

HEATER-CABIN

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HEATER UNIT

DESCRIPTION

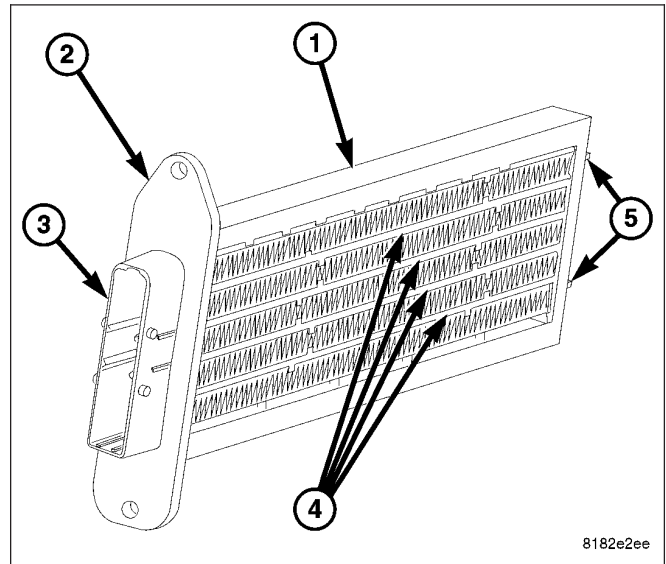
NOTE: LHD model shown. RHD model similar.

An electric positive temperature coefficient (PTC) heater unit (1) is used on vehicles when equipped with the 2.0L diesel engine. The PTC heater unit aids in passenger compartment heating by compensating for the lower engine coolant temperatures produced by the diesel engine. The PTC heater unit is mounted in the HVAC air distribution housing, downstream of the heater core and is controlled by the diesel engine control module (ECM) and the totally integrated power module (TIPM) through two relays in diesel accessory fuse/relay block located below the left front fender.

The PTC heater consists of a molded plastic mounting plate (2) with an integral wire connector receptacle (3). Concealed behind the mounting plate are four heating elements with fins (4) that transfer the heat produced by the PTC heater to the conditioned air flowing within the air distribution housing. Two retaining tabs (5) are molded onto the opposite end of the heater unit to support the heater unit inside the air distribution housing.

The PTC heater unit is connected to the vehicle electrical system through the instrument panel wire harness.

The PTC heater unit is accessed for service by removing the instrument panel.



OPERATION

The positive temperature coefficient (PTC) heater unit dissipates 1 kW of electrical power through 4 heating bars. The totally integrated power module (TIPM) operates the two relays for the PTC heater unit. The PTC heater unit is split into two "banks". Each bank is driven separately based on alternator load. This allows for lower in-rush current and optimum battery charging. After a bank has been turned on, another bank can only be turned on 10 seconds after the previous. On average, the PTC banks are not switched more than 25 times for each vehicle start. Electrical power output is between 900-1050 W.

The control system for the PTC heater unit is diagnosed using a scan tool. Prior to replacing a PTC heater unit, check for any diagnostic trouble codes (DTCs) related to the ECM, TIPM and heating-A/C system (refer to 24 - HVAC Electrical Diagnostics for more information).

The PTC heater unit cannot be adjusted or repaired and, if faulty or damaged it must be replaced.

DIAGNOSIS AND TESTING

POSITIVE TEMPERATURE COEFFICIENT (PTC) HEATER UNIT

WARNING: Disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: For circuit descriptions and diagrams, refer to the appropriate wiring information. The wiring information includes wiring diagrams, proper wire and connector repair procedures, further details on wire harness routing and retention, as well as pin-out and location views for the various wire harness connectors, splices and grounds.

Prior to replacing the positive temperature coefficient (PTC) heater unit, check for any diagnostic trouble codes (DTCs) related to the engine control module (ECM), totally integrated power module (TIPM) and the heating-A/C system and repair as necessary (refer to 24 - HVAC Electrical Diagnostics for more information).

1. Disconnect and isolate the negative battery cable.
2. Disconnect the wire harness connector from the PTC heater unit (Refer to 24 - HEATING & AIR CONDITIONING/CABIN HEATER/HEATER UNIT - REMOVAL).
3. Using an ohmmeter, check for continuity between all of the PTC heater unit terminals. In each case there should be continuity. If OK, repair the wire harness circuits between the PTC heater unit and the TIPM. If NOT OK, replace the PTC heater unit.

