SAG586505000
SAG586505500
System Application Guide
Spec. No. 586505000 (Model LMS1000)
Spec. No. 586505500 (Model LMS1000)
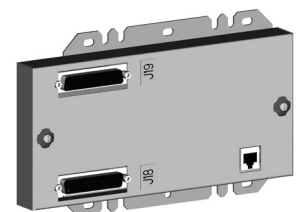Issue AZ, April 7, 2014

EMERSON
Network Power

SYSTEM OVERVIEW

Description: A programmable monitoring, controlling, and data acquisition system designed for use in telecommunications power sites.
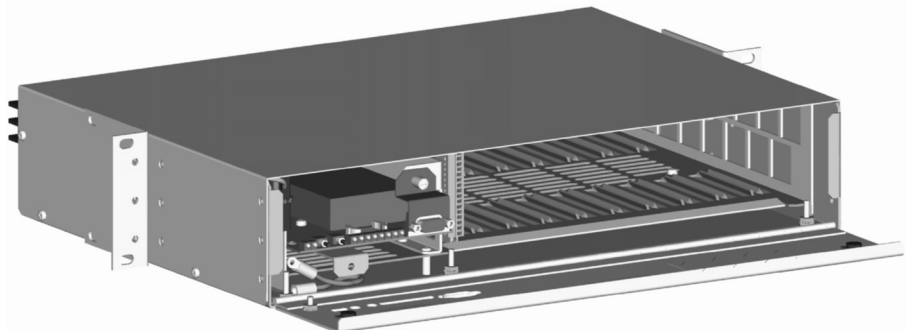
- Consists of a Main Cabinet which holds up to ten input/output circuit cards, in a cabinet size that occupies two 19" or 23" relay rack spaces. For system expansion and/or to monitor points at other locations, Supplemental (Expansion) Cabinets are available. Each Expansion Cabinet holds up to ten input/output circuit cards, in a cabinet size that occupies two 19" or 23" relay rack spaces. Also available are Expansion Assemblies which provide an input circuit card equipped with a fixed number of analog and binary input points in a sheet metal housing. These assemblies can be mounted inside customer equipment. The Main Cabinet, Expansion Cabinets, and Expansion Assemblies are interconnected via the LMS1000 network.

- The Main Cabinet and Expansion Cabinets can be equipped with various input circuit cards to monitor a variety of analog, binary, and temperature points. The Expansion Assemblies are always equipped with an input circuit card to monitor a fixed number of analog and binary points.

- LMS1000 collects data from the input circuit cards. The data collected is used for alarm processing and reporting, and to provide statistics.

- LMS1000 is capable of reporting alarm conditions to a remote terminal, pager, or Email address. For remote terminal or pager notification, the Main CPU circuit card must be equipped with the optional modem. Two types of alarm reporting mechanisms are provided, System Alarm Reporting and Individual User Alarm Reporting.

Expansion Assembly

Main Cabinet
(Expansion Cabinet Similar)

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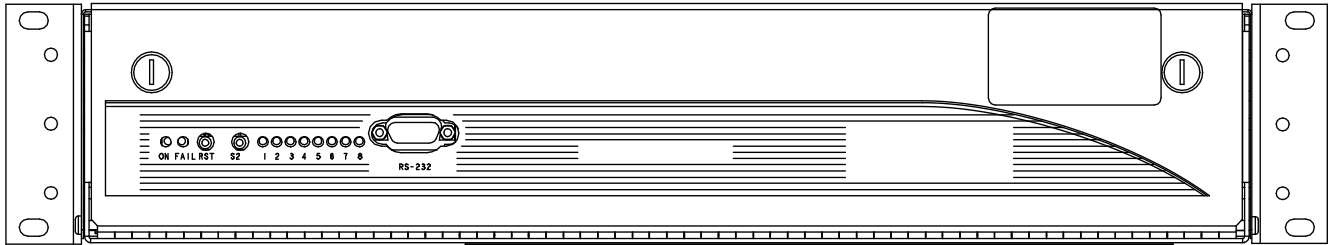Spec. No. 586505500 (Model LMS1000)

Home

- LMS1000 is capable of reporting alarm conditions via SNMP traps over Ethernet or via TL1 (over Ethernet) when the 'TL1 over Ethernet' option is ordered. TL1 is also available via a serial connection in 'direct mode'.

- The Main CPU circuit card provides programmable LEDs to allow local indication of alarm conditions or occurrences. For remote indication, the Main and/or Expansion Cabinets can be equipped with output circuit cards which provide programmable relays. These relays may also be used to control other equipment.

- LMS1000 easily interfaces with the MCA of Vortex® Power Systems (VPS) and NetSure™ Power Systems (NPS). This interface allows an LMS1000 user to remotely monitor, adjust, and control the Power System via LMS1000; plus easily use the features of LMS1000 with the Power System. Separate analog, binary, and relay circuit cards do not have to be supplied for this interface. Analog, binary, relay, and temperature circuit cards (I/O cards) can be provided to monitor equipment external to the Power System. In a VPS/NPS, one simple cable connection between the Main Cabinet and the VPS/NPS completes the interconnections required. Note that the LMS1000 is factory integrated into Spec. Nos. 582140000, 582140001, and 582126100 NetSure Power Systems.

  Note that Spec. Nos. 582140000, 582140001, and 582126100 NetSure Power Systems do not use the LMS1000 Cabinets. The LMS1000 is factory integrated into the Power Systems. Note that LMS1000 I/O circuit card mounting positions are provided inside a 582140000, 582140001, and 582126100 NetSure Power System.

- LMS1000 can be accessed via a local port, a modem port (when optional modem is ordered), an optional TL1 port, and an Ethernet port (for Telnet access, Web access, SNMP access, optional TL1 access, and Email alarm reporting). A local front panel display option is also available.

- Available software options include…

  Power Metering
  Energy Management*
  Rectifier/PCU Sequencing*
  TL1/X.25
  TL1 (over Ethernet)
  Gateway Port
  LMS Dual MCA Interface

  *** Note:** LMS1000 Energy Management and Sequencing features are not for use in the Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.*

- Available specialty interfaces include…

  Door Access Controller Interface
 External GPS Modem Interface
  AC Analyzer Interface

Family:	NetSure™
Spec. No.:	586505000 and 586505500
Model:	LMS1000
Agency Approval:	UL Recognized to UL 1950 CSA 22.2, No. 950
Framework Type:	Main and Expansion Cabinets: Mounted in a Customer Provided 19 or 23 Inch Wide Rack
Mounting Width:	Main and Expansion Cabinets: 19 or 23 Inch (Relay Rack Mounting)
Mounting Depth:	Main and Expansion Cabinets: 13.250 Inches
Mounting Height:	Main and Expansion Cabinets: 3.470 Inches
Access:	Front and Rear for Installation and Maintenance, Front for Operation
Color:	586505000: Off-White 586505500: Textured Gray
Environment:	-40°C to +60°C (-40°F to +140°F)

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586505000 and 586505500

Main Cabinet (Expansion Cabinets Similar) (19" Cabinet Shown)

List 1: LMS1000 Monitoring System (MAIN CABINET - 19"/23")

List 2: LMS1000 Monitoring System (MAIN CABINET - 23" only)

List 6: LMS1000 Monitoring System (EXPANSION CABINETS - 19"/23")

List 7: LMS1000 Monitoring System (EXPANSION CABINETS - 23" only)

List 10: LMS1000 Monitoring System (EXPANSION ASSEMBLIES) (not shown)
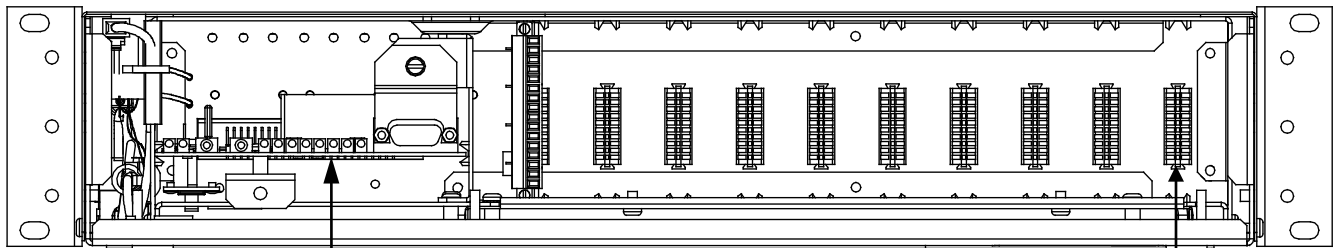
P/O List 1 and 6: CPU Circuit Card

List 70: Modem Circuit Card (MAIN CABINET ONLY)

List 92: VPS MCA Interface Cable, Customer Specified Length

List 93: VPS MCA Interface Cable Termination Kit

List 94: VPS MCA Interface Cable, Pre-Assembled, 6'

Front Door Opened in Illustration

Standard Software Features

WEB Interface

SNMP

Available Software Options

List 78: LMS Dual MCA Interface Software Option

List 79: Gateway Port Software Option

List 82: PCU/Rectifier Sequencing Software Option

List 83: Energy Management Software Option

List 86: TL1/X.25 Software Option

List 87: Power Metering Software Option

List 88: Local Port Redirection

List 90: TL1 (over Ethernet) Software Option

Available Specialty Interfaces

List 80: Door Access Controller Interface

List 84: External GPS Modem Interface

List 85: AC Analyzer Interface

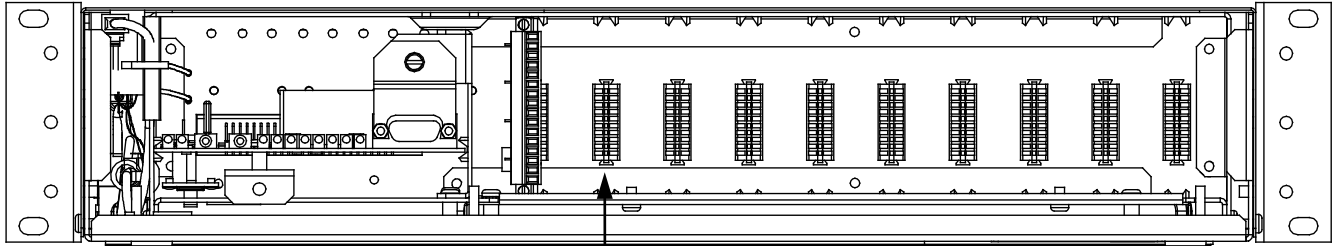**Front Panel Display Option**

List 60: (for use in later version 19" cabinets)

List 61: (for use in earlier version 19" cabinets)

List 62: (for use in 23" cabinets) (requires 10th I/O slot)

List 63: (for use in 23" cabinets) (DOES NOT require 10th I/O slot)

Determines Earlier vs. Later Version 19" Cabinets

I/O Slot #10 has a Larger (30 pos.) Connector

I/O Slot #10 is the Same as the Other I/O Slots

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Main Cabinet
(Expansion Cabinets Similar)
(19" Cabinet Shown)

Front Door
Opened in
Illustration

Available Input/Output (I/O) Circuit Cards

List 20: Four (4) Input Analog Circuit Card

List 21: Eight (8) Input Temperature Circuit Card

List 22: Eight (8) Input Analog Circuit Card

List 23: Twelve (12) Input Analog Circuit Card for Measuring Individual Battery Cell Voltages

List 30: Four (4) Input Binary Circuit Card

List 31: Eight (8) Input Binary Circuit Card

List 40: Four (4) Output Form-C Relay Circuit Card

List BA, BB, and BC: Current Limit Resistor Kits

List BE, BF, and P/N 535135: In-Line Fuse Kits

List ST and SU: Temperature Sensors

SEE ALSO

System Overview
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List Descriptions
Accessory Descriptions
Specifications
Dimensional Drawings
Related Documentation

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LIST DESCRIPTIONS

List 1: Common Equipment for the LMS1000 Main Cabinet

Features

♦ Provides the LMS1000 MAIN CABINET **(19"/23" relay rack mounting) (off-white)**.

♦ Refer to the "Specifications" section of this document for further information.
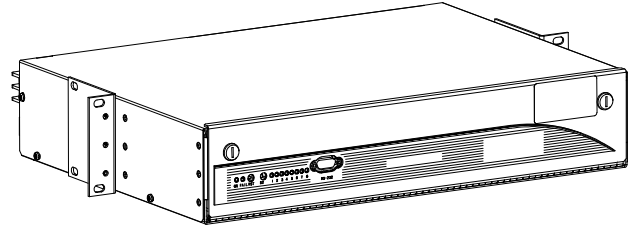
Restrictions

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order 586505000 List 1 (off-white).
2) Order Analog Circuit Cards as required per List 20, List 22, and List 23.
3) Order Temperature Circuit Cards as required per List 21.
4) Order Binary Circuit Cards as required per List 30 and List 31.
5) Order Relay Circuit Cards as required per List 40.
6) Order Modem Circuit Card as required per List 70.
7) Order Software Options as required per List 78, 79, 81, 82, 83, 86future_release, 87, 88, 89, and/or 90.
8) Order Specialty Interfaces as required per List 80, List 84, and/or List 85.
9) Order a MCA interconnect cable if required per List 92 and List 93, or List 94.
10) Order Front Panel Display option as required per List 60.
11) Order Accessories as required per the "ACCESSORY" section.

List 2: Common Equipment for the LMS1000 Main Cabinet

Features

♦ Provides the LMS1000 MAIN CABINET **(23" only relay rack mounting) (586505000 off-white) (586505500 gray)**.

♦ Refer to the "Specifications" section of this document for further information.
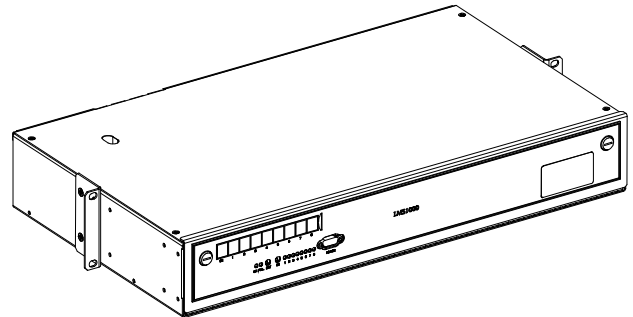
Restrictions

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order 586505000 List 2 (off-white) or 586505500 List 2 (gray).
2) Order Analog Circuit Cards as required per List 20, List 22, and List 23.
3) Order Temperature Circuit Cards as required per List 21.
4) Order Binary Circuit Cards as required per List 30 and List 31.
5) Order Relay Circuit Cards as required per List 40.
6) Order Modem Circuit Card as required per List 70.
7) Order Software Options as required per List 78, 79, 81, 82, 83, 86future_release, 87, 88, 89, and/or 90.
8) Order Specialty Interfaces as required per List 80, List 84, and/or List 85.

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9) Order a MCA interconnect cable if required per List 92 and List 93, or List 94.

10) Order Front Panel Display option as required per List 62 or List 63.

11) Order Accessories as required per the "ACCESSORY" section.

List 6: Common Equipment for One (1) LMS1000 Expansion Cabinet

Features

♦ Provides one (1) LMS1000 EXPANSION CABINET **(19"/23" relay rack mounting) (off-white)**.

♦ Refer to the "Specifications" section of this document for further information.
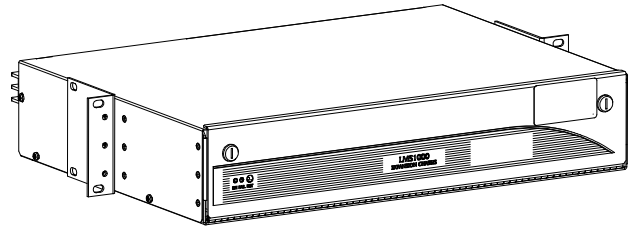
Restrictions

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order 586505000 List 6 (off-white).

2) Order Analog Circuit Cards as required per List 20 and List 22.

3) Order Temperature Circuit Cards as required per List 21.

4) Order Binary Circuit Cards as required per List 30 and List 31.

5) Order Relay Circuit Cards as required per List 40.

List 7: Common Equipment for One (1) LMS1000 Expansion Cabinet

Features

♦ Provides one (1) LMS1000 EXPANSION CABINET **(23" only relay rack mounting) (586505000 off-white) (586505500 gray)**.

♦ Refer to the "Specifications" section of this document for further information.
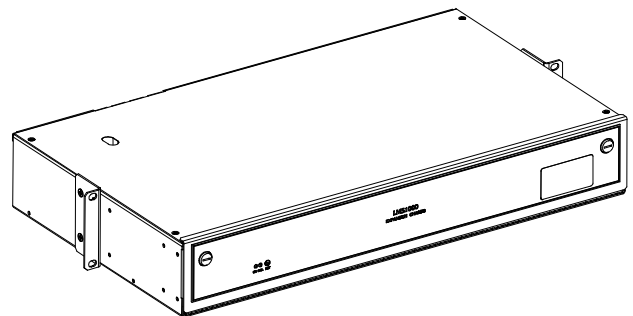
Restrictions

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order 586505000 List 7 (off-white) or 586505500 List 7 (gray).

2) Order Analog Circuit Cards as required per List 20 and List 22.

3) Order Temperature Circuit Cards as required per List 21.

4) Order Binary Circuit Cards as required per List 30 and List 31.

5) Order Relay Circuit Cards as required per List 40.

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List 10: Common Equipment for
One (1) LMS1000 Expansion Assembly

Features

♦   Provides one (1) LMS1000 EXPANSION ASSEMBLY.

♦   Refer to the "Specifications" section of this document for further information.

Restrictions

The Expansion Assembly analog inputs can only be used for 50mV shunts on the same discharge bus. None of the 24 inputs on any given Expansion Assembly may exceed –0.15 to +0.95 V between inputs. Each of the 8 binary channels are only activated by a -48V signal (typical of a fuse alarm bus).

Ordering Notes

1)   Order as required to monitor fixed points outside an Emerson Network Power Power System.

2)   Order LMS1000 network cables as required per the "ACCESSORY" section.

