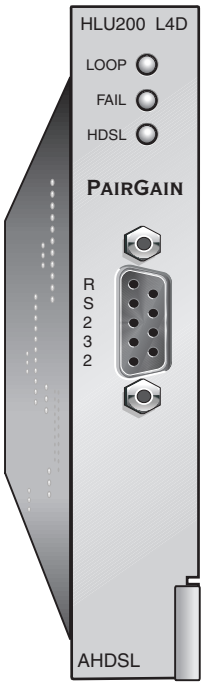
HIGAIN

Quick Installation Guide



HLU-200 List 4D
Line Unit

Litespan-2000
Channel Bank

ADC

THE HLU-200 LIST 4D

The HiGain® HLU-200 List 4D is a HiGain Line Unit (HLU) that plugs into any channel unit slot of a Litespan® 2000 Channel Bank Assembly (CBA). The HLU-200 List 4D is an enhanced version of the HLU-200 List 2D, and can be provisioned from its front panel craft port or from Litecraft™. Within Litespan, the HLU-200 List 4D is called an Asynchronous High-bit-rate Digital Subscriber Line (AHDSL) channel unit. When paired with a HiGain Remote Unit (such as an HRU-402), the HLU-200 provides 1.544 Mbps transmission on two unconditioned copper pairs over the full Carrier Service Area (CSA) range. The CSA includes loops of up to 12,000 feet of 24 AWG wire or up to 9,000 feet of 26 AWG wire (including bridged taps).

FEATURES

- Front panel status Light Emitting Diodes (LEDs)
- Front-panel craft port or Litecraft provisioning
- Margin threshold alarm
- Loss of Signal/Alarm Indicator Signal (LOS/AIS) payload alarm option
- Remote Loss of Signal (RLOS) disable alarm option
- Bit Error Rate (BER) alarm options
- Lightning and power cross-protection on HDSL interfaces
- Ultra-low wander (Stratum 1 compliant)
- Selectable Power Feed modes: Auto, High, and Low
- Inventory screen displays circuit and unit IDs
- HRU Loopback screen
- Four line-powered spans (three doublers and one remote)
- Five-span range (60 kft, 24 AWG) with four doublers and locally powered remote unit
- Grounded loop detection on HDSL Lines
- Payload (PL) or HiGain (HG) loopback source identification
- Troubleshooting screens

SPECIFICATIONS

Operating Temperature	-40 °F to +149 °F (-40 °C to + 65 °C)
Operating Humidity	5% to 95% non-condensing
Heat Dissipation	5 W (without doubler), 6.3 W (with doubler), typical
Electrical Protection	Secondary surge and power cross-protection on all HDSL ports
Mounting	Litespan 2000 CBA/ONU-48, 96
HDSL Line Rate	784 kbps full-duplex 2 Binary, 1 Quaternary (2B1Q) HDSL transmission on 2 pairs
HDSL Output	+13.5 dBm ±0.5 dB at 135 Ω
Maximum Provisioning Loss	35 dB at 196 KHz, 135 Ω
DS1 Line Rate	1.544 Mbps ±200 bps
DS1 Line Format	Alternate Mark Inversion (AMI) or Bipolar with 8-zero Substitution (B8ZS)
DS1 Frame Format	Extended SuperFrame (ESF) or SuperFrame (SF) in AUTO mode or Unframed in UNFR mode
Line Clock Rate	Internal Stratum 4 clock

1 INSTALLATION

Wear an antistatic wrist strap when installing the HLU-200. Avoid contact with circuit board components.

1 Slide the HLU-200 into the desired card slot in a Litespan 2000 CBA. Push it back until it touches the backplane connector.

2 Place your thumbs on the HLU-200 front panel and push firmly to insert the HLU-200 in the backplane connector.

2 REINSTALLING THE HLU

Do not reinstall the HLU-200 for at least 15 seconds after removing it from the CBA. Reinstalling it sooner may cause the HLU-200 to enter a dormant state. In the dormant state, the red Fail LED remains on and does not change state, as a normal unit does. The dormant state may last for 1 hour in a fully loaded CBA.

