HiGain

HiGain Remote Enclosure

Model	List Number	Part Number	CLEI Code
HRE-450	2B	150-1121-22	T1RHCGS4
HRE-450	3B	150-1121-32	T1M11N0C
HRE-450	4B	150-1121-42	T1M12N0C

ADC Telecommunications, Inc.
User Manual
Section 150-450-132-02

Revision History of This Manual

Revision	Release Date	Revisions Made
01	March 6, 2000	Initial Release
02	January 7, 2002	ADC Rebranding

USING THIS MANUAL

The following conventions are used in this manual:

Notes contain information about special circumstances.

Cautions indicate the possibility of equipment damage or personal injury.

For a list of abbreviations used in this document, refer to "Appendix B - Product Support" on page 14.

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. 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 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 technical practice describes the ADC® HiGain® Remote Enclosure Models HRE-450 List 2B, List 3B, and List 4B. The HRE-450 is one component of the HiGain T1 transmission system, which transmits data at up to 1.544 Mbps on two unconditioned copper pairs over the full Carrier Service Area (CSA) range. A HiGain system consists of a line unit and a remote unit, and may include up to four doublers to extend the transmission distance.

The HRE-450 is a weatherproof enclosure that houses either one single-slot HiGain Remote Unit (HRU) or one HiGain Doubler Unit (HDU). The HRE-450 is mounted outdoors on any suitable above-ground surface such as a concrete wall or wood telephone pole. It can not be installed underground, as this requires a sealed or pressurized unit to prevent water intrusion. The HRE-450 List 2B has a single 20-foot, gel-filled cable stub; the HRE-450 List 3B has a single 20-foot long, air-filled cable stub; the HRE-450 List 4B has no cable stub.

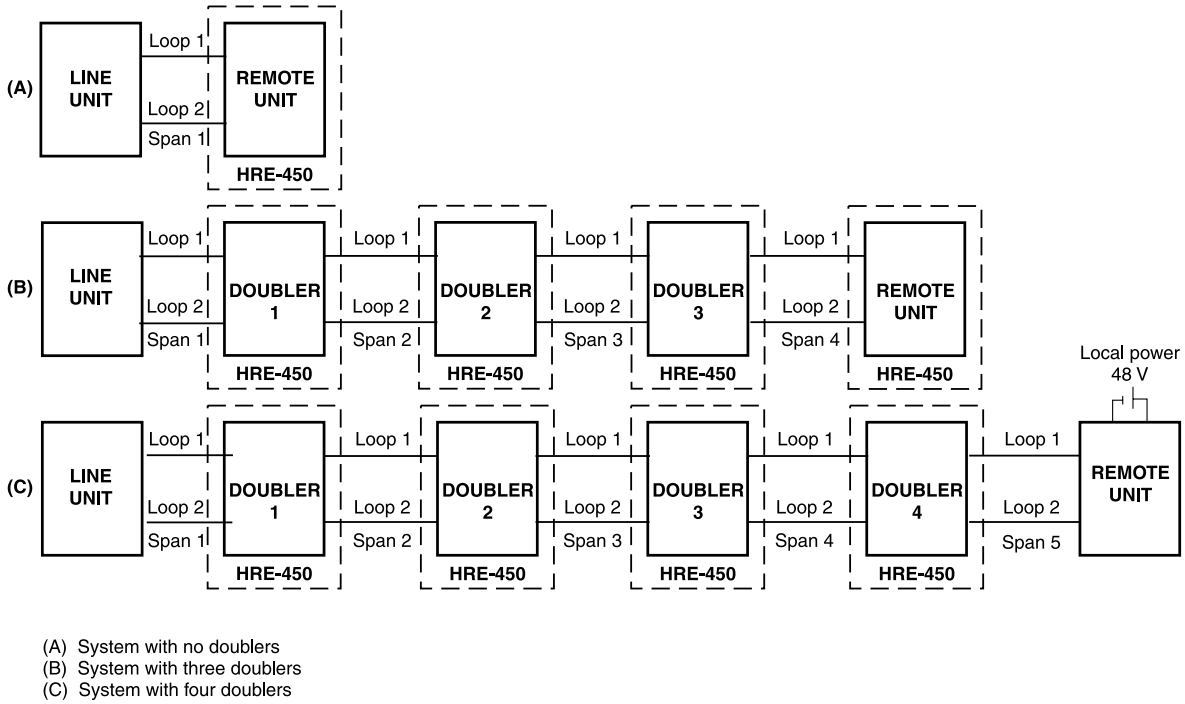
In contrast to the HRE-450 List 2, List 3, and List 4, which only accept 400 mechanics plugs, the List 2B, List 3B, and List 4B accept plugs with either 200 or 400 mechanics. These also support chassis/frame ground on both Pins 1 and 27.

