Lucent Technologies
Bell Labs Innovations

Lineage® 2000 OMNIpulse™

Product Manual
Select Code 167-790-116
Comcode 107028367
Issue 11
October 1999

Lineage® *2000*
OMNIpulse™

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

3   Setup and Installation

4   Operation

5   *Super-User Operation*

6   *Voice Response*

7   *Applications*

8   *Product Warranty*

Appendix A   *Warnings*

Appendix B   *Alarms*

Appendix C   *Statistics Algorithms*

Appendix D   *Dial-Out Features*

List of Figures

List of Tables

1   *Introducing OMNIpulse*™

General Information

The Lineage® 2000 family name of premier energy monitoring and control products is globally recognized as the right choice for the ultimate in systems performance and reliability. Selecting this product brings the Lucent Technologies commitment to product and service excellence to your telecommunications system. This long-standing Lucent Technologies commitment has been gained from years of worldwide telecommunications experience in the development, manufacturing, engineering, installation and servicing of leading edge energy systems, products and services.

This manual (167-790-116) describes the OMNIpulse™ Monitoring and Control System and its component parts: the Microprocessor Board, Datalogger Boards, Termination Boards, Power and Alarm Relay Board, and Display Panel. The OMNIpulse system is shown in Figures 1-1 through 1-3.

The OMNIpulse is a microprocessor-based data acquisition and control system designed to monitor power, environmental, security or other conditions in unattended central offices, huts and vaults. The user can access the system by computer, data terminal or telephone, and can program it to dial out to a remote phone or terminal periodically for status reports or alarms.

Note: OMNIpulse units manufactured and shipped before April 1, 1999 included a Voice Response function, allowing users to communicate with OMNIpulse from any Touch-Tone™ telephone. This feature is described in Section 6 of this manual. Voice Response is no longer provided on units shipped since April 1, 1999.

The Microprocessor Board provides basic centralized monitoring, control and reporting functions of the OMNIpulse

system, allowing both local and remote access to the system. Features include extensive data collection with the ability to custom-select information for viewing present status, history, and statistics. History information may be sorted with oldest events shown first or newest events shown first, and may be grouped so that all events of the same type are displayed together. The system has the ability to dial-out on alarm and/or control relay status changes or to dial-out with periodic status reports. The voice response feature allows the user to log-in remotely through any Touch-Tone™ telephone, or allows the system to dial-out in the voice mode, eliminating the need for a data terminal. Phone numbers and delays are programmable, allowing the system to work with pagers, answering machines or voice mail systems.

The Datalogger Board provides the data acquisition and control capabilities of OMNIpulse and provides flexible, cost-effective system monitoring. System capacity is added in a modular fashion, with each Datalogger Board supporting 16 multi-range datalogger channels and eight control relays. The datalogger channels are highly accurate (0.1% of reading) and have programmable scale factors and offsets, allowing a myriad of transducers to be used. Derived channels further enhance the datalogger channels by providing the means to operate arithmetically on the datalogger channel readings. This is useful for transducers whose outputs require more manipulation than simple offset and scale factors, or to combine arithmetically several datalogger channel readings. Control relays are available to be activated or de-activated when other system parameters change state, such as alarm occurrence or retirement, time events occurring, and other control relays changing state. In this way, the OMNIpulse system monitors conditions in its surroundings, and can use this input to control related equipment.

The Datalogger Channel Termination Board and Control Relay Termination Board allow the user to make connections easily to high-quality terminal strips. These boards are separate from the other electronic circuitry.

The Power and Alarm Relay Board provides power for the unit, a means of reporting active alarm conditions via Form C relay contacts to an alarm gathering/processing system, and signals to the display panel.

The Display Panel provides system-wide visual indication of alarm and system status, including user-defined visual

indicators. Proper operation of the visual indicators may be easily verified with the LED Test Switch. The ability to temporarily de-activate alarm relays and/or control relays is provided with the Alarm Cut-Off switch, which is useful for silencing local audible alarms while maintenance work is in progress.

Installation of the circuit packs for this unit is simple, quick, and requires no special training. Operation of the monitoring system is easy to learn, with a menu-driven interface and on-screen instructions to walk the user through each function.
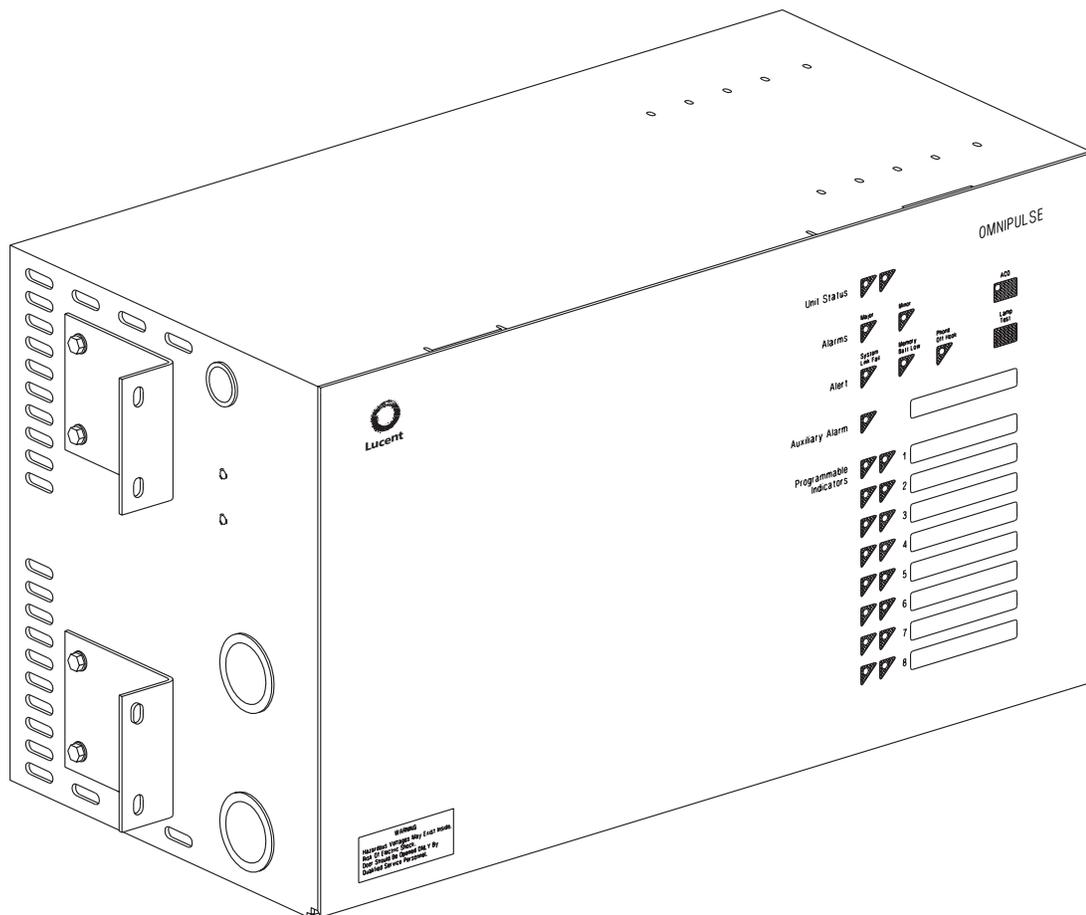
Figure 1-1A: Lineage® 2000 OMNIpulse Monitoring and Control System
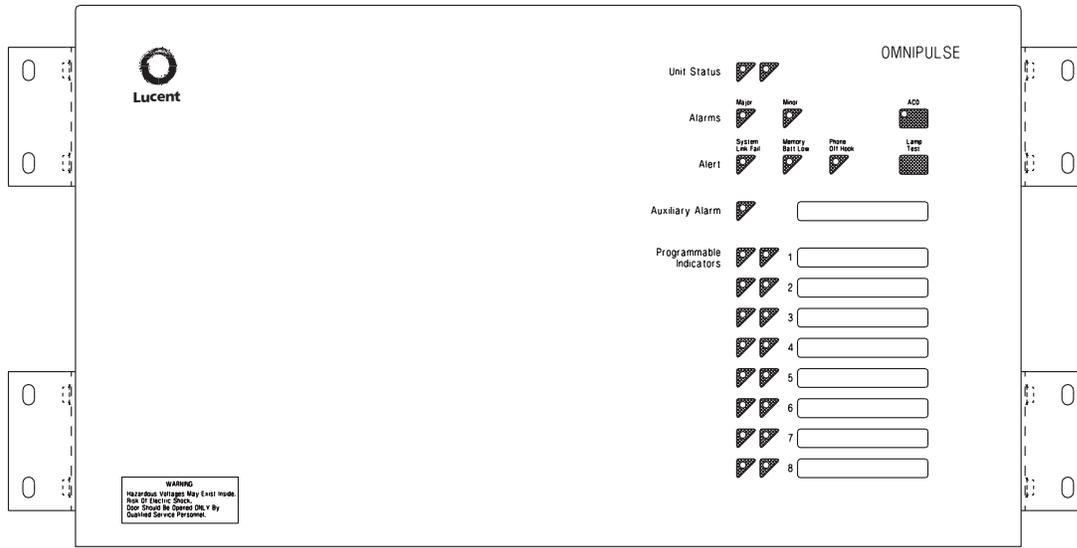
Figure 1-1B: Lineage® 2000 OMNIpulse Monitoring and Control System

MICROPROCESSOR BOARD

DATALOGGER BOARD #4

DATALOGGER BOARD #3

DATALOGGER BOARD #2

DATALOGGER BOARD #1

POWER/RELAY BOARD

DATALOGGER CHANNEL TERMINATION

OFF ON

FRM GND
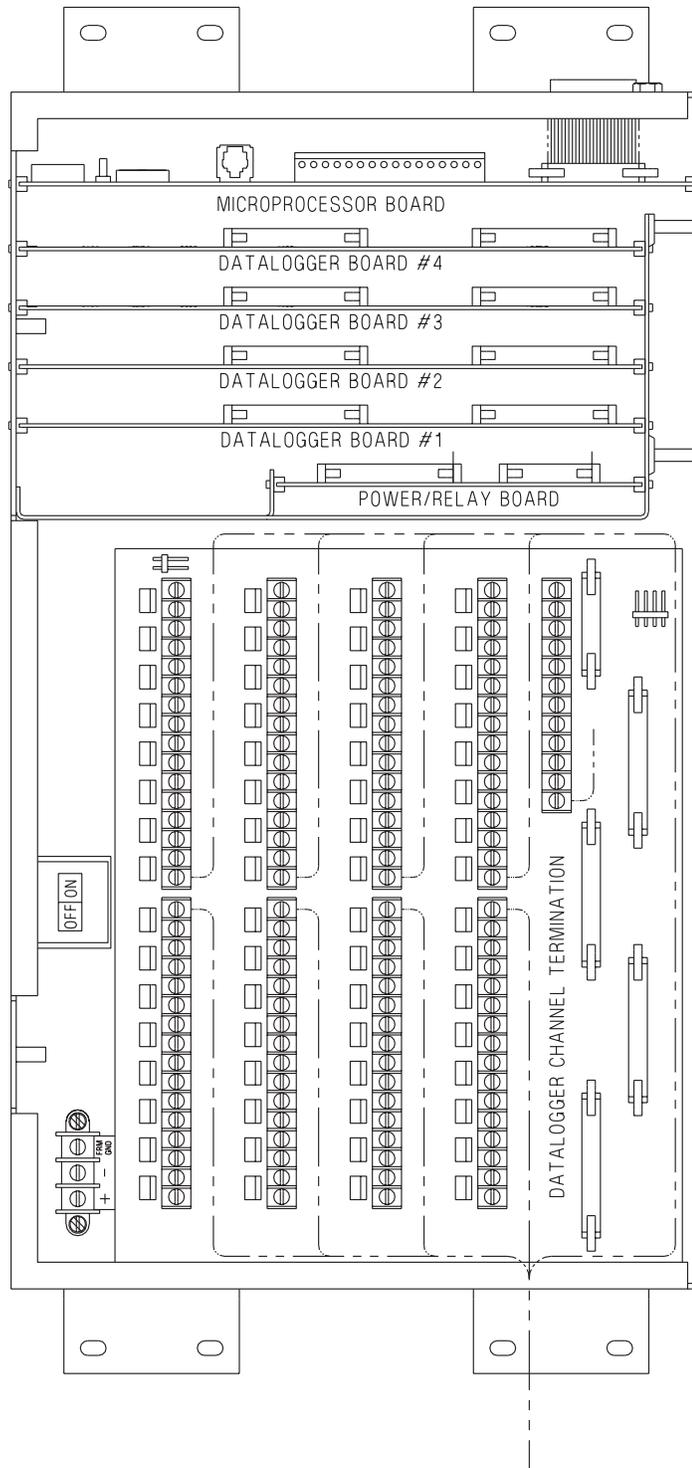
Figure 1-2: Lineage® 2000 OMNIpulse, Inside View
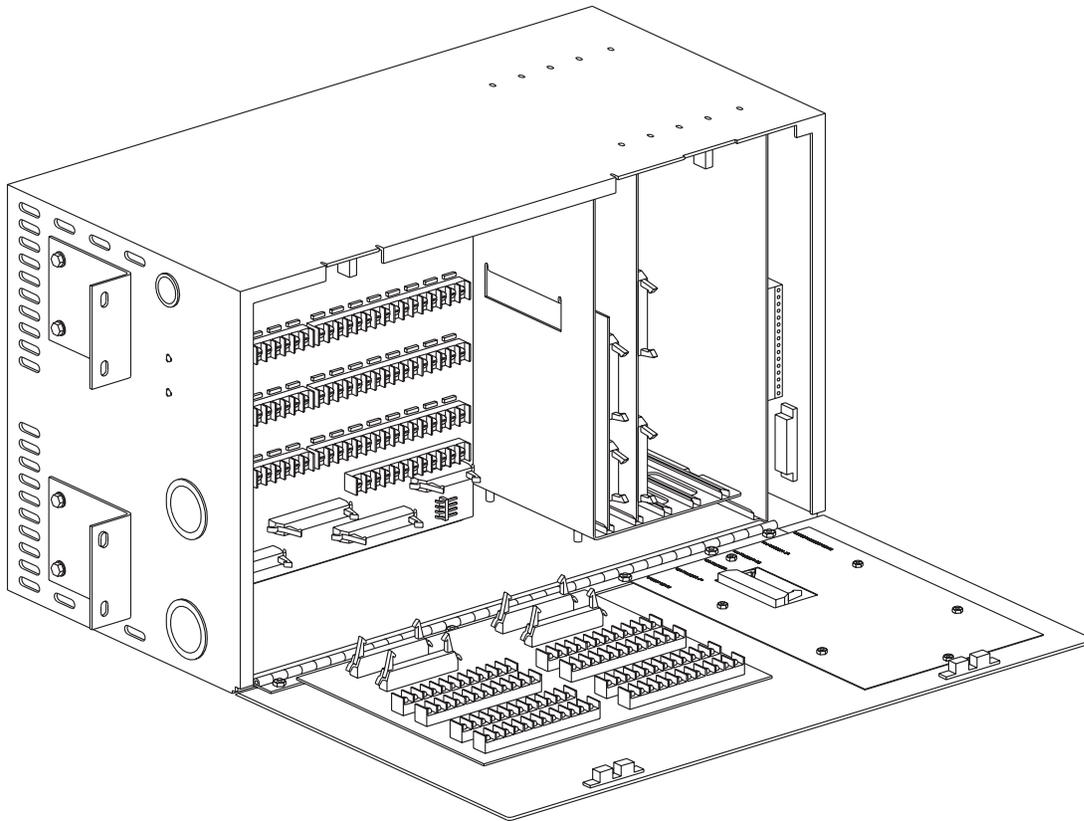
Figure 1-3: Lineage® 2000 OMNIpulse, View With Front Cover Open

About This Manual

This first Section introduces you to OMNIpulse and lists what you need to use it. For more specific information:

- Section 2 provides the system specifications and product descriptions for each of the OMNIpulse components.

- Section 3 is the installation and configuration section of this manual. It describes how to set up your OMNIpulse system and provides guidelines and procedures for installation.

- Section 4 is the regular User's Guide section of this manual. It provides information for personnel responsible for the daily operation and monitoring of OMNIpulse system. Information in this section includes how to log into a system both locally and remotely as well as an overview of the User's menu structure. All features available to the regular User are also provided to the Super-User.

- Section 5 is the Super-User's Guide section. It provides information for users whose duties include the administration and monitoring of OMNIpulse systems. Information in this section includes how to log in as a Super-User both locally and remotely, as well as how to administer all configurable items. Also included is an overview of the Super-User's menu structure.

- Section 6 describes the Voice Response feature. **Note: OMNIpulse units manufactured and shipped before April 1, 1999 included a Voice Response function, allowing users to communicate with OMNIpulse from any Touch-Tone™ telephone. Voice Response is no longer provided on units shipped since April 1, 1999.**

- Section 7 provides application notes. These notes contain typical connection diagrams and suggested methods of using the OMNIpulse.

- The appendices provide detailed information on several of the features including statistics algorithms, dial-out on alarm algorithms, program line logic explanations, TL1 command interface, etc.

Throughout the remainder of this manual, the following conventions are used:

- Boxed NOTE messages are cautions to the user that the action taken may cause a loss of information but is otherwise not harmful to the system.

- Boxed CAUTION messages inform the user of potential safety hazards, preventive measures, or actions that may damage the OMNIpulse system.

- The symbol [†] denotes menu items that are optionally displayed or configurable, based on the physical configuration of the OMNIpulse system. Control relays are one such example.

Do You Have What You Need To Get Started?

The following minimum system equipment is required for installation:

- OMNIpulse Unit (standard unit is configured with Microprocessor Board, one Datalogger Board, Power/Alarm Relay Board, and Termination Boards)

- Additional Datalogger Boards (if required)

- Current limiting resistor assemblies

- A telephone connection for remote data and/or voice communications with OMNIpulse

  Note: OMNIpulse units manufactured and shipped before April 1, 1999 included a Voice Response function, allowing users to communicate with OMNIpulse from any Touch-Tone™ telephone. This feature is described in Section 6 of this manual. Voice Response is no longer provided on new units.

The following additional equipment is recommended for use with your OMNIpulse system:

- Terminal for local access: OMNIpulse supports the AT&T/Teletype 4425, 5410, 5420, and 5425, and AT&T 710, 610 and 615 terminals. Also supported are the DEC VT100 and compatible terminals and ANSI compatible terminals.

- Printer for local printing: OMNIpulse supports a serial printer at 1200 baud for printing new alarm events.

- Remote Modem: OMNIpulse may be used with a modem at a remote location for calling in the system (1200/2400 baud), and for receiving dial-out on alarm and periodic

status dial-out reports (300/1200/2400 baud). A Lucent Technologies 4024 or Hayes compatible modem is recommended.

- Remote Printer and Modem: OMNIpulse may be used with a serial printer connected to a modem at a remote location for the transmission of alarm occurrences or daily reports.

Installation Overview

Installing and preparing an OMNIpulse unit for operation consists of several steps which are outlined below. Details are presented in Section 3.

Step	Purpose
Mount Unit	Provide a secure mechanical installation
Set-up Microprocessor Board	Enable/disable control relays
	Choose local terminal or printer operation
	Install memory back-up battery
	Connect telephone line
Set-up Datalogger Board	Select proper voltage
	Install optional Datalogger Boards
Field Wiring Unit Power	Connect input power
Datalogger Termination	Wire channels to external equipment Board
	Set individual channels as analog or binary
Control Relay	Wire control relays to external equipment Termination Board
Power On	Turn the unit on
X.25/TL1 Equipment Setup and Installation	TL1 Installation

The OMNIpulse unit can then be software configured and customized as required, via either the local terminal or a remote terminal. This configuration is detailed in Section 5.

Before Proceeding

Before doing anything else:

1. Read each section of this manual carefully. Each section has been organized to provide specific information about the installation, usage and administration of the OMNIpulse Monitoring and Control system.

2. Fill out and send in your product registration card. Once you are registered as an OMNIpulse owner, you will receive our total product support.

3. Know your products. This manual assumes you know how to use and/or configure a terminal or printer for local use and a modem for remote use. If you're new to these types of products, or you need a refresher, see your product owner's guide before proceeding.

System Overview

The Lucent Technologies OMNIpulse is a general purpose data acquisition, monitoring and control system with the growth capabilities to handle both large and small system needs. It is accessed from virtually any computer terminal using a standard RS-232 connector or a modem and telephone line.

In addition to data acquisition, the OMNIpulse system is capable of providing control functions through Form C control relays on the Datalogger Board(s). Control relays may be disabled in hardware, if desired.

The OMNIpulse system will monitor all types of equipment regardless of vintage or manufacturer.

System Control

The heart of the OMNIpulse system is a microprocessor that manages the collection and processing of data. For a fully configured unit, each channel is sampled approximately once every 10 seconds in a round-robin fashion. (For some configurations, higher sampling rates are possible. See Appendix K.) Each measurement is compared to the alarm limits for that channel and used to update the internally stored statistics. If an alarm condition exists, the specified major, minor or auxiliary alarm relay is operated for the duration the alarm condition exists. The Microprocessor Board keeps an extensive history of the time of occurrence, retirement, and length (in some cases) of all data channel alarms, control relays states, login sessions, visual indicator states, and even a set of user-defined alarm events. These same data readings and histories may be sent automatically to a remote user with the periodic dial-out feature.

The Microprocessor Board also provides the local and remote interfaces. Locally, a user may access OMNIpulse through a local terminal port. Remotely, a user has access to OMNIpulse over the telephone network either by data communications via a modem and terminal or through the use of a standard Touch-Tone telephone via the voice response capabilities of OMNIpulse. (**Voice Response is available only on units shipped prior to April 1, 1999.**) Both local and remote users may access OMNIpulse simultaneously.

Datalogger Channels   The OMNIpulse unit is expandable in increments of 16 datalogger channels by adding additional Datalogger Boards, for a total of 64 channels within one unit. Each datalogger channel can measure ac and dc voltages in ranges of 150 mV (dc only), 6 V, 60 V and 150 V, all with an accuracy of 0.1 percent of the reading for dc measurements and 0.7 percent for an ac measurement. Each datalogger channel is differential (two wire) and is isolated both from other channels and from ground. The wiring is connected to barrier strip terminal blocks on the Datalogger Channel Termination Board, which is located in a separate compartment from the electronic circuitry. For safety, all the datalogger channel leads must have current limiting resistors at the source to limit the current in the event of shorts. Current limiting modules are provided to limit the current from any of the two wires in the channel to less than 5 mA when the input voltage is less than +/-150 VAC or VDC across the wires or from any wire to ground (in accordance with Table 725-31 [a] and [b] of the National Electrical Code [NEC]). The ac output is Class 2 only if the circuit measured has acceptable isolation in accordance with the NEC (Tables 725-31 [a] and [b], Note 1).

These same datalogger channels may be used as binary sense channels to sense the presence or absence of a contact closure, such as the alarm relay contacts in a battery plant controller or other equipment. Any channel termination pair may be configured easily for binary use by connecting a jumper on the Datalogger Channel Termination Board and connecting a single pair of wires directly to an isolated set of contacts on the equipment to be monitored, eliminating the need for current limiting resistor assemblies inside the OMNIpulse unit.

Datalogger channel alarms may be configured via software to set one of three system relays to the alarm state.

Alarm Outputs   The three programmable alarm outputs are major alarm, minor alarm, and auxiliary alarm. For flexibility, these alarm outputs are provided as Form C contacts (Normally Open and Normally Closed contacts). The three alarm outputs can be programmed individually to be activated when any data channel reading goes beyond a user-specified threshold, when any data channel monitoring a contact closure/opening senses a change to the alarm state, or any user-defined alarm becomes active.

A fourth alarm output, system fault alarm, indicates a major internal fault, or improper software execution. The detection of

an internal fault will cause the system fault alarm to be activated, but the unit will continue normal operation as much as possible given the fault condition. In the unlikely event of improper software execution or microprocessor failure, the OMNIpulse unit will light all visual indicators on the Display Panel, and place all four Form C alarms contacts in their alarm state. Visual indicators on the Display Panel show the state of the four alarms.

Control Relays The OMNIpulse Datalogger Boards provide eight Form C control relays per board. These control relays are programmable to turn on/off based on any channel alarm, combination of channel alarms, system alarms and/or time events. If control relay capability is not desired, a DIP switch on the Microprocessor Board will disable the control relays and attempting to access the control relay software menus will result in the message Control Relays not installed or disabled being displayed. In the unlikely event of improper software execution or microprocessor failure, the OMNIpulse unit will latch all control relays in their last on/off state at the time of the failure.

Alarm Cut-Off An Alarm Cut-Off (ACO) switch on the Display Panel allows the user to temporarily de-activate alarm relays and/or control relays. This is useful for silencing local audible alarms while maintenance work is in progress. The choice of which alarm/control relays are de-activated is programmable, with the default of none being affected by ACO. An ACO time-out feature is included to remove the ACO automatically, setting the relays back to their active state after a programmable time period.

Visual Indicators Each OMNIpulse unit has a series of system status and alarm indicators and an additional eight user-programmable visual indicators for custom use. These additional visual indicators are programmable to turn on/off based on any channel alarm, combination of channel alarms, system alarms and/or time events. These indicators are Light Emitting Diodes (LEDs) to avoid the maintenance associated with filament lamps.

Communications Ports The OMNIpulse units all come equipped with four serial communications ports. Two of the ports are RS-232 compatible and are available for use to locally access the OMNIpulse system via a terminal or printer, and to pass-through to other Lineage®

2000 equipment such as MCS, XCS, ECS, and RAS. The third port is an RS-485 port for TL1/X.25 communication. The fourth port, a built-in modem, is available on the Microprocessor Board for 300/1200/2400 baud modem access to the OMNIpulse system.

Security Feature   The system has a two-level login security feature. The two levels are read-only and read/write. By logging in with a User password, the read-only user may read system status and information, but may not change information in the system other than the general notepad. A read-only user may switch to the read/write mode by entering a Super-User password and gain access to Super-User functions including clearing statistics, and changing configurations, alarm levels, date and time. This two-level security feature allows the plant engineer to control and configure the unit, while operations personnel have access only to stored information.

Two distinct system warnings will be issued in the event of unauthorized attempts to access the OMNIpulse system. The warning ****Excessive unsuccessful login attempts were made:** will be issued after six consecutive invalid User passwords are entered, while the warning ****Excessive unsuccessful Super-User login attempts were made:** will be issued after four consecutive invalid Super-User passwords are entered.

Additional security is provided through a callback login scheme, where pre-assigned numbers are called back after selection by a user. The chance of unauthorized access is minimized through the physical security of pre-assigned calling stations.

Input Power   The OMNIpulse units get their power from a 24-volt or 48-volt dc source. Either polarity input is accommodated and may be altered in the field. The real-time clock and all system configuration, system passwords, histories and statistics are battery-backed so loss of primary power has minimal effect on the system.

Mounting Considerations   The OMNIpulse unit can be either frame or wall mounted so it can be located conveniently near the points to be monitored. The unit provides front access to all internal circuit packs and termination panels for easy maintenance and system wiring.

System Growth   The basic OMNIpulse unit has a fully-loaded capacity of 64 datalogger channels and 32 control relays. When the monitoring and/or control needs grow beyond this limit, it is possible to grow the OMNIpulse system by the addition of another OMNIpulse unit using the RS-485 interface.

Another growth option is the traditional pass-through mode using a standard RS-232 interface. In this mode, each unit is an independent monitoring station, each with its own configuration and status kept within the unit itself. In this case, the user must log in to the first unit, and pass-through and log in to each subsequent unit. This is provided to support older AT&T monitoring equipment.

Customer Training

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

Customer Service

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

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

Technical Support

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

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

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

Product Repair and Return

Repair and return service is provided for Lucent Technologies customers around the world.

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

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

Warranty Service

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

On-Line Power Systems Product Manuals

For Lucent Technologies users logging in from inside the corporate firewall, the address of the "Power Systems On-Line Product Manuals" page is *http://www.cic.lucent.com/lineage.html*.

For customers logging in from outside the firewall, the address is *http://www.lucent8.com/lineage.html*. The annual subscription fee for access to this site is $25. To obtain a password, follow the instructions on-line or call 1-888-Lucent8 (1-888-582-3688). When prompted for an order number, enter or say "167-790-010."

