2008 ENGINE

Engine Exhaust - Cab & Chassis Sierra, Cab & Chassis Silverado, Sierra & Silverado

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Catalytic Converter to Exhaust Manifold Nut (4.3L, 4.8L, 5.3L, 6.0L, 6.2L)	50 N.m	37 lb ft
Catalytic Converter to Muffler Nut (4.3L, 4.8L, 5.3L, 6.0L, 6.2L)	45 N.m	33 lb ft
Catalytic Converter to Particulate Filter Nut (6.6L)	45 N.m	33 lb ft
Exhaust Gas Recirculation (EGR) Cooler Pipe Bracket Upper Bolt (6.6L)	9 N.m	80 lb in
Exhaust Gas Recirculation (EGR) Cooler Pipe Lower Bolt (6.6L)	9 N.m	80 lb in
Exhaust Heat Shield Nut	9 N.m	80 lb in
Exhaust Manifold Bolts (4.8L, 5.3L, 6.0L, 6.2L)		
• First Pass	15 N.m	11 lb ft
• Final Pass	25 N.m	18 lb ft
Exhaust Manifold Bolt/Nut (6.6L)		
• First Pass	57 N.m	42 lb ft
• 4 Center Bolts an Additional Pass	57 N.m	42 lb ft
Exhaust Manifold Bolt/Stud (4.3L)	30 N.m	22 lb ft
Exhaust Manifold Heat Shield Bolt (4.3L, 4.8L, 5.3L, 6.0L, 6.2L)	9 N.m	80 lb in
Exhaust Manifold Heat Shield Bolt (6.6L)	10 N.m	89 lb in
Exhaust Manifold Pipe to Exhaust Manifold Nut (6.0L)	50 N.m	37 lb ft
Exhaust Muffler Clamp (6.0L)	47 N.m	35 lb ft
Exhaust Muffler to Exhaust Manifold Pipe Nut (6.0L)	45 N.m	33 lb ft
Exhaust Muffler to Exhaust Particulate Filter Nut (6.6L)	45 N.m	33 lb ft

Exhaust Pipe Bolt (6.6L)	53 N.m	39 lb ft
Exhaust Pipe Hanger Bracket Bolt (6.0L, 6.6L)	25 N.m	18 lb ft
Exhaust Pipe Heat Shield Bolt (6.6L)	10 N.m	89 lb in
Heated Oxygen Sensor (HO2S) (4.3L, 4.8L, 5.3L, 6.0L, 6.2L)	42 N.m	31 lb ft
Muffler to Catalytic Converter Nut (4.3L, 4.8L, 5.3L, 6.0L, 6.2L)	45 N.m	33 lb ft
Oil Level Indicator Tube Bolt (4.8L, 5.3L, 6.0L, 6.2L)	25 N.m	18 lb ft
Oil Level Indicator Tube Bolt (6.6L)	21 N.m	15 lb ft
Oil Pan Skid Plate Bolt	28 N.m	21 lb ft
Rear Shock Absorber Lower Bolt (6.0L, 6.2L, 6.6L)	95 N.m	70 lb ft
Steering Shaft Coupling Bolt/Nut (4.8L, 5.3L, 6.0L, 6.2L)	50 N.m	37 lb ft
Transmission Fluid Fill Tube Nut (6.6L)	18 N.m	13 lb ft
Transmission Mount to Support Nut (6.0L, 6.6L)	40 N.m	30 lb ft
Transmission Support Crossmember Bolt (6.0L, 6.6L)	95 N.m	70 lb ft
Turbocharger Exhaust Pipe to Bracket Bolt (6.6L)	34 N.m	25 lb ft
Turbocharger Exhaust Pipe to Catalytic Converter Clamp (6.6L)	12 N.m	106 lb in
Turbocharger Exhaust Pipe Heat Shield Bolt (6.6L)	10 N.m	89 lb in
Turbocharger Exhaust Pipe to Turbocharger Clamp Bolt (6.6L)	15 N.m	11 lb ft
Turbocharger Upper Heat Shield Bolt (6.6L)	10 N.m	89 lb in

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** .

Visual/Physical Inspection

- Inspect for aftermarket or non-OEM devices such as, but not limited too; 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**.
- 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

Diagnostic Aids

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

IMPORTANT: Do not replace a restricted particulate filter. Repair the engine condition that clogged the particulate filter, and then attempt to perform a service regeneration. Refer to Exhaust Particulate Filter Cleaning (LMM DPF Regeneration Enable) or Exhaust Particulate Filter Cleaning (LMM DPF Service Regeneration).

If the vehicle is equipped with a 6.6 L diesel engine do not perform this diagnostic. The exhaust system does not have a location for installing the **J 35314-A** Exhaust Back Pressure Gage. See **Special Tools**. Instead remove the suspect component, operate the vehicle, verify for improved performance. If performance is improved then replace the faulty component.

Test Description

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

4: 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** . See **Special Tools**. Removing the heated oxygen sensor (HO2S) sensor may set a DTC. When finishing this diagnostic table, be sure to clear all codes.

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

8: 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**
3	Is the vehicle equipped with a 6.6L diesel engine?	-	Go to Diagnostic Aids	Go to **Step 4**

4	1. Remove the HO2S that is in front of and closest to the catalytic converter. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** for the 4.3L engine, or to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (2500 Series - Cab/Chassis)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines. 2. Install the **J 35314-A** Exhaust Back Pressure Gage in place of the HO2S. See **Special Tools**. 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 gage. Does the reading exceed the specified value?	20 kPa (3 psi) If equipped with a 4.8L, 5.3L, 6.0L, or 6.2L - 3.4 kPa (0.5 psi)	Go to **Step 5**	Go to **Step 8**
	1. Turn the engine off and place the ignition in the lock position. 2. Remove the **J 35314-A** . See **Special Tools**.			

5	3. Re-install the HO2S. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** for the 4.3L engine, or to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (2500 Series - Cab/Chassis)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines. 4. Remove the post-catalyst HO2S. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** for the 4.3L engine, or to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (2500 Series - Cab/Chassis)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (1500 Series)** or **Heated Oxygen Sensor Replacement -**	20 kPa (3 psi) If equipped with a 4.8L, 5.3L, 6.0L, or 6.2L - 3.4 kPa (0.5 psi)			

	Bank 2 Sensor 2 (2500 Series) or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series - Cab/Chassis)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines. 5. Install the **J 35314-A** in place of the post HO2S. See **Special Tools**. 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 gage. Does the reading exceed the specified value?		Go to **Step 6**	Go to **Step 7**
6	Inspect the exhaust system for the following conditions: • Damage in the exhaust pipe • Debris in the exhaust pipe • Muffler or resonator internal failure • Two-layer exhaust pipe separation Did you find and correct the condition?	-	Go to **Step 8**	-
7	Replace the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)** or **Catalytic Converter Replacement - Left Side (6.0L - Cab/Chassis)**. Did you find and correct the condition?	-	Go to **Step 8**	-
	1. Remove the **J 35314-A** . See **Special Tools**. 2. Reinstall the HO2S. Refer to **Heated**			

8	**Oxygen Sensor Replacement - Bank 1 Sensor 2** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** for the 4.3L engine, or to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (2500 Series - Cab/Chassis)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series - Cab/Chassis)** for the 4.8L, 5.3L, 6.0L, and 6.2L engines. 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

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	• Align and tighten the components to the specifications. Refer to **Fastener Tightening Specifications**.

components.	• 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 Side (4.3L)** or **Exhaust Manifold Replacement - Left Side (4.8L, 5.3L, 6.0L, and 6.2L)** or **Exhaust Manifold Replacement - Left Side (6.6L)** • **Exhaust Manifold Replacement - Right Side (4.3L)** or **Exhaust Manifold Replacement - Right Side (4.8L, 5.3L, 6.0L, and 6.2L)** or **Exhaust Manifold Replacement - Right Side (6.6L)**.
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 (1500 Series w/4.3L, 4.8L, 5.3L, 6.0L)** or **Muffler Replacement (1500 Series w/6.2L)** or **Muffler**

	Replacement (2500/3500 Series w/6.0L) or **Muffler Replacement (2500/3500 - Cab/Chassis w/6.0L)** or **Muffler Replacement (6.6L)**.

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 (1500 Series w/4.3L, 4.8L, 5.3L, 6.0L)** or **Muffler Replacement (1500 Series w/6.2L)** or **Muffler Replacement (2500/3500 Series w/6.0L)** or **Muffler Replacement (2500/3500 - Cab/Chassis w/6.0L)** or **Muffler Replacement (6.6L)**.
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 (4.3L) Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)Catalytic Converter Replacement (6.6L)**

	• **Muffler Replacement (1500 Series w/4.3L, 4.8L, 5.3L, 6.0L)Muffler Replacement (1500 Series w/6.2L)Muffler Replacement (2500/3500 Series w/6.0L)Muffler Replacement (2500/3500 - Cab/Chassis w/6.0L)Muffler Replacement (6.6L)**

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (4.3L)

Removal Procedure

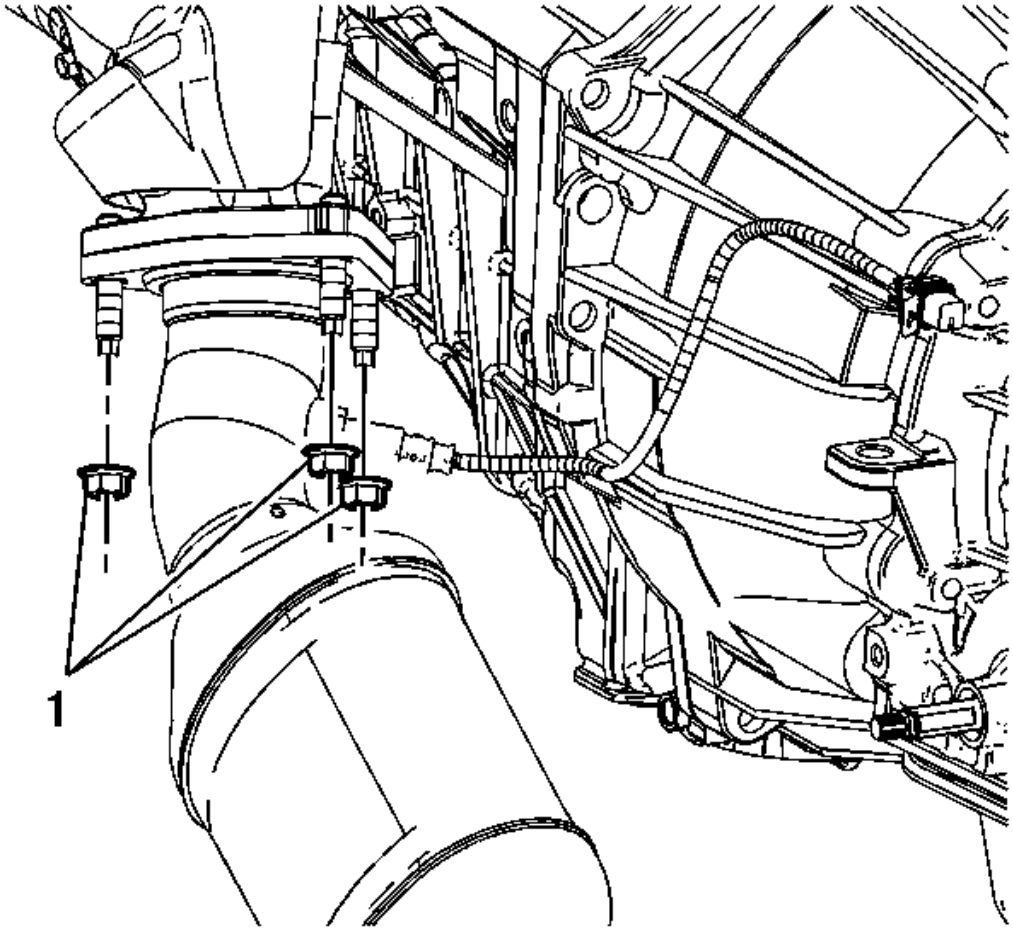


Fig. 1: View Of Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the catalytic converter to exhaust manifold nuts (1).
3. Lower the vehicle.

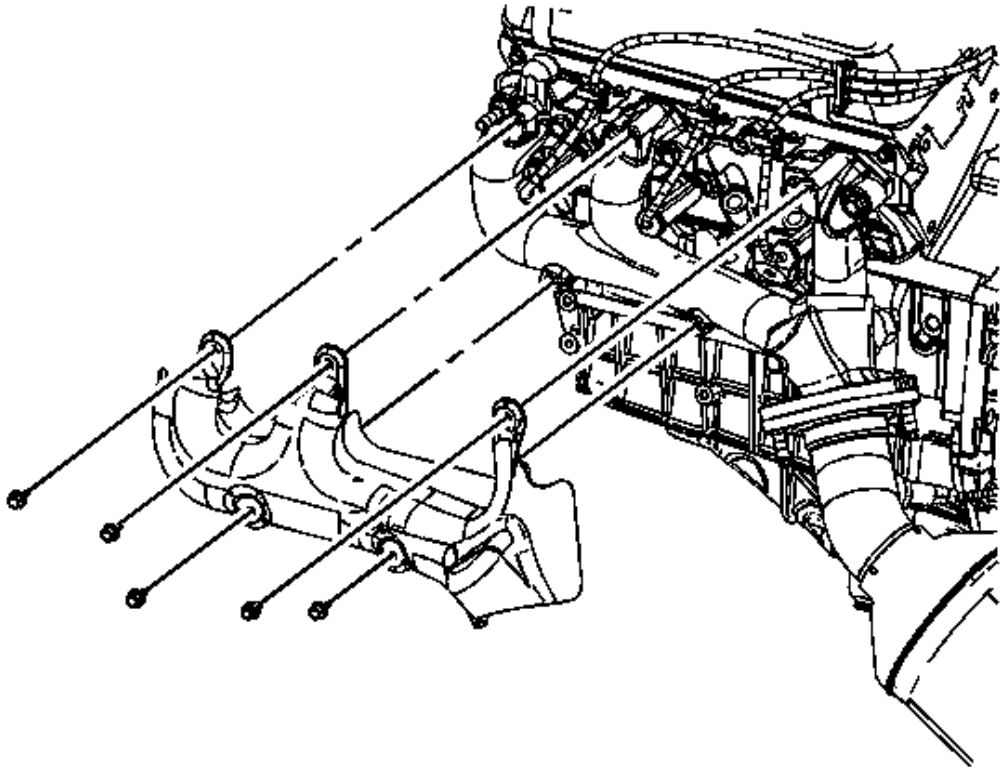


Fig. 2: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust manifold heat shield bolts and shield.
5. Remove the spark plugs. Refer to **Spark Plug Replacement** .
6. Reposition the spark plug wires out of the way, if necessary.

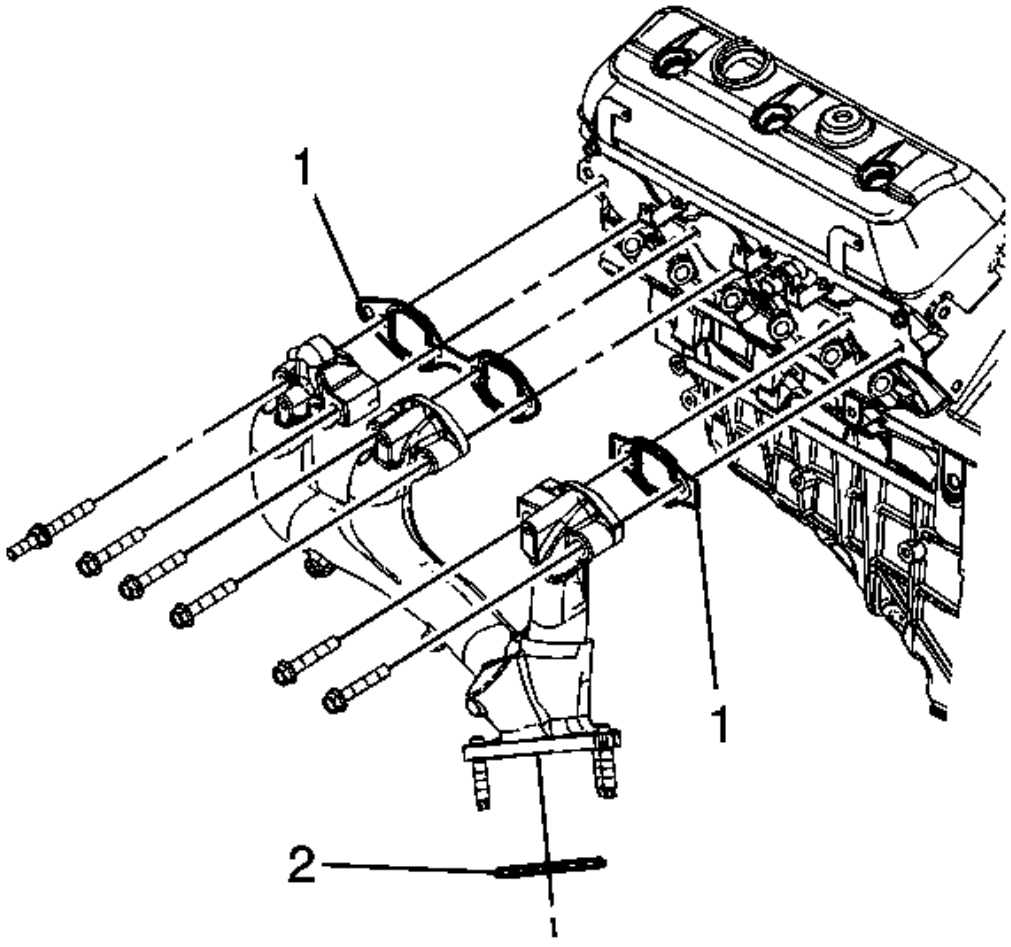


Fig. 3: View Of Catalytic Converter Seal & Exhaust Manifold Components
Courtesy of GENERAL MOTORS CORP.

7. Remove the exhaust manifold bolts and stud.
8. Remove the exhaust manifold and gaskets (1). Discard the gaskets.
9. Remove the exhaust manifold to catalytic converter seal (2). Discard the seal.

Installation Procedure

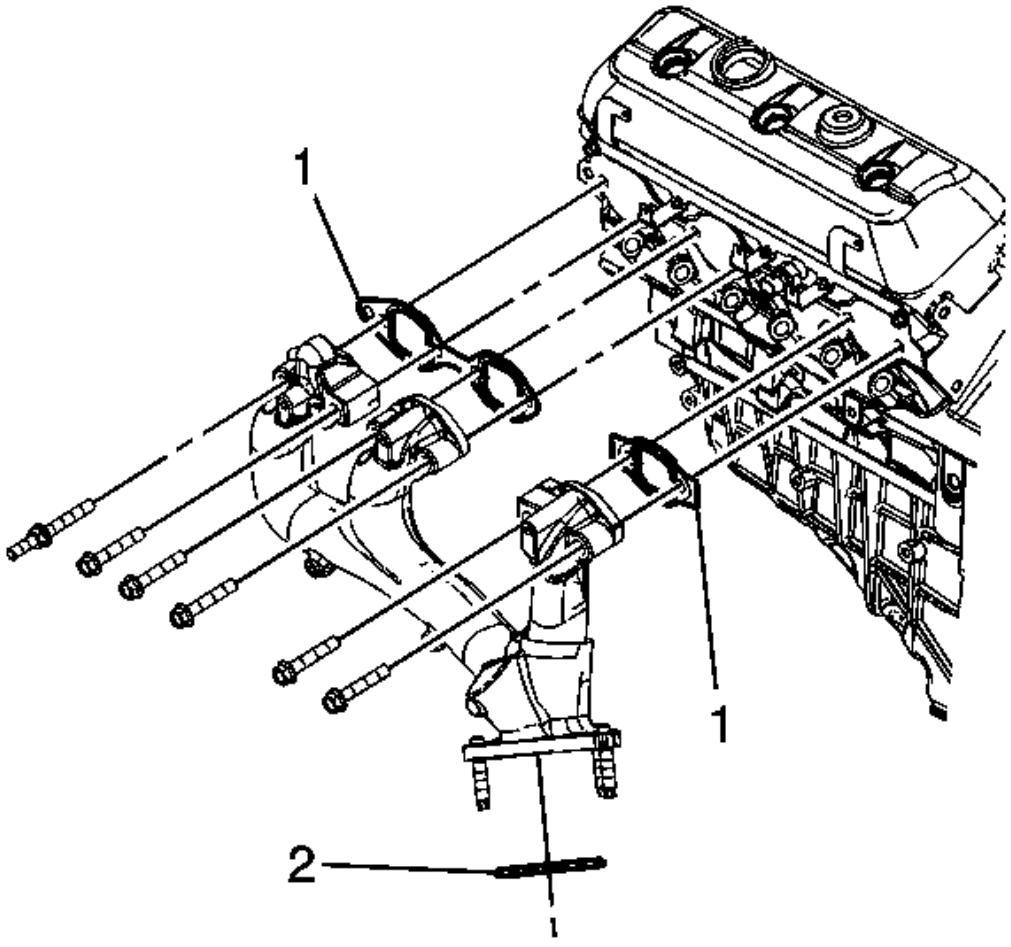


Fig. 4: View Of Catalytic Converter Seal & Exhaust Manifold Components
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW exhaust manifold to catalytic converter seal (2) into the relief in the catalytic converter.
2. Place the exhaust manifold into position and install the manifold studs to the catalytic converter.
3. Place the NEW exhaust manifold gaskets (1) between the manifold and the cylinder head.

NOTE: Refer to Fastener Notice .

4. Install the exhaust manifold bolts and stud.

   Tighten: Tighten the bolts/stud to 30 N.m (22 lb ft).

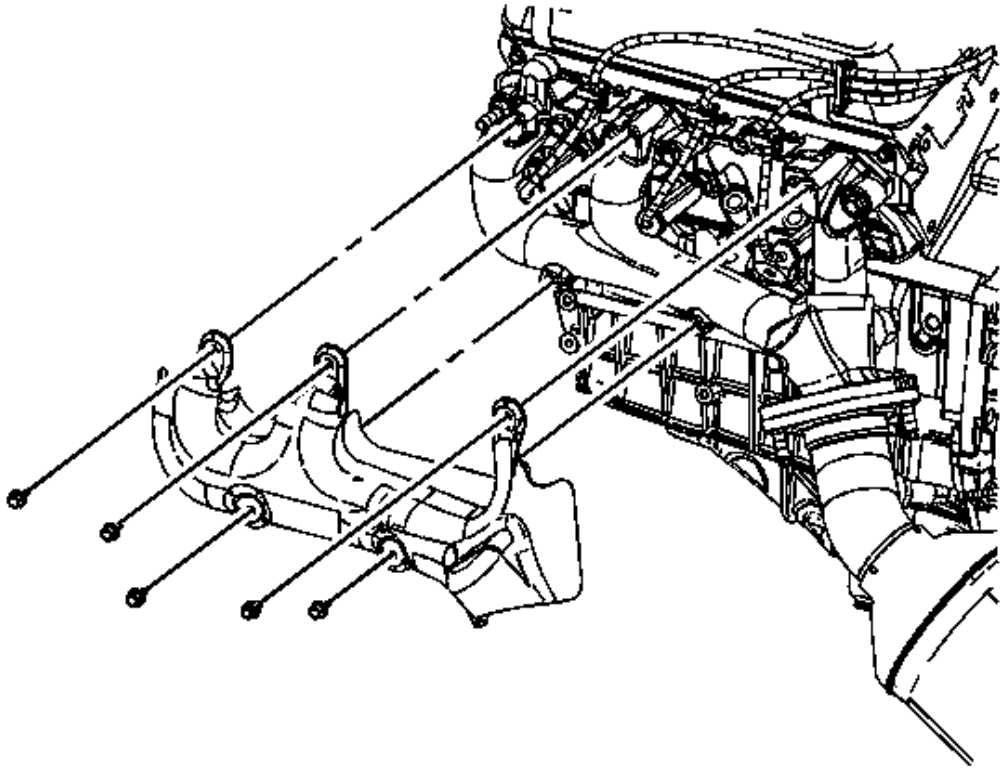


Fig. 5: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Install the spark plugs. Refer to **Spark Plug Replacement** .
6. Position the exhaust manifold heat shield to the manifold and install the bolts.

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

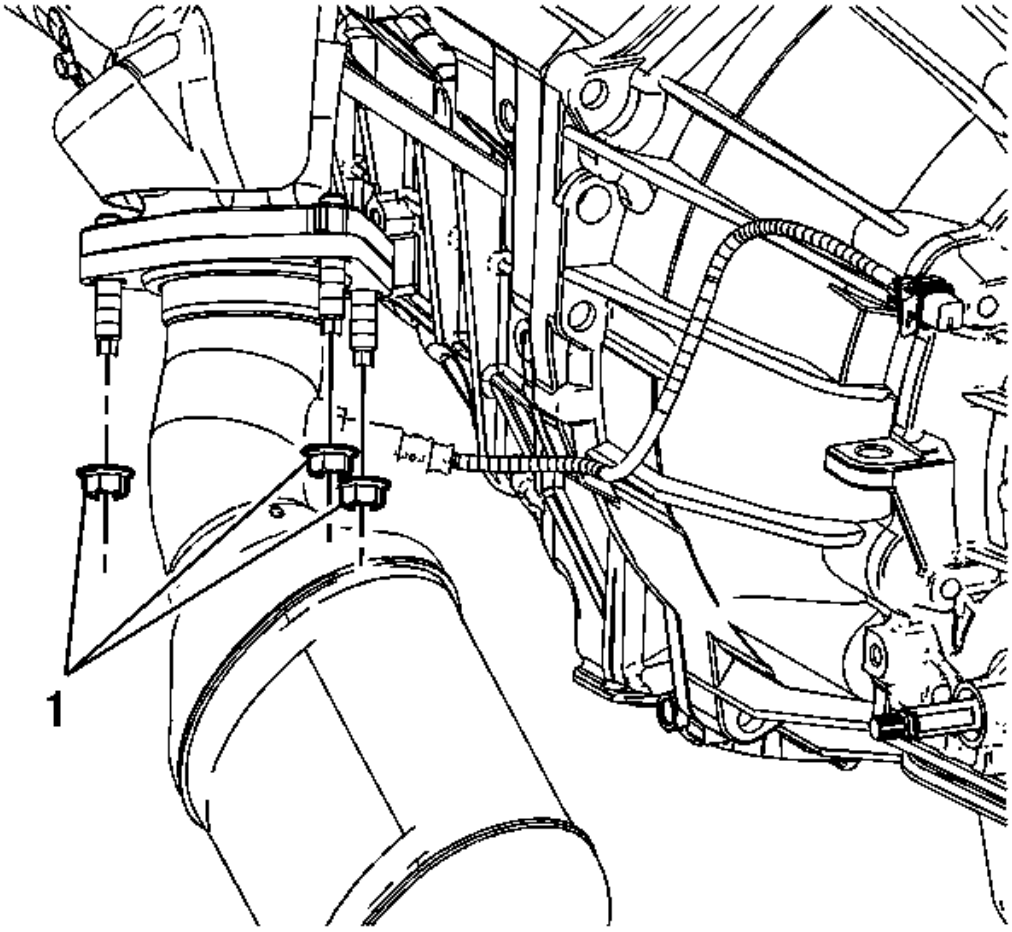


Fig. 6: View Of Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

7. Raise and support the vehicle.
8. Install the catalytic converter to exhaust manifold nuts (1).

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

9. Lower the vehicle.

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (4.8L, 5.3L, 6.0L, AND 6.2L)

Tools Required

J 42640 Steering Column Anti-Rotation Pin

Removal Procedure

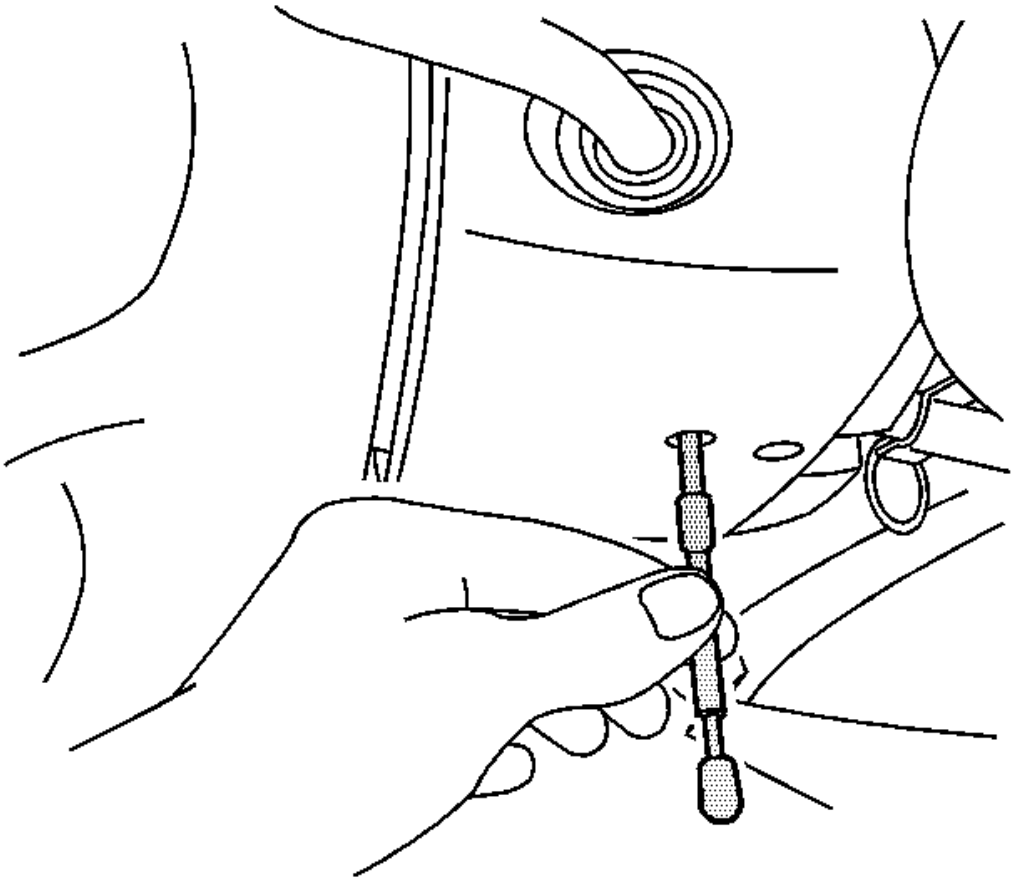


Fig. 7: Identifying J 42640
Courtesy of GENERAL MOTORS CORP.

1. Install the **J 42640** into the steering column lower access hole.
2. Remove the left wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Left Side (Chevrolet)** or **Front Wheelhouse Liner Replacement - Left Side (GMC)** .
3. Fully raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

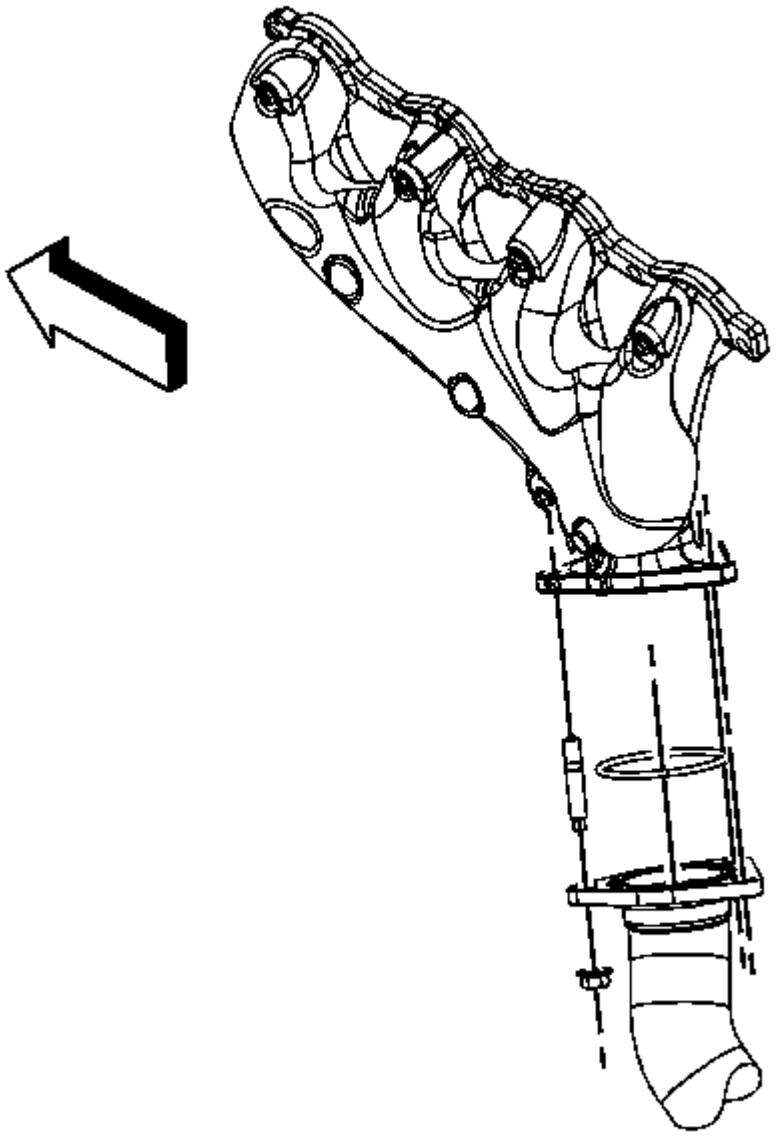


Fig. 8: View Of Exhaust Manifold, Gasket & Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

4. Remove the catalytic converter to exhaust manifold nuts. (1500 series shown, 2500 series similar).
5. Lower the vehicle part way in order to work through the wheel opening.

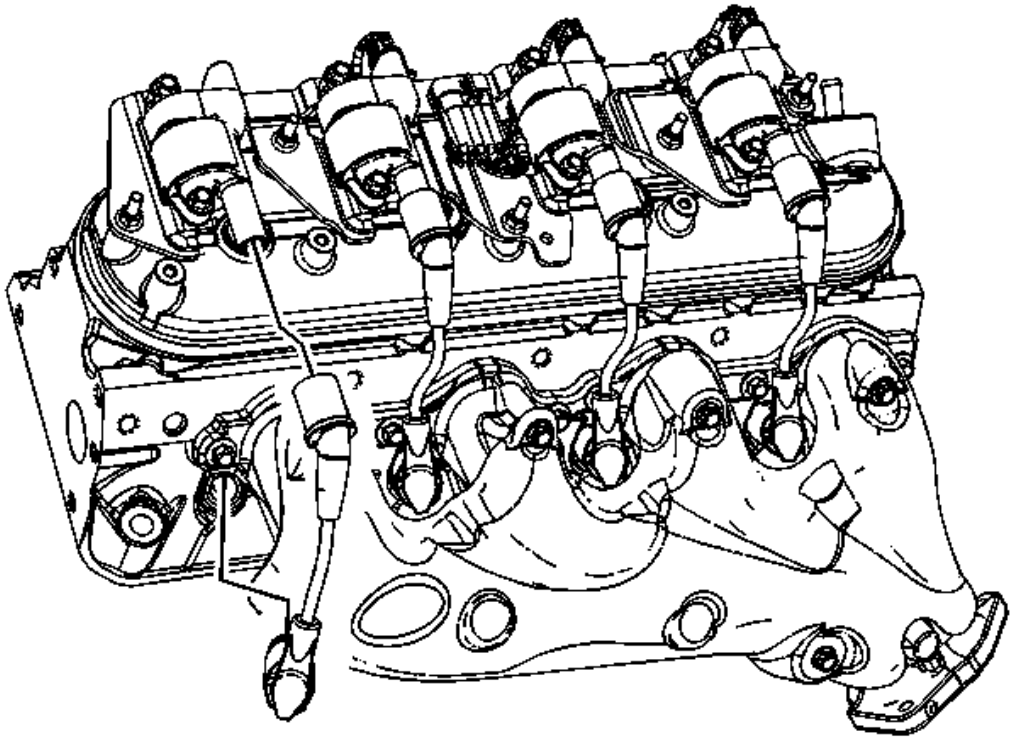


Fig. 9: View Of Spark Plug Wires
Courtesy of GENERAL MOTORS CORP.

6. Remove the spark plug wires from the spark plugs.
    1. Twist the spark plug wire boot a 1/2 turn.
    2. Pull only on the boot in order to remove the wire from the spark plug.
7. Remove the spark plug wires from the ignition coils.
    1. Twist the spark plug wire boot a 1/2 turn.
    2. Pull only on the boot in order to remove the wire from the ignition coil.

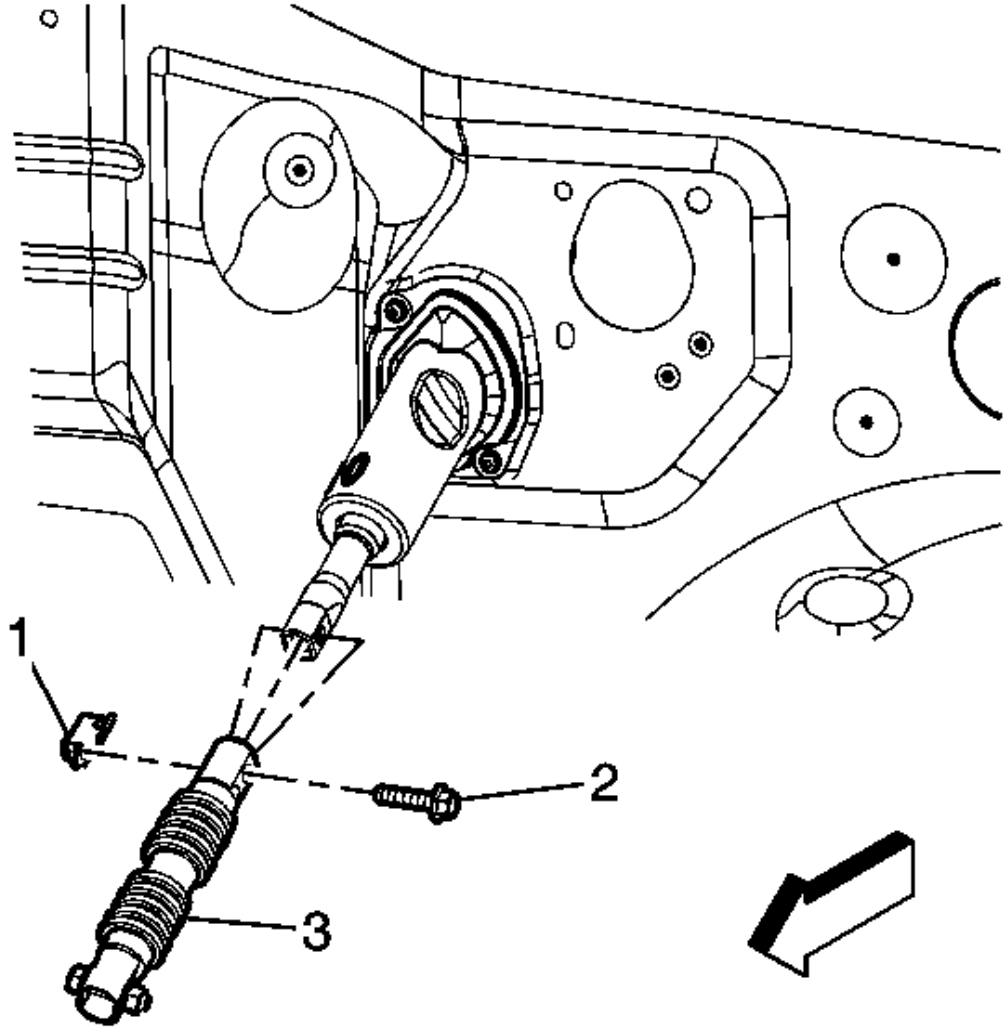


Fig. 10: View Of Steering Shaft, Coupling Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

8. Mark the relationship of the upper intermediate steering shaft to the steering column.
9. Remove the steering shaft coupling bolt (2) and nut (1) from the upper intermediate steering shaft.
10. Separate the upper intermediate steering shaft (3) from the steering column, position both shafts out of the way.

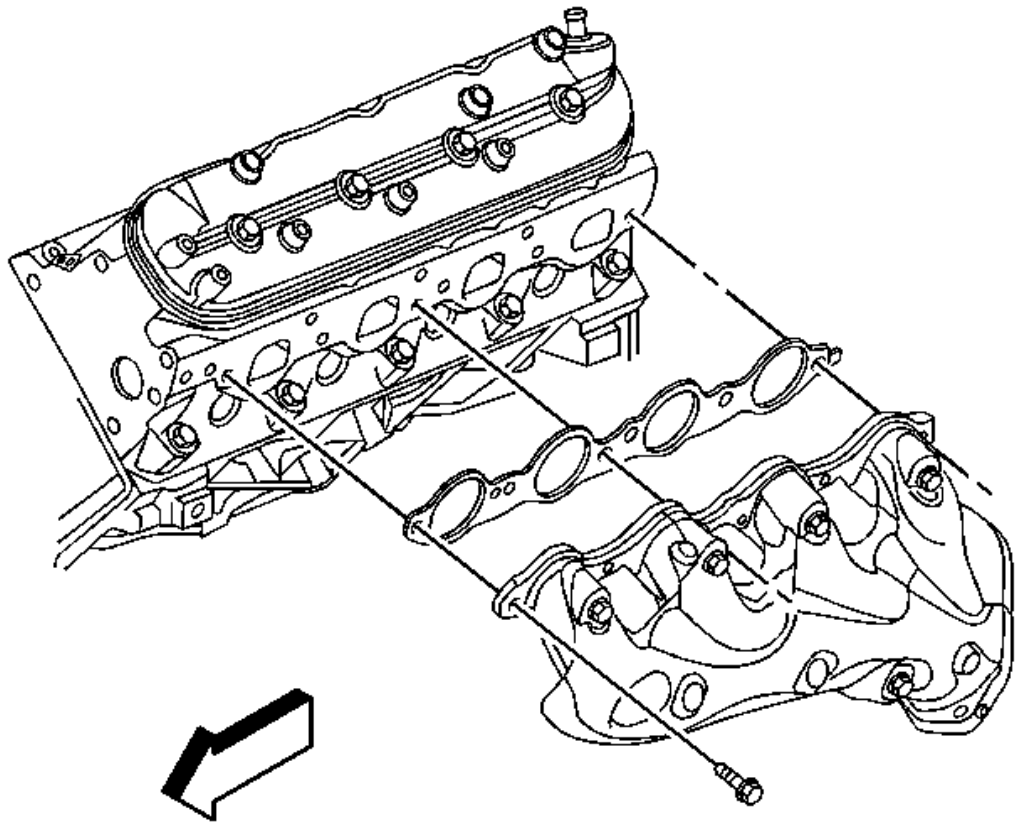


Fig. 11: View Of Exhaust Manifold, Manifold Bolts & Gasket
Courtesy of GENERAL MOTORS CORP.

11. Remove the exhaust manifold bolts, and exhaust manifold.
12. Remove and discard the exhaust manifold gasket.
13. Remove and discard the catalytic converter seal.

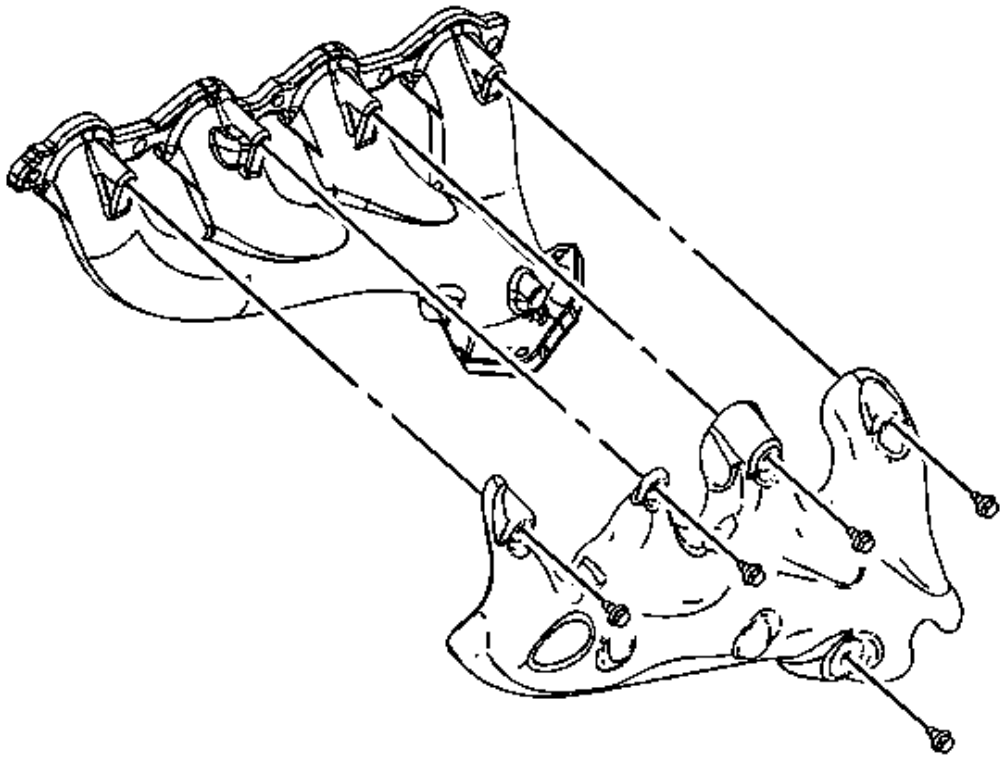


Fig. 12: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

14. If replacing the exhaust manifold, remove the exhaust manifold heat shield bolts, and shield from the exhaust manifold.

Installation Procedure

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 Diagnostic (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 3 threads of the bolt.**

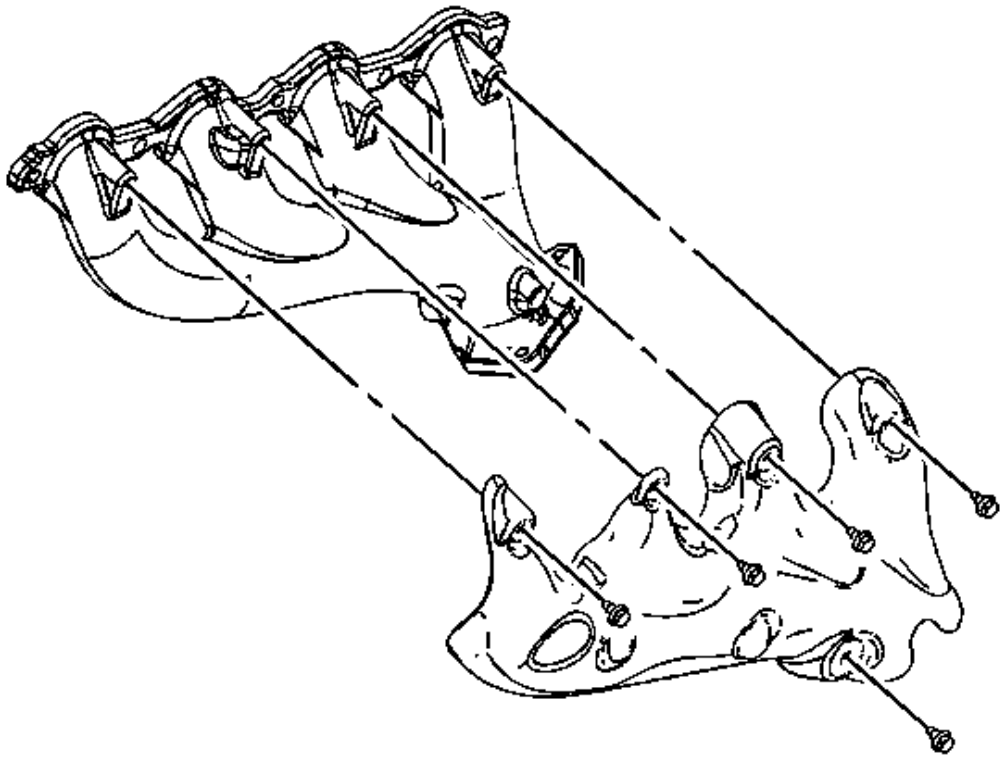


Fig. 13: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. If the exhaust manifold was replaced, position and install the exhaust manifold heat shield, and bolts to the exhaust manifold.

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

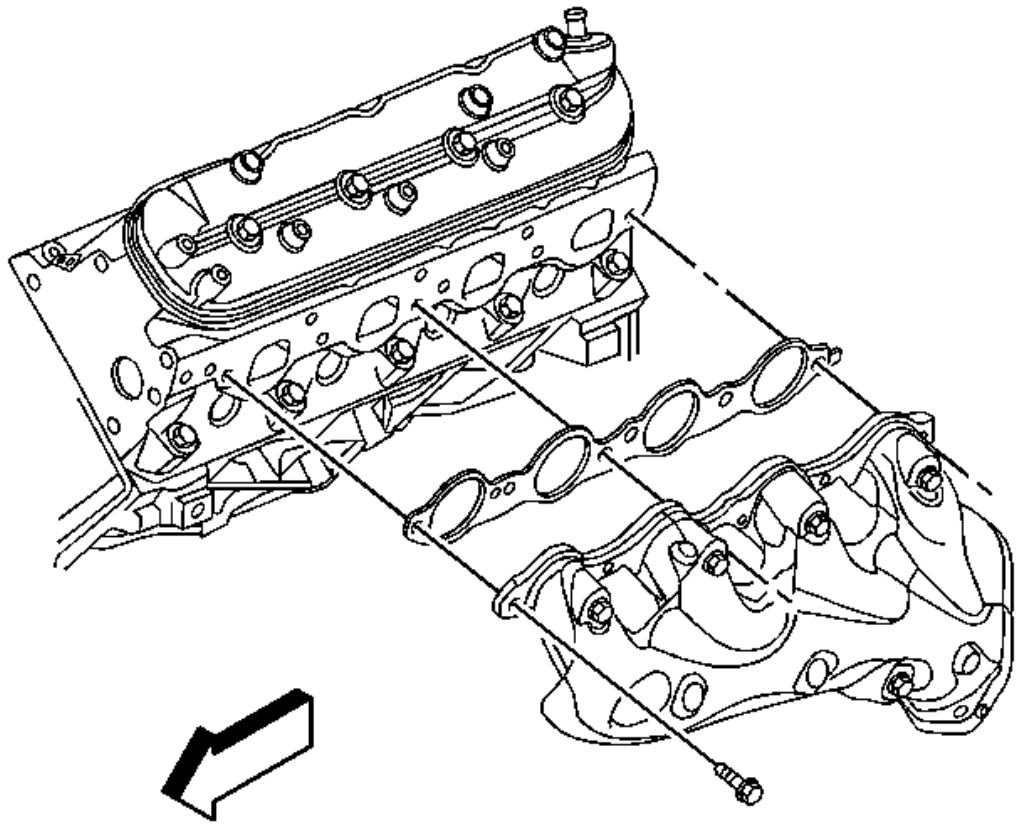


Fig. 14: View Of Exhaust Manifold, Manifold Bolts & Gasket
Courtesy of GENERAL MOTORS CORP.

2. Clean the threads of the exhaust manifold bolts.
3. 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.
4. Install a NEW catalytic converter seal to the catalytic converter.
5. Position the NEW exhaust manifold gasket and exhaust manifold to the cylinder head.
6. Ensure that the exhaust manifold is seated to the catalytic converter.
7. Install the exhaust manifold bolts.

Tighten:

1. Tighten the bolts a first pass to 15 N.m (11 lb ft). Tighten the exhaust manifold bolts

beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.

2. Tighten the bolts a final pass to 20 N.m (15 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.

8. Using a flat punch, bend the gasket tab at the rear of the gasket around the cylinder head edge.

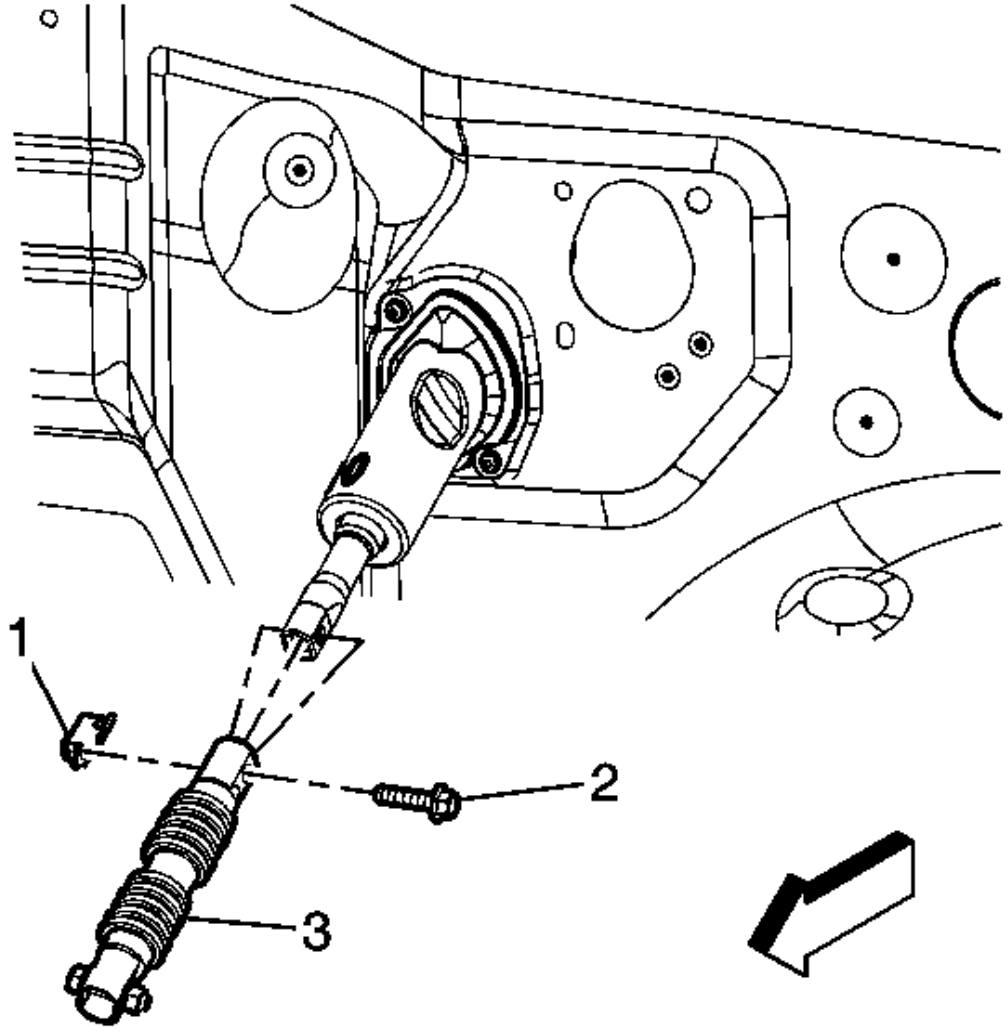


Fig. 15: View Of Steering Shaft, Coupling Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

9. Position and align the marks on the upper intermediate steering shaft and the steering column.
10. Install the upper intermediate steering shaft (3) to the steering column.
11. Install the steering shaft coupling bolt (2) and nut (1) to the upper intermediate steering shaft.

Tighten: Tighten the bolt/nut to 50 N.m (37 lb ft).

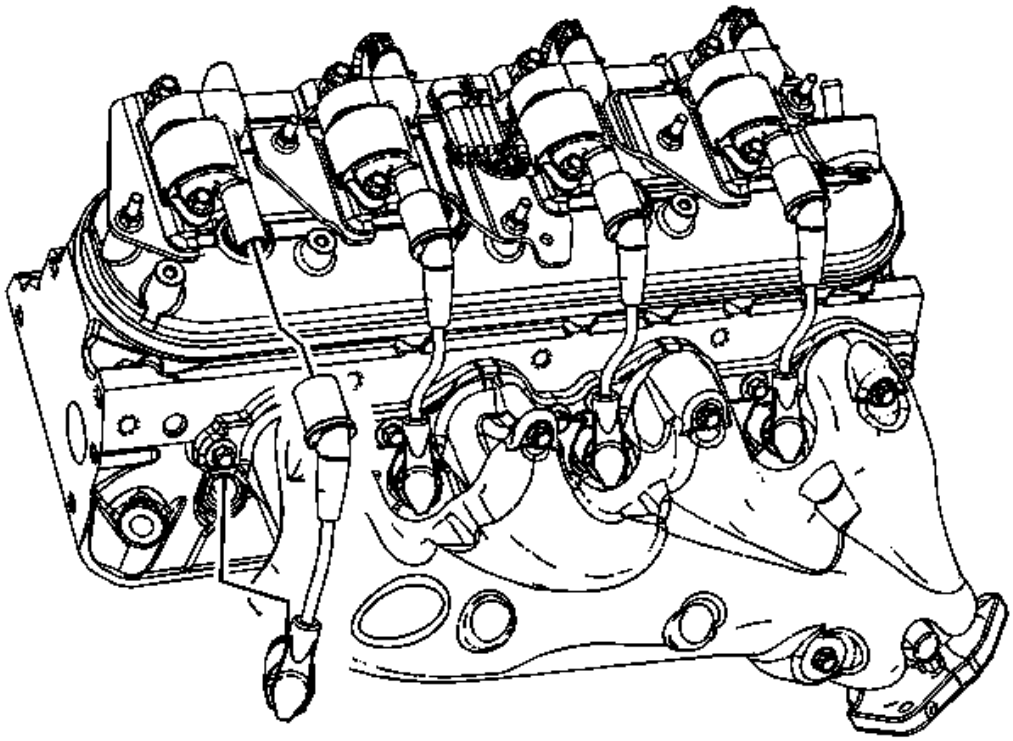


Fig. 16: View Of Spark Plug Wires
Courtesy of GENERAL MOTORS CORP.

12. Install the spark plug wires to the spark plugs.
13. Install the spark plug wires to the ignition coils.

14. Inspect the spark plug wires for proper installation.
    1. Push sideways on each boot in order to inspect the seating.
    2. Reinstall any loose boot.
15. Fully raise and support the vehicle.

