

Lucent Technologies
Bell Labs Innovations



Lineage[®] 2000
Intelligent Reserve Unit (IRU)
J85577A-1

Product Manual
Select Code 157-010-100
Comcode 106791205
Issue 5
November 1999
©1999 Lucent Technologies

Product Manual
Select Code 157-010-100
Comcode 106791205
Issue 5
November 1999

Lucent Technologies
Lineage[®] 2000
Intelligent Reserve Unit (IRU)
J85577A-1

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

1 Introduction

<i>General Information</i>	<i>1 - 1</i>
<i>Before Proceeding</i>	<i>1 - 1</i>
<i>About This Manual</i>	<i>1 - 2</i>
<i>Intelligent Reserve Unit Overview</i>	<i>1 - 3</i>
<i>Customer Assistance Contacts</i>	<i>1 - 4</i>
<i>Customer Training</i>	<i>1 - 4</i>
<i>Customer Service</i>	<i>1 - 4</i>
<i>Technical Support</i>	<i>1 - 5</i>
<i>Product Repair and Return</i>	<i>1 - 5</i>
<i>Warranty Service</i>	<i>1 - 5</i>
<i>On-Line Power Systems Product Manuals</i>	<i>1 - 5</i>

2 Product Description

<i>Intelligent Reserve Unit Specifications</i>	<i>2 - 1</i>
<i>Reserve-Time Prediction Algorithm</i>	<i>2 - 4</i>
<i>Overview</i>	<i>2 - 4</i>
<i>Algorithm Compensation for Battery End Voltage</i>	<i>2 - 5</i>
<i>Battery Life Prediction</i>	<i>2 - 5</i>
<i>Features</i>	<i>2 - 6</i>
<i>IRU</i>	<i>2 - 6</i>
<i>Faceplate</i>	<i>2 - 9</i>
<i>Definitions of Terms</i>	<i>2 - 10</i>

3 Setup and Installation

<i>Intelligent Reserve Unit - Installation</i>	<i>3 - 1</i>
<i>Tools</i>	<i>3 - 1</i>
<i>Installation Procedure</i>	<i>3 - 1</i>
<i>System Component Descriptions</i>	<i>3 - 8</i>
<i>Battery Interface Module</i>	<i>3 - 8</i>
<i>Battery Cable Set</i>	<i>3 - 9</i>
<i>Input Power/Temperature Cable Set</i>	<i>3 - 9</i>
<i>User Channel Cable Set</i>	<i>3 - 10</i>
<i>Modem Wiring</i>	<i>3 - 10</i>
<i>Alarm Relay Wiring</i>	<i>3 - 10</i>

<i>Pass-Through and RS485 Ports</i>	3 - 11
<i>Memory Backup Battery</i>	3 - 11
<i>Local Terminal Wiring</i>	3 - 13
<i>Local Terminal Configuration</i>	3 - 13
<i>AT&T/Teletype 5410, 5420, 5425 Terminals</i>	3 - 13
<i>AT&T 610 and 615 Terminals</i>	3 - 14
<i>AT&T 710 Terminal</i>	3 - 14
<i>DEC VT100 or Compatible</i>	3 - 15
<i>ANSI Compatible Terminals</i>	3 - 15
<i>Modem</i>	3 - 16
<i>On-board Modem</i>	3 - 16
<i>Remote Modem</i>	3 - 16

4 Operation

<i>General Information</i>	4 - 1
<i>Conventions</i>	4 - 1
<i>Terminal Login Procedure</i>	4 - 2
<i>Operating Environment</i>	4 - 3
<i>Menus</i>	4 - 3
<i>Command Line Access</i>	4 - 4
<i>Line Editing</i>	4 - 4
<i>Menu Structure</i>	4 - 6
<i>Logging Off</i>	4 - 6
<i>Feature Descriptions</i>	4 - 6
<i>Display Alarms - PATH: Main Menu/Display Alarms</i>	4 - 6
<i>Display Warnings - PATH: Main Menu/ Display Warnings</i>	4 - 8
<i>Super-User Login - PATH: Main Menu/ Super-User Login</i>	4 - 8
<i>View History - PATH: Main Menu/View History</i>	4 - 8
<i>View Statistics - PATH: Main Menu/View Statistics</i>	4 - 13
<i>Data Channels - PATH: Main Menu/Data Channels</i>	4 - 17
<i>String Discharge Data - PATH: Main Menu/String Discharge Data</i>	4 - 18
<i>Battery Capacity - PATH: Main Menu/ Battery Capacity</i>	4 - 19
<i>Battery Life - PATH: Main Menu/Battery Life</i>	4 - 19
<i>Notepad/Inventory - PATH: Main Menu/ Notepad/Inventory</i>	4 - 19
<i>Pass-Through - PATH: Main Menu/Pass-Through Bye - PATH: Main Menu/Bye</i>	4 - 21 4 - 22
<i>Polling Interface (PEERS)</i>	4 - 22
<i>Polling User Login Procedure</i>	4 - 22
<i>User Commands</i>	4 - 22
<i>Super-User Login Procedure</i>	4 - 23

Super-User Commands 4 - 24

5 Super-User Operation

<i>Super-User Login</i>	5 - 1
<i>Super-User Functions</i>	5 - 2
<i>Clear History - PATH: Super-User Functions/</i>	
<i>Clear History</i>	5 - 4
<i>Clear Statistics - PATH: Super-User Functions/</i>	
<i>Clear Statistics</i>	5 - 7
<i>Clear Pending Dial-Outs - PATH: Super User Functions/</i>	
<i>Clear Pending Dial-Outs</i>	5 - 9
<i>Clear Warnings - PATH: Super User Functions/Clear</i>	
<i>Warnings</i>	5 - 9
<i>Edit Inventory - PATH: Super-User Functions/Edit</i>	
<i>Inventory</i>	5 - 9
<i>Edit Notepad 2 - PATH: Super-User Functions/Edit</i>	
<i>Notepad 2</i>	5 - 11
<i>Return to User Status - PATH: Super-User Functions/</i>	
<i>Return to User Status</i>	5 - 11
<i>Configure - PATH: Super-User Functions/Configure</i>	5 - 11

6 Applications

<i>Transducer Compatibility</i>	6 - 1
<i>Fuse and Contact Closure Monitoring</i>	6 - 1

7 Product Warranty

Appendix A Warnings

<i>Unit Warnings</i>	A - 1
<i>Automatic Warnings</i>	A - 1
<i>User-Clearable Warnings</i>	A - 2
<i>Diagnostic Warnings</i>	A - 3

Appendix B Alarms

<i>Battery Alarms and Battery Alarms History</i>	B - 1
<i>System Alarms and System Alarms History</i>	B - 2
<i>User Channel Alarms and User Channel Alarms History</i>	B - 3
<i>Alarm Relays and Alarm Relays History</i>	B - 3
<i>Unit Alarms and System Alarms History</i>	B - 4

Appendix C	Statistics Algorithms	
	Types and Values of Statistics Logs	C - 1
	Effects of Changes	C - 2
Appendix D	Dial-Out Features	
	Dial-Out on Alarm Algorithm	D - 1
	Periodic Status Dial-Out Algorithm	D - 2
Appendix E	Connector Pin Assignments	
Appendix F	IRU Command Line Access	
	Introduction	F - 1
	Command Structure	F - 1
	Menu Commands	F - 2
	List of Commands	F - 3
Appendix G	Troubleshooting Guide	

List of Figures

<i>Figure 1-1: Intelligent Reserve Unit</i>	<i>1 - 4</i>
<i>Figure 2-1: IRU Faceplate</i>	<i>2 - 10</i>
<i>Figure 3-1: Block Diagram of Intelligent Reserve Unit</i>	<i>3 - 17</i>
<i>Figure 3-2: Intelligent Reserve Unit Circuit Board</i>	<i>3 - 17</i>
<i>Figure 3-3: Lucent Technologies SLC 96 Installation</i>	<i>3 - 18</i>
<i>Figure 3-4: Lucent Technologies Series 5 Installation</i>	<i>3 - 18</i>
<i>Figure 3-5: NT Series 800 Urban Installation</i>	<i>3 - 19</i>
<i>Figure 3-6: NT Series 600 Urban Installation</i>	<i>3 - 19</i>
<i>Figure 3-7: NT OPM Cabinet Installation</i>	<i>3 - 20</i>
<i>Figure 3-8: Battery Interface Module Connections</i>	<i>3 - 20</i>
<i>Figure 4-1: Login Header</i>	<i>4 - 3</i>
<i>Figure 4-2: IRU Main Menu Screen</i>	<i>4 - 6</i>
<i>Figure 4-3: IRU User Functions Menu Map</i>	<i>4 - 7</i>
<i>Figure 5-1: IRU Super-User Functions Menu Screen</i>	<i>5 - 2</i>
<i>Figure 5-2: IRU Super-User Functions Menu Map</i>	<i>5 - 3</i>
<i>Figure 5-3: Configure Menu Screen</i>	<i>5 - 11</i>
<i>Figure 5-4: System Parameters Menu Screen</i>	<i>5 - 22</i>
<i>Figure 6-1: Closure to Voltage</i>	<i>6 - 2</i>
<i>Figure 6-2: Monitoring an Indicator Lamp</i>	<i>6 - 2</i>
<i>Figure 6-3: Fuse Monitoring</i>	<i>6 - 3</i>
<i>Figure 6-4: Closure to Ground</i>	<i>6 - 3</i>

List of Tables

<i>Table 2-A: IRU Specifications</i>	<i>2 - 1</i>
<i>Table 2-B: Operating Ambient Temperature Reading</i>	<i>2 - 3</i>
<i>Table 2-C: Temperature Measurement Accuracy</i>	<i>2 - 3</i>
<i>Table 3-A: IRU Mounting (Horizontal or Vertical)</i>	<i>3 - 2</i>
<i>Table 3-B: Battery Interface Module Mounting</i>	<i>3 - 4</i>
<i>Table 3-C: IRU Powering Connection</i>	<i>3 - 6</i>
<i>Table E-1: Alarm Relay Contacts</i>	<i>E - 1</i>
<i>Table E-2: Power/Temperature Connector</i>	<i>E - 2</i>
<i>Table E-3: RS485 Connector</i>	<i>E - 2</i>
<i>Table E-4: User Channel Connections</i>	<i>E - 2</i>
<i>Table E-5: Pass-Through Port</i>	<i>E - 3</i>
<i>Table E-6: Local Terminal RS232</i>	<i>E - 3</i>
<i>Table F-1: Battery String Commands</i>	<i>F - 3</i>
<i>Table F-2: User Channel Commands</i>	<i>F - 4</i>
<i>Table F-3: Temperature Channel Commands</i>	<i>F - 5</i>
<i>Table F-4: Miscellaneous Commands</i>	<i>F - 5</i>

1 Introduction

General Information

The Lineage[®] 2000 family name of premier energy monitoring and controlling products is globally recognized as the ultimate choice for 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 over 80 years of worldwide telecommunications experience in the development, manufacturing, engineering, installation, and servicing of leading edge energy systems, products and services.

From a Central Office or other centralized location, the Lucent Technologies Intelligent Reserve Unit (IRU) monitors the condition of the Lucent Technologies IR Series reserve batteries in service at remote sites. The IRU monitors the system's ambient temperature and battery voltage and current during a discharge. Through the use of a Lucent Technologies patented battery reserve prediction algorithm, the IRU is able to predict the amount of reserve remaining, as well as the life and capacity of the batteries.

This product manual (Select Code 157-010-100) describes the features, specifications, installation, applications, and operation of the IRU.

Before Proceeding

Before doing anything else:

1. Read each section of this manual carefully. Each chapter has been organized to provide specific information about the installation, usage and administration of the Intelligent Reserve Unit.

2. Fill out and send in your product registration card, which you will find in the drawing package. Once you're registered as an IRU owner, you will receive our total product support, including software updates as needed.
3. Know your products. This manual assumes you know how to use and/or configure a terminal 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.

About This Manual

Section 1 introduces you to the Lucent Technologies Intelligent Reserve Unit and gives you the overall description of the product.

Section 2 provides the unit specifications and product descriptions for each of the IRU components.

Section 3 is the installation and configuration section of this manual. It describes how to set up your IRU 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 the IRU. 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.

Section 5 is the Super-User's guide section. It provides information for users whose duties include the administration and monitoring of the IRU. 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. All features available to the regular User are also provided to the Super-User.

Section 6 provides application notes. These notes contain typical connection diagrams and suggested methods of using the IRU.

Section 7 covers the warranty for this product.

Appendices A through G provide detailed information on several of the features including statistics algorithms, dial-out on alarm algorithms, external connections, etc.

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

Note

Boxed Note messages like this inform the user that the action taken may cause a loss of information but is otherwise not harmful to the system.

Caution

Boxed Caution messages like this are cautions to the user of potential safety hazards, preventive measures, or actions that may damage the IRU.

***Intelligent
Reserve Unit
Overview***

The Intelligent Reserve Unit is designed to increase the reliability of reserve power at remote sites during a power failure and at the same time reduce the expense of battery maintenance. As the number of telecommunications applications has proliferated, battery maintenance has become increasingly expensive and difficult. Due to corporate cost reductions, maintenance personnel have been reduced significantly. This cut-back can result in inadequate maintenance leaving many sites without enough reserve power. Often, reserve power fails at the site before it should and without the craftsperson realizing that the site is in jeopardy. The IRU will constantly test batteries against an algorithmically modeled characteristic discharge profile. This algorithm correlates terminal voltage, load current, and temperature with reserve capacity. The major functions of the IRU are:

- Predict battery reserve during battery on discharge.
- Monitor battery voltages and string currents.
- Predict remaining cell life based on battery ambient temperature and age.

The monitoring module is built around a microprocessor supported by a patented, reserve-time algorithm developed by Bell Laboratories. Using this algorithm, the microprocessor calculates the battery's reserve capacity and stores the result in memory along with the measured voltage and current. A built-in

modem enables this data to be accessed on demand from a Central Office or other centralized location or to be sent out to one or more locations over existing telephone lines.

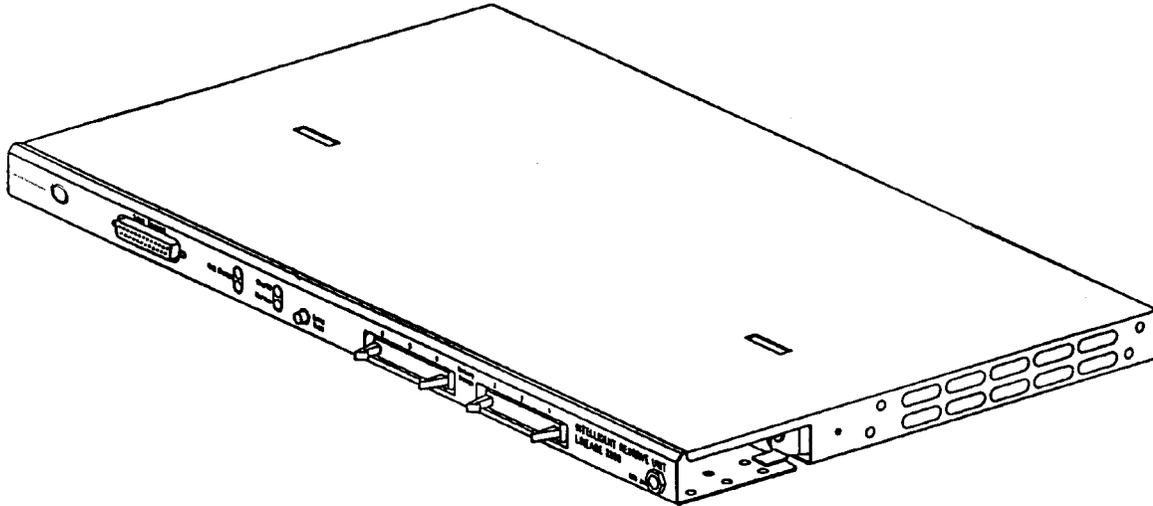


Figure 1-1: Intelligent Reserve Unit

Customer Assistance Contacts

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*

Intelligent Reserve Unit Specifications

Table 2-A: IRU Specifications

Operating Voltage	+/-40.0 to +/-60.0 volts dc (+/-48 volts dc nominal)
Input Power	21.6 watts maximum; in-line-fused cable set provided
Overall Dimensions	(w x d x h) 47 cm x 27.9 cm x 2.5 cm (18.5 in x 11.0 in x 1.0 in)
Weight	4.1 kgs (9 lbs)
Operating Temperature Range	-40 to 80°C (-40 to 176°F)
Altitude	-61 to 3962 meters (-200 to 13,000 feet) For altitudes of 1524 to 3962 meters (5000 to 13,000 feet), derate maximum temperature by 0.656°C (3.6°F) per 304 meters (1000 feet) above 1524 meters (5000 feet).
Humidity	10% to 95% noncondensing
Electrostatic Discharge	IEC 801-2 Levels 2 & 4 (14 kV & 15 kV) at 40% relative humidity
Radiated Emission	FCC Level A
Electromagnetic Immunity	10 V/m over a range of 20 to 1000 MHz

Table 2-A: IRU Specifications

Safety Agency Approvals	Listed by Underwriters Laboratories to 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)
Supported Terminals	AT&T/Teletype 4245, 4410, 5410, 5420, 5425 AT&T 610, 615, 710 DEC VT100 or compatibles American National Standards Institute (ANSI) compatibles
Microprocessor	Motorola 68000 16-bit, 8 MHz clock speed
Local Port	RS-232 serial port, auto-baud select: 1200, 2400, 4800, 9600 bps
Pass-through Port	RS-232 serial port: 300, 1200, 2400, 4800, 9600 bps
Inter-unit Port	Full Duplex RS-485 serial port with operating range of 4000 feet (1212 meters)
Modem	On-Board: 300 FSK, and 1200 DPSK bps (full duplex) with RJ11 four-wire telephone jack, designed to operate into a data-quality line or talk pair no longer than 18,000 feet
Real-Time Clock	System clock accurate to 1 minute per month
Replacement Battery	Tadiran TL-5101/S. Provides a minimum of 96 hours of memory backup when unit power is off
Battery Channel Inputs:	Total of 30, sufficient for 6 strings of IR batteries
User Channel Inputs:	Total of 2 per unit, each usable for binary or analog inputs Floating differential inputs Fused wire sets provided
Alarm Contacts:	Three sets of form C contacts
Auxiliary Contact:	Reserved for future use

Table 2-A: IRU Specifications

Temperature Channel Input:	One per unit, with thermistor assembly provided to monitor battery ambient temperature
Maximum Scan Rate for Temperature and User Channels:	Once every 9.8 seconds
Maximum Scan Rate for Voltages and Currents:	Once every 58 seconds Note: Battery string voltages and currents scan rate is a function of the number of battery strings enabled. Scan rate decreases by approximately 9.67 seconds for every battery string disabled.
Maximum Input Voltage:	60 volts dc
Channel Measurement Accuracies:	See two charts below.

