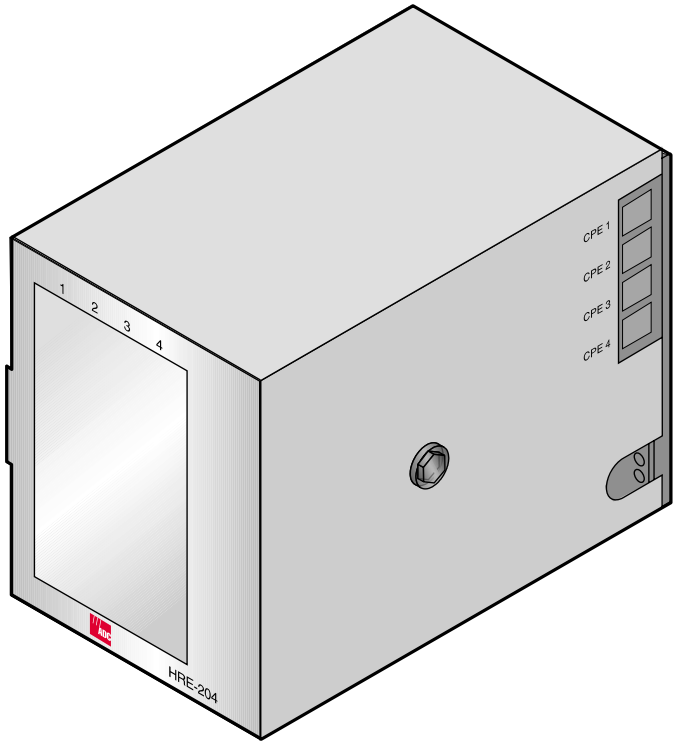
HiGain

USER MANUAL



HRE-204 List 1 and List 2
HiGain Remote Enclosure
Product Catalog: 150-204-100-03
CLEI: T1MF5004, T1MF6004

Revision History of This Manual

To order copies of this document, use document catalog number 150-204-100-03.

Issue	Release Date	Revisions Made
1	February 12, 1999	Initial release
2	May 7, 1999	Added optional wall mount hinge
3	February 18, 2002	ADC Rebranding

USING THIS MANUAL

Notes contain information about special circumstances.

Cautions indicate the possibility of personal injury or equipment damage.

The Electrostatic Discharge (ESD) symbol indicates that a device or assembly is susceptible to damage from electrostatic discharge.

INSPECTING SHIPMENT

Upon receipt of the equipment:

- Unpack each container and inspect the contents for signs of damage. If the equipment has been damaged in transit, immediately report the extent of damage to the transportation company and to ADC DSL Systems, Inc. Order replacement equipment, if necessary.
- Check the packing list to ensure complete and accurate shipment of each listed item. If the shipment is short or irregular, contact ADC DSL Systems, Inc. as described in Product Support on page 19. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

This document describes the ADC® HiGain® Remote Enclosure HRE-204 List 1 and List 2. The HRE-204 List 1 and List 2. List 1 and List 2 house HiGain Line Units (HLUs) and remote units (HRUs). The HRE-204 List 1 and List 2 List 1 has RJ48C DS1 connectors, and the HRE-204 List 1 and List 2 List 2 has RJ48X connectors.

FEATURES

The HRE-204 List 1 and List 2 List 1 and List 2 provide the following features:

- four 200 mechanics or two 400 mechanics slots
- optional RJ48C (List 1) or RJ48X (List 2) modular jack for DS1 customer interface connections
- printed-circuit backplane provides terminal block or RJ48 connectors
- tamper-proof locking screw for security
- accepts 48 V input power for HLU applications
- wall or desktop mounting
- separate 48 V input terminals for slot isolation
- optional wall hinge mount
- pre-painted, cold-rolled, #16 gauge steel construction

APPLICATIONS

HiGain provides a quick and cost-effective way of delivering T1 High Capacity Digital Service (HCDS) to customers over metallic cable pairs. The primary application of the HRE-204 List 1 and List 2 Remote Enclosure is to house the remote units of a HiGain repeaterless T1 transmission system.

Because the HRE-204 List 1 and List 2 uses standard 200 and 400 mechanics slots, it can accommodate any plug with 200 or 400 mechanics, including the HiGain HRU-412, HRU-411, and HRU-402 remote units and the HLU-431 line unit.

BACKPLANE

Figure 1 shows the HRE-204 List 1 and List 2 backplane. Table 1 on page 3 describes its connectors.

