



**PRELIMINARY**

# *Galaxy Manager*

User's Guide  
Select Code 193-104-107  
Comcode 108988201  
Issue 4.3 Preliminary  
January 2004



*User's Guide*  
*Select Code 193-104-107*  
*Comcode 108988201*  
*Issue 4.3 Preliminary*  
*January 2004*

## *Galaxy Manager*

**Notice:**

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



# **Table of Contents**

## **1 Overview / Introduction**

<i>Customer Service Contacts</i>	1 - 2
<i>Customer Service, Technical Support,     Product Repair and Return, and Warranty Service</i>	1 - 2
<i>Customer Training</i>	1 - 2
<i>On-Line Power Systems Product Manuals</i>	1 - 2
<i>EasyView and Gateway Software</i>	1 - 2

## **2 Specifications**

## **3 User Screens**

<i>Intro Page</i>	3 - 1
<i>System Overview</i>	3 - 3
<i>Site Symbols</i>	3 - 3
<i>Managed Site Quick Links</i>	3 - 4
<i>Alarm Button</i>	3 - 5
<i>Screen Links</i>	3 - 5
<i>Site List Screen Link</i>	3 - 6
<i>System Information Page</i>	3 - 6
<i>Office Record</i>	3 - 7
<i>Reserve &amp; Recharge Time</i>	3 - 7
<i>Trending</i>	3 - 8
<i>Gateway</i>	3 - 9
<i>Alarms</i>	3 - 9
<i>System Reports</i>	3 - 10
<i>Overview of All Sites</i>	3 - 10
<i>Canned Report - Capacity report</i>	3 - 11
<i>Generic Data Viewer</i>	3 - 12
<i>Active Alarms</i>	3 - 13
<i>Acknowledging Alarms</i>	3 - 13
<i>Alarm History</i>	3 - 15
<i>Print, Pie, and Bar</i>	3 - 15
<i>Engineering Tools</i>	3 - 16
<i>Reserve &amp; Recharge Time Calculator</i>	3 - 16
<i>Office Temperature</i>	3 - 17
<i>End Cell Voltage</i>	3 - 17
<i>Plant Load</i>	3 - 17

<i>Rectifier Capacity</i>	<i>3 - 17</i>
<i>Battery Strings</i>	<i>3 - 17</i>
<i>Hours of Reserve</i>	<i>3 - 17</i>
<i>Total Effective Reserve AH</i>	<i>3 - 17</i>
<i>Hours to 95% Recharge</i>	<i>3 - 18</i>
<i>Rectifier Recharge Factor</i>	<i>3 - 18</i>
<i>Cable Sizing Calculator</i>	<i>3 - 18</i>
<i>Lineage Power Website</i>	<i>3 - 20</i>
<i>Help</i>	<i>3 - 20</i>

## *List of Figures*

<i>Figure 2-1: Gateway Networking Diagram</i>	<i>2 - 2</i>
<i>Figure 3-1: Gateway Manager Home Page</i>	<i>3 - 1</i>
<i>Figure 3-2: System Overview Screen</i>	<i>3 - 3</i>
<i>Figure 3-3: "Drilled Down" Lower Level Map</i>	<i>3 - 4</i>
<i>Figure 3-4: Gateway Manager Screen Links</i>	<i>3 - 5</i>
<i>Figure 3-5: Concord System Data</i>	<i>3 - 6</i>
<i>Figure 3-6: Galaxy Manager Trend Data</i>	<i>3 - 8</i>
<i>Figure 3-7: Galaxy Gateway Login from the Live Data Link</i>	<i>3 - 9</i>
<i>Figure 3-8: System Reports</i>	<i>3 - 10</i>
<i>Figure 3-9: Canned Report - Data Spreadsheet</i>	<i>3 - 10</i>
<i>Figure 3-10: Canned Report - Capacity Report</i>	<i>3 - 11</i>
<i>Figure 3-11: System Reports - Generic Data Viewer</i>	<i>3 - 12</i>
<i>Figure 3-12: Active Alarms</i>	<i>3 - 13</i>
<i>Figure 3-13: Acknowledge Alarms Screen</i>	<i>3 - 14</i>
<i>Figure 3-14: Alarm History Viewer</i>	<i>3 - 15</i>
<i>Figure 3-15: Battery Reserve Calculator</i>	<i>3 - 16</i>
<i>Figure 3-16: Cable Sizing Calculator, Centralized Architecture</i>	<i>3 - 19</i>
<i>Figure 3-17: Cable Sizing Calculator, Distributed Architecture</i>	<i>3 - 20</i>



# 1 *Overview / Introduction*

Galaxy Manager enables the secure and timely management of geographically distributed power systems. Its graphical interface gives the user an intuitive view of the status of all sites and their systems on geographic maps. Continuously recorded site data as well as the system configuration are maintained in a relational database. Users can drill down through the maps or site listings to view specific equipment readings, print various reports, and interact with various graphical charts. At all times, the server is continuously monitoring for alarm conditions and status changes across the sites being managed. All collected data and monitored sites are also remotely accessible through the network from the Galaxy Manager, permitting password protected configuration changes and upgrades.

Alarm data for sites being monitored can be viewed from geographic regional maps, through a live alarm viewer. Past site alarms are also available in a history log. Several power management utility tools are provided, including a system cable sizing tool and a battery reserve/recharge time calculator that uses the data from a specific site and provides data for "what if" scenarios. Direct links to Lineage Power internet pages are also provided to permit easy access to product data sheets, manuals, and ordering guides. (External sites will not be accessible if the system is not connected to the Internet).

Galaxy Manager is furnished by Lineage Power as a complete hardware and software package, requiring only a 10Base-T (RJ-45) physical connection to the user's LAN/WAN intranet network. To be monitored by Galaxy Manager, equipment must be accessible on this intranet through one of the following:

- a Galaxy Gateway monitoring and control system
- a Galaxy Manager Portal
- another Galaxy Manager compatible data gathering unit.