Table 2-B: Operating Ambient Temperature Reading

Select Range	Maximum Input	Resolution	+32 to +122°F (0 to +50°C)	-40 to 176°F (-40 to +80°C)	Digit Value 1 Digit
100mV	+/-100mV	3.66µV	+/- (0.4%R+10digit)	+/- (0.5%R+25digit)	0.00001V
5V	+/-5V	173.95µV	+/- (0.1%R+10digit)	+/- (0.25%R+25digit)	0.0001V
15V	+/-15V	0.519mV	+/- (0.1%R+6digit)	+/- (0.25%R+30digit)	0.01V
60V	+/-60V	1.83mV	+/- (0.1%R+12digit)	+/- (0.25%R+45digit)	0.001V

Notes:
R is the measurement reading as displayed by the IRU.
Battery voltages use 15V range, string current use 100 mV range.
Battery shunt has a 1% tolerance.

Table 2-C: Temperature Measurement Accuracy

Operating Ambient Temperature Range	Maximum Worst Case Reading Accuracies
+32 to +122°F (0 to +50°C)	+/- 3.0°F (+/- 1.7°C)
-40 to +176°F (-40 to +80°C)	+/- 6.1°F (+/- 3.4°C)

Reserve-Time Prediction Algorithm

Overview

Prior to the introduction of the IRU, the only method for estimating reserve time was to use the power data sheet information and assume some amperage drain. However, battery cell performance deviates from the power data sheet with age and temperature, and the current drain is poorly defined – it fluctuates with calling rates and the equipment configuration. The IRU compensates for these variations by monitoring the discharge profile of each battery as well as the current drain in order to make its reserve-time prediction.

At the heart of the reserve-time prediction is a patented adaptive algorithm. It predicts reserve time remaining based upon voltage, current, and temperature measurements and continuously updates its estimate of reserve with each new reading in real time. The accuracy of this algorithm improves as the discharge proceeds and more energy is removed from the battery.

The algorithm predicts reserve time for each battery to a particular end voltage which is adjusted for voltage drops in the system. During the initial stages of the discharge, the algorithm prediction takes into account power data sheet information, temperature, historic capacity from prior discharges, and battery status according to the life-temperature algorithm. This stage lasts until approximately 20% of the battery capacity is removed. After this period, the algorithm adaptively incorporates the measured discharge profile of the battery into its prediction.

The IRU provides the predicted reserve time for each string in the system to a set end-voltage. This system reserve time, which is reported in the screen header, is also used to generate the reserve time alarms. The reserve time predicted at any time during a discharge is based on the predicted remaining capacity and the current drain rate that is averaged over the last 0.5 removed Ampere-Hours. Consequently, the accuracy of the predicted reserve time is limited by the accuracy with which the calculated average current reflects the average current of the remaining period of the discharge. The IRU also provides the

predicted reserve time for each battery in the system. These values may be used to identify batteries with low capacity that need to be replaced.

For batteries which exhibit normal discharge behavior, the accuracy of the predicted reserve time is within -30% and +20% for operating temperatures from -20°C to +60°C. The algorithm is purposely weighted so that its reserve-time prediction is conservative. Thus, the prediction will tend to underestimate instead of overestimate reserve time. The accuracy of the reserve-time prediction is limited by the accuracy of the initial capacity assumption, by changes in the discharge current, and by deviations in battery performance from normal discharge behavior.

The following paragraph provides further explanation on how the string end voltage is derived.

***Algorithm
Compensation for
Battery End Voltage***

The end voltage at the battery is based on the configured end voltage for the string and any voltage drop due to resistance or diodes between the IRU interface module and the system reference point for the bus voltage (See Section 5 for information on configuring battery string).

For illustration, suppose a system has low voltage disconnect set to 43V, 200 mohms of resistance, a diode drop of 0.6 volts, and a two-amp load. When the low-voltage disconnect occurs at 43.0 volts, the batteries are actually at 44.0 volts due to the 0.4 volt drop across the 200 mohms resistance at two amps and the 0.6 volts drop across the diode. The algorithm compensates for these drops and internally sets the end voltage for each battery to one-fourth of its adjusted battery string end voltage.

For the previous example, the adjusted end voltage for the battery string is 44.0 volts which corresponds to an end voltage of 11.0 volts for each of the four batteries in that string.

***Battery Life
Prediction***

Stationary lead-acid batteries for float applications are designed with excess electrolyte to minimize maintenance and are generally positive-plate-limited in capacity. A major cause for failure in these batteries is grid growth, or expansion of the positive grid. Grid growth exceeding a certain level causes

sufficient separation of the active material from the grid that the capacity becomes severely positive-limited and the battery must be replaced.

Consequently, the float life of stationary lead-acid batteries is determined by the growth rate of the positive grid. This growth rate is a function of temperature. The rate generally doubles with every 10°C (18°F) increase and decreases by half for every 10°C decrease. For example, a stationary battery that is designed for 5 years life at 25°C (77°F) will have a float life of 2.5 years at 35°C (95°F) or 10 years at 15°C (59°F).

Equivalently speaking, a battery on float for 1 day at 35°C loses 1 day of its 2.5-year life. At 25°C, it loses 2 days of its 5-year life.

The IRU battery life prediction algorithm takes into account the temperature dependence of the battery life. At every hour interval, a running average for the battery temperature is determined and the remaining battery life at this temperature is calculated and displayed on the screen. As a result, it is normal to see the calculated remaining battery life varying with time and temperature.

Features

The Intelligent Reserve Unit is designed to bring intelligence about reserve power to the remote terminal network. The IRU monitors the voltage and current of each battery as well as the battery ambient temperature. A microprocessor uses these measurements to determine when to replace each battery and to estimate the reserve time remaining during a power failure.

IRU

The IRU features are:

- Supports up to 30 battery data channels, sufficient to monitor up to 6 strings of IR batteries with configurable alarm thresholds and types.
- Provides a prediction of the available reserve time to a user-specified end voltage for a 48-volt IR battery string either during discharge or when the battery is fully charged to the recommended float voltage.

- Offers automatic selection or custom programming of desired string end voltage, in the range of 40.0 to 48.0 volts (0.1 volt steps).
- Provides multiple security levels: User, Super-User, and Call-back.
- Supports PEERS (Power Engineering and Equipment Record System) mechanized polling interface.
- Provides a built-in RS-232 port for local terminal connection supporting from 1200 to 9600 bps operation.
- Provides a built-in 300/1200 bps modem with an RJ11 telephone jack to facilitate remote monitoring and control.
- Provides a local user interface that supports most common terminal types. It may either be totally menu-driven or accessed via a command line interface.
- 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.
- Offers sixteen-bit processing power and battery-backup memory to support both remote and local terminals simultaneously.
- Collects trend statistics on temperature and user channels on a daily and monthly basis.
- Collects basic hourly average, maximum, and minimum statistics on temperature channel, user channel and all string loads.
- Provides extensive history information on:
 - System History - 32 events
 - Login History - 32 events
 - Battery Channel Alarms - 256 events
 - User Channel Alarms - 32 events
 - Battery Discharge History - 48 events
 - Alarm Relay History - 32 events

- 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 dial-outs.
 - Periodic status dial-out feature.
 - Pager notification with separate system pager identification number.
- Provides reports with periodic status dial-out to send:
 - All histories
 - All user channel readings
 - Battery life and capacity
 - All statistics
- Provides user programmable unit identification capability to facilitate remote monitoring of multiple units from a central location.
- Provides ability to backup and restore system configuration using XMODEM protocol.
- Features built-in unit self-diagnostics.
- Provides 8 pages for recording:
 - Circuit pack inventory
 - Miscellaneous inventory
- Provides maintenance reminders to display messages on specified dates.
- Provides user readable/writable notepad for messages of interest to all.
- Provides protected notepad for Super-User messages.
- Provides two user channels with multiple range selection (100 mV, 5V, 15V, 60V) and input type selection (+dc, -dc) or contact closure monitoring (CC or CO).
- Provides user programmable scale factor, transducer offset, and alarm thresholding on user channels.

- Allows viewing battery string and user channel measurements at both local and remote terminals simultaneously.
- Provides three Form C alarm relays that are programmable via software to activate/de-activate based on alarm types.

Faceplate

The faceplate of the IRU provides a visual indication of basic system operation. See Figure 2-1 for the location of each feature.

- Unit status is indicated by either of a pair of visual indicators labeled Unit Status: the green visual indicator is lit when power is supplied to the unit and the system is operational; the red visual indicator is lit when the microprocessor fails.
- A second red visual indicator labeled Maj/BD lights when the monitored batteries are on discharge or when any user-configured major alarms are present. This LED will blink during a discharge if the predicted reserve time drops below 2 hours.
- A yellow visual indicator labeled Min/Aux lights when any warning alarms or minor/auxiliary alarms are present.
- An LED test switch is available for on-site testing of visual indicators, thus showing power is being distributed onto the board. Pressing this switch will momentarily turn on all indicators. The alarm relay states will not be affected by this test.
- An ESD jack is provided at the right-hand corner of the IRU. It should be used with an ESD strap any time the unit is opened. This protects sensitive components from damage by electrostatic discharge.

Definitions of Terms

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

Table 2-D: Definitions of Terms

Battery Capacity:	Time to reach the specified end voltage from the start of discharge at average load
Battery Reserve Time:	Time remaining from the present time for discharging battery to reach its specified end-voltage at its average load and temperature
Battery Life:	Number of months remaining at the average battery temperature until a battery should be replaced

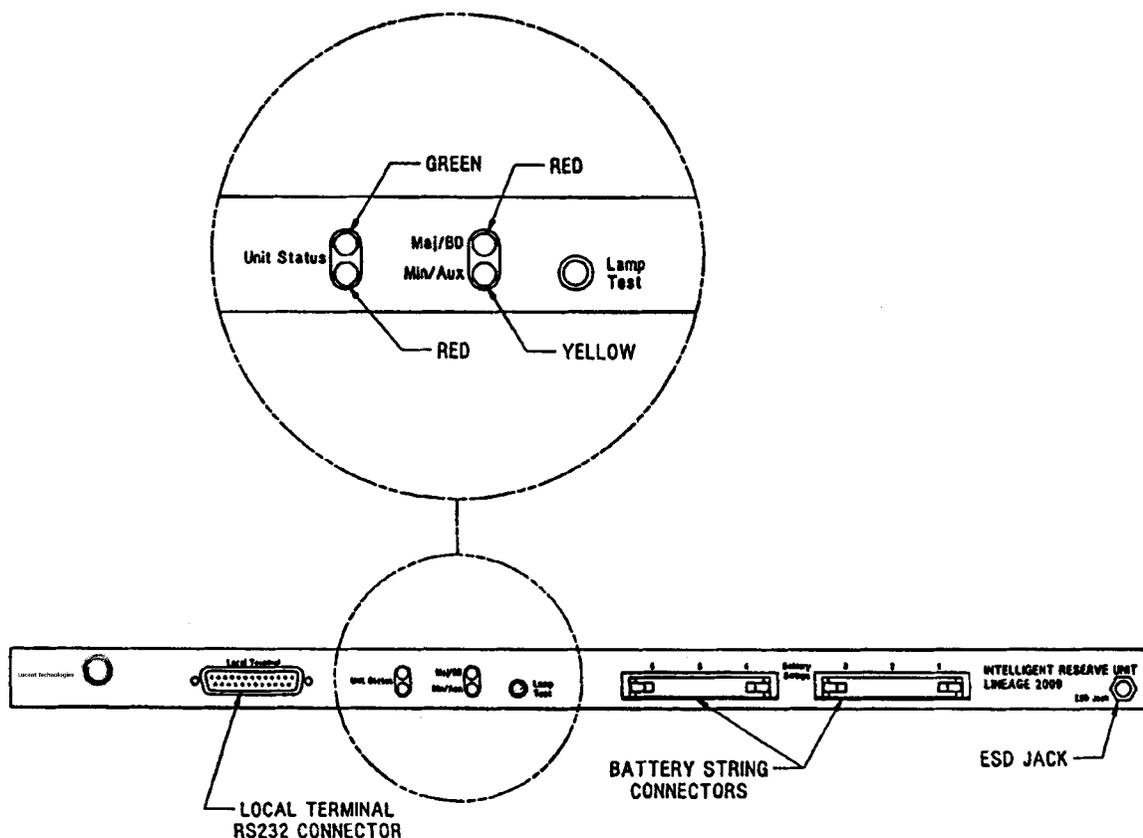


Figure 2-1: IRU Faceplate

3 *Setup and Installation*

Intelligent Reserve Unit - Installation

Note

The unit is to be installed or serviced only by qualified personnel.

Tools

- 1 ESD wrist strap
- 1 socket set
- 1 flat-blade screwdriver
- Wire cutter/stripper
- Wire splices

Installation Procedure

1. The shipping container should be opened and the contents inspected for damage.

Contents:

- Intelligent Reserve Unit
- Mounting brackets
- Mounting hardware
- Memory backup battery
- Battery interface modules and battery cables
- Ground strap
- Power/Temperature cable assembly
- Phone line wire set
- Drawing package
- User channel cable assembly (optional)
- Battery cable extension (optional)

2. Verify that the input voltage shown on the nameplate label located on the bottom of the unit agrees with the input voltage of the source available to power the unit. If the voltage is incorrect, the unit must be returned and one of the proper input voltage rating acquired.
3. The unit is now ready to be mounted and wired. Read the description of the system components in paragraph “System Component Descriptions” to become familiar with the unit and its auxiliary equipment. **Install, wire and configure the unit in the sequence described.**
4. Install the IRU: Determine the location in the cabinet in which the IRU will fit. Table 3-A provides suggested mounting locations for particular applications. Use flat and lockwashers with mounting hardware.
5. Connect frame ground: Attach the ring lug from the ground strap on the right side of the unit to an open frame hole using a star lockwasher between the lug and frame. This provides a frame ground connection and is important for the on-board modem to function correctly. Verify the frame ground connection by checking the continuity between the ESD jack and the frame connection.

Table 3-A: IRU Mounting (Horizontal or Vertical)

Lucent Technologies SLC Series 5 or Lucent Technologies SLC 96	Horizontal mounting at bottom of frame beneath battery shelf. A brown support bar may have to be removed in some cabinets (Figure 3-3 or 3-4).
NT Series 600 Cabinet	Horizontal mounting to the bottom of the rectifier shelf. One set of brackets enables mounting to 18" wide rectifier shelf with four studs protruding from bottom. Second set enables mounting to 20" wide rectifier shelf with four studs protruding from back (Figure 3-6) Vertical mounting alongside an existing 4TEL® RMU® on back wall of cabinet.
NT Series 800 Cabinet	Horizontal mounting at bottom of frame (Figure 3-5)
NT OPM Cabinet	Vertical mounting on the back wall of left side of cabinet with or without a 4TEL® RMU® (Figure 3-7)

6. Install battery interface modules and fuse assemblies: Each battery interface module accepts four IR batteries, connects the batteries in series, provides two wires to connect the string to the cabinet power, and provides a monitoring connection for the IRU. Position each module so that the wire harness from all four batteries in the string can be attached to it. Use #6-32X1/4 self-tapping screws to mount module brackets when required. Table 3-B shows instructions for mounting and wiring the battery interface modules. See also paragraph “Battery Interface Module.”

A fuse assembly is provided with each battery interface module. This should be inserted between Battery #2 or #3 and the respective B2 or B3 connector on each module (see Figure 3-8). This fuse protects the module in case of a short in the battery string.

Record the manufactured date, installed date, and connector position of the interface module for each battery in each string. This information is required to program the IRU. (See step 21.)

7. Open IRU: The IRU circuit board is accessed by pulling on both sides of the front faceplate. The circuit board slides out approximately six inches.

Note

All wiring should include enough slack to allow the IRU to be reopened and extended six inches.