3)   Also order the following as required to terminate customer wiring to the J18/J19 D-type connectors provided on the assembly.

   a)   D-Sub Connector Housing (Male): Emerson Network Power P/N 116694 (Tyco P/N 1658641-2).

   b)   Crimp-Type Pins (Male): Emerson Network Power P/N 245381800 (Tyco P/N 66506-3 [supplied on a strip] or P/N 66506-9 [supplied loose]).

   c)   Cable Clamp Housing: Emerson Network Power P/N 116731 (Tyco P/N 748677-5).

   d)   Jack Screw Male Kit: Emerson Network Power P/N 116737 (Tyco P/N 747784-8).

   e)   Hand Crimping Tool: Pro Crimper II Tyco P/N 58448-2.
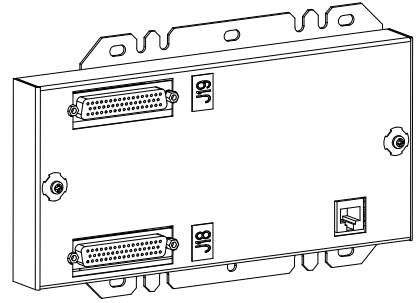
List 20: Four (4) Input Analog Circuit Card

Features

♦   Monitors voltages, shunts, and current loops.

♦   Each circuit card provides four (4) analog inputs to the system.

♦   Refer to the "Specifications" section of this document for further information.

Restrictions

Not for use in Expansion Assemblies.

Maximum number of analog points that can be monitored is dependent on how many open I/O slots are available in the system network and maximum number of analog channels the system supports. Each 586505000/586505500 cabinet holds up to ten (10) I/O circuit cards. Refer to "Firmware Specifications" under "Specifications" in this document for number of analog channels supported.

Shunts should be protected by a 49.9 ohm resistor. All other analog inputs should be protected by a fuse in each lead.

Note: *When LMS1000 is connected to an MCA, the MCA Interface does not require connections to analog, binary, or relay circuit cards. The MCA Interface provides analog inputs independently from the analog circuit cards installed.*

Ordering Notes

1)   Order one (1) List 20 analog circuit card for every four (4) analog points to be monitored using LMS1000.

2)   Order current limit resistor kits as required per List BA, BB, and BC.

3)   Order in-line fuse kits as required per List BE, BF, or P/N 535135.

4)   Also available is a 130VDC Monitoring Wire Harness. See ACCESSORY INFORMATION section for description. Order one (1) P/N 520839 130VDC Monitoring Wire Harness per 130VDC input to be monitored, as required.

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List 21: Eight (8) Input Temperature Circuit Card

Features

♦ Monitors temperature probe inputs.

♦ Each circuit card provides eight (8) temperature inputs to the system (mapped as analog channels).

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Not for use in Expansion Assemblies.

Maximum number of temperature points that can be monitored is dependent on how many open I/O slots are available in the system network and maximum number of analog channels the system supports. Each 586505000/586505500 cabinet holds up to ten (10) I/O circuit cards. Refer to "Firmware Specifications" under "Specifications" in this document for number of analog channels supported.

Ordering Notes

1) Order one (1) List 21 temperature circuit card for every eight (8) temperature probes to be monitored using LMS1000.

2) Order temperature probes as required per List ST and SU.

List 22: Eight (8) Input Analog Circuit Card

Features

♦ Monitors 50 mv shunt inputs.

♦ Each circuit card provides eight (8) analog inputs to the system.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Not for use in Expansion Assemblies.

This circuit card can only be used for 50mV shunts on the same discharge bus. None of the 8 inputs on any given card may exceed –0.15 to +0.95 V between inputs. The card to card voltage differential does not matter. These cards may not be used for RIM applications. For RIM applications, use the universal analog circuit card 586505000 and 586505500 List 20.

Maximum number of analog points that can be monitored is dependent on how many open I/O slots are available in the system network and maximum number of analog channels the system supports. Each 586505000/586505500 cabinet holds up to ten (10) I/O circuit cards. Refer to "Firmware Specifications" under "Specifications" in this document for number of analog channels supported.

Shunt inputs should be protected by a 49.9 ohm resistor.

Note: *When LMS1000 is connected to an MCA, the MCA Interface does not require connections to analog, binary, or relay circuit cards. The MCA Interface provides analog inputs independently from the analog circuit cards installed.*

Ordering Notes

1) Order one (1) List 22 analog circuit card for every eight (8) analog points to be monitored using LMS1000.

2) Order current limit resistor kits as required per List BA, BB, and BC.

List 23: Twelve (12) Input Analog Circuit Card
for Measuring Individual Battery Cell Voltages

Features

♦ Monitors individual battery cell voltages.

♦ Each circuit card provides twelve (12) analog inputs to the system.

♦ Refer to the "Specifications" section of this document for further information.

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Restrictions

Not for use in Expansion Cabinets and Expansion Assemblies.

This circuit card must only be used for adjacent cells in a common battery string. The input requires the inter-cell connector to be the negative (–) input on one cell and the positive (+) input for the next one. This cannot be used for pilot cells in multiple battery strings.

A maximum of six (6) cards may be installed in the Main Cabinet

Maximum number of analog points that can be monitored is dependent on how many open I/O slots are available in the system network and maximum number of analog channels the system supports. Each 586505000/586505500 cabinet holds up to ten (10) I/O circuit cards. Refer to "Firmware Specifications" under "Specifications" in this document for number of analog channels supported.

Analog inputs should be protected by a fuse in each lead.

Ordering Notes

1) Order one (1) List 23 analog circuit card for every twelve (12) battery cells to be monitored using LMS1000.

2) Order in-line fuse kits as required per List BE, BF, or P/N 535135.

List 30: Four (4) Input Binary Circuit Card

Features

♦ Monitors 0-60 volts AC/DC double ended binary inputs.

♦ Each circuit card provides four (4) binary inputs to the system. Each input requires two connections (source and return).

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Not for use in Expansion Assemblies.

Maximum number of binary points that can be monitored is dependent on how many open I/O slots are available in the system network and maximum number of binary channels the system supports. Each 586505000/586505500 cabinet holds up to ten (10) I/O circuit cards. Refer to "Firmware Specifications" under "Specifications" in this document for number of binary channels supported.

Note: *When LMS1000 is connected to an MCA, the MCA Interface does not require connections to analog, binary, or relay circuit cards. The MCA Interface provides binary inputs independently from the binary circuit cards installed.*

Ordering Notes

1) Order one (1) List 30 binary circuit card for every four (4) binary points to be monitored using LMS1000.

2) For recommended protection on input wiring, order current limit resistor kits as required per List BA, BB, and BC.

List 31: Eight (8) Input Binary Circuit Card

Features

♦ Monitors 0-60 volts AC/DC single ended inputs.

♦ Each circuit card provides eight (8) binary inputs to the system. Each input requires only one connection (source), plus a single +BAT and/or -BAT connection for all inputs as required.

♦ The other connection point for each binary input is made via the placement of the appropriate jumper on the circuit card. This jumper either applies +BAT or -BAT to this connection point. This simplifies wiring to the binary inputs since +BAT and/or -BAT, as required, only has to be connected to the circuit card at one point.

♦ Refer to the "Specifications" section of this document for further information.

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Restrictions

Not for use in Expansion Assemblies.

Maximum number of binary points that can be monitored is dependent on how many open I/O slots are available in the system network and maximum number of binary channels the system supports. Each 586505000/586505500 cabinet holds up to ten (10) I/O circuit cards. Refer to "Firmware Specifications" under "Specifications" in this document for number of binary channels supported.

Note: *When LMS1000 is connected to an MCA, the MCA Interface does not require connections to analog, binary, or relay circuit cards. The MCA Interface provides binary inputs independently from the binary circuit cards installed.*

Ordering Notes

1) Order one (1) List 31 binary circuit card for every eight (8) binary points to be monitored using LMS1000.

2) For recommended protection on input wiring, order current limit resistor kits as required per List BA, BB, and BC.

List 40: Four (4) Output Form-C Relay Circuit Card

Features

♦ Provides four relays each with one set of Form-C relay contacts.

♦ These relays are used for control or alarm applications and can be programmed by the user.

♦ Relays may also be manually forced "on" (energized) (SET RLY). Any relay forced on can also be manually turned off (CLR RLY). (A jumper is provided on the relay circuit card to enable/disable the SET RLY and CLR RLY commands.)

♦ The relay circuit cards can also be programmed to work with the energy management and/or sequential start option, if ordered (relays are not required to provide energy management and/or sequential start to a VPS/NPS Power System).

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Not for use in Expansion Assemblies.

Maximum number of relay outputs that can be provided is dependent on how many open I/O slots are available in the system network and maximum number of rely channels the system supports. Each 586505000/586505500 cabinet holds up to ten (10) I/O circuit cards. Refer to "Firmware Specifications" under "Specifications" in this document for number of relay channels supported.

Note: *When LMS1000 is connected to an MCA, the MCA Interface does not require connections to analog, binary, or relay circuit cards. When energy management and/or sequencing option is ordered, relays are not required to control the VPS/NPS PCUs.*

Note: *Also available in a Spec. No. 582140000, 582140001, and 582126100 Power System are MCA Customer Alarm Relay circuit cards. Refer to SAG582140000, SAG582140001, and SAG582126100.*

Ordering Notes

1) Order one (1) List 40 relay circuit card for every four (4) relay contacts to be provided by LMS1000.

List 60: LMS1000 Display Option (for use in later version 586505000 19" cabinets)

Features

♦ Provides a front panel display and keypad.

♦ Allows local access to the system without a terminal.

♦ You can view plant voltage and load current, view active alarms, perform channel scans, view the Events Log and Alarm Log, view channel statistics, and view battery discharge history.

Restrictions

There are two kits offered for the 19" cabinet. One kit is used with the earlier version cabinet, the other for the later version cabinet.

> 586505000 List 1 cabinets manufactured on or before 3/21/03, use kit P/N 524354 (586505000 List 61).

> 586505000 List 1 cabinets manufactured after 3/21/03, use kit P/N 524353 (586505000 List 60).

The later version cabinet has been modified to allow the LMS1000 Display Interface circuit card to be plugged into the 10th LMS1000 I/O circuit card mounting slot. To determine exactly which kit is compatible with your 19" cabinet, look at the LMS1000 I/O circuit card backplane connectors. If all backplane connectors are uniform, you have the earlier version cabinet and must use kit P/N 524354 (586505000 List 61). If the 10th I/O backplane connector is longer then the others, you have a later version cabinet that uses Kit P/N 524353 (586505000 List 60). See the following illustration.

Requires the right-most I/O circuit card mounting slot.

Requires LMS1000 firmware 5.0.0 or later.

Requires use of the LMS1000 OEM2 Port. CANNOT be used if List 84 ordered.

Not for use in 23" cabinets.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.
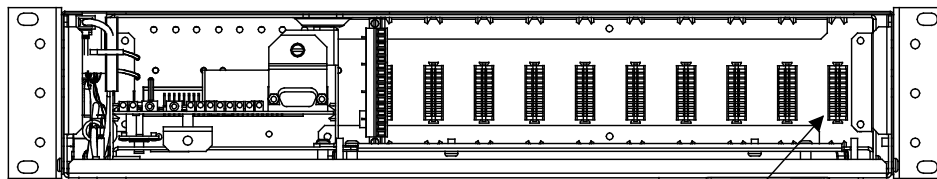
Determines earlier version vs. later version 19" cabinet.

Front Door Opened in Illustration

Earlier Version Cabinet: I/O slot #10 is the same as the other I/O slots.
USE KIT P/N 524354 (586505000 List 61)

Later Version Cabinet: I/O Slot #10 has a larger (30 pos.) connector.
USE KIT P/N 524353 (586505000 List 60)

Ordering Notes

1) Order one (1) List 60 to provide a front panel display and keypad in a later version 586505000 19" cabinets. This option is factory installed if ordered with the system. This option is also field installable.

List 61: LMS1000 Display Option (for use in earlier version 586505000 19" cabinets)

Features

♦ Provides a front panel display and keypad.

♦ Allows local access to the system without a terminal.

♦ You can view plant voltage and load current, view active alarms, perform channel scans, view the Events Log and Alarm Log, view channel statistics, and view battery discharge history.

Restrictions

There are two kits offered for the 19" cabinet. One kit is used with the earlier version cabinet, the other for the later version cabinet.

> 586505000 List 1 cabinets manufactured on or before 3/21/03, use kit P/N 524354 (586505000 List 61).

> 586505000 List 1 cabinets manufactured after 3/21/03, use kit P/N 524353 (586505000 List 60).

The later version cabinet has been modified to allow the LMS1000 Display Interface circuit card to be plugged into the 10th LMS1000 I/O circuit card mounting slot. To determine exactly which kit is compatible with your 19" cabinet, look at the LMS1000 I/O circuit card backplane connectors. If all backplane connectors are

uniform, you have the earlier version cabinet and must use kit P/N 524354 (586505000 List 61). If the 10th I/O backplane connector is longer then the others, you have a later version cabinet that uses Kit P/N 524353 (586505000 List 60). See the above illustration.

Requires LMS1000 firmware 5.0.0 or later.

Requires use of the LMS1000 OEM2 Port. CANNOT be used if List 84 ordered.

Not for use in 23" cabinets.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order one (1) List 61 to provide a front panel display and keypad in an earlier version 586505000 19" cabinets. This option is field installable.

List 62: LMS1000 Display Option (for use in 586505000/586505500 23" cabinets)

Features

♦   Provides a front panel display and keypad.

♦   Allows local access to the system without a terminal.

♦   You can view plant voltage and load current, view active alarms, perform channel scans, view the Events Log and Alarm Log, view channel statistics, and view battery discharge history.

Restrictions

Requires the right-most I/O circuit card mounting slot
(see List 63 for a kit that DOES NOT require the right-most I/O slot).

Requires LMS1000 firmware 5.0.0 or later.

Requires use of the LMS1000 OEM2 Port. CANNOT be used if List 84 ordered.

Not for use in 19" cabinets.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order one (1) List 62 to provide a front panel display and keypad in a 23" cabinet. This option is factory installed if ordered with the system. This option is also field installable.
586505000 List 62 provides a new 23" off-white front panel.
586505500 List 62 provides a new 23" gray front panel.

List 63: LMS1000 Display Option (for use in 586505000/586505500 23" cabinets)

Features

♦   Provides a front panel display and keypad.

♦   Allows local access to the system without a terminal.

♦   You can view plant voltage and load current, view active alarms, perform channel scans, view the Events Log and Alarm Log, view channel statistics, and view battery discharge history.

♦   Similar to List 61 that DOES NOT require the use of the 10th I/O slot.

Restrictions

Requires LMS1000 firmware 5.0.0 or later.

Requires use of the LMS1000 OEM2 Port. CANNOT be used if List 84 ordered.

Not for use in 19" cabinets.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order one (1) List 63 to provide a front panel display and keypad in a 23" cabinet. This option is factory installed if ordered with the system. This option is also field installable.

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586505000 List 63 provides a new 23" off-white front panel.
586505500 List 63 provides a new 23" gray front panel.

List 70: Modem Circuit Card

Features

♦ Provides for remote communications up to 56K BPS.

♦ An RJ-11 jack (for telephone line connection) is provided on the rear of the 586505000/586505500 cabinet. In a Spec. No. 582140000, 582140001, and 582126100 Power System; the RJ-11 jack located on the circuit card is used.

♦ Plugs onto the Main CPU circuit card.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

For use in a 586505000/586505500 Main Cabinet or 582140000/582140001/582126100 Primary Bay only.

Required for remote terminal or pager alarm notification via the System Alarm Reporting and/or Individual User Alarm Reporting mechanisms.

Ordering Notes

1) Order a List 70 modem circuit card if remote communications and/or alarm reporting over a telephone line is required.

List 78: LMS Dual MCA Interface Software Option

Features

♦ Allows the MCA in a Spec. No. 582140000, 582140001, or 582126100 NETSURE Power System (NPS) to interface with the MCA in a Vortex Power System (VPS) via the LMS.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Can only be used in the integrated LMS of a Spec. Nos. 582140000, 582140001, and 582126100 systems.

Operation of Energy Management is disabled when the Dual MCA Interface option is installed.

Ordering Notes

1) Order List 78 if a 582140000, 582140001, or 582126100 system is to interface with an MCA in a Vortex Power System (VPS) via the LMS.

List 79: Gateway Port Software Option

Features

♦ Allows the LMS1000 to emulate a "dumb" RS-232 asynchronous terminal interface. When installed, user input through either a local or remote LMS1000 port is directed to the customer equipment connected to the LMS1000 Gateway port.

♦ When connected to a Lorain SMART DGU, automatically extends some LMS commands to the DGU and returns DGU responses to user port.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

In the 586505000/586505500 system, the Gateway port is provided via the LMS1000 OEM1 port. CANNOT be used if List 85, List 86, or List 88 ordered.

In the Spec. Nos. 582140000, 582140001, and 582126100 Power Systems; the Gateway port is provided via the port located on the front of the LMS1000 CPU circuit card installed in the Primary Bay.

Refer to the "Specifications" section of this document for further restrictions.

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Ordering Notes

1) Order List 79 if a Gateway Port is required.

2) If you are connecting the Gateway Port to a DGU, also order null modem cable P/N 545562 (5') or 548010 (50'). This cable connects between the DGU and the LMS1000.

3) In Power Systems with an integrated controller shelf [NetSure 702, NetSure 801, NetSure 802], connecting the Gateway Port to a DGU requires a straight through cable P/N 548009 be ordered. This cable connects between the DGU COM1 card, Port A, and the LMS RS-232 port located on the front of the LMS card assembly.

List 80: Door Access Controller (DAC) Interface

Features

♦ Configure and monitor the Door Access Controller via LMS1000.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Interfaces to a Desarrollos Digitales Door Access Controller Model MKC-1 only.

The DAC Port is provided via the OEM3 (VPS/NPS) Port. If used with a VPS/NPS, customer must provide a "Y" cable to allow both the Door Access Controller and VPS/NPS to be connected to the LMS1000 OEM3 Port.