This manual introduces Galaxy Manager and the views and controls it offers. Help and guidance with specific issues may be requested via an email to Lineage Power at [galaxy.manager@lineagepower.com](mailto:galaxy.manager@lineagepower.com). Please be sure to include your return email address so that we may respond.

Your suggestions and questions are welcomed so that we may continue to improve the product.

**Recommended server configuration:**

Main processor and processor speed: Intel-based CPU, 2 GHz  
Memory: 256 MB  
Number of hard drives / size: One 40 GB  
Operating system: Windows 2000 Professional or Server; Fedora Linux  
CD-ROM: CD-RW  
Network Card: 10/100 Mbs network interface card

**Client requirements:**

Microsoft Internet Explorer 6.0 or later  
Intranet connectivity  
Display: 1024 x 768 VGA (Recommended: 1280 x 1024)  
Optional: Sound card and speaker

## ***Customer Service Contacts***

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

For customers in the United States, Canada, Puerto Rico, and the US Virgin Islands, call 1-800-THE-1PWR (1-800-843-1797). This number is staffed from 7:00 am to 5:00 pm Central Time (zone 6), Monday through Friday, on normal business days. At other times this number is still available, but for emergencies only. Services provided through this contact include initiating the spare parts procurement process, ordering documents, product warranty administration, and providing other product and service information.

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

***Customer Training***

Lineage Power 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.

***Downloads and  
Software***

To download the latest product information, product software and software upgrades, visit our web site at <http://www.lineagepower.com>

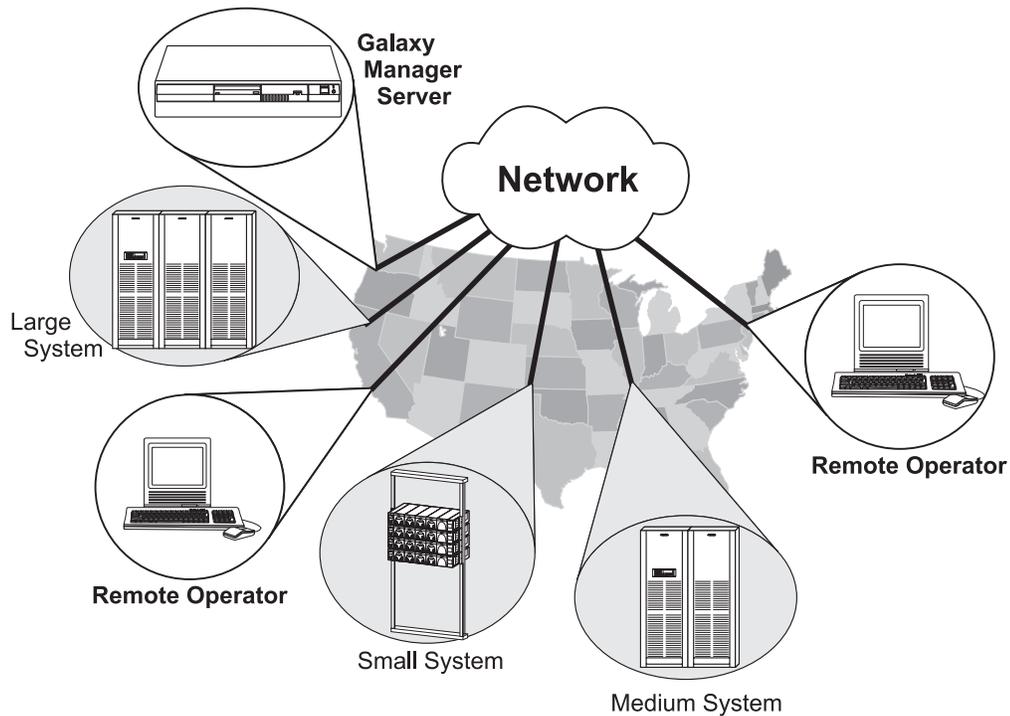
## 2 *Specifications*

A simplified depiction of a power management network is shown in Figure 2-1. The key components are the power systems, the remote users of the system, the server that manages the retrieval, storage and application tools that present and manipulate the data, and the network and protocols that allow everything to communicate. Galaxy Manager is the software manager and host system shown connected at the top of this network.

A complete monitoring package including a host system and the Galaxy Manager software is available. The Galaxy Manager host system consists of a dedicated PC / server for power network management. It is supplied by Lineage Power with the Galaxy Manager software and all appropriate business application tools pre-loaded. This system is fully configured and tested prior to shipping.

If only the Galaxy Manager software is ordered, the customer-provided server should meet the following minimum specifications:

<b>Main processor and processor speed:</b>	Intel-based CPU, 2 GHz
<b>Memory:</b>	256 MB
<b>Number of hard drives / size:</b>	One 40 GB
<b>Operating system:</b>	Windows 2000 Professional or Server, or UNIX (e.g. RedHat Version 9)
<b>CD-ROM:</b>	CD-RW
<b>Display:</b>	17" diagonal, 1280 x 1024 resolution 16MB VGA or DVI with VGA adapter
<b>Speaker:</b>	Internal audio speaker
<b>Network Card:</b>	10/100 Mbs network interface card



**Figure 2-1: Gateway Networking Diagram**

Sites without network access to live data may be recorded within Galaxy Manager using information from a detailed site survey. Detailed site surveys are generally performed by Lineage Power, however, these surveys are available for self population. Limited database changes (such as contact information, battery string and rectifiers changes, and administration changes) can be performed using the Galaxy Manager screens. (See the Galaxy Manager Training Guide for additional information on how to change site equipment data in the Galaxy Manager database.)

Galaxy Manager's usefulness is enhanced when direct communication with individual power plant sites within the system is provided permitting the transmission of live alarm and other data. A simple means for users to communicate with those sites is also provided. Galaxy Gateway using a LAN or intranet is presently the communication tool necessary for providing this enhanced capability to Galaxy Manager.