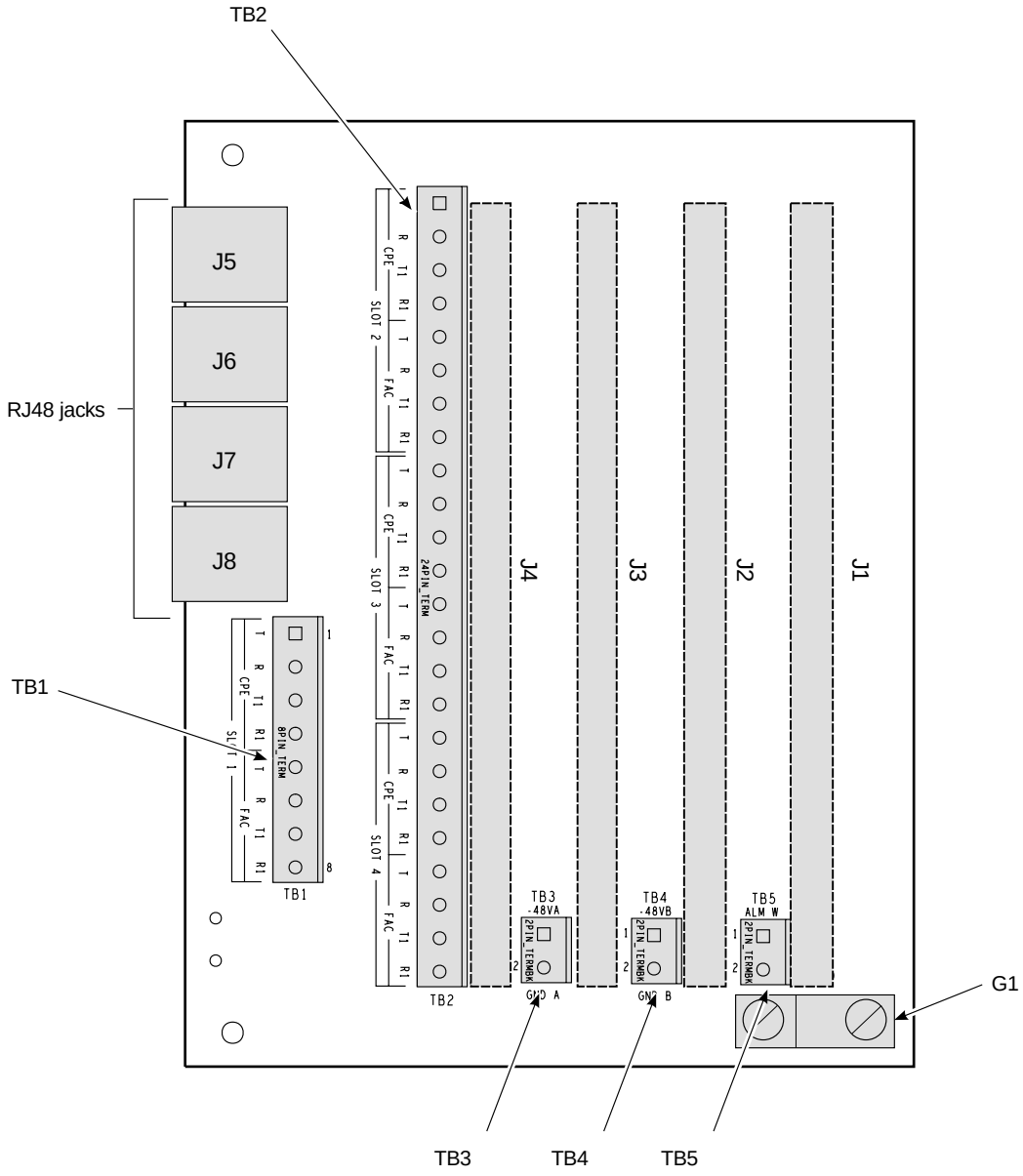


Figure 1. *HRE-204 List 1 and List 2 Backplane*

Table 1. *Backplane Connectors*

Connector(s)	Function
J5 through J8	RJ48C CPE jacks (List 1) or RJ48X jacks (List 2)
TB1	Terminal block connector for Slot 1 CPE (DS1) and FAC (HDSL) interfaces
TB2	Terminal block connector for Slots 2, 3, and 4 CPE and FAC interfaces
TB3	Terminal block connector for providing 48VA and GND A power connections to Slots 1 and 2
TB4	Terminal block connector for providing 48VB and GND B power connections to Slots 3 and 4
TB5	Terminal block connector for HLU alarm output interface
G1	Frame ground lug

Figure 2 shows the backplane wiring connections to all four slots.

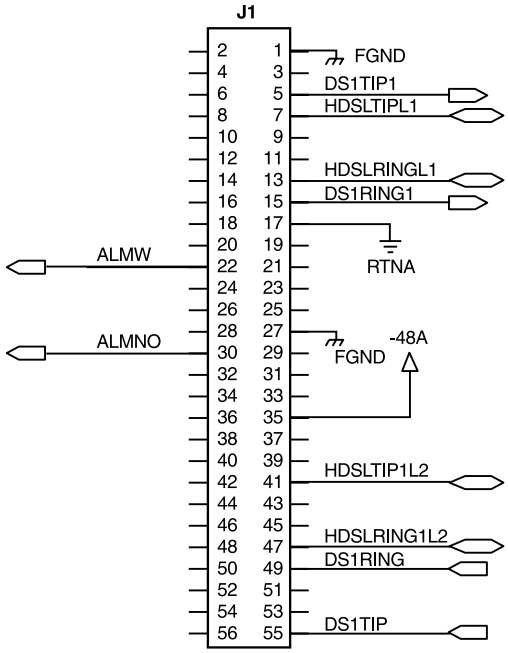


Figure 2. *Backplane Slot Connections*

SLOT CONNECTORS

Figure 3 shows the front view of the four slot connectors, J1 through J4. These slots are for installing HiGain Line Units and HiGain Remote Units.

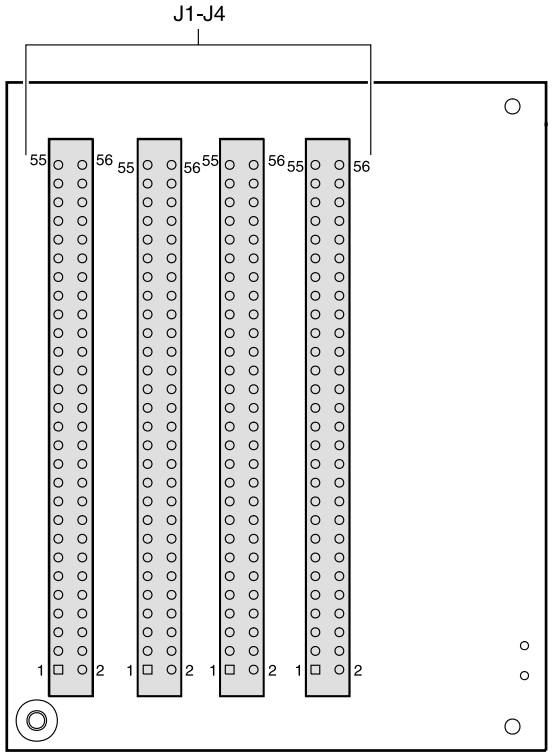


Figure 3. *HRE-204 List 1 and List 2 Remote Enclosure*

INSTALLATION

This section provides information on installing and mounting the HRE-204 List 1 and List 2 List 1 and List 2.

INSTALLATION KIT

- two mounting screws
- two anchor nuts

MOUNTING OPTIONS

The HRE-204 List 1 and List 2 is suitable for mounting on a desktop or on a wall. Before setting up the equipment, select a location that will provide appropriate security.

