HiGain

QUICK INSTALLATION

HRU-488 LIST 1
REMOTE UNIT

ADC

THE HRU-488 LIST 1

The HiGain® Remote Unit HRU-488 List 1 functions as the remote end of a repeaterless T1 transmission system. The HLU connects to a HiGain Line Unit (HLU) High-bit-rate Digital Subscriber Line (HDSL), creating a system that provides 1.544 Mbps transmission on two unconditioned copper pairs over the full Carrier Service Area (CSA) range. HiGain Doubler Units (HDUs) can also be used to extend the range. The HRU-488 List 1 supports local powering only.

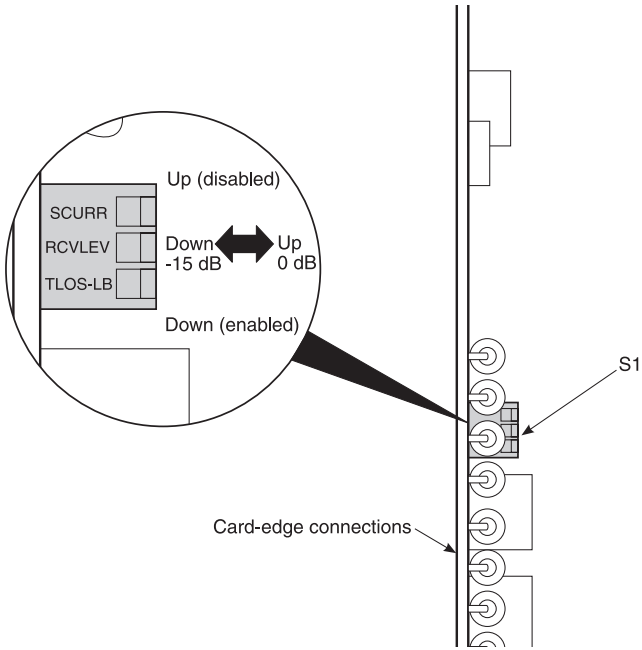
FEATURES

- 1.544 Mbps full-duplex transmission on two unconditioned copper pairs
- Status Light Emitting Diodes (LEDs) for Digital Signal Level 1 (DS1) and HDSL
- Craft port access for maintenance terminal connection
- Double Dual Module Plus (DDM+) mechanics
- Support for up to five spans
- HiGain maintenance screens for inventory, provisioning, troubleshooting, performance monitoring, and reporting
- Generic and addressable repeater loopback activation codes
- Lightning and power cross-protection on HDSL and DS1 interfaces
- Local powering only with sealing current option
- Ultra-low wander
- Fuse alarm circuit
- Two HDSL interfaces to HLU, HDU

SPECIFICATIONS

Operating Temperature	-40 °F to + 149 °F (-40 °C to + 65 °C)
Operating Humidity	5% to 95% non-condensing
Line Power Consumption	3.1 Watts
Electrical Protection	Secondary surge and power cross-protection on all DS1 and HDSL ports
Mounting	DDM+ high-density shelf
HDSL Line Code	784 kbps 2B1Q (each loop)
HDSL Output	+13.5 dBm ±0.5 dB, 135 Ω
DS1 Pulse Output	0 dB or -15 dB
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 Super Frame (ESF), Super Frame (SF), or Unframed (UNFR)

1 INSTALLATION



1 To set the simplex sealing current (SCURR), do one of the following:

- If the HRU-488 List 1 is to be used with an HDU-451 List 1, List 2, List 3, or List 3B doubler, disable the simplex sealing current by placing the SCURR switch in the up position. The HRU-488 sealing current circuit is not compatible with these doublers.
- If the HRU-488 List 1 is to be used with the following compatible doublers, enable the SCURR switch (down position).
  - HDU-404, HDU-407, HDU-409
  - HDU-437, HDU-439 List 1 or List 1B
  - HDU-451 List 4 or List 4B

2 To enable the Transmit Loss of Signal (TLOS) Loopback (LB), set the switch to the down position.

3 Set the Receive Level (RCVLEV) switch to the down (-15 dB) position or the up (0 dB) position.

4 Lift the front panel and slide the HRU-488 List 1 into the enclosure slot guides. Push the unit back until properly seated in the backplane card-edge connector.