Galaxy Gateway is a remote communication alternative to public network modems for use with Lineage Power Galaxy SC, Galaxy SCF, Galaxy Millennium, Galaxy Vector and Yukon controllers. Using an Ethernet connection, Gateway provides remote access to these power plant controllers to display power information and permit changes to their configuration (at the proper security levels) via the World Wide Web and/or an intranet based LAN (Local Area Network). Working in

conjunction with Galaxy Manager, it serves as the cornerstone of a safe and secure comprehensive monitoring and control system designed to meet power plant engineering, operations, and maintenance needs. Galaxy Gateway provides access to plant alarm and control information for either distributed locations (with pager or email notification) or centralized locations like a Network Operations Center or Galaxy Manager (using the SNMP protocol), in addition to access via standard web browsers such as Internet Explorer or Netscape Navigator and access via any Telnet client such as HyperTerminal.

Galaxy Gateway communicates using TCP/IP internet protocol with the network. A 10Base-T (RJ-45) physical connection is used between the Gateway card and a LAN/WAN network device, typically a router. Built-in Gateway software applications include a web server facility that supports HTTP (web access), a command line interface via a Telnet connection to the power system, and a file server, supporting FTP for remote software upgrades. Also included are support for SMTP internet pager service, SMTP remote server alarm email capability, and the Galaxy Manager network management client using SNMP. The TL1 Transaction Language protocol is also supported over TCP/IP through the Galaxy Gateway.

Galaxy Manager Portal has been developed to communicate to non-Lineage Power (such as a DGU) and older Lineage Power equipment. This product incorporates all the standard applicable features of the Galaxy Gateway into a convenient rack-mounted or wall-mounted unit. Standard versions of Galaxy Manager Portal will also be made available for additional equipment. These units can then be customized by Lineage Power to provide connectivity to equipment utilizing an RS-232 or RS-485 interface and machine protocol. Thus, the Galaxy Manager Portal can provide network connectivity to traditionally non-networked equipment.

Additional information regarding Galaxy Gateway is available on the Lineage Power web site at <http://www.lineagepower.com/software.html>. The links available on this site include the Gateway data sheet and product manual, plus a demo site to allow live access to a Gateway using a web browser. There is also a demo version of Gateway Manager which can be accessed by registering to become a Lineage Power partner.



## 3 *User Screens*

### *Intro Page*

The Introduction screen of Galaxy Manager is depicted in Figure 3-1:



**Figure 3-1: Gateway Manager Home Page**

This screen is a temporary screen which will automatically redirect you to the System Overview page after approximately 20 seconds.

NOTE: Unless otherwise indicated, the term “site” in this document refers to a geographic location of a power system or power systems, and the word “system” refers to an individual power system at that site. There may be multiple power systems on different floors at one power site, for example, that might share an AC Generator.

If your Galaxy Manager requires a login and password, a logon/ password box appears in the upper right hand corner. If you’ve forgotten your Galaxy Manager login or password, type your valid

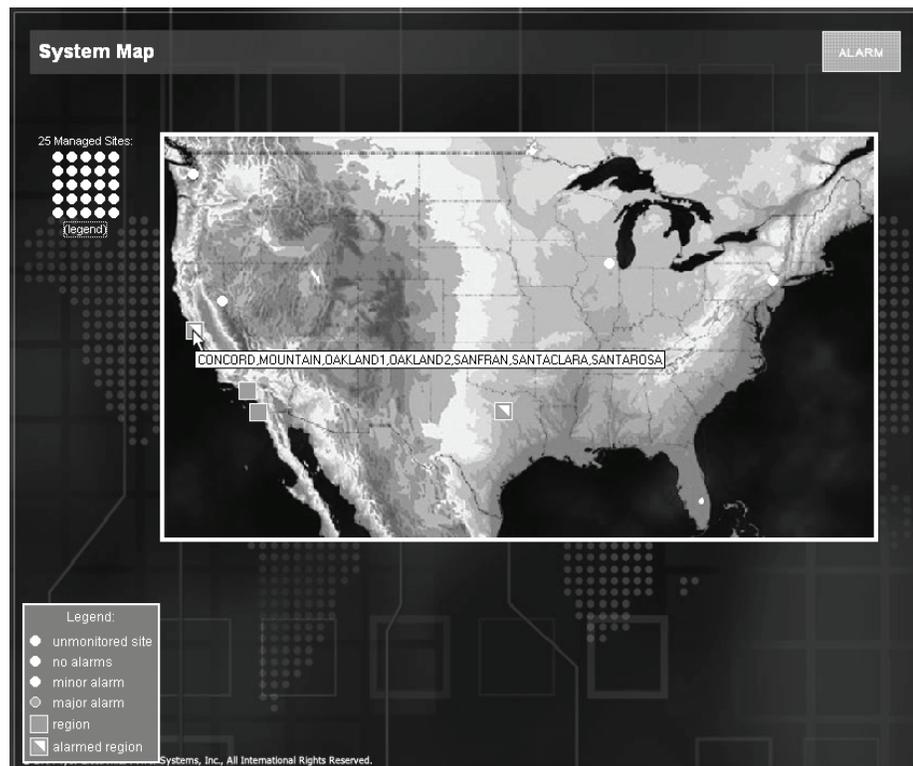
Galaxy Manager email address (the login/password that Lineage Power has set up in your database) in the User Name field and your password will be mailed to you at that address.

Administrators of Galaxy Manager can use the Administration link on the template to administer logins, passwords, email addresses, customer banner/warning information, and server addresses for your intranet email.

## System Overview

The System Overview display shows a top-level map of all sites being monitored (Figure 3-2). Access to the regional geographic mapping and access feature of Galaxy Manager is obtained by:

- clicking on site symbols (dots and boxes) on the site map
- clicking on the Managed Site quick-links in the upper left-hand corner of the screen.
- clicking on the Site List link on the right side of the screen which will display links to all monitored sites.



**Figure 3-2: System Overview Screen**

### Site Symbols

Site symbols shown on these maps use the following legend:

- **Grey dots** (un-monitored sites) represent individual sites not currently monitored by Galaxy Manager, but for which site survey data has been collected and is available for access.
- **Green dots** (no alarms) represent monitored sites that have no active alarms.
- **Yellow dots** (minor alarm) represent monitored sites with active minor alarm(s).

