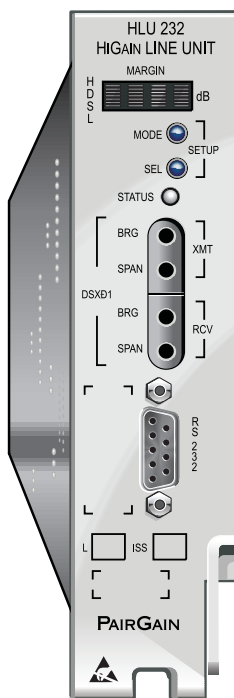

HIGAIN LINE UNIT

QUICK INSTALLATION GUIDE

Model	List Number	Part Number	CLEI Code
HLU-232	1D	150-1246-14	T1L1GK03AA



PAIRGAIN TECHNOLOGIES, INC.
ENGINEERING SERVICES TECHNICAL PRACTICE



SECTION 350-232-100-01

Revision History of This Practice

Revision	Release Date	Revisions Made
01	July 13, 1998	Initial Release

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USING THIS MANUAL

Two types of messages, identified by icons, appear in the text.



Notes contain information about special circumstances.



Cautions indicate the possibility of equipment damage or the possibility of personal injury.

TABLE OF CONTENTS

Introduction	1
Compatibility	2
Features	2
Installation	5
System Options	6
Setting Options through MODE and SEL	6
Factory Default Values	7
Product Identification	7
System Settings	8
Protection Switching System Settings	12
Connecting to a Maintenance Terminal	13
Testing	14
Alarms	14
Loopbacks	15
Four-Character Diagnostic Messages	18
Specifications	20
Documentation	21
Product Support	22
Technical Support	22
Warranty	23
FCC Certification	24

INTRODUCTION

The PairGain® HiGain® Line Unit Model HLU-232 List 1D is the Central Office (CO) side of a repeaterless T1 transmission system. The HLU-232 List 1D can be used with an HRU-412 to provide a complete HiGain High-bit-rate Digital Subscriber Line (HDSL) system with protection switching capability.

Protection switching occurs when a primary HLU-232 List 1D automatically switches to a protection HLU-232 List 1D for hot-standby backup. Switch over from the primary HLU-232 List 1D to the protection HLU-231 List 1D occurs when there is degradation of service, an alarm condition, or major failure of the primary circuit. The protection HLU-232 List 1D is the hot-standby backup system that monitors the operation of the primary system.

The HLU-232 List 1D can operate in the following modes:

- as the primary line unit in a hot-standby backup system
- as the redundant protection line unit in a hot-standby backup system
- as a stand-alone HDSL line unit

A HiGain HDSL system provides 1.544 Mbps transmission on two unconditioned copper pairs over the full Carrier Serving Area (CSA) range. The CSA includes loops up to 12,000 feet using AWG 24 or 9,000 feet using AWG 26 wire, including bridged taps.

COMPATIBILITY

Use the primary and protection HLU-232 List 1D units in conjunction with two HRU-412 remote units housed in a remote HRE-422 enclosure. An HLU-232 List 1D, an HRU-412, the HDSL cable pairs, and doublers (optional) make a complete system.

HLU-232 List 1D units install in a standard 220-type Mechanics shelf, such as the HiGain HCS-417 or HCS-418, using an HSA-232 Shelf Adapter.

Use the HLU-232 List 1D with up to two doublers. The doublers can be HiGain HDU-451, HDU-437, or HDS-439. The HLU-232 List 1D has self adjusting line voltage to accommodate applications with an HRU-412 and doublers. The line power supply converts the -48Vdc battery power to -130 Vdc (when there are no doublers in use) or -200 Vdc (when doublers are in use) feed that provides simplex power feed on the two HDSL line interfaces.

FEATURES

[Figure 1](#) illustrates the HLU-232 List 1D front panel. [Table 1](#) defines the functions. [Table 2](#) gives a description of the STATUS LEDs located on the front panel.

