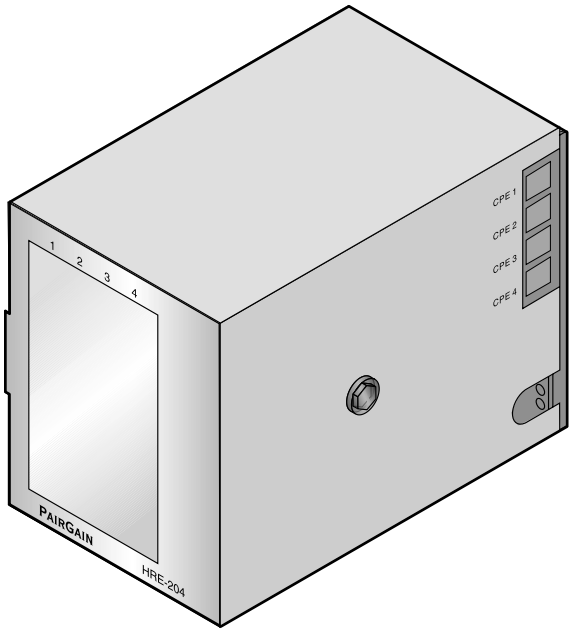
HiGain Remote Enclosure

Technical Practice



HRE-204 List 1A
Part Number: 150-2203-11
CLEI Code: T1M3DG0A

HRE-204 List 2A
Part Number: 150-2203-21
CLEI Code: T1M3EG0A

Section 150-204-111-01

pairgain
THE POWER BEHIND DSL ACCESS

Revision History of This Practice

Revision	Release Date	Revisions Made
01	November 3, 1999	Initial release.
02	April 7, 2000	New firmware.

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USING THIS TECHNICAL PRACTICE

The following conventions are used in this manual:

- `Monospace type` indicates screen text, including text you type at a screen prompt.
- Keys you press are indicated by small icons such as ENTER. Key combinations to be pressed simultaneously are indicated with a plus sign as follows: CTRL + ESC.
- Three types of messages, identified by icons, appear in text.

Notes contain information about special circumstances.

Cautions indicate the possibility of equipment damage or personal injury.

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

For a list of abbreviations used in this document, refer to "Appendix C - Abbreviations" on page 22.

DOCUMENTATION

If you have comments on this PairGain document, send an email to technical_publications@pairgain.com. Type the product name and the section number of the document in the subject area of the email message.

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 PairGain. 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 PairGain as described in the Warranty located inside the back cover. 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 PairGain® HiGain® Remote Enclosure HRE-204 List 1A and List 2A that houses HiGain Line Units (HLUs) and remote units (HRUs). The HRE-204 List 1A has RJ48C DS1 connectors, and the HRE-204 List 2A has RJ48X connectors.

FEATURES

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

- four 200-mechanics or two 400-mechanics slots
- RJ48C (List 1A) or RJ48X (List 2A) modular jack for DS1 customer interface connections
- printed-circuit backplane with terminal block and RJ48 connectors
- tamper-proof locking screw for security
- 48 V input power for HLU applications
- separate input terminals for slot isolation
- wall or desktop mounting
- 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 HRE-204 houses units for a HiGain repeaterless T1 transmission system.

The HRE-204 List 1A and List 2A uses standard 200-mechanics and 400-mechanics slots and can accommodate any plug with 200-mechanics or 400-mechanics, including the HiGain HRU-402 (HDSL) and H2TU-R-402 (HDSL2) remote units, and the HLU-432 (HDSL) line unit.

Since the HRE-204 supports chassis ground to pin 27, it is not compatible with PairGain legacy HDSL HRU-412 remotes that only use pin 1 for chassis ground.

The HRE-204 provides a chassis ground connection to pin 27 only in every slot.

BACKPLANE

Figure 1 shows the HRE-204 backplane. Table 1 describes its connectors.

