Lucent Technologies
Lineage® 2000
ECS Controller Options

Notice:
Every effort was made to ensure that the information in this document was complete and accurate at the time of printing. However, information is subject to change.

Table of Contents

4   *Operation*

Appendix H   Programing Control Relays

Appendix I   Available Voice Commands

Appendix J   Periodic Status Dial-Out

Appendix K   TL1 (Transaction Language 1) Command Supported By the ECS Controller

List of Figures

List of Tables

1   *Introduction*

*General
Information*

This manual (Lucent Technologies 167-790-109) describes the ECS Microprocessor Option Board, Datalogger Option Board, and the Voice Response Option, which are available separately or together with the ECS Basic Controller.

The Microprocessor Board, designated CP2, is designed to augment the basic centralized monitoring, control and reporting functions of the Evolutionary Control System (ECS) Basic Controller, allowing both local and remote access to the system. This allows central control of unmanned sites, reducing the need for costly visits. A Lineage® 2000 ECS Controller is shown in Figure 1-1.
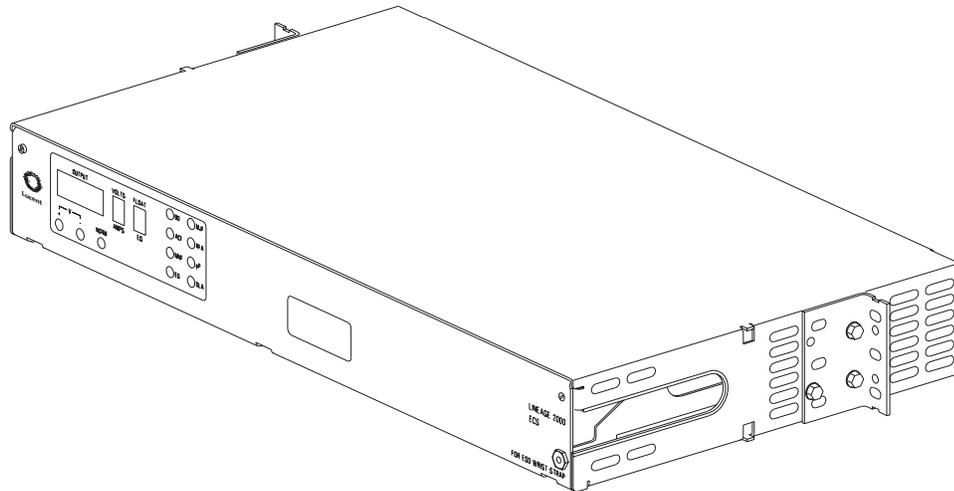
Figure 1-1: Lineage® 2000 ECS Controller

The Voice Response Option, available on CP2, is accessible from a standard Touch-Tone® telephone anytime and anywhere. This feature further extends the reporting functions of ECS by eliminating the need for a data terminal at a remote location.

The Datalogger Monitoring Option, designated CP3, is designed to extend the data acquisition and control capabilities of CP2 and provide flexible, cost-effective power plant monitoring.

Installation of the circuit packs for these options is simple, quick, and requires no special training. Operation of the monitoring system is easy to learn, since on-screen instructions walk the user through each function.

Further information on the basic controller is contained in its product manual.

This manual combines all available user documentation on the ECS system options and should supersede any previously issued documents.

Technical Support

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

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

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

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

Central and South America

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

Europe, Middle East, and Africa	If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.
Asia Pacific Region	If you need product technical support, contact your local Field Support/Regional Technical Assistance Center or contact your sales representative who will be happy to discuss your specific needs.

Product Repair and Return

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

USA, Canada, Puerto Rico, and the US Virgin Islands	For information on returning of products for repair, customers may call 1-800-255-1402 for assistance.
Central and South America	If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.
Europe, Middle East, and Africa	If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.
Asia Pacific Region	If you need to return a product for repair, your sales representative will be happy to discuss your individual situation.

Customer Service

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

2   *Product Description*

ECS Microprocessor (CP2) Specifications

Table 2-A: CP2 Specifications

Operating Voltage	-40.0 to -60.0 volts dc (-48 volts dc nominal)* +/-20.0 to +/-30.0 volts dc (+/-24 volts dc nominal)*
Input Power	10.0 watts maximum
Microprocessor	Motorola 68000 16-bit, 8 Mhz clock speed
Local Port	RS-232 serial port, auto-baud select: 1200, 2400, 4800, 9600 bps
Remote Port	J11 4-wire telephone jack
TL1 Port	RS-485 serial port with operating range of 4000 feet (1212 meters): 300, 600, 1200, 2400, 4800, 9600 bps
Modem	Auto-baud select: 300, 1200 bps; Hayes compatible modems
Supported Terminals	AT&T/Teletype 4425, 5410, 5420, 5425 AT&T 610, 615, and 710 DEC VT100 or compatibles American National Standards Institute (ANSI) compatibles
Plant Shunt Compatibility	50 millivolts at 300, 600, 1200, 2000, 2600, 4000, 6000 or 8000 amps

Table 2-A: CP2 Specifications

Replacement Battery	For CP2s coded BAB1 or BAB2, Sanyo CR 1/3 - N or Duracell DL 1/3 - N For CP2s coded BAB1B or BAB2B, Panasonic BR2032
Temperature	32 to 122 degrees Fahrenheit (0 to 50 degrees Celsius)
Altitude	-200 to 13,000 feet (-61 to 3962 meters) For altitudes of 5000 to 13,000 feet (1524 to 3962 meters), derate maximum temperature by 3.8 degrees Fahrenheit (0.656 degrees Celsius) per 1000 feet (304 meters) above 5000 feet (1524 meters).
Humidity	10% to 95% noncondensing
Electrostatic Discharge	IEC 801-2 Level 5 (15kV) at 40% relative humidity
Radiated & Conducted	FCC Level A Emissions
Electromagnetic Immunity	10 V/m over the range of 20 to 2000 Mhz
*Two types of CP2 are available. One operates from -48Vdc nominal, the other from either +24Vdc or -24Vdc nominal.	

ECS Datalogger (CP3) Specifications

Table 2-B: CP3 Specifications

Analog Inputs:	Total of 16, each usable for binary or analog inputs Relay Scanner Floating differential inputs True RMS ac readings
Maximum Interval for each channel:	Once every 12 seconds nominal
Maximum Input Voltage:	150 Vac or dc in common mode or differential mode

DC Accuracy

Table 2-C: DC Accuracy

Range	Maximum Input Magnitude	Resolution	Analog Reading Accuracy*	Full Scale Accuracy
±150 mV	150 mV	7.5 μV	±(0.1% Reading + 3 digits)	±0.19 mV
±6 V	6 V	0.3 mV	±(0.1% Reading + 3 digits)	±0.0073 V
±60 V	60 V	3 mV	±(0.1% Reading + 3 digits)	±0.073 V
±150 V	150 V	7.5 mV	±(0.1% Reading + 3 digits)	±0.19 V
*Requires two external 31.6K, 2 watt, 1% resistors per channel. <R>1 digit = 0.007% of full scale.				

AC Accuracy

Table 2-D: AC Accuracy

Range	Maximum Input Magnitude	Resolution	RMS Reading Accuracy†	Full Scale Accuracy2 0-100HZ‡
±6 V	6 V	0.3 mV	±(0.7% Reading + 5 digits)	±0.0425 V
±60 V	60 V	3 mV	±(0.7% Reading + 5 digits)	±0.425 V
±150 V	150 V	7.5 mV	±(0.7% Reading + 5 digits)	±1.1 V
†Requires two external 31.6K, 2 watt, 1% resistors per channel. <R>Accuracy is for sinusoidal input voltage.				
‡At 400 Hz, accuracy of the 6V range reduces to +/-10%. All other ranges are reduced to +/-1.7% plus 5 digits of reading				

Relay Description

Electrical Capability: Form C contact (normally open [NO] or normally closed [NC]) 0.5 A, 60 Vdc maximum into resistive load.

Feature Summaries

Microprocessor (CP2)

The CP2 Microprocessor is a Lineage® 2000 ECS Controller Option that extends the monitoring, controlling and reporting capabilities of the basic ECS Controller.

- A single-board, 16-bit microprocessor-based controller that can be installed or removed without disruption of service.

- Totally menu-driven software features with no commands to remember.
- A user-friendly user interface, supporting most common terminal types.
- Provides multiple security levels: user, Super-User, and call-back.
- Supports PEERS (Power Engineering and Equipment Record System) mechanized polling interface.
- Built-in RS-232 port for local terminal/printer connection supporting from 1200 to 9600 bps operation for local terminal, 1200 bps operation for local printer.
- Built-in 300/1200 bps modem with an RJ11 socket to facilitate remote monitoring and control.
- Supports Transaction Language (TL1) command interface with centralized monitoring system via built-in RS-485 port at 300 to 9600 bps. Refer to Appendix K.
- Processing power and memory to support both remote and local terminals simultaneously.
  Provides extensive history information on:
  - Plant Alarms: 128 events
  - Rectifiers: 50 events
  - Boost charging: 12 events
- Provides sorting/selection functions for easy review and analysis of history information.
- Collects extensive statistics on:
  - Plant load current on an hourly, daily, and monthly basis for trend information
  - Plant voltage and current during battery discharge for battery performance analysis
  - Busy hour average load current for any user programmable, 24-hour period
- Offers field-strappable, remote rectifier ON/OFF control feature.
- Offers field-strappable, boost charge control feature with programmable fixed-time equalize option, and automatic boost after a sustained battery discharge option.
- Provides extensive rectifier status information.
- Facilitates ac engine transfer control with rectifier sequence control and programmable transfer delay features.
- Supports pass-through communications mode that allows up to seven Remote Access Systems (RAS) or other Lucent Technologies equipment to be daisy-chained to the ECS Controller.

- Offers extensive plant alarm monitoring and reporting capability through:
    – Programmable dial-out on alarm(s) feature with user assignable delays and telephone number(s)
    – Periodic status dial-out feature with optional automatic retrieval of plant and datalogger history and statistics information
- Persistent dial-out on alarm ("NAG") feature with programmable call-out interval.
- Provides user programmable plant identification capability to facilitate remote monitoring of multiple plants from a central location.
- Offers a programmable warning feature based on plant capacity versus actual usage to ascertain plant growth needs and adequacy of reserve capacity.
- Has built-in controller self-diagnostics.
- Provides Inventory pages for keeping track of:
    – Plant Configuration
    – Rectifier Information
    – Reserve Battery Information
    – Controller Information
    – Bulk Ringers
    – Distribution Panel Location and Configuration
- Provides user readable/writable notepad for messages intended for all users.
- Provides protected notepad for Super-User messages along with a special notepad for automatic reminders on routine plant maintenance items.
- Offers all menu items in the user's choice of English or Spanish.

Datalogger (CP3)   The CP3 Datalogger is a Lineage® 2000 ECS Data monitoring option that allows the battery plant controller to monitor analog channels and provides the ability to energize relays based on current plant alarm status or Conditional Logic. CP3 is directly controlled by the CP2 microprocessor option.

- Totally menu-driven software features with no commands to remember.
- Sixteen data monitoring channels with multiple range selection (150 mV, 6V, 60V, 150V) and power type selection (+dc, -dc, ac).

- Eight Form C relay contacts programmable to plant or datalogger channel status.
- CP3 History information provided by CP2. History provided on:
    – Datalogger Alarms: 128 events
    – Datalogger Relays: 16 events
- CP3 Statistics gathering provided by CP2. It provides:
    – Basic statistics on all channels
    – Trend information on an hourly, daily, and monthly basis for any user-programmable datalogger channel
    – Busy hour average information for any user programmable datalogger channel
- User programmable scale factor and alarm thresholding on all channels.
- Viewing of CP3 channel measurements and relay status available to both local and remote terminals simultaneously.
- Extends the Dial-Out-On-Alarm capabilities of CP2 to include user specified datalogger alarms.

Voice Response Option

- Voice response option provides high-quality voice reporting of plant information when used in conjunction with the dial-out features of CP2.
- Voice response option allows for access to plant functions from a remote location when a data terminal is not available.

3   *Setup and Installation*

Caution

Always use an ESD wrist strap or similar grounding device when handling any circuit packs. Failure to do so may cause damage to the circuit packs. A jack is provided on the ECS Controller front panel for this purpose.

Note

The basic ECS Controller (CP1) is shipped from the factory with boost control hardware disabled, and rectifier restart control hardware enabled. To enable or disable these features, hardware straps on CP1 must be changed as detailed in "*Basic Controller (CP1) Configuration.*" Features which are hardware disabled on CP1 are not available through the ECS microprocessor option (CP2).

Basic Controller (CP1) Configuration

Boost control and rectifier restart control can be hardware enabled or disabled by the user.

Boost Control

The boost jumper, P106 shown in Figure 3-1, is factory set in the DISABLE position (pins 1 & 2, designated FL). If the plant is equipped with boost-type rectifiers and flooded-type batteries, this jumper may be moved to the ENABLE position (pins 2 & 3, designated EQ). When boost is enabled, the front panel switch and CP2 boost options can be used for boost charge control. It

should be noted that if the P106 jumper is removed or lost, the boost control function is disabled.

Automatic Restart   The restart jumper, P105 shown in Figure 3-1, is factory set in the ENABLE position (pins 1 & 2, designated RS). This setting allows the controller to attempt to restart rectifiers after a high voltage shutdown. For batteryless plants equipped with only one rectifier, the jumper should be moved to the DISABLE position (pins 2 & 3, designated NRS). Manual intervention will be required to restart the rectifier in such an application. It should be noted that if the P105 jumper is removed or lost, the automatic restart function is disabled.

For other basic controller configurations (high voltage thresholds, battery on discharge threshold, etc.), refer to the ECS Controller Product Manual (Select Code 167-790-031 for the ECS-6 Controller, 167-790-033 for the ECS-12 Controller) and the appropriate Battery Plant Product Manual.

ECS Microprocessor Option (CP2) Configuration

DIP Switch Settings   DIP switch SW202 on CP2 must be set for specific plant operation. Refer to Figure 3-2 for the location of SW202. Open switch positions are labeled on the CP2 DIP switch.

Important

The ECS Microprocessor (CP2) is shipped from the factory with remote rectifier on/standby (TR) control hardware disabled.
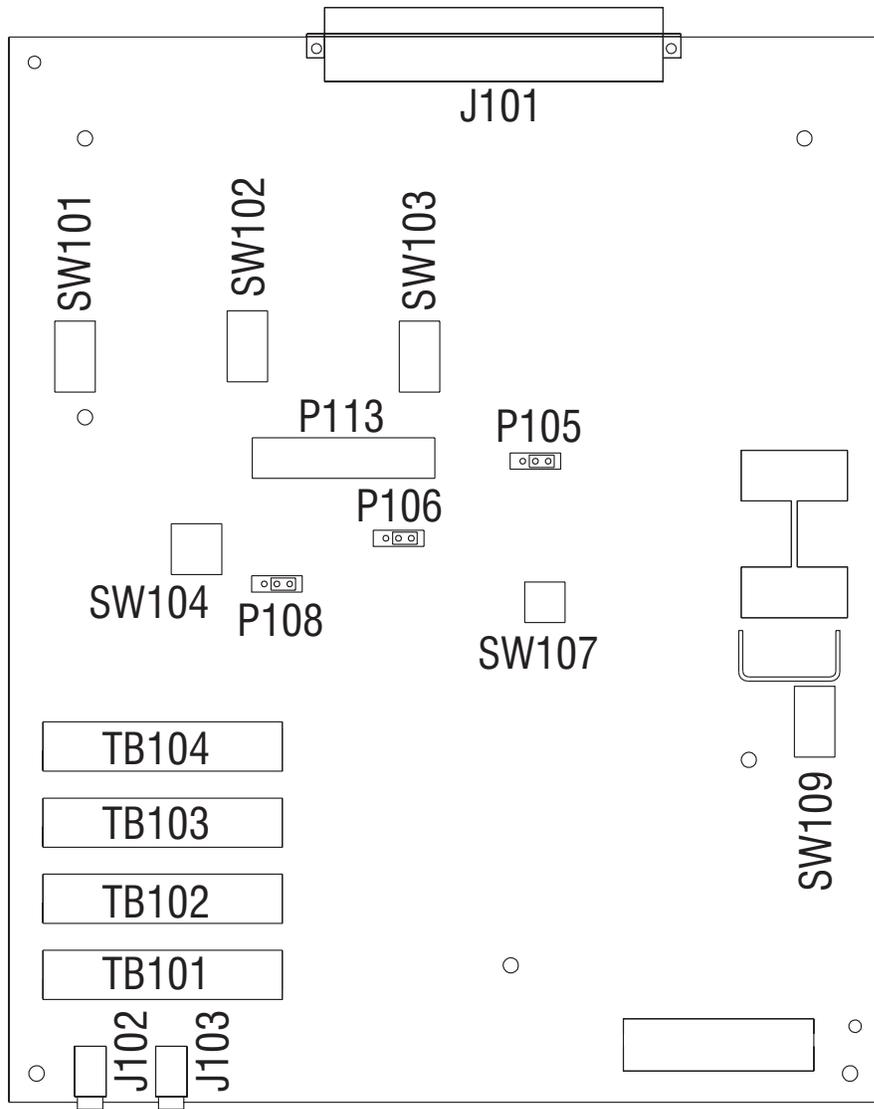
Figure 3-1: CP1 Jumper and Switch Locations

Table 3-A: SW202 DIP Switch Settings

1	Remote TR	Open Closed	Enable Disable
2	Shunt Size		
3	Shunt Size	See Table 3-B For Specific Shunt Size Settings	
4	Shunt Size		
5	Remote Super-User Login	Open Closed	Enable Disable
6	Maximum Number of Rectifiers	Open Closed	12 Rectifiers 6 Rectifiers
7 (Not used for CP2s coded BAB1B or BAB2B	Nominal Battery Plant Voltage	Open Closed	-48 Volts +/-24 Volts
8	Local Port	Open Closed	Terminal Printer

- **Remote TR:** To enable remote TR control of rectifiers, Switch 1 of SW202 must be open.
- **Shunt Size:** Switches 2 through 4 of SW202 set the specific shunt size configurations of the plant. See Table 3-B. Note the shunt size shown in the login configuration screen (Figure 4-1) will display only the 50mV shunt size.
- **Remote Super-User Login:** Switch 5 of SW202 must be open to enable the remote Super-User Login.
- **Nominal Battery Plant Voltage:** Switch 7 of SW202 must be open for a -48 volt battery plant, or closed for +/-24 volt battery plants. These are the correct settings for CP2s coded BAB1 or BAB2. This switch is not used for CP2s coded BAB1B or BAB2B.
- **Maximum Number of Rectifiers:** Switch 6 of SW202 specifies the maximum number of rectifiers that the controller in which CP2 is installed will support. For example, with the J85501D-1 or J85501E-1 (ECS 6 or 6U) controllers, close Switch 6. For the J85501D-2 or J85501E-2 (ECS 12 or 12U) controller, open Switch 6.

Caution

Incorrect setting may cause malfunction. See "*ECS Microprocessor Option (CP2) Configuration.*"

- **Local Terminal/Printer:** If the local RS-232 port of CP2 is to be used for a terminal, switch 8 of SW202 must be open. If the local port is to be used for a printer, switch 8 of SW202 must be closed. Refer to Figure 3-2 for RS-232 port location.

Table 3-B: Specific Shunt Size Setting

Size	DIP Switch Positions	Settings
25 mV at 4000 amps 50 mV at 8000 amps	2 3 4	Closed Closed Closed
25 mV at 3000 amps 50 mV at 6000 amps	2 3 4	Open Closed Closed
25 mV at 150 amps 50 mV at 300 amps 100 mV at 600 amps	2 3 4	Closed Open Closed
25 mV at 300 amps 50 mV at 600 amps	2 3 4	Open Open Closed
25 mV at 600 amps 50 mV at 1200 amps 100 mV at 2400 amps	2 3 4	Closed Closed Open
25 mV at 1000 amps 50 mV at 2000 amps 100 mV at 4000 amps	2 3 4	Open Closed Open
25 mV at 1300 amps 50 mV at 2600 amps 100 mV at 5200 amps	2 3 4	Closed Open Open
25 mV at 2000 amps 50 mV at 4000 amps 100 mV at 8000 amps	2 3 4	Open Open Open
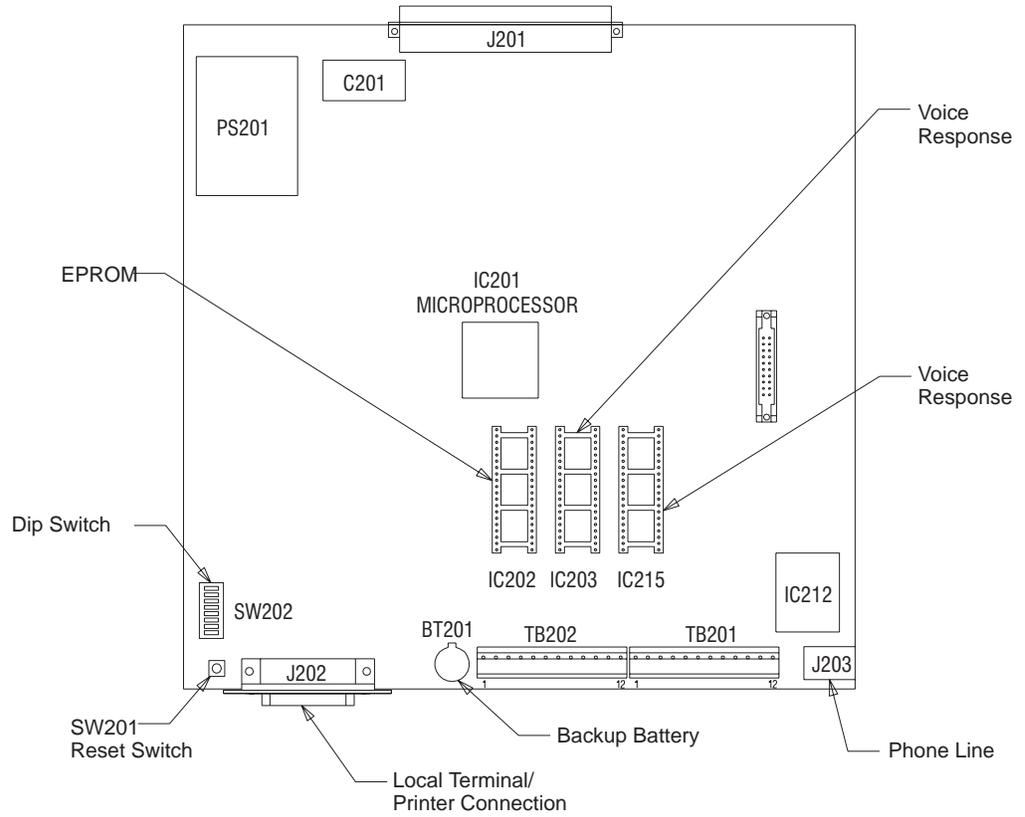
Figure 3-2: ECS Microprocessor Option (CP2) Circuit Pack

Front Panel Screws

Jack for
ESD Strap

Cover Plate
and Nuts

CP2

CP3
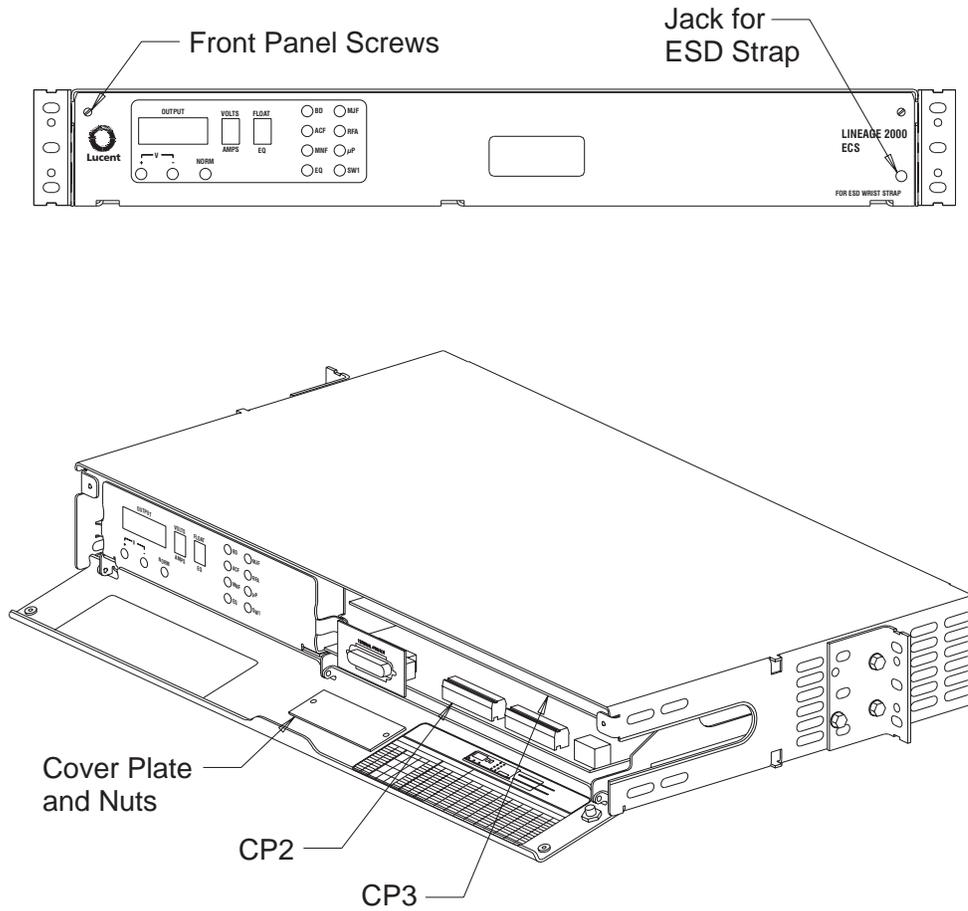
Figure 3-3: ECS Option Board (CP2 and CP3) Installation

Memory Backup Battery Installation A battery is shipped with the Microprocessor Board to provide backup power to the memory components to prevent memory loss if power to the controller is lost.

Note

> During the initial installation, do not install the memory battery until just before you install the Microprocessor Board. The battery begins providing backup power as soon as it is installed, and its reserve will be used up if primary power is not applied for a long period.

The backup battery is shipped in the same carton as CP2. Refer to Figure 3-2 for the location of the memory backup battery and the battery holder assembly. When inserting the battery, make certain that the + and - polarity markings on the battery are aligned correctly with those marked on the holder before insertion. Inserting the battery backwards may cause permanent damage. Take care not to drop the battery back onto the circuit pack.

The battery will provide backup for a minimum of 96 hours in the event of power loss. A warning is issued when the memory backup battery should be replaced. Use a small needle-nosed pliers with the tips taped to remove the old battery. Replace it only with Sanyo CR 1/3-N or Duracell DL 1/3-N for CP2s coded BAB1 or BAB2. Replace it only with Panasonic part number BR2032 for CP2s coded BAB1B or BAB2B.

Caution

> Battery can explode or leak if disassembled, shorted, recharged, exposed to fire or high temperature, or inserted incorrectly.

Note

> If CP2 is unplugged (powered down) when replacing the memory backup battery, history and configuration information will be lost.

Maximum Number of Rectifiers DIP Switch 6 of SW202 specifies the maximum number of rectifiers that the controller in which CP2 is installed will support. SW202-6 should be set open for use in the J85501D-2

or J85501E-2 (ECS 12 or 12U) controller and closed in the
J85501D-1 and J85500E-1 (ECS 6 or 6U) controllers.

Caution

CP2 should not be used in the 12-rectifier mode in controllers
which support only up to six rectifiers. Attempts to do so will
have unpredictable results.

ECS Microprocessor Option (CP2) Installation

Tools Required
for Installation

- 1 standard screwdriver
- 1 ESD wrist strap
- 1 5/16 inch nut driver or wrench

Caution

Always use an ESD wrist strap or similar grounding device
when handling any controller circuit packs. Failure to do so
may cause damage to the circuit packs. A jack is provided on
the ECS Controller front panel for this purpose.

Installation
Procedure

(Refer to Figure 3-3.)

1. Wear ESD wrist strap and plug into the jack provided on
   the controller front panel.

2. Using a standard screwdriver, loosen the two front panel
   screws on the controller until the hinged panel can be
   opened. The controller may be pulled forward
   approximately 7-1/2 inches.

3. Using a 5/16 inch nut driver or wrench, remove the cover
   plate for the RS232 port from the controller front panel.
   Cover plate may be discarded.

4. Insert CP2 into guides provided on the lower right-hand side of the controller. Press firmly to seat CP2 into the controller backplane.