2   Product Description

OMNIpulse™
Unit
Specifications

Dimensions	Width: 20.31 inches (516 mm) Depth: 10.12 inches (257 mm) Height: 11.81 inches (300 mm)
Weight	20 pounds (9.09 kilograms)
Operating Voltage	+/-40.0 to +/-60.0 volts dc (+/-48 volts dc nominal, J85576A1 List 1) +/-20.0 to +/-30.0 volts dc (+/-24 volts dc nominal, J85576A1 List 2)
Input Power	50.0 watts maximum
Supported Terminals	AT&T/Teletype 4245, 4410, 5410, 5420, 5425 AT&T 710, 610, 615 DEC VT100 or compatibles American National Standards Institute (ANSI) compatibles
Operating Temperature	32 to 122°F (0 to 50°C)
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°F (0.656°C) per 1000 feet (304 meters) above 5000 feet (1524 meters)
Humidity	10% to 95% noncondensing
Electrostatic Discharge	IEC 801-2 Level 5 (15 kV) at 40% relative humidity

Radiated and Conducted Emissions	FCC Level A
Electromagnetic Immunity	10 V/m over a range of 20 to 2000 MHz
Safety Agency Approvals	Listed by Underwriters Laboratories to UL 1244. (Telephone communications tested to UL 1459) Certification requirements: UL listed for continuous operation at 5°C to 40°C, up to 2200 meters (7218 feet) and relative humidity up to 80% (with wet bulb temperature not to exceed 27°C), installed in a controlled environment and in a restricted access area in accordance with Articles 110-16, 110-17 and 110-18 of the National Electric Code (areas include but are not limited to dedicated equipment rooms or equipment closets)

Microprocessor Board Specifications

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	RJ11 4-wire telephone jack
Pass-Through Port	RS-232 serial port: 300, 1200, 2400, 4800, 9600 bps
TL1 Port	RS-485 serial port with an operating range of 4000 feet (1212 meters): 300, 600, 1200, 2400, 4800, 9600 bps
Modem	On-Board: 300 FSK (dial-out only), 1200 DPSK, 2400 QAM bps (full duplex)
Real-Time Clock	Motorola low-power clock accurate to 1 minute per month
Replacement Battery	Panasonic BR2032. Provides a minimum of 96 hours of memory backup when primary power is off

Datalogger Specifications

Datalogger Inputs:	Total of 16 per board, each usable for binary or analog inputs
	Relay Scanner
	Floating Differential inputs
	True RMS ac readings
Maximum Scan Rate for each channel:	Once every 10 seconds nominal. (For faster scan rate, refer to Appendix K.)
Maximum Input Voltage:	150V ac or dc in common mode or differential mode

:

DC Accuracy				
Range	Max. Input Magnitude[2]	Resolution	Reading Accuracy[1]	Full Scale Accuracy
150mV	150mV	7.5μV	+/-(0.1% Reading + 3 digits)	+/-0.19mV
6V	6V	0.3mV	+ /-(0.1% Reading + 3 digits)	+/-0.0073V
60V	60V	3mV	+/-(0.1% Reading + 3 digits)	+/-0.073V
150V	150V	7.5mV	+/- (0.1% Reading + 3 digits)	+/-0.19V

(1) Requires one Current Limiting Resistor Assembly (Comcode 846679165) per channel.
   1 digit = 0.007% of full scale.

(2) Across the channel or from any channel input to ground. (Voltages to ground may be higher than the voltage across the channel. If the voltage to ground exceeds 150VAC or VDC, the current limiter module will not have a NEC Class 2 output.)

:

AC Accuracy				
Range	Max. Input Magnitude[2]	Resolution	Reading Accuracy[1]	Full Scale Accuracy[3]
6V	6V	0.3mV	+/-(0.7% Reading + 5 digits)	+/-0.0425V
60V	60V	3mV	+/-(0.7% Reading + 5 digits)	+/-0.425V
150V	150V	7.5mV	+/- (0.7% Reading + 5 digits)	+/-1.1 V

(1) Requires one Current Limiting Resistor Assembly (Comcode 846679165) per channel. Accuracy is for sinusoidal input voltage.

(2) Across the channel or from any channel input to ground. (Voltages to ground may be higher than the voltage across the channel. If the voltage to ground exceeds 150VAC or VDC, the current limiter module will not have a NEC Class 2 output.)

(3) At 400 Hz, accuracy of the 6V range reduces to +/- 10%. All other ranges are reduced to +/- 1.7% plus 5 digits of reading. AC accuracy is not guaranteed for the lower 5% of range.

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

Feature Summaries

Microprocessor Board Feature Summary

The OMNIpulse Microprocessor Board provides the basic monitoring, controlling, communications, data processing and reporting capabilities of the OMNIpulse system. Its features include:

- A well-engineered user interface that supports most common terminal types and is totally menu-driven with no commands to remember.

- 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 300/1200/2400 bps modem with an RJ11 telephone jack to facilitate remote monitoring and control. 300 bps is for dial-out only.

- Supports 300/1200/2400/4800/9600 bps pass-through communications mode that permits access to other Lucent Technologies Lineage® 2000 equipment via the RS-232 pass-through port.

- Supports Transaction Language (TL1) command interface with centralized monitoring systems via built-in RS-485 port at 300 to 9600 bps. Refer to Section 3 and Appendix M.

- Sixteen-bit processing power and memory to support both remote and local terminals simultaneously.

- Supports up to 64 datalogger channels and 32 control relays on four Datalogger Boards.

- Provides custom selection of data channels and control relays as specialized viewing groups, facilitating easy access to channel readings, history, and statistics, and control relay status and history.

- Supports up to 32 derived channels which provide arithmetic operations on datalogger channel readings.

- Collects trend statistics on up to eight selectable datalogger and/or derived channels on an hourly, daily, and monthly basis.

- Collects basic hourly average, maximum, and minimum statistics on all available datalogger channels and derived channels.

- Collects busy hour statistics on up to four selectable datalogger and/or derived channels for any programmable 24 hour period.

- Provides programmable Trace functions on up to four datalogger or derived channels for up to 120 readings each, with programmable sample rate ranging from one second to 24 hours.

- Provides up to 16 user-defined alarms which can combine various channel alarm conditions, control relay states, and time events to generate custom alarms.

- Provides extensive history information on:

  - System   32 events

  - Derived Channel Alarms   256 events

  - User-Defined Alarms   128 events

  - Login History   32 events

  - Datalogger Channel Alarms   512 events

  - Control Relay History   256 events

  - Visual Indicator History   64 events

  - Alarm Relay History   32 events

- Provides grouping/ordering functions for easy review and analysis of history information.

- Offers extensive alarm monitoring and reporting capability through:

  - Programmable dial-out on alarm(s) feature with user assignable delays and telephone numbers.

  - Persistent dial-out on alarm(s) (nag) until alarm retires, with programmable delay between persistent dial-outs.

  - Periodic status dial-out feature.

  - Pager notification with separate system pager identification number.

- Provides reports with periodic status dial-out feature to send all actual alarms and warnings and any of the following:

  - All histories

  - All datalogger channel readings

  - All derived channel readings

  - All datalogger and derived channel statistics

- Provides user programmable system identification capability to facilitate remote monitoring of multiple systems from a central location.

- Provides ability to backup and restore system configuration using XMODEM protocol.

- Has built-in unit self-diagnostics.

- Provides inventory pages for keeping track of:

- ■ OMNIpulse circuit pack information

- ■ OMNIpulse transducer information

- • Maintenance reminders provided to display messages on specified dates.

- • User readable/writable notepad provided for messages of interest to all.

- • Protected notepad provided for Super-User messages.

Voice Response Feature Summary

Note: OMNIpulse units manufactured and shipped before April 1, 1999 included a Voice Response function, allowing users to communicate with OMNIpulse from any Touch-Tone™ telephone. This feature is described in Section 6 of this manual. Voice Response is no longer provided on units shipped since April 1, 1999.

- • Voice response provides high-quality voice reporting of alarm and status information via Dial-Out on Alarm and Periodic Status Dial-Out to a telephone or answering machine.

- • Voice response allows access to OMNIpulse functions from a remote location through any Touch-Tone telephone when a data terminal is not available.

Datalogger Feature Summary

The OMNIpulse Datalogger Board allows the OMNIpulse to monitor data channels and provides the ability to energize relays based on system alarm status or conditional logic. The Datalogger Board is directly controlled by the Microprocessor Board. Its features include:

- • A high precision, data monitoring board that can be installed or replaced without disruption of service to the rest of the OMNIpulse system.

- • Sixteen data monitoring channels per board with multiple range selection (150 mV, 6V, 60V, 150 Volts) and power type selection (+dc, -dc, ac) or contact closure monitoring (CC or CO).

- • Eight Form C control relay contacts per board programmable to be activated/de-activated when other system parameters change state, such as alarm

occurrence/retirement, time events occurring, and other control relays changing state.

- User programmable scale factor, transducer offset, and alarm thresholding on datalogger channels.

- Datalogger History information provided by the Microprocessor Board.

- History provided on:

  - Datalogger Alarms512 events

  - Control Relay States256 events

- Viewing datalogger channel measurements and relay status available to both local and remote terminals simultaneously.

Power and Alarm Relay Board Feature Summary

- Provides a Form C system relay to indicate a system fault. User may connect to these relay contacts via the Datalogger Channel Termination Board.

- Provides three Form C alarm relays that are programmable via software to activate/de-activate based on datalogger channel, derived channel, and/or user-defined alarm status. User may connect to these relay contacts via the Datalogger Channel Termination Board.

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

Display Panel Feature Summary

The right side of the OMNIpulse door provides a display panel for a visual picture of basic system operation. Also provided on the display panel are two switches for the Alarm Cut-Off feature and to test the visual indicators. See Figure 2-1 for the location of each feature.

4. Unit status has a green visual indicator lit during normal operation, or a red indicator lit in the unlikely event of a fault.

5. A red visual indicator lights when the Major alarm relay is in its alarm state.

6. A yellow visual indicator lights when the Minor alarm relay is in its alarm state.

7. A yellow visual indicator lights when the Auxiliary alarm relay is in its alarm state. A slide-out card is provided to note the user-specified meaning of this alarm.

8. A yellow visual indicator lights if a communication link problem is detected in the RS-485 link.

9. A yellow visual indicator lights when the memory backup battery on the Microprocessor Board requires replacement.

10. A yellow visual indicator lights when OMNIpulse is communicating with a remote user (dial-out or dial-in) over the telephone link of the Microprocessor Board.

11. Eight programmable visual indicators are lit when the corresponding user-provided logic equation becomes true. A slide-out card is provided to note the user-specified meaning of each indicator. Each indicator may be programmed as either red or yellow to match the severity of the event it is signaling.

12. An LED test switch is available for on-site testing of visual indicators. Pressing this switch will cycle all indicators on for several seconds, then off for several seconds. The indicators will return to normal operation after this test. The alarm relay states will not be affected by this test.

13. An Alarm Cut-Off (ACO) switch is available with a visual status indicator to show when it is activated. The ACO switch is used for de-energizing system alarm relays and/or control relays. The user configures which relays should de-energize with ACO, and the ACO time-out period. See Appendix H for further information on the ACO feature.
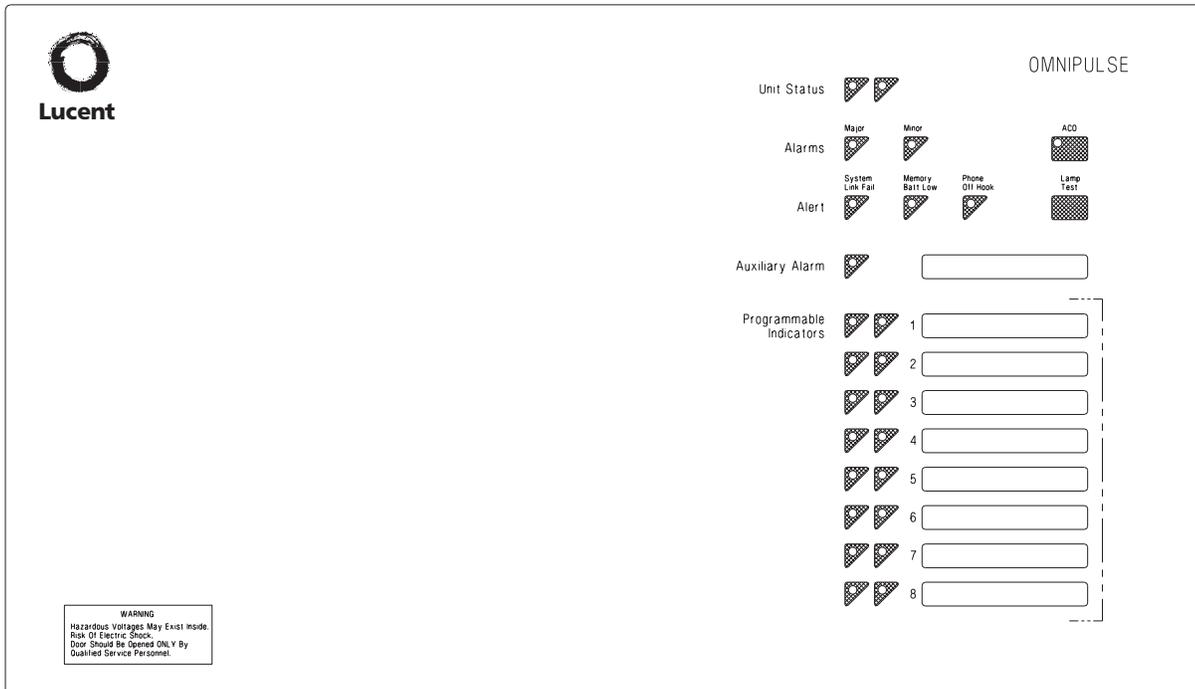
Figure 2-1: Display Panel Features

3   Setup and Installation

OMNIpulse™
Unit Setup

Warning

Hazardous voltages may be present inside the unit which could cause shock or serious injury. The OMNIpulse unit is to be installed in restricted access areas only. These include but are not limited to dedicated equipment rooms or equipment closets. The unit is to be installed or serviced only by qualified personnel.

Tools Required for Installation:

- 1 ESD wrist strap

- 1 socket set

- 1 small needle-nose pliers

- 1 small flat-blade screwdriver

- 1 small Phillips screwdriver

- wall mounting hardware, if applicable

The OMNIpulse unit should be installed as follows:

1. Open the shipping container and inspect the contents for damage.

   Contents

   - OMNIpulse unit

   - Mounting brackets (total of 8)

   - Mounting hardware

   - Terminal spade lugs

   - Jumpers for the Datalogger Termination board

- Current Limiting Resistor Assemblies

- Memory Backup Battery for the Microprocessor board

2. Verify that the input voltage shown on the label on the side of the unit agrees with the input voltage available for the unit. If the voltage is incorrect, do not install the unit. The input voltage of the unit is not field-configurable. The unit must be returned and one of the proper input voltage rating acquired.

3. Determine the mounting location for the unit. The mounting brackets are to be located in one of three locations depending on the type of frame used or if it is to be wall mounted. (See assembly drawing J85576A-1, or Figure 1-1B for details.)

4. Mount brackets to unit using hardware provided.

5. Mounting

   a. For wall mounting:

      (1) Drill mounting holes into wall as shown in Figure 1-1B or the assembly drawing. Depending on wall material, anchors may be required. (Brackets will accommodate 3/8" diameter bolt with 1/2" diameter head, maximum.)

      (2) Start screws into holes.

      (3) Hang unit on screws and tighten.

   b. For rack (frame) mounting:

      (1) Position the unit in the rack and align the appropriate mounting holes.

      (2) Tighten all mounting hardware.

The OMNIpulse unit is furnished with all necessary circuit packs. Only additional Datalogger Boards need to be installed. Minimal setup is required on packs as described in the paragraphs that follow.

Caution

> Always use an ESD wrist strap or similar grounding device when handling any OMNIpulse circuit packs. Failure to do so may cause damage to the circuit packs. A jack is provided on the right side of each OMNIpulse unit for this purpose.

OMNIpulse Microprocessor Board Configuration

Tools Required for Installation:

•   1 ESD wrist strap

•   1 small needle-nose pliers

•   1 small screwdriver

DIP Switch Settings

DIP switch SW202 on the Microprocessor Board must be set for specific option operation. Switch configuration is described below. Refer to Figure 3-1 for the location of SW202. Open and closed switch positions are also shown in Figure 3-1.

Table 3-A: SW202 DIP Switch Settings

Position	Function	Open	Closed
1	Remote Super-User Login	Disabled	Enabled
2	TL1 Command Interface	Disabled	Enabled
3	Reserved		
4	Control Relay Functions	Disabled	Enabled
5	Reserved		
6	Reserved		
7	Reserved		
8	Local Terminal/Printer	Terminal	Printer

Memory Battery Installation and Replacement

Note

> During initial installation of the OMNIpulse unit, do not install the memory battery until you are ready to turn the unit on. The battery begins providing backup power as soon as it is installed, and if primary power is not applied for a long period during installation, the battery's reserve will be used up.

Warning

Danger of explosion or fire if lithium battery is incorrectly replaced. Replace only with Panasonic BR2032 or an equivalent recommended by the manufacturer. Spare batteries may be ordered from Lucent Technologies from J85576A-1. Lithium batteries may be regulated wastes (due to reactivity) when disposed of. Always discard used batteries according to applicable local, state and federal regulations.

Notice

The battery manufacturer, Panasonic, has provided the following information regarding its product.

"Caution: Risk Of Fire, Explosion, And Burns. Do Not Recharge, Disassemble, Heat Above 100°C (212°F) Or Incinerate. Dispose Of Used Batteries Promptly. Keep Away From Children."

The backup battery is shipped with the OMNIpulse unit. Refer to Figure 3-1 for the location of the memory backup battery and the battery holder. When inserting the battery, make certain that the + and - polarity markings on the battery are aligned correctly with those marked on the battery holder before inserting. Insert the battery in the proper orientation under the metal spring in the holder. Take care not to drop the battery into the unit.

The battery will provide memory backup for a minimum of 96 hours of loss of primary power. The front panel Memory Battery Low visual indicator will light when the unit is operating from primary power and the battery is near the end of its usable life. Removing the battery from its holder may require the use of needle-nose pliers. Replace battery only with a Panasonic part number BR2032.

Caution

DO NOT unplug the Microprocessor Board when replacing the memory backup battery. If the board is powered down or unplugged when replacing the memory backup battery, history and configuration information will be lost.

In the event software has to be updated, remove the memory backup battery before replacing the EPROM on the Microprocessor Board. The battery shall be reinstalled before powering up the board. The history and configuration information will be lost.
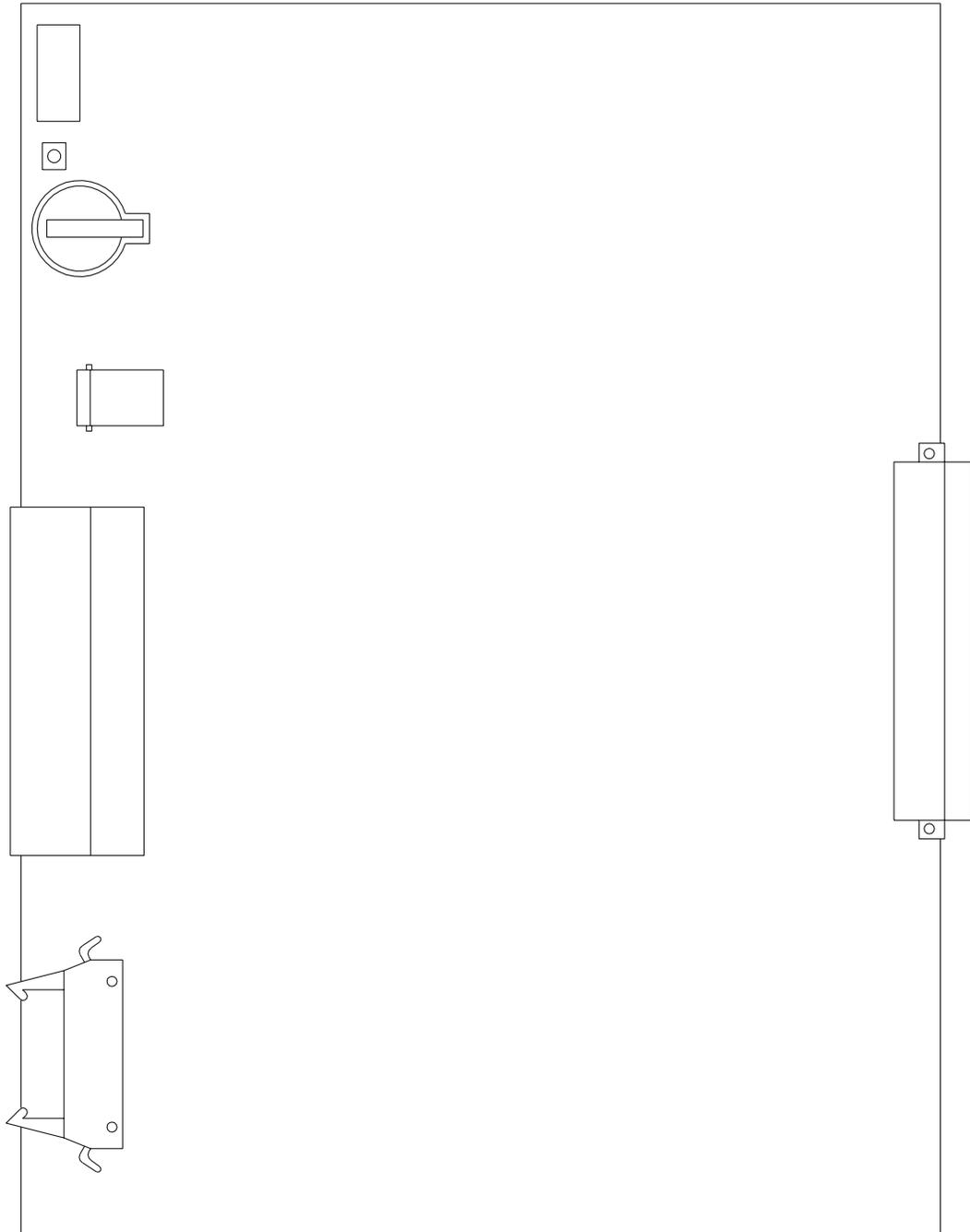
Figure 3-1: OMNIpulse Microprocessor Board

Microprocessor Board Field Wiring Instructions

Field wiring associated with the Microprocessor Board is connected to terminal block TB201 (see Figure 3-1). This terminal block is a 16-position separable connector that accepts the stripped end of a wire in a screw-clamp type connection. Maximum wire size should be 22 AWG wire, strip ends 0.5 inch. Torque screws to 5 in-lbs. To ease connection, remove the terminal block from the circuit board by pulling it toward the front edge of the board while keeping pressure applied to the board to keep it from pulling out of the backplane connector. After making connections, simply plug it back into the board. This is only to ease wiring, and connections may also be made with the terminal block attached to the board. To connect the wire, loosen the screw associated with the desired terminal, insert the stripped end of the wire into the opening beside the screw, tighten the screw, and test the connection by pulling gently on the wire. Refer to Appendix E for pin assignments. Route the wires through the right-hand side of the unit. All wiring must comply with the National Electrical Code and any local codes.

Remote Modem Connection

The Microprocessor Board is equipped with a standard RJ11 telephone jack (see Figure 3-1). The phone line is to be routed in through the right side of the unit and connected via the jack (J201). All wiring must comply with the National Electrical Code and any local codes.

Local Terminal/Printer Connection

The OMNIpulse unit is equipped with a 25-pin D-sub connector which can be used to connect a local terminal or local printer directly. This connector is located on the right side of the unit (see Figure 3-2). Simply plug the mating connector from the terminal/printer cable into the D-sub connector on the unit and tighten the strain relief screws of the cable connector if applicable. This connector on the unit attaches to the Microprocessor Board via a ribbon cable to P202 on the Microprocessor Board (see Figure 3-1). This cable must be removed on the Microprocessor Board end when removing the board and must be re-connected after the board is installed. All wiring must comply with the National Electrical Code and any local codes.
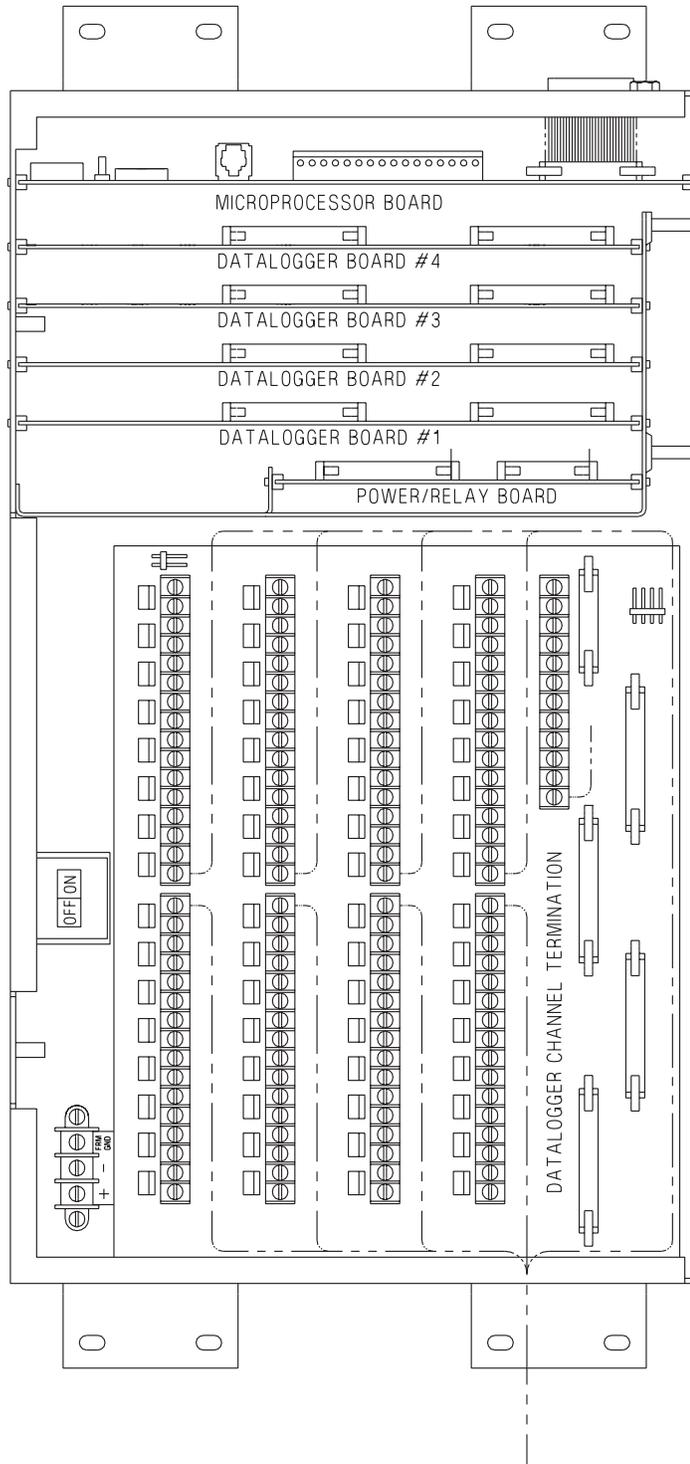
Figure 3-2: Lineage® 2000 OMNIpulse™ Front View with Cover Removed

OMNIpulse Datalogger Board Configuration

Datalogger Preparation   A jumper (P302) is provided for selecting 24- or 48-volt operation (see Figure 3-3 for location). Verify that it is set for the proper operating voltage. Factory-installed boards should be preset for the proper voltage, but the installer should verify the setting.

Additional Datalogger Board Installation   One Datalogger Board is provided with your OMNIpulse unit. Additional boards must be installed in the field. Set operating voltage as described above.

Caution

> Wear a properly connected ESD wrist strap while working.

Installation Procedure

Refer to Figure 3-2 and perform the following:

1. Wearing a properly connected ESD wrist strap, open the front door by pulling at the top edge. The ESD jack is located on the right side of the unit.

2. Identify the slot on the right side of the unit into which the Datalogger Board is to be installed. Move the two ribbon cables associated with it out of the way sufficiently to insert the board. Datalogger Boards should be added from left to right, with the left slot holding the first board shipped with the standard unit, and the right slot holding the last board to be installed in a fully configured unit. Datalogger channel and control relay numbering is fixed for the board slots. Slot 1 has datalogger channels 1-16 and control relays 1-8, slot 2 has datalogger channels 17-32 and control relays 9-16, and so on. Installing boards in other than a left to right sequence will have no adverse effect on unit operation, but gaps will exist in the datalogger channel and control relay numbering. For example, if slots 1 and 3 are populated, datalogger channels 1-16 and 33-48 and control relays 1-8 and 17-24 will be displayed.

3. Insert the Datalogger Board into guides provided. Press firmly to seat the Datalogger Board into the backplane. The front edge of the board should be even with the front edge of the bracket on which it rests.

4. Insert the two ribbon cables associated with the installed board into the two connectors on the board.

5. Identify the group of terminals on the Datalogger Channel Termination Board and Control Relay Termination Board that are associated with the position of the newly installed Datalogger Board, and connect wiring (see "Datalogger Channel Wiring").

6. Repeat steps 2-5 for all Datalogger Boards to be installed.

7. Close the front door by swinging it up and pressing until the latches engage.

Note

> If the Microprocessor Board is powered down when installing a Datalogger Board, history and configuration information will be lost if no memory backup battery is present. Powering down the Microprocessor will result in a Processor Halt and Processor Start entry in the history log.

OMNIpulse Unit Wiring Instructions

Caution

> Turn the power switch off (see Figure 3-2) before wiring input power to the unit. After input power is connected, verify the proper voltage and polarity at TB1 before turning the power switch on.Improper voltage and/or polarity may cause circuit failure.

The remainder of the wiring to the unit is done in the wiring compartment on the left side of the unit.

Input Power Connection

Input power should be connected to terminal block TB1 (see Figure 3-2). Input power and frame ground wires are not provided with the unit. Wire should be a minimum of 20 AWG, and should have UL approved insulation with a voltage rating of at least 250V (wiring insulation type and method of connection to the source must comply with the National Electrical Code and any local codes). Before inserting fuses, ensure that all capacitors have been charged. A capacitor forming tool is recommended for this purpose. Power wiring should be routed

in through the hole in the upper left side of the unit and secured with cable ties for strain relief. Flanged spade lugs (AMP part number 322777) are provided for the input power terminal block. They may be used with wire sizes 18-20 AWG. Use AMP Hand Tool 47386 for crimping on the terminal. Torque screws to 12 in-lbs. A terminal is provided on the input power terminal block to ensure a good connection for frame ground. An alternate location for frame ground wires larger than 18 gauge AWG is available with two 1/4-20 tapped holes, 1 inch spacing. See Figure 1-3.

