

## 2004 HVAC

### Heating, Ventilation And Air Conditioning - Vue

## SPECIFICATIONS

### FASTENER TIGHTENING SPECIFICATIONS

#### Fastener Tightening Specifications

Application	Specifications	
	Metric	English
Air Inlet Assembly Screws	1 N.m	9 lb in
Air Outlet Duct Screws	1 N.m	9 lb in
Battery Box to Body Bolts	15 N.m	11 lb ft
Blower Motor Resistor Screws	1 N.m	9 lb in
Blower Motor Screws	1 N.m	9 lb in
Compressor Clutch Nut	19 N.m	14 lb ft
Compressor Hose Assembly to Battery Box Nut (L61)	8 N.m	71 lb in
Compressor Hose Assembly to Compressor Bolt	27 N.m	20 lb ft
Compressor Hose Assembly to Condenser Nut	16 N.m	12 lb ft
Compressor Hose Assembly to TXV Nut (L61)	16 N.m	12 lb ft
Compressor to Engine Block Bolts	22 N.m	16 lb ft
Compressor Pressure Relief Valve	10 N.m	89 lb in
Compressor Thermal Protection Switch Retainer Bolt	6 N.m	53 lb in
CRFM Bracket Bolts	10 N.m	89 lb in
Defrost Actuator to Evaporator Case Screws	1 N.m	9 lb in
Defroster Duct to HVAC Module Nuts	2.5 N.m	22 lb in
Discharge Line Nuts	16 N.m	12 lb ft
Evaporator Case Assembly to Blower Case Assembly Screws	1 N.m	9 lb in
Evaporator Cover Screws	1 N.m	9 lb in
Evaporator Outlet Hose to Air Cleaner Bracket Bolt (L66)	7 N.m	62 lb in
Evaporator Outlet Hose to Compressor Hose Nut (L66)	16 N.m	12 lb ft
Evaporator Outlet Hose to Cowl Nut (L66)	8 N.m	71 lb in
Evaporator Outlet Hose to TXV Nut (L66)	16 N.m	12 lb ft
Evaporator Pipe Cover Screw	1 N.m	9 lb in
Floor Actuator to Evaporator Case Screws	1 N.m	9 lb in
Front of Dash to HVAC Module Seal Nuts	8 N.m	70 lb in
Heater Core Cover Screws	1 N.m	9 lb in
Heater Core Pipe Cover Screw	1 N.m	9 lb in
Heater Core Screws	1 N.m	9 lb in
Heater Duct to Heater Core Cover Screws	2 N.m	18 lb in

Hold Down Bracket and Bolt	6 N.m	53 lb in
HVAC Module to Cross Car Beam Nuts and Bolts	8 N.m	70 lb in
Intermediate Duct Fasteners	2.5 N.m	22 lb in
Liquid Line to Receiver Dehydrator Nut	16 N.m	12 lb ft
Liquid Line to Strut Tower Nut (L61)	5 N.m	44 lb in
Liquid Line to Strut Tower Nut (L66)	10 N.m	89 lb in
Liquid Line to TXV Nut	16 N.m	12 lb ft
Metal Bracket to HVAC Module Screws	2 N.m	18 lb in
Panel Actuator to Evaporator Case Screws	1 N.m	9 lb in
Passenger Compartment Air Filter Housing Nuts	9 N.m	80 lb in
Receiver Dehydrator Bracket Bolt to Body	10 N.m	89 lb in
Receiver Dehydrator to Condenser Nut	16 N.m	12 lb ft
Recirc Assembly Screws	1 N.m	9 lb in
Refrigerant Low Temperature Sensor Bolt to TXV	5 N.m	45 lb in
Refrigerant Pressure Sensor to Compressor Hose Assembly	10 N.m	89 lb in
TXV Backing Plate Bolts	9 N.m	80 lb in

## REFRIGERANT SYSTEM CAPACITIES

### Refrigerant System Capacities

Application	Specification	
	Metric	English
PAG Oil Saturn P/N 22695048		
Abrupt Refrigerant Loss	103 ml <sup>1</sup>	3.5 oz <sup>1</sup>
Compressor Replacement		
<ul style="list-style-type: none"> <li>The Visteon model SC105V service compressor is precharged with the specified amount of PAG oil. - 2.2L (L61)</li> </ul>	120 ml <sup>2</sup>	4 oz <sup>2</sup>
<ul style="list-style-type: none"> <li>The Visteon model SC100V service compressor is precharged with the specified amount of PAG oil. - 3.5L (L66)</li> </ul>	120 ml <sup>2</sup>	4 oz <sup>2</sup>
Condenser Replacement	30 ml <sup>2</sup>	1 oz <sup>2</sup>
Evaporator Replacement	30 ml <sup>2</sup>	1 oz <sup>2</sup>
Receiver/Dehydrator Replacement	60 ml <sup>3</sup>	2 oz <sup>3</sup>
Thermal Expansion Valve Replacement	20 ml <sup>2</sup>	0.75 oz <sup>2</sup>
<ul style="list-style-type: none"> <li>Total System PAG Oil Capacity</li> </ul>	207 ml	7.00 oz
R-134a		
<ul style="list-style-type: none"> <li>Refrigerant Charge - 2.2L (L61)</li> </ul>	0.68 kg	1.5 lb
<ul style="list-style-type: none"> <li>Refrigerant Charge - 3.5L (L66)</li> </ul>	0.79 kg	1.75 lb

<sup>2</sup> If more than the specified amount of PAG oil was drained from a component, add the equal amount of oil drained.

## **DIAGNOSTIC INFORMATION AND PROCEDURES**

### **DIAGNOSTIC STARTING POINT - HEATING, VENTILATION AND AIR CONDITIONING**

The Heating, Ventilation and Air Conditioning (HVAC) system is divided into 2 separate sections. The first, Heating, Ventilation and Air Conditioning, has all procedures that pertain to a HVAC component or function that is not specifically associated with the manual control system. The second, HVAC Systems - Manual, has all procedures specific to the Manual control system.

Begin the system diagnosis with the **Diagnostic System Check - HVAC Systems - Manual** in HVAC Systems - Manual.

The Diagnostic System Check will provide the identification of the control module(s) which command the system.

The use of the Diagnostic System Check will identify the correct procedure for diagnosing the system and where the procedure is located.

Review the Description and Operation information to help you determine the correct symptom diagnostic procedure when a malfunction exists. Reviewing the Description and Operation information will also help you determine if the condition described by the customer is normal operation. The HVAC Description and Operation information is divided into:

- **Air Delivery Description and Operation** in HVAC Systems - Manual
- **Air Temperature Description and Operation** in HVAC Systems - Manual

The Air Delivery Description and Operation contains the following topics:

- Air Speed
- Air Distribution

The Air temperature Description and Operation contains the following topics:

- Heater Mode
- A/C Mode
- A/C Cycle

### **LEAK TESTING**

#### **Refrigerant Leak Testing**

#### **Tools Required**

- **J 39400-A** Halogen Leak Detector.
- **J 41447 R 134a** A/C Tracer Dye-Box of 24.
- **J 42220** Universal 12V Leak Detection Lamp.
- **J 46297** A/C Dye Injector Kit.
- **J 46297-12** Replacement Dye Cartridges.
- See **Special Tools and Equipment** .

**IMPORTANT: Saturn vehicles are now manufactured with fluorescent dye installed directly into the A/C system.**

The preferred method of leak testing is with the use of fluorescent dye. **J 41447** is the only fluorescent dye approved by Saturn. See **Special Tools and Equipment** .

The fluorescent dye mixes and flows with the PAG oil throughout the refrigerant system.

Verifying some passive leaks may require using the **J 39400-A** , even though the A/C system contains fluorescent dye. See **Special Tools and Equipment** .

The only time that adding additional fluorescent dye is required is after flushing the A/C system.

#### **Fluorescent Leak Detector**

Fluorescent dye will assist in locating any leaks in the A/C system.

**IMPORTANT: PAG oil is water soluble.**

- Condensation on the evaporator core or the refrigerant lines may wash the PAG oil and fluorescent dye away from the actual leak. Condensation may also carry dye through the HVAC module drain.
- Leaks in the A/C system will be indicated in a light green or yellow color when using the leak detection lamp.

Use the leak detection lamp in the following areas:

- All fittings or connections that use seal washers or O-rings
- All of the A/C components
- The A/C compressor shaft seal
- The A/C hoses and pressure switches
- The HVAC module drain tube, if the evaporator core is suspected of leaking
- The service port sealing caps

The sealing cap is the primary seal for the service ports.

- Follow the instructions supplied with the **J 42220** . See **Special Tools and Equipment** .

- To prevent false diagnosis in the future, thoroughly clean the residual dye from any area where leaks were found. Clean any refrigerant dye on components with brake and choke cleaner, Saturn P/N 21007432.
- If any refrigerant dye contacts an exterior paint surface, remove it by performing the following steps:
  - Carefully wash affected surfaces according to the Saturn Owner's Handbook to remove any dirt and to ensure that paint is not scratched during dye removal.
  - Mix water and isopropyl alcohol to obtain 50/50 mixture. Soak a soft 100 percent cotton cloth towel with the solution and wet down the affected areas to remove dye.
  - After dye has been removed, wash affected areas and inspect to make sure that the dye has been removed.

### Fluorescent Dye Injection

**IMPORTANT: J 41447 is the only A/C leak detection dye approved by Saturn. See Special Tools and Equipment .**

- Not all of the fluorescent dyes are compatible with PAG oil.

Some types of dye decrease the oil viscosity or may chemically react with the oil.

- R-134a leak detection dye requires time to work. Depending upon the leak rate, a leak may not become visible for between 15 minutes and 7 days.

**IMPORTANT: Do NOT overcharge the A/C system with dye. This may cause reliability problems. Use only one 7.39 ml (0.25 oz) charge bottle of J 41447 . See Special Tools and Equipment .**

- With the A/C system charged, add **J 41447** to the A/C system using **J 46297** . See Special Tools and Equipment . Follow the instructions provided with **J 46297** . See Special Tools and Equipment .
- To prevent false diagnosis in the future, thoroughly clean the residual dye from any area where leaks were found. Clean any refrigerant dye on components with brake and choke cleaner, Saturn P/N 21007432.
- The dye injection package contains a notice sticker. Complete the leak detection information and place the sticker near the charge label.

### Halogen Leak Detector

**CAUTION: Do not operate the detector in a combustible atmosphere since its sensor operates at high temperatures or personal injury and/or damage to the equipment may result.**

Ensure that the vehicle has at least 0.41 kg (0.9 lb) of refrigerant in the A/C refrigeration system in order to perform a leak test. Refer to Refrigerant Recovery and Recharging for recharging the A/C system.

**IMPORTANT: Halogen leak detectors are sensitive to the following items:**

- Windshield washing solutions
- Many solvents and cleaners
- Some adhesives used in the vehicle

Clean and dry all surfaces in order to prevent a false warning. Liquids will damage the detector.

**IMPORTANT: Follow a continuous path in order to ensure that you will not miss any possible leaks. Test all areas of the system for leaks.**

Follow the instructions supplied with the **J 39400-A** . See **Special Tools and Equipment** .

### **AIR CONDITIONING (A/C) SYSTEM PERFORMANCE TEST (L61)**

This test measures the operating efficiency of the A/C system under the following conditions:

- The current ambient air temperature
- The current relative humidity
- The high side pressure of the A/C system
- The low side pressure of the A/C system
- The temperature of the air being discharged into the passenger compartment

#### **Test Description**

The numbers below refer to the step numbers on the diagnostic table.

**1:** This step determines if the A/C system has at least the minimum refrigerant charge required to operate the system without damage.

**2:** This step measures the performance of the A/C system.

**3:** This step is to allow for vehicle variations as well as high ambient temperatures.

#### **Air Conditioning (A/C) System Performance Test (L61)**

<b>Step</b>	<b>Action</b>	<b>Values</b>	<b>Yes</b>	<b>No</b>
<b>IMPORTANT:</b>				
<ul style="list-style-type: none"> <li>• The ambient air temperature must be at least 16°C (60°F).</li> <li>• Do not induce additional air flow across the front of the vehicle during the test.</li> <li>• If you were sent here from a DTC diagnostic table, clear the DTC upon completion of this test.</li> </ul>				
	<ol style="list-style-type: none"> <li>1. Park the vehicle inside or in the shade.</li> <li>2. Open the windows in order to ventilate the interior of the vehicle.</li> <li>3. If the A/C system was operating,</li> </ol>	More than 16°C (60°F)		

1	<p>allow the A/C system to equalize for about 2 minutes.</p> <ol style="list-style-type: none"> <li>4. Turn OFF the ignition.</li> <li>5. Install the <b>J 43600</b> . See <b><u>Special Tools and Equipment</u></b> .</li> <li>6. Record the ambient air temperature displayed on the <b>J 43600</b> . See <b><u>Special Tools and Equipment</u></b> .</li> <li>7. Record the low and high side STATIC pressure readings.</li> </ol> <p>Are both the low side and high side pressures within the specified value?</p>	<p>- 345 kPa (50 psi) More than 24°C (75°F) - 483 kPa (70 psi) More than 33°C (90°F) - 690 kPa (100 psi)</p>		
2	<p><b>IMPORTANT:</b> <b>Record the relative humidity and the ambient air temperature at the time of the test.</b></p> <ol style="list-style-type: none"> <li>1. Close the vehicle doors and windows.</li> <li>2. Open the drivers door window 12.7-15.2 cm (5-6 inches).</li> <li>3. Select the following HVAC control settings: <ul style="list-style-type: none"> <li>• The A/C is ON</li> <li>• The coldest temperature setting</li> <li>• The maximum blower speed</li> <li>• Recirculation mode</li> <li>• The I/P panel outlet mode</li> <li>• All I/P panel outlets are OPEN</li> </ul> </li> <li>4. Install the temperature probes of the <b>J 43600</b> in the left and right center panel air outlets. See <b><u>Special Tools and Equipment</u></b> .</li> <li>5. Apply the parking brake.</li> <li>6. Place the transaxle/transmission in one of the following positions: <ul style="list-style-type: none"> <li>• PARK (Automatic)</li> <li>• NEUTRAL (Manual)</li> </ul> </li> <li>7. Start the engine.</li> <li>8. Operate the A/C system for 5</li> </ol>	-		

Go to **Step 2**

Go to **Leak Testing**

	<p>minutes.</p> <p>9. Inspect A/C components for the following conditions:</p> <ul style="list-style-type: none"> <li>• Abnormal frost areas</li> <li>• Unusual noises</li> </ul> <p><b>IMPORTANT:</b>  <b>Press the RESET button, before using the print function of the J 43600 . See <u>Special Tools and Equipment</u> .</b></p> <p>10. Print the following information:</p> <ul style="list-style-type: none"> <li>• The panel outlet air temperatures</li> <li>• The low-side pressure</li> <li>• The high-side pressure</li> </ul> <p>11. Compare the low and high side pressures and the panel output temperatures to the A/C performance table below.</p> <p>Does all the data recorded fall within the specified ranges of the A/C performance table?</p>			
3	<p>If the pressures and temperatures recorded do not fall within the specified ranges:</p> <ol style="list-style-type: none"> <li>1. Continue to operate the A/C system for an additional 5 minutes.</li> <li>2. RESET the <b>J 43600</b> and record the pressures and temperatures again. See <u>Special Tools and Equipment</u> .</li> <li>3. Compare the low and high side pressures and the panel output temperature to the A/C performance table.</li> </ol> <p>Does all the data recorded fall within the specified ranges of the A/C performance table?</p>	-	Go to <b>Step 8</b>	Go to <b>Step 3</b>
4	<p>Do the high and low side pressures fall within the specified ranges, but the panel</p>	-	Go to <b>Air Conditioning (A/C)</b>	

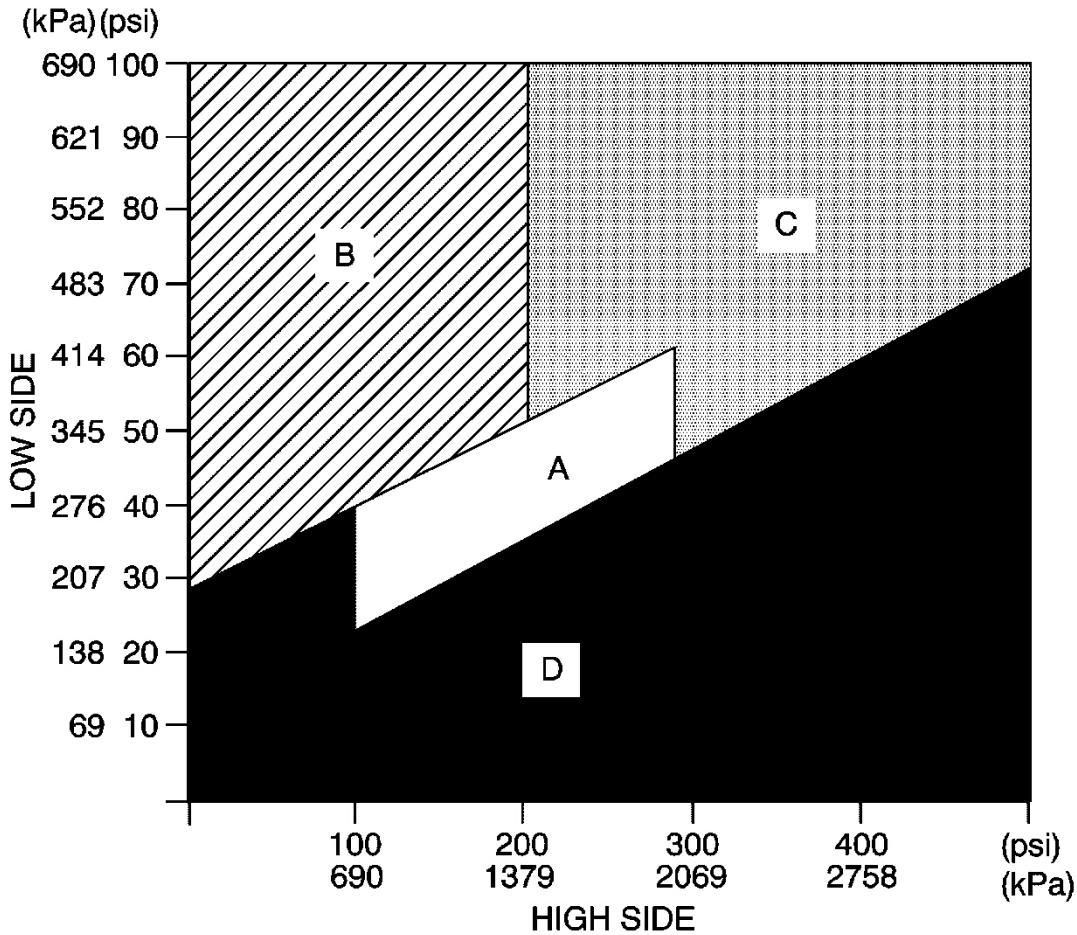


	outlet temperatures do not?		<b><u>Diagnostics - Pressure Zone A</u></b>	Go to <b>Step 5</b>
5	Is the low side pressure greater than the specified range, but the high side pressure within or less than the specified range?	-	Go to <b><u>Air Conditioning (A/C) Diagnostics - Pressure Zone B</u></b>	Go to <b>Step 6</b>
6	Are the low and high side pressures both greater than the specified ranges?	-	Go to <b><u>Air Conditioning (A/C) Diagnostics - Pressure Zone C</u></b>	Go to <b>Step 7</b>
7	Is the high side pressure greater than the specified range, but the low side pressure is within or less than the specified range?	-	Go to <b><u>Air Conditioning (A/C) Diagnostics - Pressure Zone D</u></b>	Go to <b>Step 8</b>
8	Operate the system in order to verify the test results. Did you find the same results?	-	System OK	Go to <b><u>Symptoms - HVAC Systems - Manual</u></b> in HVAC Systems - Manual

**A/C Performance Table**

<b>Ambient Temperature</b>	<b>Relative Humidity</b>	<b>Low Side Service Port Pressure</b>	<b>High Side Service Port Pressure</b>	<b>Maximum Left Center Discharge Air Temperature</b>
13-18°C (55-65° F)	0-100%	191-235 kPa (28-34 psi)	539-781 kPa (78-113 psi)	7°C (45°F)
19-24°C (66-75° F)	Less than 40%	191-258 kPa (38-37 psi)	708-878 kPa (103-128 psi)	8°C (47°F)
	Greater than 40%	197-258 kPa (29-37 psi)	708-955 kPa (103-139 psi)	10°C (50°F)
25-29°C (76-85° F)	Less than 35%	213-261 kPa (31-38 psi)	783-1129 kPa (114-164 psi)	10°C (50°F)
	35-60%	225-277 kPa (33-40 psi)	833-1137 kPa (121-165 psi)	12°C (54°F)
	Greater than 60%	238-303 kPa (35-44 psi)	877-1205 kPa (127-175 psi)	14°C (58°F)
30-35°C (86-95° F)	Less than 30%	225-288 kPa (33-42 psi)	940-1357 kPa (136-197 psi)	12°C (54°F)
	30-50%	238-303 kPa (35-44 psi)	1000-1387 kPa (145-201 psi)	14°C (58°F)
	Greater than 50%	238-322 kPa (35-47 psi)	1000-1372 kPa (145-199 psi)	15°C (60°F)
36-41°C (96-105° F)	Less than 20%	251-322 kPa (36-47 psi)	1153-1637 kPa (167-238 psi)	15°C (60°F)
	20-40%	276-352 kPa (40-51 psi)	1240-1728 kPa (180-251 psi)	18°C (65°F)

	Greater than 40%	288-375 kPa (42-54 psi)	1328-1811 kPa (193-263 psi)	21°C (71°F)
42-46°C (106-115°F)	Less than 20%	288-364 kPa (42-53 psi)	1365-1811 kPa (198-263 psi)	21°C (71°F)
	Greater than 20%	316-390 kPa (46-57 psi)	1503-1887 kPa (218-274 psi)	21°C (71°F)
47-49°C (116-120°F)	Below 30%	316-390 kPa (46-57 psi)	1547-1948 kPa (225-283 psi)	21°C (71°F)



**Fig. 1: A/C System Pressure - Zone Classification**

Courtesy of GENERAL MOTORS CORP.

**AIR CONDITIONING (A/C) SYSTEM PERFORMANCE TEST (L66)**

This test measures the operating efficiency of the A/C system under the following conditions:

- The current ambient air temperature

- The current relative humidity
- The high side pressure of the A/C system
- The low side pressure of the A/C system
- The temperature of the air being discharged into the passenger compartment

### Test Description

The numbers below refer to the step numbers on the diagnostic table.

**1:** This step determines if the A/C system has at least the minimum refrigerant charge required to operate the system without damage.

**2:** This step measures the performance of the A/C system.

**3:** This step is to allow for vehicle variations as well as high ambient temperatures.

### Air Conditioning (A/C) System Performance Test (L66)

Step	Action	Values	Yes	No
<b>IMPORTANT:</b>				
<ul style="list-style-type: none"> <li>• <b>The ambient air temperature must be at least 16°C (60°F).</b></li> <li>• <b>Do not induce additional air flow across the front of the vehicle during the test.</b></li> <li>• <b>If you were sent here from a DTC diagnostic table, clear the DTC upon completion of this test.</b></li> </ul>				
<b>1</b>	<ol style="list-style-type: none"> <li>1. Park the vehicle inside or in the shade.</li> <li>2. Open the windows in order to ventilate the interior of the vehicle.</li> <li>3. If the A/C system was operating, allow the A/C system to equalize for about 2 minutes.</li> <li>4. Turn OFF the ignition.</li> <li>5. Install the <b>J 43600</b> . See <b>Special Tools and Equipment</b> .</li> <li>6. Record the ambient air temperature displayed on the <b>J 43600</b> . See <b>Special Tools and Equipment</b> .</li> <li>7. Record the low and high side STATIC pressure readings.</li> </ol> <p>Are both the low side and high side pressures within the specified value?</p>	<p>More than 16°C (60°F) - 345 kPa (50 psi)</p> <p>More than 24°C (75°F) - 483 kPa (70 psi)</p> <p>More than 33°C (90°F) - 690 kPa (100 psi)</p>	Go to <b>Step 2</b>	Go to <b>Leak Testing</b>
	<b>IMPORTANT:</b> <b>Record the relative humidity and the ambient air temperature at the time of the test.</b>			

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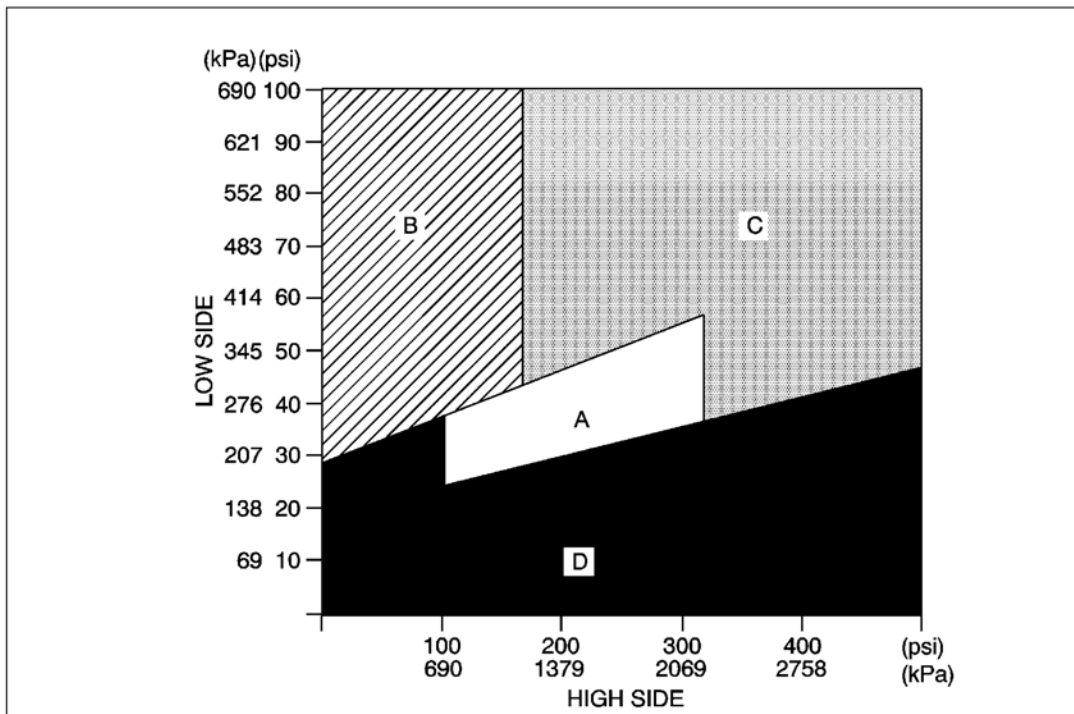
1. Close the vehicle doors and windows.
2. Open the drivers door window 12.7-15.2 cm (5-6 inches).
3. Select the following HVAC control settings:
  - The A/C is ON
  - The coldest temperature setting
  - The maximum blower speed
  - Recirculation mode
  - The I/P panel outlet mode
  - All I/P panel outlets are OPEN
4. Install the temperature probes of the **J 43600** in the left and right center panel air outlets. See **Special Tools and Equipment** .
5. Apply the parking brake.
6. Place the transaxle/transmission in PARK.
7. Start the engine.
8. Operate the A/C system for 5 minutes.
9. Inspect A/C components for the following conditions:
  - Abnormal frost areas
  - Unusual noises
- IMPORTANT:**  
**Press the RESET button, before using the print function of the J 43600 . See Special Tools and Equipment .**
10. Print the following information:
  - The panel outlet air temperatures
  - The low-side pressure
  - The high-side pressure
11. Compare the low and high side pressures and the panel output

	temperatures to the A/C performance table below.  Does all the data recorded fall within the specified ranges of the A/C performance table?		Go to <b>Step 8</b>	Go to <b>Step 3</b>
3	If the pressures and temperatures recorded do not fall within the specified ranges:  <ol style="list-style-type: none"> <li>1. Continue to operate the A/C system for an additional 5 minutes.</li> <li>2. RESET the <b>J 43600</b> and record the pressures and temperatures again. See <b>Special Tools and Equipment</b>.</li> <li>3. Compare the low and high side pressures and the panel output temperature to the A/C performance table.</li> </ol> Does all the data recorded fall within the specified ranges of the A/C performance table?	-	Go to <b>Step 8</b>	Go to <b>Step 4</b>
4	Do the high and low side pressures fall within the specified ranges, but the panel outlet temperatures do not?	-	Go to <b><u>Air Conditioning (A/C) Diagnostics - Pressure Zone A</u></b>	Go to <b>Step 5</b>
5	Is the low side pressure greater than the specified range, but the high side pressure within or less than the specified range?	-	Go to <b><u>Air Conditioning (A/C) Diagnostics - Pressure Zone B</u></b>	Go to <b>Step 6</b>
6	Are the low and high side pressures both greater than the specified ranges?	-	Go to <b><u>Air Conditioning (A/C) Diagnostics - Pressure Zone C</u></b>	Go to <b>Step 7</b>
7	Is the high side pressure greater than the specified range, but the low side pressure is within or less than the specified range?	-	Go to <b><u>Air Conditioning (A/C) Diagnostics - Pressure Zone D</u></b>	Go to <b>Step 8</b>
8	Operate the system in order to verify the test results. Did you find the same results?	-	System OK	Go to <b><u>Symptoms - HVAC Systems - Manual</u></b> in HVAC Systems - Manual

### A/C Performance Table

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<b>Ambient Temperature</b>	<b>Relative Humidity</b>	<b>Low Side Service Port Pressure</b>	<b>High Side Service Port Pressure</b>	<b>Maximum Left Center Discharge Air Temperature</b>
13-18°C (55-65°F)	0-100%	181-198 kPa (26-29 psi)	675-792 kPa (98-115 psi)	9°C (49°F)
19-24°C (66-75°F)	Less than 40%	186-198 kPa (27-29 psi)	820-1040 kPa (119-151 psi)	5°C (42°F)
	Greater than 40%	189-203 kPa (28-30 psi)	875-1082 kPa (127-157 psi)	6°C (43°F)
25-29°C (76-85°F)	Less than 35%	198-213 kPa (29-31 psi)	1068-1275 kPa (155-185 psi)	7°C (45°F)
	35-60%	213-222 kPa (31-32 psi)	1158-1399 kPa (168-203 psi)	9°C (48°F)
	Greater than 60%	227-238 kPa (33-35 psi)	1247-1488 kPa (181-216 psi)	12°C (53°F)
30-35°C (86-95°F)	Less than 30%	222-238 kPa (32-35 psi)	1344-1640 kPa (195-238 psi)	10°C (50°F)
	30-50%	236-250 kPa (34-36 psi)	1419-1771 kPa (206-257 psi)	12°C (53°F)
	Greater than 50%	238-264 kPa (35-38 psi)	1412-1778 kPa (205-258 psi)	13°C (56°F)
36-41°C (96-105°F)	Less than 20%	250-254 kPa (36-37 psi)	1516-1723 kPa (220-250 psi)	12°C (53°F)
	20-40%	269-278 kPa (39-40 psi)	1550-1840 kPa (225-267 psi)	14°C (57°F)
	Greater than 40%	290-304 kPa (42-44 psi)	1454-1612 kPa (211-234 psi)	16°C (61°F)
42-46°C (106-115°F)	Less than 20%	278-299 kPa (40-43 psi)	1598-1750 kPa (232-254 psi)	13°C (56°F)
	Greater than 20%	304-332 kPa (44-48 psi)	1654-1791 kPa (240-260 psi)	19°C (67°F)
47-49°C (116-120°F)	Below 30%	296-376 kPa (43-55 psi)	1667-2139 kPa (242-310 psi)	22°C (71°F)



**Fig. 2: A/C System Pressure - Zone Classification**  
 Courtesy of GENERAL MOTORS CORP.

## AIR CONDITIONING (A/C) DIAGNOSTICS - PRESSURE ZONE A

### Air Conditioning (A/C) Diagnostics - Pressure Zone A

Step	Action	Value	Yes	No
DEFINITION: The high and low side pressures may be normal or slightly less than normal. <ul style="list-style-type: none"> <li>• Air Delivery Concern</li> <li>• Slight Refrigerant Under Charge</li> <li>• Refrigerant Contamination</li> </ul>				
1	Were you sent here from the air conditioning (A/C) System Performance Test?	-	Go to Step 2	Go to <b>Air Conditioning (A/C) System Performance Test (L61)</b> or <b>Air Conditioning (A/C) System Performance Test (L66)</b>
2	Refer to the instrument panel outlet air temperatures recorded during the A/C system performance test. Does the discharge air temperature between the	-		

	right and left center instrument panel outlets vary by more than 1-2°C (2-3°F)?		Go to <b>Step 7</b>	Go to <b>Step 3</b>
3	Did the customer mention that the A/C system output temperatures are good at first, but then turn warm during extended drives?	-	Go to <b>Step 4</b>	Go to <b>Step 5</b>
4	Increase engine speed to 2,000 RPM. During extended operation of the A/C system, does the low side pressure decrease, possibly accompanied by heavy frost on the liquid line between the expansion device and the evaporator?	-	Go to <b>Air Conditioning (A/C) Diagnostics - Pressure Zone D</b>	Go to <b>Step 5</b>
5	<ol style="list-style-type: none"> <li>1. Refer to the pressures recorded during the A/C system performance test.</li> <li>2. Inspect for the following conditions: <ul style="list-style-type: none"> <li><b>CAUTION:</b> <b>Refer to <u>Moving Parts and Hot Surfaces Caution</u> in <u>Cautions and Notices</u>.</b></li> <li>• The high side pressure is slightly greater than the specified pressure ranges but still within Zone A on the A/C Pressure-Zone Classification Chart in the A/C System Performance Test. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61)</u></b> or <b><u>Air Conditioning (A/C) System Performance Test (L66)</u></b> .</li> <li>• The discharge line is hot.</li> <li>• The suction line is cool.</li> </ul> </li> </ol> <p>Do the listed conditions exist?</p>	-		
6	<ol style="list-style-type: none"> <li>1. Refer to the pressures recorded during the A/C system performance test.</li> <li>2. Inspect for the following conditions: <ul style="list-style-type: none"> <li>• The low side pressure is slightly lower than the specified pressure ranges but still within Zone A on the A/C Pressure-Zone Classification Chart in the A/C System Performance Test. Refer to <b><u>Air Conditioning (A/C) System</u></b></li> </ul> </li> </ol>	-		



	<p><b><u>Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66) .</u></b></p> <ul style="list-style-type: none"> <li>• The discharge line is warm to hot.</li> <li>• The suction line is cool to warm.</li> </ul>			<p>Go to <b><u>Too Hot in Vehicle</u></b> in HVAC Systems - Manual</p>
	<p>Do the listed conditions exist?</p>		<p>Go to <b>Step 8</b></p>	
7	<p>The A/C system may be undercharged.</p> <ol style="list-style-type: none"> <li>1. Leak test A/C system. Refer to <b><u>Leak Testing</u></b> .</li> <li>2. Recharge the A/C system to specifications. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> </ol>	-		
	<p>Is the action complete?</p>		<p>Go to <b>Step 14</b></p>	-
8	<p>The A/C system may be contaminated. View the information screen on <b>J 43600</b> for detection of foreign gases in the A/C system. See <b><u>Special Tools and Equipment</u></b> .</p> <p>Do foreign gases exist?</p>	-	<p>Go to <b>Step 9</b></p>	<p>Go to <b>Step 10</b></p>
9	<ol style="list-style-type: none"> <li>1. Evacuate the A/C system to a scavenging tank. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> <li>2. Recharge the A/C system to specifications.</li> </ol>	-		
	<p>Is the action complete?</p>		<p>Go to <b>Step 14</b></p>	-
10	<p>The A/C system may contain too much moisture or air.</p> <ol style="list-style-type: none"> <li>1. Evacuate and recharge the A/C system to specifications. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> <li>2. Operate the A/C system and inspect the instrument panel outlet air temperatures. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66)</u></b> .</li> </ol>	-		
	<p>Are the instrument panel outlet air temperatures within the specified ranges of the A/C Performance Test Table?</p>		<p>Go to <b>Step 15</b></p>	<p>Go to <b>Step 11</b></p>

11	<p>The A/C system may contain too much refrigerant oil.</p> <p><b>IMPORTANT:</b>  <b>Operate the A/C system on low, in order to enhance oil flow to the high side of the system.</b></p> <ol style="list-style-type: none"> <li>1. Operate the A/C system with the engine at idle speed and the blower speed on low for approximately 15 minutes.</li> <li>2. Recover the refrigerant from the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> <li>3. Remove the receiver dehydrator. Refer to <b><u>Receiver Dehydrator Replacement</u></b> .</li> <li>4. Drain and measure the refrigerant oil from the receiver dehydrator.</li> </ol> <p>Was more than the specified amount of refrigerant oil drained from the receiver?</p>	148 ml (5 oz)	Go to <b>Step 12</b>	Go to <b>Step 13</b>
12	<ol style="list-style-type: none"> <li>1. Reinstall the receiver dehydrator. Refer to <b><u>Receiver Dehydrator Replacement</u></b> .</li> <li>2. Recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> </ol> <p>Are the actions complete?</p>	-	Go to <b>Step 14</b>	-
13	<ol style="list-style-type: none"> <li>1. Add the specified amount of refrigerant oil to the receiver dehydrator. Refer to <b><u>Refrigerant System Capacities</u></b> .</li> <li>2. Install the receiver dehydrator. Refer to <b><u>Receiver Dehydrator Replacement</u></b> .</li> <li>3. Recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> </ol> <p>Are the actions complete?</p>	-	Go to <b>Step 14</b>	-
14	<ol style="list-style-type: none"> <li>1. Record the low and high side pressures and the instrument panel outlet air temperature.</li> <li>2. Compare the instrument panel outlet air temperatures to those listed in the A/C System Performance Chart. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61)</u></b> or <b><u>Air Conditioning (A/C)</u></b></li> </ol>	-		Go to <b>Air</b>

	<b><u>System Performance Test (L66)</u></b> .			<b><u>Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66)</u></b>
	Are the high and low side pressures and instrument panel outlet air temperatures within specifications?		Go to <b>Step 15</b>	
15	Operate the system in order to verify the repair. Did you find and correct the condition?	-	System OK	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems - Manual

## AIR CONDITIONING (A/C) DIAGNOSTICS - PRESSURE ZONE B

### Air Conditioning (A/C) Diagnostics - Pressure Zone B

Step	Action	Yes	No
DEFINITION: The low side pressure is higher than normal and the high side pressure is lower than normal.			
<ul style="list-style-type: none"> <li>• Malfunctioning Air Conditioning (A/C) Compressor</li> <li>• Refrigerant Under Charge</li> </ul>			
1	Were you sent here from the air conditioning (A/C) System Performance Test?	Go to <b>Step 2</b>	Go to <b><u>Air Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66)</u></b>
2	After continued operation of the A/C system, do the low and the high side pressures equalize or become static?	Go to <b>Step 5</b>	Go to <b>Step 3</b>
3	<ol style="list-style-type: none"> <li>1. Refer to the pressures recorded during the A/C System Performance Test.</li> <li>2. Inspect for the following conditions: <p style="text-align: center;"><b>CAUTION:</b> <b>Refer to <u>Moving Parts and Hot Surfaces Caution</u> in Cautions and Notices.</b></p> </li> </ol> <ul style="list-style-type: none"> <li>• The low side pressure is equal to or greater than the specified pressure range of the A/C Performance Table. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66)</u></b> .</li> <li>• The high side pressure is less than the specified pressure range of the A/C Performance Table. Refer to <b><u>Air</u></b></li> </ul>		

	<p><b><u>Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66) .</u></b></p> <ul style="list-style-type: none"> <li>• The low side refrigerant line at the compressor feels cool to warm.</li> <li>• The high side refrigerant line at the compressor feels warm to hot.</li> </ul> <p>Do the listed conditions exist?</p>	Go to <b>Step 5</b>	Go to <b>Step 4</b>
4	<p>1. Refer to the pressures recorded during the A/C System Performance Test.</p> <p>2. Inspect for the following conditions:</p> <p><b>CAUTION:</b> <b>Refer to <u>Moving Parts and Hot Surfaces Caution in Cautions and Notices.</u></b></p> <ul style="list-style-type: none"> <li>• The low side pressure is greater than the specified pressure range of the A/C Performance Table. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66) .</u></b></li> <li>• The high side pressure is less than the specified pressure range of the A/C Performance Table. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66) .</u></b></li> <li>• The low side refrigerant line at the compressor feels warm.</li> <li>• The high side refrigerant line at the compressor feels warm to hot.</li> </ul> <p>Do the listed conditions exist?</p>	Go to <b>Step 5</b>	Go to <b><u>Air Conditioning (A/C) System Performance Test (L61) or Air Conditioning (A/C) System Performance Test (L66)</u></b>
5	<p>The A/C system has a low refrigerant charge. Evacuate and recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging .</u></b></p> <p>Is the action complete?</p>	Go to <b>Step 6</b>	-
	<p>1. After you perform the repairs, record the following:</p> <ul style="list-style-type: none"> <li>• The low and the high side pressures</li> <li>• The instrument panel outlet air temperature</li> </ul> <p>2. Compare the pressures and the temperature to those</p>		

6	<p>listed in the A/C Performance Chart. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61)</u></b> or <b><u>Air Conditioning (A/C) System Performance Test (L66)</u></b> .</p> <p>Are the readings within the specified ranges found on the A/C Performance Chart?</p>	Go to <b>Step 13</b>	Go to <b>Step 7</b>
7	<p>The A/C compressor is malfunctioning. Remove the thermal expansion valve (TXV) and inspect for contamination. Refer to <b><u>Thermal Expansion Valve Replacement (First Design)</u></b> or <b><u>Thermal Expansion Valve Replacement (Second Design)</u></b> .</p> <p>Did you find metal flakes on the TXV?</p>	Go to <b>Step 9</b>	Go to <b>Step 8</b>
8	<p>Inspect the TXV for a brown, powdery residue indicating desiccant in the A/C system.</p> <p>Is a brown, powdery residue present?</p>	Go to <b>Step 11</b>	Go to <b>Step 12</b>
9	<ol style="list-style-type: none"> <li>1. Remove the compressor hose from the compressor. Refer to <b><u>Compressor Hose Assembly Replacement (L66)</u></b> or <b><u>Compressor Hose Assembly Replacement (L61)</u></b> .</li> <li>2. Inspect for metal flake contamination at the line connections and the compressor ports.</li> </ol> <p>Is metal flake contamination present?</p>	Go to <b>Step 10</b>	Go to <b>Step 12</b>
10	<ol style="list-style-type: none"> <li>1. Replace the A/C compressor. Refer to <b><u>Compressor Replacement (L61)</u></b> or <b><u>Compressor Replacement (L66)</u></b> .</li> <li>2. Replace the TXV. Refer to <b><u>Thermal Expansion Valve Replacement (First Design)</u></b> or <b><u>Thermal Expansion Valve Replacement (Second Design)</u></b> .</li> <li>3. Evacuate and recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> </ol> <p>Is the action complete?</p>	Go to <b>Step 13</b>	-
11	<ol style="list-style-type: none"> <li>1. Replace the TXV. Refer to <b><u>Thermal Expansion Valve Replacement (First Design)</u></b> or <b><u>Thermal Expansion Valve Replacement (Second Design)</u></b> .</li> <li>2. Replace the A/C compressor. Refer to <b><u>Compressor Replacement (L61)</u></b> or <b><u>Compressor Replacement (L66)</u></b> .</li> <li>3. Replace the receiver dehydrator. Refer to <b><u>Receiver Dehydrator Replacement</u></b> .</li> <li>4. Evacuate and recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> </ol>		

	Is the action complete?	Go to <b>Step 13</b>	-
12	<ol style="list-style-type: none"> <li>1. Replace the A/C compressor. Refer to <b><u>Compressor Replacement (L61)</u></b> or <b><u>Compressor Replacement (L66)</u></b> .</li> <li>2. Evacuate and recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> </ol>	Go to <b>Step 13</b>	-
13	<p>Operate the system in order to verify the repair</p> <p>Did you find and correct the condition?</p>	System OK	Go to <b><u>Symptoms - HVAC Systems - Manual</u></b> in HVAC Systems - Manual

## AIR CONDITIONING (A/C) DIAGNOSTICS - PRESSURE ZONE C

### Air Conditioning (A/C) Diagnostics - Pressure Zone C

Step	Action	Yes	No
<p>DEFINITION: The low and the high side pressures are both higher than normal.</p> <ul style="list-style-type: none"> <li>• Restricted Condenser Air Flow</li> <li>• Cooling Fan Malfunction</li> <li>• Thermal Expansion Valve (TXV) Malfunction</li> </ul>			
1	Were you sent here from the air conditioning (A/C) System Performance Test?	Go to <b>Step 2</b>	Go to <b><u>Air Conditioning (A/C) System Performance Test (L61)</u></b> or <b><u>Air Conditioning (A/C) System Performance Test (L66)</u></b>
2	<ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Turn ON the A/C.</li> <li>3. Inspect for proper cooling fan operation. Refer to <b><u>Cooling System Description and Operation</u></b> in Engine Cooling.</li> </ol> <p>Are the cooling fans ON and operating properly?</p>	Go to <b>Step 3</b>	Go to <b>Step 5</b>
3	<p>Visually inspect for the following conditions:</p> <ul style="list-style-type: none"> <li>• Damaged condenser cooling fins</li> <li>• Missing or misaligned air baffles</li> <li>• Restricted air flow</li> </ul> <p>Do any of these conditions exist?</p>	Go to <b>Step 4</b>	Go to <b>Step 6</b>
	Repair the air flow restriction.	Go to	

4	Is the action complete?	<b>Step 9</b>	-
5	Repair the fault to the cooling fan operation. Refer to <b>Cooling Fan Inoperative (L61)</b> or <b>Cooling Fan Inoperative (L66)</b> in Engine Cooling. Is the repair complete?	Go to <b>Step 9</b>	-
6	<b>CAUTION:</b> <b>Refer to <u>Moving Parts and Hot Surfaces Caution in Cautions and Notices.</u></b>  Feel the liquid line on both sides of the thermal expansion valve (TXV). Are the temperatures on both sides of the TXV similar?	Go to <b>Step 7</b>	Go to <b>Step 8</b>
7	Replace the damaged or faulty TXV. Refer to <b>Thermal Expansion Valve Replacement (First Design)</b> or <b>Thermal Expansion Valve Replacement (Second Design)</b> . Is the action complete?	Go to <b>Step 9</b>	-
8	1. Air is in the refrigerant system, or the system is overcharged. Refer to the view screen on <b>J 43600</b> ACR 2000 Air Conditioning Service Center for foreign gas content in the refrigerant. See <b>Special Tools and Equipment</b> . 2. Recover and recharge the A/C system. Refer to <b>Refrigerant Recovery and Recharging</b> .  Is the action complete?	Go to <b>Step 9</b>	-
9	1. Record the low and high side pressures and the instrument panel outlet air temperature after you have performed the repairs. 2. Compare the pressures and the instrument panel outlet air temperature to those listed in the A/C Performance Chart. Refer to <b>Air Conditioning (A/C) System Performance Test (L61)</b> or <b>Air Conditioning (A/C) System Performance Test (L66)</b> .  Are the readings within the specified ranges listed in the A/C Performance Chart?	Go to <b>Step 10</b>	Go to <b>Air Conditioning (A/C) System Performance Test (L61)</b> or <b>Air Conditioning (A/C) System Performance Test (L66)</b>
10	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems - Manual

## AIR CONDITIONING (A/C) DIAGNOSTICS - PRESSURE ZONE D

### Air Conditioning (A/C) Diagnostics - Pressure Zone D

Step	Action	Yes	No
<p>DEFINITION: The low side pressure is lower than normal and the high side pressure is higher than normal.</p> <ul style="list-style-type: none"> <li>• A restriction in the Air Conditioning (A/C) system</li> <li>• Debris in the system</li> </ul>			
1	<p>Were you sent here from the air conditioning (A/C) System Performance Test?</p>	Go to <b>Step 2</b>	Go to <b>Air Conditioning (A/C) System Performance Test (L61)</b> or <b>Air Conditioning (A/C) System Performance Test (L66)</b>
2	<p><b>CAUTION:</b> <b>Refer to <u>Moving Parts and Hot Surfaces Caution in Cautions and Notices.</u></b></p> <p>Feel the liquid line before the thermal expansion valve (TXV). Is the liquid line cold before the TXV?</p>	Go to <b>Step 3</b>	Go to <b>Step 8</b>
3	<p>Feel along the surfaces of the following high side components:</p> <ul style="list-style-type: none"> <li>• The compressor hose between the compressor and the condenser</li> <li>• The condenser</li> <li>• The liquid line between the condenser and the TXV</li> </ul> <p>Did you detect an abrupt drop in temperature along the surfaces of any of the listed components?</p>	Go to <b>Step 7</b>	Go to <b>Step 4</b>
4	<ol style="list-style-type: none"> <li>1. Feel the liquid line at the TXV location for extreme cold, possibly accompanied by heavy frost.</li> <li>2. Feel along the liquid line beyond the TXV location for warm temperature.</li> </ol> <p>Is the liquid line extremely cold at the TXV location and warm beyond the TXV location?</p>	Go to <b>Step 11</b>	Go to <b>Step 5</b>
5	<p>Feel along the surfaces of the following low side components:</p> <ul style="list-style-type: none"> <li>• The evaporator inlet tube between the TXV and the evaporator core</li> <li>• The evaporator outlet tube between the evaporator core and the compressor suction hose</li> </ul>		



	<ul style="list-style-type: none"> <li>• The compressor suction hose</li> </ul> <p>Did you feel an abrupt temperature change along the surfaces of any of the listed components?</p>	Go to <b>Step 7</b>	Go to <b>Step 6</b>
6	<p>Feel along the surfaces of the low and the high side components.</p> <ul style="list-style-type: none"> <li>• The evaporator inlet tube between the TXV and the evaporator core</li> <li>• The evaporator outlet hose between the TXV and the compressor</li> <li>• The compressor hose assembly</li> <li>• The condenser</li> <li>• The liquid line between the condenser and the TXV</li> </ul> <p>Are the temperatures of these components only mildly warm?</p>	Go to <b>Step 14</b>	Go to <b>Step 8</b>
7	<ol style="list-style-type: none"> <li>1. Recover the refrigerant. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> <li>2. Remove the restriction from the component, or replace the component which produced an abrupt temperature drop.</li> </ol> <p>Is the action complete?</p>	Go to <b>Step 9</b>	-
8	<ol style="list-style-type: none"> <li>1. Recover the refrigerant and evacuate the system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> <li>2. Record the weight of the recovered refrigerant.</li> <li>3. Compare the weight of the recovered refrigerant with the system capacity. Refer to <b><u>Refrigerant System Capacities</u></b> .</li> </ol> <p>Is the weight of the recovered refrigerant charge greater than 75% of the total system capacity?</p>	Go to <b>Step 9</b>	Go to <b>Step 10</b>
9	<p>Recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</p> <p>Is the cooling performance improved?</p>	Go to <b>Step 20</b>	Go to <b>Step 10</b>
10	<ol style="list-style-type: none"> <li>1. Leak test the system. Refer to <b><u>Leak Testing</u></b> .</li> <li>2. Repair any leaks.</li> </ol> <p>Is the action complete?</p>	Go to <b>Step 20</b>	-

11	<p>The TXV is restricted.</p> <ol style="list-style-type: none"> <li>1. Replace the TXV. Refer to <b><u>Thermal Expansion Valve Replacement (First Design)</u></b> or <b><u>Thermal Expansion Valve Replacement (Second Design)</u></b> .</li> <li>2. If the TXV was restricted, note the type of debris present.</li> </ol> <p>Are metal flakes present?</p>	Go to <b>Step 12</b>	Go to <b>Step 13</b>
12	<ol style="list-style-type: none"> <li>1. Remove the compressor hose assembly from the vehicle. Refer to <b><u>Compressor Hose Assembly Replacement (L66)</u></b> or <b><u>Compressor Hose Assembly Replacement (L61)</u></b> .</li> <li>2. Inspect the hose for debris by blowing shop air through one end of the hose while covering the other end with a shop towel.</li> <li>3. Observe the amount of debris collected in the shop towel.</li> </ol> <p>Did a large amount of debris collect in the shop towel?</p>	Go to <b>Step 18</b>	Go to <b>Step 19</b>
13	<p>If the TXV was restricted with a brown or black residue, replace the receiver dehydrator. Refer to <b><u>Receiver Dehydrator Replacement</u></b> .</p> <p>Are the actions complete?</p>	Go to <b>Step 20</b>	-
14	<ol style="list-style-type: none"> <li>1. Recover the refrigerant. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> <li>2. Disconnect the compressor hose from the compressor. Refer to <b><u>Compressor Hose Assembly Replacement (L66)</u></b> or <b><u>Compressor Hose Assembly Replacement (L61)</u></b> .</li> <li>3. Inspect for the presence of debris in the compressor suction port.</li> </ol> <p>Is debris present in the compressor suction port?</p>	Go to <b>Step 15</b>	Go to <b>Step 19</b>
15	<ol style="list-style-type: none"> <li>1. Remove the debris from the suction port.</li> <li>2. Inspect the TXV for damage or debris. Refer to <b><u>Thermal Expansion Valve Replacement (First Design)</u></b> or <b><u>Thermal Expansion Valve Replacement (Second Design)</u></b> .</li> </ol> <p>Did you find evidence of damage or debris?</p>	Go to <b>Step 17</b>	Go to <b>Step 16</b>
	<p>If the TXV does not show any signs of damage or debris,</p>		

16	<p>perform the following procedure:</p> <ol style="list-style-type: none"> <li>1. Remove the compressor hose assembly from the vehicle. Refer to <b><u>Compressor Hose Assembly Replacement (L66)</u></b> or <b><u>Compressor Hose Assembly Replacement (L61)</u></b> .</li> <li>2. Inspect the hose for debris by blowing shop air through one end of the hose while covering the other end with a shop towel.</li> <li>3. Observe the amount of debris collected in the shop towel.</li> </ol> <p>Did a large amount of debris collect in the shop towel?</p>	Go to <b>Step 18</b>	Go to <b>Step 19</b>
17	<ol style="list-style-type: none"> <li>1. Replace the TXV. Refer to <b><u>Thermal Expansion Valve Replacement (First Design)</u></b> or <b><u>Thermal Expansion Valve Replacement (Second Design)</u></b> .</li> <li>2. If the TXV was restricted, observe the type of debris present.</li> </ol> <p>Are metal flakes present?</p>	Go to <b>Step 12</b>	Go to <b>Step 13</b>
18	<p>If a large amount of debris was collected in the shop towel from the compressor hose assembly, replace the receiver dehydrator. Refer to <b><u>Receiver Dehydrator Replacement</u></b> .</p> <p>Is the action complete?</p>	Go to <b>Step 19</b>	-
19	<ol style="list-style-type: none"> <li>1. Install the compressor hose assembly. Refer to <b><u>Compressor Hose Assembly Replacement (L66)</u></b> or <b><u>Compressor Hose Assembly Replacement (L61)</u></b> .</li> <li>2. Recharge the A/C system. Refer to <b><u>Refrigerant Recovery and Recharging</u></b> .</li> </ol> <p>Are the actions complete?</p>	Go to <b>Step 20</b>	-
20	<ol style="list-style-type: none"> <li>1. Record the low and the high side pressures and the instrument panel outlet air temperature after you perform the repairs.</li> <li>2. Compare the pressures and the instrument panel outlet air temperature to those listed in the A/C Performance Chart. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61)</u></b> or <b><u>Air Conditioning (A/C) System Performance Test (L66)</u></b> .</li> </ol>		Go to <b>Air Conditioning (A/C) System Performance Test</b>

	Are the readings within the specified ranges as shown on the A/C Performance Chart?	Go to <b>Step 21</b>	<b>(L61) or Air Conditioning (A/C) System Performance Test (L66)</b>
21	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems - Manual

## HEATING PERFORMANCE DIAGNOSTIC

### Heating Performance Diagnostic

Step	Action	Yes	No
DEFINITION: Heating system performance.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to <b>Step 2</b>	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems-Manual
2	1. Start the engine. 2. Allow the engine to idle.  Does the engine reach a normal operating temperature?	Go to <b>Step 3</b>	Go to <b>Step 9</b>
3	1. Allow the engine to idle. 2. Select the FLOOR mode. 3. Select the minimum blower speed. 4. Select the warmest temperature setting. 5. Feel the temperature of the inlet and outlet heater hoses at the heater core.  Does the inlet heater hose feel warmer than the outlet heater hose?	Go to <b>Step 7</b>	Go to <b>Step 4</b>
4	1. Install a thermometer into the center I/P PANEL air outlet. 2. Secure a thermometer to the heater core outlet hose. 3. Select the PANEL mode. 4. Select the maximum blower speed. 5. Select the warmest temperature setting. 6. Record the temperature at the following locations: <ul style="list-style-type: none"> <li>• The center I/P PANEL air outlet</li> <li>• The heater core outlet hose</li> </ul> 7. Compare the recorded temperatures.  Are the two temperature readings about equal?	Go to <b>Step 5</b>	Go to <b>Step 6</b>
	1. Inspect and repair the following areas of the vehicle		

5	<p>for cold air leaks:</p> <ul style="list-style-type: none"> <li>• The cowl</li> <li>• The recirculation door</li> <li>• The HVAC module case</li> </ul> <p>2. Perform the necessary repairs.</p> <p>Are the repairs complete?</p>	Go to <b>Step 10</b>	-
6	<p>1. Inspect the temperature door operation. Refer to <b><u>Diagnostic System Check - HVAC Systems - Manual</u></b> in HVAC Systems-Manual.</p> <p>2. Perform any necessary repairs.</p> <p>Are the repairs complete?</p>	Go to <b>Step 10</b>	-
7	<p>1. Turn OFF the engine.</p> <p>2. Backflush the heater core.</p> <p>3. Start the engine.</p> <p>4. Select the FLOOR mode.</p> <p>5. Select the minimum blower speed.</p> <p>6. Select the warmest temperature setting.</p> <p>7. Feel the temperature of the inlet and outlet heater hoses at the heater core.</p> <p>Does the inlet heater hose feel warmer than the outlet heater hose?</p>	Go to <b>Step 8</b>	Go to <b>Step 10</b>
8	<p>Replace the heater core. Refer to <b><u>Heater Core Replacement</u></b> .</p> <p>Is the repair complete?</p>	Go to <b>Step 10</b>	-
9	<p>Repair the low engine temperature concern. Refer to <b><u>Engine Fails To Reach Normal Operating Temperature</u></b> in Engine Cooling.</p> <p>Is the repair complete?</p>	Go to <b>Step 10</b>	-
10	<p>Operate the system in order to verify the repair.</p> <p>Did you find and correct the condition?</p>	System OK	Go to <b>Step 2</b>

## DEFROSTING INSUFFICIENT

### Defrosting Insufficient

Step	Action	Yes	No
DEFINITION: Time required to defrost the windshield is longer than usual.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to <b>Step 2</b>	Go to <b><u>Symptoms - HVAC Systems - Manual</u></b> in HVAC Systems - Manual

2	<ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Select the DEFROST mode.</li> <li>3. Select the maximum blower speed.</li> </ol> <p>Does sufficient air flow from the defroster outlets?</p>	Go to <b>Step 3</b>	Go to <b>Step 11</b>
3	<p>Measure the engine operating temperature.</p> <p>Does engine reach normal operating temperature?</p>	Go to <b>Step 4</b>	Go to <b>Step 9</b>
4	<ol style="list-style-type: none"> <li>1. Select the minimum blower speed.</li> <li>2. Select the warmest temperature setting.</li> <li>3. Feel the temperature of the inlet and outlet hoses at the heater core.</li> </ol> <p>Does the inlet heater hose feel warmer than the outlet heater hose?</p>	Go to <b>Step 12</b>	Go to <b>Step 5</b>
5	<p>Is the vehicle equipped with air conditioning?</p>	Go to <b>Step 6</b>	Go to <b>Step 14</b>
6	<p>Test the operation of the A/C compressor clutch.</p> <p>Does the A/C compressor clutch engage?</p>	Go to <b>Step 8</b>	Go to <b>Step 7</b>
7	<p>Repair the A/C compressor clutch. Refer to <b><u>HVAC Compressor Clutch Does Not Engage</u></b> in HVAC Systems - Manual.</p> <p>Is the repair complete?</p>	Go to <b>Step 15</b>	-
8	<p>Perform the A/C system performance test. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61)</u></b> or <b><u>Air Conditioning (A/C) System Performance Test (L66)</u></b>.</p> <p>Is the A/C system operating within the specifications?</p>	Go to <b>Step 10</b>	Go to <b>Step 13</b>
9	<p>Repair the low engine temperature concern. Refer to <b><u>Engine Fails To Reach Normal Operating Temperature</u></b> in Engine Cooling.</p> <p>Is the repair complete?</p>	Go to <b>Step 15</b>	-
10	<p>Inspect for correct operation of the recirculation door.</p> <p>Is the recirculation door operating correctly?</p>	Go to <b>Step 15</b>	Go to <b>Step 14</b>
11	<p>Repair the air delivery concern. Refer to <b><u>Air Delivery Improper</u></b> in HVAC Systems - Manual.</p> <p>Is the repair complete?</p>	Go to <b>Step 15</b>	-
12	<p>Repair the heating concern. Refer to <b><u>Heating Performance Diagnostic</u></b>.</p> <p>Is the repair complete?</p>	Go to <b>Step 15</b>	-
13	<p>Repair the A/C performance concern. Refer to <b><u>Air Conditioning (A/C) System Performance Test (L61)</u></b> or <b><u>Air Conditioning (A/C) System Performance Test (L66)</u></b>.</p> <p>Is the repair complete?</p>	Go to <b>Step 15</b>	-
	<p>Repair the recirculation door concern. Refer to <b><u>Air</u></b></p>		

14	<b>Recirculation Malfunction</b> in HVAC Systems - Manual. Is the repair complete?	Go to <b>Step 15</b>	-
15	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to <b>Step 2</b>

## HIGH OR LOW TEMPERATURE CONTROL EFFORT

### High or Low Temperature Control Effort

Step	Action	Yes	No
DEFINITION: The temperature control operates with either too much or too little effort.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to <b>Step 2</b>	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems - Manual
2	Is one of the following a concern of the customer: <ul style="list-style-type: none"> <li>• The temperature control operates with little or no resistance.</li> <li>• The HVAC outlet air temperature is constant, regardless of the temperature control setting.</li> <li>• While driving the vehicle the temperature control setting changes.</li> </ul> Does the temperature control operate too freely?	Go to <b>Step 3</b>	Go to <b>Step 7</b>
3	1. Idle the engine at normal operating temperature. 2. Cycle the temperature control from the coldest setting to the warmest setting. Does the temperature change from cold to hot?	Go to <b>Step 17</b>	Go to <b>Step 4</b>
4	Inspect the connections of the temperature control cable. Is the temperature control cable disconnected from the temperature door?	Go to <b>Step 15</b>	Go to <b>Step 5</b>
5	Inspect the temperature control cable and linkage at the temperature door, while operating the temperature controls. Does the temperature door move while operating the temperature controls?	Go to <b>Step 22</b>	Go to <b>Step 6</b>
6	Inspect the cable casing while operating the temperature controls. Does the cable casing move, instead of the cable, while operating the temperature controls?	Go to <b>Step 19</b>	Go to <b>Step 16</b>
	Inspect the HVAC control module for any debris or obstructions that would increase the effort to operate		

7	the temperature controls. Are there any obstructions?	Go to <b>Step 21</b>	Go to <b>Step 8</b>
8	<ol style="list-style-type: none"> <li>1. Disconnect the temperature control cable from the temperature door.</li> <li>2. Operate the HVAC control module with the temperature control cable disconnected.</li> </ol> Does the HVAC control module bind now?	Go to <b>Step 10</b>	Go to <b>Step 9</b>
9	<p>With the temperature control cable disconnected:</p> <ol style="list-style-type: none"> <li>1. Manually operate the temperature door.</li> <li>2. Inspect the door for binding.</li> </ol> Does the temperature door bind with the cable disconnected?	Go to <b>Step 20</b>	Go to <b>Step 10</b>
10	<ol style="list-style-type: none"> <li>1. Disconnect the temperature control cable from the HVAC control assembly.</li> <li>2. Operate the HVAC control module with the cable disconnected.</li> </ol> Does the HVAC control module bind now?	Go to <b>Step 17</b>	Go to <b>Step 11</b>
11	<p>With the temperature control cable disconnected at both ends:</p> <ol style="list-style-type: none"> <li>1. Extend the cable in both directions.</li> <li>2. Inspect the cable for binding.</li> </ol> Does the temperature control cable bind?	Go to <b>Step 18</b>	Go to <b>Step 12</b>
12	<ol style="list-style-type: none"> <li>1. Inspect the temperature control cable for kinks or bends from incorrect routing.</li> <li>2. Repair the cable or routing as necessary.</li> </ol> Does the temperature cable still bind?	Go to <b>Step 18</b>	Go to <b>Step 13</b>
13	Operate the HVAC control module with the temperature control cable disconnected. Does the HVAC control module bind now?	Go to <b>Step 17</b>	Go to <b>Step 14</b>
14	Assemble the temperature control system. Is the action complete?	Go to <b>Step 22</b>	-
15	Connect the temperature control cable to the temperature door linkage install the cable retainers. Is the action complete?	Go to <b>Step 22</b>	-



16	Repair the lack of heating or lack of cooling condition. Refer to <b>Engine Fails To Reach Normal Operating Temperature</b> . Is the action complete?	Go to <b>Step 22</b>	-
17	Replace the HVAC control module. Refer to <b>HVAC Control Module Replacement</b> in HVAC Systems - Manual. Is the repair complete?	Go to <b>Step 22</b>	-
18	Replace the temperature control cable. Refer to <b>Temperature Control Cable Replacement</b> in HVAC Systems - Manual. Is the repair complete?	Go to <b>Step 22</b>	-
19	Secure the temperature control cable casing. Is the action complete?	Go to <b>Step 22</b>	-
20	Repair the binding door. Is the repair complete?	Go to <b>Step 22</b>	-
21	Remove the debris. Is the action complete?	Go to <b>Step 22</b>	-
22	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to <b>Step 2</b>

## NOISE DIAGNOSIS - BLOWER MOTOR

### Noise Diagnosis - Blower Motor

Step	Action	Yes	No
DEFINITION: Noise originating from the blower motor.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to <b>Step 2</b>	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems-Manual
2	Inspect the air inlet grille for debris. Is debris present?	Go to <b>Step 8</b>	Go to <b>Step 3</b>
3	<ol style="list-style-type: none"> <li>1. Sit inside the vehicle.</li> <li>2. Close the vehicle doors and windows.</li> <li>3. Turn ON the ignition, with the engine OFF.</li> <li>4. Cycle the blower motor through all of the speeds and modes in order to determine where and when the noise occurs.</li> </ol> Is a noise evident during the blower operation?	Go to <b>Step 4</b>	Go to <b>Step 11</b>
4	Inspect for excessive vibration at each blower motor speed by feeling the blower case. Is excess vibration present?	Go to <b>Step 6</b>	Go to <b>Step 5</b>
5	Listen to the blower motor at each speed. Is the blower motor making a squeaking or chirping	Go to	

	noise?	<b>Step 9</b>	Go to <b>Step 11</b>
6	<ol style="list-style-type: none"> <li>1. Remove the blower motor. Refer to <b><u>Blower Motor Replacement</u></b> .</li> <li>2. Inspect the blower motor impeller for deposits of foreign material.</li> <li>3. Inspect the blower motor for deposits of foreign material.</li> </ol> <p>Did you find any foreign material on the blower motor or blower motor impeller?</p>	Go to <b>Step 8</b>	Go to <b>Step 7</b>
7	<p>Inspect the blower motor for the following conditions:</p> <ul style="list-style-type: none"> <li>• Cracked blades</li> <li>• A loose impeller retainer</li> <li>• Improper impeller alignment</li> </ul> <p>Did you find any of these conditions?</p>	Go to <b>Step 9</b>	Go to <b>Step 10</b>
8	<p>Remove the foreign material.</p> <p>Is the action complete?</p>	Go to <b>Step 10</b>	-
9	<p>Replace the blower motor. Refer to <b><u>Blower Motor Replacement</u></b> .</p> <p>Is the repair complete?</p>	Go to <b>Step 11</b>	-
10	<p>Install the blower motor. Refer to <b><u>Blower Motor Replacement</u></b> .</p> <p>Is the action complete?</p>	Go to <b>Step 11</b>	-
11	<p>Operate the system in order to verify the repair.</p> <p>Did you find and correct the condition?</p>	System OK	Go to <b>Step 2</b>

## NOISE DIAGNOSIS - AIR CONDITIONING (A/C) SYSTEM

### Noise Diagnosis - Air Conditioning (A/C) System

Step	Action	Yes	No
DEFINITION: Noise originating from the A/C compressor, drive belt or the A/C lines.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to <b>Step 2</b>	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems-Manual
	<p>A/C system noises can be generally categorized into 3 areas:</p> <ul style="list-style-type: none"> <li>• Screeching, Squealing, Chirping noises</li> <li>• Moaning noises</li> <li>• Vibration/Rattle noises</li> </ul>		

2	<ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Ensure that the A/C is ON.</li> </ol> <p>Is a screeching, squealing noise heard when the A/C is engaged?</p>	Go to <b>Step 3</b>	Go to <b>Step 9</b>
3	<p>With the engine OFF, inspect the drive belt for excessive wear. Refer to <b><u>Drive Belt Excessive Wear Diagnosis</u></b> in Engine Mechanical - 2.2L (L61) or <b><u>Drive Belt Excessive Wear Diagnosis</u></b> in Engine Mechanical - 3.5L (L66).</p> <p>Is the drive belt excessively worn?</p>	Go to <b>Step 18</b>	Go to <b>Step 4</b>
4	<p>Inspect the drive belt tension. Refer to <b><u>Drive Belt Tensioner Diagnosis</u></b> in Engine Mechanical - 2.2L (L61) or <b><u>Drive Belt Tensioner Diagnosis</u></b> in Engine Mechanical - 3.5L (L66).</p> <p>Is the drive belt tension correct?</p>	Go to <b>Step 5</b>	Go to <b>Step 19</b>
5	<p>Inspect the drive belt for excessive oil coverage.</p> <p>Is the drive belt covered with oil?</p>	Go to <b>Step 17</b>	Go to <b>Step 6</b>
6	<ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Ensure that the A/C is ON.</li> <li>3. Inspect the compressor and the clutch.</li> </ol> <p>Is the A/C compressor locked up?</p>	Go to <b>Step 24</b>	Go to <b>Step 7</b>
7	<p>Is the A/C compressor clutch slipping?</p>	Go to <b>Step 23</b>	Go to <b>Step 8</b>
8	<p><b>CAUTION:</b> Refer to <b><u>Moving Parts and Hot Surfaces Caution in Cautions and Notices</u></b>.</p> <p>Using a stethoscope, listen to the A/C compressor for any abnormal noises. Is the compressor causing an abnormal noise?</p>	Go to <b>Step 15</b>	Go to <b>Step 10</b>
9	<p>Does a moaning noise exist when the A/C clutch is engaged?</p>	Go to <b>Step 10</b>	Go to <b>Step 12</b>
10	<p>Listen to the A/C compressor components and mounting for noise concerns using a stethoscope.</p> <p>Are any of these components loose, damaged or excessively worn?</p>	Go to <b>Step 20</b>	Go to <b>Step 11</b>
11	<ol style="list-style-type: none"> <li>1. Idle the engine.</li> <li>2. Engage the A/C compressor clutch.</li> <li>3. Using a stethoscope, move around the entire refrigerant plumbing system. Listening for any abnormal noises caused by a component of the A/C system touching another component.</li> </ol> <p>Are any of the A/C components grounding out and causing a</p>	Go to	

	vibration noise?	<b>Step 22</b>	Go to <b>Step 13</b>
12	Does a vibration or rattle noise exist when the A/C clutch is engaged?	Go to <b>Step 13</b>	Go to <b>Step 14</b>
13	Does the noise stop when the A/C clutch is disengaged?	Go to <b>Step 15</b>	Go to <b>Step 25</b>
14	<ol style="list-style-type: none"> <li>1. Idle the engine in PARK with the A/C compressor clutch engaged.</li> <li>2. Using a stethoscope, move around the entire A/C system testing for any abnormal noises caused by a component.</li> </ol> <p>Do any of the A/C components cause an abnormal noise?</p>	Go to <b>Step 21</b>	Go to <b>Step 25</b>
15	Verify that the A/C system is properly charged. Refer to <b>Refrigerant System Capacities</b> . Is the A/C system properly charged?	Go to <b>Step 26</b>	Go to <b>Step 16</b>
16	Recharge the A/C system to specification. Refer to <b>Refrigerant Recovery and Recharging</b> . Is the abnormal compressor noise still present?	Go to <b>Step 24</b>	Go to <b>Step 26</b>
17	Repair the oil leak. Refer to <b>Oil Leak Diagnosis</b> in Engine Mechanical - 2.2L (L61) or <b>Oil Leak Diagnosis</b> in Engine Mechanical - 3.5L (L66). Is the repair complete?	Go to <b>Step 26</b>	-
18	Replace the drive belt. Refer to <b>Drive Belt Replacement</b> in Engine Mechanical - 2.2L (L61) or <b>Drive Belt Replacement</b> in Engine Mechanical - 3.5L (L66). Is the repair complete?	Go to <b>Step 26</b>	-
19	Replace the drive belt tensioner. Refer to <b>Drive Belt Tensioner Replacement</b> in Engine Mechanical - 2.2L (L61) or <b>Drive Belt Tensioner Replacement</b> in Engine Mechanical - 3.5L (L66). Is the repair complete?	Go to <b>Step 26</b>	-
20	Repair or replace the A/C compressor mounting component. Is the repair complete?	Go to <b>Step 26</b>	-
21	Repair or replace the component which is causing the moaning concern as needed. Is the repair complete?	Go to <b>Step 26</b>	-
22	Correctly route or insulate the A/C component. Is the repair complete?	Go to <b>Step 26</b>	-
23	Replace the A/C compressor clutch. Refer to <b>Compressor Clutch Assembly Replacement</b> . Is the repair complete?	Go to <b>Step 26</b>	-
24	Replace the A/C compressor. Refer to <b>Compressor Replacement (L61)</b> or <b>Compressor Replacement (L66)</b> . Is the repair complete?	Go to <b>Step 26</b>	-
25	The concern may be caused by an engine related component. Refer to <b>Vibration Analysis - Engine</b> in Vibration Diagnosis		

	and Correction. Did you find and correct the condition?	Go to <b>Step 26</b>	-
26	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to <b>Step 2</b>

## NOISE DIAGNOSIS - HVAC MODULE

### Noise Diagnosis - HVAC Module

Step	Action	Yes	No
DEFINITION: Noise originating from the HVAC module.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to <b>Step 2</b>	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems - Manual
2	<ol style="list-style-type: none"> <li>1. Start the engine.</li> <li>2. Cycle through all of the following: <ul style="list-style-type: none"> <li>• Blower motor speeds</li> <li>• HVAC modes</li> <li>• Temperature control settings</li> </ul> </li> <li>3. Determine the type of noise: <ul style="list-style-type: none"> <li>• Scrape, pop</li> <li>• Tick/click, chirp or groaning</li> <li>• Air rush/whistle</li> </ul> </li> </ol> <p>Is a scrape or pop noise evident when selecting modes or temperature settings?</p>	Go to <b>Step 6</b>	Go to <b>Step 3</b>
3	Is a tick/click, chirping, groaning or scraping noise present, but decreases as blower motor speed is decreased?	Go to <b>Step 6</b>	Go to <b>Step 4</b>
4	Is an air rush/whistle noise evident in all modes but not all temperature settings?	Go to <b>Step 6</b>	Go to <b>Step 5</b>
5	Is an air rush/whistle noise evident only in defrost or floor mode?	Go to <b>Step 6</b>	Go to <b>Step 6</b>
6	<ol style="list-style-type: none"> <li>1. Remove the instrument panel center trim bezel. Refer to <b>Trim Bezel Replacement - Center</b> in Instrument Panel, Gages and Console.</li> <li>2. Remove the center air outlet duct.</li> </ol> <p>Is the action complete?</p>	Go to <b>Step 7</b>	-
7	<ol style="list-style-type: none"> <li>1. Inspect the air flow doors for proper operation.</li> <li>2. Inspect the ducts for obstructions or foreign materials.</li> </ol>	Go to	

	Were any of these conditions found?	<b>Step 10</b>	Go to <b>Step 8</b>
8	Inspect the mode and temperature doors and seals for warping or cracking. Are the doors in normal condition?	Go to <b>Step 11</b>	Go to <b>Step 9</b>
9	Replace the appropriate door and/or seals. Is the repair complete?	Go to <b>Step 11</b>	-
10	Remove any obstructions or foreign material found. Is the action complete?	Go to <b>Step 11</b>	-
11	1. Install the center air outlet duct. 2. Install the I/P center trim bezel. Refer to <b>Trim Bezel Replacement - Center</b> in Instrument Panel, Gages and Console.  Is the action complete?	Go to <b>Step 12</b>	-
12	Operate the system to verify the repair. Did you find and correct the condition?	System OK	Go to <b>Step 2</b>

## ODOR DIAGNOSIS

### Odor Diagnosis

Step	Action	Yes	No
DEFINITION: Odor originating or noticed through the HVAC system.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to <b>Step 2</b>	Go to <b>Symptoms - HVAC Systems - Manual</b> in HVAC Systems-Manual
2	1. Sit inside the vehicle. 2. Close all of the doors and windows. 3. Start the engine. 4. Allow the engine idle at normal operating temperature. 5. Select the maximum blower speed. 6. Select the PANEL air outlet mode. 7. Select the coldest temperature setting. 8. Cycle through all of the blower speeds, modes and temperatures to define what type of odor is present. <ul style="list-style-type: none"> <li>• Musty smell</li> <li>• Coolant smell</li> <li>• Oil smell</li> </ul> Does the odor have a musty smell?	Go to <b>Step 3</b>	Go to <b>Step 8</b>
3	Inspect the HVAC filter and the air inlet grille for debris. Is debris present?	Go to <b>Step 4</b>	Go to <b>Step 5</b>

4	Remove any debris. Is the action complete?	Go to <b>Step 15</b>	-
5	Inspect for wet carpeting. Is the carpet wet?	Go to <b>Step 6</b>	Go to <b>Step 14</b>
6	Inspect for the following conditions: <ul style="list-style-type: none"> <li>• Water leaks around the windshield</li> <li>• Blockage of the HVAC module drain</li> <li>• Leaks around the door seals</li> </ul> Is a leak present?	Go to <b>Step 7</b>	Go to <b>Step 14</b>
7	Repair the leak as necessary. Is the repair complete?	Go to <b>Step 15</b>	-
8	Does the odor have a coolant smell?	Go to <b>Step 9</b>	Go to <b>Step 12</b>
9	Inspect the cooling system for leaks. Refer to <b>Loss of Coolant</b> in Engine Cooling. Is a leak present?	Go to <b>Step 10</b>	Go to <b>Step 12</b>
10	Inspect for coolant leaking inside the vehicle or for a film build-up on the windshield. Is the condition present?	Go to <b>Step 11</b>	Go to <b>Step 15</b>
11	Replace the heater core. Refer to <b>Heater Core Replacement</b> . Is the repair complete?	Go to <b>Step 15</b>	-
12	Does the odor have an oily smell?	Go to <b>Step 13</b>	Go to <b>Step 15</b>
13	1. Inspect the engine compartment for any leaks. Refer to the following procedures: <ul style="list-style-type: none"> <li>• <b>Oil Leak Diagnosis</b> in Engine Mechanical-2.2L (L61)</li> <li>• <b>Oil Leak Diagnosis</b> in Engine Mechanical-3.5L (L66)</li> <li>• <b>Fluid Leak Diagnosis</b> in Automatic Transaxle 5AT</li> <li>• <b>Fluid Leak Diagnosis</b> in Automatic Transaxle VT25-E</li> </ul> 2. Repair any oil leaks.  Is the repair complete?	Go to <b>Step 15</b>	-
14	A musty odor can be caused by mold or mildew build-up on the evaporator or the heater core or inside of the HVAC module. Refer to <b>Odor Correction</b> .	Go to	-

	Is the action complete?	<b>Step 15</b>	
15	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to <b>Step 2</b>

## REPAIR INSTRUCTIONS

### ODOR CORRECTION

#### Eliminating Air Conditioning Odor

Odors may be emitted from the air conditioning system primarily at start up in hot, humid climates. The following conditions may cause the odor:

- Debris is present in the HVAC module.
- Microbial growth on the evaporator core

When the blower motor fan is turned on, the microbial growth may release an unpleasant musty odor into the passenger compartment. To remove odors of this type, the microbial growth must be eliminated. Perform the following procedure:

Deodorize the evaporator core using Deodorizing Aerosol Kit.

Perform the following steps in order to deodorize the A/C system:

1. Ensure that the plenum which draws outside air into the HVAC module is clear of debris.
2. Disable the A/C compressor clutch operation by disconnecting the clutch coil electrical connector.
3. Dry the evaporator core by performing the following steps:
  1. Start the engine.
  2. Select the warmest temperature setting.
  3. Select the recirculation mode.
  4. Run the blower motor on high for 10 minutes.
4. Locate an area in the HVAC module case between the blower motor and the evaporator core downstream of the blower motor.
5. Drill a 3.175 mm (0.125 in) hole where the hole will not interfere with or damage the following components:
  - The blower motor
  - The evaporator core
  - Any other operating part the of system
6. Wear safety goggles and latex gloves in order to perform the following actions:
  1. Select the maximum blower speed.
  2. Insert the deodorizer extension tube into the hole to the mark on the extension tube.
  3. Use short spray bursts and vary the direction of spray for a 2-3 minute period of time.



7. Shut the engine OFF. Allow the vehicle to sit for 3-5 minutes.
8. Seal the 3.175 mm (0.125 in) hole with body sealer or RTV gasket compound.
9. Start the engine.
10. Operate the blower motor on high for 15-20 minutes to dry.
11. Reconnect the A/C compressor clutch coil electrical connector.
12. Verify proper clutch operation.

## **REFRIGERANT RECOVERY AND RECHARGING**

### **Tools Required**

**J 43600** ACR 2000 Air Conditioning Service Center. See **Special Tools and Equipment** .

**CAUTION:** Avoid breathing the A/C Refrigerant 134a (R-134a) and the lubricant vapor or the mist. Exposure may irritate the eyes, nose, and throat. Work in a well ventilated area. In order to remove R-134a from the A/C system, use service equipment that is certified to meet the requirements of SAE J 2210 (R-134a recycling equipment). If an accidental system discharge occurs, ventilate the work area before continuing service. Additional health and safety information may be obtained from the refrigerant and lubricant manufacturers.

**CAUTION:** For personal protection, goggles and gloves should be worn and a clean cloth wrapped around fittings, valves, and connections when doing work that includes opening the refrigerant system. If R-134a comes in contact with any part of the body severe frostbite and personal injury can result. The exposed area should be flushed immediately with cold water and prompt medical help should be obtained.

**NOTE:** R-134a is the only approved refrigerant for use in this vehicle. The use of any other refrigerant may result in poor system performance or component failure.

**NOTE:** To avoid system damage use only R-134a dedicated tools when servicing the A/C system.

**NOTE:** Use only Polyalkylene Glycol Synthetic Refrigerant Oil (PAG) for internal circulation through the R-134a A/C system and only 525 viscosity mineral oil on fitting threads and O-rings. If lubricants other than those specified are used, compressor failure and/or fitting seizure may result.

**NOTE:** R-12 refrigerant and R-134a refrigerant must never be mixed, even in the smallest of amounts, as they are incompatible with each other. If the refrigerants are mixed, compressor failure is likely to occur. Refer to the

**manufacturer instructions included with the service equipment before servicing.**

The **J 43600** is a complete air conditioning service center for R-134a. See **Special Tools and Equipment** . The ACR 2000 recovers, recycles, evacuates and recharges A/C refrigerant quickly, accurately and automatically. The unit has a display screen that contains the function controls and displays prompts that will lead the technician through the recover, recycle, evacuate and recharge operations. R-134a is recovered into and charged out of an internal storage vessel. The ACR 2000 automatically replenishes this vessel from an external source tank in order to maintain a constant 5.45-6.82 kg (12-15 lbs) of A/C refrigerant.

The ACR 2000 has a built in A/C refrigerant identifier that will test for contamination, prior to recovery and will notify the technician if there are foreign gases present in the A/C system. If foreign gases are present, the ACR 2000 will not recover the refrigerant from the A/C system.

The ACR 2000 also features automatic air purge, single pass recycling and an automatic oil drain.

Refer to the **J 43600** ACR 2000 manual for operation and setup instruction. See **Special Tools and Equipment** . Always recharge the A/C System with the proper amount of R-134a. Refer to **Refrigerant System Capacities** for the correct amount.

#### **A/C Refrigerant System Oil Charge Replenishing**

If oil was removed from the A/C system during the recovery process or due to component replacement, the oil must be replenished. Oil can be added to the system by pouring the correct amount into the replaced component or into an open refrigerant line. For the proper quantities of oil to add to the A/C refrigerant system, refer to **Refrigerant System Capacities** .

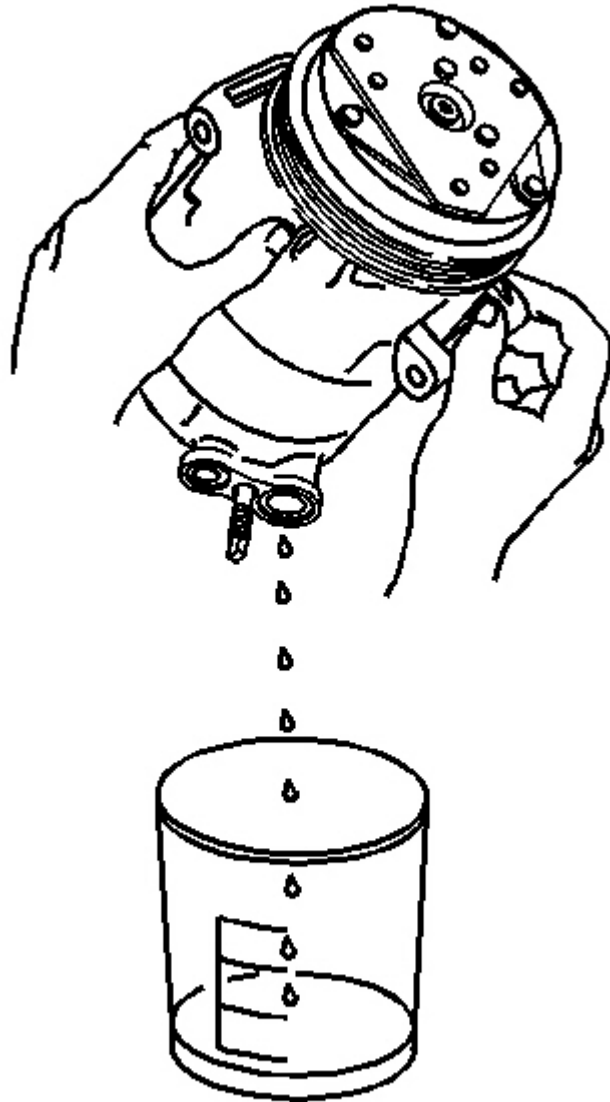
### **COMPRESSOR OIL BALANCING**

#### **Draining Procedure**

**IMPORTANT: Drain and measure as much of the refrigerant oil as possible from the removed compressor.**

1. Drain the oil from both the suction and discharge ports of the removed compressor into a clean, graduated container.

Rotate the compressor shaft to assist in draining the compressor.



**Fig. 3: Draining A/C Compressor Oil**  
Courtesy of GENERAL MOTORS CORP.

2. Measure and record the amount of oil drained from the removed compressor.

This measurement will be used during installation of the replacement compressor.

**IMPORTANT: During the oil removal procedure, the condition of the oil should be evaluated. Compressor oil never breaks down unless something is wrong with the compressor or air conditioning (A/C) system. If one or more of the following conditions exist, replace the compressor and receiver dehydrator.**

3. Inspect the polyalkylene glycol (PAG) oil for the following conditions:
  - The color of the oil is dark brown or black.
  - There is a presence of foreign substances, metal fillings, etc. in the oil.

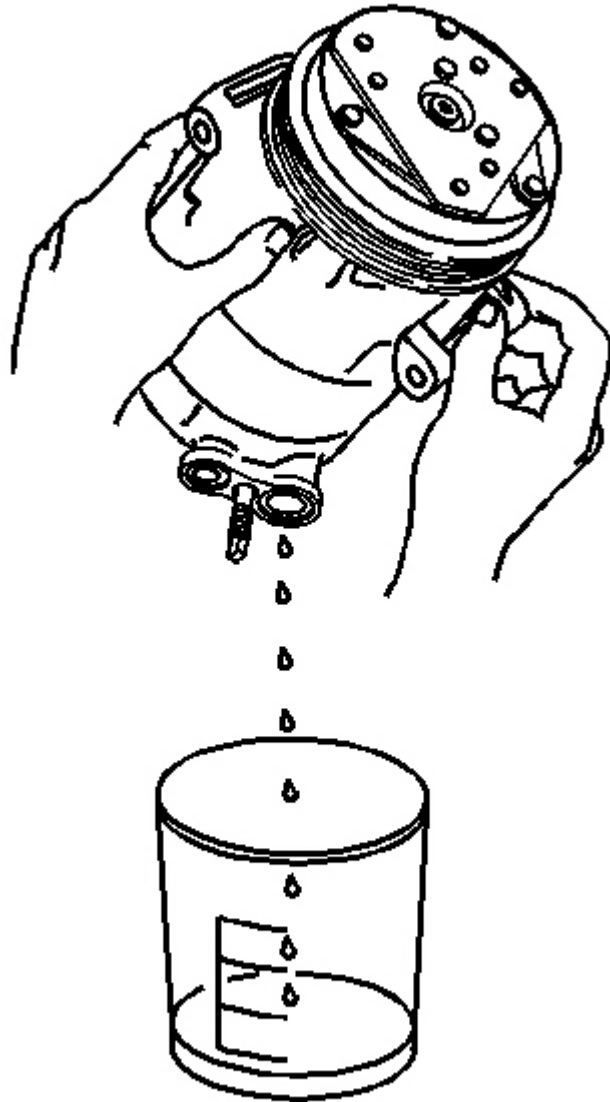
If the receiver-dehydrator is not replaced, damage to A/C compressor will occur.

4. Properly discard the used refrigerant oil.

#### **Balancing Procedure**

**IMPORTANT: The refrigerant oil in the A/C system must be balanced during compressor replacement.**

1. The replacement compressor is shipped with 120 ml (4.0 oz) of refrigerant oil.



**Fig. 4: Draining A/C Compressor Oil**  
Courtesy of GENERAL MOTORS CORP.

2. Compare the amount of refrigerant oil recorded during compressor removal to the amount of refrigerant oil shipped in the replacement compressor. If the amount of refrigerant oil drained and recorded from the removed compressor is:
  - Less than 120 ml (4.0 oz), leave the 120 ml (4.0 oz) in the replacement compressor.

- More than 120 ml (4.0 oz), add to the compressor the difference between the 120 ml (4.0 oz) and the amount drained.

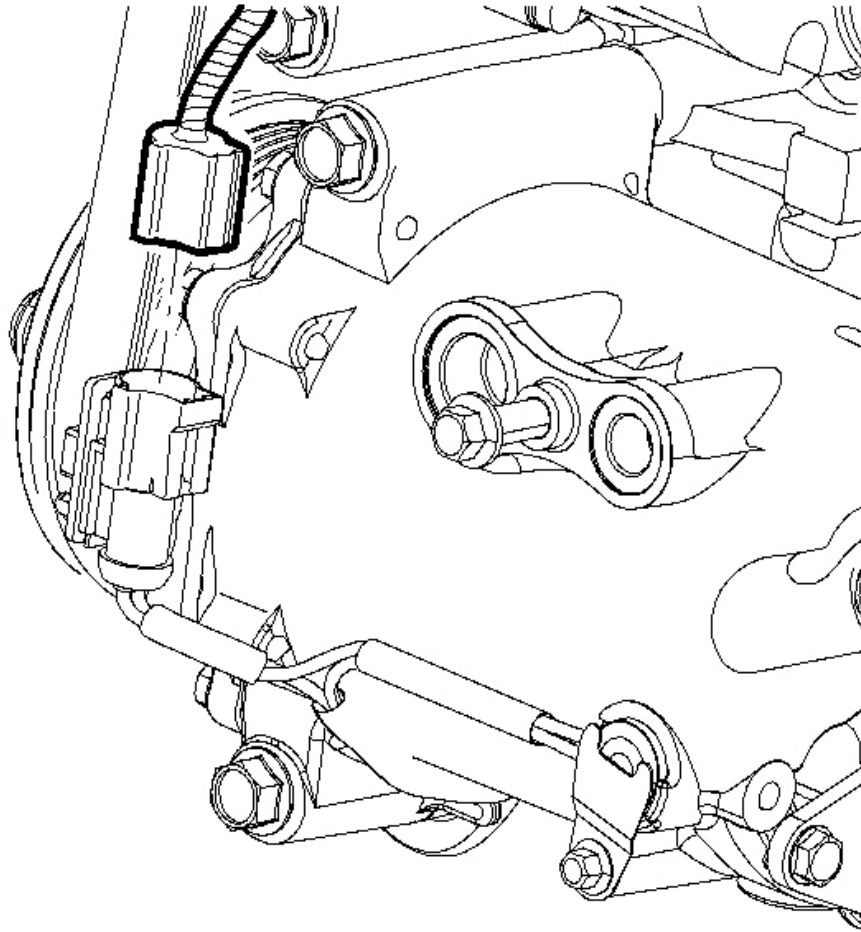
## **COMPRESSOR REPLACEMENT (L61)**

### **Tools Required**

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

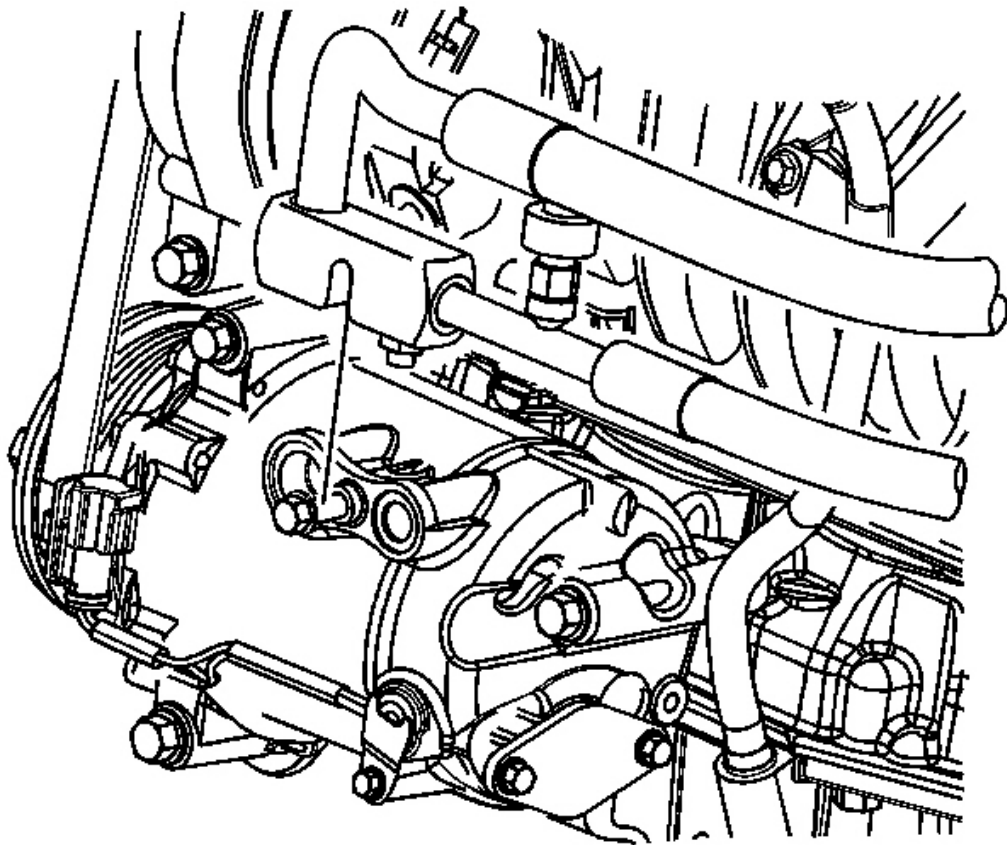
### **Removal**

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the drive belt. Refer to **Drive Belt Replacement** in Engine Mechanical - 2.2L (L61).
3. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.



**Fig. 5: Electrical Connector & Compressor**  
**Courtesy of GENERAL MOTORS CORP.**

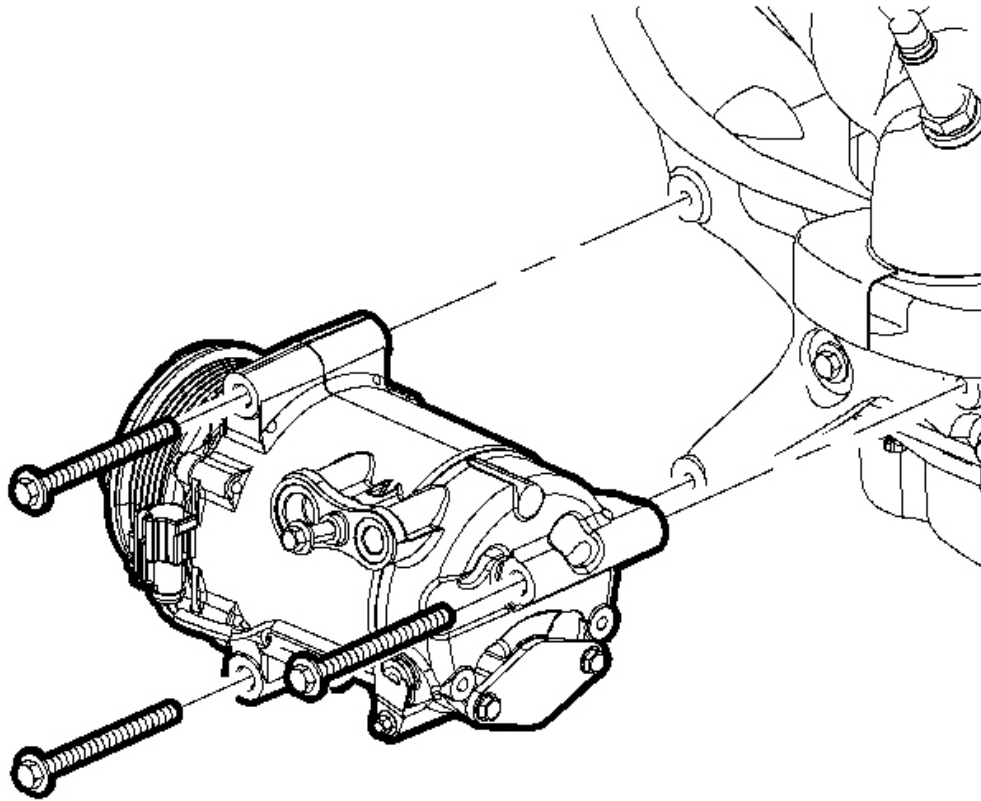
4. Disconnect the electrical connector from the compressor.



**Fig. 6: Compressor, Hose & Bolt**  
Courtesy of GENERAL MOTORS CORP.

5. Remove the compressor hose bolt from the compressor.
6. Remove the compressor hose from the compressor.
7. Remove and discard the O-rings from the compressor. Refer to **O-Ring Replacement** .
8. Install a shipping cap to the compressor hose to prevent moisture or contamination from entering the A/C system.
9. Install a shipping cap to the compressor to prevent oil spillage during compressor removal.





**Fig. 7: Compressor Bolts & Engine**  
Courtesy of GENERAL MOTORS CORP.

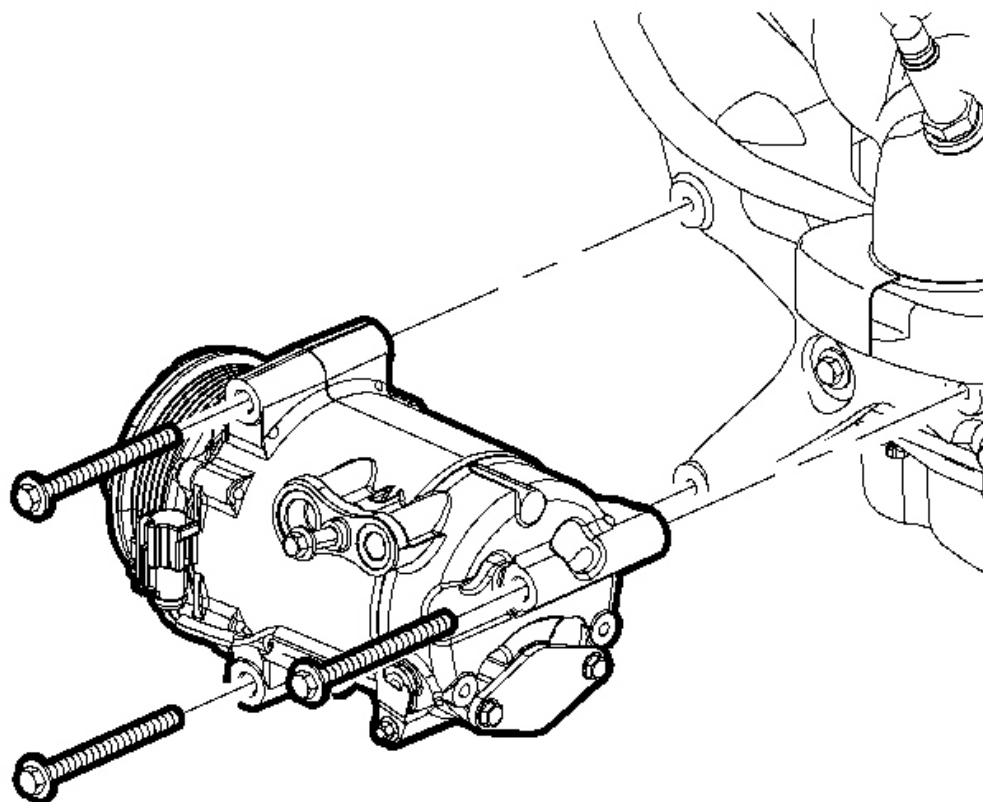
10. Remove the compressor bolts from the engine.
11. Remove the compressor from the vehicle.

#### **Installation**

**NOTE:** Do NOT mix refrigerant oils. Use of incorrect refrigerant oil will cause compressor failure. This compressor uses a low viscosity refrigerant oil, Saturn P/N 22695048.

**IMPORTANT: NEW compressor assemblies are shipped with a partial poly-alkylene glycol (PAG) refrigerant oil charge. Use of the incorrect PAG oil can result in compressor failure.**

1. If replacing the compressor, refer to **Compressor Oil Balancing** .
2. Install a shipping cap to the compressor to prevent oil spillage during installation.



