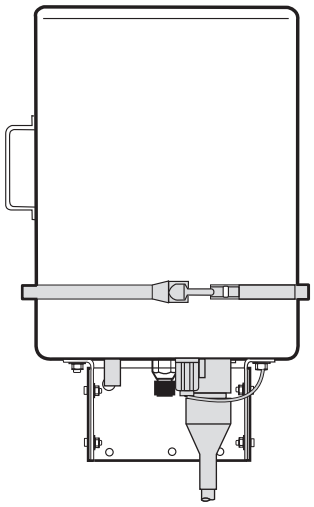
USER MANUAL



HRE-506

List 1

Part Number: 150-2204-01
CLEI: T1RHT0V4

List 2

Part Number: 150-2204-02
CLEI: T1RHT0W4

Revision History of This Manual

Issue	Release Date	Revisions Made
01	January 21, 1999	Initial release.
02	March 28, 2000	Changed plastic valves to all metal valves on the gel-filled and air-filled units.
03	August 5, 2002	Rebrand

USING THIS MANUAL

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

Notes indicate special circumstances.

Cautions indicate the possibility of either personal injury or equipment damage.

For a list of abbreviations used in this document, refer to “Appendix D: Abbreviations” on page 45.

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. 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 “Appendix C - Product Support” on page 44. If you must store the equipment for a prolonged period, store the equipment in its original container.

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OVERVIEW

The ADC® HiGain® HRE-506 List 1 (gel-filled) and List 2 (air-filled) are outdoor, stainless steel, weatherproof enclosures designed to house up to six HiGain remote or doubler units. The HRE-506 is part of a HiGain system.

FEATURES

The following features are included on the HRE-506 weatherproof enclosures:

- Six doubler card slots for these units:
  - HDU-437 and HDU-407 (DDS Mechanics), HDU-439 (Dual 239 T1 Mechanics), HDU-409, EDU-409 (Single 239 T1 Mechanics) Full T1 doublers, or EDU-842 (DDS Mechanics/ETSI)
  - HDU-217 (DDS Mechanics) or HDU-219 (Dual 239 T1 Mechanics) Fractional T1 doublers
  - T1 repeaters
- 30-foot (9.144 M) gel- or air-filled 28-pair cable stub
- Flat surface, rack, or pole mount
- Primary surge protection
- Seamless stainless steel cover
- Single stub access
- Tilt-forward mounting
- Unique card guides automatically adapt every slot to three mechanics

APPLICATIONS

The primary application of the HRE-506 remote enclosure is to house HiGain remote or doubler units in an HDSL/T1 transmission system. The HRE-506 is an outdoor enclosure with six single-width mechanical slots. It has a single gel-filled stub (HRE-506 List 1) or air-filled stub (HRE-506 List 2).

The air-filled unit can be pressurized locally or from the main feeder cable through an air core stub. This air core stub protects the air-filled unit from flooding the water when it is mounted in underground manholes.

The gel-filled unit is intended for above ground pole mounting applications that do not require pressurization through the cable stub. However, if you prefer to pressurize the unit, it can be locally pressurized through its Air Stem/Air Inlet T valve, as shown in Figure 1 on page 2.

Both units have primary gas-tube surge protection on all cable pairs.

The HRE-506 can house the following doubler and repeater units. All doublers and repeaters share the same generic slot pair assignments as shown in Table 1 on page 18.

- HDU-439, HDU-437, HDU-409 or HDU-407 Full T1 unit (1.544 Mbps)
- HDU-219 or HDU-217 Fractional T1 unit (0.772 Mbps)
- EDU-842 ETSI unit (2.048 Mbps) and EDU-409 E1 unit (2.048 Mbps)
- ISDN repeater
- DDS repeater
- 239 T1 repeater

PRESSURIZED APPLICATIONS

For pressurized applications on the HRE-506, the Schrader air stem valve is used. A pressure gauge attaches to the valve for the purpose of measuring the internal pressure of the enclosure. This valve is also used to relieve the internal pressure prior to opening and removing the dome cover. This can be done by depressing the center pin on the valve. Figure 1 below shows the air stem valve location.

Depressurizing must be performed every time the cover is removed from the enclosure. Failure to do so may cause personal injury or damage to the equipment.

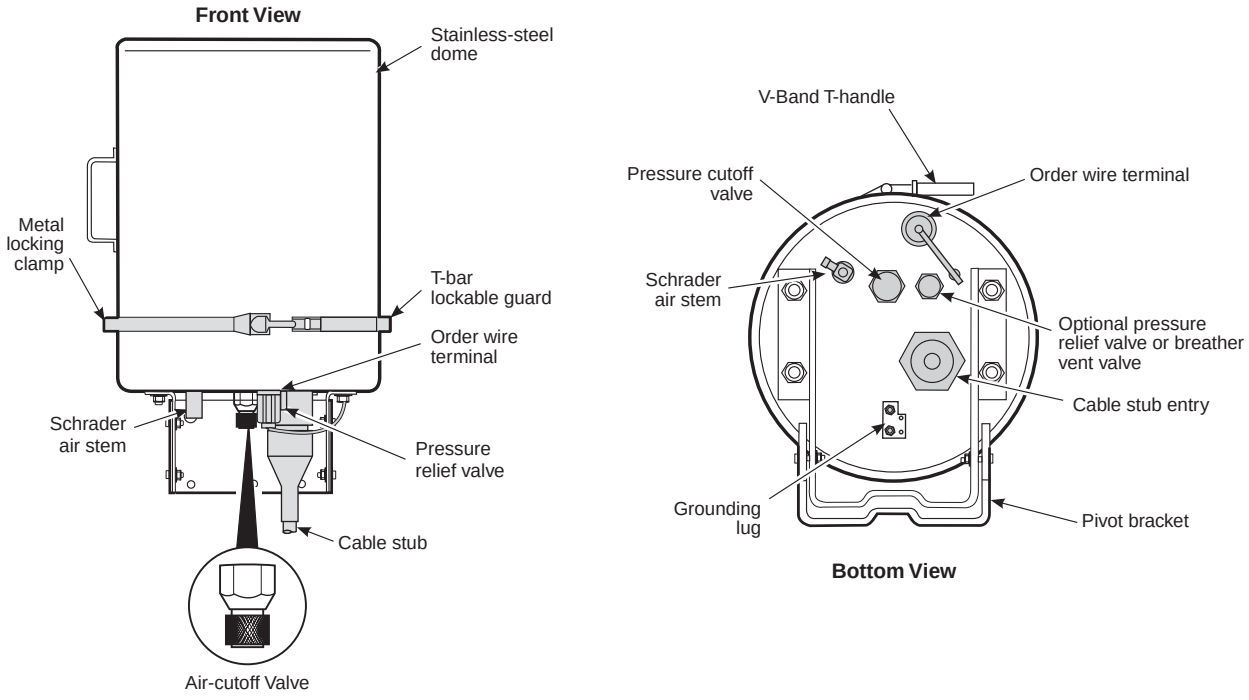


Figure 1. *HRE-506 List 2 Remote Air-Filled Enclosure*

An optional breather vent assembly is enclosed in the air-filled HRE-506 List 2 shipping kit. The kit is a small plastic bag attached to a red and brown colored spare pairs shrink tube. The breather vent replaces the pressure-relief valve, if the air-filled unit is not pressurized. The assembly allows the enclosure to breathe and keeps the internal atmosphere free of harmful contaminants. Figure 2 on page 3 shows the five metal valves.

Unlike the gel-filled unit, the pressure cutoff valve in the air-filled unit cannot be used to cut off an external air source that is applied to the Schrader air stem valve. The air-filled unit pressure cutoff valve can only control the air source that is applied to the enclosure through the air core stub.

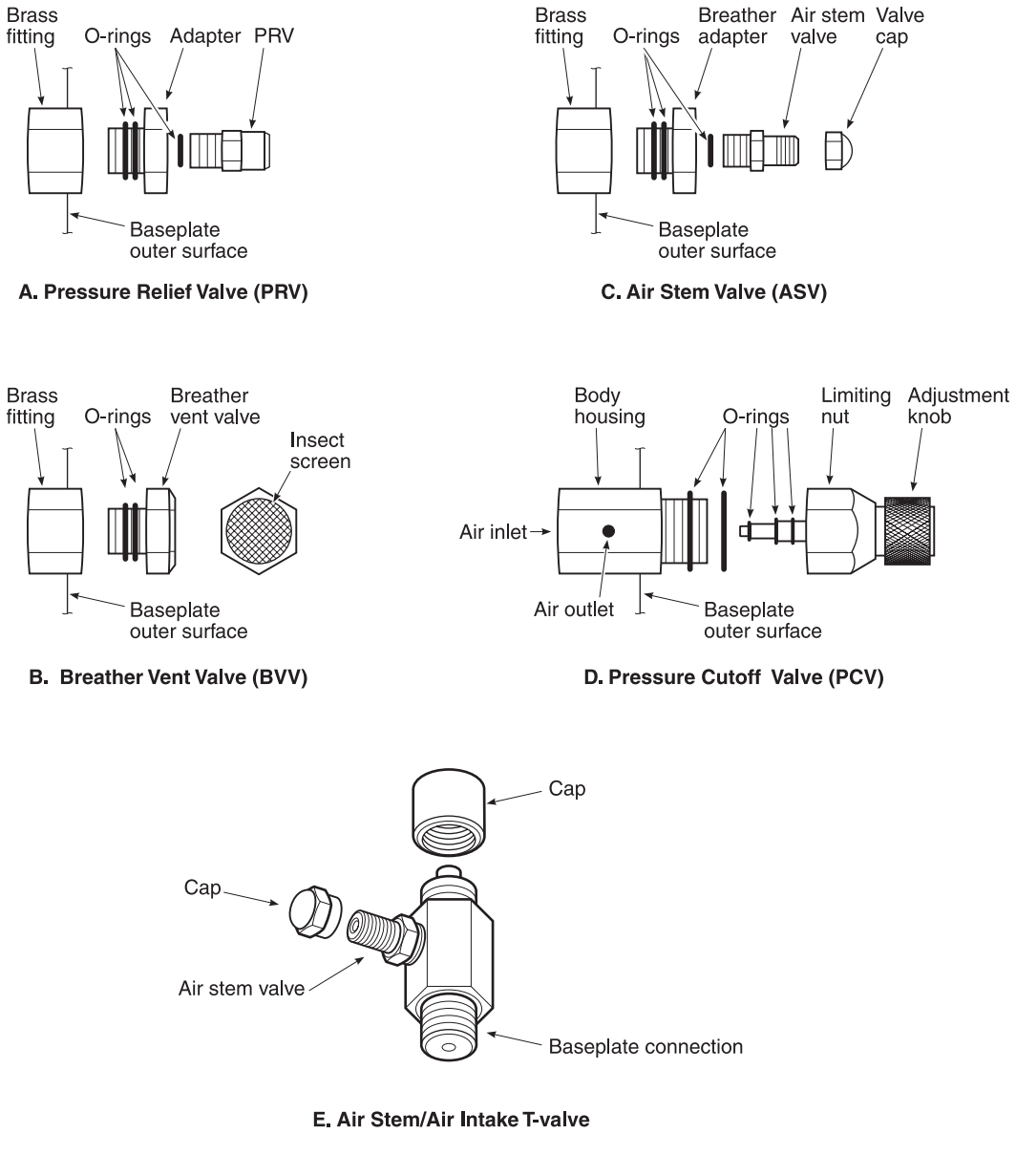


Figure 2. *Metal Valves*

FUNCTIONAL DESCRIPTION

The following section discusses the function of each component on the HRE-506. The HRE-506 consists of an aluminum card cage with a holding capacity for up to six remote or doubler units, a stainless steel composite baseplate, and a stainless steel cover that maintains weather-tight integrity.

Gel-Filled Unit

The gel-filled HRE-506 List 1 unit is equipped with three metal valves installed in the base section, as shown in Figure 3 on page 5. The gel-filled screened 28-pair, 24 American Wire Gauge (AWG) cable stub on the gel-filled unit is equivalent to an ALP FTS-PIC filled-core telephone cable. The unit has foam skin insulation with a single-filed jacket. This insulation allows the cable stub on the gel-filled unit to be used in buried, aerial, and duct applications.

Standard color codes are used for pair identification with color compounds chosen for electrical balance and permanency. The outer jacket provides a flexible protective covering that withstands exposure to sunlight, atmospheric temperatures, ground chemicals, and stresses expected in standard installations. The outside diameter of the cable is 0.64 inches (16.25 mm).

The cable complies with the requirements of the American Standards Institute (ANSI) and the Insulated Cable Engineers Association (ICEA) S-84-608-1994 and REA PE-89, respectively.

The gel-filled unit is similar to the air-filled unit, except that the gel-filled unit has a breather vent valve instead of a pressure relief valve. The breather vent valve allows the circulation of outside air through the gel-filled enclosure when it is not pressurized. Circulating outside air through the gel-filled enclosure prevents the buildup of excessive moisture and other damaging contaminants within the enclosure.

A combined Schrader air stem and external air input T-valve is also included with the gel-filled units. The Schrader air stem valve can be used to connect to an external air source or release the internal pressure whenever the dome is removed. Opposite the Schrader valve, the external air input valve accepts tubing for connection to an external air source. The pressure cutoff valve allows the external source of air to be cutoff, when the dome is opened.

