
HIGAIN LINE UNIT

QUICK INSTALLATION GUIDE

Model	List Number	Part Number	CLEI Code
HLU-819	1	150-2238-01	VACHPSXC



PAIRGAIN TECHNOLOGIES, INC.
ENGINEERING SERVICES
SECTION 350-819-200-01

PAIRGAIN

Revision History of This Guide

Revision	Release Date	Revisions Made
01P	September 21, 1999	Preliminary Release
01	November 12, 1999	Initial Release

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USING THIS GUIDE

The following conventions are used in this guide:

- Monospace type indicates screen text, including text you type at a screen prompt.
- Keys you press are indicated by small icons such as **ENTER**. Key combinations to be pressed simultaneously are indicated with a plus sign as follows: **CTRL** + **ESC**.
- Three types of messages, identified by icons, appear in text.



Notes contain information about special circumstances.



Cautions indicate the possibility of equipment damage or personal injury.



The Electrostatic Discharge (ESD) Susceptibility symbol indicates that a device or assembly is susceptible to damage from electrostatic discharge.

DOCUMENTATION

If you have comments on this PairGain document, send an email to technical_publications@pairgain.com. Type the product name and the section number of the document in the subject area of the email message.

Document Number	Title
150-819-200-01	HLU-819 List 1 Technical Practice
700-811-102-01	ERE-811 List 2, List 3, and List 4 Technical Practice
700-814-112-01	UTU-814 List 1B Quick Installation Guide

INSPECTING THE SHIPMENT

Upon receipt of the equipment:

- Unpack each container and inspect the contents for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to PairGain. Order replacement equipment, if necessary.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact PairGain as described in the Warranty located inside the back cover. If you must store the equipment for a prolonged period, store the equipment in its original container.

SAFETY

To ensure your safety when servicing and installing this equipment, please take the following precautions:



Be careful when installing or modifying telephone lines. Dangerous voltages can be present. It is unsafe to install telephone wiring during a lightning storm.

Always disconnect all telephone lines and power connections before servicing or disassembling this equipment. For performance and safety reasons, only power supplies listed for use with telephone equipment by a locally recognized organization should be used with PairGain equipment. All wiring external to the product should follow the local wiring codes.

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OVERVIEW

This guide contains installation information for the PairGain® HiGain® Line Unit HLU-819 List 1. The HLU-819 installs in any 3192-compliant chassis and interfaces with the PairGain HiGain ETSI™ Universal Termination Unit UTU-814 List 1B. The HLU-819 and the UTU-814 provide the Central Office (CO) and remote terminal (RT) sides of a repeaterless, High bit-rate Digital Subscriber Line (HDSL). The RT provides both DSX-1 (T1) and data interface (V.35, V.36, RS-449, X.21, or RS 530) ports to the customer (see [Figure 1](#)). The HLU-819 accepts the respective payloads through a DSX-1 port from a multiplexer or a DS1 cross-connect shelf and transports it to the UTU-814 List 1B at a maximum data rate of up to 1.544 Mbps. An internal time slot assignment function splits the DS1 bandwidth between these two ports as two Nx64K tributaries.

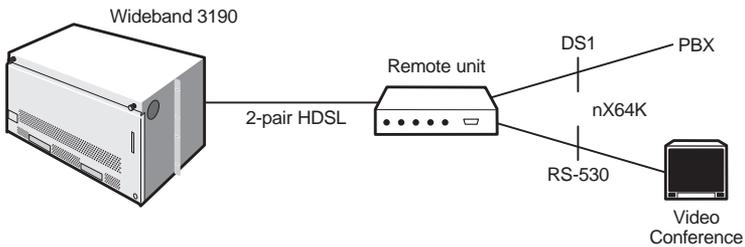


Figure 1. Typical HLU-819 List 1 Application
(T1 to Dual-Port Operation)



In order for the HLU-819 List 1 to support T1 transmission over HDSL lines at the customer remote, the ETSI Remote Enclosure ERE-811 List 2 and the UTU-814 List 1B (ETSI card) must be used at the remote location.

The HLU-819 List 1 is part of the Open Span Termination Shelf (OSTS) family of products supported by the PairGain Wideband System 3190. With this card, the entire PairGain ETSI family of remote Customer Premise Equipment (CPE) can be subtended to the Wideband System 3190 to provide standard Digital Service Unit (DSU) and Channel Service Unit (CSU) data port interfaces.

The HLU-819 fits into a 3192 mechanics shelf and conforms to ANSI T1.403-1989 and AT&T CB 119 standards. It has a transmission range of up to 12,000 ft. (3.66 km) when using 24 American Wire Gauge (AWG) and 9,000 ft. (2.74 km) when using 26 AWG twisted pair copper wire, including bridged taps. The HLU-819 requires -36 to -72 Vdc from the local power supply and can source up to 50 milliamperes (mA) on each of the HDSL data loops to line power the remote unit.

STANDARD FEATURES

- DSX-1 (T1) interface at the CO
- DS1 (T1) and data port interfaces at the remote
- Two pair High bit-rate Digital Subscriber Line (HDSL) interface to an ETSI remote unit
- Terminal Access Option (TAO) and Transaction Language (TL1) command interfaces
- Framing insertion for transmission of framed and unframed data into T1 network
- Detection of standard CSU loopup and loopdown codes
- Time slot prioritization
- Single pair operation
- Status LED
- Compatible with OSTS
- DSX-1 splitting and bridge craft access
- Line power to drive the remote unit
- Integrated dual port fractional T1 delivery system

FRONT PANEL

Figure 2 shows the HLU-819 front panel. Table 1 on page 4 describes the front-panel components. A diagram of the line and bridging access jacks is shown in Figure 3 on page 5.