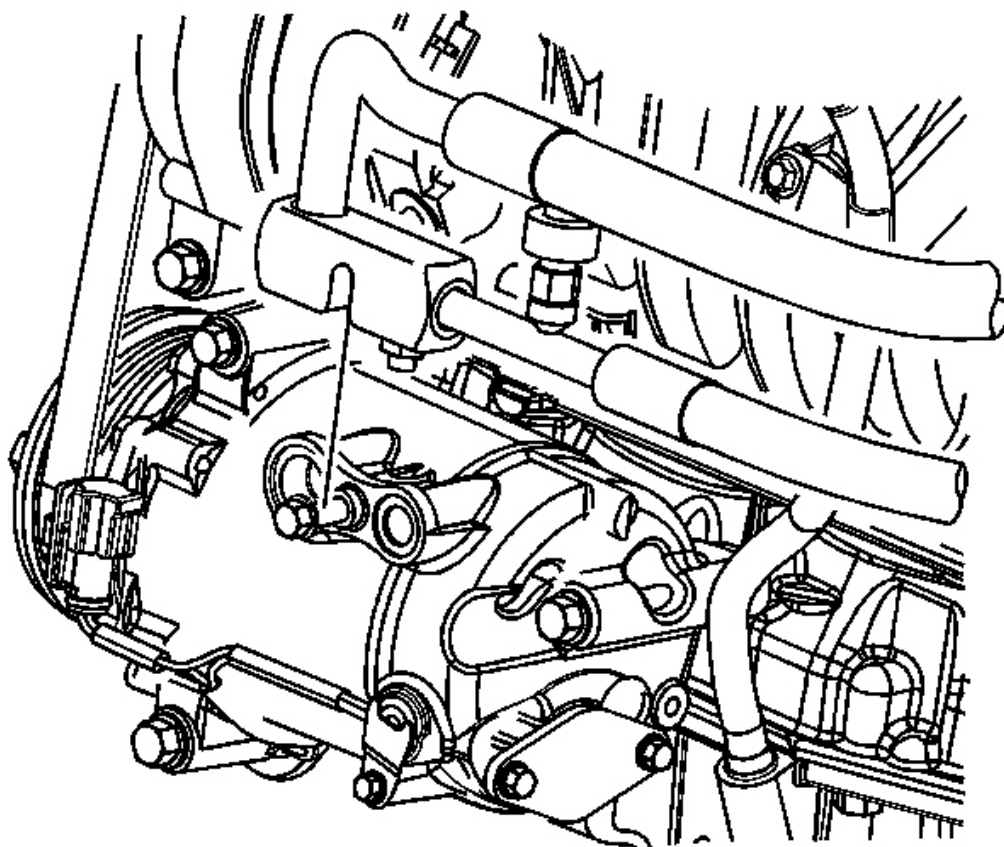
**Fig. 8: Compressor Bolts & Engine**  
Courtesy of GENERAL MOTORS CORP.

3. Install the compressor to the vehicle.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

4. Install the compressor bolts to the engine.

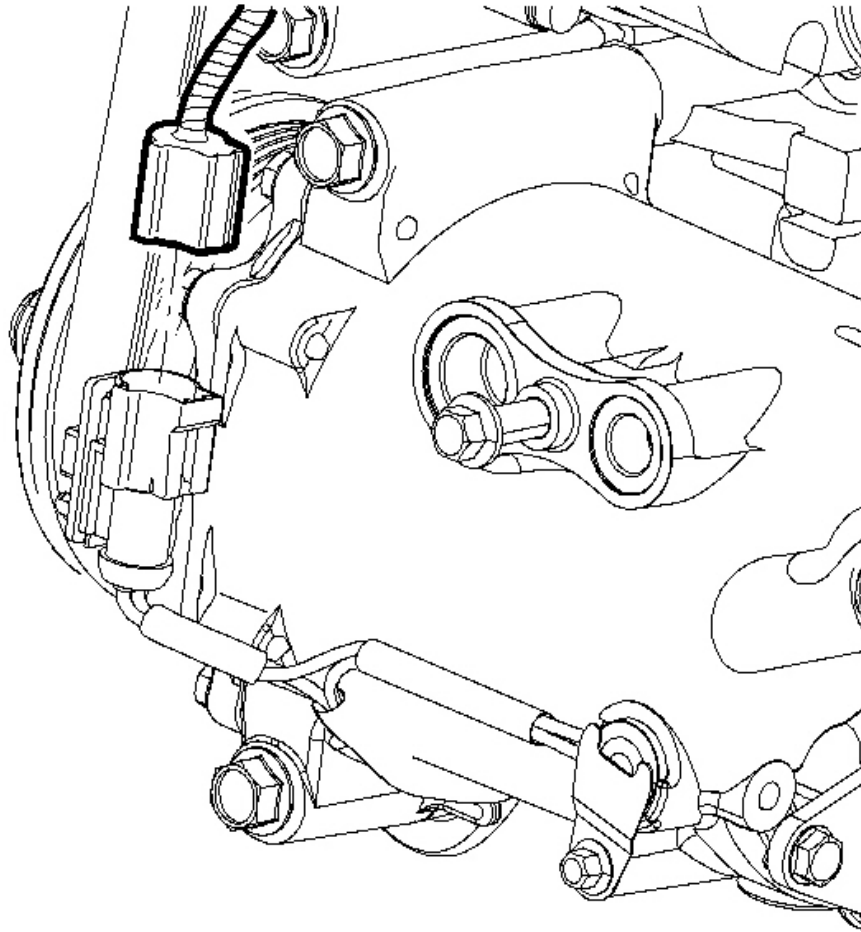
**Tighten:** Tighten the bolts to 22 N.m (16 lb ft).



**Fig. 9: Compressor, Hose & Bolt**  
Courtesy of GENERAL MOTORS CORP.

5. Remove the shipping caps from the compressor and the compressor hose.
6. Install new O-rings to the compressor. Refer to **O-Ring Replacement** .
7. Install the compressor hose to the compressor.
8. Install the compressor hose bolt to the compressor.

**Tighten:** Tighten the bolt to 27 N.m (20 lb ft).



**Fig. 10: Electrical Connector & Compressor**  
Courtesy of GENERAL MOTORS CORP.

9. Connect the electrical connector to the compressor.
10. Install the drive belt. Refer to **Drive Belt Replacement** in Engine Mechanical - 2.2L (L61).
11. Lower vehicle.
12. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
13. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

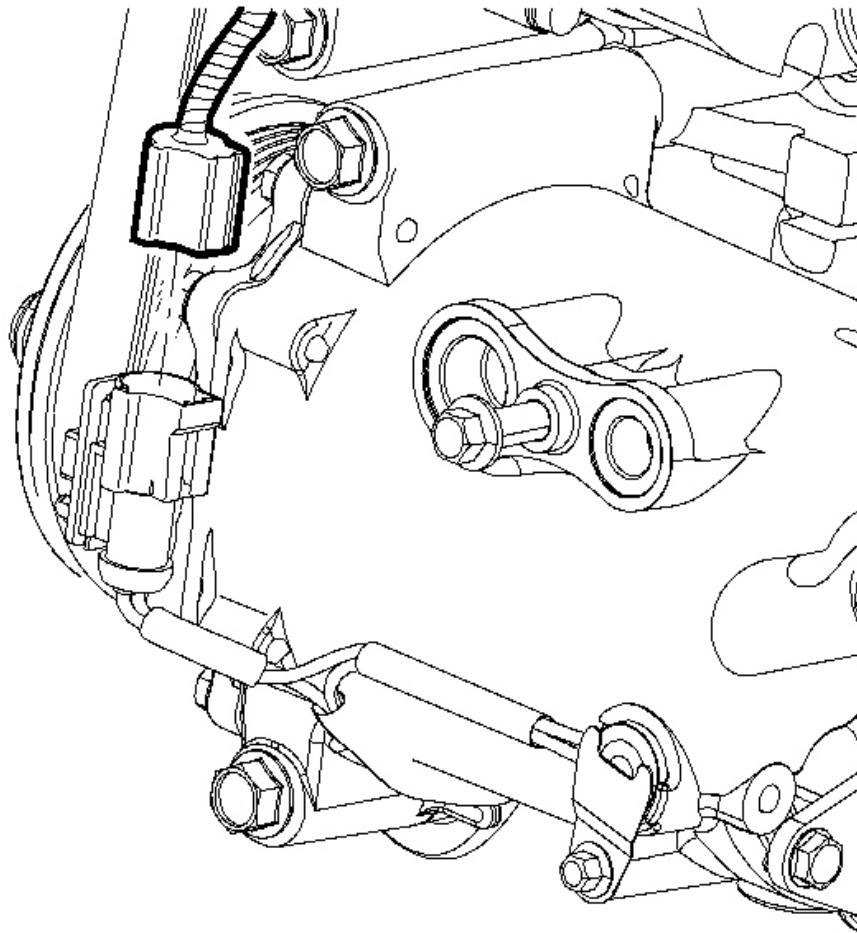
## **COMPRESSOR REPLACEMENT (L66)**

### **Tools Required**

**J 39400-A Halogen Leak Detector. See Special Tools and Equipment .**

## **Removal**

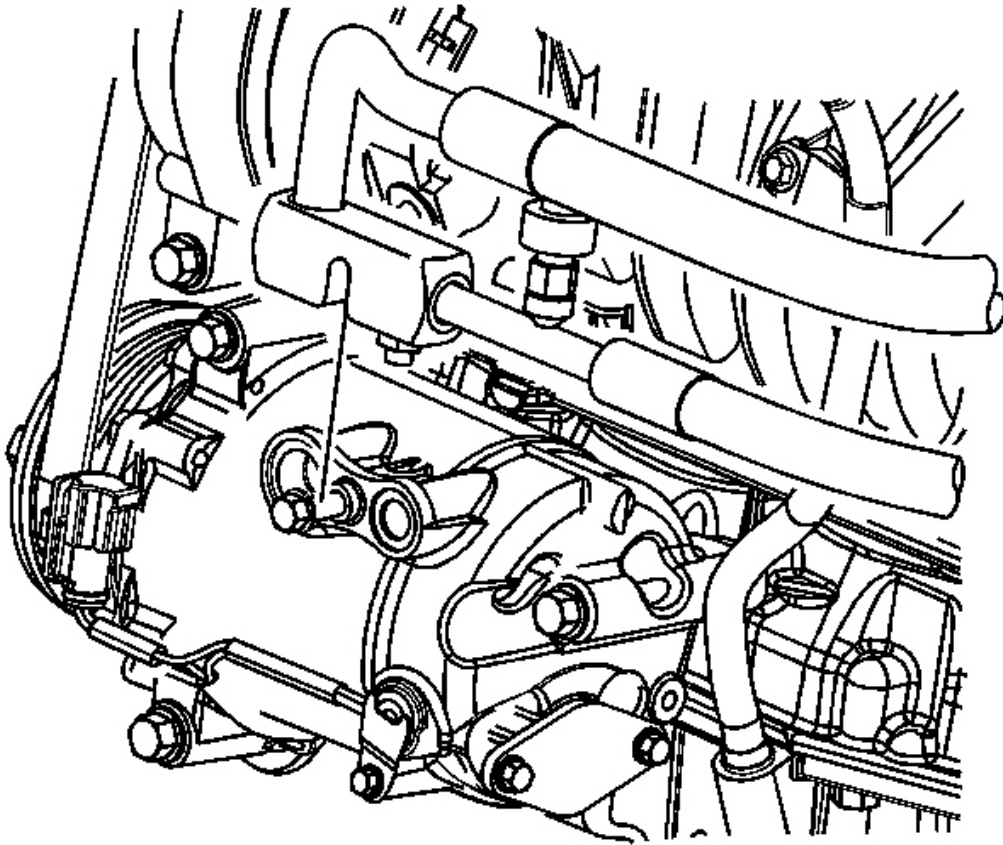
**IMPORTANT:** Performing this procedure will require replacement of the forward engine frame bolts.



**Fig. 11: Electrical Connector & Compressor**  
Courtesy of GENERAL MOTORS CORP.

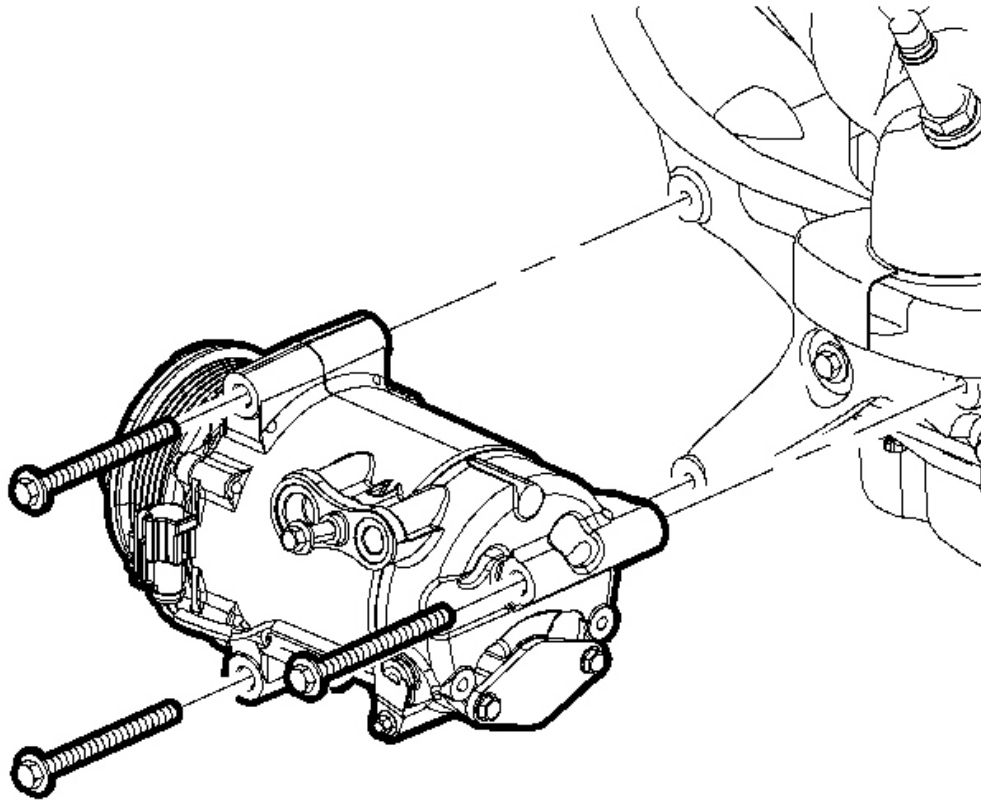
1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** in Engine Controls - 3.5L (L66).

3. Remove the accessory drive belt. Refer to **Drive Belt Replacement** in Engine Mechanical - 3.5L (L66).
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
5. Disconnect the electrical connector from the compressor.



**Fig. 12: Compressor, Hose & Bolt**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the compressor hose bolt from the compressor.
7. Remove the compressor hose from the compressor.
8. Remove and discard the O-rings from the compressor. Refer to **O-Ring Replacement** .
9. Install a cap to the compressor hose to prevent moisture or contamination from entering the A/C system.



**Fig. 13: Compressor Bolts & Engine**  
Courtesy of GENERAL MOTORS CORP.

10. Place an adjustable jack stand or a lifting device under the front edge of the engine frame.
11. Loosen, but do not remove, the front engine frame mounting bolts.
12. Lower the forward edge of the engine frame approximately 12.7 mm (0.5 in).
13. Remove the compressor bolts from the engine.
14. Remove the compressor from the vehicle.

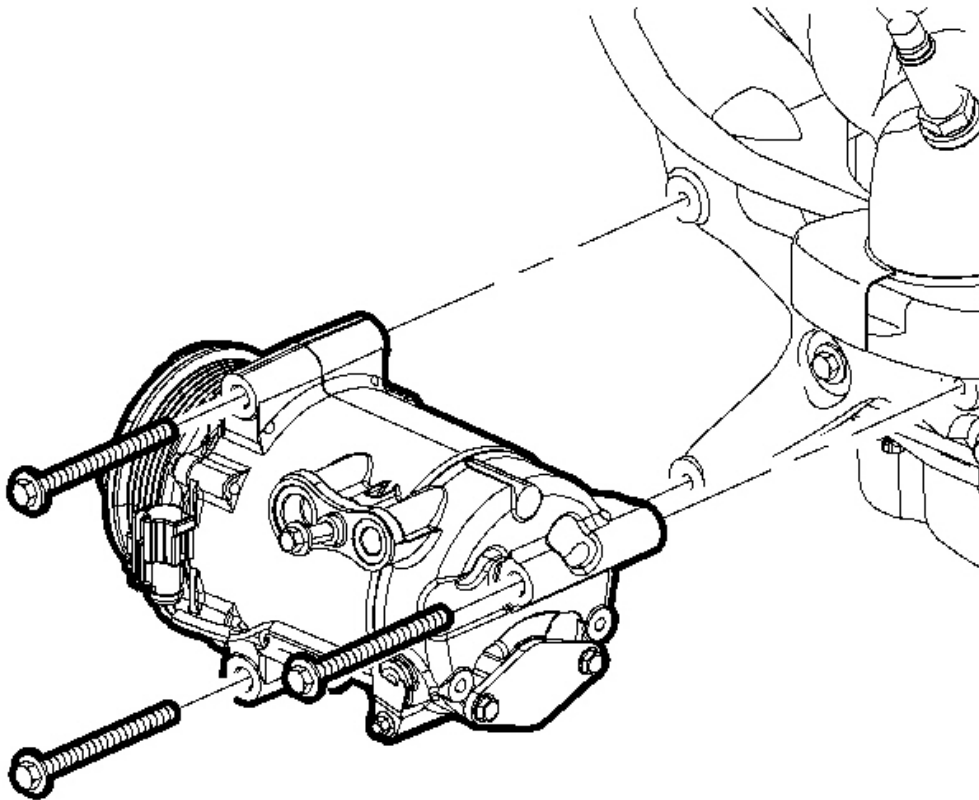
#### **Installation**

**NOTE:** Do NOT mix refrigerant oils. Use of incorrect refrigerant oil will cause

compressor failure. This compressor uses a low viscosity refrigerant oil, Saturn P/N 22695048.

**IMPORTANT:** NEW compressor assemblies are shipped with a partial poly-alkylene glycol (PAG) refrigerant oil charge. Use of the incorrect PAG oil can result in compressor failure.

1. If replacing the compressor, refer to Compressor Oil Balancing .



**Fig. 14: Compressor Bolts & Engine**  
Courtesy of GENERAL MOTORS CORP.



2. Install the compressor to the vehicle.

**NOTE:** Refer to Fastener Notice in **Cautions and Notices**.

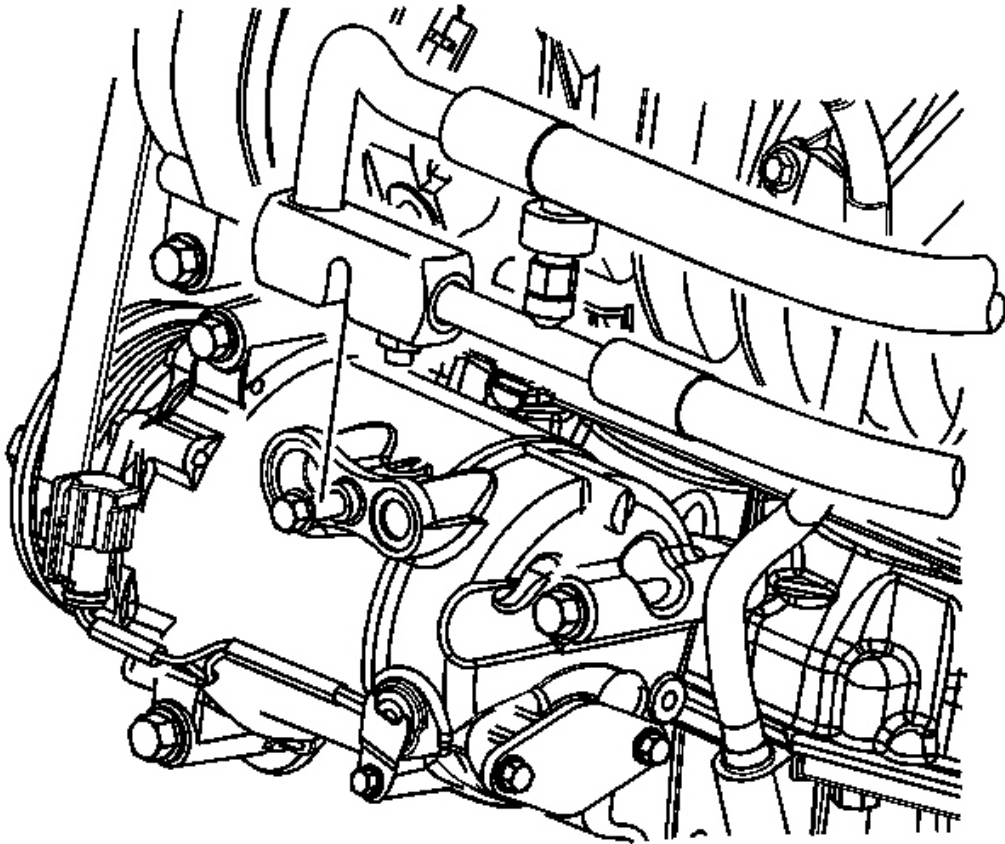
3. Install the compressor bolts to the engine.

**Tighten:** Tighten the bolts to 22 N.m (16 lb ft).

4. Raise the forward edge of the engine frame.
5. Remove and discard the right hand front engine frame bolt.
6. Install a new right hand front engine frame bolt.
7. Remove and discard the left hand front engine frame bolt.
8. Install a new left hand front engine frame bolt.
9. Tighten the engine frame bolts to the body.

**Tighten:** Tighten the bolts to 155 N.m (114 lb ft).

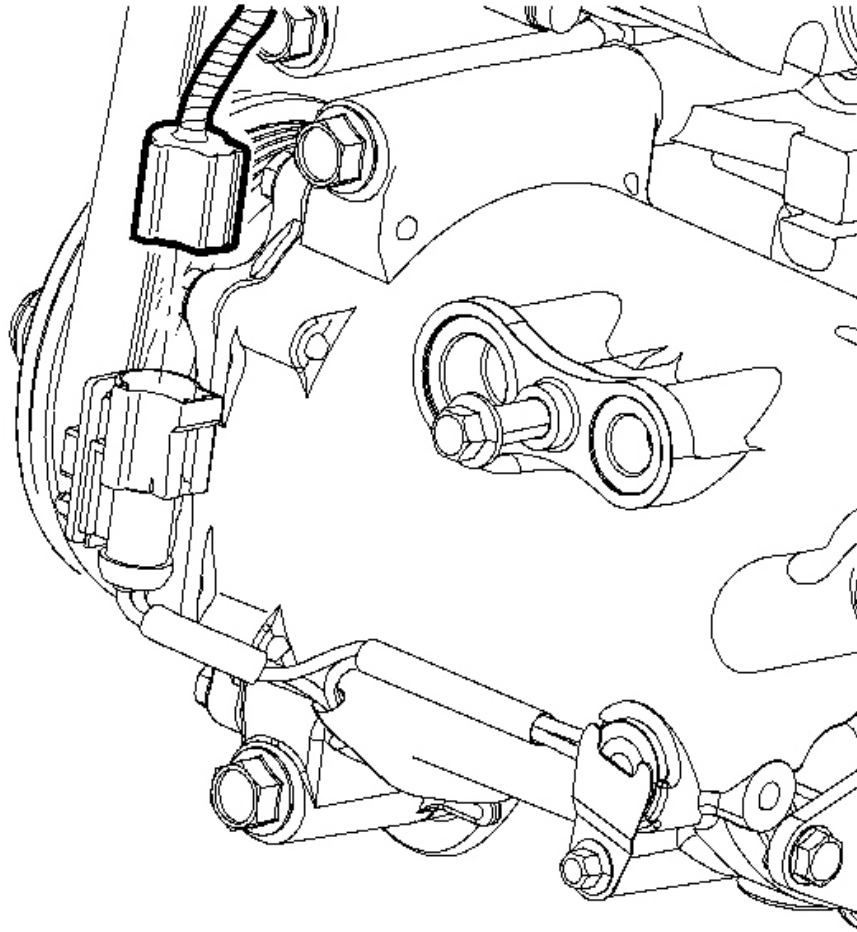
10. Remove the adjustable jack stand or lifting device from the front edge of the engine frame.



**Fig. 15: Compressor, Hose & Bolt**  
Courtesy of GENERAL MOTORS CORP.

11. Remove the caps from the compressor and the compressor hose.
12. Install new O-rings to the compressor. Refer to **O-Ring Replacement** .
13. Install the compressor hose to the compressor.
14. Install the compressor hose bolt to the compressor.

**Tighten:** Tighten the bolt to 27 N.m (20 lb ft).



**Fig. 16: Electrical Connector & Compressor**  
Courtesy of GENERAL MOTORS CORP.

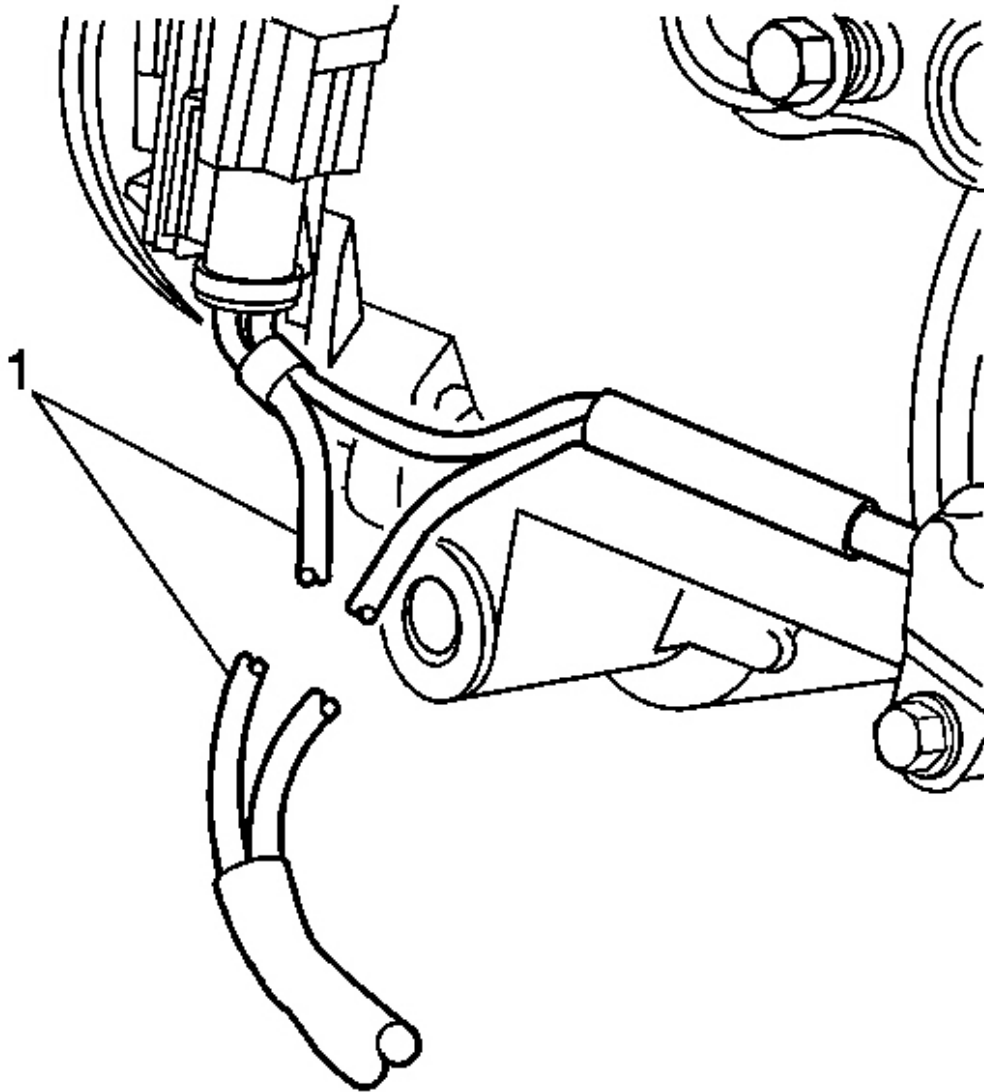
15. Connect the electrical connector to the compressor.
16. Lower the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
17. Install the accessory drive belt. Refer to **Drive Belt Replacement** in Engine Mechanical - 3.5L (L66).
18. Install the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** in Engine Controls - 3.5L (L66).
19. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
20. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

## **COMPRESSOR THERMAL PROTECTION SWITCH REPLACEMENT**

**Tools Required**

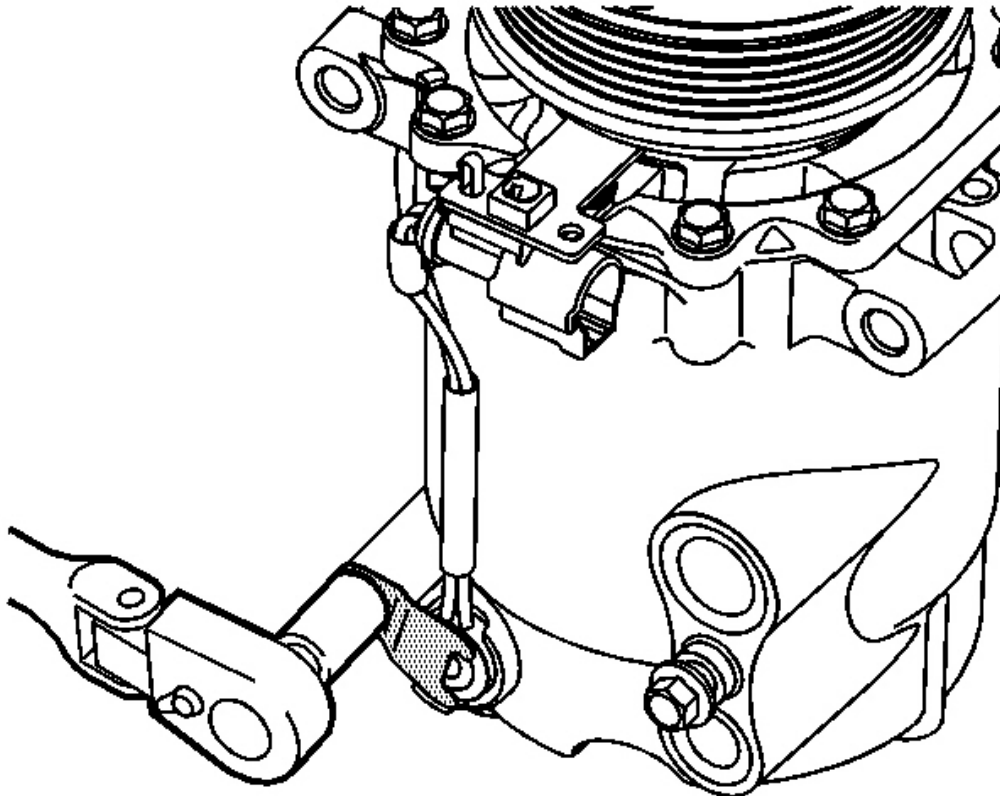
**J 44020 Terminal Repair Kit**

**Removal Procedure**



**Fig. 17: Electrical Connector & Clutch Coil Bracket**  
Courtesy of GENERAL MOTORS CORP.

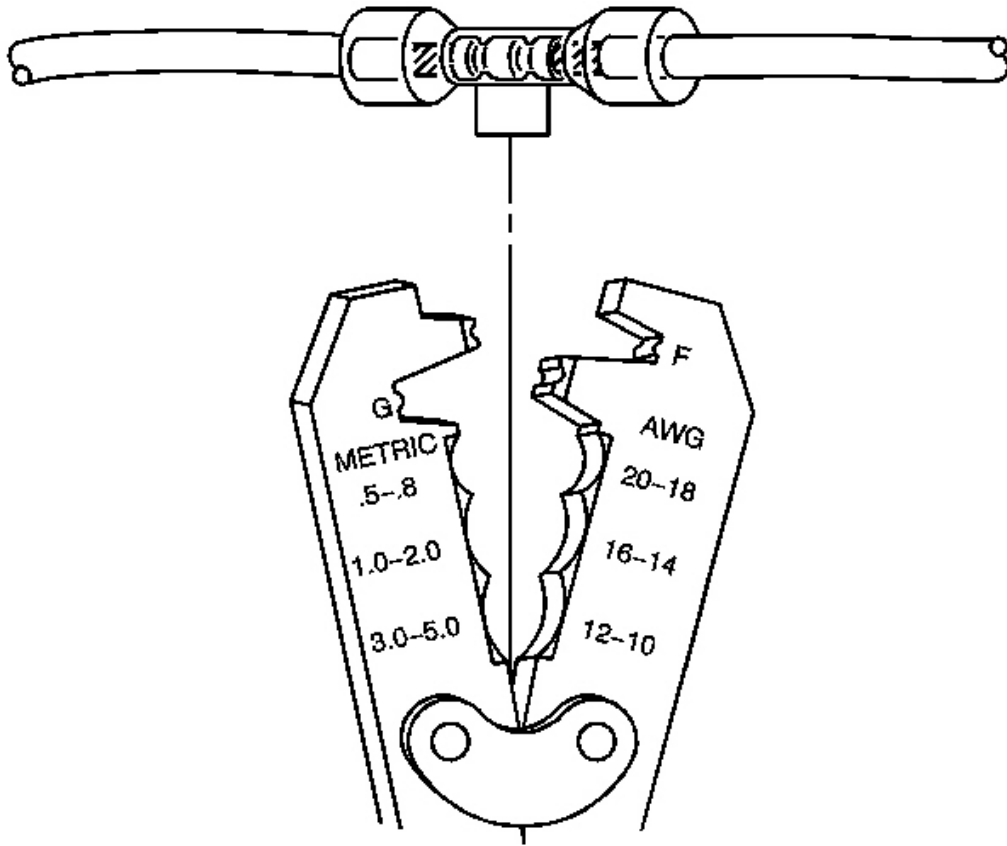
1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Cut the wire harness leads 1 to the clutch coil.
3. Remove the electrical connector from the clutch coil bracket.



**Fig. 18: TPS Retainer Bolt & Compressor**  
Courtesy of GENERAL MOTORS CORP.

4. Remove the thermal protection switch (TPS) retainer bolt from the compressor.
5. Remove the TPS retainer from the compressor.
6. Remove the TPS assembly from the compressor. It may be necessary to gently pry the TPS with a flat bladed tool.

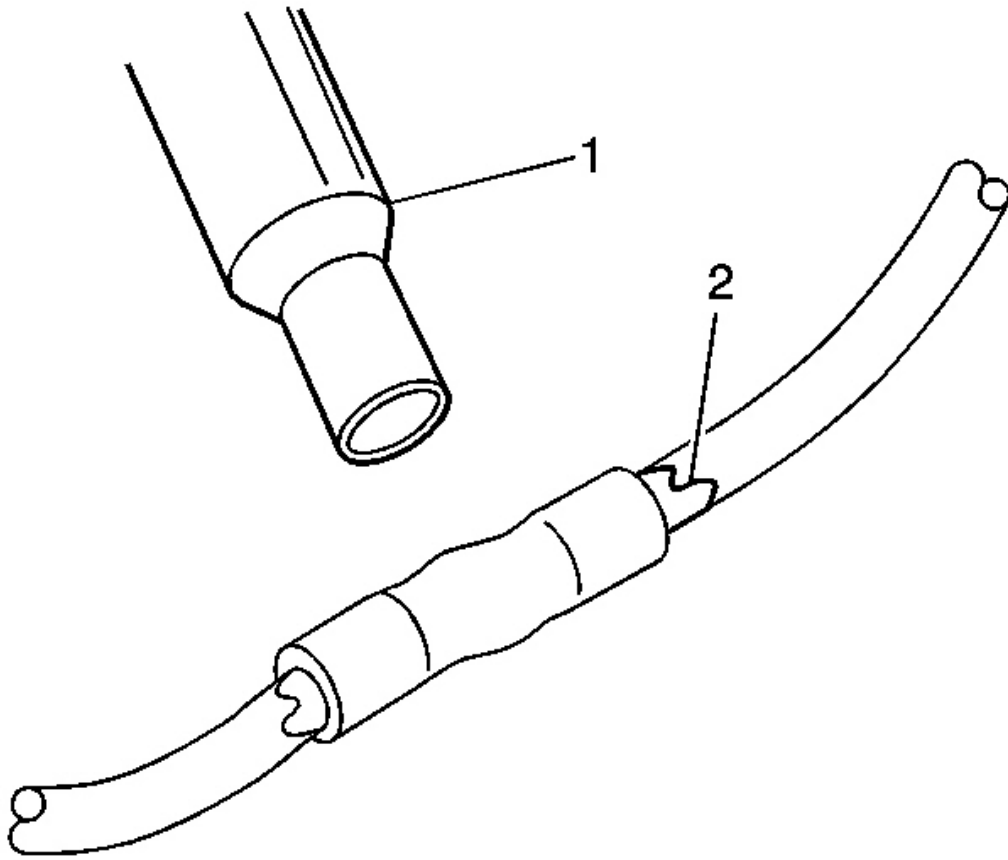
#### **Installation Procedure**



**Fig. 19: Measuring & Cutting The TPS Assembly**  
Courtesy of GENERAL MOTORS CORP.

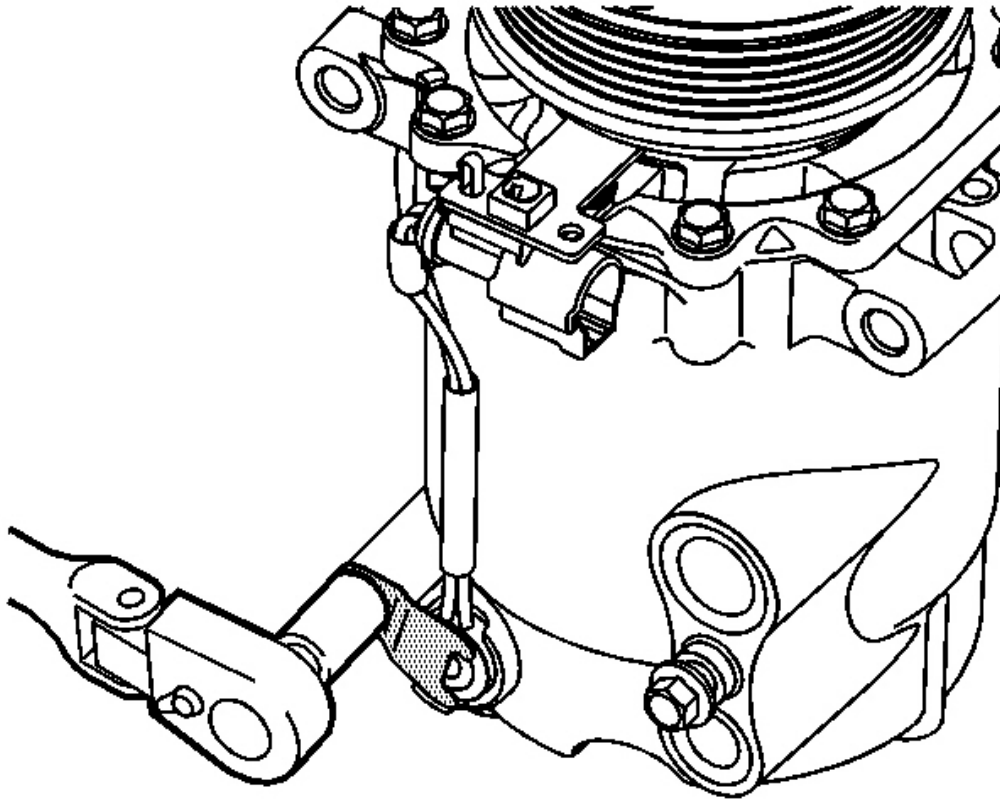
**IMPORTANT:** To ensure proper routing and retention, be sure the new TPS assembly is cut to the same length as the original TPS assembly.

1. Measure and cut the new TPS assembly to the proper length.
2. Remove 9.5 mm (3/8 in) of insulation from the ends of the TPS assembly and the wire harness.
3. Position the stripped ends of wire in the appropriate splice sleeve found in **J 44020** .
4. Crimp the splices using an approved crimping tool.
5. Gently tug on the wires to ensure proper crimping.



**Fig. 20: Splice Joints & Splice Sleeves**  
Courtesy of GENERAL MOTORS CORP.

6. Apply heat 1 to the splice joints until glue 2 flows from the splice sleeves.



**Fig. 21: TPS Retainer Bolt & Compressor**  
Courtesy of GENERAL MOTORS CORP.

7. Clean the TPS pocket of any foreign material.

**IMPORTANT: Use Saturn thermal conductive sealant P/N 22681632 to ensure the TPS functions properly.**

8. Apply Saturn thermal conductive sealant P/N 22681632 to the TPS pocket.
9. Install the TPS to the TPS pocket on the compressor.
10. Remove any excess sealant from around the switch.
11. Install the TPS retainer to the compressor.

**NOTE: Refer to Fastener Notice in Cautions and Notices.**

12. Install the TPS retainer bolt to the compressor.



**Tighten:** Tighten the bolt to 6 N.m (53 lb in).

13. Install the electrical connector to the clutch coil bracket.
14. Lower the vehicle.

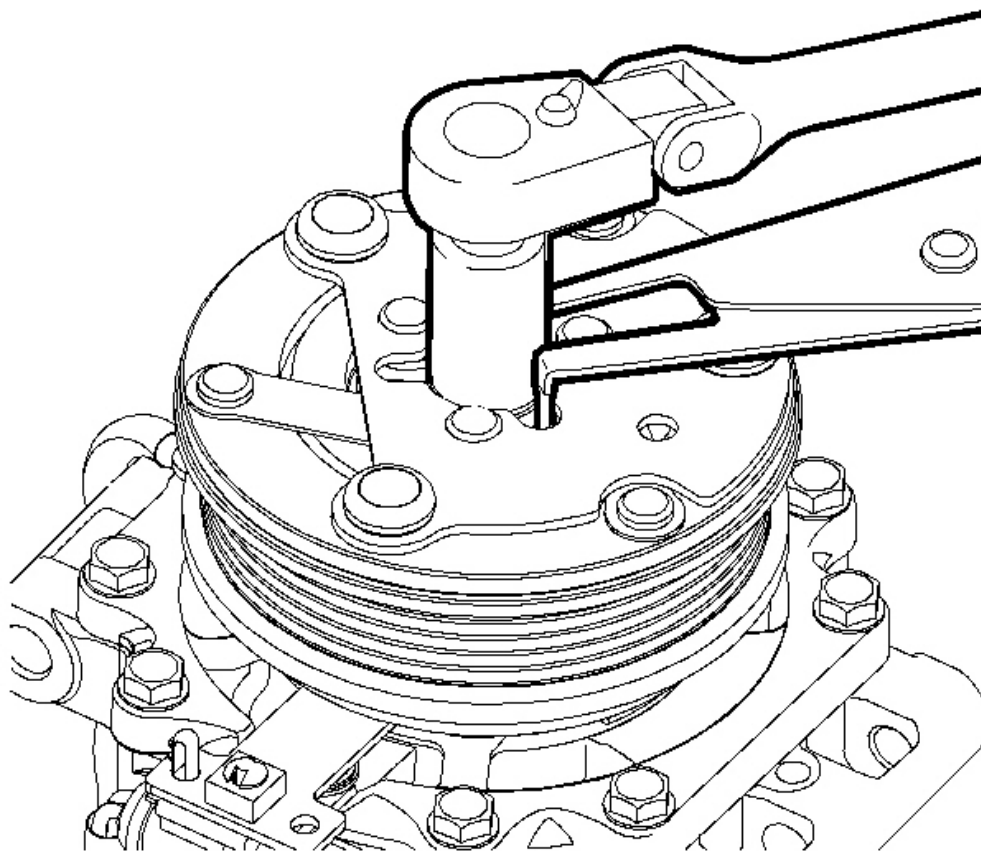
## **COMPRESSOR CLUTCH ASSEMBLY REPLACEMENT**

### **Tools Required**

- **J 25031-A** Three Jaw Puller. See **Special Tools and Equipment** .
- **J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .
- **J 45267** Clutch Holding Tool. See **Special Tools and Equipment** .
- **J 45504** Clutch Pulley Installer. See **Special Tools and Equipment** .
- **SA9149AC-8** Snap Ring Pliers. See **Special Tools and Equipment** .

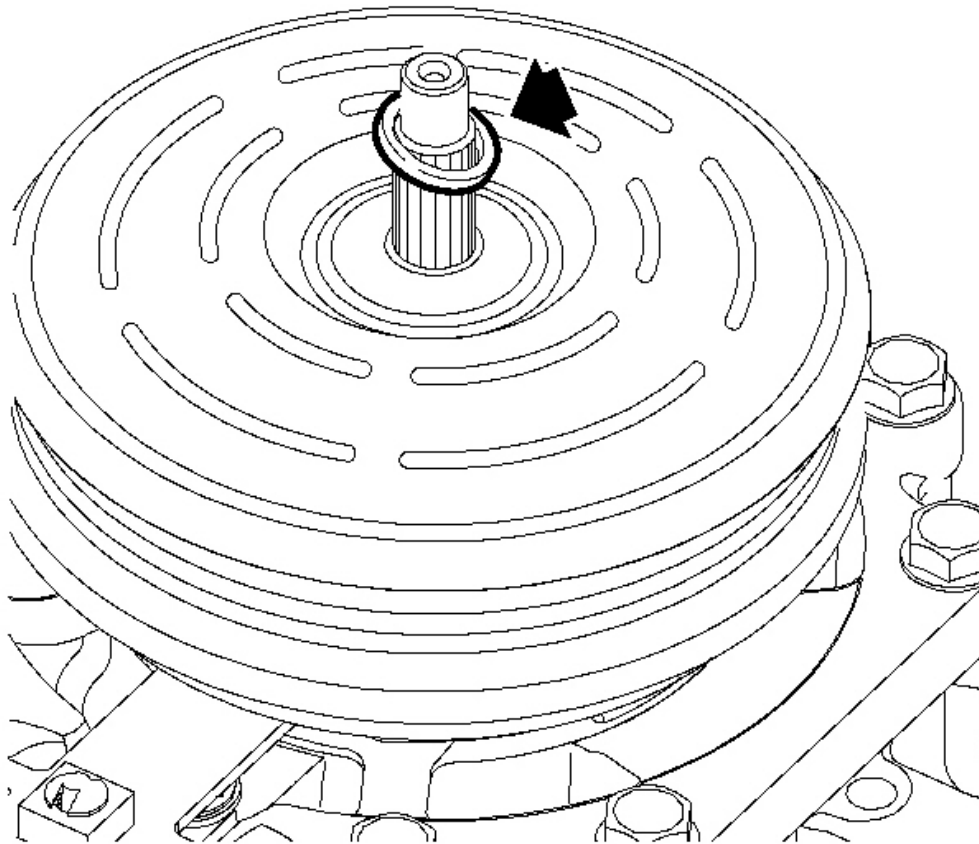
### **Removal Procedure**

1. Remove the compressor. Refer to **Compressor Replacement (L61)** or **Compressor Replacement (L66)** .



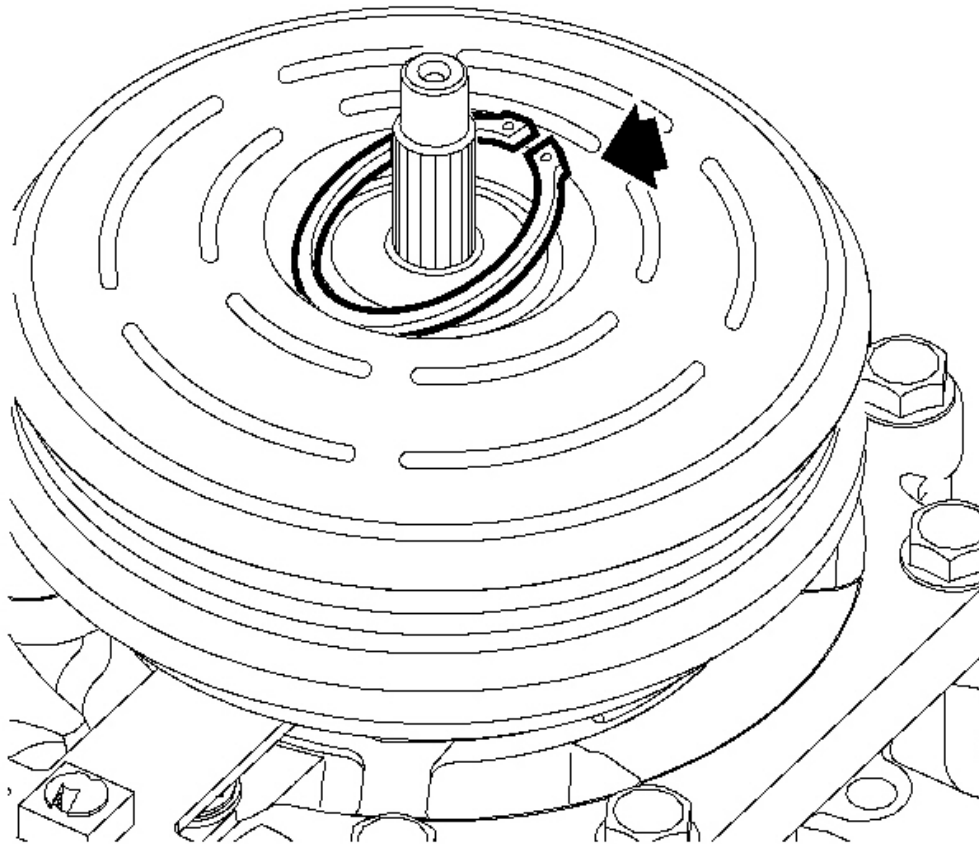
**Fig. 22: Clutch Nut, Disk & Hub Assembly**  
Courtesy of GENERAL MOTORS CORP.

2. Use **J 45267** to hold the disk and hub assembly. See **Special Tools and Equipment** . Remove the clutch nut and the disk and hub assembly.



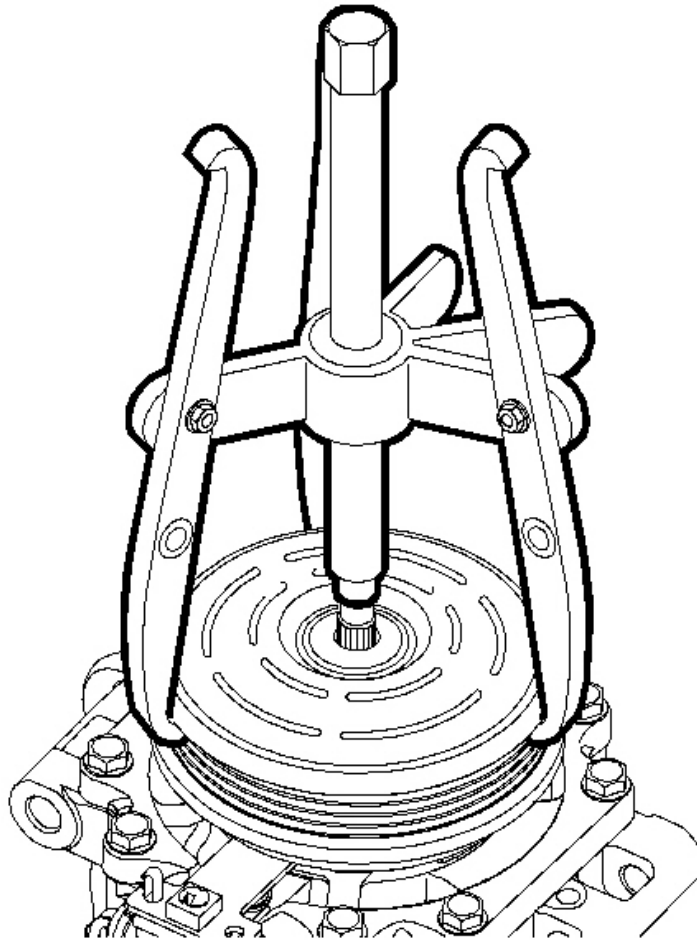
**Fig. 23: Compressor Clutch Assembly & Spacer**  
Courtesy of GENERAL MOTORS CORP.

3. Remove the spacer.



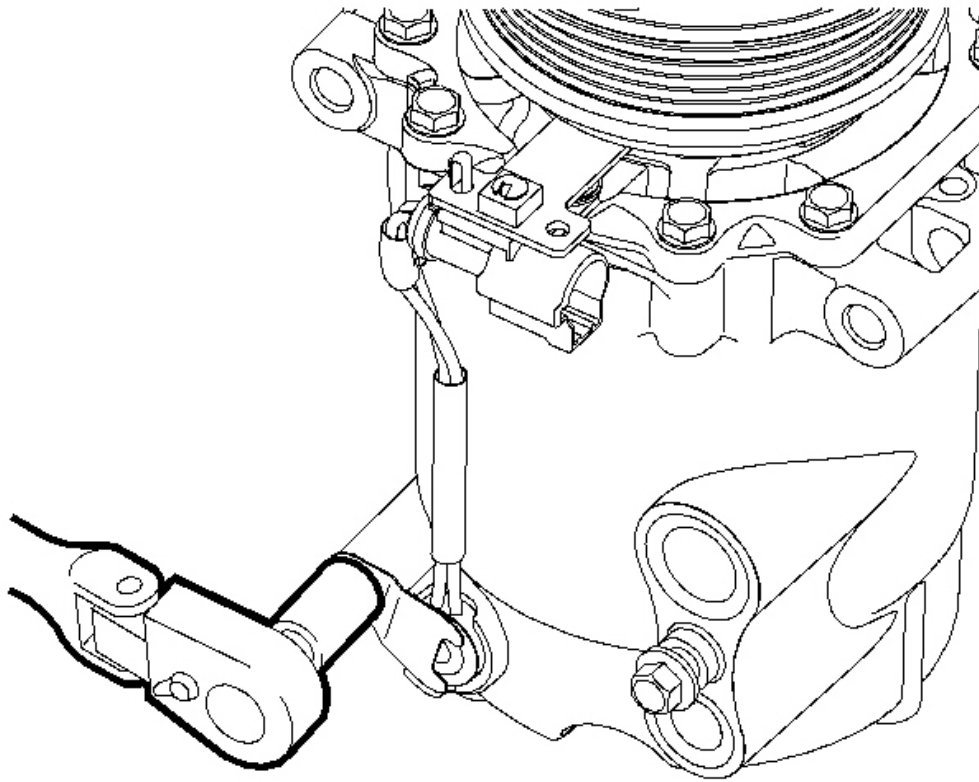
**Fig. 24: Pulley Snap Ring**  
Courtesy of GENERAL MOTORS CORP.

4. Use SA9149AC-8 to remove the pulley snap ring. See **Special Tools and Equipment** .



**Fig. 25: A/C Clutch Pulley**  
Courtesy of GENERAL MOTORS CORP.

5. Use **J 25031-A** to remove the A/C clutch pulley. See **Special Tools and Equipment** .

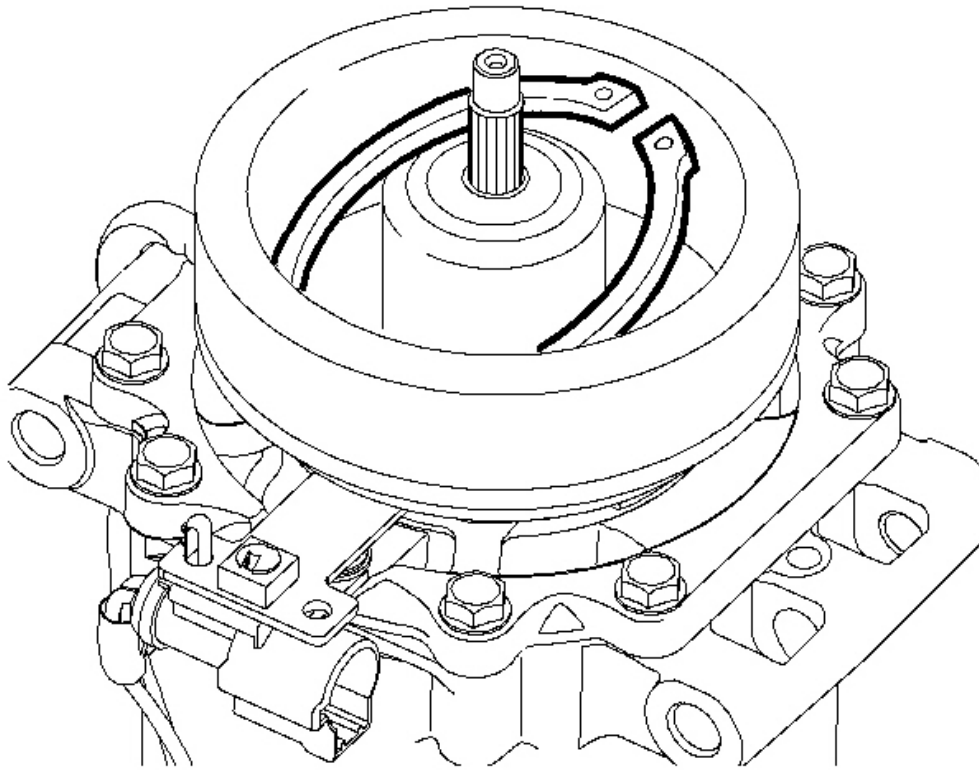


**Fig. 26: Thermal Switch Bolt & Hold-Down Bracket**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the thermal switch bolt and the hold-down bracket.

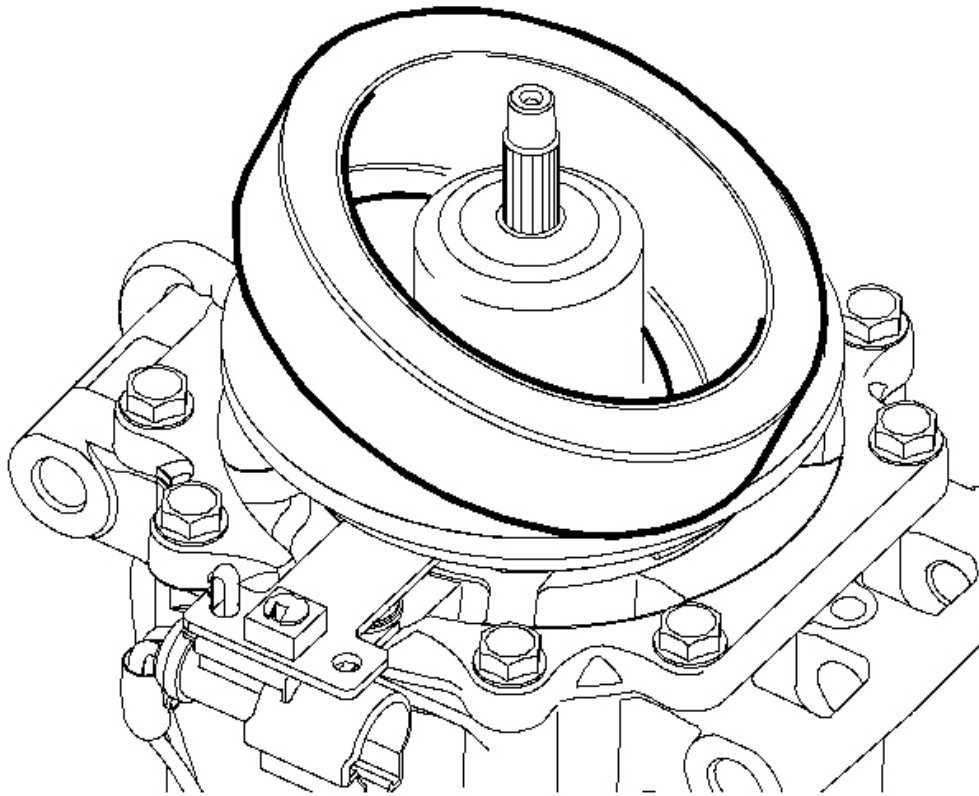
**IMPORTANT:** It may be necessary to pry the switch lightly with a small screwdriver.

7. Lift out the thermal switch while lightly twisting and pulling up on the sensor.



**Fig. 27: Field Coil Snap Ring**  
Courtesy of GENERAL MOTORS CORP.

8. Use SA9149AC-8 to remove the field coil snap ring. See **Special Tools and Equipment** .



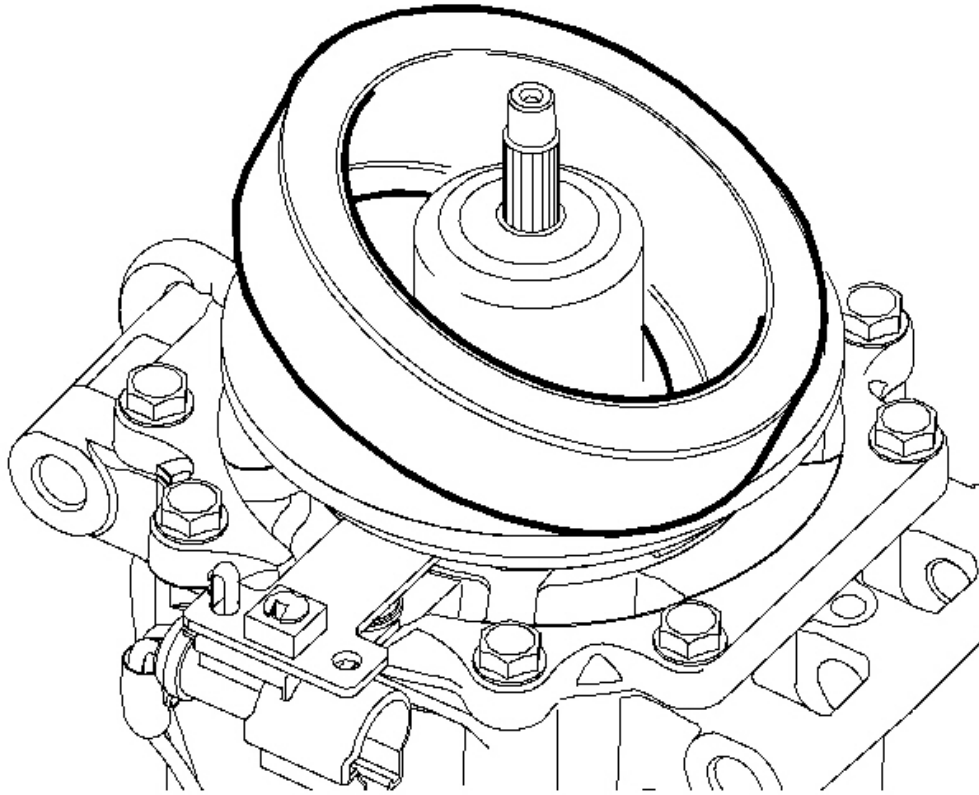
**Fig. 28: A/C Clutch Field Coil**  
**Courtesy of GENERAL MOTORS CORP.**

9. Remove the A/C clutch field coil.

#### **Installation Procedure**

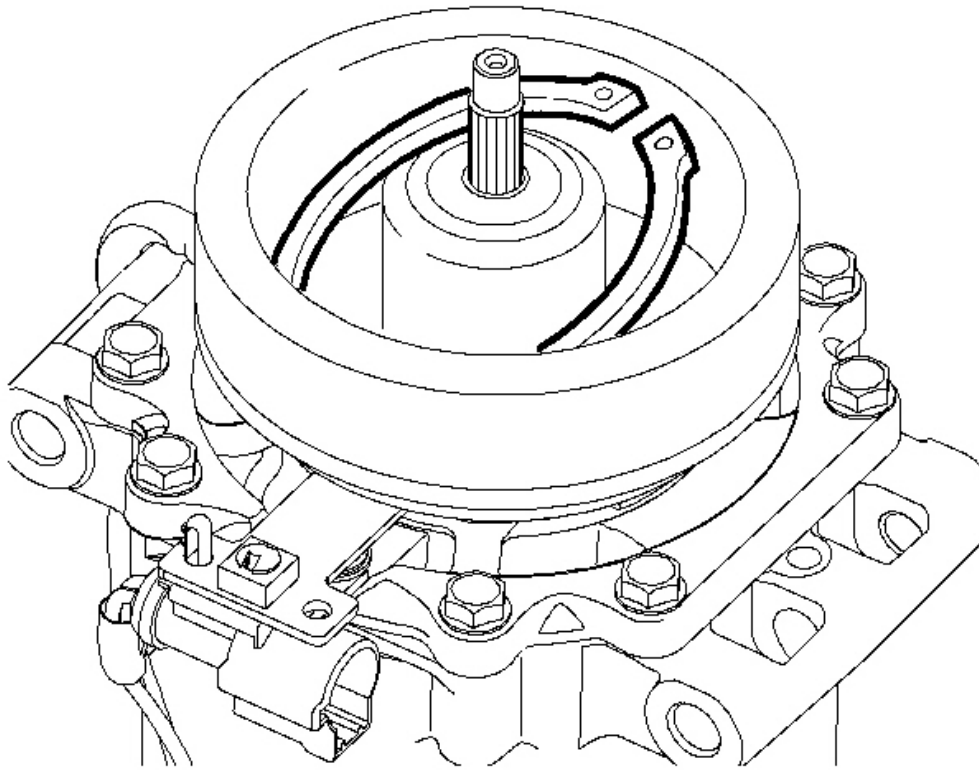
1. Clean the mounting surfaces on the A/C clutch field coil and pulley.





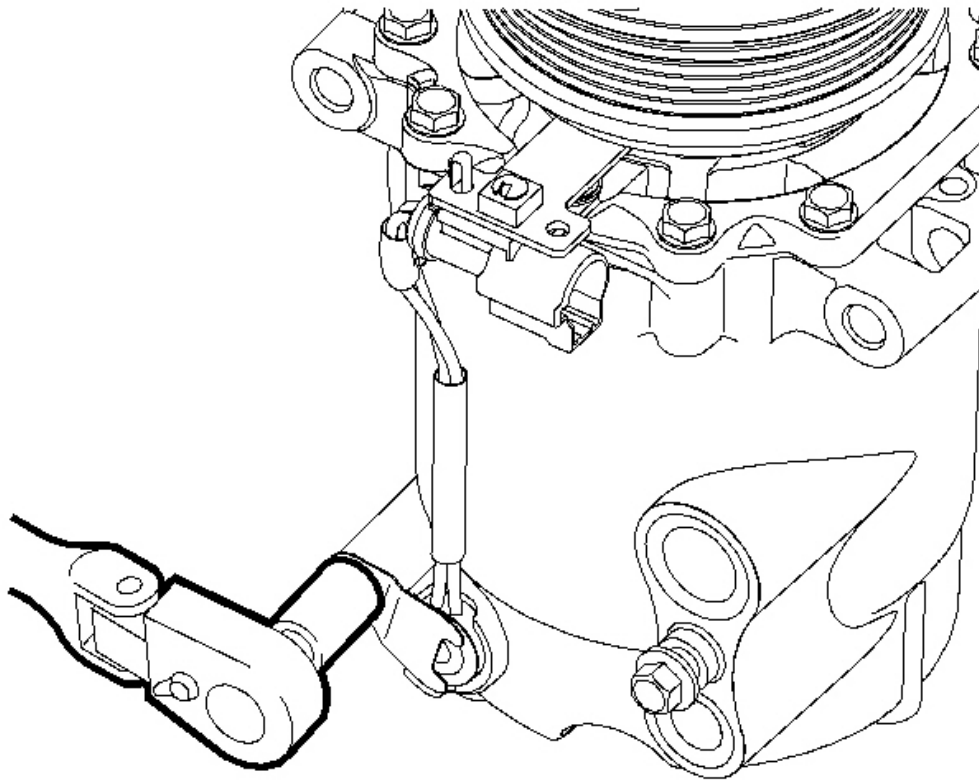
**Fig. 29: A/C Clutch Field Coil**  
**Courtesy of GENERAL MOTORS CORP.**

2. Install the A/C clutch field coil.



**Fig. 30: Field Coil Snap Ring**  
Courtesy of GENERAL MOTORS CORP.

3. Use SA9149AC-8 to install the field coil snap ring with the bevel side out. See **Special Tools and Equipment** .



**Fig. 31: Thermal Switch Bolt & Hold-Down Bracket**  
Courtesy of GENERAL MOTORS CORP.

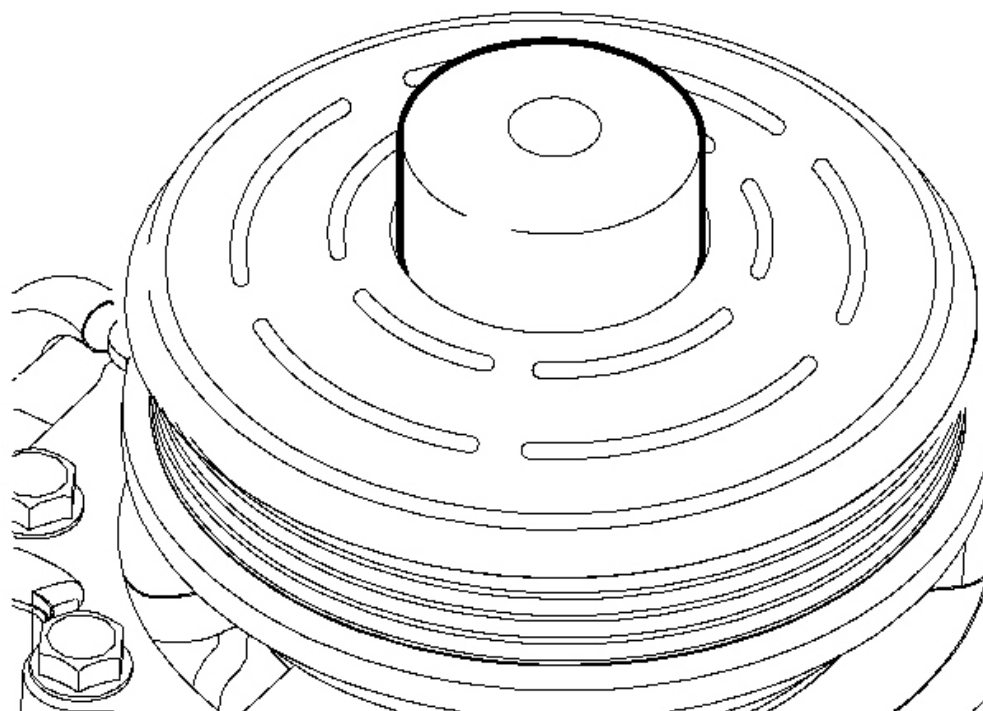
**IMPORTANT:** It is important to use Saturn Sealant P/N 22681632 as a thermal conductive material. Failure to use this sealant may affect the function of the switch.

4. Clean the thermal switch pocket if necessary.
5. Apply thermal switch sealant, approximately the size of a pea, into the switch pocket.
6. Install the thermal switch by pushing the switch into place and wetting out the sealant, while holding the switch in place. Wipe away any excess sealant.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

7. Install the thermal switch hold-down bracket and bolt.

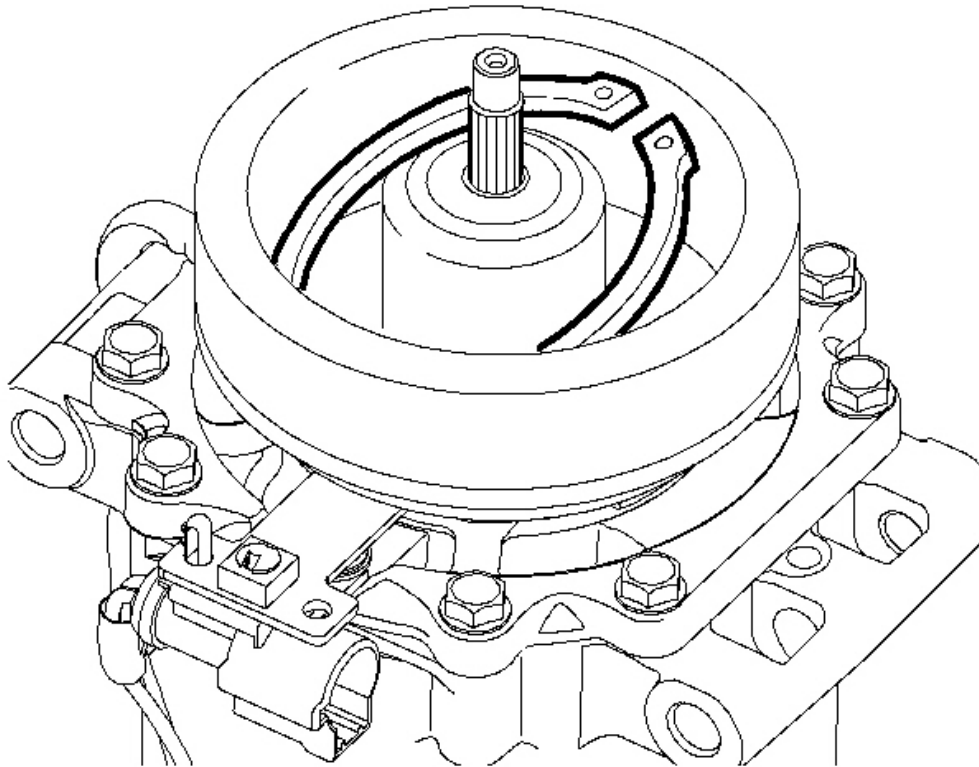
**Tighten:** Tighten the bolt to 6 N.m (53 lb in).



**Fig. 32: Clutch Bearing/Pulley Assembly & Hub**  
Courtesy of GENERAL MOTORS CORP.

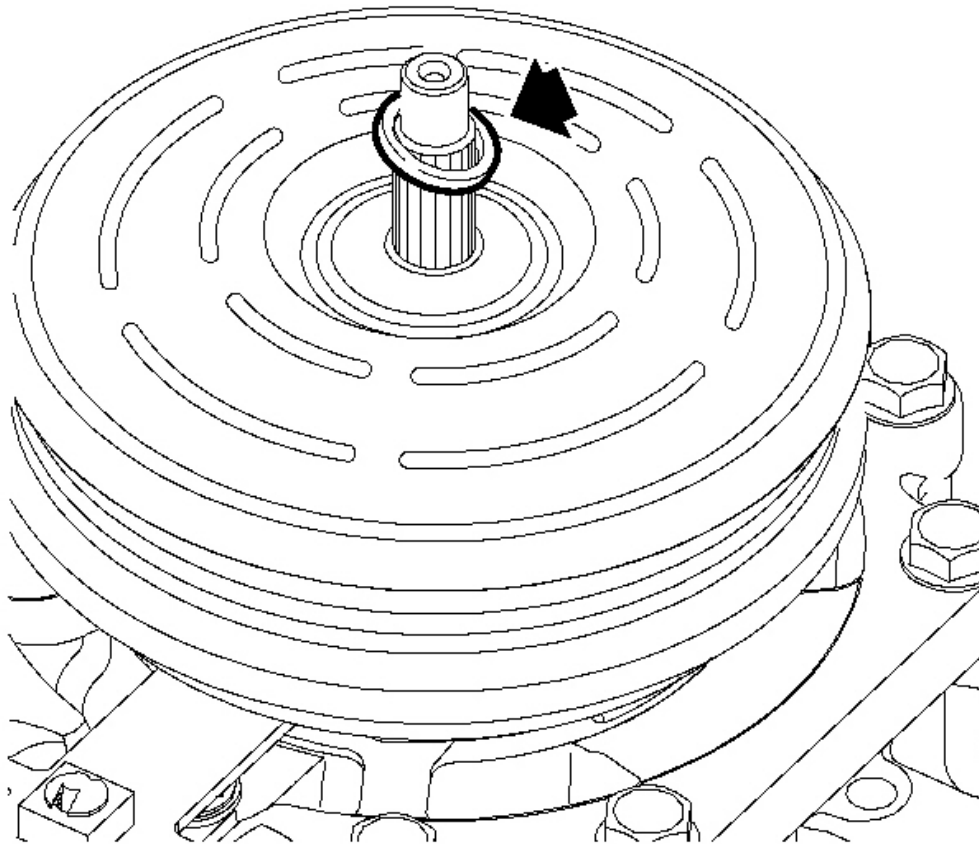
**IMPORTANT:** The A/C clutch bearing and pulley is a slip fit on the compressor. If correctly aligned the pulley should slip on easily. If difficulty is encountered, install using the pulley installer tool.

8. Use **J 45504** to align the clutch bearing/pulley assembly over the hub. See **Special Tools and Equipment** . Gently tap on the assembly to install.



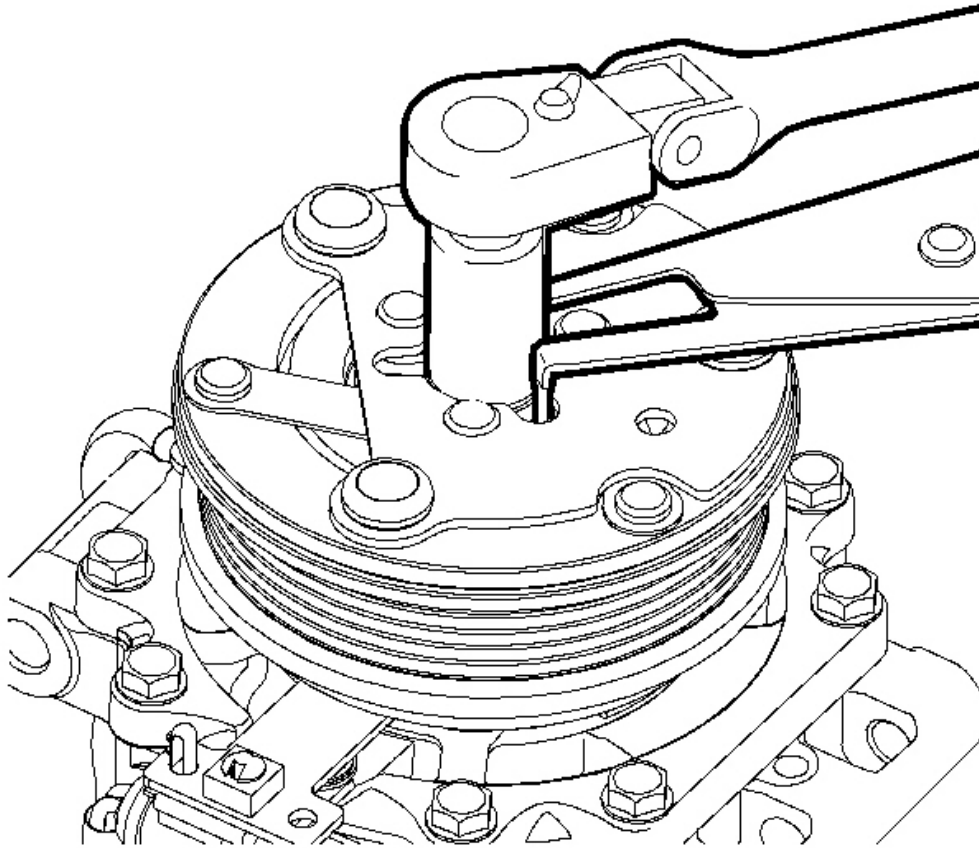
**Fig. 33: Field Coil Snap Ring**  
Courtesy of GENERAL MOTORS CORP.

9. Use **SA9149AC-8** to install the pulley snap ring with the bevel side out. See **Special Tools and Equipment** .



**Fig. 34: Compressor Clutch Assembly & Spacer**  
Courtesy of GENERAL MOTORS CORP.

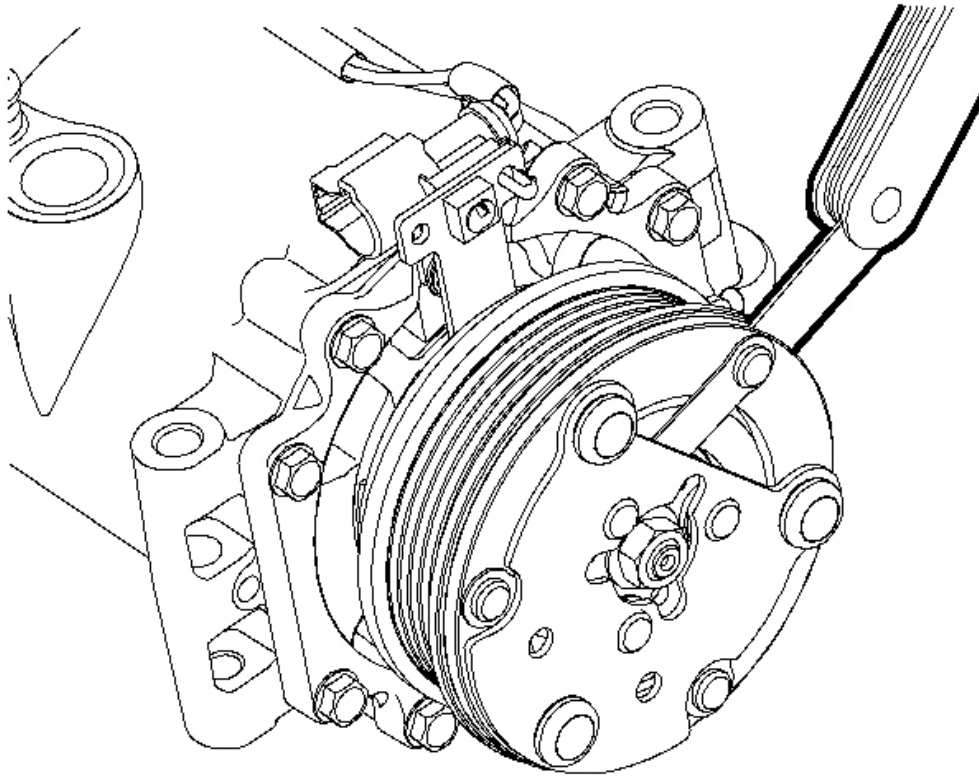
10. Install the spacer.



**Fig. 35: Clutch Nut, Disk & Hub Assembly**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Align the block tooth on the disk and hub assembly with the groove in the shaft.

11. Install the drive plate and nut. Use the old nut to evaluate the clearances.



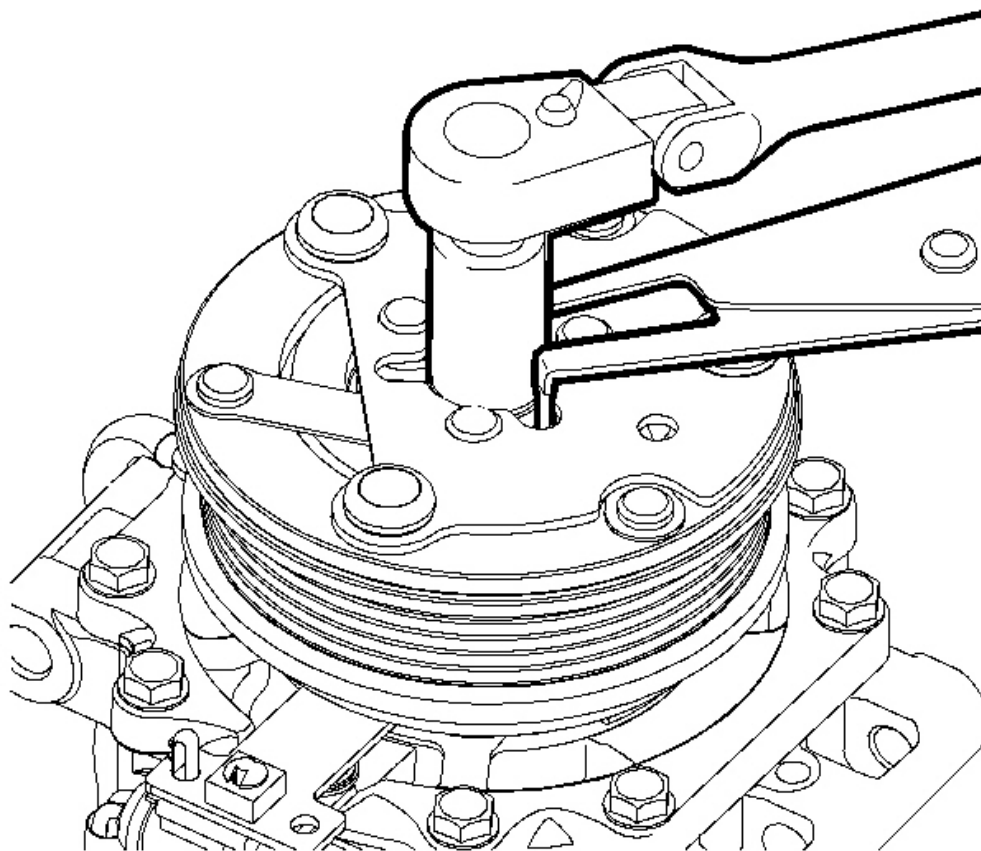
**Fig. 36: Measuring The Clearance Between The Pulley & Drive Plate Using A Feeler Gauge**  
Courtesy of GENERAL MOTORS CORP.

12. Using a feeler gauge, measure the clearance between the pulley and the drive plate.

**Measure:** The clearance should be 0.35-0.75 mm (0.014-0.030 in).

13. If necessary, adjust the clearance by adding or removing clutch hub spacers.





**Fig. 37: Clutch Nut, Disk & Hub Assembly**  
Courtesy of GENERAL MOTORS CORP.

14. Once the correct air gap is obtained, install a new clutch nut. Use **J 45267** to hold the disk and hub assembly while tightening. See **Special Tools and Equipment** .

**Tighten:** Tighten the nut to 19 N.m (14 lb ft).

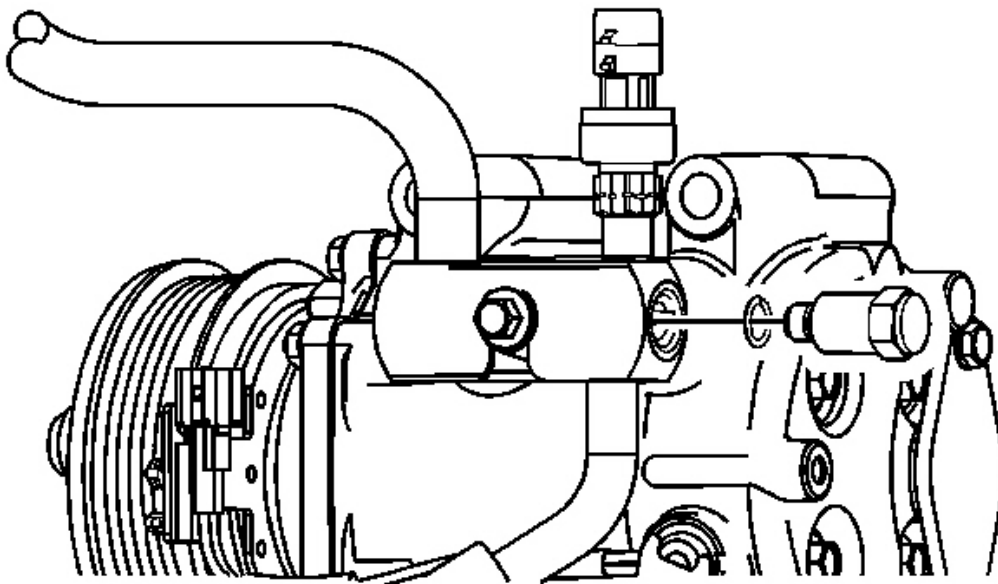
15. Install the compressor. Refer to **Compressor Replacement (L61)** or **Compressor Replacement (L66)** .
16. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
17. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

## Tools Required

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

## Removal Procedure

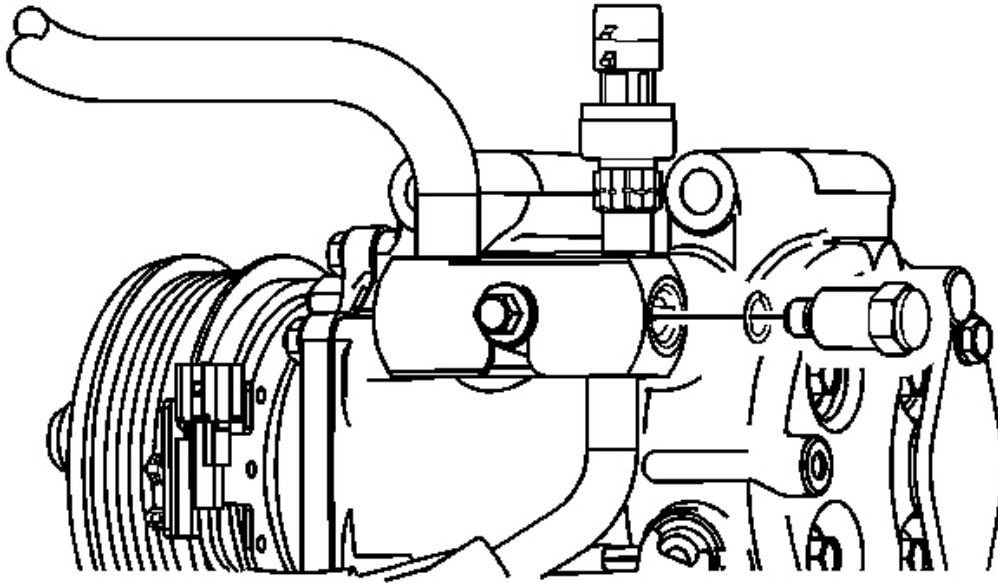
1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.



**Fig. 38: Pressure Relief Valve & Compressor Hose**  
Courtesy of GENERAL MOTORS CORP.

3. Remove pressure relief valve from compressor hose.

## Installation Procedure



**Fig. 39: Pressure Relief Valve & Compressor Hose**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Use R-12 refrigerant oil (mineral) to lubricate O-rings. Use of R-134a (PAG) oil will cause premature corrosion of fitting joints.

1. Lubricate the pressure relief valve O-ring with new R-12 mineral compressor oil. Refer to **O-Ring Replacement** .

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

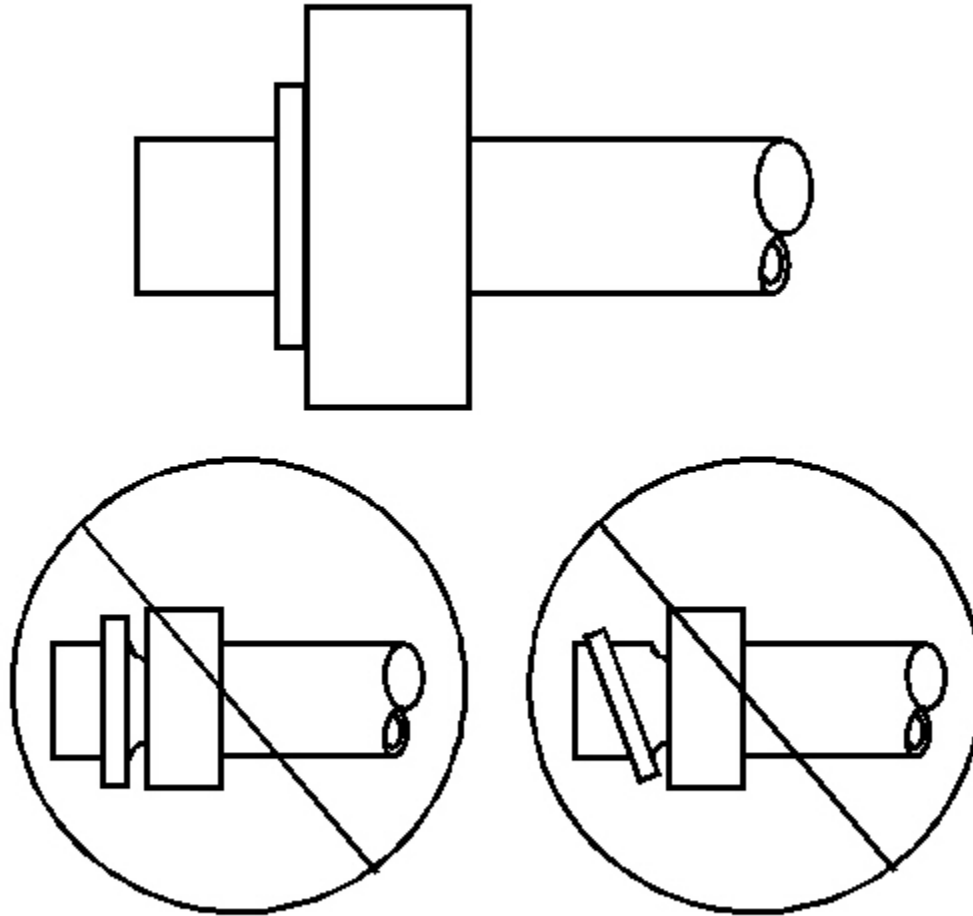
2. Install the pressure relief valve to the compressor hose.

**Tighten:** Tighten the pressure relief valve to 10 N.m (89 in ft).

3. Lower the vehicle.
4. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
5. Test the affected A/C joint for leaks using **J 39400-A** . See **Special Tools and Equipment** .

## SEALING WASHER REPLACEMENT

### Removal Procedure



**Fig. 40: Identifying Sealing Washer**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the seal washer from the A/C refrigerant component.

**IMPORTANT: Cap or tape the open A/C refrigerant components immediately to prevent system contamination.**

2. Inspect the seal washer for signs of damage to help determine the root cause of the failure.
3. Inspect the A/C refrigerant components for damage or burrs. Repair if necessary.

**IMPORTANT: DO NOT reuse sealing washer.**

4. Discard the sealing washer.

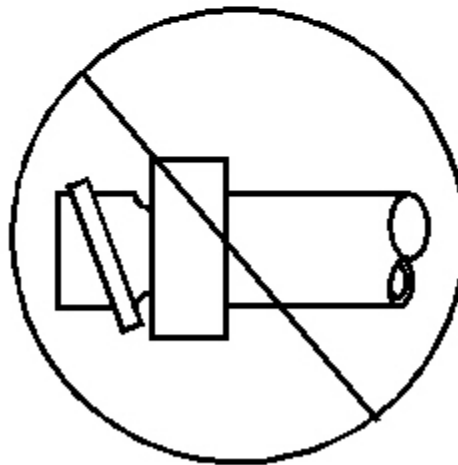
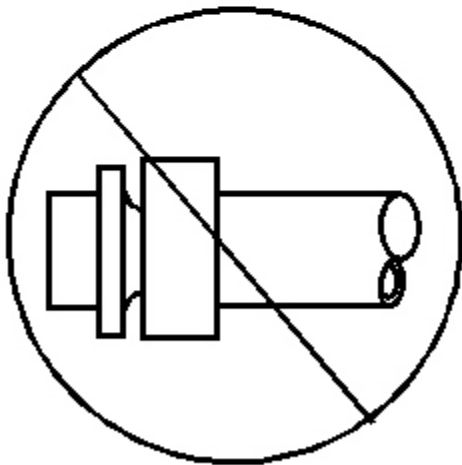
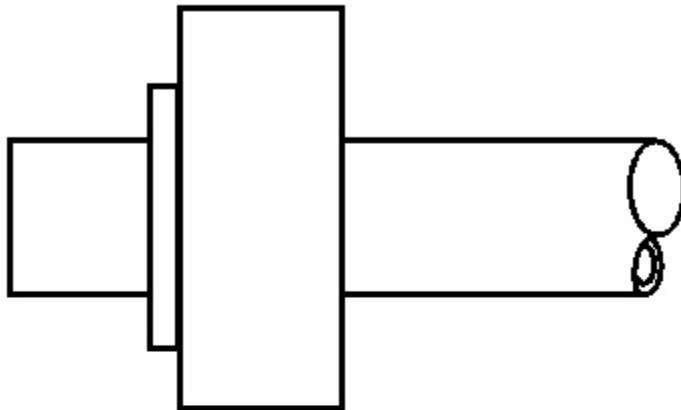
### Installation Procedure

**IMPORTANT: Flat washer type seals do not require lubrication.**

1. Inspect the new seal washer for any signs of cracks, cuts, or damage.

Do not use a damaged seal washer.

2. Remove the cap or tape from the A/C refrigerant components.



**Fig. 41: Identifying Sealing Washer**  
**Courtesy of GENERAL MOTORS CORP.**

3. Using a lint-free clean, dry cloth, clean the sealing surfaces of the A/C refrigerant components.
4. Carefully install the new seal washer onto the A/C refrigerant component.

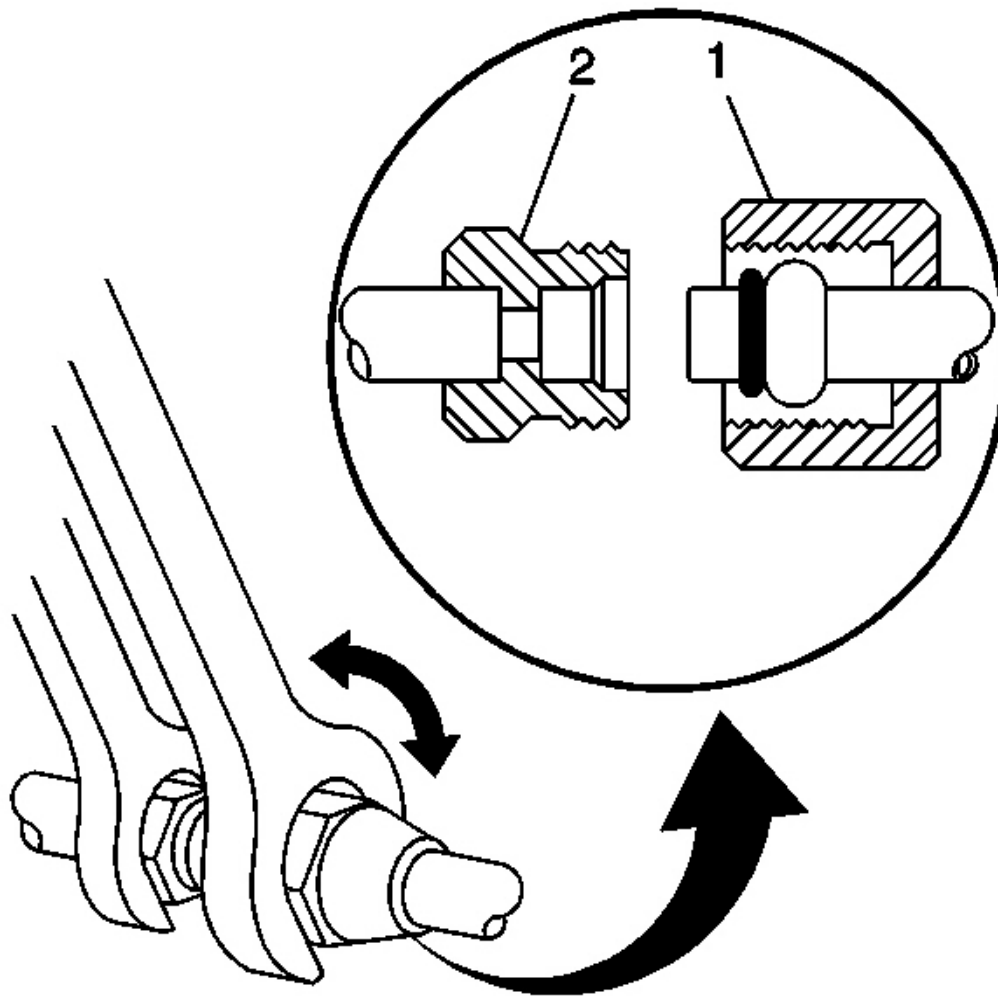
The washer must completely bottom against the surface of the fitting.

**IMPORTANT: After tightening the A/C components, there should be a slight sealing washer gap of approximately 1.2 mm (3/64 in) between the A/C line and the A/C component.**

5. Assemble the remaining A/C refrigerant components. Refer to the appropriate repair procedure.

## **O-RING REPLACEMENT**

### **Removal Procedure**



**Fig. 42: Identifying A/C Line Fittings**  
Courtesy of GENERAL MOTORS CORP.

1. Disassemble the A/C refrigerant components. Refer to the appropriate repair procedure
  - For compression style fittings use a back up wrench on the fitting (2) and loosen the fitting nut (1).
  - For banjo style fittings remove the bolt retaining the banjo type fitting.
2. Remove the O-ring seal from the A/C refrigerant component.
3. Inspect the O-ring seal for signs of damage to help determine the root cause of the failure.
4. Inspect the A/C refrigerant components for damage or burrs. Repair if necessary.

**IMPORTANT: Cap or tape the open A/C refrigerant components immediately to prevent system contamination.**

5. Cap or tape the A/C refrigerant components.
6. Discard the O-ring seal.

#### **Installation Procedure**

1. Inspect the new O-ring seal for any sign or cracks, cuts, or damage. Replace if necessary.
2. Remove the cap or tape from the A/C refrigerant components.
3. Using a lint-free clean, dry cloth, carefully clean the sealing surfaces of the A/C refrigerant components.

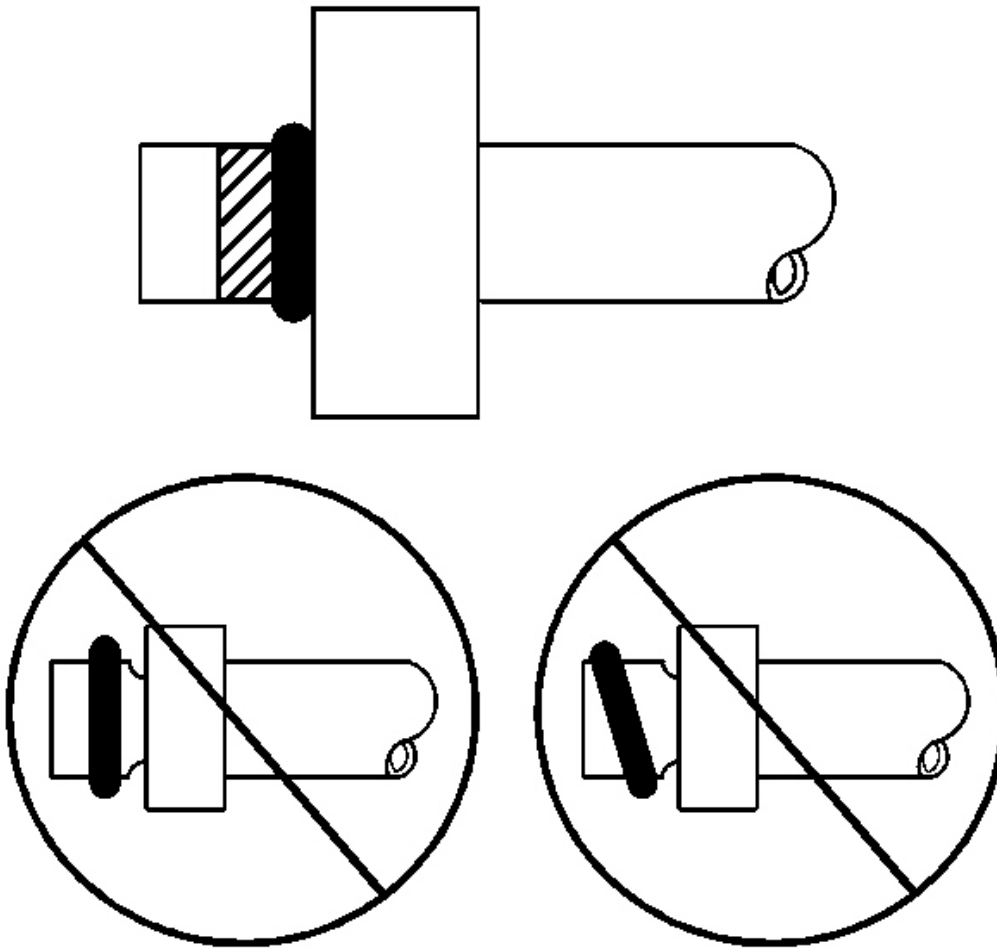
**IMPORTANT: DO NOT allow any of the mineral base 525 viscosity refrigerant oil on the new O-ring seal to enter the refrigerant system.**

4. Lightly coat the new O-ring seal with mineral base 525 viscosity refrigerant oil.

**IMPORTANT: DO NOT reuse O-ring seals.**

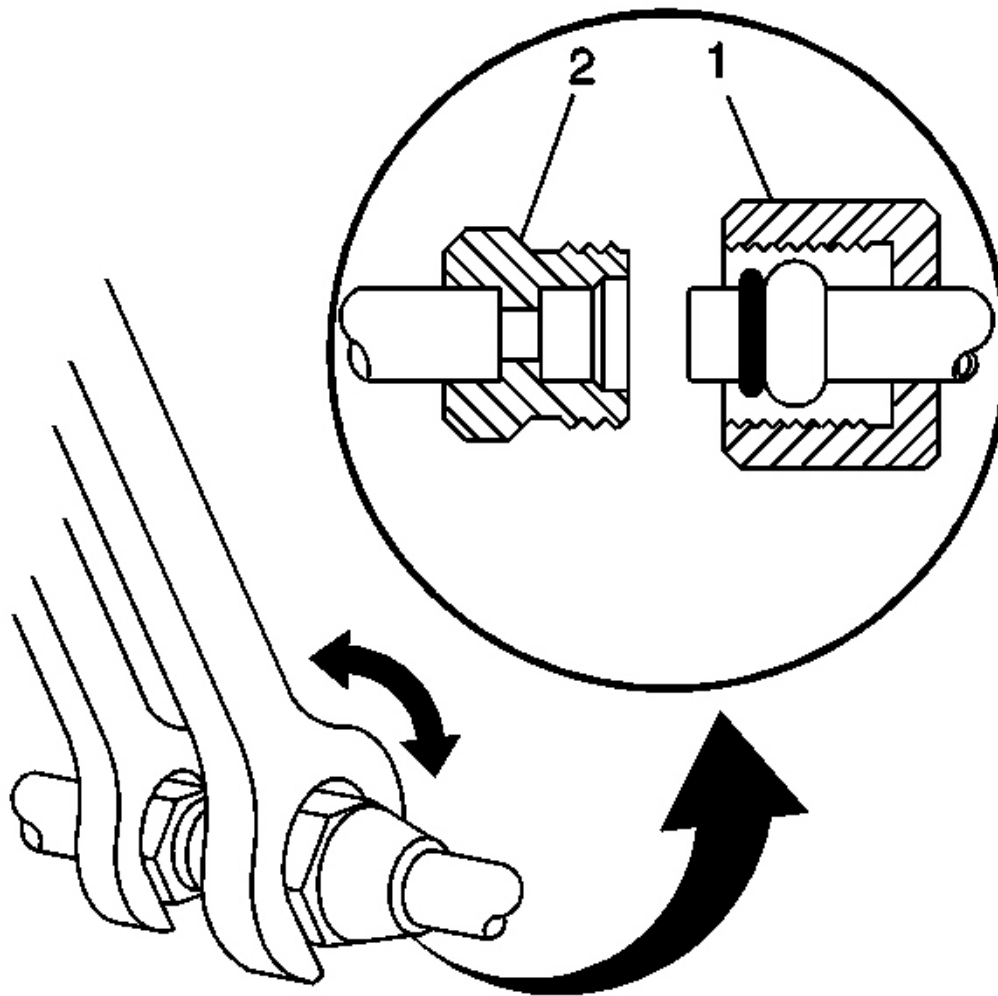
5. Carefully slide the new O-ring seal onto the A/C refrigerant component.