An optional pressure relief valve is included in the shipping kit for the gel-filled unit. The kit comes in a small plastic bag that is attached to the shrink tab on one of the spare pairs. Use the pressure relief valve in place of the breather vent assembly when the gel-filled unit is to be locally pressurized. For installation details, see “HRE-506 List 1 Vented to Pressurized Conversion Procedure” on page 29.

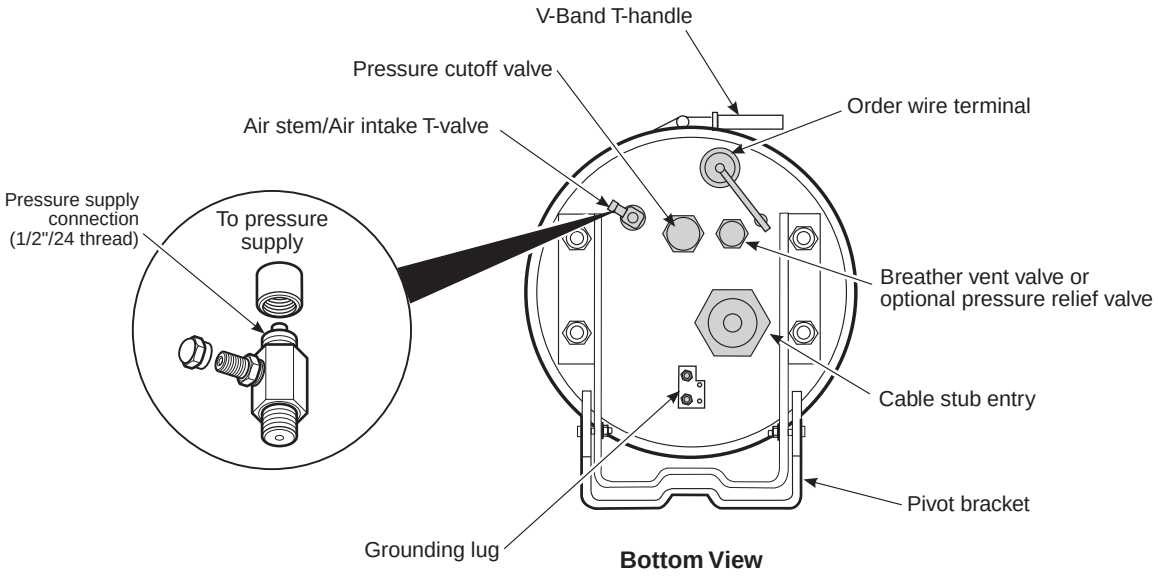


Figure 3. *HRE-506 List 1 Remote Gel-Filled Enclosure*

Air-Filled Stub Unit

The air-filled, screened, 28-pair, 24 AWG cable stub on the HRE-506 List 2 unit (Figure 1 on page 2) is equivalent to an ALP FTS-PIC air-core telephone cable. The unit comes with three metal valves: an air-pressure cutoff valve, a Schrader air stem valve, and a pressure relief valve. The air cutoff valve is used to shut off the inlet air supply that is pumped from the main feeder cable through the 30-foot (9.144 M) stub into the HRE-506 enclosure.

The air-filled stub unit is intended for buried, aerial, and duct applications. Standard colors are used for pair identification. An inner-core jacket protects the core and provides improved mechanical and electrical characteristics. The outer jacket provides protective covering that withstands, atmospheric temperatures, ground chemicals, and stresses expected in standard installations. The outside diameter of the cable is 0.64 inches (16.25 mm).

The cable complies with the requirements of ANSI/ICEA S-85-625-1996 and REA PE-22.

The HRE-506 cable sealing, O-ring, and V-Band seal have been safely tested to 36 pounds per square inch (PSI). Most cables become ruptured or damaged at this pressure level. However, the HRE-506 cable sealing is designed to handle this amount of pressure.

Avoid using pressures above 36 PSI. Such pressures could force the V-Band away from the flange and, in effect, impel the dome away from the housing. This could cause damage or injury.

The common pressure supplied through the cable is approximately 9 PSI. This is sufficient to prevent water from entering the cable or housing. ADC recommends pressurizing the enclosure to a maximum of 12 PSI.

To avoid pressure buildup, the pressure relief valve is set to release air at a maximum pressure of 15 PSI. Due to manufacturing tolerances of the springs, this maximum pressure has a tolerance of ± 3 PSI. This pressure and tolerance is well within the safety concerns that may apply to the housing, personnel, or cable.

The pressure relief valve is not intended for controlling the air pressure that is being applied to the housing cable.

Air-filled Stub Pressurization

This unit has an air pressure cutoff valve, air stem Schrader valve, and pressure relief valve. The air pressure cutoff valve is used to shut off the inlet air supply that is pumped from the main feeder cable through the 30-foot (9.144 M) stub into the HRE-506 enclosure.

- To shut off the inlet air supply, turn the air-cutoff valve clockwise 1 full turn.
- To turn on the inlet air supply, turn the air-cutoff valve counterclockwise 1 full turn.

INSTALLATION

This section describes the HRE-506 installation, including the following:

UNPACKING AND INSPECTING THE SHIPMENT

When you receive the equipment, inspect it for signs of damage. If damage has occurred, immediately report the extent of damage to the transportation company and to ADC. For additional information, see "Appendix C - Product Support" on page 44.

Your shipment should consist of:

- One HRE-506
- HiGain Remote Enclosure HRE-506 List 1 and List 2 Technical Practice

Before installing the HRE-506, unpack and inspect the shipment for missing components and physical damage that may have occurred during shipping.

To unpack the enclosure:

1. Remove the HRE-506 from its shipping carton. Verify that all the equipment listed on the packing list is present.
2. Inspect the HRE-506 enclosure, card cage, and O-ring for shipping damage.

   If the equipment has been damaged in transit, immediately report the damage to the transportation company and to your sales representative. Order replacement equipment, if necessary.
3. Locate and loosen the retaining screws at the rear base of the card cage.
4. Tilt the card cage on its hinge. Lower the card cage to its level position and tighten the screws to lock in position. ADC recommends that the card cage be kept in a level, locked position.

If you must store the equipment for a prolonged period of time, store it in the container shipped with your equipment.

MOUNTING

The HRE-506 may be mounted in a rack, pole, pedestal, or flat surface, using the enclosure mounting bracket assembly. Figure 4 on page 9 details the enclosure dimensions and Figure 5 on page 10 shows the mounting bracket.

For all installations, the enclosure must be mounted vertically. In addition, a shady location is preferred to minimize thermal stress. Refer to Table 4 on page 33 for thermal load capacity information.

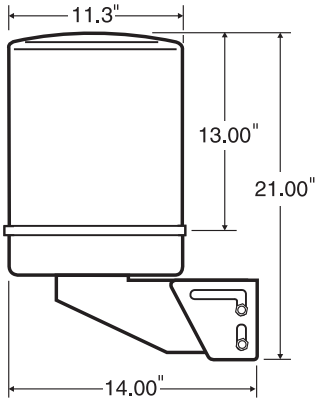
The mounting instructions for the various methods are:

- Small pole or pedestal mounting with a diameter less than or equal to 7 inches (17.78 cm), see "Small Pole or Pedestal Mounting" on page 11.
- Pole mounting with a diameter greater than 7 inches (17.78 cm), see "Large Pole Mounting" on page 12.
- Flat-surface mounting, see "Flat Surface-Mounting" on page 12.
- Rack mounting, see "Rack Mounting" on page 13.

While mounting the enclosure using any of these procedures, hold the enclosure securely to prevent personal injury or damage to the enclosure.

Because of the size and weight of the enclosure, you may want to remove the dome before beginning the mounting procedure. For more information, see "Detaching the Dome from the Baseplate" on page 19.

Mounted



Note: Dimensions are in inches.

Tilted

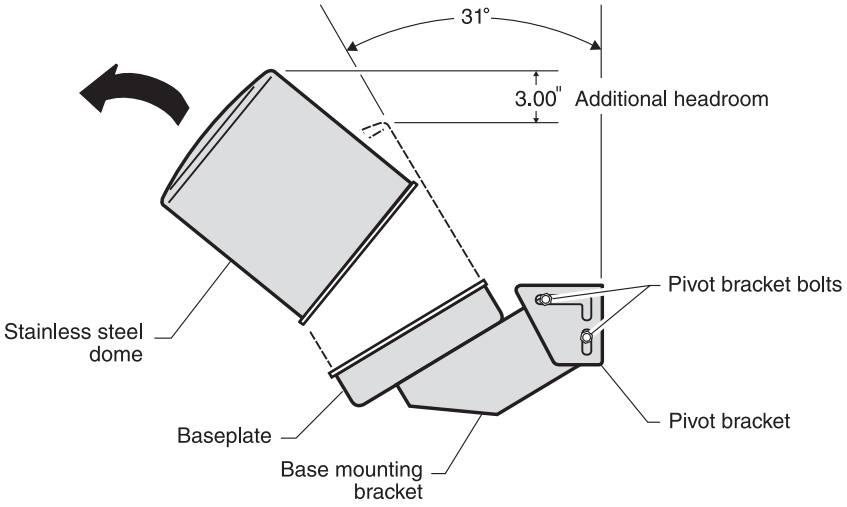


Figure 4. *HRE-506 Enclosure*

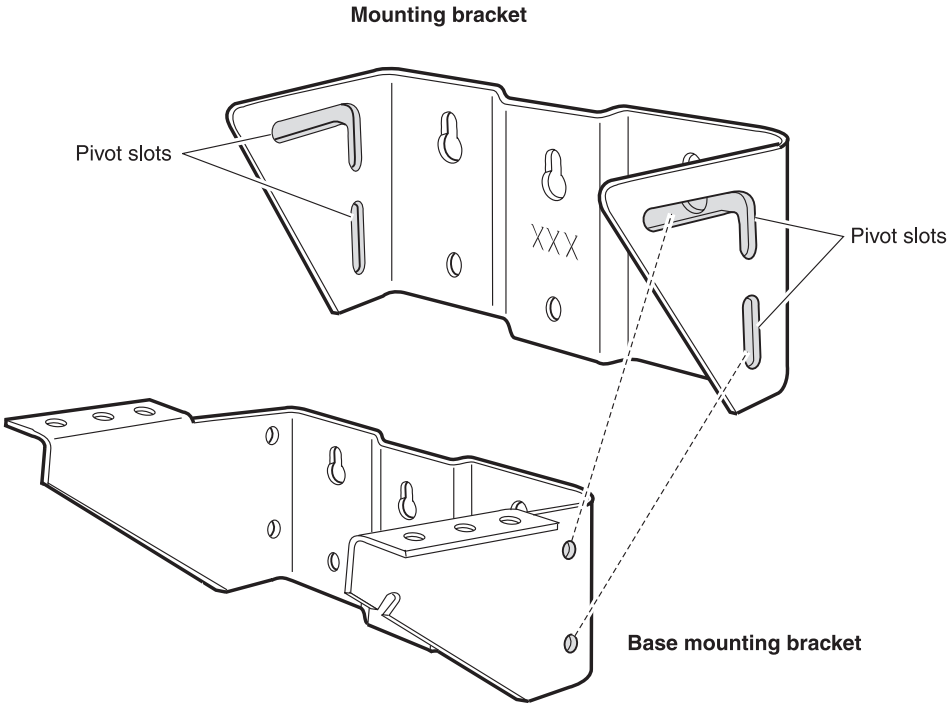


Figure 5. *Pivot-mounting Bracket*

Small Pole or Pedestal Mounting

Use the procedure below to mount the enclosure on a pole or pedestal where the pole is less than 7 inches (17.78 cm) in diameter. Figure 4 on page 9 details the enclosure dimensions and Figure 5 on page 10 shows the mounting bracket.

Have the following equipment ready before you begin:

- Two $^{3}/_{8}$-inch (0.952 cm) lag bolts, 4 inches (10.16 cm) long (minimum)
- Two $^{3}/_{8}$-inch (0.952 cm) washers
- One wrench
- One pencil
- One drill with a $^{1}/_{4}$-inch (0.635 cm) bit

To mount the enclosure, follow these steps:

1 Select a mounting location on the pole or pedestal.

2 Remove the mounting bracket from the HRE-506 enclosure by removing the four bolts that connect each sideplate, as shown in Figure 5 on page 10.

3 Position the mounting bracket with the stub down against the pole or pedestal. Mark the location of the two center mounting lag bolt holes. Use the two middle mounting holes for this application. Remove the mounting bracket.

4 Drill two $^{1}/_{4}$-inch (0.635 cm) diameter mounting holes at the locations marked in Step 3. Each hole should be drilled approximately 3 inches (7.62 cm) into the pole.

5 Start a lag bolt in the top mounting hole by screwing the lag bolt into the pole or pedestal approximately $^{2}/_{3}$- inch (1.70 cm).

6 Insert a lag bolt into the bottom hole of the mounting bracket and tighten the bolt.

7 Secure the enclosure bracket to the pole or pedestal by tightening the two lag bolts.

8 Reattach the enclosure to the mounting bracket and torque the four mounting bracket bolts to 30–40 inch-pounds (3.4–4.5 Newton-meters).

9 If the cable stub connects to an underground cable, dress the cable down the pole or pedestal to the splice case. If the cable stub connects to an aerial cable, form a drip loop in the cable and dress it up the pole or pedestal to the splice case.