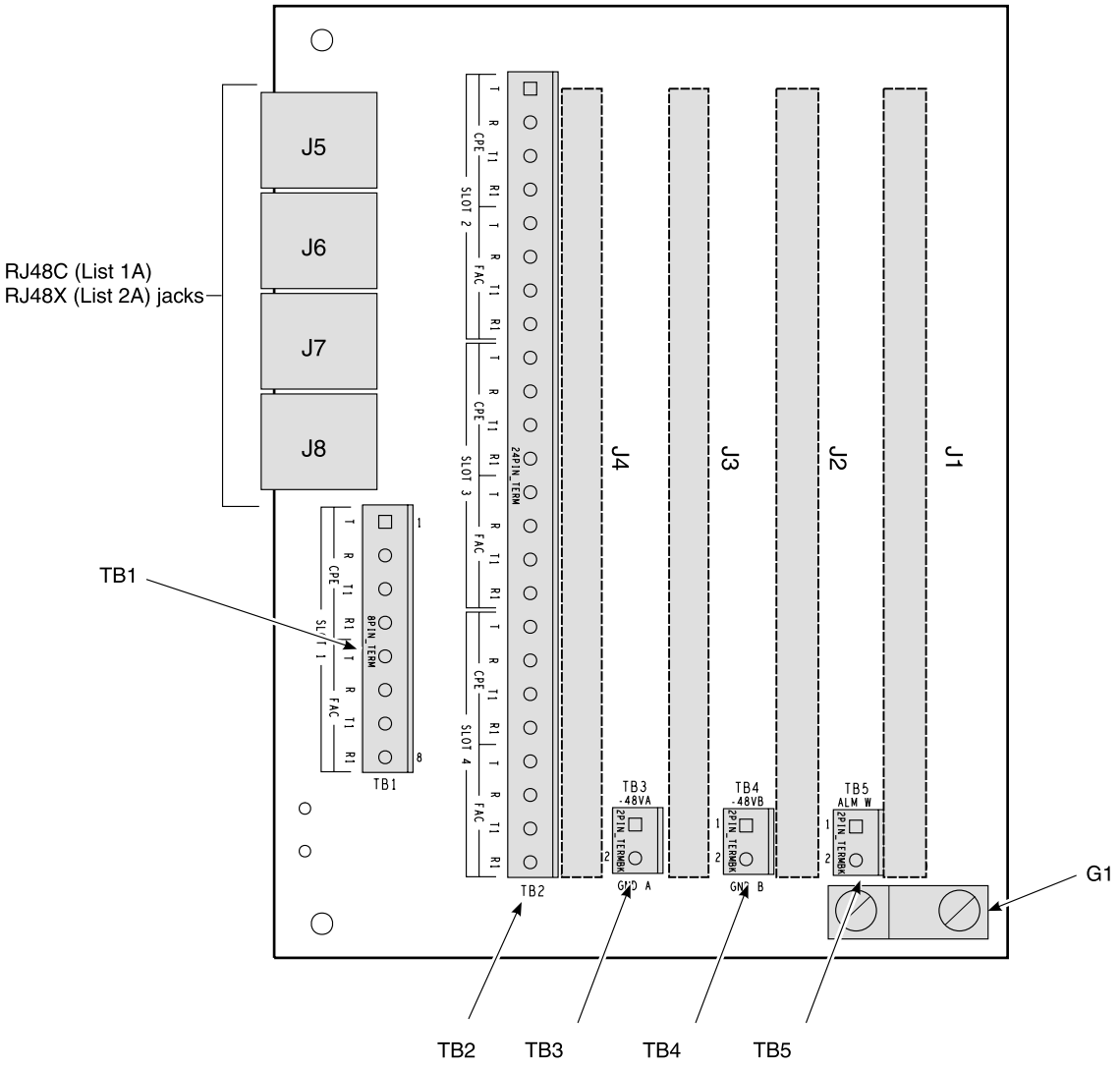


Figure 1. *HRE-204 List 1A and List 2A Backplane*

Table 1. *Backplane Connectors*

Connector(s)	Function
J5 through J8	RJ48C CPE (Customer Premises Equipment) jacks (List 1A) or RJ48X jacks (List 2A)
TB1	Terminal block connector for Slot 1 CPE (DS1) and FAC (Forced Authorization Code - 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 (pin 27 for all four slots)

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

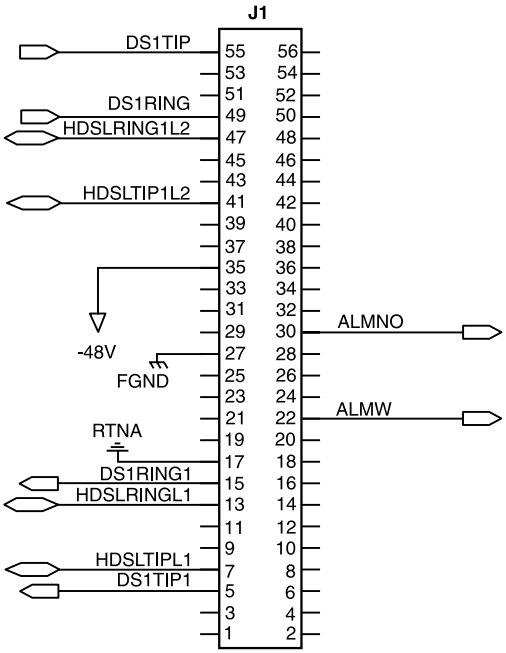


Figure 2. *Backplane Slot Connections*

SLOT CONNECTORS

Figure 3 shows the front view of the four slot connectors, J1 through J4, used to install HLUs and HRUs.

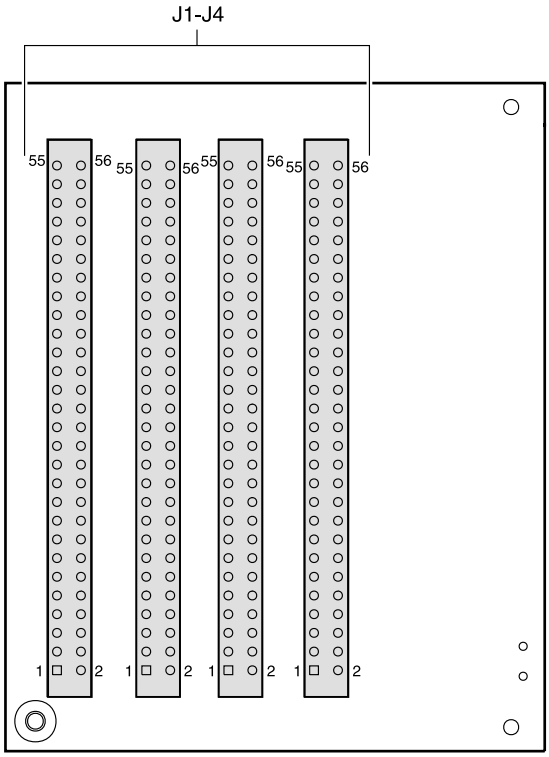


Figure 3. *HRE-204 List 1A and List 2A Remote Enclosure Slot Connectors*

INSTALLATION

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

INSTALLATION KIT

- two mounting screws
- two anchor nuts

MOUNTING OPTIONS

The HRE-204 is suitable for mounting on a desktop or on a wall. Before setting up the equipment, select a location that provides appropriate security.

