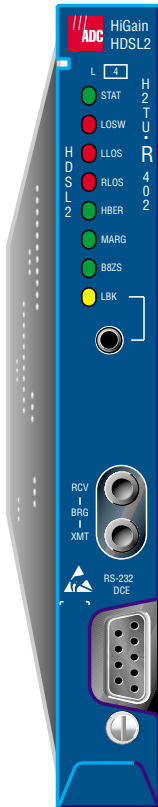


# HiGain HDSL2

## Quick Installation Guide



**H2TU-R-402 List 4  
Remote Unit**

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## H2TU-R-402 LIST 4

The HiGain® HDSL2 product family is the industry's first practical implementation of High bit-rate Digital Subscriber Line 2 (HDSL2). When an H2TU-R-402 List 4 remote unit is used in conjunction with a HiGain HDSL2 line unit (H2TU-C), the system provides 1.552 Mbps transmission on one unconditioned copper pair over the full Carrier Service Area (CSA) range. The CSA includes loops of up to 12,000 feet of 24 AWG or 9,000 feet of 26 AWG wire, including bridged taps.

## FEATURES

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- Front-panel status LEDs and craft port
  - Performance Report Messaging (SPRM and NPRM)
  - Local or line powered
  - Blockage Indicator History
  - Loss of Signal (LOS)/Alarm Indication Signal (AIS) payload alarm option
  - Remote provisioning through TL1 FDL or 11-bit payload commands
  - Bit Error Rate (BER) alarm options
  - Bipolar Violation Transparency (BPVT) options
  - DS1 Sectionalized Event Log
  - Ultra-low wander
  - Payload or HiGain loopback source identification
  - HiGain HDSL2 maintenance screens for remote provisioning, performance monitoring, inventory, and troubleshooting
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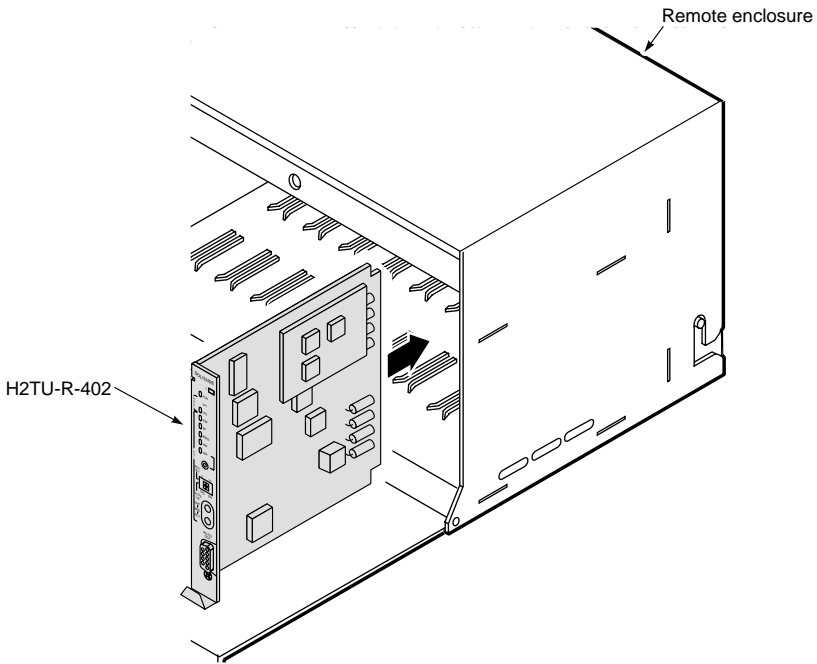
## SPECIFICATIONS