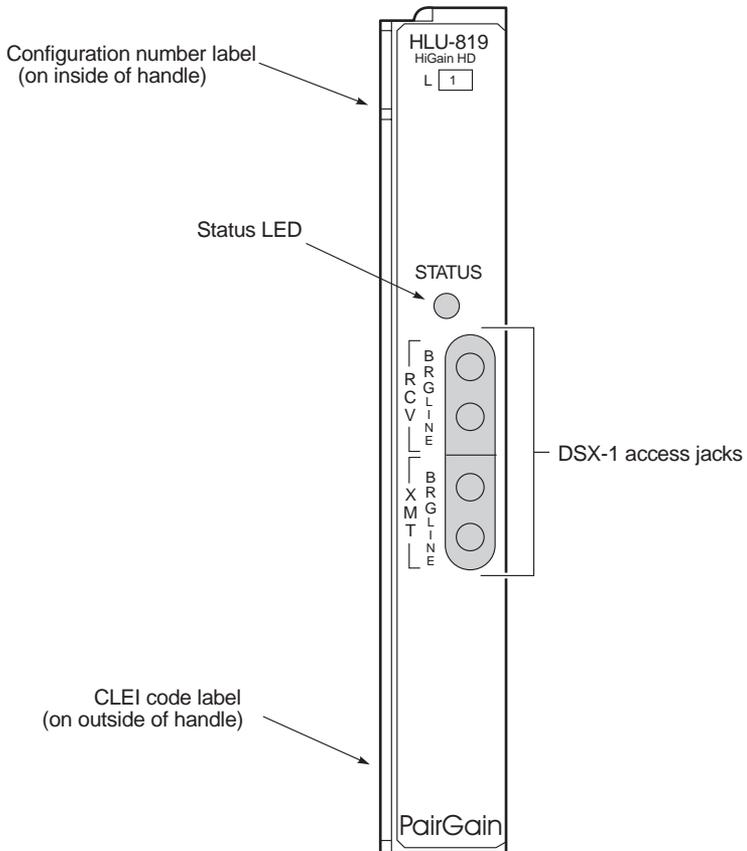


Figure 2. HLU-819 Front Panel

Table 1. HLU-819 List 1 Front-panel Status LED Description

Item	Function
Status LED	Displays synchronization state and alarm status for HDSL Loop.
Steady Green	HDSL Loop is ready to transmit and receive data across all spans.
Slow Blinking Green	HDSL Loop acquisition is in progress for local span.
Pulsing Red	<ul style="list-style-type: none"> • Indicates Loss of Sync Word (LOSW), Margin (MAR) below threshold, or Errored Second (ES) count above threshold. • Pulses for every ES on any span. • Indicates Loss of Clock (LOC) or DSX-1 signal, Receive Alarm Indication Signal (RAIS), or Loss of Frame Alignment (LFA).
Steady Yellow	Indicates Local (LOC) loopback.
<hr/>	
DSX-1 access jacks	
BRG	Provides non-intrusive bridging jack access to XMT and RCV at the DSX-1 interface. Allows the two T1 payloads to be monitored.
LINE	Provides splitting jack access to Transmit (XMT) and Receive (RCV) at the DSX-1 interface. Breaks the XMT and RCV paths to permit test signal insertion and retrieval.
CLEI and ECI bar code label (located on the side of the unit)	Provides the human-readable Common Language Equipment Identifier (CLEI) code number and the Equipment Catalog Item (ECI) bar code number.
<hr/>	
Configuration Number (located on the side of the unit)	<p>Contains either a five- or six-digit warranty configuration number or a standalone two- or three-digit configuration number as follows:</p> <ul style="list-style-type: none"> • Digit 1 = Last digit of shipment year • Digits: 2 and 3 = Shipment month • Digits: 4 and 5 = Configuration number <p>The configuration number can also be found on a small bar label that contains the Julian date code and part number. This gummed label may be attached to the PC board or to the front panel.</p>

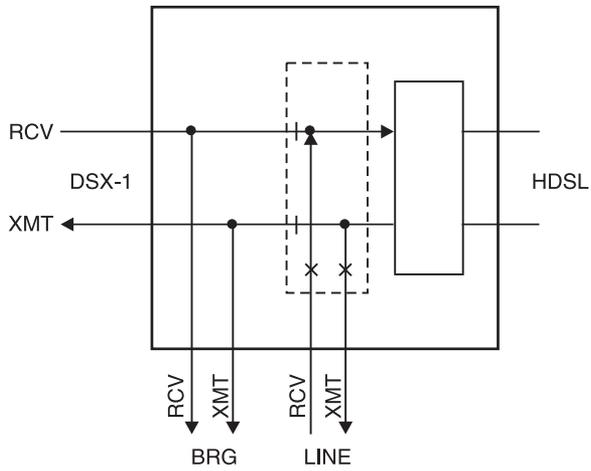


Figure 3. DSX-1 Access Jacks

INSTALLATION

This section provides instructions for setting up the HLU-819 and installing the UTU-814 List 1B into the ERE-811 remote unit. The remote unit can be powered from either the HLU-819 (must be configured) or locally, either AC or -48 Vdc. The remote unit must be set up independently from the CO terminal



Shelf and remote enclosure chassis ground must be connected to earth ground to protect the equipment and for safety of personnel.

Additional protection is required when the network side of the equipment is extended to an outside facility.



When installing an HLU in a chassis or a UTU in a remote enclosure, be sure to wear an antistatic wrist strap. Avoid touching components on the circuit board.

INSTALLING THE HLU-819 INTO A 3192 SHELF

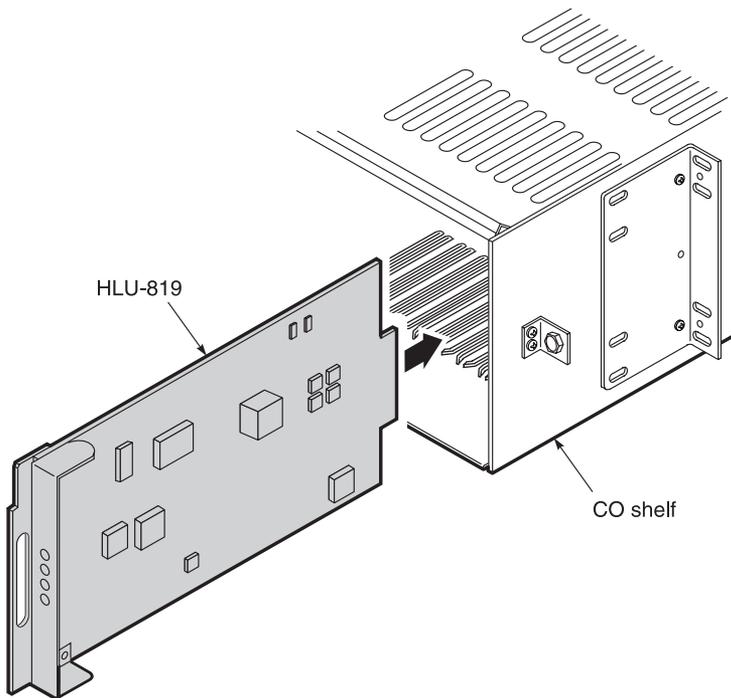


Figure 4. *Installing the HLU-819 into a Shelf*

- 1 Slide the HLU-819 into the guide rails of any of the open 28 slots on the shelf (Figure 4).
- 2 Push the unit back until it touches the backplane card-edge connector and is firmly seated. Once the HLU-819 is in place, it is automatically configured as an LTU which displays on the maintenance terminal console screens.