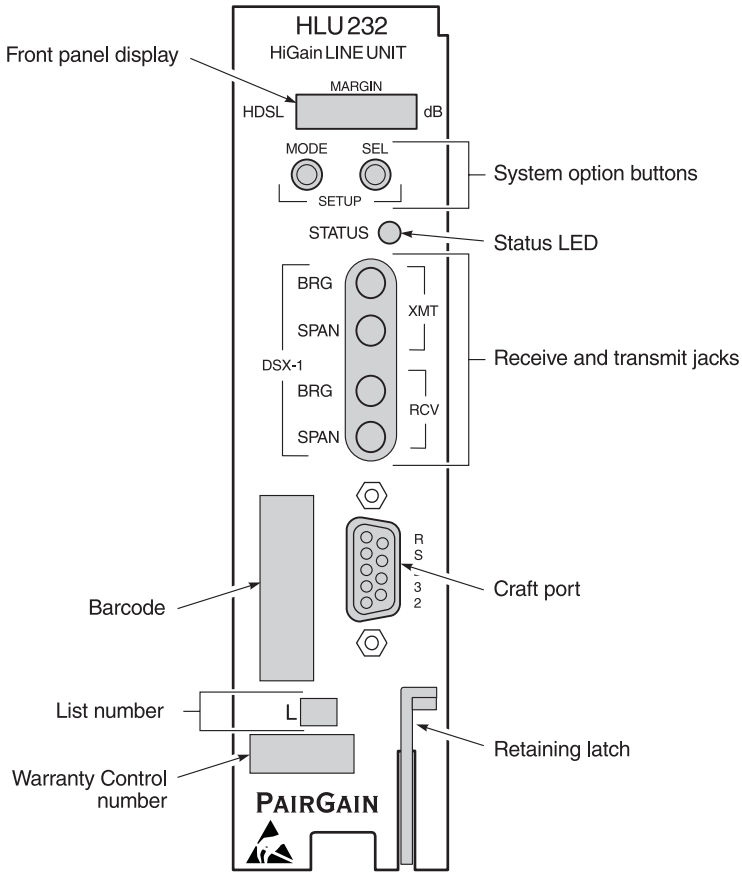


Figure 1. HLU-232 List 1D Front Panel

Table 1. *Front Panel Features*

Name	Function
Front panel display	Provides information about the HDSL, Signal/Noise S/N margin, and optional settings. The front panel display illuminates when power is applied. The front panel remains on for 5 minutes when the conserve power mode is not set using the MODE and SEL buttons.
SETUP buttons	Use the MODE and SEL buttons to set system parameters.
DSX-1 test jacks	The miniature 210 jacks, or SmartJack, provide spanning and bridging test access for the DSX-1 transmit and receive signals.
Craft port	Provides access to system maintenance, provisioning, and performance monitoring menus and screens.
Retaining latch	Secures the HLU-232 List D in a shelf slot.

Table 2. *STATUS LED States*

LED Color	State
Normal Operation	
Green	Operation is normal.
Flashing Green	HDSL acquisition.
Red	Fuse alarm or fault.
Flashing Red	Minor alarm. Press the SEL button to disable the alarm.
Yellow	HLU-232 List 1D loopback occurring (CREM or NLOC).
Flashing Yellow	HiGain system is in an armed state.
Burn-in Operation	
Green	Self test OK.
Yellow	Burn-in test running.
Red	Burn-in test failed.

INSTALLATION

The HLU-232 List 1D installs in a 220-type mechanics shelf (such as the HiGain HCS-417 or HCS-418) using an HSA-232 Shelf Adapter (PairGain Part Number 150-1250-01). Perform the following steps for installation:

- 1 Set the S1 PROT'N (protection switch) on the line unit extender card(s) for the HSA-232 Shelf Adapter as follows:
 - ON when using two HLU-232 List 1D units for protection switching
 - OFF when using HLU-232 List 1D units for normal stand-alone operation

