interface allows 3 commands that allow viewing of active alarms. Which command is used depends on the programmed severity of the alarm. If the severity is record-only the REC command is used to retrieve the active alarms referred to as record-only events. If the severity is warning then the WAR command is used to retrieve the active alarms referred to as warnings. If the severity is critical, major, or minor then the ALA command is used to retrieve the active alarms. See the T1.317 command language description for details regarding the syntax of these commands. The examples below illustrate how these commands may be used to retrieve active alarm information:

ALA	Retrieve all active alarms in the system
WAR DC1	Retrieve all active warnings linked to the DC plant
REC PS1	Retrieve all active record-only events linked to the power system object

Part 2

Galaxy SCF Controller (SC Front Access) J85501F-1

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

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Inventory
Low Voltage Disconnect
Maintenance Reminder
Notepad
Periodic Status Call Out
Rectifier Bays
Rectifier Manager
Rectifier Monitoring and Control
Remote Peripheral Monitoring
Security
Serial Access Ports
Slope Thermal Compensation
Software Upgrades
Statistics
Terminal Menu Interface
Timer Events
User Defined Events
Universal Reserve Time Prediction

AC Distribution

The controller supports monitoring of several ac distribution parameters. The ac distribution feature is configured through the T1.317 interface using EasyView and is viewed from the T1.317 interface or front panel.

This feature supports monitoring of the following parameters:

Phase voltages
Phase currents
Voltages between phases
Phase fail alarms
Master ac breaker alarm

Configuration of this feature involves linking remote peripheral monitoring channels or derived channels to the dc distribution, as well as linking user-defined events to the ac distribution alarms. Refer to Appendix A for examples on how this configuration is accomplished.

Alarm Cut-Off (ACO)

This feature provides a means for temporarily disabling the Power Critical, Power Major, and Power Minor Audible alarm contacts. ACO is useful for silencing local audible alarms while maintenance work is in progress. Power Critical, Power Major, and Power Minor severities can be individually enabled or disabled for ACO. An ACO time-out feature for each alarm severity level is included to remove the ACO automatically, setting the relays back to their active state after a programmable time.

ACO is active when Power Critical, Power Major, and Power Minor alarms are active. When all Power Critical, Power Major, and Power Minor alarms retire, ACO also retires. Any new Power Critical, Power Major, or Power Minor alarm disables ACO. The user may toggle the ACO state. The user must manually initiate ACO.

If alarms of different severities are active, only the highest severity power alarm contact will be active. On ACO time-out, the audible alarms are again activated, but only the highest severity audible alarm will be activated. If there are Power Critical and Power Major alarms active, and ACO is activated, the Power Major ACO timer may retire; if the Power Critical ACO timer has yet to time-out, there will be no active audible alarms. In addition, when all alarms of the highest severity retire, the audible alarm contacts will activate the new highest severity alarm level.

Every ACO activation and deactivation is logged in the system event log.

Alarm Cut-off (ACO) Parameters

The ACO feature parameters may be set via the T1.317 interface or the front panel.

Power Critical enabled	Enabled/disabled for Power Critical Alarms
Power Major enabled	Enabled/disabled for Power Major Alarms
Power Minor enabled	Enabled/disabled for Power Minor Alarms
State	toggling the ACO state

The following ACO features may be set/viewed only via the T1.317 interface:

Description	Description (default: Alarm Cut-off)
Power Critical time-out	From 0 to 4 hours, default: 1 hour; 0 means never time-out
Power Critical ACO state	Read-only Power Critical ACO state
Power Major time-out	From 0 to 4 hours, default: 1 hour; 0 means never time-out
Power Major ACO state	Read-only Power Major ACO state
Power Minor time-out	From 0 to 72 hours, default: 8 hours; 0 means never time-out
Power Minor ACO state	Read-only Power Minor ACO state

Alarm Test

The alarm test feature provides a means to sequentially assert user selected contact relays and to test and verify the complete alarms system interfacing the plant. In addition, the RFA test signal is sent to each rectifier. High Voltage may also be sent to each rectifier if its corresponding hardware and software DIP switch is enabled.

Alarm test is locally activated if the ALM TEST button on the front of the BJB basic controller processor board is depressed, and the plant is in normal mode (no Power Critical, Power Major, or Power Minor alarms active). Alarm test can be remotely initiated using a T1.317 command; however, there is another hardware and software DIP switch that can disable the remote T1.317 command entry of alarm test.

If alarm test is currently active, another alarm test command ends the previous alarm test and re-starts the alarm test. Any Power Critical, Power Major, or Power Minor alarm other than RFA or HV (which may be generated by the alarm test feature) aborts the alarm test.

Next, the user selectable list of alarm contacts is sequentially activated. The user can selectively enable each alarm contact for use in the alarm test. By default, all contacts are used in the alarm test. Each selected contact remains active for a duration of between 5 seconds and 5 minutes, the default value being 1 minute.

After the alarm test, if an RFA is not generated by a rectifier that processes RFA test, and the rectifier has a Galaxy Rectifier cable (with RFA test in the cable), the Galaxy reports the rectifier as failing the test and creates the Alarm Test Fail Warning.

All incidences of alarm test, alarm test fail, and alarm test abort are logged in the system history log.

The order of events of the alarm test are:

- Rectifier High Voltage Shutdown for 2 seconds
- RFA Test for 5 seconds
- User selectable alarm contact list in the following order:
  Power Critical (PCR)
  Power Major (PMJ)
  Power Minor (PMN)
  Major Fuse (MJF)
  Minor Fuse (MNF)
  Battery on Discharge (BD)
  AC Fail (ACF)
  Rectifier Fail Alarm (RFA)
  Very Low Voltage (VLV)
  High Voltage (HV)
  Controller (CTLR)
  User Relay 1 (UR1)
  User Relay 2 (UR2)

Each alarm contact being tested is displayed under the main menu - ALM TST STAT (basic controller only) and under the meas/stat menu.

Alarm Test Parameters

The alarm test function and the Simulate HV feature can be enabled or disabled from the front panel or the T1.317 interface.

The following alarm test features may be configured or viewed only via the T1.317 interface.

Description	Description (default: Alarm Test n)
State	Active alarm test state (1 = active; 0 = inactive)
Rectifier failure list	List of rectifiers that have failed alarm test
Remote alarm test enabled	Allow T1.317 initiated alarm test
Duration	Duration of each alarm contact (range: 5 seconds to 300 seconds/5 minutes; default: 60 seconds)
Power Critical enabled	Activate Power Critical alarm contact during alarm test
Power Major enabled	Activate Power Major alarm contact during alarm test
Power Minor enabled	Activate Power Minor alarm contact during alarm test

Major Fuse enabled	Activate Major Fuse alarm contact during alarm test
Minor Fuse enabled	Activate Minor Fuse alarm contact during alarm test
Battery on Discharge enabled	Activate Battery on Discharge alarm contact during alarm test
AC Fail enabled	Activate AC Fail alarm contact during alarm test
Rectifier Fail Alarm enabled	Activate Rectifier Fail Alarm alarm contact during alarm test
Very Low Voltage enabled	Activate Very Low Voltage alarm contact during alarm test
High Voltage enabled	Activate High Voltage alarm contact during alarm test
Controller enabled	Activate Controller alarm contact during alarm test
User Relay 1 enabled	Activate User Relay 1 alarm contact during alarm test
User Relay 2 enabled	Activate User Relay 2 alarm contact during alarm test

In addition, three alarm events are associated with the alarm test feature:

Alarm Test Active	Alarm test is currently active
Alarm Test Failed	Alarm test has failed (user clearable)
Alarm Test Aborted	Alarm test has been aborted by an alarm (user clearable)

Backup and Restore

The backup and restore feature allows the user to backup the system configuration as a series of T1.317 commands in an ASCII format. The ASCII format allows the user the flexibility to view and edit the configuration before restoring it. The user can backup and restore the system configuration from a T1.317 interface on the local, modem, or auxiliary access ports. Backup and restore is also supported on the auxiliary port using the TL1 protocol. Backup and restore may be done using the Xmodem protocol for reliable data transfer or in ASCII text.

The system configuration is backed up as a series of ADD, LIN, CHA, and ALI T1.317 commands. The restore process passes these commands through the T1.317 command line processor to be executed as if they had been entered from the command line.

During restore, output is not sent to the access port. If commands in the configuration backup file conflict with the current configuration of the system then those commands will be ignored. The restore feature is intended to take a controller from its default configuration to a custom configuration. It should be used after software upgrade or backup battery power loss. Restore will not directly affect the current state of the history logs, call-out, or statistics, except in the case where those features are affected by changes in parameter values.

Battery Bays and Sections

A battery bay consists of one or more battery sections. The controller supports up to 32 battery sections. A battery section is 1 or more battery strings connected to a common battery shunt. Each battery section contains the following items:

Contactor	Battery disconnect contactor (CN1, CN2, or no contactor). (See LVD feature)
Contactor state	Battery contactor state (See LVD feature). This is a read-only item.
Number of strings	Number of strings in the section. This item is used for the battery section reserve time prediction algorithm. (See Universal Reserve Time Prediction algorithm).
Battery type	Battery used in section. This item is used for the battery section reserve time prediction algorithm. (See Universal Reserve Time Prediction Algorithm).
Capacity	Maximum capacity of battery section in Ampere Hours. This is based on the number of strings in the section and the name-plate capacity of the battery type selected. This calculated item is for information purposes only.
Reserve time	Remaining battery reserve time for the battery section. (See Universal Reserve Time Prediction Algorithm).

Current	Discharge current for the battery section. The section current is used with the following features: low voltage load disconnect battery section reserve time prediction, and plant load calculations, when using only battery shunts for the plant.
Voltage	A built-in link point for the battery section voltage. If no monitoring point is linked to the section voltage, then the plant voltage is used for the battery section reserve time prediction algorithm. (See Universal Reserve Time prediction algorithm).
Mid-point voltage	A built-in link point for the battery section mid-point voltage. A monitoring point may be linked to this item. This item is for information purposes only.
Pilot cell voltage	A built-in link point for the battery section pilot cell voltage. A monitoring point may be linked to this item. This item is for information purposes only.
Charge current	A built-in link point for the battery section charge current. If two shunt module channels are used to monitor battery section current (one channel for charge current, and one channel for discharge current), then the charge current channel should be linked to this point. Using bipolar shunt modules would eliminate the need for two monitoring points, and the need to configure this item. This item and the discharge current link are used as the basis for the battery section current
Discharge current	A built-in link point for the battery section discharge current. If two shunt module channels are used to monitor battery section current (one channel for charge current, and one channel for

	discharge current), then the discharge current channel should be linked to this point. Bipolar shunt module channels should be used to monitor battery section current. This item and the charge current link are used as the basis for the battery section current.
Temperature	A built-in link point for the battery section temperature. If no monitoring point is linked to the section temperature, then the reserve time prediction probe temperature would be used as the section temperature, if applicable. The highest section temperature per contactor is used for the low voltage battery disconnect feature, slope thermal compensation, and the reserve time prediction algorithm.
Fuse status	A built-in link point for the battery section fuse status. This item is for information purposes only.

Boost

This feature provides the ability to operate the battery plant at a defined voltage rather than the float voltage. This is done by sending signals to the rectifiers that will cause them to switch between their float and second voltage level. The voltage levels are determined by the rectifier set points.

The battery plant voltage in boost mode may be higher or lower than in the float mode. *Higher than float voltage* boost may be used to rapidly recharge non-valve regulated lead acid batteries. *Lower than float voltage boost*, or Battery Thermal Protection (BTP), may be used to prevent thermal run-away on valve regulated lead acid batteries. Circuitry external to the controller is necessary to provide this feature.

Because the plant voltage is increased or decreased during boost (or BTP) modes, the controller also provides two voltage thresholds for the float and boost modes. Alarm thresholds that change going from float to boost (or BTP) modes are the battery on discharge (BD), the high float voltage (HFV), and the high voltage (HV) alarms. By default, the float and boost mode alarm thresholds are identical, and each alarm threshold must be changed prior to entering boost (or BTP) to avoid creating any of these alarms.

If the plant is in boost (or BTP) modes, and a rectifier fail alarm (RFA), HFV, or HV alarm occurs, boost mode is terminated. In addition, if an RFA, HFV, or HV alarm is currently active, the only method of entering boost is from the front panel. Boost and BTP modes are generally prevented during these alarms, in order to protect the rectifiers.

There are several different methods for entering boost or BTP modes. The controller supports the following boost (or BTP) methods:

Front Panel Boost:

From the front panel of the controller, place the plant in boost (or BTP) mode. Boost mode is entered even if there is an RFA, HFV, or HV alarm active. The plant will remain in boost (or BTP) modes until the operator manually takes the plant out of boost (or BTP) mode or future RFA, HFV, or HV alarms occur.

External BTP Circuitry:

External battery thermal protection circuitry places the plant in BTP or float mode. A software DIP switch enables and disables external BTP boost.

External Timer Circuitry:

External timer circuitry places the plant in boost (or BTP) or float modes. A software and hardware DIP switch enables and disables External Timer boost.

With the addition of the intelligent controller, the controller provides the following methods of entering boost:

Timed Manual Boost:

The operator from the T1.317 interface places the plant in boost mode for the specified duration in hours.

NOTE **Note that for timed manual boost, the method of entering boost from the EasyView software, the boost (or BTP) mode is initially disabled by RFA, HFV, and HV alarms. The only**

method of entering boost (or BTP) while these alarms are active is to enter boost via the front panel.

Timed Auto Boost:

Timed auto boost is a method of automatically recharging batteries after a battery discharge. At the end of the discharge (battery on discharge alarm retires), the plant will automatically recharge the batteries for a time period that is a user specified multiple of the battery discharge duration. The battery discharge (battery on discharge alarm) must last at least four minutes before entering auto timed boost.

Quiescent Recharge Current Terminated (QRCT) Boost:

If the boost auto mode selected is QRCT, the plant will automatically enter boost mode if either of the following conditions occur:

- Battery voltage drops below a user specified voltage threshold after the first five minutes of the start of a battery discharge event.
- The total current flowing into or out of the batteries exceeds a user specified current threshold.

For QRCT, a battery discharge event occurs when the sum of the battery shunt currents exceeds 2% of the total shunt nominal full scale current rating. The current is defined as the battery section current. Refer to the battery section configuration for more details on configuration.

The plant will remain in boost mode until the first of the following conditions occurs:

- Number of hours since the plant entered the boost mode has exceeded the user specified value (This the timed manual duration parameter, 0 indicates no time limit).
- The absolute value of the current gradient (slope) (change in current/change in time) drops below a user specified value (0.00 amps/hour indicates no limit).

With QRCT boost, the plant will remain in boost for at least 45 minutes while the controller gathers enough data to make exit calculations.

NOTE **If the plant is placed in boost mode for any reason, and the boost auto mode of QRCT is selected, the plant may exit boost because of the QRCT exit conditions.**

QRCT mode and Battery Thermal Protection Boost are incompatible; when BTP is enabled, QRCT is disabled.

There is a software and hardware DIP switch for the boost (or BTP) modes that will disable all forms of entry into boost (or BTP) mode.

Any condition described above, when enabled, can cause the galaxy to enter boost (or BTP). Once in boost (or BTP) mode, any method described above can take the plant out of boost.

There is a boost history that consists of the boost start date and time, the reason for entering boost, the reason for exiting boost, and the boost duration.

Boost Modes

There are four boost (or BTP) modes of operation. The boost mode are used as the boost state, and the entrance and exit reasons for the boost history.

The boost modes are:

BTP	Battery Thermal Protection is the boost mode when BTP is enabled and active.
QRCT	QRCT is the boost mode when the plant is in boost mode and QRCT is the auto mode selected and BTP is disabled.
TIMED AUTO	Timed auto boost is the boost mode when the plant is in auto timed boost.
MAN	Change mode by a discrete external or user signal
OFF	When the plant is not in boost

Boost Qualifying Reasons

BTP, QRCT, and MAN boost modes have the following qualifying reasons that indicate the boost entrance and exit conditions:

EXTERNAL	External Timer Boost Circuitry
BTP	External BTP Circuitry
MANUAL	Front Panel
TIMED	Enter or exit boost for a designated time period
ALARM	RFA, HV, or HFV alarms caused boost or BTP exit
REMOTE	Operator requested boost entry or exit from T1.317 or EasyView
FEATURE	Boost BTP feature was disabled while active

Boost Parameters

The boost (or BTP) feature parameters may be set via the T1.317 interface or the front panel.

Boost Enabled	Parameter enabling and disabling any form of boost or BTP entry. The hardware status can also be viewed.
BTP Enabled	Parameter DIP switch to enable/disable external BTP circuitry
Timer Boost Enabled	Parameter enabling and disabling external timer boost or BTP entry or exit. The hardware status can also be viewed.
Plant State	Parameter to toggle between boost (or BTP) and float states

The following boost (or BTP) parameters may be set/viewed only via the T1.317 interface:

Auto Mode	“TIMED” indicating Timed auto boost, “QRCT” indicating QRCT auto mode “OFF” indicating no form of auto boost is selected.

Timed Manual	Duration for timed boost, default value is 8 hours, range is 0 to 80 Duration hours, 0 is forever
Auto Multiplication Factor (AMF)	For timed auto boost, boost duration = bd duration * AMF; default value is 5, range is 1 to 9
Voltage Threshold QRCT	Quiescent boost entrance voltage threshold. 24 volt plant range is 20 to 30 volts, default 26 volts. 48 volt plant range is 40 to 60 volts, default 52 volts
Current threshold QRCT Boost	Boost entrance battery current threshold. Default value 50 amps
Current/Time threshold	QRCT boost exit current gradient threshold. Default value 0.0 amps/hour

T1.317 Boost Usage

To activate boost or BTP, use the following command:

OPE DCP,STT=BOOST   or

OPE DCP,STT=BTP

To return to float mode, use the following command:

OPE DCP,STT=FLOAT

To view the boost or BTP history, issue the following command:

HIS BST

To clear the boost or BTP history, issue the following command:

CLH BST

Call-out on Alarm

The call out feature allows the user to program the controller to call-out via the modem port when an alarm occurs or retires. The user can configure up to 4 phone numbers for call-out and an alternate number to call if any of the others fail to connect. In addition, each alarm can be configured to call-out only if the alarm remains active for a programmable amount of time and to call-out periodically while the alarm condition persists.

Call-out Phone Number Configuration Parameters

There are five call-out phone numbers in the system identified as P1, P2, P3, P4, and A1. The A1 phone number is an alternate phone number that is called in the event that any of the other numbers fail to connect. Call out phone number configuration involves defining a phone number and setting the communication parameters to be used when that phone number is called. For each call-out phone number, including the alternate phone number, the following parameters may be configured:

Type	Range: Data or Pager
Phone Number (up to 25 characters)	Default: none Valid Characters: 0-9 ( ) - # * , (, translates to a 2 second delay)
Connect Baud Rate	Range: 300, 1200, 2400, 4800, 9600, 14400 Default: 2400
Data Bits	Range: 7 or 8 Default: 8
Parity	Range: odd, even, none Default: none
Stop Bits	Range: 1 or 2 Default: 1
Pager ID Delay	Range: 0 to 9 seconds Default: 0
Pager ID (up to 25 characters)	Default: none

Notes on Call-out to Pagers:

When the phone number type is configured as a pager number, any alarm may be configured to call-out to the pager number when the alarm occurs and/or retires. When the alarm call-out condition occurs, the controller will dial the configured phone number and wait 30 seconds for 10 consecutive seconds of silence. Silence is defined as no rings, beeps, voice, or other sources of noise. If the pager service provides 10 seconds of silence, the controller will wait the number of seconds configured as the pager id delay, to wait out the pager service out-going message, and then output the configured pager id. If the pager service does not provide 10 seconds of silence while waiting for the pager id, the controller will not send the pager id and will consider the call-out attempt failed. Please see the section entitled “Call-out on Alarm Algorithm” for a description of how the controller handles failed call-out attempts.

Alarm Call-out Configuration Parameters

Once a phone number is configured it can be used as a call out destination for an alarm. For most alarms the following parameters may be configured:

Nag Interval (interval in which to call-out on alarms that remain active)	Range: 15 to 60 minutes Default: 15 minutes)
Notify Delay (minimum number of seconds alarm is active before call-out)	Range: 0 to 540 seconds Default: 0
Notify on Occur (call-out when alarm occurs)	Range: 0(no) 1(yes) Default: 0(no)
Notify on Retire (call-out when the alarm retires)	Range: 0(no) 1(yes) Default: 0(no)
Nag on Occur (call-out periodically if the alarm persists)	Range: 0(no) 1(yes) Default: 0(no)
Notification Destination (call-out destination phone numbers)	P1 for phone number 1 P2 for phone number 2 P3 for phone number 3 P4 for phone number 4 default: none

NOTE **The alternate phone number cannot be configured as a destination. This is because the alternate phone number is called automatically when call-out to any of the phone numbers in the destination list fails.**

Call-out on Alarm Algorithm

Assume that an alarm has been configured to call-out on P1 when the alarm occurs. When it occurs, the Galaxy will call out to P1. If P1 cannot be reached, Galaxy will then report the alarm to A1 (if provided). If A1 is reached and the alarm has been reported, Galaxy will not call the primary number again.

However, if the system cannot reach A1 or if A1 is not provided, the system will wait 12 minutes before it tries to call the first primary number again. There can be a total of three 12 minute delays. If Galaxy is still unable to reach the destination, the alarm will be deleted from the call out queue and a Number Did Not Respond event will be issued. When a connection to a phone number is successful, all alarms pending call out to that number will be reported at that time.

The call out on alarm feature can handle up to 256 events, which should be sufficient for most systems. In the unlikely event that alarms occur/retire faster than the call out on alarms feature can send them to the remote user, it is possible to fill the 256 event memory. If this happens, the last event after the memory became full will not be called out, and a user clearable Queue Overflow event will be issued. Normal operation will resume as soon as calls are completed and call out events are removed from the memory.

Alarms Generated by Call-out

There are three alarms that indicate problems in the call-out feature. These alarms are Queue Overflow, Number Did Not Respond, and Number Not Configured. Each alarm is described below.

Queue Overflow

This alarm occurs when there are too many alarms waiting to call-out. This problem is most likely to occur in systems with many alarms changing state and where programmed phone numbers are not responding. The default severity for this alarm is warning.

Number Did Not Respond

This alarm occurs when a primary and alternate phone number fail to connect at least three times in a row. This problem is likely to occur if the phone cables are not connected currently, the Galaxy did not detect 10 seconds of silence after dialing, or if the destination phone is off hook. The default severity for this alarm is warning.

Number Not Configured

This alarm occurs when a phone number is listed as the notification destination of an alarm but does not have phone number defined. To avoid this alarm always configure the phone numbers before configuring the alarms to call-out. The default severity for this alarm is warning.

Controller Failure

If the basic controller fails or is removed, the following responses occur:

- The plant mode will revert to float mode.
- The energy management algorithm is inoperative.
- Plant voltage and current monitoring is lost.
- Office alarm monitoring is lost.
- All the alarm relays operate.
- The front panel no longer works.
- The front panel LEDs no longer work.
- Alarm Cut-Off (ACO) no longer works.
- The intelligent controller continues to operate normally and can be accessed via the local, modem, and auxiliary ports.
- The Basic Controller Circuit Pack Failure Alarm (Power Major) is created.

If the intelligent controller fails or is removed, the following responses occur:

- All LEDs and alarm relays activated at the time of failure or removal will remain activated until the alarm relay activation condition is removed and either the basic controller is reset or the intelligent controller becomes operational again.
- The plant mode will revert to float mode.
- The basic controller will assume control of the front panel display (simplified feature set).
- The energy management algorithm is inoperative.
- Alarm test is aborted.
- Signals are retired.
- The Intelligent Controller Circuit Pack Failure Alarm (Power Major) is created.

Converter Management

The controller provides support for up to 8 converters on the serial rectifier interface bus. Support is organized into two levels: converter plant support and individual converter support.

Converter Plant

At the plant level the Galaxy provides access to the converter plant output voltage, total converter drain, and low voltage disconnect (standby) feature. The low voltage disconnect feature allows the controller to automatically place the converters into standby when the input voltage rises above a configurable threshold.

The following is a list of the configurable converter plant parameter:

Output voltage	default: 50.0V range: 48.0V to 52.0V
Low voltage disconnect threshold	default: 23.0V range: 20.0V to 23.0V
Low voltage reconnect threshold	default: 25.0V range: 22.0V to 27.0V
Low voltage disconnect enable	default: disable range: disable, enable

The following is a list of additional converter plant parameters that may be viewed:

Converter plant output voltage

Total converter drain

Total converter capacity

Converter related alarm conditions, such as failure, distribution fuse open, or id conflict, appear as converter plant alarms. These alarms may be programmed to call out or configured just as other alarms are in the system.

Individual Converters

The controller automatically senses when converters are present and connected to the serial rectifier interface bus. The controller will assert a CFA alarm when a converter is removed from the system. To clear the alarm the converter must be removed from the system by explicitly setting its state to VACANT. The controller provides access to individual converter parameters and control over the state of individual converters. Individual converters may be placed into standby and removed from the remote interface. The following is a list of converter parameters:

Converter drain
Converter capacity
Converter state (ON, OFF, STANDBY, or VACANT
Converter fail
Converter distribution open
Converter id conflict

Data Switch

The data switch feature gives remote access via a Galaxy access port to equipment connected to the Galaxy at any of four data switch RS-232 ports. This feature can operate in a mode or in an alarm reporting mode.

In pass-through mode data is passed between a Galaxy access port and the assigned data switch port as if there were a direct link from the access port to the connected equipment. While in pass-through mode the Galaxy monitors the data stream for the RBYE command. The RBYE command tells the Galaxy to close down the connection between the access port and the connected equipment by sending a hang-up command.

In alarm reporting mode the Galaxy can be configured to sense alarms on the connected equipment and report those alarm conditions over the modem access port. Alarms are sensed by the assertion of the alarm signal from the connected equipment. While the alarm is asserted the Galaxy will poll the connected equipment and check if the alarm state of the connected equipment has changed. If it has changed, the Galaxy will call-out again to inform the customer of the changed alarm condition if configured to do so. The data switch can be configured to call-out when the alarm occurs, when the alarm retires, or both.

Data Switch Configuration Parameters

This data switch feature may be configured via the T1.317 interface. The following are parameters that can be configured for the data switch feature. The communication parameters are defined for communication between the data switch port and the connected equipment.

Description	Description (default: Connected Equipment n) connected equip ID up to 6 characters used to identify the equipment attached to the port. GALAXY, OMNI, ECS, MCS, XCS, and RAS are recognized by the GALAXY and will provide automatic configuration. (default: GALAXY)
State	N/A, IDLE, PASS-THRU, or REPORT. The user enters pass-through by setting this parameter to PASS-THRU. If the current state is REPORT, the data switch is in the process of retrieving an alarm report from the connected equipment. An attempt to enter pass-through in this state is denied.
Reporting enabled	0:disable 1:enable When alarm reporting is enabled the connected equipment's alarm signal will be monitored.
Baud rate	300, 1200, 2400, 4800, 9600, or 19200 supported (default: see below)
Databits	7 or 8 supported (default: see below)
Parity	None, odd, or even supported (default: see below)
Stop bits	1 or 2 supported (default: see below)
Monitor dsr	0:no 1:yes monitor the connected equipment's dsr signal as an indication that the connected equipment is present
Handshake	None, hardware, or software (default: none)

Attention prompt	A command string that will get the attention of the connected equipment. This is usually some newline character sequence. Up to 12 characters are supported. An escape character is represented as '\[', a carriage return is specified as '\r', and a line feed is specified as '\n'. A 1/2 second pause can be inserted into the command string by '\,' and a 2 second pause can be inserted into a command string by '\.'. Up to 12 characters. (default: see below)
Password	The password is the keyword used to get into the connected equipment. It is not visible at the user security level. The length is up to 20 characters. (default: see below)
Alarms command	This string is used to instruct the connected equipment to send a report of active alarms. Up to 30 characters. (default: see below)
Header size	Number of \r terminated lines in the alarm report header. The header will be ignored when determining whether the alarm state has changed or not. (default: see below)
Hang-up command	This string is sent to the connected equipment to terminate the connection. Up to 20 characters. (default: see below)

Defaults

When the connected equipment ID configuration parameter is set to either GALAXY, OMNI, ECS, MCS, RAS, or XCS, the following parameters are set to the default values listed below:

	Galaxy	OMNIpulse	ECS	MCS	RAS	XCS
Baud rate	9600	9600	9600	1200	1200	1200
Databits	8	8	8	7	7	7
Parity	None	None	None	Odd	Odd	Odd
Stopbits	1	1	1	1	1	1
Monitor dsr	1	1	1	1	1	1
Handshake	No	No	No	No	No	No
Attention	"\r\,\r"	"\r\,\r"	"\r\,\r"	"\r\,\r"	"\r\,\r"	"\r\,\r"
Password	"LINEAGE\r"	"POLLING\r"	"POLLING\r"	"LINEAGE\r"	"LINEAGE\r"	"LINEAGE\r"
Alarms cmd	ALMS\r"	ALMS\r"	ALMS\r"	ALMS\r"	ALMS\r"	ALMS\r"
Header size	0	9	6	1	7	0
Hang-up	"BYE\r"	"BYE\r"	"BYE\r"	"BYE\r"	"BYE\r"	"BYE\r"

Data Switch Alarm Configuration Parameters

In addition to the configuration parameters listed above, each data switch port has a connected equipment alarm associated with it with the following parameters:

Identifier	CEA1 for data switch port 1 CEA2 for data switch port 2 CEA3 for data switch port 3 CEA4 for data switch port 4
Description	Configurable up to 30 characters
Alarm state	Indicates the connected equipment alarm state: 0:inactive 1:active
Severity	Configurable as critical, major, minor, warning, or record-only. (default: minor)
Notify on occur	Configurable as 0 for no and 1 for yes (default:0)
Notify on retire	Configurable as 0 for no and 1 for yes (default:0)
Nag	Configurable as 0 for no and 1 for yes (default:0)

Nuisance delay	Configurable as 0 for none or 1 to 10 minutes (default:0)
Destination	Configurable call out destinations: P1, P2, P3, P4 (default: none)

When an active alarm is reported via call-out or a T1.317 command, the full alarm report from the connected equipment is reported. When the alarm is retired the standard Galaxy format is used. If an attempt to log into the connected equipment fails then the active alarm condition will be reported in the standard Galaxy format.

Pass-through Mode

The following parameters must be configured correctly before entering pass-through mode: baud rate, data bits, parity, stop bits, handshaking, attention prompt, password, hang-up command, and monitor dsr. When pass-through mode is entered from a T1.317 interface, the controller does the following:

- Initializes the data switch port using the configured communication parameters
- Sends attention string to data switch port
- Sends password to data switch port
- Continuously passes data between the two ports while monitoring the access port data stream for the RBYE\r character sequence.
- Upon seeing the RBYE\r sequence, issues the hang-up command string to the connected equipment.

Alarm Reporting Mode

All of the configurable parameters for both the data switch port and alarm should be configured be fore entering alarm reporting mode. After entering alarm reporting mode the controller does the following:

- Waits for data switch alarm signal to go low
- Initializes the data switch port using the configured communication parameters
- Sends attention string to data switch port
- Sends password to data switch port
- Sends alarm command to data switch port
- Stores alarm command response in a buffer
- Sends hang-up command to data switch port
- Asserts the connected equipment event (call-out if configured)

After doing this the controller will poll the connected equipment every minute to check for changes in the alarm report. Polling will stop when the alarm signal returns high. At this time the Galaxy will retire the connected equipment event and call out if configured to do so.

If the monitor dsr parameter is set to 1(yes) and the dsr signal is not present the Galaxy will continue to monitor the alarm signal but will not retrieve an alarm report from the connected equipment. Alarms from the connected equipment may be viewed in the call-out report or in the active alarms report. In these reports the alarm report line for the connected equipment alarm is followed by the connected equipment's alarm response in the following format:

:BEGIN	Indicates the beginning of the connected equipment alarm report
Alarm Report Body	Up to 1000 characters received from the connected equipment
:END	Indicates the end of the connected equipment alarm report

DC Distribution

The controller supports monitoring of the dc distribution alarm status. This may be configured through the T1.317 interface using Easy View and viewed from the T1.317 interface or front panel.

Configuration of this feature involves linking a user-defined event to the dc Distribution fuse status alarm. For examples on how this configuration is accomplished please see the section of this manual entitled “T1.317 DC Distribution Management.”

Derived Channels

The Derived Channels feature is provided to group together a number of system measuring values through the use of an arithmetic program line to derive meaningful data to the user's application. The feature is only available on the intelligent controller. The system supports a total of 32 Derived Channels. You may enter a program line for each Derived channel; the program line is an arithmetic expression that can take the following entries:

- Parenthesis, +, - , *, /

- Numbers are accepted.
- Plant analog attributes: dc1 vdc (plant dc voltage), dc1 adc (plant dc current), dc1 trd (plant total rectifier drain), dc1 ubt (plant Universal Battery temperature).
- Rectifier current value: gxx adc, where xx is from 01 to 24.
- Remote monitor value attribute: cxyy val, where x is from 1 to 7, yy is from 01 to FF.
- Derived channels value attribute: dxx val, where xx is from 01 to 32, except self recurse. For example: (c208 val + c308 val + dc1 vdc)/3.0

The program line can have up to 60 characters; the number of operators and operands combined cannot exceed 10. To delete a program line of an UDE, the set the program line to double quotes with nothing in between (““). A program line that contains some invalid operands will activate the **Invalid program Expression system alarm.** For example, if the program line contains **c308** (channel 3 of remote Peripheral module 08) and you remove the module from the system, the program line is invalid. Each Derived channel has basic statistics associated with it, and you can configure any of the 32 Derived Channels for Busy hour statistics or Trend statistics. Please refer to the section on statistics for details.

Energy Management

The energy-management algorithm matches the number and ampacities of all available battery plant rectifiers to the actual plant load requirements, favoring the shutdown of smaller, less-efficient rectifiers when plant load requirements are low enough to warrant selected rectifier shutdown, thus maintaining the battery plant at maximum efficiency without sacrificing reliability or creating nuisance alarms. The controller continuously monitors the number of connected rectifiers, their individual ampacities, the actual output current being delivered by each and the actual office load-current demand. With this information, the algorithm strives to maintain the following relationship:

$$\Sigma C_{Ron} \geq \max (I_{Load\ or}\ \Sigma I_{Ron}) \times 1.04$$

Where,
ΣC_{Ron} = sum of ampacities of all rectifiers turned on
and
ΣI_{Ron} = sum of outputs of all rectifiers turned on

The energy-management algorithm compares the plant load current (I_{Load}) with the sum of output currents being delivered by all rectifiers presently connected and turned on (ΣI_{Ron}). The controller then multiplies the larger of these two values by 1.04 and shuts down unneeded rectifiers to just meet the terms of the inequality of the equation with the sum of the ampacities of the remaining rectifiers that are left running. In this manner, the larger, more-efficient rectifiers are allowed to remain running at or near maximum load, where individual efficiencies are highest. But unneeded rectifiers are not neglected, either. To ensure that all rectifiers are operational when eventually called upon for service, the algorithm exercises all rectifiers on a monthly basis, guaranteeing that every connected rectifier is operated for at least 24 hours each month. All connected rectifiers that have not operated a total of 24 hours in the previous monthly cycle will turn on the first Wednesday of the next month at 10:00am for 24 hours.