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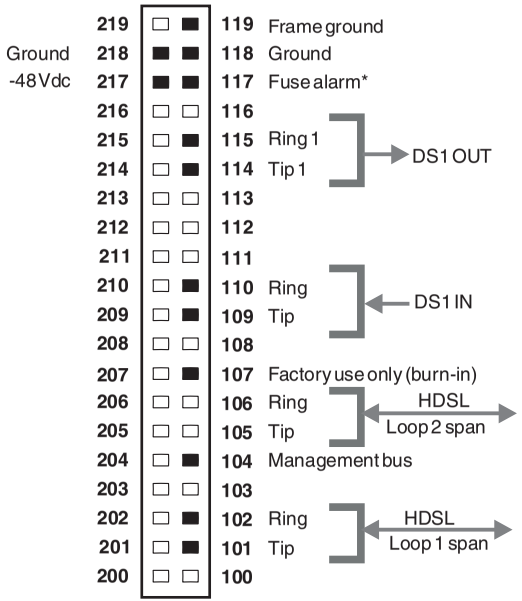
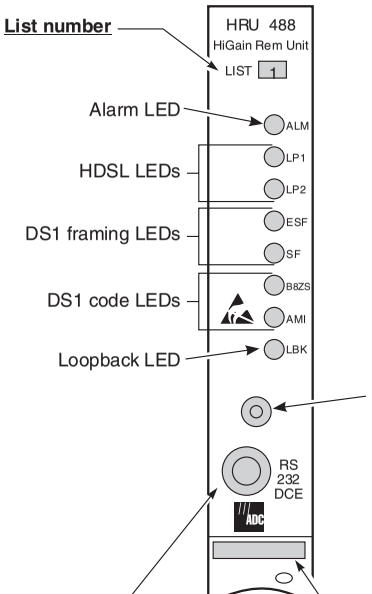
Card-Edge Connector



* Fuse alarm is normally floating (0 to 80 Vdc maximum) and at -48 Vdc (10 mA maximum) when activated.

Front Panel



Loopback control button

Pressing the button for 5 seconds activates a remote loopback towards the network, called a Network Remote Loopback (NREM). Any existing loopback is terminated before NREM is activated. The unit can be looped down by either pressing the LPBK control button again for 5 seconds or by the standard loopdown inband messages.

RS-232 craft port

The Bantam 210 jack provides bidirectional communication between the HRU and a maintenance terminal for access to maintenance, provisioning, and performance screens. Use a Db9 to phone plug jack adapter, part number 120-1035-01, to connect a standard RS-232 Db-9 terminal cable between the serial port on a PC and the HRU craft port.

Configuration number

Modem settings:
1200-9600 baud
8 data bits
No parity
1 stop bit
Hardware flow control: NONE
Terminal emulation: VT-100

2 VERIFICATION

Once the HLU is installed, verify that it is operating properly by monitoring the Status LEDs on the front panel.

Status LED Descriptions

LED Status	Indicates
Alarm (ALM) LED	Shows alarm states for remote and local Loss of Signal (LOS).
Solid red	Indicates an LOS condition at the HLU T1 input.
Blinking	Indicates an LOS condition at the HLU T1 input.
HDSL LEDs	Displays HDSL Loop 1 and Loop 2 conditions.
Solid green	Indicates HDSL Loop 1 and Loop 2 are in sync.
Blinking once per second	Indicates the HDSL loop is trying to acquire sync.
Blinking 4 times per second	Indicates a margin alarm condition at the HRU on the last span.
Blinking 10 times per second	Indicates a Cyclical Redundancy Check (CRC) error on the HDSL loop.
OFF	Indicates no activity on the HDSL loop.
DS1 Framing (FRM) LEDs (ESF and SF)	Indications for framing patterns. If DS1 signals are not detected, the ESF, SF, B8ZS, and AMI LEDs will not light.
ESF LED = Solid green	Indicates Extended Super Frame (ESF). The LED blinks once per second when a frame error is indicated.
SF LED = Solid green	Indicates Super Frame (SF). The LED blinks once per second when a frame error is indicated.
OFF	Indicates unframed or no signal.
DS1 Code LEDs (B8ZS and AMI)	Indications for DS1 code options. If DS1 signals are not detected, the ESF, SF, B8ZS, and AMI LEDs will not light.
B8ZS LED = Solid green	Indicates that the DS1 line code option is set to B8ZS or the option is set to AUTO and an AMI line code is being received at the HRU DS1 input. The LED blinks once per second when a string of excessive zeros is detected.
AMI LED = Solid green	Indicates that the user DS1 line code option is set to AMI or the option is set to AUTO and an AMI line code is being received at the HRU DS1 input. This LED blinks once per second when a Bipolar Violation (BPV) is detected.
Loopback (LPBK) LED	Shows loopback states to and from the network and to and from the Customer Interface (CI).
Solid yellow	Indicates Network Remote Loopback (NREM), SmartJack (SMJK), or Transmit Loss of Signal (TLOS).
Blinking once per second	Indicates Customer Local Loopback (CLOC) loopback state.
Blinking 4 times per second	Indicates the HRU is in an Armed state.