- **Red dots** (major alarm) represent monitored sites with active major alarm(s).
- **Blue boxes** represent clusters of sites located relatively close to one another with no active alarms. Clicking on a blue box brings up a “zoomed in” map showing increased detail and a new representation of the individual sites.
- **Blinking red/yellow boxes** represent clusters of sites located relatively close to one another, one or more of which have active alarms. Clicking on a blinking red/yellow box brings up a “zoomed in” map showing increased detail and a new representation of the individual sites.

Sites and clusters of sites are identified if the mouse is placed over them.



**Figure 3-3: “Drilled Down” Lower Level Map**

Note the yellow San Francisco dot in Figure 3-3. Clicking on the San Francisco dot results in the Site Data screen of Figure 3-5.

### ***Managed Site Quick Links***

This group of dots represent every managed site. The dots are arranged in alphabetical order by site name, and can be furthered segregated by Office Code. Placing the mouse over a dot shows the name of the site it represents. Each dot is a direct link to the site’s information page.

**Alarm Button** A network power system status indicator (Alarm button) is provided in the upper right-hand corner of all screens. The color of the indicator provides the following overall information:

**Green:** No alarms present.

**Yellow or Red:** Minor or major alarms are active.

**White:** Alarms are currently active but have all been acknowledged.

**Blue:** Indicates no sites are actively monitored.

Clicking on this button shows the active alarms and gives you the option to acknowledge them by clicking on the alarm event. If all existing alarms have been acknowledged, the Alarm Button will turn white. If a new alarm occurs the button will change to the appropriate color (yellow or red) to indicate that a new alarm condition has become active. Acknowledged alarm events may be re-activated by clicking on the alarm event and using the Unacknowledge feature.

**Screen Links** Access to the Galaxy Manager data is achieved through the fixed links located along the right side of the Galaxy Manager screens. These links are shown in Figure 3-4:



**Figure 3-4: Gateway Manager Screen Links**

Note that placing the system mouse over the screen links or other links within Galaxy Manager's context cursor-sensitive help text provides help or an expanded description of the link function. A discussion of each of these Home page links follows.

### Site List Screen Link

Clicking this link shows a list of all managed sites in alphabetical order. Clicking a site link in the list displays the site's information page. For sites with more than one managed system, the sites' individual descriptions are displayed. The appropriate site symbol dot is shown for each site listed. Those actively monitored will provide the alarm status for the system.

### System Information Page

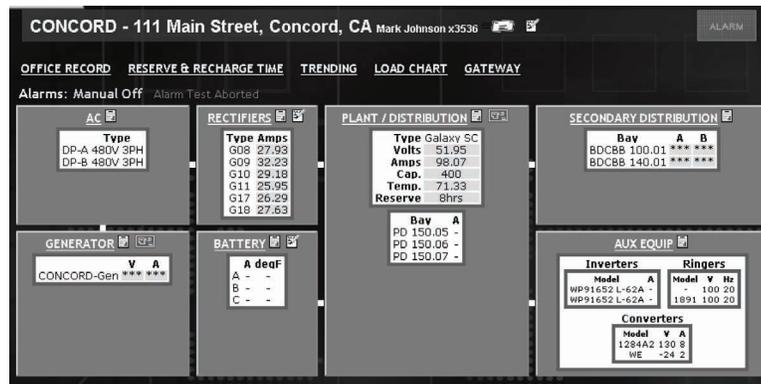


Figure 3-5: Concord System Data

The System Information screen provides a block-level view of the managed power system. Each block shows its key parameters. Clicking on a link in any block shows a screen displaying specific information about the system component.

Converters, inverters and ringers are considered auxiliary equipment. If there is no data for these components, the header will show “No Auxiliary Equipment” and nothing will be shown in the box. This is the same for all other system components.

Data inside gray boxes indicates “live” data, or data coming from the Galaxy Gateway.

**Note:** To set up floorplans for individual systems, you must create a Floorplans directory in the same directory where the Galaxy Manager code exists (e.g., /var/www/html on UNIX systems and c:\sokit\site\ on Windows systems.) In this directory, you should place .jpg files of the floorplans with the site name, underscore, floor number. For example, for the CONCORD site on Floor 1, this file would be named CONCORD\_1.jpg. The floor must be set in the power\_system table for CONCORD. For a generator for a site, the name will be CONCORD\_G.jpg.

Clicking on the paper/pencil icon in the banner at the top allows editing of the contact information for this system.

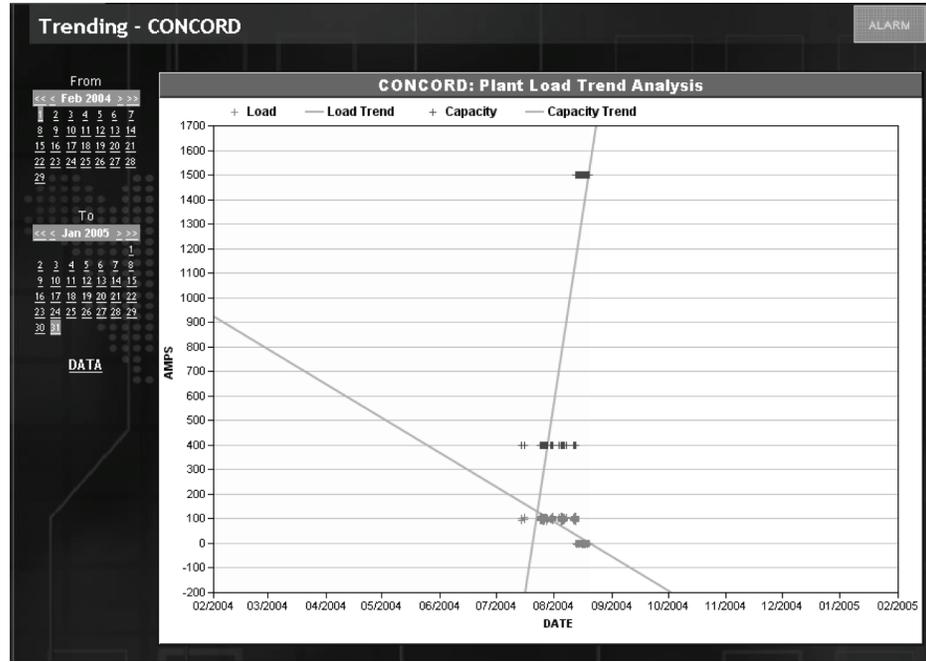
Clicking on the email link in the banner at the top provides an email form for emailing any information about this screen to any email address in your network. This email icon only shows up if the contact person has an internal email address in the Galaxy Manager database.