Regardless of where the HRE-204 is mounted, PairGain 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.

Mounting the HRE-204 on a Desktop

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.

Mounting the HRE-204 on a Wall

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

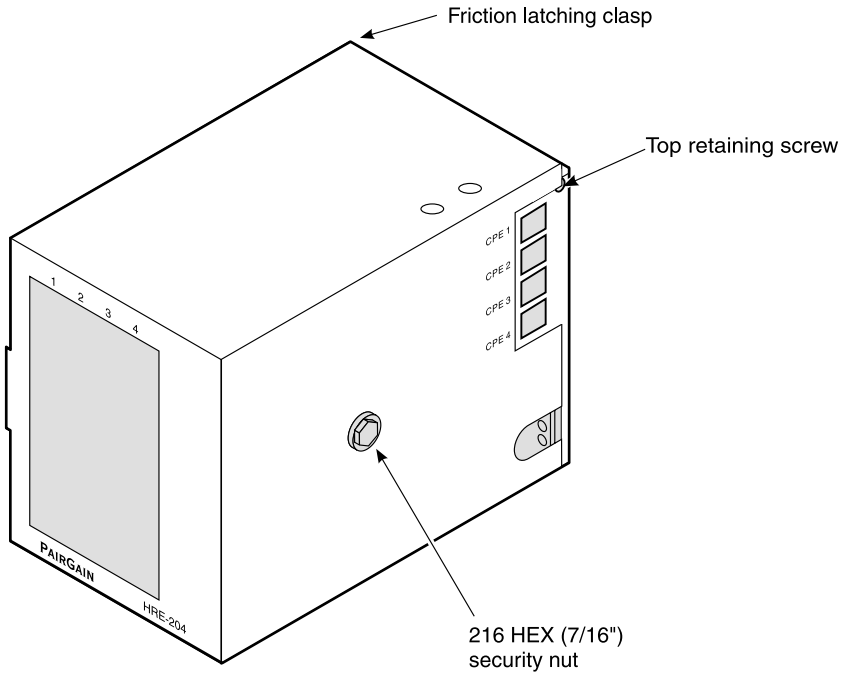


Figure 4. *Side Panel Assembly*

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 friction latching 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).

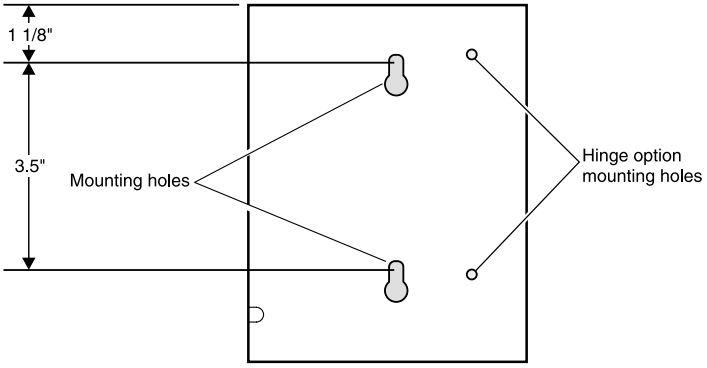


Figure 5. *HRE-204 Backplate*

6 Drill pilot holes and attach the backplate to the backboard with the two number 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 friction latching clasp.

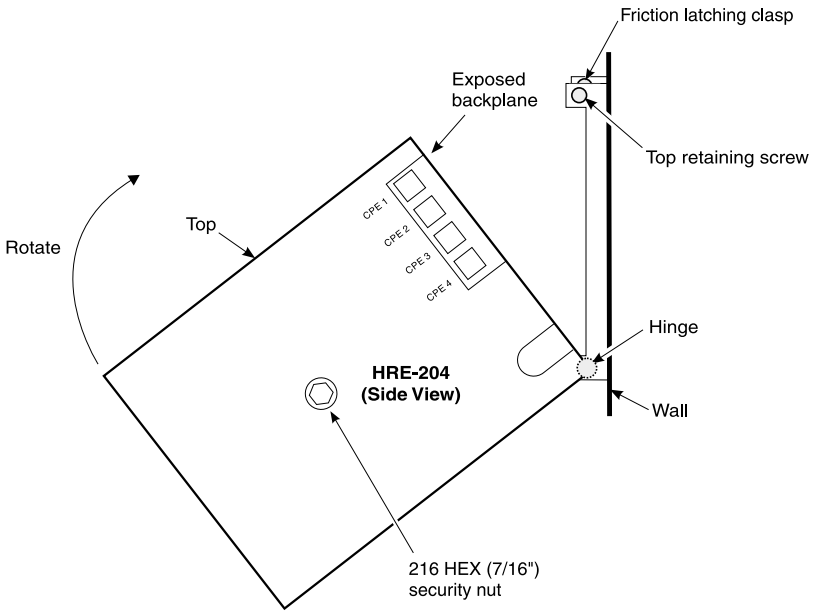


Figure 6. *Wall Mounting and Hinging View*

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

The transparent Lexan panel in the front cover makes slight contact with the card handles when it is reattached. This prevents walk-out due to vibration and is a standard feature of the HRE-204.

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 wall-mounted HRE-204, 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 $^{1}/_{4}$-inch machine screws, supplied with the hinge assembly, to attach the hinge to the two mounting holes on the HRE-204 backplate, as shown in Figure 7.