REMOVAL

WARNING: Refer to the applicable warnings and cautions for this system before performing the following operation (refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - WARNING) and (refer to 24 - HEATING & AIR CONDITIONING/PLUMBING - CAUTION). Failure to follow the warnings and cautions could result in possible personal injury or death.

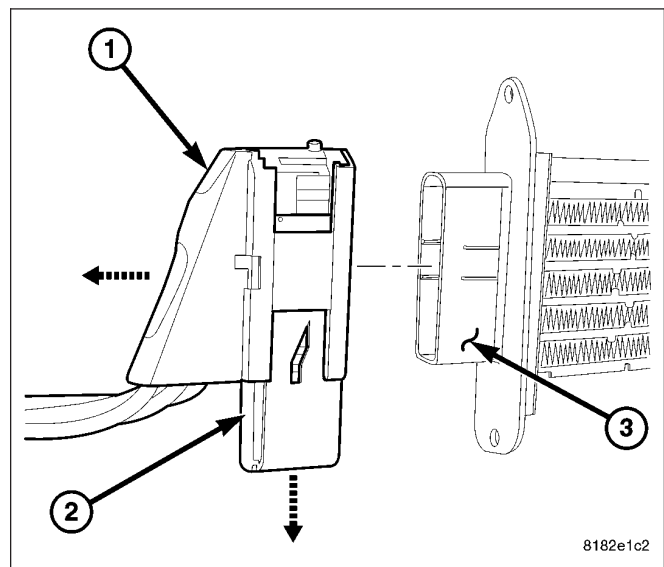
WARNING: Disable the airbag system before attempting any steering wheel, steering column, or instrument panel component diagnosis or service. Disconnect and isolate the negative battery (ground) cable, then wait two minutes for the airbag system capacitor to discharge before performing further diagnosis or service. This is the only sure way to disable the airbag system. Failure to take the proper precautions could result in accidental airbag deployment and possible personal injury or death.

NOTE: PTC heater shown removed from distribution housing for clarity.

1. Disconnect and isolate the negative battery cable.
2. Remove the instrument panel (Refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - REMOVAL).

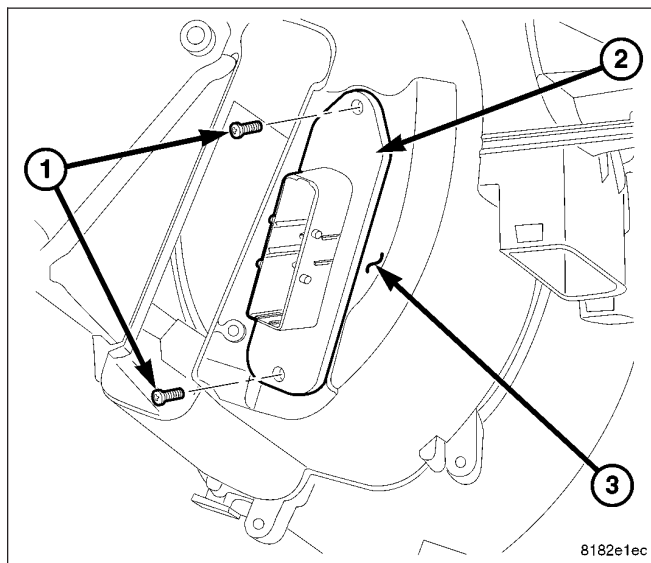
NOTE: To disconnect the wire harness connector from the heater unit, pull downward on the connector lock while pulling the connector away from the heater unit.

3. Disengage the wire connector lock (2) that secures the wire harness connector (1) to the positive temperature coefficient (PTC) heater unit (3) located on the left side of the HVAC air distribution housing and disconnect the connector from the heater.



NOTE: LHD model shown. RHD model similar.