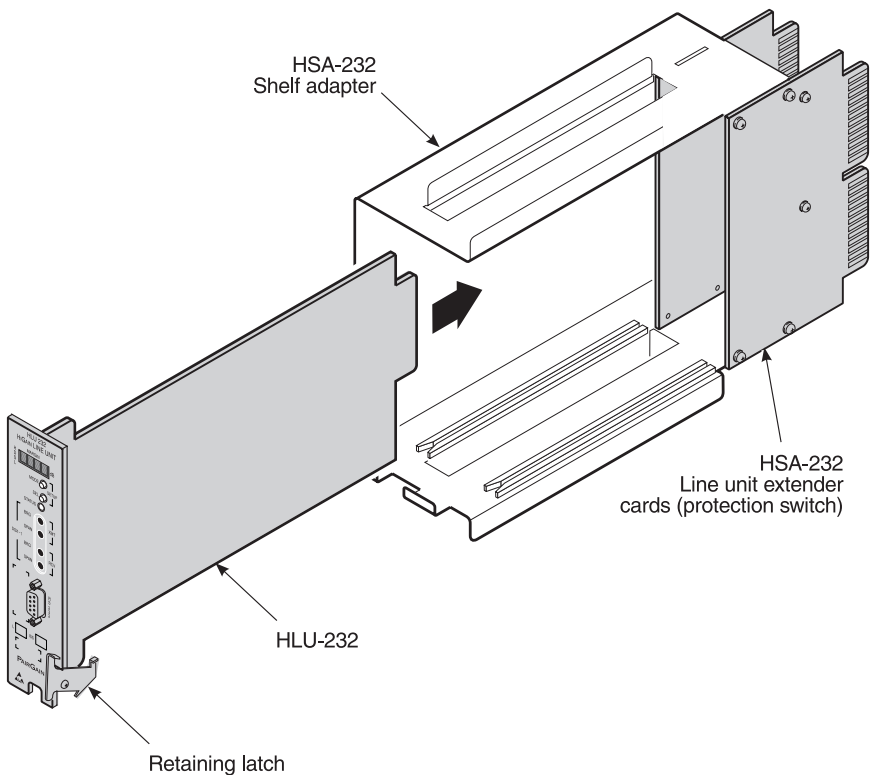


Figure 2. *Installing the HLU-232 List 1D*

- 2 Install the HSA-232 Shelf Adapter in the PRIM or PROT slot of the 220-type mechanics shelf. Refer to the technical practice for the shelf.
 - Use the PRIM slot for a primary HLU-232 List 1D
 - Use the PROT slot for the redundant protection HLU-232 List 1D.
- 3 Slide the HLU-232 List 1D in one of the HSA-232 Shelf Adapter slots. Use the card guide.
- 4 Push the HLU-232 List 1D into the slot until it contacts the 30-pin connector of the HSA-232 Shelf Adapter. The retaining latch on the front of the HLU-232 List 1D opens.
- 5 Press on the front panel of the HLU-232 List 1D until it is entirely within the card guides and makes contact with the 30-pin connector. The retaining latch closes.

SYSTEM OPTIONS

The HLU-232 List 1D contains non-volatile RAM (NVRAM) that stores the system settings options. No dip-switches or jumpers are required to configure the system options. They are set using the MODE and SEL buttons on the front panel, through a maintenance terminal connected to the Craft (RS-232) port, or from a Network Management interface. The System Settings are retained if shelf power is lost or if the HLU-232 List 1D is unplugged.

SETTING OPTIONS THROUGH MODE AND SEL

To provision the HLU-232 List 1D using the front panel MODE and SEL buttons:

- 1 Press the MODE button at least for one second, but less than three seconds, and release. The message on the front panel display alternates between the first system parameter and its current setting.
- 2 Press the SEL button repeatedly to scroll through all possible parameters of the option being displayed.

- 3 Select the desired option then press the MODE button. This updates the currently displayed mode to the setting selected, then selects the next configured parameter.

After the last option is selected, the following message appears in the front panel display:

Confirm? (Yes/No)

CONF NO is the default setting.

- 4 Do one of the following:
 - Cancel the session without saving the parameter changes by pressing the MODE button.
 - Accept the requested parameter changes by pressing the SEL button. Yes displays and the changes are made.

If neither button is pressed for 30 seconds, the display returns to its normal mode without installing any new changes.

FACTORY DEFAULT VALUES

To set all options to the factory default values:

- 1 Press the SEL button for six seconds. The DFLT NO message appears.
- 2 Do one of the following:
 - To set the default values, press the SEL button while the DFLT NO message displays. DFLT YES displays, indicating the factory default values are now in effect.
 - To terminate the Default mode, without setting the factory default values, press the MODE button or do nothing for 30 seconds.

PRODUCT IDENTIFICATION

Pressing the MODE button for three or more seconds causes the display to scroll through the HLU-232 List 1D software version number, its list number, the DSX-1 frame pattern, the line code setting of the HLU-232 List 1D, and all option settings. The line code parameter is the actual DSX-1 line code received by the HLU-232 List 1D when Framing is set to AUTO (on the

System Settings menu). When the framing parameter is not set to AUTO, the HLU-232 List 1D mimics one of the other line code settings, AMI or B8ZS. This is not determined by the received line code.