Recommended to use a Desarrollos Digitales Isolation Board (Model DTP-1-485 / 96-DC24-T, E) between the DAC and LMS1000.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order List 80 as required.

List 82: PCU/Rectifier Sequencing Software Option

Features

♦ Provides PCU/Rectifier Sequential Start.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Besides the sequencing software option, LMS1000 requires dedicated binary (VPS/NPS and traditional rectifiers) and relay (traditional rectifiers only) inputs/outputs to manage the power plant. See the Wiring section of the Installation Instructions (Section 5879).

The LMS1000 Sequencing feature is not for use in 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order List 82 if PCU/Rectifier Sequencing is required.

2) Order a binary circuit card if spare inputs are not available for a Commercial AC Fail/Transfer Detection input and a Standby On/Proper Operate Detection input. (Binary channel 9011 'All AC Off' may be used as the Commercial AC Fail/Transfer Detection input in a VPS/NPS Power System).

3) Order analog, binary, and relay circuit cards as required when used with 'traditional rectifiers'.

List 83: Energy Management Software Option

Features

♦ Provides PCU/Rectifier Energy Management

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Besides the energy management software option, LMS1000 requires dedicated analog, binary, and relay (traditional rectifiers only) inputs/outputs to manage the power plant. See the Wiring section of the Installation Instructions (Section 5879).

The LMS1000 Energy Management feature is not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order List 83 if PCU/Rectifier Energy Management is required.

2) Order analog, binary, and relay circuit cards as required when used with 'traditional rectifiers'.

List 84: External GPS Modem Interface

Features

♦ Provides access to the LMS1000 via an external GPS Modem.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Interfaces to an Enfora GPS External Modem only.

External Modem Port is provided via the LMS1000 OEM2 Port. CANNOT be used if List 60, 61, 62, or 63 ordered.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order List 84 as required.

List 85: AC Analyzer Interface

Features

♦ LMS1000 reads and records values from the AC Analyzer.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

Interfaces to a Dossena AC Analyzer Model MV3DL only.

AC Analyzer Port is provided via the LMS1000 OEM1 Port. CANNOT be used if List 79, List 86, or List 88 ordered.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order List 85 as required.

List 86: TL1/X.25 Software Option

Features

♦ Provides a TL1/X.25 Interface and RS-232 Port with PAD support.

♦ Refer to the "Specifications" section of this document for further information.

Restrictions

TL1/X.25 Port is provided via the LMS1000 OEM1 Port. CANNOT be used if List 79, List 85, List 88, or List 90 ordered.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order List 86 if TL1/X.25 is required (see also List 90 for another TL1 option).

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List 87: Power Metering Software Option

Features

♦   Refer to the "Specifications" section of this document for further information.

Restrictions

This option must be factory installed, or field installed by Emerson Network Power only. This option can be field installed remotely via dial-up phone lines if your LMS1000 is equipped with a modem or via Ethernet if connected to a TCP/IP network.

Ordering Notes

1)   Order List 87 if Power Metering is required.

2)   Order a List 20 analog circuit card. This analog circuit card provides 4 analog inputs. One will be connected to system voltage. This leaves three for measuring customer loads. Order one additional analog circuit card per four additional customer loads to be monitored. Note that there is also an 8-input analog circuit card (List 22) available which monitors up to eight 50 mv shunts.

3)   Also order one (1) in-line fuse kit to protect the analog leads connected to system voltage. Specify List BE (3/8" ring lug), List BF (5/16" ring lug), or P/N 535135 (1/4" ring lug, 3/8" ring lug, or butt splice).

4)   And order a current limit resistor kit for each customer load to be monitored for power consumption. Specify List BA (3/8" ring lug), List BB (splice), or List BC (ring lug for #10 stud)

List 88: Local Port Redirection to OEM 1 Port Option

Features

♦   Local communications access is provided via the rear OEM 1 port instead of the front panel port.

Restrictions

The local port is redirected to the LMS1000 OEM1 Port. CANNOT be used if List 79, List 85, or List 86 ordered.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1)   Order List 88 if the local port is required to be on the rear of the cabinet instead of on the front.

List 90: TL1 (over Ethernet) Software Option

Features

♦   With the TL1 (over Ethernet) software option, LMS1000 supports TL1 interface in a TCP/IP network. An Ethernet port is provided for this network connection.

♦   Refer to the "Specifications" section of this document for further information.

Restrictions

CANNOT be used if List 86 is ordered.

Ordering Notes

1)   Order List 90 if TL1 (over Ethernet) is required (see also List 86 for another TL1 option).

List 92: MCA Interface Cable, Customer Specified Length

Features

♦   A category 5, four twisted pair conductor, 24 AWG solid copper cable.

♦   Cable connects between the MCA of a Vortex Power System (VPS) or NETSURE Power System (NPS) and the 586505000/586505500 Main Cabinet.

♦   Customer specified length cable.

♦   See also List 94.

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Restrictions

Must be assemble by the customer.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order multiple List 92 as required. Each List 92 provides 5 feet of cable. When ordering multiple List 92, cable is provided uncut.

2) Order cable termination kit per List 93.

List 93: MCA Interface Cable Termination Kit

Features

♦ Consists of one RJ-45 plug, one 9-pin male D-type plug, four snap-in crimp type contacts, and one cable clamp assembly kit.

♦ See also List 94.

Restrictions

Must be assembled by the customer.

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order one (1) List 93 if cable ordered per List 92.

2) Order cable per List 92.

List 94: MCA Interface Cable, Pre-assembled

Features

♦ Cable connects between the MCA of a Vortex Power System (VPS) or NETSURE Power System (NPS) and the 586505000/586505500 Main Cabinet.

♦ 6' long pre-assembled cable.

♦ See also Lists 92 and 93.

Restrictions

Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

Ordering Notes

1) Order one (1) List 94 (a six-foot cable terminated at one end with an RJ-45 plug, and at the other end with a 9-pin male D-type plug). **Note:** Another cable option would be P/N 500819 which is a 1.75' cable terminated at one end with an RJ-45 plug, and at the other end with a 9-pin male D-type plug.

List BA: Current Limit Resistor Kit

Features

♦ Provides one (1) 49.9 Ohm resistor pigtail assembly with a 3/8" ring lug.

♦ Used to protect analog inputs as described under List 20 and List 22 description.

♦ Can also be used to protect binary inputs as described under List 30 and 31 description.

Ordering Notes

1) Order as required.

List BB: Current Limit Resistor Kit

Features

♦ Provides one (1) 49.9 Ohm resistor pigtail assembly with a splice connection.

♦ Used to protect analog inputs as described under List 20 and List 22 description.

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♦ Can also be used to protect binary inputs as described under List 30 and 31 description.

Ordering Notes

1) Order as required.

List BC: Current Limit Resistor Kit

Features

♦ Provides one (1) 49.9 Ohm resistor pigtail assembly with 5/16" ring lug.

♦ Used to protect analog inputs as described under List 20 and List 22 description.

♦ Can also be used to protect binary inputs as described under List 30 and 31 description.

Ordering Notes

1) Order as required.

List BE: In-Line Fuse Kit

Features

♦ Provides one (1) in-line fuse (1A) pigtail assembly with a 3/8" ring lug.

♦ Used to protect analog inputs as described under List 20 and List 23 description.

Ordering Notes

1) Order as required.

List BF: In-Line Fuse Kit

Features

♦ Provides one (1) in-line fuse (1A) pigtail assembly with a 5/16" ring lug.

♦ Used to protect analog inputs as described under the List 20 and List 23 descriptions.

Ordering Notes

1) Order as required.

List ST: Temperature Sensor

Features

♦ Provides one (1) temperature probe to be used with the List 21 temperature input circuit card.

♦ Mounts to a 5/16 or M8 stud.

Restrictions

LMS1000 Temperature Probe Wire Specifications:

• **Preferred** wire is P/N 1562077, 18 Ga. solid twisted pair, maximum length is 200 feet.

• **Optional** wire is P/N 1562001, 20 Ga. shielded twisted pair (shield grounded at one end), maximum length is 100 feet.

Ordering Notes

1) Order List ST as required.

List SU: Temperature Sensor

Features

♦ Provides one (1) temperature probe to be used with the List 21 temperature input circuit card.

♦ Mounts to a 1/4 or M6 stud.

Restrictions

LMS1000 Temperature Probe Wire Specifications:

- **Preferred** wire is P/N 1562077, 18 Ga. solid twisted pair, maximum length is 200 feet.
- **Optional** wire is P/N 1562001, 20 Ga. shielded twisted pair (shield grounded at one end), maximum length is 100 feet.

Ordering Notes

1) Order List SU as required.

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In-Line Fuse Kit, P/N 535135

Features

♦ Provides one (1) in-line fuse (1A) pigtail assembly with a butt splice on one end and the other end unterminated (a butt splice, 1/4" ring lug, and 3/8" ring lug are provided loose to be crimped on the unterminated end as required).

♦ Used to protect analog inputs as described under List 20 and List 23 description.

Ordering Notes

1) Order P/N 535135 as required.

Replacement CPU Memory
Backup Battery

Features

♦ The CPU circuit card employs a 3 volt 170 mAH lithium battery which has a shelf life of ten years. Under typical discharge conditions (25 degrees C), the battery can power the memory for about 5000 hours.

♦ When the lithium battery reaches approximately 2.5 volts; a local indicator illuminates, the Hardware Failure contacts on the Main CPU card change state, and the firmware generates a Self Diagnostic Error. When this happens it means the lithium battery, under typical conditions, will be able to power the memory for about another ten days.

Restrictions

Emerson Network Power recommends that the memory backup battery be replaced once a year.

Ordering Notes

1) Order Part No. 241163100.

LMS1000 Network Cables

Features

♦ Cables to connect the 586505000/586505500 Main Cabinet, 586505000/586505500 Expansion Cabinets, and 586505000/586505500 Expansion Assemblies into the LMS1000 Network.

Restrictions

In Spec. Nos. 582140000, 582140001, and 582126100 Power Systems; order cable options per SAG582140000, or SAG582140001, or SAG582126100.

Ordering Notes

1) Cable options include a standard length cable as specified in a), or a customer specified length of cable as specified in b). The customer must assemble the cable specified in b).

   a) Standard Length Cable:
   Part No. 421842700, a 6 foot long cable terminated at both ends with an RJ-45 plug.
   Part No. 509900, a 4 foot long cable terminated at both ends with an RJ-45 plug.

   b) Cable Only: Part No. 156202100, a category 5, four twisted pair conductor, 24 AWG solid copper cable. Specify length in 5 feet increments (cable is provided uncut). Also order termination kit specified in c).

   c) Cable Termination Kit: Part No. 483589500, consists of two RJ-45 plugs.

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130VDC Monitoring Wire Harness

Features

♦ Cable harness to monitor 130VDC inputs via the LMS1000 List 20 Four (4) Input analog card providing a SELV input of 0-50mVDC.

Restrictions

Requires available input on a List 20 Four (4) Input analog card per measurement.

Ordering Notes

1) Order one (1) P/N 520839 130VDC Monitoring Wire Harness per 130VDC input to be monitored, as required.

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SPECIFICATIONS

1. 586505000/586505500 LMS1000 SYSTEM

1.1 Environmental Ratings

1.1.1 Operating Ambient Temperature Range: -40°C to +60°C (-40°F to +140°F).

1.1.2 Storage Temperature Range: -40°C to +85°C (-40°F to +185°F).

1.1.3 Humidity: This system is capable of operating in an ambient relative humidity range of 0% to 95%, noncondensing.

1.1.4 Altitude: The maximum operating ambient temperature should be derated by 10°C at an elevation of 10,000 feet above sea level. For elevations between 3,000 feet and 10,000 feet, derate the maximum operating ambient temperature linearly.

1.1.5 Safety Compliance:

(A) This unit is UL Recognized to the requirements of UL 1950, Standard for Information Technology Equipment, for use in Telephone, Electronic Data Processing or Information Processing Equipment.

(B) This unit meets the requirements of CSA 22.2, No. 950 and is tested and Certified by UL ("c UR") for use in Telephone, Electronic Data Processing or Information Processing Equipment.

1.2 Firmware Specifications

Note: If connected to an MCA, the MCA Interface provides additional analog and binary channels. These channels are dedicated to monitor predetermined MCA parameters.

1.2.1 The unit supports multiple Users logged in at a time, except as noted in (B) below.

(A) The unit supports fixed IP addresses and does not support the DHCP protocol.

(B) The unit supports a single TELNET session.

1.2.2 Users: 8, maximum.

1.2.3 Analog Channels: 700, maximum, and MCA interface channels.

1.2.4 Binary Channels: 700, maximum, and MCA interface channels.

1.2.5 Function Channels: 64, maximum.

1.2.6 Relay Channels: 100, maximum.

1.2.7 LED Channels: 8, maximum.

1.2.8 Energy Management Channels: 80, maximum.

1.2.9 Groups of Channels: 8, maximum.

1.2.10 Information Pages: 3, maximum.

1.2.11 Status Pages: 16, maximum.

1.2.12 Programmable Commands: 8, maximum.

1.3 Node Specifications

1.3.1 Maximum Number of Nodes Supported: 25.

1.3.2 Maximum Length of Node Cabling:

(A) Node-to-Node: 250 Meters.

(B) Total Wire Length of All Node-to-Node Segments: 450 Meters (1476 Feet).
This is the maximum length of the entire LMS100 Network, and is calculated by adding up the length of every network cable used to interconnect the Main Cabinet, Expansion Cabinets, and Expansion Assemblies. Refer to the Installation Instructions (Section 5879) for cable assembly instructions.

1.4　Software Features

1.4.1　User Interface:　Users can interface with LMS1000 through the local port using a local terminal, through a modem (if optional modem installed), through the Ethernet port via a TELNET session, through the Ethernet port using a MIB browser, or through the Ethernet port over the Internet via a WEB Browser.

The local port default parameters are 8 data bits, 1 stop bit, and no parity. These defaults cannot be changed. The data rate of the local port is software selectable from 110 to 19200 bits/s. The data rate is factory set to 19200 bits/s.

The modem port default parameters are 8 data bits, 1 stop bit, and no parity. These defaults cannot be changed. When answering, the data rate of the internal modem switches to match the incoming call. When reporting, the modem data rate will be set to the speed that is programmed in the user configuration of the user being called. When the modem performs a callback, it will call at the speed it answered at.

A user can also interface with LMS1000 via a Telnet session. The LMS1000 presently supports only one Telnet session at a time. To support a Telnet session or MIB browser access, the unit's IP address must be set using the IP command.

1.4.2　Security:　When a user logs onto the system, the user is prompted to enter a "User Password".

User configurations provide a "User Access Level" which can be used to limit the commands available to a particular user through the local and remote ports.

The SNMP feature does not support multiple access levels.

Added security for Ethernet connections is provided via the user configurable Host address list.

1.4.3　Unit Identification:　Each LMS1000 can be uniquely identified through a programmable unit name, unit number, system identifier (TL1 option), unit header, and unit pager code.

Each LMS1000 is uniquely identified through a programmable unit TCP/IP address.

1.4.4　Alarm Classes:　The alarm class feature allows easier relay and LED programming, and helps classify and identify alarms in system reports and scans. There are eight alarm classes (numbered 1 through 8) available. Individual channel alarms (Analog, Binary, etc.) can be assigned to a particular Alarm Class. This Alarm Class then appears as part of the SCAN, ALARMS, and LOG reports to help identify the type of alarm. Relay control programs can be as simple as R0001 = K2, which means relay channel one will energize when there is an alarm for any channel whose Alarm Class is two.

1.4.5　Introduction to Channels:

(A)　Channel Identification (I/O Numbering Scheme):　The LMS1000 provides **analog** and **binary** input monitoring points, and extended **relay** contact output points. In addition, local front panel programmable **LEDs** are provided. Each input and output point is directly associated with a channel. Thus there are LMS1000 **analog**, **binary**, **relay**, and **LED** channels. In the LMS100, you can combine two or more analog inputs into one **function** channel, and advance software options provide **energy management** channels. This adds **function** channels and **energy management** channels to the list of channel types in the LMS1000.

In the LMS1000 system; the 586505000/586505500 Main Cabinet or 582140000/582140001/582126100 Primary Bay, the 586505000/586505500 Expansion Cabinets or 582140000/582140001/582126100 Secondary Bays, the 586505000/586505500 Expansion Assemblies, and the MCA Interface are referred to as nodes. A node is a grouping of I/O's in a common assembly, cabinet, or bay.

LMS1000 channels are identified through a type designation (A = analog, B = binary, R = relay, L = LED, F = function, and E = energy management), a Node Number (I/O grouping) prefix, and an input/output number. Remember, a particular channel's type

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designation and input/output number is identical to that of the input or output associated to it.

- Installed optional LMS1000 I/O circuit cards in the 586505000/586505500 Main Cabinet or 582140000/582140001/582126100 Primary Bay and each 586505000/586505500 Expansion Cabinet or 582140000/582140001/582126100 Secondary Bay are automatically detected by LMS1000 firmware. Inputs and outputs are automatically assigned consecutive numbers (per cabinet or bay) for each type detected, starting with the circuit card of that type installed in the left most position (as viewed from the front). Types are A for analog, B for Binary, and R for relay. Temperature inputs are mapped to analog channels.

  The Node Number is a fixed number for the 586505000/586505500 Main Cabinet (Node 00), and includes all I/O's associated to the 586505000/586505500 Main Cabinet. For the 582140000/582140001/582126100, Node 00 is the grouping of LMS1000 I/O cards installed in the Primary Bay. Node 00 also includes the LED, Function, and Energy Management channels. For both 586505000/586505500 and 582140000/582140001/582126100, you assign Node Numbers (21-89) to the groupings of LMS1000 I/O cards installed in 586505000/586505500 Expansion Cabinets and 582140000/582140001/582126100 Secondary Bays during the Initial Start-Up procedure.

- Input numbers for the LMS1000 MCA Interface are pre-assigned (The LMS1000 MCA Interface provides additional analog channels and binary channels. These channels are dedicated to the LMS1000 MCA Interface, and are automatically mapped to monitor predetermined MCA parameters.). The Node Number for the LMS1000 MCA Interface is 90 for all Vortex or NETSURE Power Systems except the Spec. Nos. listed next. The Node Number for the LMS1000 MCA Interface to Spec. Nos. 582140000, 582140001, and 582126100 NETSURE Power Systems is 99.