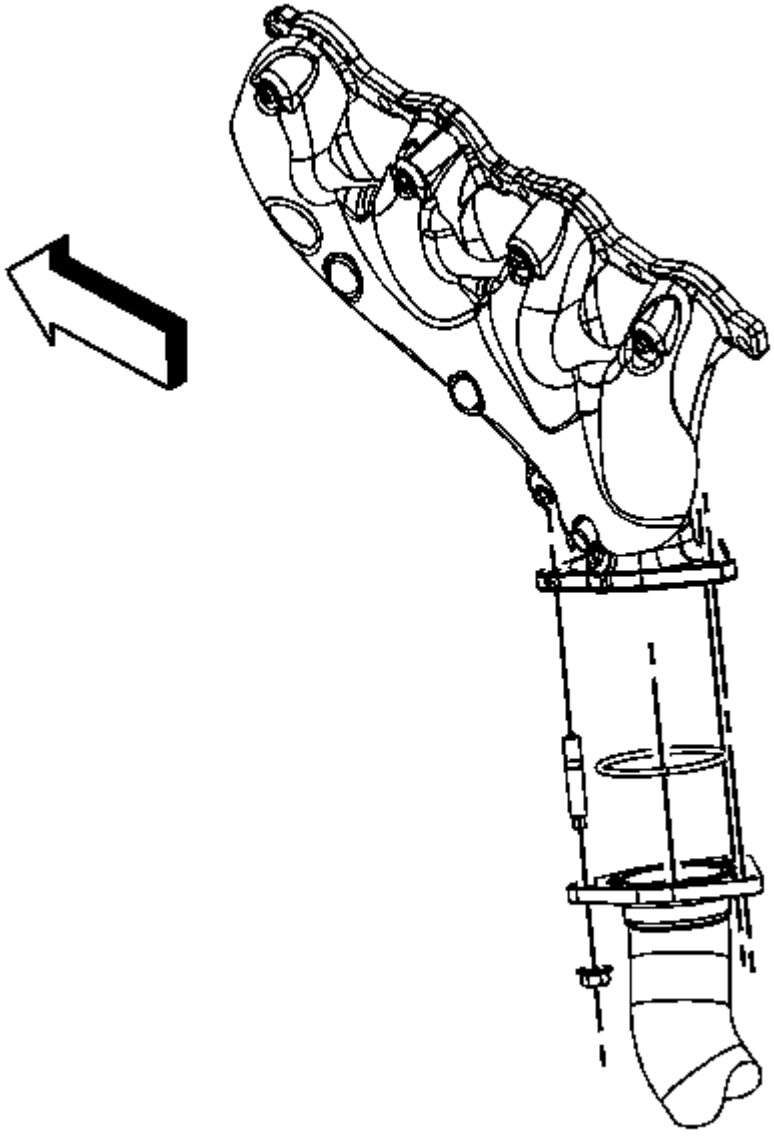


Fig. 17: View Of Exhaust Manifold, Gasket & Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

16. Install the catalytic converter to exhaust manifold nuts. (1500 series shown, 2500 series similar).

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

17. Partially lower the vehicle.

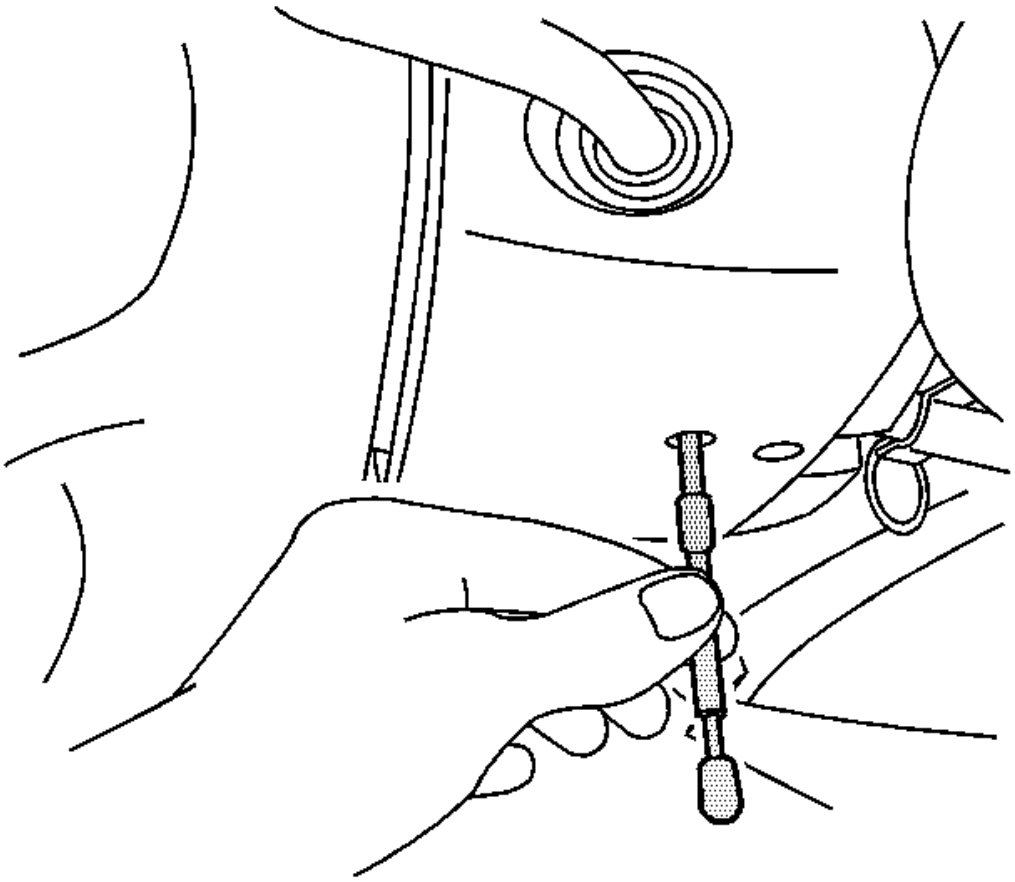


Fig. 18: Identifying J 42640
Courtesy of GENERAL MOTORS CORP.

18. Install the left wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Left**

Side (Chevrolet) or **Front Wheelhouse Liner Replacement - Left Side (GMC)** .

19. Remove the **J 42640** from the steering column lower access hole.

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (6.6L)

Removal Procedure

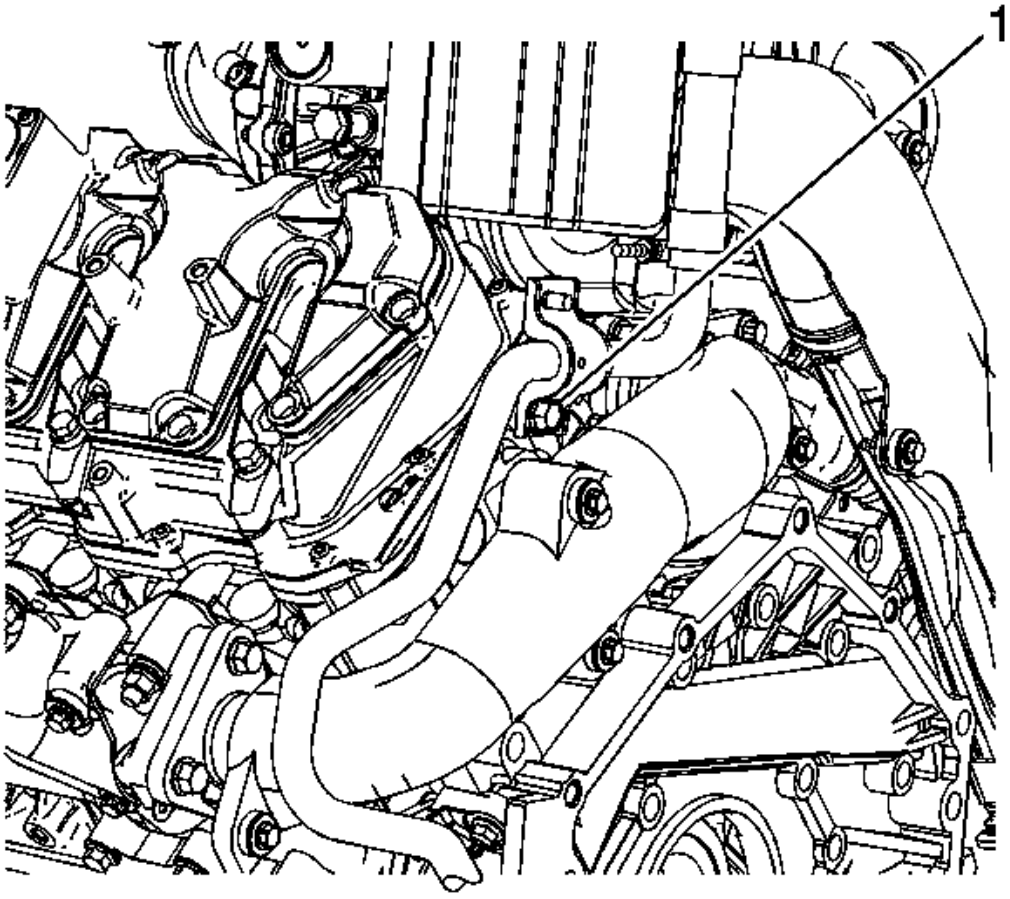


Fig. 19: View Of EGR Cooler Pipe Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

1. Drain the cooling system. Refer to **Cooling System Draining and Filling (Vac-N-Fill)** or **Cooling System Draining and Filling (Static Fill)** .
2. Remove the charge air cooler inlet pipe. Refer to **Charge Air Cooler Inlet Pipe**

Replacement .

3. Remove the glow plug control module. Refer to **Glow Plug Control Module Replacement** .
4. Remove the exhaust gas recirculation (EGR) cooler pipe bracket upper bolt (1).
5. Raise and suitably support the vehicle half way. Refer to **Lifting and Jacking the Vehicle** .

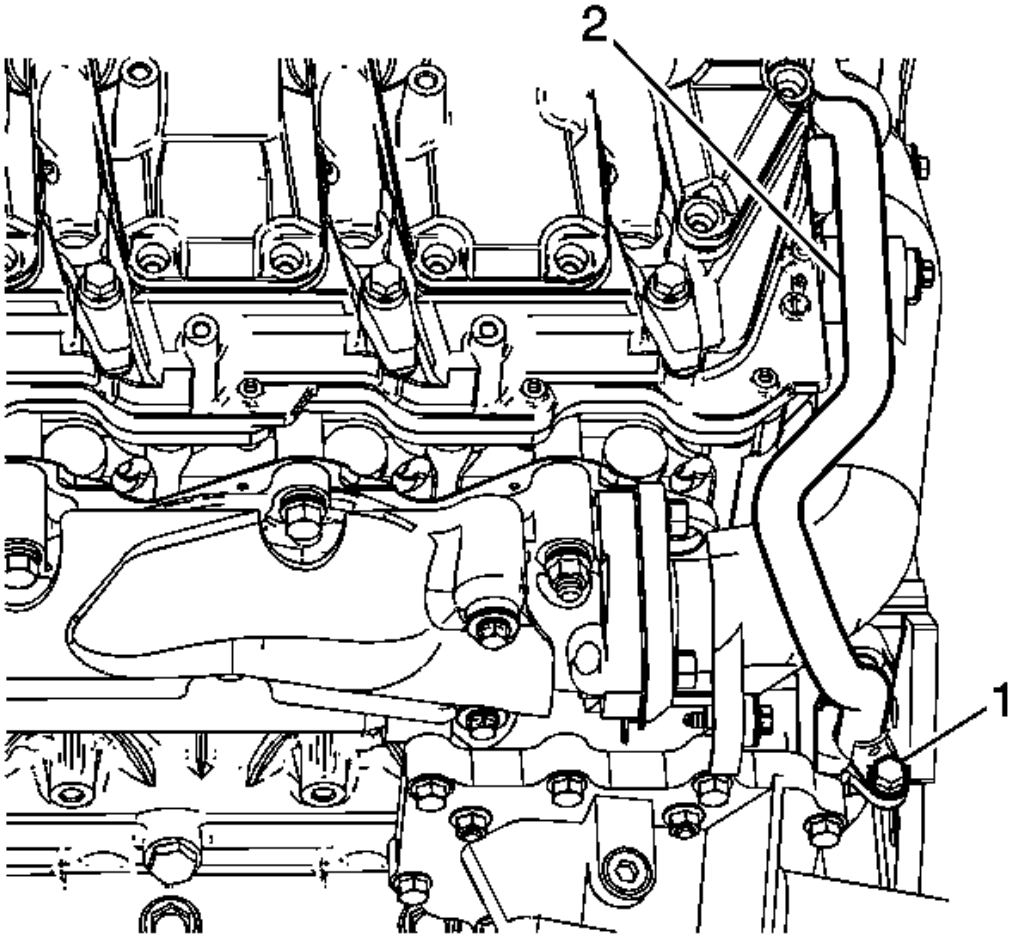


Fig. 20: View Of EGR Cooler Pipe & Bolt
Courtesy of GENERAL MOTORS CORP.

6. Perform the following steps working through the wheelhouse opening, remove the EGR

cooler pipe lower bolt (1) at the oil cooler.

7. Reposition the EGR cooler pipe (2) out of the way.

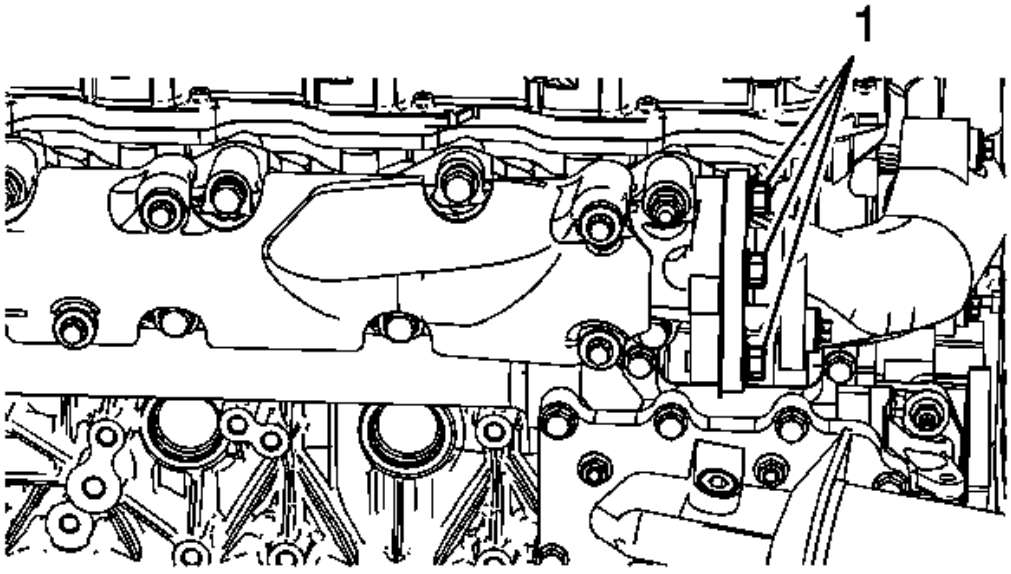


Fig. 21: View Of Exhaust Pipe To Exhaust Manifold Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the exhaust pipe to exhaust manifold bolts (1).

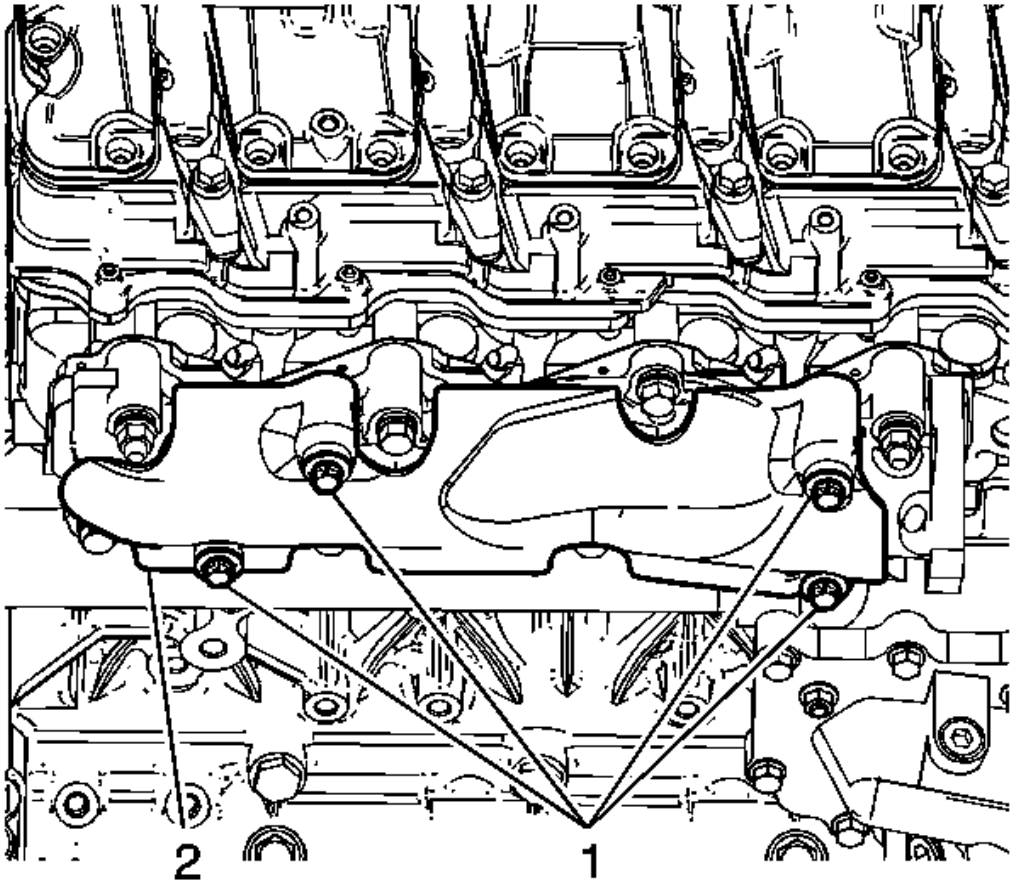


Fig. 22: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the exhaust manifold heat shield bolts (1) and shield (2).

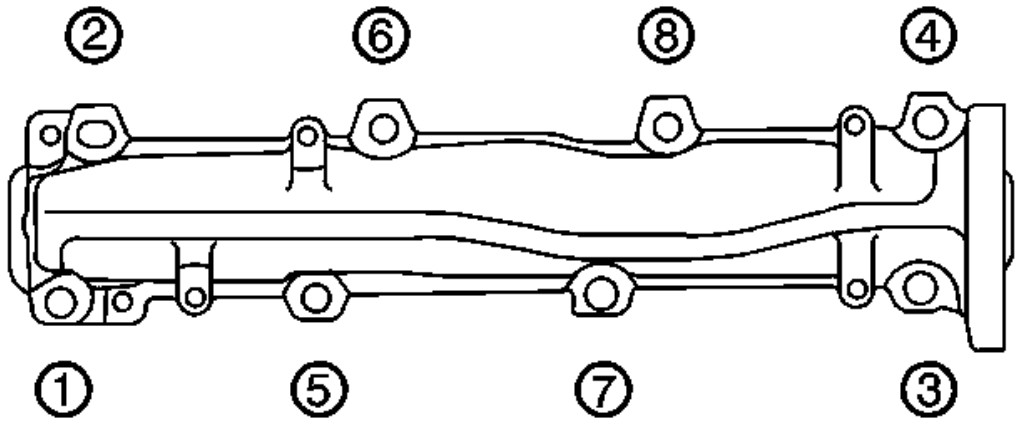


Fig. 23: Left Exhaust Manifold Bolts & Nuts Removal & Installation Sequence
Courtesy of GENERAL MOTORS CORP.

10. Remove the exhaust manifold bolts and nuts in the sequence shown.
11. Remove the exhaust manifold and gasket. Discard the gasket.

Installation Procedure

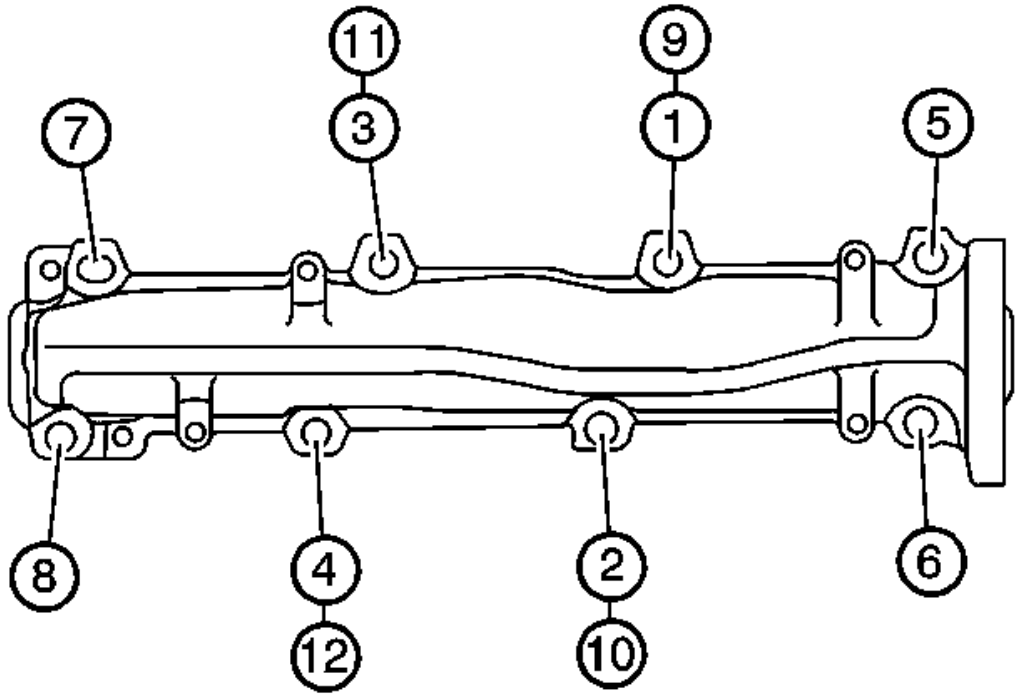


Fig. 24: Exhaust Manifold Bolt Tightening Sequence -- Left Side
Courtesy of GENERAL MOTORS CORP.

1. Install the a NEW exhaust manifold gasket onto the manifold studs.
2. Position a NEW exhaust pipe gasket between the exhaust manifold and exhaust pipe. Align the tab on the gasket to face outward.
3. Install the exhaust manifold onto the studs.

NOTE: Refer to Fastener Notice .

4. Install and tighten the exhaust manifold bolts and nuts in the sequence shown.

Tighten:

- Tighten the bolts/nuts to 57 N.m (42 lb ft).
- Tighten the 4 center bolts/nuts an additional pass to 57 N.m (42 lb ft).

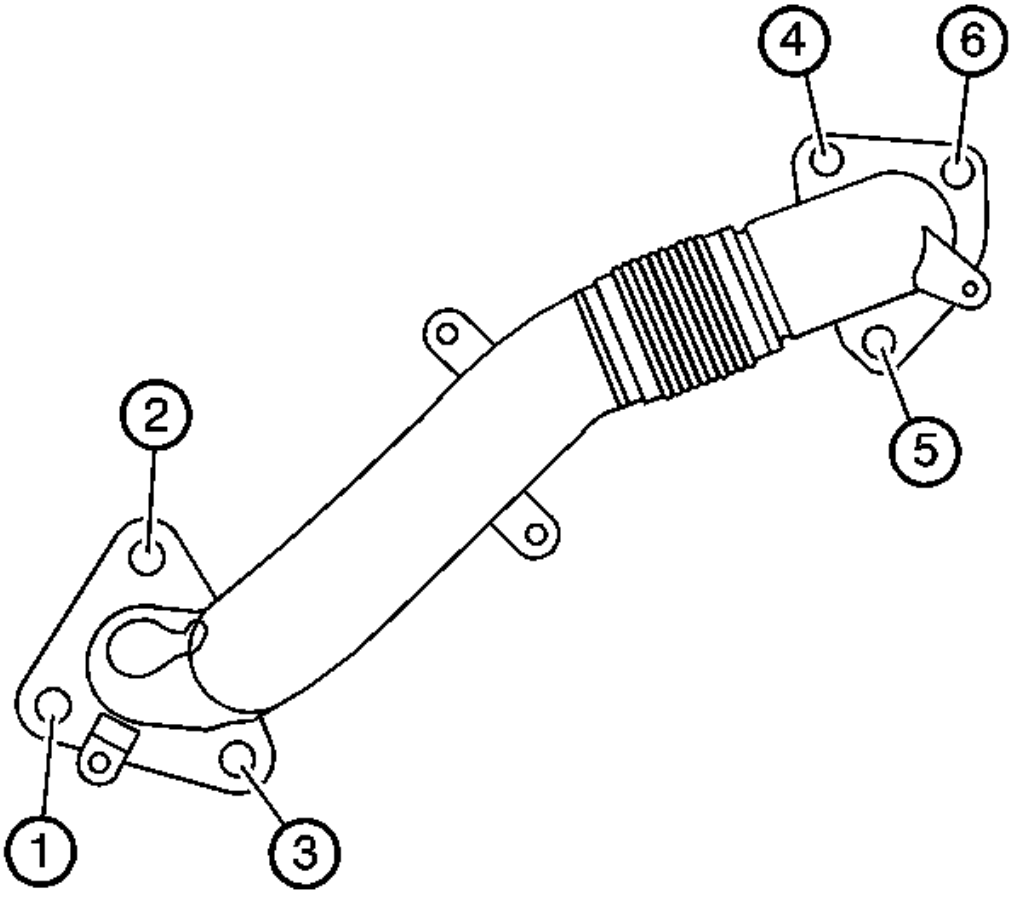


Fig. 25: Exhaust Pipe To Exhaust Manifold Bolt Tightening Sequence - Left Side
Courtesy of GENERAL MOTORS CORP.

5. Install and tighten the exhaust pipe to exhaust manifold bolts in the sequence shown (1, 2, and 3).

   Tighten: Tighten the bolts to 53 N.m (39 lb ft).

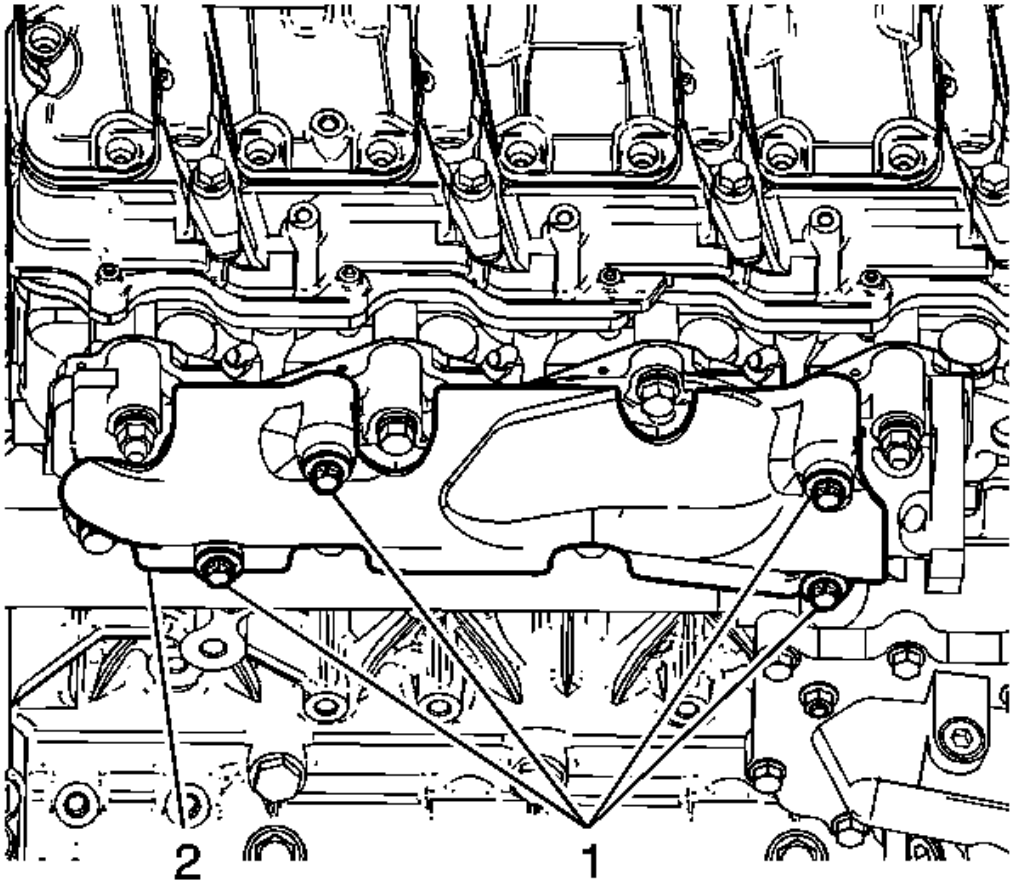


Fig. 26: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

6. Position the exhaust manifold heat shield (2) to the manifold and install the bolts (1).

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

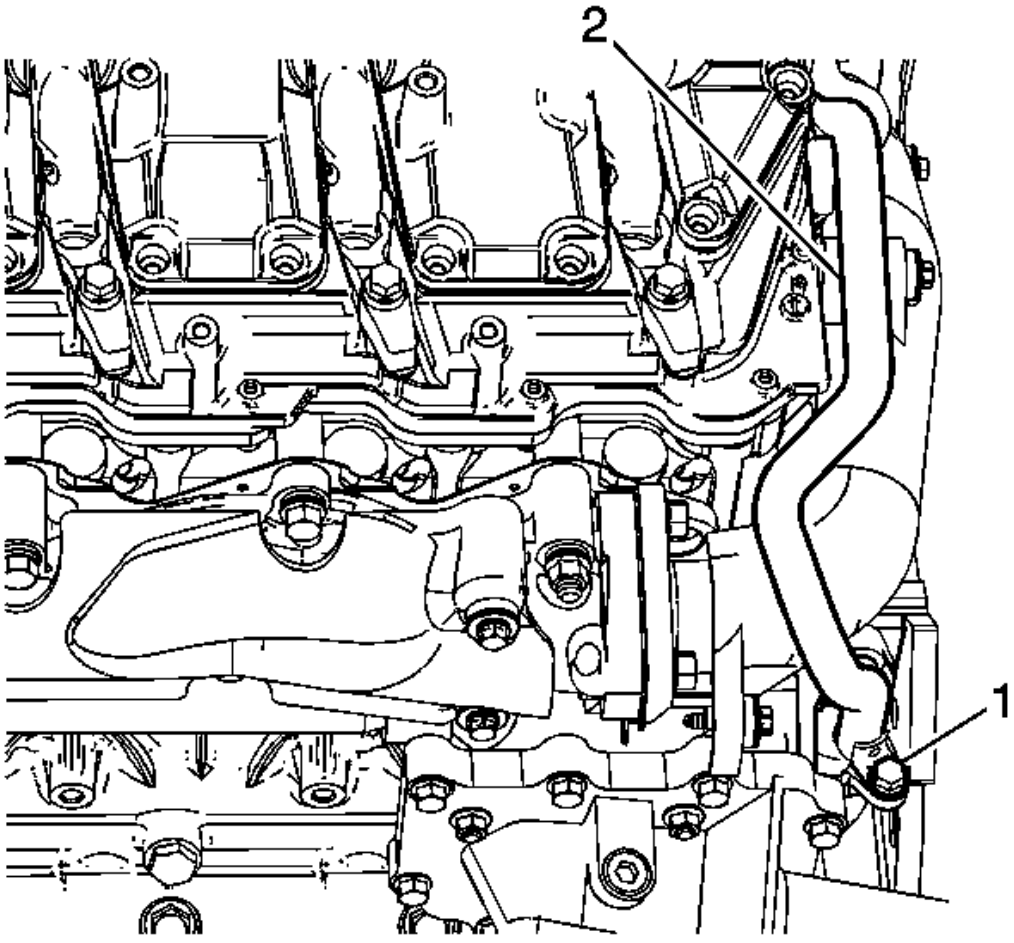


Fig. 27: View Of EGR Cooler Pipe & Bolt
Courtesy of GENERAL MOTORS CORP.

7. Position the EGR cooler pipe (2) to the oil cooler.
8. Install the EGR cooler pipe lower bolt (1) at the oil cooler.

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

9. Lower the vehicle.

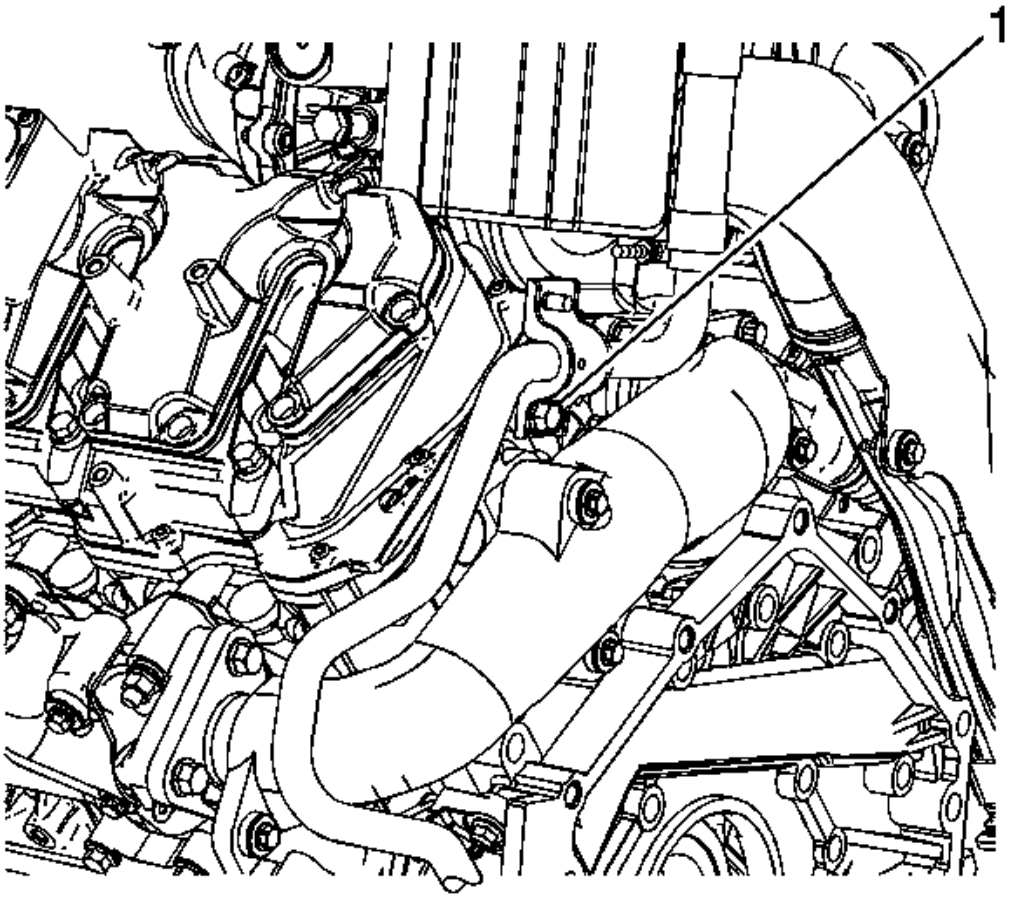


Fig. 28: View Of EGR Cooler Pipe Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

10. Install the EGR cooler pipe bracket upper bolt (1).

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

11. Install the glow plug control module. Refer to **Glow Plug Control Module Replacement** .
12. Install the charge air cooler inlet pipe. Refer to **Charge Air Cooler Inlet Pipe Replacement** .
13. Fill the cooling system. Refer to **Cooling System Draining and Filling (Vac-N-Fill)** or **Cooling System Draining and Filling (Static Fill)** .

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (4.3L)

Removal Procedure

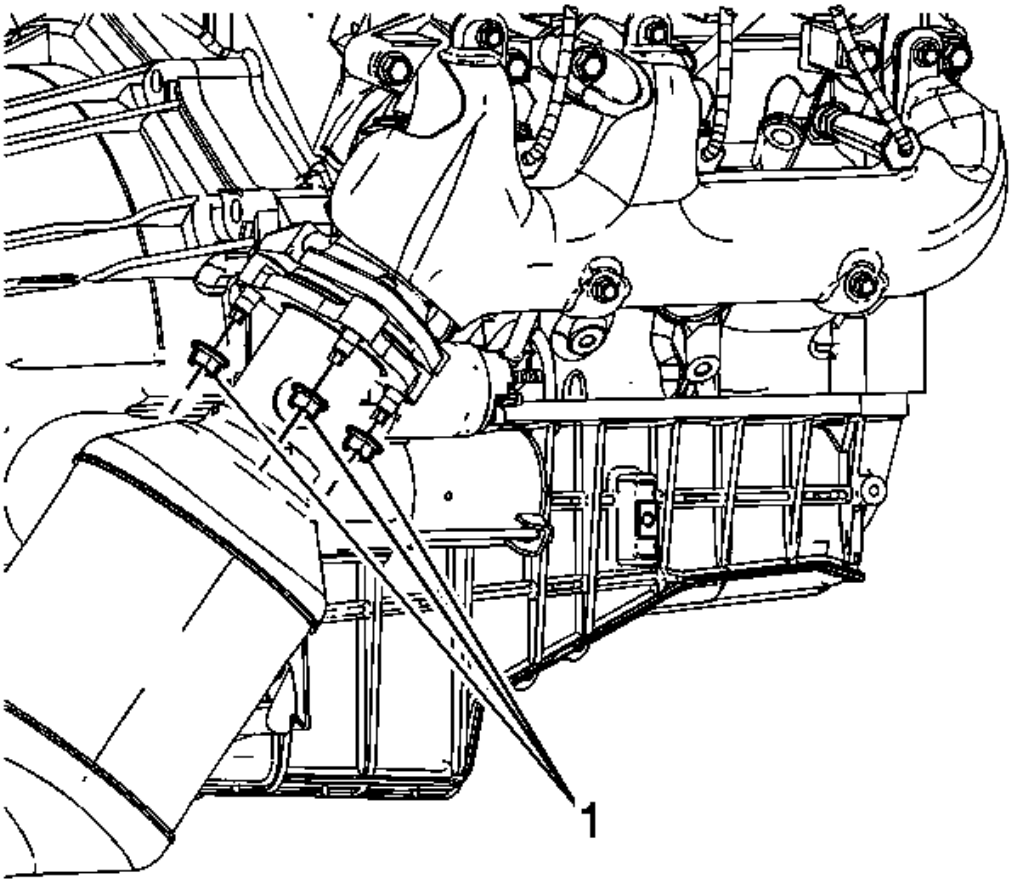


Fig. 29: View Of Catalytic Converter To Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the heated oxygen sensor (HO2S). Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** .
2. Remove the catalytic converter to exhaust manifold nuts (1).
3. Lower the vehicle.

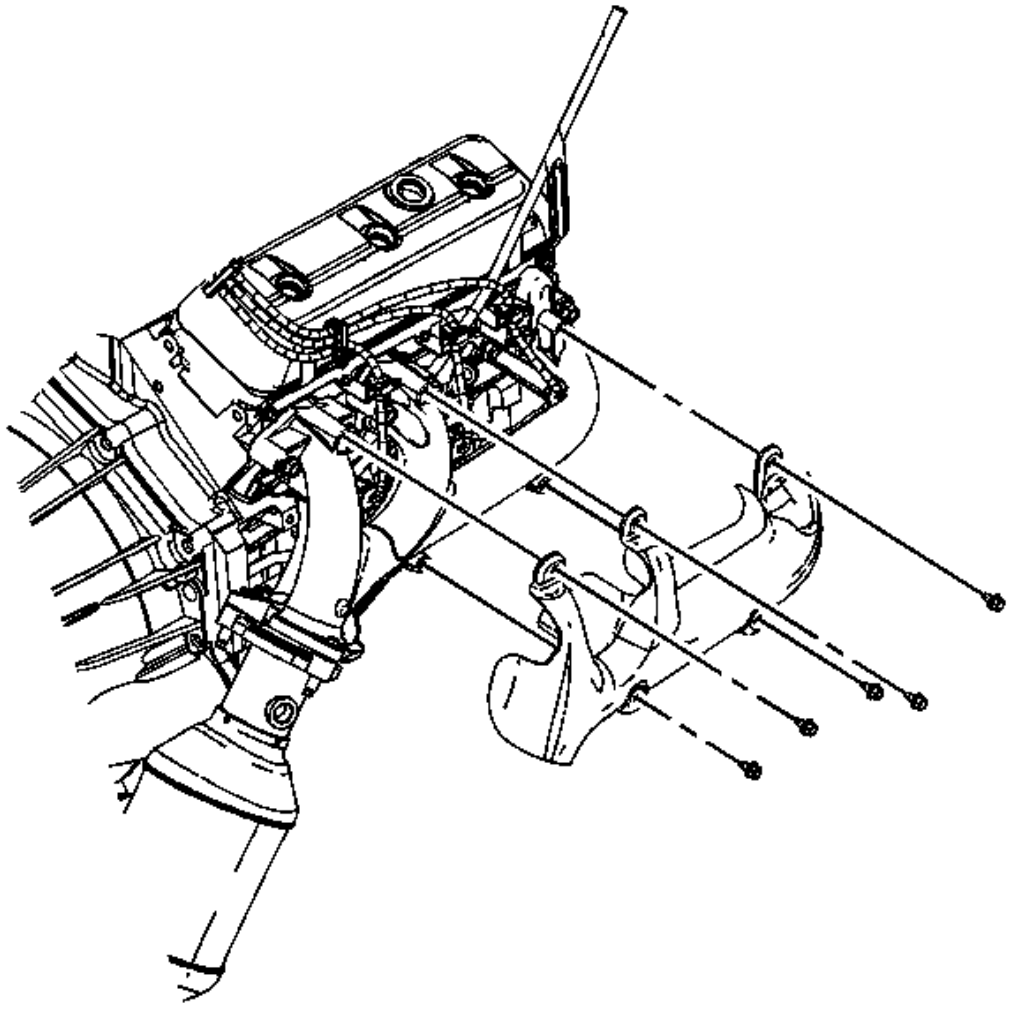


Fig. 30: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust manifold heat shield bolts and shield.
5. Remove the spark plugs. Refer to **Spark Plug Replacement** .
6. Reposition the spark plug wires out of the way, if necessary.

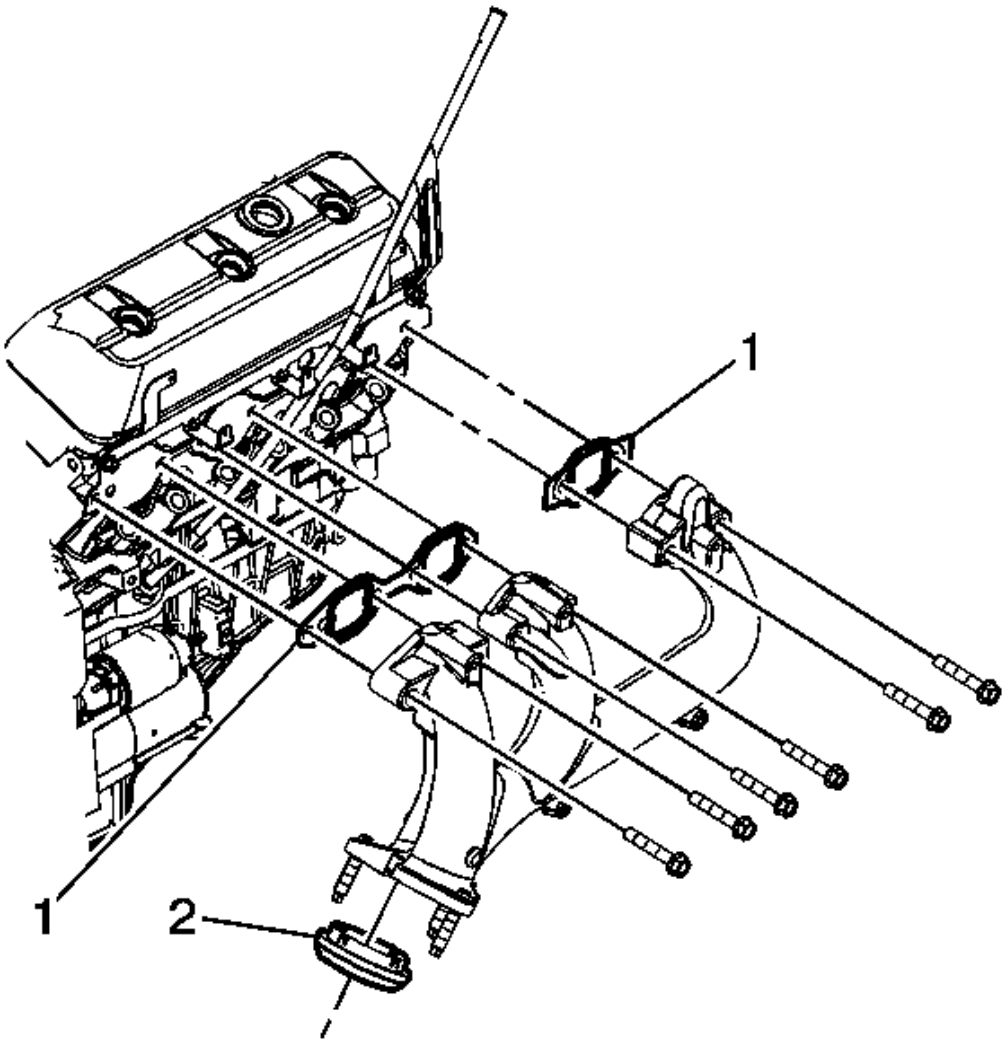


Fig. 31: View Of Catalytic Converter Seal & Exhaust Manifold Components
Courtesy of GENERAL MOTORS CORP.

7. Remove the exhaust manifold bolts.
8. Remove the exhaust manifold and gaskets (1). Discard the gaskets.
9. Remove the exhaust manifold to catalytic converter seal (2). Discard the seal.

Installation Procedure

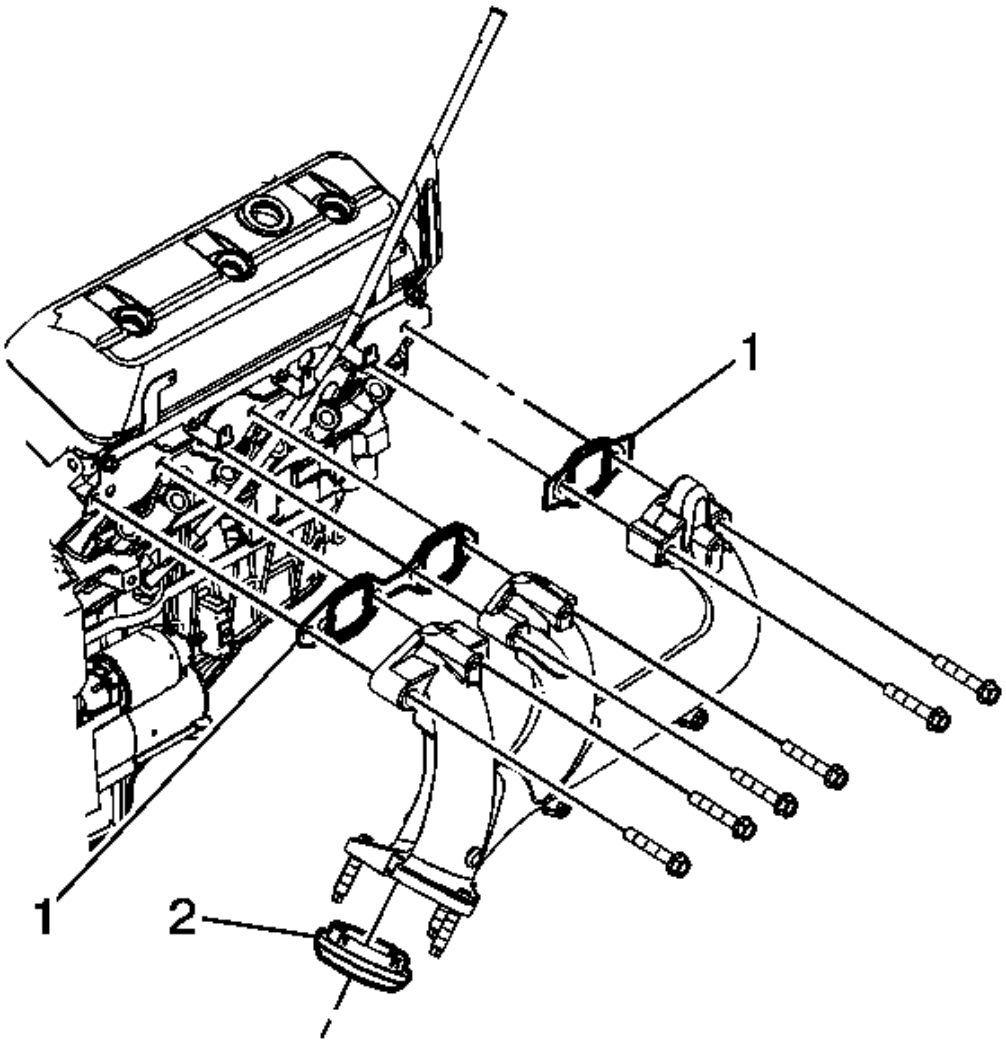


Fig. 32: View Of Catalytic Converter Seal & Exhaust Manifold Components
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW exhaust manifold to catalytic converter seal (2) into the exhaust manifold.
2. Place the exhaust manifold into position and install the manifold studs to the catalytic converter.
3. Place the NEW exhaust manifold gaskets (1) between the manifold and the cylinder head.

NOTE: Refer to Fastener Notice .

4. Install the exhaust manifold bolts and stud.

   Tighten: Tighten the bolts/stud to 30 N.m (22 lb ft).

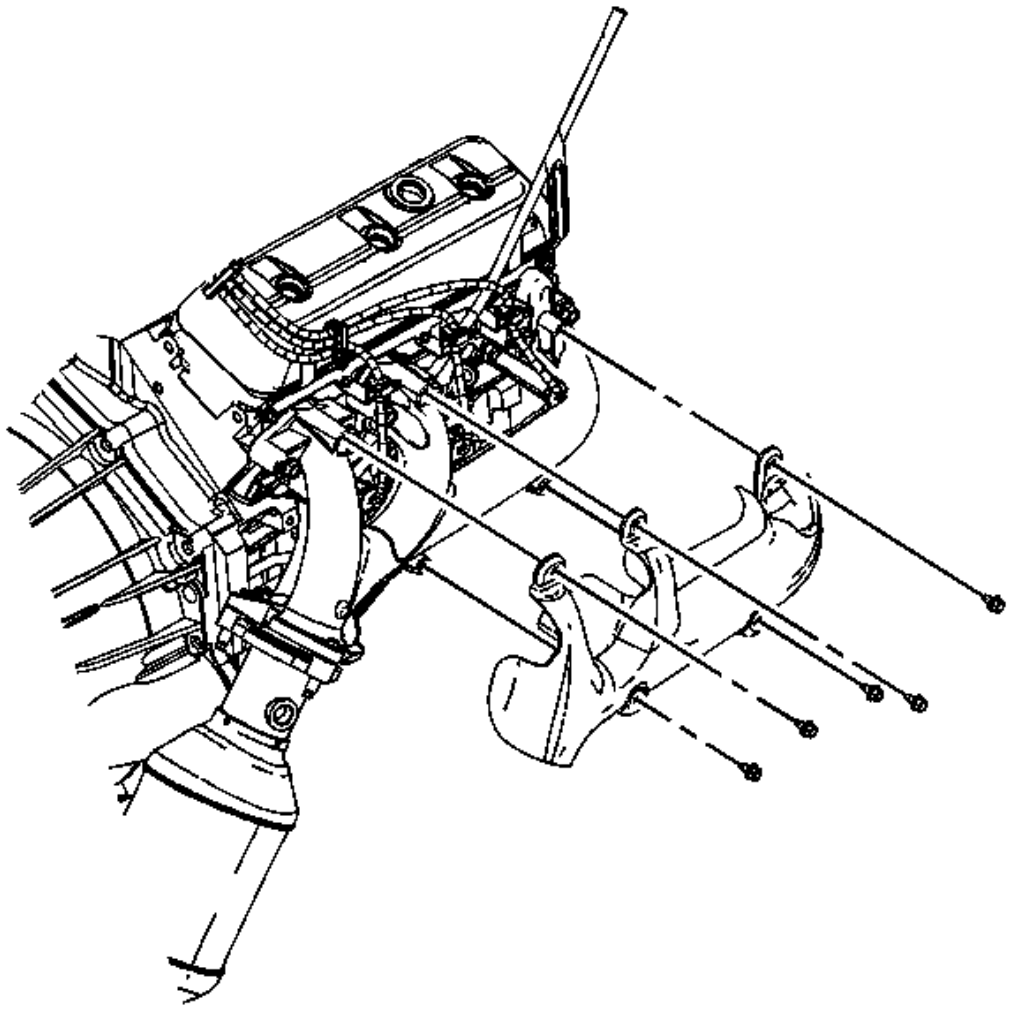


Fig. 33: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Install the spark plugs. Refer to **Spark Plug Replacement** .

6. Position the exhaust manifold heat shield to the manifold and install the bolts.

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

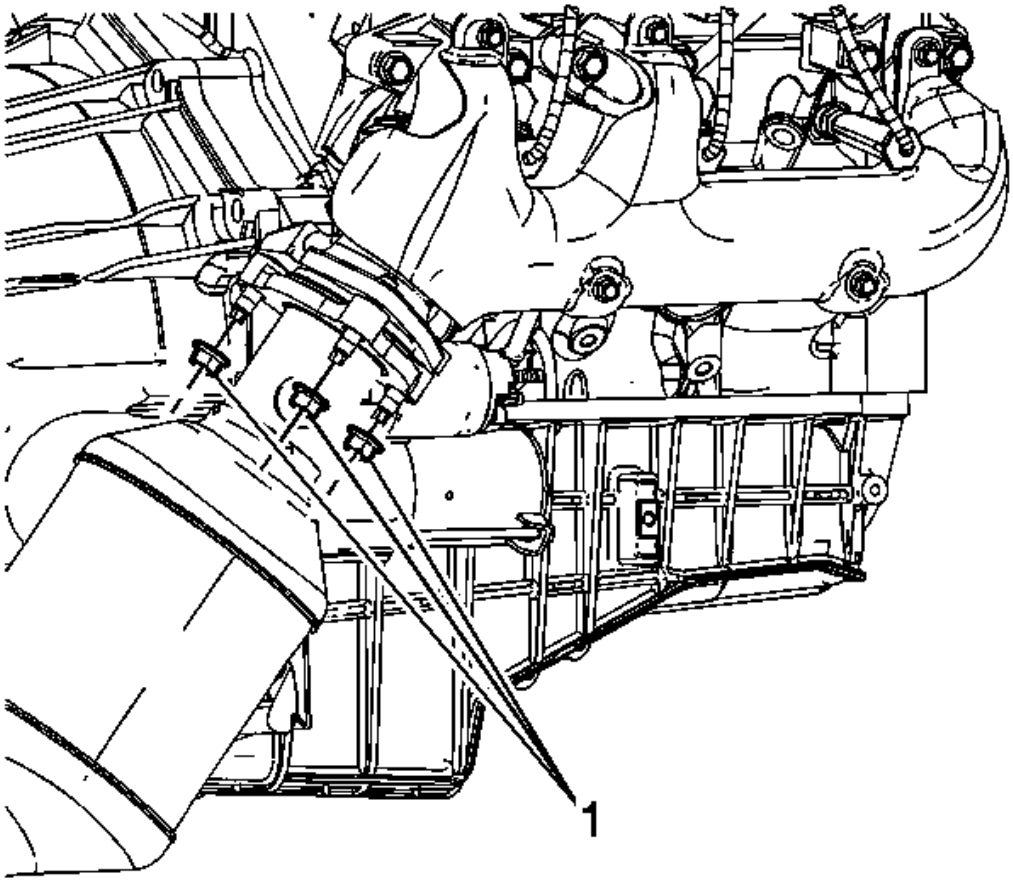


Fig. 34: View Of Catalytic Converter To Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

7. Raise and support the vehicle.
8. Install the catalytic converter to exhaust manifold nuts (1).

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

9. Lower the vehicle.

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (4.8L, 5.3L, 6.0L, AND 6.2L)

Removal Procedure

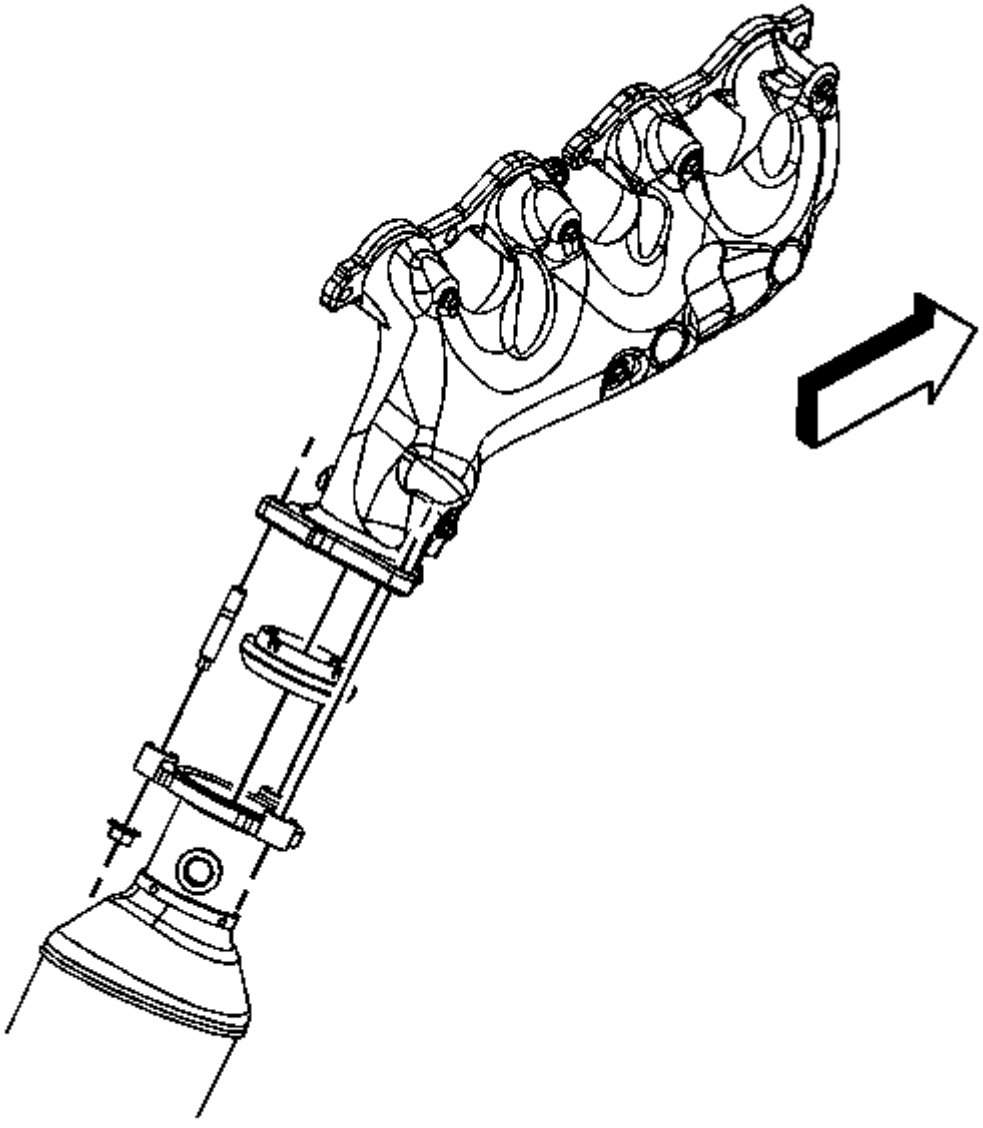


Fig. 35: View Of Exhaust Manifold, Gasket & Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

1. Remove the heated oxygen sensor (HO2S). Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** .
2. Fully raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Remove the catalytic converter to exhaust manifold nuts, 1500 series shown, 2500 series similar.

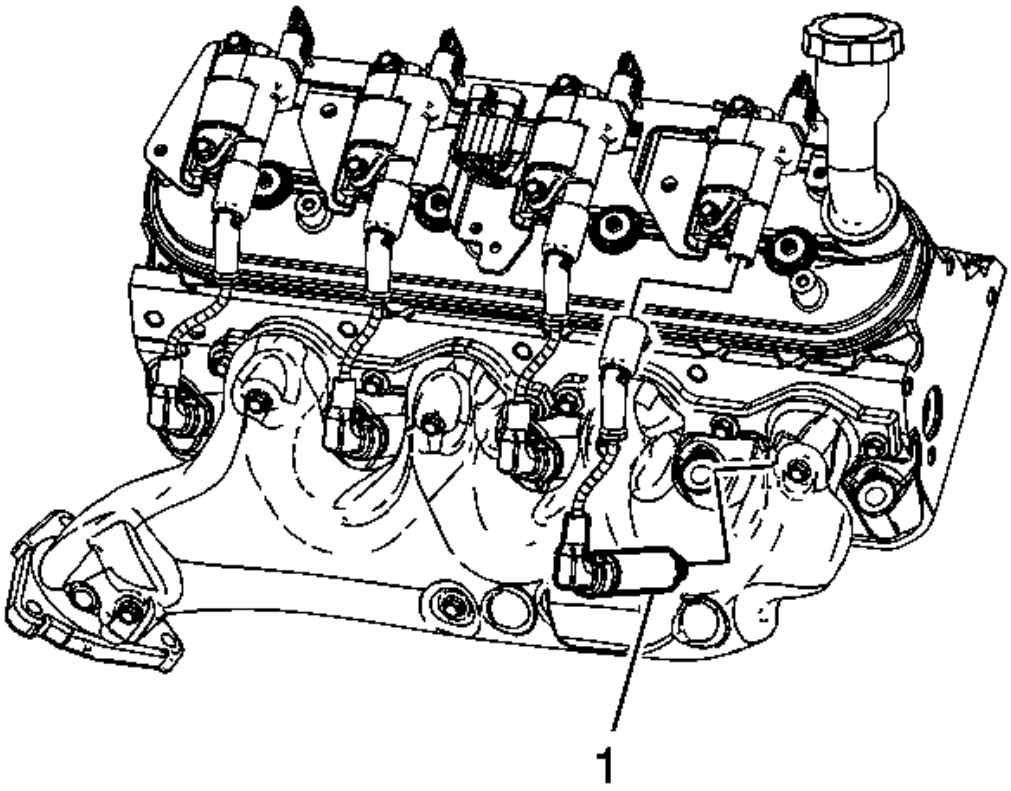


Fig. 36: Locating Spark Plug Wires
Courtesy of GENERAL MOTORS CORP.