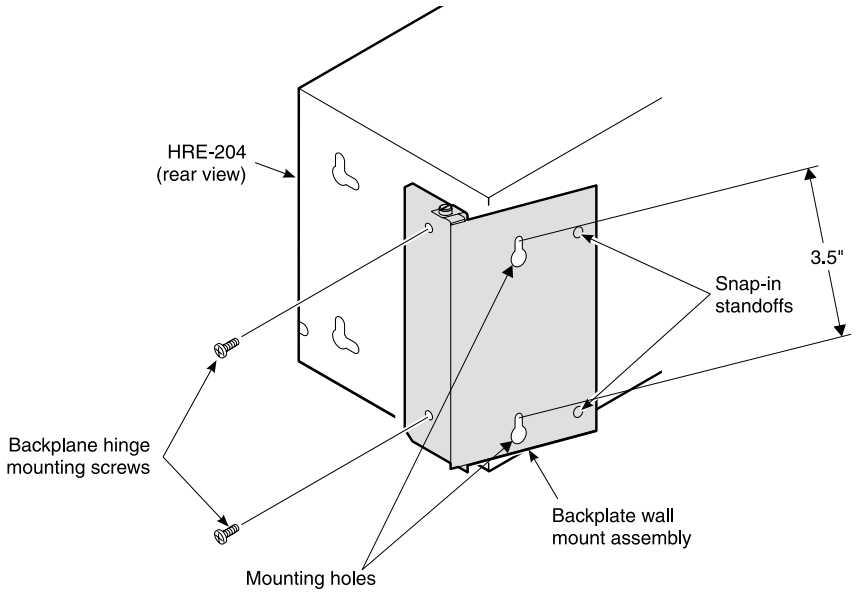


Figure 7. *Optional Mounting Hinge*

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

COMPLETING TURNUP

Once the HRE-204 is mounted, insert the card into the unit in the following manner:

1 Loosen the 216 HEX security nut on the side panel (Figure 4 on page 6) 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 turnup procedure. (See "Appendix B - Product Support" on page 20 for obtaining technical practice information.)

If you are using the HRE-204 to locally power one or more HRUs or HLU-431, see "48 Volt Power Options" on page 10. If you install an HLU-431 into the HRE-204, see "HLU Alarm Output Interface" on page 11 for information about the alarm output interface.

POWER AND GROUNDING

The chassis frame ground is connected to pin 27, which is connected to each slot as well as the backplane ground lug G1, as shown in Figure 1 on page 2. Connect the frame ground lug to the 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 unground enclosure to attenuate the noise inducing energy from stray EMI fields**
- **bit errors due to crosstalk from adjacent communication equipment.**

The HRE-204 List 1A and List 2A support mechanics that use pin 27 for the frame (chassis) ground access.

In certain unusual noise environments, it may be necessary to connect the HRU's circuit ground pin 17 to frame ground pin 27 of the card-edge connector to remove bit errors from the T1 payload.

48 VOLT POWER OPTIONS

When using the HRE-204 to locally power HRU plugs or HLU-432 line unit, the 48 V power can be provided in either isolated or non-isolated mode. Power is provided to terminal blocks TB3 and TB4, the pin assignments for which are shown in Figure 8.

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 fail-safe feature. 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.

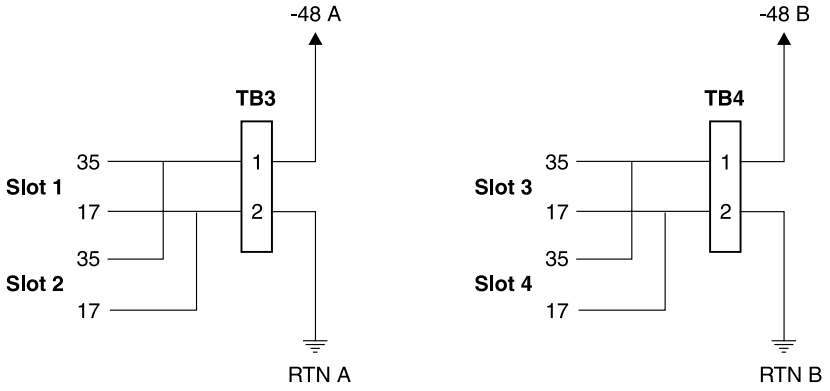


Figure 8. *TB3 and TB4 Pin Assignments*

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	Current Required (mA)	Power supply	Input Power AWG Wire Size [a] (Two Inputs)	(One Input)
HRU-402, List 4	3.5 Watts	1	73	Westell 6048-01 (100 ma)	26 AWG	26 AWG
		1, 2, or 3	210	Teltrend 2005 (250 ma)	26 AWG	26 AWG
		4	300	Troncom WPS-4806 (520 ma)	26 AWG	26 AWG
H2TU-R-402, List 4	6 Watts	1	125	Teltrend 2005	26 AWG	26 AWG
		2	250	Troncom WPS-4806	26 AWG	26 AWG
HLU-432 (no doublers)	14 Watts	1	300	Troncom WPS-4806 Troncom WPS-4810	26AWG	26 AWG
		2	600		26 AWG	22 AWG
HLU-432 (with doublers)	24 Watts	1	500	Troncom WPS-4806 Troncom WPS-4810	26 AWG	22 AWG
		2	1000		22 AWG	20 AWG

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

HLU ALARM OUTPUT INTERFACE

When HLU-431 line units are installed in the HRE-204, the Normally Open (NO) and Common (COM) system alarm relay contacts are bused together and made available on the Euro-style terminal block TB5. Figure 9 shows the TB5 pin assignments.

