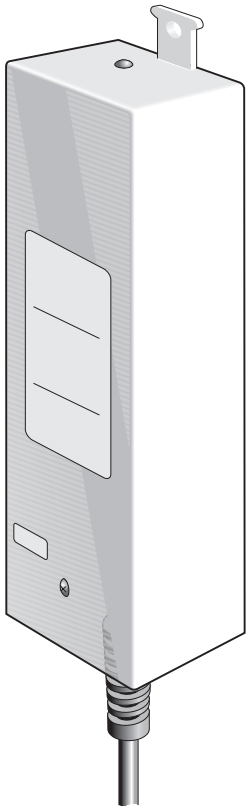
USER MANUAL



HRE-602 List 1
Part Number: 150-2255-01
CLEI: T1M1ZM0C

HRE-602 List 1B
Part Number: 150-2255-12

Revision History of This Manual

Revision	Release Date	Revisions Made
01	November 3, 1999	Initial release
02	June 30, 2000	Added HRE-602 List 1B
03	September 29, 2000	Revised Figure 3
04	August 9, 2002	ADC rebrand

USING THIS MANUAL

The following conventions are used in this manual:

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

Notes contain information about special circumstances.

Cautions indicate the possibility of personal injury or equipment damage.

The Electrostatic Discharge (ESD) 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 13.

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 "Appendix B - Product Support" on page 12. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

This practice describes the HiGain® Remote Enclosure Model HRE-602 List 1 and List 1B. The HRE-602 is a weatherproof, outdoor, dual-slot enclosure that houses the following units:

- HiGain Mini Doublers (require two slots)
  - HDU-217
  - HDU-219
  - HDU-407
  - HDU-437
  - HDU-439
- HiGain Micro Doubler, HDU-409 (requires one slot)
- HiGain WorldAccess Mini Doublers (require two slots)
  - EDU-840
  - EDU-841

The HRE-602 List 1 and List 1B differ only in the length of the gel-filled cable stub. Table 1 shows the difference between the two units.

Table 1. *Cable Stub Length*

HiGain Remote Enclosure	Cable Stub Length
HRE-602 List 1	20 ft (6.10 m)
HRE-602 List 1B	100 ft (30.48 m)

The HRE-602's unscreened cable stub is incompatible with the 239 T1 repeaters, which require screened cables to control crosstalk.

FEATURES

- Compact dimensions
- Eliminates need for expensive controlled environmental vaults
- Unaffected by dust, wind, rain, sleet, ice, and snow
- Easily mounted with two screws on a wall or pole
- Weather-sealing cable fittings that protect connections and provide strain relief
- Easy-open bottom cap, secured by one retaining screw and four compression bolts
- Compatible with aboveground and belowground installations
- Replaceable gas-tube surge voltage protection on all eight ports

APPLICATIONS

The HRE-602 List 1 and List 1B houses doublers and allows quick and easy deployment of a single- or multi-doubler circuit, as shown in Figure 1.

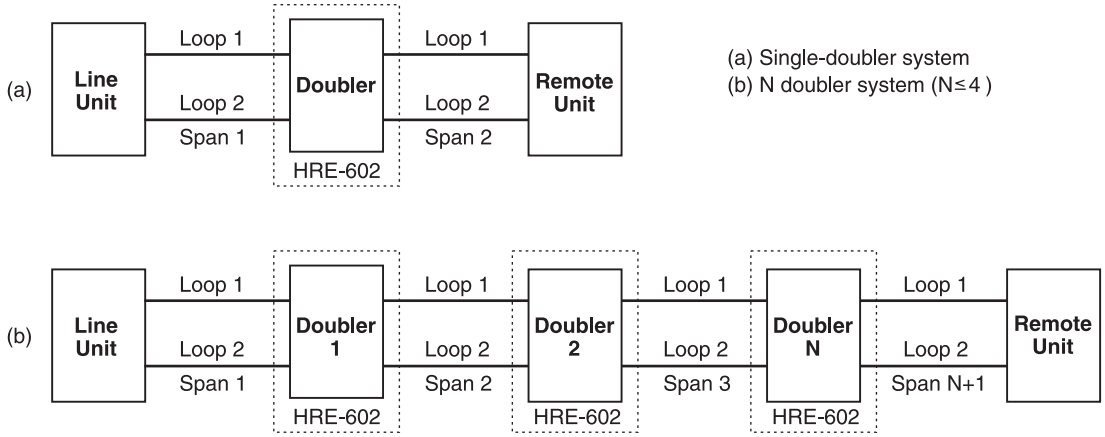

Figure 1. *HRE-602 Applications*

PRODUCT DESCRIPTION

The HRE-602 List 1 and List 1B include:

- External mechanics featuring:
  - HRE-602 List 1: 20 ft (6.1 m) gel-filled stub

    HRE-602 List 1B: 100 ft (30.48 m) gel-filled stub
  - Ground wire
  - End cap
- Internal mechanics featuring:
  - Card-edge connector
  - Gas-tube protectors

EXTERNAL MECHANICS

Figure 2 shows the external mechanics of the HRE-602 including the cable stub wiring assignments and enclosure dimensions.