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<b>Operating Temperature</b>	-40 °F to +149 °F (-40 °C to + 65 °C)
<b>Operating Humidity</b>	5% to 95% non-condensing
<b>Line Power Consumption</b>	5 Watts
<b>Electrical Protection</b>	Secondary surge and power cross protection on all DS1 and HDSL2 ports
<b>Mounting</b>	Any 400 or 200 mechanics shelf
<b>HDSL2 Line Rate</b>	1.552 Mbps Overlapped Pulse Amplitude Modulated Transmission with Interlocking Spectra (OPTIS)
<b>HDSL2 Output</b>	+16.5 dBm ±0.5 dBm, 135 Ω
<b>DS1 Pulse Output</b>	0 dB, -7.5 dB, -15 dB
<b>Maximum Provisioning Loss</b>	35 dB at 196 KHz, 135 Ω
<b>DS1 Line Rate</b>	1.544 Mbps ±200 bps
<b>DS1 Line Format</b>	Alternate Mark Inversion (AMI) or Bipolar with 8-zero Substitution (B8ZS)
<b>DS1 Frame Format</b>	Extended SuperFrame (ESF), SuperFrame (SF), or Unframed (UNFR)

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# 1 INSTALLATION



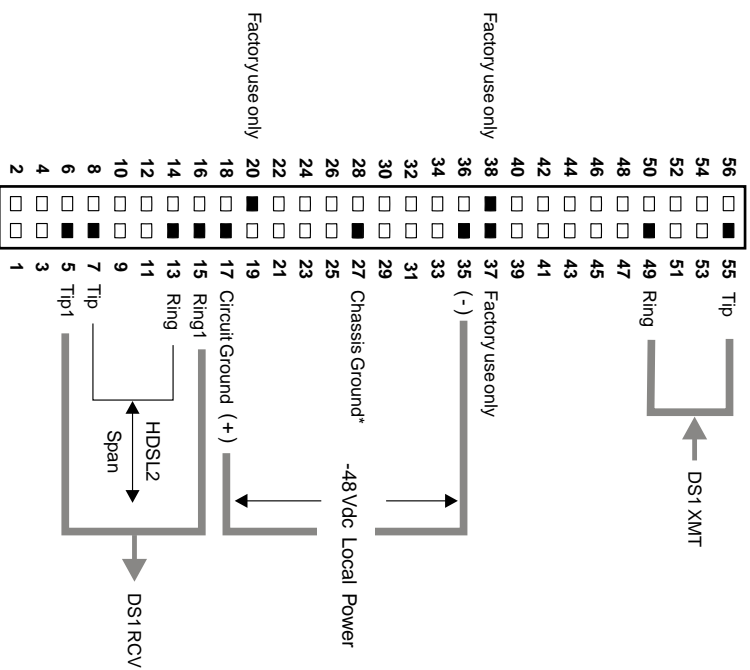
**Wear an antistatic wrist strap when installing the H2TU-R.  
Avoid touching components on the circuit board.**

- 1** Align the H2TU-R with the enclosure slot guides and slide the unit in. Push the unit back until it touches the backplane card-edge connector.
- 2** Place your thumbs on the H2TU-R front panel and push the unit into the card-edge connector.

*Continued*

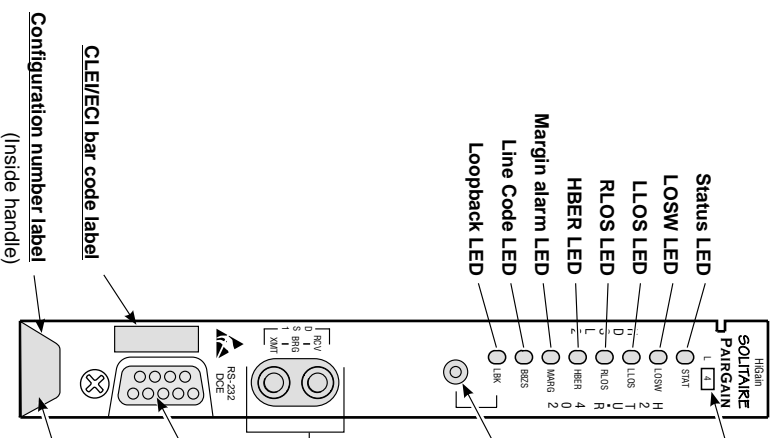


## Card-edge connector



Active pins are highlighted in black.

\* Chassis Ground may be tied to Earth Ground according to local practice.