Large Pole Mounting

Use the procedure below to mount the enclosure on a pole with a diameter greater than 7 inches (17.78 cm). Figure 4 on page 9 details the enclosure dimensions and Figure 5 on page 10 shows the mounting bracket.

Have the following equipment ready before you begin:

- Four $^{3}/_{8}$-inch (0.952 cm) lag bolts, 4 inches (10.16 cm) long (minimum)
- Four $^{3}/_{8}$-inch (0.952 cm) washers
- One wrench
- One pencil
- One drill with a $^{1}/_{4}$-inch (0.635 cm) bit

To mount the enclosure, follow these steps:

1 Select a mounting location on the pole.

2 Remove the enclosure base mounting bracket from the mounting bracket by removing the four bolts that connect each side plate, as shown in Figure 5 on page 10.

3 Position the mounting bracket with the stub down against the pole. Mark the location of the top outside mounting holes. Use the four corner mounting holes for this application. Remove the mounting bracket.

4 Drill four $^{1}/_{4}$- inch (0.635 cm) diameter holes 3 inches (7.62 cm) deep at the locations marked in Step 3 above.

5 Start a lag bolt in each of the two top matched bolt mounting slots by screwing the lag bolt into the pole approximately $^{2}/_{3}$ of an inch of the bolt length.

6 Insert the lag bolts into the two holes on the outside bottom of the mounting bracket. Screw in the lag bolts.

7 Secure the enclosure bracket to the pole by securely tightening all lag bolts.

8 Reattach the enclosure base mounting brackets with the four side plate bolts and torque the mounting bracket bolts to 30–40 inch-pounds (3.4–4.5 Newton-meters).

9 If the cable stub connects to an underground cable, dress the cable down the pole to the splice case. If the cable stub connects to an aerial cable, form a drip loop in the cable and dress it up the pole to the splice case.

Flat Surface-Mounting

Use the procedure below to mount the enclosure on a flat surface or in a manhole. You must allow room for enough top clearance to remove the cover. Allow at least 3 inches (7.62 cm) of clearance above the dome, if the 31° tilt feature is used. Allow at least 10 inches (25.4 cm) of clearance, if the tilt feature is not used. Figure 4 on page 9 details the enclosure dimensions and Figure 5 on page 10 shows the mounting bracket.

Have the following equipment ready before you begin this procedure:

- Four $^{3}/_{8}$-inch (0.952 cm), 16 NC anchor bolts, 2 $^{1}/_{2}$ inches (6.35 cm) long for wall mounting
- Four $^{3}/_{8}$-inch (0.952 cm) washers
- One wrench
- One pencil
- One drill with a $^{1}/_{4}$-inch (0.635 cm) bit

To mount the enclosure, perform these steps:

1 Select a mounting location on a wall.

2 Remove the enclosure base mounting bracket from the mounting bracket by removing the four bolts that connect each side plate, as shown in Figure 5 on page 10.

3 Position the mounting bracket against the wall and mark the location of the four outside mounting holes.

4 Drill four $^{1}/_{4}$-inch (0.635 cm) diameter holes 2-$^{1}/_{2}$ inches (6.35 cm) deep at the locations marked in Step 3.

5 Start an anchor bolt in each of the two top, bolt-mounting slots and screw the bolt into the wall approximately $^{2}/_{3}$ of an inch of the bolt length.

6 Insert and tighten the anchor bolts in the two bottom holes located on the outside of the mounting bracket.

7 Secure the enclosure bracket to the wall by tightening all anchor bolts.

8 Reattach the enclosure base mounting brackets to the mounting bracket with the four side plate bolts and torque the mounting bracket bolts to 30–40 inch-pounds (3.4–4.5 Newton-meters).

9 If the cable stub connects to an underground cable, dress the cable down the wall to the splice case. If the cable stub connects to an aerial cable, form a drip loop in the cable and dress it up the wall to the splice case.

Rack Mounting

Before you rack mount the enclosure, you may want to remove the dome because of the weight and size of the enclosure, you may want to remove the dome prior to mounting the enclosure. The enclosure must be mounted vertically. A shady location is also recommended to minimize thermal stress.

Have the following equipment ready before you begin this procedure:

- Four $^{3}/_{8}$-inch thru bolts for rack mounting.
- Four $^{3}/_{8}$-inch nonmetallic washers. Nonmetallic washers are required to avoid a ground loop that may result if both the rack and the enclosure are grounded. ADC does not recommend using the rack ground for the enclosure ground since its integrity is not 100 percent reliable.
- One wrench.

To rack mount the enclosure, follow these steps:

1 Select a location on the cable rack.

2 Position the enclosure so that the outside slots and holes in the mounting bracket align with the mounting holes in the cable rack.

3 Slide the thru-bolts with nonmetallic washers through the outside slots and holes of the mounting bracket. Begin tightening the bolts into the mounting holes.

4 Secure the enclosure to the rack by tightening the thru bolts.

The desiccant bags shipped with the unit must be activated prior to closing the lid. Do this by removing the bags from their plastic container and placing them inside the enclosure.

GROUNDING

Use the standard grounding procedure in "Grounding a Pole Mounted Enclosure" below.

The HRE-506 requires a resistance of 25 Ω or less to ground as measured with a Megger-type ohmmeter.

The 8 MIL aluminum shield on the stub is connected to the card cage mounting brackets by a braided shield ground wire. This wire connects the shield to the enclosure ground lug. The wire may be temporarily removed from the enclosure ground lug when troubleshooting ground faults. The wire can be removed by unscrewing the screws that secure the braided shield ground wire to the card cage mounting bracket.

Have the following equipment ready before you begin:

- One bullet bond
- One ground rod for pole-mounted enclosures (may require more than one rod)
- One Megger-type ohmmeter
- One 6 AWG cable

The braided shield ground wire should be reconnected to the card cage bracket after completing the ground fault test. This ensures that the stub's shield is properly grounded which is required to reduce the possibility of shield corrosion and lightning damage.

The stub's screen divider is an insulated floating divider separating the Group 1 and Group 2 pairs from the Group 3 and Group 4 pairs. DO NOT GROUND THE SCREEN DIVIDER. Doing so could result in degraded performance.

Grounding a Pole Mounted Enclosure

Use the following procedure to ground a pole or pedestal mounted enclosure. See Figure 6 on page 15.

1 Bond the main cable shield through the splice case using bullet bond.

2 Drive the ground rod into the ground near the enclosure location.

Ground the HRE-506 before splicing the cable stub into the main cable. This grounding method or an accepted local grounding method must be in effect at all times to safeguard personnel.

If the HRE-506 is improperly grounded, the LPU surge arrestors will not work and the enclosure will be unprotected.

3 Use a Megger-type ohmmeter to measure the resistance between enclosure ground and the ground rod. The resistance must be 25 Ω or less.

4 If the resistance requirement is met, proceed to Step 5. If the resistance requirement is not met, follow local practices to lower the resistance to ground to comply with the requirement before proceeding to Step 5.

5 Use a 6 AWG cable to connect the grounding lug on the enclosure to the ground rod.

6 Use a 6 AWG cable, connect the main cable shield to the ground rod.

If the main feeder cable's shield is bonded to the stub's shield, the green insulated or bonded stub shield wire should be disconnected from the metal card cage base. This is recommended to reduce service affecting noise from being injected into the doubler circuits from circulating ground loop currents, and to help inhibit corrosion.

7 If commercial power ground exists, bond telephone ground to power ground as a safety measure.

8 Using a Megger-type ohmmeter, measure the main cable shield resistance to ground rods. The resistance must be 5 Ω or less.

9 If the resistance requirement is not met, ground the main cable shield every 2,000 ft (610 m).

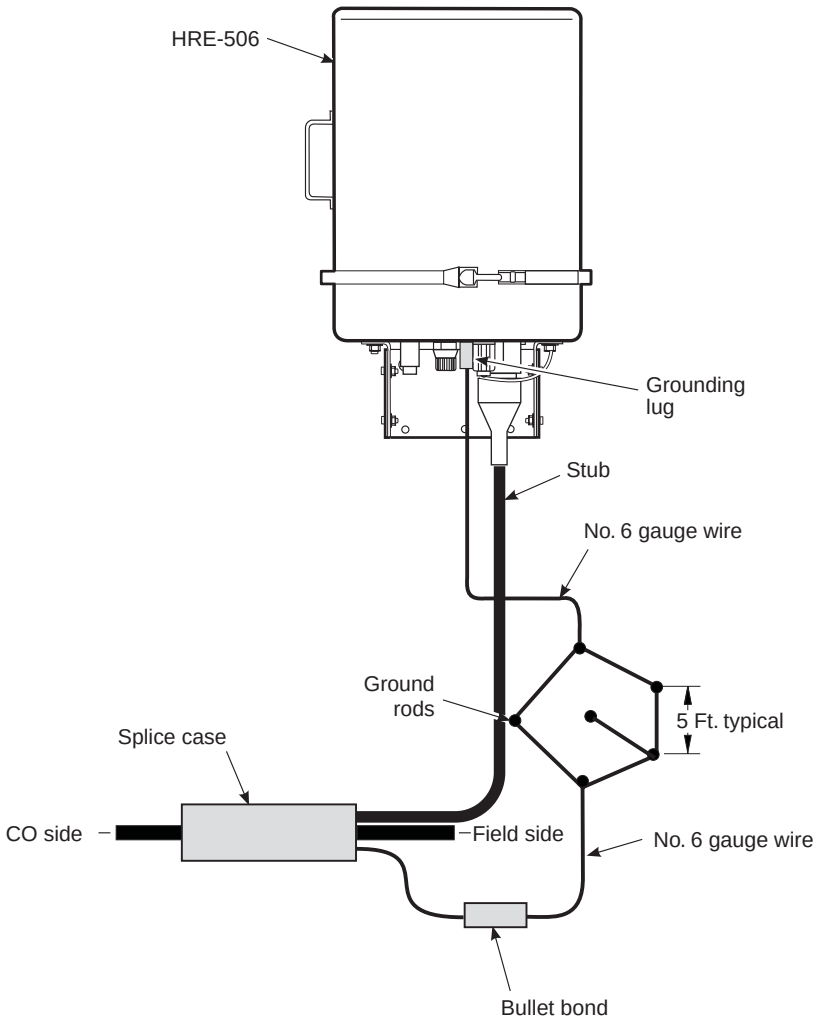


Figure 6. *Grounding for Pole-mounted Unit*

Grounding a Flat Surface Mounted Enclosure

To ground a flat surface-mounted enclosure, perform the following steps:

1 Bond the main cable shield through the splice case using bullet bond. Figure 7 on page 17 shows the location of the slice case and bullet bond.

2 Using a Megger-type ohmmeter, measure the resistance between enclosure ground and the ground connection point in the manhole. The resistance must be 25 Ω or less.

Ground the HRE-506 before splicing the cable stub into the main cable. This grounding method or an accepted local grounding method must be in effect to safeguard personnel.

If the HRE-506 is improperly grounded, the LPU surge arrestors will not work and the enclosure will be unprotected.

3 If the requirement is met, proceed to Step 4. If the requirement is not met, follow the procedure normally used for mounting the enclosure to lower the resistance to ground to comply with the requirement in Step 2, then proceeding to Step 4.

4 Using 6 AWG cable, connect the ground lug on the HRE-506 to the ground connection in the manhole. Torque the grounding lug to between 18 and 22 inch-pounds (2.0 and 2.5 Newton-meters).

5 Using 6 AWG cable, connect the main cable shield to the ground connection in the manhole.

If the feeder cable's shield is bonded to the stub's shield, the green insulated or bonded stub shield wire should be disconnected from the metal card cage base. This is recommended to reduce service affecting noise from being injected into the doubler circuits from circulating ground loop currents, and help inhibit corrosion.

6 Use a Megger-type ohmmeter, measure the main cable shield resistance to manhole ground. The resistance must be 5 Ω or less.