Needless turning off of rectifiers due to short-term swings in plant load are eliminated by restricting the shutdown of rectifiers to 10-minute intervals. After initially powering up a Galaxy controlled battery plant, the unneeded rectifiers are shut down one at a time, at 10-minute intervals. The smallest ampacity rectifiers are turned off first, leaving the minimum number of larger ampacity rectifiers on. On the other hand, sudden large increases in plant loads will immediately be accompanied by a rectifier being turned on. During the 10-second rectifier walk-in (gradual warm-up), the BD (battery on Discharge) alarm is inhibited to prevent nuisance alarms. To reduce turn-on/turn-off stress on any rectifier, no rectifier is permitted more than three on-off cycles per day by the energy management routine. Rectifiers in standby mode (through their front panel switch control) will not be turned on by the energy management algorithm. The energy management routing uses a hardware and software DIP switch to disable the algorithm. The algorithm is also disabled when either a Battery on Discharge (BD) alarm occurs, the rectifiers are boost charging batteries, attached rectifiers are not configured in the system, or attached rectifiers do not provide a VI or shunt signal compatible with the associated rectifier interface board. If the energy management algorithm is DIP switch enabled and then disabled due to a BD condition, the controller generates the Efficiency Disabled warning.

The energy management feature may be enabled via the T1.317 interface or from the front panel. The energy management enabled parameter shows the state of the hardware and software DIP switches for energy management. The energy management state shows the state of the energy management algorithm (e.g., the algorithm could be enabled by both DIP switches, but could be disabled due to a BD condition.)

History

The history logs allow the user to record a number of alarms and events that occur in the system, including rectifier state history, battery discharge history, boost history, and login history. The user can control history log reports by specifying chronological order, specific alarms/events, grouping similar alarms, or by limiting the report to events between specific dates. When history logs are clear in whole or part, the history logs cleared alarm becomes active. The history logs may be viewed and cleared from the local port, modem port, auxiliary port, or front panel.

Alarm

Alarm history maintains a record of the date, time, and severity of critical, major, minor, warning, and record-only events. An entry is added to the history when an alarm occurs and when an alarm retires. The table below defines how many entries are retained for plant alarms, user defined events, and other alarms.

	# of entries
Plant Alarms	256
User Defined Events	256
Other Alarms	64

Normally alarm history entries are reported in order from the newest entry to the oldest entry. However, from the access ports entries for the same alarm can be grouped together, the report can be limited to a specific range of dates, the entries can be ordered oldest first, and the report can be limited to specific alarms. The history report includes the following information:

Identifier	A mnemonic that uniquely identifies the alarm
Date	Date entry was made
Time	Time entry was made
Severity	Alarm severity (critical, minor, major, warning, record-only)
Description	A short description of the alarm.

Rectifier State

The rectifier state history maintains a record of the date and time of every rectifier state change. An entry is added to the history when any of the rectifiers change state. The latest 256 state entries are retained. The history report includes the following information:

Identifier	A mnemonic that uniquely identifies the alarm
Date	Date entry was made
Time	Time entry was made
Status	New status (ON, OFF, STANDBY, VACANT)
Description	A short description of the rectifier

If the status is OFF or STANDBY a cause may be included in parenthesis after status.

Battery Discharge

The battery discharge history maintains a record of the date, time, and duration of battery discharges. An entry is added to the history at the end of each discharge cycle. The latest 16 discharge cycles are retained. The history report includes the following information:

Date	Date discharge started
Time	Time discharge started
Load	Average load during discharge
Duration	Duration of the discharge in hours and minutes
Reserve_time	Remaining reserve time at end of discharge in hours and minutes(optional)

Boost State History

The boost state history maintains a record of the date, time, and duration of the plant boost state. An entry is added to the history at the end of each boost cycle. The latest 16 boost cycles are retained. The history report includes the following information:

Date	Date boost started
Time	Time boost started

Start_mode The mode that initiated the boost:

EXTERNAL	External timer
BTP	Battery thermal protection
MANUAL	Front panel
TIMED MANUAL	Timed boost started from an access port
TIMED AUTO	Automatic post battery discharge time based

End_mode The condition that caused boost to terminate:

EXTERNAL	External timer
BTP	Battery thermal protection
MANUAL	Front panel
TIMED MANUAL	Timed boost started from an access port
TIMED AUTO	Automatic post battery discharge time based
ALARM	Aborted due to alarm condition
REMOTE	Aborted from access port
FEATURE	Aborted due to boost feature disable

Duration Duration of the boost state in hours and minutes

Login State History

The login history maintains a record of dates and times the system has been accessed via the local port, modem port, or auxiliary port. An entry is added to the history when the user logs into the system and when he logs out. The latest 48 entries are retained. The history report includes the following information:

Identifier A mnemonic that identifies the access port:
LP1 for local port
MP1 for modem port
AU1 for auxiliary port

Date Date entry was made

Time Time entry was made

Application Login application: TERMINAL(T1.317) or TL1

Status Status of the login:

USER	T1.317 user
SUPER-USER	T1.317 super-user
ADMINISTRATOR	T1.317 administrator
LOGIN	TL1 login
LOGOUT	login terminated
FAILED	login attempt failed

Inventory

The inventory feature provides a database for the user to keep a record of the system configuration and maintenance history. Fields are provided for specific information. However, the user may enter whatever information he chooses into these fields as long as that information does not exceed the field size. The list below shows the inventories supported by the system. Reference the object tables in the appendix for the fields supported in each inventory:

- Plant Inventory
- Rectifier Inventory
- Controller Option Inventory
- Remote Peripheral Monitor Inventory
- Reserve Battery Inventory
- Battery String Inventory
- Distribution Bay Inventory
- Panel Inventory
- Slot Inventory

All inventory fields, except for identifiers and descriptions, default to empty. Some inventories should be linked together to show the relationship between them. The reserve battery and battery string inventories should be linked together to show that the battery strings are part of the reserve battery inventory. The distribution bay, panel, and slot inventories should also be linked together to show that the bay contains panels that in turn contain slots for fuses and circuit breakers. This linking operation is made easy with the Easy View program.

The plant inventory and rectifier inventory inventories exist in the system by default. The controller option, remote peripheral monitor, reserve battery, battery strings, distribution bay, panel, and slot inventories are added as needed. As an example, the following steps would add and build a distribution bay inventory with one panel and one slot:

- Add distribution bay inventory object to the system
- Add panel inventory objects to the system

- Link the panel inventory objects to the distribution bay object
- Add a slot inventory object for each slot
- Link each slot to its corresponding panel

Low Voltage Disconnect (LVD)

The controller supports low voltage battery disconnect and/or low voltage load disconnect using the User Relay 1 (UR1) and the User Relay 2 (UR2) contacts. The controller allows each contact to be either a load disconnect, a battery disconnect, or for use as a user programmable alarm contact.

Low Voltage Load Disconnect (LVLD)

The low voltage load disconnect feature disconnects the load associated with a contactor when the plant voltage drops below a user programmable disconnect threshold. The load is reconnected when the plant voltage is at or above a user programmable reconnect threshold and there are no phase alarms and AC Fail alarms active.

Load shedding is when different loads are disconnected at different voltages. Less important loads are disconnected at a higher disconnect threshold. The controller can perform load shedding with two different voltage disconnect contacts.

Low Voltage Battery Disconnect (LVBD)

The low voltage battery disconnect feature disconnects the battery sections associated with a contactor, when the plant voltage drops below a user programmable disconnect threshold. The battery sections are reconnected when the plant voltage is at or above the user programmable reconnect threshold.

In addition, there is a high temperature disconnect threshold that is also associated with battery contactors. With the intelligent controller, battery sections can be created and associated with a disconnect contactor, and a temperature. If any battery section temperature is higher than the high temperature disconnect threshold, then that particular battery disconnect contactor is opened. If the intelligent controller is not present, or battery sections, or temperatures for battery sections are not defined, the universal battery temperature probe is automatically associated with the contactor. The contactor is closed when all battery section temperatures associated with the contactor are at least 3 degrees Celsius below the disconnect threshold, and there are no Phase alarms or AC Fail alarms active.

If there are two battery disconnect contactors, the operator can optionally open one contactor for battery maintenance. The operator can then close the contactor, when maintenance is completed.

The operator can select any combination of contactor types or contactors associated with UR1 and UR2.

When a contactor is defined as a battery or load contactor, the user programmable alarms associated with contactor are immediately disabled, and if applicable, a User Relay Conflict Warning is created. The alarm is cleared when all alarms are disassociated with contactor.

The following items are associated with the LVD feature:

Type	BATTERY - contactor is a LVBD contactor
	LOAD - contactor is a LVLD contactor
	NONE - for contactor 1, UR1 may be used with user programmable alarms for contactor 2, UR2 may be used with user programmable alarms
Status	CONNECTED - the contactor is closed.
	CONNECTED(FAILED) - the contactor is open, but was commanded to be closed.
	DISCONNECTED(LV) - the contactor is open because the plant voltage was lower than the disconnect threshold.
	DISCONNECTED(HT) - the contactor is open because the battery temperature was higher than the high temperature disconnect threshold. (Used only for LVBD contactors).
	DISCONNECTED(MT) - the contactor is open from user requested maintenance. (Used only for 2 LVBD contactors).

	DISCONNECTED(FAILED) - the contactor is closed, but was commanded to be open. There can be any combination of disconnected reasons.
Disconnect threshold	The voltage that the LVBD or LVLD contactor opens. For 48 volt plants, the range of values is 40 to 50 volts, default of 44. For 24 volt plants, the range of values is 20 to 25 volts, default of 22.
Reconnect threshold	The voltage that the LVBD or LVLD contactor will close at, after the contactor has opened. The reconnect threshold should be higher than the disconnect threshold. For 48 volt plants, the range of values is 45 to 55 volts, default of 48. For 24 volt plants, the range of values is 22 to 27 volts default of 24.
High temperature disconnect threshold	If any battery section temperature associated with the battery contactor is above this threshold, the contactor will open. The contactor will close at 3 degrees Celsius below the disconnect threshold.
Contactor open alarm	Each contactor has an alarm (C1O, C2O) that indicates that the contactor is open.
Contactor failed alarm	Each contactor has an alarm (C1F, C2F) that indicates that the contactor has failed to open or failed to close.
User relay conflict warning	If a user has selected contactor 1 or 2 to be battery or load disconnect contactors, and there are also alarms associated with User Relay 1 or User Relay 2, respectively, then the alarm contacts are automatically disabled, and the user relay conflict warning is generated.

Maintenance Reminder

Maintenance Reminder is a utility that allows you to enter maintenance reminder (or any other) notes. There are twelve (12) reminders in the controller equipped with the intelligent board. You can specify an activation date and time, and at that point in time the system will notify users with the content of the reminder. You can enter a note sixty (60) characters long for each reminder. You can specify the destination such as a telephone number that the system will call for notification. You may also specify a severity level associated with the activation of each reminder; the default level is a WARNING. Once the reminder event is activated, it will stay on until you clear it through the CLREVNT field in the MAIN menu or by issuing a T1.317 command. The only user interface is through T1.317 commands or Easy View.

Notepad

Notepad is a utility that allows you to enter general purpose text and set a notification on login flag so that when users login into the system, they will be notified that there is a note waiting for them. The feature is available on the intelligent controller only. The system supports two notepads. One is available for read/write by all users; the other is readable to all users but only the Super-user can write. Each notepad has fifteen (15) lines of text; each line is sixty (60) characters long. The text of the notepad can be entered one line at a time, and all 15 lines can be viewed at once.

Periodic Status Call-out

The periodic call out feature allows the user to program the controller to call-out via the modem port periodically and execute up to 10 command lines as if they had been executed from a T1.317 interface.

Periodic call out configuration involves defining a phone number, setting the communication parameters, setting a call out interval, and defining commands to be executed when connected. The following parameters can be configured:

Phone Number	May contain up to 25 characters. default: none valid characters: 0-9 ( ) - # * , (, translates to a 2 second delay)
Connect Baud rate	Range: 300, 1200, 2400, 4800, 9600, 14400 default: 2400

Data Bits	Range: 7 or 8 default: 8
Parity	Range: odd, even, none default: none
Stop Bits	Range: 1 or 2 default: 1
Interval	Range: Sunday thru Saturday, Daily, Monthly, Quarterly, Never default: Never
Time	default: 6:00am
Commands 1 to 10	T1.317 reporting commands, up to 40 characters per command

Commands are limited to those that can be executed by the user security level from a T1.317 interface. The following operations cannot be performed from a periodic call out command:

- Activate/deactivate ACO
- Initiate an alarm test
- Restart rectifiers
- Login
- Turn rectifiers on

If the periodic call out feature is enabled, Galaxy will call out to the assigned phone number at a user-specified time and day. Galaxy will make four attempts to reach this number. If the phone number cannot be reached on the first attempt, the Galaxy will try again every 12 minutes for a total of four tries. If the fourth attempt is unsuccessful, a Number Did Not Respond event will be issued and Galaxy will not retry the call until the next occurrence of the call out time and day. For monthly intervals the Galaxy will call out on the first day of the month. For a quarterly interval the Galaxy will call out on the first day of January, April, July, and October.

Rectifier Bays

The controller supports organizing rectifiers into bays. The rectifier bay feature may be configured through the T1.317 interface using Easy View and viewed from the T1.317 interface or front panel.

This feature is only necessary when using the SAPO interface. For other applications it is not necessary but may be useful for organizing the rectifiers in a way that reflects the actual system configuration. Bays can be added to the configuration and then individual rectifiers can be linked to those bays. For each bay the following parameters can be monitored:

Bay input circuit breaker
Bay temperature

Configuration of this feature involves linking remote peripheral monitoring channels and use-defined events to the rectifier bay. For examples on how this is accomplished please see the section of this manual entitled “T1.317 Rectifier Management.”

Rectifier Off Conditions

The rectifier may experience one or more of the following OFF conditions:

- MAN: the rectifier is turned off from its front panel or has lost power
- STCB: the Switch-mode rectifier is turned off from it front panel or the rectifier has its output circuit breaker in the off position.
- ACF: the rectifier is reporting an ac failure or the controller is assuming that since all rectifiers are off, that there is an ac failure.
- RFA: the rectifier is reporting a Rectifier Failure Alarm (RFA) condition
- RFA-HV: the rectifier is reporting an RFA due to a high voltage condition.
- RFA-CB: the rectifier is reporting an RFA due to a circuit breaker failure.
- RFA-TA: the rectifier is reporting an RFA due to insufficient airflow or excessive ambient temperature.
- PH: on non full 3-phase rectifiers, a phase (or limited output) alarm indicates that the rectifier has lost all power.

Rectifier Standby Conditions

The rectifier may experience one or more of the following STANDBY conditions:

- TERM: the operator has placed the rectifier in reserve
- EMS: the energy management routine has placed the rectifier in reserve
- PH: the full 3-phase rectifier, has a phase alarm, and because of this, the controller temporarily places the rectifier in reserve until 10:00 am the following morning or until a battery on discharge alarm occurs, whichever

condition is earlier. A full 3-phase rectifier with a phase alarm, will continue to operate but not at its rated capacity.

- ETR: the rectifier is not used in internal rectifier sequencing or the ETR signal is still active
- TR: the rectifier is placed in standby by the external rectifier sequencer via TR1, TR2, TR3 or TR4
- CB: The rectifier is reporting a circuit breaker failure, however the rectifier does not turn itself off. This occurs on Tyco Electronics J874 series rectifiers. The controller places the rectifier in standby mode until the rectifier is repaired, in order to protect the rectifier. There is no overriding condition for this standby mode.

External Rectifier Sequencer

The external rectifier sequencer is used to regulate which rectifiers will be on following a commercial power failure and subsequent engine-alternator run (and vice-versa). The controller constantly monitors Transfer [TR] signals from the external sequence controller. There are 4 signals from the external sequencer: TR1, TR2, TR3 and TR4. Each TR signal controls multiple rectifiers, and upon receipt, the controller will place the associated rectifiers in standby mode.

- TR1 controls rectifiers 1, 2, 9, 10, 17, and 18.
- TR2 controls rectifiers 3, 4, 11,12, 19, and 20.
- TR3 controls rectifiers 5, 6, 13, 14, 21, and 22.
- TR4 controls rectifiers 7, 8, 15, 16, 23, and 24.

NOTE **A ground signal on a TR lead places all rectifiers in its group are immediately placed in standby mode, Once the ground is removed, the rectifiers are turned back on with intervening one-second delays to preclude inrush difficulties.**

If the external sequence controller places a rectifier in standby mode, the External Transfer Shutdown alarm is created.

Internal Rectifier Sequencer

The controller can be used to select which rectifiers are used when the plant is running on engine-alternator ac. The controller receives two signals, Engine Transfer (ETR) and RO, which indicate the transfer of ac from commercial ac to engine-alternator ac or vice-versa.

The Galaxy monitors the ETR signal, which indicates a transfer of ac source. Upon activation of the ETR signal (a ground), all rectifiers are placed in standby mode. The controller does not know yet, whether the new source for the ac is the commercial ac or the engine-alternator ac, but must wait until the engine-alternator is up to its rated frequency and voltage. This waiting period is a user programmable time period.

The RO signal, which previously was in a non-deterministic state, is now read to determine whether the ac switch is to commercial ac or the engine-alternator ac (a ground). If the switch is to commercial ac, all rectifiers are turned back on using a fixed 1 second interval, to avoid inrush. Otherwise, the engine-alternator is the ac source, which has a limited capacity, thus a smaller user selectable set of rectifiers are used. Initially, all rectifiers are used. Each rectifier in this set is turned on using the engine-alternator transfer retirement interval, to avoid inrush; the default engine-alternator transfer retirement interval is 1 second. In all cases, the battery subsystem is supplying power to the load when neither commercial ac or the engine-alternator is powering the rectifiers.

There is a software DIP switch that can enable or disable engine sequencing. Initially, engine sequencing is disabled.

For internal sequencing to occur, the following steps must be taken:

1. ETR, RO and their respective returns must be connected to the controller.

2. Internal rectifier sequencing is an intelligent controller option, so the Galaxy intelligent controller must be installed and functioning properly.

3. Plant rectifier sequencing, which by default is software disabled, must be enabled.

4. The list of rectifiers used in sequencing should be chosen; by default all rectifiers are used in rectifier sequencing.

5. The time period after the ETR signal is removed, and the engine-alternator is up to its rated frequency and voltage must be chosen. The default value is 1 second. The delay time before checking the RO signal range is between 1 second and 10 minutes (600 seconds).

6. The engine-alternator TR retirement interval, in order to avoid inrush, must be chosen. The default value is 1

second. The TR retirement interval default value is 1 second. The valid retirement interval range is from 0.1 seconds to 10 minutes (600 seconds).

7. After the transfer back to commercial ac, the retirement interval of TRs is a fixed 1 second interval.

NOTE **The energy management algorithm is NOT disabled when switching to the engine-alternator; however, a battery on discharge alarm disables the energy management routine for the duration of the battery on discharge.**

Operator Rectifier Control

The operator can restart all rectifiers, turn on rectifiers, on place a rectifier in standby mode.

Rectifier Restart

The operator at any security level and at any time can manually restart all rectifiers from the front panel or from the T1.317 interface.

In addition to the operator manually restarting rectifiers, auto restart of rectifiers after an RFA can be enabled with a hardware and software DIP switch.

Remote Rectifier Turn On

A hardware and software DIP switch regulates the control of turning rectifiers on remotely. When logged in via the T1.317 interface, at any security level, the operator can remotely turn a rectifier on, if the hardware and software DIP switches for remote turn on are enabled.

Remote Rectifier Turn Off

A hardware and software DIP switch regulates the control of placing the rectifiers in standby mode. When logged in via the T1.317 interface, the super-user or administrator can remotely place a rectifier in the standby mode, if the hardware and software DIP switches for remote turn off are enabled.

Overriding Rectifier Standby Conditions

There are two conditions when rectifiers in standby mode will abnormally be turned on: when there is low plant voltage condition and when engine signals are invalid.

Low Plant Voltage Conditions

Two plant voltage thresholds override standby conditions. These voltage thresholds are the Battery On Discharge (BD) alarm threshold, and a second threshold, known as the Rectifier On Threshold (ROT). When the plant voltage drops below these thresholds, rectifiers are turned on from standby mode, in hopes of maintaining normal operation of the plant.

After the occurrence of a battery on discharge alarm, all rectifiers placed in standby mode by the presence of the phase alarm, or by the energy management algorithm, will turn on. Phase alarm and energy management standby conditions are re-enabled after the battery on discharge alarm retires.

During the initial portion of a battery discharge, plant voltage may drop sharply by several volts, then rises soon after. This voltage drop is known as the Coup De Fouet portion of the battery discharge. Depending upon plant load conditions, this voltage drop may even be below the Rectifier On Threshold. To account for the Coup De Fouet voltage drop, the plant voltage must be below the Rectifier On Threshold for a user programmable time threshold. This time threshold is known as the Rectifier On Delay (ROD). The default value for the ROD is 10 minutes. Thus, when the plant voltage drops below the ROT value for the ROD delay, all rectifiers in standby mode for any reason, except Tyco Electronics J874 series rectifiers with active Circuit Breaker Alarms, will turn on.

Invalid Engine Signals

The controller monitors signals from the external engine sequencer (TR1, TR2, TR3, and TR4), as well as the ETR sequence signal. If all four TR signals are simultaneously activated, or the ETR signal is activated longer than the user programmable Engine Time-Out threshold, then the Galaxy assumes there is a problem with the source of the signals and all the rectifiers are turned back on in an orderly manner. The Engine Time-Out Threshold is set to 30 minutes as a default, and can be delayed up to 60 minutes. Zero minutes as a threshold indicates that this time-out value is to be ignored.

Rectifier Control Parameters

The following plant control parameters may be set/viewed via the T1.317 interface or the front panel:

Automatic Rectifier Restart after RFA	Software enabled and disabled, and view hardware status

Remote Rectifier Turn On	Software enabled and disabled, and view hardware status
Remote Rectifier Turn Off	Software enabled and disabled, and view hardware status
Internal Rectifier Sequencing	Software enabled and disabled (no hardware status)
Rectifier On Threshold-	For 48-volt plants: default 44 volts, range 40 to 50 volts for 24-volt plants: default 22 volts, range 22 to 25 volts
Operator Rectifier Restart-	Restart all rectifiers, no DIP switches applicable. Current viewed in amperes. Capacity based on type, read-only rated capacity of rectifier.

The following plant control features may be set/viewed only via the T1.317 interface:

Engine-alternator TR	Default 1 second, range 0.1 to 600 seconds
retirement interval	(10 minutes)
Delay before checking RO signal	Default 1 second, range 1 to 600 seconds (10 minutes)
Rectifier on Delay	Default 10 minutes, range 0 to 60 minutes (Coup De Fouet time)
TR1-4 state	View TR1, TR2, TR3 and TR4 statuses

The following plant alarms are associated with any rectifier, and may be viewed from the front panel or via the T1.317 interface:

Engine Time-Out	ETR or TR1-4 signals on longer than ETO threshold. Threshold range is 0-60 minutes; default is 30 minutes. 0 minute threshold disables alarm.

Engine Transfer Shutdown	TR1-4 signal placed rectifier in Standby mode
MRFA	Multiple RFA alarm. Default threshold value 2 RFAs. Threshold range is 2 to 24 rectifiers.
RFA	RFA alarm
ACF	AC Fail alarm
PHA	Phase alarm
LCA	Low Current alarm
LSF	Load Share Fuse alarm
MAN	Rectifier turned manually off or lost power alarm
ERD	Excess Rectifier Drain presence alarm. The alarm also has a threshold value. If any rectifier output current is more than the threshold value multiplied by the rated current, the alarm is generated. The default value is 1.18. The range of values is 1.0 to 2.0 (100% to 200%)
RIC	Rectifier type unconfigured alarm

The following rectifier control features may be set/viewed for each rectifier only via the T1.317 interface:

Rectifier type	Type of rectifier
State	VACANT, OFF, STANDBY, or ON
Sequencing	Use rectifier in internal sequencing
RFA	RFA presence signal for rectifier
ACF	AC Fail presence signal for rectifier

PHA	Phase alarm presence signal for rectifier
LCA	Low Current Alarm presence signal for rectifier
LSF	Load Share Fuse alarm presence signal for rectifier
MAN	Rectifier turned manually off presence signal for rectifier
ERD	Excess Rectifier Drain presence signal for rectifier
ETS	TR1-4 placed rectifier in standby mode presence signal
RIC	Rectifier type unconfigured presence signal for rectifier

Rectifier Manager

Serial rectifiers have no manual controls other than a Power On / STDBY switch. The manual Voltage Adjust potentiometer and Current Limit potentiometer have been replaced by the Rectifier Manager. Through the configuration of the Rectifier Manager the rectifier's voltage and current limit are controlled to the desired values by a serial data link between the rectifier and the controller. The Rectifier Manager can be configured through the controller's Front Panel or via EasyView software by connection to the local port or remotely by modem.

Should the data link between the controller and rectifier be lost, the rectifier "remembers" it's last communication with the controller and maintains voltage and current limit as had been set. In this instance, regulation voltage transfers from the battery bus to the rectifiers output voltage.

In EasyView follow the menu path:
Main → Configure → Rectifier → Rectifier Manager.

From the Front Panel press <Menu> to bring up the MAIN menu, move the cursor to CONFIG and press <ENTER> to bring up the CONFIGURATION menu, move the cursor to RECT MNGR and press <ENTER> to bring up the RECTIFIER MANAGEMENT menu.

The following configurable parameters are presented

PLT V FLOAT	Controls the plant voltage in the Float Mode.
PLT V BOOST	Controls the plant voltage in the Boost (increase) or BTP (decrease) Modes.
I LIMIT FLOAT	Controls the rectifier current limit in the Float Mode. Configuration is in the percentage of rectifier capacity.
I LIMIT BOOST	Controls the rectifier current limit in the Boost Mode. Configuration is in the percentage of rectifier capacity.
SHVSD FLOAT	Controls the rectifier Internal high voltage shutdown threshold in the Float Mode. Should be set higher than the plant HV FLOAT.
SHVSD BOOST	Controls the rectifier Internal high voltage shutdown threshold in the Boost Mode. Should be set higher than the plant HV BOOST.
LDSH	Forced Load Share between rectifier's Enable/Disable.
RMOVE RECT	Rectifier is configured when plugged to the controller and the ID is set in the rectifier. This configuration remains in memory even when the rectifier is removed. This field allows the removal of the rectifier from the controller's memory.

Rectifier Monitoring and Control

The controller monitors each rectifier calculating the rectifier current, and present state. From the rectifier signals, the controller determines the rectifier state, which, listed in order of priorities, is either:

- VACANT, if the rectifier or rectifier cable is not attached to the controller.

- OFF, if the rectifier is attached to the controller, but is turned off from the rectifier front panel, the rectifier has lost power, or has some internal failure.
- STANDBY, if the rectifier is attached to the controller, is turned on from the rectifier front panel; however the controller has turned the rectifier off and holds the rectifier in reserve.
- ON, if the rectifier is attached, is turned on and is operating normally.

A rectifier state history records state changes for all the rectifiers in the plant. In addition, rectifier alarms are placed in the system history log.

If any rectifier has an alarm, the rectifier state and particular alarm signal will show the alarm status. The alarm is indicated only at the plant level. So multiple simultaneous rectifier alarms of the same type can only be diagnosed by monitoring the individual rectifier statuses or by monitoring rectifier diagnostics. The alarm will be shown only once at the plant alarm level.

Remote Peripheral Monitoring

The intelligent controller supports a network of two-wire interface smart modules called Remote Peripheral Monitoring. The network can have up to 255 modules. The system supports the Voltage Module (VTM), Shunt Module (SHM), Temperature Module (TPM), Binary Module (BIM), and Control Relay Module (CRM). Following is a list of all common features:

- Each module has a circuit card mounted on a plastic case. Each module contains measuring channels used to measure the external devices. Each module has a green LED that is illuminated under normal operation, but rapidly blinks to indicate an error condition. The LED blinks off for about 0.5 second each time the module is accessed.

- Each module is individually factory calibrated. These data points are stored in a non-volatile memory. There are 4 data points per channel and the controller uses these values to calibrate the measuring values from the channels.

- Each module has a serial number stored in nonvolatile memory at manufacture. This number is composed of: character M or character R, the year (00-99), the month

(1-12), 4 characters indicating the manufacturing location, and the 6 digit serial number.

- Each module has a user-selectable address via two (2) rotary switches. This address shall be read and stored by the module whenever it is powered up. Thus if you change the address setting, the module power must be reset (by removing it from the base and re-inserting it) for the new address to be recognized. The address must be unique; address 0 is reserved for broadcasting. You must not use this address. Any address duplication will result in a failure for all involved modules.

- There are three system alarms/warnings associated with the remote peripheral monitoring. They are RPM fail alarm (MDF1), measure out of range alarm (MOR1), RPM type conflict warning (MTC1). It takes only one of the 255 modules and their associated channels to turn these events ON, but it takes all 255 modules and their associated channels to turn these events OFF. The MDF1 and the MTC1 originate from the module level; the MOR1 originates from a channel level and propagates to the module and system level. These alarms and warnings are logged in a history log as they occur and retire. There are at most 256 entries in this log.

- Galaxy keeps basic statistics for these measuring channels. If the module type is changed, then the statistics for the associated channels are reset and re-started. For some channels, if the configuration attributes such as offset or scale factor are changed, then the statistics feature is reset and re-started. Any of the measuring channels can be configured for Trend statistics or Busy Hour statistics.

- The Remote Peripheral Monitoring network interface board is an optional board. So there is a small chance that the board may be inserted or removed from the system while it is in service. If the board is removed while the system is up, the system performs a WARM BOOT. On booting up, the remote module process continuously checks for the board signature with sleep time about 10 seconds in between until the board present signal is detected.

  The following is an estimate of the measuring cycle time and time to recognize a newly inserted module.

Number of attached modules	1	16	32
	64	128	255
Measure Cycle (sec)	6.8	9.5	12.3
	18.0	29.4	52.0
New module scan (sec)	55	76	98
	144	235	416

Configuration Feature

The configuration of the modules and associated channels is done automatically by the system except in some special cases. Each module has an attribute, when set, will denote that the configuration of the module and its associated channels is locked; and the system won't remove the configuration from the system even when the physically removed the module out of the system (tlk: true/false). This attribute can be set by users, or can be set to true automatically when the users changes any of the other attributes of the module or the associated channels.

If a module's configuration is locked (tlk=true), then:

- Detection of error changes the status of the module (and associated channels) to failed. The system rpm failed alarm is activated. When the error conditions go away, the alarm signal is clear. The module and its channels status change to attached.
- Removal of a module from system changes its status to detached, but does not remove the inventory entry. A system warning (rpm failed) is asserted.
- Reconnecting of a module with the same type restores its status to attached. The rpm failed signal is clear.
- Reconnecting of a module with different type causes its status to change to type changed, but will not change other attributes. A system warning signal (type conflict) is asserted. If you reconnect a new module of the same type as configured then the status will change to attached, and the warning signal will be cleared. If you clear the lock then the configuration data will be filled with the information from the new module, the warning signal will be cleared, the module status is set to attached.

If the configuration locked is false, then:

- Detection of error changes the status of a module (and channels) to failed. A system RPM failed alarm signal is asserted.
- Removal of a module from system changes the module and associated channels status to invalid. The module and its channels configuration are deleted. Any warning or alarm signals posted due to this module and its channels are de-asserted. The information of the module and its channels disappear from the system.

Voltage Modules

Voltage Monitor Module (VTM) is an RPM module used to measure dc voltage. Each module has six measuring channels used to measure external voltage, based on the range of the module in use, and one external temperature channel. You can configure the module and channels description, which is a text string. You can also configure the channels unit (normally Volt for voltage channels; and C or F for temperature channel). For voltage channels, you can enter the offset, factor value that will be used in computing the final value of the channels reading. The final value is computed as: fin_val = (cal_val - offset) * scale where fin_val is final value, cal_val is calibrated reading value. The default value for offset is 0, and 1.0 for scale.

In some cases you can use a voltage channel and User Define Events (UDE) to simulate a Binary channel. For hardware configuration, please refer to the Remote Peripheral Monitor system manual, section “Using Voltage Channel as Binary channel”. The next example describes the software configuration.

This example is for the case where there is only one threshold for both TRUE and FALSE. Assume that the user want to use the reading from channel 1 of module address 02 to generate a TRUE/FALSE state. Issue the command:

** ADD UDE

to add a new UDE, expect to see: Uxxxx, where xxxx is the UDE number (for example 0003).

** CHA U0003,PRG=“C102 VAL > 3.1"

to program the U0003 state to TRUE if the reading of channel 1, module 2 is greater than 3.1 (the threshold); otherwise the state is FALSE. Remember that a UDE is an alarm, so the user can program its severity, dial out, ... The alarm is active when the UDE state is TRUE.

Shunt Modules and Channels

Shunt Monitor Module (SHM) is an RPM module that used to measure dc current. Each module has six measuring channels used to measure external voltage (-10 to 110 ± 0.55mV) and using the shunt size to derive the current, and 1 external temperature channel. You can configure the module and channels description, which is a text string. For shunt channels, you can enter the current shunt (sh_i) and voltage shunt (sh_v) value that will be used in computing the final value of the channels reading. The final value is computed as: fin_val = (cal_val * sh_i)/sh_v where fin_val is final value, cal_val is calibrated reading value. The default value for sh_i and sh_v is 1.0.

Temperature Modules and Channels

The 223T module has seven channels to measure temperature at seven different points in the system. Each channel must be connected to a 100K thermal probe (Thermistor comcode 407209808). This RPM module can measure temperature within the range of -40°C (-40°F) to 70°C (158°F), with a tolerance of ±1°C (±0.55°F). Current limiting resistors are not required for connections to the thermal probes. You can configure the module and channels description, which is a text string.

Bipolar Shunt Modules and Channels

These are the same as Shunt Modules and Channels, except that the application range is from -50mV to 150mV.

Binary Modules and Channels

Binary Monitor Module (BIM) is an RPM module that monitors the external dc voltage and result in a ON or OFF state. If the voltage level is greater than 3.1V then the channel state is ON, the state is OFF if the voltage level is less than 1.9V, and the channel state is undetermined if the voltage level is otherwise. Each module has six measuring channels used to monitor external voltage, and one external temperature channel. you can configure the module and channels description, which is a text string.

Relay Modules and Channels

Control Relay Module (CRM) is an RPM module with three (3) Form-C relays as output devices. For each relay, you can enter a program line using the T1.317 or EasyView to control the state of the relay. If the program line is evaluated to a TRUE then the relay will be turned ON; the relay state will be OFF otherwise. Please consult the section on User Defined Event for details on the expression operands and operators. Also, you can configure the module and channels description (a text string) to describe the relay usage.

Security

The controller supports a number of security features that provide control over access to the controller. These features include:

- Hardware/software switches
- Three levels of T1.317 passwords
- TL1 password
- Call-back security
- Security alarms

Security Levels/Passwords

The controller supports three levels of security from the T1.317 interface and one from the TL1 interface. The security levels are described in general below. For detailed information about security limitations placed on specific features, refer to the description of those features.

User security level:

- Can view almost every parameter in the system
- Can change only a few parameters
- 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

TL1 security level:

- See the TL1 interface description
- Default password: LINEAGE

When logging into a T1.317 interface the user may enter either the user, super-user, or administrator password. Once logged in, the user may change security levels. Passwords may be changed at the administrator security level from the T1.317 interface. When changing passwords, the following guidelines must be followed:

- Passwords must be between 6 and 15 characters long
- User and TL1 passwords may contain alpha-numeric characters
- Super-user and administrator passwords may contain any ASCII character from value 32 to 126
- Passwords may not be enclosed in double quotes
- The same password may not be used for different T1.317 interface security levels
- Passwords are not case sensitive (i.e. LINEAGE is the same as lineage)

The administrator password can be reset to the default setting by pressing the password reset button located on the front of the intelligent controller.