5. Close the controller front panel and tighten both front panel screws.

Field Wiring Instructions   Field wiring associated with CP2 can be connected to two removable terminal blocks, TB201 and TB202 (see Figure 3-2). Refer to Appendix G for pin assignments. Maximum wire size should be 22 AWG. Wires should be routed out the right-hand side of the controller, leaving approximately eight inches of slack outside to allow the shelf to slide.

ECS Datalogger Option (CP3) Installation

Tools Required for Installation
*   1 standard slotted screwdriver
*   1 small slotted screwdriver
*   1 ESD wrist strap

Caution

Always use an ESD wrist strap or similar grounding device when handling any controller circuit packs. Failure to do so may cause damage to the circuit packs. A jack is provided on the ECS Controller front panel for this purpose.

Installation Procedure   (Refer to Figure 3-3.)

1. Wear ESD wrist strap and plug into the jack provided on the controller front panel.

Note

If CP2 is powered down or unplugged when installing CP3, a loss of history and configuration information will occur if no memory backup battery is present. Powering down or unplugging CP2 will result in a Processor Halt and Processor Start entry in the history log.

2. Disconnect the printer or terminal that may be connected to the front panel terminal connector.

3. Using a standard screwdriver, loosen the two front panel screws on the controller until the hinged panel can be opened.

4. Insert CP3 into guides provided on the upper right hand side of the controller. Press firmly to seat CP3 into the controller backplane.

5. Refer to section on CP3 field wiring instructions for connections to CP3.

6. Close the controller front panel and tighten both front panel screws.

7. Reconnect the printer or terminal that was connected to the front panel terminal connector.

CP3 Field Wiring Instructions   Field wiring for CP3 is connected to terminal blocks TB301, TB302, TB303, and TB304 for analog channel connections and terminal blocks TB305 and TB306 for control relay connections (see Figure 3-4 for descriptions). These terminal blocks are 12 position removable connectors that accept the stripped end of a stranded wire in a clamp-type connection. Maximum wire size should be 22 AWG; strip ends 0.25 inch. Wires should be tied in a bundle which is routed in front of the terminal blocks and out the right side of the controller. Some space should be left to access the terminations for future use if necessary. Approximately 8 inches of slack should be left in the wire bundle outside of the controller to allow the drawer to slide in and out. The remaining sections describe concerns such as sense point wiring, relay contacts wiring, protection resistors, optional wire set and transducers.

Termination Panel Option

An optional termination panel is available with CP3 which allows the analog channel and control relay connections to be made in an external box. This box can be mounted on the side of the frame (if no appearance package is used), in empty space in the frame, or on the wall (see Figure 3-11). If this option is ordered, your CP3 will be equipped with ribbon cable connectors instead of removable terminal blocks. Install CP3 as described above.

Installation Procedure

1. Unpack sheet metal parts, circuit pack and cable set.

2. Mount the panel in the desired location. (If the panel is to be mounted in the frame, mount brackets onto the back first.)

3. Slide circuit pack into place in the panel.

4. Connect the ribbon cable set such that the top connector on the termination board (P101) connects with the left-most connector on CP3 (P304) and the lower connector on the termination board (P102) connects with the right-most connector on CP3 (P305).

5. Dress cables through the slot on the right side of the controller, allowing slack for the tray to fully extend out.

6. Attach sense point and control relay wiring as required, following instructions in "CP3 Field Wiring Instructions."

Note

Terminal blocks in the termination panel are marked with the correct configuration. Disregard terminal block pin assignments in the following sections as they refer to pin assignments used on CP3 when the terminal panel option is not ordered.

7. Install the termination panel cover and tighten the two panel cover screws.
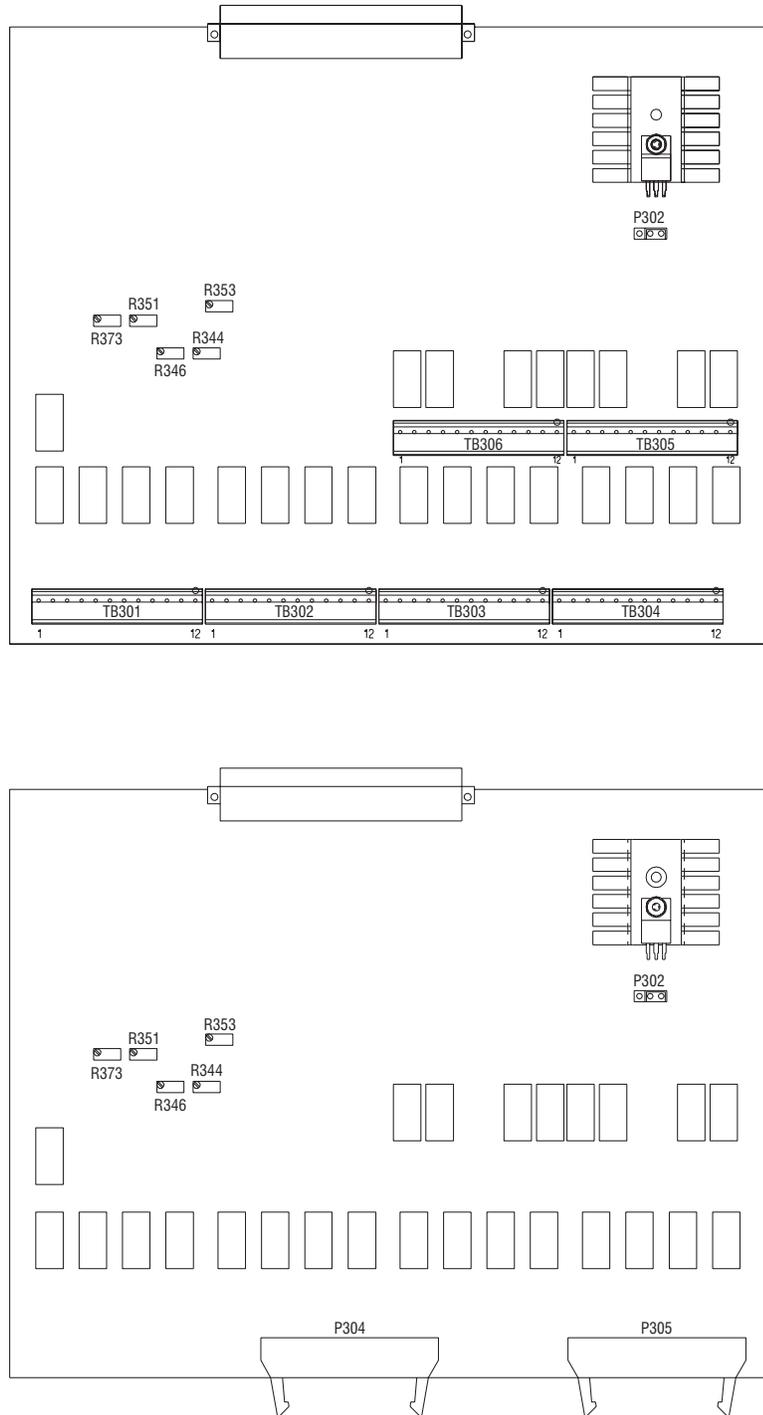
Figure 3-4: ECS Datalogger Option (CP3) Circuit Pack

Sense Point Wiring   A total of 16 analog channels are provided on CP3 for monitoring. Each channel terminal block (TB301-304) is made up of four analog measurement channels (P/N pair) and two positive and negative bias voltage points. Bias voltage (V Bias), equal to the present plant voltage, is provided for applications where it is desired to use the analog channels to sense the presence or absence of voltages at user-defined limits, e.g., when generating binary alarms through an isolated contact. V Bias is not intended as a general purpose power supply.

The V Bias jumper, P302 shown in Figure 3-4, must be installed to enable the voltage biases. For 48 volt plants, install the jumper between positions 2 and 3 (designated 48V). For 24 volt plants, install the jumper between positions 1 and 2 (designated 24V).

The terminal blocks are configured as follows:

PINS	TB301	TB302	TB303	TB304
1	A01 P	A05 P	A13 P	A09 P
2	A01 N	A05 N	A09 N	A13 N
3	A02 P	A06 P	A10 P	A14 P
4	A02 N	A06 N	A10 N	A14 N
5	A03 P	A07 P	A11 P	A15 P
6	A03 N	A07 N	A11 N	A15 N
7	A04 P	A08 P	A12 P	A16 P
8	A04 N	A08 N	A12 N	A16 N
9	VB +	VB +	VB +	VB +
10	VB +	VB +	VB +	VB +
11	VB -	VB -	VB -	VB -
12	VB -	VB -	VB -	VB -
Note: A = Analog Channel; VB = Voltage Bias				

A pair of wires (or twisted pair) for each channel should be connected through one of the openings in the right side of the unit. Shielded cable is not required typically because of the robustness of the monitoring scheme. If shielded wire is used, however, its shield should be tied to frame ground at the controller. The other end of the shield must be left floating. Wiring should comply with NEC Section 725 Class 2 and any local codes that may apply.

For accuracy, measurement points should be as close as possible to the source being measured. See Section 4, "Super-User Features" for information on configuring channels.

Sign Convention   **Autopolarity:** CP3 measurements use autopolarity in a manner similar to a DVM. The terminal block inputs have been designated P and N for each channel. When the P terminal is connected to the most positive voltage, CP3 will report the voltage as positive. Likewise, when the P terminal is connected to the most negative voltage, CP3 will report the voltage as negative. This is true regardless of whether the Voltage Type is configured as +dc or -dc. When the Type is configured as ac, the reading will always be positive.

Note

The symbols A>B means A is greater than B; in a strict mathematical sense, 10>5, and -5>-10.

Voltage Type: The -dc Type is provided as a convenience when configuring alarms while monitoring negative battery plants. The feature works as follows: (1) a +dc Type yields the relationship 55 >45 and (-45) >(-55), and (2) a -dc Type yields the relationship (-55) > (-45) and 45 >55. This makes it possible, for example, to wire a -48V battery plant with the -48V battery bus to the "P" terminal, -48-volt return to the "N" terminal, and use a -dc Type for a typical reading of -54V, an upper alarm threshold of -57V to indicate an overvoltage, and a lower alarm threshold of -52V to indicate a battery on discharge.

Protection Resistors   Protection resistors (Current Limiting Resistor Assembly, Comcode 846679165) are always required in series with both sense leads for each channel to maintain the calibration of the system. This assembly should be used even when using the analog channel in a binary configuration.

The purpose of the protection resistors is to limit the current available in the interconnecting wiring to meet NEC Class 2 circuit definition for any source voltage up to 150 V ac or dc. Refer to the NEC Section 725 for Class 2 wiring.

Protection resistors (one 31.6K, 2 watt, 1% resistor on each lead) should always be placed at the end of the leads which supply power. This is typically the equipment end. See Figures 3-6 through 3-9. When the bias supply is the source of power the resistor should be placed near the terminal blocks of CP3. See Figure 3-10. The assembly provides resistors for each lead of a channel. Splice the assembly's leads onto channel wires; strain

relieve the wires (see Figure 3-5). Class 2 wiring should be separated from Class 1 wiring.

Control Relay
Contacts Wiring

Terminal blocks TB305 and TB306 provide connections to eight isolated Form-C control relays. A Form-C relay provides a combination of normally open (NO), and normally closed (NC) contacts with one side of each in common (C). The normal state is the de-energized or off state. If a control relay is de-energized (off), a contact closure will exist between the NC and C poles and no contact closure will exist between the NO and C poles. Likewise, if a control relay is energized (on), a contact closure will exist between the NO and C poles and no closure will exist between the NC and C poles.

The terminal blocks on CP3 are configured as follows:

PINS	TB305	TB306
1	CR1NO	CR5NO
2	CR1C	CR5C
3	CR1NC	CR5NC
4	CR2NO	CR6NO
5	CR2C	CR6C
6	CR2NC	CR6NC
7	CR3NO	CR7NO
8	CR3C	CR7C
9	CR3NC	CR7NC
10	CR4NO	CR8NO
11	CR4C	CR8C
12	CR4NC	CR8NC

Control relays provide contact closures (and opens) when user-definable events occur. A conditional instruction line is input by a Super-User for each control relay such that, if all conditions are met, the relay will be energized ON. (See Section 4, "User Features" for further explanation.)

Transducer
Compatibility
and
Measurement
Techniques

CP3 can measure ac or dc voltages either directly or with the use of transducers. This section discusses the use of transducers with the ECS CP3 as well as compatibility issues and possible transducer suppliers.

A programmable transducer offset is available to allow the use of non zero-crossing transducers.

Transducers with current output are compatible with CP3 with the addition of a load resistor placed in series with the current loop. The current limiting resistor assemblies can then be placed across the load resistor to measure a voltage proportional to the transducer output. The load resistor value must then be taken into account in scale factor calculations. To realize the noise immunity provided by current loops, the load resistor must be located close to CP3.

Temperature Transducer Measurements

There are two basic strategies for measuring temperature with CP3. The first is to use a thermocouple with an appropriate transmitter to connect to CP3. The transmitter is a voltage conditioning device which provides a reference and transforms the output of a thermocouple (which is non-linear) into a linear voltage. The thermocouple is generally mounted in some form of probe which is physically separate from the transmitter.

The second strategy for temperature measurement is to use an integrated temperature transducer. These types of units are generally contained in one physical device, sometimes resulting in a more cost effective alternative, provided the appropriate temperature range is available.

Room temperature can be measured using either strategy. For temperature measurements using the thermocouple strategy, a type-E thermocouple should be used for the temperature range zero degrees Fahrenheit to 150 degrees.

Battery temperature is measured with a thermocouple, similar to the way room temperature is measured, using a type-E thermocouple. This does require, however, that the thermocouple has a coating that will not be corroded by battery acid.

Engine exhaust gas temperature may be measured using the thermocouple which is already present in the engine. These thermocouples are usually type-J or type-K, each requiring a separate transmitter type.

There are two points to note to obtain accurate thermocouple measurements. The first is to use isolated transmitters in which the measurement circuitry is isolated from the power supply. This will prevent cross-talk between transmitters through the power supply in applications where more than one transmitter is needed. The second is that the transmitters must internally have

some sort of electronic ice point reference. This will prevent temperature changes in the transmitter from affecting the actual temperature measurements.

AC Power Line Measurements

AC power line measurements are often used for reserve engine/alternator applications, but could be equally useful for monitoring commercial ac. Commercially available transducers suitable for these applications include those for single phase, three wire (delta) and four wire (wye) three-phase lines.

For safety, never connect measurement channels directly to ac power. Use a suitable isolation transformer/transducer.

AC currents can be measured easily by using a sensor transformer at the secondary of the engine metering circuits.

Power measurements give the load on an engine, or the real power (KW) being delivered by the commercial line. For these measurements, a power transducer that has a voltage output or current output (with load resistor) that is linear is required. The input to this type of transducer is usually the current of all phases, and the voltage of one or two of the phases, for single and three phase lines respectively. It may also be possible to use an existing power transducer which is already included with the engine/alternator.

A frequency transducer will indicate the frequency present on the ac line. These are generally calibrated to a frequency of 60 HZ and the linear output is the deviation from that frequency. For instance, one such transducer may output -1 mA to 0mA to +1mA for a range from 55 Hz to 65 Hz. In this example, 0 mA is equal to 60 Hz, and 1mA is 65 Hz with linear divisions between points.

Transducers Suppliers Below are listed some of the manufacturers who can supply transducers of various types:

Crompton Instruments Inc.
800 Regency Drive
Glendale Heights, IL 60139
(708) 351-4554

Omega Engineering, Inc.
One Omega Drive
Box 4047
Stamford, CT 06907
(203) 359-1660

ITW Deltar
21555 S. Harlem Avenue
Frankfort, IL 60423
(708) 720-2600

Rochester Instruments
Systems
255 North Union Street
Rochester, NY 14605
(716) 263-7700

Yokogowa Corp. of America
2 Dart Road
Newnan, GA 30265
(404) 253-7000
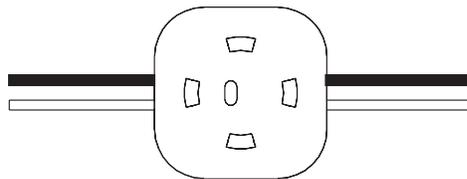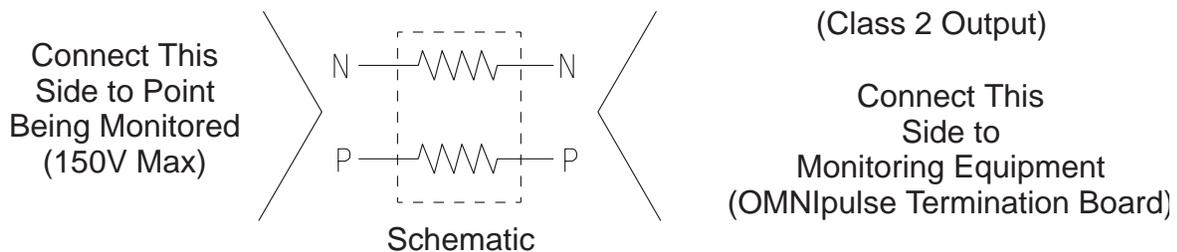
Figure 3-5: Current Limiting Resistor Assembly (Comcode 846679165)

Applications Figures   The following applications are shown using a typical voltage value of -48Vdc to illustrate how to set up various parameters. This voltage value as well as any alarm threshold limits are meant only as examples. See Figures 3-6 through 3-10.

CP3 may be used to monitor the state of an alarm relay contact. Datalogger channels may be configured for alarm on contact open (CO) or alarm on contact close (CC) to achieve this easily. A voltage must be applied to the contact via appropriate current limiting resistors. CP3 then monitors the applied voltage. If the voltage is above 2 volts, the contact is considered to be open; if it is less than 2 volts, it is considered closed. The alarm thresholds and range are automatically chosen when CC or CO type is chosen, and the value displayed will be "open" or "closed." Note that "open" always means voltage is present, and "closed" means voltage is not present. The application figures show various ways of monitoring alarm contacts using CC, CO, or the more general analog -dc type.
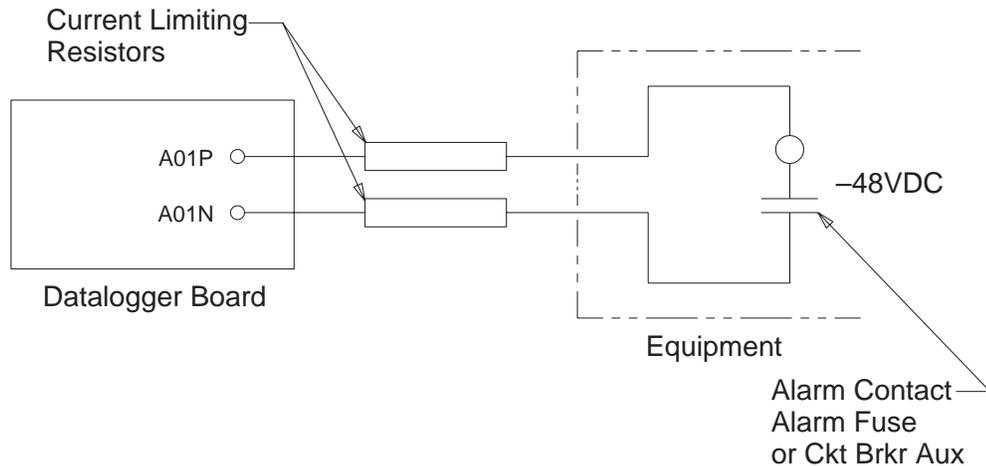
Figure 3-6: Closure to Voltage
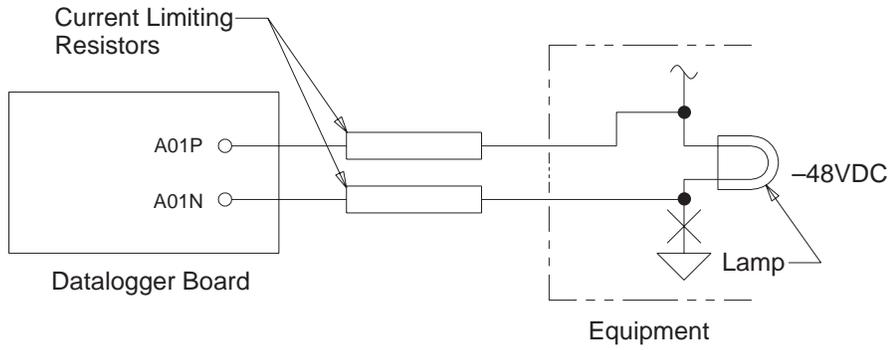
Figure 3-7: Monitoring an Indicator Lamp
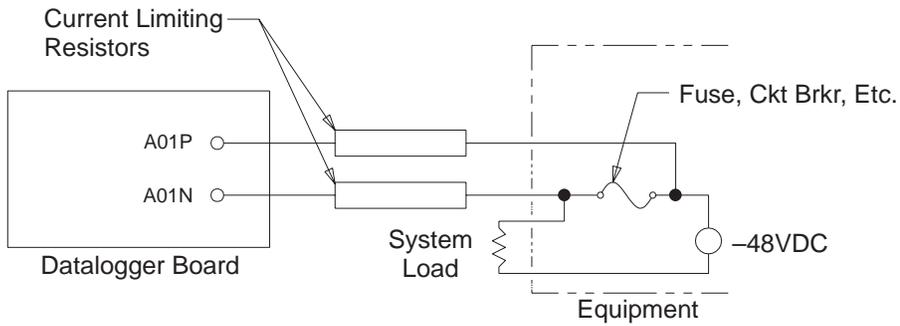
Figure 3-8: Fuse Monitoring
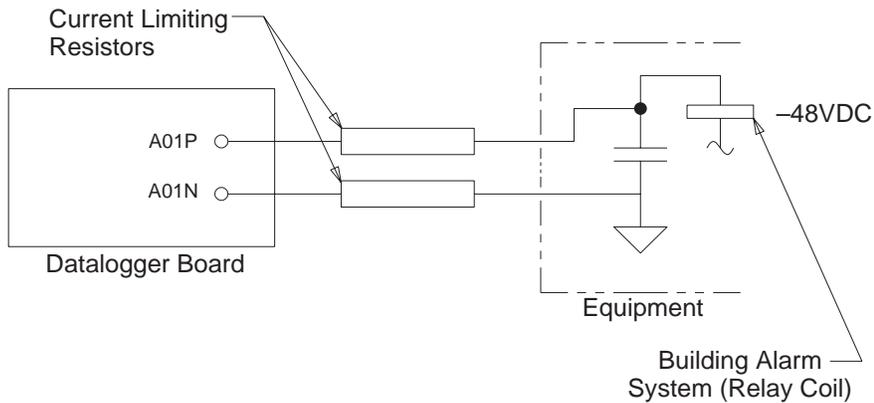
Figure 3-9: Already Monitored Alarm Contact (Closure to Ground)
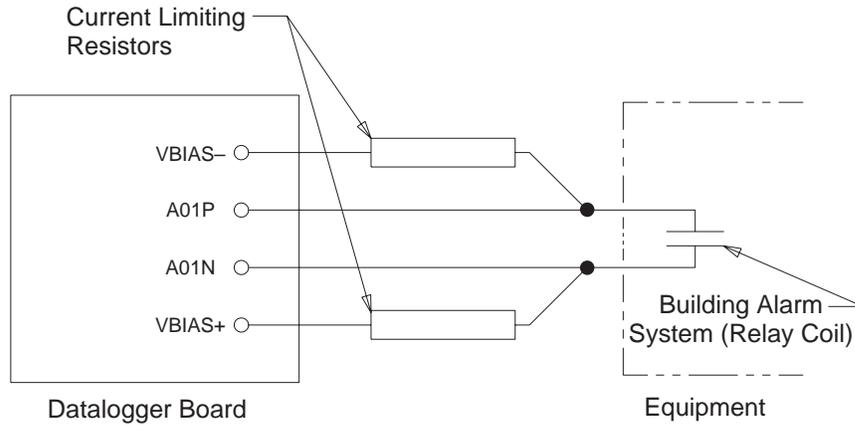
Figure 3-10: Isolated Contact
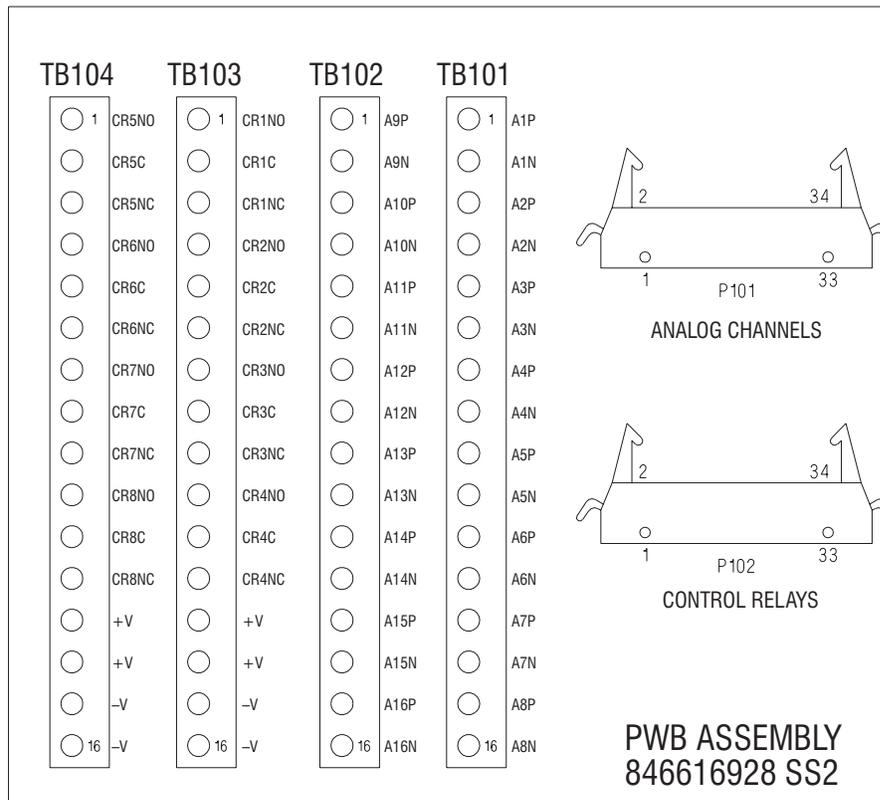
Figure 3-11: Termination Panel Connections
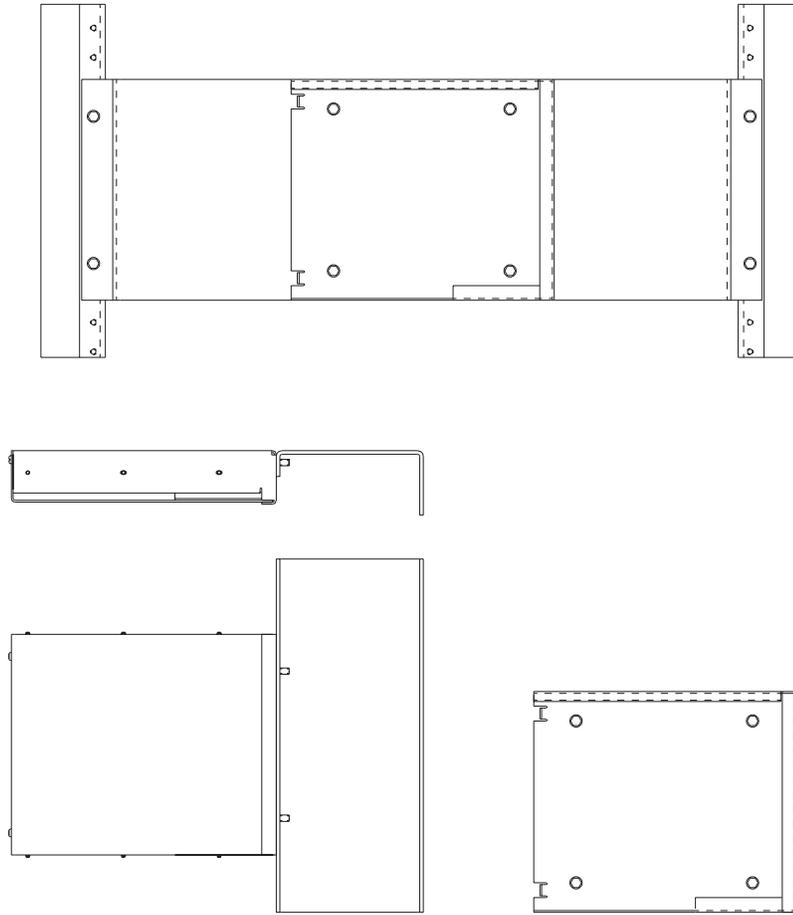
Figure 3-12: Termination Panel Mounting

ECS Voice Response Option Installation

An upgrade kit is available to add the voice response feature to a Microprocessor Board purchased without it. The Microprocessor Board is also available with this feature already installed (see ordering documentation).