Set DS1 line code option to conform to the type of T1 service (AMI or B8ZS) provided by the HiGain system. Use AUTO when the HLU-232 List 1D acts as a standby circuit to T1 circuits whose line codes are not known or may be both AMI and B8ZS. Before selecting AUTO, consider the following limitations:

- 1 AUTO induces one BPV in the T1 bit stream whenever it switches from AMI to B8ZS.
- 2 AUTO allows each HiGain system end to set its DS1 mode to the code it is receiving at its local T1 input port. This makes each unit's code independent of the T1 code coming from a distant T1 input port. Thus, if the line codes received by the HiGain system are different at each end of the two T1 directions, the HiGain T1 output codes will not match, causing the received data to be AMI instead of B8ZS (or vice versa), and thus violating the 1s density rules by having excessive zeroes.

SYSTEM SETTINGS

The following user options are set by using a maintenance terminal connected to the Craft (RS-232) Port: Circuit ID, DS0 Blocking, and Margin Alarm Threshold.

Table 3. HLU-232 List 1D System Setting Menu Options

Option	Parameter	Description
EQL	EXT	Disables the internal equalizer so the external equalizer can provide current equalization.
	0*	Sets the equalizer to DSX-1 for 0 to 132 feet.
	133	Sets the equalizer to DSX-1 for 133 to 265 feet.
	266	Sets the equalizer to DSX-1 for 266 to 398 feet.
	399	Sets the equalizer to DSX-1 for 399 to 532 feet.
	533	Sets the equalizer to DSX-1 for 533 to 655 feet.

Table 3. HLU-232 List 1D System Setting Menu Options (Continued)

Option	Parameter	Description
LPBK	DIS	Configures the HiGain system to ignore the (2-in-5) in-band SmartJack loopback command.
	ENA*	Enables the HiGain system to recognize the (2-in-5) in-band SmartJack loopback command.
SPLB	GNLB*	Configures the HiGain system to respond to the generic (3/4/5/6-in-7) in-band loopback codes.
	A1LB and A2LB	Configures the HiGain system to respond to the Teltrend addressable repeater in-band loopback codes.
	A3LB	Configures the HiGain system to respond to the Wescom addressable repeater in-band loopback codes.
	A4LB	Configures the HiGain system to respond to the Wescom Mod 1 addressable repeater in-band loopback codes.
	A5LB	Configures the HiGain system to respond to the Teltrend Mod 1 addressable repeater in-band loopback codes.
PWRF	DIS	Disables powering to the HRU-412 and doubler(s), if used.
	ENA*	Enables powering to the HRU-412 and doubler(s), if used.
ZBTS	ON	Tells the HiGain system that the ESF frame is operating in ZBTSI mode.
	OFF*	Tells the HiGain system that the ESF frame is operating in normal non-ZBTSI mode.
ESAL	17	Red Status LED flashes when 17 Errored Seconds (ES) (17 HDSL cyclic redundancy check (CRC) errors on either HDSL loop or a total of 17 BPVs on DSX-1) occur within a 24 hour period.
	170	Red Status LED flashes when 170 ES (170 HDSL CRC errors on either HDSL loop or a total of 170 BPVs on DSX-1) occur within a 24 hour period.
	NONE*	Prevents generation of a minor alarm due to excessive errored seconds.

Table 3. HLU-232 List 1D System Setting Menu Options (Continued)

Option	Parameter	Description
LBTO	NONE	Disables automatic time-out cancellation of all loopbacks, except SMJK.
	20	Sets automatic cancellation of all loopbacks to 20 minutes after initiation.
	60*	Sets automatic cancellation of all loopbacks to 60 minutes after initiation.
	120	Sets automatic cancellation of all loopbacks to 120 minutes after initiation.
ALM	DIS*	Disables the activation the output alarm has on pin H when a minor alarm occurs.
	ENA	Enables the activation of the output alarm (on pin H) when a minor alarm occurs.
DS1	AUTO	The HLU-232 List 1D and HRU-412 independently monitor their incoming T1 bit streams for the B8ZS pattern. If either unit detects this pattern, it enters its B8ZS mode. It reverts back to its AMI mode if no B8ZS patterns are received for five seconds.
	B8ZS*	Places both the HLU-232 List 1D and HRU-412 into B8ZS mode.
	AMI	Places both the HLU-232 List 1D and HRU-412 into AMI mode.
FRMG	AUTO*	Configures the HiGain system to operate in an auto-framing mode (AUTO) where the system continuously searches the input T1 bit stream for a valid SF or ESF frame pattern. This feature insures proper channel time slot alignment for fractional T1 applications (DS0 blocking). While the HiGain system can also process unframed data in AUTO mode, it is preferable to use the unframed (UNFR) mode for unframed applications. Using AUTO mode for unframed applications runs the risk of detecting pseudo-valid frame sequences, which can affect data integrity.
	UNFR	Configures the HiGain system to operate in unframed mode (UNFR). This mode disables the auto framing process and forces the HiGain system to function as a transparent bit pipe.

