2010 AC

eating, entilation, and Air Conditioning - SRX

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
A/C Compressor Mounting Bolt	58 N.m	43 lb ft
A/C Compressor Mounting Nut	22 N.m	12 lb ft
A/C Line to Shock Tower Bracket Nut	9 N.m	80 lb in
Air Distribution Duct Screws	2 N.m	18 lb in
Air Inlet Housing Fasteners	2.5 N.m	23 lb in
Air Outlet Duct Screws	2 N.m	17 lb in
Blower Motor Mounting Screws	1.5 N.m	13 lb in
Compressor Pressure Relief Valve	8 N.m	70 lb in
Condenser Mounting Bolts	9 N.m	80 lb in
Discharge Hose at Compressor Bolt	9 N.m	80 lb in
Heater and A/C Evaporator and Blower Module Fastener	1.4 N.m	12 lb in
Heater Core Inlet/Outlet Tube Bolt	2.5 N.m	23 lb in
Heater Hose Bracket Nuts	9 N.m	80 lb in
HVAC Module Mounting Bolts	9 N.m	80 lb in
HVAC Module Mounting Nuts	9 N.m	80 lb in
HVAC Module Screws	1 N.m	9 lb in
Instrument Panel Outer Air Outlet Fastener	2.5 N.m	22 lb in
Liquid Line at Condenser	9 N.m	80 lb in
Receiver Dehydrator Bolt and Bracket Bolt	6 N.m	53 lb in
Refrigerant Pressure Sensor	5 N.m	44 lb in
Suction Hose at Compressor Bolt	9 N.m	80 lb in
Suction Line Bracket Screw	2 N.m	18 lb in
Surge Tank Outlet Hose Bracket Nuts	9 N.m	80 lb in
T V Bolts	6 N.m	53 lb in
T V Stud	6 N.m	53 lb in

REFRIGERANT SYSTEM SPECIFICATIONS

Refrigerant System Capacities

Application	Specification	
	Metric	English
Abrupt Refrigerant Loss	60 ml[1]	2.0 oz.[1]

cardiagn.com

PAG Oil GM P/N 12378526 for United States PAG Oil GM P/N 88900060 for Canada		
Compressor Replacement		
NOTE: **Compressor failure can occur if the oil removed during refrigerant recovery is not replaced.** The service compressor is shipped with 74 ml^2 (2.5 $oz.^2$) of PAG oil.		
Condenser Replacement	30 ml^2	1.0 $oz.^2$
Evaporator Replacement	90 ml^2	3.0 $oz.^2$
Any Line Set (Hose/Tube or Tube Assembly) Replacement	30 ml^2	1.0 $oz.^2$
• Total System PAG Oil Capacity	110.0 ml	3.7 oz.
R-134a		
• Refrigerant Charge	0.73 kg	1.61 lb
[1] Abrupt refrigerant loss due to large leak, hose rupture, collision, or pressure relief valve opening. Conditions that allow the refrigerant to seep or bleed off over time do not cause this oil loss. Upon replacement of a component that caused a large refrigerant loss, also add the required amount of oil for the particular component. [2] If more than the specified amount of PAG oil was drained from a component, add the amount drained.		

IAGNOSTIC INFOR ATION AN PROCE URES

HANDLING OF REFRIGERANT LINES AND FITTINGS

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

- Keep all metal tubing lines free of dents or kinks. Any line restrictions will cause the loss of system capacity.
- Never bend a flexible hose line to a radius of less than four times the diameter of the hose.
- Never allow a flexible hose line to come within 65 mm (2-1/2 in) of the exhaust manifold.
- Inspect flexible hose lines regularly for leaks or brittleness.
- Replace flexible hose lines with new lines if you find signs of deterioration or leaking.
- Discharge the refrigeration system of all refrigerant before disconnecting any fitting in the refrigeration system.
- Proceed very cautiously regardless of the gauge readings.

WARNING: For personal protection, goggles and lint-free gloves should be worn and a clean cloth wrapped around fittings, valves, and connections when doing work that includes opening the refrigerant system. If refrigerant comes in contact with any part of the body severe frostbite and personal injury can result. The exposed area should be

cardiagn.com

flushed immediately with cold water and prompt medical help should be obtained.

- Open the fittings very slowly.
- If you notice pressure when you loosen a fitting, allow the pressure to bleed off as described Discharging, Adding Oil, Evacuating, and Charging Procedures for A/C System.
- Cap or tape any refrigerant line immediately after it is opened. This will prevent the entrance of moisture and dirt, which can cause internal compressor wear or plugged lines in the condenser, the evaporator core, the expansion valve, or the compressor inlet screens.

NOTE: Use two proper wrenches to connect the fittings.

- Back up the opposing fitting to prevent distortion of the connecting lines or the components.
- Keep the sealing surfaces in perfect condition. A burr or a piece of dirt may cause a refrigerant leak.
- hen seal washers are used, always install the seal washer without lubrication.
- hen O-rings are used, always lightly coat the new O-ring seal with mineral base 525 viscosity refrigerant oil prior to installation.

LEA TESTING

Special Tools

- **J 3 400-A:** Halogen Leak Detector
- **J 41447:** R-134A A/C Tracer Dye-Box of 24
- **J 42220:** Universal 12V Leak Detection Lamp
- **J 43872:** Fluorescent Dye Cleaner
- **J 462 7:** A/C Dye In ector Kit
- **J 462 7-12:** Replacement Dye Cartridges

Refrigerant Leak Testing

NOTE: General otors vehicles are now manufactured with fluorescent dye installed directly into the air conditioning (A/C) system.

The fluorescent dye mixes and flows with the polyalkylene glycol (PAG) oil throughout the refrigerant system.

Verifying some passive leaks may require using the **J 3 400-A:** Halogen Leak Detector, even though the A/C system contains fluorescent dye.

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.

cardiagn.com

NOTE: 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:** Universal 12V Leak Detection Lamp.
- To prevent false diagnosis in the future, thoroughly clean the residual dye from any area where leaks were found. Use a rag and the approved **J 43872:** Fluorescent Dye Cleaner.

Fluorescent Dye In ection

NOTE: Use only fluorescent dye approved by General otors.

- **4144 : R-134A A/C Tracer ye- ox of 24 can be poured directly into a removed A/C component.**
- **4 2 -12: Replacement ye Cartridges is injected into the low side port using 4 2 : A/C ye Injector it.**

- 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.

NOTE: o NOT overcharge the A/C system with dye. Use only one .3 ml (0.25 oz.) charge.

- To prevent false diagnosis, thoroughly clean any residual dye from the service port with a rag and the approved fluorescent dye cleaner **J 43872:** Fluorescent Dye Cleaner.

Halogen Leak Detector

cardiagn.com

WARNING: o 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 0.45 kg (1 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.

NOTE: alogen leak detectors are sensitive to the following items:

- **Windshield washing solutions**
- **any 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.

NOTE: 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 3 400-A:** Halogen Leak Detector.

AIR CONDITIONING (A/C) SYSTEM PERFORMANCE TEST (LF1)

Test Description

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

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.

Step	Action	Values	Yes	No
I PORTANT: • The ambient air temperature must be at least 1 C (0 F). • o not induce additional air flow across the front of the vehicle during the test.				

cardiagn.com

- **If you were sent here from a TC diagnostic table, clear the TC upon completion of this test.**

1	1. Park the vehicle inside or in the shade. 2. Open the windows in order to ventilate the interior of the vehicle. 3. If the A/C system was operating, allow the A/C system to equalize for about 5 minutes. 4. Turn OFF the ignition. 5. Install the **J 43600** ACR 2000 Air Conditioning Service Center. See **Special Tools**. 6. Record the ambient air temperature displayed on the **J 43600** . See **Special Tools**. 7. Record the low and high side STATIC pressure readings. Are both the low side and high side pressures above the specified value?	More than 16°C (60°F) - 345 kPa (50 psi) More than 24°C (75°F) - 483 kPa (70 psi) More than 33°C (90°F) - 690 kPa (100 psi)	Go to **Step 2**	Go to **Leak Testing**
	I PORTANT: **Record the relative humidity and the ambient air temperature at the time of the test.** 1. Close the vehicle doors and windows. 2. Open the driver door window 12.7-15.2 cm (5-6 in). 3. Select the following HVAC control settings: • The A/C is ON. • The maximum blower speed • The maximum blower speed selected on the auxiliary blower controls • Recirculation mode • The Face mode • The coldest temperature setting • Passenger setting is OFF • All A/C outlets are OPEN 4. Install the temperature probes of the **J 43600** in the left and right center A/C air outlets. See **Special Tools**.			

cardiagn.com

2	5. Apply the parking brake. 6. Place the transaxle/transmission in the following position: 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 **I PORTANT:** **ake sure that the compressor is engaged when taking the data. Press the RESET button, before using the print function of the 43 00 . See Special Tools.** 10. Print the following information: • The outlet air temperatures • The low-side pressure • The high-side pressure 11. Compare the low and high side pressures and the output temperatures to the A/C Performance Table. Does all the data recorded fall within the specified ranges of the A/C Performance Table?	-	Go to **Step 8**	Go to **Step 3**
3	If the pressures and temperatures recorded do not fall within the specified ranges of the A/C Performance Table: 1. Continue to operate the A/C system for an additional 5 minutes. 2. RESET the **J 43600** and record the pressures and temperatures again. See **Special Tools**. 3. Compare the low and high side pressures and the output temperature to the A/C Performance Table. Does all the data recorded fall within the specified ranges?	-	Go to **Step 8**	Go to **Step 4**
	Do the high and low side pressures fall within the		Go to **Air**	

carquiagn.com

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

A/C Performance Table

Ambient Temperature	Relative Humidity	Low Side Service Port Pressure	High Side Service Port Pressure	Maximum Left Center Discharge Air Temperature
13-18°C (55-65°F)	0-100%	151-213 kPa (22-31 psi)	427-902 kPa (62-131 psi)	7°C (43°F)
19-24°C (66-75°F)	Less than 40%	151-241 kPa (22-35 psi)	558-1047 kPa (81-152 psi)	8°C (46°F)
	Greater than 40%	165-261 kPa (24-38 psi)	668-1129 kPa (97-164 psi)	9°C (48°F)
25-29°C (76-85°F)	Less than 35%	186-261 kPa (27-38 psi)	923-1288 kPa (134-187 psi)	10°C (50°F)
	35-50%	192-275 kPa (28-40 psi)	957-1302 kPa (139-189 psi)	12°C (52°F)
	Greater than 50%	206-289 kPa (30-42 psi)	992-1322 kPa (144-192 psi)	13°C (54°F)
		213-296 kPa (31-43	1191-1598 kPa	

cardiagn.com

30-35°C (86-95°F)	Less than 30%	psi)	(173-232 psi)	13°C (55°F)
	30-50%	220-310 kPa (32-45 psi)	1212-1577 kPa (176-229 psi)	14°C (63°F)
	Greater than 50%	234-323 kPa (34-47 psi)	1219-1557 kPa (177-226 psi)	15°C (66°F)
36-41°C (96-105°F)	Less than 20%	248-323 kPa (36-47 psi)	1529-1929 kPa (222-280 psi)	17°C (61°F)
	20-40%	248-337 kPa (36-49 psi)	1522-1880 kPa (221-273 psi)	18°C (63°F)
	Greater than 40%	261-344 kPa (38-50 psi)	1508-1839 kPa (219-267 psi)	18°C (64°F)
42-46°C (106-115° F)	Less than 20%	282-358 kPa (41-52 psi)	1867-2197 kPa (271-319 psi)	19°C (70°F)
	Greater than 20%	289-365 kPa (42-53 psi)	1853-2129 kPa (269-309 psi)	20°C (68°F)
47-49°C (116-120° F)	Below 30%	316-385 kPa (46-56 psi)	2122-2418 kPa (308-251 psi)	20°C (72°F)

A/C System Pressure - Zone Classification

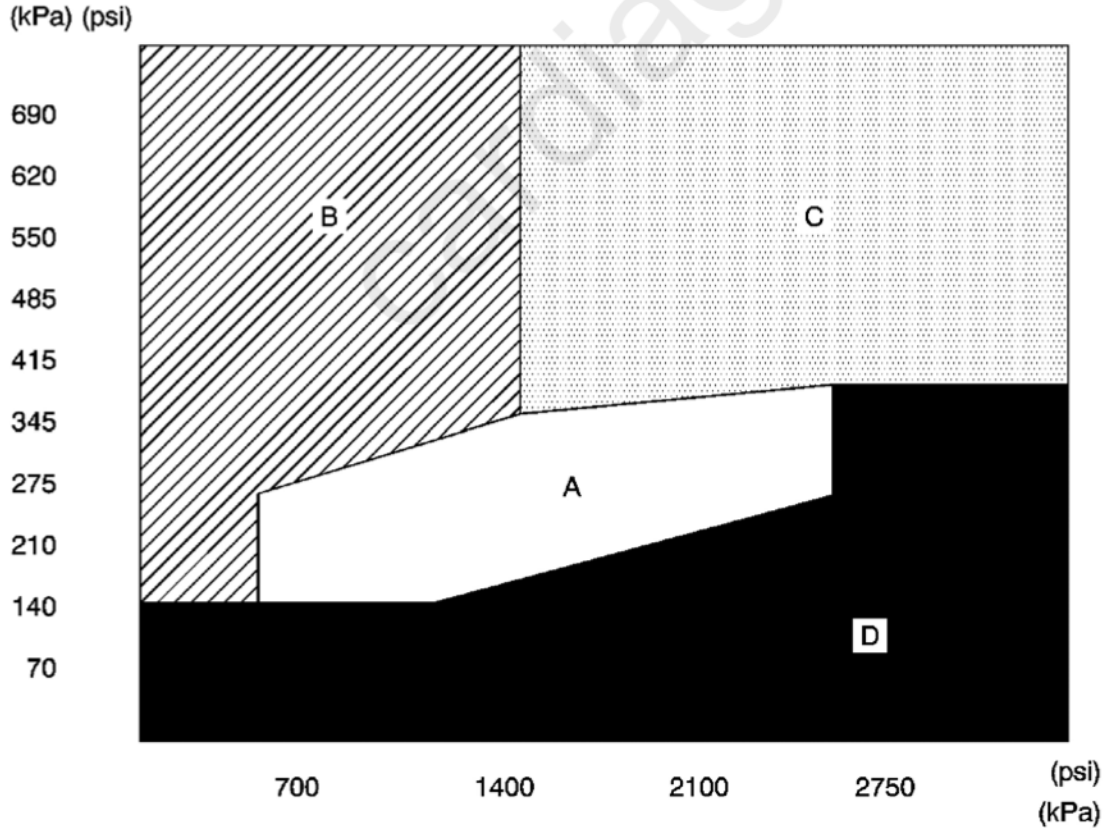


Fig. 1: Identifying A/C System Pressure - Zone Classification

Courtesy of GENERAL MOTORS CORP.

AIR CONDITIONING (A/C) SYSTEM PERFORMANCE TEST (LAU)

Test Description

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

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.

Step	Action	Values	Yes	No
I PORTANT: • **The ambient air temperature must be at least 1 C (0 F).** • **o not induce additional air flow across the front of the vehicle during the test.** • **If you were sent here from a TC diagnostic table, clear the TC upon completion of this test.**				
1	1. Park the vehicle inside or in the shade. 2. Open the windows in order to ventilate the interior of the vehicle. 3. If the A/C system was operating, allow the A/C system to equalize for about 5 minutes. 4. Turn OFF the ignition. 5. Install the **J 43600** ACR 2000 Air Conditioning Service Center. See **Special Tools**. 6. Record the ambient air temperature displayed on the **J 43600** . See **Special Tools**. 7. Record the low and high side STATIC pressure readings. Are both the low side and high side pressures	More than 16°C (60°F) - 345 kPa (50 psi) More than 24°C (75°F) - 483 kPa (70 psi) More than 33°C (90°F) - 690 kPa (100 psi)		Go to **Leak**

cardiagn.com

	above the specified value?		Go to **Step 2**	**Testing**
2	**I PORTANT:** **Record the relative humidity and the ambient air temperature at the time of the test.** 1. Close the vehicle doors and windows. 2. Open the driver door window 12.7-15.2 cm (5-6 in). 3. Select the following HVAC control settings: • The A/C is ON. • The maximum blower speed • The maximum blower speed selected on the auxiliary blower controls • Recirculation mode • The Face mode • The coldest temperature setting • Passenger setting is OFF • All A/C outlets are OPEN 4. Install the temperature probes of the **J 43600** in the left and right center A/C air outlets. See **Special Tools**. 5. Apply the parking brake. 6. Place the transaxle/transmission in the following position: 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 **I PORTANT:** **ake sure that the compressor is engaged when taking the data. Press the RESET button, before using the print function of the 43 00 . See Special Tools.** 10. Print the following information:	-		

carlagn.com

	• The outlet air temperatures • The low-side pressure • The high-side pressure 11. Compare the low and high side pressures and the output temperatures to the A/C Performance Table. Does all the data recorded fall within the specified ranges of the A/C Performance Table?		Go to **Step 8**	Go to **Step 3**
3	If the pressures and temperatures recorded do not fall within the specified ranges of the A/C Performance Table: 1. Continue to operate the A/C system for an additional 5 minutes. 2. RESET the **J 43600** and record the pressures and temperatures again. See **Special Tools**. 3. Compare the low and high side pressures and the output temperature to the A/C Performance Table. Does all the data recorded fall within the specified ranges?	-	Go to **Step 8**	Go to **Step 4**
4	Do the high and low side pressures fall within the specified ranges, but the outlet temperatures do not?	-	Go to **Air Conditioning (A/C) Diagnostics - Pressure Zone A**	Go to **Step 5**
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 **Air Conditioning (A/C) Diagnostics - Pressure Zone B**	Go to **Step 6**
6	Are the low and high side pressures both greater than the specified ranges?	-	Go to **Air Conditioning (A/C) Diagnostics - Pressure Zone C**	Go to **Step 7**
	Is the high side pressure greater than or within the specified range, but the low side pressure is		Go to **Air Conditioning**	

cardiagn.com

7	less than the specified range?	-	**(A/C) Diagnostics - Pressure Zone D**	Go to **Step 8**
8	Operate the system in order to verify the test results. Did you find the same results?	-	System OK	Go to **Symptoms - HVAC Systems - Automatic**

A/C Performance Table

Ambient Temperature	Relative Humidity	Low Side Service Port Pressure	High Side Service Port Pressure	Maximum Left Center Discharge Air Temperature
13-18 C (55-65 F)	0-100	165-213 kPa (24-31 psi)	999-1350 kPa (145-196 psi)	7 C (43 F)
19-24 C (66-75 F)	Less than 40	179-241 kPa (26-35 psi)	1061-1412 kPa (154-205 psi)	8 C (46 F)
	Greater than 40	179-254 kPa (26-37 psi)	1150-1502 kPa (167-218 psi)	9 C (48 F)
25-29 C (76-85 F)	Less than 35	192-254 kPa (28-37 psi)	1267-1550 kPa (184-225 psi)	9 C (48 F)
	35-50	199-261 kPa (29-38 psi)	1322-1570 kPa (139-189 psi)	10 C (50 F)
	Greater than 50	206-275 kPa (30-40 psi)	1350-1632 kPa (196-237 psi)	12 C (52 F)
30-35 C (86-95 F)	Less than 30	206-268 kPa (30-39 psi)	1433-1729 kPa (208-251 psi)	12 C (52 F)
	30-50	213-282 kPa (31-41 psi)	1460-1750 kPa (212-254 psi)	13 C (55 F)
	Greater than 50	220-303 kPa (32-44 psi)	1488-1777 kPa (216-258 psi)	14 C (57 F)
36-41 C (96-105 F)	Less than 20	213-275 kPa (31-40 psi)	1632-1908 kPa (237-277 psi)	13 C (55 F)
	20-40	220-296 kPa (32-43 psi)	1639-1922 kPa (238-279 psi)	14 C (57 F)
	Greater than 40	234-310 kPa (34-45 psi)	1660-1922 kPa (241-279 psi)	15 C (59 F)
42-46 C (106-115 F)	Less than 20	227-289 kPa (33-42 psi)	1832-2067 kPa (266-300 psi)	14 C (57 F)
	Greater than 20	241-310 kPa (35-45 psi)	1832-2067 kPa (266-300 psi)	15 C (59 F)
47-49 C (116-120 F)	Below 30	241-310 kPa (36-46 psi)	1991-2232 kPa (308-251 psi)	17 C (61 F)

cardiagn.com

A/C System Pressure - Zone Classification

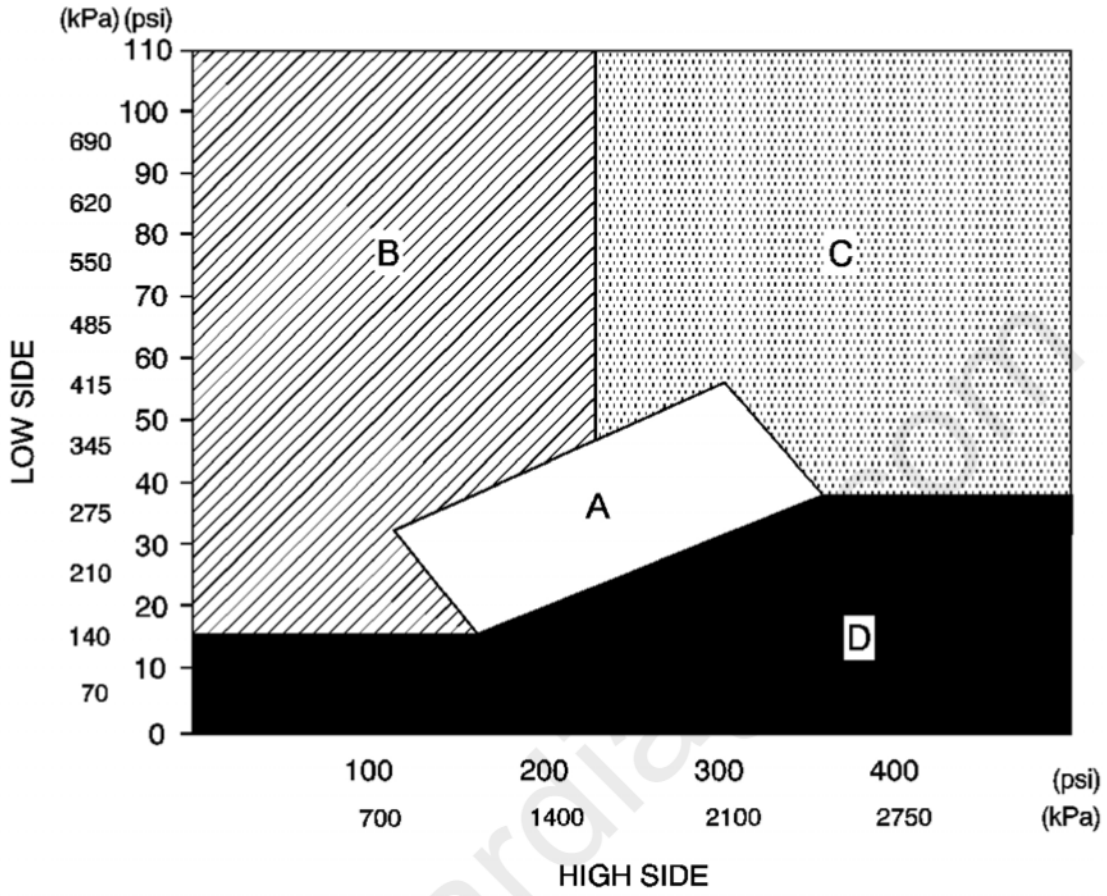


Fig. 2: Identifying A/C System Pressure - Zone Classification
Courtesy of GENERAL MOTORS CORP.

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

Step	Action	Yes	No
DEFINITION: The high and low side pressures may be normal or slightly less than normal. • Air Delivery Concern • Slight Refrigerant Under Charge • Refrigerant Contamination			
1	Were you sent here from the A/C System Performance Test?		Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System**

		Go to **Step 2**	**Performance Test (LAU)**
2	Did the customer mention that the A/C system output temperatures are good at first, but then turn warm during extended drives?	Go to **Step 3**	Go to **Step 4**
3	Increase engine speed to 1,500 RPM. During extended operation of the A/C system, does the low side pressure decrease?	Go to **Air Conditioning (A/C) Diagnostics - Pressure Zone D**	Go to **Step 4**
4	Refer to the pressures recorded during the A/C system performance test. **WARNING:** **Refer to oving Parts and ot Surfaces Warning .** Inspect for the following conditions: • The high side pressure is slightly greater than the specified pressure ranges in the A/C System performance Table but still near one A on the A/C Pressure- one Classification Chart. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. • The discharge line is hot. • The suction line is cool. Do the listed conditions exist?	Go to **Step 7**	Go to **Step 5**
5	Refer to the pressures recorded during the A/C system performance test. Inspect for the following conditions: • The low side pressure is slightly lower than the specified pressure ranges but still near one A on the A/C Pressure- one Classification Chart. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. • The discharge line is warm-to-hot. • The suction line is cool-to-warm. Do the listed conditions exist?	Go to **Step 6**	Go to **Air Temperature Malfunction**

carmanuals.com

6	The A/C system may be undercharged. 1. Leak test the A/C system. Refer to **Leak Testing**. 2. Evacuate and Recharge the A/C system to specifications. Refer to **Refrigerant Recovery and Recharging**. Is the repair complete?	Go to **Step 11**	-
7	The A/C system may be contaminated. View the **43600** ACR 2000 Air Conditioning Service Center information screen for detection of foreign gases in the A/C system. See **Special Tools**. Do foreign gases exist?	Go to **Step 8**	Go to **Step 9**
8	1. Evacuate the A/C system to a scavenging tank. Refer to **Refrigerant Recovery and Recharging**. 2. Recharge the A/C system to specifications. Is the repair complete?	Go to **Step 11**	-
9	The A/C system may contain too much moisture or air. 1. Evacuate and recharge the A/C system to specifications. Refer to **Refrigerant Recovery and Recharging**. 2. Operate the A/C system and inspect the panel outlet air temperatures. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. Are the panel outlet temperatures within the specified ranges of the A/C Performance Test Table?	Go to **Step 11**	Go to **Step 10**
10	1. Record the low and high side pressures and the I/P panel outlet air temperature. 2. Compare the panel outlet temperatures and pressure to those listed in the A/C System Performance Chart. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. Are the high and low side pressures and I/P panel		Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test**

	outlet temperatures within specifications?	Go to **Step 11**	(LAU)
11	Operate the system in order to verify the repair. Did you correct the condition?	System OK	Go to **Symptoms - HVAC Systems - Automatic** .

AIR CONDITIONING (A/C) DIAGNOSTICS - PRESSURE ONE B

Step	Action	Value	Yes	No
DEFINITION: The low side pressure is higher than normal and the high side pressure is lower than normal. • Malfunctioning A/C Compressor • Refrigerant Under Charge				
1	Were you sent here from the A/C System Performance Test?	-	Go to **Step 2**	Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**
2	Refer to the pressures recorded during the A/C System Performance Test. Inspect for the following conditions: **WARNING:** **Refer to oving Parts and ot Surfaces Warning .** • The low side pressure is greater than the specified pressure range of the A/C Performance Table. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. • The high side pressure is less than the specified pressure range of the A/C Performance Table. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. • The low side refrigerant line at the	-		

cardiagn.com

	compressor feels cool-to-cold. • The high side refrigerant line at the compressor feels warm-to-hot. Do the listed conditions exist?		Go to **Step 3**	Go to **Step 7**
3	The A/C system may be undercharged or have compressor or expansion valve problems. 1. Leak test the A/C system. Refer to **Leak Testing**. 2. Note any potential leaks for later repair. 3. Recover the refrigerant charge from the vehicle. Refer to **Refrigerant Recovery and Recharging**. 4. Record the weight of the recovered refrigerant. Is the recovered amount below the specified values?	Standard AC 0.57 kg (1.26 lbs) Rear AC (C57) 0.80 kg (1.76 lbs)	Go to **Step 4**	Go to **Step 6**
4	The system is low on refrigerant charge. 1. Repair any leaks noted in step 3 above. 2. Evacuate and Recharge the A/C system to specifications. Refer to **Refrigerant Recovery and Recharging**. Is the repair complete?	-	Go to **Step 5**	-
5	1. Record the low and the high side pressures and the I/P panel outlet temperatures. Refer to step 2 of the Air Conditioning (A/C) System Performance Test. 2. Compare the panel outlet temperatures and pressures to those listed in the A/C System Performance Chart. Are the high and low side pressures and I/P panel outlet temperatures within specification?	-	System OK	Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**
	The thermal expansion valve needs to be replaced. 1. Replace the thermal expansion valve. Refer to **Air Conditioning Evaporator**			

cardiagn.com

6	**Thermal Expansion Valve Replacement**. 2. Repair any leaks noted in step 3 above. 3. Evacuate and recharge the A/C system to specifications. Refer to **Refrigerant Recovery and Recharging**. Is the repair complete?	-	Go to **Step 5**	-
7	Refer to the pressures recorded during the A/C System Performance Test. Inspect for the following conditions: **WARNING:** **Refer to oving Parts and ot Surfaces Warning .** • The low side pressure is greater than the specified pressure range of the A/C Performance Table. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. • The high side pressure is less than the specified pressure range of the A/C Performance Table. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. • The low side refrigerant line at the compressor feels warm. • The high side refrigerant line at the compressor feels warm to hot. Do the listed conditions exist?	-	Go to **Step 8**	Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**
	The system could be low charged or there could be a problem with the A/C compressor. 1. Verify that the compressor is engaging properly. 2. Verify that the A/C system performance data was taken with the compressor clutch engaged for more than 10 seconds.			

8	3. Raise the engine RPM to 1,200. 4. Record the low and high side pressures and the I/P panel outlet temperatures. Refer to step 2 of the Air Conditioning (A/C) System Performance Test. 5. Compare the panel outlet temperatures and pressures to those listed in the A/C System Performance Chart. Are the high and low side pressures and I/P panel outlet temperatures within specification?	-	Go to **Step 3**	Go to **Step 9**
9	With the engine speed raised to over 2,000 RPM and the A/C compressor clutch engaged, listen for any unusual compressor noises. Any unusual noises heard?	-	Go to **Step 3**	Go to **Step 10**
10	1. Replace the A/C compressor. Refer to **Air Conditioning Compressor Replacement (LF1)** or **Air Conditioning Compressor Replacement (LAU)**. 2. Evacuate and recharge the A/C system. Refer to **Refrigerant Recovery and Recharging**. Is the repair complete?	-	Go to **Step 11**	-
11	Operate the system in order to verify the repair. Did you find and correct the condition?	-	System OK	Go to **Symptoms - HVAC Systems - Automatic** .

AIR CONDITIONING (A/C) DIAGNOSTICS - PRESSURE ONE C

Step	Action	Yes	No
DEFINITION: The low and the high side pressures are both higher than normal. • Restricted Condenser Air Flow • Cooling Fan Malfunction • Expansion Device Malfunction			
1	Were you sent here from the A/C System Performance Test?		Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System**

cardiagn.com

		Go to **Step 2**	**Performance Test (LAU)**
2	1. Start the engine. 2. Make sure that the A/C is ON. 3. Inspect for proper cooling fan operation. Refer to **Cooling Fan Description and Operation (LAU)** or **Cooling Fan Description and Operation (LF1)** . Are the cooling fans ON and operating properly?	Go to **Step 3**	Go to **Step 5**
3	Visually inspect for the following conditions: • Damaged condenser cooling fins • Missing or misaligned air baffles • Restricted front end air flow Do any of these conditions exist?	Go to **Step 4**	Go to **Step 6**
4	Repair the air flow restriction. Is the repair complete?	Go to **Step 7**	-
5	Repair the fault to the cooling fan operation. Refer to **Cooling Fan Description and Operation (LAU)** or **Cooling Fan Description and Operation (LF1)** . Is the repair complete?	Go to **Step 7**	-
6	1. Air is in the refrigerant system, or the system is overcharged. Refer to the view screen on **43600** ACR 2000 Air Conditioning Service Center for foreign gas content in the refrigerant. See **Special Tools**. 2. Recover and recharge the A/C system. Refer to **Refrigerant Recovery and Recharging**. Is the repair complete?	Go to **Step 7**	-
7	1. Record the low and high side pressures and the I/P panel outlet air temperature after you have performed the repairs. 2. Compare the pressures and the panel outlet temperature to those listed in the A/C Performance Chart. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. Are the readings within the specified ranges listed in		Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test**

	the A/C Performance table?	Go to **Step 8**	**(LAU)**
8	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to **Symptoms - HVAC Systems - Automatic**

AIR CONDITIONING (A/C) DIAGNOSTICS - PRESSURE ONE D

Step	Action	Value	Yes	No
DEFINITION: The low side pressure is lower than normal and the high side pressure is higher than normal. • A restriction in the A/C system • Debris in the system				
1	Were you sent here from the A/C System Performance Test?	-	Go to **Step 2**	Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**
2	**WARNING:** **Refer to oving Parts and ot Surfaces Warning .** Feel the liquid line at the front of dash.Is the liquid line cold at the front of dash?	-	Go to **Step 3**	Go to **Step 8**
3	Feel along the surfaces of the following low side components: • The compressor discharge hose • The Condenser • The liquid line between the condenser and the expansion device Did you detect an abrupt drop in temperature along the surfaces of any of the listed components?	-	Go to **Step 7**	Go to **Step 4**
	1. Feel the liquid line at the expansion device location for extreme cold, possibly accompanied by heavy frost. 2. Feel along the liquid line beyond the			

cardiagn.com

4	expansion device location for warm temperature. Is the liquid line extremely cold at the expansion device location and warm beyond the expansion device location?	-	Go to **Step 11**	Go to **Step 5**
5	Feel along the surfaces of the following low side components: • The evaporator inlet tube between the expansion device and the evaporator core • The evaporator outlet tube between the evaporator core and the compressor suction hose • The compressor suction hose Did you feel an abrupt temperature change along the surfaces of the listed components?	-	Go to **Step 7**	Go to **Step 6**
6	Feel along the surfaces of the low and the high side components: • The evaporator inlet tube between the expansion device and the evaporator core • The evaporator outlet tube and the compressor • The compressor suction hose • The compressor discharge hose • The condenser • The evaporator inlet tube between the condenser and the expansion device Are the temperatures of these components only mildly warm?	-	Go to **Step 14**	Go to **Step 8**
7	1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**. 2. Remove the restriction from the component, or replace the component which produced an abrupt temperature drop. Is the repair complete?	-	Go to **Step 9**	-
	1. Recover the refrigerant and evacuate the			

cardiagn.com

8	system. Refer to **Refrigerant Recovery and Recharging**. 2. Record the weight of the recovered refrigerant. 3. Compare the weight of the recovered refrigerant with the system capacity. Refer to **Refrigerant System Specifications**. Is the weight of the recovered refrigerant charge greater than 75 percent of the total system capacity?	-	Go to **Step 9**	Go to **Step 10**
9	Recharge the A/C system. Refer to **Refrigerant Recovery and Recharging**. Is the cooling performance improved?	-	Go to **Step 21**	Go to **Step 10**
10	1. Leak test the system. Refer to **Leak Testing**. 2. Repair any leaks found. Are the repairs complete?	-	Go to **Step 21**	-
11	The expansion device is restricted. 1. Replace the expansion device. Refer to **Air Conditioning Evaporator Thermal Expansion Valve Replacement**. 2. If the expansion device was restricted, note the type of debris present. Are metal flakes present?	-	Go to **Step 12**	Go to **Step 13**
12	1. Remove the compressor hose from the vehicle. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)** or **Air Conditioning Condenser and Evaporator Hose Replacement (LAU)**. 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. 3. Observe the amount of debris collected in the shop towel. Did a large amount of debris collect in the shop towel?	-	Go to **Step 18**	Go to **Step 20**
	If the expansion device was restricted with a brown or black residue, perform the following			

carmagn.com

13	procedure: 1. Flush the A/C system. Refer to **Flushing**. 2. Replace the desiccant bag. Refer to **Receiver and Dehydrator Replacement**. Are the repairs complete?	-	Go to **Step 21**	-
14	1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**. 2. Disconnect the compressor hoses from the compressor. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)** or **Air Conditioning Condenser and Evaporator Hose Replacement (LAU)**. Is debris present in the compressor suction port?	-	Go to **Step 15**	Go to **Step 19**
15	1. Remove the debris from the suction port. 2. Inspect the expansion device for damage or debris. Refer to **Air Conditioning Evaporator Thermal Expansion Valve Replacement**. Did you find evidence of damage or debris?	-	Go to **Step 17**	Go to **Step 16**
16	If the expansion device does not show any signs of damage or debris, perform the following procedure: 1. Remove the compressor hose from the vehicle. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)** or **Air Conditioning Condenser and Evaporator Hose Replacement (LAU)**. 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. 3. Observe the amount of debris collected in the shop towel. Did a large amount of debris collect in the shop towel?	-	Go to **Step 18**	Go to **Step 19**
	1. Replace the expansion device. Refer to **Air**			

cardiagn.com

17	**Conditioning Evaporator Thermal Expansion Valve Replacement**. 2. If the expansion device was restricted, observe the type of debris present. Are metal flakes present?	-	Go to **Step 12**	Go to **Step 13**
18	If a large amount of debris was collected in the shop towel from the suction hose, replace the desiccant bag. Refer to **Receiver and Dehydrator Replacement**. Is the repair complete?	-	Go to **Step 19**	-
19	Install the compressor hoses. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)** or **Air Conditioning Condenser and Evaporator Hose Replacement (LAU)**. Are the repairs complete?	-	Go to **Step 21**	-
20	1. Install the compressor hose. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)** or **Air Conditioning Condenser and Evaporator Hose Replacement (LAU)**. 2. Recharge the A/C system. Refer to **Refrigerant Recovery and Recharging**. Are the repairs complete?	-	Go to **Step 21**	-
21	1. Record the low and the high side pressures and the panel outlet air temperature after you perform the repairs. 2. Compare the pressures and the panel outlet temperature to those listed in the A/C Performance Chart. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. Are the readings within the specified ranges as shown on the A/C Performance Chart?	-	Go to **Step 22**	Go to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**
22	Operate the system in order to verify the repair. Did you find and correct the condition?	-	System OK	Go to **Symptoms - HVAC Systems - Automatic**

HEATING PERFORMANCE DIAGNOSTIC

Carmagn.com

Step	Action	Yes	No
DEFINITION: Heating system performance.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to **Step 2**	Go to **Symptoms - HVAC Systems - Automatic**
2	1. Start the engine. 2. Allow the engine to idle. Does the engine reach a normal operating temperature?	Go to **Step 3**	Go to **Step 9**
3	**WARNING:** **Refer to oving Parts and ot Surfaces Warning .** 1. Select the FLOOR mode. 2. Select the minimum blower speed. 3. Select the warmest temperature setting. 4. 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 **Step 7**	Go to **Step 4**
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: • The center I/P PANEL air outlet • The heater core outlet hose 7. Compare the recorded temperatures. Are the 2 temperature readings about equal?	Go to **Step 5**	Go to **Step 6**
5	1. Inspect and repair the following areas of the vehicle for cold air leaks: • The cowl • The recirculation door • The HVAC module case 2. Perform the necessary repairs.		

cardiagn.com

	Are the repairs complete?	Go to **Step 10**	-
6	1. Inspect the temperature door operation. Refer to **Diagnostic System Check - Vehicle** . 2. Perform any necessary repairs. Are the repairs complete?	Go to **Step 10**	-
7	1. Turn OFF the engine. 2. Backflush the heater core. 3. Start the engine. 4. Select the FLOOR mode. 5. Select the minimum blower speed. 6. Select the warmest temperature setting. 7. 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 **Step 8**	Go to **Step 10**
8	Replace the heater core. Refer to **Heater Core Replacement**. Is the repair complete?	Go to **Step 10**	-
9	Repair the low engine temperature concern. Refer to **Engine Fails To Reach Normal Operating Temperature** . Is the repair complete?	Go to **Step 10**	-
10	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to **Step 2**

DEFROSTING INSUFFICIENT

Step	Action	Yes	No
DEFINITION: Time required to defrost the windshield is longer than normal.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to **Step 2**	Go to **Symptoms - HVAC Systems - Automatic**
2	1. Start the engine. 2. Select the DEFROST mode. 3. Select the maximum blower speed. Does sufficient air flow from the defroster outlets?	Go to **Step 3**	Go to **Step 10**
3	Measure the engine operating temperature. Does engine reach a normal operating temperature?	Go to **Step 4**	Go to **Step 8**
	1. Select the minimum blower speed.		

cardiagn.com

4	2. Select the maximum temperature setting. **WARNING:** **Refer to oving Parts and ot Surfaces Warning .** 3. Feel the temperature of the inlet and outlet hoses at the heater core. Does the inlet hose feel warmer than the outlet hose?	Go to **Step 11**	Go to **Step 5**
5	Test the operation of the A/C compressor clutch. Does the A/C compressor clutch engage?	Go to **Step 7**	Go to **Step 6**
6	Repair the A/C compressor clutch. Refer to **Air Conditioning Compressor Malfunction** . Is the repair complete?	Go to **Step 14**	-
7	Perform the A/C system performance test. Refer to **Air Conditioning (A/C) System Performance Test (LF1)** or **Air Conditioning (A/C) System Performance Test (LAU)**. Is the A/C system operating within the specifications?	Go to **Step 9**	Go to **Step 12**
8	Repair the low engine temperature concern. Refer to **Engine Fails To Reach Normal Operating Temperature** . Is the repair complete?	Go to **Step 14**	-
9	Inspect for correct operation of the recirculation door. Is the recirculation door operating correctly?	Go to **Step 14**	Go to **Step 13**
10	Repair the air delivery concern. Refer to **Diagnostic Starting Point - Vehicle** . Is the repair complete?	Go to **Step 14**	-
11	Repair the heating concern. Refer to **Heating Performance Diagnostic**. Is the repair complete?	Go to **Step 14**	-
12	Repair the A/C performance concern. Refer to **Symptoms - HVAC Systems - Automatic** . Is the repair complete?	Go to **Step 14**	-
13	Repair the recirculation door concern. Refer to **Diagnostic Starting Point - Vehicle** . Is the repair complete?	Go to **Step 14**	-
14	Operate the system in order to verify the repair. Did you find and correct the problem?	System OK	Go to **Step 2**

NOISE DIAGNOSIS - AUXILIARY BLOWER MOTOR

Step	Action	Yes	No
DEFINITION: Noise originating from the auxiliary blower motor.			