Regardless of where the HRE-204 List 1 and List 2 is mounted, ADC recommends that the frame ground lug be connected to earth ground according to the grounding recommendations found in Section 9 of Bellcore's GR-1089-DEC, 1996. See "Power and Grounding" on page 9 for more information.

Desktop Mounting

The remote enclosure includes four inverted dimples in the bottom plate for desktop mounting. The dimples create an air gap between the bottom of the enclosure and the surface of the desk. This prevents overheating by providing air flow through the enclosure. Do not block the air flow from the bottom of the unit.

Wall Mounting

To mount the enclosure on a wall, loosen the backplate and use it as a template for the two mounting holes as follows:

1 Loosen the 216 HEX security nut on the side panel (Figure 4) with a $^{7}/_{16}$-inch CAN wrench.

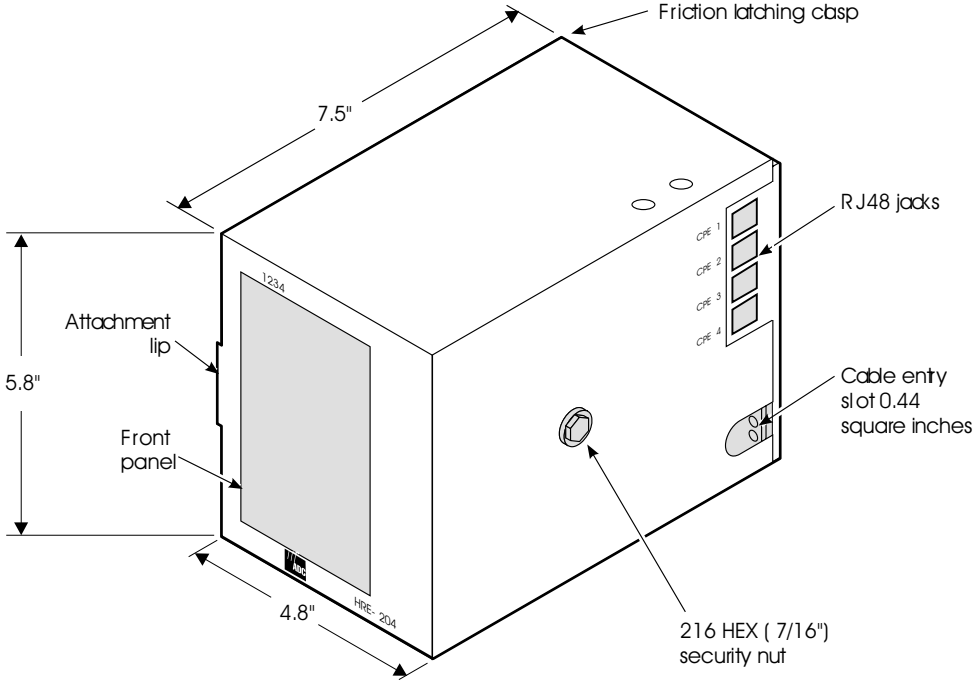


Figure 4. *Side Panel Assembly*

2 Remove the side panel.

3 Remove the top retaining screw that holds the backplate to the chassis.

4 Grip the top of the rear panel, which is held in place with corner friction clasps, and unlatch it from the enclosure.

5 Use the backplate as a template to mark the wall locations for drilling the mounting holes (Figure 5).

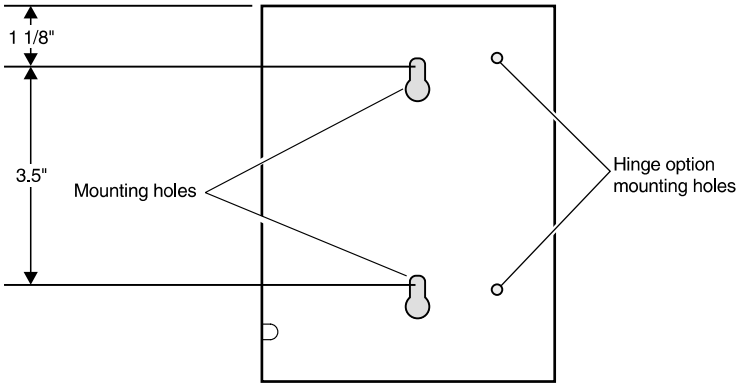


Figure 5. *HRE-204 List 1 and List 2 List 1 Backplate*

6 Drill pilot holes and attach the backplate to the backboard with the two No. 10 x 5/8-inch sheet metal screws and washers supplied with the remote enclosure.

7 Rotate the main chassis up and snap it into the backplate friction clasps (Figure 6).

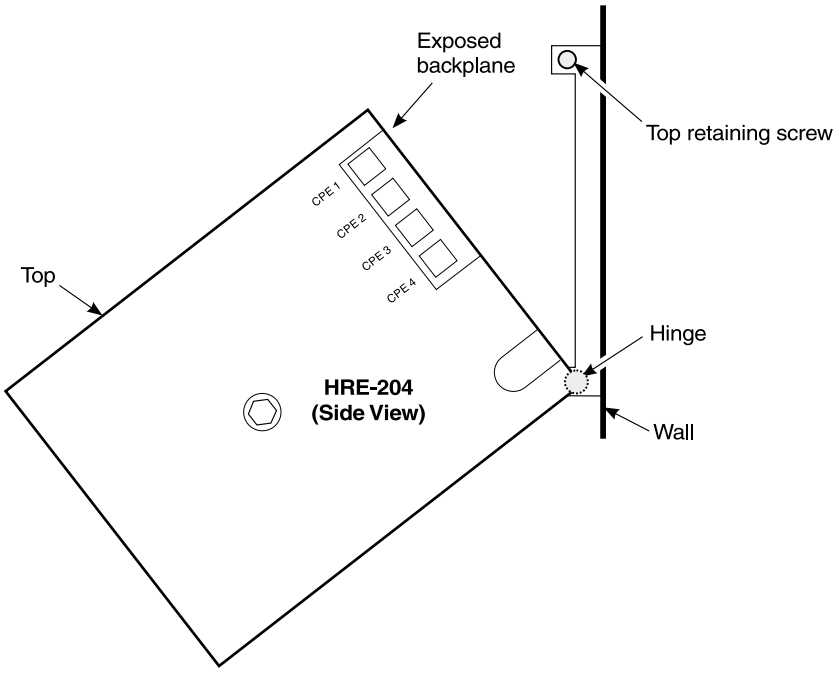


Figure 6. *Wall Mounting and Hinging View*

8 Reattach the side panel and tighten the 216 HEX security nut to secure it to the main chassis.

When the main chassis is attached to the backplate, it can be rotated down to provide access to the backplane connector and other internal areas. Unlatch the chassis from the two friction clasps in the upper corner of the backplate to lower it. See Figure 6 for hinging details.