Table 3. HLU-232 List 1D System Setting Menu Options (Continued)

Option	Parameter	Description
HAIS	2LP*	Causes the HiGain system to transmit the AIS signal at the HLU-232 List 1D and HRU-412 T1 output ports when the HDSL loops are not in sync (LOSW).
	1LP	Causes the HiGain system to transmit the AIS signal at the HLU-232 List 1D and HRU-412 T1 output ports when the HDSL loops are not in sync (LOSW) or when a Margin alarm occurs.
SAIS	ENA*	Causes the HRU-412 List 6 and 7 to transmit the AIS signal toward the Customer Interface (CI) when in NREM or SmartJack loopback.
	DIS	Causes the HRU-412 List 6 and 7 to transmit the signal from the network toward the CI when executing an HRU NREM or SmartJack loopback. The AIS signal is off.
CONF	YES	Confirms that all of the above operating modes are to be updated to their current selections.
	NO*	Prevents the most recently selected operating mode selections from being updated. They remain as they were before the system option settings mode was entered.
MARG	0 to 15 dB	The Margin Alarm Threshold is set using a maintenance terminal connected to the Craft port. Margin Alarm Threshold determines the minimum allowable margin below which a minor alarm can occur. Note that setting the threshold to 0 inhibits the margin alarm.
	4 dB*	
DSO	BLK	The DSO blocking option is set using a maintenance terminal connected to the Craft port. The four-character HLU-232 List 1D front panel display gives the status of the blocking option. BLK indicates at least one channel is blocked.
	NONE*	No channels are blocked.

* Indicates HLU-232 List 1D factory (default) settings.

PROTECTION SWITCHING SYSTEM SETTINGS

Use the system settings in [Table 4](#) for a system with protection switching (hot-standby backup) only. Set the options for each parameter as required for your application.

Table 4. *Protection Switching System Settings*

Parameter	Options	Description
Protection Mode	MDIS	Invokes the manual disable mode.
	MPRO	Invokes the manual protect mode.
	APRO*	Invokes the Auto Protect mode and enables the software to execute the Monitor state function and Switched state function.
	AHLD	Invokes the Auto Hold mode.
Minimum Lock-in Time	Lock-in minutes (3*)	Sets the length of time the system is switched to the protect mode before trying to switch back to the primary mode. The range is 1 to 99 minutes.
BER (CRC) Threshold	IE-4*	Sets the BER threshold to 10-4: 4704 CRC or FEBE errors in one minute.
	IE-5	Sets the BER threshold to 10-5: 470 CRC or FEBE errors in one minute.
	IE-6	Sets the BER threshold to 10-6: 47 CRC or FEBE errors in one minute.
	IE-7	Sets the BER threshold to 10-7: 4.7 CRC or FEBE errors in one minute.
BER Measurement Interval	5*	Sets the BER measurement interval to five minutes.
	10	Sets the BER measurement interval to 10 minutes.
	15	Sets the BER measurement interval to 15 minutes.
Maximum Switch-overs	1 to 9 (4*)	Input the maximum number of switchovers that can occur.
Switch Interval	1 to 99 minutes (10*)	Input the time interval in which the maximum switchovers can occur.
Lock-in Hours	0 to 99 hours (24*)	Input the lock-in time frame in which the switchovers can occur. Selecting 0 does not lock-in switchovers.

* Indicates default HLU-232 List 1D factory setting.

CONNECTING TO A MAINTENANCE TERMINAL

Use the Craft (RS-232) port to access the maintenance, provisioning, and performance menus and screens:

- 1 Connect a standard 9-pin console cable to the Craft port.