Access Port Security Hardware/Software Switches

The controller provides switches for each access port that can be used to allow full access to the system or limit access to the user security level. The hardware switches are located on the intelligent controller switch bank SW203. These switches can be set to the 0(disable) or 1(enable) position. There is a matching software switch for each access port. These software switches may also be set to 0(disable) or 1(enable). The table below describes the hardware and software switch settings and the resulting level of access. When viewing software switches from the front panel or T1.317 interface, the reason for limited access will be displayed in parenthesis as either HW for hardware switch, SW for software switch, or both.

Hardware Switch	Software Switch	Level of Access
0	0	limited access (HW,SW)
0	1	limited access (HW)

1	0	limited access (SW)
1	1	full access

If an access ports security switch is changed from full to limited access while a someone is logged into that port, their security level will be dropped to the user level as soon as they access a function that requires super-user or administrator security privileges.

Call-back Security

The call back security feature allows the Galaxy to be configured for remote access from up to 5 phone numbers. Once these numbers are configured and call-back security is enabled, access via the modem port will be answered by a prompt for one of these 5 locations. After the location is entered, the Galaxy will hang-up, wait 5 seconds, and then call the phone number assigned to the selected location. Once the call is answered, the Galaxy will prompt for a password and start a T1.317 session. To prevent the Galaxy from hanging up before prompting for a location, disable error correction on the answering modem. See the modem manufacturer's documentation for the modem initialization command to disable error correction.

Security Events

The controller provides three programmable events that indicate, password at default, excessive login attempts, and external password reset. The password at default event is active when any password is at its default setting. To clear this event change all passwords to something other than their default setting.

The excessive login attempts event becomes active when the user fails 6 times to enter a correct password when logging onto the system or when the user fails 3 times to enter a correct password when changing security levels. This event must be cleared manually from the front panel or from the T1.317 interface. This event is logged into history each time it occurs regardless of whether it has been cleared previously or not.

The external password reset event becomes active when the administrator password is reset using the reset password button located on the front of the intelligent controller. This event must be cleared manually from the front panel or from the T1.317 interface. This event is logged into history each time it occurs regardless of whether it has been cleared previously or not.

Serial Access Ports

The controller provides three serial access ports that serve as interfaces to the system. The ports are called the local port, auxiliary port, and the modem port. Access to the ports can be configured to restrict super-users and administrators from logging into the ports. See the security section of this manual for details on limiting access to the ports. Each of the serial access ports is described below.

Local Port

The local port is an RS-232 port that provides access to terminals using a T1.317 interface or it can serve as an alarm reporting interface that can be connected to printer or other serial data logging device. The following defines the parameters that characterize the local port:

Login state	Indicates whether a user is logged in on this port. The possible states are: LOGOUT - no one is logged in USER - T1.317 user security level session in progress SUPER-USER - T1.317 super-user security level session in progress ADMINISTRATOR - T1.317 administrator security level session in progress TL1 - TL1 session in progress
Baud rate	Range of values: 300, 1200, 2400, 4800, 9600, 19200, or AUTO, default: AUTO
Data bits	Range of values: 7 or 8, default: 8
Parity	Range of values: odd, even, or none, default: none
Stop bits	Range of values: 1 or 2, default: 1
Time-out	Defines idle time in minutes before T1.317 interface user is automatically logged off. Range of values: 0 to 45 minutes where 0 disables the time-out, default: 5 minutes
Handshaking	Range of values: none software - X-ON and X-OFF flow control hardware - RTS and CTS flow control default: none

Application Determines whether the port is used for logging events or as a T1.317 interface. range of values: TERMINAL - T1.317 interface EVENT LOG - all events are reported as they occur and retire default: TERMINAL

If the baud rate parameter is set to AUTO then the port will autobaud from 1200 to 9600 baud. Autobaud at 300 and 19200 baud rates is not available. The port autobauds by looking for the carriage return character, ASCII 13, before a login session begins. If the local port configuration is changed, then that change will take affect immediately.

In order for the local port to be used as an event logger, it must be configured as such in both software and hardware. The hardware DIP switch is located on SW203-2. When the port is used as an event log application the baud rate should be set to match the equipment connected to the local port.

Auxiliary Port

The auxiliary port provides access to terminals using a T1.317 interface or equipment supporting the TL1 protocol. The auxiliary port can be configured for RS-232 or RS-485 by DIP switch SW203-1 on the intelligent controller. The following defines the parameters that characterize the auxiliary port:

Login state Indicates whether a user is logged in on this port. The possible states are:
- LOGOUT - no one is logged in
- USER - T1.317 user security level session in progress
- SUPER-USER - T1.317 super-user security level session in progress
- ADMINISTRATOR - T1.317 administrator security level session in progress
- TL1 - TL1 session in progress

Baud rate Range of values: 300, 1200, 2400, 4800, 9600, 19200, or AUTO, default: AUTO

Data bits Range of values: 7 or 8, default: 8

Parity Range of values: odd, even, or none, default: none

Stop bits Range of values: 1 or 2, default: 1

Time-out Defines idle time in minutes before T1.317 interface user is automatically logged off. Range of values: 0 to 45 minutes where 0 disables the time-out, default: 0

HandshakingRange of values: no
software - X-ON and X-OFF flow control
default: no

ApplicationDetermines whether the port is used as a T1.317 interface or Tl1 interface.
Range of values: TERMINAL - T1.317 interface
TL1 - Tl1 interface
default: TERMINAL

If the baud rate parameter is set to AUTO then the port will autobaud from 1200 to 9600 baud. Autobaud at 300 and 19200 baud rates is not available. The port autobauds by looking for the carriage return character, ASCII 13, before a login session begins. If the application is set to Tl1 then the baud rate should be set to match the baud rate of the communication equipment connected to the auxiliary port. If the auxiliary port configuration is changed, then that change will take affect immediately.

Modem Port

The modem port provides access to terminals using a T1.317 interface and is also used for alarm call-out and periodic status call-out. The following defines the parameters that characterize the modem port:

Login state	Indicates whether a user is logged in on this port. The possible states are: LOGOUT - no one is logged in USER - T1.317 user security level session in progress SUPER-USER - T1.317 super-user security level session in progress ADMINISTRATOR - T1.317 administrator security level session in progress
Data bits	Range of values: 7 or 8, default: 8

Initialization string	Sent to initialize the modem. This should NOT be changed when using the built-in modem. For external modems the initialization string should be set so that the modem uses bidirectional hardware (RTS/CTS) flow control, does not echo commands, and returns numeric status codes. The modem should NOT be programmed to automatically answer incoming calls.

Default value: at &f \n0 \q3 e v

Parity	Range of values: odd, even, or none, default: none
Stop bits	Range of values: 1 or 2, default: 1
Time-out	Defines idle time in minutes before T1.317 interface user is automatically logged off. range of values: 0 to 45 minutes where 0 disables the time-out, default: 5 minutes
Handshaking	Range of values: no software - X-ON and X-OFF flow control default: no
Rings	Determines the number of rings before answering. range of values: 2 to 15, default: 2

When a user calls the controller using the modem port, the Galaxy modem will negotiate with the originating modem for the highest possible baud rate up to 14400. When the modem port is used for alarm call-out, periodic status call-out, or call-back security, the communication parameters defined for each of those features will be used instead of the parameters defined above.

A noisy or unusable connection may occur at certain modem connection rates. If this occurs, set the modem to a lower speed connection. Consult the modem manufacturer’s documentation for lowering the connection speed. For some modems, the command “S37=9” will set the modem to connect at 9600 baud.

When the data bits, parity, stop bits, or handshaking parameters are changed, those changes will not take effect until the next login session. This differs from the way the local and auxiliary ports behave.

Enhanced Remote Security Via Modem Port and Auxiliary Port

The modem and auxiliary ports can be configured for full access and read-only using DIP switches 203-1, 2, 3, 4 and 5. Restricted access is also available. This prevents changes via the modem and auxiliary ports that will affect the state of the plant, even when logged in as a Super-User or Administrator. This enhanced remote security is enabled and disabled with DIP switch SW204-3. The functions and parameters restricted with the enhanced remote security feature are listed in Table 7-A.

Table 7-A: Remote Security Via Modem and Auxiliary Ports

Functions
Enable or disable Rectifier Restart feature
Change All Rectifier On Threshold
Change Timed Manual Boost Duration
Change Boost Current Threshold
Change Rectifier Status*
Change Rectifier Shunt Voltage configuration
Change Rectifier Float High Voltage Shutdown Threshold
Change Rectifier Boost High Voltage Shutdown Threshold
Change Rectifier Float Set Point
Change Rectifier Boost Set Point
Change Rectifier Boost Current Limit
Change Converter Voltage Set-Point
Change Converter Low Voltage Disconnect Threshold
Change Converter Low Voltage Reconnect Threshold
Enable or disable Converter Low Voltage Disconnect feature
Change Converter Status*
Change Battery High Temperature Threshold
Enable or disable Battery Current Limit
Change Battery Limit Threshold
Change Battery Contactor Status**
Change Battery Disconnect Threshold
Change Battery Reconnect Threshold
Change Very Low Voltage Alarm Threshold and Severity
Change Multiple Rectifier Fail Alarm Threshold and Severity
Change Limited Recharge Current Alarm Threshold and Severity
Change Excess Rectifier Drain Alarm Threshold and Severity
Change Engine Transfer Timeout Alarm Threshold and Severity

Table 7-A: Remote Security Via Modem and Auxiliary Ports

Functions
Change Reserve Time Low Alarm Threshold and Severity
Change Multiple Converter Fail Alarm Threshold and Severity
Change Battery On Discharge Alarm Threshold and Severity
Change High Voltage Alarm Threshold and Severity
Change High Float Voltage Alarm Threshold and Severity
* The change to “Standby” or “Vacant” status is prohibited. The change to “On” status is allowed. ** The change to “Open” status is prohibited. The change to “Close” status is allowed.

Slope Thermal Compensation

Slope thermal compensations allows the continuous adjustment of battery float voltage (plant voltage) due to changes in battery temperature, optimizing the performance of valve regulated batteries. The total amount of adjustment is calculated at 0.1 times the number of cells defined in the battery plant. The basic controller assumes 12/24 cells for 24/48 volt plants. In the intelligent controller the number of cells per string is configured by the user. The adjustment to plant voltage per degree change in temperature, (PV/DO), is equal to the total adjustment voltage divided by the difference between the start (NOM TEMP) and stop (LOW TEMP or UPPER TEMP) temperatures.

A NOM TEMP of 25° C and a HIGH TEMP of 53° C in a 24 cell plant provides a PV/D° equal to 72 mV/deg C. This slope is compatible with Tyco batteries. To obtain the per cell change voltage change per degree change in temperature, (CV/D°), divide PV/D° by the number of cells. Some battery manufactures may recommend this number.

Additionally a high temperature threshold may be set that will further reduce plant voltage in one step by a factor of .17 volts times the number of cells in the battery plant.

The STC feature uses the universal battery temperature probe plugged into the BJF fuse board in the controller or the temperatures of RPM channels linked to configured Battery Sections, to obtain it's temperature measurement.

STC	Enables/Disables the Slope Thermal Compensation feature.

LOW TEMP	Temperature at which the plant voltage will have raised 0.1 volts x the number of cells. Valid range is 23° to 68° F or -5° to 20° C
NOM TEMP	Temperature at which the plant voltage is set to it's nominal value. Compensation begins at temperatures above or below this point. Valid range is 59° to 86° F or 15° to 30° C.
UPPER TEMP	Temperature at which the plant voltage will have decreased 0.1 volts x the number of cells. Valid range is 86° to 131° F or 30° to 55° C.
STEP TEMP	Temperature at which the plant voltage will further decrease 0.17 volts x the number of cells. 113° to 185° F or 45° to 85° C
RAISE VOLTS	Enables or Disables the raising of plant voltage due to decreasing temperature.

Software Upgrades

The software upgrade feature is a convenient way to upgrade the intelligent controller software from the local, modem, or auxiliary access ports. The upgrade procedure is limited to the administrator security level and is supported from the T1.317 interface and EasyView. The Galaxy supports a binary upgrade using the Xmodem protocol or an ASCII text upgrade. Generally the binary upgrade file will have a .bin extension and the S-record upgrade file will have a .abs extension. A binary upgrade will take less time than a text upgrade.

The controller upgrade procedure follows the steps outlined below to reprogram the on board EEPROM chips with the new version of software:

- Upload a binary or ASCII text software upgrade file from the access port
- Verify the checksum of the uploaded file
- Clear the EEPROM chips
- Program the EEPROM chips
- Verify the checksum of the programmed EEPROM chips

Once the Galaxy starts to upload the software upgrade file, the current configuration is lost and when upgrading completes the system will reboot with a default configuration. It is therefore very important to backup the system configuration so that it can be restored after the upgrade is completed. See the backup and restore section of this manual for details on how to backup and restore the system configuration.

Statistics

The statistics features permit collecting plant data over various time periods. These data are held in battery-backed RAM to protect against loss during power failure. Battery discharge statistics can be used to analyze battery performance. In addition, the controller keeps three types of statistics logs: basic, trend, and busy hour statistics.

Two basic values are used throughout the statistics logs, instantaneous values and hourly average values. They are defined as follows:

Instantaneous values: Readings for the monitored value. Plant and rectifier measured values are read every 5 seconds. Remote Peripheral Channels and Derived Channels are read every minute.

Hourly average values: At each change of hour the channel average is set to 0 and the sampling of instantaneous values begins at the instantaneous value data rate. Each reading is added and the total is divided by the number of readings at the next change of hour. Ten instantaneous values are required for an hourly average to be recorded.

Basic Statistics

Basic statistics are stored for every measured value, read at the instantaneous data rate. The items stored for basic statistics are:

Highest Hourly Average Values: The three highest hourly averages are kept in memory and updated each hour. Collection of data begins when the first valid hourly average is available.

Highest Hourly Maximum: At the change of each hour, the highest instantaneous value for the previous hour is compared with the three highest hourly maximums stored in memory. If it is greater than any of those, the lowest maximum value will be deleted and the new value included in the three highest maximum values.

Lowest Hourly Minimum: At the change of each hour, the lowest instantaneous value for the previous hour is compared with the three lowest hourly minimum values stored in memory. If it is smaller than any of those, the highest will be deleted and the new value included.

Trend Statistics

Trend statistics are stored for the plant load and up to 8 user configurable measured value channels. The items stored for trend statistics include:

Daily High and Low: The instantaneous lowest and highest value readings, for each of the previous 16 days.

Daily Maximum Hourly Average: The highest one-hour average values, for each of the previous 32 days.

Monthly Average: The monthly average of the daily maximum one-hour averages, for each of the previous 13 months.

Busy Hour Statistics

Busy hour statistics are stored for the plant load and up to 4 user configurable measured value channels. For each busy hour statistics item being monitored, 24 consecutive hourly averages are collected beginning at the user specified time and date. In addition, the highest instantaneous value occurring within that 24 hour period is also stored. This feature can be used to determine the busy hour(s) of any selected 24-hour period.

Battery Discharge Statistics

Beginning one minute after a Battery Discharge alarm occurs, plant voltage and current are sampled at 5 second intervals. Whenever the plant voltage drops by more than 250mV on a 48-volt plant or 125mV on a 24-volt plant, the battery on discharge series entry number, time, date, plant voltage, and battery current, will be added to the Discharge Statistics table.

The frequency at which entries are added to the log depends on the rate of battery discharge. If a voltage reading differs by at least 250mV from the previous entry (125mV for 24-volt plants), it will be recorded. If voltage does not drop by the minimum valid, records will be made at 15-minute intervals. Thus, data points are spaced more closely together in time during periods of rapid discharge, and are shown less frequently during more stable periods when plant load is less and voltage is steady.

Once logging has begun, it will continue until the alarm is retired. At any time, a super-user or administrator may clear the log. If the log is not cleared, each new battery discharge charge alarm will continue with a new series of entries, with the next higher series number.

Battery discharge statistics are limited to 120 entries. At the 121st consecutive entry, the oldest occurrence will be lost and all others will be moved up by one entry. The loss of the last entry may cause the series numbers for the following discharges to go down by one number.

The battery on discharge statistics also contains the start date and time, end date and time, duration and average load during the last discharge.

Effect of Power Failure

Loss of dc power to the controller will affect computation of statistics as follows:

Hourly Statistics: Hourly maximum or minimum value for an hour in which power has failed will be the high or low reading between restoration of power and the next change of hour.

The hourly average value will be the average of the readings between restoration of power and the next change of hour.

If power fails more than once during an hour, only the last interval between and the restoration and change of hour will be used.

If power failure lasts more than one hour, or if fewer than 10 readings could be taken in the hour, the data for that hour will not be displayed.

If power failure lasts through the change of hour, data for the first hour will not be displayed.

Daily Statistics: Daily maximum and minimum values for the day of a power failure will be the high and low readings between the time power was restored and the next change of day.

The daily maximum one-hour average will be the highest average recorded since power was restored. If multiple power failures occur during the day, only readings taken between the last power restoration and the change of day will be used.

Effect of Changing Date and Time

In general, statistics logs will not be affected by clock changes unless they are in the process of being recorded when the change is made. Even then, changes are similar to those experienced in a power failure, and proper logging will resume at the next change of hour or day. Where the change results in an incomplete entry, no data will be displayed for that period.

Effect of Changing Scale Factor, Range, or Channel Type

Changes plant shunt, rectifier shunt, derived channel program line or remote peripheral scale factor will make the trend study invalid because large changes are possible out of range readings. Trend and basic statistics associated with the channel will be cleared and the first new entry will begin at the next minute.

Terminal Menu Interface

All Galaxy controller software includes a text based menu interface that can be used to check most of the system's status, history, and statistics functions, using a standard ASCII type terminal. Refer to Appendix E for complete description.

Timer Events

Timer Events is a feature available on the intelligent controller only. The main purpose of Timer Event is to generate a binary signal at a specified time and date that will persist for the duration that you configure. This binary signal can be used in the User Defined Events program line to generate time based alarms. There are 32 Timer Events available in the system. You can specify start date, start time, and duration in minutes range from 1 minute to 24 hours. The default start date is daily, the default start time is midnight, and the default duration is forever. The value for default date is 00/00/0000, (mm/dd/yyyy); the value for default duration is 0. Setting any portion of the date to 0 causes that value to be ignored when deciding if the Timer Event is active. For instance, a Timer Event with a date of 00/01/0000 will occur on the first of every month. Timer Events parameters with invalid values will be rejected and the changes will not be made. If any change is made to the start date, start time, duration, or the system data and time, the system will re-evaluate these parameters and change the event state to ON or OFF according to the following diagram:

OT: Origin of system time
ST: Timer Event start time
t: System current time
ET: End time = ST + duration

```
  +-------------------+----------+------------+--------->
OT                 ST          t              ET
```

After the system recomputes the Timer Event start date, time, duration, and current date, time. If the t value is outside the [ST,ET] window then the Timer Event state is OFF; if it is inside the [ST,ET] window then the Time state is ON.

User Defined Events

The User Defined Events (UDE) feature allows you to craft customized system alarms/events through the use of a logical program line. Only the intelligent controller supports this feature. There are 1500 User Defined Events in the system.

The customer can configure a program line that will evaluate to a binary value. If this value is TRUE then the event is turned ON, and if it is FALSE then the event is OFF. The program line can have up to 40 characters, and 12 operands and operators combined. To delete a program line of an UDE, set the program line to double quotes with nothing in between (““).

You can set the alarm severity level that can be one of the following: CRITICAL, MAJOR, MINOR, RECORD ONLY, WARNING. There is the alarm notification destination (a phone number, a beeper,...); when to notify (notify on occur, notify on retire or both); number of times to try to notify (nagging time).

The UDE events is latchable. If the UDE’s latch attribute is set, when an event occurs it will stay ON even if the conditions that caused the event to happen cease to exist. To clear a latched event, use the “Clear User Clearable Events” from the front panel or T1.317; the other way is to clear the latch.

A history log for User Defined Events contains up to 256 entries.

Legal Operators for UDEs

The following list contains all the legal operands for UDE program line:

- Logical operators accepted (, AND, | OR, ^ XOR, ! NOT).
- Binary mathematical operators accepted: (+, -, *, /).
- Unitary mathematical operators accepted: (+, -).
- Comparator operators accepted (= EQ, < LT, > GT).
- Parentheses accepted.

- The expression has the following precedence (highest first):(), NOT, unary +, negation -, *, /, +,-,, <, >, EQ, AND, XOR, OR.

The follows are acceptable operands:

- Numbers are accepted.
- Plant analog attributes: dc1 vdc (plant voltage), dc1 adc (plant current), dc1 trd (total rectifier drain, dc1 ubt (plant universal battery temperature).
- Rectifier current attribute: gxx adc, where xx is from 01 to 24 (for 24 rectifiers).
- Remote monitor value attribute: cxyy val, where x is from 1 to 7, yy is from 01 to FF.
- Remote monitor state and alarm attributes: Cxyy ATR, where x is from 1 to 7, yy is from 01 to FF (Hexadecimal number); ATR is MOR (for Measure Out of Range alarm), MDF (Module Fail alarm), MTC (for Module Type Conflict alarm), or STT (for module state, which has a value of 0 if module is connected and good, 1 otherwise).
- Derived channels value attribute: dxx val, where xx is from 01 to 32.
- Timer Events state as binary value: Txx stt, where xx is 01-32.
- User defined event alarm state: Uxxxx ast, where xxxx is 0001-1500.
- All system alarm state: alarm ast, where alarm is:

A1:	Controller Fail	LVD1:	Low Voltage Disconnect
RF1:	Controller Fuse	OSA1:	Open String
CPA1:	Circuit Pack Fail	EMD1:	Energy Management Disabled
RPF1:	Remote Peripheral Fuse	EPD1:	Excess Plant Drain
PCF1:	PC Power Fuse	SNC1:	Shunt Not Configured
EPR1:	External Password Reset	RFA1:	Rectifier Fail
PFD1:	Password At Default	ACF1:	AC Fail

EXL1:	Excessive Login Attempt	PHA1:	Phase Or Low Output
BBL1:	Memory Backup Battery	LCA1:	Low Current
PHT1:	Processor Halt	LSF1:	Load Share Fuse
CLC1:	Clock Changed	MAN1:	Manual Off
STF1:	Self Test Failed	ETS1:	External Transfer Shutdown
PGI1:	Program Line Invalid	RIC1:	Rectifier Incomplete Config
CCH1:	Configuration Changed	COF1:	Queue Overflow
HCL1:	History Cleared	COR1:	Number Did Not Respond
MOR1:	Measure OUT Of Range	NNC1:	Number Not Configured
MTC1:	Module Type Conflict	POR1:	Number Did Not Respond
MDF1:	Module Failure	AAC1:	ACO Active
BTJ1:	Battery Thermal Major	ATA1:	Alarm Test Active
BTN1:	Battery Thermal Minor	ATF1:	Alarm Test Failed
AMJ1:	Auxiliary Fuse Major	ATB1:	Alarm Test Aborted
AMN1:	Auxiliary Fuse Minor	VLA1:	Very Low Voltage
FAJ1:	External Fuse Major	MFA1:	Multiple Rectifier Fail
FAN1:	External Fuse Minor	LMR1:	Limited Recharge
RBF1:	Regulation Battery Fuse	ERD1:	Excess Rectifier Drain

BTF1: Battery Thermal Fuse	ETO1: Engine Transfer Timeout
BPF1: Battery Power Fuse	RPI1: Rectifier/Plant Inconsistency
ABS1: Alarm Battery Supply	BDA1: Battery On Discharge
VSF1: Sense/Control Fuse	HVA1: High Voltage
LVDA1: Low Voltage Fail	HFV1: High Float Voltage
RTL1: Reserve Time Low	

For example: (c301 val > dc1 vdc) & bda1 ast will evaluate to TRUE if channel 3 of module 01 value is greater than the plant voltage AND there is a BD alarm in the system.

The expression can contain system resources that can be added to or removed from the system dynamically (e.g., rectifier, remote peripheral monitoring modules). If the expression has operands that is no longer exist in the system, the expression is no longer valid and the system Invalid Expression alarm is set.

NOTE **If the objects have only one attribute that can be used in the program line, then you can omit the attribute name. For example:**

C105 VAL or **C105** will work.

BDA1 AST or **BDA1, TE03 STT** or **TE03** will work.

U0012 STT or **U0012, DR08 VAL** or **DR08** will work.

But you must enter **DC1 ADC, DC1 VDC, DC1 TRD, DC1 UBT** because the **DC1** object has more than one attribute that can be used in a program line.

Examples

The following are additional examples of User Defined Event (UDE) program lines:

1. You may connect channel 1 of shunt module address 05 to a shunt and generate a Major alarm if the reading is out of the 20 to 60 amperes range.

   Add a UDE channel to the system by issuing the T1.317 command: ADD UDE,U0001

   Change the severity level of U0001 to MAJOR:
   CHA U0001,SEV=MAJ

   Change the U0001 program line:
   CHA U0001,PRG="(C105 < 20) | (C105 > 60)"

2. You may monitor the abnormal condition on all the Remote Peripheral Monitor modules:

   Add an UDE channel to the system by issuing the T1.317 command: ADD UDE,U0002

   Change the U0002 program line:
   CHA U0002,PRG="MOR1 | MTC1 | MDF1"

   Change the severity level of U0002 to MINOR:
   CHA U0002,SEV=MIN

   The above will generate a Minor Alarm if a Module Out of Range alarm (MOR1) exists or a Module Type Conflict alarm exists (MTC1) or a Module Failure alarm (MDF1) exists.

3. You may monitor if a fuse is blown using channel 1 of the Binary module address 03 and generate a Minor alarm. In this example, it is assumed that the voltage across the good fuse is almost 0, and the voltage across the blown fuse is greater than 3.1V.

   Add an UDE channel to the system by issuing the T1.317 command: ADD UDE,U0003

   Change the U0003 program line:
   CHA U0003,PRG="C103 VAL"

   Change the severity level of U0003 to MINOR:
   CHA U0003,SEV=MIN

The above will generate a Minor Alarm if the fuse is blown. The internal threshold of the Binary channel is set so that if the voltage reading is greater than 3.1V, the channel value is set to ON (TRUE). If the voltage reading is less than 1.9V, the channel value is set to OFF (FALSE). Otherwise the channel value is set to UNKNOWN.

4. You may connect each channel of a 0-3V Voltage module (address 12, for example) to a Round Cell battery (voltage = 2V), and generate a Minor alarm if the voltage dips below 1.90V.

   Add multiple UDE channels to the system by issuing the T1.317 commands:

   ADD UDE,U0004
   ADD UDE,U0005
   ADD UDE,U0006

   Change the U0004, U0005, and U0006 program lines:

   CHA U0004,PRG="C112 < 1.9 | C212 < 1.9"
   CHA U0005,PRG="C312 < 1.9 | C412 < 1.9"
   CHA U0006,PRG="C512 < 1.9 | C612 < 1.9"

   Change the severity level of U0004, U0005, and U0006 to MINOR:

   CHA U0004,SEV=MIN
   CHA U0005,SEV=MIN
   CHA U0006,SEV=MIN

NOTE **For a Binary Channel:**

< 1.9V means the state is OFF or CLOSED or 0.
> 3.1V means the state is ON or OPEN or 1.

For a Control Relay Channel:

A FALSE program line results in the relay in the OFF or CLOSED state.

A TRUE program line results in the relay in the ON or OPEN state.

Universal Reserve Time Prediction

The reserve time prediction option provides an accurate prediction of the total remaining battery reserve time for the plant. The prediction is adaptive; that is, it adjusts to continuously changing conditions in the plant, and also takes into account the discharge characteristics of the battery type that is used in the plant in order to make an accurate reserve time prediction. The batteries should be fully recharged prior to the initial prediction. The prediction is continuously updated as the load changes, and predicts for all four states of the battery: float, Coup De Fouet, discharge, and recharge. If the load changes at any time during the prediction, regardless of which of the four states the battery is in, the prediction is updated based on the current conditions.

Currently, the algorithm supports the following battery types:

Valve regulated types

- Tyco IR-30
- Tyco IR-40
- Tyco 12IR-125
- Tyco 4VR-125E
- Tyco 2VR375E

Flooded types

- KS-20472, L-1S round cells
- KS-15544, L-508
- Exide GU-41
- Exide GU-45

The algorithm starts reporting the reserve time as soon as all of the required hardware is installed and configured. The initial prediction is based on the manufacturer's data for the particular type of battery, the minimum allowable cell voltage, the temperature, and the load. **Since the manufacturer's data are based on a fully charged battery, the initial prediction will be accurate only if the battery is fully charged.**

When the ac fails and the batteries begin to discharge, during the initial portion of the discharge, known has as the Coup De Fouet, the predictor continuously subtracts the ampere hours that are being removed from the battery from the reserve time predicted before the start of the discharge. The Coup De Fouet time period varies with the rate of discharge and begins when the Battery starts to discharge. The Coup De Fouet time period is calculated as approximately 5 percent of the projected discharge time, and is typically 1 minute to 15 minutes.

After the Coup De Fouet, the prediction is based on a Tyco patented prediction algorithm. In essence, the algorithm “learns” the characteristics of the particular battery string(s), then uses the learned characteristics for future predictions rather than using the manufacturer’s data as was used for the initial prediction.

When the ac returns, and the battery begins to charge, the reserve time prediction is continuously updated as ampere-hours are added into the battery. If there is not a subsequent battery on discharge before the battery is fully charged, when the battery is fully charged the reserve time prediction for the plant will be based on the learned battery characteristics. With the plant now in the float mode, the algorithm then uses the learned battery characteristics for subsequent predictions. Recall that the initial prediction was based on battery manufacturer’s data.

If there are subsequent ac failures before the batteries are fully recharged, the prediction is updated by subtracting the ampere-hours removed during the discharge and adding ampere hours during charge. Note that a prediction is always made, regardless of the load, number of ac failures, and changes in the load. Eventually the batteries will be fully charged and in the float mode. With the plant in the float mode, the algorithm uses the learned battery characteristics for subsequent predictions.

The total reserve time for the discharge is also stored in the plant battery on discharge history. The reserve times included in the battery on discharge history can be used as one of the criterion for determining when to check or replace the batteries in the plant.

If the predicted reserve time drops below a user configurable threshold, with a default value of 2 hours, then the reserve time too low alarm is created. The alarm is retired after the batteries recharge. This alarm can also occur if the plant load increases so that the battery reserve time is less than two hours with a fully charged battery. A prediction is never made if the plant load in amperes is not in the range from C/2 to C/32, where C is the ampere-hour rating of the batteries.

For typical discharges, the uncertainty is ± 5% of the reserve time remaining. The accuracy of the reserve time prediction improves as the discharge progresses. The algorithm will provide accurate reserve time predictions for the operational temperature range of the battery. In addition, if battery sections are configured, a reserve time prediction will also be calculated for each battery section.

Reserve Time Prediction Installation

The reserve time prediction algorithm requires the universal battery temperature probe to provide battery temperature information for the algorithm. The thermistor on the temperature probe should be installed on any terminal of any battery string in the plant. Since the thermistor supplied is highly insulated (case-to-lead electrical resistance), the thermistor can be mounted to any cell terminal in the battery string. However, extreme caution should be exercised when installing the thermistor to any “above-ground” battery terminal post, in order to avoid shorting all (or part of) the battery string. Also, in multiple battery string plants, it is recommended that the installer choose a cell in the string that is anticipated to experience the lowest ambient temperature. (Before deciding on thermistor placement, temperature measurements can be taken at each string using a thermometer, or similar portable temperature-measuring device, in order to determine which cell has the lowest ambient temperature. This can be done as long as the battery subsystem area of the plant is not currently experiencing any unusual temperature variations.) This selection will lead to a more conservative prediction of the remaining reserve time.

Reserve time for individual battery sections can also be predicted. This might be used in a distributed power architecture. To accomplish this prediction technique, the voltage, current, and temperature of each battery section can be monitored using remote peripheral monitors.

Reserve Time Prediction Parameters

The algorithm uses plant voltage, plant current, the rectifier float set point, the sum of the rectifier currents, the battery temperature, the battery type, the number of battery strings, the minimum allowable volts per cell, and the number of cells per string to determine the remaining reserve time.

The reserve time prediction algorithm monitors the following items for predicting reserve time and provides alarms as indicated:

Temperature Probe Present:
This input allows Galaxy to recognize that the battery temperature probe is present. If the temperature probe is present, then the prediction algorithm is active; if removed the reserve time predictions will cease.

Battery Temperature:
This temperature is used as a one of the inputs for the plant reserve time prediction. If the reading is blank, this indicates the controller thinks that no probe is attached. The temperature information is available to the user and may be used as a monitoring point. For example, using temperature as one of the User Defined Events (UDE) can be used to generate an alarm.

Plant Current:
The plant current is used in the algorithm calculations. The plant load is compared with the sum of the rectifier currents to determine whether the batteries are charging or discharging. During the charge phase, the reserve time is predicted by adding the ampere-hours returned to the batteries to the prediction. During the Coup De Fouet discharge phase, the reserve time is predicted by subtracting the ampere-hours from the prediction, and during the post Coup De Fouet discharge phase the prediction is based on the adaptive algorithm. The reserve time presented to the user is always a function of the present state of the battery plant.

Sum of the Rectifier Currents:
The sum of the rectifier currents is used in the algorithm. The value is valid when all rectifier types are configured, as they should be per the installation instructions. The Galaxy Controller calculates this value. The algorithm subtracts the sum of the rectifier currents from the plant load to determine the battery current and whether the battery is discharging or charging.

Plant Voltage:
The reserve time prediction uses the plant voltage as the most important value in predicting the reserve time during discharge. The monitored plant voltage is the same as the battery voltage. The algorithm normalizes the battery voltage by dividing the battery voltage by the number of cells per string (12 for a 24-volt plant or 24 for a 48-volt plant).

The following items are provided as user configurable parameters for use in the reserve time prediction algorithm:

End Volts per Cell:
The plant voltage, normalized on a per cell basis, which the user chooses for calculating the reserve time. The default value is 1.75 volts. The range of values for this setting is 1.75 to 1.95 volts. The predicted reserve time will vary significantly as the end cell voltage changes from 1.75 to 1.95.

Battery Type:
The reserve time prediction algorithm is based on a modeling technique that is adaptive for different types of batteries. The batteries currently supported are listed above. The default value is the Tyco Electronics KS-20472, L-1S battery.

Number of Battery Strings:
The reserve time is adjusted to reflect the number of battery strings and the actual plant load. The range is 1 to 32 strings, with the default setting of 2 strings.

Cells Per String:
The algorithm must know the number of cells per string. Dividing by the number of cells per string normalizes the plant voltage (or battery voltage). The program allows 1 to 75 cells per string. For 24-volt plants, the default number of cells per string is 12. For 48-volt plants, the default number of cells per string is 24.

Rectifier Float Set Point:
During discharges, the reserve time is normalized for a constant power discharge using the rectifier float set point. The default rectifier set point is 26.04 volts for 24-volt plants; the default rectifier set point for 48-volt plants is 52.08 volts.

Reserve Time Too Low Alarm Threshold:
The Reserve Time too Low alarm is created during a battery on discharge when the predicted reserve time drops below this configurable threshold value (in hours). The default value is 2 hours. The alarm is cleared when the batteries recharge. If the universal battery temperature probe is removed, which should never happen, the alarm is cleared.