- Input numbers for the LMS1000 Interface to Spec. Nos. 582140000, 582140001, and 582126100 NETSURE Power System Bays are pre-assigned (The LMS1000 Bay Interface provides additional analog channels and binary channels. These channels are dedicated to the LMS1000 Bay Interface, and are automatically mapped to monitor predetermined parameters.). The Node Number for each Bay is 1 through 20, starting with the Primary Bay.

- The LMS1000 also provides self diagnostic alarms on binary channels B0081 through B0099.

Example: A0001,
A represents an analog input/channel
00 represents the 586505000/586505500 Main Cabinet Node or 582140000/582140001/582126100 Primary Bay LMS1000 I/O Grouping Node (cannot be changed)
01 represents input/channel #01

Example: A3001,
A represents an analog input/channel
30 represents the 586505000/586505500 Expansion Cabinet Node or 582140000/582140001/582126100 Secondary Bay LMS1000 I/O Grouping Node set as Node #30 (set when network initially established)
01 represents input/channel #01

Example: A4001,
A represents an analog input/channel
40 represents the 586505000/586505500 Expansion Assembly Node set as Node #40 (set when network initially established)
01 represents input/channel #01

Example: A9001,
A represents an analog input/channel
90 represents the VPS/NPS MCA Node (cannot be changed)
01 represents input/channel #01

Example: A9901,
A represents an analog input/channel
99 represents the NPS MCA Node (cannot be changed)
01 represents input/channel #01

Example: A0101,
A represents an analog input/channel
01 represents the 582140000/582140001/582126100 Primary Bay Node
(cannot be changed)
01 represents input/channel #01

Example: A0201,
A represents an analog input/channel
02 represents an 582140000/582140001/582126100 Secondary Bay Node
(cannot be changed)
01 represents input/channel #01

(B) Channel Configurations: Each channel has certain attributes that are used by the system in the various software features it provides. These attributes are presented to the user in the channel configurations which allow the user to enter specific information pertaining to these attributes.

(1) Analog Channels: These channels monitor a variety of DC voltages or temperatures. Additionally, with external interfaces, these channels can monitor other signals such as AC voltages, current, and oil pressure. Each of the analog channels has four adjustable alarm limits that can be programmed to report an alarm condition, or record this condition for statistical purposes. Alarms can be distinguished as low or high alarms, and an "Alarm Polarity" attribute can be set to further define the alarm.

Note: Channels of the eight input temperature circuit card are assigned as Analog Channels in the system configuration. These inputs can be set to display in Celsius (default) or Fahrenheit.

- **Alarm Polarity Attribute:** Provides means to specify the sign of the signal connected to an analog input. This allows the value of the input signal to be processed correctly for display to the user and for calculation of statistics and alarm limit activation.

  a) **Positive polarity ('+'):** (default value) The value of the input signal is displayed using the sign as provided by the hardware circuitry. The processing of alarm limits and statistics is performed with the most positive value being a 'High' signal and the most negative value being a 'Low' signal.

  b) **b) Negative Polarity ('-'):** The value of the input signal is inverted (multiplied by -1) before it is displayed or used for processing. The processing of alarm limits and statistics is performed with the most negative value being a 'High' signal and the most positive value being a 'Low' signal. For example, given a float voltage of –54.0V, –56.0V is a high limit.

- **Alarm Limit Mode:** Provides means to specify how processing of alarm limits is performed. .

  a) **Normal mode:** (default value) Analog alarm limits are processed using the 'High' and 'Low' values as determined by the analog channel's polarity attribute (discussed above).

  b) **Bipolar mode:** Analog alarm limits are processed using zero as the 'Low' value and the most positive or negative value as the 'High' value. An alarm

(high or low) can only occur if the sign of the alarm limit matches the sign of the reading value.

For example, this may be used in detecting both high charge current and a high discharge current on a battery shunt. Assume a shunt is wired for a negative float current reading, and it has a high alarm limit of –6.0 amps to detect a high float current. It can then also have a high limit of +100.0 amps to detect a high discharge current. So, in this example there are two high alarms, with opposite polarity.

(2) Binary Channels: Typical binary inputs include alarm and status indications, and any input with an on and off state. Each of the binary channels can be programmed to report an alarm condition, or record this condition for statistical purposes.

(3) Energy Management Channels: See description of Energy Management channels under "Software Options" found later in this document.

(4) Function Channels: Two or more constants, analog channels, and/or function channels can be programmed into a single function channel. Examples are using the data from various analog channels to obtain load sums and averages, or multiplying two channels together to obtain a power value. Each of the function channels has four adjustable alarm limits that can be programmed to report an alarm condition, or record this condition for statistical purposes.

(5) LED Channels: Eight programmable status LED indicators are provided on the front of the Main CPU card. These LEDs can be programmed to illuminate red, green, or amber (via the LED channels) at specific events or occurrences.

(6) Relay Channels: Each relay channel can be programmed to activate or deactivate the associated relay at a specific event or occurrence, or to be associated to an energy management channel when the energy management and/or sequencing option is ordered.

Note: Relay channels are not required when the energy management and/or sequencing option is used to control VPS/NPS PCUs.

1.4.6   Groups: The group feature permits organizing analog, binary, function, LED, relay, and energy management channels together under one common name as a group. Each group is programmed with a unique name, and may contain any or all channels. This feature enables the user to extract information concerning the group, such as alarm reports and statistics, by using the group name or number instead of each individual channel name.

1.4.7   Alarm Reporting: The system can be programmed to activate an alarm when the monitored activity connected to any input (or the value of a mathematical expression between various inputs) increases or decreases past a predetermined level, or when any relay or status LED indicator associated with the system energizes or illuminates. When an alarm condition occurs on an input (analog, binary, or function channel), the system can be programmed to notify the user through local visual indicators, extended alarm relay contacts, remote terminal, pager, Email, and/or TL1 network (when TL1 option is ordered). Remote terminal, pager, Email, and/or TL1 network (when TL1 option is ordered) notification of an alarm condition is also available if an alarm condition occurs on an output (relay or LED channel). All system alarms are reported via the SNMP interface.

There are two types of alarm reporting mechanisms available for remote terminal, pager, or Email notification; SYSTEM ALARM REPORTING and INDIVIDUAL USER ALARM REPORTING. System Alarm Reporting has priority over Individual User Alarm Reporting. The system has an automatic log-off feature. This feature will automatically log off a user who is communicating remotely with the system via modem, if the system needs to issue an alarm report to that or another remote terminal via the modem.

In addition to System Alarm Reporting and Individual User Alarm Reporting, TL1 Report Messages are issued via the LMS1000 TL1 port when the TL1 software option is installed.

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The automatic log-off feature mentioned above is automatically disabled for the TL1 port. See the description of the TL1 software option.

See also the description of the SNMP software feature for its alarm reporting mechanisms.

1.4.8   **System Alarm Reporting:** This method is designed to satisfy the requirements of maintenance personnel. In this method, the system as a whole is programmed to report alarm conditions to a specific user (or a sequence of users if the primary user cannot be reached) if an alarm occurs on any channel programmed for System Alarm Reporting. When an alarm condition occurs on a channel configured for System Alarm Reporting, the system attempts alarm notification by either dialing the first user in the predetermined calling sequence or by Emailing the first user. If this user is reached, the alarm report is given in the mode (pager, modem, or Email) configured for the specified user. System Alarm Reporting is considered successful when:

   a) the system connects with a modem or an Email notification is sent to a valid Email address,

       or

   b) the user issues an ACKnowledgement after receiving the alarm notification.

One of the above options is selected during initial system programming. If alarm reporting is not successful, the system continues, calling or Emailing the next specified user. If each user is called or Emailed and an alarm report is not successfully issued, the system waits the specified retry time interval and then repeats the process.

1.4.9   **Individual User Alarm Reports:** This method provides each user with the capability of receiving four different reports, with the first three listed pertaining only to channels that the user has selected. These reports can be delivered by the system to the user through a pager (via modem), remote terminal (via modem), or Email (via Ethernet). These reports are:

   (A) Occurred Alarm Reports: a report of any new alarms that have occurred on the user's channels.

   (B) Retired Alarm Reports: a report of any alarms that have cleared on the user's channels.

   (C) Persistent Alarm Reports: a periodic report of any alarms that still exist on the user's channels.

   (D) Daily Report: The user specifies a standard system command or one of the programmable commands which is issued as this report. The daily report is given at a specific time each day.

1.4.10   **Alarm Cut-Off (ACO):** The alarm cut-off feature enables silencing an external alarm by de-energizing the system alarm relay connected to it. All relays configured for alarm cut-off are de-energized by issuing a command. Another command can be issued to cancel alarm cut-off.

This feature operates by masking (preventing) existing analog and binary alarm conditions from affecting a relay's control program. These alarms are considered cancelled and no longer figure into the evaluation of the relay's control program. Any cancelled alarm that clears and then turns in again DOES have the ability to affect a relay's operation.

A relay channel attribute termed the "Cycle Frequency" is designed for use with external alarm circuitry that has its own alarm cut-off. More specifically, this is for applications where an external ACO has silenced an audible alarm but it is desired to have it turn in again after a preset amount of time. The cycle frequency allows energized system relays to temporarily turn off for 15 seconds, thus providing another "open to close" transition to turn in the audible alarm again.

1.4.11   **Information Pages:** Three user programmable information pages (or screens) can be entered in the system. These information pages can be viewed by any user. These pages can serve as a note pad or location of instructions for users.

1.4.12   **Status Pages:** Sixteen user programmable status pages (or screens) can be formatted in the system. These pages permit the displaying of scan information derived from separate

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channels on a single page format. SCAN information includes the present value and alarm status of a channel, plus other pertinent information.

1.4.13 Programmable Commands: Eight user programmable commands can be entered in the system. A programmable command combines up to eight standard commands into a single command which then can be executed by typing the name given to the programmable command.

1.4.14 Mail: Users have the ability to send mail (messages) to other users, or to themselves.

1.4.15 Alarm Log: The system stores a listing of the 500 latest alarms that have occurred.

1.4.16 Event Log: The system stores a listing of the 500 latest events that have occurred.

1.4.17 Analog Channel Maximum Load Percentages (Rate Report): This feature determines how plant (battery and rectifier) capacities and other sizing limits (fuses, circuit breakers, and wire sizes) are faring under actual load conditions. This feature allows the customer to easily determine the maximum load percentage (that has occurred) versus an analog channel alarm limit. This feature divides the maximum peak value of an analog input and the highest hourly average into a designated alarm limit and presents the results as percentages. These percentages inform the customer how close a channel's peak and high hourly average values are in relation to its alarm limit(s).

1.4.18 Battery Discharge Timer: The LMS1000 can record Battery Discharge History. A Binary, LED, or Relay channel must be identified to monitor the "On Battery" condition. Analog or Function channels must be identified to monitor the Plant Voltage and Plant Load. The Battery Discharge Timer feature displays the last 50 recorded discharges in a tabular format. The information displayed includes the duration of the battery discharge, the time and date at which the discharge began, the lowest recorded plant voltage during the discharge, and the average plant load.

1.4.19 Battery Thermal Runaway: In a VPS/NPS, the LMS1000 is capable of overriding system output voltage (controlled by the MCA) to avoid thermal runaway.

1.4.20 MCA Interface: The MCA Interface allows an LMS1000 User to communicate with the MCA located in a Vortex Power System (VPS) or a NETSURE Power System (NPS). This allows a User to monitor, adjust, and control the VPS/NPS via LMS1000. This interface also enables LMS1000 to control the PCUs in the Power System via the features available in LMS1000. One simple cable connection between the LMS1000 and the MCA completes the interconnections required in a VPS/NPS Power System (except Spec. Nos. 582140000, 582140001, and 582126100). The LMS1000 is factory integrated in a Spec. No. 582140000, 582140001, and 582126100 NETSURE Power System and requires no customer interconnection.

The same tasks accomplished via the MCA local interface pad can be done via the LMS1000. This includes alarm monitoring, system voltage/current monitoring, adjustment of system/alarm circuits, setting system configuration, and setting system calibration. In addition, the LMS1000 automatically maps dedicated analog and binary channels to the Power System. This enables existing LMS1000 features (e.g. alarm log, alarm reporting, analog statistics) to be easily used with the Power System. Also, LMS1000 maintains a history of MCA/Power System configuration and events.

The MCA Interface requires an RS-485 circuit card to be installed on the MCA in the Power System (except Spec. Nos. 582140000, 582140001, and 582126100). Spec. Nos. 582140000, 582140001, and 582126100 MCA Interface is factory integrated and does not require additional hardware.

Note: The MCA interface in a Spec. No. 582140000, 582140001, or 582126100 Power system only supports one (1) MCA "CAN Input/Output" circuit card per bay.

Each task supported by the MCA Interface is listed below (for VPS and NPS Power Systems other than Spec. Nos. 582140000, 582140001, and 582126100).

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Available to all LMS1000 Users via the ALARMS NETSURE Commands

- View Active VPS/NPS System Alarms

- View Active VPS/NPS Subsystem Alarms

- View Active VPS/NPS MCA Alarms

- View Active VPS/NPS Shunt Alarms

- View Active VPS/NPS LVD Alarms

Available to all LMS1000 Users via the SCAN NETSURE Commands

- View VPS/NPS System Status and Alarms…
  System Output Voltage
  Total System Output Current
  Individual System Output Currents (individual shunts)
  Temperature Probe Values and Alarm Status
  System Alarms (includes PCU and Temperature Probe alarms)

- View VPS/NPS Subsystem Status and Alarms (if installed)…
  Subsystem Output Voltage
  Total Subsystem Output Current
  Individual Subsystem Output Currents (individual shunts)
  Subsystem Alarms

- View VPS/NPS PCU Status…
  Total PCU Current
  Individual PCU Currents

- View VPS/NPS Battery Status and Alarms (if battery Shunt PODs installed)…
  Total Battery Current
  Individual Battery Currents
  Battery Alarms

- View VPS/NPS MCA Alarms

- View VPS/NPS LVD Alarms

Available to LMS1000 Users with Access to Level 2
Commands via the PRCONFIG NETSURE Commands

- View VPS/NPS Settings…
  System Float Voltage
  System Test/Equalize Voltage
  System High Voltage Alarm #1
  System High Voltage Alarm #2
  System Battery On Discharge Alarm
  System 50% Battery On Discharge Alarm
  System High Voltage Shutdown
  System Overcurrent Alarm
  System Current Limit
  System Output Voltage Calibration Reading
  NAG Minutes (Audible Alarm Cutoff Reset Time Period)
  Battery Charge Temperature Compensation Module's Calibration Voltage
  Subsystem High Voltage Alarm (if installed)
  Subsystem Low Voltage Alarm (if installed)
  Subsystem Output Voltage Calibration Reading (if installed)
  Subsystem Overcurrent Alarm (if installed)
  Battery Overcurrent Alarm
  Auto Equalize Multiplier
  Digital Temperature Compensation Slope
  Digital Temperature Compensation Maximum Voltage

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Digital Temperature Compensation Minimum Voltage
Battery Current Limit
Relay Test Time
Test/Equalize Timeout
Low Voltage Disconnect "Disconnect" (for each installed LVD)
Low Voltage Disconnect "Reconnect" (for all installed LVDs)
Temperature Probes Alarms

- View VPS/NPS Equipment Inventory...
  PCUs
  System Shunts
  Subsystem Shunts
  Battery Shunts
  LVDs
  Temperature Probes
  Vacant PCU Mounting Positions
  Maximum System Current Capacity
  System Operating Mode (Float or Equalize [forced, manual, timed, auto])
  Temperature Compensation Mode (None, Analog, Digital [Highest, Averaged, Probe #1])
  MCA Customer Text Message (custom name), Spec. No., Serial No., Software Version
  Each PCU Customer Text Message (custom name), Spec. No., Serial No.,
      Output Voltage Rating, Current Rating

Available to Indicated LMS1000 Users via the SET NETSURE Commands

LMS1000 Users with Access to Level 4 Commands

- Set VPS/NPS NAG Minutes (Audible Alarm Cutoff Reset Time Period)

LMS1000 Users with Access to Level 5 Commands

- Set VPS/NPS System High Voltage Alarm #1 Setting

- Set VPS/NPS System High Voltage Alarm #2 Setting

- Set VPS/NPS System Battery On Discharge Alarm Setting

- Set VPS/NPS System 50% Battery On Discharge Alarm (Voltage is Very Low Alarm) Setting

- Set VPS/NPS System Overcurrent Alarm Setting

- Set VPS/NPS Subsystem High Voltage Alarm Setting (if installed)

- Set VPS/NPS Subsystem Low Voltage Alarm Setting (if installed)

- Set VPS/NPS Subsystem Overcurrent Alarm Setting (if installed)

- Set VPS/NPS Relay Test Time

- Set VPS/NPS Temperature Probe Alarms

- Set VPS/NPS Auto Equalize Multiplier

LMS1000 Users with Access to Level 6 Commands

- Set VPS/NPS MCA Remote Access Password

- Set VPS/NPS System Operating Mode (Float or Test/Equalize)

- Set VPS/NPS System Output Voltage Calibration Reading

- Set VPS/NPS Subsystem Output Voltage Calibration Reading (if installed)

- Reset VPS/NPS System Output Voltage Calibration Reading to Factory Default

- Reset VPS/NPS Subsystem Output Voltage Calibration Reading to Factory Default (if installed))

- Set VPS/NPS Analog Battery Charge Temperature Compensation Module's Calibration Voltage

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- Set VPS/NPS Number of 25A, 50A, 100A, and 200A PCU Mounting Positions Available in the System (also custom PCU sizes can be set)

- Reset VPS/NPS Inventory to Reflect Current System Configuration

- Set VPS/NPS System Float Voltage Setting

- Set VPS/NPS System Test/Equalize Voltage Setting

- Set VPS/NPS System High Voltage Shutdown Setting

- Set VPS/NPS System Current Limit Setting

- Set VPS/NPS Low Voltage Disconnect "Disconnect" Settings for all Installed LVDs

- Set VPS/NPS Low Voltage Disconnect "Reconnect" Setting

- Manually Reconnect a Specified LVD.