**Fig. 43: Seating O-Ring**  
Courtesy of GENERAL MOTORS CORP.

6. The O-ring seal must be fully seated.



**Fig. 44: Identifying A/C Line Fittings**  
Courtesy of GENERAL MOTORS CORP.

7. Assemble the A/C components.

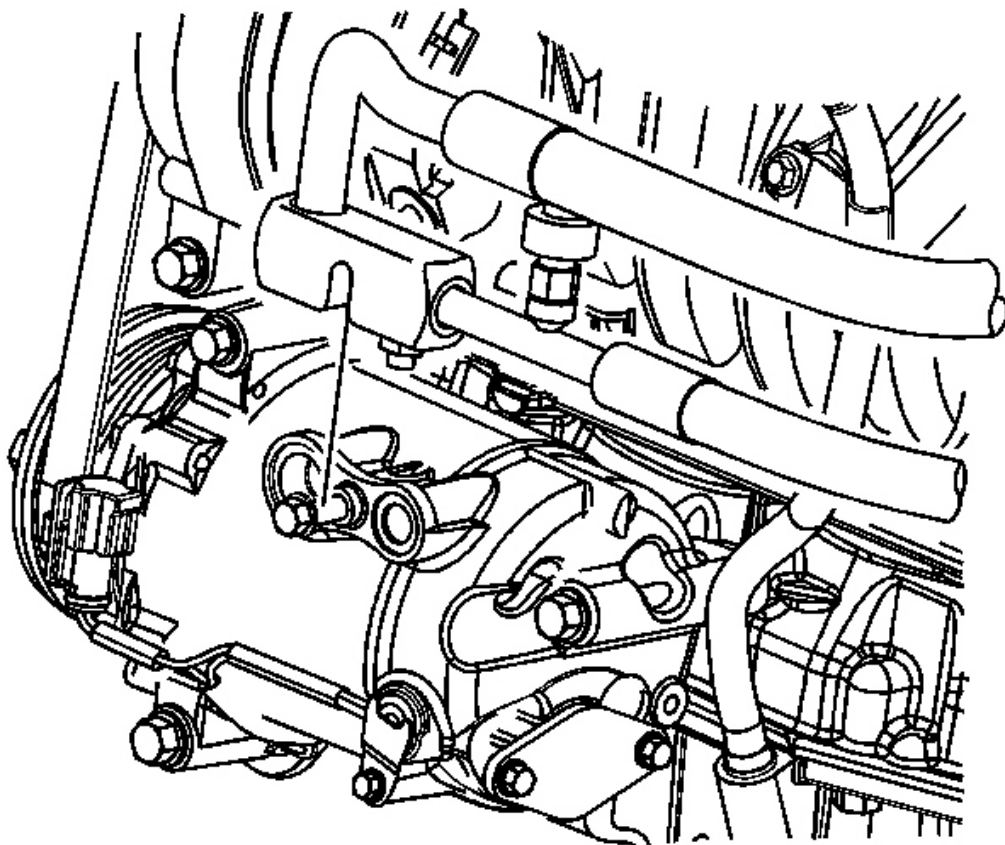
Refer to the appropriate repair procedure.

- For compression style fittings use a back up wrench on the fitting (2) and tighten the fitting nut (1) to specification.
- For banjo style fittings install the bolt retaining the banjo type fitting and tighten to specification.

## Tools Required

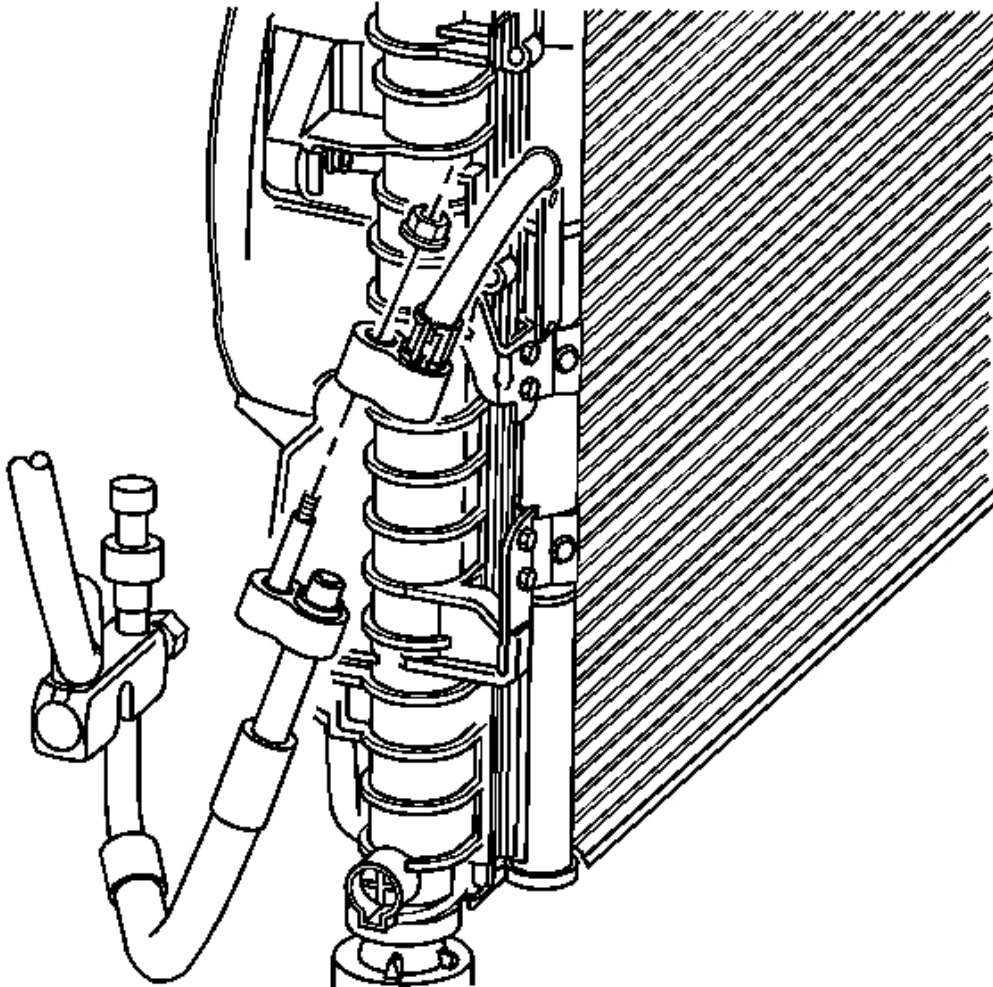
**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

## Removal Procedure



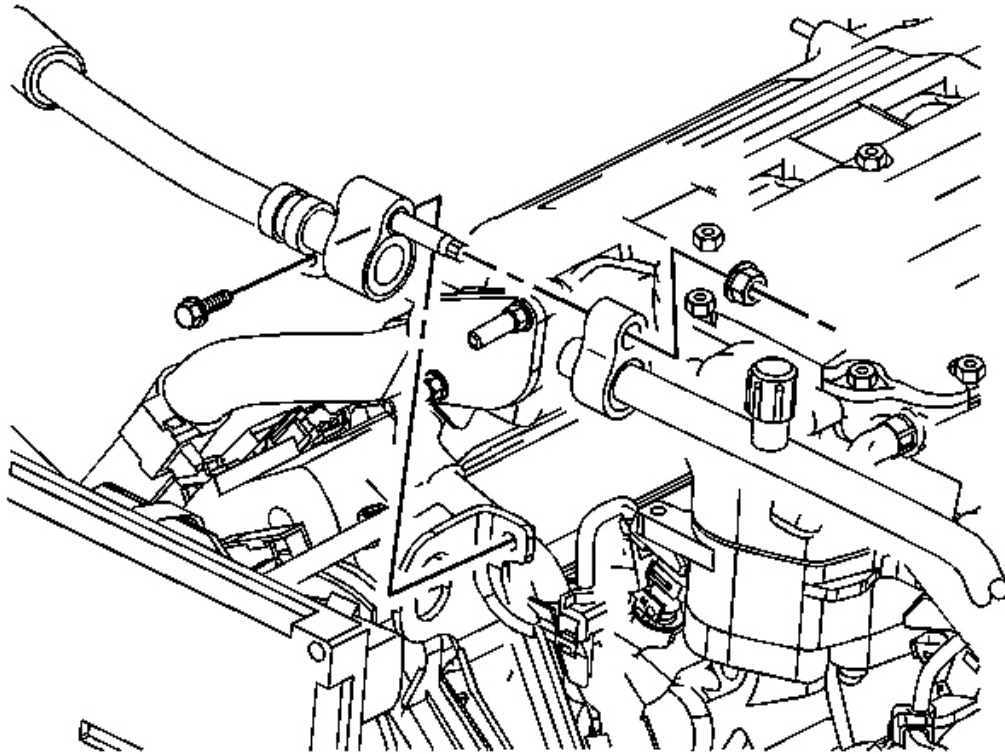
**Fig. 45: Compressor, Hose & Bolt**  
Courtesy of GENERAL MOTORS CORP.

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
3. Remove the compressor hose bolt from the compressor.
4. Remove the compressor hose from the compressor.
5. Remove and discard the O-rings from the compressor. Refer to **O-Ring Replacement** .
6. Install a protective cap to the compressor to prevent contamination and desiccant saturation.



**Fig. 46: Compressor Hose, Nut & Condenser**  
Courtesy of GENERAL MOTORS CORP.

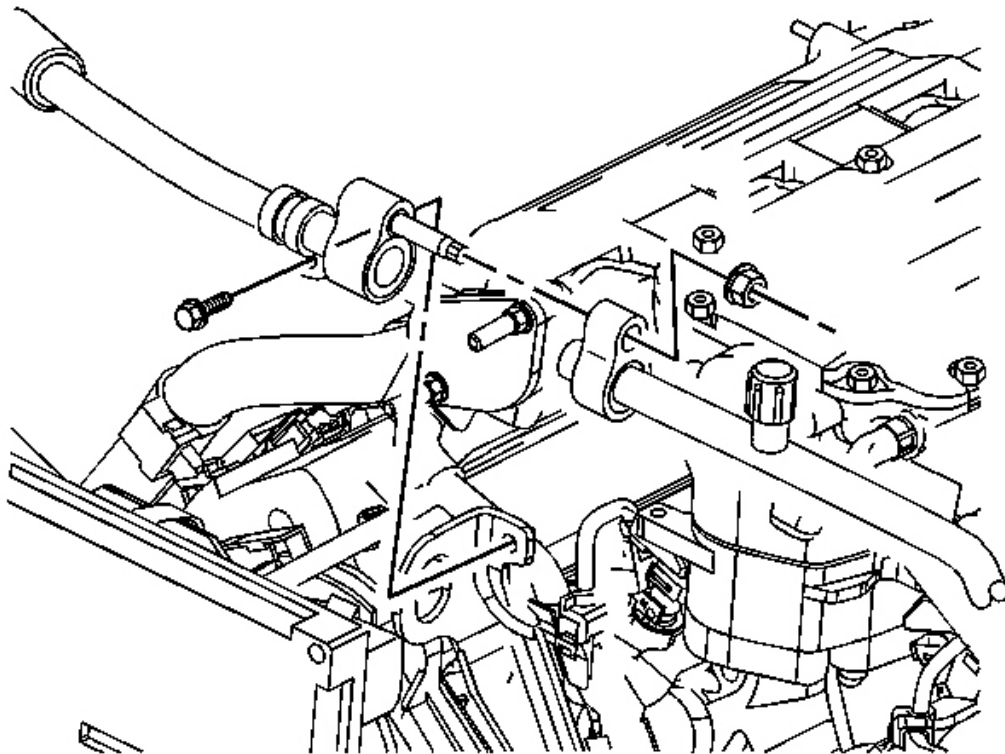
7. Lower the vehicle.
8. Remove the right headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarker, Park, Turn Signal Bulb Replacement** in Lighting Systems.
9. Remove the compressor hose nut from the condenser.
10. Remove the compressor hose from the condenser.
11. Install a protective cap to the condenser to prevent contamination and desiccant saturation.



**Fig. 47: Compressor Hose, Nut & Evaporator Outlet Hose**  
Courtesy of GENERAL MOTORS CORP.

12. Remove the compressor hose nut from the evaporator outlet hose.
13. Remove the compressor hose from the evaporator outlet hose.
14. Install a protective cap to the evaporator outlet hose to prevent contamination and desiccant saturation.
15. Remove the compressor hose from the vehicle.
16. Remove and discard the sealing washers from the suction hose and the condenser ends of the compressor hose. Refer to **Sealing Washer Replacement** .

#### **Installation Procedure**



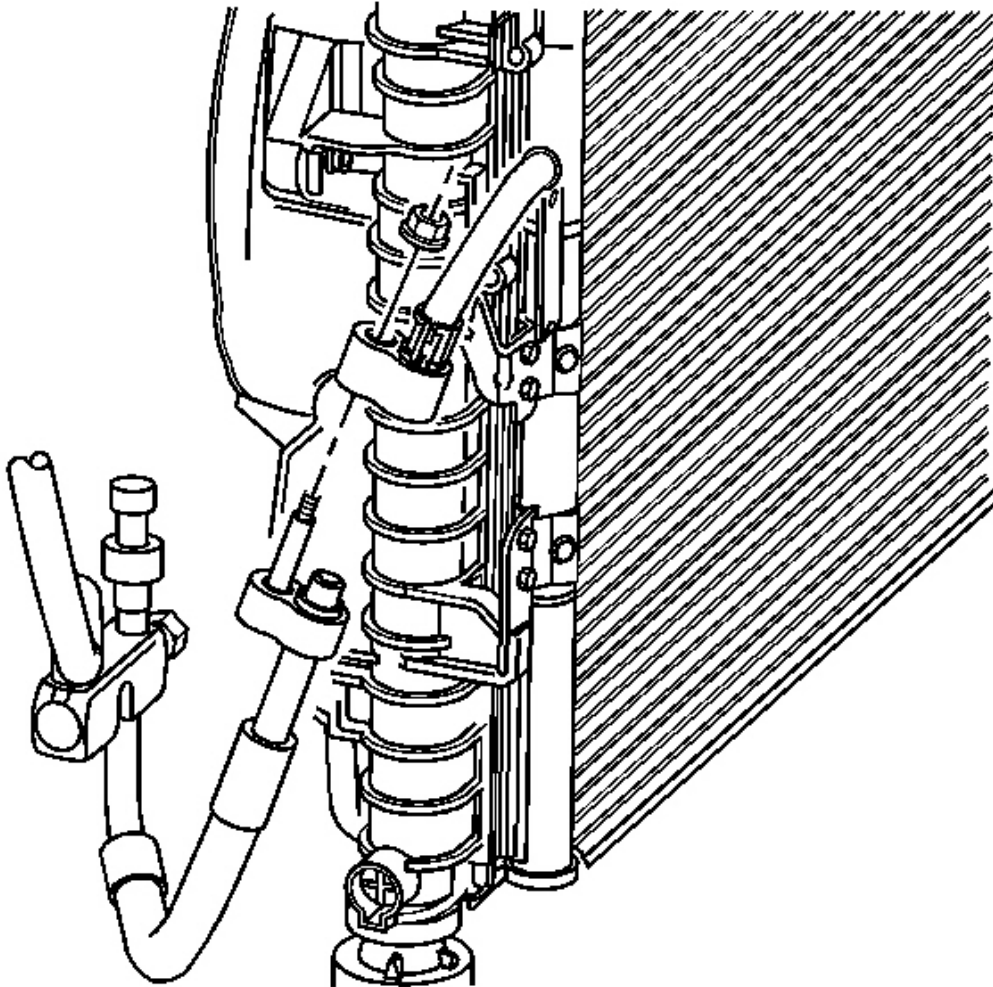
**Fig. 48: Compressor Hose, Nut & Evaporator Outlet Hose**  
Courtesy of GENERAL MOTORS CORP.

1. Install new seal washers to the evaporator outlet hose and the condenser ends of the compressor hose. Refer to **Sealing Washer Replacement** .
2. Position the compressor hose in the vehicle.
3. Remove the protective cap from the evaporator outlet hose.
4. Install the compressor hose to the evaporator outlet hose.

**NOTE:** Refer to **Fastener Notice in Cautions and Notices.**

5. Install the compressor hose nut to the evaporator outlet hose.

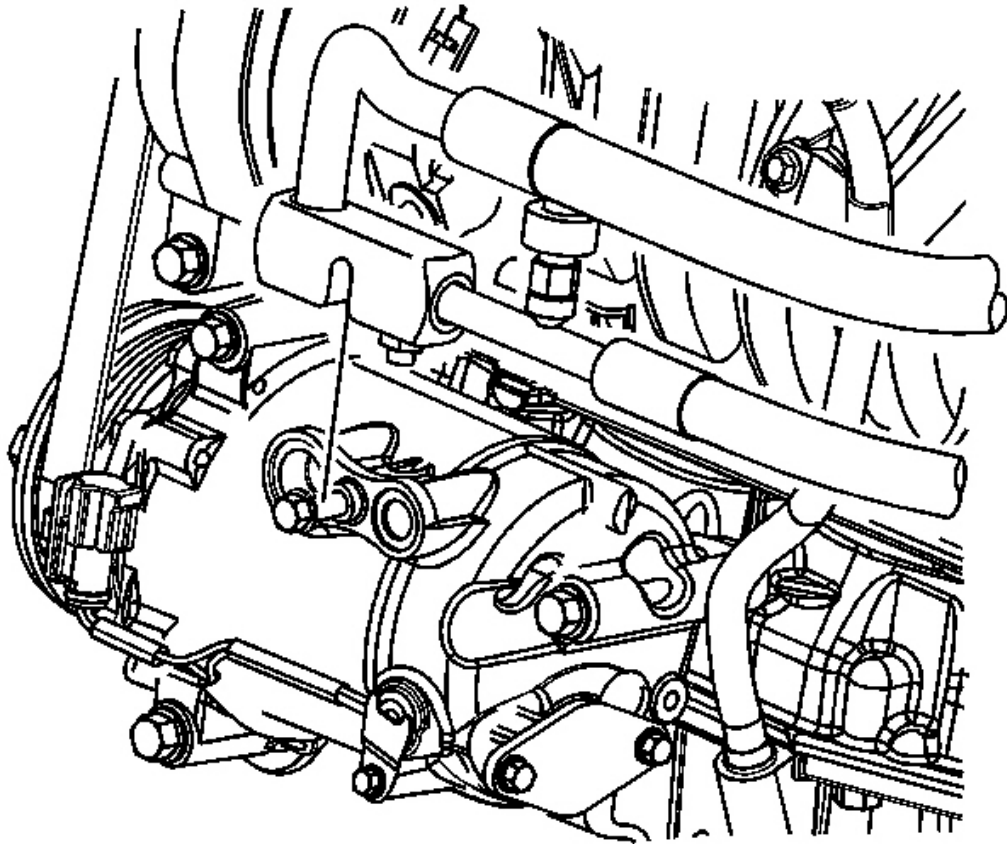
**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 49: Compressor Hose, Nut & Condenser**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the protective cap from the condenser.
7. Install the compressor hose to the condenser.
8. Install the compressor hose nut to the condenser.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 50: Compressor, Hose & Bolt**  
Courtesy of GENERAL MOTORS CORP.

9. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
10. Remove the protective cap from the compressor.
11. Install new O-rings to the compressor. Refer to **O-Ring Replacement** .
12. Install the compressor hose to the compressor.
13. Install the compressor hose bolt to the compressor.

**Tighten:** Tighten the bolt to 27 N.m (20 lb ft).

14. Lower the vehicle.
15. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
16. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .



17. Install the right headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarker, Park, Turn Signal Bulb Replacement** in Lighting Systems.

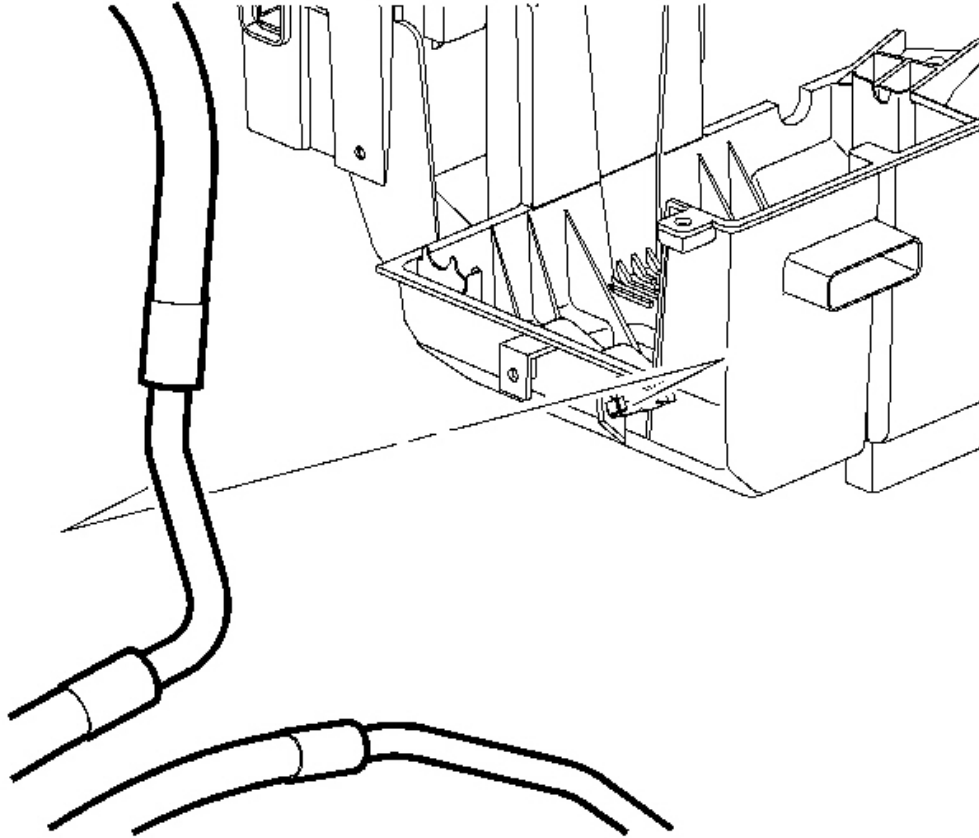
## **COMPRESSOR HOSE ASSEMBLY REPLACEMENT (L61)**

### **Tools Required**

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

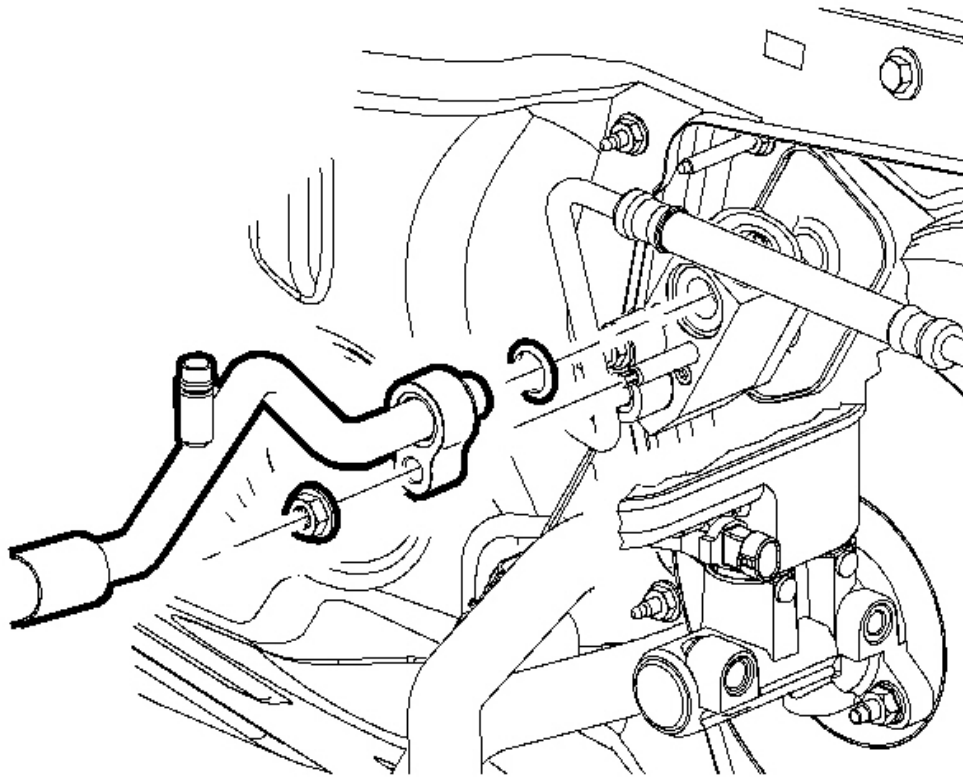
### **Removal Procedure**

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the left headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarker, Park, Turn Signal Bulb Replacement** in Lighting Systems.



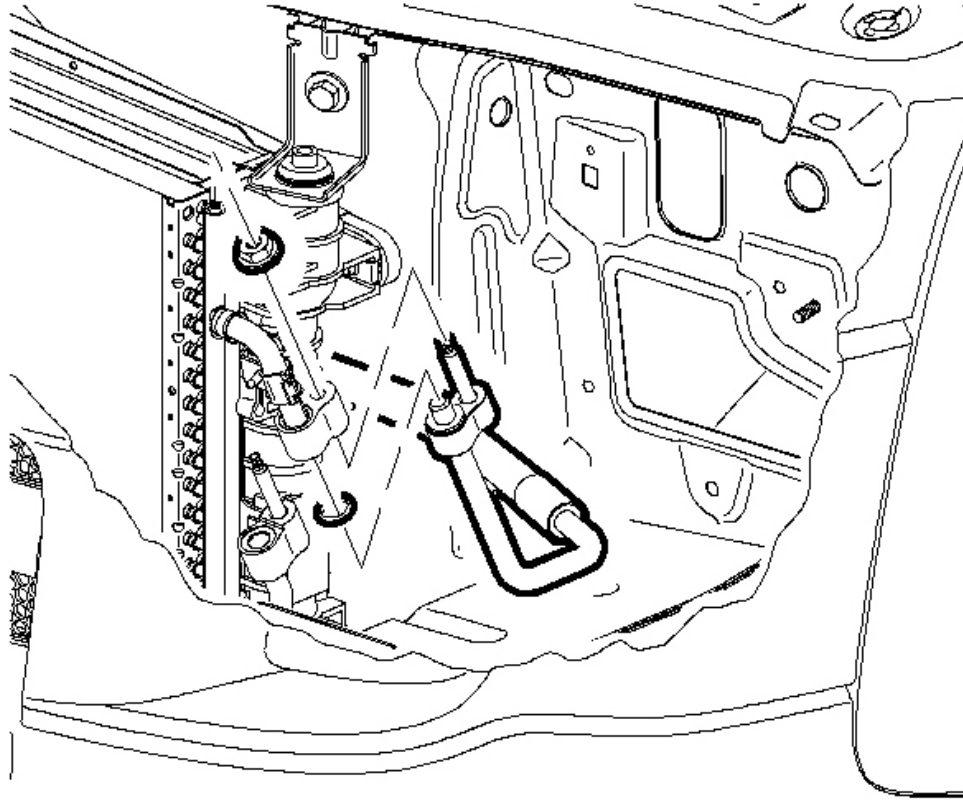
**Fig. 51: Compressor Hose, Nut & Battery Box**  
**Courtesy of GENERAL MOTORS CORP.**

3. Remove the compressor hose nut from the battery box.
4. Remove the compressor hose from the battery box.



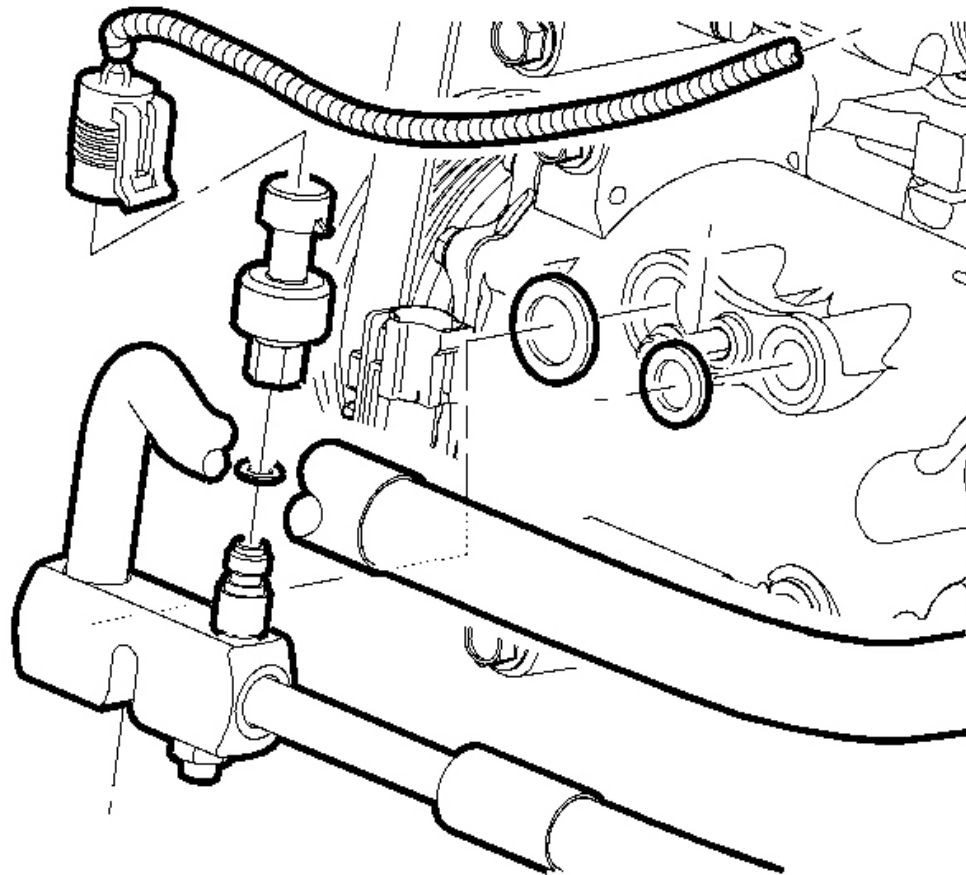
**Fig. 52: Compressor Hose, Nut & TXV**  
**Courtesy of GENERAL MOTORS CORP.**

5. Remove the compressor hose nut from the TXV.
6. Remove the compressor hose from the TXV.
7. Install a protective cap to the TXV to prevent contamination and desiccant saturation.



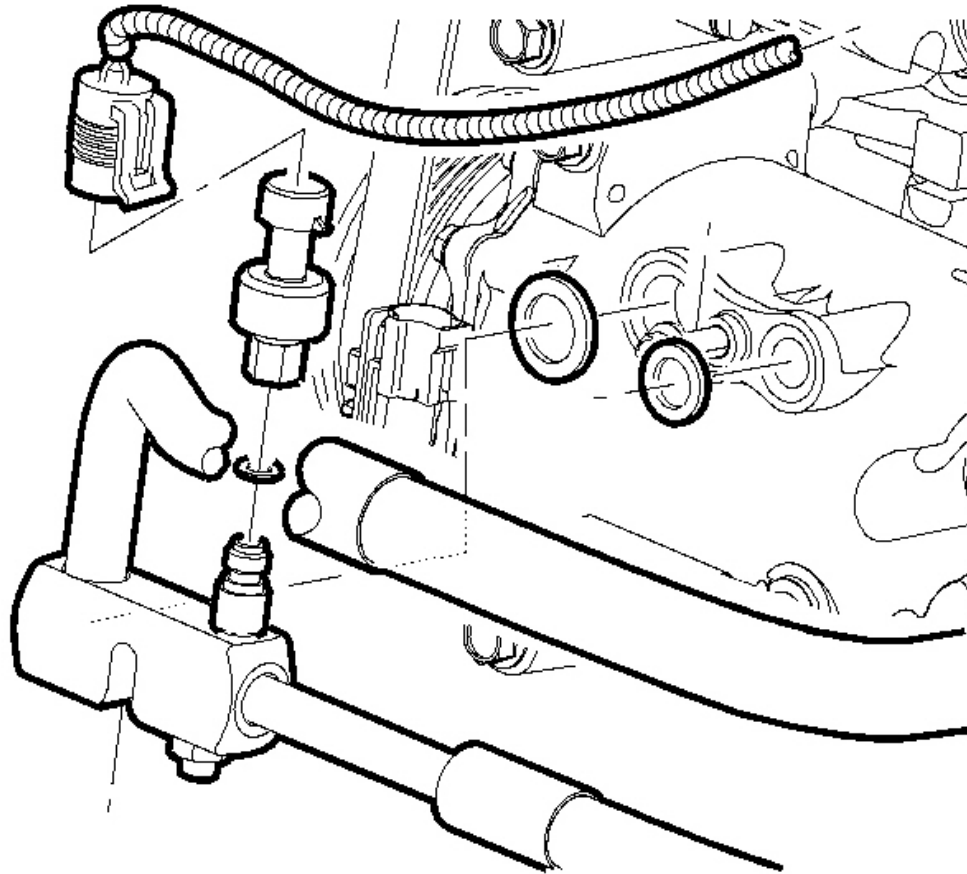
**Fig. 53: Compressor Hose, Nut, Condenser & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

8. Remove the compressor hose nut from the condenser.
9. Remove the compressor hose nut from the condenser.
10. Install a protective cap to condenser to prevent contamination and desiccant saturation.
11. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.



**Fig. 54: Compressor Hose, Bolt, Compressor, O-Rings & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

12. Remove the compressor hose bolt from the compressor.
13. Remove the compressor hose from the compressor.
14. Remove and discard the O-rings from the compressor. Refer to **O-Ring Replacement** .
15. Install a protective cap to the compressor to prevent contamination and desiccant saturation.
16. Remove the compressor hose from the vehicle.
17. Remove and discard the sealing washers from the TXV and the condenser ends of the compressor hose. Refer to **Sealing Washer Replacement** .



**Fig. 55: Compressor Hose, Bolt, Compressor, O-Rings & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

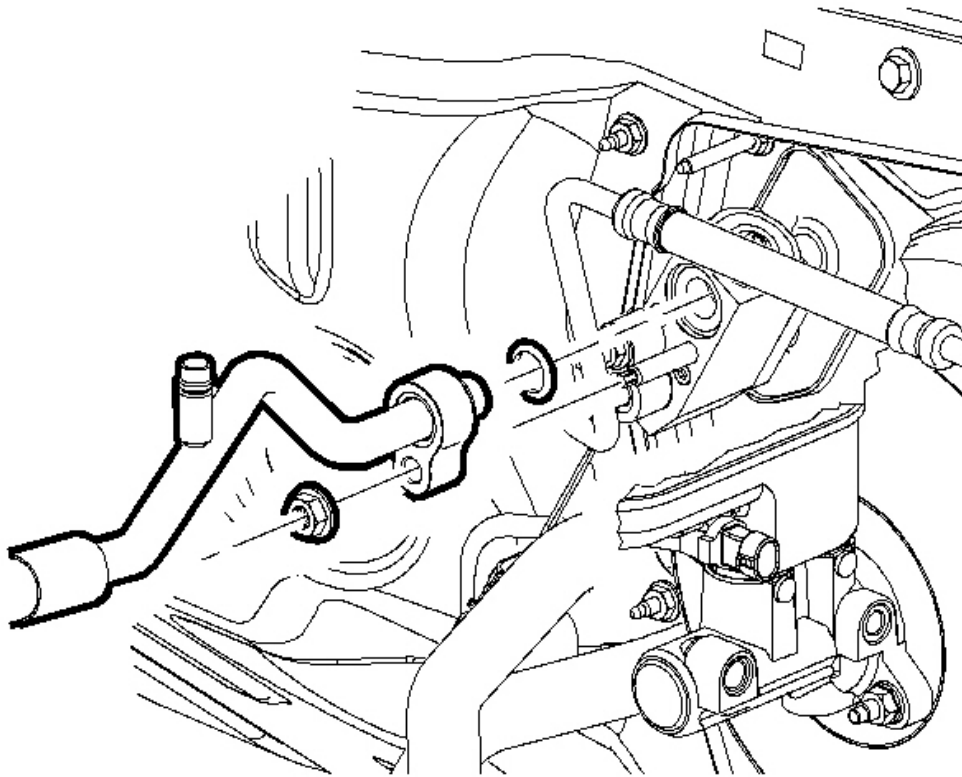
1. Install new seal washers to the TXV and the condenser ends of the compressor hose. Refer to **Sealing Washer Replacement** .
2. Position the compressor hose in the vehicle.
3. Remove the protective cap from the compressor.
4. Install new O-rings to the compressor. Refer to **O-Ring Replacement** .
5. Install the compressor hose to the compressor.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

6. Install the compressor hose bolt to the compressor.

**Tighten:** Tighten the bolt to 27 N.m (20 lb ft).

7. Lower vehicle.



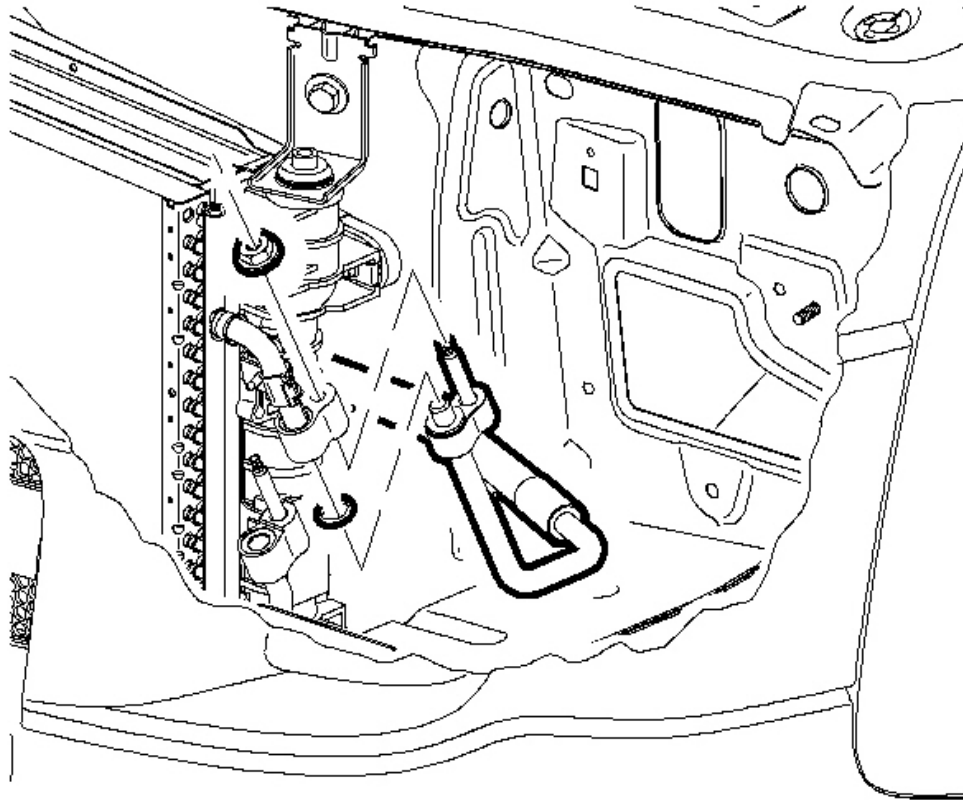
**Fig. 56: Compressor Hose, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

8. Remove the protective cap from the TXV.

9. Install the compressor hose to the TXV.

10. Install the compressor hose nut to the TXV.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).

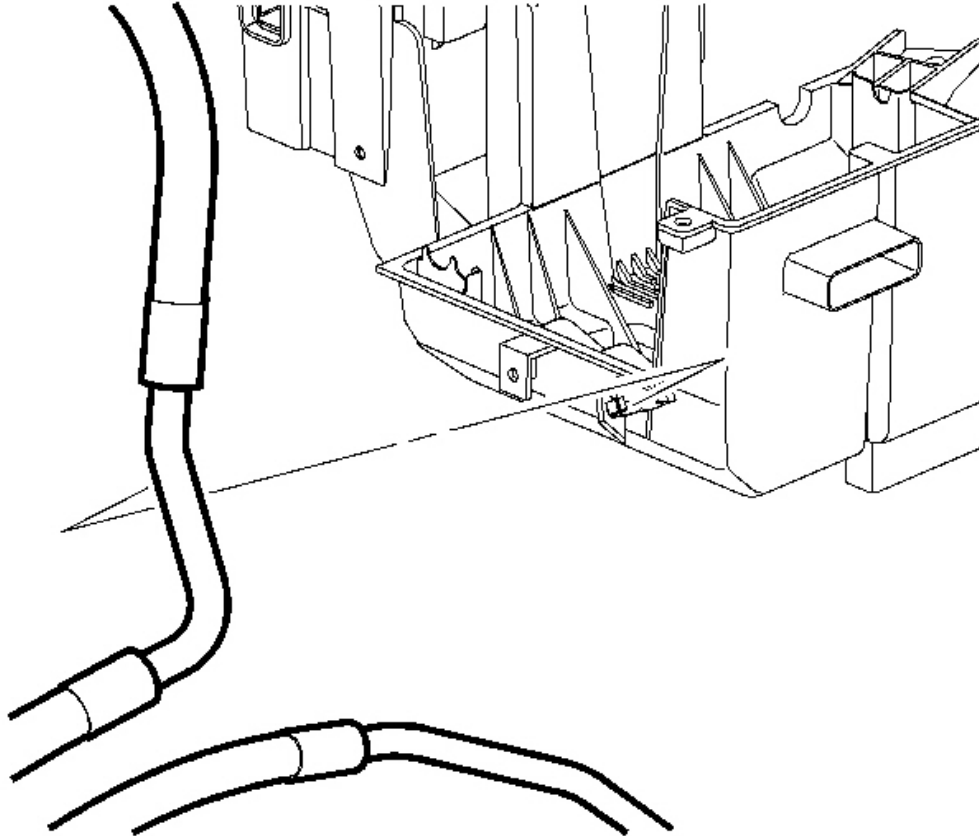


**Fig. 57: Compressor Hose, Nut, Condenser & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

11. Remove the protective cap from the condenser.
12. Install the compressor hose to the condenser.
13. Install the compressor hose nut to the condenser.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).





**Fig. 58: Compressor Hose, Nut & Battery Box**  
Courtesy of GENERAL MOTORS CORP.

14. Install the compressor hose to the battery box.
15. Install the compressor hose nut to the battery box.

**Tighten:** Tighten the nut to 8 N.m (71 lb in).

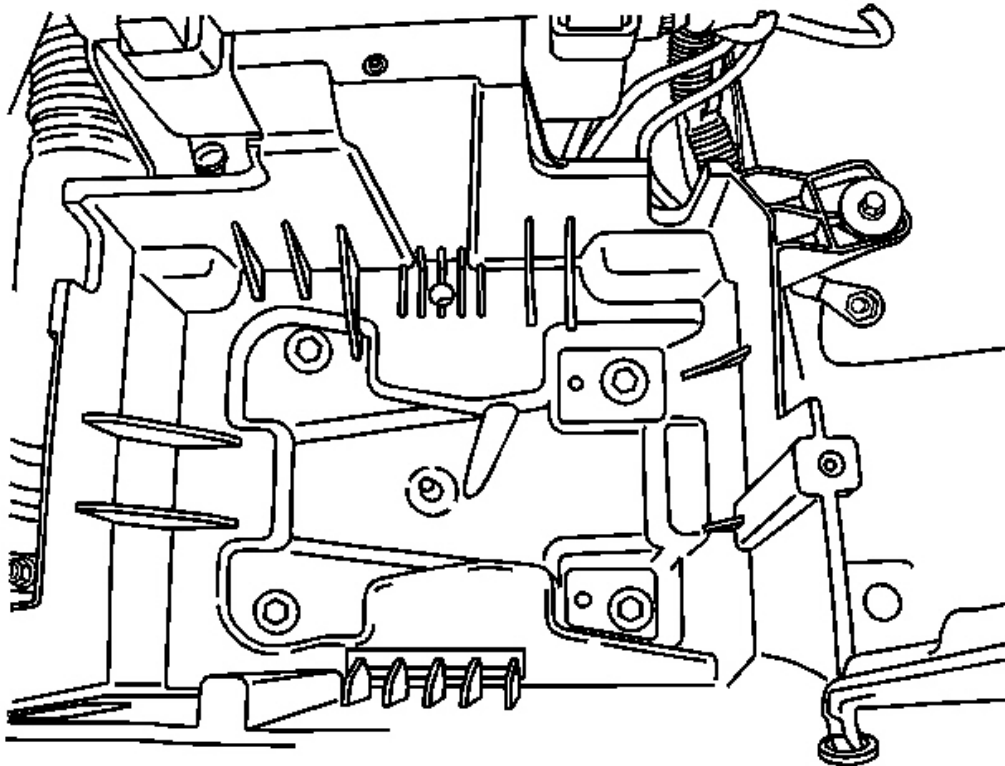
16. Install left headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarker, Park, Turn Signal Bulb Replacement** in Lighting Systems.
17. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
18. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

## LIQUID LINE REPLACEMENT (L61)

### Tools Required

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

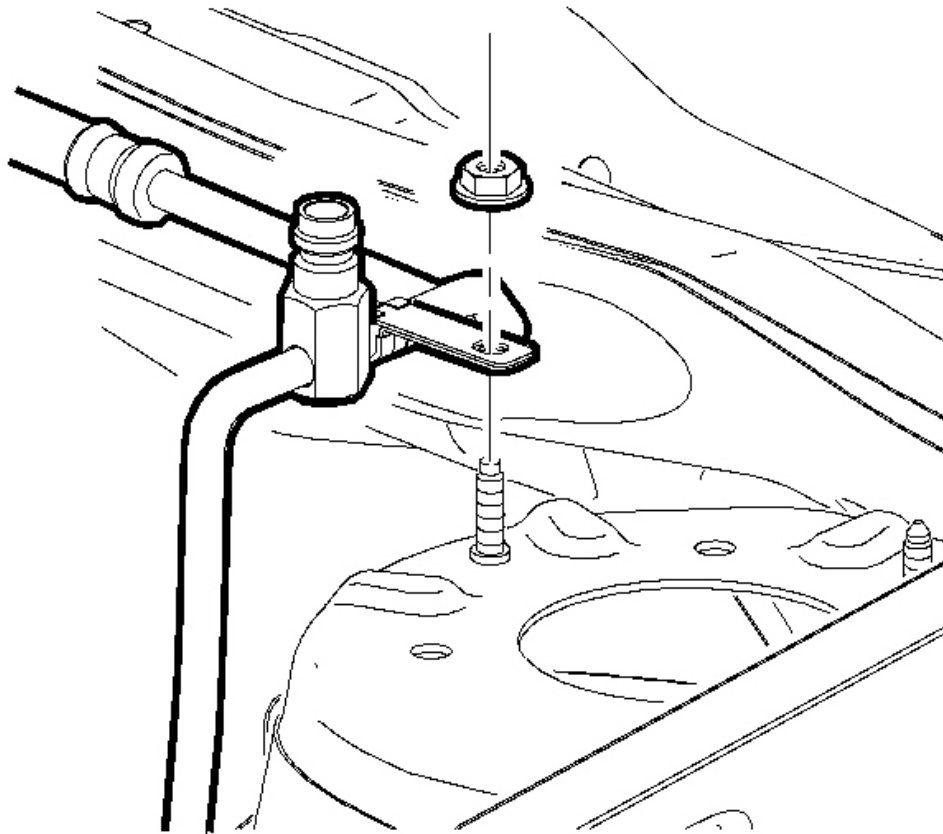
### Removal Procedure



**Fig. 59: Battery Box & Components**  
Courtesy of GENERAL MOTORS CORP.

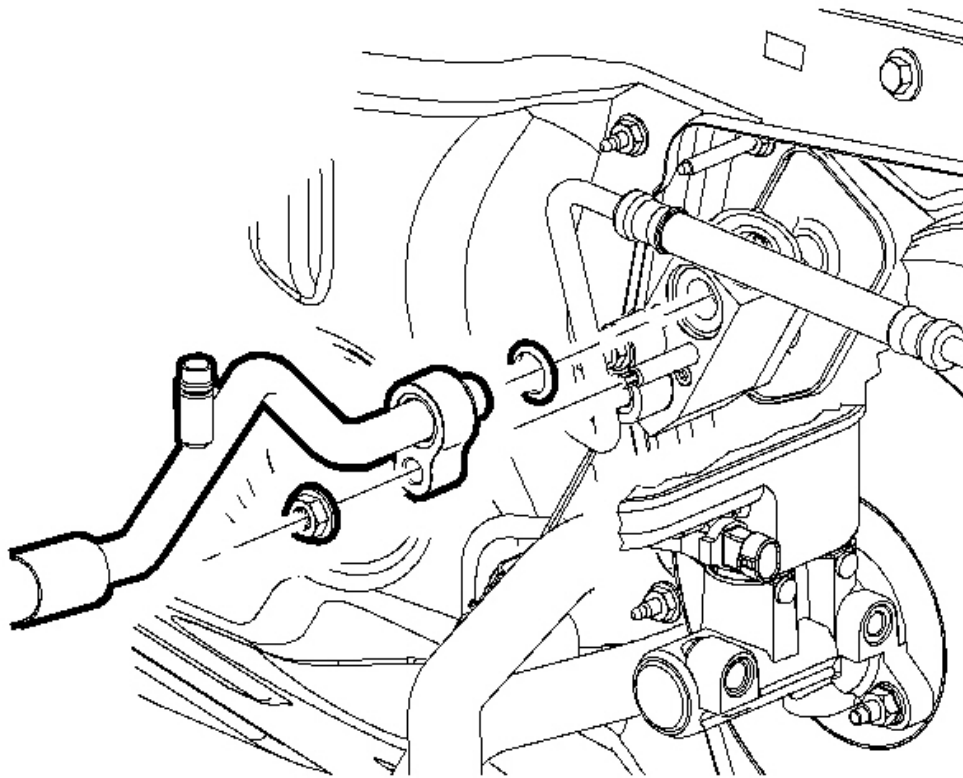
1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the left headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarker, Park, Turn Signal Bulb Replacement** in Lighting Systems.
3. Remove the surge tank. Refer to **Surge Tank Replacement** in Engine Cooling.
4. Remove the washer bottle. Refer to **Washer Pump/Reservoir Replacement** in Wiper/Washer Systems.
5. Remove the battery. Refer to **Battery Replacement** in Engine Electrical.

6. Remove the battery box bolts from the battery box.
7. Disconnect the negative battery cable from the wheelhouse.



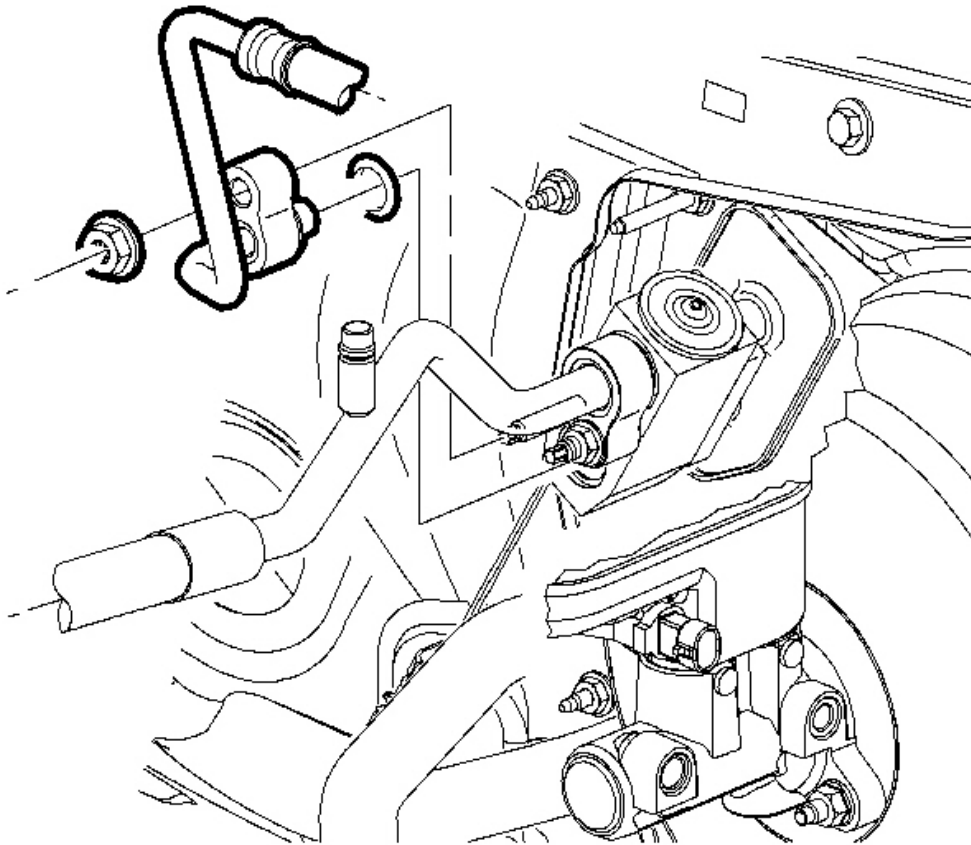
**Fig. 60: Liquid Line, Strut Tower & Nut**  
Courtesy of GENERAL MOTORS CORP.

8. Remove the nut retaining the liquid line to the strut tower.
9. Disconnect the harness and vent hose retainers from the liquid line.



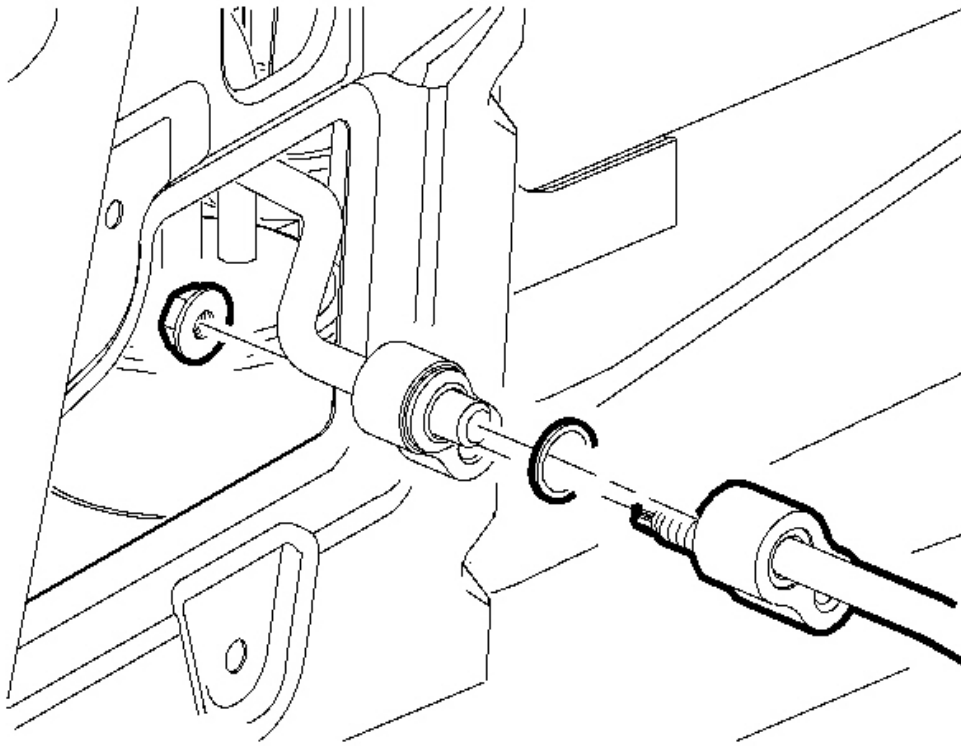
**Fig. 61: Compressor Hose, Nut & TXV**  
**Courtesy of GENERAL MOTORS CORP.**

10. Remove the evaporator outlet hose nut from the TXV.
11. Remove the evaporator outlet hose from the TXV.



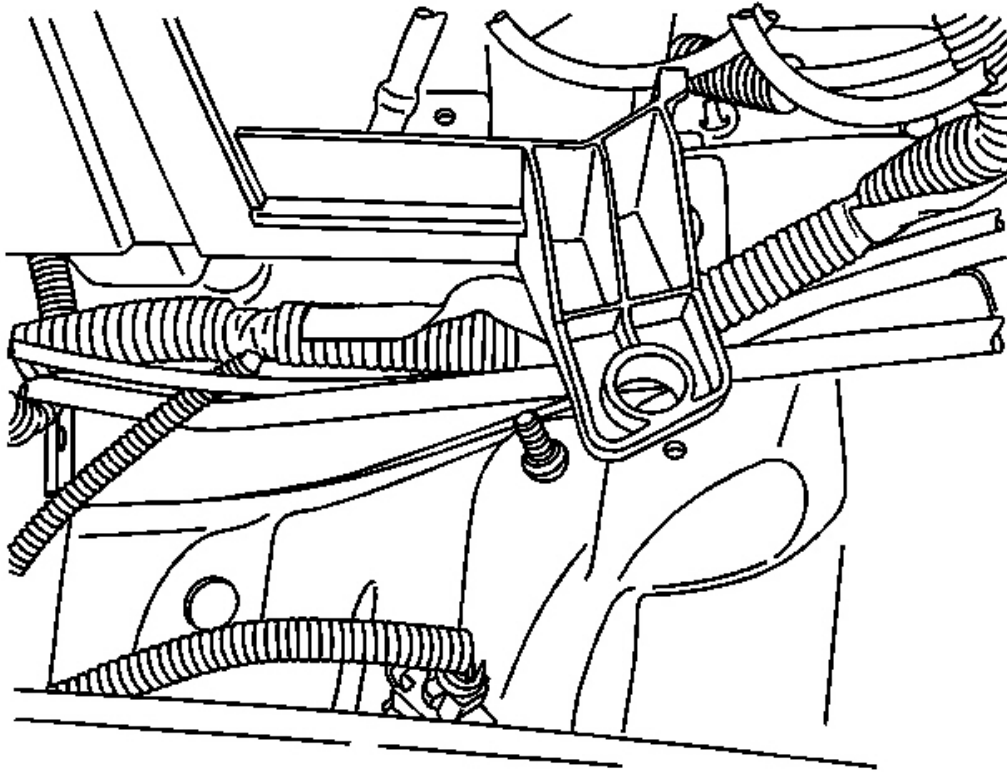
**Fig. 62: Liquid Line, Nut & TXV**  
**Courtesy of GENERAL MOTORS CORP.**

12. Remove the liquid line nut from the TXV.
13. Remove the liquid line from the TXV.



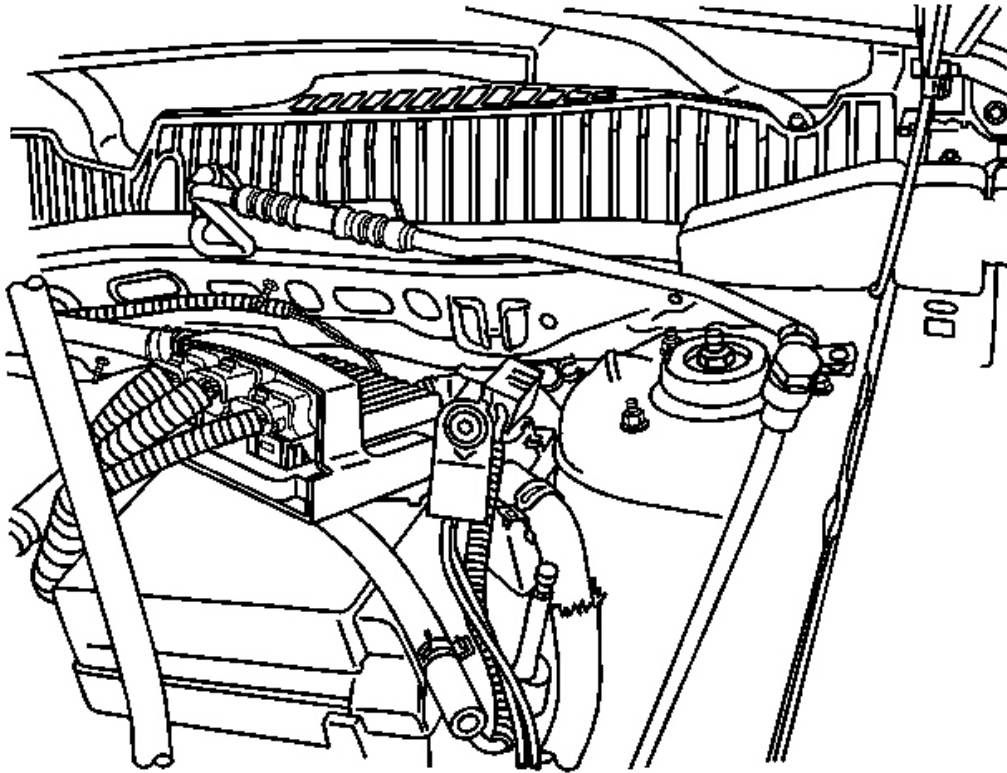
**Fig. 63: Liquid Line, Nut & Receiver Dehydrator**  
**Courtesy of GENERAL MOTORS CORP.**

14. Remove the liquid line nut from the receiver dehydrator.
15. Remove the liquid line from the receiver dehydrator.



**Fig. 64: Liquid Line, Battery Box & Ground Lug**  
Courtesy of GENERAL MOTORS CORP.

16. Position the battery box inboard to allow for routing of the liquid line.
17. Route the liquid line above the battery box and the ground lug.



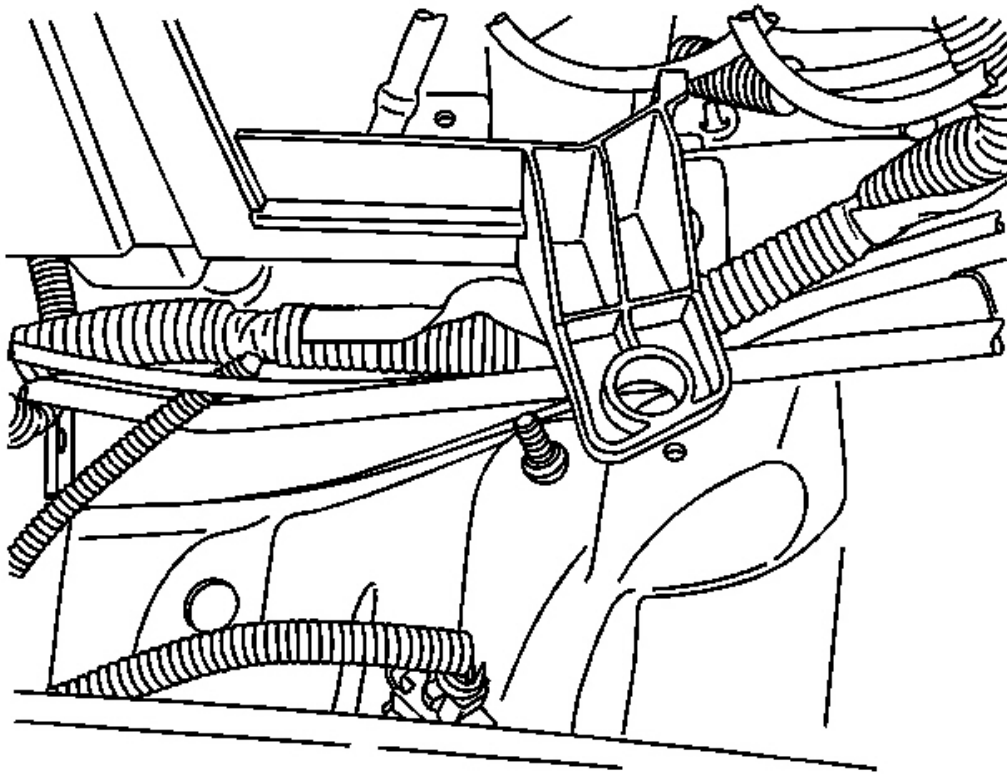
**Fig. 65: Rear Liquid Line, Sealing Washer & Protective Caps**  
Courtesy of GENERAL MOTORS CORP.

18. Lift the rear portion of the liquid line upward and remove the liquid line from the vehicle.
19. Remove and discard the sealing washer from the liquid line. Refer to **Sealing Washer Replacement** .
20. Install protective caps to the receiver dehydrator and the TXV to prevent contamination and desiccant saturation.

#### **Installation Procedure**

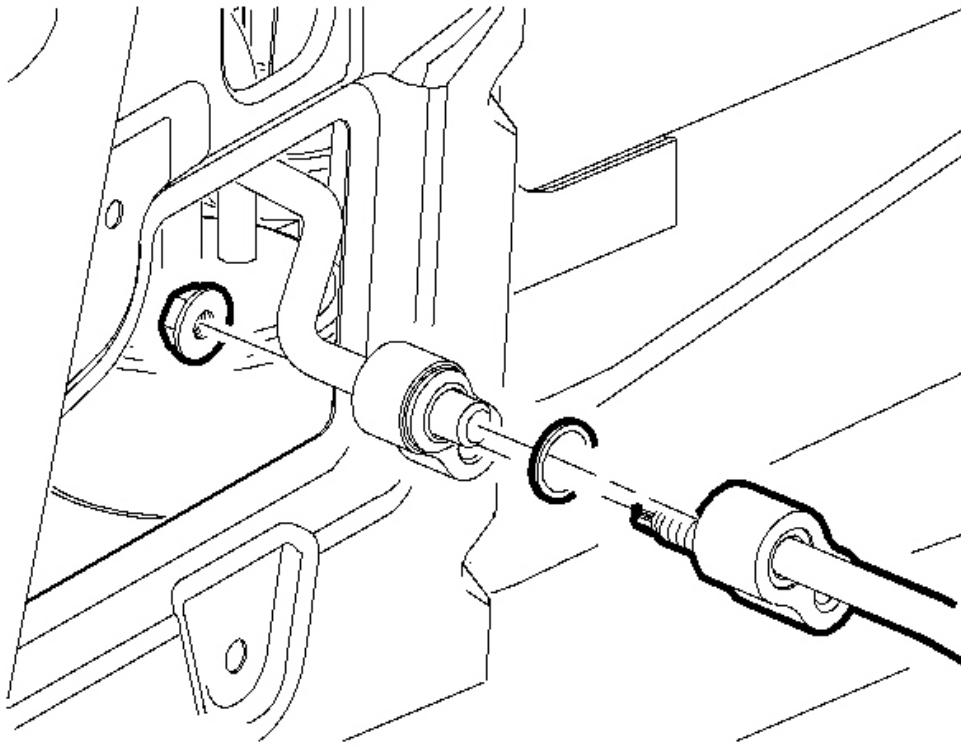
1. Remove the protective caps from the receiver dehydrator and the liquid line.





**Fig. 66: Liquid Line, Battery Box & Ground Lug**  
Courtesy of GENERAL MOTORS CORP.

2. Install the new sealing washer to the receiver dehydrator. Refer to **Sealing Washer Replacement** .
3. Route the receiver dehydrator end of the liquid line into position.



**Fig. 67: Liquid Line, Nut & Receiver Dehydrator**  
Courtesy of GENERAL MOTORS CORP.

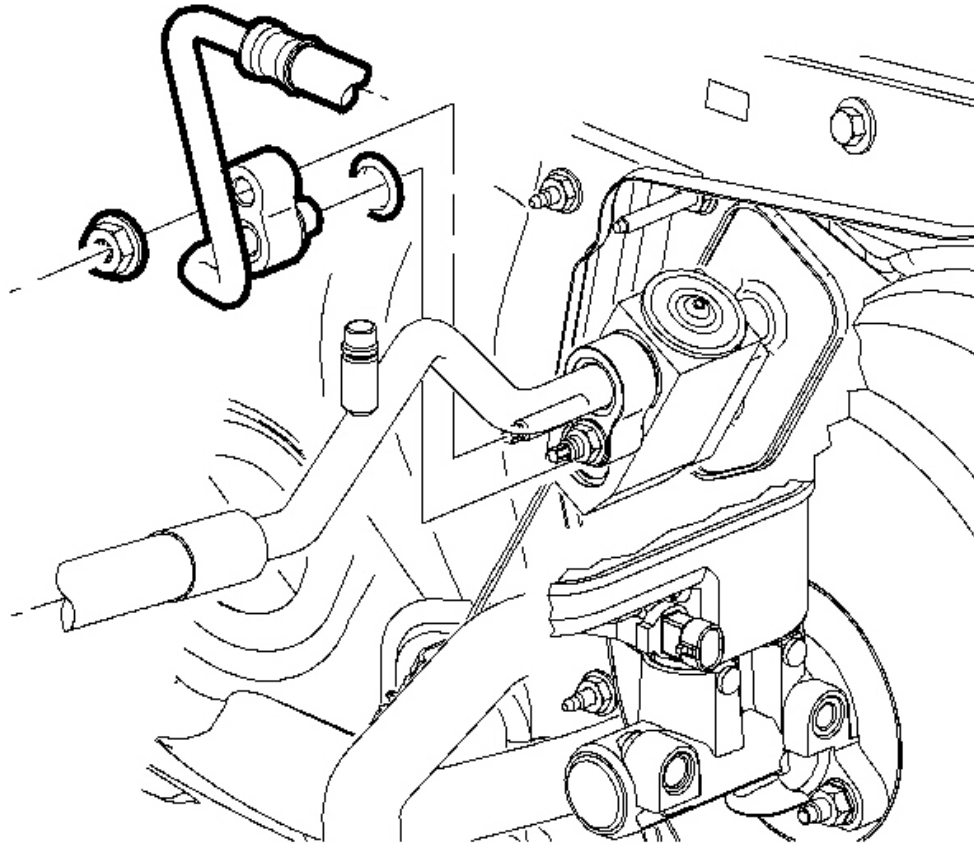
4. Install the liquid line to the receiver dehydrator.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

**IMPORTANT:** Use a large pair of pliers to hold the fitting while tightening the nut. Be careful not to twist the line.

5. Install the liquid line nut to the receiver dehydrator.

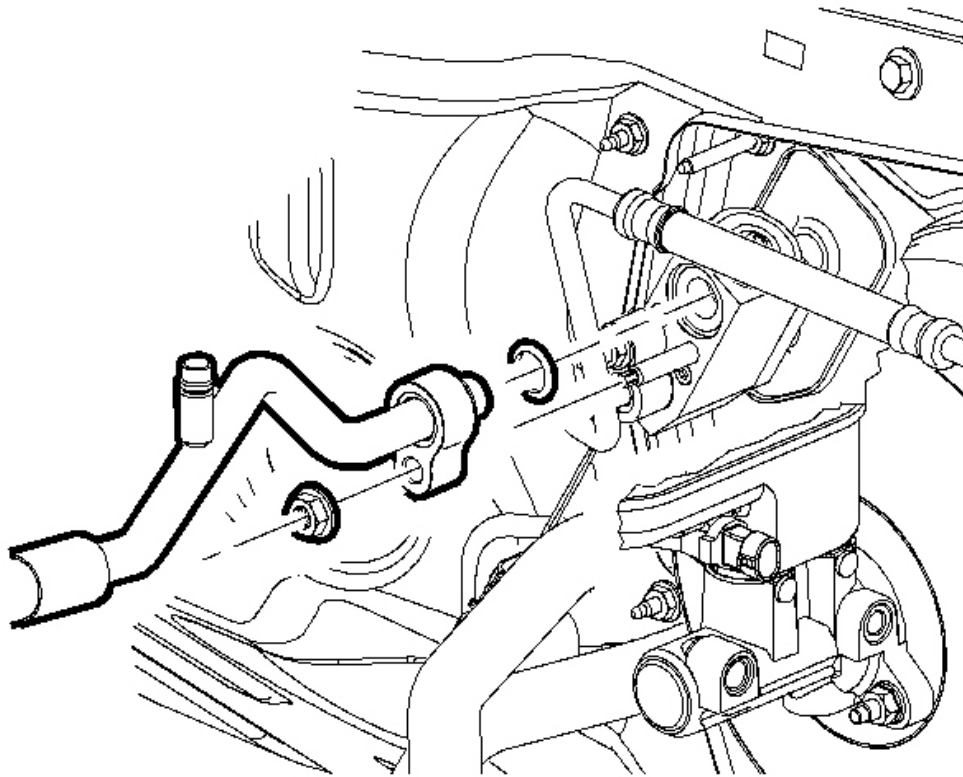
**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 68: Liquid Line, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the protective cap from the TXV and the liquid line.
7. Install a new sealing washer to the liquid line at the TXV.
8. Install the liquid line to the TXV.
9. Install the liquid line nut to the TXV.

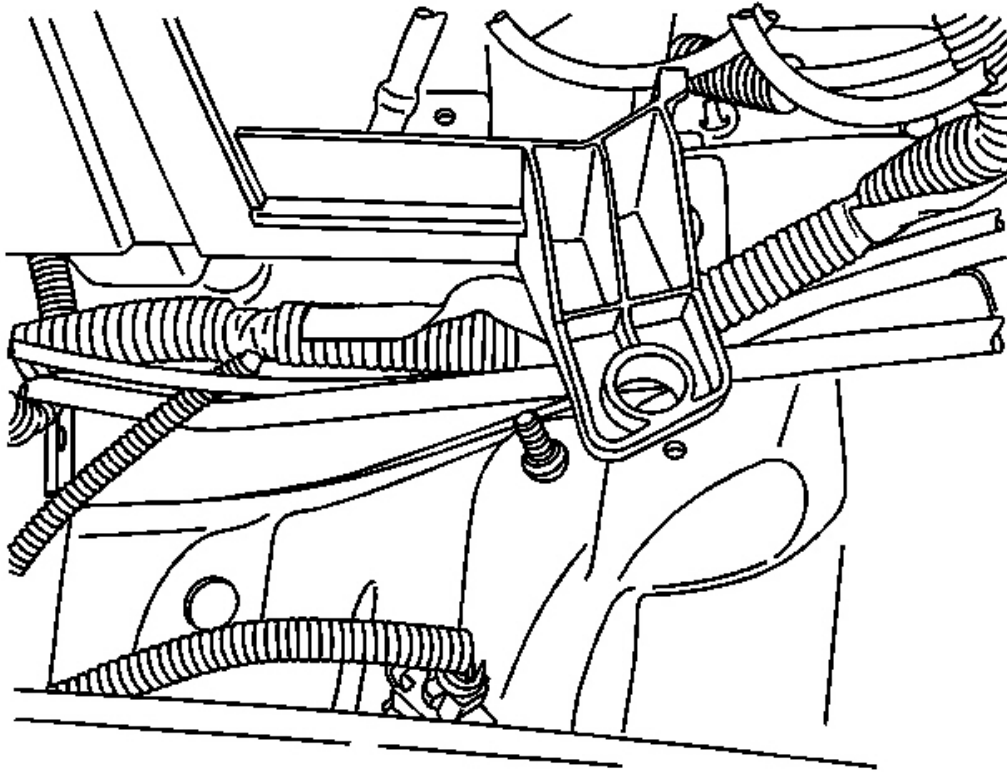
**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 69: Compressor Hose, Nut & TXV**  
**Courtesy of GENERAL MOTORS CORP.**

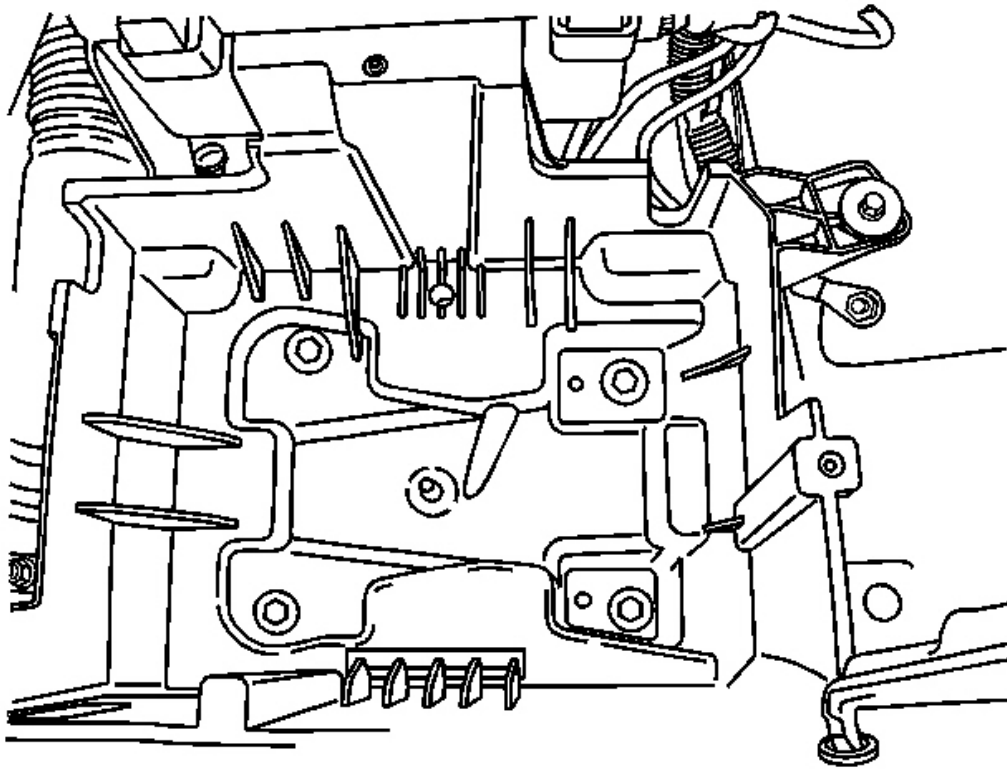
10. Install the evaporator outlet hose to the TXV.
11. Install the evaporator outlet hose nut to the TXV.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 70: Liquid Line, Battery Box & Ground Lug**  
Courtesy of GENERAL MOTORS CORP.

12. Route the liquid line below the battery box and the ground lug.
13. Connect the negative battery cable to the wheelhouse.

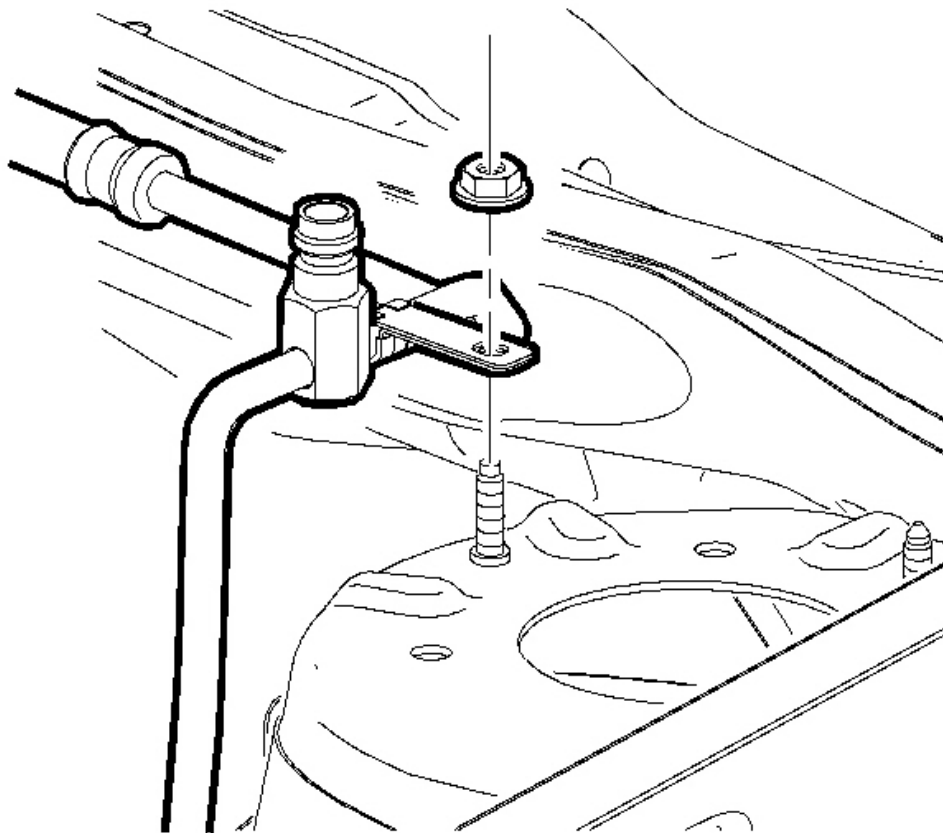


**Fig. 71: Battery Box & Components**  
Courtesy of GENERAL MOTORS CORP.

14. Install the battery box bolts to the battery box.

**Tighten:** Tighten the nut to 15 N.m (11 lb ft).

15. Install the battery. Refer to **Battery Replacement** in Engine Electrical.



**Fig. 72: Liquid Line, Strut Tower & Nut**  
Courtesy of GENERAL MOTORS CORP.

16. Install the liquid line to the strut tower.
17. Install the liquid line nut to the strut tower.

**Tighten:** Tighten the nut to 5 N.m (44 lb in).

18. Connect the harness and vent hose retainers to the liquid line.
19. Install the surge tank. Refer to **Surge Tank Replacement** in Engine Cooling.
20. Install the washer bottle. Refer to **Washer Pump/Reservoir Replacement** in Wiper/Washer Systems.
21. Install the left headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering**,

**Sidemarkers, Park, Turn Signal Bulb Replacement** in Lighting Systems.

22. Recharge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
23. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

## **LIQUID LINE REPLACEMENT (L66)**

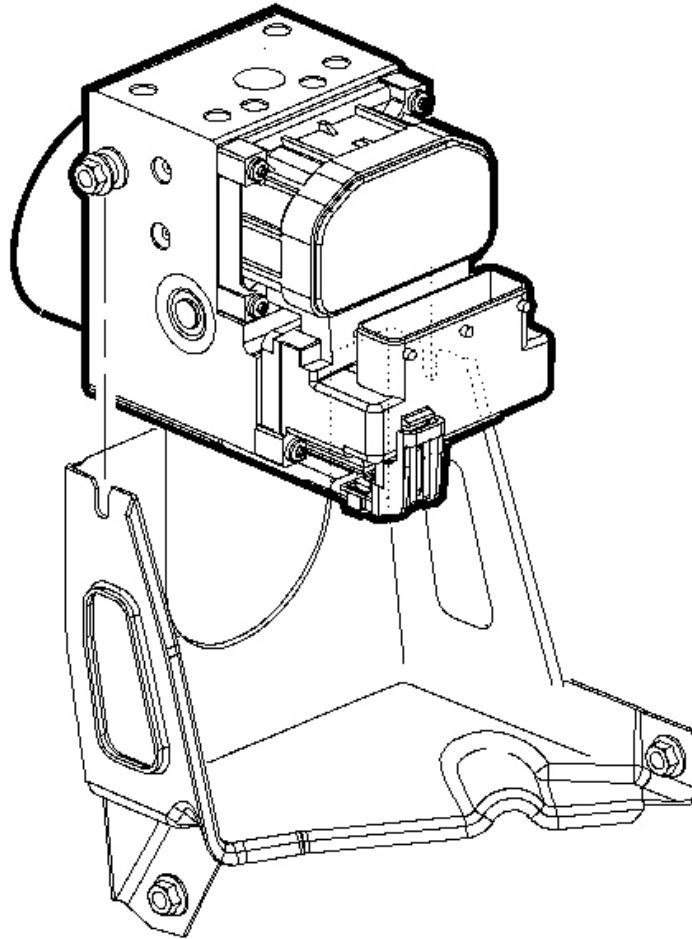
### **Tools Required**

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

### **Removal Procedure**

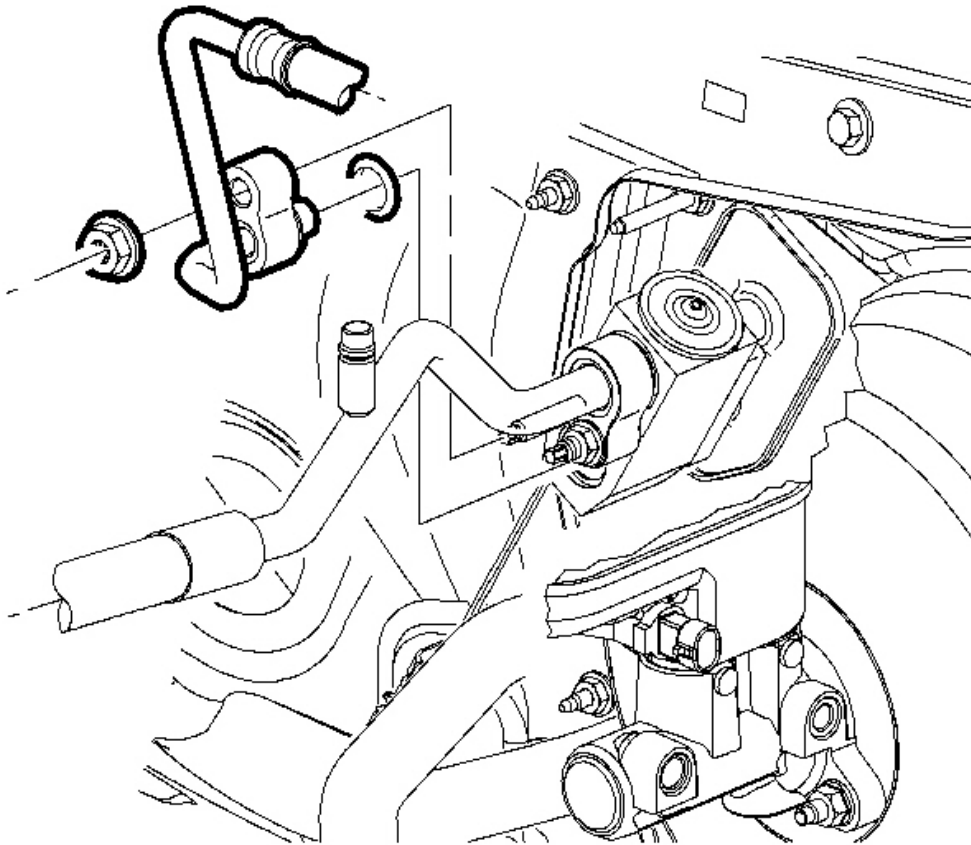
1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the left headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarkers, Park, Turn Signal Bulb Replacement** in Lighting Systems.
3. Remove the air cleaner duct. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
4. Remove the surge tank. Refer to **Surge Tank Replacement** in Engine Cooling.
5. Remove the battery tray. Refer to **Battery Tray Replacement (L61)** or **Battery Tray Replacement (L66)** in Engine Electrical.





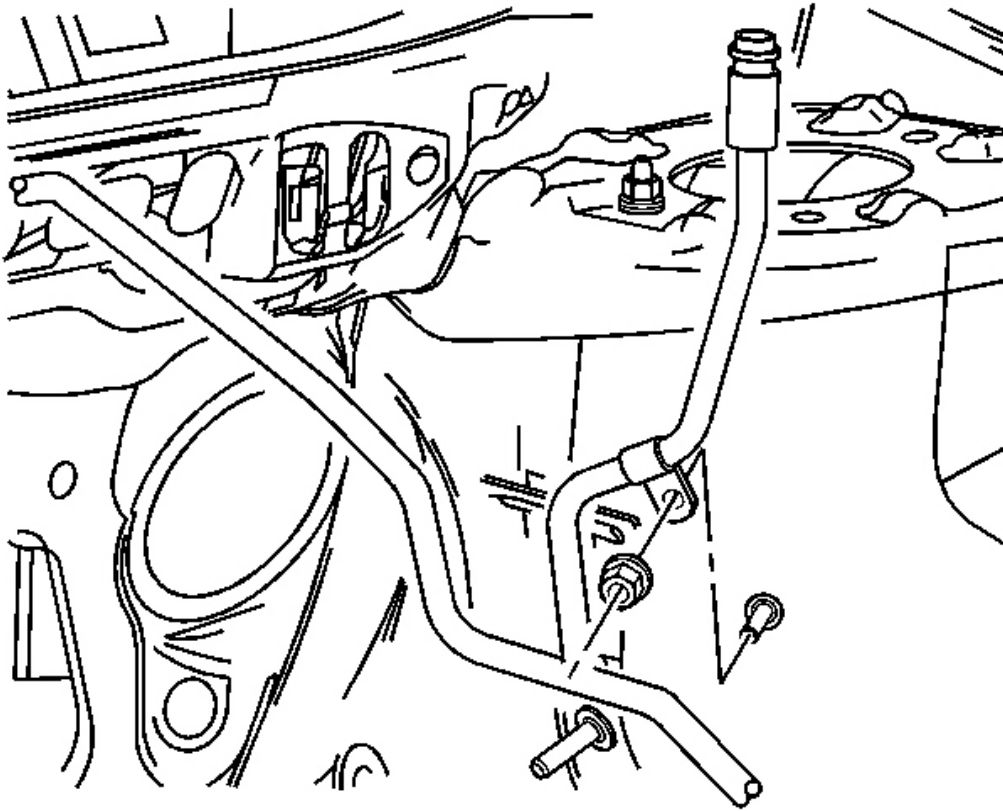
**Fig. 73: ABS Brake Modulator Assembly & Bracket**  
**Courtesy of GENERAL MOTORS CORP.**

6. Loosen the ABS brake modulator assembly nuts from the modulator bracket, if equipped.
7. Carefully reposition the ABS brake modulator to allow for liquid line removal, if equipped.



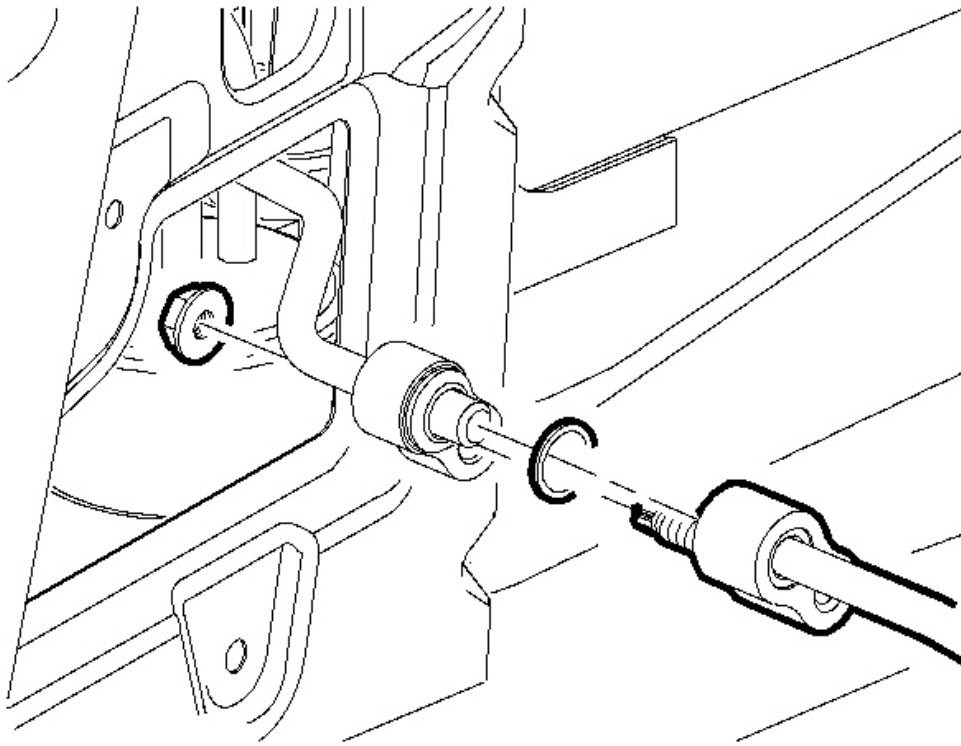
**Fig. 74: Liquid Line, Nut & TXV**  
**Courtesy of GENERAL MOTORS CORP.**

8. Remove the liquid line nut from the TXV.
9. Remove the liquid line from the TXV.



**Fig. 75: Liquid Line & Strut Tower**  
Courtesy of GENERAL MOTORS CORP.

10. Remove the nut retaining the liquid line to the strut tower.
11. Remove the nut retaining the liquid line to the strut tower.

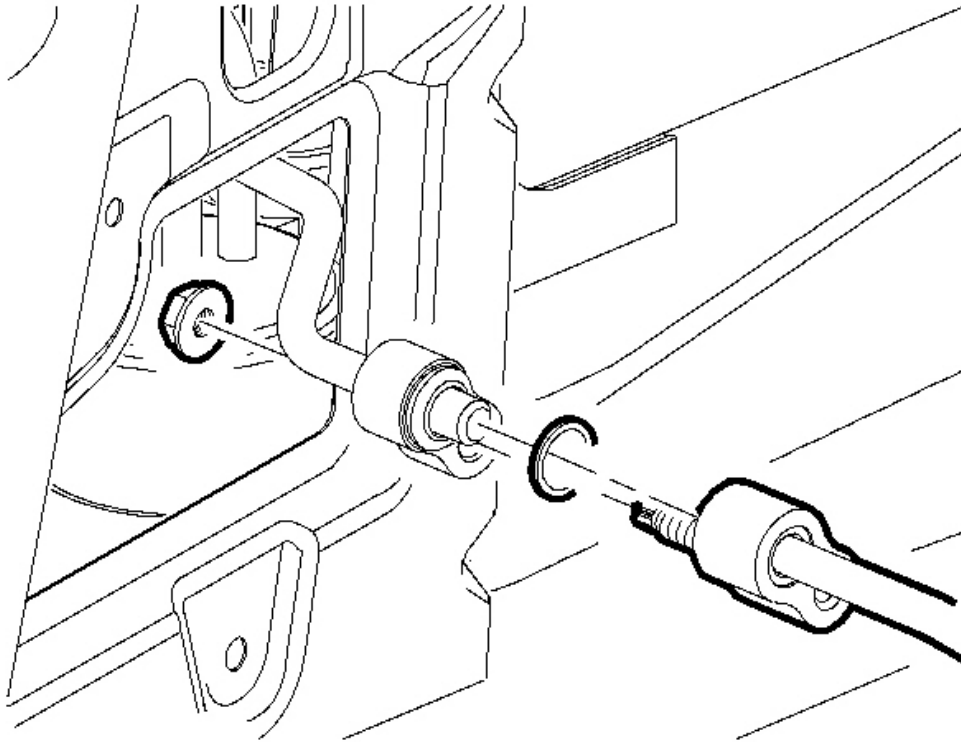


**Fig. 76: Liquid Line, Nut & Receiver Dehydrator**  
Courtesy of GENERAL MOTORS CORP.

12. Remove the liquid line nut from the receiver dehydrator.
13. Remove the liquid line from the receiver dehydrator.
14. Lift the rear portion of the liquid line upward and remove the liquid line from the vehicle.
15. Remove and discard the sealing washer from the liquid line. Refer to **Sealing Washer Replacement** .
16. Install protective caps to the receiver dehydrator and the TXV to prevent contamination and desiccant saturation.

#### **Installation Procedure**

1. Remove the protective caps from the receiver dehydrator and the liquid line.
2. Install the new sealing washer to the receiver dehydrator. Refer to **Sealing Washer Replacement** .
3. Route the receiver dehydrator end of the liquid line into position.



**Fig. 77: Liquid Line, Nut & Receiver Dehydrator**  
Courtesy of GENERAL MOTORS CORP.

4. Install the liquid line to the receiver dehydrator.

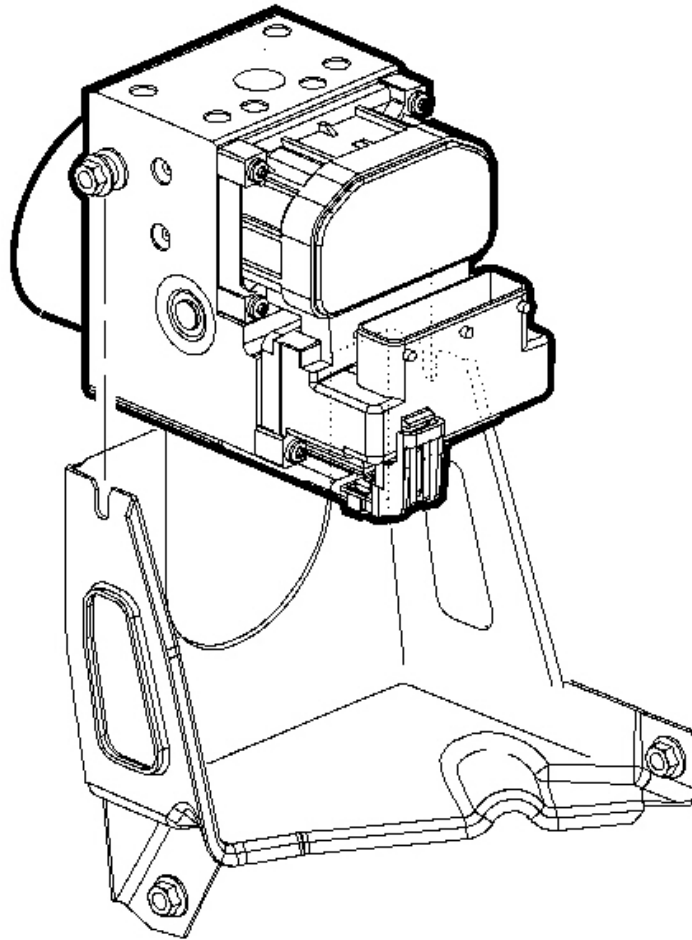
**NOTE:** Refer to Fastener Notice in Cautions and Notices.

**IMPORTANT:** Use a large pair of pliers to hold the fitting while tightening the nut. Be

**careful not to twist the line.**

5. Install the liquid line nut to the receiver dehydrator.

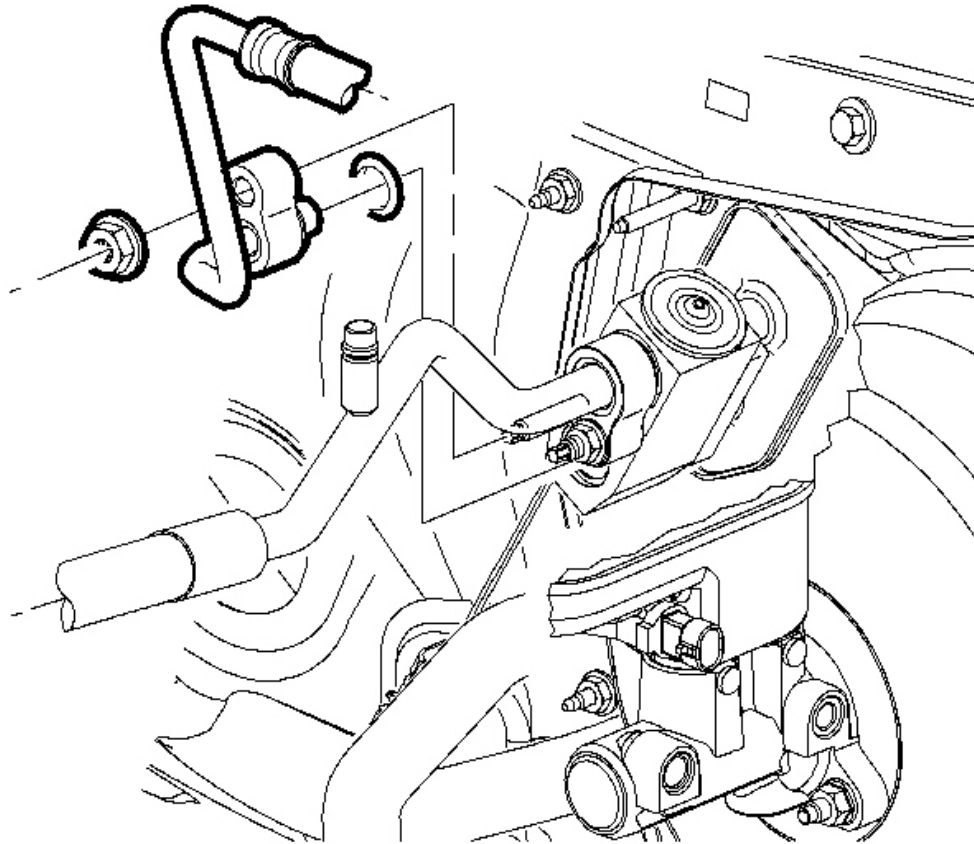
**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 78: ABS Brake Modulator Assembly & Bracket**  
**Courtesy of GENERAL MOTORS CORP.**

6. Carefully reposition the ABS brake modulator assembly to the modulator bracket, if equipped.
7. Tighten the brake modulator assembly nuts to the ABS modulator bracket, if equipped.

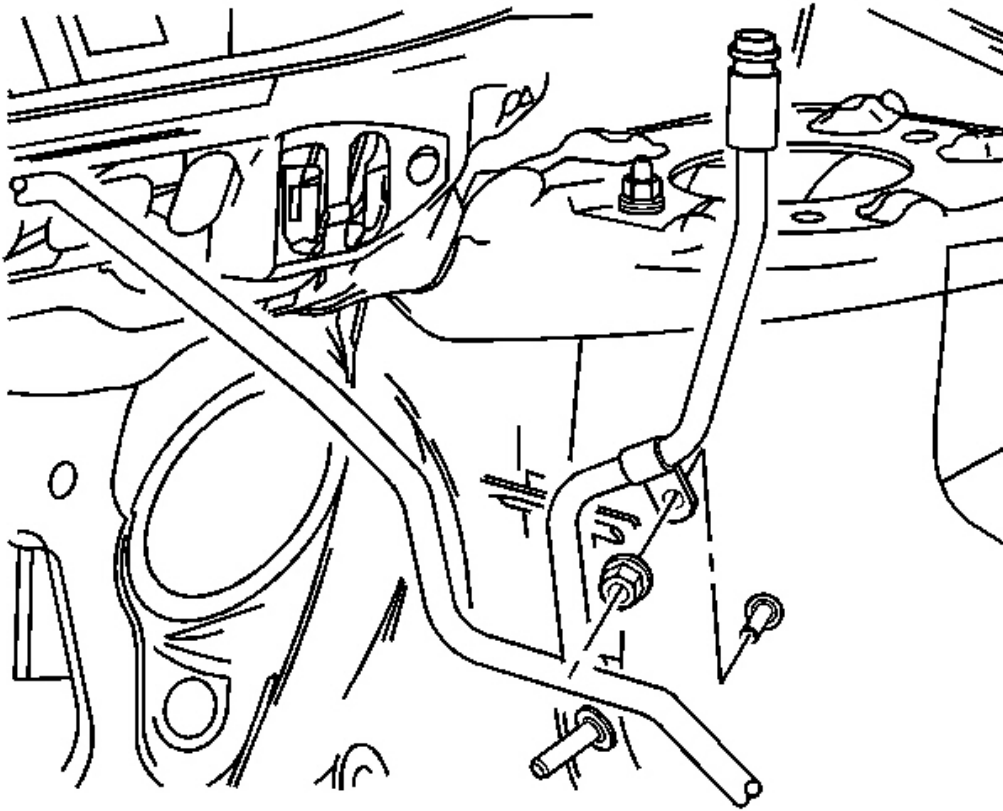
**Tighten:** Tighten the nut to 20 N.m (15 lb ft).