3 POWER-UP SEQUENCE

The HLU-200 front-panel LEDs indicate a sucessful power-up as follows:

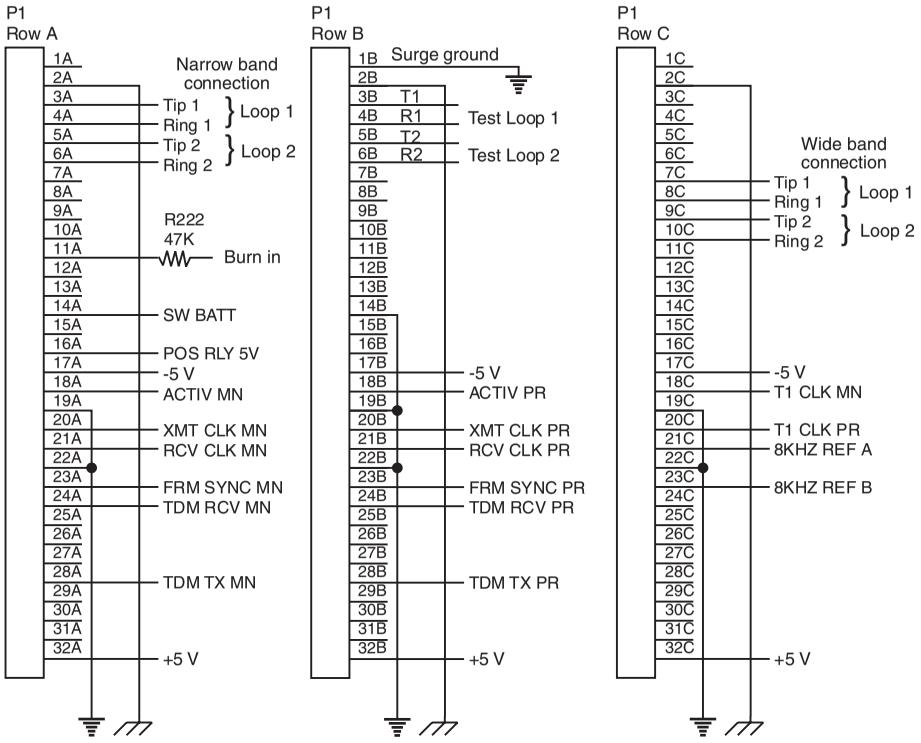
1 The Fail and HDSL LEDs light a steady red when the HLU is first installed and remain lit until the Litespan CBA starts its program download.

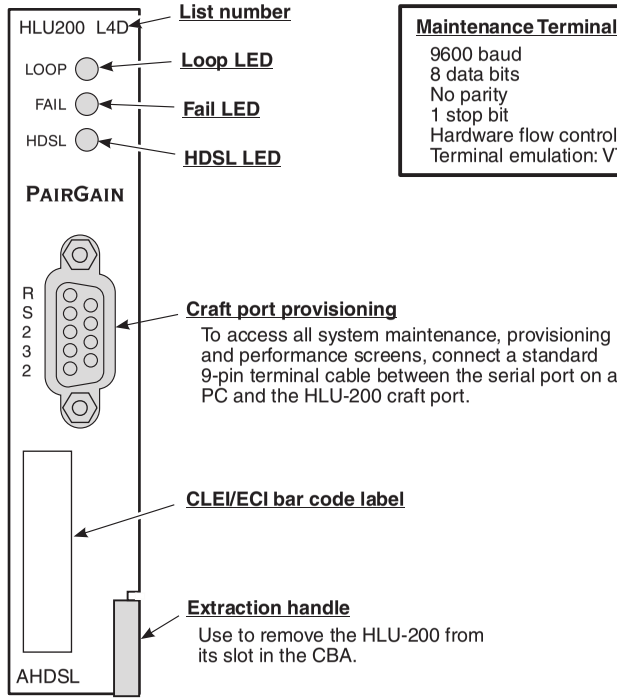
2 The Loop, Fail, and HDSL LEDs blink in sequence during the CBA program download.