1	Were you sent here from Symptoms or another diagnostic table?	Go to **Step 2**	Go to **Diagnostic System Check - Vehicle**
2	1. Sit inside the vehicle. 2. Close the vehicle doors and windows. 3. Turn ON the ignition, with the engine OFF. 4. Cycle the auxiliary blower motor through all of the speeds in order to determine where and when the noise occurs. Is a noise evident during auxiliary blower operation?	Go to **Step 3**	Go to **Step 12**
3	Inspect for excessive vibration at each auxiliary blower motor speed by feeling the auxiliary blower case. Is excess vibration present?	Go to **Step 5**	Go to **Step 4**
4	Listen to the auxiliary blower motor at each blower speed. Is the auxiliary blower motor making a squeaking or chirping noise?	Go to **Step 10**	Go to **Step 12**
5	Inspect the blower motor and the blower motor housing for proper installation. Is the blower motor or the blower motor housing touching the vehicles body and causing the vibration?	Go to **Step 9**	Go to **Step 6**
6	1. Remove the auxiliary blower motor. Refer to **Auxiliary Blower Motor Replacement**. 2. Inspect the auxiliary blower motor impeller for deposits of foreign material. 3. Inspect the auxiliary blower motor for deposits of foreign material. Did you find foreign material on the auxiliary blower motor?	Go to **Step 8**	Go to **Step 7**
7	Inspect the auxiliary blower motor for the following conditions: • Cracked blades • A loose impeller retainer • Improper impeller alignment Did you find any of these conditions?	Go to **Step 9**	Go to **Step 11**
8	Remove the foreign material. Is the action complete?	Go to **Step 11**	-
9	Install the component so there is no contact with the vehicles body.		

carlegh.com

	Is the action complete?	Go to **Step 12**	-
10	Replace the auxiliary blower motor. Refer to **Au iliary Blower otor Replacement**. Is the repair complete?	Go to **Step 12**	-
11	Install the auxiliary blower motor. Refer to **Au iliary Blower otor Replacement**. Is the action complete?	Go to **Step 12**	-
12	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to **Step 2**

NOISE DIAGNOSIS - BLO ER OTOR

Step	Action	Yes	No
DEFINITION: Noise originating from the blower motor.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to **Step 2**	Go to
2	Inspect the air inlet grille for debris. Is debris present?	Go to **Step 8**	Go to **Step 3**
3	1. Sit inside the vehicle. 2. Close the vehicle doors and windows. 3. Turn ON the ignition, with the engine OFF. 4. Cycle the blower motor through all of the speeds and modes in order to determine where and when the noise occurs. Is a noise evident during the blower operation?	Go to **Step 4**	Go to **Step 11**
4	Inspect for excessive vibration at each blower motor speed by feeling the blower case. Is excess vibration present?	Go to **Step 6**	Go to **Step 5**
5	Listen to the blower motor at each speed. Is the blower motor making a squeaking or chirping noise?	Go to **Step 9**	Go to **Step 11**
6	1. Remove the blower motor. Refer to **Blower otor Replacement**. 2. Inspect the blower motor impeller for deposits of foreign material. 3. Inspect the blower motor for deposits of foreign material. Did you find any foreign material on the blower motor or blower motor impeller?	Go to **Step 8**	Go to **Step 7**
	Inspect the blower motor for the following conditions: • Cracked blades		

7	• A loose impeller retainer • Improper impeller alignment Did you find any of these conditions?	Go to **Step 9**	Go to **Step 10**
8	Remove the foreign material. Is the action complete?	Go to **Step 10**	-
9	Replace the blower motor. Refer to **Blower otor Replacement**. Is the repair complete?	Go to **Step 11**	-
10	Install the blower motor. Refer to **Blower otor Replacement**. Is the action complete?	Go to **Step 11**	-
11	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to **Step 2**

AIR CONDITIONING CO PRESSOR OIL DIAGNOSIS

NOTE: **To avoid repeat compressor failure, always inspect the condition of the refrigerant oil and take the appropriate corrective action before installing the replacement compressor.**

Condition	Correcti e Action
Clean Oil no debris present	No corrective action necessary.
Clean Oil with debris present	• Inspect the suction port of the replacement compressor for presence of a suction screen. If the Replacement Compressor does NOT contain a suction screen, Install Suction Screen in the line. • Replace desiccant or component containing the desiccant. • Replace desiccant filter if applicable. • Remove and inspect high pressure side filter (if applicable). • Remove, inspect, clean, or replace orifice tube. • If the system has a front orifice tube and is equipped with a filter in the rear auxiliary line, remove, inspect, clean, or replace the filter. • If the system has a front orifice tube and is not equipped with a filter in the rear auxiliary line, remove the filter in the auxiliary TXV and Install a universal inline A/C Filter P/N 89016656 (AC Delco P/N 15-10413) as close to the rear TXV as possible.
Dark brown/black and/or pungent/unusual odor with no debris present	• Replace desiccant or component containing the desiccant. • Replace desiccant filter if applicable. • Flush refrigerant system. Refer to **Flushing**

cardiagn.com

Dark brown/black and/or pungent/unusual odor with debris present	• Replace desiccant or component containing the desiccant. • Replace desiccant filter if applicable. • Flush refrigerant system. Refer to **Flushing** • Inspect the suction port of the replacement compressor for presence of a suction screen. If the replacement compressor does NOT contain a suction screen, install suction screen. • Remove and inspect high pressure side filter (if applicable). • Remove, inspect, clean, or replace orifice tube. • If the system has a front orifice tube and is equipped with a filter in the rear auxiliary line, remove, inspect, clean, or replace the filter. • If the system has a front orifice tube and is not equipped with a filter in the rear auxiliary line, remove the filter in the auxiliary TXV and install a universal inline A/C Filter P/N 89016656 (AC Delco P/N 15-10413) as close to the rear TXV as possible.
Oil Overcharge	Flush refrigerant system. Refer to **Flushing**
Refrigerant Contamination	Flush refrigerant system. Refer to **Flushing**
Hybrid Polyolester Refrigerant Oil (POE) Contamination	• Flush refrigerant system. Refer to **Flushing** • Replace desiccant or component containing the desiccant. • Replace desiccant filter if applicable.

NOISE DIAGNOSIS - AIR CONDITIONING A/C SYSTE

Step	Action	Yes	No
1	Were you sent here from Symptoms or another diagnostic table?	Go to **Step 2**	Go to **Symptoms - HVAC Systems - Automatic**
2	1. A/C system noises can be generally categorized into 3 areas: • Screeching, squealing, chirping noises • Moaning noises • Vibration/rattle noises 2. Start the engine. 3. Ensure that the A/C is ON. Is a screeching, squealing noise heard when the A/C is ON?	Go to **Step 3**	Go to **Step 6**
3	With the engine OFF, inspect the drive belt for excessive wear. Refer to **Dri e Belt Falls Off and E cessi e ear Diagnosis** . Is the drive belt excessively worn?	Go to **Step 14**	Go to **Step 4**

4	Inspect the drive belt tension. Refer to **Drive Belt Tensioner Diagnosis**. Is the drive belt tension correct?	Go to **Step 15**	Go to **Step 5**
5	Inspect the drive belt for excessive oil coverage. Is the drive belt covered with oil?	Go to **Step 13**	Go to **Step 6**
6	1. Start the engine. 2. Ensure that the A/C is ON. Is the compressor locked up?	Go to **Step 19**	Go to **Step 7**
7	Using a stethoscope, listen to the A/C compressor for any abnormal noises. Is the compressor causing an abnormal noise?	Go to **Step 11**	Go to **Step 8**
8	Listen to the A/C compressor components and mounting for noise concerns using a stethoscope. Are any of these components loose, damaged or excessively worn?	Go to **Step 16**	Go to **Step 9**
9	1. Idle the engine. 2. Engage the A/C. 3. Using a stethoscope, move around the entire refrigerant plumbing system, inspecting for any abnormal noises caused by component ground-out. Are any of the A/C components grounding out and causing a noise?	Go to **Step 21**	Go to **Step 10**
10	1. 1. Idle the engine in PARK with the A/C on. 2. 2. Using a stethoscope, move around the entire A/C system testing for any abnormal noises caused by a component. Do any of the A/C components cause an abnormal noise?	Go to **Step 17**	Go to **Step 20**
11	Verify that the A/C system is properly charged. Refer to **Refrigerant System Specifications**. Is the A/C system properly charged?	Go to **Step 19**	Go to **Step 16**
12	Recharge the A/C system to specification. Refer to **Refrigerant Recovery and Recharging**. Is the abnormal compressor noise still present?	Go to **Step 20**	Go to **Step 21**
13	Repair the oil leak. Refer to the appropriate repair procedure in Engine Mechanical. Is the repair complete?	Go to **Step 21**	-
14	Replace the drive belt. Refer to **Drive Belt Replacement**. Is the replacement complete?	Go to **Step 21**	-

Cardiagn.com

15	Replace the drive belt tensioner. Refer to **Dri e Belt Replacement** . Is the replacement complete?	Go to **Step 21**	-
16	Repair or replace the A/C compressor mounting component. Is the repair complete?	Go to **Step 21**	-
17	Repair or replace the component which is causing the moaning concern as needed. Is the repair complete?	Go to **Step 21**	-
18	Correctly route or insulate the A/C component. Is the repair complete?	Go to **Step 21**	-
19	Replace the A/C compressor. Refer to **Air Conditioning Compressor Replacement LF1** or **Air Conditioning Compressor Replacement LAU** . Is the replacement complete?	Go to **Step 21**	-
20	The concern may be caused by an engine related component. Refer to **Vibration Analysis - Engine** . Did you find and correct the condition?	Go to **Step 21**	-
21	Operate the system in order to verify the repair. Did you find and correct the condition?	System OK	Go to **Step 2**

NOISE DIAGNOSIS - HVAC ODULE

Step	Action	Yes	No
DEFINITION: Noise originating from the HVAC module.			
1	Were you sent here from Symptoms or another diagnostic table?	Go to **Step 2**	Go to **Symptoms - HVAC Systems - Automatic**
2	1. Start the engine. 2. Cycle through all of the following: • Blower motor speeds • HVAC modes • Temperature control settings 3. Determine the type of noise: • Scrape, pop • Tick/click, chirp or groaning • Air rush/whistle Is a scrape or pop noise evident when selecting modes or temperature settings?	Go to **Step 6**	Go to **Step 3**
3	Is a tick/click, chirping, groaning or scraping noise present, but decreases as blower motor speed is decreased?	Go to **Step 6**	Go to **Step 4**

cardiagn.com

4	Is an air rush/whistle noise evident in all modes but not all temperature settings	Go to **Step 6**	Go to **Step 5**
5	Is an air rush/whistle noise evident only in defrost or floor mode	Go to **Step 6**	Go to **Step 6**
6	Remove the instrument panel (I/P) carrier. Refer to **Instrument Panel Tie Bar Replacement** . Is the action complete	Go to **Step 7**	-
7	• Inspect the air flow doors for proper operation. • Inspect the ducts for obstructions or foreign materials. ere any of these conditions found	Go to **Step 10**	Go to **Step 8**
8	Inspect the mode and temperature doors and seals for warping or cracking. Are the doors in normal condition	Go to **Step 11**	Go to **Step 9**
9	Replace the appropriate door and/or seals. Is the repair complete	Go to **Step 11**	-
10	Remove any obstructions or foreign material found. Is the action complete	Go to **Step 11**	-
11	Install the I/P carrier. Refer to **Instrument Panel Tie Bar Replacement** . Is the action complete	Go to **Step 12**	-
12	Operate the system to verify the repair. Did you find and correct the condition	System OK	Go to **Step 2**

ODOR DIAGNOSIS

Step	Action	Yes	No
DEFINITION: Odor originating or noticed through the VAC system.			
1	ere you sent here from Symptoms or another diagnostic table	Go to **Step 2**	Go to **Symptoms - HVAC Systems - Automatic**
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.		

cardiagn.com

	• Musty smell • Coolant smell • Oil smell Does the odor have a musty smell	Go to **Step 3**	Go to **Step 8**
3	Inspect the VAC filter and the air inlet grille for debris. Refer to **Passenger Compartment Air Filter Replacement**. Is debris present	Go to **Step 4**	Go to **Step 5**
4	Remove any debris. Is the action complete	Go to **Step 15**	-
5	Inspect for wet carpeting. Is the carpet wet	Go to **Step 6**	Go to **Step 14**
6	Inspect for the following conditions: • ater leaks around the windshield • lockage of the VAC module drain • Leaks around the door seals Is a leak present	Go to **Step 7**	Go to **Step 14**
7	Repair the leak as necessary. Is the repair complete	Go to **Step 15**	-
8	Does the odor have a coolant smell	Go to **Step 9**	Go to **Step 12**
9	Inspect the cooling system for leaks. Refer to **Loss of Coolant** . Is a leak present	Go to **Step 10**	Go to **Step 12**
10	Inspect for coolant leaking inside the vehicle or for a film build-up on the windshield. Is the condition present	Go to **Step 11**	Go to **Step 15**
11	Replace the heater core. Refer to **Heater Core Replacement**. Is the repair complete	Go to **Step 15**	-
12	Does the odor have an oily smell	Go to **Step 13**	Go to **Step 15**
13	1. Inspect the engine compartment for any leaks. Refer to the following procedures: • **Oil Leak Diagnosis** for the 3.0L LF1engine or for the 2.8L LAUL engine • **Power Steering Fluid Leaks** . 2. Repair any oil leaks. Is the repair complete	Go to **Step 15**	
	A musty odor can be caused by mold or mildew		

cardiagn.com

14	build-up on the evaporator or the heater core or inside of the VAC module. Refer to **Odor Correction**. Is the action complete	Go to **Step 15**	-
15	Operate the system in order to verify the repair. Did you find and correct the condition	System OK	Go to **Step 2**

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 VAC module.
- Microbial growth on the evaporator core

hen 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:

Deodori e the evaporator core using Deodori ing Aerosol Kit.

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

1. Ensure that the plenum that draws outside air into the VAC 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 maximum temperature setting.
    3. Select the recirculation mode.
    4. Run the blower motor on high for 10 minutes.
4. Locate an area in the air conditioning duct 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. ear safety goggles and latex gloves in order to perform the following actions:
    1. Select the maximum blower speed.

cardiagn.com

2. Insert the deodori er 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.
13. Using the scan tool enable the afterblow. Refer to **Afterblow Enabling** .

REFRIGERANT RECOVERY AND RECHARGING

Special Tools

- **GE-8800:** ACR 2000 Air Conditioning Service Center
- **GE-45037-A:** A/C Oil In ector

WARNING: To prevent personal injury, avoid breathing A/C Refrigerant and lubricant vapor or mist. Work in a well ventilated area. To remove refrigerant from the A/C System, use service equipment designed for recovery that is certified to meet the requirements of the appropriate SAE Standards. If an accidental system discharge occurs, ventilate the work area before continuing service. Additional health and safety information may be obtained from the refrigerant, refrigerant recovery, and lubricant manufacturers.

WARNING: For personal protection, goggles and lint-free gloves should be worn and a clean cloth wrapped around fittings, valves, and connections when doing work that includes opening the refrigerant system. If refrigerant 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.

CAUTION: You must replace the desiccant if the A/C refrigerant system has been open to atmosphere for more than four hours, or if the A/C refrigerant oil has been contaminated. Failure to replace the desiccant will result in damage to the A/C refrigerant system.

CAUTION: 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.

CAUTION: To avoid system damage use only R-134a dedicated tools when servicing

the A/C system.

CAUTION: 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.

CAUTION: 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 **GE-8800:** service center is a complete air conditioning service center for R-134a. The ACR 2000 recovers, recycles, evacuates and recharges A/C refrigerant uickly, 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 **GE-8800:** service center ACR 2000 manual for operation and setup instruction. Always recharge the A/C System with the proper amount of R-134a. Refer to **Refrigerant System Specifications**

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 in ected into a charged system using **GE-45037-A:** in ector. For the proper uantities of oil to add to the A/C refrigerant system, refer to **Refrigerant System Specifications**

FLUSHING

Special Tools

- **GE-8800:** ACR 2000 Air Conditioning Service Center
- **GE-45268:** Flush Adapter Kit
- **GE-41447:** Leak Detection Dye
- **GE-42220:** Universal 12V Leak Detection Lamp

For e uivalent regional tools. Refer to **Special Tools**

NOTE: Flushin with the E 00: ACR 2000 Air Conditionin Ser ice Center is not intended to remo e metal from the A C s stem.

Flushing is intended to remove the following:

Recovery Flushing Procedure

- Contaminated polyalkylene glycol (PAG) oil
- Desiccant, following a desiccant bag failure
- Overcharge of PAG oil
- Refrigerant contamination

NOTE: armer en ine or ambient temperature decreases the refri erant reco er time durin the A C flush procedure.

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**
2. Remove the thermal expansion valve (TXV). Refer to **Air Conditioning Evaporator Thermal E pansion Valve Replacement**
3. Install the stud for the **GE 5 6 :** Flush Adapter Kit kit onto the GE 45268-115.
4. Install the GE 45268-115 in place of the TXV.

CAUTION: Refer to Fastener Caution

5. Install the TXV mounting bolts.

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

6. Connect the evaporator line to the GE 45268-115.
7. Install the TXV block fitting nut.

   Tighten: Tighten the bolts to 17 N.m (12.5 lb ft).

8. Remove the A/C compressor. Refer to **Air Conditioning Compressor Replacement (LF1)** or **Air Conditioning Compressor Replacement (LAU)**
9. Install GE 45268-10 to the A/C compressor hose assembly.
10. Install the nut and bolt from the **GE 5 6 :** Flush Adapter Kit kit to the GE 45268-10 and compressor hose assembly.

    Tighten: Tighten the bolts to 17 N.m (12.5 lb ft).

11. Forward flow refrigerant flushing is recommended for contaminated refrigerant or PAG oil.

    Perform the following procedure:

cardiagn.com

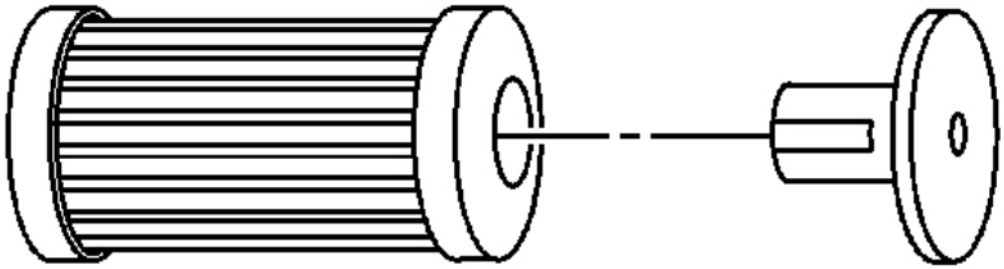


Fig. : View Of A/C Filter Check Valve
Courtesy of GENERAL MOTORS CORP.

NOTE: The filter inside E 2 1 is ser iceable. Remo e and discard the chec al e from the filter.

1. Service the filter with ACDelco P/N GF 470, before each flush.
2. Install the port plugs GE 45268-9 onto the GE 45268-10.
3. Install the fitting GE 45268-7 onto the GE 45268-10.
4. Install the fitting GE 45268-8 onto the GE 45268-10.
5. Connect GE 45268-1 flush filter to the suction port of GE 45268-7 flush adapter.
6. Connect the blue hose from the **GE** : ACR 2000 Air Conditioning Service Center to the GE 45268-1 flush filter adapter.
7. Connect the red hose from the **GE** : ACR 2000 Air Conditioning Service Center to the GE 45268-8 flush adapter.

12. Reverse flow refrigerant flush is recommended for desiccant bag failure. Replace the A/C condenser when the A/C flush is complete and perform the following procedure:

NOTE: The filter inside E 2 1 is ser iceable. Remo e and discard the chec al e from the filter.

1. Service the filter with ACDelco P/N GF 470, before each flush.
2. Install the port plugs GE 45268-9 onto the J 45268-10.
3. Install the fitting GE 45268-7 onto the J 45268-10.
4. Install the fitting GE 45268-8 onto the J 45268-10.
5. Connect GE 45268-1 flush filter to the discharge port of GE 45268-7 flush adapter.
6. Connect the blue hose from **GE** : ACR 2000 Air Conditioning Service Center to the GE 45268-1 flush filter adapter.
7. Connect the red hose from **GE** : ACR 2000 Air Conditioning Service Center to the GE 45268-

8 flush adapter.

NOTE: Close the al e on the e ternal refri erant tan before startin the flush process.

13. Flush the A/C system. Follow the instructions supplied with the **GE : ACR 2000 Air Conditioning** Service Center.
14. Disconnect the red hose on the **GE : ACR 2000 Air Conditioning Service Center from the GE** 45268-10.
15. Disconnect the blue hose on the **GE : ACR 2000 Air Conditioning Service Center from the GE** 45268-1.
16. Remove GE 45268-1 from the GE 45268-10.
17. Remove the GE 45268-10 from the A/C compressor hose assembly.

NOTE: The A C s stem must be replenished with the correct amount of A oil. Flushin will remo e all the A oil from the A C s stem.

18. If you will reinstall the removed A/C compressor, perform the following procedure:
    1. Remove the A/C compressor drain plug.
    2. Drain the PAG oil from the A/C compressor. Rotate the compressor input shaft to assist in draining the PAG oil from the compressor.
    3. Install the A/C compressor drain plug.

       Tighten: Tighten the drain plug to 16 N.m (12 lb ft).

    4. Add the total system capacity of PAG oil to the A/C compressor. Refer to **Refrigerant System Specifications**
19. If you will replace the A/C compressor after flushing the system, perform the following procedure:
    1. Determine if the new service compressor is shipped with PAG oil. Refer to the **Refrigerant System Specifications**
    2. If the service compressor is shipped with PAG oil, DO NOT drain the new PAG oil from the compressor.
    3. Deduct the amount of PAG oil shipped with the service compressor from the amount of PAG oil listed in the capacities table. Refer to **Refrigerant System Specifications**
    4. Add the calculated amount to the compressor, as needed.

NOTE: Flushin will remo e the fluorescent lea detection d e from the A C s stem.

20. Add one bottle of **GE 1 7:** Leak Detection Dye directly to the A/C Compressor.
21. Install the A/C compressor. Refer to **Air Conditioning Compressor Replacement (LF1)** or **Air Conditioning Compressor Replacement (LAU)**
22. Remove GE 45268-115.

cardiagn.com

23. Inspect the TXV for debris. Clean or replace as needed.
24. Install the TXV. Refer to **Air Conditioning Evaporator Thermal E pansion Valve Replacement**
25. Evacuate and recharge the A/C system. Refer to **Refrigerant Recovery and Recharging**
26. Leak test the fittings using **GE : Universal 12V Leak Detection Lamp.

AIR CONDITIONING COMPRESSOR OIL BALANCING

Draining Procedure

NOTE: rain and measure as much of the refri erant oil as possible from the rear head ports of the RE O E compressor.

1. Drain the refrigerant oil from the crankcase and rear head ports into a clean, graduated container.

cardiagn.com



Fig. : Draining A/C Refrigerant Oil From Compressor
Courtesy of GENERAL MOTORS CORP.

2. Rotate the compressor shaft to assist in draining the compressor.
3. Measure and record the amount of oil drained from the removed compressor.

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

cardiagn.com

4. Inspect oil drained from removed compressor. Refer to **Air Conditioning Compressor Oil Diagnosis**.
5. Properly discard the used refrigerant oil.
6. Clean the graduated cylinder.

NOTE: rain and measure as much of the refrigerant oil as possible from the rear head ports of the NEW compressor.

7. Drain bolt and drain the refrigerant oil from the crankcase and rear head ports into a clean, graduated container.
8. Rotate the compressor shaft to assist in draining the compressor.

Balancing Procedure

cardiagn.com



Fig. 5: Draining A/C Refrigerant Oil From Compressor
Courtesy of GENERAL MOTORS CORP.

NOTE: **The refrigerant oil in the A/C system must be balanced during compressor replacement.**
The replacement compressor is shipped with the total system capacity of refrigerant oil.

cardiagn.com

1. Refer to the amount of refrigerant oil recorded during the compressor removal.
2. If the amount of oil recorded from the removed compressor is less than or equal to 75 ml (2.5 fl. oz.), add 75 ml of the new PAG oil back into the new compressor through the compressor suction port.
3. If the amount of oil recorded from the removed compressor is greater than 75 ml (2.5 fl. oz.), add the equivalent amount of the new PAG oil back into the new compressor through the compressor suction port.
4. Rotate the clutch driver three times to lubricate the internal compressor components.

NOTE: If additional A/C components are replaced during compressor replacement, add the PAG oil directly to the A/C compressor to compensate the A/C system.

5. If necessary, refer to **Refrigerant System Specifications**.

AIR CONDITIONING COMPRESSOR REPLACEMENT (LF1)

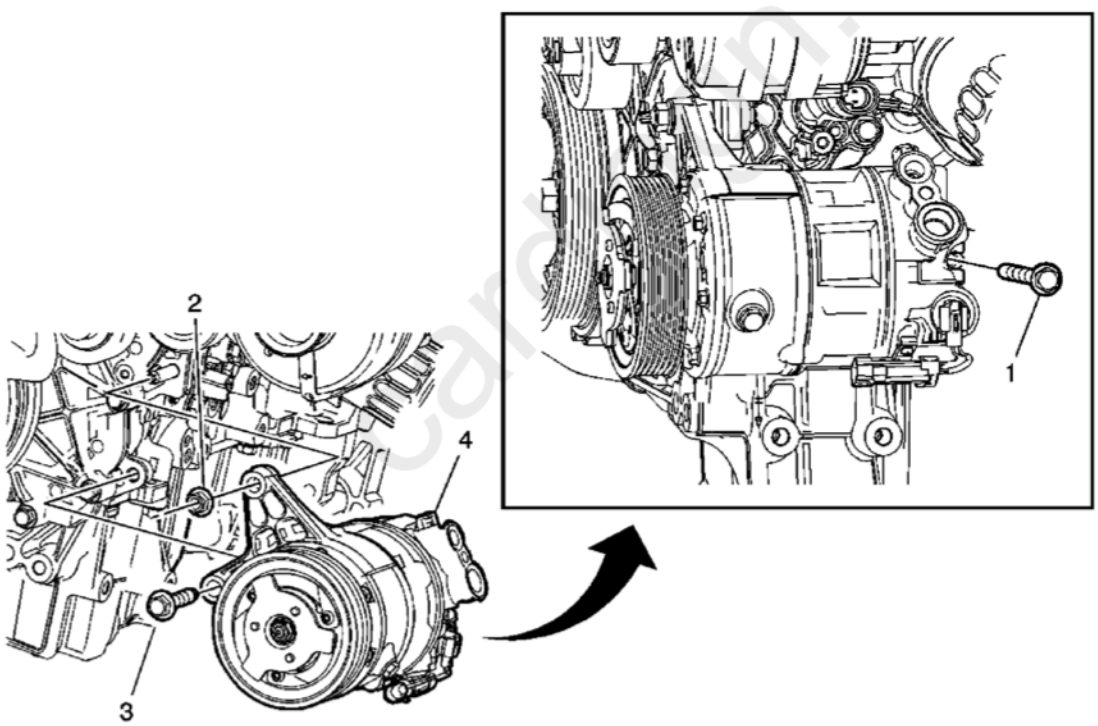


Fig. 6: View Of Air Conditioning Compressor (LF1)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**.	

2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle**
3. Remove front wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement** .
4. Remove the drive belt from the compressor. Refer to **Drive Belt Replacement** .
5. Disconnect the A/C compressor electrical connector.
6. Remove the air conditioning condenser and evaporator hose from the compressor. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)**

1	A/C Compressor Bolt **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 58 N.m (43 lb ft)
2	A/C Compressor Nut **Tighten:** 22 N.m (12 lb ft)
3	A/C Compressor Bolt **Tighten:** 58 N.m (43 lb ft)
4	A/C Compressor **Procedure** 1. Remove and discard sealing washers. Refer to **Air Conditioning System Seal Replacement**. 2. hen replacing the A/C compressor, balance the compressor oil. Refer to **Air Conditioning Compressor Oil Balancing**.

AIR CONDITIONING COMPRESSOR REPLACEMENT (LAU)

cardiagn.com

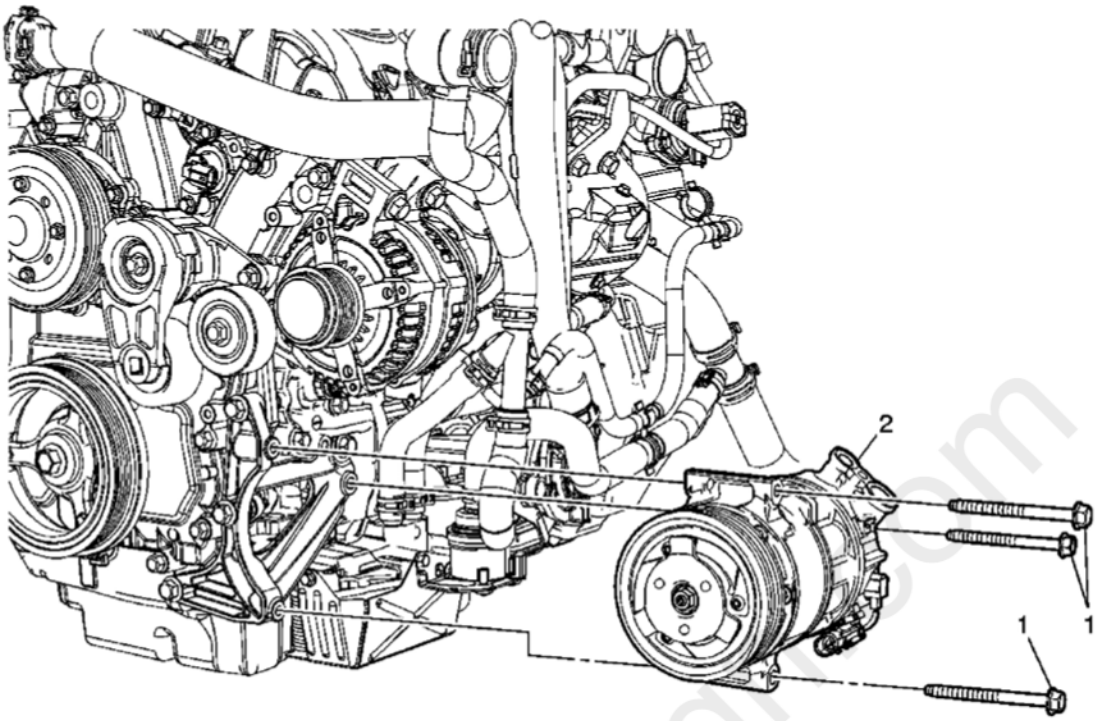


Fig. 7: Identifying Air Conditioning Compressor (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**. 2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** 3. Remove front wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement** . 4. Remove the drive belt. Refer to **Drive Belt Replacement** . 5. Disconnect the A/C compressor electrical connector. 6. Remove the air conditioning condenser and evaporator hose. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LAU)**	
1	A/C Compressor Bolt **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 22 N.m (22 lb ft)
	A/C Compressor **Procedure**

2	1. Remove and discard sealing washers. Refer to **Air Conditioning System Seal Replacement**. 2. hen replacing the A/C compressor, balance the compressor oil. Refer to **Air Conditioning Compressor Oil Balancing**.

COMPRESSOR PRESSURE RELIEF VALVE REPLACEMENT LF1

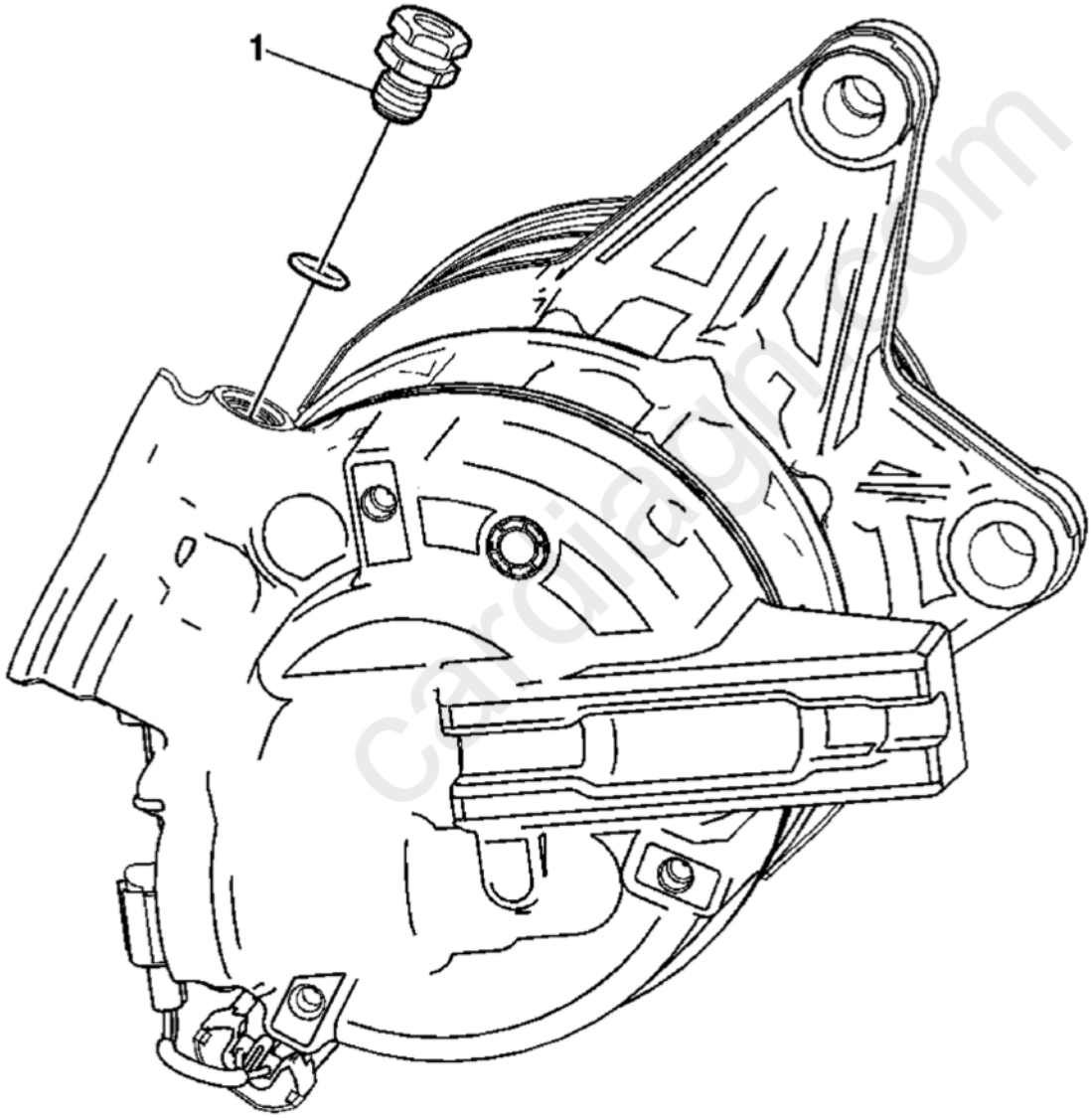


Fig. : Vie Of Compressor Pressure Relief Valve LF1
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	

1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**.
2. Remove the air conditioning compressor. Refer to **Air Conditioning Compressor Replacement LF1** or **Air Conditioning Compressor Replacement LAU**.

