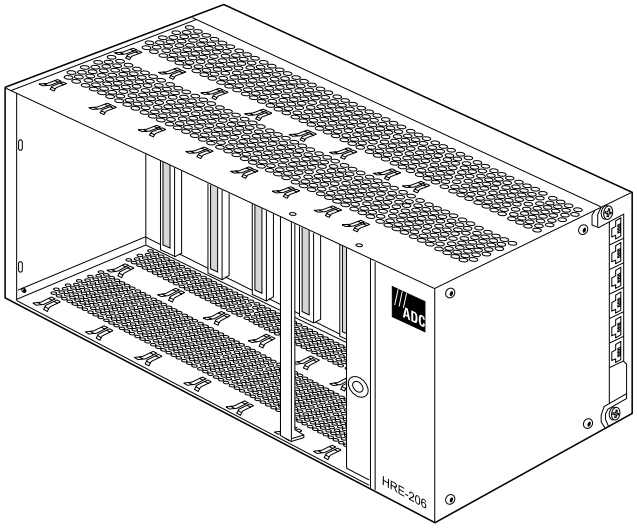
HiGain

TECHNICAL PRACTICE



HRE-206 List 1 Remote Enclosure
Part Number: 1146963
CLEI Code: T1MF50JG

HRE-206 List 2 Remote Enclosure
Part Number: 1146964
CLEI Code: T1MF60JG

Revision History of This Practice

To order copies of this document, use document catalog number LTPH-TP-1003-02.

Issue	Release Date	Revisions Made
1	January 18, 2001	Initial release.
2	June 1, 2001	Updated backplane drawings and enclosure grounding requirements.

USING THIS TECHNICAL PRACTICE

Two types of messages, identified by icons, appear in the text.

Notes contain information about special circumstances.

Cautions indicate the possibility of personal injury or equipment damage.

For a list of abbreviations used in this document, refer to "Appendix C - Abbreviations" on page 19.

INSPECTING THE 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 as described in "Returns" on page 18. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

The HiGain® Remote Enclosure HRE-206 List 1 and List 2 house up to six 200-mechanics HiGain remote units (HRUs or H2TU-Rs), one protection switching controller card (PSC-606 List 1), and an optional power supply. The remote enclosure is used as a 1+1 (redundant) or 1+N (revertive or non-revertive) protection enclosure when the protection switching controller card is installed. The HRE-206 must meet the following system requirements for the protection switching application to function: HXU-358 multiplexer (software version 1.04 or higher), an HMU-319 List 7A or 7C (version 3.06 or higher), an HRU-402 or H2TU-R-402 (List 6) remote unit, and a PSC-606 protection switching controller card.

The HRE-206 List 1 has RJ48C DS1 connectors, and the HRE-206 List 2 has RJ48X connectors. When the PSC-606 card is not installed, the HRE functions as a standard 6-slot enclosure.

The remote enclosure supports the 1+1 protection function when an HRU-402 or H2TU-R-402 (List 6) is installed in slots 5 and 6. Slot 6 is the protection slot, and slot 5 provides protection to slot 6 in the event of a failure.

The enclosure supports a 1+N protection function when an HRU-402 or H2TU-R-402 (List 6) is installed in protection slot 6. Any or all of the remaining slots may be occupied by any remote unit.

For more information, see the Protection Switching Controller PSC-606 List 1 Technical Practice, document number LTPH-TP-1006-xx.

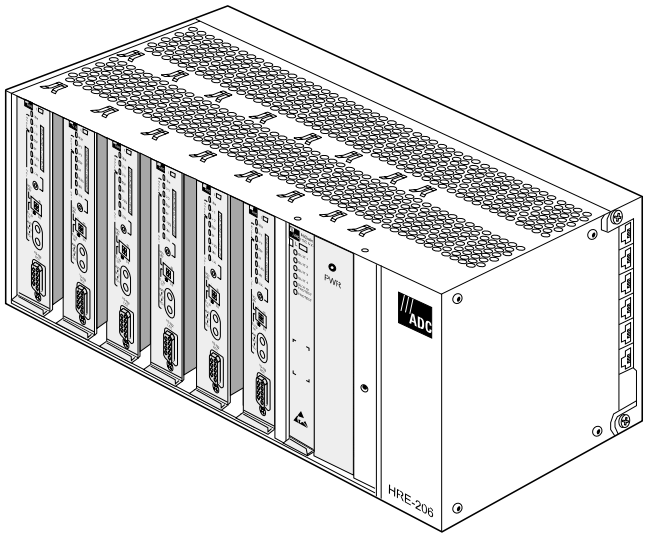


Figure 1. *HRE-206 List 1 and List 2 Remote Enclosure*

FEATURES

The HRE-206 provides the following features:

- Six 200-mechanics (or three 400-mechanics) card slots and one 400-mechanics power supply slot
- One PSC-606 protection switching controller card slot (slot 7)
- RJ48C (List 1) or RJ48X (List 2) modular jacks for DS1 customer interface connections
- Printed-circuit backplane provides terminal block, wirewrap pin, and RJ48 connectors
- Tamperproof locking screw for security
- Accepts line powering, optional power supply, or external -48 Vdc source
- Wall, rack, or desktop mounting
- Pre-painted, cold-rolled #16 gauge steel construction

APPLICATIONS

HiGain provides a quick and cost-effective way of delivering DS1 High Capacity Digital Service (HCDS) to customers over metallic cable pairs. The primary application of the HRE-206 remote enclosure is to house the remote units of a HiGain DS1 transmission system for protection circuit applications.