FEATURES

- Compact design
- Easily mounted on a wall or pole using supplied screws
- Front cover opens easily, which enables quick inspection or service of enclosed unit
- Uses weather-sealing cable fittings that protect connections and provide strain relief
- Protects remote or line unit against adverse weather conditions and harmful contaminants
- Uses Quiet-Front Connector Modules (QFCMs) to provide electrical surge protection and corrosion-resistant wire

APPLICATIONS

Figure 1 shows three different HRE-450 applications. The line unit is installed in a Central Office (CO) shelf and the HRU or HDU is housed in an HRE-450. For customer applications located outside the CSA, one can deploy up to four doublers.



(A) System with no doublers
(B) System with three doublers
(C) System with four doublers

Figure 1. *HRE-450 Applications*

DESCRIPTION

This section describes the components and compatibility of the HRE-450.

HRE-450 COMPONENTS

The HRE-450 is a weather-resistant, non-pressurized, white rectangular enclosure with a removable front lid. It can house one unit with either 400 or 200 mechanics. (200 mechanics plugs are half the width of the 400 mechanics.) Figure 2 and Table 1 on page 4 identify the HRE-450 components.

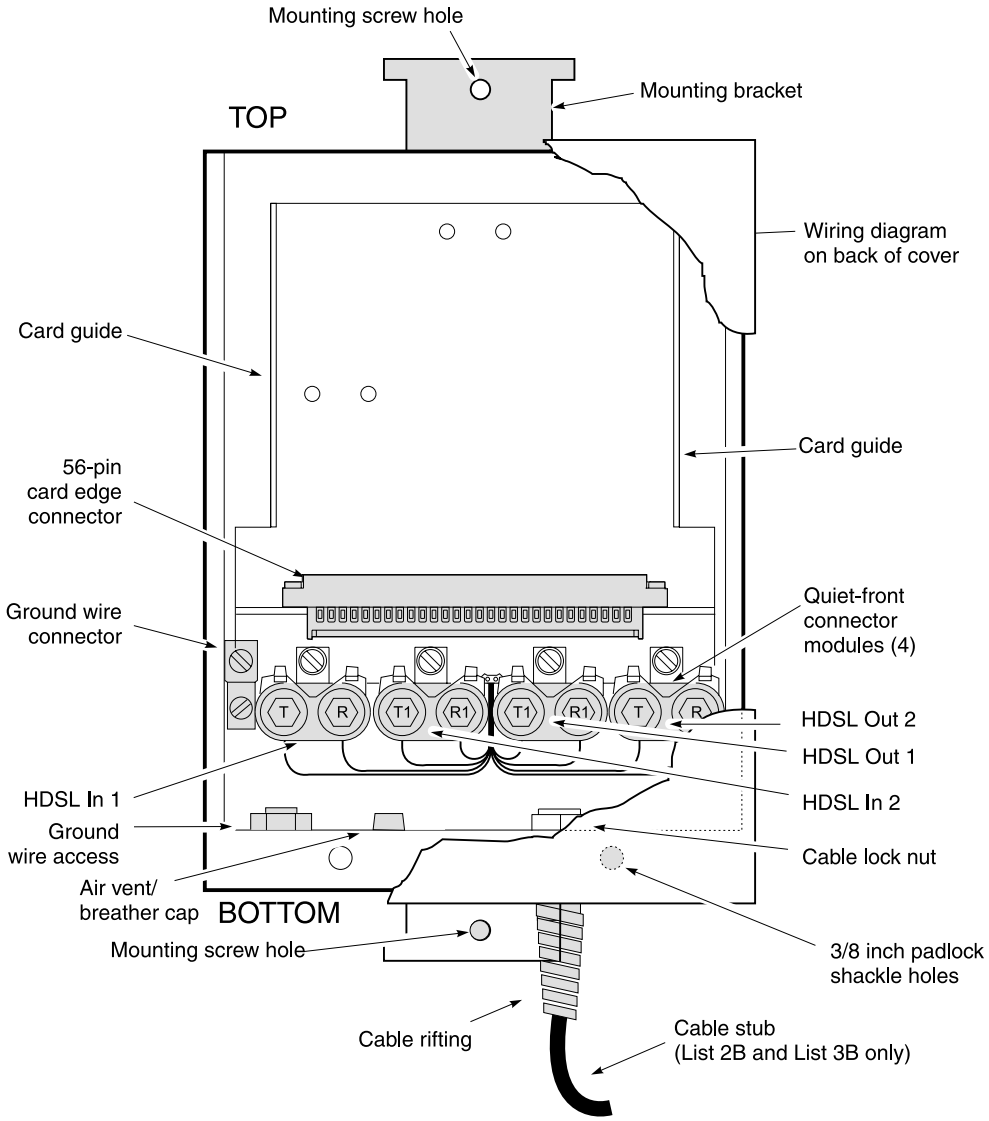


Figure 2. *HRE-450 Components*

Table 1. *HRE-450 Components*

Component	Function
Locking tab	Secures the unit to the connector.
Mounting screw guides	Indicate where to drill the mounting screw holes.