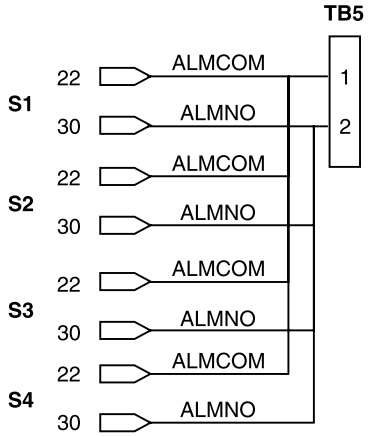


Figure 9. *System Alarm (TB5) Pin Assignments*

FACILITY SIDE HDSL CONNECTIONS

The HDSL facility side ports are available through the FAC ports of the Euro-style terminal blocks. Figure 10 shows the TB1 (Slot 1) pin assignments, and Figure 11 shows the TB2 pin assignments (Slots 2, 3, and 4).

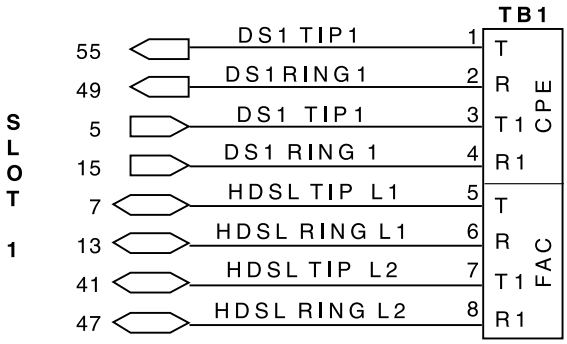


Figure 10. *TB1 Pin Assignments (Slot 1)*

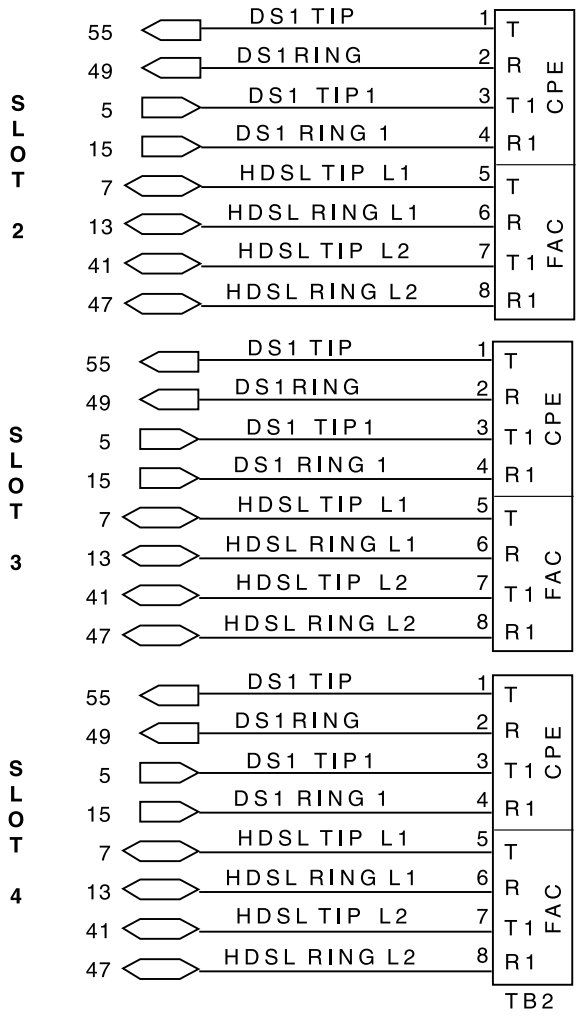


Figure 11. *TB2 Pin Assignments (Slots 2, 3, and 4)*

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 17.

If the Loop 1 and Loop 2 leads are reversed, a CHREV (Channels Reversed) message appears in the ALARMS display field when viewing the HiGain Status screen field. 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 CONNECTIONS

The following DS1 XMT and RCV interfaces are available:

- Euro-style terminals, CPE1 (J5) through CPE4 (J8), where XMT = Tip and Ring, RCV = Tip1 and Ring1
- RJ48 jacks, as shown in Figure 1 on page 2.

Figure 12 shows the pin assignments for the RJ48C jack.