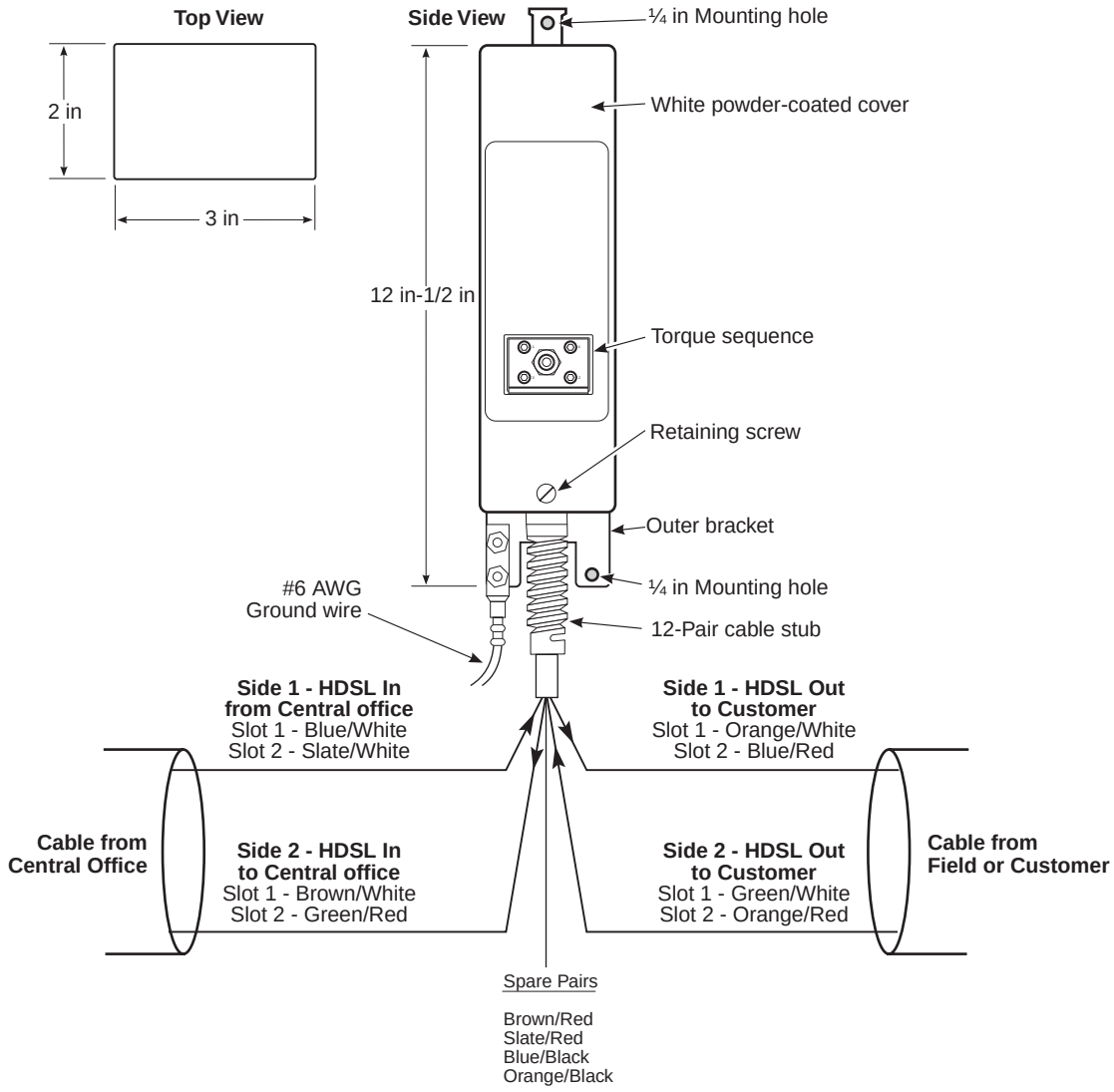

Figure 2. *HRE-602 External Mechanics*

HRE-602 Gel-Filled Stub

The enclosure has a single, 12-pair gel-filled stub for access to the doubler's eight ports, plus a No. 6 American Wire Gauge (AWG), stranded ground wire. The 24 AWG stub has a foam skin insulation with a filled jacket intended for aerial (aboveground) applications. Each conductor has dual insulation consisting of an inner coating of natural, insulating-grade, high-density cellular polyethylene covered by an outer skin of color-coded, high-density solid polyethylene. Standard color codes are used for pair identification with color compounds chosen for electrical balance and permanency.