The alarm can also occur if the plant load increases so that the calculated reserve time with fully charged batteries is less than two hours. This occurs if the battery capacity exceeds C/2. For this case, the alarm can be removed by configuring the alarm threshold to zero.

8 Troubleshooting

Many of the troubleshooting procedures described in this Section require removing or replacing circuit packs. Review "Circuit Pack Addition, Removal and Replacement" in Section 3 before you go on.

Basic Controller Circuit Packs

BJB (microprocessor board): After power up, or after a reset, the green and amber LEDs will both be lit while self diagnostics are in progress (which will take about 10 seconds). If all diagnostics pass, the amber LED will extinguish and the green LED will remain lit. If failures are detected during diagnostics the green LED will extinguish, and the amber LED will remain lit. During normal operation if a failure occurs the green LED will extinguish and the amber LED will light. When a failure occurs, perform the following steps.

1. Press the reset switch on the front of the BJB circuit pack. If all diagnostics pass, it is possible that some type of "one time" abnormality occurred to cause the failure, such as hot-insertion of option boards, shorting backplane pins when installing optional equipment, etc. If the diagnostics did not pass, or if the problem reoccurs, go to the next step.

2. Replace the BJB circuit pack and verify the failure is resolved. If the problem remains, put the original BJB circuit pack back in the controller and go to the next step.

3. Remove all BJC rectifier interface boards, and the BJE alarm relay/display board and press the reset switch on the BJB. If the problem is still present, replace the BJA power board. If the problem is resolved insert all boards that were removed, reset the controller, and verify proper operation.

If the problem remains put the original BJA power board back in the controller and go to the next step.

4. Insert all boards that were removed one at a time, while resetting the controller after each board is installed and looking for improper operation. Replace the board that causes a failure, insert the remaining option boards, and verify proper operation.

Other Basic Boards: The basic controller boards (rectifier interface, alarm relay/display, and power) are diagnosed by the basic controller's microprocessor. If problems are detected the failed board's amber LED is lit, otherwise the green LED is lit. If the amber LED is lit, first reset the BJB microprocessor board and see if the problem clears. If the problem reoccurs, replace the option board. **If the basic controller microprocessor board fails, both the green and amber LEDs on the other basic controller boards will be lit.**

BJA (power board): The test jacks on the front of this board can be used to verify the supply voltages. The three voltage levels should be:

1. +5V: 4.75V-5.25V
2. +15V: 14.25V-15.75V
3. -15V: 14.25V-15.75V

None of these voltage levels are field adjustable. If any of the voltages are high, replace the power board. If any of the voltages are below the lower limits, either the power board is at fault or one of the other basic controller boards is overloading the supply. Replace the power board, if the problem persists remove the other basic controller boards one at a time until the voltage rises back into range. Replace the faulty board that was overloading the supply and put the original BJA power board back in the controller.

Front Panel Display: If the front panel display or LEDs/switches fail, first verify the ribbon cable from the backplane to the display is not cut, abraded, or otherwise mangled. Reset the BJB microprocessor board after replacing cable but before retesting. Replace the BJE alarm relay/display board, and finally either the display or the BJG LED and switch board, depending on whether the display or LEDs/switches are failing.

Intelligent Controller Circuit Packs

BJH (microprocessor board): After power up, or after a reset, the green and amber LEDs will both be lit while self diagnostics are in progress (which will take about a 30 seconds). If all diagnostics pass, the amber LED will extinguish and the green LED will remain lit. If failures are detected during diagnostics the green LED will extinguish, and the amber LED will remain lit. If a terminal is attached to the local port during diagnostics, the diagnostic messages will show which test failed. During normal operation if a failure occurs the green LED will extinguish and the amber LED will light. When a failure occurs, perform the following steps.

1. Press the reset switch on the front of the BJH circuit pack. If all diagnostics pass, it is possible that some type of “one time” abnormality occurred to cause the failure, such as hot-insertion of option boards, shorting backplane pins when installing optional equipment, etc. If the diagnostics did not pass, or if the problem reoccurs, go to the next step.

2. Replace the BJH circuit pack and verify the failure is resolved. If the problem remains, put the original BJH circuit pack back in the controller and go to the next step.

3. Remove all option cards and press the reset switch on the BJH. If the problem is still present, replace the BJJ power board. If the problem is resolved insert the option boards, reset the controller, and verify proper operation. If the problem remains put the original BJJ power board back in the controller and go to the next step.

4. Insert the option boards one at a time, while resetting the controller after each board is installed and looking for improper operation. Replace the option board that causes a failure, insert the remaining option boards, and verify proper operation.

BJJ (power board): The LEDs on this board work independent of the microprocessor. Analog comparators monitor the levels of the three power supplies. If no problem exists, the green LED is lit, if one of the supplies is out of range, the amber LED is lit. The test jacks on the front of the board can be used to verify the supply voltages. The three voltage levels should be:

1. +5V: 4.75V-5.25V
2. +12V: 12.43V-12.85V (although it should not be necessary to field adjust, this is the only adjustable voltage on the BJJ power board. Its output level is controlled by potentiometer R101.)
3. VPP: 12.08V-12.12V

If the amber LED is lit, verify the voltages at the test jacks. If all voltages are within the above limits, or if any of the voltages are high, replace the power board. If any of the voltages are below the lower limits, either the power board is at fault or one of the other intelligent boards is overloading the supply. Replace the power board, if the problem persists remove the intelligent boards one at a time until the voltage rises back into range. Replace the faulty board that was overloading the supply and put the original BJJ power board back in the controller.

Intelligent Option Boards: The intelligent option boards (modem, data switch, and peripheral monitor) are diagnosed by the microprocessor. If problems are detected the option board's amber LED is lit, otherwise the green LED is lit. If the amber LED is lit, first reset the BJH microprocessor board and see if the problem clears. If the problem reoccurs, replace the option board.

Replacing a Memory Backup Battery

The memory backup battery is located on the BJH (Intelligent Controller) circuit pack. The battery provides power to retain system configuration stored in memory in the event the BJH circuit pack is removed or input power to the Galaxy Controller is interrupted. Battery life is typically about five years.

When the memory backup battery is low, the Memory Backup Battery Low warning is active and the battery should be replaced. Perform the following three procedures to replace the memory backup battery to prevent loss of system configuration: backup system configuration; replace memory backup battery, and restore system configuration.

Backup System Configuration

Use the EasyView software to perform a backup of the system configuration. Refer to the discussion of EasyView in Section 4 of this manual. If you need to install EasyView for the first time, see the Product Manual "Lineage® 2000 EasyView Software for the Galaxy Controller," Select Code 193-104-105. Follow these steps to perform the backup:

1. Log in and begin an EasyView session.

2. Open the File menu and select Backup. Select a file name and directory to store the system configuration. Click OK. EasyView displays the status of the backup. Click OK when the Backup operation is completed.

3. If site passwords are not at default, open the Options menu and select Setup Sites. Select your connection profile from the Site list. Click Modify. Change the Administrator password to the default password "administrator." Change the Connect password to "administrator." Click OK. Click Close.

4. Open the Connect menu and select Disconnect to end the EasyView session.

Replace Battery

You must remove the BJH Intelligent Controller circuit pack to replace the battery. Follow these steps:

1. Identify the BJJ Intelligent Power Board (far left position) and pull its circuit pack locking lever forward and downward to release it from the backplane. Slide the pack straight out until fully disengaged from the backplane.

NOTE **When the BJJ Intelligent Power Board is removed, a Power Major alarm will be issued by the BJB basic controller.**

2. Identify the BJH Intelligent Controller circuit pack and pull its locking lever forward and downward to unlock the pack. Then slide the pack straight out of the card cage.

3. Remove the memory battery. Take care not to flex the battery holder clip excessively.

4. Insert the memory battery (Panasonic BR2032 or equivalent, Tyco Comcode 406526079) into the BJH (Intelligent Controller) circuit pack X201 battery holder. Observe proper polarity; the battery holder clip contacts the "+" side of the memory battery. Take care not to flex the battery holder clip excessively.

5. Align the BJH Intelligent Controller circuit pack with the circuit pack tracks and carefully slide the circuit pack into the card cage. Seat and lock the circuit pack into the card cage by lifting the circuit pack locking lever to the full upright position.

6. Reengage the BJJ Intelligent power board into the backplane and lift its circuit pack locking lever into the full upright position. Observe active green LEDs on all packs after approximately one minute.

Restore System Configuration

1. Log in and begin an EasyView session using the previously modified connection profile.

2. Open the File menu and click on Restore. Select the configuration file you saved when you performed the Backup operation. Click OK. EasyView displays the status of the backup. Click OK when the Restore operation is complete.

3. Open the Configure menu and click on Configure Passwords. Change the passwords from the default setting to the appropriate password for your site.

4. Open the Configure menu and click on System → System Time. Set the System time and date. Click OK.

5. If passwords are not at system defaults, open the Options menu and click on Setup Sites. Select your connection profile from the Site list. Click Modify. Change the passwords to those chosen for the site. Click OK. Click Close.

6. Open the Connect menu and select Disconnect to end the EasyView session.

Alarms

This Table lists alarms available on Galaxy SC, SCF and Millennium Controllers.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
AAC1	ACO Active	Alarm Cut-Off has been initiated to silence local audible alarms. Any subsequent Power Critical, Power Major, or Power Minor alarm disables ACO. A programmable ACO time-out period for each alarm severity resets silenced alarms.
ABS1	Alarm Battery Supply	Operated ABS fuse on Galaxy's BJF fuse card or on Millennium's BSH basic control card.
ACF1	AC Fail	A rectifier is reporting an AC failure or Galaxy is assuming an AC failure because all rectifiers are off.
AMJ1	Auxiliary Major	A resistive battery potential is present on the AMJ alarm input at Galaxy TB3-21 or Millennium BSL-64, indicating a major alarm is active in the external equipment connected to this point.
AMN1	Auxiliary Minor	A resistive battery potential is present on the AMN alarm input at Galaxy TB3-22 or Millennium BSL-66, indicating a minor alarm is active in the external equipment connected to this point.
ATA1	Alarm Test Active	Alarm Test is currently active. Any real alarm with a severity of Critical, Major or Minor, other than RFA or HV, aborts an active Alarm Test.
ATB1	Alarm Test Aborted	Alarm Test has been aborted by an alarm. This is a latched event, remaining active until cleared by a user.
ATF1	Alarm Test Failed	A Galaxy rectifier with the RFAT feature has failed to generate a RFA during Alarm Test. This is a latched event, remaining active until cleared by a user.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
BBL1	Memory Backup Battery Low	The intelligent controller memory battery, located on the front edge of the Galaxy BJH or Millennium BSJ Intelligent Control pack requires replacement. Do NOT power down the controller or remove the BJH or BSJ pack from Galaxy or Millennium while this warning is active or configuration information will be lost.
BCA1	Battery Type Conflict	The DC Plant - Battery Type (DC1, BTY) and Battery Management - Battery Test Class (BR1, BTC) attributes (sealed vs. flooded) do not match.
BDA1	Battery On Discharge	The plant voltage is below the threshold set for BD in the present plant mode, FLOAT or BOOST/BTP. This alarm will not retire immediately upon rectifier restoration after an extended discharge. Plant voltage will not fully recover until depleted battery energy has been replaced. Do NOT adjust the rectifier voltage adjustments if they are at or near rated output currents.
BFA1	Battery Test Failed	A Battery Test was aborted before a reserve time could be established. This is a latched event, remaining active until cleared by a user.
BID1	Bay Interface ID Conflict	The ID for a BIC (Bay Interface Card) connected to the controller’s serial bus is the same as that of a previously installed BIC.
BPF1	Battery Power Fuse	Operated BAT fuse on Galaxy’s BJF fuse card. External shutdown control of connected parallel interface rectifiers is not available when the BAT fuse is operated or vacant.
BTA1	Battery Test Active	A Battery Test session has been initiated. (Available only in plants with all serial rectifiers. Rectifier voltage has been lowered and the batteries are discharging.) The BAT LED and BD relays are active and both the BDA1 and VLA1 alarm thresholds along with STC (Slope Thermal Compensation) are inhibited while the Battery Test is active.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
BTF1	Battery Thermal Fuse	Operated BTP fuse on Galaxy's BJF fuse card.
BTJ1	Battery Thermal Major	A Battery Thermal Protection (BTP) module wired to the BTP inputs of Galaxy TB3 is reporting a battery temperature above its major alarm threshold (varies with BTP type).
BTN1	Battery Thermal Minor	A Battery Thermal Protection (BTP) module wired to the BTP inputs of Galaxy TB3 is reporting a battery temperature above its minor alarm threshold (varies with BTP type).
CCH1	Configuration Changed	A change has been made to a configuration setting. This is a latched event, remaining active until cleared by a user.
CDFA1	Converter Distribution Fuse	A converter distribution module connected to the controller's serial bus is reporting an operated fuse in it's output distribution.
CDID1	Converter ID Conflict	The ID for a converter connected to the controller's serial bus is the same as that of a previously installed converter.
CEA1	Connected Equip Alarm 1	Equipment monitored by Galaxy through Data Switch Port-1 is reporting an alarm.
CEA2	Connected Equip Alarm 2	Equipment monitored by Galaxy through Data Switch Port-2 is reporting an alarm.
CEA3	Connected Equip Alarm 3	Equipment monitored by Galaxy through Data Switch Port-3 is reporting an alarm.
CEA4	Connected Equip Alarm 4	Equipment monitored by Galaxy through Data Switch Port-4 is reporting an alarm.
CEA5	Connected Equip Alarm 5	Equipment monitored through Data Switch Port-5 is reporting an alarm. (Millennium only.)
CEA6	Connected Equip Alarm 6	Equipment monitored through Data Switch Port-6 is reporting an alarm. (Millennium only.)

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
CFA1	Converter Fail	A converter connected to Galaxy's serial bus has failed.
CFJ1	Converter Fan Major	Two or more converters connected to the controller's serial bus are reporting fan failures.
CFN1	Converter Fan Minor	A converter connected to the controller's serial bus is reporting a fan failure.
CLC1	Clock Changed	A change has been made to Galaxy's Time or Date setting. This is a latched event, remaining active until cleared by a user.
CLM1	Rectifier Current Limit	The rectifiers connected to the controller's serial bus have reached their current limit setting. Plant voltage may, therefore, be lower than that requested in Rectifier Manager.
CMA1	Minor Comm Fail Alarm	The controller has lost communication with a device that it had previously recognized on its rectifier/converter/BIC serial bus. If one of these devices is to be permanently removed, it is necessary to issue a Remove Rectifier, Remove Converter, or Unmap BIC command to clear the CMA1 alarm.
CMFA1	Multiple Converter Fail	Multiple converters connected to the controller's serial bus have failed. This threshold is programmable.
CNF1	Contactor 1 Failed	A contactor controlled by the controller's LVD CN1 settings (usually used with all LVBD contactors of a plant) is in the opposite state of that it has been instructed to be in (open if instructed to be closed, closed if instructed to be open).
CNF2	Contactor 2 Failed	A contactor controlled by the controller's LVD CN2 settings (usually used with all LVBD contactors of a plant) is in the opposite state of that it has been instructed to be in (open if instructed to be closed, closed if instructed to be open).

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
CNF3	Contactor 3 Failed	A contactor controlled by the controller's LVD CN3 settings (sometimes used with some of the LVLD contactors of a plant) is in the opposite state of that it has been instructed to be in (open if instructed to be closed, closed if instructed to be open).
CNO1	Contactor 1 Open	The contactors controlled by the controller's LVD CN1 settings (usually used with all LVBD contactors of a plant) are open (disconnected).
CNO2	Contactor 2 Open	The contactors controlled by the controller's LVD CN2 settings (usually used with some or all LVLD contactors of a plant) are open (disconnected).
CNO3	Contactor 3 Open	The contactors controlled by the controller's LVD CN3 settings (sometimes used with some of the LVLD contactors of a plant) are open (disconnected).
COF1	Queue Overflow	The 256 event call-out on alarm memory queue filled, causing events occurring while full to be dropped from the call-out queue. This is a latched event, remaining active until cleared by a user. Usually indicates that programmed phone numbers are not responding.
COR1	Number Did Not Respond	Active when both a primary and alternate call-out phone number failed to connect at least 3 times in a row. This is a latched event, remaining active until cleared by a user.
CPA1	Circuit Pack Fail	Galaxy (BJB) or Millennium (BSH) basic controller alarm.
CRA1	Controller Fail	Galaxy (BJH) or Millennium (BSJ) intelligent controller alarm. An intelligent controller failure results in the front panel display reverting to the basic simplified menu feature set.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
CRF1	Controller Fuse	Operated INTEL fuse on Galaxy's BJF fuse card or Intelligent Power fuse on Millennium's BSH basic card.
DID1	ID Conflict	The ID for a rectifier connected to the controller's serial bus is the same as that of a previously installed rectifier.
EMD1	Energy Management Disabled	The Energy Management feature has been disabled either in hardware (Galaxy BJH or Millennium SW204-1), software, or due to an active BD alarm, Boost mode, or attached rectifiers that are unconfigured or have an invalid load reading.
EPD1	Excess Plant Drain	Plant load has been reported at greater than the plant shunt size. This is a latched event, remaining active until cleared by a user.
EPR1	External Password Reset	The administrator password has been reset to it's default (ADMINISTRATOR) by use of the password reset switch on the front of the Galaxy BJH intelligent controller or Millennium BSJ SW205. This is a latched event, remaining active until cleared by a user. This event is logged into history each time it occurs, regardless of whether it has been cleared previously or not.
ERD1	Excess Rectifier Drain	A connected rectifier load has been reported at greater than the programmable threshold for this event. This is a latched event, remaining active until cleared by a user.
ETO1	Engine Transfer Time-out	Either all 4 external TR (transfer or terminate rectifier) shutdown signals have been active simultaneously for longer than the programmable time limit or the ETR (engine transfer or terminate rectifier) shutdown signal for Galaxy's internal rectifier sequence circuit has been active for longer than the programmable time limit.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
ETS1	External Transfer Shutdown	A rectifier shutdown is active through external signals into TR1 to TR4 on Galaxy's TB3-8 to TB3-11 or Millennium BSL-73, 79, 85, 80.
EXL1	Excessive Login Attempts	A user has failed 6 times at entering a correct password at login or 3 times when changing security levels. This is a latched event, remaining active until cleared by a user. This event is logged into history each time it occurs, regardless of whether it has been cleared previously or not.
FAJ1	External Fuse Major	A resistive battery potential is present on the FAJ alarm input at Galaxy TB3-5 or Millennium BSL-63, indicating a major fuse or CB alarm is active in the plant distribution circuit connected to this point.
FAN1	External Fuse Minor	A resistive battery potential is present on the FAN alarm input at TB3-6 or Millennium BSL-65, indicating a minor fuse alarm is active in the plant circuit connected to this point. Typically only the capacitor charge circuit fuse alarm is wired here as a minor fuse alarm
HCL1	History Cleared	A user has cleared the event history record of one of Galaxy's history reports. This is a latched event, remaining active until cleared by a user.
HFV1	High Float Voltage	Plant voltage is above the programmed threshold for this alarm. The HFV threshold should be set lower than the HVA threshold which causes a HVSD signal to be issued to plant rectifiers.
HPA1	Half Power	Reserved for future application.
HVA1	High Voltage	Plant voltage is above the programmed threshold for this alarm. The HVA alarm causes a HVSD signal to be issued to plant rectifiers.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
LCA1	Low Current	A connected rectifier has load share enabled, but its present output load is less than a predefined threshold for that rectifier type. (Usually 3% or less of capacity.)
LMR1	Limited Recharge	The plant load has exceeded the programmed percentage of the total rectifier capacity set for this alarm. Rectifier capacity may be inadequate for recharging batteries in an acceptable period of time following an extended battery discharge. This is a latched event, remaining active until cleared by a user.
LSF1	Load Share Fuse	The fuse protecting the load share bus has operated on the control card of a connected rectifier.
LVD1	Low Voltage Disconnect	An externally controlled LVD is open, providing a closure signal to Galaxy between TB3-37/-38 or Millennium BSL-61/-62 for alarm purposes.
LVDA1	Low Voltage Disconnect Fail	The monitoring circuit of an external LVD has failed, providing a resistive battery potential signal into Galaxy TB3-16 or Millennium BSL-84.
MAN1	Manual Off	A connected rectifier has been manually turned off or has lost AC input power.
MCM1	Major Comm Fail Alarm	The controller has lost communication with two or more devices that it had previously recognized on its rectifier/converter/BIC serial bus. Typically indicates that the serial bus is physically interrupted. If any of these devices is being permanently removed from service, it is necessary to issue Remove Rectifier, Remove Converter, or Unmap BIC commands to clear this alarm.
MDF1	Module Failure	RPM system alarm. A module connected to one of the 3 RPM serial buses has failed or has been disconnected.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
MFA1	Multiple Rectifier Fail	The number of rectifiers currently processing a RFA alarm has exceeded the programmable threshold for this alarm.
MOR1	Measurement Out of Range	RPM system alarm. A channel measurement on a RPM is outside the DC voltage range designed for that RPM type. Often indicates reversed polarity for measurement leads on a unipolar module type.
MTC1	Module Type Conflict	RPM system alarm. A module has been connected and given the address used previously by a module of a different type, without unlocking the previous module's configuration.
NNC1	Number Not Configured	A call-out number has been assigned as the notification destination for an alarm, which does not have the phone number field defined.
OSA1	Open String	A battery disconnect circuit is providing a resistive battery potential signal into Galaxy TB3-7 or Millennium BSL-72, indicating that a battery string is presently off line.
PCF1	PC Power Fuse	Operated PCPWR fuse on Galaxy's BJF fuse card. Note that this fuse feeds plant voltage to the P400 PCPWR jack of the BJF card and is not presently used.
PFD1	Password At Default	One or more of the log-in passwords is at it's default value. All passwords must be set to something other than their default before this event will clear.
PGI1	Program Line Invalid	The program line for a derived channel, user defined event channel, or RPM control relay channel contains an invalid operand. Typically occurs when a RPM channel value or state is used in a program line and that RPM is disconnected or otherwise goes into a failure mode.

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
PHA1	Phase Or Low Output	A connected 3-phase rectifier is indicating loss or low voltage of an AC input phase. J874-series Tyco rectifiers can produce partial output with the loss of an AC input phase, so a PHA1 against this rectifier type in an intelligent Galaxy results in their placement into a TR standby mode until 10AM the following day or until a BD alarm activates.
PHT1	Processor Halt	Galaxy’s BJH or Millennium’s BSJ intelligent controller stopped processing, usually due to a reset or reboot.
POR1	Number Did Not Respond	Active when the periodic status call-out phone number failed to connect 4 times in a row. This is a latched event, remaining active until cleared by a user.
RBF1	Regulation Battery Fuse	Operated Regulation fuse, A1 to C8, on Galaxy’s BJF fuse card.
RFA1	Rectifier Fail	A connected rectifier is reporting a failure condition to Galaxy.
RIC1	Rectifier Incomplete Config	The controller recognizes the presence of a rectifier for which sufficient configuration has not been completed.
RPF1	Remote Peripheral Fuse	Operated PER MON fuse on Galaxy’s BJF fuse card or Option Power fuse on Millennium’s BSH basic card.
RPI1	Rect/Plant Inconsistency	The plant load has exceeded the total rectifier drain by more than the factor programmed for this alarm, without causing plant voltage to fall. This is a latched event, remaining active until cleared by a user. Either the plant load reading or the total rectifier drain value is in error.
RTL1	Reserve Time Low	The predicted battery reserve time has fallen below the programmed threshold.
SNC1	Shunt Not Configured	The shunt has been configured for either battery or load type and the value programmed for shunt Amps is invalid. (0)

Table 8-A: Galaxy Alarms

Symbol	Designation	Explanation
STF1	Self Test Failed	During initial boot, one or more of the tests performed on the basic (Galaxy BJB or Millennium BSH) or intelligent (Galaxy BJH or Millennium BSJ) controllers failed. This is a latched event, remaining active until cleared by a user.
TPA1	Thermal Probe Failure	A temperature probe used for the Reserve Time Prediction or Slope Thermal Compensation features is returning a temperature outside of an acceptable range.
URC1	User Relay Conflict	Battery management contactor LVD CN1, CN2, or CN3 has been configured for a type other than NONE and associated user relay UR1, UR2, or UR3 has also been assigned to report an alarm condition. This attribute is only applicable in plants not using BIC cards.
VLA1	Very Low Voltage	The plant voltage is below the threshold set for VLV. This is a critical alarm, indicating that load failures are imminent.
VSF1	Sense/Control Fuse	Operated SENSE fuse on Galaxy's BJF fuse card or Voltage Sense fuse on Millennium's BSH basic card. Also issued if the regulation voltage leads are not connected (plant voltage is 0V).
ZID1	ID Not Configured	A devise on the rectifier/converter serial bus has been recognized without an assigned ID.

9 Safety

Safety Statements

Please read and follow all safety instructions and warnings before installing, maintaining, or repairing the Galaxy SCF Controller. Also refer to the peripheral monitoring system product manual for safety statements related to the installation and use of these devices.

The Global Power System (including the peripheral monitoring modules) is Listed by Underwriters Laboratories Inc. to the requirements of UL Subject 1801 as a controller for use with DC Power Distribution Centers for Communications Equipment. The Listing is based on the items noted below.

Install only in restricted access areas (dedicated equipment rooms, equipment closets, or the like) in accordance with articles 110-16, 110-17, and 110-18 of the U.S. National Electric Code (NEC), ANSI/NFPA No. 70, and pursuant to applicable local codes.

This equipment is to be used in controlled environments (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).

This equipment has been evaluated for use in a continuous ambient temperature of up to 50° C.

This equipment must not be installed over combustible surfaces.

This equipment is to be connected to 24Vdc or 48Vdc systems that are electrically isolated from the ac mains and are reliably earth grounded, or connected to systems where the rectifiers were evaluated to UL1950 and identified as Safety Extra Low Voltage (SELV) outputs.

For installations in the United States, UL Listed compression connectors should be used to terminate UL Listed field-wired conductors where required. For all installations, the appropriate connector should be applied only 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.

For electrical connections requiring crimp-on lugs, make sure the proper crimping tools and dies are used (information for these connections are provided in the product documentation). Torque electrical connections to the values specified on labels or in the product documentation (T drawings).

For any power wiring, the insulation on field-wired conductors should be rated no less than 90° C. Wire conductor size should be no less than allowed by electrical codes for 60° C wire (regardless of insulation temperature rating used) and based on the ampacity of the associated protection device.

Alarm contacts on TB2 and TB3 are not fused within the controller. Therefore, current limiting protection for these contacts must be provided by external circuits. Maximum ratings for alarm connections are 60Vdc and 0.3A. Exceeding these maximum ratings could result in fire or damage to the unit.

Fuse holders, fuses, and termination kits may not be provided with the equipment. Refer to the product documentation for the proper hardware. Use only the parts specified in the equipment documentation (T and J drawings).

The maximum cable sizes or the required cable assemblies for the input/output wiring are noted on the T drawings.

Installing fuses not specified for use in this equipment may result in injury to service personnel or equipment damage. Use only replacement parts listed in this manual and on the equipment drawings.

The shunt input to TB1 (shunt +, shunt -) must be from the grounded side of the system, therefore, this input is not fused on the fuse board. If the Galaxy SCF Controller is ever used with systems where the shunt is located in the hot side of the plant, a suitable in-line fuse rated 1-1/3A must be installed.

The input to TB1 (DB/RB) should be wired per applicable local codes or the National Electrical Code. The input wiring should be protected by a suitable dc rated overcurrent protector. The internal circuits supplied by these inputs are protected on the fuse board inside the controller.

Each output of the peripheral monitor board supplies the peripheral monitoring system modules with current limited Class 2 levels from an inherently limited transformer rated 30Vac max. The typical operating current from each output is less than 0.5A (with a maximum of 85 modules attached).

Connectors on the backplane contain communication circuits, current limited signals, and 19 to 30Vdc or 36 to 60Vdc control signals fused at 1-1/3 amp.

The PCPWR connector on the fuse board is fused at 3A. This is intended for supplying dc power to devices located next to the controller.

The BATT PRED connector on the fuse board contains current limited circuitry.

Use only the screws provided for mounting the equipment in a frame or equivalent screws no smaller than No. 12-24 x 5/8. A minimum of 4 screws should be used on each side.

Grounding/bonding for the equipment can be provided through the mounting brackets. In this case, make sure the frame is suitably grounded. There is also a place provided on the equipment for the connection of a grounding conductor.

This controller uses a replaceable lithium battery:

DANGER

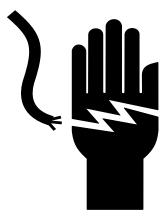
Danger of explosion or fire if lithium battery is incorrectly replaced. Replace only with Panasonic BR2032 or an equivalent recommended by the manufacturer. Spare batteries may be ordered per the product documentation. Lithium batteries may be regulated wastes (due to reactivity) when disposed of. Always discard used batteries according to applicable local, state, and federal regulations.

DANGER

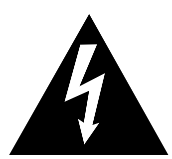
The manufacturer, Panasonic, has provided the following information regarding its product. Caution: Risk of fire, explosion, and burns. Do not recharge, disassemble, heat above 100° C (212° F), or incinerate. Dispose of used batteries promptly. Keep away from children.

Warning Statements And Safety Symbols

This symbol identifies the need to refer to the equipment instructions for important information.



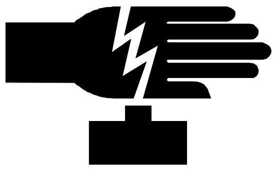
These symbols (or equivalent) are used to identify the presence of hazardous ac mains voltage.

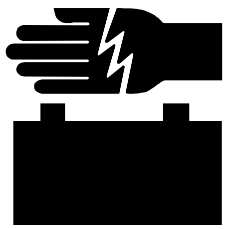


This symbol is used to identify the presence of hazardous ac or dc voltages. It may also be used to warn of hazardous energy levels.

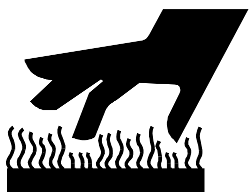
This symbol is used to identify the need for safety glasses and may sometimes be accompanied by some type of statement, for example: “Fuses can cause arcing and sparks. Risk of eye injury. Always wear safety glasses.”

The telecom-type (e.g., GMT type) fuses can produce sparks during interruption or clearing of a fault on a high energy circuit. Use only fuses provided with safety caps for this type of circuit.

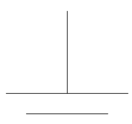


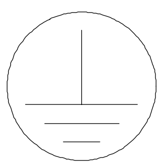


One of these two symbols (or equivalent) may be used to identify the presence of rectifier and battery voltages. The symbol may sometimes be accompanied by some type of statement, for example: “Battery voltage present. Risk of injury due to high current. Avoid contacting conductors with uninsulated metal objects. Follow safety precautions.”



This symbol is used to identify the presence of a hot surface. It may also be accompanied by a statement explaining the hazard. A symbol like this with a lightning bolt through the hand also means that the part is or could be at hazardous voltage levels.





These symbols are used to identify the safety earth ground or bonding point for the equipment.

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.”

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

- This unit must be installed, serviced, and operated only by skilled and qualified personnel who have the necessary knowledge and practical experience with electrical equipment and who understand the hazards that can arise when working on this type of equipment.
- Hazardous energy and/or voltages may be present in the unit and on the interface cables that can shock or cause serious injury. Follow all safety warnings and practices when servicing this equipment.In addition to proper job training and safety procedures, the following are some basic precautions that should always be used:

  - Use **only** properly insulated tools.
  - Remove all metallic objects (key chains, glasses, rings, watches, or other jewelry).
  - Wear safety glasses.
  - 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.

10 Product Warranty

A. Seller warrants to Customer only, that:

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

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

WARRANTY PERIOD

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

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

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

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

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

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

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

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

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

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

Appendix A Using the T1.317 Interface

Functional Overview

The T1.317 interface is the primary source of access to all of the features of the Galaxy SCF Controller. It is based on the principles outlined in the ANSI standard entitled, "Uniform Language for Accessing Power Plants - Human-Machine Language." The T1.317 language is based on viewing the system as a set of objects with attributes. The attributes can hold a value, multiple values, or be links to other objects. After logging into the system, a user may change the state of the system or request reports by sending command messages that reference the objects and attributes.

This section describes the T1.317 interface, the initial login, and the command set.

Login

A user can login to a T1.317 interface on the local, auxiliary, or modem port. For the local and auxiliary ports the application attribute (APP) must be set to terminal, which is the default setting. When the controller detects activity on a T1.317 port, the following prompt is sent to that port:

ENTER PASSWORD:

The user may enter the user, super-user, or administrator password. If the password is incorrect the system will send the following messages and wait for a new password:

INVALID PASSWORD

ENTER PASSWORD:

The user is allowed six attempts to enter a correct password. If the password is correct the user is given access to the system with the permission associated with the entered password. After a login header one of the following prompts will appear:

*	user prompt
**	super-user prompt
***	administrator prompt

At this point the user can enter T1.317 commands. The login header, which is described below, may be accessed at any time by entering the HEADER alias.

```
:PS1                  ; identifies power system controller
                      object
SDE=Mytown Plant      ; the site description
SID=12345             ; the site id
DES=Tyco Electronics Galaxy SCF Controller
                      ; controller description
SWV=2.0.2,2.0.2       ; basic and intelligent controller software
                      versions
DOW=Saturday          ; day of the week
DAT=01/01/1994        ; the date
TIM=12:00AM           ; the time

.

0 ALARMS              ; number of active alarms

.

1 WARNINGS            ; number of active warnings

.

:DC1                  ; identifies DC plant 1 object
DES=DC Plant 1        ; plant description
VDC=-52.08 V          ; plant DC voltage
ADC=635 A             ; plant DC current
STT=FLOAT             ; plant state

.
```

```
:UNP        ; identifies user notepad object
STT=0       ; user notepad state 0:old 1:please read
:SNP        ; identifies super-user notepad object
STT=0       ; super-user notepad state 0:old 1:please
              read

.

*           ; command prompt
```

Objects and Attributes

The T1.317 standard organizes the power system into objects and attributes. Objects are resources in the system and are referenced by an identifier. Examples of objects are DC plant 1 identified as DC1, rectifiers identified as G01 to G64, and alarms such as the rectifier fail alarm identified as RFA1. If a command references an object identifier, such as G01, then that command will be executed on that object.

Each object belongs to a type or class that is also referenced by an identifier. The type of each object mentioned above is DC plant identified as DCP, rectifier type identified as REC, and standard alarm type identified as SDA. If a command references an object type, such as REC, then the command will be executed on all objects of that type.

Each system resource has settings that can be viewed or changed from the command line. These settings are called attributes. Each attribute can be referenced by an identifier. For example, the object DC1 has a DC voltage attribute identified as VDC and a DC current identified as ADC. References to attributes are always made with respect to its object. For example, the command to view the plant current is

STA DC1,ADC

In this command, STA is the view status command header, DC1 refers to the DC plant 1 object, and ADC refers to the DC current attribute.

Objects can be linked together to create a hierarchy of objects. For example, because rectifiers are part of the DC plant, rectifiers G01 to G64 are linked to DC1. In this example DC1 is the parent object of the rectifiers and the rectifiers are the children of DC1. Objects are linked together by a special attribute of the parent called a linkable attribute. In our example, rectifiers are linked to DC1 via the REC attribute. The REC attribute of DC1 happens to have the same name as the rectifier type identifier. As another example, the rectifier fail alarm, RFA1, is linked to DC1 via the RFA attributes. The result of this link is that a rectifier fail alarm will be reported as a DC plant alarm.