8. Install Memory Backup Battery: A cylindrical lithium backup battery is shipped loose with the IRU. The battery holder is located in the center front position of the IRU circuit pack (Figure 3-2). Remove the battery cover by prying up each side. Align the polarity markings, insert the battery and replace the cover. See also paragraph “Memory Backup Battery.”
9. Install battery channel cables: Plug the battery cable labeled “STRINGS 1-3” into the 30-position connector on the front faceplate. The opposite ends are terminated in a ten-position connector that mates with the battery interface module for each string. For applications of 4 or more strings of batteries, the second battery cable is required (ordered separately). Each battery string will be identified

by the IRU by the number labeled on this cable. The modules may be marked with the string number. The cables should be dressed in cable trough areas, and any excess tied off.

Table 3-B: Battery Interface Module Mounting

	Mounting	Wiring
Lucent Technologies SLC Series 5 or Lucent Technologies SLC 96	Horizontally above battery connectors on each battery shelf. Brackets are provided for mounting to frame. (Figure 3-3 or 3-4).	Connect P1 and P4 into corresponding P1 and P4 on the battery shelf.
NT Series 600 or 800 Cabinet	Locate near each battery string. Adhesive-backed mounting pads are provided to secure module in place.	Connect P1 and P4 into opposite ends of the four connector battery string cable assembly used in the cabinet. Connect P1 to the most positive end (ground) and P4 to the most negative end (-48 volts). The single wires to connectors P1 and P4 should line up with the wires in the mating connection which lead back to the bus.
NT OPM	Place one module in the middle of each battery string. Adhesive-backed mounting pads are provided to secure module in place.	

10. Alarm Relay connections (optional): Connect alarm leads to terminal block TB201. See paragraph “Alarm Relay Wiring” for more information. See Appendix E for pin assignments.
11. Install User Channel cable (optional): Plug the user channel cable into P206, the four-position connector on the right side of the board. The opposite ends of this cable should be attached to any points at which the customer is interested in monitoring a maximum 60 VDC voltage. Dress the cable along cable trough areas, tying off any excess length. The cables are six feet long.
12. Install phone line: Connect the phone line to J202, an RJ11 jack found on the left side of the circuit board. Connect the other end to a spare telephone pair: green to tip, red to ring. This can be done by stripping and splicing the wires or by using the connector block provided. See also paragraph “Modem Wiring.”

13. Route Power/Temperature cable: The IRU requires a nominal 48 VDC supply connected via the Power/Temperature cable. Make connections at the source end first do not plug the cable into the IRU until step 16 of the installation. Table 3-C has instructions for power connections in various applications.

The temperature probe (thermistor assembly) for measuring the ambient temperature around the batteries is located at the opposite end of the cable set. The bead (end) of the probe assembly should be installed centrally over the batteries and tied off in such a way that it is suspended in air just above them, with the end not touching any equipment directly. An adhesive-backed cable tie base is provided for this purpose.

14. Strain-relieve cables: After all wiring has been dressed to the IRU, the wires going into the unit sides must be cable tied down to the IRU base. Holes in the base are provided for this purpose.
15. Configure a local terminal as described in paragraph "Local Terminal." Connect to the local terminal (25 position female) on the front of the unit.
16. Power up the unit: connect the power cable to P207 and then slide the IRU back into its case. The IRU will perform unit diagnostics for approximately 15 seconds, during which time all visual indicators on the front of the unit will be lit and the three alarm relays will be in their alarm state. During the diagnostics the IRU will transmit diagnostics information to the local port. This information will appear on a terminal connected to the local port. The information will be transmitted at 9600 bps. It will be of the form:

```
Testing....Please Wait
RAM test Passed
EPROM test Passed
Clock test Passed
DUART test Passed
A to D test Passed
Modem test Passed
Press RETURN
```

Table 3-C: IRU Powering Connection

<p>Lucent Technologies SLC Series 5</p>	<p>The IRU power cable for this system is designed to support a power connection for the IRU as well as a power connection from a 2A fan assembly to the power shelf. Connect the six pin plug of the IRU power cable to J114 on the power shelf. P114 from a 2A fan assembly may need to be disconnected. Reconnect P114 from the fan assembly to the available six pin jack on the IRU power cable (Figure 3-4).</p>
<p>Lucent Technologies SLC 96</p>	<p>Connect the spade lugs of the power cable to the covered terminal block on the right front of the 1A or 1B Power and Jack Panel. At the far right of the terminal, connect the black wire (Vin-) to the -48V terminal and the red wire (Vin+) to the GND terminal (Figure 3-3).</p>
<p>NT Series 600 Cabinet</p>	<p>The IRU power cable for this system is designed to support a power connection for the IRU as well as a power connection for one battery string. Connect the two pin plug of the power cable to the string 6 connection on the DC power control panel. If a battery string must be disconnected to accommodate the IRU power connection, reconnect the battery string to the available two pin jack on the IRU power cable (Figure 3-6).</p>
<p>NT Series 800 Cabinet</p>	<p>Connect the spade lugs of the power cable to a spare circuit breaker in the DC distribution shelf located above the rectifiers. Connect the black wire (Vin-) to the -48 volt terminal and the red wire (Vin+) to the GND terminal. The terminals are located at the rear of the distribution shelf. Turn breaker switch to ON position (Figure 3-5).</p>
<p>NT OPM</p>	<p>Connect the spade lugs of the power cable to the terminal strip which supplies nominal 48 volt power to batteries. Connect the black wire (Vin-) to a -48 volt terminal and the red wire (Vin+) to a GND terminal. The terminal strip is located in the center of the rear cabinet wall (Figure 3-7).</p>

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.

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 IRU will stop executing its program due to the serious impact of failure of these parts and the

“normal” green LED will not be lit. 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 diagnostics test (see Appendix A). These diagnostics tests will run any time the power is removed then returned or any time the reset switch (SW202) is pressed. After diagnostics are complete, the IRU will start normal operation, at which time all indicators on the faceplate will be set to show the present unit status, all alarm relays will be set to the proper state depending on system conditions, and data channel scanning will begin for those channels which are enabled.

17. Login to IRU: Enter the default password, LINEAGE, or the current password.
18. Become a Super-User: Select Super-User Login at the main menu. Enter the default password for Super-User login, 2000, or the current password.
19. Set the present date and time: Select Super-User functions/Configure/System Parameters/Reset Date & Time. Refer to Section 5.
20. Select the desired temperature units: The default is Fahrenheit; for Celsius select Super-User Functions/Configure/System Parameters/Temperature Units. Refer to Section 5.
21. Configure the battery strings to be monitored: Select Super-User Functions/Configure/Battery Strings. Refer to Section 5.
22. View the battery channel readings to make sure the IRU is reading correct voltages and currents: Select Main Menu/Data Channels/Battery Channels. Refer to Section 4.
23. Set the various thresholds (temperature, charge current, discharge current, capacity, and battery life) for the batteries: Select Super-User Functions/Configure/Battery Thresholds. Refer to Section 5.
24. Configure dial-out on alarm: Select Super-User Functions/Configure/Dial-Out on Alarm. Refer to Section 5. Dial-out

configuration consists of two parts: phone numbers and alarm matrix (Section 5).

25. IRU issues reserve time alarms during a discharge when the reserve time falls below eight hours, four hours, two hours, and one hour. To change these default times, or to disable the alarm feature: Select Super-User Functions/Configure/Reserve Time Alarms. Refer to Section 5.
26. Configure periodic status dial-out (daily, weekly, monthly or quarterly): Select Super-User Functions/Configure/Periodic Status Dial-Out. Refer to Section 5.
27. Change the factory default user and super-user passwords: Select Super-User Functions/Configure/System Parameters/Change Password. Refer to Section 5.

System Component Descriptions

The Intelligent Reserve Unit consists of the main circuit pack enclosed in a sheet metal unit, a battery interface module for each battery string to be monitored, and the cables to interconnect the system. The main unit is opened by grasping both sides of the faceplate and pulling back. The circuit pack will slide out with the faceplate about six inches, allowing access to internal wiring and for maintenance. To close, push the circuit pack back into the enclosure until it snaps into place. Following are descriptions of the auxiliary equipment that may be used with the main unit.

Battery Interface Module

A module is required at each string of batteries for the IRU to access voltage and current measurements from each battery. This module is mounted at each string where the wire set from each battery can reach it. The battery interface module has four connectors, marked B1 through B4 (for Battery 1 through 4). Plug the batteries into these connectors in the same manner they would have been plugged into the battery shelf or wire set that would normally put them in series (i.e., 181A Apparatus, battery string wire harness, etc.). Figure 3-1 shows a block diagram of the IRU system.

The module also has a wire assembly which consists of two 2-position connectors. These should be plugged into the P1 and P4 connectors on the battery shelf or wire set for the cabinet, making sure that the designations on the shelf connectors and module connectors match. The module is now placed the

batteries in series, so that the potential between the P1 and P4 ends of the wire set is 48 VDC and so no connections are required to the center two connectors (P2 and P3). P1 is the most positive end of the string (usually ground). P4 is the most negative (usually -48 volts).

The battery interface module must be protected by a fuse of a rating no greater than 20A. A fuse assembly is provided with each module. It should be installed as shown in Figure 3-8.

Battery Cable Set

The battery cables connect the battery interface modules with the IRU. These cables connect to the module at the ten-position connector labeled IRU CONNECTION and to the IRU at the connectors on the front labeled Battery Strings. The IRU can monitor up to six strings of batteries. Each battery cable is equipped to monitor up to three strings. When the strings are connected, each battery interface module should be marked with the number identified on the connector that plugs into it. This uniquely identifies the battery string to the IRU. Route these cables along cable trough areas. Enough slack should be left to allow the IRU shelf to be pulled out without having to disconnect the cables.

Input Power/ Temperature Cable Set

A cable is provided with provision for the power input leads and thermistor connection. Refer to Appendix E for pin assignments. The power leads are supplied with an in-line fuse assembly which is to be connected to an isolated secondary DC power source (see Figures 3-3 through 3-8). This fuse assembly is always required to protect the cable and unit and may not be removed. It is installed as close as possible to the source. Excess wire length should be looped up and tied off in the cabinet.

The temperature measuring leads are equipped with a thermistor at the end. This is used to monitor ambient temperature near the batteries. It is to be installed by cable tying it off in a location where the tip is not touching any other equipment, preferably centered just above the batteries (see Figures 3-3 through 3-7). This temperature is monitored by the IRU and used in battery life calculations.

The IRU end of the wire set will be plugged into the connector labeled P207.

Note

Plugging in the power cable immediately provides power to the board. Wait until all other wiring is completed and the local terminal is configured correctly before making this connection.

User Channel Cable Set

A wire set is provided for the two user-specified data channels. These channels may be used for any miscellaneous voltage measurements (maximum 60 VDC). The wire set is connected to the IRU by plugging into the connector labeled P206. The leads are provided with in-line fuse assemblies. These fuses are to be installed as close to the source end of the leads as possible (that is, at the equipment being monitored). Again, these fuse assemblies are required to protect the wire and IRU and may not be removed. The channel input leads have been designated P and N. When the P lead is connected to the most positive voltage, the user channel reading will be positive. Refer to Section 5.

Modem Wiring

A phone line is provided with a RJ11 jack (J202) on the IRU (see Figure 3-2). Plug the RJ11 connector end of the line into the jack. The other end should be terminated to a spare telephone pair. Allow enough slack in the wire to allow the IRU shelf to be opened and pulled out for maintenance. Verify a good frame ground connection by checking continuity between the ESD jack and the frame connection.

Alarm Relay Wiring

Three sets of Form C alarm relay contacts are provided for customer use. They may be used to control visual or audible alarms. Input ratings to the alarm relays must be 250 mA and 60 VDC maximum.

Caution

The IRU 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 must conform to the National Electric Code.

Caution

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

Connections can be made to the four Form C alarm relay contacts via terminal block TB201 (Figure 3-2).

The terminal block is a separable connector that accepts the stripped end of a wire in a screw-clamp type connection. Maximum wire size should be 18 AWG wire. Strip ends 3/8 inch. To ease connection, remove the terminal block from the circuit board by pulling up. After making connections, simply plug back onto the board. This is only to ease connections; 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 its opening, tighten the screw, and test the connection by pulling gently on the wire. See Appendix E for pin assignments.

Pass-Through and RS485 Ports

Connectors are provided on the IRU for two other communications protocols: a pass-through port for communicating with other Lucent Technologies controller products, and an RS485 port. See Appendix E for pin assignments. Wiring must conform to the National Electric Code.

Memory Backup Battery

A lithium battery is shipped with the unit to provide backup power to the RAM components on the main circuit board so that no information will be lost in the event power is removed from the unit.

Note

During the initial installation of the IRU, 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. If primary power is not applied for a long period during installation, the battery's reserve will be used up.

The backup battery is shipped loose with the IRU. Refer to Figure 3-2 for the location of the memory backup 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. Pry the battery holder cover off and insert the battery in the proper orientation into the holder. Take care not to drop the battery onto the circuit pack. Replace the battery holder cover by snapping into place.

Warning

Danger of explosion or fire if lithium battery is incorrectly replaced. Replace only with Tadiran TL5101 or an equivalent recommended by the manufacturer. Spare batteries may be ordered from Lucent Technologies from J85577A-1. Lithium batteries may be regulated hazardous wastes (due to reactivity) when disposed of. Always discard used batteries according to applicable local, state and federal regulations.

Notice

The manufacturer, Tadiran, has provided the following information regarding its product. "When dealing with Lithium Batteries, please follow the listed precautions carefully in order to prevent accidents: Do not stack or pack loosely to avoid short circuiting. Do not short circuit. Do not heat or incinerate. Do not charge. Do not deform or disassemble. Do not apply solder directly. Do not mix different types or partially used batteries together. Always observe proper polarities."

The battery will provide the circuit pack with memory backup for a minimum of 96 hours in the event of a loss of unit power. A warning is issued by the system when the memory backup battery should be replaced. The battery is replaced by snapping the cover off and removing the old battery. Replace only with Tadiran part number TL-5101/S.

Note

If the Intelligent Reserve Unit is powered down when replacing the memory backup battery, history and configuration information will be lost. See Section 5 for information on backup configuration.

Local Terminal Wiring

The IRU is equipped with a 25-pin D-sub connector which can be used to connect a local terminal for on-site access to the IRU. This connector is located on the faceplate (see Figure 2-1). Simply plug the mating connector from the terminal cable into the connector on the faceplate and tighten the strain relief screws on the cable connector, if applicable. Wiring must conform to the National Electric Code.

Local Terminal Configuration

Note

The following terminal settings for IRU will also apply for a terminal shared with older Lucent equipment.
--

Supported Terminals:

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

AT&T/Teletype 5410, 5420, 5425 Terminals

Communication Parameters:

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

Duplex: full	Send Parity: space
Check Parity: no	132 Columns: off
Memory Access: scroll	Clock: async
Return Key: CR	New Line On LF: no
Autowrap: off	Cursor: blink
Margin Bell: User Preference	Keyboard Model: 5420
Transmission: char	Send from: cursor
Send Edit Seq: yes	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 610 and 615
Terminals***

Communication Parameters:

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

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

User Preferences:

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

AT&T 710 Terminal

Only two options need be changed from terminal defaults:

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:

Speed: 1200, 2400, 4800, 9600 bps (local terminal)
300, 1200 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: OFF
Scrolling: JUMP
Cursor: User Preference

***ANSI Compatible
Terminals***

Communications Parameters:

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

Note

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

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.

Modem

On-board Modem

The IRU is equipped with an on-board modem, accessible through the phone line jack (J202). Connect the IRU to the telephone network through a voice grade tip/ring pair no longer than 18,000 feet.

Remote Modem

A remote modem (not provided with IRU) is necessary to be able to call or receive calls from the IRU remotely. The remote modem must be set for 300 or 1200 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. When using a Hayes compatible modem for alarm report reception and for calling the IRU, the remote modem must be configured with the following commands:

Command ATSO=2 sets the modem to answer automatically 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 ATY1 enables the long space disconnect option to eliminate noise associated with terminating connections.