Tools Required for Installation

- 1 standard slotted screwdriver
- 1 ESD wrist strap

Caution

> Always use an ESD wrist strap or similar grounding device when handling any controller circuit packs. Failure to do so may cause damage to the circuit packs. A jack is provided on the ECS Controller front panel for this purpose.

Installation Procedure

(Refer to Figure 3-2.)

1. Always wear ESD wrist strap and plug into the jack provided on the controller front panel.

2. Disconnect the printer or terminal that may be connected to the front panel terminal connector.

3. Using a standard screwdriver, loosen the two front panel screws on the controller until the hinged panel can be opened.

4. If necessary, unplug the phone line that may be connected to phone jack J203 and pull terminal blocks TB201 and TB202 off pins on board.

Note

> When installing the Voice Response Option, a loss of history and configuration information will occur if no memory backup battery is present. Removing and reinserting CP2 will result in a Processor Halt and Processor Restart entry in the history log.

5. Unplug CP2 from the controller backplane and lay it on a clean, static free, flat surface.

6. Carefully insert the ICs into their designated sockets, taking care that the tab is oriented the same way as shown on the circuit board artwork (refer to Figure 3-2).

7. Re-insert CP2 into the guides provided on the lower right-hand side of the controller. Press firmly to seat CP2 into the controller backplane.

8. Connect the phone line to phone jack J203 and, if removed, replace the terminal blocks TB201 and TB202 on the pins.

9. Close the controller front panel and tighten both front panel screws.

10. Reconnect the terminal or printer to the front panel terminal connector.

Modem, Terminal, and Printer Configuration and Connections

The ECS Microprocessor Option (CP2) is equipped with two communication ports: an RS232 connector which can be connected directly to a local terminal or local printer, and a standard RJ11 telephone jack for remote communication. Refer to Figure 3-2 for the location of these connectors. Refer to the appropriate manuals for each terminal.

Some modems have default setups that enable error correction or automatic speed buffering. When connecting to the controller, it is important to disable this option (e.g., in the modem communications setup, the ATQ0 command disables error correction for many modems). Refer to your modem manual for specific details.

Remote Modems

The remote modem must be set for either 300 or 1200 bps operation and must be configured in auto answer mode. When using a Hayes-compatible modem for either alarm report reception or for calling ECS, the modem must be configured with the following commands:

Command ATSO=2 sets the modem to automatically answer after the second ring;

Command ATS7=30 sets the auto-answer tone disconnect time for 30 seconds. This number should be larger if the user is experiencing long network delays;

Command ATX=2 prevents Voice Option from being interpreted as a busy signal.

Command ATQ0 disables error correction for the modem communication

For modems other than Hayes compatible modems, consult your owner's manual for settings.

Note

> The following terminal settings for CP2 will also apply for a terminal shared with older AT&T equipment.

Supported Terminals
- AT&T/Teletype 4425, 5410, 5420, 5425 display terminals
- AT&T 610, 615 or 710 display terminals
- DEC VT100 or compatible terminals
- American National Standards Institute (ANSI) compatible terminals, including terminal emulators for PCs
- DEC VT320 or compatible (required for Spanish operation)

AT&T/Teletype 5410, 5420, 5425 Terminals

Communication Parameters:

ECS communication parameters can be configured for 7 or 8 data bits; odd, even, or no parity; and 1 or 2 stop bits (dial-out only).

Speed: 1200, 2400, 4800, 9600 bps (local terminal);
        300, 1200 bps (remote terminal)

Duplex: full	Send Parity: odd
Check Parity: no	132 Columns: space
Memory Access: scroll	Clock: async
Return Key: CR	New Line On LF: no
Autowrap: on	Cursor: blink
Margin Bell: User Preference	Keyboard Model: 5420
Transmission: char	Send from: cursor
Send Edit Seq: yes	Send Graphics: no

Terminal Modes:

These following modes must be active. An asterisk appearing on the display denotes that the mode is active.

CHAR MODE*
REMOTE MODE*
DC1DC3 MODE*

AT&T/Teletype 4425 Terminal

Same as for type 5425 with the following additions:

Wait for DSR: no	Send Attributes: no
Dialer: no	VT52: no

AT&T 610 and 615 Terminals

Communication Parameters:

ECS communication parameters can be configured for 7 or 8 data bits; odd, even, or no parity; and 1 or 2 stop bits (dial-out only).

Speed: 1200, 2400, 4800, 9600 bps (for local terminal);
        300, 1200 bps (for remote terminal)

Send Parity: none	Check Parity: no
Local Echo: off	Encoding: off
Generate Flow: on	Receive Flow: on
Pass Flow: yes	Monitor Mode: off
Auto Wrap: off	New Line on LF: no
RETURN Key: CR	ENTER Key: CR

User Preferences:

Columns: 80	Reverse Video: no
Volume: User Preference	Key Click: User Preference
Scrolling: jump	Scroll Speed : fast
Cursor Type: block	Cursor Blink: User Preference
Labels: User Preference	

AT&T 710 Terminal

Only two options need be changed from terminal defaults:

Communication parameters:

ECS communication parameters can be configured for 7 or 8 data bits; odd, even, or no parity; and 1 or 2 stop bits (dial-out only).

Set to 8 bits, no parity, 1 stop bit, and no check.

Keyboard parameters:

Set SWAP DELETE option to YES.

DEC VT100 or Compatible

Communication Parameters:

ECS communication parameters can be configured for 7 or 8 data bits; odd, even, or no parity; and 1 or 2 stop bits (dial-out only).

Speed:1200, 2400, 4800, 9600 bps (local terminal);
      300, 1200 bps (remote terminal)
No Local Echo
DEC-423 Data Leads Only
Limited Transmit

Display:

Columns: 80	Scrolling: JUMP
Auto Wrap: ON	Cursor: User Preference

ANSI Compatible Terminals

Communications Parameters:

ECS communication parameters can be configured for 7 or 8 data bits; odd, even, or no parity; and 1 or 2 stop bits (dial-out only).

Transmit Speed = Receive Speed: 300, 1200, 2400, 4800, 9600 bps
8 bits, No Parity
No Local Echo
Back Space Definition = BS
Return Definition = CR

Note

ANSI terminals include PC compatible personal computers using a terminal emulation package. If using a PC as your ECS terminal, ensure that the CONFIG.SYS file containing the line "DEVICE = ANSI.SYS" is in the root directory of the boot disk. The "ANSI.SYS" file, usually found with the MS-DOS start-up disk, must also be in the root directory of the boot disk.

The terminal settings of the PC will depend on the communications software being used. General settings are shown above. Consult your terminal emulator manual for details on connecting to an ANSI compatible system.

Local Printer Configurations

A standard serial printer can be connected to the RS232 port instead of a local terminal. In this configuration, the local printer will log plant alarms as they occur. Printer communication parameters must be set as follows:

Receive Speed: 1200 bps
8 bits, No Parity
1 Stop Bit (if applicable)
Handshake ON = DC1/DC3. (XON/XOFF)

Data Switch Compatibility

The ECS power plant can be accessed remotely using the stand-alone Lucent Technologies Data Switch in instances when only one phone line is available, or through the connected MCS Data Switch when ECS is being used to supplement an existing MCS power plant. All that is required for remote communications is a cabled connection between the ECS local terminal port and the Data Switch port board in the stand-alone model or to the remote communications board in the MCS. Refer to Appendix G.5 (Data Switch Connections) diagram for cable connections to these units.

Data Switch Alarm Connections

The Data Switch allows calling out to a remote station when an alarm occurs. Although ECS also provides this capability itself, the user may still use the Data Switch for all alarm reporting. Keep three things in mind when using the Data Switch with the ECS:

1. The Data Switch is notified of an alarm through a contact closure to the Data Switch itself. The ECS CP2 does not provide for such a closure. However, the ECS basic controller (CP1) does. CP1 provides several Form C contacts, field wired through four terminal blocks that are assigned to the various office alarm outputs from the controller. The signal on each terminal is indicated inside of the controller front panel. These contacts can be wired together to inform the Data Switch when an alarm occurs. If the ECS has the optional Datalogger Card, one control relay may also be used to provide the necessary closure.

The CP3 control relay may be programmed to react only to certain alarms or may use the control word "ANY" to be energized on any of the 13 plant alarms and datalogger threshold alarms. Refer to your Basic Controller manual for information on CP1 wiring.

2. Once it is connected to the remote station, the Data Switch will attempt to log in to the connected ECS in order to interrogate it for all active alarms. This is done assuming a machine to machine interface or command language interface. This is equivalent to ECS's PEERS interface. When using ECS with a Data Switch, the user must ensure that the Data Switch is configured to use the ECS PEERS password, which has the factory default of "POLLING."

3. When logged into the menu-driven interface of ECS, the <Esc> and arrow keys cannot be used. Data Switch looks for an <Esc>, and when it finds one it returns to the Data Switch command screen. Arrow keys typically produce "escape sequences," which are <Esc> characters followed by other characters. Data Switch interprets these arrow key escape sequences as simple <Esc> characters and returns control to the command screen as if the <Esc> key were pressed. To get around this, ECS has alternatives to the <Esc> and arrow keys. They are control characters, that is, the <CTRL> key and another key pressed simultaneously. The control characters and their functions are listed below.

Control Character	Function
<CTRL><E>	Used anywhere <Esc> is normally used.
<CTRL><U>	Used in place of up arrow to move the cursor between fields within a screen.
<CTRL><D>	Used in place of down arrow to move the cursor between fields within a screen.
<CTRL><N>	Used in place of right arrow to move the cursor within fields during editing, or between fields within a screen. "<N>" stands for "next."
<CTRL><P>	Used in place of left arrow to move the cursor within fields during editing, or between fields within a screen. "<P>" stands for "previous."

The control characters used in place of arrow keys function only within screens. They will not function when navigating through the menus. The <Space> or <Backspace> keys must be used to move down or up respectively through the menus, or "hot-keys" may be used to select the desired menu option.

X.25/TL1 Equipment Setup and Installation

An X.25 connection to the ECS controller is achieved through a connection to an external Packet Assembler/Dissassembler (PAD). The PAD serves as an interface between the asynchronous TL1 port on the ECS controller and the X.25 synchronous network.

Figure 3-13 shows a block diagram of the X.25 connection. The asynchronous connection is accomplished through an RS-485 to RS-232 converter to the ECS controller. The synchronous connection to the X.25 network may be user configured as either a permanent virtual circuit (PVC) or as a switched virtual circuit (SVC). Contact your network administrator to determine which type of connection will be provided.

Note

> The RS-232/485 converter can be connected to each of ports P2 through P5 on the PAD unit. Thus, one PAD can support up to four simultaneous ECS Controller connections.

Equipment Setup and Installation

Parts used in the installation:

Note

> The following steps describe a typical installation. Depending on what optional equipment was ordered or is being reused, some of the following may not be present.

Tools:

- 1 ESD wrist strap
- 1 flathead screwdriver
- 1 Phillips head screwdriver
- 1 socket set or nutdriver set

Parts:

The following is provided with ECS Controller X.25/TL1 option or upgrade kit):

•   1 RS-232/485 converter
•   Twisted pair wire for data interface between ECS Controller and RS232/485 converter

The following is provided with PAD option:

•   1 PAD
•   1 PAD power cable (with 3-pin circular connector)
•   2 Y-shaped DB-25 cables
•   1 memory backup battery

The following is provided with DSU option:

•   1 Data Service Unit (DSU)

The following is provided with mounting shelf option:

•   1 mounting shelf and hardware for DSU and PAD units

Customer provides:

•   1 computer terminal for setup purposes
•   1 DB-25 cable to connect terminal to PAD
•   Power wiring for PAD and DSU
•   Phone line to connect DSU to network
•   1 9-volt, 500 milliamp ac-to dc power supply
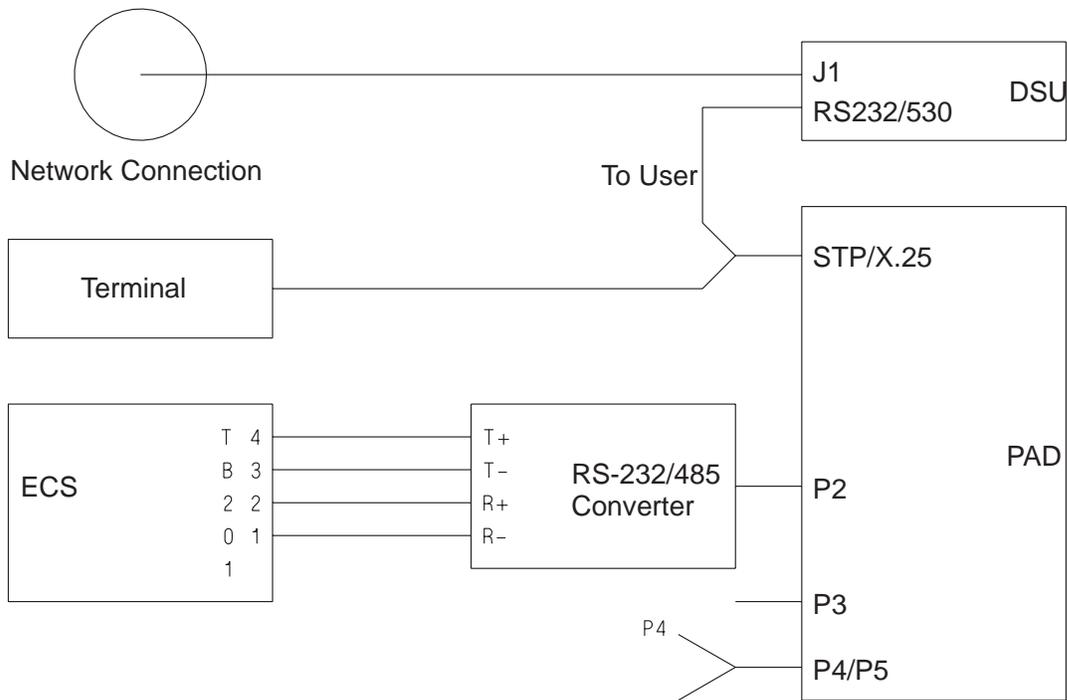
Figure 3-13: ECS Controller TL1 Block Diagram

The TL1 port connection should be installed as follows (refer to Figures 3-13, 3-14 and 3-15):

Pad unit setup:

1. Remove the four Phillips screws from the bottom of the PAD unit.

Note

Refer to manufacturer's product manual for important safety information about the battery.

2. Locate the battery holder on the CPU (main) circuit board and install the battery in the orientation shown in Figure 3-14. The battery is not enabled until Jumper LK14 is set (see Table 3-C).

3. Verify and set the jumpers on the CPU and daughter boards as shown in Table 3-C. You may need to remove the daughter board temporarily to access the jumpers.

4. Reattach PAD cover and secure with screws.

Table 3-C: Pad Jumper Settings

Jumper Location	Jumper Setting*	Function
LK6 (CPU)	Position 1 jumpered	Port 2 +12V power
LK3 (Daughter)	Position 3 jumpered	Port 3 +12V power
LK6 (Daughter)	Position 3 jumpered	Port 4 +12V power
LK14 (CPU)	Jumpered	Backup Battery Enabled
* Ports STP, X.25 and 5 do not have a power jumper setting.		
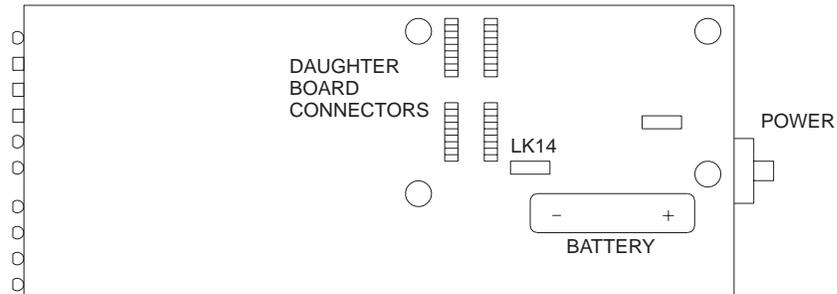
Figure 3-14. PAD CPU Board
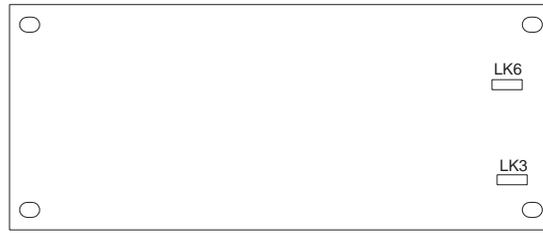
Figure 3-15: PAD Daughter Board
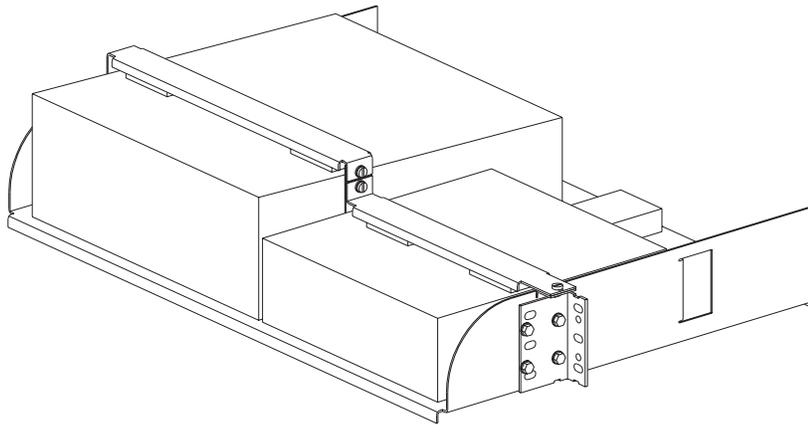
Figure 3-16: PAD and DSU Mounting Shelf

Mount shelf in rack (frame):

1. Mount brackets to the shelf using hardware provided. The brackets may be mounted in two orientations to accommodate different rack sizes.

2. Position the shelf in the rack and secure using the hardware provided.

Mount the PAD and DSU units in the shelf:

1. Set the units on the shelf in the positions shown in Figure 3-16, making sure the feet on the bottom of the unit protrude through the holes in shelf.

2. Set the appropriate bracket across the top of each unit and fasten using the hardware provided.

Make connections to the system:

1. Connect the Y-cable labeled "To User" to the connector labeled "STP/X.25" on the back of the PAD unit (see Figure 3-13).

2. Connect the "To User" end of the Y-cable to the 3-foot long DB-25 cable. Connect the other end of the DB-25 cable to the connector labeled "RS232/530" on the back of the DSU.

3. Connect a terminal to the remaining end of the "To User" Y-cable, using a standard DB-25 cable. This terminal will be used for setup of the PAD only.

4. On the RS-232/485 converter, set the DTE/DCE switch to DTE.

5. Set the RS-232/485 converter to 4 wire, transmitter enabled by RTS communications, by setting the converter's DIP switches to the following positions:

Table 3-D: RS-232/485 Converter DIP Switch Settings

Dip Switch	SW1	SW2	SW3	SW4	SW5
Mode	OFF	ON	OFF	OFF	ON

6. Connect the RS-232/485 converter to the ECS controller RS-485 port, terminal block TB201, using the following configuration:

Table 3-E: Wiring Connections from ECS TB201 to RS-232/485 Converter

Converter Wiring Position	ECS Controller TB201 Pin #
T+	4
T-	3
R+	2
R-	1

Refer to "ECS Microprocessor Option (CP2) Configuration" for information on connecting wires to terminal blocks.

7. Connect the DB-25 Connector of the RS-232/485 converter directly to the PAD, on the first available port, from port P2 - P5 (port 2 to port 5).

8. Connect the X.25 network phone line using an 8-pin modular jack to the J1 port on the back of the DSU.:

Caution

Refer to manufacturer's instructions and safety warnings when connecting power.

9. Connect the appropriate power to the DSU terminal block.

10. Connect the 3-pin power cable to the back of the PAD at the connector labeled POWER.

11. Connect appropriate power to the PAD power cable as described in the figure below
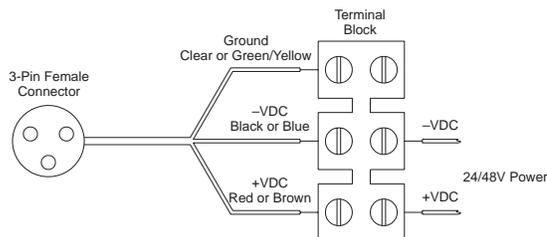
Figure 3-17: PAD Power Cable Setup

12. Complete the PAD setup in "X.25 /TL1 Equipment Setup and Installation.".

PAD Setup   The PAD is set up by typing a set of commands on the setup terminal, to define the logical connection.   This setup is dependent upon the network administrator, and the existing PAD port usage. The following symbols in the setup will be used for site-dependent parameters.

Substitute <PN>, port number, for the port number of the RS-232/485 converter. Valid port numbers are 2, 3, 4, 5, 6 and 19 for the user setup port. The caret "^" character stands for the space character (depress space bar).

The symbol <RETURN> denotes that the Return or Enter key is pressed.

All commands and parameters are case insensitive.

The PAD should respond to all commands with the response "CMD ACCEPTED," except the "SET" and "PROF" commands, which have no PAD response. PAD messages are described in Table 3-F.

Table 3-F: Pad Messages

Pad Message	Description
CMD ACCEPTED	Command was entered and executed without errors.
CMD REJECTED	Command rejected by command. Probably caused by incomplete command.
COM	Call connected.
ERR	Invalid command syntax or missing or bad command parameter.
ERR 014	Command rejected. Command requires password.
INV	Invalid X.28 PAD parameter.
INV CMD	Command entered does not exist.
INV PARAM VALUE	Parameter values have incorrect options set are incorrect or out-of-range.
RESET DTE 000	PVC operational.
RESET DTE 017	PVC out of order. Check connection and DCE/DTE status of **ALL** devices.
RESET DTE 051	PVC out of order (timer expiry).
RESET DTE 073	Call contains invalid DTE address.
RESET DTE 113	SVC Cleared because X.25 connection down.
SERVICE:	PAD Service prompt (banner).

1. On the terminal connected to the setup port P1, enter **…** <RETURN> (type 3 periods and press RETURN).

2. By default, the PAD requires a password for each command entered. Turn this option off by typing the Set System command: S^S^PA:XYXYXY^OP:N<RETURN>.

3. Define the ECS controller as a DTE device on the local PAD channel number zero, by entering the Set Network Connection command: S^N^C^CH:0^TE:Y<RETURN>.

4. To define the semicolon and less-than sign (ASCII 59 and 60) as TL1 command terminators, enter the Set Character Definitions command: S^C^D^PO: <PN>^EN:059,060<RETURN>

5. Define the parity, speed, and number of data bits for the port by entering the Set Line Parameter command: S^L^P^PO:<PN>^SP:<SPD>^PR:<PRT>^LE:<BTS>^ST :<STB><RETURN>

    where:

    <SPD> is the speed of the port in bps. Valid speeds are: 300, 600, 1200, 2400, 4800, **9600**.

    <PRT> is the parity of the port. Valid parity options are: E=even; **N=none**; O=odd

    <BTS> is the number bits per character for the port. Valid bit numbers are: 7, **8**.

    <STB> is the number of stop bits for the port. Valid stop bit numbers are **1**, 2.

Note

These settings must match the ECS software TL1 port settings. The preferred settings are speed: **9600**, parity: **none**, data bits: **8**, stop bits: **1**.

6. Define the X.3 port profile, as PAD profile D0 (D-ZERO), by entering the following commands:

    S^A^P^PC:Y^PF:D0<RETURN>

    PROF^A2<RETURN>

    SET^6:0,3:128,2:0<RETURN>

    S ^A^ P^PC:N^PF:A2<RETURN>

    S^A^P^ PO:<PN>^IF:D0^PF:D0<RETURN>

7. Warm start the PAD , to initiate the commands above, by entering the following command:

    W^S <RETURN>

8. Wait 5 seconds for the PAD to re-start, and reconnect to the PAD by typing: **…** <RETURN>

9. Continue with either the PVC or SVC port setup in "X.25/TL1 Equipment Setup and Installation."

To display parameters set above, issue one or all of the following commands at any time:

D^S	Display System (Show required passwords)
D^A^A^PO:<PN>	Display Address Associations (Show SVC address)
D^N^C	Display Network Connection (Show DCE/DTE status of PAD)
D^L^P^PO:<PN>	Display Line Parameters (Show port communication characteristics)
D^C^D^PO:<PN>	Display Character Definitions (Show TL1 command termination characters)
D^A^P^PO:<PN>	Display Asynchronous Parameters (Show X.3 configuration for port)
D^U^C^PO:<PN>	Display User Configuration (Show PVC connection)

PVC Port Setup

Note

> The PVC must originate from the central computerized monitoring system, commonly called the Operating System (OS). The network administrator will provide a logical channel number, <LCN>, for the port. This number will be in the range 0 to 252.

1. Set up the PVC channel with the Set User Configuration command:

    S^U^C^PO:<PN>^PV:<LCN><RETURN><L>

2. Warm start the PAD, by entering the command:

    W^S <RETURN>

3. Reset the ECS Controller.

    The PVC port will wait until connection. The X.25 Link lights on the front panel of the PAD will illuminate upon connection with the OSs.

    The setup terminal and the connecting DB-25 to DB-25 cable can now be removed if necessary.

SVC Port Setup 1. To convert the port from a PVC to a SVC, issue the Set User Configuration command:

    S^U^C^PO:<PN><RETURN>

    For a SVC connection, the network administrator will provide a network address, <NA>, which is a 2 to 15 digit number.

2. To name the SVC port, issue the Set Address Associations commands:

    S ^A^A^PO:<PN>^AD: <NA>^CH:0<RETURN>

    W^S<RETURN>

3. Reset the ECS Controller.

    The SVC port will now wait until connection. The X.25 Link lights on the front panel of the PAD will illuminate upon connection with the OSs.

    The setup terminal and the connecting DB-25 to DB-25 cable can now be removed if necessary.

Debugging TL1 The ECS controller will not generate any messages until a valid activate user command has been received. Thus, it becomes difficult to debug wiring or software setup problems.

The testing technique described below will test the interface from the OS to the PAD, and later from the PAD to the ECS.

Debugging OS to PAD Connection **Testing the DSU**

Verify that the speed of the connection matches the number displayed on the front panel of the DSU.

If the front panel displays the message "LINE", then the wiring of the 8-pin network phone line is incorrect.

If the DSU error light is flashing, then there is a break in the data connection, or the DSU is malfunctioning.

For normal operation, the transmit and receive lights on the DSU should be flashing on and off in quick succession.

Debugging the PAD

For normal operation, the front panel transmit and receive lights for the X.25 connection should be continuously flashing, although at a different rate than the DSU.

Data transmitted and received by the ECS should be seen momentarily on the front panel port lights.

1. Connect the terminal to the remaining end of the "To User" Y-cable, using a standard DB-25 cable.

2. On the terminal, reconnect to the PAD by typing:
   ... <RETURN>.

3. Warm start the PAD, by issuing the command
   w s <RETURN>.

4. Wait 5 seconds for the PAD to re-start, and reconnect to the PAD by typing: **...** <RETURN>.

5. Have the OS issue another activate user command. If the OS does not receive the ECS's response, display the TL1 connection status by typing the Display Networks

Statistics command: D^N^S <RETURN>.

The output of the command will look like:

```
                         STATISTICS
                      HDLC STATISTICS
    CHAN        STATUS      DTR       RTS        DCD        CTS
     0          UP-000      UP        UP        UP-001     UP-001
     1          UP-000      UP        UP        DN-001     DN-001
```

```
                      FRAME STATISTICS
CHAN    STATUS    BAD    ABORT   TIME   REJ   REJ   FRMR   FRMR   RNR   RNR
                  CRC    IN      OUT    IN    OUT   IN     OUT    IN    OUT
0       UP-001    000    000     000    000   000   000    000    000   000
1       DN-000    000    000     000    000   000   000    000    000   000
```

```
                      PACKET STATISTICS
CHAN   STATUS   RXCOUNTERS           TXCOUNTERS           CALLS        CLEARS
                PACKETS   SEGMENTS   PACKETS   SEGMENTS   IN     OUT   IN      OUT
0      UP-001   00000016  00000016   00000234  00000315   00005  00000 00002   00002
1      DN-000   00000000  00000000   00000000  00000000   00000  00000 00000   00000
BUFFER COUNT              TOTAL: 0134          FREE: 0105
```

If the HDLC Statistics channel 0 status is not UP, then there is an open connection somewhere between the DSU, PAD, RS-232/485 converter, and the ECS. Check that the RS-232/485 converter is securely connected to the PAD.