The objects supported by this system are described in detail, along with their attributes, in Appendix B. Most objects are a permanent part of the system; they cannot be added nor deleted. Some objects, such as remote peripheral monitor objects, are added to the system automatically based on the hardware configuration. Other objects may be added on as needed. These objects include user-defined objects, user-defined events, and TL1 objects.

Users can customize the system by creating their own parent to child relationships using user-defined objects, user-defined events, and remote peripheral monitor objects. This is done by using commands to add an attribute to a parent object, add a child object to the system, if necessary, and then link the child to the parent at the newly created attribute. The command descriptions below describe how this can be done.

Command Set

The command set is divided into two groups, operation commands and report commands. In this section each command is described along with its syntax and report format.

Command Syntax

A T1.317 command line is terminated by a <CR> (ASCII 13) or <LF> (ASCII 10). Multiple commands can be concatenated on a single command line by separating the commands with the ‘;’ character. For example:

CHA PS1 TIM 2:00;STA PS1 TIM

This command will set the system time to 2:00 and then report the system time. The T1.317 language is not case sensitive; commands may be entered in upper or lower case. The following are symbols used for convenience in describing the command syntax:

<>	These symbols are used to group elements of the command together
<r>*	Zero or more occurrences of r
<r>+	At least one occurrence of r
[r]	r is optional
<r|s>	Either r or s
identifier	Unquoted text that starts with an alpha character followed by alpha-numeric characters. Note that OBJTYPE, OBJID, ATTRL, ATTRID are all identifiers.
number	Numerical values of the form: ddd.ddd, .ddd, ddd, or ddd.
text	Double quote deliminated text. May not contain a line-feed or carriage return character.
date	dd/dd/dd[dd] month, day, and year order depend on system settings
time	dd:dd[:dd][<a|p>m]
objid	An object identifier (i.e., DC1-DC Plant 1, G01-Rectifier 1)
objtype	The type of an existing object (i.e., DCP-DC Plant, REC-Rectifier)
objpath	Defines a path to an object type, object, or linkable attribute. The following are examples of valid paths: SDA- path to all objects of SDA(standard alarm) type DC1 REC- path to all rectifiers linked to DC1 DC1 REC G01- path to rectifier G01 linked to DC1 REC
attrl	An attribute of an object that can be linked to another object. In the example above REC is a linkable attribute of DC1 having the object G01 linked to it.
attrid	A non-linkable attribute of an object.
value	<number | text | date | time>

Operation Commands

Operation commands change the state of the system. Listed below are the commands, description, syntax, and the operations those commands perform.

Operation Commands Summary:

ADD	Add a user addable object to the system. Add a linkable attribute to an object.
ALI	Assign a command line an alias.
BYE	Terminate a session.
CHA	Change the value of an attribute.
CLE	Clear an event.
CLH	Clear history.
CLS	Clear statistics.
DEL	Delete a user addable object from the system. Delete a linkable attribute from an object.
ECHO	Echo the following text.
LIN	Link an object to a linkable attribute.
LOGIN	Login at a security level.
OPE	Change the state of special operational attributes.
PAGE	Set the command response page size for the current session.
PAS	Change a password.
REM	Remark
RSDATE	Interactively set the system date and time.
UNL	Unlink an object from a user linkable attribute.
BACKUP	Backup the system configuration.
RESTORE	Restore the system configuration.
UPGRADE	Upgrade the intelligent controller software.

All commands return a minimal response of **.<CR><LF>** (period-carriage return-line feed). This command complete response is an acknowledgment that the command was received and processed. If an error occurred while processing the command then a line preceded by the ! (exclamation) character will give an error code and short description of the error.

ADD (object)

ADD Add an object to the system

Syntax: ADD objtype
ADD objtype,objid[,"description"]

When adding an object to the system, **objtype** must be one of the following:

DRC	for derived channels
TL1	for TL1 interface objects
TME	for timer events
UDE	for user-defined events
UDO	for user-defined objects

For user-defined objects, objid may be any identifier that does not conflict with one of the system reserved object identifiers. For other objects, objid must be one of the identifiers reserved for that type of object.

If objid is omitted, the system will pick the next reserved object identifier automatically. That chosen identifier will be reported by the command. The description is optional and will be assigned as the value of the object's DES attribute. If the description is omitted, a default description will be given to the new object.

The following example adds the user-defined event identified as U0001 to the system:

ADD UDO,U000

ADD (attribute)

ADD Add a linkable attribute to an object

Syntax: ADD objid,attrl

When adding a linkable attribute to an object, the attribute name must not conflict with any of the existing attribute names of the object. After adding the linkable attribute to an object the user may link an object to it using the LIN command.

The following example adds a TL1 object to the system, and links it to the DC1 object:

ADD TL1,TL001	Add a TL1 object called TL001
ADD DC1,TL1	Add a TL1 linkable attribute to DC1
LIN DC1 TL1,TL001	Link TL001 to DC1 at L1 linkable attribute

This link enables TL1 access to the DC plant.

ALI

ALI Assign a command line an alias

Syntax: ALI alias="command line"

When defining an alias, alias may not conflict with system commands or system defined alias names. If alias conflicts with a user defined alias, that alias will be overwritten with the new command line. A user defined alias can be deleted by setting it equal to ““. The alias may be up to 15 characters long and the command line may be up to 80 characters long. Up to 50 aliases may be defined by the user. Use the ALI command without arguments to see a list of all aliases in the system.

The following examples define an alias called “myload” that reports the plant load and basic statistics and then deletes this alias:

ALI MYLOAD=”STA DC1,ADC;SUM DC1,ADC”

ALI MYLOAD=””

BYE

BYE Terminate a session

Syntax: BYE

CHA

CHA Change the value of an attribute

Syntax: CHA objpath<,attrid=value>+

The user must be logged in at the super-user security level in order to change most attribute values. The exceptions to this rule are the user notepad comment lines. The comma in the command separates the object path from the attribute being assigned a new value. Note that one or more attributes can be changed at a time using this command.

The following example changes the plant shunt voltage and shunt current:

CHA DC1,SHV=250,SHA=400

CLE

CLE Clear an event

Syntax: CLE objpath

Some events must be cleared, or retired, manually by the user. These events must be cleared using the CLE command.

Listed below are the events that must be cleared using the CLE command:

- Standard alarms: EPR1, EXL1, CLC1, STF1, CCH1, HCL1, EPD1, COF1, COR1, POR1, ATF1, ATB1
- Single threshold alarms: LMR1, ERD1, RPI1
- All maintenance reminders
- All user defined events with the latched attribute (LAT) equal to 1

The example below clears any DC plant alarms and clears maintenance reminder MR01:

CLE DC1

CLE MR01

CLH

CLH Clear history

Syntax: CLH objpath CLH objpath,attrid

When attrid is omitted, this command will clear the history of any alarms or events in the path defined by objpath. For example, CLH DC1 will clear the history of alarms and events linked to DC plant 1 or any of its children. The second syntax is used to clear attribute specific history. For example, CLH DC1 REC G01,STT will clear the rectifier state history of rectifier G01.

The following example will clear the DC1 plant alarm history:

CLH DC1

Command lines used to clear special histories are shown below:

CLH REC,STT	Clear rectifier state history
CLH MDM,STT	Clear modem login history
CLH LPT,STT	Clear local port login history
CLH AUX,STT	Clear auxiliary port history
CLH BST,STT	Clear boost state history
CLH DC1,BOD	Clear battery on discharge history

CLS

CLS Clear statistics

Syntax: CLS objpath<,<attrid | attrl>>*

This command can be used to clear basic statistics associated with the measurement attributes of objects that objpath leads to. For example, CLS DC1 REC G01 will clear the rectifier 1 DC current statistics. If an object contains several attributes with basic statistics associated with them the attrid identifier can be used to specify which statistics should be cleared. For example, CLS DC1,ADC,VDC will clear the basic statistics for DC plant current and voltage but will not clear statistics for total rectifier drain, universal battery temperature, or the battery on discharge statistics.

To clear trend or busy hour statistics objpath must lead to a trend or busy hour statistics object. For example, CLS TR1 will clear trend statistics 1.

DEL (object)

DEL Delete an object from the system

Syntax: DEL objid

Before an object can be deleted using this command, the UNL command must be used to unlink any objects linked to any of its attributes. Only the following types of objects may be deleted:

DRC for derived channels

TL1 for TL1 interface objects

TME for timer events

UDE for user-defined events

UDO for user-defined objects

The following example adds and then deletes a user defined object call GEN1:

ADD UDO,GEN1

DEL GEN1

DEL (attribute)

DEL   Delete a linkable attribute from an object

Syntax: DEL objid,attrl

Before an attribute can be deleted using this command, the UNL command must be used to unlink any objects linked to it. Only linkable attributes added by the user may be deleted.

The following example adds a linkable attribute to G01 and then deletes it:

ADD G01,MYSIG

DEL G01,MYSIG

ECHO

ECHO   Echo the following text

Syntax: ECHO “text”

This command will simply output the text included in the command line. This command is useful for embedding comments into a periodic status report.

LIN

LIN   Link an object to a linkable attribute

Syntax: LIN objpath,objid<,objid>*

In this command, objpath leads to a linkable attribute. If the name of the linkable attribute is the name of an object type, for example REC(rectifier), then more than one object of that type may be linked to it. Otherwise, one object can be linked to a linkable attribute at a time. An object may be linked to only one parent at a time. The first comma separates the path to the linkable attribute from the list of objects being linked to it.

The following example adds a user defined event to the power system manager object, PS1, and sets its severity to minor:

ADD UDE,U0001	Add a user defined event identified as U0001
ADD PS1,RMHOT	Add a linkable attribute called RMHOT to PS1

LIN PS1 RMHOT,U0001	Link U0001 to PS1 at the RMHOT linkable attribute
CHA PS1 RMHOT,SEV=MIN	Set the RMHOT event severity to minor

This example results in the user-defined event called U0001 being reported as the power system manager alarm RMHOT.

LOGIN

LOGIN Login at a security level

Syntax: LOGIN [password]

This command allows the user to change security levels. If the password is not include in the command line, this command responds with an ENTER PASSWORD: prompt. The user is then given 3 tries to enter the password of the user, super-user, or administrator security level. If the wrong password is entered the controller will respond with INVALID PASSWORD followed by the password prompt. After three unsuccessful password attempts the controller will log off and report excess login attempts condition.

OPE

OPE Change the state of special operational attributes

Syntax: OPE objpath,attrid=value

The state of certain attributes are changed using this command instead of the CHA command. These attributes will initiate some special function or operating mode. The command may or may not require the super-user security level.

The examples below illustrate how to change the operational attributes in the system:

OPE DC1,STT=”FLOAT”	Set DC plant 1 state to float (super-user security)
OPE DC1,RSS=1	Initiate a DC plant 1 rectifiers restart (user security)
OPE REC,STT=”ON”	Turn all rectifiers on (user security for on, super-user security for standby)

OPE ACO,STT=1	Alarm cut-off (user security)
OPE ATS,STT=1	Initiate an alarm test (user security)
OPE DS1,STT=”pass-thru”	Pass-thru to data switch 1 (user security for PASS-THRU)

NOTE **The following command is not allowed in the Galaxy SCF Controller:**

OPE REC,STT=”STANDBY”

PAGE

PAGE: Set the command response page length in lines for current session

Syntax: PAGE number

For this command, if the number is between 1 and 99, paging is enabled and commands will respond with no more than number lines of data at a time. After responding with a page of data the controller will respond with:

<SPACE> to continue, other to cancel...

If the user presses the space bar, the controller will respond with the next page of data. If the user presses any other key, the rest of the command output will not be sent to the terminal. If number is set to 0, paging is cancelled. The page setting is set back to 0 when a user logs off.

PAS

PAS Change a password

Syntax:PAS x[,password,password]

Where x is:
- U for user password
- S for super-user password
- A for administrator password
- T for TL1 password

This command allows passwords to be changed at the administrator security level only. If the passwords are not included in the command line, the controller will respond by prompting the user twice for the new password. If both passwords match and are valid the password for the requested security level will be changed.

REM

REM Remark

Syntax: REM text

Where text is a series of any characters terminated by a carriage return or newline character.

This command is useful for embedding comments into a backup file or any file used in downloading a set of commands to the controller. The remainder of the command line is ignored after the REM command header.

RSDATE

RSDATE Interactively set the system date and time

Syntax: RSDATE

This command prompts the user to enter a new data and time separated by a semicolon.

UNL

UNL Unlink an object from a user linkable attribute

Syntax: UNL objpath,objid<,objid>*

In this command, objpath leads to a linkable attribute and objid is the identifier of an object linked to that attribute. For example, UNL DC1 TL1,TL001 will unlink the TL001 object from the TL1 attribute of the DC plant. Only objects linked using the LIN command can be unlinked. The LIN report command or STA command can be used to list the links to an object.

The following example adds a user defined event to the power system manager object, PS1, and then unlinks it:

ADD UDE,U0001	Add a user defined event identified as U0001
ADD PS1,RMHOT	Add a linkable attribute called RMHOT to PS1

LIN PS1 RMHOT,U0001 Link U0001 to PS1 at the RMHOT linkable attribute

UNL PS1 RMHOT,U0001 Unlink U0001 from PS1 at the RMHOT linkable attribute

BACKUP

BACKUP Backup the system configuration

Syntax: BACKUP [X|A]

Where
X indicates XMODEM transfer
A indicates ASCII transfer

This command allows the super-user or administrator to backup the system configuration. If the optional arguments are not included, the controller responds by prompting the user for either an ASCII or XMODEM file transfer or to cancel the backup operation. The backup command output is a series of ADD, LIN, and CHA commands.

When using the ASCII option, it is useful to use software flow control (XON, XOFF) especially at faster baudrates. When using the XMODEM option software flow control must be turned off and the data bits attribute must be set to 8.

RESTORE

RESTORE Restore the system configuration

Syntax: RESTORE [X|A]

Where
X indicates XMODEM transfer
A indicates ASCII transfer

This command allows the administrator to restore a system configuration. If the optional arguments are not included, the controller responds to this command by prompting the user for either an ASCII or XMODEM file transfer or to cancel the restore operation. This command is intended to take a controller from its default configuration to a custom configuration. It should be used after software upgrade or backup battery power loss. If commands in the custom configuration file conflict with the current configuration of the system then those commands will be ignored.

The restore command executes the commands in the backup file as if they had been entered from the command line with the exception that output is not sent to the user terminal. When using the ASCII option it is useful to use software flow control (XON, XOFF) especially at faster baudrates. When using the XMODEM option software flow control must be turned off and the data bits attribute must be set to 8.

UPGRADE

UPGRADE Upgrade the intelligent controller software

Syntax: UPGRADE

This command allows the administrator to upgrade the to upgrade the intelligent controller software. The controller responds to this command by prompting the user to continue or cancel. If the user chooses to continue, the controller will enter upgrade mode. See the description of software upgrade for more information.

Reporting Commands

Reporting commands report the state of the system or some subset of the system.

Reporting Commands Summary:

ALA	Report active alarms.
ALI	Report aliases.
ATT	Report the object attributes.
CON	Report the settings of configuration and operation attributes.
DIA	Report diagnostic information.
HELP	Report the customer service 800 number
HIS	Report history information
LIN	Report object links
LIS	List object type information.
MET	Report the value of measurement attributes.
NAL	Report the number of active alarms.

NRE Report the number of active record only events.

NWA Report the number of active warnings.

NUM Report the number of objects of a given type

PAGE Report the page size.

ORP Report orphan objects, those without parents.

PAR Report an object’s path.

REC Report active record only events.

STA Reports the value of an attribute.

SUM Report statistical data.

WAR Report active warnings.

All commands return a minimal response of .<CR><LF> (period-carriage return-line feed). This command complete response is an acknowledgment that the command was received and processed. If an error occurred while processing the command then a line preceded by the ! (exclamation) character will give an error code and short description of the error.

ALA

ALA Report active alarms

Syntax: ALA [objpath]

This command searches the objects that objpath leads to, and all objects linked to these objects, for active alarms. If objpath is omitted, all active alarms are reported. Each line in the report has the following format:

event_path,date,time,severity,description

The following examples will report all the active alarms in the system and just the DC plant active alarms:

ALA

ALA DC1

ALI

ALI Report aliases

Syntax: ALI
ALI alias<,alias>*

If alias is omitted, all aliases in the system are reported. The system defined aliases are reported first followed by the user defined aliases. The system defined aliases are reported with the alias name in uppercase. The user defined aliases are reported with the alias name in lowercase. If alias is included in the command line, only the aliases that appear in the command will be reported.

Each alias is reported using the following format:

alias=command_line

ATT

ATT Reports the object attributes

Syntax: ATT objpath

This command reports just the attribute mnemonics of objects that objpath leads to. Attributes are reported one per line. For example, ATT DC1 will list all the attributes mnemonics of the DC1 object.

CON

CON Report the settings of configuration and operation attributes

Syntax: CON objpath

This command reports the values of attributes that can be changed by the CHA command or the OPE command. It is useful for limiting a report to only those attributes that are settable.

DIA

DIA Report diagnostic information

Syntax: DIA [objpath]

This command reports diagnostic information for the entire system or just the objects that objpath leads to. This command is useful for additional information on active alarms or warnings in the system. The following example will retrieve all diagnostics information and just the DC plant diagnostics information:

DIA

DIA DC1

HELP

HELP	Report the customer service 800 number
Syntax:	HELP

This command returns: 1-800-THE-1PWR.

HIS (event)

HIS	Report event history information
Syntax:	HIS objpath<,hisoption=value>* HIS [hisoption=value<,hisoption=value>*]

Where hisoption and value are defined as follows:

Hisoption	Value
g for group	0:no 1:yes (default:0)
n for newest date	date (default: current date)
o for oldest date	date (default: oldest system date)
f for report first	“o”:oldest first “n”:newest first (default n)
i for include	“comma separated list of events”

This command searches the objects that objpath leads to, and all objects linked to these objects, for events and reports any history for those events. If objpath is omitted, history on all events in the system is reported. By default history reports are ordered most resent event first. The history options can be used to change the order of the report, group similar events, limit the span of dates reported, or to limit the events included in the report.

Each line of the history has the following format:

event_path,date,time,severity,description

The following example reports DC1 plant alarm history and just RFA1 history:

HIS DC1

HIS DC1 RFA

HIS (special)

HIS Report special history information

Syntax: HIS objpath,attrid

This form of the history command is used to report special types of history. The special histories include rectifier state history, battery on discharge history, boost history, and login history. The following examples show how this is done:

HIS REC,STT	Report rectifier state history
HIS DC1,BOD	Report battery on discharge history
HIS MDM,STT	Report modem login history
HIS LPT,STT	Report local port login history
HIS AUX,STT	Report auxiliary port login history

LIN

LIN Report object links

Syntax: LIN objpath

This command is useful for reporting the children of an object. If objpath leads to an object all the linkable attributes of that object will be reported with the objects that are linked to them. If objpath leads to a linkable attribute then the objects linked to that attribute will be reported. The report will include the object identifier preceded by a colon followed by a line for each linkable attribute in the following format: attrid=objid list. For example, LIS PS1 will report all of the links to the power system object.

LIS (types)

LIS List all object types

Syntax: LIS

All object types are reported one per line using the following format: objtype,description.

LIS (objects)

LIS List all objects of the given type

Syntax: LIS objtype

Objects of the given type are reported one per line using the following format: objid,description. For example, LIS DTA will list all of the dual threshold alarms in the system.

LIS (object type)

LIS List the type of an object

Syntax: LIS objid

The type of the given object is reported using the following format: objtype,description. For example, LIS BDA1 will report that the batter on discharge alarm, BDA1, is a dual threshold alarm.

MET

MET Report the value of measurement attributes

Syntax: MET objpath<,<attrid | attrl>>*

This command is useful for reporting the values of measurement attributes of objects that objpath leads to. Examples of measurement attributes are plant voltage and plant current. The object tables in the appendix indicate which attribute are measurements. In addition, linkable attributes linked to remote peripheral monitor channels are considered measurement attributes. If attributes are specified in the command line, those attributes must be measurement attributes. If linkable attributes are specified on the command line, those attributes must be linked to a remote peripheral monitor channel. For linkable attributes the measurement value of the remote peripheral monitor channel is reported. The report will include the object identifier preceded by a colon followed by a line for each attribute using the following format: attrid=value. The following examples report all measurement date from the DC plant and limits the report to the DC voltage and current:

MET DC1

MET DC1,VDC,ADC

NAL/NWA/NRE

NAL/NWA/NRE Report the number of active alarms, warnings, or record-only events

Syntax: NAL [objpath]
NWA [objpath]
NRE [objpath]

This command searches the objects that objpath leads to, and all objects linked to these objects, for active events. The command reports the number of active events found. If objpath is omitted, the total number of active events in the system is reported.

The following examples will report all the number of active warnings in the entire system and the number of active alarms in just the DC plant:

NWA

NAL DC1

NUM

NUM Report the number of objects of a given type

Syntax: NUM objtype

This command reports the number of objects of a given type that exist in the system.

The example below illustrates how this command may be used:

NUM UDE Report the number of user-defined objects that have been added

ORP

ORP Report the orphan objects, those without parents

Syntax: ORP objpath

This command lists all of the objects that are not linked to a parent object. This is useful for example, to find out which user-defined object or remote peripheral monitoring channels are still available. If objpath is omitted, then all orphan objects are listed. If objpath is an object type specifier, then all of the orphans of that type will be listed.

The following are examples of this command.

ORP VTM	Report all of the orphan voltage monitoring channels
ORP UDE	Report all of the orphan user defined events

PAGE

PAGE	Report the page size
Syntax:	PAGE

This command returns the page size in lines set by using the PAGE command. The page size is only value for the current login session and will be reset when the user logs out.

PAR

PAR	Report an object's path
Syntax:	PAR objpath

For this command, objpath must lead to an object identifier. The command reports the complete path of the identified object. For example, PAR G01 will report a parent path of DC1 REC G01 which indicates that G01 is a child of DC1 linked to the REC attribute.

REC

REC	Report active record-only events
Syntax:	REC [objpath]

This command searches the objects that objpath leads to, and all objects linked to these objects, for active record-only events. If objpath is omitted, all active record-only events are reported.

Each line in the report has the following format:

event_path,date,time,severity,description

The following examples will report all the active record-only events in the system and just the DC plant active record-only events:

REC

REC DC1

STA

STA Reports the value of an attribute

Syntax: STA objpath<,<attrid | attrl>>*

This command is useful for reporting the values of attributes of objects that objpath leads to. For linkable attributes this command will report the objects linked to the attribute. If attributes are included in the command line, the report is limited to those attributes. The report will include the object identifier preceded by a colon followed by a line for each attribute in the following format: attrid=value.

The following examples reports the status of all rectifier G01 attributes and then just the status of the type attribute for all rectifiers:

STA G01 (alternate Syntax: STA DC1 REC G01,STT)

STA REC,STT (alternate Syntax: STA DC1 REC,STT)

The alternate syntax illustrates that the full path object may be used in the command line. The alternate syntax illustrates that rectifiers are linked to DC1 at the REC limitable attribute.

SUM

SUM Report statistical data

Syntax: SUM objpath<,<attrid | attrl>>*

This command is useful for reporting the statistics data for measurement attributes of objects that objpath leads to. Examples of measurement attributes are plant voltage and plant current. The object tables in the appendix indicate which attribute are measurements. In addition, linkable attributes linked to remote peripheral monitor channels are considered measurement attributes. If attributes are specified in the command line, those attributes must be measurement attributes.

If linkable attributes are specified on the command line, those attributes must be linked to a remote peripheral monitor channel.

This command is also used for reporting battery on discharge, trend, and busy hour statistics. Examples of these commands are listed below:

SUM DC1,BOD	Report battery on discharge statistics
SUM TR1	Report trend 1 statistics
SUM BH1	Report busy hour 1 statistics

WAR

WAR	Report active warnings
Syntax:	WAR [objpath]

This command searches the objects that objpath leads to, and all objects linked to these objects, for active warnings. If objpath is omitted, all active warnings are reported. Each line in the report has the following format:

event_path,date,time,severity,description

The following examples will report all the active warnings in the system and just the DC plant active warnings:

WAR

WAR DC1

System Defined Aliases

The following are aliases defined by the system. They provide a measure of compatibility with the MCS and PEERS commands. Users may create their own aliases by using the ALI command. Included in parenthesis is the T1.317 command line that these commands alias.

ALMS	Report all active alarms. (ALA)
CLRLDST	Clear plant load statistics. (CLS DC1, ADC)
DATE	Report the date and time. (STA PS1,DAT,TIM)

HEADER	Report the login header. (STA PS1, SDE, SID, DES, SWV, DOW, DAT, TIM; NAL; NWA; STA DCP,DES,VDC, ADC, STT; STA NPD, STT)
LOADST	Report plant load statistics. (SUM DC1,ADC)
LOGHSTRY	Report login histories. (HIS MDM,STT;HIS LPT,STT;HIS AUX,STT)
MENU	Report aliases. (ALI)
PASSWD	Change user password. (PAS U)
RCTLD	Report rectifier load. (STA REC,ADC)
SHSTRY	Report system history. (HIS PS1)
VI	Report plant voltage and current. (STA DC1,VDC,ADC)
WARNS	Report system warnings. (WAR)

Error Reporting

When processing a command line, errors may occur at several stages, for example, the command may contain bad syntax or the command may try to set an attribute value to an invalid value. When an error occurs due to a bad command an error report is sent to the user. The report will have the following format:

!errno,message

Where:
! signals that this line contains an error message
errno is a error code from -999 to -100
message describes the error

Refer to Appendix C for a list of the T1.317 interface error message and their possible causes.

Appendix B T1.317 Objects and Attributes

This appendix contains tables of all objects supported by the T1.317 interface. The objects are listed in categories with each object being described in terms of its attributes. Each attribute is identified by a description, mnemonic, type, related commands, and a range of values. The mnemonic is used to identify the attribute and the type indicates what type of value the attribute is.

For example, the system object identified as PS1 has an attribute called system time that is identified by the mnemonic TIM. Its value is of type TIME. This attribute may be modified using the CHA command and its value will be reported by the CON command. However, it is not included in a backup.

As another example, the system object has an attribute identified by the mnemonic TUN which stands for temperature units. This attribute is of type TEXT, for example “C” or “F”. This attribute may be modified using the CHA command, its value will be reported using the CON command, and it will be included in a backup.

Note that the value of any attribute may be acquired by using the STA commands.

Unless otherwise noted, default values are in **bold** type.

Table B-1: System Objects and Attributes

			Related Commands					
ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
System		PSM						
Identifier	IDE	TEXT						PS1
Description	DES	TEXT						Tyco Galaxy Controller
Site Id	SID	TEXT	X			X	X	20 chars **(default: 1)**
Site Description	SDE	TEXT	X			X	X	55 chars **(default: “”)**
Software Versions	SWV	TEXT						d.d,d.d
Day of Week	DOW	TEXT						Sunday, Monday, Tuesday, ...
System Date	DAT	DATE	X			X		mm/dd/yy
Date Format	DTF	TEXT	X			X	X	**mm/dd/yyyy**, dd/mm/yyyy, yyyy/ mm/dd
								mm/dd/yy, dd/mm/yy, yy/mm/dd
System Time	TIM	TIME	X			X		hh:mm
Time Format	TMF	NUMBER	X			X	X	**12** or 24
Day Light Savings	DLS	NUMBER	X			X	X	**0:off** 1:on
Language	LNG	TEXT	X			X	X	ENGLISH, **SYMBOLIC**, OTHER
Temperature Units	TUN	TEXT	X			X	X	C or **F**
Critical Equals Major	CEM	NUMBER	X			X	X	0:no **1:yes** (HW,SW)
Front Panel Configuration	FPC	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Serial Port Configuration	SPC	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Remote Rectifier On	RRN	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Remote Rectifier Off	RRF	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Alarm Sub-objects								
Intelligent Controller Fail	CRA	ATTRL						CRA1
Intelligent Control Fuse	CRF	ATTRL						CRF1
Circuit Pack Fail	CPA	ATTRL						CPA1
Remote Peripheral Fuse	RPF	ATTRL						RPF1
PC Power Fuse	PCF	ATTRL						PCF1
External Password Reset	EPR	ATTRL						EPR1
Passwords At Defaults	PFD	ATTRL						PFD1
Excessive Login Attempts	EXL	ATTRL						EXL1
Memory Backup Battery Low	BBL	ATTRL						BBL1
Processor Halt	PHT	ATTRL						PHT1
Clock Changed	CLC	ATTRL						CLC1
Self Test Failed	STF	ATTRL						STF1
Program Line Invalid	PGI	ATTRL						PGI1
Configuration Changed	CCH	ATTRL						CCH1
History Cleared	HCL	ATTRL						HCL1
Measurement Out Of Range	MOR	ATTRL						MOR1
Module Type Conflict	MTC	ATTRL						MTC1
Module Failure	MDF	ATTRL						MDF1
Other Sub-objects								
System Alarm Test	ATS	ATTRL						AT1
Ambient Temperature	AMT	ATTRL						
Maintenance Reminders	MRM	ATTRL						MR*nn*

Table B-2: DC Distribution Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
DC Distribution Feeder		FEE						
Identifier	IDE	TEXT						LDA
Description	DES	TEXT	X			X	X	DC Distribution Feeder
Distribution Fuse	DFA	ATTRL						

Table B-3: AC Distribution Objects and Attributes

			Related Commands					
ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
AC Distribution		ACD						
Identifier	IDE	TEXT						ACD1
Description	DES	TEXT	X			X	X	AC Distribution
Phase R Voltage	PRV	ATTRL						
Phase S Voltage	PSV	ATTRL						
Phase T Voltage	PTV	ATTRL						
Voltage Between RS	RSV	ATTRL						
Voltage Between ST	STV	ATTRL						
Voltage Between TR	TRV	ATTRL						
Phase R Current	PRA	ATTRL						
Phase S Current	PSA	ATTRL						
Phase T Current	PTA	ATTRL						
Phase R Fail Alarm	PRF	ATTRL						
Phase S Alarm	PSF	ATTRL						
Phase T Fail Alarm	PTF	ATTRL						
Master Switch Alarm	MSA	ATTRL						

Table B-4: Alarm Test Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Alarm Test		ATS						
Identifier	IDE	TEXT						AT1
Description	DES	TEXT	X			X	X	Alarm Test 1
Alarm Test State	STT	NUMBER		X		X		0:inactive 1:active
Rectifier Test Failure	RTF	TEXT						list of rectifiers not passing alarm test
Alarm Test Enable	LTE	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Remote Alarm Test Enable	RTE	NUMBER	X			X	X	**0:disable** 1:enable (HW,SW)
HV Shutdown	HVS	NUMBER	X			X	X	**0:disable** 1:enable (HW,SW)
Duration	DUR	NUMBER	X			X	X	5-300:**60** seconds
Test Power Critical	PCR	NUMBER	X			X	X	0:no **1:yes**
Test Power Major	PMJ	NUMBER	X			X	X	0:no **1:yes**
Test Power Minor	PMN	NUMBER	X			X	X	0:no **1:yes**
Test Major Fuse	MJF	NUMBER	X			X	X	0:no **1:yes**
Test Minor Fuse	MNF	NUMBER	X			X	X	0:no **1:yes**
Test Battery on Discharge	BD	NUMBER	X			X	X	0:no **1:yes**
Test AC Fail	ACF	NUMBER	X			X	X	0:no **1:yes**
Test Rectifier Fail Alarm	RFA	NUMBER	X			X	X	0:no **1:yes**
Test Very Low Voltage	VLV	NUMBER	X			X	X	0:no **1:yes**
Test High Voltage	HV	NUMBER	X			X	X	0:no **1:yes**
Test Controller	CTLR	NUMBER	X			X	X	0:no **1:yes**
Test User Relay 1	UR1	NUMBER	X			X	X	0:no **1:yes**
Test User Relay 2	UR2	NUMBER	X			X	X	0:no **1:yes**
Alarm Test Active	ATA	ATTRL						ATA1
Alarm Test Failed	ATF	ATTRL						ATF1
Alarm Test Aborted	ATB	ATTRL						ATB1

Table B-5: DC Plant Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
DC Plant		DCP						
Identifier	IDE	TEXT						DC1
Description	DES	TEXT	X			X	X	DC Plant 1
Plant Type	TYP	NUMBER						+48V DC, +24V DC, -48V DC, -24V DC
Voltage	VDC	NUMBER		X	X			number V
Current	ADC	NUMBER		X	X			number A
Capacity	CAP	NUMBER						number A
Total Rectifier Drain	TRD	NUMBER			X			number A
Shunt Type	SHT	TEXT	X			X	X	**LOAD**, BATTERY, NONE
Shunt Current	SHA	NUMBER	X			X	X	**0**-4,294,967,296 A
Shunt Voltage	SHV	NUMBER	X			X	X	1-**150** mV
State	STT	TEXT		X		X		**FLOAT**, BOOST(if BTP=0), BTP(if BTP=1)
Backup HV Threshold	BHV	NUMBER						number V
Battery On Discharge	BOD	NUMBER						0:no BD 1:BD active
Energy Management State	EMS	NUMBER						0:off 1:on
Energy Management Enable	EME	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Restart State	RSS	NUMBER		X		X		0:off 1:on
Restart Enable	RSE	NUMBER	X			X	X	0:disable **1:enable** (HW, SW)
Rectifier Sequencing	RSQ	NUMBER	X			X	X	**0:disable** 1:enable
All Rectifier On Threshold	ROT	NUMBER	X			X	X	20-25:**22** or 40-50:**44** volts
Rectifier On Delay	ROD	NUMBER	X			X	X	0-60:**10** minutes
Transfer	TRF	NUMBER						0:inactive 1:active,...,0:inactive 1:active
Initial Engine Transfer Delay	ITD	NUMBER	X			X	X	1-600:**1** seconds
Transfer Sequence Interval	TSI	NUMBER	X			X	X	0.1-600:**1.0** seconds
Battery Therm. Integrity	BTI	NUMBER						0:detached 1:attached
Universal Battery Temperature	UBT	NUMBER			X			number C
Universal Temp Probe Present	TPP	NUMBER						0:no 1:yes
Number of Strings	NST	NUMBER	X			X	X	1-70:**2**
Number of Cells per String	CPS	NUMBER	X			X	X	1-75:**12 (24V plant) or 24 (48V plant)**
Plant Battery Type	BTY	TEXT	X			X	X	**L-1S**,IR-30,IR-40,12IR-125,4VR-125,2VR-375,L-508,default: “”
Reserve Time	RTM	TIME						hh:mm
Alarm Sub-objects								
Battery Thermal Major	BTJ	ATTRL						BTJ1
Battery Thermal Minor	BTN	ATTRL						BTN1
Auxiliary Fuse Major	AMJ	ATTRL						AMJ1
Auxiliary Fuse Minor	AMN	ATTRL						AMN1
External Fuse Major	FAJ	ATTRL						FAJ1
External Fuse Minor	FAN	ATTRL						FAN1
Regulation Battery Fuse	RBF	ATTRL						RBF1
Batt Thermal Fuse	BTF	ATTRL						BTF1
Battery Power Fuse	BPF	ATTRL						BPF1
Alarm Battery Supply	ABS	ATTRL						ABS1
Sense/control Fuse	VSF	ATTRL						VSF1
Low Voltage Disconnect Fail	LVDA	ATTRL						LVDA1
Low Voltage Disconnect	LVD	ATTRL						LVD1
Open String	OSA	ATTRL						OSA1
Energy Management Disabled	EMD	ATTRL						EMD1
Excess Plant Drain	EPD	ATTRL						EPD1
Shunt Not Configured	SNC	ATTRL						SNC1
User Relay Conflict	URC	ATTRL						URC1