7 If the requirement is not met, ground the main cable shield every 2,000 feet (610 m).

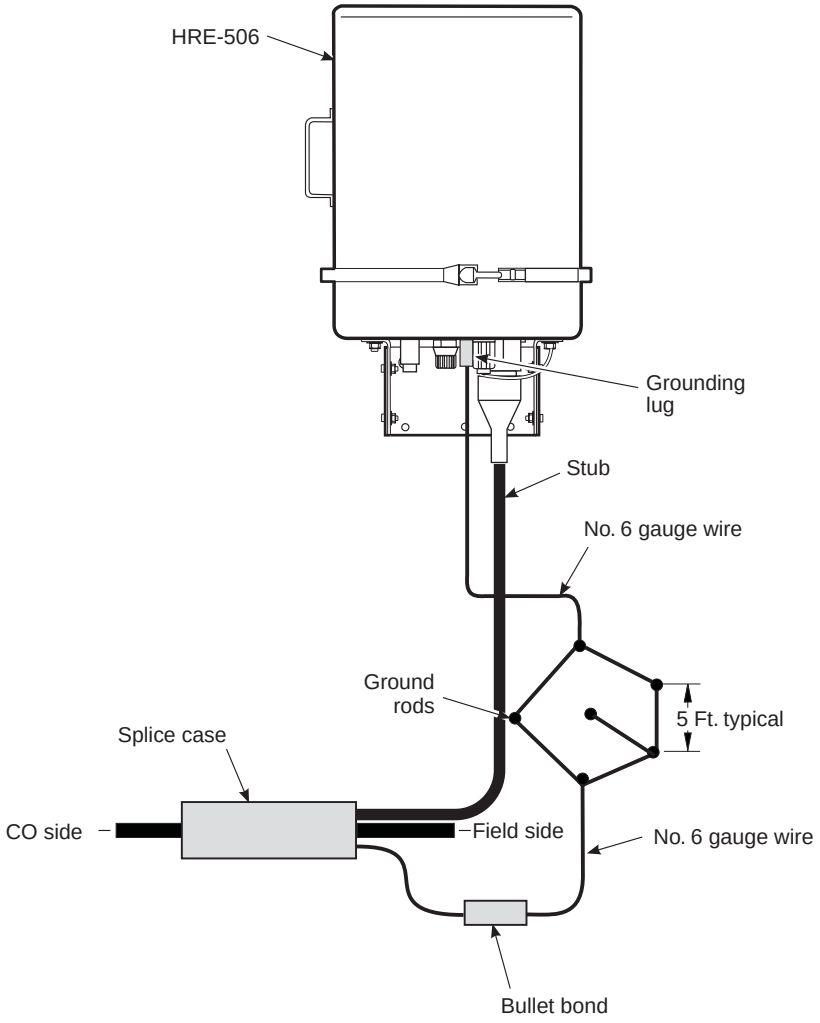


Figure 7. *Grounding for Flat Surface-mounted Unit*

INSTALLING DOUBLER OR REPEATER UNITS

To install either the doubler or repeater unit, perform these steps:

1 Slide the unit into the card guides of the slot, then push the unit into the enclosure until it is seated in the slot connector.

2 Push the unit into the card edge connector until it is entirely within the card guide. The unit should snap into place, indicating that it is properly seated.

Table 1 lists the slot pin assignments for the doubler and repeater units supported by the HRE-506.

Table 1. *Slot Pin Assignments*

Signal	Side	Direction	Connector Pin
Tip	1	In	6
Ring	1	In	5
Tip	2	In	12
Ring	2	In	11
Tip	1	Out	4
Ring	1	Out	3
Tip	2	Out	9
Ring	2	Out	8
Ground	--		1
Ground	--	--	10

DETACHING THE DOME FROM THE BASEPLATE

Figure 8 on page 19 illustrates how to detach the dome.

To detach the dome from the enclosure base plate, follow these steps:

1 Release internal pressure.

2 Unclamp the dome from the baseplate.

3 Lift the dome up and away from the baseplate.

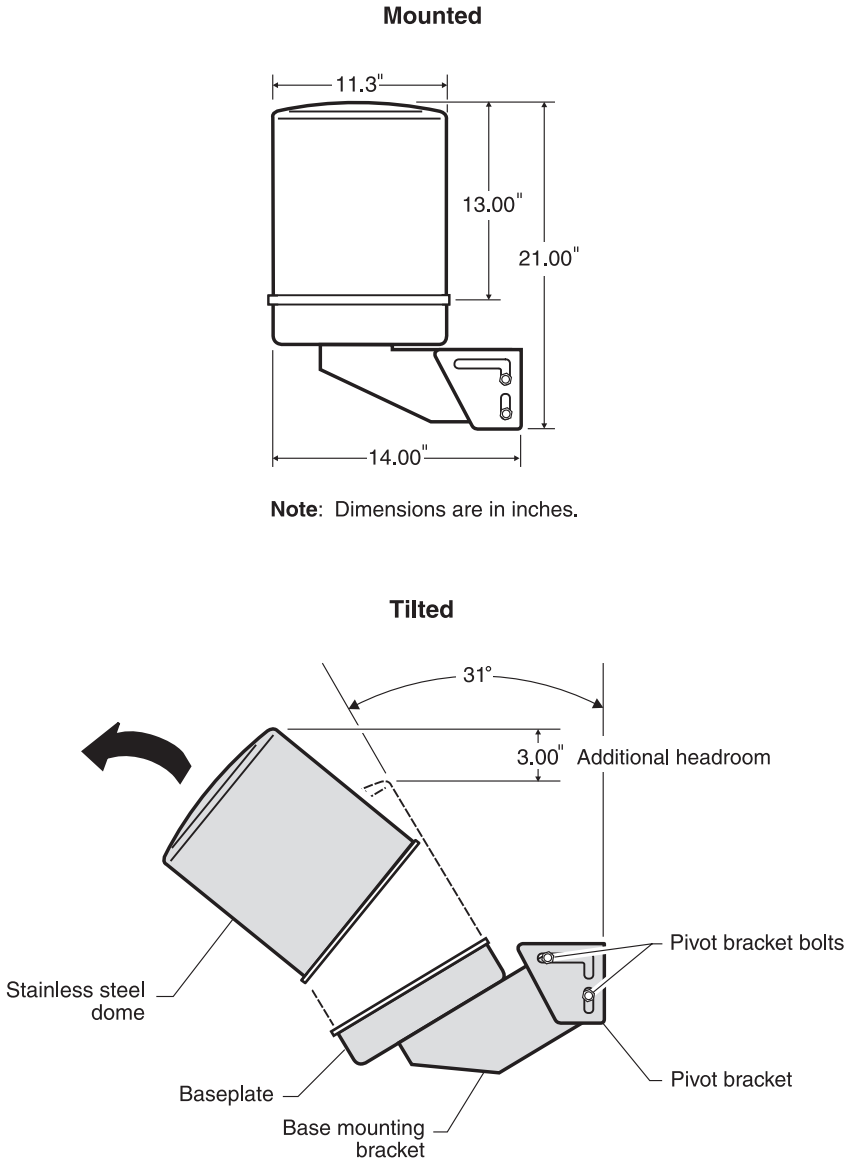


Figure 8. *HRE-506 Enclosure*

OPENING THE ENCLOSURE

When handling the HRE-506 enclosure, always assume it is pressurized. Failure to relieve the pressure before removing its cover may result in serious personal injury.

Exercise care when removing and handling the stainless steel dome. A damaged stainless steel dome may not seal properly.

Opening a Gel-Filled Enclosure

You can open a gel-filled enclosure which is or is not being pressured.

To open a gel-filled HRE-506 List 1 enclosure, which is not being pressurized, perform these steps:

1 Unlock the enclosure.

2 Loosen the cover clamp and twist the stainless steel dome, then remove the cover clamp and stainless steel dome.

To open a gel-filled HRE-506 List 1 enclosure, which is being pressurized, perform these steps:

1 Confirm that the external pressure supply is off and verify the pressure cutoff valve is in the open position, as shown in Figure 2 on page 3. If not, turn the cutoff valve counterclockwise until the pressure cutoff valve is in the open position. This is the standard position when operating a gel-filled enclosure in a pressurized application.

2 If you were able to turn off the external pressure supply, release the remaining pressure within the enclosure by depressing the center pin of the air stem. Unlock the enclosure. Loosen cover clamp and twist the stainless steel dome slightly to break the seal.

3 If you were unable to turn off the external pressure supply, locate the pressure cutoff valve as shown in Figure 3 on page 5. Close the pressure cutoff valve by rotating the valve clockwise one full turn. This blocks the pressure from the external source.

Unlock the enclosure. Gently push the dome cover back and forth while loosening the cover clamp until the seal is broken and the pressure is released. The seal should break well before the cover clamp is loosened enough to allow the cover to separate from the enclosure.

4 Remove the cover clamp and the stainless steel dome from the enclosure.

Opening an Air-Filled Enclosure

To open an air-filled HRE-506 List 2, perform these steps:

1. Locate the pressure cutoff valve, as shown in Figure 3 on page 5.
2. Close the pressure cutoff valve by rotating the valve clockwise one full turn. This blocks the pressure from the main cable.
3. Release the remaining pressure within the enclosure by depressing the center pin of the air stem.
4. Unlock the enclosure. Loosen cover clamp and twist the stainless steel dome slightly to break the seal.
5. Remove the cover clamp and the stainless steel dome from the enclosure.

Exercise care when removing and handling the stainless steel dome. A damaged stainless steel dome may not seal properly when replaced.

CLOSING THE ENCLOSURE

1. Inspect the enclosure cover and baseplate for dirt, moisture, or mechanical damage, especially around the baseplate flange and O-ring. Remove any accumulation of dirt or moisture from the cover and replace any damaged components.
2. Remove the two desiccant bags from the plastic storage bag and place them in the enclosure.
3. Fasten the slot retainer bracket in place.
4. Slide the stainless steel dome over the card cage and position it on the O-ring and baseplate.
5. Lubricate the threads of the cover clamp T-bolt with an anti-seize compound.
6. Position the cover clamp around the base of the cover and the baseplate flange. Handtighten the T-bolt securely, then torque the T-bolt to between 10 and 15 inch-pounds (1.1 and 1.7 Newton-meters).
7. If you are pressurizing an HRE-506 List 2 from a portable pressure bottle, block air from the cable stub in the splice case by placing an air-dam in the stub according to local practice to prevent pressure leakage back into the main cable. Verify that the air-cutoff valve is off or turned fully clockwise. Turn on the pressure from the external source.
8. If you are pressurizing an HRE-506 List 2 from the main cable, open the air-inlet tube by turning the air valve 1 full turn counterclockwise. Allow the enclosure to pressurize from the main cable through the cutoff stub.
9. If you are pressurizing an HRE-506 List 1 which has been converted to a pressurized version (the breather vent has been replaced with a pressure relief valve), verify that the air cutoff valve is fully open or turned counterclockwise. Turn on the pressure from the external source.
10. If you are pressurizing the enclosure as described above and the unit will not monitor pressurization, check the O-ring and enclosure for leaks by painting the enclosure with a pressure-testing solution such as soap and water. If you detect a leak, tighten the T-bolt and tap lightly around the cover clamp. Repeat as necessary until the cover is sealed.
11. Secure the HRE-506 with a padlock. This step is not required for manhole-mounted enclosures. However, a locking assembly is provided, if needed.

The desiccant bags shipped with the units must be activated prior to closing the lid. Do this by removing the bags from their plastic container and placing them inside the enclosure.

PIVOTING THE ENCLOSURE

All HRE-506 units have access to an order wire terminal pair, as shown in Figure 1 on page 2 and Figure 3 on page 5. The enclosure mounting plate allows the unit to be tilted 31° from its vertical position, as shown in Figure 4 on page 9. This reduces the headroom required in manhole installations from 10 inches to less than 3 inches and the amount of valuable air space required for such underground applications.

To pivot the enclosure out from its vertical position:

1 Loosen the four bolts that connect the pivot bracket to the enclosure base plate.

2 Lift the housing up slightly and pull it out until the top bolts rest against the end of the two pivot bracket slots.

APPENDIX A: SPECIFICATIONS

Environment

Operating Temperature:	-40 ° to +140 °F (-40 ° to +60 °C)
Operating Humidity:	10 to 95% (non-condensing)
Altitude:	To 14,000 ft (4,300 m)
Mounting:	Dual or Single 239 T1 or DDS/ISDN Repeater Mechanics

Dimensions

Height:	21 inches (53.4 cm)
Diameter:	11.3 inches (28.7 cm)
Depth:	14 inches (35.5 cm)
Volume:	0.33 ft^3 (.009 m^3)
Weight:	HRE-506 List 1 (gel-filled): 39 lb (17.7 kg)
	HRE-506 List 2 (air-filled): 37 lb (16.8 kg)

Stub Diameters

Gel:	1 in. (25.4 mm) max.
Air:	0.8 in (20 mm) max.

28-PAIR T-SCREEN CABLE STUB SPECIFICATIONS

Figure 9 provides specifications for 28-pair T-screen cable.

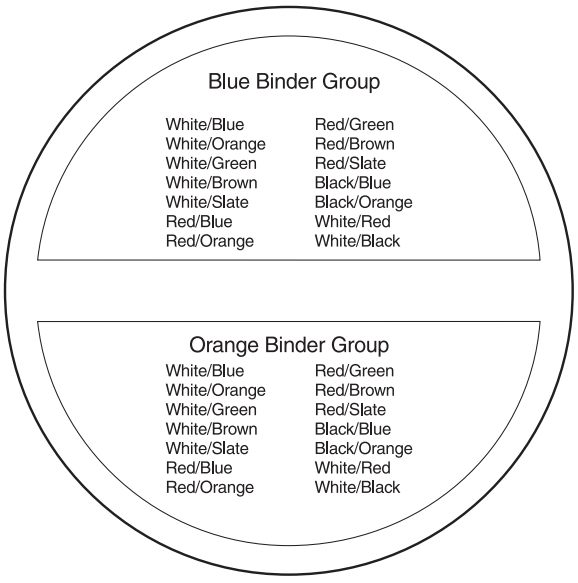


Figure 9. *T-screen Color Code Specifications (28-pair Cable)*

APPENDIX B: ADDITIONAL INFORMATION

CLEI CODE AND CONFIGURATION NUMBER INFORMATION

Figure 10 shows the location of the CLEI code labels on HRE-506 List 1 and List 2 units. Table 2 on page 24 gives a brief description of what the labels represent.

