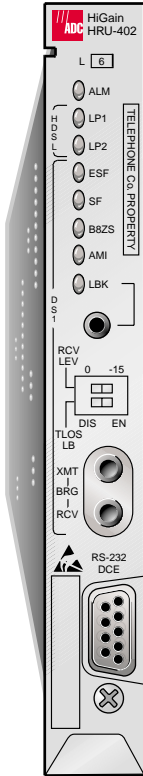


Quick Installation Guide



HRU-402 List 6 Remote Unit

HRU-402 List 6

The ADC® HiGain® Remote Unit, HRU-402 List 6, is the customer-premises side of a repeaterless T1 transmission system. The system provides 1.544 Mbps transmission on two unconditioned copper pairs over the full Carrier Service Area (CSA) range. Enhanced firmware allows the HRU-402 List 6 to be deployed in Soneplex Wideband 3190 protection switching applications. These applications have the following system requirements: two HXU-358 Multiplexers (software version 1.04 or higher), an HMU-319 List 7A or List 7C Management Unit (software version 3.06 or higher), an HLU-319 List 6 Line Unit, and an HRE-206 Remote Enclosure equipped with a PSC-606 Protection Switching Controller.

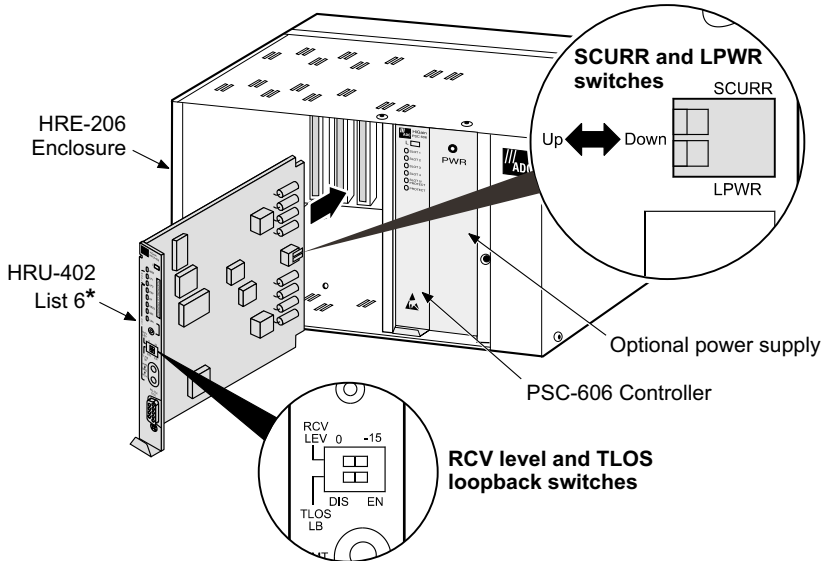
FEATURES

-
- 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 connection for viewing maintenance terminal screens
 - Supports automatic protection switching (APS)
 - Supports up to five spans
 - Generic and addressable repeater loopback activation codes
 - Lightning and power cross-protection on HDSL and DS1 interfaces
 - DS1 transmit and receive monitor jacks for testing
 - Supports line and local power applications
 - Remote provisioning
 - Ultra-low wander
-

SPECIFICATIONS

Operating Temperature	-40 °F to +149 °F (-40 °C to + 65 °C)
Operating Humidity	5% to 95% non-condensing
Power Consumption	3.1 W (when connected to HLU-231 List 8x, HLU-319 List 5x, or HLU-388 List 5x; 4.5W when connected to all other line units.) Line powered: 5.2 W (sealing current on) Locally powered: 4.1 W (sealing current off)
Electrical Protection	Secondary surge and power cross-protection on all DS1 and HDSL2 ports
Mounting	Narrow 200 mechanics shelf (half-width 400 mechanics)
HDSL Line Code	784 kbps 2B1Q full duplex
HDSL Output	+13 dBm ±0.5 dBm, 135 Ω
DS1 Pulse Output	0 dB, -7.5 dB, -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), Bipolar with 8-zero Substitution (B8ZS) or Zero Byte Time Slot Interchange (ZBTSI)
DS1 Frame Format	Extended SuperFrame (ESF), SuperFrame (SF) or THRU (unframed)

1 INSTALLATION



* The HRU-402 List 6 installs in slots 5 and 6 for 1+1 APS and in slot 6 for 1+n APS. The PSC-606 Controller installs in slot 7.