Because the HRE-206 uses standard 200- and 400-mechanics slots, it can accommodate any plug with 200 or 400 mechanics, including the HiGain HRU-412, HRU-402, and H2TU-R-402 remote units and the HLU-431 and HLU-432 line units.

BACKPLANE

Figure 2 shows the HRE-206 backplane. Table 1 on page 3 describes its connectors.

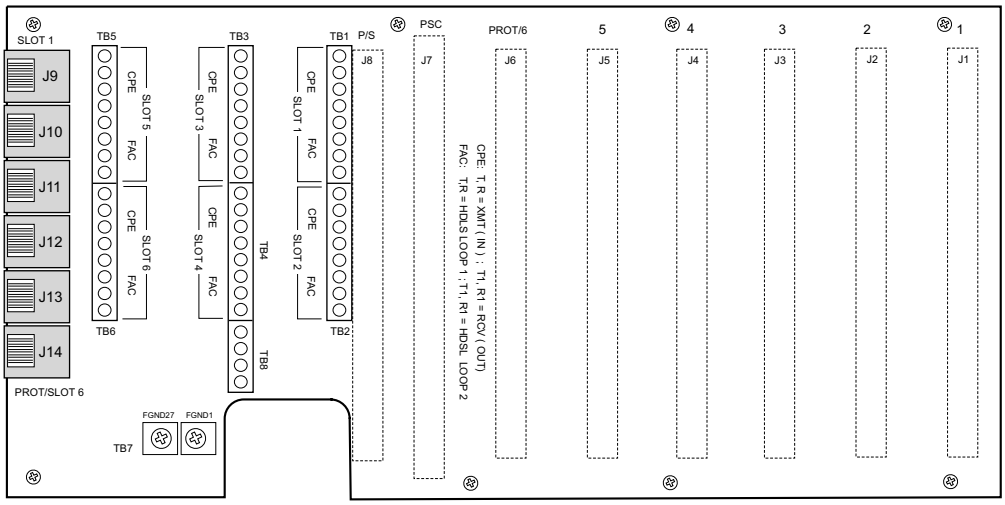


Figure 2. *HRE-206 Backplane*

Table 1. *Backplane Connectors*

Connector(s)	Function
J9 through J14	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 Slot 2 CPE and FAC interfaces
TB3	Terminal block connector for Slot 3 CPE and FAC interfaces
TB4	Terminal block connector for Slot 4 CPE and FAC interfaces
TB5	Terminal block connector for Slot 5 CPE and FAC interfaces
TB6	Terminal block connector for Slot 6 CPE and FAC interfaces
TB7	Frame ground (FGND 1 and FGND 27) [(a)]
TB8	Terminal block connector for providing -48 Vdc battery return and supply for Slot 8.

(a) Pin 27 of every slot is always connected to ground. When a jumper is connected across TB7, pin 1 and pin 27 of each slot are connected together. This attaches both pins to frame (chassis) ground. See Table 2 on page 7 for a list of units that require pin 1 of each slot to be attached to frame ground for proper fault protection. The enclosure is shipped without a jumper across TB7.

Figure 3 shows the backplane wiring connections to slots 1 through 6. (For backplane connections to slot 7, refer to the PSC-606 technical practice, document number 150-606-100-xx.)

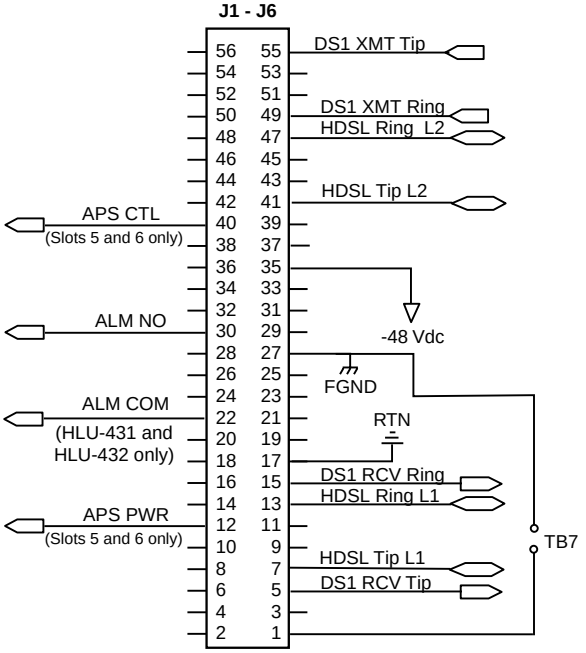


Figure 3. *Backplane Slot Connections (Slots 1 through 6)*

SLOT CONNECTORS

Figure 4 shows the front view of slot connectors J1 through J6 for installing HiGain line units and HiGain remote units. Slot connectors J7 and J8 are for installing the protection switch controller card (PSC-606) and the power supply module respectively.