### List number

Indicates the list number of the H2TU-R-402.

### Loopback control button

Press the button for 5 seconds to activate a bidirectional loopback towards the network and the customer (NREM and CLOC). Any existing loopback is terminated before these loopbacks are activated. The unit can be looped down by pressing the LPBK control button again for 5 seconds, by the standard loopdown inband messages, or by the maintenance terminal.

### DS1 input (XMT) and output (RCV) bridging (BRG) jacks

Provides non-intrusive bridging jack access to (XMT) and from (RCV) the HDSSL2 span at the DS1 interface. Allows testing of the HDSSL2 system.

### Craft port provisioning

To access all system maintenance, provisioning, and performance screens, connect a standard 9-pin terminal cable between the serial port on a PC and the H2TU-R craft port.

### Extraction handle

Use to remove the H2TU-R-402 from its slot.

### Maintenance Terminal Modern Settings

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

# 2 VERIFICATION

Once the H2TU-R-402 is installed, verify that it is operating properly by monitoring the Status LEDs on the front panel.

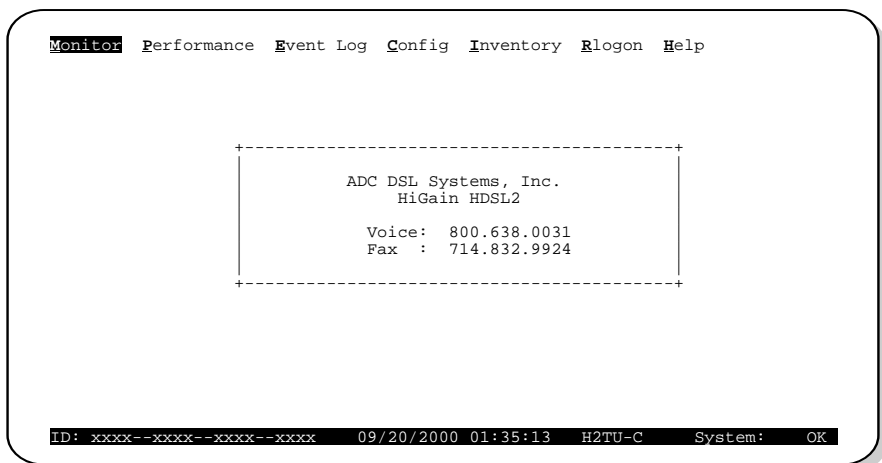
## Status LED Descriptions

LED Status	Indicates
<b>Status (STAT) LED</b>	Shows status of power, loop acquisition, and span synchronization.
OFF	Indicates that no power is applied to the H2TU-R-402.
Solid green	Indicates normal operation: the HDSL2 span is synchronized.
Blinking once per second	Indicates that the HDSL2 loop is trying to acquire synchronization.
<b>Loss of Sync Word (LOSW) LED</b>	Shows synchronization status for the connected HDSL2 span.
OFF	Indicates normal operation: the connected HDSL2 span is synchronized.
Solid red	Indicates that the HDSL2 loop has lost synchronization.
<b>Local Loss of Signal (LLOS) LED</b>	Shows the presence of the DSX-1 signal at the H2TU-C line unit.
OFF	Indicates normal operation: the DSX-1 signal is present at the H2TU-C.
Solid red	Indicates a loss of the DSX-1 signal at the H2TU-C.
<b>Remote Loss of Signal (RLOS) LED</b>	Shows presence of the DS1 signal at the H2TU-R-402.
OFF	Indicates normal operation: the DS1 signal is present at the H2TU-R-402.
Solid red	Indicates a loss of the DS1 signal at the H2TU-R-402.
<b>HDSL2 Block Error Rate (HBER) LED</b>	Shows the status of the HDSL2 Block Error Rate (HBER) alarm for the span connected to H2TU-R-402.
OFF	The HDSL2 span is not synchronized.
Solid green	Indicates that the span connected to the H2TU-R-402 has no HBER alarm.
Solid red	Indicates that the span connected to the H2TU-R-402 has crossed the HBER alarm threshold.
<b>Margin alarm (MARG) LED</b>	Shows the status of the MARG alarm for the span connected to H2TU-R-402.
OFF	Indicates that the HDSL2 span is not synchronized.
Solid green	Indicates that the HDSL2 span connected to the H2TU-R-402 is synchronized.
Solid red	Indicates that the span connected to the H2TU-R-402 has crossed the MARG alarm threshold.
<b>Line code (B8ZS) LED</b>	Shows whether the line code option is provisioned for AMI or B8ZS.
OFF	Indicates that the system is provisioned for AMI line code.
Solid green	Indicates that the system is provisioned for B8ZS line code.
<b>Loopback (LBK) LED</b>	Shows the presence of an active loopback at the H2TU-R-402.
OFF	Indicates no loopback at the H2TU-R-402.
Solid yellow	Indicates there is loopback activated at the H2TU-R-402.