1	Compressor ressure Relief Valve **CAUTION:** **Refer to Fastener Caution .** **Procedure:** Remove and discard sealing washers. Refer to **Air Conditioning System Seal Replacement**. **Tighten:** N.m (7 lb in)

COMPRESSOR PRESSURE RELIEF VALVE REPLACEMENT LAU

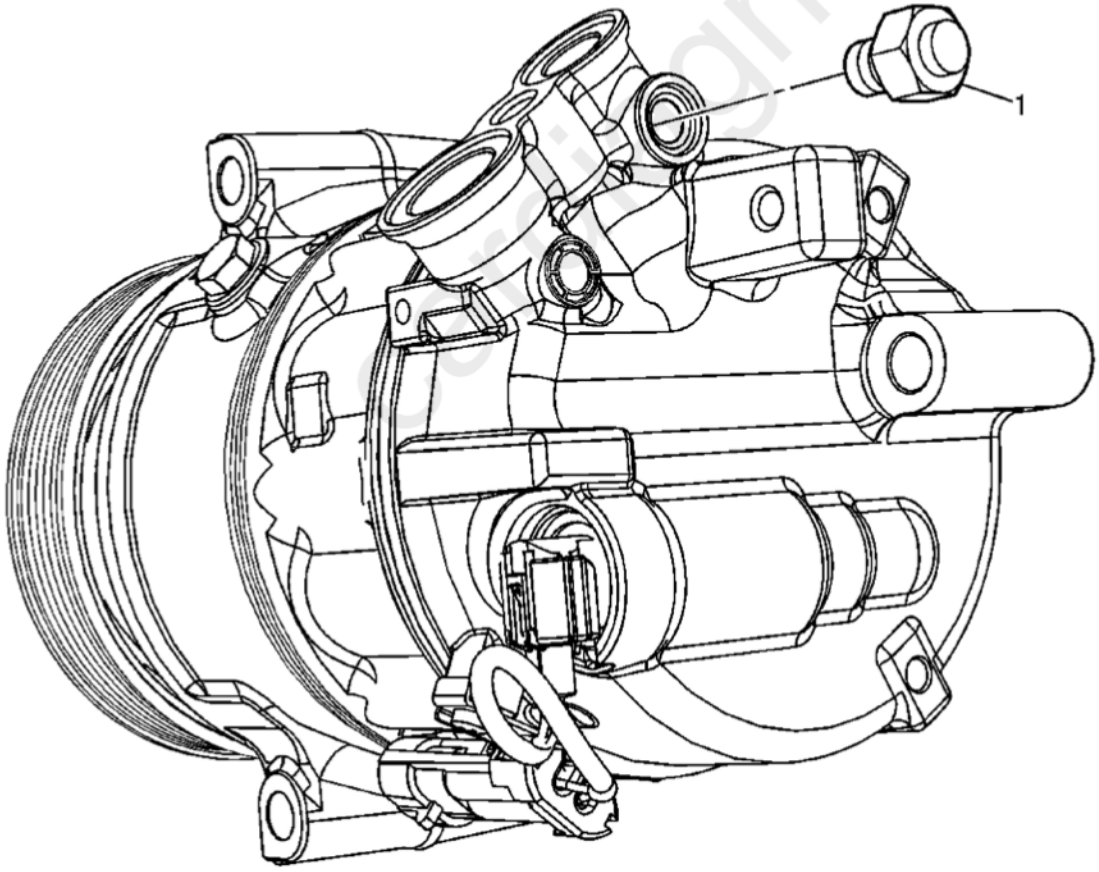


Fig. : Vie Of Compressor Pressure Relief Valve LAU
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**. 2. Remove the air conditioning compressor. Refer to **Air Conditioning Compressor Replacement LAU** .	
1	Compressor ressure Relief Valve **CAUTION:** **Refer to Fastener Caution .** **Procedure:** Remove and discard sealing washers. Refer to **Air Conditioning System Seal Replacement**. **Tighten:** N.m (7 lb in)

AIR CONDITIONING COMPRESSOR BRAC ET REPLACEMENT LAU

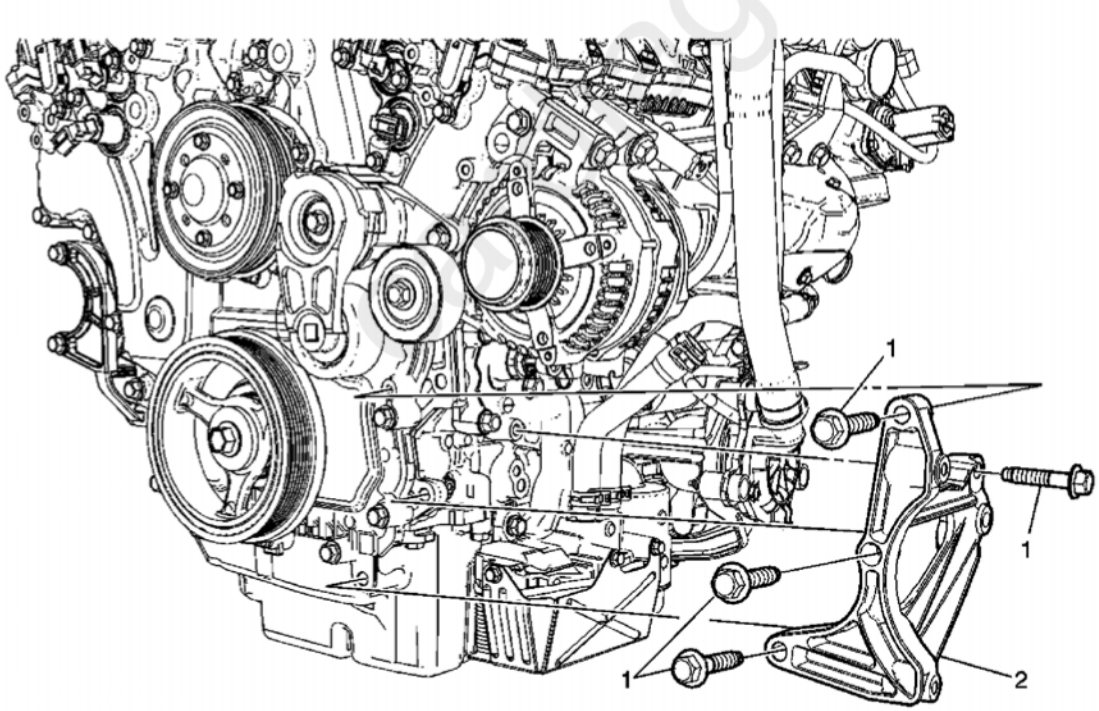


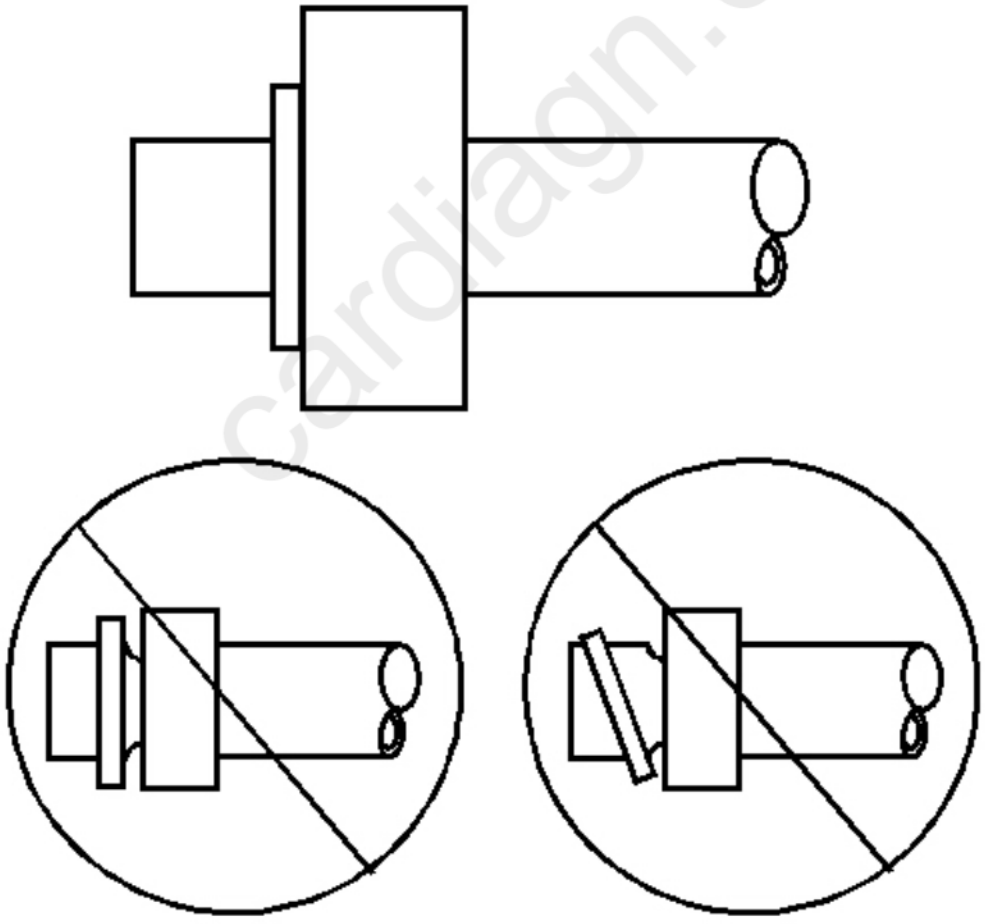
Fig. 1 : Vie Of Air Conditioning Compressor Brac et LAU
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures:	

Remove the compressor. Refer to **Air Conditioning Compressor Replacement LAU**	
1	A/C Compressor Bracket Bolts (Qty 3). **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 5 N.m (43 lb ft)
2	A/C Comperssor Bracket

AIR CONDITIONING S STEM SEAL REPLACEMENT

Removal Procedure



cardiagn.com

Fig. 11: Identifying Good & Bad Sealing Washer Positions
Courtesy of GENERAL MOTORS CORP.

1. Remove the seal washer from the A/C refrigerant component.
2. Inspect the seal washer for any signs of damage.
3. Inspect the A/C refrigerant components for damage or burrs. Repair or replace as necessary.

NOTE: O NOT reuse sealing washer.

4. Discard the sealing washer.

Installation Procedure

NOTE: 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.

cardiagn.com

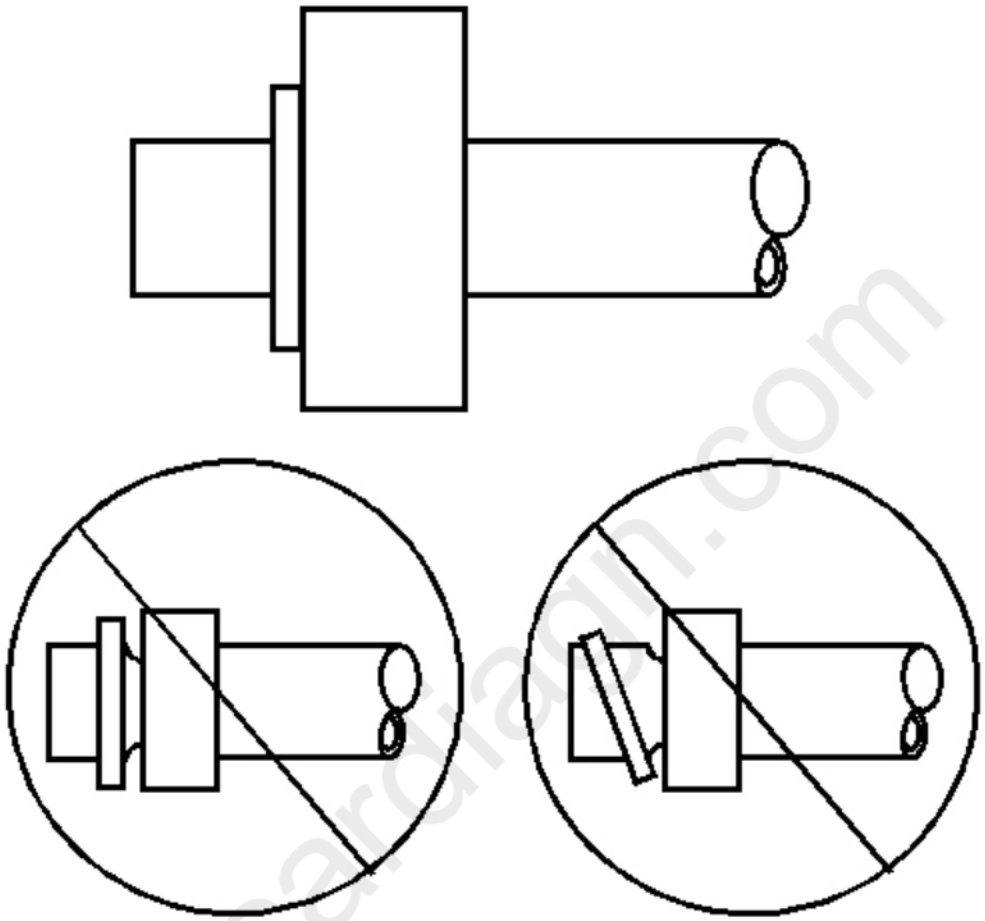


Fig. 12: Identifying Good & Bad Sealing Washer Positions
Courtesy of GENERAL MOTORS CORP.

2. Using a lint-free clean, dry cloth, clean the sealing surfaces of the A/C refrigerant components.
3. Carefully install the new seal washer onto the A/C refrigerant component.
4. The washer must completely bottom against the surface of the fitting.

NOTE: **After tightening the A/C components, there should be a slight sealing washer gap of approximately 1.2 mm (3/ 4 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.

AIR CONDITIONING O-RING SEAL REPLACEMENT

Removal Procedure

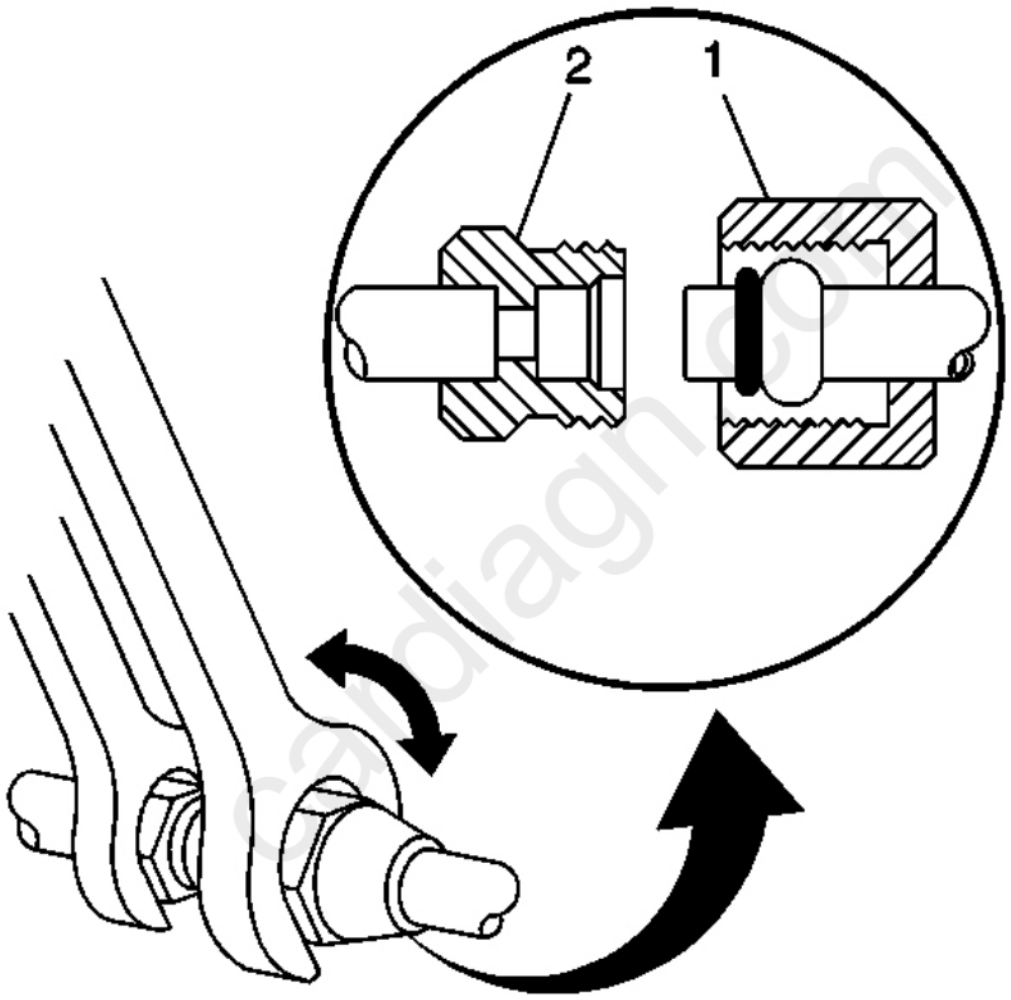


Fig. 13: Disassembling/Reassembling A/C Line Fittings
Courtesy of GENERAL MOTORS CORP.

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 ban o style fittings remove the bolt retaining the ban o 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.

NOTE: 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.

NOTE: O 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.

NOTE: O NOT reuse O-ring seals.

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

cardiagn.com

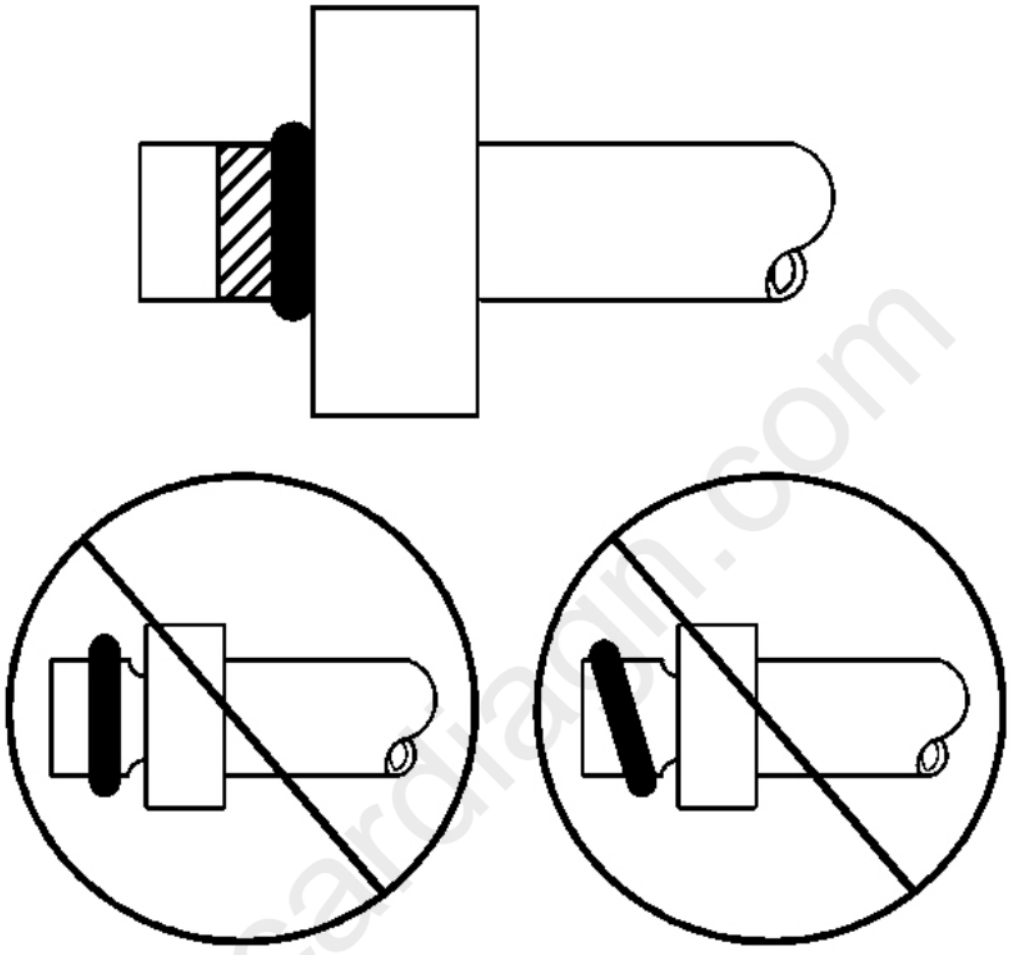


Fig. 14: Identifying Proper Seating Of A/C Refrigerant O-Ring
Courtesy of GENERAL MOTORS CORP.

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

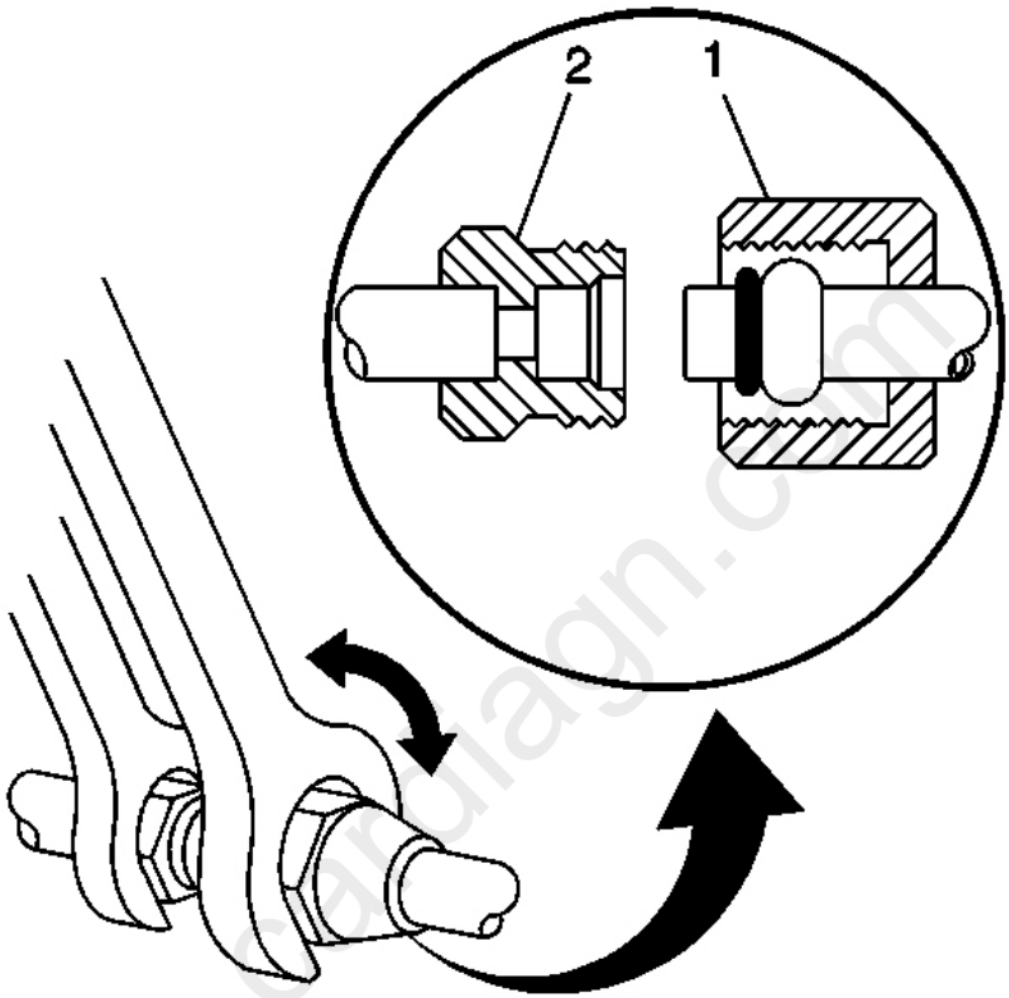


Fig. 15: Disassembling/Reassembling A/C Line Fittings
Courtesy of GENERAL MOTORS CORP.

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 ban o style fittings install the bolt retaining the ban o type fitting and tighten to specification.

AIR CONDITIONING CONDENSER AND AIR CONDITIONING EVAPORATOR TUBE

REPLACEMENT

Removal Procedure

1. Recover the refrigerant from the A/C system. Refer to **Refrigerant Recovery and Recharging**
2. Remove the intake manifold cover. refer to **Intake Manifold Cover Replacement**
3. Remove the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement (LF1)** or **Air Cleaner Assembly Replacement (LAU)**
4. Remove the radiator air lower deflector. Refer to **Radiator Air Lower Deflector Replacement**

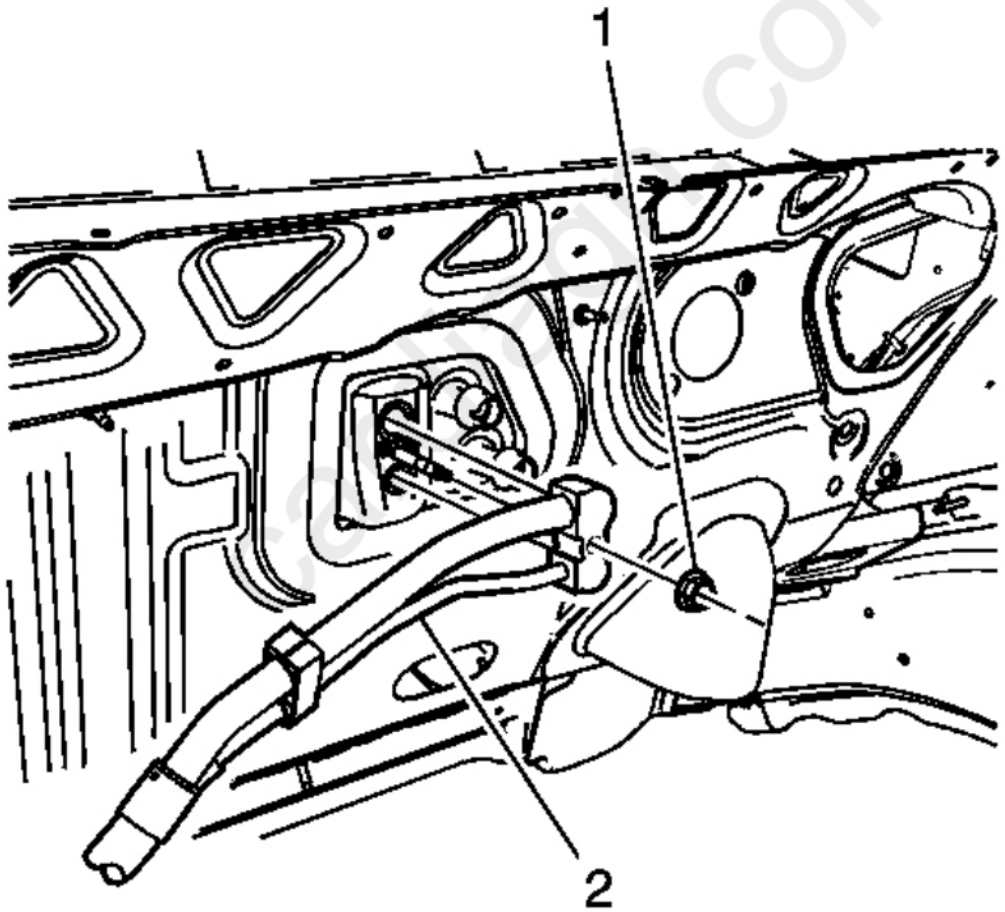


Fig. 1 : Locating Condenser & Air Conditioning Evaporator Tubes
Courtesy of GENERAL MOTORS CORP.

5. Remove the air conditioning condenser and air conditioning evaporator tube nut (1) at thermal expansion

valve.

6. Remove the air conditioning condenser and air conditioning evaporator tube (2) from thermal expansion valve.

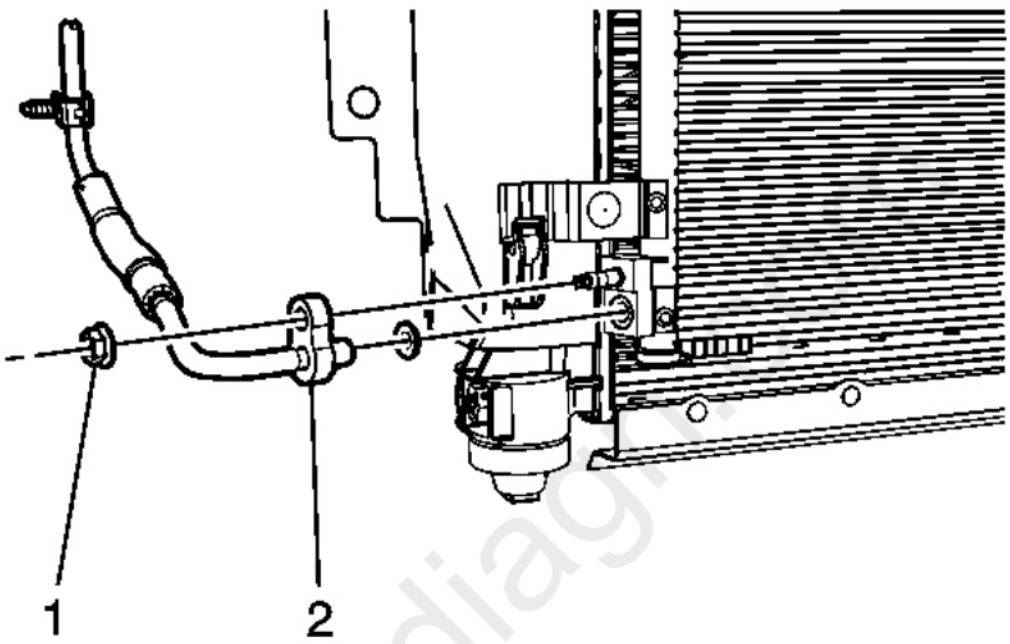


Fig. 1 : View Of Air Conditioning Condenser & Air Conditioning Evaporator Tube Nut
Courtesy of GENERAL MOTORS CORP.

7. Remove the air conditioning condenser and air conditioning evaporator tube nut (1) at condenser.
8. Remove the air conditioning condenser and air conditioning evaporator tube (2) from condenser.

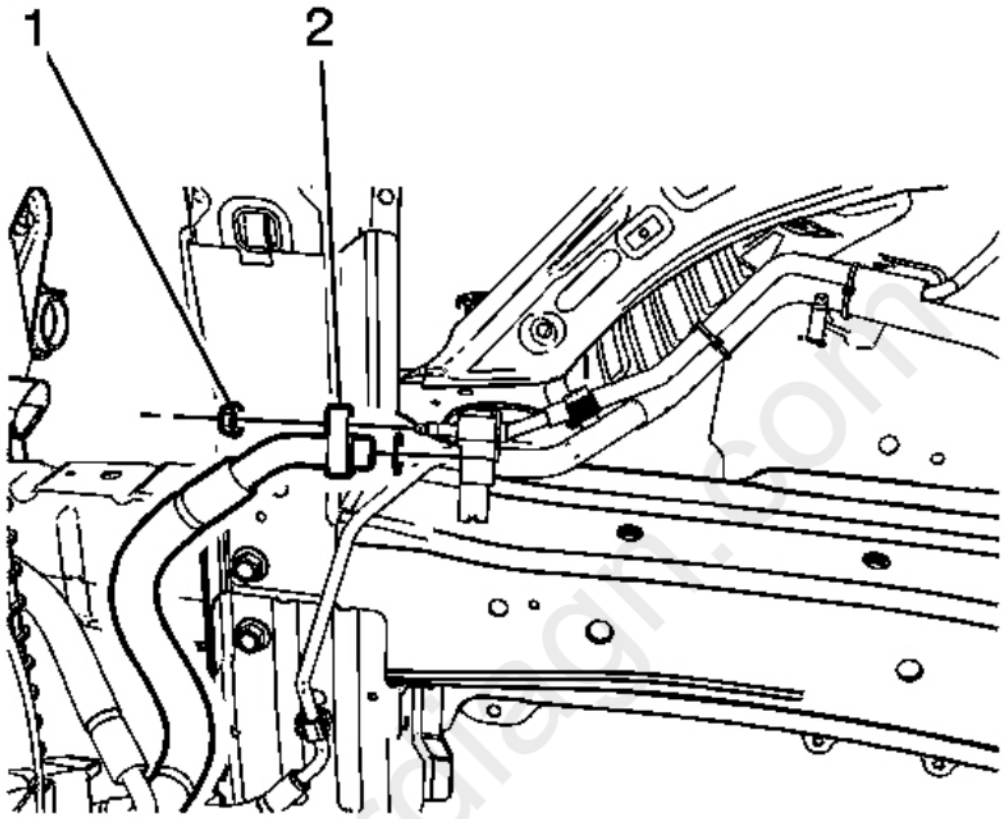


Fig. 1 : Identifying Condenser & Evaporator Hose Nut
Courtesy of GENERAL MOTORS CORP.

9. Remove the air conditioning condenser and evaporator hose nut (1) at air conditioning condenser and air conditioning evaporator tube.
10. Remove the air conditioning condenser and evaporator hose (2) from air conditioning condenser and air conditioning evaporator tube

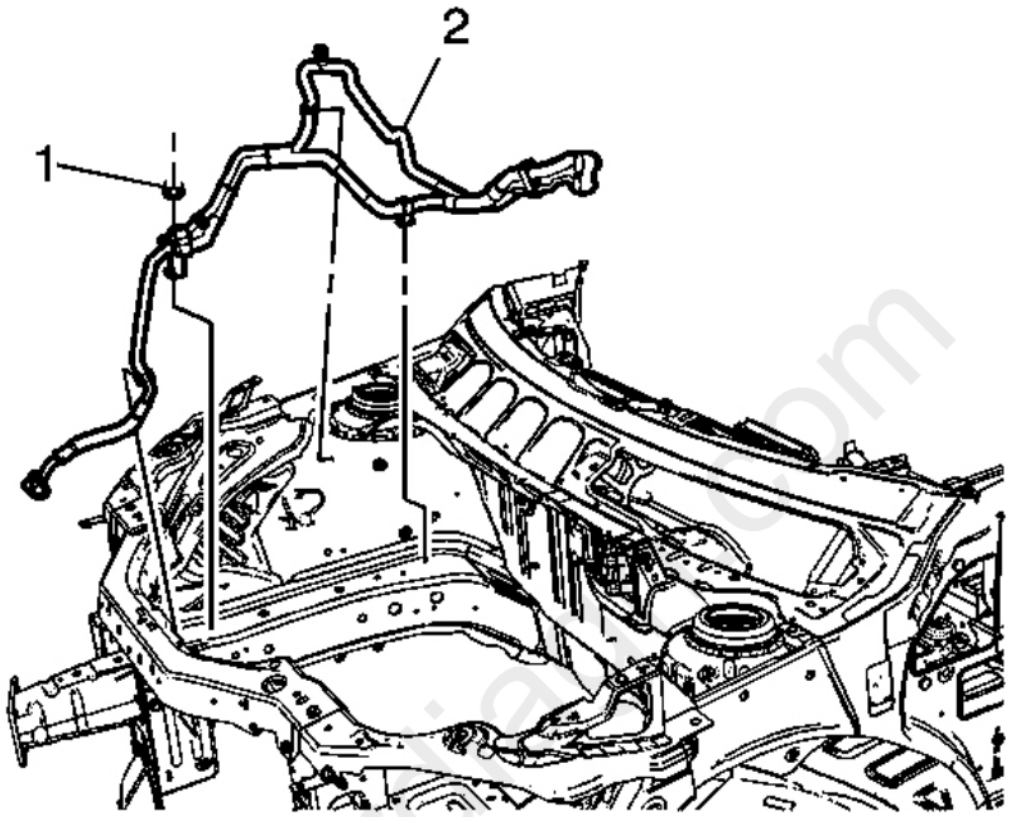


Fig. 1 : View Of A C Condenser & Air Conditioning Evaporator Tubes
Courtesy of GENERAL MOTORS CORP.

11. Remove the air conditioning condenser and air conditioning evaporator tube nut (1) at the frame rail.
12. Disengage tube retainers from body.
13. Remove the air conditioning condenser and air conditioning evaporator tube (2) from vehicle.

Installation Procedure

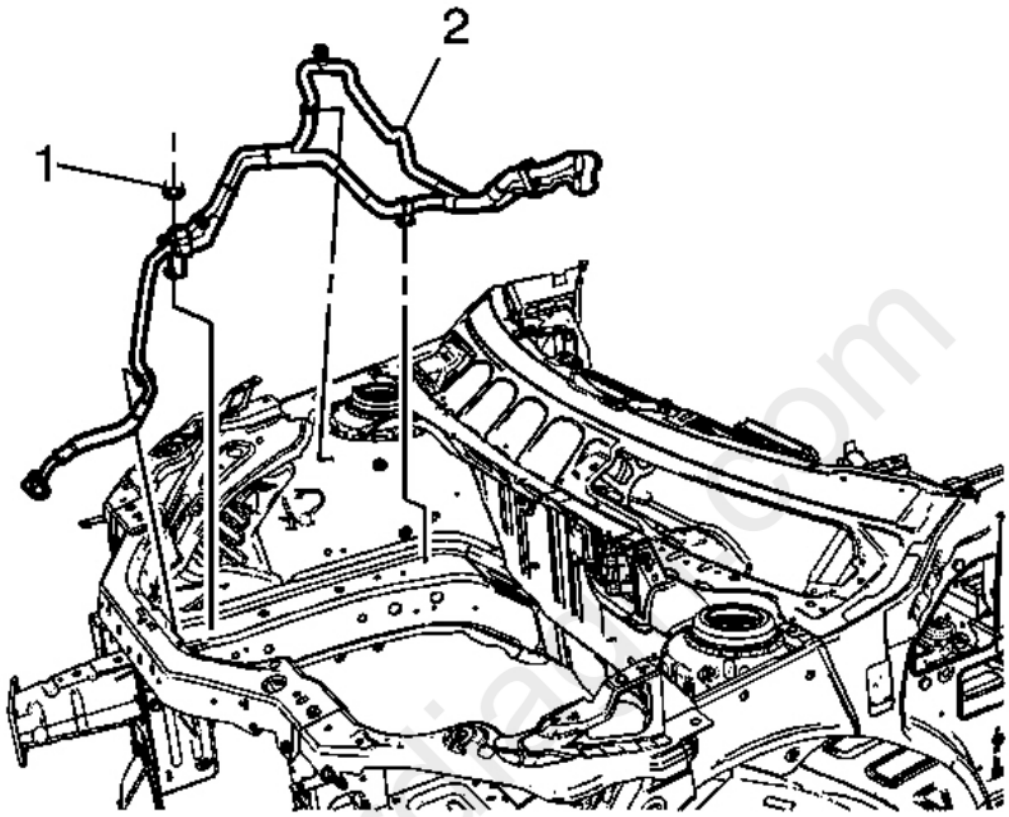


Fig. 2 : View Of A C Condenser & Air Conditioning Evaporator Tubes
Courtesy of GENERAL MOTORS CORP.

1. Install the air conditioning condenser and air conditioning evaporator tube (2) to the vehicle.
2. Engage tube retainers from body.

CAUTION: Refer to Fastener Caution .

3. Install the air conditioning condenser and air conditioning evaporator tube nut (1) at the frame rail and tighten to 15 N.m (11 lb in).

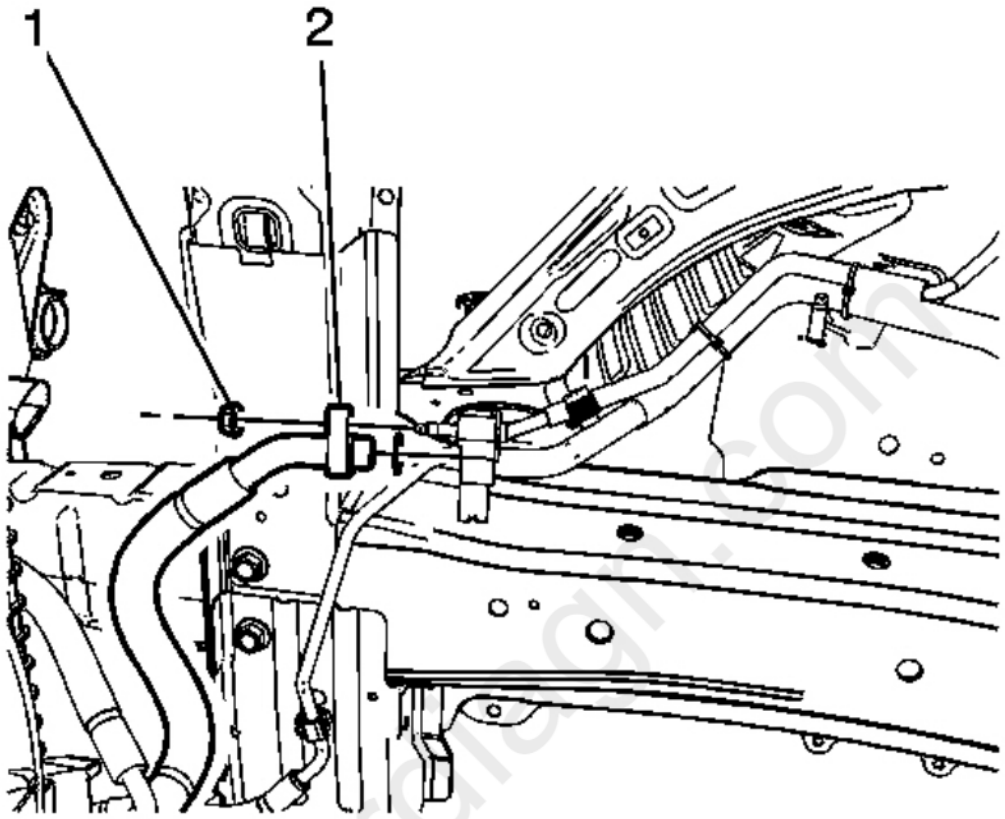


Fig. 21: Identifying Condenser & Evaporator Hose Nut
Courtesy of GENERAL MOTORS CORP.

4. Install the air conditioning condenser and evaporator hose (2) from air conditioning condenser and air conditioning evaporator tube
5. Install the air conditioning condenser and evaporator hose nut (1) at air conditioning condenser and air conditioning evaporator tube and tighten to 15 N.m (11 lb in).

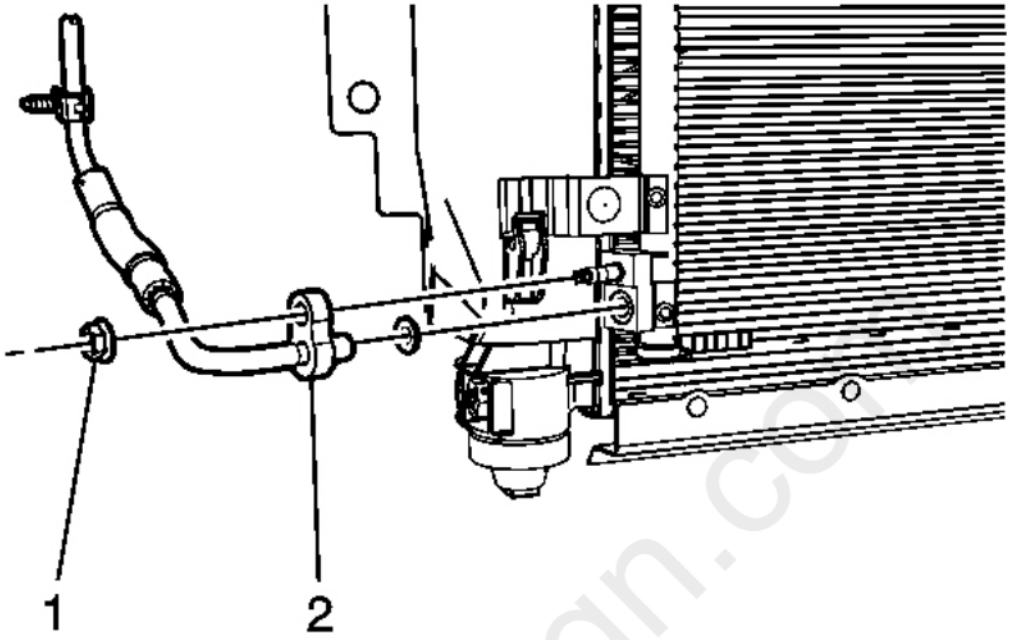


Fig. 22: View Of Air Conditioning Condenser & Air Conditioning Evaporator Tube Nut
Courtesy of GENERAL MOTORS CORP.

6. Install the air conditioning condenser and air conditioning evaporator tube (2) from condenser.
7. Install the air conditioning condenser and air conditioning evaporator tube nut (1) at condenser and tighten to 15 N.m (11 lb in).