**Fig. 79: Liquid Line, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

8. Remove the protective cap from the TXV and the liquid line.
9. Install a new sealing washer to the liquid line at the TXV.
10. Install the liquid line to the TXV.
11. Install the liquid line nut to the TXV.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 80: Liquid Line & Strut Tower**  
Courtesy of GENERAL MOTORS CORP.

12. Install the liquid line to the strut tower.
13. Install the liquid line nut to the strut tower.

**Tighten:** Tighten the nut to 10 N.m (89 lb in).

14. Install the battery tray. Refer to **Battery Tray Replacement (L61)** or **Battery Tray Replacement (L66)** in Engine Electrical.
15. Install the surge tank. Refer to **Surge Tank Replacement** in Engine Cooling.
16. Install the air cleaner duct. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
17. Install the left headlamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarker, Park, Turn Signal Bulb Replacement** in Lighting Systems.
18. Recharge the A/C system. Refer to **Refrigerant Recovery and Recharging** .



19. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

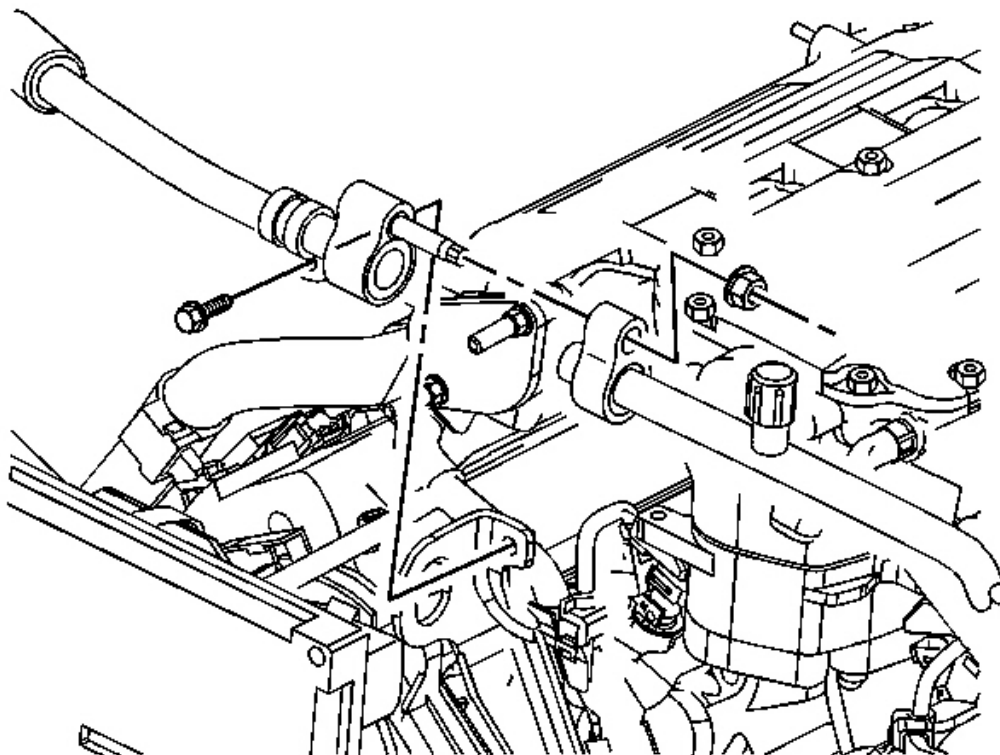
## **EVAPORATOR HOSE REPLACEMENT - OUTLET (L66)**

### **Tools Required**

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

### **Removal Procedure**

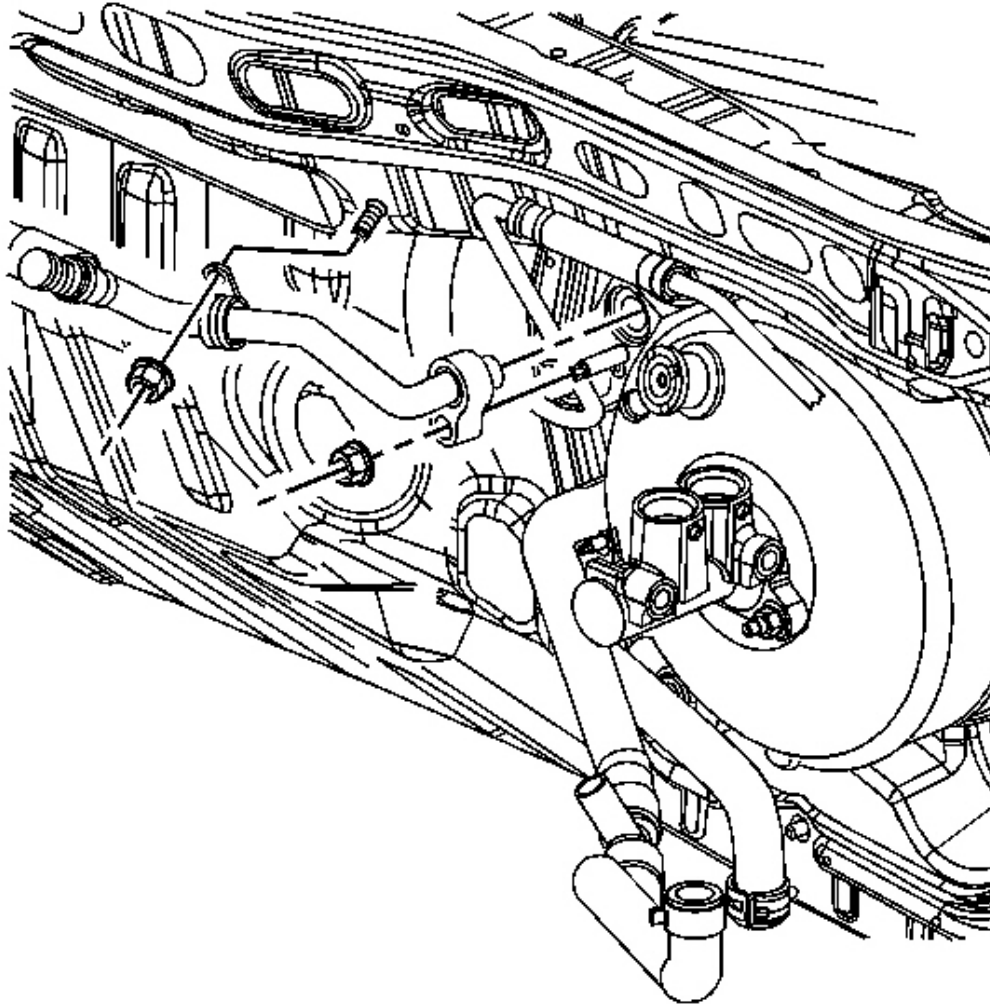
1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the air cleaner outlet duct from the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).



**Fig. 81: Compressor Hose, Nut & Evaporator Outlet Hose**  
Courtesy of GENERAL MOTORS CORP.

3. Remove the compressor hose nut from the evaporator outlet hose.

4. Separate the compressor hose from the evaporator outlet hose.
5. Remove and discard the seal washer from the compressor hose. Refer to **Sealing Washer Replacement** .
6. Install a protective cap to the compressor hose to prevent contamination and desiccant saturation.
7. Remove the evaporator outlet hose bolt from the air cleaner outlet duct bracket.

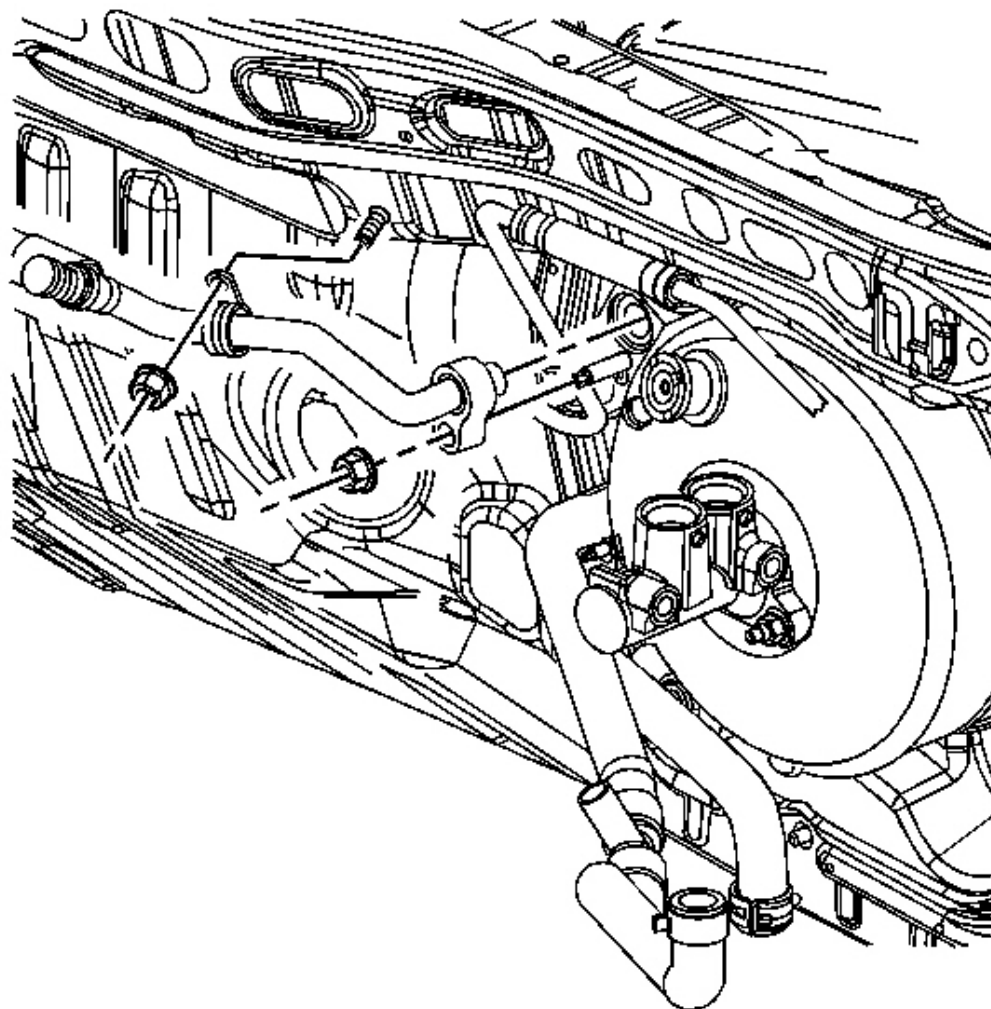


**Fig. 82: Evaporator Outlet Hose, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

8. Remove the evaporator outlet hose nut from the cowl.
9. Remove the evaporator outlet hose nut from the TXV.

10. Remove the evaporator outlet hose from the TXV.
11. Install a protective cap to the TXV to prevent contamination and desiccant saturation.
12. Remove and discard the seal washer from the evaporator outlet hose. Refer to **Sealing Washer Replacement** .

#### **Installation Procedure**



**Fig. 83: Evaporator Outlet Hose, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

1. Install a new seal washer to the evaporator outlet hose. Refer to **Sealing Washer Replacement** .
2. Remove the protective cap from the TXV.
3. Install the evaporator outlet hose to the TXV.

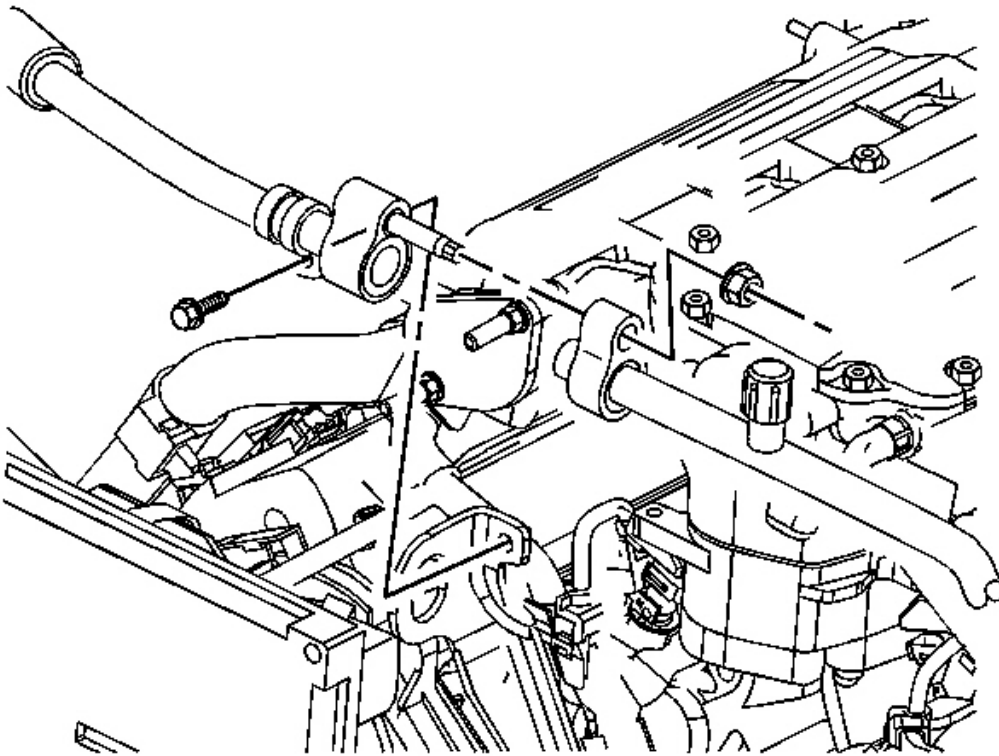
**NOTE:** Refer to **Fastener Notice in Cautions and Notices.**

4. Install the evaporator outlet hose nut to the TXV.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).

5. Install the evaporator outlet hose nut to the cowl.

**Tighten:** Tighten the nut to 8 N.m (71 lb in).



**Fig. 84: Compressor Hose, Nut & Evaporator Outlet Hose**  
Courtesy of GENERAL MOTORS CORP.

6. Install the evaporator outlet hose bolt to the air cleaner outlet duct bracket.

**Tighten:** Tighten the bolt to 7 N.m (62 lb in).

7. Remove the protective cap from the compressor hose.

8. Install a new seal washer to the compressor hose. Refer to **Sealing Washer Replacement** .

9. Install the compressor hose to the evaporator outlet hose.

10. Install the compressor hose nut to the evaporator outlet hose.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).

11. Install the air cleaner outlet duct to the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).

12. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .

13. Test the affected A/C fittings for leaks using **J 39400-A** . See **Special Tools and Equipment** .

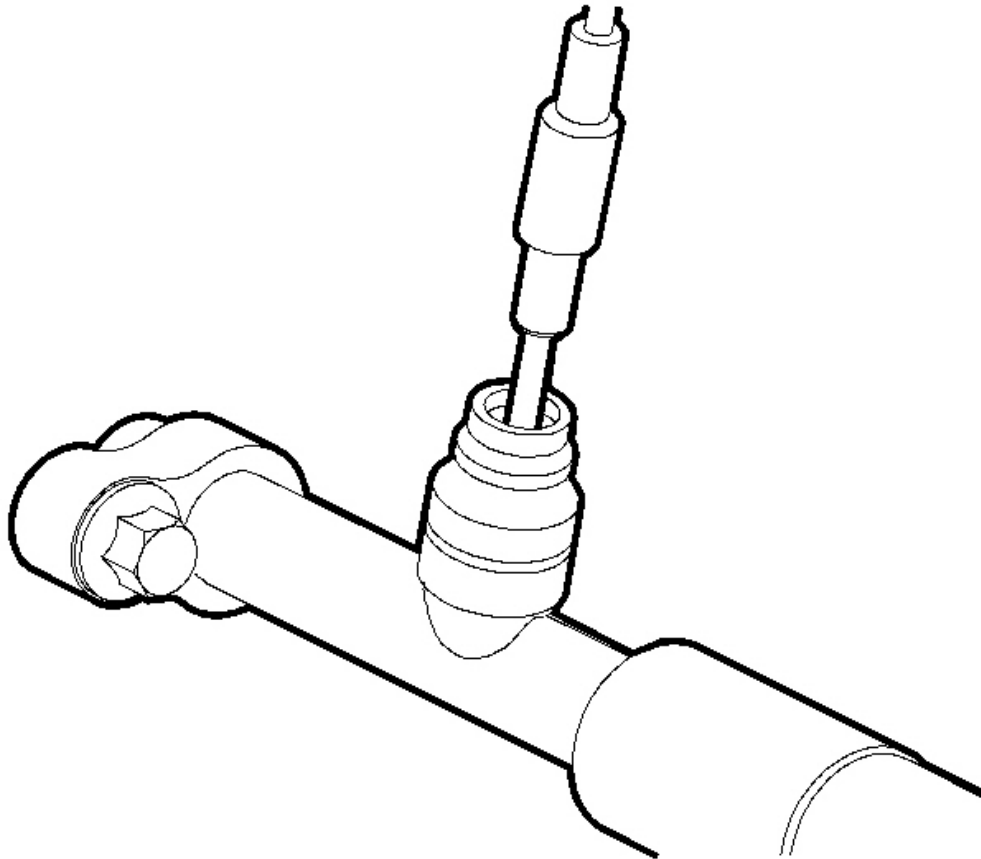
## **SERVICE PORT VALVE CORE REPLACEMENT**

### **Tools Required**

- **J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .
- **J 46246** Valve Core Removal Tool. See **Special Tools and Equipment** .

### **Removal Procedure**

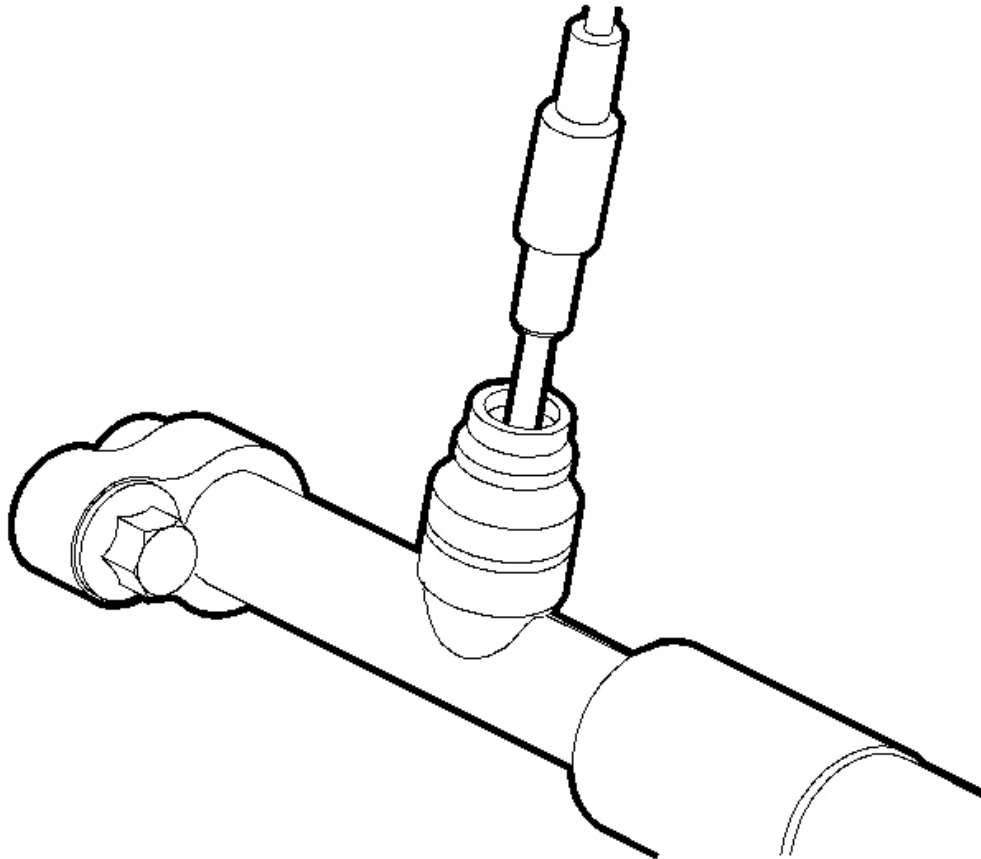
1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .



**Fig. 85: Equivalent & Valve Core**  
Courtesy of GENERAL MOTORS CORP.

2. Use **J 46246** or equivalent to remove the valve core. See **Special Tools and Equipment** .

#### **Installation Procedure**



**Fig. 86: Equivalent & Valve Core**  
Courtesy of GENERAL MOTORS CORP.

1. Use **J 46246** or equivalent to install and tighten the valve core. See **Special Tools and Equipment** .
2. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .

**IMPORTANT:** To prevent loss of refrigerant charge, tighten the cap. Replace the cap if the seal is missing or damaged.

3. Test the affected A/C fittings for leaks using **J 39400-A** . See **Special Tools and Equipment** .

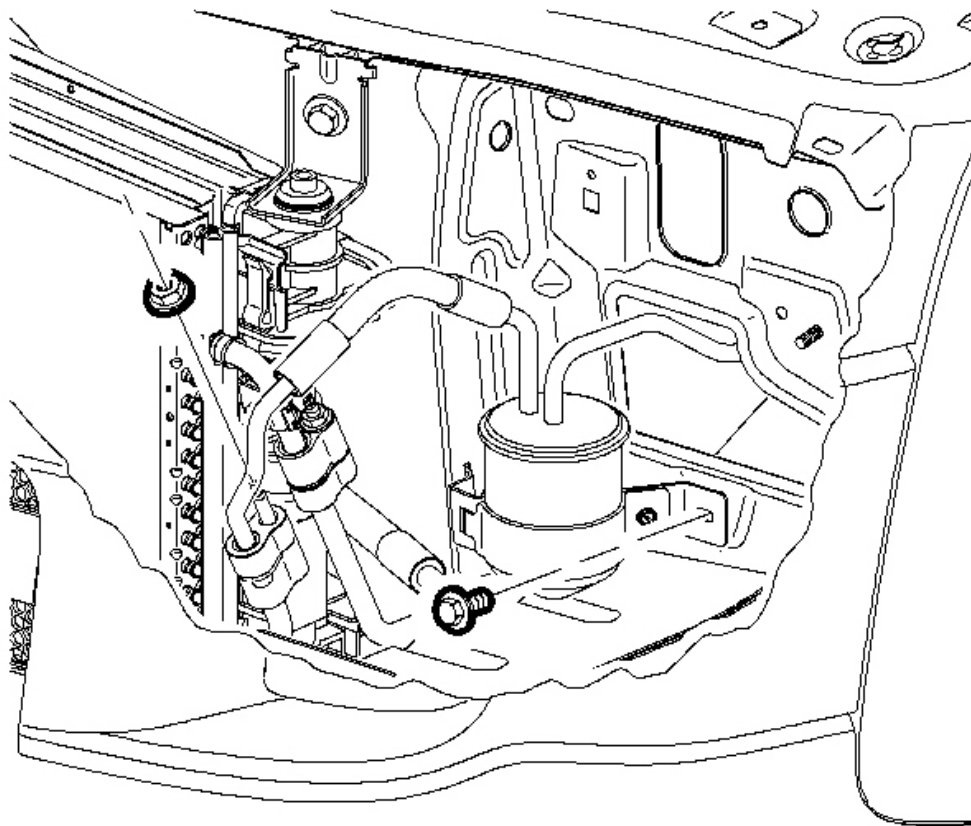
## RECEIVER DEHYDRATOR REPLACEMENT

## Tools Required

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

## Removal Procedure

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the left headlamp assembly. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarkers, Park, Turn Signal Bulb Replacement** in Lighting Systems.

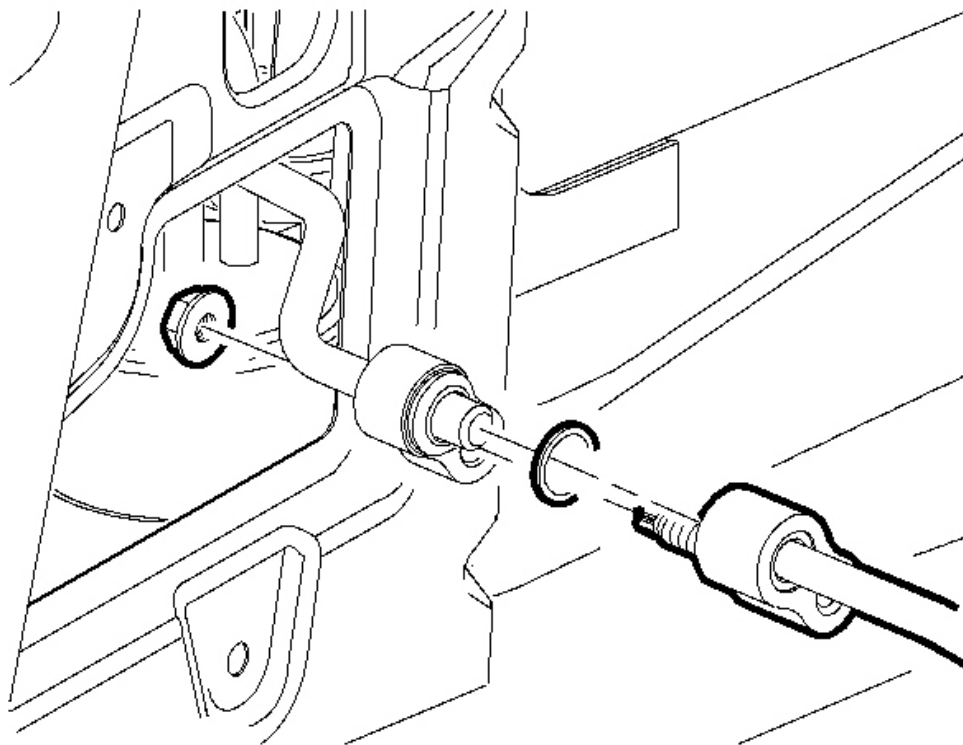


**Fig. 87: Receiver Dehydrator, Nut & Condenser**  
Courtesy of GENERAL MOTORS CORP.



**IMPORTANT: Use a large pair of pliers to hold the fitting. Be careful not to twist the line.**

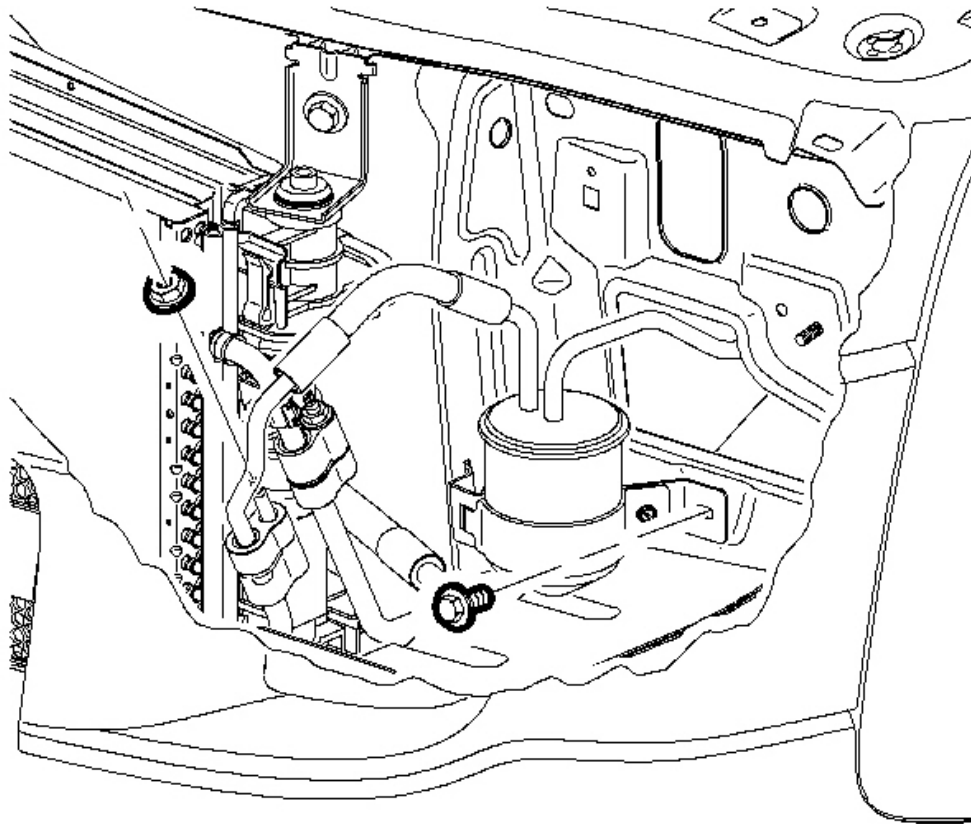
3. Remove the receiver dehydrator nut from the condenser.



**Fig. 88: Liquid Line, Nut & Receiver Dehydrator**  
Courtesy of GENERAL MOTORS CORP.

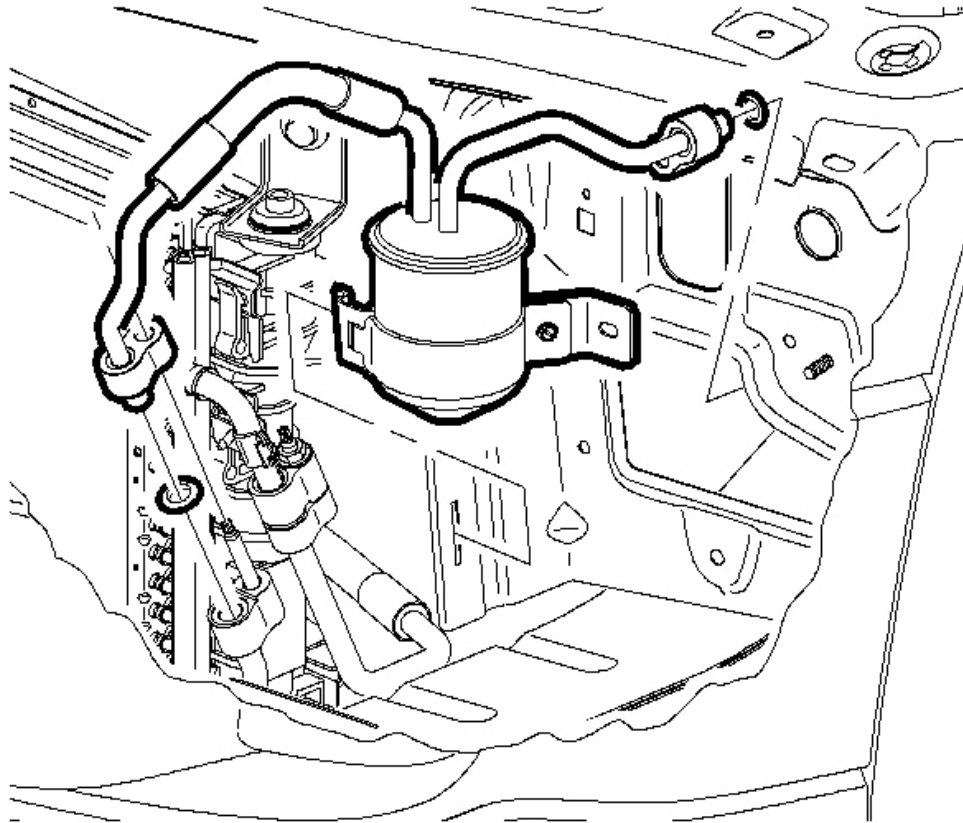
**IMPORTANT: Use a large pair of pliers to hold the fitting. Be careful not to twist the line.**

4. Remove the receiver dehydrator nut from the liquid line.



**Fig. 89: Receiver Dehydrator, Nut & Condenser**  
**Courtesy of GENERAL MOTORS CORP.**

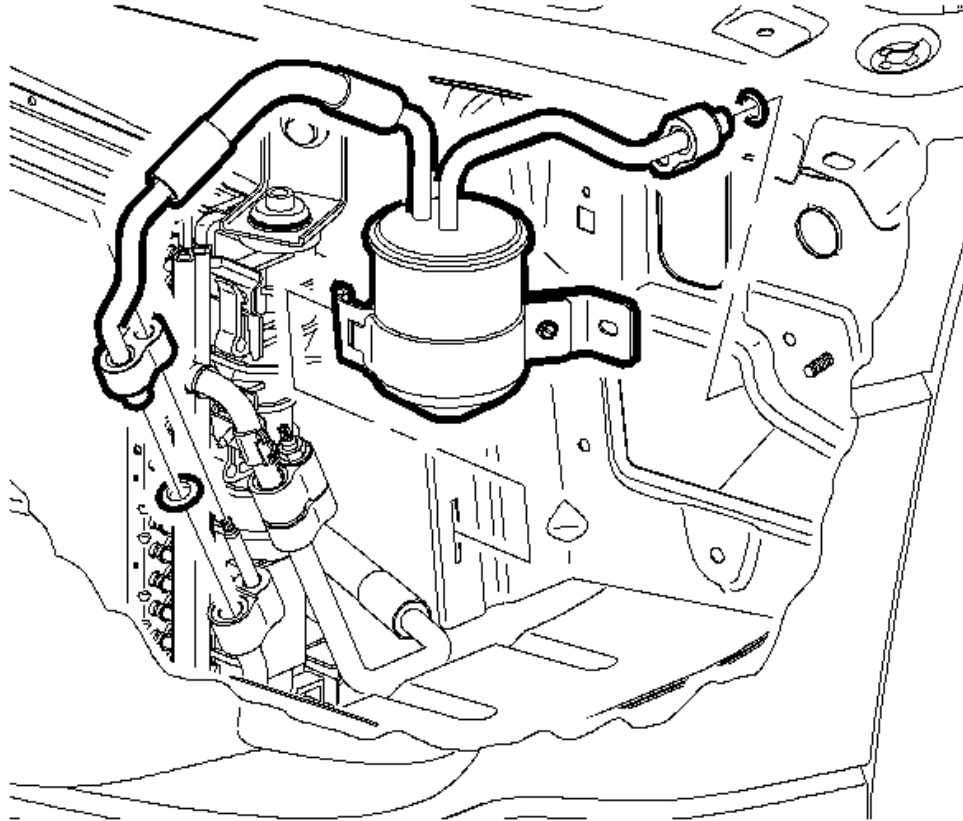
5. Remove the receiver dehydrator bracket bolt from the vehicle.



**Fig. 90: Receiver Dehydrator, Protective Caps & Liquid Line**  
Courtesy of GENERAL MOTORS CORP.

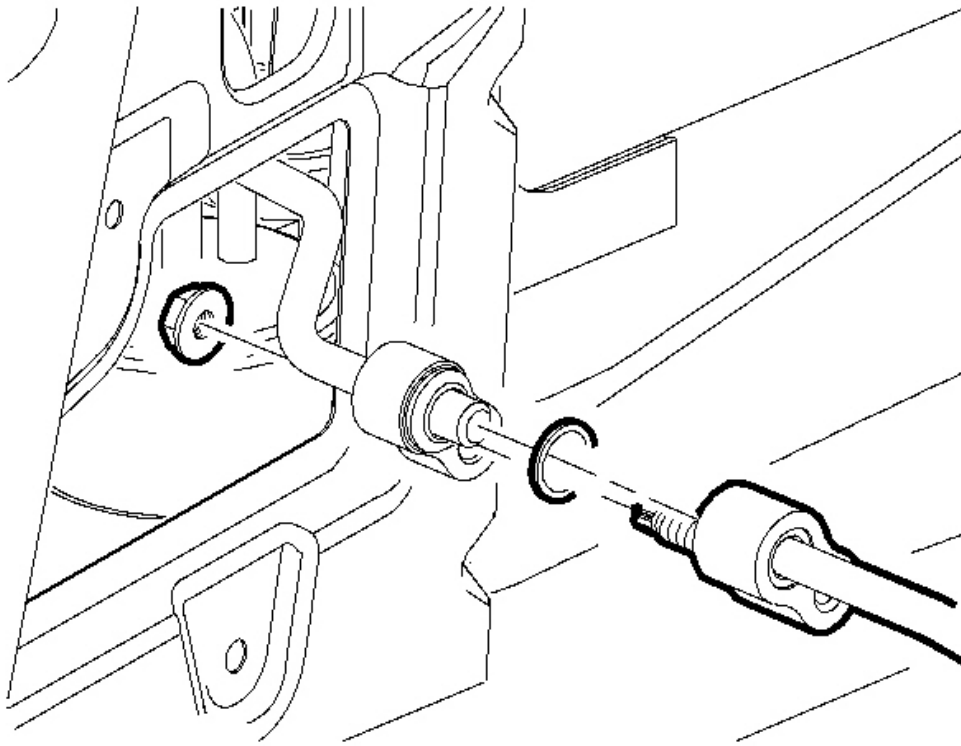
6. Remove the receiver dehydrator from the vehicle.
7. Install protective caps to the condenser, the liquid line, and the receiver dehydrator to prevent contamination and desiccant saturation.

#### **Installation Procedure**



**Fig. 91: Receiver Dehydrator, Protective Caps & Liquid Line**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the protective caps from the condenser, the liquid line, and the receiver dehydrator.
2. Add the specified amount of PAG oil to the receiver dehydrator. Refer to **Refrigerant System Capacities** .
3. Install new seal washers to the receiver dehydrator. Refer to **Sealing Washer Replacement** .
4. Install the receiver dehydrator to the vehicle.



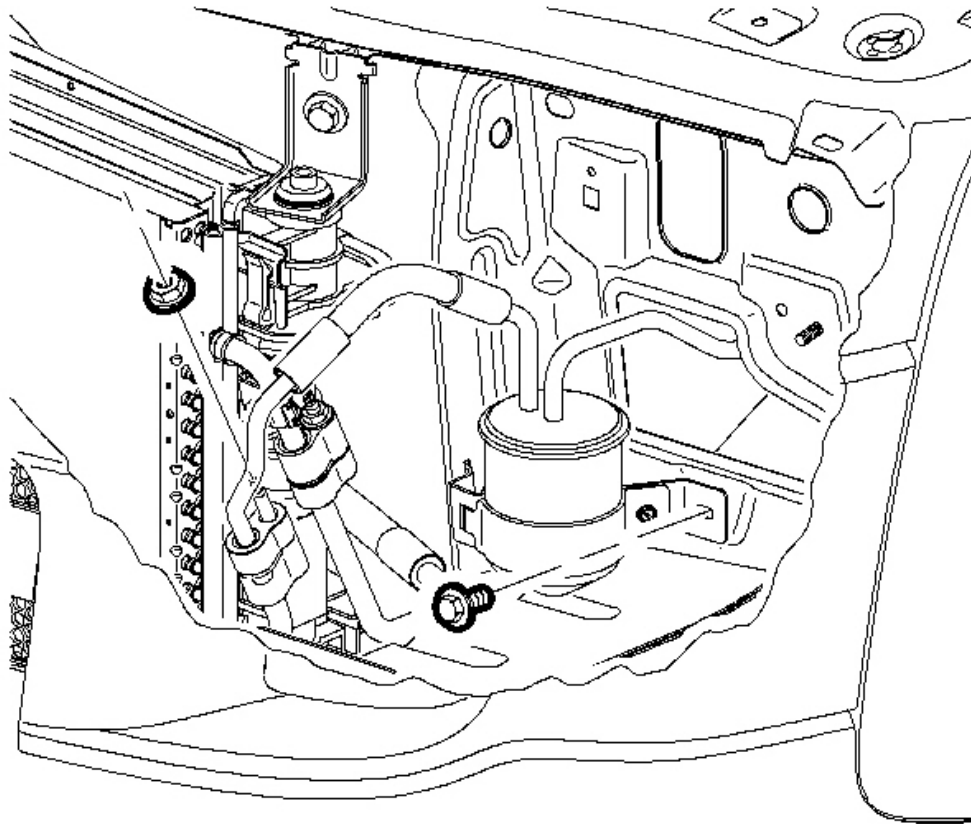
**Fig. 92: Liquid Line, Nut & Receiver Dehydrator**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

**IMPORTANT:** Use a large pair of pliers to hold the fitting. Be careful not to twist the line.

5. Install the receiver dehydrator nut to the liquid line.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 93: Receiver Dehydrator, Nut & Condenser**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Use a large pair of pliers to hold the fitting. Be careful not to twist the line.

6. Install the receiver dehydrator nut to the condenser.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).

7. Position the receiver dehydrator in the vehicle.
8. Install the receiver dehydrator nut to the vehicle.

**Tighten:** Tighten the bolt to 10 N.m (89 lb in).

9. Install left head lamp. Refer to **Headlamp Assembly or Headlamp Bulb and/or Cornering, Sidemarker, Park, Turn Signal Bulb Replacement** in Lighting Systems.
10. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
11. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

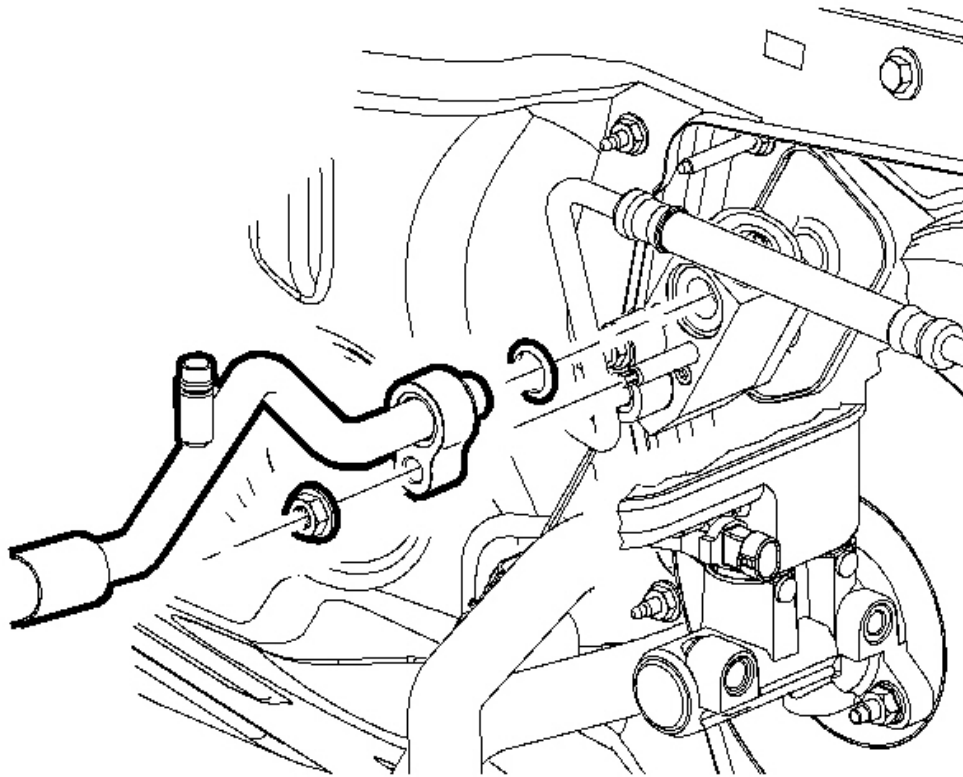
## **THERMAL EXPANSION VALVE REPLACEMENT (FIRST DESIGN)**

### **Tools Required**

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

### **Removal Procedure**

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .



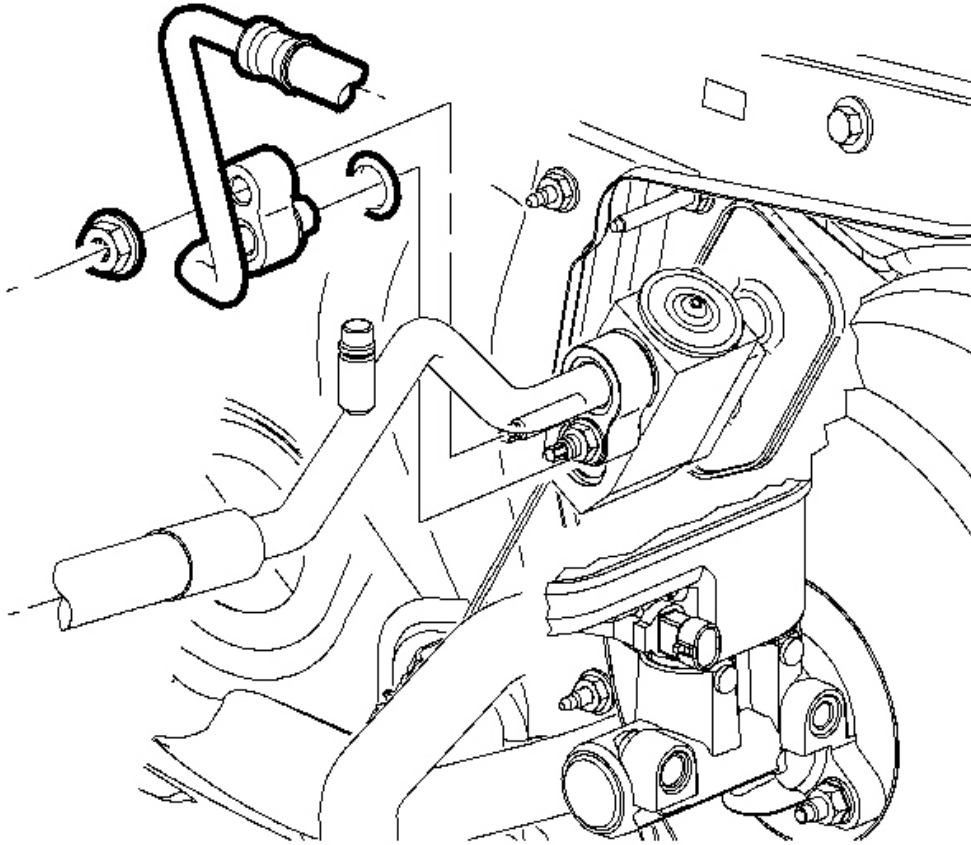
**Fig. 94: Compressor Hose, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** When removing the thermal expansion valve (TXV), keep dirt and foreign material from getting on or into the O-ring sealing surfaces. Clean tools and a clean work area are important for proper service. The TXV seal area should be cleaned before any repairs are performed. The parts must be kept clean at all times and any parts to be assembled should be cleaned with a non-petroleum based solvent and dried with air. Use only lint free cloths to wipe parts. Do not allow solvent to enter evaporator or hoses.

2. Remove the evaporator outlet hose nut from the TXV.
3. Remove the evaporator outlet hose from the TXV.

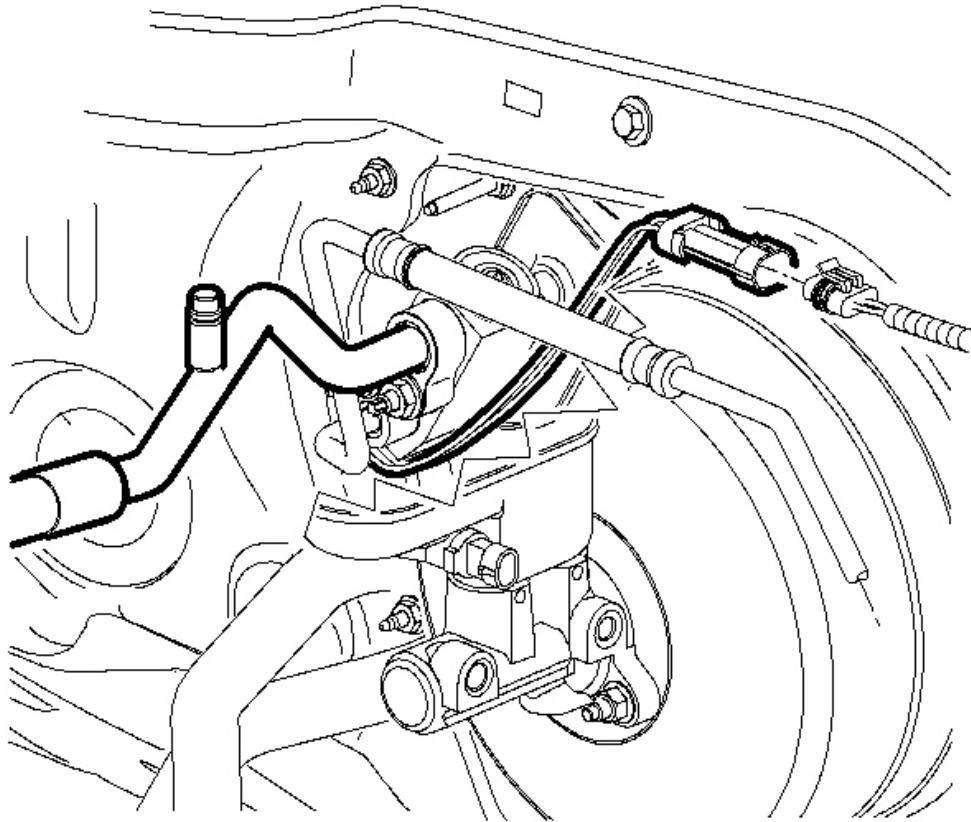


4. Install a protective cap to the evaporator outlet hose to prevent contamination and desiccant saturation.



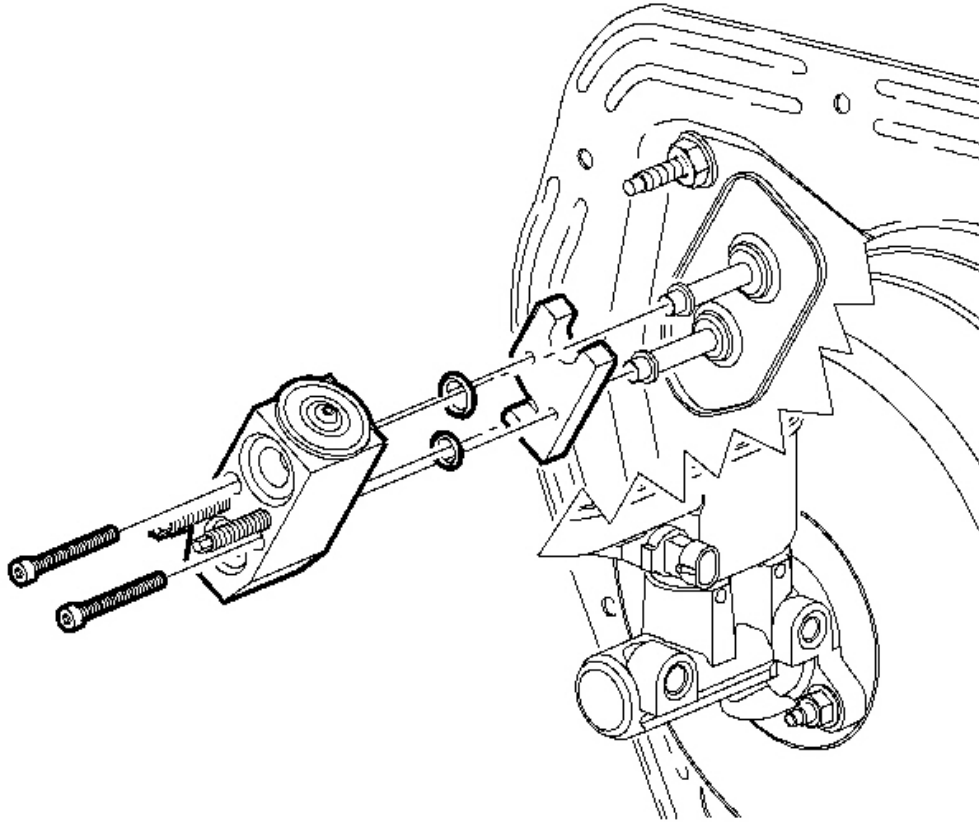
**Fig. 95: Liquid Line, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

5. Remove the liquid line nut from the TXV.
6. Remove the liquid line from the TXV.
7. Install a protective cap to the liquid line to prevent contamination and desiccant saturation.



**Fig. 96: Refrigerant Low Temperature Sensor & Engine Harness**  
Courtesy of GENERAL MOTORS CORP.

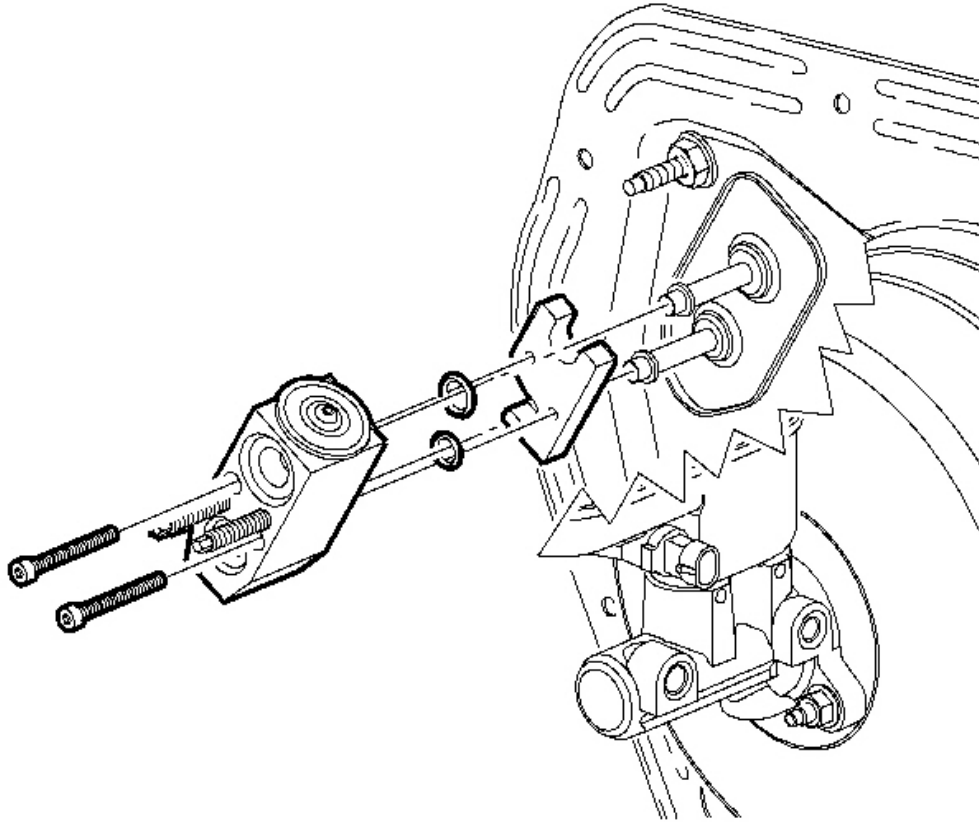
8. Disconnect the refrigerant low temperature sensor from the engine harness.



**Fig. 97: TXV, Bolts & Backing Plate**  
Courtesy of GENERAL MOTORS CORP.

9. Remove the TXV bolts from the backing plate.
10. Remove the TXV and the backing plate from the vehicle.
11. Remove and discard the O-rings from the evaporator pipes. Refer to **O-Ring Replacement** .
12. Install a protective cap to the evaporator pipes to prevent contamination and desiccant saturation.

#### **Installation Procedure**



**Fig. 98: TXV, Bolts & Backing Plate**  
Courtesy of GENERAL MOTORS CORP.

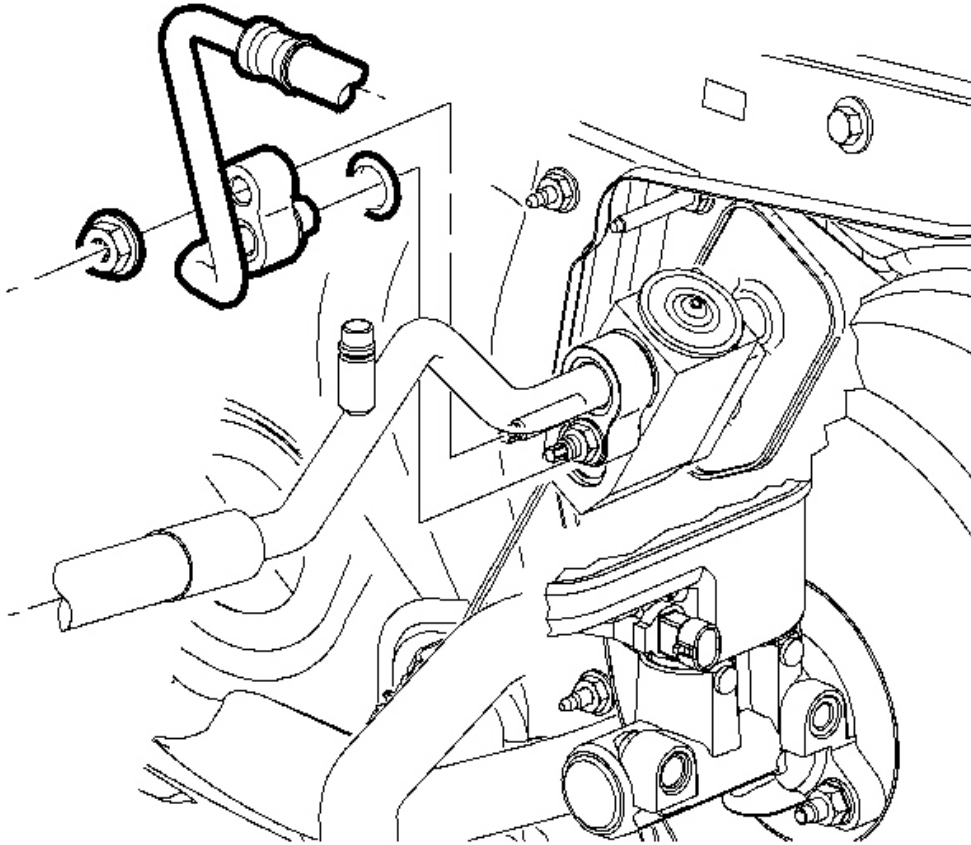
**IMPORTANT: Use only lint free cloths to wipe parts. Do not allow any solvent to enter evaporator or hoses.**

1. Remove the protective caps from the evaporator pipe and ensure the seal areas are clean, dry and lint free.
2. Install new O-rings to the evaporator pipes. Refer to **O-Ring Replacement** .
3. Remove the protective caps from the TXV.
4. Install the TXV and the backing plate to the evaporator pipes.

**NOTE: Refer to Fastener Notice in Cautions and Notices.**

5. Install the TXV bolts to the backing plate.

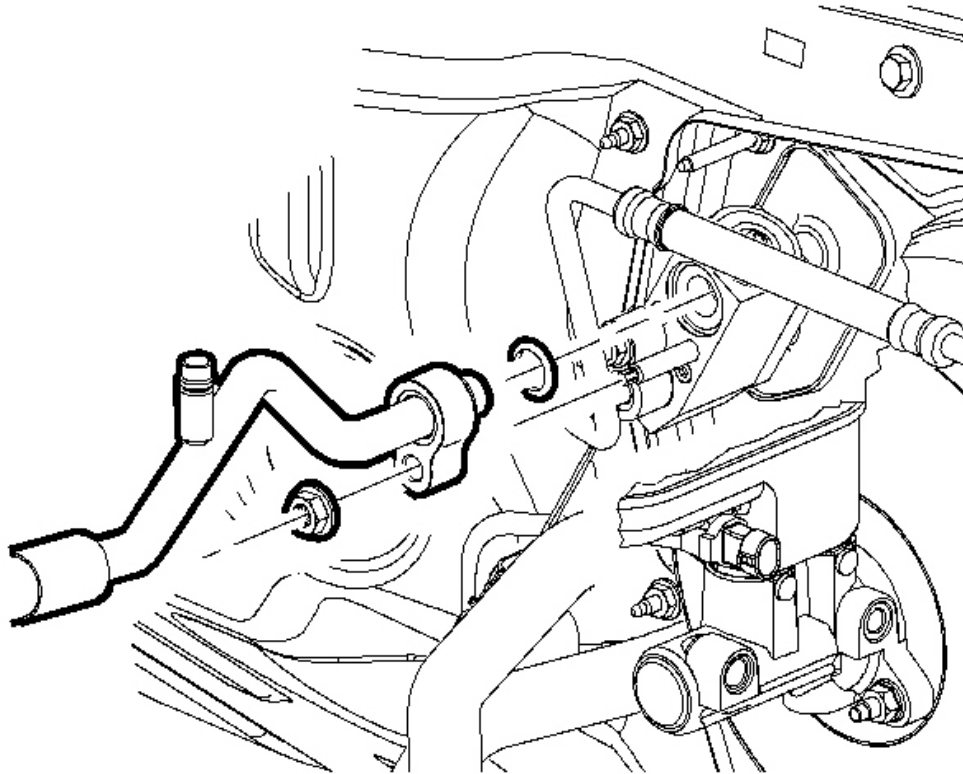
**Tighten:** Tighten the bolts to 9 N.m (80 lb in).



**Fig. 99: Liquid Line, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the protective cap from the liquid line.
7. Install a new seal washer to the liquid line. Refer to **Sealing Washer Replacement** .
8. Install the liquid line to the TXV.
9. Install the liquid line nut to the TXV.

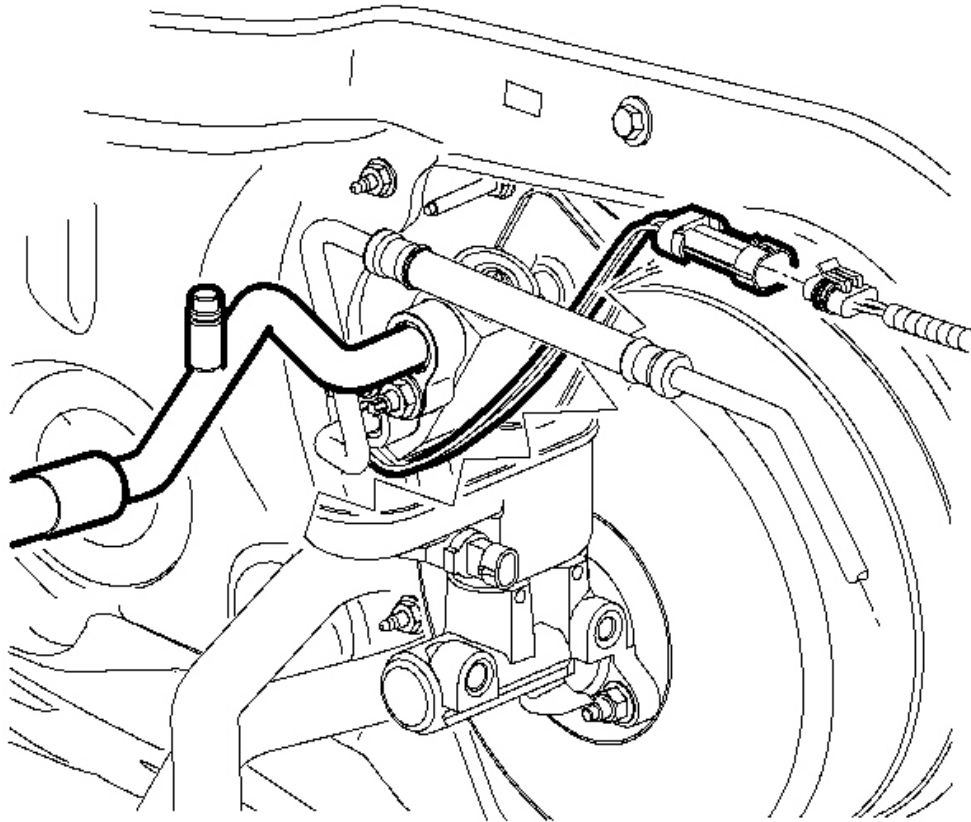
**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 100: Compressor Hose, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

10. Remove the protective cap from the evaporator outlet hose.
11. Install a new seal washer to the evaporator outlet hose. Refer to **Sealing Washer Replacement** .
12. Install the evaporator outlet hose to the TXV.
13. Install the evaporator outlet hose nut to the TXV.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 101: Refrigerant Low Temperature Sensor & Engine Harness**  
Courtesy of GENERAL MOTORS CORP.

14. Connect the refrigerant low temperature sensor to the engine harness.
15. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
16. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

#### **THERMAL EXPANSION VALVE REPLACEMENT (SECOND DESIGN)**

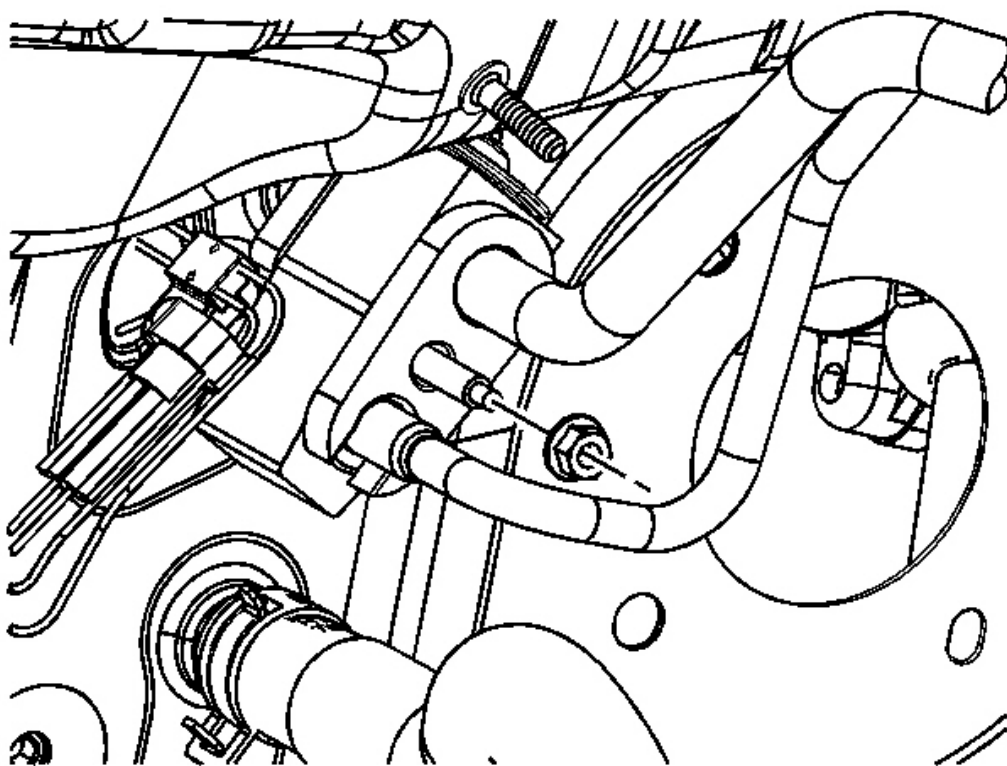
##### **Tools Required**

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

## Removal Procedure

The second design can be identified by the attachment method of the evaporator outlet hose and the liquid line to the Thermal Expansion Valve (TXV). They are retained to the TXV as a pair using a single nut.

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .

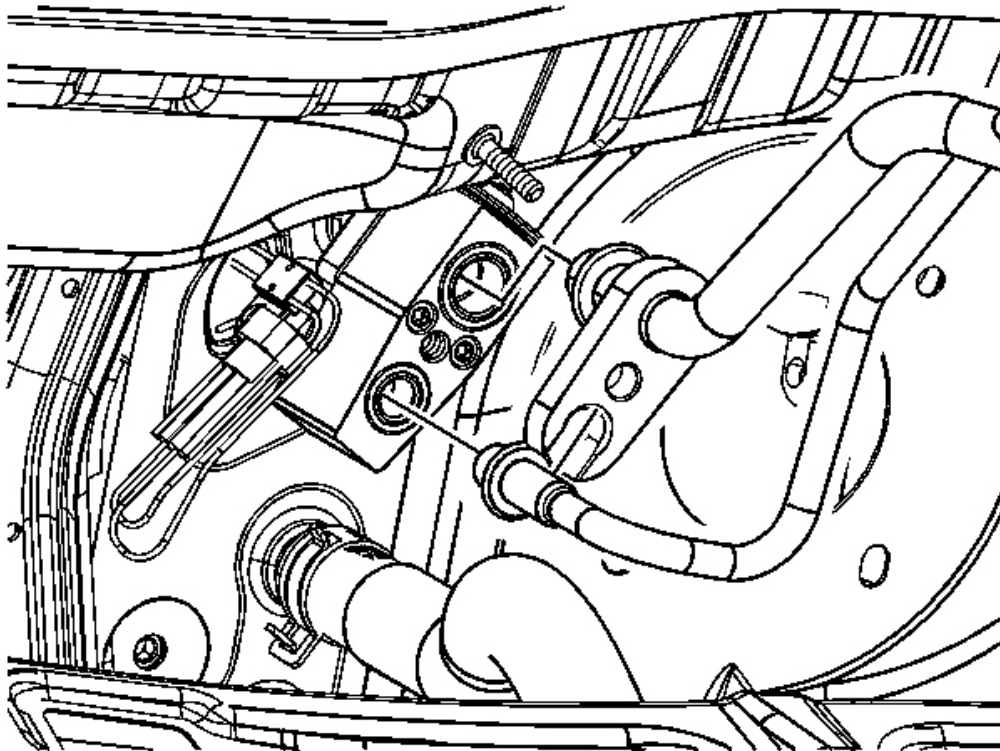


**Fig. 102: Evaporator Outlet Hose, Liquid Line Retainer Plate, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** When removing the thermal expansion valve (TXV), keep dirt and foreign material from getting on or into the O-ring sealing surfaces. Clean tools and a clean work area are important for proper service. The TXV seal area should be cleaned before any repairs are performed. The parts must be kept clean at all times and any parts to be assembled should be cleaned with a non-petroleum based solvent and dried with air. Use only lint free cloths to wipe parts. Do not allow solvent to enter evaporator or hoses.

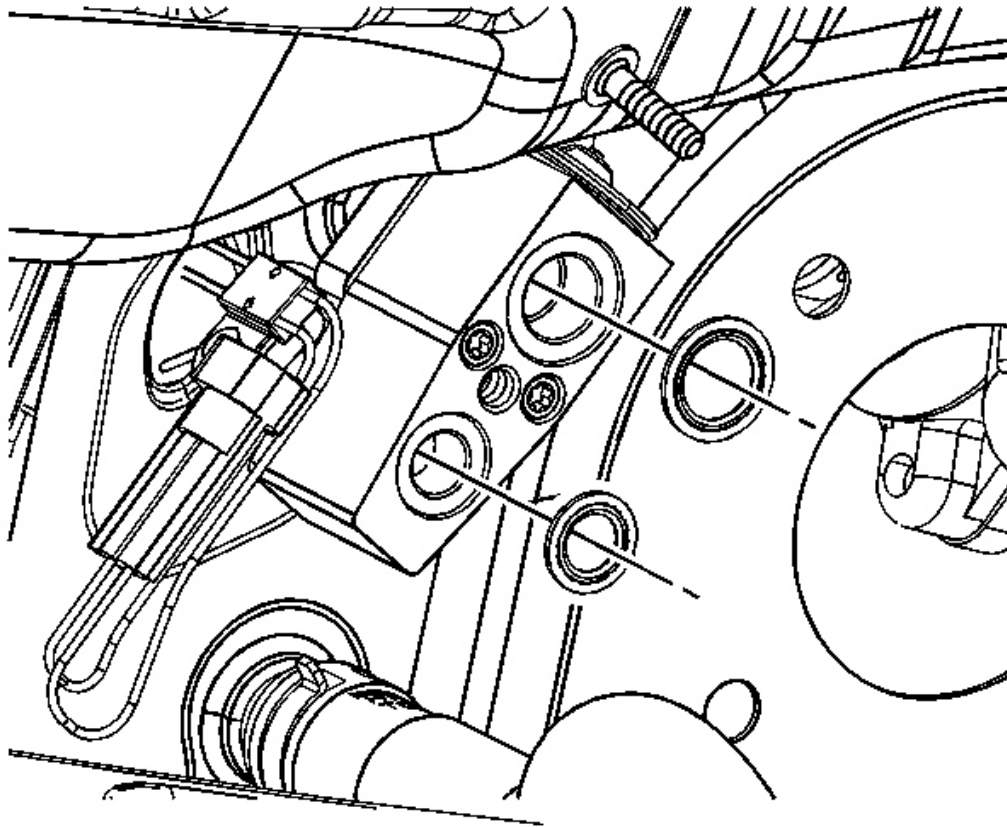


2. Remove the evaporator outlet hose and liquid line retainer plate nut from the TXV.



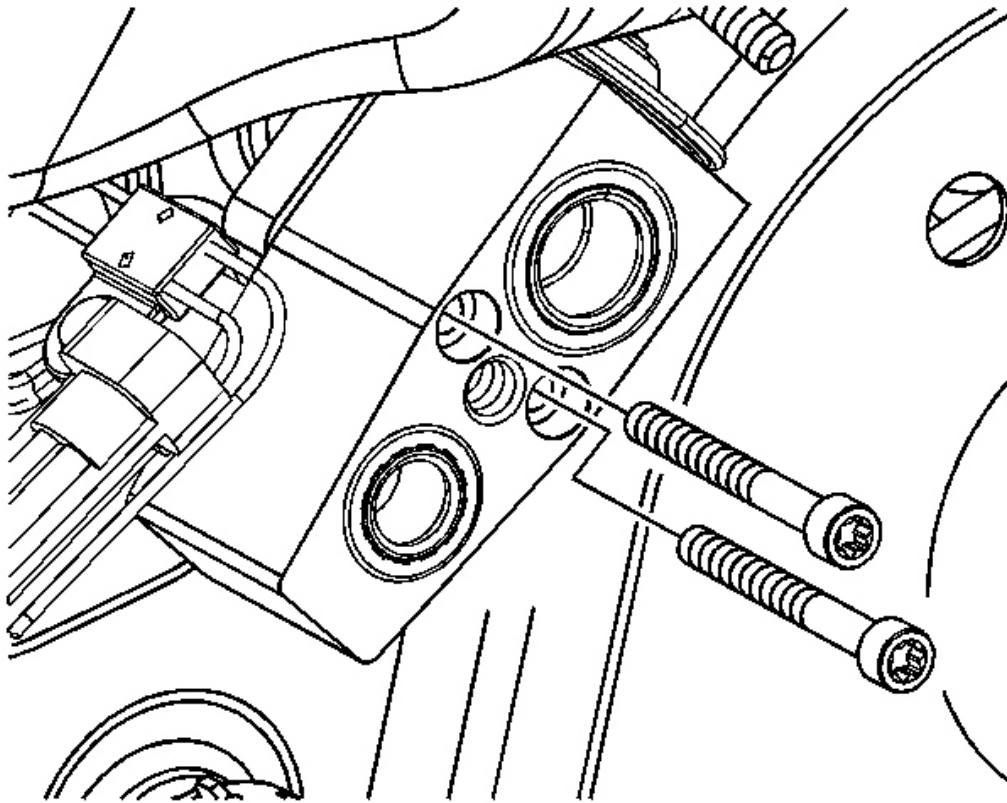
**Fig. 103: Evaporator Outlet Hose, Liquid Line & TXV**  
Courtesy of GENERAL MOTORS CORP.

3. Remove the evaporator outlet hose and liquid line from the TXV.



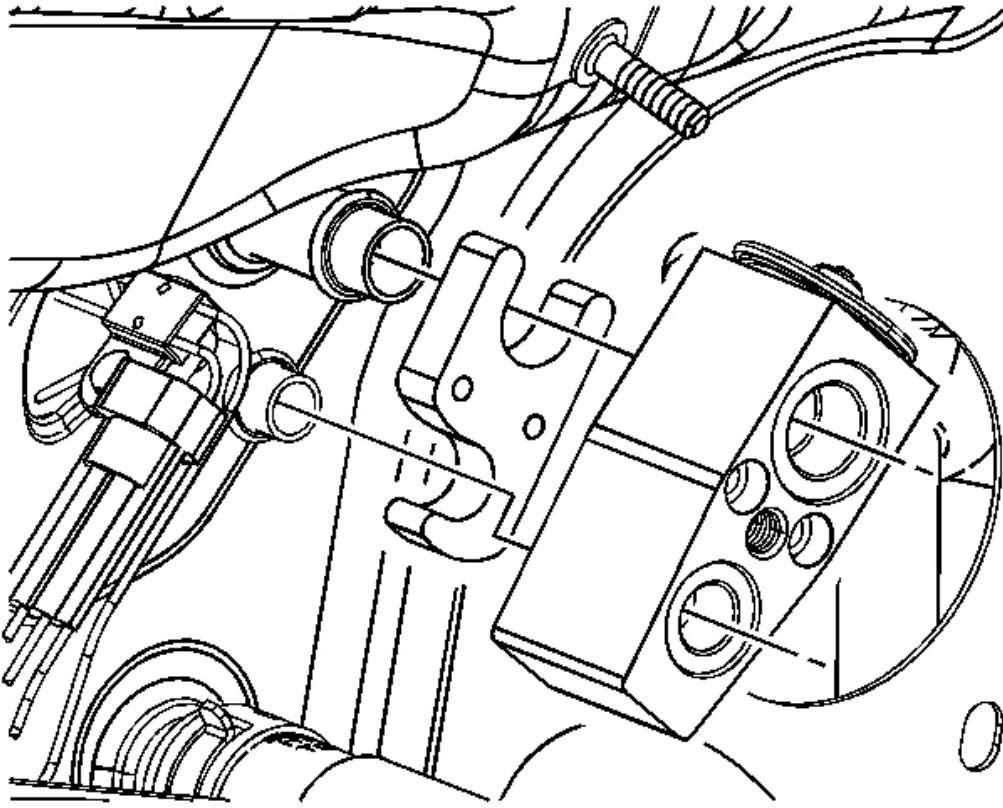
**Fig. 104: Sealing Washers, Evaporator Outlet Hose, Liquid Line & Protective Caps**  
Courtesy of GENERAL MOTORS CORP.

4. Remove and discard the sealing washers from the evaporator outlet hose and liquid line.
5. Install protective caps to the evaporator outlet hose and the liquid line to prevent contamination and desiccant saturation.



**Fig. 105: TXV, Bolts & Backing Plate**  
**Courtesy of GENERAL MOTORS CORP.**

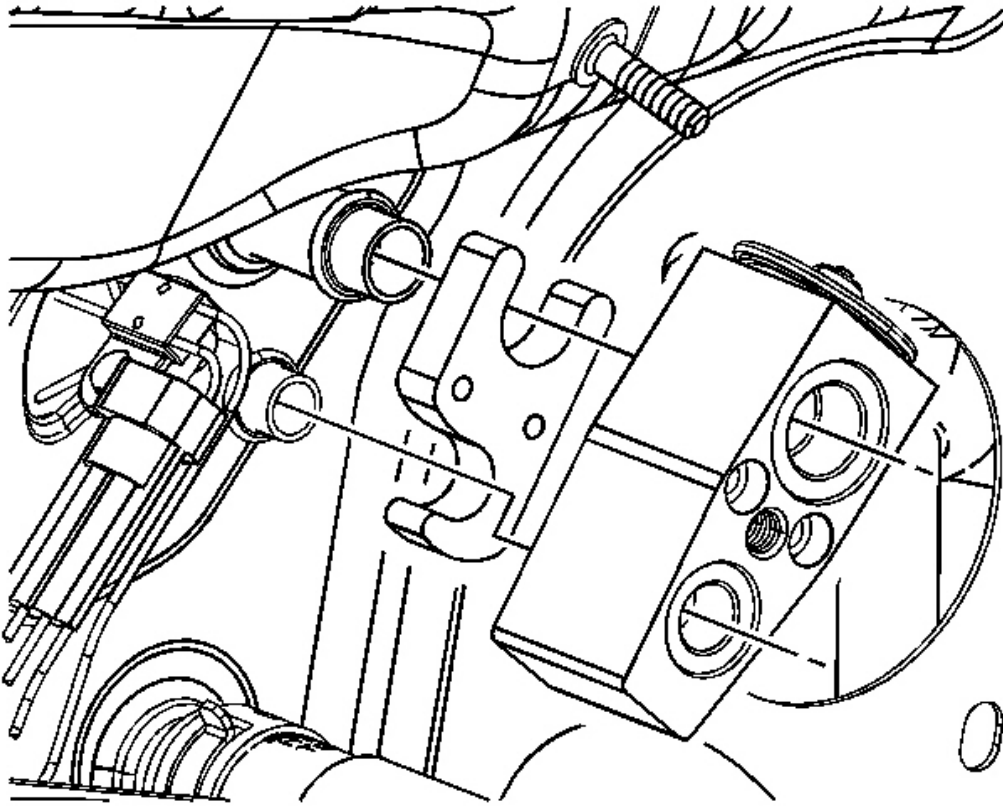
6. Remove the TXV bolts from the backing plate.



**Fig. 106: TXV, O-rings, Backing Plate & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

7. Remove the TXV and the backing plate from the vehicle.
8. Remove and discard the O-rings from the evaporator pipes. Refer to **O-Ring Replacement** .
9. Install a protective cap to the evaporator pipes to prevent contamination and desiccant saturation.

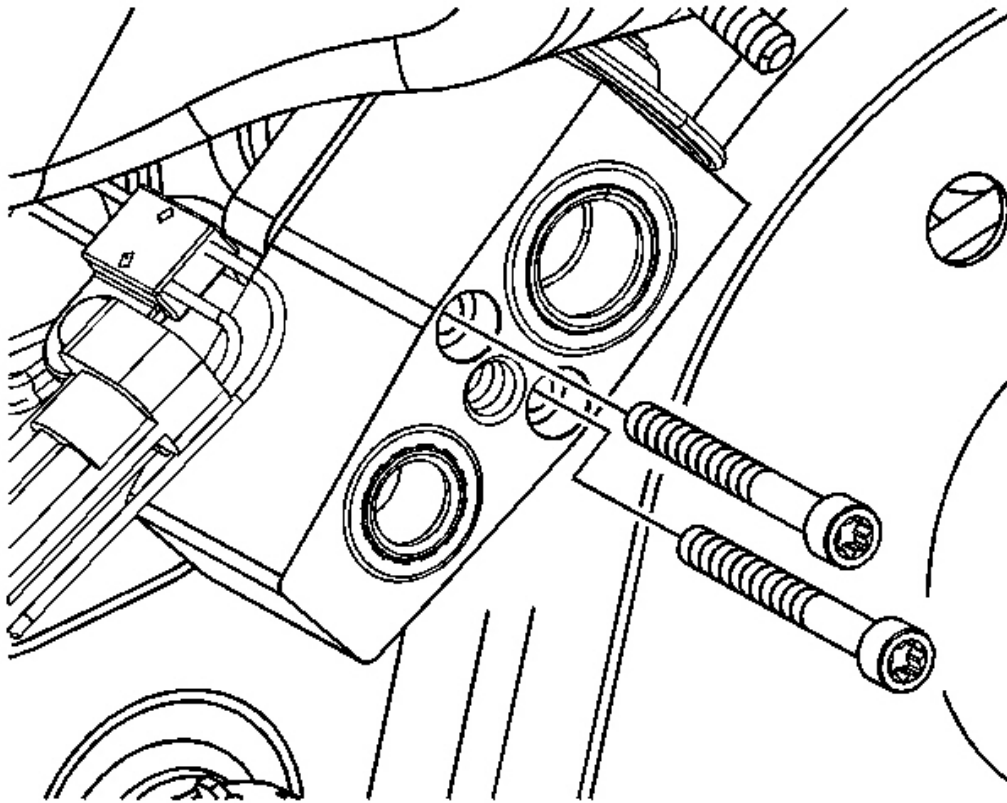
#### **Installation Procedure**



**Fig. 107: TXV, O-rings, Backing Plate & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: Use only lint free cloths to wipe parts. Do not allow any solvent to enter evaporator or hoses.**

1. Remove the protective caps from the evaporator pipe and ensure the seal areas are clean, dry and lint free.
2. Install new O-rings to the evaporator pipes. Refer to **O-Ring Replacement** .
3. Remove the protective caps from the TXV.
4. Install the TXV and the backing plate to the evaporator pipes.

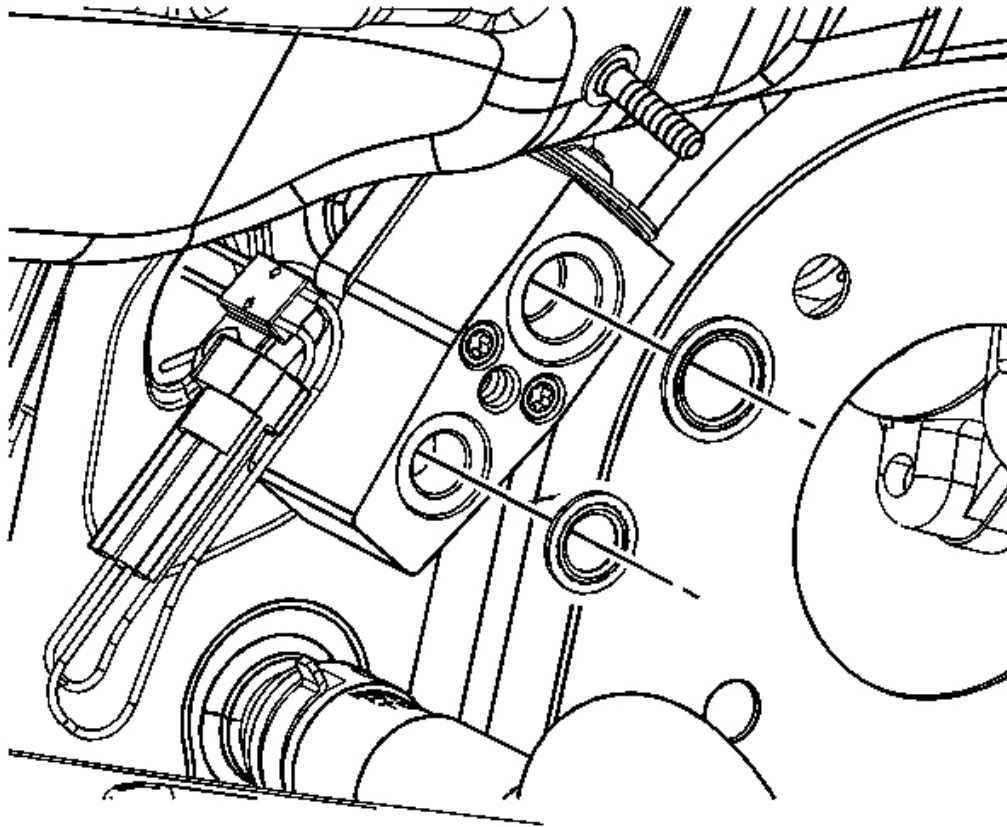


**Fig. 108: TXV, Bolts & Backing Plate**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

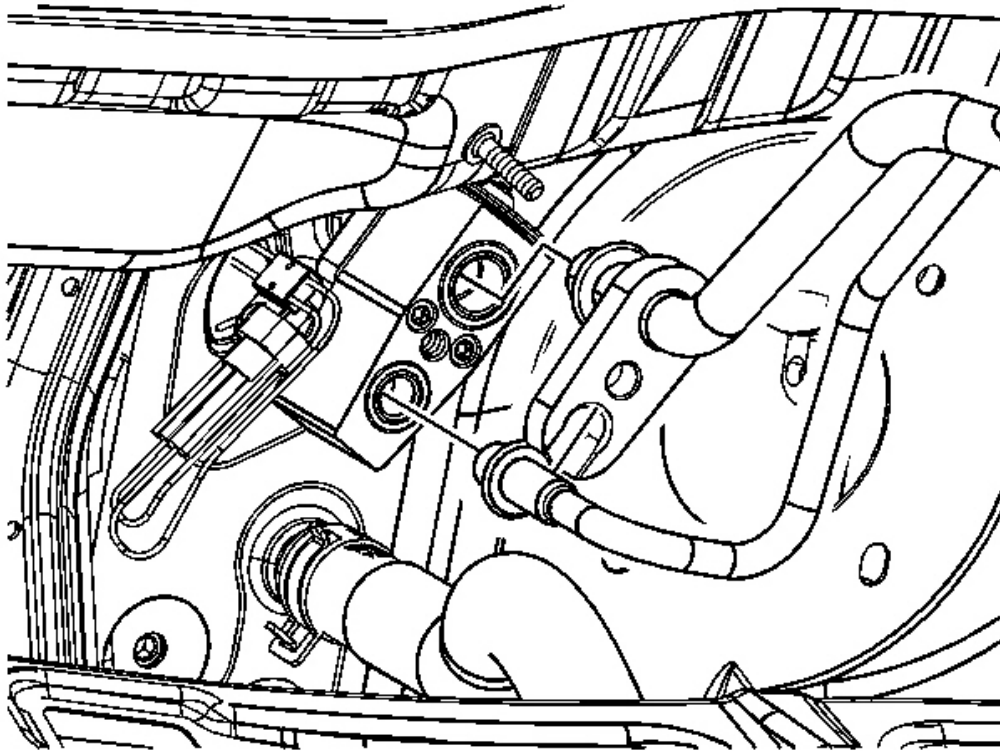
5. Install the TXV bolts to the backing plate.

**Tighten:** Tighten the bolts to 8 N.m (71 lb in).



**Fig. 109: Sealing Washers, Evaporator Outlet Hose, Liquid Line & Protective Caps**  
Courtesy of GENERAL MOTORS CORP.

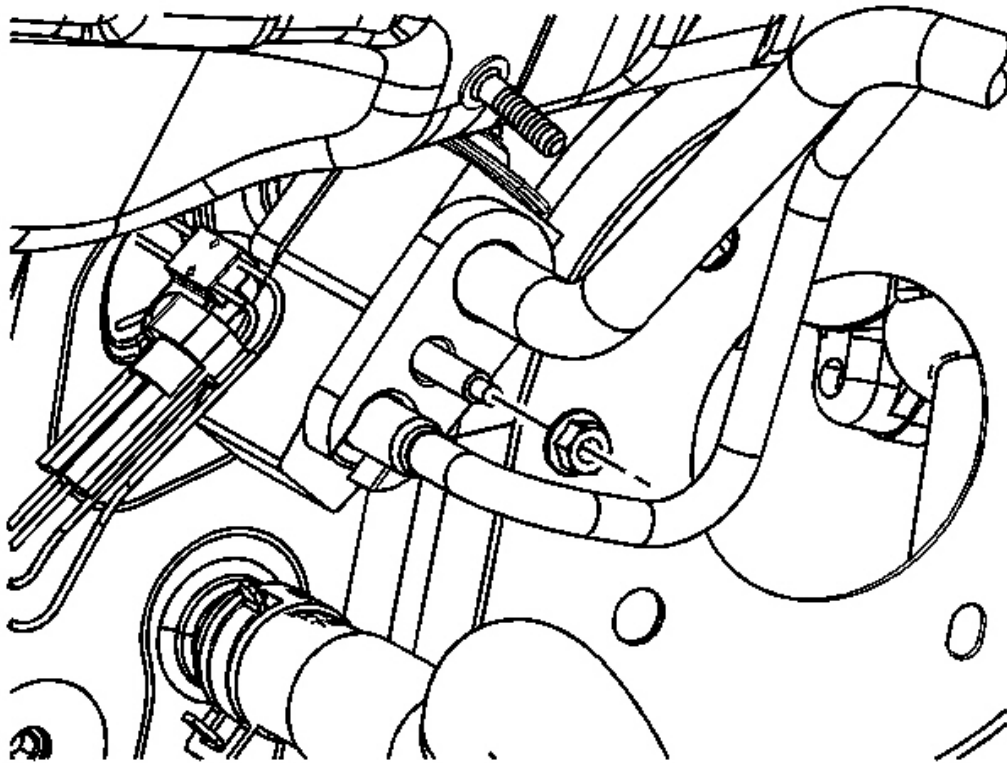
6. Remove the protective caps from the liquid line and the evaporator outlet hose
7. Install new seal washers to the liquid line and the evaporator outlet hose. Refer to **Sealing Washer Replacement** .



**Fig. 110: Evaporator Outlet Hose, Liquid Line & TXV**  
Courtesy of GENERAL MOTORS CORP.

8. Install the liquid line and the evaporator outlet hose to the TXV.





**Fig. 111: Evaporator Outlet Hose, Liquid Line Retainer Plate, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

9. Install the liquid line and evaporator outlet hose retainer plate nut to the TXV.

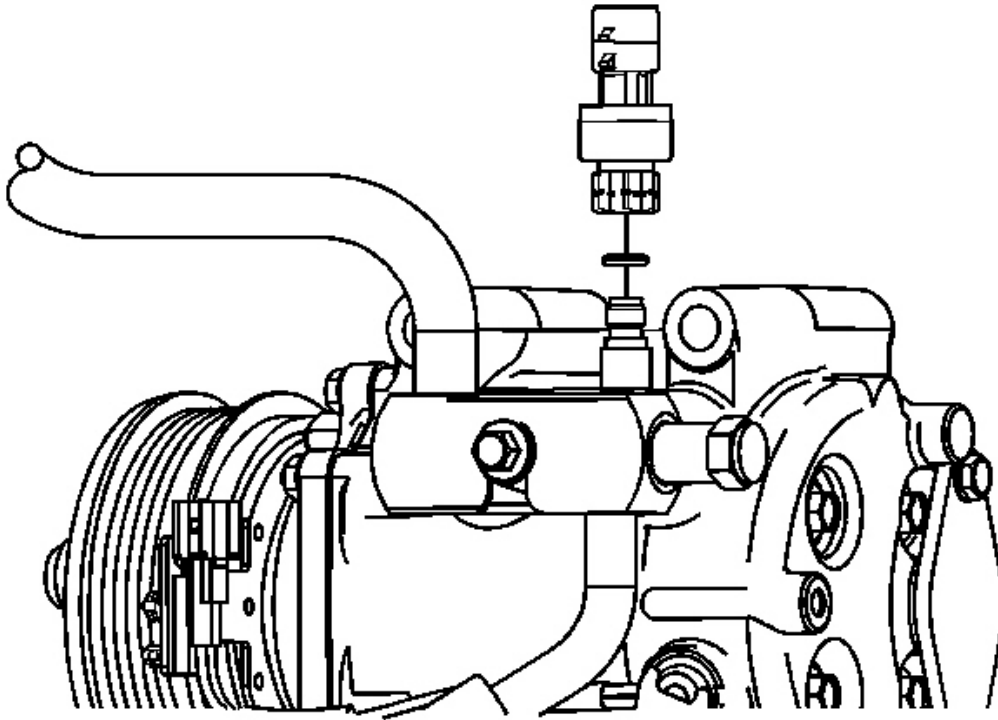
**Tighten:** Tighten the nut to 20 N.m (15 lb ft).

10. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
11. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

## **AIR CONDITIONING (A/C) REFRIGERANT PRESSURE SENSOR REPLACEMENT**

### **Removal Procedure**

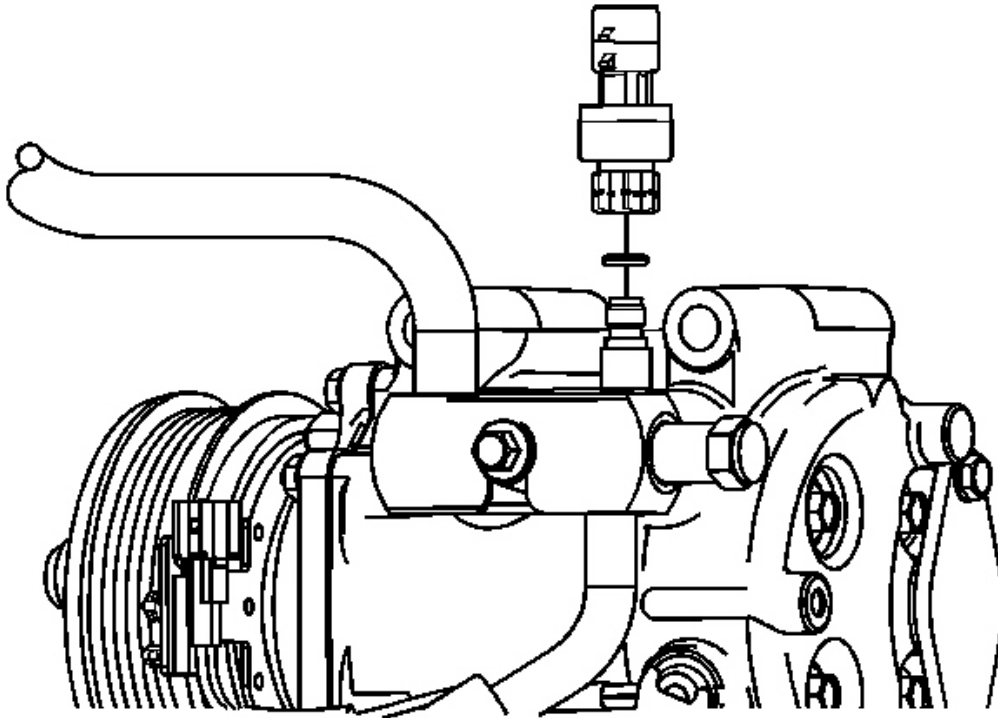
1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .



**Fig. 112: Electrical Connector & Refrigerant Pressure Sensor**  
Courtesy of GENERAL MOTORS CORP.

2. Disconnect the electrical connector from the refrigerant pressure sensor.
3. Remove the refrigerant pressure sensor from the compressor hose.

#### **Installation Procedure**



**Fig. 113: Electrical Connector & Refrigerant Pressure Sensor**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Use R-12 refrigerant oil (mineral) to lubricate O-rings. Use of R-134a (PAG) oil will cause premature corrosion of fitting joints.

1. Lubricate the refrigerant pressure sensor O-ring with mineral oil. Refer to **O-Ring Replacement** .

**NOTE:** Refer to **Fastener Notice in Cautions and Notices.**

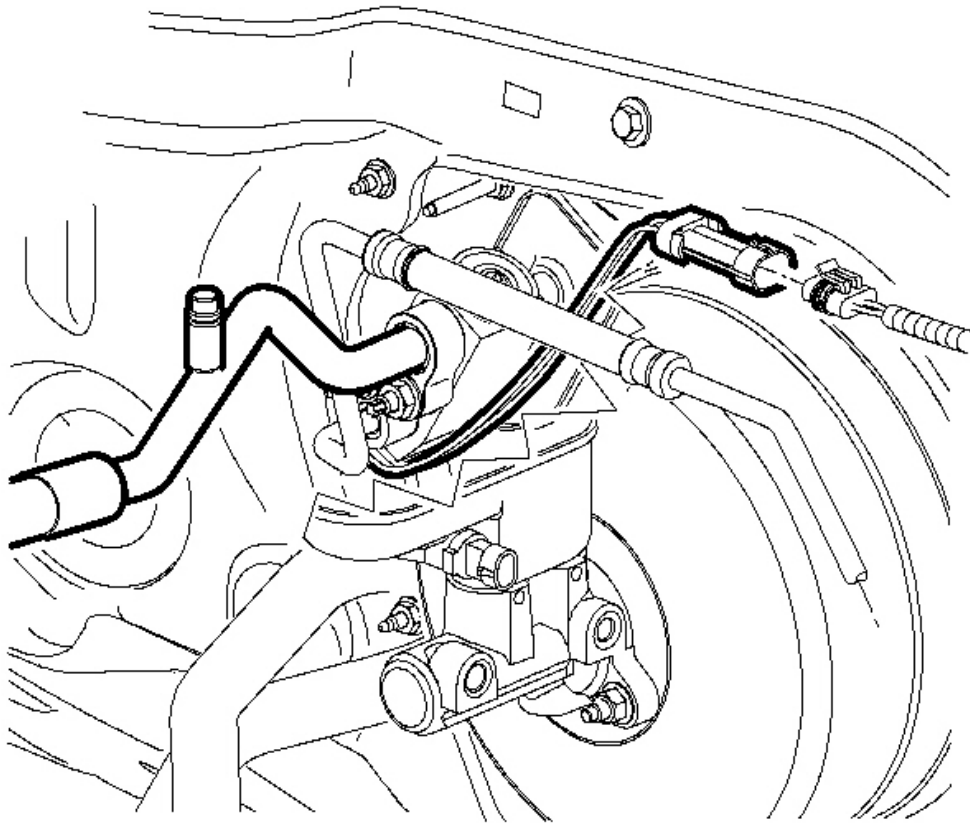
2. Hand start the refrigerant pressure sensor to the compressor hose, taking care not to pinch the O-ring and tighten.

**Tighten:** Tighten the pressure sensor to 10 N.m (89 lb in).

3. Install the electrical connector to the refrigerant pressure sensor.
4. Lower the vehicle.

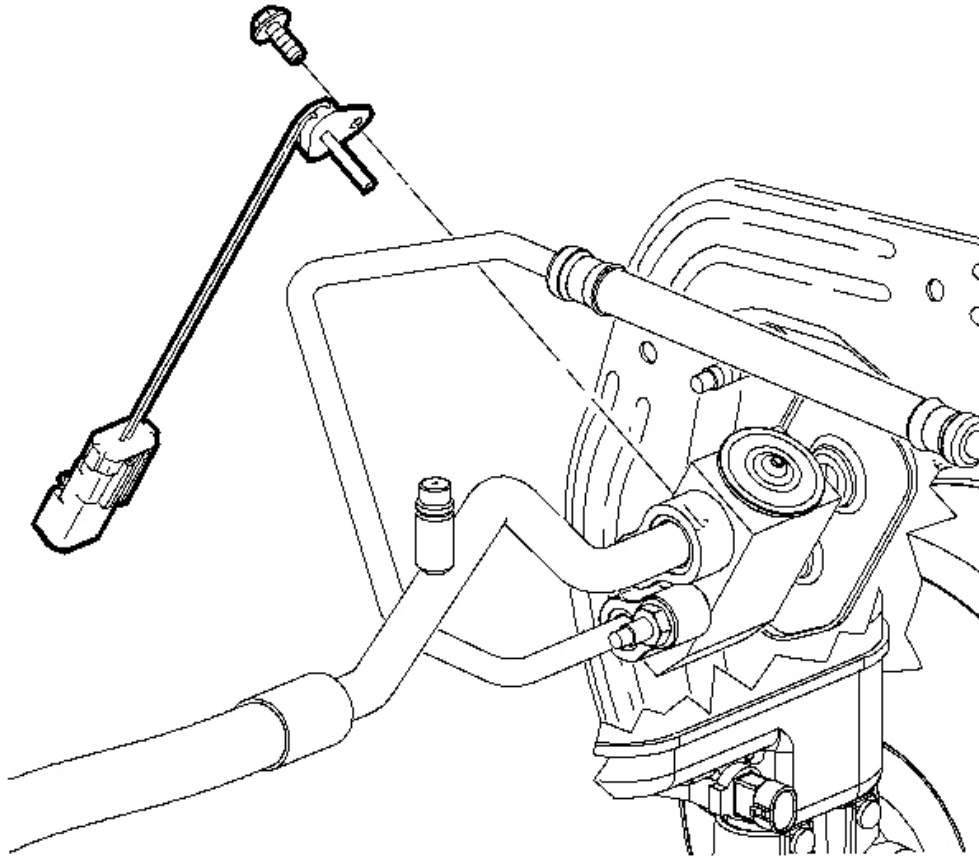
# AIR CONDITIONING (A/C) REFRIGERANT LOW TEMPERATURE SENSOR REPLACEMENT (FIRST DESIGN)

## Removal Procedure



**Fig. 114: Refrigerant Low Temperature Sensor & Engine Harness**  
Courtesy of GENERAL MOTORS CORP.

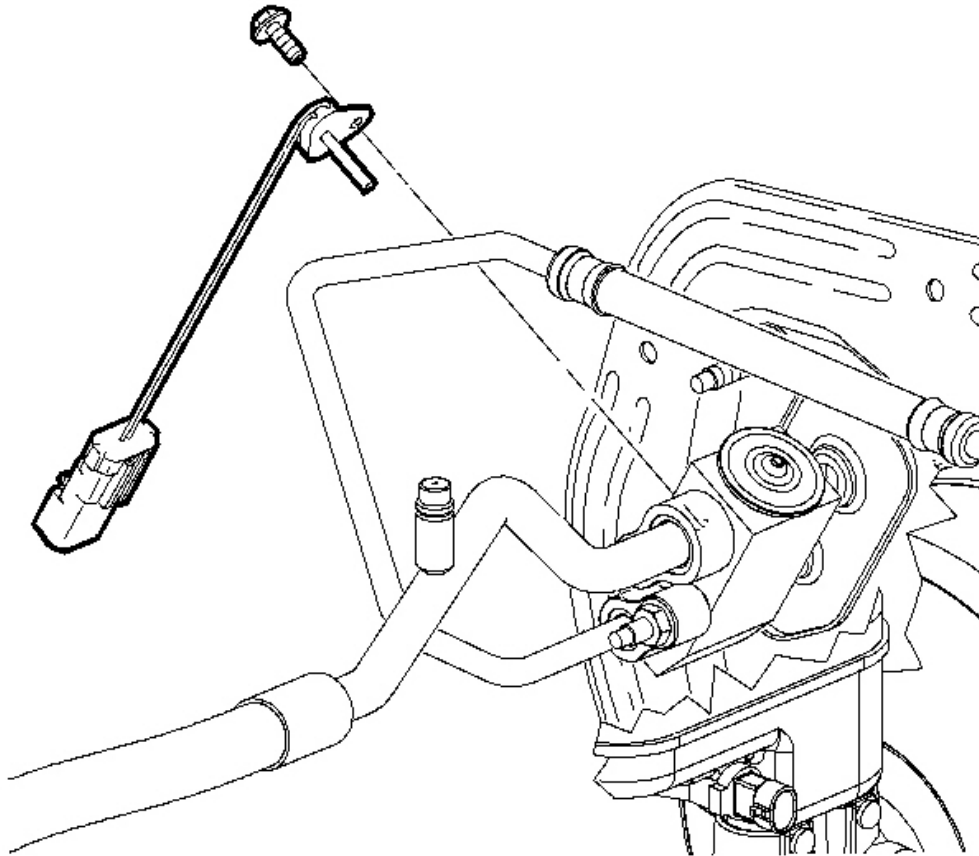
1. Disconnect the thermal expansion valve (TXV) temperature sensor from the engine harness.