- Set VPS/NPS PCU Fan Speed (fast, slow)

- Set VPS/NPS PCU Load Share Alarm (on, off)

- Set VPS/NPS PCU State (on, off)

- Set VPS/NPS Digital Battery Charge Temperature Compensation Source (Highest, Averaged, Probe #1)

- Set VPS/NPS Battery Overcurrent Alarm Setting

- Set VPS/NPS Digital Battery Charge Temperature Compensation (Slope, Min. Voltage, Max. Voltage)

- Set VPS/NPS Battery Current Limit

- Set VPS/NPS Test/Eq Timeout

- Set VPS/NPS Individual PCU Custom Text Messages

- Set VPS/NPS Custom Text Message for MCA

- Set VPS/NPS Interface (on, off)

Available to LMS1000 Users with Access to Level 6 Commands via the DOWNLOAD NETSURE , DOWNLOAD TFTP NETSURE , UPLOAD NETSURE , and UPLOAD TFTP NETSURE Commands, respectively

- Download the Configuration of the VPS/NPS to an ASCII File

- Upload a Previously Downloaded Configuration to the VPS/NPS

Each task supported by the MCA Interface is listed below for NPS Power Systems Spec. Nos. 582140000, 582140001, and 582126100.

Available to LMS1000 Users with Access to Level 2 Commands via the PRCONFIG NPS Commands

- View NPS System Float Voltage Setting

- View NPS System Test/Equalize Voltage Setting

- View NPS System High Voltage Shutdown Setting

- View NPS System Current Limit Setting

- View NPS System High Voltage Alarm #1 Setting

- View NPS System High Voltage Alarm #2 Setting

- View NPS System Battery On Discharge Alarm Setting

- View NPS System Voltage is Very Low Alarm Setting

- View NPS System Total Load Current Alarm Setting

- View NPS System Group A Load Current Alarm Setting

- View NPS System Group B Load Current Alarm Setting

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- View NPS System High Temperature Alarm #1 Setting
- View NPS System High Temperature Alarm #2 Setting
- View NPS System Low Temperature Alarm #1 Setting
- View NPS System Low Temperature Alarm #2 Setting
- View NPS NAG Minutes (Audible Alarm Cutoff Reset Time Period) Setting
- View NPS Manual Test/Equalize Time Setting
- View NPS Relay Test Time Setting
- View NPS Auto Equalize Time Multiplier Setting
- View NPS Temperature Compensation Slope Setting
- View NPS Temperature Compensation Maximum Voltage Setting
- View NPS Temperature Compensation Minimum Voltage Setting
- View NPS Inventory

Available to Indicated LMS1000 Users via the SET NPS Commands

LMS1000 Users with Access to Level 4 Commands

- Set NPS NAG Minutes (Audible Alarm Cutoff Reset Time Period)

LMS1000 Users with Access to Level 5 Commands

- Set NPS System Battery On Discharge Alarm Setting
- Set NPS System Voltage is Very Low Alarm Setting
- Set NPS System High Voltage Alarm #1 Setting
- Set NPS System High Voltage Alarm #2 Setting
- Set NPS System Total Load Current Alarm Setting
- Set NPS System Group A Load Current Alarm Setting
- Set NPS System Group B Load Current Alarm Setting
- Set NPS Relay Test Time Setting
- Set NPS System High Temperature Alarm #1 Setting
- Set NPS System High Temperature Alarm #2 Setting
- Set NPS System Low Temperature Alarm #1 Setting
- Set NPS System Low Temperature Alarm #2 Setting
- Set NPS System Power Share Capacity Setting

LMS1000 Users with Access to Level 6 Commands

- Set NPS System Operating Mode (Float or Test/Equalize)
- Turn any Installed NPS PCU On or Off (TR Feature)
- Set NPS MCA Remote Access Password
- Set Custom Text Messages for NPS Elements
- Set NPS System Float Voltage Setting
- Set NPS System Test/Equalize Voltage Setting
- Set NPS System High Voltage Shutdown Setting
- Set NPS System Current Limit Setting
- Perform a Relay Test
- Set NPS Manual Test/Equalize Time Setting
- Set NPS Auto Equalize Time Multiplier Setting

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- Set NPS Temperature Readings to Celsius
- Set NPS Temperature Readings to Fahrenheit
- Set NPS Temperature Compensation Slope Setting
- Set NPS Temperature Compensation Maximum Voltage Setting
- Set NPS Temperature Compensation Minimum Voltage Setting
- Reset NPS Inventory to Reflect Current System Configuration
- Set the following parameters for NPS MCA CAN I/O circuit cards
  - Designate Analog Input as "Auxiliary" or "Distribution"
  - Set the Scale Factor for Analog Input and Output
  - Designate the Alarm State for Binary Inputs
  - Set Custom Text Messages (Names)
  - Enable or disable NPS System Alternate Current Limit operation
  - Set NPS System Alternate Current Limit Capacity setting
  - Set NPS System Sequencing Delay setting

Available to LMS1000 Users with Access to Level 6 Commands via the DOWNLOAD NPS, DOWNLOAD TFTP NPS, UPLOAD NPS, and UPLOAD TFTP NPS Commands, respectively

- Download the Configuration of the NPS to an ASCII File
- Upload a Previously Downloaded Configuration to the NPS

1.4.21 IP Parameters

(A) The system "IP" address can be set.

(B) The "Gateway Address" can be set and listed.

(C) The "Netmask Address" can be set and listed.

1.4.22 WEB Interface

- Allows you to access the LMS1000 over the Internet via a WEB Browser.
- Displays LMS status, statistics, logs, and inventory in WEB pages.
- Displays User configurable status pages and channel groups in WEB pages.
- Edit pages for basic LMS settings, channel configuration, and control programs.
- Requires Google Chrome (version 24.0.1312.57 or later), Firefox (version 18.0.2 or later), or Microsoft Internet Explorer (version 7.0 or later).
- Requires LMS1000 with firmware version 11.0.0.0, or later.

1.4.23 SNMP: LMS1000 supports SNMP (Simple Network Management Protocol) interface in a TCP/IP network. Communications to and from LMS1000 is accomplished via a MIB (Management Information Base) browser. An Ethernet port is provided for this network connection.

(A) SNMP Alarm Reporting via the Ethernet Port: All system alarms are reported via the SNMP interface. Alarms sent via SNMP traps can be configured for three different types. These are …

(1) TRAPS OCCURRED, selects reporting of new system alarms that have occurred.

(2) TRAPS RETIRED, selects reporting of system alarms that have cleared.

(3) TRAPS PERSISTENT, selects periodic reporting of system alarms that still exist. The **Persistent Alarm Period** specifies how frequently the system will attempt a Persistent Alarm Report.

(B) SNMP Parameters:

(1) The "Get" community string can be set and listed.

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(2) The "Set" community string can be set and listed.

(3) The "Traps" community string can be set and listed.

(4) "Trap Addresses" can be added, deleted, and listed. SNMP V1 or V2 traps can be received. The SNMP version of the traps sent are selected through software (V1 or V2).

(5) "Host Addresses" can be added, deleted, and listed.

(6) "Trap Addresses" can be enabled and disabled.

1.5 Available Software Options

1.5.1 Gateway Port Software Option (if installed): The Gateway Software Option allows the LMS1000 to provide an RS-232 terminal interface connection accessible via a user port. When installed, equipment connected to the LMS1000 Gateway port can be accessed by a user through either a local or remote LMS1000 port. A user can then interface to the connected equipment directly using their terminal interface connected to the LMS1000.

Additionally, through the use of a device profile the LMS1000 can perform automatic logon to the device connected to the Gateway Port. This is done with device profile and password parameters supplied in the "CONNECT" command request made by the user to the LMS1000.

Restrictions

- Only one LMS1000 Gateway port supported.
  Only one Gateway port user at a time supported.

- **Session Abort Control:** A Gateway session must be manually terminated using the Gateway session termination escape sequence. The LMS1000 will not detect an abort of the Gateway session by the device connected to the Gateway port, nor is it capable of terminating the session with the device connected to the Gateway port when the LMS1000 session is aborted abruptly.

- **Loss of Carrier:** The LMS1000 will automatically terminate a Gateway Port session established via modem dial up or TELNET in the event of a loss of carrier or network connection.

- **User Timeout:** A Gateway Port session is automatically terminated and the user is returned to the LMS1000 command prompt when the User Timeout Period is exceeded. If a Gateway session was established using a Gateway Profile the LMS1000 will automatically log off of the Gateway device.

- **Alarm Reporting:** When using a dial-up session to communicate with the Gateway port, dial-out alarm notification via LMS1000 is delayed until the Gateway session is terminated and control is returned to the LMS1000.

- With the exception of session inactivity monitoring, any related communications protocol control (i.e., character echoing) will be performed by the device connected to the Gateway port.

- Third party software utilized to communicate with a Gateway Port device will need to first logon to the LMS1000 and enter the CONNECT command. The only exception to this is when the Gateway Port is set to operate in the "Global" mode and a Global command is issued.

- The LMS1000 will not support any third party proprietary communications protocol required to communicate with customer equipment connected to the Gateway port.

1.5.2 Power Metering Software Option (if installed): This option allows accurate metering of power consumed by equipment connected to your power plant. This feature monitors power consumption of up to sixty-four (64) separate pieces of equipment connected to the power plant. Power consumption data is generated and stored for any function channel properly configured for power monitoring. Entering the command POWER generates and displays the power consumption report. This report may also be generated in a "comma separated value"

format which can easily be imported into a spreadsheet for record keeping or presentation purposes. The user is responsible for translating power consumption data into dollars billed.

To use this feature, an analog channel must monitor system voltage and other analog channels must monitor load current for each equipment to be monitored for power consumption. A function channel must be configured for each equipment to be monitored for power consumption by entering the phrase "KW" for the "Unit Text", and entering the appropriate program line to multiply the value of the analog channel monitoring system voltage with the value of the analog channel monitoring load current, then divide this product by 1000 [i.e. F01=(A0001*A0002)/1000]. Instead of dividing by 1000, you could multiply by 0.001 [i.e. F01=A0001*A0002*0.001]

To get a report, enter the command POWER. Any time the POWER command is entered, LMS1000 generates a power consumption report for the function channels and displays the resulting information. For the "comma separated value" format, enter the command POWER CSV. The POWER command is available to a user programmed for access to level 1 commands.

To clear the Power Metering data, enter the command CLR POWER. The CLR POWER command is available to a user programmed for access to level 4 commands.

1.5.3   **Energy Management Software Option (if installed):** The optional energy management programming permits an installation to only operate rectifiers/PCUs as needed to maintain the load and keep batteries in a fully charged condition. As load increases, the energy management feature will turn on additional rectifiers/PCUs as needed in 15 second intervals when load requirements exceed a user selectable percent (90-99%) of the total capacity of the operating rectifiers/PCUs to maintain the load. LMS1000 will also turn off rectifiers/PCUs as necessary in 15 minute intervals if the load decreases below a separate user selectable percent of the total capacity of the would be operating rectifiers/PCUs. Rectifiers/PCUs which are always operating to maintain any load requirements are cycled through the group of rectifiers/PCUs controlled by this feature to provide uniform operating times for each rectifier/PCU. This rotation occurs from 1-365 days (at midnight), as selected by the user. The base rectifier/PCU is rotated decrementally through the group. As an example, first rectifier/PCU 5 was on at all times, at the programmed time interval rectifier/PCU 4 is on at all times, and at the next occurrence of the programmed time interval rectifier/PCU 3 will be on at all times. If energy management is used, all rectifiers/PCUs in the system should be controlled.

Energy Management Channels: A maximum of 80 energy management channels can be programmed, thus LMS1000 can support any combination of up to 80 energy managed rectifiers and PCUs. An energy management channel combines two input channels with a single output channel (rectifier only) per rectifier/PCU to accomplish the task of controlling the rectifiers/PCUs for energy management and sequential start purposes.

Note: *The number of rectifiers that can be controlled is limited to 32 due to the availability of 32 relay channels dedicated for energy management/sequential start. PCUs do not require hard wired relay channels for energy management, hence 80 PCUs may be controlled. Any combination of rectifiers and PCUs may be controlled, up to 80 total, as long as rectifiers don't exceed 32.*

Note: *Operation of Energy Management is disabled when the Dual MCA Interface option is installed.*

1.5.4   **Sequential Start Software Option (if installed):** LMS1000 can support up to 80 sequential start controlled rectifiers/PCUs (see note above). There are two types of optional sequencing available with the sequential start option: commercial AC sequencing and standby sequencing. Commercial AC sequencing permits sequential starting of rectifiers/PCUs assigned to energy management channels when commercial AC input fails and subsequently is restored. When AC power is lost and then resumes, the AC sequencing option turns off all controlled rectifiers/PCUs, and then starts the rectifiers/PCUs sequentially at 15 second

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intervals until all controlled rectifiers/PCUs are operating. This prevents commercial AC power surges which could cause an overload condition possible when several rectifiers/PCUs are started simultaneously. The standby sequencing option prevents similar surges when rectifiers/PCUs are powered from a backup AC source, such as an engine-alternator, after a failure occurs in the commercial AC source. These surges could stall or overload the standby equipment. LMS1000 senses when the commercial AC input fails and immediately turns off all controlled rectifiers/PCUs. It waits a programmed time interval and, when it senses that the standby equipment is operating properly, then sequences the rectifiers/PCUs on at 15 second intervals until all controlled rectifiers/PCUs are operating. When AC input power resumes, commercial AC sequencing as described above occurs. Once all controlled rectifiers/PCUs are restarted, energy management (if supplied) will resume. Rectifier/PCU sequencing has priority over energy management. Both types of sequencing use binary input changes to initiate the sequencer.

The sequencer can also be configured with a Sequencer Failsafe Timer feature. This feature aborts sequencer operation when an external monitoring device controlling sequencer operation fails. The timer starts when LMS1000 detects an AC failure. If the timer expires before a signal is received, indicating that the commercial AC is restored or load was transferred to the standby power source, the following occur: The sequencer is disabled, an entry is made in the event log, the sequencer variables are reset, and all rectifiers/PCUs are turned on. If a signal is received before the timer expires, the timer is deactivated and reset. When the sequencer is disabled, the Set Sequence command must be re-issued to re-activate the sequencer.

Note: Setting the Sequencer Failsafe Timer to zero (0) disables this feature.

The sequencer can also be configured with an AC Restoration Qualification Timer feature. This feature is only available when the INPUT TYPE attribute of the sequencer is configured as a FAIL type, and not as a TRANSFER type. This feature allows the sequencer to turn all rectifiers/PCUs off and start the sequence re-start operation at a specific time interval from when commercial AC is restored. The timer starts when a signal is received indicating that the commercial AC is restored. The standby sequencer (if configured) operates normally until the timer expires. When the timer expires, all rectifiers/PCUs are turned off and the AC sequencer starts. If AC fails before the timer expires, the timer is deactivated.

Note: The AC Restoration Qualification Timer feature should be set to a few seconds less than the actual amount of time required for a proper transfer.

Note: Setting the AC Restoration Qualification Timer to zero (0) disables this feature.

1.5.5   **TL1/X.25 Software Option (if installed):** LMS1000 can operate as a Network Element (NE) in a Network Maintenance and Administration (NMA) system. An NMA is an Operations System (OS) developed by Bell Communications Research (Bellcore).

This software option provides support to the specific TL1 commands and messages listed in the Commands Chapter of the User Instructions (Section 5847). This option also provides an asynchronous RS-232 port connection. The port is designed to provide an interface to a network device which converts the asynchronous output to X.25 packets. The packets can then be sent out across the network to an operations center or user console.

The terms Access Identifier, LMS1000 Access Identifier, and LMS1000 Sub-Access Identifier are described as follows.

Access Identifier: In a Network Maintenance and Administration (NMA) system, a unique access identifier (AID) is used to identify each entity contained within the system. LMS1000 must be configured to allow a single access identifier to be used to access and report on an NMA system entity which may consist of a multiple of sub-entities, each monitored by a variety of LMS1000 channels. This is accomplished by configuring LMS1000 access identifiers and LMS1000 sub-access identifiers as described next. A list of suggested access identifiers and sub-access identifiers appears in TA-NWT-001360, Table 4-1.

LMS1000 can be set to use an "AID delimiter". When enabled, the LMS1000 access identifier

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field and the LMS1000 sub-access identifier field in all responses to TL1 commands and reports containing a TL1 access identifier field is separated by a hyphen. The use of an "AID delimiter" (a hyphen) can be enabled or disabled, as described in "Setting the TL1/X.25 Port Parameters" of the System Configuration Chapter in the Installation Instructions (Section 5879).

LMS1000 Access Identifier: Thirty-two (32) LMS1000 access identifiers are available. The LMS1000 access identifier is used to uniquely identify a system entity (such as a power plant).

LMS1000 Sub-Access Identifier: The LMS1000 sub-access identifiers are used to uniquely identify each sub-entity of an entity (such as each rectifier, each battery string, etc. contained in a power plant).

The association between all LMS1000 channels monitoring an individual rectifier, an individual battery string, etc. is made by configuring each channel monitoring this individual sub-entity with a unique sub-access identifier name. This is done when the individual LMS1000 channels are configured.

Thus all LMS1000 channels monitoring rectifier one may be configured with the sub-access identifier name RECT1. All LMS1000 channels monitoring rectifier two may be configured with sub-access identifier RECT2. All LMS1000 channels monitoring battery string one may be configured with the sub-access identifier BATSTR1. All LMS1000 channels monitoring battery string two may be configured with sub-access identifier name BATSTR2. Etc.

Now, to associate the sub-entities (each rectifier, each battery string, etc.) to the entity (the power plant), you configure the access identifier to include all LMS1000 channels monitoring this entity and any sub-entity contained within. This is done through the use of the LMS1000 command SET AID.