INSTALLING THE UTU-814 INTO THE ERE-811 REMOTE ENCLOSURE

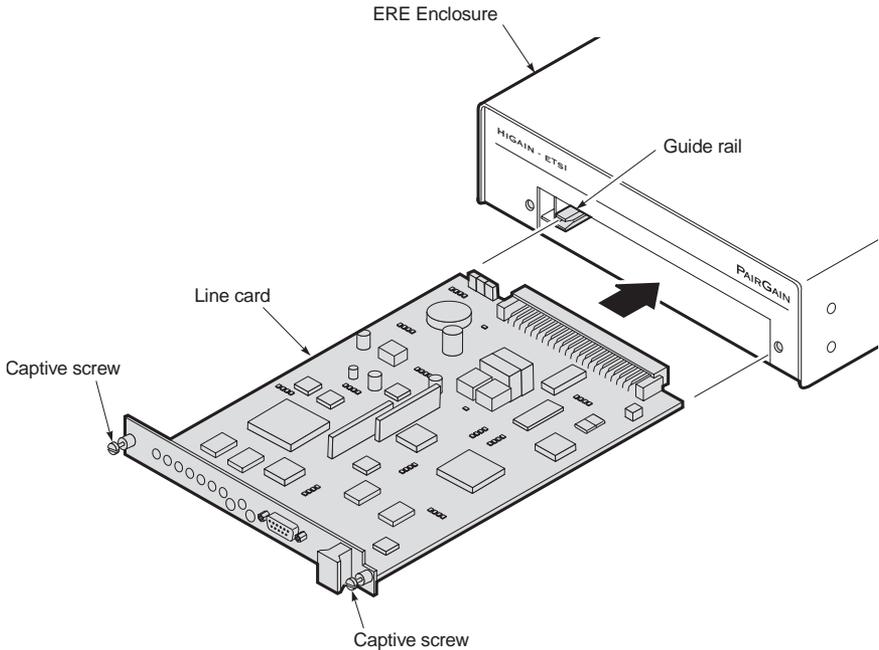


Figure 5. *Installing the UTU-814 into the ERE-811 Remote Enclosure*

- 1 Align the card with the guide rails at the left and right sides of the enclosure opening (Figure 5).
- 2 Push the card into the enclosure until the front panel is flush with the front of the enclosure.
- 3 Tighten the captive screws.
- 4 Connect the DS1 port cable DB-15F (Figure 6 on page 9), if applicable.

- 5 Connect the Nx64K data port cable DB-25F (Figure 6), if applicable. The following adapters can be used when connecting the cable:
 - ECA-800 List 1 (DB-25M to M-34F, V.35)
 - ECA-801 List 1 (DB-25M to DB-15F, X.21)
 - ECA-807, List 1 (DB-25M to DB-37F, RS-449, V.36)
- 6 Connect the HDSL line port cable DB-9F (Figure 6). The following adapter can be used when connecting the cable:
 - ECA-806, List 1 (DB-15M to RJ-48C)

The UTU-814 is automatically configured as an NTU, which displays on the maintenance terminal console screens after HDSL startup and synchronization.



Jumpers and BNC are not applicable for UTU-814 List 1B. For T1 applications, UTU-814 List 1B uses the standard 100 Ω (DB-15), G.703 interface.

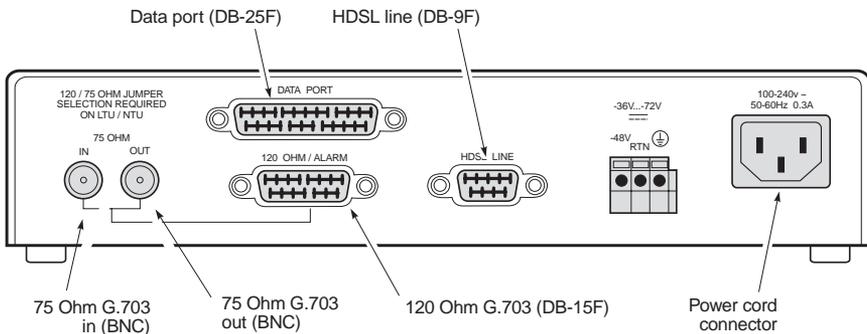


Figure 6. ERE-811 List 2 Rear Panel

HDSL STARTUP AND SYNCHRONIZATION

Power-up the shelf where the HLU-819 is installed and observe the following:

- 1 During the power-up self test, the HLU-819 List 1 LED is a steady yellow. If the LED stays yellow for more than 30 seconds after power-up, verify the unit is not in a loopback mode. If no loopback conditions are present, the unit has failed the self test. (See [“Appendix B - Product Support” on page 30](#) if assistance is required).
- 2 The Status LED flashes green once per second as the unit attempts to establish synchronization.
- 3 After approximately 30 seconds, confirm one of the following:
 - The Status LED is steady green, indicating the unit is synchronized and ready to transmit and receive data. The unit can now be configured through the maintenance terminal console screen menus.
 - The Status LED continues to flash. If the LED does not stop flashing after approximately one minute, it indicates that the HDSL pair corresponding to the indicator is experiencing an excessive signal loss or is in an open condition. Check the line and repair if necessary.

SYSTEM CONFIGURATION

A maintenance terminal is used to access the line unit console screens and configuration menus. Through these screens and menus, the HDSL system is configured, monitored, tested, and its circuit inventory can be displayed.

The console screens must be viewed through the HMU-319 or Operating System (OS) port located at the back of the Wideband System 3190, or through a Trivial File Transfer Protocol (TFTP) session over an Ethernet Local Area Network (LAN) connected to the chassis. The console screens cannot be accessed through the HLU-819 because this model does not provide a craft port.



HMU-819 firmware must be version 3.0 and higher.

Refer to document 150-319-107-01 for more detailed information on terminal connections.

After HDSL establishes communication with the remote unit, the HDSL system can be configured and performance monitored from the HMU-319 management unit. Both the HLU-819 and UTU-814 are configured at this time from the same maintenance screens. If the HDSL link is down, the only parameters that can be changed are those on the local unit.

The HLU-819 provides a special lockout feature that prevents users connected to the remote maintenance terminal from changing the circuit configuration. When blocked, the maintenance screens are not accessible from the remote craft port.

MAINTENANCE TERMINAL CONNECTION

To connect a maintenance terminal:

- 1 Connect a standard serial cable from the maintenance terminal COM port to the front-panel craft port of the HMU-319. The pinouts for the craft port and maintenance terminal connectors are shown in [Figure 7 on page 12](#).