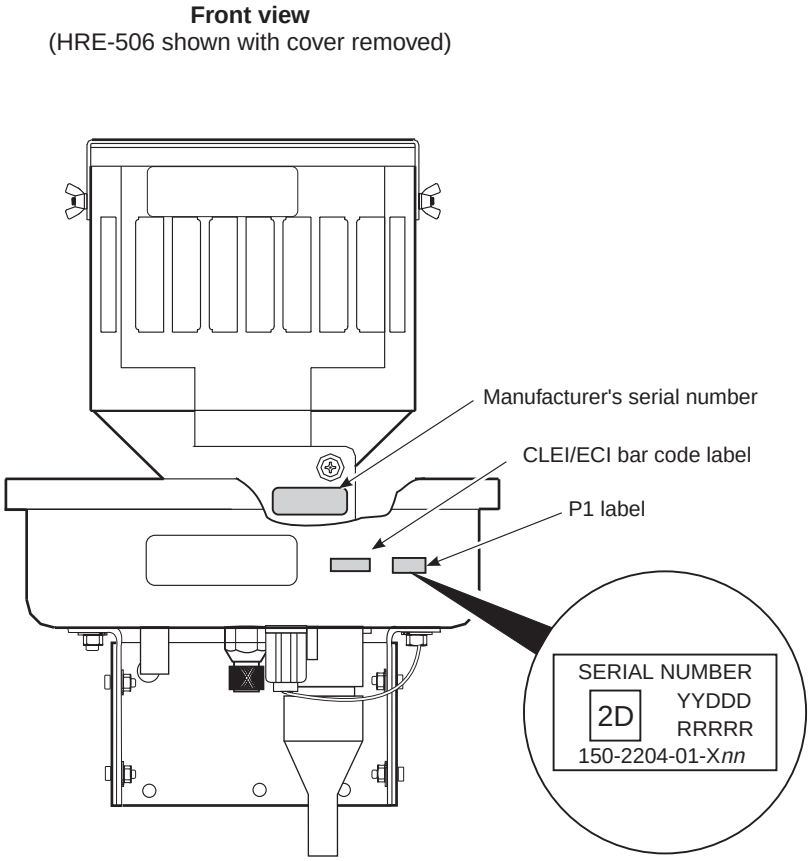


Figure 10. *Label Locations*

Table 2. *Label Description*

Label	Description
CLEI and ECI Bar Code Label	Contains human-readable Common Language Equipment Identifier (CLEI) code number and Equipment Catalog Item (ECI) bar code number.
P1 Label Date Code	Contains the serial number, date code, and configuration code. Date code consists of: • YY: Last two digits of shipment year. • DDD: Julian date Configuration code consists of : • Part number • Xnn: Configuration code
Manufacturer's Serial Number	Contains number supplied by the customer.

HRE-506 ENCLOSURE INFORMATION

This section describes the stainless steel dome and card cage.

Stainless Steel Dome

A stainless steel dome cover fits over the card cage and protects the enclosure from heat and other harmful environmental effects. The dome seals the inner assembly when clamped to the baseplate, providing a seamless, corrosion-resistant, easily-removed protective cover.

The stainless steel cover V-retainer, which is equipped with a T-bolt, is used to tighten the dome firmly against the O-ring on the baseplate. The O-ring creates a pressure-tight seal between the dome and the baseplate. A locking cover over the T-handle prevents unauthorized access to the enclosure. This cover accepts a padlock with a maximum shackle diameter of 0.3-inch (0.76 cm).

Card Cage

The card cage, shown in Figure 11 on page 26, inside the enclosure has six mounting positions to hold up to six doubler units. There is also a retainer bar on top of the card cage that extends the width of the cage. The retainer bar is used for:

- Writing the circuit ID on the label attached to the retainer bar.
- Preventing the doubler units from disconnecting when the enclosure is subjected to severe vibrations or mounted in non-vertical planes.
- Accessing the remote or doubler units by loosening the side wingnuts and rotating the retainer bar forward.

The enclosure has a mechanism that enables the card cage to tilt approximately 45°. This provides easy access to the rear of the card cage for servicing the LPU board. Two knobbed retainer screws at the base of the card cage (one on each side) lock the card cage in its normal level position. This helps prevent it from tilting during severe vibrations. The cable stubs shield is grounded to the card cage base through a short braided wire which is connected to the card cage base. The card cage itself is grounded through a ribbon ground connected between the base of the card cage and the side.

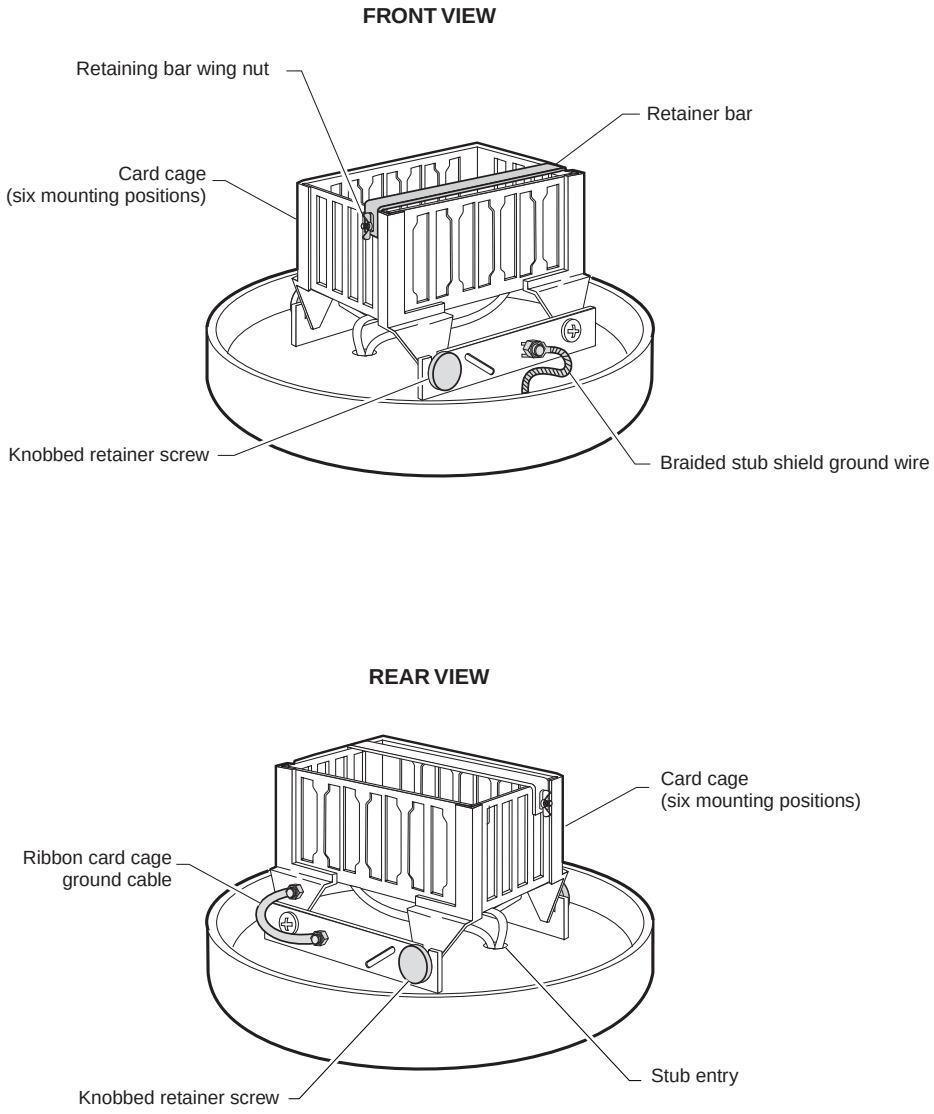


Figure 11. *HRE-506 with Cover Removed*

Lightning Protection Unit

The LPU, shown in Figure 12, is a printed circuit board assembly that attaches to the card edge connector of each slot. The LPU is used primarily for protecting the HDSL loops and customer T1 circuits.

All HRE-506 units are equipped with four LPUs. Each LPU contains four gas tubes that provide surge protection to the four ports in each slot. The tubes have three leads that provide protection from Tip and Ring to ground. The ground pin is connected to Pin 1 of each slot.

The gas tube parameters are equivalent to a TII 47 BT. The Vdc breakdown ranges from 300 to 500 volts. The tube can withstand at least 400, 10/1000, 500 amp discharges. Amp discharges are quantities of discharges that occur before system degradation.

Although the individual gas tubes are field-replaceable components, ADC recommends replacing the entire LPU when any of its protector tubes are suspected of functioning improperly.

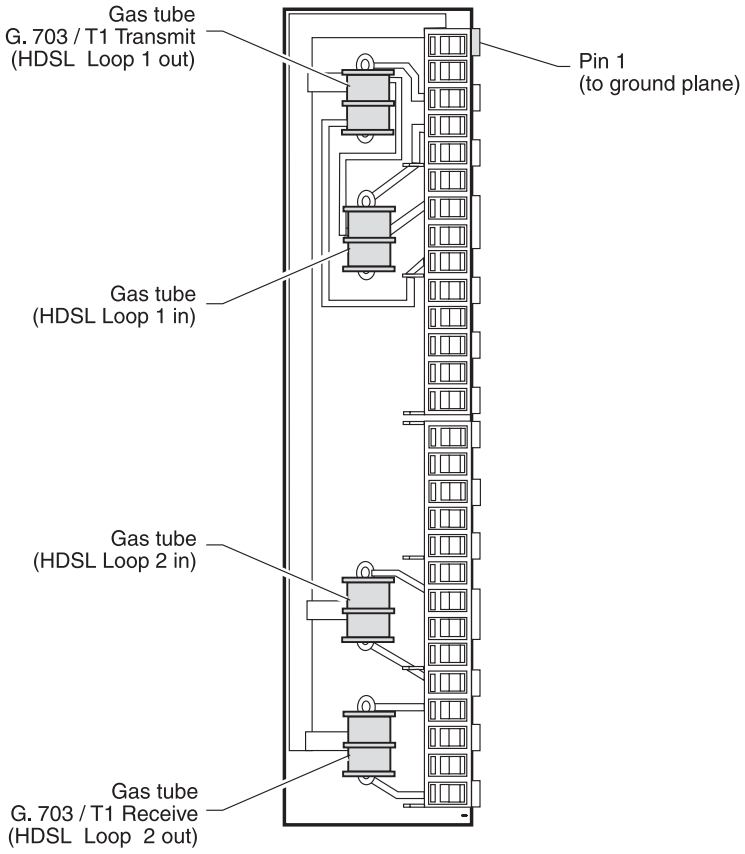


Figure 12. *Lightning Protection Unit*

Cable Stub and Pressurization

Every HRE-506 is equipped with a single, 30-foot (9.144-meter) screened cable stub. See Table 3 on page 31 for a complete description of the cable stub. The stub is available as HRE-506 List 1 (gel-filled) or List 2 (air-filled).

The stub is secured to the enclosure baseplate by a cable strain relief adapter. The cable pair is splayed and encapsulated in the polyurethane that is poured into the enclosure base. This provides an airtight seal at the cable entry point.

The HRE-506 List 2 cable-pressurized enclosure has an air-inlet tube that accompanies the air-filled stub. The air-inlet tube connects the inside of the enclosure to the main feeder cable. This tube enables dry air or dry nitrogen to flow from the main cable into the cable stub through the air-cutoff valve and into the enclosure. The air-cutoff valve, as shown in Figure 1 on page 2, controls the flow through the air-inlet tube as described in "Air-Filled Stub Unit" on page 5.

The HRE-506 enclosures have been safety tested to 36 psi. This amount of pressure can severally damage most cables and cable stubs. Pressure above 36 psi is dangerous because the v-band is forced away from the flange and the dome could be impelled away from the housing causing damage and injury.

The common pressure supplied through the air core cable is about 9 psi. This is more than enough pressure to prevent any water from entering the housing. ADC recommends pressurizing the enclosure to a maximum of 12 psi.

The pressure relief valve is not intended to control the pressure that is supplied to the enclosure. The external network pressure control system, usually located at the front end of the main feeder cable in the servicing CO, performs this function. Instead, the pressure relief valve should be used as a safety device for limiting the maximum internal pressure in the enclosure.

The pressure release valve is set to release at a maximum pressure of 15 psi. Due to manufacturing tolerances of the springs, the 15 psi pressure has a tolerance of ±3 psi. The pressure and the tolerance are well within any safety concerns that might apply to the housing, personnel, or cable.

HRE-506 List 1 Vented to Pressurized Conversion Procedure

The following instructions are used to convert the HRE-506 List 1 gel-filled vented enclosure to an external pressurized enclosure.

The HRE-506 List 1 enclosure can be converted to a pressurized housing that uses a continuous local pressure source. The conversion requires replacing the breather vent assembly with an optional pressure relief valve. The breather vent assembly, located in the base pan, allows the internal pressure to equalize with the outside pressure. The optional pressure relief valve is included in the shipping kit. The HRE-506 List 1 comes with a gel-filled cable, which precludes pressurizing through the cable stub.

Static pressurization requires monitoring and maintenance as the pressure decreases over time.