4. Remove the right wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .

5. Remove the spark plug wires (1) from the spark plugs.
    1. Twist the spark plug wire boot a 1/2 turn.
    2. Pull only on the boot in order to remove the wire from the spark plug.
6. Remove the spark plug wires from the ignition coils.
    1. Twist the spark plug wire boot a 1/2 turn.
    2. Pull only on the boot in order to remove the wire from the ignition coil.

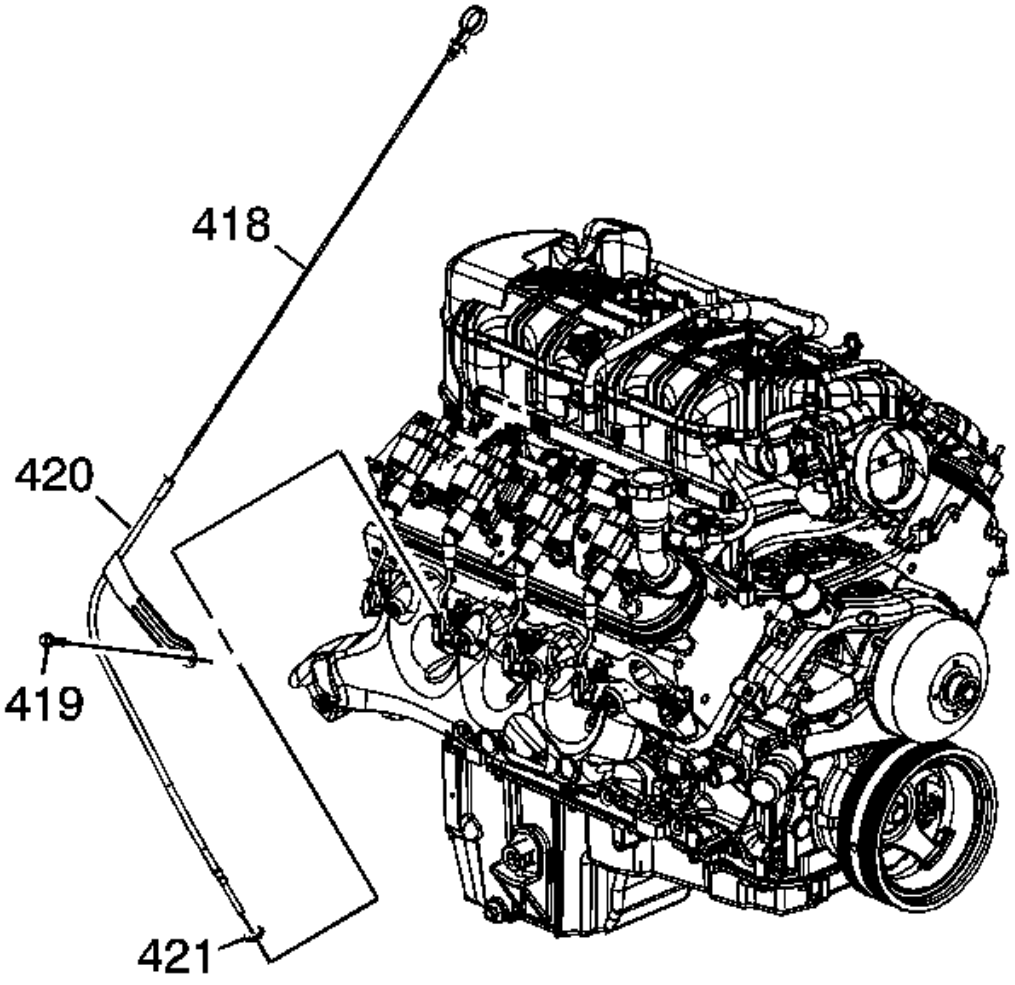


Fig. 37: View Of Oil Level Indicator, Tube Bolt, Indicator Tube & O-Ring Seal
Courtesy of GENERAL MOTORS CORP.

7. Remove the oil level indicator tube bolt (419).
8. Remove the oil level indicator tube (420) from the engine block.

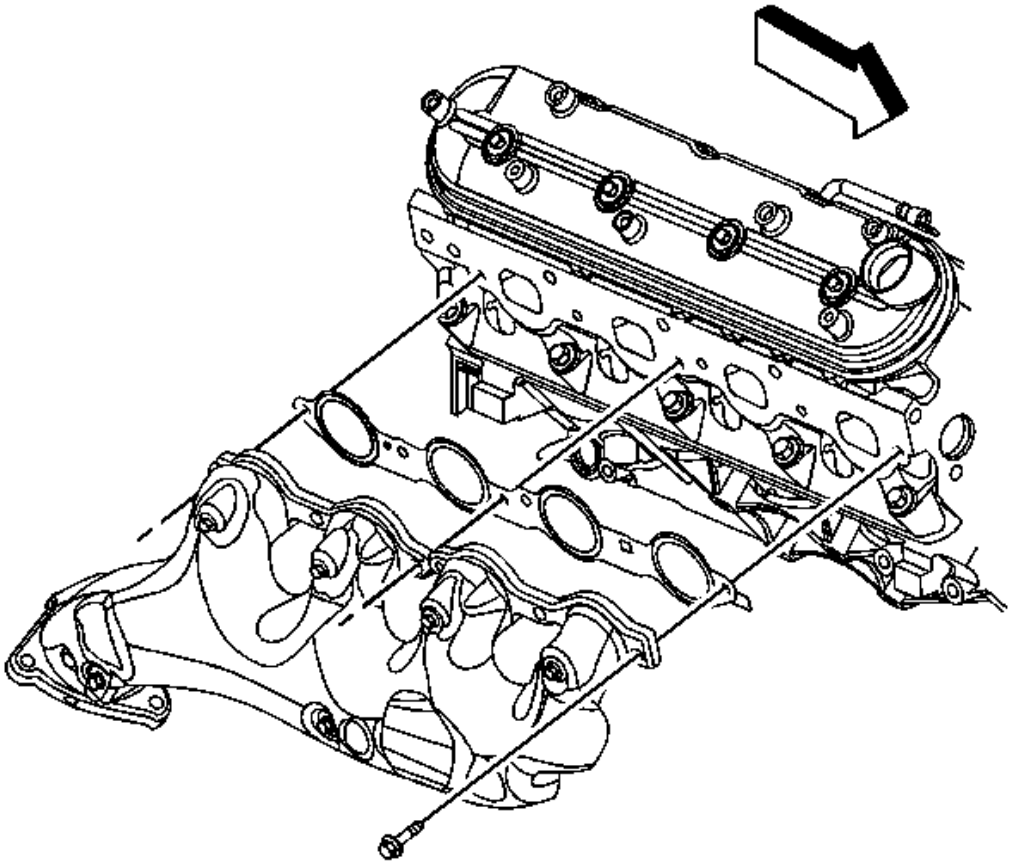


Fig. 38: View Of Exhaust Manifold, Gasket & Bolts
Courtesy of GENERAL MOTORS CORP.

9. Remove the exhaust manifold bolts and exhaust manifold.
10. Remove and discard the exhaust manifold gasket.
11. Remove and discard the exhaust manifold seal.

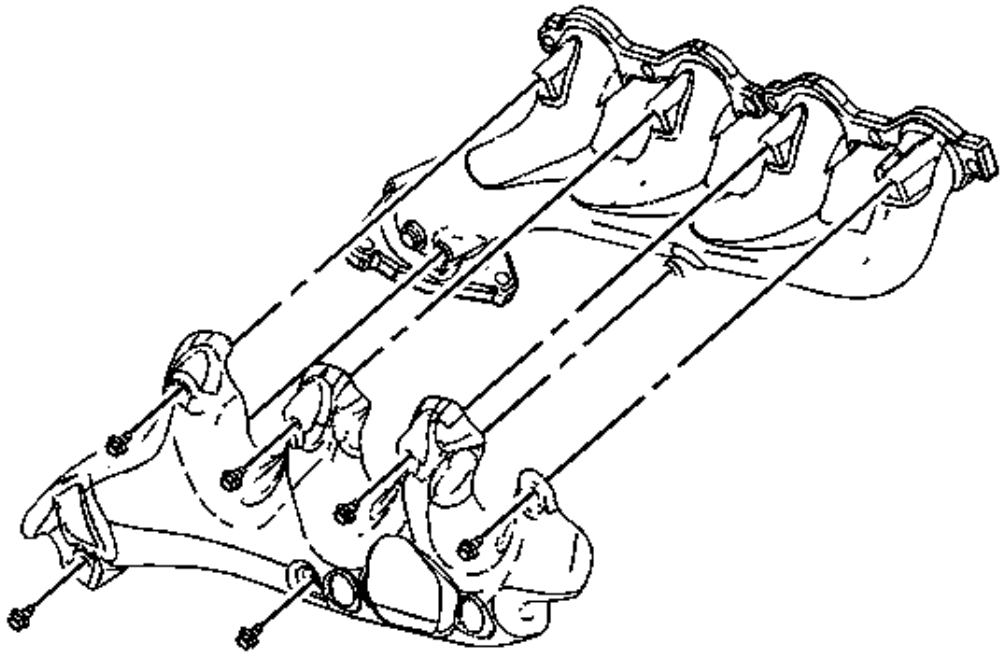


Fig. 39: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

12. If replacing the exhaust manifold, remove the exhaust manifold heat shield bolts, and shield from the exhaust manifold.

Installation Procedure

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 3 threads of the bolt.**

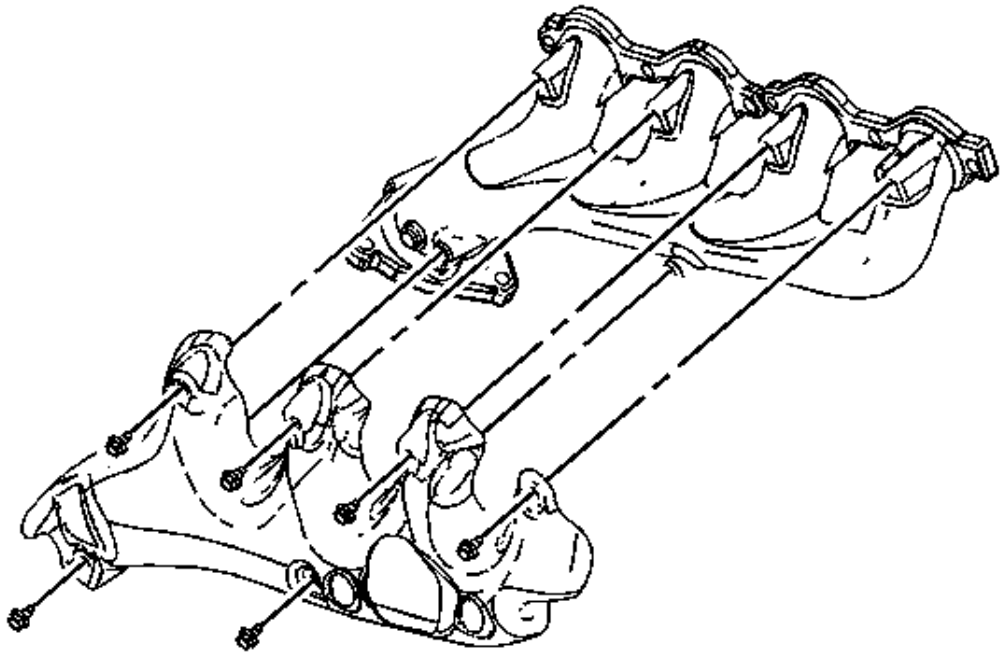


Fig. 40: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. If the exhaust manifold was replaced, position and install the exhaust manifold heat shield, and bolts to the exhaust manifold.

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

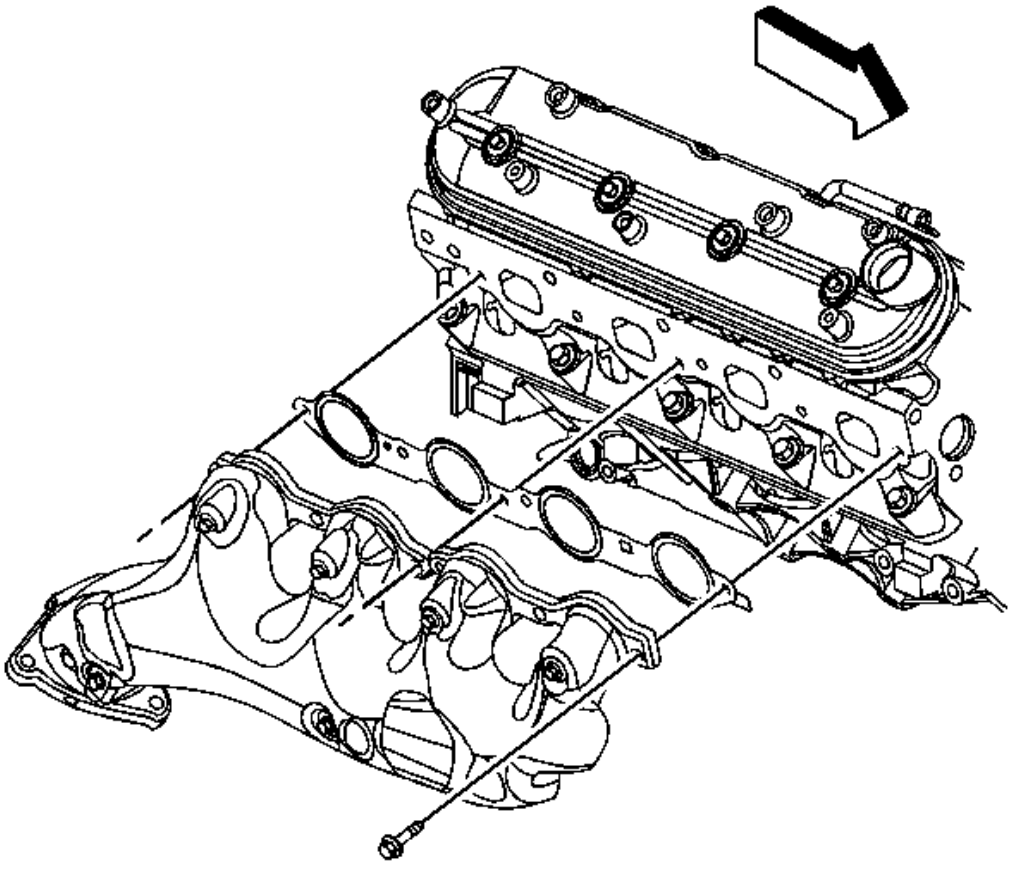


Fig. 41: View Of Exhaust Manifold, Gasket & Bolts
Courtesy of GENERAL MOTORS CORP.

2. Clean the threads of the exhaust manifold bolts.
3. 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.
4. Install a NEW catalytic converter seal to the exhaust manifold.
5. Position the NEW exhaust manifold gasket and exhaust manifold to the cylinder head.
6. Ensure that the catalytic converter seal is seated to the catalytic converter.
7. Install the exhaust manifold bolts.

Tighten:

1. Tighten the bolts a first pass to 15 N.m (11 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.
2. Tighten the bolts a final pass to 20 N.m (15 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.

8. Using a flat punch, bend the gasket tab at the rear of the gasket around the cylinder head edge.

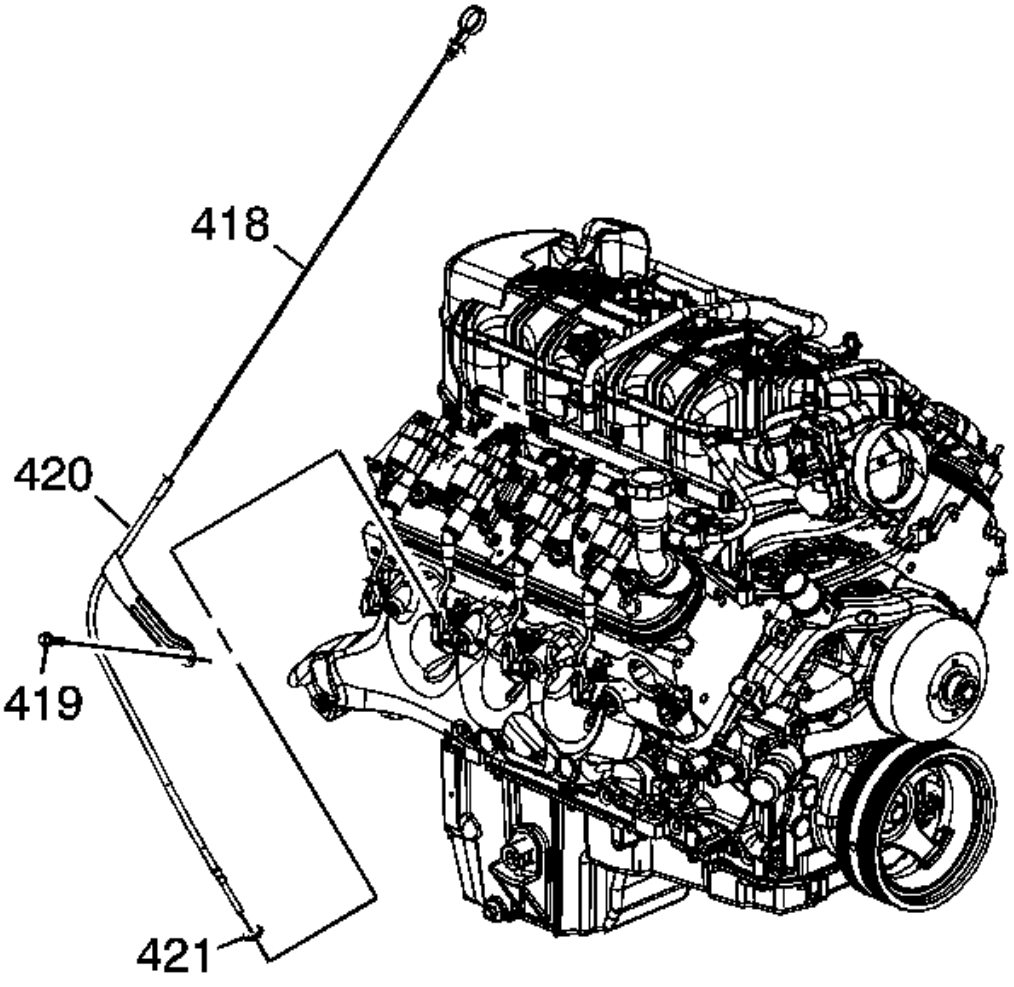


Fig. 42: View Of Oil Level Indicator, Tube Bolt, Indicator Tube & O-Ring Seal

Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The O-ring seal may be reused if not cut or damaged.

9. Inspect the O-ring seal (421) for cuts or damage, replace as necessary.
10. Lubricate the O-ring seal (421) with clean engine oil.
11. Install the oil level indicator tube (420) to the engine block.
12. Install the oil level indicator tube bolt (419).

Tighten: Tighten the bolt 25 N.m (18 lb ft).

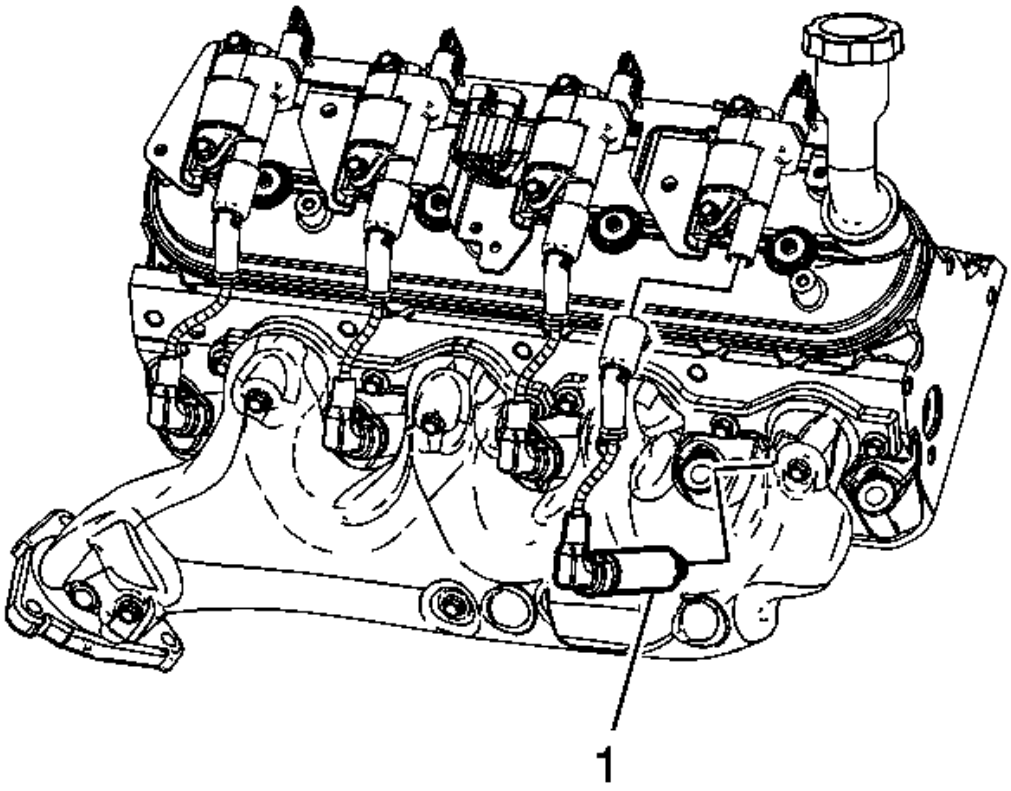


Fig. 43: Locating Spark Plug Wires
Courtesy of GENERAL MOTORS CORP.

13. Install the spark plug wires (1) to the spark plugs.

14. Install the spark plug wires to the ignition coils.
15. Inspect the spark plug wires for proper installation.
    1. Push sideways on each boot in order to inspect the seating.
    2. Reinstall any loose boot.
16. Install the right wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .
17. Fully raise and support the vehicle.

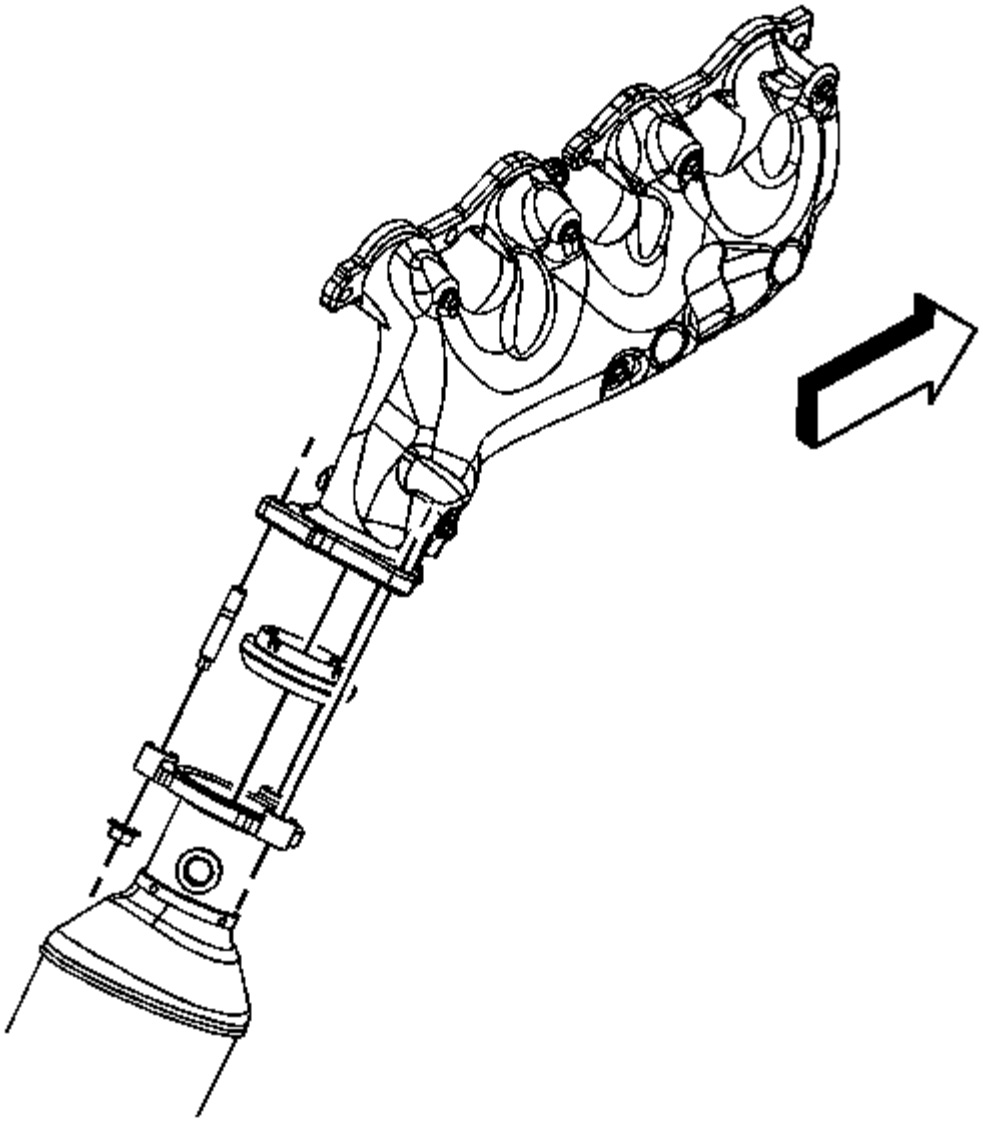


Fig. 44: View Of Exhaust Manifold, Gasket & Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

18. Install the catalytic converter to exhaust manifold nuts, 1500 series shown, 2500 series similar.

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

Partially lower the vehicle in order to work through the wheel opening.

Install the HO2S. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** .

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (6.6L)

Removal Procedure

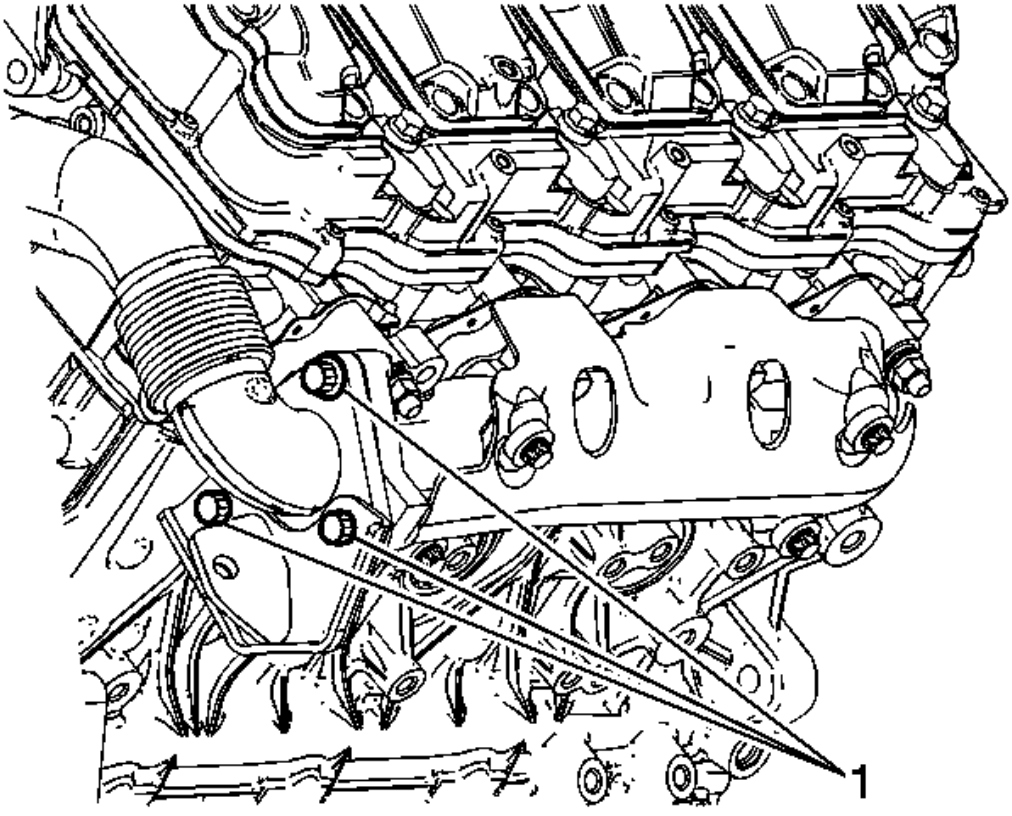


Fig. 45: View Of Exhaust Pipe Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the turbocharger exhaust pipe. Refer to **Turbocharger Exhaust Pipe Replacement (6.6L)**.

2. Remove the wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .
3. Perform the following steps working through the wheelhouse opening, remove the exhaust pipe to exhaust manifold bolts (1) and bracket.

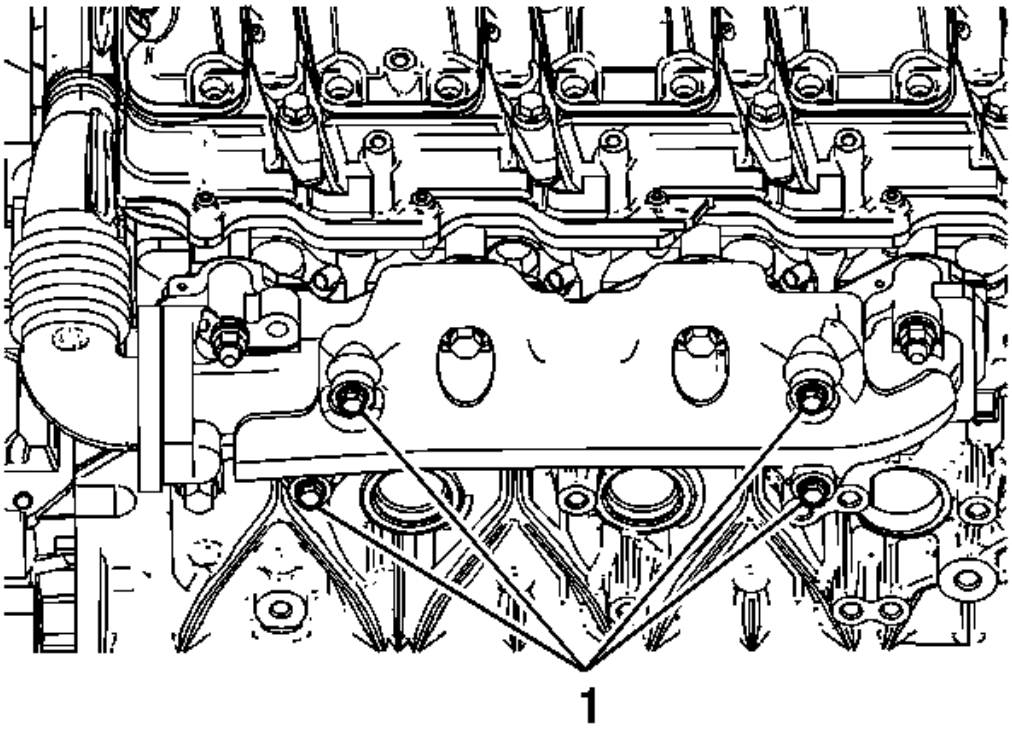


Fig. 46: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust manifold heat shield bolts (1) and shield.

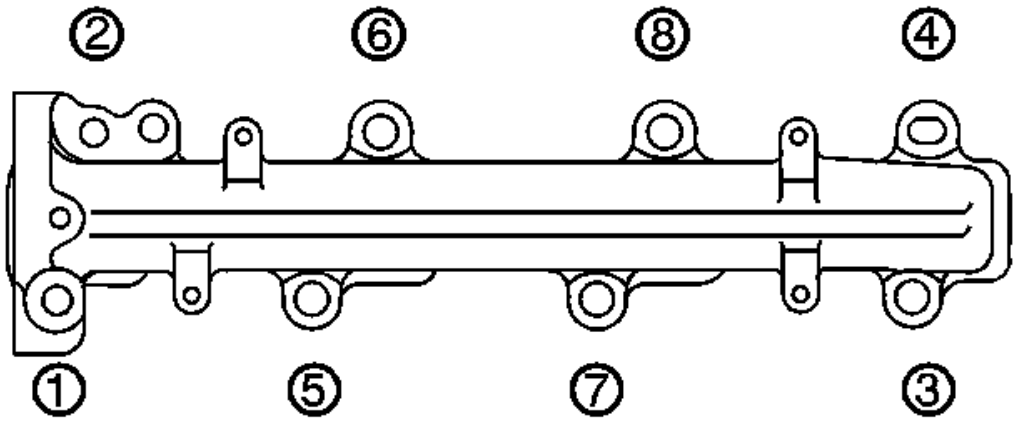


Fig. 47: Right Exhaust Manifold Bolts And Nuts Removal & Installation Sequence
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust manifold bolts and nuts in the proper sequence.

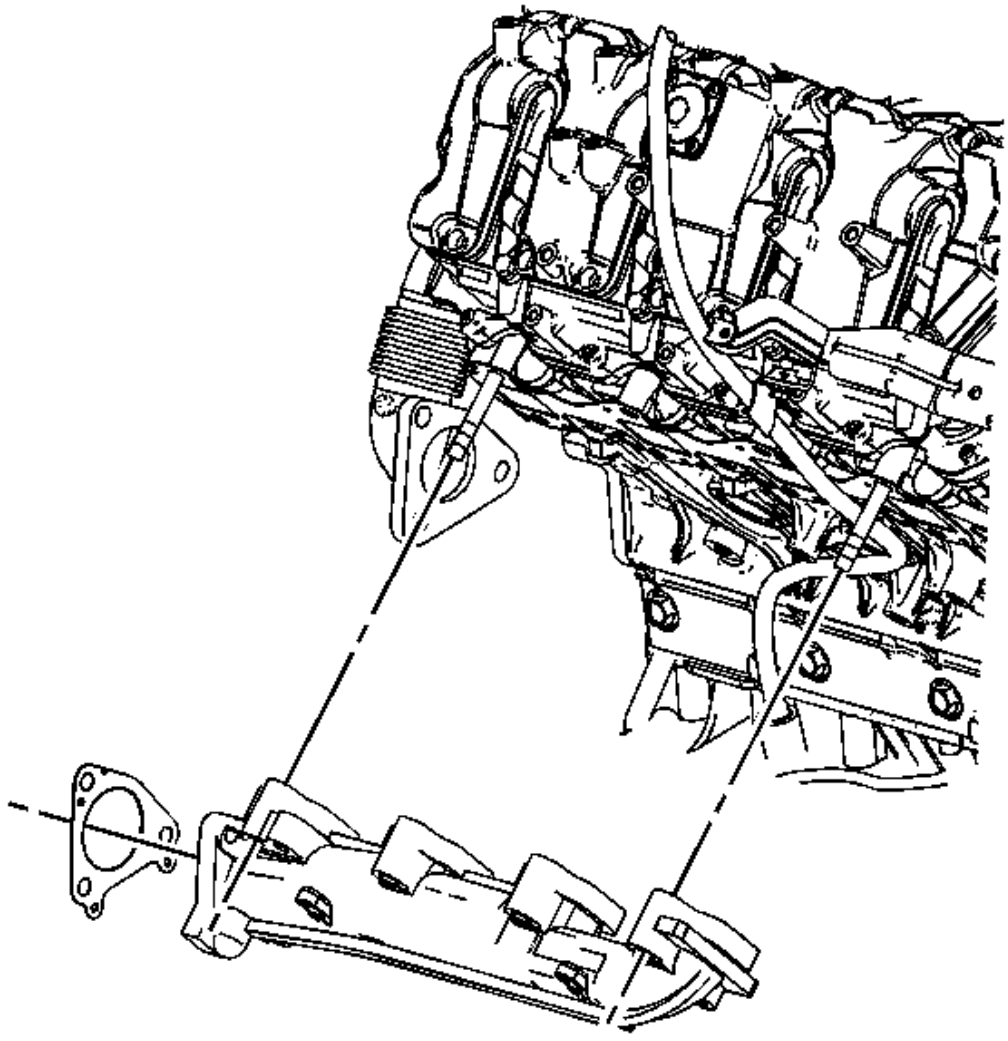


Fig. 48: View Of Exhaust Manifold & Gasket
Courtesy of GENERAL MOTORS CORP.

6. Remove the exhaust manifold and exhaust manifold to pipe gasket.

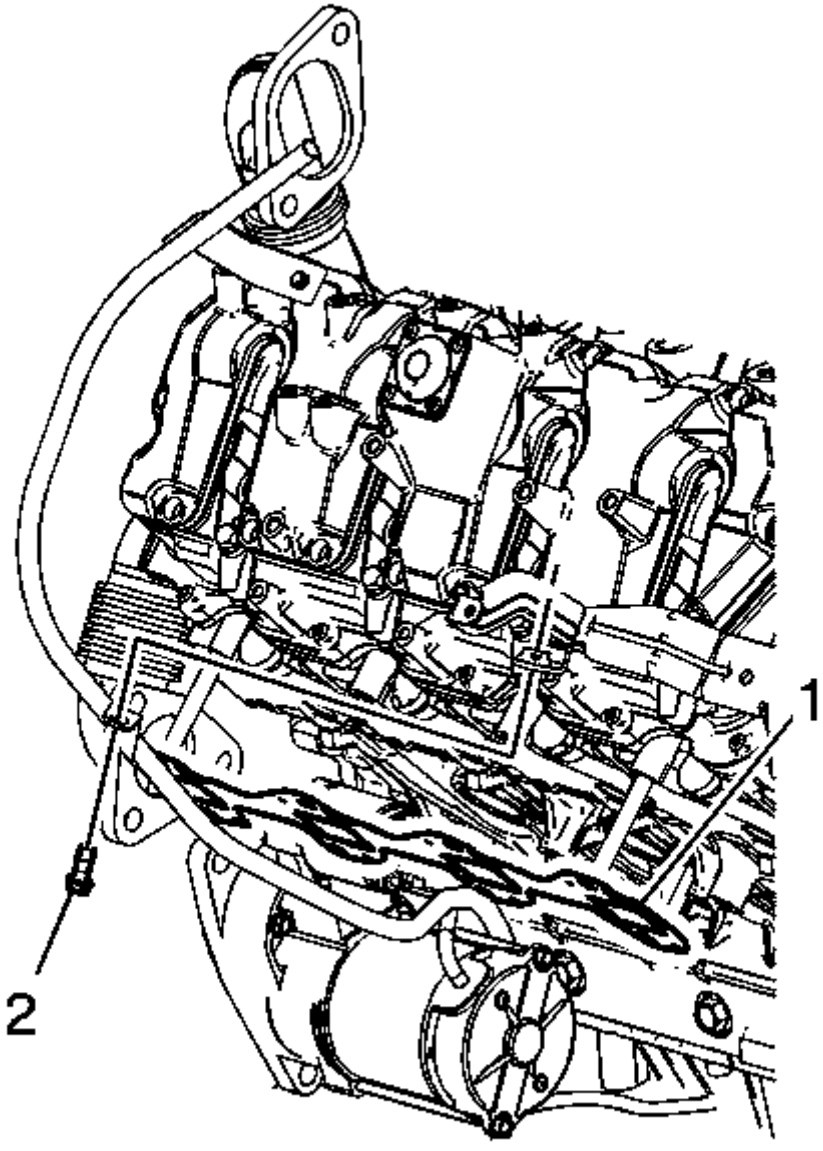


Fig. 49: View Of Oil Level Indicator Tube Bolt & Manifold Gasket
Courtesy of GENERAL MOTORS CORP.

7. Remove the oil level indicator tube bolt (2) and rotate the oil level indicator tube out of the way.
8. Remove and discard the exhaust manifold gasket (1).

Installation Procedure

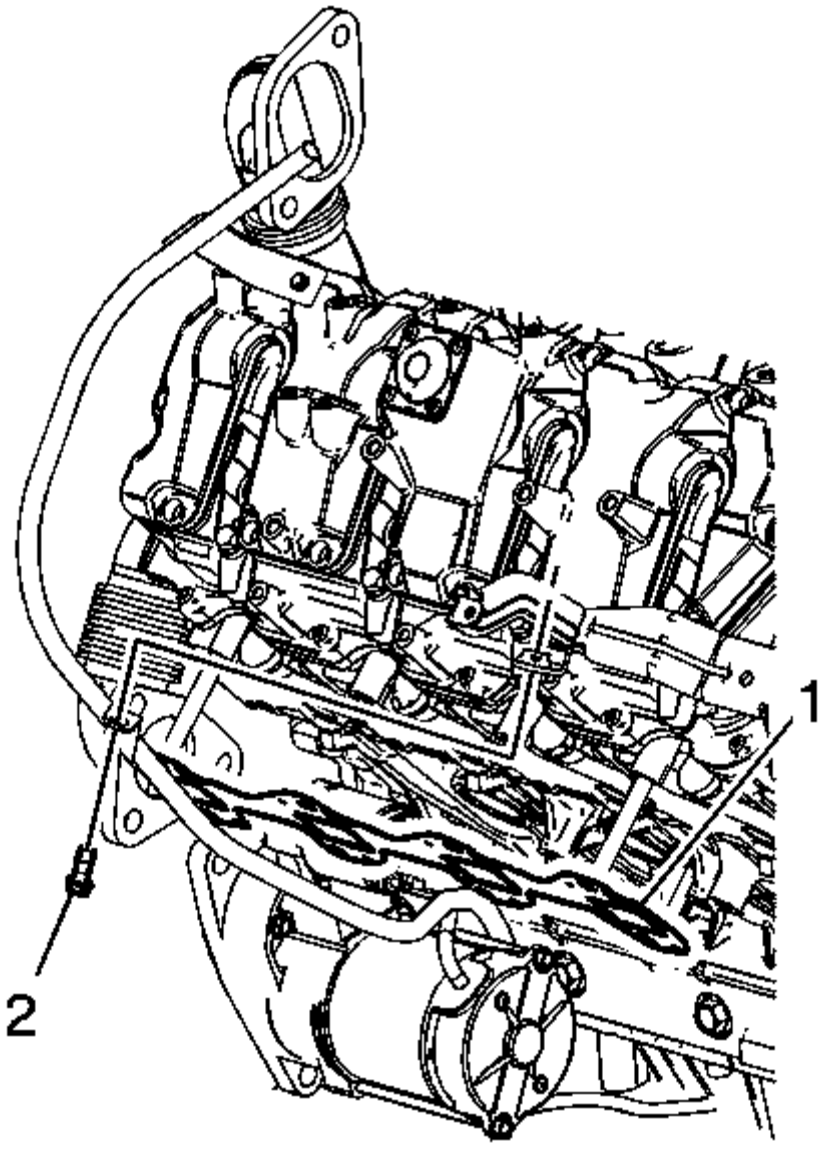


Fig. 50: View Of Oil Level Indicator Tube Bolt & Manifold Gasket
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW exhaust manifold gasket (1) onto the studs.

NOTE: Refer to Fastener Notice .

2. Rotate the oil level indicator tube into position and install the oil level indicator tube bolt (2).

   Tighten: Tighten the bolt to 21 N.m (15 lb ft).

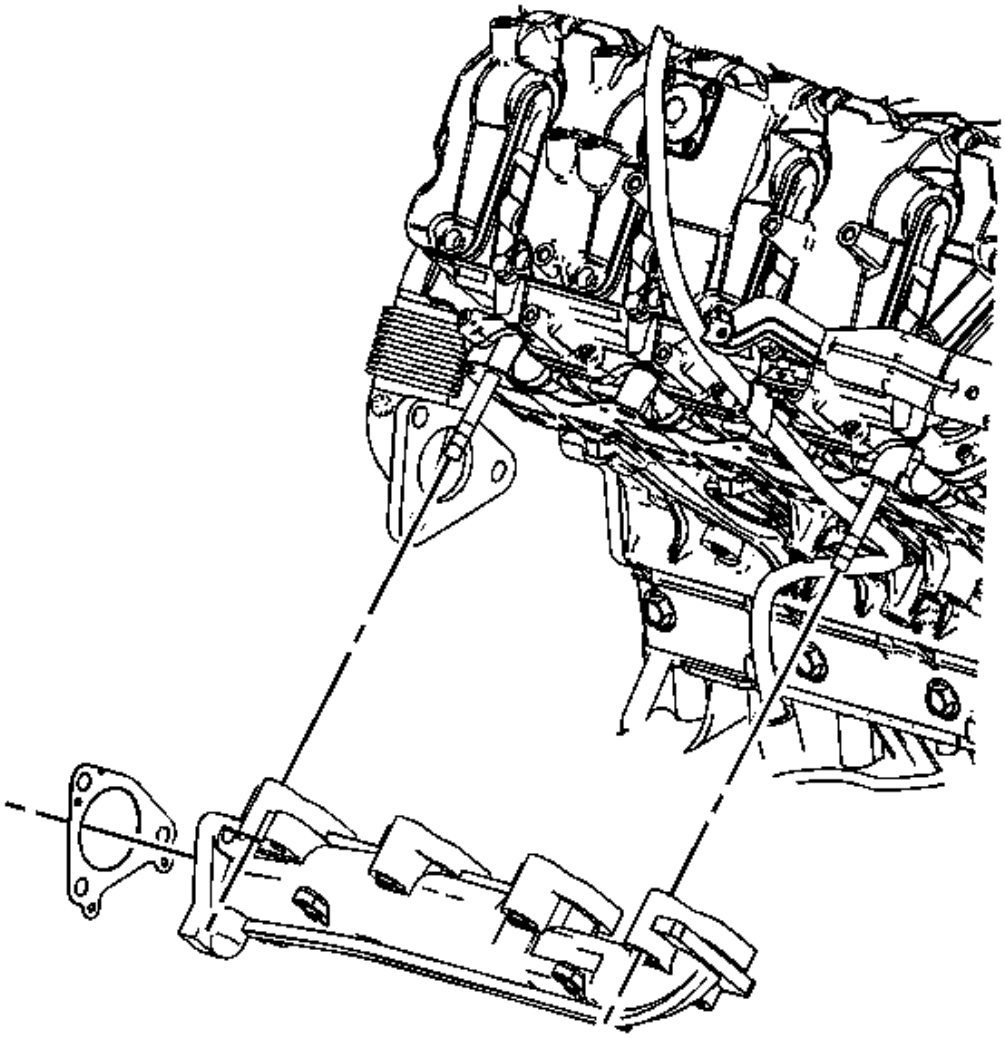


Fig. 51: View Of Exhaust Manifold & Gasket
Courtesy of GENERAL MOTORS CORP.

3. Position a NEW exhaust pipe gasket between the exhaust manifold and exhaust pipe. Align the tabs on the gasket to face downward.
4. Install the exhaust manifold onto the studs.

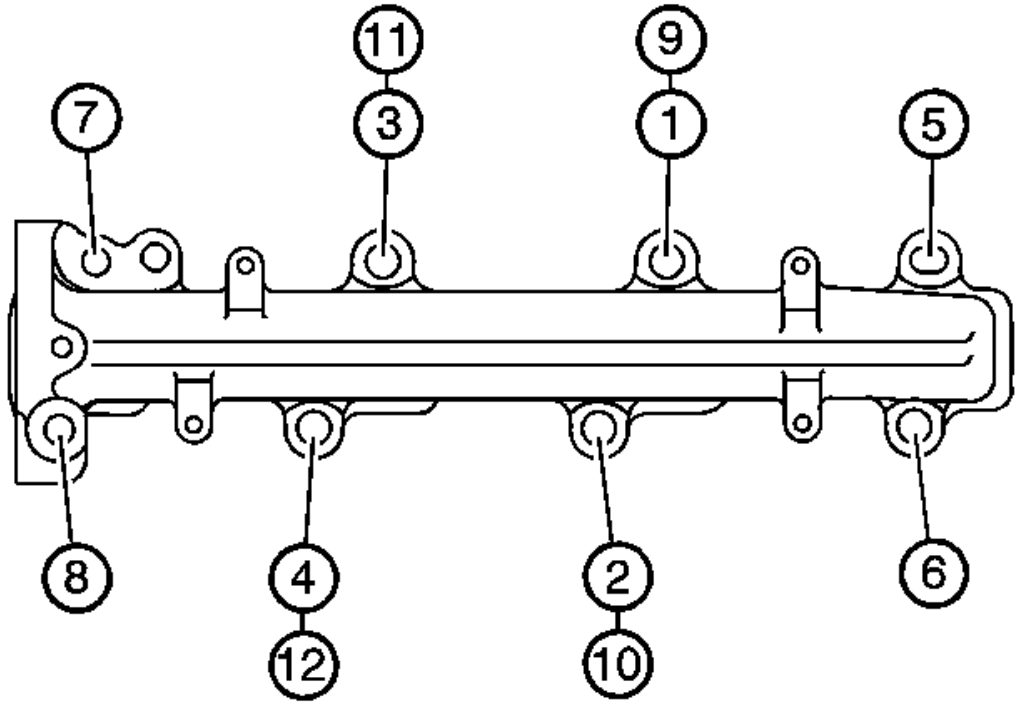


Fig. 52: Exhaust Manifold Bolt Tightening Sequence -- Right Side
Courtesy of GENERAL MOTORS CORP.

5. Install and tighten the exhaust manifold bolts and nuts in the sequence shown.

Tighten:

- Tighten the bolts/nuts to 57 N.m (42 lb ft).
- Tighten the 4 center bolts/nuts an additional pass to 57 N.m (42 lb ft).

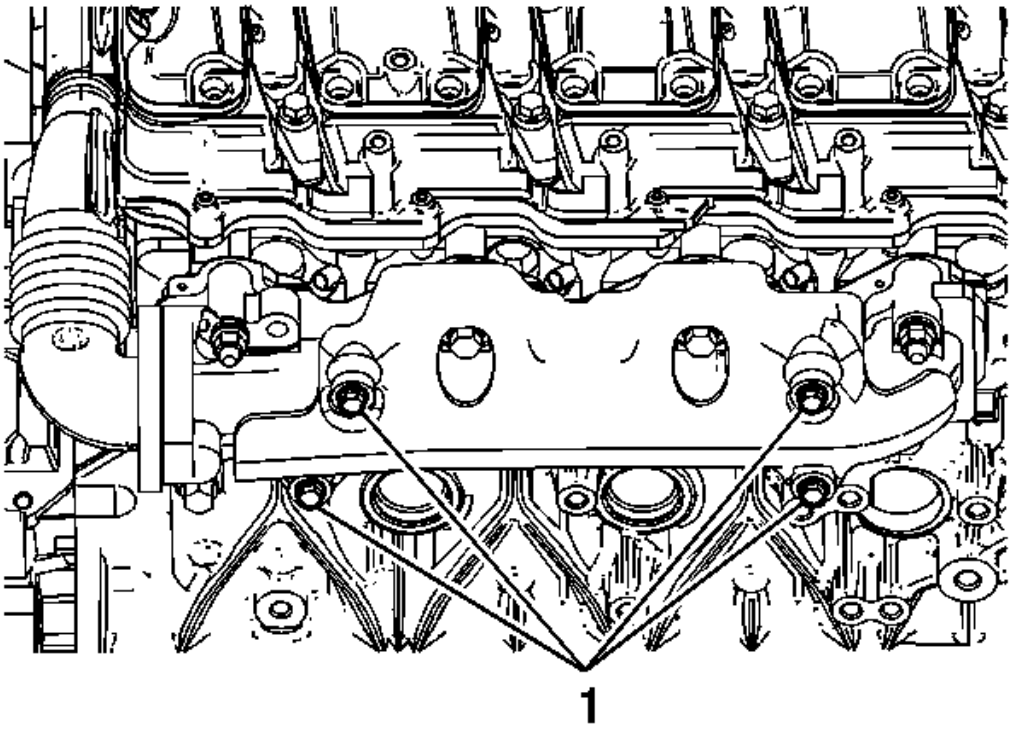


Fig. 53: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

6. Position the exhaust manifold heat shield to the manifold and install the exhaust manifold bolts (1).

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

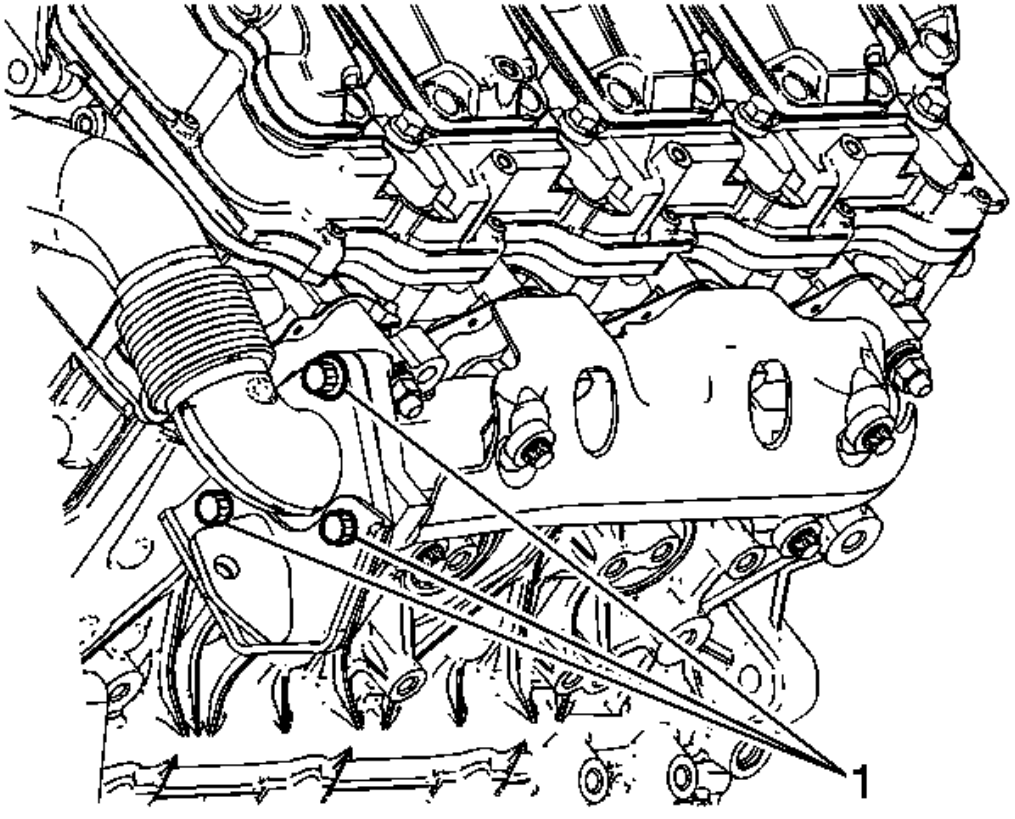


Fig. 54: View Of Exhaust Pipe Bracket Bolts
Courtesy of GENERAL MOTORS CORP.

7. Install the exhaust pipe bracket and the exhaust pipe to exhaust manifold bolts (1).

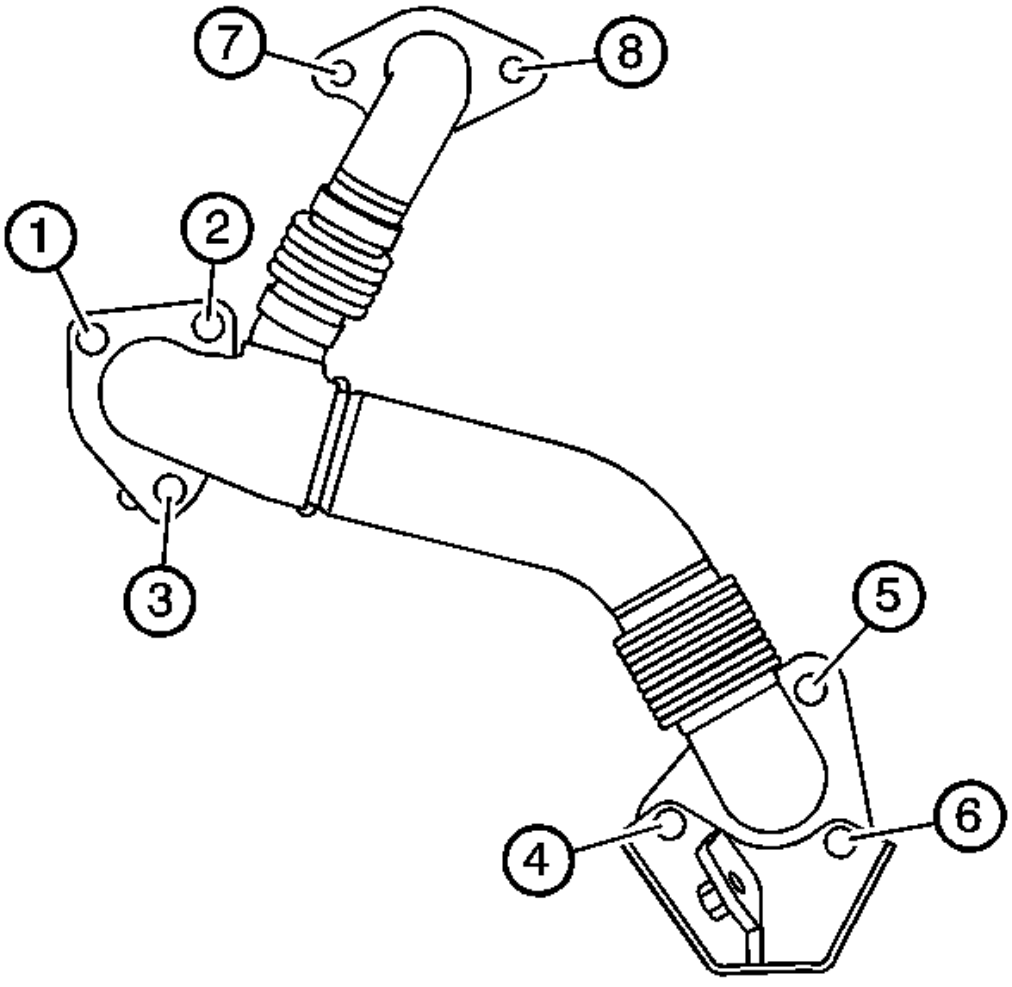


Fig. 55: View Of Exhaust Manifold Bolt Tightening Sequence
Courtesy of GENERAL MOTORS CORP.

8. Tighten the exhaust pipe to exhaust manifold bolts in the sequence shown (4, 5, and 6).

   Tighten: Tighten the bolts to 53 N.m (39 lb ft).

9. Install the wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .
10. Install the turbocharger exhaust pipe. Refer to **Turbocharger Exhaust Pipe Replacement (6.6L)**.