TL1 Report Messages: When used in a TL1 network, each user is provided with the capability of receiving TL1 report messages pertaining only to channels that the user has selected. These messages are delivered by the LMS1000 to the user via the TL1 port. These messages are:

(A) Report Alarm Messages: A Report Alarm message is issued when a user channel configured with the notification code attribute "CR", "MJ", or "MN" alarms or retires.

(B) Report Event Messages: A Report Event message is issued when a user channel configured with the notification code attribute "NA" alarms or retires.

(C) Report Condition Messages: A Report Condition message is a periodic report on all alarms for user channels configured with the notification code "CR", "MJ", "MN", or "NA" that have not cleared since the last report was issued. If the report condition interval is set to a value of zero, this type of report message is disabled.

1.5.6 **TL1 (over Ethernet) Software Option (if installed):** Same as TL1/X.25 Software Option (see Paragraph 1.5.5) except TL1 support is provided via the LMS1000 Ethernet port.

1.5.7 **LMS Dual MCA Interface Software Option (if installed):** This option allows a Spec. No. 582140000, 582140001, and 582126100 NETSURE Power System (NPS) to be integrated with an existing Vortex Power System.

Requires LMS Firmware version 9.0.1.2 or later.

The option allows system control and monitoring functions to be performed through a single controller. System related data parameters from the Vortex system are passed to the NPS controller (MCA). System settings are controlled by the NPS MCA and can be changed either directly at its front panel interface or indirectly with the LMS's 'SET NPS' commands.

Status of the Vortex Power System parameters are still accessible using the Vortex System front panel display or associated LMS commands. Changes in settings not associated to system control can be modified through the LMS's 'SET VORTEX' commands. VPS parameter readings and status are assigned to LMS nodes ninety and ninety-one. Refer to *Accessing a Vortex Power System* in the OPERATION Chapter of the LMS User's Manual (Section 5847) for a list of the specific parameter channel assignments.

System settings can be changed using one of two methods.

- The front panel interface of the NPS main bay. The LMS detects that the setting has been changed on the NPS's front panel and also changes the associated setting of the VPS.

- The LMS's command line interface using the 'Set NPS' commands. The LMS requests the NPS to change the setting and upon verification the associated VPS setting is updated.

The following VPS readings and statuses are communicated to the NPS controller via the LMS-NPS LISP communications link.

- The VPS '*Total PCU Current'* reading (LMS function channel sixty-four program line must be 'F64 = A9005'). The value is summed into NPS *Total PCU Current* parameter reading (associated LMS channel A9902).

- The VPS '*Total System Current'* reading (LMS function channel sixty-three program line must be 'F63 = A9002'). The value is summed into NPS *Total Load Current* parameter reading (associated LMS channel A9903).

- The number of failed VPS PCUs. The NPS uses this to determine the System PCU Major and System PCU Minor alarms.

- The VPS '*Fuse Alarm*' status (LMS LED channel seven program line must be 'L7 = B9010'). The status must be configured in the NPS controller function definition to create an alarm indication.

- The VPS '*AC Fail Alarm'* status (LMS LED channel eight program line must be 'L8 = B9011'). The status must be configured in the NPS controller function definition to create an alarm indication.

- The VPS *'System Major'* and *'System Minor'* (the associated LMS channels (B9015 and B9016) must have the 'Alarm Class' parameter configured for LMS Alarm Class 'MAJOR and MINOR' respectively).

1.6   Specialty Interfaces

1.6.1   Door Access Controller (DAC) Interface: Provides interface to a Door Access Controller via the LMS1000 OEM3 Port.

- The DAC can be configured and monitored via LMS1000.

- Provides dual control of the door latch (LMS1000 and DAC Keypad). Keypad access can be enabled and disabled via LMS1000.

- Provides LMS1000 Binary Channels to monitor DAC Communications, Strike Failure, Forced Entry, Invalid DAC PIN List, and a Door Open Alarm.

- Provides LMS1000 Event Log entries for each valid and invalid Key Codes entered.

- Key codes can be SET, DELETED, LISTED. DAC access via key codes can be enabled and disabled.

- Status of door and electric strike can be viewed.

- An LMS1000 Relay will be used to allow remote control of the Door Latch in the event the DAC fails. The LMS1000 Relay will be controlled via two user configurable LMS1000 commands to open the door and lock the door.

1.6.2   External GPS Modem Interface: Provides interface to an external modem via the LMS1000 OEM2 Port.

1.6.3   AC Analyzer Interface: Provides interface to an AC Analyzer via the LMS1000 OEM1 Port.

- Provides LMS1000 Analog Channels to display the various parameters monitored by the AC Analyzer. Provides an LMS1000 Binary Channel to monitor the communications path to the AC Analyzer.

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2. 586505000/586505500 LMS1000 MAIN CABINET

2.1 Input Ratings

2.1.1 Input Voltage Range: 20 - 60 Volts DC.

2.1.2 Maximum Input Current: 0.7 Amperes.

2.2 Mounting

2.2.1 586505000 List 1: Furnished reversible mounting angles permit mounting in a 19" or 23" wide relay rack with 1" or 1-3/4" multiple drilling. **586505000 and 586505500 List 2:** Furnished mounting angles permit mounting in a 23" wide relay rack with 1" or 1-3/4" multiple drilling.

2.2.2 Mounting angles may be re-positioned for flush front mounting, 5-inch front projection mounting, or 6-inch front projection mounting.

2.3 I/O Circuit Card Mounting Positions

2.3.1 Provides for mounting of any combination of I/O (analog, binary, relay, and temperature) circuit cards. CARDS MUST BE LOADED LEFT TO RIGHT (AS VIEWED FROM THE FRONT OF THE CABINET). DO NOT SKIP SLOTS.

2.3.2 Contains ten (10) I/O circuit card mounting slots.

2.4 CPU Circuit Card, Part No. 545476 (used in 586505000/586505500) and 545558 (used in 582140000, 582140001, and 582126100)

2.4.1 General: The CPU circuit card contains the system's firmware, a power supply circuit, communications circuits, and programmable local LED indicators. This circuit card can be equipped with a piggy-back modem circuit card.

2.4.2 Processor: MC 68EN302 - 20MHz.

2.4.3 SRAM - Data: 2M bytes.

2.4.4 Flash - System: 1M bytes.

2.4.5 Flash - Application: 3M bytes.

2.4.6 Real-Time Clock: The time base for the operating system comes from a real time clock. This integrated circuit is totally self-contained and does not require any calibration. Accuracy=10 PPM (27 seconds per month) or better at nominal temperature.

2.4.7 Low Lithium Battery Detection Circuit: Illuminates a local LED indicator for low lithium battery indication.

2.4.8 Communications:

Note: The following ports may be different when the LMS1000 is used in a Spec. No. 582140000, 582140001, or 582126100 Power System. Refer to the 582140000, 582140001, or 582126100 system documentation.

(A) Local Port (RS-232): A front panel 9-pin female D-type jack is provided. This jack is configured as a DCE (Data Communication Equipment). Refer to Table 1 for pin assignments.

Note: When List 88 is ordered, the port on the front of the 586505000/586505500 cabinet is inactive, and the local port is redirected to OEM1 located on the rear of the cabinet. The configuration of the OEM1 port in this application is as shown in Table 2.

(B) Modem Port: An internal 56K bps modem circuit card can be installed onto the CPU circuit card. The modem circuit card connects to an RJ-11 phone jack located on the rear of the system cabinet for customer phone line connection.

(C) Ethernet Port: A rear panel RJ-45 10BaseT jack is provided. This jack has a standard Ethernet pin configuration scheme, twisted pair.

(D) OEM1 Port (RS-232): A 9-pin female D-type jack is provided on the rear panel of the 586505000/586505500 cabinet. This jack is configured as a DTE (Data Terminal Equipment). Refer to Table 2 for pin assignments. The port's function is determined by the LMS1000 Software Options or LMS1000 Specialty Interface Options installed.

(E) OEM2 Port (RS-232/RS-422): A 9-pin female D-type jack is provided on the rear of the 586505000/586505500 cabinet. This jack is configured as a DTE (Data Terminal Equipment). This port is software selectable to provide either an RS-232 or an RS-422 connection. Refer to Tables 3 and 4 for pin assignments. The port's function is determined by the LMS1000 Software Options or LMS1000 Specialty Interface Options installed.

(F) OEM3 VPS/NPS Port (RS-485): A 9-pin female D-type jack is provided on the rear of the 586505000/586505500 cabinet. This jack is used to connect LMS1000 to an MCA located in a Vortex Power System (VPS) or NETSURE power System (NPS). The port's function is also determined by the LMS1000 Software Options or LMS1000 Specialty Interface Options installed. Refer to Table 5 for pin assignments.

(G) LMS1000 Network Ports: Four RJ-45 jacks are provided for interconnecting Expansion Cabinets and Expansion Assemblies into the LMS1000 network. Refer also to Paragraph 1.3 "Node Specifications".

Port Pin Number	Application	Input/Output
1	-	-
2	Transmitted Data (TxD)	Output from System
3	Received Data (RxD)	Input to System
4	Data Set Ready (/DSR)	Output from System
5	Signal Ground (Gnd)	-
6	Data Terminal Ready (/DTR)	Input to System
7	Clear to Send (/CTS)	Input to System
8	Request to Send (/RTS)	Output from System
9	-	-

Note: *When List 88 is ordered, the port on the front of the cabinet is inactive, and the local port is redirected to OEM1 located on the rear of the cabinet. The configuration of the OEM1 port in this application is as shown in Table 2. List 88 cannot be used in conjunction with List 85 (AC Analyzer Interface) or List 86 (TL1/X.25).*

Table 1
Front Panel Local Port (9-Pin Female D-Type Jack) Pin Assignments
RS-232 Configured as DCE

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Port Pin Number	Application	Input/Output
1	-	-
2	Received Data (RxD)	Input to System
3	Transmitted Data (TxD)	Output from System
4	Data Terminal Ready (/DTR)	Output from System
5	Signal Ground (Gnd)	-
6	Data Set Ready (/DSR)	Input to System
7	Request to Send (/RTS)	Output from System
8	Clear to Send (/CTS)	Input to System
9	-	-

Table 2
OEM1 Port (9-Pin Female D-Type Jack) Pin Assignments
RS-232 Configured as DTE

Port Pin Number	Application	Input/Output
1	Data Carrier Detect (/DCD)	Input to System
2	Received Data (RxD)	Input to System
3	Transmitted Data (TxD)	Output from System
4	Data Terminal Ready (/DTR)	Output from System
5	Signal Ground (Gnd)	-
6	Data Set Ready (/DSR)	Input to System
7	Request to Send (/RTS)	Output from System
8	Clear to Send (/CTS)	Input to System
9	-	-

Table 3
OEM2 Port (9-Pin Female D-Type Jack) Pin Assignments
Software Selected for RS-232 Connection, Configured as DTE

Port Pin Number	Application	Input/Output
1	Received Data (RxD-)	Input to System
2	Received Data (RxD+)	Input to System
3	Transmitted Data (TxD+)	Output from System
4	Transmitted Data (TxD-)	Output from System
5	Signal Ground (Gnd)	-
6	Handshake Out (HSO-)	Output from System
7	Handshake Out (HSO+)	Output from System
8	Handshake In (HSI+)	Input to System
9	Handshake In (HSI-)	Input to System

Table 4
OEM2 Port (9-Pin Female D-Type Jack) Pin Assignments
Software Selected for RS-422 Connection, Configured as DTE

Port Pin Number	Application	Input/Output
1	--	--
2	Transmitted Data (TxD)	Output from System
3	Received Data (RxD)	Input to System
4	--	--
5	Signal Ground (Gnd)	--
6	--	--
7	--	--
8	--	--
9	--	--

Table 5
OEM3 Port (9-Pin Female D-Type Jack) Pin Assignments
RS-485 Configured as DCE

2.4.9   Controls and Indicators: The following controls and indicators are provided on the CPU circuit card. Refer to the Operating Chapter in the User Instructions (Section 5847) for descriptions and locations.

(A) Eight Programmable LED Indicators: Programmable for illumination event and color (red, amber, or green)

(B) One Programmable Switch (can be used in program lines)

(C) One CPU Reset Pushbutton Switch

(D) One CPU/Hardware Fail LED Indicator

(E) One Power On / Low Lithium Battery LED Indicator

2.4.10   External CPU/Hardware Fail Alarm Contacts: A single set of Form-C relay contacts change state when a hardware failure activates one or more of the hardware fail channels. In the LMS1000, these channels are B0081 through B0099. These contacts are rated for 0.6A at 125 VAC, 0.5A at 110 VDC, and 2.0A at 30 VDC.

2.4.11   Watchdog Circuit: A watchdog circuit constantly monitors program execution and issues a system reset if it appears the processor is "lost". If the processor is still not functioning after the first reset, the circuit automatically shuts down the system by performing a permanent system reset. This permanent reset can be cleared by momentarily depressing the CPU RST (reset) pushbutton switch.

2.4.12   Memory Backup Battery: All of the information that is programmed by the customer is stored in RAM memory on the CPU circuit card. When power is removed, the real time clock and RAM memory are backed up by a lithium battery and a .1 farad capacitor. The capacitor actually serves two purposes. First, when the memory and clock are on backup power, the capacitor supplies the load (for about 20 minutes) before the battery takes over. This reduces the drain on the battery which helps lengthen its life. Second, when a battery is removed, the capacitor continues to supply power until the new battery is installed. Thus, the contents of the clock and memory are preserved while the lithium battery is being replaced.

2.5   LMS1000 Front Panel Display Option

2.5.1 Provides a front panel vacuum florescent display (VFD) and keypad.

- The VFD is a 4-line, 20-character display.
- The keypad consists of 12 keys; numbers 0 through 9, ENTER, and MENU. The following numeric keys also function as arrow keys: 2 = UP, 8 = DOWN, 4 = LEFT, 6 = RIGHT.

2.5.2   Provides read only access to view plant voltage and load current, view active alarms, perform channel scans, view the Events Log and Alarm Log, view channel statistics, and view battery discharge history.

2.5.3   Requires LMS1000 firmware version 5.0.0 or later.

2.5.4   List 60 and List 62 require I/O card slot #10. List 61 and List 63 use an interconnect harness in lieu of the 10th I/O slot.

2.5.5   Not for use in Spec. Nos. 582140000, 582140001, and 582126100 Power Systems.

2.6 **Optional Modem Circuit Card, Part No. 508951**

2.6.1   **General:** Provides for remote communications at 56K bps.

2.6.2   Compatible with CCITT V.22, Bell 212A, and Bell 103 standards.

2.6.3   DTMF and pulse dialing.

2.6.4   FCC Part 68 Registered.

2.6.5   **Theory of Operation**

Refer to Figure 1 for a flow diagram depicting modem operation.

Note: *Additional features (i.e. error control, data compression, etc.) supported by remote modem must be deactivated. Refer to operating manual supplied by modem manufacturer.*

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Report to be Made

Modem goes Off-Hook

Dial Tone Detected within 5 Seconds ?

NO → Terminate Call Attempt, Modem goes On-Hook, Report Attempt Failed

YES

Dial Phone Number

Answer Tone Detected within 1 Minute ?

NO → Terminate Call Attempt, Modem goes On-Hook, Report Attempt Failed

YES

Attempt to Establish Communication with Remote Modem

Communications Established ?

NO → Terminate Call Attempt, Modem goes On-Hook, Report Attempt Failed

YES

Give Reports

More Reports to Make ?

YES

NO

Attempt Remote Modem Logon, See Remote Modem Logon Procedure (Sheet 3)

Remote Logon Successful ?

NO

YES

Command Mode

Terminate Communication Session

Figure 1 (Sheet 1 of 3)
Modem Operation - Modem Calling Procedure

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Ring Signal Detected
by Modem Card

Programmed
Number of
Rings Detected
?

NO → No Further
Action Taken

YES

Modem goes
Off-Hook

Carrier Detected
within 1 Minute
?

YES → Attempt to Establish
Communication with
Remote Modem

Communications
Established
?

YES

NO

NO

Terminate
Answer Attempt,
Modem goes
On-Hook

Prompt User for
Logon Password

Figure 1 (Sheet 2 of 3)
Modem Operation - Modem Answer Procedure

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Continued from
Modem Calling Procedure
(Sheet 1)

Output Logon
Prompt "ENTER
PASSWORD"

Carriage Return
Detected within
10 seconds
?

NO

Remote Logon
Unsuccessful

YES

Valid Password
Detected
?

NO

Password Entry
Attempt < 3
?

YES

NO

YES

Remote Modem
Logon Successful

Figure 1 (Sheet 3 of 3)
Modem Operation - Remote Modem Logon Procedure

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3. **586505000/586505500 LMS1000 EXPANSION CABINET**

   3.1 **Input Ratings**

      3.1.1 **Input Voltage Range:** 20 - 60 Volts DC.

      3.1.2 **Maximum Input Current:** 0.7 Amperes.

   3.2 **Mounting**

      3.2.1 **586505000 List 6:** Furnished reversible mounting angles permit mounting in a 19" or 23" wide relay rack with 1" or 1-3/4" multiple drilling. **586505000 and 586505500 List 7:** Furnished mounting angles permit mounting in a 23" wide relay rack with 1" or 1-3/4" multiple drilling.

      3.2.2 Mounting angles may be re-positioned for flush front mounting, 5-inch front projection mounting, or 6-inch front projection mounting.

   3.3 **I/O Circuit Card Mounting Positions**

      3.3.1 Provides for mounting of any combination of I/O (analog, binary, relay, and temperature) circuit cards. CARDS MUST BE LOADED LEFT TO RIGHT (AS VIEWED FROM THE FRONT OF THE CABINET). DO NOT SKIP SLOTS.

      3.3.2 Contains ten (10) I/O circuit card mounting slots.

   3.4 **CPU Circuit Card, Part No. 506153 (also used in 582140000, 582140001, and 582126100 Secondary Bays)**

      3.4.1 **General:** The CPU circuit card contains the LMS1000 Expansion firmware, a power supply circuit, and communications circuits.

      3.4.2 **Processor:** TMPN3150 - 10MHz.