Optional Hinged Wall Mounting

To reduce the forward profile of the normal wall mounted HRE-204 List 1 and List 2, a wall mount hinge assembly, part number 150-2224-01, is available to attach the side of the unit flush to the wall. This reduces the outward projection from 7.5 inches to 4.8 inches.

1 Use the hinge as a template to mark the wall location for drilling the mounting holes.

2 Drill pilot holes and attach the hinge to the wall with the two No. 10 x $^{5}/_{8}$-inch sheet metal screws supplied with the hinge assembly.

3 Use the two 6-32 x $^{1}/_{4}$ machine screws, also supplied with the hinge assembly to attach the hinge to the two mounting holes on the HRE-204 List 1 and List 2 backplate, as shown in Figure 7.

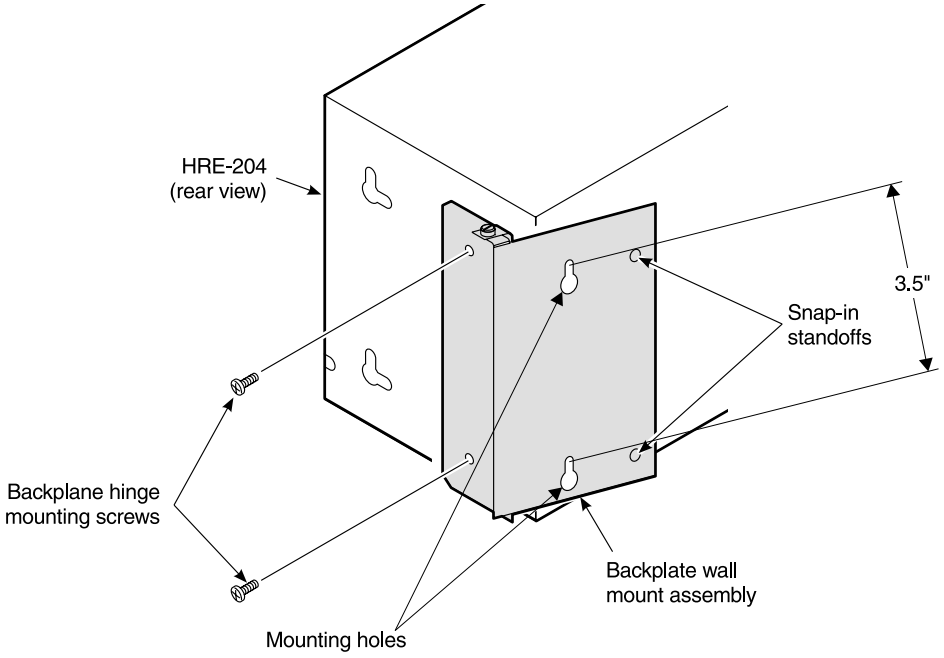


Figure 7. *Optional Mounting Hinge*

4 The two snap-in standoffs on the hinge bracket fit into two mounting holes in the HRE-204 List 1 and List 2 side panel when the enclosure is closed against the hinge. This secures the HRE-204 List 1 and List 2 to the hinge and prevents normal vibration from jarring it loose.

TURN-UP

Follow these steps to complete the turn-up procedure:

1 Loosen the 216 HEX security nut on the side panel (Figure 4 on page 5) with a $^{7}/_{16}$-inch CAN wrench.

2 Remove the side panel from the chassis to expose the card slots.

3 Insert the card in the assigned slots and refer to the card's technical practice for the appropriate turn-up procedure.

If you are using the HRE-204 List 1 and List 2 to locally power one or more HRUs or HLU-431 Line Units, see "48 Volt Power Options" on page 9. If you install an HLU-431 Line Unit into the HRE-204 List 1 and List 2, see "HLU Alarm Output Interface" on page 14 for information about the alarm output interface.

POWER AND GROUNDING

The chassis frame and pins 1 and 17 (slot frame ground) of each slot are connected to the HRE-204 List 1 and List 2 ground lug G1, located on the backplane, as shown in Figure 1 on page 2. ADC recommends that the frame ground lug be connected to earth ground according to the grounding recommendations found in Section 9 of Bellcore's GR-1089-DEC, 1996.

Failure to properly ground the enclosure can cause unsafe voltage levels to occur which can result in the following adverse situations:

- **a shock hazard to craft personnel who come into contact with the enclosure**
- **damage to the installed circuits if the normal discharge path to earth ground of the enclosure's secondary surge voltage protection components is missing**
- **bit errors due to the inability of the ungrounded enclosure to attenuate the noise inducing energy from stray EMI fields**
- **bit errors due to crosstalk from adjacent communication equipment.**

In certain unusual noise environments, it may be necessary to connect the HRU's circuit ground pin 17 to frame ground pin 1 of the card-edge connector to remove bit errors from the T1 payload.

48 VOLT POWER OPTIONS

When using the HRE-204 List 1 and List 2 to locally power HRU plugs or HLU-431 line units, the 48 V power can be provided in either an isolated or non-isolated mode. Power is provided to terminal blocks TB3 and TB4, the pin assignments for which are shown in Figure 8 on page 10.

The isolated mode requires two separate external power supplies, which are connected to TB3 for Slots 1 and 2, and to TB4 for Slots 3 and 4. This isolated mode prevents the loss of all circuits if one power supply fails.

