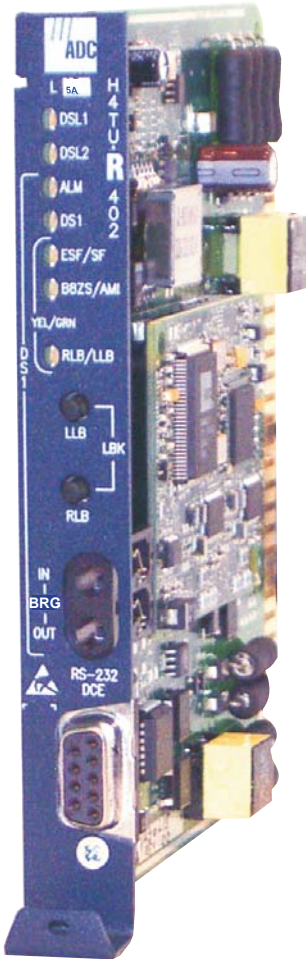


# QUICK INSTALLATION



**HIGAIN**  
**H4TU-R-402 LIST 5A**  
**(LINE & LOCAL POWER)**  
**REMOTE UNIT**

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## THE H4TU-R-402 LIST 5A

The H4TU-R-402 List 5A (H4TU-R) functions as the remote end of a T1 transmission system. The H4TU-R, when used in conjunction with an HDSL4 line unit (H4TU-C), transmits a 1.544 Mbps T1 payload a maximum distance of 12 kft. over two unconditioned copper pairs (26 AWG). Three powered spans are supported.

## FEATURES

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**Front panel:** status LEDs, craft port for maintenance screen access, DS1 monitor jacks, and LLB and RLB loopback pushbuttons for activating loopback commands

**Maintenance screens** for inventory, provisioning, performance monitoring, and troubleshooting, including:

- Remote provisioning through TL1 FDL commands
- Loop attenuation and insertion loss reporting

- HDSL4 Loop reversal indication
- Power Back Off (PBON and PBOC) for configuring HDSL4 transmit power to reduce crosstalk
- Performance Report Messaging (SPRM, NPRM, and AUTO)

**Power:** local or line

**Doubler support for up to three spans**

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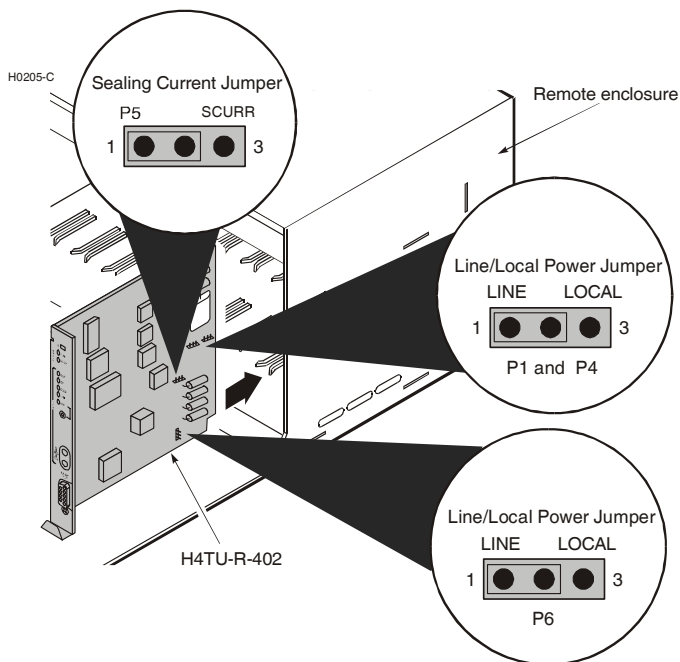
## SPECIFICATIONS

