Engine Exhaust - Hummer H2

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Engine Shield Bolt	20 N.m	15 lb ft
Exhaust Heat Shield Bolt	9 N.m	80 lb in
Exhaust Heat Shield Nut (Body Panel)	9 N.m	80 lb in
Exhaust Manifold Bolts - 4.8L, 5.3L, and 6.0L Engines		
• First Pass in Sequence	15 N.m	11 lb ft
• Final Pass in Sequence	25 N.m	18 lb ft
Exhaust Manifold Heat Shield Bolt - 4.8L, 5.3L, and 6.0L Engines	9 N.m	80 lb in
Exhaust Manifold Pipe Hanger Bracket Bolt	12 N.m	106 lb in
Exhaust Manifold Pipe Nut	50 N.m	37 lb ft
Exhaust Muffler Clamp Bolt	30 N.m	22 lb ft
Exhaust Muffler Hanger Nut	50 N.m	39 lb ft
Exhaust Muffler Nut	40 N.m	30 lb ft
Exhaust Pipe Clamp	44 N.m	33 lb ft
Hood Hinge Bolts	25 N.m	18 lb ft
Oxygen Sensor	42 N.m	31 lb ft
Rear Shock Absorber Lower Bolt	95 N.m	70 lb ft
Transmission Bolt	100 N.m	74 lb ft
Transmission Mount Nut	40 N.m	30 lb ft
Transmission Support Crossmember Bolt	70 N.m	52 lb ft

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - ENGINE EXHAUST

Begin the system diagnosis by reviewing the system Description and Operation. Reviewing the information will help you determine the correct symptom diagnostic procedure when a malfunction exists. It will also help you determine if the condition described by the customer is normal operation. Refer to **Symptoms - Engine Exhaust** in order to identify the correct procedure for diagnosing the system.

SYMPTOMS - ENGINE EXHAUST

- Review the Exhaust System Description and Operation in order to familiarize yourself with the system functions. Refer to **Exhaust System Description** .
- All diagnostics on a vehicle should follow a logical process. Strategy Based Diagnostics is a uniform approach for repairing all systems. The diagnostic flow is the place to start when repairs are necessary and may always be used in order to resolve a system problem. For a detailed explanation, refer to **Strategy Based Diagnosis** in General Information.

Visual/Physical Inspection

- Inspect for aftermarket or non-OEM devices such as, but not including; tailpipe extensions, headers, and exhaust cutouts. This could affect the operation and proper performance of the exhaust system.
- Verify the exact operating conditions under which the concern exists. Note factors such as engine RPM, engine temperature, engine load, and frequency of concern.
- Inspect the easily accessible or visible system components for obvious damage or conditions which could cause any symptom.

Intermittent

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating as designed.

Symptom List

Refer to a symptom diagnostic procedure from the following list in order to diagnose the symptom:

- Loss of power

  Refer to **Restricted Exhaust** .

- Poor acceleration

  Refer to **Restricted Exhaust** .

- Poor fuel economy

  Refer to **Restricted Exhaust** .

- Excessive smoke (diesel)

  Refer to **Restricted Exhaust** .

- Exhaust hissing noise

  Refer to **Exhaust Leakage** .

- Exhaust popping noise

Refer to **Exhaust Leakage** .

- Exhaust rattle noise

  Refer to **Exhaust Noise** .

- Loud exhaust noise

  Refer to **Exhaust Noise** .

- Exhaust buzz, groan, hum noise

  Refer to **Exhaust Noise** .

RESTRICTED EXHAUST

Test Description

CAUTION: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.

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

3: The exhaust system has very low back pressure under normal conditions. If the exhaust system is restricted, a significant increase in the exhaust pressure is noticed on the **J 35314-A** Exhaust Back Presser Tester. Removing the heated oxygen sensor (HO2S) may set a DTC. When finishing this diagnostic table, be sure to clear all codes. See **Special Tools and Equipment** .

4: This step will isolate the catalytic converter from the remainder of the exhaust system.

7: Confirming that the condition has been fixed is essential. If the symptom still exists and the vehicle has a dual exhaust system, proceed to Step 2 and repeat diagnostic procedure on the opposite exhaust pipe.

Restricted Exhaust

Step	Action	Value(s)	Yes	No
1	Did you verify the customers complaint?	-	Go to Step **2**	-
2	Did you review the exhaust symptoms diagnostic information and perform the necessary inspections?	-	Go to **Step 3**	Go to **Symptoms - Engine Exhaust**
	1. Remove the heated oxygen sensor (HO2S) that is in front of and closest to the catalytic converter. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** or **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** in Engine	20 kPa (3 psi)		

3	Controls - 6.0L (LQ4). 2. Install the **J 35314-A** in place of the HO2S sensor. See **Special Tools and Equipment** . 3. Start the engine. 4. Increase and monitor the engine speed at 2,000 RPM. 5. Observe the exhaust system back pressure reading on the gauge. Does the reading exceed the specified value?	If equipped with a 4.8L, 5.3L, or 6.0L - 3.4 kPa (0.5 psi)	Go to **Step 4**	Go to **Step 7**
4	1. Turn the engine off and place the ignition in the lock position. 2. Remove the **J 35314-A** . See **Special Tools and Equipment** . 3. Re-install the HO2S sensor. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** or **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** in Engine Controls - 6.0L (LQ4). 4. Remove the post-catalyst HO2S sensor. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2** or **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2** in Engine Controls - 6.0L (LQ4). 5. Install the **J 35314-A** in place of the post HO2S sensor. See **Special Tools and Equipment** . 6. Start the engine. 7. Increase and monitor the engine speed at 2,000 RPM. 8. Observe the exhaust system back pressure reading on the gauge. Does the reading exceed the specified value?	20 kPa (3 psi) If equipped with a 4.8L, 5.3L, or 6.0L - 3.4 kPa (0.5 psi)	Go to **Step 5**	Go to **Step 6**
5	Inspect the exhaust system for the following conditions: • Damage in the exhaust pipe. • Debris in the exhaust pipe • Muffler internal failure. • Two-layer exhaust pipe separation. Did you find and correct the condition?	-	Go to **Step 7**	-

6	Replace the catalytic converter. Refer to **Catalytic Converter Replacement (Right Hand)** . Did you find and correct the condition?	-	Go to **Step 7**	-
7	1. Remove the **J 35314-A** . See **Special Tools and Equipment** . 2. Re-install the HO2S sensor. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2** or **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2** in Engine Controls - 6.0L (LQ4). 3. Clear any codes. 4. Road test the vehicle in order to verify the repair. Did you correct the condition?	-	System OK	Go to **Step 2**

EXHAUST LEAKAGE

Exhaust Leakage

Problem	Action
CAUTION: **While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.** DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand close to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise.Refer to **Symptoms - Engine Exhaust** prior to beginning this table.	
Misaligned or improperly installed exhaust system components.	• Align and tighten the components to the specifications. Refer to **Fastener Tightening Specifications** . • Ensure the exhaust hangers are in the proper locations and not loose.
Exhaust leaks at the following connections: • Exhaust manifold to pipe • Flanges • Pipe clamps	Tighten the components to the specifications. Refer to **Fastener Tightening Specifications** .
Seals or gaskets leaking. • Exhaust manifold to cylinder head • Exhaust pipes to exhaust manifold • Catalytic converter connection • EGR connections, if equipped	Replace the leaking seal or gasket. Refer to the affected components procedure for service.

Irregularities at the mating surfaces on the flange connections.	Repair as required or replace the affected component. Refer to the affected components procedure for service.
Exhaust manifold cracked or broken.	Replace the exhaust manifold. Refer to • **Exhaust Manifold Replacement - Left** • **Exhaust Manifold Replacement - Right** .
Exhaust system component connection welds leaking.	Replace the leaking component. Refer to the affected component's procedure for service.
Muffler damaged or leaking at the seams.	Replace the affected muffler. Refer to **Muffler Replacement** .

EXHAUST NOISE

Exhaust Noise

Condition	Action
CAUTION: **While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.** DEFINITION: An audible or physical noise due to a faulty component or damaged components causing a loose or misaligned exhaust system resulting in a rattle or vibration noise (buzz, groan, hum).Refer to **Symptoms - Engine Exhaust** prior to beginning this table.	
Popping or hissing noise	Exhaust leak. Refer to **Exhaust Leakage** .
Loud exhaust	1. Compare to a known good vehicle. 2. Inspect for a damaged or failed muffler or resonator. 3. Replace the faulty muffler. Refer to **Muffler Replacement** .
External rattle or vibration noise	1. Inspect for a bent or loose hanger, loose heat shield, or loose clamp. 2. Inspect for a exhaust pipe causing interference. 3. Repair or replace the affected component. Refer to the affected component's service procedure.
Internal rattle	1. Test the components by tapping with a rubber mallet to confirm a rattle. 2. Replace the faulty catalytic converter, or muffler. Refer to one of the following procedures: • **Catalytic Converter Replacement (Right Hand)** • **Muffler Replacement**

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT - LEFT

Removal Procedure

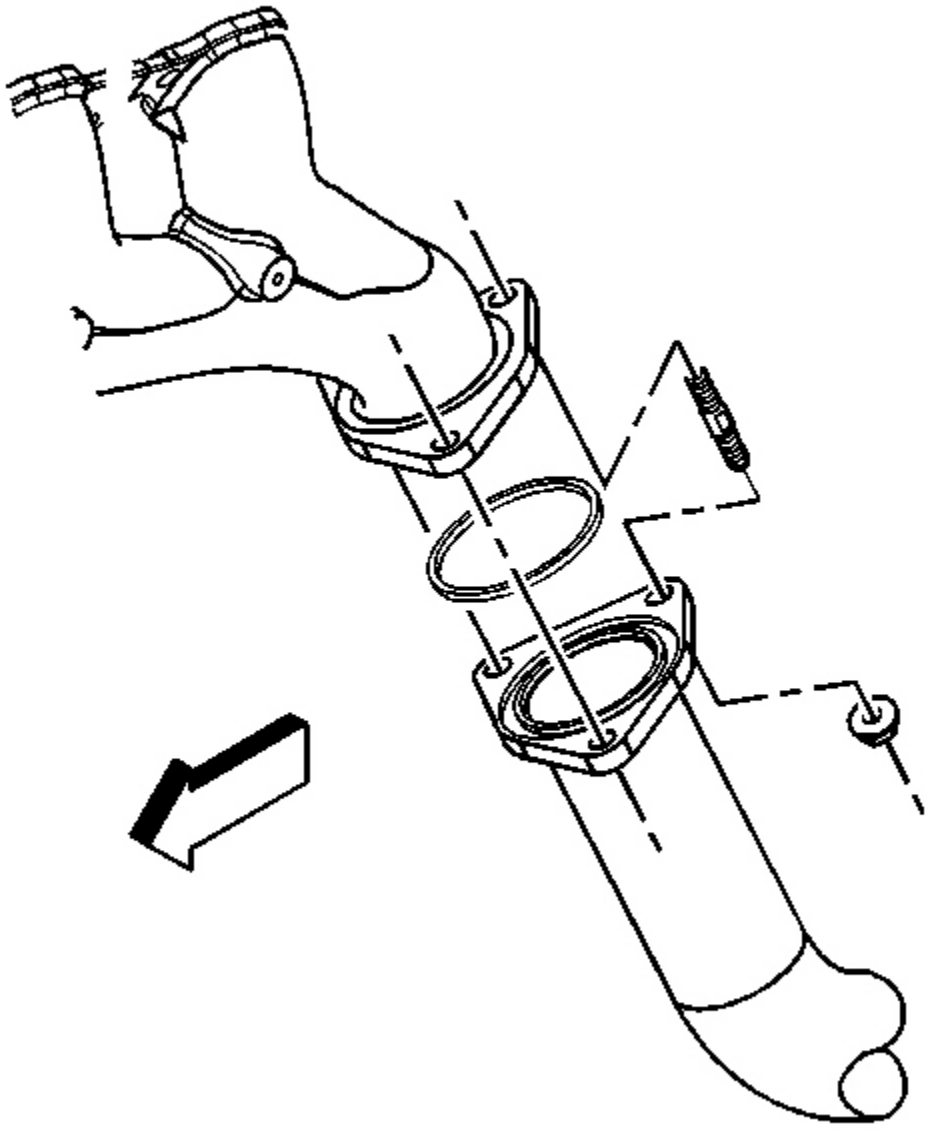


Fig. 1: Exhaust Manifold Pipe Nuts (Left)
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the exhaust manifold pipe nuts.
3. Lower the vehicle.
4. Remove the spark plug wires. Refer to **Spark Plug Wire Replacement** in Engine Controls - 4.8L, 5.3L

and 6.0L.

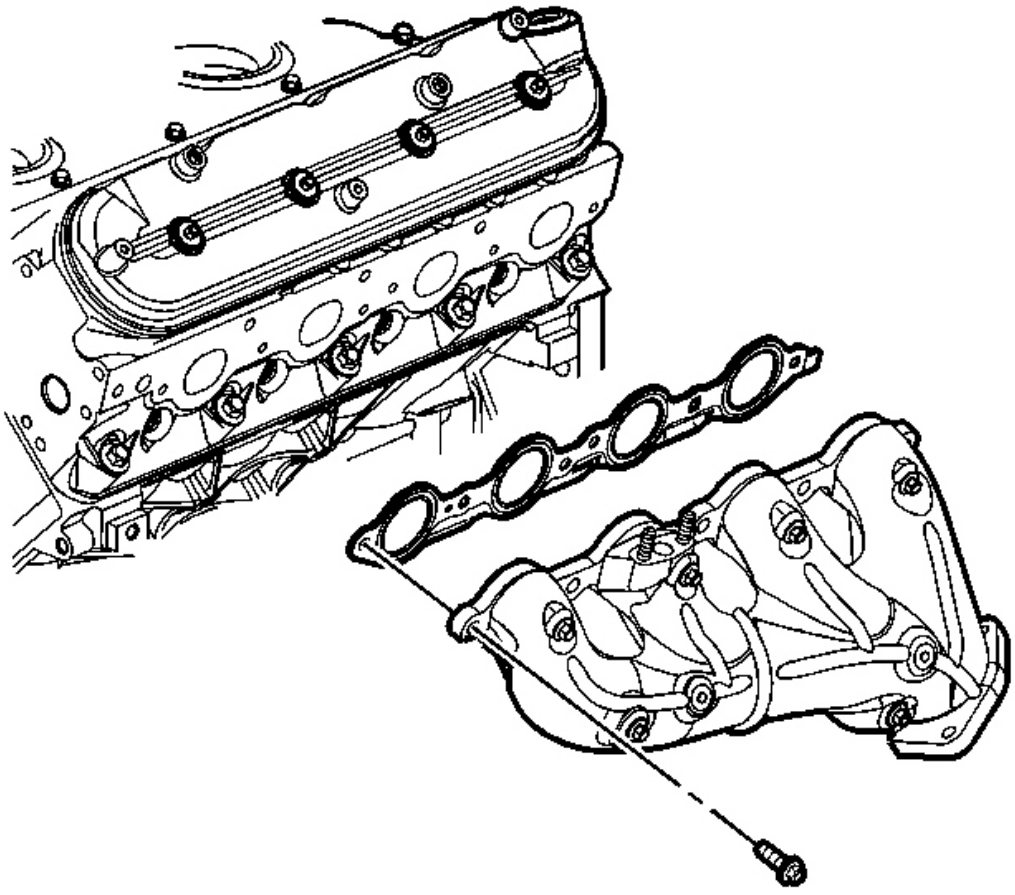


Fig. 2: Exhaust Manifold Bolts, Manifold & Gasket
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust manifold bolts, manifold, and gasket.
6. Discard the gasket.

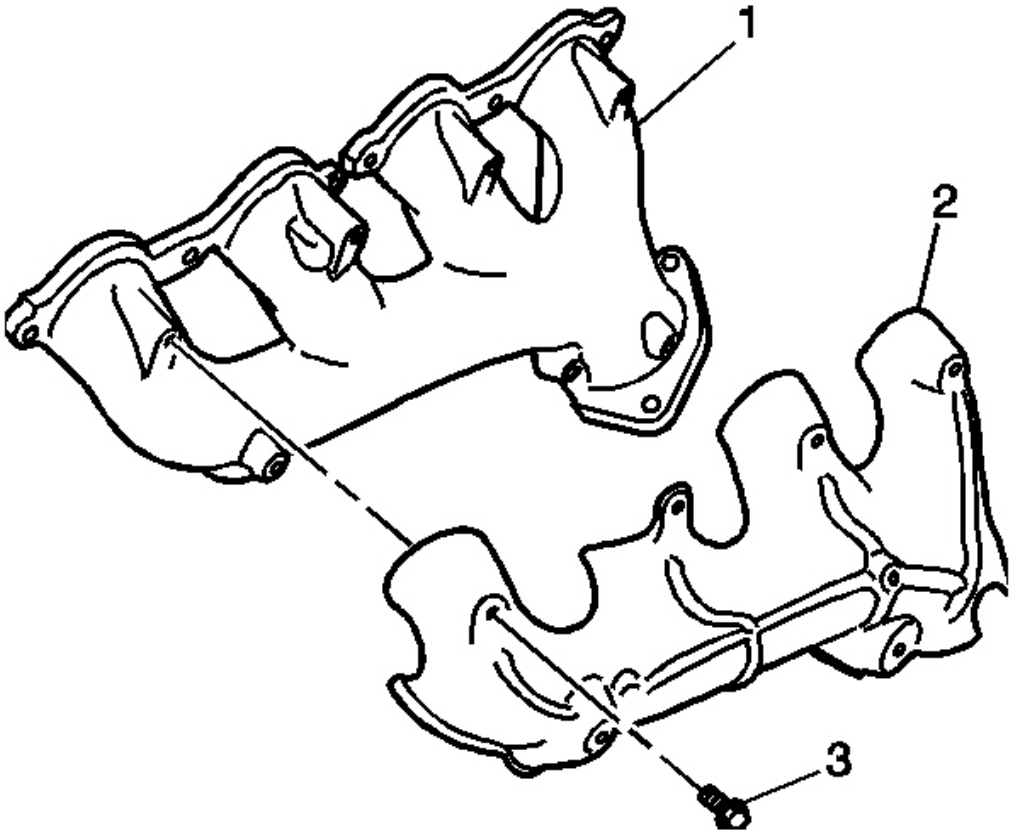


Fig. 3: View Of Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

7. Remove the heat shield bolts (3), and shield (2) from the exhaust manifold (1), if necessary.
8. Clean and inspect the exhaust manifold, if the manifold is not being replaced. Refer to **Exhaust Manifold Cleaning and Inspection** in the Engine Mechanical - 4.8L, 5.3L and 6.0L.