If either the frame statistics, or packet statistics channel 0 status is not UP then there is something wrong in the setup with the OS or the PAD.

All channel 1 statuses should be ignored.

Test the RS-232/485 converter to ECS

1. Disconnect the RS-232/485 converter from the PAD and set the converter's DTE/DCE switch to DCE.

2. Connect a 9-volt, 500 milliamp ac-to-dc power supply in the side power connection of the converter. The PAD usually powers the converter.

3. Connect the RS-232/485 converter's RS-232 connection to the terminal.

4. Configure the terminal to be in half-duplex mode, and the same Issue an activate user command from the terminal. If the ECS responds, then verify the PAD's power jumper switch positions.

5. Otherwise, verify the RS-232/485 converter settings (open, closed, open, open, closed). Try another RS-232/485 converter or ECS's CP2 circuit pack.

When testing is completed:

1. Reset the RS-232/485 converter DTE/DCE switch back to DTE.

2. Disconnect the AC adapter from the RS-232/485 converter.

3. Reconnect the RS-232/485 converter to the PAD.

4. To test the connection, have the OS transmit the activate user command.

5. If the message is not received, go to the "Test the OS to PAD" section.

Test the OS to PAD

1. Disconnect the RS-232/485 converter from the PAD Port and connect the terminal and cable to the PAD port, where the RS-232/485 converter was plugged in. Messages can now be transmitted directly from the OS to the terminal and back.

Note

Use the semi-colon (;) as the command terminator (not carriage return)

If messages are received, then check the setup for the PAD and the OS.

If no messages are received, there is a possibility of a bad RS-232 port on the PAD.

2. Reconnect the terminal to the remaining end of the "To User" Y-cable, using a standard DB-25 cable.

3. On the terminal, reconnect to the PAD by typing: **...**<RETURN>.

4. Cancel the PVC connection for the port by issuing the command:

   S^U^C^PO: <PN><RETURN>.

5. Re-enter PAD setup commands using the new port number, including the PVC or SVC setup.

6. Remember to warm start the PAD.

7. Now connect the terminal to the new PAD port. Messages can now be transmitted directly from the OS to the terminal and back, using the semi-colon command terminator.

8. Disconnect the terminal.

9. Reconnect the RS-232/485 converter to the pad to the new port.

10. Have the OS retransmit the activate user command.

General Operational Considerations

1. If there are multiple ECSs connected to the PAD, each connection should have a unique PVC number assigned by the OS administrator.

2. Activate user commands must be issued by the OS, every time the ECS CP2 circuit pack is reset.

4   *Operation*

The ECS Microprocessor option (CP2) software displays a series of screens and menus to allow interaction with the ECS Battery Plant. Each item is self-explanatory, and each will prompt the user to go on to the next item. CP2 normally supports two types of interface: a completely menu-driven interface for normal use, and a command line interface that is mainly intended for PEERS compatibility. If the Voice Response option is added, CP2 supports a telephone keypad driven interface that works with the remote Voice Response option.

Terminal Login Procedure

After CP2 is powered up, the local terminal will display some self-diagnostic information and prompt the user to press <Return>. The user will then be prompted to enter the password. Type in the password and press <Return>. CP2 is shipped with the factory default password LINEAGE. This password should be changed by a designated Super-User as explained in "Super-User Functions" below. If an invalid password is typed, the user will be prompted to try again. The password does not appear on the screen as it is typed. Six attempts at entering the correct password are permitted. At the sixth incorrect attempt, the system logs off and the user must start again. If the connection was from a remote terminal using a modem, the user must call again. At the next login, CP2's list of active warnings will include an "Excessive invalid login attempts were made" warning which can be cleared by a Super-User.

Choose terminal type: The next screen prompts the user to choose the type of terminal. Refer to Section 3, "ECS Datalogger Option (CP3) Installation" for a list of supported systems. Type the number that matches the choice and press <Return>.

Login header: The next screen displays a three-line header and some basic information about the plant configuration. The header will be updated on each screen throughout the login session. As shown in Figure 4-1, it will display:

System identification/status information:

      (1)the current ECS Controller software version
      (2)the current time and date
      (3)a plant identification block (Super-User definable)
      (4)plant voltage
      (5)plant load current
      (6)whether warnings or alarms are present
      (7)whether the plant is in float or equalize mode
      (8)whether a new message has been added to either of the notepads

Plant configuration information:

      (9)plant type
      (10)shunt size
      (11)maximum number of rectifiers supported
      (12)local port configuration
      (13)whether boost control is hardware enabled or disabled
      (14)whether remote rectifier control is hardware enabled or disabled
      (15)whether CP3 datalogger is installed or not
      (16)whether Voice Response Option is installed or not

Press <Return> to continue to the Main Menu

```
Lucent Technologies ECS CONTROLLER VERSION 2.3                01/01/92  02:27
            PLANT ID: 1   Lucent Technologies ECS 2000 - 'THE RIGHT CHOICE'

VOLTAGE:=-53.97 V          LOAD=0.4 A         WARNING(S)        FLOAT MODE
                                              PRESENT

     ALARM STATUS:           NONE
    WARNING STATUS                      2 WARNING(S) PRESENT
    NOTEPAD STATUS:      No Notification
            PLANT CONFIGURATION:  Plant Type:              -48 Volts
                                  Shunt Size:              300A/50mv
                      Maximum number of Rectifiers:            6
                           Local Port Configured for:      Terminal
                                Boost Control:             Enabled
                        Remote Rectifier Control:          Enabled
                 Datalogger Option:                        Present
                        Voice Response Option:             Present
                        Press <Return> to continue:
```

Figure 4-1: Login Header

Operating Environment

The remaining screens in this menu-driven environment allow the user to interact with the plant, choosing items of information to view or changing the way the information is presented. All users have monitoring ability and may have some degree of rectifier control if the rectifier control feature is hardware enabled. Super-Users can exercise additional control and configuration functions. These choices are presented in a series of menus.

Navigation and Commands

Select items on the menu by moving the highlight bar with the arrow keys or by typing the first letter of the item to be selected.

<Return>	Execute selected menu item
<Esc>	Return to previous screen
<Control-E>	Return to previous screen
<Del>	Return to main menu
<?>	Customer Service Hotline telephone number
<*>	Toggle language selection between English and Spanish

Note

> A time-out feature will automatically log the user off the system if no keyboard activity occurs for a five-minute period. An audible beep will be issued after four minutes to warn the user.

Menu Structure   Selecting an item from the Main Menu gives a user access to the appropriate sub-menus. The functions of each are detailed in, "Feature Descriptions." Figure 4-2 is a general map of the menu structure.

Logging Off   The last item on the Main Menu, Bye, logs the user off the system. To log in again from a local terminal, press <Return>, or call back from a remote terminal. The ENTER PASSWORD prompt will then be displayed.

Feature Descriptions

Note

> Features preceded by the symbol §§ in this manual mean that this menu item will only appear if the CP3 Datalogger Option has been installed.

User Features   All users have access to the features listed on the Main Menu upon logging in as described in "Terminal Login Procedure" and "Operating Environment." In the listings below, PATH indicates the menu and submenu selections to follow.

MAIN MENU
Display Alarms
Display Warnings
Super-User Login
View History
Rectifier Control
View Statistics
§§Datalogger/Relays
Notepad/Inventory
Pass-Through
Bye
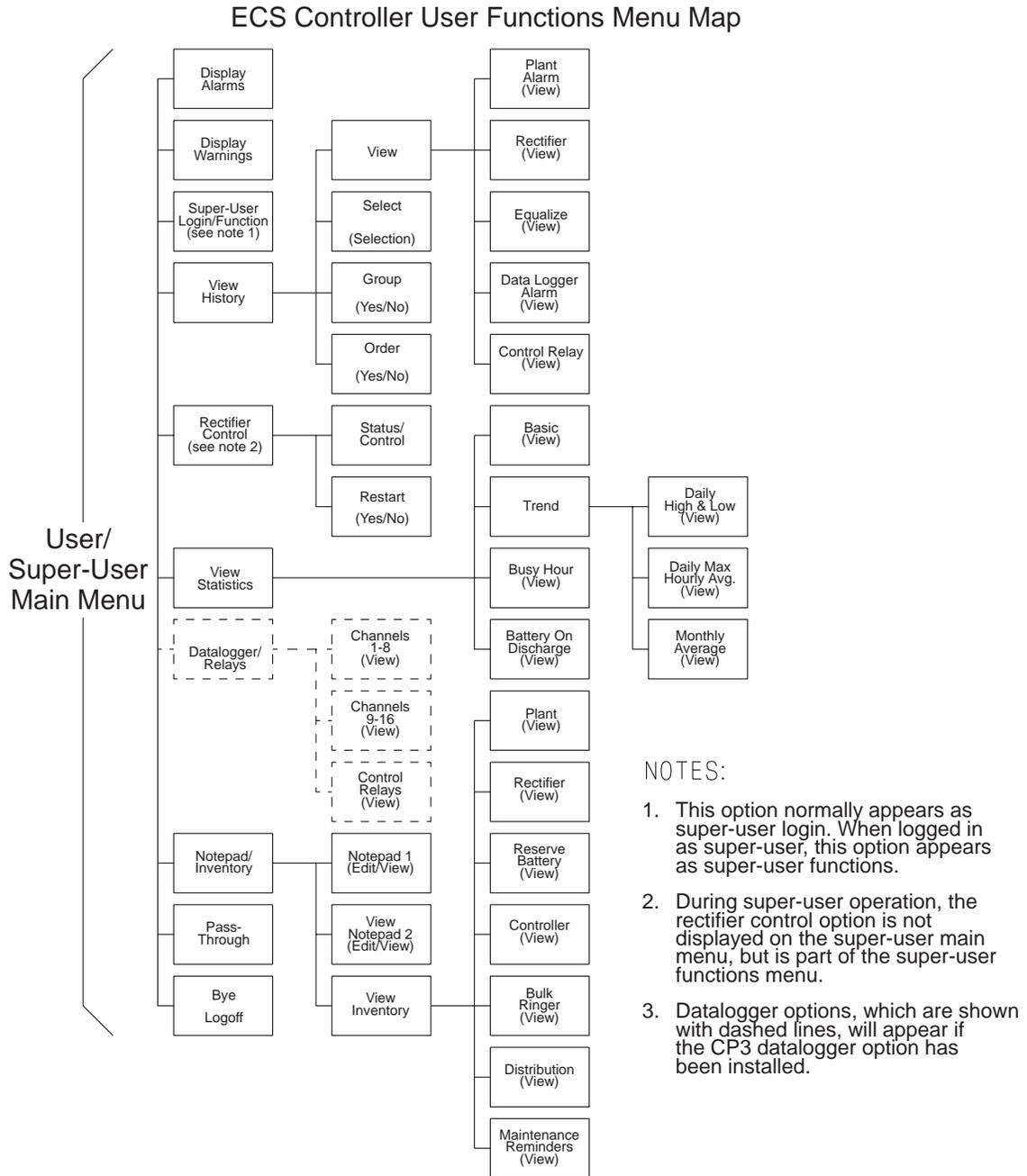
ECS Controller User Functions Menu Map

Figure 4-2: ECS Microprocessor Option (CP2) User Functions Menu Map

Display Alarms - PATH: Main Menu/Display Alarms	Displays all active alarm conditions. Alarms are listed by abbreviation of alarm type, date and time of occurrence, and alarm description. Refer to Appendix B for a complete list and description of possible alarms.

Display Warnings - PATH: Main Menu/Display Warnings

Displays all active warning conditions. System warnings are issued to indicate that some normal maintenance or additional controller configuration procedure may be required. Three types of warnings may be issued. Warnings marked by a double asterisk (**) indicate that the warning can only be cleared by a Super-User. See "Super-User Features." These warnings may be a user-clearable system warning or may be a user defined and user clearable custom warning of an action to take on a specified date (see "Super-User Features."). Warnings not marked by a double asterisk will automatically clear when the warning condition retires. Refer to Appendix A for a complete list and description of possible warnings, along with recommended actions. Only 13 warnings will be displayed per page. Press <Return> to display remaining warnings.

Super-User Login - PATH: Main Menu/Super-User Login

Allows access to plant configuration and control options. The Super-User Login feature may be disabled. See Section 3 "DIP Switch Settings" for more information. A second level security password is required. Refer to "Super-User Features." Four login attempts are allowed during a login session. At the fourth incorrect login attempt, the system logs off and the user must start again. If the connection was from a remote terminal using a modem, the user must call again. At the next login, CP2's list of active warnings will include an "Excessive invalid Super-User login attempts were made" warning which can be cleared by a Super-User.

View History - PATH: Main Menu/View History

Displays a sub-menu of viewing format options and the View option for access to all system history logs. If any history log fills more than one page, pressing <Return> will advance the display one page. Typing the minus sign <-> followed by <Return> will move the display back to the previous page.

View - PATH: Main Menu/View History/View.

Displays a sub-menu of system history logs. These include Plant Alarm History, Rectifier History, Datalogger Alarm History, Datalogger Relay History, and, if the Boost Control function is hardware enabled, Equalize History. Refer to "Super-User Features." for enabling the Boost Control function.

Plant Alarm - PATH: Main Menu/View History/View/Plant Alarm.

Note

History for each feature is stored up to a pre-set maximum of events. Thereafter, new event occurrences will cause the oldest event to be lost and all remaining records to be renumbered.

Displays the most recent plant alarm events, up to a maximum of 128 events. Refer to Appendix B for alarm event descriptions. Each numbered event includes the date and time logged, abbreviation of alarm type, status of alarm condition (Occurred or Retired), and an alarm description. The most recent date and time that the log was edited and cleared are also displayed here. Refer to "Super-User Features, Clear History/Plant Alarm," for editing and clearing options. By default, entries are made to this log in the order they occur, with the most recent event displayed first. This format can be changed using the Select, Group and Order options. The current status of these options is displayed immediately after the title on the Plant History Log.

Rectifier - PATH: Main Menu/View History/View/Rectifier.

Displays the most recent changes in rectifier status, up to a maximum of 50 events. Refer to Appendix F for rectifier status descriptions. Each numbered event includes the date and time of occurrence, rectifier identification, and the status of the rectifier for which the event was logged. The most recent date and time that the log was cleared is also displayed here. Refer to "Super-User Features, Clear History/Rectifier" for the clearing option. By default, entries are made to this log in the order they occur with the most recent event being displayed first. This format can be changed using the Group and Order options described on the following page. The current status of these options is displayed immediately after the title on the Rectifier History Log.

Boost - PATH: Main Menu/View History/View/Boost.

Displays the most recent boost cycles, up to a maximum of 12 events. Each numbered event includes the date and time boost charge began, the start mode, the end mode, and the duration of the boost period. No end mode or duration are displayed during an ongoing cycle. Refer to Appendix E for start and end mode descriptions. The most recent date and time that the log was cleared is also displayed here. Refer to "Super-User Features, Clear History/Boost" for the clearing option. By default, entries

are made to this log in the order they occur, with the most recent event being displayed first. This format can be changed using the Order option described on the following page. The current status is displayed immediately after the title on the Boost History Log.

§§ Datalogger Alarm - Path: Main Menu/View History/View/Datalogger Alarm.

Displays the most recent datalogger alarm events, up to a maximum of 128 events. The alarm events result from a datalogger reading being either above the upper thresholds or below the lower thresholds that are programmed by the Super-User, or from a contact closure or contact open being sensed when configured for contact monitoring. Each numbered event includes the date and time logged, abbreviation of alarm type, status of the alarm, and the channel description as entered in the super-user datalogger configuration screen. The most recent date and time that the log was edited and cleared are also displayed here. Refer to "Super-User Features, Clear History/Datalogger Alarm," for editing and clearing options. By default, entries are made into this log in the order they occur, with the most recent event displayed first. This format can be changed using the Select, Group, and Order options.

§§ Datalogger Relays - PATH: Main Menu/View History/View/Datalogger Relays.

Displays the most recent relay events, up to maximum of 16 events. The events result from a relay being energized or de-energized as a result of the Control Relay Program Line becoming entirely true, or entirely false. See "Super-User Features" for a description of the Control Relay program line. Each numbered event includes the date and time logged, status of the relay event, and the description entered in the super-user configuration screen. The most recent date and time that the log was cleared is displayed. Refer to "Super-User Features, Clear History/Datalogger Relay," for options. By default, entries are made into this log in the order they occur, with the most recent event displayed first. This format can be changed using the Select, Group, and Order options.

Select - PATH: Main Menu/View History/Select.

Displays a sub-menu of system select options. These include Plant Alarms and Datalogger Alarms. The sub-menus can be

used to select the specific types of alarm events that will be displayed when viewing history.

Plant Alarms - Main Menu/View History/Select/Plant Alarms.

This option can be used to select the specific types of alarm events that will be displayed when viewing the Plant Alarm History Log. The terminal arrow keys are used to move the cursor among the user-selectable fields. Pressing the space bar will change the fields to I (include) or E (exclude). Pressing <Return>saves the displayed configuration. By default, all alarm events are included. Changing the ALL field to I or E will update all individual fields to I or E, respectively. For example, changing the ALL field to E to exclude all events, and changing the Battery on Discharge field to I to include this event, will cause the History Log to display only the recorded Battery on Discharge events. A status of PARTIAL will be displayed immediately after the screen title, indicating that some alarm events in the actual log may not be displayed.

§§ Datalogger - Main Menu/View History/Select/Datalogger.

This option can be used to select the specific types of alarm events that will be displayed when viewing the Datalogger Alarm History Log. The terminal arrow keys are used to move the cursor among the user-selectable fields. Displayed with each field is the channel description as entered in the super-user configuration screen. Pressing the space bar will change the fields to I (include) or E (exclude). Pressing <Return> saves the displayed configuration. By default, all alarm events are included. Changing the ALL field to I or E will update all individual fields to I or E, respectively. For example, changing the ALL field to E will exclude all events, and changing the A01 field to I to include only this event, will cause the History Log to display only the recorded A01 events. A status of PARTIAL will be displayed immediately after the screen title, indicating that some alarm events in the actual log may not be displayed.

Note

This feature is reset to default status of ALL included when logging in to the system. Once changed, the change will remain in effect only for the current login session and only for the port (local or remote) from which the change is made.

Group - PATH: Main Menu/View History/Group.

This option can be used to group like events together for viewing in the Plant Alarm History, Rectifier History, Datalogger Alarm History and Datalogger Relay History Log. The current option setting is displayed. The user is then prompted as to whether events in these logs should be grouped. Entering <y> at this prompt will cause the Plant Alarm, Rectifier History, Datalogger Alarm History and Datalogger Relay History Logs to be displayed (when viewed) as follows: The Plant Alarm History Log will be displayed with events grouped by alarm type (Processor Halt, Major Fuse Alarm, etc.); and the Rectifier History Log will be displayed with events grouped by rectifier number (Rect #1, Rect #2, etc.). The Datalogger Alarm History Log will be grouped by analog channel numbers (A01, A02, etc.), and the Datalogger Relay History Log will be grouped by Control Relay numbers (CR1, CR2, etc.). The current setting will be displayed immediately after the history log screen titles as GROUPED.

Note

> This feature is reset to default status of NOT GROUPED when logging in to the system. Once changed, the change will remain in effect only for the current login session and only for the port (local or remote) from which the change is made.

Order - PATH: Main Menu/View History/Order.

This option can be used to change the order in which events are displayed in the Plant Alarm, Rectifier, Datalogger Alarm, Datalogger Relay, and Equalize History Logs. The current option setting is displayed. The user is then prompted as to whether events in these logs should be displayed OLDEST FIRST. Entering <y> at this prompt will cause the Plant Alarm, Rectifier, Datalogger Alarm, Datalogger Relay, and Equalize History Logs to be displayed (when viewed) such that the oldest events logged will appear first. New alarm events will appear last. The current setting will be displayed immediately after the history log screen titles as OLDEST FIRST.

Note

> This feature is reset to default status of NEWEST FIRST when logging in to the system. Once changed, the change will remain in effect only for the current login session and only for the port (local or remote) from which the change is made.

Rectifier Control   This selection displays a sub-menu of rectifier status and control features available to the user. The ECS microcomputer controller may be configured to handle a maximum of 6 rectifiers (or 12 rectifiers if the extra control hardware is present). The display will be different based on the configuration. In battery plants that have been configured for a maximum of six rectifiers, only one sub-menu will be shown. In battery plants that have been configured for a maximum of twelve rectifiers, two sub-menus will be shown. See Section 3, "ECS Microprocessor Option Configuration," for selecting the maximum rectifier configuration.

Note

CP2 is shipped from the factory with remote rectifier control hardware disabled. In this configuration, the remote rectifier control features in the Status/Control option cannot be accessed from a local or remote terminal. Refer to Section 3, "ECS Microprocessor option (CP2) Configuration" for CP2 hardware configuration. Individual rectifier status, however, is still available in the Status/Control option.

Status/Control - Rect 1 to 6 - PATH: Main Menu/Rectifier Control/"Status/Control" Rect 1 to 6.

This selection displays the Present State of each rectifier of the first six rectifiers. Refer to Appendix F for detailed rectifier status descriptions. If remote rectifier control is hardware enabled (refer to Section 3, "ECS Microprocessor option (CP2) Configuration" for hardware configuration), the terminal arrow keys can be used to move the cursor among user-selectable Desired State fields. Pressing the space bar will change fields to allowable entries at the current cursor location. After all changes have been made, pressing <Return> will change rectifier status and update the Present State fields.

Status/Control - Rect 7 to 12 - PATH: Main Menu/Rectifier Control/"Status/Control" Rect 7 to 12.

This selection displays the Present State of each rectifier of the second six rectifiers. Refer to Appendix F for detailed rectifier status descriptions. If remote rectifier control is hardware enabled (refer to Section 3 "ECS Microprocessor option (CP2) Configuration" for hardware configuration), the terminal arrow keys can be used to move the cursor among user-selectable Desired State fields. Pressing the space bar will change fields to

allowable entries at the current cursor location. After all changes have been made, pressing <Return> will change rectifier status and update the Present State fields.

Note

A normal user is only permitted to turn on rectifiers that have been turned off through CP2. Rectifiers turned off for any other reason cannot be turned on with CP2. Refer to "Super-User Features" for control options available to a Super-User.

Restart - PATH: Main Menu/Rectifier Control/Restart.

This option permits the user to send a restart signal to all rectifiers. This signal will attempt to restart failed rectifiers. No waiting is required to repeat the signal. The user is prompted to confirm a restart signal to all rectifiers. After issuing the restart signal, the user is requested to select the Status/Control option to view the status of the rectifiers. If no rectifiers have failed, the message "There Are No Failed Rectifiers" will be displayed.

View Statistics -
PATH: Main
Menu/View
Statistics

This selection displays a sub-menu of plant load statistics. Refer to Appendix C for specific individual statistics algorithms. Statistics information can be cleared by a Super-User (refer to "Super-User Functions/Clear Statistics"). New statistics information will start being collected again from the time statistics are cleared.

Basic - PATH: Main Menu/View Statistics/Basic.

This selection displays three sets of continuously updated plant load and datalogger channel statistics. Also displayed are the last date the statistical data were cleared, date and time of the current statistics, and the statistical units and descriptions. When navigating through this screen, pressing <Return> will always display the next available screen, beginning with the plant load followed by the 16 datalogger channel statistics. Pressing the minus sign <-> followed by <Return> allows the user to go back 1 screen. Pressing the minus sign <-> followed by a number, followed by <Return>, allows the user to go back that number of screens. Pressing the plus sign <+> followed by a number will move the user forward that many screens. Pressing <Esc> or <Del> will return the user to previous menus.

Three Highest Hourly Averages: At the change of every hour, CP2 determines the average plant load and datalogger channel averages for the previous hour. The three highest of these averages are displayed.

Three Highest Hourly Maximums: At the change of every hour, CP2 determines the highest instantaneous plant load and datalogger readings for the previous hour. The three highest of these maximums are displayed.

Three Lowest Hourly Minimums: At the change of every hour, CP2 determines the lowest instantaneous plant load and datalogger readings for the previous hour. The three lowest of these minimums are displayed.

Trend - PATH: Main Menu/View Statistics/Trend.

This selection displays a sub-menu of statistics for determining trends in the plant load current and one datalogger channel. The datalogger channel for which the trend is determined must be configured using the super-user Statistics configuration screen. When navigating through this screen, pressing <Return> will always display the next available screen, beginning with the plant load followed by the datalogger channel statistics. Pressing the minus sign <-> followed by return allows the user to go back 1 screen. Pressing <Esc> or <Del> will return the user to previous menus.

Daily High & Low - PATH: Main Menu/View Statistics/Trend/Daily High & Low.

This selection displays the highest and lowest instantaneous plant load currents and chosen datalogger channel as well as the time of occurrence for each of 16 consecutive days. Statistics can be cleared by a Super-User (refer to "Super-User Functions/Clear Statistics"). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

Daily Maximum Hourly Average - PATH: Main Menu/View Statistics/Trend/Daily Maximum Hourly Average.

This selection displays the maximum hourly average for the plant load current and chosen datalogger channel as well as the time of occurrence for each of 32 consecutive days. Statistics can be cleared by a Super-User (refer to "Super-User

Functions/Clear Statistics"). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

Monthly Average - PATH: Main Menu/View Statistics/Trend/Monthly Average.

This selection displays 13 consecutive monthly averages of daily maximum hourly plant load averages and chosen datalogger channel averages. Statistics can be cleared by a Super-User (refer to "Super-User Functions/Clear Statistics"). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

Busy Hour - PATH: Main Menu/View Statistics/Busy Hour.

This selection displays 24 consecutive hourly averages for a configured channel. The channel may be the plant load current averages or a datalogger channel averages. The peak instantaneous plant load current or datalogger channel reading for the 24 hour period is also displayed here. The start time and date for the period during which data will be collected can be programmed by a Super-User (refer to "Super-User Functions/Configure/Statistics"). Busy Hour statistics recording is stopped once 24 hourly averages have been collected.

Battery Discharge - PATH: Main Menu/View Statistics/Battery Discharge.

This selection displays up to 60 entries showing date, time, battery voltage, and plant load current during a battery discharge. An entry is recorded at least every 15 minutes, and at most every minute, depending on the rate at which battery voltage is decreasing. Logging stops when the Battery on Discharge alarm retires. If a new Battery on Discharge alarm occurs prior to clearing the statistics log, the first entry for the new discharge period will be marked with an asterisk (*). The specific algorithm used to determine when entries are recorded is given in Appendix C. Statistics can be cleared by a Super-User (refer to "Super-User Functions/Clear Statistics").

Datalogger/
Relays - PATH:
Main Menu/
"Datalogger/
Relays"

Displays a sub-menu of viewing options for the first 8 analog channel thresholds and present values, the second 8 analog channel thresholds/values, and the 8 Control Relay status and program settings.

§§**Datalogger Channels (1-8)** - PATH: Main Menu/"Datalogger/Relays"/Channels 1 to 8.

This option is used for viewing the present description, upper and lower thresholds, units and present readings of 8 of the 16 analog channels. The channel descriptions and units are entered in the Super-User configuration menu in order to best describe what is connected to the datalogger channel. Going above or below the upper and lower thresholds will cause a datalogger alarm. The E/D field displays whether a channel is Enabled or Disabled. If a channel is Disabled, it will not be scanned, nor will it cause any alarms. No present value will be displayed for an unconfigured channel. Channel values are a direct result of the percentage of full scale that has been read and multiplied by the user supplied scale factor. If a channel is unconfigured, the channel value will be left blank since the channel is not being scanned. The screen display is automatically updated every 5 seconds to reflect changes in the channel readings. The updates will continue until a key is pressed or the terminal timeout occurs.

§§**Datalogger Channels (9-16)** - PATH: Main Menu/"Datalogger/Relays"/Channels 9 to 16.

This option allows viewing the second set of eight datalogger channels in the same way as channels 1-8.

Note

This feature is set to default status of all channels DISABLED when CP3 is first plugged in.

§§**Control Relays** - PATH: Main Menu/"Datalogger/Relays"/Control Relays.

This option is used to view the present description and status of each of the eight CP3 control relays, as well as any associated program line for each of the relays. The description is entered in the Super-User configuration menu in order to best describe what is connected to the relay contact. The status displays whether the relay is presently energized or de-energized. Any

change of status is reflected in the Datalogger Relay History Log. The Control Relay Program Line is a conditional instruction line for which if all conditions are met, the associated relay will be energized ON. The program line may be as simple as ON or OFF, or more complex based on alarm conditions, dates and time, or datalogger channel and relay status. See Appendix H for examples of program lines and acceptable word usage.