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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>HDSL4 Span Voltage</b>              | 0, 185 Vdc (Voltage is applied across Loop 1 and Loop 2.)                   |
| <b>Line or Local Power Consumption</b> | 5 Watts   |
| <b>Sealing Current Option</b>          | Sinks 10 mA sealing current from H4TU-C.                                    |
| <b>Electrical Protection</b>           | Secondary surge and power cross-protection (all DS1 and HDSL4 ports)        |
| <b>Mounting</b>                        | Any 200 mechanics shelf   |
| <b>HDSL4 Line Rate</b>                 | 784 kbps Overlapped Pulse Amplitude Modulation (OPAM) transmission per pair |
| <b>HDSL4 Output</b>                    | +14.1 dBm $\pm$ 0.5 dBm, 135 $\Omega$                                       |
| <b>DSX-1 Pulse Output</b>              | 6 V <sup>pk-pk</sup> , pre-equalized for 0 to 655 feet of ABAM cable        |
| <b>Maximum Insertion Loss (at KHz)</b> | Span 1 = 47 dB, Span 2 and Span 3 = 43 dB                                   |
| <b>Maximum Loop Attenuation</b>        | Span 1 = 34 dB, Span 2 and Span 3 = 31 dB                                   |
| <b>DSX-1 Input Level</b>               | +1.5 dB to -7.5 dB DSX  |
| <b>DSX-1 Line Rate</b>                 | 1.544 Mbps $\pm$ 200 bps  |
| <b>DSX-1 Line Format</b>               | Alternate Mark Inversion (AMI) or Bipolar with 8-zero Substitution (B8ZS)   |
| <b>DSX-1 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 H4TU-R.  
Avoid touching components on the circuit board.**

Align the H4TU-R with the enclosure slot guides and slide the unit in until it touches the backplane card-edge connector. Place your thumbs on the front panel and push the H4TU-R into the card-edge connector.

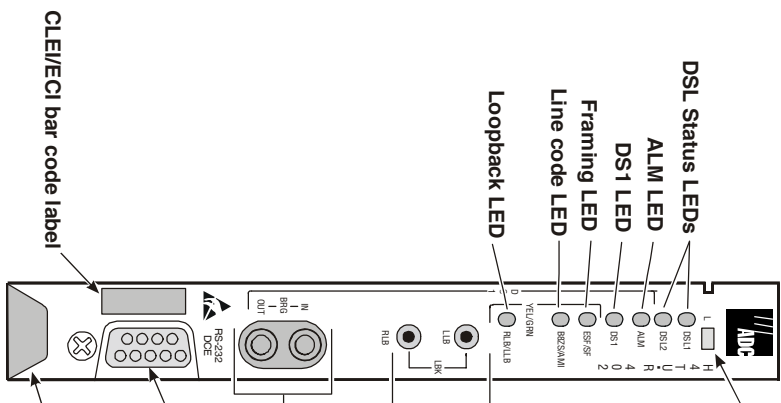
- 1 Configure the H4TU-R for line or local power, as follows:
  - For line power, place a jumper on pins 1 and 2 of P1, P4 and P6.
  - For local power, place a jumper on pins 2 and 3 of P1, P4 and P6.
- 2 Check the setting of the Sealing Current (SCURR) jumper (P5). The default setting is disabled (jumper on pins 1 and 2). If the unit is locally powered and your application requires sealing current, place a jumper on pins 2 and 3.
- 3 Align the unit with the enclosure slot guides and slide the unit in. Push the unit back until it touches the backplane card-edge connector.

Place your thumbs on the front panel and push the unit into the card-edge connector.

## Card-Edge Connector

|    |                          |    |                  |                     |
|----|--------------------------|----|------------------|---------------------|
| 56 | <input type="checkbox"/> | 55 | DS1 Tip          |                     |
| 54 | <input type="checkbox"/> | 53 |                  |                     |
| 52 | <input type="checkbox"/> | 51 |                  |                     |
| 50 | <input type="checkbox"/> | 49 | DS1 Ring         |                     |
| 48 | <input type="checkbox"/> | 47 | HDLSL4 Ring1     |                     |
| 46 | <input type="checkbox"/> | 45 |                  |                     |
| 44 | <input type="checkbox"/> | 43 |                  |                     |
| 42 | <input type="checkbox"/> | 41 | HDLSL4 Tip1      |                     |
| 40 | <input type="checkbox"/> | 39 |                  |                     |
| 38 | <input type="checkbox"/> | 37 | Factory Use Only |                     |
| 36 | <input type="checkbox"/> | 35 | (-)              |                     |
| 34 | <input type="checkbox"/> | 33 |                  |                     |
| 32 | <input type="checkbox"/> | 31 |                  |                     |
| 30 | <input type="checkbox"/> | 29 |                  |                     |
| 28 | <input type="checkbox"/> | 27 | Chassis Ground*  | -48 Vdc Local Power |
| 26 | <input type="checkbox"/> | 25 |                  |                     |
| 24 | <input type="checkbox"/> | 23 |                  |                     |
| 22 | <input type="checkbox"/> | 21 |                  |                     |
| 20 | <input type="checkbox"/> | 19 |                  |                     |
| 18 | <input type="checkbox"/> | 17 | Circuit Ground   | (+)                 |
| 16 | <input type="checkbox"/> | 15 | DS1 Ring1        |                     |
| 14 | <input type="checkbox"/> | 13 | HDLSL4 Ring      |                     |
| 12 | <input type="checkbox"/> | 11 |                  |                     |
| 10 | <input type="checkbox"/> | 9  |                  |                     |
| 8  | <input type="checkbox"/> | 7  | HDLSL4 Tip       |                     |
| 6  | <input type="checkbox"/> | 5  | DS1 Tip1         |                     |
| 4  | <input type="checkbox"/> | 3  |                  |                     |
| 2  | <input type="checkbox"/> | 1  | Chassis Ground*  |                     |

## Front Panel



### List number

Indicates the list number of the H4TU-R-402.