**Fig. 115: Temperature Sensor & TXV**  
**Courtesy of GENERAL MOTORS CORP.**

2. Remove the temperature sensor from the TXV.

**Installation Procedure**



**Fig. 116: Temperature Sensor & TXV**  
Courtesy of GENERAL MOTORS CORP.

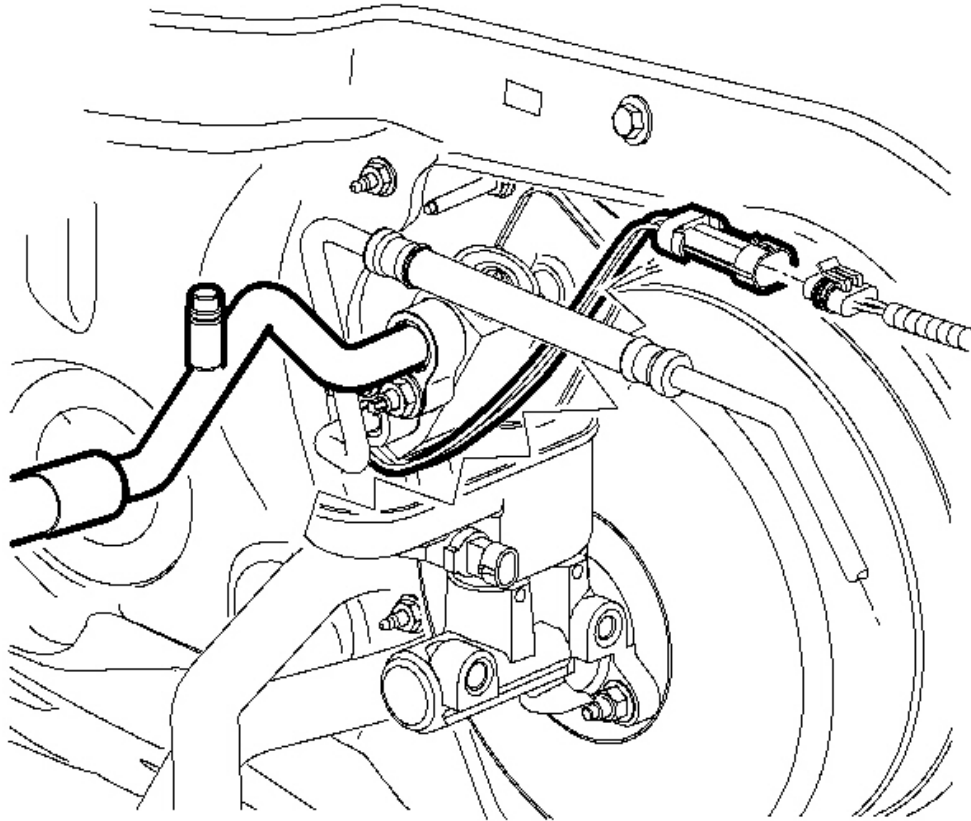
**IMPORTANT:** The TXV cavity for temperature sensor must be packed with thermal grease to ensure functionality.

1. Fill the temperature sensor housing in the TXV with the thermal grease included with the service kit.
2. Install the temperature sensor and wipe away the excess grease.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

3. Install the temperature sensor bolt.

**Tighten:** Tighten the bolt to 5 N.m (44 lb in).



**Fig. 117: Refrigerant Low Temperature Sensor & Engine Harness**  
Courtesy of GENERAL MOTORS CORP.

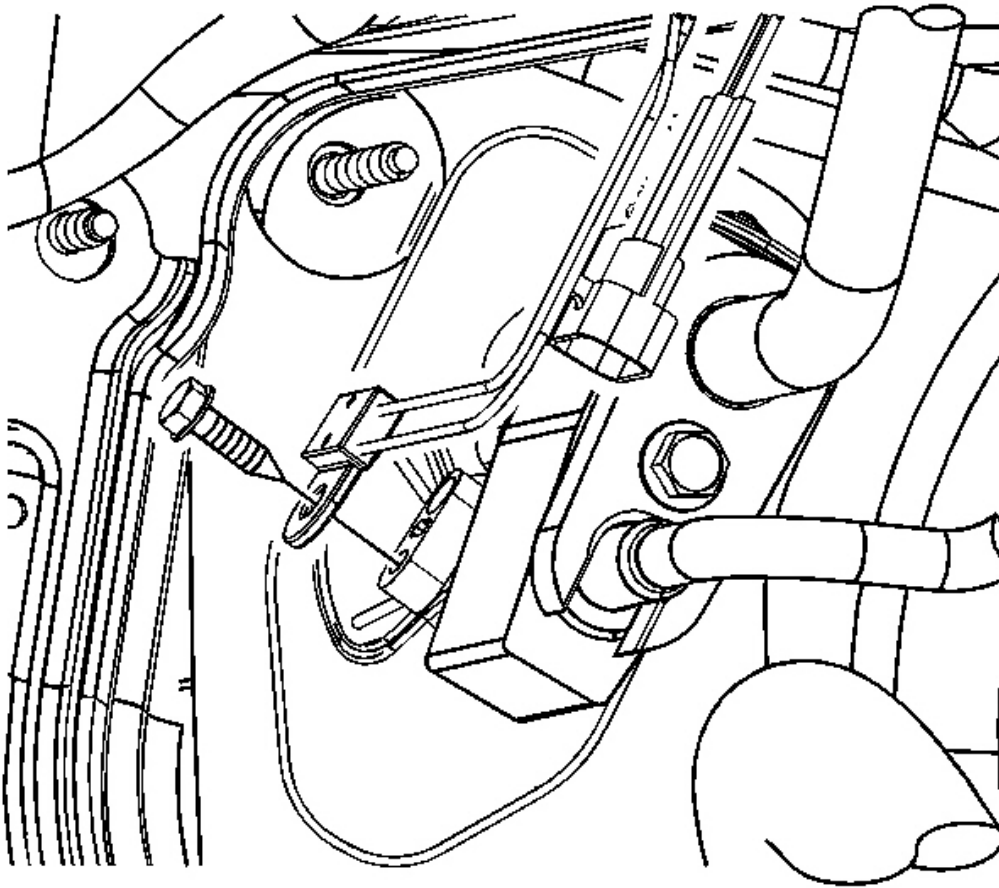
4. Connect the temperature sensor to the engine harness.

#### **AIR CONDITIONING (A/C) REFRIGERANT LOW TEMPERATURE SENSOR REPLACEMENT (SECOND DESIGN)**

##### **Removal Procedure**

The second design can be identified by the location of the temperature sensor. The temperature sensor is

retained with a screw to the evaporator pipe.

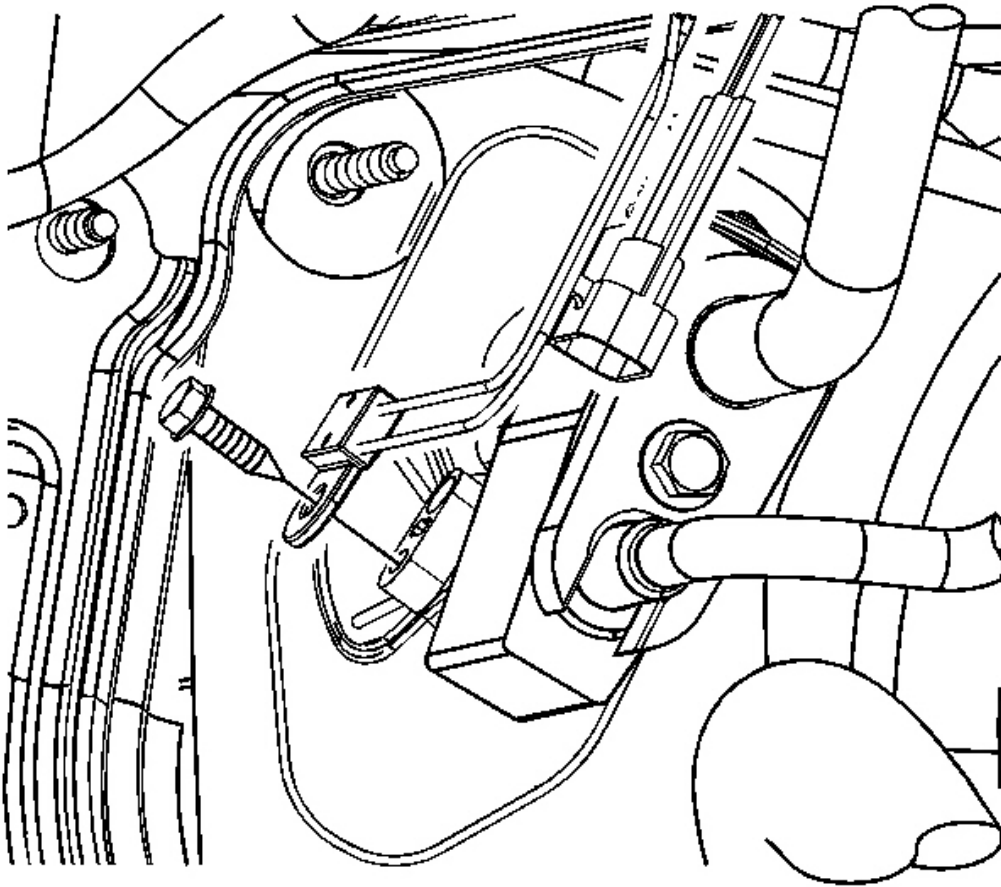


**Fig. 118: TXV Temperature Sensor, Engine Harness & Evaporator Pipe**  
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the thermal expansion valve (TXV) temperature sensor from the engine harness.
2. Remove the temperature sensor screw from the evaporator pipe.
3. Remove the temperature sensor from the evaporator pipe.

#### **Installation Procedure**





**Fig. 119: TXV Temperature Sensor, Engine Harness & Evaporator Pipe**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: The TXV cavity for temperature sensor must be packed with thermal grease to ensure functionality.**

1. Fill the temperature sensor housing in the TXV with the thermal grease included with the service kit.
2. Install the temperature sensor and wipe away the excess grease.

**NOTE: Refer to Fastener Notice in Cautions and Notices.**

3. Install the temperature sensor screw.

**Tighten:** Tighten the screw to 8.5 N.m (75 lb in).

4. Connect the temperature sensor to the engine harness.

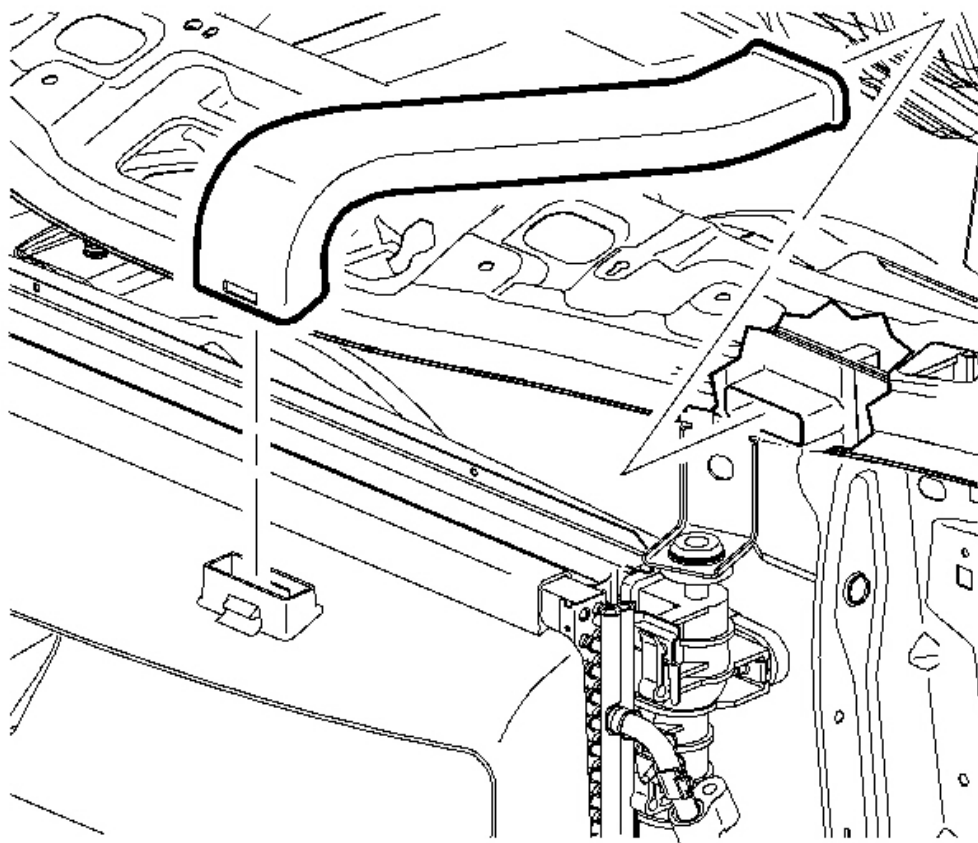
## CONDENSER REPLACEMENT

### Tools Required

**J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .

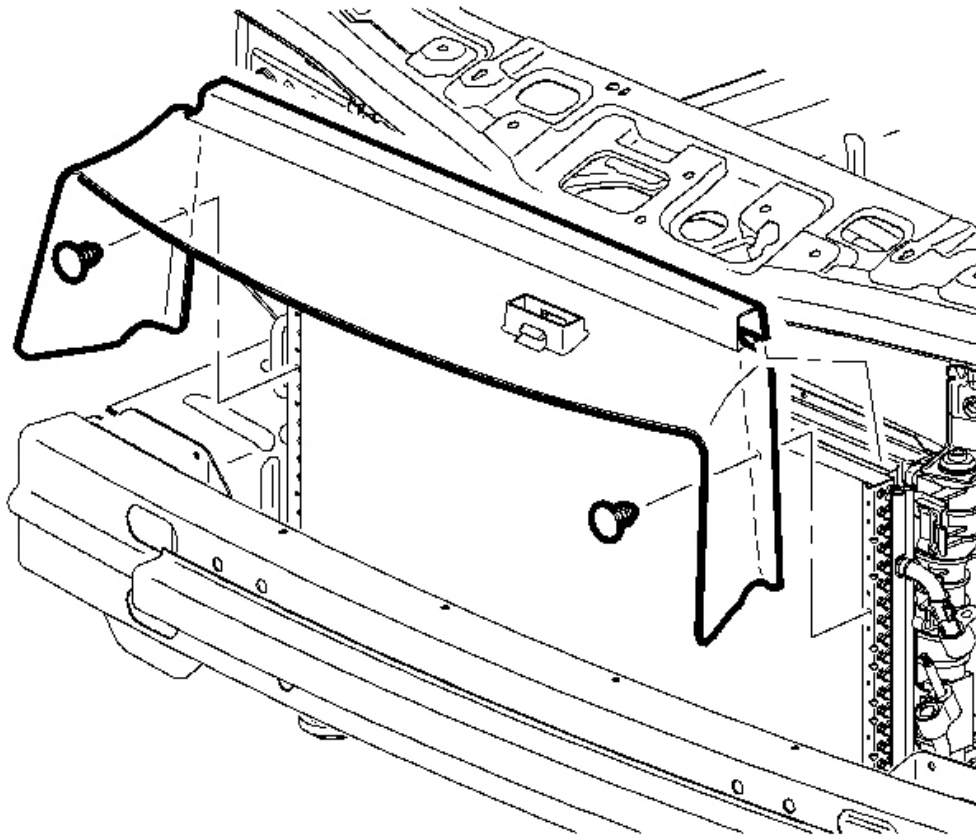
### Removal Procedure

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
2. Remove the front fascia. Refer to **Fascia Replacement - Front Bumper** .



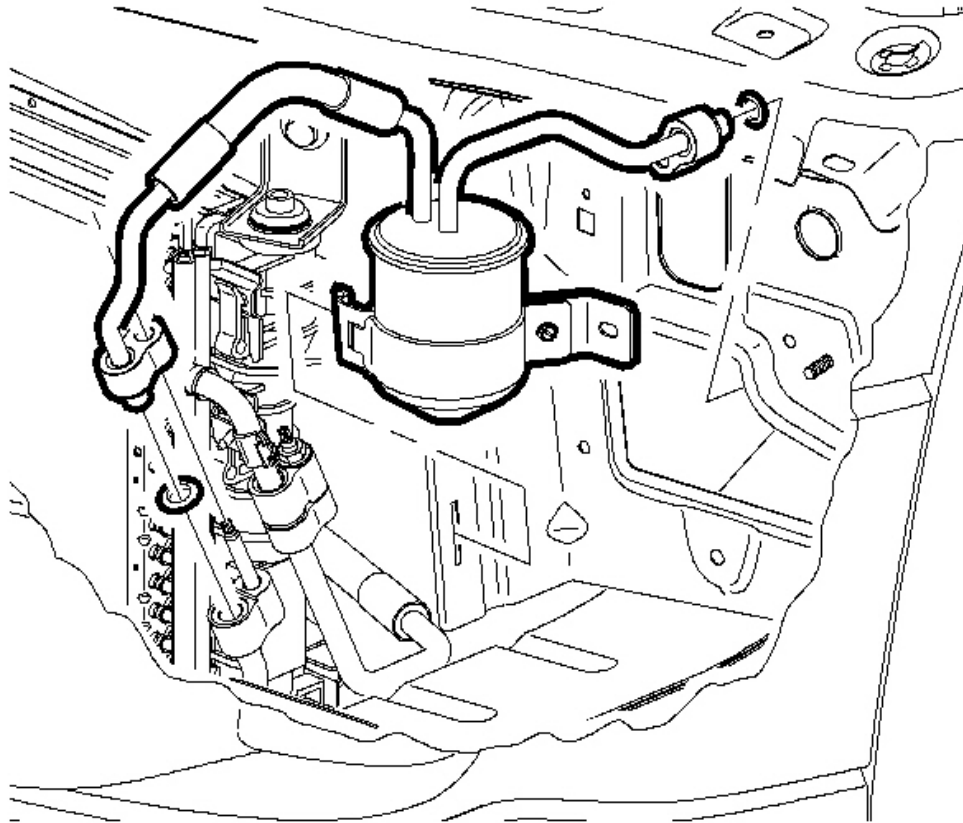
**Fig. 120: Battery Box Air Duct**  
Courtesy of GENERAL MOTORS CORP.

3. For L61 vehicles, remove the battery box air duct.



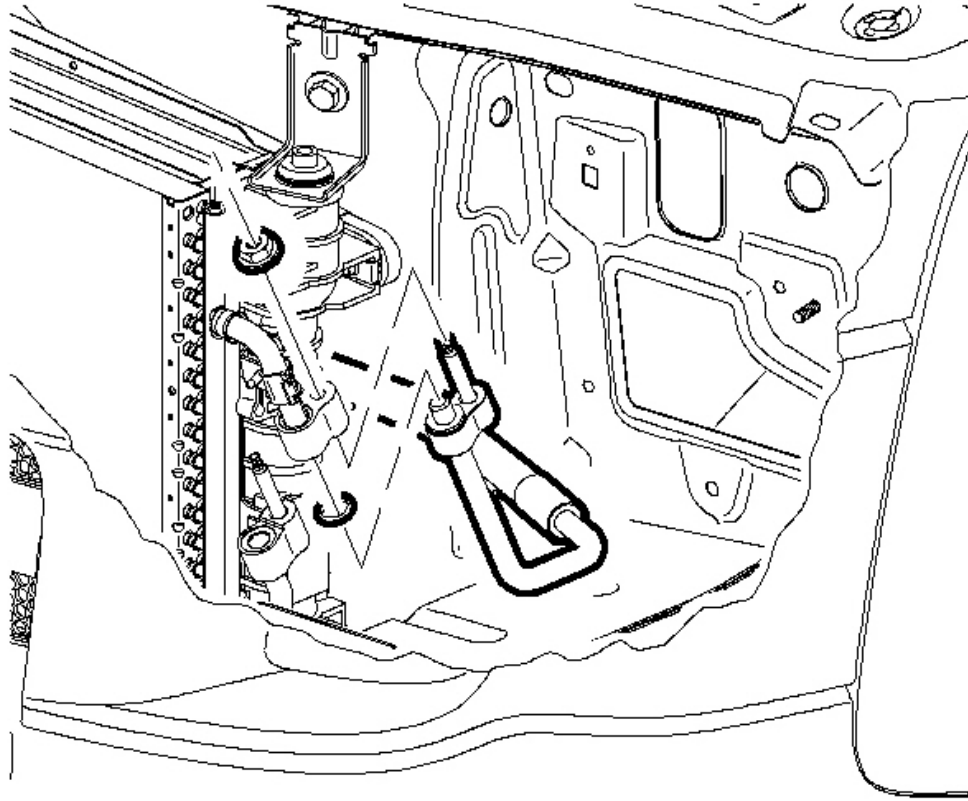
**Fig. 121: CRFM Closeout Panel**  
Courtesy of GENERAL MOTORS CORP.

4. Remove the condenser radiator fan module (CRFM) closeout panel.



**Fig. 122: Receiver Dehydrator, Protective Caps & Liquid Line**  
Courtesy of GENERAL MOTORS CORP.

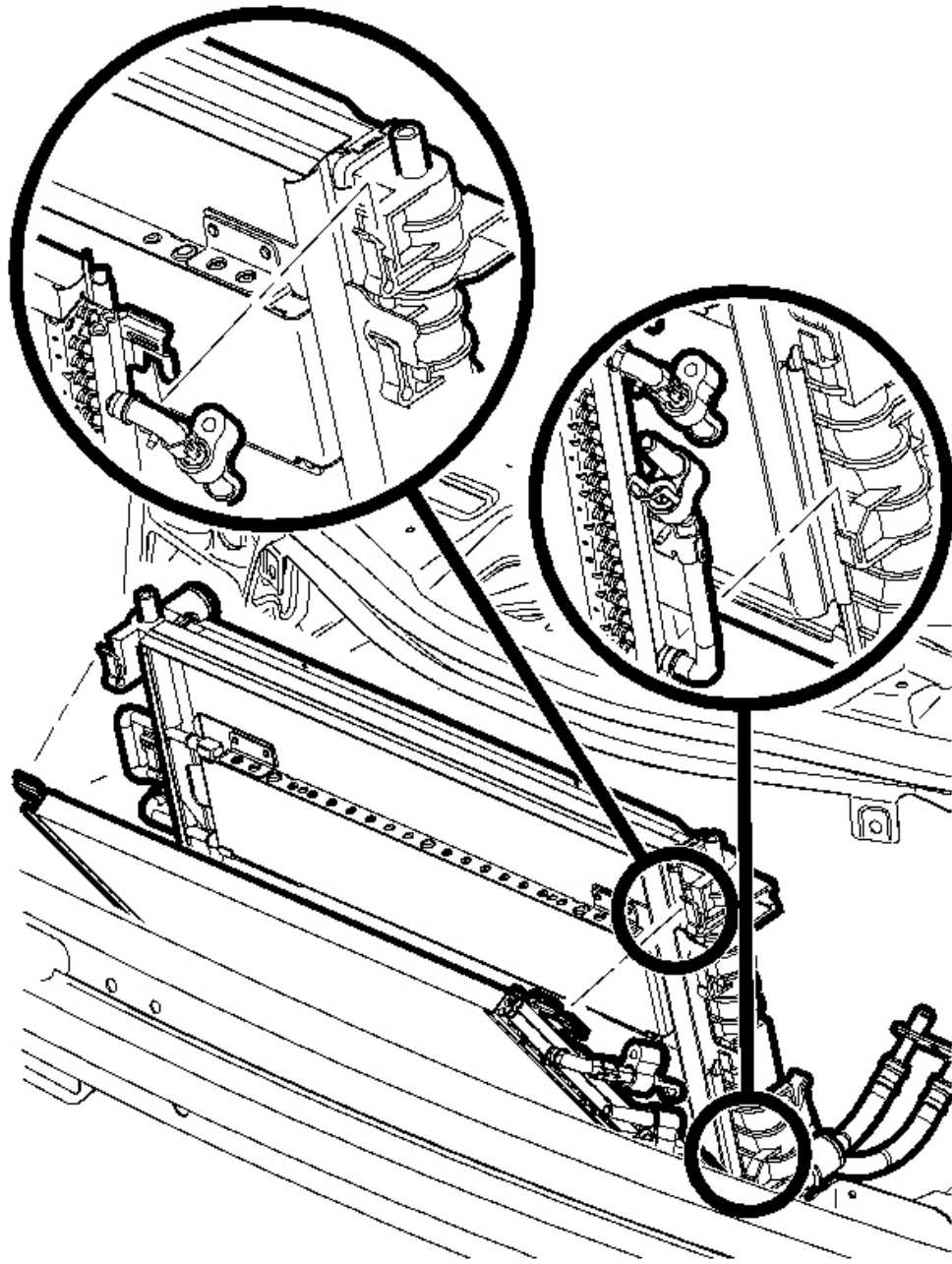
5. Remove receiver dehydrator from the condenser.
6. Install a protective cap to the receiver dehydrator to prevent contamination and desiccant saturation.



**Fig. 123: Compressor Hose, Nut, Condenser & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

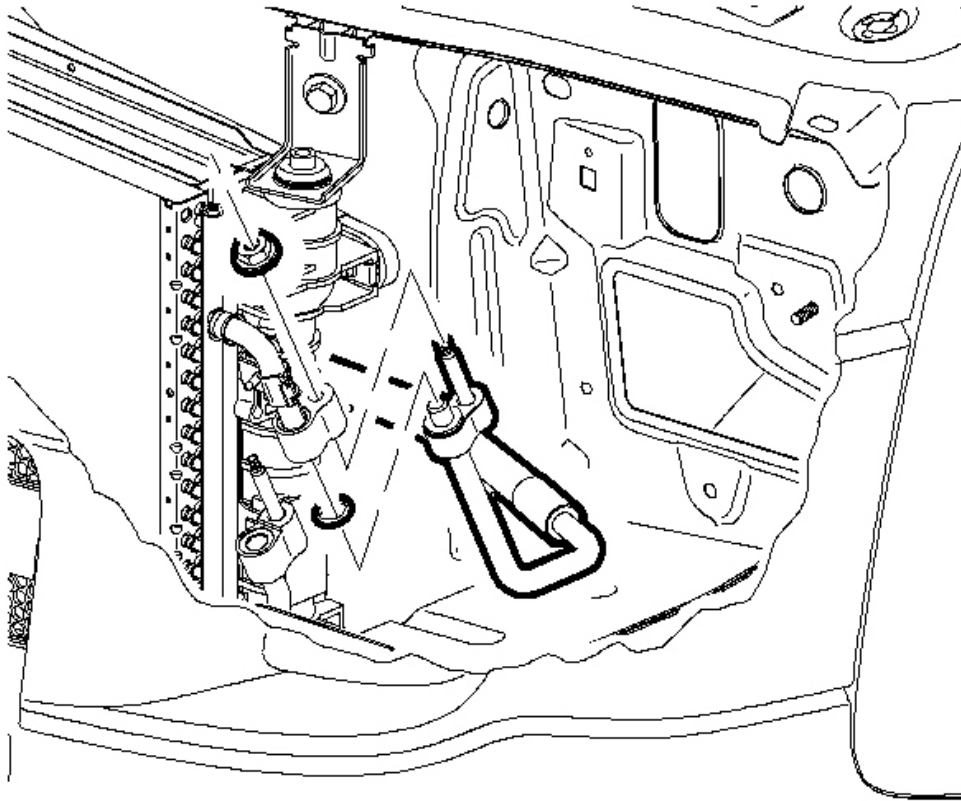
7. Remove the compressor hose from the condenser.
8. Install a protective cap to the compressor hose to prevent contamination and desiccant saturation.
9. Lift the condenser while holding the upper retention tabs forward.
10. Remove the condenser from the vehicle.

#### **Installation Procedure**



**Fig. 124: Inspecting Radiator Condenser Seals For Proper Position**  
Courtesy of GENERAL MOTORS CORP.

1. Add the specified amount of PAG oil to the condenser. Refer to **Refrigerant System Capacities** .
2. Inspect the radiator to condenser seals for the proper position.
3. Install the condenser by guiding the tabs into the retention clips on the radiator. Press down to engage the retention clips.



**Fig. 125: Compressor Hose, Nut, Condenser & Protective Cap**  
Courtesy of GENERAL MOTORS CORP.

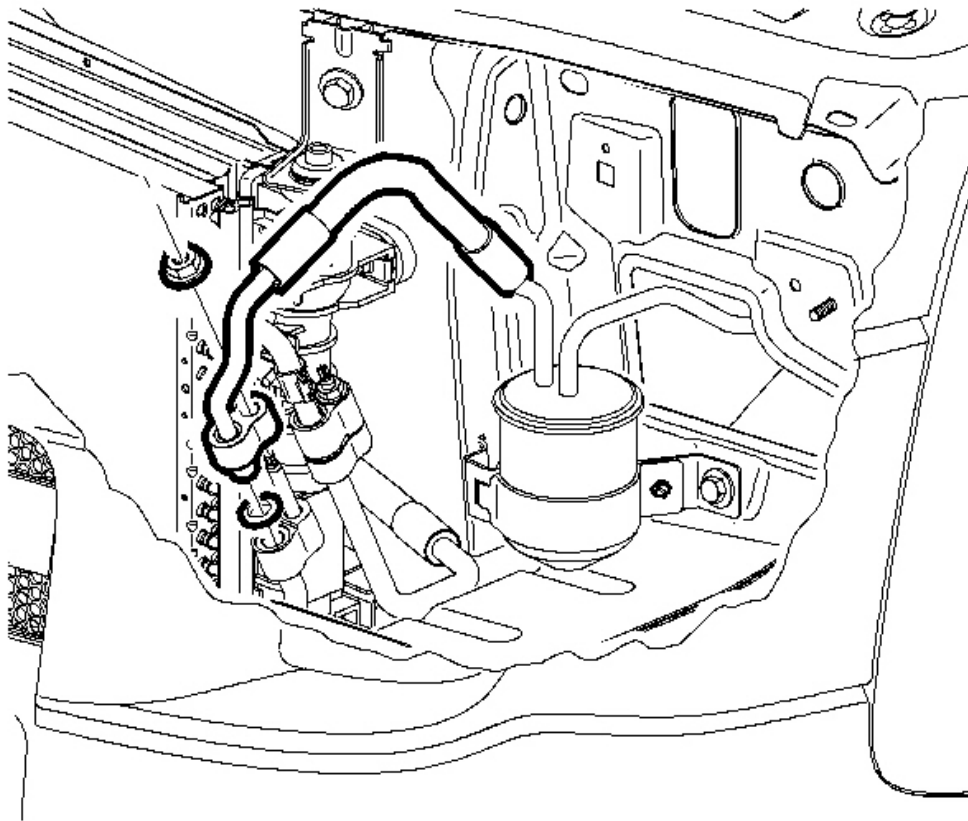
4. Remove the protective cap from the compressor hose.

5. Install a new sealing washer to the compressor hose. Refer to **Sealing Washer Replacement** .
6. Install the compressor hose to the condenser.

**NOTE:** Refer to **Fastener Notice** in **Cautions and Notices**.

7. Install compressor hose nut to the condenser.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).

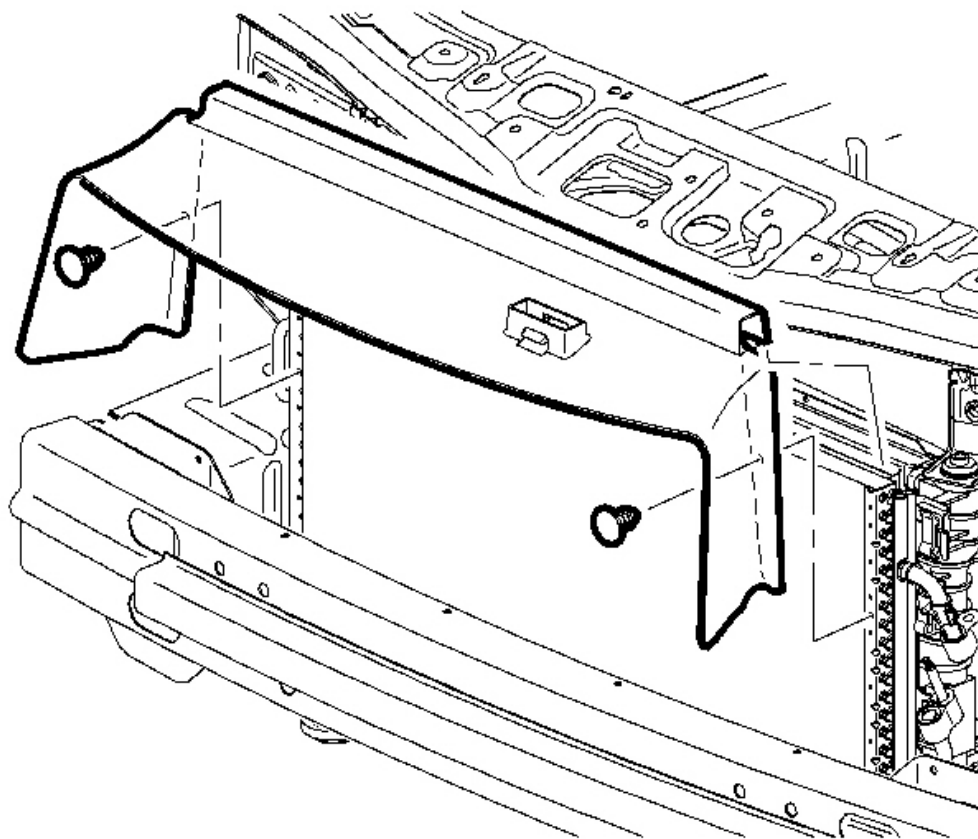


**Fig. 126: Receiver Dehydrator, Condenser & Seal Washer**  
Courtesy of GENERAL MOTORS CORP.



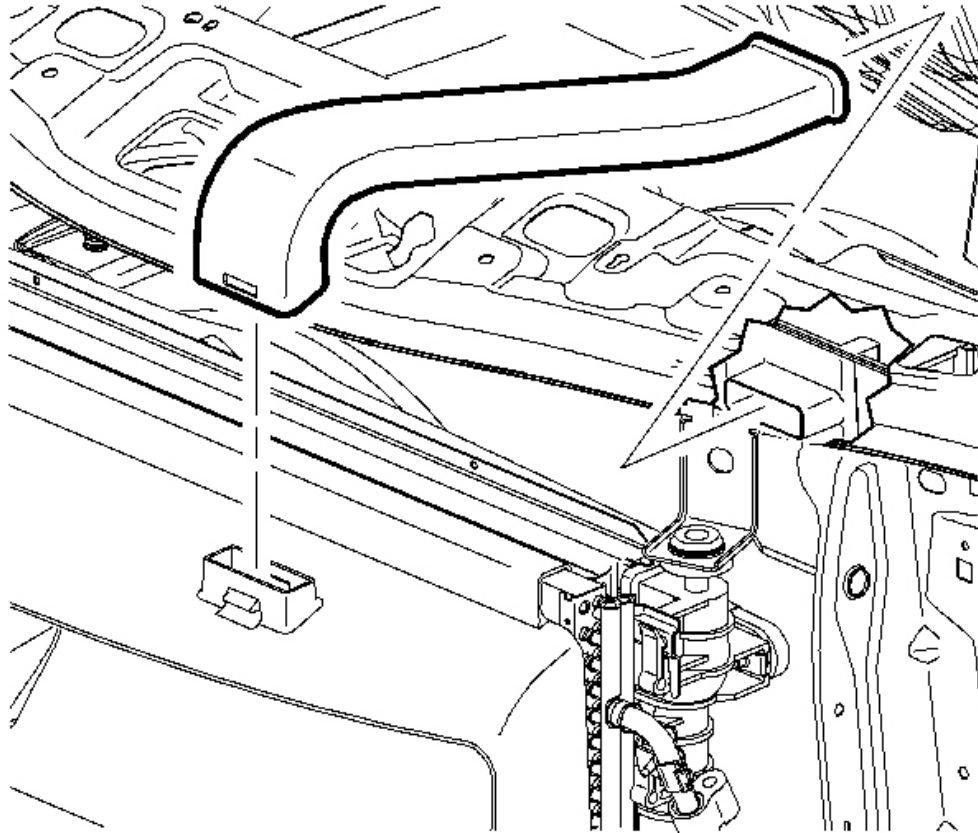
8. Install a new seal washer to the receiver dehydrator. Refer to **Sealing Washer Replacement** .
9. Install the receiver dehydrator to the condenser.
10. Install the receiver dehydrator nut to the condenser.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 127: CRFM Closeout Panel**  
Courtesy of GENERAL MOTORS CORP.

11. Install the CRFM closeout panel.



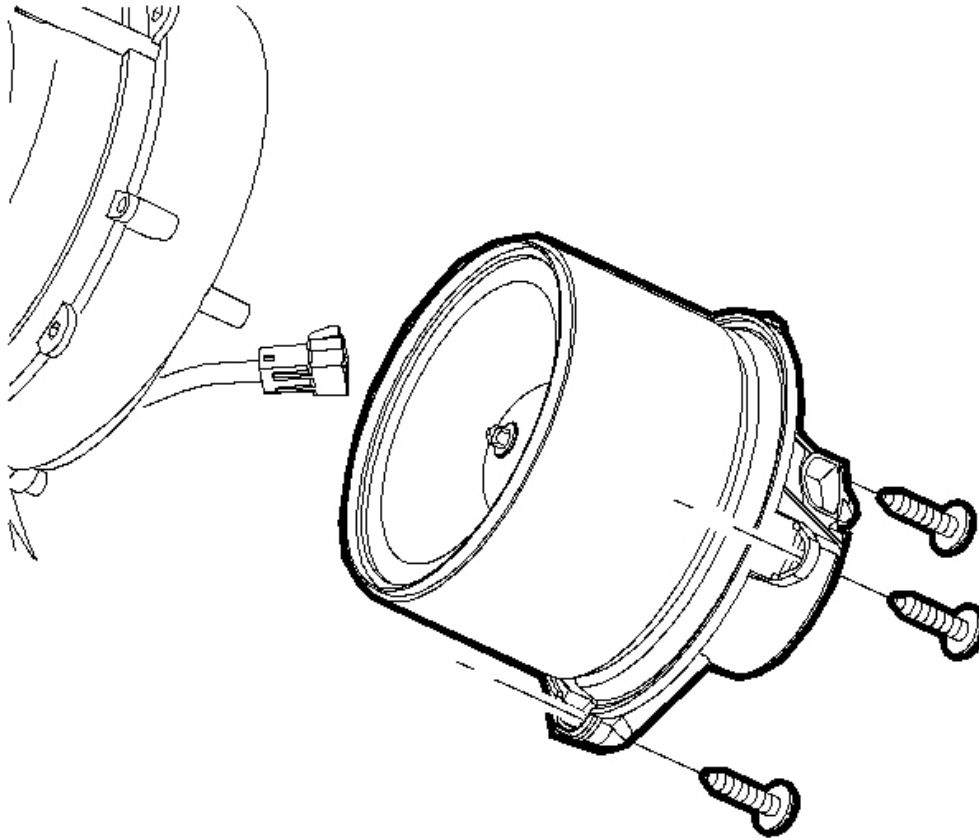
**Fig. 128: Battery Box Air Duct**  
Courtesy of GENERAL MOTORS CORP.

12. For L61 vehicles, install the battery box air duct.
13. Install the front fascia. Refer to **Fascia Replacement - Front Bumper** .
14. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
15. Use **J 39400-A** to test the affected A/C joints leaks. See **Special Tools and Equipment** .

## **BLOWER CASE ASSEMBLY REPLACEMENT**

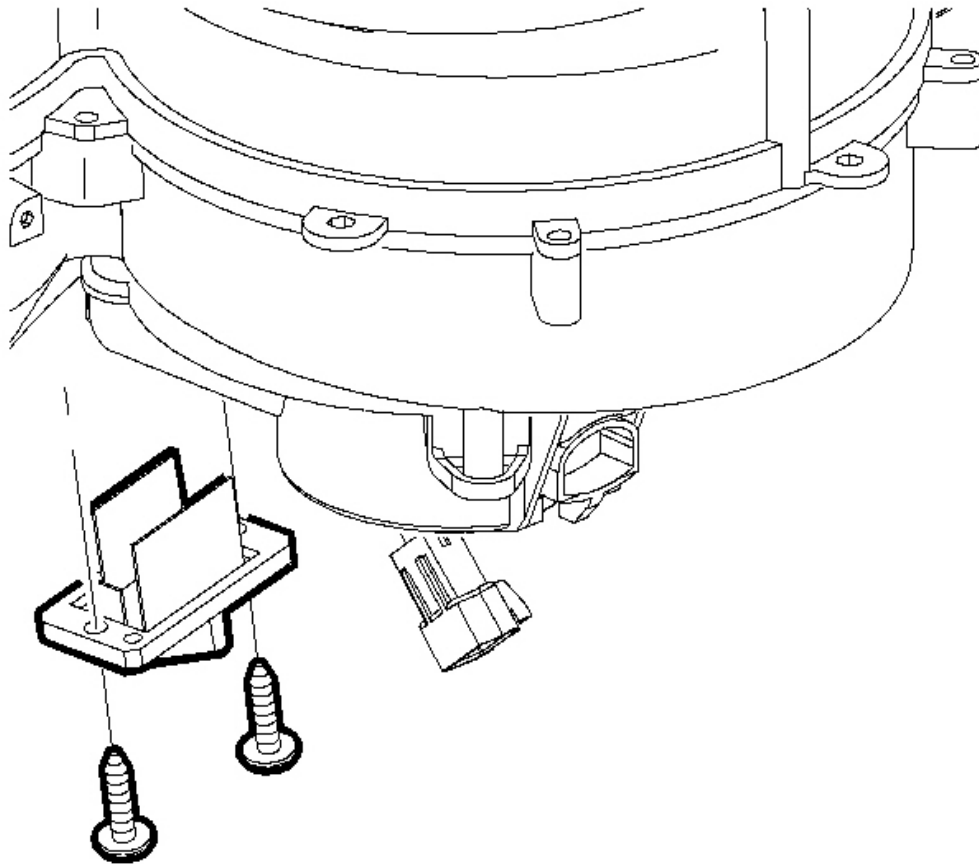
### **Removal Procedure**

1. Remove the evaporator core. Refer to **Evaporator Core Replacement (First Design)** .
2. Remove the air inlet assembly. Refer to **Air Inlet Assembly Replacement** .
3. Remove the HVAC module wire harness from the blower case assembly.



**Fig. 129: Blower Motor Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

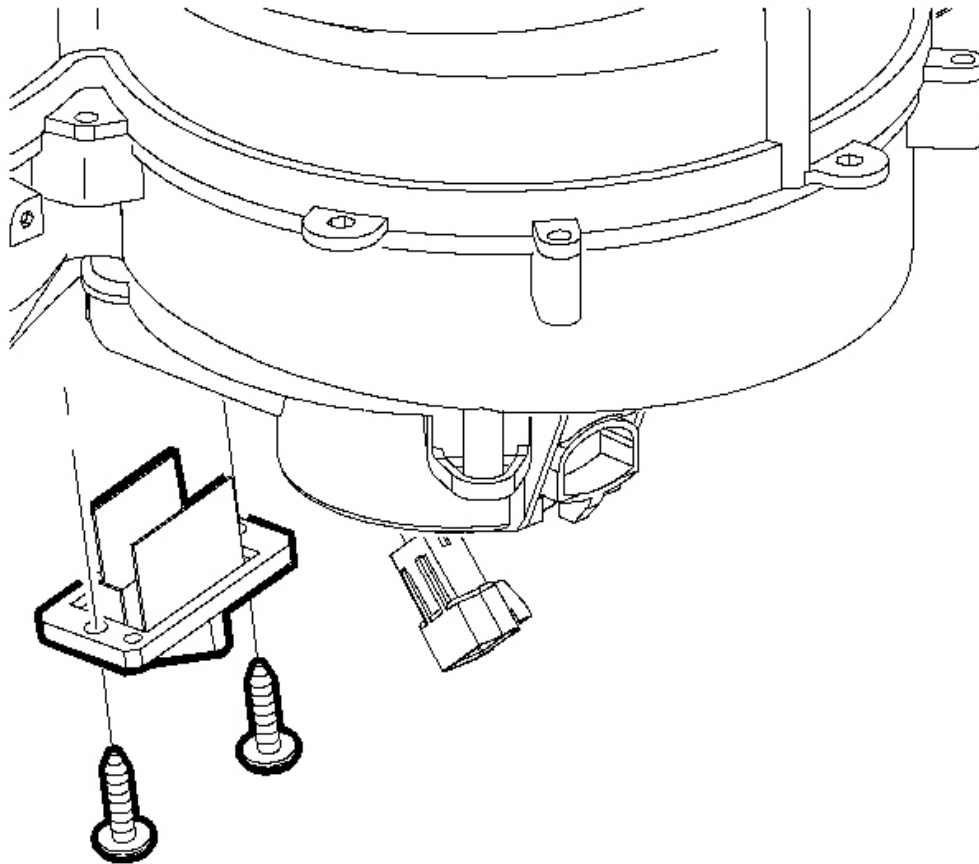
4. Remove the blower motor screws from the blower case assembly.
5. Remove the blower motor from the blower case assembly.



**Fig. 130: Blower Motor Resistor, Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the blower motor resistor screws from the blower case assembly.
7. Remove the blower motor resistor from the blower case assembly.

#### **Installation Procedure**



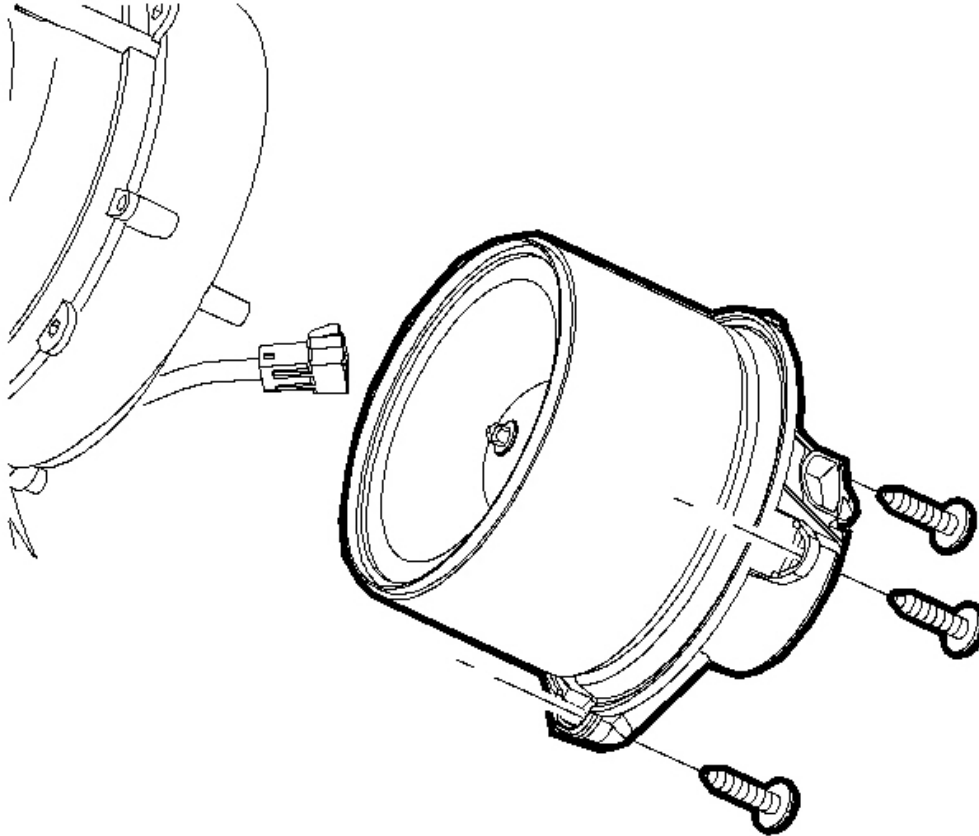
**Fig. 131: Blower Motor Resistor, Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Install the blower motor resistor to the blower case assembly.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

2. Install the blower motor resistor screws to the blower case assembly.

**Tighten:** Tighten the screws to 1 N.m (9 lb in).



**Fig. 132: Blower Motor Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

3. Install the blower motor to the blower case assembly.
4. Install the blower motor screws to the blower case assembly.

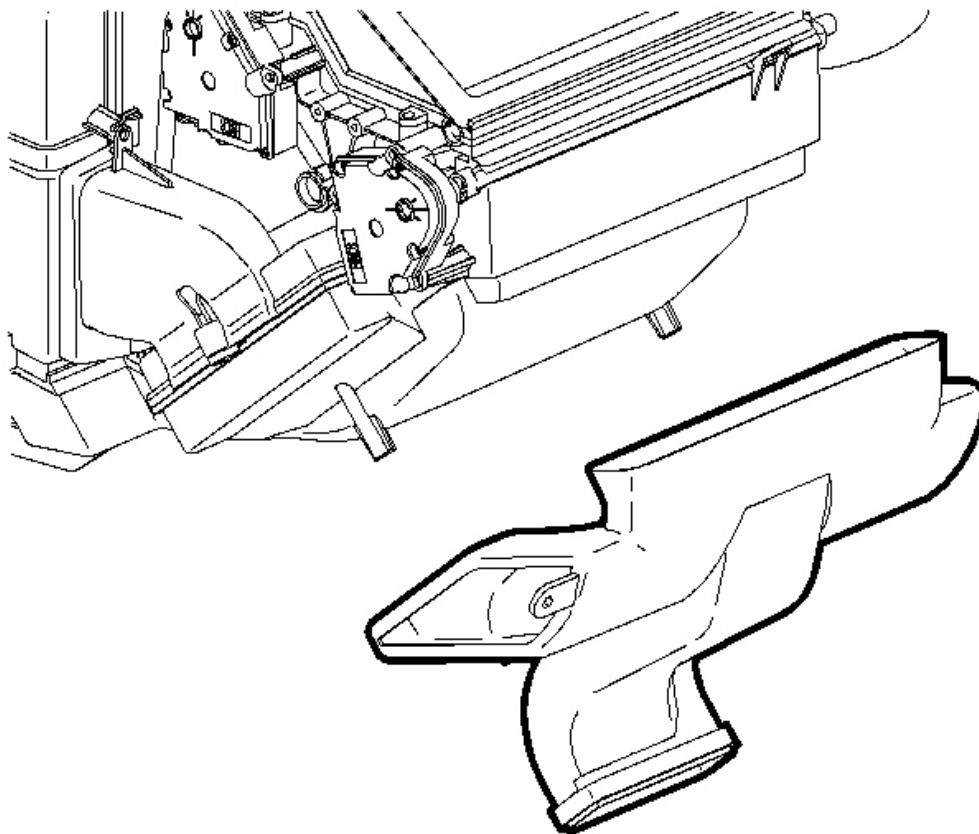
**Tighten:** Tighten the screws to 1 N.m (9 lb in).

5. Install the HVAC module wire harness from the blower case assembly.
6. Install the air inlet assembly. Refer to [Air Inlet Assembly Replacement](#) .
7. Install the evaporator core. Refer to [Evaporator Core Replacement \(First Design\)](#) .

# AIR CONDITIONING (A/C) EVAPORATOR CASE ASSEMBLY REPLACEMENT

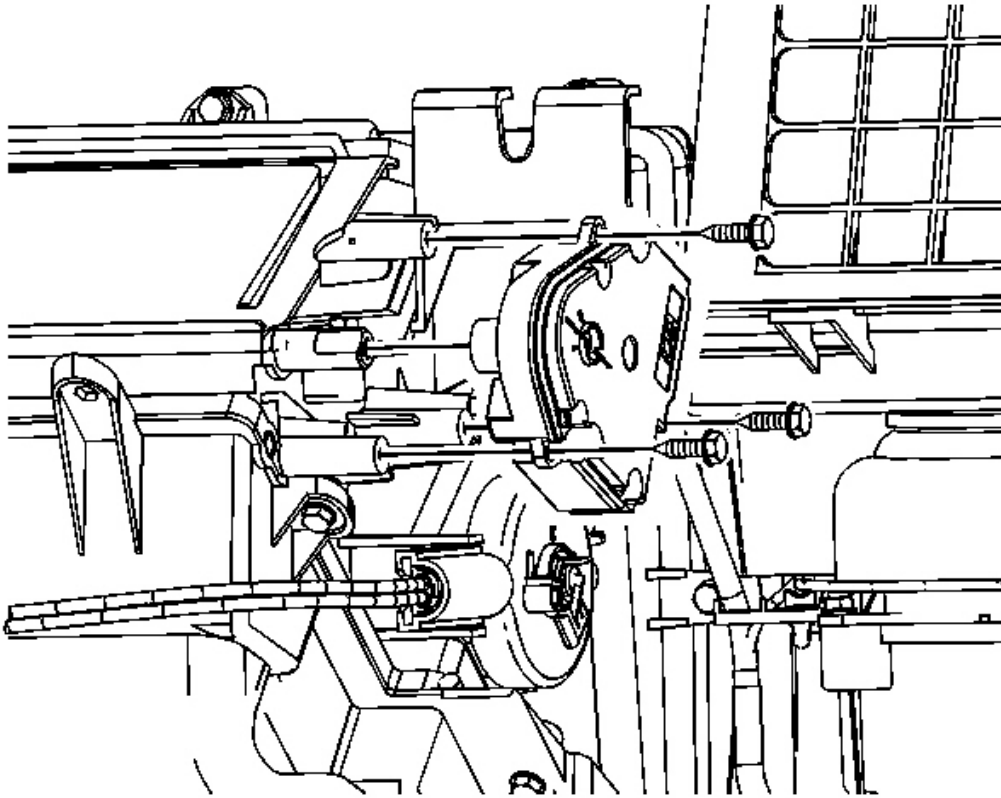
## Removal Procedure

1. Remove the HVAC module. Refer to **HVAC Module Assembly Replacement** .



**Fig. 133: Heater Duct, Screws & Heater Core Cover**  
Courtesy of GENERAL MOTORS CORP.

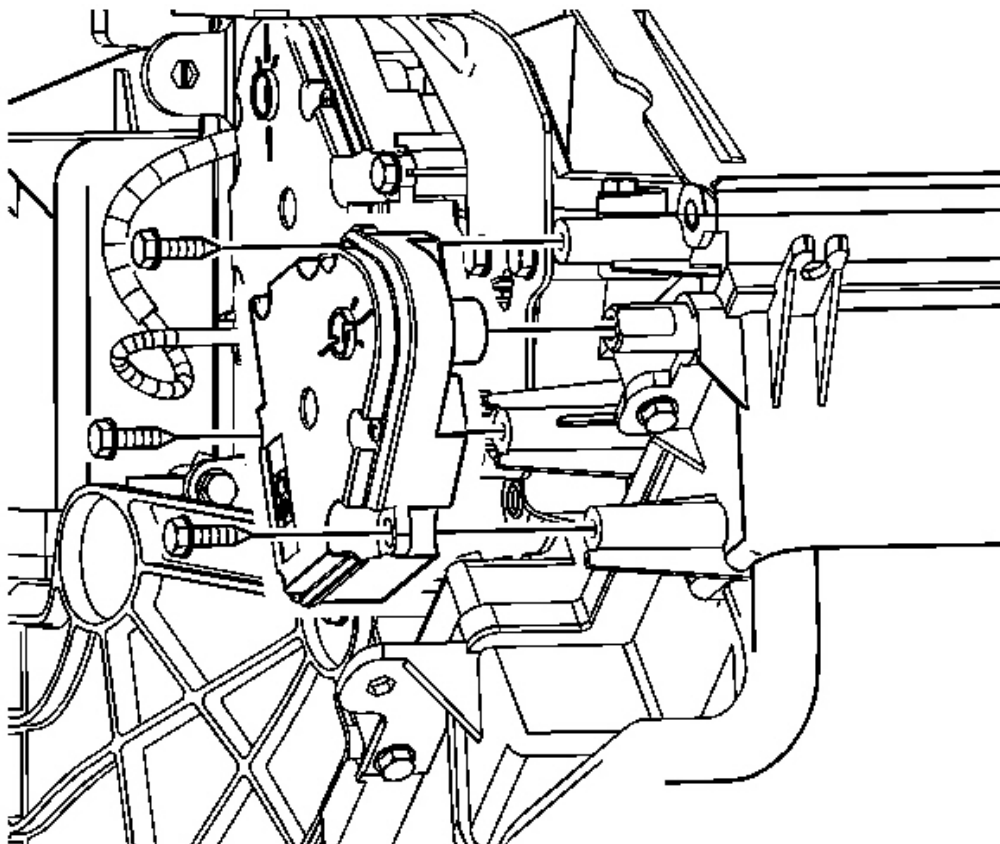
2. Remove the heater duct screws from the heater core cover.
3. Remove the heater duct from the heater core cover.



**Fig. 134: Panel Actuator, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

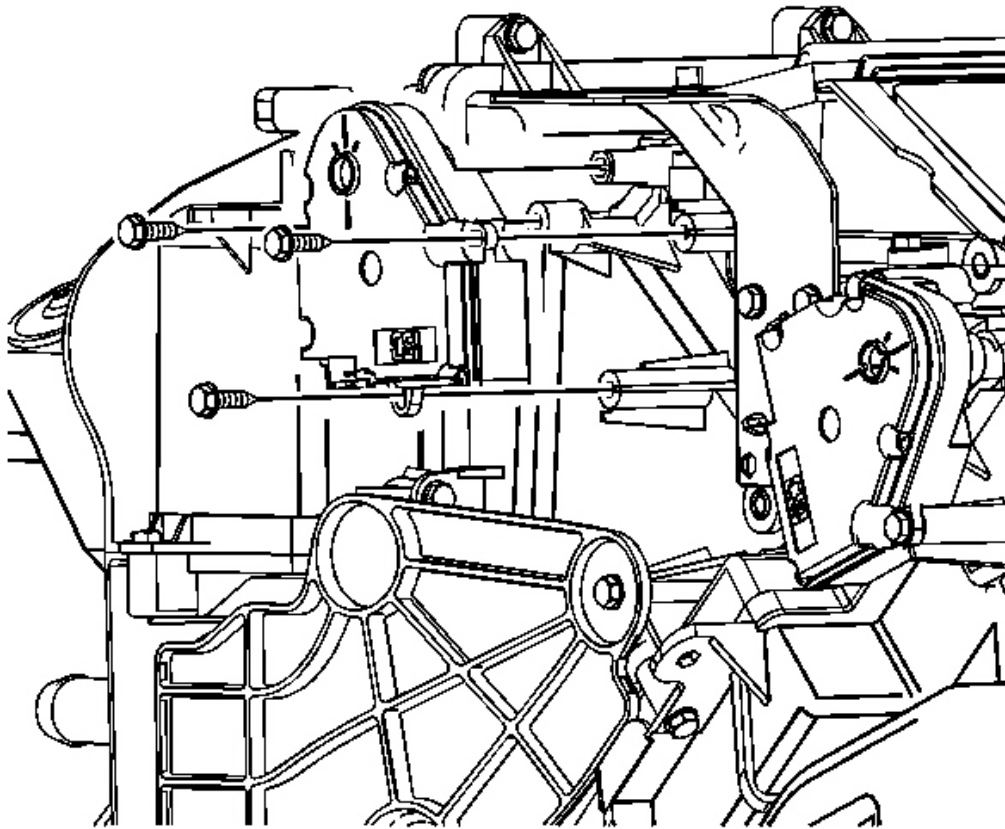
4. Remove the panel actuator screws from the evaporator case assembly.
5. Remove the panel actuator from the evaporator case assembly.





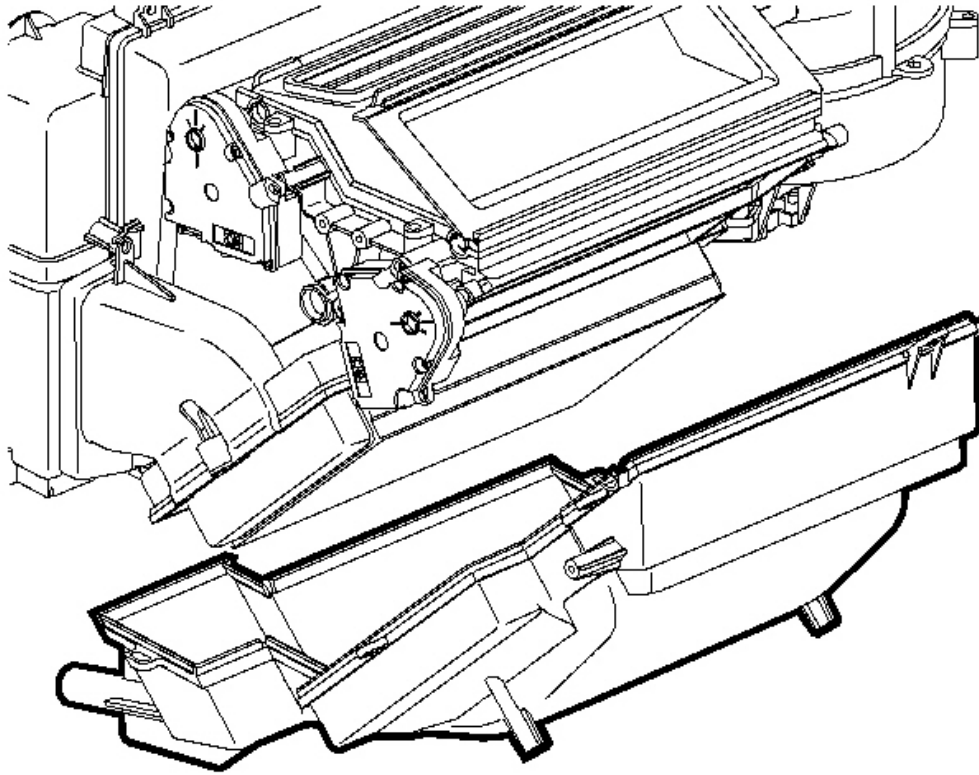
**Fig. 135: Floor Actuator, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

6. Remove the floor actuator screws from the evaporator case assembly.
7. Remove the floor actuator from the evaporator case assembly.



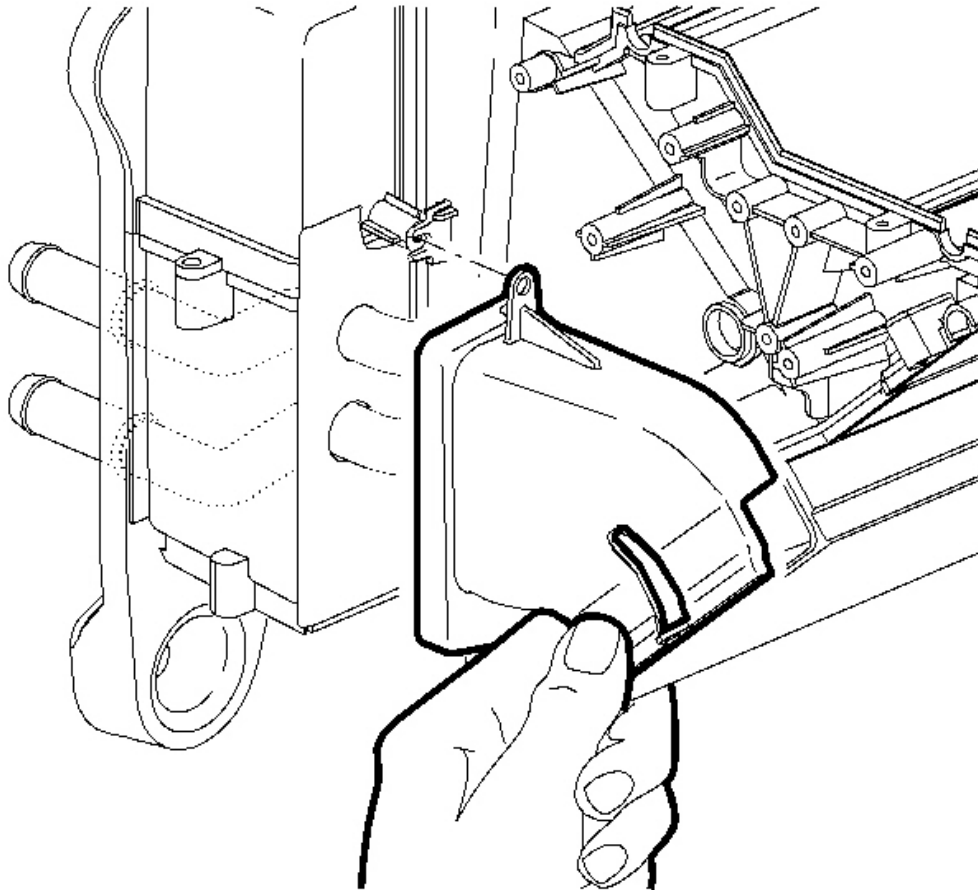
**Fig. 136: Defrost Actuator, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

8. Remove the defrost actuator screws from the evaporator case assembly.
9. Remove the defrost actuator from the evaporator case assembly.



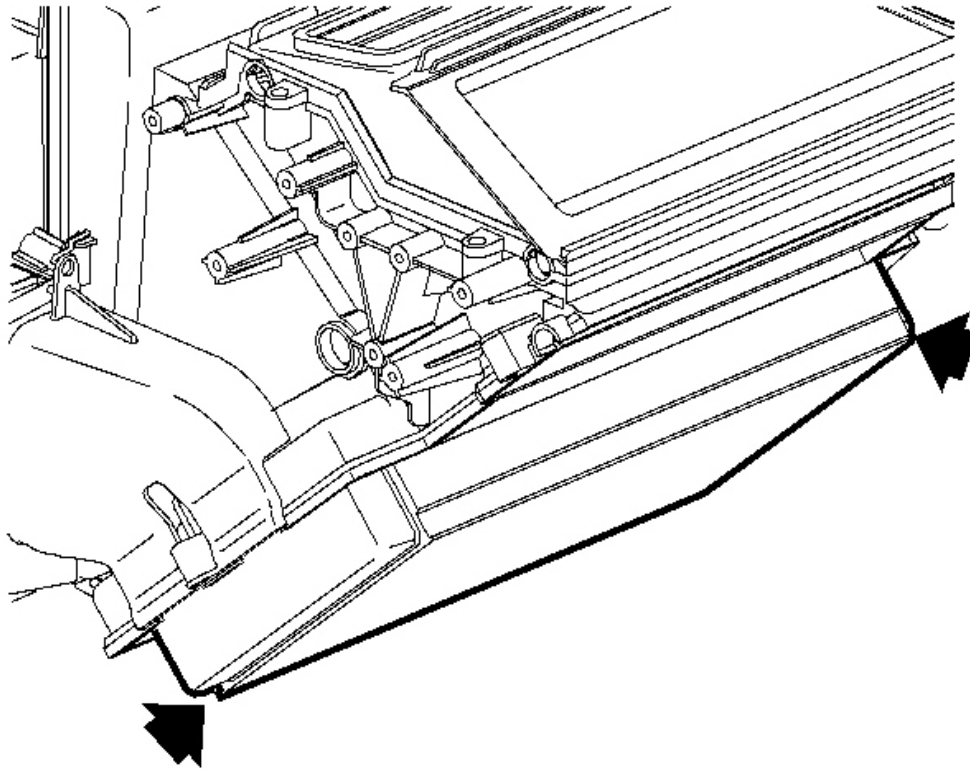
**Fig. 137: Heater Core Cover, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

10. Remove the heater core cover screws from the evaporator case assembly.
11. Remove the heater core cover from the evaporator case assembly.



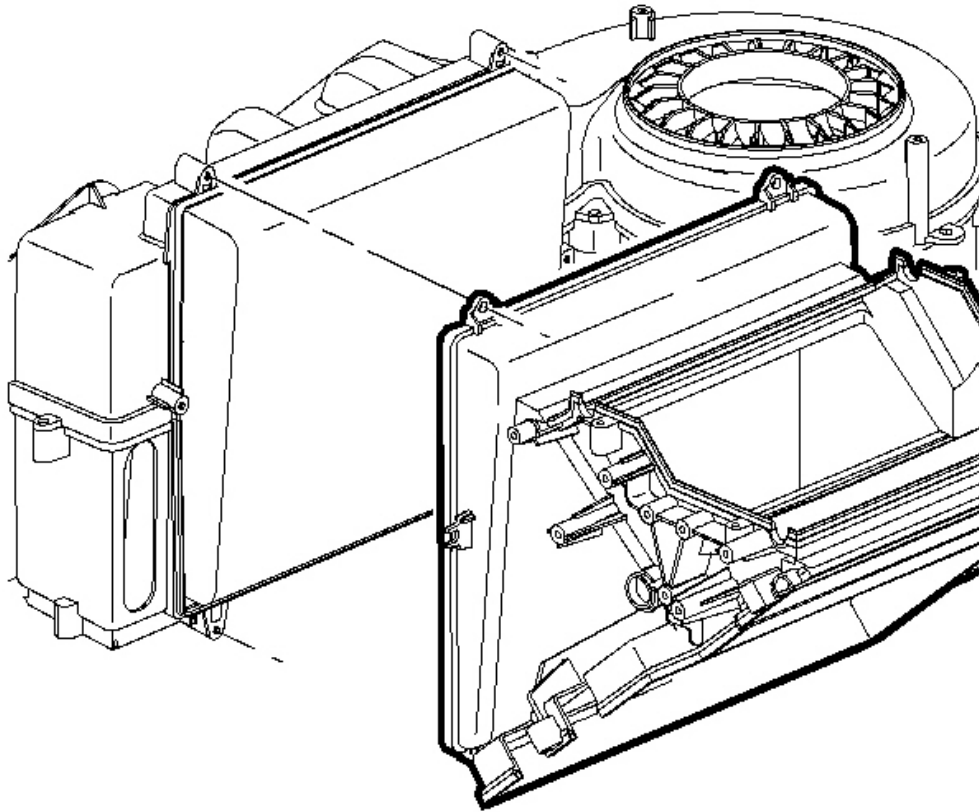
**Fig. 138: Heater Core Pipe Cover**  
**Courtesy of GENERAL MOTORS CORP.**

12. Remove the heater core pipe cover screw.
13. Remove the heater core pipe cover.
14. Remove the heater core pipe seal.



**Fig. 139: Heater Core & End Tanks**  
Courtesy of GENERAL MOTORS CORP.

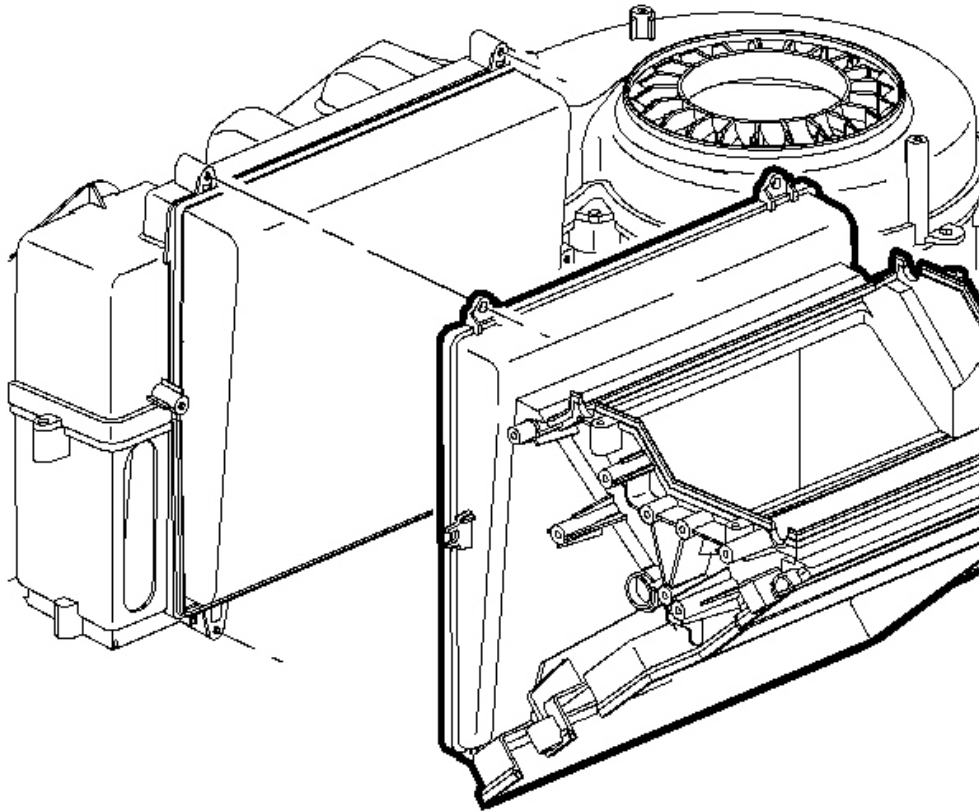
15. Grasp the heater core at the end tanks and remove. Spraying perimeter of heater core seal with a soap and water mixture will ease removal.



**Fig. 140: Evaporator Case Assembly, Screws & Blower Case Assembly**  
**Courtesy of GENERAL MOTORS CORP.**

16. Remove the evaporator case assembly screws from the blower case assembly.
17. Remove the evaporator case assembly from the blower case assembly.

#### **Installation Procedure**



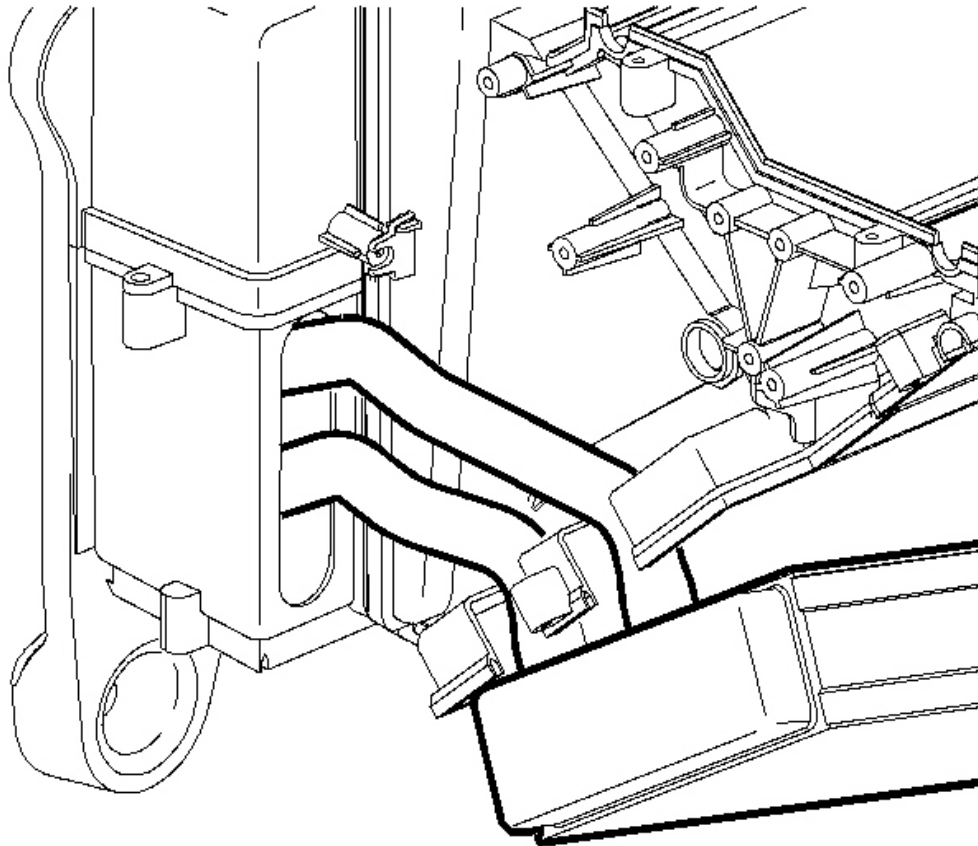
**Fig. 141: Evaporator Case Assembly, Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Install evaporator case assembly to the blower case assembly.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

2. Install evaporator case assembly screws to the blower case assembly.

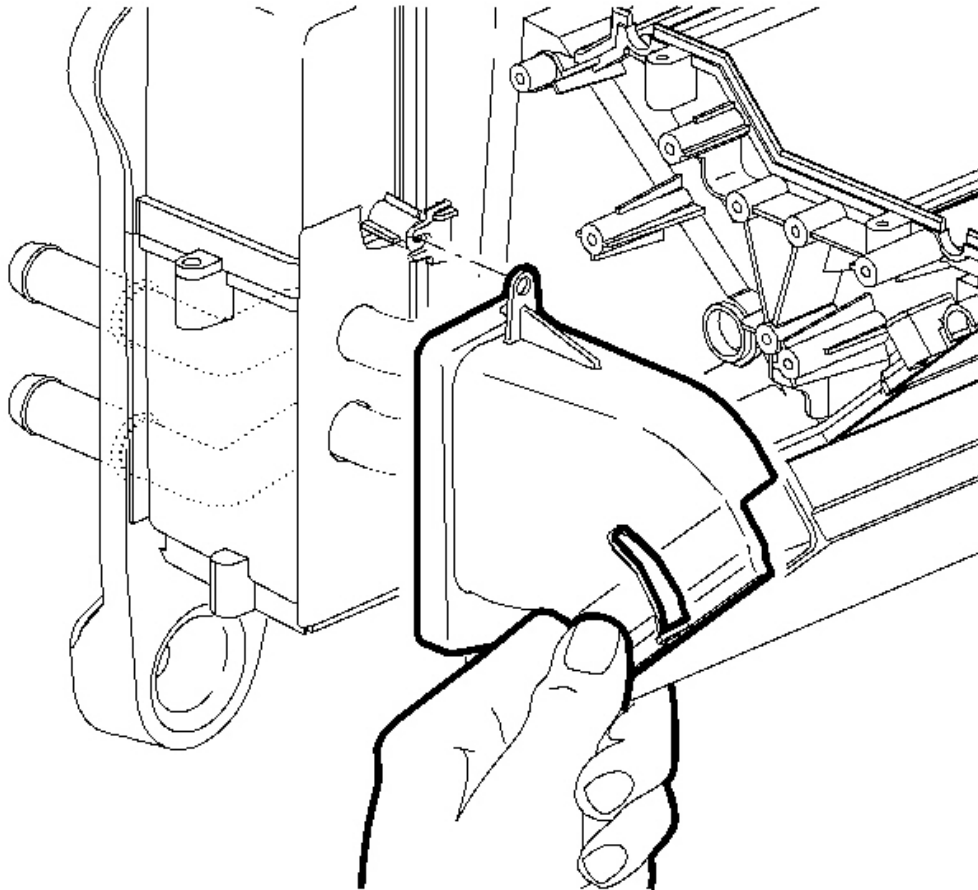
**Tighten:** Tighten the screws to 1 N.m (9 lb in).



**Fig. 142: Heater Core & Pipe Seal**  
Courtesy of GENERAL MOTORS CORP.

3. Install heater core. Spraying perimeter of heater core seal with a soap and water mixture will ease installation.
4. Install heater core pipe seal.

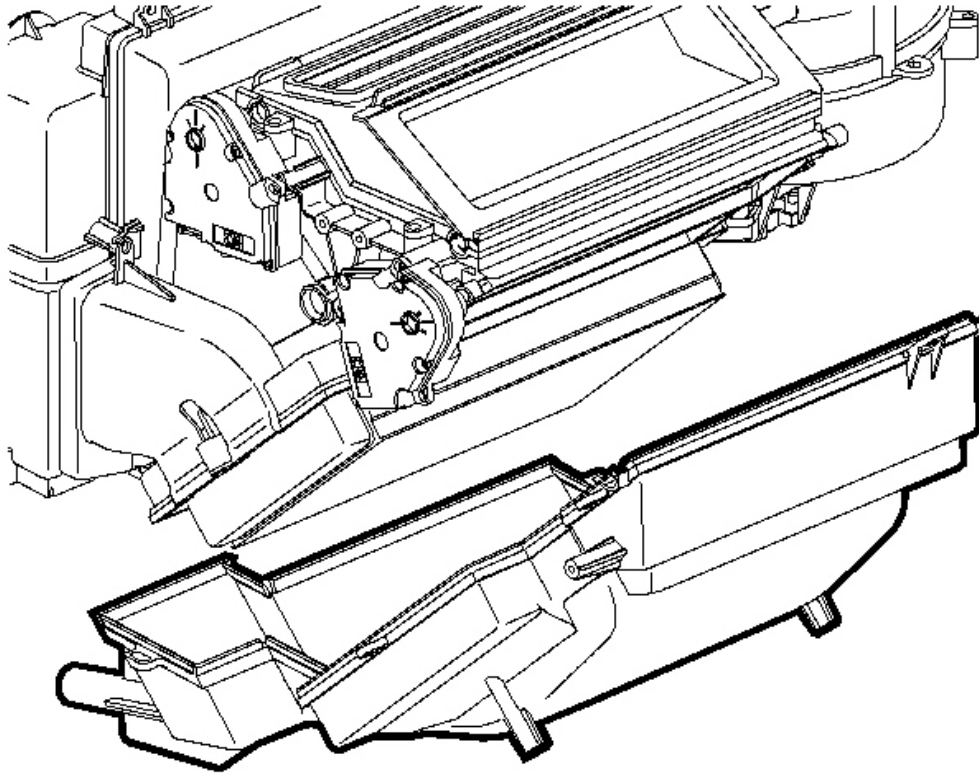




**Fig. 143: Heater Core Pipe Cover**  
Courtesy of GENERAL MOTORS CORP.

5. Install heater core pipe cover.
6. Install heater core pipe cover screw.

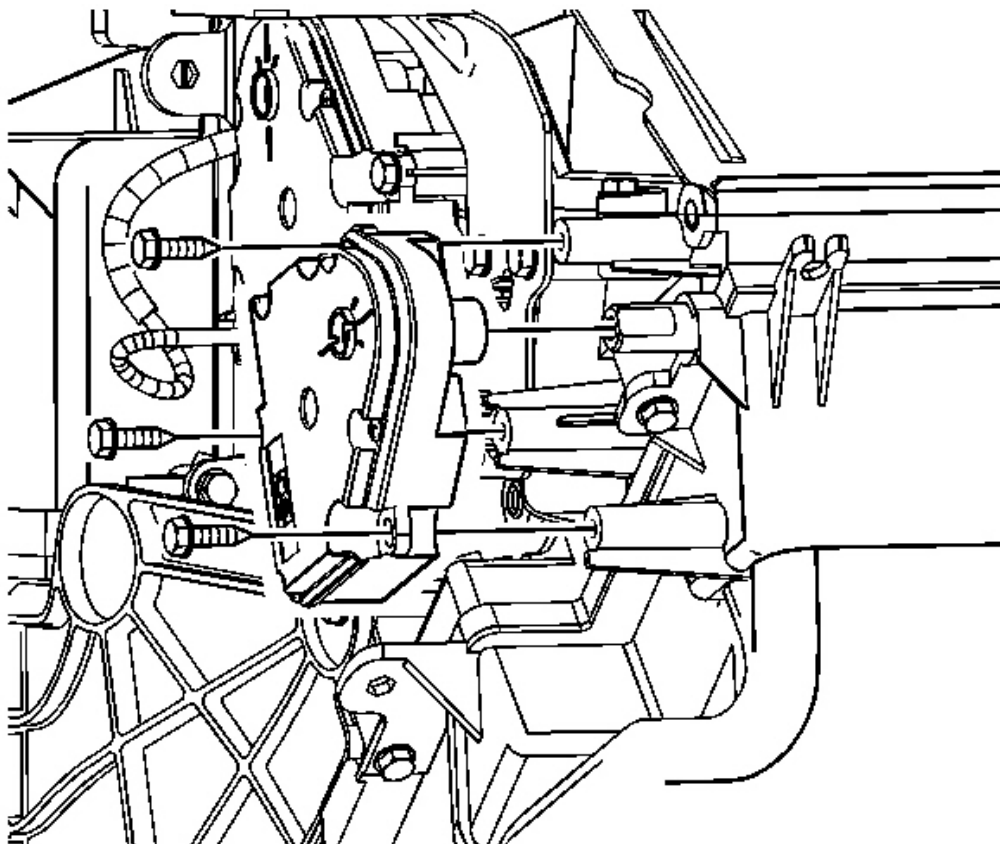
**Tighten:** Tighten the screw to 1 N.m (9 lb in).



**Fig. 144: Heater Core Cover, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

7. Install heater core cover.
8. Install heater core cover screws.

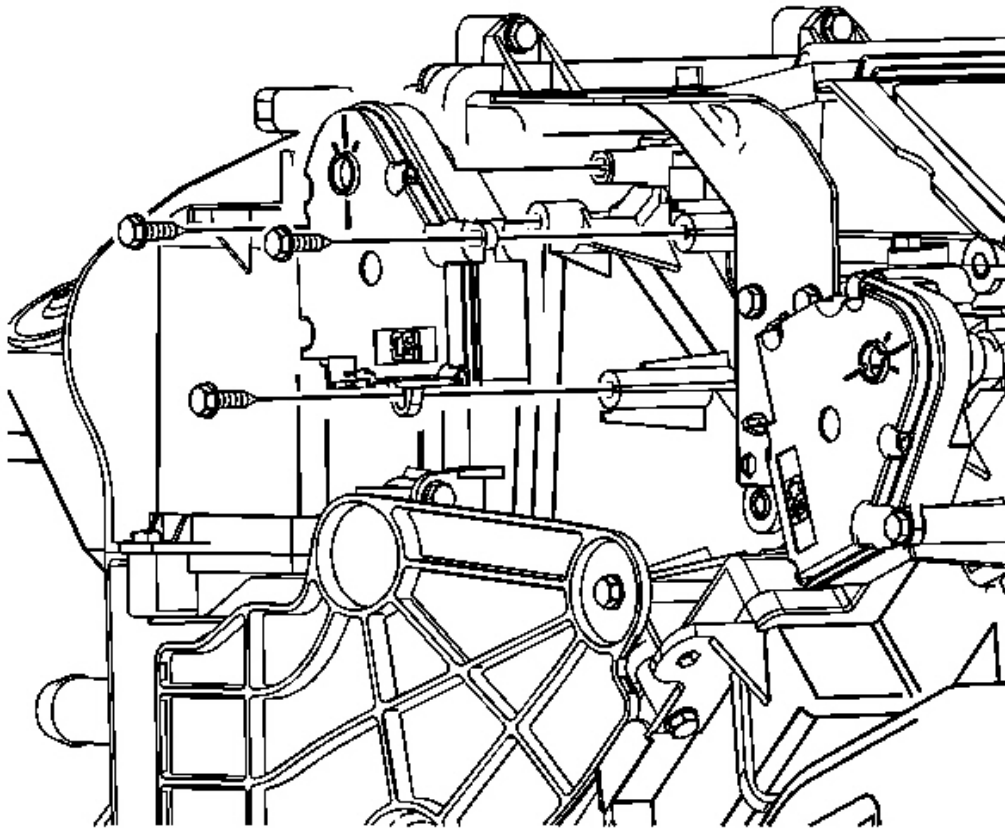
**Tighten:** Tighten the screws to 1 N.m (9 lb in).



**Fig. 145: Floor Actuator, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

9. Install the floor actuator to the evaporator case assembly.
10. Install the floor actuator screws to the evaporator case assembly.

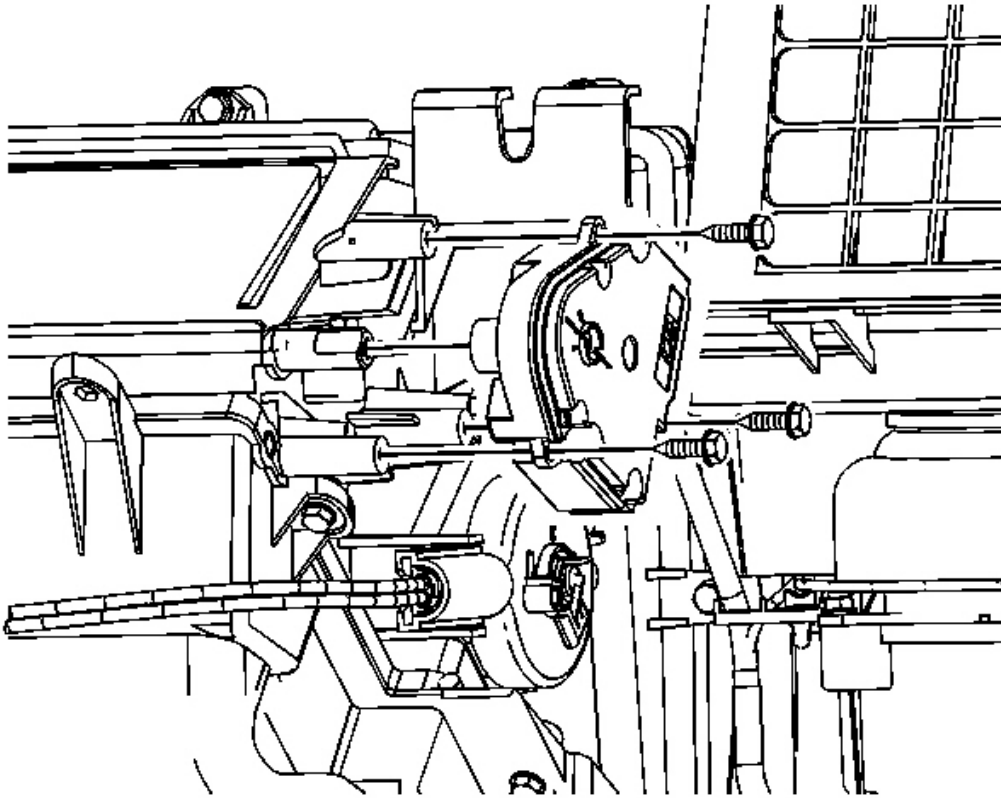
**Tighten:** Tighten the screws to 1 N.m (9 lb in).



**Fig. 146: Defrost Actuator, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

11. Install the defrost actuator to the evaporator case assembly.
12. Install the defrost actuator screws to the evaporator case assembly.

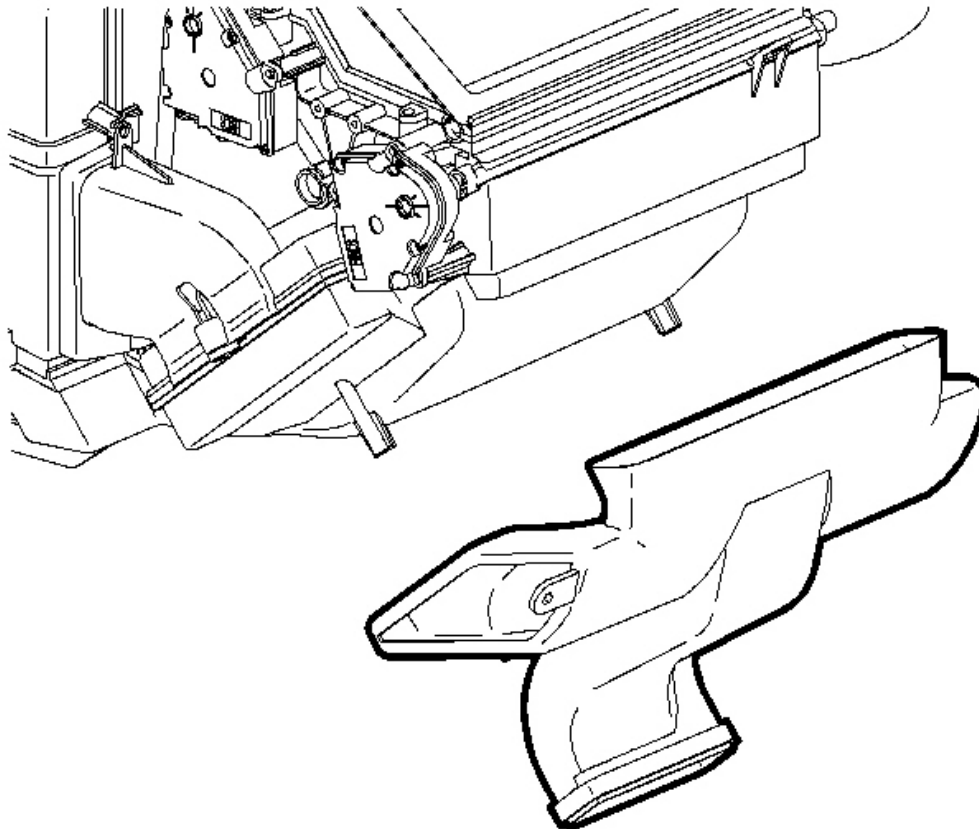
**Tighten:** Tighten the screws to 1 N.m (9 lb in).



**Fig. 147: Panel Actuator, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

13. Install the panel actuator to the evaporator case assembly.
14. Install the panel actuator screws to the evaporator case assembly.

**Tighten:** Tighten the screws to 1 N.m (9 lb in).



**Fig. 148: Heater Duct, Screws & Heater Core Cover**  
Courtesy of GENERAL MOTORS CORP.

15. Install the heater duct.
16. Install the heater duct screws.

**Tighten:** Tighten the screws to 1 N.m (9 lb in).

17. Install the HVAC module. Refer to **HVAC Module Assembly Replacement** .

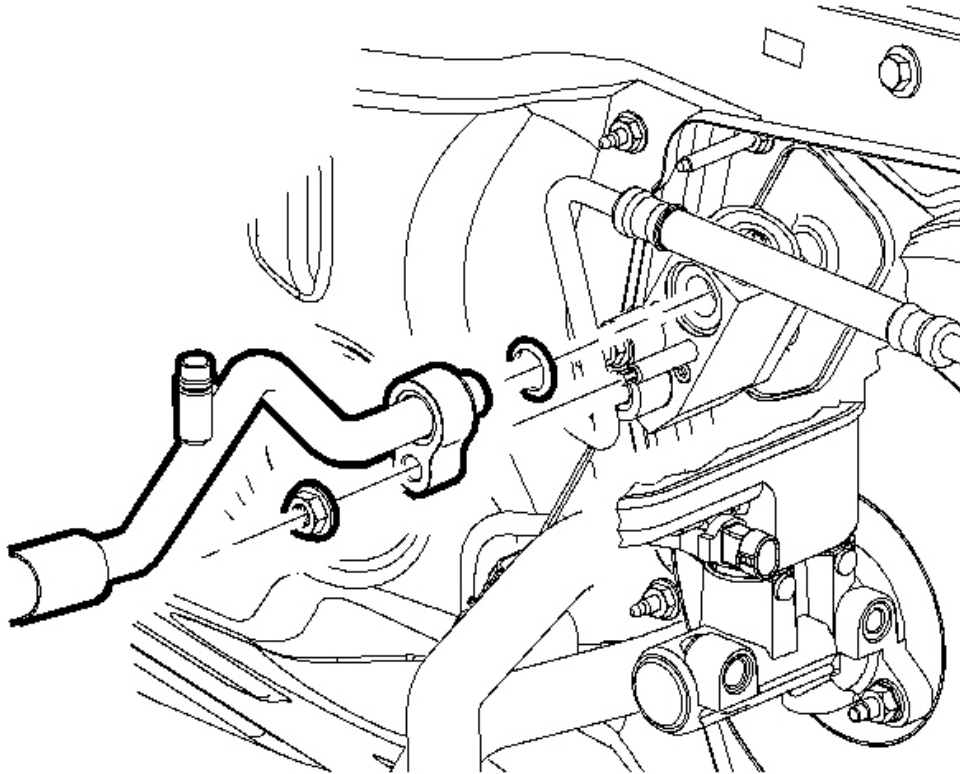
## **HVAC MODULE ASSEMBLY REPLACEMENT**

### **Tools Required**

- **J 39400-A** Halogen Leak Detector. See **Special Tools and Equipment** .
- **SA9111E** Hose Clamp Pliers. See **Special Tools and Equipment** .

### Removal Procedure

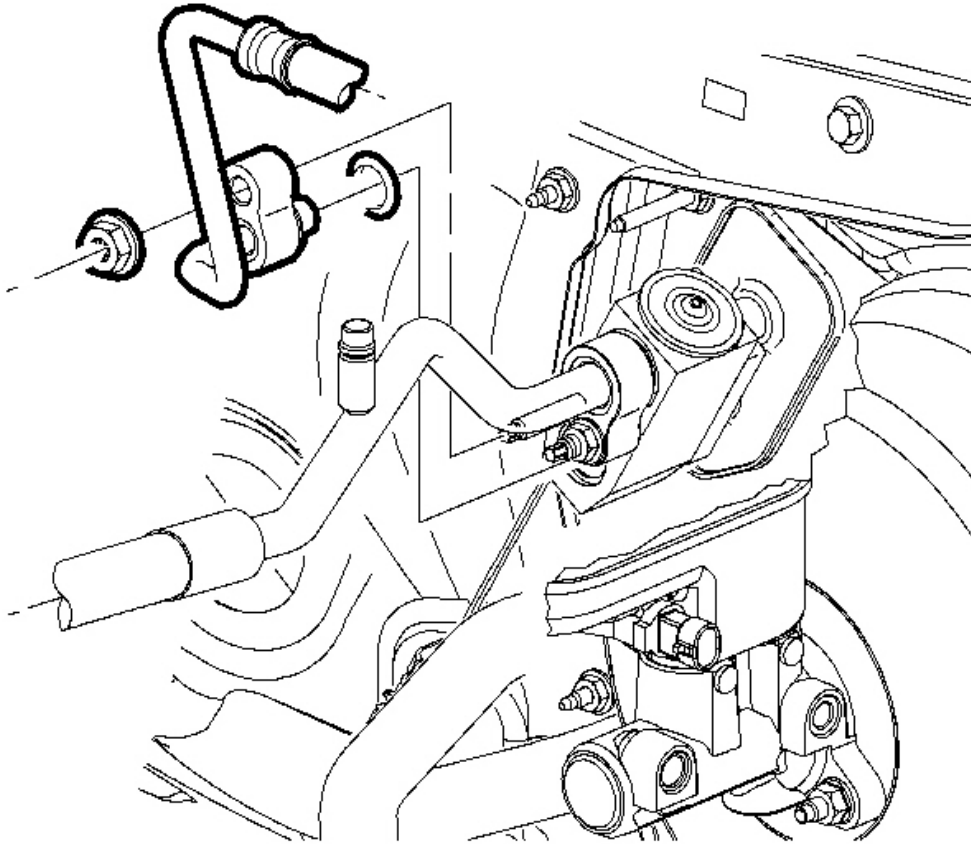
1. Disable the frontal and curtain air bags. Refer to **SIR Disabling and Enabling Zone 2** , **SIR Disabling and Enabling Zone 3** , **SIR Disabling and Enabling Zone 5** , and **SIR Disabling and Enabling Zone 6** in SIR.
2. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** .
3. Drain the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.



**Fig. 149: Compressor Hose, Nut & TXV**

Courtesy of GENERAL MOTORS CORP.

4. Remove the evaporator outlet hose nut from the TXV.
5. Remove the evaporator outlet hose from the TXV.
6. Remove and discard the sealing washer from the evaporator outlet hose. Refer to **Sealing Washer Replacement** .
7. Install a protective cap to the evaporator outlet hose to prevent contamination and desiccant saturation.