Installation Procedure

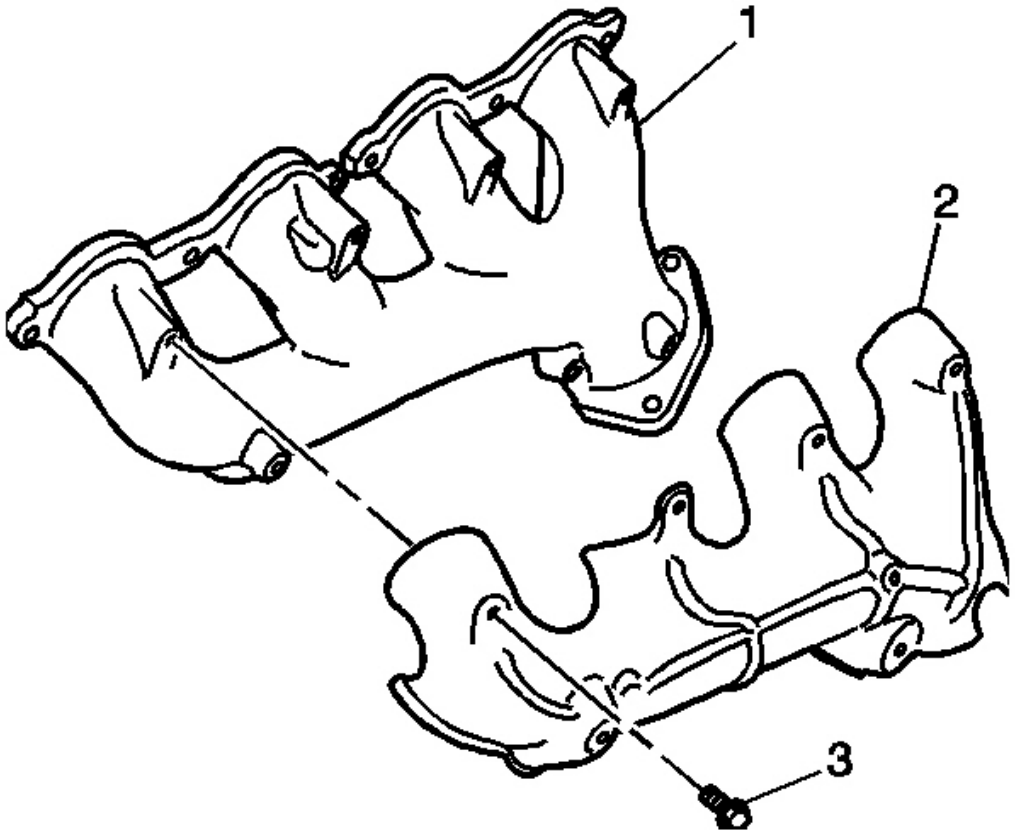


Fig. 4: View Of Heat Shield & Bolts (Left)
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the heat shield (2), and bolts (3) to the exhaust manifold (1), if necessary.

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

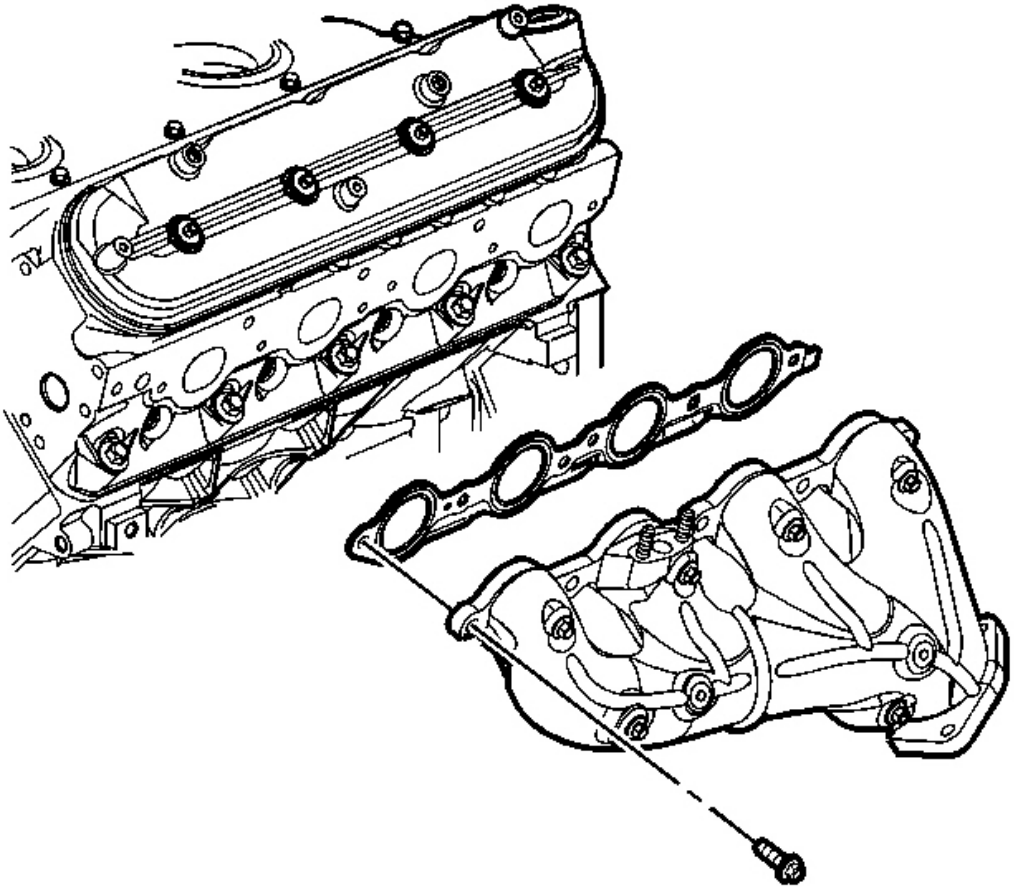


Fig. 5: Exhaust Manifold Bolts, Manifold & Gasket (Left)
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **Tighten the exhaust manifold bolts as specified in the service procedure. Improperly installed and/or leaking exhaust manifold gaskets may affect vehicle emissions and/or On-Board Diagnostics (OBD) II system performance.**
- **The cylinder head exhaust manifold bolt hole threads must be clean and free of debris or threadlocking material.**
- **Do not apply sealant to the first three threads of the bolt.**

2. Apply a 5 mm (0.2 in) wide band of threadlock GM P/N 12345493 (Canadian P/N 101953488) or equivalent to the threads of the exhaust manifold bolts.
3. Install the exhaust manifold, NEW gasket and bolts.

Tighten:

1. Tighten the exhaust manifold bolts a first pass to 15 N.m (11 lb ft). Tighten the exhaust manifold bolts beginning with the center two bolts. Alternate from side-to-side, and work toward the outside bolts.
2. Tighten the exhaust manifold bolts a final pass to 25 N.m (18 lb ft). Tighten the exhaust manifold bolts beginning with the center two bolts. Alternate from side-to-side, and work toward the outside bolts.

4. Install the spark plug wires. Refer to **Spark Plug Wire Replacement** in Engine Controls - 4.8L, 5.3L and 6.0L.
5. Using a flat punch, bend over the exposed edge of the exhaust manifold gasket at the rear of the left cylinder head.
6. Raise the vehicle.

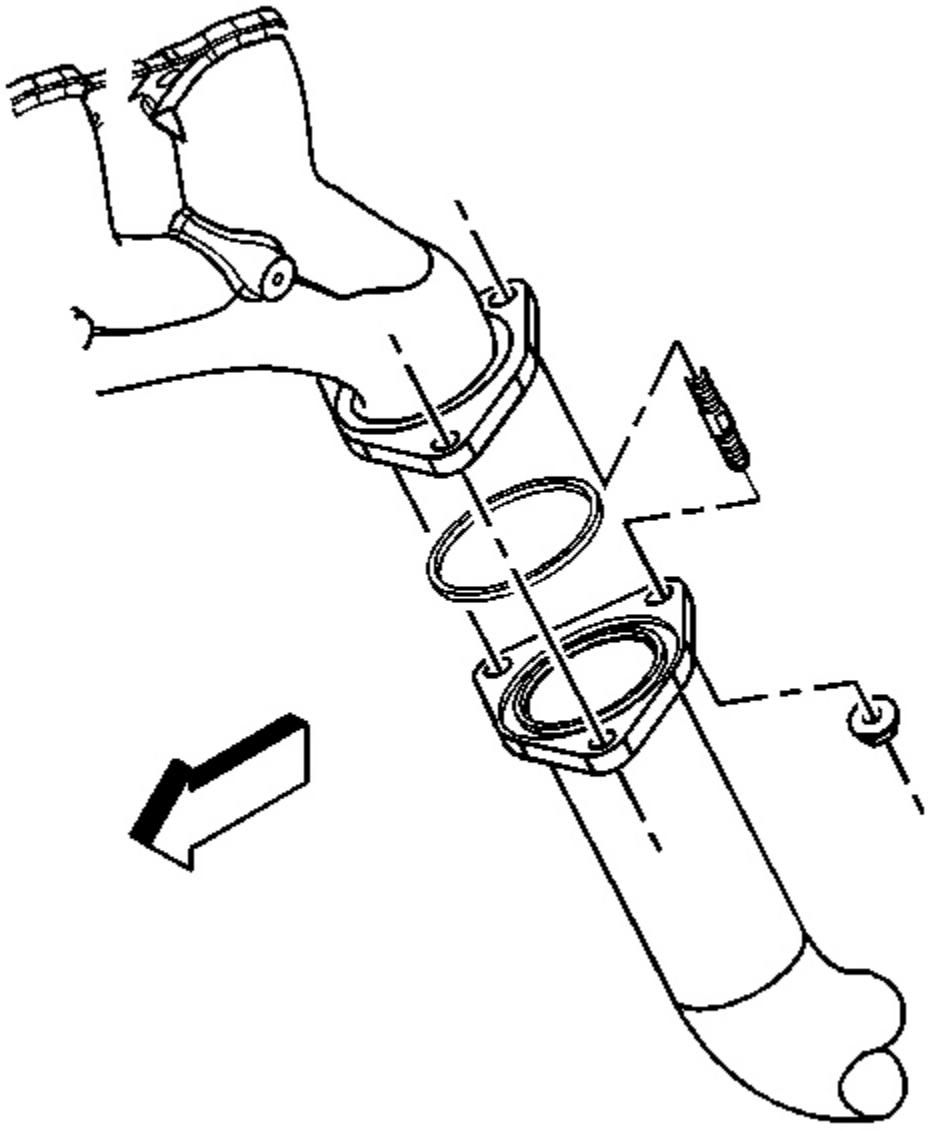


Fig. 6: Exhaust Manifold Pipe Nuts (Left)
Courtesy of GENERAL MOTORS CORP.

7. Install the exhaust manifold pipe nuts.

   Tighten: Tighten the nuts to 50 N.m (37 lb ft).

8. Lower the vehicle.
9. Install the ignition coils. Refer to **Ignition Coil(s) Replacement** in Engine Controls - 4.8L, 5.3L and 6.0L.

EXHAUST MANIFOLD REPLACEMENT - RIGHT

Tools Required

J 43181 Heater Line Quick Connect Release Tool

Removal Procedure

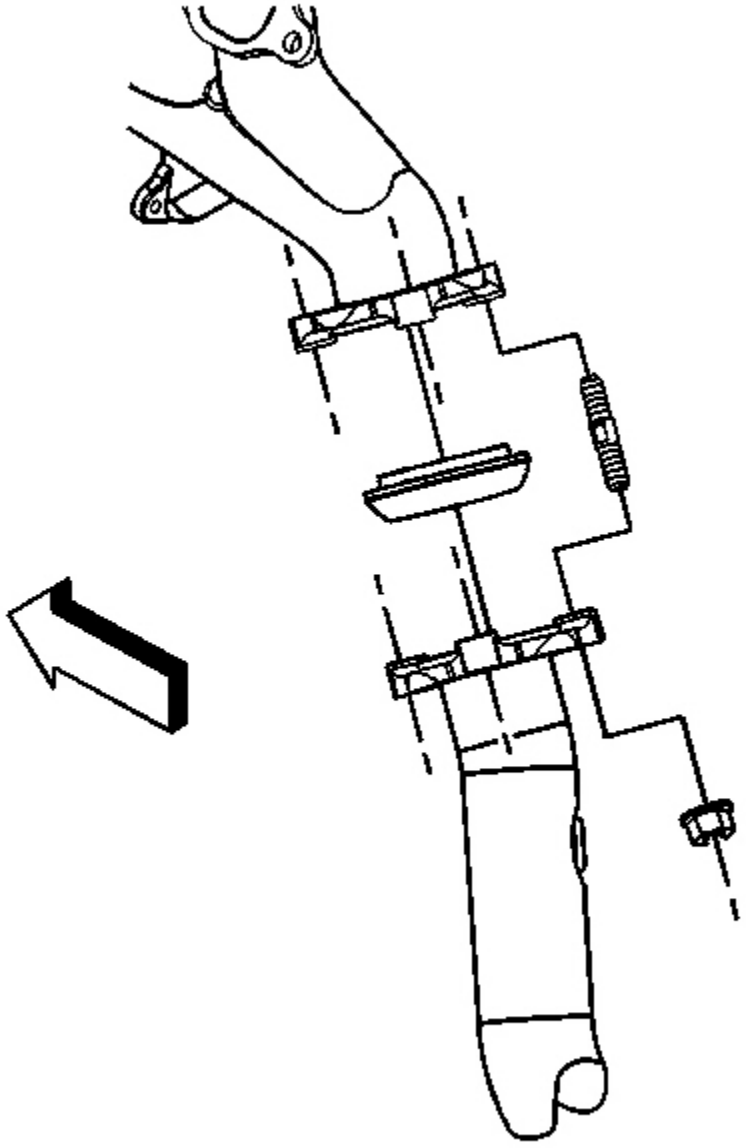


Fig. 7: Exhaust Manifold Pipe Nuts (Right)
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the exhaust manifold pipe nuts.
3. Lower the vehicle.

4. Remove the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** in Engine Controls - 4.8L, 5.3L and 6.0L.
5. Drain the coolant. Refer to **Draining and Filling Cooling System** in Engine Cooling.
6. Using the **J 43181** , remove the heater core hoses from the heater core. Position aside.
7. Remove the spark plug wires. Refer to **Spark Plug Wire Replacement** in Engine Controls - 4.8L, 5.3L and 6.0L.
8. Remove the oil level indicator tube. Refer to **Oil Level Indicator and Tube Removal** in Engine Mechanical - 4.8L, 5.3L and 6.0L.

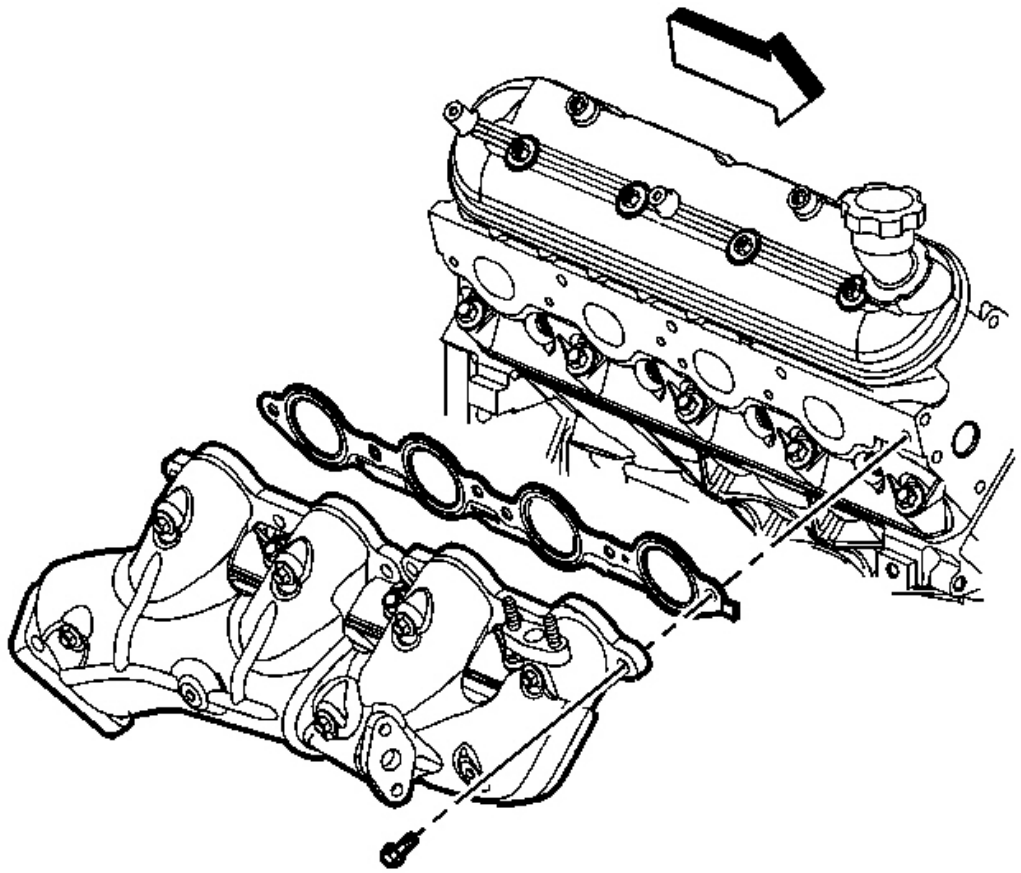


Fig. 8: Exhaust Manifold Bolts, Manifold & Manifold Gasket (Right)
Courtesy of GENERAL MOTORS CORP.