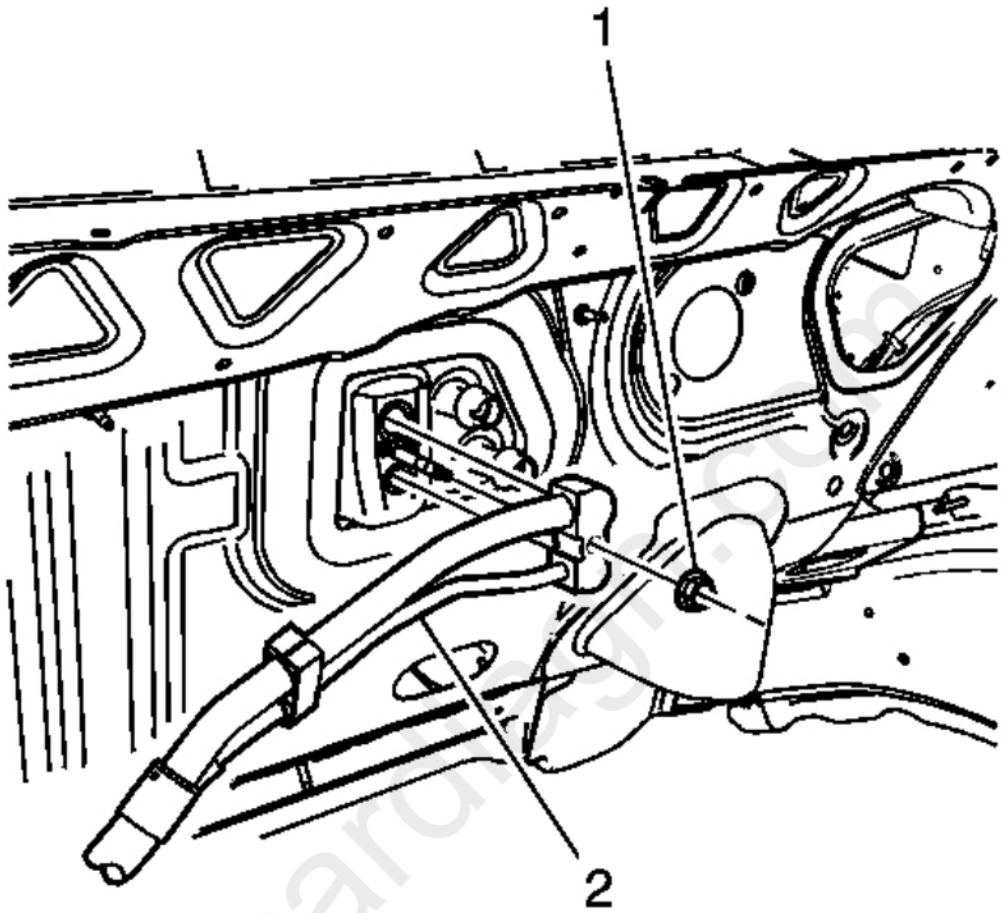


Fig. 23: Locating Condenser & Air Conditioning Evaporator Tubes
Courtesy of GENERAL MOTORS CORP.

8. Install the air conditioning condenser and air conditioning evaporator tube (2) from thermal expansion valve.
9. Install the air conditioning condenser and air conditioning evaporator tube nut (1) at thermal expansion valve and tighten to 15 N.m (11 lb in).
10. Install the radiator air lower deflector. Refer to **Radiator Air Lower Deflector Replacement**
11. Install the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement (LF1)** or **Air Cleaner Assembly Replacement (LAU)**
12. Install the intake manifold cover. refer to **Intake Manifold Cover Replacement**
13. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging**

AIR CONDITIONING CONDENSER AND EVAPORATOR HOSE REPLACEMENT (LF1)

Removal Procedure

1. Recover the refrigerant from the A/C system. Refer to **Refrigerant Recovery and Recharging**
2. Raise and support the vehicle. Refer to **Air Cleaner Assembly Replacement (LF1)**
3. Remove the front bumper fascia. Refer to **Front Bumper Fascia Replacement**
4. Disconnect the air conditioning pressure sensor electrical connector.

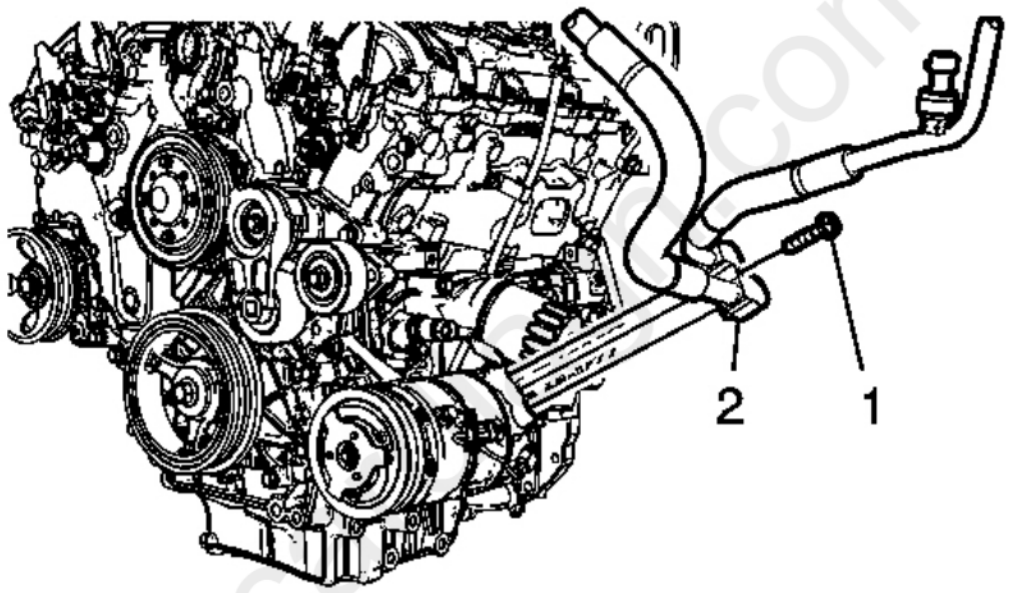


Fig. 24: Identifying Condenser & Evaporator Hose Bolt At Compressor
Courtesy of GENERAL MOTORS CORP.

5. Remove the air conditioning condenser and evaporator hose bolt (1) at the compressor.
6. Remove the air conditioning condenser and evaporator hose (2) from the compressor.

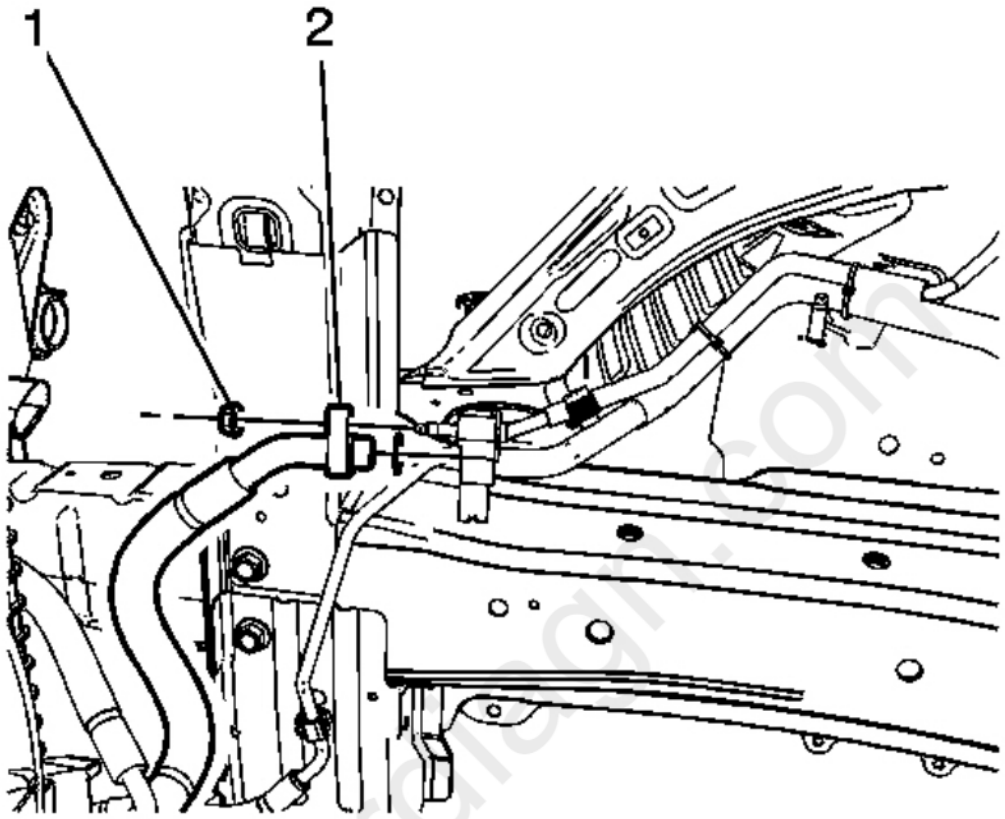


Fig. 25: Identifying Condenser & Evaporator Hose Nut
Courtesy of GENERAL MOTORS CORP.

7. Remove the air conditioning condenser and evaporator hose nut (1) at the air conditioning condenser and air conditioning evaporator tube.
8. Remove the air conditioning condenser and evaporator hose (2) from air conditioning condenser and air conditioning evaporator tube.

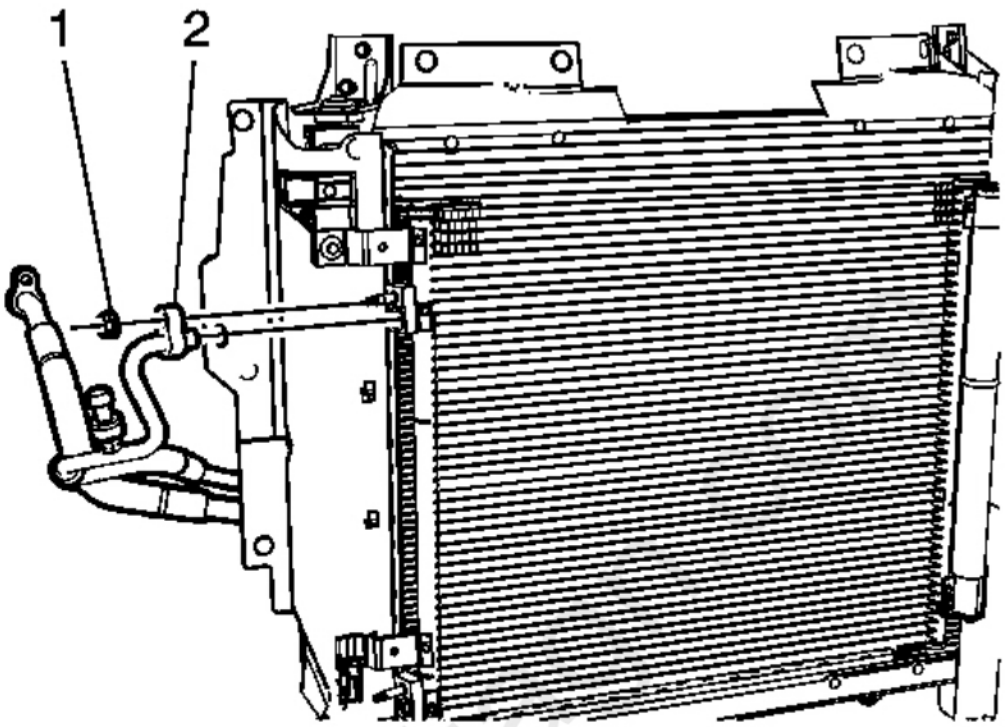


Fig. 26: View Of A/Condenser Hoses
Courtesy of GENERAL MOTORS CORP.

9. Remove the air conditioning condenser and evaporator hose nut (1) at the condenser.
10. Remove the air conditioning condenser and evaporator hose (2) from the condenser.
11. Remove the air conditioning condenser and evaporator hose (2) from vehicle.
12. Remove and discard all sealing washers.
13. Transfer the air conditioning pressure sensor if necessary.

Installation Procedure

1. Install new sealing washers. Refer to **Air Conditioning System Seal Replacement**

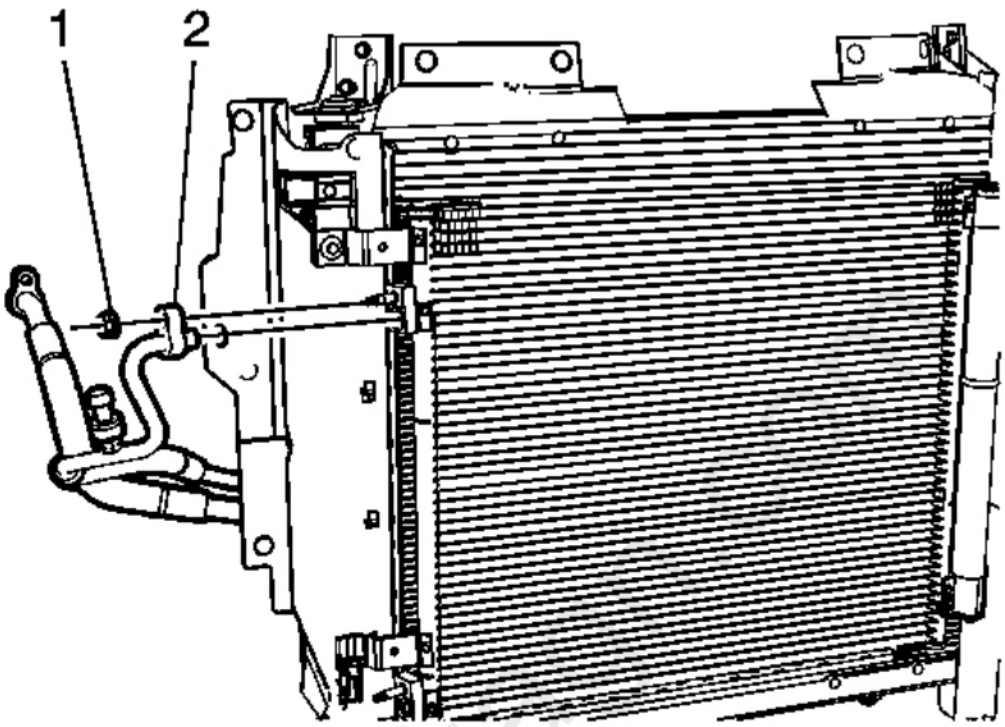


Fig. 27: View Of A/Condenser Hoses
Courtesy of GENERAL MOTORS CORP.

2. Install the air conditioning condenser and evaporator hose (2) to the condenser.

CAUTION: Refer to Fastener Caution .

3. Install the air conditioning condenser and evaporator hose nut (1) at the condenser and tighten to 15 N.m (11 lb in).

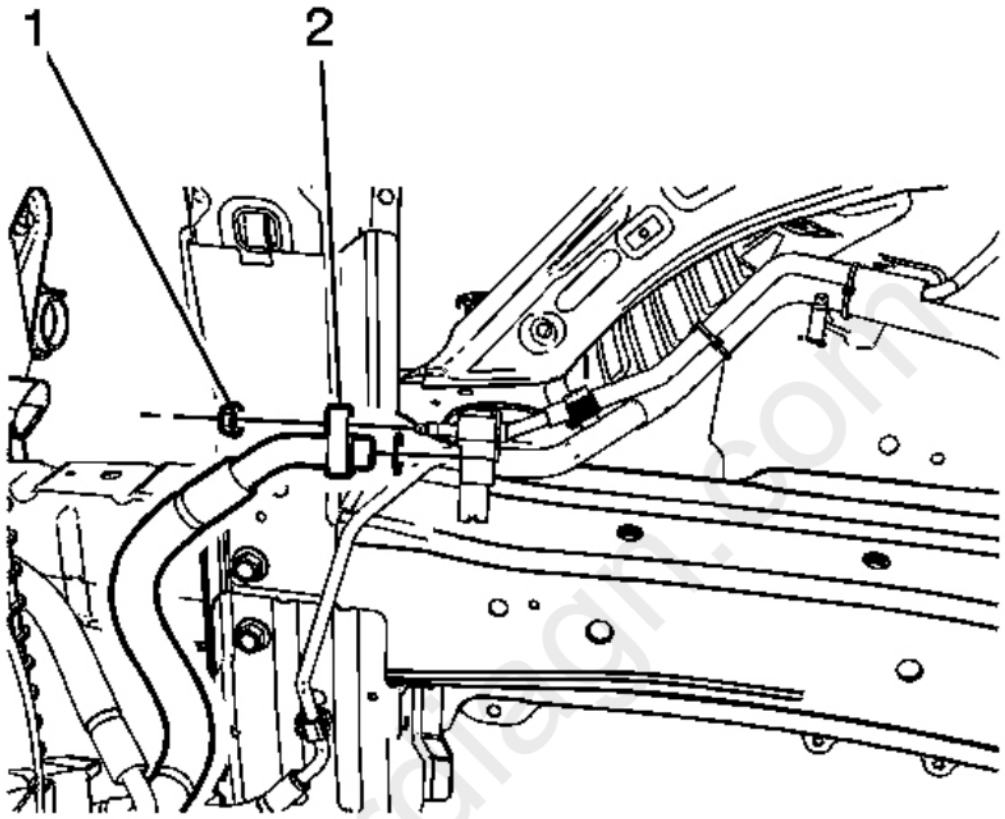


Fig. 28: Identifying Condenser & Evaporator Hose Nut
Courtesy of GENERAL MOTORS CORP.

4. Install the air conditioning condenser and evaporator hose (2) to the air conditioning condenser and air conditioning evaporator tube.
5. Install the air conditioning condenser and evaporator hose nut (1) to air conditioning condenser and air conditioning evaporator tube and tighten to 15 N.m (11 lb in).

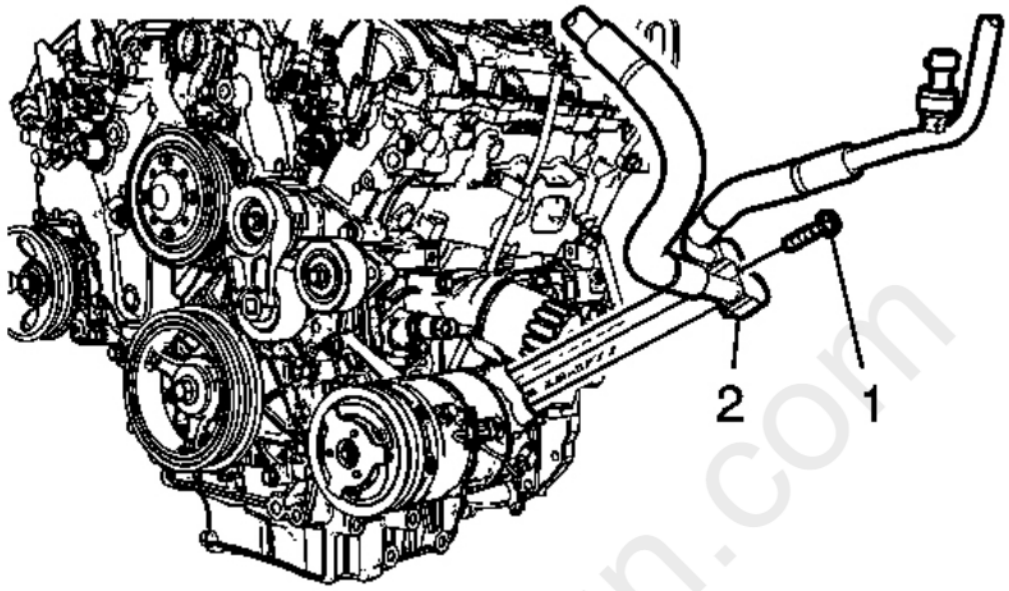


Fig. 2 : Identifying Condenser & Evaporator Hose Bolt At Compressor
Courtesy of GENERAL MOTORS CORP.

6. Install the air conditioning condenser and evaporator hose (2) to the compressor.
7. Install the air conditioning condenser and evaporator hose bolt (1) at compressor and tighten to 15 N.m (11 lb in).
8. Connect the air conditioning pressure sensor electrical connector.
9. Install the front bumper fascia. Refer to **Front Bumper Fascia Replacement**
10. Lower the vehicle.
11. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging**

AIR CONDITIONING CONDENSER AND EVAPORATOR HOSE REPLACEMENT LA

Removal Procedure

1. Recover the refrigerant from the A/C system. Refer to **Refrigerant Recovery and Recharging**
2. Raise and support the vehicle. Refer to **Air Cleaner Assem ly Replacement LA**
3. Remove the front bumper fascia. Refer to **Front Bumper Fascia Replacement**

cardiagn.com

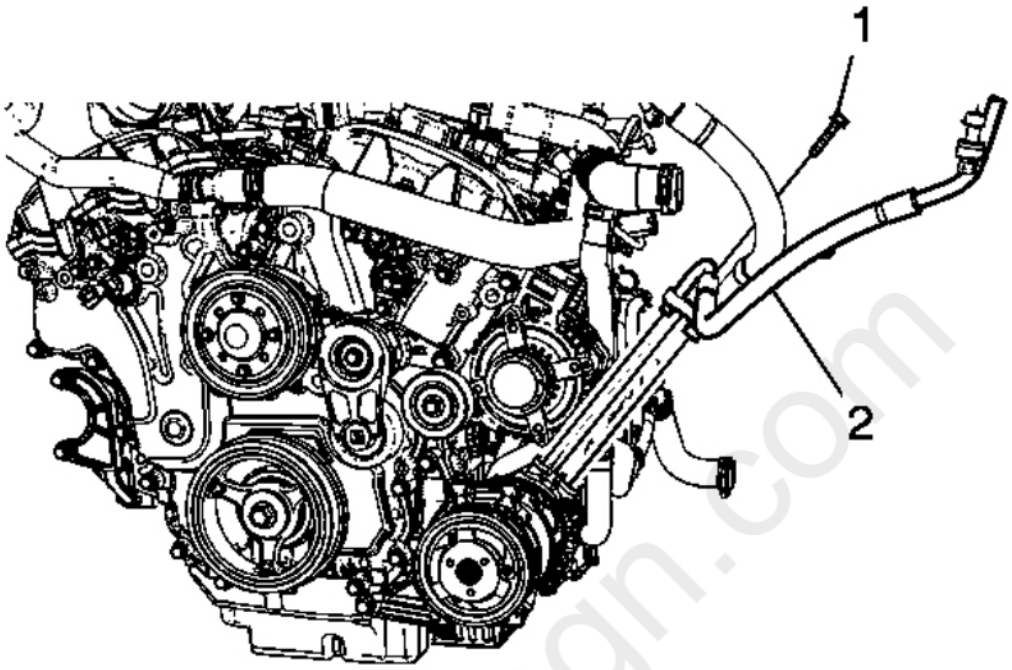


Fig. 30: Identifying A/C Compressor & Hoses
Courtesy of GENERAL MOTORS CORP.

4. Remove the air conditioning condenser and evaporator hose bolt (1) at the compressor.
5. Remove the air conditioning condenser and evaporator hose (2) from the compressor.

cardiagn.com

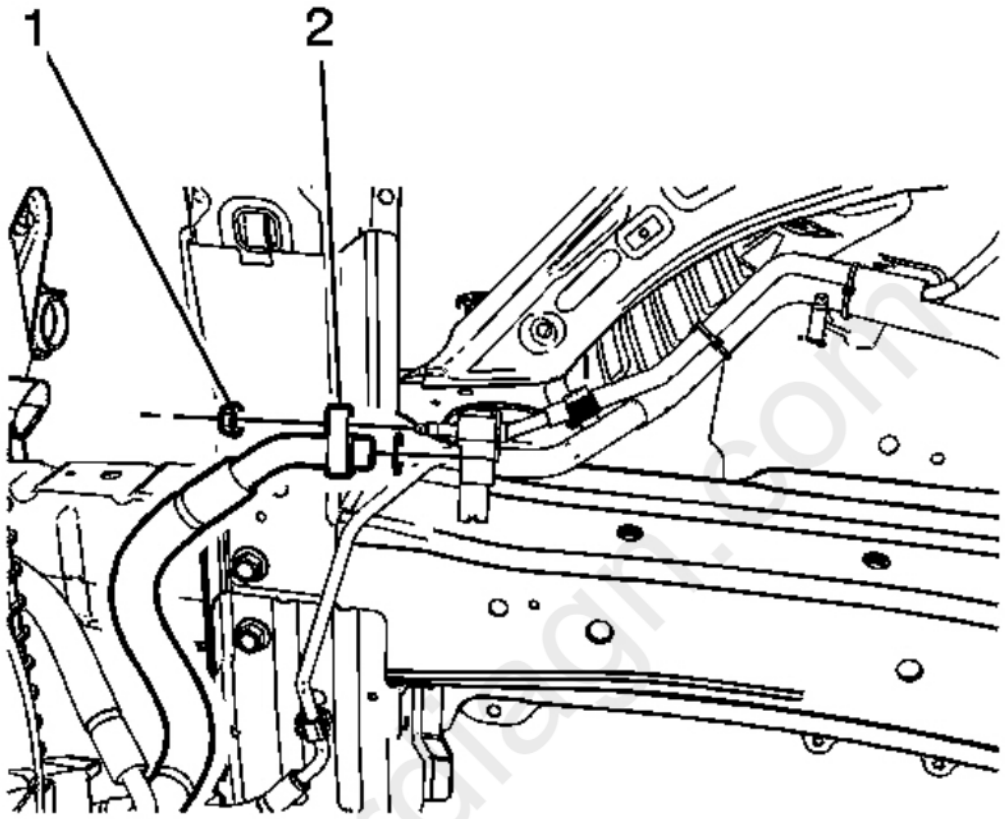


Fig. 31: Identifying Condenser & Evaporator Hose Nut
Courtesy of GENERAL MOTORS CORP.

6. Remove the air conditioning condenser and evaporator hose nut (1) at the air conditioning condenser and air conditioning evaporator tube.
7. Remove the air conditioning condenser and evaporator hose (2) from air conditioning condenser and air conditioning evaporator tube.

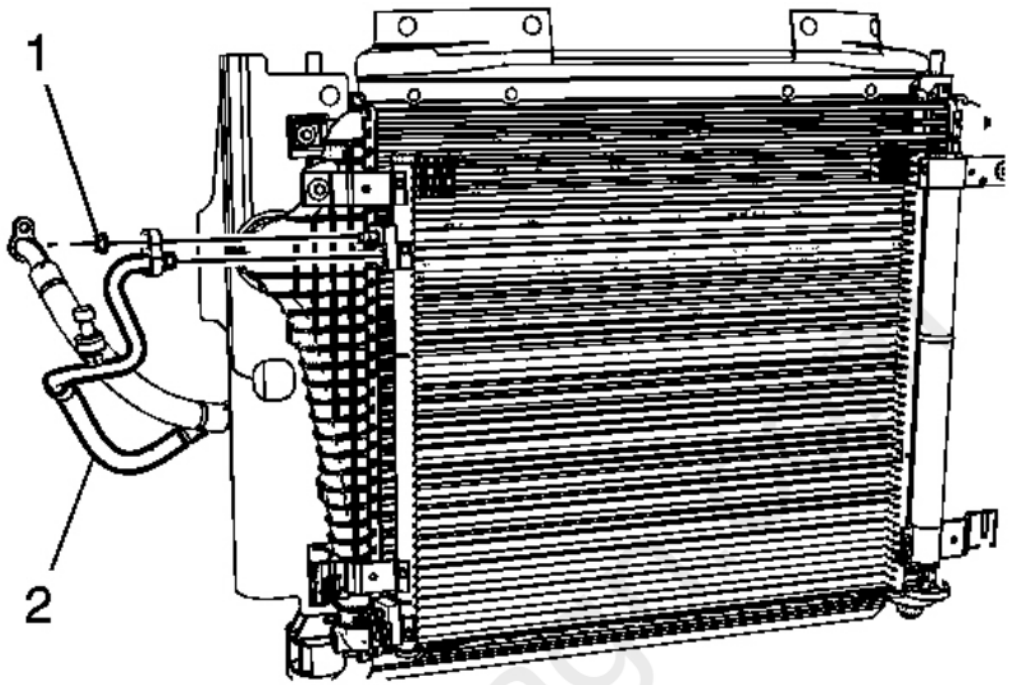


Fig. 32: View Of Condenser & Evaporator Hose & Nuts
Courtesy of GENERAL MOTORS CORP.

8. Remove the air conditioning condenser and evaporator hose nut (1) at the condenser.
9. Remove the air conditioning condenser and evaporator hose (2) from the condenser.
10. Remove the air conditioning condenser and evaporator hose (2) from vehicle.
11. Remove and discard all sealing washers.

Installation Procedure

1. Install new sealing washers. Refer to **Air Conditioning System Seal Replacement**

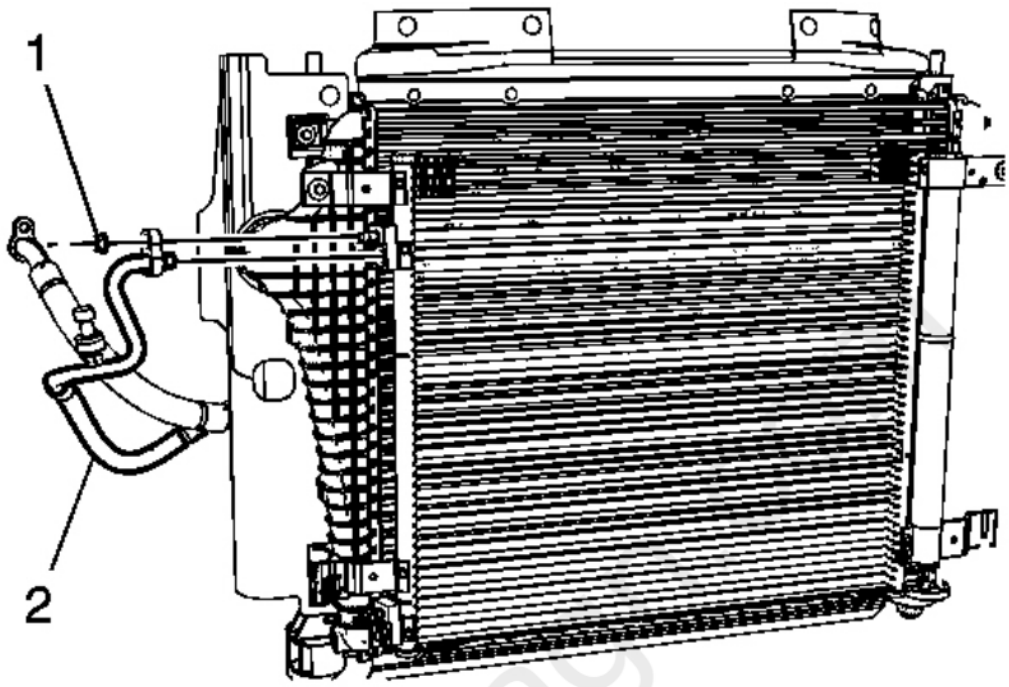


Fig. 33: View Of Condenser & Evaporator Hose & Nuts
Courtesy of GENERAL MOTORS CORP.

2. Install the air conditioning condenser and evaporator hose (2) to the condenser.

CAUTION: Refer to Fastener Caution .

3. Install the air conditioning condenser and evaporator hose nut (1) at the condenser and tighten to 15 N.m (11 lb in).

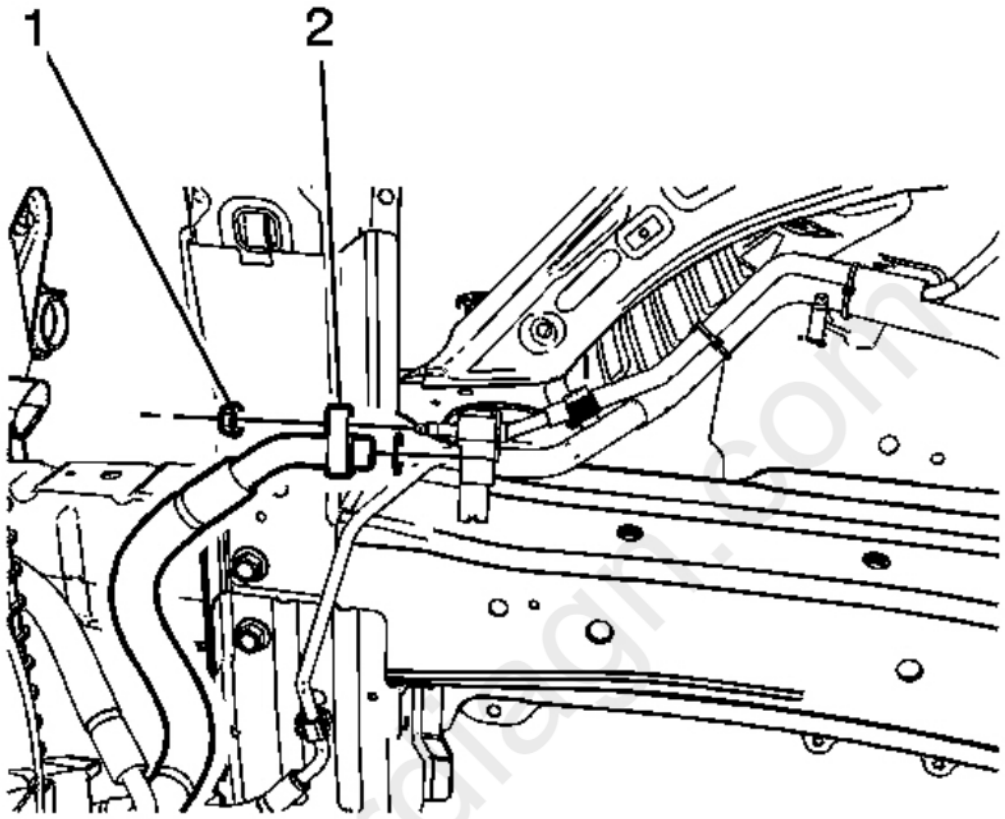


Fig. 34: Identifying Condenser & Evaporator Hose Nut
Courtesy of GENERAL MOTORS CORP.

4. Install the air conditioning condenser and evaporator hose (2) to the air conditioning condenser and air conditioning evaporator tube.
5. Install the air conditioning condenser and evaporator hose nut (1) to air conditioning condenser and air conditioning evaporator tube and tighten to 15 N.m (11 lb in).

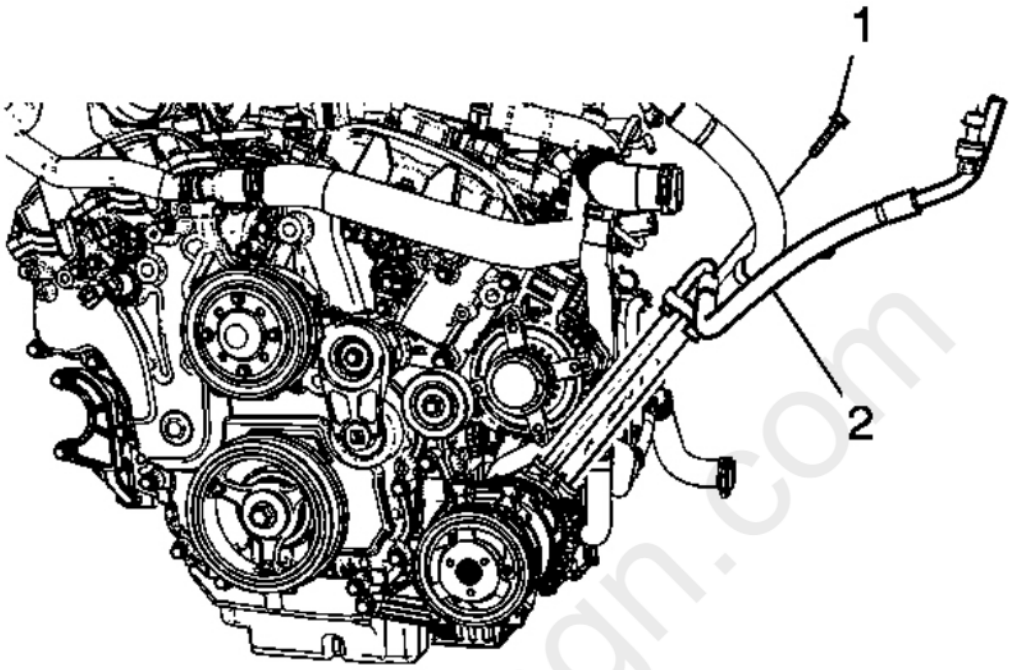


Fig. 35: Identifying A/C Compressor & Hoses
Courtesy of GENERAL MOTORS CORP.

6. Install the air conditioning condenser and evaporator hose (2) to the compressor.
7. Install the air conditioning condenser and evaporator hose bolt (1) at compressor and tighten to 15 N.m (11 lb in).
8. Install the front bumper fascia. Refer to **Front Bumper Fascia Replacement**
9. Lower the vehicle.
10. Evacuate and charge the A/C system. Refer to **Refrigerant Recovery and Recharging**

AIR CONDITIONING REFRIGERANT SERVICE VALVE CORE REPLACEMENT

Special Tools

- **GE 50078:** Electronic Leak Detector
- **GE 46246:** Valve Core Tool

For equivalent regional tools. Refer to **Special Tools**

Removal Procedure

cardiagn.com

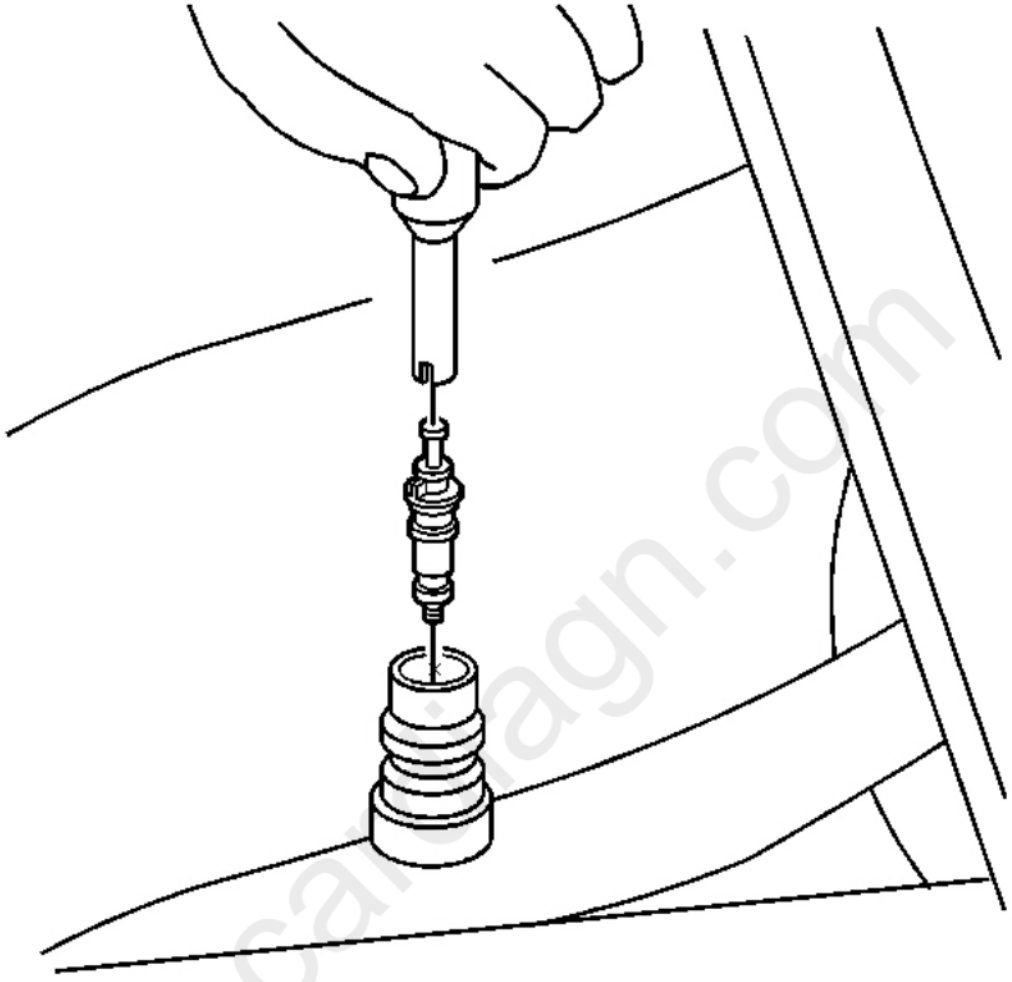


Fig. 3 : E ploded View of Service Port & Valve Core
Courtesy of GENERAL MOTORS CORP.

1. Recover the refrigerant from the A/C system. Refer to **Refrigerant Recovery and Recharging**
2. Using the **GE 4 24 :** Valve Core Tool, remove the valve core from the service port.

Installation Procedure

carmagn.com

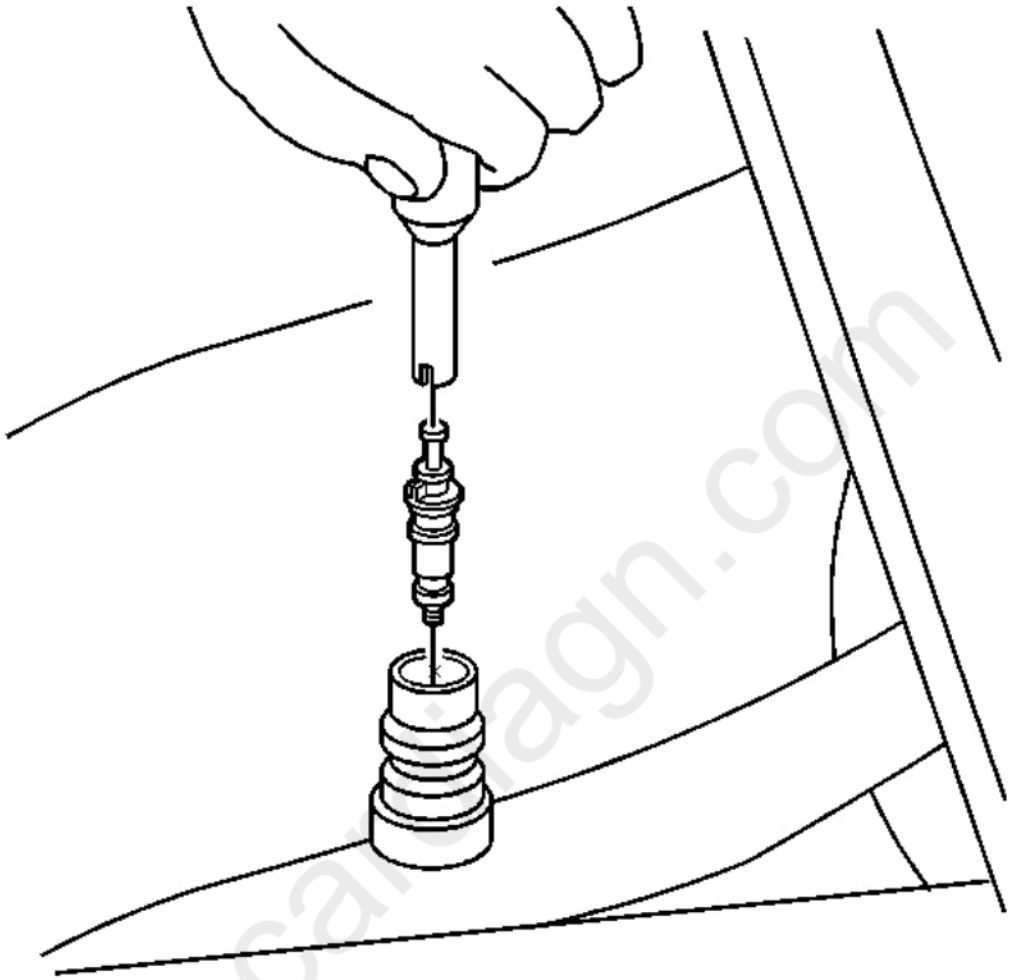


Fig. 3 : E ploded View of Service Port & Valve Core
Courtesy of GENERAL MOTORS CORP.