Clicking on the paper/pencil icons in either the Rectifiers or Battery boxes allows editing (adding, removing, or changing) rectifier and battery string information in the Galaxy Manager database.

***Office Record*** Clicking this link displays a customized report providing key items for a particular system, such as Plant Load, Battery Strings, and Rectifiers information.

***Reserve & Recharge Time*** Clicking this link takes you to the Reserve & Recharge Calculator for this system. This page is also accessible by clicking the Reserve & Recharge Calculator screen link under Engineering Tools. A detailed description of this feature is found under the Engineering Tools heading later in this section.

**Trending** Clicking this link takes you to the Trending feature for this system. Manager automatically trends each monitored system's total rectifier capacity and system load. A linear trend approximation for the plant capacity and load are also provided. Figure 3-6 shows a sample screen.

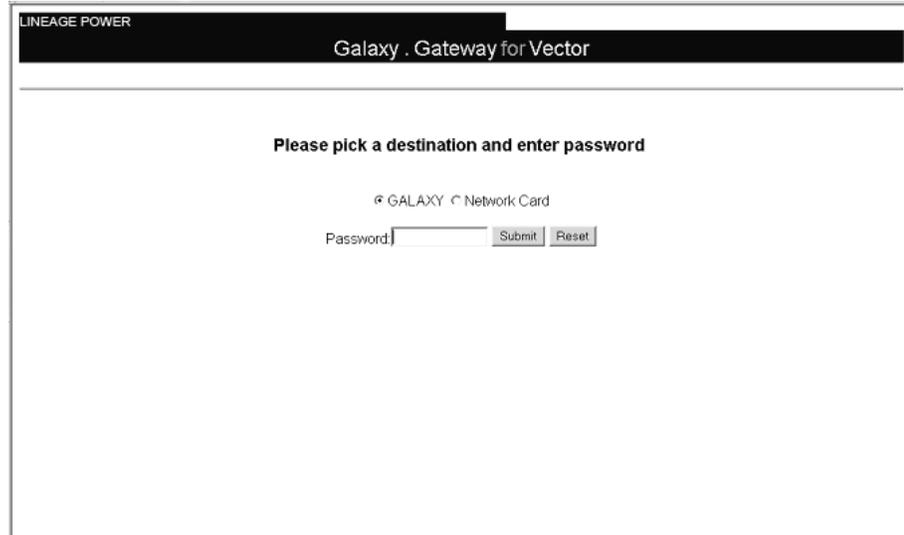


**Figure 3-6: Galaxy Manager Trend Data**

Manager trending supports filtering based on dates. The displayed trend plot may be selected by clicking on the calendars at the left of the graph to select a start date and an end date. The data in the trend plots may be printed using the DATA button. This data can be exported to a comma-delineated file for post processing, by right-clicking anywhere in the data and choosing Export to Microsoft Excel, if your local computer has Microsoft Excel.

The trend analysis includes an extrapolation of the data by showing a trend line for both loads and capacities. Note that the portion of the graph in yellow indicates time that has already passed; the white portion of the graph indicates time in the future.

**Gateway** Clicking this link permits the user to log directly into the Galaxy Gateway card (Figure 3-7) of the power plant to further interrogate or make changes to the system once the password is entered in the login screen.

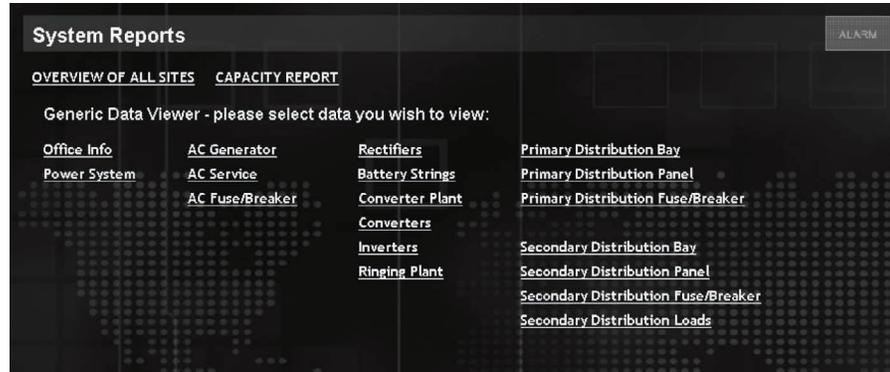


**Figure 3-7: Galaxy Gateway Login from the Live Data Link**

**Alarms** This shows a list of the alarms (displayed in red for major, yellow for minor, and white for remaining) that are currently active for this system.

## System Reports

Clicking on this link provides a quick means to access Galaxy Manager “canned” reports, and also a list of tables to generate customer reports, as shown in Figure 3-8.



*Figure 3-8: System Reports*

## Overview of All Sites

Clicking this link displays a site system overview report listing more specific site details (see Figure 3-9).