9. Remove the exhaust manifold bolts, manifold, and manifold gasket.
10. Discard the gasket.

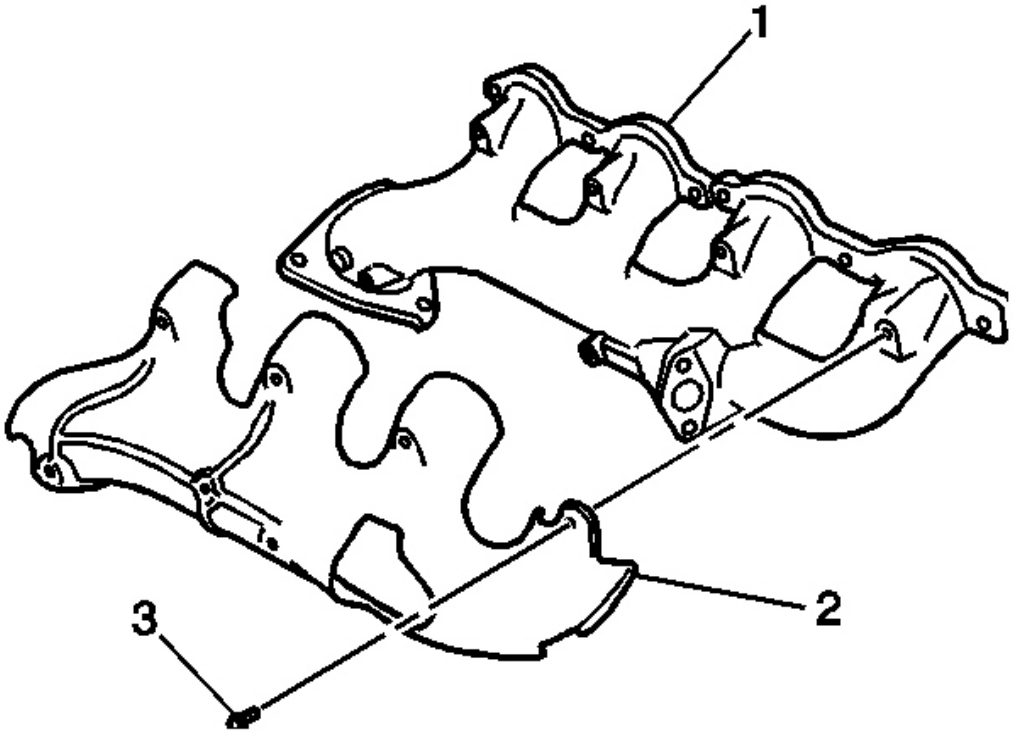


Fig. 9: Heat Shield Bolts, Heat Shield & Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

11. Remove the heat shield bolts (1), and shield (2) from the exhaust manifold (1).
12. Clean and inspect the exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection** in Engine Mechanical - 4.8L, 5.3L and 6.0L.

Installation Procedure

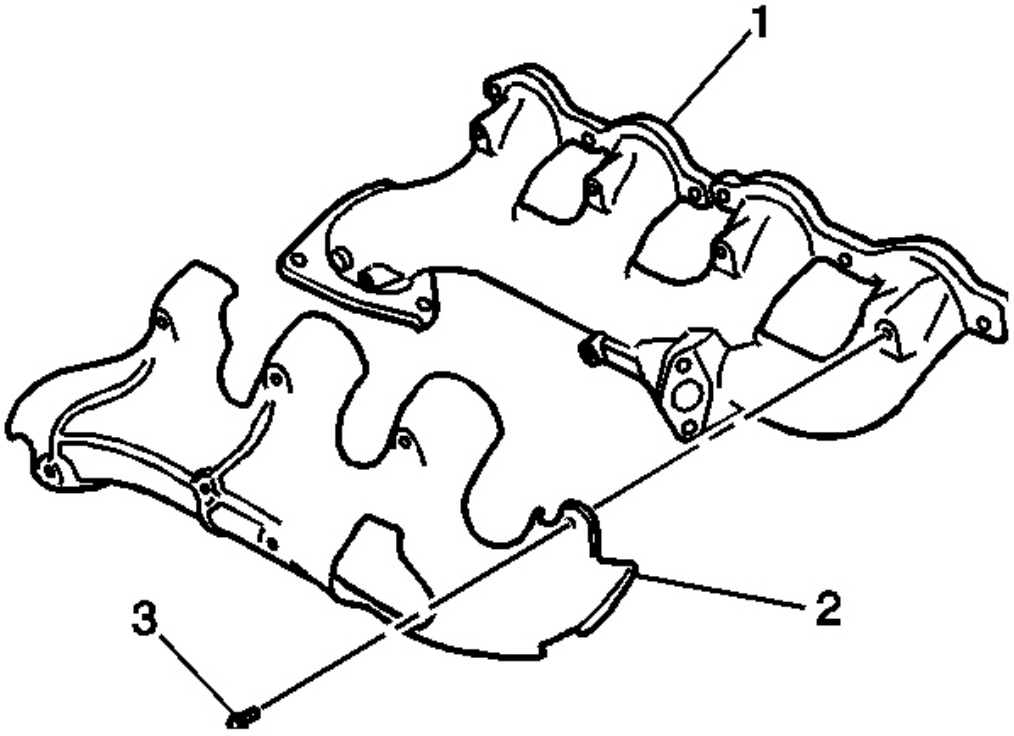


Fig. 10: Heat Shield Bolts, Heat Shield & Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the heat shield (2), and bolts (1) to the exhaust manifold (1), if necessary.

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

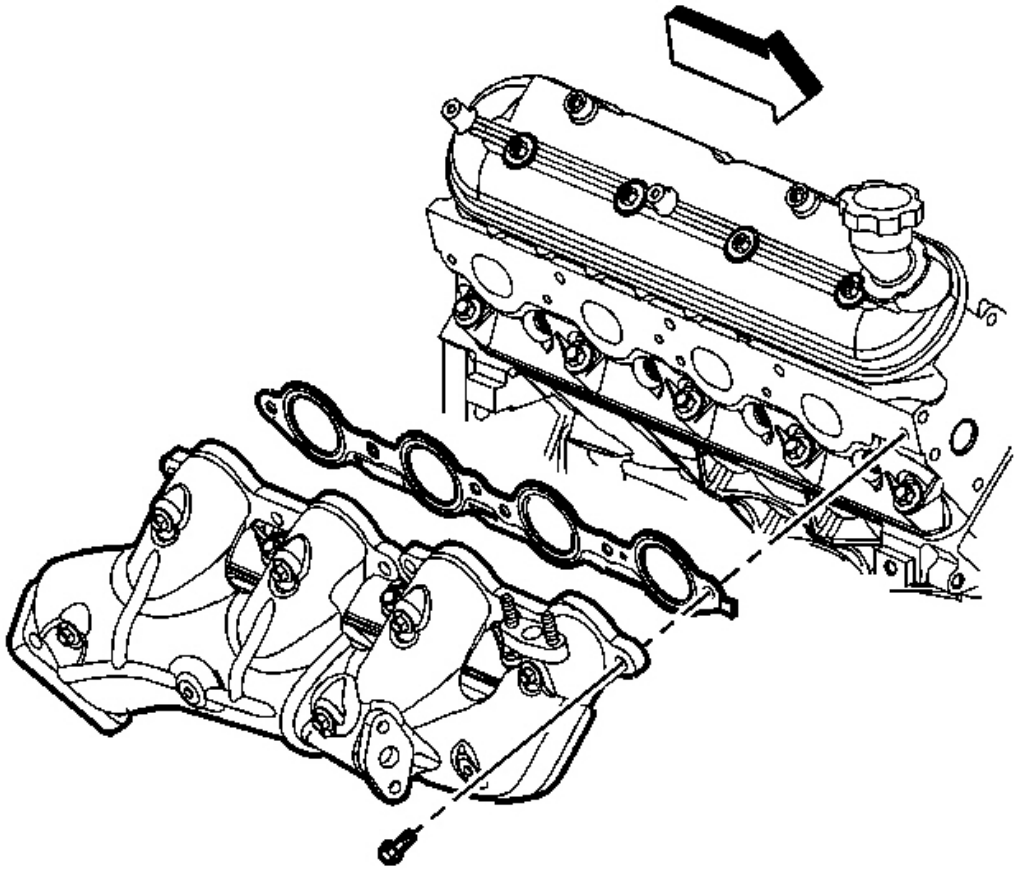


Fig. 11: Exhaust Manifold Bolts, Manifold & Manifold Gasket (Right)
Courtesy of GENERAL MOTORS CORP.

IMPORTANT:

- **Tighten the exhaust manifold bolts as specified in the service procedure. Improperly installed and/or leaking exhaust manifold gaskets may affect vehicle emissions and/or On-Board Diagnostics (OBD) II system performance.**
- **The cylinder head exhaust manifold bolt hole threads must be clean and free of debris or threadlocking material.**
- **Do not apply sealant to the first three threads of the bolt.**

2. Apply a 5 mm (0.2 in) wide band of threadlock GM P/N 12345493 (Canadian P/N 10953488) or equivalent to the threads of the exhaust manifold bolts.
3. Install the NEW manifold gasket, exhaust manifold, and bolts.

Tighten:

1. Tighten the exhaust manifold bolts a first pass to 15 N.m (11 lb ft). Tighten the exhaust manifold bolts beginning with the center two bolts. Alternate from side-to-side, and work toward the outside bolts.
2. Tighten the exhaust manifold bolts a final pass to 25 N.m (18 lb ft). Tighten the exhaust manifold bolts beginning with the center two bolts. Alternate from side-to-side, and work toward the outside bolts.

4. Using a flat punch, bend over the exposed edge of the exhaust manifold gasket at the front of the right cylinder head.
5. Install the oil level indicator tube. Refer to **Oil Level Indicator and Tube Removal** in Engine Mechanical - 4.8L, 5.3L and 6.0L.
6. Install the spark plug wires.
7. Install the inlet heater hose. Refer to **Heater Hose Replacement - Inlet** in Heating, Ventilation and Air Conditioning.
8. Install the outlet heater hose. Refer to **Heater Hose Replacement - Outlet** in Heating, Ventilation and Air Conditioning.
9. Install the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** in Engine Controls - 4.8L, 5.3L and 6.0L.
10. Raise the vehicle.

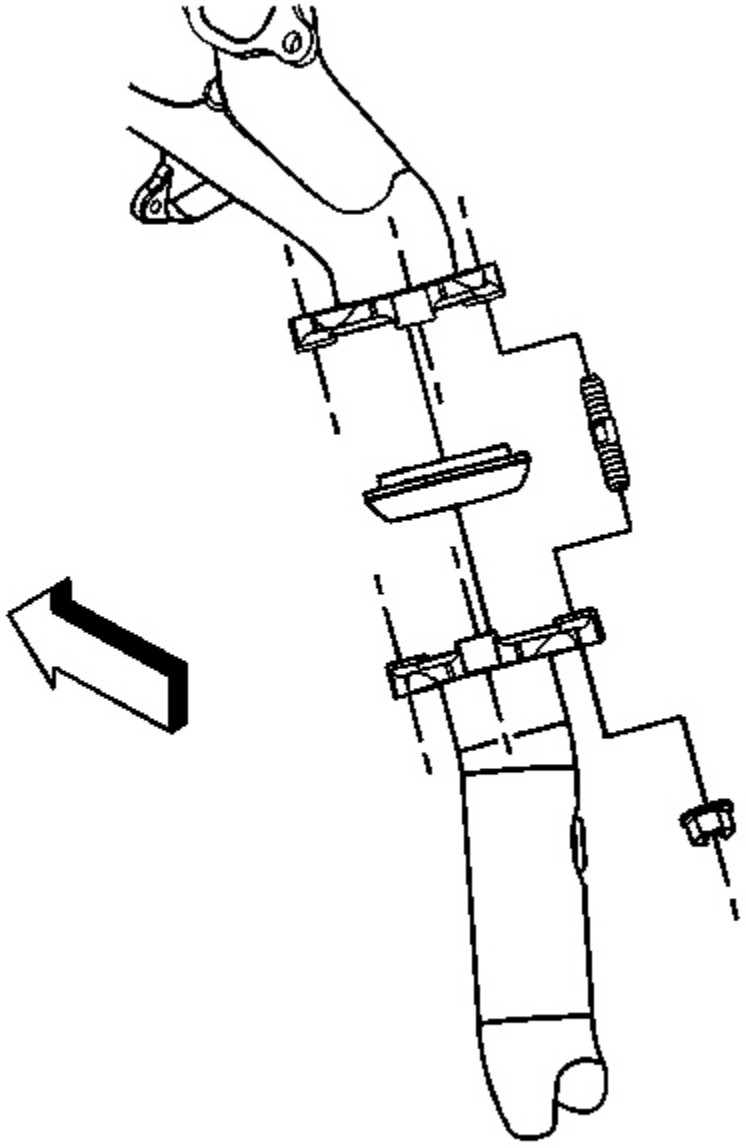


Fig. 12: Exhaust Manifold Pipe Nuts (Right)
Courtesy of GENERAL MOTORS CORP.

11. Install the exhaust manifold pipe nuts.

    Tighten: Tighten the nuts to 50 N.m (37 lb ft).

12. Lower the vehicle.
13. Fill the cooling system. Refer to **Draining and Filling Cooling System** in Engine Cooling.

EXHAUST MANIFOLD PIPE REPLACEMENT

Removal Procedure

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.

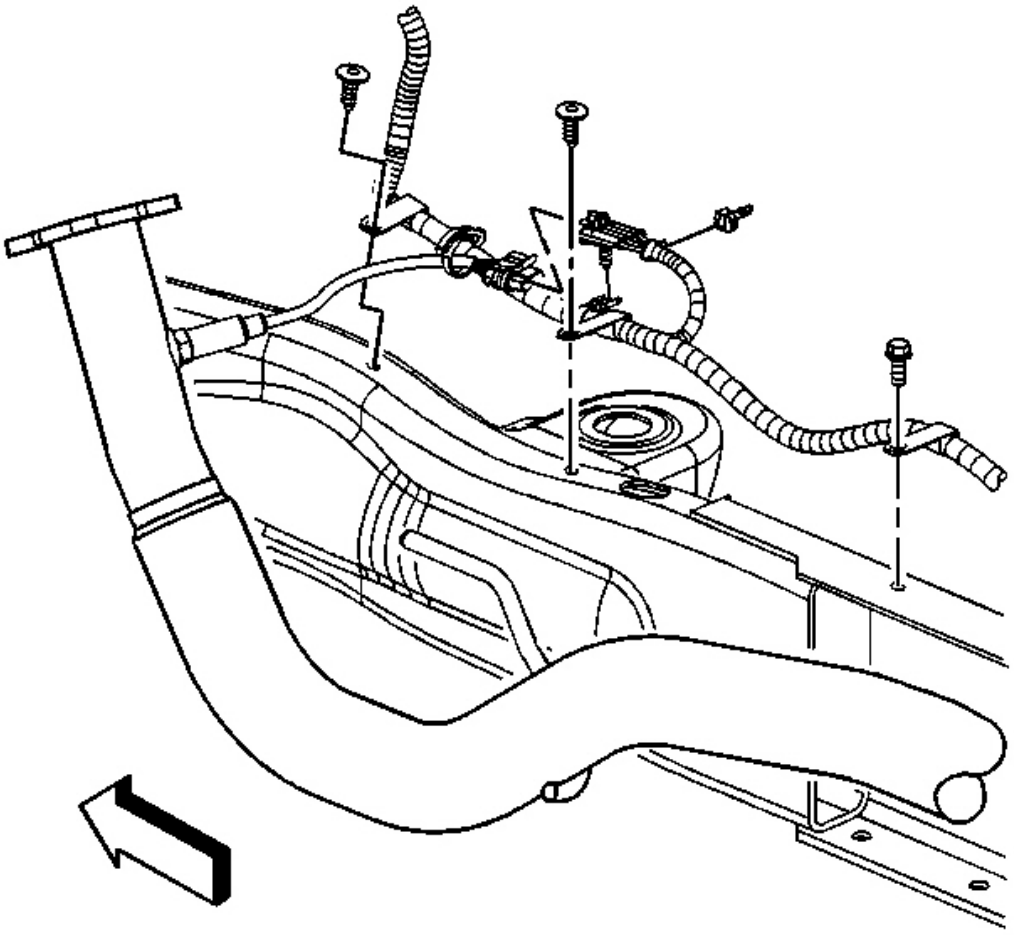


Fig. 13: View Of O2 Sensor Harness
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust muffler. Refer to **Muffler Replacement** .
4. Remove the clip around the engine harness and the oxygen sensor pigtail.
5. Disconnect the connector position assurance (CPA) retainer.
6. Disconnect the oxygen sensor electrical connector.
7. If replacing the exhaust manifold pipe, remove the oxygen sensor.

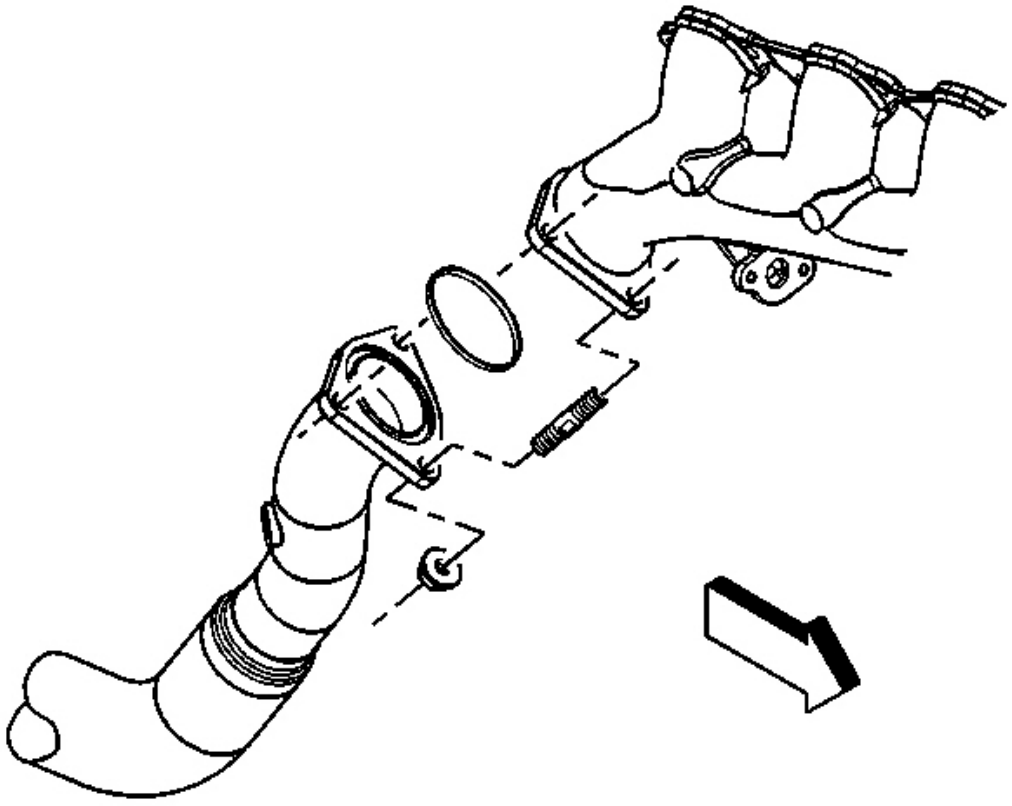


Fig. 14: Exhaust Manifold Pipe Nuts (Right)
Courtesy of GENERAL MOTORS CORP.