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

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

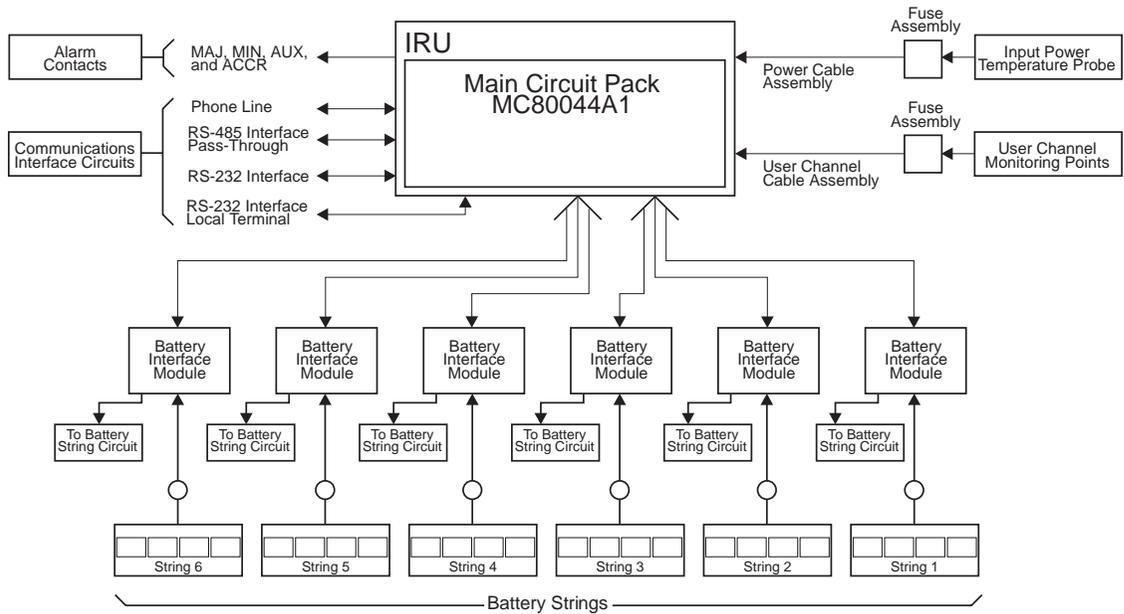


Figure 3-1: Block Diagram of Intelligent Reserve Unit

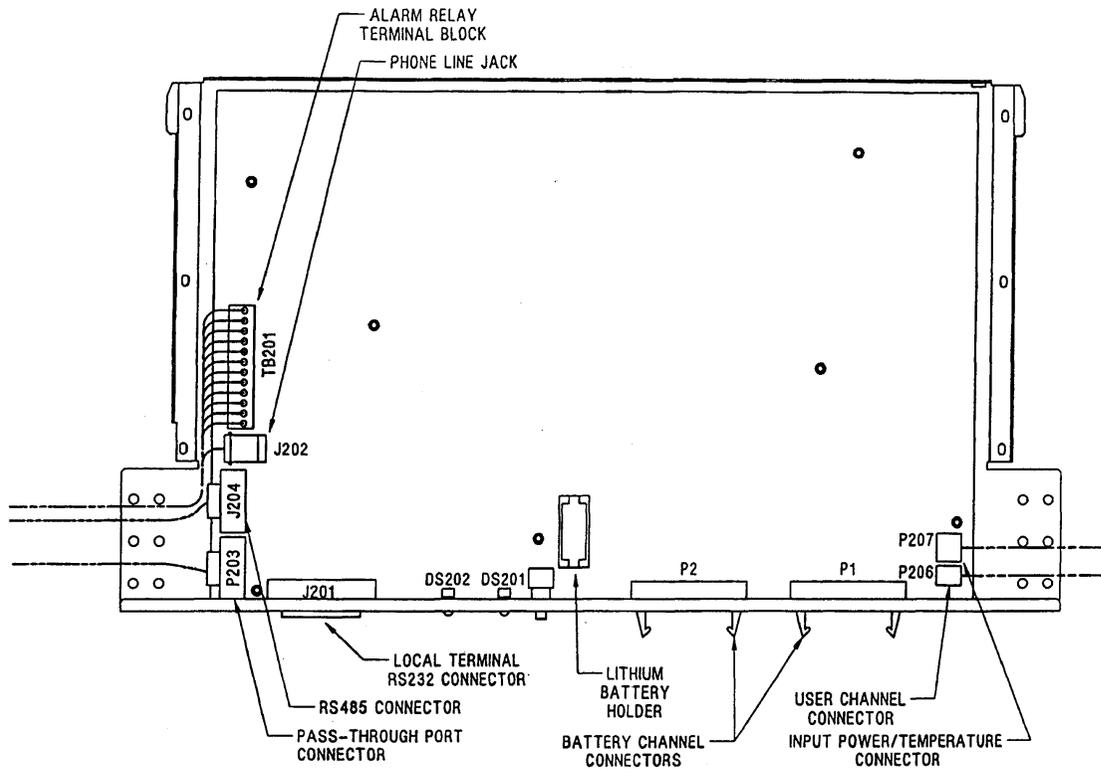


Figure 3-2: Intelligent Reserve Unit Circuit Board

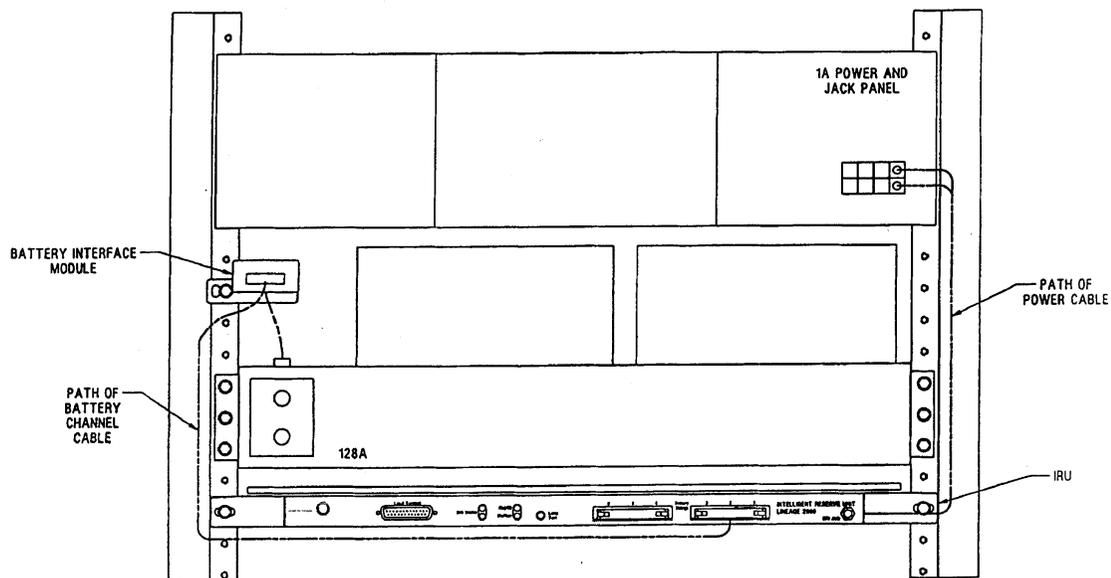


Figure 3-3: Lucent Technologies SLC 96 Installation

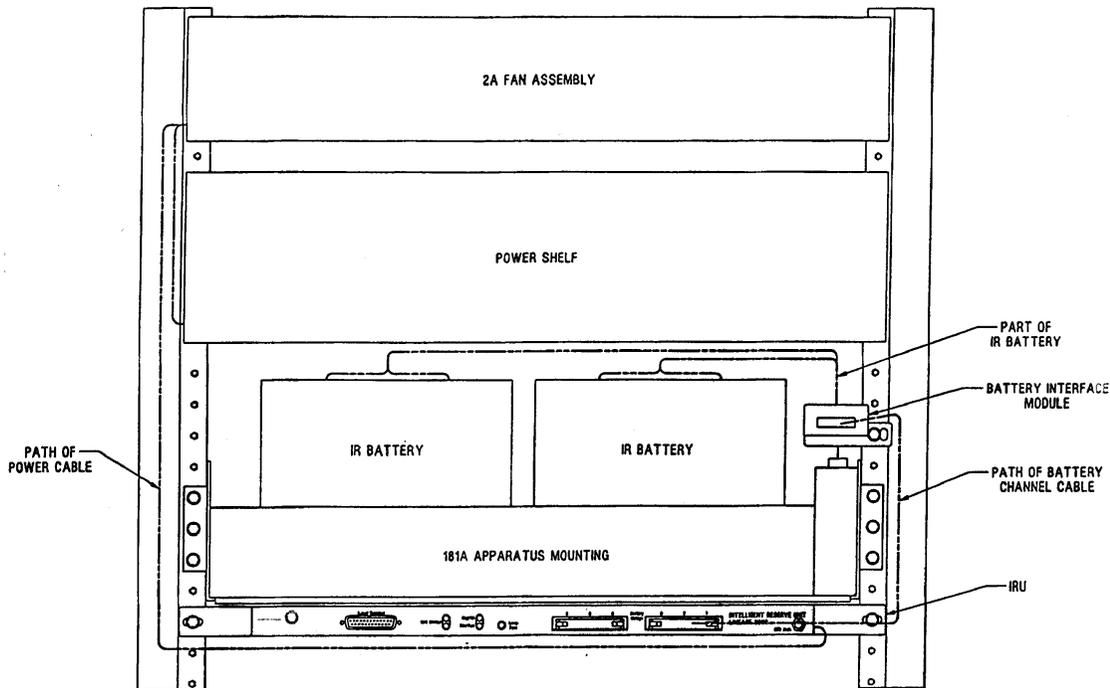


Figure 3-4: Lucent Technologies Series 5 Installation

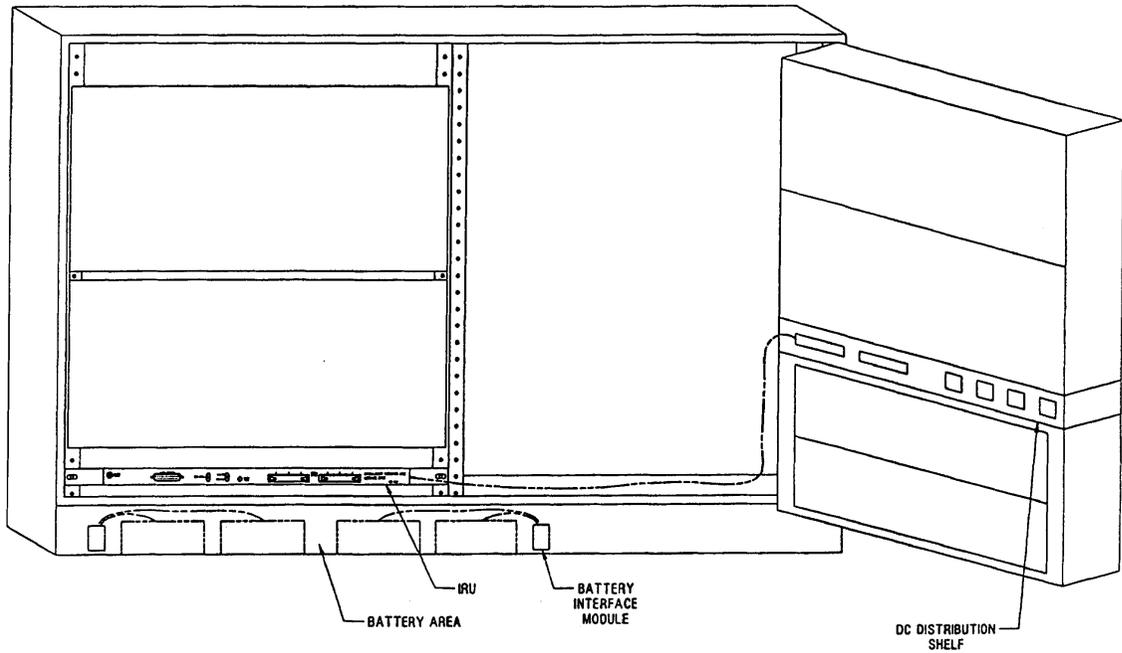


Figure 3-5: NT Series 800 Urban Installation

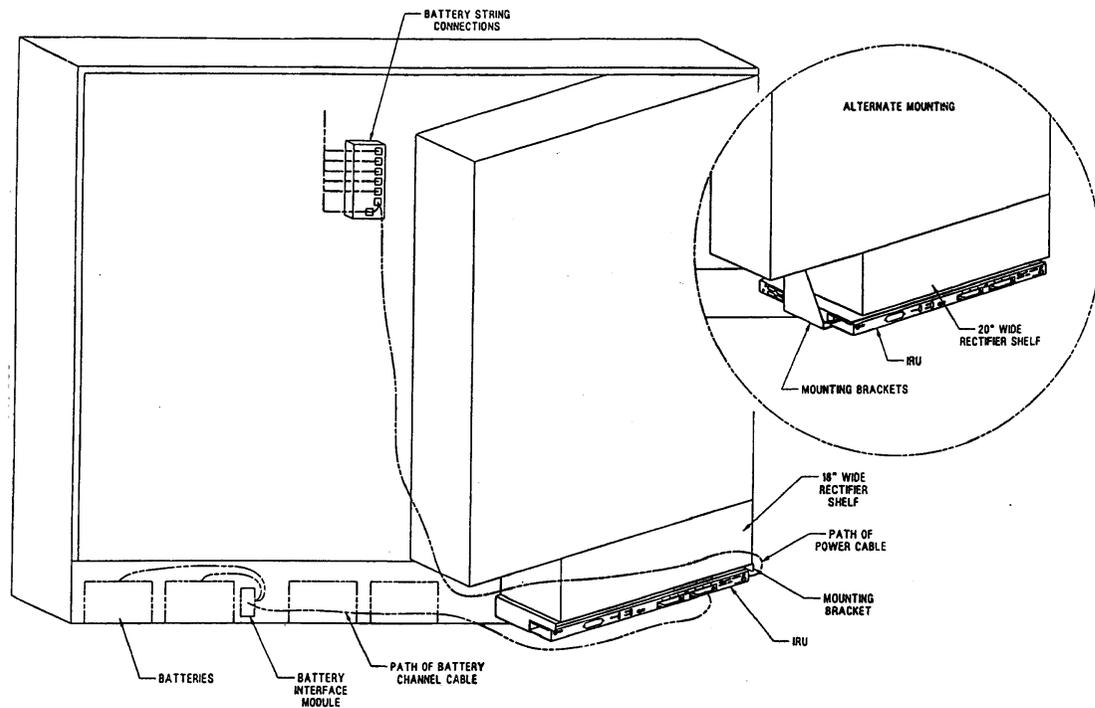


Figure 3-6: NT Series 600 Urban Installation

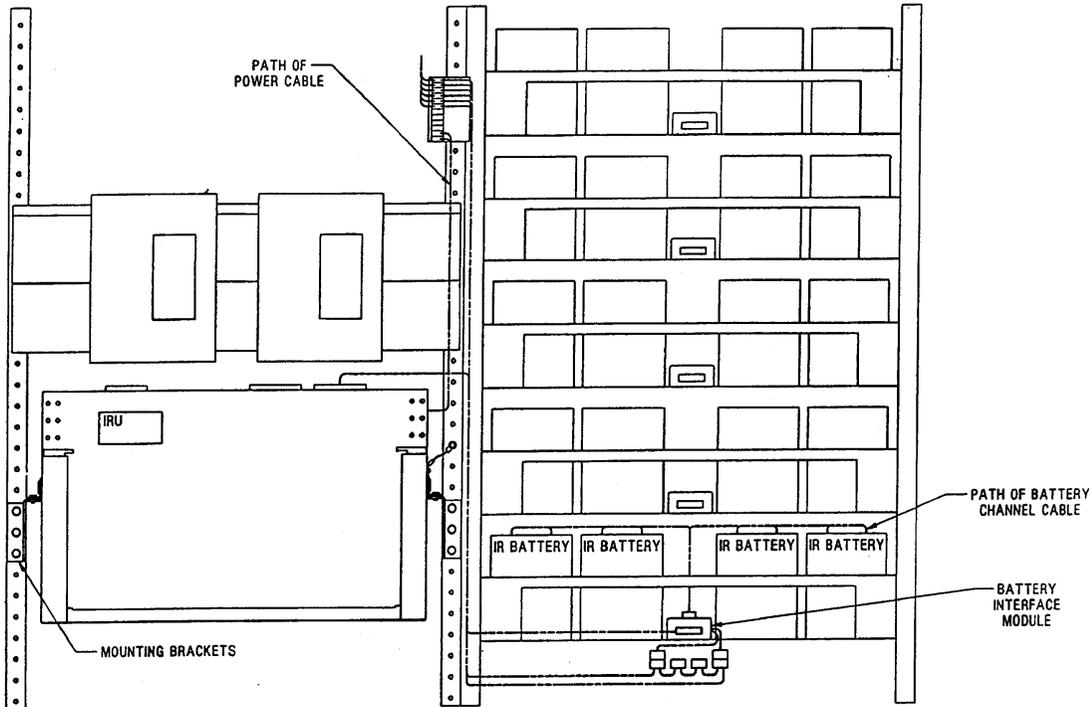


Figure 3-7: NT OPM Cabinet Installation

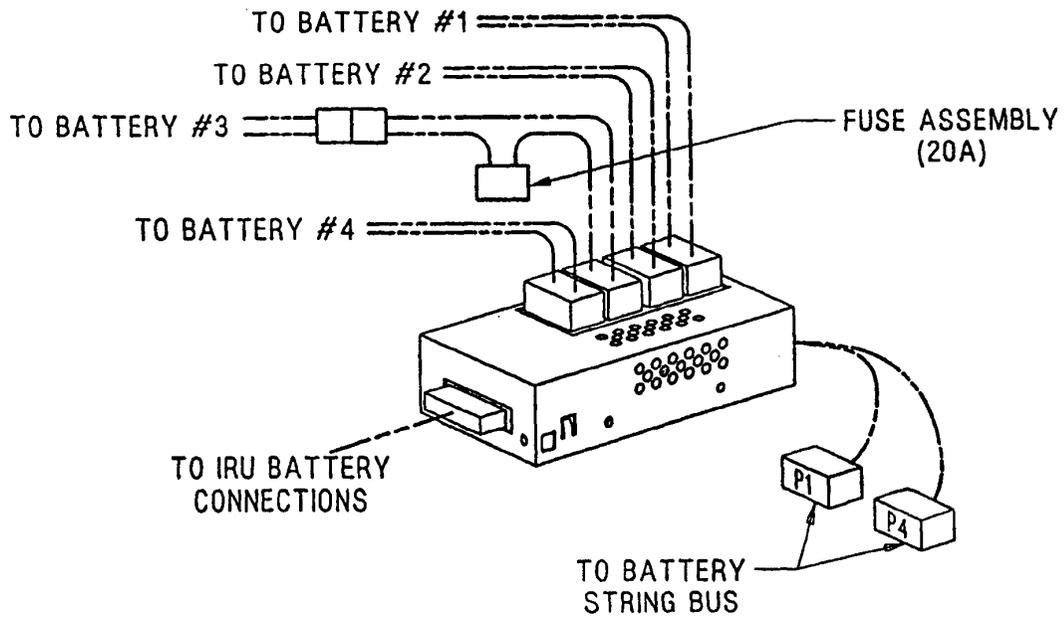


Figure 3-8: Battery Interface Module Connections

4 *Operation*

General Information

The Intelligent Reserve Unit software displays a series of screens and menus to allow interaction within the monitoring unit. 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 Intelligent Reserve Unit features three types of interfaces: a completely menu-driven interface for normal use, a command line access, and a polling interface that is mainly intended for PEERS compatibility.