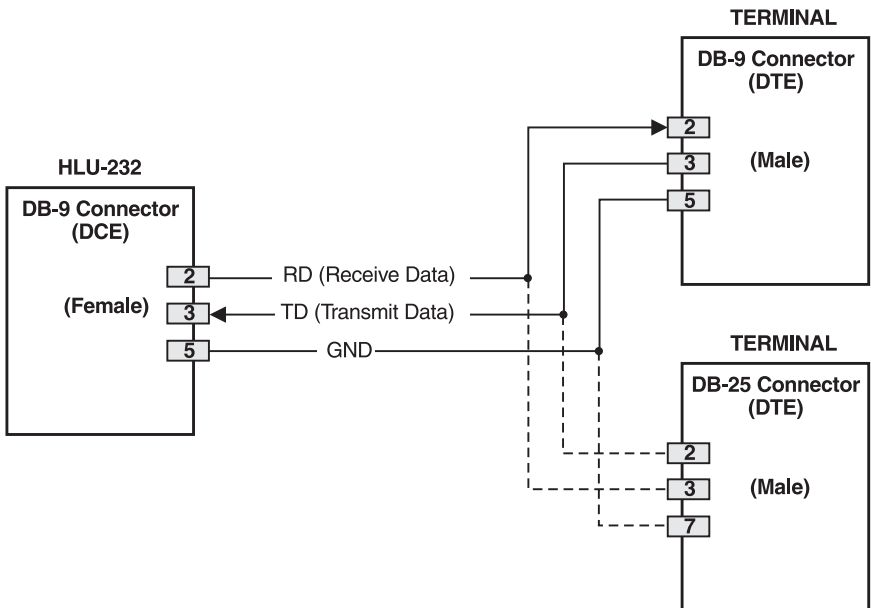


Figure 3. Connecting to a Maintenance Terminal

- 2 Connect the other end of the console cable to a maintenance terminal or a PC running a terminal emulation program.

- 3 Configure the maintenance terminal to the following communication settings:
 - 1200 to 9600 bps baud (9600 baud preferred)
 - Parity: None
 - 8 data bits
 - 1 stop bit
 - Hardware Flow Control set to None
 - VT Terminal Emulation
- 4 Press the space bar several times to activate the autobaud feature and to display the log on screen.

Refer to the full theory of practice for the HLU-232 List 1D for more information on the menus and screens.

TESTING

The HLU-232 List 1D front panel four character message display provides system diagnostic messages for alarm conditions and the status of loopback tests (see [Table 7 on page 18](#)).

ALARMS

The alarms shown in [Table 5](#) are listed in order of priority. More than one alarm condition can exist at any time. When more than one alarm condition exists, the highest priority alarm displays. The ALRM message precedes every specific alarm condition.

Table 5. Alarm Descriptions

Message	Full Name	Description
LOSW	Loss of Sync Word	Loss of HDSL loop sync.
LLOS	Local Loss of Signal	Loss of the HLU T1 input signal.
RLOS	Remote Loss of Signal	Loss of HRU T1 input signal.
H1(2)ES	HDSL CRC Error on Channel 1 or Channel 2	HDSL Loop 1 or Loop 2 exceeded the 24 hour user selected Errored Seconds (ES) CRC threshold.
PROT	Protection Unit	Circuit switched to protection unit.
PROR	Protection Error -Remote	Primary HRU failed to switch over to the back up circuit when commanded, or the protection HRU failed to switch over to the primary unit when commanded.
HBER	HiGain Bit Error Rate	BER alarm threshold exceeded.
DS1	DS1 BPV errors	Total number of bipolar violations (BPV) at the HLU-232 List 1D and HRU T1 inputs exceeded the 24 hour user selected threshold.
MAL1(2)	Margin Alarm for Loop 1 or Loop 2	Margin on HDSL Loop 1 or Loop 2 dropped below the minimum threshold value set on the Systems Settings menu, MARGIN ALARM THRES option.

LOOPBACKS

A number of loopback options are available for a HiGain system. Enable or disable the loopbacks using the MODE and SEL buttons or on the System Settings menu.

The loopbacks are:

- SmartJack loopback: enables the HRU-412 to respond to the standard 2/3 in five SmartJack in-band loopback codes and emulate the functions of a standard NID.
- GNLB: HiGain Generic Loopback

- A1LB: T1E1.4/92 compliant with query loopback, IOR powerdown, three loopback time-out choices, initiation from either end, repeating bit error signatures, alternate query loopback
- A2LB (Teltrend): same as A1LB; has Special Loopback (SPLB) functions for Southwestern Bell
- A3LB (Wescom): SPLB functions for New England Telephone
- A4LB (Teltrend Mod 1): SPLB functions for New York Telephone
- A5LB (Wescom Mod 1): SPLB functions for Southern New England Telephone (SNET)

Procedures for loopbacks are described in the detailed technical practice for the HLU-232 List 1D.