# 3 LOGGING ON TO THE MAIN MENU

The H2TU-R-402 supports local and remote logon through a maintenance terminal (ASCII terminal or a PC running terminal emulation software) connected to the craft port on the H2TU-R-402 front panel.

Logging on creates menus and screens for the H2TU-R-402 that are replications of those viewed at the H2TU-C. Once logged on, you can view system settings and inventory, initiate loopbacks, monitor performance, and configure the circuit.



To log on using a maintenance terminal:

- 1 Press **CTRL** + **R** to refresh the Logon screen, if necessary.
- 2 Press the first letter of the desired menu. Use the **SPACEBAR** to cycle through menu selections, and press **ENTER** to change a setting or display a menu.
- 3 Press **R** to log off.

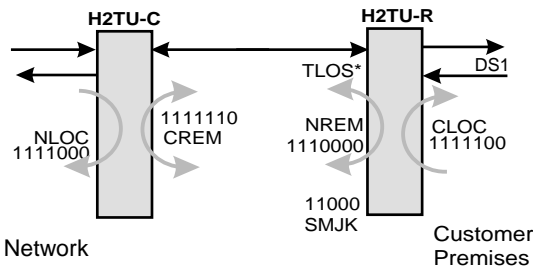
Type the first letter	To view:
<b>M</b> onitor	A graphical representation of circuit activity and devices.
<b>P</b> erformance	Performance history statistics (current, 25-hour, 48-hour, 31-day, blockage indicator) at DS1 and HDSL interfaces. Also, displays alarm status and count.
<b>E</b> vent log	Sectionalized Event History for alarms and errors at all four legs of the DS1 signal at the H2TU-R.
<b>C</b> onfig	Configuration options (standard, ADC, signal generation, date and time, master clear, factory defaults).
<b>I</b> nventory	Product information, circuit and unit identifications.
<b>R</b> logon	Maintenance terminal screens at the H2TU-C.
<b>H</b> elp	Glossary, screen navigation keys, ADC contact information.



**For more information about the HiGain HDSL2 maintenance screens, refer to the technical practice for the H2TU-C line unit. Contact Customer Service to obtain a copy.**

## 4 LOOPBACK TESTING

Initiate loopbacks with the H2TU-R-402 LBK button, the H2TU-C front-panel display, the maintenance terminal monitor screen, or with inband codes. The inband codes shown below can be sent by a test set. For more information, refer to the technical practice for the H2TU-C line unit.



\* When enabled, TLOS is an automatic loopback that occurs with a LOS at the remote DS1 input.

### *GNLB Loopback Commands*

Loopback	Inband Code	Description
NLOC	1111000	DSX-1 signal is looped back to the network at the H2TU-C.
NREM	1110000	DSX-1 signal is looped back to the network at the H2TU-R.
SMJK	11000	DSX-1 signal is looped back to the network at the H2TU-R SmartJack module.
CREM	1111110	Signal from customer is looped back to the customer at the H2TU-C.
CLOC	1111100	Signal from customer is looped back to the customer at the H2TU-R.
Loopdown	11100	Deactivates any of the above loopbacks.

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## 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

ADC DSL Systems, Incorporated ("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 H2TU-R-402 List 4 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

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