Paragraphs “Conventions” through “Feature Descriptions” describe the normal user interface. Paragraph “Polling Interface” describes the polling interface. Appendix F describes the command line interface.

Conventions

Throughout the remainder of this section, the following convention will be used to represent the order in which menus should be accessed to use the feature described:

PATH: Main Menu/Aaaa/Bbbb/Cccc

For example, to view the Battery Discharge History, the following would be presented:

PATH: Main Menu/View History/View/Battery Discharge

This means to do the following:

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 “Battery Discharge” option which will display the Battery Discharge history.

Terminal Login Procedure

After the Intelligent Reserve Unit is powered up, the local terminal will display self-diagnostic information and prompt the user to press <Return>. The user may have to press <Return> several times while the system determines baud rate. The user will then be prompted to enter the password. Type in the password and press <Return>. The IRU 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, IRU’s list of active warnings will include a user-clearable ****Excessive invalid 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 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 unit status. The header will be updated on each screen throughout the login session. As shown in Figure 4-1, it will display:

Unit identification/status information:

1. the present IRU software version
2. the present battery temperature, day, time, and date
3. a unit identification block (Super-User definable)

4. total number of alarms present
5. reserve time (if any string is on discharge)
6. number of warnings present
7. number of major, minor, auxiliary, and record only alarms present
8. whether notification has been set for either of the notepads
9. whether another user is logged in

```
LUCENT IRU VERSION 2.0  78.1 DEG. F  FRIDAY 02/21/92 03:38
UNIT ID: 123ABC  (Super-User Defined ID)
3 ALARM(S) PRESENT  RESERVE TIME 03:461  WARNING(S) PRESENT

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

NOTEPAD STATUS: View Notepad 1 and Notepad 2
USER STATUS: A local user is currently logged in.
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 unit, choosing items of information to view or changing the way the information is presented. All users have monitoring ability and may have some degree of 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 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 will go to the main menu.

Command Line Access

Users who are already familiar with the IRU features may use a command line to take them immediately to the screen they want without having to navigate through the menus. IRU 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 F.

Note

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

Line Editing

A line editing feature eases unit configuration and using notepads. The feature can be used in all description, units, battery string configuration dates and temperature, 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. <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. <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. This means information can be yanked from a field in one screen and added into a field in a different screen.

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> 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, <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 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 paragraph “Feature Descriptions.” Figure 4-2 displays 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
String Discharge Data
Battery Capacity
Battery Life
Notepad/Inventory
Pass-Through
Bye
```

Figure 4-2: IRU Main Menu Screen

Logging Off

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

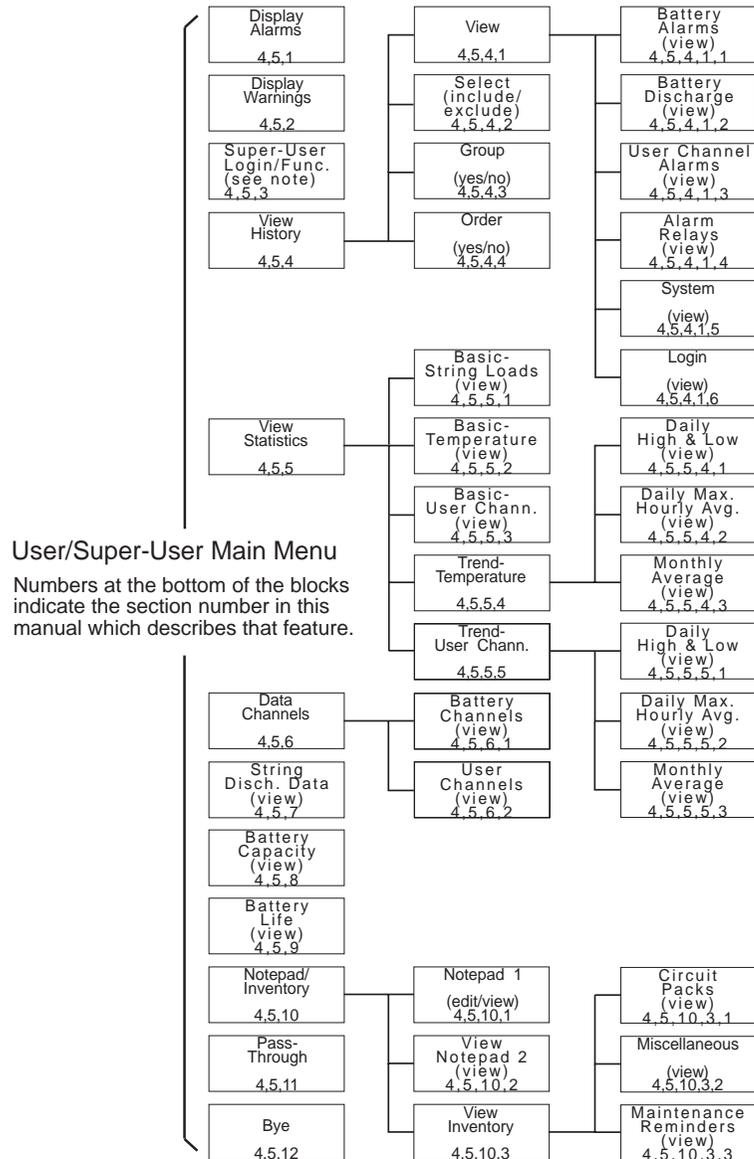
Feature Descriptions

All users have access to the features listed on the Main Menu upon logging in as described in paragraph “Terminal Login Procedure.” In the listings below, PATH indicates the menu and submenu selections to follow to get to the desired feature. Figure 4-3 is a User Functions Menu Map for IRU. Each function displayed in the map is keyed to the appropriate paragraph of this manual.

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 Major, Minor, Auxiliary, or Record Only type for

battery, and user channel alarms, and the alarm description. Refer to Appendix B for a complete list and description of possible alarms. Only 13 alarms will displayed per page. Press <Return> to display remaining alarms.



Note: This option normally appears as Super-User Login. When logged in as Super-User, this option appears as Super-User Functions.

Figure 4-3: IRU User Functions Menu Map

***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 of an action to take on a specified date (see Section 5, "Maintenance Reminders"). 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 unit configuration. A second level security password is required. Refer to Section 5, "Super-User Login."

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

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

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.

Battery Alarms - Path: Main Menu/View History/View/Battery Alarms.

Displays the most recent battery alarm events, up to a maximum of 256 events. The alarm events are a result of any battery channel reading being either above upper thresholds or below lower thresholds that are programmed by the Super-User. It also includes battery discharge alarm, temperature channel alarm and reserve time alarms. 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 alarm description. 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, and (L) means the lower threshold was the cause. The most recent date and time that the log was edited and cleared are also displayed here. Refer to Section 5, "Clear History/Battery Alarms" 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. Refer to Appendix B for alarm event descriptions.

Battery Discharge Alarms - Path: Main Menu/View History/View/Battery Discharge.

Displays the most recent battery discharge events, up to a maximum of 48 events. The alarm events are a result of any string of batteries going on discharge. Each numbered event includes the date and time logged, abbreviation of alarm (i.e. string number), duration of the string discharge, and the last predicted reserve time for that discharge. The most recent date and time that the log was edited and cleared are also displayed here. Refer to Section 5, "Clear History/Battery Discharge" 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 Select, Group, and Order options.

User Channel Alarms - Path: Main Menu/View History/View/User Channel Alarms.

Displays the most recent user channel alarm events, up to a maximum of 32 events. The alarm events are a result of a user channel 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 User 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, "Clear History/User Channel Alarm" for editing and clearing options. By default, entries are made into this log in the order they occur, with the most recent event displayed first. This format can be changed using the select, group, and order options.

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

Displays the most recent alarm relay events, up to a maximum of 32 events. System alarms include Processor Halt, Processor Restart, and System Clock Changed. 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 user channel alarms, and battery alarms. 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 or off), 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, "Clear History/Alarm Relays" 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.

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

Displays the most recent system alarm events, up to a maximum of 32 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 5, "Clear History/System Alarm" for editing and clearing options. By default, entries are made to this log in

the order they occur, with the most recent event displayed first. This format can be changed using the Select, Group and Order options. The current status of these options is displayed immediately after the title on the 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. For an unsuccessful login attempt, the duration field will display “UNSUCCESSFUL.” Logins via the polling interface will display “PEERS” along with the User or Super-User status of that login session (see paragraph “Polling Interface” for more information on the polling interface). Refer to Section 5, “Clear History/Login” for clearing options.

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

This option can be used to select particular alarms for viewing battery alarm history. The current option setting is displayed. The user can then select as to whether all or individual battery string alarms can be viewed. Use arrow keys to move among fields, pressing <Space Bar> to toggle the option field between “Include” and “Exclude.” The current setting will be saved by pressing <Return>, <Esc> or pressing to quit without saving.

Note

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

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 user channel alarm history log will be grouped by channel numbers (UC1, UC2).

The battery alarm history log will be grouped by alarm events (BD, RT, S1B1, S1B2, etc.).

The battery discharge history log will be grouped by string numbers (STR1, STR2, etc.).

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

The system alarm history log will be displayed with events grouped by alarm type (processor halt, processor restart, and system clock changed).

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. Statistics are kept on string loads, temperature, and user channels. Refer to Appendix C for specific individual statistics algorithms. Statistics information can be cleared by a Super-User (refer to Section 5, “Super-User Functions/Clear Statistics”). New statistics information will start being collected again from the time statistics are cleared.

Note

If a user 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-String Loads - PATH: Main Menu/View Statistics/
Basic-String Loads.**

This selection displays three sets of continuously updated load data for each string. Also displayed are the last date the statistical data was cleared, date and time of the current statistics, and the statistical channel and descriptions. When navigating through this screen, pressing <Return> will display the next consecutive string, or the previous menu if on the last screen of statistics. Entering a valid battery string number followed by <Return> will display the statistics for the chosen string number. Pressing <Esc> will return the user to previous menu, or pressing will return the user to main menu.

- Three Highest Hourly Averages: At the change of every hour, the microprocessor determines the battery 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 determines the highest instantaneous battery 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 determines the lowest instantaneous battery channel readings for the previous hour. The three lowest of these minimums are displayed.

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

This selection displays three sets of continuously updated temperature channel. Also displayed are the last date the statistical data was cleared, date and time of the current statistics, and the statistical channels and descriptions. Pressing <Return> will return the user to previous menu.

- Three Highest Hourly Averages: At the change of every hour, the microprocessor determines the temperature 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 determines the highest instantaneous temperature 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 determines the lowest instantaneous temperature channel readings for the previous hour. The three lowest of these minimums are displayed.

**Basic-User Channels - PATH: Main Menu/View Statistics/
Basic-User Channels.**

This selection displays three sets of continuously updated user channel statistics. Also displayed are the last date the statistical data was cleared, date and time of the current statistics, and the statistical channels 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. Pressing the minus sign (-) followed by <Return> allows you to go back 1 screen. Pressing <Esc> will return the user to previous menu, or pressing will return the user to main menu.

- Three Highest Hourly Averages: At the change of every hour, the microprocessor determines the user 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 determines the highest instantaneous user 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 determines the lowest instantaneous user channel readings for the previous hour. The three lowest of these minimums are displayed.

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

This selection displays a sub-menu of statistics for determining trends on the temperature channel. Pressing <Return> will return the user to previous menu.

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

This selection displays the highest and lowest instantaneous readings of the temperature channel 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, “Super-User Functions/Clear Statistics”). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

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

This selection displays the maximum hourly average of the temperature channel 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, “Super-User Functions/Clear Statistics”). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

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

This selection displays 13 consecutive monthly averages of daily maximum hourly averages of the temperature channel. Statistics can be cleared by a Super-User (refer to Section 5, “Super-User Functions/Clear Statistics”). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

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

This selection displays a sub-menu of statistics for determining trends in the two user channels. 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.

Pressing the minus sign (-) followed by <Return> allows you to go back one screen. Pressing <Esc> will return the user to previous menu, or pressing will return the user to main menu.

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

This selection displays the highest and lowest instantaneous readings of the user 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, “Super-User Functions/Clear Statistics”). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

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

This selection displays the maximum hourly average of the user 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, “Super-User Functions/Clear Statistics”). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

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

This selection displays 13 consecutive monthly averages of daily maximum hourly averages of the user channels. Statistics can be cleared by a Super-User (refer to Section 5, “Super-User Functions/Clear Statistics”). Once cleared, recording of these events begins at the present time and is made available for display at the change of the current day.

**Data Channels -
PATH: Main Menu/
Data Channels**

Displays a sub-menu of viewing options for viewing the configuration and present value of the battery channels, and the user channels.

**Battery Channels - PATH: Main Menu/Data Channels/
Battery Channels.**

This option is used for viewing the description, units and present value of each of the battery channels. Battery thresholds are entered using the battery threshold configuration feature. Upper and lower battery voltage thresholds are automatically set and are dependent on the string voltage. Refer to Appendix B, Alarms (S1B1-S6B4 Battery Voltage Alarms) to determine these thresholds. If a channel is disabled, 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 channel is presently in an alarm condition. Four stars will also be displayed in the unlikely event of a failure in the unit which results in invalid battery channel readings. The battery channels are displayed one string (5 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 enable string, pressing a string number and <Return> will display the chosen string number, pressing <Esc> will return to the previous menu, or pressing will return to the main menu.

Note

- All strings are set to default status of DISABLED when the Intelligent Reserve Unit is first powered on.
- In the string current field, the user-configured charge current thresholds appear when the batteries are charging, and the discharge current thresholds appear when the batteries are on discharge. See Section 5, "Super-User Functions/Configure/Battery Thresholds."

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

This option is used for viewing the present description, upper and lower thresholds, units and present value of each of the user 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 using the Super-User channel configuration feature in order to best describe what is connected to the user channel. The upper and lower thresholds set the range of valid values for which going above or below, respectively, will cause a user 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. A star (*) at the beginning of a line indicates that 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. OVL (overload) will be displayed when inputs exceed the range settings for these channels (60V range for the battery channels and 100mV range for the string current channels). A user-clearable Channel readings out of range warning will also be issued. The two user channels are displayed on 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>, or pressing <Esc> will return to the previous menu, pressing will return to the main menu.

Note

User channels are set to default status of DISABLED when the Intelligent Reserve Unit is first powered on.
--

String Discharge Data - PATH: Main Menu/String Discharge Data

This option is used for viewing the present string discharge data for up to 6 battery strings. Provided information for each string includes string number, discharge duration, average load, and reserve time. The minimum reserve time also appears at the header at the top of the screen. The discharge data are updated approximately once every minute. Pressing any key will stop the present reading update and prompt the user for the next desired

action. If no batteries have been on discharge for longer than one minute, then no string discharge data is available. Pressing <Return> will return the user to the previous menu.

***Battery Capacity -
PATH: Main Menu/
Battery Capacity***

This option is used for viewing the present and last predicted battery capacity, which is the time to reach a specified end voltage from the start of discharge at average load. Provided information for each battery includes battery number, installed date, present predicted capacity, last predicted capacity, and number of discharges. This selection also displays the present average load, last average load, and end voltage of the chosen string. The information is arranged such that each string is on a separate screen. Pressing <Return> will display the next enabled string, or the previous menu if on the last battery string. Entering a valid battery string number followed by <Return> will display the information for the chosen string. Pressing <Esc> will return the user to previous menu, or pressing will return the user to main menu.

***Battery Life - PATH:
Main Menu/Battery
Life***

This option is used for viewing the remaining life of each battery based on average temperature to date and manufactured/ installation date. Provided information for each battery includes battery number, installed date, and remaining life (months at degrees Fahrenheit/Celsius, reported at the average site temperature which is updated every 24 hours). The information is arranged such that each string is on a separate screen. Pressing <Return> will display the next enabled string, or the previous menu if on the last battery string. Entering a valid battery string number followed by <Return> will display the information for the chosen string. Pressing <Esc> will return the user to previous menu, or pressing will return the user to main menu.

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

Displays a sub-menu of viewing options for access to the IRU 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 paragraph “Command Line Access” for editing instructions. 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 IRU 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 circuit packs or other associated equipment. Provided entries for each circuit pack include the description, CLEI code, serial number and installed date. See Sect. 5.2.5.1 for detailed information on editing circuit pack inventory information. The circuit pack inventory information is arranged in four screens, with 10 entries each. 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 will return to the main menu.