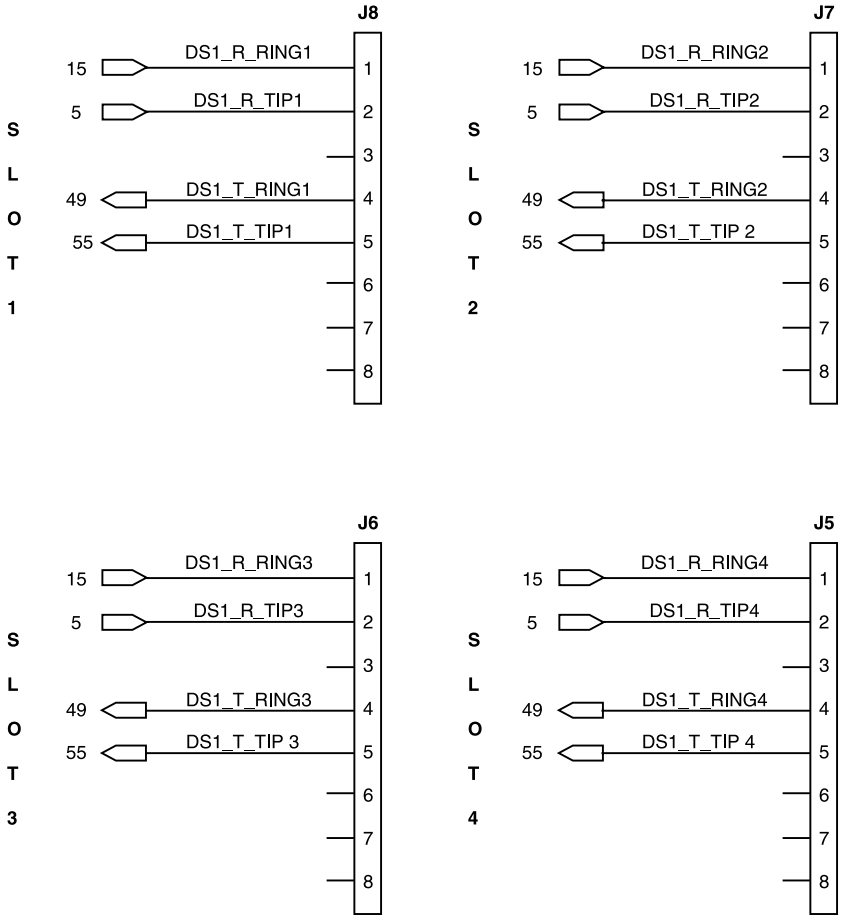


Figure 12. *RJ48C Pin Assignments (List 1A)*

Figure 13 shows the RJ48X (List 2A) pin assignments.

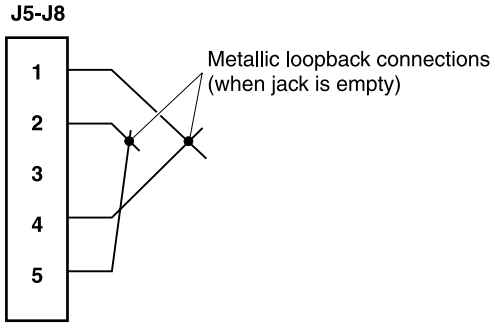


Figure 13. *RJ48X Pin Assignments (List 2A)*

APPENDIX A - SPECIFICATIONS

Mounting	Four type 200 or two type 400 mechanics plugs
Telco Facility	Euro-style terminal blocks
CPE	RJ48C (List 1A) RJ48X (List 2A)
Power Supply Option	See “48 Volt Power Options” on page 10
Height	5.8 in (15 cm)
Width	4.8 in (12 cm)
Depth	7.5 in (19 cm)
Weight	3.0 lbs (1.4 kg)
Operating Environment	Temperature: 0 °F to +158 °F (-18 °C to 70 °C) Humidity: 0 to 95% non-condensing

BAR CODE AND CONFIGURATION NUMBER INFORMATION

Figure 14 shows the location of the bar code and configuration number labels on the bottom of the HRE-204 List 1A and List 2A. Table 3 provides a brief description of the information on the labels.

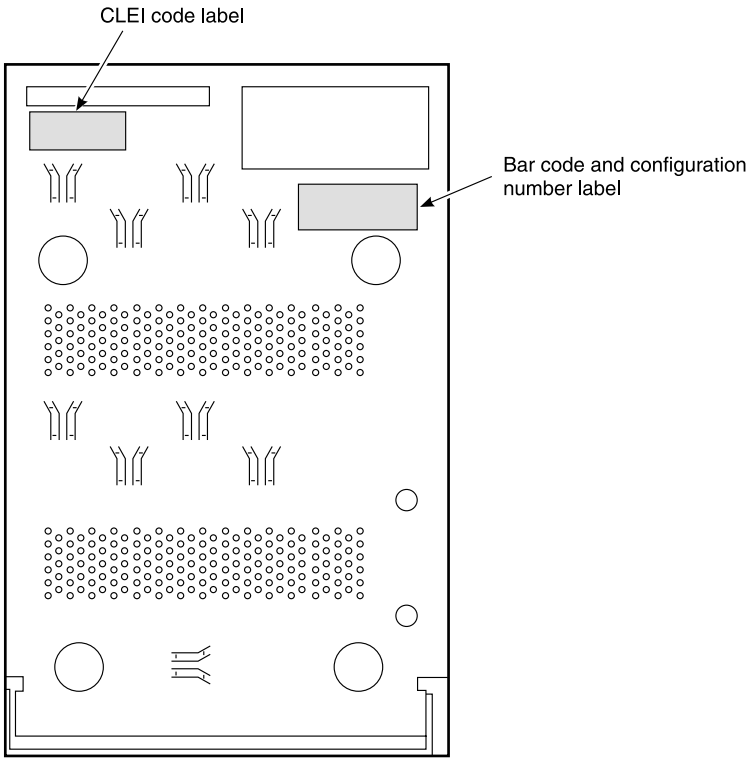


Figure 14. *Bar Code and Configuration Number Label Locations*

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.

SLOT PIN ASSIGNMENTS

Slot pin assignments for the various mechanics compatible with the HRE-204 are shown in the following figures:

- Figure 15 for the HRU-402
- Figure 16 on page 18 for the HLU-432
- Figure 17 on page 19 for the H2TU-R-402