Note

This feature is set to default status of all relays De-Energized when CP3 is first plugged in.

Notepad/ Inventory - PATH: Main Menu/"Notepad/ Inventory"

Displays a sub-menu of viewing options for access to the ECS inventory pages, as well as read/write access to the general message notepad 1, and read-only access to the Super-User notepad 2.

View Notepad 1 - PATH: Main Menu/"Notepad/Inventory"/Notepad 1.

This selection displays a 15 x 75 character notepad that may be read or written by both user or Super-User. When selected, any previously entered message will be displayed. The terminal arrow keys are used to move the cursor among the notepad lines. Any key entry will automatically put that line into edit mode and clear the line. The user may enter up to 75 characters on each line. Pressing <Return> will save all new lines and any changed lines. Pressing either <Esc> or <Del> will put back the original lines and will discard any edited changes. When <Return> is pressed, the user will be prompted to specify whether the login header should notify the next user that a new message has been entered in the notepad. Answering "No" to the prompt results in a message "No Notification" in the header. Answering "Yes" prompts the user to see the appropriate notepad.

View Notepad 2 - PATH: Main Menu/"Notepad/Inventory"/View Notepad 2.

This selection displays a 15 x 75 character notepad similar to Notepad 1 but which is read-only to the user. Only the Super-User can enter messages in this Notepad but the messages are available for all to read.

View Inventory - PATH: Main Menu/"Notepad/Inventory"/View Inventory.

This selection displays a sub-menu of Inventory entry pages that are available for viewing. These pages display information about the physical plant configuration and inventory as well as engineering information or suggested equipment replacement dates as entered by the Super-User. Editing these pages must be done from the Super-User configuration screen. See "Super User Features/Configure."

Plant - PATH: Main Menu/"Notepad/Inventory"/View Inventory/Plant.

This selection allows the viewing of the inventory page related to the general plant configuration. Information provided includes the installation date, agency approvals, plant capacities, nominal voltages and other provided equipment.

Rectifiers - PATH: Main Menu/"Notepad/Inventory"/View Inventory/Rectifiers.

This selection allows the viewing of the inventory page related to connected plant rectifiers. Information provided include the individual rectifier vendors, the rectifier identification codes, rectifier capacity, and the date the rectifiers were installed.

Reserve Battery - PATH: Main Menu/"Notepad/Inventory"/View Inventory/Reserve Battery.

This selection allows the viewing of the inventory page related to the engineered plant load. Information provided include the reserve battery code number, its vendor, the engineered reserve time and load, and the number of battery strings.

Controller - PATH: Main Menu/"Notepad/Inventory"/View Inventory/Controller.

This selection allows the viewing of the inventory page related to the circuit pack inventory and configuration. Information is provided for each of the available plant controllers. Provided entries for each circuit pack include the board CLEI code, its serial number, and its installed date.

Bulk Ringer - PATH: Main Menu/"Notepad/Inventory"/View Inventory/Bulk Ringer.

This selection allows the viewing of the inventory page related to the connected bulk ringers. Information provided includes the ringer vendors, ringer CLEI codes, and the ringer manufacturing date. Other information includes the installed date and the ringer capacity.

Distribution - PATH: Main Menu/"Notepad/Inventory"/View Inventory/Distribution.

This selection allows the viewing of the inventory page related to distribution and protection panels. Information provided include the location and model number, maximum panel design capacity, total of installed protection devices, total number of fuse holders or circuit breaker positions provided, and the total number of fuses or circuit breakers installed.

Maintenance Reminders - PATH: Main Menu/"Notepad/Inventory"/View Inventory/Maintenance Reminders

This selection allows the viewing of the Maintenance Reminders that have been programmed and the dates on which they will become active. These reminders will show up as active, user-clearable warnings on the appropriate dates. A total of 12 reminders can be programmed by the Super-User.

Pass-Through - PATH: Main Menu/ Pass-Through

This option is used when the battery plant is connected with other Lucent Technologies equipment via the RS232 pass-through port. This selection passes the communication link with the local or remote terminal through the CP2 directly to the connected unit(s). Refer to Figure 3-2, TB202, for RS232 pin locations to make this connection. When Pass-Through is selected, communication is exactly as though connected directly to the other unit(s). While in Pass-Through mode, CP2 only monitors communication. The command RBYE will return the communication link to CP2. Note that if the BYE command is not issued to the connected system before entering the RBYE command, the communication link will be returned to CP2, but the connected system will remain active until it times out. The Pass-Through assumes a default baud rate of 1200 baud when CP2 is first powered up. See "Super-User Features/Configure" for information on changing the Pass-Through baud rate.

Bye - PATH:
Main Menu/Bye

This selection logs a user or Super-User off the system.

Super-User
Features

Note

Features preceded by the symbol §§ in this manual mean that this menu item will only appear if the CP3 Datalogger Option has been installed.

Paragraph "*Feature Descriptions/User Features*" describes features available to a regular user upon logging into the system. A Super-User has configuration and control abilities in addition to all the options available to a regular user.

To log in as a Super-User, log in to the system and select the Super-User Login option from the Main Menu. If the Super-User option is enabled in the hardware (switch 1 of SW202 in closed position), the system will prompt for a Super-User password. The ECS system is shipped with the factory default Super-User password, 2000. Type the Super-User password and press the <Return> key. The system will issue a message that Super-User status has been granted and prompt for a <Return>. Pressing the <Return>key will display the Super-User Main Menu. All options available to a regular user are on this menu, with the addition of a Super-User Functions option which a Super-User can select for system configuration and control.

Note

During Super-User operation, the Rectifier Control option is not displayed on the Super-User Main Menu, but is now part of the Super-User Functions Menu.

Super-User Functions

The Super-User Functions Menu, where system configuration and control features are located, is reached by selecting Super-User Functions from the Super-User Main Menu.

SUPER-USER FUNCTIONS
Rectifier Control
Boost Control

Clear History
Clear Statistics
Clear Pending Dial-Outs
Clear Warnings
Edit Inventory
Edit Notepad 2
Configure

Rectifier Control - PATH: Super-User Functions/ Rectifier Control   This selection displays a sub-menu of rectifier status and control features available to the Super-User.

ECS Controller Super-User Menu Map

NOTES:

1. Datalogger options, which are shown with dashed lines, will appear if the CP3 datalogger option has been installed.

2. The TL1 configuration options only appear if the TL1 feature is included.

3. When logged in as super-user, this option appears as super-user functions.
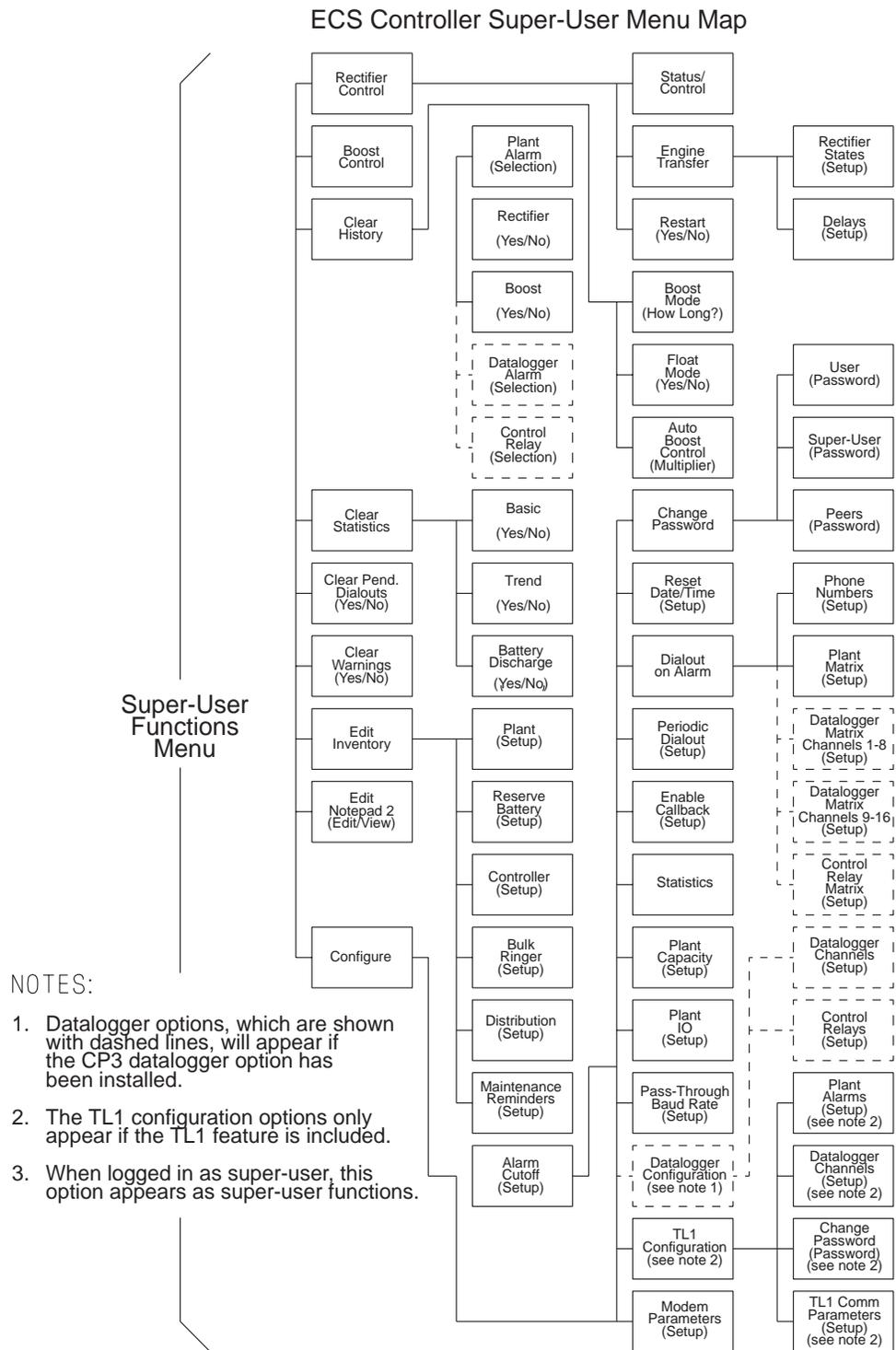
Figure 4-3: ECS Microprocessor Option (CP2) Super-User Functions Menu Map

Note

CP2 is shipped from the factory with remote rectifier control hardware disabled. In this configuration, remote rectifier control features cannot be accessed. Refer to Section 3, "ECS Microprocessor Option (CP2) Configuration" for hardware configuration. Individual rectifier status, however, is still available in the Status/Control option.

The ECS microcomputer controller may be configured to handle either a maximum of six rectifiers or a maximum of 12 rectifiers. The display will be different based on the configuration. In battery plants that have been configured for a maximum of six rectifiers (see Section 3, "Maximum Number of Rectifiers"), only one configuration screen is shown. In battery plants that have been configured for a maximum of 12 rectifiers, two configuration screens are shown.

Status/Control - Rect 1 to 6 - PATH: Super-User Functions/Rectifier Control/"Status/Control"Rect 1 to 6.

This selection displays the current state of each of the first six rectifiers. Refer to Appendix F for detailed rectifier status descriptions. If remote rectifier control is hardware enabled (refer to Section 3, "DIP Switch Settings"), the terminal arrow keys can be used to move the cursor among user-selectable Desired State fields. Pressing the space bar will change fields to allowable entries at the current cursor location. After all changes have been made, pressing <Return> will change rectifier status and update the Present State fields.

Status/Control - Rect 7 to 12 - PATH: Super-User Functions/Rectifier Control/"Status/Control" Rect 7 to 12.

This entry appears only if the plant has been configured for 12 rectifiers. Its operation is identical to that of the first six rectifiers.

Note

If the plant voltage drops below 44V (48V plant) or 22V (24V plant) the controller will turn on any rectifiers that have been placed into standby mode using this feature. Rectifiers turned off for any other reasons, however, cannot be turned on by CP2.

Engine Transfer - PATH: Super-User Functions/Rectifier Control/Engine Transfer.

This selection displays a sub-menu of options used in configuring the Rectifier Sequence control feature resident on CP2.

Rectifier States - PATH: Super-User Functions/Rectifier Control/Engine Transfer/Rectifier States.

This feature is used to determine which rectifiers will be sequenced on in the event of a transfer to an engine alternator. The Super-User moves the cursor among the Desired Setting fields using the terminal arrow keys. Pressing the space bar will change fields to allowable entries at the current cursor location. After all changes have been made, pressing <Return> will save the Desired Settings and update the Present Setting fields. Rectifiers set to OFF will not be sequenced on after an engine transfer. Note that the Present Setting does not indicate current rectifier status.

Note

When rectifier sequencing occurs during a transfer to an engine alternator, the ON/OFF setting in Rectifier States overrides any previously issued ON/OFF commands. When sequencing back to commercial ac, all rectifiers will be sequenced ON, overriding any previously programmed OFF command.

Delays - PATH: Super-User Functions/Rectifier Control/Engine Transfer/Delays.

There are two delays associated with rectifier sequencing during an engine transfer: the delay before the first rectifier in the sequence is turned on, and the delay between subsequent rectifier start-ups. Selection of this option allows modification of both of these delays. The Super-User moves between the two delay fields using the terminal arrow keys. The factory default setting for the first rectifier delay is one second. This can be changed in increments of one second intervals up 10 seconds, and then in five-second intervals up to 55 seconds, and then afterwards in one-minute intervals up to a maximum of 10 minutes. Toggle the space bar for each incremental change. The factory default setting for the delay between rectifier startups is one second and can be changed incrementally in one-second

intervals up to a maximum of 10 seconds. After all changes have been made, pressing <Return> will save the desired settings, after the user confirms the selections.

Restart - PATH: Super-User Functions/Rectifier Control/Restart.

The Super-User is prompted to confirm sending a restart signal to all rectifiers. This signal will attempt to restart failed rectifiers. No waiting is required to repeat the signal. The user is prompted to confirm a restart signal to all rectifiers. After issuing the restart signal, the user is requested to select the Status/Control option to view the status of the rectifiers. If no rectifiers have failed, the message "There Are No Failed Rectifiers" will be displayed.

Boost Control   This selection displays a sub-menu of boost control functions. This section describes Super-User control of PROGRAM boost, TERMINAL float, and AUTO boost modes. Refer to Appendix E, Boost Status, for a detailed description of all boost status information. Refer to the appropriate battery manual for the battery manufacturer's boost charging recommendations.

Note

> The system hardware can be configured such that equalize control is not permitted. When equalize control is disabled, selection of this option will display a message that this feature is disabled in hardware. See Section 3, "Basic Controller Configurations," for basic controller configuration.

Boost Mode - PATH: Super User Functions/Boost Control/Boost Mode.

Allows the Super-User to change the plant status from float mode to PROGRAM boost mode. This selection prompts the Super-User for the number of hours, up to 24, during which the plant should remain in boost mode. If the plant is already in equalize mode, this option will display the time, date, and start mode of the boost function. If the start mode is AUTO or PROGRAM, the duration and the time remaining in boost mode is displayed. The plant status cannot be changed to boost mode if any plant alarm, other than UEQ, is present.

Float Mode - PATH: Super User Functions/Boost Control/Float Mode.

Allows the Super-User to change the plant status from boost mode to TERMINAL float mode.This selection displays the time, date, and mode of the start of the boost function. If the start mode is AUTO or PROGRAM, the programmed duration and the time remaining in boost mode is displayed. The Super-User is then prompted to verify the request to go into float mode.

Auto-Boost Configuration - Path: Super User Functions/Boost Control/Auto-Boost Configuration.

This selection displays a sub-menu of auto-boost configuration functions.

Auto-Boost Type - Path: Super User Functions/Boost Control/Auto-Boost Configuration/Auto-Boost Type.

This feature will configure the auto-boost type to TIMED, QRCT, or disabled. **QRCT** stands for Quiescent Recharge Terminated auto-boost, in which the plant enters boost after BD retires and exits boost when batteries are no longer consuming current.

Timed Auto-Boost Sub-Menu - Path: Super User Functions/Boost Control/Auto-Boost Configuration/Timed Auto-Boost Sub-menu.

If configured to Timed Auto-Boost, this feature causes the plant to go into boost mode automatically after a BD alarm lasting more than four minutes is retired. The total time the plant remains in boost mode is equal to the time the batteries were on discharge multiplied by the specified Auto Mode Multiplier (AMM).

QRCT Auto-Boost Sub-Menu - Path: Super-User Functions/Boost Control/Auto-Boost Configuration/QRCT Auto-Boost Sub-Menu.

If enabled, this feature causes the plant to go into boost mode automatically if **either** of the following conditions occur:

• Battery voltage drops below a specified value (factory default 52 volts) after the first five minutes of the start of a battery discharge event.

• The total current flowing into the batteries exceeds a specified value (factory default 50 amps).

An entry of "n" for either of these values indicates that the criteria will not be used in activating boost.

The battery discharge event is based on the polarity of the voltages from the battery shunts. The number of battery shunts and their ampacities for a 50 mV drop must be selected. The datalogger channels 14 through 16, depending on the number of shunts selected, will be configured automatically for monitoring these shunts.

The plant will remain in boost mode until the **first** of the following conditions occurs:

• Number of hours since the plant entered the boost mode has exceeded the specified value (factorydefault 15 hours).
• The absolute value of the gradient calculation (change in current/change in time) drops below a specified value (factory default 0.00 amps/hour).
• Using these criteria, the plant will remain in boost for at least 45 minutes while the controller gathers enough data to make calculations.

Clear History - PATH: Super-User Functions/Clear History

This selection displays a sub-menu of system history logs that can be individually cleared. In all cases, the Super-User is prompted to verify this selection.

Plant Alarm - PATH: Super User Functions/Clear History/Plant Alarm.

The plant alarm history log is displayed and the Super-User is prompted for line numbers corresponding to the events to be deleted. A Super-User can delete individual alarm events, a selected group or range of events, or clear the entire plant alarm history log. Examples of valid entries to this prompt are:

<Return>	Displays the next page of events
<-><Return>	Displays the previous page of events
<1><Return>	Deletes line 1
<1, 3, 5><Return>	Deletes lines 1, 3 and 5
<1-5><Return>	Deletes lines 1 through 5

<Return>	Displays the next page of events
<all>	Clears the entire plant alarm history

After a deletion, all remaining records are renumbered and the date last edited is updated. If the entire history log is cleared, the date of last clearance is updated.

Note

> When deleting individual events, groups, or ranges of events, only entries on the current screen may be deleted. To delete entries on a preceding or following screen, move to the screen on which the entry is displayed.

Rectifier - PATH /Super-User Functions/Clear History/Rectifier.

The Super-User is prompted to clear the entire rectifier history log. Answering yes to this prompt clears the log and updates the date of last clearance. Pressing <Esc> or <Del><ES> <L> at the prompt will leave this screen with the log unaltered.

Boost - PATH /Super User Functions/Clear History/Boost.

The Super-User is prompted to clear the entire boost history log. Answering Yes to this prompt clears log and updates date of last clearance. Pressing <Esc> or <Del> at the prompt will leave this screen with the log unaltered.

§§ Datalogger Alarm - Path: Super-User Functions/Clear History/Datalogger Alarm

The datalogger alarm history log is displayed and the Super-User is prompted for line numbers corresponding to the events to delete. A Super-User can delete individual alarm events, a selected group or range of events or clear the entire datalogger alarm history log. Examples of valid entries to this prompt are:

<Return>	Displays the next page of events.
<-><Return>	Displays the previous page of events.
<1><Return>	Deletes line 1.
<1, 3, 5><Return>	Deletes lines 1, 3, and 5.

<Return>	Displays the next page of events.
<1-5><Return>	Deletes lines 1 through 5.
<all><Return>	Clears the entire datalogger alarm history.

After deletion, all remaining records are renumbered and the date last edited is updated. If the entire history log is cleared, the date of last clearance is updated. Pressing <Esc> or <Del><L> at the prompt will leave this screen with the remainder of the log unaltered.

Note

When deleting individual events, groups, or ranges of events, only entries on the current screen may be deleted. To delete entries on a preceding or following screen, move to the screen on which the entry is displayed.

§§ Control Relays - Path: Super-User Functions/Clear History/Control Relays.

The Super-User is prompted to clear the entire Control Relay history log. Answering yes to this prompt clears the log and updates the date of last clearance. Pressing <Esc> or <Del><L> at the prompt will leave this screen with the log unaltered.

Note

History for each feature is stored up to a pre-set maximum of events. Thereafter, new event occurrences will cause the oldest event to be lost, and all remaining records to be renumbered.

Clear Statistics - PATH: Super-User Functions/Clear Statistics.

This selection displays a sub-menu of system statistics logs that can be individually cleared.

Basic - Plant - PATH: Super-User Functions/Clear Statistics/Basic - Plant.

The Super-User is prompted to clear all basic plant load related statistics.

§§**Basic - Datalogger** - PATH: Super-User Functions/Clear Statistics/Basic - Datalogger.

The Super-User is prompted to clear the basic datalogger statistics. A Super-User can delete individual channel statistics, a selected group or range of channel statistics, or all channel statistics. Examples of valid entries to this prompt are:

<1><Return>	Deletes Channel 1 statistics.
<1, 3, 5><Return>	Deletes Channels 1, 3 and 5 statistics.
<all><Return>	Clears the entire datalogger channel statistics log.

Trend - Plant - PATH: Super-User Functions/Clear Statistics/Trend - Plant.

The Super-User is prompted to clear all plant load trend statistics.

§§**Trend - Datalogger** - PATH: Super-User Functions/Clear Statistics/Trend - Datalogger.

The Super-User is prompted to clear all datalogger trend statistics for the channel selected.

Battery Discharge - PATH: Super-User Functions/Clear Statistics/Battery Discharge.

The Super-User is prompted to clear all battery discharge statistics.

Clear Pending Dial-Outs - PATH: Super User Functions/Clear Pending Dial-Outs
This option works in conjunction with the Dial-Out on Alarm feature (see the Configure section). When the Dial-Out on Alarm feature is enabled, the controller stores in memory the alarm conditions that have occurred for which Dial-Out on Alarm is specified. If a Super-User should log in to the system before the controller has had a chance to dial out, the log of pending dial-outs in memory can be cleared by selection of this option.

Clear Warnings -
PATH: Super
User
Functions/Clear
Warnings

Selection of this option allows the Super-User to clear all user-clearable warnings and maintenance reminders individually or in groups or ranges of warnings. Only 13 warnings are displayed per page. <Return> will advance the display to the next page. Examples of valid entries are:

<1><Return>	Deletes Warning 1
<1, 3, 5><Return>	Deletes Warnings 1, 3 and 5
<all><Return>	Deletes all existing user-clearable warnings and reminders

Deleting warnings or maintenance reminders will cause all remaining items to be renumbered. Refer to Appendix A for a description of all system and user-clearable warnings.

Edit Inventory -
PATH:
Super-User
Functions/Edit
Inventory

This selection displays a sub-menu of Inventory entry pages that are available to the Super-User for saving information about his physical plant configuration and inventory.

Plant - PATH: Super-User Functions/Edit Inventory/Plant.

This selection allows the viewing and editing of the inventory page related to the general plant configuration. The terminal arrow keys are used to move the cursor among the inventory page fields. Inventory information that can be changed to include the installation date, agency approvals, plant capacities, nominal voltages and other provided equipment. Pressing <Return> will save the inventory information. Pressing either <Esc> or <Del> <L> will exit this screen without saving.

Rectifiers - PATH: Super-User Functions/Edit Inventory/Rectifiers.

This selection allows the viewing and editing of the inventory page related to connected plant rectifiers. The terminal arrow keys are used to move the cursor among the inventory page fields. Inventory information that can be changed to include individual rectifier vendors, the rectifier identification codes, rectifier capacity, and the date the rectifiers were installed. Pressing <Return> will save the inventory information. Pressing either <Esc> or <Del><L> will exit this screen without saving.

Reserve Battery - PATH: Super-User Functions/Edit Inventory/Reserve Battery.

This selection allows the viewing and editing of the inventory page related to the engineered plant load. Information that can be changed includes the reserve battery code number, its vendor, the engineered reserve time and load, and the number of battery strings. Pressing <Return> will save the inventory information. Pressing either <Esc> or <Del><L> will exit this screen without saving.

Controller - PATH: Super-User Functions/Edit Inventory/Controller.

This selection allows the viewing and editing of the inventory page related to the circuit pack inventory and configuration. Information that can be changed for each circuit pack the board CLEI code, its serial number, and its installed date. Pressing <Return> will save the inventory information. Pressing either <Esc>or <Del> <L>will exit this screen without saving.

Bulk Ringer - PATH: Super-User Functions/Edit Inventory/Bulk Ringer.

This selection allows the viewing and editing of the inventory page related to the connected bulk ringers. The terminal arrow keys are used to move the cursor among the inventory page fields. Information provided include the ringer vendors, ringer CLEI codes, and the ringer manufacturing date. Other information include the installed date and the ringer capacity. Pressing either <Esc> or <Del> will exit this screen without saving.

Distribution - PATH: Super-User Functions/Edit Inventory/Distribution.

This selection allows the viewing and editing of the inventory page related to distribution and protection panels. The terminal arrow keys are used to move the cursor among the inventory page fields. Information provided include the model number, maximum panel design capacity, total of installed protection devices, total number of fuse holders or circuit breaker positions provided, and the total number of fuses or circuit breakers installed. Pressing either <Esc> or <Del> will exit this screen without saving.

Maintenance Reminders - PATH: Super-User Functions/Edit Inventory/Maintenance Reminders

This selection presents the Super-User with a special 12-line notepad for reminding maintenance personnel of specific actions to take on specified dates. Each of the 12 available lines has an associated date field that specifies the date on which the maintenance reminder will be posted as an active user-clearable warning. The user may enter up to 60 characters for each reminder message. The date must be entered in order for the message to be posted. The user must select the Display Warnings feature to view these maintenance messages. These messages may be cleared only by the Super-User in the same manner as other user-clearable warnings. See "Super-User Features" for instructions on clearing warnings. Once a maintenance reminder has been posted, it will remain in the active warning list until it is cleared or until a new reminder with the same number becomes active. Programming a reminder date without its reminder message is not allowed.

Edit Notepad 2 - PATH: Super-User Functions/Edit Notepad 2

This selection displays a 15 x 75 character notepad that may be read by all but written only by the Super-User. When selected, any previously entered message will be displayed. The terminal arrow keys are used to move the cursor among the notepad lines. Any key entry will automatically put that line into edit mode and clear the line. The Super-User may enter up to 75 characters on each line. Pressing <Return> will save all new lines and any changed lines. Pressing either <Esc> or <Del> will put back the original lines and will discard any edited changes. When <Return> is pressed, the user will be prompted to specify whether the login header should notify the next user that a new message has been entered in the notepad. Answering "No" to the prompt results in a message "No Notification" in the header. Answering "Yes" prompts the user to see the appropriate notepad.

Configure - PATH: Super-User Functions/ Configure

All CP2 configuration options are available through the Configure Menu which is reached by selecting Super-User Functions/Configure from the Super-User Main Menu.

CONFIGURE
Change Password
Reset Date and Time
Dial-out on Alarm

Periodic Status Dial-Out
Enable Callback
Statistics
Plant Capacity
Plant Identification
Alarm Cut-Off
Pass Through Baud
§§Datalogger Configuration
Modem Parameters

Change Password - PATH: Super-User
Functions/Configure/Change Password.

This selection displays a sub-menu of passwords which the
Super-User can change. Passwords must be composed of six to
ten alphanumeric characters. Super-User passwords may also
use special characters including such punctuation marks as
periods, commas and semicolons. The password is not upper and
lower case sensitive. For security reasons, it is recommended
that all passwords be changed frequently.

User - PATH: Super-User Functions/Configure/Change
Password/User.

The Super-User is prompted for the current Super-User
password, the new user password, and then prompted to verify
the new user password. The factory default user password is
LINEAGE.

Super-User - PATH: Super-User Functions/Configure/Change
Password/Super-User.

The Super-User is prompted for the current Super-User
password, the new Super-User password, and then prompted to
verify the new Super-User password. The factory default
Super-User password is 2000.

PEERS - PATH: Super-User Functions/Configure/Change
Password/PEERS.

The password is used in conjunction with the PEERS automatic
system polling interface. The factory default password is

POLLING. The Super-User is prompted for the current Super-User password, the new PEERS password, and then prompted to verify the new PEERS password.

Reset Date & Time - PATH: Super-User Functions/Configure/Reset Date & Time.