### Loopback control pushbuttons

Press pushbutton for 5 seconds to activate a dual loopback at the network (RLB) or at the customer (LLB). Any existing loopback is terminated before these loopbacks are activated. The unit can be looped down by pressing either pushbutton again for 5 seconds, by the standard loopdown inbound messages, or by the maintenance terminal no active loopback in the system, will activate a bi-directional loopback at the Remote Unit (loopback at RT towards NET and CPE using LLB) or (loopback at the CO towards NET and CPE using RLB).

Press both pushbuttons together for more than 2 seconds on one- and two-span systems (all LEDs on the front panel will reflect the corresponding LED states at the CO) or on a 3-span system (the DSL1 and 2 LEDs will reflect the DSL status of the span between the 1<sup>st</sup> and 2<sup>nd</sup> repeater). All other LEDs at RT will reflect the LED status at the CO unit. All LEDs at the RT will resume to the RT LED states when both LLB and RLB buttons are released. This "Display CO" LED feature is invoked on either H4TU-C-1.5A or H4TU-C-1 units.

### DS1 input (OUT) and output (IN) bridging (BRG) jacks

Provides non-intrusive test access.

### 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 H4TU-R craft port.

### Extraction handle

Use to remove the H4TU-R-402 from its slot.

### Maintenance Terminal Modem Settings

9600 baud  
8 data bits  
No parity  
1 stop bit  
Hardware flow control: OFF  
Terminal emulation: VT100

\*Chassis Ground may be tied to earth ground per local practice.  
Note: Active pins are highlighted in black.

## 2 VERIFICATION

Once the H4TU-R is installed, verify that it is operating properly by monitoring the Status LEDs on the front panel.