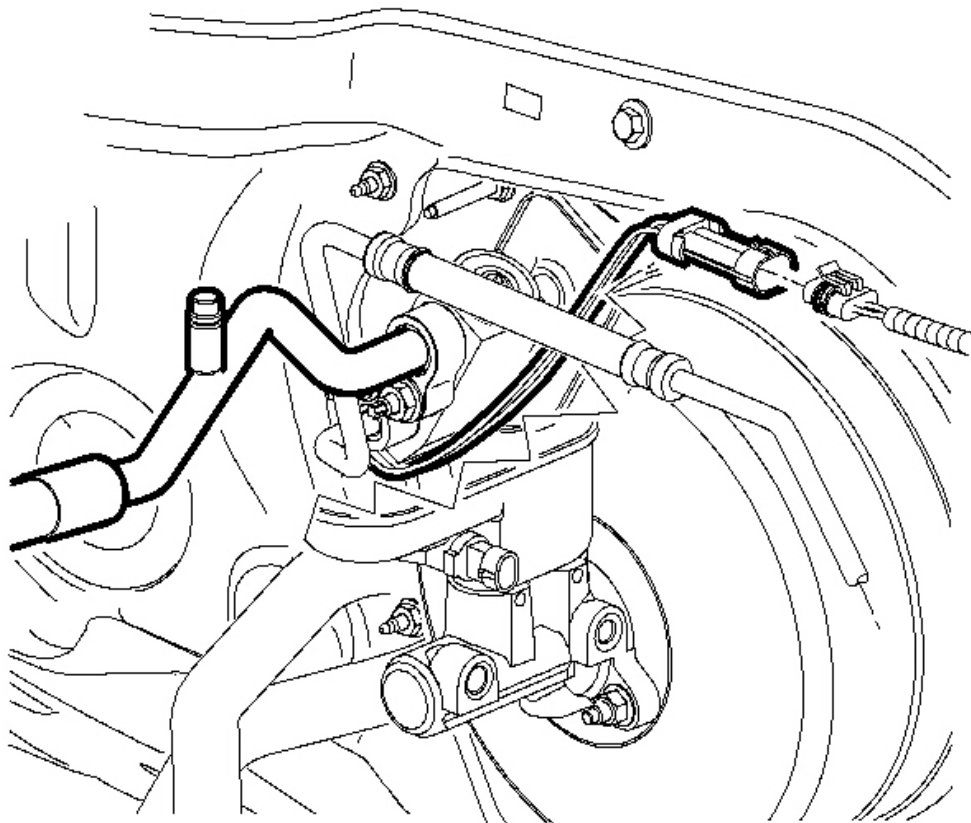


**Fig. 150: Liquid Line, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

8. Remove the liquid line nut from the TXV.

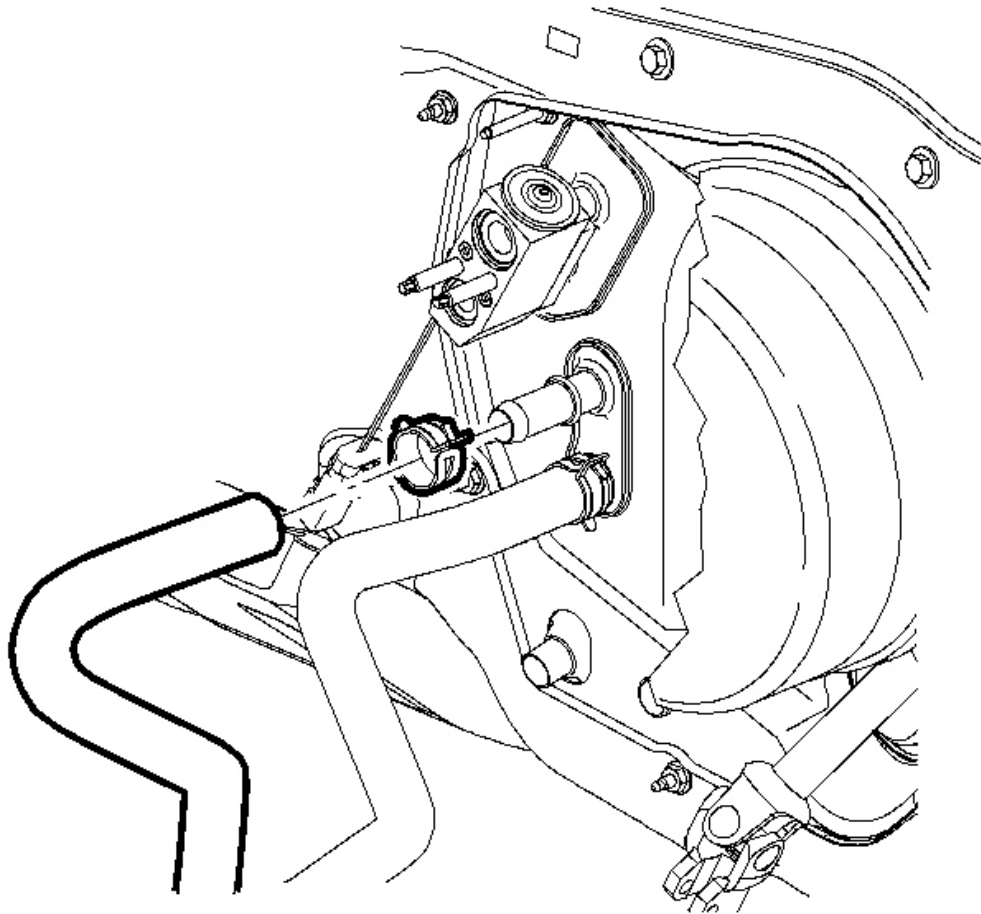


9. Remove the liquid line from the TXV.
10. Remove and discard the sealing washer from the liquid line. Refer to **Sealing Washer Replacement** .
11. Install a protective cap to the liquid line to prevent contamination and desiccant saturation.



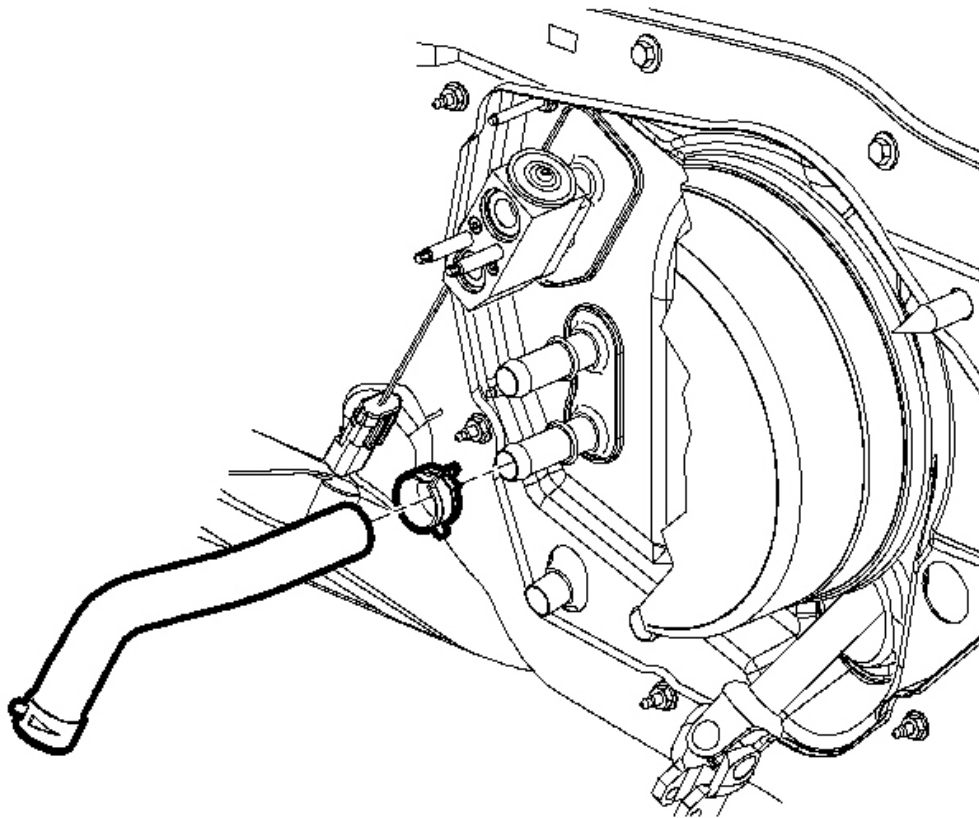
**Fig. 151: Refrigerant Low Temperature Sensor & Engine Harness**  
Courtesy of GENERAL MOTORS CORP.

12. Disconnect the TXV low temperature sensor connector from the engine harness.



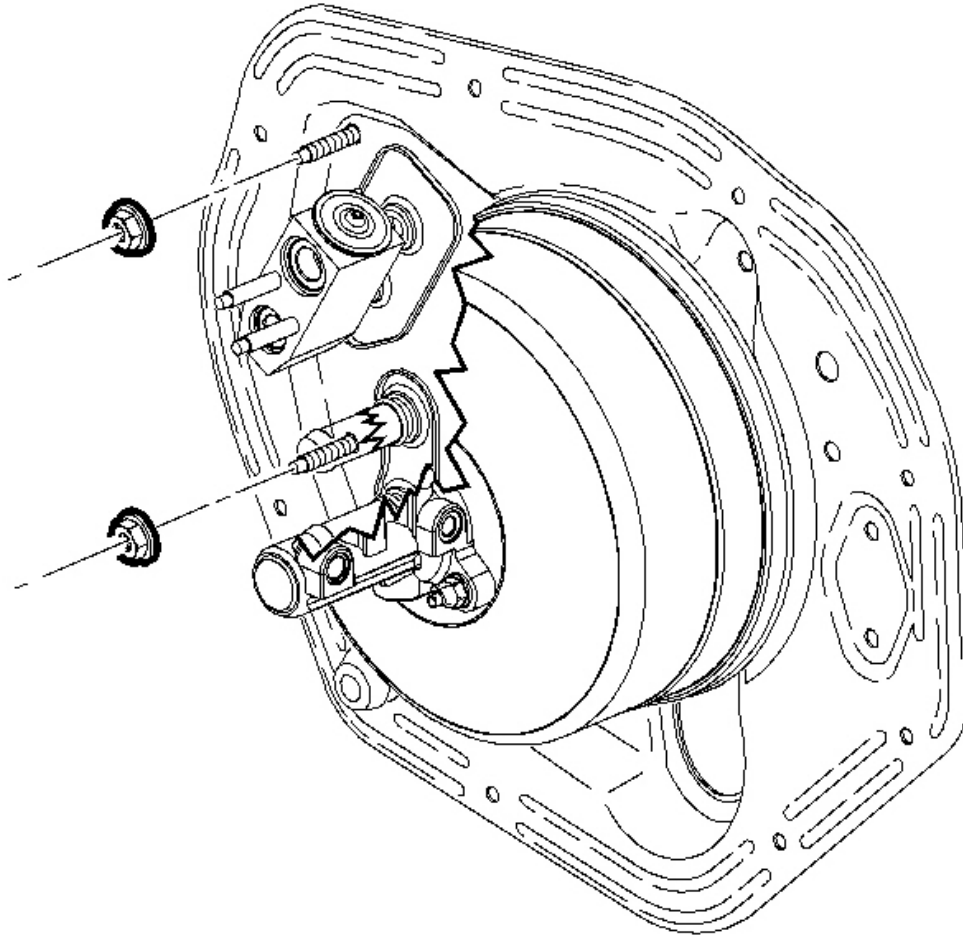
**Fig. 152: Heater Outlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

13. Reposition the heater outlet hose clamp at the heater core using **SA9111E** . See **Special Tools and Equipment** .
14. Remove the heater outlet hose from the heater core.



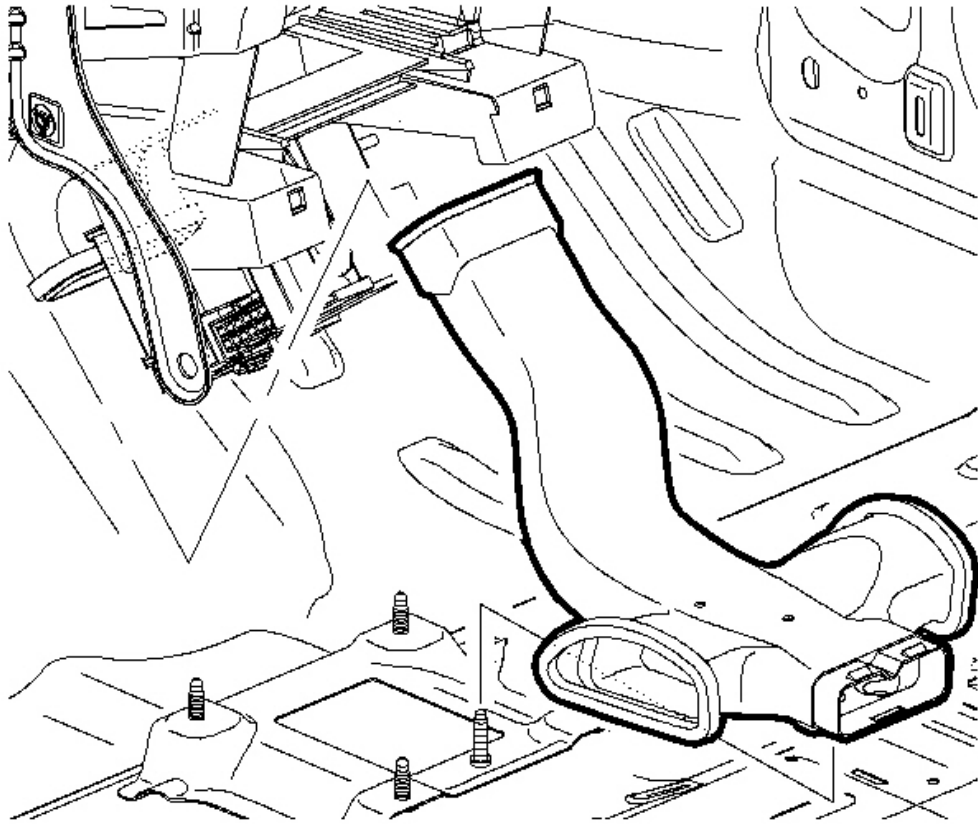
**Fig. 153: Heater Inlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

15. Reposition the heater inlet hose clamp at the heater core using **SA9111E** . See **Special Tools and Equipment** .
16. Remove the heater inlet hose at the heater core.
17. Plug the heater core and the evaporator core with clean towels to prevent spillage when the HVAC module is removed.



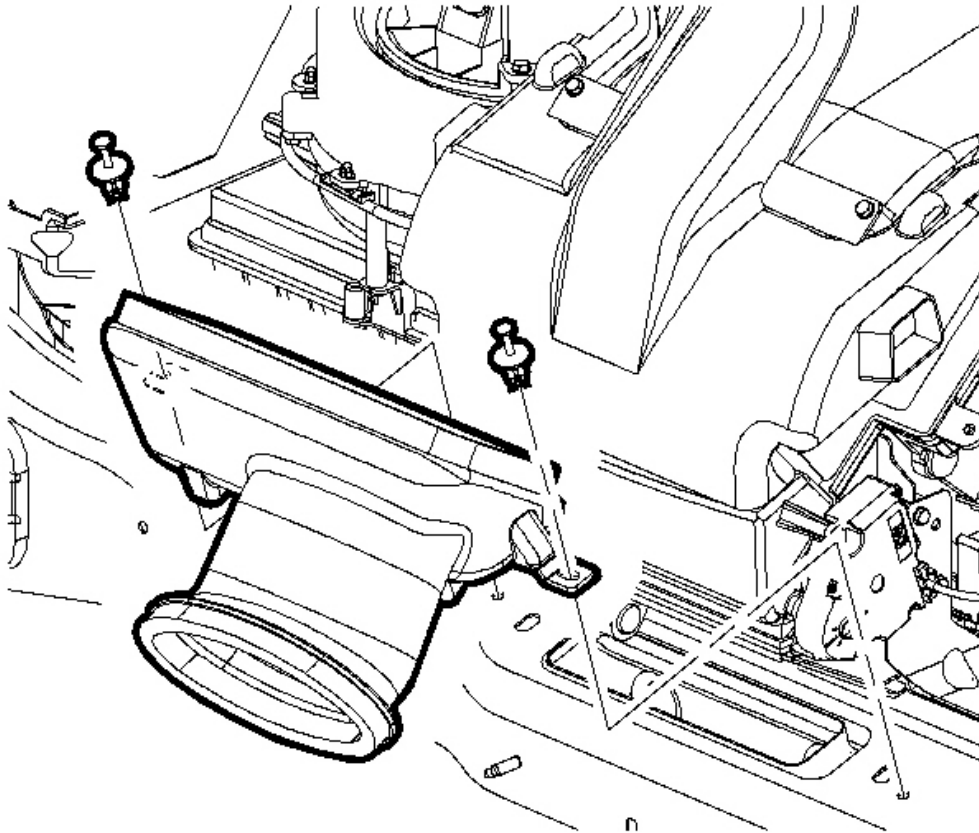
**Fig. 154: HVAC Module Seal & Nuts**  
Courtesy of GENERAL MOTORS CORP.

18. Remove the HVAC module seal nuts from the front of dash.
19. Remove the instrument panel (I/P) retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages, and Console.
20. Remove the shift control bracket. Refer to **Shift Control Replacement** in Manual Transmission - Getrag 5 or **Shift Control Replacement** in Automatic Transmission - VT25-E.



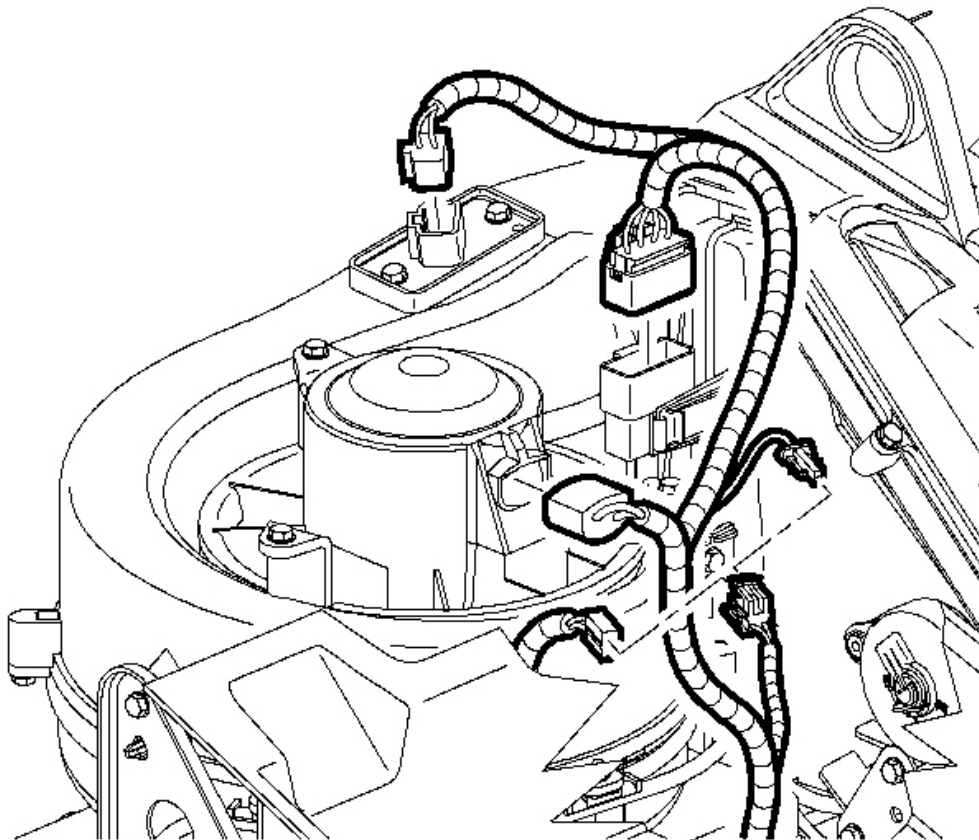
**Fig. 155: Center Floor Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

21. Remove the center floor air outlet duct by sliding the duct forward then up at the rear.



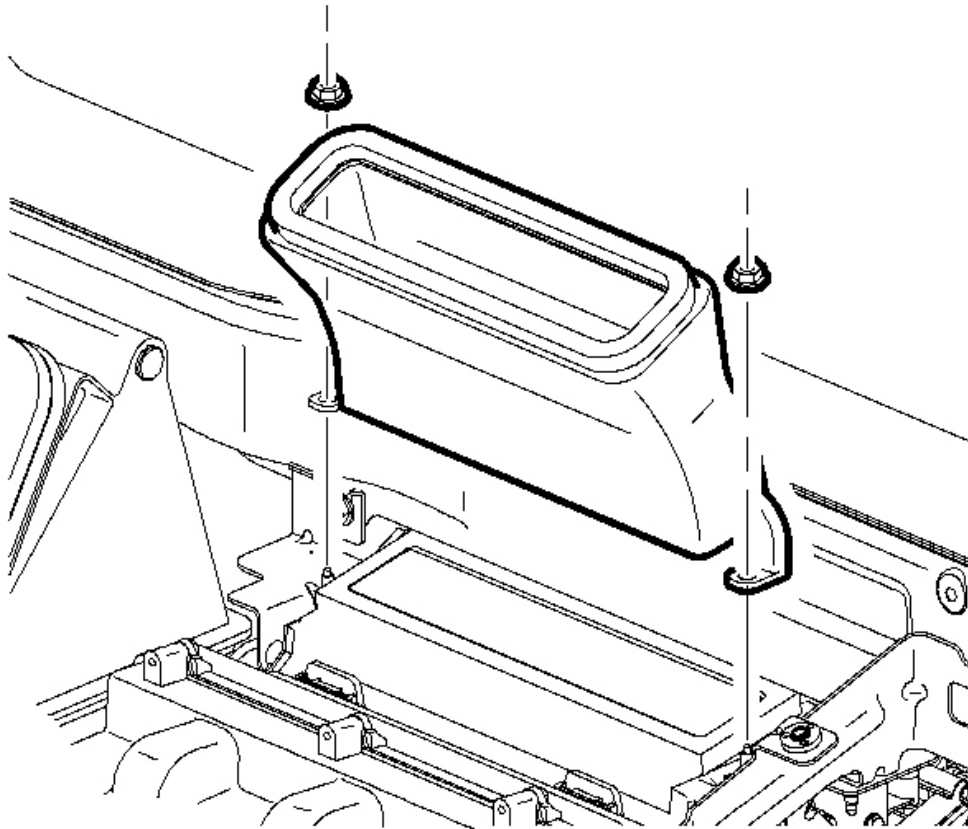
**Fig. 156: Center I/P Air Outlet Duct & Retainers**  
**Courtesy of GENERAL MOTORS CORP.**

22. Remove the center I/P air outlet duct retainers from the cross car beam.
23. Remove the center I/P air outlet duct from the cross car beam.



**Fig. 157: Blower Motor Electrical Connector & I/P Wire Harness**  
**Courtesy of GENERAL MOTORS CORP.**

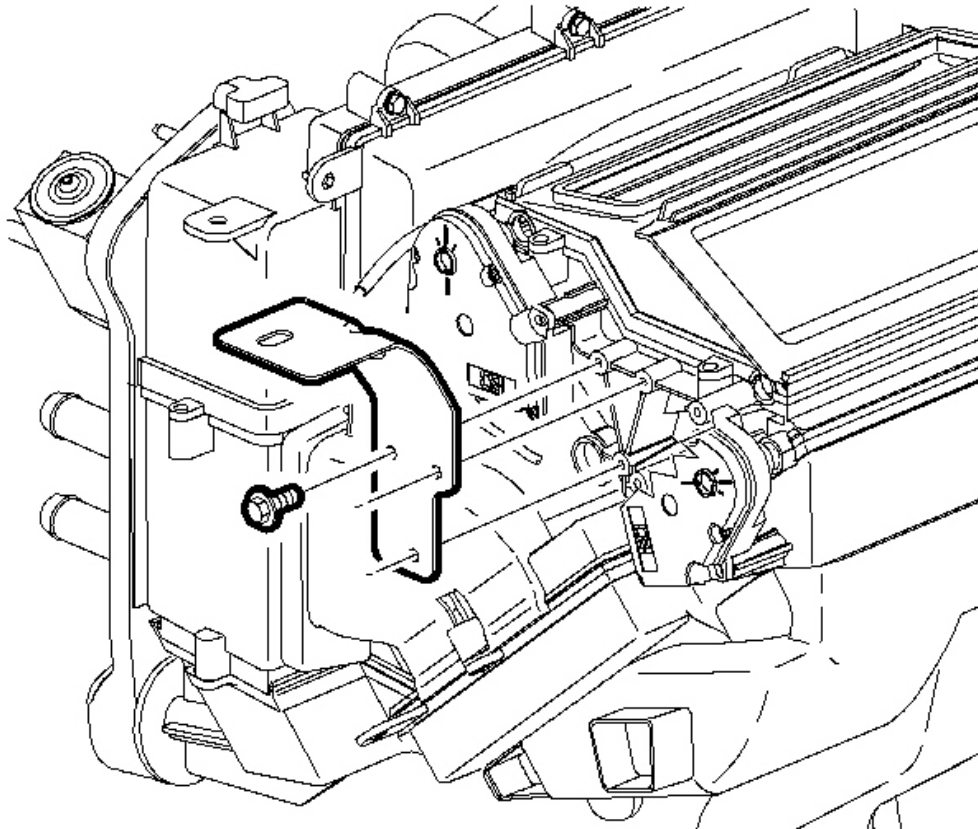
24. Disconnect the blower motor electrical connector from the I/P wire harness.
25. Disconnect the blower motor resistor electrical connector from the I/P wire harness.
26. Disconnect the HVAC module electrical connector from the I/P wire harness.



**Fig. 158: Defroster Duct & Retainer**  
**Courtesy of GENERAL MOTORS CORP.**

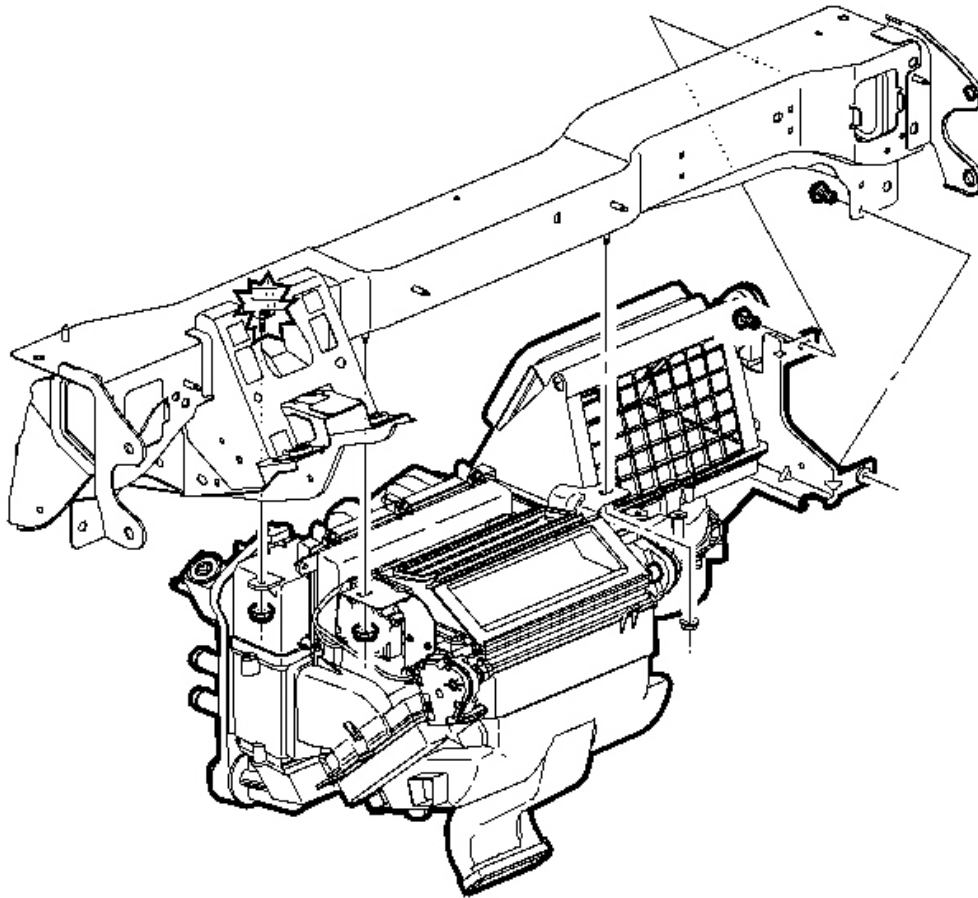
27. Remove the defroster duct retainer from the cross car beam.
28. Remove the defroster duct nuts from the HVAC module.
29. Remove the defroster duct from the HVAC module.
30. Disconnect the I/P wire harness clips from the HVAC module.





**Fig. 159: Metal Bracket & Nut**  
Courtesy of GENERAL MOTORS CORP.

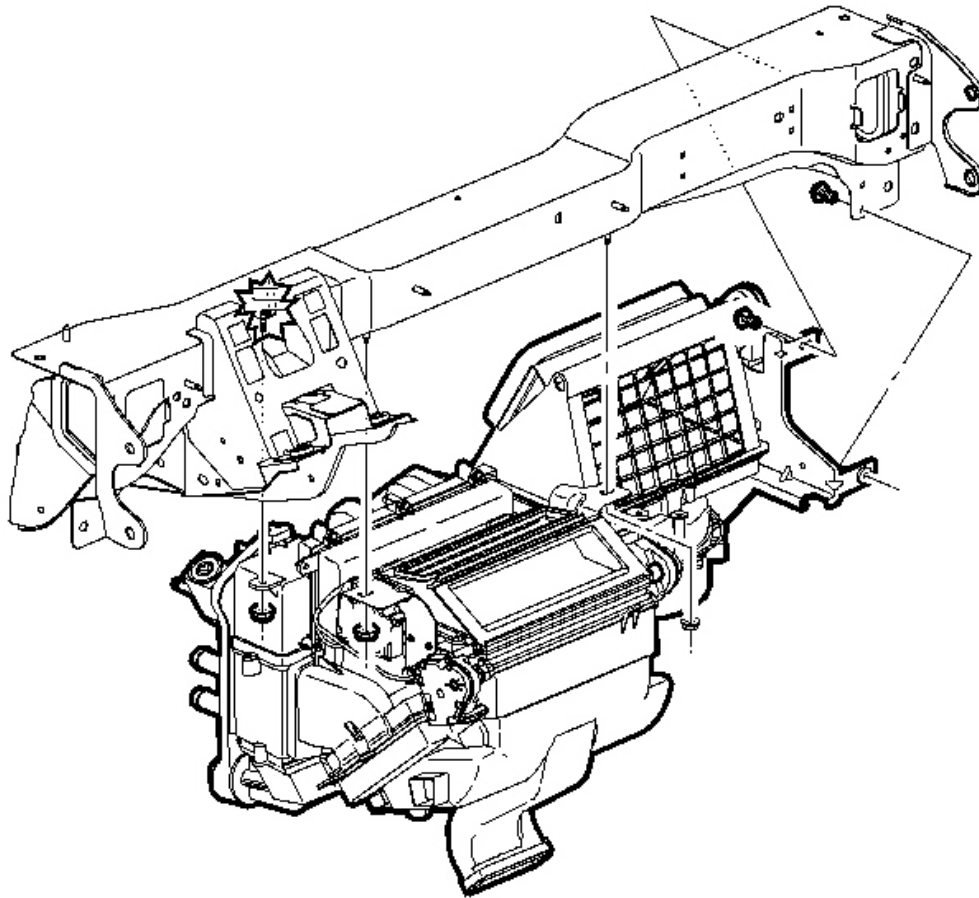
31. Remove the metal bracket nut from the cross car beam.
32. Remove the metal bracket nuts from the HVAC module.
33. Remove the metal bracket from the HVAC module.



**Fig. 160: HVAC Module, Bolts & Cross Car Beam**  
**Courtesy of GENERAL MOTORS CORP.**

34. Remove the HVAC module bolts from the right side of the cross car beam.
35. Remove the HVAC module nut from the center of the cross car beam.
36. Remove HVAC module bolt from the left side of the cross car beam.
37. Remove the HVAC module from the vehicle.

**Installation Procedure**



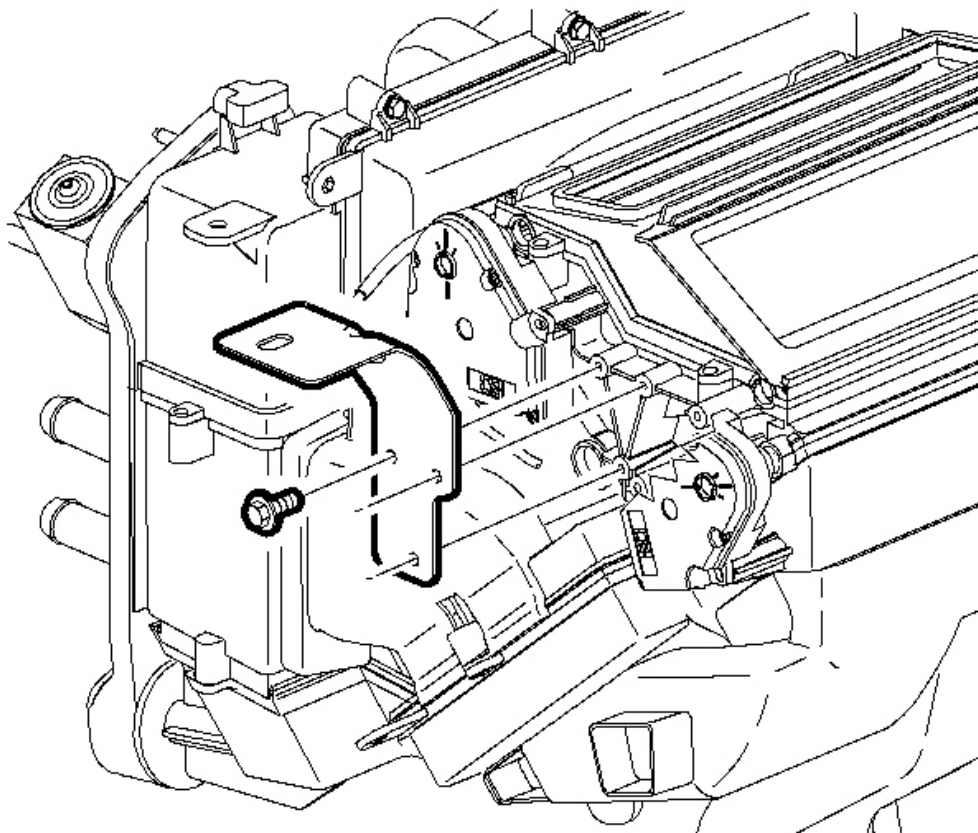
**Fig. 161: HVAC Module, Bolts & Cross Car Beam**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT:** Make sure the HVAC module seals are flush and even as they meet their mating surfaces. This will reduce the chance of leaks and ensure proper fit.

1. Inspect the front of dash seal for proper alignment.
2. Inspect the seal mating surfaces to ensure there are no obstructions.

**IMPORTANT:** Make sure the plastic molded in bracket at the center of the HVAC module is forward of the cross car beam during installation.

3. Loosen the HVAC module from the cross car beam.



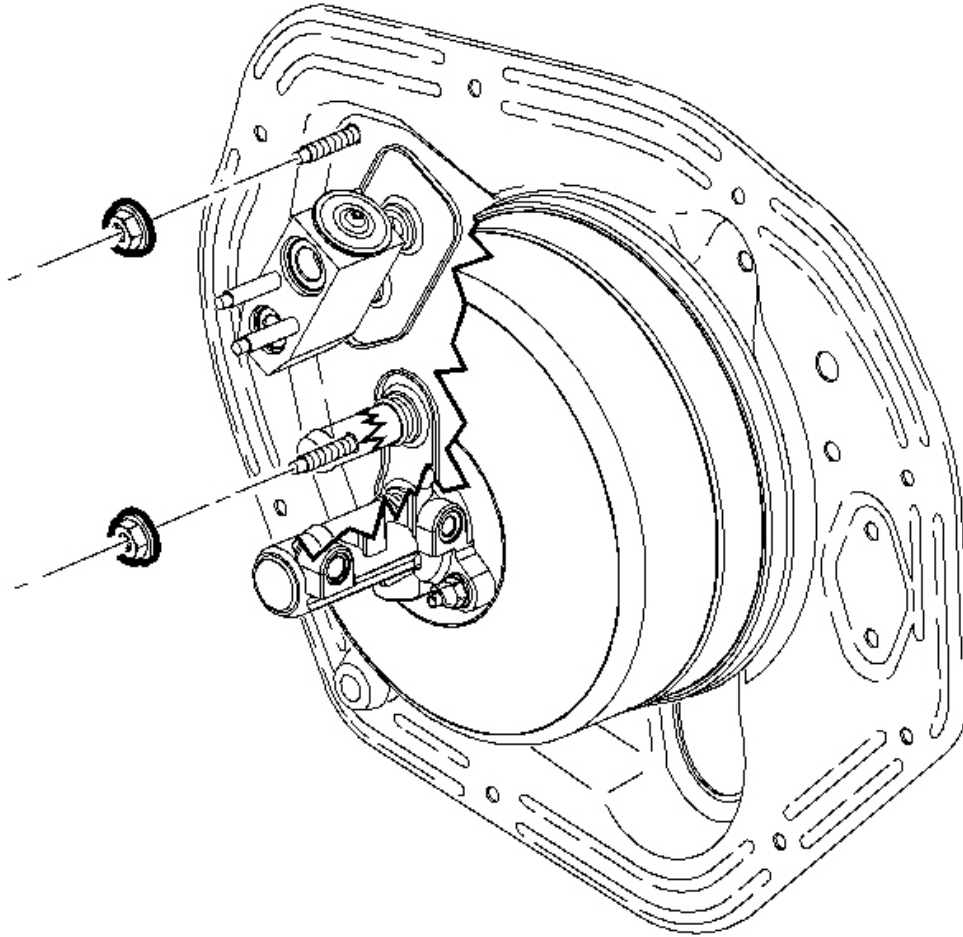
**Fig. 162: Metal Bracket & Nut**  
Courtesy of GENERAL MOTORS CORP.

4. Install the metal bracket to the left side of the HVAC module.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

5. Install the metal bracket bolts to the left side of the HVAC module.

**Tighten:** Tighten the bolts to 2 N.m (18 lb in).

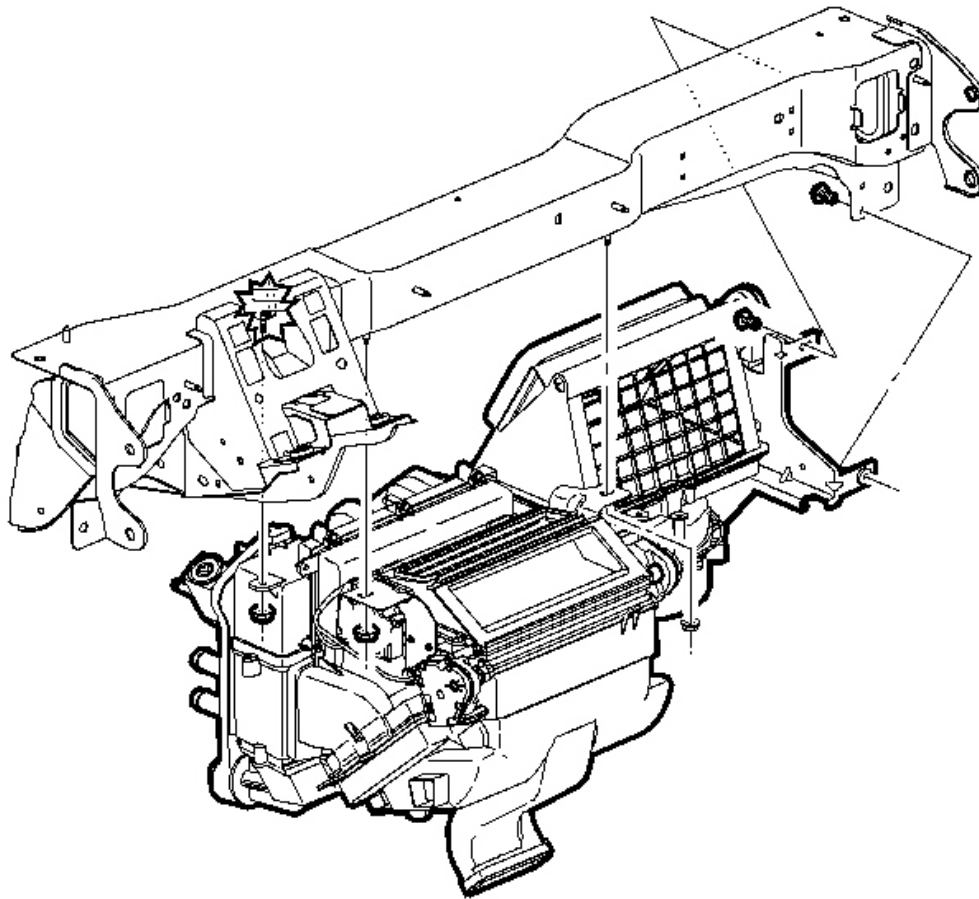


**Fig. 163: HVAC Module Seal & Nuts**  
Courtesy of GENERAL MOTORS CORP.

**IMPORTANT: New front of dash seal nuts must be used to prevent leaks.**

6. Install the HVAC module seal nuts to the front of dash. Draw the HVAC module to the front of dash evenly by alternating between the seal nuts.

**Tighten:** Tighten the nuts to 8 N.m (71 lb in).



**Fig. 164: HVAC Module, Bolts & Cross Car Beam**  
Courtesy of GENERAL MOTORS CORP.

7. Install the HVAC module bolts to the right side of the cross car beam.
8. Push up on the right side of the HVAC module while tightening the HVAC module bolts to the cross car beam.

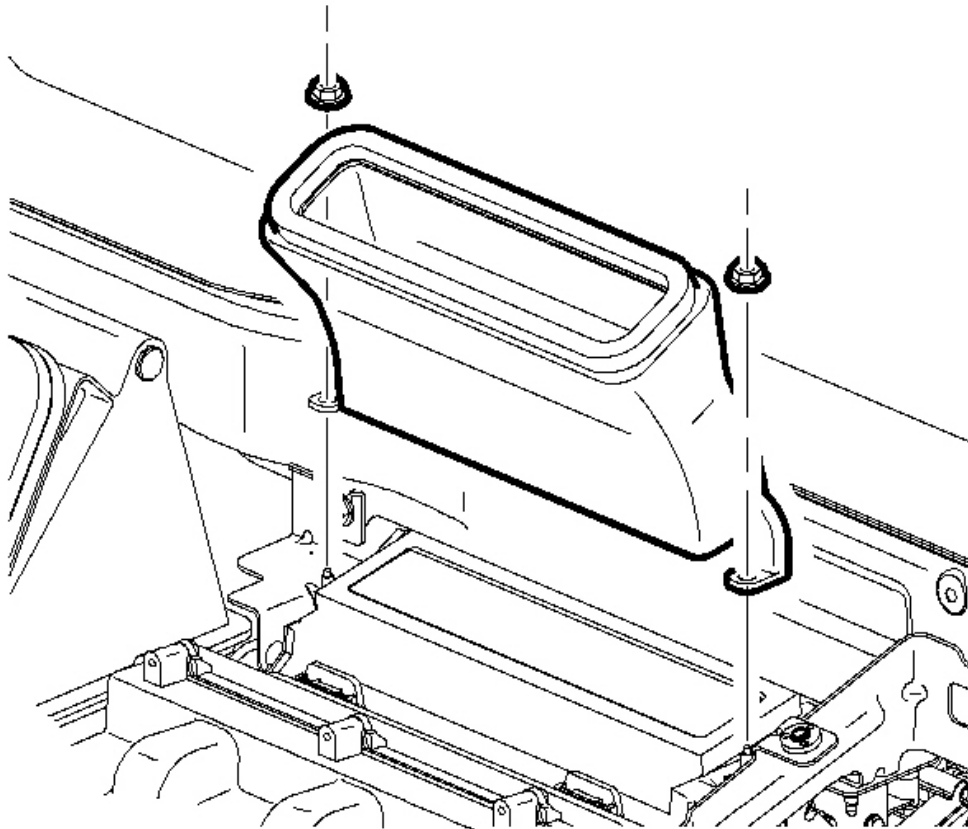
**Tighten:** Tighten the bolts to 8 N.m (71 lb in).

9. Install the HVAC module bolt to the left side of the cross car beam.

**Tighten:** Tighten the bolt to 8 N.m (71 lb in).

10. Install the HVAC module nuts to the left side and center of the cross car beam.

**Tighten:** Tighten the nuts to 8 N.m (71 lb in).

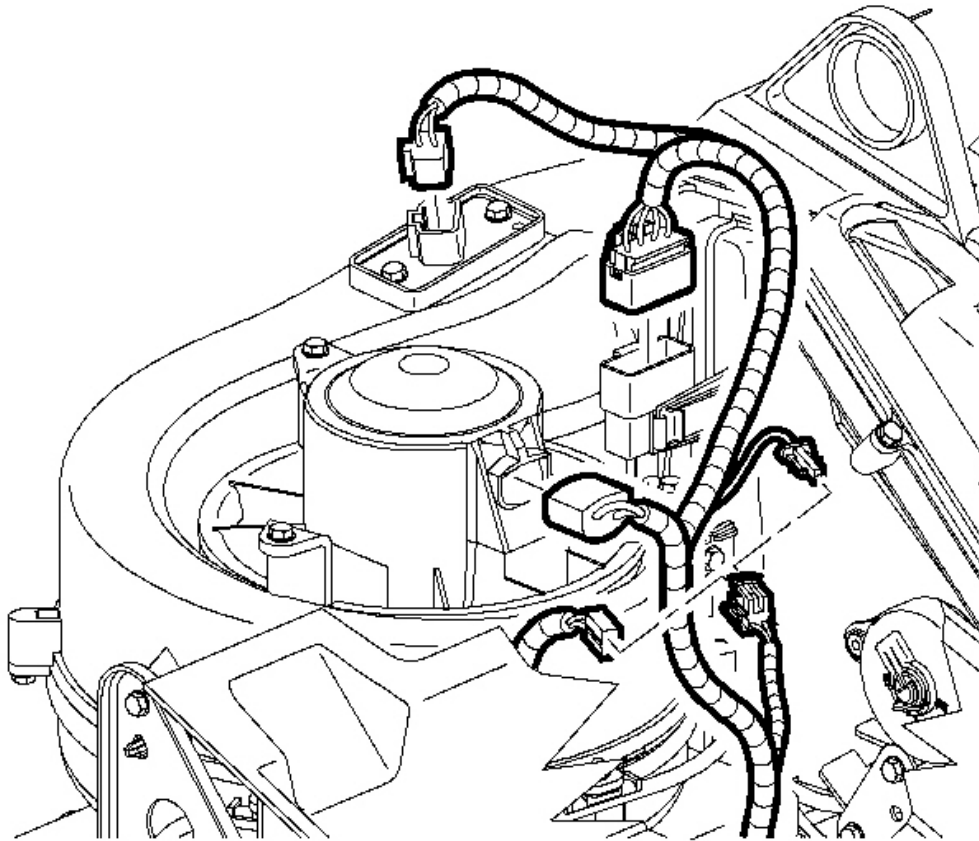


**Fig. 165: Defroster Duct & Retainer**  
Courtesy of GENERAL MOTORS CORP.

11. Install the defroster duct to the HVAC module.
12. Install the defroster duct nuts to the HVAC module.

**Tighten:** Tighten the nuts to 2.5 N.m (22 lb in).

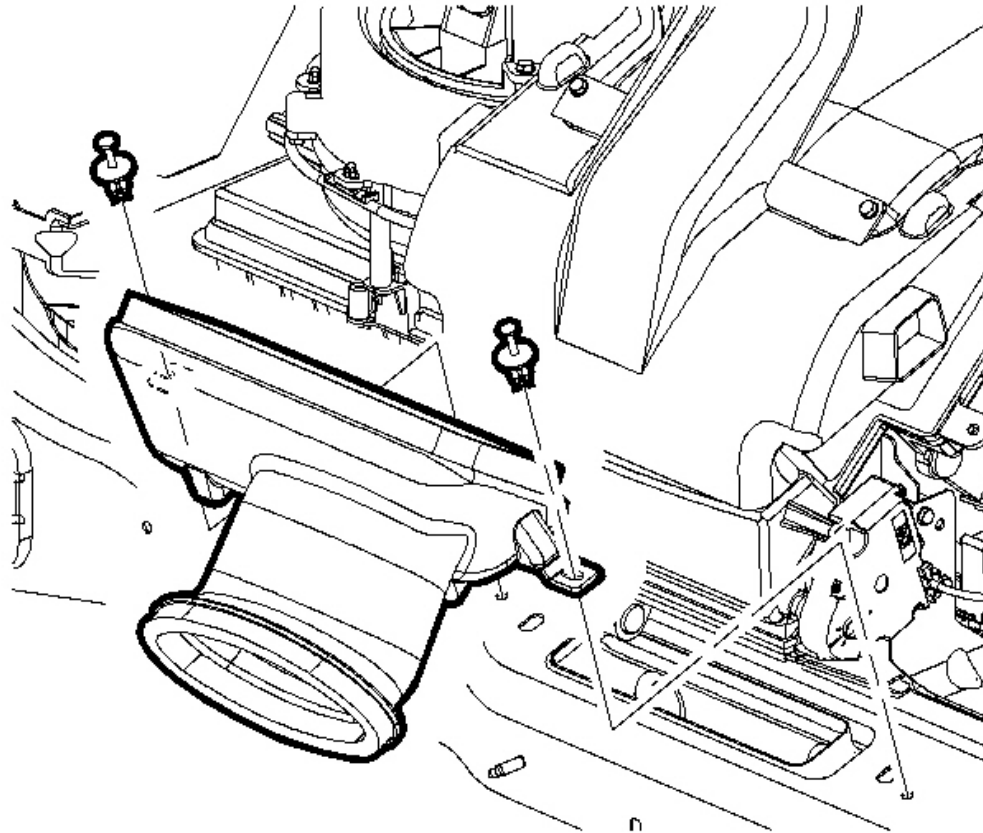
13. Install the defroster duct retainer to the cross car beam.
14. Connect the I/P wire harness clips to the HVAC module.



**Fig. 166: Blower Motor Electrical Connector & I/P Wire Harness**  
Courtesy of GENERAL MOTORS CORP.

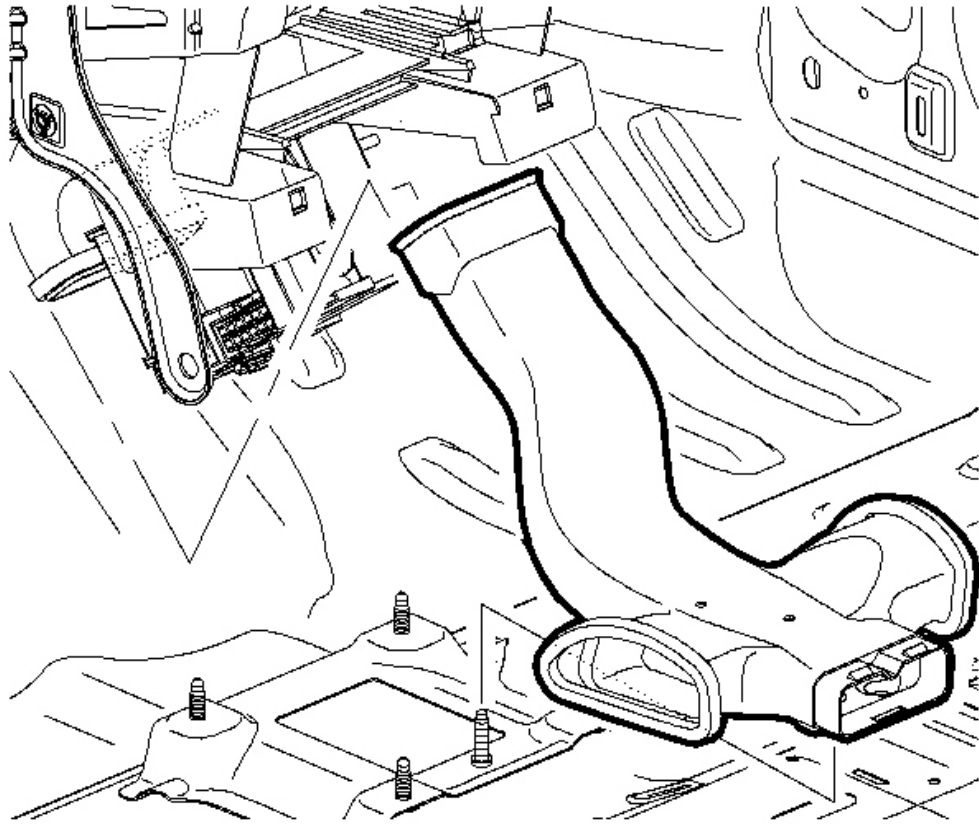
15. Connect the blower motor electrical connector to the I/P wire harness.
16. Connect the blower motor resistor electrical connector to the I/P wire harness.
17. Connect the HVAC module electrical connector to the I/P wire harness.





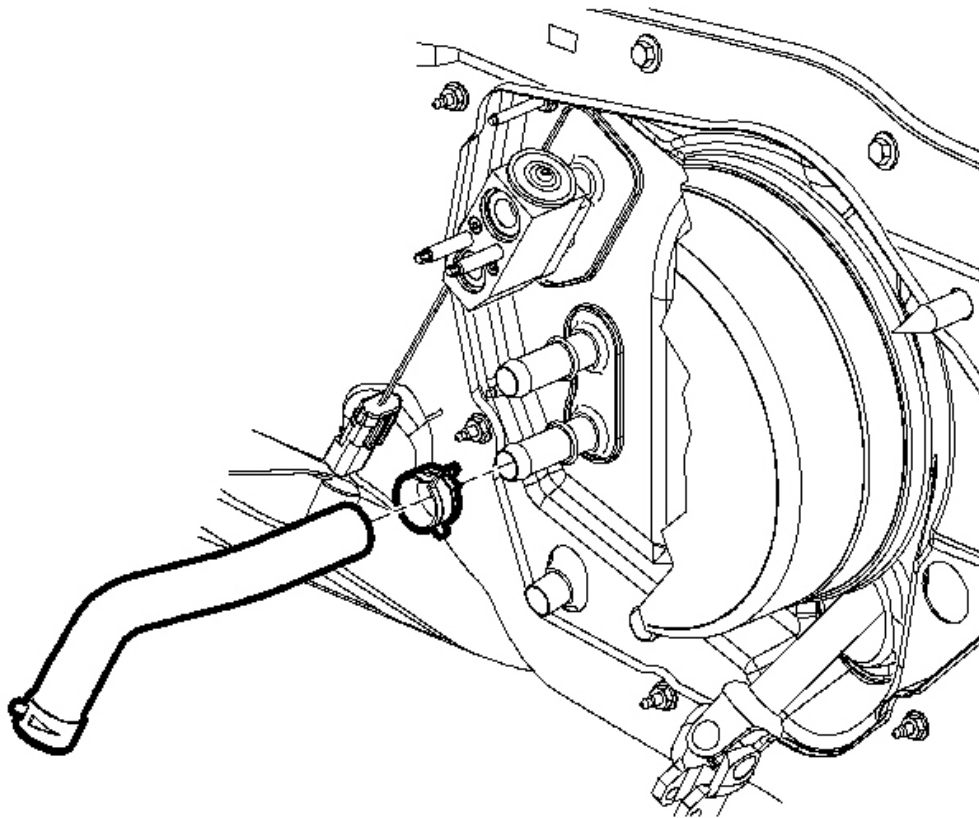
**Fig. 167: Center I/P Air Outlet Duct & Retainers**  
**Courtesy of GENERAL MOTORS CORP.**

18. Install the center I/P duct to the cross car beam.
19. Install the center I/P duct retainers to the cross car beam.



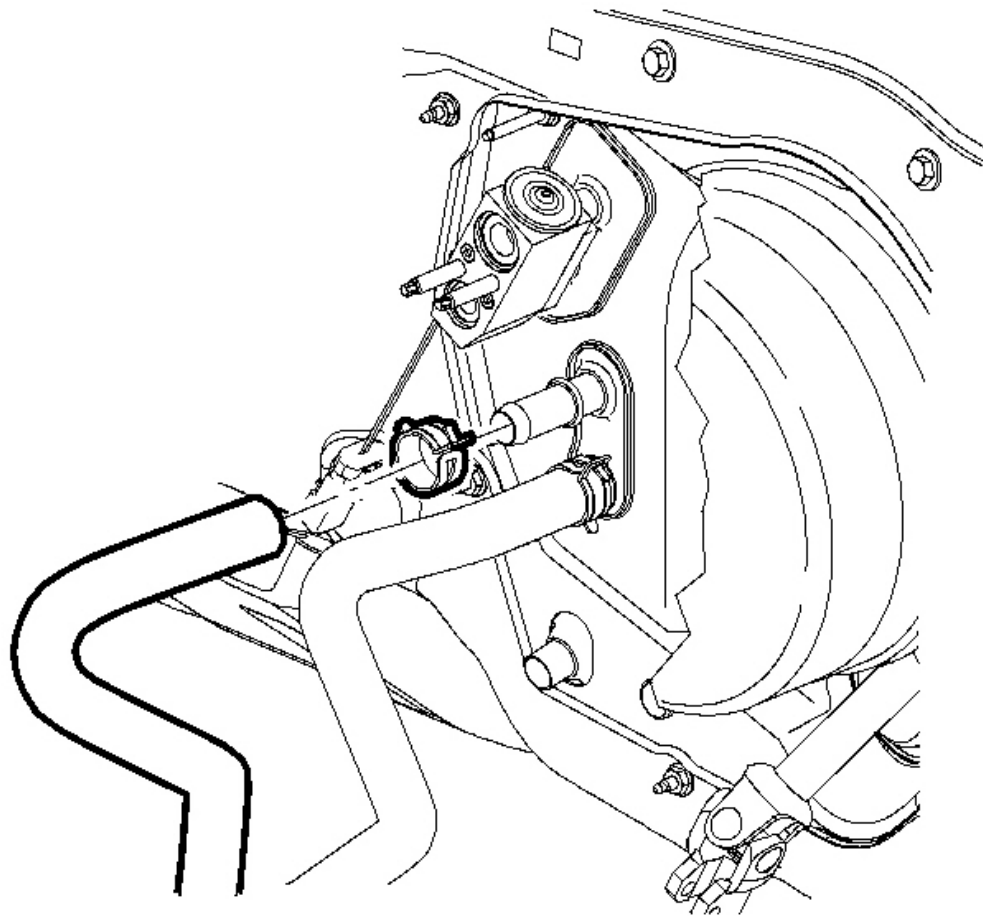
**Fig. 168: Center Floor Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

20. Install the center floor air outlet by sliding forward onto the front floor air outlet then down and rearward over the rear floor air outlet.
21. Install the shift control bracket. Refer to **Shift Control Replacement** in Manual Transmission - Getrag 5 or **Shift Control Replacement** in Automatic Transmission - VT25-E.
22. Install the I/P retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages, and Console.



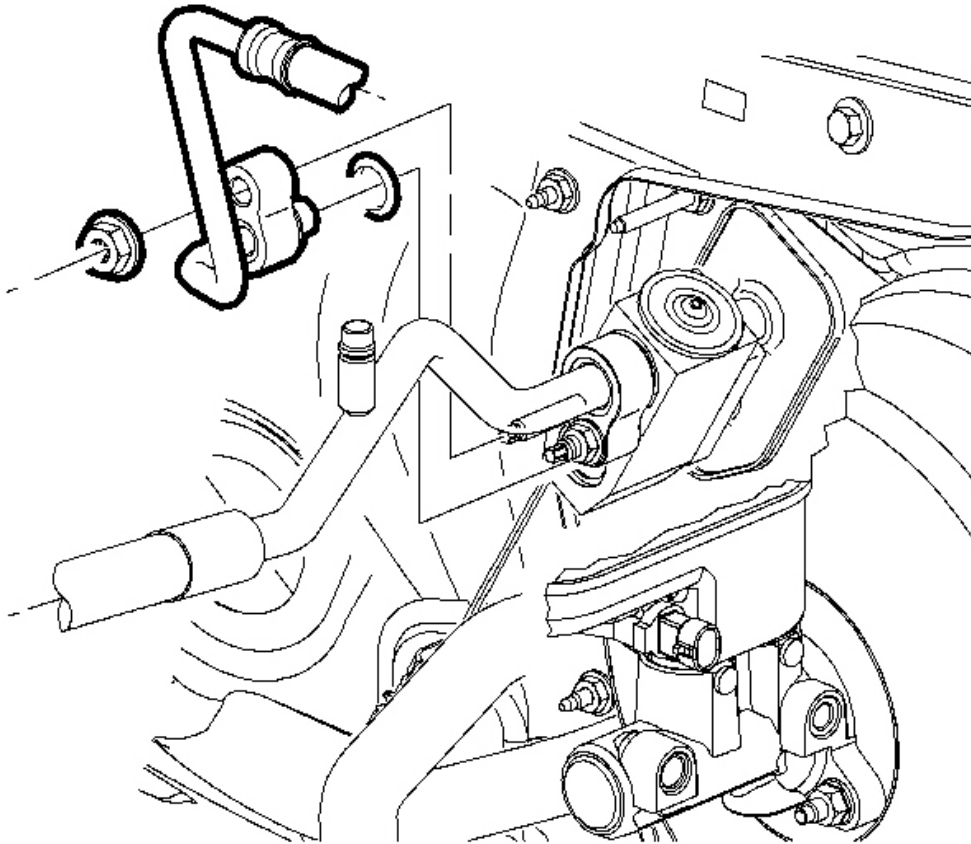
**Fig. 169: Heater Inlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

23. Install the heater inlet hose to the heater core.
24. Install the heater inlet hose clamp to the heater core using **SA9111E** . See **Special Tools and Equipment** .



**Fig. 170: Heater Outlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

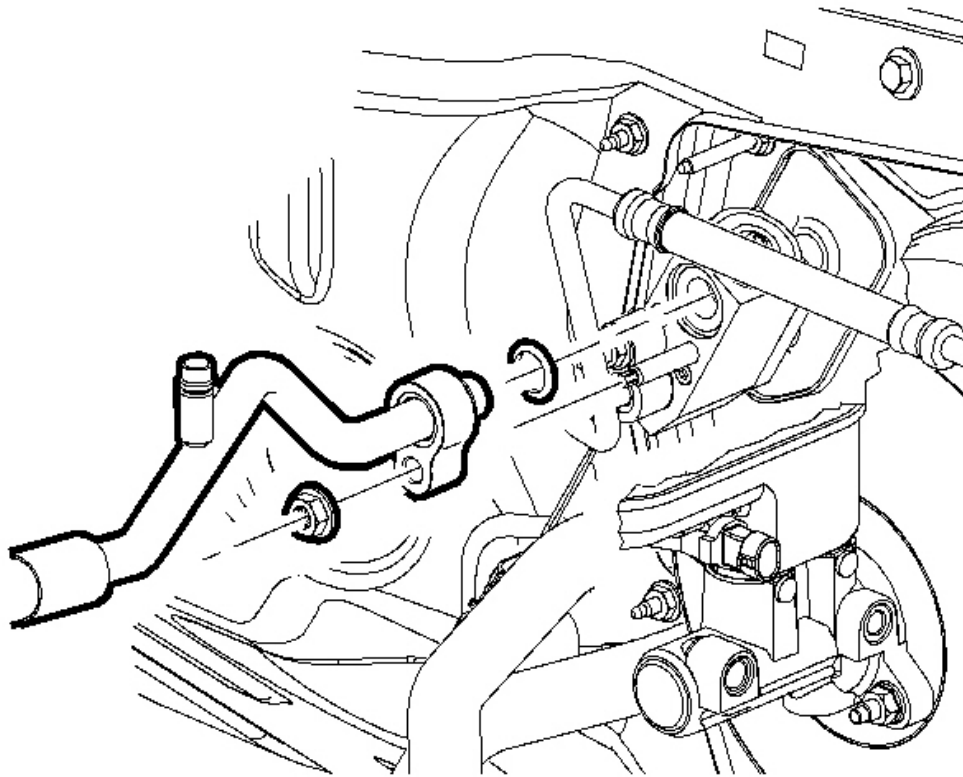
25. Install the heater outlet hose to heater core outlet.
26. Install the heater outlet hose clamp to the heater core using SA9111E . See **Special Tools and Equipment** .



**Fig. 171: Liquid Line, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

27. Ensure the mating surfaces are clean and free of debris, and install a new seal washer to the liquid line. Refer to **Sealing Washer Replacement** .
28. Install the liquid line to the TXV.
29. Install the liquid line nut to the TXV.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).



**Fig. 172: Compressor Hose, Nut & TXV**  
Courtesy of GENERAL MOTORS CORP.

30. Ensure the mating surfaces are clean and free of debris, and install a new seal washer to the evaporator outlet hose. Refer to **Sealing Washer Replacement** .
31. Install the evaporator outlet hose to the TXV.
32. Install the evaporator outlet hose nut to the TXV.

**Tighten:** Tighten the nut to 16 N.m (12 lb ft).

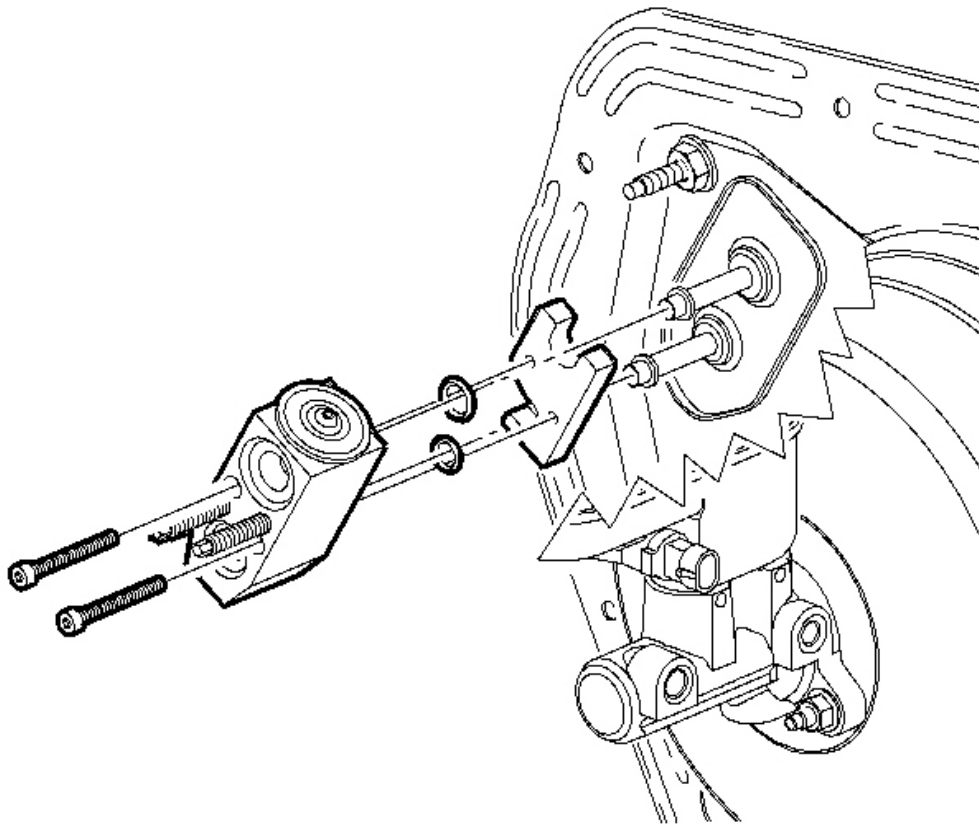
33. Enable the frontal and curtain air bags. Refer to **SIR Disabling and Enabling Zone 2** , **SIR Disabling and Enabling Zone 3** , **SIR Disabling and Enabling Zone 5** , and **SIR Disabling and Enabling Zone 6** in SIR.

34. Fill the coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
35. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging** .
36. Test the affected A/C joints for leaks using **J 39400-A** . See **Special Tools and Equipment** .

## **EVAPORATOR CORE REPLACEMENT (FIRST DESIGN)**

### **Removal Procedure**

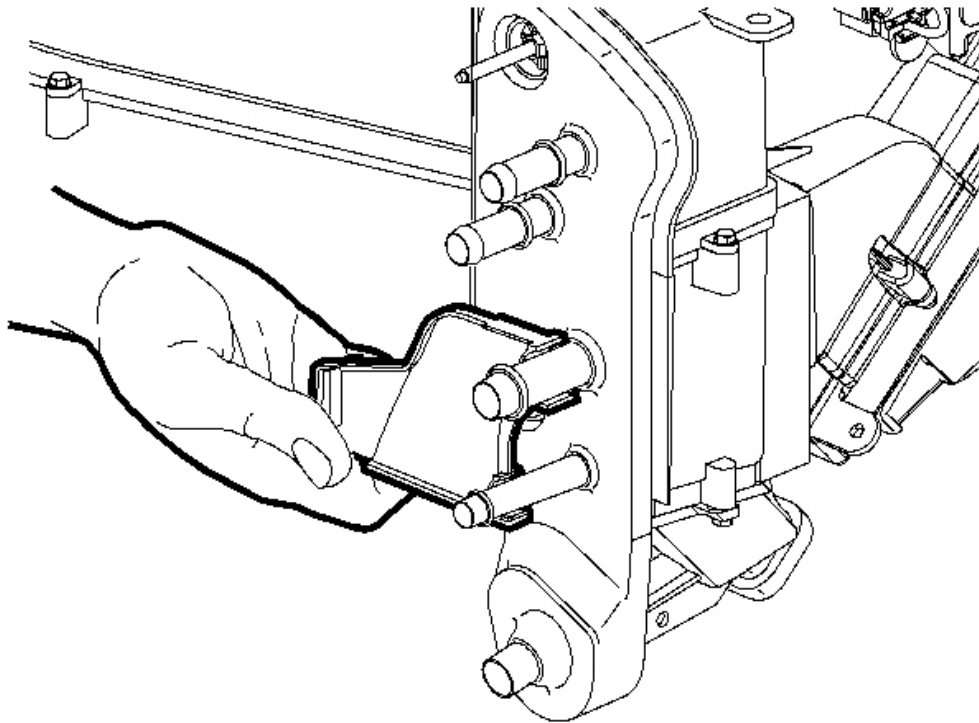
The first design can be identified by the attachment method of the evaporator outlet hose and the liquid line to the thermal expansion valve (TXV). They are retained to the TXV independently using nuts.



**Fig. 173: TXV, Bolts & Backing Plate**

Courtesy of GENERAL MOTORS CORP.

1. Remove the HVAC module. Refer to **HVAC Module Assembly Replacement** .
2. Remove the evaporator case assembly. Refer to **Air Conditioning (A/C) Evaporator Case Assembly Replacement** .
3. Remove the TXV bolts from the backing plate.
4. Remove the TXV and the backing plate from the evaporator pipes.
5. Remove the O-rings from evaporator pipes. Refer to **O-Ring Replacement** .
6. Install protective caps to the evaporator pipes to prevent system contamination.
7. Remove the HVAC module front of dash seal.

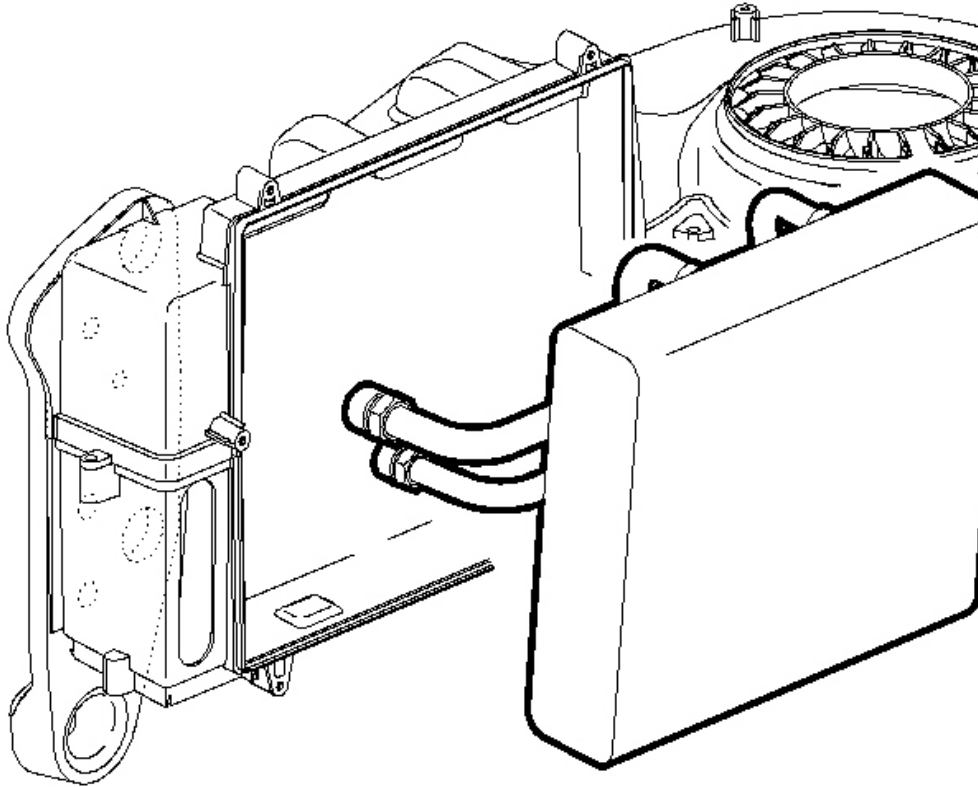


**Fig. 174: Evaporator Pipe Cover, Screw & Blower Case Assembly**



Courtesy of GENERAL MOTORS CORP.

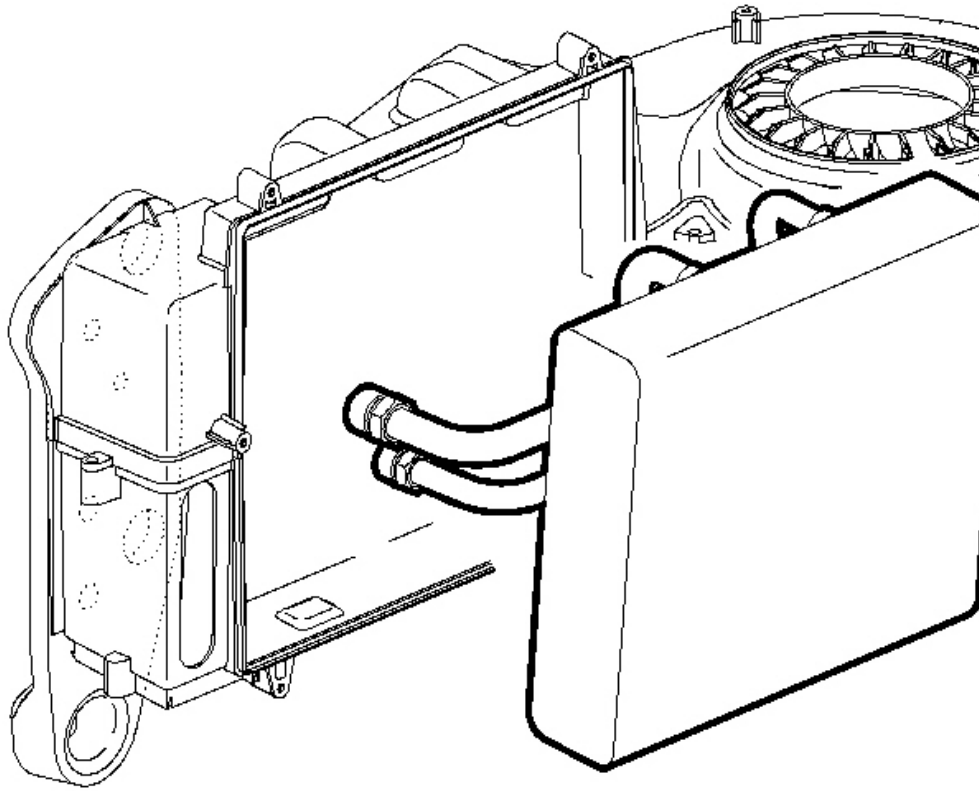
8. Remove the evaporator pipe cover screw from the blower case assembly.
9. Remove the evaporator pipe cover from the blower case assembly.



**Fig. 175: Evaporator Core & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

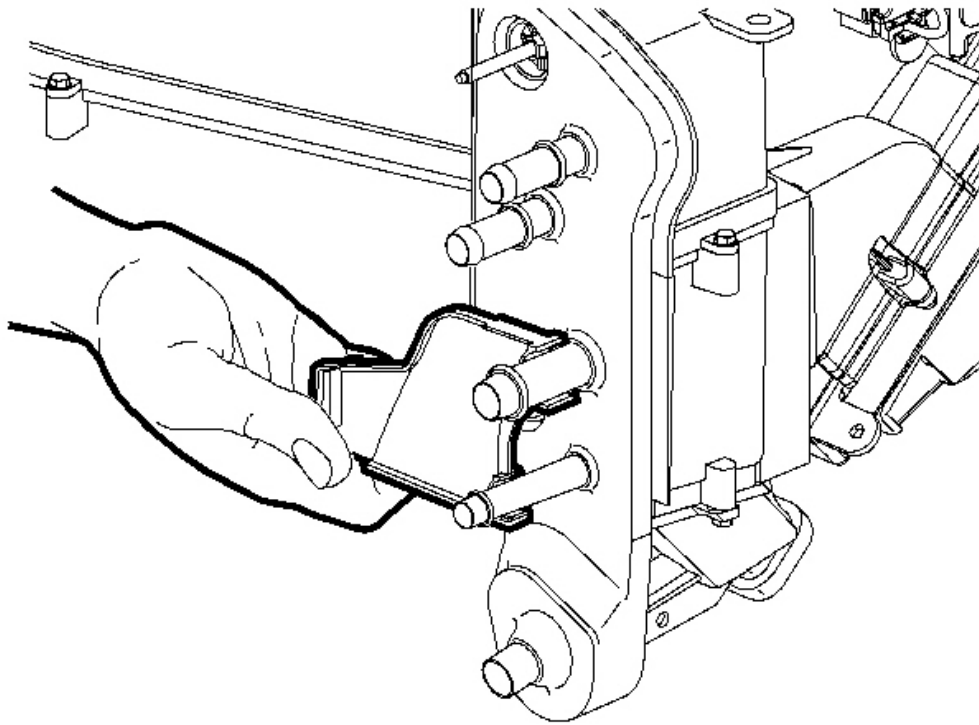
10. Remove the evaporator core from the blower case assembly. Spraying the perimeter of the evaporator core seal with a soap and water mixture will ease removal.

**Installation Procedure**



**Fig. 176: Evaporator Core & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Add the proper of polyalkylene glycol (PAG) oil to the evaporator core. Refer to **Refrigerant System Capacities** .
2. Inspect the seal around the evaporator core. Make sure the seal is in correct position and retained properly.
3. Spray the seal with a soap and water mixture to ease the installation of evaporator core.
4. Install the evaporator core to the blower case assembly.



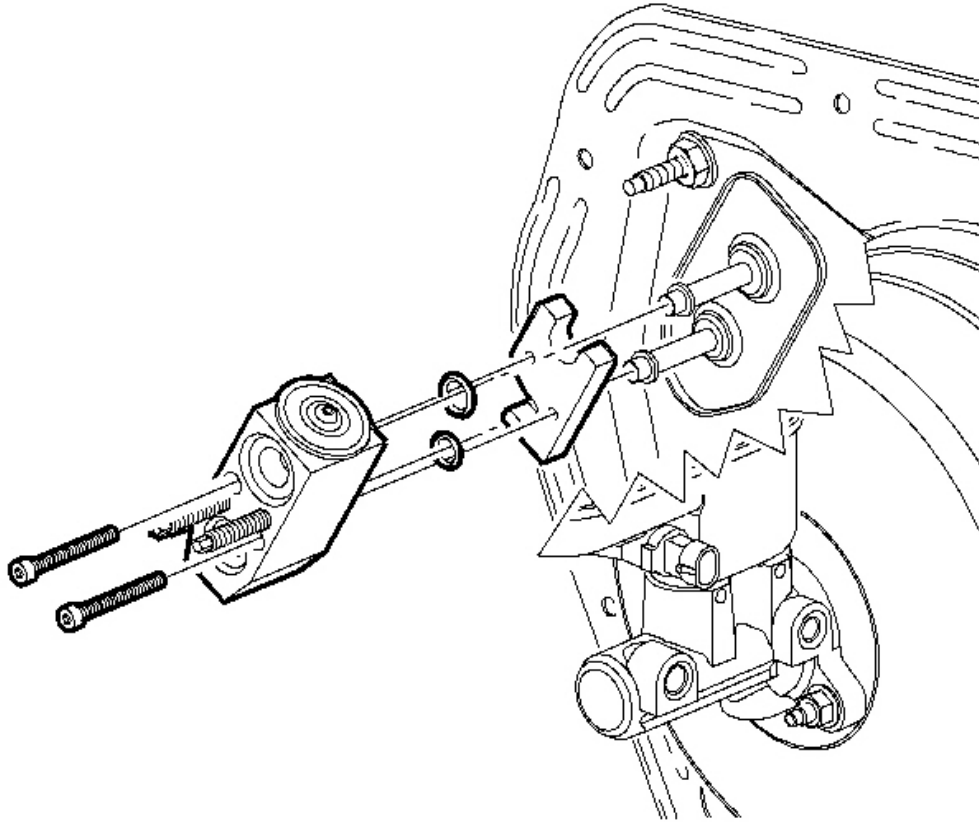
**Fig. 177: Evaporator Pipe Cover, Screw & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

5. Install the evaporator pipe cover.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

6. Install the evaporator pipe cover screw.

**Tighten:** Tighten the screw to 1 N.m (9 lb in).



**Fig. 178: TXV, Bolts & Backing Plate**  
Courtesy of GENERAL MOTORS CORP.

7. Install the HVAC module front of dash seal.
8. Remove the protective caps from the evaporator pipes and ensure the seal areas are clean, dry and lint-free.

**IMPORTANT: Use only R-12 refrigerant oil (mineral) to lubricate O-rings. Use of R-134a PAG oil will cause premature corrosion of fitting joints. Use only clean lint free cloths with non-petroleum based solvents to clean refrigerant system sealing surfaces. Allow solvent to dry with air. Do not allow solvents to enter refrigerant system.**

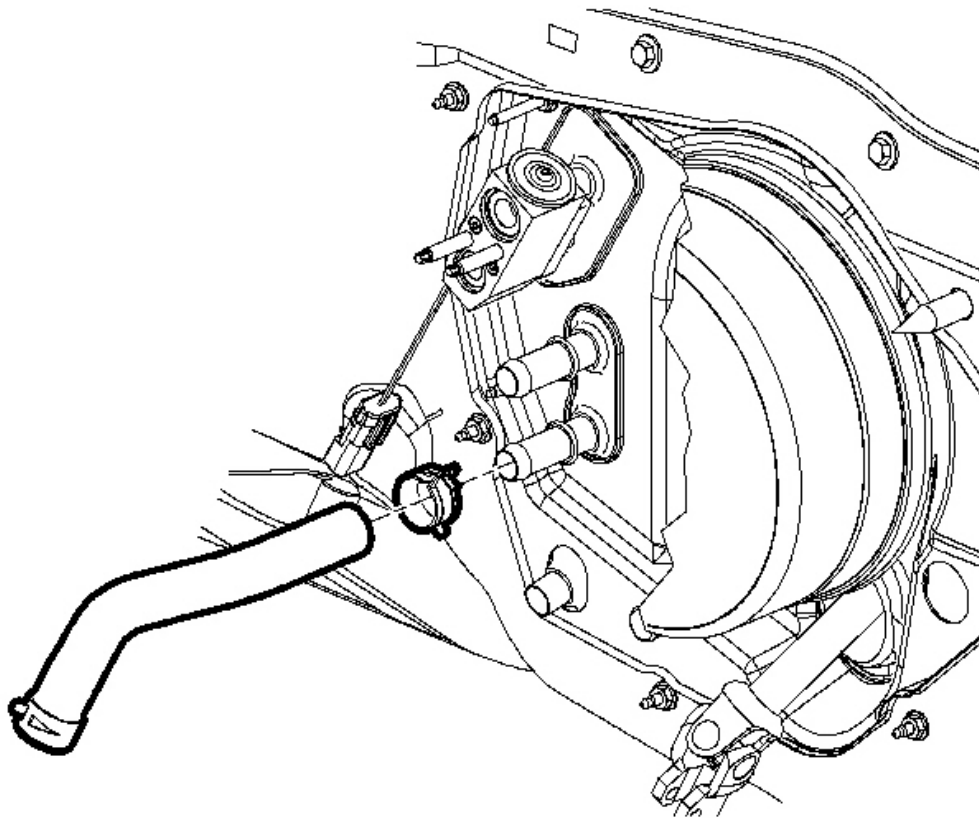
9. Install new O-rings to the evaporator pipes. Refer to **O-Ring Replacement** .
10. Install the TXV and the backing plate to the evaporator pipes.
11. Install the TXV screws to the backing plate.

**Tighten:** Tighten the screws to 9 N.m (80 lb in).

12. Install the evaporator case assembly. Refer to **Air Conditioning (A/C) Evaporator Case Assembly Replacement** .
13. Install the HVAC module. Refer to **HVAC Module Assembly Replacement** .

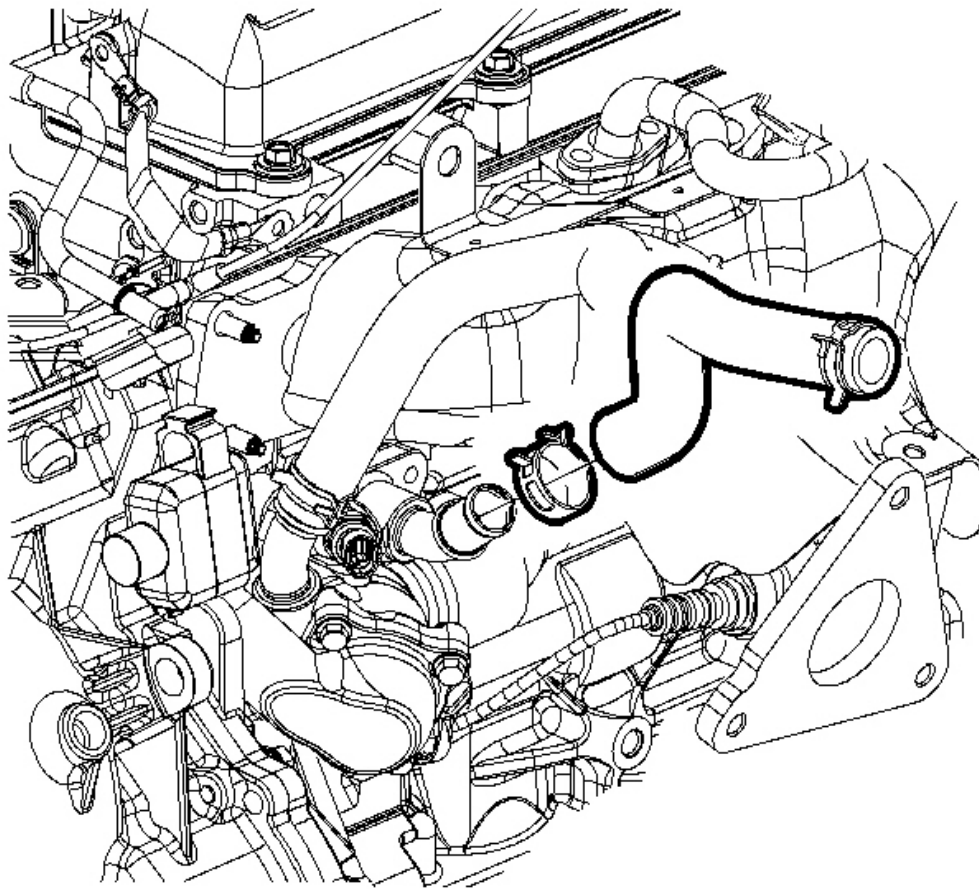
## **HEATER HOSE REPLACEMENT - INLET (L61)**

### **Removal Procedure**



**Fig. 179: Heater Inlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

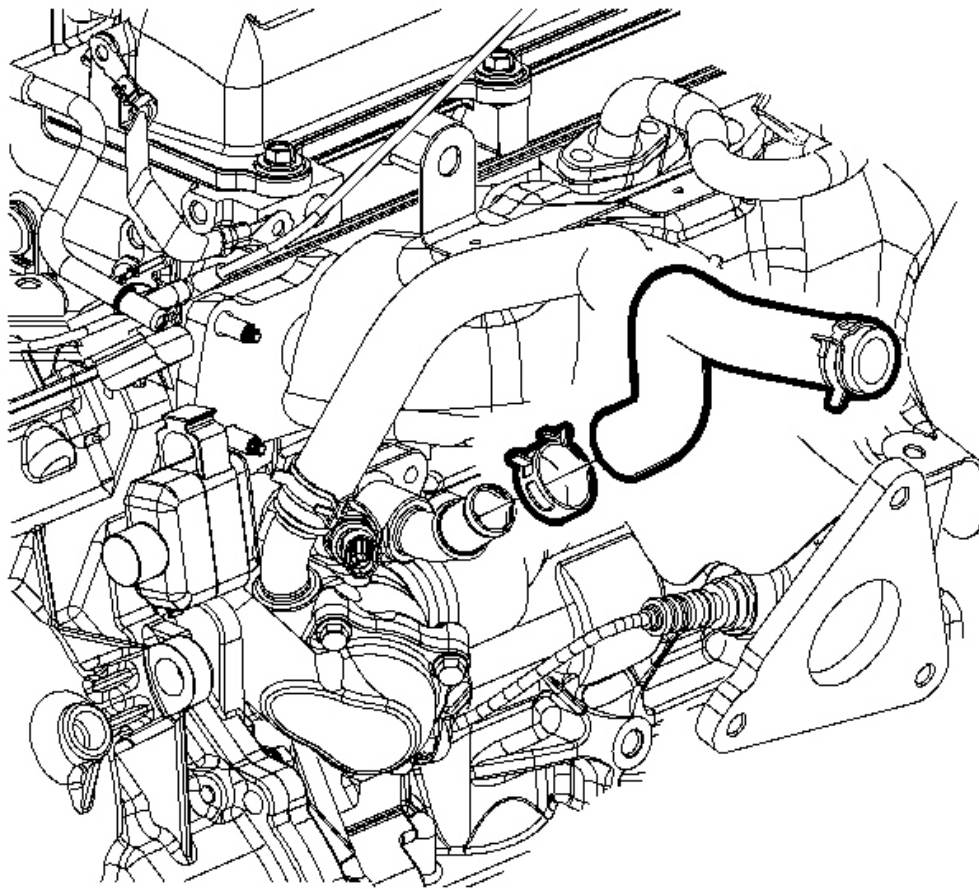
1. Drain the coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
2. Remove the heater inlet hose clamp from the heater core.
3. Remove the heater inlet hose from the heater core.



**Fig. 180: Heater Inlet & Hose Clamp**  
Courtesy of GENERAL MOTORS CORP.

4. Remove the heater inlet hose clamp from the engine.
5. Remove the heater inlet hose from the engine.

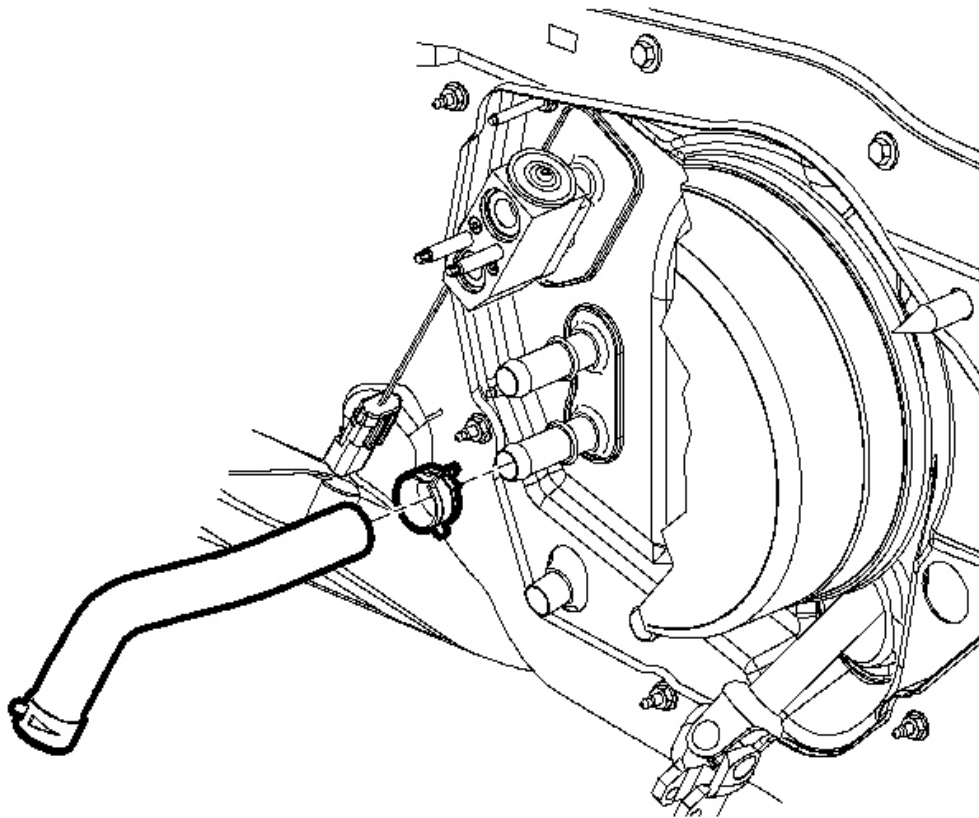
#### **Installation Procedure**



**Fig. 181: Heater Inlet & Hose Clamp**  
Courtesy of GENERAL MOTORS CORP.

1. Install the heater inlet hose to the engine.
2. Install the heater inlet hose clamp to the engine.



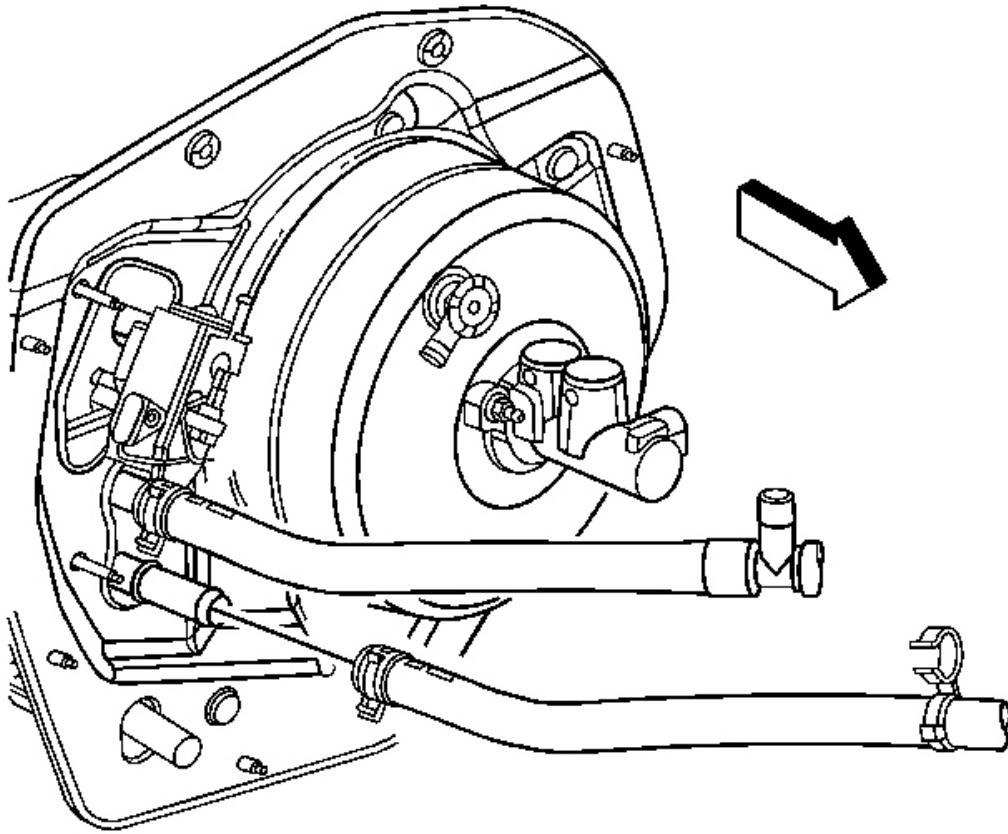


**Fig. 182: Heater Inlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

3. Install the heater inlet hose to the heater core.
4. Install the heater inlet hose clamp to the heater core.
5. Fill the cooling system. Refer to **Draining and Filling Cooling System** in Engine Cooling.

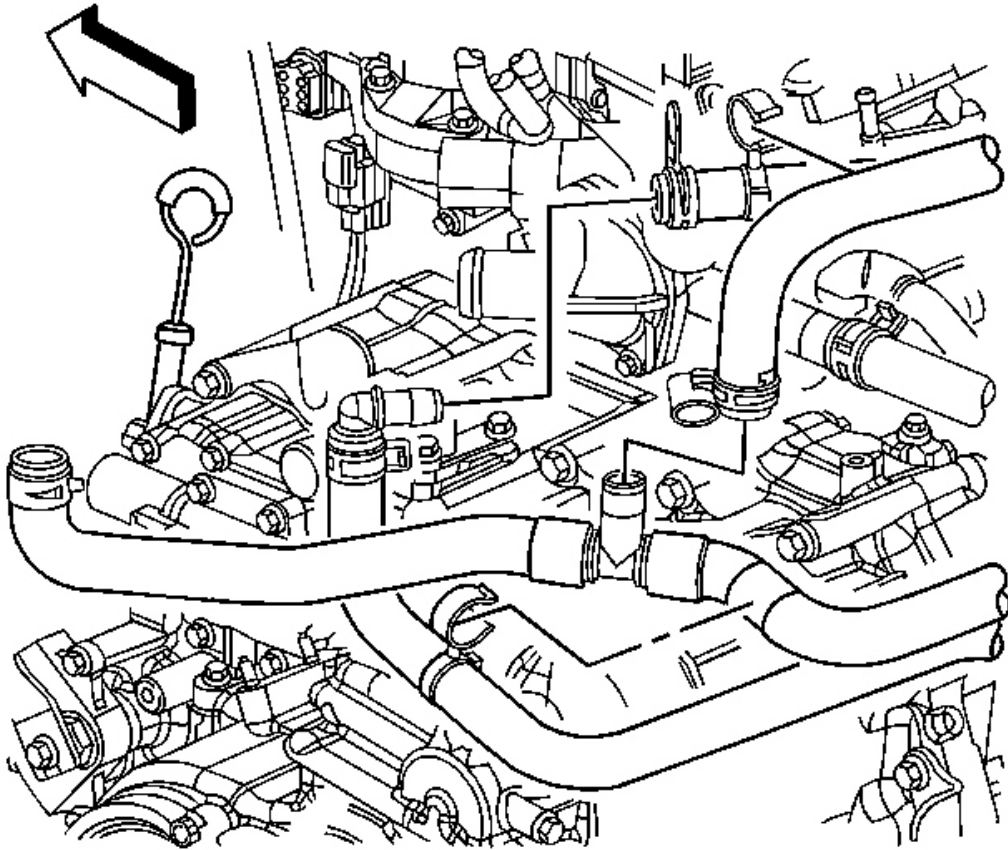
#### **HEATER HOSE REPLACEMENT - INLET (L66 AT HEATER CORE)**

##### **Removal Procedure**



**Fig. 183: Heater Inlet Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

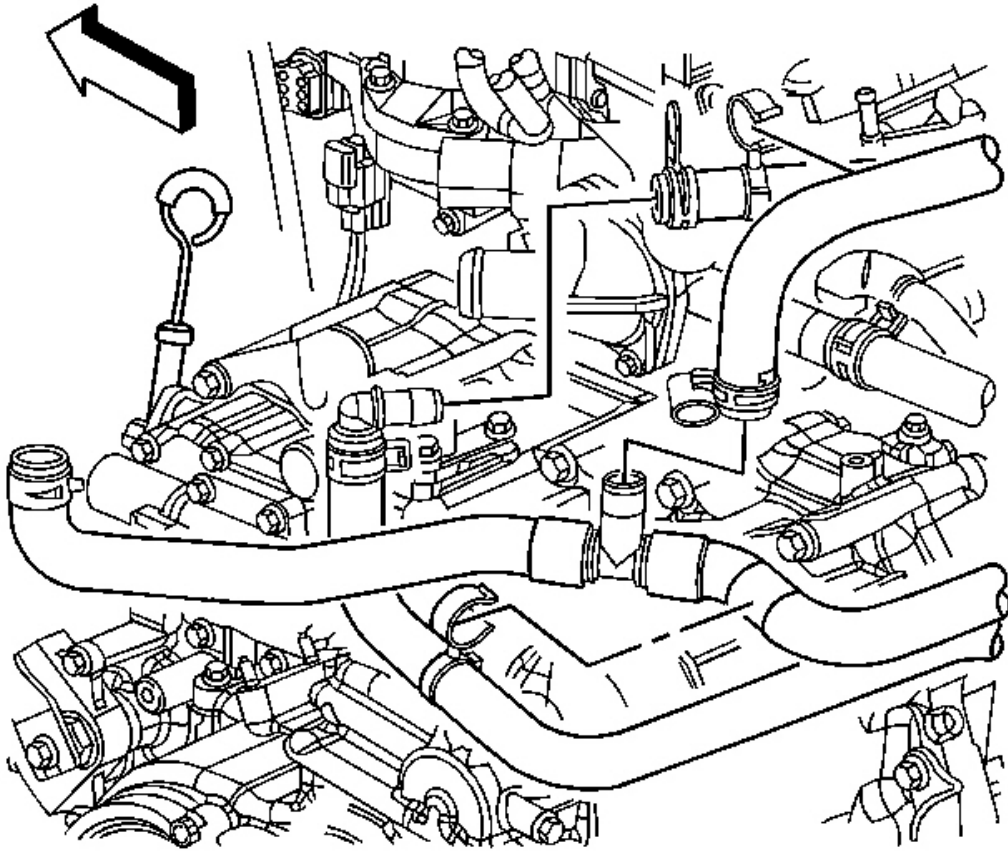
1. Drain the coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
2. Remove the air cleaner outlet duct from the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
3. Remove the heater inlet hose clamp from the heater core.
4. Remove the heater inlet hose from the heater core.



**Fig. 184: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

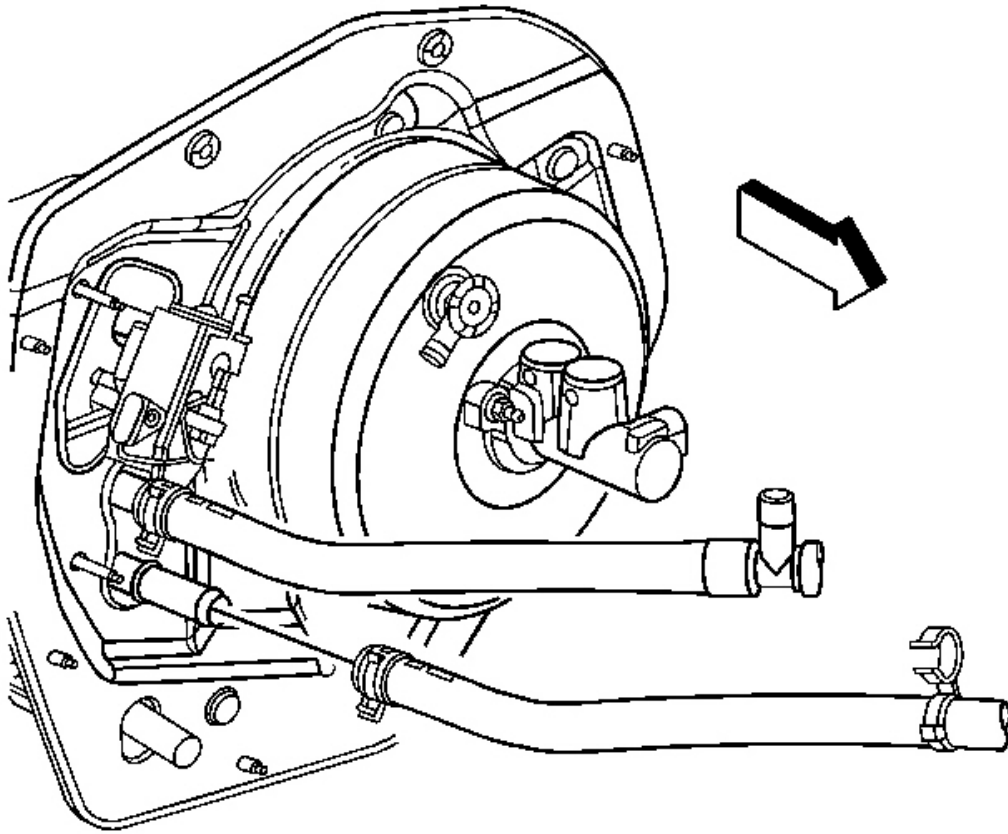
5. Remove the heater inlet hose clamp from the elbow fitting.
6. Remove the heater inlet hose from the elbow fitting.