Mounting bracket	Secures the remote unit or doubler in the enclosure.
Wiring diagram label	Provides installation wiring diagram for both DS1 and HDSL interfaces.
56-pin card edge connector	Provides card edge connectivity for the installed remote or doubler unit.
Card guides	Guides and aligns card with card-edge connector during card insertion.
Quiet-Front Connector Modules	Primary surge protection to all four ports.
Ground wire connector	Used to attach the grounding wire.
Ground wire access	Access hole for insertion of ground wire lug.
Air vent/breather cap	Permits air circulation and keeps internal atmosphere free of harmful contaminants.
3/8 in. padlock shackle holes	Used to attach a padlock for security.
Cable stub	Provides access for HDSL and DS1 signal connections (List 3B only).
Compression connector nuts	Creates a nearly airtight fit to inhibit water and other contaminants.
Cable rifting	Protects excessive bending of stub at entrance point.

COMPATIBILITY

The HRE-450 is compatible with the following ADC products:

- HiGain Doubler Unit HDU-451
- HiGain Doubler Unit HDU-404
- HiGain Remote Unit HRU-412 (List 6 or greater)
- HiGain Remote Unit HRU-402
- HiGain HDSL2 Remote Unit H2TU-R-402

INSTALLATION

This section describes the tools and procedures for installing the HRE-450.

INSTALLATION KIT

The HRE-450 installation kit components are listed in Table 2. If any items are missing, or the shipment is damaged, please contact your ADC sales representative.