8. Remove the exhaust manifold pipe nuts.

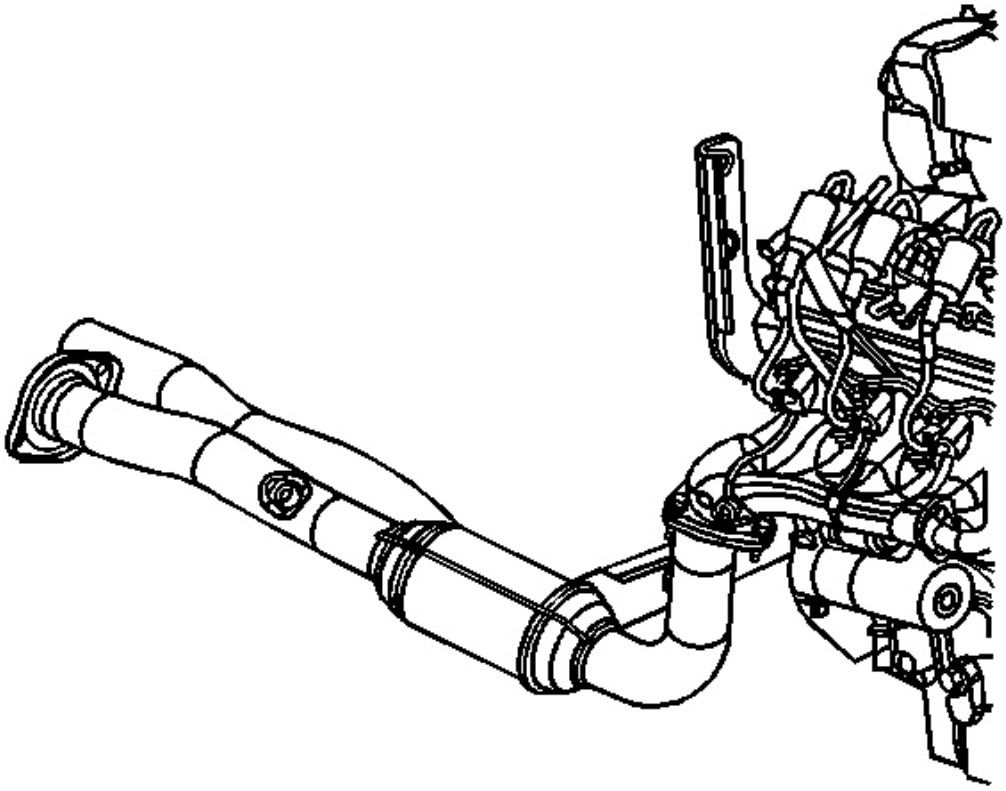


Fig. 15: Exhaust Manifold Pipe
Courtesy of GENERAL MOTORS CORP.

9. Remove the exhaust manifold pipe.
10. Slide the exhaust manifold pipe hanger out of the exhaust pipe hanger bracket.
11. Discard the exhaust manifold pipe seal.

Installation Procedure

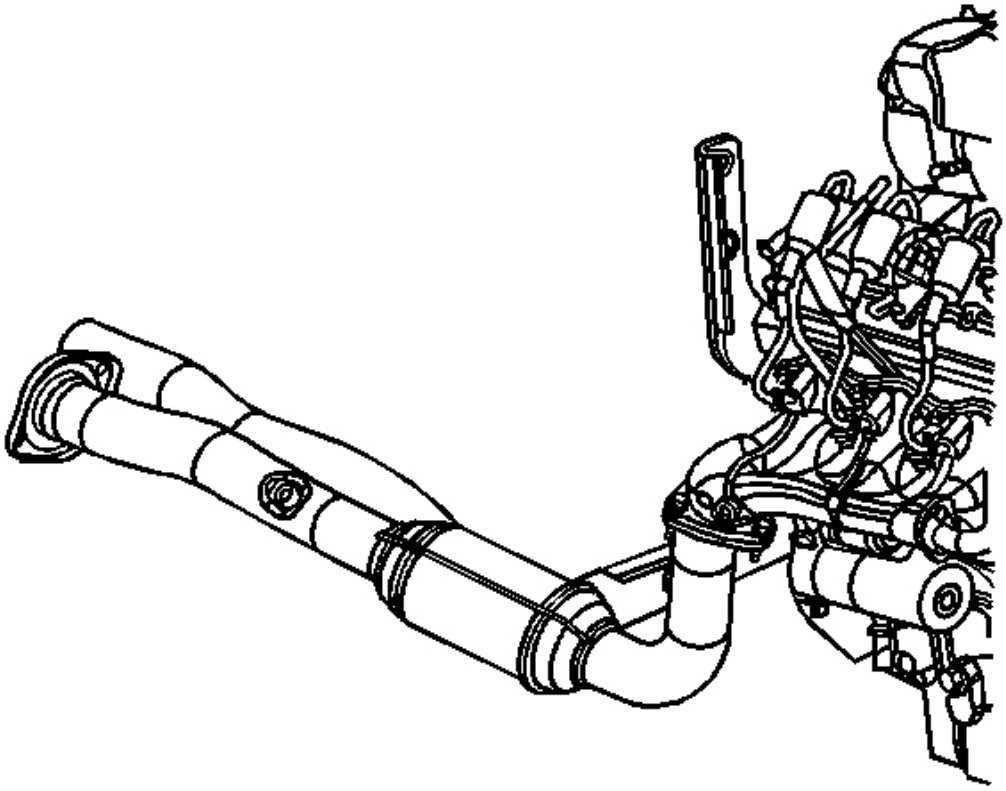


Fig. 16: Exhaust Manifold Pipe
Courtesy of GENERAL MOTORS CORP.

1. Install a new exhaust manifold pipe seal to the exhaust manifold pipe.
2. Install the exhaust manifold pipe.
3. Apply lubricant to the exhaust pipe hanger bracket, in order to aid in installation.
4. Slide the exhaust manifold pipe hanger into the exhaust pipe hanger bracket.

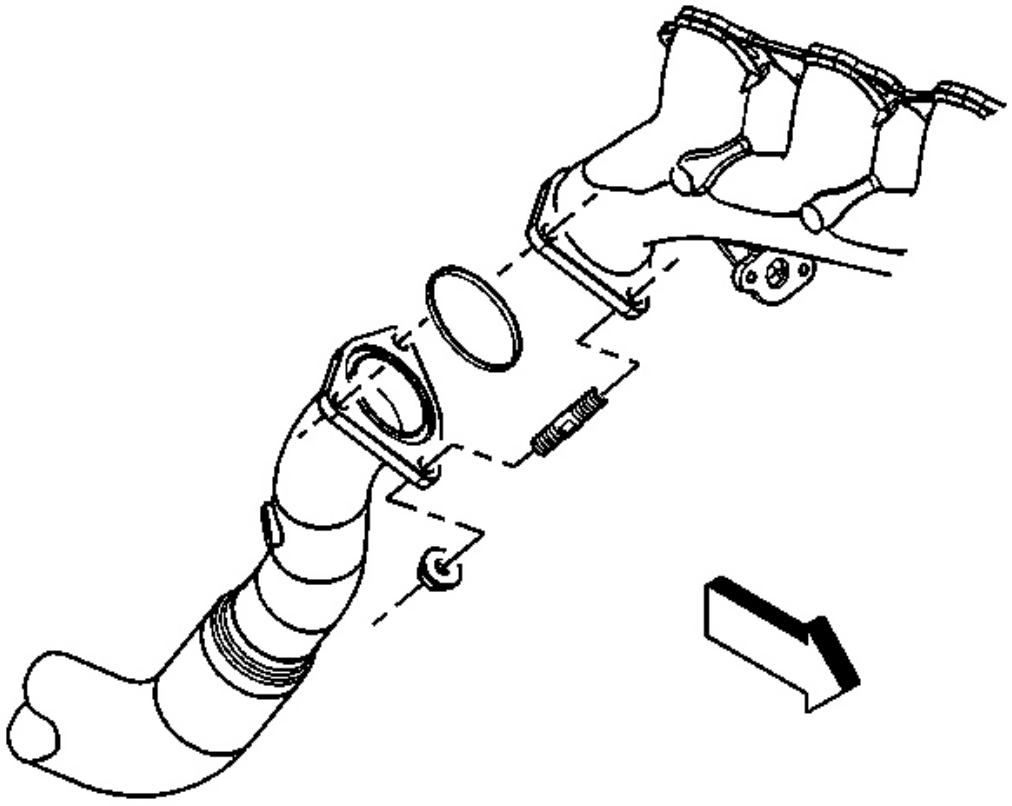


Fig. 17: Exhaust Manifold Pipe Nuts (Right)
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Install the exhaust manifold pipe nuts.

   Tighten: Tighten the nuts to 50 N.m (39 lb ft).

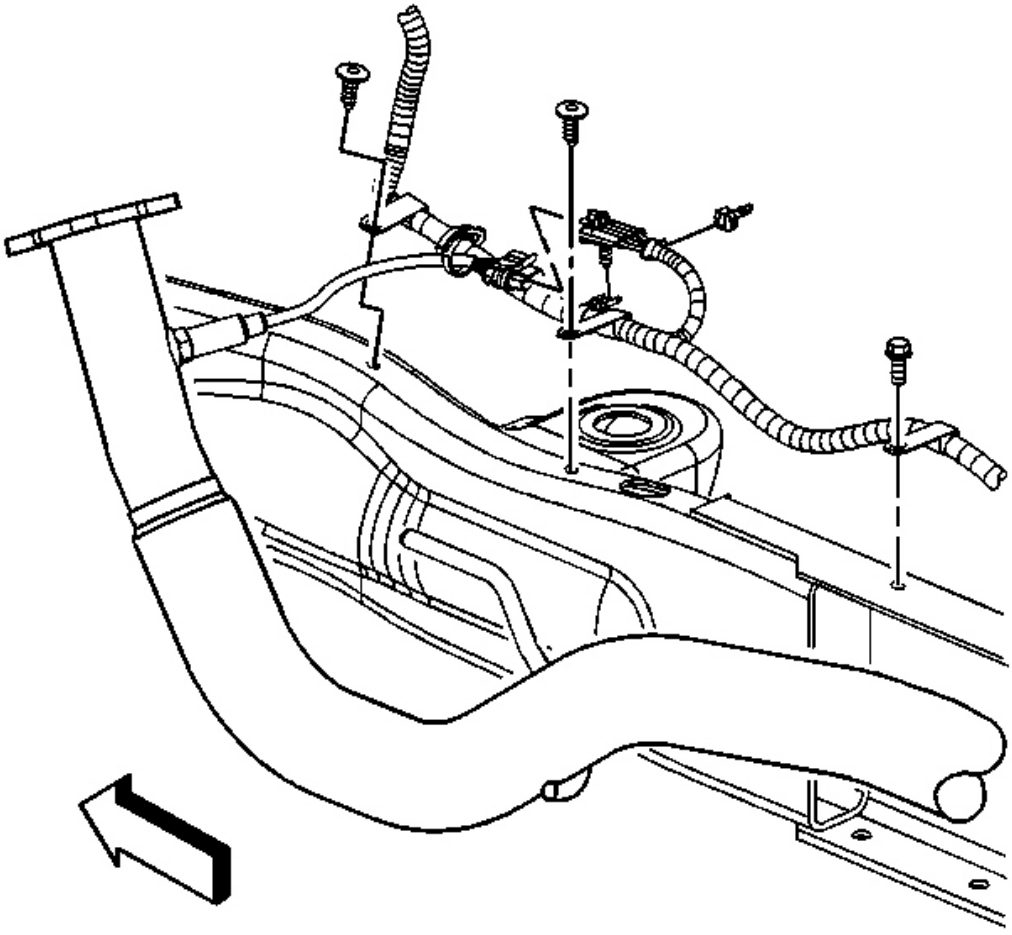


Fig. 18: View Of O2 Sensor Harness
Courtesy of GENERAL MOTORS CORP.

6. If the exhaust manifold pipe was replaced perform the following:
    1. Apply anti-seize compound GM P/N 12377953 or equivalent to the threads of the old oxygen sensor.
    2. Install the old oxygen sensor.

       Tighten: Tighten the oxygen sensor to 42 N.m (31 lb ft).

7. If the exhaust manifold pipe was not replaced perform the following:
    1. Connect the oxygen sensor electrical connector.
    2. Connect the CPA retainer.

3. Install the clip around the engine harness and the oxygen sensor pigtail.

8. Install the exhaust muffler. Refer to **Muffler Replacement** .
9. Install the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.

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

10. Lower the vehicle.

EXHAUST SEAL REPLACEMENT

Removal Procedure

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.

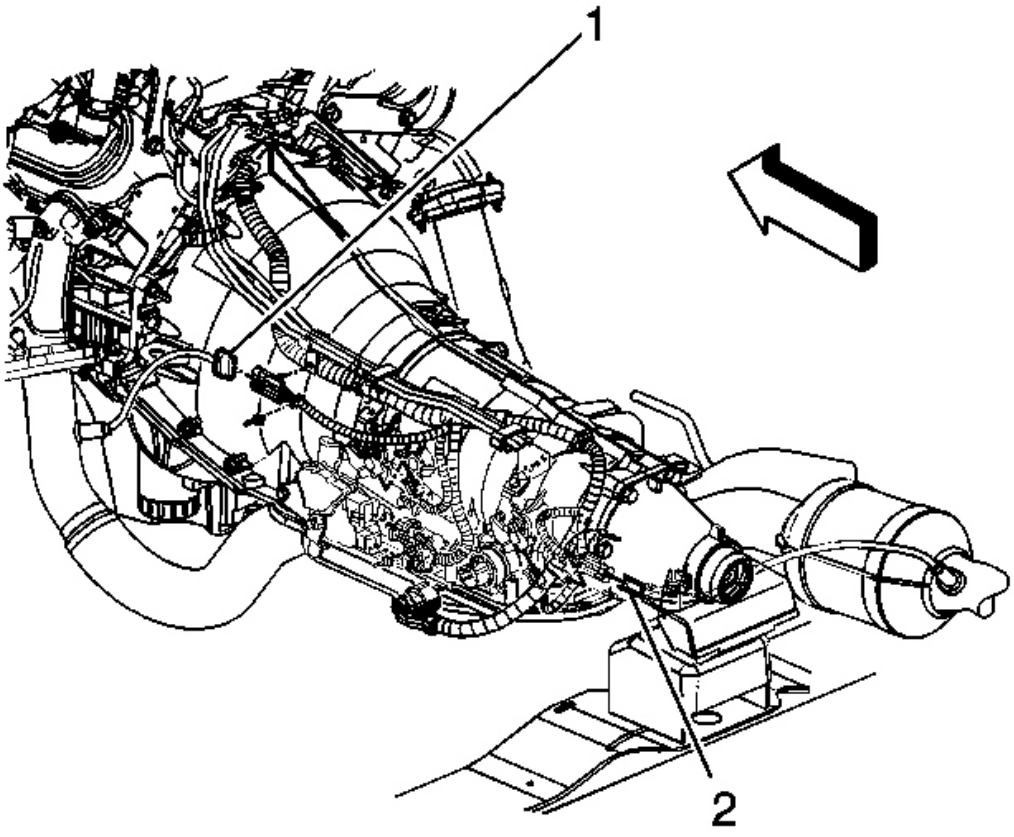


Fig. 19: View Of Transmission
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the CPA retainer.
4. Disconnect the oxygen sensor electrical connector (1).
5. Support the catalytic converter or exhaust manifold pipe with adjustable jackstands.

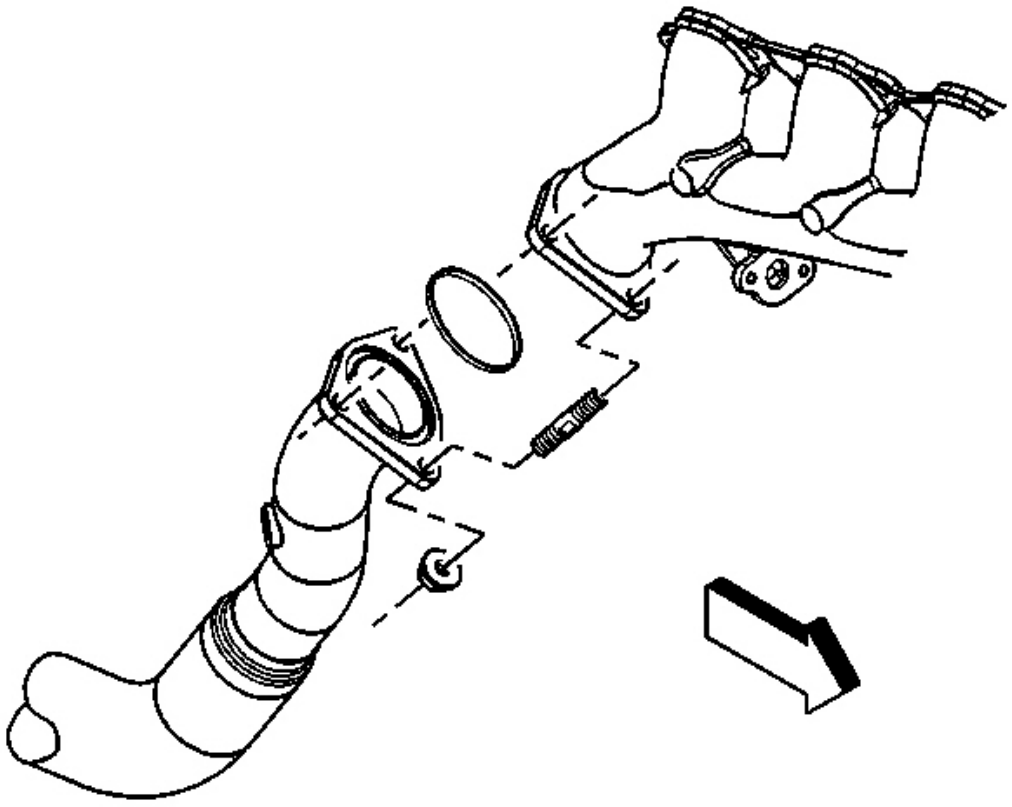


Fig. 20: Exhaust Manifold Pipe Nuts (Right)
Courtesy of GENERAL MOTORS CORP.