      3.4.3 **SRAM - Data:** 32K bytes.

      3.4.4 **Flash - System:** 128K bytes.

      3.4.5 **LMS1000 Network Ports:** Four RJ-45 jacks are provided for interconnecting Expansion Cabinets and Expansion Assemblies into the LMS1000 network.

      3.4.6 **Controls and Indicators:** The following controls and indicators are provided on the CPU circuit card. Refer to the Operating Chapter in the User Instructions (Section 5847) for descriptions and locations.

         (A) One Power On LED Indicator

         (B) One CPU Fail LED Indicator

         (C) One CPU Hardware Reset Pushbutton Switch

4. **586505000/586505500 LMS1000 EXPANSION ASSEMBLY**

   4.1 **Input Ratings**

      4.1.1 **Input Voltage Range:** 20 - 60 Volts DC.

      4.1.2 **Maximum Input Current:** 0.2 Amperes.

   4.2 **Mounting**

      4.2.1 Customer mounted. See "Overall Dimensions (Expansion Assembly)" under PHYSICAL SIZE INFORMATION section for details.

   4.3 **I/O Connector Pinouts**

      4.3.1 See "Connector Locations (Expansion Assembly)" under PHYSICAL SIZE INFORMATION.

   4.4 **CPU Circuit, P/O Part No. 507606**

      4.4.1 **General:** The CPU circuit contains the Expansion Assembly's firmware, a power supply circuit, and communications circuits.

      4.4.2 **Processor:** TMPN3150 - 10MHz.

      4.4.3 **SRAM - Data:** 32K bytes.

      4.4.4 **Flash - System:** 128K bytes.

      4.4.5 **Analog Inputs:** Provides twenty-four (24) 50mv shunt inputs. ±0.1% from -40°C to +65°C.

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Common mode voltage between inputs must not exceed –0.15 to +0.95 volts.

4.4.6   **Binary Inputs:** Provides eight (8) binary inputs.

(A) Single-ended input connections, return is –BAT.

(B) Input State: An applied voltage of 12 to 60 volts, DC, is defined as the CC (contact closed) state. An applied voltage of 2.0 volts or less is defined as the CO (contact open) state. Voltages between 2.0 and 12 volts are undefined.

4.4.7   **LMS1000 Network Port:** One RJ-45 jack is provided for interconnecting into the LMS1000 network.

5.   INPUT/OUTPUT (I/O) CIRCUIT CARDS

5.1   Four (4) Input Analog Circuit Card, Part No. 506336

5.1.1   **General:** Adds four (4) analog inputs to the system.

5.1.2   **Inputs:** Monitors 0-50 mv DC (shunts), 0-100 mv DC (shunts), 0-20 ma current loop signals, and voltages from 0 to 60 volts DC. Each input is jumper selectable for either shunt, current loop, or voltage. Two sets of terminals provided for each input. One set for connection of 0-60 volts DC. The other set for connection of 50 mv shunts, 100 mv shunts, and 20 ma current loops.

5.1.3   **Channel-to-Channel Isolation:** 60 volts, maximum. Inputs are isolated from each other via an A/D converter block operating from an isolated power supply.

5.1.4   **20ma Input:** Polarity Sensitive.

5.1.5   **Update Frequency:** Once every 4 seconds.

5.1.6   **Accuracy:**

(A) Large Signal Inputs (error in absolute volts)

(1) 5 to 60 VDC @ +25°C: ±0.04V

(2) 5 to 60 VDC @ -40°C to +85°C: ±0.06V

(3) 0 to 5 VDC @ +25°C: ±0.002V

(4) 0 to 5 VDC @ -40°C to +85°C: ±0.006V

(B) Small Signal Inputs (error as % of transducer full scale)

(1) 20 ma current loop transducers @ -40°C to +85°C: ±0.1%

(2) 50 mv and 100 mv shunts @ -40°C to +85°C: ±0.1%

5.2   Eight (8) Input Analog Circuit Card, Part No. 514528

5.2.1   **General:** Adds eight (8) analog inputs to the system.

5.2.2   **Inputs:** Monitors 0-50 mv DC (shunts).

Common mode voltage between inputs must not exceed –0.15 to +0.95 volts.

5.2.3   **Channel-to-Channel Isolation:** Not Provided. All 8 channels are referenced to the CH-1 return lead (TB1-2)

5.2.4   **Update Frequency:** Once every 2 seconds.

5.2.5   **Accuracy:** @ -40°C to +85°C: ±0.1% (error as % of transducer full scale [50mv]).

5.3   Twelve (12) Input Analog Circuit Card, Part No. 520838

5.3.1   **General:** Adds twelve (12) analog inputs to the system.

5.3.2   **Inputs:** Monitors individual battery cell voltages.

5.3.3   **Update Frequency:** 10 seconds.

5.3.4   **Maximum Cell Voltage:** 2.5 volts.

5.4   Four (4) Input Binary Circuit Card, Part No. 506332

5.4.1   **General:** Adds four (4) binary inputs to the system. Double-ended input connections.

5.4.2   **Maximum Input Voltage:** 60 volts DC.

5.4.3   **Channel-to-Channel Isolation:** 60 volts, maximum.

5.4.4   **Input State:** An applied voltage of 12 to 60 volts, DC, is defined as the CC (contact closed) state. An applied voltage of 2.0 volts or less is defined as the CO (contact open) state. Voltages between 2.0 and 12 volts are undefined.

5.4.5   **Alarm State:** Either the CC or CO state may be configured as the alarm state.

5.5   **Eight (8) Input Binary Circuit Card, Part No. 506334**

5.5.1   **General:** Adds eight (8) binary inputs to the system. Single-ended input connections.

5.5.2   **Maximum Input Voltage:** 60 volts DC.

5.5.3   **Channel-to-Channel Isolation:** 60 volts, maximum.
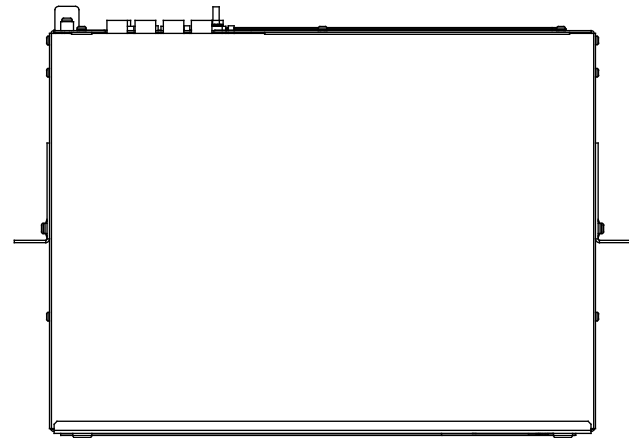
5.5.4   **Input State:** An applied voltage of 12 to 60 volts, DC, is defined as the CC (contact closed) state. An applied voltage of 2.0 volts or less is defined as the CO (contact open) state. Voltages between 2.0 and 12 volts are undefined.

5.5.5   **Alarm State:** Either the CC or CO state may be configured as the alarm state.

5.6   **Four (4) Output Form-C Relay Circuit Card, Part No. 506335**

5.6.1   **General:** Adds four (4) Form-C relay output contacts to the system.

5.6.2   **Relay Contacts:** 4 sets.

5.6.3   **Contact Arrangement:** Form-C.

5.6.4   **Contact Rating:** Contacts are rated for 0.6A at 125 VAC, 0.5A at 110 VDC, 2.0A at 30 VDC.

5.6.5   **Channel-to-Channel Isolation:** 177 volts, maximum.

5.7   **Eight (8) Input Temperature Circuit Card, Part No. 506333**

5.7.1   **General:** Adds eight (8) temperature inputs to the system.

5.7.2   **Accuracy:** ±0.5°C, from -10°C to +85°C.

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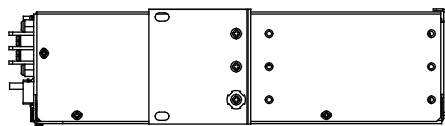Issue AZ, April 7, 2014

PHYSICAL SIZE INFORMATION

Overall Dimensions
(586505000 Main [List 1] and Expansion [List 6] Cabinets)
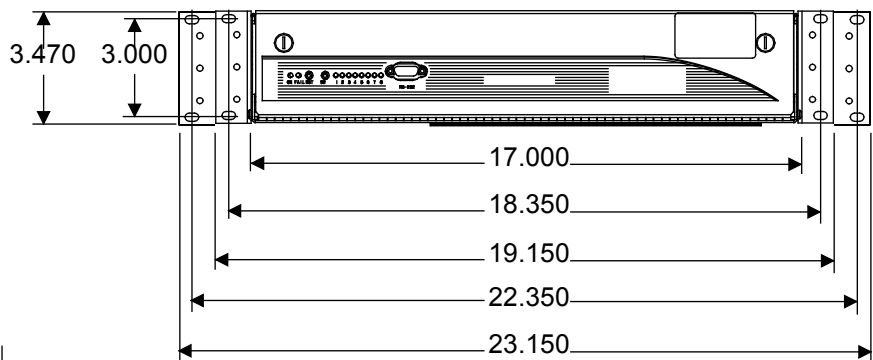
NOTES

1. All Dimensions are in Inches
   Unless Otherwise Specified

2. Finish: Off-White (M500-117)

3. Weight in Lbs
   Cabinet
      Net: 17
      Shipping: 21
   Circuit Cards, Maximum, Each
      Net: 0.5
      Shipping: 1.5

4. Mounting Angles May Be Positioned Flush
   Front Mounting, 5-Inch Front Projection
   Mounting or 6-Inch Projection Mounting

TOP VIEW

LEFT SIDE VIEW

3.470   3.000

17.000
18.350
19.150
22.350
23.150

FRONT VIEW

5.000
6.000
12.500
13.250

RIGHT SIDE VIEW

REAR VIEW

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Overall Dimensions
(586505000/586505500 Main [List 2] and Expansion [List 7] Cabinets)

NOTES

1. All Dimensions are in Inches
   Unless Otherwise Specified

2. Finish: Off-White (M500-117) for 586505000
            Textured Gray (M500-147) for 586505500

3. Weight in Lbs
   Cabinet
      Net: 17
      Shipping: 21
   Circuit Cards, Maximum, Each
      Net: 0.5
      Shipping: 1.5

4. Mounting Angles May Be Positioned Flush
   Front Mounting, 5-Inch Front Projection
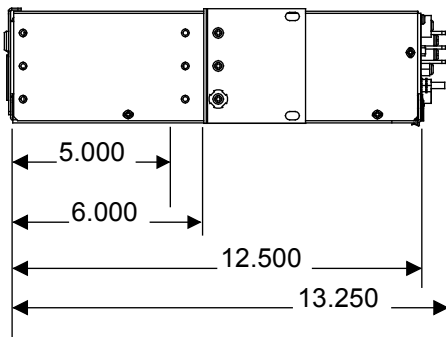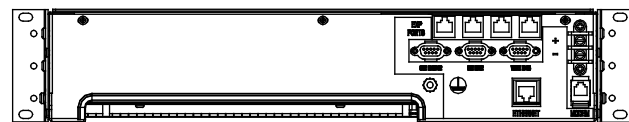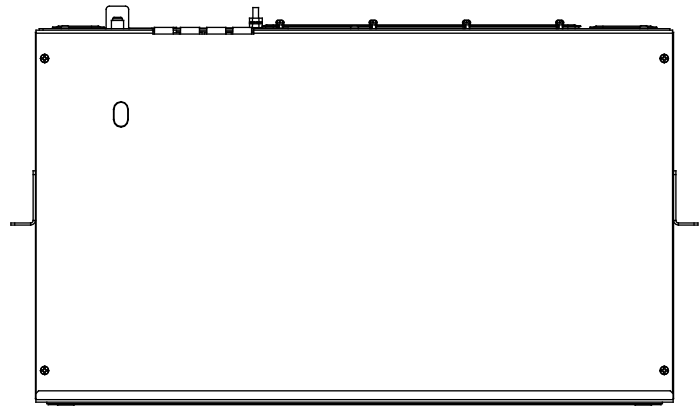   Mounting or 6-Inch Projection Mounting

TOP VIEW

LEFT SIDE VIEW

3.470   3.000

21.380
22.250
23.000

FRONT VIEW

5.000

6.000

12.500

13.250

RIGHT SIDE VIEW

REAR VIEW

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Overall Dimensions (586505000/586505500 Expansion Assembly)

TOP VIEW
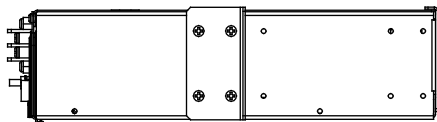
LEFT
SIDE
VIEW
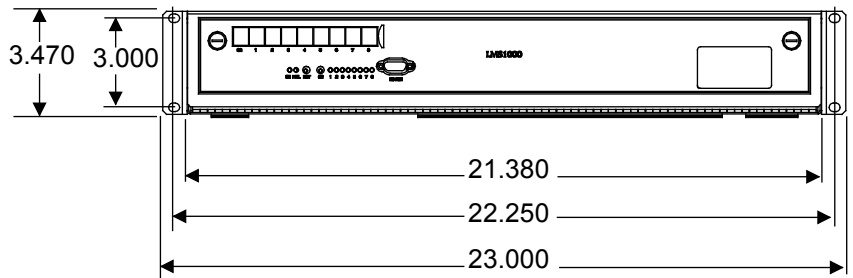
FRONT VIEW
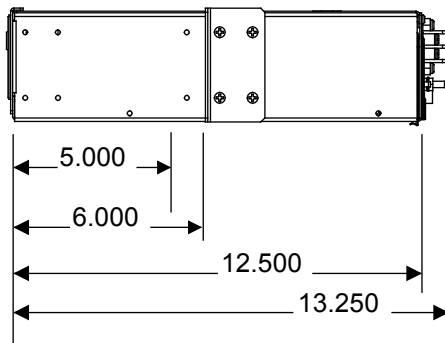
RIGHT
SIDE
VIEW
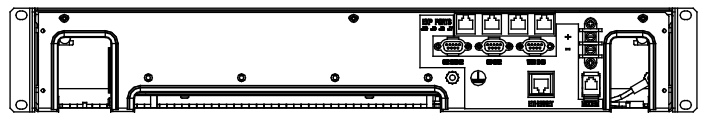
0.218 x 0.375
Slot (5) Places

0.218 Dia.
Hole (1) Place

0.218D
Slot (8) Places

2.41   0.56   0.56   1.63   1.63   0.56   0.56

1.189

3.96

4.878

5.500

9.060
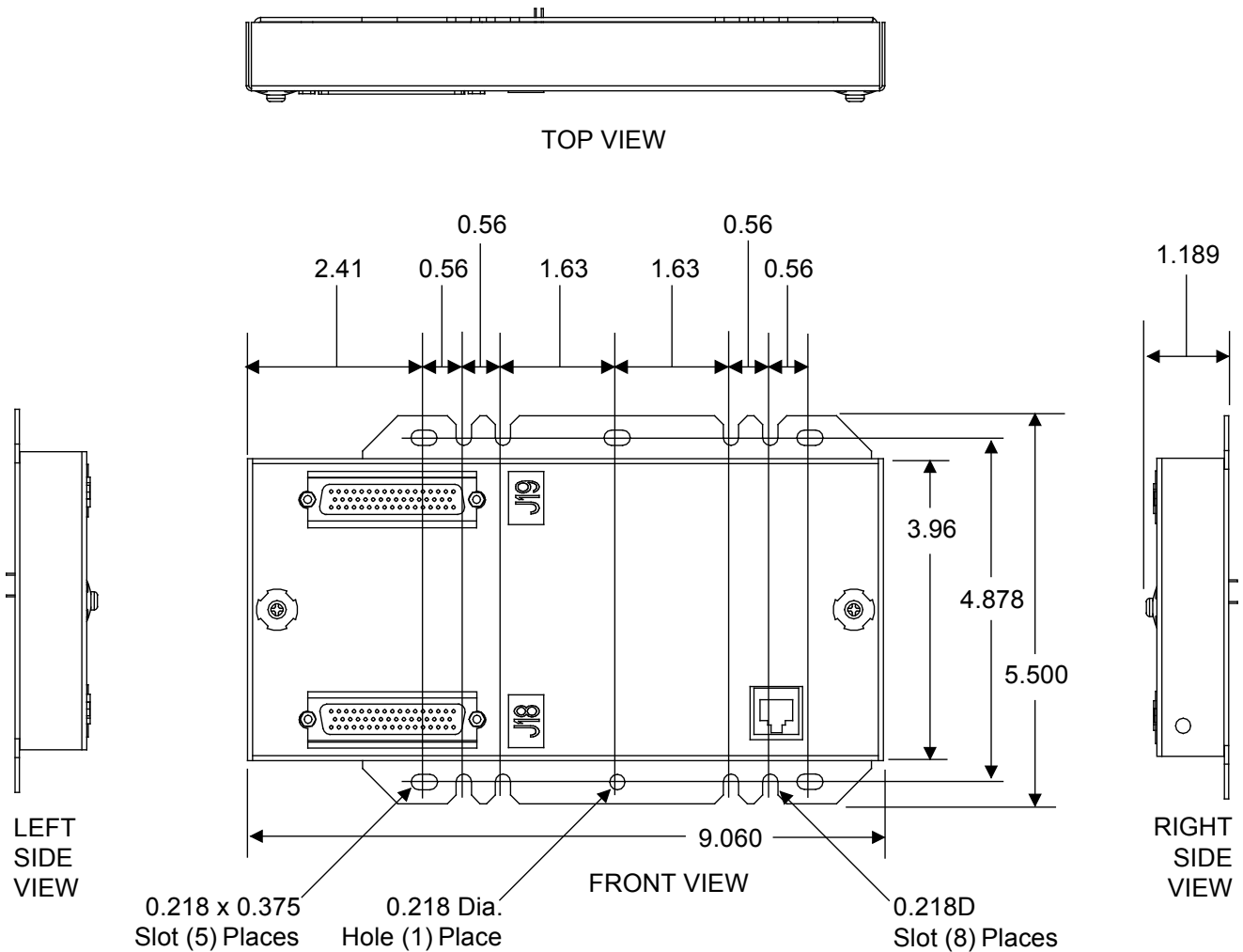
NOTES

1. All Dimensions are in Inches
   Unless Otherwise Specified

2. Finish: Off-White

3. Weight in Lbs
   Net:
   Shipping: 3

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Connector Locations (586505000/586505500 Main Cabinet)
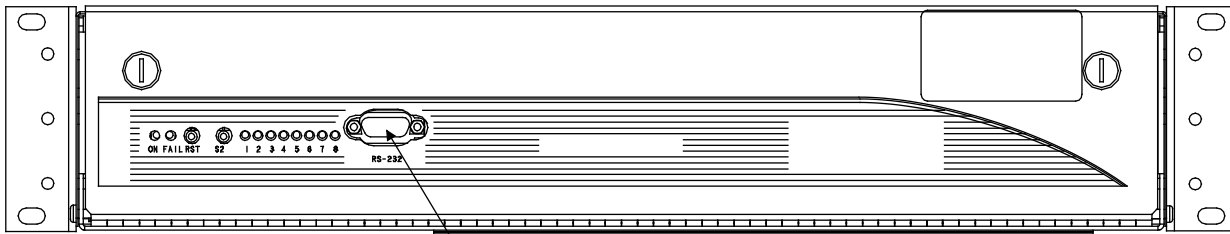
Front View
(Main Cabinet)
(19" Cabinet Shown)