- 2 Configure the maintenance terminal for the following communication settings:
- VT100 emulation or ANSI (if VT100 is not available)
 - Clear the modem initialization string if supported by the terminal
 - Bits per second: 9600 (recommended)
 - Data bits: 8
 - Parity: None
 - Stop bits: 1
 - Flow Control: None

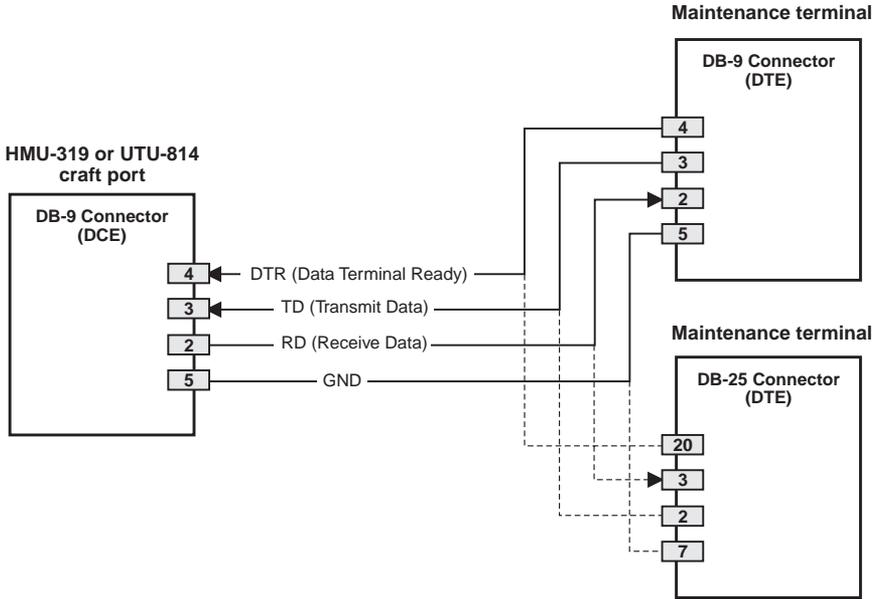


Figure 7. *HMU-319 Craft Port and Maintenance Terminal Connector Pinouts*

LOGGING ON



Logon procedure may vary depending on the software revision level on the HMU-319. Consult the software manual for your particular system (refer to “[Appendix B - Product Support](#)” on page 30).

You must log on to the WBS-3190 in order to access the HLU-819 maintenance terminal console screens. Perform the following steps in the order indicated.

- 1 Once the maintenance terminal is connected to the HMU and a banner (headline) appears on the screen, press **RETURN**.
- 2 The **Enter TID** field appears to the left of the cursor, then press **RETURN**.
- 3 Type `superuser` in the **Enter Username** field, then press **RETURN**. (The **Enter Username** field may be changed by the user.)
- 4 Type `public#1` in the **Enter Password** field, then press **RETURN**. (The **Enter Password** field may be changed by the user.)
- 5 Type `TAO` at the prompt, then press **RETURN**. This opens the Terminal Access Option (TAO).
- 6 Select the shelf number of the HLU-819 to display the shelf status screen.
- 7 Select the slot number of the HLU-819 to log onto the HLU and display the console screen menus.



If the password or username is forgotten or lost, please contact Customer Service for assistance.

NAVIGATING MENUS

Use the keys described in [Table 2](#) to navigate the console screens and menus.

Table 2. *Console Screen Navigation Keys*

These Keys	Perform this Function
Alpha-numeric keys	Type the underlined or highlighted letter to select and execute a menu item. For example, on the console screen menu bar, type C to access the <i>Config</i> drop-down menu. Also use these keys to enter values in text fields. For example, on the <i>Config Date and Time</i> menu, type the date in a DD/MM/YY format on the LTU and NTU.
↑ and ↓ keys	Press the ↓ key to access a console screen drop-down menu. For example, press the ↓ key on <i>Config</i> to access the <i>Config</i> drop-down menu. Or press the ↑ and ↓ keys to highlight a sub-menu item, then press ENTER to select the item.
TAB key	Provides same function as the ↓ key.
← and → keys	Moves horizontally across the Menu bar, except when in a text entry field.
CTRL + E and CTRL + X	CTRL + E moves up one line and CTRL + X moves down one line on the History screens.
CTRL + C and CTRL + R	CTRL + C performs page-down and CTRL + R performs page-up functions on the History screens.
SPACEBAR	Toggles among options displayed for current menu item. For example, to select the Application mode from the <i>Config System Settings</i> menu, press the ↓ key to highlight the Application mode option, then press the SPACEBAR until the desired option (UNSTRUCT, STRUCT, TSP, SINGLE) is highlighted, then press ENTER to confirm the selection.
ESC	Exits the current screen and returns to the previous screen. Selections made on the current screen are discarded. Press ESC in a text field to cancel the text entry and restore the old value.

Table 2. Console Screen Navigation Keys (Cont.)

These Keys	Perform this Function
ENTER	<p>Applies all selections on the current screen. Press ENTER twice for numeric changes to take effect. When editing a text field, however, the first ENTER terminates editing and a second ENTER applies any changes.</p> <p>Because the system will not accept invalid configurations, some settings will not be allowed. Verify that all new settings remain set after the highlighted cursor is moved from the selection being changed.</p>

CONSOLE SCREEN MENU STRUCTURE

The Console screen displays a row of drop-down menus that serve as a guide to the appropriate option or screen. [Figure 8 on page 16](#) shows the structure of the Console screen menus, which pertains only to the local configuration and not to the remote. Each menu is identified by name in the menu bar (Monitor, History, Config, etc.). The “Display” and “Displays” designation indicates that the menu or sub-menu shows one or more screens. [Table 3 on page 17](#) describes the drop-down menus selected from the Console screen. (For a detailed explanation of the screens, refer to the technical practice. See “[Documentation](#)” on page iii.)