3 The HDSL LED is yellow and then blinks green until both HDSL loops are in synchronization, at which time it lights a steady green.

The HDSL LED blinks red to indicate alarm conditions and lights a steady red if there is a problem with the HLU-200.

Continued





Maintenance Terminal Modem Settings

9600 baud
8 data bits
No parity
1 stop bit
Hardware flow control: OFF
Terminal emulation: VT-100

HLU-200 List 4D LED Descriptions

LED	Description
Loop	Indicates loopback status.
Steady green	One of the HLU-200 List 4D loopbacks are in effect (see Loopback Testing).
Blinking green (one or two blinks)	The CBA program download and handshake routine are in progress.
Fail	Indicates state of CBA download and Litecraft provisioning.
Steady red	Program download and handshake from CBA has failed.
Blinking red (one or two blinks)	The CBA program download and handshake routine are in progress.
Off	The CBA program download and handshake routine are complete.
HDSL	Tri-color LED that indicates the HLU-200 self-test state, the state of the HDSL loop, and failure of the HLU-200 48 V fuse.
Steady yellow	The HLU-200 is executing its self-test routine.
Blinking green	Blinks green during acquisition and synchronization of the HDSL loops
Steady green	Both HDSL loops are synchronized and no minor alarms are present.
Blinking red	An alarm condition is present (see HLU-200 Alarms).
Steady red	The HLU-200 48 V fuse has failed.

4 PROVISIONING

After installing the HLU-200 List 4D, perform these basic provisioning tasks:

1. Connect a maintenance terminal to the craft port, then press the **SPACEBAR** several times to access the Maintenance Terminal Main Menu screen.

In step 2 that follows, the Craftport Provision option (in the System Settings screen) must be set to ENABLED to allow the HLU-200 to be provisioned from the front panel craft port.

2. Press **B** to access the Set Clock screen, then set the time and date.
3. Press **E** and then **C** to access the System Settings screen. Change the settings of any system parameters as necessary.
4. Press **E** and then **H** to access the System Inventory screen, then type in the Circuit ID number for each unit.
5. Once the unit is successfully installed and provisioned, clear any performance history from the Span Status screen by pressing **E**, **A**, and **C** and from the Alarm History screen by pressing **E**, **G**, and **C**.

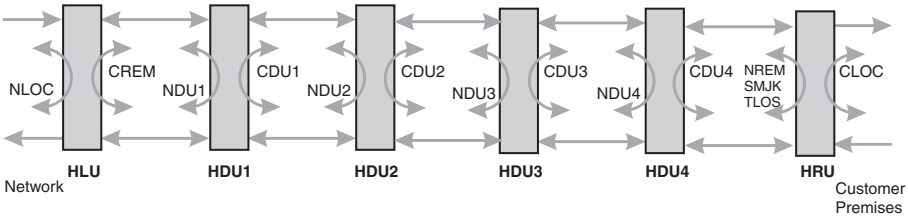
```
HI-GAIN HLU-200     MAINTENANCE TERMINAL MAIN MENU   (ver V1.0L-4D)
                              CIRCUIT ID#:

                         A. VIEW SPAN STATUS
                         B. SET CLOCK
                         C. SYSTEM SETTINGS
                         D. LOOPBACK MODE:  NONE
                         E. VIEW PERFORMANCE DATA
                         F. VIEW PERFORMANCE HISTORY
                         G. VIEW ALARM HISTORY
                         H. VIEW SYSTEM INVENTORY
                         I. VIEW TROUBLESHOOTING
```

Maintenance Terminal Main Menu Screen

5 LOOPBACK TESTING

Initiate loopback testing from the maintenance terminal screens or use a test set to send inband codes.