Table B-5: DC Plant Objects and Attributes (continued)

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
ID Not Configured	ZID	ATTRL						ZID1
Rectifier Fail	RFA	ATTRL						RFA1
AC Fail	ACF	ATTRL						ACF1
Phase or Low Output	PHA	ATTRL						PHA1
Low Current	LCA	ATTRL						LCA1
Load Share Fuse	LSF	ATTRL						LSF1
Manual Off	MAN	ATTRL						MAN1
External Transfer Shutdown	ETS	ATTRL						ETS1
Rectifier Incomplete Config	RIC	ATTRL						RIC1
Half Power	HPA	ATTRL						HPA1
ID Conflict	DID	ATTRL						DID1
Very Low Voltage (VLV)	VLA	ATTRL						VLA1
Mult Rectifier Fail(MRFA)	MFA	ATTRL						MFA1
Limited Recharge	LMR	ATTRL						LMR1
Excess Rectifier Drain	ERD	ATTRL						ERD1
Engine Transfer Timeout	ETO	ATTRL						ETO1
Rectifier/Plant Inconsistency	RPI	ATTRL						RPI1
Reserve Time Low	RTL	ATTRL						RTL1
Battery On Discharge (BD)	BDA	ATTRL						BDA1
High Voltage (HV)	HVA	ATTRL						HVA1
High Float Voltage	HFV	ATTRL						HFV1
Other Sub-objects								
Boost	BST	ATTRL						BS1
Rectifier	REC	ATTRL						G01 to G24

Table B-6: Boost Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Boost		BST						
Identifier	IDE	TEXT						BS1
Description	DES	TEXT	X			X	X	Boost Control 1
State	STT	TEXT						QRCT, MANUAL, BTP, TIMED AUTO, OFF
Boost Enable	BSE	NUMBER	X			X	X	**0:disable** 1:enable (HW,SW)
External Timer Boost Enable	TBE	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Battery Therm. Protect Enable	BTP	NUMBER	X			X	X	**0:disable** 1:enable
Auto Mode	ATM	TEXT	X			X	X	**OFF**,QRCT,TIMED
Timed Manual Duration	TMD	NUMBER	X			X	X	1-80:**8** hours
Auto Multiplication Factor	AMF	NUMBER	X			X	X	1-9:**5**
Current Term Voltage Thresh	CTV	NUMBER	X			X	X	20-30:**26** or 52:40-60:**52** volts
Current Term Current Thresh	CTA	NUMBER	X			X	X	>= 0 amps **(default: 50)**
Current/Time Ratio	CTR	NUMBER	X			X	X	>= 0 **(default: 0)**
Alarm Sub-Objects								
Boost State Alarm	BSA	ATTRL						

Table B-7: Rectifiers Objects and Attributes

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Rectifier Manager		RMN						
Identifier	IDE	TEXT						GM1
Description	DES	TEXT	X			X	X	Rectifier Manager 1
Load Share Enable	LSE	NUMBER	X			X	X	0:disable **1:enable**
Float High Voltage Shutdown	FSD	NUMBER	X			X	X	25-30:**27.75** or 50-60:**55.50** volts
Boost High Voltage Shutdown	BSD	NUMBER	X			X	X	26-30:**27.75** or 52-60:**55.50** volts
Float Set-Point	FSP	NUMBER	X			X	X	22-28:**26.04** or 44-56:**52.08** volts
Boost Set-Point	BSP	NUMBER	X			X	X	22-30:**26.04** or 44-60:**52.08** volts
Float Current Limit	FCL	NUMBER	X			X	X	30-**110**%
Boost Current Limit	BCL	NUMBER	X			X	X	30-**110**%
Rectifier Bay		RBY						
Identifier	IDE	TEXT						RB1 to RB32
Description	DES	TEXT	X			X	X	Rectifier Bay *n*
Bay Temperature	TMP	ATTRL						
AC Circuit Breaker Alarm	ICB	ATTRL						
Rectifiers	REC	ATTRL						G01 to G64
Rectifier		REC						
Identifier	IDE	TEXT						G01 to G64
Description	DES	TEXT	X			X	X	Rectifier *nn*
Rectifier Type	TYP	TEXT	X			X	X	12 char **(default: UNCONFIGURED)**
DC Current (VI, VIR)	ADC	NUMBER			X			number A
DC Voltage	VDC	NUMBER			X			number V
State	STT	TEXT		X		X		ON*, OFF, STANDBY*, VACANT*
Shunt Voltage	SHV	NUMBER	X			X	X	1-4,294,967,296:**50** mV
Capacity	CAP	NUMBER						number A
Temperature	TMP	NUMBER			X			number F or C
MAN Type	MNT	TEXT	X			X	X	CC, CO, **NONE**
Use In Sequence Enable	SEQ	NUMBER	X			X	X	0:no **1:yes**
Output Breaker State	OCB	TEXT						CLOSED, OPEN
Rectifier Fail	RFA	NUMBER						0:inactive 1:active
AC Fail	ACF	NUMBER						0:inactive 1:active
Phase or Limited Output	PHA	NUMBER						0:inactive 1:active
Low Current	LCA	NUMBER						0:inactive 1:active
Load Share Fuse	LSF	NUMBER						0:inactive 1:active
Standby or Manual Off	MAN	NUMBER						0:inactive 1:active
Excess Rectifier Drain	ERD	NUMBER						0:inactive 1:active
External Transfer Shutdown	ETS	NUMBER						0:inactive 1:active
Rectifier Incomplete Config	RIC	NUMBER						0:inactive 1:active
Half Power	HPA	NUMBER						0:inactive 1:active
ID Conflict	DID	NUMBER						0:inactive 1:active
Input Breaker State	ICB	ATTRL						

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

Table B-8: Converter Management Objects and Attributes

			Related Commands					
ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
Converter Plant		CON						
Identifier	IDE	TEXT						CP1
Description	DES	TEXT	X			X	X	Converter Plant 1
DC Voltage	VDC	NUMBER		X	X			number in volts
DC Current	ADC	NUMBER			X			number in amps
Capacity	CAP	NUMBER						number in amps
Voltage Set-Point	VSP	NUMBER	X			X	X	48-52:**50**V
Low Voltage Discon Threshold	DTH	NUMBER	X			X	X	20-25:**23**V
Low Voltage Recon Threshold	RTH	NUMBER	X			X	X	22-27:**25**V
Low Voltage Disconnect Enable	LVD	NUMBER	X			X	X	**0:disable** 1:enable
Alarm Sub-objects								
Converter Fail Alarm	CFA	ATTRL						CFA1
Distribution Fuse Alarm	DFA	ATTRL						CDFA1
Id Conflict	DID	ATTRL						CDID1
Multiple Convert Fail Alarm	MFA	ATTRL						CMFA1
DC Converter		DCC						
Identifier	IDE	TEXT						C01 to C16
Description	DES	TEXT	X			X	X	DC Converter *nn*
Type	TYP	TEXT						10 chars
DC Current	ADC	NUMBER			X			number in amps
Capacity	CAP	NUMBER						number in amps
State	STT	TEXT		X		X		ON*, OFF, STANDBY*, VACANT*
Converter Fail	CFA	NUMBER						0:inactive 1:active
Distribution Fuse Alarm	DFA	NUMBER						0:inactive 1:active
ID Conflict	DID	NUMBER						0:inactive 1:active

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

Table B-9: Battery Management Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Battery Reserve		BAR						
Identifier	IDE	TEXT						BR1
Description	DES	TEXT	X			X	X	Battery Reserve 1
High Temperature Threshold	TTH	NUMBER	X			X	X	30°-90-:**75**°C or 86-194:**167**°F
Current Limit Enable	CLE	NUMBER	X			X	X	**0:disable** 1:enable
Current Limit Threshold	CLT	NUMBER	X			X	X	10-**1000** A
End Volts Per Cell	CEV	NUMBER	X			X	X	1.75-1.95:**1.75**
Alarm Sub-objects								
Contactor 1 Open Alarm	C1O	ATTRL						BC1
Contactor 2 Open Alarm	C2O	ATTRL						BC2
Contactor Failed Alarm	BCA	ATTRL						BCA1
Battery Bay	BBY							
Identifier	IDE	TEXT						BB01 to BB32
Description	DES	TEXT	X			X	X	Battery Bay 1 (or 2)
Temperature	TMP	ATTRL						
Battery Sections	BAT	ATTRL						
Battery Section	BAT							
Identifier	IDE	TEXT						B01 to B70
Description	DES	TEXT	X			X	X	Battery Section 1
Contactor	CON	TEXT	X			X	X	CN1 or CN2 **(default: “”)**
State	STT	TEXT						DISCON,CONNECT,UNKNOWN
Number of Strings	NST	NUMBER	X			X	X	**1** -70
Section Battery Type	BTY	TEXT	X			X	X	**L-1S**,IR-30,IR-40,12IR-125,4VR-125,2VR-375,L-508,default: “”
Section Nominal Capacity	CAP	NUMBER						number
Reserve Time	RTM	TIME						hh:mm
DC Current	ADC	NUMBER			X			number A
Sub-objects								
DC Voltage	VDC	ATTRL						
Mid-Point Voltage	MPV	ATTRL						
Pilot Cell Voltage	SCV	ATTRL						
DC Charge Current	ACH	ATTRL						
DC Discharge Current	ADS	ATTRL						
Temperature	TPS	ATTRL						
Fuse Status Alarm	FST	ATTRL						
Battery Type Definition	BTD							
Identifier	IDE	TEXT						BT01 to BT12
Description	DES	TEXT	X			X	X	Battery Configuration 1
Battery Type	BTY	TEXT	X			X	X	up to 14 characters
Battery Class	BTC	TEXT	X			X	X	FLOODED, SEALED
Capacity	CAP	NUMBER	X			X	X	number
Data Parameter 1	D01	NUMBER	X			X	X	number
Data Parameter 2	D02	NUMBER	X			X	X	number
Data Parameter 3	D03	NUMBER	X			X	X	number
Data Parameter 4	D04	NUMBER	X			X	X	number
Data Parameter 5	D05	NUMBER	X			X	X	number
Data Parameter 6	D06	NUMBER	X			X	X	number
Data Parameter 7	D07	NUMBER	X			X	X	number
Data Parameter 8	D08	NUMBER	X			X	X	number
Data Parameter 9	D09	NUMBER	X			X	X	number
Data Parameter 10	D10	NUMBER	X			X	X	number

Table B-9: Battery Management Objects and Attributes (continued)

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Predefined battery types:	BT01:	L-1S						
	BT02:	IR-30						
	BT03:	IR-40						
	BT04:	12IR-125						
	BT05:	4VR-125						
	BT06:	2VR-375						
	BT07:	L-508						
Slope Thermal Compensation	STC							
Identifier	IDE	TEXT						SC1
Description	DES	TEXT	X			X	X	Slope Thermal Comp
State	STT	NUMBER	X			X	X	**0:disable** 1:enable
Raise Voltage Enable	RVE	NUMBER	X			X	X	**0:disable** 1:enable
Lower Temperature Threshold	LTT	NUMBER	X			X	X	**-5**-20 °C or **23**-68 °F
Nominal Temperature Threshold	NTT	NUMBER	X			X	X	**15**-30 °C or **59**-86 °F
Upper Temperature Threshold	UTT	NUMBER	X			X	X	**30**-55 °C or **86**-131 °F
Step Temperature	SPT	NUMBER	X			X	X	**45**-85 °C or **113**-185 °F
Contactor		CNT						
Identifier	IDE	TEXT						CN1 or CN2
Description	DES	TEXT	X			X	X	Contactor 1 or 2
Status	STT	TEXT		X				NONE, DISCON, CONNECT, FAILED
Type	TYP	TEXT	X			X	X	**NONE**, BATTERY, LOAD
Disconnect Threshold	DTH	NUMBER	X			X	X	20-25:**22**V or 40-50:**44**V
Reconnect Threshold	RTH	NUMBER	X			X	X	22-27:**24**V or 44-55:**48**V
Alarm Sub-objects								
Contactor Open Alarm	CNO	ATTRL						CNO1 or CNO2
Contactor Failed Alarm	CNF	ATTRL						CNF1 or CNF2

Table B-10: Alarm And Events Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Standard Alarm		SDA						
Identifier	IDE	TEXT						see list below
Description	DES	TEXT	X			X	X	see below
Alarm State	AST	NUMBER						0:inactive 1:active
Severity	SEV	TEXT	X			X	X	CRIT MAJ, MIN, WRN, RO
LED	LED	TEXT	X			X	X	BATT, BD, DIST, RECT, AC, RM, or CTLR
Contact Closure	ACC	TEXT	X			X	X	ACF,MJF,MNF,RFA,VLV,HV, BD,CTLR,UR1, or UR2
Notify Delay	DLY	NUMBER	X			X	X	**0**-540 seconds
Notify On Occur	NOO	NUMBER	X			X	X	**0:no** 1:yes
Notify On Retire	NOR	NUMBER	X			X	X	**0:no** 1:yes
NAG On Occur	NAG	NUMBER	X			X	X	**0:no** 1:yes
Notify Destination	DST	TEXT	X			X	X	**“”**, P1,P2,P3,P4

IDE	DEFAULT DESCRIPTION
CRA1	Controller Fail
CRF1	Controller Fuse
CPA1	Circuit Pack Fail
RPF1	Remote Peripheral Fuse
PCF1	PC Power Fuse
EPR1*	External Password Reset
PFD1	Password At Default
EXL1*	Excessive Login Attempts
BBL1	Memory Backup Battery Low
PHT1	Processor Halt
CLC1*	Clock Changed
STF1*	Self Test Failed
PGI1	Program Line Invalid
CCH1*	Configuration Changed
HCL1*	History Cleared
MOR1	Measurement Out Of Range
MTC1	Module Type Conflict
MDF1	Module Failure
BTJ1	Battery Thermal Major
BTN1	Battery Thermal Minor
AMJ1	Auxiliary Fuse Major
AMN1	Auxiliary Fuse Minor
FAJ1	External Fuse Major
FAN1	External Fuse Minor
RBF1	Regulation Battery Fuse
BTF1	Battery Thermal Fuse
BPF1	Battery Power Fuse
ABS1	Alarm Battery Supply
VSF1	Sense/Control Fuse
LVDA1	Low Voltage Disconnect Fail
LVD1	Low Voltage Disconnect
OSA1	Open String
EMD1	Energy Management Disabled
EPD1*	Excess Plant Drain
SNC1	Shunt Not Configured
URC1	User Relay Conflict
ZID1	ID Not Configured
RFA1	Rectifier Fail
ACF1	AC Fail
PHA1	Phase Or Low Output

Table B-10: Alarm And Events Objects and Attributes (continued)

ATTRIBUTE	MNEM	TYPE	Related Commands: CHA	OPE	MET	CON	BACKUP	VALUE
LCA1	Low Current							
LSF1	Load Share Fuse							
MAN1	Manual Off							
ETS1	External Transfer Shutdown							
RIC1	Rectifier Incomplete Config							
HPA1	Half Power							
DID1	ID Conflict							
CFA1	Converter Fail							
CDFA1	Converter Distribution Fuse							
CDID1	Converter ID Conflict							
COF1*	Queue Overflow							
COR1*	Number Did Not Respond							
NNC1	Number Not Configured							
POR1*	Number Did Not Respond							
AAC1	ACO Active							
ATA1	Alarm Test Active							
ATF1*	Alarm Test Failed							
ATB1*	Alarm test aborted							
CNO1	Contactor 1 Open							
CNO2	Contactor 2 Open							
CNF1	Contactor 1 Failed							
CNF2	Contactor 2 Failed							

* These alarms can be cleared using the CLE command

ATTRIBUTE	MNEM	TYPE	Related Commands: CHA	OPE	MET	CON	BACKUP	VALUE
Threshold Alarm		THA						
Identifier	IDE	TEXT						see list below
Description	DES	TEXT	X			X	X	see below Alarm State AST NUMBER 0:inactive 1:active
Severity	SEV	TEXT	X			X	X	CRIT, MAJ, MIN, WRN, RO
Threshold	THR	NUMBER	X			X	X	number
LED	LED	TEXT	X			X	X	BATT, BD, DIST, RECT, AC, RM, or CTLR
Contact Closure	ACC	TEXT	X			X	X	ACF,MJF,MNF,RFA,VLV,HV, BD,CTLR,UR1, or UR2
Notify Delay	DLY	NUMBER	X			X	X	**0**-540 seconds
Notify On Occur	NOO	NUMBER	X			X	X	**0:no** 1:yes
Notify On Retire	NOR	NUMBER	X			X	X	**0:no** 1:yes
NAG On Occur	NAG	NUMBER	X			X	X	**0:no** 1:yes
Notify Destination	DST	TEXT	X			X	X	“”,P1,P2,P3,P4

IDE	DEFAULT DESCRIPTION	THRESHOLD RANGE
VLA1	Very Low Voltage	20-25.5:**23**V or 40-51:**46**V
MFA1	Multiple Rectifier Fail	2-24:**2**
LMR1*	Limited Recharge	0.5-1.0:**0.8**
ERD1*	Excess Rectifier Drain	1.0-2.0:**1.18**
ETO1	Engine Transfer Timeout	0-60:**30** minutes
RPI1*	Rectifier/Plant Inconsistency	1.0-2.0:**1.05**
RTL1	Reserve Time Low	0-100:**2** hours
CMFA1	Multiple Converter Fail	2-8:**2**

* These alarms can be cleared using the CLE command

Table B-10: Alarm And Events Objects and Attributes (continued)

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Dual Threshold Alarm		DTA						
Identifier	IDE	TEXT						see list below
Description	DES	TEXT	X			X	X	see below
Alarm State	AST	NUMBER						0:inactive 1:active
Severity	SEV	TEXT	X			X	X	CRIT, MAJ, MIN, WRN, RO
Float Threshold	FTH	NUMBER	X			X	X	number
Boost Threshold	BTH	NUMBER	X			X	X	number
LED	LED	TEXT	X			X	X	BATT, BD, DIST, RECT, AC, RM, or CTLR
Contact Closure	ACC	TEXT	X			X	X	ACF,MJF,MNF,RFA,VLV,HV, BD,CTLR,UR1, or UR2
Notify Delay	DLY	NUMBER	X			X	X	**0**-540 seconds
Notify On Occur	NOO	NUMBER	X			X	X	**0:no** 1:yes
Notify On Retire	NOR	NUMBER	X			X	X	**0:no** 1:yes
NAG On Occur	NAG	NUMBER	X			X	X	**0:no** 1:yes
Notify Destination	DST	TEXT	X			X	X	**“”**,P1,P2,P3,P4

IDE	DEFAULT DESCRIPTION	FLOAT	BOOST
		THRESHOLD VOLTAGE RANGES (default:min-max)	
BDA1	Battery On Discharge	23-28:**25**V or 46-55:**51**V	23-28:**25**V or 46-55:**51**V
HVA1	High Voltage	24.75-29.75:**26.8**V or 50-60:**53.6**V	25.75-31.75:**26.8**V or 52-60:**53.6**V
HFV1	High Float Voltage	24.75-29.75:**26.5**V or 50-60:**53**V	25.75-31.75:**26.5**V or 52-60:**53**V

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
User Defined Events		UDE						
Identifier	IDE	TEXT						6 char (default: U*nnnn (nnnn=1-1500)*
Description	DES	TEXT	X			X	X	30 char
Alarm State	AST	NUMBER						0:inactive 1:active
Severity	SEV	TEXT	X			X	X	CRIT, MAJ, MIN, WRN, **RO**
Program Line	PRG	TEXT	X			X	X	60 char
Minimum Duration	DUR	NUMBER	X			X	X	> **0** seconds
Latched	LAT	NUMBER	X			X	X	**0:no** 1:yes
LED	LED	TEXT	X			X	X	**“”**,BATT, BD, DIST, RECT, AC, RM, or CTLR
Contact Closure	ACC	TEXT	X			X	X	**“”**,ACF,MJF,MNF,RFA,VLV,HV, BD,CTLR,UR1, or UR2
Notify Delay	DLY	NUMBER	X			X	X	**0**-540 seconds
Notify On Occur	NOO	NUMBER	X			X	X	**0:no** 1:yes
Notify On Retire	NOR	NUMBER	X			X	X	**0:no** 1:yes
NAG On Occur	NAG	NUMBER	X			X	X	**0:no** 1:yes
Notify Destination	DST	TEXT	X			X	X	**“”**,P1,P2,P3,P4

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Timer Events		TME						
Identifier	IDE	TEXT						6 char (default: T*nn (nn=1-32)*
Description	DES	TEXT	X			X	X	30 char
State	STT	NUMBER						0:inactive 1:active
Date	DAT	DATE	X			X	X	date (**00/00/0000** daily)
Time	TIM	TIME	X			X	X	time **(default: 11:59am)**
Duration	DUR	NUMBER	X			X	X	1 to 1440 minutes (**0**:forever)

Table B-10: Alarm And Events Objects and Attributes (continued)

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Maintenance Reminder		MRM						
Identifier	IDE	TEXT						MR*nn* (*nn*=1 to 12)
Description	DES	TEXT	X			X	X	Maintenance Reminder *nn*
Alarm State	AST	NUMBER						0:inactive 1:active
Severity	SEV	TEXT						WRN (not changeable)
Notify On Occur	NOO	NUMBER	X			X	X	**0:no** 1:yes
Notify On Retire	NOR	NUMBER	X			X	X	**0:no** 1:yes
NAG On Occur	NAG	NUMBER	X			X	X	**0:no** 1:yes
Notify Destination	DST	TEXT	X			X	X	**“”**,P1,P2,P3,P4
Notification Date	DAT	DATE	X			X	X	**01/01/1992**
Notification TIME	TIM	TIME	X			X	X	**12:00AM**
Text	TXT	TEXT	X			X	X	60 char

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Connected Equipment Alarm		CEA						
Identifier	IDE	TEXT						CEA1, CEA2, CEA3, and CEA4
Description	DES	TEXT	X			X	X	Connected Equip Alarm *n*
Alarm State	AST	NUMBER						0:inactive 1:active
Severity	SEV	TEXT	X			X	X	CRIT, MAJ, **MIN**, WRN, RO
Notify Delay	DLY	NUMBER	X			X	X	**0**-540 seconds
Notify On Occur	NOO	NUMBER	X			X	X	**0:no** 1:yes
Notify On Retire	NOR	NUMBER	X			X	X	**0:no** 1:yes
NAG On Occur	NAG	NUMBER	X			X	X	**0:no** 1:yes
Notify Destination	DST	TEXT	X			X	X	**“”**,P1,P2,P3,P4

Table B-11: Data Switch Objects and Attributes

			Related Commands					
ATTRIBUTE	**MNEM**	**TYPE**	**CHA**	**OPE**	**MET**	**CON**	**BACKUP**	**VALUE**
Data Switch		DSW						
Identifier	IDE	TEXT						DS1,DS2,DS3,DS4
Description	DES	TEXT	X			X	X	Data Switch *n*
Connected Equipment ID	CID	TEXT	X			X	X	**GALAXY**,OMNI, ECS, MCS, XCS, RAS (up to 6 char)
State	STT	NUMBER		X				IDLE, REPORTING, PASS-THRU, N/A
Reporting Enable	REN	NUMBER	X			X	X	**0:disable** 1:enable
Connect Baudrate	BDR	NUMBER	X			X	X	300,1200,2400,4800,**9600**,19200
Data Bits	DBT	NUMBER	X			X	X	7,**8**
Parity	PRY	TEXT	X			X	X	O,E,**N**
Stop Bits	SBT	NUMBER	X			X	X	**1**,2
Handshake	HSH	TEXT	X			X	X	**NO**,SW,HW
Monitor DSR Signal	DSR	NUMBER	X			X	X	0:no **1:yes**
Alarm Header Length	HDR	NUMBER	X			X	X	**0** to 100 lines
Attention Prompt	APR	TEXT	X			X	X	12 char **(default: \r\,\r)**
Password	PWD	TEXT	X			X	X	20 char **(default: LINEAGE\r)**
Alarms Command	ACM	TEXT	X			X	X	30 char **(default: ALMS\r)**
Hang-up Command	HUC	TEXT	X			X	X	20 char **(default: BYE\r)**
Connected Equip Alarm	CEA	ATTRL						CEA1, CEA2, CEA3, or CEA4

Table B-12: Remote Peripheral Monitor Objects and Attributes

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Remote Peripheral Monitor		RPM						
Identifier	IDE	TEXT						M*xx (x=0-9,A-F, i.e. xx is 01 to FF)*
Description	DES	TEXT	X			X	X	30 char (*type* Module *xx*)
Serial Number	SER	NUMBER						
Status	STT	TEXT						ATTACHED,DETACHED, FAIL,TYPE CONFLICT
Module Type	TYP	TEXT						SHM, VTM, TPM
Type Lock	TLK	NUMBER	X			X	X	**0:not locked** 1:locked
Measurement Out of Range	MOR	NUMBER						0:inactive 1:active
Module Failure	MDF	NUMBER						0:inactive 1:active
Type Conflict	MTC	NUMBER						0:inactive 1:active
Voltage Monitor		VTM						
Identifier	IDE	TEXT						C*cxx (x=0-9,A-F;c=1-6)*
Description	DES	TEXT	X			X	X	30 char (Voltage Chan *c* Module *xx*)
Status	STT	TEXT						ATTACHED,DETACHED, FAIL,TYPE CONFLICT
Channel Type	TYP	TEXT						VTM
Range	RNG	TEXT						text
Value	VAL	NUMBER			X			number units
Unit	UNI	TEXT	X			X	X	5 chars **(default: V)**
Offset	OFS	NUMBER	X			X	X	-99999-99999:**0**
Scale Factor	SCF	NUMBER	X			X	X	-99999-99999:**1**
Measurement Out of Range	MOR	NUMBER						0:inactive 1:active
Shunt Monitor		SHM						
Identifier	IDE	TEXT						C*cxx (x=0-9,A-F;c=1-6)*
Description	DES	TEXT	X			X	X	30 char (Shunt Chan *c* Module *xx*)
Status	STT	TEXT						ATTACHED,DETACHED, FAIL,TYPE CONFLICT
Channel Type	TYP	TEXT						SHM
Range	RNG	TEXT						text
Value	VAL	NUMBER			X			number A
Shunt Current	SHA	NUMBER	X			X	X	-2,147,483,648-2,147,483,648:**1** A
Shunt Voltage	SHV	NUMBER	X			X	X	-2,147,483,648-2,147,483,648:**1** mV (not 0)
Measurement Out of Range	MOR	NUMBER						0:inactive 1:active
Temperature Monitor		TPM						
Identifier	IDE	TEXT						C*cxx (x=0-9,A-F;c=1-7)*
Description	DES	TEXT	X			X	X	30 char (Temperature Chan *c* Module *xx*)
Status	STT	TEXT						ATTACHED,DETACHED, FAIL,TYPE CONFLICT
Channel Type	TYP	TEXT						TPM
Value	VAL	NUMBER			X			number C or F
Measurement Out Of Range	MOR	NUMBER						0:inactive 1:active
Control Relay		CRM						
Identifier	IDE	TEXT						C*cxx (x=0-9,A-F;c=1-3)*
Description	DES	TEXT	X			X	X	30 char (Relay Chan *c* Module *xx*)
Status	STT	TEXT						ATTACHED,DETACHED, FAIL,TYPE CONFLICT
Channel Type	TYP	TEXT						CRM
Value	VAL	NUMBER		X	X			OFF or ON
Program Line	PRG	TEXT	X			X	X	60 char **(default: “”)**
Measurement Out Of Range	MOR	NUMBER						0:inactive 1:active

Table B-12: Remote Peripheral Monitor Objects and Attributes (continued)

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Binary Monitor		BIM						
Identifier	IDE	TEXT						Cc*xx (x=0-9,A-F;c=1-6)*
Description	DES	TEXT	X			X	X	30 char (Binary Chan *c* Module *xx*)
Status	STT	TEXT						ATTACHED,DETACHED, FAIL,TYPE CONFLICT
Channel Type	TYP	TEXT						BIM
Value	VAL	NUMBER			X			CLOSED or OPEN
Measurement Out Of Range	MOR	NUMBER						0:inactive 1:active
Derived Channels		DRC						
Identifier	IDE	TEXT						DR*nn* (*nn=01 to 32)*
Description	DES	TEXT	X			X	X	30 char (Derived Chan *nn*)
Value	VAL	NUMBER			X			number *units*
Program Line	PRG	TEXT	X			X	X	60 char **(default: “”)**
Unit	UNI	TEXT	X			X	X	5 chars **(default: “”)**

Table B-13: Reporting Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Call-Out Manager		COM						
Identifier	IDE	TEXT						CM1
Description	DES	TEXT	X			X	X	30 char (Call-Out Manager)
NAG Interval	NGI	NUMBER	X			X	X	**15** to 60 minutes
Alarm Sub-objects								
Queue Overflow	COF	ATTRL						COF1
Number Did Not Respond	COR	ATTRL						COR1
Number Not Configured	NNC	ATTRL						NNC1
Phone Numbers	COP	ATTRL						P1,P2,P3,P4,A1
Call-Out Phone Number		COP						
Identifier	IDE	TEXT						P1,P2,P3,P4,A1
Description	DES	TEXT	X			X	X	*(Alternate)* Call-Out Number
Type	TYP	TEXT	X			X	X	**DATA**, PAGER
Phone Number	PHN	TEXT	X			X	X	*digit ( ) * # - ,* up to 25 characters **(default: “”)**
Connect Baudrate	BDR	NUMBER	X			X	X	300,1200,**2400**,4800,9600,14400
Data Bits	DBT	NUMBER	X			X	X	7,**8**
Parity	PRY	TEXT	X			X	X	O,E,**N**
Stop Bits	SBT	NUMBER	X			X	X	**1**,2
Pager Id Delay	DLY	NUMBER	X			X	X	**0**-9 seconds
Pager Id	PGR	TEXT	X			X	X	up to 25 characters **(default: “”)**
Periodic Call-Out		PSO						
Identifier	IDE	TEXT						PO1
Description	DES	TEXT	X			X	X	Periodic Call-Out 1
Phone Number	PHN	TEXT	X			X	X	*digit ( ) * # - ,* up to 25 characters **(default: “”)**
Connect Baudrate	BDR	NUMBER	X			X	X	300,1200,**2400**,4800,9600,14400
Data Bits	DBT	NUMBER	X			X	X	7,**8**
Parity	PRY	TEXT	X			X	X	O,E,**N**
Stop Bits	SBT	NUMBER	X			X	X	**1**,2
Interval	INT	TEXT	X			X	X	Sunday...Saturday,Daily, Monthly,Quarterly,**Never**
Time	TIM	TIME	X			X	X	hh:mm **(default: 6:00am)**
Command Line *1-10*	CL*01-10*		TEXTX				X	X Up to 40 characters each **(de fault: “”)**
Alarm Sub-objects								
Number Did Not Respond	POR	ATTRL						POR1

Table B-14: Remote Communication Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands CHA	OPE	MET	CON	BACKUP	VALUE
Modem		MDM						
Identifier	IDE	TEXT						MD1
Description	DES	TEXT	X			X	X	Modem Port 1
State	STT	TEXT						USER,SUPER-USER, ADMINISTRATOR,TL1,LOGOUT
Data Bits	DBT	NUMBER	X			X	X	7,**8**
Parity	PRY	TEXT	X			X	X	O,E,**N**
Stop Bits	SBT	NUMBER	X			X	X	**1**,2
Time-Out	TMO	NUMBER	X			X	X	0(disabled) - 45:**5** minutes
Handshaking	HSH	TEXT	X			X	X	**NO**,SW
Number of Rings Before Answer	NRG	NUMBER	X			X	X	**2**-15
Write Enable	WRE	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Modem Initialization String	INS	TEXT	X			X	X	up to 40 characters “” assigns the default string
Local RS-232 Port		LPT						
Identifier	IDE	TEXT						LP1
Description	DES	TEXT	X			X	X	Local Port 1
State	STT	TEXT						USER,SUPER-USER, ADMINISTRATOR,TL1,LOGOUT
Baudrate	BDR	TEXT	X			X	X	**AUTO**, 300,1200,2400, 4800,9600,19200
Data Bits	DBT	NUMBER	X			X	X	7,**8**
Parity	PRY	TEXT	X			X	X	O,E,**N**
Stop Bits	SBT	NUMBER	X			X	X	**1**,2
Time-Out	TMO	NUMBER	X			X	X	0(disabled) - 45:**5** minutes
Handshaking	HSH	TEXT	X			X	X	**NO**,HW,SW
Application	APP	TEXT	X			X	X	**TERMINAL**, EVENT LOG (HW,SW)
Write Enable	WRE	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)
Auxiliary Port		AUX						
Identifier	IDE	TEXT						AU1
Description	DES	TEXT	X			X	X	Auxiliary Port 1
State	STT	TEXT						USER,SUPER-USER, ADMINISTRATOR,TL1,LOGOUT
Baudrate	BDR	TEXT	X			X	X	**AUTO**, 300,1200, 2400,4800, 9600,19200
Data Bits	DBT	NUMBER	X			X	X	7,**8**
Parity	PRY	TEXT	X			X	X	O,E,**N**
Stop Bits	SBT	NUMBER	X			X	X	**1**,2
Time-Out	TMO	NUMBER	X			X	X	**0**(disabled) - 45 minutes
Handshaking	HSH	TEXT	X			X	X	**NO**,SW
Application	APP	TEXT	X			X	X	**TERMINAL**, TL1, SAPO
Write Enable	WRE	NUMBER	X			X	X	0:disable **1:enable** (HW,SW)

Table B-15: Configurable Statistics Objects and Attributes

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Trend		TRS						
Identifier	IDE	TEXT						TR1 to TR8,DCT1
Description	DES	TEXT	X			X	X	(DC1) Trend Statistics *n*
Source	SRC	TEXT	X			X	X	Any MET attribute path **(default: “”)**
Busy Hour Statistics		BHS						
Identifier	IDE	TEXT						BH1 to BH4,DCBH1
Description	DES	TEXT	X			X	X	(DC1) Busy Hour Statistics *n*
Source	SRC	TEXT	X			X	X	Any MET attribute path
Start Date	SDT	DATE	X			X	X	**default: 12/31/2091**
Start Hour	SHR	NUMBER	X			X	X	0-**23**