Table 2. *Installation Kit*

Quantity	Description
1	HiGain Remote Enclosure (HRE) 450 Technical Practice, Section 150-450-132-xx
2	Three wood screws (#10 x 1.5 inch)
1	Three anchor nuts (#10 x 1 inch)
2	Three flat washers (#10 CPS/ZPS)
2	One cable tie (5.5 inch length, 0.15 inch width)

LOCATING THE NECESSARY TOOLS

To install the HRE-450, you need the following tools:

- Blade screwdriver
- Drill
- Wood/metal or concrete drill bit, depending on installation surface
- Hammer
- Type 216C (7/16 inch) wrench

INSTALLING THE HRE-450

Install the HRE-450 onto a concrete or wood surface, such as a wall or telephone pole, using the hardware provided in the Installation Kit. The HRE-450 must be installed above ground, in a location that provides access to wiring and grounding connections. To install the unit:

1 Using a 3/8 inch wrench, loosen the cover screw on the HRE-450 and remove the cover.

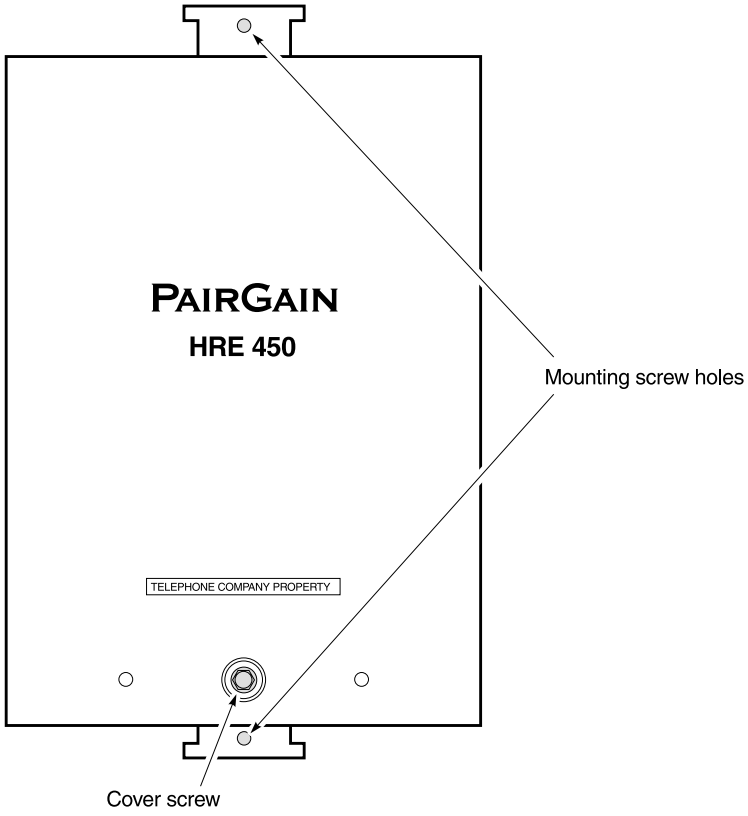


Figure 3. *HRE-450 Front Cover*

2 The two compression connector nuts must be secure to seal the unit from water damage. If a fitting is not secure, tighten it using your fingers.

To locate the two compression connector nuts, see Figure 6 on page 9.

3 Place the HRE-450 in the selected installation location, then mark the mounting screw hole locations on the installation surface using the mounting screw guides.

The HRE-450 must always be mounted vertically with the stubs pointing down. This prevents wind-driven rain and running water from entering the enclosure. Do not install horizontally.

4 Do one of the following:

- If the installation location is wood, use a drill with a wood or metal drill bit to drill the mounting screw holes into the wooden surface.
- If the installation location is concrete, use a drill with a concrete drill bit that is slightly smaller than the diameter of the anchor nuts to drill the mounting screw holes into the concrete surface. Insert the two anchor nuts into the mounting holes and tap the anchor nuts into place with a hammer.

5 While holding the HRE-450 in place, place a washer over one of the mounting-screw holes. Then use a #2 screwdriver to screw one of the provided screws into the mounting hole.