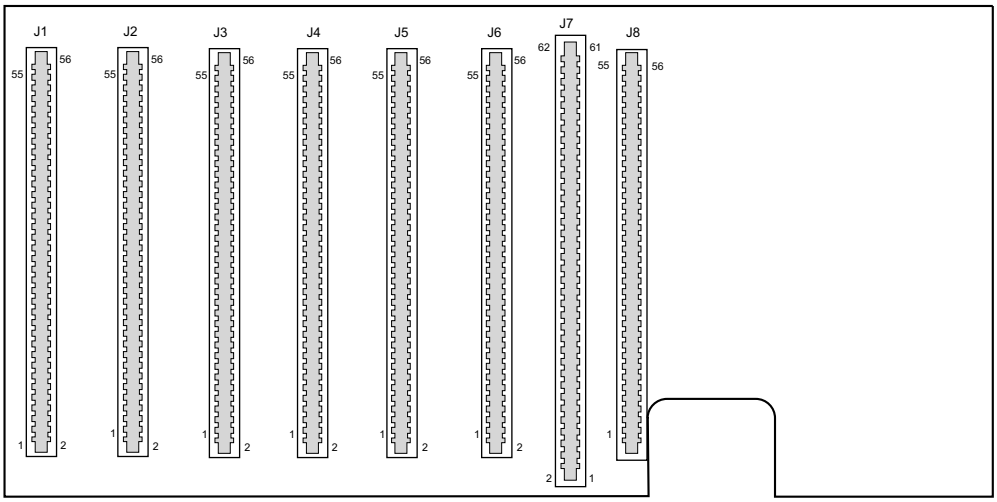


Figure 4. *HRE-206 Slot Connectors (front view)*

INSTALLATION

This section provides information on installing and mounting the HRE-206 List 1 and List 2.

A CAN wrench, not included in the installation kit, is required to open the plastic door.

INSTALLATION KIT

- four mounting screws
- four anchor nuts
- rack mounting brackets

MOUNTING OPTIONS

The HRE-206 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-206 is mounted, ADC recommends that the frame-ground lug (pin 27) should 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 7 for more information.

Desktop Mounting

The remote enclosure includes four standoffs on the bottom plate for desktop mounting. The standoffs create an air gap between the bottom of the enclosure and the surface of the desk. This prevents overheating by providing airflow through the enclosure. Do not block the airflow from the top or bottom of the unit.