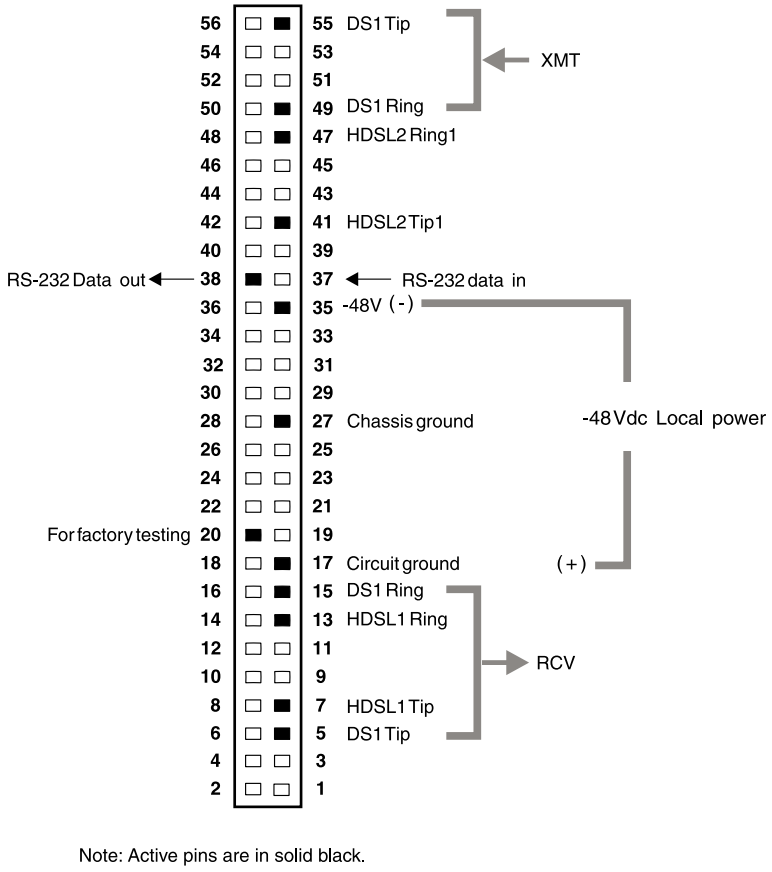


Figure 15. *HRU-402, List 4 Pin Assignments*

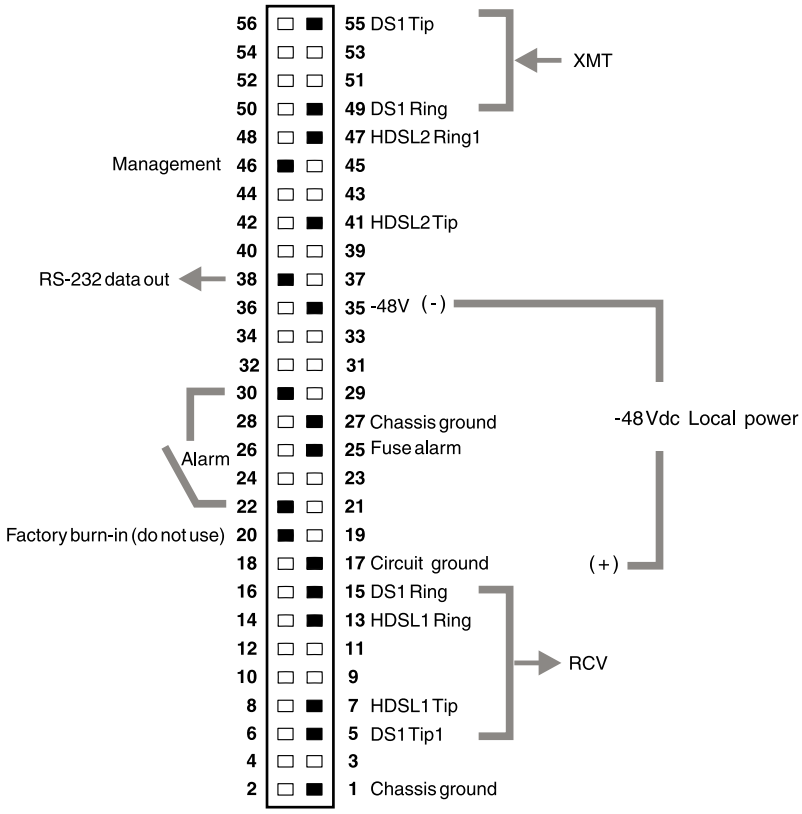
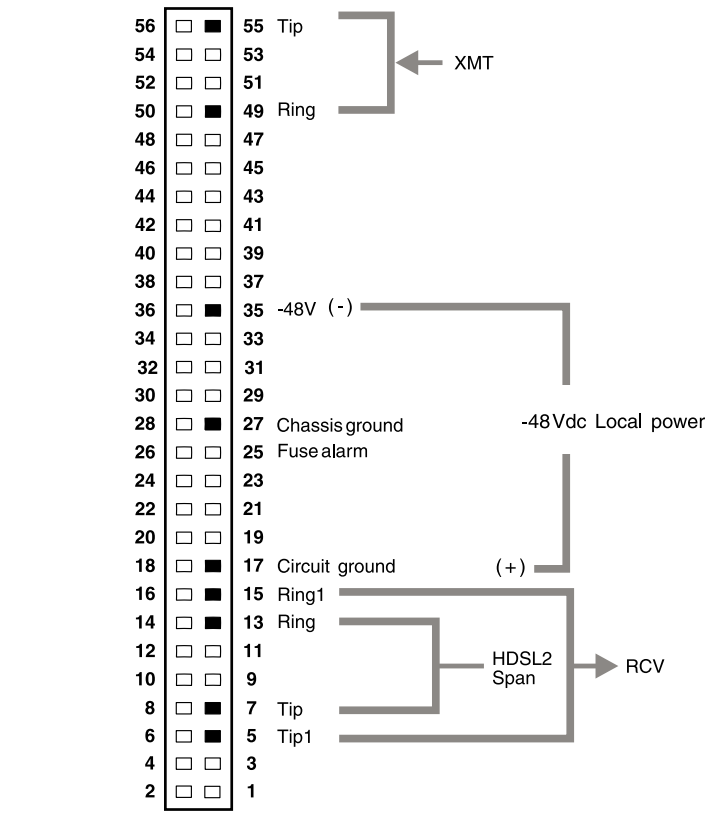


Figure 16. *HLU-432 Pin Assignments*



Note: Active pins are in solid black.