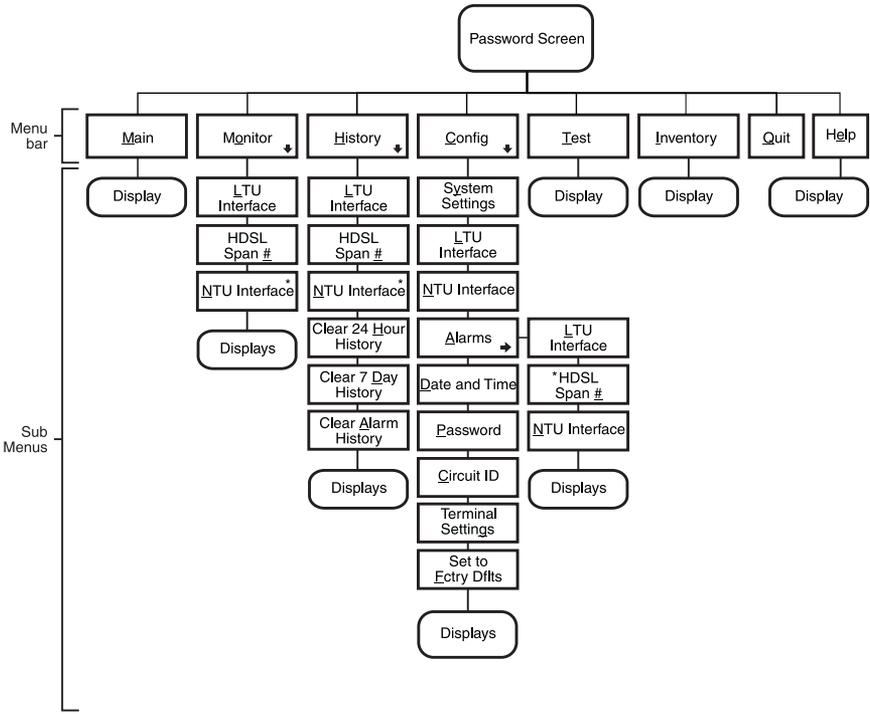


Figure 8. Console Screen Menu Structure

Table 3. Console Screen Menus

Menu Name	Function
<u>M</u> ain	Displays the Main status Console screen to: <ul style="list-style-type: none"> • View the circuit configuration • View performance summary information • View alarm summary information.
<u>M</u> onitor	Monitors the past 24-hour performance of the LTU interfaces, NTU interfaces, or HDSL spans.
<u>H</u> istory	Views 24-hour, 7-day, or alarm history displays for any of the following: <ul style="list-style-type: none"> • LTU interface • HDSL spans • NTU interface • Clear all the 24-hour, 7-day or alarm histories
<u>C</u> onfig	Performs any of the following system functions: <ul style="list-style-type: none"> • View or change global operating parameters for the system • View or change LTU interface, HDSL span, or NTU interface operating parameters • View or change alarm parameters • Set the time and date • Set or change the unit password • Change the circuit ID • Configure terminal display • Set all operating parameters to factory defaults
<u>T</u> est	Performs any of the following test functions: <ul style="list-style-type: none"> • Set the loopback mode and location • Set the loopback time-out • Enable or disable loopback operation • Initiate Bit Error Rate (BER) test and monitor BER results
<u>I</u> nventory	Displays registration information to track product manufacturing, configuration, and revision state.
<u>Q</u> uit	Logs off the system.
<u>H</u> elp	Displays a screen of helpful information regarding the product.

SYSTEM SETTINGS

The settings available in the *Config System Settings* menu are listed in [Table 4](#). The settings in boldface type are factory default settings.

Table 4. *Settings in Config System Settings Menu*

System Setting	Description
Application mode	Select one of the following application modes:
UNSTRUCT	System operates in the unstructured (unframed) application mode using 24 time slots. Use when LTU and NTU use either the DSX-1 or Nx64K port with no framing. Two port (DSX-1 and Nx64K) operation is not possible.
STRUCT	System operates in the structured (framed) application mode using 1 to 24 time slots. Use to transport framed voice channels between the LTU and NTU DSX-1 ports and serial data between the Nx64K ports at the same time.
TSP	System operates in time slot prioritization mode. Time slots 1 through 12 transport high priority traffic over Loop 1; time slots 13 through 24 transport low priority traffic over Loop 2. If a loop fails, time slots 1 through 12 are sent over the active loop. The NTU must be locally powered. Remote Power Feed must be set to NONE.
SINGLE	System operates in single-pair mode using time slots 1 through 12 on Loop 1. Use to transport framed voice channels between the LTU and NTU DSX-1 ports or serial data between the Nx64K ports. The NTU must be locally powered. Remote Power Feed must be set to NONE.
Remote Power Feed Mode	Select one of the following power feed modes:
NONE	Disables the remote power feed mode. The NTU must be locally powered. Used for TSP and SINGLE application modes.
POWER	LTU (HLU-819) supplies full power to the NTU through both loops.
WETTING	LTU (HLU-819) supplies a low level DC current to prevent corrosion of HDSL lines and connections. The NTU must be locally powered.

Table 4. Settings in Config System Settings Menu (Cont.)

System Setting	Description
Remote Power Feed Loop	No selection available.
BOTH	BOTH is displayed in UNSTRUCT (unframed), STRUCT (framed), and TSP application modes. The LTU (HLU-819) uses Loop 1 and Loop 2 to supply power to the NTU.
LOOP1	LOOP1 displays in SINGLE application mode when POWER is selected for Remote Power Feed mode. This is followed by the warning NTU LOCAL POWER REQUIRED, PROCEED ANYWAY (Y/N). This will allow the remote unit to be powered from one loop, but will limit distance.
Remote Console Screen Access	Select whether system settings can be made from the NTU console screen or the settings are read-only. This option is set only at the LTU.
ALLOWED	NTU console screens can be used to make system settings.
BLOCKED	NTU console screens are read-only. The LOC and REM pushbuttons on the NTU are also disabled. System settings can be made only from the LTU console screen. A remote user is unable to log on, either initially or after quitting the screen, if the system setting is set to BLOCKED. If the system setting is changed to BLOCKED while the remote user is logged on, the screen changes to read-only.
Protection Switch Command	Not supported.

LTU (HLU-819) AND NTU (UTU-814) INTERFACE SETTINGS

The settings available in the *Config LTU* and *Config NTU Interface* menus are listed in [Table 5](#). The settings in boldface type are factory default settings.

Table 5. *Settings in Config LTU and NTU Interface Menus*

Field	Description
Primary Timing Source DS1:	Select the clock source for the HDSL transmit direction.
EXT	External 1.544 MHz clock. (This is not a valid option with the HLU-819.)
DSX-1	Clock extracted from T1 data stream.
DSX-1 Port	
Framing Mode	Select the framing mode used by your equipment.
D4-SF	Provides 12 frames of 24 time slots per SuperFrame.
ESF	Provides 24 frames of 24 time slots per Extended SuperFrame.
N/A	Unit is in unstructured (unframed) application mode.
Idle Code	Select a transmit idle code for insertion into unused time slots.
00 to FF	Idle code (from 00 to FF) is transmitted in unused time slots from DSX-1 port.
Data Rate/# of TSs ^(a)	Specify the DSX-1 transmit data rate as the number of kbps or the number of Nx64K time slots.
64 to 1536 (kbps) or	Enter the data rate from 64 to 1536 kbps (for example, 64, 256, 768). Factory default setting is 1536 kbps (24 time slots).
0 to 24 (time slots)	Enter the number of Nx64K time slots up to 24 (for example, 1, 12, 24). Factory default setting is 24 (1536 kbps).
Beginning TS ^(a)	Enter the number of the beginning time slot for the transmitted T1 data. Options are time slots 1 to 24 in STRUCT (framed) application mode and time slot 1 in UNSTRUCT (unframed) mode. The factory default setting is time slot 1.