6. Remove the right exhaust manifold pipe nuts.

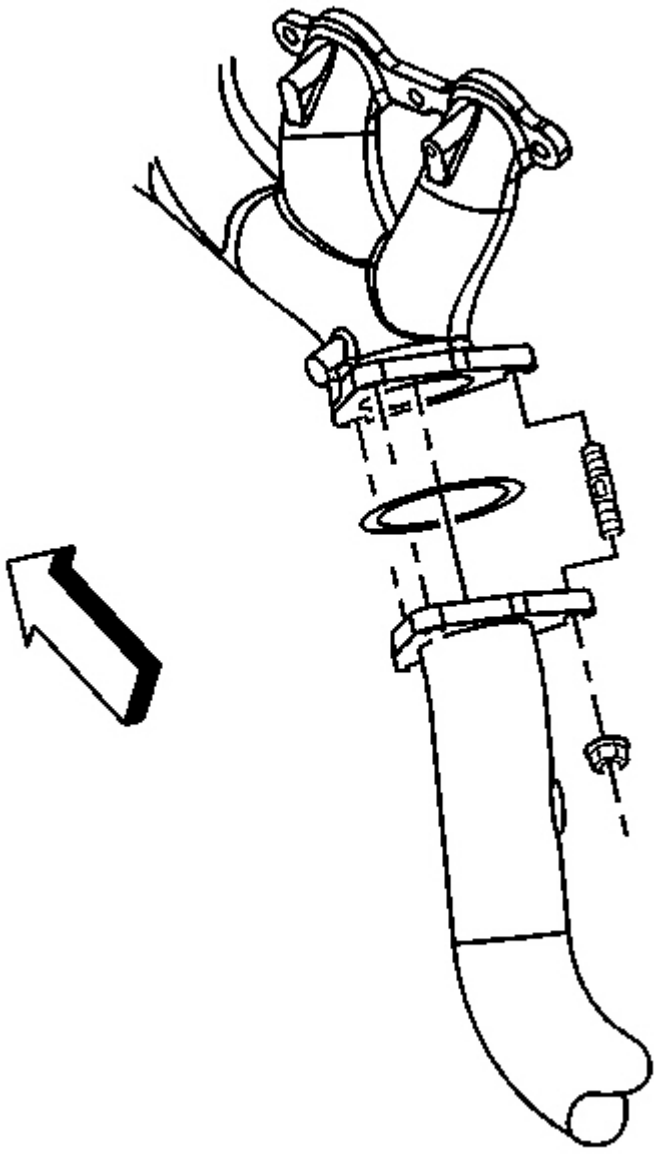


Fig. 21: Exhaust Manifold Pipe Nuts (Left)
Courtesy of GENERAL MOTORS CORP.

7. Remove the left exhaust manifold pipe nuts.
8. Remove the exhaust hanger mounting bracket bolts.
9. Lower the catalytic converter or exhaust manifold pipe using the adjustable jackstands.

10. Remove the exhaust manifold pipe seal(s).

Installation Procedure

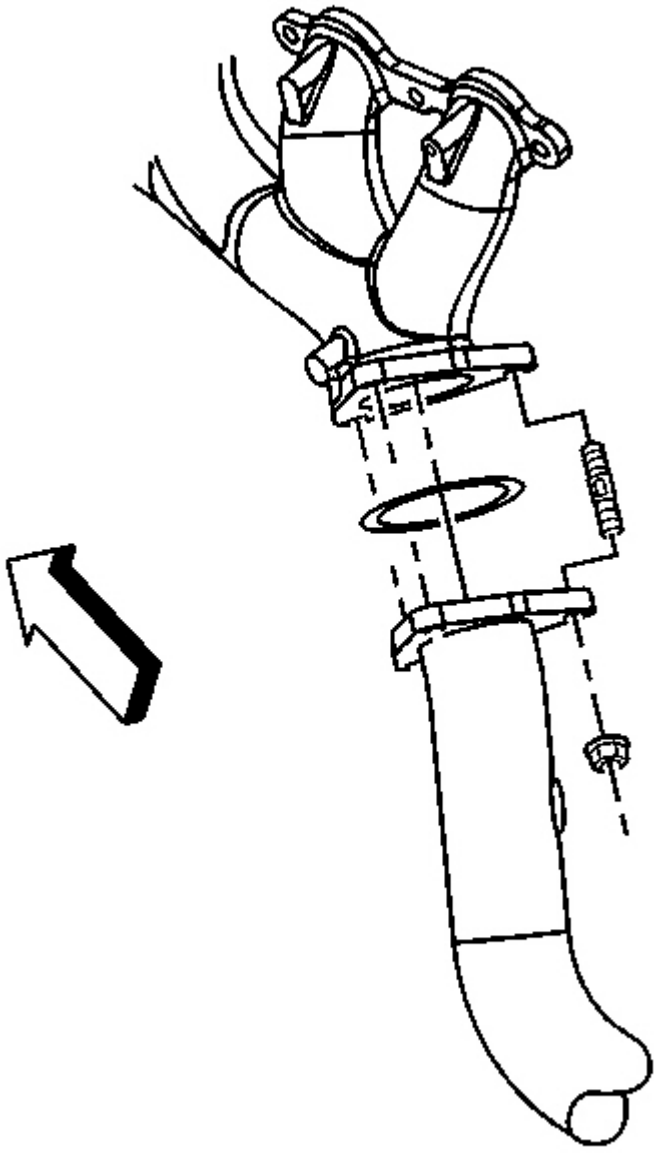


Fig. 22: Exhaust Manifold Pipe Nuts (Left)
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust manifold pipe seal(s).
2. Raise the catalytic converter or exhaust manifold pipe using the adjustable jackstands.
3. Install the exhaust hanger mounting bracket bolts.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the left exhaust manifold pipe nuts.

Tighten:

- Tighten the transmission bolts to 100 N.m (74 lb ft).
- Tighten the exhaust pipe hanger bracket bolts to 12 N.m (106 lb in).
- Tighten the exhaust manifold pipe nuts to 50 N.m (39 lb ft).

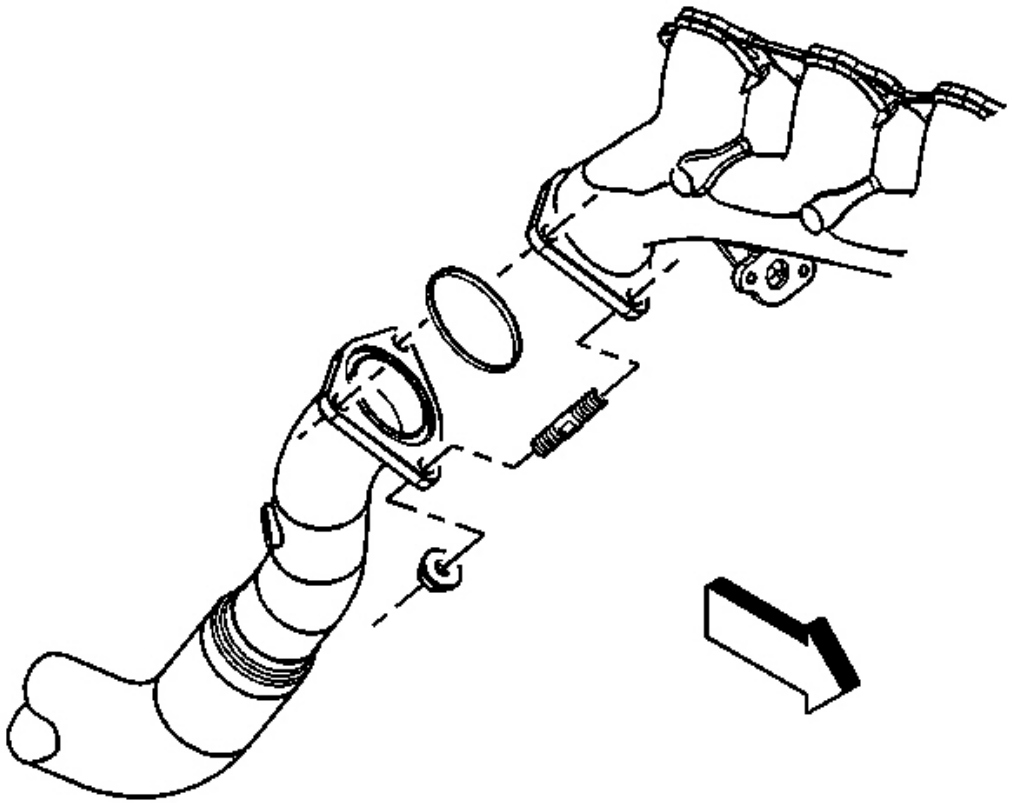


Fig. 23: Exhaust Manifold Pipe Nuts
Courtesy of GENERAL MOTORS CORP.

5. Install the right exhaust manifold pipe nuts.

   Tighten: Tighten the nuts to 50 N.m (39 lb ft).

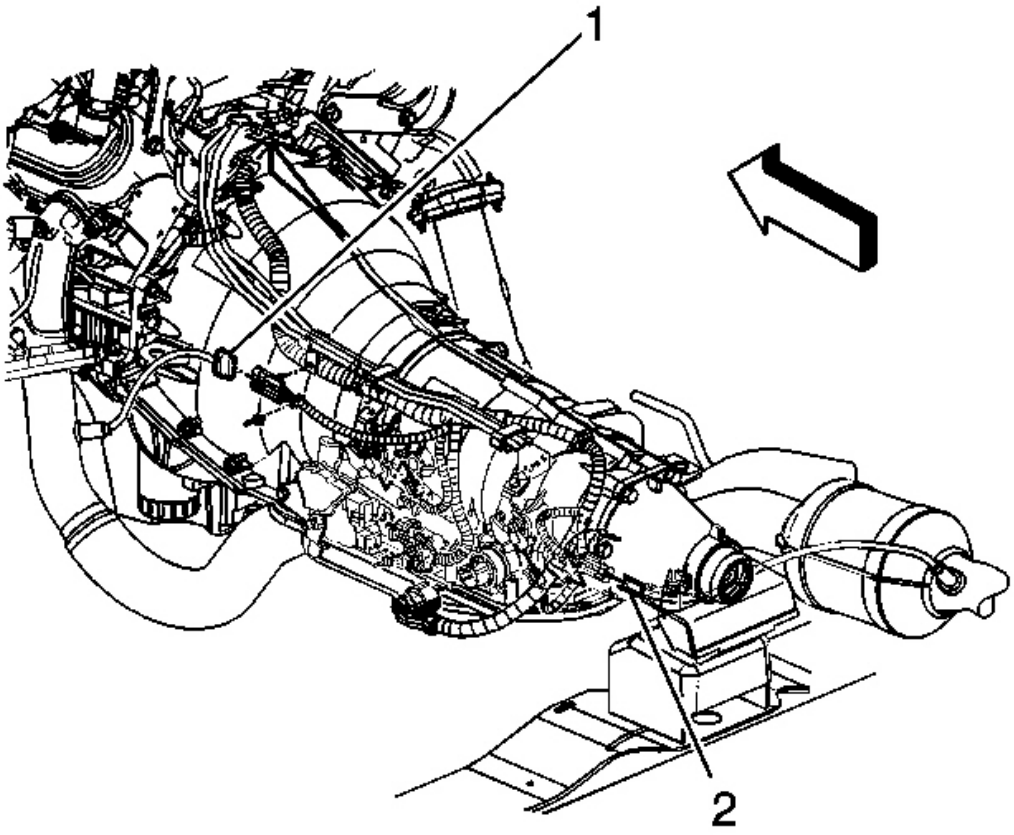


Fig. 24: View Of Transmission
Courtesy of GENERAL MOTORS CORP.

6. Connect the oxygen sensor electrical connector (1).
7. Connect the CPA retainer.
8. Remove the adjustable jackstands from catalytic converter or exhaust manifold pipe.
9. Install the engine protection shields. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.

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

10. Lower the vehicle.

CATALYTIC CONVERTER REPLACEMENT (RIGHT HAND)

Removal Procedure

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the catalytic converter guard. Refer to **Catalytic Converter Guard Replacement** in Frame and Underbody.

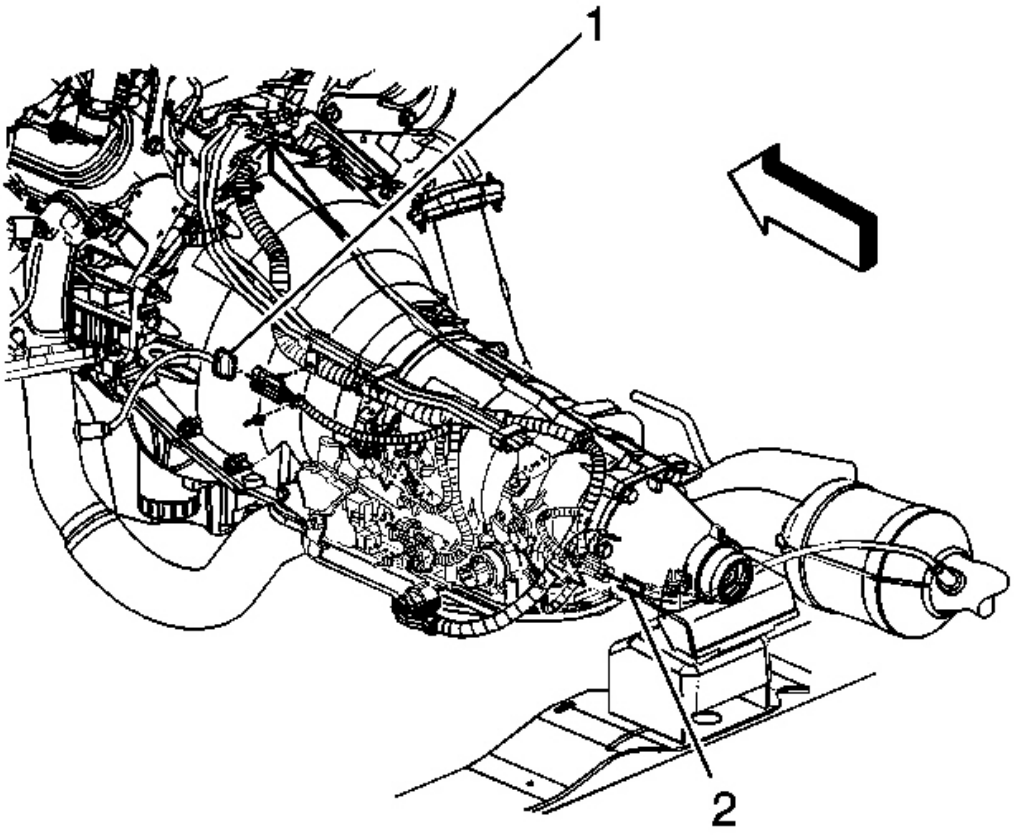


Fig. 25: View Of Transmission
Courtesy of GENERAL MOTORS CORP.

3. Disconnect the connector position assurance (CPA) retainers.
4. Disconnect the oxygen sensor electrical connectors (1, 2).
5. Remove the catalytic converter to muffler flange nuts.

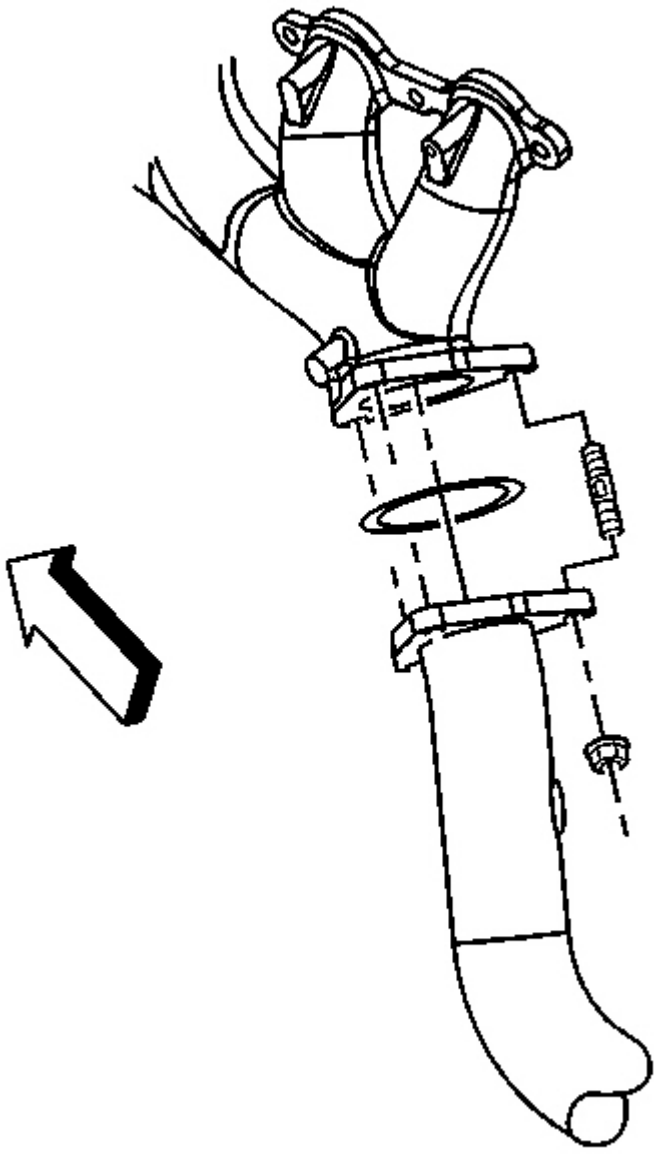


Fig. 26: Exhaust Manifold Pipe Nuts (Left)
Courtesy of GENERAL MOTORS CORP.