To convert the HRE-506 List 1 enclosure from a vented housing to a pressurized one, follow these instructions:

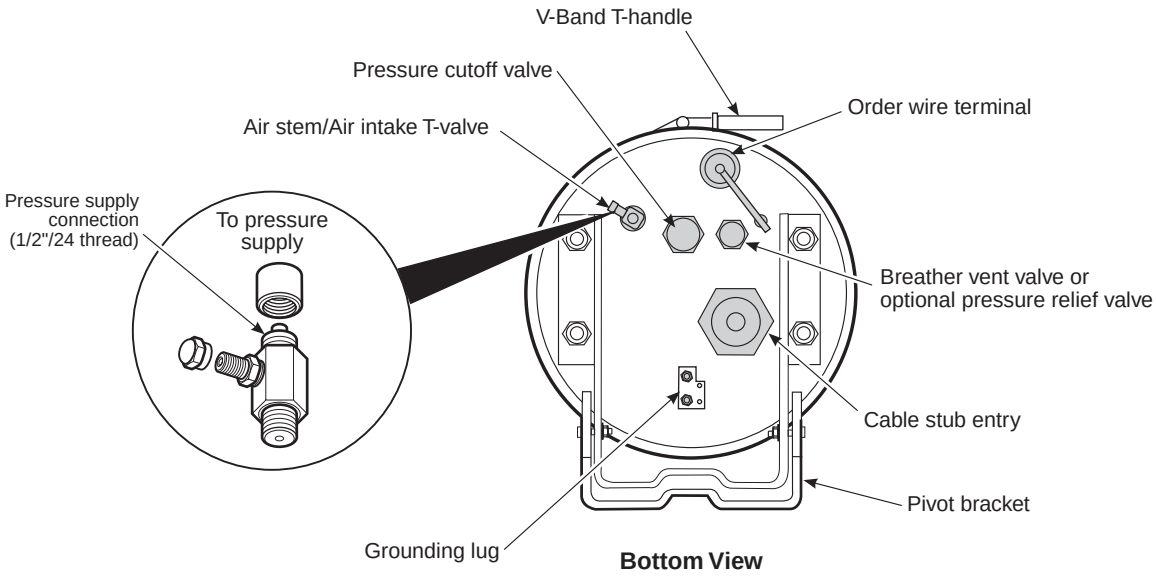


Figure 13. *HRE-506 List 1 Remote Gel-Filled Enclosure*

1. Locate the breather vent valve on the bottom of the housing. Remove the valve by unscrewing it. Refer to Figure 2 on page 3 for more details. Save the breather vent or store it inside the housing for future conversions.
2. Check the threaded hole for debris and clean it, if necessary.
3. Remove the pressure relief valve from the plastic bag. Verify that the gasket material is installed on the threaded end of the valve.
4. Carefully place the threaded end of the pressure relief valve into the threaded hole on the bottom of the housing located by the breathe vent valve. While holding the valve straight, push it into the hole and begin turning the valve clockwise to screw in place.

If there are any signs of resistance while screwing the valve into place, you could be crossthreading the part. Remove the valve and restart.

5 Turn the valve until it is hand tight with compression against the gasket material.

The housing is now ready to be pressurized either through the Schrader air valve stem, which is part of the T-valve and accepts a standard tire valve chuck, or through the air valve stem located at the opposite end of the T-valve, as shown in Figure 13 on page 29.

6 Remove the two-unit desiccant bag from the shipping carton and place it in the HRE-506 unit.

7 Attach a plastic tube ($^1/_4$-inch ID x $^3/_8$-inch OD, not included) to the $^1/_4$-inch air inlet protrusion of the air intake valve.

8 Secure the tube to the valve with the hex bolt and ferrule.

The tube and fitting assembly is also called an Express Air Connection Fitting, which is not supplied by ADC.

Spare Connections

The HRE-506 stub has three spare pairs and one order wire pair. One spare pair and the order wire pair are in the blue group. The remaining two spares are in the orange group.

Order Wire Connections

The external order wire pair access port is connected to its surge protector by the red-brown jumper wire. The black and white order wire pair also terminates on this protector. This permits access to the order wire without opening the enclosure. Simply unscrew the order wire protective cap, as shown in Figure 1 on page 2, to expose the order wire terminals.

WIRING

A single cable stub on the HRE-506 provides access to the main feeder cable. The stub is a 28-pair, 24-gauge, T-screened cable with two 14-pair binder groups. Table 3 shows the pair assignments, numbering, color codes, and other stub details. Both pair groups have the same color coding.

Table 3. *Cable Stub Wire Pair Assignments for Doubler Units (28-pair)*

HRE-506 Slot	HDSL Direction	Side	Group	Color Tip and Pin Number		Color Ring and Pin Number		Pair Number
1	In	1	Blue	White	6	Blue	5	1
2	In	1	Blue	White	6	Orange	5	2
3	In	1	Blue	White	6	Green	5	3
4	In	1	Blue	White	6	Brown	5	4
5	In	1	Blue	White	6	Slate	5	5
6	In	1	Blue	Red	6	Blue	5	6
1	In	2	Blue	Red	9	Orange	8	7
2	In	2	Blue	Red	9	Green	8	8
3	In	2	Blue	Red	9	Brown	8	9
4	In	2	Blue	Red	9	Slate	8	10
5	In	2	Blue	Black	9	Blue	8	11
6	In	2	Blue	Black	9	Orange	8	12
Spare			Blue	White		Red		SP1
Order Wire			Blue	White		Black		SP2
1	Out	1	Orange	White	4	Blue	3	1
2	Out	1	Orange	White	4	Orange	3	2
3	Out	1	Orange	White	4	Green	3	3
4	Out	1	Orange	White	4	Brown	3	4
5	Out	1	Orange	White	4	Slate	3	5
6	Out	1	Orange	Red	4	Blue	3	6
1	Out	2	Orange	Red	12	Orange	11	7
2	Out	2	Orange	Red	12	Green	11	8
3	Out	2	Orange	Red	12	Brown	11	9
4	Out	2	Orange	Red	12	Slate	11	10
5	Out	2	Orange	Black	12	Blue	11	11
6	Out	2	Orange	Black	12	Orange	11	12
Spare			Orange	White		Red		SP1
Spare			Orange	White		Black		SP2

The first 12 pairs in each group connect to the six shelf slots, as shown in Figure 14 below. The HRE-506 is shown as being wired in a typical mini-repeater fashion, using Side 1 and Side 2 terminology. This adheres to conventional T1 terminology, which describes a unidirectional (simplex) service.

HDSL is a bidirectional (duplex) service and could be shown with bidirectional doubler header arrows. The black/white pair in Group 1 is used to access the order wire pair, as discussed in "Grounding" on page 14.

Table 3 on page 31 describes the HDSL In and Out references. The HDSL Side 2 In pair in Table 3 corresponds to the T1 repeater references in Side 2 Out pair, as shown in Figure 14. The HDSL Side 2 Out pair in Table 3 corresponds to the T1 Side 2 In pair in Figure 14.

The wiring from the cable stub entry to the card cage connectors and to the order wire connector is factory-installed. The wiring diagram shown in Figure 14 is located on the inside of the stainless steel dome for easy reference.

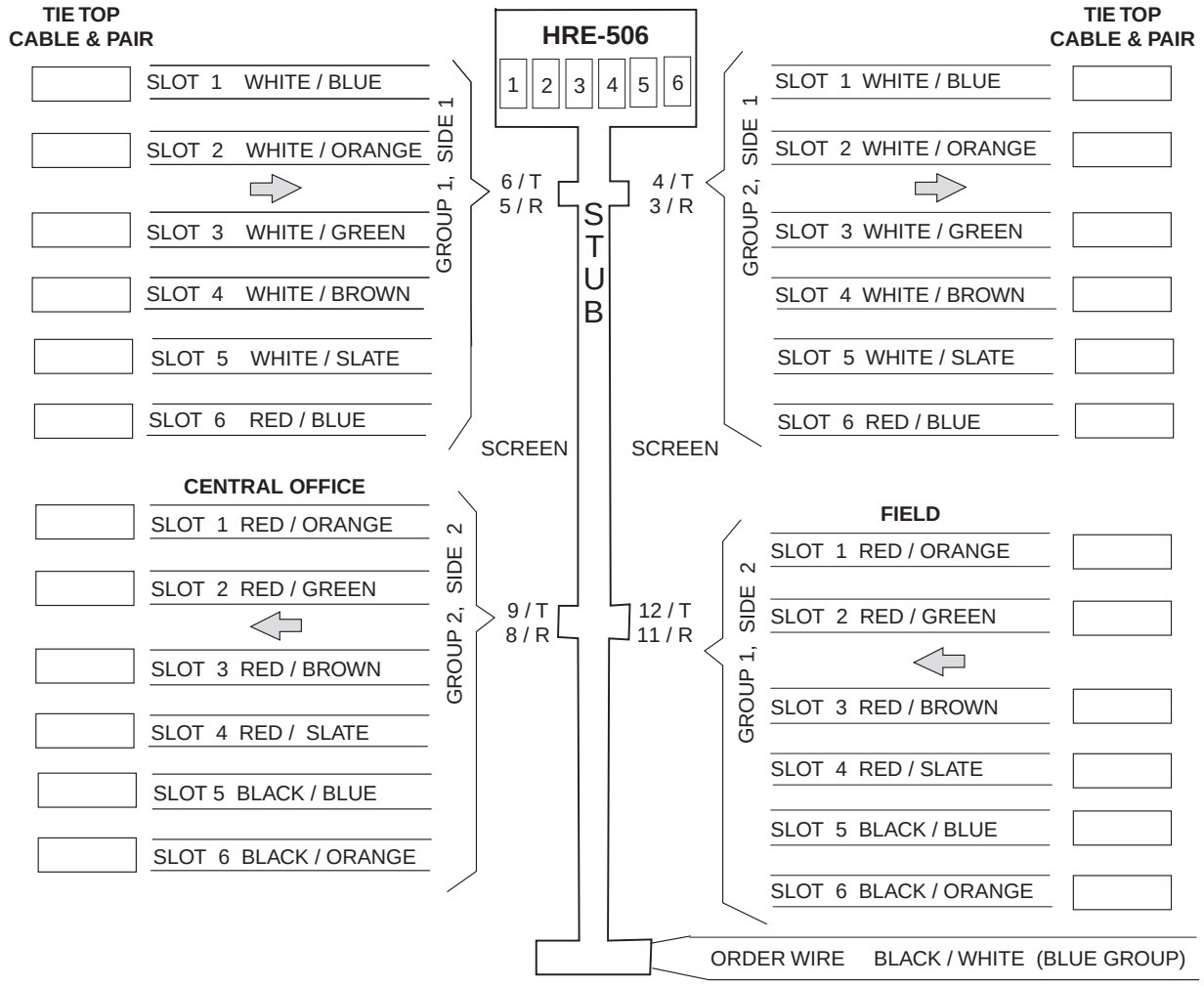


Figure 14. *HRE-506 Interface Wiring Diagram and Cable Assignments*

GENERAL DEPLOYMENT RULES

The HRE-506 is an airtight enclosure. The breather vent valve on gel-filled units and the pressure relief valve on air-filled units allow minimum ventilation to the atmosphere. This environment traps the heat generated by the installed plugs and, in effect, causes the heat temperature to significantly rise within the enclosure. The number of doublers or repeaters that can be housed in the HRE-506 is dependent upon the:

- Plug type
- Doubler version (the list number of the doubler version also affects the number of doubler units housed in the HRE-506)
- Solar exposure
- Unit orientation

Table 4 lists the HRE-506 deployment rules. Even when the deployment rules are followed, the metal surfaces of the installed units can feel hot to the touch when removed from an HRE-506 that is operating in elevated ambient temperatures. These conditions are normal for the plugs operating under these circumstances. The plugs were designed to withstand these elevated temperatures.

When less than six slots are being used, assign the slots in the following sequence to reduce hot spot temperatures: 1, 6, 3, 4, 5, 2.

To comply with the requirements in TA-NWT-001210 (maximum ambient temperature of 115°F with full solar load), the number of full T1 HDU-439 or HDU-437 doublers must be limited to six without full solar load or five with full solar load. The fractional doublers (HDU-219 and HDU-217) and the full T1 microdoublers (HDU-409 and HDU-407) comply with the TA when all six slots are occupied with full solar load.

When mixing various repeaters and doublers in the same enclosure, assign the thermal load as shown in Table 4.

Four T1 repeaters or two DDS ISDN repeaters are thermally equivalent to one HDU-439 doubler. Also, one HDU-439 or HDU-437 doubler is thermally equivalent to 1.5 HDU-217, 219, 407, or 409 doublers. When fractional values result from applying these equivalent relationships, always round up to the nearest whole number.

Table 4. *HRE-506 Deployment Rules for Doublers and Repeaters*

Recommended Unoccupied Slot Numbers [a]	Maximum Number of Occupied Slots	Solar Load [b]	HDU-437, EDU-842, and HDU 439 Max. Ambient Temp [c]	HDU-217, HDU-219, HDU-409, EDU-409, and HDU-407 Max. Ambient Temp [c]
None	6	Full	95 °F	115 °F
None	6	None	105 °F	125 °F
5 or 2	5	Full	105 °F	125 °F
5 or 2	5	None	115 °F	135 °F
5, 2	4	Full	115 °F	135 °F
5, 2	4	None	125 °F	145 °F
2 and 5, and 6, 3, or 1	3	Full	125 °F	145 °F
2 and 5, and 6, 3, or 1	3	None	135 °F	155 °F

(a) Following these recommendations for unoccupied slots minimizes thermal stress on the doublers.
(b) Solar Load: FULL = maximum sunlight exposure per TR-TSY-000057. NONE = indoor or fully shaded.
(c) All maximum ambient temperatures of 115 °F or more with full solar load comply with the outside deployment requirements of section 10.2.1.3 of TA-NWT-001210.