TURBOCHARGER EXHAUST PIPE REPLACEMENT (6.6L)

Removal Procedure

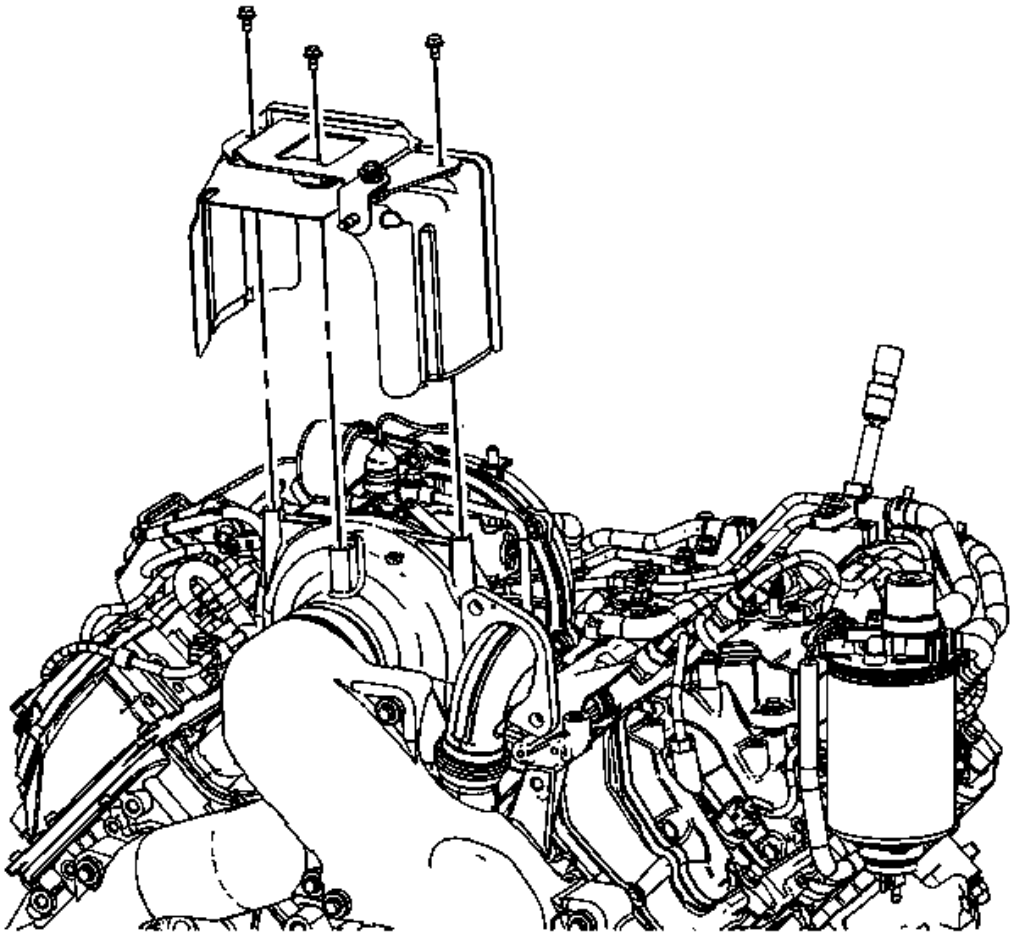


Fig. 56: View Of Upper Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the glow plug control module. Refer to **Glow Plug Control Module Replacement** .
2. Remove the exhaust gas recirculation (EGR) valve cooler. Refer to **Exhaust Gas Recirculation Valve Cooler Replacement** .
3. Remove the turbocharger upper heat shield bolts and shield.

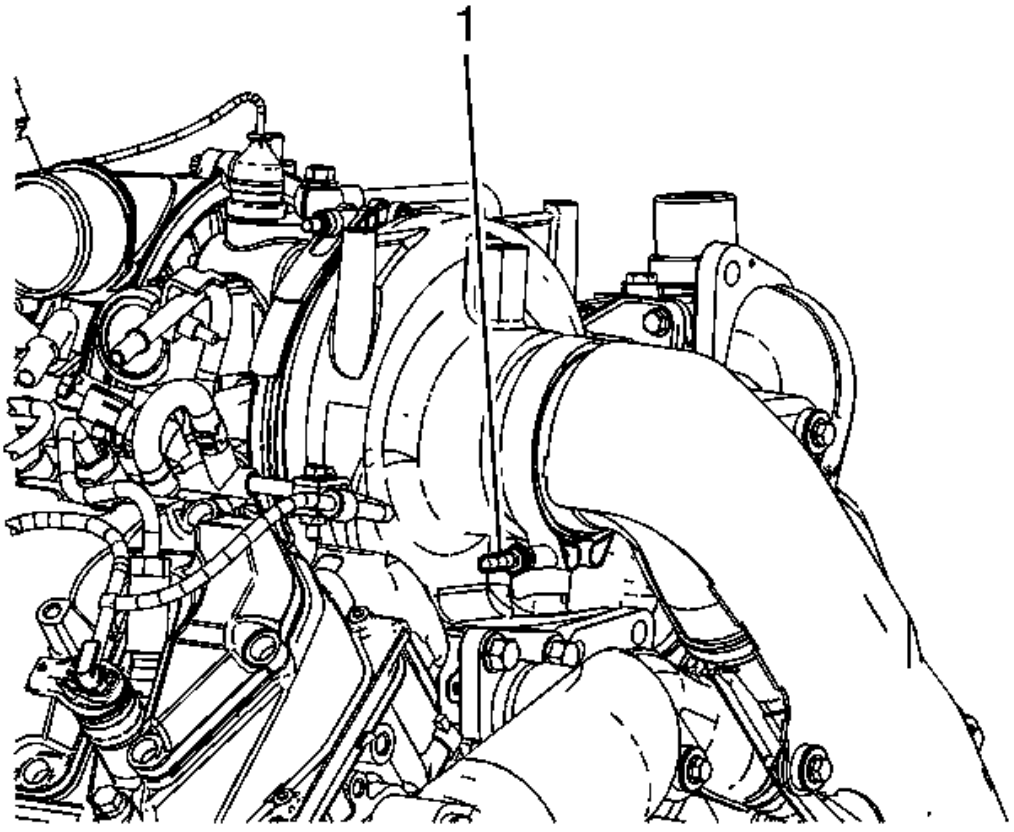


Fig. 57: View Of Turbocharger Clamp Bolt
Courtesy of GENERAL MOTORS CORP.

4. Loosen the turbocharger exhaust pipe to turbocharger clamp bolt (1).
5. Remover the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.

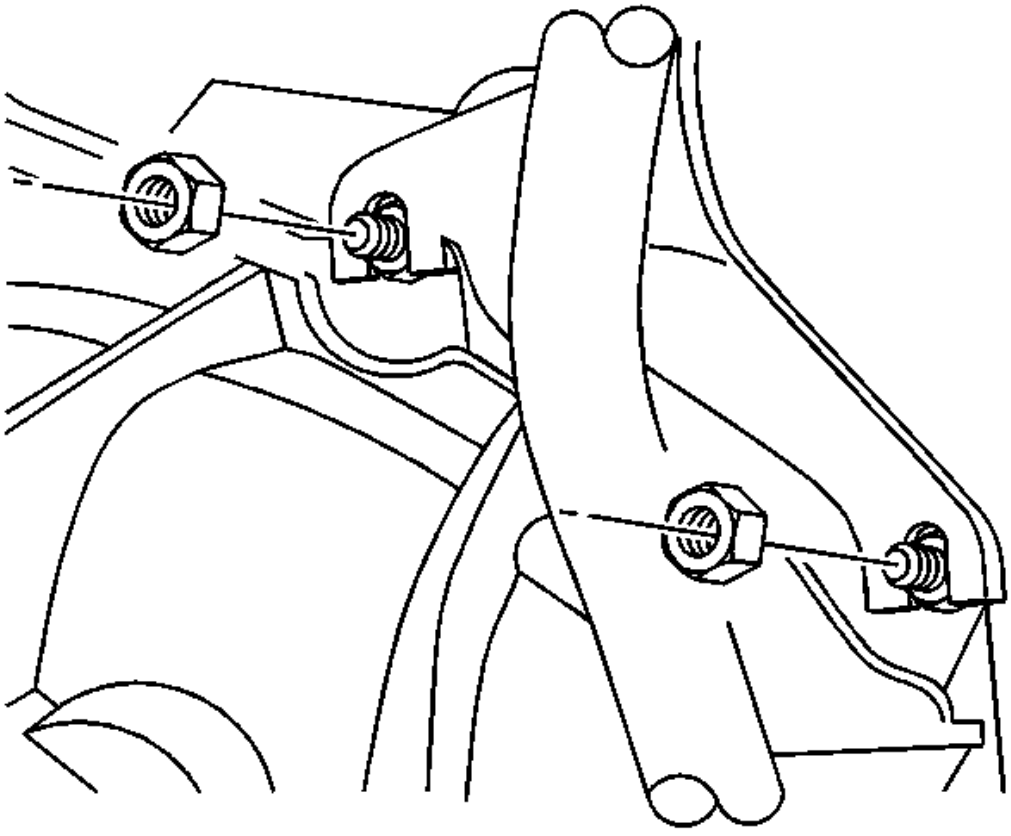


Fig. 58: View Of Fill Tube To Bellhousing Nuts
Courtesy of GENERAL MOTORS CORP.

6. Perform the following steps working through the wheelhouse opening, Remove the transmission fluid fill tube to bellhousing nuts.
7. Position the transmission fluid fill tube to the right side of the vehicle. The tube does not require removal from the transmission.

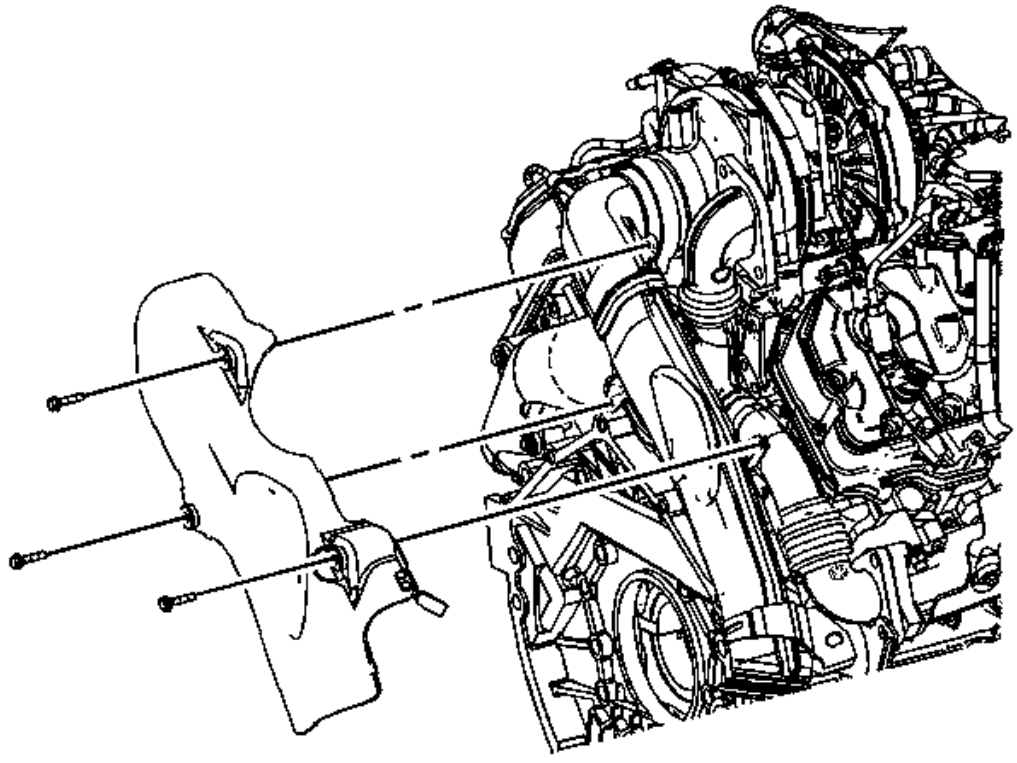


Fig. 59: View Of Turbocharger Exhaust Pipe Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

8. Remove the turbocharger exhaust pipe heat shield bolts and shield.

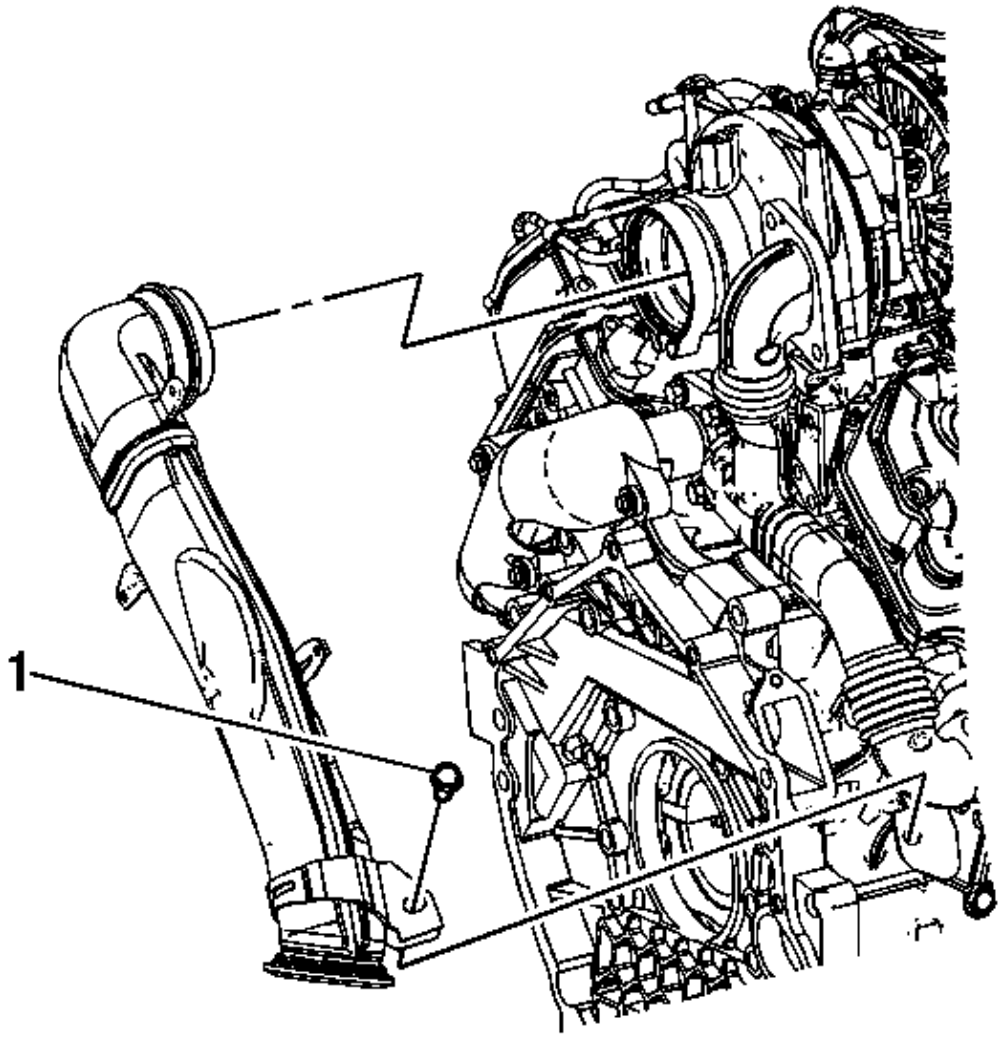


Fig. 60: View Of Turbocharger Exhaust Pipe Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

9. Remove the turbocharger exhaust pipe to bracket bolt (1).
10. Remove the turbocharger exhaust pipe.

Installation Procedure

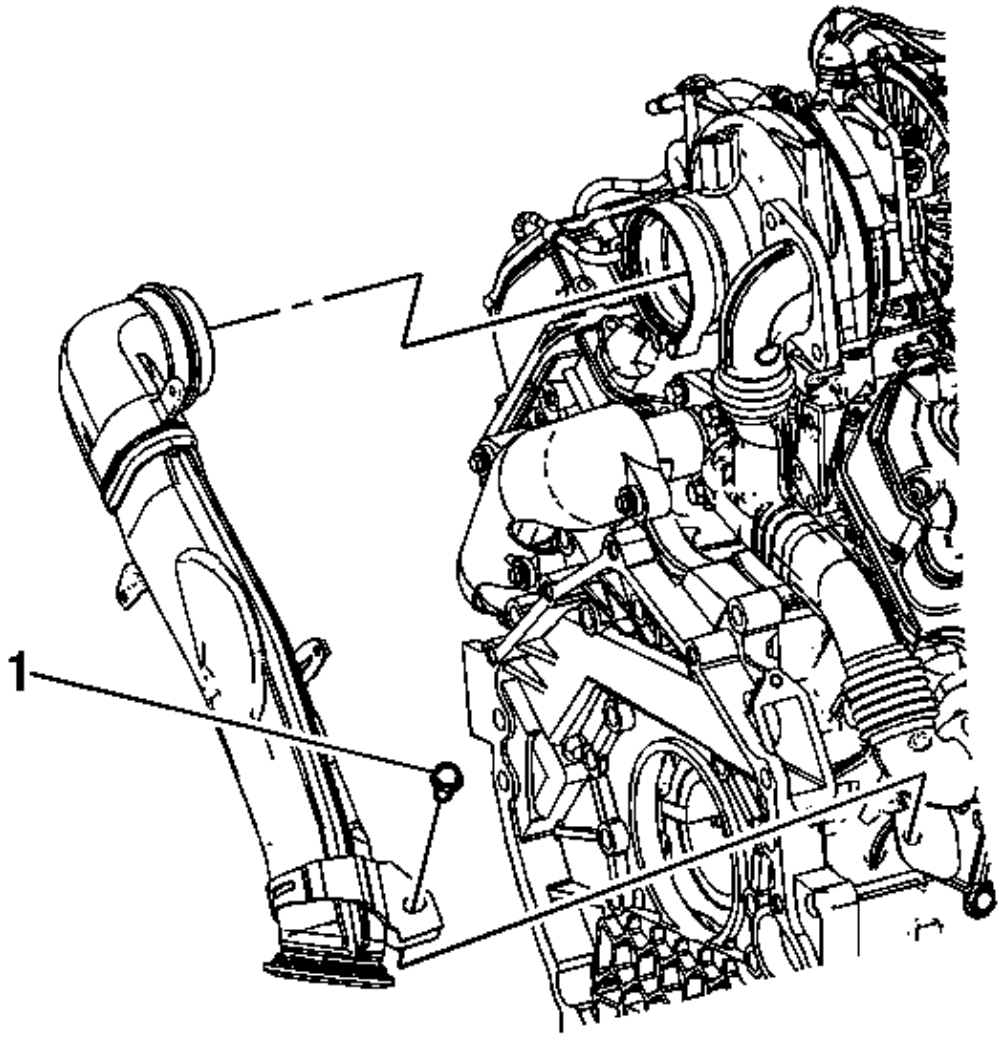


Fig. 61: View Of Turbocharger Exhaust Pipe Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

1. Install the turbocharger exhaust pipe into the clamp and position the pipe flat against the turbocharger.
2. Loosely install the turbocharger exhaust pipe to bracket bolt (1).

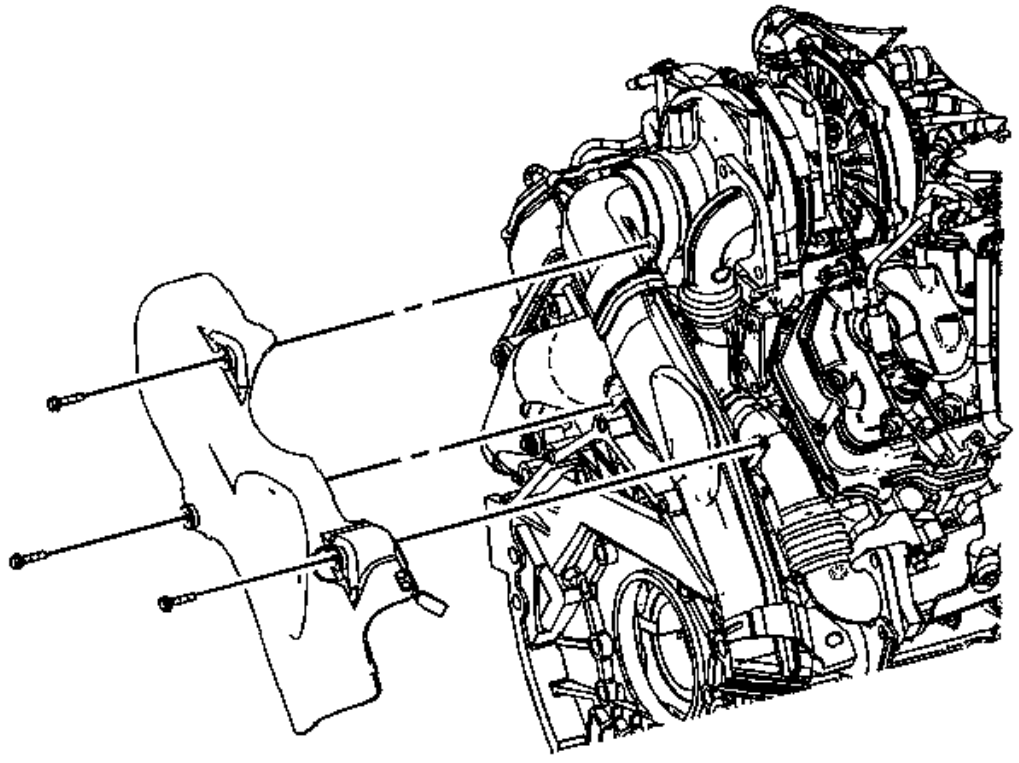


Fig. 62: View Of Turbocharger Exhaust Pipe Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

3. Position the turbocharger exhaust pipe heat shield and install the heat shield bolts.

   Tighten: Tighten the bolts to 10 N.m (89 lb ft).

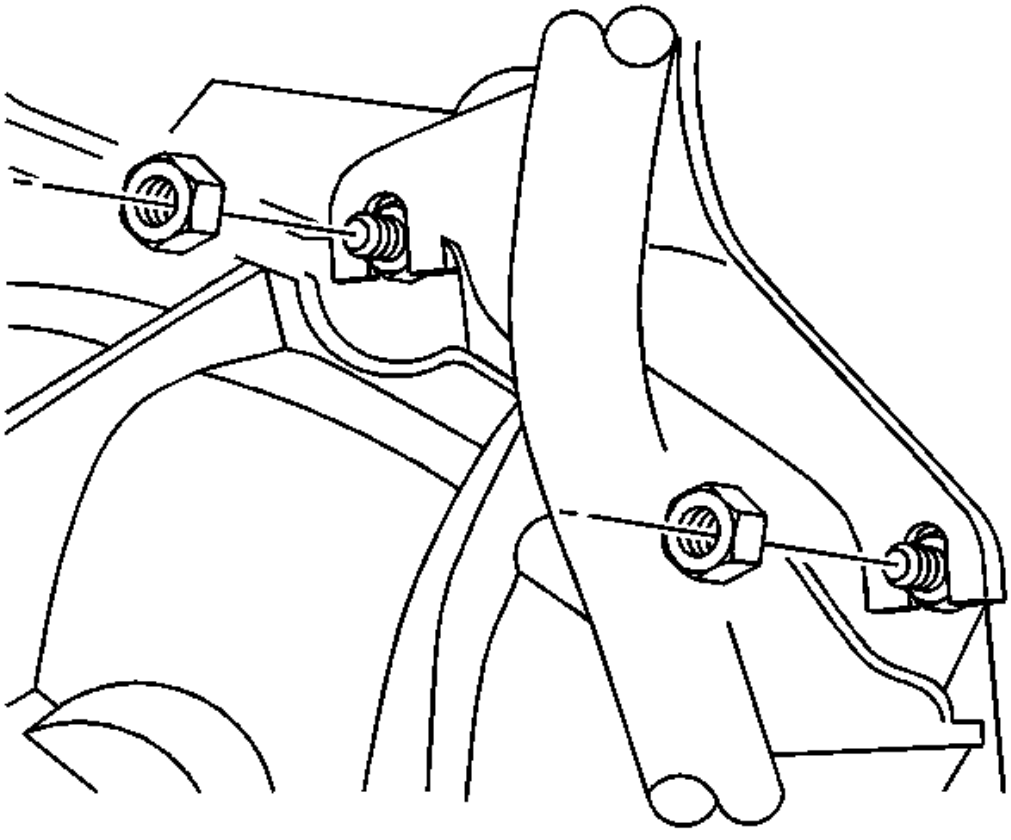


Fig. 63: View Of Fill Tube To Bellhousing Nuts
Courtesy of GENERAL MOTORS CORP.

4. Position the transmission fluid fill tube.
5. Install the transmission fluid fill tube to bellhousing nuts.

Tighten: Tighten the nuts to 18 N.m (13 lb ft).

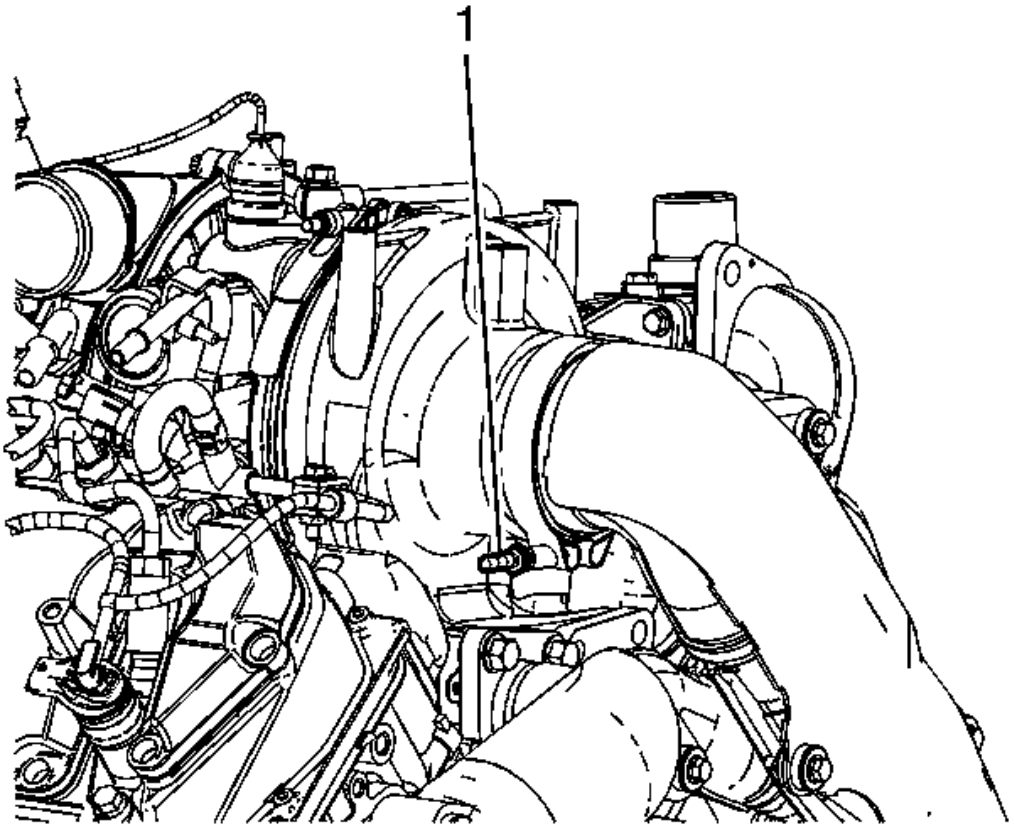


Fig. 64: View Of Turbocharger Clamp Bolt
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Prior to tightening the turbocharger exhaust clamp, ensure that the turbocharger exhaust pipe is inserted into the clamp.

6. Tighten the turbocharger exhaust pipe to turbocharger clamp bolt (1).

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

7. Install the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.
8. Tighten the turbocharger exhaust pipe to bracket bolt.

Tighten: Tighten the bolt to 34 N.m (25 lb ft).

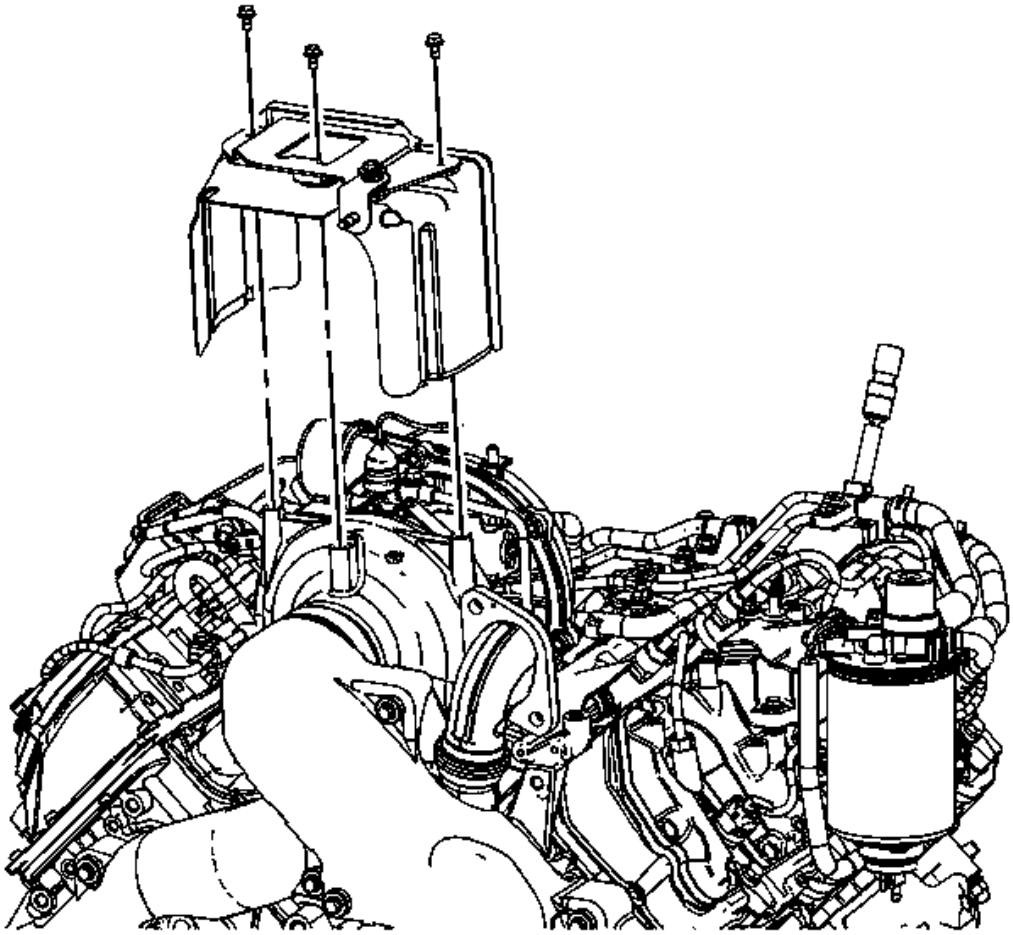


Fig. 65: View Of Upper Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

9. Install the turbocharger upper heat shield and bolts.

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

10. Install the EGR valve cooler. Refer to **Exhaust Gas Recirculation Valve Cooler Replacement** .
11. Install the glow plug control module. Refer to **Glow Plug Control Module Replacement** .

EXHAUST MANIFOLD PIPE REPLACEMENT (6.0L - CAB/CHASSIS)

Removal Procedure

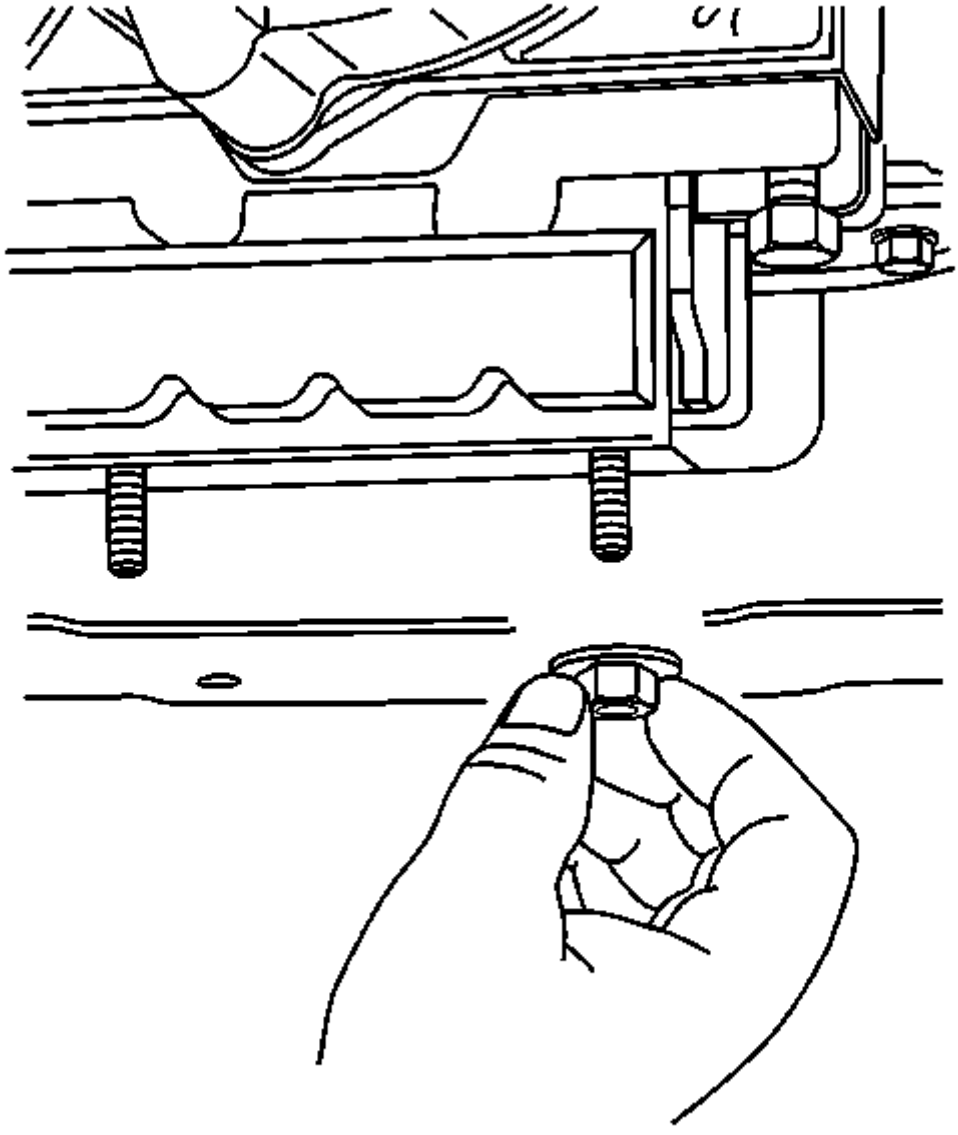


Fig. 66: Identifying Transmission Mount Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the heated oxygen sensor (HO2S). Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** .
2. Support the transmission with a suitable transmission jack.
3. Remove the transmission mount to transmission support nuts.
4. Using the transmission jack, raise the transmission up off of the transmission support.

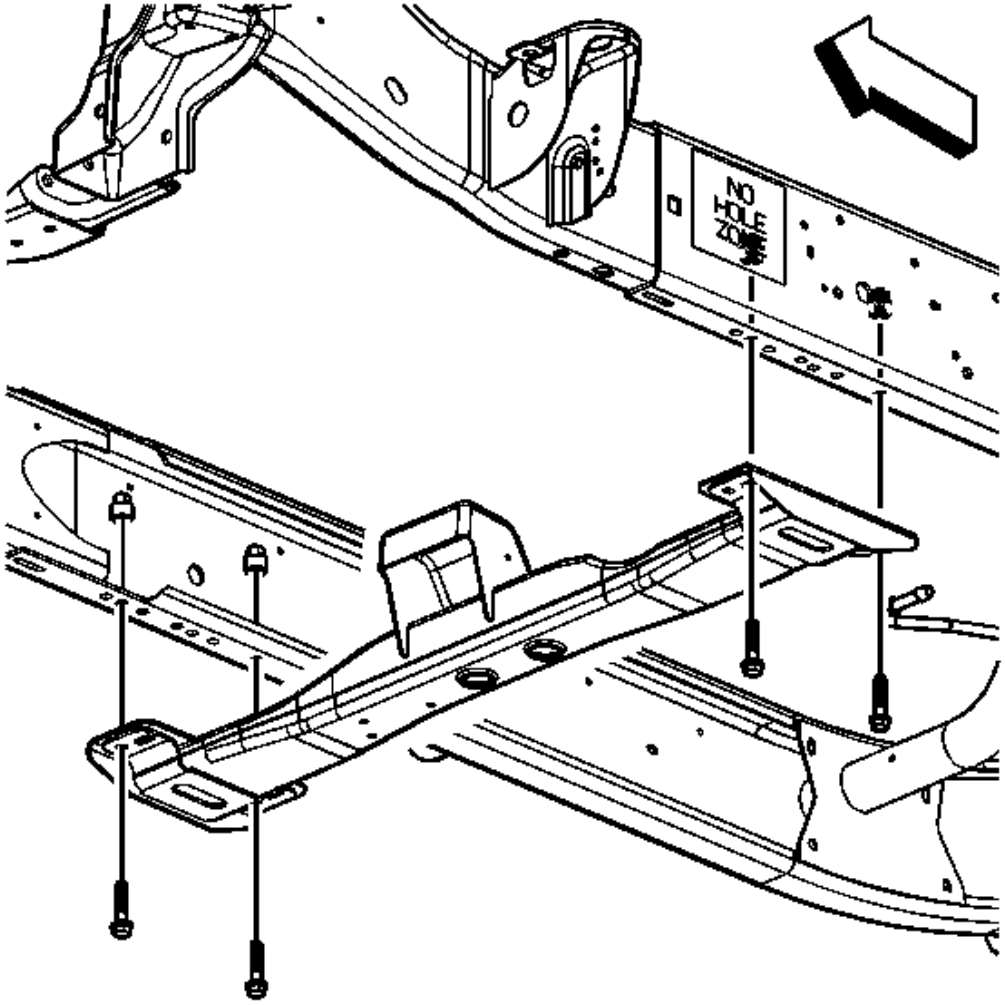


Fig. 67: View Of Transmission Support Crossmember & Bolts

Courtesy of GENERAL MOTORS CORP.

5. Remove the transmission support crossmember bolts.
6. Remove the transmission support crossmember.

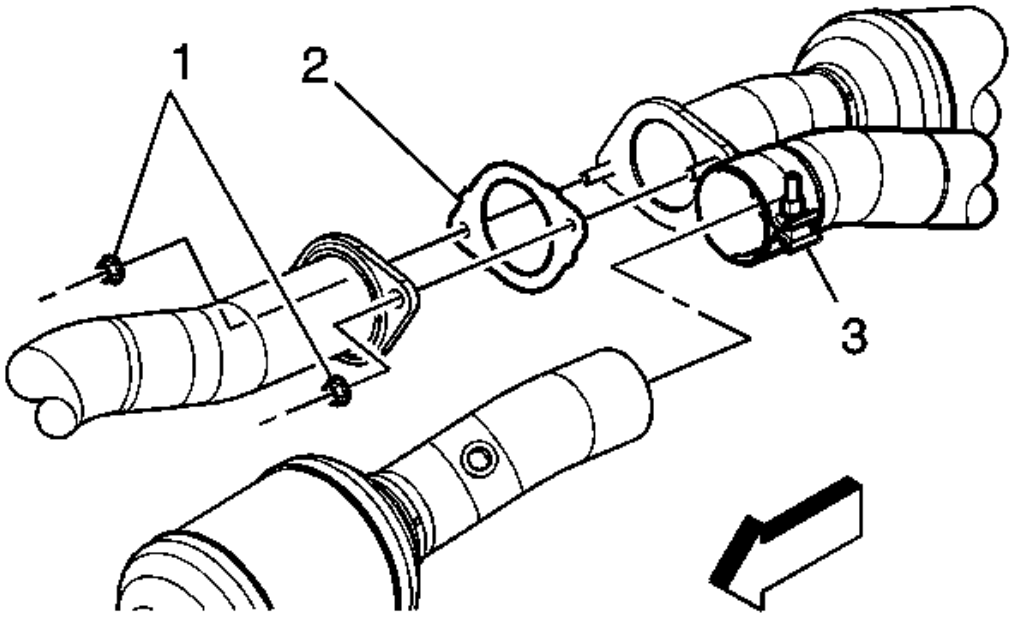


Fig. 68: View Of Exhaust Muffler, Exhaust Manifold Pipe, Gasket & Nuts
Courtesy of GENERAL MOTORS CORP.

7. Remove the exhaust muffler to exhaust manifold pipe nuts (1).

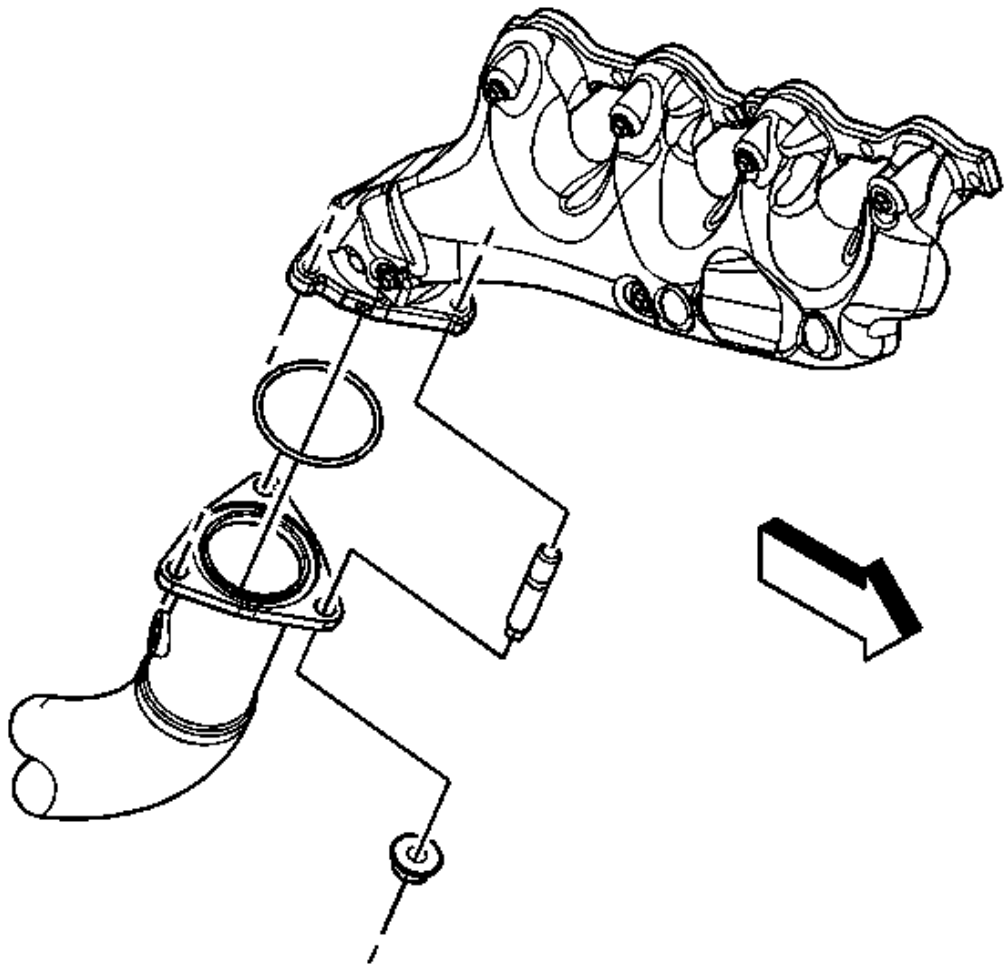


Fig. 69: View Of Exhaust Manifold Pipe, Gasket, Bolt & Manifold
Courtesy of GENERAL MOTORS CORP.

8. Remove the exhaust manifold pipe to exhaust manifold nuts.
9. Using the transmission jack, lower the transmission slightly.
10. Separate any necessary exhaust muffler insulators so that the pipe may be separated from the muffler.

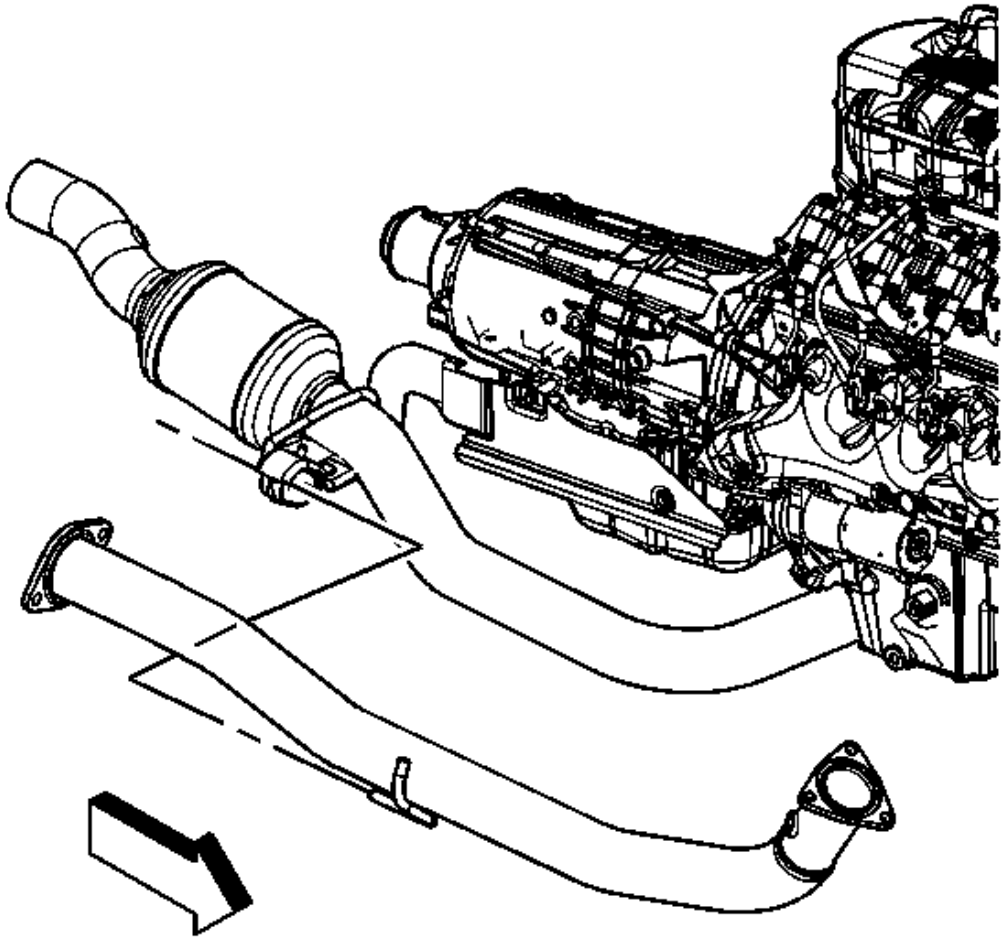


Fig. 70: View Of Exhaust Manifold Pipe
Courtesy of GENERAL MOTORS CORP.

11. Remove the exhaust manifold pipe.
12. Discard the exhaust manifold pipe gasket.

Installation Procedure

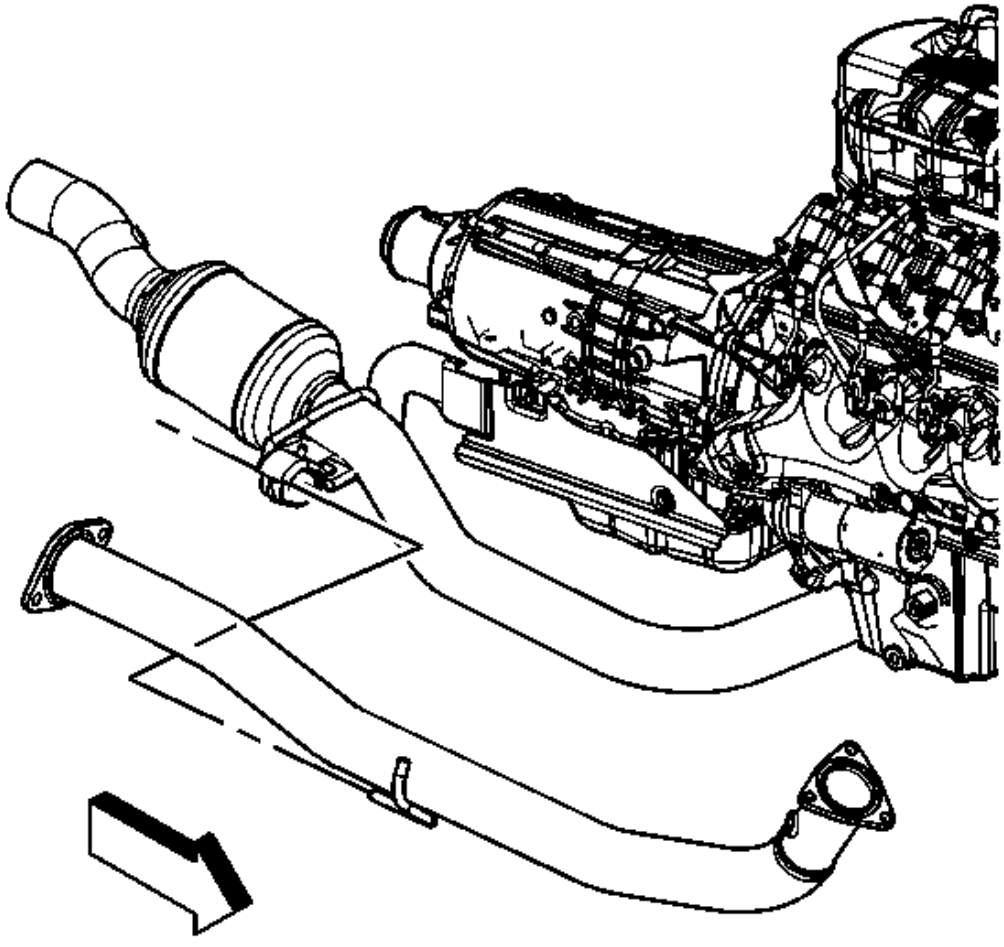


Fig. 71: View Of Exhaust Manifold Pipe
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW exhaust manifold pipe gasket onto the muffler studs.
2. Install the exhaust manifold pipe.

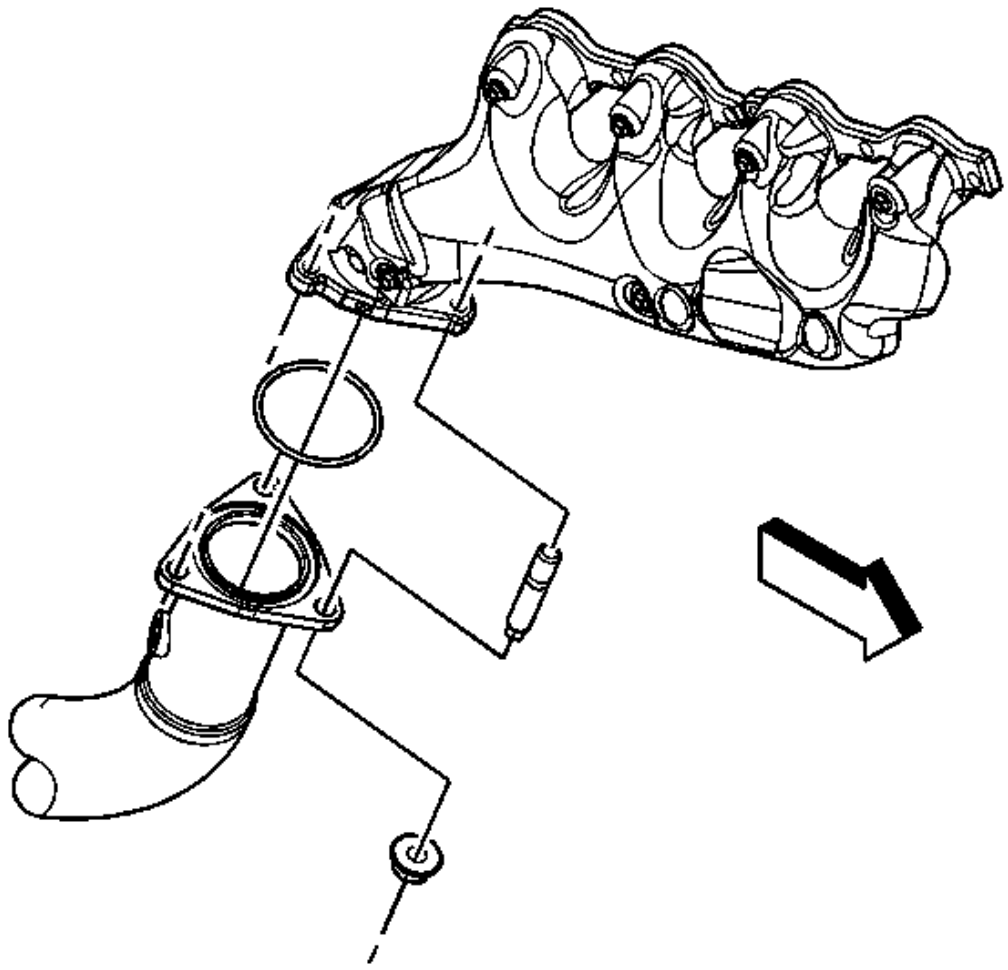


Fig. 72: View Of Exhaust Manifold Pipe, Gasket, Bolt & Manifold
Courtesy of GENERAL MOTORS CORP.

3. Install any necessary exhaust muffler insulators that were separated from the muffler.
4. Using the transmission jack, raise the transmission slightly.

NOTE: Refer to Fastener Notice .

5. Install the exhaust manifold pipe to exhaust manifold nuts.

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

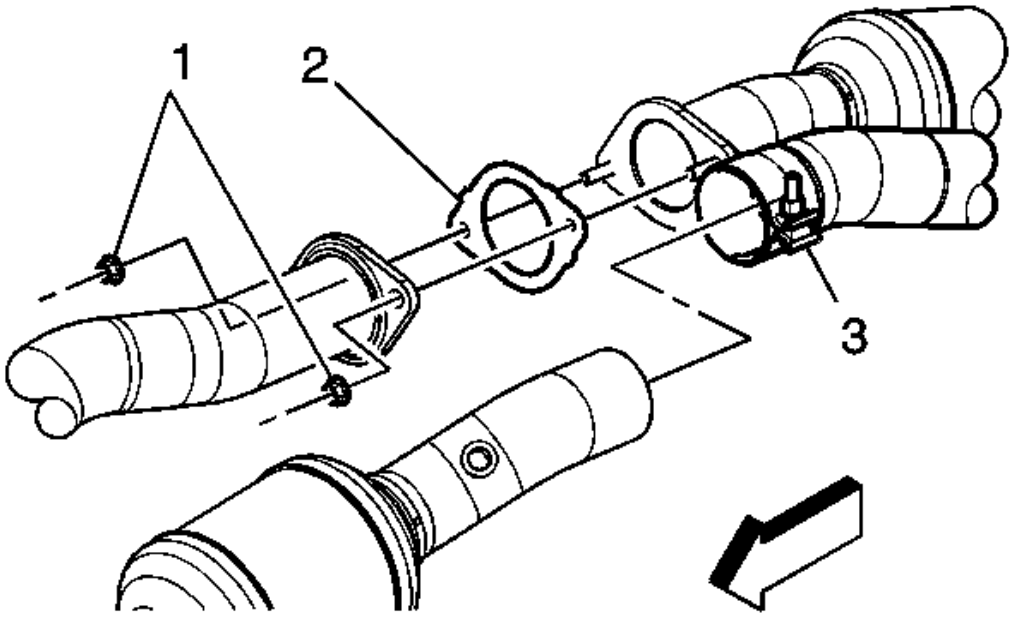


Fig. 73: View Of Exhaust Muffler, Exhaust Manifold Pipe, Gasket & Nuts
Courtesy of GENERAL MOTORS CORP.

6. Install the exhaust muffler to exhaust manifold pipe nuts (1).

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

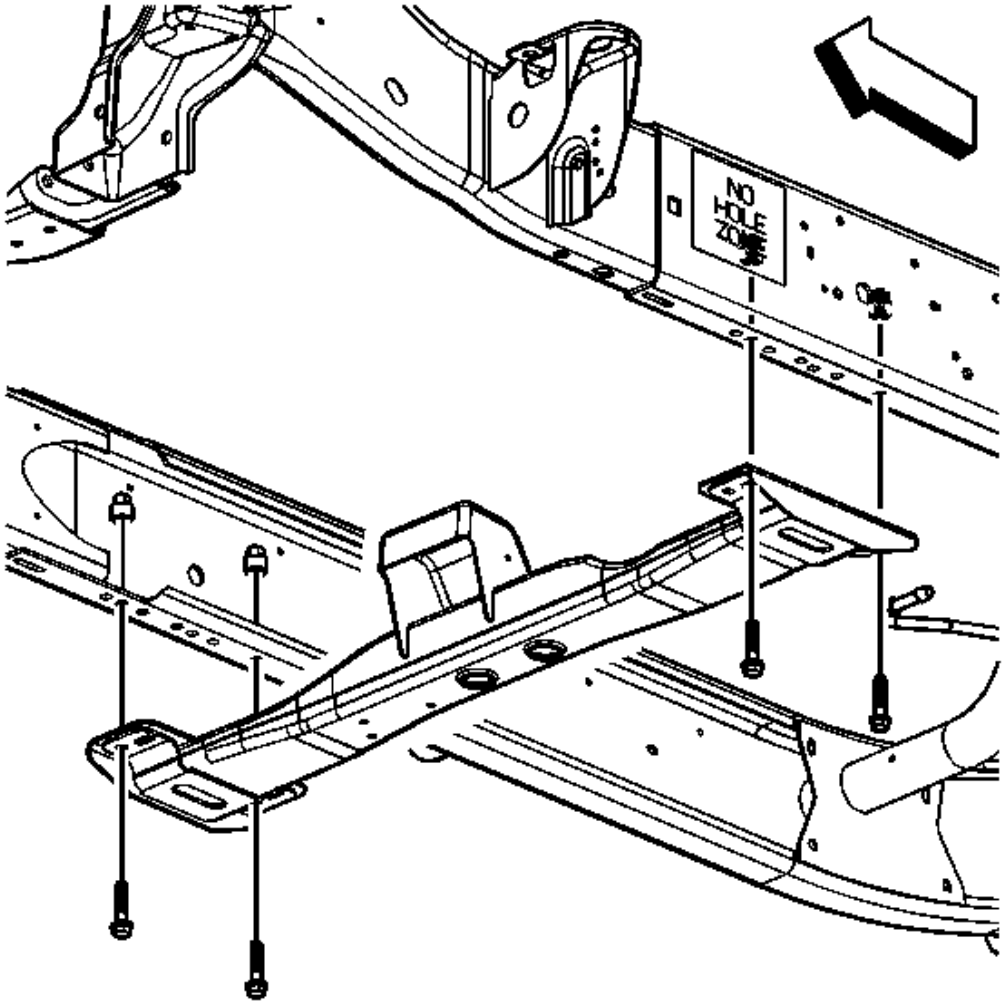


Fig. 74: View Of Transmission Support Crossmember & Bolts
Courtesy of GENERAL MOTORS CORP.

7. Position the transmission support crossmember.
8. Install the transmission support crossmember bolts.

Tighten: Tighten the bolts to 95 N.m (70 lb ft).