GALAXY Manager		LINEAGE POWER							
SITE/SYSTEM OVERVIEW									
Site	System	URL	Controller Type	# Battery Strings	Total Battery Reserve (Hours)	# Rectifiers	# Inverters	# BDFBs	
BAKERSFIELD	BAKERSFIELD			0	0	0	4	8	
BURBANK	BURBANK			3	6.5	7	6	0	
CHICAGO	CHICAGO			5	12	12	1	3	
CONCORD	CONCORD	http://135.107.103.239		3	3,6667	8	1	7	
DALLAS	DALLAS	http://135.107.103.238		5	8	10	1	4	
LASVEGAS1	LASVEGAS1			3	20	6	0	0	
LASVEGAS2	LASVEGAS2			3	20	6	0	0	
LOSANG	LOSANG			1	2.02	6	5	5	
MOUNTAIN	MOUNTAIN			18	13	37	5	9	
NYC	NYC			0	0	0	0	0	
OAKLAND1	OAKLAND1			3	8	8	3	3	
OAKLAND2	OAKLAND2			2	5.217	6	4	4	
ONTARIO	ONTARIO			3	6.5	7	6	0	
PHOENIX	PHOENIX			6	12	16	1	2	
SANDIEGO1	SANDIEGO1			8	19	24	10	4	
SANDIEGO2	SANDIEGO2			0	0	0	3	2	
SANFRAN	SANFRAN	http://135.107.103.237		5	8	10	1	5	

*Figure 3-9: Canned Report - Data Spreadsheet*

***Canned Report - Capacity report***

Clicking this link displays a list of the sites/system, beginning with the highest percentage of capacity (current capacity divided by maximum capacity time 100) for that system. This report can be used to decide which systems may need additional resources to handle capacities. (see Figure 3-10).

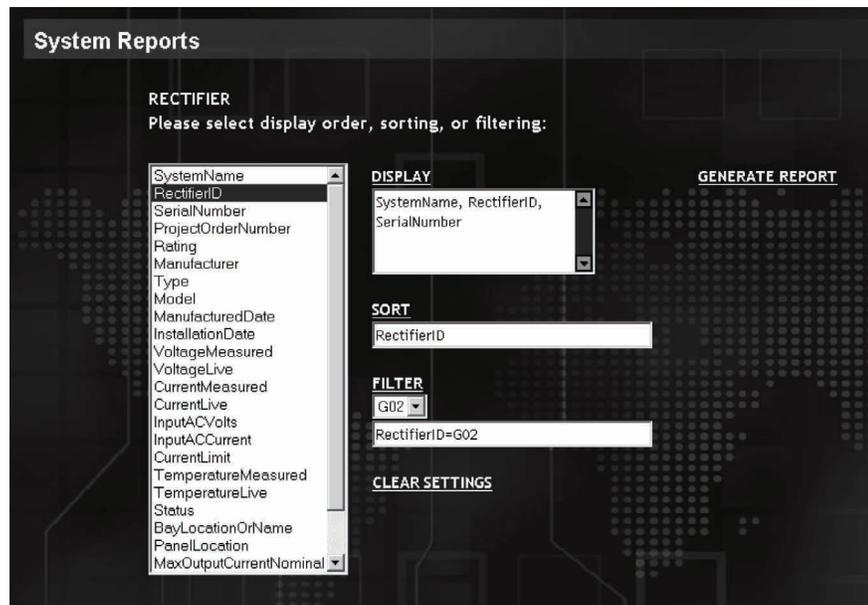
GALAXY Manager™		Tyco Electronics Power Systems			
SITE/SYSTEM CAPACITY REPORT					
Site	System	Required Reserve (hours)	Maximum Capacity (amps)	Current Capacity (amps)	% of Capacity (ordered)
LOSANG	LOSANG	2	45	265	588.89%
MOUNTAIN	MOUNTAIN	13	600	1792	298.67%
DALLAS	DALLAS	8	160	207	129.38%
CONCORD	CONCORD	4	1600	860	53.75%
LASVEGAS1	LASVEGAS1	20	500	223	44.6%
LASVEGAS2	LASVEGAS2	20	600	223	37.17%
CHICAGO2	CHICAGO2	12	1600	410	25.63%

***Figure 3-10: Canned Report - Capacity Report***

**Generic Data Viewer**

Galaxy Manager tables are displayed that are organized by equipment. By clicking on any of these table, you can generate your own customized database reports, such as shown in Figure 3-11. This screen shows you how to generate a report from the Rectifier table, if you want to see System Name, Rectifier ID, and Serial Number, sorted by Rectifier ID, for the G02 rectifier for each system. Hit Generate Report to create this table, which can then be exported to Microsoft Excel by right-clicking anywhere in the data.

Note: If you would like to enter a manual filter (e.g., RectifierID=G% to see all rectifiers with IDs that begin with G), you can edit the FILTER box manually.



**Figure 3-11: System Reports - Generic Data Viewer**

## Active Alarms

This screen link provides a list of active alarms for all systems currently monitored by Galaxy Manager. See Figure 3-12. The time and date displayed are the time and date that Galaxy Manager received the alarm information.

Occurred	System	Alarm	Severity	Ack	Comment
2004-08-17 13:36:00	LSANCA29_Galaxy	High Voltage	MAJ		
2004-08-17 13:36:00	LSANCA02_11th	Alarm Battery Supply	MAJ		
2004-08-19 16:54:00	DALLAS	Half Power	MIN		
2004-08-19 16:45:00	DALLAS	Self Test Failed	MIN		
2004-08-19 16:51:00	CONCORD	Alarm Test Aborted	RO		
2004-08-19 16:42:00	CONCORD	Queue Overflow	WRN		

**Figure 3-12: Active Alarms**

Alarm entries may appear in any of 3 colors:

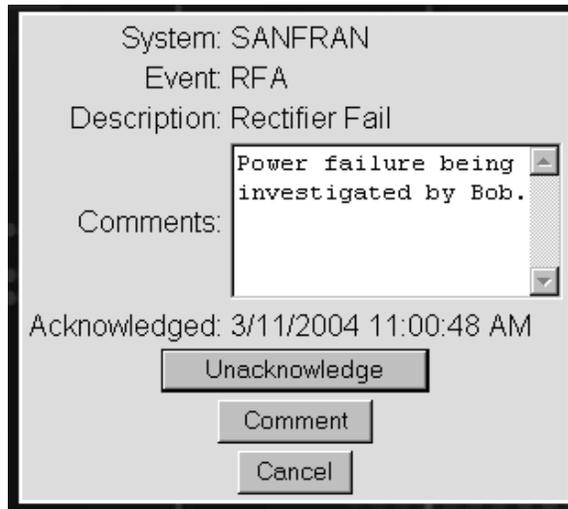
- **Black Text / Red Background:** Major alarms
- **Black Text / Yellow Background:** Minor alarms
- **White Text / Blue Background:** Acknowledged alarms

Note that you can click on the header of each column in this table to sort by that header; for example, if you'd like to see all CONCORD alarms at the top of the report, click on the System header. You can click this header again to have the alarms sorted in the opposite direction.