- 1 Set the DS1 RCV LEV and TLOS loopback switches. These switches set the DS1 receive line buildout level toward the Customer Interface (CI).

Switch 1 (RCV LEV)	0	Default setting. Sets the DS1 receive level toward the CI to 0 db.
	-15	Sets the DS1 receive level toward the CI according to -15 db.
Switch 2 (TLOS)	ENA	Default setting. Enables the TLOS loopback option.
	DIS	Disables the TLOS loopback option.

- 2 Set the S1 switches (SCURR and LPWR) adjacent to the card-edge connector.

SCURR (see note)	Disable (up position)	Default setting. Disables the flow of simplex sealing current towards the upstream unit.
	Enable (down position)	Enables the flow of simplex sealing current towards the upstream unit.
LPWR	Line power (up position)	Default setting. Configures the HRU-402 List 6 to receive power from the upstream line unit over the HDSL pairs.
	Local power (down position)	Configures the HRU-402 List 6 to receive power from a local -48V supply.



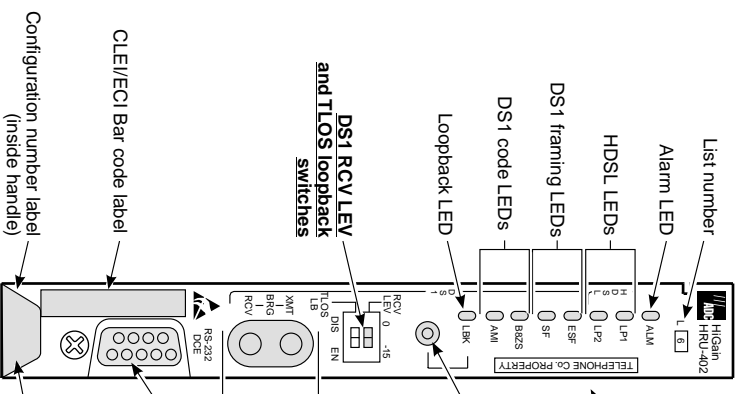
Enable the SCURR switch if you are using the following doublers: HDU-404, HDU-407, HDU-409, HDU-437, HDU-439 List 1 or 1B, HDU-451 List 4 or 4B. Disable the SCURR switch if you are using an HDU-451 Lists 1, 2, 3, or 3B.

Continued



Card-Edge Connector

56	<input type="checkbox"/>	55	DS1 Tip	} XMT
54	<input type="checkbox"/>	53		
52	<input type="checkbox"/>	51		
50	<input type="checkbox"/>	49	DS1 Ring	} RCV
48	<input type="checkbox"/>	47	HDLSL2 Ring1	
46	<input type="checkbox"/>	45		
44	<input type="checkbox"/>	43		} -48 Vdc Local Power
42	<input type="checkbox"/>	41	HDLSL2 Tip 1	
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*	
26	<input type="checkbox"/>	25		} (+)
24	<input type="checkbox"/>	23		
22	<input type="checkbox"/>	21		
20	<input type="checkbox"/>	19	Factory Use Only	} (+)
18	<input type="checkbox"/>	17	Circuit Ground	
16	<input type="checkbox"/>	15	DS1 Ring1	
14	<input type="checkbox"/>	13	HDLSL1 Ring	} RCV
12	<input type="checkbox"/>	11		
10	<input type="checkbox"/>	9		
8	<input type="checkbox"/>	7	HDLSL1 Tip	} XMT
6	<input type="checkbox"/>	5	DS1 Tip1	
4	<input type="checkbox"/>	3		
2	<input type="checkbox"/>	1	Chassis Ground*	



S1 switches (SCURR and LPWR)
Located next to card-edge connector. See step 2 (Installation) for more information

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 inbound messages.

DS1 transmit (XMT) and receive (RCV) bridging jacks
For 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 HKU craft port.

Modern settings:
1200-9600 baud
8 data bits
No parity
1 stop bit
Hardware flow control: OFF
Terminal emulation: VT-100

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

INSTALLATION (Continued)

- If provisioning for 1+1 APS, install two HRU-402 List 6 remote units: one in slot 5 of the HRE-206 enclosure and another in slot 6. If provisioning for 1+n APS, install one HRU-402 List 6 in slot 6 of the HRE-206.