Wall Mounting

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

1 Loosen the HEX security nut on the front cover (Figure 5) with a $^{3}/_{8}$-inch CAN wrench.

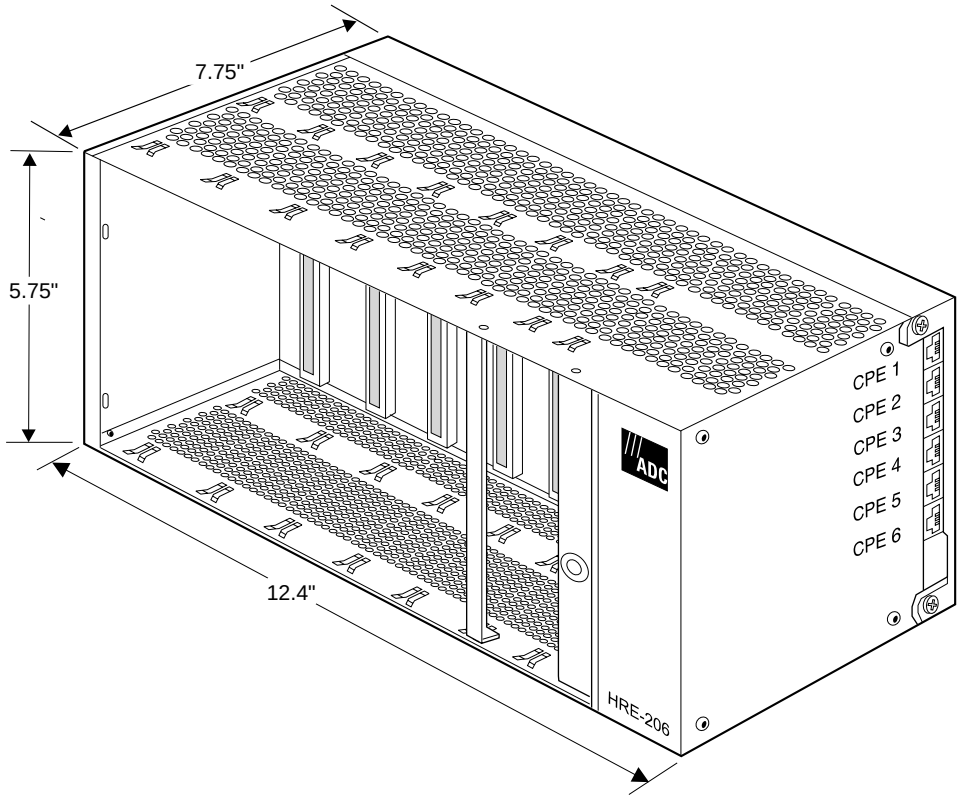


Figure 5. *Chassis Assembly*

2 Remove the four top and bottom retaining screws that hold the backplate to the chassis.

3 Use the backplate as a template to mark the wall locations for drilling the mounting holes (Figure 6).

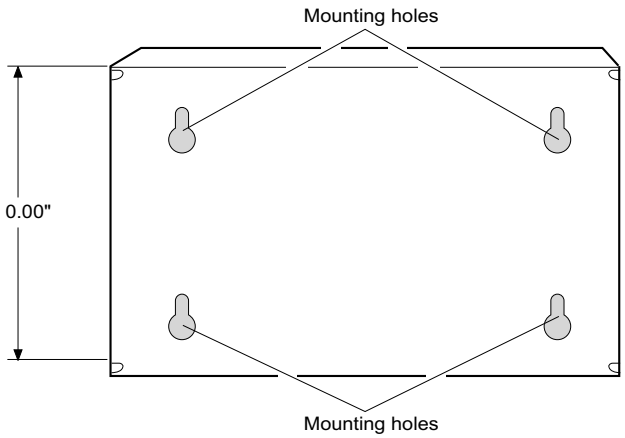


Figure 6. *HRE-206 Backplate*

4 Drill pilot holes and attach the backplate to the backboard with the four No. 10 x $^{5}/_{8}$-inch sheet metal screws and washers supplied with the remote enclosure.

5 Attach the remote enclosure to the backplate. To allow the enclosure to hinge either up or down, remove the bottom or top retaining screws respectively.

When the main chassis is attached to the backplate, it can be rotated up or down to provide access to the backplane connector and other internal areas. See Figure 7 for hinging details.

6 Rotate the main chassis back into position and replace the retaining screws (Figure 7).

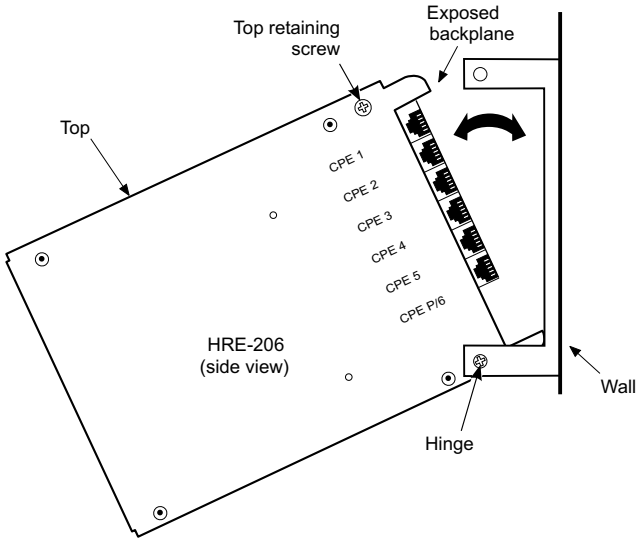


Figure 7. *Wall Mounting and Bottom-Hinged View*

TURN-UP

Follow these steps to complete the turn-up procedure:

1 Loosen the 216 HEX security nut on the front cover (Figure 5 on page 5) with a $^{3}/_{8}$-inch CAN wrench.

2 Remove the front cover from the chassis to expose the card slots.

3 Insert the cards in the assigned slots and refer to the card's technical practice for the appropriate turn-up procedure. (See "Appendix B - Product Support" on page 18 for obtaining technical practice information.)

If you are using the HRE-206 to locally power one or more HRUs, see "48 Volt Power Options" on page 8.

POWER AND GROUNDING

Pin 27 of every slot is always connected to chassis ground. When a jumper is connected across TB7, pin 1 and pin 27 of each slot are connected together. This attaches both pins to frame (chassis) ground. See Table 2 below for a list of units that require pin 1 of each slot to be attached to frame ground for proper fault protection. The enclosure is shipped without a jumper across TB7.

Table 2. *Units Requiring Jumper Across TB7*

Unit Model Number
• All HRU-412, List xx
• HRU-612, List xx
• HLU-431, List 1, List 2
• HRU-512, List xx
• ERU-412, List xx

ADC recommends that the frame ground lug on the outside of the enclosure 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:

- **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 Electromagnetic Interference (EMI) fields**
- **Bit errors due to crosstalk from adjacent communication equipment**

In certain unusual noise environments, it may be necessary to connect pin 17 (the HRU's circuit ground pin) to frame ground of the card-edge connector to remove bit errors from the DS1 payload.

48 VOLT POWER OPTIONS

When using the HRE-206 to locally power HRU plugs or HLU-431 and HLU-432 line units, -48 Vdc power is provided at terminal block TB8, the pin assignment for which is shown in Figure 8.

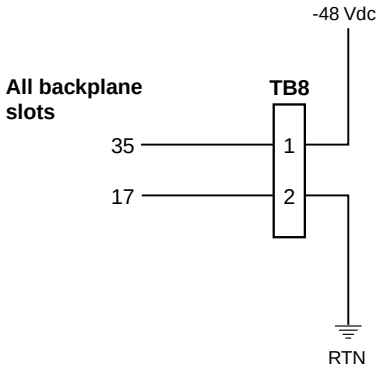


Figure 8. *TB8 Pin Assignment*

Third party wall mount power supply can be used to provide -48 Vdc power for various plug applications, as shown in Table 3.