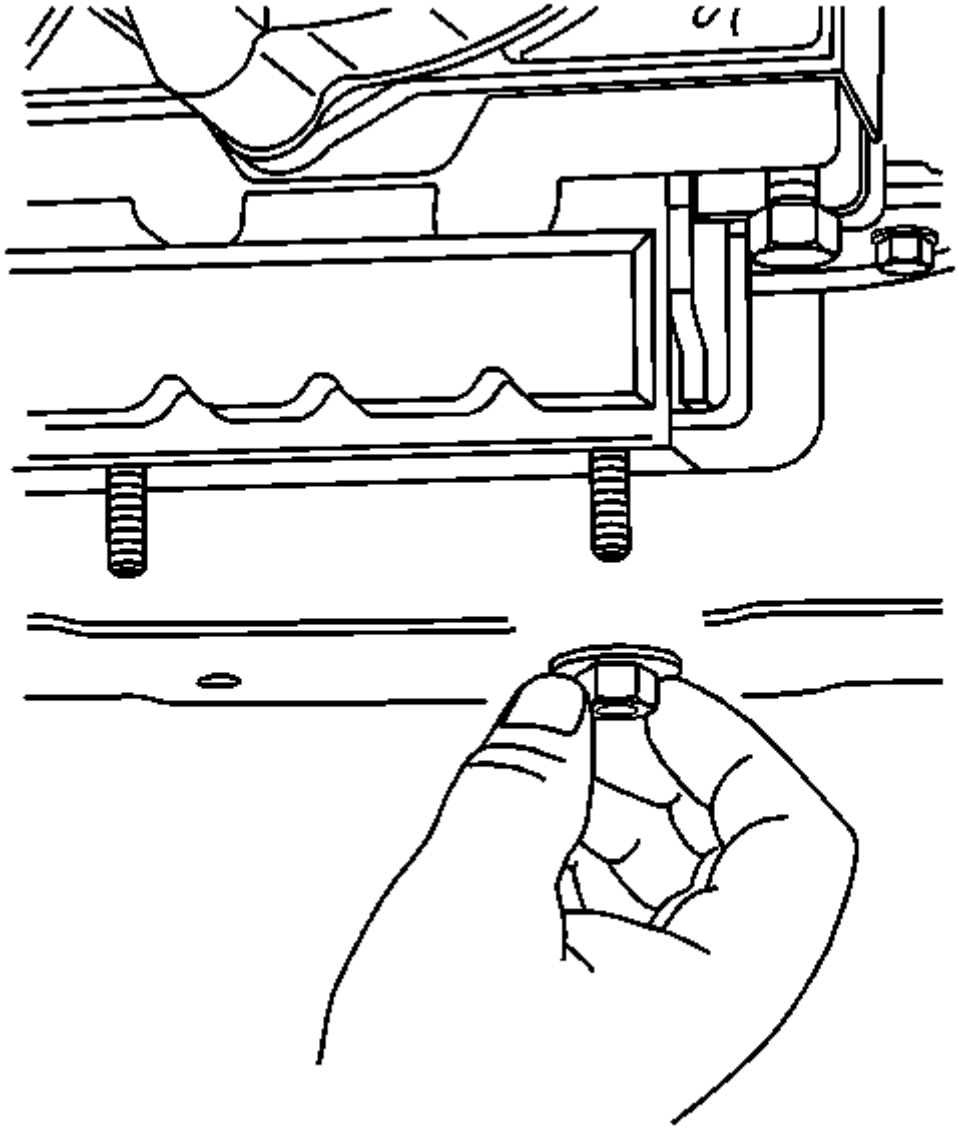


Fig. 75: Identifying Transmission Mount Nuts
Courtesy of GENERAL MOTORS CORP.

9. Using the transmission jack, lower the transmission onto the transmission support.
10. Install the transmission mount to transmission support nuts.

Tighten: Tighten the nuts to 40 N.m (30 lb ft).

11. Remove the support from the transmission.
12. Install the HO2S. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** .

EXHAUST PIPE REPLACEMENT - LEFT SIDE (6.6L)

Removal Procedure

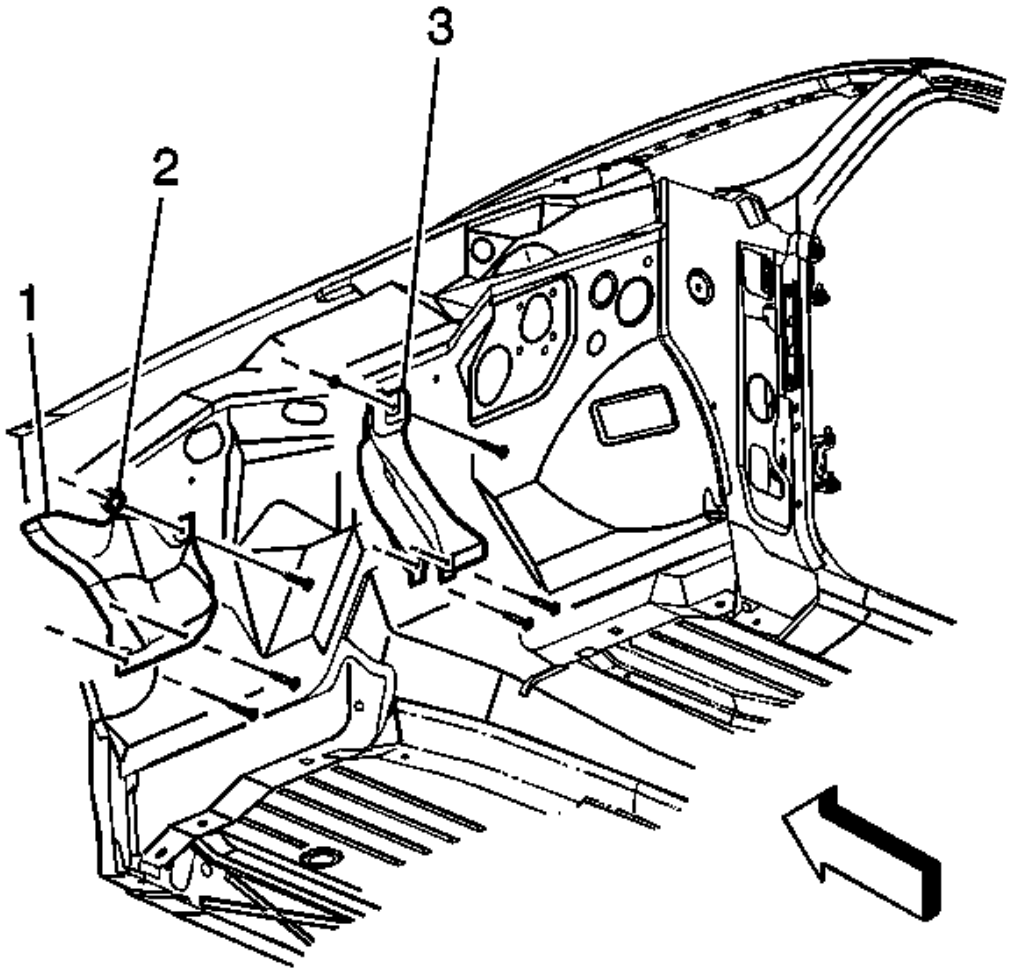


Fig. 76: View Of Left Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the transmission. Refer to **Transmission Replacement** .
2. Remove the exhaust heat shield nuts (2) and heat shield (3) from the dash panel.

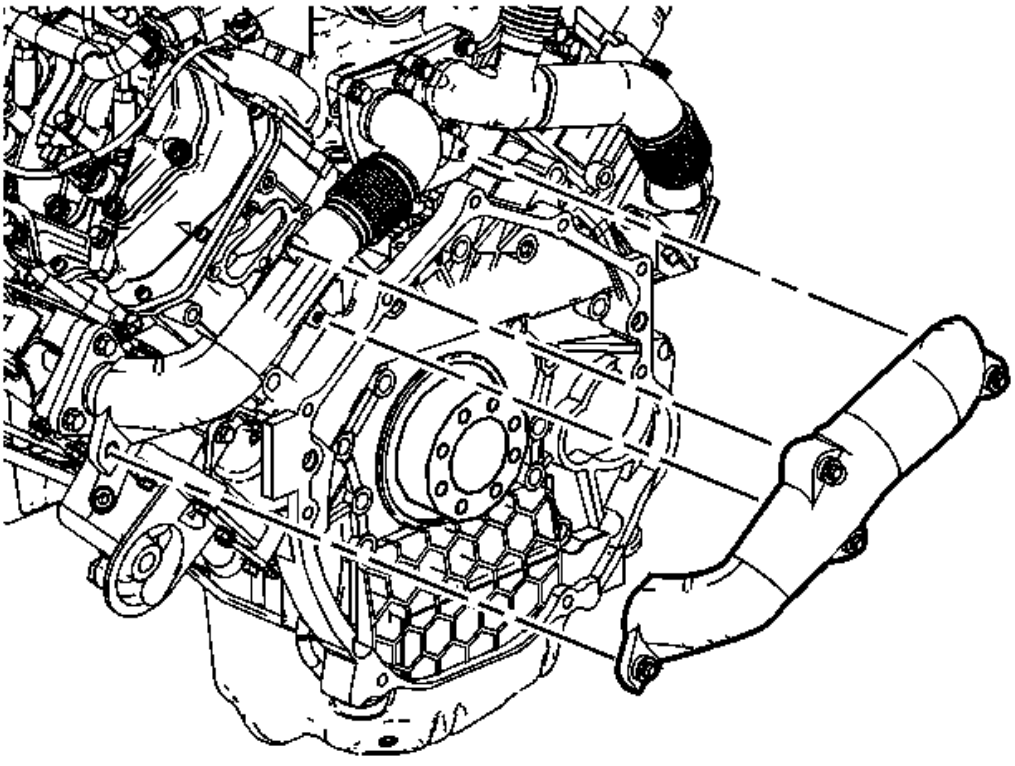


Fig. 77: View Of Exhaust Outlet
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust pipe heat shield bolts and shield.

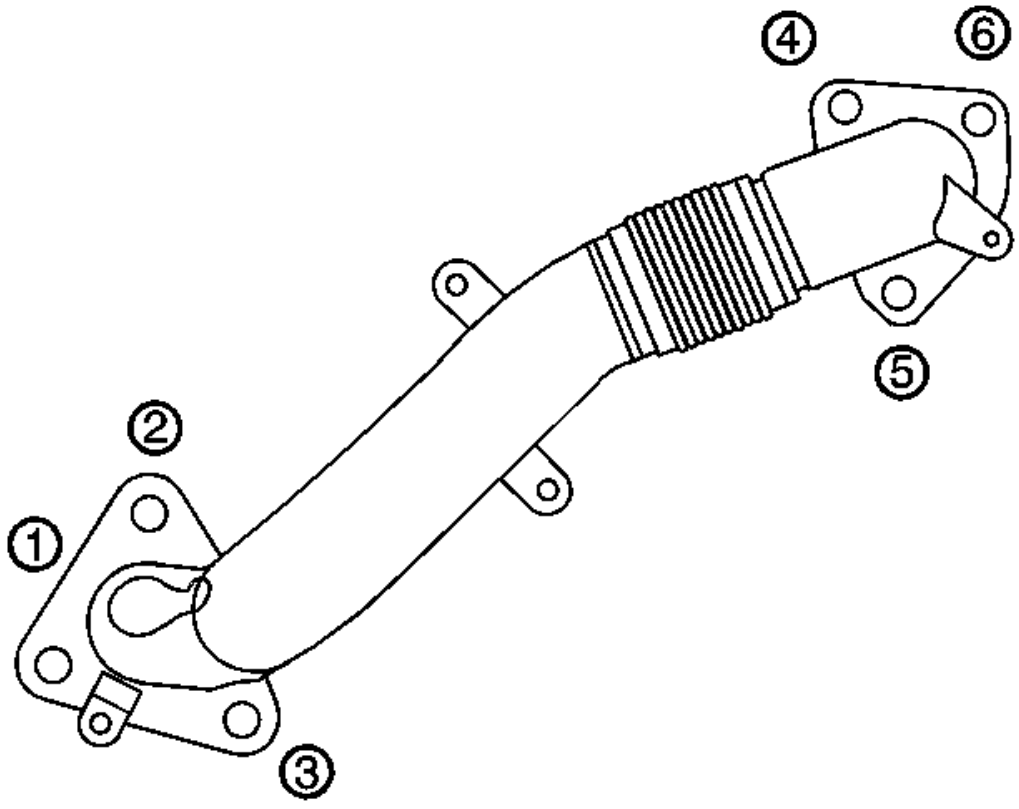


Fig. 78: Left Exhaust Pipe Bolts Removal Sequence
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust pipe bolts in the sequence shown.

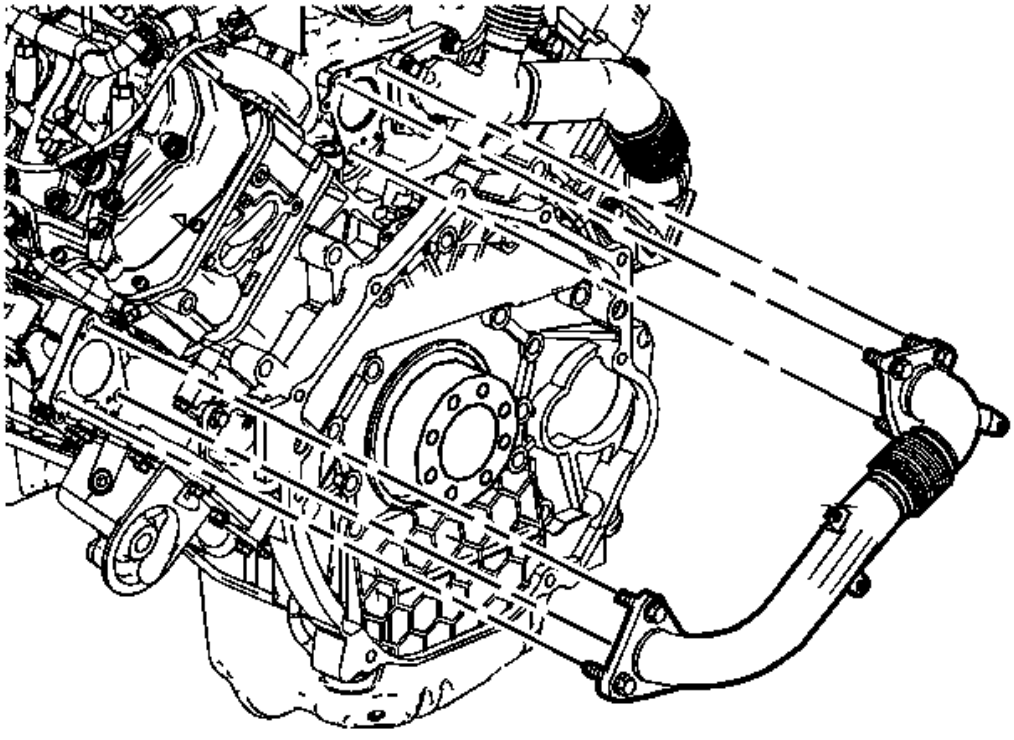


Fig. 79: View Of Left Exhaust Pipe
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust pipe and gaskets. Discard the gaskets.

Installation Procedure

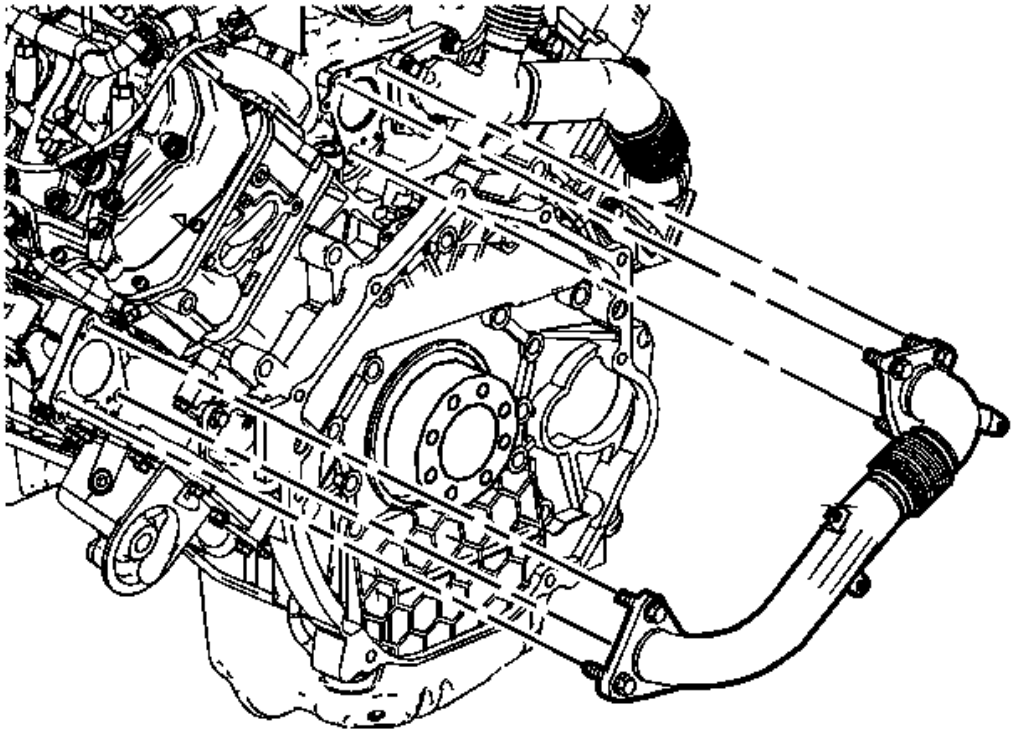


Fig. 80: View Of Left Exhaust Pipe
Courtesy of GENERAL MOTORS CORP.

1. Position the exhaust pipe with a NEW gasket to the turbocharger.
2. Loosely install the exhaust pipe to turbocharger bolts.
3. Position the exhaust pipe with a NEW gasket to the exhaust manifold. Align the tabs on the gasket to face downward.
4. Loosely install the exhaust pipe to exhaust manifold bolts.

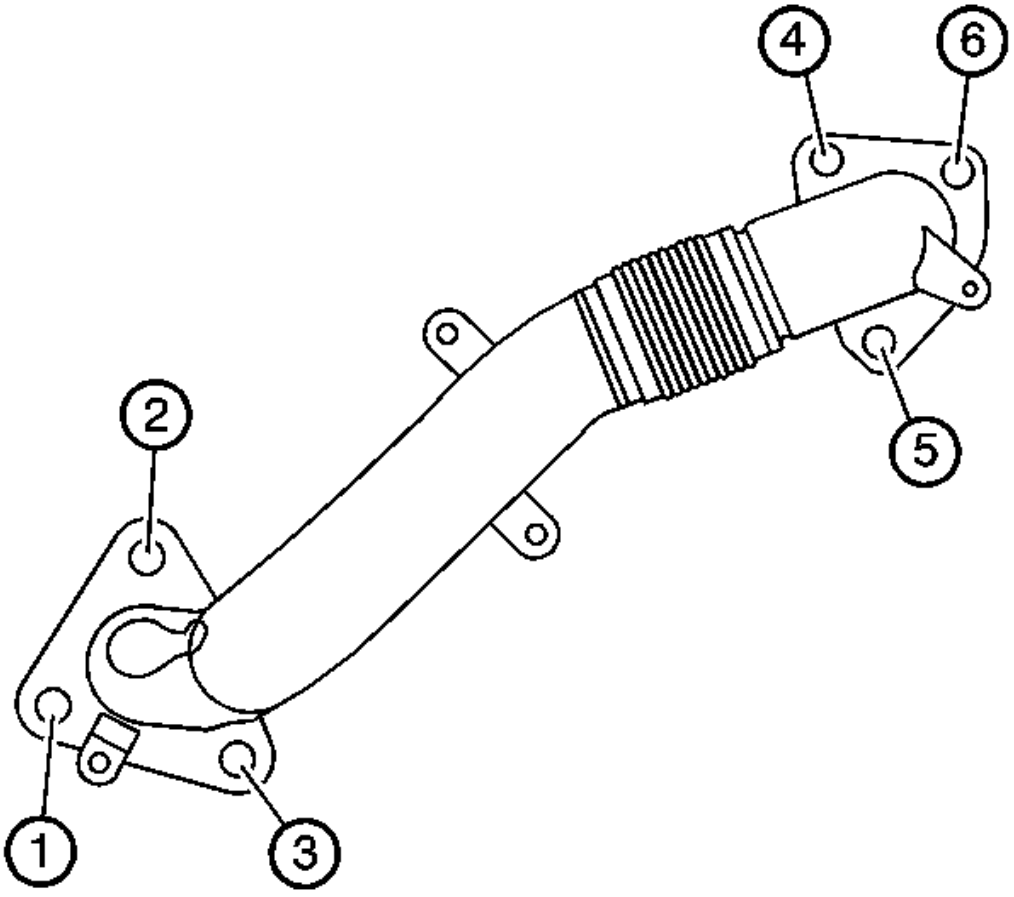


Fig. 81: Exhaust Pipe To Exhaust Manifold Bolt Tightening Sequence - Left Side
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

5. Tighten the exhaust pipe bolts in the sequence shown.

   Tighten: Tighten the bolts to 53 N.m (39 lb ft).

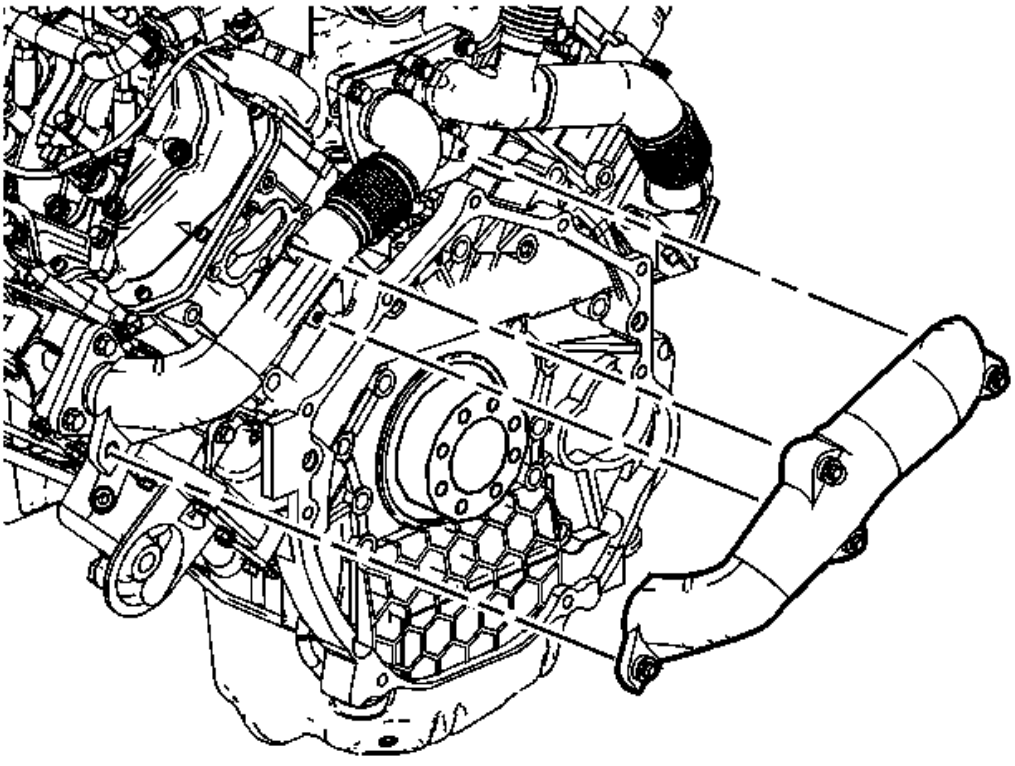


Fig. 82: View Of Exhaust Outlet
Courtesy of GENERAL MOTORS CORP.

6. Install the exhaust pipe heat shield bolts.

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

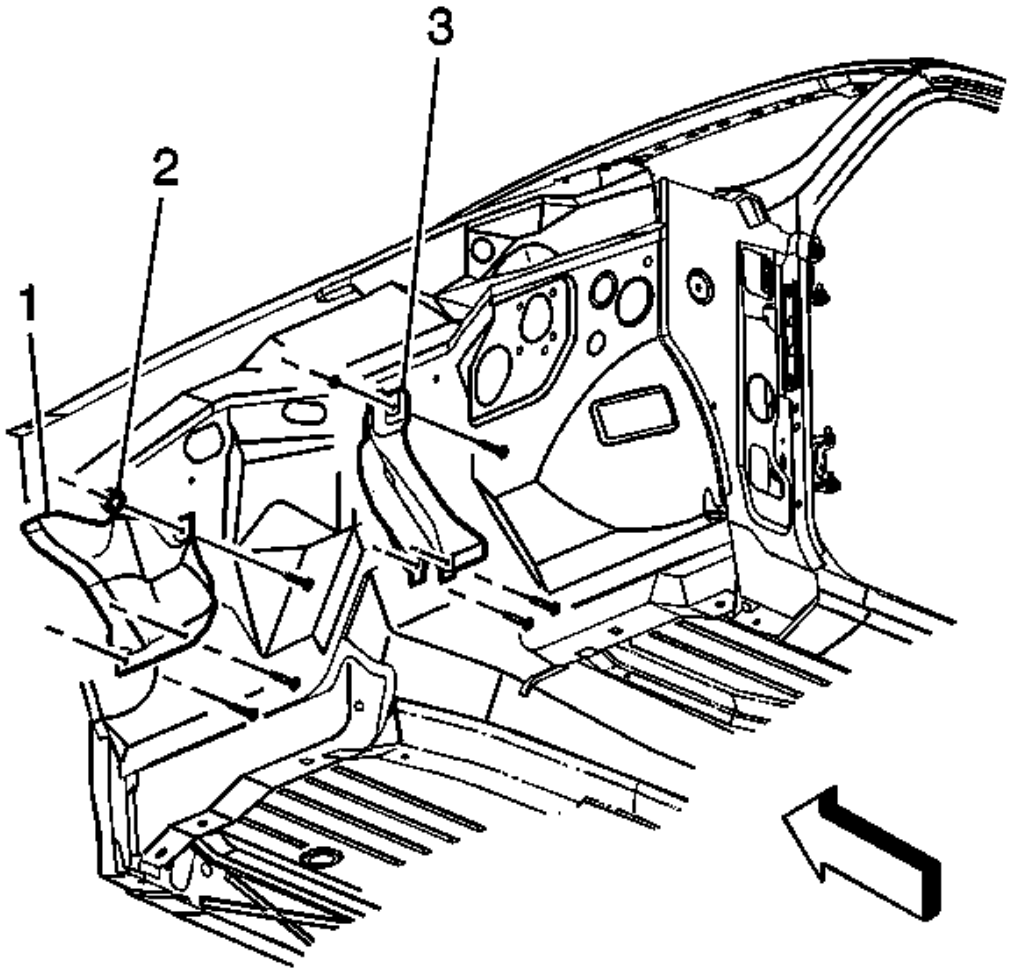


Fig. 83: View Of Left Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

7. Install the left side exhaust heat shield (3) at the dash panel.
8. Install the heat shield nuts (2).

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

9. Install the transmission. Refer to **Transmission Replacement** .

EXHAUST PIPE REPLACEMENT - RIGHT SIDE (6.6L)

Removal Procedure

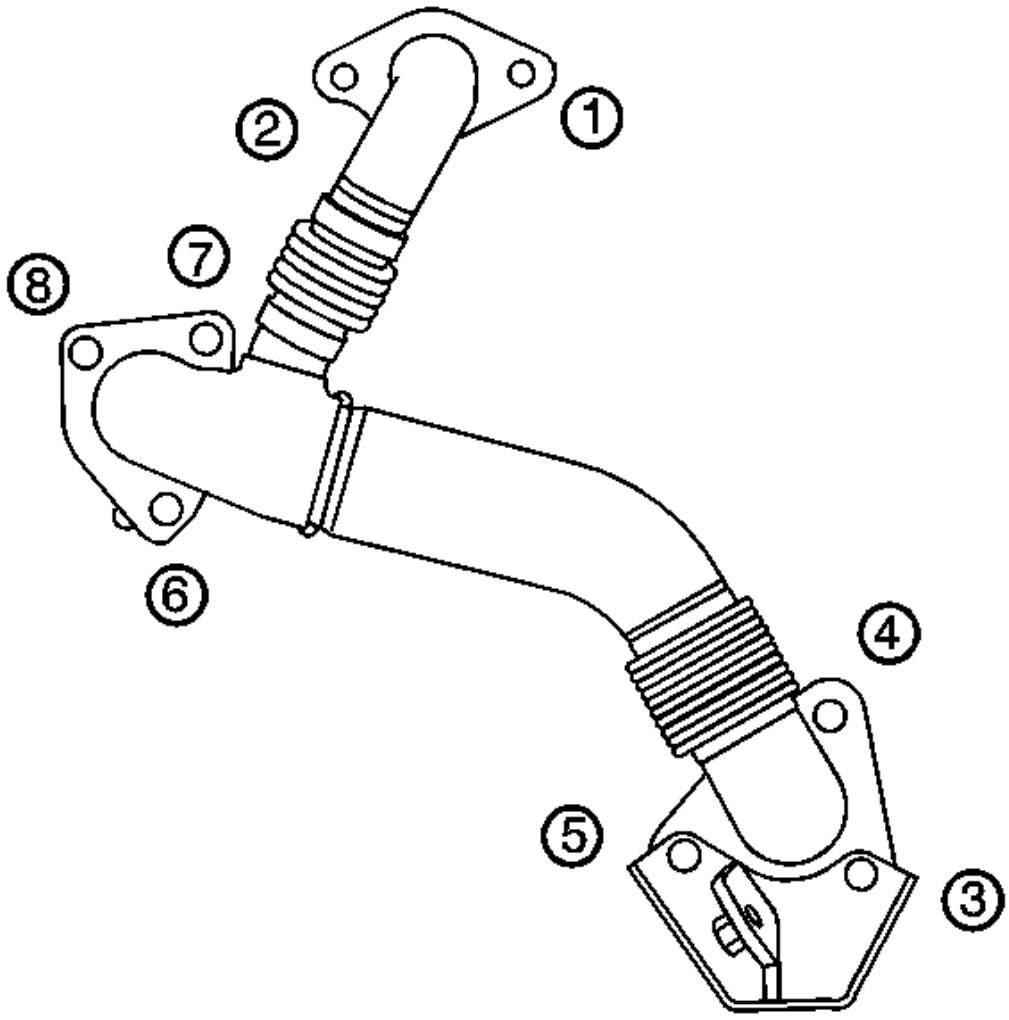


Fig. 84: Exhaust Pipe Bolts Removal Sequence
Courtesy of GENERAL MOTORS CORP.

1. Remove the turbocharger exhaust pipe. Refer to **Turbocharger Exhaust Pipe Replacement (6.6L)**.
2. Remove the transmission. Refer to **Transmission Replacement** .
3. Remove the exhaust pipe bolts in the proper sequence.

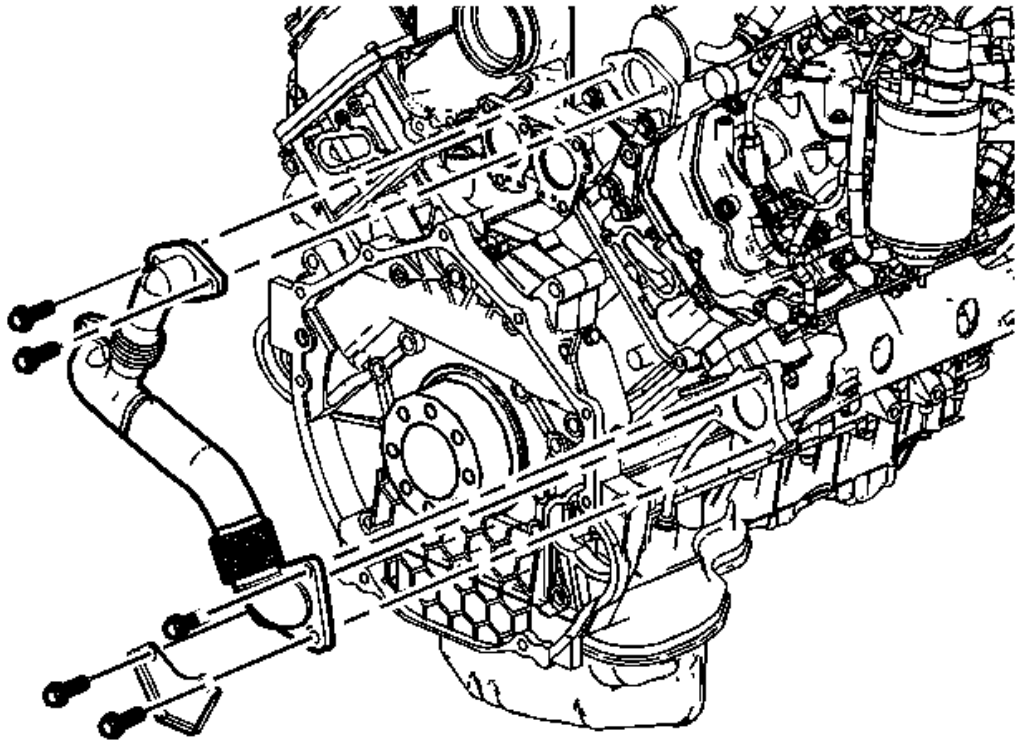


Fig. 85: View Of Right Exhaust Pipe
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust pipe, bracket and gaskets. Discard the gaskets.

Installation Procedure

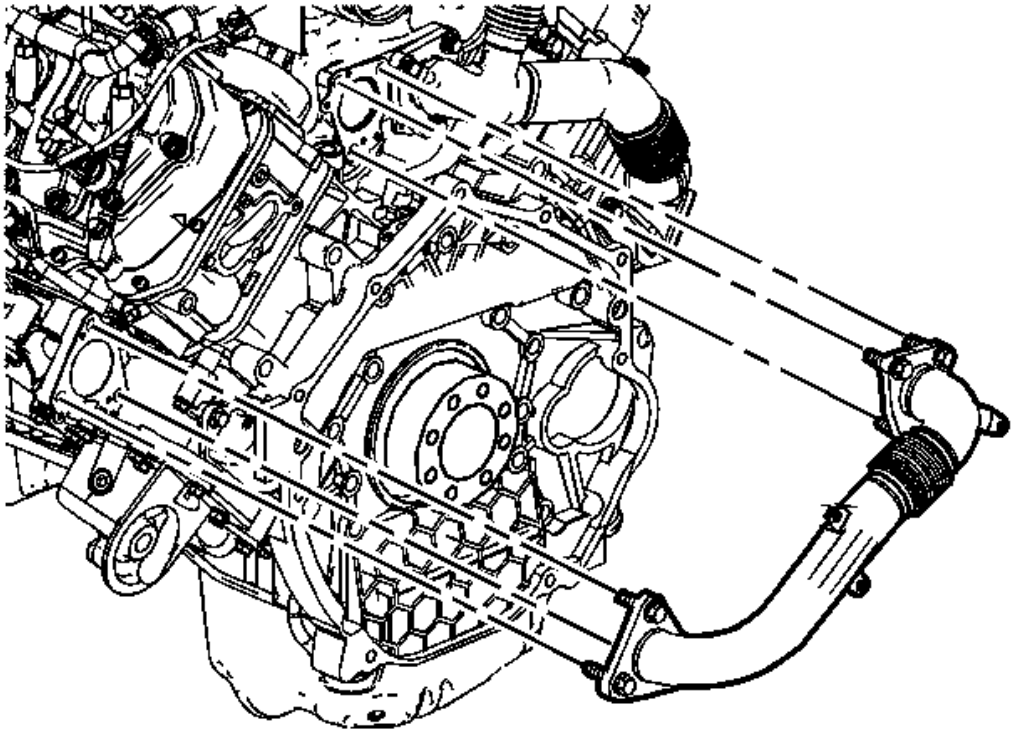


Fig. 86: View Of Left Exhaust Pipe
Courtesy of GENERAL MOTORS CORP.

1. Position the exhaust pipe with a NEW gasket to the turbocharger.
2. Loosely install the exhaust pipe to turbocharger bolts.
3. Position the exhaust pipe with a NEW gasket to the exhaust manifold. Align the tabs on the gasket to face downward.
4. Loosely install the exhaust pipe to exhaust manifold bolts.

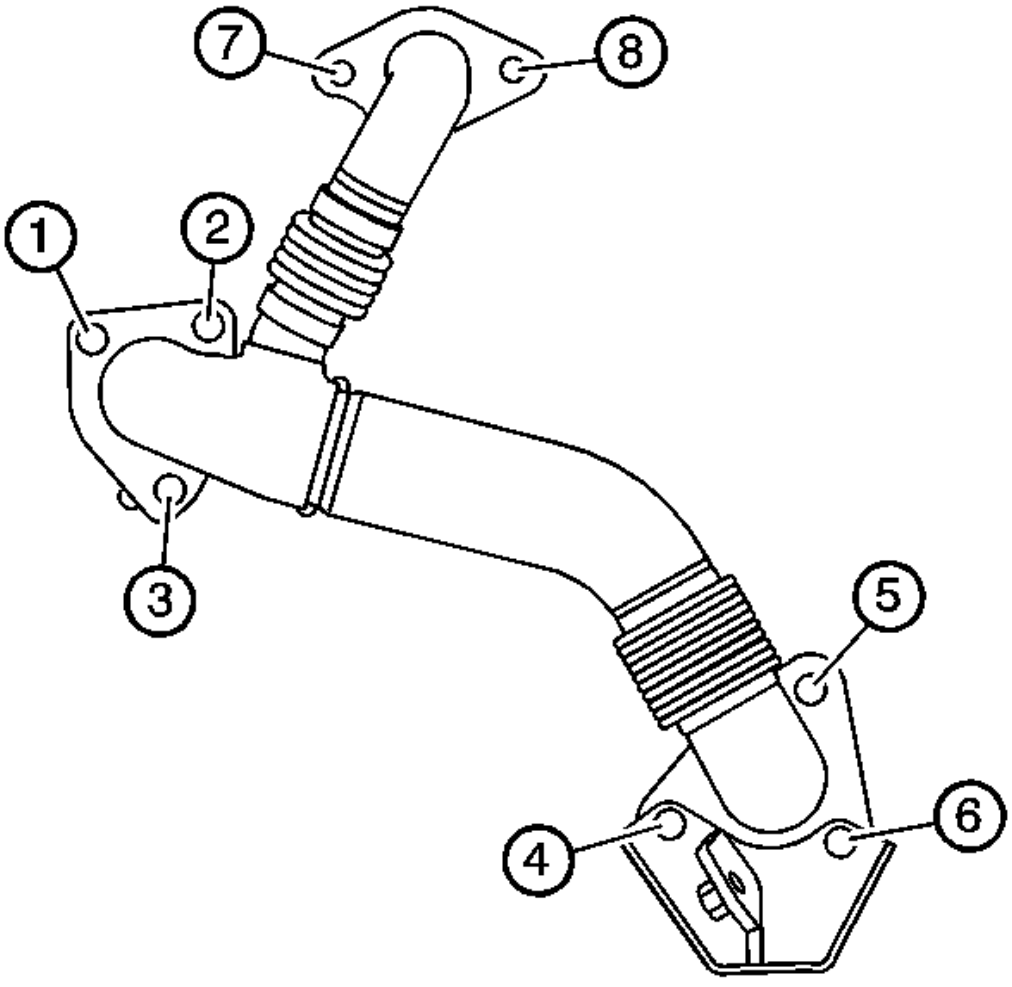


Fig. 87: View Of Exhaust Manifold Bolt Tightening Sequence
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

5. Tighten the exhaust pipe bolts in the sequence shown.

   Tighten: Tighten the bolts to 53 N.m (39 lb ft).

6. Install the transmission. Refer to **Transmission Replacement** .
7. Install the turbocharger exhaust pipe. Refer to **Turbocharger Exhaust Pipe Replacement**

(6.6L).

EXHAUST SEAL REPLACEMENT (4.8L, 5.3L, 6.0L, 6.2L)

Removal Procedure

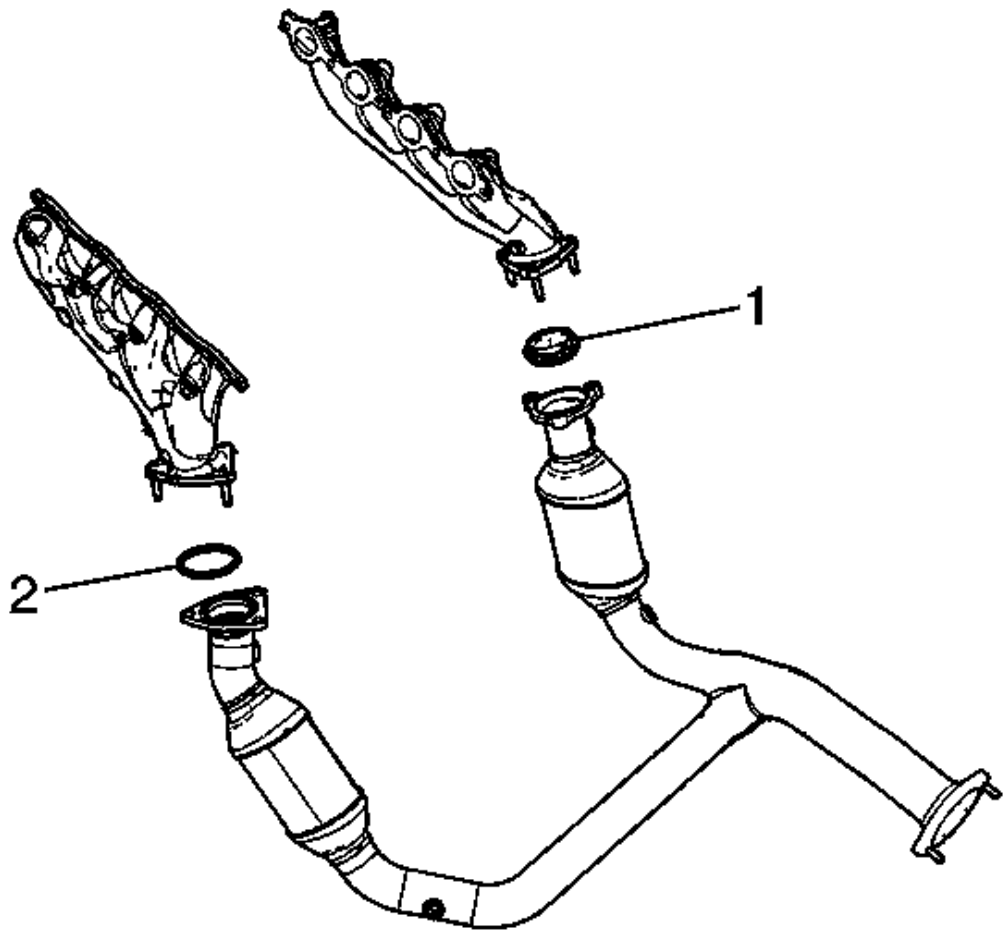


Fig. 88: View Of Exhaust Seals
Courtesy of GENERAL MOTORS CORP.

1. Remove the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.

2. Remove and discard the appropriate exhaust seal (1 or 2). (1500 series shown, 2500 series similar).

Installation Procedure

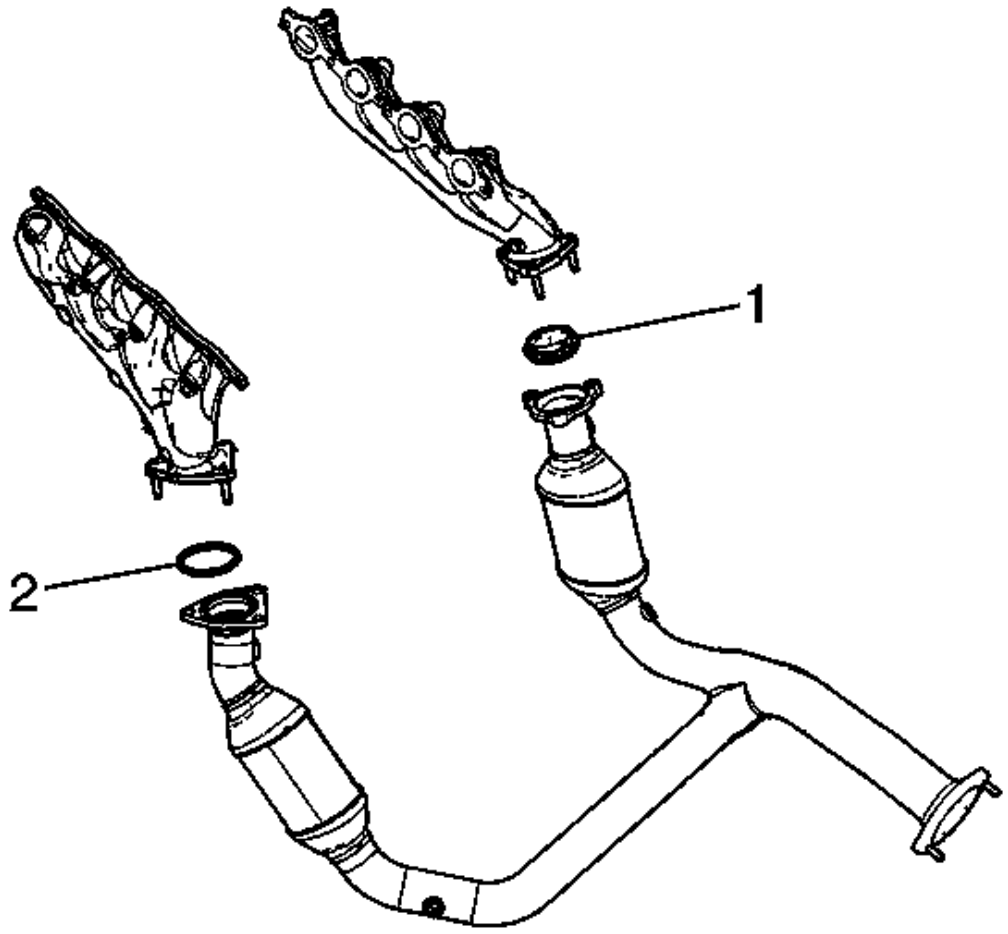


Fig. 89: View Of Exhaust Seals
Courtesy of GENERAL MOTORS CORP.

1. Install the NEW appropriate exhaust seal (1 or 2). (1500 series shown, 2500 series similar).
2. Install the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter**

Replacement (6.6L).

EXHAUST SEAL REPLACEMENT (6.0L - CAB/CHASSIS)

Removal Procedure

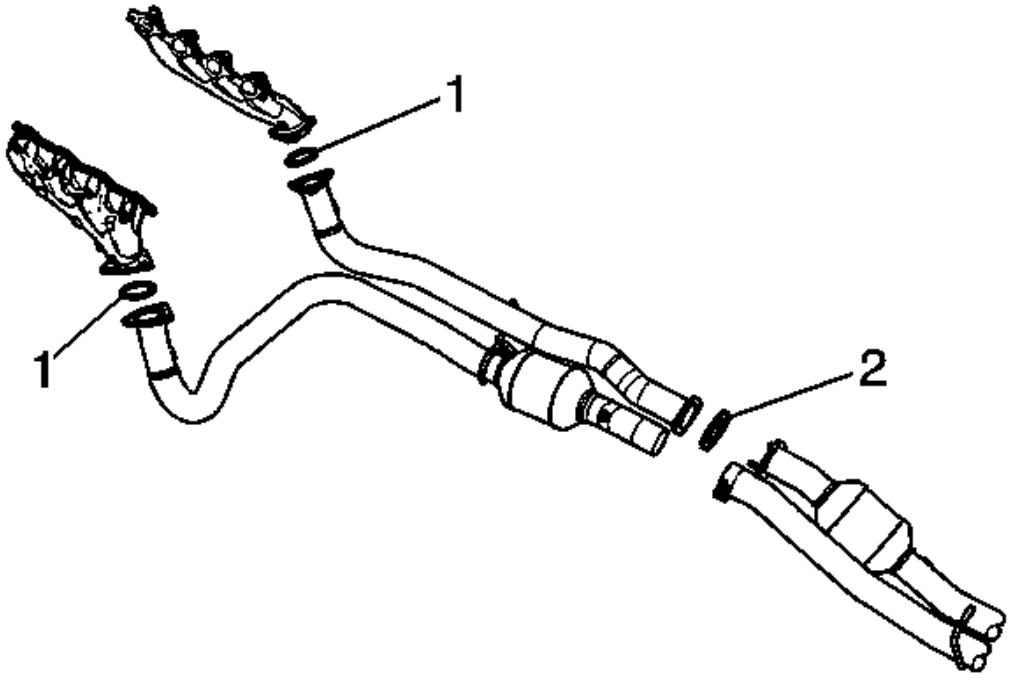


Fig. 90: Identifying Appropriate Exhaust Seals & Gaskets
Courtesy of GENERAL MOTORS CORP.

1. Remove the left catalytic converter, if required. Refer to **Catalytic Converter Replacement - Left Side (6.0L - Cab/Chassis)**.
2. Remove the exhaust manifold pipe, if required. Refer to **Exhaust Manifold Pipe Replacement (6.0L - Cab/Chassis)**.
3. Remove and discard the appropriate exhaust seal (1) or gasket (2).

Installation Procedure

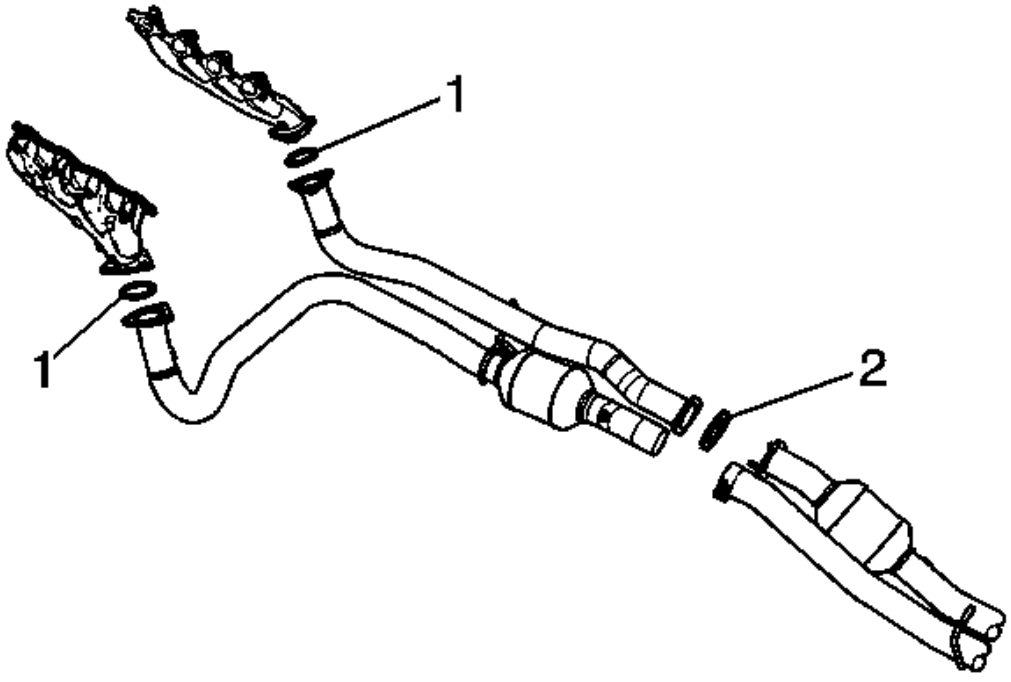


Fig. 91: Identifying Appropriate Exhaust Seals & Gaskets
Courtesy of GENERAL MOTORS CORP.

1. Install the NEW appropriate exhaust seal (1) or gasket (2).
2. Install the exhaust manifold pipe, if required. Refer to **Exhaust Manifold Pipe Replacement (6.0L - Cab/Chassis)**.
3. Install the left catalytic converter, if required. Refer to **Catalytic Converter Replacement - Left Side (6.0L - Cab/Chassis)**.

CATALYTIC CONVERTER REPLACEMENT (4.3L)

Removal Procedure

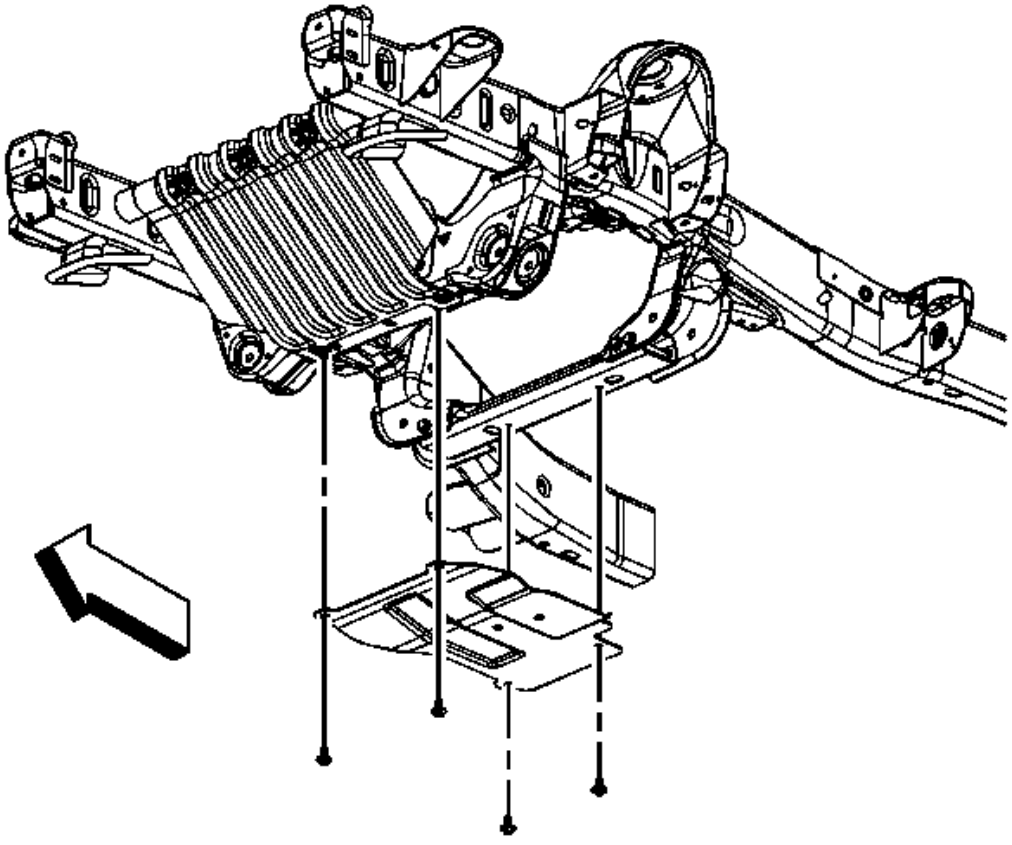


Fig. 92: View Of Oil Pan Skid Plate & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the oil pan skid plate bolts and skid plate, if equipped.
3. Remove the transmission crossmember. Refer to **Transmission Support Crossmember Replacement (2WD 2500 HD/3500)** or **Transmission Support Crossmember Replacement (2WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 2500 HD/3500)** .

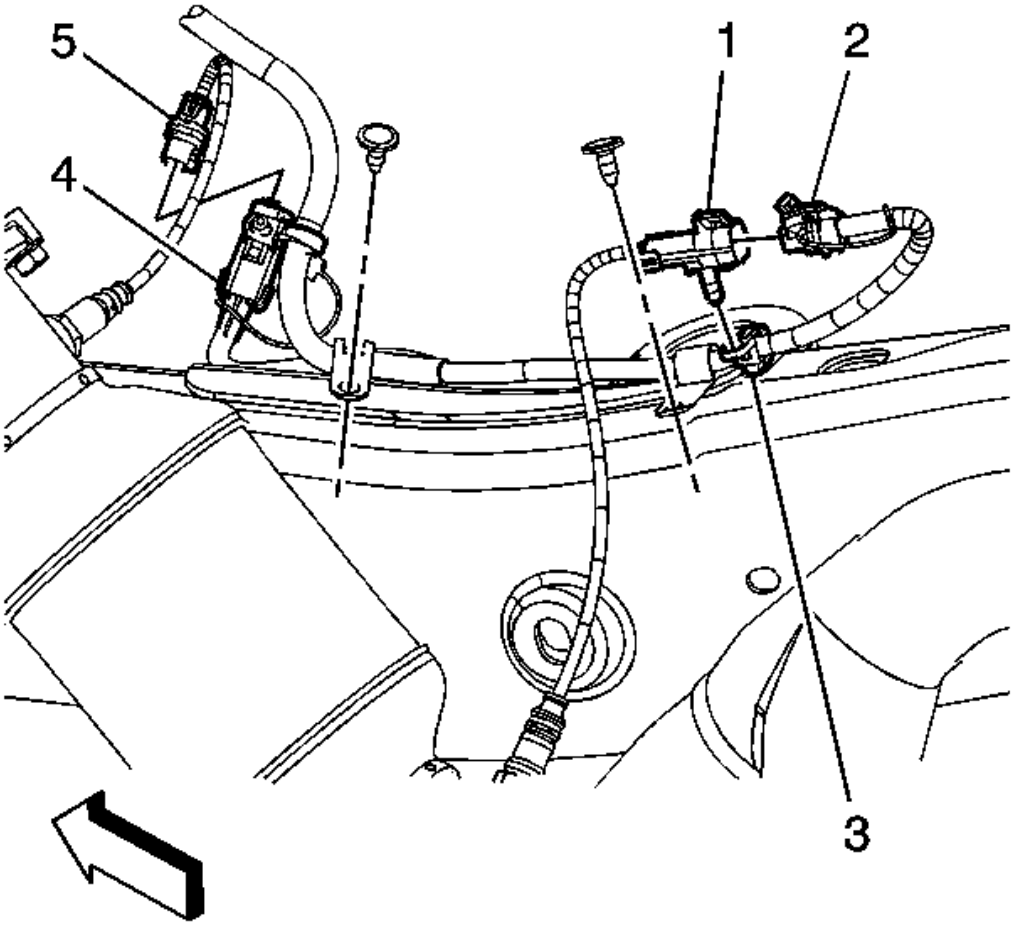


Fig. 93: View Of Engine Harness Clip & Electrical Connectors
Courtesy of GENERAL MOTORS CORP.

4. Remove the right front connector position assurance (CPA) retainer.
5. Disconnect the right front heated oxygen sensor (HO2S) electrical connector (5) from the engine wiring harness electrical connector (4).
6. Remove the right rear CPA retainer.
7. Disconnect the engine wiring harness electrical connector (2) from the right rear HO2S electrical connector (1).
8. Remove the right rear HO2S electrical connector clip from the engine harness clip (3).

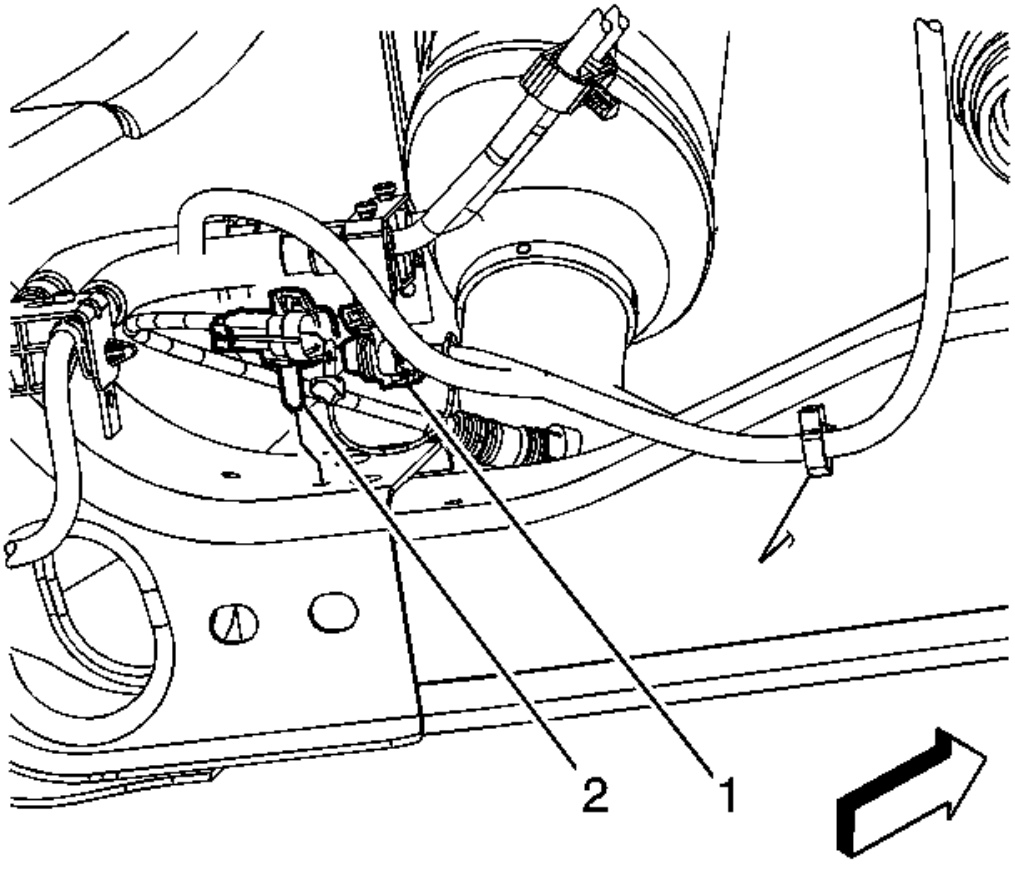


Fig. 94: View Of Engine Wiring Harness Electrical Connector & HO2S Electrical Connector
Courtesy of GENERAL MOTORS CORP.