#### **Installation Procedure**



**Fig. 185: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

1. Install the heater inlet hose to the elbow fitting.
2. Install the heater inlet hose clamp to the elbow fitting.

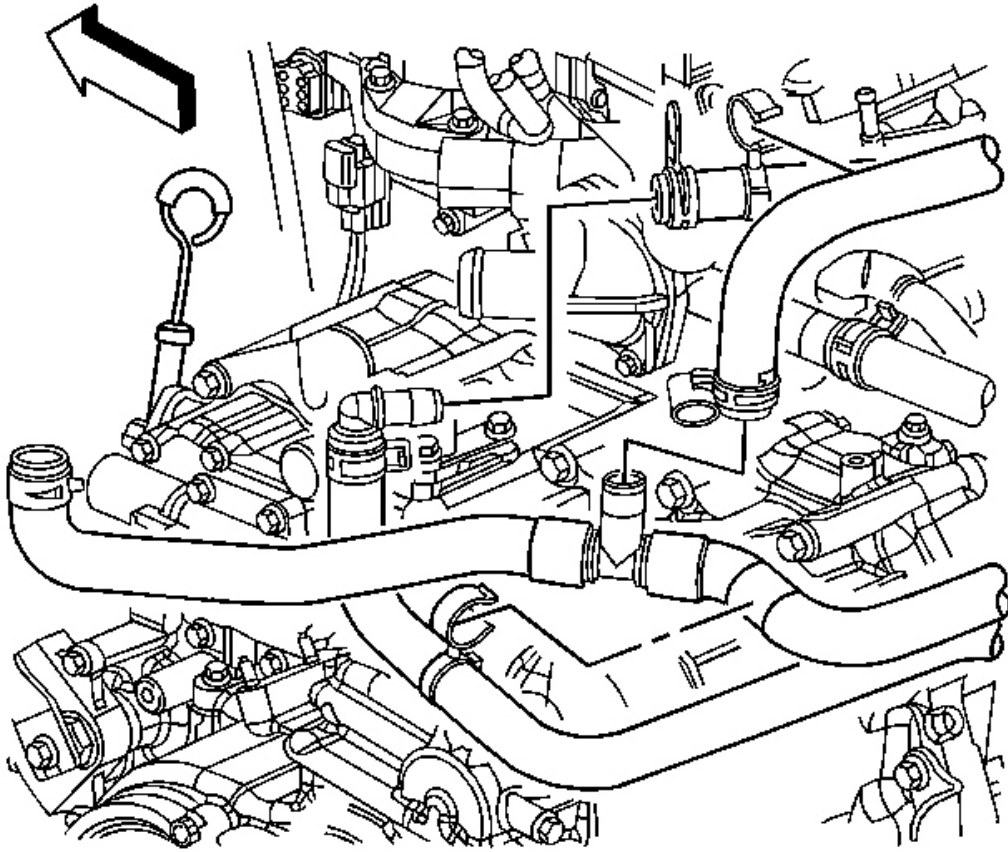


**Fig. 186: Heater Inlet Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

3. Install the heater inlet hose to the heater core.
4. Install the heater inlet hose clamp to the heater core.
5. Install the air cleaner outlet duct to the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
6. Fill the cooling system. Refer to **Draining and Filling Cooling System** in Engine Cooling.

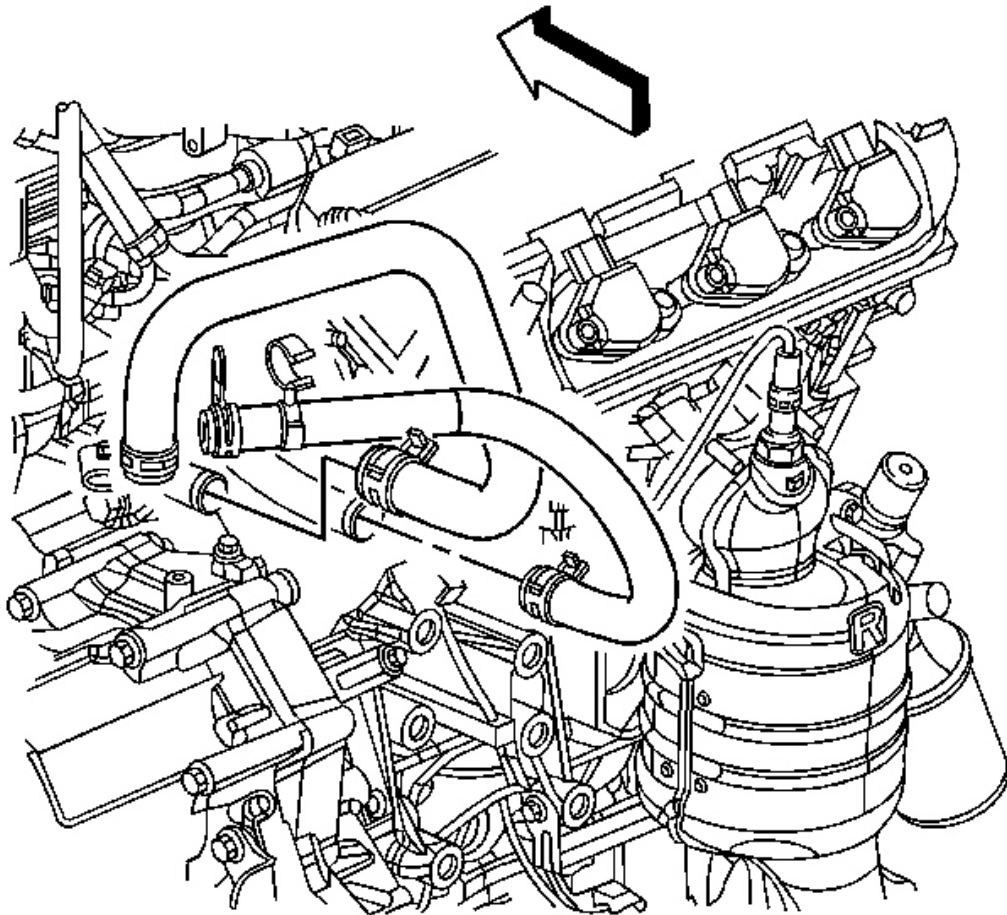
## **HEATER HOSE REPLACEMENT - INLET (L66 AT ENGINE)**

### **Removal Procedure**



**Fig. 187: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

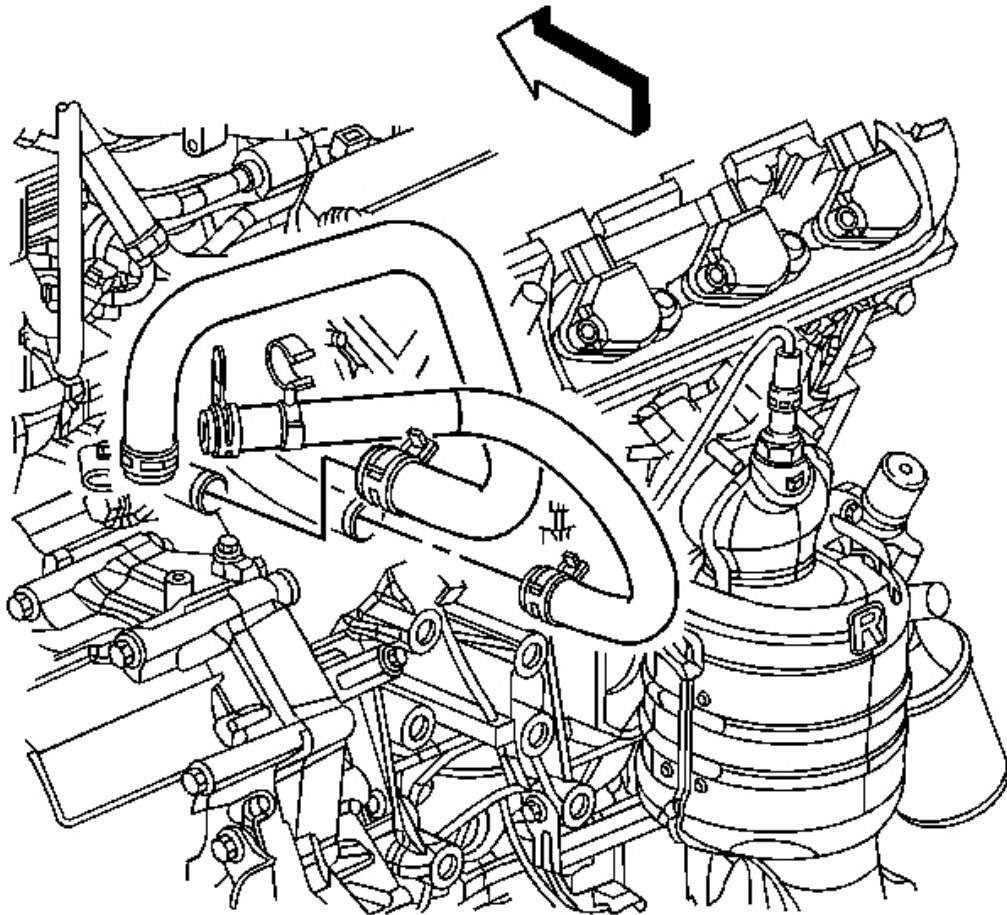
1. Drain the coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
2. Remove the air cleaner outlet duct from the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
3. Remove the heater inlet hose clamp from the elbow fitting.
4. Remove the heater inlet hose from the elbow fitting.



**Fig. 188: Heater Inlet Hose Clamp & Engine**  
Courtesy of GENERAL MOTORS CORP.

5. Remove the heater inlet hose clamp from the engine.
6. Remove the heater inlet hose from the engine.

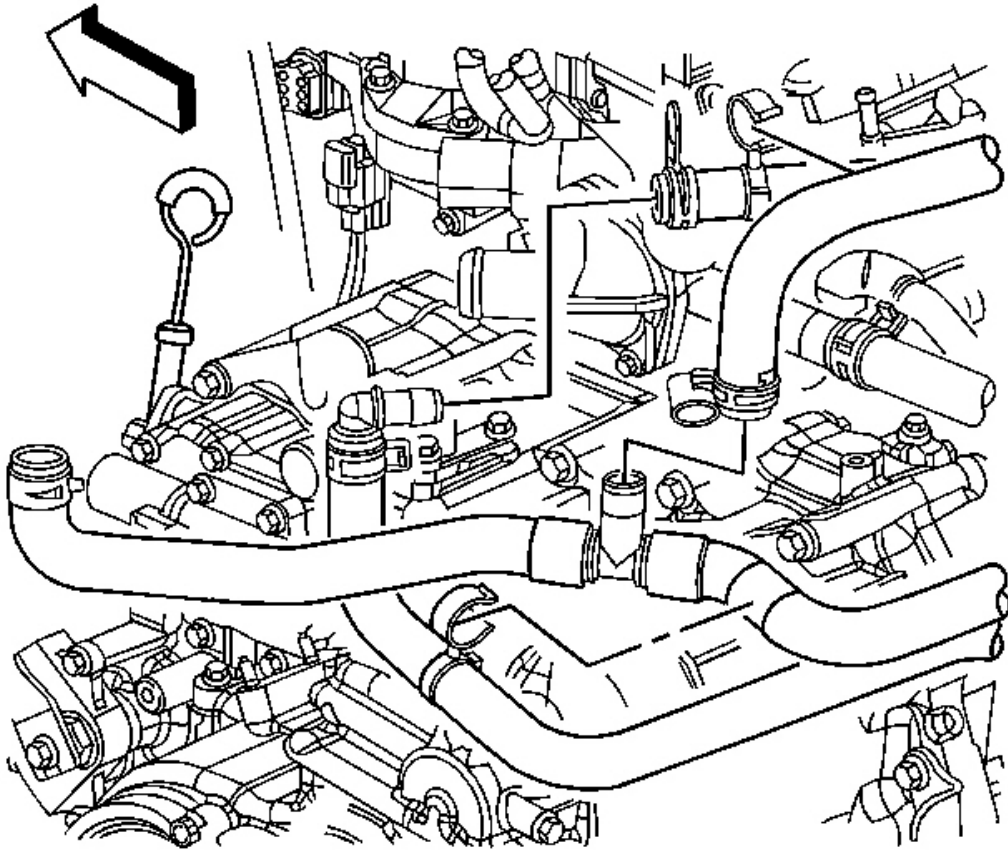
#### **Installation Procedure**



**Fig. 189: Heater Inlet Hose Clamp & Engine**  
Courtesy of GENERAL MOTORS CORP.

1. Install the heater inlet hose to the engine.
2. Install the heater inlet hose clamp to the engine.



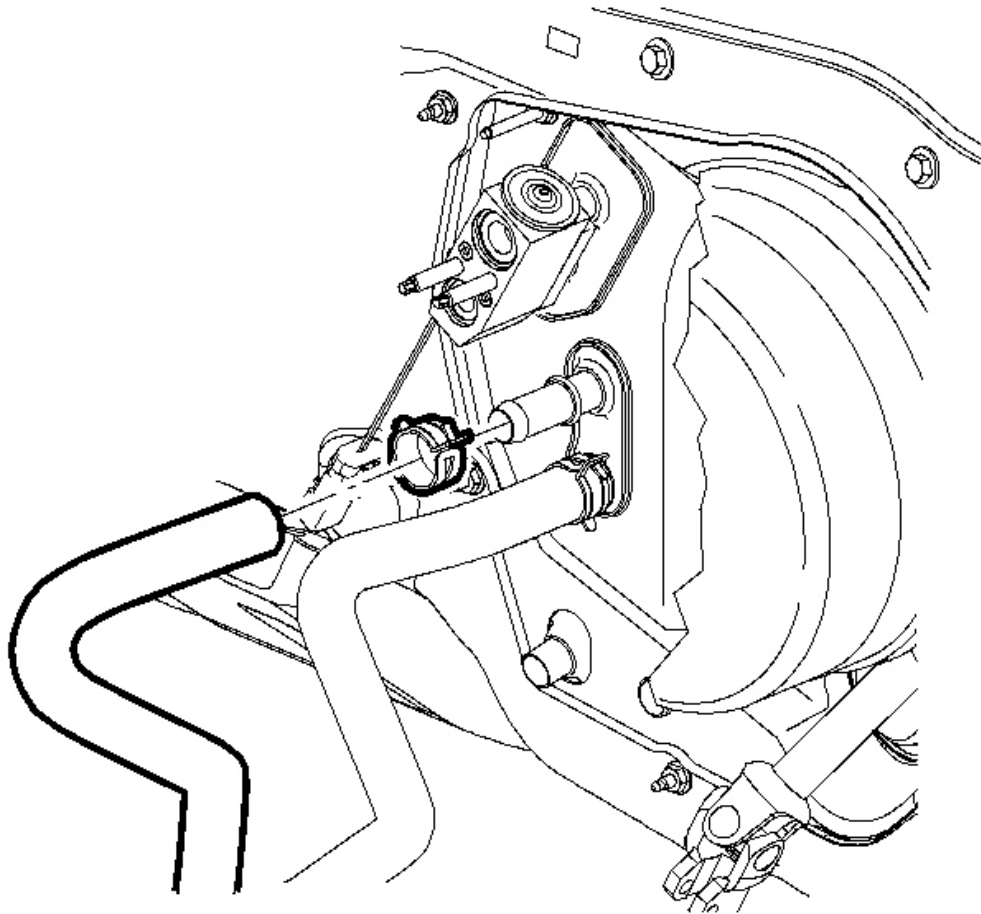


**Fig. 190: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

3. Install the heater inlet hose to the elbow fitting.
4. Install the heater inlet hose clamp to the elbow fitting.
5. Install the air cleaner outlet duct to the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
6. Fill the cooling system. Refer to **Draining and Filling Cooling System** in Engine Cooling.

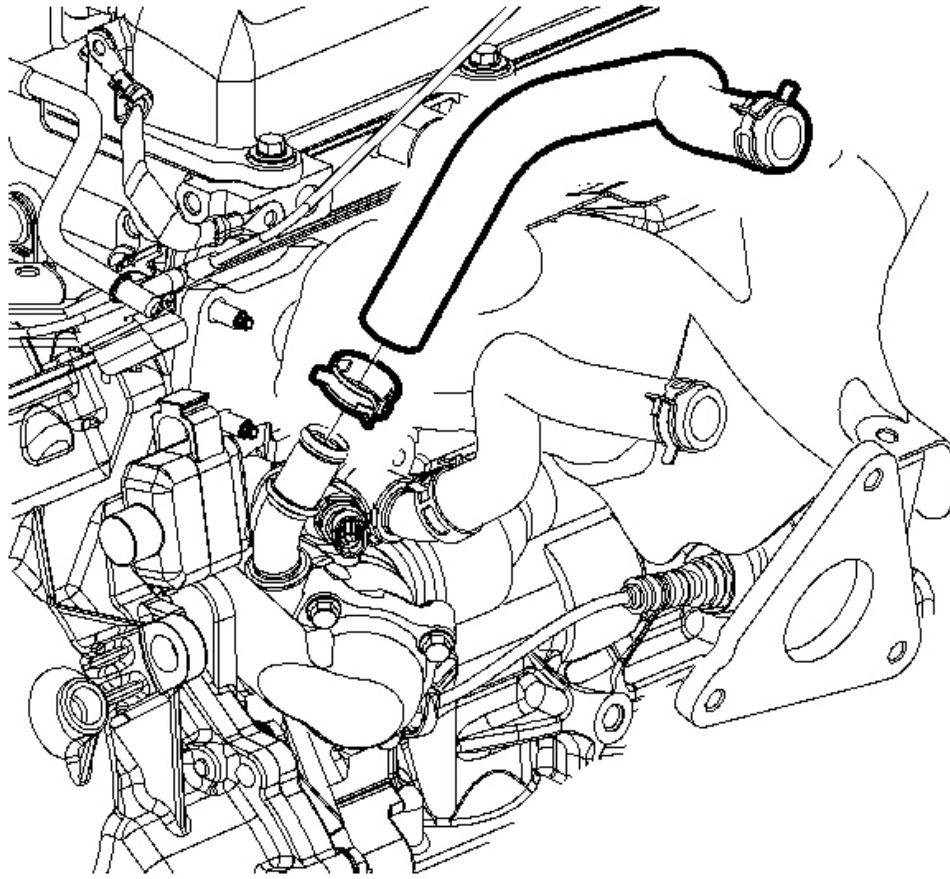
## **HEATER HOSE REPLACEMENT - OUTLET (L61)**

### **Removal Procedure**



**Fig. 191: Heater Outlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

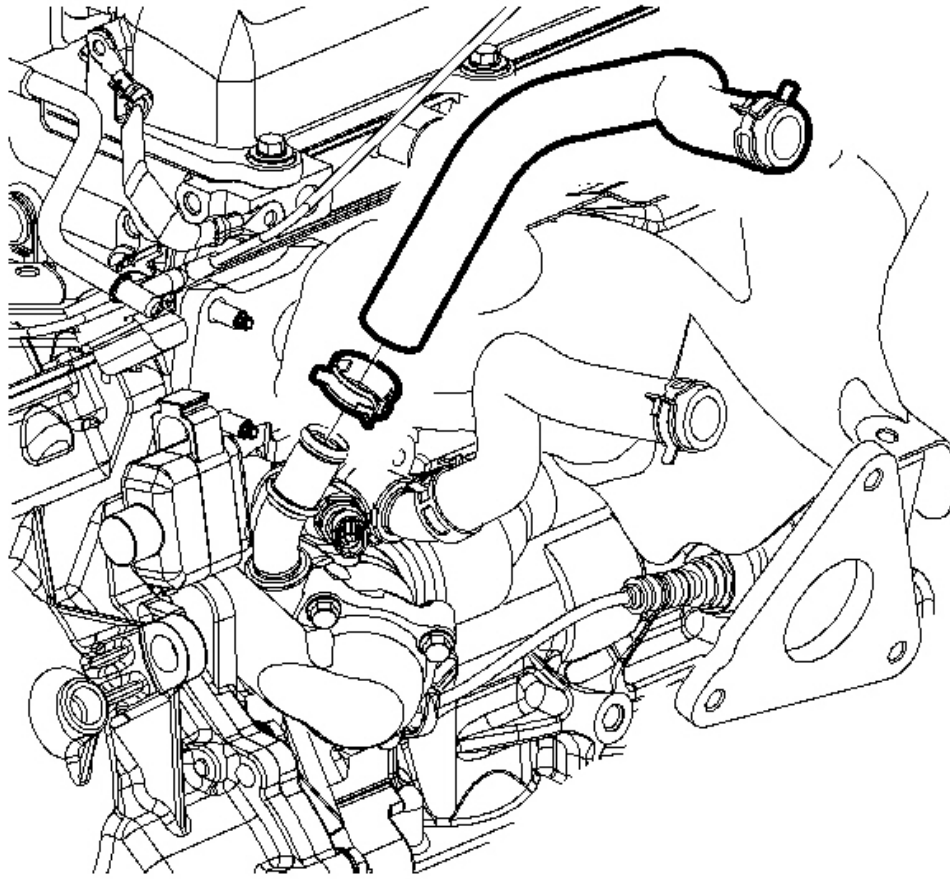
1. Drain the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
2. Remove the heater outlet hose clamp from the heater core.
3. Remove the heater outlet hose from the heater core.



**Fig. 192: Heater Outlet Hose Clamp & Engine**  
**Courtesy of GENERAL MOTORS CORP.**

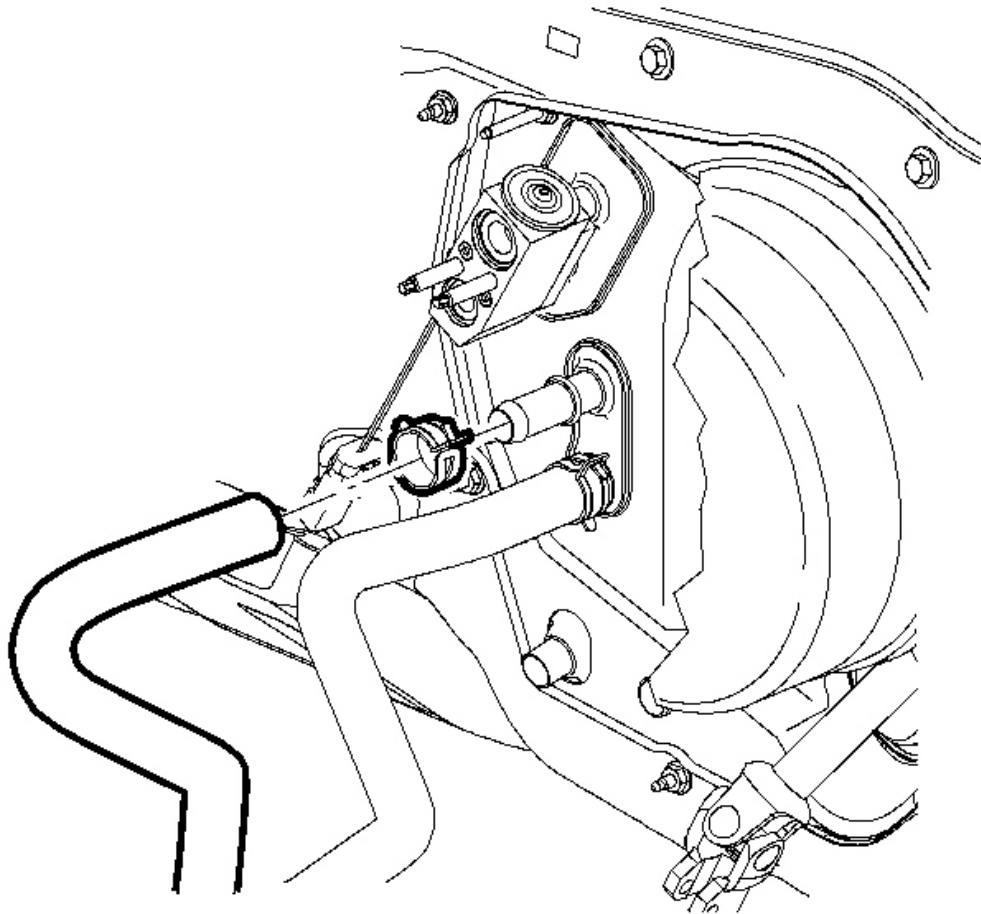
4. Remove the heater outlet hose clamp from the engine.
5. Remove the heater outlet hose from the engine.

**Installation Procedure**



**Fig. 193: Heater Outlet Hose Clamp & Engine**  
**Courtesy of GENERAL MOTORS CORP.**

1. Install the heater outlet hose to the engine port.
2. Install the heater outlet hose clamp to the engine port.

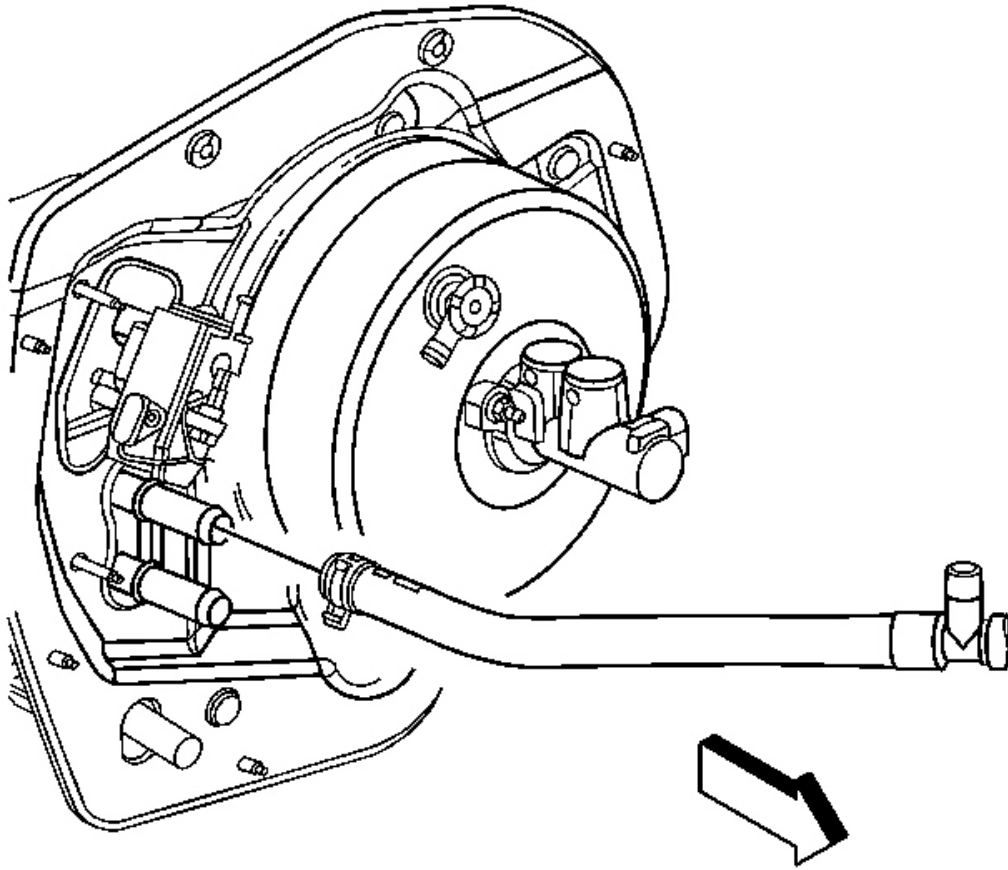


**Fig. 194: Heater Outlet, Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

3. Install the heater outlet hose to the heater core.
4. Install the heater outlet hose clamp to the heater core.
5. Fill the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.

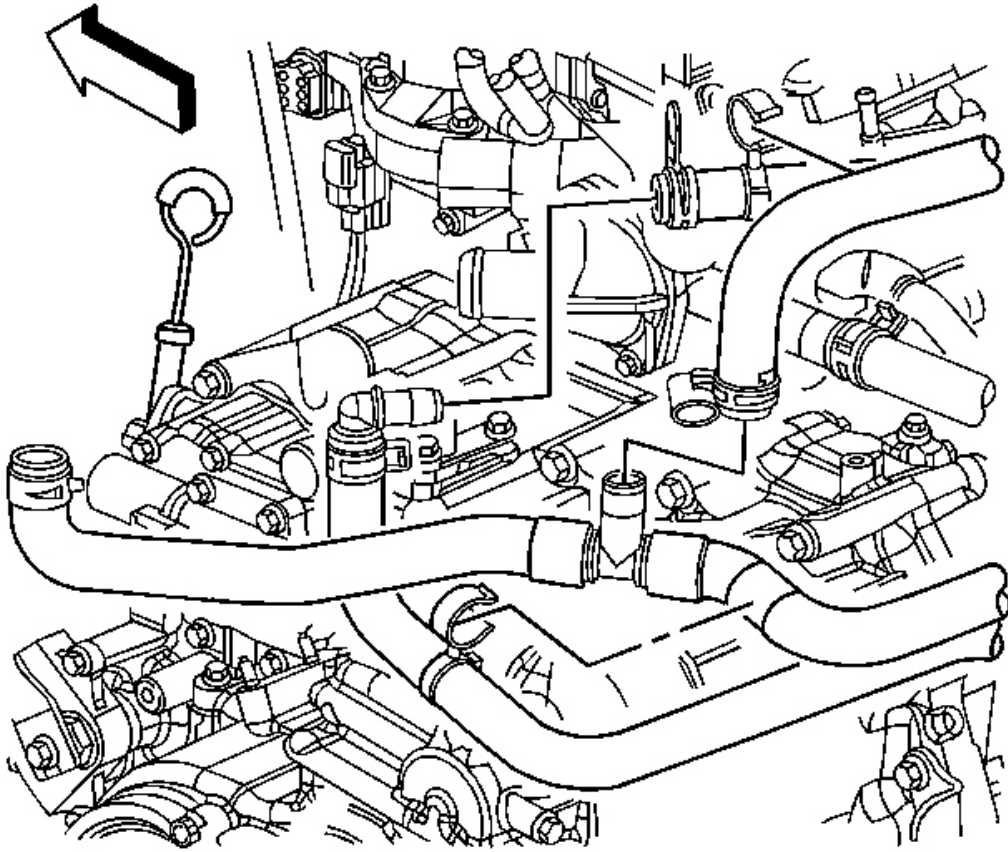
#### **HEATER HOSE REPLACEMENT - OUTLET (L66 AT HEATER CORE)**

##### **Removal Procedure**



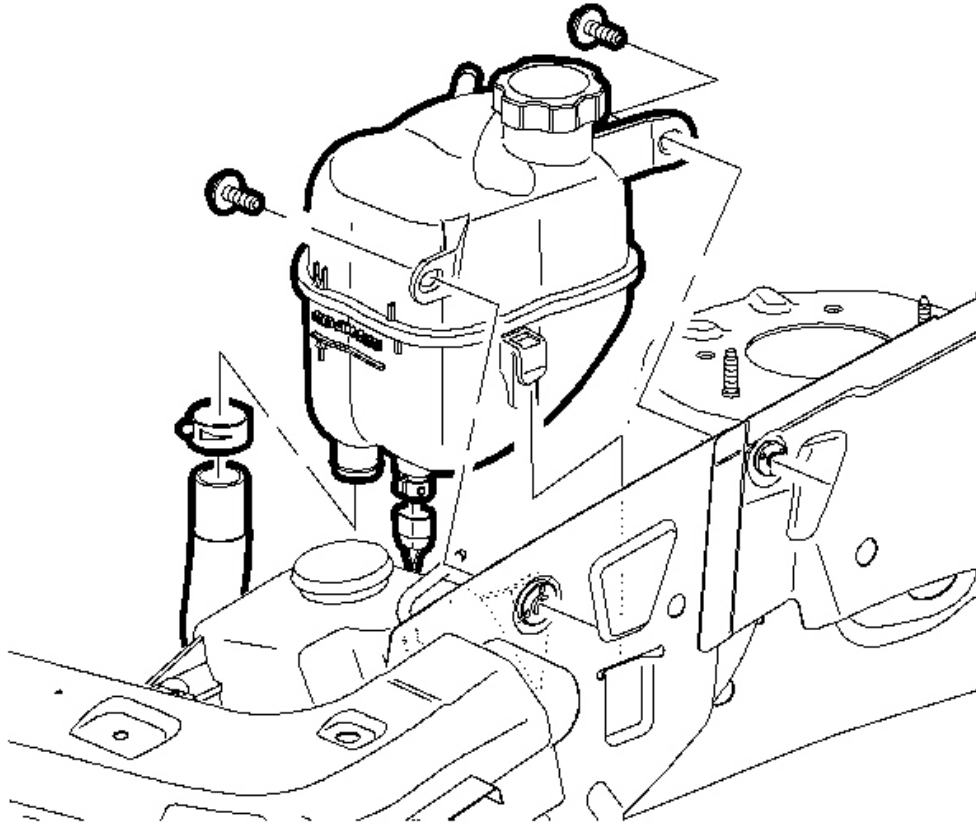
**Fig. 195: Heater Outlet Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

1. Drain the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
2. Remove the air cleaner outlet duct from the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
3. Remove the heater outlet hose clamp from the heater core.
4. Remove the heater outlet hose from the heater core.



**Fig. 196: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

5. Remove the heater outlet hose clamp from the "T" fitting.
6. Remove the heater outlet hose from the "T" fitting.

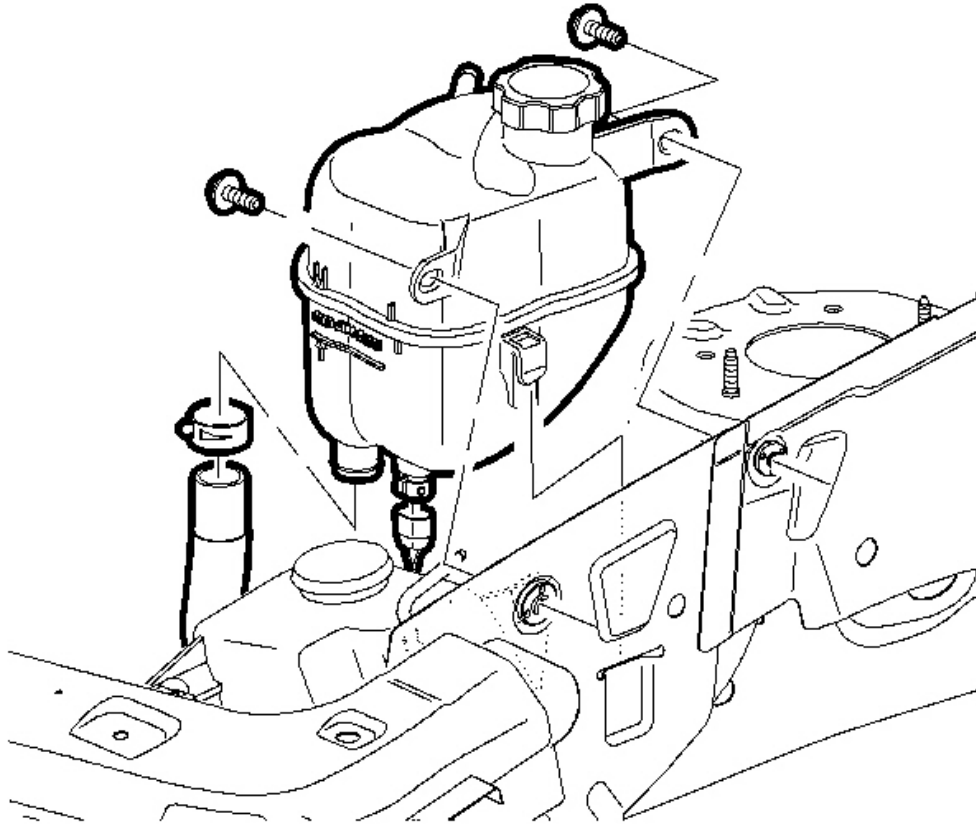


**Fig. 197: Heater Outlet Hose Clamp & Surge Tank**  
Courtesy of GENERAL MOTORS CORP.

7. Remove the heater outlet hose clamp from the surge tank.
8. Remove the heater outlet hose from the surge tank.

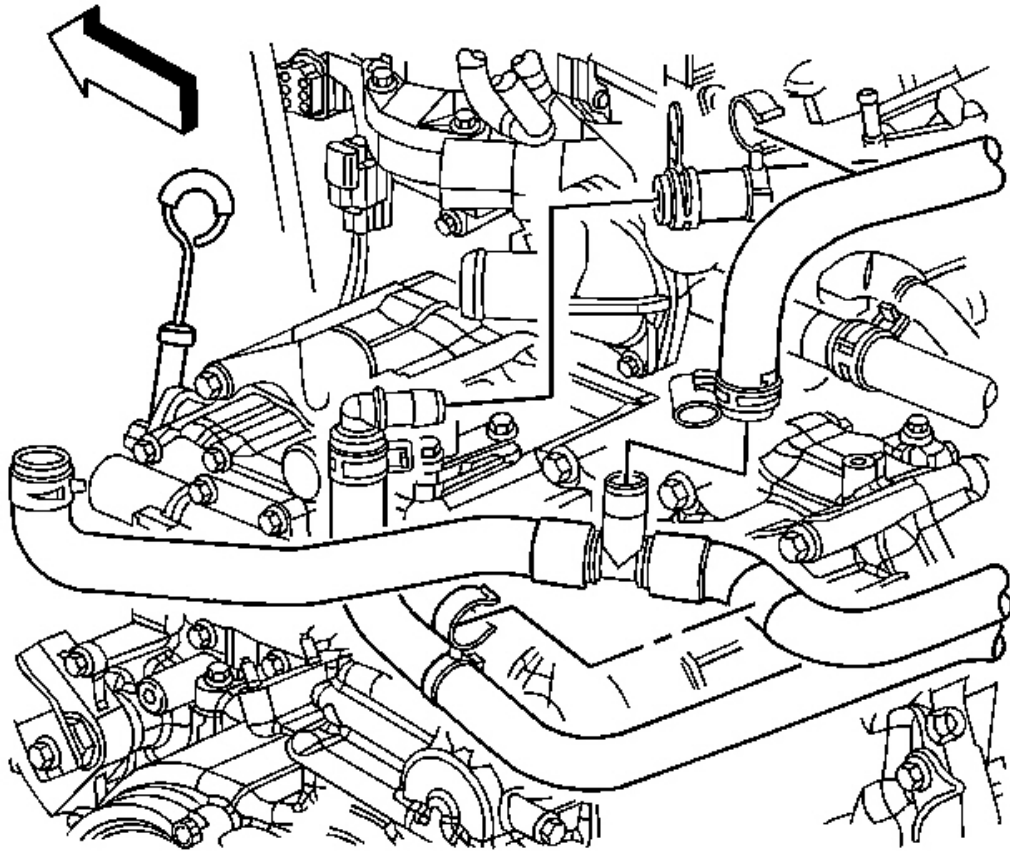
**Installation Procedure**





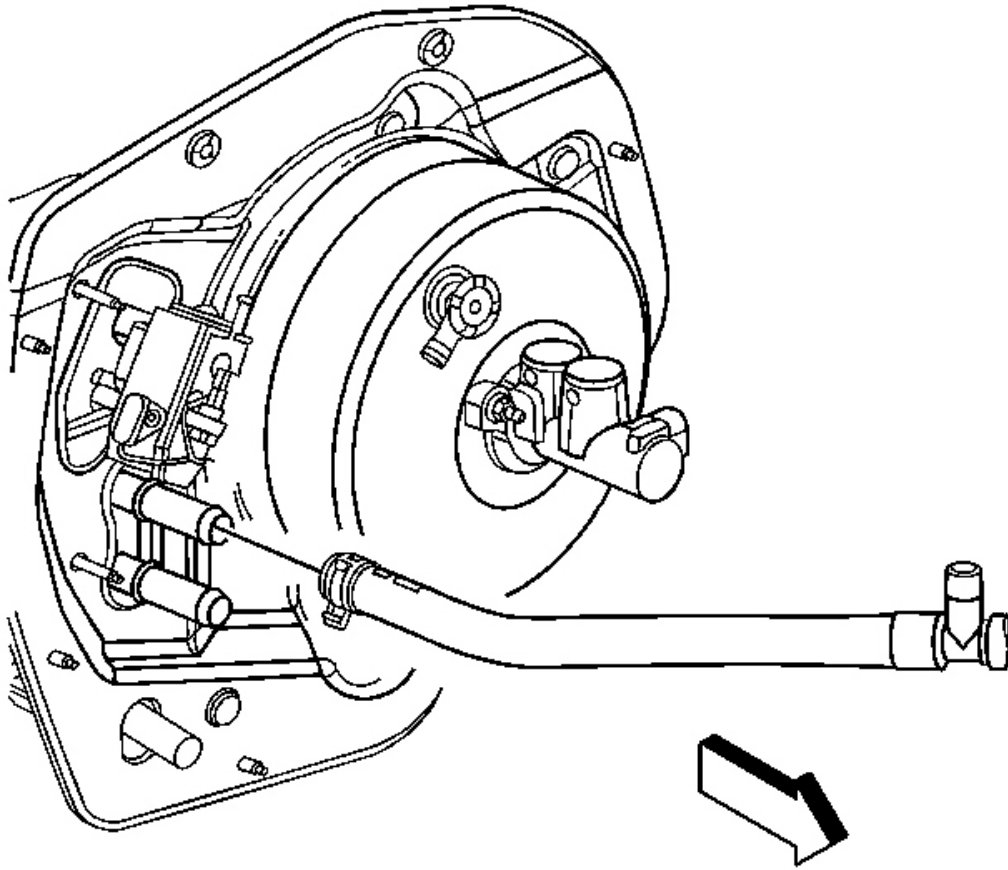
**Fig. 198: Heater Outlet Hose Clamp & Surge Tank**  
Courtesy of GENERAL MOTORS CORP.

1. Install the heater outlet hose to the surge tank.
2. Install the heater outlet hose clamp to the surge tank.



**Fig. 199: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

3. Install the heater outlet hose to the "T" fitting.
4. Install the heater outlet hose clamp to the "T" fitting.

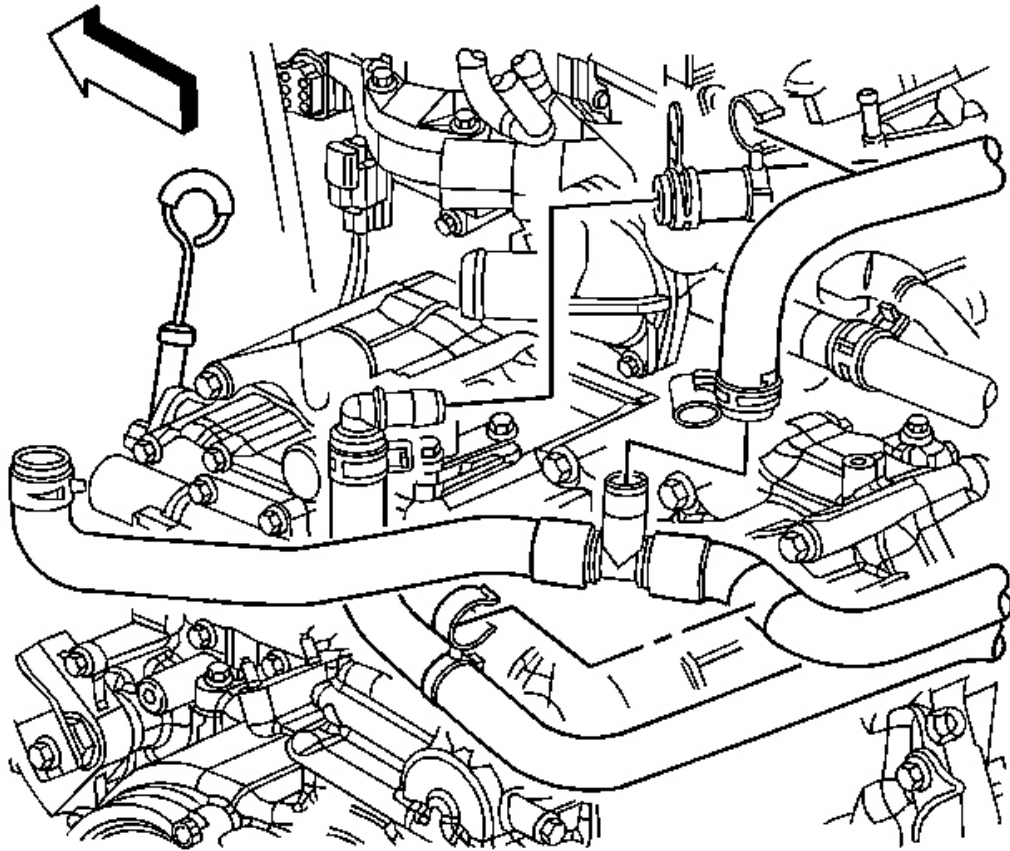


**Fig. 200: Heater Outlet Hose Clamp & Heater Core**  
Courtesy of GENERAL MOTORS CORP.

5. Install the heater outlet hose to the heater core.
6. Install the heater outlet hose clamp to the heater core.
7. Install the air cleaner outlet duct to the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
8. Fill the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.

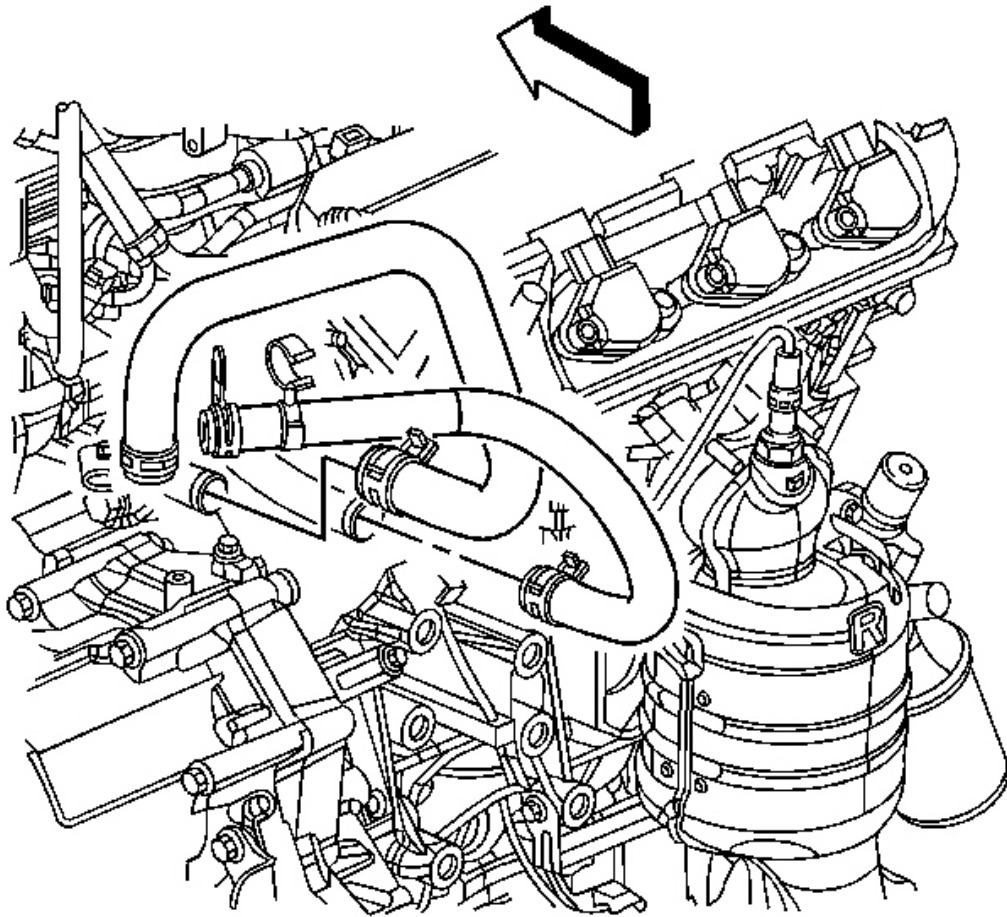
#### **HEATER HOSE REPLACEMENT - OUTLET (L66 AT ENGINE)**

##### **Removal Procedure**



**Fig. 201: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

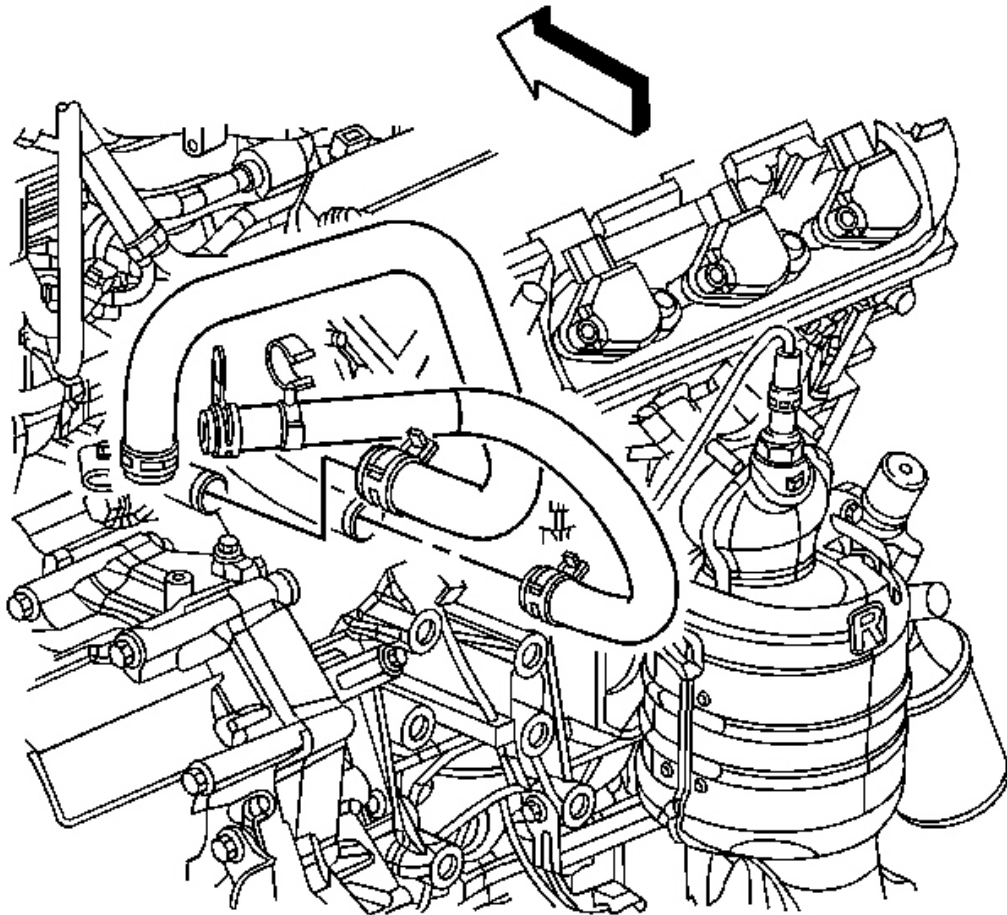
1. Drain the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
2. Remove the air cleaner outlet duct from the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
3. Remove the heater outlet hose clamp from the "T" fitting.
4. Remove the heater outlet hose from the "T" fitting.



**Fig. 202: Heater Inlet Hose Clamp & Engine**  
Courtesy of GENERAL MOTORS CORP.

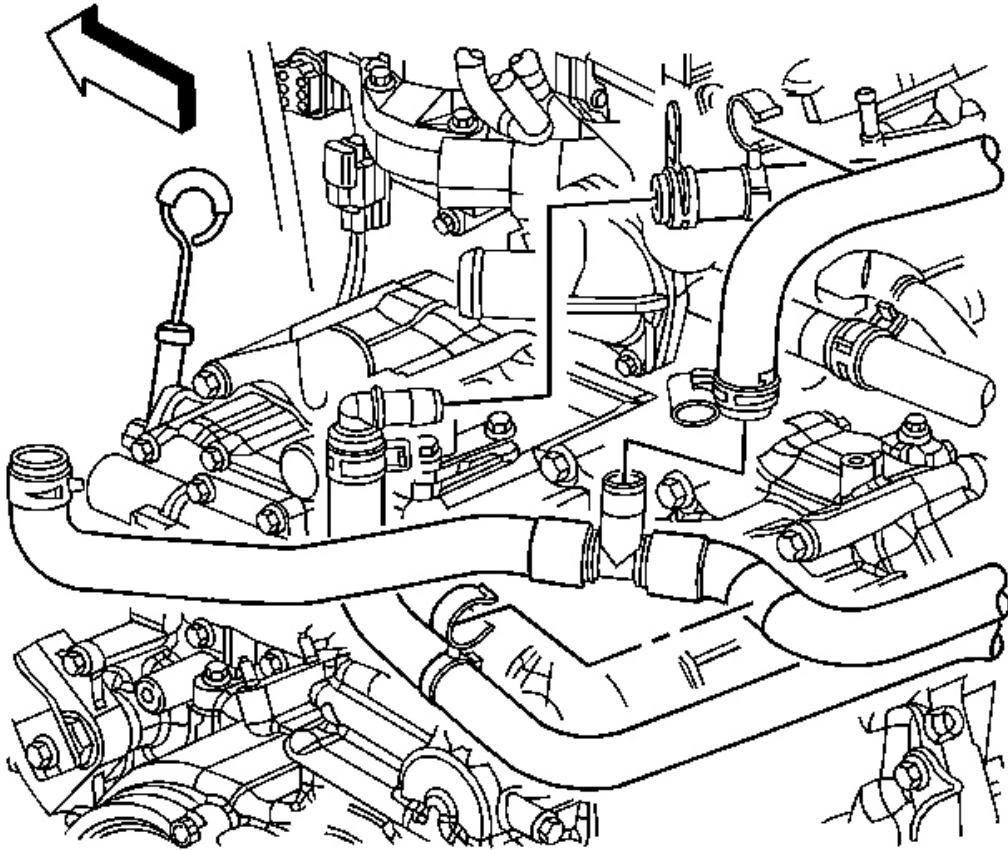
5. Remove the heater outlet hose clamp from the engine.
6. Remove the heater outlet hose from the engine.

#### **Installation Procedure**



**Fig. 203: Heater Inlet Hose Clamp & Engine**  
Courtesy of GENERAL MOTORS CORP.

1. Install the heater outlet hose to the engine.
2. Install the heater outlet hose clamp to the engine.

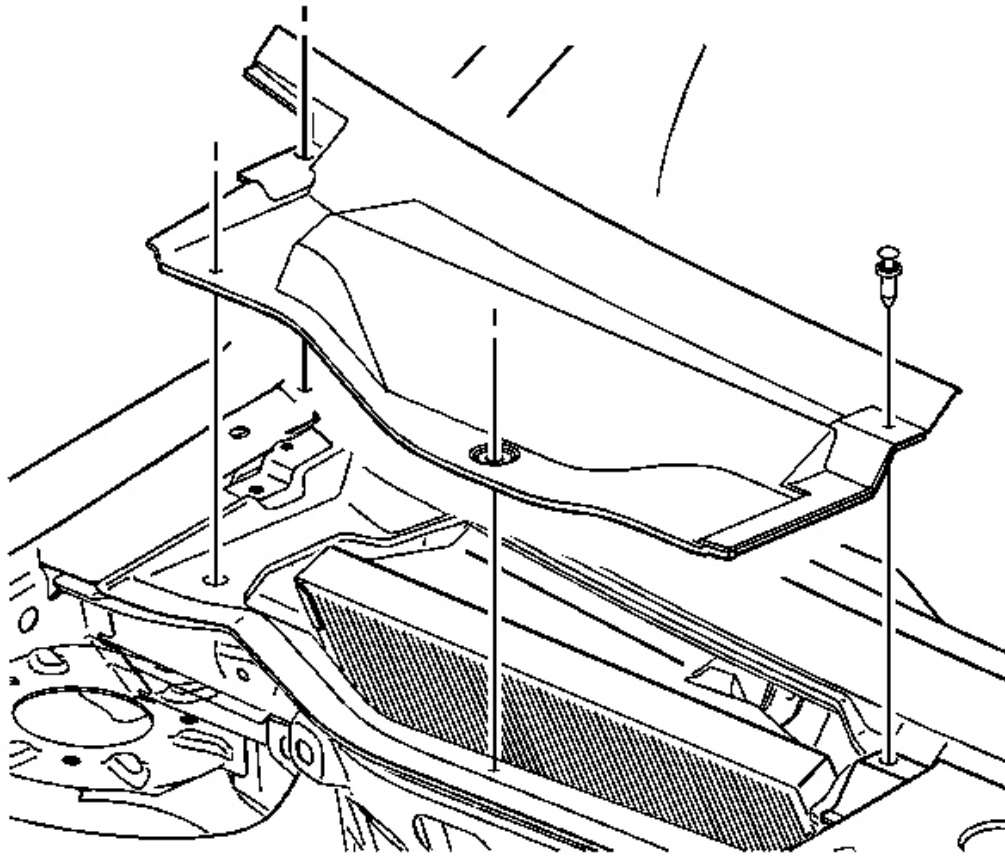


**Fig. 204: Heater Inlet Hose Clamp & Elbow Fitting**  
Courtesy of GENERAL MOTORS CORP.

3. Install the heater outlet hose to the "T" fitting.
4. Install the heater outlet hose clamp to the "T" fitting.
5. Install the air cleaner outlet duct to the vehicle. Refer to **Air Cleaner Resonator Outlet Duct Replacement** in Engine Controls - 3.5L (L66).
6. Fill the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.

## **PASSENGER COMPARTMENT AIR FILTER HOUSING REPLACEMENT**

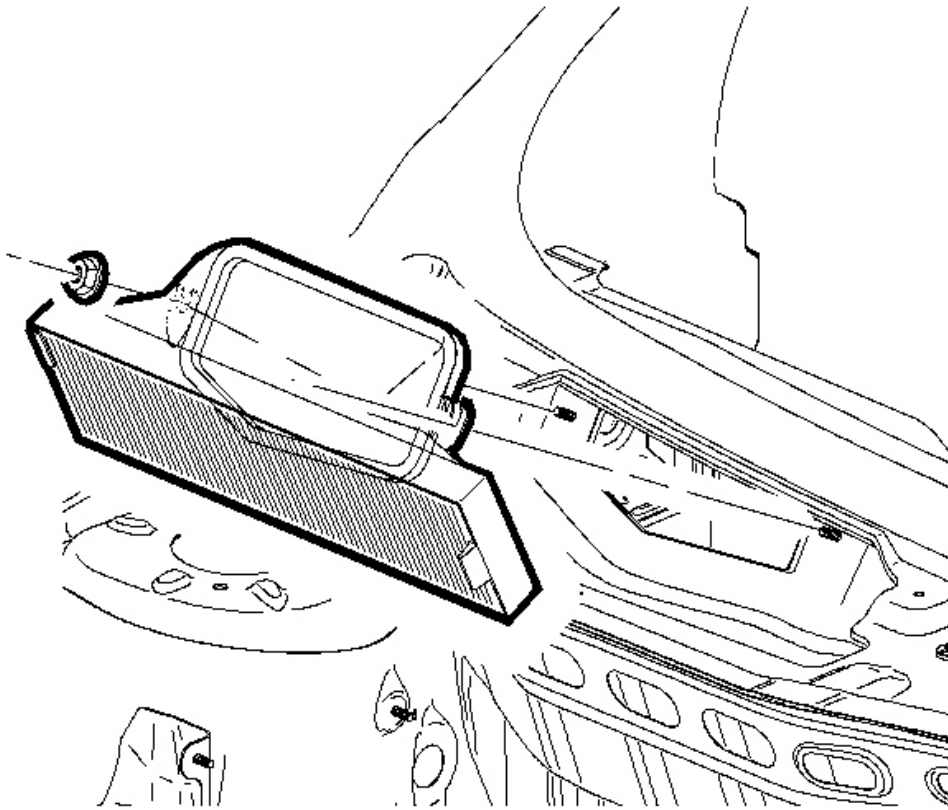
### **Removal Procedure**



**Fig. 205: Push Pins & Air Filter Access Panel**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the push pins from the air filter access panel.
2. Lift the air filter access panel and disconnect the washer nozzle hose from the washer nozzle.
3. Remove the air filter access panel.

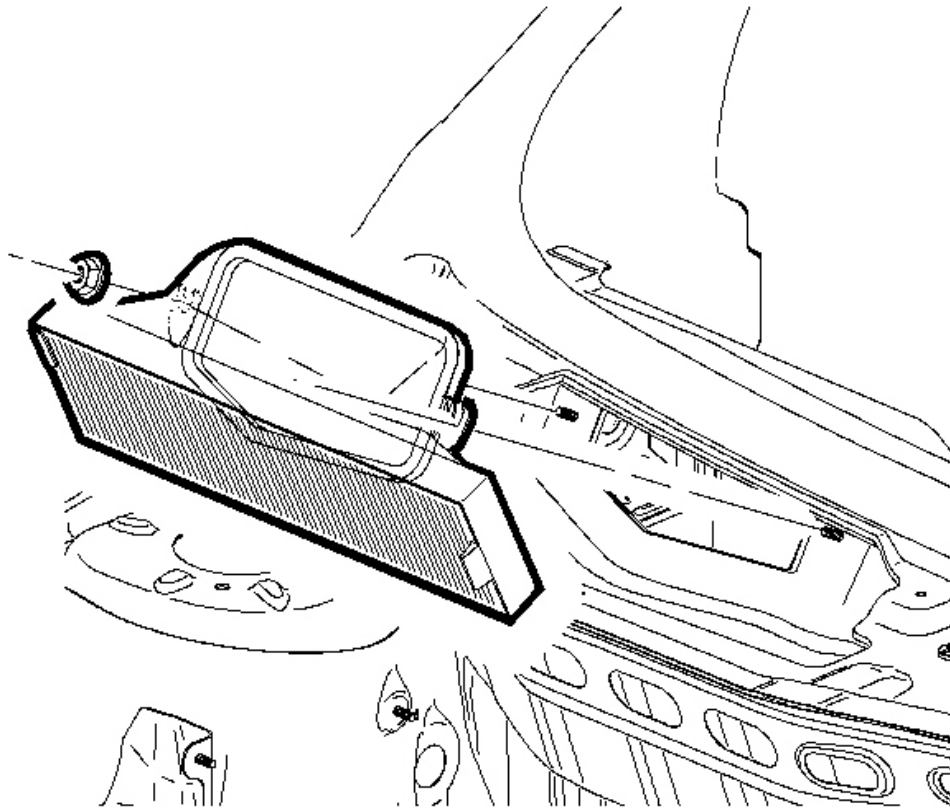




**Fig. 206: Filter Housing & Nuts**  
**Courtesy of GENERAL MOTORS CORP.**

4. Remove the filter housing nuts from the body.
5. Remove the filter housing from the body.

**Installation Procedure**



**Fig. 207: Filter Housing & Nuts**  
**Courtesy of GENERAL MOTORS CORP.**

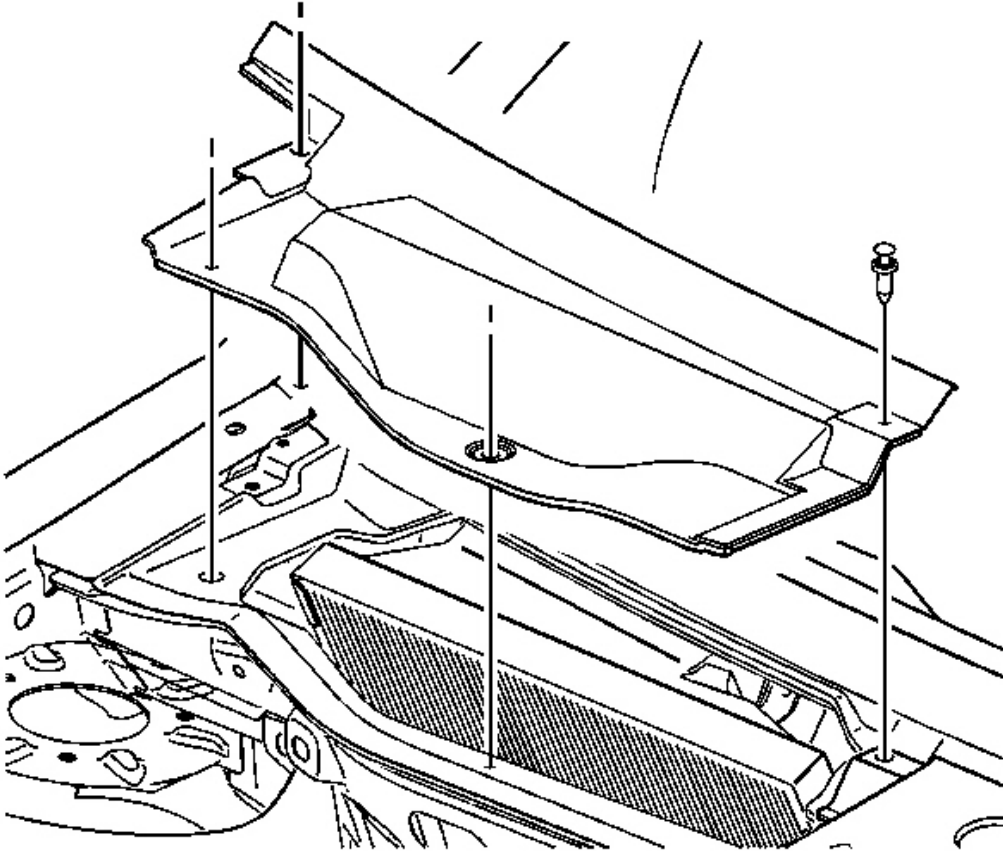
1. Inspect the foam seal. If the seal is damaged, replace the seal using Kent Industries adhesive back foam tape P/N 46485 or equivalent.
2. Install the filter housing to the body.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

**IMPORTANT:** New seal nuts must be used when installing passenger compartment air filter housing to prevent leaks.

3. Install the new seal nuts to the filter housing.

**Tighten:** Tighten the nuts to 9 N.m (80 lb in).

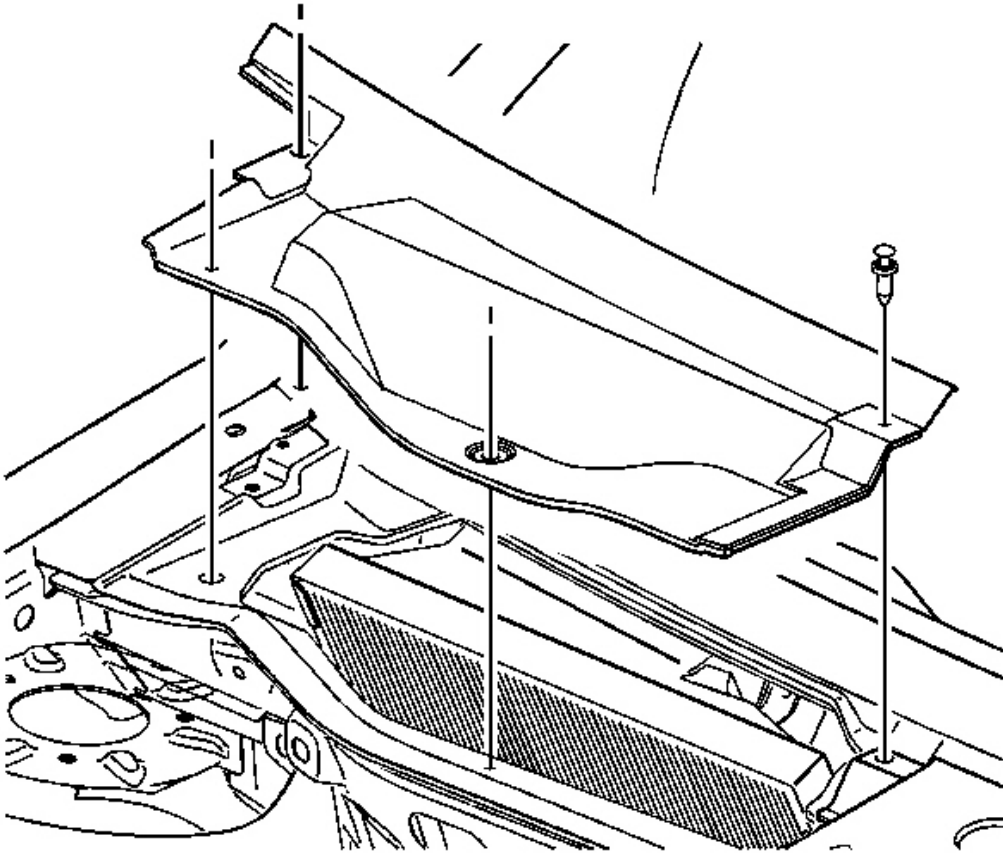


**Fig. 208: Push Pins & Air Filter Access Panel**  
Courtesy of GENERAL MOTORS CORP.

4. Connect the washer nozzle hose to the washer nozzle.
5. Install the air filter access panel.
6. Install the push pins to the air filter access panel.

## **PASSENGER COMPARTMENT AIR FILTER REPLACEMENT**

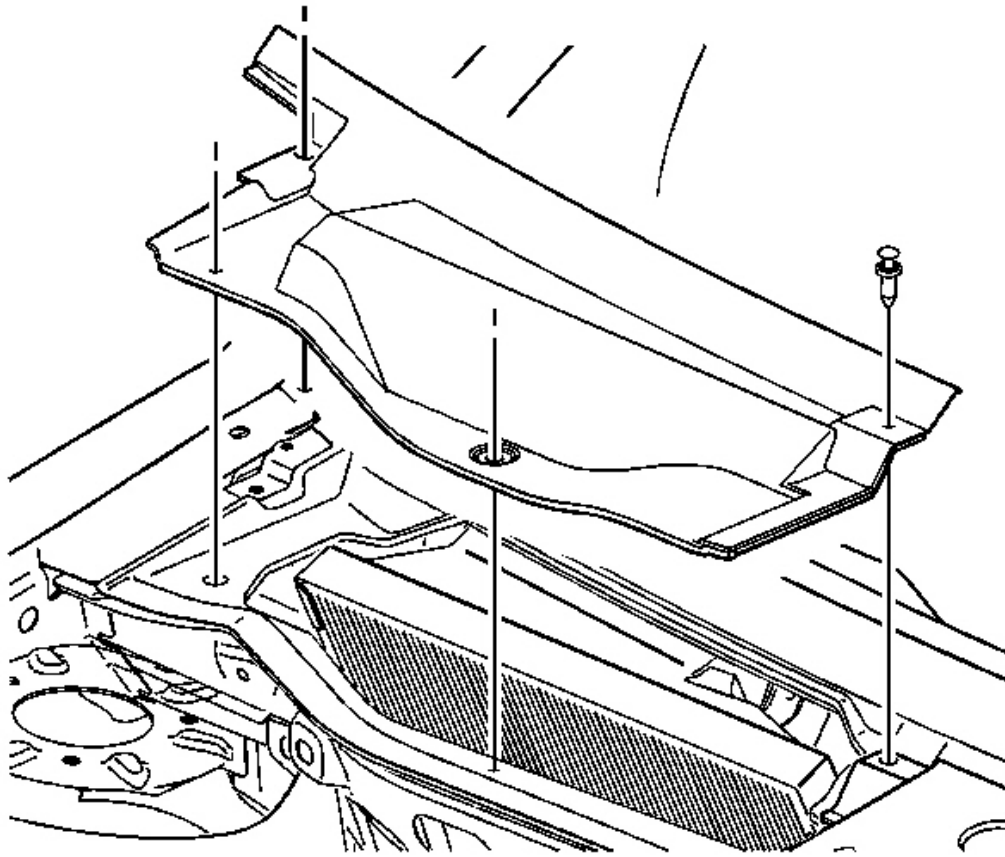
### **Removal Procedure**



**Fig. 209: Push Pins & Air Filter Access Panel**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the push pins from the air filter access panel.
2. Remove the air filter access panel.
3. Remove the air filter from the housing.

**Installation Procedure**



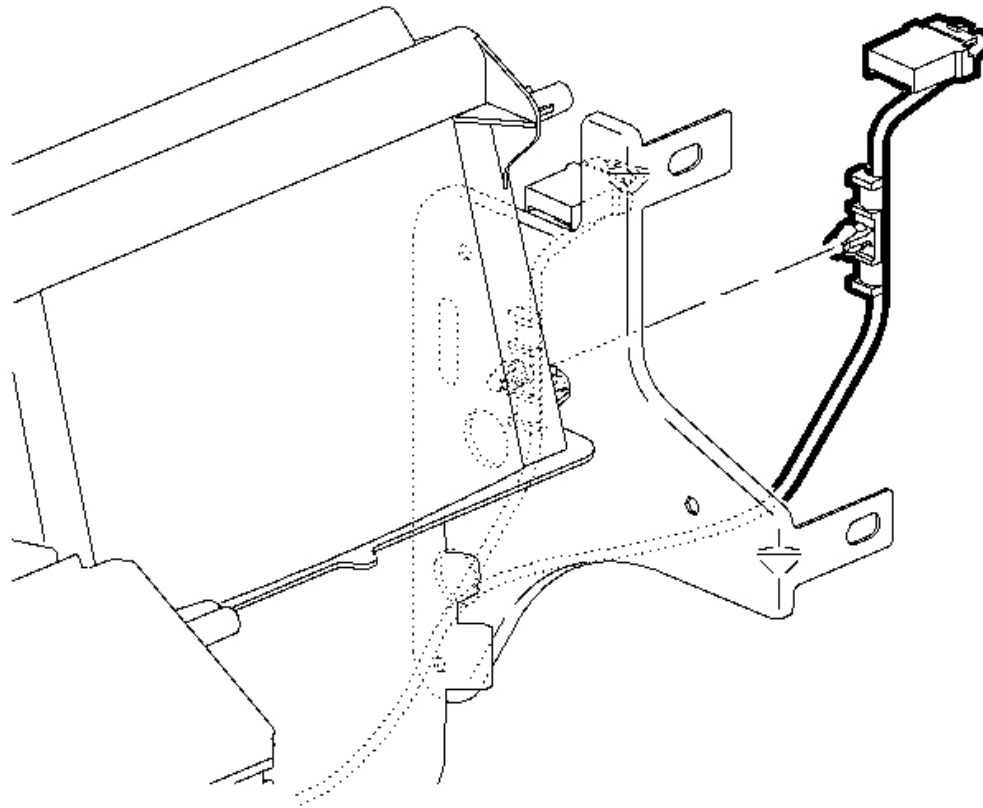
**Fig. 210: Push Pins & Air Filter Access Panel**  
Courtesy of GENERAL MOTORS CORP.

1. Install the air filter into the housing.
2. Install the air filter access panel.
3. Install the air filter access panel push pins.

## **AIR INLET ASSEMBLY REPLACEMENT**

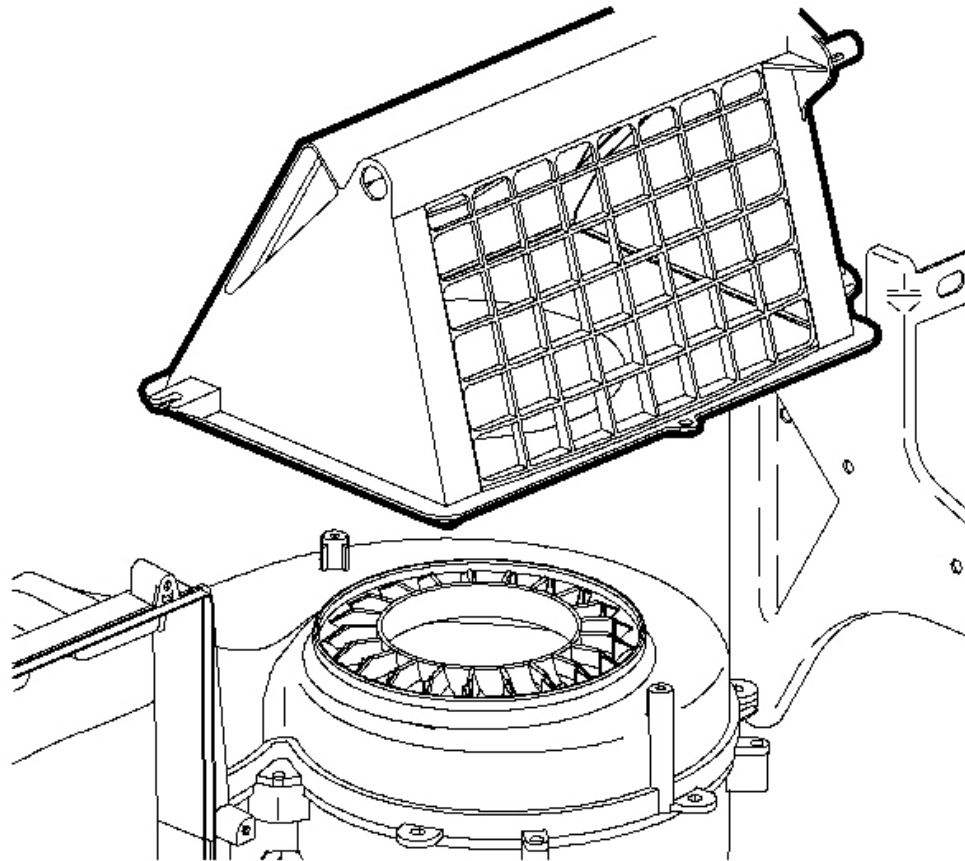
### **Removal Procedure**

1. Remove the HVAC module. Refer to **HVAC Module Assembly Replacement** .



**Fig. 211: Electrical Connector & Recirculation Actuator**  
**Courtesy of GENERAL MOTORS CORP.**

2. Disconnect the electrical connector from the recirculation actuator.
3. Unclip the wire harness from the HVAC module end bracket.
4. Remove the end bracket screws from the air inlet assembly.
5. Remove the end bracket nuts from the blower case assembly.
6. Remove the end bracket from the blower case assembly.



**Fig. 212: Air Inlet Assembly**  
**Courtesy of GENERAL MOTORS CORP.**

7. Remove the recirculation actuator screws.
8. Remove the recirculation actuator.
9. Remove the air inlet assembly screws.
10. Remove the air inlet assembly.

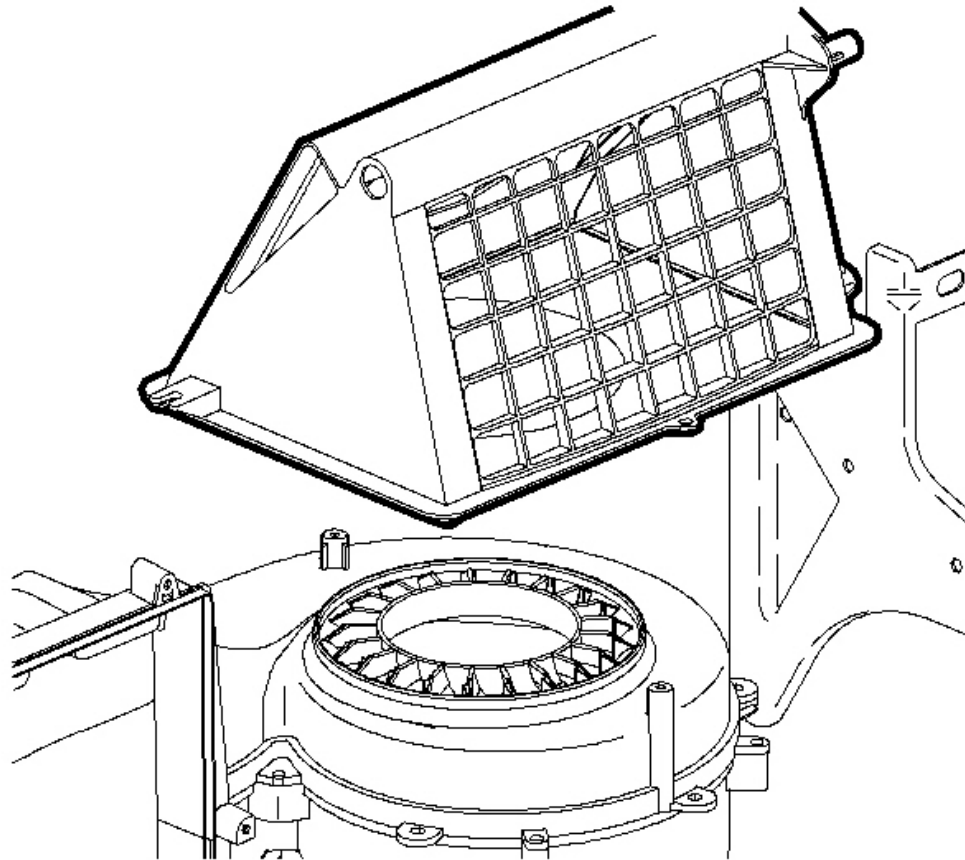
#### **Installation Procedure**

1. Install the air inlet assembly.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

2. Install the air inlet assembly screws.

**Tighten:** Tighten the screws to 1 N.m (9 lb in).

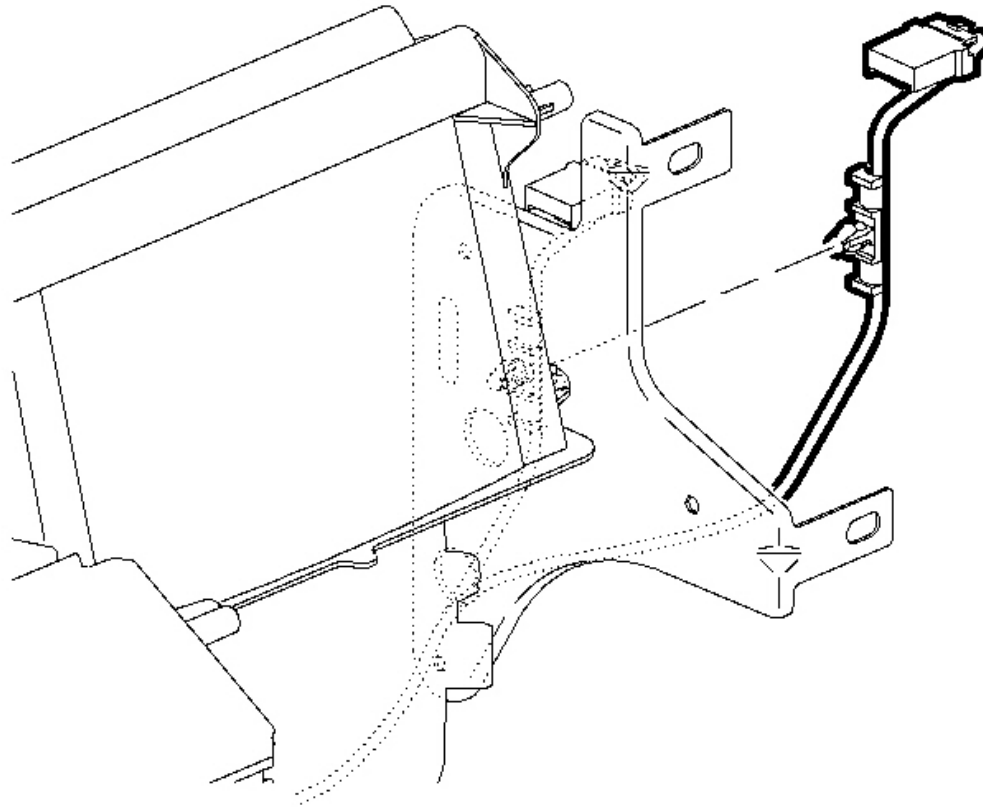


**Fig. 213: Air Inlet Assembly**  
Courtesy of GENERAL MOTORS CORP.

3. Install the recirculation actuator.
4. Install the recirculation actuator screws.



**Tighten:** Tighten the screws to 1 N.m (9 lb in).



**Fig. 214: Electrical Connector & Recirculation Actuator**  
Courtesy of GENERAL MOTORS CORP.

5. Route the HVAC module harness through the end bracket bottom hole and install the bracket.
6. Install the end bracket screws.

**Tighten:** Tighten the screws to 2 N.m (18 lb in).

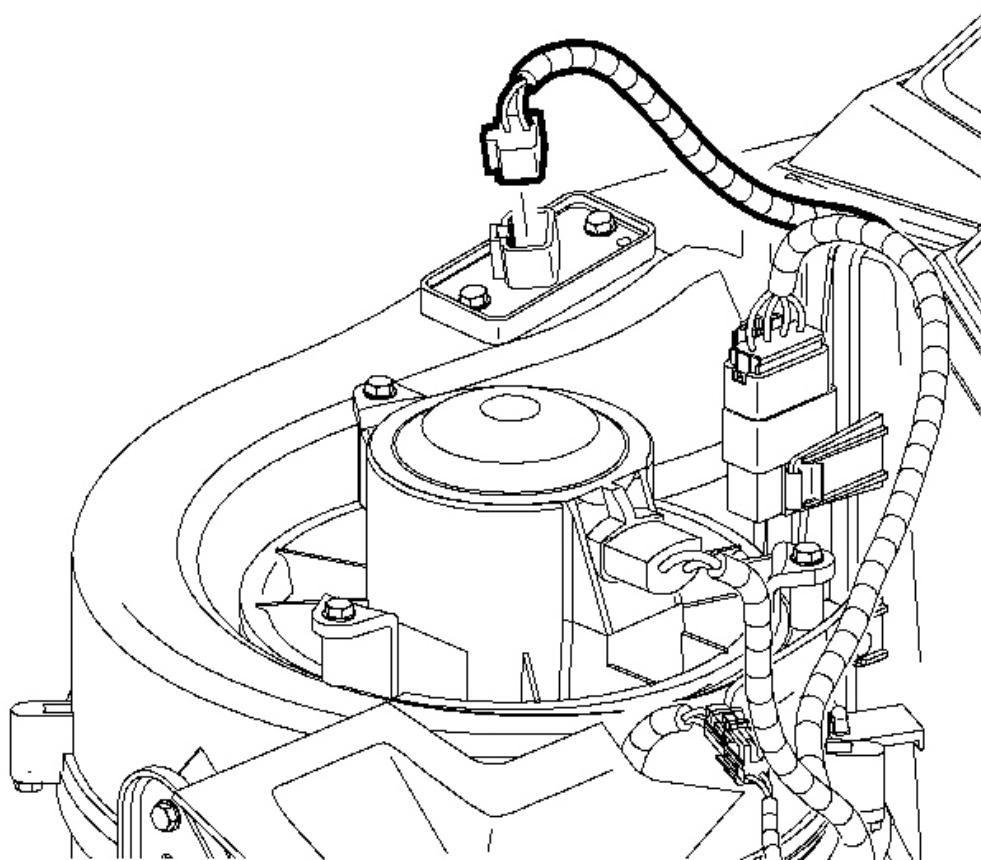
7. Install the end bracket nuts.

**Tighten:** Tighten the nuts to 2 N.m (18 lb in).

8. Clip the wire harness to the end bracket.
9. Install the electrical connector to the recirculation actuator.
10. Install the HVAC module. Refer to **HVAC Module Assembly Replacement** .

## **BLOWER MOTOR RESISTOR REPLACEMENT**

### **Removal Procedure**

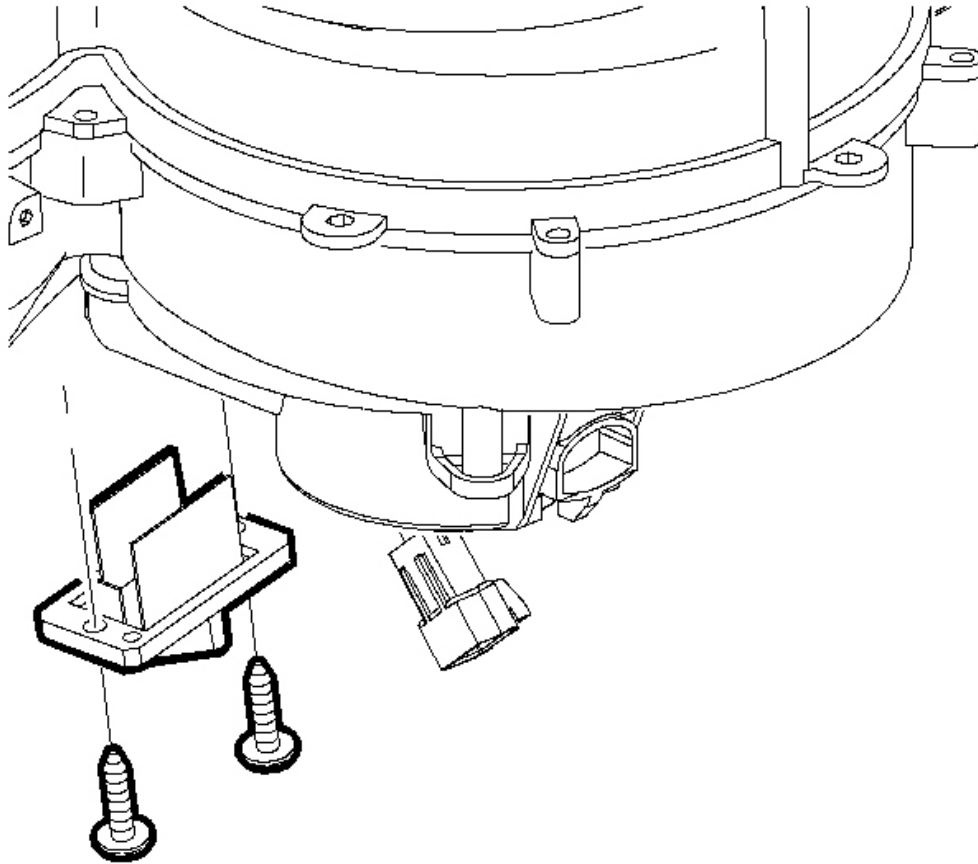


**Fig. 215: Electrical Connector & Blower Motor Resistor**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the right side insulator/closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right**

in Instrument Panel, Gages and Console.

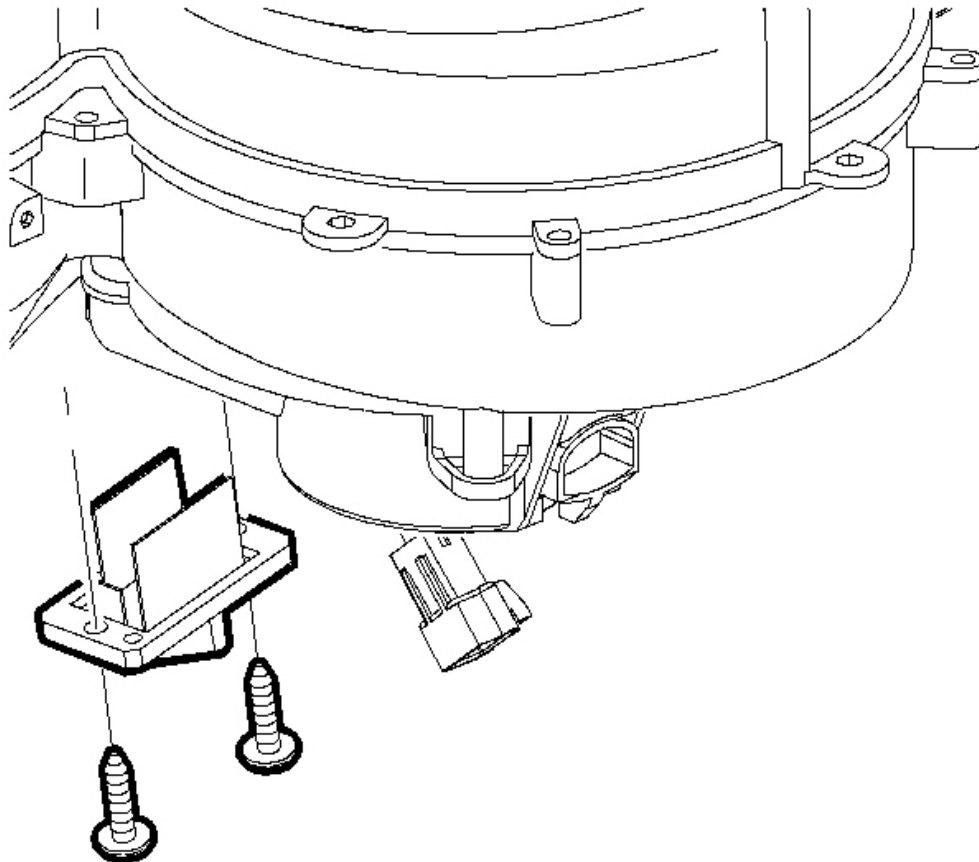
2. Disconnect the electrical connector from the blower motor resistor.



**Fig. 216: Blower Motor Resistor, Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

3. Remove the blower motor resistor screws from the HVAC module.
4. Remove the blower motor resistor from the HVAC module.

#### **Installation Procedure**



**Fig. 217: Blower Motor Resistor, Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Install the blower motor resistor to the HVAC module.

**NOTE:** Refer to **Fastener Notice** in **Cautions and Notices**.

2. Install the blower motor resistor screws to the HVAC module.

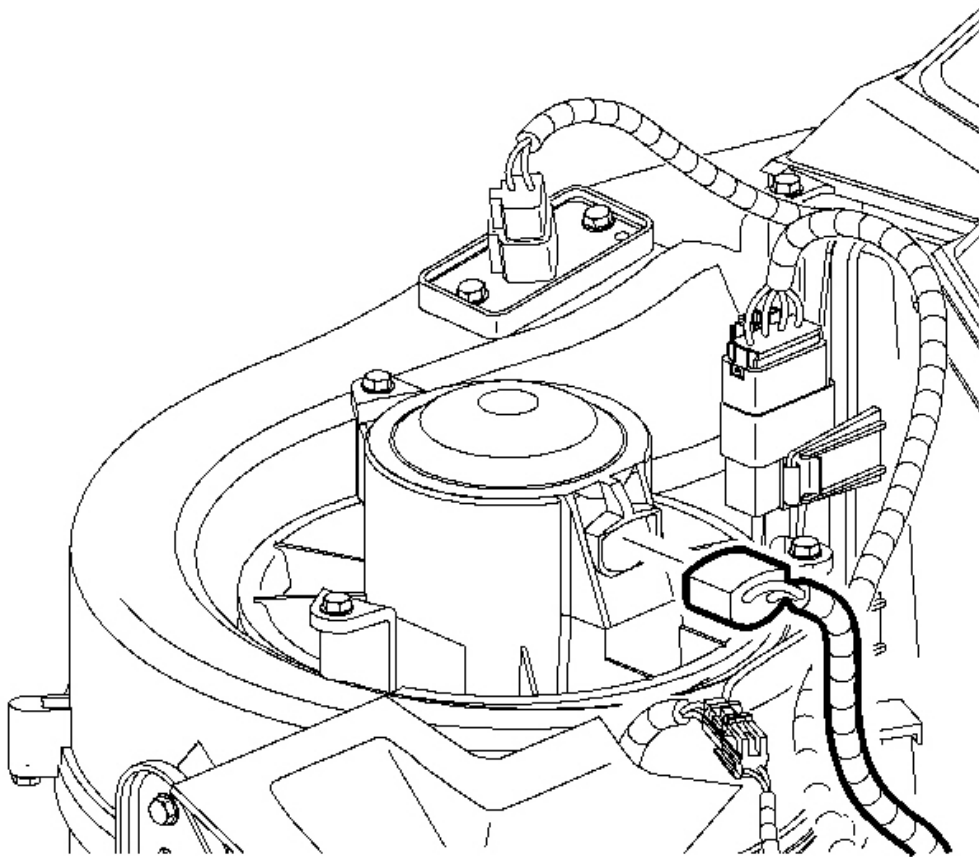
**Tighten:** Tighten the screws to 1 N.m (9 lb in).

3. Connect the electrical connector to the blower motor resistor.

4. Install the right side insulator/closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages and Console.

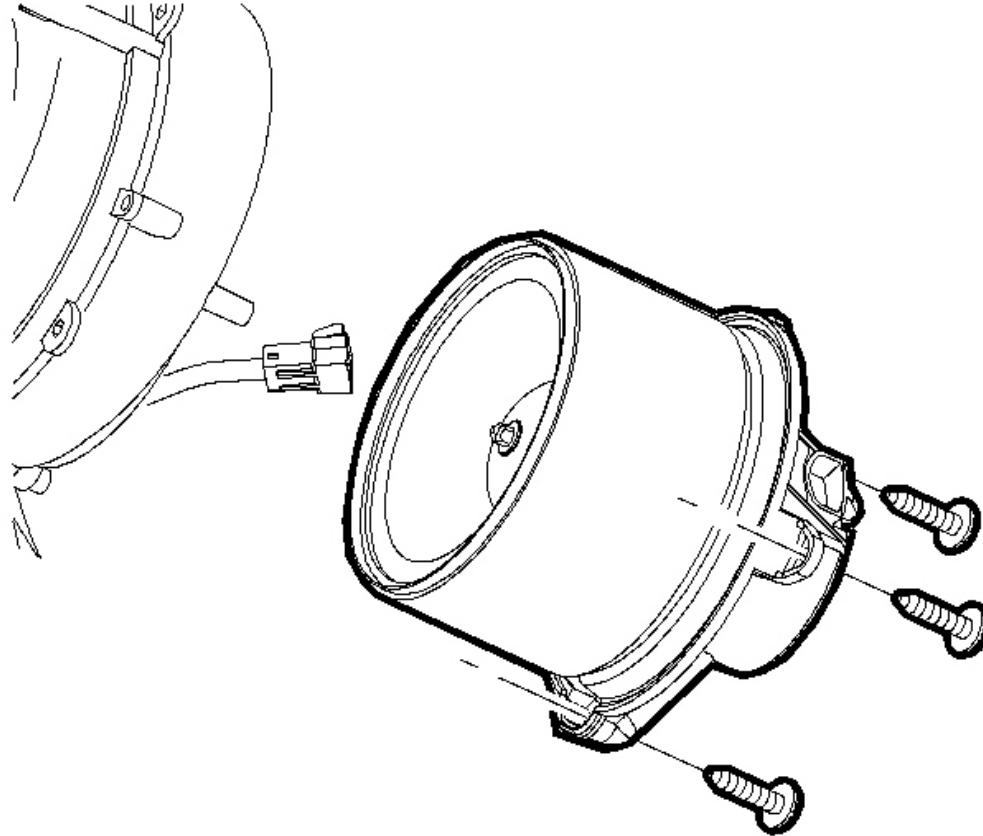
## **BLOWER MOTOR REPLACEMENT**

### **Removal Procedure**



**Fig. 218: Electrical Connector & Blower Motor**  
Courtesy of GENERAL MOTORS CORP.

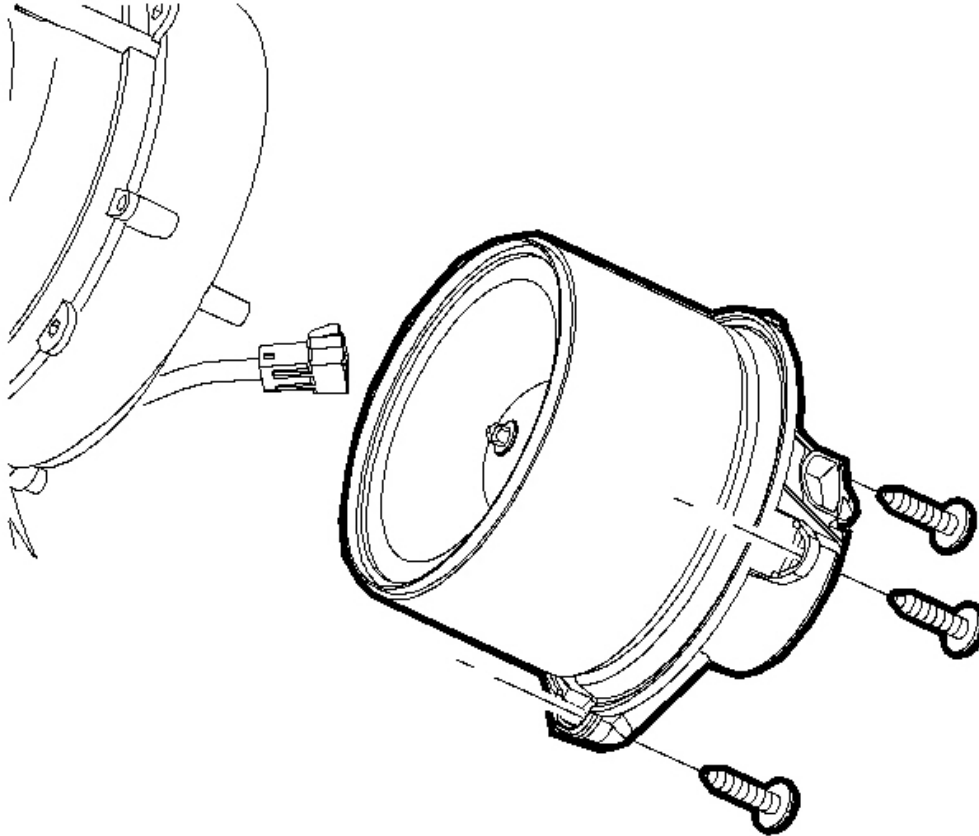
1. Remove the passenger side insulator/closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages and Console.
2. Disconnect the electrical connector from the blower motor.



**Fig. 219: Blower Motor Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

3. Remove the blower motor screws from the HVAC module.
4. Remove the blower motor from the HVAC module.

#### **Installation Procedure**



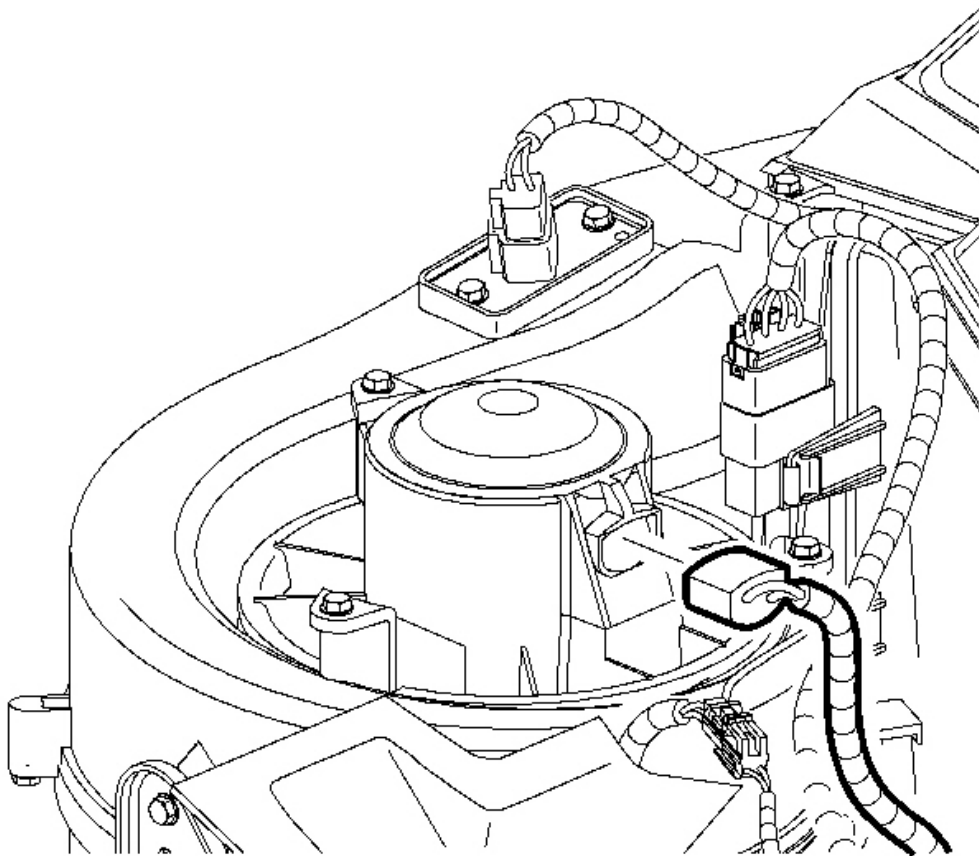
**Fig. 220: Blower Motor Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Install the blower motor to the HVAC module.

**NOTE:** Refer to **Fastener Notice** in Cautions and Notices.

2. Install the blower motor screws to the HVAC module.

**Tighten:** Tighten the screws to 1 N.m (9 lb in).



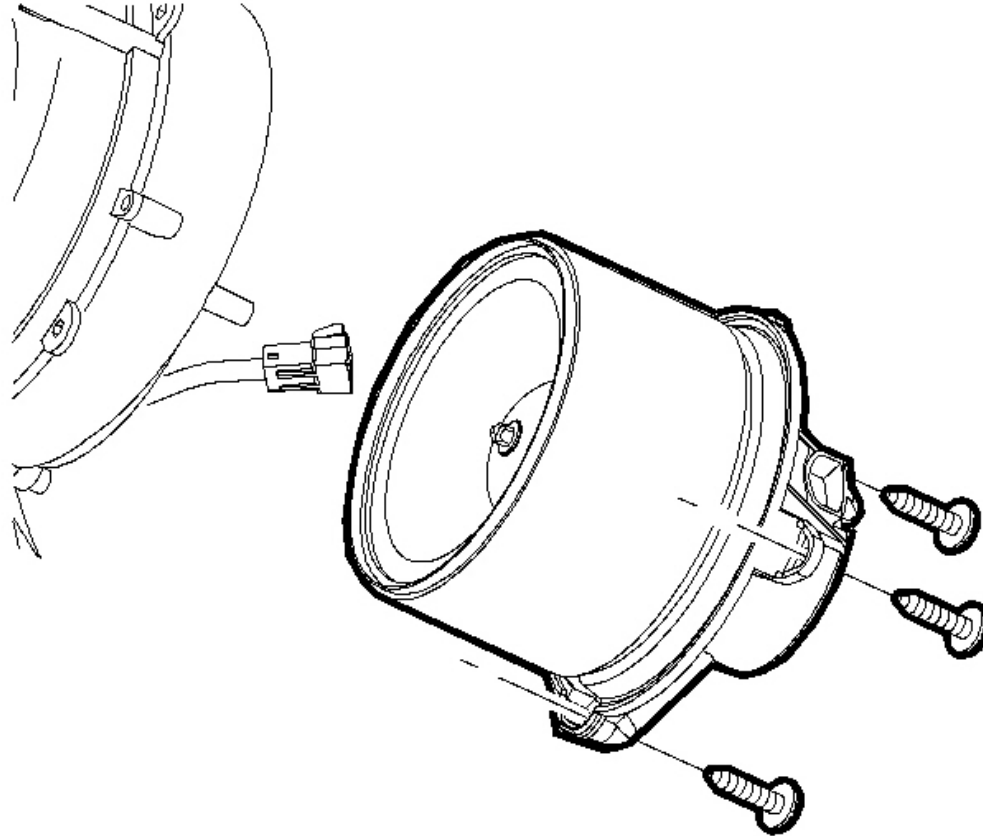
**Fig. 221: Electrical Connector & Blower Motor**  
Courtesy of GENERAL MOTORS CORP.