The non-isolated mode only uses one power supply, but has no failsafe feature, since all circuits are lost if the power supply fails. To connect a single power supply for non-isolated mode:

1 Connect the power supply to either TB3 or TB4.

2 Connect the equivalent pins of the unused terminal block to the active terminal block. This connects the power source to all slots.

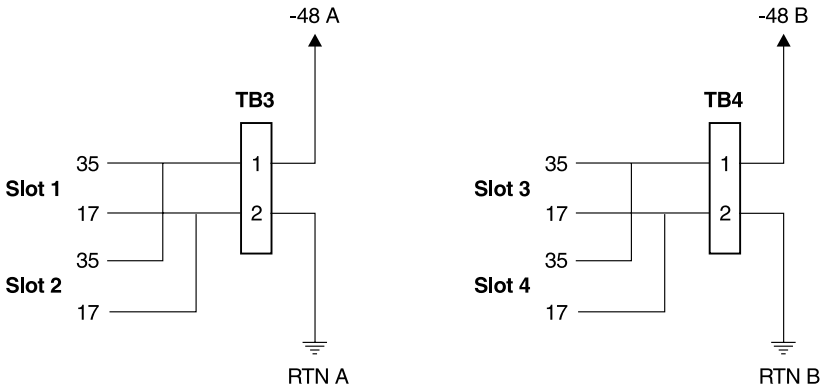


Figure 8. *TB3 and TB4 Pin Assignments*

Third party wall mount power supplies can be used to provide 48 V power for various plug applications, as shown in Table 2.

Table 2. *Power Requirements for Various Plug Applications*

HiGain Unit	Maximum power per unit	Number of units	Power Required (mA)	Power supply	Input Power AWG Wire Size* (Two Inputs)	(One Input)
HRU-402	3.5 Watts	1	73	Westell 6048-01 (100 ma)	26	26
		1, 2, or 3	210	Teltrend 2005 (250 ma)	26	26
		4	300	Troncom WPS-4806 (520 ma)	26	26
HRU-412	6 Watts	1	125	Teltrend 2005	26	26
		2	250	Troncom WPS-4806	26	26
HLU-431 (no doublers)	14 Watts	1	300	Troncom WPS-4806	26	26
		2	600	Troncom WPS-4810	26	22
HLU-431 (with doublers)	24 Watts	1	500	Troncom WPS-4806	26	22
		2	1000	Troncom WPS-4810	22	20

* Minimum input power lead wire size current capacity is based on 1000 circular mils per ampere.

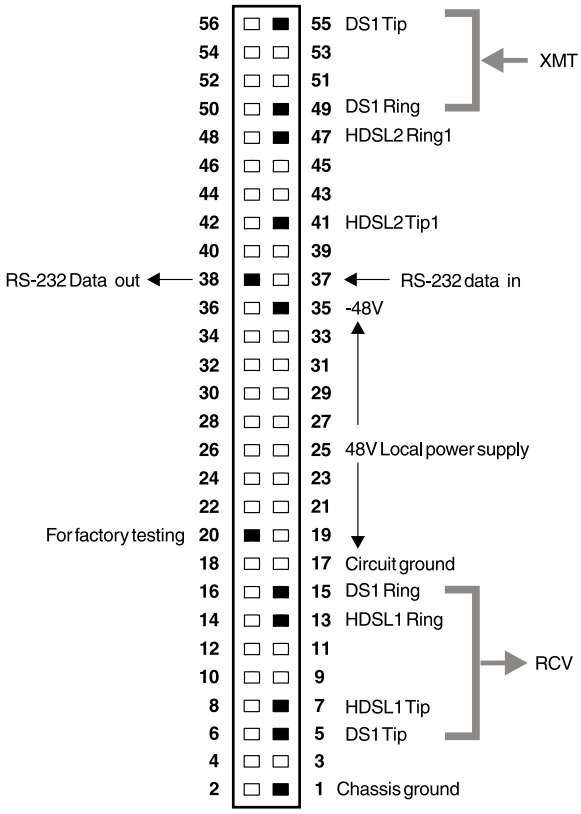
PIN ASSIGNMENTS

The following sections show the connector pin assignments of the HiGain plugs which are compatible with the HRE-204 List 1 and List 2.

SLOT PIN ASSIGNMENTS

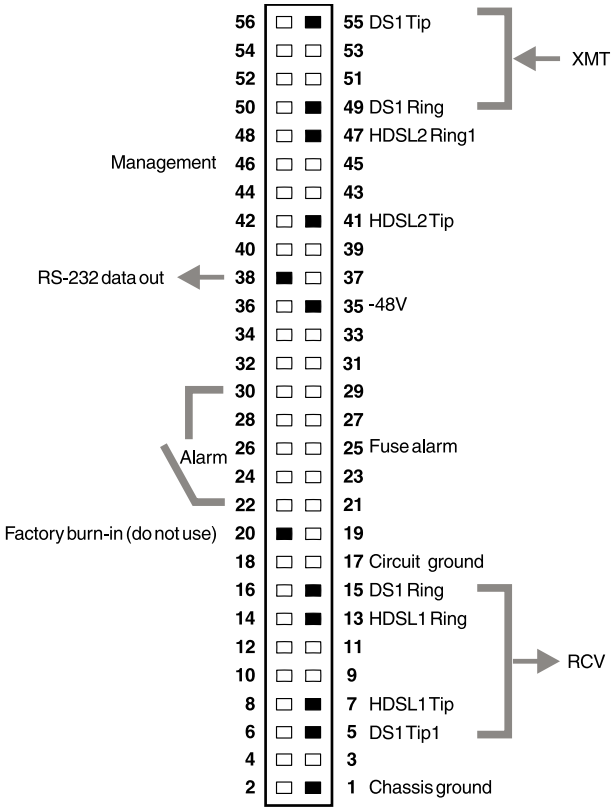
Slot pin assignments for the various plugs compatible with the HRE-204 List 1 and List 2 are shown in the following figures:

- Figure 9
- Figure 10 on page 12
- Figure 11 on page 13



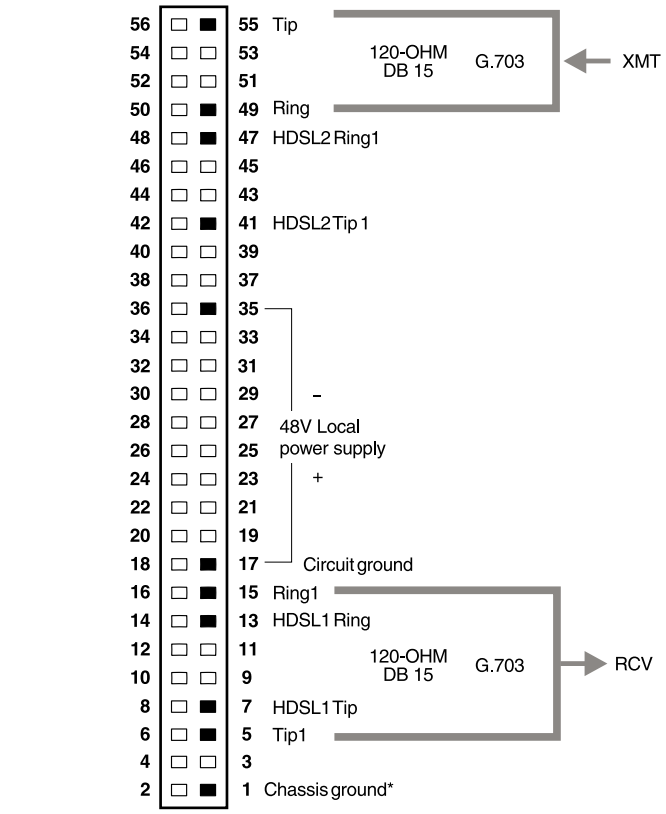
Note: Active pins are represented in solid black.

Figure 9. *HRU Pin Assignments (All Lists)*



Note: Active pins are highlighted in black.

Figure 10. *HLU-431 Pin Assignments*



Note: Active pins are represented in solid black.

Figure 11. *ERU-412 Pin Assignments*

If you are installing HiGain-ETSI remote units in the HRE-204 List 1 and List 2, use only the 120Ω G.703 ERU. The 75 Ω G.703 ERU should not be used. The 75 Ω interface requires BNC connectors that are not available in the HRE-204 List 1 and List 2.

HLU ALARM OUTPUT INTERFACE

When HLU-431 line units are installed in the HRE-204 List 1 and List 2, the system alarm relay contacts for each slot, Normally Open (NO) and Common (COM), are bused together and made available on the Euro style terminal block TB5. Figure 12 shows the TB5 pin assignments.

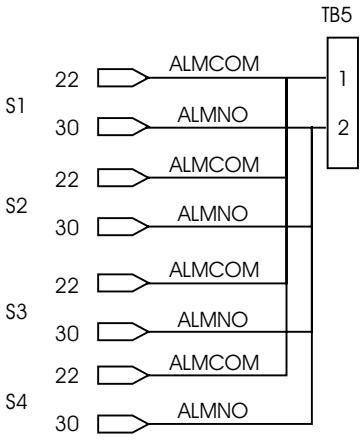


Figure 12. *System Alarm (TB5) Pin Assignments*

FACILITY SIDE HDSL CONNECTIONS

The HDSL facility side ports are available through the FAC ports of the Euro style screw-down terminal blocks. Figure 13 shows the pin assignments for TB1 (Slot 1), and Figure 14 shows the TB2 pin assignments (Slots 2, 3, and 4).

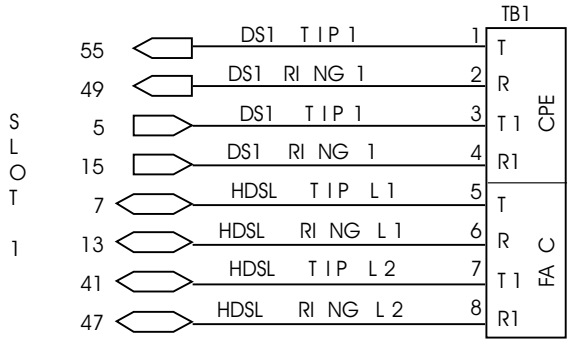


Figure 13. *TB1 Pin Assignments*

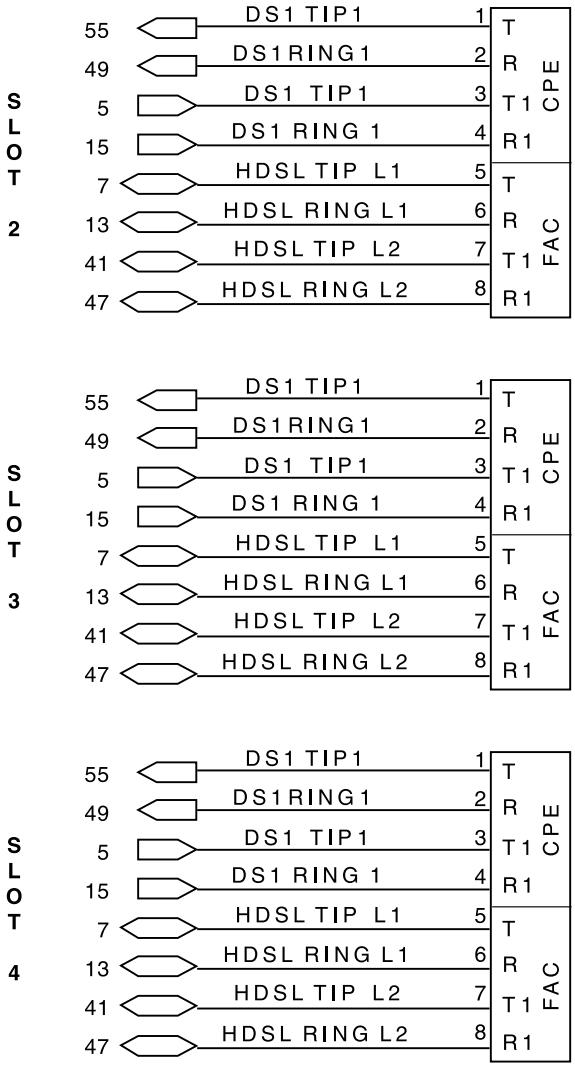


Figure 14. *TB2 Pin Assignments*

Loop 1 connects to the Tip and Ring leads. Loop 2 connects to the Tip1 and Ring1 leads. To locate the appropriate connector, see the pin assignment representations in "Slot Pin Assignments" on page 11.