OMNIpulse Field Wiring   Field wiring associated with the Datalogger Board is connected to two termination boards: the Datalogger Channel Termination Board (mounted inside the left side of the unit) and the Control Relay Termination Board (mounted on the left side of the unit's door). Connections to these boards are made via barrier strip terminal blocks (see Figures 3-4 and 3-5). These are 12- or 16-position terminal blocks with #6-32 screws that accept either flanged spade terminals or ring terminals. A pair of wires (or twisted pair) for each channel to be connected should be routed through one of the openings in the left side of the unit. Shielded cable is typically not required with the OMNIpulse because of the robustness of its monitoring scheme, however studs are provided near the openings for their shield termination if used. Maximum wire size should be 18 AWG wire. Spade lugs (AMP 322777) are provided; crimp using AMP Hand Tool 47386. If other lugs are used, apply only to appropriately sized wires using only the connector manufacturer's recommended tooling. Torque screws to 12 in-lbs. Cabled tie and route wires as shown in Figure 3-2.

DANGER

> Once connections are made to termination boards, hazardous voltages may be present on the terminal blocks. Take care when working inside the wiring compartment. When possible, remove power from a channel when servicing
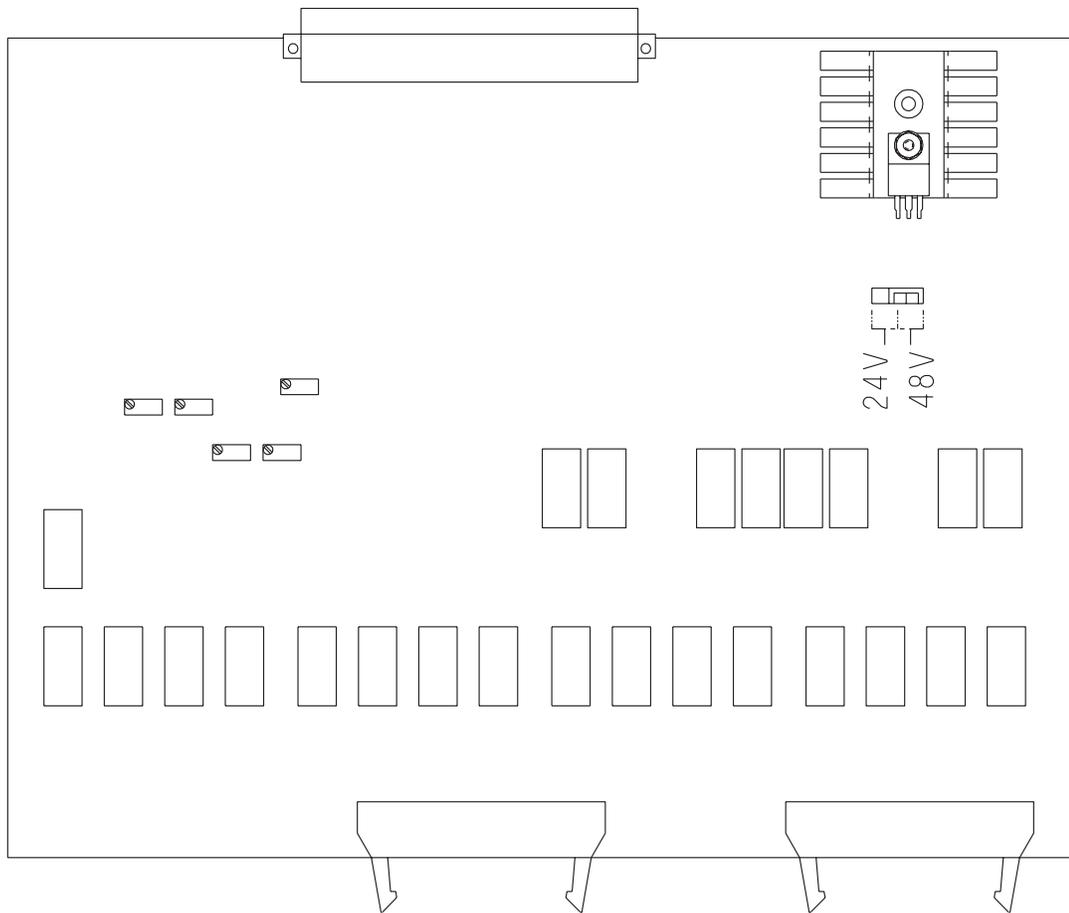
Figure 3-3: OMNIpulse Datalogger Board

Datalogger Channel Wiring

Auto-polarity: The Datalogger Board measurements use auto-polarity in a manner similar to a digital voltmeter. The terminal block inputs on the Datalogger Channel Termination Board have been designated P and N for each channel. When the P terminal is connected to the most positive voltage, the datalogger channel reading will be positive. Likewise, when the P terminal is connected to the most negative voltage, the datalogger channel reading will be negative. This is true regardless of whether the Type is configured as +dc or -dc. When the Type is configured as ac, the readings will always be positive.

Voltage Type: The -dc Type is provided as a convenience when configuring alarm thresholds 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, -48V return to the N terminal and use a -DC Type for a typical datalogger channel 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.

Current limiting resistor assemblies (Comcode 846679165) must be used for all datalogger channel terminations except when monitoring isolated contacts as described in "Control Relay Wiring." **The resistance of the current limiting resistor assembly has been included in the calibration of the Datalogger Boards, and failure to use the assemblies will result in inaccurate datalogger channel readings.**

For safety, all the datalogger channel leads must have current limiting resistors at the source to limit the current in the event of shorts. Current limiting modules are provided to limit the current from any of the two wires in the channel to less than 5 mA when the input voltage is less than +/-150 VAC or VDC across the wires or from any wire to ground (in accordance with Table 725-31[a] and [b] of the National Electrical Code [NEC]). When measuring ac, the output is Class 2 only if the circuit measured has acceptable isolation in accordance with the NEC (Tables 725-31[a] and [b], Note 1). Wiring insulation type and method of connection to the source must comply with the National Electrical Code and any local codes.

DANGER

Inside of current limiting module contains hazardous voltages that could cause shock or serious injury. There are no serviceable parts inside. Even though the output of current limiting modules is considered NEC Class 2, there is still risk of electrical shock.
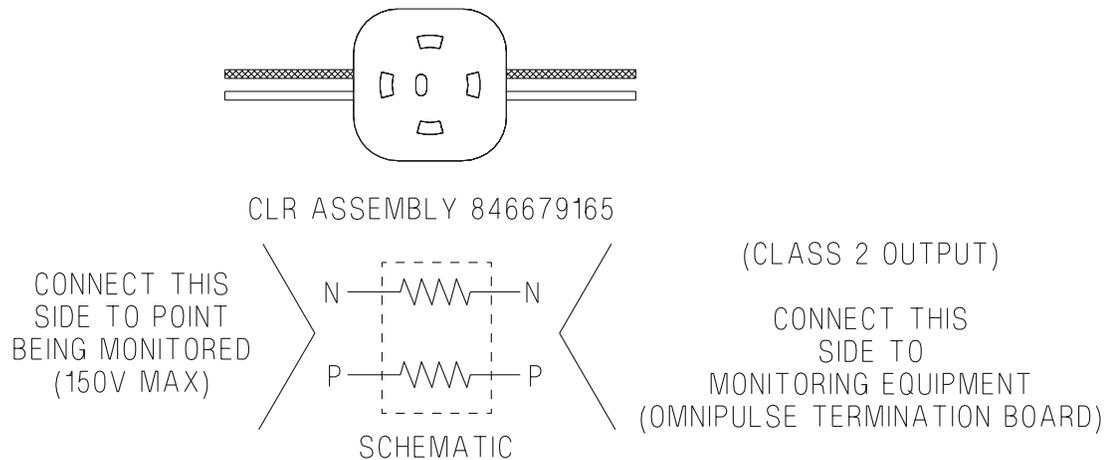
Figure 3-4: Current Limiting Resistor Assembly

Monitoring Isolated Contacts: A jumper on the Datalogger Channel Termination Board is associated with each datalogger channel terminal pair to configure it for use in sensing an isolated contact. Simply placing the jumper on the header directly above a channel connects a 48-volt (nominal) supply across the terminal with built-in current limiting resistors. Do not use any external current limiting resistors (such as Comcode 846679165 or 85366772). These resistors will not allow the monitoring of contact closures to function properly. The channel leads can then be connected to a contact at the equipment end and monitored to sense the state of the contact. Wiring insulation type and method of connection to the source must comply with the National Electrical Code and any local codes.

Note

- When any jumper is present on P501-P564, its corresponding channel (A1-A64) is 48VDC nominal NEC Class 2 output.

- Never apply voltage to a datalogger channel which has been configured with the jumper to sense an isolated contact. Application of voltage may cause invalid readings for that channel.

Control Relay Wiring

Terminals are provided on the Control Relay Termination Board to isolated Form C control relays. These terminations consist of three contacts per relay: NO (normally open), C (common), and

NC (normally closed) with contacts rated at 60VDC and 500mA maximum. The normal state is the de-energized or off state. If a control relay is de-energized, a contact closure will exist between the NC and C poles. Likewise, if a control relay is energized, a contact closure will exist between the NO and C poles. Control relays provide contact closures and opens when user-definable events occur. See Section 5 for configuring relays and Appendix F for program line expressions

System Relay Wiring

Terminals are provided on the Datalogger Channel Termination Board to four Form C relays for system alarms (i.e., SYSTEM, MAJOR, MINOR, and AUX.)
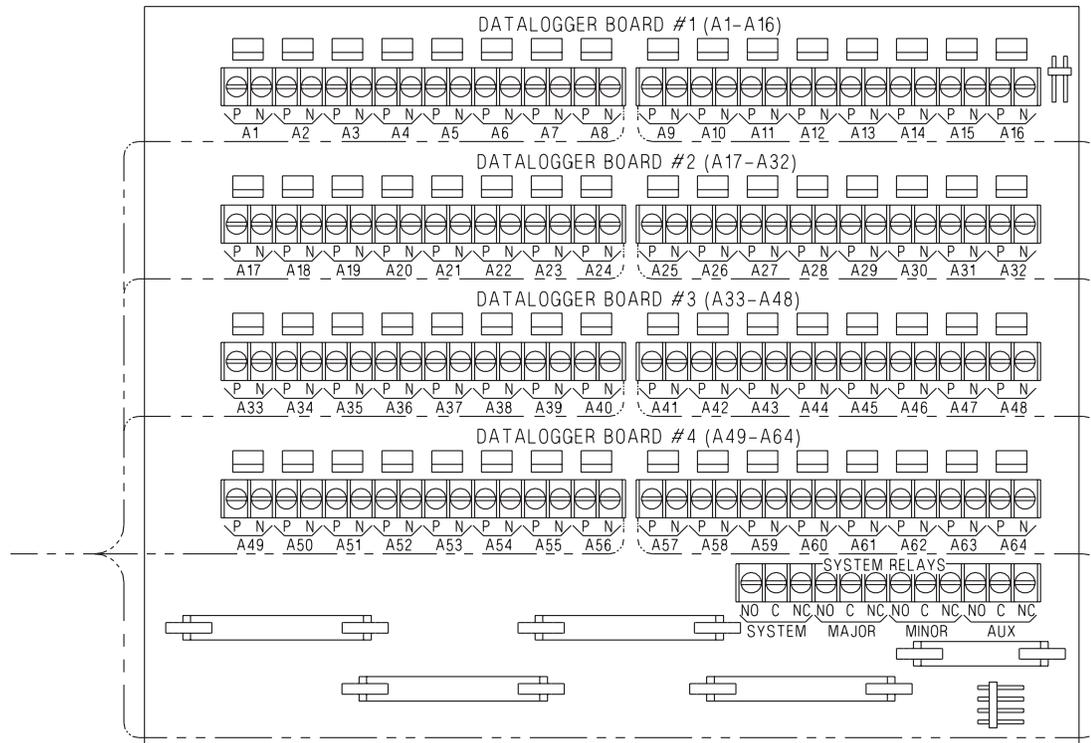
Figure 3-5: OMNIpulse Datalogger Channel Termination Board
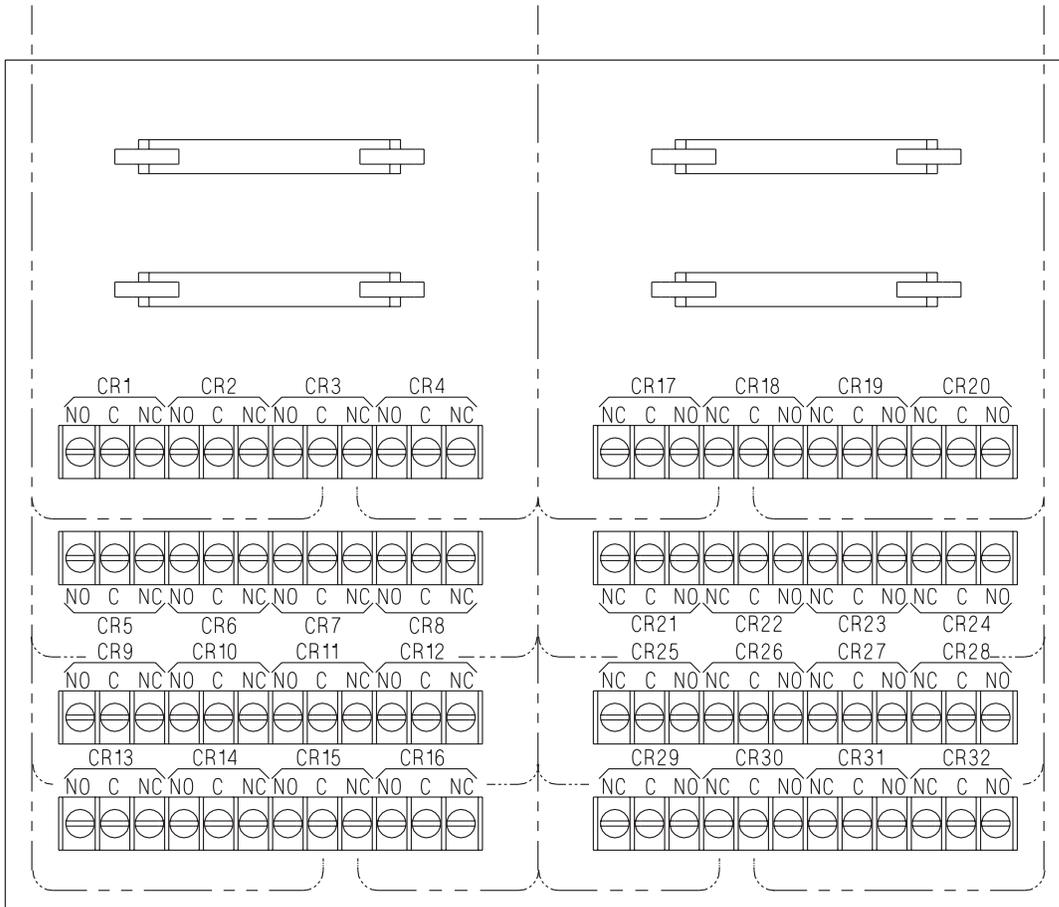
Figure 3-6: Control Relay Termination Board

Alarm Relay Contacts

Four sets of Form C alarm relay contacts are provided for customer use. They may be used to control visual or audible alarms. These terminations consist of three contacts per relay: NO (normally open), C (common), and NC (normally closed). The normal state is the de-energized or alarm state. If an alarm is present, a contact closure will exist between the NC and C poles of the appropriate relay. Likewise if no alarm is present, a contact closure will exist between the NO and C poles of the appropriate relay. Input ratings to the alarm relays must be 500mA and 60VDC maximum. Connections can be made to the four Form C alarm relay contacts via terminal block TB509 of the Datalogger Channel Termination Board.

Caution

- The OMNIpulse must be protected from any inductive loads that are placed across the alarm relay contacts by a diode or other appropriate contact protection. Failure to protect the unit may result in permanent damage. Wiring insulation type and method of connection to the source must comply with the National Electrical Code and any local codes.

- The alarm relay circuits cannot be fuse protected since an open fuse could prevent an alarm from being sent. Therefore, the current limiting protection for the relays must be designed into the external circuit. Exceeding the maximum ratings specified could result in damage to the unit or fire.

Remote Modem Configuration

The remote modem must be set for 300, 1200, or 2400 bps operation, and must be configured in auto answer mode with the baud rate set to match the baud rate configured in the dial-out configuration screen for alarm report reception. Note that 300 bps can only be used for dial-out reception, not for calling in to the OMNIpulse. When using a Hayes-compatible modem for alarm report reception and for calling the OMNIpulse system, the remote modem must be configured with the following commands:

- Command **ATS0=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 **ATX2** prevents the Voice Response feature from being interpreted as a busy signal. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)**

- Command **ATY1** enables the long space disconnect option to eliminate noise associated with terminating connections.

For modems other than AT&T or Hayes-compatible modems, consult your owner's manual for settings.

Local Terminal/ Printer Configurations

Note

The following terminal settings for OMNIpulse 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 710, 610 or 615 display terminals

- DEC VT100 or compatible terminals

- American National Standards Institute (ANSI) compatible terminals, including terminal emulators for PCs

AT&T/Teletype 5410, 5420, 5425 Terminals

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

- Duplex: full

- Check Parity: no

- Memory Access: scroll

- Return Key: CR

- Autowrap: off

- Margin Bell: User Preference

- Transmission: char

- Send Edit Seq: yes

- Send Parity: space

- 132 Columns: off

- Clock: async

- New Line On LF: no

- Cursor: blink

- Keyboard Model: 5420

- Send from: cursor

- Send Graphics: no

Terminal Modes:

The 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 above with the following additions:

- Wait for DSR: no

- Dialer: no

- Send Attributes: no

- VT52: no

AT&T 610 and 615 Terminals   **Communication Parameters:**

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

- Send Parity: none

- Local Echo: off

- Generate Flow: on

- Pass Flow: yes

- Auto Wrap: off

- RETURN Key: CR

- Check Parity: no

- Encoding: off

- Receive Flow: on

- Monitor Mode: off

- New Line on LF: no

- ENTER Key: CR

User Preferences:

- Columns: 80

- Volume: User Preference

- Scrolling: jump

- Cursor Type: block

- Labels: User Preference

- Reverse Video: no

- Key Click: User Preference

- Scroll Speed: fast

- Cursor Blink: User Preference

AT&T 710 Terminal

Only two options need be changed from terminal defaults:

Communications parameters:

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

Keyboard parameters:

- Set SWAP DELETE option to YES.

DEC VT100 or Compatible

Communications Parameters:

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

- Receive Speed = Transmit Speed

- 8 bits, No Parity

- 1 Stop Bit

- No Local Echo

- DEC-423 Data Leads Only

- Limited Transmit

Display Parameters:

- Columns: 80

- Auto Wrap: ON

- Scrolling: JUMP

- Cursor: User Preference

ANSI Compatible Terminals

Communications Parameters:

- Transmit Speed = Receive Speed: 1200, 2400, 4800, 9600 bps (local terminal); 300, 1200, 2400 bps (remote terminal)

- 8 bits, No Parity

- No Local Echo

- Back Space Definition = BS

- Return Definition = CR

ANSI terminals include PC compatible personal computers using a terminal emulation package. If using a PC as your OMNIpulse 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

- 1 Stop Bit (if applicable)

- Handshake ON = DC1/DC3. (XON/XOFF)

Power On

After mounting the unit, installing all boards and wiring, and configuring the local terminal and/or printer, proceed as follows to turn the unit on.

- If the memory battery has not yet been installed in the Microprocessor Board, install it now. Refer to "Memory Battery Installation and Replacement" for instructions on installation.

- Turn on the power switch located in the left compartment of the OMNIpulse unit (see Figure 3-2).

The Microprocessor Board will perform unit diagnostics. This will take approximately 15 seconds, during which time all visual indicators on the Display Panel will be lit and the four system alarm relays will be in their alarm state.

- During diagnostics the Microprocessor Board will transmit diagnostics information to the local port. This information will appear on a terminal or printer connected to the local port. The information will be transmitted at 9600 bps if the local port has been configured for a terminal (switch SW202, position 8 on the Microprocessor Board is open), or 1200 bps if the local port has been configured for a printer (switch SW202, position 8 on the Microprocessor Board is closed). The information will be of the form:

  - RAM test Passed

  - EPROM test Passed

  - Clock test Passed

  - DUART test Passed

  - DUART2 test Passed

  - Port test Passed

  - Modem test Passed

  - Speech test Passed

  - Datalogger test Passed

If the local port is configured for a terminal, these messages will be preceded by "Testing.....Please Wait" and followed by "Press RETURN". Pressing the terminal's <RETURN> key will cause the diagnostics information to scroll off the display and the "ENTER PASSWORD:" login prompt to be displayed. If the local port is configured for a printer, these messages will be

followed by a header showing "Date Time Status Description" after which alarm status changes will be printed at the time they occur.

The "Passed" message on each line of the diagnostics will be replaced by a failure message should the corresponding test detect a problem. If the RAM, EPROM, or Clock tests fail, the diagnostics will terminate after the failure message, and the Microprocessor Board will stop executing its program due to the serious impact of failure of these parts. If any other tests fail, the diagnostics will continue and the unit will operate as normally as possible considering the failed component. Warning messages will be posted calling out the failed diagnostic test (see Appendix A).

These diagnostics tests will run any time the power switch is turned off then on, any time primary power is lost then restored, and any time switch SW201 (reset switch) on the Microprocessor Board is pressed.

After diagnostics are complete, the Microprocessor Board will start normal operation. All indicators on the Display Panel will be set to show the present unit status, all alarm relays and control relays will be set to the proper state depending on system conditions, and datalogger channel scanning will begin for those channels which are enabled.

After the unit is turned on, configure the unit through the local or remote port. The remainder of this manual describes the features of the unit and how to configure and use them.

X.25/TL1 Equipment Setup and Installation

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

Figure 3-7 shows a block diagram of the X.25 connection. The asynchronous connection is accomplished through an RS-485 to RS-232 converter to the OMNIpulse. 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 OMNIpulse 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:

Following provided with OMNIpulse X.25/TL1 option or upgrade kit):

- 1 RS-232/485 converter

- twisted pair wire for data interface between OMNIpulse and RS232/485 converter

Following 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

Following provided with DSU option:

- 1 Data Service Unit (DSU)

Following 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
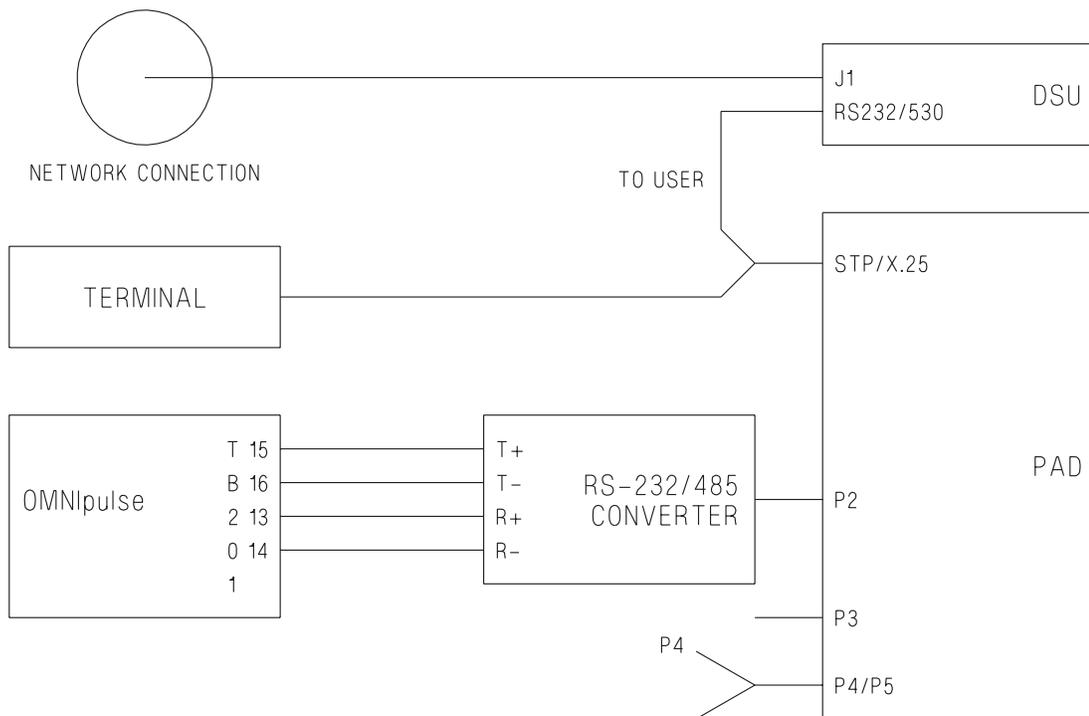
Figure 3-7: OMNIpulse TL1 Block Diagram

The TL1 port connection should be installed as follows (refer to Figures 3-7, 3-8 and 3-9):

OMNIpulse unit setup:

1. Enable the TL1 function by setting DIP switch SW202 position 2 to the closed position (see "DIP Switch Settings").

Pad unit setup:

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

2. Locate the battery holder on the CPU (main) circuit board and install the battery in the orientation shown in Figure 3-8. The battery is not enabled unless Jumper LK14 is set (see Table 3-B).

Note

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

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

Table 3-B: 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.		

4. Reattach PAD cover and secure with screws.
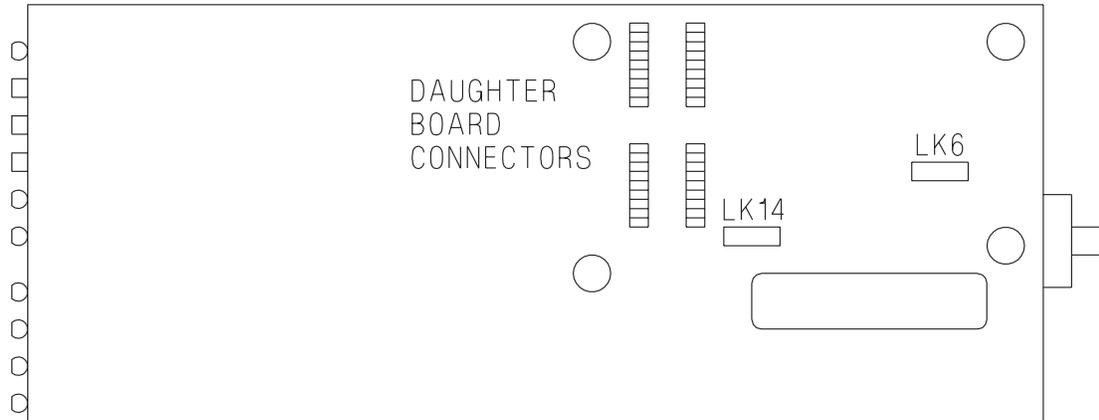
Figure 3-8: PAD CPU Board
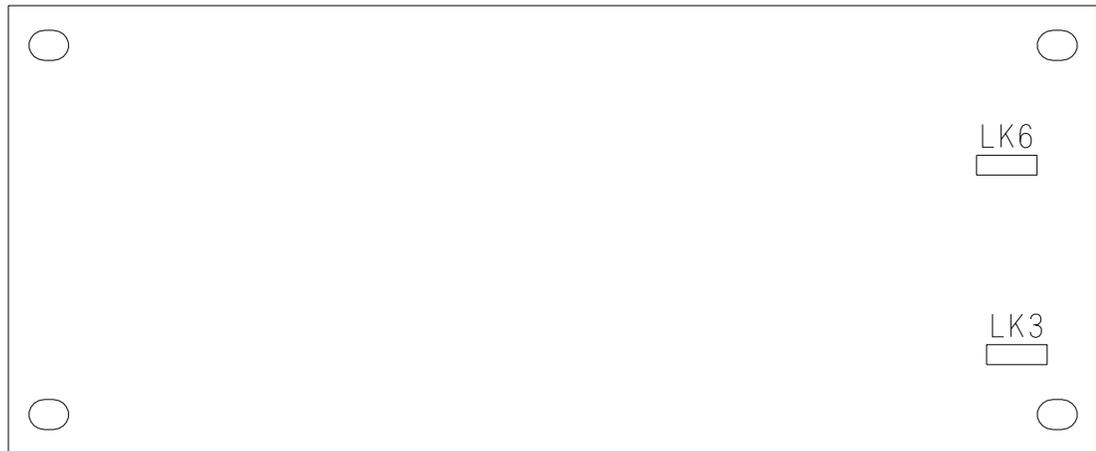
Figure 3-9: PAD Daughter Board

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 3-10, 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.
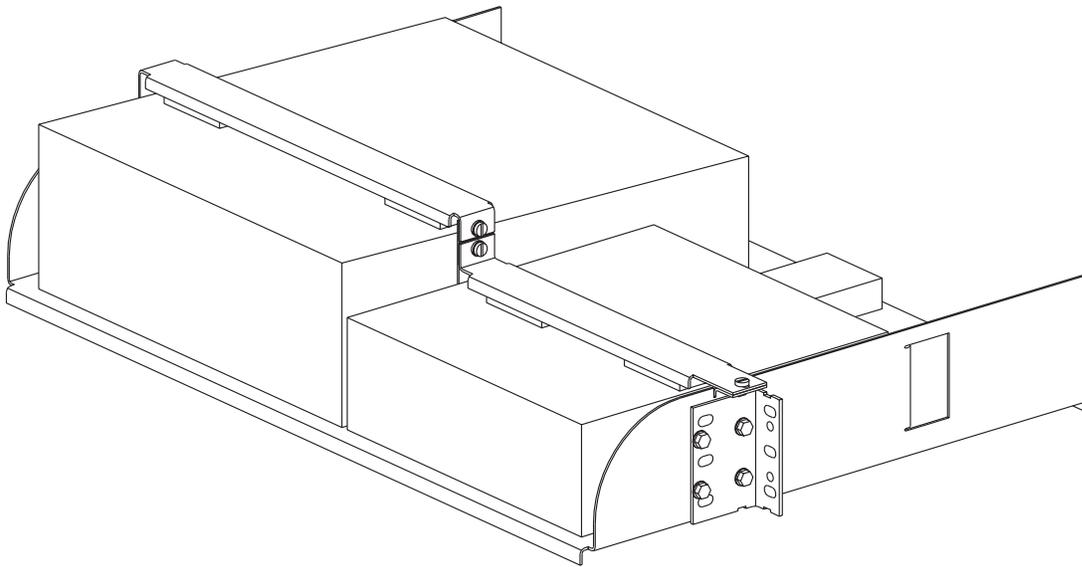
Figure 3-10: PAD and DSU Mounting Shelf

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 3-7).