The assembly is flooded with an ETPR compound that fills the air space between the insulated conductors. A non-hygroscopic core wrap protects the core and provides improved mechanical and electrical characteristics. The inner surface of the core wrap is coated with the ETPR filling compound. The outer surface is coated with an amorphous polypropylene compound. 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-84-608-1994. The outside diameter of the cable is 0.48 inches (12.2 mm).

The stub is routed through a ferrite coil, which prevents internal EMI energy from exiting and terminates on an internal assembly. The assembly contains the card-edge connector and gas-tube protector board.

Figure 3 details the eight doubler ports and the eight stub cable pairs that terminate at each port. The CO ports connect to the upstream cable pair connections to either another doubler or the line unit. The field ports connect to the downstream cable pair connections to either another doubler or remote unit. The four spare pairs remain unterminated.

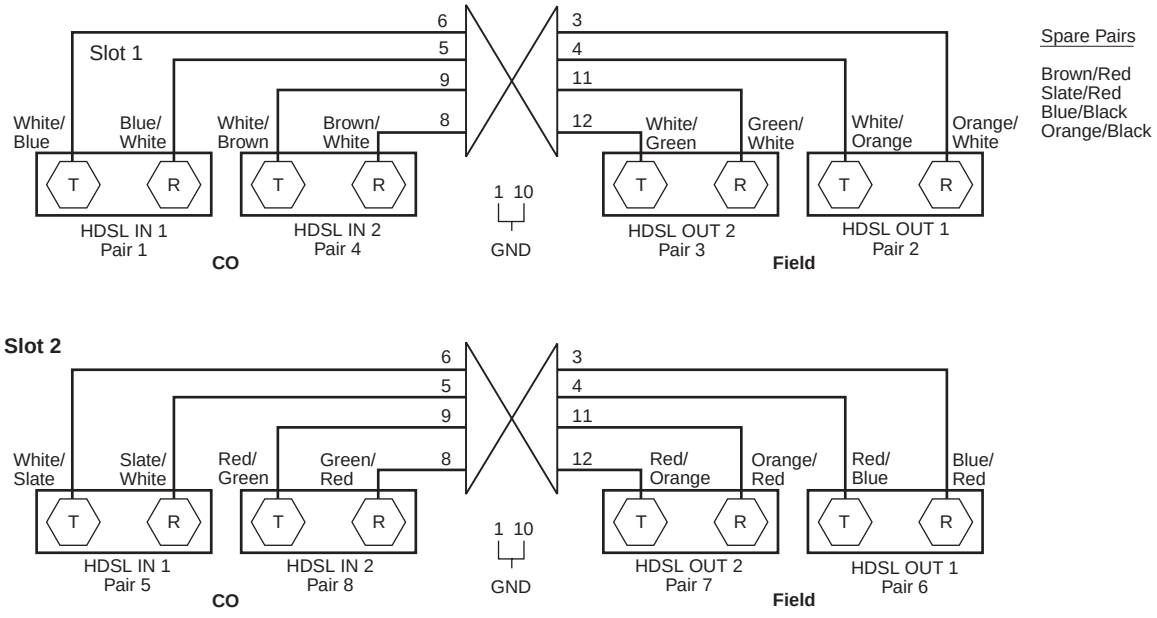

Figure 3. *Wiring Diagram*

Ground Wire

The ground wire provides both EMI and voltage surge protection to the doublers.

End Cap

Four compression bolts reside on the outer end plate. When properly torqued, these bolts compress a thick neoprene washer that is located between the two end plates on the enclosure, shown in Figure 4. This compression causes the washer to expand against the enclosure sides to form a waterproof barrier. The enclosure can then be installed anywhere in the network, including locations submerged in water.

INTERNAL MECHANICS

Figure 4 shows a front view of the HRE-602.