Table 3. *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, 5, or 6	500	Troncom WPS-4806 (520 ma)	26	26
HDU-404	3 watts	Unit is line powered. No locally-powered requirements.				
HRU-412	6 watts	1	125	Teltrend 2005	26	26
		3	375	Troncom WPS-4806	26	26
HLU-431 (no doublers)	14 watts	1	300	Troncom WPS-4806	26	26
		3	900	Troncom WPS-4810 (1 amp)	26	22
HLU-431 (with two doublers)	24 watts	1	500	Troncom WPS-4806	26	22
		2	1000	Troncom WPS-4810	22	20
HLU-432 (no doublers)	12 watts	1	250	Teltrend 2005		
		2	500	Troncom WPS-4806		
		3, 4	1000	Troncom WPS-4810		
HLU-432 (with four doublers)	24 watts	1	500	Troncom WPS-4806		
		2	1000	Troncom WPS-4810		

(*) Minimum current capacity is based on 1000 circular mils per ampere.

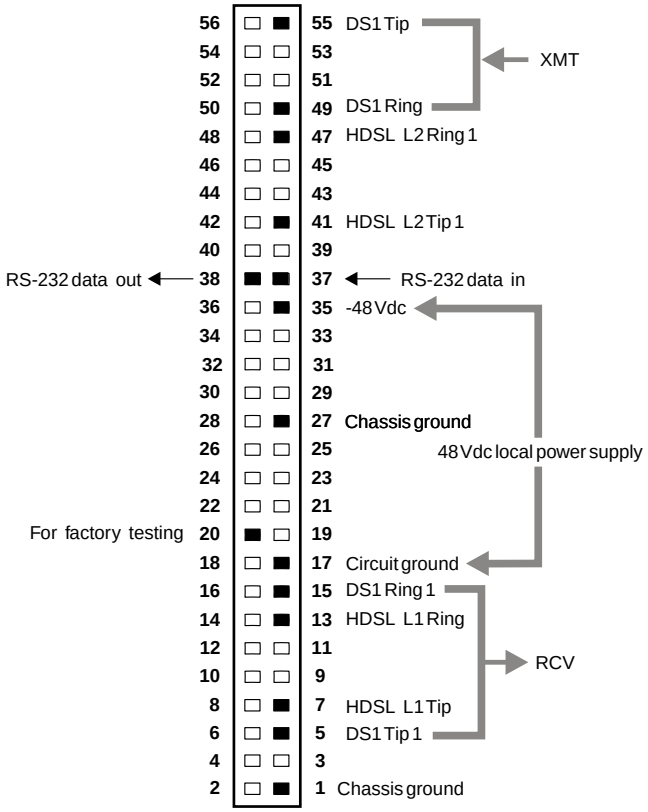
The maximum power dissipation within the HRE-206 remote enclosure is limited to 40 watts to permit reliable operation up to a maximum ambient temperature of 115 °F.

SLOT PIN ASSIGNMENTS

The following sections show the connector pin assignments of the HiGain plugs which are compatible with the HRE-206.

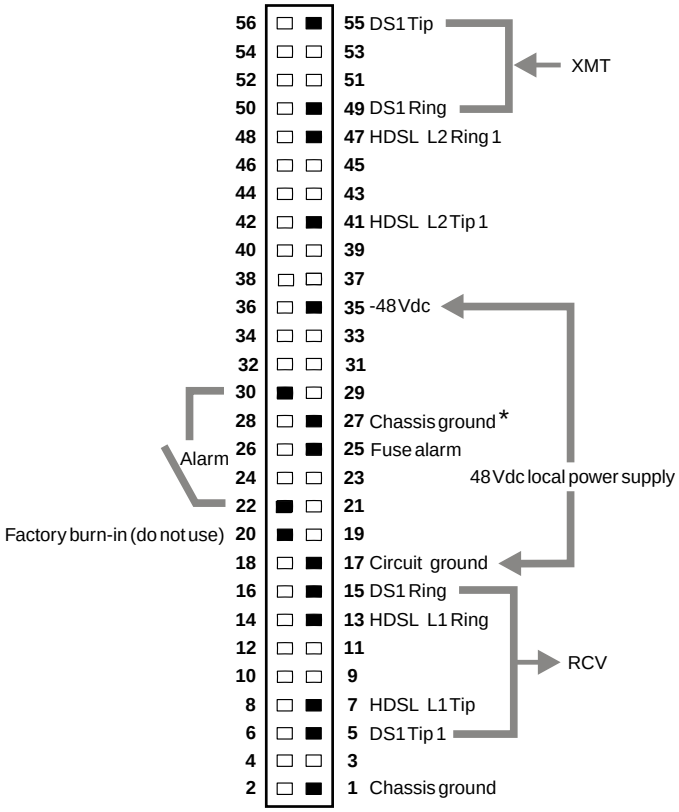
Slot pin assignments for the various plugs compatible with the HRE-206 are shown in the following figures:

- Figure 9 (HRU pin assignments)
- Figure 10 on page 10 (HLU-431 and HLU-432 pin assignments)
- Figure 11 on page 11 (ERU-412 pin assignments)
- Figure 12 on page 12 (HDSL2 remote pin assignments)



Note: Active pins are highlighted in black.