Table B-16: Inventory Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands: CHA	OPE	MET	CON	BACKUP	VALUE
Plant Inventory		PLI						
Identifier	IDE	TEXT						PLI1
Description	DES	TEXT	X			X	X	Plant Inventory 1
Plant Installation Date	IDT	TEXT	X			X	X	8 char (**default: “”)**
Plant Service Date	SDT	TEXT	X			X	X	8 char **(default: “”)**
Last Inventory Entry Date	EDT	TEXT	X			X	X	8 char **(default: “”)**
Nominal Plant Output Voltage	NOV	TEXT	X			X	X	6 char **(default: “”)**
Nom Boost Condition	NBC	TEXT	X			X	X	6 char **(default: “”)**
Nom Equalize Condition	NEQ	TEXT	X			X	X	6 char **(default: “”)**
Nom Load Share Condition	NLS	TEXT	X			X	X	6 char **(default: “”)**
Nom Float HV Threshold	NFH	TEXT	X			X	X	6 char **(default: “”)**
Nom Boost HV Threshold	NBH	TEXT	X			X	X	6 char **(default: “”)**
Nom Float HFV Threshold	NFF	TEXT	X			X	X	6 char **(default: “”)**
Nom Boost HFV Threshold	NBF	TEXT	X			X	X	6 char **(default: “”)**
Nom BD Threshold	NBD	TEXT	X			X	X	6 char **(default: “”)**
Nom VLV Threshold	NVL	TEXT	X			X	X	6 char **(default: “”)**
Nom Plant Capacity Threshold	NPC	TEXT	X			X	X	6 char **(default: “”)**
Installed Rectifier Capacity	IRC	TEXT	X			X	X	6 char **(default: “”)**
Shunt Voltage	SHV	TEXT	X			X	X	6 char **(default: “”)**
Shunt Amperes	SHA	TEXT	X			X	X	6 char **(default: “”)**
Low Voltage Disconnect	LVD	TEXT	X			X	X	6 char **(default: “”)**
Rectifier Inventory		REI						
Identifier	IDE	TEXT	X					GI01 to GI24
Description	DES	TEXT	X			X	X	Rectifier Inventory *n*
Type	TYP	TEXT	X			X	X	15 char **(default: “”)**
Technology	TEC	TEXT	X			X	X	6 char **(default: “”)**
Capacity	CAP	TEXT	X			X	X	6 char **(default: “”)**
CLEI Code	CLEI	TEXT	X			X	X	10 char **(default: “”)**
Serial Number	SER	TEXT	X			X	X	12 char **(default: “”)**
Date Installed	IDT	TEXT	X			X	X	8 char **(default: “”)**
Nominal Float Voltage	NFV	TEXT	X			X	X	6 char **(default: “”)**
Nominal Boost Voltage	NBV	TEXT	X			X	X	6 char **(default: “”)**
Nominal Current Limit	NCL	TEXT	X			X	X	6 char **(default: “”)**
Options Installed	OP*1-5*	TEXT	X			X	X	20 char **(default: “”)**
Maintenance History	CL*01-20*		TEXTX				X	X 30 char **(default: “”)**

ATTRIBUTE	MNEM	TYPE	Related Commands: CHA	OPE	MET	CON	BACKUP	VALUE
Distribution Bay Inventory		DBI						
Identifier	IDE	TEXT						DI1 to DI2
Description	DES	TEXT	X			X	X	Distrib Bay Inventory *n*
Remaining Space	RSP	TEXT	X			X	X	2 char **(default: “”)**
Panel Inventory		PIN						
Identifier	IDE	TEXT						PI01 to PI20
Description	DES	TEXT	X			X	X	Panel Inventory *n*
Bay	BAY	TEXT	X			X	X	20 char **(default: “”)**
Number of Slots	NSL	TEXT	X			X	X	2 char **(default: “”)**
Remaining Capacity	RCP	TEXT	X			X	X	6 char **(default: “”)**
Remaining Space	RSP	TEXT	X			X	X	2 char **(default: “”)**

Table B-16: Inventory Objects and Attributes (continued)

ATTRIBUTE	MNEM	TYPE	CHA	OPE	MET	CON	BACKUP	VALUE
			Related Commands					
Slot Inventory		SLI						
Identifier	IDE	TEXT						SLI001 to SLI200
Description of Load	DES	TEXT	X			X	X	Slot Inventory *n*
Fuse or Circuit Breaker	TYP	TEXT	X			X	X	4 char **(default: “”)**
Fuse/Circuit Breaker Size	SIZ	TEXT	X			X	X	8 char **(default: “”)**
Reserve Battery Inventory		RBI						
Identifier	IDE	TEXT						RI1
Description	DES	TEXT	X			X	X	Reserve Battery Inventory 1
Type of Batteries	TYP	TEXT	X			X	X	15 char **(default: “”)**
Vendor	VND	TEXT	X			X	X	12 char **(default: “”)**
Number of Cells	NUM	TEXT	X			X	X	2 char **(default: “”)**
Reserve Time	RTM	TEXT	X			X	X	2 char **(default: “”)**
Reserve Load	RLD	TEXT	X			X	X	6 char **(default: “”)**
Battery String Inventory		STI						
Identifier	IDE	TEXT						STI01 to STI20
Description	DES	TEXT	X			X	X	Battery String Inventory *n*
Date Installed	IDT	TEXT	X			X	X	8 char **(default: “”)**
Maintenance History	CL*01-10*		TEXTX				X	X 30 char **(default: “”)**
Controller Option Inventory		COI						
Identifier	IDE	TEXT	X			X	X	CI01 to CI45
Description	DES	TEXT	X			X	X	Controller Option *n*
Date Installed	IDT	TEXT	X			X	X	8 char **(default: “”)**
Version Number	VER	TEXT	X			X	X	6 char **(default: “”)**
CLEI Code	CLEI	TEXT	X			X	X	10 char **(default: “”)**
Remote Peripheral Monitor Inven	RMI							
Identifier	IDE	TEXT						MI*xx (x=0-9,A-F, i.e. 01 to FF)*
Description	DES	TEXT	X			X	X	30 char (*type* Module *xx*)
Date Installed	IDT	TEXT	X			X	X	8 char **(default: “”)**
Location	LOC	TEXT	X			X	X	15 char **(default: “”)**

Table B-17: TL1 Management Objects and Attributes

			Related Commands					
ATTRIBUTE	**MNEM**	**TYPE**	**CHA**	**OPE**	**MET**	**CON**	**BACKUP**	**VALUE**
TL1 Manager		TLM						
Identifier	IDE	TEXT						TLM1
Description	DES	TEXT	X			X	X	30 char (TL1 Manager)
Activate-User Enable	AUE	NUMBER	X			X	X	0:disable **1:enable**
CTS Connect Detection	CTS	NUMBER	X			X	X	**0:disable** 1:enable
DSR Connect Detection	DSR	NUMBER	X			X	X	**0:disable** 1:enable
TL1 Object		TL1						
Identifier	IDE	TEXT						TL001 to TL256
Description	DES	TEXT	X			X	X	30 char (TL1 Object nnn)
Condition Description	CDS	TEXT	X			X	X	60 char **(default: Condition Description)**
Aid	AID	TEXT	X			X	X	20 char **(default: AID1)**
Condition Type	CND	TEXT	X			X	X	20 char **(default: Condition Type)**
Service Affecting	SAF	NUMBER	X			X	X	0:no **1:yes**
Reporting	RPT	TEXT	X			X	X	**EQUIPMENT**, ENVIRONMENT, PRESENCE

Table B-18: Miscellaneous Objects and Attributes

ATTRIBUTE	MNEM	TYPE	Related Commands: CHA	OPE	MET	CON	BACKUP	VALUE
Call-Back Security		CBS						
Identifier	IDE	TEXT						CB1
Description	DES	TEXT	X			X	X	Call-Back Security 1
State	STT	NUMBER	X			X	X	**0:off** 1:on
Call-Back Phone Number	PH*1-5*	TEXT	X			*X*	X	*digit ( )* * # - , space **(default: “”)**
Connect Baudrate	BR*1-5*	NUMBER	X			X	X	300,1200,**2400**,4800,9600,14400
Notepad		NPD						
Identifier	IDE	TEXT						UNP, SNP
Description	DES	TEXT	X			X	X	(Super)User Notepad
Notify State	STT	NUMBER	X			X	X	**0:don’t notify** 1:notify
Comment Line	CL*01-15*		TEXTX				*X*	X up to 60 chars each **(default: “”)**
Alarm Cut-off		ACO						
Identifier	IDE	TEXT						ACO1
Description	DES	TEXT	X			X	X	Alarm Cut-off
State	STT	NUMBER		X		X		0:disable 1:enable
Critical ACO State	CST	NUMBER						0:inactive 1:active
Critical ACO Enable	CAE	NUMBER	X			X	X	0:disable **1:enable**
Critical ACO Timeout	CTO	NUMBER	X			X	X	**1**-4 hours
Major ACO State	JST	NUMBER						0:inactive 1:active
Major ACO Enable	JAE	NUMBER	X			X	X	0:disable **1:enable**
Major ACO Timeout	JTO	NUMBER	X			X	X	**1**-4 hours
Minor ACO State	NST	NUMBER						0:inactive 1:active
Minor ACO Enable	NAE	NUMBER	X			X	X	0:disable **1:enable**
Minor ACO Timeout	NTO	NUMBER	X			X	X	1-72:**8** hours
Alarm Sub-objects								
ACO Active	AAC	ATTRL						AAC1
User Defined Object		UDO						
Identifier	IDE	TEXT						6 char (default: O*nnn (nnn=1-100)*
Description	DES	TEXT	X			X	X	30 char

Users “build” their user defined objects by following the example below:

Command	Comment
ADD UDO,CELL1	- Add a user defined object called CELL1 to the system
ADD CELL1,TEMP	- Add the attribute TEMP to CELL1
LIN CELL1 TEMP,C701	- LInk a temperature monitor channel to CELL1 TEMP

Appendix C T1.317 Error Messages

Syntax Related Errors

Listed below are the T1.317 interface error message and their possible causes.

-100,TOO MANY CHARACTERS
The command line is too long. Break the command up into separate commands and put them on separate lines.

-101,INVALID TEXT
The text string is missing a closing “.

-102,UNEXPECTED CHARACTERS
There is an unexpected character in the command line.

-103,OUT OF TOKEN SPACE
There are too many elements in the command line. Break the command line into separate commands.

-104,EXPECTED IDENTIFIER
-105,EXPECTED EQUAL SIGN
-106,EXPECTED VALUE
-107,EXPECTED COMMA
-108,EXPECTED TEXT
-109,EXPECTED NUMBER
-110,EXPECTED TERMINATOR
-111,UNKNOWN COMMAND
-112,SYNTAX ERROR

These are specific command syntax errors. Refer to the command section of this manual for a description of the command syntax.

Security Related Errors

-220,SECURITY ERROR
Must be super-user or administrator to execute this command. Login at a higher security level using the LOGIN command and try again.

-221,EXCESSIVE LOGIN ATTEMPTS
The wrong password was entered too many times when trying to login or change security levels.

-222,LOGIN LIMITED TO USER
The access port is limited to the user security level only. If this is a problem, set the WRE attribute of the access port object to 1(enable) from another access port that has super-user privilege or to RD_WR from the front panel and flip the access port's "FULL ACCESS" dip switch on SW203 of the intelligent controller to the '1'(enable) position.

-223,INVALID PASSWORD
An attempt was made to change the password to an invalid value. See the section on security for a description of valid passwords.

-224,NEW PASSWORD MISMATCH
The first and second passwords entries did not match when attempting to change a password.

-225,CALL-BACK FAILED
Could not carry out call-back security. Check that the call-back location was entered correctly and that a phone number is defined for that location.

-226,ONE SUPER-USER/ADMINISTRATOR ALLOWED
Could not allow super-user or administrator login because there is already a super-user or administrator login on one of the other access ports. Wait for the other super-user or administrator to log off or precede the password with the '!' character to force a login.

Command Execution Related Errors

-300,INVALID ALIAS
An attempt was made to define an invalid alias. Check that the alias is not too long and does not conflict with system defined aliases or commands.

-301,OUT OF ALIAS SPACE
The limit of 50 user defined aliases has been reached. Set old unused alias equal to "" to clear them out and make room for new ones.

-302,INVALID COMMAND LINE
The command line was too long.

-303,ALIAS FAILED
The aliases are nested too deeply. Redefine alias so that aliases are not as dependent on other aliases.

-304,INVALID PARAMETER
An attempt was made to change an attribute to an invalid value. Check that the value is in the proper range.

-305,TYPE MISMATCH
Attribute and value types don't match. For example, an attempt was made to assign text to an attribute value expecting a number.

-306,NOT CONFIGURATION ATTRIBUTE
An attempt was made to use the CHA command to change an attribute that is either read only or needs to be changed using the OPE command.

-307,BAD DATE
-308,BAD TIME
-309,BAD INPUT
Could not understand the date or time input for an RSDATE command.

-310,OBJECT NOT FOUND
An attempt was made to execute a command referencing objects that don't exist.

-311,OUT OF MEMORY
This error indicates that the memory resources defined for a specific function have been used up. This error will occur if there are no more objects of a given type or there is no more space for new attributes.

-312,COULD NOT DELETE
An attempt was made to delete a system defined object or linkable attribute.

-313,OBJECT HAS PARENT
An attempt was made to delete an object with a parent or link an object to a second parent.

-314,LINK EXISTS
An attempt was made to delete an object with children or delete a linkable attribute that is linked to an object. Use the UNL command to unlink children from the linkable attributes before deleting an object or its attributes. This error may also occur if an attempt was made to link a second object to a linkable attribute that supports only one link.

-315,LINK NOT FOUND
An attempt was made to unlink an object from an attribute to which it is not linked.

-316,COULD NOT UNLINK
An attempt was made to unlink an object from an attribute that was not linked using the LIN command.

-317,CIRCULAR LINK
The LIN command would have resulted in a circular link. A very simple example of circular link would be one that linked an object to itself.

-318,TOO MANY ARGUMENTS
There are too many arguments in the command line. This occurs when too much is being done with one command line. Use two commands for the same operation if possible.

-319,INVALID ATTRIBUTE
The referenced attribute is not an attribute of the referenced object.

-320,INVALID OBJECT
This error occurs when a bad object identifier is referenced in the command line.

-321,INVALID OBJECT TYPE
Reference has been made to an invalid object type. This error will occur if an attempt is made to add objects of types that cannot be added.

-322,PATH TOO LONG
The object path is too long to be resolved. Use a shorter object path in the command line.

-323,INVALID PATH
Could not resolve the given path or the path is not of a valid form.

-324,ATTRIBUTE EXISTS
An attempt was made to add an attribute to an object with an attribute of the same name.

-325,OBJECT EXISTS
An attempt was made to add an object that already exists in the system.

-327,OBJECT/TYPE CONFLICT
An attempt was made to add a user-defined object with an identifier that conflicts with an object type. Pick a different identifier for the object.

-328,FEATURE DISABLED
An attempt was made to activate a feature that has been disabled. Check the feature's software and hardware dip switch settings.

-329,INDEPENDENT CTLR NOT AVAILABLE
An attempt was made to access a feature that requires the basic controller support.

-331,NOT OPERATE ATTRIBUTE
An attempt was made to use the OPE command on an attribute that cannot be changed using the OPE command. Try using the CHA command instead.

-332,COMMAND NOT ALLOWED
Because of the serious affect that they may have, some commands are not allowed. Some examples of commands that are not allowed are:

CLH	Clear all event histories
OPE REC,STT=STANDBY	Set all rectifiers to standby at once

-334,PORT CONFIGURATION DISABLED
Access port configuration is disabled. Check the serial port configuration attribute in the PS1 object and the MODEM/AUX/LOCAL PORT CONFIG dip switch setting on SW203 on the intelligent controller.

-336,PORT IS BUSY
An attempt was made to pass-thru to a data switch port already in use.

-338,CONNECTION FAILED
A connection failed during an attempt to pass-thru on a data switch port.

-339,BOARD MISSING
A command was executed that requires the presence of a missing circuit pack. For example, this error will be reported if an attempt is made to pass-thru on the data switch without a data switch circuit pack.

-340, EQUIPMENT NOT DETECTED
This error will occur if an attempt is made to pass-thru on the data switch when the connected equipment is not sensed via the DSR signal.

-341,ALARM ACTIVE
The command could not be executed due to active alarms in the system.

-342, OBJECT IS LOCKED
An attempt was made to delete a remote peripheral monitor module that is locked.

Diagnostic Messages

Table C-1 lists various controller diagnostic messages.

Table C-1: Galaxy SCF Controller Diagnostic Messages

Number	Message
500	Rect cable module type is unknown
501	Phase failure produced excess ripple causing output breaker to trip
502	Short on output filter capacitor
503	Alarm board in rectifier failed
504	One phase of the ac input failed or rectifier diodes may have failed, triacs or inductors failed
505	Commercial ac has failed or alarm board in rectifier failed
506	MAN off; if not turned off, check ckt packs and associated wiring

Table C-1: Galaxy SCF Controller Diagnostic Messages

Number	Message
507	Failure in current limit ckt or possible personnel intervention
508	Rect failed due to high voltage, circuit packs in rectifier failed
509	RFA present; fuses in rect blew or internal HV circuit was operated
510	Simulated RFA not generated
511	LCA present; check load share setup
512	LSF present; check load share fuse
513	Excess rect drain; current limit failed or mis-adjusted
514	Possible controller rect board fail
515	Rect type and rect cable module inconsistent
516	STCB off; if not turned of, check rect circuit breaker
517	LCA present; check load share setup
518	Rect failed due to high voltage, circuit packs in rectifier failed
519	RFA present; fan blocked or failed
520	RFA present; fuses in rect blew or internal HV circuit was operated
521	AC fail; if no loss of ac, check rectifier connections
522	Excess RCT Drain: Possible rectifier board failure
523	Circuit Breaker Alarm: Rect CB open or fuse blown
524	RFA Present: Check room temperature, check rectifier ventilation
525	RFA Present: Fan failed of fan stopped by rect low voltage
526	Rectifier is not responding: Check rectifier and connections
527	TR from remote operator request
528	TR from energy management algorithm
529	TR from circuit breaker failure
530	TR from loss of phase
531	TR from the engine present
532	TR from sequencing event
533	Low plant voltage overrides TR that turned on rectifier
534	Rectifier type should be configured

Table C-1: Galaxy SCF Controller Diagnostic Messages

Number	Message
600	Plant voltage wiring reversed
601	Plant shunt wiring reversed
602	Basic controller down; no plant or rectifier data or control
603	BTP temperature over %s
604	BTP temperature over %s, or BTP thermistor failure
605	Break in BTI caused BTN
606	Battery is at low voltage of %s
607	Batt discharge at %s min(s)
608	Battery is charging
609	Recharge capacity fell below %1.of% average hourly load = 1.of% A average rectifier capacity = %1.of A
610	Engine signals active too long, rectifiers turned back on
611	Efficiency disabled due to BD
612	Efficiency disabled due to boost or BTP mode
613	Efficiency disabled due to incomplete rectifier configuration
614	Efficiency disabled due to conflicting rectifier type
700	Module type mismatch
701	Module failed
702	Module detached
703	Module out of range
704	Program line invalid

Appendix D TL1 (Transaction Language 1) and X.25 Interface

Introduction

The Transaction Language (TL1) command interface for the Galaxy SCF Controller equipped with the BJH intelligent board enables direct communication with a central computerized monitoring system using TL1 commands as specified by Bellcore. In TL1 terminology the controller is commonly called a Network Element (NE) and the central computerized monitoring system is called the Operations System (OS). This Appendix describes the wiring and configuration of controller for TL1, the relevant TL1 command format, setup procedures for the controller, a detailed description of the TL1 commands and messages supported by the controller, and pertinent Bellcore documents.

The connection from controller to X.25 is made through an external Packet Assembler/Dissassembler (PAD). The PAD serves as an interface between the asynchronous TL1 port on the controller (AUX) and the X.25/TL1 synchronous network.

Figure D-1 shows a block diagram of the X.25 connection. The asynchronous connection is accomplished through an RS-232/485 converter to the controller. The synchronous connection to the X.25 network may be user configured as either a permanent virtual circuit (PVC) or as a switched virtual circuit (SVC). Contact your network administrator to determine which type of connection will be provided.

NOTE **The RS-232/485 converter can be connected to each of ports P2 through P5 on the PAD unit; one PAD can support up to four simultaneous X.25/TL1 connections.**

Preparation

Tools and Parts

Tools and parts used in the installation are listed below.

NOTE **The following procedures describe a typical installation. Depending on what optional equipment was ordered or is being reused, some of the items in these lists may not be present.**

Tools:

- ESD wrist strap
- flathead screwdriver
- 1 Phillips head screwdriver
- 1 socket set or nutdriver set

Parts:

The following parts are provided for use with the controller X.25/TL1 interface:

- 1 RS-232/485 converter
- twisted pair wire for data interface between controller and RS-232/485 converter

The following are provided with the PAD kit:

- 1 PAD
- 1 PAD power cable (with 3-pin circular connector)
- 2 Y-shaped DB-25 cables
- 1 memory backup battery

The following is provided with the DSU kit:

- 1 Data Service Unit (DSU)

The following is provided with the mounting shelf kit:

- 1 mounting shelf and hardware for DSU and PAD units

The following are provided by the Customer:

- 1 computer terminal for setup purposes
- 1 DB-25 cable to connect the terminal to PAD
- Power wiring for PAD and DSU
- Phone line to connect DSU to network
- 1 power supply, 120Vac, 12 Watt to 9Vac

Procedures

Enable the TL1 Function

Enable the TL1 function by setting BJH DIP switch SW203 position 1 to the open position. (Refer to Table 3-B.)

Assemble the PAD Unit

1. Remove the four Phillips screws from the bottom of the PAD unit.

2. Locate the battery holder on the CPU (main) circuit board and install the battery as shown in Figure D-2. The battery is not enabled unless Jumper LK14 is set (see Table D-1).

NOTE **Refer to the manufacturer's product manual for important safety information about the battery.**

3. Verify and set the jumpers on the CPU and daughter boards as shown in Table D-1. You may need to remove the daughter board temporarily to access the jumpers. (See Figure D-3.)

4. Reattach the PAD cover and secure with screws.

Mount the Shelf in Rack/Frame

1. Mount brackets to the shelf using hardware provided. The brackets may be mounted in two orientations to accommodate different rack sizes.

2. Position the shelf in the rack and secure using the hardware provided.

Mount the PAD and DSU Units in the Shelf

1. Set the units on the shelf in the positions shown in Figure D-4, making sure the feet on the bottom of the unit protrude through the holes in shelf.

2. Set the appropriate bracket across the top of each unit and fasten using the hardware provided.

Make Connections to the System

1. Connect the Y-cable labeled “To User” to the connector labeled “STP/X.25” on the back of the PAD unit (see Figure D-1).

2. Connect the “To User” end of the Y-cable to the 3-foot long DB-25 cable. Connect the other end of the DB-25 cable to the connector labeled “RS-232/530” on the back of the DSU.

3. Connect a terminal to the remaining end of the “To User” Y-cable, using a standard DB-25 cable. This terminal will be used for setup of the PAD only.

4. On the RS-232/485 converter, set the DTE/DCE switch to DTE.

5. Set the RS-232/485 converter to 4 wire, transmitter enabled by RTS communications, by setting the converter's DIP switches to the positions shown in Table D-2.

6. Connect the RS-232/485 converter to the controller RS-485 port, located on terminal block TB4 of the front access board, using the configuration in Table D-3.

7. Connect the DB-25 Connector of the RS-232/485 converter directly to the PAD, on the first available port, from port P2 - P5 (port 2 to port 5).

8. Connect the X.25 network phone line using an 8-pin modular jack to the J1 port on the back of the DSU.

9. Connect the appropriate power to the DSU terminal block.

10. Connect the 3-pin power cable to the back of the PAD at the connector labeled POWER.

11. Connect appropriate power to the PAD power cable as shown in Figure D-5.

NOTE **Refer to the manufacturer’s instructions and safety warnings when connecting power.**

Table D-1: Pad Jumper Settings

Jumper Location	Jumper Setting*	Function
LK6 (CPU)	Position 1 jumpered	Port 2 +12V power
LK3 (Daughter)	Position 3 jumpered	Port 3 +12V power
LK6 (Daughter)	Position 3 jumpered	Port 4 +12V power
LK14 (CPU)	Jumpered	Backup Battery Enabled
*Ports STP, X.25 and 5 do not have a power jumper setting.		

Table D-2: RS-232/485 Converter DIP Switch Settings

DIP Switch	SW1	SW2	SW3	SW4	SW5
Mode	Off	On	Off	Off	On

Table D-3: Wiring Connections from Controller Aux Port TB2 to RS-232/485 Converter

Converter Wiring Position	Controller Aux Port Tb2
T+	T+ (top)
T-	T-
R+	R+
R-	R- (bottom)

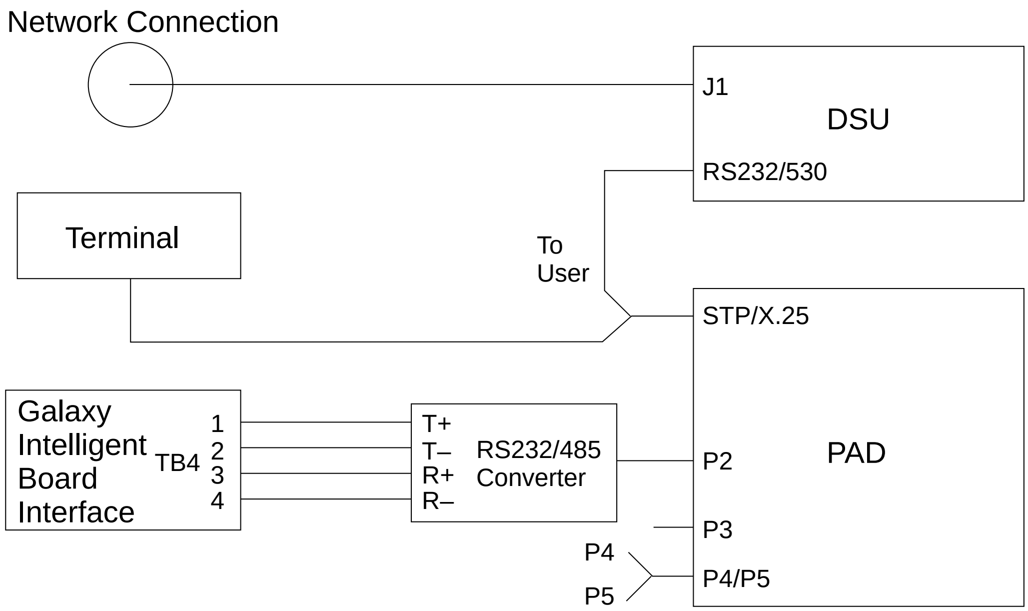


Figure D-1: Controller/X.25 Connection Block Diagram

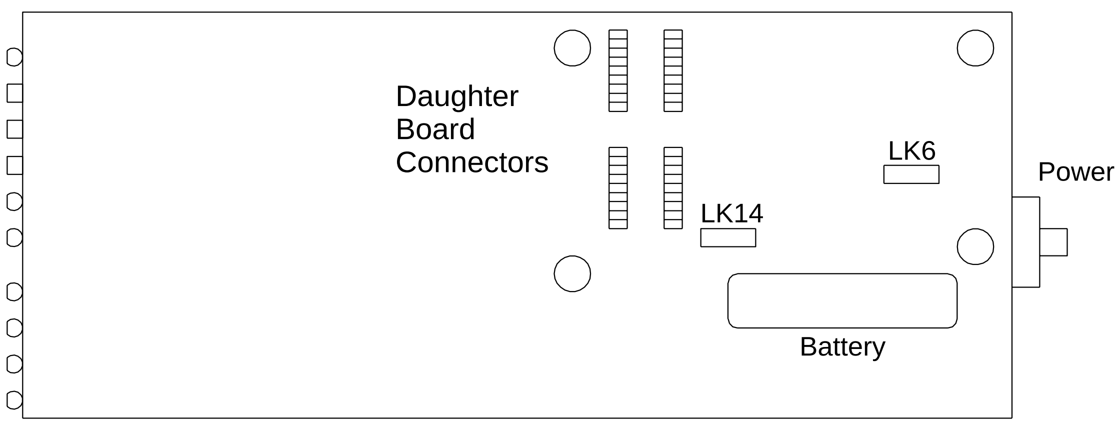


Figure D-2: PAD CPU Board

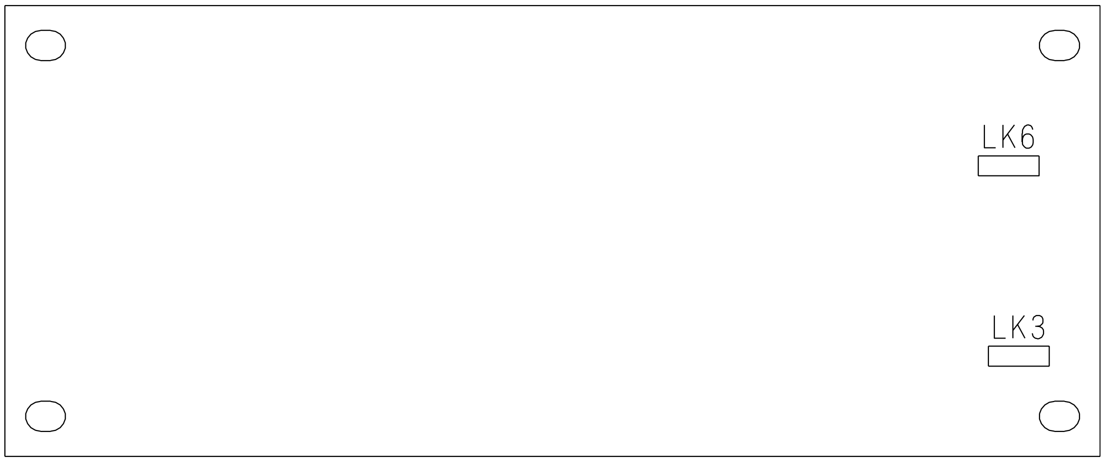


Figure D-3: PAD Daughter Board

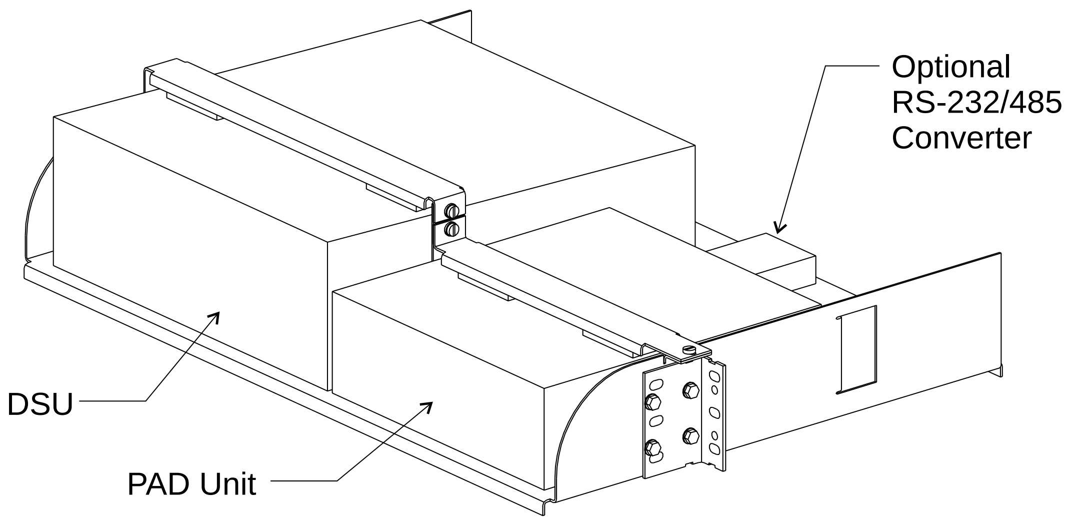


Figure D-4: PAD and DSU Mounting Shelf

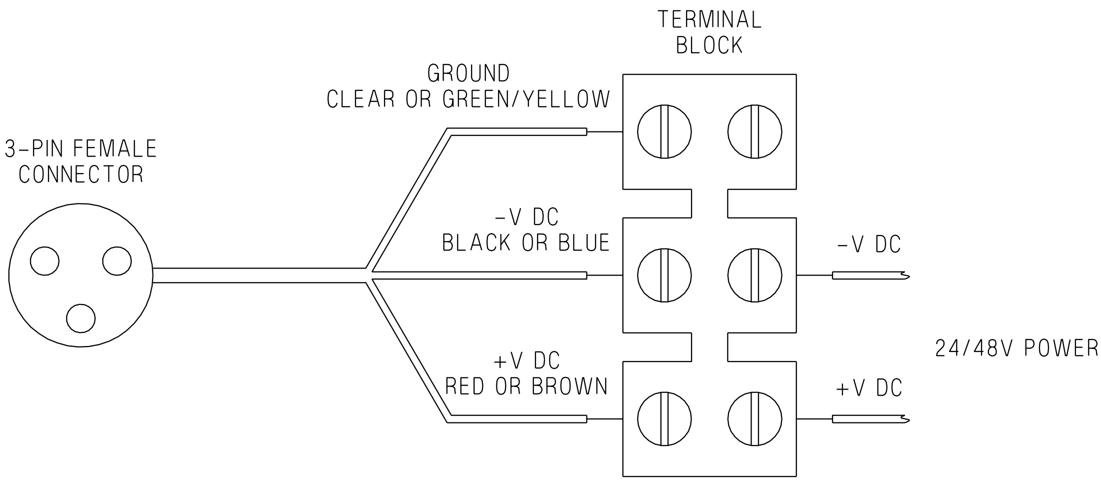


Figure D-5: PAD Power Cable Connection

PAD Setup

The PAD is set up by typing a set of commands on the setup terminal to define the logical connection. This setup is dependent upon the network administrator and the existing PAD port usage. The symbols in the setup will be used for site-dependent parameters.

Substitute <PN>, port number, for the port number of the RS-232/485 converter. Valid port numbers are 2, 3, 4, and 5 and 19 for the user setup port. The caret “^” character stands for the space character (depress space bar).

The symbol <RETURN> denotes that the Return or Enter key is pressed.

All commands and parameters are case insensitive.

The PAD should respond to all commands with the response “CMD ACCEPTED,” except the “SET” and “PROF” commands, which have no PAD response. PAD messages are described in Table D-4.

1. On the terminal connected to the setup port STP, enter ...<RETURN> (3 periods and a carriage return).

2. By default, the PAD requires a password for each command entered. Turn this option off by typing the Set

System command:
S^S^PA:XYXYXY^OP:N<RETURN>.

3. Define the controllercontroller as a DTE device on the local PAD channel number zero, by entering the Set Network Connection command:
S^N^C^CH:0^TE:Y<RETURN>.

4. To define the semicolon and less-than sign (ASCII 59 and 60) as TL1 command terminators, enter the Set Character Definitions command:
S^C^D^PO:<PN>^EN:059,060<RETURN>

5. Define the parity, speed, and number of data bits for the port by entering the Set Line Parameter command:
S^L^P^PO:<PN>^SP:<SPD>^PR:<PRT>^LE:<BTS>^ST:<STB><RETURN>

   Where:

   – <SPD> is the speed of the port in bps. Valid speeds are: 300, 600, 1200, 2400, 4800, **9600**.
   – <PRT> is the parity of the port. Valid parity options are: E=even; **N=none**; O=odd
   – <BTS> is the number bits per character for the port. Valid bit numbers are: 7, **8**.
   – <STB> is the number of stop bits for the port. Valid stop bit numbers are **1**, 2.