If the Loop 1 and Loop 2 leads are reversed, a CHREV (Channels Reversed) message is displayed in the ALARMS display field when viewing the HiGain Status screen. This condition does not affect system operation, but should be corrected to avoid any confusion regarding the identities of the two HDSL loops.

CPE DS1 (G.703) CONNECTIONS

The DS1 (G.703) XMT and RCV interfaces are available at either the Euro style terminals, CPE1 (J5) through CPE4 (J8), where XMT = Tip and Ring, RCV = Tip1 and Ring1, or the RJ48 jacks, as shown in Figure 1 on page 2. Figure 15 shows the pin assignments for the RJ48C jack. Figure 16 shows the RJ48X pin assignments.

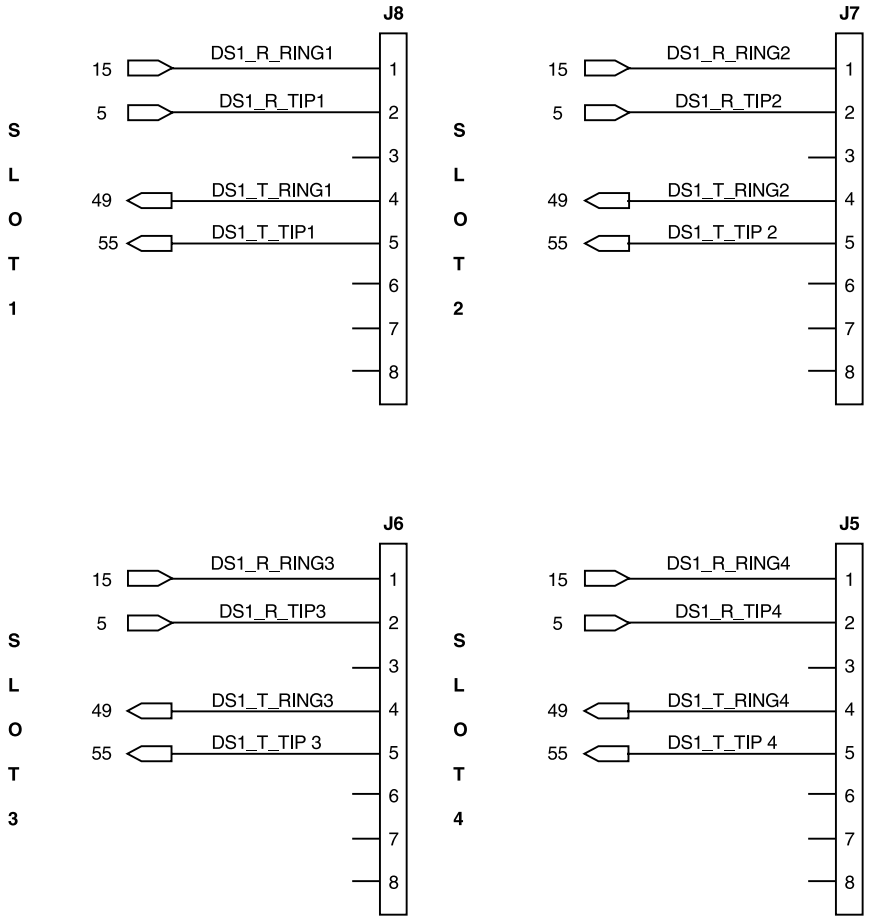


Figure 15. *RJ48C Pin Assignments (List 1)*

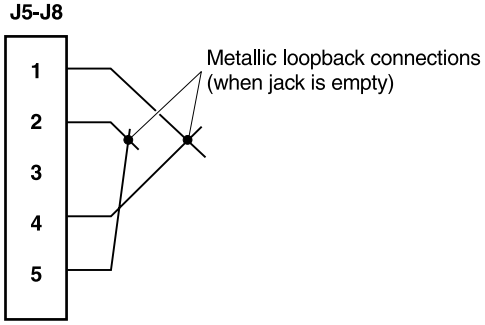


Figure 16. *RJ48X Pin Assignments (List 2)*

APPENDIX A - SPECIFICATIONS

Mounting	Four type 200 or two type 400 mechanics plugs
Telco Facility	Euro style terminal blocks
CPE	RJ48 Connector Options: RJ48C (List 1) RJ48X (List 2)
Power Supply Option	See "48 Volt Power Options" on page 9
Height	5.8 in. (15 cm)
Width	4.8 in. (12 cm)
Depth	7.5 in. (19 cm)
Weight	3.0 lb (1.4 kg)
Operating Environment	Temp: 0 °F to +158 °F (-18 °C to 70 °C) Humidity: 0 to 95% non-condensing

APPENDIX B - ABBREVIATIONS

Abbreviations used throughout this manual are defined below:

ANSI	American National Standards Institute
AWG	American Wire Gauge
CLEI	Common Language Equipment Identifier
CO	Central Office
CP	Customer Premises
ECI	Equipment Catalog Item
EDU	HiGain E1 Doubler Unit
EMI	ElectroMagnetic Interference
ETSI	European Telecommunications Standards Institute
HCS	HiGain Card Shelf
HDU	HiGain T1 Doubler Unit
HRE	HiGain Remote Enclosure
ICEA	Insulated Cable Engineers Association
LED	Light Emitting Diode
REA	Rural Electrification Administration
RMA	Return Material Authorization

APPENDIX C - PRODUCT SUPPORT

ADC Customer Service Group provides expert pre-sales and post-sales support and training for all its products.

Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center (TAC).