1. Install the valve core to the service port.

CAUTION: Refer to Fastener Caution

2. Using the **GE 4 24 :** Valve Core Tool, tighten the valve core to 11 N.m (97 lb in).
3. Evacuate and recharge the A/C system. Refer to **Refrigerant Recovery and Recharging**
4. Leak test the fittings of the component using **GE 5 :** Electronic Leak Detector.

carmagn.com

RECEIVER AND DEH DRATOR REPLACEMENT

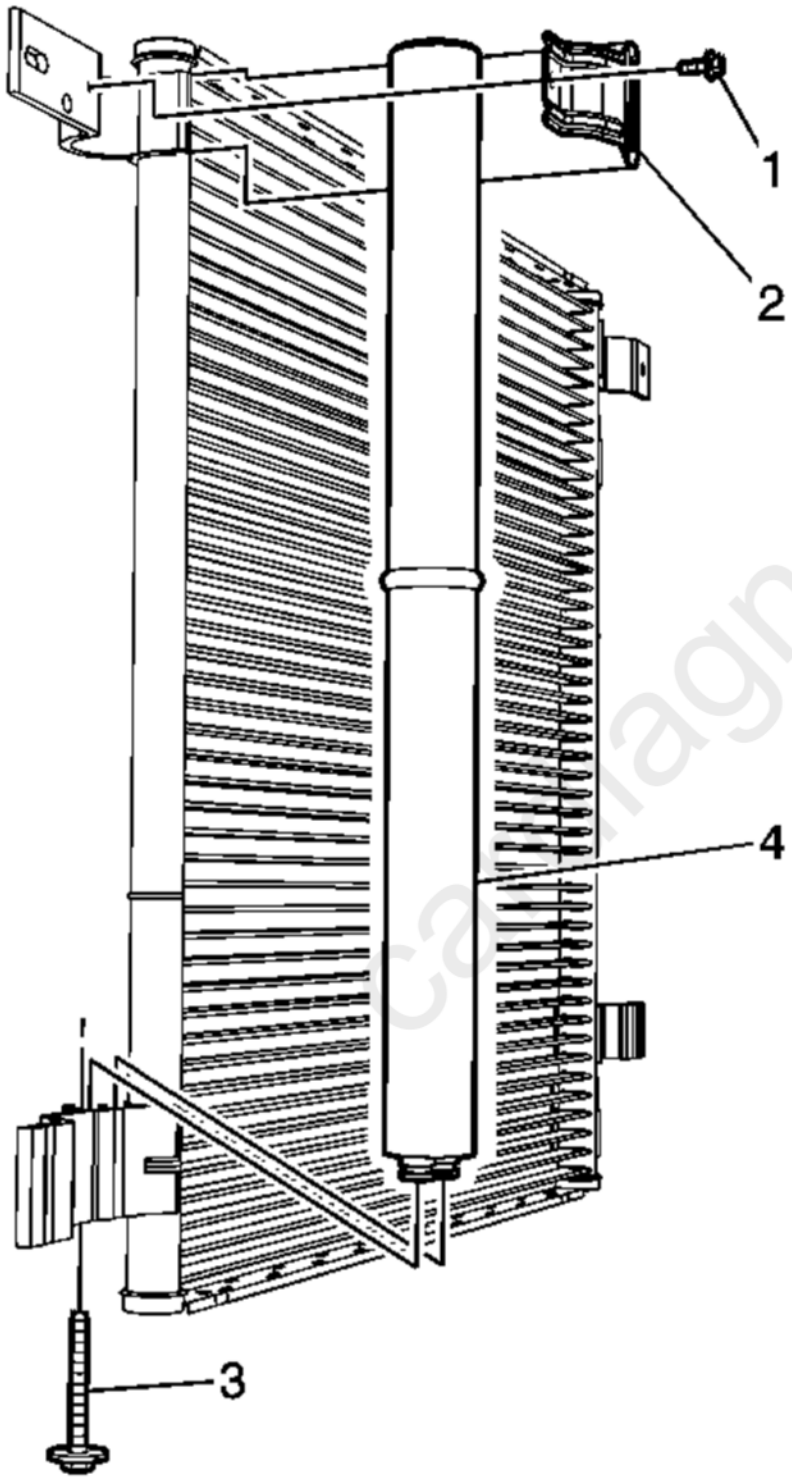


Fig. 3 : View Of Receiver & Dehydrator
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the air conditioner condenser. Refer to **Air Conditioning Condenser Replacement (LF1)** or **Air Conditioning Condenser Replacement (LAU)**	
1	Receiver and Dehydrator Bracket Blot. **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 6 N.m (53 lb in)
2	Receiver and Dehydrator Bracket
3	Receiver and Dehydrator Bolt **Tighten:** 6 N.m (53 lb in)
4	Receiver and Dehydrator **Procedure:** Remove and discard O-ring seal. Refer to **Air Conditioning O-Ring Seal Replacement**

AIR CONDITIONING EVAPORATOR THERMAL E PANSION VALVE REPLACEMENT

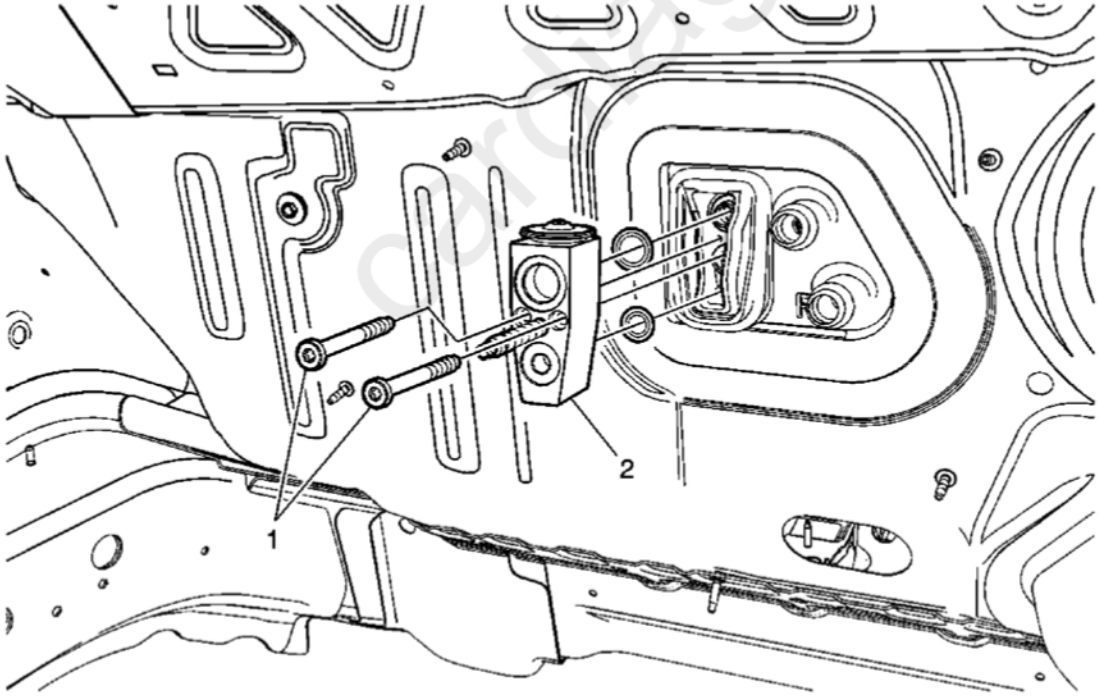


Fig. 3 : Identifying Air Conditioning Evaporator Thermal E pansion Valve
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name

Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**. 2. Remove the air conditioning condenser and air conditioning evaporator tube from the TXV valve. Refer to **Air Conditioning Condenser and Air Conditioning Evaporator Tube Replacement**.	
1	Thermal Expansion Valve Bolt (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 6 N.m (53 lb in)
2	Thermal Expansion Valve **Tip:** Remove and discard the sealing washers. Refer to **Air Conditioning System Seal Replacement**.

AIR CONDITIONING (A/C) REFRIGERANT PRESSURE SENSOR REPLACEMENT (LF1)

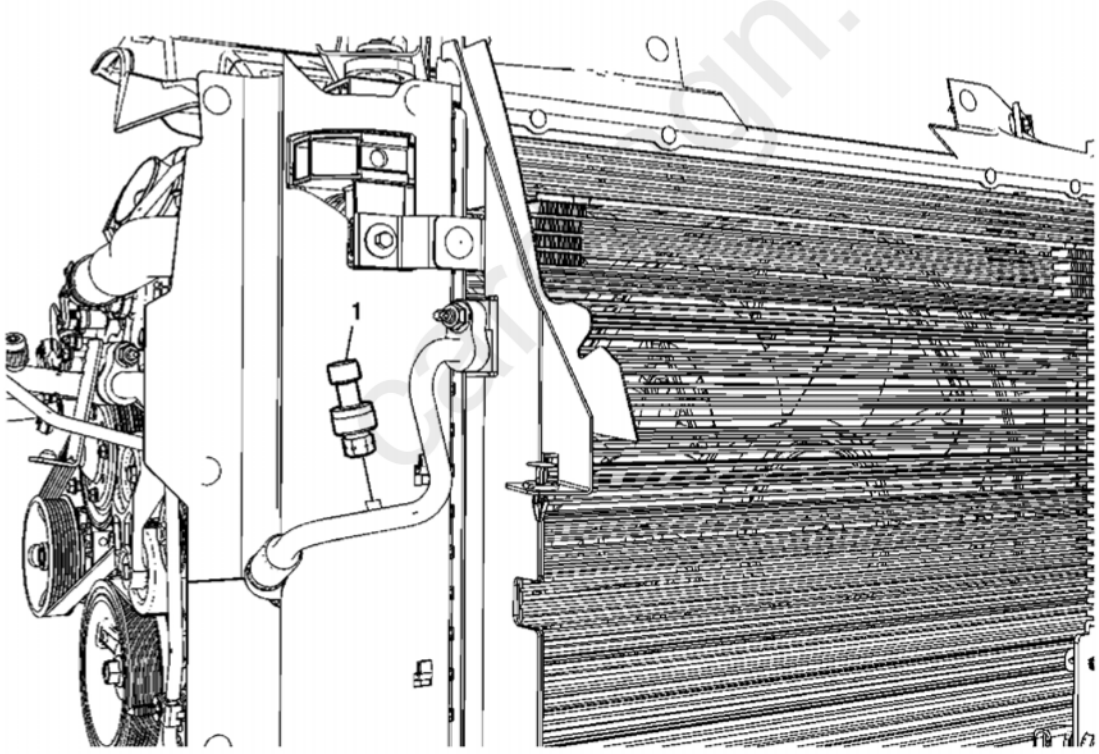


Fig. 4 : Identifying Air Conditioning (A/C) Refrigerant Pressure Sensor (LF1)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**.	

2. Remove the front bumper fascia. Refer to **Front Bumper Fascia Replacement**	
1	A/C Refrigerant Pressure Sensor **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 5 N.m (44 lb in)

AIR CONDITIONING (A/C) REFRIGERANT PRESSURE SENSOR REPLACEMENT (LAU)

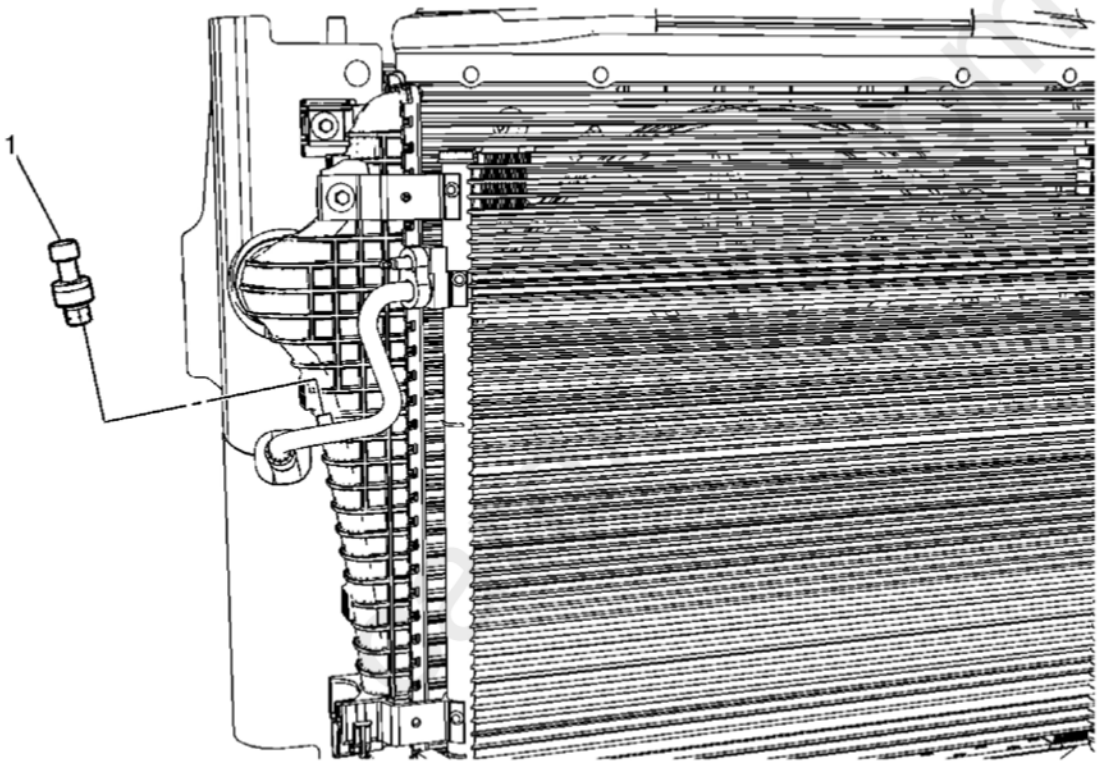


Fig. 41: Air Conditioning (A/C) Refrigerant Pressure Sensor (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**. 2. Remove the front bumper fascia. Refer to **Front Bumper Fascia Replacement**	
1	A/C Refrigerant Pressure Sensor **CAUTION:** **Refer to Fastener Caution .**

	Tighten: 5 N.m (44 lb in)

EVAPORATOR AIR TEMPERATURE SENSOR REPLACEMENT

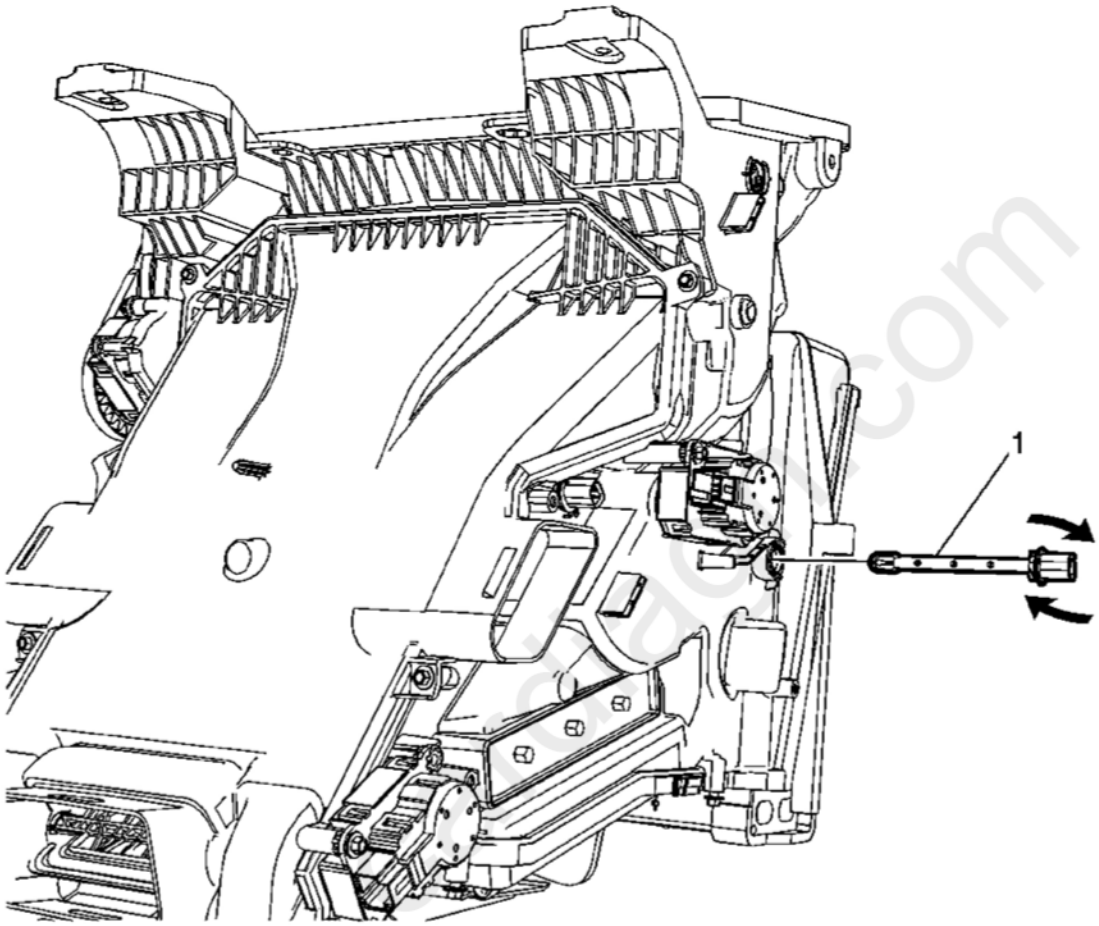


Fig. 42: Identifying Evaporator Air Temperature Sensor
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Remove the instrument panel compartment. Refer to **Instrument Panel Compartment Replacement** . 2. Reposition any wiring or hoses to gain access to evaporator temperature sensor.	
1	Evaporator Temperature Sensor **Procedure** 1. Disconnect the wiring connector

	2. Rotate sensor 1/4 turn counter clock wise to remove

AIR CONDITIONING CONDENSER REPLACEMENT (LF1)

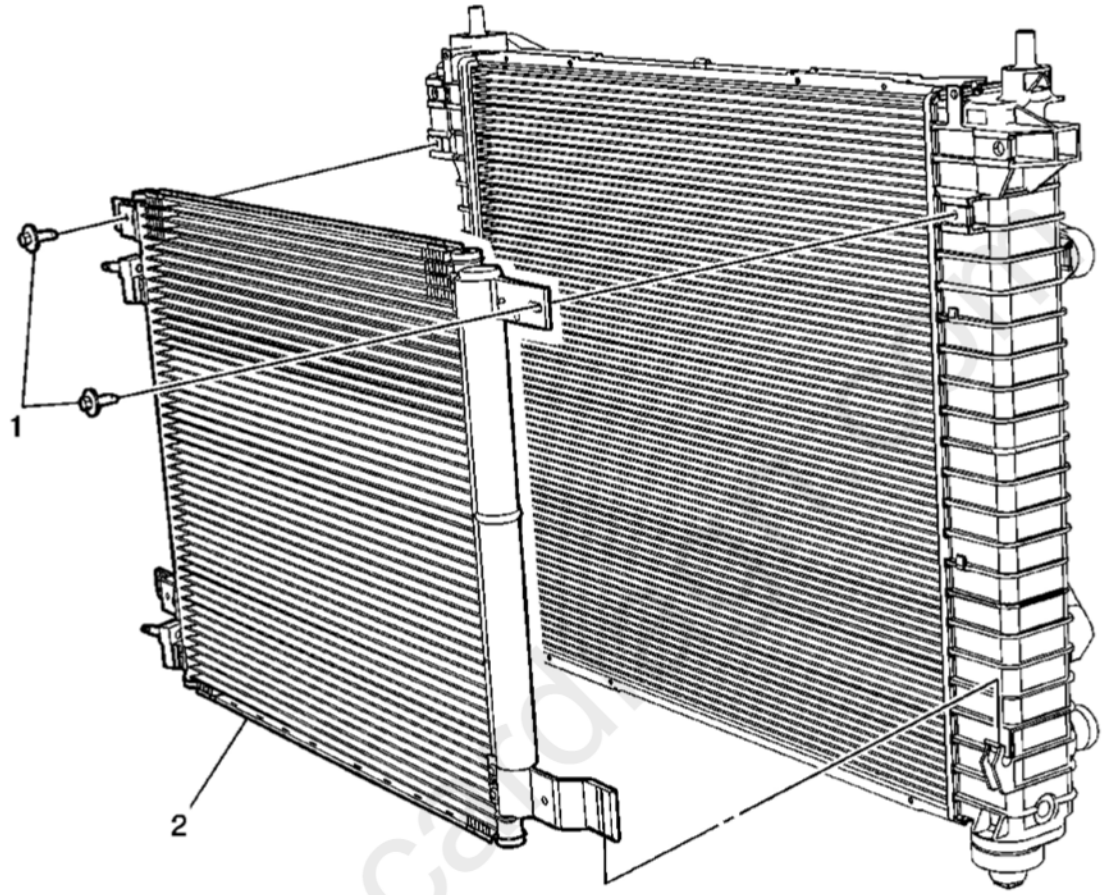


Fig. 43: View Of Air Conditioning Condenser (LF1)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** 2. Remove the front bumper fascia. Refer to **Front Bumper Fascia Replacement** 3. Remove the radiator air side baffles. Refer to **Radiator Air Side Baffle Replacement - Left Side** and **Radiator Air Side Baffle Replacement - Right Side** 4. Remove the air conditioning condenser and air conditioning evaporator hose tube. Refer to **Air Conditioning Condenser and Air Conditioning Evaporator Tube Replacement** 5. Remove the air conditioning condenser and evaporator hose. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)**	

1	Air Conditioning Condenser Bolts (Qty 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 9 N.m (80 lb in)
2	Air Conditioning Condenser **Tip:** The air condition condenser is removed through the bottom.

AIR CONDITIONING CONDENSER REPLACEMENT (LAU)

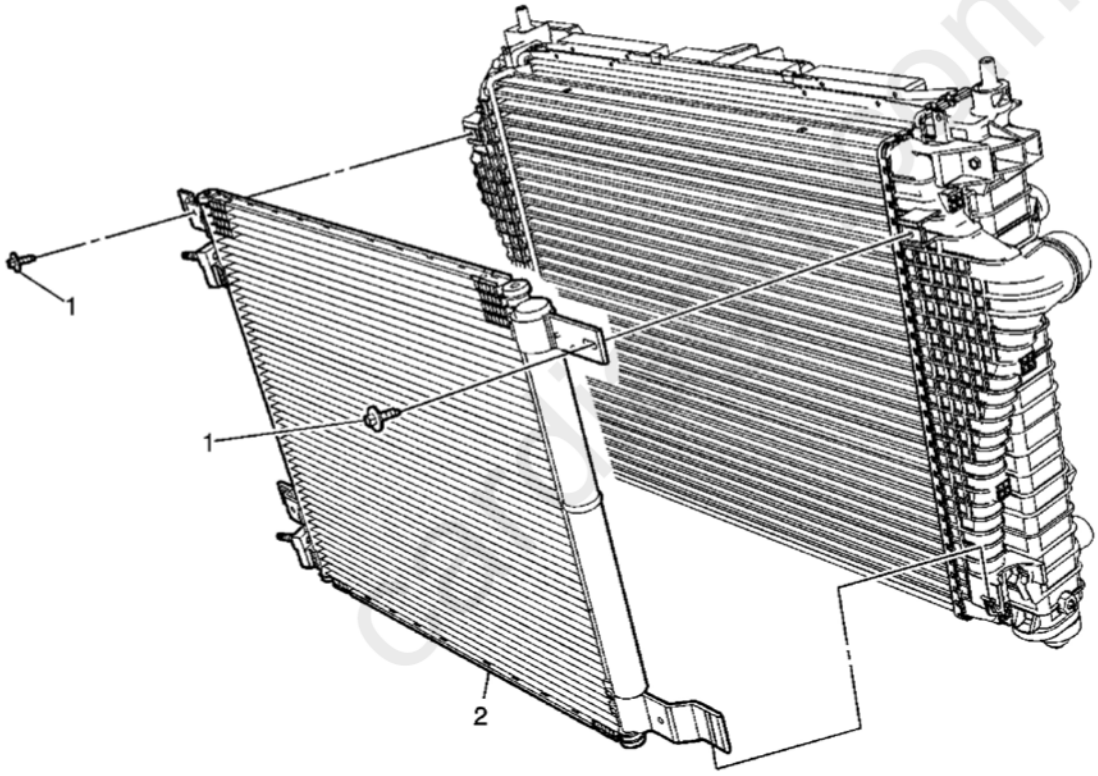


Fig. 44: View Of Air Conditioning Condenser (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging** 2. Remove the front bumper fascia. Refer to **Front Bumper Fascia Replacement** 3. Remove the radiator air side baffle and deflector. Refer to **Radiator Air Side Baffle Replacement - Left Side** and **Radiator Air Side Baffle Replacement - Right Side** 4. Remove the air conditioning condenser and air conditioning evaporator hose tube. Refer to **Air**	

	Conditioning Condenser and Air Conditioning Evaporator Tube Replacement 5. Remove the air conditioning condenser and evaporator hose. Refer to **Air Conditioning Condenser and Evaporator Hose Replacement (LF1)** or **Air Conditioning Condenser and Evaporator Hose Replacement (LAU)**
1	Air Conditioning Condenser Bolts (Qty 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 9 N.m (80 lb in)
2	Air Conditioning Condenser **Tip:** The air condition condenser is removed through the bottom.

HEATER AND AIR CONDITIONING EVAPORATOR MODULE REPLACEMENT

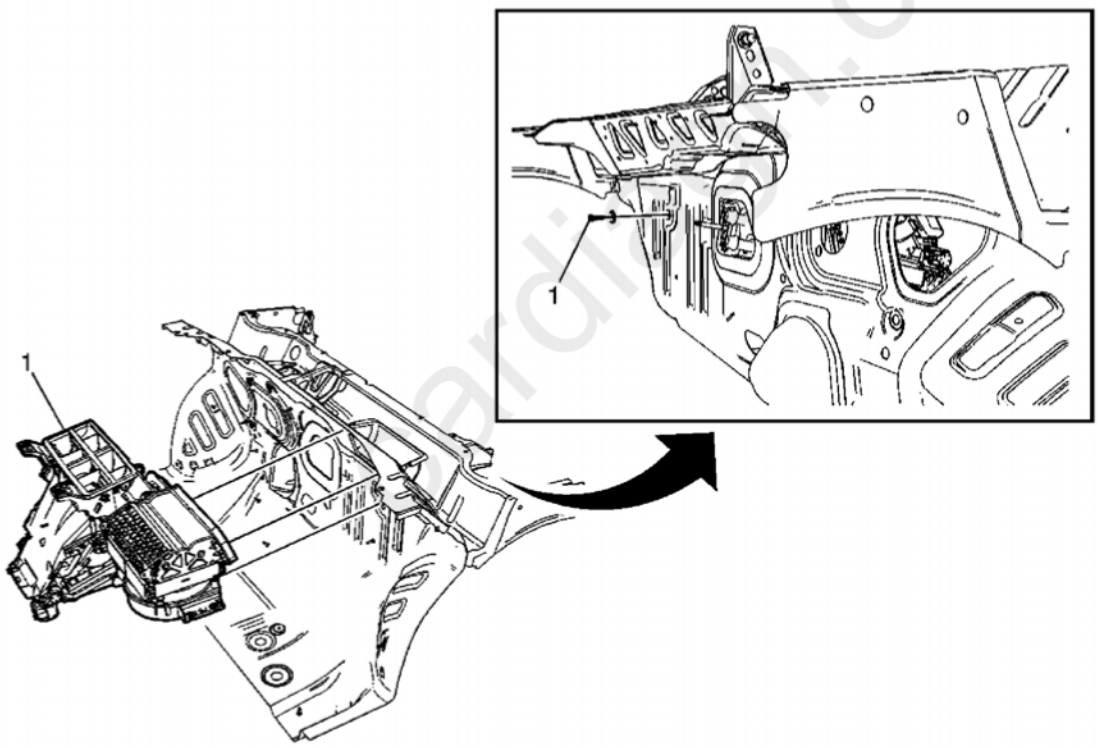


Fig. 45: Identifying Heater & Air Conditioning Evaporator Module
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Recover the refrigerant. Refer to **Refrigerant Recovery and Recharging**. 2. Remove the heater inlet hose from the heater core tube. Refer to **Heater Inlet Hose Replacement**	

	(LF1) or **Heater Inlet Hose Replacement (LAU)**. 3. Remove the heater outlet hose from the heater core tu e. Refer to **Heater Outlet Hose Replacement (LF1)** or **Heater Outlet Hose Replacement (LAU)**. . Remove the instrument panel tie ar. Refer to **Instrument Panel Tie Bar Replacement** .
1	Heater and Air Conditioning vaporator and lo er odule Fastener **CAUTION:** **Refer to Fastener Caution .** **Procedure:** ith the aid of an assistant remove the heater and air conditioning evaporator and lo er module from the vehicle. **Tig ten:** 1. .m (12 l in)

AIR CONDITIONING EVAPORATOR REPLACEMENT

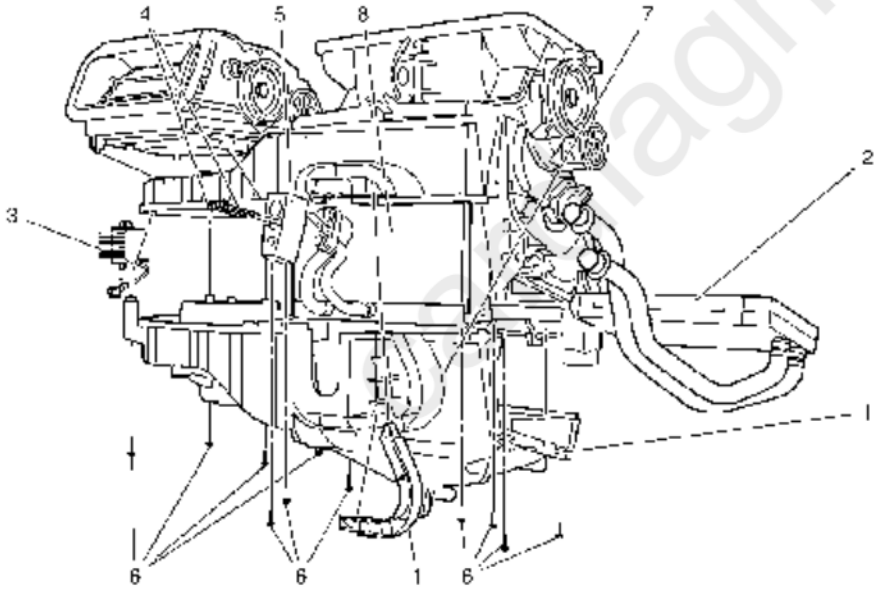


Fig. 46: Locating Air Conditioning Evaporator
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
	1. Remove the heater and air conditioning evaporator and lo er module. Refer to **Heater and Air Conditioning Evaporator Module Replacement**. 2. isconnect the heater and air conditioning evaporator and lo er module assem ly electrical connectors.

1	Remove Heater Core Scre and rac et **CAUTION:** **Refer to Fastener Caution .** **Tig ten:** 2. .m (23 l in)
2	Remove Heater Core retainer scre **Procedure:** Pull out the heater core. **Tig ten:** 2. .m (23 l in)
3	Heater and lo er and Air Conditioning Control odule Refer to **Heater and Blo er and Air Conditioning Control Module Replacement** .
	A C vaporator hermal pansion alve Fastener (Qty: 2) **Tig ten:** .m (3 l in)
	Air Conditioning vaporator hermal pansion alve **Procedure:** Remove and discard sealing ashers.
	Heater and Air Conditioning vaporator and lo er odule Case Scre (Qty: 11) **Tig ten:** 1. .m (l in)
	Heater and Air Conditioning vaporator and lo er odule Lo er Case
	Air Conditioning vaporator Core

HEATER INLET HOSE REPLACEMENT (LF1)

Special Tools

BOB 38185: Hose Clamp Pliers

For equivalent regional tools. Refer to **Special Tools**

Removal Procedure

1. rain the cooling system. Refer to **Cooling System Draining and Filling (Static Fill LF1)** or **Cooling System Draining and Filling - Vac-N-Fill(GE 47716)**
2. Remove the inta e manifold cover. Refer to **Intake Manifold Cover Replacement**

cardiagn.com

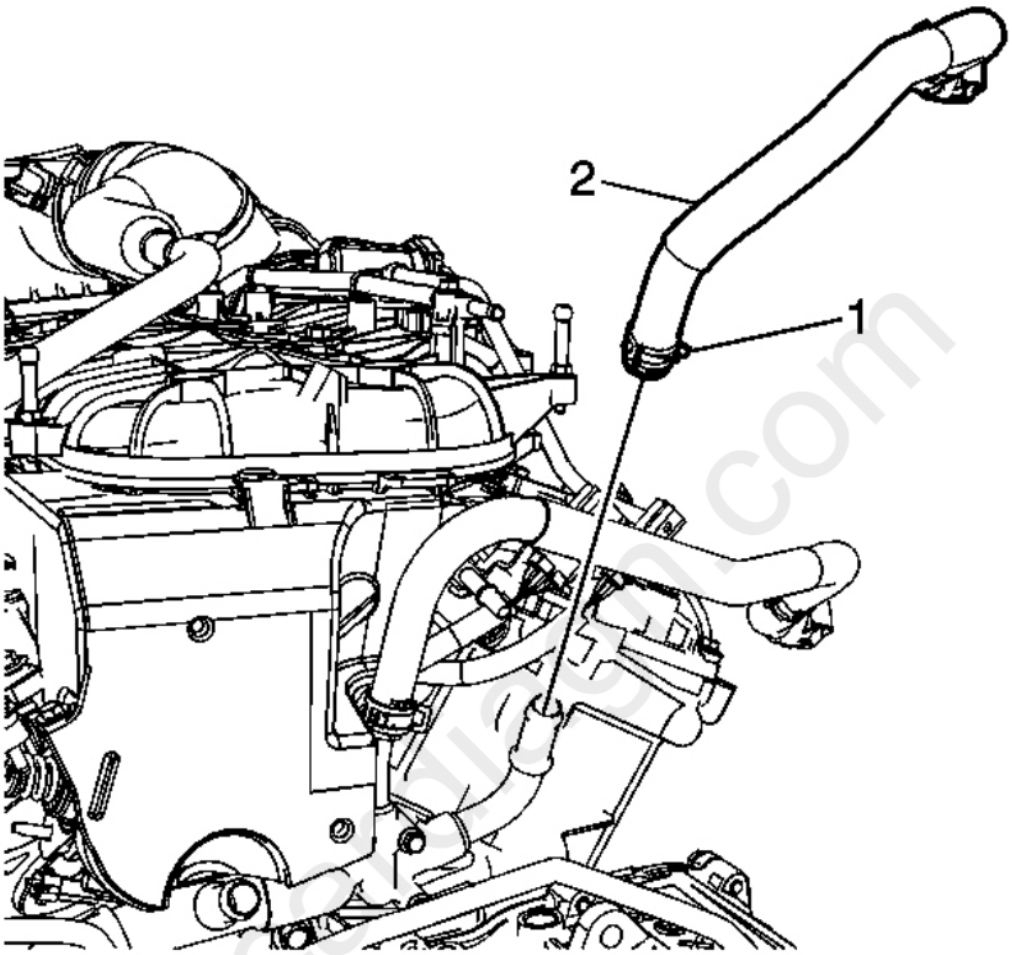


Fig. 47: Identifying Heater Inlet Hose & Clamp
Courtesy of GENERAL MOTORS CORP.

3. isengage tension on the heater inlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
. Remove the heater inlet hose (2) from the engine.

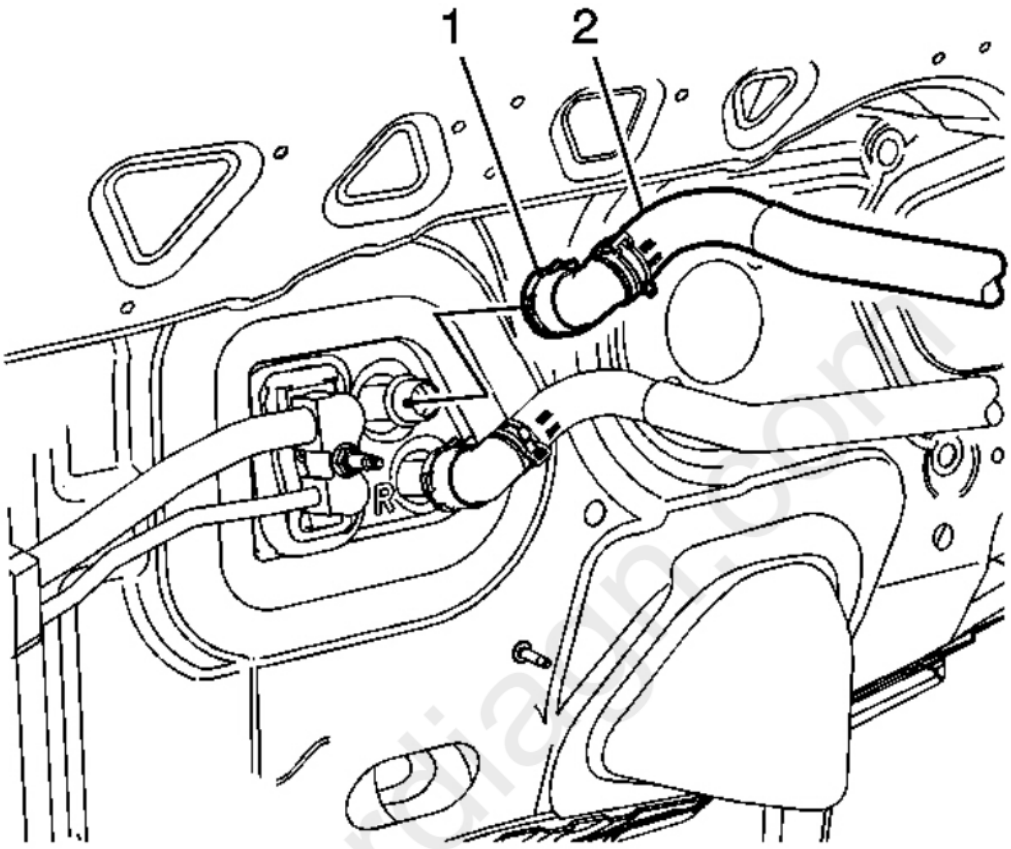


Fig. 48: Identifying Heater Inlet Hose Quick Disconnect Fitting
Courtesy of GENERAL MOTORS CORP.

. Release the clip from the quic disconnect (1) and remove the heater inlet hose (2) from the heater core tu e.
. Remove the heater inlet hose from the vehicle.

Installation Procedure

1. Install heater inlet hose to the vehicle.

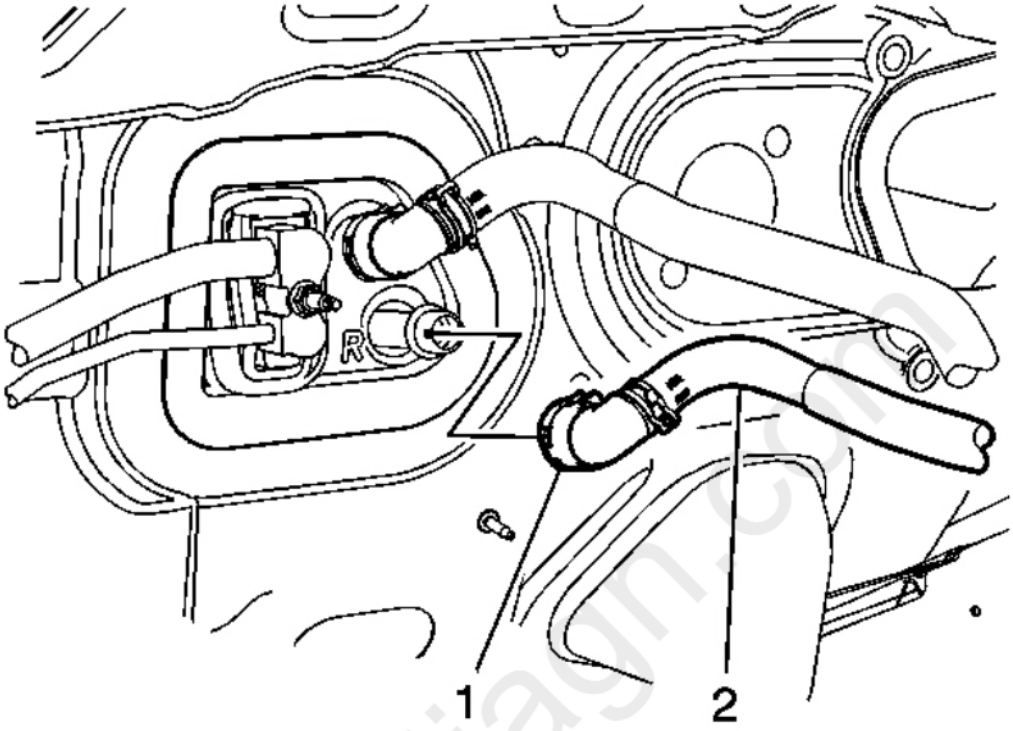


Fig. 4 : Vie Of Heater Inlet Hose At Heater Core
Courtesy of GENERAL MOTORS CORP.