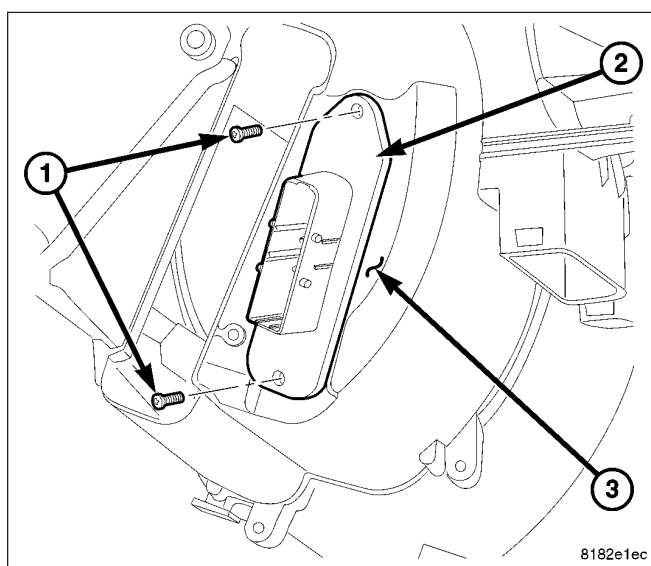
4. Remove the two screws (1) that secure the PTC heater unit (2) to the left side of the HVAC air distribution housing (3).
5. Carefully remove the PTC heater unit from the air distribution housing by pulling it straight out of the housing.



INSTALLATION

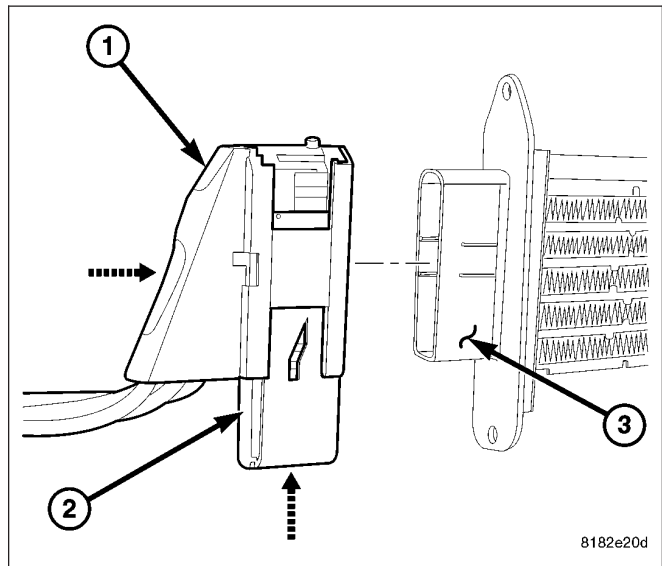
NOTE: LHD model shown. RHD model similar.

1. Carefully install the positive temperature coefficient (PTC) heater unit (2) into the left side of the HVAC air distribution housing (3). Make sure to position the two locator tabs on the end of the heater unit into the molded locator indentations on the right side of the air distribution housing.
2. Install the two screws (1) that secure the PTC heater unit to the air distribution housing. Tighten the screws to 1.2 N·m (10 in. lbs.).



NOTE: PTC heater shown removed from distribution housing for clarity.

3. Connect the wire harness connector (1) to the PTC heater unit (3) while pushing upward on the connector lock (2). Make sure the wire harness connector and lock are fully engaged.
4. Install the instrument panel (refer to 23 - BODY/INSTRUMENT PANEL/INSTRUMENT PANEL ASSEMBLY - INSTALLATION).
5. Reconnect the negative battery cable.

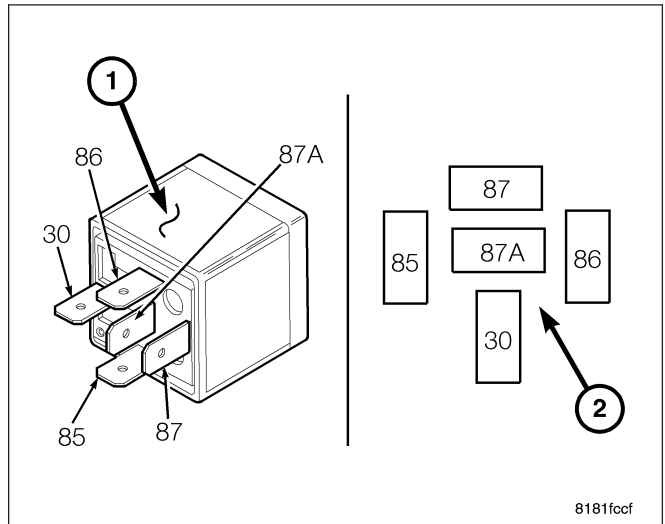


RELAY-HEATER UNIT

DESCRIPTION

Two relays (1) are used for the electric positive temperature coefficient (PTC) heater system when equipped with the 2.0L diesel engine. The relays are International Standards Organization (ISO)-type relays. Relays conforming to the ISO specifications have common physical dimensions, current capacities, terminal functions and patterns (2). The PTC relays are electromechanical devices that switch fused battery current directly to the heating elements of the PTC heater unit. The PTC relays are energized by control circuits of the totally integrated power module (TIPM).