**Miscellaneous - PATH: Main Menu/Notepad/Inventory/
View Inventory/Miscellaneous.**

This selection allows the viewing of the inventory page related to the miscellaneous inventory. Provided entries for each miscellaneous item include description, vendor, serial number, and installed date. See Section 5 for detailed information on editing miscellaneous inventory information. The miscellaneous inventory information is arranged in four screens, with 10 entries each. 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 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 IRU is connected with other Lucent Technologies equipment via the RS232 pass-through port. This selection passes the communication link with the local or remote terminal through the intelligent reserve unit directly to the connected unit(s). Refer to Figure 3-1 and Appendix E for P203 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 Intelligent Reserve Unit only monitors communication. The command RBYE will return the communication link to IRU. Note that if the BYE command is not issued to the connected system before entering the RBYE command for any Lucent Technologies equipment, the communication link will be returned to IRU, but the connected system may remain active until it times out. The pass-through baud rate defaults to 1200 bps, but can be changed using the pass-through baud configuration feature. See Section 5 for information on programming the pass-through baud rate. Note that the pass-through baud rate and the local or remote serial port baud rate are independent, thus it is log into IRU from a remote terminal and modem at 1200 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 paragraphs. 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 IRU is not available through the polling interface. Such features as grouping/ordering histories, 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 paragraph "Terminal Login Procedure" except that the PEERS password must be entered instead of the User password. The default PEERS password is POLLING. After login, the three-line system header will be displayed and the asterisk (*) prompt will be issued. Commands are entered by typing the command (in either upper or lower case) at the (*) prompt and pressing the <Return> key. The same security feature for detecting excessive login attempts for the User login applies here.

User Commands

ALMS	Output all active alarms.
ARHSTRY	Output the alarm relay history.
BAHSTRY	Output the battery alarm history.
BATLIFE	Output remaining battery life for all strings.
BATCAP	Output predicted capacity of each battery.
BDHSTRY	Output the battery discharge history.
BYE	Log off the connected system without returning the communication link to the IRU.
DSCAN	Output all battery and user channel readings.
DSTAT	Output all statistics.
FDRLD	Output all battery and user channel readings.

FDRST	Output all statistics.
HLINES	Prompts the user for the number of history lines to be output when any of the HSTRY commands is issued.
HSTRY	Output battery alarm history logs, battery discharge history logs, user channel alarm history logs, alarm relay history logs, system alarm history logs, and login history logs.
INVENTORY	Output all inventories.
LOGHSTRY	Output the login history.
LOGIN	Request to become Super-User in the polling interface. Refer to Paragraph "Super-User Login Procedure."
PRCONFIG	Output all user channel configurations.
RBYE	Return to communication with IRU 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 IRU, but the connected system may remain active until it times out.
RASPASS	Pass the communication link through to a connected system.
SHSTRY	Output the system history.
UCHSTRY	Output the user channel history.
WARNS	Output all active warnings.

***Super-User Login
Procedure***

To log in as a Super-User in the polling interface, type LOGIN at the user prompt (*). IRU will issue a prompt requesting the Super-User password. Type the Super-User password and press <Return>. The default Super-User password is 2000. IRU will then issue the Super-User prompt (**). The same security feature for excessive Super-User login attempts applies for Super-User logins with the polling 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.
CLRFDST	Clears all statistics.

5 *Super-User Operation*

Super-User Login

Section 4, “Feature Descriptions” describes features available to a regular user upon logging into the unit. A Super-User has configuration abilities in addition to all the options available to a regular user. To log in as a Super-User, log in to the unit and select the Super-User Login option from the Main Menu. The unit will prompt for a Super-User password. The Intelligent Reserve Unit is shipped with the factory default Super-User password, 2000. This password should be changed by a designated Super-User as explained in paragraph “Change Password” 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 unit 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, IRU’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 unit configuration. Figure 5-1 is a general map of the Super-User Functions menu structure.

Super-User Functions

The Super-User Functions Menu, where unit configuration 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 shown in Figure 5-1 below. Figure 5-2 is a Super-User Functions Menu Map for IRU. Each function displayed in the map is keyed to the appropriate paragraph of this manual.

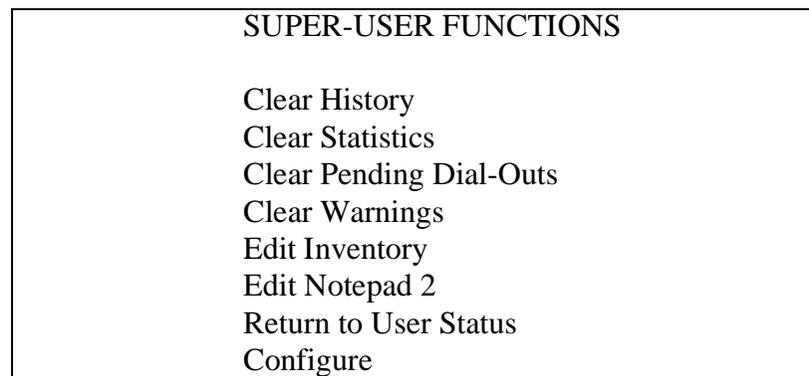


Figure 5-1: IRU Super-User Functions Menu Screen

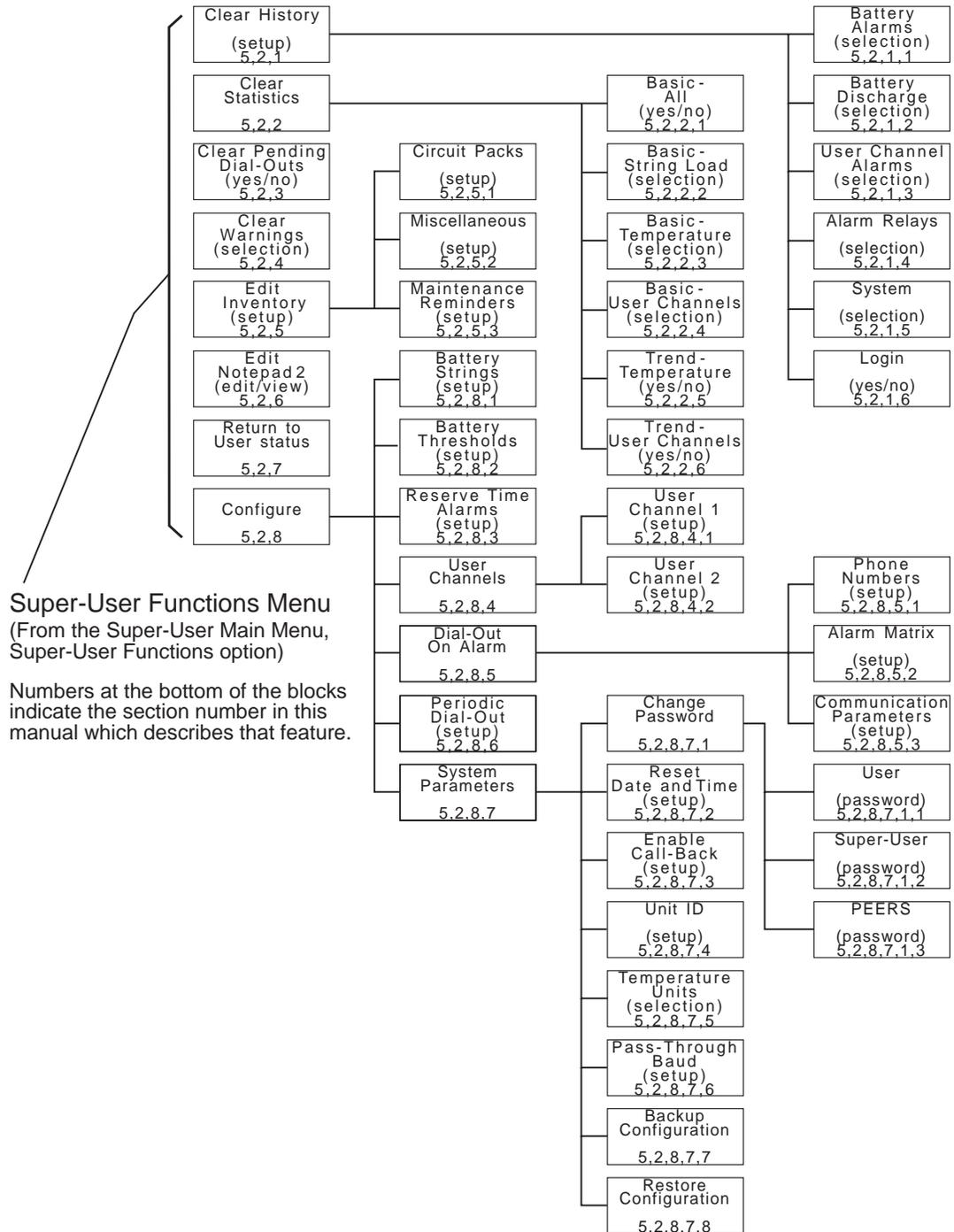


Figure 5-2: IRU Super-User Functions Menu Map

**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 renumbered.

**Battery Alarms - Path: Super-User Functions/Clear History/
Battery Alarms.**

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

Note

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

**Battery Discharge - Path: Super-User Functions/Clear
History/Battery Discharge.**

The battery discharge 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 battery discharge 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 battery discharge 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 at the prompt will leave this screen with the remainder of the log unaltered.

Note

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

User Channel Alarms - Path: Super-User Functions/Clear History/User Channel Alarms.

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

Note

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

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

Note

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

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. 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. Pressing <Esc> or at the prompt will leave this screen with the remainder of the log unaltered.

Note

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

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

The Super-User is prompted to clear the entire login history log. Answering yes to this prompt clears the log and updates the date of last clearance. Pressing <Esc> or 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 - 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 will leave the statistics intact.

Basic - String Load - PATH: Super-User Functions/Clear Statistics/Basic - String Load.

The system displays three sets of continuously updated load statistics for each string and the Super-User is prompted to clear the statistical data. Answering <Y> to this prompt will clear statistics for the string on the current screen. Answering <N> or

pressing <Esc> or will leave the statistics intact. Pressing <Return> will display the next enable string, or the previous menu if on the last screen of statistics. To clear statistics on a particular string, move to the screen on which the statistics are displayed by entering a valid string number followed by <Return>.

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

The system displays three sets of continuously updated battery temperature channel statistics and the Super-User is prompted to clear the statistical data. Answering <Y> to this prompt will clear statistics for this channel. Answering <N> or pressing <Esc> or will leave the statistics intact.

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

The system displays three sets of continuously updated user channel statistics and the Super-User is prompted to clear the statistical data. Answering <Y> to this prompt will clear statistics for the channel on the current screen. Answering <N> or pressing <Esc> or will leave the statistics intact. Pressing <Return> will display the next user channel, or the previous menu if on the last screen of statistics. Pressing the minus sign (-) followed by <Return> allows you to go back 1 screen.

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

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

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

The Super-User is prompted to clear user channel trend statistics. Answering <Y> to this prompt will clear all trend statistics for the two user channels. Answering N or pressing <Esc> or will leave the statistics 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 paragraph “Dial-Out on Alarm”). When the Dial-Out on Alarm feature is enabled, the unit 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 unit has had a chance to dial out, the log of pending dial-outs in memory can be cleared by selection of this option.

Clear Warnings - PATH: Super User Functions/Clear Warnings

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

<1><Return>deletes Warning 1.

<1,3,5><Return>deletes Warning 1,3, and 5.

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

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

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

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 unit 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, “Command Line Access.”

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. The circuit pack inventory information is arranged in four screens, with 10 entries each. Pressing <Return> will save the inventory information. Pressing either <Esc> or will exit this screen without saving.

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

This selection allows the viewing and editing of the inventory page related to the miscellaneous inventory and configuration. Information that can be changed for each miscellaneous item includes the item type, serial number, and its installed date. The miscellaneous inventory information is arranged in four screens, with 10 entries each. Pressing <Return> will save the inventory information. Pressing either <Esc> or 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 paragraph "Edit Inventory" 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, "Command Line Access" 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 will put back the original lines and will discard any edited changes. When <Return> is pressed, the user will be prompted to specify whether the login header should notify the next user that a new message has been entered in the notepad. Answering No to the prompt results in a message No Notification in the header. Answering Yes prompts the user to see the appropriate notepad.

***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 IRU configuration options are available through the Configure Menu, reached by selecting Super-User Functions/Configure from the Super-User Main Menu. Figure 5-3 displays the Configure Menu.

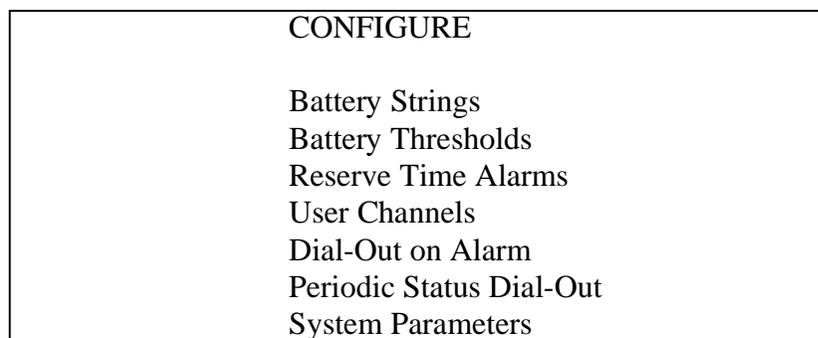


Figure 5-3: Configure Menu Screen

Battery Strings - PATH: Super-User Functions/Configure/Battery Strings.

Selection of this option allows the Super-User to configure the battery string data for the chosen string to enable monitoring and to determine battery life based on storage time and average temperature. The terminal arrow keys are used to move among the fields. The field descriptions are as follows:

Monitoring: Enable/Disable. This entry activates the string for monitoring. Use the space bar to toggle through the options.

System Type: This entry allows the Super-User to select the type of cabinet to be configured for the enabled string. The IRU supports subscriber loop applications such as Lucent Technologies' SLC-96 and Series 5 carrier systems, Northern Telecom's DMS 1* URBAN® Series 600, Series 800 and OPM systems, and custom applications. Use the space bar to toggle through the options. Once a system type is selected, default values are set for the next three fields, i.e., end-voltage, voltage drop, and cable resistance. Only Custom system type allows the user to specify end-voltage, voltage drop, and cable resistance. (Note: DMS 1* URBAN is a registered trademark of Northern Telecom.)

Battery Type: This entry informs the IRU of the type of battery to be monitored. Use the space bar to toggle through the options.

End Voltage: This entry displays the Low Voltage Disconnect (LVD) trip voltage. For the four supported system types (SLC-96, Series 5, OPM, Urban), default values for each cabinet are automatically displayed and can not be changed. When system type is custom selected, the user can choose the end-voltage. Use the space bar to toggle through the options.

Voltage Drop: This entry displays the fixed voltage drop from the enabled string to the LVD point. For the four supported system types (SLC-96, Series 5, OPM, Urban), default values for each cabinet are automatically displayed and can not be changed. When system type is custom selected, the user can choose the voltage drop. Use the space bar to toggle through the options.

Cable Resistance: This entry displays the cable resistance from the enabled string to the LVD point. For the four supported system types (SLC-96, Series 5, OPM, Urban), default values

for each cabinet are automatically displayed and can not be changed. When system type is custom selected, the user can choose the cable resistance. Use the space bar to toggle through the options.

Manufactured Date: This entry allows the Super-User to enter the battery manufactured date (mm/dd/yy).

Installed Date: This entry allows the Super-User to enter the battery installed date (mm/dd/yy).

Average Temperature: This entry allows the Super-User to enter the estimated average temperature to which the battery has been exposed from the date of manufacture to the date of installation.

Pressing <Return> after changing any of the Input Type, End-Voltage, Voltage Drop, Cable Resistance 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 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 string configuration screen, any valid string number and <Return> to go to that string configuration screen, <Esc> to go to the previous menu, or to go to the main menu. Battery string configuration dates and temperature fields may be edited using the line editing features described in Section 4, "Command Line Access."

Battery Thresholds - PATH: Super-User Functions/ Configure/Battery Thresholds.

This screen allows the Super-User to configure battery alarm thresholds for all batteries in the system monitored by the IRU. The terminal arrow keys are used to move the cursor among the option fields. The Notification Type field is changed by pressing the space bar to toggle through the options. This selection displays its own defaults for discharge current, charge current, battery temperature, battery capacity, and battery life. The discharge/charge current lower threshold, and the battery capacity/life upper threshold default is NONE and can not be changed. In addition, battery capacity and battery life alarm type will only be WARNING. Pressing <Return> after changing any information of the fields will save the new configuration.

Pressing <Esc> or will restore the original entries without change and will go to the previous menu or main menu respectively.

Reserve Time Alarms - PATH: Super-User Functions/Configure/Reserve Time Alarms.

This option is used to select the reserve time alarm thresholds. Reserve time alarms occur when the reserve time for an ongoing battery discharge falls below their configured threshold. They retire when the Battery Discharge (BD) alarm retires. The factory defaults are: RT1 at 8 hrs, RT2 at 4 hrs, RT3 at 2 hrs, and RT4 at 1hr. The alarm type will default to MINOR. Use the terminal arrow keys to move the cursor among the option fields. Press the space bar to toggle through the options of the threshold field; select Disable to disable the alarm. The Notification Type field can be changed by pressing the space bar to toggle through the options. Pressing <Return> after changing any information of the fields will save the new configuration. Pressing <Esc> or will restore the original entries without change and will go to the previous menu or main menu respectively.

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

This selection displays a submenu of the two user channel options that the Super-User can change.

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

Selection of this option allows the super-user to configure the user 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.

Channel Description: This entry is left to the Super-User to enter a meaningful description of what is connected to the user channel. It may be edited using the line editing features described in Section 4, "Command Line Access."

Type: This entry informs the unit of the type of voltage (+dc, -dc, CC, CO) to be measured. This is necessary, since the measurement techniques vary for the four 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. See Section 6.

Auto-Polarity: The IRU measurements use auto-polarity in a manner similar to a DVM (digital volt meter). The channel input leads have been designated P and N. When the P lead is connected to the most positive voltage, the user channel reading will be positive. Likewise, when the P terminal is connected to the most negative voltage, the user channel reading will be negative. This is true regardless of whether the type is configured as +dc or -dc. See Appendix E for pin assignments.