For more information about APS and complete provisioning instructions, see the PSC-606 Protection Switch Controller technical practice, catalog number LTPH-TP-1006-01.

2 VERIFICATION

Once the HRU-402 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 a Loss of Signal (LOS) condition at the T1 input of the HRU.
Blinking	Indicates a LOS condition at the T1 input of the line unit.
HDSL LED	Displays HDSL Loop 1 (LP1) and Loop 2 (LP2) conditions.
Solid green	Indicates HDSL loop is 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 on the HDSL loop.
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)^(a)	Indicates framing patterns. If DS1 signals are not detected, the ESF and SF LEDs will not light.
ESF LED = Solid green	Indicates Extended Super Frame (ESF). The LED blinks once per second when a frame error occurs.
SF LED = Solid green	Indicates Super Frame (SF). The LED blinks once per second when a frame error occurs.
OFF	Indicates unframed or no signal.
DS1 Code LEDs (B8ZS and AMI)^{(a) (b)}	Indicates DS1 code options. If DS1 signals are not detected, the B8ZS and AMI LEDs will not light.
B8ZS LED = Solid green	Indicates that the DS1 line code option is set to Bipolar with 8-Zero Substitution (B8ZS). 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 Alternate Mark Inversion (AMI). 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 (NREM), SmartJack (SMJK), or Transmit Loss of Signal (TLOS) loopback.
Blinking once per second	Indicates Customer Local (CLOC) loopback state.
Blinking 4 times per second	Indicates the HRU is in an Armed state.

(a) If DS1 signals are not detected the ESF, SF, B8ZS and AMI LEDs do not light.

(b) Auto option indicates when the DS1 code is being detected as AMI or B8ZS. This option is not available with HLU-231 List 8D and List 8E, HLU-319 List 5D and List 5E, or HLU-388 List 5D and List 5E.

3 LOGGING ON TO THE MAIN MENU

The HRU-402 List 6 supports local and remote logon through a maintenance terminal (VT100 or a PC running VT100 terminal-emulation software) connected to the front-panel craft port. Remote login creates menus and screens for the HRU-402 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:

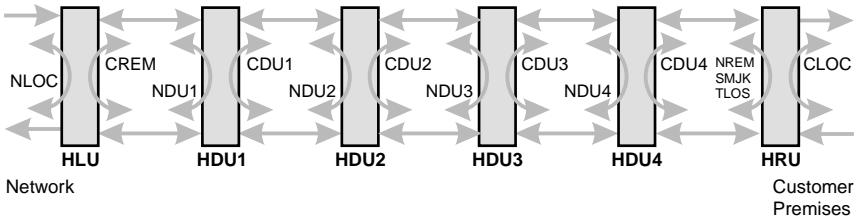
- 1 Press the **SPACEBAR** several times to display the Remote Login screen.
- 2 Press the **ENTER** key to view the HiGain Maintenance Terminal Screen. The Remote Terminal Main Menu items are replications of the line unit screens. Depending on the HLU attached to the HRU-402, remote provisioning may be available. Refer to the HLU technical practice for details.



For more information about the HiGain maintenance screens, refer to the technical practice for the HiGain line unit used in your system. Contact Customer Service to obtain a copy.

4 LOOPBACK TESTING

Initiate loopback testing from the maintenance terminal menus or by using inband codes. The inband codes shown below can be sent by a test set. For more information, refer to the technical practice for the HLU line unit.



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	1111100	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.

COMPATIBILITY

The HRU-402 List 6 is compatible with the following HiGain products for non-APS applications:

Line Units	Doublers	Indoor Enclosures	Outdoor Enclosures
HLU-231 List 8x	HDU-404	HRE-204	HRE-450
HLU-319 List 5x	HDU-407	HRE-206	HRE-454
HLU-388 List 5x	HDU-409	HRE-420	
HLU-200	HDU-437	HRE-422	
HLU-432 List 1	HDU-439 List 1 or 1B	HRE-425	
	HDU-451 List 4 or 4B	HRE-427	
		200 mechanics shelves	
		400 mechanics shelves	

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

The HRU-402 List 6 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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