Table 6 contains loopback information.

Table 6. *Loopback Types*

Type	Full Name	Description
CREM	Customer Remote Loopback	Signal from customer is looped back to customer at the HLU-232 List 1D.
NLOC	Network Local Loopback	DSX signal is looped back to DSX at the HLU-232 List 1D.
CLOC	Customer Local Loopback	Signal from customer is looped back to customer at the HRU.
NREM	Network Remote Loopback	DSX signal is looped back to DSX at the HRU.
SMJK	Remote Smart-Jack Loopback	Signal from DSX is looped back at the HRU.
NDU1	Network Doubler 1 Loopback	Signal from network looped back to doubler 1.
NDU2	Network Doubler 2 Loopback	Signal from network looped back to doubler 2.
CDU1	Customer Doubler 1 Loopback	Signal from customer looped back to doubler 1.
CDU2	Customer Doubler 2 Loopback	Signal from customer looped back to doubler 2.

Figure 4 illustrates the loopback functions.

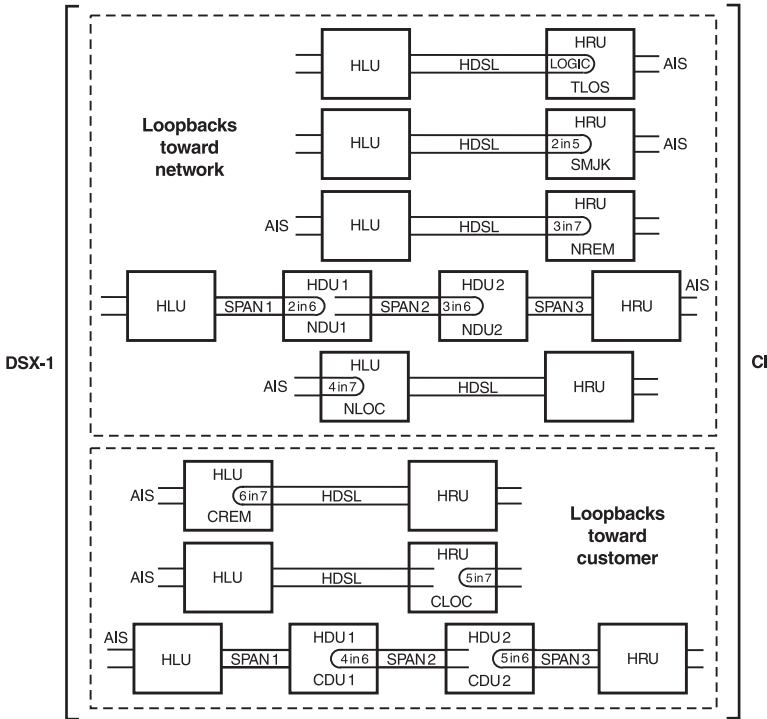


Figure 4. Loopback Operation

FOUR-CHARACTER DIAGNOSTIC MESSAGES

Table 7 lists HLU-232 List 1D four-character front panel display messages.

Table 7. *Four-Character Diagnostic Messages*

Message	Full Name	Description
CREM	Customer Remote Loopback	Signal from the customer is looped back to the customer at the HLU-232 List 1D.
NLOC	Network Local Loopback	DSX signal is looped back to DSX at HLU-232 List 1D.
CLOC	Customer Local Loopback	Signal from the customer is looped back to the customer at HRU.
NREM	Network Remote Loopback	DSX signal is looped back to DSX at HRU.
SMJK	Remote SmartJack Loopback	Signal from DSX is looped back at the HRU by the HRU SmartJack module.
HDU1	Network Doubler 1 Loopback	Signal from network looped back to doubler 1.
HDU2	Network Doubler 2 Loopback	Signal from network looped back to doubler 2.
CDU1	Customer Doubler 1 Loopback	Signal from customer looped back to doubler 1.
CDU2	Customer Doubler 2 Loopback	Signal from customer looped back to doubler 2.
TLOS	Transmit Loss Of Signal	HRU is in a logic loopback state caused by a loss of its T1 input from the NI, if enabled using the HRU TLOS switch.
FERR	Framing Bit Error Occurred	Framing bit error occurred at the HLU-232 List 1D T1 input.
LBPV	Local Bipolar Violation	BPVs received at the T1 input to the HLU-232 List 1D.
SIG 1 or 2	Signal 1 or Signal 2	The HLU-232 List 1D and the HRU transceivers are establishing contact with each other.