Note

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

Voltage Type: In configuring the user channels, a voltage type is selected. 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 cabinet with the -48V bus to the P terminal, -48V return to the N terminal and use a -dc type for a typical user 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.

Range: This entry chooses from among the available full scale voltage ranges that can be displayed. Available ranges are 100mV, 5V, 15V, and 60V. Use the space bar to toggle through the options.

Scale Factor: This entry allows the user to enter a multiplying factor when measuring non-linear voltages. For a straight voltage measurement, the scale factor is 1.00". A non-unity scale factor is used when transducers are being used, shunts are measured, or when correction factors are required. The scale factor is expressed in terms of units per volt for all ranges but the 100mV 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 user channel input

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

$$100 \text{ A}/50 \text{ mV} = 2 \text{ A/mV.}$$

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: 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 milli-ampere current loop measurement where it is desired for the 4 milli-ampere 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 user channel. The limit is specified in terms of the units that the channel is to display. By using a signed value, the user channel 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 none 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, and record only. 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.

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 units field may be edited using the line editing features described in Section 4, "Command Line Access."

Binary Alarms: Binary alarms are on/off type alarms. The IRU has software provisions for monitoring alarm contacts and generating binary alarms when the contact is open or closed. When the CC (alarm on Contact Closed) or CO (alarm on Contact Open) type is selected, the remaining Range, Scale Factor, Transducer Offset and Units are automatically set to accommodate the binary channel measurement scheme used in IRU, and may not be changed by the user. The Alarm Thresholds are also automatically set such that sensed voltages of less than 2 volts are determined to be closed, and voltages above 2 volts are determined to be open. To use this feature, set the Input Type to CC or CO, depending on whether the alarm should occur when the contact opens (CO) or when the contact closes (CC), and connect the contacts to be monitored to the user channel cable set and plug into P206. Refer to Appendix E, Connector Pin Assignments, for P206 pin assignments, and Section 6, Applications, for illustrations of typical specific sense point monitoring wiring setup schematic diagram illustration configurations. 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 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 to go to the main menu.

**User Channel 2 - PATH: Super-User Functions/Configure/
User Channels/User Channel 2.**

Same information as User Channel 1.

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

With this feature enabled, IRU can dial out to assigned phone numbers and report when alarm conditions occur and/or retire. Phone numbers assigned must be connected to remote terminals with a 300, or 1200 bps modem, and the remote modem must be configured for auto-answer. 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 IRU 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, "Command Line Access." Phone numbers may include numbers, star(*), pound(#), hyphen(-), parentheses(), and commas(.). Commas will cause a two-second

delay before sending out the next tone and can be used for pauses. For example: (123)555-6666,,22# will dial out the primary number and wait six seconds before sending the extension number. A Pager ID field exists for entering a numeric identification code. This ID code is sent as touch-tones when the pager phone number has been successfully dialed. The TYPE field is used to select the mode which will be used when dialing out. The choices are DATA for use with a modem, and PAGER for use with a remote pager. The Type field is changed by pressing the space bar to cycle through the choices. When DATA is selected, it is possible to select between a modem speed of 300, or 1200 bps in the Baud Rate field. This is done by pressing the space bar when in the Baud Rate field. This field must be set to the baud rate of the modem connected to the remote terminal which will receive the dial-out information. Pressing <Return> will save all new lines and any changed lines. Pressing either <Esc> or 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. For a pager, the interval designates the time between the connection of the controller to the pager service and transmission of the pager ID. This provides the flexibility needed for working with a wide variety of pagers. 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 will put back the original lines and will discard any edited changes.

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

<p>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.</p>
--

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

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

The Dial-Out Communication Parameters can be configured to make the dial-out feature 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 status dial-out (see paragraph “Periodic Status Dial-Out”). Dial-in communication and call-back security parameters remain fixed at 8 data bits, no parity, and 1 stop bit.

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

Enabling this option will cause the unit to dial out a brief status report on a regular basis, either daily, weekly, monthly, or quarterly. 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. As an example, Setting the How Often field to TUESDAY will cause the unit to dial out every Tuesday at the specified time (time is based on a 24 hour clock). Changing the How Often field to DAILY will cause the unit to dial out every day at the specified time. Changing the How Often field to MONTHLY will cause the unit to dial out on every first day of the month at the specified time. Changing the How Often field to QUARTERLY will cause the unit to dial out on every first day of the quarter (Jan 1st, Apr 1st, Jul 1st, and Oct 1st) at the specified time. The dial-out report will consist of the three line unit header and the list of active alarms or warnings. The unit will then automatically disconnect. The Baud Rate field can be toggled to 300 and 1200 bps. The phone number field may be edited using the line editing features described in Section 4, “Command Line Access.”

In addition to the brief status report which consists of the unit identification and the present warning and alarm status, the user may have the unit send other useful information reports on a regular basis. The options include battery life and reserves, all unit statistics, unit histories, and present 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. 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 will exit without updating the periodic status dial-out.

Note

Since reports may be lengthy, the user should make sure the remote station has sufficient paper or disk space to receive the entire report.

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

All IRU 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. The System Parameters menu is shown in Figure 5-4.

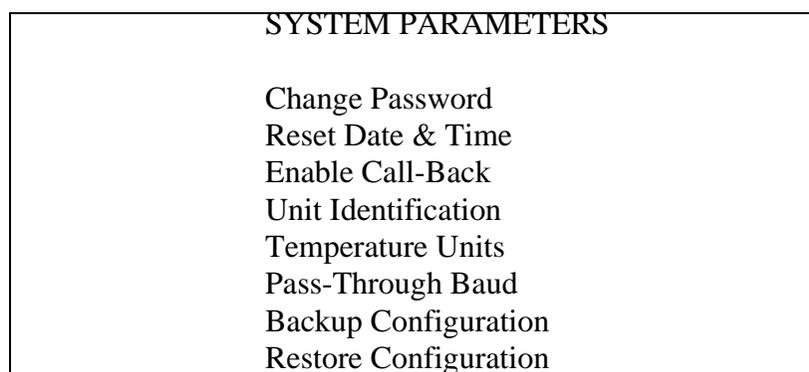


Figure 5-4: System Parameters Menu Screen

**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. A warning will be displayed until the default passwords are changed.

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

The password is used in conjunction with the PEERS automatic system polling interface. The factory default password is POLLING. The Super-User is prompted for the current Super-User password, the new PEERS password, and then prompted to verify the new PEERS password. 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 on the 1st Sunday in April and the 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 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.

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

Call-Back is an optional security feature incorporated by IRU. This feature limits the remote locations from which the unit 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 unit will then hang up, call the remote location back, and require the remote user to log in again. If the unit fails to complete the call, the call-back 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, "Command Line Access." The Baud Rate field will change between 300, and 1200 bps when the space bar is pressed. This field must be set to the baud rate of the modem connected to the remote terminal for which Call-Back is desired.

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

This selection permits a Super-User to specify a unit identification and description. This will appear in the second line of the system header (Refer to Figure 4-1). The unit identification can be from one to eight alphanumeric characters and has a factory default setting of 1. The unit 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, "Command Line Access."

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

**Temperature Units - PATH: Super-User Functions/
Configure/System Parameter/Temperature Units.**

This selection is used to select the system temperature unit. Pressing the space bar toggles the unit field between Celsius and Fahrenheit. The factory default setting is Fahrenheit. Changing from Fahrenheit to Celsius will cause all screens to report temperature in Celsius. Pressing <Return> saves the new configuration. Pressing <Esc> or will restore the original configuration without change. After saving or restoring the configuration pressing <Return> or <Esc> returns to the previous menu, pressing 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[®] 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 IRU.

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

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

This option is used to save the IRU configuration information to an external memory device such as a personal computer disk drive. Since IRU maintains battery life discharge memories and uses them for reserve time calculations, it is recommended that IRU memory be backed up periodically. It also provides a way to easily return to a desired configuration in the unlikely event of

a unit failure or prolonged power outage where the configuration information is lost. 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 IRU.

Note

All data gathering is suspended during the backup operation, which lasts for approximately 10 minutes at 1200 bps (local and remote terminals), 5 minutes at 2400 bps, or 2 minutes at 9600 bps (local terminal only). During this period of time any equipment connected to IRU will not be monitored. Before using backup from a remote location, critical equipment operation should be checked 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 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 <CTRL><X> multiple times.

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, the partial backup file should be deleted from the external memory device and another backup attempted. 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 the user should check all critical equipment being monitored by IRU before logging off the system. No other action is required by the user.

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

This option is used to restore previously backed up configuration information to an IRU. This can be used to recover from a prolonged power outage where memory backup power is lost or to recover from a unit failure. While restoring the configuration, only one user may be logged into the unit. 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 IRU. Note that once a restoration is complete, the IRU will automatically reset, so the user must log back into the unit. 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 reconfigure any part of the unit. This is very useful for initially configuring units, where a standard configuration template can be restored, then a small amount of custom configuring can be done to match each unit specific requirements. This will produce a vast savings of time over manually configuring the entire unit. When restoring a configuration, only configuration information is restored. Since the restored configuration may be quite different from the previous configuration, all history, statistics, and warnings 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 unit from a remote location. This could occur mostly when using restore to configure a new unit.

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

Note

The restore feature will probably only be used in a unit which has lost its configuration. Note that as with backup, no data is gathered during the restore operation, which lasts for approximately 10 minutes at 1200 bps (local & remote terminals), 5 minutes at 2400 bps, or 2 minutes at 9600 bps (local terminal only). During this time any equipment connected to IRU will not be monitored. When using restore from a remote location, check critical equipment operation after the restoration by logging back in and viewing the data channels monitoring it.

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 to return to the previous menus. After you have pressed <Return>, IRU 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 <CTRL><X> multiple times.

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 unit 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 restore didn't get to will have the previous configuration. Although this cannot harm the unit, it could result in unexpected alarms, dial-outs, warnings, etc.

After successfully restoring a unit, 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 unit. If the phone numbers are to remain the same, the time for the periodic dial-out may need to be changed so two units aren't attempting to reach the same number at the same time. The unit ID fields and inventories should be changed to match the new unit, and the notepads and maintenance reminders should be checked to see if they make sense for the new unit. Whether manually configuring or using restore to initially configure a new unit, the time and date should be set, and the passwords changed.

6 *Applications*

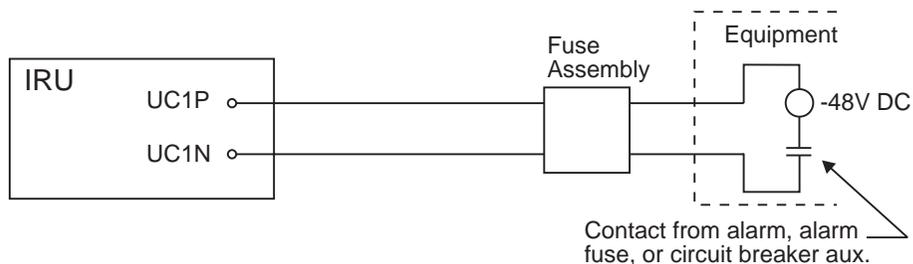
Transducer Compatibility

To be compatible with IRU, 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, IRU provides a Transducer Offset feature for each User channel. Transducers with current output are compatible with the IRU 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.

Fuse and Contact Closure Monitoring

Figures 6-1 through 6-4 show how to configure IRU User channels for various applications using a typical voltage of -48 Vdc. This voltage as well as specific alarm thresholds are meant only as examples.

The IRU may be used to monitor the state of an alarm relay contact. User channels may be configured for alarm on contact open (CO) or alarm on contact close (CC) to achieve this easily. A voltage must be applied to the contact via appropriate current limiting resistors. The IRU then monitors the applied voltage. If the voltage is above 2 volts, the contact is considered to be open; if it is less than 2 volts, it is considered closed. The alarm thresholds and range are automatically chosen when CC or CO type is chosen, and the value displayed will be “open” or “closed.” Note that “open” always means voltage is present, and “closed” means voltage is not present. The application figures show various ways of monitoring alarm contacts using CC, CO, or the more general analog -dc type.



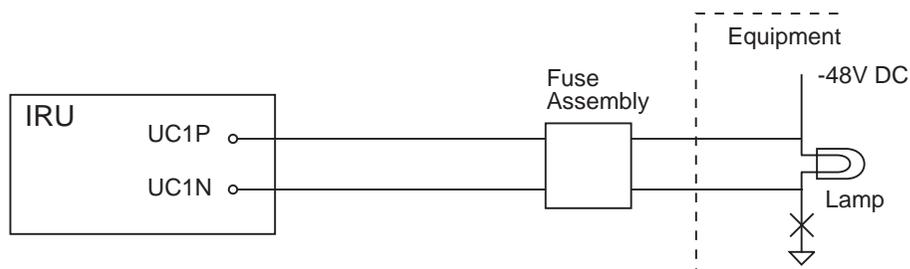
Contact closes to signal trouble condition:

	Use Type:	Set Upper Alarm Threshold to:	Set Lower Alarm Threshold to:
Binary Configuration	CO	na	na
Analog Configuration	-DC 60V Range	-40 VDC	None

Contact opens to signal trouble condition:

	Use Type:	Set Upper Alarm Threshold to:	Set Lower Alarm Threshold to:
Binary Configuration	CC	na	na
Analog Configuration	-DC 60V Range	None	-10 VDC

Figure 6-1: Closure to Voltage



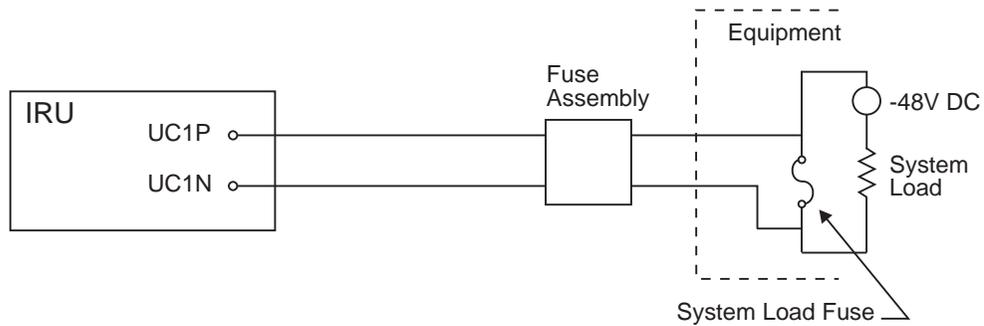
Lamp lit to signal trouble condition:

	Use Type:	Set Upper Alarm Threshold to:	Set Lower Alarm Threshold to:
Binary Configuration	CO	na	na
Analog Configuration	-DC 60V Range	-40 VDC	None

Lamp off to signal trouble condition:

	Use Type:	Set Upper Alarm Threshold to:	Set Lower Alarm Threshold to:
Binary Configuration	CC	na	na
Analog Configuration	-DC 60V Range	None	-10 VDC

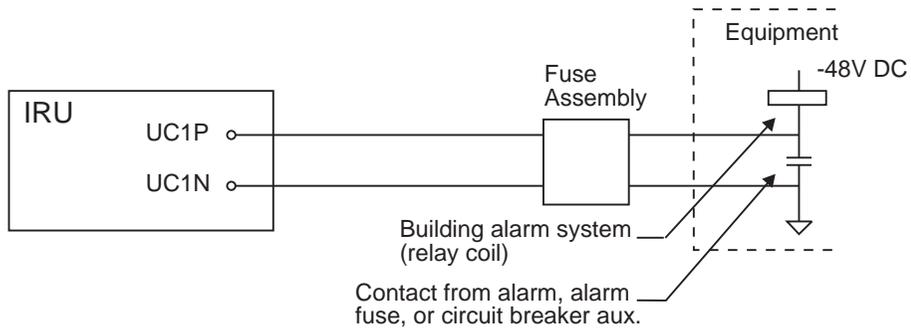
Figure 6-2: Monitoring an Indicator Lamp



Fuse clears in trouble condition:

	Use Type:	Set Upper Alarm Threshold to:	Set Lower Alarm Threshold to:
Binary Configuration	CO	na	na
Analog Configuration	-DC 60V Range	-40 VDC	None

Figure 6-3: Fuse Monitoring



Contact closes to signal trouble condition:

	Use Type:	Set Upper Alarm Threshold to:	Set Lower Alarm Threshold to:
Binary Configuration	CC	na	na
Analog Configuration	-DC 60V Range	None	-10 VDC

Contact opens to signal trouble condition:

	Use Type:	Set Upper Alarm Threshold to:	Set Lower Alarm Threshold to:
Binary Configuration	CC	na	na
Analog Configuration	-DC 60V Range	-40 VDC	-None

Figure 6-4: Closure to Ground

7 ***Product Warranty***

A. Seller warrants to Customer only, that:

1. As of the date title to Products passes, Seller will have the right to sell, transfer, and assign such Products and the title conveyed by Seller shall be good;
2. Upon shipment, Seller's Manufactured Products will be free from defects in material and workmanship, and will conform to Seller's specifications or any other agreed-upon specification referenced in the order for such Product;
3. With respect to Vendor items, Seller, to the extent permitted, does hereby assign to Customer the warranties given to Seller by its Vendor of such Vendor Items, such assignment to be effective upon Customer's acceptance of such Vendor Items. With respect to Vendor items recommended by Seller in its specifications for which the Vendor's warranty cannot be assigned to Customer, or if assigned, less than Sixty (60) days remain of the Vendor's warranty or warranty period when the Vendor's items are shipped to Customer or when Seller submits its notice of completion of installation if installed by Seller, Seller warrants that such Vendor's items will be free from defects in material and workmanship on the date of shipment to Customer. In such an event, the applicable Warranty Period will be sixty (60) days.