RS-232
(Located on CPU Circuit Card,
Accessible through Front Door)
9-Pin Female D-Type Connector

For Local Terminal Connection

5   1

9   6

* Communications Ports
9-Pin Female D-Type Jacks

List 85:
AC Analyzer Port
or
List 86:
TL1/X.25 Port
or
List 88:
Local Port Redirection
or
List 79:
Gateway Port

Always Vortex
(VPS) Port
and
List 80:
Door Access Controller Port
(use 'Y' cable to also connect
VPS to same port)
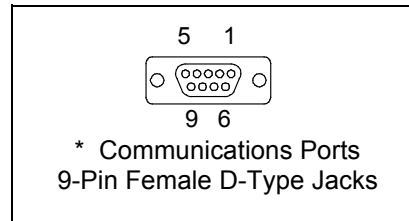
List 60/61:
LMS Front Panel Display Port
or
List 84:
External GPS Modem Port

RS-232/422
OEM 2 Port*

RS-232
OEM 1 Port*

RS-485 (Vortex)
OEM 3 Port*

RJ-45
System
Network
Ports
(Expansion
Ports)

Shelf Grounding
Stud (10-32)

DC Input
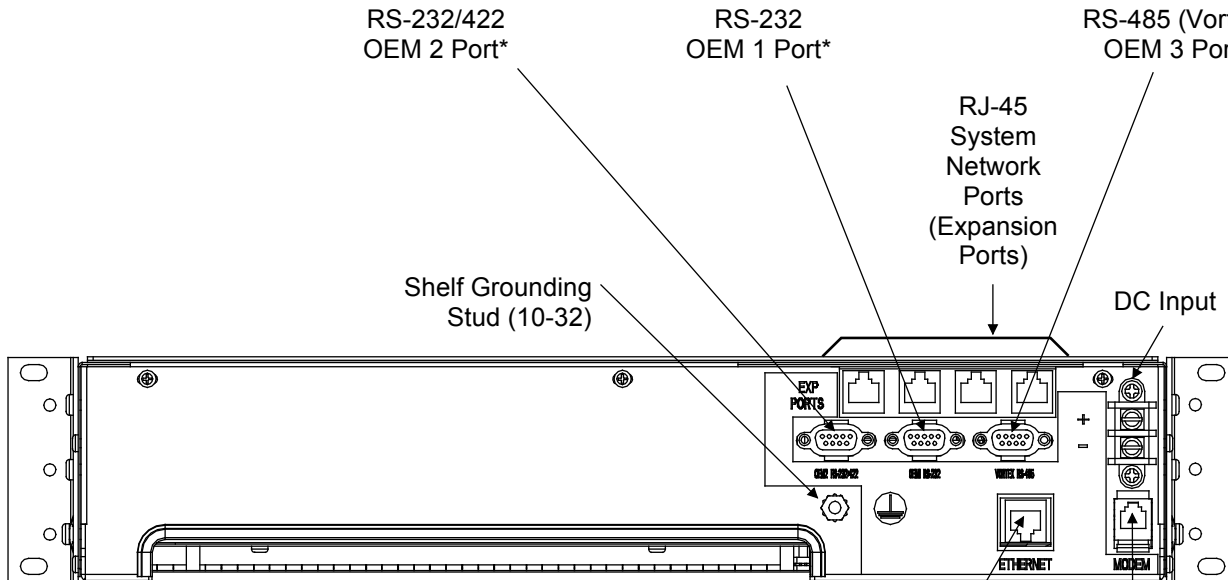
Rear View
(Main Cabinet)
(19" Cabinet Shown)

Access Opening and Cable Channel
for Connections to I/O Circuit Cards
and External CPU/Hardware Fail Alarms

RJ-45
ETHERNET
Port

RJ-11
Phone Line
(active only if
modem installed)
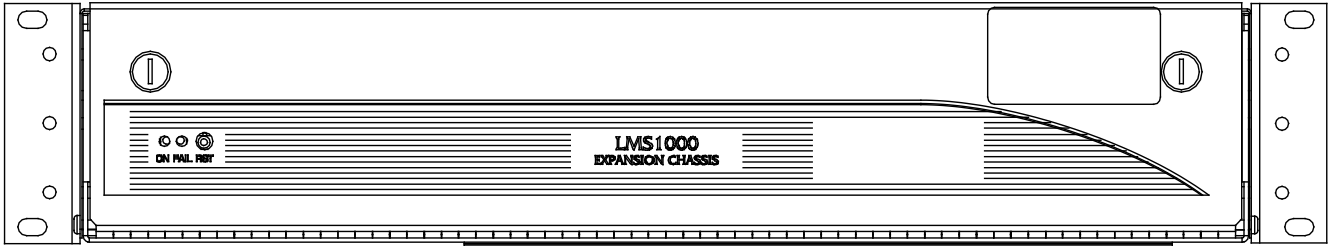
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Connector Locations (586505000/586505500 Expansion Cabinet)

Front View
(Expansion Cabinet)
(19" Cabinet Shown)
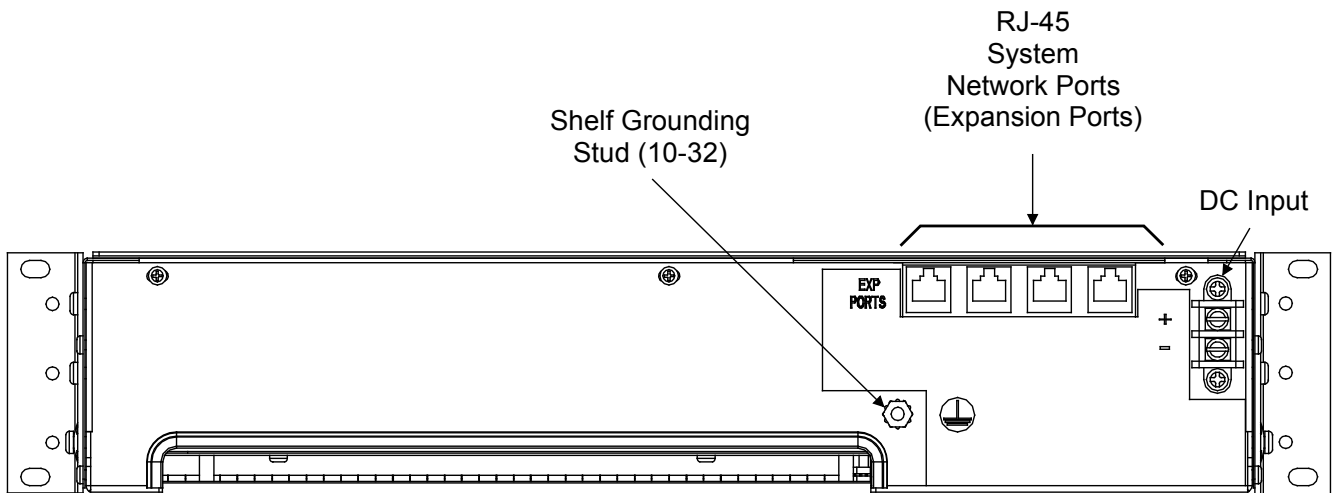
RJ-45
System
Network Ports
(Expansion Ports)

DC Input

Shelf Grounding
Stud (10-32)

Rear View
(Expansion Cabinet)
(19" Cabinet Shown)

Access Opening and Cable Channel
for Connections to I/O Circuit Cards

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Connector Locations (586505000/586505500 Expansion Assembly)

I/O Ports
J19

34
18
1

50
33
17

J19

17
33
50

1
18
34

J18

I/O Ports
J18

RJ-45
System
Network Port
(Expansion Port)

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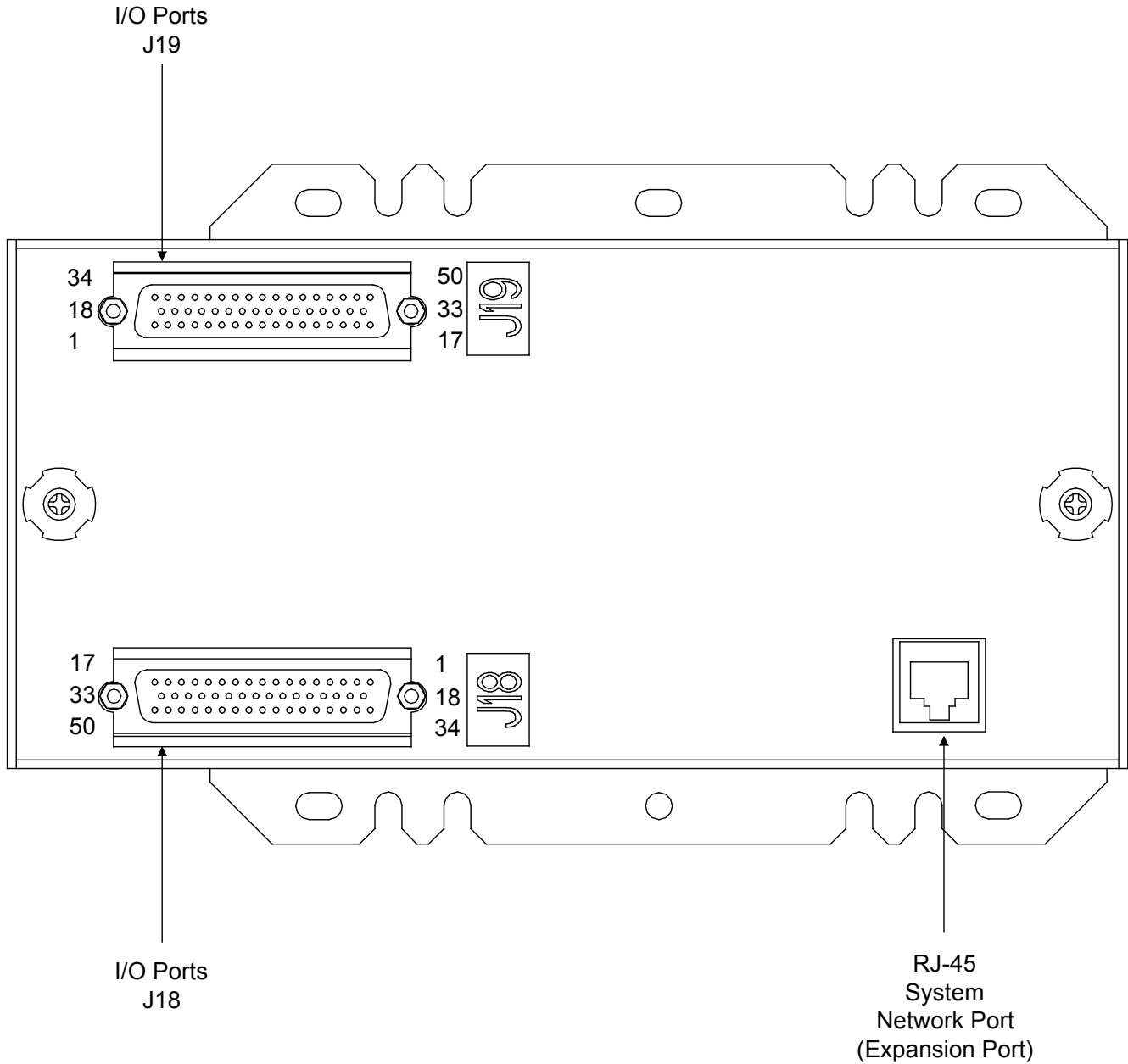
CONNECTOR J18 PIN	FUNCTION	CONNECTOR J18 PIN	FUNCTION
1	Binary Input Channel 4	26	Shunt Input, Channel 4 (+)
2	Binary Input Channel 3	27	Shunt Input, Channel 2 (−)
3	Binary Input Channel 1	28	Shunt Input, Channel 1 (+)
4	Battery Return	29	not used
5	Battery	30	not used
6	Circuit Ground	31	not used
7	Shunt Input, Channel 8 (+)	32	not used
8	Shunt Input, Channel 6 (−)	33	not used
9	Shunt Input, Channel 5 (+)	34	Frame Ground
10	Shunt Input, Channel 3 (−)	35	Frame Ground
11	Shunt Input, Channel 2 (+)	36	Binary Input Channel 6
12	not used	37	Binary Input Channel 8
13	not used	38	not used
14	not used	39	not used
15	not used	40	not used
16	not used	41	Shunt Input, Channel 7 (−)
17	not used	42	Shunt Input, Channel 6 (+)
18	Binary Input Channel 5	43	Shunt Input, Channel 4 (−)
19	Binary Input Channel 7	44	Shunt Input, Channel 3 (+)
20	Binary Input Channel 2	45	Shunt Input, Channel 1 (−)
21	Battery Return	46	not used
22	Battery	47	not used
23	Shunt Input, Channel 8 (−)	48	not used
24	Shunt Input, Channel 7(+)	49	not used
25	Shunt Input, Channel 5 (−)	50	not used

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CONNECTOR J19 PIN	FUNCTION	CONNECTOR J19 PIN	FUNCTION
1	Shunt Input, Channel 23 (−)	26	Shunt Input, Channel 12 (+)
2	Shunt Input, Channel 22 (+)	27	Shunt Input, Channel 9 (−)
3	Shunt Input, Channel 20 (−)	28	Shunt Input, Channel 9 (+)
4	Shunt Input, Channel 19 (+)	29	not used
5	Shunt Input, Channel 17 (−)	30	not used
6	Shunt Input, Channel 17 (+)	31	not used
7	Shunt Input, Channel 15 (−)	32	not used
8	Shunt Input, Channel 14 (+)	33	not used
9	Shunt Input, Channel 12 (−)	34	Shunt Input, Channel 24 (−)
10	Shunt Input, Channel 11 (+)	35	Shunt Input, Channel 24 (+)
11	Shunt Input, Channel 10 (−)	36	Shunt Input, Channel 21 (−)
12	not used	37	Shunt Input, Channel 20 (+)
13	not used	38	Shunt Input, Channel 18 (−)
14	not used	39	Shunt Input, Channel 16 (+)
15	not used	40	Shunt Input, Channel 14 (−)
16	not used	41	Shunt Input, Channel 13 (+)
17	not used	42	Shunt Input, Channel 11 (−)
18	Shunt Input, Channel 23 (+)	43	Shunt Input, Channel 10 (+)
19	Shunt Input, Channel 22 (−)	44	not used
20	Shunt Input, Channel 21 (+)	45	not used
21	Shunt Input, Channel 19 (−)	46	not used
22	Shunt Input, Channel 18 (+)	47	not used
23	Shunt Input, Channel 16 (−)	48	not used
24	Shunt Input, Channel 15 (+)	49	not used
25	Shunt Input, Channel 13 (−)	50	not used

RELATED DOCUMENTATION

Schematic Diagram: SD586505000/SD586505500

Instructions: Section 5847 (LMS1000 User Instructions)
                          Section 5879 (LMS1000 Installation Instructions)

                          Section 5877 (582140000 NetSure Power System User Instructions)
                          Section 5876 (582140000 NetSure Power System Installation Instructions)

                          Section 6016 (582140001 NetSure Power System User Instructions)
                          Section 6017 (582140001 NetSure Power System Installation Instructions)

                          Section 6027 (582126100 NetSure Power System User Instructions)
                          Section 6028 (582126100 NetSure Power System Installation Instructions)

                          Section 5942 (586505000 List 60 and 586505000/586505500 List 62
                          Front Panel Display Option Instructions)

                          Section 5943 (586505000 List 61 and 586505000/586505500 List 63
                          Front Panel Display Option Instructions)

                          Section 5944 (LMS1000 I/O Circuit Cards Installation Instructions)

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REVISION RECORD

Issue	Change Number (ECO)	Description of Change	Date	Approved
AT	LLP212240	LMS Dual MCA Interface Software Option added. Spec. No. 582126100 added. LPS (Lorain Power System) changed to NPS (NETSURE™ Power System). Vortex® Power System (VPS) changed to NETSURE™ Power System (NPS).	04/15/2009	John Jasko
AU	LLP213082	Updates for LMS Firmware 9.1 and MCA version 2.2.	05/10/2010	John Jasko
AV	LLP214281	Updates for LMS Firmware 10.1.	11/11/2010	J. Kirkpatrick
AW	LLP215817	Use new cable 548009 and 548010	06/03/2011	Khristebelle Ilagan
AX	LLP215777	Update Tyco connector parts	07/06/2011	Khristebelle Ilagan
AY	LLP218383	LMS WEB pages updated.	05/09/2013	John Jasko
AZ	LLP220044	LMS WEB pages updated V12.0.	04/07/2014	John Jasko
				John Jasko Apr 17, 2014
				David Essi Apr 17, 2014

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EnergyNet: Secure.EmersonNetworkPower.com

EMERSON
Network Power