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-C: 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 OMNIpulse RS-485 port, located on terminal block TB201 on the microprocessor board, using the following configuration:

Table 3-D: Wiring Connections from RS-232/485 Converter to OMNIpulse TB201

Converter Wiring Position	OMNIpulse TB201 Pin #
T+	15
T-	16
R+	13
R-	14

Refer to "Microprocessor Board Field Wiring Instructions" 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.:

Note

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

12. Complete the PAD setup in "PAD Setup."
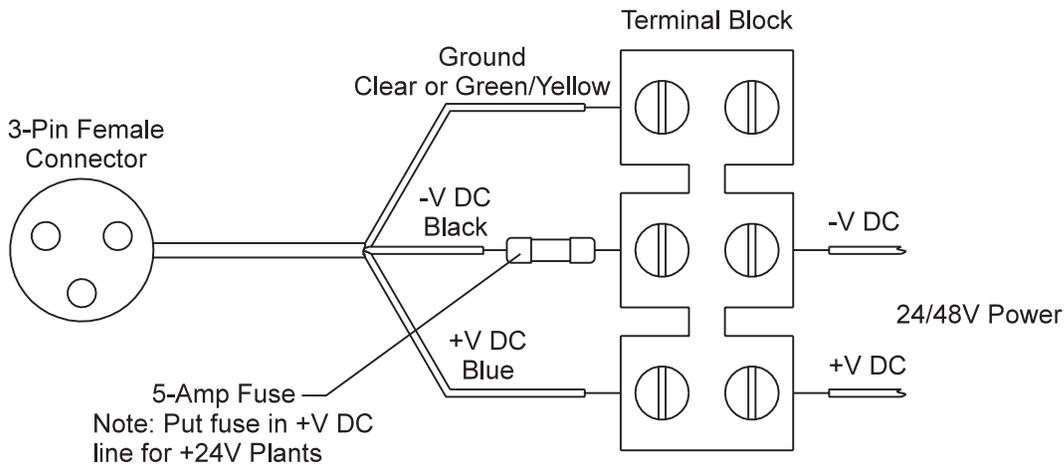
Figure 3-11: PAD Power Cable Setup

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-E.

Table 3-E: 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.

Table 3-E: Pad Messages

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 STP, enter ...<RETURN> (3 periods and a carriage return).

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

3. Define the OMNIpulse 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 OMNIpulse or 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 "PVC Port Setup" or "SVC Port Setup."

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

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

D^U^C^PO:<PN>   Display User Configuration (Show
                     PVC connection)

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>

   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.

3. Reset the OMNIpulse.

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

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

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

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

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

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

                      W^S<RETURN>

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

3. Reset the OMNIpulse.

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

Debugging TL1   The TL1 interface does not report any messages until an activate user command. Thus, it becomes extremely 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 OMNIpulse.

Debugging OS to PAD Connection

Testing the DSU

Verify 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 OMNIpulse 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.

6. If the OS does not receive the OMNIpulse'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 similar to the following:

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 CRC	ABORT IN	TIME OUT	REJ IN	REJ OUT	FRMR IN	FRMR OUT	RNR IN	RNR OUT
0	UP-001	000	000	000	000	000	000	000	000	000
1	DN-000	000	000	000	000	000	000	000	000	000

PACKET STATISTICS

CHAN	STATUS	RX COUNTERS PACKETS	SEGMENTS	TX COUNTERS PACKETS	SEGMENTS	CALLS IN	OUT	CLEARS 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 OMNIpulse. 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.

<u>Test the RS-232/485 Converter to OMNIpulse</u>

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 terminal configuration as the TL1 port setup.

5. Issue an activate user command from the terminal. If the OMNIpulse responds, then verify the PAD's power jumper switch positions.

6. Otherwise, verify the OMNIpulse's TL1 DIP switch setting SW202 position 2 (closed), and RS-232/485 converter settings (open, closed, open, open, closed). Try another RS-232/485 converter or OMNIpulse'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 "Test the OS to PAD."

<u>Test the OS to PAD</u>

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

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

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

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

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

4. Cancel the PVC connection for the port by issuing the command: S^U^C^PO:<PN> <RETURN>.

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

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

7. Disconnect the terminal.

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

9. Have the OS retransmit the activate user command.

General Operational Considerations

1. If there are multiple OMNIpulses or ECS controllers 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 OMNIpulse CP2 circuit pack is reset.

4 *Operation*

General Information

The OMNIpulse™ Microprocessor Board software displays a series of screens and menus to allow interaction with the OMNIpulse monitoring system. Each item is self-explanatory, and each will prompt the user to go on to the next item or provide the necessary help to aid the user in making the next selection.

The Microprocessor Board supports four types of interfaces:

• Completely menu-driven interface for normal use;

• Command line access for advanced users to navigate more quickly through the menus,

• Polling interface that is mainly intended for PEERS compatibility.

• Voice response feature for use with a Touch-Tone™ telephone.
  Note: OMNIpulse units manufactured and shipped before April 1, 1999 included a Voice Response function, allowing users to communicate with OMNIpulse from any Touch-Tone™ telephone. This feature is described in Section 6 of this manual. Voice Response is no longer provided on units shipped since April 1, 1999.

The normal user interface and the PEERS interface are described in this section. The command line access is described in Appendix L. The TL1 supported commands are described in Appendix M.

Conventions

Throughout the remainder of this section, the following conventions will be used:

"**PATH: Main Menu/Aaaa/Bbbb/Cccc**" will be used to represent the order in which menus should be accessed to use the feature described. For example, to view the User-Defined Alarm History with "**PATH: Main Menu/View History/View/User-Defined Alarm**":

1. At the Main Menu select the "View History" option which will display the "Viewing Format" Menu.

2. At the Viewing Format Menu select the option "View" which will display the "View History" Menu.

3. At the View History Menu select the "User-Defined Alarms" option which will display the User-Defined alarm history.

The symbols † and ‡ denote menu items that are optionally displayed based on either physical configuration or system configuration as described in Section 5.

Terminal Login Procedure

After the Microprocessor Board is powered up, the local terminal will display 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>. The user may need to press <Return> several times while the system checks the baud rate. The Microprocessor Board is shipped with the factory default password "**LINEAGE**." This password should be changed by a designated Super-User as explained in Section 5 as soon as possible.

The password does not appear on the screen as it is typed. If an invalid password is typed, the user will be prompted to try again. 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, OMNIpulse's list of active warnings will include a user-clearable ****Excessive unsuccessful login attempts were made** warning, and the unsuccessful attempt with the date and time it occurred will be saved in the login history.

Choose terminal type: The next screen prompts the user to choose the type of terminal. Refer to Section 3.6 for a detailed list of supported terminals. Type the number that best matches your terminal and press <Return>.

Login header: The next screen displays a three-line header at the top of the screen and some basic information about the system 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 present OMNIpulse software version

(2)   the present day, time, and date

(3)   a system identification block (Super-User definable)

(4)   total number of alarms present

(5)   number of warnings present

(6)   number of major, minor, auxiliary, and record only alarms present

(7)   whether notification has been set for either of the notepads

OMNIpulse configuration information:

(8)   local port configuration

(9)   number of datalogger channels installed

(10)   number of control relays installed

(11)   state of Alarm Cut-Off (ACO) (active or inactive)

```
LUCENT TECHNOLOGIES OMNIPULSE VERSION 4.0 (1)           (2) TUESDAY 01/01/90 02:27

SYSTEM ID: 123ABC         Super-User defined ID (3)

1 ALARM(S) (4)                                       (5) 1 WARNING(S) PRESENT


   ALARM STATUS:          1 Major Alarm(s) Present                   (6)
                          No Minor Alarms Present
                          No Auxiliary Alarms Present
                          No Record Only Alarms Present



   NOTEPAD STATUS         View Notepad 1 and Notepad 2               (7)



   SYSTEM CONFIGURATION:  Local Port Configured for:    Terminal     (8)
                          Installed Datalogger Channels: 64          (9)
                          Installed Control Relays:     32           (10)
                          Alarm Cut-Off (ACO):          Active       (11)


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 system, choosing items of information to view or changing the way the information is presented. Command lines may be used instead of menus. All users have monitoring ability and may have some degree of control.

Menus

Selecting a menu option consists of moving the highlight bar to the desired option, then pressing <Return>. The highlight bar can be moved in the following ways:

- Use the terminals arrow keys to move up and down the menu options.

- Use the backspace key and space bar respectively to move up and down the menu options.

- Type the first letter (hot-key) of the desired menu option.

The menus are wrap-around; that is, pressing the up-arrow or backspace key when the highlight bar is on the top menu option will move the highlight bar to the bottom menu option, or

pressing the down-arrow key or space bar when the highlight bar is on the bottom menu option will move it to the top menu option.

To return from sub-menus, press <Esc> to go to the previous menu, or <Del> to go to the main menu. When in non-menu screens, such as viewing history, the last line on the screen will prompt for specific actions for navigating through that feature, but in general pressing <Return> or <Esc> will go to the previous menu, or <Del> will go to the main menu.

Command Line Access

Users who are already familiar with the OMNIpulse features may use a command line to take them immediately to the screen they want without having to navigate through the menus. OMNIpulse provides a command line for each feature screen. To use the command line mode from anywhere in the menu system, the user types a forward slash </>. The screen will display an input field in reverse video with a prompt to enter a command. Typing in a valid command followed by <Return> takes the user to the appropriate screen at once. A complete listing of the command structure is given in Appendix L.

Note

If the local port of OMNIpulse is connected through the Lineage$^®$ 2000 Data Switch, <Esc> and arrow keys cannot be used to navigate through the menus and screens. <Esc> and escape sequences generated by arrow keys return control from the connected system to the Data Switch command screen. See Appendix J for complete instructions for communicating with OMNIpulse through Data Switch.

Line Editing

A line editing feature eases system configuration and using notepads. The feature can be used in all description, program logic, arithmetic expression, units, and phone number fields as well as in both notepads and all inventory pages.

Overwrite Mode

Default editing of fields is done in the overwrite mode, i.e., typing any character will delete all information in the present field and replace it with the new information. Use of arrow keys in the overwrite mode will move the cursor to a different field.

<L><CTRL><C> in the overwrite mode will delete the character under the cursor. This is only useful for deleting the first character in a line.

Yank and Add

Yank and add commands are useful for placing the same information in multiple fields. <L><CTRL><Y> "yanks" the field where the cursor is presently located into memory. <CTRL><A> "adds" the yanked information from memory into the field where the cursor is presently located, replacing any existing information in that field. The yanked information remains in memory until replaced with new information via a subsequent "yank" command, or until the present login session is terminated. Thus information can be yanked from a field in one screen and added into a field in a different screen. For example, if the majority of the channels in the units field of the datalogger and derived channels have units of volts, type in "volts" in the first channel, then "yank" the units field and "add" it to the units field in subsequent channels.

Insert mode

The insert mode is used to make changes in a field which is already configured. This is useful for fixing typing errors, or making other minor changes without retyping the whole field. <CTRL><I><LI> enters the insert mode in the field where the cursor is presently located. When in the insert mode, the left and right arrow keys move the cursor left and right in the present field, <L><CTRL><C> deletes the character under the cursor, <Backspace> deletes the character preceding the cursor, and typing any character places that character in front of the cursor and moves the cursor right. While in the insert mode, <CTRL><Y> yanks the entire field without exiting the insert mode, and <CTRL><A> adds the yanked information from memory, replacing any existing information in that field, without exiting the insert mode. <CTRL><X> exits the insert mode but leaves the cursor in the present field; up or down arrow keys exit the insert mode and move the cursor up or down a field; <Esc> or <Del> exit the insert mode and restore the original fields for the present screen; and <Return> exits the insert mode and saves all information for the present screen. Using yank, add, and insert modes it is possible to quickly program many fields with nearly identical information by" adding" some generic information relevant to all fields, then "inserting" a small amount of information specific to each field.

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 main menu structure. The menu will be displayed on the terminal as follows:

MAIN MENU

Display Alarms

Display Warnings

Super-User Login

View History

View Statistics

Data Channels

Control Relays

Visual Indicators

Notepad/Inventory

Pass-Through

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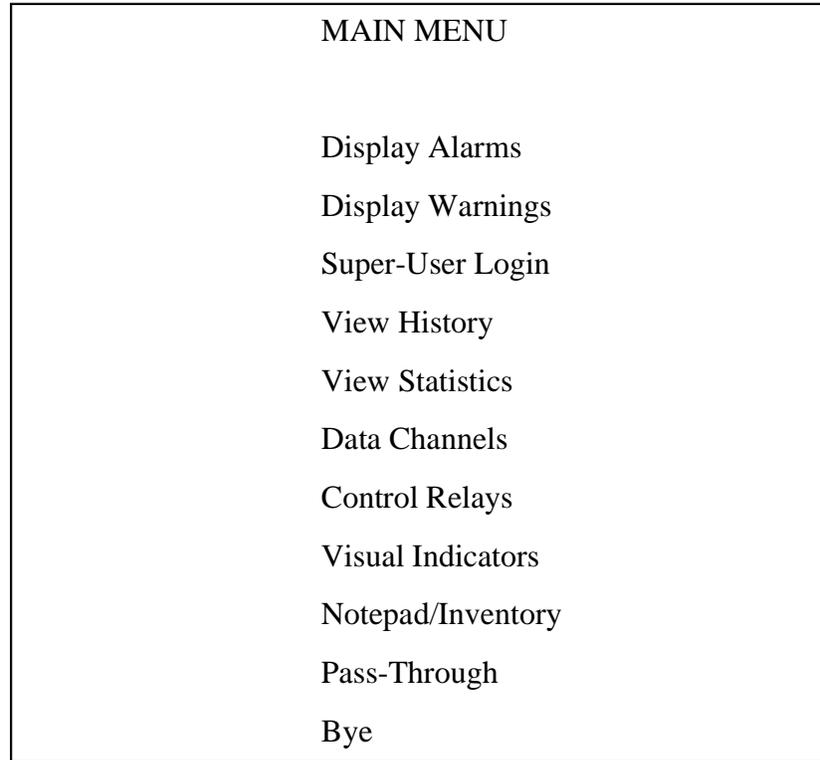
Logging Off   The last item on the Main Menu, Bye, logs the user off the system. To log in again from a local terminal, press <Return>, or call back from a remote terminal. The ENTER PASSWORD prompt will then be displayed.

.

OMNIpulse User Functions Menu Map
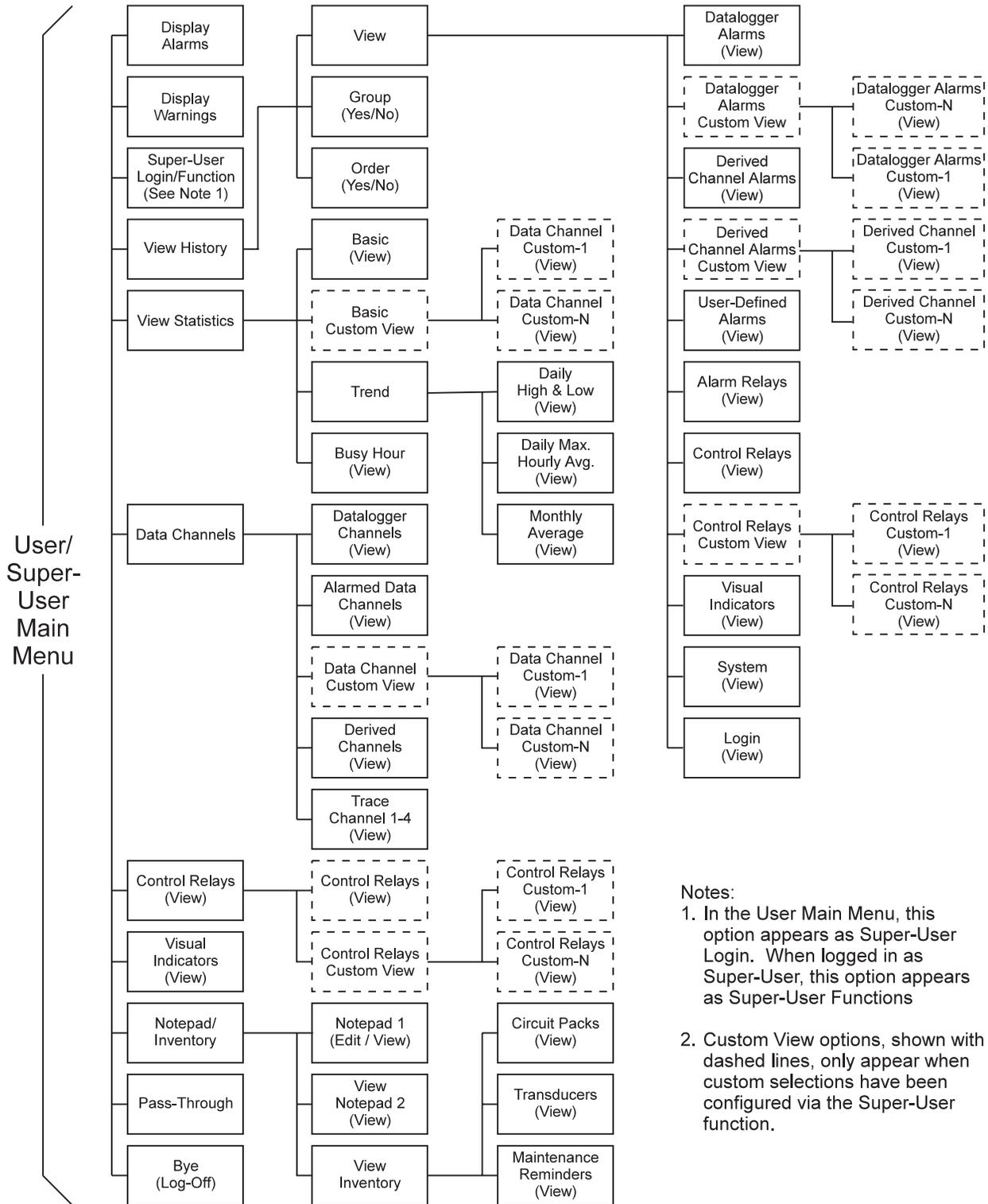
Notes:
1. In the User Main Menu, this option appears as Super-User Login. When logged in as Super-User, this option appears as Super-User Functions

2. Custom View options, shown with dashed lines, only appear when custom selections have been configured via the Super-User function.

Figure 4-2: OMNIpulse Main Menu Map

Feature Descriptions

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

Display Alarms - PATH: Main Menu/Display Alarms.

Displays all active alarm conditions. Alarms are listed by abbreviation of alarm, date and time of occurrence, the associated MAJ, MIN, AUX, or RO type for datalogger channel, derived channel, and user-defined alarms, and the alarm description. Refer to Appendix B for a complete list and description of possible alarms. Only 13 alarms will be displayed per page. Press <Return> to display remaining 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 configuration procedure may be required. Two types of warnings may be issued. Warnings marked by a double asterisk (**) indicate that the warning must be cleared by a Super-User (see Section 5). These warnings may be user-clearable system warnings or user defined and user clearable custom warnings of an action to take on a specified date (see Section 5). 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 system configuration and control options. A second level security password is required. Refer to Section 5.

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 and custom 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. Typing a number followed by <Return> will move the display to that page number. If the number is larger than the total

number of pages, the display will move to the last page. The page number is shown on the right hand side of the screen under the history log title.

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

Displays a sub-menu of system history logs. These include Datalogger Alarm history, Derived Channel Alarm history, Alarm Relay history, Control Relay history, User-Defined Alarm history, Visual Indicator history, System history, Login history, and if the custom selection function has been enabled, the Custom Datalogger Channel history, Custom Derived Channel history and/or Custom Control Relay history. Refer to Section 5 for configuring the custom selection feature.

Note

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

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

Displays the most recent datalogger alarm events, up to a maximum of 1024 events. The alarm events are a result of a datalogger reading being either above the upper thresholds or below the lower thresholds that are programmed by the Super-User, or 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 and status, the major, minor, auxiliary, or record only alarm type, and the channel description as entered in the Super-User Datalogger Channels configuration screen. An indication of which threshold was crossed to cause the alarm is included with the status. A (U) means the upper threshold was the cause, an (L) means the lower threshold was the cause, a (C) means a contact closure was the cause, or an (O) means a contact open was the cause of the alarm. The most recent date and time that the log was edited and cleared are also displayed here. Refer to Section 5 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 Alarms-Custom View [†] **- PATH: Main Menu/View History/View/Datalogger Alarms-Custom View.**

This option will be displayed only if custom selection of datalogger channels has been configured by the Super-User (see Section 5 for configuring custom selections of datalogger channels). Selecting this option will display a sub-menu of the configured custom selections for datalogger channels. Selecting one of the sub-menu options will display the same type of information as the general datalogger channels history, but will display only those events associated with the datalogger channels chosen for that particular custom selection group.

Note

The events displayed in the Datalogger Alarm Custom View option are simply a subset of the events in the general datalogger alarm history log. Clearing events in the general datalogger alarm history log will clear the same events in the custom view histories. For this reason there is no option to edit or clear the custom view histories. Likewise, when the general datalogger alarm history log fills to the maximum number of events, and new events come in causing the earliest events to be lost, the same earliest events will be lost from the custom view histories.

Derived Channel Alarms - PATH: Main Menu/View History/View/Derived Channel Alarms.

Displays the most recent derived channel alarm events, up to a maximum of 256 events. The alarm events are a result of a derived channel calculation being either above the upper thresholds or below the lower thresholds that are programmed by the Super-User. Each numbered event includes the date and time logged, channel number alarmed, status of the alarm, the major, minor, auxiliary, or record only alarm type, the channel description as entered in the Super-User derived channel configuration screen, and an indication of which threshold was crossed to cause the alarm. A (U) means the upper threshold was the cause, and an (L) means the lower threshold was the cause of the alarm. The most recent date and time that the log was edited and cleared are also displayed here. Refer to Section 5 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.

Derived Channel Alarms-Custom View † - PATH: Main Menu/View History/View/Derived Channel Alarms-Custom View.

This option will be displayed only if custom selection of data channels has been configured by the Super-User (see Section 5 for configuring custom selections of data channels). Selecting this option will display a sub-menu of the configured custom selections for data channels. Selecting one of the sub-menu options will display the same type of information as the general derived channel alarm history, but will display only those events associated with the derived channels chosen for that particular custom selection group.

Note

The events displayed in the Derived Channel Alarm Custom View option are simply a subset of the events in the general derived channel alarm history log. Clearing events in the general derived channel alarm history log will clear the same events in the custom view histories. For this reason there is no option to edit or clear the custom view histories. Likewise, when the general derived channel alarm history log fills to the maximum number of events, and new events come in causing the earliest events to be lost, the same earliest events will be lost from the custom view histories.

User-Defined Alarms - PATH: Main Menu/View History/View/User-Defined Alarms.

Displays the most recent user-defined alarm events, up to a maximum of 128 events. The events are the result of an alarm or combination of alarms as defined in the User-Defined Alarm program line becoming totally true, or totally false. See Section 5 for a description of the user-defined alarm feature. Each numbered event includes the date and time logged, abbreviation of alarm type, status of alarm condition (occurred or retired), and an alarm description as entered by the Super-User. The most recent date and time that the log was edited and cleared are also displayed here. Refer to Section 5 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 Group and Order options.

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

Displays the most recent alarm relay events, up to a maximum of 32 events. The events are the result of a Major, Minor, or Auxiliary alarm occurring or retiring, and the associated relay changing state. The alarm relays can be programmed to operate with datalogger alarms, derived channel alarms, and/or user-defined alarm. See Section 5 for a description of programming the alarm relays to operate with these three types of alarms. Each numbered event includes the date and time logged, abbreviation of alarm type and status of alarm condition (on, off, or off [ACO]), and an alarm description. The most recent date and time that the log was edited and cleared are also displayed here. Refer to Section 5 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 Group and Order options.

Control Relays [†] **- PATH: Main Menu/View History/View/Control Relays.**

Displays the most recent relay events, up to maximum of 512 events. The events are the result of a relay being energized or de-energized as a result of the control relay program line becoming entirely true, or entirely false. See Section 5 for a description of the control relay program line. Each numbered event includes the date and time logged, status of the relay event (on, off, or off [ACO]), and the description as entered in the Super-User configuration screen. The most recent date and time that the log was cleared is displayed. Refer to Section 5 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 Group and Order options.

Control Relays-Custom View [‡] **- PATH: Main Menu/View History/View/Control Relays-Custom View.**

This option will be displayed only if custom selection of control relays has been configured by the Super-User (see Section 5 for configuring custom selections of control relays). Selecting this option will display a sub-menu of the configured custom selections for control relays. Selecting one of the sub-menu options will display the same type of information as the general control relays history, but will display only those events associated with the control relays chosen for that particular custom selection group.

Note

The events displayed in the Control Relay Custom View option are simply a subset of the events in the general control relay history log. Clearing events in the general control relay history log will clear the same events in the custom view histories. For this reason there is no option to edit or clear the Custom View histories. Likewise, when the general control relay history log fills to the maximum number of events, and new events come in causing the earliest events to be lost, the same earliest events will be lost from the custom view histories.

Visual Indicators - PATH: Main Menu/View History/View/Visual Indicators

Displays the most recent Visual Indicator events, up to a maximum of 128 events. The events are the result of a Visual Indicator turning on or off as a result of the Visual Indicator program line becoming totally true, or totally false. See Section 5 for a description of the Visual Indicator feature. Each numbered event includes the date and time logged, status of Visual Indicator event (On or Off), and a description as entered in the Super-User configuration screen. The most recent date and time that the log was edited and cleared are also displayed here. Refer to Section 5 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 Visual Indicator History Log.

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

Displays the most recent system alarm events, up to a maximum of 64 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 Section 5for 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 System History Log.

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

Displays the most recent User and Super-User login sessions up to a maximum of 32 events. Each numbered event includes the date and time the login started, whether the login was through the local or remote port, whether the login was User or Super-User status, and the duration of the call. Logins via the polling interface will display PEERS along with the User or Super-User status of that login session (see "Polling Interface" for more information on the polling interface). Logins via the voice response feature will display VOICE along with the User status of that login session **(see Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999)**. Refer to Section 5 for clearing options.

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

This option can be used to group like events together for viewing all history logs except login history. 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 each of the history logs to be displayed (when viewed) as follows:

- The datalogger alarm history log will be grouped by channel numbers (A01, A02, etc.).

- The derived channel alarm history log will be grouped by channel numbers (DC01, DC02, etc.).

- The user-defined alarm history log will be grouped by channel numbers (UD01, UD02, etc.).

- The alarm relay history log will be displayed with events grouped by alarm type (major, minor, or auxiliary.).

- The control relay history log will be grouped by control relay numbers (CR1, CR2, etc.).

- The visual indicator history log will be grouped by visual indicator numbers (VI1, VI2, etc.).

- The system alarm history log will be displayed with events grouped by alarm type (processor halt, major alarm, 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 all of the 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 all of the alarm 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.

View Statistics -
PATH: Main
Menu/View
Statistics.

This selection displays a sub-menu of system basic and trend statistics. Refer to Appendix C for specific individual statistics algorithms. Statistics information can be cleared by a Super-User (refer to Section 5). New statistics information will start being collected again from the time statistics are cleared.

Note

> If a datalogger channel is configured to monitor contact open or contact closed, no statistics will be available for that channel since open and closed have no significance in the sense of high and low statistics values.

Basic - PATH: Main Menu/View Statistics/B5asic.

This selection displays three sets of continuously updated derived channel and datalogger channel statistics. Also displayed are the last date the statistical data was 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, or the previous menu if on the last screen of statistics. Entering a valid datalogger (A1-A64) or derived (DC1-DC32) channel number followed by <Return> will display the statistics for that channel. Pressing only <Return> to display the next available statistics screen will display only those channels with statistics available, but any channel may be accessed by entering the channel number and <Return>. Pressing <Esc> or <Del> will return the user to previous menus.

> **Three Highest Hourly Averages:** At the change of every hour, the microprocessor board determines the data channel averages for the previous hour. The three highest of these averages are displayed.

> **Three Highest Hourly Maximums:** At the change of every hour, the microprocessor board determines the highest instantaneous data channel readings for the previous hour. The three highest of these maximums are displayed.

> **Three Lowest Hourly Minimums:** At the change of every hour, the microprocessor board determines the lowest instantaneous data channel readings for the previous hour. The three lowest of these minimums are displayed.

Basic-Custom View [†] **- PATH: Main Menu/View Statistics/Basic-Custom View.**

This option will be displayed only if custom selection of data channels has been configured by the Super-User (see Section 5 for configuring custom selections of data channels). Selecting this option will display a sub-menu of the configured custom selections for data channels. Selecting one of the sub-menus displays all the basic statistics information described above for data channels, but only the data channels selected by the Super-User custom view option for the chosen group will be displayed.

Trend - PATH: Main Menu/View Statistics/Trend.
This selection displays a sub-menu of statistics for determining trends in up to eight datalogger and/or derived channels. The datalogger channel for which the trend is determined must be configured using the Super-User statistics configuration screen, Section 5. When navigating through this screen, pressing

<Return> will always display the next available screen. Pressing the minus sign (-) followed by <Return> allows you to go back one screen. Pressing <Esc> or <Del> returns you to previous menus.

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

This selection displays the highest and lowest instantaneous readings of the chosen datalogger/derived channels as well as the time of occurrence for each of 16 consecutive days. Statistics can be cleared by a Super-User (refer to Section 5). 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 of the chosen datalogger/derived channels as well as the time of occurrence for each of 32 consecutive days. Statistics can be cleared by a Super-User (refer to Section 5). 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 averages of the chosen datalogger/derived channels. Statistics can be cleared by a Super-User (refer to Section 5). 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 up to four configured datalogger and/or derived channels. The peak instantaneous datalogger/derived 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 Section 5).

Data Channels - PATH: Main Menu/Data Channels.

Displays a sub-menu of viewing options for viewing the configuration and present value of the datalogger channels and derived channels, and for viewing the trace data.

Datalogger Channels - PATH: Main Menu/Data Channels/Datalogger Channels.

This option is used for viewing the present description, upper and lower thresholds, units and present value of each of the datalogger channels. If the channel is configured for contact open/closed, no alarm thresholds are shown and the value will be the present state (open or closed) measured. Description and units are entered in the Super-User configuration menu in order to best describe what is connected to the datalogger channel. The upper and lower thresholds set the range of valid values for which going above or below, respectively, will cause a datalogger alarm. If a channel is disabled or unconfigured, it will not be scanned, no present value will be displayed, and it will not cause any alarms. A star (*) at the beginning of a line indicates that the channel is presently in an alarm condition.

Channel values are a direct result of the percentage of full scale that has been read, minus the user-programmed transducer offset, then multiplied by the user-programmed scale factor. If the result of this calculation is larger than can be displayed, four stars (****) will be displayed for the channel value. Four stars will also be displayed in the unlikely event of a failure in the unit which results in invalid datalogger channel readings.

The datalogger channels are displayed 8 channels per screen, and while in the screen the present readings for those channels are updated approximately once every five seconds if at least one of the channels is enabled. Pressing any key will stop the present reading update, and prompt the user for the next desired action. Pressing <Return> will display the next consecutive channel, pressing a channel number and <Return> will display the chosen channel number, pressing <Esc> will return to the previous menu, or pressing <Del> will return to the main menu.

Note

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

Alarmed Data Channels - PATH: Main Menu/Data Channels/Alarmed Data Channels.

Selecting this option will display all the information described above for datalogger channels or below for derived channels, but only the data channels with active alarms at the time of choosing this option. As described in datalogger channels and derived channels, the readings will be updated approximately once every five seconds. A single star (*) will appear at the beginning of each line that is presently in an alarm state. If the alarm condition goes away while in this option, the star will also go away. If new alarms occur while in this option, they will not be added to this list until you leave the option then return to it.

Data Channels Custom View [†] - PATH: Main Menu/Data Channels/Data Channels Custom View.

This option will be displayed only if custom selection of data channels has been configured by the Super-User (see Section 5 for configuring custom selections of data channels). Selecting this option will display a sub-menu of the configured custom selections for data channels. Selecting one of the sub-menus displays all the information described above for datalogger channels or below for derived channels, but only the data channels selected by the Super-User custom view option for the chosen group will be displayed.

Derived Channels - PATH: Main Menu/Data Channels/Derived Channels.

This option is used for viewing the present description, upper and lower thresholds, units and present value of each of the 32 derived channels. The description and units are entered in the Super-User configuration menu in order to best describe the derived channel. The upper and lower thresholds set the range of valid values for which going above or below, respectively, will cause a derived channel alarm. If a channel is disabled or unconfigured, it will not be scanned, no present value will be displayed, and it will not cause any alarms.

Derived channel values are determined with an arithmetic expression which operates on values received from one or more datalogger channels, other derived channels, or constants (see Section 5 for details on configuring derived channels). If a channel is unconfigured, the channel value will be left blank

since the channel is not being scanned. If the value of a derived channel is too large to be displayed, four stars (****) will be displayed for that channel's value.

Derived channels are displayed eight to a screen. Pressing <Return> will display the next consecutive eight derived channels or return you to the previous menu if all derived channels have been displayed. Pressing a valid derived channel number and <Return> will display the screen containing that channel. Pressing <Esc> will return to the previous menu, or pressing <Del> will return to the main menu.

Trace Channel 1-4 - PATH: Main Menu/Data Channels/Trace Channel 1-4.

These four options are used for viewing the present channel number configured, sampling rate, trigger program line, and readings and their associated date and time for each of the four trace data options (see Section 5 for details on clearing the trace data, and Section 5 for details on configuring the trace options).

Each screen of trace data will display up to 20 readings. Pressing <Return> will display the next screen of readings or return you to the previous menu if all readings (120 maximum) have been displayed. A star (*) will be displayed beside the reading that occurred at the trigger point. Pressing minus (-) and <Return> will display the previous screen in multiple screen traces. Pressing <Esc> will return to the previous menu, or pressing<L> <Del> will return to the main menu.

Control Relays † *- PATH: Main Menu/Control Relays.*

This option displays a sub-menu of Control Relays and Control Relays-Custom View if custom viewing has been set up for control relays. If custom viewing has not been set up this option goes straight to the control relay viewing option described next.

Control Relays ‡ - PATH: Main Menu/Control Relays/Control Relays.

This option is used to view the present description and status of each of the control relays, as well as the type and 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 ON or OFF, or ACO if the Mode is PCO and the ACO is active. Any change of status is reflected

in the control relay history log. The Mode describes how the control relay will respond. This includes on, off program control, program control with ACO, or pulse operation. 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 based on system alarm conditions, dates and time, data channel alarms, and/or other control relay status. See Appendix F for examples of program lines and acceptable word usage. Pressing <Return> will display the next consecutive eight control relays or return you to the previous menu if all control relays have been displayed. Pressing a valid control relay number and <Return> will display the screen containing that control relay. Pressing <Esc> will return to the previous menu, or pressing <Del><L> will return to the main menu.

Note

This feature is set to default status of all relays de-energized when the Datalogger Board is first plugged in, or if control relays are disabled with switch SW202, position 4 open on the Microprocessor Board.

Control Relays Custom View [†] **- PATH: Main Menu/Control Relays Custom View.**

This option will be displayed only if custom selection of control relays has been configured by the Super-User. See Section 5 for configuring custom selections of control relays. Selecting this option will display a sub-menu of the configured custom selections for control relays. Selecting one of the sub-menu options will display the same type of information as the general control relays described above, but will display only those events associated with the control relays chosen for that particular custom selection group.

Visual Indicators
- PATH: Main
Menu/Visual
Indicators.

This option is used to view the present description, status, and color of each of the programmable visual indicators, as well as any associated program line for each. The description is entered in the Super-User configuration menu in order to best describe each indicator. The status displays whether the indicator is presently ON or OFF. Any change of status is reflected in the visual indicator history log. The Color is the color (red or yellow) presently programmed for each indicator. The Mode describes how the visual indicator will respond. This includes

on, off, or program control. The visual indicator program line is a conditional instruction line for which if all conditions are met, the associated indicator will be ON. The program line may be based on system alarm conditions, dates and time, data channel alarms, control relay status, and/or other visual indicator status. See Appendix F for examples of program lines and acceptable word usage.

Pressing <Return> or <Esc> will return to the previous menu, or pressing <L><Del> will return to the main menu.

Note

> This feature is set to default status of all indicators Off when the Omnipulse unit is first powered up.

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

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

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

Displays a 15 x 75 character notepad that may be read or written by both user or Super-User. On entry, any previously entered message will be displayed. The terminal arrow keys are used to move the cursor among the notepad lines. See "Line Editing" for editing instruction. Note that each line in the notepad is considered a separate field for the purposes of the editing feature. 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 "N" to the prompt results in a message "No Notification" in the header. Answering "Y" prompts the user to see the appropriate notepad.

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

Displays a 15 x 75 character notepad that is read only to the user. These messages are write-protected by the Super-User but are available for all to read. See Section 5 for information on editing Notepad 2.

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 OMNIpulse configuration and inventory as well as engineering information or suggested equipment replacement dates.

Circuit Packs - PATH: Main Menu/Notepad/Inventory/View Inventory/Circuit Packs.

This selection allows the viewing of the inventory page related to the circuit packs in the OMNIpulse unit. Information is provided for up to 10 circuit packs per unit, with up to four units allowed for a system. Provided entries for each circuit pack include the description, CLEI code, serial number, and installed date. See Section 5 for detailed information on editing circuit pack inventory information.

The circuit pack inventory information is arranged in four screens, with 10 entries each, such that each unit's inventory is on a separate screen. Pressing <Return> will display the next screen of inventory information, or return to the previous menu if on the fourth screen. Pressing <1>, <2>, <3>, or <4> and <Return> will display that screen of inventory information. Pressing <Esc> will return to the previous menu, or pressing <L><Del> will return to the main menu.

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

This selection allows the viewing of the inventory page related to the transducer inventory. Information is available for transducers used with the OMNIpulse system. Provided entries for each transducer include transducer description, vendor, serial number, and installed date. See Section 5 for detailed information on editing transducer inventory information.

The transducer inventory information is arranged in four screens, with 10 entries each, such that each unit's inventory is on a separate screen. Pressing <Return> will display the next screen of inventory information, or return to the previous menu if on the fourth screen. Pressing <1>, <2>, <3>, or <4> and

<Return> will display that screen of inventory information. Pressing <Esc> will return to the previous menu, or pressing <Del> will return to the main menu.

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

This selection allows the viewing of the maintenance reminders. This information includes the text of the reminder, and the date that it will be displayed. See Section 5 for detailed information on editing maintenance reminders.

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

This option is used when the OMNIpulse is connected with other Lucent Technologies equipment via the RS-232 pass-through port. This selection passes the communication link with the local or remote terminal through the microprocessor board directly to the connected unit(s). Refer to Figure 3-1 and Appendix E for TB201 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, the Microprocessor Board only monitors communication. The command RBYE will return the communication link to OMNIpulse. Note that if the BYE command is not issued to the connected system before entering the RBYE command for the Lineage® 2000 Remote Access System, or a similar command for other Lucent Technologies equipment, the communication link will be returned to OMNIpulse, but the connected system may remain active until it times out.

The baud rate of the connected system must be programmed into OMNIpulse. See Section 5 for information on programming the pass-through baud rate. The default baud rate is 1200 bps. Note that the pass-through baud rate and the local or remote serial port baud rate are independent, thus it is possible to log into OMNIpulse from a remote terminal and modem at 2400 bps and pass-through to a connected system at 300, 1200, 2400, 4800, or 9600 bps.

Bye - PATH: Main Menu/Bye.

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

Polling Interface (PEERS)

The polling interface is an alternative to the menu-driven interface described in the previous sections. It is intended primarily for machine-machine communications where the ease of the menu-driven interface is not needed, and often not desired. Note that the full functionality of OMNIpulse is not available through the command line interface. Such features as grouping/ordering histories, viewing custom configurations, and the majority of the Super-User configuration functions are not accessible as these features are not useful for machine-machine communications.

Polling User Login Procedure

The login procedure is exactly the same as described for a normal user in Section 4.3 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. The same security feature for detecting excessive login attempts for the User login applies here.

User Commands

ALMS	Output all active alarms.
AMPEERS	Outputs maximum value of the Three Highest Hourly Averages from basic statistics of each channel.
ARHSTRY	Output alarm relay history.
ASCAN	Outputs all analog channel readings.
BSCAN	Outputs all binary channel readings.
BYE	Log off the connected system without returning the communication link to OMNIpulse.
CRHSTRY	Output control relay history.
CRSTAT	Output the present state of all control relays.
DCHSTRY	Output derived channel alarm history.
DCSCAN	Output all derived channel readings.
DLHSTRY	Output datalogger channel alarm history.

DSCAN	Output all datalogger channel readings.
DSTAT	Output all datalogger and derived channel statistics.
FDRLD	Output all datalogger channel readings.
FDRST	Output all datalogger and derived channel statistics.
HLINES	Prompts the user for the number of history lines to be output when any of the HSTRY commands are issued.
HSTRY	Output datalogger channel, derived channel, user defined, and system alarm history logs, and control relay, visual indicators, and login history logs.
INVENTORY	Output all circuit pack and transducer inventories.
LOGIN	Request to become Super-User in the command line interface. Refer to Super-User Login Procedure.
LOGHSTRY	Output login history.
MENU	List of all available commands.
PRCONFIG	Output all datalogger and derived channel configurations.
RASPASS	Pass the communication link through to a connected system.
RBYE	Return to communication with OMNIpulse after having entered 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 OMNIpulse, but the connected system may remain active until it times out.
SHSTRY	Output system history.
TRACE	Output all trace data for the four trace channels.
UDHSTRY	Output user-defined alarm history.

VIHSTRY	Output visual indicator history.
VISTAT	Output the present state of all visual indicators.
WARNS	Output all active warnings.

Super-User Login Procedure

To log in as a Super-User in the command line interface, type LOGIN at the user prompt (*). OMNIpulse will issue a prompt requesting the Super-User password. Type the Super-User password and press <Return>. The default Super-User password is **2000**. OMNIpulse 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.
CLRFDRST	Clears all datalogger and derived channel statistics.
CPASSWDP	Allows Super-User to change PEERS password.
CPASSWDS	Allows Super-User to change Super-User password.
CPASSWDU	Allows Super-User to change User password.

5   *Super-User Operation*

Super-User Login

Section 4 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 login is enabled through the hardware (switch 1 of SW202 in closed position), then the system will prompt for a Super-User password. The OMNIpulse system is shipped with the factory default Super-User password **2000** and switch 1 of SW202 closed. This password should be changed by a designated Super-User as explained in **"Datalogger Channels - PATH: Super-User Functions/Configure/TL1 Configuration/Datalogger Channels"** as soon as possible. Type the Super-User password and press the <Return> key.

The password does not appear on the screen as it is typed. If an invalid password is typed, the user will be prompted to try again. Four attempts at entering the correct password are permitted. At the fourth 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, OMNIpulse's list of active warnings will include a user-clearable ****Excessive unsuccessful Super-User login attempts were made** warning, and the unsuccessful attempt with the date and time it occurred will be saved in the login history.

When the correct password is entered, 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. Figure 5-1 is a general map of the Super-User Functions menu structure.

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. The menu will be displayed on the terminal as follows:

SUPER-USER FUNCTIONS

Clear History

Clear Statistics

Clear Trace Data

Clear Pending Dial-Outs

Clear Warnings

Edit Inventory

Edit Notepad 2

Return to User Status

Configure

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.

Note

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

.

OMNIpulse Super-User Menu Map

User/ Super-User Main Menu