A control screen is displayed with the current date and time. Terminal arrow keys are used to move the cursor between the date and time fields. Time and date must be entered as shown on the display. Note that the system clock is a 24-hour clock. For example, 2:00 pm must be entered as 14:00. The "Select Date Format" toggles between mm/dd and dd/mm. After the current date and time are typed in, pressing <Return> will prompt the user to confirm the system clock change. Date and time must be set at installation, as the factory default setting is 01/01/90, 00:00. The calendar provides for Leap Year and an option is provided to reset the clock automatically for Daylight Saving Time. The controller assumes that dates with the year 90 through 99 are in the 20th Century, years 00 through 89 in the 21st Century.

Note

For reference purposes, changing the system time or date makes two CLKC (System Clock Changed) entries in the plant alarm history log. The first reads "occurred" and shows the old time and date. The second reads "retired" and shows the new time and date.

Dial-Out on Alarm - PATH: Super-User Functions/Configure/Dial-Out on Alarm.

With this feature enabled, CP2 can dial out to assigned phone numbers and report when alarm conditions occur and/or retire. Phone numbers assigned must be connected to remote printers or terminals with a 300 or 1200 bps modem, and the modem must be configured for auto-answer. If the Voice Response Option is present, it is possible to report alarms to a telephone using voice. As added enhancements, a pager feature is provided for when response time is critical and a persistent dial out on alarm ("NAG") feature has been added to ensure that the remote station is aware of any critical alarms until they are cleared. When the "NAG" alarm is enabled, a dial out on alarm call is made to the designated phone numbers at regular intervals until the alarm is retired or a Super-User intentionally turns off this

feature by selecting "No" for both Call on Occur and Call on Retire. This selection displays a sub-menu for establishing alarm conditions on which to dial out, and storing phone numbers to be called. Refer to Appendix D for the specific Dial-Out on Alarm algorithms.

Phone Numbers - PATH: Super-User Functions/Configure/Dial-Out on Alarm/Phone Numbers.

This screen allows the Super-User to specify telephone numbers to be dialed out by CP2 in the event of specified alarm conditions. The terminal arrow keys are used to move the cursor among the option fields. Up to four primary telephone numbers are entered at the P1 through P4 fields for assignment on the Plant Matrix selection of the Dial-Out on Alarm Menu. An alternate telephone number, A1, can be assigned, and will be called in the event that an alarm condition occurs and the controller is unable to establish contact with any of the primary numbers.

Phone numbers may include numbers, star (*), pound (#), hyphen (-), parentheses ( ), and commas (,). Commas will cause a two-second delay before sending out the next tone and can be used for pauses. For example: (123) 555-6666,,,22# will dial out the primary number and wait six seconds before sending the extension number. A Pager ID field exists for entering a numeric identification code. This ID code is sent as touch-tones when the pager phone number has been successfully dialed.

The TYPE field is used to select the mode which will be used when dialing out. The choices are DATA for use with a modem, VOICE for use with the Voice response option, and PAGER for use with a remote pager. The Type field is changed by pressing the space bar to cycle through the choices. When DATA is selected, it is possible to select between a modem speed of 300 or 1200 bps in the Baud Rate field. This is done by pressing the space bar when in the Baud Rate field. This field must be set to the baud rate of the modem connected to the remote printer or terminal which will receive the dial-out information.

The DELAY field can be used for "fine tuning" the time interval the controller will wait before sending the pager ID or before the voice response communication begins. For a pager, the interval designates the time between the connection of the controller to the pager and transmission of the pager ID. For a voice response call, the interval designates the time between the voice command

"Please enter pound sign" and the beginning of the dial-out call. This provides the flexibility needed for working with a wide variety of pagers or answering machines. The delay field is changed by pressing the space bar when in the delay field. Default time is two seconds. The delay will increment in one-second intervals, maximum nine seconds.

The Persistent Dial-Out ("NAG") Interval Field is used to set the time interval between reminder calls. The time interval begins at 15 minutes and will increment in five-minute intervals up to one hour. The interval field is changed by pressing the space bar to cycle through the choices. The actual "NAG" feature is enabled in the Plant Matrix screen. Pressing <Return> will save all new lines and any changed lines. Pressing either <Esc> or <Del> will put back the original lines and will discard any edited changes.

If the type selected is VOICE, the called party will be greeted and prompted to press the # (pound) key to continue. This is done to allow the called party to prepare for the remainder of the message. Once the # key is pressed, the called party will be given the Plant ID, Plant Voltage, Plant Load, Plant Mode, and the number of current active alarms and warnings. If the # key is not pressed, the system will wait for the configured delay and then begin to transmit the alarm information.

Note

> Never use the telephone number 911 for anything but police, fire or medical emergencies.

Plant Matrix - PATH: Super-User Functions/Configure/Dial-Out on Alarm/Plant Matrix.

This screen lists each alarm code (see Appendix B) with options concerning the conditions on which to dial out for each alarm. The terminal arrow keys are used to move the cursor among the option fields. The space bar will change the field entry indicated by cursor location as follows:

Call on Occur	YES/NO/NAG			
Delay	0 through 59 seconds, and 1 through 9 minutes.			
Call on Retire	YES/NO			
Destination	P1	P2	P3	P4
	YES/NO	YES/NO	YES/NO	YES/NO

When NO is selected for all call-on-occur and call-on-retire fields, the dial-out feature is disabled. An example of option selections is shown below for a Battery on Discharge Alarm.

Call on Occur	YES	Specifies that the plant should dial out on the first occurrence of this specified alarm.
Call on Occur	NAG	Specifies that the plant should dial out on the first occurrence of this specified alarm and continue to call out at the specified interval if the alarm persists at the end of each interval.
Delay	3 seconds.	Dial out only if the alarm condition lasts longer than 3 seconds. (See note below.)
Call on Retire	YES	Specifies that the plant should dial out if an alarm that was present is now clear.

Destination	P1	P2	P3	P4
	YES*	YES*	YES*	NO*

*Specifies that a dial out attempt should be made to numbers P1, P2, P3 but not P4.

Note

The purpose of the user defined Delay feature is to avoid nuisance dial outs. For example, if it is desired that the system not dial out on an ACF alarm lasting less than one minute, the Delay feature for the ACF alarm could be set to one minute

§§ Datalogger Matrix - Ch 1 to 8 - PATH: Super-User Functions/Configure/Dial-Out on Alarm/Datalogger Matrix - Ch 1 to 8.

This screen lists the channel numbers A1 through A8 with options concerning the conditions on which to dial out for each of the first eight datalogger channel alarms. The terminal arrow keys are used to move the cursor among the option fields. Options are changed identically to that of the plant alarms above. The phone number destination options are the same as those used with plant alarms. When making changes, pressing

<Return>will save all changes. Pressing <Esc> or <Del> will exit without saving.

§§Datalogger Matrix - Ch 9 to 16 - PATH: Super-User Functions/Configure/Dial-Out on Alarm/Datalogger Matrix - Ch 9 to 16.

This screen lists the channel numbers A9 through A16 with options concerning the conditions on which to dial out for each of the last eight datalogger channel alarms. This is identical in operation to the first eight.

§§Control Relay Matrix - PATH: Super-User Functions/Configure/Dial-Out on Alarm/Control Relay Matrix.

This screen lists the control relay numbers CR1 through CR8 with options concerning the conditions on which to dial out for each of the eight CP3 Control relays. The terminal arrow keys are used to move the cursor among the option fields. Options are changed identically to that of the plant alarms above. The phone number destination options are the same as those used with plant alarms. As a clarification of ON and OFF conditions, a relay is ON when the relay is energized (contact between the relay common and the NORMALLY OPEN contact). A relay is OFF when the relay is de-energized (contact between the relay common and the NORMALLY CLOSED contact). When making changes, Pressing <Return> will save all changes. Pressing <Esc> or <Del> will exit without saving.

Periodic Status Dial-Out - PATH: Super-User Functions/Configure/Periodic Status Dial-Out.

Enabling this option will cause the system to dial out a brief status report on a regular basis, either daily, weekly, monthly or quarterly. This feature is available using either DATA or the Voice Response Option. When configuring, the terminal arrow keys are used to move the cursor among the fields; pressing the space bar will change the field indicated by the current cursor location. The field descriptions are as follows:

Periodic Status Dial-Out: This entry activates the periodic dial-out. The feature can be disabled without clearing the other configuration parameters. Use the space bar to toggle between the options.

Telephone Number: This entry is the number to be dialed out. Phone numbers may include numbers, star (*), pound (#), hyphen (-), parentheses (), and commas (,). Commas will cause a two-second delay before sending out the next tone and can be used for pauses. For example: (123)555-5555,,,22# will dial out the primary number and wait six seconds before sending the extension number. Note that the hyphen and parentheses in the number are included for readability only and have no effect on dialing the number. When the correct phone number has been entered, use the arrow keys to move to the next field.

Type: This field is used to select between the DATA and VOICE selections. If the type selected is DATA, the dial-out report will consist of the three line system header and the list of active alarms and warnings. The system will then automatically disconnect. A VOICE response will include the header information, active alarms if any, and the number of warnings present. Use the space bar to toggle between the options.

If the type selected is VOICE, the called party will be greeted and prompted to press the # (pound) key to continue. This is done to allow the called party to prepare for the remainder of the message. Once the # key is pressed, the called party will be given the remainder of the report. Id the # key is not pressed, the system will wait the configured delay and then begin to transmit the remainder of the report.

Pressing the # key during the message will cause the entire periodic status message to be repeated from its beginning. At the completion of the message, the user will have five seconds to hit the # key. Otherwise the system will disconnect automatically after reporting its status.

Whether DATA or VOICE is selected, if the called party cannot be reached, the system will retry 30 minutes after its first attempt. If it is still unsuccessful in connecting, a system warning will be posted.

Baud Rate/Delay: This field is used to select 300 or 1200 baud for DATA calls, or to specify a delay between answering the phone and sending out the message for VOICE calls otherwise. Delays increment in one-second intervals to nine seconds, with a default delay of two seconds. The delay is useful to "fine tune" the use of the voice response feature with an answering machine recorder. Use the space bar to toggle between the options.

How Often: This field is used to select how often the periodic status dial-out will occur. "Daily" will call every day, a "day" of the week (e.g., Monday) will call on that day every week, "monthly" will call on the first of each month, and "quarterly" will call on the first of January, April, July and October. Use the space bar to toggle between the options.

Time of Day: This field is used to select the time that the periodic status dial-out will occur. The time is based on a 24-hour clock. It is possible to have many controller call into a central number with their status by staggering their dial-out times appropriately. When the correct time has been entered, use the arrow keys to move to the next field.

In addition to the brief status report which consists of the system identification and the present warning and alarm status, the user may have the system send other useful information reports on a regular basis. The options include all system statistics, system histories, present datalogger channel readings, and present derived channel readings. To select these items, use the arrow keys to move to the proper field and use the space bar to enable or disable the individual reports.

Note

The additional reports are available in DATA MODE only. They are not available with the Voice Response option. Since reports may be lengthy, the user should make sure that the remote station has sufficient paper or disk space to receive the entire report.

Enable Call-Back - PATH: Super-User Functions/Configure/Enable Call-Back.

Call-Back is an optional security feature incorporated by CP2. This feature limits the remote locations from which CP2 can be contacted (up to three). The Super-User can assign a maximum of three telephone numbers and enable the Call-Back feature. This will change the remote login procedure as follows: The remote user will call the controller and log in as usual. After selecting the terminal type, the user will be prompted to enter the number 1, 2 or 3 which corresponds to the telephone number of that remote location. CP2 will then hang up, call the remote location back, and require the remote user to log in again. If CP2 fails to complete the call, the callback session must be started again.

On the Call-Back configuration screen, the terminal arrow keys are used to move the cursor among the option fields. Telephone numbers are assigned to fields labelled 1, 2 and 3. The Baud Rate field will change between 300 and 1200 bps when the space bar is pressed. This field must be set to the baud rate of the modem connected to the remote terminal for which Call-Back is desired.

Statistics - PATH: Super-User Functions/Configure/Statistics.

This selection displays a sub-menu of options that can be configured for collection of statistics.

§§Trend - PATH: Super-User Functions/Configure/Statistics/Trend.

This selection permits the Super-User to choose a datalogger channel for which the trend statistics will be gathered. The Super-User will be prompted to toggle the channel number input (DISABLE and A01 through A16), with a default of DISABLE. The description of what that channel is also displayed. Pressing <Return> will prompt the Super-User to confirm the selection. Answering "Yes" will save the channel information and clear previously stored data from the Trend Statistics Log. Pressing <Esc> or <Del> will exit without saving. Collection of new data will begin at the start of the next hour. The first data will be available for display one hour after the start hour.

Note

In order for the statistics to be gathered, the chosen channel must also be configured. See "Super-User Features," Datalogger Configuration, for information on how to configure a datalogger channel. Re-configuring a channel selected for trend statistics will cause previously collected data to be lost. Statistic gathering begins when a channel is enabled.

Busy Hour - PATH: Super-User Functions/Configure/Statistics/Busy Hour.

This selection is used to set the desired start date and hour for collection for either the plant load or one of the sixteen datalogger channels. The terminal arrow keys are used to move between the start date, channel selection, and hour fields. Channel selection is numbered 0 through 16, where zero is the plant load, and all others depict a datalogger channel, whose

description is also shown. The start date and hour must be entered as shown on the display. Note that the hour is based on a 24 hour clock. Therefore, 2:00 pm is typed in as hour 14. Once the channel, start date and hour have been typed in, pressing <Return> will prompt the Super-User to confirm the selection. Answering "Yes" will save the channel information and clear previously stored data from the Busy Hour Statistics Log. Collection of new data will begin at the start of the date and hour set here. The first data will be available for display one hour after the start hour. Pressing <Esc>or <Del> will exit without saving, and will leave the previously stored data undisturbed.

Note

The starting time for Busy hour statistics MUST be beyond the current time.

Plant Capacity - PATH: Super-User Functions/Configure/Plant Capacity.

This selection is used to specify a load current level at which the following warning is issued:

> Plant load has exceeded programmed capacity. View Statistics.

The level is specified as a percentage of the total programmed installed plant capacity. The terminal arrow keys are used to move between the installed plant capacity and percentage fields. Pressing the space bar changes the field indicated by cursor location. On power up, the factory default values are 0 for installed capacity and 35 for percentage. Maximum allowed installed plant capacity is equal to the shunt size selected by the DIP switches in Section 3 "ECS Microprocessor Option (CP2) Configuration." When the installed capacity is 0, the feature is disabled and no warning will be issued. Once enabled, a system warning will be issued if the daily maximum hourly average plant load current is above the specified level. This warning, if it arises, is posted at the change of the current day and will be deleted automatically when the next daily maximum hourly average is less than the specified level.

Plant Identification - PATH: Super-User Functions/Configure/Plant Identification.

This selection permits a Super-User to specify a plant identification and description. This will appear in the second line of the system header (Refer to Figure 4-1). The plant identification can be from one to eight alphanumeric characters and has a factory default setting of 1. The plant description has no default setting, and can accept up to 55 alphanumeric and special characters.

Alarm Cutoff - PATH: Super-User Functions/Configure/Alarm Cut-Off.

The Alarm Cut-Off (ACO) feature is used to turn off a specified control relay temporarily if audible alarms are connected to that control relay. This selection configures which control relay is turned off and sets the ACO time-out feature. ACO can be activated by issuing an ACO command from TL1 interface (see Appendix M).

Pass-Through Baud - PATH: Super-User Functions/Configure/Pass-Through Baud.

This selection is used to set the baud rate for communication with a connected Lucent Technologies Remote Access System (RAS). Pressing the space bar toggles the baud rate field between 300 and 1200 bps. The factory default setting is 1200 bps. This feature allows communication with a slower connected system without the need to slow down the communication rate with the CP2.

§§Datalogger Configuration - PATH: Super-User Functions/Configure/ Datalogger Configuration.

This selection displays a sub-menu of CP3 options that the Super-User can change. These options are the configuration of the 16 analog channels, or the programming of the 8 Control Relays.

Datalogger Channels - PATH: Super-User Functions/Configure/Data Channels/Datalogger Channels.

Selection of this option allows the super-user to configure the datalogger channels. The terminal arrow keys are used to move among the fields. The field descriptions are as follows:

Enable/Disable: This entry activates the channel for scanning. Use the space bar to toggle through the options. If a channel is left Disabled, the remaining fields can not be changed.

Channel Description: This entry is left to the Super-User to enter a meaningful description of what is connected to the datalogger channel.

Type: This entry informs the system of the type of voltage (+dc, -dc, ac, CC, CO) to be measured. This is necessary, since the measurement techniques vary for the five types. Use the space bar to toggle through the options. The CC and CO types are for binary measurements, which are used for detecting contact closures (CC) or contact opens (CO) and issuing alarms in conjunction with the binary channel straps on the Datalogger Channel Termination Board.

Range: This entry chooses from among the available full scale voltage ranges that can be displayed.Available ranges are 150mV, 6V, 60V, and 150V. Use the space bar to toggle through the options.

Scale Factor: This entry allows the user to enter a multiplying factor when measuring non-linear voltages. For a straight voltage measurement, the scale factor is "1.00". A non-unity scale factor is used when transducers are being used, shunts are measured, or when correction factors are required.The scale factor is expressed in terms of units per volt for all ranges but the 150mv range, which is expressed in units per millivolt. For example, if a shunt is to be measured and the measurement display is desired in terms of amps rather than millivolts, then the scale factor is entered as:

> number of amps/corresponding number of volts at
> datalogger input

Putting values into the equation, for a 100 amp, 50 millivolt shunt, the scale factor is:

> 100 A / 50 mV = 2 A/mV.

It is recommended that the Units field reflect this measurement.

Note

> The scale factor is multiplied by the reading AFTER the transducer offset is subtracted from the reading.

Note

> Changing the range, scale factor, or transducer offset will clear any previously gathered statistics for that channel.

Transducer Offset: This entry allows the user to enter an offset that will be subtracted from a non-zero crossing transducer measurement. An example of this would be a 4-20 milliampere current loop measurement where it is desired that the 4 milliampere measurement result in zero. The transducer offset may be a negative number so the offset is actually added to the measurement. Note that subtracting an offset from a negative dc measurement will result in a larger negative reading, not a smaller one.

Alarm Thresholds: This entry allows the user to enter the signed "out-of-bounds" values that are specific to each datalogger channel. The limit is specified in terms of the units that the channel is to display. By using a signed value, the datalogger will detect changes in polarity and properly record the signal alarms. The sense of detection depends on the configuration polarity of the channel. For example, for +dc type, +59 volts >+48 volts, and -2 volts >-3 volts. For a -dc type, -59 volts >-48 volts, and 2 volts >3 volts.

Note

> The user is strongly encouraged to set limits. However, if no limits are desired, simply enter "NONE". When "NONE" is used, no alarms will be issued for that channel.

Units: This entry allows the Super-User to select the units that go along with the channel readings. This can be up to 5 characters. Examples are Amps, VDC, KWH, and KVA.

Each selection displays its own defaults for analog alarm threshold, range, and scale factors, which the Super-User can accept or change. Pressing <Return> after changing the Input Type, Range, Scale Factor, or Transducer Offset fields will result in a message prompting the user to save the new

configuration. Answering <Y> to this prompt will save all input. Pressing <Esc> or <Del> will restore the original entries without change. Changing any other fields or making no change will result in a message that the configuration has been saved, without further prompting. In any case the user will be prompted to press <Return> to go to the next channel configuration screen, any valid channel number and <Return> to go to that channel configuration screen, <Esc> to go to the previous menu, or <Del> to go to the main menu.

Control Relays - PATH: Super-User Functions/Configure/Datalogger/Relays/Control Relays.

Selection of this option allows the super-user to enter a description and to configure each of the eight Form C Control Relays. The states of the relays are determined by the relay Program Line which is an equation composed of Plant Alarms, Date/Time entries, datalogger alarms, other control relay states, and of course ON and OFF. The control relays are energized when the states of the program components are such that the entire sum of the line is true. The individual components are considered to be true when they are active and are considered to be false when they are inactive. For example:

BD AND NOT RFA	The relay will be energized when a BD alarm is active for any amount of time and no rectifier has failed.
(NOT HV) OR (NOT ACF)	The relay will be energized whenever both HV or ACF type alarms are concurrently inactive.
BD EQUAL ACF	The relay will be energized whenever the state of the BD and ACF alarms are the same, regardless of whether the state is active or inactive. The important thing is that they are equal.
T10:00 ; P1:00	The relay will be energized daily at 10:00 am (24 hour clock) and will remain on for 1 hour and 0 minutes.
ON	Energizes the relay unconditionally.

Control Relay program components may be combined by using parentheses for grouping to form even more complex equations. See Appendix H for a complete description of the Control Relay

program components and their usage. When configuring, the terminal arrow keys are used to move the cursor among the fields.

Program lines entered are checked for validity. If a word that is not pre-defined as in Appendix H is entered the error displayed will be:

ILLEGAL INPUT

If all words are pre-defined, but the program line does not make sense, the error displayed will be:

ILLEGAL PROGRAM SYNTAX

An example of this error would be a line such as:

BD AND OR HV

Pressing <Return> will save all input and the states of the relays will be updated based on the program lines. Pressing <Esc> or <Del> will restore the original lines and exit without change.

Modem Parameters - PATH: Super-User Functions/Configure/System Parameters/Modem Parameters.

Modem Parameters can be configured to make features compatible with other equipment. The terminal arrow keys can be used to move the cursor among the parameters fields. Pressing the space bar will change fields to allow entries at the current cursor location. The Data Bits field toggles between 7 and 8; the Parity field toggles among ODD, EVEN, and NONE, and the Stop Bits field toggles between 1 and 2. Note that this feature affects only the dial-out parameters. The dial-out communication parameters set here are also used for periodic dial-out. Dial-in communication and call-back security parameters remain fixed at 8 data bits, no parity, and 1 stop bit.

Another modem parameter is the "Rings Before Answer" feature. This allows the user to select the number of rings required before the unit will answer. If this field is set to 12, OMNIpulse will not answer until the 12th ring. This, for example, would provide time for a person to answer on a second phone connected to this line, should he choose to do so.

The space bar toggles this field from 2 to 15.

The Wait For Dial Tone option is used to enable dial-outs in areas with non-standard dial tones. Pressing the space bar toggles between Yes and No. Set this option to No only after attempts to dial over a known good line result in a "No Dial Tone" warning.

The dial-out language is selected in the "Dial-out Reports In" field. Pressing the space bar toggles between English and Spanish.

TL1 Configuration - PATH: Super-User Functions/ Configure/TL1 Configuration

This selection is used to configure the Transaction Language (TL1) interface. Refer to Appendix K.

Plant Alarms - PATH: Super-User Functions/Configure/TL1 Configuration/Plant Alarms

Selection of this option allows the Super-User to configure the TL1 specifics of plant alarms.

TL1 reporting: This entry enables reporting alarm conditions and equipment configuration via the TL1 interface. Use the space bar to toggle between disable and equipment.

Access identifier (AID): This entry allows the Super-User to select the AID by which the channel will be addressed via the TL1 interface.

Alarm condition type: This entry allows the Super-User to select the alarm condition type that will be reported (via the TL1 interface) whenever a plant alarm condition occurs.

Service affecting: This selection defines whether an active alarm on the channel is service affecting or non-service affecting. Use the space bar to toggle between the two conditions.

TL1 Alarm Type: This entry allows the Super-User to choose the type of TL1 alarm that will be generated when a plant alarm condition occurs. The options available are MAJOR, MINOR, and CRITICAL. Use the space bar to toggle through these options.

Pressing <Return> will save the new configuration. Pressing <Esc> or <Del> will restore the original configuration without changes. After saving or restoring the configuration, the

Super-User will be prompted to press <Return> to go to the plant alarm menu.

Datalogger Channels - PATH: Super-User Functions/Configure/TL1 Configuration/Datalogger Channels

Selection of this option allows the Super-User to configure the TL1 specifics of datalogger channels.

TL1 reporting: This entry enables reporting alarm conditions and equipment configuration via the TL1 interface. Use the space bar to toggle among disable, equipment, environment, and equipment presence.

Access identifier (AID): This entry allows the Super-User to select the AID by which the channel will be addressed via the TL1 interface.

Alarm condition type: This entry allows the Super-User to select the alarm condition type that will be reported (via the TL1 interface) whenever an alarm condition, due to upper threshold or contact closure, is present on the channel.

Service affecting: This selection defines whether an active alarm on the channel is service affecting or non-service affecting. Use the space bar to toggle between the two conditions.

Pressing <Return> will save the new configuration. Pressing <Esc> or <Del> will restore the original configuration without changes. After saving or restoring the configuration, the Super-User will be prompted to press <Return> to go to the next channel, press a valid channel number and <Return> to configure that channel, <Esc> to go to the previous menu, or <Del> to go to the main menu.

Change Password - PATH: Super-User Functions/Configure/TL1 Configuration/Change Password

The Super-User is prompted for the current Super-User password, the new TL1 password, and then prompted to verify the new TL1 password. The default TL1 password is LINEAGE.

Communications Parameters - PATH: Super-User Functions/Configure/TL1 Configuration/Communications Parameters

The Super-User can configure the TL1 communications parameters using this selection. Use the terminal arrow keys to move the cursor among the parameter fields. Toggle the parameter values by pressing the space bar.

Data rate	Toggles between 300, 600, 1200, 9600 baud.
Data bits	Toggles between 7 and 8.
Stop bits	Toggles between 1 and 2.
Parity	Toggles between none, odd and even.

Command Line/PEERS Interface

User Login Procedure

The login procedure is exactly the same as described for a normal user in "Terminal Login Procedure" except that the PEERS password must be entered instead of the User password. The default PEERS password is POLLING. After login, the three-line system header will be displayed and the asterisk (*) prompt will be issued. Commands are entered by typing the command (in either upper or lower case) at the (*) prompt and pressing the <Return> key.

User Commands

ALMS	Outputs all active alarms.
AMPEERS	Outputs maximum value of the Three Highest Hourly Averages for basic statistics for plant and each datalogger channel.
ASCAN	Outputs among all analog channel readings.
BSCAN	Outputs all binary channel readings.
BYE	Logs off the system.
DSCAN	Outputs all current datalogger readings.
DSTAT	Outputs all datalogger statistics.
HSTRY	Outputs alarm, rectifier and equalize history logs.
FDRLD	Outputs all current datalogger readings.
FDRST	Outputs all datalogger statistics.

ALMS	Outputs all active alarms.
LOADST	Outputs all plant statistics.
LOGIN	Requests to become Super-User in the command line interface. Refer to Super-User Login Procedure ("Command Line/PEERS Interface/Super-User Login Procedure").
MENU	List of all available commands.
RASPASS	Passes the communication link through to a connected system.
RBYE	Returns to communication with CP2 after entering the RASPASS command. Note that if no BYE command is issued to the connected system before the RBYE command is entered, the communication link will be returned to CP2, but the connected system will remain active until it times out.
VI	Outputs battery plant voltage and load current.

Super-User Login Procedure The Super-User Login feature may be disabled. See Section 3 "ECS Microprocessor Option (CP2) Configuration/DIP Switch Setting" for more information. To log in as a Super-User in the command line interface, type LOGIN at the user prompt (*). CP2 will issue a prompt requesting the Super-User password. Type the Super-User password and press <Return>. The default Super-User password is 2000. CP2 will then issue the Super-User prompt (**). The same security feature for excessive Super-User login attempts applies for Super-User logins with the command line interface. All user commands can be issued along with the following Super-User commands.

Super-User Commands

RSDATE	Allows Super-User to change the system date and time. A prompt will show the proper format (mm/dd/yy:hh:mm). Typing in the date and time and pressing <Return> will update the current system date and time.
CLRLDST	Clears plant statistics.
CLRFDRST	Clears all datalogger statistics.
CPASSWDP	Allows Super-User to change PEERS password.

RSDATE	Allows Super-User to change the system date and time. A prompt will show the proper format (mm/dd/yy:hh:mm). Typing in the date and time and pressing <Return> will update the current system date and time.
CPASSWDS	Allows Super-User to change Super-User password.
CPASSWDU	Allows Super-User to change User password.

Voice Response Option

Note

The # key must be pressed after each command.

Login Procedure   If CP2 is equipped with the Voice Response Option, remote user communication is possible from any Touch-Tone® telephone. After calling the ECS controller, the remote user will be greeted with an introductory message prompting that the keypad # (pound) key be pressed to continue. The remote user will have five seconds in which to press this key before the system will assume that the user wishes to initiate communications via modem. At the end of this five-second wait, the system will begin sending modem signals. If the remote user still wishes voice response communications, he will be required to disconnect and call again.