Table 5. *Settings in Config LTU and NTU Interface Menus (Cont.)*

Field	Description
AIS Mode	Specify the mode used to assert an Alarm Indication Signal (AIS). Used in structured (framed) mode.
FULL	The full AIS mode asserts the AIS when one loop is down.
HALF	The half AIS mode asserts the AIS when both loops are down.
Line Equalization	Select the line equalization according to the distance from the DSX-1 cross-connect to the UTU-814 and the HLU-819.
0	Sets the line equalization for 0 to 133 feet.
133	Sets the line equalization for 133 to 266 feet.
266	Sets the line equalization for 266 to 399 feet.
399	Sets the line equalization for 399 to 533 feet.
533	Sets the line equalization for 533 to 655 feet.
Insert Framing	Enable or disable framing insertion. Use where data requires insertion of D4-SF or ESF framing for transmission over T1 network.
DIS	Disables framing insertion.
ENA	Enables framing insertion.
Line Code	Select Bipolar Eight Zero Suppression (B8ZS) or Alternate Mark Inversion (AMI) line coding.
B8ZS	Outgoing streams of eight consecutive zeros are replaced with B8ZS code words. Received B8ZS words are replaced with all zeros.
AMI	Binary ones (marks) are transmitted as alternating positive and negative pulses, and zeros have an absence of pulses.

Table 5. *Settings in Config LTU and NTU Interface Menus (Cont.)*

Field	Description
Nx64K Port (Data port on the UTU-814)	
Interface Type	Selection is only available for NTU. The serial data interface at the Nx64K port conforms to V.35, V.36, RS-530, RS-449, or X.21 standards.
Data Rate/# of TSs ^(a)	Specify the Nx64K transmit data rate as the number of kbps or the number of Nx64K time slots.
64 to 1536 (kbps) or	Enter the data rate from 64 to 1536 kbps (for example, 64, 256, 768). Factory default setting is 1536 kbps (24 time slots).
0 to 24 (time slots)	Enter the number of Nx64K time slots up to 24 (for example, 1, 12, 24). Factory default setting is 24 (1536 kbps).
Beginning TS ^(a)	Enter the number of the beginning time slot for the transmitted serial data. Options are time slots 1 to 24 in STRUCT (framed) application mode and time slot 1 in UNSTRUCT (unframed) mode. The factory default setting is time slot 1.
Transmit Clock	Specify the transmit data (SD) clock as External (EXT), Internal Rising Edge (INT_RISING), or Internal Falling Edge (INT_FALLING).
CTS/DSR/RLSD	Specify one of three methods the LTU and NTU uses to generate the CTS, DSR, and RLSD control signals for the Nx64K (V.35, V.36, RS-530, RS-449, or X.21) serial data port. The Nx64K port is hardware configured as DCE. Set each of these parameters to match the requirements of the application. The choices are:
STD (standard)	The output control signal follows the ITU standards.
ON (force ON)	Control signals are always ON.
OFF (force OFF)	Control signals are always OFF.
LL/RL	Select whether the LTU and NTU respond to or ignore the Local Loopback (LL) and Remote Loopback (RL) control signals.
DIS	LTU and NTU ignore LL and RL control signals.
ENA	LTU and NTU respond to LL and RL control signals. Status of local and remote loopbacks appears on the Test display.
^(a) The number of times slots selected for the DSX-1 port determines the number of time slots remaining for the Nx64K port, and may determine the beginning time slot for the Nx64K port in NTU only. Overlapping time slots are not allowed.	

READING THE CONSOLE SCREENS

The UTU-814 List 1B performs the same functions as a HiGain Remote Unit (an HRU). However, in all console screens, the UTU is referred to as an “NTU” and the HLU-819 is referred to as an “LTU.”



For proper operation, only NTUs will connect to LTUs.

VIEWING STATUS

View status using a maintenance terminal or PC running a terminal emulation program connected to the HMU-319 craft port using TAO to access the HLU-819.

MAIN CONSOLE SCREEN

The main console screen displays a summary of LTU and NTU circuit configuration, as well as performance statistics and alarm status for each interface. [Table 6 on page 24](#) lists the information displayed in each field of the main console screen.



When entering a number on the screen, for example a time slot number, it is important to hit the **ENTER key slowly two times for the change to take effect.**

When selecting an option from a set of choices, for example line code B8ZS or AMI, it is important to hit the **ENTER key once to secure that selection.**

Table 6. Information Displayed in Main Console Screen

Field	Description
Circuit Configuration	
DSX-1	Identifies the LTU and NTU DSX-1 port.
<i>n</i> TS	Indicates the number of T1 time slots (<i>n</i>) selected for the DSX-1 application interface.
V.35	Identifies the NTUV.35 port.
V.36	Identifies the NTU V.36 port.
RS-449	Identifies the NTU RS-449 port. (RS-530 supersedes RS-449, but does not display on the main console screen. RS-449 must be selected to use the RS-530 interface.)
X.21	Identifies the NTU X.21 port.
<i>n</i> k	Indicates the data rate selected for the Nx64K application interface.
RPF/WETTING	Indicates RPF (POWER) or WETTING mode for Remote Power Feed. Nothing is shown when NONE is selected.
Timing	Indicates the clock source for the HDSL transmit direction.
EXT	External 1.544 MHz clock.
DSX-1	Clock extracted from T1 data stream.
Framing	Indicates the Framing Mode selected for the DSX-1 port.
D4-SF	SuperFrame contains 12 frames with 24 time slots per SuperFrame.
ESF	SuperFrame contains 24 frames with 24 time slots per Extended SuperFrame.
Application Mode	Indicates application mode selected.
STRUCT	With framing.
UNSTRUCT	No framing.
TSP	Time slot prioritization with framing.
SINGLE	Single pair with framing.
Performance	
MAR1	Displays the Margin value for the HDSL Loop 1 interface at the LTU and NTU or displays link status (SIG, ACK, etc.) if link is not up.
MAR2	Displays the Margin value for the HDSL Loop 2 interface at the LTU and NTU or displays link status (SIG, ACK, etc.) if link is not up.

Table 6. Information Displayed in Main Console Screen (Cont.)