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

Warranty Period

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

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

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

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

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

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

- E. The defective or nonconforming Products or parts which are replaced shall become Seller's property.
- F. If Seller determines that a Product for which warranty service is claimed is not defective or nonconforming, Customer shall pay Seller all costs of handling, inspecting, testing, and transportation and, if applicable, traveling and related expenses.
- G. Seller makes no warranty with respect to defective conditions or nonconformities resulting from actions of anyone other than Seller or its subcontractors, caused by any of the following: modifications, misuse, neglect, accident, or abuse; improper wiring, repairing, splicing, alteration, installation, storage, or maintenance; use in a manner not in accordance with Seller's or Vendor's specifications or operating instructions, or failure of Customer to apply previously applicable Seller modifications and corrections. In addition, Seller makes no warranty with respect to Products which have had their serial numbers or month and year of manufacture removed, altered, or with respect to expendable items, including, without limitation, fuses, light bulbs, motor brushes, and the like.

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

©1999 Lucent Technologies
All Rights Reserved
Printed in U.S.A.

Appendix

A

Warnings

Unit Warnings

Unit warnings, displayed by selecting the Display Warnings option on the Main Menu, 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 IRU.

Automatic Warnings

Controller memory backup battery is low: Issued when the IRU memory backup battery should be replaced. Refer to Figure 3-1 for the battery location. The replacement battery is a Tadiran, part number TL-5101/S, (3.6 volt lithium battery).

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 Tadiran TL-5101/S only. Use of Another Battery May Present A Risk of Fire or Explosion. Spare batteries may be ordered from Lucent Technologies, Comcode 406677880.

No dial-out number for P (1-4): Use Configure menu: IRU 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 appear up to four times if each of the 4 primary numbers doesn't have a phone number configured. Refer to Section 5.2.9.3, Super-User Functions/Configure/Dial-Out on Alarm.

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

Battery life below configured threshold: Indicates that the remaining battery life of any battery has fallen below the user-specified threshold. Refer to Sect. 5.8.3, Super-User Functions/Configure/Battery Thresholds.

User-Clearable Warnings

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

****Battery capacity below configured threshold:** Indicates that the battery capacity of any battery has fallen below the user-specified threshold. Refer to Section 5.8.3, Super-User Functions/Configure/Battery Thresholds.

**** Excessive unsuccessful login attempts were made:** Issued when six consecutive invalid passwords are entered at the ENTER PASSWORD: prompt, 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 IRU is going to dial out has exceeded the memory reserved for this function. The dial-out list holds a maximum of 64 events. Refer to Appendix D, Dial-Out Algorithms, for more specific details.

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

**** Dial tone was not detected.** Was unable to dial out: Indicates that IRU attempted to dial out and did not get a dial tone upon going off-hook.

**** String (1-6) readings out of range:** Indicates a possible overload (OVL) condition or a problem with the hardware that may be preventing accurate readings from battery channels. IRU may need replacement.

****User Channel (1-2) readings out of range:** Indicates a possible overload (OVL) condition or a problem with the hardware that may be preventing accurate readings from user channels. IRU may need replacement.

Diagnostic Warnings

Terminal port problems. Call the Hotline: The terminal port test has failed and may have varying results when printing.

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.

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.

IRU channel readings out of range. Call the Hotline: The test of the data channels on the IRU has recorded an invalid reading that may be due to device failure.

Appendix B

Alarms

Battery Alarms and Battery Alarms History

The following are the alarm conditions reported by IRU associated with the battery strings. These abbreviations appear in the Active Alarm Report while active and are automatically deleted when retired. The Battery Alarms History will record the date and time the alarm condition occurred and the date and time it retired. Alarms are displayed showing the alarm type (Major, Minor, Auxiliary or Record Only), and the user-defined description.

S1B1-S6B4 (String 1 Battery 1 through String 6 Battery 4 Alarm): Indicates that a battery voltage has exceeded either the upper or lower thresholds. Along with Occurred, the Battery Alarms History will also display U or L to indicate whether the upper or lower threshold was exceeded.

Upper and lower battery voltage thresholds are determined as follows: The upper threshold (volts) is the minimum of:

17.4
or
 $13.8 + 0.3 * (\text{String Voltage} - 52)$

The lower threshold (volts) for string voltages less than or equal to 54 volts is the maximum of:

12.75
or
 $12.75 + 0.125 * (\text{String Voltage} - 52)$

The lower threshold (volts) for string voltages between 54 and 56 volts is:

$$13 + 0.2 * (\text{String Voltage} - 56)$$

The lower threshold (volts) for string voltages greater than or equal to 56 volts is 13 volts.

S1C-S6C (String 1 Current through String 6 Current Alarm): Indicates that a string current has exceeded either the upper or lower user-specified thresholds. These are the thresholds set using the Battery Thresholds configuration feature. Along with Occurred, the Battery Alarms History will also display U or L to indicate whether the upper or lower threshold was exceeded, and C or D to indicate whether the string was charging or discharging when the alarm occurred.

BD (Battery Discharge Alarm): Indicates that current is flowing out of a battery string.

TEMP (Battery Temperature Alarm): Indicates that the battery temperature has exceeded either the upper or lower user-specified thresholds. These are the thresholds set using the Battery Thresholds configuration feature. Along with Occurred, the Battery Alarms History will also display U or L to indicate

RT1-RT4 (Reserve Time Alarm): Indicates that the predicted reserve time remaining for an active battery string discharge has fallen below one of the four user-specified thresholds. These are the thresholds set using the Reserve Time Alarms configuration feature.

System Alarms and System Alarms History

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

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 IRU 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 IRU microprocessor board is powered up or reset. It is recorded as occurred only.

User Channel Alarms and User Channel Alarms History

The following are the alarm conditions reported by the IRU for user channels. These abbreviations and descriptions appear in the Active Alarm Report while active. They are automatically deleted when the condition retires. The user 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, 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.

UC1, UC2 (User 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.

Alarm Relays and Alarm Relays History

The following is a list of all alarm relay conditions reported by IRU. 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.

MAJ (Major alarm): An alarm condition indicating that a data channel programmed to send a MAJ alarm has exceeded its upper or lower threshold.

MIN (Minor alarm): An alarm condition indicating that a data channel programmed to send a MIN alarm has exceeded its upper or lower threshold.

Unit Alarms and System Alarms History

The following is a list of all unit alarm conditions reported by IRU.

CLCK (Unit Clock Changed): This event is recorded in the unit 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 unit history log whenever the IRU is powered down, reset, or otherwise halted. It is recorded as occurred only.

PR (Processor Restart): This event is recorded in the unit history log whenever the IRU 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. IRU keeps two types of statistics logs: basic, and trend statistics.

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

Instantaneous values: Data 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.

Effects of Changes

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

Effect of Power Failure:

Loss of main power to the IRU 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 User Channel Input Type, Range, Scale Factor, or Transducer Offset:

Changes in User channel input type, range, scale factor, or transducer offset 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, IRU will dial out to the assigned phone number as soon as the user-specified conditions occur. Alarm events are stored in a dial-out queue and processed in the order that they occur.

Five phone numbers can be assigned, four primary numbers (P1, P2, P3, and P4), and one alternate number (A1). IRU 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. IRU will call out to P1 for an alarm stored in the dial-out queue. If the first destination cannot be reached, IRU will then attempt to call out the next selected number, P2. If it is not reached, IRU 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, IRU will not call the first primary number again.

However, if the unit cannot reach A1 or if A1 is not provided, the unit will wait 12 minutes before it tries to call the first primary number again. If IRU 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 IRU 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, IRU 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. IRU 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. IRU will make only two attempts at reaching this number. If the phone number cannot be reached on the first attempt, IRU 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 IRU will not retry the call until the next occurrence of the dial-out time and day.

Appendix E Connector Pin Assignments

Pin assignments on the IRU circuit pack are as follows (refer to Figure 3-1):

Table E-1: Alarm Relay Contacts

TB201 Pin #	Description	
1	ACCR	NC
2	ACCR	NO
3	ACCR	C
4	AUX	NC
5	AUX	NO
6	AUX	C
7	MIN	NC
8	MIN	NO
9	MIN	C
10	MAJ	NC
11	MAJ	NO
12	MAJ	C

Table E-2: Power/Temperature Connector

P207 Pin #	Description
1	-Vin
2	nc
3	TEMPB
4	+Vin
5	nc
6	TE MPA

Table E-3: RS485 Connector

J204 Pin #	Description
1	RX+
2	RX-
3	nc
4	TX+
5	TX-
6	nc
7	nc
8	nc
9	nc

Table E-4: User Channel Connections

P206 Pin #	Description
1	USER1N
2	USER2N
3	USER1P
4	USER2P

Table E-5: Pass-Through Port

P203 Pin #	Description
1	nc
2	RXD2
3	TXD2
4	DTR2
5	COMMON2
6	DSR2
7	RTS2
8	CTS2
9	nc

Table E-6: Local Terminal RS232

J201 Pin #	Description
2	TXD1
3	RXD1
4	RTS 1
5	CTS1
6	DSR1
7	COMMON1
20	DTR1
all others	nc

Appendix F ***IRU Command Line Access***

Introduction

A command line access is provided for each feature screen in the IRU. 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.

Command Structure

Most of the commands are constructed using the following scheme:

A typical command, for example, BSCFG, can be viewed as consisting of two parts. The first two letters indicate the entity to be worked on. In this example, BS stands for Battery String. The second part of the command indicates the action requested on the entity. In this example, CFG stands for configuration.

The valid entities are:

BS	Battery String
UC	User Channels
TC	Temperature Channel

The valid actions are:

CFG	Configuration
R	Readings
S	Statistics Basic
SCLR	Clear Statistics Basic
H	History
HCLR	Clear History
DCFG	Dial-Out Configuration

For example, the command to view history of channel alarm is:

UCH

In general, channel numbers can be appended to commands to go to the display for that particular channel. For example, BSCFG4 immediately displays the configuration screen for Battery String 4.

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.

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:

BSMENU	displays battery string commands
UCMENU	displays user channel commands
TCMENU	displays temperature channel commands
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

Table F-1: Battery String Commands

Command	Function
BSCFG	configure battery strings
BSCFGn	configure battery string n (n = 1 to 6)
BSTCFG	configure battery string thresholds
BSR	view battery string readings
BSRn	view battery string readings for string n (n = 1 to 6)
BSL	view battery string life
BSLn	view battery string life for string n (n = 1 to 6)
BSC	view battery string capacity (reserve)
BSCn	view battery string capacity (reserve) for string n (n = 1 to 6)
BSD	view battery string discharge data
BSH	view battery alarm history
BSHn	view battery alarm history for string n (n = 1 to 6)
BSDH	view battery string discharge history
BSDHn	view battery string discharge history for string n (n = 1 to 6)
BSS	view battery string basic statistics (load only)
BSSn	view battery string basic statistics (load only) for string n (n = 1 to 6)
BSSCLR	clear battery string basic statistics
BSSCLRn	clear battery string basic statistics for string n (n = 1 to 6)
BSDCFG	battery string dial-out matrix configuration

Table F-2: User Channel Commands

Command	Function
UCCFG	configure the user channels starting from channel 1
UCCFGn	configure user channel n (n = 1 or 2)
UCR	present readings of all user channels
UCRn	present reading of user channel n (n = 1 or 2)
UCH	user channel alarm history
UCHCLR	clear user channel alarm history
UCS	basic statistics of all user channels starting from channel 1
UCSn	basic statistics for user channel n (n = 1 or 2)
UCSCLR	clear basic statistics of for user channels
UCSCLRn	clear basic statistics of for user channels n (n = 1 or 2)
UCTRSHL	user channel trend statistics (high and low) starting channel 1
UCTRSHLn	user channel trend statistics (high and low) for channel n (n = 1 or 2)
UCTRSDM	user channel trend statistics (daily max.& min.) starting from channel 1
UCTRSDMn	user channel trend statistics (daily max. & min.) for channel n (n = 1 or 2)
UCTRSMA	user channel trend statistics (monthly avg.) starting from channel 1
UCTRSMA n	user channel trend statistics (monthly avg.) for channel n (n = 1 or 2)
UCTRSCLR	clear trend statistics for all user channels
UCDCFG	user channel dial out alarm matrix configuration

Table F-3: Temperature Channel Commands

Command	Function
TCUCFG	temperature unit configuration
TCS	temperature channel basic statistics
TCSCLR	clear temperature channel basic statistics
TCTRSHL	temperature channel trend statistics (high and low)
TCTRSDM	temperature channel trend statistics (daily max.& min.)
TCTRSMMA	temperature channel trend statistics (monthly avg.)
TCTRSCCLR	clear trend statistics for temperature channel

Table F-4: Miscellaneous Commands

Command	Function
ARH	alarm relay history
ARHCLR	clear alarm relay history
BACKUP	backup data
BYE	terminate communications
CBKCFG	callback security configuration
DCOMCFG	configure dial-out communication parameters
DIALCLR	clear pending dial out queue
DTCFG	reset date and time
EINVCK	edit circuit pack inventory
EINVMI	edit miscellaneous inventory
EMR	edit maintenance reminders
ENOTE2	edit notepad 2
GRPH	change grouping of histories
IDCFG	Unit identification configuration
INVCK	view circuit pack inventory
INVMI	view miscellaneous inventory

Table F-4: Miscellaneous Commands

LOGH	login history
LOGHCLR	clear login history
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
RTCFCG	reserve time alarm configuration
RU	return to user status
SELH	select events in the histories
SH	system alarm history
SHCLR	clear system alarm history
SU	login as super user
WRNCLR	clear warnings (user clearable)

Appendix

G

Troubleshooting Guide

Use this checklist to isolate and correct possible causes of trouble with the Intelligent Reserve Unit.

None of the Front Panel LEDs light:

1. Verify that the input power cable is completely inserted into P207 of the IRU.
2. Check for a blown fuse in the input power cable.
3. Verify that the input power cable is properly connected to a supply of the proper voltage.
4. If the above are correct, carefully slide the IRU out of its case until the input power connector (P207) is accessible. Measure with a digital volt meter, being careful not to short out adjacent pins, between P207 pin 4 (+) and P207 pin 1 (-) to verify that the voltage is the correct value and polarity.
5. If the voltage is correct at connector P207, and none of the LEDs operate, then the unit is defective and requires maintenance.

Only the red Unit Status LED is on:

1. Carefully slide the IRU out of its case and depress the SW201 reset button. If only the red Unit Status LED again remains on, then the IRU is defective and requires maintenance.

Unable to access the IRU via the local port/terminal:

1. Verify that the RS232 cable is properly connected between the terminal and J201 on the IRU.

2. Verify that the terminal is set up for 8 data bits, no parity, and one stop bit. The IRU supports the following baud rates: 1200, 2400, 4800, 9600.
3. If using a terminal emulation program to allow a personal computer to communicate with the IRU, verify that the program is configured for 8 data bits, no parity, and one stop bit. Also ensure that the type of terminal being emulated is supported by the IRU: VT100, Teletype, or ANSI.

IRU displays * for the temperature:**

1. Check that the thermistor cable assembly (J207) is properly inserted into P207 of the IRU.
2. Check for any visual damage to the thermistor cable assembly, particularly around the tip, and to J207.

IRU does not display any voltages for a string of batteries in the system:

1. Go to the battery channel configuration screen and verify that the string is ENABLED.
2. Verify that the cabling from the IRU connector(s) P1 (and P2) are properly connected to the batteries.

Alarm contacts give erroneous alarms or do not send an alarm:

1. Inspect the wiring and connector that plugs into TB201. Verify that the connector is properly inserted.
2. Verify that the alarm contacts are properly programmed.

User Channel(s) reading shows OVL:

1. Verify that the voltage being measured is less than the scale selected for that channel. If necessary, go to the user channel configuration screen and set the correct scale. For best accuracy, use the scale that is closest to, but greater than, the maximum voltage to be measured.
2. If using the 100 mV scale, ensure that the user channel input is connected to a voltage and not floating.

Unable to call into the IRU via the modem:

1. Verify that the telephone line is properly plugged into the RJ11 telephone jack (J202) on the IRU.
2. Verify that the modem that is calling into the IRU is configured for either 300 or 1200 baud. Also, ensure that it is configured for 8 data bits, no parity, and 1 stop bit.
3. Verify that the software that is controlling the modem calling the IRU is emulating a terminal that is supported by the IRU: VT100, Teletype, or ANSI.
4. Verify that the telephone line going to the IRU is operational.
5. If the IRU modem is connected to an order-wire pair rather than a data quality phone line, the distance from the IRU to the calling modem must be less than 18,000 feet (approximately 3.4 miles).

IRU is unable to call out:

1. Verify that the telephone line is properly plugged into the RJ11 telephone jack on the IRU.
2. Verify that the telephone numbers to be called and the dial-out alarm matrix are properly configured in the IRU.
3. Verify that the communication parameters set for the IRU dial-out match those of the modem being called.

Controller Memory Backup Battery is Low warning will not retire:

1. Verify that the lithium battery is inserted in the proper polarity and is seated properly in its socket.
2. Verify that the lithium battery voltage is above 2.6V. If it is below this threshold, replace it. Read the warnings in the product manual about proper procedures in disposing of used lithium batteries.

Note

If the problem persists after you have gone through the checklist, the unit may be defective and require repair. Call the Customer Service Hotline, 1-800-THE-1PWR (1-800-843-1797).