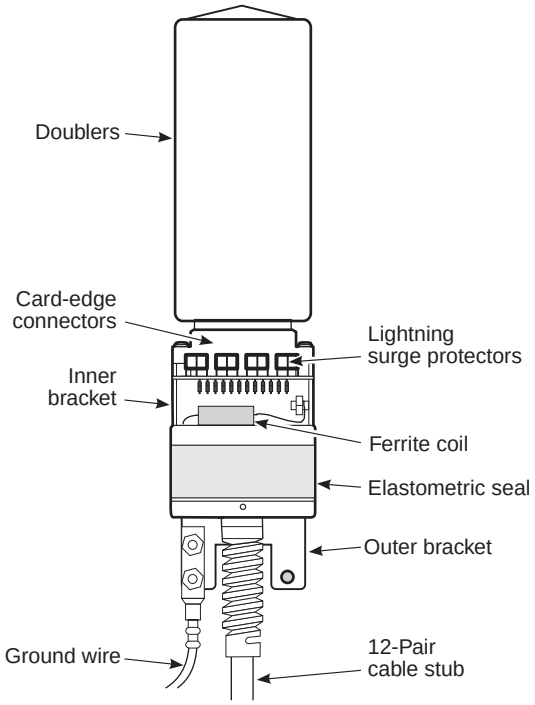

Figure 4. *Internal Mechanics*

Card-Edge Connectors

Figure 3 on page 5 details the wiring specifications for both card-edge connectors.

Gas-Tube Protectors

The eight replaceable gas-tube protectors are equivalent to a TII 47BT and have a breakdown voltage ranging from 300 V to 500 V. The breakdown voltage is a function of voltage rise-time. The tubes can withstand at least 400 repetitions at 10/1000 rise-time with 500 Amp discharges.

Thermal Deployment Limits

The HRE-602 can be deployed in an ambient temperature up to +135 °F (+57.2 °C) without solar load when housing one doubler. Reduce these limits by +10 °F (+12.2 °C) when housing two HDU-409 doublers.

These requirements comply with Bellcore standards, which require HDSL equipment placed in outdoor cabinets to operate in a temperature of -40 °F (-40 °C) outside the housing without solar load and +115 °F (+46.1 °C) with maximum solar load and maximum power dissipation.

Full solar load is equal to maximum sunlight exposure as defined in Bellcore's Technical Advisory TR-TSY-000057.

HRE-602 Replacement Kit

A replacement kit containing twenty TII 47BT gas-tube protectors is available from ADC (part number 132-1028-01). "Appendix B - Product Support" on page 12 details the ordering information.

INSTALLATION

This section provides information on installing a doubler or repeater in the HRE-602 List 1 and List 1B and mounting the enclosure. Part number and wiring information are also provided.

INSTALLATION KIT

Table 2 lists the HRE-602 installation kit components. If any of these items are missing or the shipment damaged, please contact your HiGain sales representative.

Table 2. *Installation Kit*

Quantity	Description
2	#12 x 1-inch screws
1	$^{3}/_{16}$-inch hex (Allen) wrench
2	Flat washers: $^{1}/_{4}$-inch inside diameter (ID), $^{1}/_{2}$-inch outside diameter (OD)
2	Anchor nuts
1	Desiccant capsule

TOOLS

To install the HRE-602, you need the following tools:

- Blade screwdriver
- Drill
- Wood/metal or concrete drill bit, depending on the installation surface
- Torque wrench

INSTALLING DOUBLERS

To install a doubler in the HRE-602:

1 Remove the small retaining screw from the lower front side of the case shown in Figure 2 on page 4.

2 Loosen, but do not remove, the four compression bolts from the end cap.

3 Remove the end cap.

4 Insert the doublers into the end caps of the edge connectors.

5 Remove the desiccant packet from the installation kit. Remove the desiccant capsule from the desiccant packet and place the capsule above the ferrite coil in the inner bracket shown in Figure 4 on page 6.

6 Replace the case, then insert the retaining screw.

7 Torque the four compression bolts in the sequence shown in Figure 5 below. In addition, the four compression bolts must be torqued according to their specified torque levels and in the number sequence shown in Table 3.