6. Remove the left exhaust manifold pipe nuts.

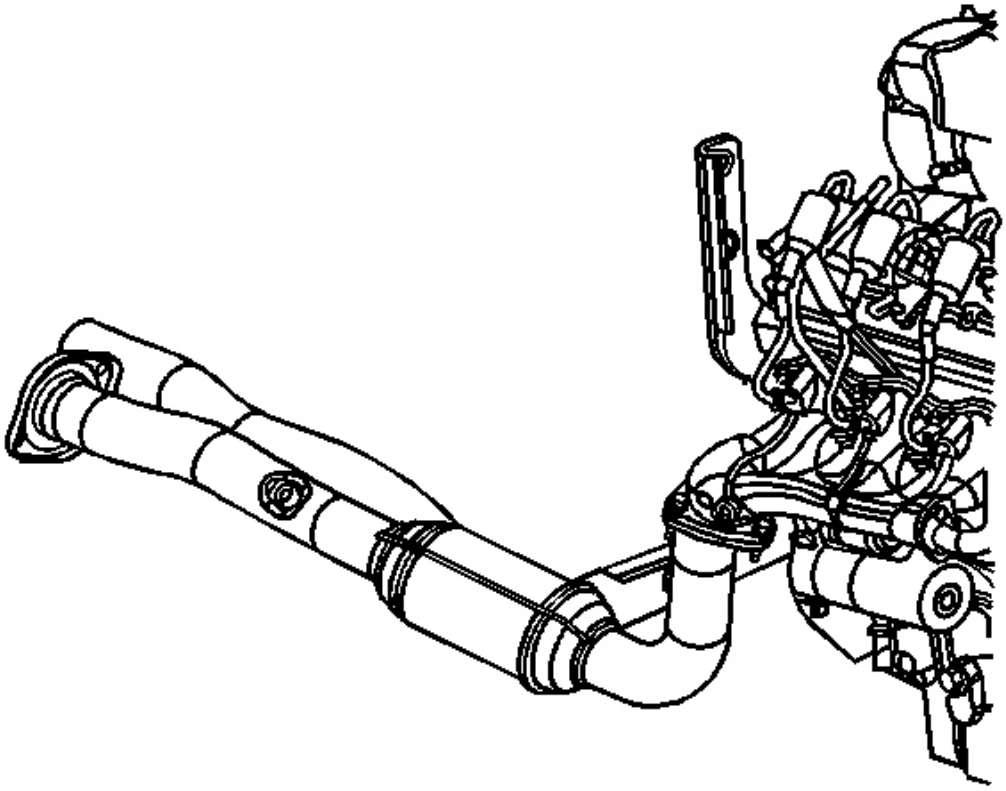


Fig. 27: Exhaust Manifold Pipe
Courtesy of GENERAL MOTORS CORP.

7. Remove the catalytic converter.

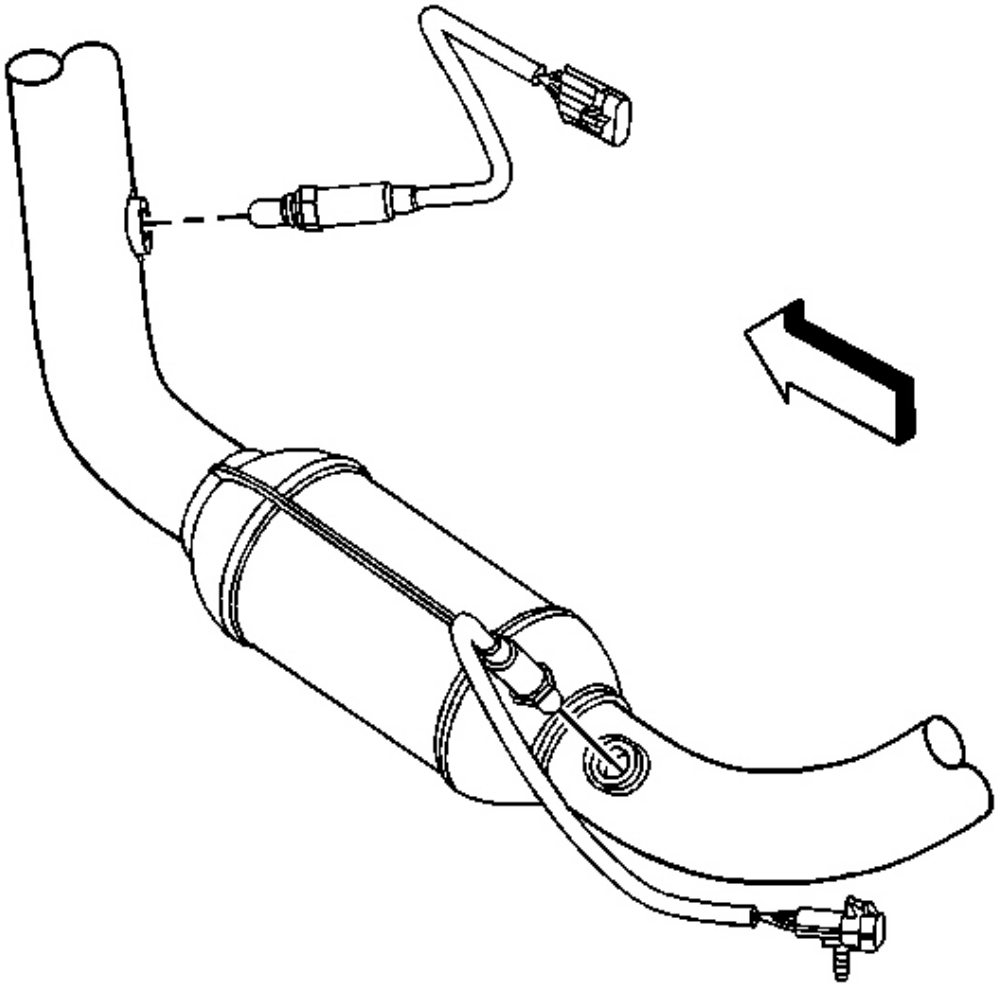


Fig. 28: Identifying O2 Sensors
Courtesy of GENERAL MOTORS CORP.

8. Remove the oxygen sensors if the catalytic converter is to be replaced.

Installation Procedure

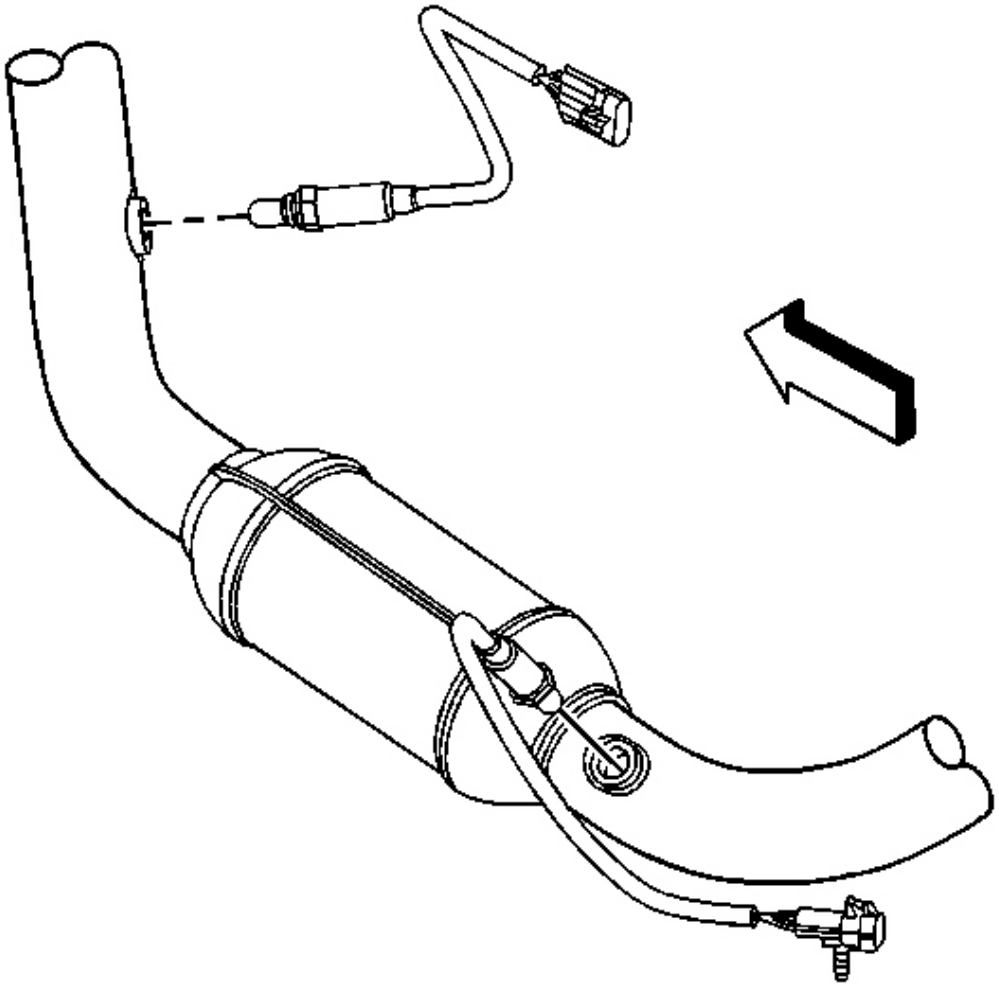


Fig. 29: Identifying O2 Sensors
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. If the catalytic converter was replaced, perform the following:
    1. Apply anti-seize compound GM P/N 12377953 or equivalent to the threads of the old oxygen sensors.
    2. Install the oxygen sensors.

    Tighten: Tighten the oxygen sensors to 42 N.m (31 lb ft).

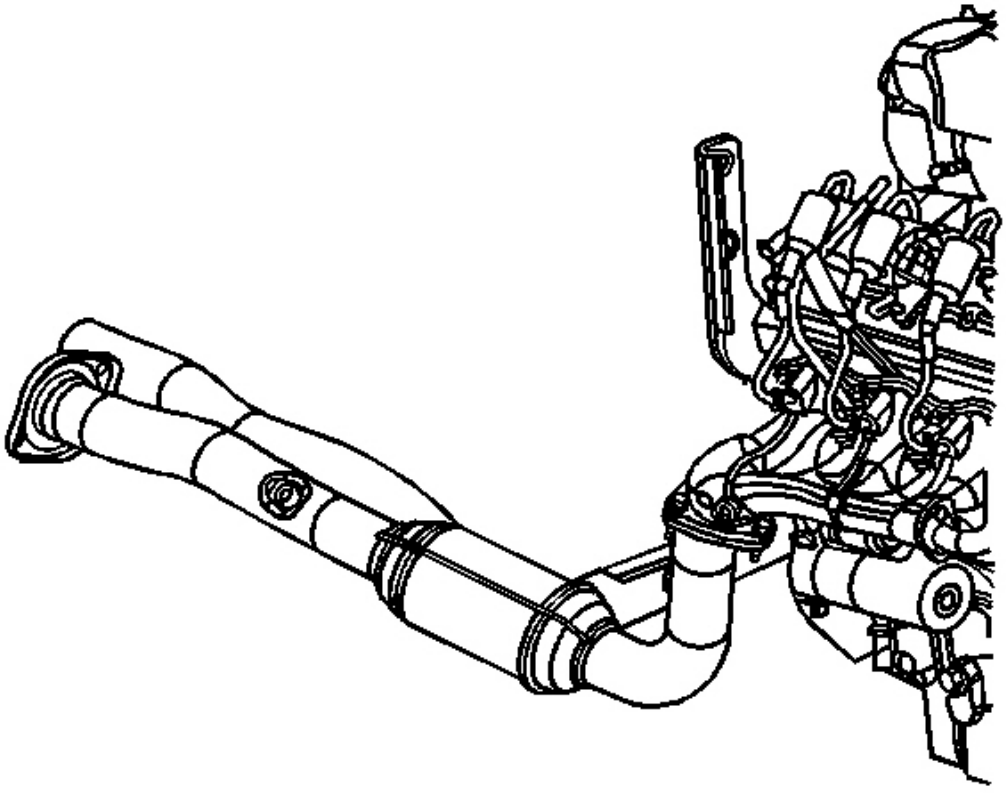


Fig. 30: Exhaust Manifold Pipe
Courtesy of GENERAL MOTORS CORP.

2. Install a NEW exhaust seal to the exhaust manifold.
3. Install the catalytic converter.

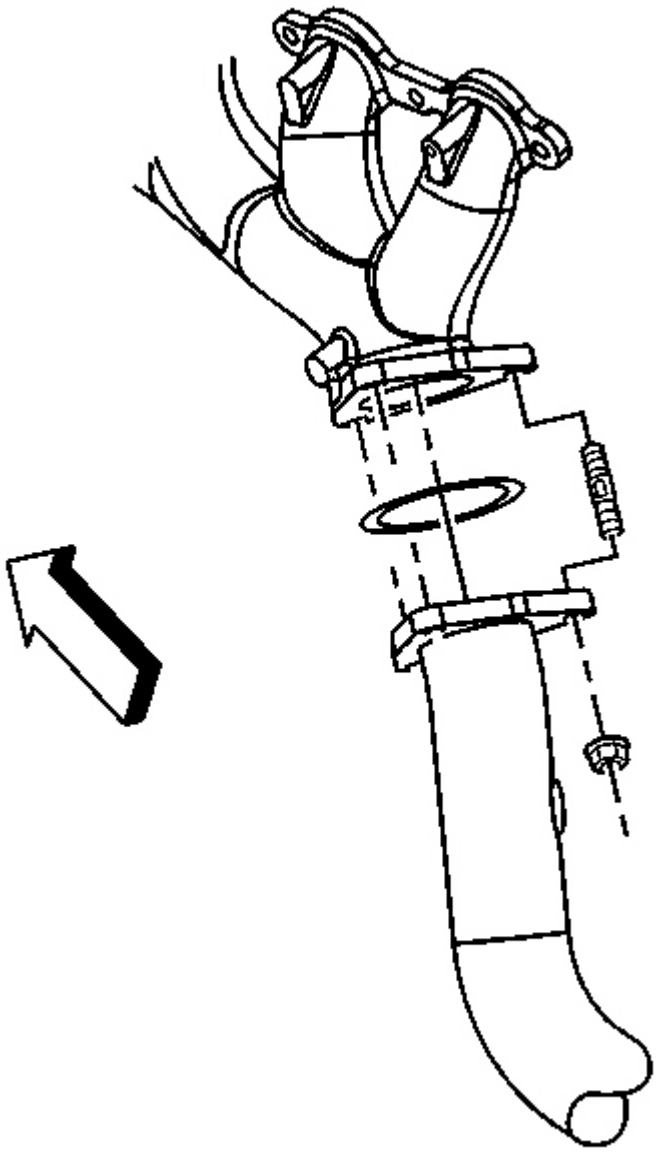


Fig. 31: Exhaust Manifold Pipe Nuts (Left)
Courtesy of GENERAL MOTORS CORP.

4. Install the left exhaust manifold pipe nuts.

   Tighten: Tighten the exhaust manifold pipe nuts to 50 N.m (39 lb ft).

5. Install the catalytic converter to muffler flange nuts.

   Tighten: Tighten the nuts to 48 N.m (35 lb ft).

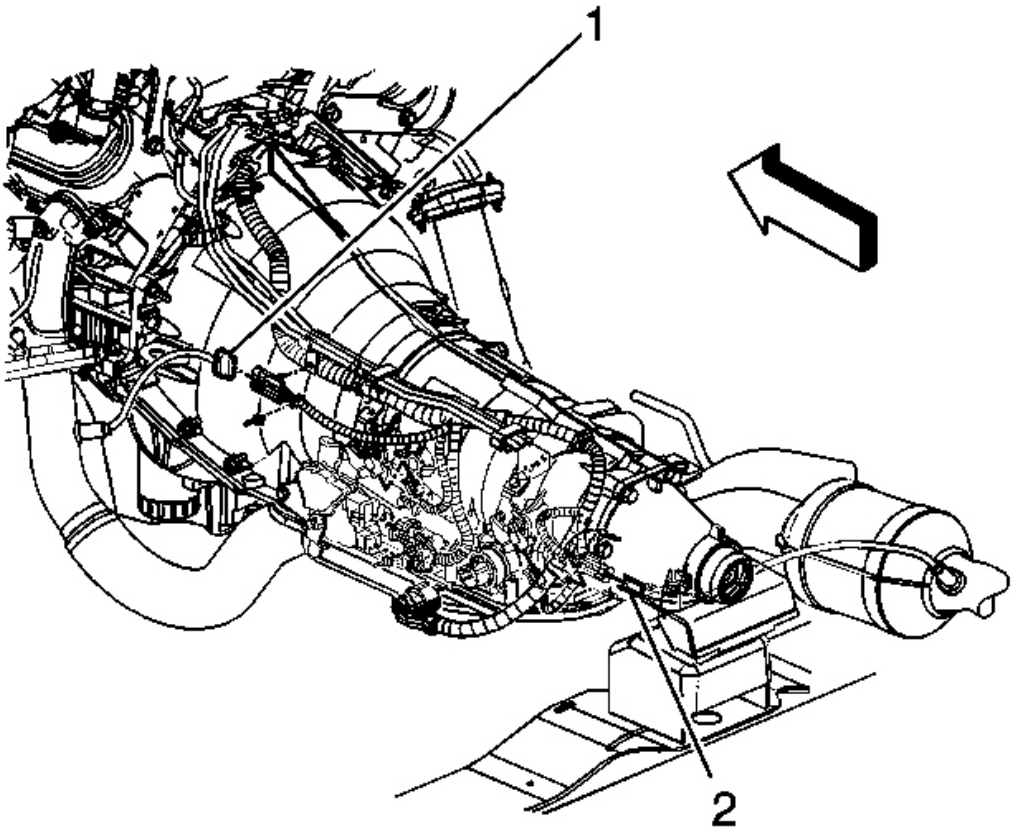


Fig. 32: View Of Transmission
Courtesy of GENERAL MOTORS CORP.

6. Connect the oxygen sensor electrical connectors (1, 2).
7. Connect the CPA retainers.

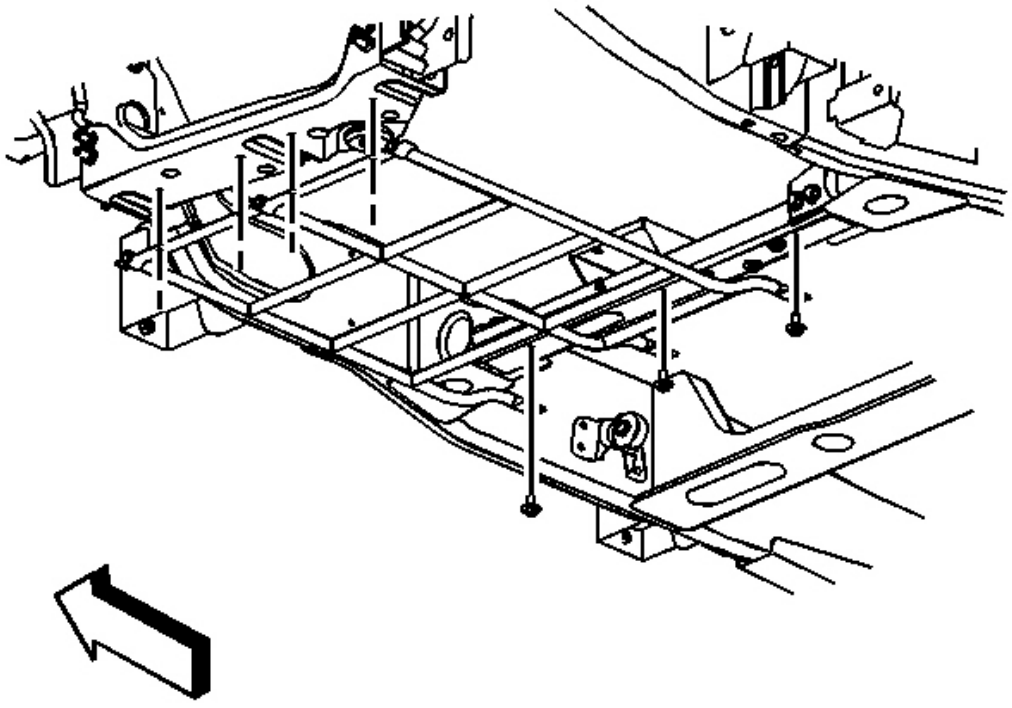


Fig. 33: Installing Catalytic Converter Guard
Courtesy of GENERAL MOTORS CORP.