The physical location of the HRE-506 doubler enclosures is driven by one of three deployment rules:

Rule 1 The first and most important rule is to place each enclosure span to the electrical limits of 35 dB. This places the first doubler at the 35 dB location, the second at 70 dB, and the third at 105 dB. These electrical settings allow the maximum range of 140 dB if the fourth span to the remote unit is also 35 dB.

Only the HDU-409, EDU-409, and HDU-407 doublers can be used in circuits with more than three spans.

Rule 2 If the first rule is not applicable, then make all the spans the same electrical length (same 196 kHz loss). This minimizes span loss and maximizes operating margin, resulting in the optimum transmission performances. If specific application constraints preclude using Rule 2, or two different circuit layout choices have the same maximum span loss, then use Rule 3.

Rule 3 To minimize the power consumption and dissipation of the line unit that powers the doubler or remote units, Span 1 must be a minimum and Span 3 must be a maximum. This choice minimizes the I^2R loss in the cable pairs and reduces the thermal stress on the line unit.

SPLICING

Splicing consists of connecting the wire pairs of the HRE-506 cable stub to the main cable located in the splice case, as shown in Figure 15 below. The following sections contain step-by-step procedures for:

- Preparing the stubs for splicing into the main cable, see "Pre-Splicing Procedure" on page 35.
- Splicing the stubs into the main cable, see "Splicing Procedure" on page 36.
- Dressing and taping the final splice in the splice case, see "Post-Splicing Procedure" on page 37.

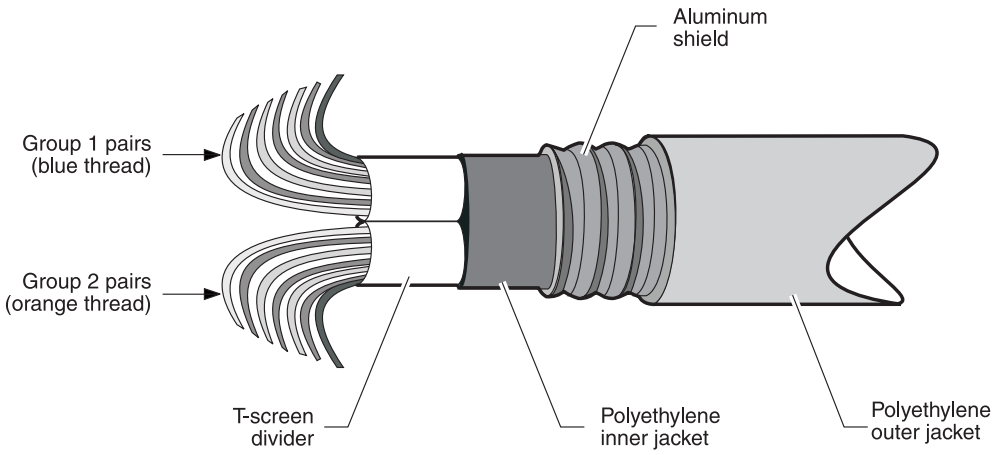


Figure 15. *Cable Stub Construction*

While performing these three splicing procedures, maintain cable pair integrity when splicing stub pairs into the main cable. The T1 lines must have correct cable connection. However, the HDSL units will compensates, if cable pairs are reversed, but may provide false indications when trouble occurs. Follow normal procedures, as required.

Pre-Splicing Procedure

Perform the following steps to pre-splice the enclosure cable stub:

Ground the HRE-506 enclosure before splicing the cable stubs into the main cable. The grounding method discussed in "Grounding" on page 14 or an accepted local grounding method must be in effect at all times to safeguard personnel.

The HRE-506 comes with a screened cable stub that is precut and capped.

The cable butt is considered to be the end of the cable stub most distant from the enclosure.

1. Strip a sufficient length of outer jacket, aluminum shield, and mylar sheath from the cable stub.
2. Strip the main cable, as required, by the cable manufacturer.
3. Install shield bonding connectors in accordance with standard practices.
4. To avoid split pairs, tie or band the ends of the Group 1 and Group 2 pairs. Cut off pair ends and the cable butt to aid in the removal of grease.
5. Separate pairs between the tied ends and the cable butt to aid in the removal of grease.

6 Remove grease by wiping the tied ends and the cable butt with a clean cloth or paper towel.

When the air temperature is low, warm the cable pairs to aid in removing grease by cleaning the stub in a heated enclosure or by using a heat gun to apply warm air to the pairs. Avoid applying excessive heat, which could deform the insulation on the pairs.

7 Keep cable pairs dry and cover the exposed splice to protect it from the elements if it is left unattended prior to completion.

Splicing Procedure

Certain applications involve splicing the cables on the HRE-506. The following section describes splicing procedures and wire list information.

1 Splice the cable stub to the main cable using the wire identification information in Table 3 on page 31.

2 Visually inspect each splice for split pairs, opens, and shorts.

Maintenance personnel sometimes cross-splice defective pairs between units. These pairs are referred to as wandering pairs and may cause problems.

3 Connect the CO side of the main cable to the CO side of the cable stub with a straight splice, as shown in Figure 16.

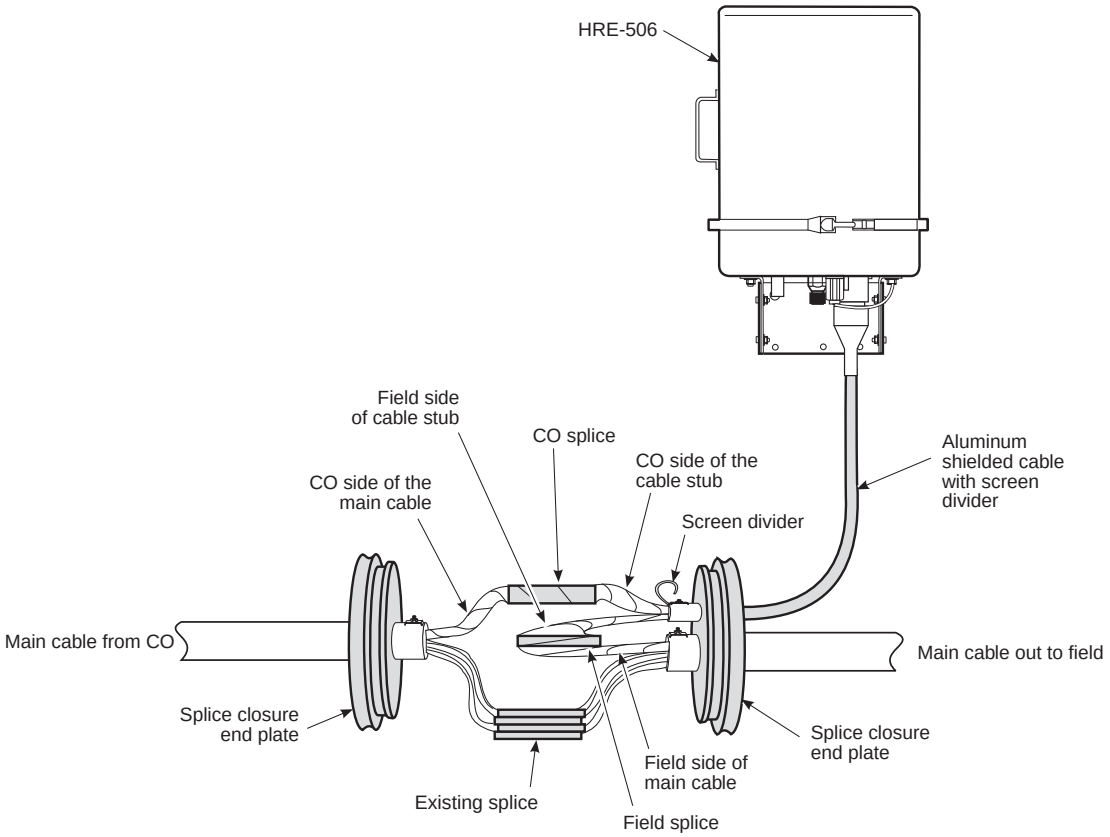


Figure 16. *Dress Splice in Splice Case*

4 Once the cables are connected, wrap the CO splice with aluminum tape or dress out the splice, according to local procedures.

5 Connect the field side of the cable stub to the field side of the main cable with a straight splice.

6 Once the cables are connected, wrap the field splice with aluminum tape as shown in Figure 16 on page 36 or dress out the splice according to local procedures.

7 Repair or correct defective or wandering pairs before closing the splice. These corrections help maintain the validity of the color code sequence of the cable stub in relation to the pair count and main cable.

8 Roll back and tape the screen divider from the cable stub.

9 Perform any cable tests required by local practice.

ADC highly recommends that you maintain cable pair integrity on the HDSL and T1/G.703 sides.

Post-Splicing Procedure

The post-splice procedure involves the following steps:

1 Starting at the cable-stub butt of the CO cable stub, wrap the pairs on one side of the screen with $^{3}/_{4}$-inch, self-bonding rubber tape. Overlap the tape by one-half its width, as shown in Figure 16 on page 36.

2 Repeat Step 1, wrapping the pairs on the other side of the screen of the CO cable stub in the same manner.

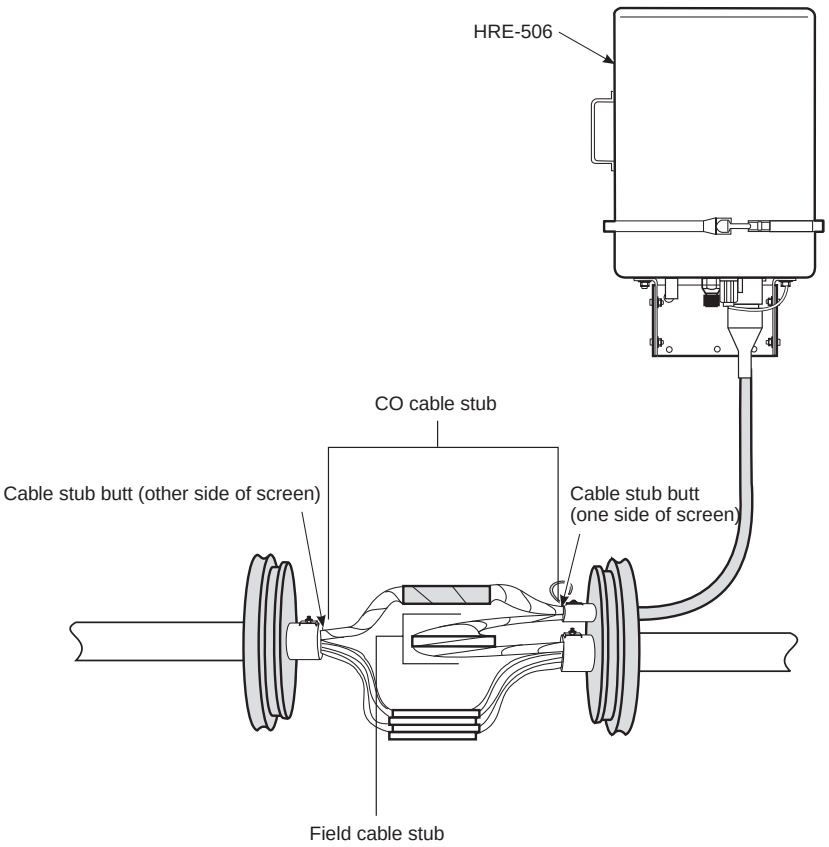


Figure 17. *Post-Splicing Procedure*

3 Starting at the cable-stub butt, wrap the pairs on one side of the screen with 2-inch, pressure sensitive, aluminum tape. Overlay the tape by one-half its width and form the tape in place. Aluminum tape provides electrical isolation from outside EMI sources. For these applications, dress out the splice per local practices.

Aluminum tape may present a potential shorting hazard when splicing paper pulp insulated cables.

4 Repeat Step 3, wrapping the pairs on the other side of the screen in the same manner.

5 Starting at the cable-stub butt of the field cable stub, wrap the pairs on one side of the screen with two layers of $^{3}/_{4}$-inch vinyl tape. Overlap the tape by one-half its width.

6 Repeat Step 5, wrapping the pairs on the other side of the field cable stub screen in the same manner.

The screen divider is an insulated floating divider that isolates Group 1 (blue thread sides 1 and 2 in) from Group 2 (orange thread sides 1 and 2 out).

Do not ground the divider or connect it to the screen divider of the main cable. This may result in poor performance. The aluminum tape used to wrap the input and output pairs provides the necessary isolation.

7 Cut the cable stub screen divider approximately 6 inches from the cable stub butt.

8 Fold each corner at a 45° angle to the center of the screen, as shown in Figure 18.

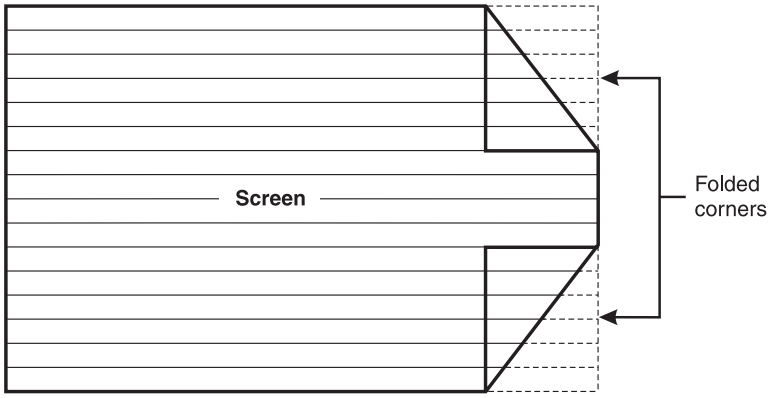


Figure 18. *Screen Folding Diagram*

9 Fold the screen divider back on itself several times and tape it to prevent it from unfolding.

10 Position the folded, taped screen divider between the spliced and taped Group 1 and Group 2 pairs.

11 Seal and close the splice case, according to the splice case instructions.

REPLACEMENT PARTS

There are seven replacement or accessory kits that are available for the HRE-506 enclosures. Table 5 on page 40 lists these kits.