You can also click inside the table on a particular system (e.g., CONCORD) to get directly to that system page, for example, to try to diagnose the alarm.

## Acknowledging Alarms

Click on any one of the alarms in the Event column in the Active Alarms screen to acknowledge the alarm and input a comment (see Figure 3-13). You will be prompted to verify this operation. Acknowledging an alarm does not remove the alarm, but provides an indication that the alarm is currently being investigated. The Acknowledge button will change to "Unacknowledge" for acknowledged alarms, and an alarm can be unacknowledged in the same fashion.



**Figure 3-13: Acknowledge Alarms Screen**

## Alarm History

This link displays alarms that have activated and/or retired in the last 30 days for all sites monitored by Galaxy Manager. See Figure 3-14.

Date/Time	System	Alarm	Severity	Action
2004-08-19 16:55:00	DALLAS	Number Not Configured	WRN	retired
2004-08-19 16:55:00	CONCORD	Manual Off	MIN	occur
2004-08-19 16:54:00	DALLAS	Half Power	MIN	occur
2004-08-19			MAJ	retired
2004-08-19			RO	retired
2004-08-19			RO	occur
2004-08-19			MIN	occur
2004-08-19			MIN	retired
2004-08-19			WRN	occur
2004-08-19			MAJ	retired
2004-08-19			WRN	retired
2004-08-19			WRN	occur
2004-08-19			MAJ	retired
2004-08-19			MAJ	occur
2004-08-19			RO	occur
2004-08-19			MAJ	retired

**Figure 3-14: Alarm History Viewer**

In this screen, when you click on the FILTER link at the top, an Alarm History Filter box appears that allows you to filter the alarm history data by To-From Dates, System, Alarm, Severity (such as major, minor, or warning), and Action (such as acknowledged or unacknowledged).

### Print, Pie, and Bar

Three links are provided at the top of the page:

**Print:** This button opens a printer-friendly screen of the currently displayed data.

**Pie:** Click the Pie button to see a pie chart system comparison of the number of alarms in the history. If the display is currently filtered, only alarms currently displayed are charted. Once the pie chart is displayed, you can display it by system (default) or by alarm.

**Bar:** Click the Bar button to see a horizontal bar chart system comparison of the number of alarms in the history. If the display is currently filtered, only alarms currently displayed are charted. Once the bar chart is displayed, you can display it by system (default) or by alarm.

**Note:** To permit printing backgrounds and bar charts in Windows Explorer, change your internet options settings to “Print background colors and images.” Typically this option is found in the menus under

Tools > Internet Options > Advanced, and under the sub-heading “Printing”. You can also right-click over the data and Export this data to Microsoft Excel.

## Engineering Tools

Clicking Engineering Tools in the screen links list provides access to the following system engineering tools:

- Reserve/Recharge Calculator
- Cable Sizing Tool

## Reserve & Recharge Time Calculator

If opened from a System Display screen, that system’s prediction data is shown on the left half of the screen, while the right half can be used to make changes to any of these parameters for establishing “What If?” scenarios (see Figure 3-15). If opened from the screen links, typical system default values (column 2) are used.

Reserve & Recharge Time Calculator			ALARM
	TYPICAL SYSTEM	WHAT IF ?	
OFFICE TEMPERATURE (F)	77	<input type="text" value="77"/>	
END CELL VOLTAGE (V)	1.86	<input type="text" value="1.86"/>	
PLANT LOAD (Amps)	1000	<input type="text" value="1000"/>	
RECTIFIER CAPACITY (Amps)	1200	<input type="text" value="1200"/>	
BATTERY STRINGS	(6) L508	<input type="text" value="6"/> <input type="text" value="L508"/>	
BATTERY STRINGS	8450AH, 1000A	<input type="text" value="8450AH, 1000A"/>	
		<input type="text" value="0"/> <input type="text" value="None"/>	
		<input type="text" value="0AH, 0A"/>	
HOURS OF RESERVE	8.4	8.4	
TOTAL EFFECTIVE RESERVE AH	8450	8450	
HOURS TO 95% RECHARGE	50.9	50.9	
RECTIFIER RECHARGE FACTOR	1.2	1.2	

**Figure 3-15: Battery Reserve Calculator**

Note that this tool does not take into account battery aging within its prediction algorithm.

The Reserve & Recharge Time Calculator can solve for hours of reserve, total effective reserve in amp-hours, hours to 95% recharge of the batteries and rectifier recharge factor. Enter new values for office temperature, end cell voltage, plant load, rectifier capacity or battery strings and hit enter to update the calculations. Calculations are

automatically updated when a parameter is changed and the cursor is moved to another parameter.

- Office Temperature*** All calculations are referenced to 77°F. This field allows you to see the impact of ambient temperatures above or below this reference temperature. Valid temperature range is from 40°F to 110°F. The default temperature value is 77°F.
- End Cell Voltage*** Average voltage that each cell in all strings is permitted to discharge to over the discharge period. Valid range for this parameter in the Calculator is 1.75V to 2.00V. The default value is 1.86V.
- Plant Load*** Total system load of the system. For monitored systems, this is the actual load current reported to Galaxy Manager. Valid load range for this parameter is from 0 to 20000 amps. The default “What If” value for plant load is 1.4 times the present system load.
- Rectifier Capacity*** Total rectifier capacity of the system. Valid capacity range is from 0 to 20000 amps. The default value is the present rectifier capacity of the system.
- Battery Strings*** Number and type of battery strings. Enter the number of battery strings (0 to 100) in the left-hand portion of the field, and select the battery type from the drop-down box (listed in alphabetical order). The default values in these fields are the number of strings and type of batteries installed in the system. An additional battery string “What If?” parameter is provided to allow a different battery type to be selected.
- Hours of Reserve*** Calculated hours of reserve for the system based on the entered parameter values. If the hours of reserve time is between 3.6 and 4 hours the displayed hours of reserve time value will be highlighted yellow. If the hours of reserve time is less than 3.6 hours the displayed hours of reserve time value will be highlighted red. This is based on a standard 4-hour reserve time.
- Total Effective Reserve AH*** Calculated total effective amp-hour rating of all of the strings and battery types installed. Also shown is an effective reserve amp-hour reserve calculation for each battery type when multiple battery types are used. The individual discharge current for each battery type is also listed.