8. Install the catalytic converter guard. Refer to **Catalytic Converter Guard Replacement** in Frame and Underbody.
9. Lower the vehicle.

MUFFLER REPLACEMENT

Tools Required

J 38185 Hose Clamp Pliers

Removal Procedure

1. Deflate the rear suspension air bags, if equipped. Refer to **Air Suspension Depressurization Procedure** in Air Suspension.
2. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

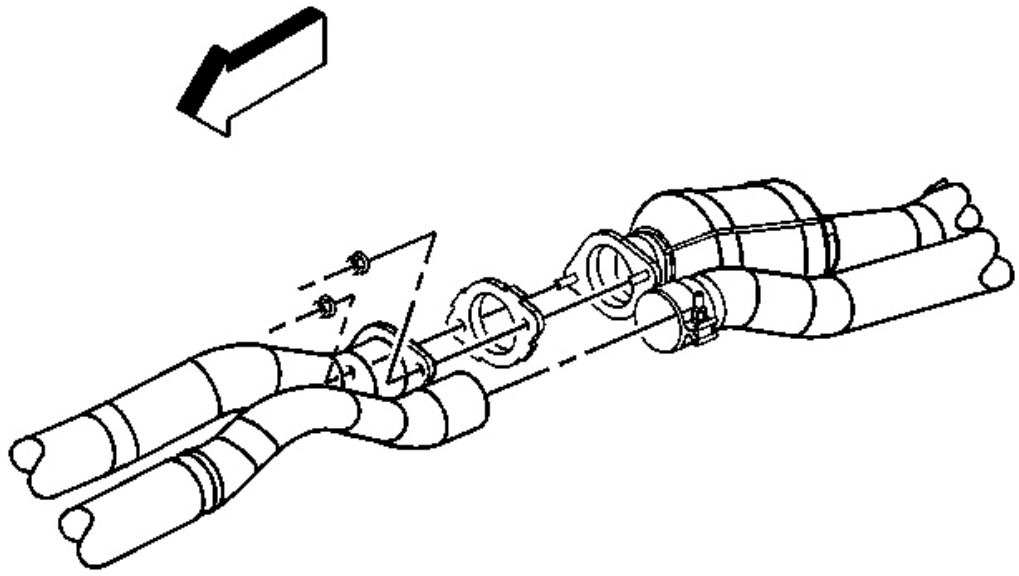


Fig. 34: Exhaust Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust muffler to catalytic converter flange nuts.
4. Loosen the exhaust pipe clamp.
5. Support the rear axle with jack stands.
6. Remove the right side lower stabilizer nut and position link aside.
7. Remove the rear track bar right hand nut and bolt.
8. Remove the right hand rear shock lower bolt and nut.
9. Disconnect the right hand air suspension level sensor, if equipped. Refer to **Air Spring Leveling Sensor Replacement** in Air Suspension.
10. Lower the axle.

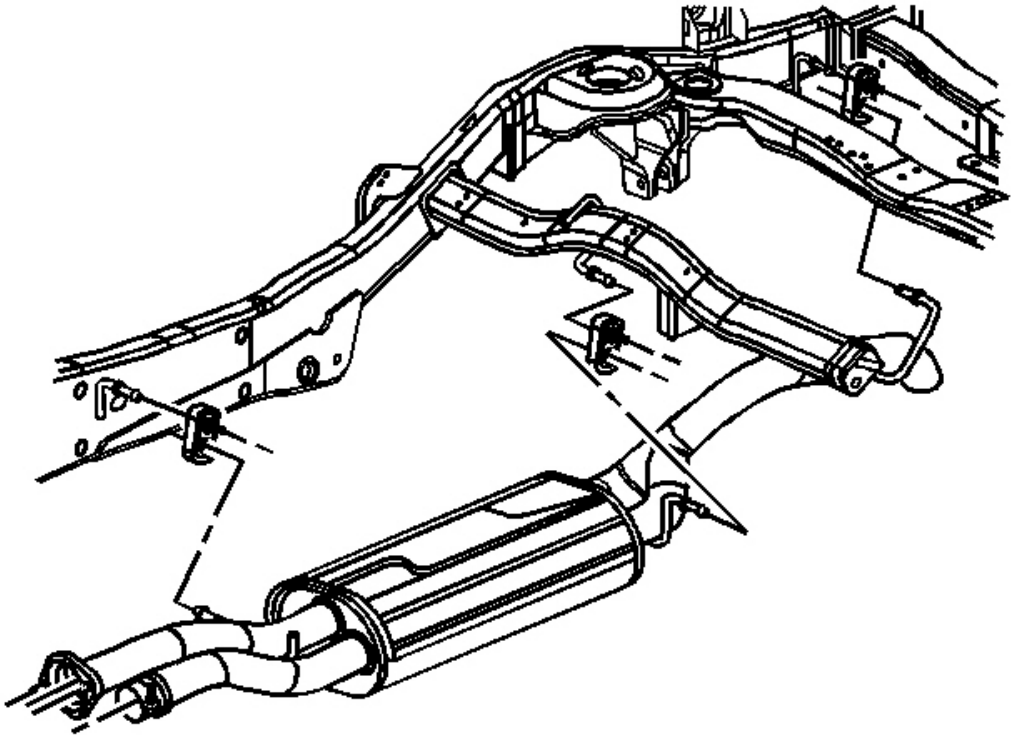


Fig. 35: Insulators & Muffler Hangers
Courtesy of GENERAL MOTORS CORP.

11. Remove the insulators from the frame hangers.
12. With the aid of an assistant, slide the muffler rearward in order to remove the muffler from the catalytic converter.
13. Remove the insulators from the muffler hangers.
14. Remove the muffler from the vehicle.

Installation Procedure

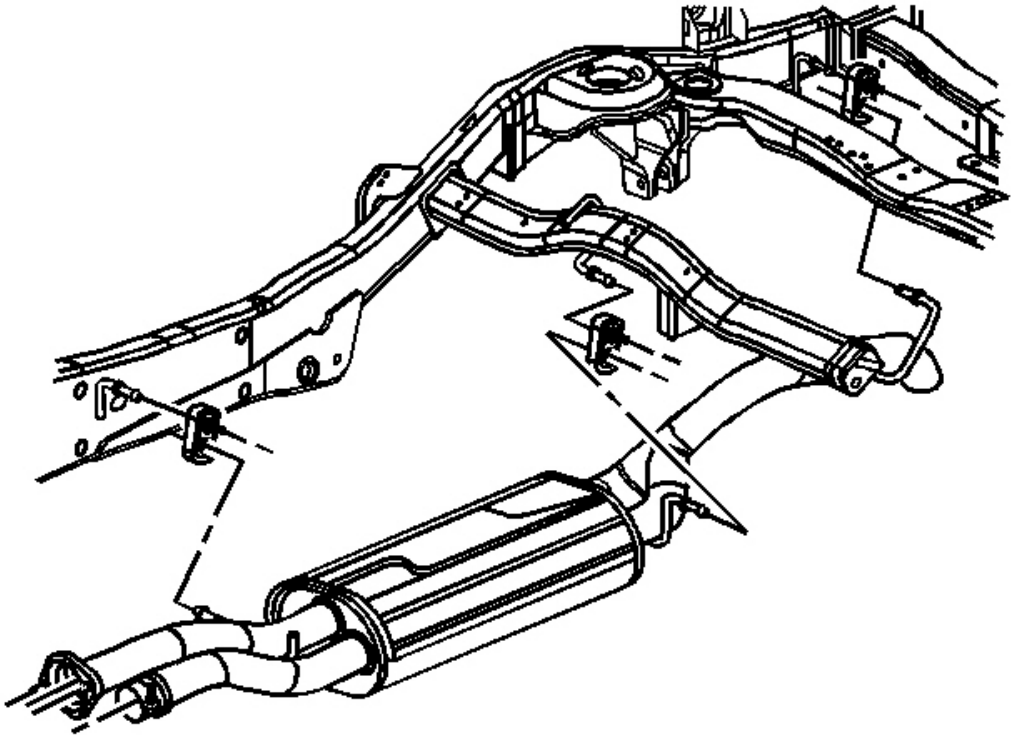


Fig. 36: Insulators & Muffler Hangers
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Apply lubricant to the insulators to aid in installation.

1. Install the insulators to the muffler hangers.
2. With the aid of an assistant, slide the muffler forward in order to install the muffler to the catalytic converter.
3. Install the insulators to the frame hangers.

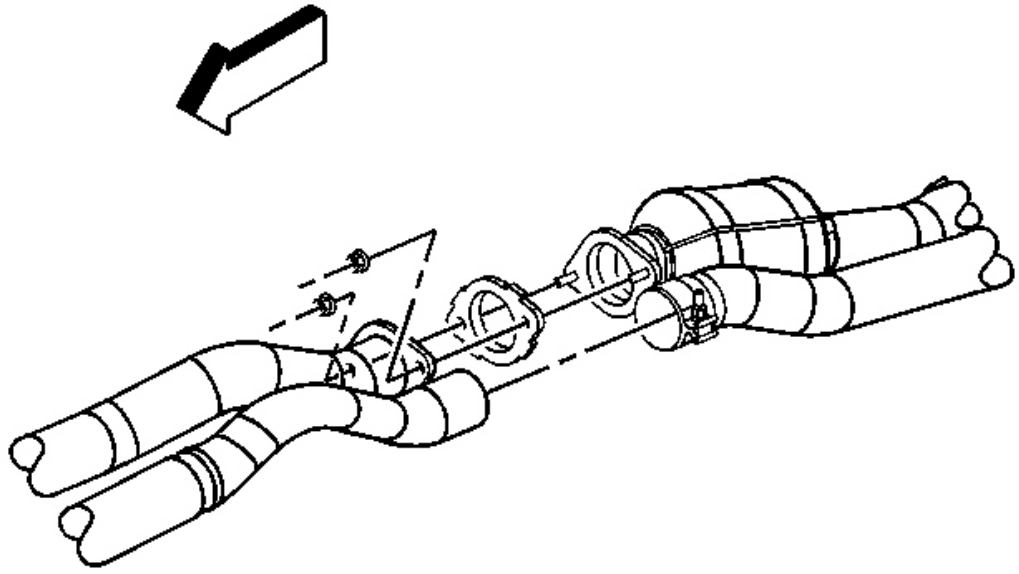


Fig. 37: Exhaust Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

4. Install the exhaust muffler nuts, until snug.

NOTE: Refer to Fastener Notice in Cautions and Notices.

5. Tighten the exhaust pipe clamp bolt and muffler nuts.

Tighten:

- Tighten the exhaust muffler nuts to 40 N.m (30 lb ft).
- Tighten the exhaust pipe clamp to 44 N.m (33 lb ft).

6. Raise the rear suspension to ride height.
7. Connect the right hand air suspension level sensor, if equipped. Refer to **Air Spring Leveling Sensor Replacement** in Air Suspension.
8. Install the right hand shock lower bolt and nut.

Tighten: Tighten the bolt and nut to 105 N.m (77 lb ft)

9. Install the rear track bar bolt and nut.

Tighten: Tighten the bolt and nut to 105 N.m (77 lb ft)

10. Install the right hand lower stabilizer nut.

    Tighten: Tighten the nut to 72 N.m (53 lb ft)

11. Remove the jack stands from under the rear axle.
12. Lower the vehicle. Ensure the air springs seat properly as the vehicle is being lowered.
13. If equipped with air suspension, start the engine and idle for 2 minutes to ensure the air spring leveling system is functioning properly.

FLOOR PANEL HEAT SHIELD REPLACEMENT

Removal Procedure

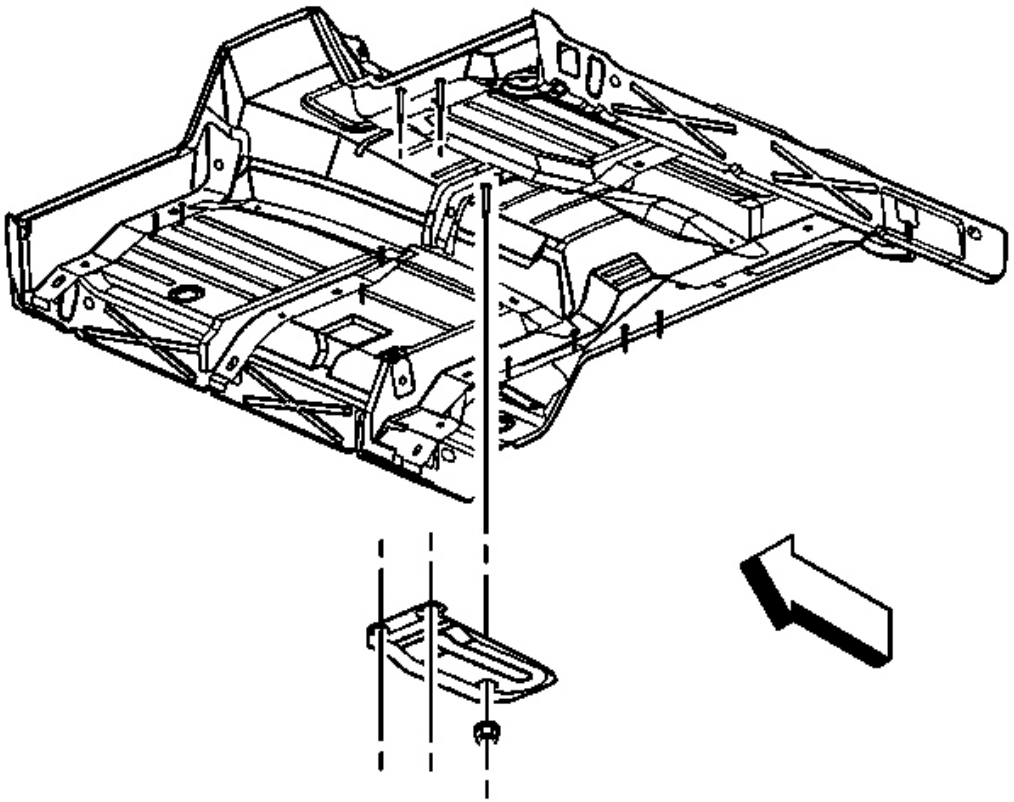


Fig. 38: Exhaust Front Heat Shield Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the exhaust front heat shield nuts.

2. Remove the exhaust front heat shield from the studs.

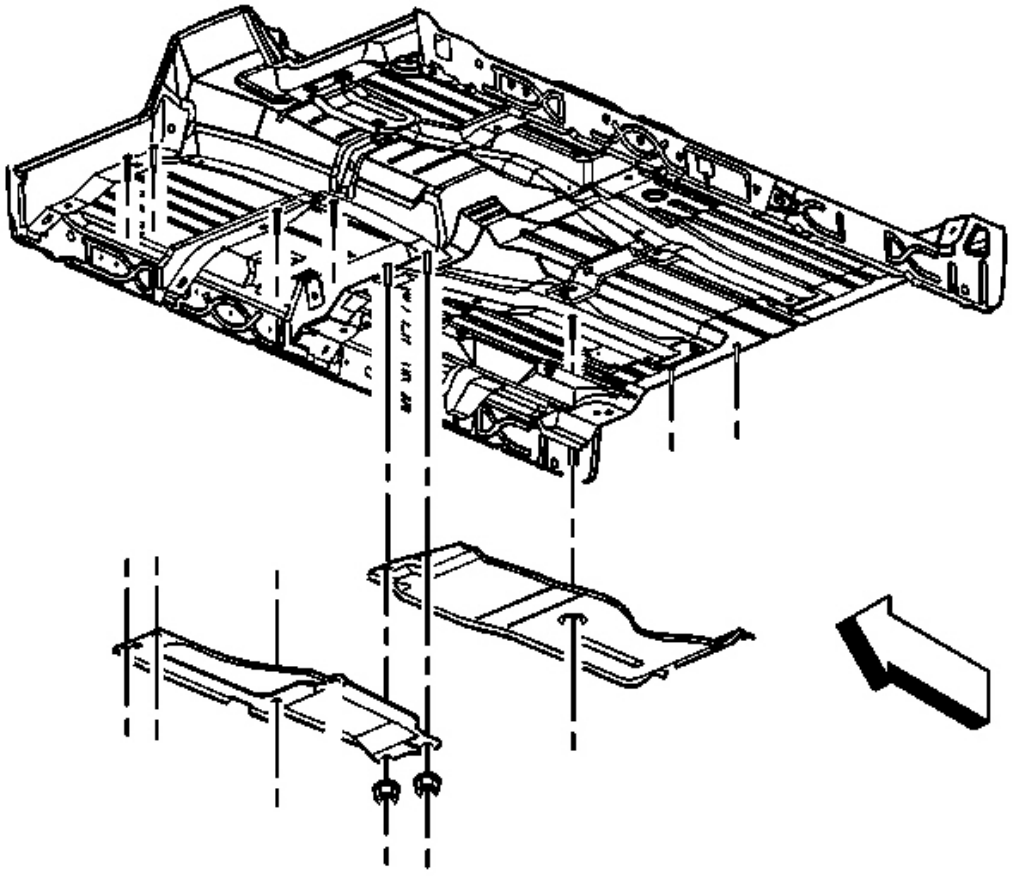


Fig. 39: Exhaust Heat Shield(S)
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust heat shield nuts.
4. Remove the exhaust heat shield(s) from the studs.