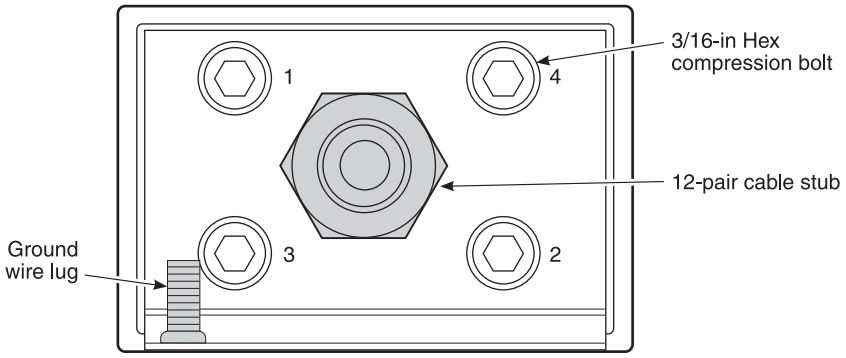

Figure 5. *End Cap Compression Bolts*

Table 3. *Torque Sequence Chart*

Number Sequence	Torque
1	30 inch/pounds (76.2 centimeter/kilograms)
2	40 inch/pounds (101.6 centimeter/kilograms)
3	40 inch/pounds (101.6 centimeter/kilograms)
4	40 inch/pounds (101.6 centimeter/kilograms)
1	50 inch/pounds (127.0 centimeter/kilograms)
2	55 inch/pounds (139.7 centimeter/kilograms)
3	55 inch/pounds (139.7 centimeter/kilograms)
4	55 inch/pounds (139.7 centimeter/kilograms)
1	70 inch/pounds (177.8 centimeter/kilograms)
2	75 inch/pounds (190.5 centimeter/kilograms)
3	75 inch/pounds (190.5 centimeter/kilograms)
4	75 inch/pounds (190.5 centimeter/kilograms)
1	75 inch/pounds (190.5 centimeter/kilograms)

MOUNTING

To mount the enclosure:

1 Select a location that allows access to wiring and grounding connections through the cable fittings on the bottom of the HRE-602.

2 Place the HRE-602 in the mounting location, then mark the mounting hole locations with a pencil. Figure 6 shows the mounting hole locations on the enclosure.

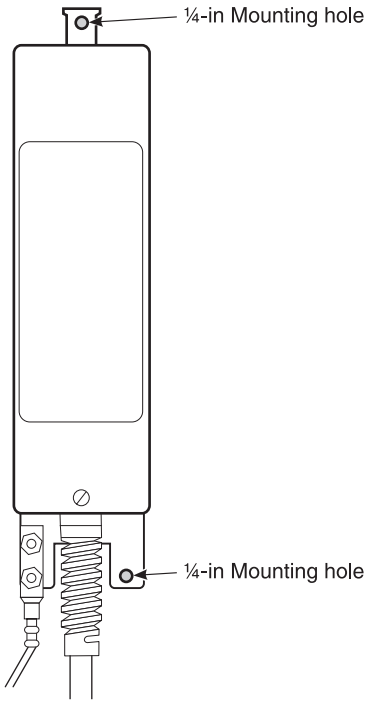

Figure 6. *Front View of Mounting Hole Locations*

3 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.
- 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.

4 Insert the anchor nuts into the pilot holes and tap the anchor nuts into place with a hammer.

5 Use a No. 2 slotted screwdriver to fasten the enclosure onto the mounting location using the two screws and two washers provided in the installation kit.

GROUNDING

The stub shield must be connected to the shield of the feeder cable during splicing since it is not connected to the enclosure ground. Failure to do so will expose the signal pairs to stray EMI which could introduce service affecting noise into the information payload. The No. 6 ground wire must also be properly grounded to provide both EMI and voltage surge protection for the doublers.

APPENDIX A - SPECIFICATIONS

The HRE-602 List 1 and List 1B outer enclosure has the following specifications:

Length	12.5 in (31.7 cm)
Width	3 in (7.7 cm)
Depth	2 in (5.1 cm)
Weight	3.5 lbs (1.6 kg)

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.

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 800.638.0031 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 telephone numbers with an 800 prefix are toll-free in the USA and Canada.

APPENDIX C - ABBREVIATIONS

A

Amp: Amperes

AWG: American Wire Gauge

C

CLEI: Common Language Equipment Identifier

CO: Central Office

E

EDU: ETSI Doubler Unit

EMI: ElectroMagnetic Interference

ETPR: Extended Thermoplastic Rubber

H

HDU: HiGain Doubler Unit

HRE: HiGain Remote Enclosure

I

ICEA: Insulated Cable Engineers Association

CERTIFICATION AND WARRANTY

FCC COMPLIANCE

The HRE-602 List 1 and List 1B do not have a clocking source and are passive devices per FCC guidelines. When a unit is 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 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-602 List 1 and List 1B have been tested and verified to comply with the applicable sections of the following safety standards:

- TR-TSY-000056
- GR 950-CORE Section 5.5.6 and 6.5.6
- T4.1E-IEC 68-2

For technical assistance, refer to “Appendix B - Product Support” on page 12.

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DOCUMENT: 150-602-100-04
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