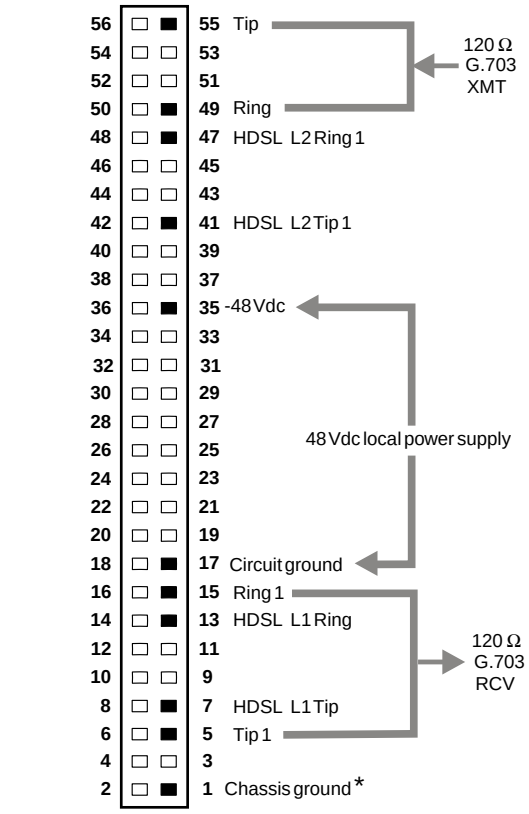
Figure 9. *HRU Pin Assignments (all lists)*



Note: Active pins are highlighted in black.

* Not supported by HLU-431

Figure 10. *HLU-431 AND HLU-432 Pin Assignments*



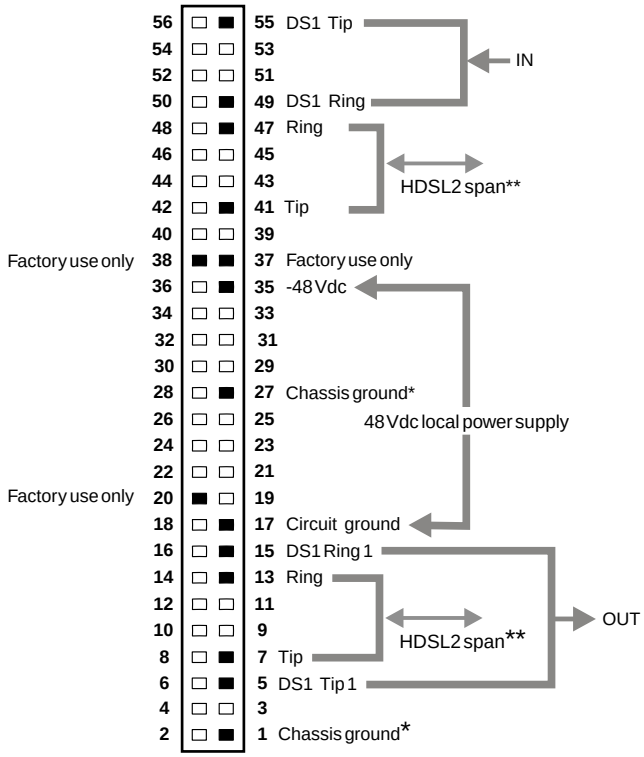
Note: Active pins are highlighted in black.

*Chassis ground may be tied to earth ground according to local practice.

Figure 11. *ERU-412 Pin Assignments*

If you are installing WorldDSL remote units in the HRE-206, use only the 120 Ω 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-206.

Ω



Note: Active pins are highlighted in black.

*Chassis ground may be tied to earth ground according to local practice.

**HDSL2 span connections vary depending on the unit list number.

Figure 12. *HDSL2 Remote Pin Assignments*

HLU ALARM OUTPUT INTERFACE

When HLU-431 or HLU-432 line units are installed in the HRE-206, 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 TB8. Figure 13 shows the TB8 pin assignments.

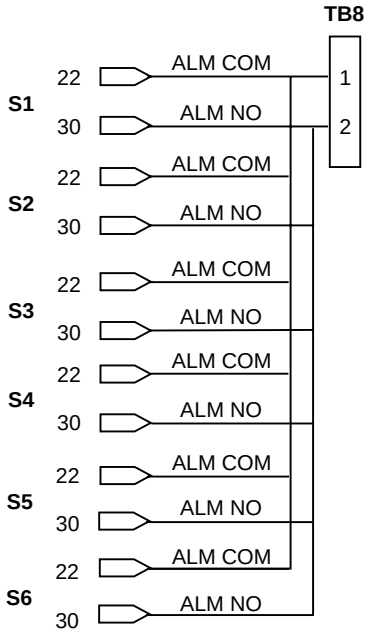


Figure 13. *System Alarm (TB8) Pin Assignments*

FACILITY SIDE HDSL CONNECTIONS

The HDSL facility side ports are available through the FAC ports of the Euro style screw-down terminal blocks. Figure 14 shows the pin assignments for TB1 through TB4 (slots 1, 2, 3, and 4).