To initiate loopbacks from the maintenance terminal screens:

1. Press **D** from the Maintenance Terminal Main Menu to access the Loopback Menu.
2. Press the appropriate letter from the Loopback Menu. The `PLEASE WAIT.....` prompt appears. The system returns to the Maintenance Terminal Main Menu where the Loopback Mode option displays the loopback in progress.
3. Terminate the loopback by pressing **D** and then **A** (or allow your Loopback Timeout setting in the System Settings screen to timeout).

```
                              LOOPBACK MENU

TIME: 00:03:33
DATE: 03/15/00
CIRCUIT ID#:


  A. DISABLE LOOPBACKS
  B. NETWORK LOOP HLU          (NLOC)    M. NETWORK LOOP DOUBLER 4   (NDU4)
  C. NETWORK LOOP HRU          (NREM)    N. CUSTOMER LOOP DOUBLER 4  (CDU4)
  D. NETWORK LOOP DOUBLER 1    (NDU1)
  F. NETWORK LOOP DOUBLER 2    (NDU2)
  G. CUSTOMER LOOP HLU         (CREM)
  H. CUSTOMER LOOP HRU         (CLOC)
  I. CUSTOMER LOOP DOUBLER 1   (CDU1)
  J. CUSTOMER LOOP DOUBLER 2   (CDU2)
  K. NETWORK LOOP DOUBLER 3    (NDU3)
  L. CUSTOMER LOOP DOUBLER 3   (CDU3)
```

Loopback Menu – Four Doublers

To initiate loopbacks from a test set connected to the front-panel craft port, use the following inband codes:

Generic In-Band Loopback Codes

Loopback	Inband Code	Description
NLOC	1111000	DSX-1 signal is looped back to the network at the HLU.
NDU1	110000	DSX-1 signal is looped back to the network at HDU 1.
NDU2	111000	DSX-1 signal is looped back to the network at HDU 2.
NDU3	1010001	DSX-1 signal is looped back to the network at HDU 3
NDU4	1010010	DSX-1 signal is looped back to the network at HDU 4
NREM	1110000	DSX-1 signal is looped back to the network at the HRU.
SMJK	11000	DSX-1 signal is looped back to the network at the HRU SmartJack module.
CREM	1111110	Signal from customer is looped back to the customer at the HLU.
CDU1	111100	Signal from customer is looped back to the customer at HDU 1.
CDU2	111110	Signal from customer is looped back to the customer at HDU 2.
CDU3	1011001	Signal from customer is looped back to the customer at HDU 3.
CDU4	1011010	Signal from customer is looped back to the customer at HDU 4.
CLOC	1111100	Signal from customer is looped back to the customer at the HRU.
Loopdown	11100	Loops down any of the above loopbacks.

For more information about the HiGain maintenance screens, refer to the HLU-200 List 4D technical practice, section number 150-200-144-xx. It can be downloaded from the Customer Site portion of the ADC Web page at *www.pairgain.com*. A password is required. If you do not have a password, contact your ADC sales representative.

FCC Certification

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

ADC DSL Systems, Incorprated ("ADC") warrants this product to be free of defects and to be fully functional for a period of sixty (60) months from the date of original shipment, given correct customer installation and regular maintenance. ADC will repair or replace at ADC's option any unit without cost during this 60-month 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 ADC for repair. Any modifications of the unit by anyone other than an authorized ADC representative voids the warranty.

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

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

Modifications

Any changes or modifications made to this device that are not expressly approved by ADC DSL Systems, 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-200 List 4D has been tested and verified to comply with the applicable sections of the following standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- GR 1089-CORE - Electromagnetic Compatibility and Electrical Safety
- Binational standard, UL-1950/CSA-C22.2 No. 950-95: Safety of Information Technology Equipment

Trademark Information

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Copyright Information

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