Installation Procedure

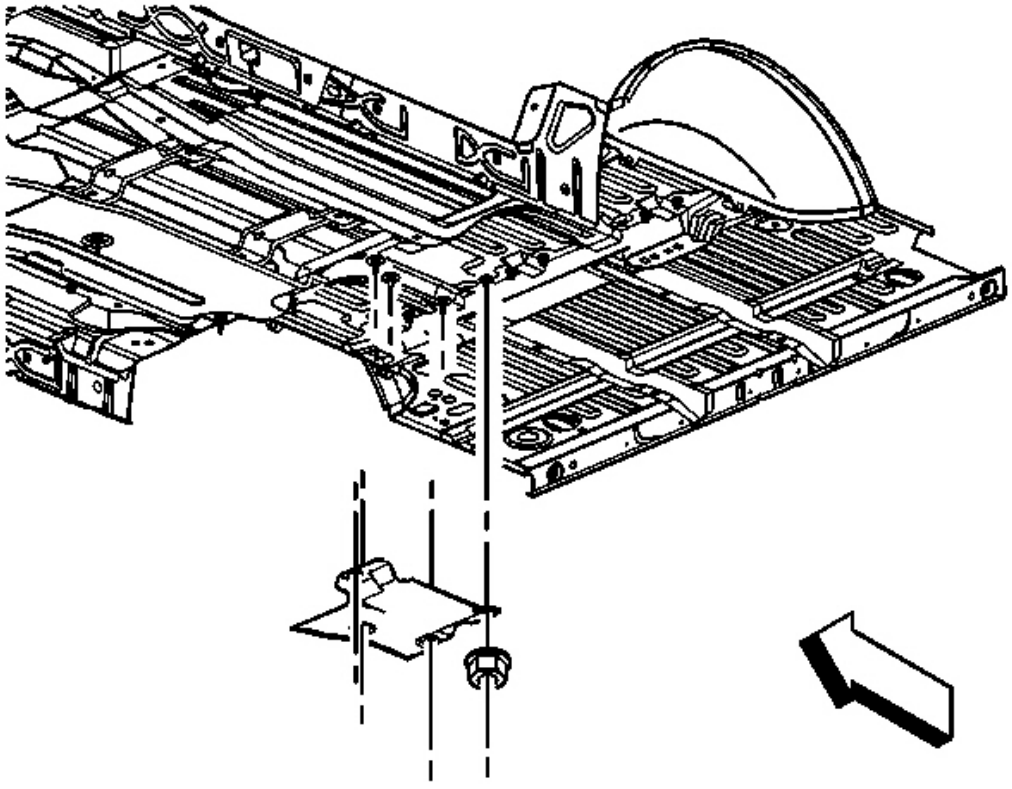


Fig. 40: Installing Exhaust Heat Shield To Studs
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the exhaust heat shield to the studs.
2. Install the exhaust heat shield nuts.

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

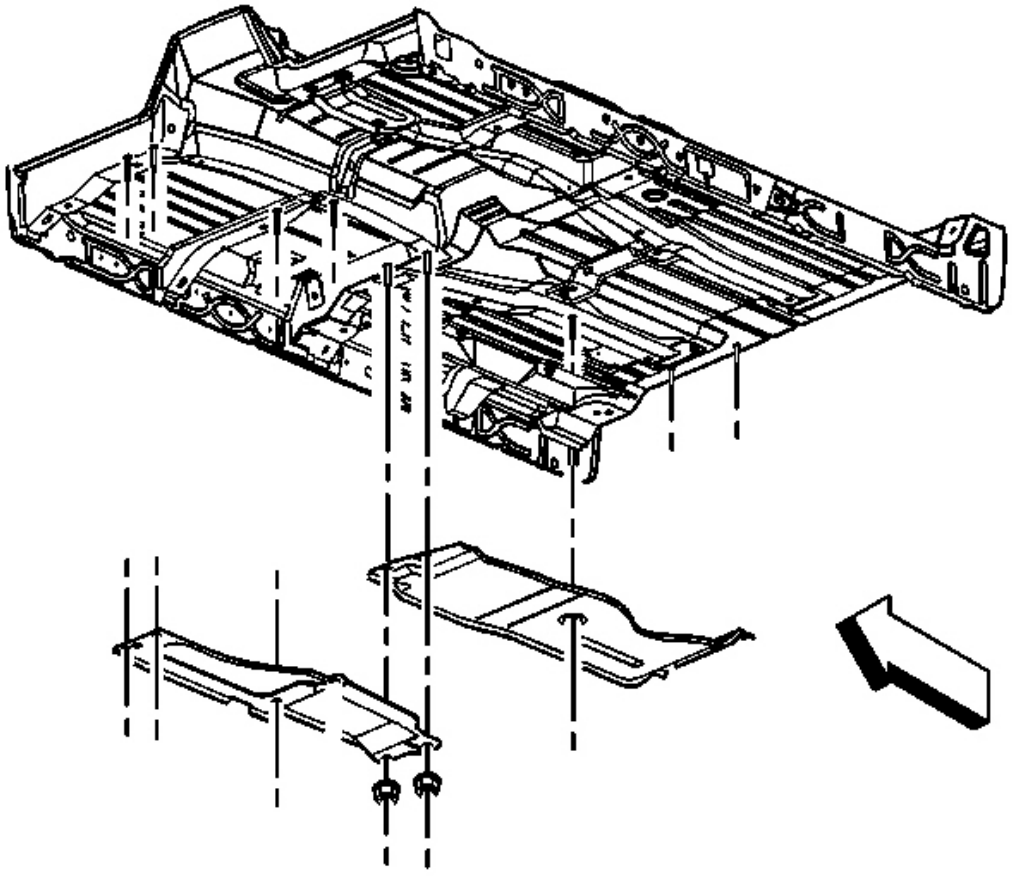


Fig. 41: Exhaust Heat Shield(S)
Courtesy of GENERAL MOTORS CORP.

3. Install the exhaust heat shield(s) to the studs.
4. Install the exhaust heat shield nuts.

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

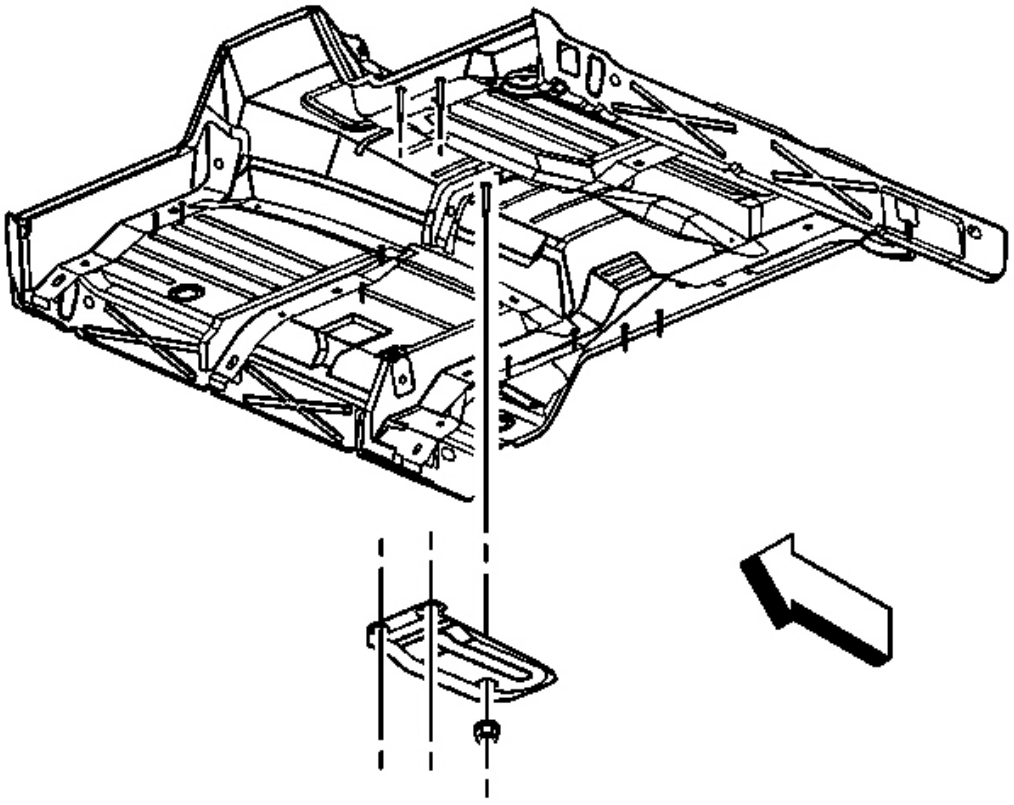


Fig. 42: Exhaust Front Heat Shield Nuts
Courtesy of GENERAL MOTORS CORP.

5. Install the exhaust front heat shield to the studs.
6. Install the exhaust front heat shield nuts.

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

EXHAUST HEAT SHIELD REPLACEMENT - DASH PANEL

Removal Procedure

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Remove the engine protection shield bolts and shield. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.

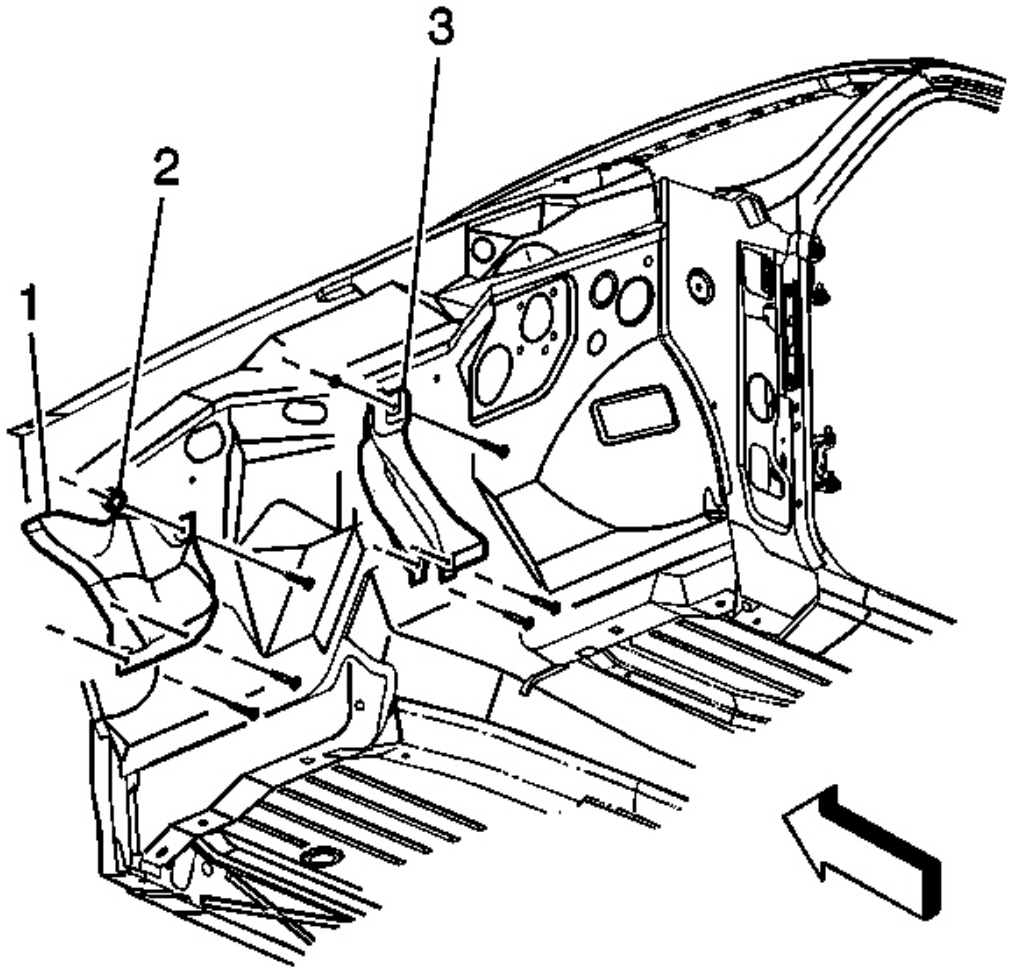


Fig. 43: Left Exhaust Heat Shield & Nuts (Dash Panel)
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust heat shield nuts.
4. Remove the exhaust heat shield from the dash panel studs (1), (3).

Installation Procedure

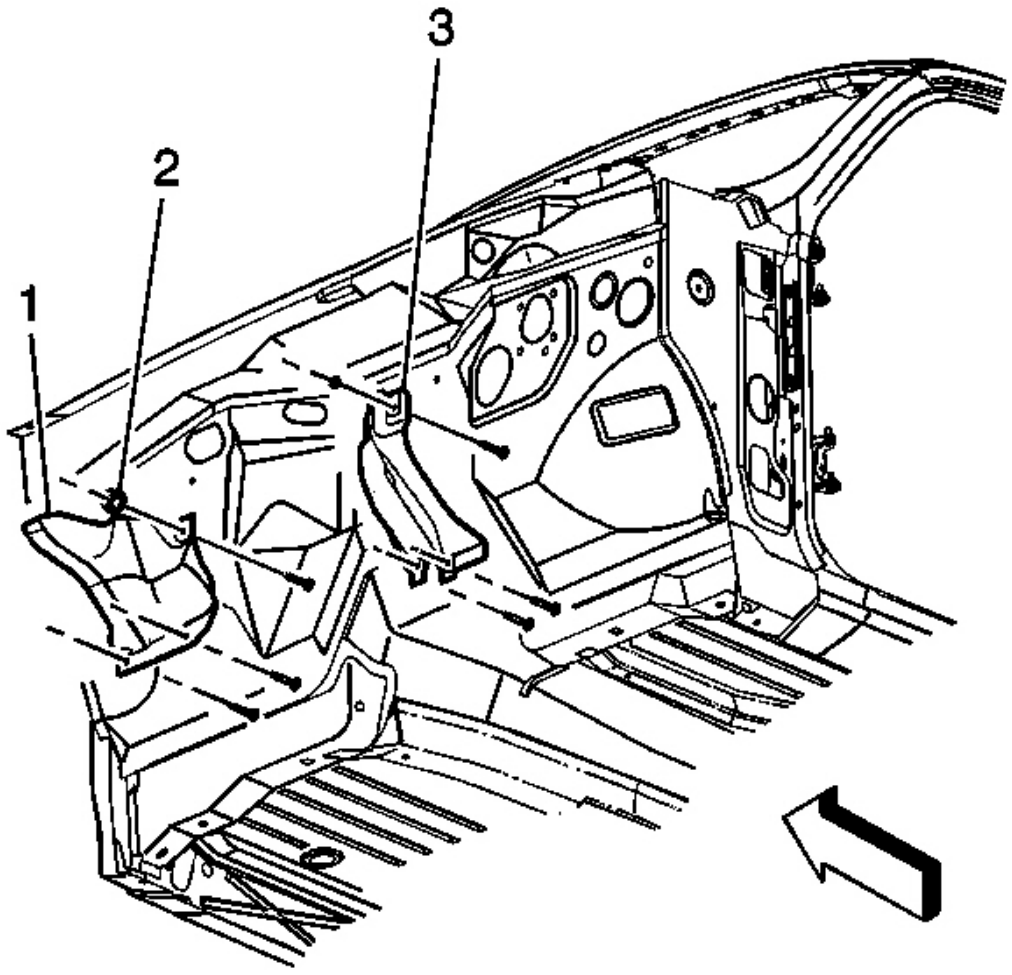


Fig. 44: Left Exhaust Heat Shield & Nuts (Dash Panel)
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

1. Install the exhaust heat shield to the dash panel studs (1), (3).
2. Install the exhaust heat shield nuts.

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

3. Install the engine protection shield and bolts. Refer to **Engine Protection Shield Replacement** in Frame and Underbody.

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

4. Lower the vehicle.

DESCRIPTION AND OPERATION

EXHAUST SYSTEM DESCRIPTION

IMPORTANT: Use of non-OEM parts may cause driveability concerns.

The exhaust system carries exhaust gases, treated by the catalytic converter, through a resonator, if applicable and into the exhaust muffler where exhaust noise is lessened.

In order to secure the exhaust pipe to the exhaust manifold, a flange and seal-joint coupling is utilized. The exhaust system may utilize a slip-joint coupling design with a clamp and a U-bolt or a flange connection with a gasket.

Exhaust hangers and rubber insulators help to support the weight of the exhaust pipe along with insulating any exhaust system vibration, rattle, or noise.

Exhaust hangers also space the exhaust system away from the underbody of the vehicle and allows the exhaust system to expand as the exhaust system warms up.

Exhaust heat shields are used to protect the body and other components from damage due to the heat from the exhaust system.

The exhaust system may be comprised of the following components:

- Exhaust manifold
- Exhaust pipes
- Catalytic converters
- Exhaust muffler
- Exhaust resonator, if equipped
- Exhaust tail pipe, if equipped
- Exhaust hangers
- Exhaust heat shields

Resonator

Some exhaust systems are equipped with a resonator. The resonator, located either before or after the muffler, allows the use of mufflers with less back pressure. Resonators are used when vehicle characteristics require specific exhaust tuning.

Catalytic Converter

The catalytic converter is an emission control device added to the engine exhaust system in order to reduce hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) pollutants from the exhaust gas.

The catalytic converter is comprised of a ceramic monolith substrate, supported in insulation and housed within a sheet metal shell. The substrate may be washcoated with 3 noble metals:

- Platinum (Pt)
- Palladium (Pd)
- Rhodium (Rh)

The catalyst in the converter is not serviceable.

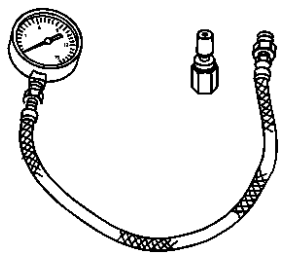
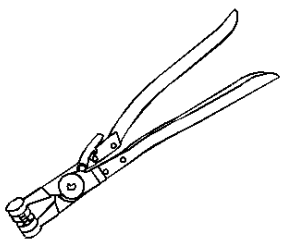
Muffler

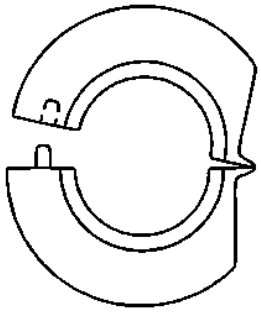
The exhaust muffler reduces the noise levels of the engine exhaust by the use of tuning tubes. The tuning tubes create channels inside the exhaust muffler that lower the sound levels created by the combustion of the engine.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description
	J 35314-A/BT-8515/BT-8515A Exhaust Back Pressure Tester
	J 38185 Hose Clamp Pliers



J 43181
Heater Line Quick Connect Release Tool