9. Remove the left rear CPA retainer.
10. Disconnect the engine wiring harness electrical connector (1) from the left rear HO2S electrical connector (2).
11. Remove the left rear HO2S electrical connector clip from the frame.

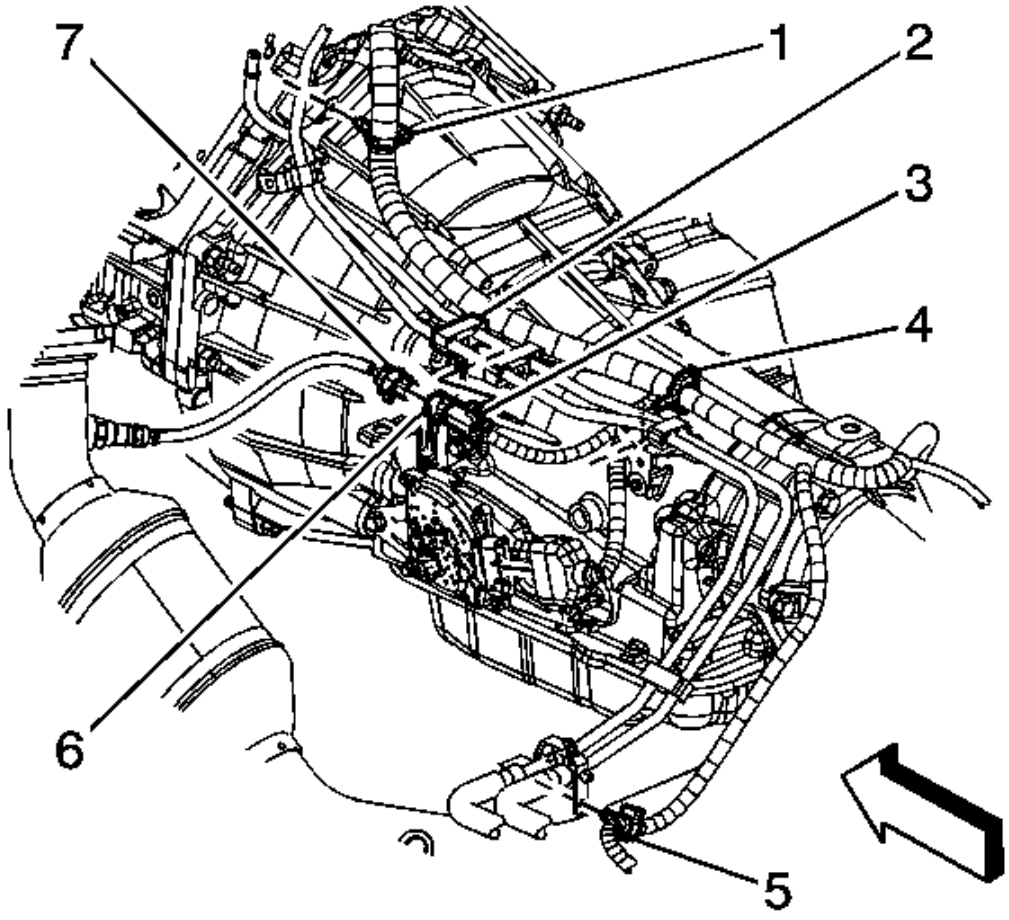


Fig. 95: View Of Various Connectors & Clips
Courtesy of GENERAL MOTORS CORP.

12. For vehicles equipped with 2 wheel drive (2WD) perform the following steps, for vehicles equipped with 4 wheel drive (4WD) proceed to step 15.
13. Remove the left front CPA retainer.
14. Disconnect the left front HO2S electrical connector (7) from the engine wiring harness electrical connector (6).

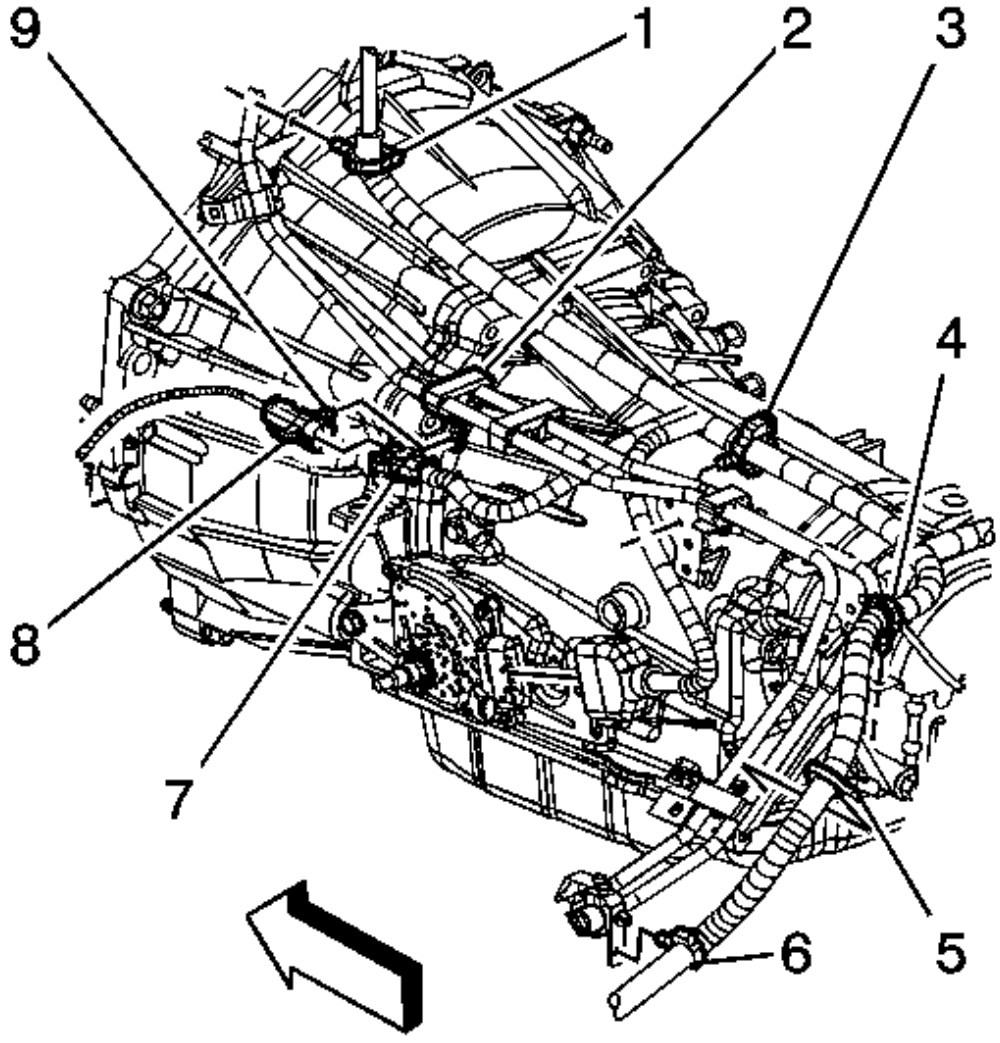


Fig. 96: View Of Various Connectors & Clips
Courtesy of GENERAL MOTORS CORP.

15. For vehicles equipped with 4WD perform the following steps, remove the left front CPA retainer.
16. Disconnect the engine wiring harness electrical connector (7) from the left front HO2S electrical connector (8).
17. Remove the left front HO2S electrical connector clip from the fuel line clip (2).

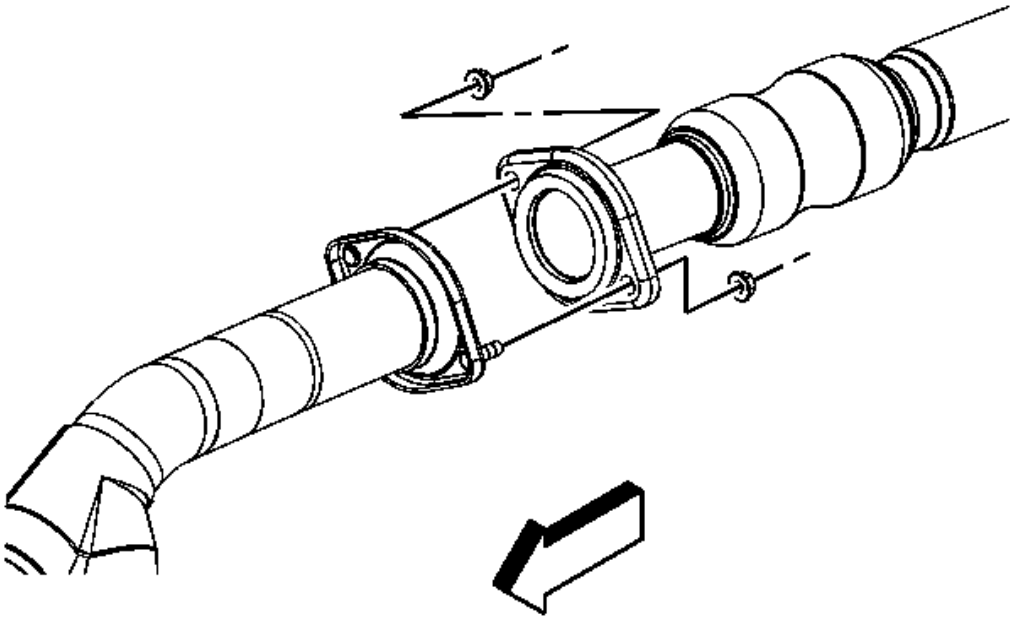


Fig. 97: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

18. Remove the catalytic converter to muffler nuts.

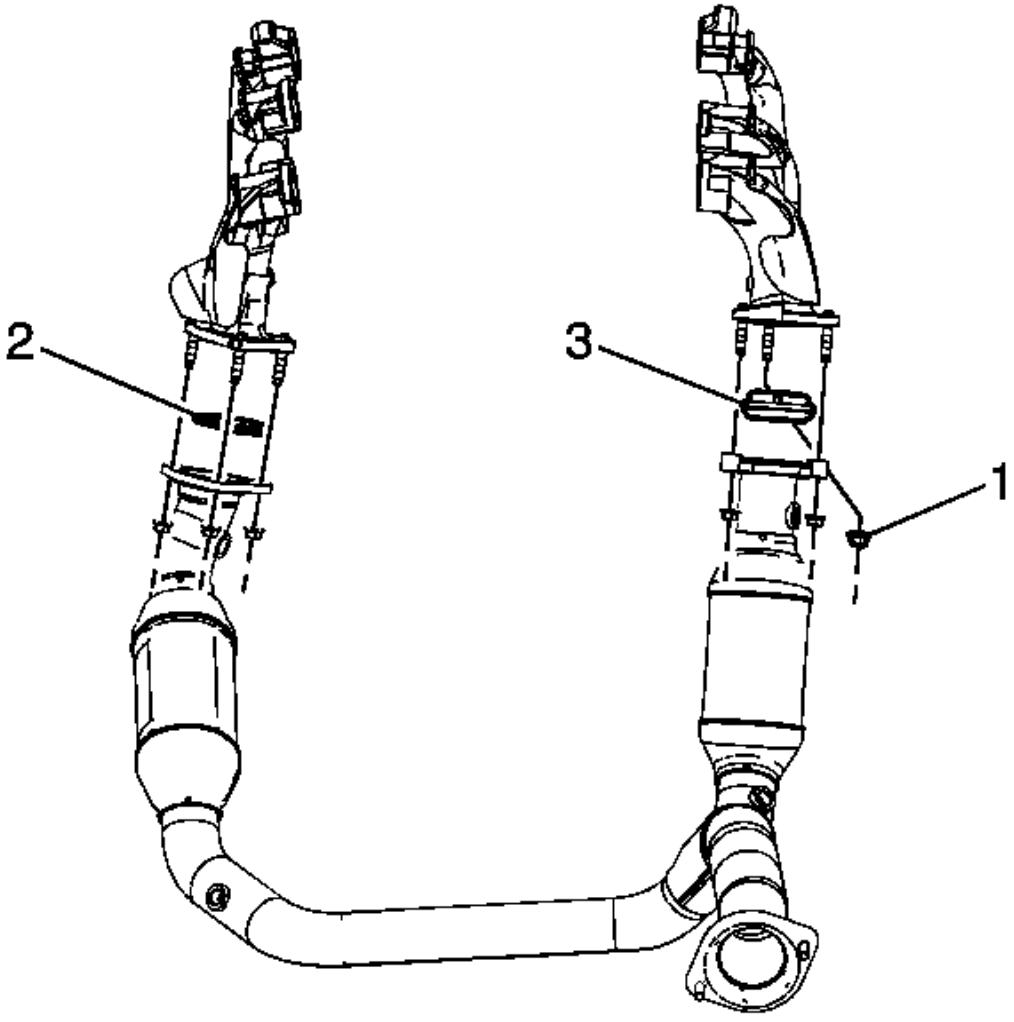


Fig. 98: View Of Exhaust Manifold Nuts & Exhaust Seals
Courtesy of GENERAL MOTORS CORP.

19. Remove the catalytic converter to exhaust manifold nuts (1).
20. Separate the catalytic converter assembly from the exhaust manifolds.
21. Remove the catalytic converter assembly from the exhaust muffler.
22. If replacing the catalytic converter assembly, perform the following steps, otherwise proceed to step 4 in the installation procedure.
23. Remove the exhaust seals (2 and 3).

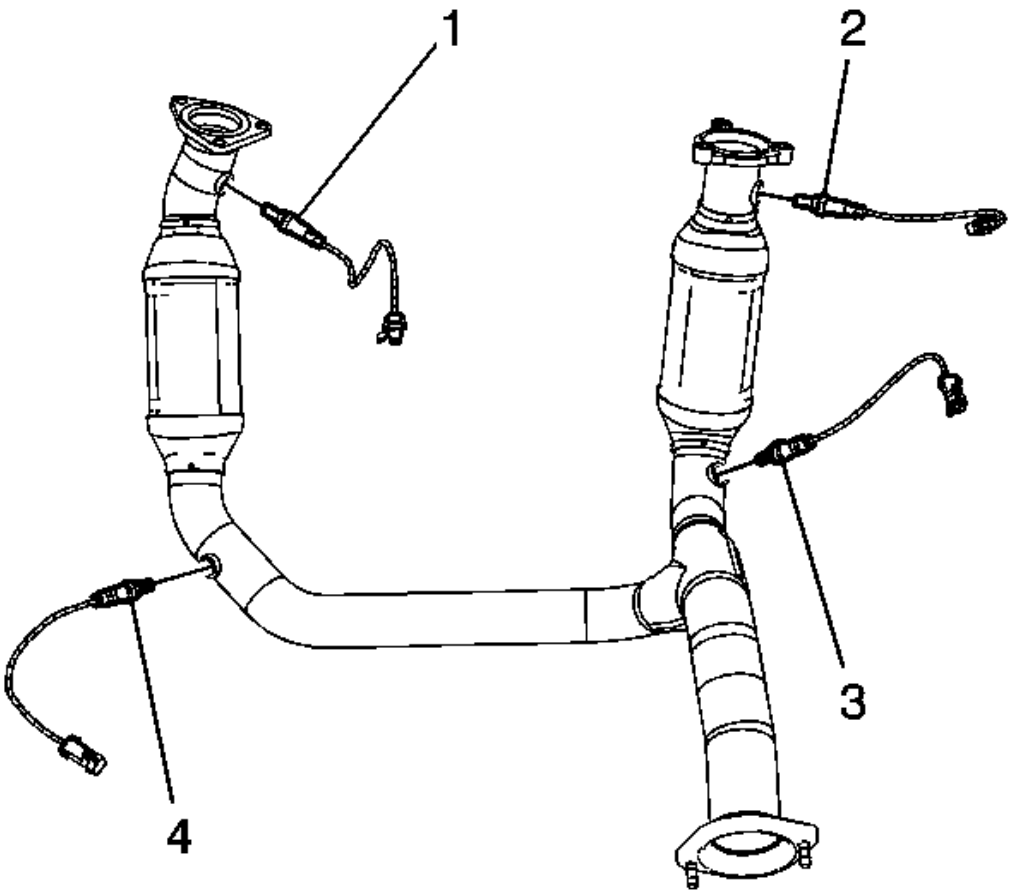


Fig. 99: View Of HO2S
Courtesy of GENERAL MOTORS CORP.

24. Remove the HO2S (1-4) from the catalytic converter assembly.

Installation Procedure

IMPORTANT: A special anti-seize compound is used on the HO2S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from as exhaust component and if for any

reason the sensor is to be reinstalled, the threads must have anti-seize compound applied before the reinstallation.

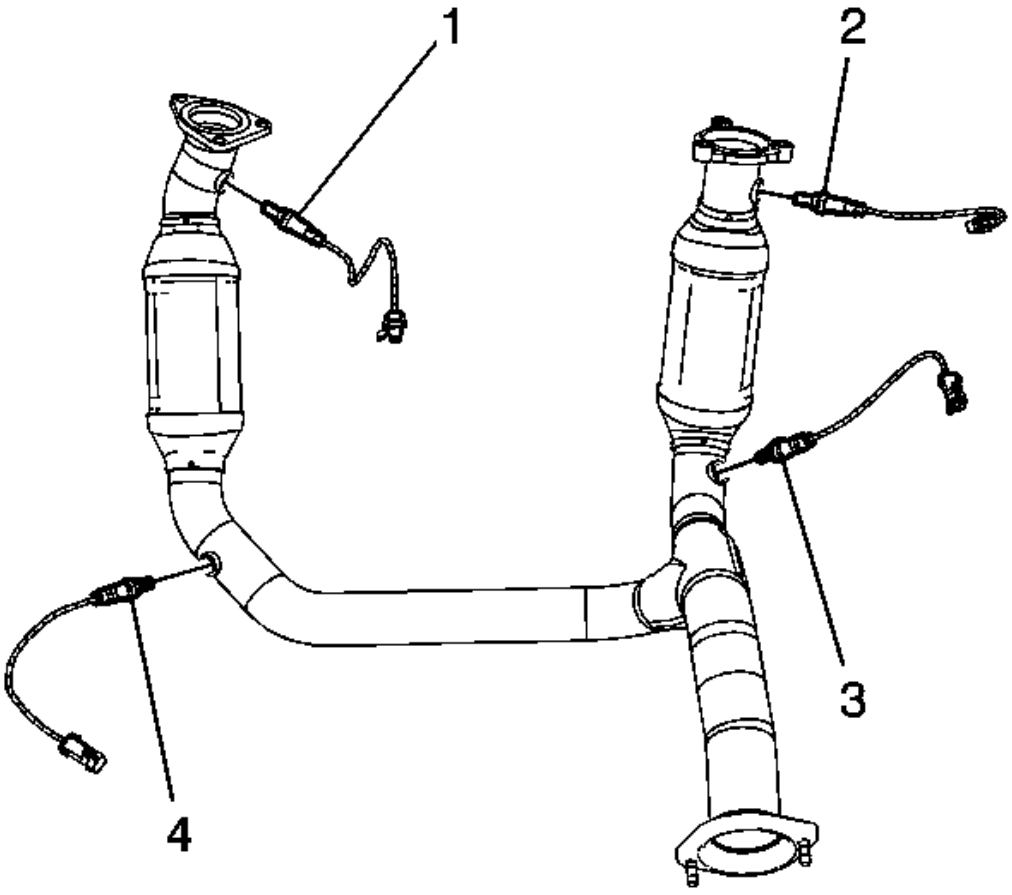


Fig. 100: View Of HO2S
Courtesy of GENERAL MOTORS CORP.

1. If replacing the catalytic converter assembly, perform the following steps, otherwise proceed to step 4.
2. If reinstalling the old sensors, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.

NOTE: Refer to Component Fastener Tightening Notice .

NOTE: Refer to Fastener Notice .

3. Install the HO2S (1-4) to the catalytic converter assembly.

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

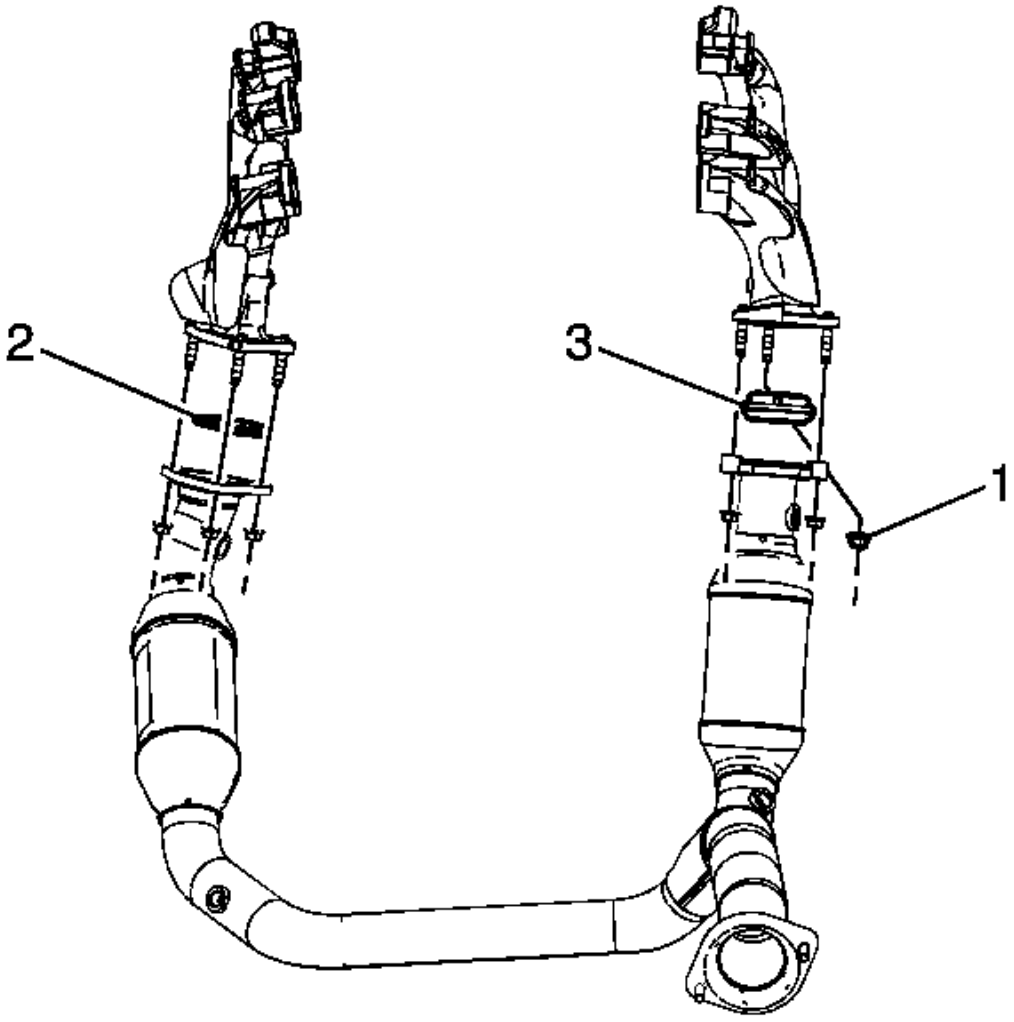


Fig. 101: View Of Exhaust Manifold Nuts & Exhaust Seals
Courtesy of GENERAL MOTORS CORP.

4. Install the NEW exhaust seals (2 and 3) as required.

5. Install the catalytic converter assembly to the muffler.
6. Install the catalytic converter assembly to the exhaust manifolds.
7. Install the catalytic converter to exhaust manifold nuts (1).

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

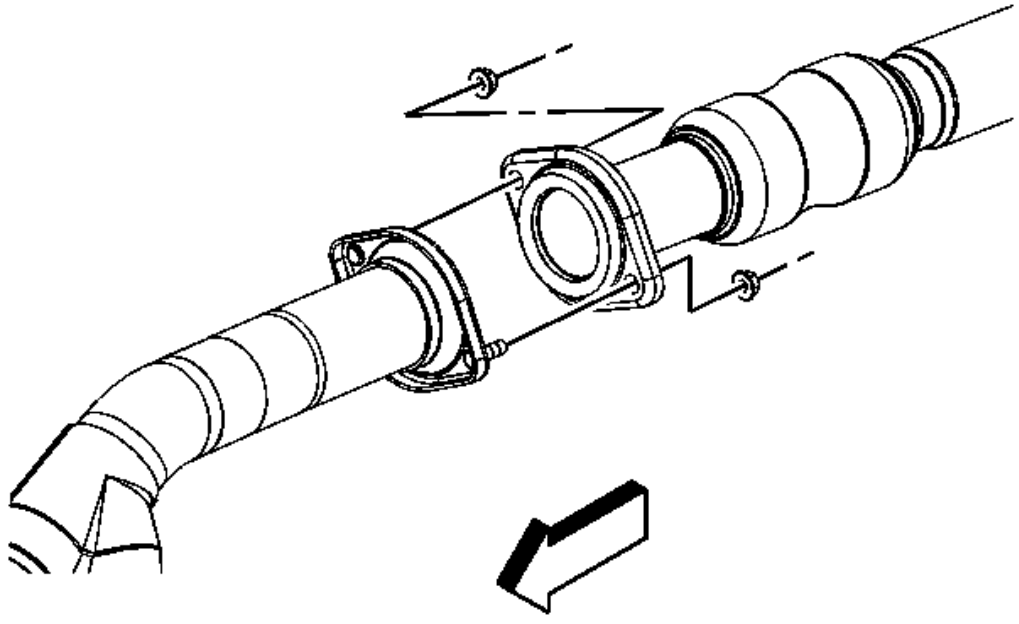


Fig. 102: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

8. Install the catalytic converter to muffler nuts.

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

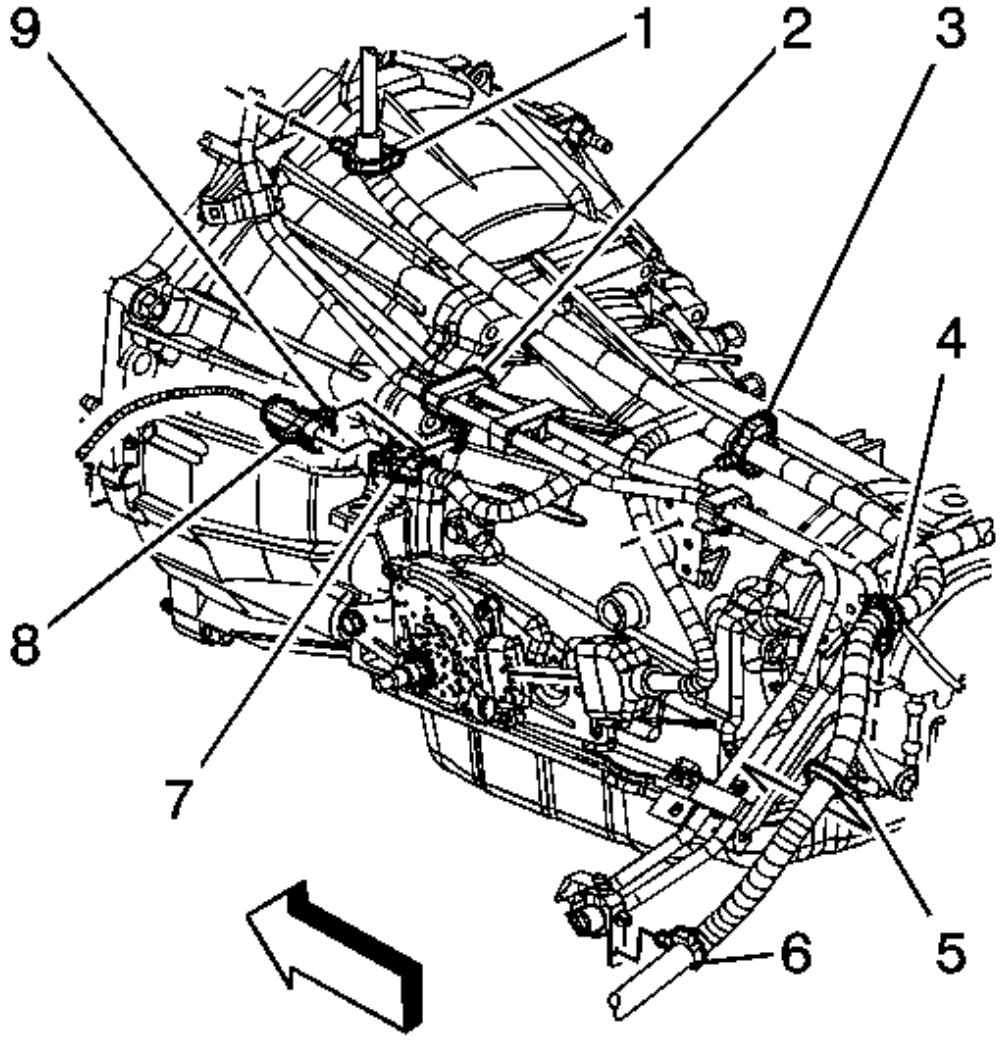


Fig. 103: View Of Various Connectors & Clips
Courtesy of GENERAL MOTORS CORP.

9. For vehicles equipped with 4WD perform the following steps, for vehicles equipped with 2WD proceed to step 13.
10. Connect the engine wiring harness electrical connector (6) to the left front HO2S electrical connector (7).
11. Install the CPA retainer.

12. Install the HO2S electrical connector clip to the fuel line clip (2).

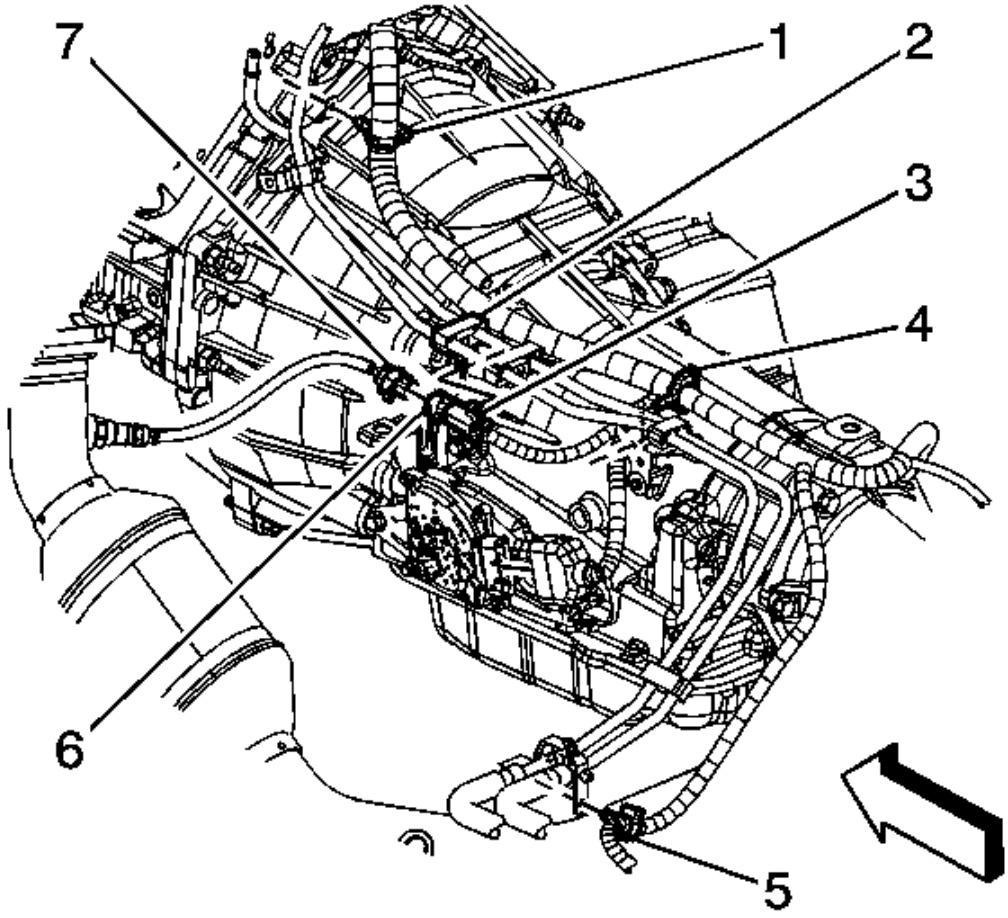


Fig. 104: View Of Various Connectors & Clips
Courtesy of GENERAL MOTORS CORP.

13. For vehicles equipped with 4WD perform the following steps, connect the engine wiring harness electrical connector (7) to the left front HO2S electrical connector (8).
14. Install the left front CPA retainer.

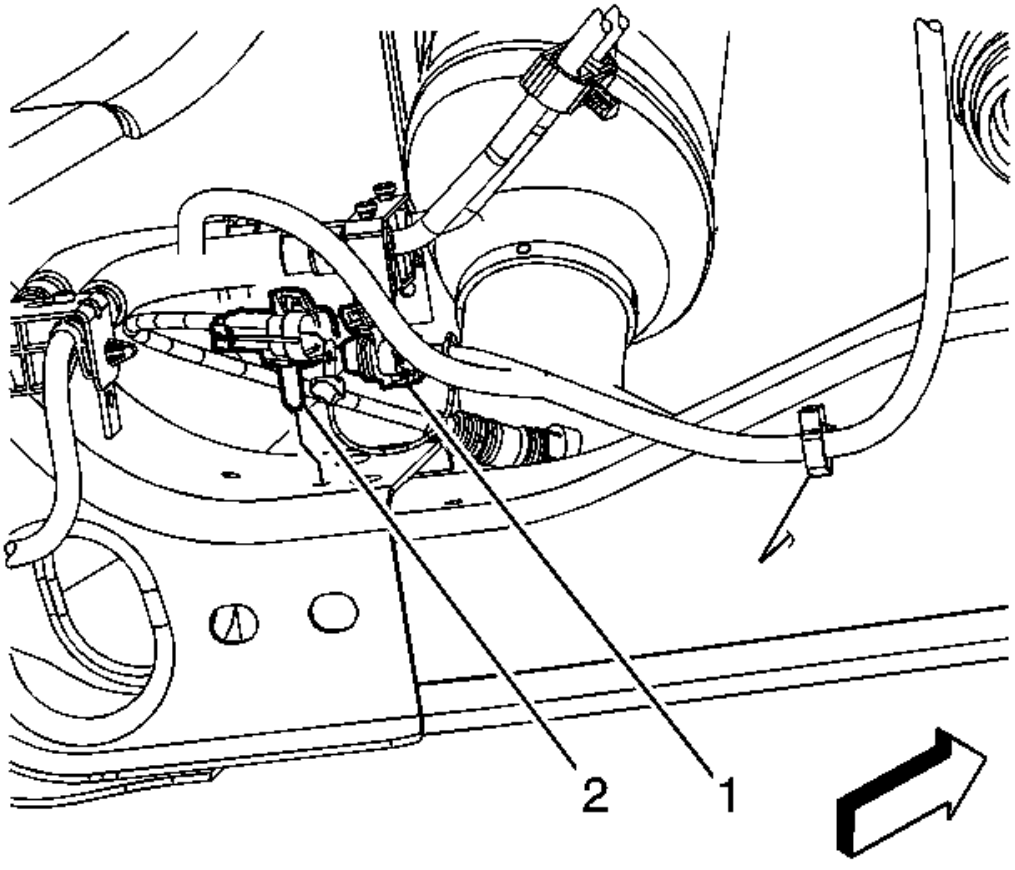


Fig. 105: View Of Engine Wiring Harness Electrical Connector & HO2S Electrical Connector
Courtesy of GENERAL MOTORS CORP.

15. Connect the engine wiring harness electrical connector (1) to the left rear HO2S electrical connector (2).
16. Install the left rear HO2S electrical connector clip to the frame.
17. Install the CPA retainer.

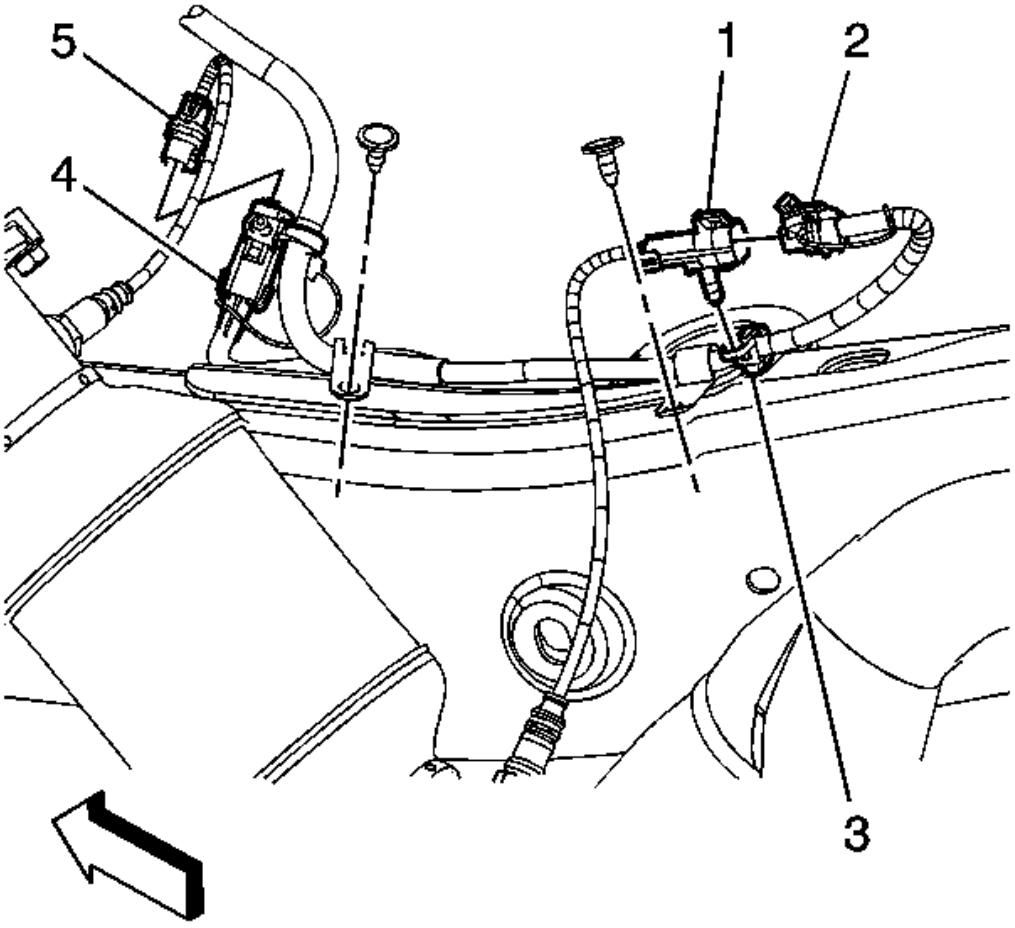


Fig. 106: View Of Engine Harness Clip & Electrical Connectors
Courtesy of GENERAL MOTORS CORP.

18. Connect the engine wiring harness electrical connector (2) to the right rear HO2S electrical connector (1).
19. Install the right rear CPA retainer.
20. Install the right rear HO2S electrical connector clip to the engine harness clip (3).
21. Connect the right front HO2S electrical connector (5) to the engine wiring harness electrical connector (4).
22. Install the right front CPA retainer.

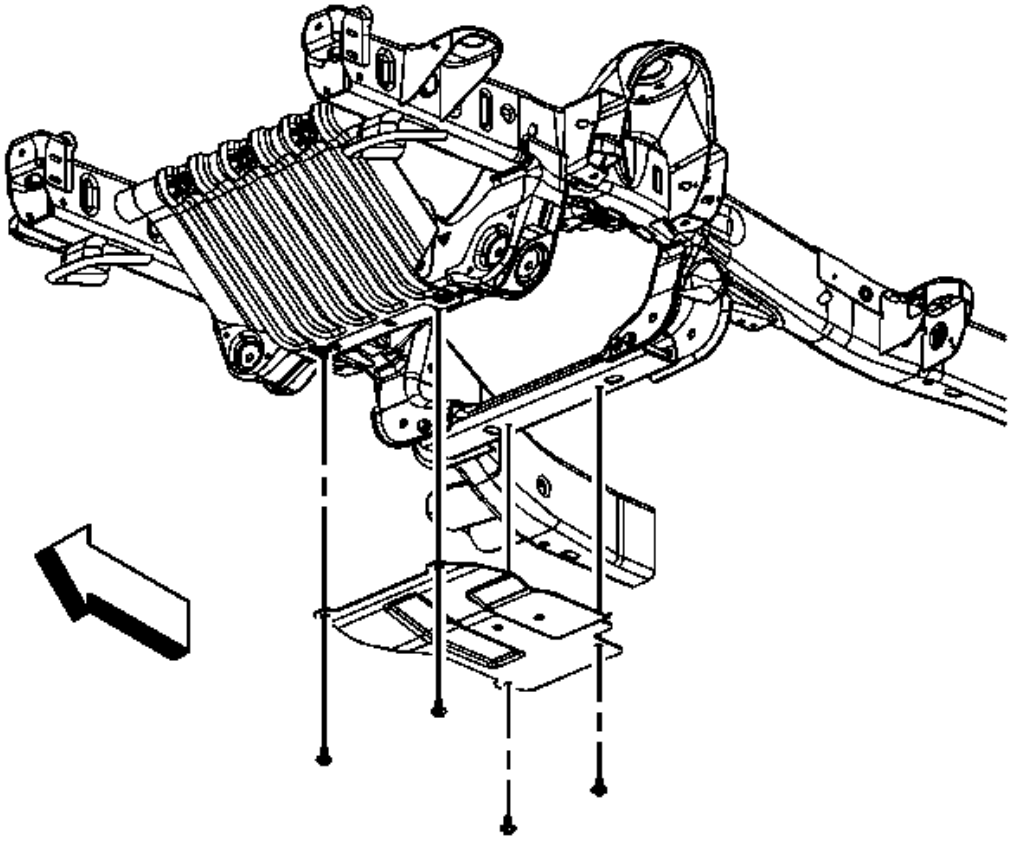


Fig. 107: View Of Oil Pan Skid Plate & Bolts
Courtesy of GENERAL MOTORS CORP.

23. Install the transmission crossmember. Refer to **Transmission Support Crossmember Replacement (2WD 2500 HD/3500)** or **Transmission Support Crossmember Replacement (2WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 2500 HD/3500)** .
24. Position the oil pan skid plate and install the oil pan skid plate bolts, if equipped.

    Tighten: Tighten the bolts to 28 N.m (21 lb ft).

25. Lower the vehicle.

CATALYTIC CONVERTER REPLACEMENT (4.8L, 5.3L, 6.0L, 6.2L)

Removal Procedure

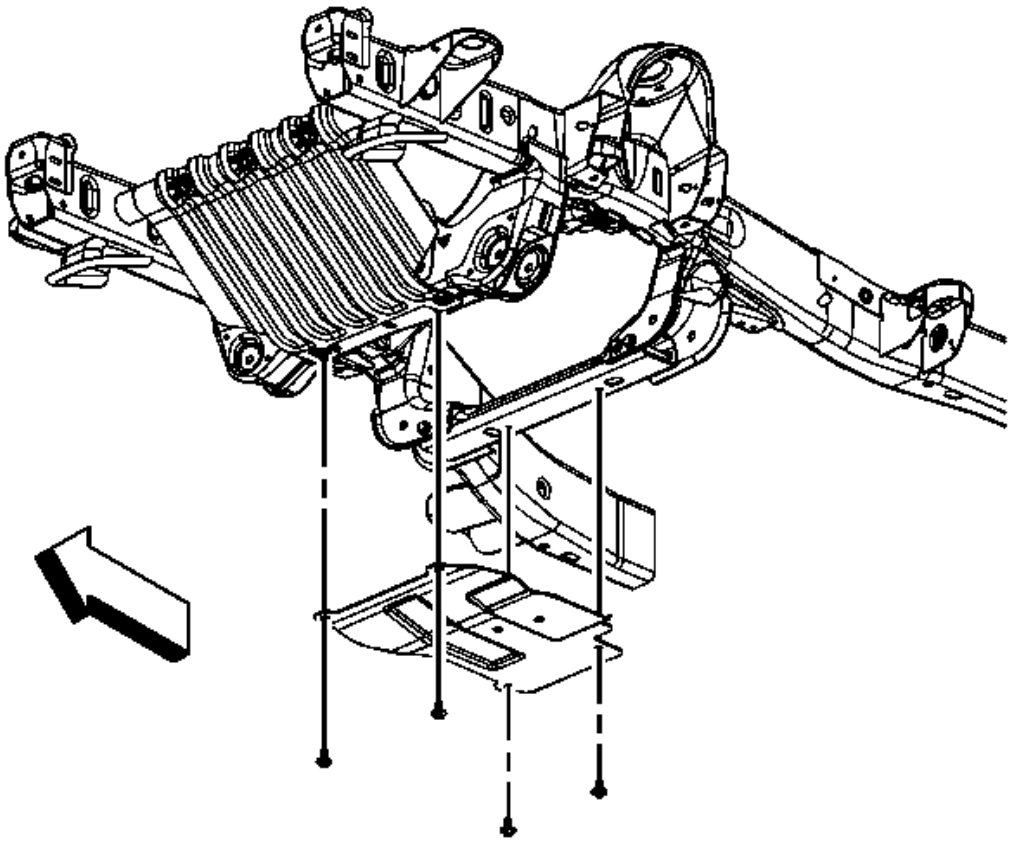


Fig. 108: View Of Oil Pan Skid Plate & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the oil pan skid plate bolts and skid plate, if equipped.
3. Remove the transmission crossmember. Refer to **Transmission Support Crossmember Replacement (2WD 2500 HD/3500)** or **Transmission Support Crossmember Replacement (2WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 2500 HD/3500)** .

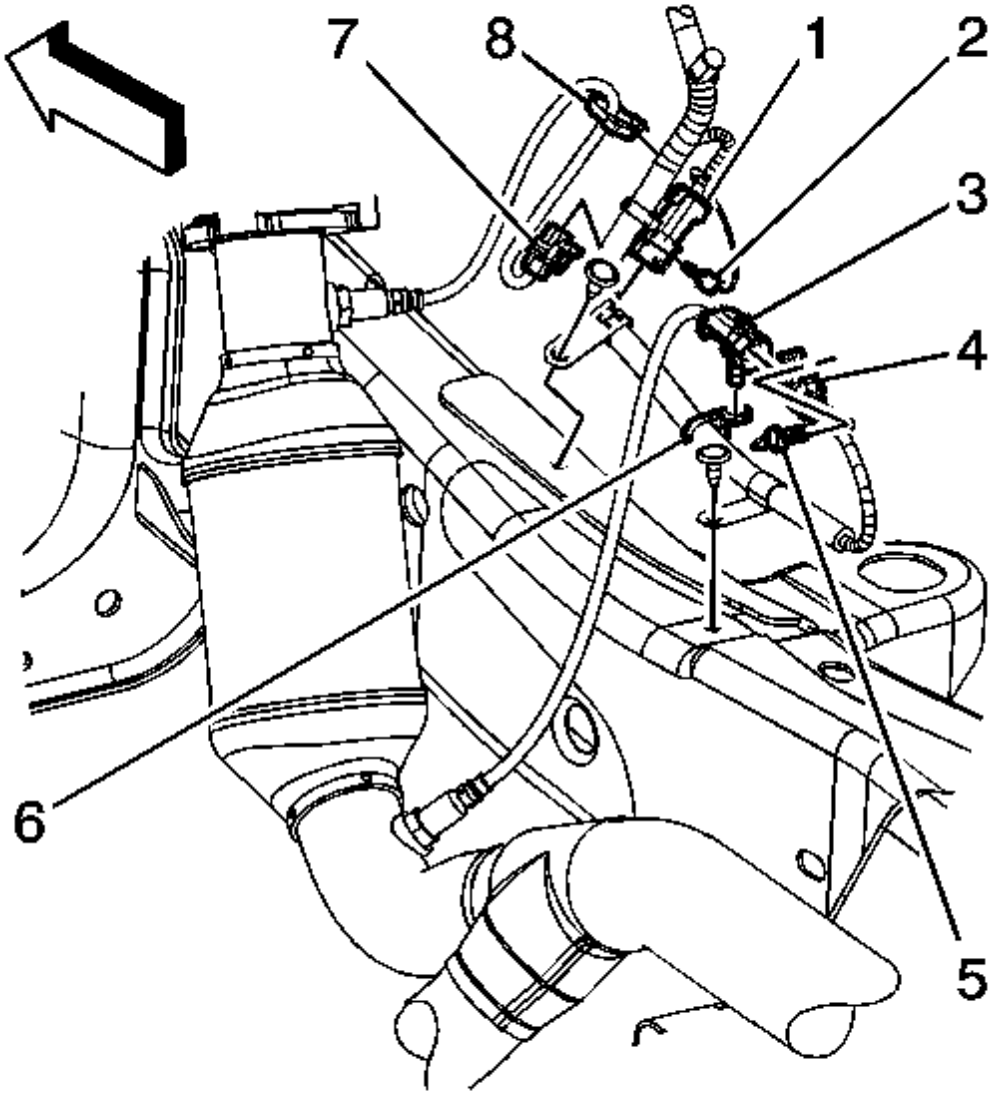


Fig. 109: View Of Engine Wiring Harness Electrical Connectors, (CPA) Retainers & Engine Harness Clips
Courtesy of GENERAL MOTORS CORP.

4. Remove the right front connector position assurance (CPA) retainer (2).
5. Disconnect the right front heated oxygen sensor (HO2S) electrical connector from the engine wiring harness electrical connector (1).

6. Remove the right rear CPA retainer (4).
7. Disconnect the engine wiring harness electrical connector (3) from the right rear HO2S electrical connector.
8. Remove the right rear HO2S electrical connector clip from the engine harness clip (5).

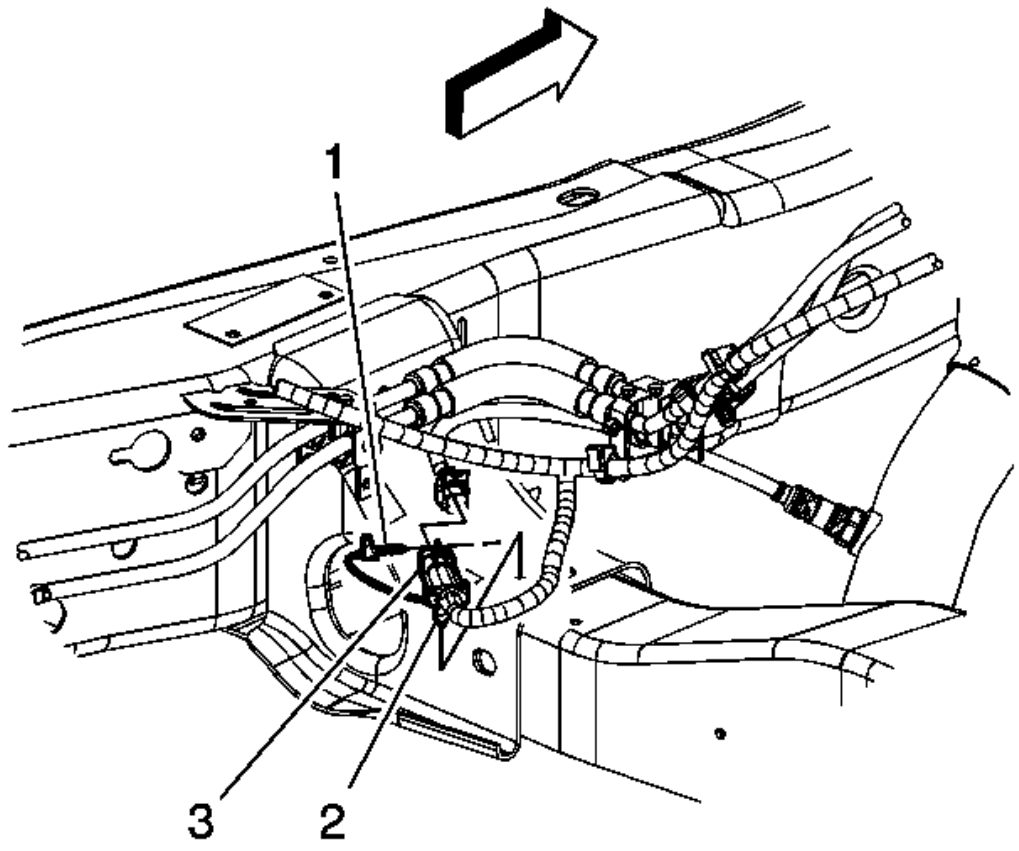


Fig. 110: View Of Left Rear CPA Retainer & Engine Wiring Harness Electrical Connector
Courtesy of GENERAL MOTORS CORP.

9. Remove the left rear CPA retainer (1).
10. Disconnect the left rear HO2S electrical connector from the engine wiring harness electrical connector (3).

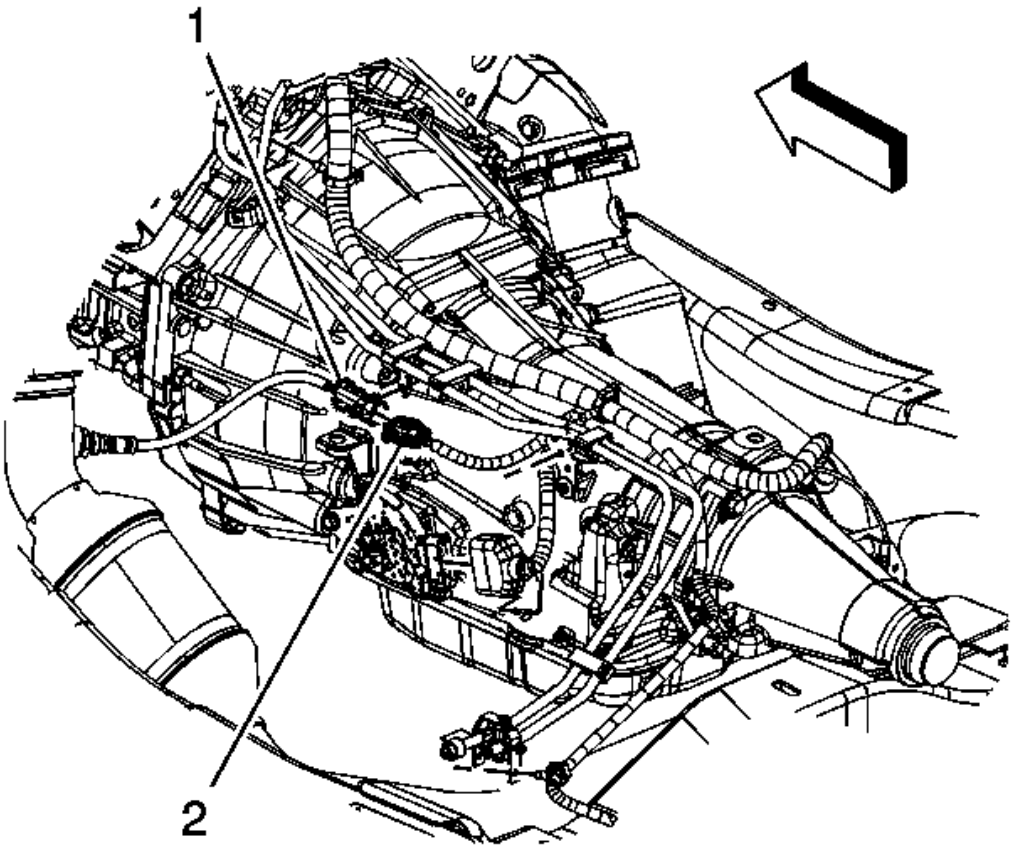


Fig. 111: View Of Left Front HO2S Electrical Connector Clip & Engine Wiring Harness Electrical Connector
Courtesy of GENERAL MOTORS CORP.

11. For vehicles equipped with a 4L60-E/4L70-E automatic transmission perform the following steps, for vehicles equipped with a 6L80-E automatic transmission proceed to step 15.
12. Remove the left front CPA retainer.
13. Disconnect the engine wiring harness electrical connector (2) from the left front HO2S.
14. Remove the left front HO2S electrical connector clip (1) from the fuel line clip.

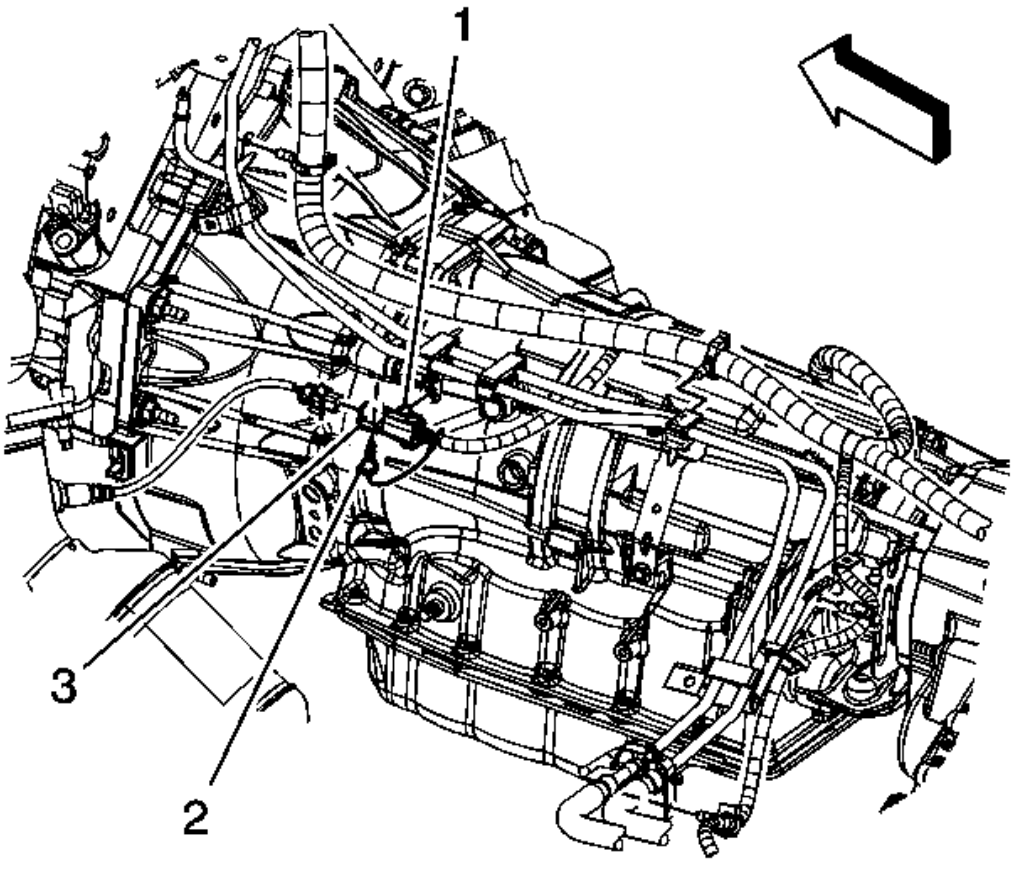


Fig. 112: View Of Engine Wiring Harness Electrical Connector Clip & Electrical Connector
Courtesy of GENERAL MOTORS CORP.

15. Remove the left front CPA retainer (2).
16. Remove the engine wiring harness electrical connector clip (1) from the fuel line clip.
17. Disconnect the engine wiring harness electrical connector (3) from the left front HO2S.