Table 7. Four-Character Diagnostic Messages (Continued)

Message	Full Name	Description
ACQ 1 or 2	Acquisition 1 or Acquisition 2	The HLU-232 List 1D and the HRU multiplexers are establishing synchronization over Loop 1 or Loop 2.
H1ES	HDSL CRC Error Channel 1	HLU-232 List 1D HDSL Loop 1 CRC error.
H2ES	HDSL CRC Error Channel 2	HLU-232 List 1D HDSL Loop 2 CRC error.
ARM	HiGain System armed	Armed to respond to Intelligent Repeater Loop Codes.
ACO	Alarm CutOff	A minor alarm occurred, and was retired by pressing the SEL button.
SELF TEST		The HLU-232 List 1D is in self-test mode. This occurs every power on/off cycle.
ALRM	Alarm Condition Exists	A minor alarm minor condition is in effect.
1=xx or 2=yy	HDSL Loop Margins	Indicates the power of the received HDSL signal on each loop, relative to noise. A value of 6 or greater is adequate for reliable system operation.
PWR FEED SHRT	Power Feed Short	Indicates a short between the two HDSL pairs or that an HRU is drawing the correct amount of power over good cable pairs but cannot communicate with the HLU-232 List 1D.
PWR FEED OPEN	Power Feed Open	Indicates an open in Tip and Ring circuit in the HDSL pair.

SPECIFICATIONS

Electrical

HDSL Line Code	784 kbps 2B1Q full duplex
HDSL Output	+13.5 dBm \pm 0.5 dB at 135 Ω
HDSL Line Impedance	135 Ω
Maximum Provisioning Loss	35 dBm at 196 kHz, 135 Ω
Line Clock Rate	Internal Stratum 4 clock
HDSL Startup Time (per span)	30 seconds (typical) 60 seconds (maximum)
One-way DS1 Delay (per span)	<220 μ seconds
DSX-1 Line Impedance	100 Ω
DSX-1 Pulse Output	12V pk-pk for EXTERNAL equalizer or pre-equalized for 0-655 feet of ABAM cable
DSX-1 Input Level	+1.5 to -7.5 dBm
DS1 Line Rate	1.544 Mbps \pm 200 bps
DS1 Line Format	AMI, B8ZS, or ZBTISI
DS1 Frame Format	ESF, SF, or unframed
Maximum Power Consumption	18 W (without doublers) 34 W (with doublers)
Maximum Heat Dissipation	7 W (without doublers) 9 W (with doublers)
Fusing	Internal, connected to FUSEALARM output, pin 26 (connected to 220 shelf pin 32 by the HSA-232 Shelf Adapter)
HDSL Span Voltage	-130 Vdc to -200 Vdc
Margin Indicator	Displays span SNR margin for both spans relative to 10^{-7} BER operation

Electrical Protection

- Secondary surge protection on DS1 and HDSL ports
- Power cross protection on HDSL ports

Physical/Environment

Operating Temperature	-40° C to 65° C (fahrenheit)
Humidity	5 to 95% (non-condensing)

Dimensions

Height	5.9 in. (15 cm)
Width	1.4 in. (3.5 cm)
Depth	8.4 in. (21.33 cm)

DOCUMENTATION

The HLU-232 List 1D has a complete technical practice that you can download from the PairGain Technical Manuals Web page at: www.pairgain.com. A password is required. If you do not have a password, contact your PairGain sales representative.

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

PRODUCT SUPPORT

This section contains product support and warranty information.

TECHNICAL SUPPORT

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

Telephone: (800) 638-0031 or (714) 832-9922

Fax: (714) 832-9924

During normal business hours (8:00 AM to 5:00 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.

In addition, PairGain maintains a computer bulletin board system for obtaining current information on PairGain products, product troubleshooting tips and aids, accessing helpful utilities, and for posting requests or questions. This system is available 24 hours a day by calling (714) 730-2800. Transmission speeds up to 28.8 kbps are supported with a character format of 8-N-1.

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 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
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.

FCC CERTIFICATION

This equipment has been tested and found to comply with the limits for FCC Class A Requirements. 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 this instruction manual, may cause harmful interference to radio communication.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Corporate Office

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