6 Do the same with the other mounting screw.

WIRING THE HRE-450 LIST 2B AND LIST 3B

The HRE-450 List 2B has a 20-foot gel-core stub. This stubs consists of a 6-pair, 24 AWG plastic-insulated, single-jacketed, gel-core cable. The HRE-450 List 3B has a 20-foot air-core stub. Conductors are insulated with solid high-density polyethylene. Standard color codes are used for pair identification with color compounds chosen for electrical balance and permanency. A non-hygroscopic core wrap protects the core and provides improved mechanical and electrical characteristics. The cable core shield is a corrugated copolymer coated 8 mil aluminum tape. The outer jacket consists of a black, low-density polyethylene material that provides a flexible protective covering that withstands exposure to sunlight, atmospheric temperatures, ground chemicals and stresses expected in standard installations. The cable complies with the requirements of ANSI/ICEA S-85-625-1989 and REA PE-22. The outside diameter of the cable is 0.36 inches (9 mm).

Figure 4 shows the identity of the four ports to which each cable stub provides access. The CO ports are restricted to the CO HDSL cable pair connections that connect the HRE-450 to either a doubler or a line unit. The field pairs connect to a downstream doubler or remote unit (for doubler applications), or to the DS1 interfaces (for remote unit applications).

Connect the HRE-450 to ground as follows:

1 Feed solid ground wire, up to #6 AWG, through the HRE-450 GND cable fitting.

2 Strip approximately $^{1}/_{2}$-inch of insulation from the end of the ground wire.

3 Insert the stripped wire into the ground wire access, then tighten the ground wire connector.

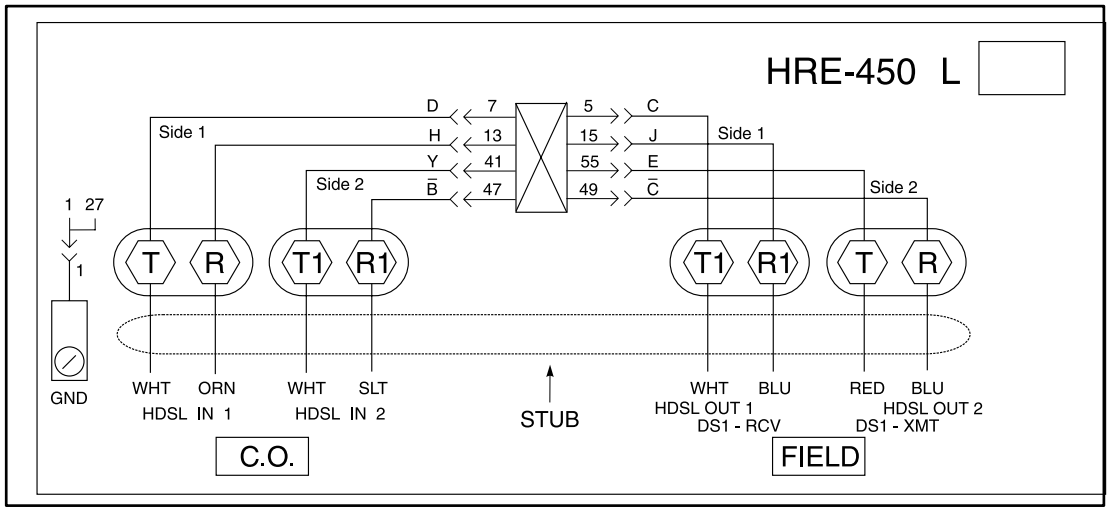


Figure 4. *HRE-450 Wiring Diagram*

The connections to the HRE-450 List 4B (no stub) are made directly to the 4 Quiet Front protectors shown in Figure 2 on page 3 and in Figure 4.

The wiring diagram and product barcode label are located on the reverse side of the HRE-450 cover. See Figure 5.