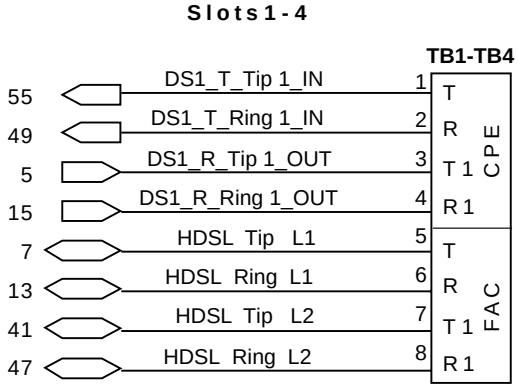


Figure 14. *TB1 through TB4 Pin Assignments*

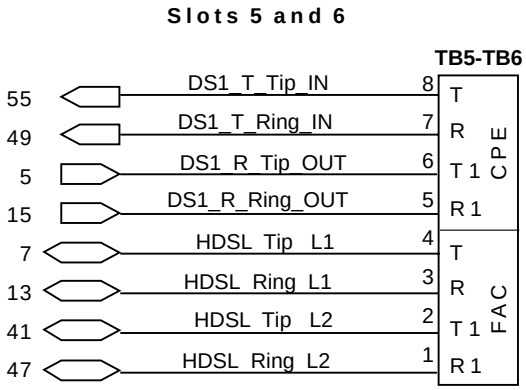


Figure 15. *TB5 and TB6 Pin Assignments*

Loop 1 connects to the Tip and Ring leads. Loop 2 connects to the Tip 1 and Ring 1 leads. To locate the appropriate connector, see the pin assignment representations in "Slot Pin Assignments" on page 9.

If the Loop 1 and Loop 2 leads are reversed in 4-wire applications, a CHREV (Channels Reversed) message appears in the ALARMS display field of 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 (J9) through CPE4 (J14) RJ48 jacks, as shown in Figure 2 on page 2, or by wire-wrap at each connector. Figure 16 shows the pin assignments for the RJ48C jack. Figure 17 on page 16 shows the RJ48X pin assignments.