Kits 132-1010, 132-1011, 132-1013, 132-1014; 132-1038-01; and 132-1030-01 are available to replace damaged components. Kit 132-1916-01 contains a set of nuts and bolt mounting hardware.

The HRE-506 contains LPU surge arrestors. See "Replacing the Stainless Steel Dome Cover" below for replacement instructions and Table 5 on page 40 for replacement part numbers. Additionally, ADC recommends that the O-ring be closely examined whenever the housing is opened for maintenance. If the O-ring is damaged, replace it.

The cover, clamp, O-ring, and LPU surge arrestors may be replaced in the field if they become damaged. See Table 5 on page 40 for replacement kits.

Replacing the Stainless Steel Dome Cover

It is necessary to replace the following items: stainless steel dome cover, metal locking clamp, and O-ring. It is recommended that the desiccant bags be replaced when the enclosure is opened. Use Davison Chemical Corp. *Proteck-Sorb-121* or equivalent desiccant.

Replacing the LPU Arrestor Boards

If any of the enclosure plugs experience severe lightning stress, ADC recommends replacing the LPU board for that plug. To Replace LPU arrestor Boards, perform the following steps:

1. Clean the dome cover and clamp of dust and debris.
2. Remove the clamp and dome cover as described in "Opening the Enclosure" on page 20.
3. Remove the defective LPU board.
4. Insert a new LPU board in the vacant position.
5. Replace other defective LPU boards in the same manner. Note that the LPU board must be reattached so that Pin 1 of the board is connected to the edge connector pin which, in turn, is connected to the green or braided shield ground wire. If the LPU board is attached in any other way, protection will not be provided.
6. Replace the O-ring, if damaged.
7. Place the cover and clamp, and then repressurize housing, if required. For additional information, refer to "Closing the Enclosure" on page 21.

Table 5. *Replacement Part Kits*

Number	Part
132-1029-01	**Cover, Metal Locking Clamp, O-Ring, Desiccant**
Qty 1	Therm-o-nator Dome Cover
Qty 1	Dome Cover O-Ring
Qty 1	V-Band Locking Clamp
Qty 2	Desiccant (2-unit bag)
132-1011-01	**O-Ring, Desiccant**
Qty 1	Dome Cover O-Ring
Qty 2	Desiccant (2-unit bag)
132-1034-01	**LPU Surge Arrestor, Desiccant**
Qty 1	Single Slot, 4 Port, Protection LPU Board
Qty 2	Desiccant (2-unit bag)
132-1013-01	**HRE-506 List 2 Security Cover**
Qty 1	Security Cover
132-1014-01	**Metal Locking Clamp, O-Ring, Desiccant**
Qty 1	Dome Cover O-Ring
Qty 1	V-Band Locking Clamp
Qty 2	Desiccant (2-unit bag)
132-1038-01	**Valve Kit (Metal)**
Qty 2	Pressure Release Valve (PRV)
Qty 2	Breather Vent Valve (BVV)
Qty 2	Air Stem Valve (ASV) and Cap
Qty 2	Air Pressure Cutoff Valve (PCV)
Qty 2	Air Intake T Valve Caps
Qty 2	Desiccant (2-unit bag)
132-1016-01	**Hardware Installation Kit**
Qty 4	1-inch long, $^3/_8$-inch Mounting Bolt
Qty 4	$^3/_8$-inch Mounting Nut
Qty 4	$^3/_8$-inch Mounting Washers
Qty 4	4-inch Mounting Lug Bolts
Qty 2	Desiccant (2-unit bag)
132-1030-01	**Protector Tube Kit**
Qty 25	47 BT Gas Tube Protectors or Equivalent

VALVE REPLACEMENT PROCEDURES

All but the Air Stem Inlet T-valve, shown in Figure 2 on page 3, can be replaced if needed. Order the valve replacement kit #132-1038-01 listed in Table 5 on page 40 to obtain new valves. Use the following procedures when replacing any of the four valves.

Replacing the Pressure Relief Valve

The Pressure Relief Valve (PRV) is part of an all metal, nickel plated brass assembly, shown in Figure 2 on page 3. The valve acts as a guard against over-pressurizing the enclosure and releases the internal pressure when it exceeds a nominal level of 15 PSI.

The assembly consists of an adapter that screws into a brass fitting located in the bottom of the base plate and the PRV valve itself which screws into this adapter. The adapter has two O-rings that are required to create an airtight seal. One is located on its outer threaded stem that connects to the brass fitting; the other is located at the base of its inner well where it seals the PRV to the adapter.

To remove and replace the PRV proceed as follows:

1 Grip the adapter nut with a $^{3}/_{4}$-inch wrench and the PRV with a $^{1}/_{2}$-inch wrench.

2 While holding the adapter nut steady (it should not be moved), loosen the PRV by turning it counterclockwise then remove the PRV by hand. If the adapter nut becomes loose, tighten it to a torque of 60 inch-pounds.

3 Check that the O-ring in the adapter's inner well has remained in place. If not, reseat it.

4 Thread the new PRV into the adapter. Do not crossthread.

5 Grip the adapter nut with a $^{3}/_{4}$-inch wrench and the PRV with a $^{1}/_{2}$-inch wrench and tighten the the PRV to 120 inch-pounds of torque.

Do not overtighten. Excessive torque does not improve the seal and may damage the PRV.

6 Pressurize the chamber and check the entire assembly for leaks.

Replacing the Breather Vent Valve

The Breather Vent Valve (BVV) is an all metal, nickel plated brass unit, as shown in Figure 2 on page 3. It allows air to circulate into the enclosure so it can breath and avoid the build up of excessive moisture and other contaminates. It has a hollow-threaded stem that connects into a brass fitting located at the bottom of the base. An O-ring is located on its outer threaded stem that connects to the brass fitting. The hollow stem contains a piece of plastic screen to prevent insects from migrating into the enclosure.

To remove and replace the breather vent, proceed as follows:

1 Grip the BVV with a $^{3}/_{4}$-inch wrench and loosen by turning it counterclockwise, then remove the valve by hand.

2 Check that the new BVV is equipped with its O-ring.

3 Thread the BVV into the brass fitting. Do not crossthread.

4 Grip the BVV with a $^{3}/_{4}$-inch wrench and tighten the valve to 60 inch-pounds of torque.

Do not overtighten. Excessive torque does not improve the seal and may damage the valve.

Replacing the Air Stem Valve

The Air Stem Valve (ASV) is part of an all metal, nickel plated brass assembly, as shown in Figure 2 on page 3. It is used to pressurize the enclosure from an external air supply or release the internal pressure.

The assembly consists of an adapter that screws into a brass fitting located at the bottom of the base. The ASV itself, which screws into this adapter and the cap connects to the top of the ASV. The adapter has two O-rings that are required to create an airtight seal. One is located on its outer threaded stem that connects to the brass fitting; the other is located at the base of its inner well where it seals the ASV to the adapter. See

To remove and replace the ASV, proceed as follows:

1 Grip the adapter nut with a $^{3}/_{4}$-inch wrench and the ASV with a $^{7}/_{16}$-inch wrench.

2 While holding the adapter nut steady (it should not be moved), loosen the ASV by turning it counterclockwise and then remove the valve by hand. If the adapter nut becomes loose, tighten it to a torque of 60 inch-pounds.

3 Check that the O-ring in the adapters inner well has remained in place. If not, reseat it.

4 Thread the new ASV into the adapter. Do not crossthread.

5 Grip the adapter nut with a $^{3}/_{4}$-inch wrench and the PRV with a $^{7}/_{16}$-inch wrench and tighten the latter to 120 inch-pounds of torque.

Do not overtighten. Excessive torque does not improve the seal and may damage the ASV.

6 Pressurize the chamber and check entire assembly for leaks.

This same ASV is also used in the Air Stem/Air Inlet T-valve assembly. The ASV in the T assembly can also be replaced. However, the rest of the T assembly is not replaceable.

Replacing Pressure Cutoff Valve

The Pressure Cutoff Valve (PCV) is part of an all-metal, nickel plated brass assembly, as shown in Figure 2 on page 3. The valve controls the flow of air from the air core stub (air-filled unit) or the external air inlet valve (gel-filled unit) into the enclosure.

The assembly consists of an adjusting knob with stem that is inner locked to a limiting nut. The outer limiting nut screws into the outer threads of the body housing connected to the enclosure's baseplate. The stem screws into the inner threads of the housing. The stem's tip has thread O-rings that open and close the air flow through the base of the body housing. When the adjusting nut is fully clockwise, the air flow is OFF. When it is rotated one turn clockwise, the airflow is ON. The body housing also has an O-ring on its threads to create an airtight seal, when the limiting nut is tightened down upon it.

To remove and replace the PCV, proceed as follows:

1 Loosen the limiting nut with a 1-inch (2.54 cm) wrench by turning it one-half turn counterclockwise.

2 Since the valve stem is internally threaded to the body housing, both the limiting nut and adjustment knob must next be turned together. Turn them counterclockwise until both are fully unthreaded from the body housing.

3 Pull the adjusting knob and limiting nut subassembly away from the body housing until completely disengaged. Some resistance will occur as the stem's O-rings rub against the walls of the body housing.

4 Check that the O-ring remains attached to the threaded tip of the body housing.

5 The replacement PCV assembly comes as a unit, which includes the limiting nut, adjustment knob and all O-rings. Do not attempt to disassemble it.

6 Insert the valve stem into the body housing's threaded tip as far as possible. Some resistance will occur as the O-rings contact the inner housing threads.

7 Rotate the limiting nut one-half turn clockwise.

8 Grasp both the limiting nut and adjustment knob. Screw this subassembly into the housing until the adjusting nut tightens the O-ring against the body housing. Do not crossthread.

9 Turn the adjusting knob clockwise until contact is felt between the stem's O-rings and the inner threads of the body housing.

10 Use the 1-inch (2.54 cm) wrench to torque the limiting nut to 200 inch-pounds. Do not overtighten. Excessive torque does not improve the seal and may damage the PCV.

11 Check that the adjusting knob has at least one and one-half turns of free movement in and out.

12 If any binding occurs, loosen the limiting nut and turn the adjustment knob until it moves freely. Retighten the limiting nut.

13 Rotate the adjustment knob a full turn counterclockwise from its full clockwise position. This should turn the pressure ON.

14 Pressurize the chamber and check the entire assembly for leaks.

15 Rotate the adjustment knob back and forth and determine that it does turn the airflow OFF when fully clockwise and ON when backed off one turn counterclockwise.

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.

Sales Assistance 800.366.3891 ext. 73000 (USA and Canada) or 952.917.3000 Fax: 952.917.3237	• Quotation Proposals • Ordering and Delivery • General Product Information
Systems Integration 800.366.3891, ext. 73000 (USA and Canada) or 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 (USA and Canada) or 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 (USA and Canada) 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 D: ABBREVIATIONS

The following abbreviations are used throughout this technical practice.

Amp	Amperes
ANSI	American National Standards Institute
ASV	Air Stem Valve and Cap
ATM	Asynchronous Transfer Mode
AWG	American Wire Gauge
BISDN	Broadband Integrated Services Digital Network
BT	Burst Tolerance
BVV	Breather Vent Valve
cm	Centimeter
CO	Central Office
CP	Customer Premises
dB	Decibel
EDU	E1 Doubler Unit
EMI	Electromagnetic Interference
ERU	E1 Remote Unit
ESD	ElectroStatic Discharge
ETPR	Extended Thermal Plastic Rubber
HDSL	High bit-rate Digital Subscriber Line
HLU	HiGain Line Unit
HRU	HiGain Remote Unit
HRE	HiGain Remote Enclosure
HTC	HiGain Test Card
ICEA	Insulated Cable Engineers Association
IEC	InterExchange Carrier
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
kHz	Kilohertz
k Ω	Kilohm
LATA	Local Access and Transport Area
LEC	Local Exchange Carrier
LPU	Lightning Protection Unit
Mil	1/1000 of an inch
mm	millimeter
Ohms	Measures of resistance
PCV	Air Pressure Cutoff Valve
PE	Processing Element
PRV	Pressure Relief Valve
PSI	Pounds Per Square Inch
RCV	Receive
REA	Rural Electrification Administration
RMA	Return Material Authorization
RX	Receive
SONET	Synchronous Optical Network
TX	Transmit
VBR	Variable Bit Rate
XMT	Transmit
V	Voltage

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 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-506 List 1 and List 2 has been tested and verified to comply with the applicable sections of the following standards:

- TR-TSY-000056 - Repeater Housings for T1, TIC, TID, and TIG Carrier Systems
- IEC/CEI/ETS-682, Extended Series T4.1E
- GR-950-CORE Section 6.5 and 6.6
- For technical assistance, refer to “Appendix C - Product Support” on page 44

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