3 LOGGING ON TO THE MAIN MENU

The HLU supports remote login through a maintenance terminal (ASCII terminal or a PC running terminal emulation software) connected to the craft port on the HLU front panel. Remote login creates menus and screens for the HLU that are identical to those viewed at the HLU. Once logged on, you can access the Remote Terminal Main Menu screens to view system settings, initiate loopbacks, and provision the circuit.

To log on and access the Remote Terminal Main Menu screens using a maintenance terminal:

1 Press the SPACEBAR several times to display the Remote Login screen.

2 Press the ENTER key to view the HiGain Maintenance Terminal Screen. The Remote Terminal Main Menu items are replications of the line unit screens. Depending on the HiGain Line Unit (HLU) attached to the HLU, remote provisioning may be available. Refer to the applicable HLU technical practice for details.

For more detailed information about the maintenance terminal screens, provisioning, and loopback mode testing, download the appropriate line unit technical practice from the the ADC website at *www.adc.com*.

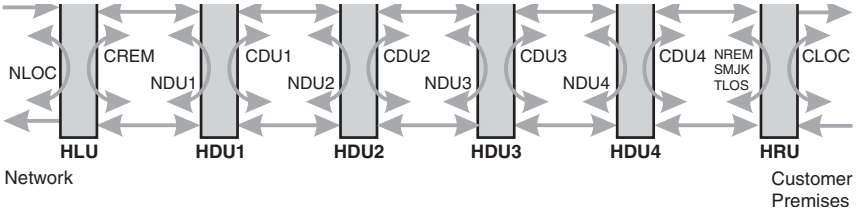
Remote Terminal Main Menu Items

Menu Item	Function
View Span Status	Allows viewing of span status from the HLU to the HRU-488 (non-doubler applications) and from any doubler spans (multi-span applications).
Set Clock	Allows setting of time and date parameters at the HRU. (a)
System Settings	Allows viewing and setting of all system settings. (a)
Loopback Mode	Allows system loopbacks to be initiated.
View Performance Data	Allows viewing of the Errored Seconds (ES) and Unavailable Seconds (UAS) for the HLU to HRU-488 span (non-doubler applications) and any additional spans (doubler applications) in 15-minute intervals over a 24-hour time period.
View Performance History	Allows viewing of the ES and UAS for the HLU to HRU-488 span (non-doubler applications) and any additional spans (doubler applications) in 24-hour intervals over a 31-day period.
View Alarm History	Allows viewing of alarm conditions for the HLU to HRU-488 span (non-doubler applications) and any additional spans (doubler applications).
View System Inventory	Displays the model, serial, and identification (ID) numbers of all units in the circuit.
View Troubleshooting	Provides a graphical analysis of the circuit and identifies problem areas.
Remote Logoff	Terminates the remote session.

(a) If the HLU does not have remote provisioning or its remote provisioning option is disabled, the HRU cannot modify these settings.

4 LOOPBACK TESTING

Initiate loopback testing from the HiGain maintenance menus or by using inband codes. The inband codes shown below can be sent by a test set.



GNLB Loopback Commands

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 HDU1.
NDU2	111000	DSX-1 signal is looped back to the network at HDU2.
NDU3	1010001	DSX-1 signal is looped back to the network at HDU3.
NDU4	1010010	DSX-1 signal is looped back to the network at HDU4.
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.
CLOC	1111100	Signal from customer is looped back to the customer at the HRU.
CDU1	111100	Signal from customer is looped back to the customer at HDU1.
CDU2	111110	Signal from customer is looped back to the customer at HDU2.
CDU3	1011001	Signal from customer is looped back to the customer at HDU3.
CDU4	1011010	Signal from customer is looped back to the customer at HDU4.
CREM	1111110	Signal from customer is looped back to the customer at the HLU.
Loopdown	11100	Deactivates any of the above loopbacks.

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

Product warranty is determined by your service agreement. Contact your sales representative or Customer Service for details.

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

This equipment has been tested and verified to comply with the applicable sections of the following safety 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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