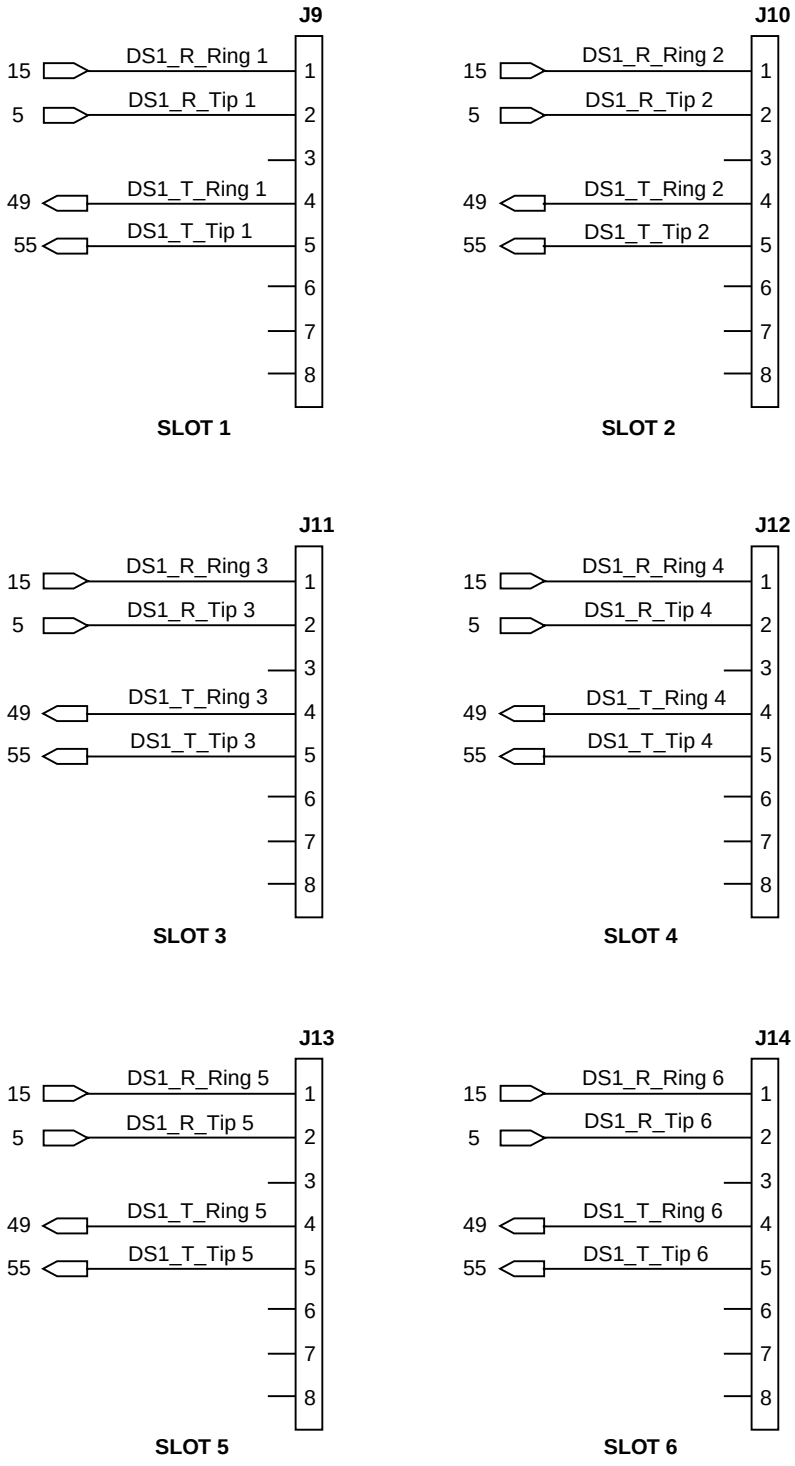


Figure 16. *RJ48C Pin Assignments (List 1) for Slot 1 through Slot 6*

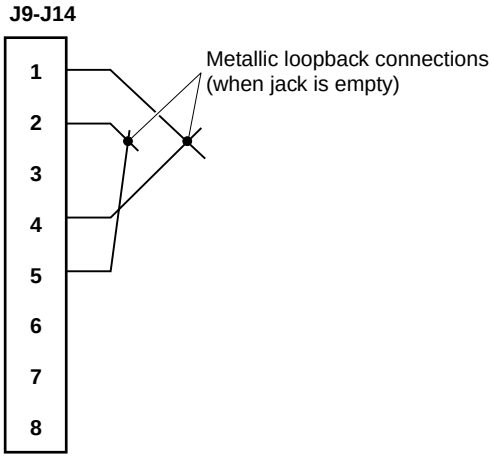


Figure 17. *RJ48X Pin Assignments (List 2)*

APPENDIX A - SPECIFICATIONS

Mounting	Eight plug slots: • Six type 200 mechanics plugs • Three type 400 mechanics plugs • One type 200 protection switching controller card • One type 400 power supply module
Telco Facility	Euro style terminal blocks or wire-wrap pins
CPE	RJ48 Connector Options: • RJ48C (List 1) • RJ48X (List 2)
Power Supply Option	See "48 Volt Power Options" on page 8
Height	5.75 in. (14.6 cm)
Width	12.4 in. (31.5 cm)
Depth	7.75 in. (19.7 cm)
Weight	3.0 lb (1.4 kg)
Operating Environment	Temperature: 0 °F to +122 °F (-18 °C to 50 °C) Humidity: 0% to 95% non-condensing

APPENDIX B - PRODUCT SUPPORT

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

TECHNICAL SUPPORT

Technical support is available 24 hours a day, 7 days a week by contacting the ADC Technical Assistance Center (TAC) at one of the following numbers:

- Telephone: 800.638.0031
  714.730.3222
  The 800 line is toll-free in the U.S and Canada.
- Fax: 714.832.9924
- Email: wsd_support@adc.com
- Online: www.adc.com/knowledge_base_frames

A Customer Service Engineer answers technical assistance calls Monday through Friday between 7:30 AM and 5:30 PM, Pacific Time, excluding holidays. At all other times, an on-duty Customer Service Engineer returns technical assistance calls within 30 minutes.

RETURNS

To return equipment to ADC:

1 Locate the purchase order number under which the equipment was purchased. You will need to provide this number to ADC Customer Service to obtain a return authorization.

2 Call ADC Customer Service to ask for a Return Material Authorization (RMA) number and instructions before returning products. Use the telephone number, fax number, or email address listed below:

- Telephone: 800.366.3891 ext. 63748 or 952-946-3748

  The 800 line is toll-free in the U.S and Canada.
- Fax: 952-946-3237
- Email Address: repair&return@adc.com

3 Be prepared to provide the following information:

- Company name, address, telephone number, and the name of a person Customer Service can contact regarding this equipment.
- A description of the equipment as well as the number of units that you are returning. Be sure to include the model and part number of each unit.
- The shipping address to which Customer Service should return the repaired equipment.
- The reason for the return.
  - The equipment needs an ECO/ECN upgrade.
  - The equipment is defective.

APPENDIX C - ABBREVIATIONS

A

AWG: American Wire Gauge

B

BNC: Bayonet-Locking Connector

C

CHREV: Channels Reversed

COM: Common

CPE: Customer Premises Equipment

D

DS1: Digital Signal, level 1

E

EMI: Electromagnetic Interference

ERU: ETSI Remote Unit

ETSI: European Telecommunications Standards Institute

H

HCDS: High Capacity Digital Service

HLU: HiGain Line Unit

HRE: HiGain Remote Enclosure

N

NO: Normally Open

P

PSC: Protection Switching Controller card

R

RMA: Return Material Authorization

T

TB: Terminal Block

CERTIFICATION AND WARRANTY

FCC CLASS A COMPLIANCE

The HRE-206 List 1 and List 2 do not have any clocking source and is a passive device per FCC guidelines. When used in conjunction with any clocking devices, this combined system may radiate radio frequency energy that causes harmful interference to radio communications. Operating such a system 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 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 60-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 been 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 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 HRE-206 List 1 and List 2 have been tested and verified to comply with the applicable sections of the following standards:

- Binational standard, UL-1950/CSA-C22.2 No. 950-95: Safety of Information Technology Equipment

ADC DSL Systems, Inc.

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Fax: 714.832.9924

Technical Assistance

800.638.0031
714.730.3222

DOCUMENT: LTPH-TP-1003-02, ISSUE 2

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