The two PTC relays are located diesel accessory fuse/relay block located below the left front fender.



OPERATION

The two ISO-standard relays (1) used for the electric positive temperature coefficient (PTC) heater system are electromechanical switches that use a low current ASD power input to control the high current fused battery power output to the PTC heater unit. On each relay, the movable, common feed relay contact is held against the fixed, normally closed relay contact by spring pressure. When the electromagnetic relay coil is energized, it draws the movable common feed relay contact away from the fixed, normally closed relay contact and, holds it against the fixed, normally open relay contact. This action allows high current to flow to one or more of the heating elements of the PTC heater.

When the relay coil is de-energized, spring pressure returns the movable relay contact back against the fixed, normally closed contact point. The resistor or diode is connected in parallel with the relay coil, and helps to dissipate voltage spikes and electromagnetic interference that can be generated as the electromagnetic field of the relay coil collapses.

The terminals for the PTC relays are connected to the vehicle electrical system through receptacles in the diesel accessory fuse/relay block. The inputs and outputs of the PTC relays include:

- Terminals (30) receive battery current through a fusible link at all times.
- Terminals (85) are connected to a ground circuit.
- Terminals (86) are connected to control circuits of the totally integrated power module (TIPM).
- Terminals (87) provide fused battery current to the PTC heating elements through the PTC relays only when the PTC relay coil is energized.
- Terminals (87A) are not connected to any circuit in this application, but provide battery current output only when the PTC relay coil is de-energized.

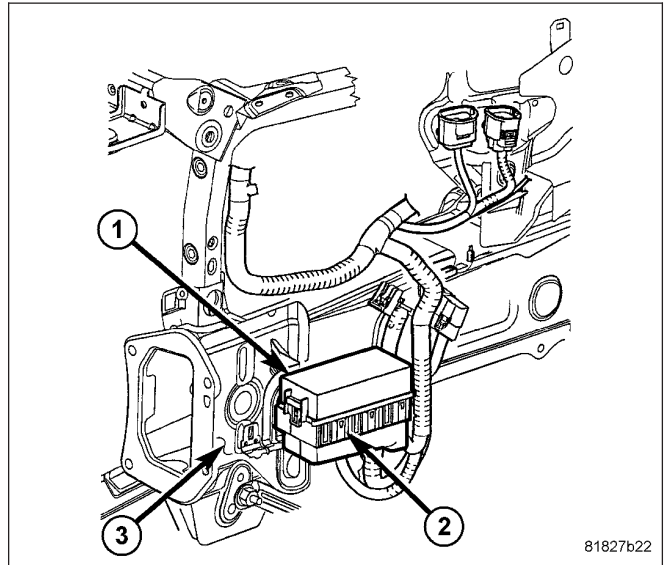
The two PTC relays cannot be repaired and, if faulty or damaged they must be replaced. Refer to the appropriate wiring information for diagnosis and testing of the ISO-standard relays and for complete TIPM and HVAC wiring diagrams.

REMOVAL

NOTE: LHD model shown. RHD model similar.

NOTE: Illustration shown with left front fender removed for clarity.

1. Disconnect and isolate the negative battery cable.
2. Remove the left front wheelhouse splash shield (refer to 23 - BODY/EXTERIOR/SPLASH SHIELD-FRONT WHEELHOUSE - REMOVAL).
3. Open the cover (1) of the diesel accessory fuse/relay block (2) located on the left front frame rail (3).
4. Remove the positive temperature coefficient (PTC) relays as necessary from the fuse/relay block.



INSTALLATION

NOTE: LHD model shown. RHD model similar.

NOTE: Illustration shown with left front fender removed for clarity.

1. Position the positive temperature coefficient (PTC) relays as necessary into the proper receptacle of the diesel accessory fuse/relay block (2) located on the left front frame rail (3).
2. Align the PTC relay terminals with the terminal cavities in the fuse/relay block and push down firmly on each relay until the terminals are fully seated.
3. Close the cover (1) of the diesel accessory fuse/relay block.
4. Install the left front wheel house splash shield (refer to 23 - BODY/EXTERIOR/SPLASH SHIELD-FRONT WHEELHOUSE - INSTALLATION).
5. Reconnect the negative battery cable.