Once the remote user has entered the # key, the user has initiated voice response communications for the remainder of the session. The remote user will be prompted to enter the User password. The user must press each of the keypad keys that are the alphabetical equivalent to the user password, terminating with a pound sign. For alphabet characters that do not appear on the keypad (Q and Z), any key may be used in its place. If a mistake is made, the star (*) key may be used to backspace one character.

If an invalid password is entered, the user will be prompted to try again. Four (4) attempts at entering the correct password are permitted. At the fourth incorrect attempt, the system disconnects and the user must call again. If the password is entered correctly, CP2 will reply with the complete header information consisting of the software version, date, time, plant identification, plant voltage and current and the active alarm

status. After this, CP2 will provide the command numbers for the basic information. The user can enter any command number at any time during a message, or even before a message starts (for advanced users). At any point, the user may ask for main menu options by pressing zero and pound.

Note

> When terminating communications, the user may enter the BYE command or just hang up. However, if the user disconnects without issuing the BYE command, the system will take up to one minute before it will accept another incoming call.

Voice Dial-Out on Alarm It is possible to configure CP2 to perform its dial-out on alarm feature using voice. Refer to "Feature Descriptions/Super-User Features," Dial-Out on Alarm for how to configure this feature. If the type selected is VOICE, the called party will be greeted and prompted to press the # (pound) key to continue. This is done to allow the called party to prepare for the remainder of the message. Once the # key is pressed or a user-programmable delay has passed (the delay can be set from one to nine seconds to suit the user's answering machine), the called party will be given the software version, Plant ID, date and time, Plant Voltage, Plant Load, Plant Mode, and the number of active alarms. The actual alarms will then be sent. Included with each alarm message will be the name of the alarm, whether it has occurred or retired, and the date and time of the occurrence/retirement. To repeat the complete message, the user may press the # key any time during the dial-out call. At the completion of the message, the user will have 5 seconds to hit the # key, otherwise the plant will disconnect automatically after reporting the alarms.

Periodic Status Dial-Out It is possible to configure the CP2 to perform its periodic status dial-out using voice. Refer to "Feature Descriptions/Super-User Features," Periodic Status Dial-out for how to configure this feature. If the type selected is VOICE, the called party will be greeted and prompted to press the # (pound) key to continue. This is done to allow the called party to prepare for the remainder of the message. Once the # key is pressed, or after the expiration of the user-programmable one- to nine-second delay, the called party will be given the software version, Plant ID, date

and time, Plant Voltage, Plant Load, Plant Mode, and the number of current active alarms and warnings.

Pressing the # key during the message will cause the entire periodic status message to be repeated from its beginning. At the completion of the message, the user will have 5 seconds to hit a repeat key, otherwise the plant will disconnect automatically after reporting its status.

Users can set up their answering machines to record the status information. Answering machines should be set to start recording after the user-programmable delay.

Voice Response Commands

The following voice commands are available when the user logs into the ECS plant from a Touch-Tone® phone. All commands must be entered as shown and terminated with a # (pound sign). To help the user remember the commands, each voice command has an associated alphabetic mnemonic as shown here. For reference, the available voice commands have been categorized by function.

Table 4-A: Datalogger Functions

Alpha	Numeric	Function
DH	34	Datalogger alarm history for all channels. This command gives the entire datalogger history of analog channel alarms in a newest alarm first order.
DHn	34n	Datalogger alarm history for channel n (n=1 to 16). This command gives alarm history information for the datalogger channel "n".
CRS	277	Status of all control relays. This command gives present state of each of the eight control relays.
CRSn	277n	Status of control relay n (n=1 to 8). This command gives the present state of control relay "n".
CRH	274	Control relay history for all relays. This command gives the entire control relay history in a newest event first order.

Table 4-A: Datalogger Functions

Alpha	Numeric	Function
CRHn	274n	Control relay history for relay n (n=1 to 8). This command gives the event history information for the control relay "n".
DL	35	Present reading of all datalogger channels. This command gives the present status of all datalogger channels
DLn	35n	Present reading of a single datalogger channel n (n=1 to 16). This command gives the present reading of the analog channel "n".

Table 4-B: ECS Plant Functions

Alpha	Numeric	Function
AL	25	Active alarms including plant and datalogger. This command gives all currently active alarms for the ECS plant and Datalogger option.
IPC	472	Installed plant capacity. This command gives the programmed plant capacity (in amps) for which a system warning will be issued.
PC	72	Plant configuration. This command gives information about the physical configuration of the battery plant and installed options.
PM	76	Plant mode: (boost/float). This command gives the present charge state of the ECS battery plant.
VI	84	This command gives the present plant voltage and current readings.

Table 4-C: ECS Rectifier Functions

Alpha	Numeric	Function
RTS	787	Rectifier status. This command gives the present status of all rectifiers.
RTSn	787n	Rectifier status for rectifier n (n=1 to 6 or 12). This command gives alarm history information for the rectifier "n".
RTH	784	Rectifier history. This command gives the history information for all the rectifiers.
RTHn	784n	Rectifier history for rectifier n (n=1 to 6 or 12). This command gives the history information for the rectifier "n".
RRS	777	Request Rectifier Restart. This command sends the rectifier restart signal to all rectifiers. The user will be asked to confirm this request.

Table 4-D: ECS Plant Alarms History

Alpha	Numeric	Function
PH	74	This command gives all plant alarm histories up to 128 events.
PHn	74n	This command allows the user to retrieve history information on specific plant alarm types as listed below:
PH1	741	History of battery on discharge alarms.
PH2	742	History of high voltage alarms.
PH3	743	History of major fuse alarms.
PH4	744	History of minor fuse alarms.
PH5	745	History of ac fail alarms.
PH6	746	History of rectifier fail alarms.

Table 4-D: ECS Plant Alarms History

Alpha	Numeric	Function
PH7	747	History of rectifier thermal alarms.
PH8	748	History of major ringer alarms.
PH9	749	History of minor ringer alarms.
PH10	7410	History of open battery string alarms.
PH11	7411	History of external alarms.
PH12	7412	History of unable to go on boost alarms.
PH13	7413	History of unable to go on float alarms.
PH14	7414	History of processor fail alarms.
PH15	7415	History of processor restart alarms.
PH16	7416	History of system clock changed alarms.

Table 4-E: Miscellaneous Functions

Alpha	Numeric	Function
HLP	457	This command gives the Lucent Technologies technical assistance toll free number, 1-800-238-2288.
DT	38	This command gives the present ECS date and time.
BYE	293	This command terminates communications.
MENU	0	This command repeats the available menu commands.
	*	Backspace equivalent. This command deletes the previously entered keystroke.

Appendix A *Warnings*

System Warnings

System warnings, displayed by selecting the Display Warnings option on the Main Menus, are issued to indicate that some normal maintenance or additional controller configuration procedure may be required.

Three types of warnings can be issued. Automatic warnings are issued while the warning condition exists and are automatically deleted when the warning condition retires. User-clearable warnings are marked with a double asterisk (**), and can be cleared by a Super-User with the Clear Warnings option on the Super-User Functions menu. Power-up diagnostic warnings are issued only on board reset or power-up, and are an indication of the hardware fitness. These are cleared on the next power-up or reset only if the test passes. The following is a description of warnings issued by CP2.

Automatic Warnings

Controller memory backup battery is low: Issued when CP2 memory backup battery should be replaced. Refer to Figure 3-2 for the battery location on CP2. The replacement battery is a Duracell, DL1/3-N, 3 volt, lithium battery or equivalent.

Caution

Battery can explode or leak if heated, disassembled, shorted, recharged, exposed to fire or high temperature, or inserted incorrectly.

No dial-out number for P1: Use Configure menu: CP2 has been configured to dial out in response to an alarm condition, but

the destination (P1) has no telephone number assigned to it. This warning will not be issued if an alternate telephone number (A1) has been assigned. Refer to Section 4, "*Super-User Functions/Configure/Dial-Out on Alarm.*"

No dial-out number for P2: Use Configure menu: CP2 has been configured to dial out in response to an alarm condition, but the destination (P2) has no telephone number assigned to it. This warning will not be issued if an alternate telephone number (A1) has been assigned. Refer to Section 4, "*Super-User Functions/Configure/Dial-Out on Alarm.*"

No dial-out number for P3: Use Configure menu: CP2 has been configured to dial out in response to an alarm condition, but the destination (P3) has no telephone number assigned to it. This warning will not be issued if an alternate telephone number (A1) has been assigned. Refer to Section 4, "*Super-User Functions/Configure/Dial-Out on Alarm.*"

No dial-out number for P4: Use Configure menu: CP2 has been configured to dial out in response to an alarm condition, but the destination (P4) has no telephone number assigned to it. This warning will not be issued if an alternate telephone number (A1) has been assigned. Refer to Section 4, "*Super-User Functions/Configure/Dial-Out on Alarm."*

Passwords still at factory default setting: It is recommended that all passwords (User, Super-User and PEERS) be changed from their factory defaults at the time of installation of CP2. Until at least one of these passwords is changed, this warning will be issued.

Plant load exceeded programmed capacity. View Statistics: This warning can only be issued if the Plant Capacity feature is enabled. Refer to Section 4, "*Super-User Functions/Configure/Plant Capacity*" for enabling this feature. Once enabled, this warning will be issued when the daily maximum hourly average plant load current rises above the level specified in the Plant Capacity feature. This warning will remain active until the daily maximum hourly average falls below the specified level.

Printer off-line or out of paper: Issued when the local port is configured for use with a line printer and the printer is either off-line or out of paper.

Rectifier(s) on standby. Check Rectifier Control menu: This warning is issued any time rectifiers are remotely turned off, and can be issued only if remote rectifier control is hardware enabled.

Datalogger channel selected for trend study is not configured: Statistics has been configured for trend study on a CP3 channel but the datalogger channel is currently disabled. Refer to Section 4, "*Super-User Functions/Configure/Datalogger Configuration.*"

User-Clearable Warnings

** Dial-out number(s) did not respond:** Indicates that CP2 attempted to dial out for an alarm condition and could not complete the call with an assigned destination telephone number. Refer to Appendix D, Dial-Out Algorithms, for more specific details.

Dial tone was not detected. Unable to dial out: Indicates that CP2 attempted to dial out either an alarm or a periodic report and could not detect a dial tone for a period of at least 15 seconds.

** Excessive unsuccessful login attempts were made:** Issued when six consecutive invalid passwords are entered at the ENTER PASSWORD: prompt, and after the <169>Too many invalid attempts...<170> message is displayed.

** Excessive unsuccessful Super-User login attempts were made:** Issued when four consecutive invalid passwords are entered at the ENTER SUPER-USER PASSWORD: prompt, and after the <169>Too many invalid attempts...<170> message is displayed.

** Pending dial-out list was full. Was unable to add event(s):** Indicates that the number of alarm events for which CP2 is going to dial out has exceeded the memory reserved for this function. The dial-out list holds a maximum of 64 events. Refer to Appendix D, Dial-Out Algorithms, for more specific details.

** Periodic dial-out number did not respond:** Indicates that CP2 attempted a periodic dial-out and could not complete the call with the assigned destination telephone number. Refer to Appendix D, Dial-Out Algorithms, for more specific details.

** Rectifiers have been turned on due to low plant voltage:
The plant voltage has dropped below 44 volts dc (or 22 volts dc
for 24-volt plants), resulting in the rectifiers that have been
placed into standby mode via software being turned on. Refer to
Appendix F.

Diagnostic Warnings

Speech data is corrupted. Call the Hotline: The Voice
Response Option data device has failed its checksum test, which
may result in garbled voice messages.

Some alarms may be reported incorrectly. Call the Hotline:
The alarm detection test has failed at power-up. Either alarms are
stuck or the board is in error, and this may result in nuisance
alarm reporting.

**Voltage/Current readings may be incorrect. Call the
Hotline:** The on-board Analog to Digital device has failed. As a
result, the voltage/current readings at the terminal may not
match those of the CP1.

Terminal port problems. Call the Hotline: This warning will
only be seen from a remote terminal. The terminal/printer port
test has failed and may have varying results when printing.

Battery monitor port problems. Call the Hotline: The port
reserved for battery monitor channel use has failed its power-up
test. This may inhibit future expansion.

On-board modem problems. Call the Hotline: The on-board
modem has failed its power-up tests and may cause problems on
dial-out alarms.

Voice response hardware problems. Call the Hotline: The
Voice response option device failed its power-on test. This will
cause the option to be disabled.

Pass-through port problems. Call the Hotline: The
pass-through port has failed its power-up test and may not be
able to communicate with external devices such as RAS.

Datalogger channels failed. Call the Hotline: The test of the
CP3 datalogger channels has recorded a reading that is either
over-range or under-range and may be due to device failure.

Appendix B   *Alarms*

Active Alarms and Plant History

The following is a list of all alarm conditions reported by the ECS Microprocessor Option (CP2). With the exception of System Clock Change (CLKC), Processor Halt (PH), and Processor Restart (PR), these abbreviations and descriptions appear in the Active Alarm Report while active, and are automatically deleted when the alarm condition retires. The Plant Alarm History Log will record the date and time the alarm condition occurred and the date and time it retired. For reference purposes, CLCK, PH and PR are recorded only as occurred in the Plant Alarm History Log.

_ACF (AC Power Fail): A rectifier alarm signal that becomes active when a rectifier has no AC power.

_BD (Battery on Discharge): A CP1 alarm signal that becomes active whenever the plant voltage is below a user-specifiable level. The Battery on Discharge level is configured via DIP switch (SW103) on the CP1 board. Refer to the ECS Controller Product Manual for configuration of this switch.

_CLKC (System Clock Changed): This event is recorded in the Plant Alarm History Log when a Super-User changes the system date and time.

_EXA (External Alarm): An alarm signal intended for use with a connected AT&T Remote Access System (RAS). Alarm condition is active when a contact closure is sensed between pins 3 and 4 of TB202. Refer to Figure 3-2 for the location of TB202.

_HV (High Voltage): A CP1 alarm signal that becomes active when the plant voltage is above a user-specifiable level. The high voltage level for float mode is configured with a DIP switch (SW102) on CP1. If the boost function is enabled, a second high voltage level must be configured with a DIP switch (SW101) on CP1 for use when the plant is in the boost mode. Refer to the ECS Controller Product Manual for configuration of these switches.

_MJF (Major Fuse Alarm): An alarm condition indicating that one of the main distribution circuit breakers has tripped, or one of the control fuses on the LVD/fuse board (CP5) has blown due to overload. This alarm condition remains active until the circuit breaker is reset or the control fuse is removed or replaced.

_MNF (Minor Fuse Alarm): An alarm condition indicating that one of the control fuses on the LVD/fuse board (CP5) has blown due to overload or the LVD circuit has opened. This alarm condition remains active until the fuse is either replaced or removed, or the LVD/fuse board has been replaced.

_OS (Open Battery String): A CP1 alarm signal that becomes active when a battery string circuit breaker is tripped manually, electronically, or due to overcurrent. The circuit breaker is monitored by a sense lead to TB101 pin 3 on CP1. Refer to appropriate battery plant product manual and the ECS Controller Product Manual.

_PH (Processor Halt): This event is recorded in the Plant Alarm History whenever CP2 is powered down, reset, or otherwise halted.

_PR (Processor Restart): This event is recorded in the Plant Alarm History Log whenever CP2 is powered up or reset.

_RFA (Rectifier Fail): A rectifier alarm signal indicating any failed rectifier condition.

_RMJ (Major Ringer Alarm): Alarm signal from CP1 indicating bulk ringer alarm condition. Major Ringer Alarm signal is monitored by sense lead to TB101 pin 4 on CP1. Refer to Figure 3-1, appropriate battery plant product manual and the ECS Controller Product Manual.

_RMN (Minor Ringer Alarm): Alarm signal from CP1 indicating bulk ringer alarm condition. Minor Ringer Alarm

signal is monitored by sense lead to TB101 pin 5 on CP1. Refer to Figure 3-1, the appropriate battery plant product manual, and the ECS Controller Product Manual.

Note

> **RMJ** and **RMN** are general purpose alarm contacts available on CP1. These are normally intended for use with bulk ringers but they can be used for other applications such as dc-dc converters or inverters. The ECS Controller will use RMJ and RMN as the mnemonics for these contacts and will describe them as "Major Ringer Alarm" and "Minor Ringer Alarm" in history, alarm reports and the Voice Response Option.

TA (Rectifier Thermal Alarm): A rectifier alarm signal to CP2 indicating that a rectifier has shut down due to inadequate air flow resulting from a possible blockage, fan failure, or high ambient temperature.

UEQ (Unable to go in Boost): An alarm condition indicating that, at some time, CP2 attempted to put the rectifiers into boost mode but the plant did not respond. This alarm will remain active until the plant is put into boost mode.

UFL (Unable to go in Float): An alarm condition indicating that, at some time, CP2 attempted to put the rectifiers into float mode but the plant did not respond. This alarm will remain active until the plant is put into float mode.

Active Alarms and Datalogger History

Alarm conditions on up to 16 analog channels are reported by the ECS Datalogger Option (CP3). These conditions appear in the Active Alarm Report while active and while the Datalogger option card is installed. They are automatically deleted when the condition retires and they will not be displayed if the Datalogger card is removed. When the card is reinserted, current alarm conditions will be displayed and history reporting will be resumed.

A1-A16 (Analog Channel Alarm): The channel shown is being alarmed due to measurement exceeding either the upper or lower threshold.

Appendix C   *Statistics Algorithms*

The statistics features permit collecting plant data over various time periods. These data are held in battery-backed RAM to protect against loss during power failure. Battery discharge statistics can be used to analyze battery performance. In addition, the controller keeps three types of plant load statistics logs: basic, trends, and busy hour statistics. These logs can be used to predict when additional rectifier capacity will be needed.

Two basic values are used throughout the statistics logs, instantaneous values and hourly average values. They are defined as follows:

Instantaneous values: Readings of plant current taken at one-minute intervals. Changes are recorded in 0.1 ampere increments.

Hourly average values: At each change of hour the channel average is set to 0 and sampling of instantaneous values begins at one-minute intervals. Each reading is added and the total is divided by the number of readings at the next change of hour. Ten instantaneous values are required for an hourly average to be recorded.

Basic Statistics:

Highest Hourly Average Values: The three highest hourly averages are kept in memory and updated each hour. Collection of data begins when the first valid hourly average is available.

Highest Hourly Maximums: At the change of each hour, the highest instantaneous value for the previous hour is compared with the three highest hourly maximums stored

in memory. If it is greater than any of those, the lowest maximum value will be deleted and the new value included in the three highest maximum values.

Lowest Hourly Minimums: At the change of each hour, the lowest instantaneous value for the previous hour is compared with the three lowest hourly minimum values stored in memory. If it is smaller than any of those, the highest will be deleted and the new value included.

Trend Statistics:

Daily High and Low: For each of the previous 16 days, the screen shows the highest and lowest instantaneous values on that day. The display includes the time of each recording.

Daily Maximum Hourly Average: For each of the previous 32 days, the screen shows the highest one-hour average value for that day. The hour (1-24) at which it occurred is also identified in the display.

Monthly Average: For each of the previous 13 months, the screen shows the monthly average of the daily maximum one-hour averages.

Busy Hour Statistics:

24 consecutive hourly averages are collected beginning at the user specified time and date. This feature can be used to determine the busy hour(s) of any selected 24-hour period.

Battery Discharge Statistics:

Beginning one minute after a Battery Discharge alarm occurs, voltage and current are sampled at one-minute intervals. Whenever the voltage drops by more than 250mV on a 48-volt plant or 125mV on a 24-volt plant, the voltage, load current and time will be added to the Discharge Statistics table.

The frequency at which entries are added to the log depends on the rate of battery discharge. If a voltage reading differs by at least 250mV from the previous entry (125mV for 24-volt plants), it will be recorded. If voltage does not drop by the minimum value, records will be made at 15-minute intervals. Thus, data points are spaced more closely together in time during

periods of rapid discharge, and are shown less frequently during more stable periods when plant load is less and voltage is steady.

Once logging has begun, it will continue until the alarm is retired. At any time, a Super-User may clear the log. If the log is not cleared, each new Battery Discharge alarm will continue with a new series of entries. The first item in each new group will be marked with an asterisk.

Battery discharge statistics are limited to 60 entries. At the 61st consecutive entry, the oldest occurrence will be lost and all others will be moved up by one entry.

Effect of Power Failure:

Loss of dc power to CP2 will affect computation of statistics as follows:

Hourly Statistics: Hourly maximum or minimum value for an hour in which power has failed will be the high or low reading between restoration of power and the next change of hour.

The hourly average value will be the average of the readings between restoration of power and the next change of hour.

If power fails more than once during an hour, only the last interval between restoration and change of hour will be used.

If power failure lasts more than one hour, or if fewer than 10 readings could be taken in the hour, the data for that hour will not be displayed.

If power failure lasts through the change of hour, data for the first hour will not be displayed.

Daily Statistics: Daily maximum and minimum values for the day of a power failure will be the high and low readings between the time power was restored and the next change of day.

The daily maximum one-hour average will be the highest average recorded since power was restored. If multiple power failures occur during the day, only readings taken

between the last power restoration and the change of day will be used.

Effect of Changing Date and Time:

In general, statistics logs will not be affected by clock changes unless they are in the process of being recorded when the change is made. Even then, changes are similar to those experienced in a power failure, and proper logging will resume at the next change of hour or day. Where the change results in an incomplete entry, no data will be displayed for that period.

Effect of Changing Datalogger Scale, Range or Channel Type:

Changes in Datalogger scale factor, range or channel type will make the trend study invalid because of large changes and possible out of range readings. Trend statistics will be cleared and the first new trend entry will begin at the next minute.

Appendix D   *Dial-Out On Alarm*

Dial-Out on Alarm

If the Dial-Out on Alarm feature is enabled, the microprocessor option (CP2) will dial out to the assigned phone number as soon as the user-specified conditions occur. Alarm events are stored in a dial-out queue and processed in the order that they occur.

Five phone numbers can be assigned, four primary numbers (P1, P2, P3 and P4), and one alternate number (A1). CP2 follows the algorithms described below for the Dial-Out on Alarm feature.

Dial-Out to P1, P2, P3 or P4: The user will determine which phone number should be tried in the individual dial-out matrix. Each selected number will be tried in succession until a connection is made. As an example, assume that P1 and P2 have been selected as YES, and P3 and P4 have been selected as NO. CP2 will call out to P1 for an alarm stored in the dial-out queue. If the first destination cannot be reached, CP2 will then attempt to call out on the next selected number, P2. If it is not reached, CP2 will then report all alarm events to A1 (if provided). Had either P3 or P4 been selected as YES, they too would have been tried before attempting A1. If A1 is reached and all the alarms have been reported, CP2 will not call the first primary number again. However, if the system cannot reach A1 or if A1 is not provided, the system will wait 12 minutes before it tries to call the first primary number again. If CP2 does get through to P1 on the first attempt, but is unable to complete the call, it will try to dial out two more times before it enters the 12 minute wait period. After 12 minutes, the above procedure will be repeated. There can be a total of three 12 minute delays. If the system is still unable to reach the destination, the first alarm will be deleted from the dial-out queue and a warning will be issued.

Appendix E   Boost Status

Boost Status Descriptions

When viewing boost history, the ECS Microprocessor Option (CP2) will display the start and end modes for the boost cycle with the following indicators.

Start Mode

MANUAL: Indicates that the plant was put into boost mode manually with the FL/EQ switch on the ECS Controller front panel.

PROGRAM: Indicates that the plant was put into boost mode for a programmed period of time using the Program Boost Control. The time remaining for the boost period can be checked by selecting either Float Mode or Boost Mode from the Boost Control menu. Refer to Section 4, "Super-User Functions/Boost Control/Boost Mode."

AUTO: Issued if the Auto-Boost Control feature is enabled. The time remaining for the boost period can be checked by selecting either Float Mode or Boost Mode from the Boost Control menu. Refer to Section 4, "Super-User Functions/Boost Control/Auto-Boost Control."

End Mode

MANUAL: Indicates that the plant was manually taken out of boost mode with the FL/EQ switch on the ECS Controller front panel.

PROGRAM: Indicates that the plant was in boost mode for the time specified using the Program Boost Control feature, and CP2 returned the plant to float mode.

AUTO: Indicates that the plant was in boost mode using the Auto-Boost Control feature, and CP2 returned the plant to float mode. Refer to Section 4, "Feature Descriptions/Super-User Features/Boost Control."

TERMINAL: Indicates that the battery plant was taken out of boost mode by selecting the Float Mode option. Refer to Section 4, "Super-User Functions/Boost Control/Float Mode."

ALARM: Indicates that an alarm condition occurred while the battery plant was in boost mode, and the plant was automatically put back into float mode.

Appendix F   *Rectifier Status*

Rectifier Status/Control

When viewing the Rectifier Status/Control screen, rectifier status will be displayed in the Present State field with the following indicators.

ON: Rectifier is on and alarm ribbon cable is connected through the alarm interface (P790) at front of rectifier.

MAN: Rectifier dc output circuit breaker and/or standby switch is manually turned off.

TERM: Rectifier has been turned off using the Status/Control screen displayed on a local or remote terminal. Note: This is only possible if remote rectifier control is hardware enabled. Refer to Section 3, "ECS Microprocessor Option(CP2) Configuration," for hardware configuration.

NC: There is no rectifier in the specified position or the ribbon cable (P790) is not connected to the front of the rectifier in this position.

AC-FAIL: AC power has been lost to the rectifier.

FAIL [TA]: Rectifier has been shut down as a result of a thermal alarm.

FAIL [HV]: Rectifier has been shut down as a result of high voltage alarm.

ENGINE TRANSFER: This status can only appear while the plant is operating on engine-alternator power during a

commercial ac power failure. This status indicates that the rectifier is off because it was specified to be off in the rectifier sequence control configuration . Refer to Section 4, "Super-User Functions/Rectifier Control/Engine Transfer." Note: Rectifiers displaying this status can be turned on remotely if remote rectifier control is hardware enabled. Refer to Section 3, "ECS Microprocessor Option(CP2) Configuration," for hardware configuration.

EXTERNAL TR: This status indicates that the rectifier has been shut down due to an external signal applied to CP1. Refer to the ECS Controller Product Manual.

Important Notes:

When initially powering up CP2 or installing new rectifiers, all installed rectifiers must be connected and manually turned on in order for the microprocessor to properly determine individual rectifier status.

If a new rectifier is installed in a plant with an existing rectifier alarm condition, the alarm condition must be at least temporarily removed before the CP2 can properly determine the status of the new rectifier. For example, if a new rectifier is installed in a plant with an existing thermal alarm on one of the rectifiers, the new rectifier status may be displayed as **FAIL/NC [TA]**.

Appendix G   External Connections

TB201 and TB202 Pin Connections

Pin assignments on CP2 terminal blocks TB201 and TB202 (refer to Figure 3-2) are as follows:

	TB201		TB202
1	*TD	1	NC
2	TD	2	NC
3	*RD	3	EXA
4	RD	4	EXAR
5	RXD3	5	DSR2
6	TXD3	6	DTR2
7	CTS3	7	RTS2
8	DTR3	8	CTS2
9	SGND3	9	RXD2
10	RO	10	TXD2
11	ETR	11	SGND2
12	ROR	12	ETRR

Signal Descriptions

TB201 pins 1-9 are reserved for future expansion.

ETR and RO signals: For the rectifier sequence feature to function, these two signals must be generated by the transfer switch in the engine-alternator.

ETR, ETRR: This signal should be a clean relay contact between ETR and ETRR (TB201 pin 11 and TB202 pin 12, respectively). This contact should show an open circuit for all conditions other than for a minimum of 5 milliseconds at the time the automatic transfer switch associated with the engine-alternator is in the process transferring between engine and commercial power. All rectifiers will be temporarily shut down when this signal is received and batteries must supply the plant load during this period.

The recommended method of generating this signal is to wire, in series, an auxiliary switch that is open when the engine-alternator's transfer switch is in the NORMAL (commercial AC) position and closed at all other times, and an auxiliary switch that is open when the transfer switch is in the EMERGENCY (engine-alternator) position and closed at all other times. This will result in the ETR signal being closed only for the interval in which both sides of the transfer switch are open. This period must be at least 5 milliseconds. Transfer switches that have programmed neutral positions or ones which afford 5 milliseconds dwell time due to their inherent operating mechanisms will function properly with this feature.

RO, ROR: This signal should be a clean relay contact between RO and ROR (TB201 pin 10 and TB201 pin 12, respectively) that is closed when the transfer switch main power contacts are in the EMERGENCY position and open at all other times.