Figure 17. *H2TU-R-402, List 4 (HDSL2) Card-Edge Connector Assignments*

APPENDIX B - PRODUCT SUPPORT

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

TECHNICAL SUPPORT

Technical assistance is available 24 hours a day, 7 days a week by contacting PairGain Customer Service Group at:

Telephone:	800.638.0031 or 714.730.3222 The 800 telephone support line is toll-free in the U.S. and Canada.
Fax:	714.832.9924
Email:	support@pairgain.com

During normal business hours (7:30 AM to 5:30 PM, Pacific Time, Monday through Friday, excluding holidays), technical assistance calls are normally answered directly by a Customer Service Engineer. At other times, a request for technical assistance is handled by an on-duty Customer Service Engineer through a callback process. This process normally results in a callback within 30 minutes of initiating the request.

WORLD WIDE WEB

PairGain product and company information can be found at *http://www. pairgain.com* using any Web browser. To download PairGain product manuals from the Customer Site portion of the PairGain Web page, you need to provide a customer password. If you do not have a password, contact your PairGain sales representative.

RETURNS

To return equipment to PairGain:

1 Locate the number of the purchase order under which the equipment was purchased. To obtain a return authorization number, you need to provide the original purchase order number to PairGain's Return Material Authorization (RMA) Department.

2 Call or write PairGain's RMA Department to ask for an RMA number and any additional instructions. Use the telephone number, fax number, or email address listed below:

- Telephone: 800.370.9670
- Fax: 714.832.9923
- Email Address: rma@pairgain.com

3 Include the following information, in writing, along with the equipment you are returning:

- Company name and address.
- Contact name and telephone number.

- The shipping address to which PairGain should return the repaired equipment.
- The original purchase order number.
- A description of the equipment that includes the model and part number of each unit being returned, as well as the number of units that you are returning.
- The reason for the return. For example:
  - The equipment needs an ECO/ECN upgrade.
  - The equipment is defective.

If the equipment is defective, please tell us what you observed just before the equipment malfunctioned. Be as detailed in your description as possible.

If there is another reason for returning the equipment, please let us know so we can determine how best to help you.

4 Pack the equipment in a shipping carton.

5 Write PairGain's address and the RMA Number you received from the RMA Department clearly on the outside of the carton and return to:

PairGain Technologies, Inc.
14352 Franklin Ave.
Tustin, CA 92780-7013

Attention: **RMA (Number)**

All shipments are to be returned prepaid. PairGain will not accept any collect shipments.

APPENDIX C - ABBREVIATIONS

A

AWG: American Wire Gauge

C

CLEI: Common Language Equipment Identifier

COM: Common

CPE: Customer Premises Equipment

D

DS1: Digital Signal, level 1

E

ECI: Equipment Catalog Item

ECN: Engineering Change Notification

ECO: Engineering Change Order

EDS: Electrostatic Discharge Susceptibility

EMI: Electromagnetic Interference

F

FAC: Forced Authorization Code

H

HCDS: High Capacity Digital Service

HDSL: High bit rate Digital Subscriber Line

HLU: HiGain Line Units

HRE: HiGain Remote Enclosure

HRU: HiGain Remote Units

N

NEBS: Network Equipment-Building System

NO: Normally Open

NTF: No Trouble Found

R

RMA: Return Material Authorization

T

TB: Terminal Block

CERTIFICATION AND WARRANTY

LIMITED WARRANTY

PairGain Technologies, Inc. (“PairGain”) warrants that, for a period of ten (10) years from the date of shipment, the hardware portion of its products will be free of material defects and faulty workmanship, under normal use. PairGain's obligation, under this warranty, is limited to replacing or repairing, at PairGain's option, any such hardware product which is returned during the 10-year warranty period per PairGain's instructions and which product is confirmed by PairGain not to comply with the foregoing warranty.

PairGain 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 PairGain published specifications and documentation for such software. PairGain’s entire liability for software that does not comply with the foregoing warranty and is reported to PairGain during the 90-day warranty period is, at PairGain’s option, either (a) return of the price paid or (b) repair or replace of the software. [PairGain 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. PairGain will replace defective media at no charge if it is returned to PairGain during the 30-day warranty period along with proof of the date of shipment.]

The transportation charges for shipment of returned products to PairGain will be prepaid by the Buyer. PairGain 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.

PairGain 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 PairGain or in PairGain'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.

PAIRGAIN 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, PAIRGAIN 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.

RETURNS

PairGain continues to repair faulty modules beyond the warranty program at a nominal charge. Contact your PairGain sales representative for details and pricing.

MODIFICATIONS

Any changes or modifications made to this device that are not expressly approved by PairGain Technologies, 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-204 List 1A and List 2A has been tested and verified to comply with the applicable sections of the following standards:

- GR 63-CORE - Network Equipment-Building System (NEBS) Requirements
- Binational standard, UL-1950/1459/CSA-C22.2 No. 950-95: Safety of Information Technology Equipment

For technical assistance, refer to *“Appendix B - Product Support”* on page 20.

Corporate Office

14402 Franklin Avenue
Tustin, CA 92780

Tel: 714.832.9922
Fax: 714.832.9924

For Technical Assistance:

+800.638.0031 or +714.730.3222