Sales Assistance 800.366.3891 extension 73000 (USA and Canada) 952.917.3000 Fax: 952.917.3237	• Quotation Proposals • Ordering and Delivery • General Product Information
Systems Integration 800.366.3891, extension 73000 (USA and Canada) 952.917.3000	• Complete Solutions (from concept to installation) • Network Design and Integration Testing • System Turn-Up and Testing • Network Monitoring (upstream or downstream) • Power Monitoring and Remote Surveillance • Service/Maintenance Agreements • Systems Operation
ADC Technical Assistance Center 800.366.3891, ext.73223 800.638.0031 714.730.3222 Fax: 714.730.2400 Email: wsd_support@adc.com	• Technical Information • System/Network Configuration • Product Specification and Application • Training (product-specific) • Installation and Operation Assistance • Troubleshooting and Repair/Field Assistance
Online Technical Support	• www.adc.com/Knowledge_Base/index.jsp
Online Technical Publications	• www.adc.com/library1/
Product Return Department 800.366.3891 ext. 73748 or 952.917.3748 Fax: 952.917.3237 Email: repair&return@adc.com	• ADC Return Material Authorization (RMA) number and instructions must be obtained before returning products.
All 800 lines are toll-free in the USA and Canada.	

BAR CODE AND CONFIGURATION NUMBER INFORMATION

Figure 17 shows the location of the bar code and configuration number labels on the bottom of the HRE-204 List 1 and List 2. Table 3 provides a brief description of the information on the labels.

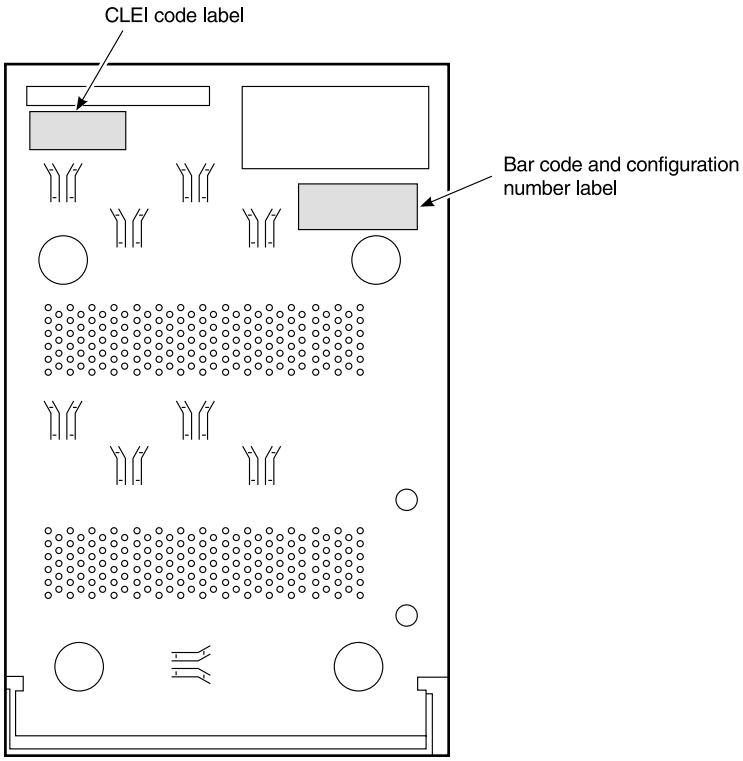


Figure 17. *Bar Code and Configuration Number Label Locations*

Table 3. *Bar Code and Configuration Number Label Descriptions*

Item	Description
CLEI code label	Contains the human-readable Common Language Equipment Identifier (CLEI) code number and Equipment Catalog Item (ECI) bar code number.
Bar code and configuration number label	This label contains the configuration or revision number, the part number, the Julian date, and the bar code serial number.

CERTIFICATION AND WARRANTY

LIMITED WARRANTY

ADC DSL Systems, Incorporated (“ADC”) warrants that, for a period of sixty (60) months from the date of shipment, the hardware portion of its products will be free of material defects and faulty workmanship under normal use. ADC's obligation, under this warranty, is limited to replacing or repairing, at ADC's option, any such hardware product which is returned during the 12-month warranty period per ADC's instructions and which product is confirmed by ADC not to comply with the foregoing warranty.

ADC warrants that, for a period of 90 days from the date of purchase, the software furnished with its products will operate substantially in accordance with the ADC published specifications and documentation for such software. ADC’s entire liability for software that does not comply with the foregoing warranty and is reported to ADC during the 90-day warranty period is, at ADC’s option, either (a) return of the price paid or (b) repair or replace of the software. ADC also warrants that, for a period of thirty (30) days from the date of purchase, the media on which software is stored will be free from material defects under normal use. ADC will replace defective media at no charge if it is returned to ADC during the 30-day warranty period along with proof of the date of shipment.

The transportation charges for shipment of returned products to ADC will be prepaid by the Buyer. ADC will pay transportation charges for shipment of replacement products to Buyer, unless no trouble is found (NTF), in which case the Buyer will pay transportation charges.

ADC may use reconditioned parts for such repair or replacement. This warranty does not apply to any product which has been repaired, worked upon, or altered by persons not authorized by ADC or in ADC's sole judgment has subjected to misuse, accident, fire or other casualty, or operation beyond its design range.

Repaired products have a 90-day warranty, or until the end of the original warranty period—whichever period is greater.

ADC DISCLAIMS ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WITH RESPECT TO ITS PRODUCTS AND ANY ACCOMPANYING WRITTEN MATERIALS. FURTHER, ADC DOES NOT WARRANT THAT SOFTWARE WILL BE FREE FROM BUGS OR THAT ITS USE WILL BE UNINTERRUPTED OR REGARDING THE USE, OR THE RESULTS OF THE USE, OF THE SOFTWARE IN TERMS OF CORRECTNESS, ACCURACY, RELIABILITY OR OTHERWISE.

MODIFICATIONS

Any changes or modifications made to this device that are not expressly approved by ADC Telecommunications, Inc. may void 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 HRE-204 List 1 and List 2 have 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
- UL-1549 - Underwriters Laboratories

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