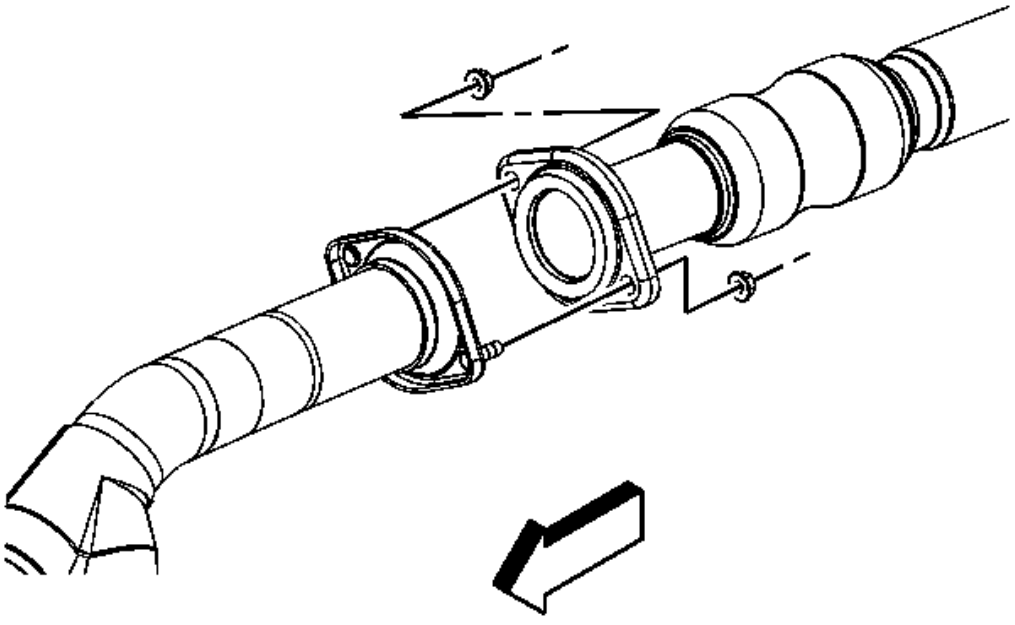


Fig. 113: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

18. If the vehicle is a 1500 series, remove the catalytic converter to muffler nuts.

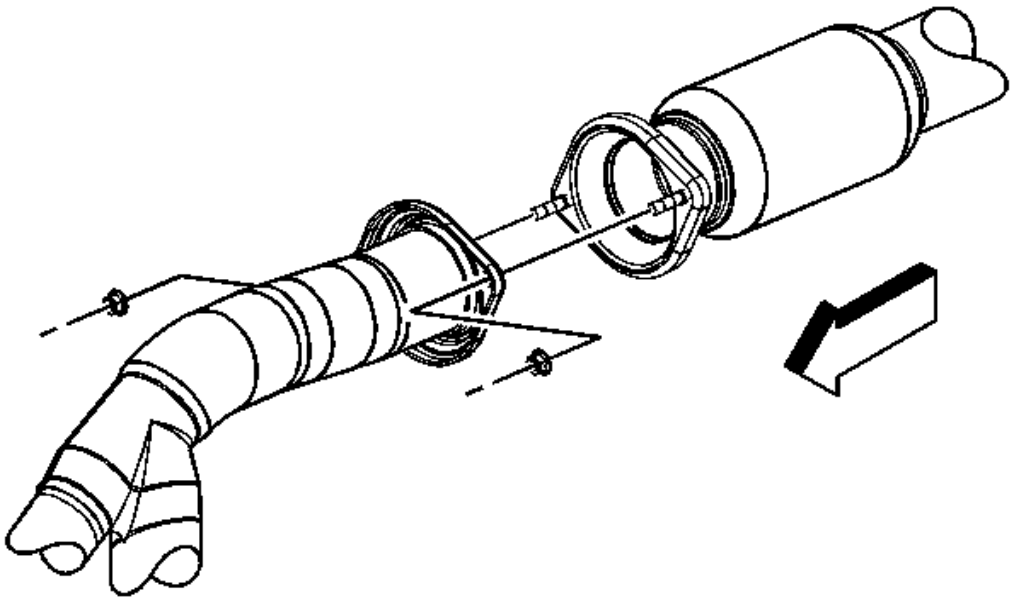


Fig. 114: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

19. If the vehicle is a 2500/3500 series, remove the muffler to catalytic converter nuts.
20. Remove the HO2S. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** .

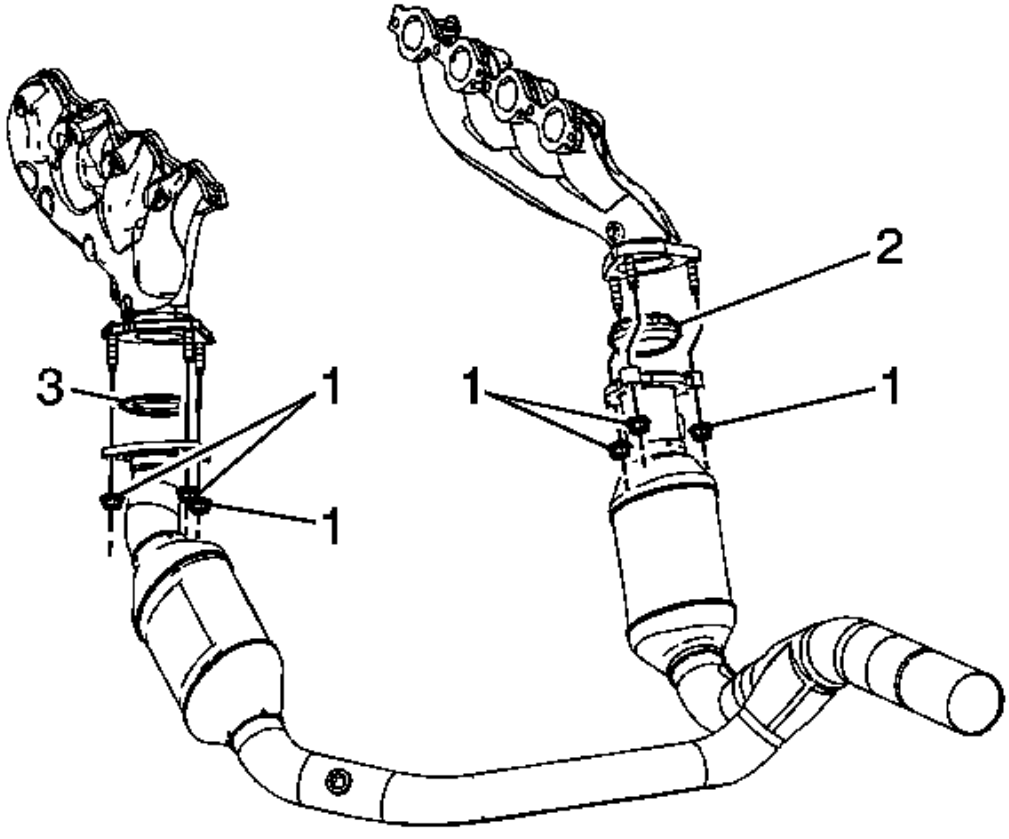


Fig. 115: View Of Catalytic Converter To Exhaust Manifold Nuts & Exhaust Seals
Courtesy of GENERAL MOTORS CORP.

21. Remove the catalytic converter to exhaust manifold nuts (1). (1500 series shown, 2500/3500 series similar).
22. Separate the catalytic converter assembly from the exhaust manifolds.
23. Remove the catalytic converter assembly from the exhaust muffler.
24. If replacing the catalytic converter assembly, perform the following steps, otherwise proceed to step 4 in the installation procedure.
25. Remove the exhaust seals (2 and 3).

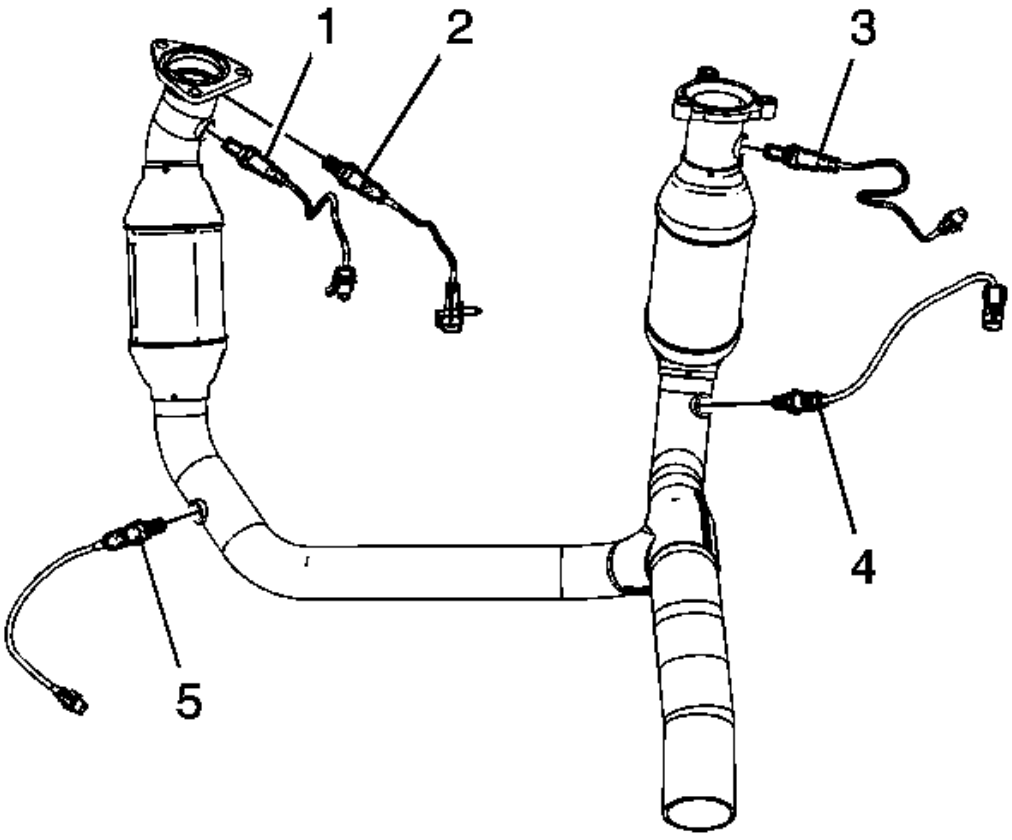


Fig. 116: View Of Catalytic Converter Assembly HO2S's
Courtesy of GENERAL MOTORS CORP.

26. Remove the HO2S (1-5) from the catalytic converter assembly. (1500 series shown, 2500/3500 series similar).

Installation Procedure

IMPORTANT: A special anti-seize compound is used on the HO2S threads. The compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from as exhaust component and if for any

reason the sensor is to be reinstalled, the threads must have anti-seize compound applied before the reinstallation.

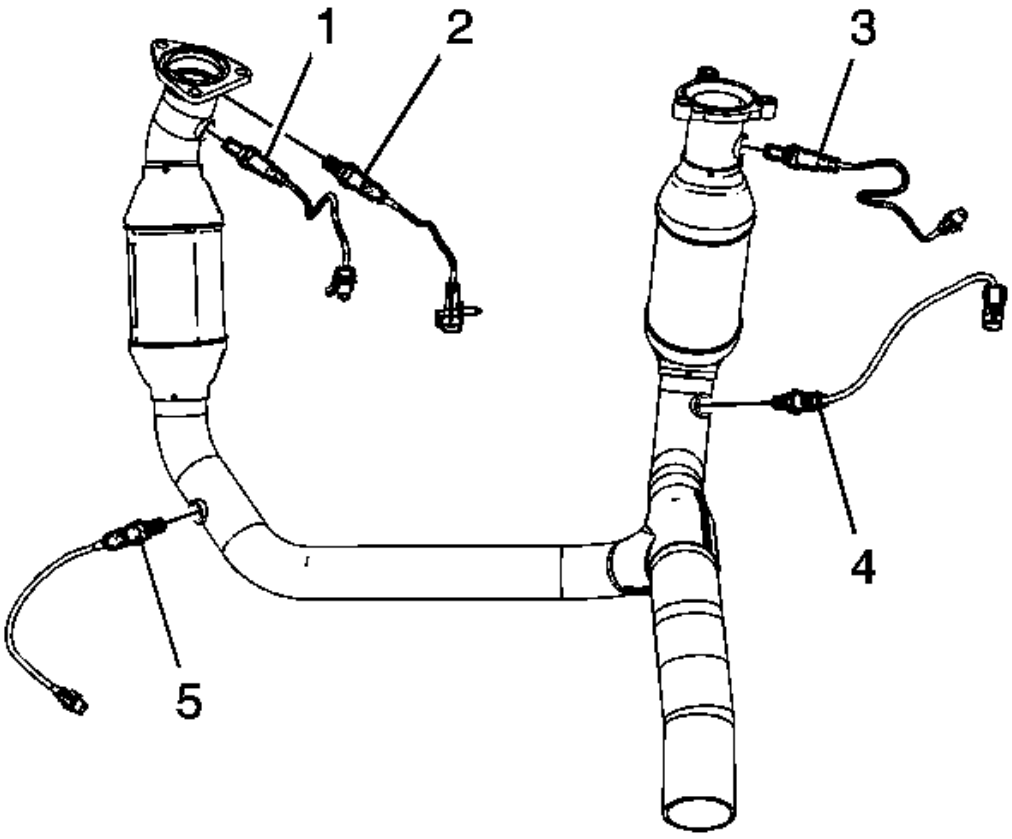


Fig. 117: View Of Catalytic Converter Assembly HO2S's
Courtesy of GENERAL MOTORS CORP.

1. If replacing the catalytic converter assembly, perform the following steps, otherwise proceed to step 4.
2. If reinstalling the old sensors, coat the threads with anti-seize compound GM P/N 12377953, or equivalent.

NOTE: Refer to Component Fastener Tightening Notice .

NOTE: Refer to Fastener Notice .

3. Install the HO2S (1-5) to the catalytic converter assembly. (1500 series shown, 2500/3500 series similar).

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

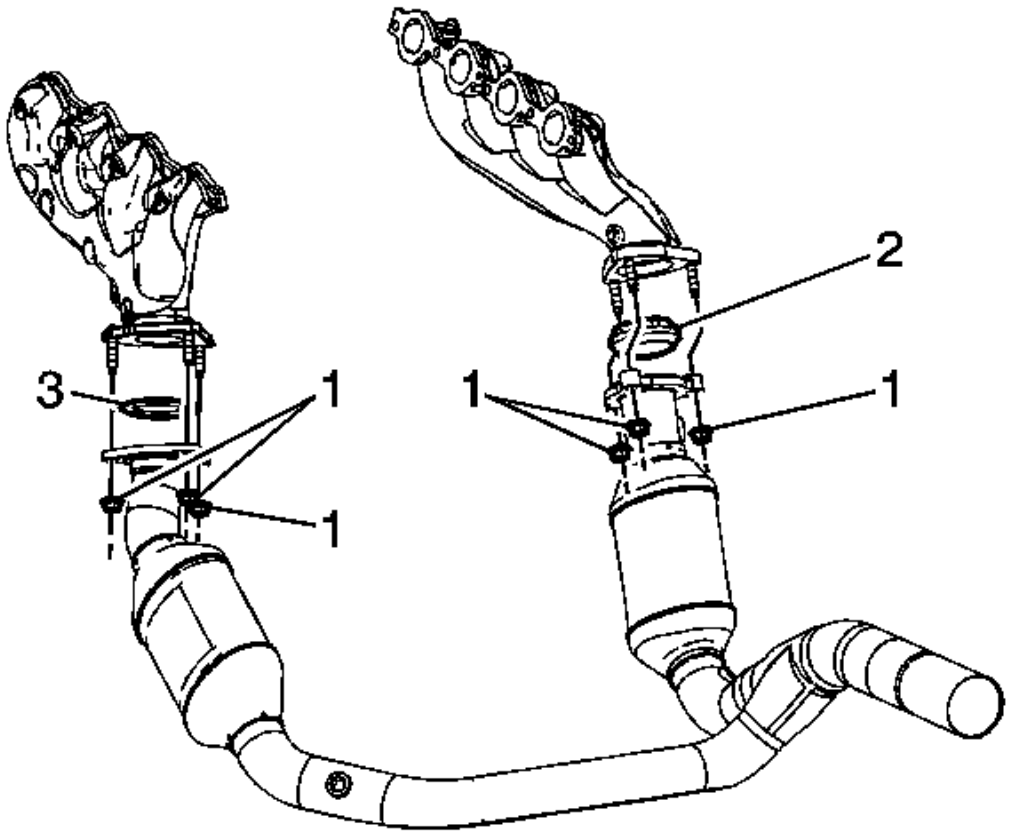


Fig. 118: View Of Catalytic Converter To Exhaust Manifold Nuts & Exhaust Seals
Courtesy of GENERAL MOTORS CORP.

4. Install the NEW exhaust seals (2 and 3) as required. (1500 series shown, 2500/3500 series similar).
5. Install the catalytic converter assembly to the muffler.
6. Install the catalytic converter assembly to the exhaust manifolds.

7. Install the catalytic converter to exhaust manifold nuts (1).

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

8. Install the HO2S. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (2500 Series - Cab/Chassis)** .

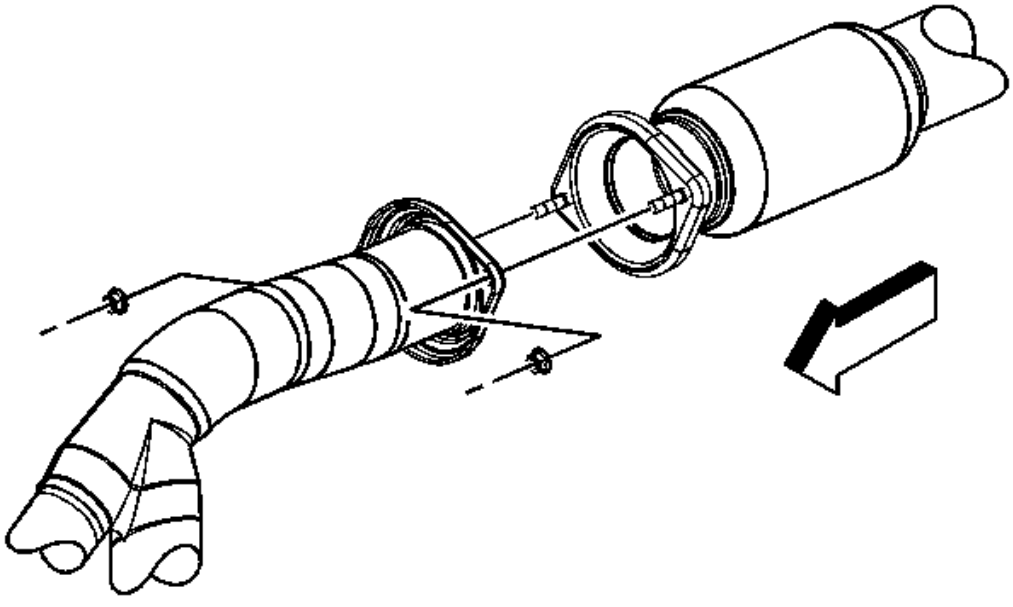


Fig. 119: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

9. If the vehicle is a 2500/3500 series, install the muffler to catalytic converter nuts.

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

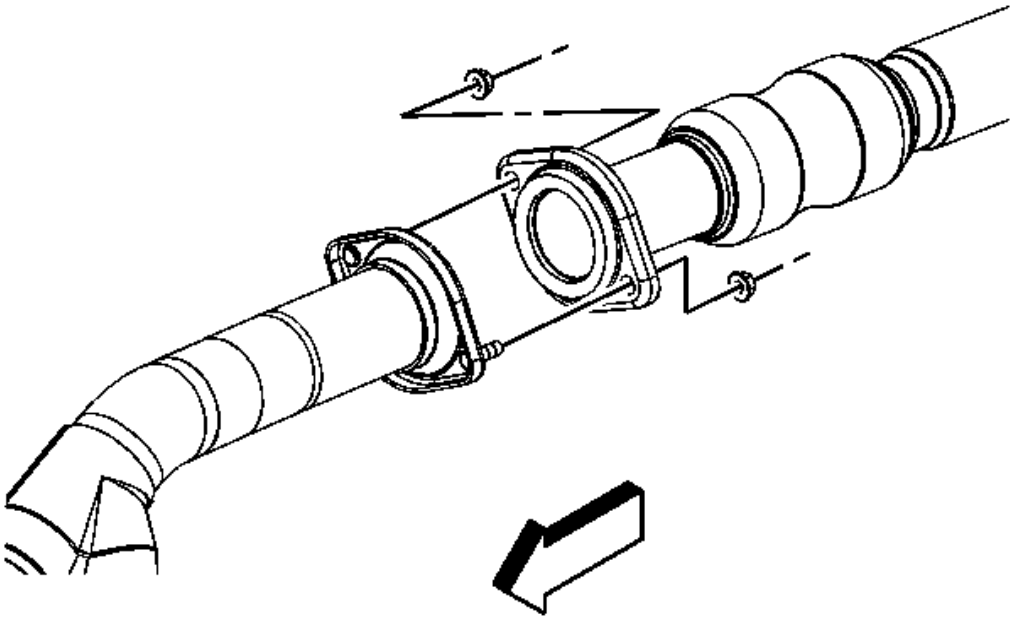


Fig. 120: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

10. If the vehicle is a 1500 series, install the catalytic converter to muffler nuts.

    Tighten: Tighten the nuts to 45 N.m (33 lb ft).

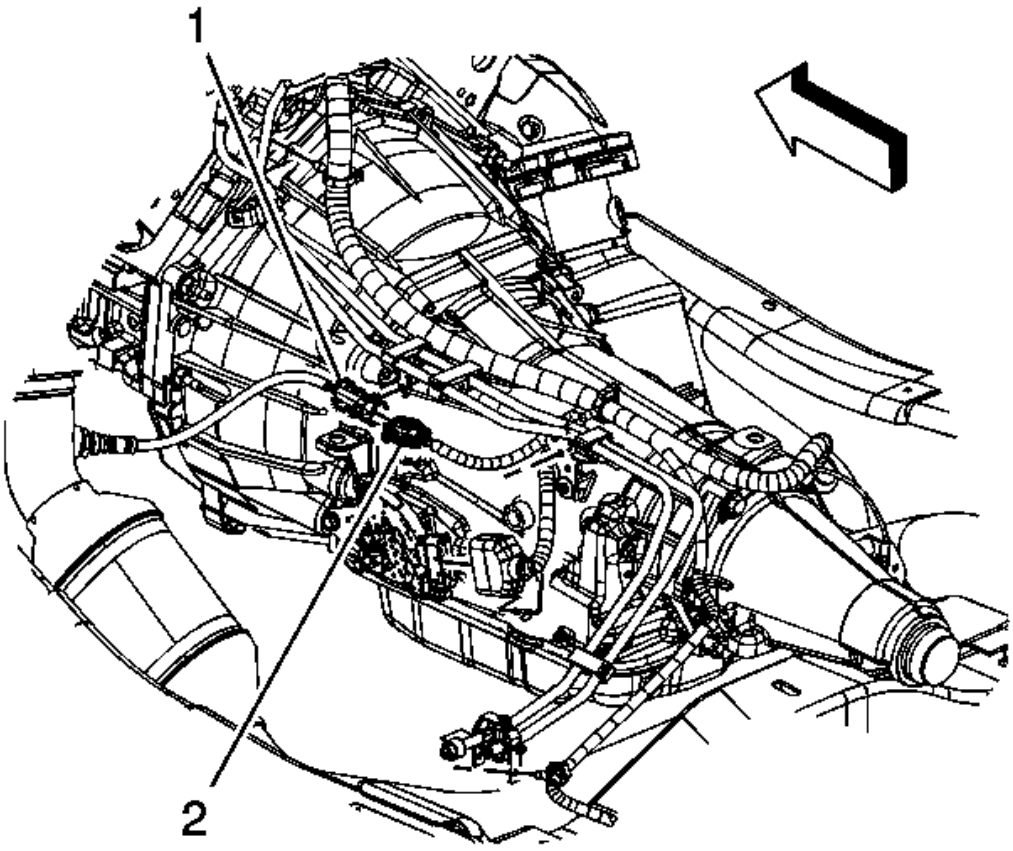


Fig. 121: View Of Left Front HO2S Electrical Connector Clip & Engine Wiring Harness Electrical Connector
Courtesy of GENERAL MOTORS CORP.

11. For vehicles equipped with a 4L60-E/4L70-E automatic transmission perform the following steps, for vehicles equipped with a 6L80-E automatic transmission proceed to step 13.
12. Install the HO2S electrical connector clip (1) to the fuel line clip.
13. Connect the engine wiring harness electrical connector (2) to the HO2S.
14. Install the CPA retainer.

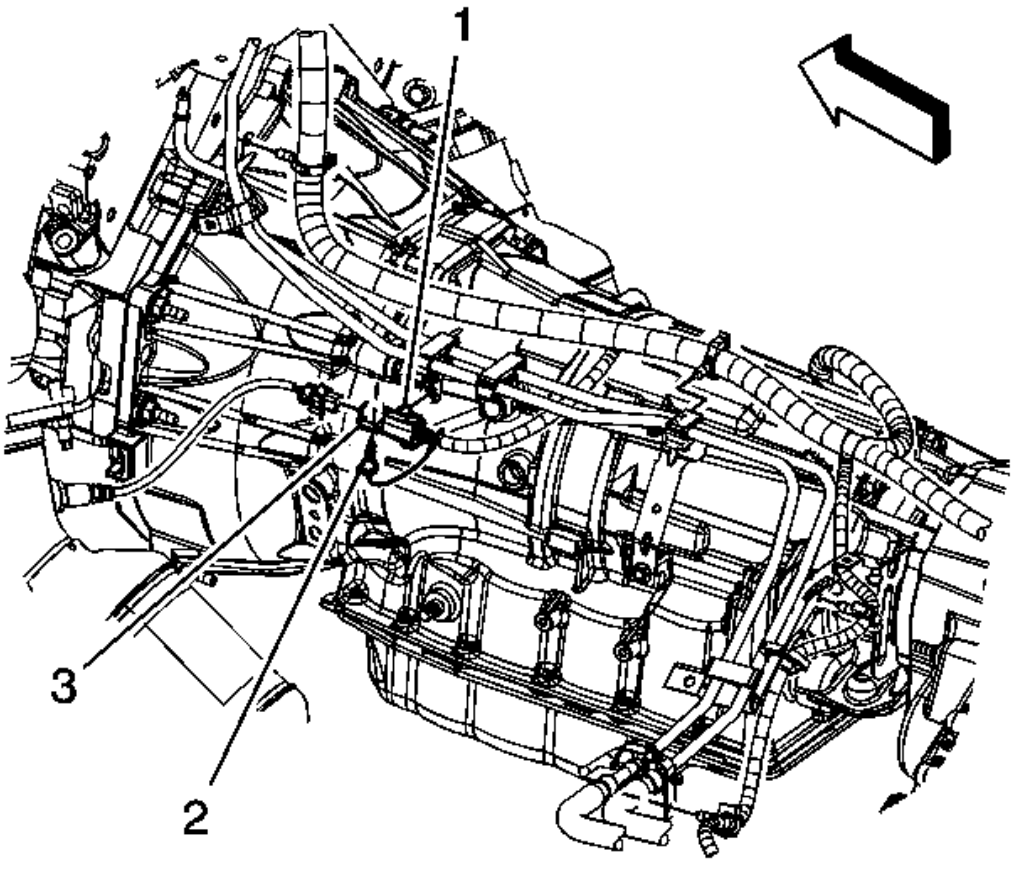


Fig. 122: View Of Engine Wiring Harness Electrical Connector Clip & Electrical Connector
Courtesy of GENERAL MOTORS CORP.

15. Connect the engine wiring harness electrical connector (3) to the HO2S.
16. Install the engine wiring harness electrical connector clip (1) to the fuel line clip.
17. Install the CPA retainer (2).

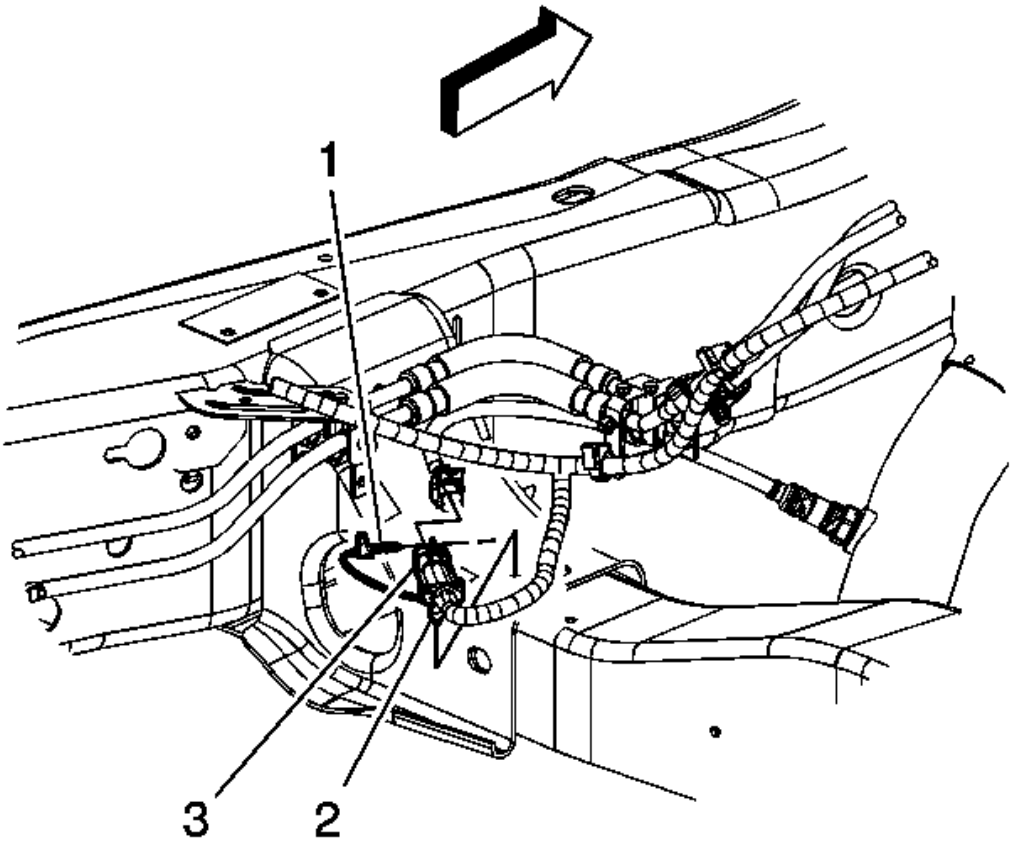


Fig. 123: View Of Left Rear CPA Retainer & Engine Wiring Harness Electrical Connector
Courtesy of GENERAL MOTORS CORP.

18. Connect the left rear HO2S electrical connector to the engine wiring harness electrical connector (3).
19. Install the left rear CPA retainer (1).

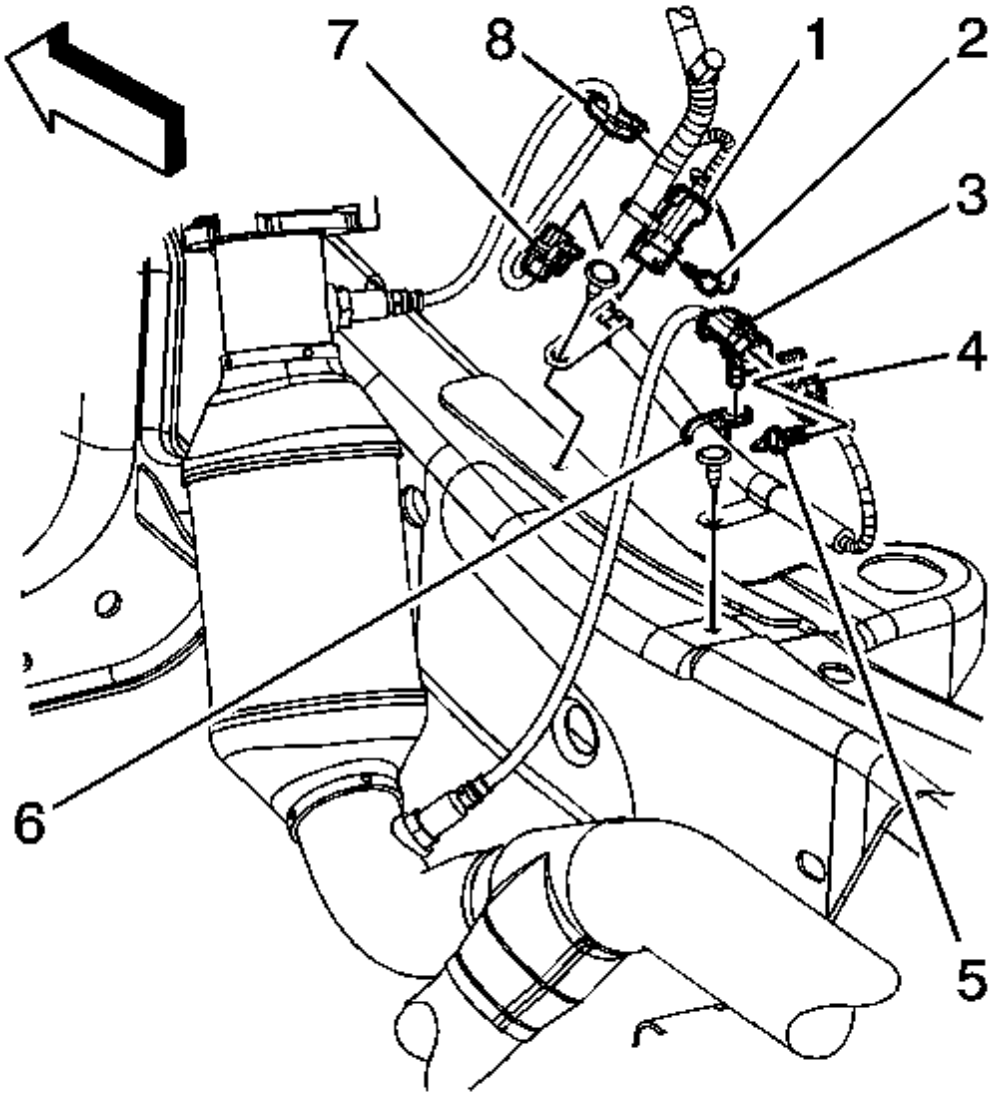


Fig. 124: View Of Engine Wiring Harness Electrical Connectors, (CPA) Retainers & Engine Harness Clips
Courtesy of GENERAL MOTORS CORP.

20. Install the right rear HO2S electrical connector clip to the engine harness clip (5).
21. Connect the engine wiring harness electrical connector (3) to the right rear HO2S electrical connector.

22. Install the right rear CPA retainer (4).
23. Connect the right front HO2S electrical connector to the engine wiring harness electrical connector (1).
24. Install the right front CPA retainer (2).

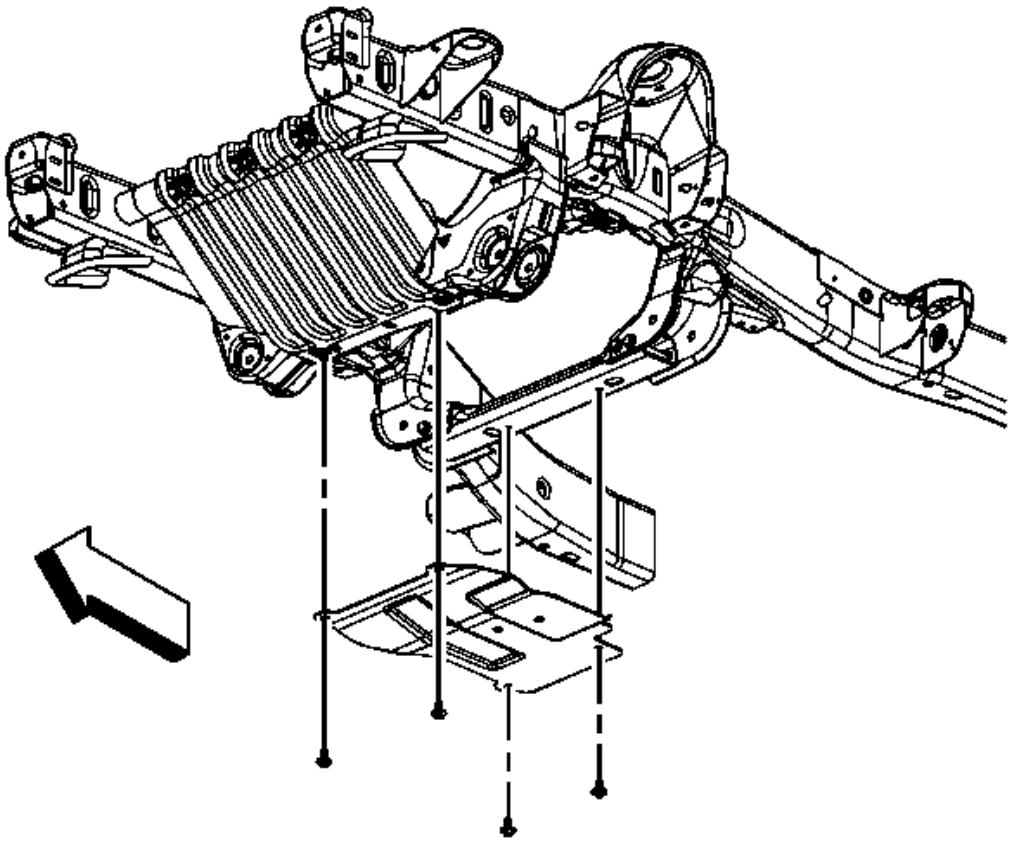


Fig. 125: View Of Oil Pan Skid Plate & Bolts
Courtesy of GENERAL MOTORS CORP.

25. Install the transmission crossmember. Refer to **Transmission Support Crossmember Replacement (2WD 2500 HD/3500)** or **Transmission Support Crossmember Replacement (2WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 1500/2500)** or **Transmission Support Crossmember Replacement (4WD 2500 HD/3500)** .

26. Position the oil pan skid plate and install the oil pan skid plate bolts, if equipped.

    Tighten: Tighten the bolts to 28 N.m (21 lb ft).

27. Lower the vehicle.

CATALYTIC CONVERTER REPLACEMENT (6.6L)

Removal Procedure

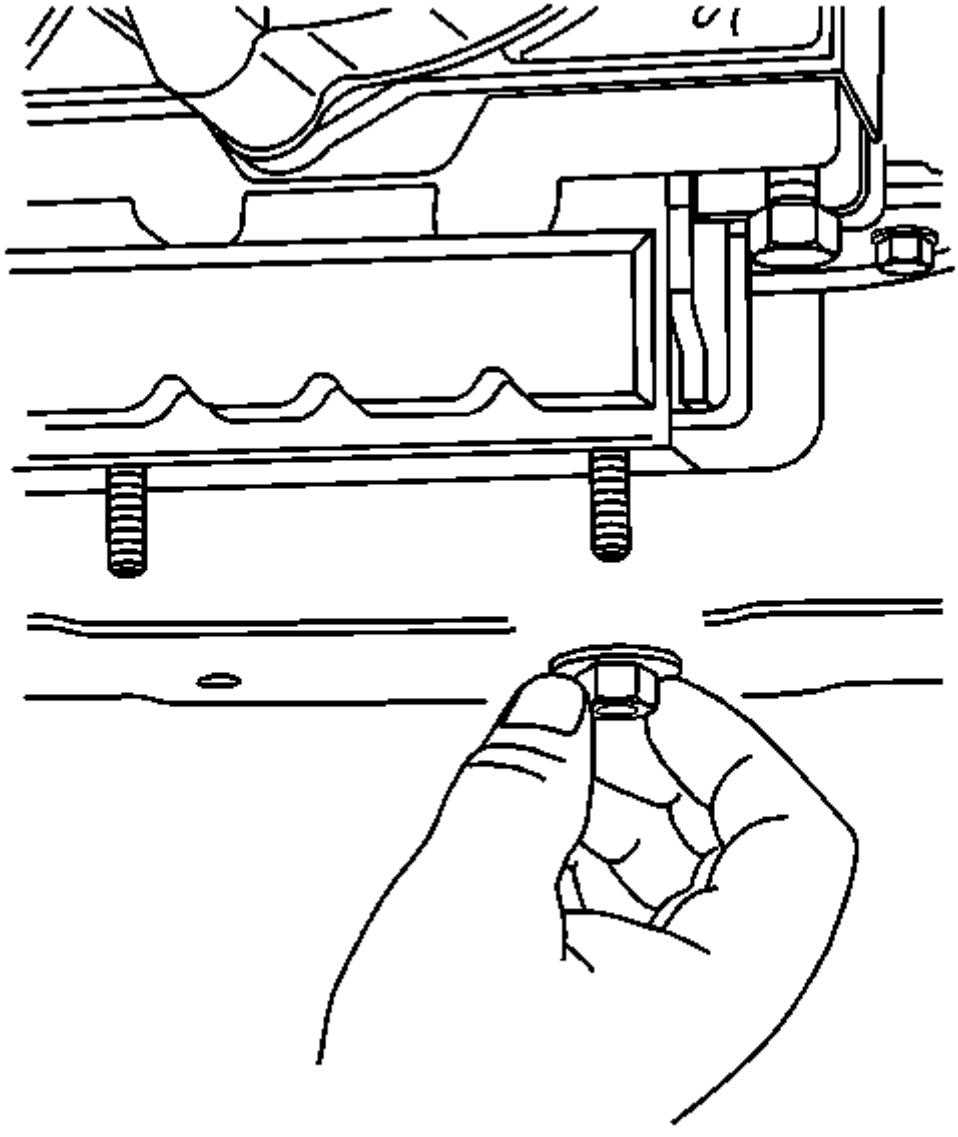


Fig. 126: Identifying Transmission Mount Nuts
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Support the transmission with a suitable transmission jack.
3. Remove the transmission mount to transmission support nuts.

4. Raise the transmission off of the transmission support.

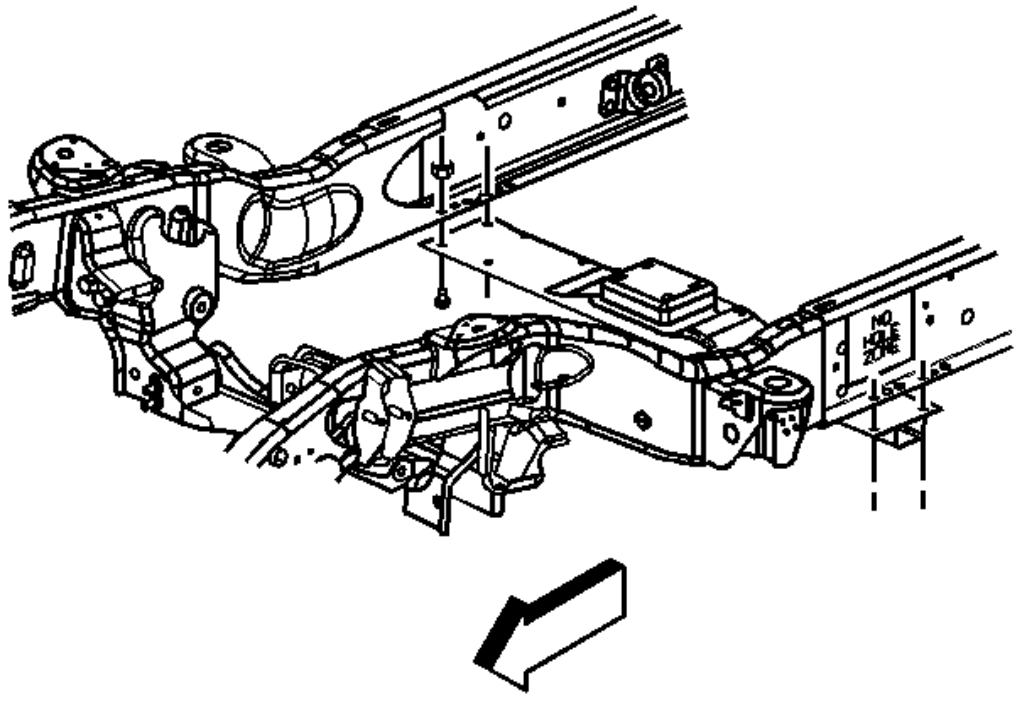


Fig. 127: Transmission Support Crossmember (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

5. Remove the transmission support crossmember bolts.
6. Remove the transmission support crossmember.

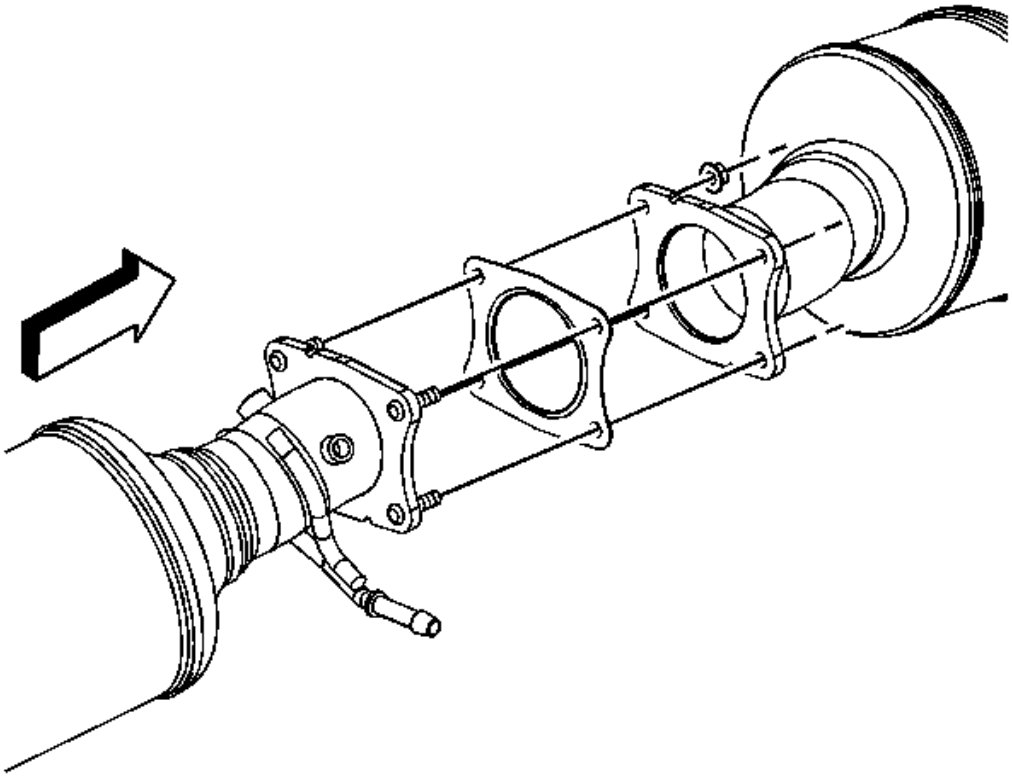


Fig. 128: View Of Catalytic Converter, Particulate Filter & Nuts
Courtesy of GENERAL MOTORS CORP.

7. Remove the catalytic converter to particulate filter nuts.

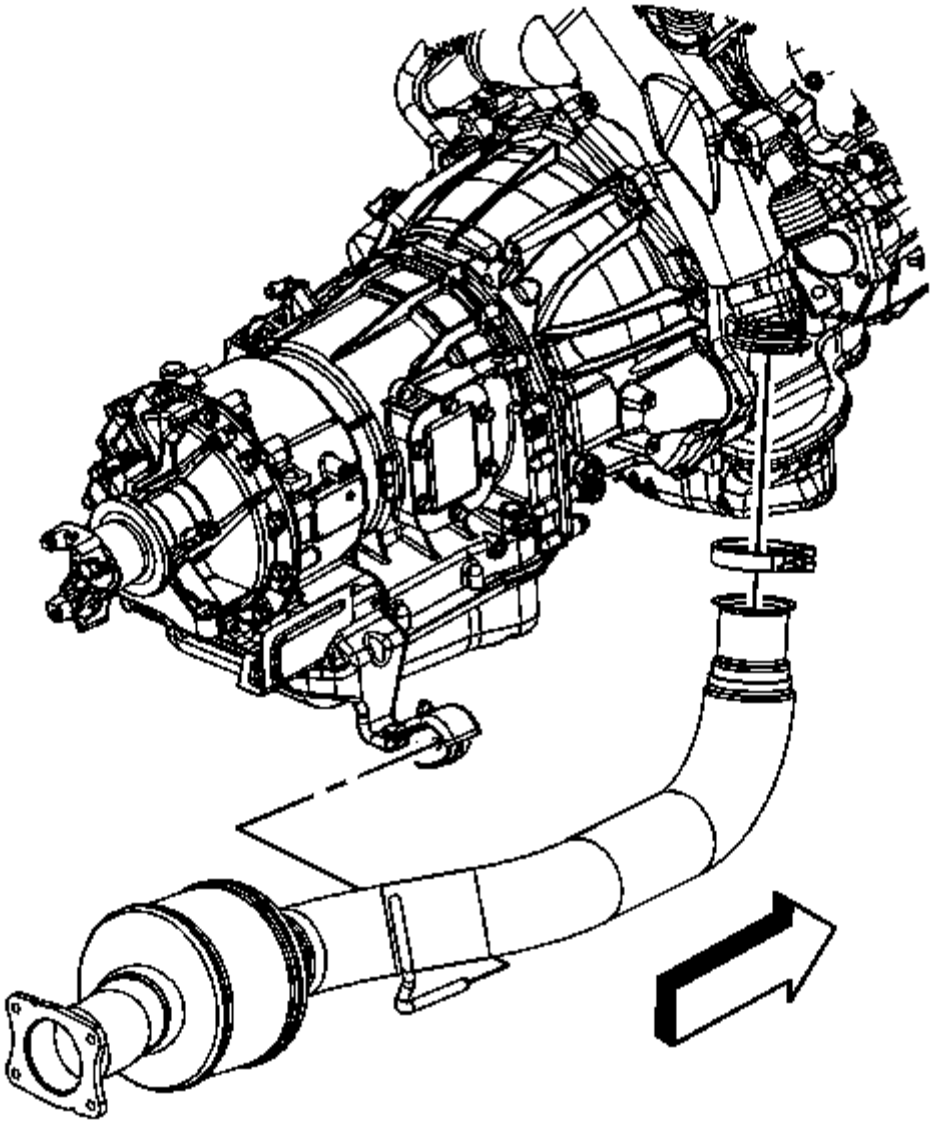


Fig. 129: View Of Turbocharger Exhaust Pipe & Clamps
Courtesy of GENERAL MOTORS CORP.

8. Loosen the turbocharger exhaust pipe to catalytic converter clamp.
9. Slide the clamp up onto the turbocharger exhaust pipe.
10. Remove the catalytic converter.

Installation Procedure

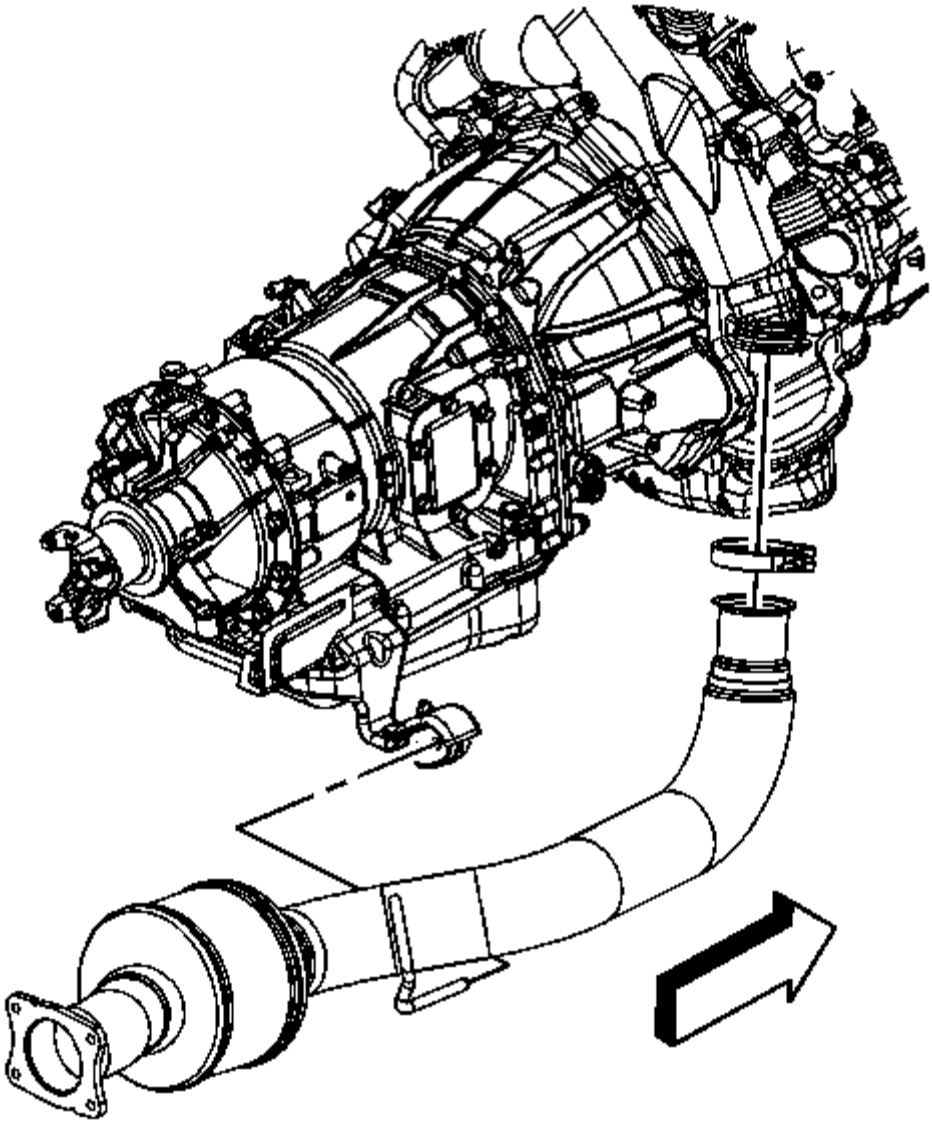


Fig. 130: View Of Turbocharger Exhaust Pipe & Clamps
Courtesy of GENERAL MOTORS CORP.

1. Apply water based lubricant to the exhaust pipe hanger bracket, in order to aid in installation.

2. Install the catalytic converter.
3. Slide the down turbocharger exhaust pipe to catalytic converter clamp.

NOTE: Refer to Fastener Notice .

4. Tighten the turbocharger exhaust pipe to catalytic converter clamp.

   Tighten: Tighten the clamp to 12 N.m (106 lb in).

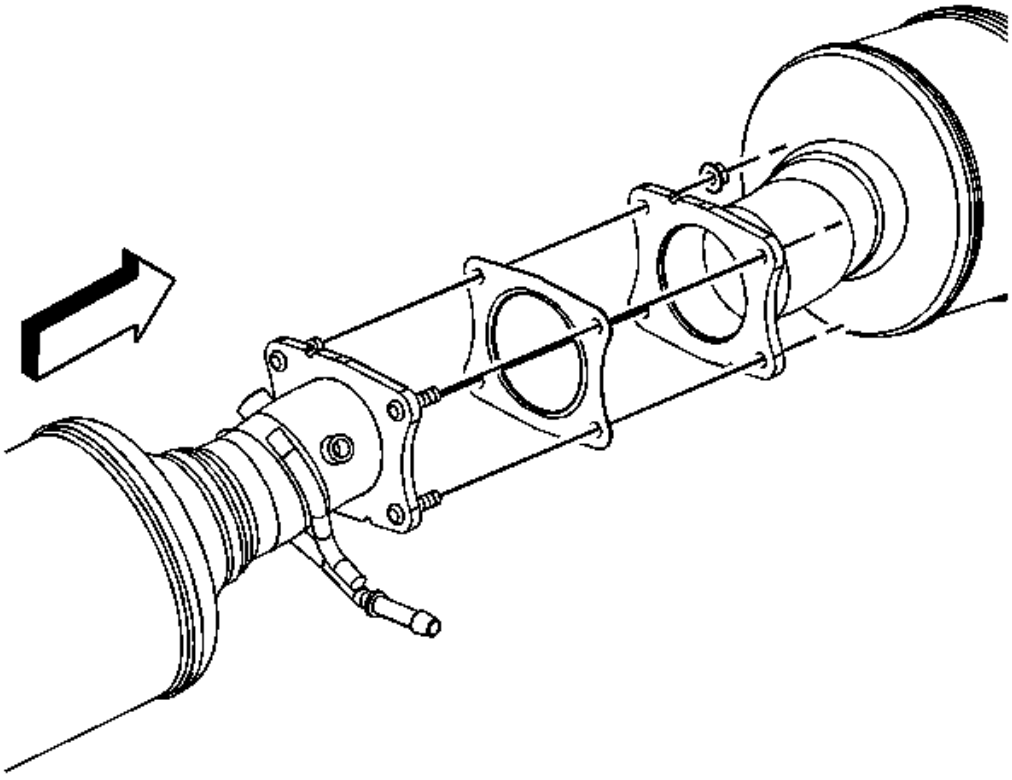


Fig. 131: View Of Catalytic Converter, Particulate Filter & Nuts
Courtesy of GENERAL MOTORS CORP.

5. Install the catalytic converter to particulate filter nuts.

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

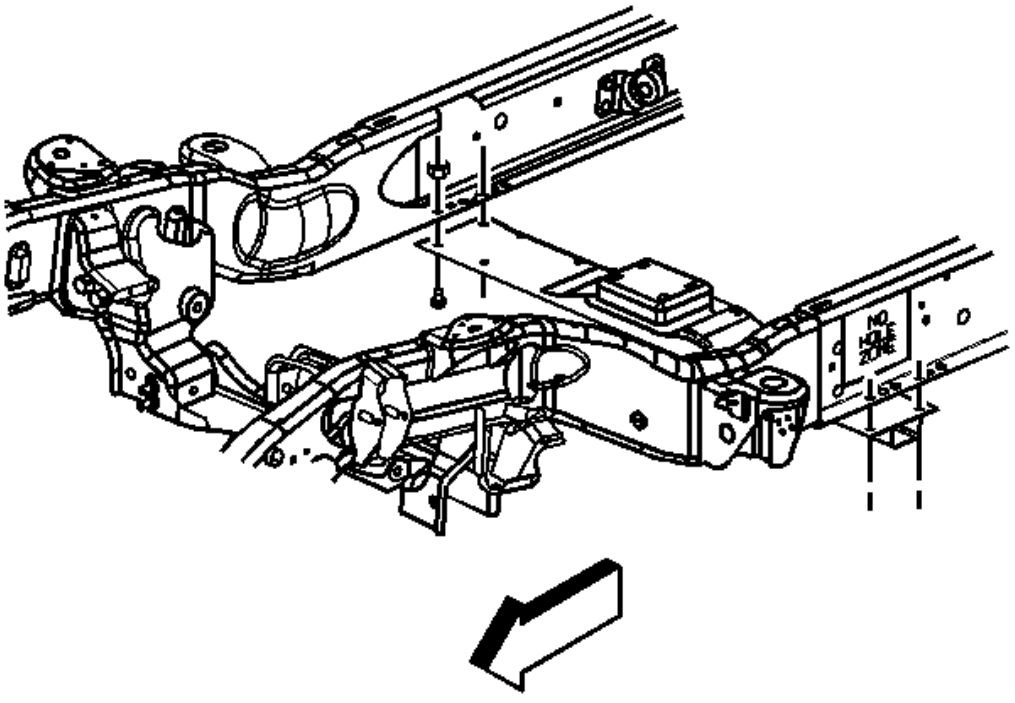


Fig. 132: Transmission Support Crossmember (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

6. Install the transmission support crossmember.
7. Install the transmission support crossmember bolts.

Tighten: Tighten the bolts to 95 N.m (70 lb ft).