NOTE: Lubricate the inside diameters of the hose with clean coolant prior to installation.

2. Install the heater inlet hose (2) to the heater core.

cardiagn.com

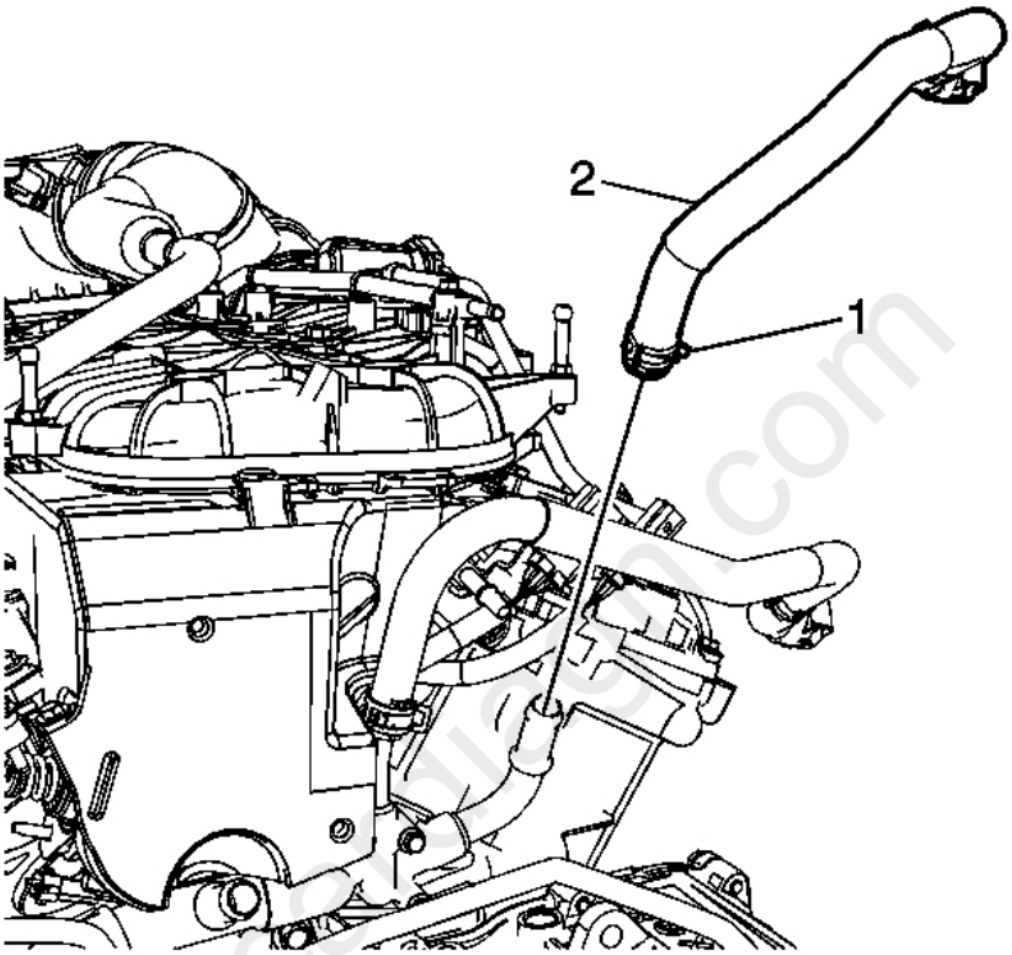


Fig. 50: Identifying Heater Inlet Hose & Clamp
Courtesy of GENERAL MOTORS CORP.

3. Install the heater inlet hose (2) to the engine.
4. Engage tension on the heater inlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
5. Install the intake manifold cover. Refer to **Intake Manifold Cover Replacement**
6. Fill the cooling system. Refer to **Cooling System Draining and Filling (Static Fill LF1)** or **Cooling System Draining and Filling - Vac-N-Fill(GE 47716)**

HEATER INLET HOSE REPLACEMENT (LAU)

Special Tools

BOB 38185: Hose Clamp Pliers

For equivalent regional tools. Refer to **Special Tools**

Removal Procedure

1. Drain the cooling system. Refer to **Cooling System Draining and Filling - Vac-N-Fill(GE 47716)** or **Cooling System Draining and Filling (Static Fill LAU)**
2. Remove the intake manifold cover. Refer to **Intake Manifold Cover Replacement**

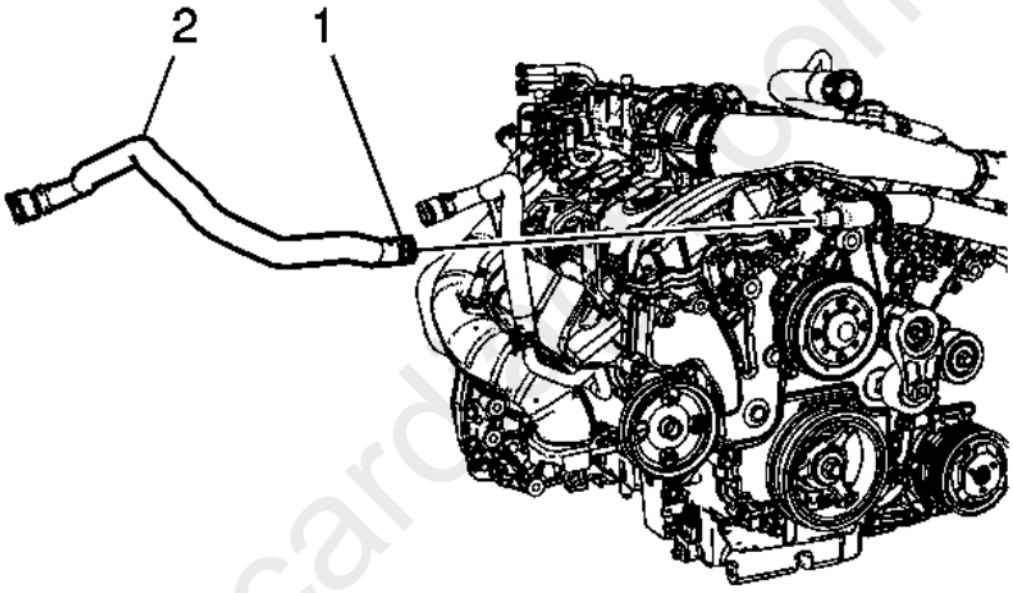


Fig. 51: Identifying Heater Inlet Hose & Clamp
Courtesy of GENERAL MOTORS CORP.

3. Disengage tension on the heater inlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
4. Remove the heater inlet hose (2) from the engine.

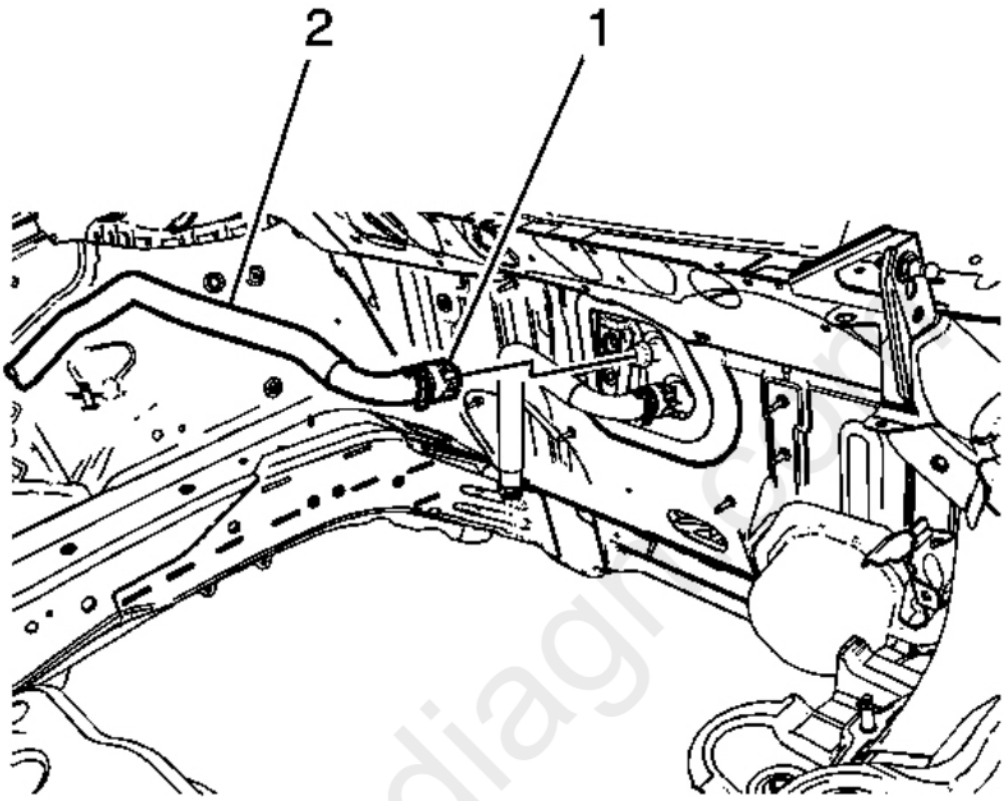


Fig. 52: Identifying Heater Inlet Hose & Quick Disconnect
Courtesy of GENERAL MOTORS CORP.

5. Release the clip from the quick disconnect (1) and remove the heater inlet hose (2) from the heater core tube.
6. Remove the heater inlet hose from the vehicle.

Installation Procedure

1. Install heater inlet hose to the vehicle.

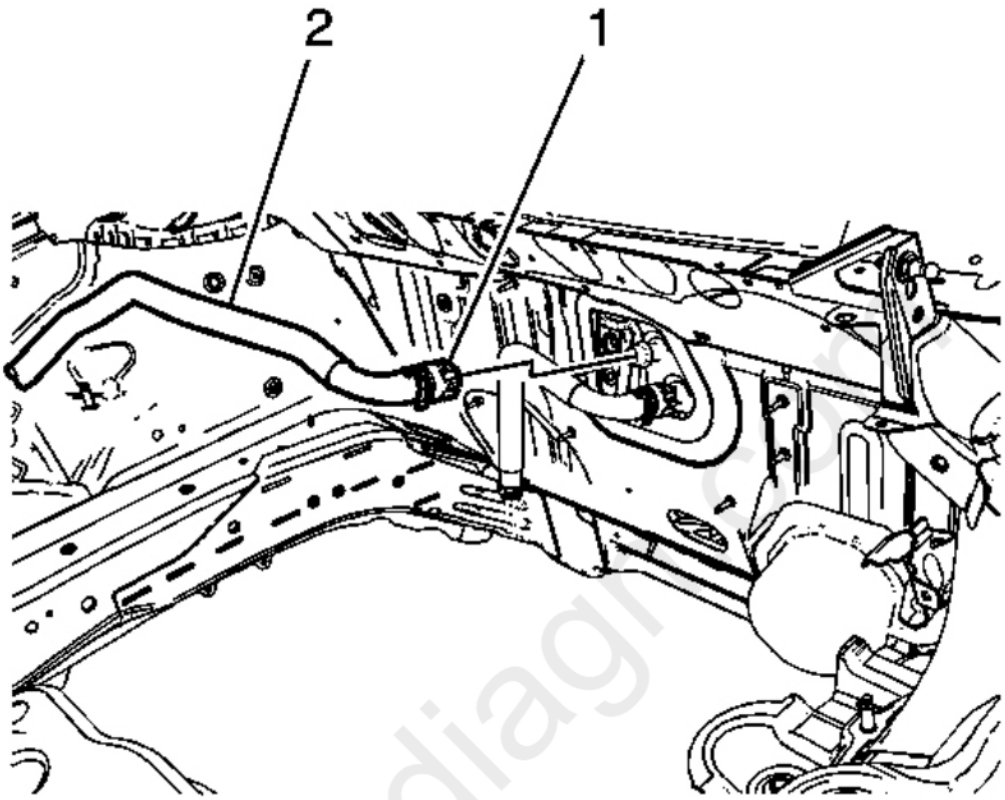


Fig. 53: Identifying Heater Inlet Hose & Quick Disconnect
Courtesy of GENERAL MOTORS CORP.

NOTE: Lubricate the inside diameters of the hose with clean coolant prior to installation.

2. Install the heater inlet hose (2) to the heater core.

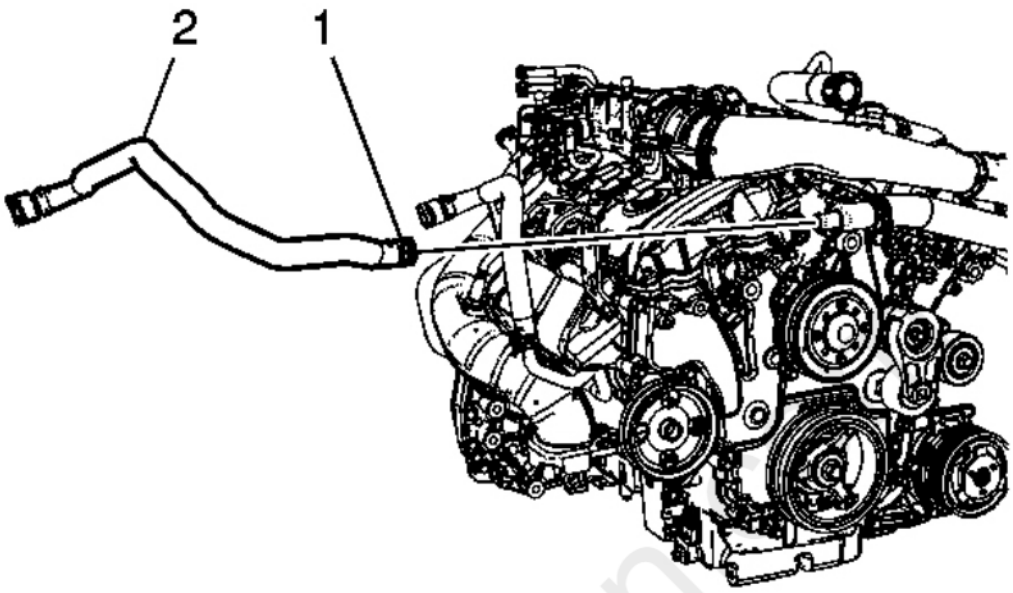


Fig. 54: Identifying Heater Inlet Hose & Clamp
Courtesy of GENERAL MOTORS CORP.

3. Install the heater inlet hose (2) to the engine.
4. Engage tension on the heater inlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
5. Install the intake manifold cover. Refer to **Intake Manifold Cover Replacement**
6. Fill the cooling system. Refer to **Cooling System Draining and Filling - Vac-N-Fill(GE 47716)** or **Cooling System Draining and Filling (Static Fill LAU)**

HEATER OUTLET HOSE REPLACEMENT (LF1)

Special Tools

BOB 38185: Hose Clamp Pliers

For equivalent regional tools. Refer to **Special Tools**

Removal Procedure

1. Drain the cooling system. Refer to **Cooling System Draining and Filling (Static Fill LF1)** or **Cooling System Draining and Filling - Vac-N-Fill(GE 47716)**
2. Remove the intake manifold cover. Refer to **Intake Manifold Cover Replacement**

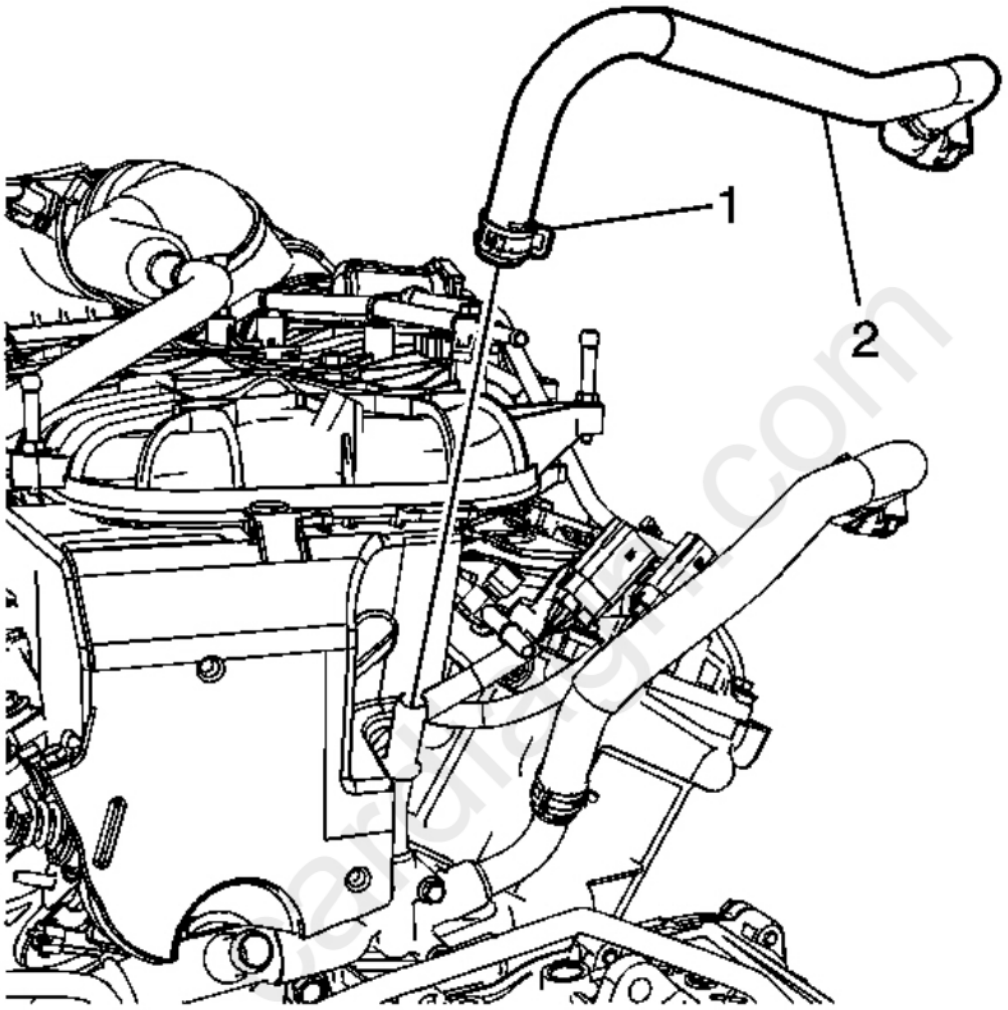


Fig. 55: Identifying Heater Outlet Hose & Clamp
Courtesy of GENERAL MOTORS CORP.

3. Disengage tension on the heater outlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
4. Remove the heater outlet hose (2) from the engine.

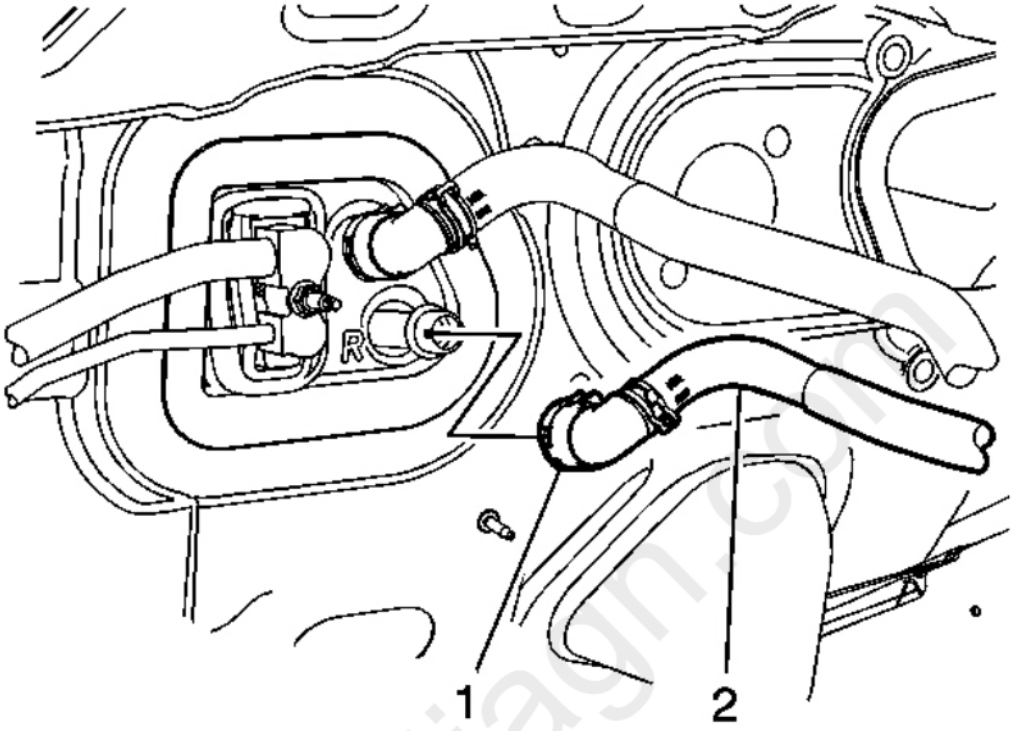


Fig. 56: Vie Of Heater Inlet Hose At Heater Core
Courtesy of GENERAL MOTORS CORP.

5. Release the clip from the quick disconnect (1) and remove the heater outlet hose (2) from the heater core tube.
6. Remove the heater outlet hose from the vehicle.

Installation Procedure

1. Install heater outlet hose to the vehicle.

Cardiagn.com

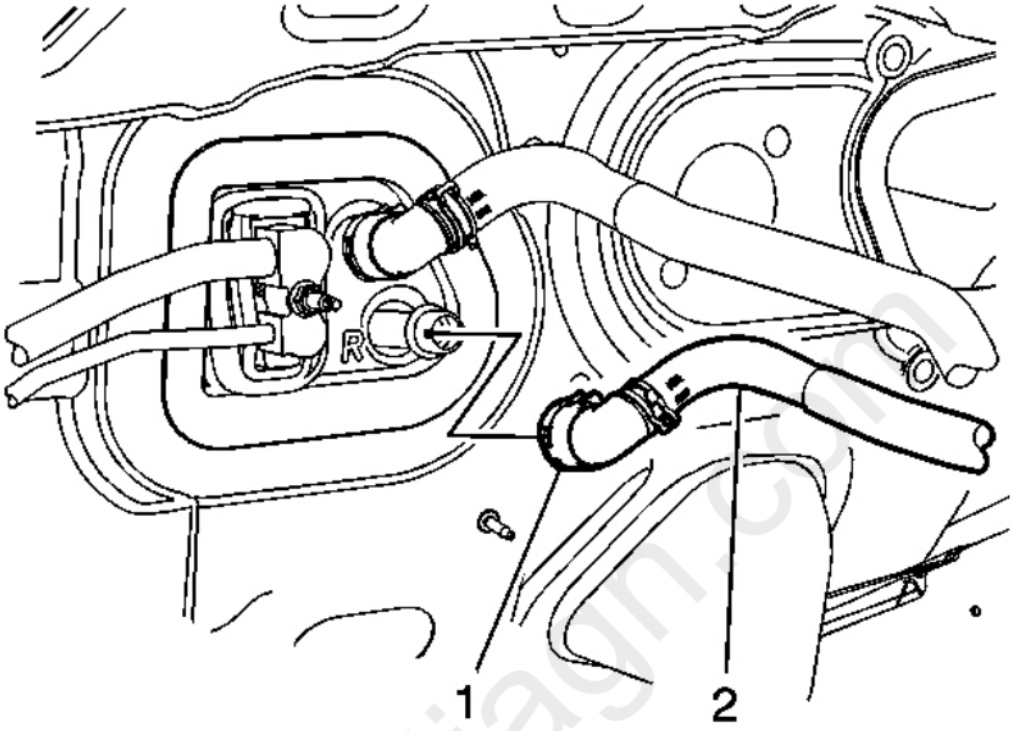


Fig. 57: Vie Of Heater Inlet Hose At Heater Core
Courtesy of GENERAL MOTORS CORP.

NOTE: Lubricate the inside diameters of the hose with clean coolant prior to installation.

2. Install the heater outlet hose (2) to the heater core.

cardiagn.com

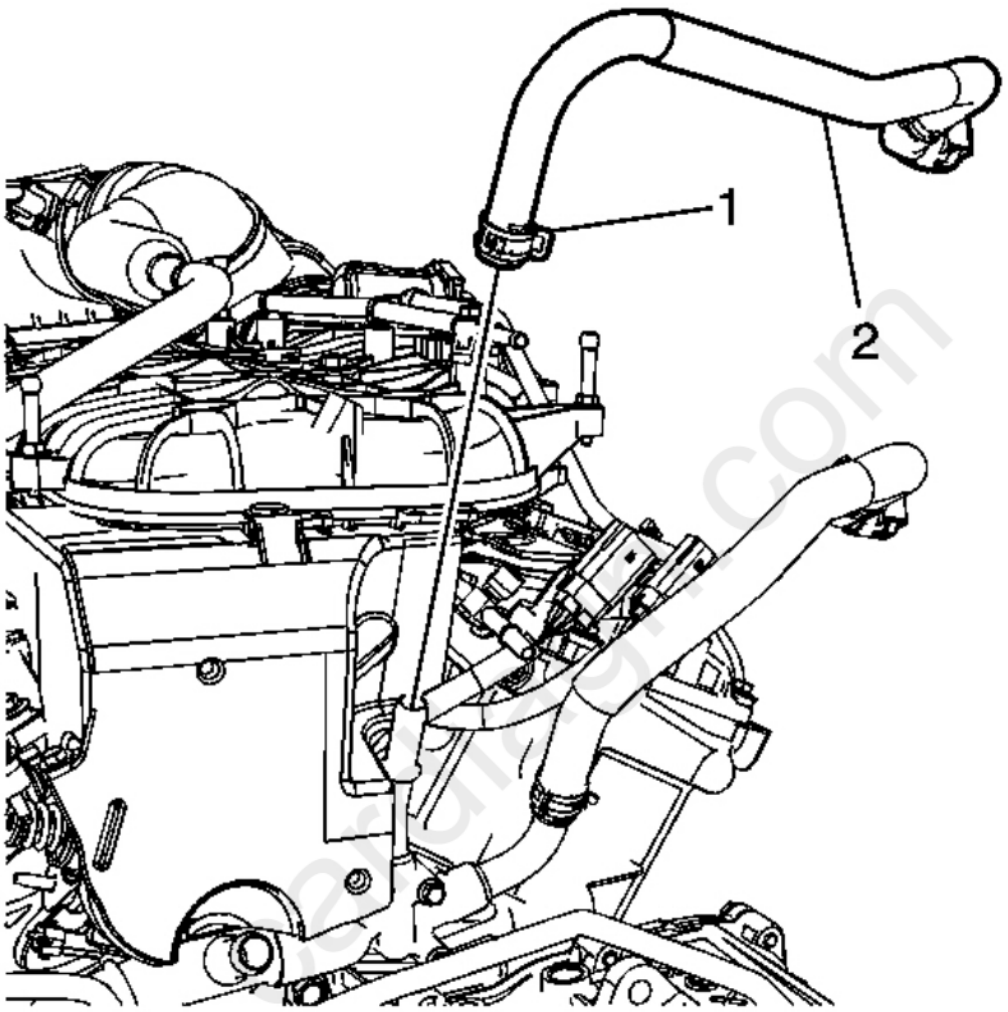


Fig. 58: Identifying Heater Outlet Hose & Clamp
Courtesy of GENERAL MOTORS CORP.

3. Install the heater outlet hose (2) to the engine.
4. Engage tension on the heater outlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
5. Install the intake manifold cover. Refer to **Intake Manifold Cover Replacement**
6. Fill the cooling system. Refer to **Cooling System Draining and Filling (Static Fill LF1)** or **Cooling System Draining and Filling - Vac-N-Fill (GE 47716)**

HEATER OUTLET HOSE REPLACEMENT (LAU)

Special Tools

BOB 38185: Hose Clamp Pliers

For equivalent regional tools. Refer to **Special Tools**

Removal Procedure

1. Drain the cooling system. Refer to **Cooling System Draining and Filling - Vac-N-Fill (GE 47716)** or **Cooling System Draining and Filling (Static Fill LAU)**
2. Remove the intake manifold cover. Refer to **Intake Manifold Cover Replacement**

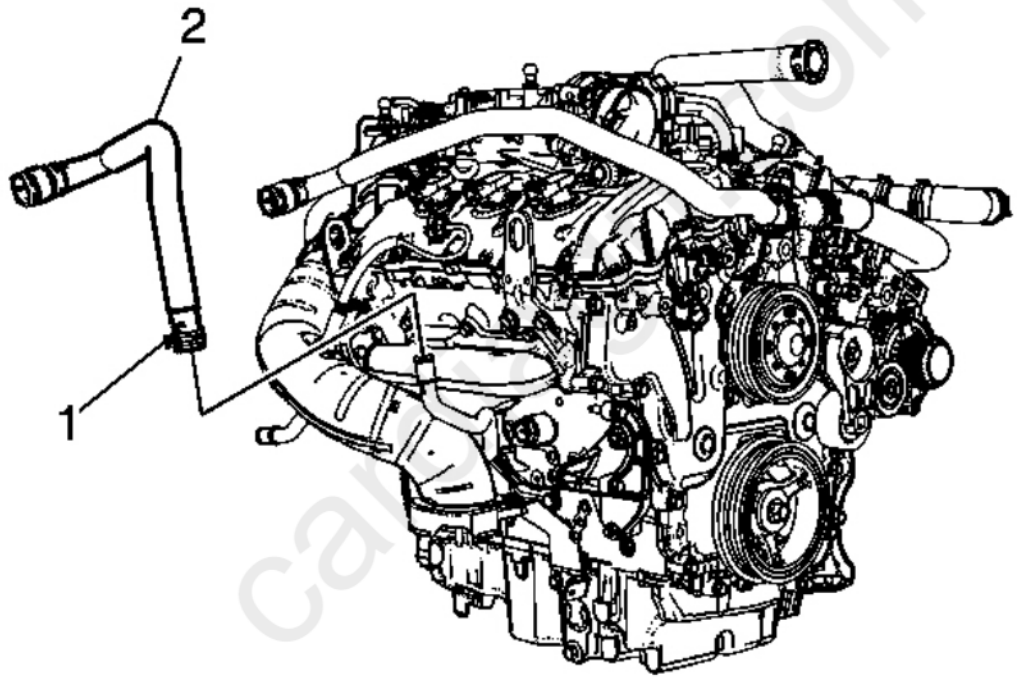


Fig. 5 : Vie Of Heater Outlet Hose
Courtesy of GENERAL MOTORS CORP.

3. Disengage tension on the heater outlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
4. Remove the heater outlet hose (2) from the engine.

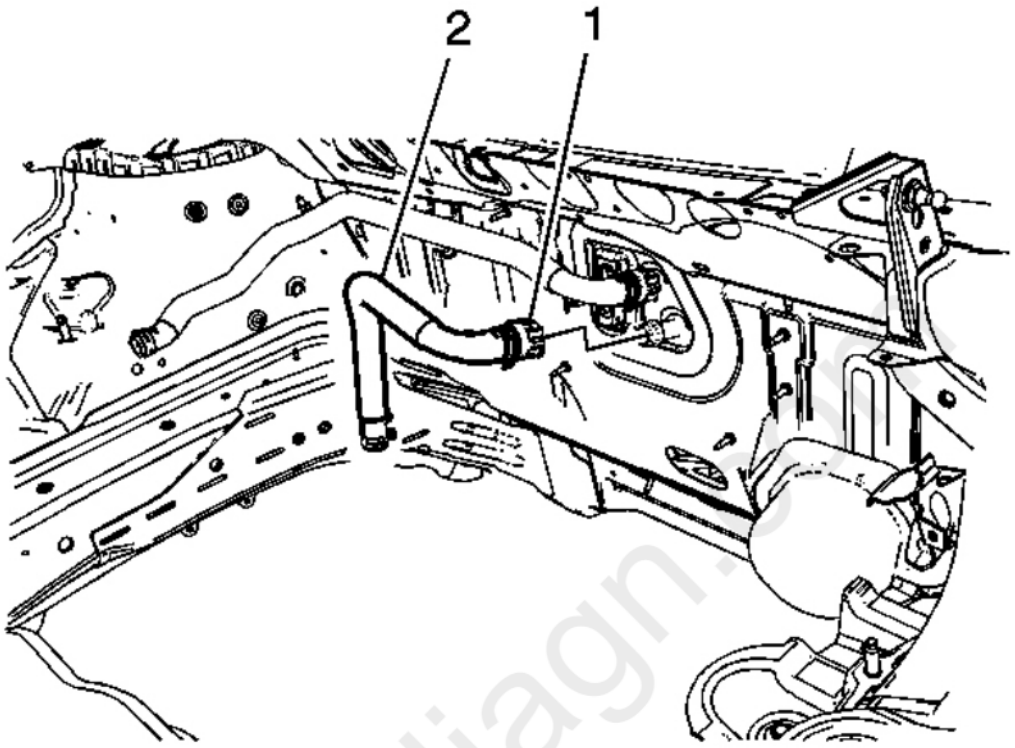


Fig. 60: View Of Heater Outlet Hose At Heater Core Tube
Courtesy of GENERAL MOTORS CORP.

5. Release the clip from the quick disconnect (1) and remove the heater outlet hose (2) from the heater core tube.
6. Remove the heater outlet hose from the vehicle.

Installation Procedure

1. Install heater outlet hose to the vehicle.

cardiagn.com

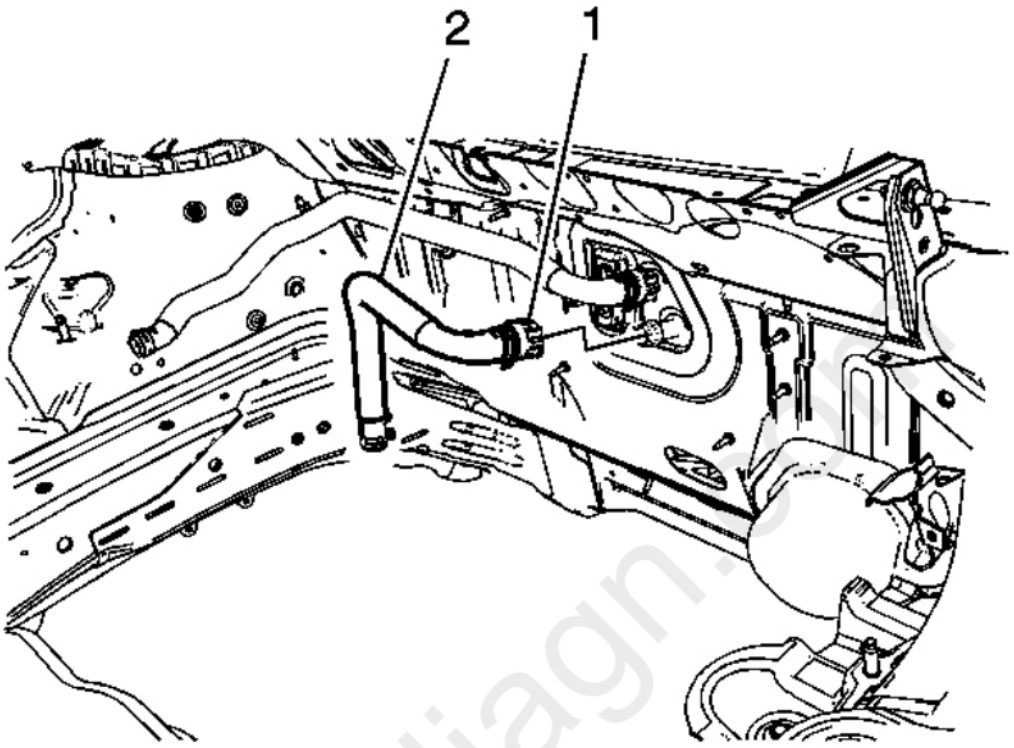


Fig. 61: View Of Heater Outlet Hose At Heater Core Tube
Courtesy of GENERAL MOTORS CORP.

NOTE: Lubricate the inside diameters of the hose with clean coolant prior to installation.

2. Install the heater outlet hose (2) to the heater core.

cardiagn.com

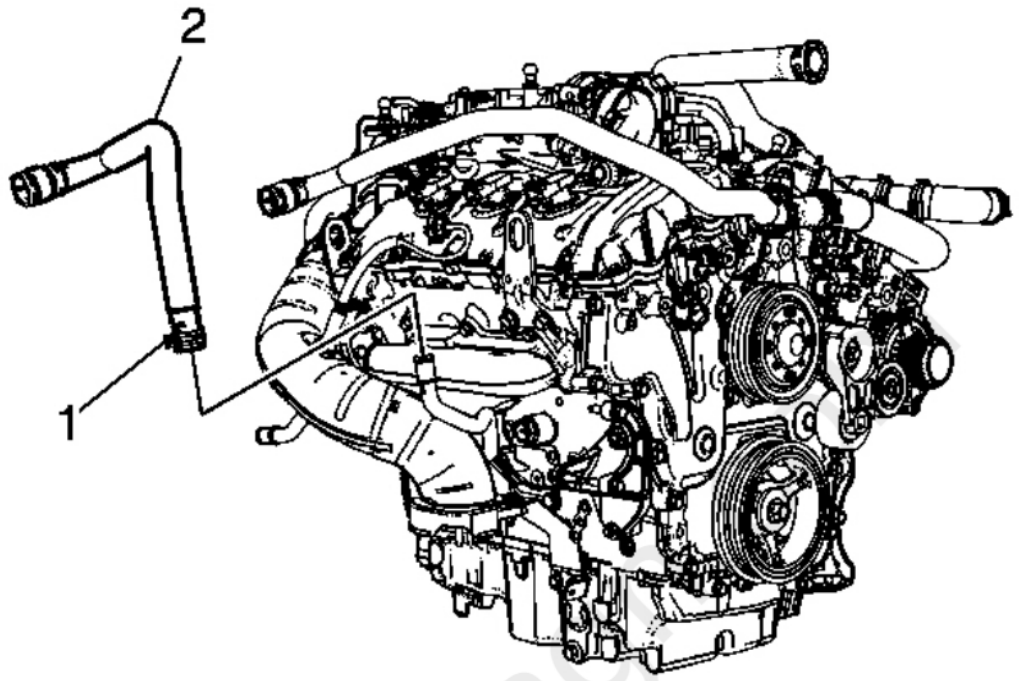


Fig. 62: View Of Heater Outlet Hose
Courtesy of GENERAL MOTORS CORP.