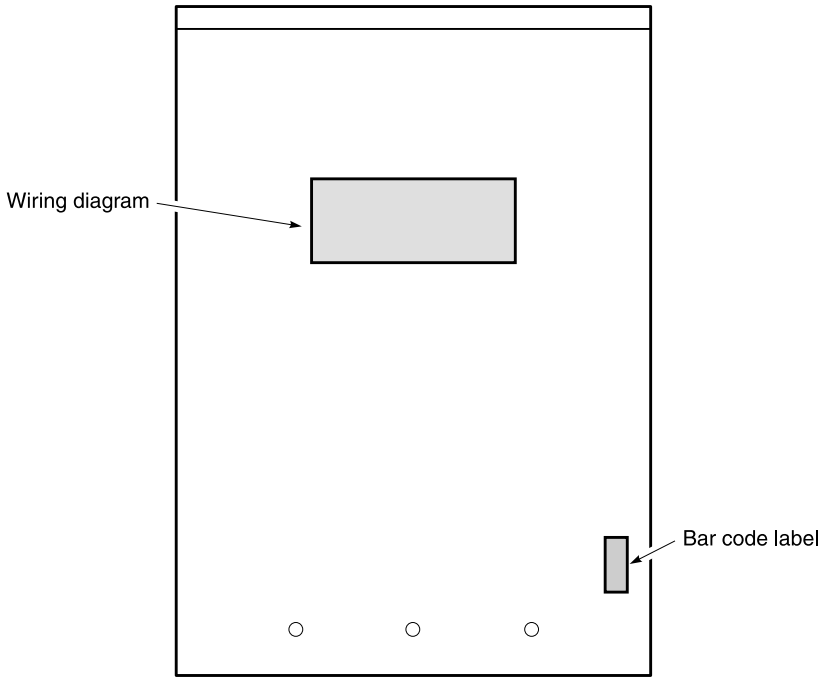


Figure 5. *Wiring Diagram and Barcode Label Locations*

WIRING THE HRE-450 LIST 4B (NO STUB)

Connect the HRE-450 List 4B to the signal cables and ground wire:

1 Loosen the compression connector nuts on the bottom of the HRE-450 using one of the following methods:

- Using your hand, turn the compression connector nuts counterclockwise.
- If the compression connector nuts are too tight to loosen by hand, use groove-joint pliers to hold each cable fitting center locknut, then use groove-joint pliers to turn each compression nut counterclockwise.