Clear History

Clear Statistics

Clear Trace Data

Clear Pending Dial-Outs (Yes/No)

Clear Warnings (Selection)

Edit Inventory

Edit Notepad 2 (Edit/View)

Return to User Status

Configure

Trace Channel 1-4 (Yes/No)

Circuit Packs (Setup)

Transducers (Setup)

Maintenance Reminders (Setup)

Data Channels

Control Relays (Setup)

Dial-Out On Alarm

Periodic Dial-Out (Setup)

User-Defined Alarms (Setup)

Visual Indicators (Setup)

Statistics

Custom Selections

Time Events (Setup)

TL1 Configuration

System Parameters

Basic-Individual (Selection)

Basic-All (Yes/No)

Trend (Yes/No)

Datalogger Channels (Setup)

Derived Channels (Setup)

Trace Channel 1-4 (Setup)

Trend (Setup)

Busy Hour (Setup)

Data Channels (Setup)

Control Relays (Setup)

Datalogger Channels (Setup)

Derived Channels (Setup)

User-Defined Alarms (Setup)

Change Password (Password)

TL1 Comm. Parameters (Setup)

Phone Numbers (Setup)

Datalogger Alarm Matrix (Setup)

Deriv. Channel Alarm Matrix (Setup)

User-Defined Alarm Matrix (Setup)

Control Relay Matrix (Setup)

Data Channel Matrix-Quick (Setup)

User-Defined Matrix-Quick (Setup)

Control Relay Matrix-Quick (Setup)

Change Password

Reset Date & Time (Setup)

Modem Parameters (Setup)

Enable Call-Back (Setup)

Alarm Cut-Off (Setup)

System ID (Setup)

Pass-Through Baud (Setup)

Backup Configuration

Restore Configuation

Security Timeout

Datalogger Alarms (Selection)

Deriv. Channel Alarms (Selection)

User-Defined Alarms (Selection)

Alarm Relays (Selection)

Control Relays (Selection)

Visual Indicators (Yes/No)

System (Selection)

Login (Yes/No)

User (Password)

Super-User (Password)

PEERS (Password)

Notes:

1. When logged in as Super-User, this option appears as Super-User Functions.

2. TL1 options, shown with dashed lines, only appear when the TL1 feature is included.

Figure 5-1: OMNIpulse Super-User Functions Map

Datalogger Alarms - PATH: Super-User Functions/Clear History/Datalogger Alarms.

The datalogger alarms history log is displayed and the Super-User is prompted for line numbers corresponding to the events to delete.

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.

A Super-User can delete individual alarm events, a selected group or range of events or clear the entire datalogger alarms history log. Examples of valid entries to this prompt are:

<table>
<tr><td></td><td><Return></td><td>displays the next page of events</td></tr>
<tr><td><-></td><td><Return></td><td>displays the previous page of events</td></tr>
<tr><td><1></td><td><Return></td><td>deletes line 1</td></tr>
<tr><td><1,3,5></td><td><Return></td><td>deletes lines 1, 3 and 5</td></tr>
<tr><td><1-5></td><td><Return></td><td>deletes lines 1 through 5</td></tr>
<tr><td><all></td><td><Return></td><td>clears the entire datalogger alarms history.</td></tr>
</table>

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> at the prompt will leave this screen with the remainder of the log unaltered.

Derived Channel Alarms - PATH: Super-User Functions/ Clear History/Derived Channel Alarms.

The derived channel alarms 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 derived channel alarms 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

<all>   <Return> clears the entire derived channel alarms 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> at the prompt will leave this screen with the remainder of the log unaltered.

User-Defined Alarms - PATH: Super-User Functions/Clear History/User-Defined Alarms.

The user-defined alarms history log is displayed and the Super-User is prompted for line numbers corresponding to the events to delete.

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.

A Super-User can delete individual alarm events, a selected group or range of events or clear the entire user-defined alarms 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

        <all>   <Return   clears the entire User-Defined
                                      alarms 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> at the prompt will leave this screen with the remainder of the log unaltered

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

The alarm relay history log is displayed and the Super-User is prompted for line numbers corresponding to the events to delete.

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.

A Super-User can delete individual alarm events, a selected group or range of events or clear the entire alarm relay 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

    <all>   <Return> clears the entire alarm relay 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> at the prompt will leave this screen with the remainder of the log unaltered.

Control Relays † - PATH: Super-User Functions/Clear History/Control Relays.

The control relay history log is displayed and the Super-User is prompted for line numbers corresponding to the events to delete.

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.

A Super-User can delete individual events, a selected group or range of events or clear the entire control relay 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

<all>   <Return> clears the entire control relay 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> at the prompt will leave this screen with the remainder of the log unaltered.

Visual Indicators - PATH: Super-User Functions/Clear History/Visual Indicators.

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

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

The system alarm history log is displayed and the Super-User is prompted for line numbers corresponding to the events to be deleted.

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.

A Super-User can delete individual alarm events, a selected group or range of events, or clear the entire system 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

<all> <Return> clears the entire System 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.

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

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

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

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

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

The basic statistics for a channel is displayed and the Super-User is prompted to clear the basic statistics for that channel. Answering <Y> to this prompt will clear the basic statistics for this channel. Answering N or pressing <Esc> or <Del> will

leave the statistics for this channel intact. The user will then be prompted for a datalogger or derived channel number for further statistics to be cleared.

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

The Super-User is prompted to clear all basic statistics. Answering <Y> to this prompt will clear all basic statistics. Answering N or pressing <Esc> or <Del> will leave the statistics intact.

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

The Super-User is prompted to clear all trend statistics. Answering <Y> to this prompt will clear all trend statistics. Answering N or pressing <Esc> or <Del> will leave the statistics intact.

Clear Trace Data - PATH: Super-User Functions/Clear Trace Data.

This selection displays a sub-menu of the four trace channels that can be individually cleared.

Trace Channel 1-4 - PATH: Super-User Functions/Clear Trace Data/Trace Channel 1-4.

Choosing one of these four submenus allows the user to clear the trace data for the chosen channel. When the data is cleared, the trigger point is re-armed such that trace data will be collected when the trigger is next encountered. The Super-User is prompted to clear the trace data for the chosen channel. Answering Y to this prompt will clear the data and re-arm the trigger. Answering N or pressing <Esc> or <Del> will leave the data intact.

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 "Dial-Out on Alarm - PATH: Super-User Functions/ Configure/Dial-Out on Alarm"). 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. Clearing this log will prevent OMNIpulse from making any further attempts to dial out on alarms up to that point.

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 Warning 1,3, and 5.

        <1-5>   <Return> deletes Warning 1 through 5.

        <all>   <Return> deletes all existing user clearable warnings and reminders.

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> at the prompt will leave this screen with the remainder of the log unaltered.

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 the system configuration and inventory. Although the inventory pages have headings such as serial number, installed date, etc. any information can be entered in any column. No checking is done for validity of entered data. The sub-menu also includes Maintenance Reminders, which may be configured to post warnings on user-specified dates. All fields in the inventory pages and the description fields may be edited using the line editing features described in Section 4.

Circuit Packs - PATH: Super-User Functions/Edit Inventory/Circuit Packs.

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 includes

the board CLEI code, its serial number, and its installed date. Pressing <Return> will save the inventory information. Pressing either <Esc> or <Del> will exit this screen without saving.

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

This selection allows the viewing and editing of the inventory page related to the transducer inventory and configuration. Information that can be changed for each transducer includes the transducer type, serial number, and its installed date. Pressing <Return> will save the inventory information. 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 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 "Clear Warnings - PATH: Super-User Functions/Clear Warnings" 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. This means that simply changing the date of a reminder that is posted will not remove the reminder from the active warnings display. The old reminder will remain until the new date is reached (if not cleared using the clear warnings option), at which time the new reminder will replace the old. 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. Each line represents a field for the purpose of editing. See Section 4 for a complete description of line editing commands. 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 <N> to the prompt results in a message No Notification in the header. Answering <Y> prompts the user to see the appropriate notepad.

Return to User Status - PATH: Super-User Functions/ Return to User Status.

Selection of this option ends the Super-User login session and returns to the User login status. The login history will be updated to reflect this change. This is useful if a Super-User is helping a regular user configure the system and wants to leave the user logged in, but not in the Super-User mode.

Configure - PATH: Super-User Functions/ Configure.

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

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

This selection displays a submenu of the data channel options that the Super-User can change. These options are the configuration of the 64 datalogger channels and 16 derived channels.

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. It may be edited using the line editing features described in Section 4.

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 150 mV, 6V, 60V, and 150V. Use the space bar to toggle through the options.

Scale Factor: (See Section 7 for examples.) 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 to the reading AFTER the transducer offset is subtracted from the reading.
• Changing the range, scale factor, or transducer offset will clear any previously gathered statistics for that channel.

Transducer Offset: (See Section 7 for examples.) 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 for the 4 milliampere measurement to 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.

Alarm Type: This entry allows the user to choose what type of alarm will be generated when an alarm threshold is exceeded. The options available are major, minor, auxiliary, record only, and critical. Use the space bar to toggle through the options. The major, minor, and auxiliary options cause the corresponding system relay to change to its alarm state when a threshold is exceeded, as well as placing an entry into the alarm history log. The record only option simply places an entry into the alarm history log. The critical alarm is dedicated for TL1 interface and is treated as a major alarm in the system. The critical alarm option is selectable only if the TL1 enable switch is closed.

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. The voice response feature supports a number of standard units. If one of these unit abbreviations is used in the Units field, the voice response feature will include it when reporting the present reading. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999)** See Appendix G for a complete list of unit abbreviations that the voice response feature recognizes. If the Units field is left blank, or configured with an unrecognized

unit, the voice response feature will report AC or DC, depending on the configure Type. The units field may be edited using the line editing features described in Section 4.

Binary Alarms: Binary alarms are on/off type alarms. The OMNIpulse has provisions for easily monitoring clean contact closures and generating binary alarms when the contact is open or closed. When the CC or CO type is selected, the remaining Range, Scale Factor, Transducer Offset, Lower and Upper Alarm Thresholds, and Units are automatically set to accommodate the binary channel measurement scheme used in OMNIpulse, and may not be changed by the user. To use this feature, connect the appropriate binary strap on the Datalogger Channel Termination Board (see Section 3), connect to the clean contact closure to be measured, and set the Input Type to CC or CO, depending on whether the alarm should occur when the contact closes (CC), or when the contact opens (CO). The appropriate alarm type must also be set to provide a major, minor, auxiliary, or record only alarm.

Each selection displays its own defaults for alarm threshold, range, and scale factors, which the Super-User can accept or change. Pressing <Return> after changing any of 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 then 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.

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

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

Enable/Disable: This entry activates the derived 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 derived channel. It may be edited using the line editing features described in Section 4.

Scale Factor: This entry allows the user to enter a multiplying factor when measuring non-linear voltages. This factor is multiplied to the result of the arithmetic expression. 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 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

Changing the scale factor or arithmetic expression will clear any previously gathered statistics for that channel.

Alarm Thresholds: This entry allows the user to enter the signed out-of-bounds values that are specific to each derived channel. The limit is specified in terms of the units that the channel is to display.

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.

Alarm Type: This entry allows the user to choose what type of alarm will be generated when an alarm threshold is exceeded. The options available are major, minor, auxiliary, record only, and critical. Use the space bar to toggle through the options. The major, minor, and auxiliary options cause the corresponding

system relay to change to its alarm state when a threshold is exceeded, as well as placing an entry into the alarm history log. The record only option simply places an entry into the alarm history log. The critical alarm is dedicated for TL1 interface and is treated as a major alarm in the system. The critical alarm option is selectable only if the TL1 enable switch is closed.

Units: This entry allows the Super-User to select the units that go along with the channel readings. This can be up to five characters. Examples are Amps, VDC, KWH, and KVA. The voice response feature supports a number of standard units. If one of these unit abbreviations is used in the Units field, the voice response feature will include it when reporting the present reading. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)** See Appendix G for a complete list of unit abbreviations that the voice response feature recognizes. The units field may be edited using the line editing features described in Section 4.

Arithmetic Expression: This entry allows the user to enter an arithmetic expression which operates on one or more data channel readings. This can be used to handle nonlinear devices, convert Centigrade to Fahrenheit temperature readings, multiply a channel measuring voltage with one measuring current to produce a wattage measurement, etc. See Appendix I for a complete description of allowable arithmetic operators and their usage. The arithmetic expression may be edited using the line editing features described in Section 4.

Each selection displays its own defaults for alarm thresholds and scale factors, which the Super-User can accept or change. Pressing <Return> after changing either of the Scale Factor or Arithmetic Expression fields will result in a message prompting the user to save the new configuration. Answering Yes 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 then 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.

Trace Channel 1-4 - PATH: Super-User Functions/ Configure/Data Channels/Trace Channel 1-4.

Selection of one of these four options allows the super-user to configure the trace conditions for the chosen trace channel. The terminal arrow keys are used to move among the fields. The field descriptions are as follows:

Start/Stop: This entry starts and stops the gathering of trace data in conjunction with the Trigger Program Conditions field. Pressing the space bar toggles between start and stop in this field. Selecting start will start the gathering of trace data immediately upon saving the configuration if the Trigger Program Conditions field is left unconfigured, or upon the equation in the Trigger Program Conditions field being satisfied. Selecting stop will stop the gathering of trace data upon saving the configuration, and will prohibit the gathering of trace data subsequently should the equation in the Trigger Program Conditions field be satisfied.

Trace Channel: This entry allows the user to choose the data channel for which trace data should be taken.

Sample Rate: This entry allows the user to choose the rate at which readings will be taken of the configured data channel. Pressing the space bar will toggle through the available scan rates.

Note

For sample rates between 1 and 10 seconds, refer to Appendix K.

Trigger Program Conditions: This entry allows the user to program conditions which should start the trace. The entry is in the form of a logic expression which starts the trace when all components of the program line are true. See Appendix F for a complete description of the program components and their usage. The trigger program conditions field may be edited using the line editing features described in Section 4.

Trace Should: This entry determines what data to collect when the trigger program conditions line becomes true. Pressing the space bar toggles through the three options which function as follows:

Start on Trigger: The collection of data will start at the time of the trigger. The trace buffer will be filled with the 120 samples taken after the trigger.

Center on Trigger: The collection of data will be centered around the time of the trigger. Trace data collection will begin immediately upon configuring the channel. When the trigger occurs, the latest 60 entries into the trace data buffer prior to the trigger will be saved (or the total number of samples taken from configuration to trigger if less than 60), then the next 64 samples taken after the trigger will be saved.

End on Trigger: The collection of data will begin immediately upon configuring the channel. When the trigger occurs, the latest 120 samples will be saved (or the total number of samples taken from configuration to trigger if less than 120), and the collection of trace data will terminate.

Pressing <Return> after changing either of the Trace Channel or Trigger Program Conditions 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 then be prompted to press <Return> or <Esc> to go to the previous menu, or <Del> to go to the main menu.

Control Relays [†] **- PATH: Super-User Functions/Configure/ Control Relays.**

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

Relay Description: This entry is left to the Super-User to enter a meaningful description of what is connected to the control relay. It may be edited using the line editing features described in Section 4.

Mode: This entry selects the way the control relay will operate. Use the space bar to toggle through the options described below.

OFF: The control relay is always off (de-energized). This is the default for all control relays upon initial power-up. It is also useful for testing equipment connected to the control relay by turning off a relay that is on due to the

program line being true, without changing the program line.

ON: The control relay is always on (energized). This is useful for testing equipment connected to the control relay without changing the program line to force the relay on.

PGM: The state of the relay is determined by the relay Program Line which is an equation composed of System Alarms, Time Events, datalogger alarms, other control relay states, visual indicators, etc. The control relays are energized when the states of the program components are such that the entire sum of the line is true, and de-energized when the sum of the line is false.

PCO: The state of the relay is determined the same as for PGM, with the added feature that if the relay is on when the front panel ACO switch is pressed, it turns off. The relay remains off from the ACO until the ACO is pressed again, or the ACO time-out period expires. If the program line becomes false before the ACO time-out period expires, the relay remains off and the ACO is canceled.

PLS: The state of the relay is determined the same as for PGM, except when the program line becomes true, the relay only stays on for the length of time programmed in the Pulse Width field for that relay, after which it turns back off. For the relay to turn on again, the program line must become false, then true again. During the Pulse Width time that the relay is on, any changes in the program line result (becoming false, then true, etc.) have no effect on the relay.

Delay: The Delay field is used to filter the program line becoming true. The program line must stay true for the length of time specified in the delay field before the relay will actually turn on. This is useful for filtering out nuisance triggers. The delay time only applies to the program line becoming true. Once the program line has been true long enough to turn on the relay, when it becomes false the relay will immediately turn off. Use the space bar to toggle through the delay times.

Pulse Width: The pulse width field is used in conjunction with the PLS mode to determine how long the relay should remain on after the program line becomes true. Use the space bar to toggle through the pulse width times. The individual components are

considered to be true when they are active and are considered to be false when they are inactive. See Appendix F for a complete description of the control relay program components, their usage, and examples.

Program Line: The control relay program line is a logic equation composed of System Alarms, Time Events, datalogger alarms, other control relay states, visual indicators, etc. The control relays are energized when the states of the program components are such that the entire sum of the line is true, and de-energized when the sum of the line is false. The individual components are considered to be true when they are active and are considered to be false when they are inactive. See Appendix F for a complete description of the Program Line components, their usage, and examples. The program line may be edited using the line editing features described in Section 4.

Program lines entered are checked for validity. If a word that is not understood is entered the error displayed will be: **ILLEGAL INPUT**. If all words are understood, but the program line does not make sense, the error displayed will be: **ILLEGAL PROGRAM SYNTAX**.

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 without change. After saving or restoring the program lines the user will be prompted to press <Return> to go to the next screen of control relay configurations, press a valid control relay number and <Return> to go to the screen containing that control relay, <Esc> to go to the previous menu, or <Del> to go to the main menu.

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

With this feature enabled, OMNIpulse 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, 1200, or 2400 bps modem, and the remote modem must be configured for auto-answer. Alarms may also be reported using the voice response feature. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)** As an added enhancement, a pager feature is provided for when response time is critical, and a persistent dial out on alarm (NAG) feature is provided 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 OMNIpulse 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 Matrix selections 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. The telephone number fields may be edited using the line editing features described in Section 4.

Phone numbers may include numbers, star (*), pound (#), hyphen (-), parentheses (), and comma (,). 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, which must be supplied whenever a pager phone number is entered. 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. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)** 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, 1200, or 2400 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. Pressing <Return> will save all new lines and any changed lines. Pressing either <Esc> or <Del> will put back the original lines and discard any edited changes.

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 service 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 remainder of the alarm report if the pound sign is not pressed. 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 to a maximum of 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 various matrix screens. 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 System ID 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.

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

This screen lists each alarm code (see Appendix B) with options concerning the conditions on which to dial out for each of the datalogger alarms. 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.

Call on Occur	YES	specifies that the system should dial out on occurrence of this specified alarm.
Delay	3 secs.	Dial out only if the alarm condition lasts longer than 3 seconds. See note below.
Call on Retire	YES	specifies that the system should dial out if an alarm that was present is now retired.
Destination	P1 P2 P3 P4	
	YES YES YES NO	
	Specifies that a dial out attempt should be tried 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 alarm lasting less than one minute, the Delay feature for that alarm could be set to one minute.

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

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

This screen lists each alarm code (see Appendix B) with options concerning the conditions on which to dial out for each of the derived channel alarms. The terminal arrow keys are used to move the cursor among the option fields. Options are changed identically to that of the datalogger channel alarm matrix above. The phone number destination options are the same as those used with datalogger channel alarms. When making changes, Pressing <Return> will save all changes. Pressing <Esc> or <Del> will exit without saving.

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

This screen lists each alarm code (see Appendix B) with options concerning the conditions on which to dial out for each of the user-defined alarms. The terminal arrow keys are used to move the cursor among the option fields. Options are changed identically to that of the datalogger channel alarm matrix above. The phone number destination options are the same as those used with datalogger channel alarms. When making changes, Pressing <Return> will save all changes. Pressing <Esc> or <Del> will exit without saving.

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

This screen lists each alarm code with options concerning the conditions on which to dial out for each of the control relays. The terminal arrow keys are used to move the cursor among the option fields. Options are changed identically to that of the datalogger channel alarm matrix above. The phone number destination options are the same as those used with datalogger channel 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.

Data Channel Alarm Matrix - Quick - PATH: Super-User Functions/Configure/Dial-Out on Alarm/Data Channel Alarm Matrix - Quick

This option allows the user to easily configure a large number of datalogger and/or derived channels with the same call on occur, delay, call on retire, and destination phone number information. The options are changed identically to those of the datalogger channel alarm matrix above. In addition to the options, a field is included to list the channels which should be configured with these options. Examples of valid entries for this field are:

A1,A3,DC4,DC10	configure matrix for datalogger channels 1 and 3 and derived channel 4 and 10
A1-A3,DC4-DC10	configure matrix for datalogger channels 1 through 3 and derived channel 4 through 10
A1-A64	configure matrix for all datalogger channels in the first unit
DC1-DC32	configure matrix for all derived channels in the first unit
all	configure matrix for all datalogger and derived channels (useful for unconfiguring all channels)

Pressing <Return> will prompt the user to save the configuration information. Answering <Y> will configure the individual alarm matrices. Answering <N> will return to the option fields. Pressing <Esc> or <Del> will exit without updating the alarm matrices.

Each time this screen is entered, the options will be set to no dial-out on occur or retire, zero second delay, no for all four destinations, and a blank channel list. Whatever options are configured each time this screen is entered will set the corresponding options in the dial-out matrix for the data channels specified in the channel list. This allows a user to quick configure several different data channel groups with similar sets of dial-out options. The individual dial-out matrices can be changed subsequent to a quick configuration, thus it is possible

to program all channels with the same dial-out options, then go into the individual matrices and make minor changes to several channels which require slightly different configurations.

User Defined Alarm Matrix - Quick - PATH: Super-User Functions/Configure/Dial-Out on Alarm/User Defined Alarm Matrix - Quick

This option allows the user to easily configure a large number of user defined alarms with the same call on occur, delay, call on retire, and destination phone number information. The options are changed identically to those of the datalogger channel alarm matrix above. In addition to the options, a field is included to list the user defined alarms which should be configured with these options. Examples of valid entries for this field are:

UD1, UD3, UD6, UD10	configure matrix for user defined alarms 1, 3, 6, and 10
UD1-UD3,UD4-UD10	configure matrix for user defined alarms 1 through 3 and 4 through 10
all	configure matrix for all user defined alarms

Pressing <Return> will prompt the user to save the configuration information. Answering <Y> will configure the user defined alarm matrix. Answering <N> will return to the option fields. Pressing <Esc> or <Del> will exit without updating the user defined alarm matrix.

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

This option allows the user to easily configure a large number of control relays with the same call on occur, delay, call on retire, and destination phone number information. The options are changed identically to those of the datalogger channel alarm matrix above. In addition to the options, a field is included to list the control relays which should be configured with these options. Examples of valid entries for this field are:

CR1,CR3,CR6,CR10	configure matrix for control relays 1, 3, 6, and 10
CR1-CR3,CR4-CR10	configure matrix for control relays 1 through 3 and 4 through 10
all	configure matrix for all control relays

Pressing <Return> will prompt the user to save the configuration information. Answering <Y> will configure the control relay matrix. Answering <N> will return to the option fields. Pressing <Esc> or <Del> will exit without updating the control relay matrix.

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 or weekly. This feature is available using either DATA or the Voice Response Option. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)** When configuring, the terminal arrow keys are used to move among the fields; pressing the space bar will change the field indicated by the current cursor location. The TYPE field is used to select between the DATA and VOICE selection. As an example, Setting the Day of Week field to TUESDAYS will cause the system to dial out every Tuesday at the specified time (time is based on a 24 hour clock). Changing the Day of Week field to DAILY will cause the system to dial out every day at the specified time. If the type selected is DATA, the dial-out report will consist of the three line system header and the list of active alarms or warnings. The system will then automatically disconnect. If the type selected is VOICE, the delay field can be used to fine tune the use of the voice response feature with an answering machine recorder. The delay field is changed by pressing the space bar when in the delay field. The delay will increment in one second intervals to a maximum of nine seconds. Default delay is two seconds. A voice response will include the header information, active alarms if any, and the number of warnings present. The phone number field may be edited using the line editing features described in Section 4.

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

Pressing <Return> will prompt the user to save the configuration information. Answering <Y> will configure the periodic status dial-out. Answering <N> will return to the option fields. Pressing <Esc> or <Del> will exit without updating the periodic status dial-out.

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. If 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 5 seconds to hit the # key, otherwise the system will disconnect automatically after reporting its status. In both cases, 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.

User-Defined Alarms - PATH: Super-User Functions/ Configure/User-Defined Alarms.

Selection of this option allows the super-user to enter a description and to configure each of the 16 user-defined alarms. The states of the user-defined alarms are determined by program

line which is an equation composed of System Alarms, Time Events, datalogger alarms, control relay states, visual indicators, etc. The user-defined alarms are active 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. See Appendix F for a complete description of the program components, their usage, and examples. The description and program line fields may be edited using the line editing features described in Section 4.

When configuring, the terminal arrow keys are used to move among the fields. Program lines entered are checked for validity. If a word that is not understood is entered the error displayed will be: **ILLEGAL INPUT**. If all words are understood, but the program line does not make sense, the error displayed will be: **ILLEGAL PROGRAM SYNTAX**.

An alarm type must also be specified for each user-defined alarm. The type specifies whether the occurrence of the alarm should generate a closure of the major (MAJ), minor (MIN), or auxiliary (AUX) alarm relays as well as produce an entry in the alarm log, or simply cause an entry in the alarm log via record only (RO). Critical alarms (CR) are for TL1 reporting only and are handled internally as major alarms. To configure this field, use the terminal arrow keys to highlight this field, then press the space bar to toggle through the four choices. The critical alarm option is selectable only if the TL1 enable switch is closed.

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 without change. After saving or restoring the program lines the user will be prompted to press <Return> to go to the next screen of user-defined alarm configurations, press a valid user-defined alarm number and <Return> to go to the screen containing that user-defined alarm, <Esc> to go to the previous menu, or <Del> to go to the main menu.

Visual Indicators - PATH: Super-User Functions/Configure/ Visual Indicators.

Selection of this option allows the super-user to enter a description, configure, and view the present status of each of the 8 Visual Indicators. The states of the Visual Indicators are determined by program line which is an equation composed of

System Alarms, Time Events, datalogger alarms, control relay states, other visual indicators, etc. The Visual Indicators are ON 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. See Appendix F for a complete description of the program components, their usage, and examples. The visual indicator description and program line fields may be edited using the line editing features described in Section 4.

When configuring, the terminal arrow keys are used to move among the fields. Program lines entered are checked for validity. If a word that is not understood is entered the error displayed will be: **ILLEGAL INPUT**. If all words are understood, but the program line does not make sense, the error displayed will be: **ILLEGAL PROGRAM SYNTAX**.

The mode and color of each of the Visual Indicators must also be specified. The mode choices are always on (ON), always off (OFF), or on/off determined by the program line (PGM). The color choices are red or yellow to distinguish the severity of the problem that each Visual Indicator is reporting. To configure these options, use the terminal arrow keys to highlight the appropriate field, then press the space bar to toggle through the choices.

Pressing <Return> will save all input and the states of the visual indicators will be updated based on the program lines, color, and mode selections. Pressing <Esc> or <Del> will restore the original lines without change. After saving or restoring the program lines the user will be prompted to press <Return>or <Esc> to go to the previous menu, press a valid Visual Indicator number and <Return> to go back to the editing mode, or <Del> to go to the main menu.

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 enter the channel number (DISABLE, A1-A64, and DC1-DC32), with a default of DISABLE. The channel description will be updated to the description entered in the appropriate channel configuration screen when the trend configuration is saved. Pressing <Return> will prompt the Super-User to confirm the selection. Answering <Y> 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 entry 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 "Data Channels - PATH: Super-User Functions/Configure/Data Channels" for information on how to configure a data channel. Re-configuring a channel selected for trend statistics will cause previously collected data to be lost. Statistics 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 of statistics for desired channels. The terminal arrow keys are used to move between the start date, channel selection, and hour fields. Channel selection is numbered A1-A64 and DC1-DC32. The channel description will be updated to the description entered in the appropriate channel configuration screen when the busy hour configuration is stored. 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 <Y> 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 entry 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 later than the current hour.

Custom Selection - PATH: Super-User Functions/ Configure/Custom Selection.

This selection displays a sub-menu of options that can be configured to group a set of data channels or control relays together for the purpose of viewing histories, statistics, configurations, and present values/states. This option is useful for viewing small groups of channels or relays that logically fit together. For example, if the cell voltages and temperatures of six batteries are being monitored, configuring two custom groups, one for cell voltages and one for cell temperatures would allow quick viewing of information pertaining to the batteries without wading through information for all the other channels.

Data Channels - PATH: Super-User Functions/Configure/ Custom Selection/Data Channels.

This selection is used to program selection names and channels to include for up to 8 custom data channel groups. The Selection Name is the name which will appear in the various view sub-menus, and should be entered to display a meaningful name for the group. The Data Channels to Include is a list of datalogger and/or derived channels that will be displayed in the various view options. Examples of valid entries are:

A1,A8,A23,DC1,DC5	displays datalogger channels 1, 8, and 23 and derived channels DC1 and DC5.
A7,A12,A15-A19	displays datalogger channels 7, 12, and 15 through 19.
A7-A12,DC4-DC7	displays datalogger channels 7 through 12 and derived channels 4 through 7.

The terminal arrow keys are used to move among the fields. Pressing <Return> saves the new configuration. Pressing <Esc> or <Del> will restore the original entries without change. The data channels to include field may be edited using the line editing features described in Section 4. After saving or restoring the configuration pressing <Return> or <Esc> returns to the previous menu, pressing <Del> returns to the main menu.

Control Relays † - PATH: Super-User Functions/Configure/ Custom Selection/Control Relays.

This selection is used to program selection names and relay numbers to include up to 8 custom control relay groups. The Selection Name is the name which will appear in the various view sub-menus, and should be entered to display a meaningful name for the group. The Control Relays to Include is a list of control relays that will be displayed in the various view options. Examples of valid entries are:

CR1,CR8,CR23   displays control relays 1, 8, and 23.

CR7,CR12,CR15-CR19 displays control relays 7, 12, and 15 through 19.

The terminal arrow keys are used to move among the fields. Pressing <Return> saves the new configuration. Pressing <Esc> or <Del> will restore the original entries without change. The control relays to include field may be edited using the line editing features described in Section 4. After saving or restoring the configuration pressing <Return> or <Esc> returns to the previous menu, pressing <Del> returns to the main menu.

Time Events - PATH: Super-User Functions/Configure/ Time Events.

This selection is used to program up to 16 time events for use in the various options with program lines such as control relays, visual indicators, and trace data. The three fields to program and their description are as follows:

Date: A date in the format month/day/year indicates the date on which an event should occur. Entering a date without a time means the event will occur at the very beginning of the date specified. Entering a date and/or time

without a duration means the event will occur at the specified date/time, but will not retire.

Time: A time in the format hour:minute (based on a 24 hour clock) indicates the time at which an event should occur. Entering a time without a date means the event will occur daily at the specified time. Entering a date and/or time without a duration means the event will occur at the specified date/time, but will not retire.

Duration: A duration in the format hours:minutes indicates how long the event should remain in effect after the associated date/time have occurred. The duration is limited to a maximum of 24 hours.

Pressing <Return> will save all input. Pressing <Esc> or <Del> will restore the original entries without change. After saving or restoring the entries the user will be prompted to press <Return> to go to the next screen of time events, press a valid time event number and <Return> to go to the screen containing that time event, <Esc> to go to the previous menu, or <Del> to go to the main menu.

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

This selection is used to configure the Transaction Language (TL1) interface and is accessible only if the TL1 option is enabled in hardware (switch 2 of SW202 is in closed position).

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. Edit the field using the line editing feature described in Section 4.

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. Edit the field using the line editing feature described in Section 4.

Contact open/Contact closed 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 contact open or closure, is present on the channel. Edit the field using the line editing feature described in Section 4.

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.

Derived Channels - PATH: Super-User Functions/ Configure/TL1 Configuration/Derived Channels.

Selection of this option allows the Super-User to configure the TL1 specifics of derived 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. Edit the field using the line editing feature described in Section 4.

Upper threshold 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, is present on the channel. Edit the field using the line editing feature described in Section 4.

Lower threshold 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 lower threshold, is present on the channel. Edit the field using the line editing feature described in Section 4.

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.

User-Defined Alarms - PATH: Super-User Functions/ Configure/TL1 Configuration/User-Defined Alarms.

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

TL1 reporting: This entry enables reporting alarm conditions and equipment configuration via the TL1 interface. Use 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. Edit the field using the line editing feature described in Section 4.

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 is present on the channel. Edit the field using the line editing feature described in Section 4.

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, 2400, 4800, 9600 baud
Data bits:	toggles between 7 and 8
Stop bits:	toggles between 1 and 2
Parity:	toggles between none, odd, and even

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

All OMNIpulse system parameter configuration options are available through the System Parameter Configure Menu which is reached by selecting Super-User Functions/Configure/System Parameters from the Super-User Main Menu.

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

The PEERS 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. Although
intended for PEERS, the command line interface can be used by
any person or system by logging in with the PEERS password.

**Reset Date & Time - PATH: Super-User Functions/
Configure/System Parameters/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.
Therefore, 2:00 pm must be entered as 14:00. 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 automatically reset the clock for daylight saving time (first Sunday in April and last Sunday in October).

Pressing <Return> will prompt the user to save the configuration information. Answering <Y> will change the date and time and a system clock changed event will be logged in the system alarm history. Answering <N> will return to the option fields. Pressing <Esc> or <Del> will exit without changing the date and time.

Note

For reference purposes, changing the system time or date makes a CLKC (System Clock Changed) entry in the system alarm history log.

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

**Enable Call-Back - PATH: Super-User Functions/
Configure/System Parameters/Enable Call-Back**

Call-Back is an optional security feature incorporated by
OMNIpulse. This feature limits the remote locations from which
the system can be contacted (up to five). The Super-User can
assign a maximum of five telephone numbers and enable the
Call-Back feature. This will change the remote login procedure
as follows: The remote user will call the system and log in as
usual. After selecting the terminal type, the user will be
prompted to enter the number 1, 2, 3, 4, or 5 which corresponds
to the telephone number of that remote location. The system will
then hang up, call the remote location back, and require the
remote user to log in again. If the system 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 labeled 1 through 5, which may
be edited using the line editing features described in Section 4.
The Baud Rate field will change between 300, 1200, and 2400
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.

**Alarm Cut-Off - PATH: Super-User Functions/Configure/
System Parameters/Alarm Cut-Off.**

This selection is used to configure how the front panel Alarm
Cut-Off (ACO) switch or an appropriate TL1 command effects
the major, minor, and auxiliary alarm relays, and to set the ACO
time-out feature. Each of the three alarm relays can be
configured to be canceled or not canceled by the ACO switch.
Typically, if the relay is used to turn on a local audible alarm it
should be canceled by ACO, otherwise it should not. The
intended purpose of ACO is to turn off local audible alarms
while maintenance work is in progress. See Appendix H for a
detailed explanation of the ACO function.

The ACO time-out feature is provided to automatically remove
the ACO after an appropriate period of time has expired. This is
useful for giving a gentle reminder that the problem causing the
alarm has not been fixed in a reasonable amount of time, and
makes it more difficult to ignore alarm conditions. The default
time-out period is one hour.

The ACO feature can also be used to temporarily turn off control relays should audible alarms be connected to control relays. To use this feature, set the control relay mode to program control with ACO (PCO) in the control relay configuration. See "Control Relays - PATH: Super-User Functions/Configure/ Control Relays" for further information on configuring control relays. The ACO time-out feature also affects control relays configured as PCO.

The terminal arrow keys are used to move among the fields, and the space bar toggles the options in each field. Pressing <Return> saves the new configuration. Pressing <Esc> or <Del> will restore the original configuration without change. After saving or restoring the configuration pressing <Return> or<Esc> returns to the previous menu, pressing <Del> returns to the main menu.

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

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

The terminal arrow keys are used to move between the fields. Pressing <Return> saves the new configuration. Pressing <Esc> or <Del> will restore the original configuration without change. After saving or restoring the configuration pressing <Return> or<Esc> returns to the previous menu, pressing <Del> returns to the main menu.

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

This selection is used to set the baud rate for communication with a connected Lucent Technologies system (such as the Lineage® 2000 MCS Controller). Pressing the space bar toggles the baud rate field between 300, 1200, 2400, 4800, and 9600 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 OMNIpulse.

Pressing <Return> saves the new configuration. Pressing <Esc> or <Del> will restore the original configuration without change. After saving or restoring the configuration pressing <Return> or<Esc> returns to the previous menu, pressing <Del> returns to the main menu.

Backup Configuration - PATH: Super-User Functions/ Configure/System Parameters/Backup Configuration.

This option is used to save the OMNIpulse configuration information to an external memory device such as a personal computer disk drive. It is useful in areas where many OMNIpulse systems share the same configuration. In such cases, the first OMNIpulse system could be configured, the configuration backed up on an external memory device, then restored to another unconfigured system. It also provides a way to return easily to a desired configuration in the unlikely event of a system failure or prolonged power outage where the configuration information is lost. Note that only the configuration information is backed up. Statistics, histories, etc. cannot be saved with this option. While backing up the configuration, only one user may be logged into the system. This is necessary so that one user isn't attempting to change the same information that another user is backing up. The backup feature may be used from a remote location through a modem, or through the local terminal port of OMNIpulse (but not when connected through the pass-through port).

If the TL1 port is active, the system will not allow backup of configuration. The user may terminate the TL1 session temporarily by issuing a Cancel User command (see Appendix M). The backup can be initiated at this point. Upon completion, the TL1 port can be activated by issuing an Activate User command (see Appendix M).

Note

All data gathering is suspended during the backup operation, which lasts for approximately 10 minutes at 1200 bps, 5 minutes at 2400 bps, or 2 minutes at 9600 bps (local terminal only). During this period of time any equipment connected to OMNIpulse will not be monitored. Before using backup from a remote location, check critical equipment operation by viewing the appropriate data channels.

The backup feature uses XMODEM protocol (8 bits, no parity). The external memory device must support this protocol to use the backup feature. There are many software packages available that support this protocol, and each has its own specific method of operation. You should be familiar with the commands necessary for your particular software to receive files using this protocol before attempting a backup. To backup the configuration, follow the instructions on the backup screen.

From the menu selection line, press <Return> to get into the backup feature. You will be prompted to press <Return> to begin the download. You can press <Esc> or <Del> to return to the previous menus.

After pressing <Return>, you have up to three minutes to initiate the remote XMODEM procedure as dictated by the terminal package you are using. You may terminate the backup at any time by pressing multiple <CTRL><X>s.

Note

If a backup is not successfully completed, either due to excessive transmission errors, losing a connection during a remote call, or manually aborting with <CTRL><X>s, delete the partial backup file from the external memory device and attempt another backup. Never attempt to use a partial backup file to restore a system.

After backup is complete, normal system operation will automatically resume. As mentioned above, you should check all critical equipment being monitored by OMNIpulse before logging off the system. No other action is required.

Restore Configuration - PATH: Super-User Functions/ Configure/System parameters/Restore Configuration

This option is used to restore previously backed up configuration information to an OMNIpulse unit. This can be used to initially configure a new system with information backed-up from a different system, to recover from a prolonged power outage where memory backup power is lost, or to recover from a system failure. While restoring the configuration, only one user may be logged into the system. This is necessary so that one user isn't attempting to view or change the same information that another

user is restoring. The restore feature may be used from a remote location through a modem, or through the local terminal port of OMNIpulse (but not through the pass-through port).

If the TL1 port is active, the system will not allow the user to restore configuration. The user may terminate the TL1 session temporarily by issuing a Cancel User command (see Appendix M). The configuration can be restored at this point. Upon completion, the TL1 port can be activated by using the Activate User command (see Appendix M).

Note that once a restoration is complete, the OMNIpulse unit will automatically reset, so the user must log back into the system. After the reset, the unit will respond exactly as it would if all the configuration information were entered manually, thus it is possible after restoration to re-configure any part of the system.

This is very useful for initially configuring systems, where a standard configuration template can be restored, then a small amount of custom configuring can be done to match each system's specific requirements. This will produce a vast savings of time over configuring the entire system manually.

When restoring a configuration, only configuration information is restored. Since the restored configuration may be quite different from the previous configuration, all history, statistics, warnings, and trace data are cleared. This avoids confusion that may result from old data not matching the new configuration. Several parameters are not changed during restoration. These parameters include the date and time, and passwords. The date and time of the restoration file cannot be correct, and passwords should be changed often, so the passwords in the restoration file might be out of date, or may not even be known! The call-back security configuration of phone numbers and baud rates is restored, but the feature is disabled since the user may not be restoring from, or have access to, one of the configured call-back numbers. If this were the case it would not be possible to log back into the system from a remote location. This could occur mostly when using restore to configure a new system.

Note

Although the restore feature will probably only be used in a unit which has lost its configuration, or is being configured for the first time, it should be noted that as with backup, all data gathering is suspended during the restore operation, which lasts for approximately 10 minutes at 1200 bps, 5 minutes at 2400 bps, or 2 minutes at 9600 bps (local terminal only). During this period of time any equipment connected to OMNIpulse will not be monitored. When using restore from a remote location, critical equipment operation should be checked after the restoration by logging back in and viewing the data channels monitoring it. Restore shall be performed on the same version of software that was backed up.

The restore feature uses XMODEM protocol (8 bits, no parity). The external memory device must support this protocol to use the restore feature. There are many software packages available that support this protocol, and each has its own specific method of operation. You should be familiar with the commands necessary for your particular software to transmit files using this protocol before attempting a restoration. To restore the configuration, follow the instructions on the restore screen.

From the menu selection line, press <Return> to get into the restore feature. You will be prompted to press <Return> to begin the upload. You can press <Esc> or <Del> to return to the previous menus.

After you have pressed <Return>, OMNIpulse will begin waiting for you to start the remote XMODEM procedure as dictated by the terminal package you are using. You may terminate the restore operation at any time by pressing multiple <CTRL><X>s.

After successfully restoring a system, the only necessary action to continue normal operation is to enable the call-back security if this feature is used.

When using restore to initially configure a new system the phone numbers used for dial-out on alarm, periodic dial-out, and call-back security should be checked to make sure they are correct for the new system. If the phone numbers are to remain the same, the time for the periodic dial-out may need to be changed so two systems aren't attempting to reach the same number at the same time. The system ID fields and inventories

should be changed to match the new system, and the notepads and maintenance reminders should be checked to see if they make sense for the new system. Whether manually configuring or using restore to initially configure a new system, the time and date should be set, and the passwords changed.

Note

If a restore operation is not successfully completed, either due to excessive transmission errors, losing a connection during a remote call, or manually aborting with <CTRL><X>s, attempt another restoration, or configure the system manually as soon as possible. The restore operation works one feature at time, thus stopping the restoration in the middle will result in some features having the restored configuration, while others that the restore operation didn't get to will have the previous configuration. Although this cannot harm the system, it could result in unexpected alarms, dial-outs, warnings, etc.

Security Time-Out - PATH: Super-User Functions/ Configure/System Parameters/Security Time-Out

This option allows the system to log the user off automatically if no keyboard activity occurs for a specified period of time. The Time-Out field toggles between DISABLE, 5 min., 10 min., and 20 min. The default is five minutes. An audible beep warns the user one minute before the specified time-out period. When the option is disabled, the user must log off to prevent unauthorized access from unattended terminals.

6   *Voice Response*

Note: OMNIpulse units manufactured and shipped before April 1, 1999 included a Voice Response function, allowing users to communicate with OMNIpulse from any Touch-Tone™ telephone. This feature is described in this section. Voice Response is no longer provided on units shipped since April 1, 1999.

Login Procedure

The Voice Response feature makes remote user communication possible from any Touch-Tone™ telephone. When you call the OMNIpulse controller, you will be greeted with an introductory message prompting you to press the keypad # (pound) key to continue. You will have five seconds in which to press this key before the system will assume that you wish to initiate communications via modem. After the five seconds expires the system will begin sending modem signals. If you still wish voice response communications, you will be required to disconnect and call again.

Once you have entered the # key, you have initiated voice response communications for the remainder of the session. You will be prompted to enter the USER password. 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), use any key in its place. If you make a mistake, use the star (*) key to backspace one character.

If you enter an invalid password, the system will be prompt you to try again. Four (4) attempts at entering the correct password are permitted. At the fourth incorrect attempt, the system disconnects and you must call again. A user-clearable warning will be posted (Excessive unsuccessful login attempts were

made). If the password is entered correctly, OMNIpulse will reply with the complete header information consisting of the software version, date, time, system ID, and the active alarm status. After this, OMNIpulse will provide the command numbers for the basic information. You can enter any command number at any time during a message, or even before a message starts. At any point, you may ask for main menu options by pressing zero and pound.

Note

- A time-out feature will automatically hang up if no commands have been entered and no messages have been output for a period of one minute.

- When terminating communications, enter the BYE command or just hang up. However, if you disconnect without issuing the BYE command, the system will finish the message(s) in progress, then wait the one minute time-out interval before it will hang up and accept another incoming call.

After each command, you must press the # key. See Appendix G for a complete list of Voice Response Commands.

Voice Dial-Out on Alarm

It is possible to configure OMNIpulse to perform its dial-out on alarm feature using voice. Refer to Section 5 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 the 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, System ID, date and time, 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 five seconds to press the # key, otherwise the plant will disconnect automatically after reporting the alarms.

Periodic Status Dial-Out

It is possible to configure OMNIpulse to perform its periodic status dial-out using voice. Refer to Section 5 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 the 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, System ID, date and time, and the number of 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 five seconds to press the # key, otherwise the plant will disconnect automatically after reporting its status.

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

7   *Applications*

Transducer Compatibility

To be compatible with OMNIpulse™, transducers must be linear. Using a temperature transducer as an example, changes in transducer output voltage must be directly proportional to changes in temperature. In order to measure the output of non-zero crossing transducers, OMNIpulse provides a Transducer Offset feature for each Datalogger channel.

Transducers with current output are compatible with the Datalogger Board with the addition of a load resistor placed in series with the current loop. 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.

Calculating Transducer Offsets and Scale Factors

Some transducers provide a zero output when there is a zero input. For example, a 50 mV, 500A shunt will provide 0 mV out for 0A in. These kinds of transducers only require a scale factor for the datalogger channels to read properly.

However, some transducers do not provide a zero output for a zero input. An offset must be calculated for these kinds of transducers to enable the datalogger channels to read properly. Transducer specification sheets provide information showing how the input and output are related. They may be equations or sets of points. The following examples show some typical transducer specifications, and a general form equation matching those specifications. Then the calculations section shows how to find both the scale factor and the offset for that example. These equations can be used for any kind of transducer whose input/output specification matches the general form equation shown.

Symbols: The equations use three symbols: v, y, and b.

v   represents the voltage output of the transducer. It is
      what the datalogger board measures.

v1   represents a specific voltage, such as 10V.

y   represents what the transducer is measuring, such as
      frequency or temperature.

y1   represents a specific measurement value, such as 100 Hz.

b   is a constant in the equation. It is supplied in the
      transducer sheet.

Example 1:   **Information from specification sheet:**
Temperature
transducer   degrees F = 171v - 4

General form equation:

y = (scale factor) (v) + b

Calculations:

scale factor   = 171

        offset   = -(b)/(scale factor)

               = -(-4)/(171)

               = (4)/171 = 0.0234

Example 2:   **Information from specification sheet:**
Frequency
Transducer   at -10v, freq = 40 Hz

at +10v, freq = 60 Hz

General form equation:

at v1 you get y1

at v2 you get y2

Note: In this example, v1 = -10, v2 = +10, y1 = 40 Hz, and
y2 = 60 Hz.

Calculations:

scale factor = (y2-y1)/(v2-v1)

= (60-40)/(10-[-10])

= (20)/(20) = 1

offset = $\dfrac{(y2 + y1)\text{-(scale factor)}(v2 + v1)}{(-2)\text{(scale factor)}}$

= $\dfrac{(100)\text{-}(1)(0)}{(-2)(1)}$

= $\dfrac{100}{-2}$ = -50

Example 3:
Current Shunt
(No Offset)

Information from specification sheet:

50 mV, 100A shunt

General form equation:

full scale mV developed at full scale amps

Calculations:

scale factor = (full scale amps)/(full scale mV)

= (100A)/(50 mV) = 2

offset = none

Fuse and
Contact
Closure
Monitoring

Datalogger channels which are configured for alarm on contact open (CO) or alarm on contact close (CO) are typically used to sense the state of an alarm relay contact on a piece of monitored equipment. OMNIpulse has been designed to monitor isolated contacts with the use of binary jumpers on the Datalogger Channel Termination Board. A binary jumper provides voltage to the isolated contact which is then measured with the normal voltage measurement circuitry on the Datalogger board.

OMNIpulse uses the 60 Vdc scale when measuring binary channels, and ignores polarity. If the voltage is above 2 volts, the contact is considered to be open. If the voltage is less than 2 volts, it is considered closed. With this in mind it is possible to monitor non-isolated relay contacts with the CC/CO configuration, but in such cases the binary jumper for that channel must NOT be used. If a relay contact is already in use to activate a local alarm system, it is possible to simply measure the voltage across the contacts, or across a lamp or other equipment associated with the contact. Configuring that channel for CC or CO will then produce the open/closed values in the Datalogger channel scan screen, and the appropriate alarm for open or closed.

The following illustrations show how to configure Datalogger channels for various applications using a typical voltage of -48Vdc. This voltage as well as specific alarm thresholds are meant only as examples. The current limiting resistors pictured are necessary in both binary and analog configurations. The binary jumpers on the Datalogger Channel Termination Board must NOT be used in any of these applications.

Note

Never apply voltage to a Datalogger channel which has been configured with the jumper to sense an isolated contact. Application of voltage may cause invalid readings for that channel.

Figure 7-1: Closure to Voltage
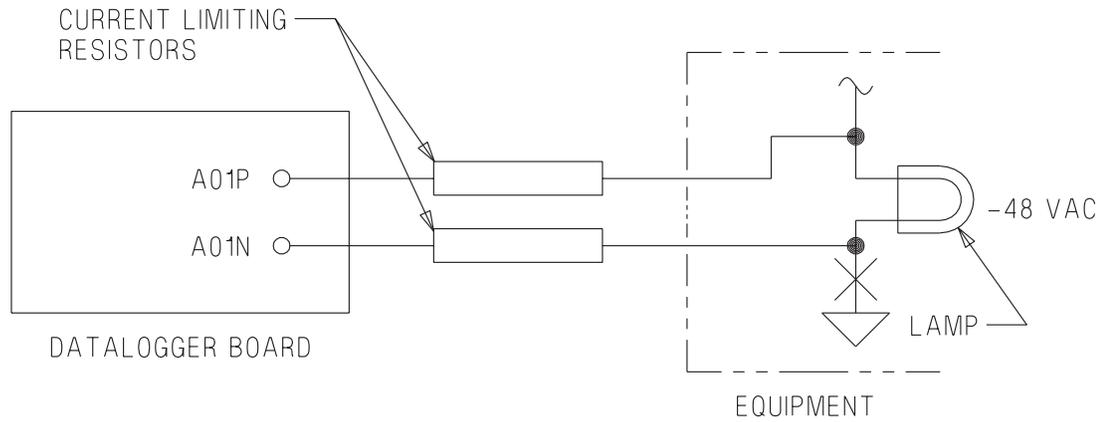
Figure 7-2: Monitoring an Indicator Lamp
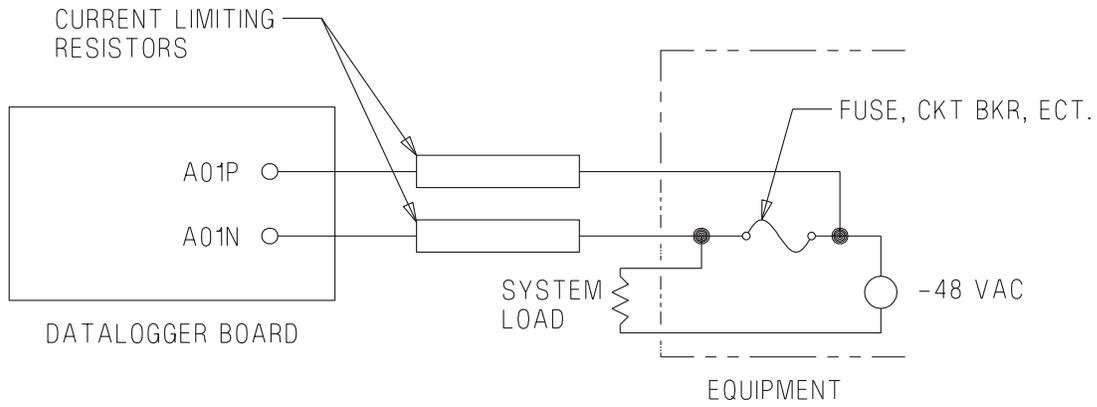
Figure 7-3: Fuse Monitoring
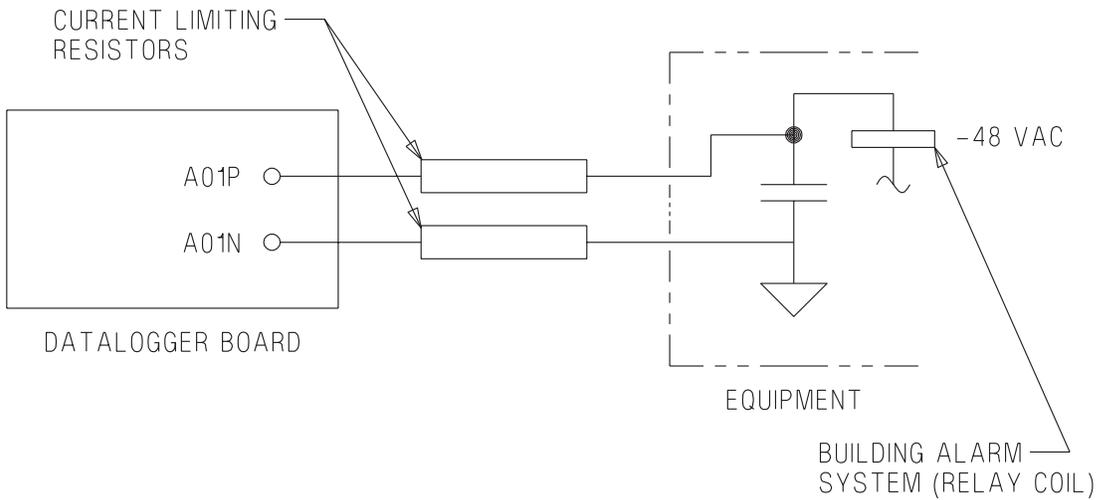
Figure 7-4: Closure to Ground

8   *Product Warranty*

A. Seller warrants to Customer only, that:

1. As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;

2. Upon shipment, Seller's Manufactured Products will be free from defects in material and workmanship, and will conform to Seller's specifications or any other agreed-upon specification referenced in the order for such Product;

3. With respect to Vendor items, Seller, to the extent permitted, does hereby assign to Customer the warranties given to Seller by its Vendor of such Vendor Items, such assignment to be effective upon Customer's acceptance of such Vendor Items. With respect to Vendor items recommended by Seller in its specifications for which the Vendor's warranty cannot be assigned to Customer, or if assigned, less than Sixty (60) days remain of the Vendor's warranty or warranty period when the Vendor's items are shipped to Customer or when Seller submits its notice of completion of installation if installed by Seller, Seller warrants that such Vendor's items will be free from defects in material and workmanship on the date of shipment to Customer. In such an event, the applicable Warranty Period will be sixty (60) days.

B. The Warranty Period listed below is applicable to Seller's Manufactured Products furnished pursuant to this Agreement, unless otherwise stated:

Warranty Period

Product Type	New Product	Repaired Product or Part*
Central Office Power Equipment**	24 Months	6 Months

* The Warranty Period for a repaired Product or part thereof is as listed or, in the case of Products under Warranty, is the period listed or the unexpired term of the new Product Warranty Period, whichever is longer.
** The Warranty Period for Products ordered for Use in Systems or equipment Manufactured by and furnished by Seller is that of the initial Systems or equipment.

C. If, under normal and proper use during the applicable Warranty Period, a defect or nonconformity is identified in a Product and Customer notifies Seller in writing of such defect or nonconformity promptly after Customer discovers such defect or nonconformity, and follows Seller's instructions regarding return of defective or nonconforming Products, Seller shall, at its option attempt first to repair or replace such Product without charge at its facility or, if not feasible, provide a refund or credit based on the original purchase price and installation charges if installed by Seller. Where Seller has elected to repair a Seller's Manufactured Product (other than Cable and Wire Products) which has been installed by Seller and Seller ascertains that the Product is not readily returnable for repair, Seller will repair the Product at Customer's site.

With respect to Cable and Wire Products manufactured by Seller which Seller elects to repair but which are not readily returnable for repair, whether or not installed by Seller, Seller at its option, may repair the cable and Wire Products at Customer's site.

D. If Seller has elected to repair or replace a defective Product, Customer shall have the option of removing and reinstalling or having Seller remove and reinstall the defective or nonconforming Product. The cost of the removal and the reinstallation shall be borne by Customer. With respect to Cable and Wire Products, Customer has the further responsibility, at its expense, to make the Cable and Wire Products accessible for repair or replacement and to restore the site. Products returned for repair or replacement will be accepted by Seller only in accordance with its instructions

and procedures for such returns. The transportation expense associated with returning such Product to Seller shall be borne by Customer. Seller shall pay the cost of transportation of the repair or replacing Product to the destination designated by Customer within the Territory.

E. The defective or nonconforming Products or parts which are replaced shall become Seller's property.

F. If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.

G. Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or Vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like.

H. THE FOREGOING WARRANTIES ARE EXCLUSIVE AND ARE IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. CUSTOMER'S SOLE AND EXCLUSIVE REMEDY SHALL BE SELLER'S OBLIGATION TO REPAIR, REPLACE, CREDIT, OR REFUND AS SET FORTH ABOVE IN THIS WARRANTY.

Appendix A   *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 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 OMNIpulse.

Automatic Warnings

Controller memory backup battery is low: Issued when the OMNIpulse microprocessor board memory backup battery should be replaced. When this warning is present, the front panel Memory Battery Low indicator will be lit. Refer to Figure 3-1 for the battery location on the Microprocessor Board. The replacement battery is a Panasonic part number BR2032 (3-volt lithium battery).

No dial-out number for P(1-4). Use Configure menu: OMNIpulse has been configured to dial out in response to an alarm condition, but the primary destination has no telephone number assigned to it. This warning will not be issued if an alternate telephone number (A1) has been assigned. P(1-4) will show the actual primary number which is not configured. It can

Caution

Lithium Battery: Risk of fire, explosion, and burns. Do not recharge, disassemble, heat above 100°C (212°F) or incinerate. Dispose of used batteries promptly. Do not recharge or incinerate. Keep away from children.

Replace battery with Panasonic BR2032 only. Use of another battery may present a risk of fire or explosion. Spare batteries may be ordered from Lucent Technologies, Comcode 406526079.

appear up to four times, once for each of the four primary numbers that doesn't have a phone number configured. Refer to Section 5.

Passwords still at factory default setting: It is recommended that all passwords (User, Super-User and PEERS) be changed from their factory defaults when OMNIpulse is installed. This warning will be issued until at least one of these passwords is changed.

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.

Data channel selected for trend study is not configured: Statistics has been configured for trend study on a data channel but the data channel is currently disabled. Refer to Section 5.

User-Clearable Warnings

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

** Excessive unsuccessful login attempts were made: Issued when six consecutive invalid passwords are entered at the **ENTER PASSWORD:** prompt, or when four consecutive invalid passwords are entered for the Voice Response feature, and after the **Too many invalid attempts** 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 **Too many invalid attempts** message is displayed.

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

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

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

Diagnostic Warnings

Speech data is corrupted. Call the Hotline: The voice response memory device has failed its checksum test which may result in garbled voice messages. The Microprocessor board probably requires replacement. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)**

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. The Microprocessor board probably requires replacement.

On-board modem problems. Call the Hotline: The on-board modem has failed its power-up tests and may cause problems on dial-out or dial-in. The Microprocessor board probably requires replacement.

Voice response hardware problems. Call the Hotline: The voice response circuit failed its power-on test. This will cause the voice response feature to be disabled. The Microprocessor board probably requires replacement. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)**

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 systems. The Microprocessor board probably requires replacement.

Datalogger *(1-4)* **channel readings out of range. Call the Hotline:** The test of the datalogger channels on a Datalogger Board has recorded an invalid reading that may be due to device failure. This message will appear for each of the four Datalogger Boards which failed the test, with the "*(1-4)*" replaced by the actual board number. The Datalogger board with the failed channel, or possibly the Microprocessor board requires replacement. This warning may occur at any time during operation if an invalid reading is detected. It will be deleted if the Datalogger board with the failure is removed, or if power-up diagnostics are run and the Datalogger test passes.

Appendix B   *Alarms*

Active Alarms and Datalogger History

The following are the alarm conditions reported by the OMNIpulse for datalogger channels. These abbreviations and descriptions appear in the Active Alarm Report while active and while the Datalogger Board is installed. They are automatically deleted when the condition retires or if the Datalogger Board is removed. When the card is reinserted, current alarm conditions will be displayed and history reporting will resume. The datalogger alarm history log will record the date and time the alarm condition occurred and the date and time it retired. Along with Occurred, the history will show whether the upper threshold (U) or lower threshold (L) was exceeded to cause the alarm, or in the case of contact closure/open will show whether the contact closed (C) or opened (O) to generate the alarm. The active alarm report and history log will also display the description entered by the Super-User for the associated channel.

A001-A64 (Datalogger Channel Alarm): The channel shown is being alarmed due to the measurement exceeding either the upper or lower thresholds, or a contact open or closed being sensed.

Active Alarms and Derived Channel History

The following are the alarm conditions reported by the OMNIpulse for derived channels. These abbreviations and descriptions appear in the active alarm report while active. They are automatically deleted when the condition retires. The derived channel alarm history log will record the date and time the alarm condition occurred and the date and time it retired. Along with Occurred, the history will show whether the upper

threshold (U) or lower threshold (L) was exceeded to cause the alarm. The active alarm report and history log will also display the description entered by the Super-User for the associated channel.

DC01-DC32 (Derived Channel Alarm): The channel shown is being alarmed due to the measurement exceeding either the upper or lower thresholds.

Active Alarms and User-Defined Alarm History

The following is a list of all alarm conditions reported by the OMNIpulse for User-Defined alarms. These abbreviations and descriptions appear in the Active Alarm Report while active. They are automatically deleted when the condition retires. The User-Defined Alarm History Log will record the date and time the alarm condition occurred and the date and time it retired. The active alarm report and history log will also display the description entered by the Super-User for the associated alarm.

UD01-UD16 (User-Defined Alarm): The alarm shown is being alarmed due to the associated program line for that alarm becoming TRUE.

Active Alarms and Alarm Relay History

The following is a list of all alarm relay conditions reported by OMNIpulse. These abbreviations and descriptions appear in the active alarm report while active, and are automatically deleted when the alarm condition retires. The alarm relay history log will record the date and time the alarm condition occurred and the date and time it retired.

AUX (Auxiliary alarm): An alarm condition indicating that a data channel programmed to send an AUX alarm has exceeded its upper or lower threshold, or a User-Defined alarm programmed to send an AUX alarm has its program line TRUE.

MAJ (Major alarm): An alarm condition indicating that a data channel programmed to send a MAJ alarm has exceeded its upper or lower threshold, or a User-Defined alarm programmed to send a MAJ alarm has its program line TRUE.

MIN (Minor alarm): An alarm condition indicating that a data channel programmed to send a MIN alarm has exceeded its upper or lower threshold, or a User-Defined alarm programmed to send a MIN alarm has its program line TRUE.

Active Alarms and System Alarm History

The following is a list of all system alarm conditions reported by OMNIpulse.

CLCK (System Clock Changed): This event is recorded in the system history log whenever the time and/or date is changed. The occurred event is the time and date before the change, and the retired event is the new time and date.

PH (Processor Halt): This event is recorded in the system history log whenever the OMNIpulse microprocessor board is powered down, reset, or otherwise halted. It is recorded as occurred only.

PR (Processor Restart): This event is recorded in the system history log whenever the OMNIpulse microprocessor board is powered up or reset. It is recorded as occurred only.

Appendix C   **Statistics Algorithms**

Types and Values of Statistics Logs

The statistics features permit collecting data over various time periods. These data are held in battery-backed RAM to protect against loss during power failures. OMNIpulse keeps three types of statistics logs: basic, trend, and busy hour statistics.

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

Instantaneous values: Datalogger and Derived channel readings taken at one-minute intervals.

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:

Twenty-four 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.

Effects of Changes

Power failures, changing the system date or time, and changing channel configuration will affect OMNIpulse's statistical functions in the following ways:

Effect of Power Failure:

Loss of main power to the OMNIPulse microprocessor board 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 Channel Input Type, Range, Scale Factor, or Transducer Offset, or Derived Channel Scale Factor or Arithmetic Expression:

Changes in Datalogger channel input type, range, scale factor, or transducer offset, or Derived channel scale factor or arithmetic expression will make the statistics invalid because of potentially large changes in channel readings after changing the configuration. For example, simply changing the scale factor from 1 to 10 would result in readings after the change being 10 times higher than those before the change. This would probably

fill all the high statistics with the new readings, and never have the new readings drop low enough to register in the low statistics. The average statistics would also be severely effected. For this reason all statistics will be cleared for a channel with these types of configuration changes, and new statistics entries will begin at the next minute after the change. Note that change in description, alarm limits, etc. which do not effect the channel readings will not cause the statistics to be cleared.

Appendix D   *Dial-Out Features*

Dial-Out on Alarm Algorithm