3. Connect the electrical connector to the blower motor.
4. Install the passenger side insulator/closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages and Console.

## **BLOWER MOTOR IMPELLER REPLACEMENT**

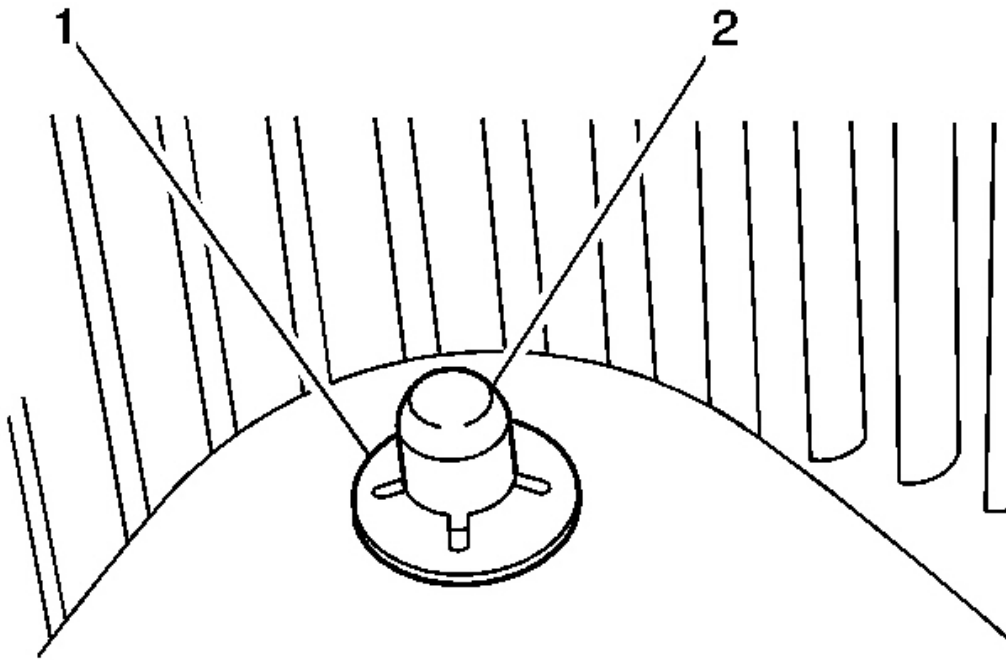
### **Removal Procedure**





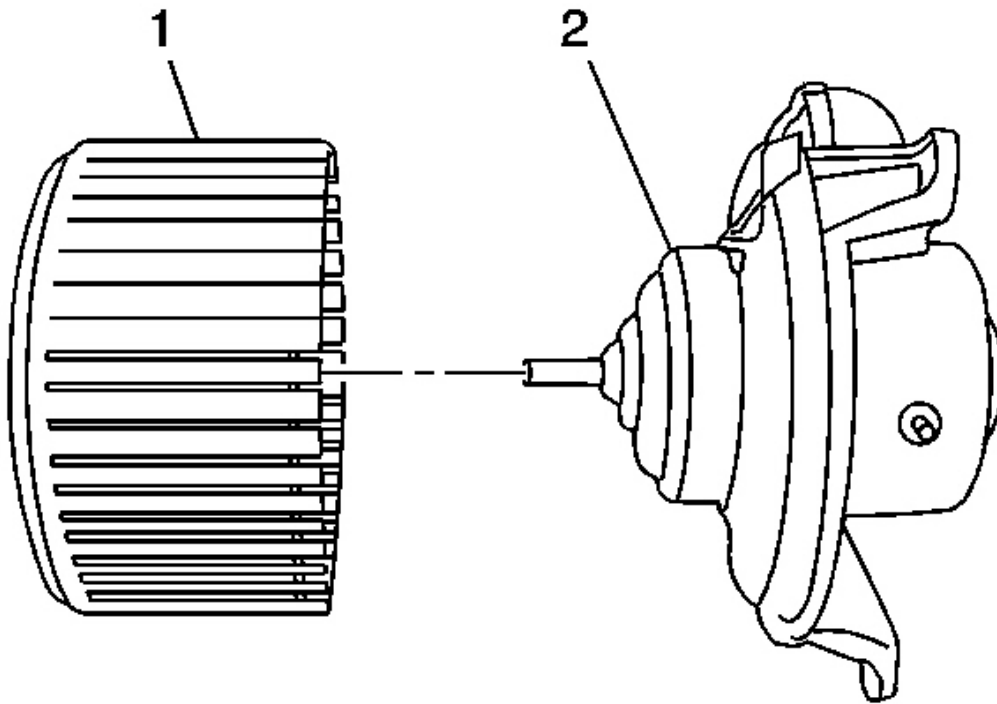
**Fig. 222: Blower Motor Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the right side insulator/closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages and Console.
2. Disconnect the electrical connector from the blower motor.
3. Remove the blower motor screws from the HVAC module.
4. Remove the blower motor from the HVAC module.



**Fig. 223: Blower Motor Impeller Retention Clip & Blower Motor Shaft**  
Courtesy of GENERAL MOTORS CORP.

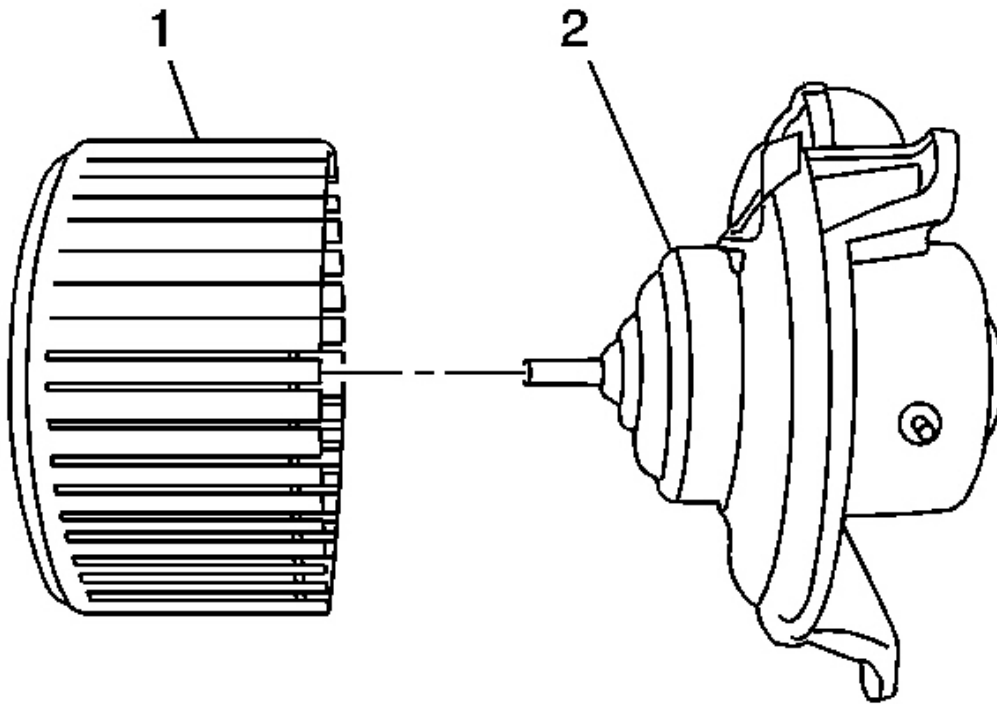
5. Remove the blower motor impeller retention clip (1) from the blower motor shaft (2).



**Fig. 224: Blower Motor Impeller & Blower Motor**  
**Courtesy of GENERAL MOTORS CORP.**

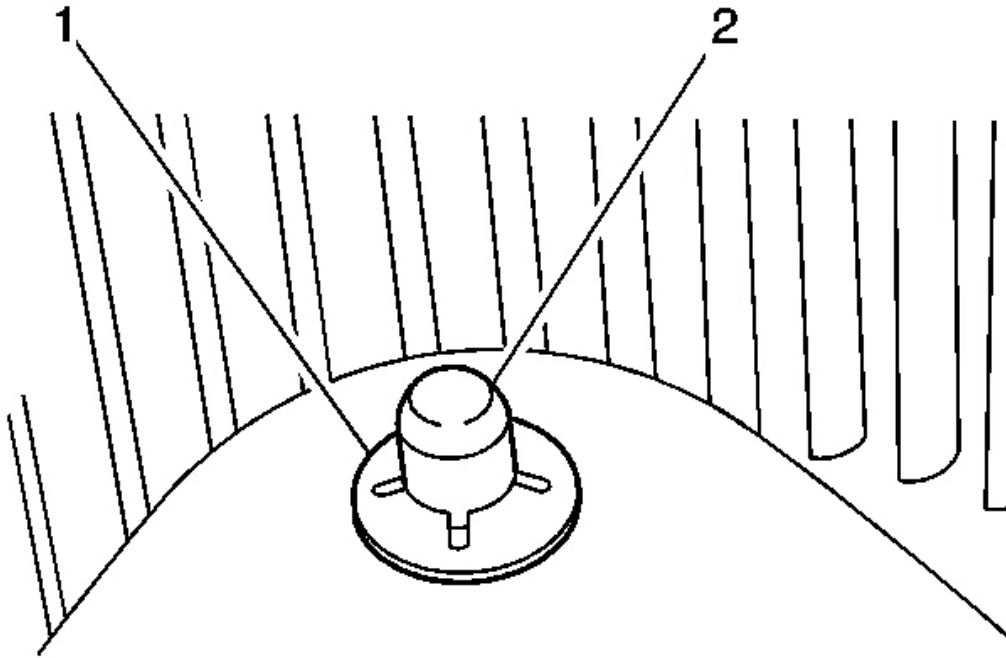
6. Remove the blower motor impeller (1) from the blower motor (2).

#### **Installation Procedure**



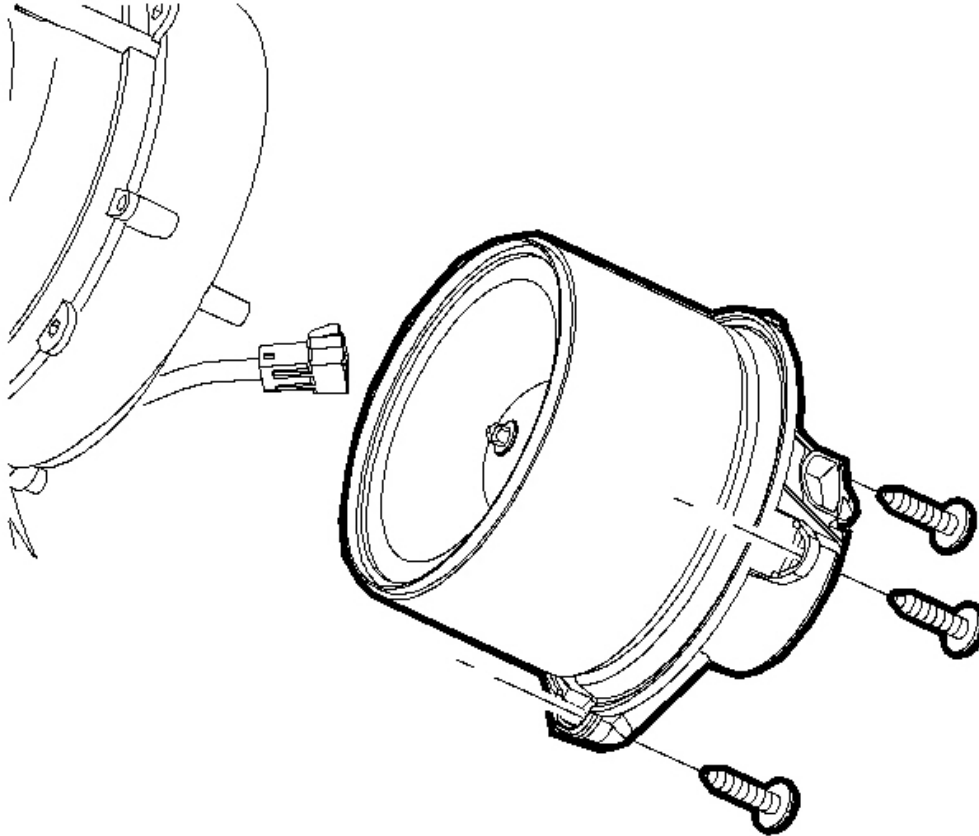
**Fig. 225: Blower Motor Impeller & Blower Motor**  
**Courtesy of GENERAL MOTORS CORP.**

1. Install the blower motor impeller (1) to the blower motor (2).



**Fig. 226: Blower Motor Impeller Retention Clip & Blower Motor Shaft**  
Courtesy of GENERAL MOTORS CORP.

2. Install the blower motor impeller retention clip (1) to the blower motor shaft (2).



**Fig. 227: Blower Motor Screws & Blower Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

3. Install the blower motor to the HVAC module.

**NOTE:** Refer to **Fastener Notice** .

4. Install the blower motor screws to the HVAC module.

**Tighten:** Tighten the screws to 1 N.m (9 lb in).

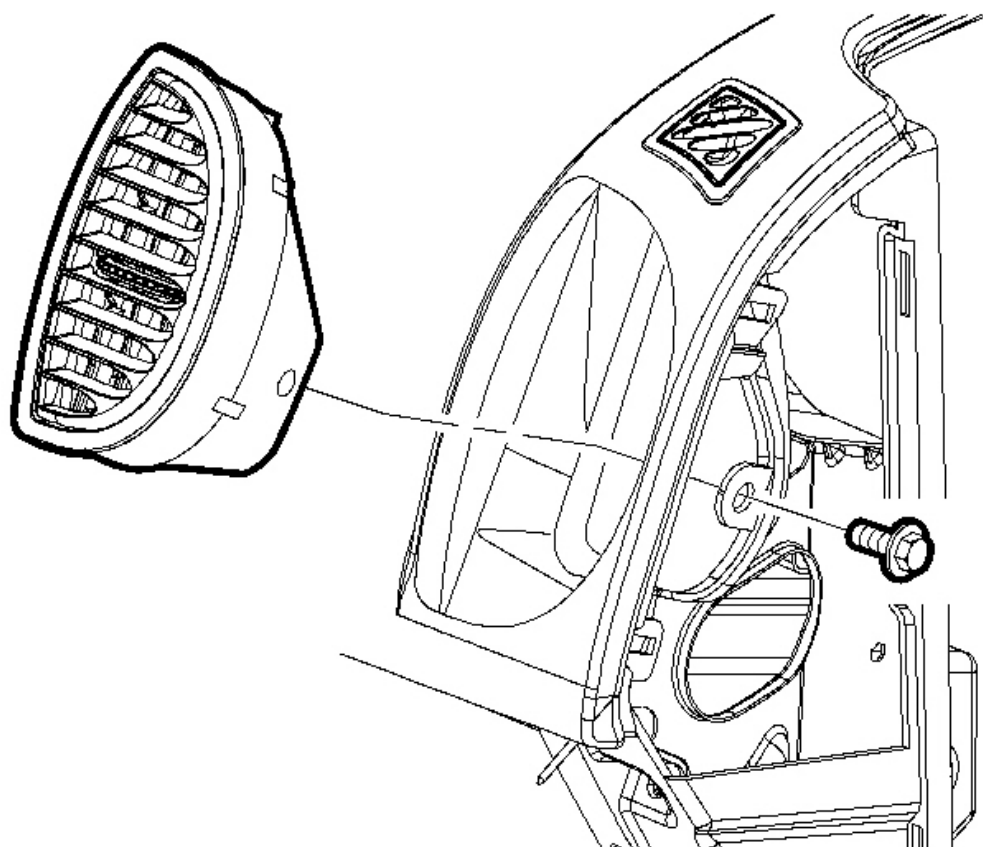
5. Connect the electrical connector to the blower motor.

6. Install the right side insulator/closeout panel. Refer to **Closeout/Insulator Panel Replacement - Right** in Instrument Panel, Gages and Console.

## **AIR OUTLET REPLACEMENT - INSTRUMENT PANEL**

### **Removal Procedure**

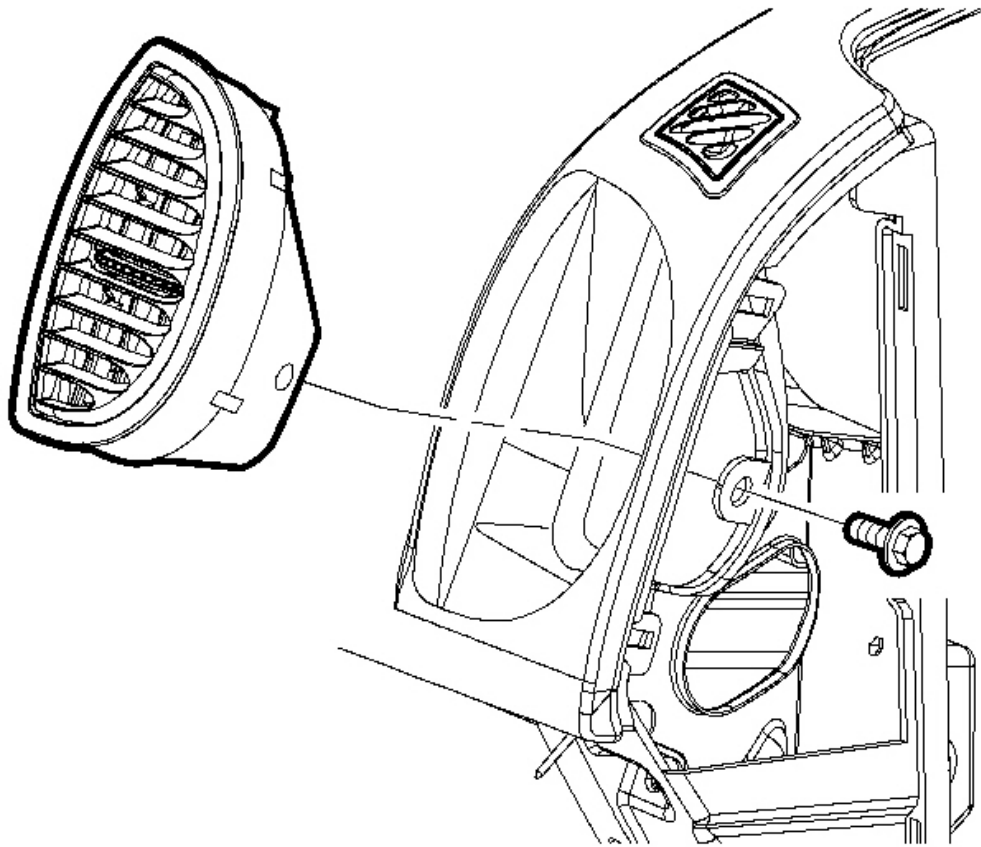
1. Remove the instrument panel (I/P) upper trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Upper** in Instrument Panel, Gages, and Console.



**Fig. 228: Outlet Bezel**  
Courtesy of GENERAL MOTORS CORP.

2. Depress the locking tabs on the outlet.
3. Carefully slide the outlet out of the I/P trim and the surrounding outlet bezel.

### Installation Procedure



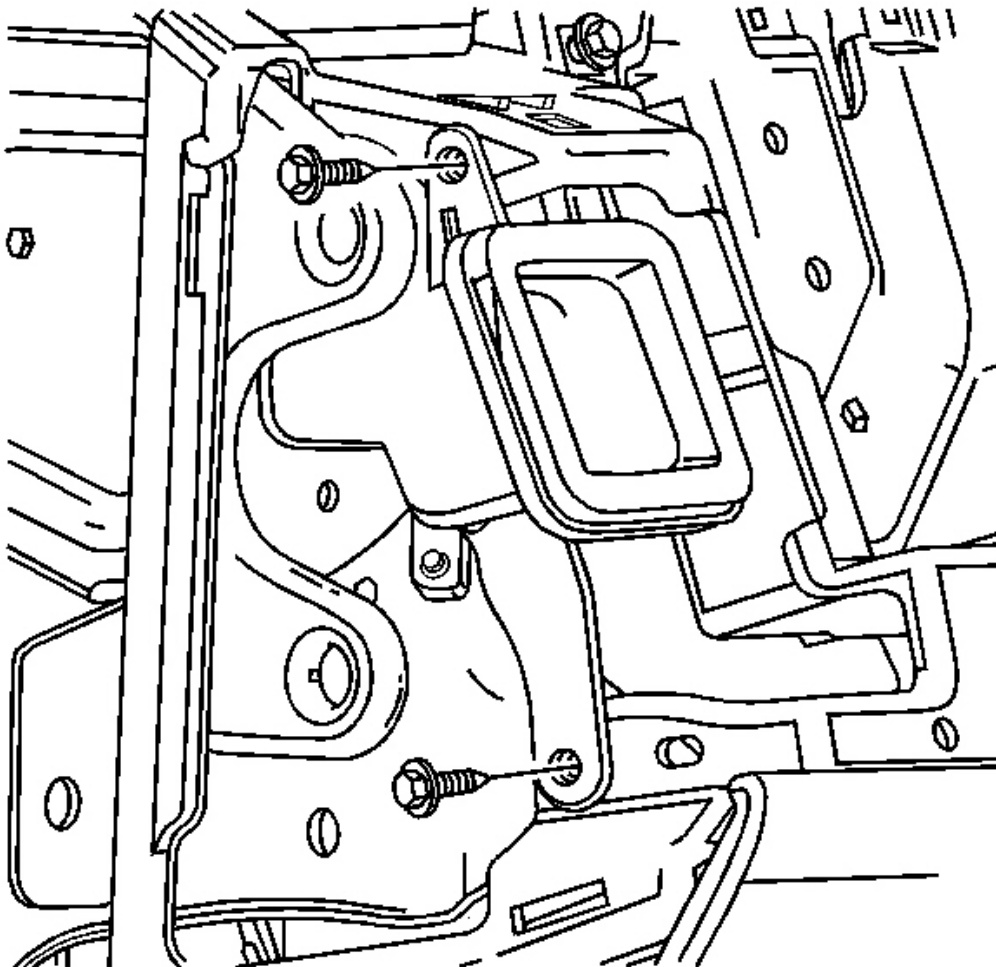
**Fig. 229: Outlet Bezel**  
Courtesy of GENERAL MOTORS CORP.

1. Install the outlet to the I/P trim panel. The outlet will snap into place.
2. Install the I/P upper trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Upper** in Instrument Panel, Gages, and Console.



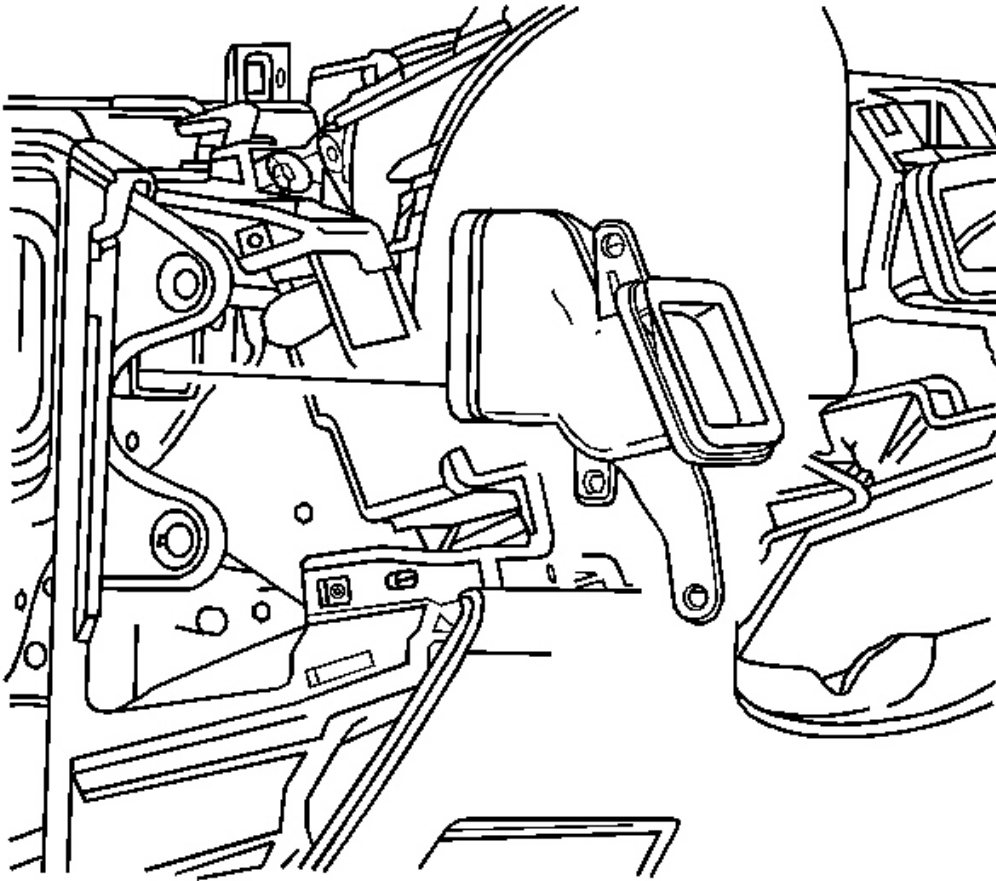
## AIR OUTLET DUCT REPLACEMENT - INSTRUMENT PANEL (I/P) - UPPER LEFT

### Removal Procedure



**Fig. 230: LH Air Outlet Duct & Screws**  
Courtesy of GENERAL MOTORS CORP.

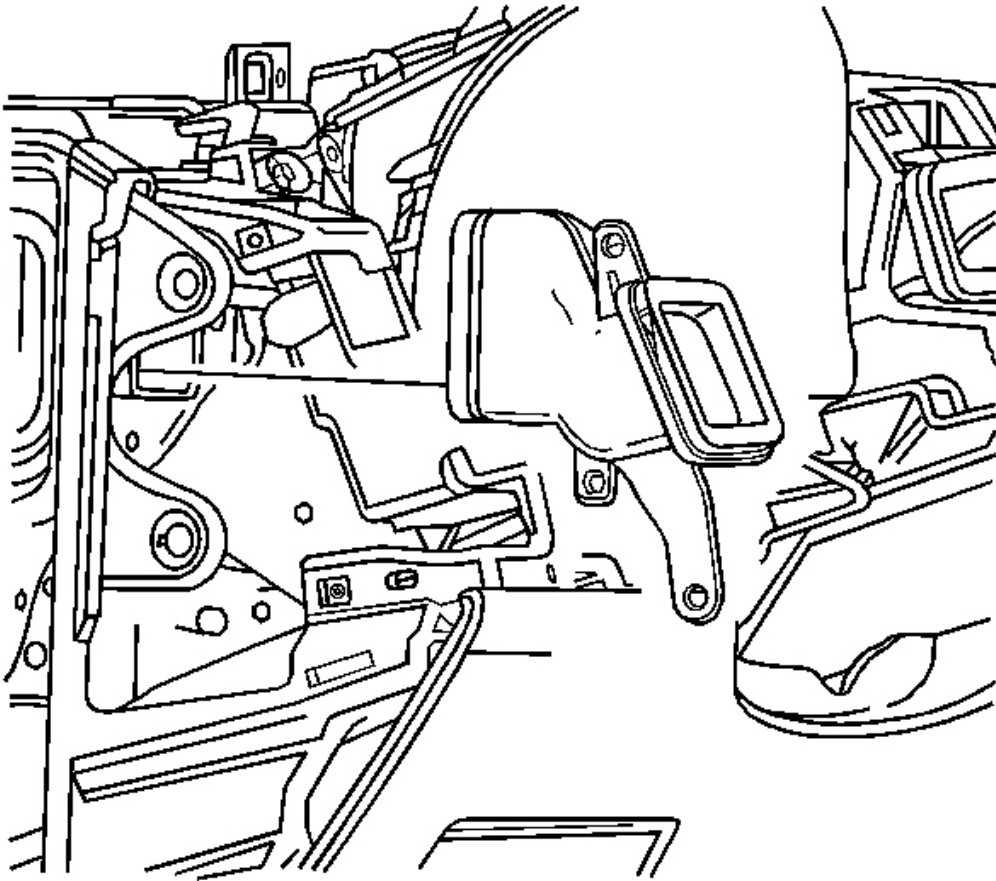
1. Remove the instrument panel upper trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Upper** in Instrument Panel, Gages and Console.
2. Remove the LH air outlet duct screws from the instrument panel retainer.



**Fig. 231: LH Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

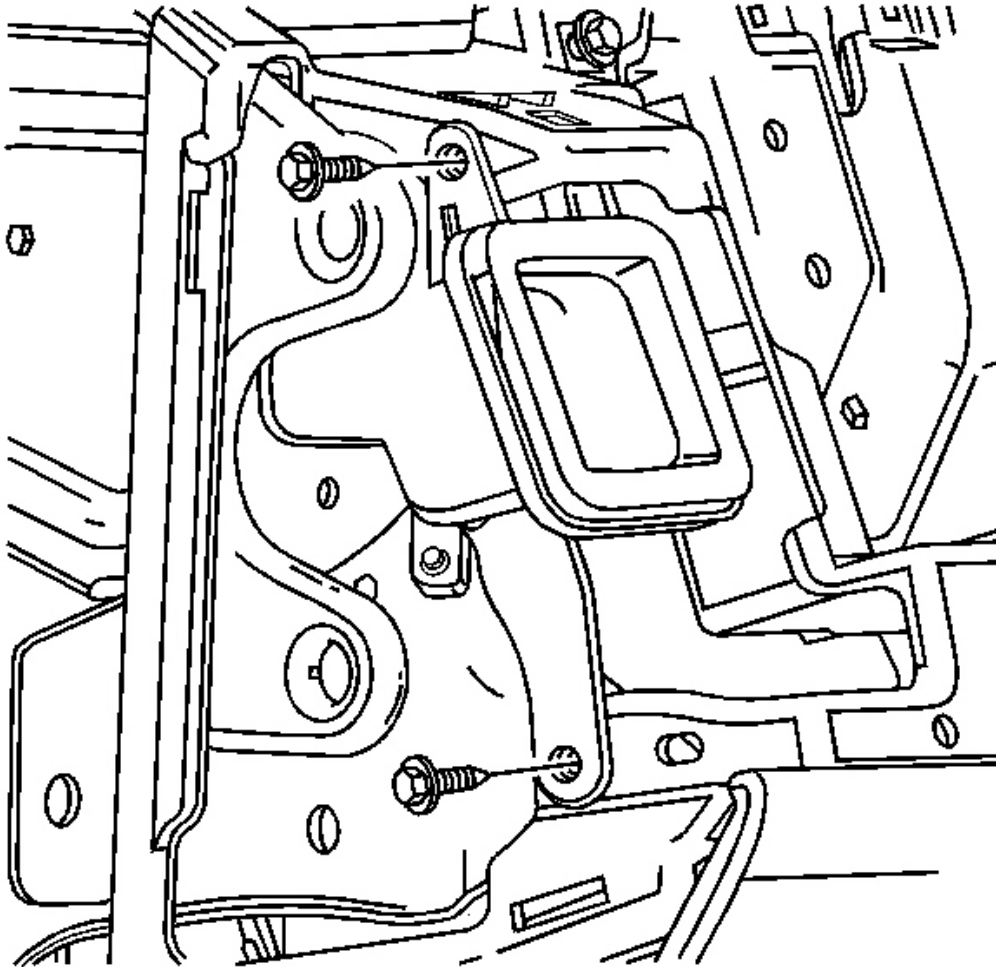
3. Remove the LH air outlet duct from the instrument panel retainer.

#### **Installation Procedure**



**Fig. 232: LH Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

1. Inspect the seals and replace if damaged using Kent Industries adhesive backed foam tape P/N 46485 (or equivalent).
2. Install the LH air outlet duct to the instrument panel retainer.



**Fig. 233: LH Air Outlet Duct & Screws**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

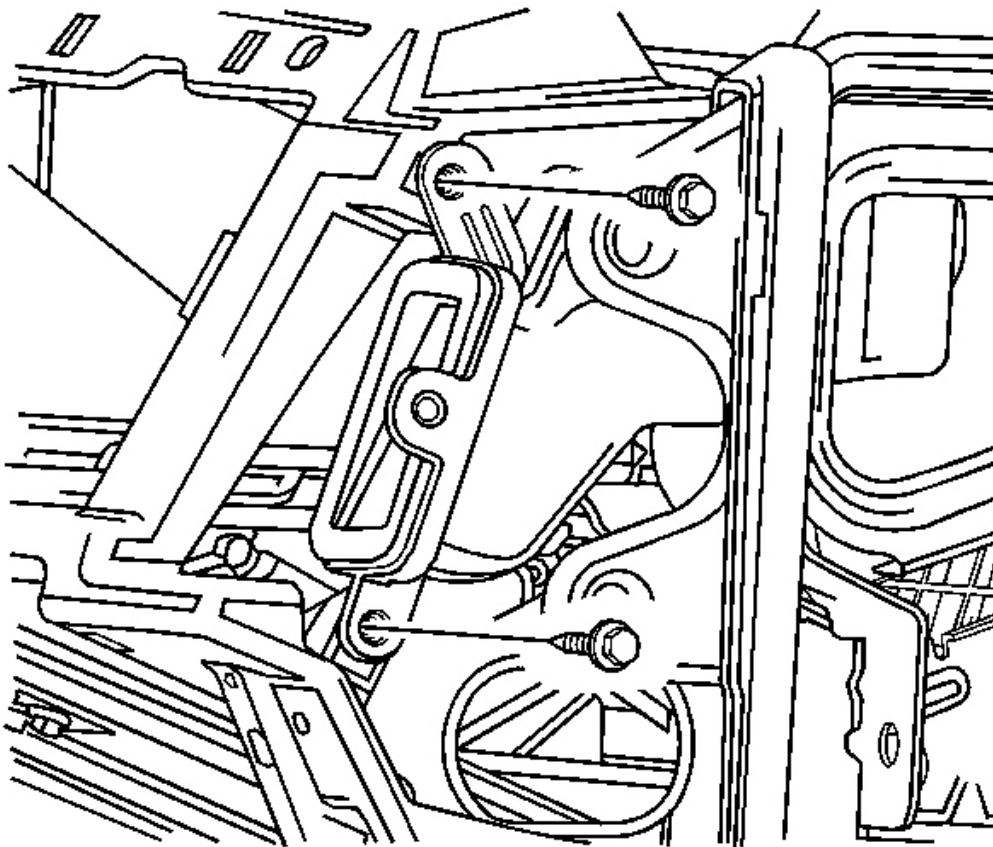
3. Install the LH air outlet duct screws to the instrument panel retainer.

**Tighten:** Tighten the screws to 1 N.m (9 lb in).

4. Install the instrument panel upper trim panel. Refer to Trim Panel Replacement - Instrument Panel (I/P) Upper in Instrument Panel, Gages and Console.

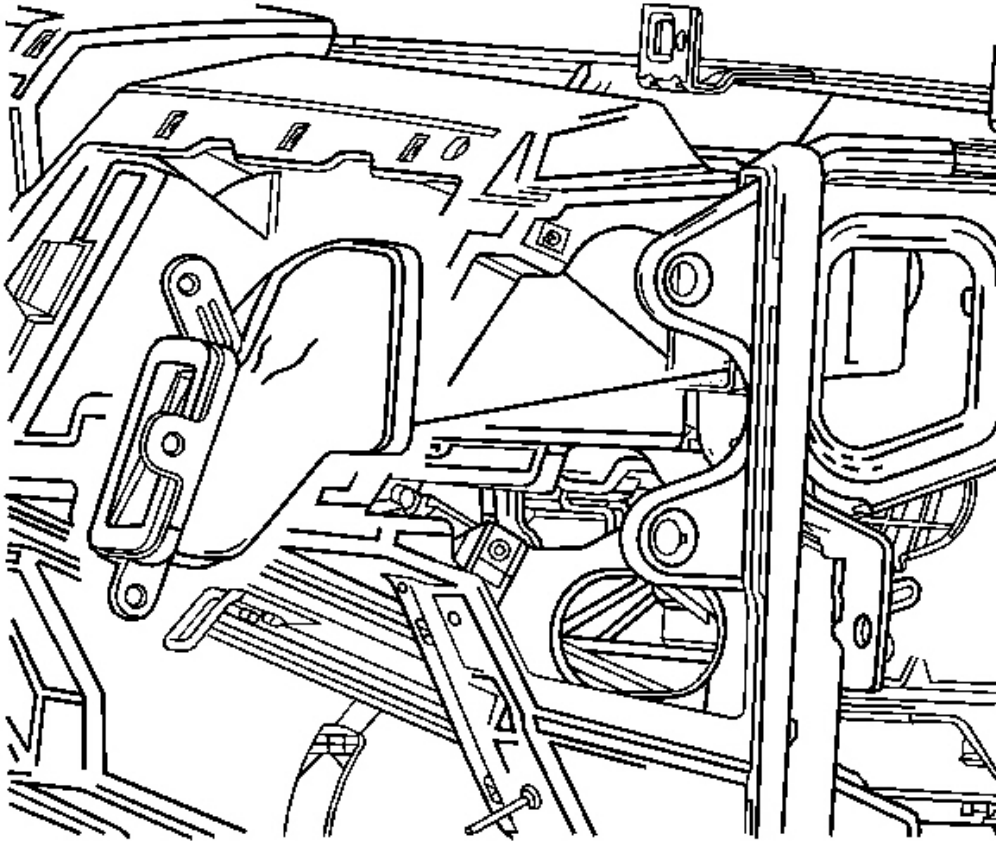
## AIR OUTLET DUCT REPLACEMENT - INSTRUMENT PANEL (I/P) - UPPER RIGHT

### Removal Procedure



**Fig. 234: RH Air Outlet Duct & Screws**  
Courtesy of GENERAL MOTORS CORP.

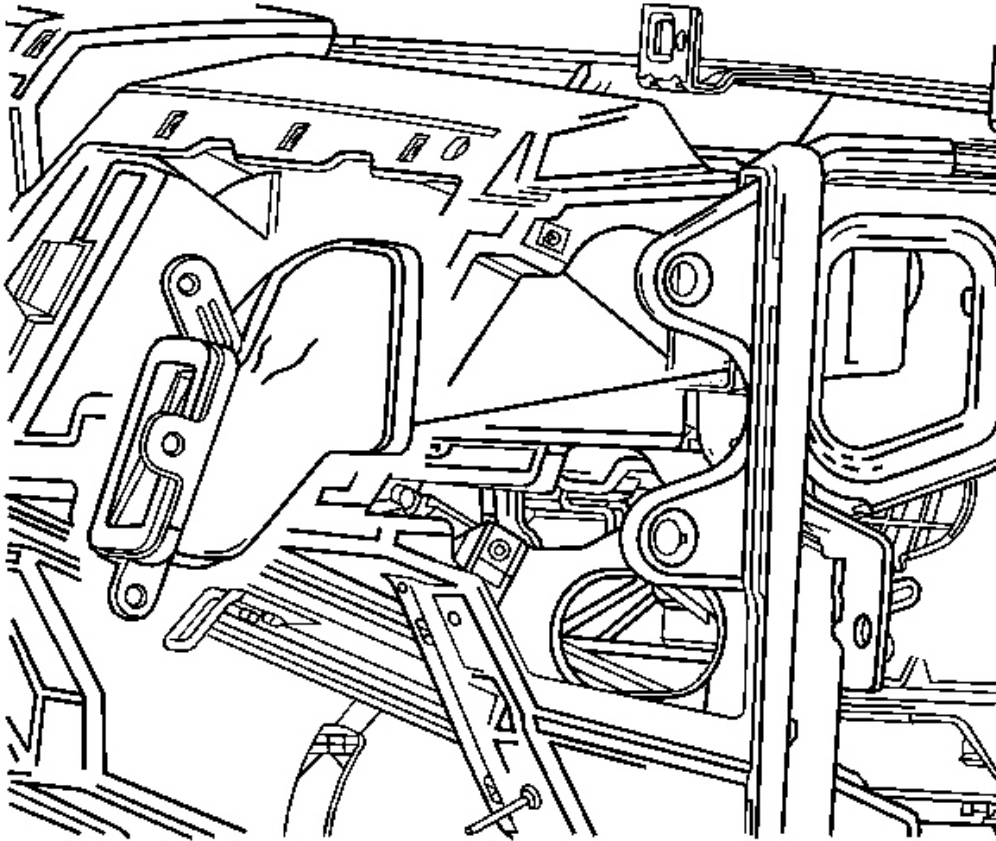
1. Remove the instrument panel upper trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Upper** in Instrument Panel, Gages and Console.
2. Remove the RH air outlet duct screws from the instrument panel retainer.



**Fig. 235: RH Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

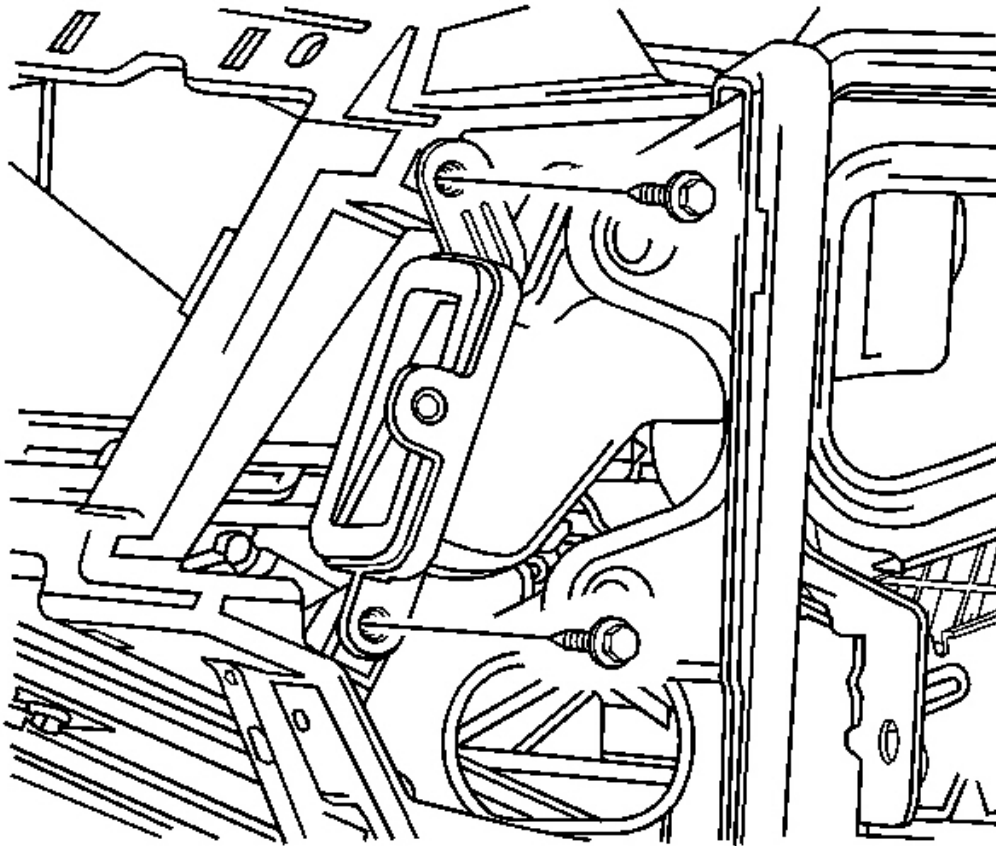
3. Remove the RH air outlet duct from the instrument panel retainer.

#### **Installation Procedure**



**Fig. 236: RH Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

1. Inspect the seals and replace if damaged using Kent Industries adhesive backed foam tape P/N 46485 (or equivalent).
2. Install the RH air outlet duct to the instrument panel retainer.



**Fig. 237: RH Air Outlet Duct & Screws**  
Courtesy of GENERAL MOTORS CORP.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

3. Install the RH air outlet duct screws to the instrument panel retainer.

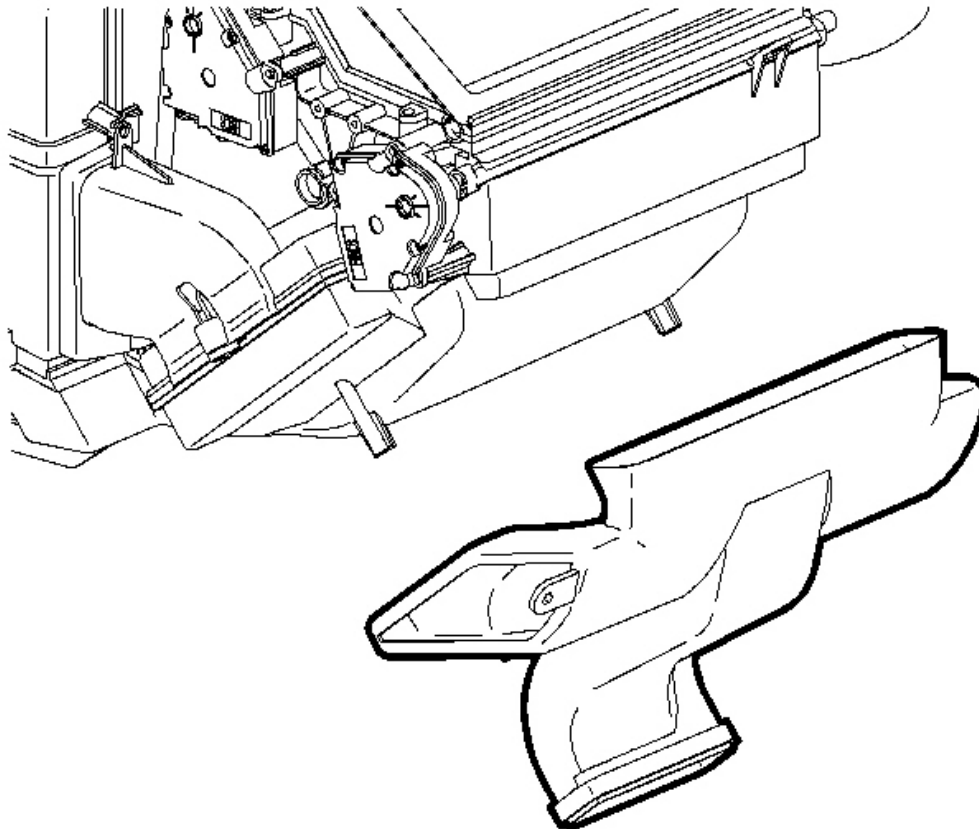
**Tighten:** Tighten the screws to 1 N.m (9 lb in).

4. Install the instrument panel upper trim panel. Refer to Trim Panel Replacement - Instrument Panel (I/P) Upper in Instrument Panel, Gages and Console.

## **AIR OUTLET REPLACEMENT - FLOOR**

### **Removal Procedure**

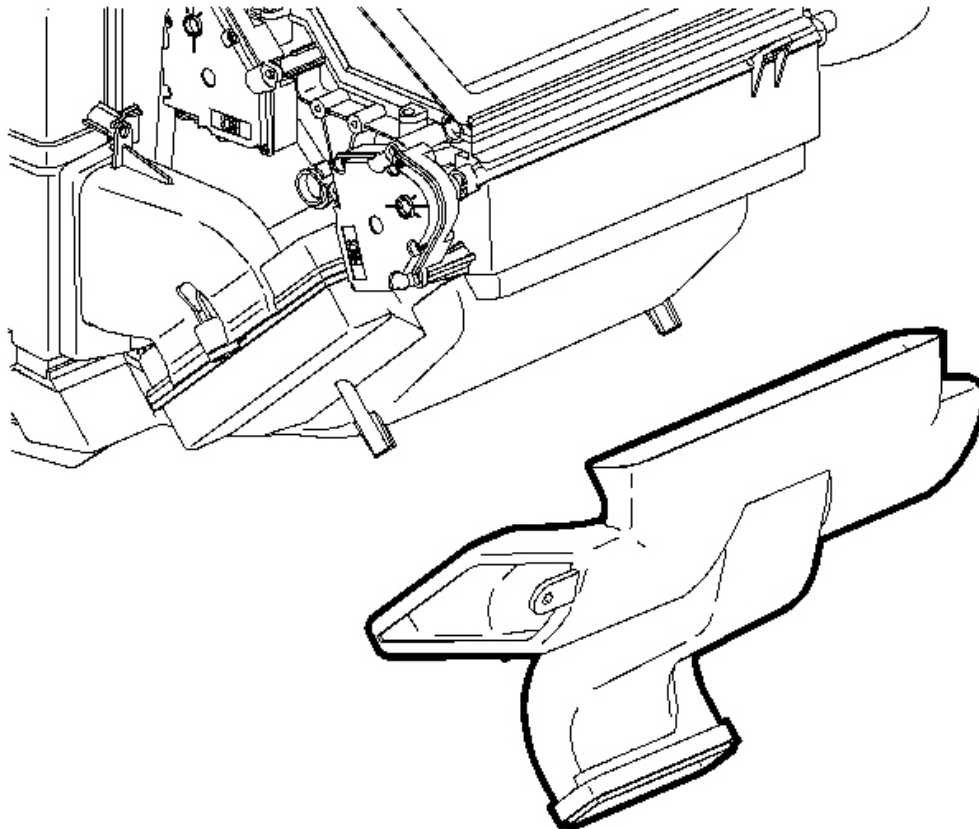




**Fig. 238: Heater Duct, Screws & Heater Core Cover**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the instrument panel retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages, and Console.
2. Remove the floor air outlet screws from the heater core cover.
3. Remove the floor air outlet from the heater core cover.

#### **Installation Procedure**



**Fig. 239: Heater Duct, Screws & Heater Core Cover**  
Courtesy of GENERAL MOTORS CORP.

1. Install the floor air outlet to the heater core cover.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

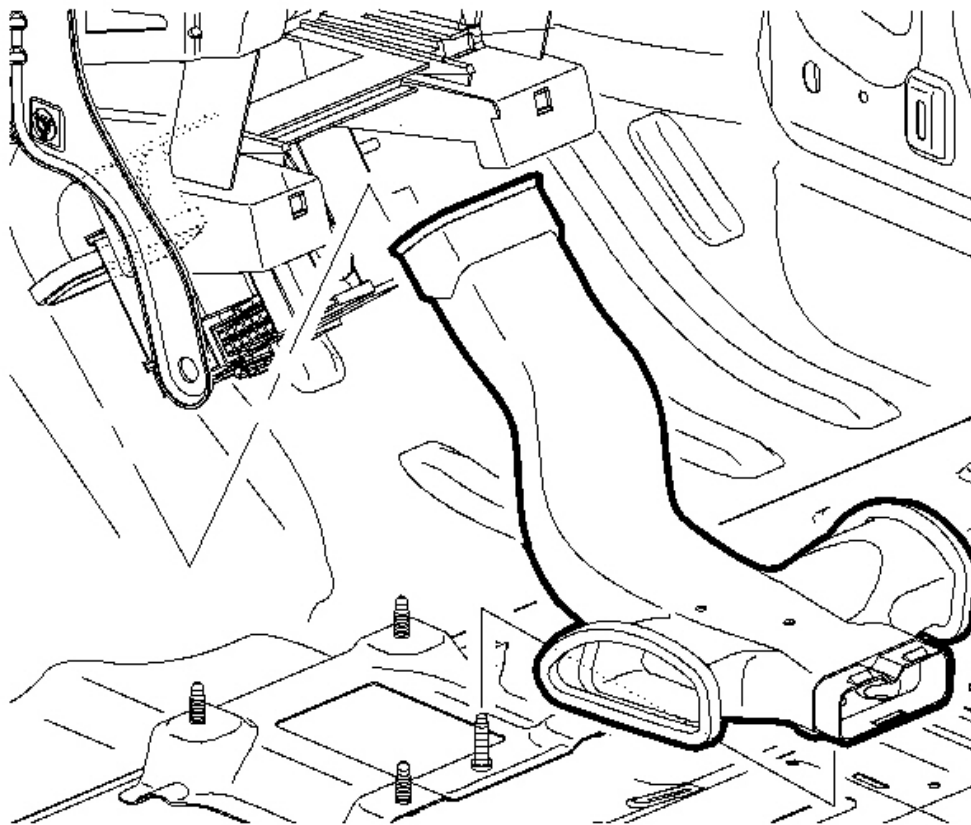
2. Install the floor air outlet screws to the heater core cover.

**Tighten:** Tighten the screws to 2 N.m (18 lb in).

3. Install the instrument panel retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages, and Console.

## AIR OUTLET REPLACEMENT - CENTER FLOOR

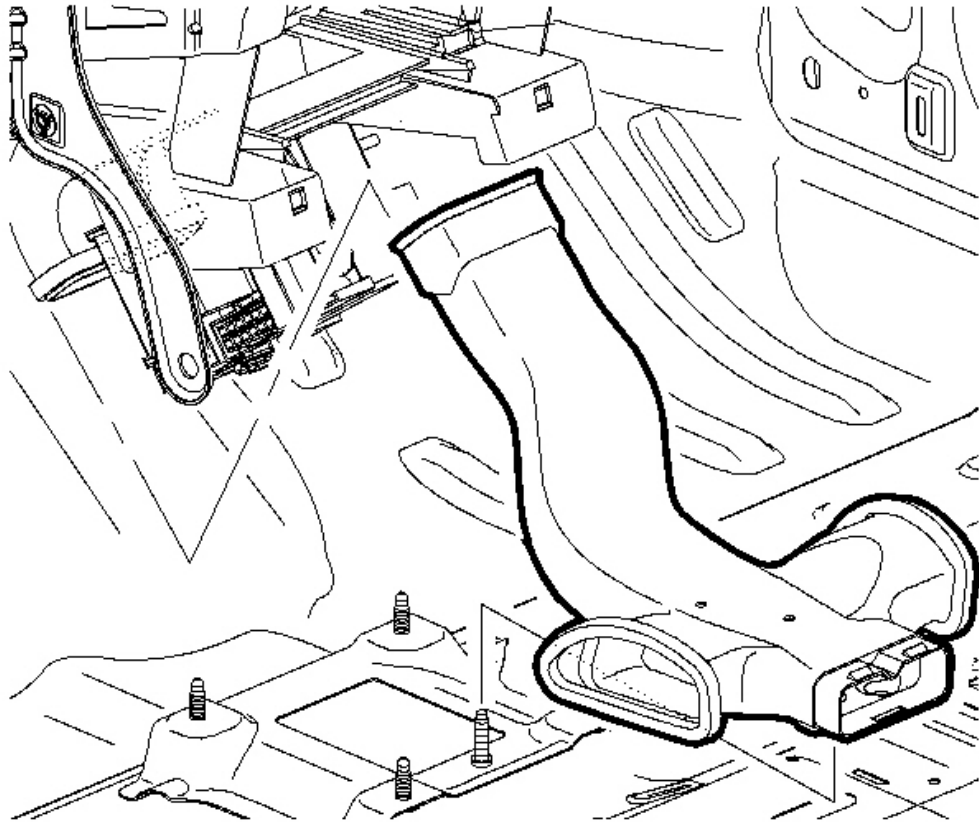
### Removal Procedure



**Fig. 240: Center Floor Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the shift control bracket. Refer to **Shift Control Replacement** in Manual Transmission - Getrag 5 or **Shift Control Replacement** in Automatic Transmission - VT25-E.
2. Slide the center floor air outlet duct forward enough to clear the rear floor air outlet duct and then up and rearward to remove.

### Installation Procedure

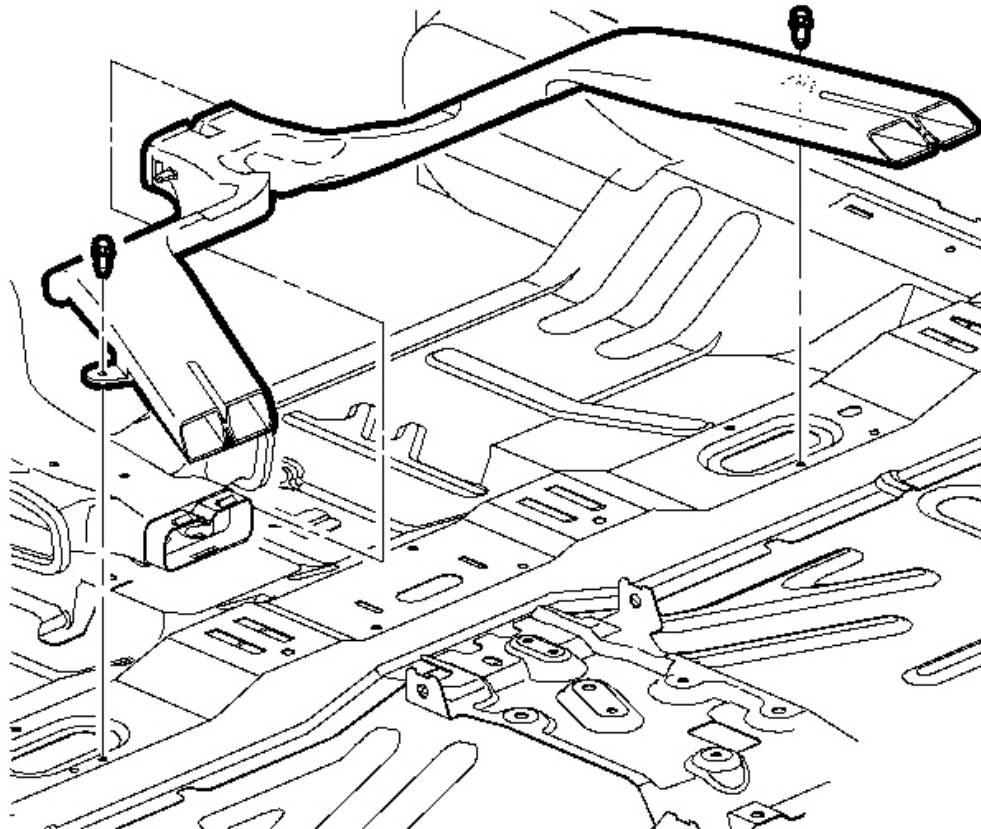


**Fig. 241: Center Floor Air Outlet Duct**  
Courtesy of GENERAL MOTORS CORP.

1. Slide the center floor air outlet duct forward enough to clear rear floor air duct and then down and rearward to install.
2. Install the shift control bracket. Refer to **Shift Control Replacement** in Manual Transmission - Getrag 5 or **Shift Control Replacement** in Automatic Transmission - VT25-E.

## **AIR OUTLET REPLACEMENT - REAR FLOOR**

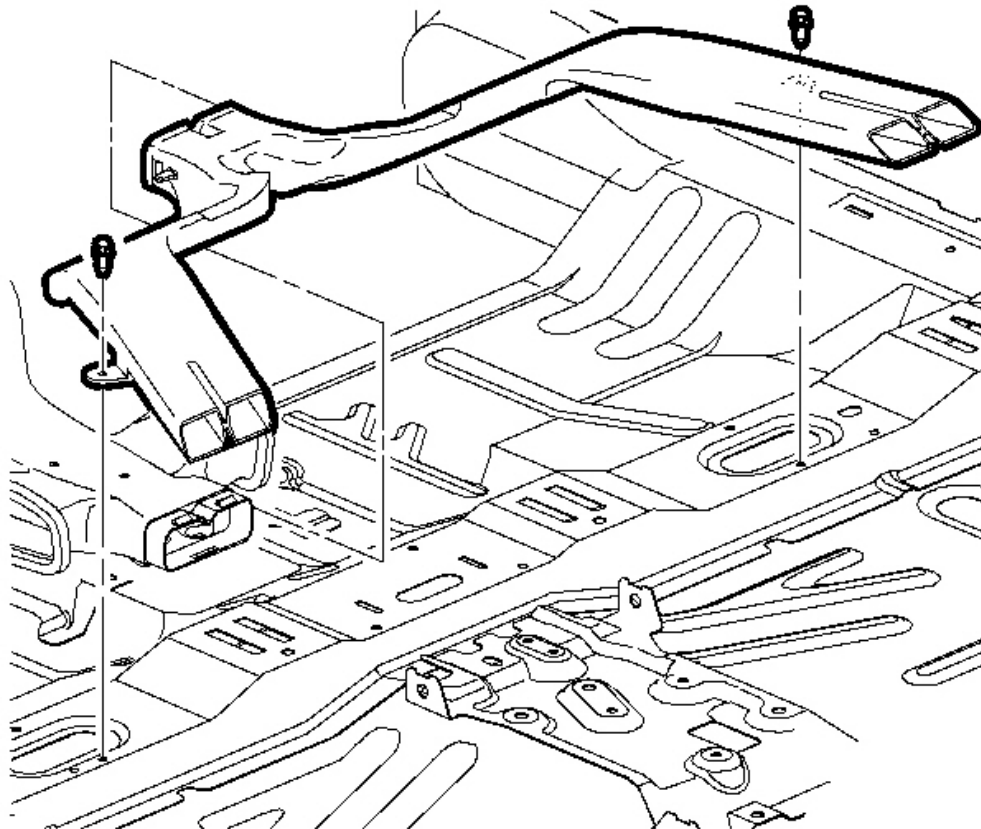
### **Removal Procedure**



**Fig. 242: Rear Floor Air Outlet & Push Pins**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the front seats. Refer to **Seat Replacement - Front Bucket** in Seats.
2. Remove the floor console. Refer to **Console Replacement - Front Floor** in Instrument Panel, Gages, and Console.
3. Partially remove the floor carpet from the front footwells to the B-pillars.
4. Remove the rear floor air outlet push pins from the floor pan.
5. Remove the rear floor air outlet from the floor pan.

#### **Installation Procedure**



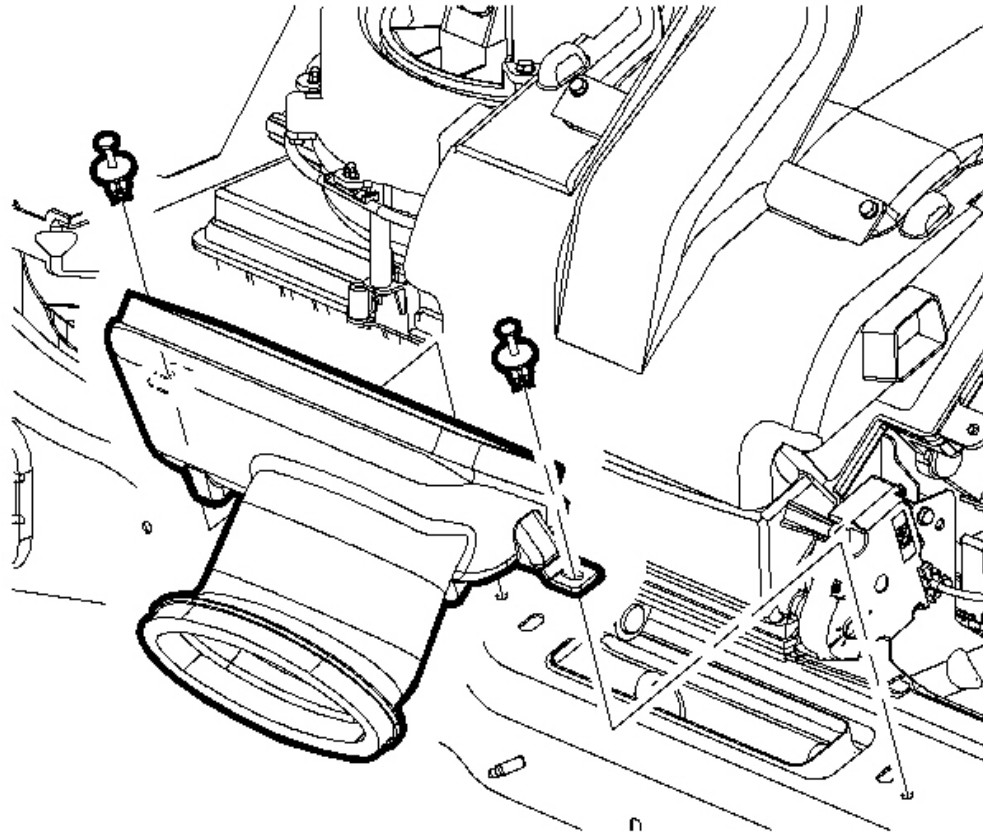
**Fig. 243: Rear Floor Air Outlet & Push Pins**  
Courtesy of GENERAL MOTORS CORP.

1. Install the rear floor air outlet to the floor pan.
2. Install the rear floor air outlet push pins to the floor pan.
3. Install the floor carpet to the B-pillars and the front footwells.
4. Install the floor console. Refer to **Console Replacement - Front Floor** in Instrument Panel, Gages, and Console.
5. Install the front seats. Refer to **Seat Replacement - Front Bucket** in Seats.

## **AIR OUTLET DUCT REPLACEMENT - CENTER**

## Removal Procedure

1. Remove the instrument panel retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages and Console.

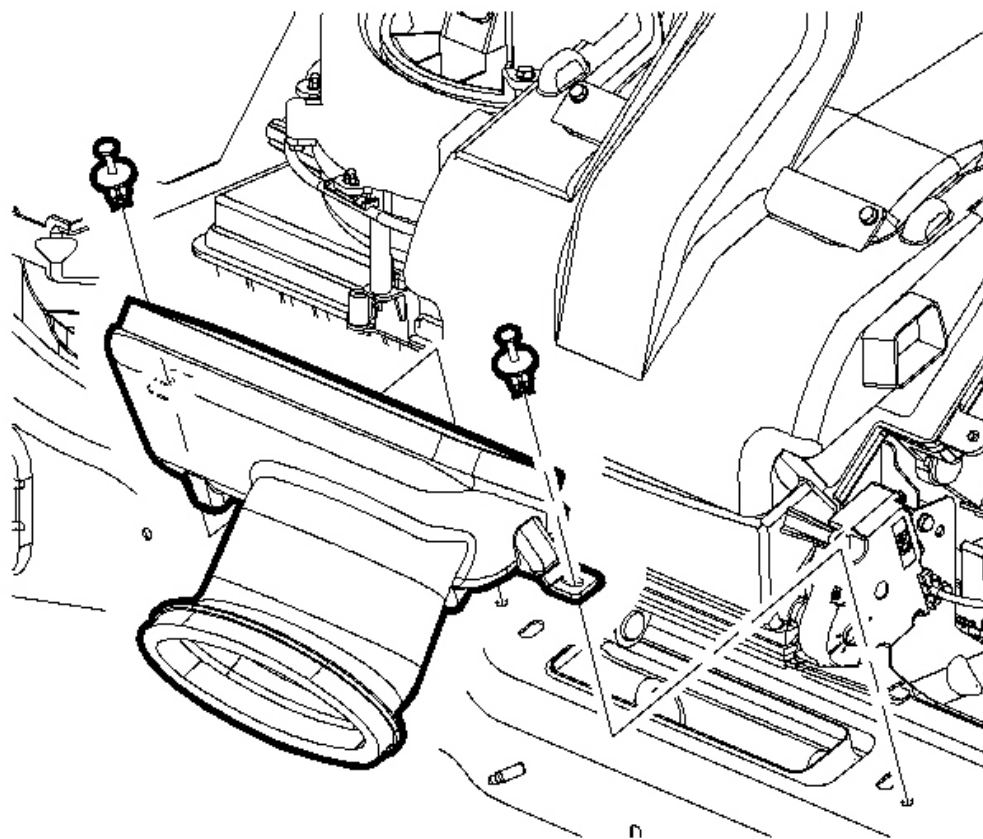


**Fig. 244: Center I/P Air Outlet Duct & Retainers**  
Courtesy of GENERAL MOTORS CORP.

2. Remove the center air outlet duct push pins from the cross car beam.
3. Remove the center air outlet duct from the cross car beam.

## Installation Procedure

1. Inspect the seals and replace if damaged using Kent Industries adhesive backed foam tape P/N 46485 or equivalent.

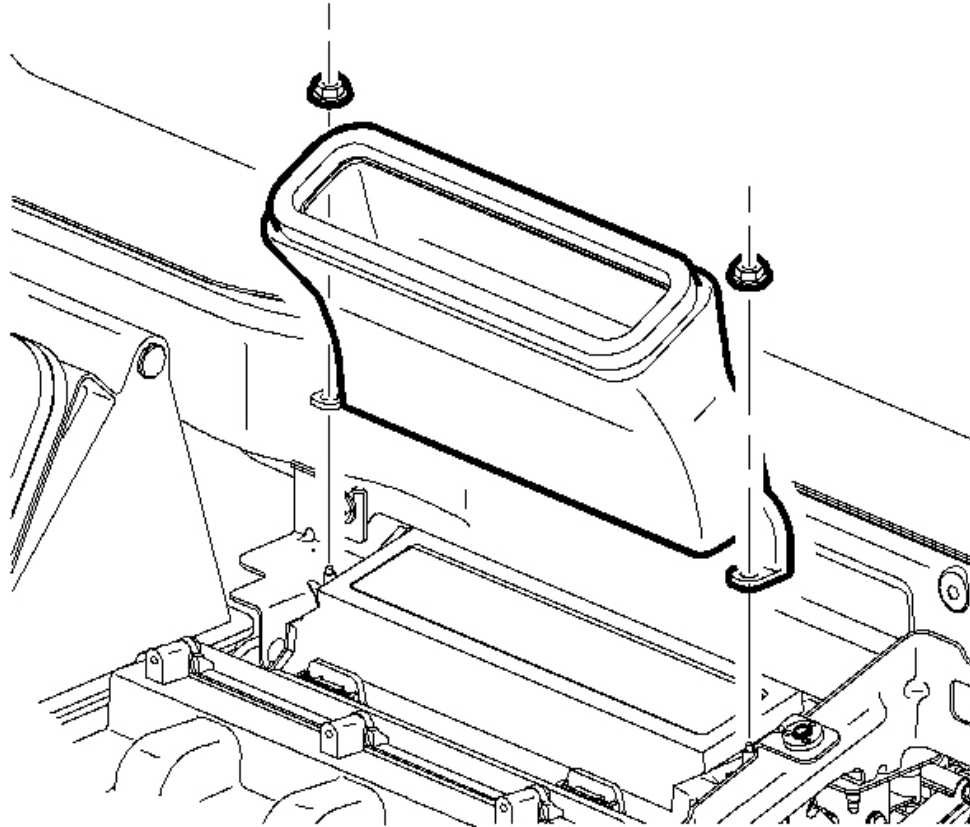


**Fig. 245: Center I/P Air Outlet Duct & Retainers**  
Courtesy of GENERAL MOTORS CORP.

2. Install the center air outlet duct to the cross car beam.
3. Install the center air outlet duct push pins to the cross car beam.
4. Install the instrument panel retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages and Console.



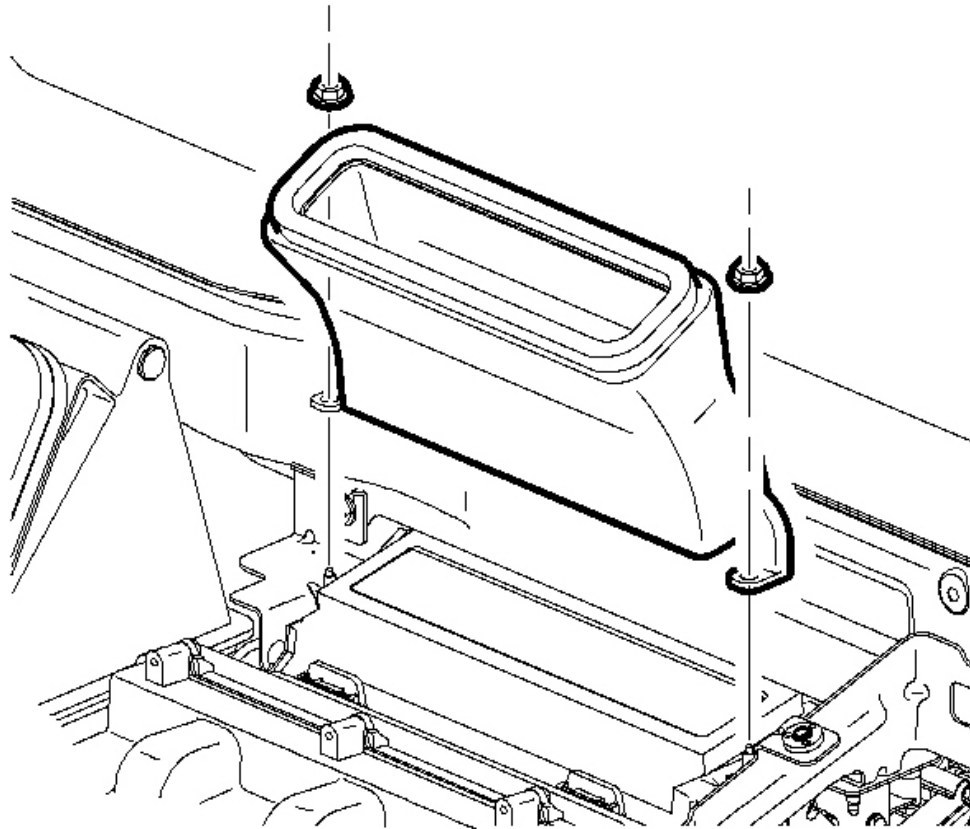
## Removal Procedure



**Fig. 246: Defroster Duct & Retainer**  
Courtesy of GENERAL MOTORS CORP.

1. Remove the instrument panel upper trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Upper** in Instrument Panel, Gages, and Console.
2. Remove the windshield defrost duct nuts from the HVAC module.
3. Remove the windshield defrost duct from the HVAC module.

## Installation Procedure



**Fig. 247: Defroster Duct & Retainer**  
Courtesy of GENERAL MOTORS CORP.

1. Inspect the windshield defrost duct seals. If damaged, replace using Kent Industries adhesive back foam tape P/N 46485 or equivalent.
2. Install the windshield defrost duct to the HVAC module.

**NOTE:** Refer to **Fastener Notice** in **Cautions and Notices**.

3. Install the windshield defrost duct nuts to the HVAC module.

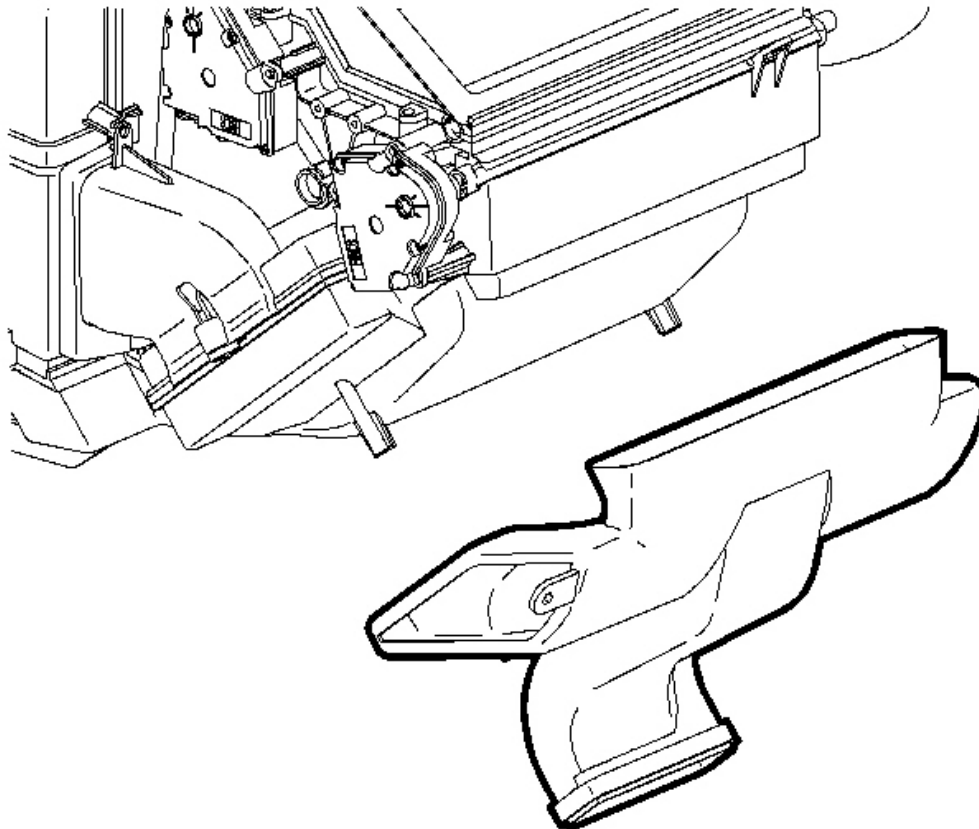
**Tighten:** Tighten the nuts to 2.5 N.m (22 lb in).

4. Install the instrument panel upper trim panel. Refer to **Trim Panel Replacement - Instrument Panel (I/P) Upper** in Instrument Panel, Gages, and Console.

## **HEATER CORE REPLACEMENT**

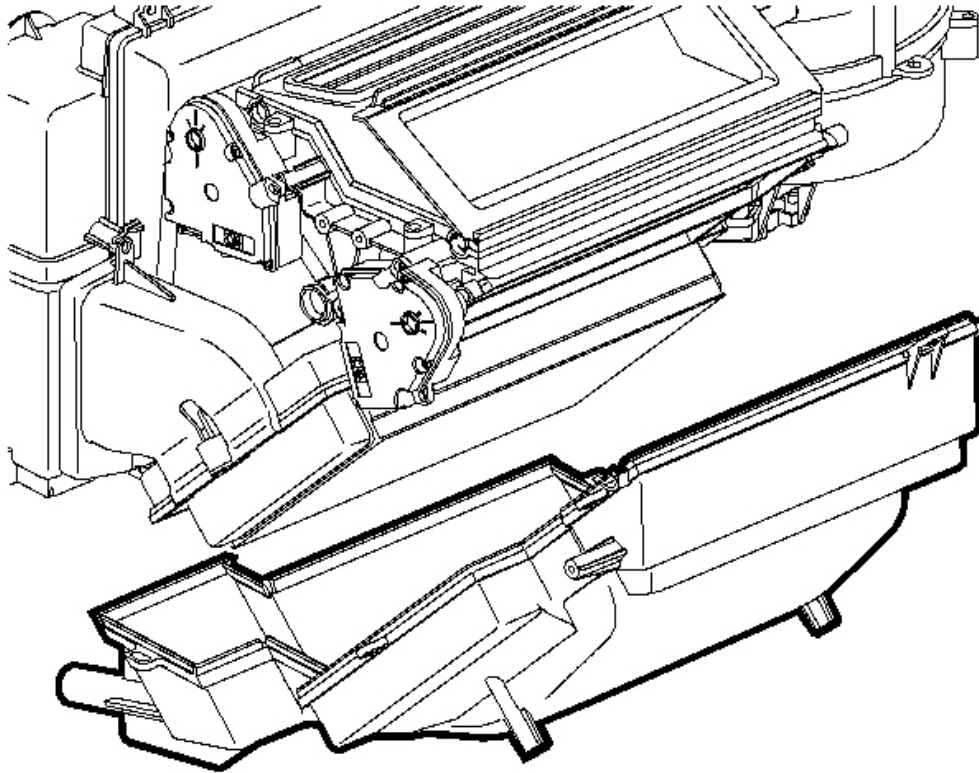
### **Removal Procedure**

1. Drain the engine coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
2. Remove the heater outlet hose clamp from the heater core.
3. Remove the heater outlet hose from the heater core.
4. Remove the heater inlet hose clamp from the heater core.
5. Remove the heater inlet hose from the heater core.
6. Remove the instrument panel retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages, and Console.
7. Remove the shift control bracket. Refer to Transmission Shift Control Bracket Replacement in Manual Transmission - Getrag 5 or **Shift Control Replacement** in Automatic Transmission - VT25-E.



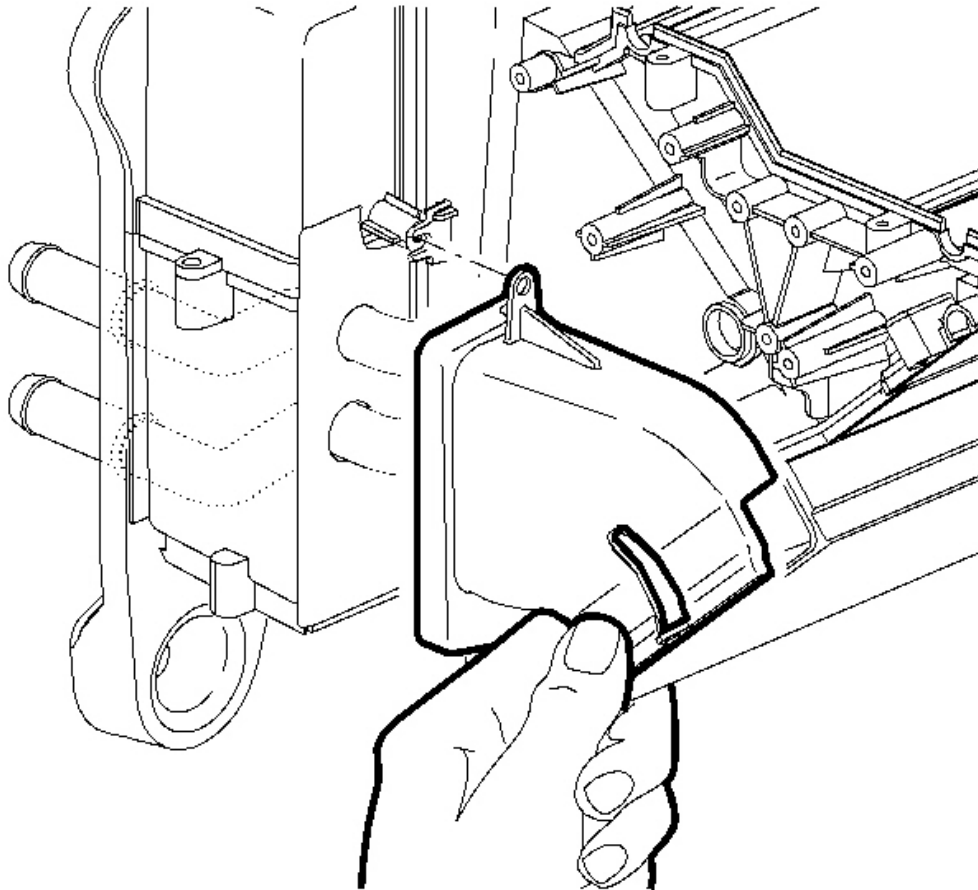
**Fig. 248: Heater Duct, Screws & Heater Core Cover**  
**Courtesy of GENERAL MOTORS CORP.**

8. Remove the heater duct screws.
9. Remove the heater duct.



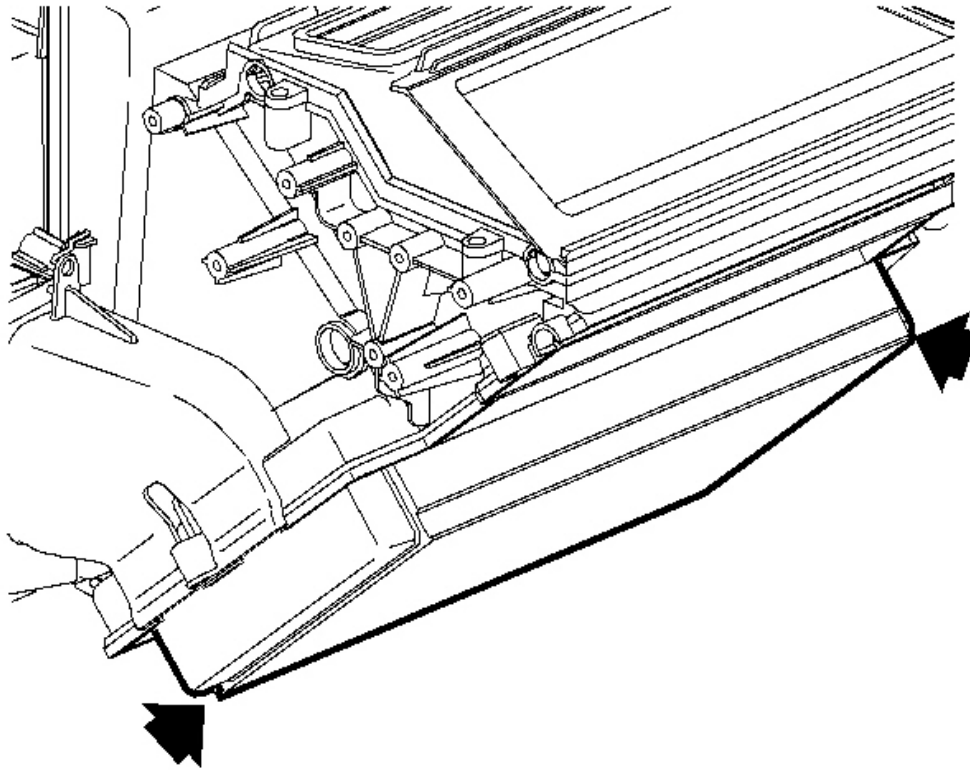
**Fig. 249: Heater Core Cover, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

10. Remove the heater core cover screws.
11. Remove the heater core cover.



**Fig. 250: Heater Core Pipe Cover**  
**Courtesy of GENERAL MOTORS CORP.**

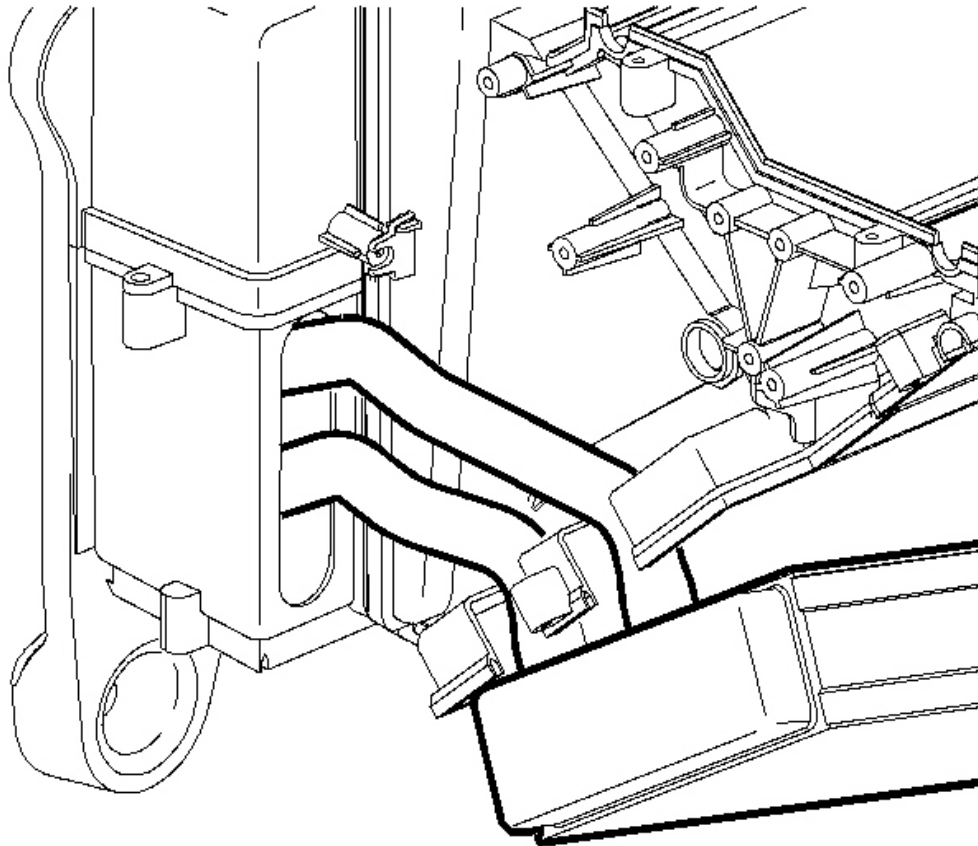
12. Remove the heater core pipe cover screw.
13. Remove the heater core pipe cover.
14. Remove the heater core pipe foam seal.



**Fig. 251: Heater Core & End Tanks**  
**Courtesy of GENERAL MOTORS CORP.**

15. Grasp the heater core at end tanks and remove heater core. Spray the perimeter of the heater core seal and the heater core pipes at the front of dash with a soap and water mixture to ease removal.

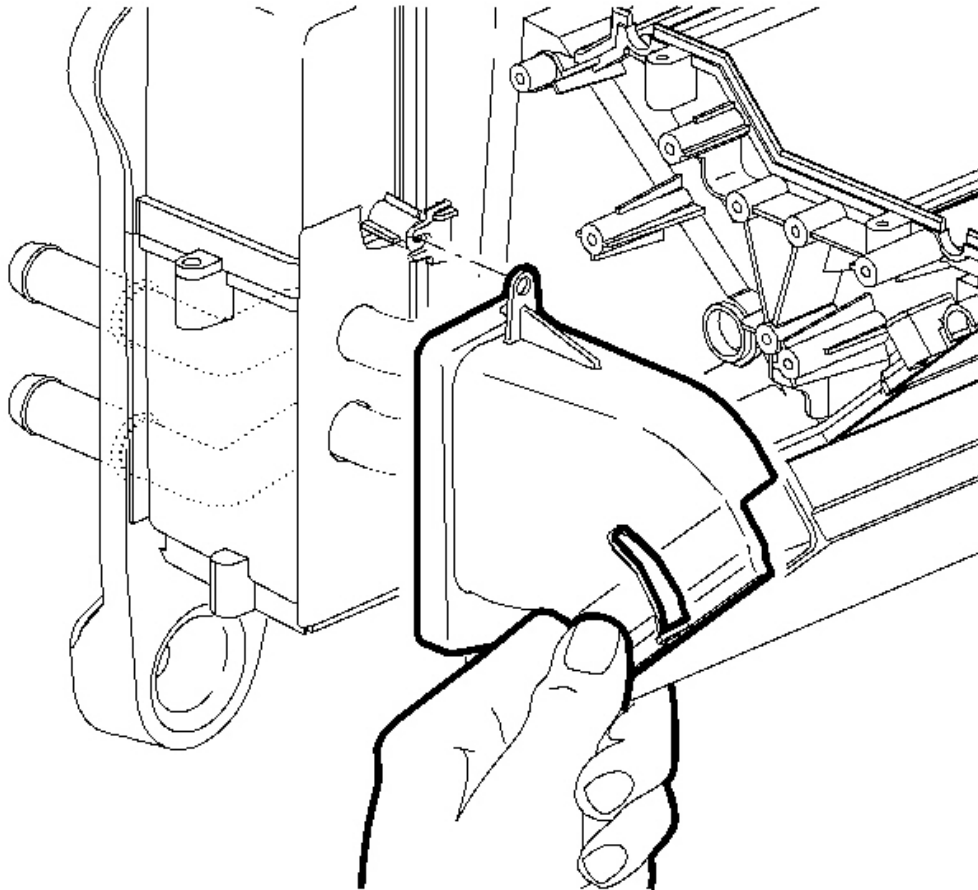
#### **Installation Procedure**



**Fig. 252: Heater Core & Pipe Seal**  
**Courtesy of GENERAL MOTORS CORP.**

1. Install the heater core. Spray the perimeter of the heater core seal and the heater core pipes at the front of dash with a soap and water mixture to ease installation.





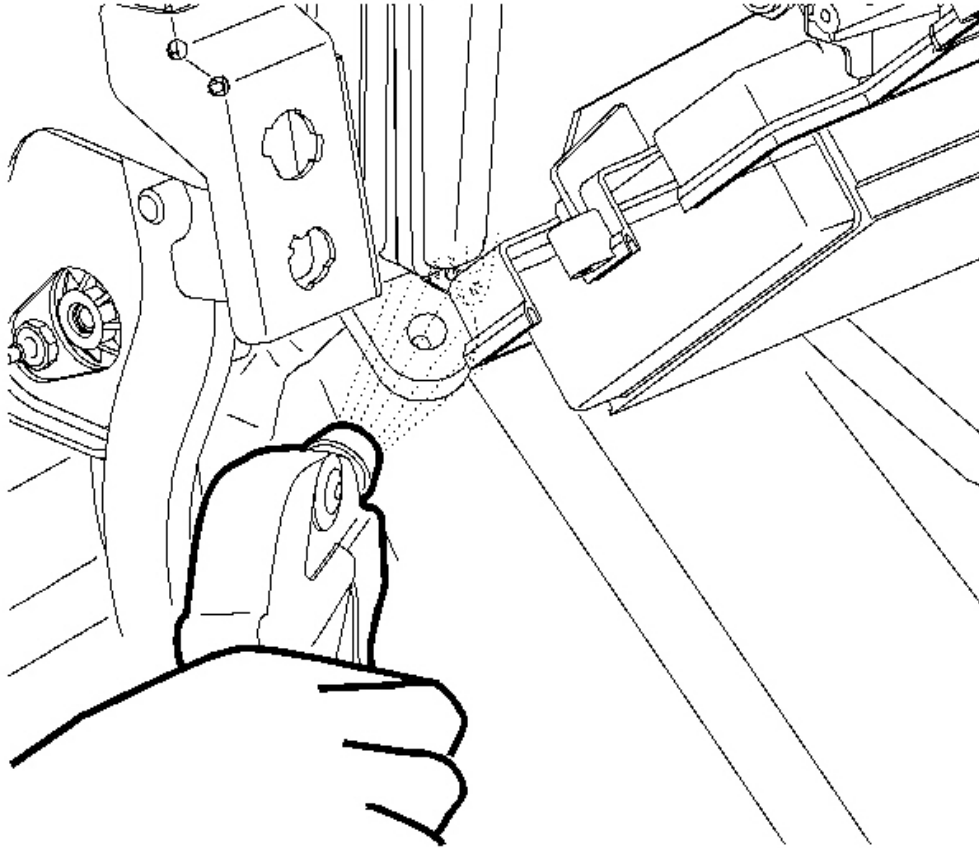
**Fig. 253: Heater Core Pipe Cover**  
Courtesy of GENERAL MOTORS CORP.

2. Install the heater core pipe seal.
3. Install the heater core pipe cover.

**NOTE:** Refer to Fastener Notice in Cautions and Notices.

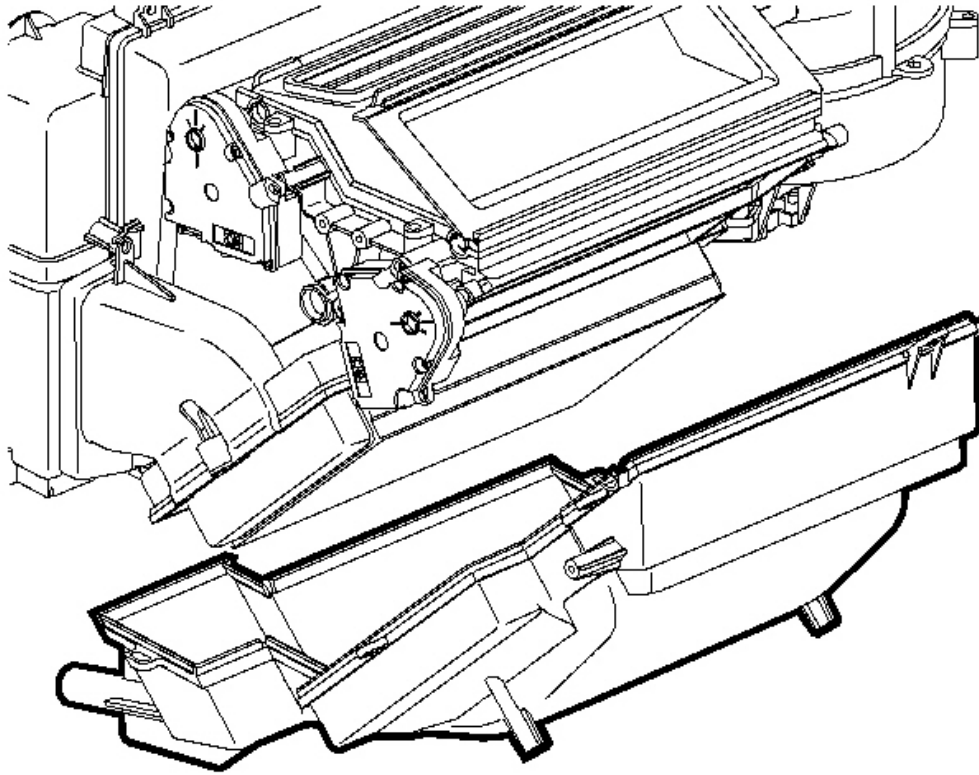
4. Install the heater core pipe cover screw.

**Tighten:** Tighten the screw to 1 N.m (9 lb in).



**Fig. 254: Spraying The Front Dash Seal At Drain Tube Opening**  
Courtesy of GENERAL MOTORS CORP.

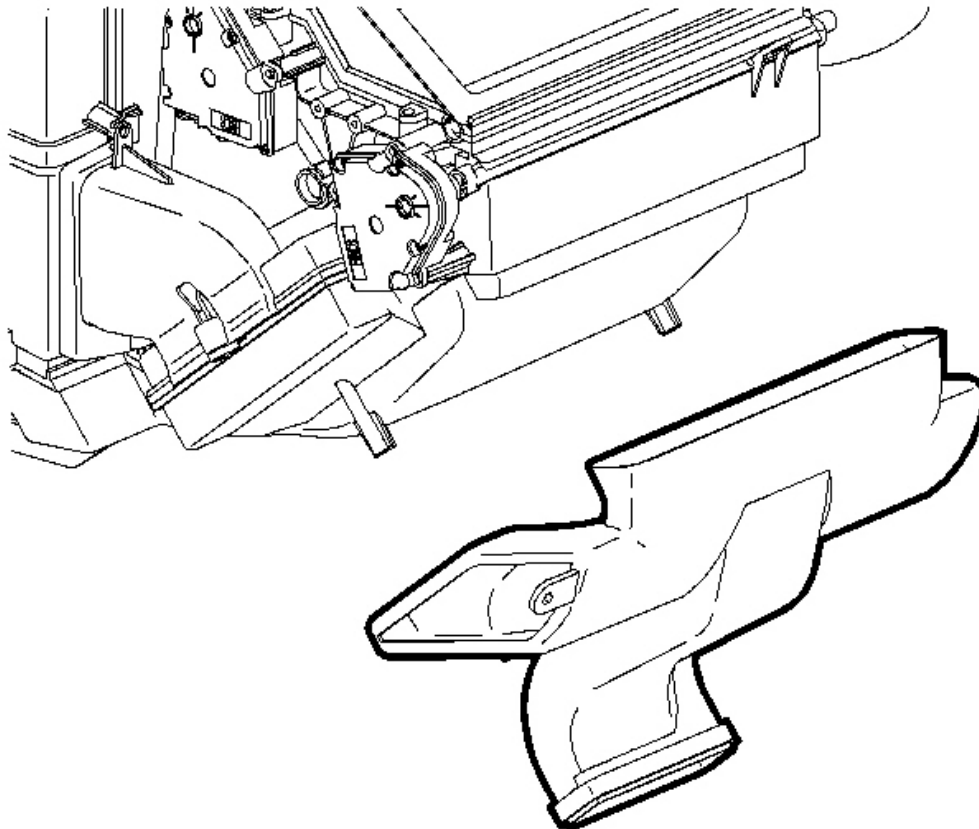
5. Spray the front of dash seal at the drain tube opening to aid in heater core cover installation.



**Fig. 255: Heater Core Cover, Screws & Evaporator Case Assembly**  
Courtesy of GENERAL MOTORS CORP.

6. Install the heater core cover.
7. Install the heater core cover screws.

**Tighten:** Tighten the screw to 1 N.m (9 lb in).



**Fig. 256: Heater Duct, Screws & Heater Core Cover**  
Courtesy of GENERAL MOTORS CORP.

8. Install the heater duct.
9. Install the heater duct screws.

**Tighten:** Tighten the screw to 1 N.m (9 lb in).

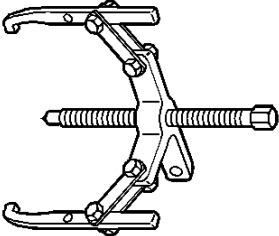
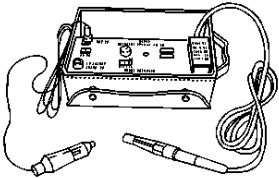

10. Install the instrument panel retainer. Refer to **Instrument Panel (I/P) Retainer Replacement** in Instrument Panel, Gages, and Console.
11. Install the shift control bracket. Refer to Transmission Shift Control Bracket Replacement in Manual Transmission - Getrag 5 or **Shift Control Replacement** in Automatic Transmission - VT25-E.

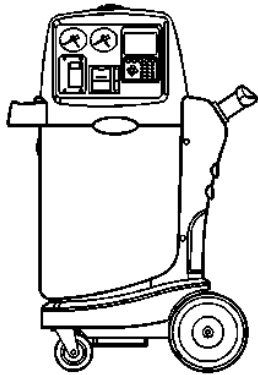
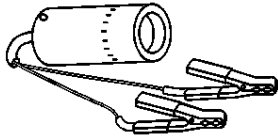
12. Install the heater inlet hose to the heater core.
13. Install the heater inlet hose clamp to the heater core.
14. Install the heater outlet hose to the heater core.
15. Install the heater outlet hose clamp to the heater core.
16. Fill the cooling system. Refer to **Draining and Filling Cooling System** in Engine Cooling.

## SPECIAL TOOLS AND EQUIPMENT

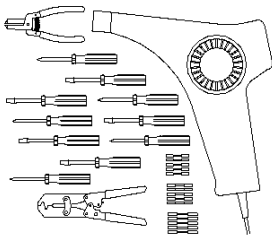
### SPECIAL TOOLS

#### Special Tools

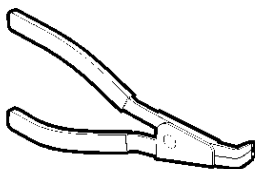
Illustration	Tool Number/Description
	<p style="text-align: center;">J 25031-A Three Jaw Puller</p>
	<p style="text-align: center;">J 39400-A Halogen Leak Detector</p>
	<p style="text-align: center;">J 41447 R-134A A/C Tracer Dye-Box of 24</p>
	<p style="text-align: center;">J 42220 Universal 12V Leak Detection Lamp</p>



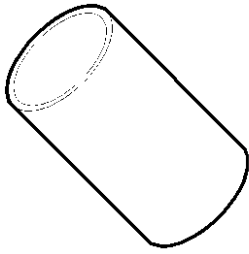
J 43600  
ACR 2000 Air Conditioning Service Center



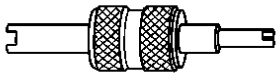
J 44020  
Terminal Repair Kit



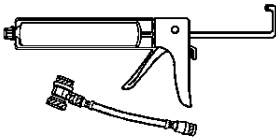
J 45267  
Clutch Holding Tool



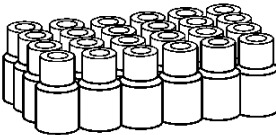
J 45504  
Clutch Pulley Installer



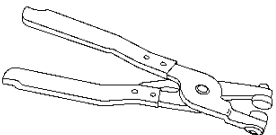
J 46246  
Valve Core Tool



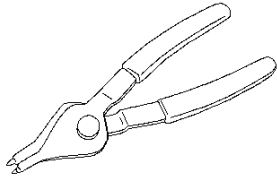
J 46297  
A/C Dye Injector Kit



J 46297-12  
Replacement Dye Cartridges



SA 9111E  
Hose Clamp Pliers



SA 9149AC-8  
Snap Ring Pliers