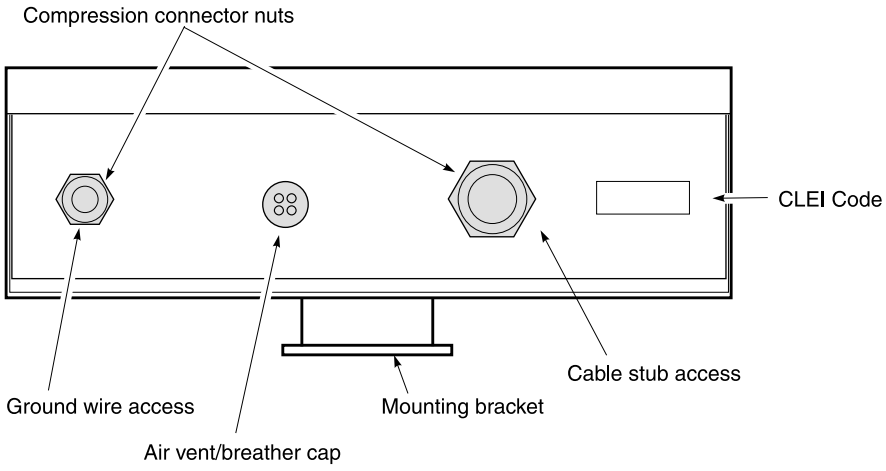


Figure 6. *Bottom View of the HRE-450*

2 Feed solid ground wire, up to #6 AWG, through the HRE-450 GND cable fitting.

3 Strip approximately 1/2-inch of insulation from the end of the ground wire.

4 Insert the stripped wire into the ground wire access, then tighten the ground wire connector.

5 Using your fingers, tighten the ground wire connector.

6 Remove the compression connector nut from the cable stub fitting.

7 Insert approximately 6 inches of interface telephone cable through the exposed cable stub fitting hub.

8 Slit the ends of the leads of each drop-wire pair and bend as shown in Figure 7.

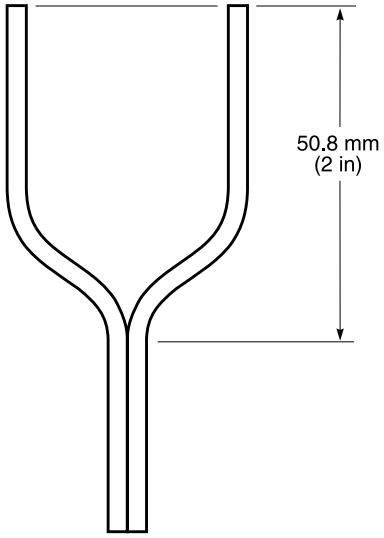


Figure 7. *Preparing the Wire Pair*

Do not strip the drop-wire pair insulation.

9 Use a Type 216C (7/16 inch) wrench to rotate each QFCM lug 1/4 turn counterclockwise to open the connectors.

Do not rotate the QFCM lug more than 1/4 turn or you will cut the wire.

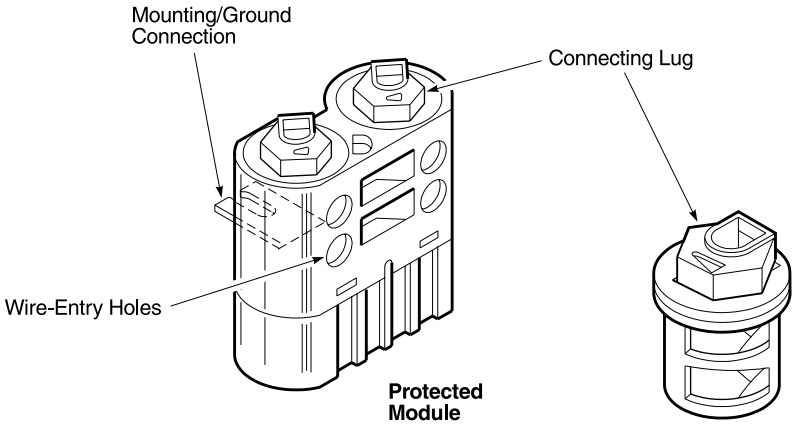


Figure 8. *Locating the QFCM Connecting Lug*

10 Insert the first pair's Tip and Ring wires into the Wire-Entry holes in the first QFCM, until the wires touch the ends of the transparent plastic caps.

11 While holding the Tip and Ring wires in place with your fingers, use a Type 216C (7/16 inch) wrench to rotate each QFCM lug 1/4 turn clockwise.

Do not rotate the QFCM lug more than 1/4 turn or you will cut the wire.

12 Using your fingers (do not use pliers or a wrench), tighten the cable rifting compression nut.

If necessary, use groove-joint pliers to hold each cable rifting center locknut while tightening each compression nut with your fingers.

13 Use cable ties to dress the wires that enter the enclosure box and connect to the QFCM terminals, per local practice.

14 Position and secure the ground wire along the installation surface and connect it to a nearby ground, per local practice.

INSTALLING A DOUBLER OR REMOTE UNIT

To install a doubler or remote unit in the HRE-450:

1 Slide the doubler or remote unit into the slot until firmly seated.

2 Slide the enclosure's locking tab over the doubler or remote unit's handle and tighten the tab screw.

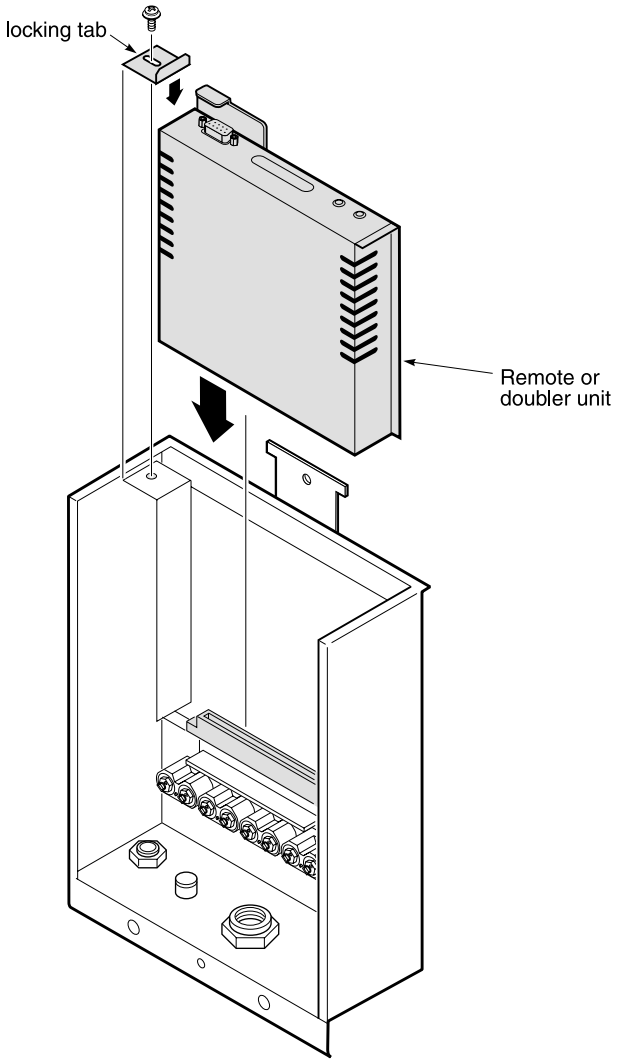


Figure 9. *Installing a Remote or Doubler Unit in an HRE-450*

3 Verify that the unit completes its initial power-on cycle and that both front-panel HDSL LEDs light green.

4 Attach the HRE-450 cover and use a torque wrench to tighten the screw to approximately 6 to 8 inch/pounds (maximum).

APPENDIX A - SPECIFICATIONS

This appendix describes the HRE-450 technical specifications.

Physical

Material	Steel
Finish	Zinc plated
Mounting	Wood, wall or pole

Enclosure Box

Height	9.31 inch (23.65 cm)
Width	7.31 inch (18.57 cm)
Depth	2.31 inch (5.87 cm)

Enclosure Lid

Height	10.25 inch (26 cm)
Width	7.5 inch (19.1 cm)
Depth	2.69 inch (6.83 cm)

Quiet Front Connector Modules (QFCM)

Electrical Protection	Each QFCM module contains a 60 A, three-element, gas-tube surge protector with a 265-600 Vdc breakdown voltage at breakdown rate of 2000 V/second.
Specification compliance	PB 80 Heavy Duty, Bellcore TP-TS-1-000073, GTS 8376, UL 497

Environmental

Operating Temperature	-40 ℃ to + 65 ℃ (-40 ℉ to 149 ℉)
Operating Humidity	5 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 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
BIA Technical Assistance Center 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.	

APPENDIX C - GLOSSARY

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
CSA	Carrier Service Area
DS1	Digital Signal, level 1
GND	Ground
HDSL	High-bit-rate Digital Subscriber Line
HDU	HiGain Doubler Unit
HRE	HiGain Remote Enclosure
HRU	HiGain Remote Unit
H2TU-R	HDSL2 Remote Unit
LED	Light Emitting Diode
QFCM	Quiet-Front Connector Module
RMA	Return Material Authorization
UL	Underwriters' Laboratories

CERTIFICATION AND WARRANTY

FCC CLASS A COMPLIANCE

The HRE-450 List 2B, List 3B, and List 4B does 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. If operating such a system in a residential area, 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 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., voids the user's warranty.

All wiring external to the products should follow the provisions of the current edition of the National Electrical Code.

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