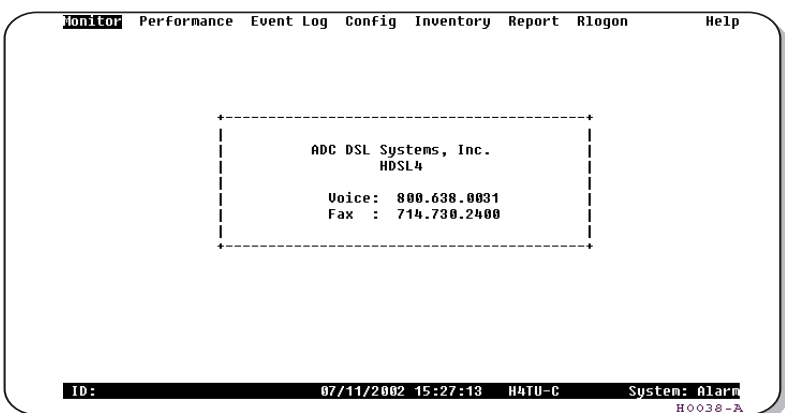
*Table 1. LED Status and Functions*

| LED/Status                       | Function  |
|----------------------------------|---|
| <b>DSL1</b>                      |   |
| OFF                              | No power is applied to the H4TU-R.  |
| Solid green                      | Loop 1 connected to the H4TU-R has synchronized without error.              |
| Flashing red once every second   | Loop 1 of the H4TU-R is in acquisition.                                     |
| Solid red                        | Loop 1 connected to the H4TU-R detects HBER or MARG alarms.                 |
| Flash red once every two seconds | Download session in progress.   |
| <b>DSL2</b>                      |   |
| OFF                              | No power is applied to the H4TU-R.  |
| Solid green                      | Loop 2 connected to the H4TU-R has synchronized without error.              |
| Flashing red once every second   | Loop 2 of the H4TU-R is in acquisition.                                     |
| Solid red                        | Loop 2 connected to the H4TU-R detects HBER or MARG alarms.                 |
| Flash red once every two seconds | Download session in progress.   |
| <b>ALM</b>                       |   |
| OFF                              | Normal operation: the DS-1 signal is present at both the H4TU-R and H4TU-C. |
| Solid yellow                     | LLOS is present at the H4TU-C.  |
| Solid red                        | RLOS is present at the H4TU-R.  |
| <b>DS1</b>                       |   |
| Solid green                      | Normal operation: the DS1 signal at the H4TU-R is error free.               |
| Solid red                        | RLOS, BPV, frame error, or CRC is detected at the H4TU-R.                   |
| <b>ESF/SF</b>                    |   |
| OFF                              | Unframed DS1 present at the H4TU-R or no DS1 is detected at the H4TU-R.     |
| Solid yellow                     | ESF frame formatting is present at the H4TU-R.                              |
| Flashing yellow once per second  | ESF frame formatting and frame error/CRC are present at the H4TU-R.         |
| Solid green                      | SF frame formatting is present at the H4TU-R.                               |
| Flashing green once per second   | SF frame formatting and frame error are present at the H4TU-R.              |
| <b>B8ZS/AMI</b>                  |   |
| OFF                              | No DS-1 signal is present at H4TU-R.  |
| Solid yellow                     | B8ZS line code is provisioned at the H4TU-R.                                |
| Flashing yellow once per second  | B8ZS and excess zeros string are present at the H4TU-R.                     |
| Solid green                      | AMI line code is provisioned at the H4TU-R.                                 |
| Flashing green once per second   | AMI and BPV are present at the H4TU-R.                                      |
| <b>RLB/LLB</b>                   |   |
| OFF                              | H4TU-R is not ARMed or in loopback.   |
| Solid yellow                     | H4TU-C is looped back toward the network or customer.                       |
| Flashing yellow once per second  | System is ARMed.  |
| Solid green                      | H4TU-R is looped back toward the network or customer.                       |

## 3 LOGGING ON TO THE MAIN MENU

The H4TU-R 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 H4TU-R front panel.

Logging on creates menus and screens for the H4TU-R that are replications of those viewed at the H4TU-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.

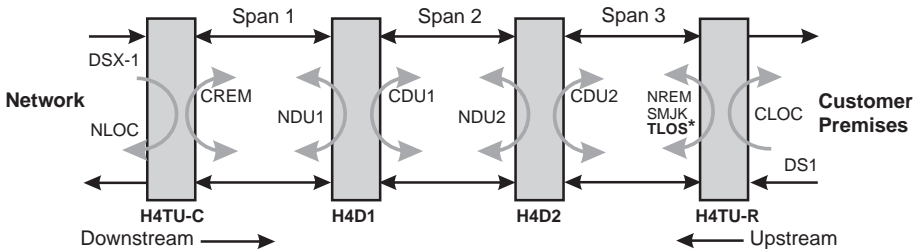
| Type the first letter   | To view:   |
|-------------------------|--|
| <b>M</b> onitor         | A graphical representation of circuit activity and devices.  |
| <b>P</b> erformance     | Performance history statistics (current, 25-hour, 48-hour, 31-day, and blockage indicator) at DS1 and HDSL4 interfaces. 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 H4TU-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> ogon           | Maintenance terminal screens at the H4TU-C.  |
| <b>H</b> elp            | Glossary, screen navigation keys, ADC contact information.   |
| <b>R</b> ep <b>O</b> rt | Downloading status and performance monitoring data to file.  |



**For more information about the HiGain HDSL4 maintenance screens, refer to the user manual of the H4TU-C line unit. Copies of user manuals can be downloaded from the ADC website at [www.adc.com](http://www.adc.com). To order a hard copy, please contact your sales representative.**

## 4 LOOPBACK TESTING

Initiate loopbacks with the H4TU-R loopback pushbuttons, the H4TU-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 on loopbacks, refer to the user manual for the H4TU-C line unit.



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

H0068-A

### Loopback Commands

| Loopback | Inband Code | Description  |
|----------|-------------|--|
| NLOC     | 1111000     | DSX-1 signal is looped back to the network at the H4TU-C.                  |
| NREM     | 1110000     | DSX-1 signal is looped back to the network at the H4TU-R.                  |
| SMJK     | 11000       | DSX-1 signal is looped back to the network at the H4TU-R SmartJack module. |
| CREM     | 1111110     | DS1 signal from customer is looped back to the customer at the H4TU-C.     |
| CLOC     | 1111100     | DS1 signal from customer is looped back to the customer at the H4TU-R.     |
| 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-60950/CSA C22.2 No. 60950-00: Safety of Information Technology Equipment.

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## World Headquarters

ADC Telecommunications, Inc.  
PO Box 1101  
Mineapolis, MN 55440-1101 USA

## For Technical Assistance

Tel: 800.366.3891



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