The proper interpretation of the operation of the ETR and RO leads on the ECS controller is as follows. When a momentary closure exists between the ETR leads (CP2's pin 11 on TB201 and pin 12 on TB202), the ECS controller turns off all rectifiers (TR) and then initiates a sequenced restart. The reason for the shutdown and subsequent sequencing is to avoid transient overloads of the engine-alternator or commercial ac power when transfers between the two occur. The RO leads (CP2's pins 10 and 12 on TB201) are used to indicate whether ac power is being provided by commercial power (RO leads open), or engine-alternator (RO leads closed). The state of the RO leads also determines how rectifiers will respond to a restart sequence

from the ECS controller. For example, when the ECS plant is operating from an engine-alternator (RO leads closed), rectifiers which are programmed OFF (as set by the user in CP2's Super-User/Rectifier/Engine Transfer/Rectifier States), remain off during sequencing to avoid steady state overloading of the alternator. Similarly, when operating from commercial power, all rectifiers are sequenced to the ON state. The state of the RO leads is determined at the end of the first delay, i.e., immediately before sequencing the first rectifier. For this reason RO should be at its proper state and stable before the first delay expires, as measured from the beginning of the ETR closure.

Pass-Through Connections

ECS Controller and Remote Access System (RAS)

To communicate through CP2 with a connected RAS unit (Pass-Through), connections must be made between CP2 and the RAS unit as follows:

ECS TB202		RAS P303	
NAME	PIN#	PIN#	NAME
DSR2	5 ⟶	7	DSR
DTR2	6 ⟵	2	DTR
RTS2	7 ⟵	3	RTS
CTS2	8 ⟶	6	CTS
RXD2	9 ⟶	8	RXD
TXD2	10 ⟵	1	TXD
SGND2	11 ——	4	SG

ECS Controller and OMNIpulse or Secondary ECS

To communicate through CP2 with another connected ECS controller or OMNIpulse unit (Pass-Through), connections must be made between the primary ECS controller and the connected system as follows:

ECS TB202   **ECS or OMNIpulse Local Port)**
(Primary Unit)   **(Connected System)**

DSR2 5 ————————▶ **20 DTR**

DTR2 6 ◀———————— **6 DSR**

RTS2 7 ◀———————— **5 CTS**

CTS2 8 ————————▶ **4 RTS**

RXD2 9 ————————▶ **2 TXD**

TXD2 10 ———————— **3 RXD**

SGND2 11 ——————— **7 SG**

Note: Features that require the connected system to have a separate telephone line will be unavailable in the connected system. These features are as follows:

• **Voice Response:** The Voice Response feature is only accessible to the unit with the telephone line connected to its RJ-11 telephone jack.
• **Dial-Out Features:** Periodic Status Dial-Out and Dial Out on Alarm Features also require that a telephone line be connected to the controller's RJ-11 telephone jack.

A suggested method for alarm reporting from the connected system is to monitor the alarm relays on the connected system using the primary system controller's external alarm (EXA) pins or a Datalogger board in the primary system controller (if installed). Monitor the relays from either the connected system's CP1 alarm relay contacts or an installed Datalogger board's control relays.

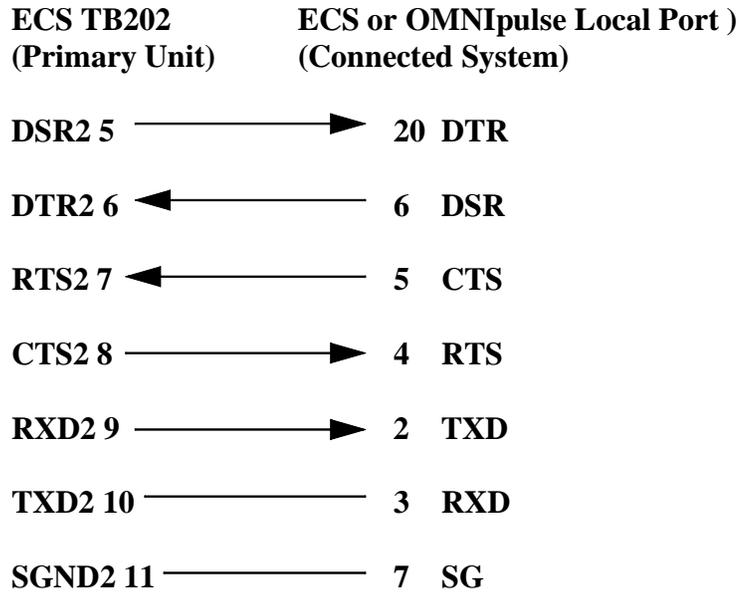The primary system controller can then be configured to dial out on EXA or the appropriate Datalogger channels to report alarms detected the connected system.

ECS Controller
and MCS
To communicate through CP2 with a connected MCS unit (Pass-Through), connections must be made between CP2 and the MCS unit as follows:

ECS TB202			MCS Controller Remote Interface Board Backplane Connection	
NAME	PIN#		PIN#	NAME
DSR2	5	⟶	111	DSR
DTR2	6	⟵	011	DTR
RTS2	7	⟵	010	RTS
CTS2	8	⟶	110	CTS
RXD2	9	⟶	109	TXD
TXD2	10	⟵	009	RXD
SGND2	11	⟶	100	GRD

External Alarm Monitor

EXA, EXAR: This signal should be a clean relay contact between EXA and EXAR (TB202 pins 3 and 4, respectively) that is closed when an alarm condition exists. This will generate an active CP2 alarm, EXA (External Alarm). This signal can be used to monitor RAS alarm conditions by connecting to the appropriate pins on the RAS connector, P308. Refer to the RAS manual for the configuration of these signals.

Data Switch Connections

To communicate through Data Switch to a connected ECS CP2, connections must be made between CP2 and the stand-alone Data Switch, or between CP2 and Data Switch in an MCS battery plant. Connections to CP2 are done through the Local Terminal port located on the front panel of the controller. The following figures show the connections between CP2 and the MCS backplane pins for each data port needing to be connected to ECS. In the stand-alone version of Data Switch, the communications pins are clearly marked. Connect the appropriate pins to their ECS equivalents.

ECS TO DATA SWITCH CONNECTIONS

ECS   Data Switch

RXD   3   ————————————▶   TXD

TXD   2   ◀————————————   RXD

CTS   5   ————▶

RTS   4   ◀————————————   CTS

DTR   6   ◀———┐

DSR   20 ——————┴————————▶   DTR

SG   7   ————————————   RTN
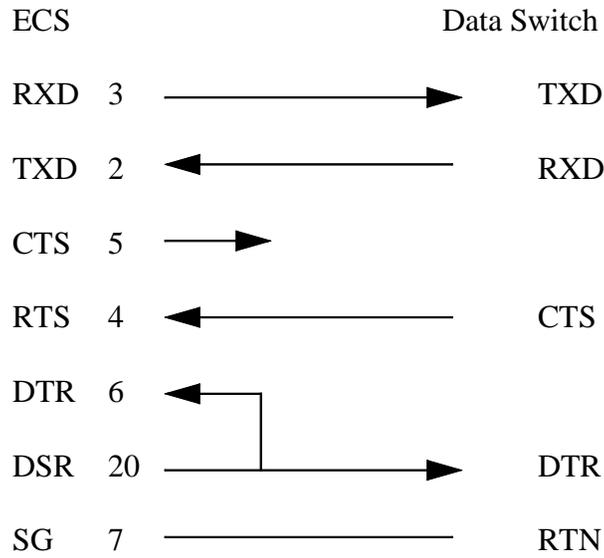
Table G-1: MCS Backplane Pin Locations

	Channel 1	Channel 2	Channel 3	Channel 4
CTS Pin	011	015	018	021
RXD Pin	010	014	017	020
DTR Pin	111	115	118	121
TXD	110	114	117	120

Appendix H   **Programing Control Relays**

The following is a list of all the alarm conditions or program words that can be used to build a CP3 Control Relay program line. A control relay program line will cause a relay to be energized only when the end result of evaluating the program line is defined as a TRUE condition.

Program words are themselves TRUE when the associated alarm/time/event is actually in effect.

- ON: This keyword will energize a relay immediately, and the relay will remain on.
- OFF: This keyword will de-energize a relay immediately, and the relay will remain off.
- AND, &: This is used when two conditions must both be TRUE before the program line is TRUE. EXAMPLE: **A1 AND A2** is TRUE when both A1 and A2 alarms are active.
- OR, | (| = the keyboard "pipe" symbol): This is used when any condition will satisfy the whole condition. EXAMPLE: **A1 OR A2** is TRUE when either or both alarms are active.
- XOR, ^: This is used when looking for opposing conditions. EXAMPLE: **A1 XOR A2** is TRUE when either but not both alarms are active.
- NOT, !: This is used when the opposite of the next term is to be used. EXAMPLE: **NOT A1** is TRUE when A1 is not active.
- EQ, =: This is used when looking for an exact comparison. EXAMPLE: **A1 EQ A2** is TRUE when A1 and A2 are both at the same state, either both active, or both inactive.
- NEQ, !=: This is used when looking for opposing conditions. EXAMPLE: **A1 NEQ A2** is TRUE when only one of the alarms is active or inactive, but not both.
- ACF (AC Power Fail): A rectifier alarm signal that becomes active when a rectifier has no AC power.

- BD (Battery on discharge): A CP1 alarm signal that is active whenever the plant voltage is below a user-specifiable level.
- EXA (External Alarm): An alarm signal intended for use with a connected AT&T Remote Access System (RAS).
- HV (High Voltage): A CP1 alarm signal that becomes active when the plant voltage is above a user specified value.
- MJF (Major Fuse Alarm): An alarm condition indicating that one of the main distribution circuit breakers has tripped, or one of the control fuses on the LVD/fuse board (CP5) has blown due to overload. This alarm remains active until the circuit breaker is reset or the control fuse is removed.
- MNF (Minor Fuse Alarm): An alarm condition indicating that one of the control fuses on the LVD/fuse board (CP5) has blown due to overload. This alarm remains active until the fuse is either replaced or removed, or the LVD/fuse board has been replaced.
- OS (Open Battery String): A CP1 alarm signal that is active when a battery string circuit breaker is tripped manually, electronically, or due to overcurrent.
- RFA (Rectifier Fail): A rectifier alarm signal indicating any failed rectifier condition.
- RMJ (Major Ringer Alarm): Alarm signals from CP1 indicating bulk ringer alarm conditions.
- RMN (Minor Ringer Alarm): Alarm signals from CP1 indicating bulk ringer alarm conditions.
- TA (Rectifier Thermal Alarm): A rectifier alarm signal indicating that a rectifier has failed due to overheating.
- UEQ (Unable to go in Boost): An alarm condition indicating that, at some time, CP2 attempted to put the rectifiers into boost mode but the plant did not respond. This alarm will remain active until the plant is put into boost mode.
- UFL (Unable to go in Float): An alarm condition indicating that, at some time, CP2 attempted to put the rectifiers into float mode but the plant did not respond. This alarm will remain active until the plant is put into float mode.
- A1 - A16 (Analog Channel Alarm): Each of the 16 analog channel alarms may be used to energize a relay. This condition is TRUE when either the configured upper or lower limit of an analog channel has been surpassed.
- CR1 - CR8 (Control Relay Energized): Each of the 8 control relays may be used to energize another relay other than itself. This condition is TRUE when the source relay is itself energized as a result of its own program line.

- EQLZ (Boost): Boost status may be used to energize a relay. This condition is TRUE when the plant is in boost mode.
- Dx (Day of the Month x): The day of the month may be used to energize a relay. This condition is TRUE on the given day of the month (1-31 as applicable) for the full 24 hour period of that day. Example: (D5 OR D31) will energize a relay on either the 5th or 31th day of the month (assuming the current month has 31 days).
- Wy (Day of the Week y): The day of the week may be used to energize a relay. This condition is TRUE on the given day of the week (1-7) where 1=Sunday, 2=Monday, etc. The condition is active for the full 24 hour period of that day.
- Txx:yy (Time of the Day): The time of day may be specified to energize a relay. This condition will become TRUE at the specified time of day and will remain so if no accompanying Period is specified. If a period is specified, the condition will become FALSE after the time has elapsed. NOTE: Time should be specified in 24 hour clock time.
- Pxx:yy (Period to remain ON): This specified the period of time a relay should remain on after the time condition becomes TRUE. This is limited to 24 hours.

Note: Period by itself does nothing. This is for use only with the Time variable. For example: T1:00; P2:30 would energize a relay at 1:00 a.m. and that relay would turn off 2 hours, 30 minutes later. P2:30 by itself does nothing, and the relay would remain OFF, since no start time was specified.

Appendix I   *Available Voice Commands*

The following voice commands are available to the user when logging into the ECS plant from a Touch- Tone® phone. All commands must be entered as shown and terminated with a # (pound sign). For easy reference, the available voice commands have been categorized by functions.

DATALOGGER FUNCTIONS

ALPHA	NUMERIC	FUNCTION
DH	34	Datalogger alarm history for all channels.
DHn	34n	Datalogger alarm history for channel n (n=1 to 16).
CRS	277	State of all control relays.
CRSn	277n	State of control relay n (n = 1 to 8).
CRH	274	Control relay history for all control relays.
CRHn	274n	Control relay history for control relay n (n=1 to 8).
DL	35	Present reading of all datalogger channels.
DLn	35n	Present reading of datalogger channel n (n=1 to 16).

ECS PLANT FUNCTIONS

ALPHA	NUMERIC	FUNCTION
AL	25	Active alarms including plant and datalogger.
IPC	472	Installed plant capacity.
PC	72	Plant configuration.
PM	76	Plant mode: (boost/float).
VI	84	Plant voltage and current.

ECS RECTIFIER FUNCTIONS

ALPHA	NUMERIC	FUNCTION
RTS	787	Rectifier status for all connected rectifiers.
RTSn	787n	Rectifier status for rectifier n (n=1 to 6 or 12).
RTH	784	Rectifier history for all connected rectifiers.
RTHn	784n	Rectifier history for rectifier n (n=1 to 6 or 12).
RRS	777	Request rectifier restart of failed rectifiers.

ECS PLANT ALARM HISTORIES

ALPHA	NUMERIC	FUNCTION
PH	74	All plant alarm histories.
PHn	74n	History of plant alarm n.
PH1	741	History of battery on discharge alarm.
PH2	742	History of high voltage alarm.
PH3	743	History of major fuse alarm.
PH4	744	History of minor fuse alarm.
PH5	745	History of ac fail alarm.
PH6	746	History of rectifier fail alarm.
PH7	747	History of rectifier thermal alarm.
PH8	748	History of major ringer alarm.
PH9	749	History of minor ringer alarm.
PH10	7410	History of open battery string alarm.
PH11	7411	History of external alarm.
PH12	7412	History of unable to go on boost alarm.
PH13	7413	History of unable to go on float alarm.
PH14	7414	History of processor fail alarm.
PH15	7415	History of processor restart alarm.
PH16	7416	History of system clock changed alarm.

MISCELLANEOUS FUNCTIONS

ALPHA	NUMERIC	FUNCTION
HLP	457	Toll free number: 1-800-238-2288
DT	38	Date and time.
BYE	293	Terminate communications.
	*	Back up one letter or number.
	0	Repeat voice option menu

Appendix J *Periodic Status Dial-Out*

Periodic Status Dial-Out Algorithm

If the Periodic Status Dial-Out feature is enabled, the microprocessor option (CP2) will dial out to the assigned phone number at a user-specified dialing time and day.

Only one phone number can be assigned for the periodic status dial-out. CP2 follows the algorithms described below for the Periodic Status Dial-Out feature.

Dial-Out to Phone Number: The user will specify the phone number that should be tried in the Periodic Status Dial-Out configuration screen. This number will be dialed out at the time and day set by the user. CP2 will make only two attempts at reaching this number. If the phone number cannot be reached on the first attempt, CP2 will wait 30 minutes before trying again. If the second attempt is unsuccessful, a warning will be issued, and CP2 will not retry the call until the next occurrence of the dial-out time and day.

Appendix K   *TL1 (Transaction Language 1) Command Supported By the ECS Controller*

Introduction

The Transaction Language (TL1) command interface option for the ECS controller enables direct communication with a central computerized monitoring system using TL1 commands as specified by Bellcore. In TL1 terminology, the ECS controller is commonly called a Network Element (NE) and the central computerized monitoring system is called the Operations System (OS). This Appendix describes the relevant TL1 command format, setup procedures for the ECS controller, a detailed description of the TL1 commands and messages supported by the ECS controller, and pertinent Bellcore documents

Command Format

The format of an input command from OS to the ECS controller is a command word followed by a variable number of fields of command-specific information separated by colons. The command is terminated by a semicolon. A typical command format is given below:

> Command: TID: AID: CTAG: GB: PB;

Command

This term designates the command string. The ECS controller supports the following commands.

> Activate User
> Cancel User
> Retrieve Header

Retrieve Alarm
Retrieve Equipment
Report Alarm
Retrieve Alarm Environment
Set Alarm Cut-Off
Operate Alarm Cut-Off
Report Alarm Environment
Report Removal
Report Restoration

TID (Target Identification)   This term identifies a particular NE. For the ECS controller, the first eight characters of the System ID (see Section 4, "Feature Descriptions/Super-User Features/Configure") is used as TID for communicating with OSs.

AID (Access Identification)   The access code contains the information needed to access or address entities within the target NE (ECS controller in this case). For each plant alarm and datalogger channel, this is a configurable parameter (see Section 4, "Feature Descriptions/Super-User Features/TL1 Configuration"). For example, if a particular channel is monitoring Rectifier 1 current in a -48 volt battery plant, the AID, as recommended by Bellcore's document TA-NWT-001360, "Generic Requirements For Power Systems Messages At The OS/NE Interface", is "N48B1RECT1."

CTAG (Correlation Tag)   The CTAG is a message identifier, assigned and sent by the OS with each command, which correlates an input command with its associated output response. The ECS controller automatically copies this value into the appropriate field of its output response to the associated input command.

GB (General Block) and PB (Parameter Block)   These terms include additional information in the command or output response.

Condition Type   For each alarm, this string (eight characters) tells the OS the type of alarm condition. For example, a battery on discharge alarm could be "DC PLANT LOW VOLTAGE." For each analog datalogger and derived channel, the user must configure the

condition type both for lower threshold alarm and upper threshold alarm. For each binary datalogger channel, the user must configure the condition type for the alarm (see Section 4 "Feature Descriptions/Super-User Features/TL1 Configuration").

Service-Affecting For each alarm, the user must specify whether the alarm condition is service-affecting or not (see Section 4 "Feature Descriptions/Super-User Features/TL1 Configuration").

Setup Procedure for ECS controller to Communicate TL1 Messages With Operating Systems (OSs)

1. Physical Setup: The ECS controller TL1 port is a RS-485 port supporting from 300 to 9600 bps communications. Find out the required type of communications with your data network. The ECS controller can be set up to interface with the data network to communicate with OSs in any of the following ways:

    Direct RS-485 interface

    Direct RS-232 interface. Use the supplied RS-485 to RS-232 converters.

    X.25 interface. Use the supplied RS-485 to RS-232 converter and connect to the external Packet Assembler Disassembler (PAD).

Refer to Section 3, "X.25/TL1 Equipment Setup and Installation," for installation setup details.

2. Link Setup: Make sure a communications link is established between the ECS controller and OS. If you are using an external PAD, refer to Section 3, "X.25/TL1 Equipment Setup and Installation," for details.

3. Configuration: For each plant alarm and datalogger channel, derived channel and user-defined alarm which must be reported to OS via TL1 messages, enable the TL1 reporting and set up other parameters using the menu interface of ECS controller. This may be done either via the local RS-232 port using a terminal or via the dial-up modem port. Refer to Section 4, "Feature Descriptions/Super-User Features/TL1 Configuration," for details.

4. Login by OS: The OS should login to the ECS controller using the "ACTIVATE USER" TL1 command. After successful login by OS, the ECS controller is ready to respond to other TL1 commands and send autonomous TL1 messages to OS.

TL1 Commands Supported by the ECS C

ontroller

List of Supported Commands:

Activate User
Cancel User
Retrieve Header
Retrieve Alarm
Retrieve Equipment
Report Alarm
Retrieve Alarm Environment
Set Alarm Cut-Off
Operate Alarm Cut-Off
Report Alarm Environment
Report Removal
Report Restoration

Details of Supported Commands:

Response Header

TL1 specifications spell out the spacing and syntax of TL1 responses. The following conventions are used in this text to show TL1 format:

cr   carriage return
lf   line feed
^   space
;   enters commands

The response header is attached to the beginning of all messages sent by the ECS controller.

>   cr lf lf
>   ^^^source id^yy-mm-dd^hh:mm:ss cr lf

where:

source id is the system id (first 20 characters) of the ECS controller as displayed in the menu header.

General Error responses

The format of the error response is:

    response header
    M^^CTAG^DENY cr lf<
    ^^^error code cr lf;

where:

CTAGnumber specified in the incoming request

Error Code:

ICNVinput command not valid
IICTinput illegal correlation tag
IISPinput illegal syntax or punctuation
ENRIequipment not configured to retrieve specified
    information
IIACinput invalid access identifier

Commands from OSs

The ECS controller accepts the following alarm queries:

Retrieve Alarm

   1. Request for alarm information from all AIDs for plant
      alarm or channel configured as equipment for TL1
      reporting
    RTRV-ALM-ALL::ALL:CTAG;

   2. Request for alarm information from a specific AID for
      plant alarm or channel configured as equipment for TL1
      reporting
    RTRV-ALM-EQPT::AID:CTAG;

The ECS controller generates the following responses:

   1. Response with no active alarms
    response header
    M^^CTAG^COMPLD cr lf;

2. Response with active alarms
   response header
   M^^CTAG^COMPLD cr lf
   ^^^"AID,EQPT:alarm level,condtype,service affecting,,," cr lf
   ...
   ^^^"AID,EQPT:alarm level,condtype,non-service affecting,,," cr lf;

Where:

CTAGcommand identification number specified in request
AIDas specified by user via configuration screen
Alarm levelCR | MJ | MN (Critical [CR], Major [MJ] or Minor [MN]
Condtypetext specified by user via configuration screen
Service affectingSA | NSA (Service Affecting or Non-Service Affecting)
     as specified by user via configuration screen

The ECS controller generates the following error response for requests made for an AID not present in the system:

   response header
   M^^CTAG^DENY cr lf
   ^^^IIAC
   cr lf;

Retrieve Header

The ECS controller supports the retrieve header request with the following syntax:

   RTRV-HDR:::CTAG;

The ECS controller generates the following response:

   response header
   M^^CTAG^COMPLD cr lf;

Retrieve Equipment

The ECS controller accepts the following query for channel configuration information:

   RTRV-EQPT::AID:CTAG;

The response is in the following format:

response header
M^^CTAG^COMPLD cr lf
"AID:keyword=value,...keyword=value" cr lf
...
"AID:keyword=value,...keyword=value" cr lf;

Where:

KeywordThe parameter name for a particular channel
ValueThe value of the parameter.

The valid keywords for plant alarm and datalogger, derived, and user-defined channels are:

physchanPhysical channel or plant alarm
descriptionchannel description
iptypeanalog or binary input types
lthreshlower alarm threshold
uthreshupper alarm threshold
scalescale factor
offsettransducer offset value
rangerange for measurement
almtype of alarm
unitsunit description

The ECS controller generates the following error response for requests made for an AID not present in the system:

response header
M^^CTAG^DENY cr lf
^^^IIAC<R><T><T><T>cr lf;

Activate User

Retrieve Alarm Environment

1. Request for environmental alarm information from all AIDs for datalogger channels that are configured as Environment for TL1 reporting

    RTRV-ALM-ENV::ALL:CTAG;

2. Request for environmental alarm information from a specific AID for channel that is configured <R><T><T>as Environment for TL1 reporting

RTRV-ALM-ENV::AID:CTAG;

The ECS generates the following responses:

1. Response with no active alarms

    response header
    M^^CTAG^COMPLD cr lf;

2. Response with active alarms

    response header
    M^^CTAG^COMPLD cr lf
    ^^^AID:alarm level, condtype,,,\conddesc\ cr lf
    ...
    ^^^AID:alarm level, condtype,,,\conddesc\ cr lf;

Set Alarm Cut-Off

The ECS sets the alarm cut-off mode if the following command is issued:

SET-ACO-EQPT::AID:CTAG::ACOMODE;

where ACOMODE represents the mode of ACO operation that is to be performed by the ECS. Valid ACOMODE values are:

MAN :   ACO is introduced by Operate Alarm Cut-off command.
DELD: ACO is introduced automatically at the ECS but is delayed for approximately 5 seconds to allow a brief audible announcement of the trouble.
IMED: ACO is introduced automatically and immediately at the ECS.

The ECS generates the following response:

response header
M^^CTAG^COMPLD cr lf;

Operate Alarm Cut-Off

Request for introducing ACO automatically and immediately at the ECS.

OPR-ACO-ALL::AID:CTAG;

The ECS generates the following response:

> response header
> M^^CTAG^COMPLD cr lf;

The ECS controller accepts the following command to activate a session (i.e., login to the system):

> ACT-USER::uid:CTAG::passwd;

Where:

uid   user identifier, having the hardcoded value of "user"

passwd   password, an ASCII string of up to 10 alphanumeric characters as specified by the user on screen

The following message is sent in response to a successful login attempt:

> response header
> M^^CTAG^COMPLD cr lf

Notes:

1. There is no response for unsuccessful login attempts.

2. The ECS controller does not transmit any messages until a user successfully logs into the system.

Cancel User

The ECS controller accepts the following command to terminate a user session on the system (i.e., logout):

> canc-user::uid:ctag;

Where:

uid   user identifier, having the hardcoded value of "user"

The ECS controller generates the following response upon receipt of a valid cancel user command:

> response header
> M^^CTAG^COMPLD cr lf;

Autonomous Commands From ECS controller (NE) to OS

Report Alarm

The ECS controller automatically sends the following message to report the occurrence or retirement of alarms configured as equipment for TL1 reporting:

```
response header
alarm code^atag^REPT^ALM^EQPT cr lf
^^^"AID:alarm level,condtype,service affecting,,,\"conddesc\"," cr lf
...
^^^"AID:alarm level,condtype,service affecting,,,\"conddesc\","" cr lf;
```

Where:

alarm code:

*C critical
** major
*^ minor
A^ automatic (i.e., all alarm levels in report are CL [clear])
ATAGinteger value (sequence number of
    autonomous command generated by ECS
    controller)
AIDas specified by user via configuration
    screen
alarm levelCR | MJ | MN | CL (Critical [CR], Major
    [MJ], Minor [MN], or Clear [CL])
condtypeas specified by user via configuration
    screen
service affecting SA | NSA (Service Affecting [SA] or
    Non-Service Affecting [NSA]) as specified
    by user via configuration screen
conddesccondition description

Report Alarm Environment

The ECS automatically sends the following message to report the occurrence or retirement of alarms on channels configured as Environment for TL1 reporting:

```
response header
alarm code^atag^REPT^ALM^ENV cr lf
^^^AID:alarm level, condtype,,,\conddesc\ cr lf
...
^^^AID:alarm level, condtype,,,\conddesc\ cr lf;
```

Report Removal

The ECS automatically sends the following message to report the removal of equipment on datalogger channels configured as Equipment Presence for TL1 reporting:

    response header
    A^^atag^REPT^RMV^EQPT cr lf
    ^^^AID cr lf
    ...
    ^^^AID cr lf;î

The datalogger channels to be reported must be configured as Contact Open or Contact Closed in the Datalogger Configuration screen.

Report Restoration

The ECS automatically sends the following message to report the restoration of equipment on datalogger channels configured as Equipment Presence for TL1 reporting:

    response header
    A^^atag^REPT^RST^EQPT cr lf
    ^^^AID cr lf
    ...
    ^^^AID cr lf;

Bellcore Reference Documents

The following Bellcore documents give the details of the communication architecture between network elements and the OS centers:

- TR-TSY-000827 Operations Technology Generic Requirements (OTGR): Generic Operations <R><T>Interfaces - Non-OSI Communications Architecture
- TR-TSY-000828 Operations Technology Generic Requirements (OTGR): Generic Operations Interfaces - OSI Communications Architecture

The message format and other details about TL1 are available in the following Bellcore documents:

- TR-TSY-000831 Operations Technology Generic Requirements (OTGR): Operations Application

        \<R>\<T>Messages - Language for Operations Application
Messages
- TR-TSY-000833 Operations Technology Generic
  Requirements (OTGR): Operations Application
  \<R>\<T>Messages - Network Maintenance: Network
  Element and Transport Surveillance Messages

The TL1 requirements specific to power equipment are in the
following preliminary Bellcore document:

- TA-NWT-001360 Generic Requirements For Power
  Systems Messages At The OS/NE Interface

This document gives a list of recommended Access Identifiers
(AIDs) and Condition Types for the power monitoring and
control equipment.