3. Install the heater outlet hose (2) to the engine.
4. Engage tension on the heater outlet hose clamp (1) at the engine using **BOB 38185:** Hose Clamp Pliers.
5. Install the intake manifold cover. Refer to **Intake Manifold Cover Replacement**
6. Fill the cooling system. Refer to **Cooling System Draining and Filling - Vac-N-Fill (GE 47716)** or **Cooling System Draining and Filling (Static Fill LAU)**

HEATER CORE OUTLET TUBE REPLACEMENT

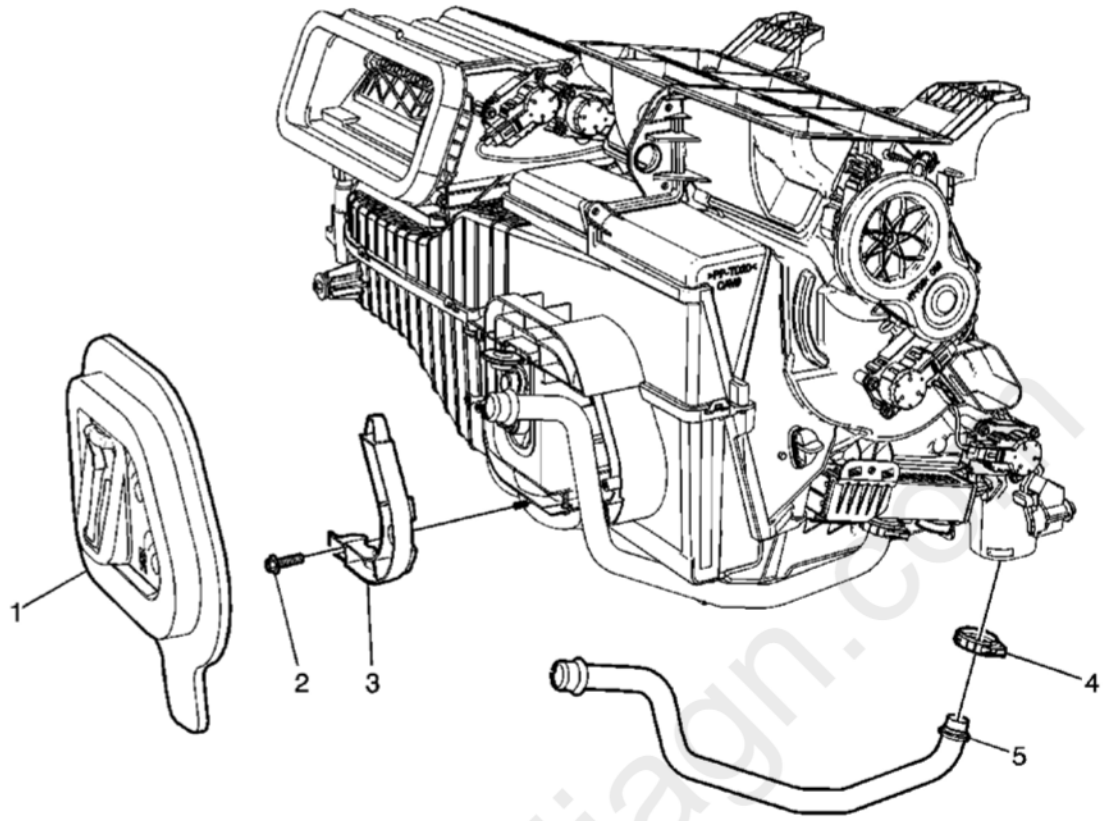


Fig. 63: View Of Heater Core Outlet Tube
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the heater and air conditioning evaporator case. Refer to **Heater and Air Conditioning Evaporator Module Replacement**.	
1	Heater Outlet Tube Boot
2	Bracket Heater Core Outlet Tube Bolt **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2.5 N.m (23 lb in)
3	Heater Core Outlet Tube Brace
4	Heater Core Outlet Tube Clamp
5	Heater Core Outlet Tube

HEATER CORE INLET TUBE REPLACEMENT

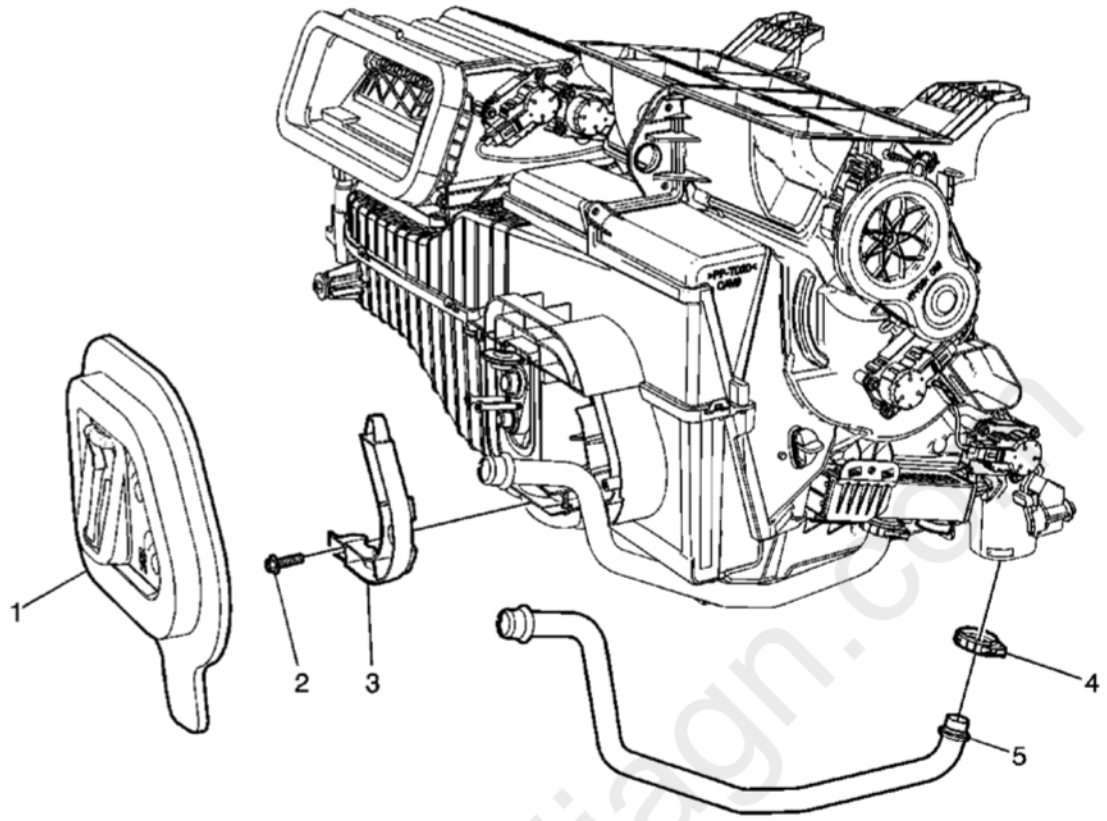


Fig. 64: Identifying Heater Core Inlet Tube
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the heater and air conditioning evaporator case. Refer to **Heater and Air Conditioning Evaporator Module Replacement**.	
1	Heater Outlet Tube Boot
2	Bracket Heater Core Inlet Tube Bolt **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2.5 N.m (23 lb in)
3	Heater Core Outlet Tube Brace
4	Heater Core Outlet Tube Clamp
5	Heater Core Outlet Tube

HEATER INLET HOSE CONNECTOR REPLACEMENT (LF1)

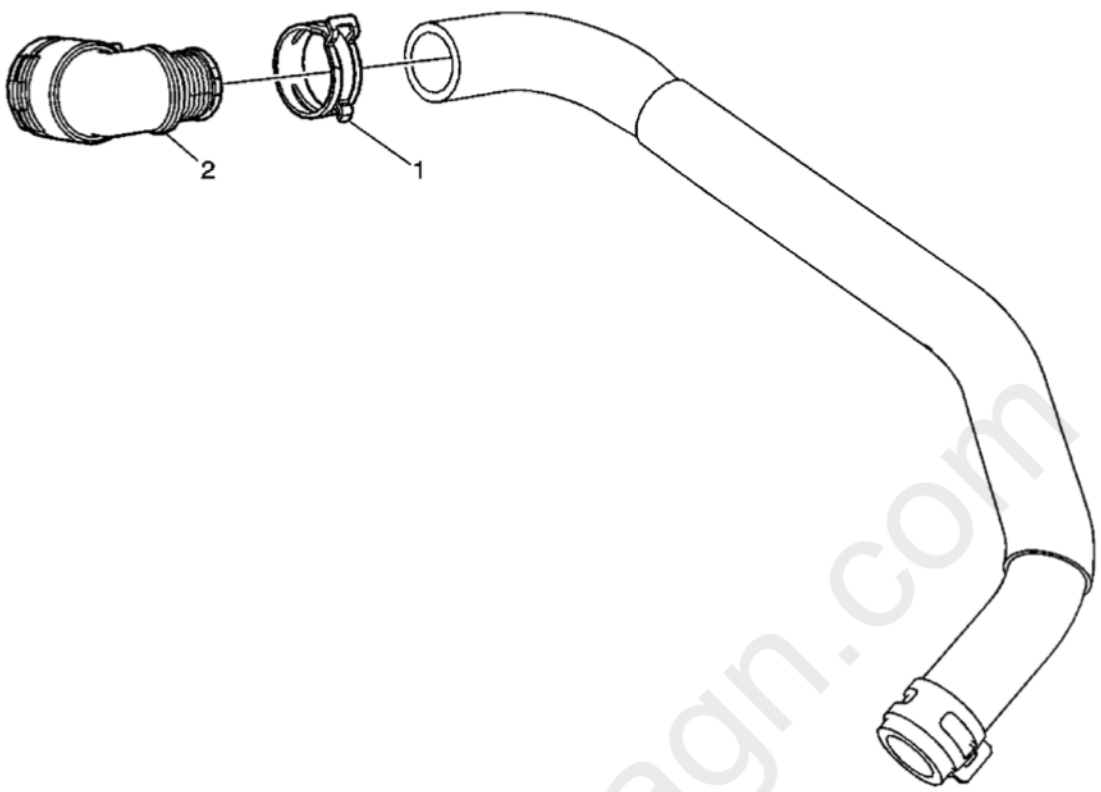


Fig. 65: Vie Of Heater Inlet Hose Connector (LF1)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the heater inlet hose from heater core. Refer to **Heater Outlet Hose Replacement (LF1)**	
1	Heater Inlet Hose Connector Clamp **Procedure:** Reposition heater inlet hose connector clamp using **BOB 38185:** Hose Clamp Pliers. **Special Tools:** **BOB 38185:** Hose Clamp Pliers For equivalent regional tools. Refer to **Special Tools**
2	Heater Inlet Hose Connector

HEATER INLET HOSE CONNECTOR REPLACEMENT (LAU)

cardiagn.com

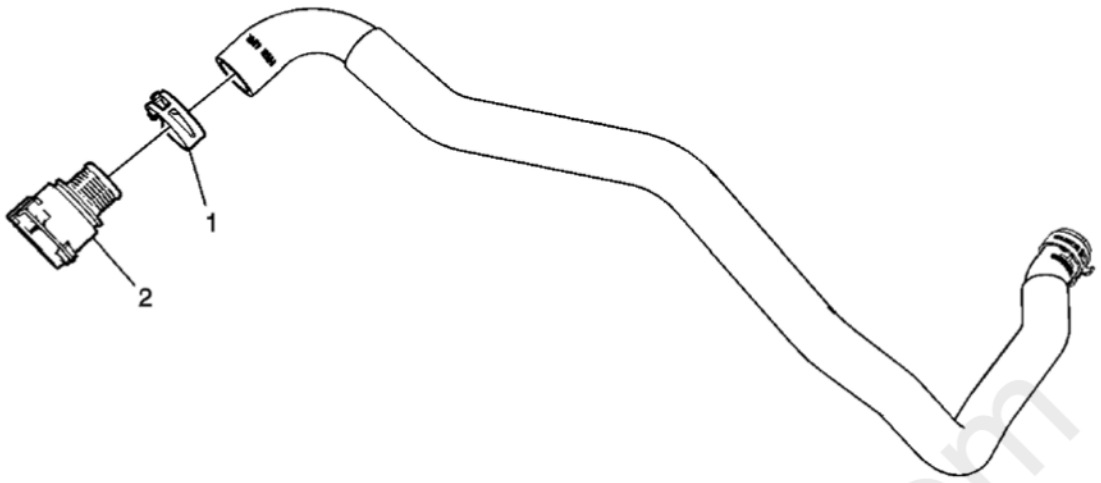


Fig. 66: Vie Of Heater Inlet Hose Connector (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the heater inlet hose from heater core. Refer to **Heater Outlet Hose Replacement (LAU)**	
1	Heater Inlet Hose Connector Clamp **Procedure:** Reposition heater inlet hose connector clamp using **BOB 38185:** Hose Clamp Pliers. **Special Tools:** **BOB 38185:** Hose Clamp Pliers For equivalent regional tools. Refer to **Special Tools**
2	Heater Inlet Hose Connector

HEATER OUTLET HOSE CONNECTOR REPLACEMENT (LF1)

cardiagn.com

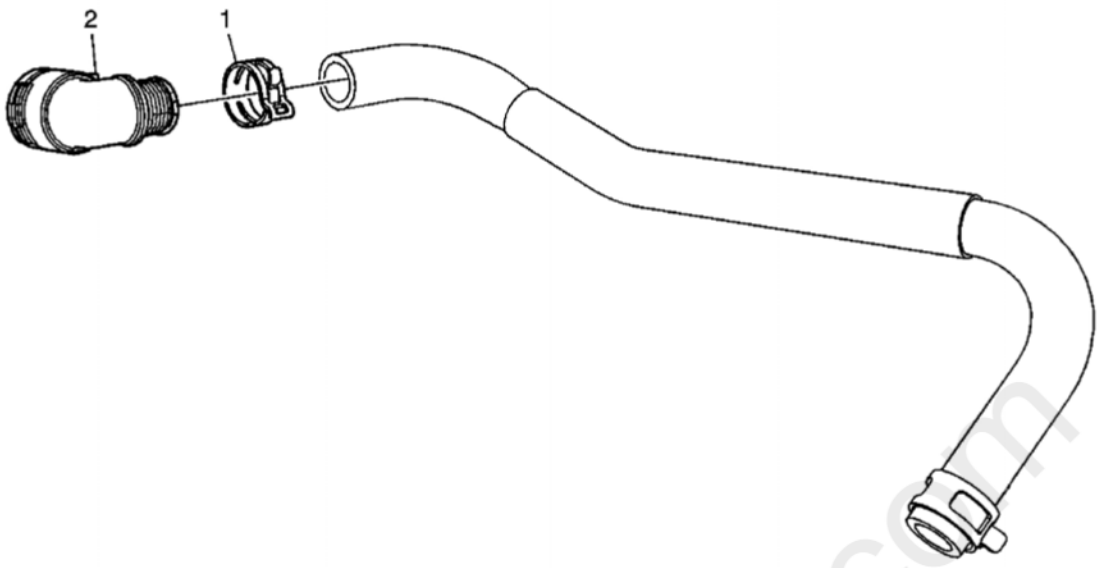


Fig. 67: Vie Of Heater Outlet Hose Connector (LF1)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the heater outlet hose from heater core. Refer to **Heater Outlet Hose Replacement (LF1)**	
1	Heater Outlet Hose Connector Clamp **Procedure:** Reposition heater outlet hose connector clamp using **BOB 38185:** Hose Clamp Pliers. **Special Tools:** **BOB 38185:** Hose Clamp Pliers For equivalent regional tools. Refer to **Special Tools**
2	Heater Outlet Hose Connector

HEATER OUTLET HOSE CONNECTOR REPLACEMENT (LAU)

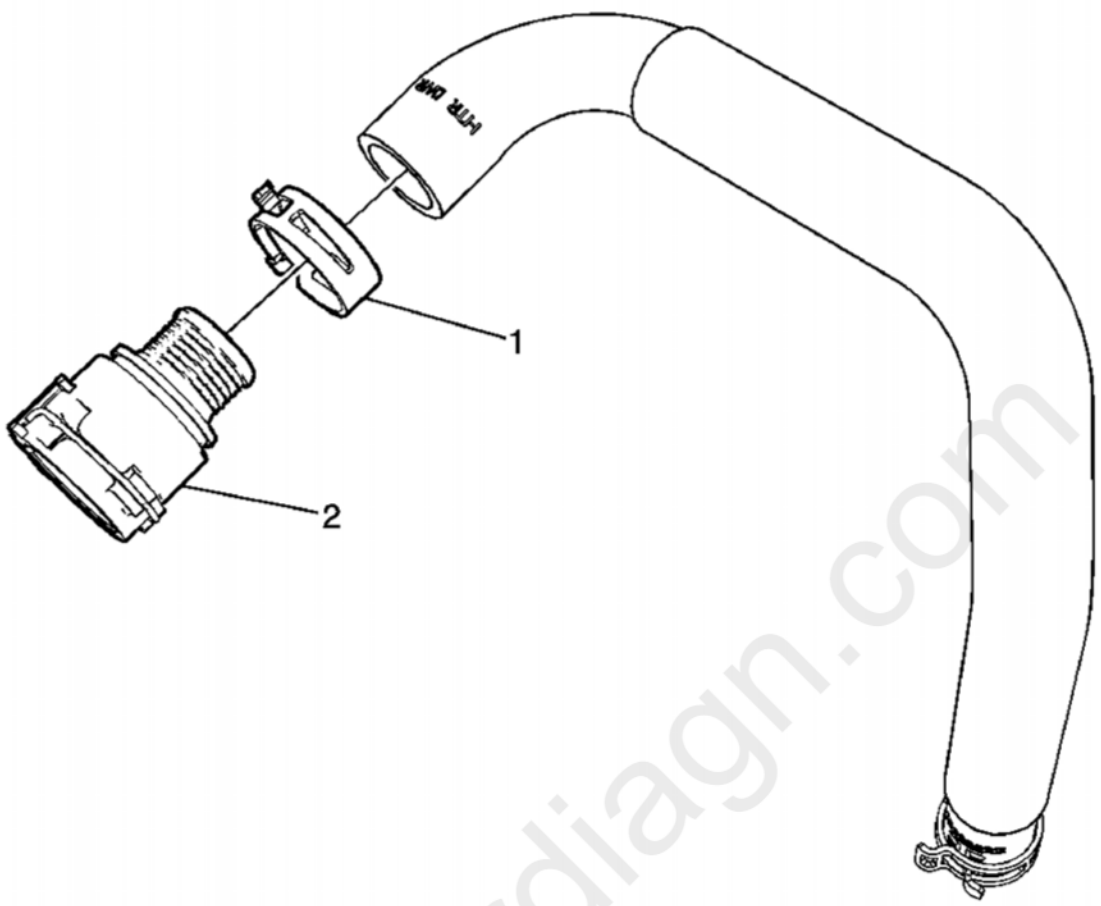


Fig. 68: Vie Of Heater Outlet Hose Connector (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the heater outlet hose from heater core. Refer to **Heater Outlet Hose Replacement (LAU)**	
1	Heater Outlet Hose Connector Clamp **Procedure:** Reposition heater outlet hose connector clamp using **BOB 38185:** Hose Clamp Pliers. **Special Tools:** **BOB 38185:** Hose Clamp Pliers For equivalent regional tools. Refer to **Special Tools**
2	Heater Outlet Hose Connector

PASSENGER COMPARTMENT AIR FILTER REPLACEMENT

cardiagn.com

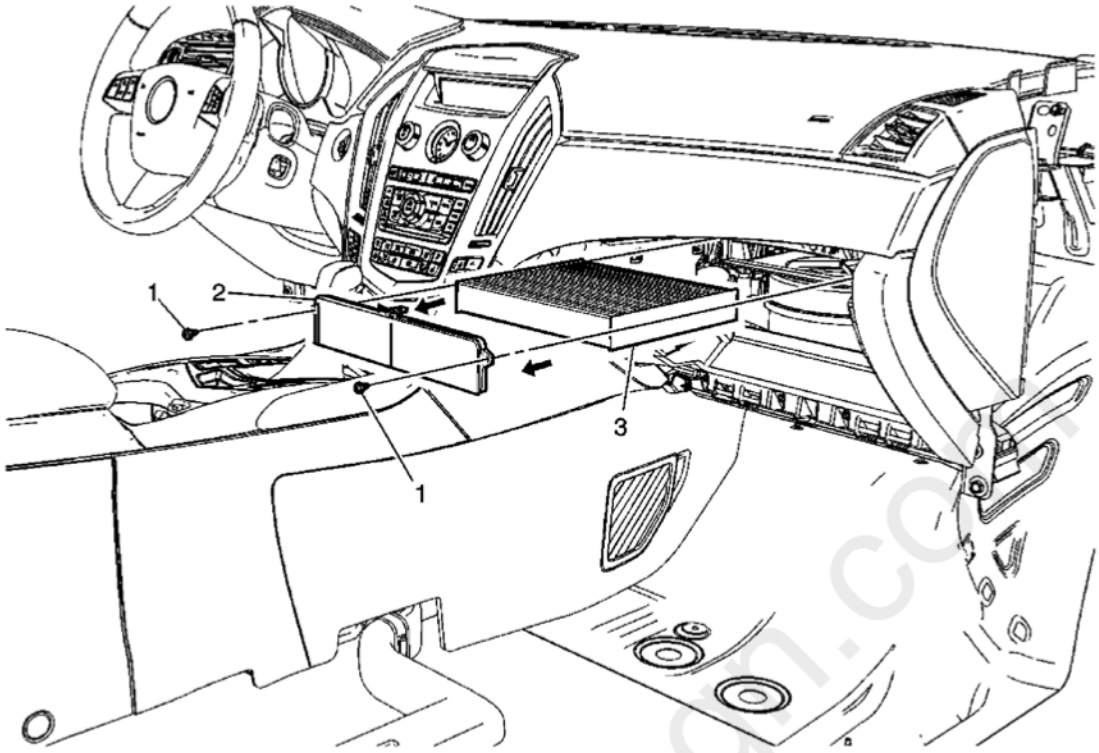


Fig. 6 : Identifying Passenger Compartment Air Filter
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove instrument panel compartment. Refer to **Instrument Panel Compartment Replacement** .	
1	Passenger Compartment Air Filter Service Lid Retainer (Qty: 3) **Procedure:** Release the retainer and open the service lid.
2	Passenger Compartment Air Filter Lid
3	Passenger Compartment Air Filter

AIR INLET HOUSING REPLACEMENT

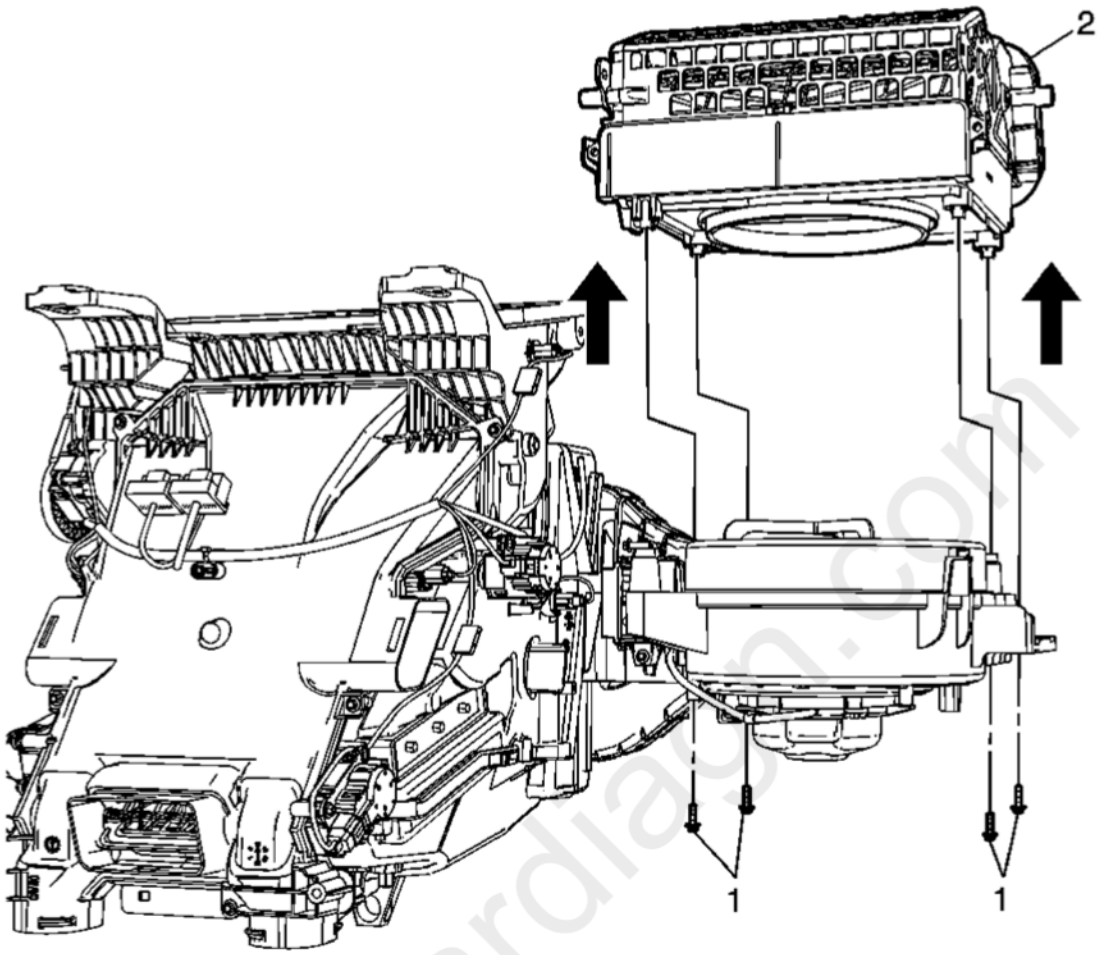


Fig. 7 : View Of Air Inlet Housing
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Remove the eater and Air Conditioning vaporator and lower odule. Refer to **Heater and Air Conditioning Evaporator Module Replacement**. 2. Disconnect the electrical connectors as necessary.	
1	Air Inlet ousing Fastener (Qty:) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2. N.m (23 lb in)
2	Air Inlet ousing

BLOWER MOTOR REPLACEMENT

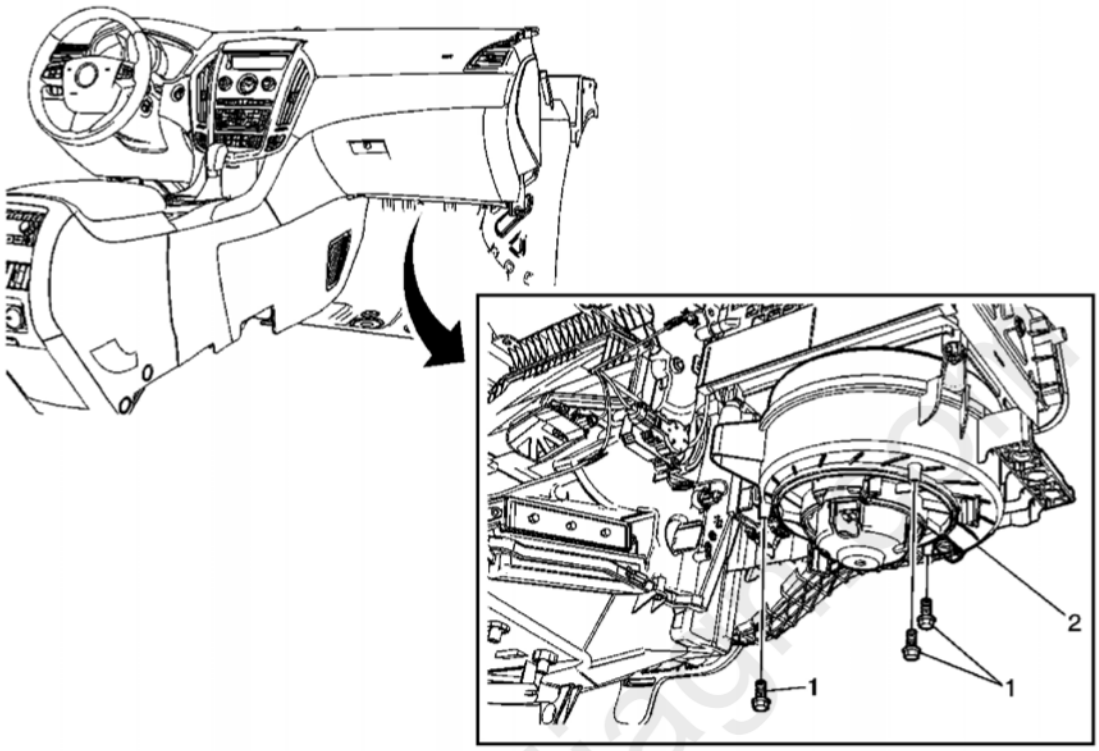


Fig. 7 : Identifying Blower Motor
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the instrument panel (I P) insulator panel right side. Refer to **Instrument Panel Insulator Panel Replacement - Right Side** . 2. Disconnect the blower motor electrical connector.	
1	lower otor Fastener (Qty: 3) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 1. N.m (1 lb in)
2	lower otor

INSTRUMENT PANEL OUTER AIR OUTLET REPLACEMENT - LEFT SIDE

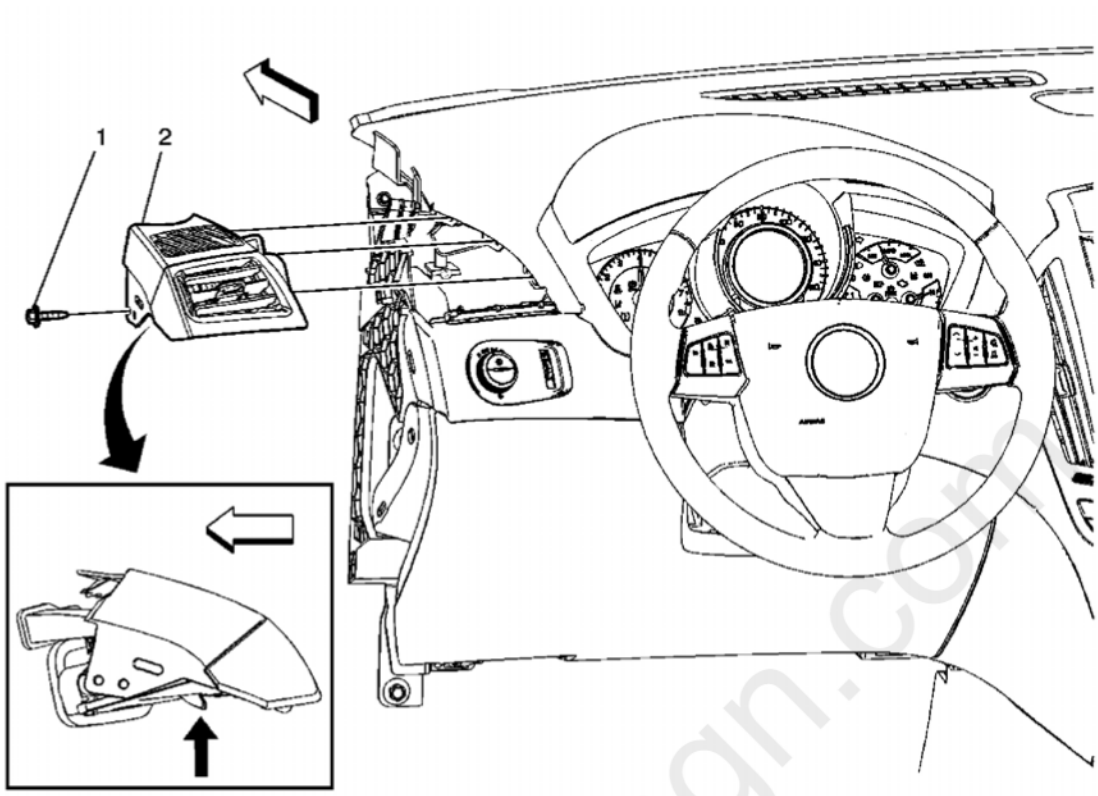


Fig. 7 : Identifying Instrument Panel Outer Air Outlet - Left Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the Instrument Panel eft Instrument Panel ide rim Panel. Refer to **Instrument Panel Side Trim Panel Replacement** .	
1	Instrument Panel Outer Air Outlet Fastener **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2. N.m (22 lb in)
2	Instrument Panel Outer Air Outlet Assembly **Procedure** 1. Reach through the opening in the end of the instrument panel and depress the tabs on the bottom of the air outlet assembly. 2. While depressing the tabs, pull the air outlet assembly outward releasing it from the instrument panel.

INSTRUMENT PANEL CENTER AIR OUTLET REPLACEMENT

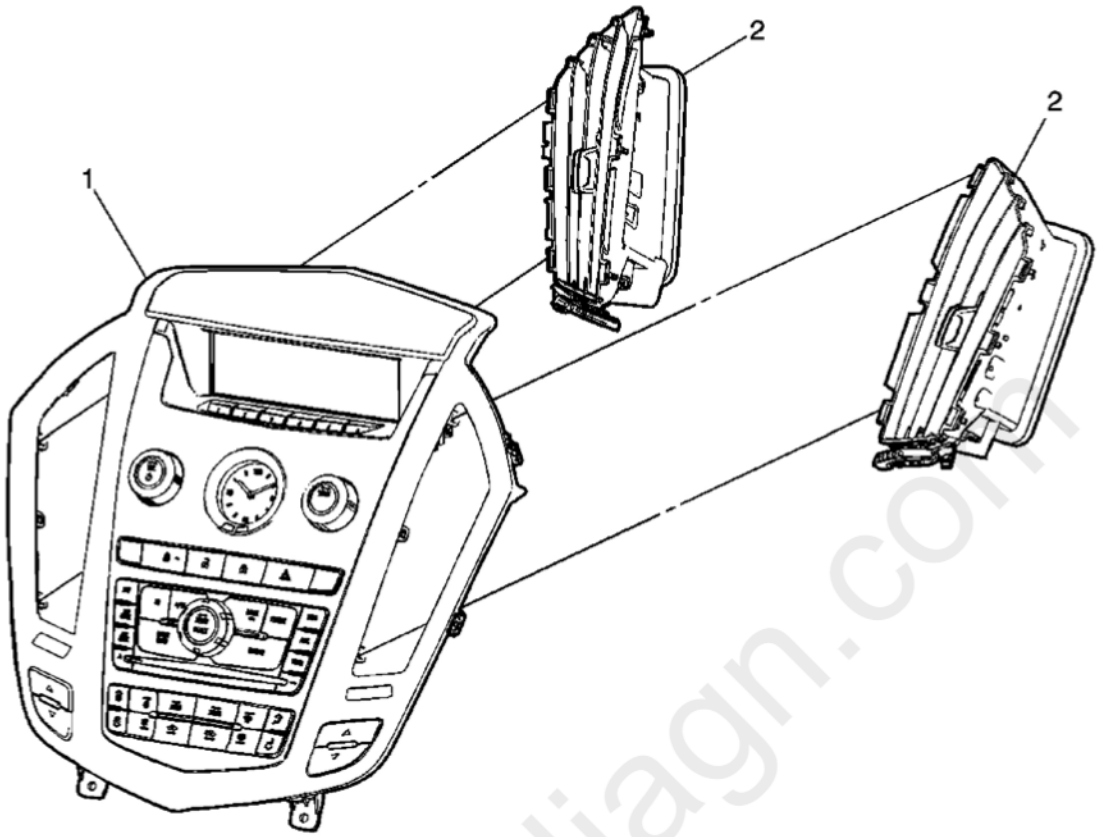


Fig. 7 : View Of Instrument Panel Center Air Outlet
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Radio Control Assembly Refer to **Radio Control Assembly Replacement**
2	Instrument Panel Center Air Outlet Assembly **Procedure:** Unsnap the air outlet assemblies from the radio control assembly.

INSTRUMENT PANEL OUTER AIR OUTLET REPLACEMENT - RIGHT SIDE

cardiagn.com

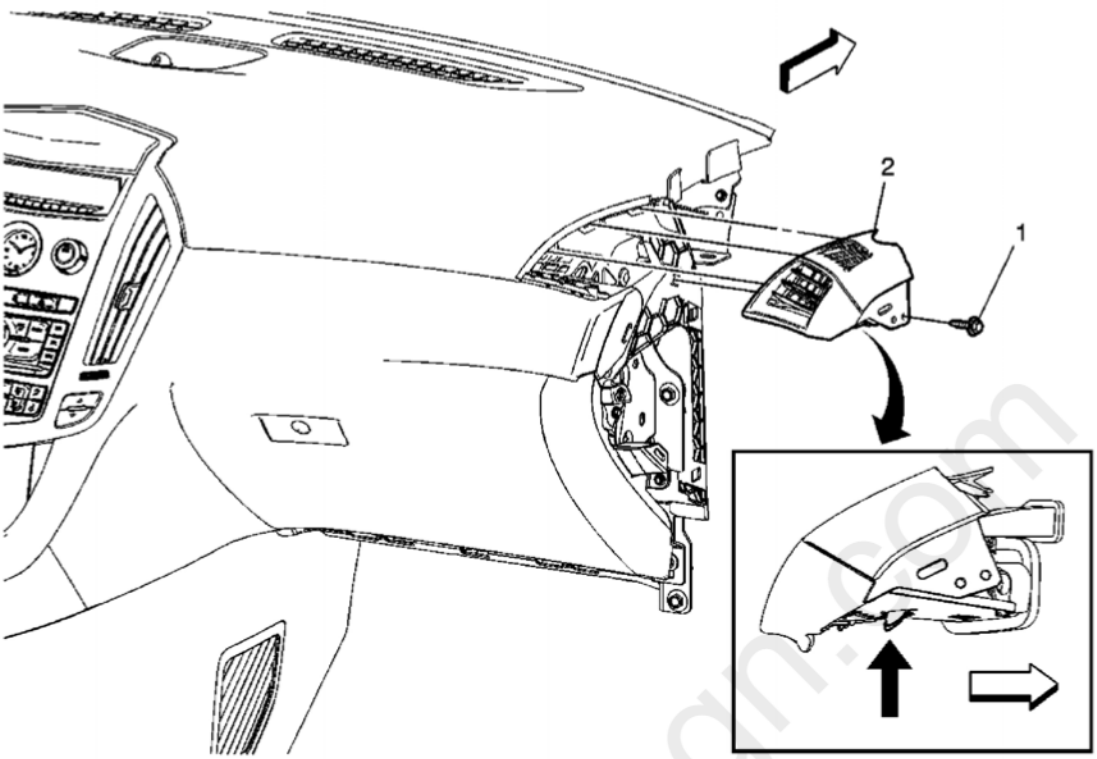


Fig. 7 : View Of Instrument Panel Outer Air Outlet - Right Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the Instrument Panel Right Instrument Panel ide rim Panel. Refer to **Instrument Panel Side Trim Panel Replacement** .	
1	Instrument Panel Outer Air Outlet Fastener **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2. N.m (22 lb in)
2	Instrument Panel Outer Air Outlet Assembly **Procedure** 1. Reach through the opening in the end of the instrument panel and depress the tabs on the bottom of the air outlet assembly. 2. While depressing the tabs, pull the air outlet assembly outward releasing it from the instrument panel.

INSTRUMENT PANEL COMPARTMENT AIR AND RADIO COOLING DUCT REPLACEMENT

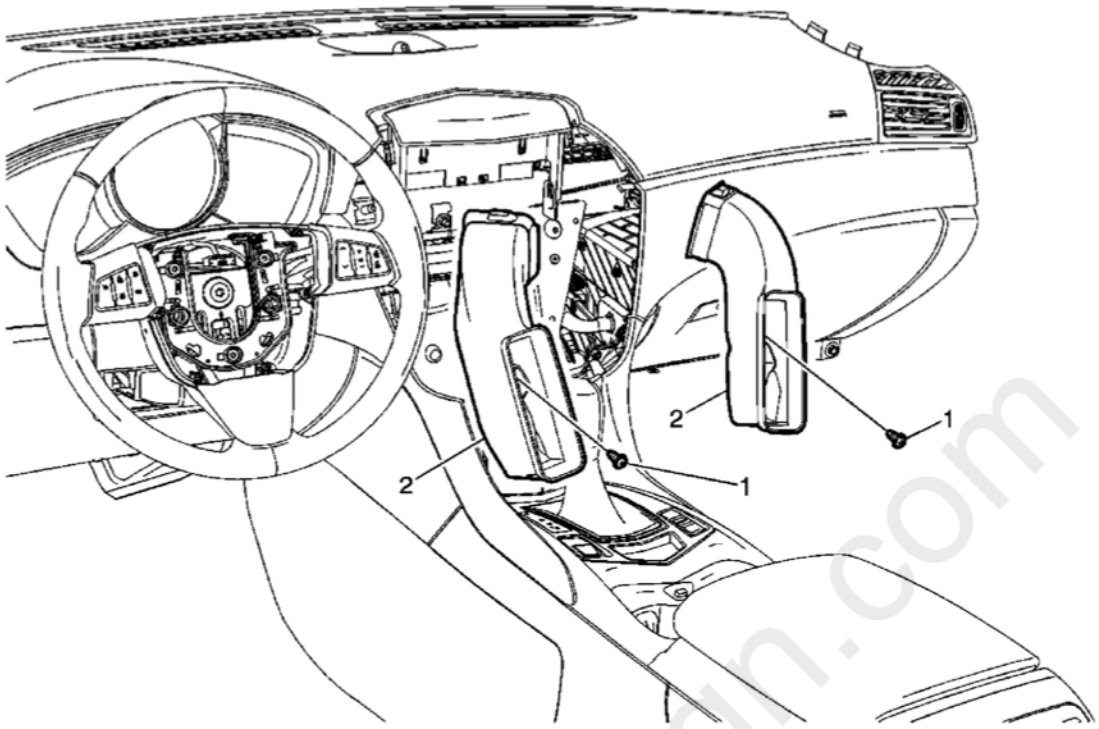


Fig. 75: View Of Instrument Panel Compartment Air and Radio Cooling Duct
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the radio control. Refer to **Radio Control Assembly Replacement** . 2. Disconnect the blower motor electrical connector.	
1	Instrument Panel Compartment Air and Radio Cooling Duct Fastener (Qty: 2) **CAUTION:** **Refer to Fastener Caution .**
2	Instrument Panel Compartment Air and Radio Cooling Duct

FLOOR FRONT AIR OUTLET DUCT REPLACEMENT

cardiagn.com

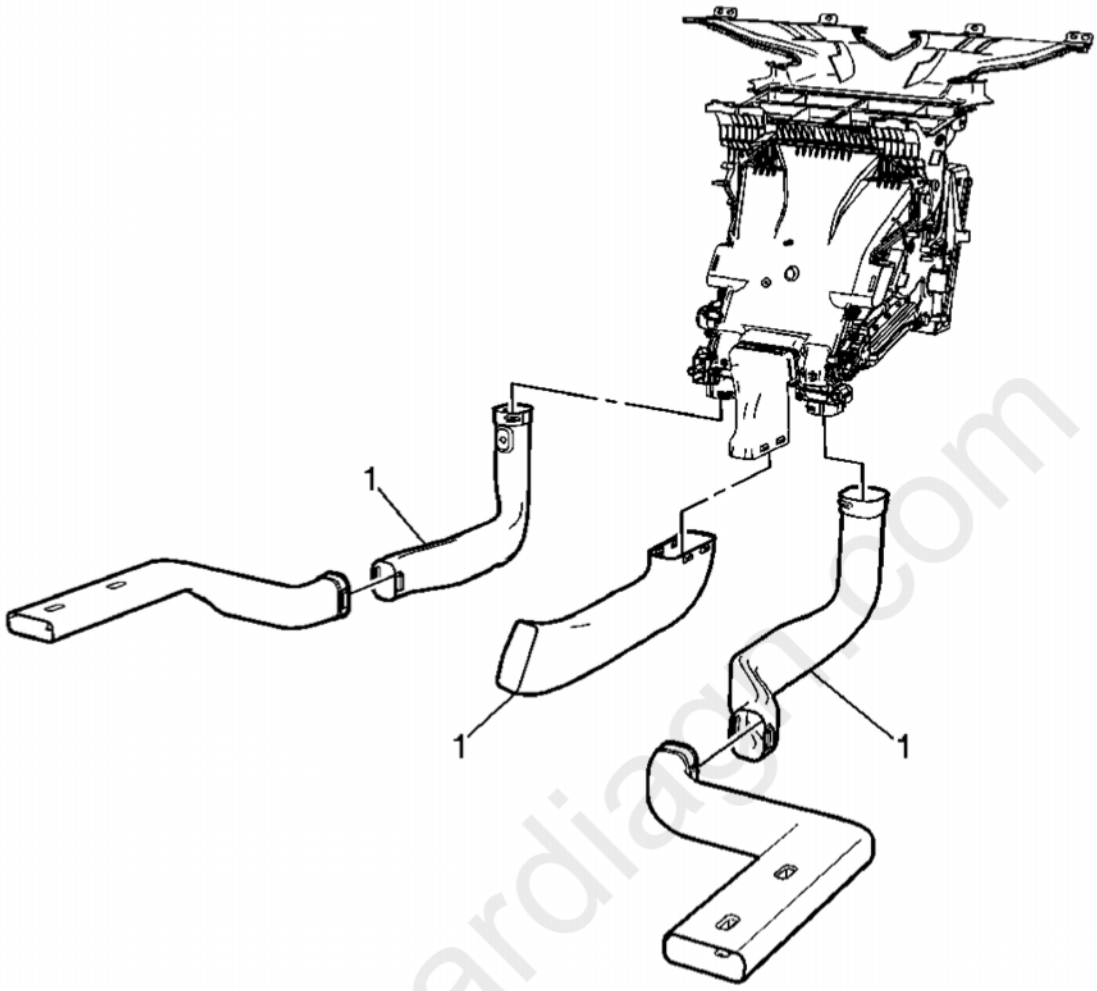


Fig. 76: View Of Floor Front Air Outlet Duct
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the front floor console. Refer to **Floor Front Air Outlet Duct Replacement**.	
1	Front Floor Console Front Air Duct (Qty: 3) Disconnect and transfer sensor on left duct, if equipped.