NOTE **These settings must match the controller software TL1 port settings. The preferred settings are speed: 9600, parity: none, data bits: 8, stop bits: 1.**

6. Define the X.3 port profile, as PAD profile D0 (D-ZERO), by entering the following commands:
S^A^P^PC:Y^PF:D0<RETURN>
PROF^A2<RETURN>
SET^6:0,3:128,2:0<RETURN>
S ^A^ P^PC:N^PF:A2<RETURN>
S^A^P^PO:<PN>^IF:D0^PF:D0<RETURN>

7. Continue with either the PVC or SVC port setup.

To display parameters set above, issue one or all of the following commands at any time:

D^S	Display System (Show required passwords)
D^A^A^PO:<PN>	Display Address Associations (Show SVC address)
D^N^C	Display Network Connection (Show DCE/DTE status of PAD)
D^L^P^PO:<PN>	Display Line Parameters (Show port communication characteristics)
D^C^D^PO:<PN>	Display Character Definitions (Show TL1 command termination characters)
D^A^P^PO:<PN>	Display Asynchronous Parameters (Show X.3 configuration for port)
D^U^C^PO:<PN>	Display User Configuration (Show PVC connection)
D^C^S^PO:<PN>	Display Connection Status

Table D-4: PAD Messages

PAD Message	Description
CMD ACCEPTED	Command was entered and executed without errors
CMD REJECTED	Command rejected. Probably caused by incomplete command.
COM	Call connected
ERR	Invalid command syntax, or missing or bad parameter.
ERR 014	Command rejected. Command requires password.
INV	Invalid X.28 PAD parameter.
INV CMD	Command entered does not exist.
INV PARAM VALUE	Parameter values have incorrect options set, are incorrect or out-of-range.
RESET DTE 000	PVC operational.
RESET DTE 017	PVC out of order. Check connection and DCE/DTE status of **ALL** devices.
RESET DTE 051	PVC out of order (timer expiry).

Table D-4: PAD Messages

PAD Message	Description
RESET DTE 073	Call contains invalid DTE address.
RESET DTE 113	SVC Cleared because X.25 connection down.
SERVICE:	PAD Service prompt (banner).

PVC Port Setup

The PVC must originate from the central computerized monitoring system, commonly called the Operating System (OS). The network administrator will provide a logical channel number, <LCN>, for the port. This number will be in the range 0 to 252.

1. Set up the PVC channel with the Set User Configuration command:

   S^U^C^PO:<PN>^PV:<LCN><RETURN>

2. Warm start the PAD, by entering the command:

   W^S<RETURN>

   The PVC port will wait until connection. The X.25 Link lights on the front panel of the PAD will illuminate upon connection with the OSs.

The setup terminal and the connecting DB-25 to DB-25 cable can now be removed if necessary.

SVC Port Setup

1. To convert the port from a PVC to a SVC, issue the Set User Configuration command:

   S^U^C^PO:<PN><RETURN>

   For a SVC connection, the network administrator will provide a network address, <NA>, which is a 2 to 15 digit number.

2. To name the SVC port, issue the Set Address Associations commands:

   S^A^A^PO:<PN>^AD: <NA>^CH:0<RETURN>
   W^S<RETURN>

The SVC port will now wait until connection. The X.25 Link lights on the front panel of the PAD will illuminate upon connection with the OSs.

The setup terminal and the connecting DB-25 to DB-25 cable can now be removed if necessary.

Debugging TL1

The TL1 interface does not report any messages until an Activate User command, making it extremely difficult to debug wiring or software setup problems. The testing techniques described below will test the interface from the OS to the PAD and from the PAD to the controller.

Debugging OS to PAD Connection

Testing the DSU

Verify that the speed of the connection matches the number displayed on the front panel of the DSU.

If the front panel displays the message “LINE”, then the wiring of the 8-pin network phone line is incorrect.

If the DSU error light is flashing, then there is a break in the data connection, or the DSU is malfunctioning.

For normal operation, the transmit and receive lights on the DSU should be flashing on and off in quick succession.

Debugging the PAD

For normal operation, the front panel transmit and receive lights for the X.25 connection should be continuously flashing, although at a different rate than the DSU.

Data transmitted and received by the controller should be seen momentarily on the front panel port lights.

1. Connect the terminal to the remaining end of the “To User” Y-cable, using a standard DB-25 cable.

2. On the terminal, reconnect to the PAD by typing: ...<RETURN>.

3. Warm start the PAD, by issuing the command w s<RETURN>.

4. Wait 5 seconds for the PAD to re-start, and reconnect to the PAD by typing: ...<RETURN>.

5. Have the OS issue another activate user command.

If the OS does not receive the controller's response:

6. Display the TL1 connection status, by typing the Display Networks Statistics command:
   D^N^S<RETURN>.

This is an example of the command output:

Statistics					
HDLC STATISTICS					
Chan	Status	DTR	RTS	DCD	CTS
0 1	UP-000 UP-000	UP UP	UP UP	UP-001 DN-001	UP-001 DN-001

Frame Statistics										
Chan	Status	Bad	Abort	Time	REJ	REJ	FRMR	FRMR	RNR	RNR
		CRC	IN	OUT	IN	OUT	IN	OUT	IN	OUT
0	UP-001	000	000	000	000	000	000	000	000	000
1	DN-000	000	000	000	000	000	000	000	000	000

Packet Statistics									
Chan	Status	RX Counters		TX Counters		Calls		Clears	
		Packets	Segments	Packets	Segments	In	Out	In	Out
0 1	UP-001 DN-000	00000016 00000000	00000016 00000000	00000234 00000000	00000315 00000000	00005 00000	00000 00000	00002 00000	00002 00000

BUFFER COUNT, TOTAL:0134 FREE:0105

If the HDLC Statistics channel 0 status is not UP, then there is an open connection somewhere between the DSU, PAD, RS-232/485 converter, and the controller. Check that the RS-232/485 converter is securely connected to the PAD.

If either the frame statistics, or packet statistics channel 0 status is not UP then there is something wrong in the setup with the OS or the PAD.

All channel 1 statuses should be ignored.

7. Issue the Display Connection Status for the port by issuing the command “D^S^C^PO:<PN><RETURN>”. The port should be connected.

Testing the RS-232/485 Converter to Controller

1. Disconnect the RS-232/485 converter from the PAD and set the converter’s DTE/DCE switch to DCE.
2. Connect a 120 volt ac, 12 Watt to 9 volt ac power supply in the side power connection of the converter. The PAD usually powers the converter.
3. Connect the RS-232/485 converter’s RS-232 connection to the terminal.
4. Configure the terminal to be in half-duplex mode, and the same terminal configuration as the TL1 port setup.
5. Issue an activate user command from the terminal. If the controller responds, then verify the PAD’s power jumper switch positions.
6. Otherwise, verify the controller’s TL1 BJH DIP switch setting SW203 position 1 (open), and RS-232/485 converter settings (open, closed, open, open, closed). Try another RS-232/485 converter or controller’s BJH circuit pack.

When testing is completed:

1. Reset the RS-232/485 converter DTE/DCE switch back to DTE.
2. Disconnect the AC adapter from the RS-232/485 converter.
3. Reconnect the RS-232/485 converter to the PAD.

4. To test the connection, have the OS transmit the activate user command.

5. If the message is not received, go to the “Test the OS to PAD” section.

Testing the OS to PAD

1. Disconnect the RS-232/485 converter from the PAD Port and connect the terminal and cable to the PAD port, where the RS-232/485 converter was plugged in. Messages can now be transmitted directly from the OS to the terminal and back.

   Note: use the semi-colon (;) as the command terminator (not carriage return).

   If messages are received, then check the setup for the PAD and the OS.

   If no messages are received, there is a possibility of a bad RS-232 port on the PAD.

2. Reconnect the terminal to the remaining end of the “To User” Y-cable, using a standard DB-25 cable.

3. On the terminal, reconnect to the PAD by typing: ...<RETURN>.

4. Cancel the PVC connection for the port by issuing the command: S^U^C^PO :<PN> <RETURN>.

5. Re-enter PAD setup commands using the new port number, including the PVC or SVC setup. Remember to warm start the PAD.

6. Now connect the terminal to the new PAD port. Messages can now be transmitted directly from the OS to the terminal and back, using the semi-colon command terminator.

7. Disconnect the terminal.

8. Reconnect the RS-232/485 converter to the pad to the new port.

9. Have the OS retransmit the activate user command.

General Operational Considerations

- If there are multiple devices connected to the PAD, each connection should have a unique PVC number assigned by the OS administrator.
- Activate user commands must be issued by the OS, every time the controller BJH circuit pack is reset.

TL1 Configuration

The TL1 interface is provided by the Intelligent Controller (BJH) board of the controller.

Auxiliary Port

To initiate TL1, configure the application attribute of the auxiliary port as TL1, and set handshaking for this port for software. (See Section 4 and Table 3-B for software and hardware configuration information.) Perform the configuration by sending the following commands through the local port:

cha au1,app=TL1
cha au1,hsh=sw

Any of the existing objects in the controller can be retrieved or reported via TL1. Any object that is to be enabled for TL1 must be added and then linked to a TL1 object. For example, if you want the Rectifier Fail Alarm (RFA1) to be reported to the Operations System (OS), send the following commands through the local port:

add RFA1,TL1
add TL1,TL001
lin RFA1 TL1, TL001

The first **add** command adds a TL1 link to the Rectifier Fail Alarm object. The second **add** command adds a TL1 object, TL001, to the system and the **lin** command links the RFA alarm to the TL001. The system supports up to 256 TL1 objects.

You must configure the attributes of every TL1 object added. For example, to configure the attributes of the TL001 object created earlier, send the following commands through the local port:

cha TL001, aid = “RECT FAIL”
cha TL001, cnd = “standard alarm”
cha TL001, saf = 1
cha TL001, rpt = “equipment”

See Appendix B for a list of objects and attributes. See the sections below for an explanation of using these elements in the TL1 command syntax.

Backup or Restore

If you wish to backup or restore the controller configuration via TL1, enable the Write Enable attribute of the auxiliary port using either hardware or software. For hardware enable, set the hardware DIP switch (SW203), position 5, to 1. For software enable, send the following command through the local port:

cha au1, wre = 1

Command Format

The format of an input command from OS to controller is a command word followed by a variable number of fields of command-specific information separated by colons. The command is terminated by a semicolon. A typical command format is given below:

Command: TID: AID: CTAG: GB: PB;

Command

This term designates the command string.

TID (Target Identification)

This term identifies a particular NE. For the controller, the first fifteen characters of the System Description is used as TID for communicating with OSs.

AID (Access Identification)

The access code contains the information needed to access or address entities within the target NE (the controller in this case). For each TL1 channel, this is a configurable parameter. For example, if a particular TL1 channel is linked to Rectifier 1 in a -48 volt battery plant, the AID, as recommended by Bellcore's document TA-NWT-001360, *Generic Requirements For Power Systems Messages At The OS/NE Interface,* is "N48B1RECT1" for that particular TL1 channel.

CTAG (Correlation Tag)

The CTAG is a message identifier, assigned and sent by the OS with each command, which correlates an input command with its associated output response. The controller automatically copies this value into the appropriate field of its output response to the associated input command.

GB (General Block) and PB (Parameter Block)

These terms include additional information in the command or output response.

Condition Type

For each alarm, this string (20 characters) tells the OS the type of alarm condition. For example, a battery on discharge alarm could be "DC PLANT LOW VOLTAGE." For each TL1 channel, the user must configure the condition type for the alarm.

Service Affecting

For each alarm, the user must specify whether the alarm condition is service-affecting or not.

Setup Procedure for the Controller to Communicate Messages With Operating Systems

Physical Setup: The controller TL1 port is a RS-232 port supporting from 300 to 9600 bps communications. Find out the required type of communications with your data network. The controller can be set up to interface with the data network to communicate with OSs in any of the following ways:

- Direct RS-485 interface. Use the supplied RS-485 to RS-232 converters.
- Direct RS-232 interface.
- X.25 interface. Connect to the external Packet Assembler Disassembler (PAD).

Refer to Section 3 for installation setup details.

Link Setup: Make sure a communications link is established between the controller and OS. If you are using an external PAD, refer to its documentation for installation details.

Configuration: Each alarm or equipment which must be reported to OS via TL1 messages must be linked to one of the TL1 channels, using T1.317 or EasyView interface to controller. This may be done either via the local RS-232 port using a terminal or via the dial-up modem port. Refer to Section 5.

Login by OS: The OS should login to the controller using the “ACTIVATE USER” TL1 command. After successful login by OS, the controller is ready to respond to other TL1 commands and send autonomous TL1 messages to OS.

TL1 Commands Supported by the Galaxy SCF Controller

Supported Commands:

Activate User

Cancel User

Retrieve Header

Retrieve Alarm

Retrieve Equipment

Report Alarm

Retrieve Alarm Environment

Set Alarm Cut-off

Operate Alarm Cut-off

Backup Configuration

Restore Configuration

Report Alarm Environment

Report Removal

Report Restoration

Read Memory

Write Memory

Details of Supported Commands:

TL1 specifications spell out the spacing and syntax of TL1 responses. To specifically show TL1 format in this text, the following conventions will be used:

cr	Carriage return
lf	Line feed
^	Space<R>
;	Enters commands

Response Header:

The response header is attached to the beginning of all messages sent by the controller.

cr lf lf
^^^source id^yy-mm-dd^hh:mm:ss cr lf

Where:

source id system id (15 characters) of the controller as displayed
in system header.

General Error responses:

The format of the error response is:

response header
M^^CTAG^DENY cr lf
^^^error code cr lf;

Where:

CTAG Number specified in the incoming request

Error Codes:

ICNV	Input command not valid
IICT	Input illegal correlation tag
IISP	Input illegal syntax or punctuation
ENRI	Not configured to retrieve specified information
IIAC	Input invalid access identifier
PICC	Privilege, illegal command code
SROF	Status, requested operation failed

Activate User

Before activating user, configure the auxiliary port for TL1 application. See "Auxiliary Port" on page 1 of this Appendix.

The controller accepts the following command to activate a session (i.e., login to the system):

ACT-USER::uid:CTAG::passwd;

Where:

uid	User identifier, having the hardcoded value of "user"
passwd	Password, an ASCII string of up to 10 alphanumeric characters as specified by the user on screen

The following message is sent in response to a successful login attempt:

response header
M^^CTAG^COMPLD cr lf

NOTES

- When establishing the connection, this command should be preceded by leading semi-colons to flush the input buffer from unwanted characters. The command issued will look like:

  ;;ACT-USER::uid:CTAG::passwd;

- There is no response for unsuccessful login attempts.

The controller does not transmit any messages until a user successfully logs into the system.

Cancel User

The controller accepts the following command to terminate a user session on the system (i.e., logout):

CANC-USER::uid:CTAG;

Where:

uid user identifier, having the hardcodeed value of “user”

The controller generates the following response upon receipt of a valid cancel user command:

response header
M^^CTAG^COMPLD cr lf;

Retrieve Header

The controller supports the retrieve header request with the following syntax:

RTRV-HDR:::CTAG;

The controller generates the following response:

response header
M^^CTAG^COMPLD cr lf;

Retrieve Alarm

Request for alarm information from all AIDs for channels that are configured as Equipment for TL1 reporting

RTRV-ALM-ALL::ALL:CTAG;

Request for alarm information from a specific AID for channel that is configured as Equipment for TL1 reporting

RTRV-ALM-EQPT::AID:CTAG;

The controller generates the following responses:

Response with no active alarms

response header
M^^CTAG^COMPLD cr lf;

Response with active alarms

response header
M^^CTAG^COMPLD cr lf
^^^"AID,EQPT:alarm level,condtype,service affecting,,,:\"
conddesc\"," cr lf
...
^^^"AID,EQPT:alarm level,condtype,service affecting,,,\"
conddesc\"," cr lf;

Where:

CTAG	Command identification number specified in request
AID	As specified by user via configuration screen
Alarm level	CR | MJ | MN (Critical [CR], Major [MJ] or Minor [MN]
Condtype	Text specified by user via configuration screen
Service affecting	SA | NSA (Service Affecting or Non-Service Affecting) as specified by user via configuration screen
Condesc	Description of the alarm object

The controller generates the following error response for requests made for an AID not present in the system:

response header
M^^CTAG^DENY cr lf
^^^IIAC
cr lf;

Retrieve Equipment

The controller accepts the following query for object configuration information:

RTRV-EQPT::AID:CTAG;

The response is in the following format:

response header
M^^CTAG^COMPLD cr lf
...
\"keyword=value,...keyword=value" cr lf;

Where:

Keyword	The attribute name for a particular object
Value	The value of the attribute

Refer to Appendix B for a list of attributes for each object type.

The controller generates the following error response for requests made for an AID not present in the system, or for channels with matching AIDs that are not enabled for TL1 reporting by the user's configuration:

response header
M^^CTAG^DENY cr lf
^^^IIAC
cr lf;

Report Alarm

The controller automatically sends the following message to report the occurrence or retirement of alarms on objects configured as Equipment for TL1 reporting:

response header
alarm code^atag^REPT^ALM^EQPT cr lf
^^^"AID:alarm level,condtype,service affecting,,,,\"
conddesc\"," cr lf
...
^^^"AID:alarm level,condtype,service affecting,,,,\"
conddesc\"," cr lf;Alarm codes:

*C	Critical
**	Major
*^	Minor

A^	Automatic (i.e., all alarm levels in report are CL [clear])
ATAG	Integer value (sequence number of autonomous command generated by controller)
AID	As specified by user via object configuration
Alarm level	CR | MJ | MN | CL (Critical [CR], Major [MJ], Minor [MN], or Clear [CL])
Condtype	As specified by user via object configuration
Service affecting	SA | NSA (Service Affecting [SA] or Non-Service Affecting [NSA]) as specified by user via object configuration
Conddesc	Object description

Retrieve Alarm Environment

Request for environmental alarm information from all AIDs for objects that are configured as Environment for TL1 reporting

RTRV-ALM-ENV::ALL:CTAG;

Request for environmental alarm information from a specific AID for channel that is configured as Environment for TL1 reporting

RTRV-ALM-ENV::AID:CTAG;

The controller generates the following responses:

Response with no active alarms

response header
M^^CTAG^COMPLD cr lf;

Response with active alarms

*r*esponse header
M^^CTAG^COMPLD cr lf
^^^"AID:alarm level, condtype,,,\"conddesc\" " cr lf
...
^^^"AID:alarm level, condtype,,,\"conddesc\" " cr lf;

Set Alarm Cut-off

The controller sets the alarm cut-off mode if the following command is issued:

SET-ACO-EQPT::AID:CTAG::ACOMODE;

Where:

ACOMODE represents the mode of ACO operation that is to be performed by the controller. Valid ACOMODE values are:

MAN: ACO is introduced by Operate Alarm Cut-off command or by manual operation (front panel) at the controller.

DELD: ACO is introduced automatically at the controller, but

is delayed for approximately 5 seconds to allow a brief audible announcement of the trouble.

IMED: ACO is introduced automatically and immediately at the controller.

AID in the command should be specified as ALL since all alarms having specified severity in ACO object configuration will be affected. Refer to Appendix B for attributes of ACO1 object.

The controller generates the following response:

response header
M^^CTAG^COMPLD cr lf;

Operate Alarm Cut-off

Request for introducing ACO automatically and immediately at the controller.

OPR-ACO-ALL::AID:CTAG;

AID in the command should be specified as ALL since all alarms having specified severity in ACO object configuration will be affected.

The controller generates the following response:

response header
M^^CTAG^COMPLD cr lf;

Backup Configuration

This command allows the Alarm Center to store all of controller's configuration in an ASCII format. Before using this feature, make sure that the Alarm Center is prepared to receive data. The TL1 input format for the backup command is:

RD-MEM-FILE::,AID>:<CTAG>;

If backup and restore are disabled through the auxiliary port, the controller will respond with a privilege error:

M^^ctag^DENY cr lf
^^^PICC cr lf;

In this case, see "Backup or Restore" in this Appendix.

If backup is permitted, the controller will respond with the following information:

IP<CTAG><cr><lf><
<configuration data>

This response indicates that the controller is In Process (IP) of executing the command and it is followed by the configuration data. The Alarm Center needs to store all the incoming data in a file. When the backup is completed successfully, the controller sends a normal response:

response header
M^^^ctag^CMPLD cr lf;

If the backup was not completed successfully, the controller sends an error response:

M^^ctag^DENY cr lf
^^^SROF cr cr lf;

Where:

SROF means Status, Requested Operation Failed.

Restore Configuration

This command allows the user to restore the backed up configuration of the controller. The input format for this command is as follows:

WRT-MEM-FILE::<AID>:<CTAG>;

If restore is permitted, the controller responds with:

IP <CTAG><cr><lf><

At this point, the Alarm Center begins transferring the backup file to the controller. When the restore is completed successfully, the controller sends a normal response:

response header
M^^ctag^COMPLD cr lf;

If the restore is unsuccessful, the controller sends an error response:

M^^ctag^DENY cr lf
^^^SROF cr lf;

If backup and restore are disabled through the auxiliary port, the controller will respond with a privilege error:

M^^ctag^DENY cr lf
^^^PICC cr lf;

In this case, see “Backup or Restore” in this Appendix.

Report Alarm Environment

The controller automatically sends the following message to report the occurrence or retirement of alarms on objects configured as Environment for TL1 reporting:

response header
alarm code^atag^REPT^ALM^ENV cr lf
^^^"AID:alarm level, condtype,,,\"conddesc\"" cr lf
...
^^^"AID:alarm level, condtype,,,\"conddesc\"" cr lf;

Report Removal

The controller automatically sends the following message to report the removal of equipment on objects configured as Equipment Presence for TL1 reporting:

response header
A^^atag^REPT^RMV^EQPT cr lf
^^^"AID" cr lf
...
^^^"AID" cr lf;

If the alarm state of the object is true, it will be reported as equipment removed.

Report Restoration

The controller automatically sends the following message to report the restoration of equipment on datalogger channels configured as Equipment Presence for TL1 reporting:

response header
A^^atag^REPT^RST^EQPT cr lf
^^^"AID" cr lf
...
^^^"AID" cr lf;

Bellcore Reference Documents

The following Bellcore documents give the details of the communication architecture between network elements and the OS centers:

- TR-TSY-000827 Operations Technology Generic Requirements (OTGR): Generic Operations Interfaces - Non-OSI Communications Architecture
- TR-TSY-000828 Operations Technology Generic Requirements (OTGR): Generic Operations Interfaces - OSI Communications Architecture

The message format and other details about TL1 are available in the following Bellcore documents:

- TR-TSY-000831 Operations Technology Generic Requirements (OTGR): Operations Application Messages - Language for Operations Application Messages
- GR-833-CORE Operations Technology Generic Requirements (OTGR): Network Maintenance: Network Element and Transport Surveillance Messages
- TR-NWT-000835 Operations Technology Generic Requirements (OTGR): Operations Application Messages - Network Element and Network System Security Administration Messages

Appendix E Terminal Menu Interface

Login

A user can enter the text-based terminal menu interface on the local, auxiliary, or modem port by first logging in to the T1.317 interface. For the local and auxiliary ports the application attribute (APP) must be set to terminal, which is the default setting. When the controller detects activity on a T1.317 port, the following prompt is sent to that port:

ENTER PASSWORD:

Enter the use password. If the password is incorrect the system will send the following messages and wait for a new password:

INVALID PASSWORD

ENTER PASSWORD:

The user is allowed six attempts to enter a correct password. If the password is correct then the user is given access to the system with the permission associated with the entered password.

Once logged in to the T1.317 interface, you access the terminal menu interface by entering TERMINAL at the T1.317 prompt. A numbered list of available commands is displayed. Typing the number of any command will display either the corresponding system status, or a sub-menu of related items. Following are the available menus.

Menus

```
   01/01/2001  01:36PM  0 Alarms  0 Warnings  -52.08V  128A
Main Menu
 0 Bye                  Logoff
 1 Plant Status         Voltage, current, and operation mode
 2 Alarms               Active alarms
 3 Warnings             Active warnings
 4 Alarm History        Alarm history
 5 Statistics           Basic and busy hour statistics          (to Statistics Menu)
 6 Rectifier Status     Rectifier status and output current     (to Rectifier Status)
 7 RPM Channels         Monitoring module information           (to Remote Peripheral Monitors Menu)
 8 Contactor Status     Contactor status
 9 Notepad              User notepad

Main Menu>
```

Main Menu

```
   01/01/2001  01:36PM  0 Alarms  0 Warnings  -52.08V  128A
Statistics
 0 Main Menu      Main Menu
 1 Plant Current  Basic statistics for DC current
 2 Busy Hour      Busy hour for maximum hourly average load current

Statistics>
```

Statistics Menu

```
   01/01/2001  01:36PM  0 Alarms  0 Warnings  -52.08V  128A
Rectifiers
 0 Main Menu      Main Menu
 1-64             Enter a rectifier number for detailed information
 65               Summary of all rectifiers

Rectifiers>
```

Rectifiers Menu

Menus, continued

```
   01/01/2001  01:36PM  0 Alarms  0 Warnings  -52.08V  128A
Remote Peripheral Monitors
 0 Main Menu                Logoff
 1 Shunt Channels           Basic statistics for DC current
 2 Voltage Channels         Busy hour for maximum hourly average load current
 3 Temperature Channels
 4 Binary Channels
 5 Relay Output Channels

Remote Peripheral Monitors>
```

Remote Peripheral Monitors Menu

Appendix F Spare Parts

The following table lists the spare parts available for the Galaxy SCF Controller Model J85501F-1.

Table F-1: Spare Parts

Ordering Comcode	Description	Associated List
107199374	Display board (CP BJG)	L-2
107748444	Alarm board (CP BJE2)	L-2
107583072	Front access interface board (CPBLG1)	L-2
847367661	LCD module	L-2
107561284	Rectifier interface board (CP BJC3)	L-23
107172355	Basic control board (CP BJB)	L-2
107172348	Basic controller power board 48V (CP BJA1)	L-14
107284473	Basic controller power board 24V (CP BJA2)	L-15
107381915	Intelligent control board (CP BJH)	L-FB or L-FD
107243834	Intelligent controller power board 48V (CP BJJ1)	L-FA or L-FB
107284481	Intelligent controller power board 24V (CP BJJ2)	L-FC or L-FD
107284499	Modem board (CP BJL2)	L-FE
107243867	Peripheral monitor board (CP BJM1)	L-FG
107243842	Data switch board (CP BJK1)	L-FH
Ordering Comcode	**Description**	**Associated List**

Table F-1: Spare Parts (Continued)		
847473774	EasyView software package	L-FA through L-FD
107934499	Galaxy SCF Controller product manual 167-792-110	L-2
107570517	Remote Peripheral Monitoring product manual 167-790-063	L-FG
406530725	1-1/3A fuse (GMT)	L-2
406204230	3A fuse (GMT)	L-2
406203976	5A fuse (GMT)	L-2
406526079	Battery BR2032 for CP BJH	L-FA through L-FD
847526688	Terminating resistor	L-FG
406712968	Inductor bead	L-FG
847074507	48V PAD (Packet Assembler/Disassembler) kit	L-FB
847074515	24V PAD (Packet Assembler/Disassembler) kit	L-FD
847074531	DSU (Digital Service Unit) kit	L-FB or L-FD
847074549	Shelf kit (holds one DSU and PAD)	L-FB or L-FD
406918425	RS485/232 converter	L-FB or L-FD

Appendix G *Glossary*

The following definitions apply to terms used throughout this manual:

Alarm Severity

The severity of any alarm or event can be configured as “critical,” “major,” “minor,” “warning,” or “record only.”

Critical Alarms are used to indicate that a severe, service-affecting condition has occurred and that immediate corrective action is imperative, regardless of time of day or day of the week. (See Bellcore TR-TSY-000474.)

Major Alarms are used for hardware or software conditions that indicate a serious disruption of service or the malfunction or failure of important circuits. These conditions require the immediate attention and response of the technician to restore or maintain system capability. The urgency is less than in critical situations because of a lesser immediate or impending effect on service or system performance. (See Bellcore TR-TSY-000474.)

Minor Alarms are used for troubles that do not have a serious effect on service to the customers or for troubles in circuits that are not essential to operation. (See Bellcore TR-TSY-000474.)

Warnings are used to indicate an incomplete or inconsistent configuration in the controller. The configuration problem may disable any associated controller feature. Any measurements associated with the warning are not valid while the warning is present.

Record Only Events are used to designate non-service affecting conditions that are placed in the alarm logs. Any form of alarm notification (e.g., dial-out, alarm contact relays, LEDs, TL1 notification) may also be configured for the event.

There are two meanings for "**service affecting**." One is that the failure affects a service that was being provided when the failure occurred. The other is that the failure will affect the ability of the network to provide service. A failure can be service affecting according to one or both definitions. (See Bellcore TR-TSY-000474.)

Plant Voltage

Float voltage is the continuous, long-term constant voltage of the plant that maintains battery cells in a fully charged condition. Refer to the battery product manual for the battery cell float voltage level. The float voltage level is set by the rectifier float voltage set point. The controller refers to this output level as the **float mode**.

Boost mode is the rapid recharge of all the battery strings. The boost voltage set point is typically 0.15 volts per 2 volt cell higher than the float voltage set point. For 48 volt plants, the boost voltage set point is 3.6 volts higher than the float set point. For 24 volt plants, the boost voltage set point is 1.8 volts higher than the float set point. Some rectifiers refer to this form of recharge as equalize. This form of recharge is usually done on non-valve regulated lead acid batteries. Refer to the battery product manual for the recommended boost voltage set point.

NOTE **The load must support the boost voltage set point.**

Battery Thermal Protection Mode (BTP) may be used to prevent thermal run away on valve regulated lead acid batteries. For 48 volt plants, the BTP voltage set point is typically 2 volts less than the float voltage setting. For 24 volt plants, the BTP voltage set point is typically 1 volt less than the float voltage setting.

The Galaxy SCF Controller supports two plant modes, float and either BTP or boost mode. While in boost or BTP mode, the energy management algorithm is temporarily disabled.

In all modes, the plant voltage is monitored for trouble indications. The following alarms and event conditions are associated with the plant voltage "Very Low Voltage," "Battery on Discharge," "High Float Voltage," "High Voltage Shutdown," and "Rectifier On Threshold".

Battery on Discharge

If rectifier output is insufficient to supply the load current for any reason (such as an ac power failure), the battery reserve will provide the necessary current. Such a battery discharge can be detected by a drop in the plant bus voltage. Whenever the plant voltage drops below a pre-selected threshold, the controller issues a Battery on Discharge alarm (BD). This alarm threshold is typically set to indicate the onset of battery discharge in order to allow enough time for maintenance personnel to respond before battery reserve is exhausted. When a BD alarm occurs, service is not usually affected immediately. However, since attention is required in a limited time, BD is considered a Power Major alarm, by default.

It should be noted here that a BD alarm does not necessarily indicate that rectifier output current has been lost or reduced. A BD alarm can be caused by misadjusted rectifier output voltage during otherwise normal operation. It can also be caused by current overload on normally functioning rectifiers.

A BD alarm will turn on all rectifiers turned off by the energy management algorithm, as well as rectifiers temporarily held off after loss of one phase of the ac.

Since the plant voltage is different in float and boost or BTP modes, there are two thresholds for BD: one user configurable threshold for float mode and one user configurable threshold for boost or BTP mode. The BD threshold for each mode is typically at least 1 volt below the plant voltage set point for nominal 48 volt plants, or 0.5 volts below the plant voltage set point for 24 volt plants. This threshold should be adjusted to avoid nuisance alarms due to component tolerances, variations in load, and other transient conditions.

In plants that have Slope Thermal Compensation enabled, special attention must be paid to the setting to avoid nuisance alarms. STC decreases the plant voltage at maximum 0.1 volts for each cell in the battery string. The BD setting should be below the maximum the plant voltage will decrease to. For example, in a 48V plant with 24 cells the maximum change will be (0.1 x 24) = 2.4 volts. Subtracting 2.4 from the nominal plant voltage of 54.50 volts = 52.1V. The BD level should be set below 52.1 volts.

Very Low Voltage

If the battery reserve has almost ended, and the plant voltage has dropped to a point where the equipment will soon cease to operate or be damaged, the controller will create the very low voltage alarm (VLV) to warn of the impending equipment loss. Some form of corrective action is imperative.

VLV is considered a Power Critical alarm, by default.

The VLV alarm threshold setting should be near the end of the battery discharge, where operator intervention or notification is required. Refer to the equipment and battery product manuals for an appropriate threshold.

Coup de Fouet

The initial portion of the battery discharge is known as the Coup de Fouet, or “the whip.” During the Coup de Fouet the plant voltage rapidly decreases several volts and then slowly rises. The depth of the dip in plant voltage is dependent upon the rate of discharge, the number of hours of battery reserve, the battery type, and battery health. Refer to the battery product manual for information on the lowest voltage during the Coup de Fouet.

The controller recognizes the Coup de Fouet event based on the start of the Battery on Discharge (BD) alarm.

Rectifier On Threshold

The Rectifier on Threshold is a secondary threshold below the Battery on Discharge (BD) threshold that turns on all remaining rectifiers in the Standby mode. This includes rectifiers that are turned off by the operator, engine sequencing, or external TR signals.

The rectifier on threshold does not turn on rectifiers immediately after the Battery on Discharge Alarm begins because of the Coup de Fouet or dip in plant voltage. The Coup de Fouet duration is user programmable and is called the Rectifier On Delay.

The rectifier on threshold should be at or below the BD alarm threshold and at or above the VLV alarm threshold. Refer to the battery product manual for information on the rectifier on threshold and Coup de Fouet duration.

Adjustable Selective High Voltage Shutdown

The controller is equipped to detect a high voltage condition on the plant bus. Such a high voltage condition is typically caused by lightning-induced transients on the commercial ac power lines. A rectifier failure might, however, cause an individual rectifier to increase its output voltage.

To prevent high voltage from damaging the connected telecommunications load, the controller will shut down rectifiers that deliver high voltage power.

When the controller detects an increase in the plant voltage above a preset threshold, it immediately issues an HV alarm to the external alarm system. HV is considered a Power Major alarm, by default.

Simultaneously with reporting the alarm, the controller sends a shutdown signal to all rectifiers. In addition, boost or BTP mode is terminated and the plant is automatically placed in float mode. Since the output of all rectifiers are paralleled in the plant, their output voltages are forced to be the same. In a high voltage condition it is important to discriminate between an individual rectifier failure and a lightning-induced transient that would affect all rectifiers in the plant. In the case of an individual failure the other working rectifiers in the plant should not be shut down. When the faulty rectifier(s) shut down the plant voltage drops to normal and the HV alarm retires.

The high voltage shutdown thresholds for float and boost mode should typically be set 1.5 volts above the plant voltage set point for 48 volt plants and 0.75 volts above the plant voltage set point for 24 volt plants.

In plants that have the RAISE VOLT feature of the Slope Thermal Compensation enabled, special attention must be paid to the setting to avoid nuisance alarms. STC increases the plant voltage at maximum 0.1 volts for each cell in the battery string. The HFV setting should be above the maximum the plant voltage will increase to. For example, in a 48V plant with 24 cells the maximum change will be (0.1 x 24) = 2.4 volts. Adding 2.4 to the nominal plant voltage of 54.50 volts = 56.9 V. The HFV level should be set above 56.9 volts and also above the HFV level.

High Float Voltage

The controller is equipped to detect a higher than normal voltage condition on the plant bus. The source of the alarm is probably due to an adjustment in the plant rather than to a failure. This alarm permits the high voltage shutdown level to be raised slightly, reducing the number of nuisance shutdowns without decreasing plant reliability.

By default, the high float voltage alarm (HFV) is considered a Power Minor alarm.

The high float voltage thresholds are typically set 1.0 volts above the plant voltage set point for 48 volt plants and 0.5 volts above the plant voltage set point for 24 volt plants.

In plants that have the RAISE VOLT feature of the Slope Thermal Compensation enabled, special attention must be paid to the setting to avoid nuisance alarms. STC increases the plant voltage at maximum 0.1 volts for each cell in the battery string. The HFV setting should be above the maximum the plant voltage will increase to. For example, in a 48V plant with 24 cells the maximum change will be (0.1 x 24) = 2.4 volts. Adding 2.4 to the nominal plant voltage of 54.50 volts = 56.9 V. The HFV level should be set above 56.9 volts.