**Hours to 95%  
Recharge**

Calculated number of hours to charge completely discharged system batteries back to 95% capacity. This is a conservative number since the recharge algorithm is based on an end-cell voltage of 1.75V. If the recharge time is between 24 and 28.8 hours the displayed recharge time value will be highlighted yellow. If the recharge time is greater than 28.8 hours the displayed recharge time value will be highlighted red. This is based on a standard 24-hour recharge time.

**Rectifier Recharge  
Factor**

Calculated ratio of rectifier capacity divided by system load.

**Cable Sizing Calculator**

The Cable Sizing Calculator provides a pictorial view of the major elements of the DC distribution network. This calculator is for sizing cable and assumes that sufficient battery strings are in place to support the load shown, for the required reserve time, to the minimum discharge volts per cell that is inputted. Battery voltage at the end of this reserve period will be the number of cells multiplied by the minimum volts per cell (VPC). The voltage drops throughout the network may then be specified and the conductors required to support the load to those voltage drops, and ultimately to a required minimum voltage at the end equipment, are calculated.

The voltage drop calculation formula for copper conductors is:

$$V_{drop} = 11.1 \times \text{Length (ft)} \times \text{Load (amps)} / \text{cable size (circular mills)}$$

Cable sizes are expressed in standard DC conductor sizes (or their multiples) available through Lineage Power as follows: 14 AWG, 12 AWG, 10 AWG, 8 AWG, 6 AWG, 4 AWG, 2 AWG, 0 AWG, 00 AWG, 0000 AWG, 350 kcmil, 500 kcmil, and 750 kcmil. All conductor lengths used in the tool should be entered as one-way cable run lengths and that the negligible voltage drops of any monitoring shunts, fuses, lug terminations, etc., within the distribution system have been ignored.

Two Cable Sizing Calculators are provided, one for power systems using centralized architecture (containing a central bus work where all load current is monitored using one common shunt or Hall-effect assembly) and one for distributed architecture systems (no common load shunt, but with individual rectifier and battery currents monitored).

The centralized calculator is displayed by default. Links are provided at the top of each calculator (“switch to distributed” and “switch to centralized”) to change the currently displayed calculator.

Both Calculators are displayed with the power system Rectifier and Battery segments located to the left, Primary and Secondary Distribution segments, then finally the End Equipment spreading across to the right. The Calculators initiate with default values provided for voltage drops between the distribution system segments, a minimum required voltage of 42V at the End Equipment, and battery strings c/o 24 cells engineered to a 1.86 minimum voltage at the end of the designed reserve period. These values can be changed as required to add both load (in amps) and loop length (in feet). Any change that violates the End Equipment's minimum voltage parameter results in its value shown in red. An error message is also displayed anytime that a load value entry is made that results in a higher load value to the right of its source, shown to its left.

### Centralized Architecture

**Cable Sizing Tool - Centralized Architecture** (switch to Distributed) ALARM

**BATTERY**  
44.64V  
Cells per string: 24  
Volts per cell at end of discharge: 1.86  
Calculate

V Loop B  
length: 10 ft  
Vdrop: 0.25 V  
11 x 750 KCM

**CENTRAL BUS WORK**  
5000 AMPS  
44.14V

V Loop C  
length: 100 ft  
Vdrop: 0.15 V  
10 x 750 KCM

**PRIMARY DISTRIBUTION**  
1000 AMPS  
43.84V

V Loop D  
length: 100 ft  
Vdrop: 1 V  
2 x 350 KCM

**SECONDARY DISTRIBUTION**  
500 AMPS  
41.84V

V Loop E  
length: 100 ft  
Vdrop: 0.6 V  
1 x 0000 awg

**END EQUIPMENT**  
100 AMPS  
40.64V

V Loop A  
length: 10 ft  
Vdrop: 2 V  
11 x 750 KCM

**RECTIFIERS**

Enter List 2 Current Drains in amps at each station.  
Enter distance of wire run in feet between each station.  
Enter one way voltage drop between each station.  
Hit RETURN to recalculate.

Output is **Volts** and **wiring**

**Figure 3-16: Cable Sizing Calculator, Centralized Architecture**

## Distributed Architecture

**Cable Sizing Tool - Distributed Architecture** (switch to Centralized) ALARM

Cells per string: 24  
Volts per cell at end of discharge: 1.86

**BATTERY**  
44.64V  
V Loop B  
length: 10 ft  
Vdrop: 0.25 V  
3 x 500 KCM

**PRIMARY DISTRIBUTION**  
1000 AMPS  
44.14V  
V Loop A  
length: 10 ft  
Vdrop: 2 V  
3 x 500 KCM  
RECTIFIERS

V Loop D  
length: 100 ft  
Vdrop: 1 V  
2 x 350 KCM

**SECONDARY DISTRIBUTION**  
500 AMPS  
42.14V  
V Loop E  
length: 100 ft  
Vdrop: 0.6 V  
1 x 0000 awg

**END EQUIPMENT**  
100 AMPS  
40.94V

Calculate

Enter List 2 Current Drains in amps at each station.  
Enter distance of wire run in feet between each station.  
Enter one way voltage drop between each station.  
Hit RETURN to recalculate.

Output is Volts and wiring.

**Figure 3-17: Cable Sizing Calculator, Distributed Architecture**

### Lineage Power Website

Link to Lineage Power Website.

### Help

When you select the HELP button, you get a pull-down menu to the ONLINE MANUAL (pdf version of this manual), and links to Lineage Power's on-line manuals on the Web, and the Lineage Power customer login page.