Field	Description
ES1	Displays the errored second counts for the LTU and NTU DSX-1 ports and the HDSL Loop 1 interface at the LTU and NTU. The counts are totals for the latest 24-hour period, including the current 15-minute interval.
ES2	Displays the errored second counts for the LTU and NTU Nx64K (V.35, V.36, RS-530, RS-449, or X.21) ports and the HDSL Loop 2 interface at the LTU and NTU. ES2 is calculated the same as for ES1.

Alarms

The Alarms field displays a list of all active alarms at the LTU and NTU interface and the HDSL Span 1 interface.

Possible LTU and NTU Interface alarms:

LOS	Loss of signal at the DSX-1 or V.35, V.36, RS-530, RS-449, or X.21 input.
LFA	Loss of frame alignment at the DSX-1 input (framed mode only).
AIS	Alarm Indication Signal (unframed all ones) received at the DSX-1 input.
RAI	Remote Alarm Indication Signal received at the DSX-1 input (framed mode only).
LOC	Loss of clock when EXT timing is used. The external clock was lost for the previous second. This alarm is reset when the clock is active again.

Possible HDSL Span 1 alarms:

MAR	Margin has fallen below alarm threshold for one or both loops of the HDSL Span.
ES	Errored second count has exceeded alarm threshold for one or both loops of the HDSL Span.
LOSW	Loss of sync word for one or both loops of the HDSL Span. Remains active during restart, but not a cold start.
PFO	Power feed open for one or both loops of the HDSL Span. Always disabled.
PFS	Power feed short for one or both loops of the HDSL Span. Remains active until power is successfully fed to remote unit, or remote power feeding is disabled.
NOPSW	Protection circuit (backup) is not available.

MONITOR SCREENS

The monitor screens display the signal activity and Performance Monitor (PM) counts at the LTU (HLU-819) DSX-1 and NTU (UTU-814) DSX-1, and Nx64K ports. [Table 7 on page 27](#) lists each field and a description of that field.

Table 7. Information in Monitor LTU and NTU Interface Screens

Field	Description
DSX-1 Port	
Errored Seconds (ES) 24 Hour Count	The number of one second intervals in which at least one bipolar violation (BPV) or one CRC-6 error was detected at the DSX-1 input port during the last 24hours.
Severely Errored Seconds (SES) 24 Hour Count	The number of one second intervals during which a Loss of Signal (LOS), an Alarm Indication Signal (AIS), or a Loss of Frame (or CRC-6 Multiframe) Alignment (LFA) occurred at the incoming port.
Unavailable Seconds (UAS) 24 Hour Count	The number of seconds that DSX-1 input signals were unavailable during the last 24 hours. After ten consecutive SESs, the system is deemed unavailable, and the current UAS counter begins counting from ten. After ten consecutive non-SESs, the system returns to availability, and the ten counts representing the non-SESs are removed from the UAS counter.
Bipolar Violation Seconds (Cumulative)	The number of seconds in which bipolar violations were detected at the DSX-1 port since error counters were last cleared.
Nx64K Port (Data port on the UTU-814)	
Data & Clk Activity	Displays the status of the data and clock signals at the Nx64K port at one-second intervals Asterisks (**) indicate an active line. Dashes (--) indicate an inactive line. Displayed fields are: <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">From DTE: TT SD</div> <div style="text-align: center;">From DCE: ST RT RD</div> </div>
Ctrl Signal State	Displays the status of the control signals at the Nx64K port at one-second intervals. ON indicates an active line. OFF indicates an inactive line. Displayed fields are: <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;">From DTE: RTS DTR RL LL</div> <div style="text-align: center;">From DCE: CTS DSR RLSD TM</div> </div>
Clear 24 Hour History	The date and time that the 24-hour histories were last cleared are displayed here. Enable this function by pressing L or ENTER to clear all 24-hour history counters (including HDLSL). This action must be confirmed by pressing Y .

Monitor HDSL Span Screens

Table 8 lists the information displayed in the *Monitor HDSL Span 1* screen for Loop 1, LTU-1/NTU-1, and Loop 2, LTU-1/NTU-1.

Table 8. *Information Displayed in Monitor HDSL Span 1 Screen*

Field	Description
Current Margin (dB) (MAR)	Indicates the excess signal-to-noise ratio relative to a 10^{-7} bit error rate. The normal range of a typical margin is from 6 to 22 dB, with a value of 6 dB corresponding to a predicted BER of 10^{-10} .
Low Margin (dB)	Indicates the lowest margin since startup or the last 24-hour history clear.
High Margin (dB)	Indicates the highest margin since startup or the last 24-hour history clear.
Pulse Attenuation (dB)	Indicates the attenuation of the 2B1Q pulse from the distant end. This value is related to the cable pair's loss at 292 KHz. The normal range of pulse attenuation is from 1 to 32 dB.
Errored Seconds (ES)	The number of one-second intervals in which at least one HDSL CRC-6 error or loss of Sync Word (LOSW) was detected on the HDSL span during the last 24 hours.
Unavailable Seconds (UAS)	The number of seconds that the HDSL span was down during the last 24 hours.
Pair Exchange	Indicates whether the HDSL pairs carrying the traffic are correctly connected or have been interchanged. The system automatically compensates for an interchange of pairs.
Loop 1 Tip/Ring Reversal	Indicates whether the two conductors of HDSL Loop 1 are correctly connected or have been interchanged. The system automatically compensates for an interchange of wire leads.
Loop 2 Tip/Ring Reversal	Indicates whether the two conductors of HDSL Loop 2 are correctly connected or have been interchanged by error. The system automatically compensates for an interchange of wire leads.
Clear 24 Hour History	Clears all 24-hour history counters (including DSX-1 values) and displays the date and time the error counters were last cleared.

APPENDIX A - COMPATIBILITY

The HLU-819 is compatible with the following T1 repeater shelves and associated equipment:

- PairGain Wideband System 3190 (HMS-357 and HMS-358)
- PairGain HMS-317 (28-slot, 23-inch shelf)
- PairGain HMS-308 (8-slot, 3192 mechanics, remote enclosure)

The UTU-814 List 1B is compatible with the following PairGain HiGain ETSI shelves and enclosures.

- EMS-830 Exchange Office Management Shelf, rear connector access (part number 150-1400-01).
- EMS-831 Exchange Office Management Shelf, front connector access (part number 150-1401-01).
- EMS-832 Exchange Office Management Shelf, front connector access (part number 150-1402-01).
- ERE-811 List 2 Single-Slot Remote Enclosure with internal ac power supply (part number 150-1411-01).

APPENDIX B - PRODUCT SUPPORT

PairGain Customer Service Group provides expert pre-sales and post-sales support and training for all its products.