If the Dial-Out on Alarm feature is enabled, OMNIpulse 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. In the case of simultaneous dial-out events, all alarms with the same destination will be reported in a single call.

Five phone numbers can be assigned, four primary numbers (P1, P2, P3, and P4), and one alternate number (A1). OMNIpulse 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. OMNIpulse will call out to P1 for an alarm stored in the dial-out queue. If the first destination cannot be reached, OMNIpulse will then attempt to call out the next selected number, P2. If it is not reached, OMNIpulse will then report all alarms 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, OMNIpulse 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 OMNIpulse 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 OMNIpulse is still unable to reach the destination, the first alarm will be deleted from the dial-out queue and a ****Dial-out number(s) did not respond:** warning will be issued.

Note

> The Dial-Out on Alarm feature can handle up to 64 alarm events, which should be sufficient for most systems. In the unlikely event that alarms are occurring/retiring faster than the Dial-Out on Alarm feature can send them to the remote user it is possible to fill the 64 event memory. If this happens, the last event(s) after the memory became full will not be dialed-out, and a user-clearable ****Pending dial-out list was full. Was unable to add event(s)** warning will be issued. Normal operation will resume as soon as dial-out call(s) are completed and dial-out events are removed from the memory.

Periodic Status Dial-Out Algorithm

If the Periodic Status Dial-Out feature is enabled, OMNIpulse 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. OMNIpulse 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 used in the Periodic Status Dial-Out configuration screen. This number will be dialed out at the time and day set by the user. OMNIpulse will make only two attempts at reaching this number. If the phone number cannot be reached on the first attempt, OMNIpulse will wait 30 minutes before trying again. If the second attempt is unsuccessful, a ****Periodic dial-out number did not respond:** warning will be issued, and OMNIpulse will not retry the call until the next occurrence of the dial-out time and day.

Appendix E   *External Connections*

TB201 Pin Connections

Pin assignments on the microprocessor board terminal block TB201 (refer to Figure 3-1) are as follows:

PIN#	TB201 NAME
1	spare
2	spare
3	spare
4	s pare
5	spare
6	DTR2
7	DSR2
8	CTS2
9	RTS2
10	TXD2
11	RXD2
12	COMMON2
13	RS-485+
14	RS-485-
15	RS-485+
16	RS-485-

Signal Descriptions

TB201 pins 1-5 are reserved for future expansion. No connections should be made to these pins.

TB201 pins 6-12 are the RS-232 serial port pass-through connections. The proper connections of these pins to several Lucent Technologies Remote Access Systems (RAS) is described below. The pins are named with the RS-232 standard names for connection to other systems.

TB201 pins 13-16 are the RS-485 serial port connections. Refer to Section 3.

Pass-Through Connections

Lucent Technologies OMNIpulse and Remote Access System (RAS)

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

OMNIpulse NAME	TB201 PIN#		RAS P303 PIN#	NAME
DSR2	7	⟶	7	DSR
DTR2	6	⟵	2	DTR
RTS2	9	⟵	3	RTS
CTS2	8	⟶	6	CTS
RXD2	11	⟶	8	RXD
TXD2	10	⟵	1	TXD
SGND2	12	—	4	SG

Lucent Technologies OMNIpulse and ECS

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

			OMNIpulse or ECS Local Port (RS-232)	
(Primary Unit)			(Connected System)	
OMNIpulse	TB201			
NAME	PIN#		PIN#	NAME
DSR2	7	⟶	20	DTR
DTR2	6	⟵	6	DSR
RTS2	9	⟵	5	CTS
CTS2	8	⟶	4	RTS
RXD2	11	⟶	2	TXD
TXD2	10	⟵	3	RXD
SGND2	12	—	7	SG

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. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)**

- **Dial-Out Features:** Periodic Status Dial-Out and Dial Out On Alarm features also require that a telephone line be connected to the unit's RJ-11 telephone jack.

A suggested method for alarm reporting from the connected system is to monitor alarm relays on the connected system using Datalogger channels on the primary unit. The primary unit can then be configured to dial out on the appropriate Datalogger channel alarms to report alarms detected by the connected system.

Lucent Technologies OMNIpulse and MCS

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

OMNIpulse NAME	TB201 PIN#		MCS Controller Remote Interface Board Backplane Connection PIN#	NAME
DSR2	7	⟶	111	DSR
DTR2	6	⟵	011	DTR
RTS2	9	⟵	010	RTS
CTS2	8	⟶	110	CTS
RXD2	11	⟶	109	TXD
TXD2	10	⟵	009	RXD
SGND2	12	—	100	GRD

Appendix F   *Program Line Expressions*

The following is a list of all the program words that can be used to build program lines for Control Relay, User-Defined Alarm, Visual Indicator, and Trace data configurations. A program line will cause the desired action (i.e., Control Relay is energized, User-Defined alarm activates, Visual Indicator turns on, or Trace starts) 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, etc. is actually in effect.

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 EQU 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.
A1-A64	Each of the 64 analog channel alarms may be used to trigger a condition. **Example:** A1 is TRUE when either the configured upper or lower limit of analog channel A001 has been surpassed.
CR1-CR32	Each of the 32 control relays may be used to trigger a condition. **Example:** CR1 is TRUE when control relay CR01 is energized.
VI1-VI8	Each of the 8 visual indicators may be used to trigger a condition. **Example:** VI1 is TRUE when visual indicator VI1 is lit.
DC1-DC16	Each of the 16 derived channel alarms may be used to trigger a condition. **Example:** DC01 is TRUE when derived channel alarm DC01 is active.
TE1-TE8	Each of the 8 time events may be used to trigger a condition. **Example:** TE01 is TRUE when configured time for TE01 is met.
UD1-UD16	Each of the 16 user-defined alarm events may be used to trigger a condition. **Example:** UD01 is TRUE when user-defined alarm UD01 is active.
D1-D31	The day of the month may be used to trigger a condition. This condition is TRUE on the given day of the month for the full 24 hour period of that day. The condition is active for the full 24 hour period of that day. **Example:** D5 OR D31 will energize a relay on either the 5th or 31st day of the month (assuming the current month has 31 days).

W1-W7	The day of the week may be used to trigger a condition. This condition is TRUE on the given day of the week where 1=Sunday, 2=Monday, etc. The condition is active for the full 24 hour period of that day. **Example:** (W3 OR W6) will energize a relay on either Tuesday or Friday.
( )	Parentheses operate to determine priority of operations.
ANY	Any may be used to trigger a condition when any alarm is active.

Appendix G   *Available Voice Commands and Units*

Note: OMNIpulse units manufactured and shipped before April 1, 1999 included a Voice Response function, allowing users to communicate with OMNIpulse from any Touch-Tone™ telephone. This feature is described in this section. Voice Response is no longer provided on units shipped since April 1, 1999.

The following list of unit abbreviations and their associated voice response are available to the user when configuring datalogger and derived channels. The units may be entered in upper or lower case.

Abbreviation	Voice Response
AMPS	Amperes
DEGC	Degrees Celsius
DEGF	Degrees Fahrenheit
FT	Feet
IN	Inches
KA	Kiloamperes
KVA	Kilovolt-amperes
KVAC	Kilovolts AC
KVDC	Kilovolts DC
KWH	Kilowatt-hours
MET	Meters

MVDC	Millivolts DC
PER	Percent
PSI	Pounds per square inch
VA	Volt-amperes
VAC	Volts AC
VDC	Volts DC

The following list of voice commands are available to the user when logging into OMNIpulse from a Touch-Tone telephone. All commands must be entered as shown and terminated with a # (pound sign).

System Alarm Functions		
Alpha	**Numeric**	**Function**
AL	25	active alarms; system, datalogger, derived, user-defined
SH	74	history for all system alarms
SHn	74n	history for system alarm n
SH1	741	(or 7401) history for system clock changed alarm
SH2	742	(or 7402) history for processor halt alarm
SH3	743	(or 7403) history for processor restart alarm
Alarm Relay Functions		
Alpha	**Numeric**	**Function**
AH	24	history for all alarm relays
AHn	24n	history for alarm relay n
AH1	241	(or 2401) history for major alarm relay
AH2	242	(or 2402) history for minor alarm relay
AH3	243	(or 2403) history for auxiliary alarm relay
Datalogger Functions		
Alpha	**Numeric**	**Function**

DL	35	present readings of all datalogger channels
DLn	35n	present reading of datalogger channel n (n=1 to 64)
DH	34	history for all datalogger channel alarms
DHn	34n	history for datalogger channel alarm n (n=1 to 64)

Control Relay Functions

Alpha	**Numeric**	**Function**
CRS	277	present state of all control relays
CRSn	277n	present state of control relay n (n=1 to 32)
CRH	274	history of state of all control relays
CRHn	274n	history of state of control relay n (n=1 to 32)

Derived Channel Functions

Alpha	Numeric	Function
DCR	327	present readings of all derived channels
DCRn	327n	present reading of derived channel n (n=1 to 16)
DCH	324	history for all derived channel alarms
DCHn	324n	history for derived channel alarm n (n=1 to 16)

User-Defined Alarm Functions

Alpha	**Numeric**	**Function**
UDH	834	history for all user-defined alarms
UDHn	834n	history for user-defined alarm n (n=1 to 16)

Visual Indicator Functions

Alpha	Numeric	Function
VIS	847	present state of all visual indicators
VISn	847n	present state of visual indicators n (n=1 to 8)
VIH	844	history of state of all visual indicators

VIHn	844n	history of state of visual indicators n (n=1 to 8)

Miscellaneous Functions

Alpha	Numeric	Function
SC	72	system configuration
HLP	457	toll free number
DT	38	date and time
BYE	293	terminate communications

Appendix H   *Alarm Cut-Off*

The Alarm Cut-Off (ACO) feature of OMNIpulse provides a means for silencing audible alarms controlled by OMNIpulse's Major, Minor, or Auxiliary alarms and/or Control Relays. The ACO switch on the front panel of the OMNIpulse unit, and the ACO time-out set in the ACO Configure screen work as follows:

- Assume analog channel 1 (A01) is configured to cause a Major alarm when its upper threshold is exceeded, and the Major alarm is configured to be canceled by ACO.

- When the threshold is exceeded, the Major alarm relay switches to its alarm state, and the alarm is recorded in the history log. While in the alarm state, a user presses the front panel ACO switch, which causes the Major alarm relay to switch to its non-alarm state, but the history log is not affected.

- If A01 drops below its upper alarm state before the ACO time-out has expired, the alarm is retired in the history log, and the Major alarm relay remains in its non-alarm state.

- If A01 remains above the upper threshold beyond the ACO time-out period, the Major alarm relay switches back to its alarm state, but the history log is not effected. The ACO switch could be pressed again after the Major alarm relay returns to its alarm state, and the cycle would start again.

- If the ACO time-out has not expired, and A01 remains above the upper alarm threshold, pressing the front panel ACO switch will remove the ACO and the Major alarm relay will return to its alarm state. In this way the ACO feature is toggled off and on with each press of the front panel ACO switch.

This description also applies to Control Relays programmed to work with ACO. The only difference is the Control Relay energizes (turns ON) when its program line is TRUE, and de-energizes (turns OFF) with ACO. Also the fact that a control relay is OFF due to ACO is reflected in the control relay status screen by showing the status as ACO, rather than simply OFF.

The effect of multiple alarm occurrences and ACO must also be considered:

- Assume analog channel 1 (A01) and analog channel 2 (A02) are both configured to cause a Major alarm when their respective upper thresholds are exceeded, and the Major alarm is configured to be canceled by ACO.

- A single occurrence of either channel exceeding its upper threshold will cause ACO to function as described above.

- If a second alarm occurs while the first alarm is ACOed, and within the ACO time-out period, the ACO is removed, and the Major alarm relay returns to its alarm state. Pressing the front panel ACO switch after the second alarm occurs will again cause the Major alarm relay to switch to its non-alarm state. The ACO time-out will begin from the time the ACO switch was pressed for the second alarm, and **BOTH** alarms must retire (A01 and A02 readings both fall below their respective upper alarm thresholds) before the ACO time-out period expires, or the Major alarm relay will switch to its alarm state when the time-out period does expire.

Appendix I *Arithmetic Expressions*

The Derived Channel function of OMNIpulse provides a field for entering an arithmetic expression in the Derived Channel Configuration screen (see Section 5). The arithmetic expression consists of operands and operators. The operands are numeric values to be used in the expression, while the operators indicate the kind of operation to take place (for example + or -). the following are lists of operands and operators.

Operands:

A1 - A64: The present reading of any datalogger channel after subtracting off the transducer offset and multiplying by the scale factor for that channel.

DC1-DC16: The present reading of any derived channel after calculating the arithmetic expression and multiplying by the scale factor for that channel.

Numeric Operands: Integer and decimal numbers may be used in an expression. There are no limits imposed on the size of the number or the number of decimal places, however using numbers that result in the final calculated reading being beyond the displayable range for the derived channel will result in stars (**) being displayed for the derived channel reading. Negative numbers may be used, but they must be placed in parentheses. For example negative 56 would be entered as (-56).

Operators:

+	Addition
-	Subtraction
*	Multiplication
/	Division

OMNIpulse uses the normal rules for operator precedence. Multiplication and division operations are performed first, then addition and subtraction are performed second. When the same operator is used more then once in an expression, the operators are evaluated from left to right. Parentheses may be used in an expression to override the normal precedence. For example (A1+A2)*100 will add A1 and A2, then multiply by 100 while A1+A2*100 will multiply A2 by 100, then add A1. If parentheses within parentheses are used, OMNIpulse evaluates the innermost expression(s) first.

Example 1:

Datalogger channels 1 through 8 are used to measure the output current of the eight rectifiers in a battery plant, and datalogger channel 9 is used to measure the same battery plant's load current. The datalogger channels are configured such that the readings are in Amps. It is desired to know the amount of discharge/recharge current for the batteries associated with this plant.

Using derived channel 1 for the battery discharge/recharge current, the arithmetic expression would be:

(A1+A2+A3+A4+A5+A6+A7+A8)-A9

The parentheses are not necessary, but are included to clarify that the total rectifier output current is calculated, then the plant's load current is subtracted. This will result in the amount of battery discharge/recharge current. Positive readings will indicate recharge current, while negative readings will indicate discharge current. By setting the lower alarm threshold to a small negative number, it is possible to create an alarm when the batteries are being discharged. This same alarm could then be used to start a Trace of the battery discharge current calculated by derived channel 1, or if the voltage is being measured by another datalogger channel, a Trace of the battery voltage during discharge.

Example 2:

Datalogger channel 24 is measuring a temperature transducer, and is configured to show readings in degrees Celsius. It is desired to show these temperature readings in degrees Fahrenheit.

Using derived channel 2 for the Fahrenheit reading, the arithmetic expression would be:

A24*1.8+32

The readings displayed for derived channel 2 would be the Fahrenheit temperature measured by the transducer of datalogger channel 24.

Appendix J   *Lucent Technologies Lineage*® *2000 Data Switch Compatibility*

The OMNIpulse system may be connected to a Lucent Technologies Lineage® 2000 Data Switch in applications where a separate telephone line dedicated to the OMNIpulse system is not available. The OMNIpulse provides many alarm and status reporting features not available through Data Switch, including nag for dial-out on alarm and periodic status dial-out. In addition OMNIpulse has two more destination phone numbers than Data Switch, has the ability to dial-out to pagers, and can dial-out and be accessed via the voice response feature. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)** These features will not be available if OMNIpulse is accessed with Data Switch, so if at all possible OMNIpulse should be accessed with its own dedicated telephone line.

Note that it may be possible to eliminate Data Switch by using OMNIpulse as the point of primary telephone line connection, and connecting another system to the pass-through port of OMNIpulse. The alarm connection from the other system, originally used to trigger the Data Switch dial-out on alarm, could be connected to one of the datalogger channels to trigger the OMNIpulse dial-out on alarm. The only difference in this connection is the pass-through system is not automatically scanned during a dial-out on alarm call from OMNIpulse as it is with Data Switch. The receiver of the alarm call would have to call back the OMNIpulse, pass-through to the connected system,

and determine the exact nature of the alarm. The pros and cons of each option must be weighed to determine which approach is best for each application.

In applications where use of Data Switch is the desired approach, connect one of the Data Switch ports to the local port of OMNIpulse as shown in Table J-1. Connect the major, minor, or auxiliary alarm relay, or one of the control relays to the alarm connection of Data Switch, and configure that relay to be active when alarm events occur in OMNIpulse for which Data Switch should dial-out. The normally open (NO) contact should be connected to the "alarm" input of Data Switch, and the common (C) contact should be connected to the "RTN" input of Data Switch. The following special procedures must be followed when accessing OMNIpulse with Data Switch.

For dial-out on alarm, Data Switch must be configured with the "polling" password of OMNIpulse to log into the command line interface of OMNIpulse. This must be done for the "ALMS" command issued by Data Switch to be recognized. If Data Switch logs into the menu driven interface of OMNIpulse using the normal "login" password, the "ALMS" command will not be recognized, and the dial-out on alarm of Data Switch will not work properly.

When connecting to OMNIpulse for normal communications, the "login" password should be used to access the most complete feature set of OMNIpulse via the menu driven interface. When logged into the menu driven interface of OMNIpulse the <Esc> and arrow keys cannot be used. Data Switch looks for an <Esc>, and when it finds one 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, OMNIpulse 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 for moving the cursor between fields within a screen.
<CTRL><D>	Used in place of down arrow for moving the cursor between fields within a screen.
<CTRL><N>	Used in place of right arrow for moving the cursor within fields during editing, or between fields within a screen. "<N>" stands for next.
<CTRL><P>	Used in place of left arrow for moving 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. See Section 4 for additional details.

Table J-1 specifies the connections between the OMNIpulse local port and a Lineage® 2000 MCS Controller resident Data Switch.

Table J-1: Connections Between OMNIpulse and MCS Controller Data Switch

OMNIpulse	OMNIpulse	MCS Backplane			
Function	Local Port	Port 1	Port 2	Port 3	Port 4
RXD	3	110	114	117	120
TXD	2	010	014	017	020
RTS*	4	011	015	018	021
CTS*	5	nc	nc	nc	nc
DTR/DSR	6,20	111	115	118	121
SG(RTN)	7	109	113	116	119
Alarm	**	009	013	016	019

* The RTS pin on OMNIpulse connects to the CTS pin on Data Switch. The CTS pin on OMNIpulse does not connect to Data Switch.

** The alarm contact of Data Switch connects to the normally open (NO) contact of one of the alarm relays or control relays of OMNIpulse. The common (C) contact of the same relay must be connected to the RTN pin of Data Switch.

On the stand-alone Data Switch, the pins are clearly marked with their function. Connections are made as follows:

Connections Between OMNIpulse and Stand-Alone Data Switch

DATA SWITCH		OMNIpulse LOCAL PORT (RS-232)	
NAME		PIN #	NAME
RXD	⟶	2	TXD
TXD	⟵	3	RXD
CTS	⟶	4	RTS
DTR	⟵	6	DSR
		20	DTR
RTN	⟶	7	SG

Appendix K   *Increased Scan Rate for Analog Channels*

Each Datalogger Board contains a single voltage measurement circuit. The Microprocessor Board is able to monitor 16 analog channels on a Datalogger Board by sequentially scanning each enabled channel. On a fully configured board (all 16 channels enabled), any one channel is scanned approximately every 10 seconds. Since each Datalogger Board makes its own measurements, this scan time does not increase when additional Datalogger Boards are installed in the system.

Occasionally, it may be desired to scan a particular channel (or a few channels) more frequently. This can be accomplished by disabling the remaining channels on the Datalogger Board containing the channel(s) for which the faster scan rate is desired. For example; to scan channel A017 every second, disable channels A018 through A032 (the remaining channels on Datalogger Board #2). Similarly, if 12 channels on a particular Datalogger Board are disabled, the remaining four channels could be scanned at approximately four-second intervals.

This can be particularly useful in conjunction with the Trace Channel feature (refer to Section 5). The Trace Channel sample rate defaults to Every 10 seconds to correspond with the time required to scan all 16 channels on a Datalogger Board. If a Datalogger Board is configured with only one channel enabled (as in the first example above), a Trace Channel can be configured with a one-second sample rate to collect 120 one-second interval readings. Similarly, if 12 channels on a particular Datalogger Board are disabled, the remaining four channels could be traced, one on each Trace Channel, at a four-second sample rate.

Datalogger Channels are divided among the Datalogger Boards as follows:

Datalogger Board	Datalogger Channels
1	A001-A016
2	A017-A032
3	A033-A048
4	A049-A064

Appendix L   *OMNIpulse Command Line Access*

Introduction

A command line access is provided for each feature screen in the OMNIpulse. The user is able to go into the command line mode from anywhere in the menu system by typing a forward slash (/). This brings an input field in reverse video with a prompt to enter a command. Typing in a valid command followed by <Return> takes the user to the appropriate screen in the system at once, thus avoiding the need to navigate through potentially many levels of menus. This is intended for advanced users who might find navigating through various menus cumbersome.

The commands are modeled after the voice commands abbreviations. **(See Section 6 for more information on the voice response feature, which is available only on units shipped prior to April 1, 1999.)**

Command Structure

Most of the commands are constructed using the following scheme:

A typical command, for example: DLCFG can be viewed as consisting of two parts. The first two letters indicate the entity to be worked on. In this example DL stands for DataLogger Channels. The second part of the command indicates the action requested on the entity. In this example CFG stands for configuration.

The valid entities are:

DL	Datalogger Channels
DC	Derived Channels
CR	Control Relays
UD	User-Defined Alarms
VI	Visual Indicators
TR	Trace Channels

The valid actions are:

CFG	Configuration
R	Readings
RAL	Readings (Alarmed Channels)
RCU	Readings (Custom)
S	Status or Statistics Basic (whichever is applicable)
SCU	Status or Statistics Basic (Custom) (whichever is applicable)
SCLR	Clear Statistics Basic
H	History
HCU	History (Custom)
HCLR	Clear History
DCFG	Dial-Out Configuration
DQCFG	Dial-Out Quick Configuration

For example, the command to view history of user-defined alarms is:

UDH

In general, channel numbers can be appended to commands to go to the display for that particular channel. For example, UDCFG9 immediately displays the configuration screen for User-Defined Alarm 9.

The commands which do not fall into the above model are lumped together as miscellaneous commands. Refer to the enclosed tables for a complete set of commands.

The Menu Commands

Entering MENU at the command line lists all available commands. The first menu, the MAIN MENU, displays the following individual sub-menu commands:

DLMENU	displays datalogger channel commands
DCMENU	displays derived channel commands
CRMENU	displays control relay commands
VIMENU	displays visual indicator commands
UDMENU	displays user-defined alarm commands
TRMENU	displays trace channel commands
TLMENU	displays TL1 (command line) commands (available only with the TL1 option)
MIMENU	displays miscellaneous commands

Pressing <Return> repeatedly will page through all available commands. These sub-menu commands can also be entered directly at the command line to display immediately only the desired set of commands and avoid paging.

While any menu is being displayed, the first two letters of any of the sub-menu commands (including MA for the MAIN MENU) can also be entered to display immediately the desired set of commands, and the <Return> key can be used to continue paging.

List of Commands

DATALOGGER CHANNEL COMMANDS	
Command	**Function**
DLCFG	configure all datalogger channels starting from channel 1
DLCFGn	configure datalogger channel n (n = 1 to 64)
DLR	present readings of all datalogger channels
DLRn	present reading of datalogger channel n (n = 1 to 64)
DLRCU	present readings of all datalogger channels (custom)
DLRAL	present readings of all datalogger channels (alarmed)
DLH	datalogger alarm history
DLHn	datalogger alarm history for channel n (n = 1 to 64)
DLHCU	datalogger alarm history (custom)
DLHCLR	clear datalogger alarm history
DLS	basic statistics of all datalogger channels starting from channel 1
DLSn	basic statistics for datalogger channel n (n = 1 to 64)
DLSCU	basic statistics of all datalogger channels (custom)
DLSCLR	clear basic statistics of for datalogger channels
DLSCLRn	clear basic statistics of for datalogger channels n (n = 1 to 64)
DLCUCFG	custom selection configuration for data channels
DLDCFG	datalogger dial out alarm matrix configuration
DLDCFGn	datalogger dial out alarm matrix configuration for channel n
DLDQCFG	datalogger dial out alarm matrix configuration (quick)
DLMENU	lists datalogger channel commands
DERIVED CHANNEL COMMANDS	
Command	**Function**
DCCFG	configure all derived channels starting from channel 1
DCCFGn	configure derived channel n (n = 1 to 32)
DCR	present readings of all derived channels

DCRn	present reading of derived channel n (n = 1 to 32)
DCRCU	present readings of all derived channels (custom)
DCRAL	present readings of all derived channels (alarmed)
DCH	derived channel alarm history
DCHn	derived channel alarm history for channel n (n = 1 to 32)
DCHCU	derived channel alarm history (custom)
DCHCLR	clear derived channel alarm history
DCS	basic statistics of all derived channels starting from channel 1
DCSn	basic statistics for derived channel n (n = 1 to 32)
DCSCU	basic statistics of all derived channels (custom)
DCSCLR	clear basic statistics for derived channels
DCSCLRn	clear basic statistics for derived channel n (n = 1 to 32)
DCCUCFG	custom selection configuration for derived channels
DCDCFG	derived dial out alarm matrix configuration
DCDCFGn	derived dial out alarm matrix configuration for channel n
DCDQCFG	derived dial out alarm matrix configuration (quick)
DCMENU	lists derived channel commands

CONTROL RELAY COMMANDS

Command	Function
CRS	state of all control relays
CRSn	state of control relay n (n= 1 to 32)
CRSCU	state of all control relays (custom)
CRCFG	configure of all control relays starting from relay 1
CRCFGn	configure control relay n (n= 1 to 32)
CRH	history of all control relays
CRHn	history of control relay n (n= 1 to 32)
CRHCU	history of all control relays (custom)
CRHCLR	clear history of all control relays
CRCUCFG	custom selection configuration for control relays

CRDCFG	control relay dial out alarm matrix configuration
CRDCFGn	control relay dial out alarm matrix configuration for relay n
CRDQCFG	control relay dial out alarm matrix configuration (quick)
CRMENU	lists control relay commands

VISUAL INDICATOR COMMANDS	
Command	**Function**
VIS	state of all visual indicators
VISn	state of visual indicators n (n= 1 to 8)
VICFG	configure of all visual indicators starting from relay 1
VICFGn	configure visual indicators n (n= 1 to 8)
VIH	history of all visual indicators
VIHn	history of visual indicators n (n= 1 to 8)
VIHCL	clear history of all visual indicators
VIMENU	lists visual indicator commands

USER-DEFINED ALARM COMMANDS	
Command	**Function**
UDCFG	configure of all user defined alarms starting from relay 1
UDCFGn	configure user defined alarm n (n= 1 to 16)
UDH	history of all user defined alarms
UDHn	history of user defined alarm n (n= 1 to 16)
UDHCLR	clear history of all user defined alarms
UDDCFG	user defined dial out alarm matrix configuration
UDDCFGn	user defined dial out alarm matrix configuration for alarm n
UDDQCFG	user defined dial out alarm matrix configuration (quick)
UDMENU	lists user-defined alarm commands

TRACE CHANNEL COMMANDS	
Command	**Function**
TRDn	trace data for trace channel n (n = 1 to 4)
TRCFGn	configure trace channel n (n = 1 to 4)

TRDCLRn	clear trace data for trace channel n (n = 1 to 4)
TRMENU	lists trace channel commands
TL1 COMMANDS (available only with the TL1 option)	
TLDLcfgn	configure TL1 Datalogger Channel information for channel n (n=1 to 64)
TLDCcfgn	configure TL1 Derived Channel information for channel n (n=1 to 32)
TLUDcfgn	configure TL1 User-Defined Alarm information for alarm n (n=1 to 16)
TLPSWD	change TL1 password
TLCOMcfg	configure TL1 communications parameters
TLMENU	lists TL1 related commands
MISCELLANEOUS COMMANDS	
Command	**Function**
ACOCFG	configure ACO parameters
AL	active alarms
ARH	alarm relay history
ARHCLR	clear alarm relay history
BACKUP	backup data
BHS	busy hour statistics starting from busy hour channel 1
BHSn	busy hour statistics for channel n (n = 1 to 4)
BHSCFG	configure busy hour statistics starting from busy hour channel 1
BYE	terminate communications
CBKCFG	callback security configuration
DIALCLR	clear pending dial out queue
DTCFG	reset date and time
EINVCK	edit circuit pack inventory
EINVTR	edit transducer inventory
EMR	edit maintenance reminders
ENOTE2	edit notepad 2

GRPH	change grouping of histories
IDCFG	Unit ID configuration
INVCK	view circuit pack inventory
INVTR	view transducer inventory
LOGH	login history
LOGHCLR	clear login history
MDMPCFG	modem configuration parameters
MENU	lists all commands
MIMENU	lists miscellaneous commands
MR	view maintenance reminders
NOTE1	view and edit notepad 1
NOTE2	view notepad 2
ORDH	change order of histories
PASS	pass-through mode
PASSCFG	pass-through baud rate configuration
PDIALCFG	periodic dial-out configuration
PHCFG	Dial-out phone number configuration
PSWDU	change user password
PSWDS	change super-user password
PSWDP	change polling password
RESTORE	restore data
RU	return to user status
SH	system alarm history
SHCLR	clear system alarm history
SU	login as super user
TECFG	time event configuration
TECFGn	time event configuration for event n (n = 1 to 16)
TRSHL	trend statistics (high and low) starting from trend channel 1
TRSHLn	trend statistics (high and low) for channel n (n = 1 to 8)

TRSDM	trend statistics (daily max.& min.) starting from trend channel 1
TRSDMn	trend statistics (daily max. & min.) for channel n (n = 1 to 8)
TRSMA	trend statistics (monthly avg.) starting from trend channel 1
TRSMAn	trend statistics (monthly avg.) for channel n (n = 1 to 8)
TRSCLR	clear trend statistics for all trend channels
TRSCFG	configure trend statistics starting from trend channel 1
WRN	active warnings
WRNCLR	clear warnings (user clearable)

Appendix M

TL1 (Transaction Language 1) Commands Supported by the OMNIpulse

Introduction

The Transaction Language (TL1) command interface option for the OMNIpulse enables direct communication with a central computerized monitoring system using TL1 commands as specified by Bellcore. In TL1 terminology, the OMNIpulse is commonly called a Network Element (NE) and the central computerized monitoring system is called the Operations System (OS). The following describes the relevant TL1 command format, setup procedures for the OMNIpulse, a detailed description of the TL1 commands and messages supported by the OMNIpulse, and pertinent Bellcore documents.

Command Format

The format of an input command from OS to OMNIpulse 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. OMNIpulse supports the following commands.

Activate User
Cancel User
Retrieve Header
Retrieve Alarm

> Retrieve Equipment
> Report Alarm
> Retrieve Alarm Environment
> Set Alarm Cutoff
> Operate Alarm Cutoff
> Report Alarm Environment
> Report Removal
> Report Restoration

TID (Target Identification)   This term identifies a particular NE. For OMNIpulse, the first eight characters of the System Description (see Section 5) 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 (OMNIpulse in this case). For each datalogger, derived and user-defined channels, this is a configurable parameter (see Section 5). 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. OMNIpulse automatically copies this value into the appropriate field of its output response to the associated input command.

GB (General Block) and PB (Parameter Block)   These terms include additional information in the command or output response.

Condition Type

For each alarm, this string (20 characters) tells the OS the type of alarm condition. For example, a battery on discharge alarm could be "DC PLANT LOW VOLTAGE." For each 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 5).

Service-Affecting   For each alarm, the user must specify whether the alarm
                        condition is service-affecting or not (see Section 5).

Setup Procedure for OMNIpulse to Communicate TL1 Messages With Operating Systems (OSs)

1. Enable the TL1 option by closing switch 2 of SW202.

2. Physical Setup: The OMNIpulse 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 OMNIpulse 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 for installation setup details.

3. Link Setup: Make sure a communications link is established between OMNIpulse and OS. If you are using an external PAD, refer to Section 3.8 for details.

4. Configuration: For each 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 OMNIpulse. This may be done either via the local RS-232 port using a terminal or via the dial-up modem port. Refer to Section 5 for details.

5. Login by OS: The OS should login to the OMNIpulse using the "ACTIVATE USER" TL1 command. After successful login by OS, the OMNIpulse is ready to respond to other TL1 commands and send autonomous TL1 messages to OS.

TL1 Commands Supported By OMNIpulse

List of Supported Commands:

Activate User
Cancel User
Retrieve Header
Retrieve Alarm
Retrieve Equipment
Report Alarm
Retrieve Alarm Environment
Set Alarm Cutoff
Operate Alarm Cutoff
Report Alarm Environment
Report Removal
Report Restoration

Details of Supported Commands:

TL1 specifications spell out the spacing and syntax of TL1 responses. To specifically show TL1 format in this text, the following conventions will be used:

cr   Carriage return
lf   Line feed
^   Space
;   Enters commands

Response Header

The response header is attached to the beginning of all messages sent by the OMNIpulse.

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 OMNIpulse 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:

    CTAG   number specified in the incoming request

Error Codes

ICNV	input command not valid
IICT	input illegal correlation tag
IISP	input illegal syntax or punctuation
ENRI	not configured to retrieve specified information
IIAC	input invalid access identifier

Commands from
OSs

The OMNIpulse accepts the following alarm queries:

Retrieve Alarm

1. Request for alarm information from all AIDs for channels that are configured as Equipment for TL1 reporting

   RTRV-ALM-ALL::ALL:CTAG;

2. Request for alarm information from a specific AID for channel that is configured as Equipment for TL1 reporting

   RTRV-ALM-EQPT::AID:CTAG;

The OMNIpulse 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,,,:\" conddesc\"," cr lf
   ...
   ^^^"AID,EQPT:alarm level,condtype,service affecting,,,\"
   conddesc\"," cr lf;

where:

CTAG	command identification number specified in request
AID	as specified by user via configuration screen
Alarm level	CR | MJ | MN (Critical [CR], Major [MJ]) or Minor [MN]
Condtype	text specified by user via configuration screen
Service affecting	SA | NSA (Service Affecting or Non-Service Affecting) as specified by user via configuration screen
Conddesc	condition description

The OMNIpulse 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 OMNIpulse supports the retrieve header request with the following syntax:

RTRV-HDR:::CTAG;

The OMNIpulse generates the following response:

response header
M^^CTAG^COMPLD cr lf;

Retrieve Equipment

The OMNIpulse 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;

where:

Keyword   The parameter name for a particular channel
Value   The value of the parameter.

The valid keywords for datalogger, derived, and user-defined channels are:

channel   channel number
description   channel description
input type   analog or binary
lthresh   lower alarm threshold
uthresh   upper alarm threshold
scale   scale factor
offset   transducer offset value
range   range for measurement
alarm type   type of alarm
units   unit description

The derived channel configuration includes the word "expression" as an additional keyword.

The user-defined alarm configuration includes the word "program" as an additional keyword.

The OMNIpulse generates the following error response for requests made for an AID not present in the system, or for channels with matching AIDs that are not enabled for TL1 reporting by the user's configuration:

response header
M^^CTAG^DENY cr lf
^^^IIAC
cr lf;

Retrieve Alarm Environment

1. Request for environmental alarm information from all AIDs for 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 as Environment for TL1 reporting

   RTRV-ALM-ENV::AID:CTAG;

The OMNIPULSE 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 OMNIPULSE 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 OMNIpulse. Valid ACOMODE values are:
>
>> MAN: ACO is introduced by Operate Alarm Cut-off command or by manual operation (front panel switch) at the OMNIpulse.
>>
>> DELD: ACO is introduced automatically at the OMNIPULSE, 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 OMNIPULSE.
>
> *AID* in the command should be specified as ALL since all alarms having specified severity in ACO Configuration screen will be effected.

The OMNIpulse generates the following response:

> *response header*
> *M^^CTAG^COMPLD cr lf;*

Operate Alarm Cut-Off

Request for introducing ACO automatically and immediately at the OMNIpulse.

> *OPR-ACO-ALL::AID:CTAG;*

where:

> *AID* in the command should be specified as ALL since all alarms having specified severity in ACO Configuration screen will be effected.

The OMNIpulse generates the following response:

> *response header*
> *M^^CTAG^COMPLD cr lf;*

Activate User

The OMNIpulse 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. When establishing the connection, this command should be preceded by leading semi-colons to flush the input buffer from unwanted characters. The command issued will look like:

   ;;ACT-USER::uid:CTAG::passwd;

2. There is no response for unsuccessful login attempts.

3. The OMNIpulse does not transmit any messages until a user successfully logs into the system.

Cancel User

The OMNIpulse accepts the following command to terminate a user session on the system (i.e., logout):

>   *CANC-USER::uid:CTAG;*

where:

>   uid   user identifier, having hardcoded value of user

The OMNIpulse generates the following response upon receipt of a valid cancel user command:

>   *response header*
>   *M^^CTAG^COMPLD cr lf;*

Autonomous Commands From OMNIpulse (NE) to OS

Report Alarm

The OMNIpulse automatically sends the following message to report the occurrence or retirement of alarms on channels 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* has one of the following values:

*C	critical
**	major
*^	minor
A^	automatic (i.e., all alarm levels in report are CL [clear])
ATAG	integer value (sequence number of autonomous command generated by OMNIpulse)
AID	as specified by user via configuration screen
Alarm level	CR | MJ | MN | CL (Critical [CR],

	Major [MJ], Minor[MN], or Clear [CL])
Condtype	as 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
Conddesc	condition description

Report Alarm Environment

The OMNIpulse 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 OMNIpulse 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;

The datalogger channels to be reported must be configured as Contact Open or Contact Closed in the Datalogger Configuration screen.

Report Restoration

The OMNIpulse automatically sends the following message to report the restoration of equipment on datalogger channels configured as Equipment Presence for TL1 reporting:

response header
A^^atag^REPT^RST^EQPT cr lf
^^^"AID" cr lf

> ...
> *^^^"AID" cr lf;*

Bellcore Reference Documents

The following Bellcore documents give the details of the communication architecture between network elements and the OS centers:

> TR-TSY-000827, *Operations Technology Generic Requirements (OTGR): Generic Operations Interfaces - Non-OSI Communications Architecture*
>
> TR-TSY-000828, *Operations Technology Generic Requirements (OTGR): Generic Operations Interfaces - OSI Communications Architecture*

The message format and other details about TL1 are available in the following Bellcore documents:

> TR-TSY-00083,1 *Operations Technology Generic Requirements (OTGR): Operations Application Messages - Language for Operations Application Messages*
>
> TR-TSY-000833, *Operations Technology Generic Requirements (OTGR): Operations Application 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.