FRONT FLOOR CONSOLE REAR AIR OUTLET REPLACEMENT

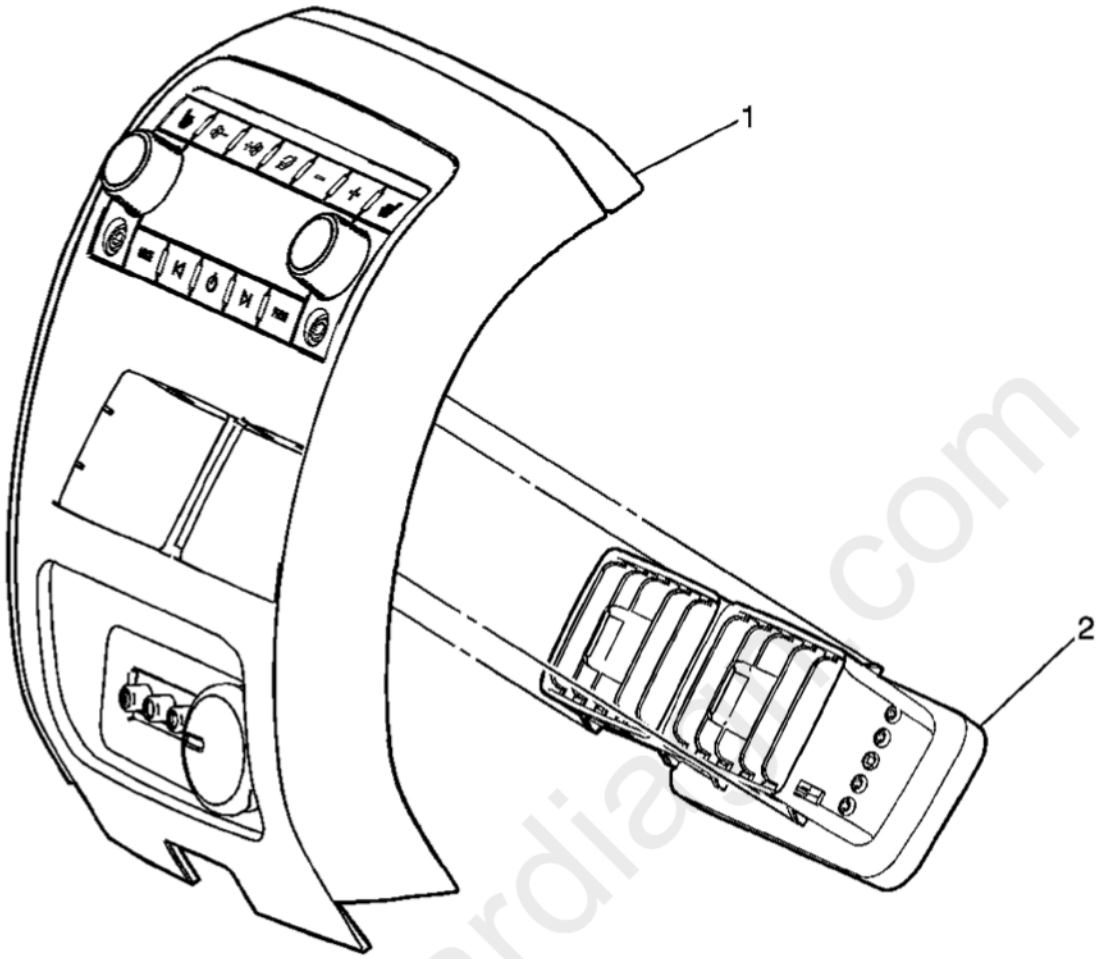


Fig. 77: View Of Front Floor Console Rear Air Outlet
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Front Floor Console Upper Cover Refer to **Front Floor Console Rear Trim Panel Replacement - Upper** .
2	Front Floor Console Rear Air Outlet Assembly **Procedure:** Unsnap the rear air outlet assembly from the front floor console upper rear cover.

WINDSHIELD DEFROSTER NOZZLE GRILLE REPLACEMENT

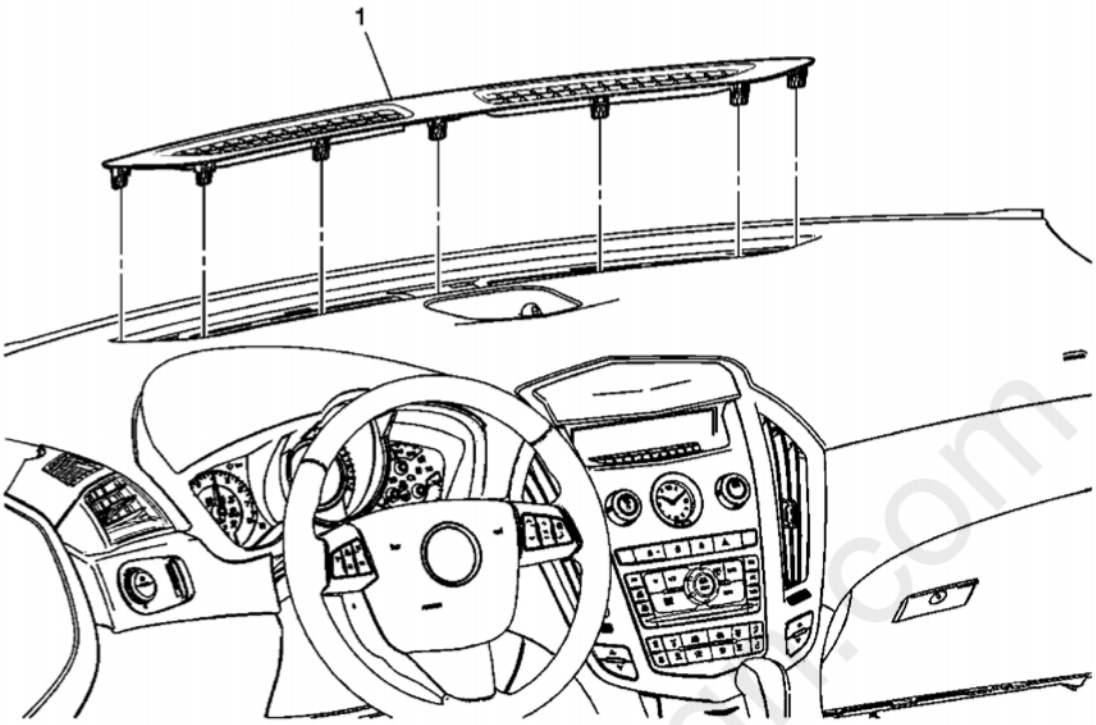


Fig. 78: View Of Windshield Defroster Nozzle Grille
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
1	Windshield Defroster Nozzle Grille Assembly **Procedure** 1. Use a flat bladed plastic trim tool in order to release the retainer clips securing the windshield defroster nozzle grille to the instrument panel assembly. 2. When reinstalling the defroster nozzle grille start the installation at the left side of the vehicle and work to the right side of the vehicle. Do not begin the installation from the center.

WINDSHIELD DEFROSTER NOZZLE DUCT REPLACEMENT

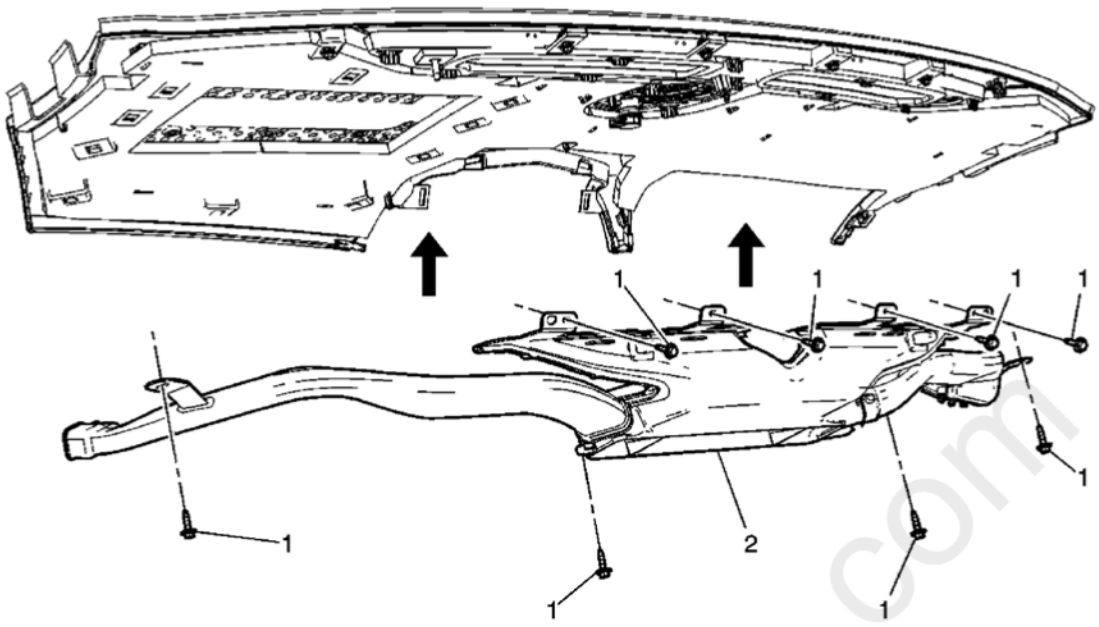


Fig. 79: View Of Windshield Defroster Nozzle Duct
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the instrument panel assembly. Refer to **Instrument Panel Assembly Removal** . 2. Remove the air distributor duct. Refer to **Air Distributor Duct Replacement**	
1	Windshield Defroster Nozzle Duct Fasteners (Qty: 8) **CAUTION:** **Refer to Fastener Caution .**
2	Windshield Defroster Nozzle Duct

AIR DISTRIBUTOR DUCT REPLACEMENT

cardiagn.com

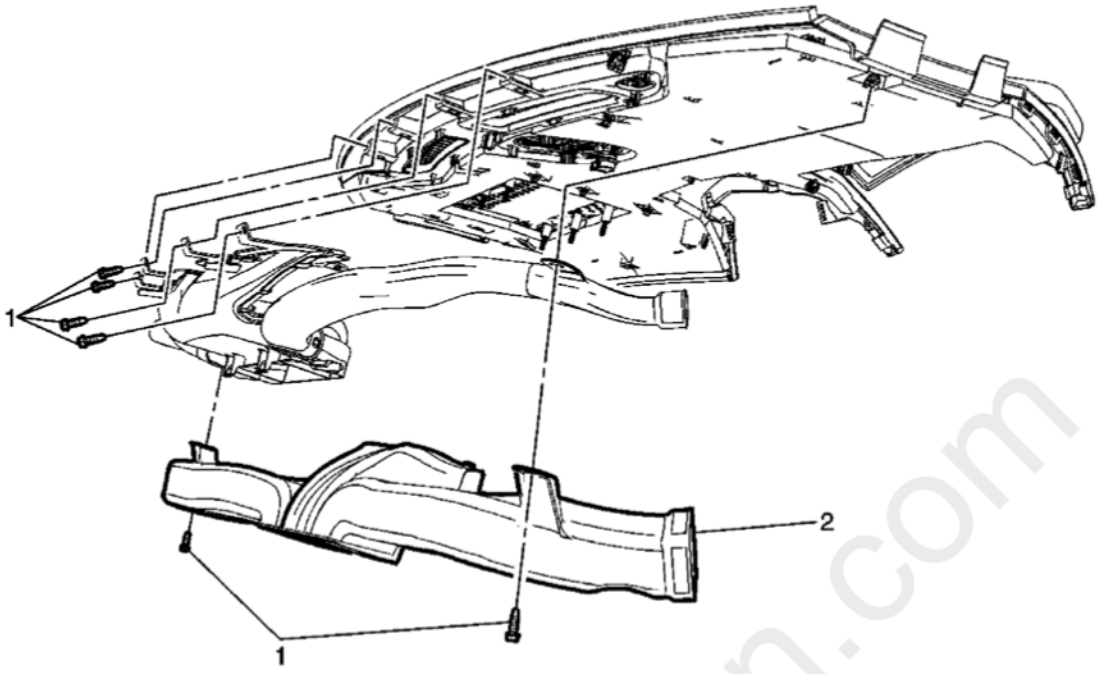


Fig. 8 : Identifying Air Distributor Duct
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Remove the Instrument panel assembly. Refer to **Instrument Panel Assembly Remo al** . 2. Reposition any wiring or hoses to gain access to air duct.	
1	Air Distributor Duct Screw (Qty: 6) **Tighten:** 1.5 N.m (13.2 lb in)
2	Air Distributor Duct

SIDE WINDOW DEFOGGER OUTLET DUCT REPLACEMENT - LEFT SIDE

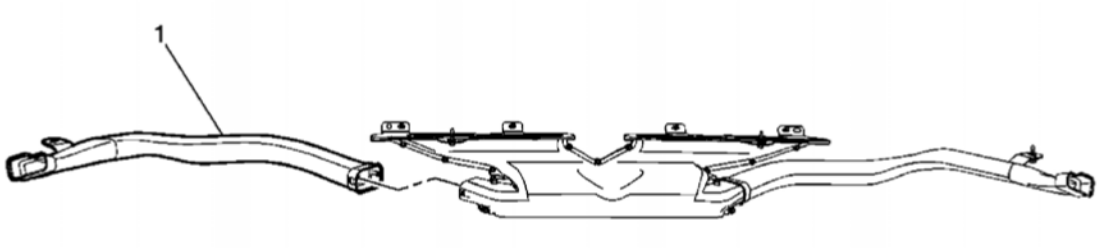


Fig. 81: Identifying Side Window Defogger Outlet Duct - Left Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the instrument panel assembly. Refer to **Instrument Panel Assembly Remo al** .	
1	Side indow Defogger Outlet Duct-Left **Procedure** 1. Remove the indshield Defroster No le Duct Replacement. Refer to **Windshield Defroster No le Duct Replacement** 2. Remove the Side indow Defogger Outlet Duct-Left. 3. Remove the Side indow Defogger Outlet Duct from vehicle.

SIDE WINDOW DEFOGGER OUTLET DUCT REPLACEMENT - RIGHT SIDE

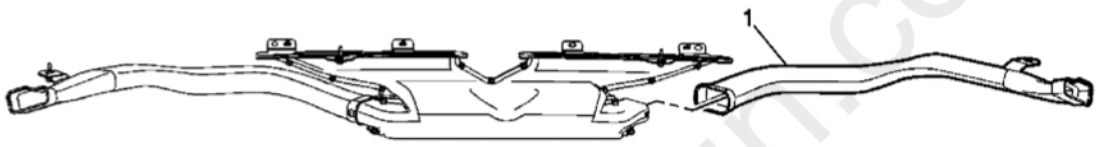


Fig. 8 : Identifying Side Window Defogger Outlet Duct - Right Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the instrument panel assembly. Refer to **Instrument Panel Assembly Remo al** .	
1	Side indow Defogger Outlet Duct-Rightt **Procedure** 1. Remove the indshield Defroster No le Duct Replacement. Refer to **Windshield Defroster No le Duct Replacement** 2. Remove the Side indow Defogger Outlet Duct-Right. 3. Remove the Side indow Defogger Outlet Duct from vehicle.

FLOOR AIR OUTLET DUCT REPLACEMENT - LEFT SIDE

cardiagn.com

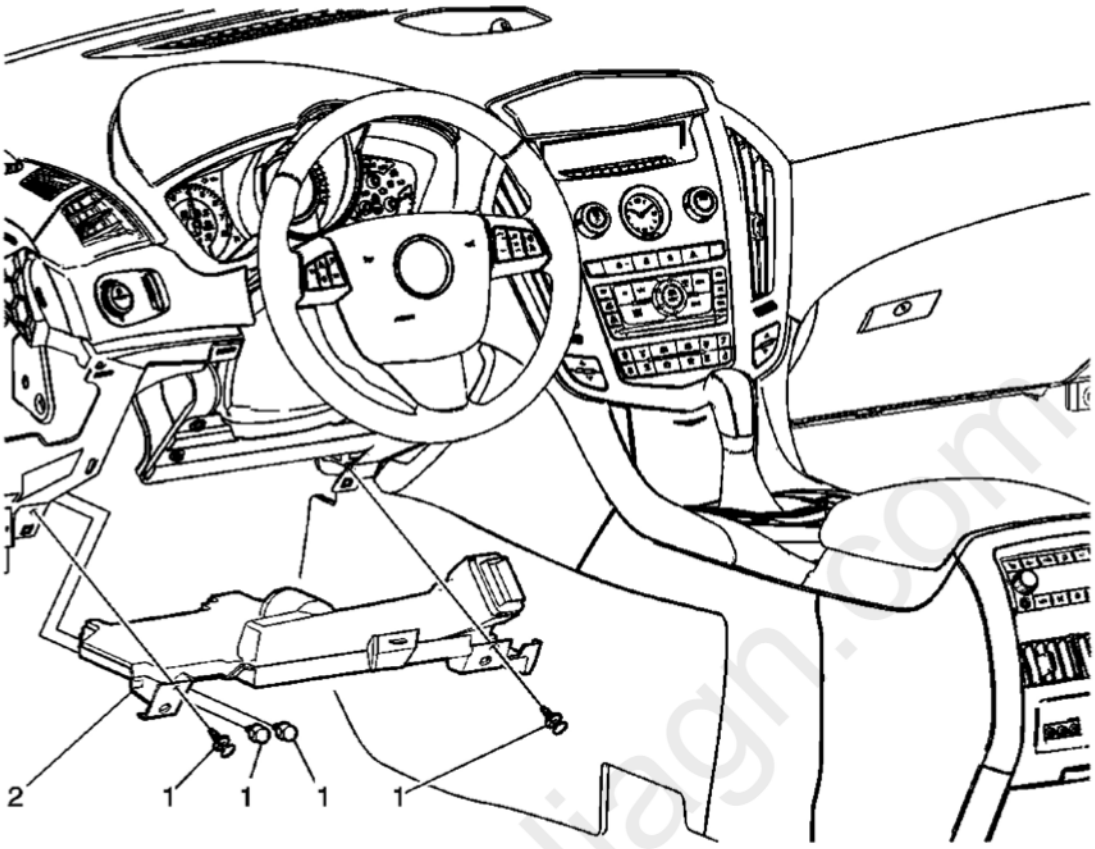


Fig. 8 : View Of Floor Air Outlet Duct - Left Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures 1. Remove the instrument panel insulator panel - left side. Refer to **Instrument Panel Insulator Panel Replacement - Left Side** . 2. Remove the instrument panel lower trim panel. Refer to **Instrument Panel Lower Trim Panel Replacement - Left Side** .	
1	Floor Air Outlet Duct Retainer (Qty: 4)
2	Floor Air Outlet Duct

FLOOR AIR OUTLET DUCT REPLACEMENT - RIGHT SIDE

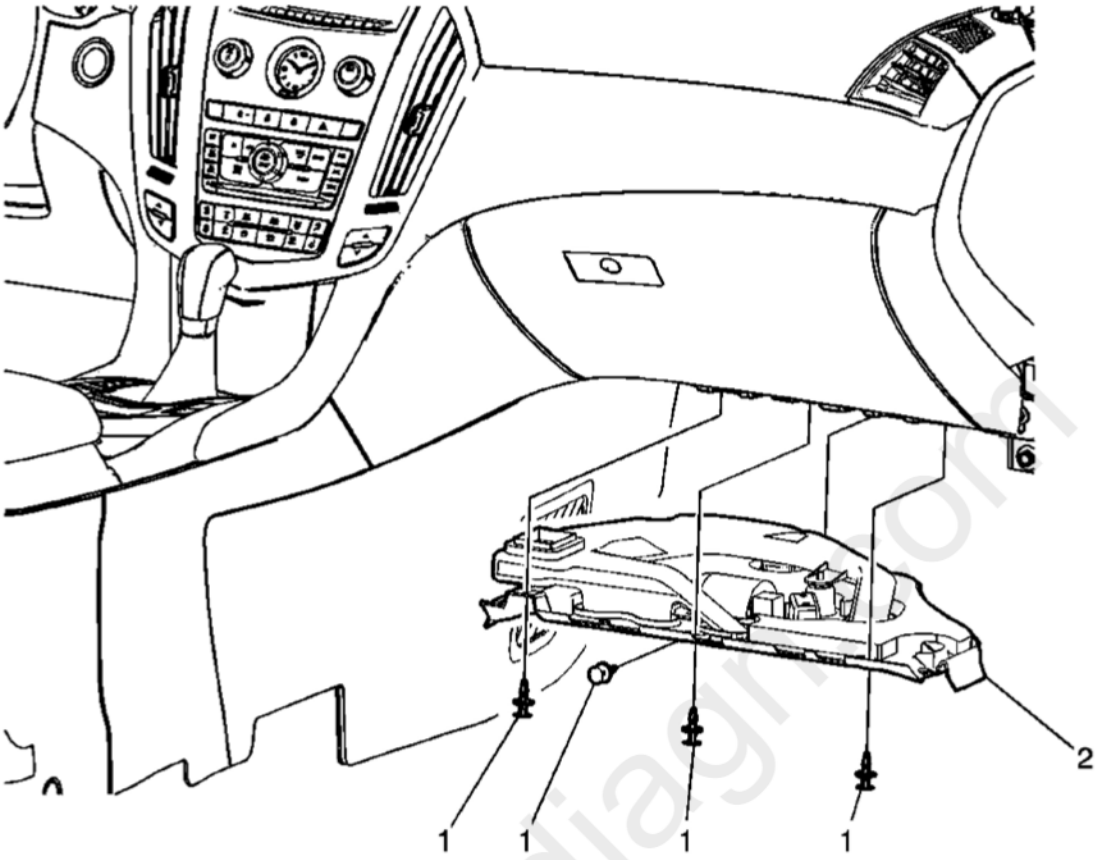


Fig. 8 : View Of Floor Air Outlet Duct - Right Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the instrument panel compartment. Refer to **Instrument Panel Compartment Replacement** .	
1	Remove fasteners (4)
2	Floor Air Outlet Duct

FLOOR REAR AIR OUTLET DUCT REPLACEMENT - LEFT SIDE

cardiagn.com

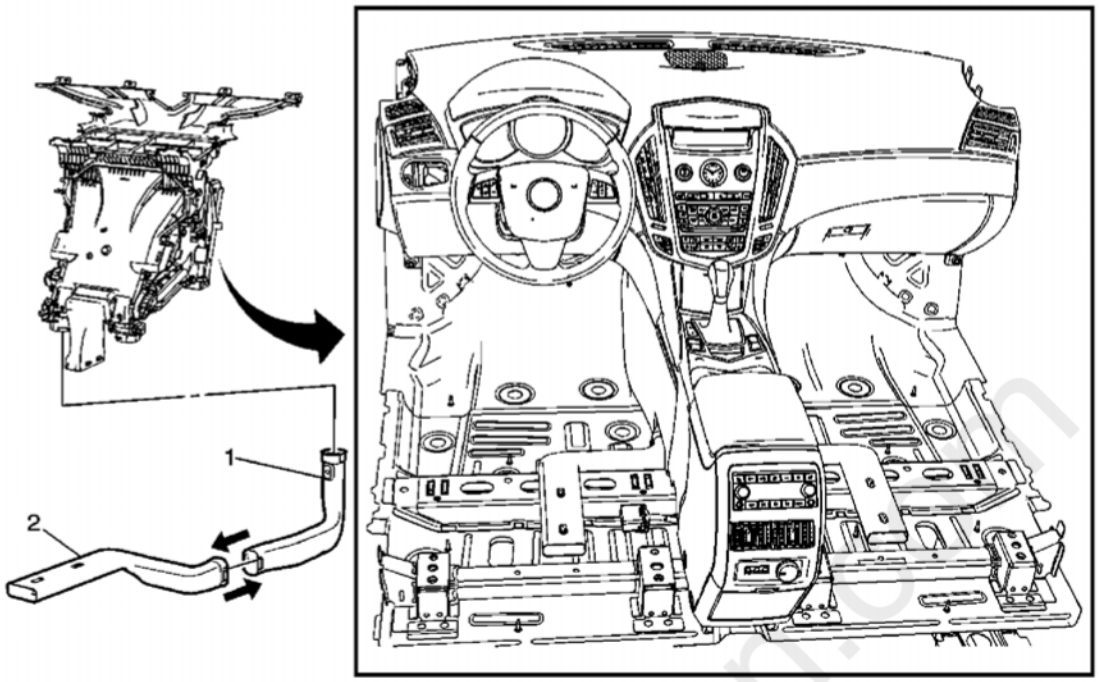


Fig. 8 : View Of Floor Rear Air Outlet Duct - Left Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the front floor carpet. Refer to **Front Floor Panel Carpet Replacement** .	
1	Front Floor Air Outlet Duct
2	Rear Floor Air Outlet Duct

FLOOR REAR AIR OUTLET DUCT REPLACEMENT - RIGHT SIDE

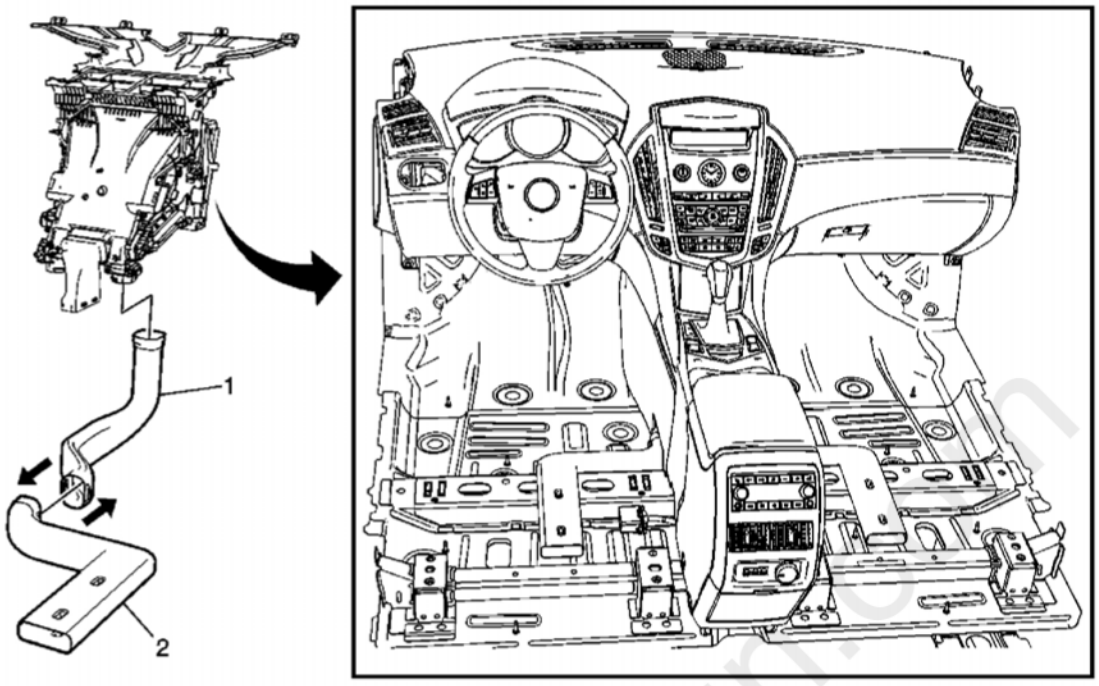


Fig. 86: View Of Floor Rear Air Outlet Duct Replacement - Right Side
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures: Remove the front floor carpet. Refer to **Front Floor Panel Carpet Replacement** .	
1	Front Floor Air Outlet Duct
2	Rear Floor Air Outlet Duct

HEATER CORE REPLACEMENT

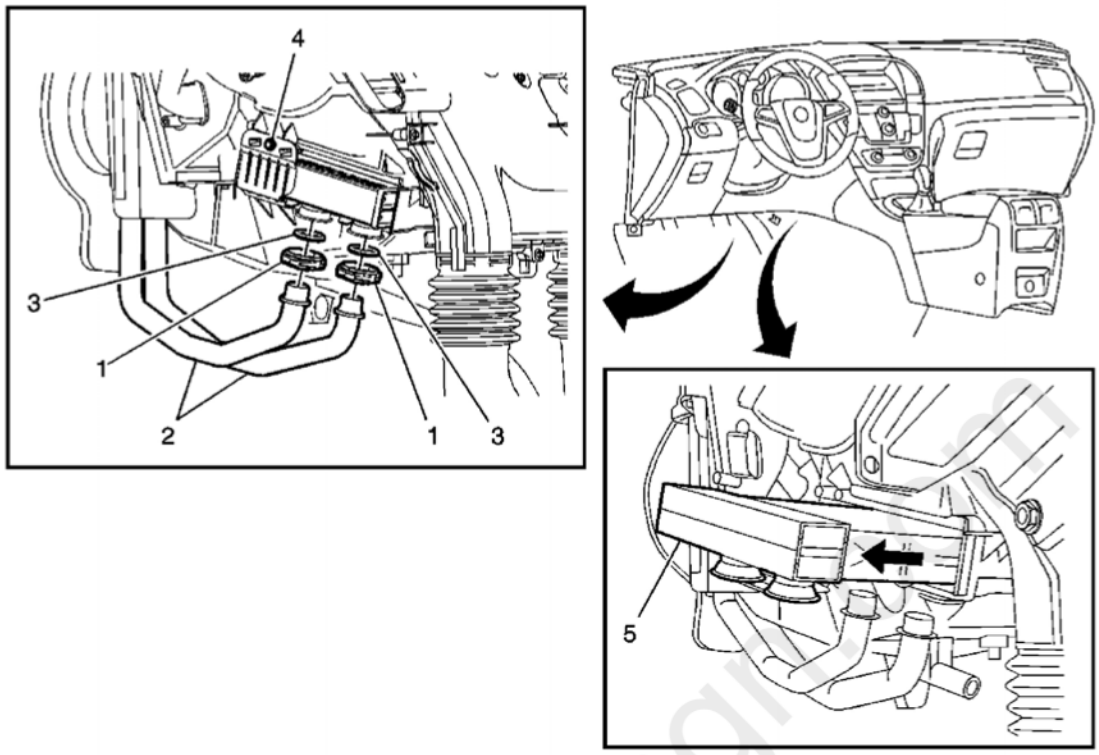


Fig. 87: Identifying Heater Core
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the instrument panel (I/P) insulator panel - left side. Refer to **Instrument Panel Insulator Panel Replacement - Left Side** . 2. Remove the instrument panel (I/P) lower trim panel. Refer to **Instrument Panel Lower Trim Panel Replacement - Left Side** . 3. Remove the heater inlet hose from the heater core tube. Refer to **Heater Inlet Hose Replacement (LF1)** or **Heater Inlet Hose Replacement (LAU)**. 4. Remove the heater outlet hose from the heater core tube. Refer to **Heater Outlet Hose Replacement (LF1)** or **Heater Outlet Hose Replacement (LAU)**.	
1	Heater Core Tube Clamp (Qty: 2)
2	Heater Core Tube Assembly **Tip:** Coolant may still be in the heater core, collect coolant or blow out heater core with compressed air.
3	Heater Core Tube Seal (Qty: 2)
4	Heater Core Bracket Fastener **CAUTION:**

	Refer to Fastener Caution . **Tighten:** 1.4 N.m (12 lb in)
5	Heater Core **Procedure:** Pull out the heater core.

AUXILIARY BLOWER MOTOR REPLACEMENT

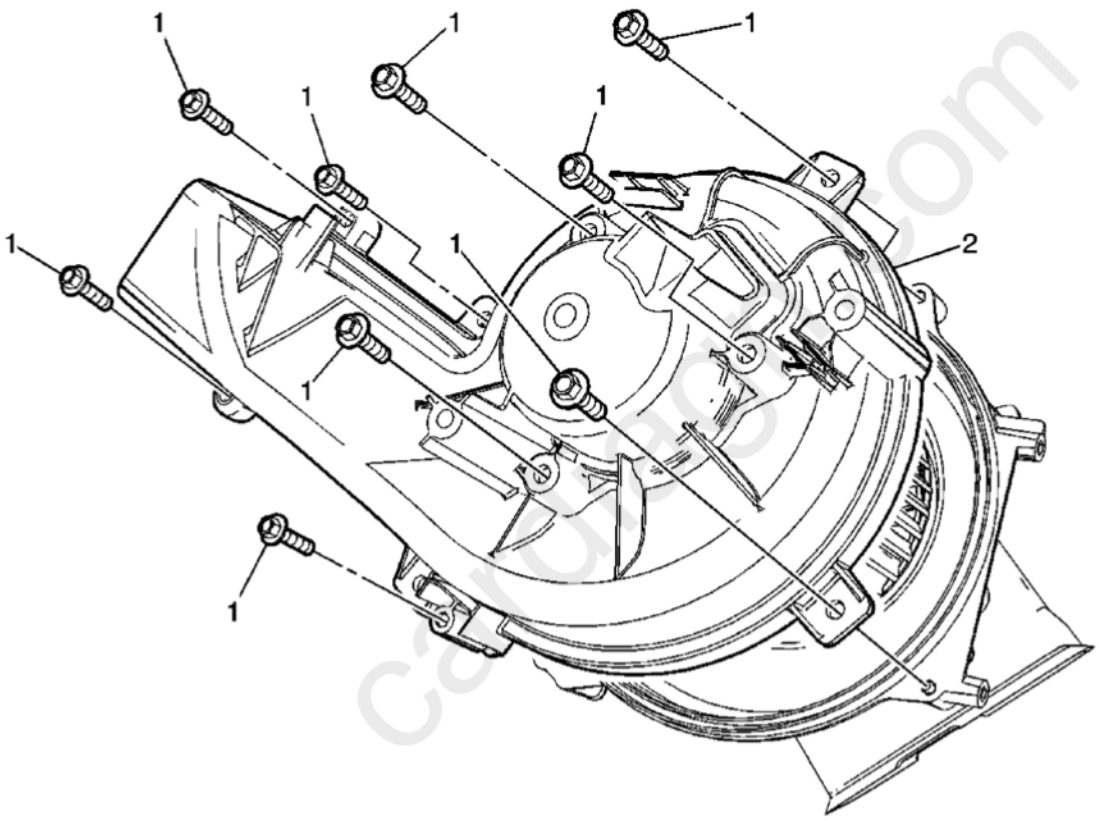


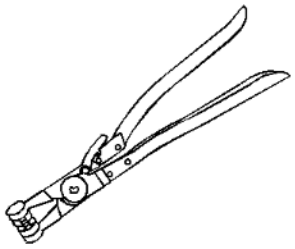
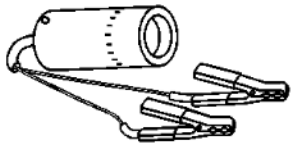
Fig. 88: View Of Auxiliary Blower Motor & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the Floor console. Refer to **Front Floor Console Replacement** . 2. Disconnect all electrical connector. 3. Remove front floor air outlet duct. Refer to **Floor Front Air Outlet Duct Replacement** 4. Remove the blower motor bracket fastener at bottom of blower assembly.	
	Auxilliary Blower Motor Fastener (Qty: 9)

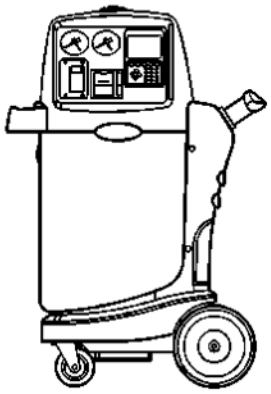
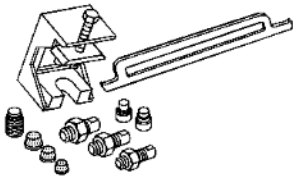
1	**CAUTION:** **Refer to Fastener Caution .** **Tighten:** 2.5 N.m (23 lb in)
2	Auxilliary Blower Motor

SPECIAL TOOLS AND EQUIPMENT

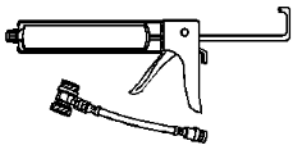
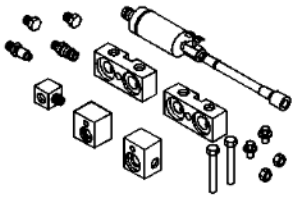
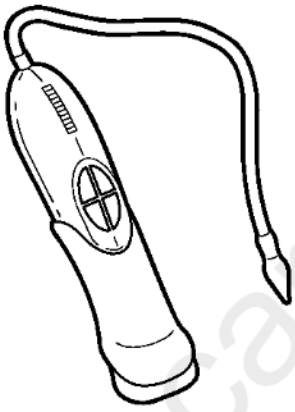
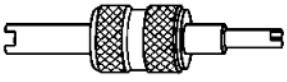
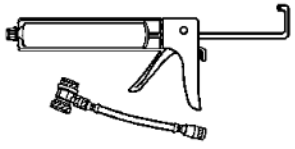
SPECIAL TOOLS

Illustration	Tool Number/Description
	BOB 38185 J 38185 Hose Clamp Pliers
	GE 41447 J 41447 R-134a A/C Tracer Dye - Box of 24
	GE 42220 J 42220 Universal 12V Leak Detection Lamp
	GE 8800 J 43600

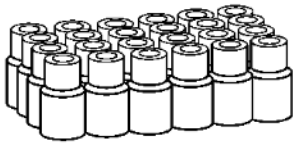
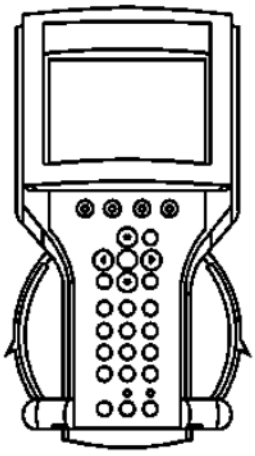
cardiagn.com

	ACR 2000 Air Conditioning Service Center
	GE 43872 J 43872 Fluorescent Dye Cleaner
	GE 44551 J 44551 Suction Screen Installation/Removal Kit

cardiagn.com

	GE 45037 J 45037 A/C Oil Injector
	GE 45268 J 45268 A/C Flushing Adapter Kit
	GE 50078 Electronic Leak Detector
	J 46246 Charge Port Valve Core Remover/Installer
	J 46297 A/C Dye Injector Kit

cardiagn.com

	GE 46297-12 J 46297-12 Replacement Dye Cartridges
	7000086I Scan Tool Used for diagnosis of vehicle electrical system.

cardiagn.com