TECHNICAL SUPPORT

Technical Assistance is available 24 hours a day, 7 days a week by contacting PairGain Customer Service Group at:

- Telephone:** 800.638.0031 or 714.832.9922
The 800 telephone support line is toll-free in the U.S. and Canada.
- Fax:** 714. 832.9924
- Email:** support@pairgain.com

During normal business hours (7:30 AM to 5:30 PM, Pacific Time, Monday through Friday, excluding holidays), technical assistance calls are normally answered directly by a Customer Service Engineer. At other times, a request for technical assistance is handled by an on-duty Customer Service Engineer through a callback process. This process normally results in a callback within 30 minutes of initiating the request.

WORLD WIDE WEB

PairGain product and company information can be found at <http://www.pairgain.com> using any Web browser. To download PairGain product manuals from the Customer Site portion of the PairGain Web page, you need to provide a customer password. If you do not have a password, contact your PairGain sales representative.

RETURNS

To return equipment to PairGain:

- 1 Locate the number of the purchase order under which the equipment was purchased. To obtain a return authorization number, you need to provide the original purchase order number to PairGain's Return Material Authorization (RMA) Department.
- 2 Call or write PairGain's RMA Department to ask for an RMA number and any additional instructions. Use the telephone number, fax number or email address listed below:
 - Telephone: 800.370.9670
 - Fax: 714.832.9923
 - Email Address: rma@pairgain.com
- 3 Include the following information, in writing, along with the equipment you are returning:
 - Company name and address.
 - Contact name and telephone number.
 - The shipping address to which PairGain should return the repaired equipment.
 - The original purchase order number.
 - A description of the equipment that includes the model and part number of each unit being returned, as well as the number of units that you are returning.
 - The reason for the return. For example:
 - The equipment needs an ECO/ECN upgrade.
 - The equipment is defective



If the equipment is defective, please tell us what you observed just before the equipment malfunctioned. Be as detailed in your description as possible.

- If there is another reason for returning the equipment, please let us know so we can determine how best to help you..

- 4 Pack the equipment in a shipping carton.
- 5 Write PairGain's address and the RMA Number you received from the RMA Department clearly on the outside of the carton and return to:

PairGain Technologies, Inc.
14352 Franklin Ave.
Tustin, CA 92780-7013

Attention: **RMA (Number)**



All shipments are to be returned prepaid. PairGain will not accept any collect shipments.

APPENDIX C - GLOSSARY

AIS	Alarm Indication Signal	DLC	Digital Loop Carrier
AMI	Alternate Mark Inversion	DS0	Digital Signal, level 0
AWG	American Wire Gauge	DS1	Digital Signal, level 1
B8ZS	Bipolar with 8-zero Substitution	DSR	Data Set Ready
BER	Bit Error Rate	DSU	Data Service Unit
BRG	Bridge	DSX-1	DS1 Cross-connect Frame
CI	Customer Installation	DTE	Data Terminal Equipment
CLEI	Common Language Equipment Identifier	DTR	Data Terminal Ready
CO	Central Office	ECA	ETSI Cable Adapter
COM	Communications	ECI	Equipment Catalog Item
CPE	Customer Premises Equipment	ENA	Enable
CSA	Carrier Service Area	ERE	ETSI Remote Enclosure
CSU	Channel Service Unit	ES	Errored Seconds
CSU	Channel Service Unit	ESF	Extended SuperFrame
CTS	Clear to Send	ETSI	European Telecommunications Standards Institute
dB	Decibel	EXT	External
DC	Direct Current	HDSL	High bit-rate Digital Subscriber Line
DCE	Data Communication Equipment	HLU	HiGain Line Unit
DDS	Digital Data Service	HMS	HiGain Management Shelf
DIS	Disable	LED	Light Emitting Diode

LFA	Loss of Frame Alignment	SF	SuperFrame
LL	Local Loopback	ST	Send Timing
LOC	Loss of Clock	TFTP	Trivial File Transfer Protocol
LOSW	Loss of Sync Word	TID	Terminal Identification
LTU	Line Termination Unit	TD	Transmit Data
MAR	Margin	TL1	Transaction Language
NEBS	Network Equipment Building System	TM	Test Mode
NEC	National Electrical Code	TS	Time Slot
ORB	Office Repeater Bay	TSP	Time Slot Priority
OS	Operating System	TT	Terminal Timing
OSTS	Open Span Termination Shelf	UAS	Unavailable Seconds
PFO	Power Feed Open	UTU	Universal Termination Unit
PFS	Power Feed Short	XMT	Transmit
PM	Performance Monitor		
RAIS	Remote Alarm Indication Signal		
RCV	Receive		
RD	Receive Data		
RL	Remote Loopback		
RLSD	Receiving Level Signal Detected		
RPF	Remote Power Feed		
RT	Remote Terminal		
RTS	Request to Send		
SD	Send Data		

CERTIFICATION AND WARRANTY

FCC CLASS A COMPLIANCE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

LIMITED WARRANTY

PairGain Technologies warrants this product to be free of defects and to be fully functional for a period of 60 months from the date of original shipment, given correct customer installation and regular maintenance. PairGain will repair or replace at PairGain's option any unit without cost during this period if the unit is found to be defective for any reason other than abuse or incorrect use or installation.

Do not try to repair the unit. If it fails, replace it with another unit and return the faulty unit to PairGain for repair. Any modifications of the unit by anyone other than an authorized PairGain representative voids the warranty.

If a unit needs repair, call PairGain for a Return Material Authorization (RMA) number and return the defective unit, freight prepaid, along with a brief description of the problem, to:

PairGain Technologies, Inc.
14352 Franklin Avenue
Tustin, CA 92780-7013
ATTN: Repair and Return Dept.
800.638.0031

PairGain continues to repair faulty modules beyond the warranty program at a nominal charge. Contact your PairGain sales representative for details and pricing.

MODIFICATIONS

Any changes or modifications made to this device that are not expressly approved by PairGain Technologies, Inc. voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

STANDARDS COMPLIANCE

The HLU-819 List 1 has been tested and verified to comply with the applicable sections of the following standard.

- UL-1459: Standard Safety - Telephone Equipment
 - CSA-C22.2 No. 225-M90: Telecommunication Equipment - Electronics and Electrical Safety
 - GR 63-CORE: Network Equipment - Building System (NEBS) Requirements
 - GR 1089-CORE: Electromagnetic Compatibility and Electrical Safety
-

Corporate Office

14402 Franklin Avenue
Tustin, CA 92780-7013

Tel: 714.832.9922

Fax: 714.832.9924

For Technical Assistance:

800.638.0031



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