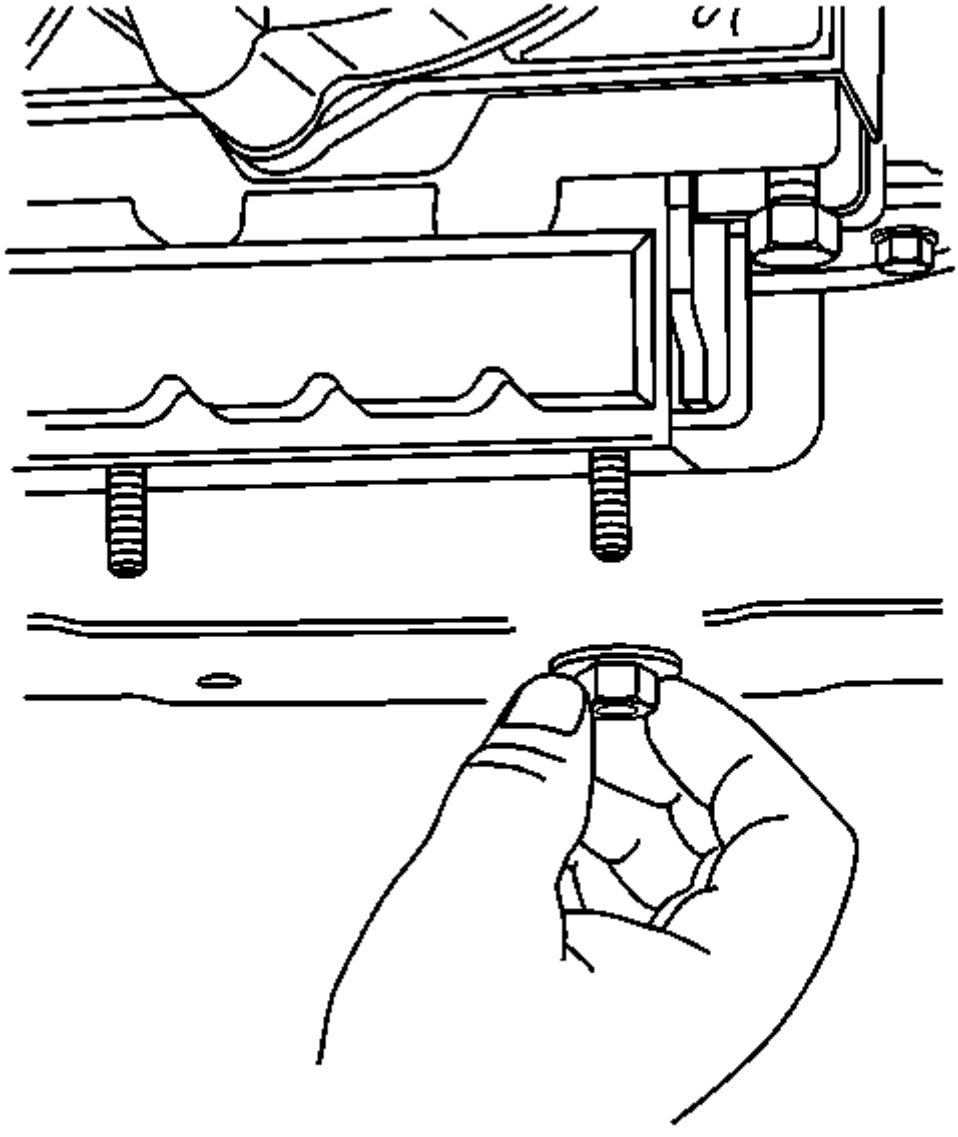


Fig. 133: Identifying Transmission Mount Nuts
Courtesy of GENERAL MOTORS CORP.

8. Lower the transmission onto the transmission support.
9. Install the transmission mount to transmission support nuts.

Tighten: Tighten the bolts to 40 N.m (30 lb ft).

10. Remove the support from the transmission.
11. Lower the vehicle.

CATALYTIC CONVERTER REPLACEMENT - LEFT SIDE (6.0L - CAB/CHASSIS)

Removal Procedure

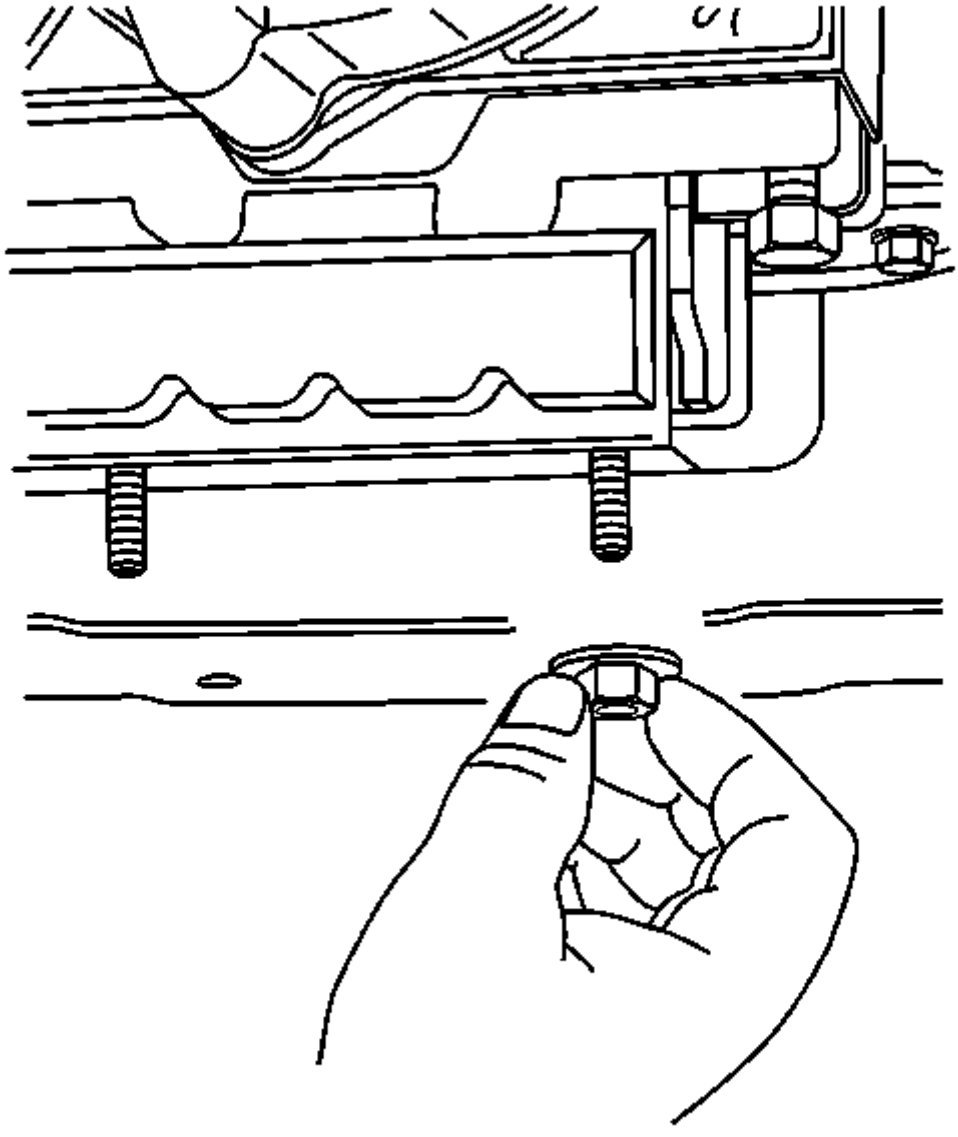


Fig. 134: Identifying Transmission Mount Nuts
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Support the transmission with a suitable transmission jack.
3. Remove the transmission mount to transmission support nuts.

4. Raise the transmission off of the transmission support.

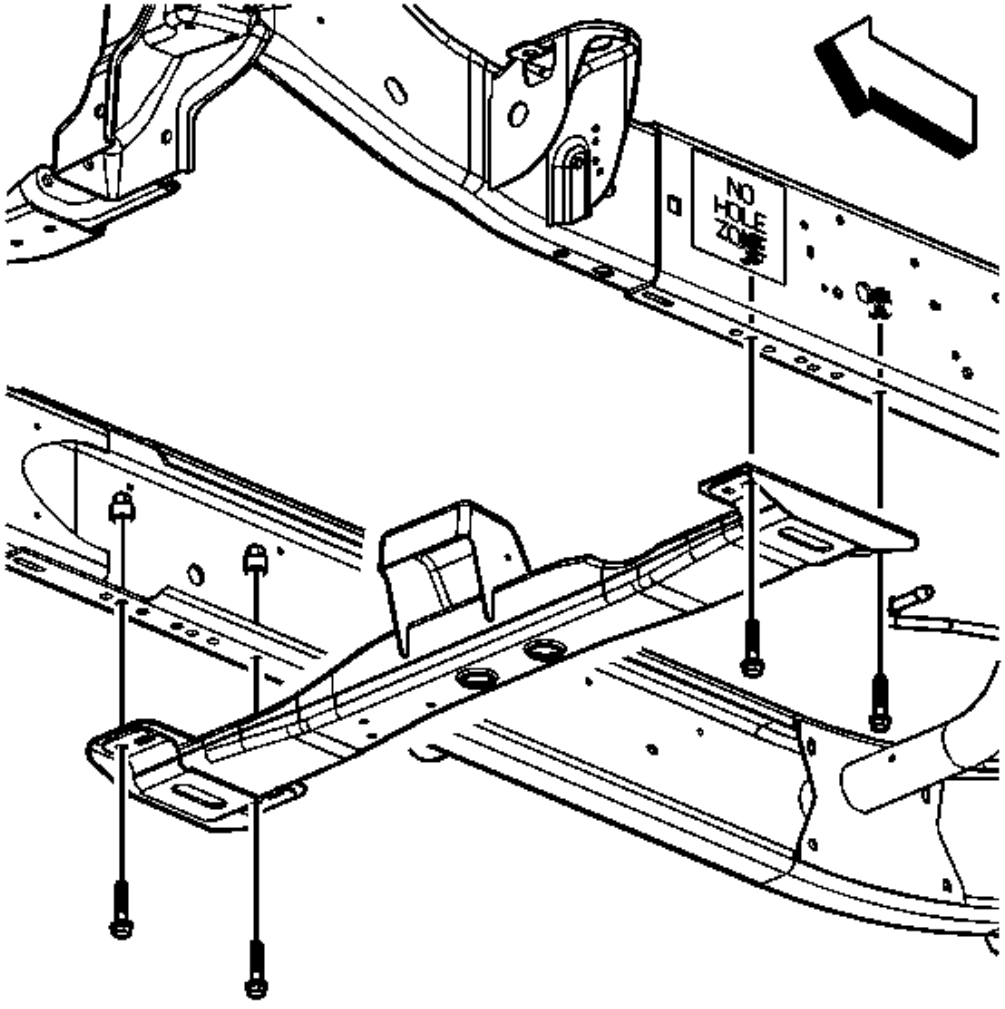


Fig. 135: View Of Transmission Support Crossmember & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the transmission support crossmember bolts.
6. Remove the transmission support crossmember.

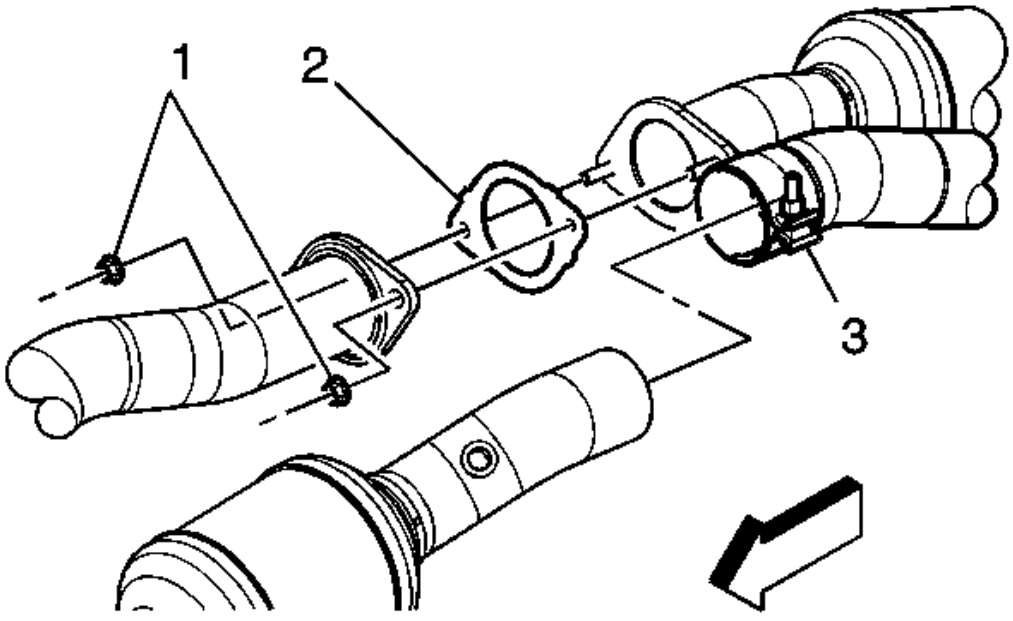


Fig. 136: View Of Exhaust Muffler, Exhaust Manifold Pipe, Gasket & Nuts
Courtesy of GENERAL MOTORS CORP.

7. Loosen the exhaust muffler clamp (3).
8. Separate any necessary exhaust muffler insulators so that the pipe may be separated from the muffler.
9. Use a jack stand to support the muffler.

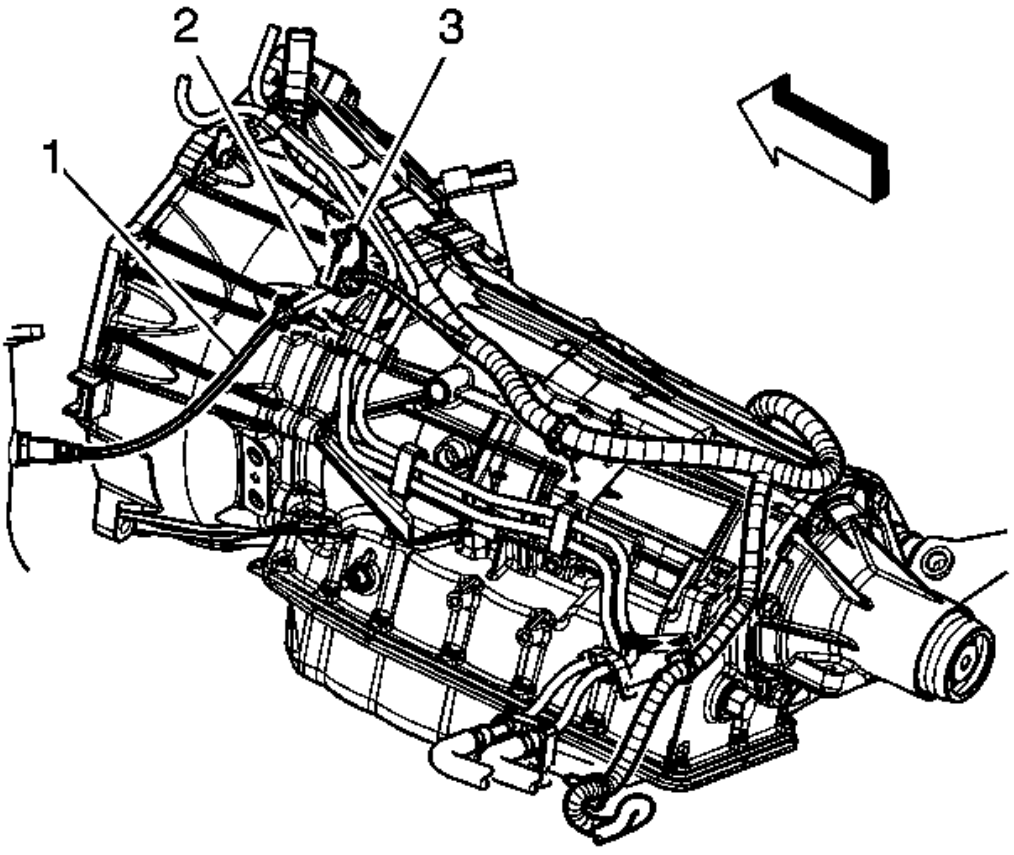


Fig. 137: View Of Front HO2S, Electrical Connector & CPA Retainer
Courtesy of GENERAL MOTORS CORP.

10. Remove the connector position assurance (CPA) retainer (3) from the left front heated oxygen sensor (HO2S).
11. Disconnect the engine wiring harness electrical connector (2) from the left front HO2S (1) electrical connector.

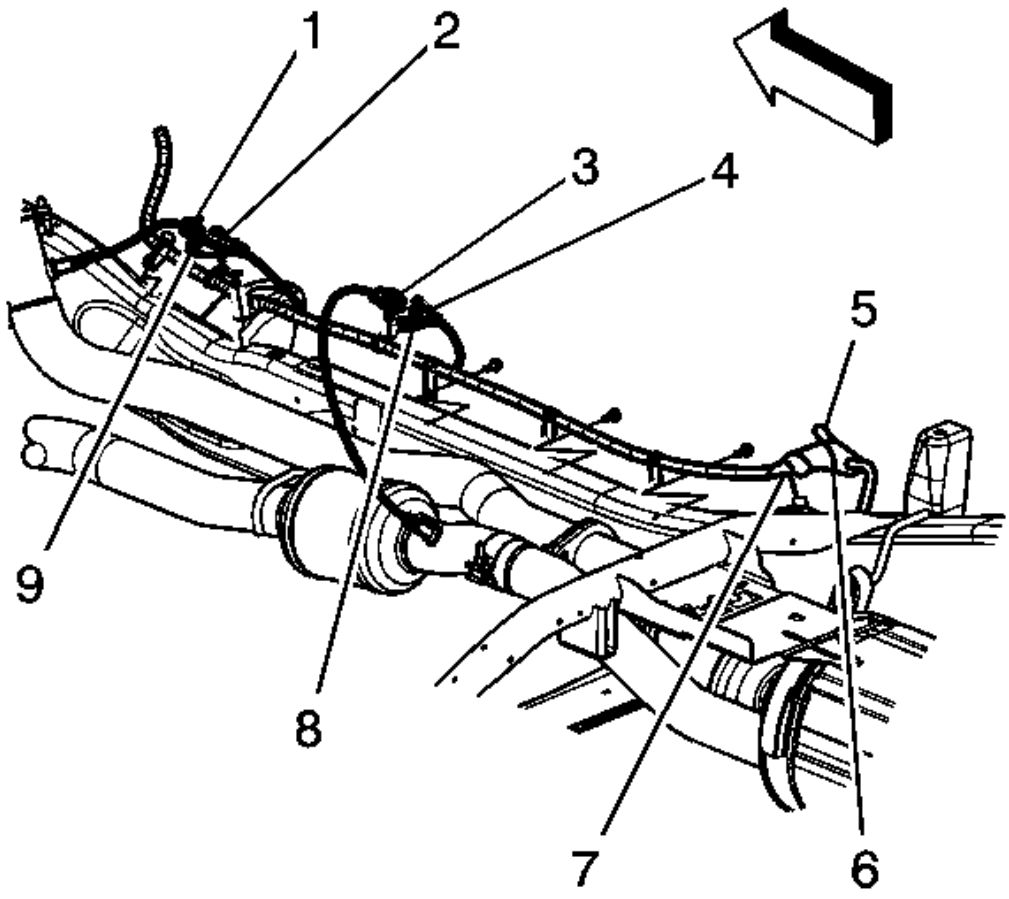


Fig. 138: View Of Rear HO2S, CPA Retainers & Electrical Connectors
Courtesy of GENERAL MOTORS CORP.

12. Remove the CPA retainer (8) from the left rear HO2S.
13. Disconnect the engine wiring harness electrical connector (4) from the left rear HO2S electrical connector (3).

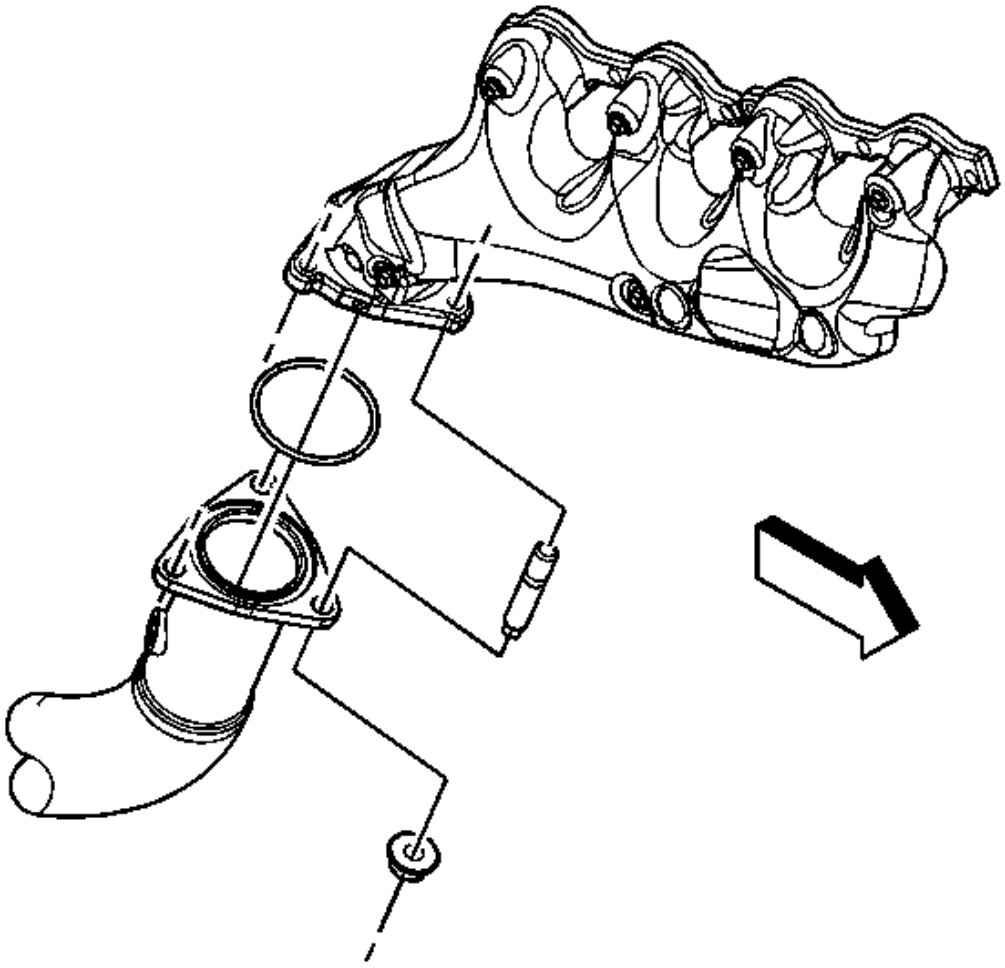


Fig. 139: View Of Exhaust Manifold Pipe, Gasket, Bolt & Manifold
Courtesy of GENERAL MOTORS CORP.

14. Loosen the exhaust manifold pipe to exhaust manifold nuts.

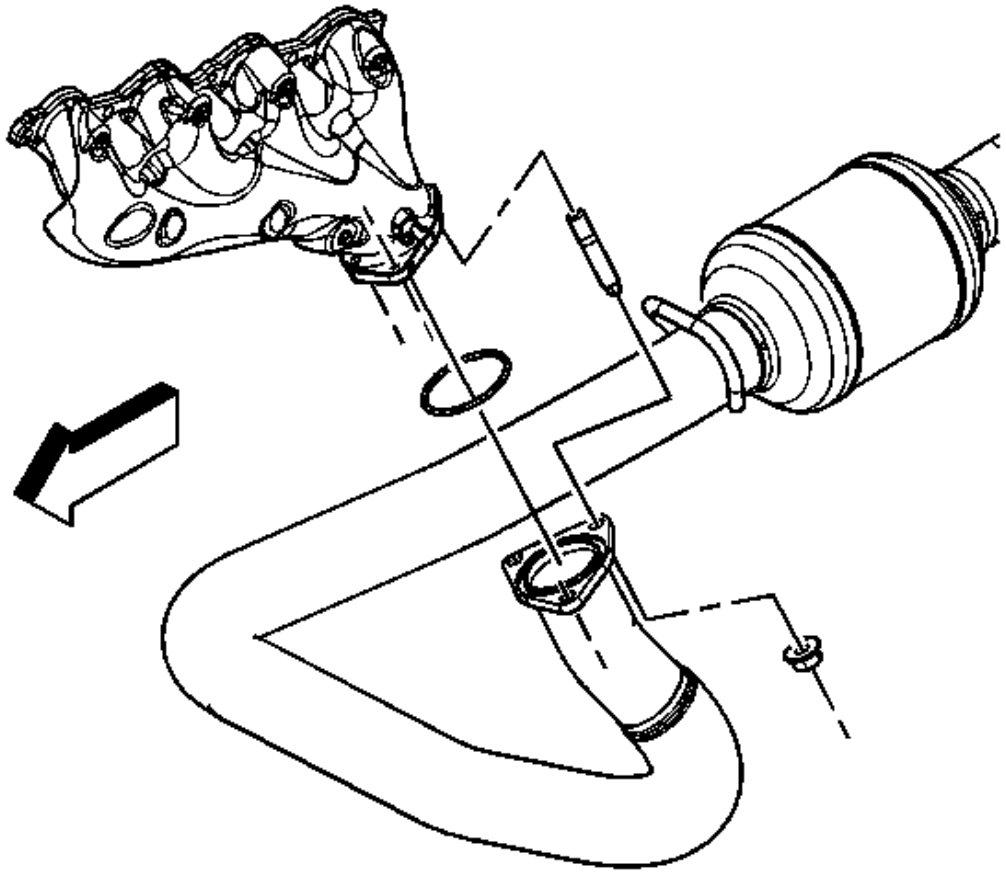


Fig. 140: View Of Exhaust Manifold, Bolts, Catalytic Converter & Gasket
Courtesy of GENERAL MOTORS CORP.

15. Remove the left catalytic converter to exhaust manifold nuts.
16. Using the transmission jack, lower the transmission slightly.

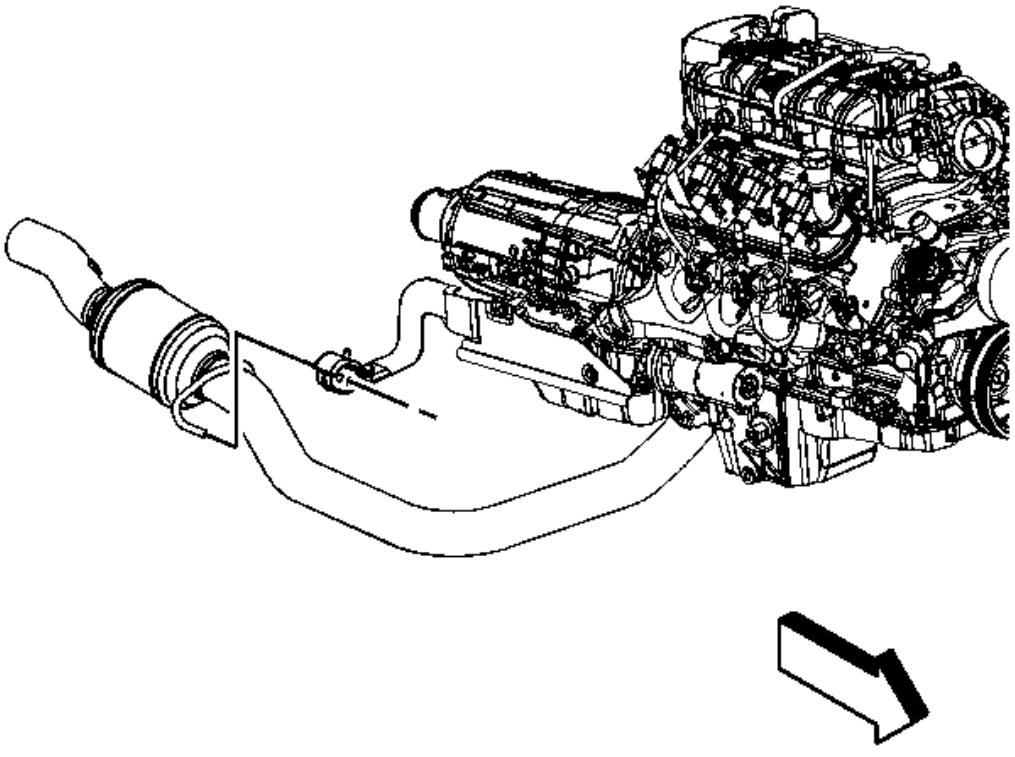


Fig. 141: View Of Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

17. Remove the left catalytic converter.

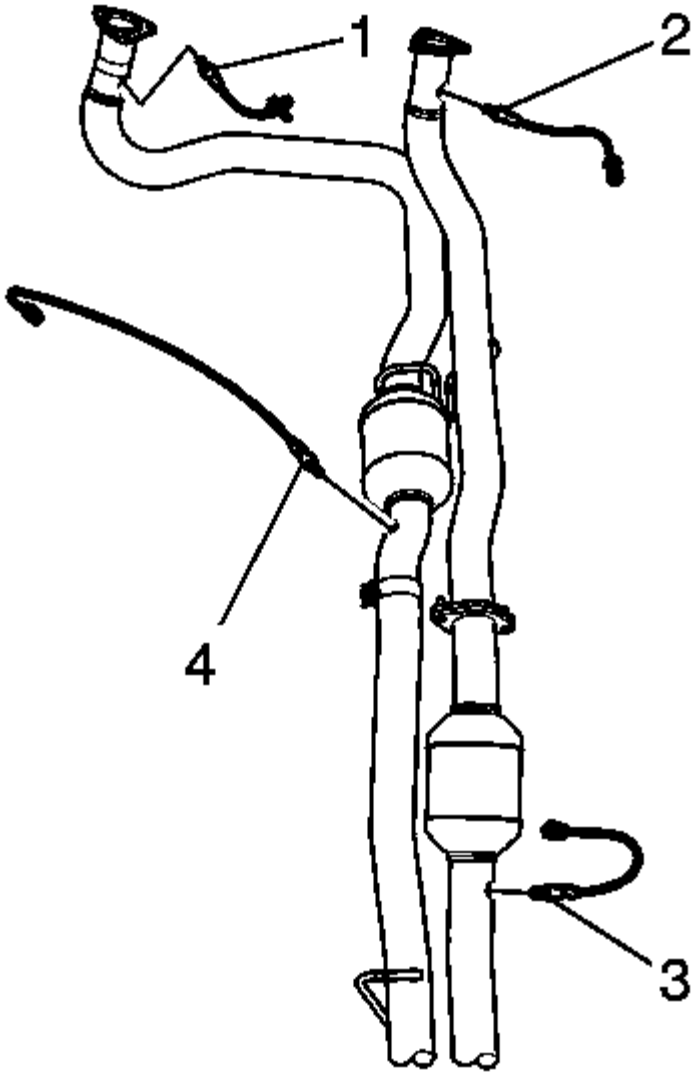


Fig. 142: View Of Catalytic Converter HO2S
Courtesy of GENERAL MOTORS CORP.

18. If the left catalytic converter is being replaced, remove the HO2S (1 and 4).

Installation Procedure

IMPORTANT: A special anti-seize compound is used on the HO2S threads. The

compound consists of liquid graphite and glass beads. The graphite tends to burn away, but the glass beads remain, making the sensor easier to remove. New, or service replacement sensors already have the compound applied to the threads. If the sensor is removed from an exhaust component and if for any reason the sensor is to be reinstalled, the threads must have the anti-seize compound applied before the reinstallation.

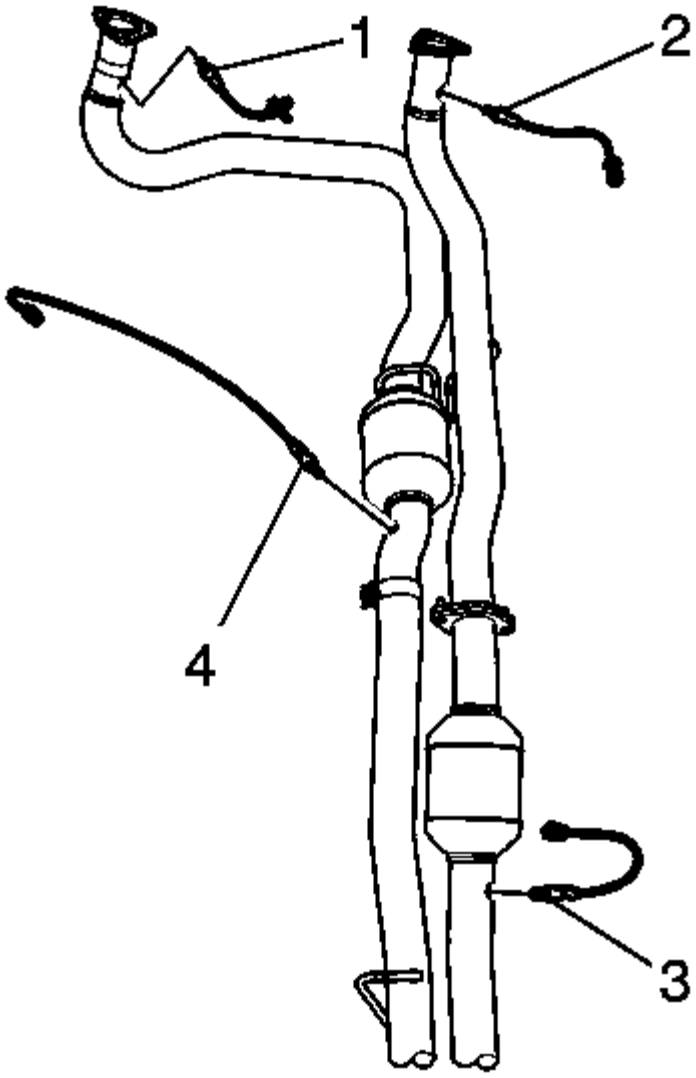


Fig. 143: View Of Catalytic Converter HO2S
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. If the left catalytic converter was replaced, perform the following steps:
    1. If reinstalling the old sensor, coat the threads with anti-seize compound GM P/N

12377953 or equivalent.

2. Install the HO2S (1 and 4).

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

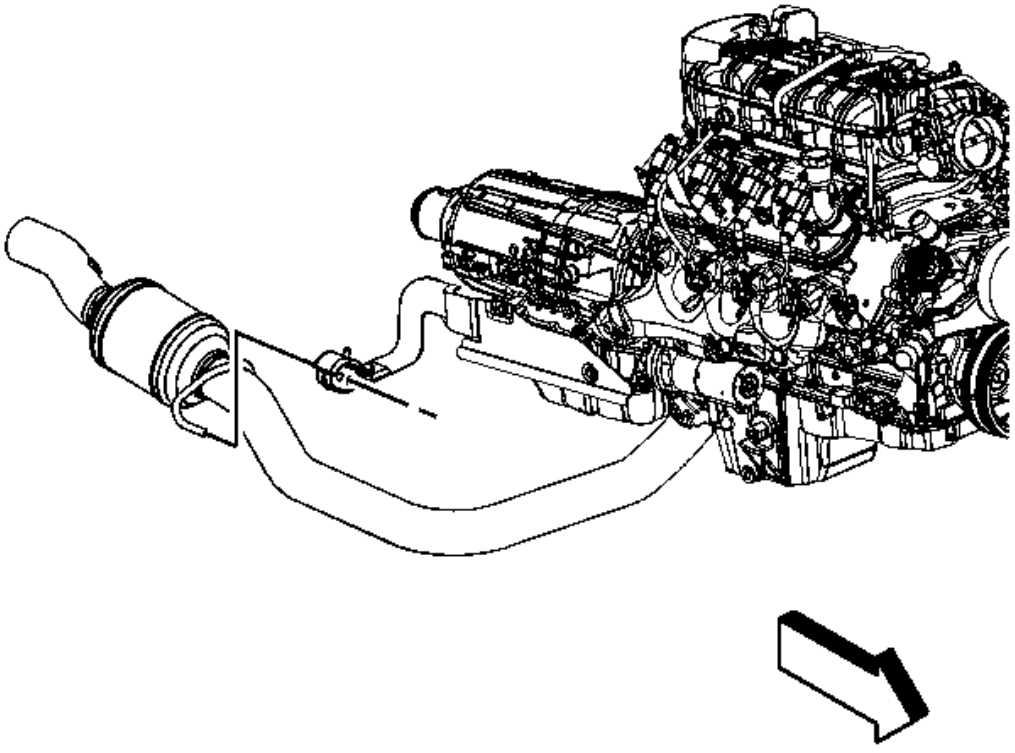


Fig. 144: View Of Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

2. Install the left catalytic converter.

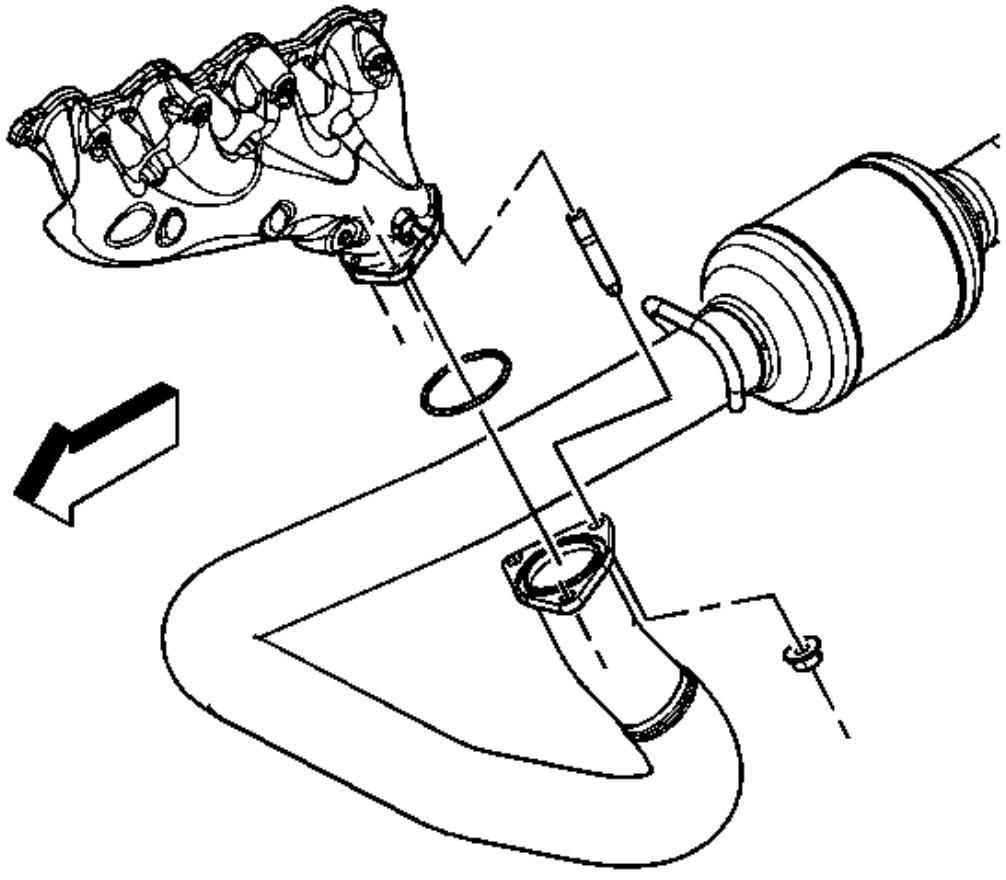


Fig. 145: View Of Exhaust Manifold, Bolts, Catalytic Converter & Gasket
Courtesy of GENERAL MOTORS CORP.

3. Using the transmission jack, raise the transmission slightly.
4. Install the left catalytic converter to exhaust manifold nuts.

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

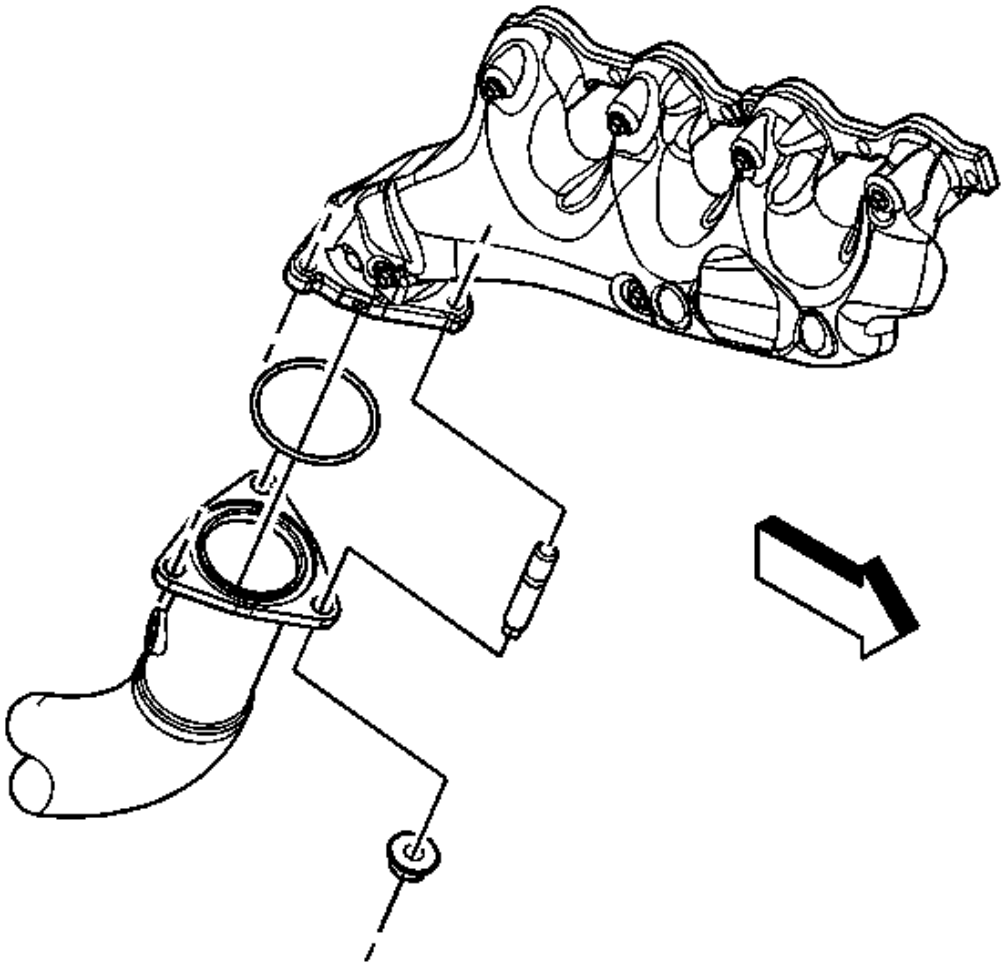


Fig. 146: View Of Exhaust Manifold Pipe, Gasket, Bolt & Manifold
Courtesy of GENERAL MOTORS CORP.

5. Tighten the exhaust manifold pipe to exhaust manifold nuts.

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

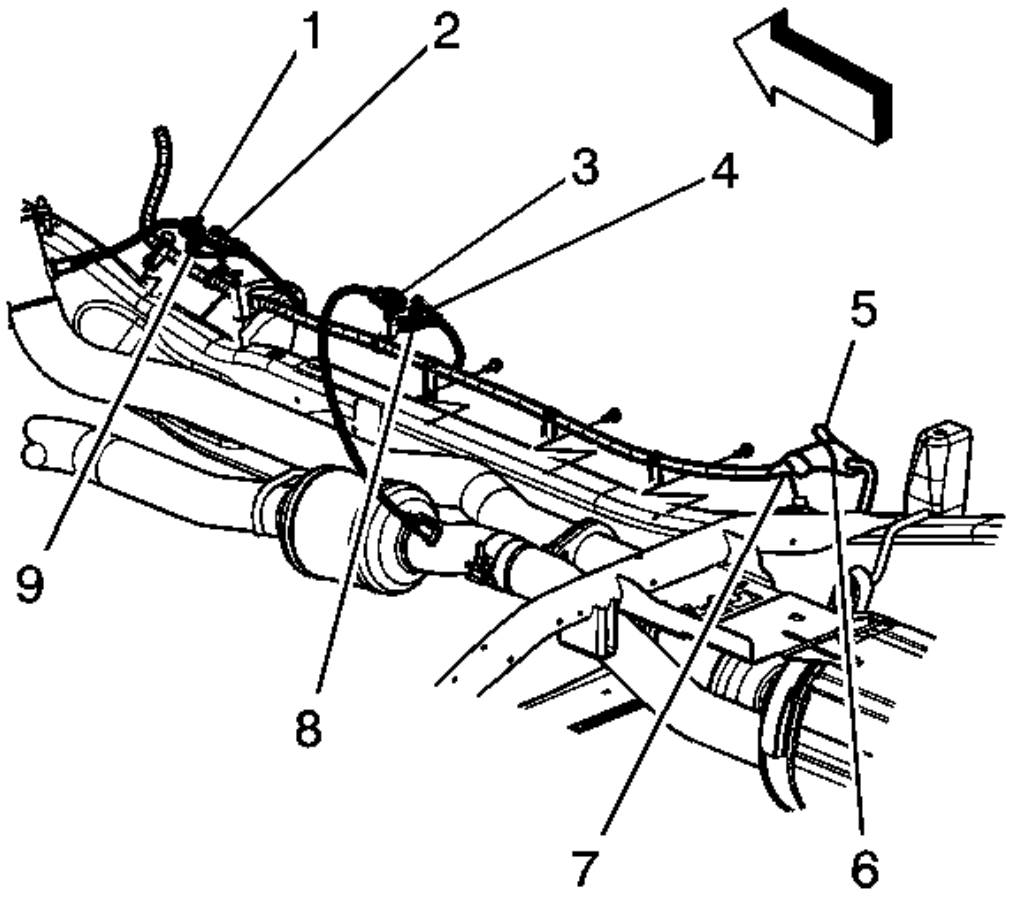


Fig. 147: View Of Rear HO2S, CPA Retainers & Electrical Connectors
Courtesy of GENERAL MOTORS CORP.

6. Connect the engine wiring harness electrical connector (4) to the left rear HO2S electrical connector (3).
7. Install the CPA retainer (8) to the left rear HO2S.

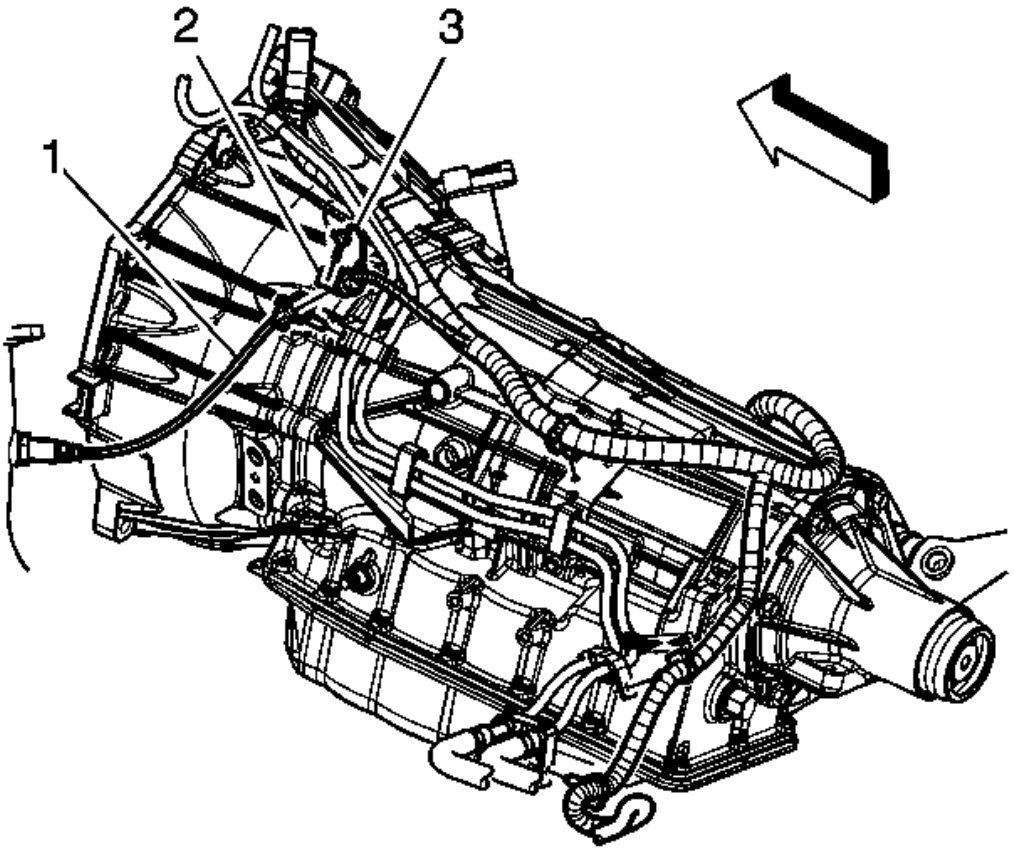


Fig. 148: View Of Front HO2S, Electrical Connector & CPA Retainer
Courtesy of GENERAL MOTORS CORP.

8. Connect the engine wiring harness electrical connector (2) to the left front HO2S (1) electrical connector.
9. Install the CPA retainer (3) to the left front HO2S.

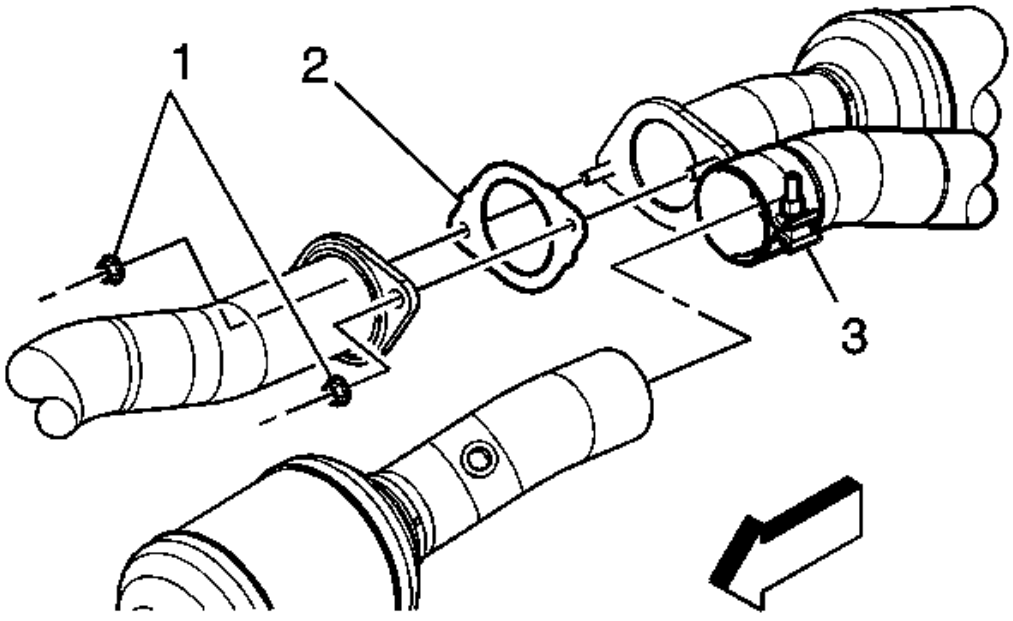


Fig. 149: View Of Exhaust Muffler, Exhaust Manifold Pipe, Gasket & Nuts
Courtesy of GENERAL MOTORS CORP.

10. Tighten the exhaust muffler clamp (3).

    Tighten: Tighten the clamp to 47 N.m (35 lb ft).

11. Install any necessary exhaust muffler insulators that were separated from the muffler.
12. Remove the jack stand from under the muffler.

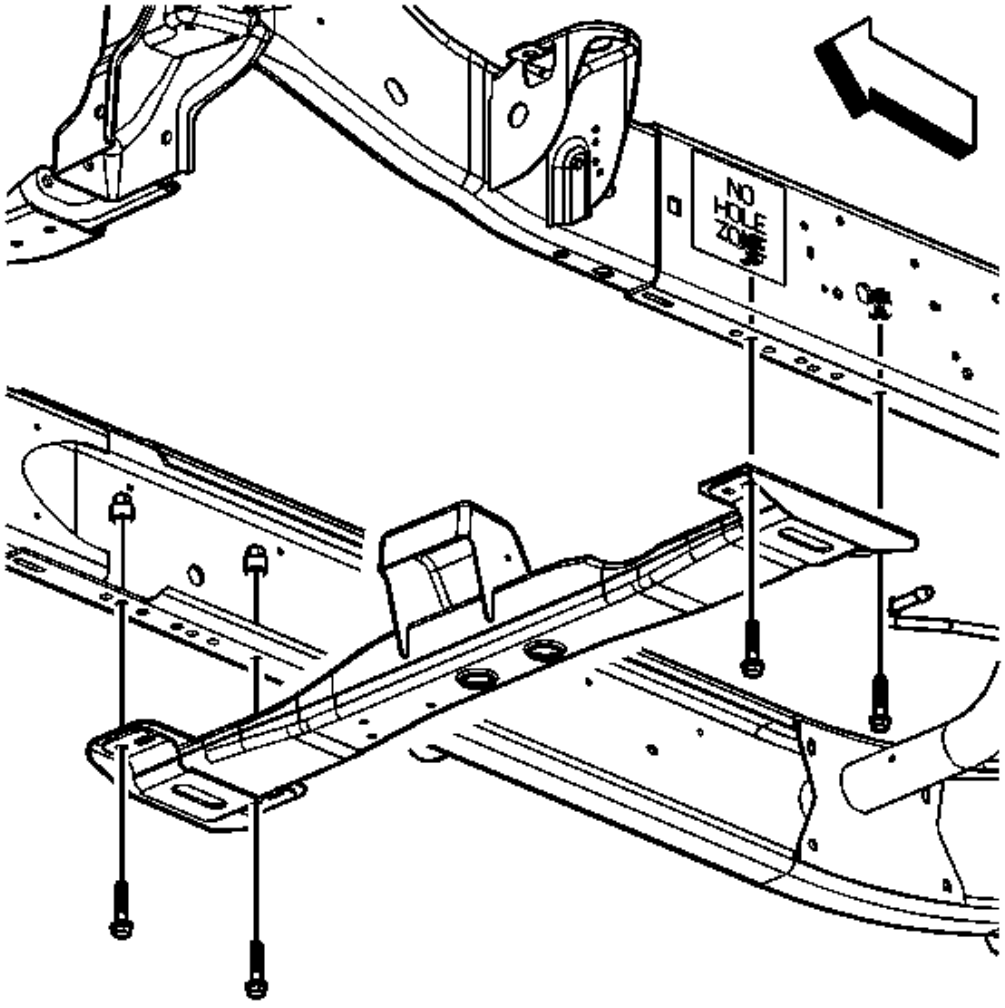


Fig. 150: View Of Transmission Support Crossmember & Bolts
Courtesy of GENERAL MOTORS CORP.

13. Position the transmission support crossmember.
14. Install the transmission support crossmember bolts.

Tighten: Tighten the bolts to 95 N.m (70 lb ft).

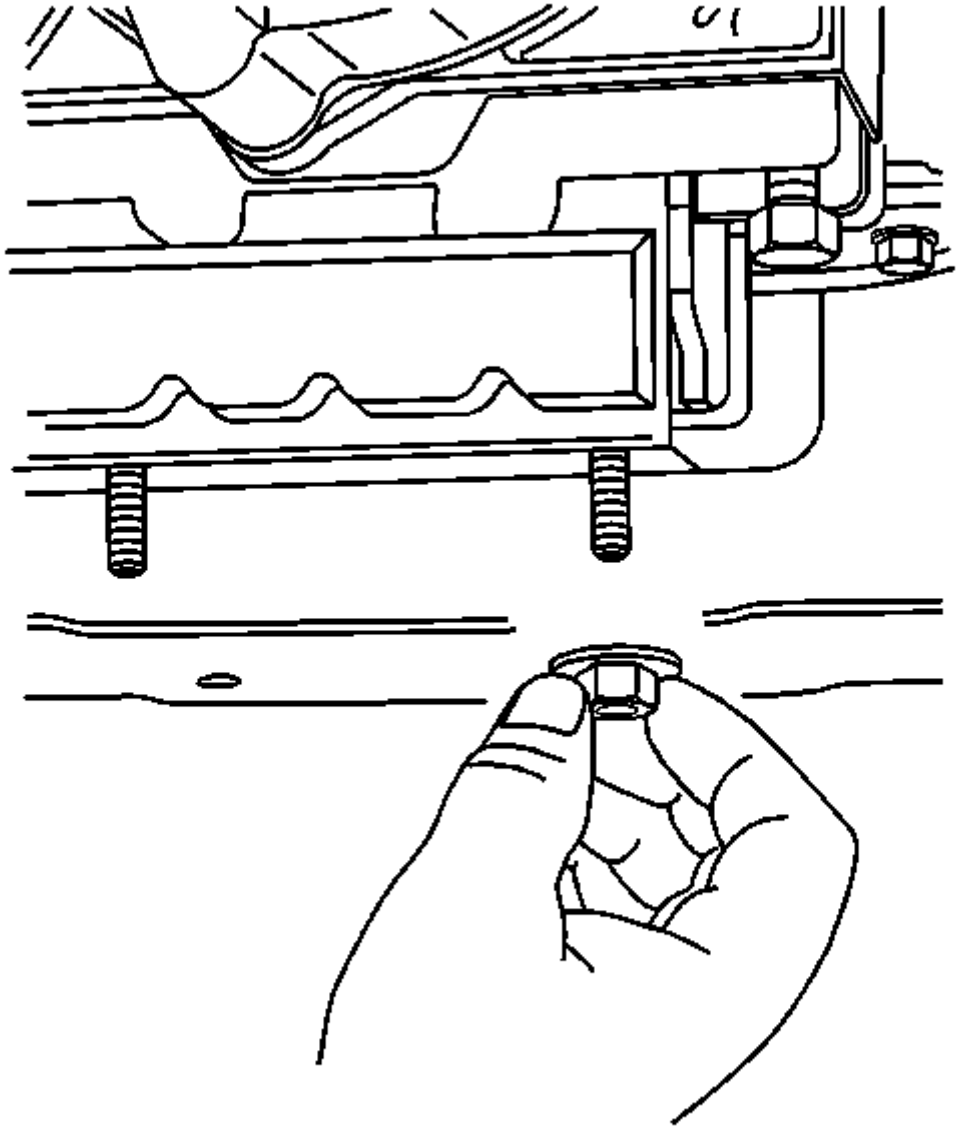


Fig. 151: Identifying Transmission Mount Nuts
Courtesy of GENERAL MOTORS CORP.

15. Using the transmission jack, lower the transmission onto the transmission support.
16. Install the transmission mount to transmission support nuts.

Tighten: Tighten the nuts to 95 N.m (70 lb ft).

17. Remove the support from the transmission.
18. Lower the vehicle.

EXHAUST PARTICULATE FILTER CLEANING (LMM DPF REGENERATION ENABLE)

DPF Regeneration Enable

IMPORTANT: The DPF Regeneration Enable is required when specific service procedures have been performed. Do not perform a DPF Regeneration Enable unless instructed to in the Repair Instruction section of the service procedure. After the system repair perform the following to avoid possible damage to the DPF.

1. Ignition ON, clear all DTCs with a scan tool.
2. Select DPF Regeneration Enable within the Special Function menu.
3. Select ON.
   - The selection can be confirmed by the DPF Regeneration Reason parameter indicating Device Control.
4. Exit the Special Function Menu. The scan tool can now be removed.

The vehicle will perform an active Regeneration as soon as the engine running conditions are met.

EXHAUST PARTICULATE FILTER CLEANING (LMM DPF SERVICE REGENERATION)

CAUTION: Tailpipe outlet exhaust temperature will be greater than 300°C (572°F) during service regeneration. To help preven t personal injury or property damage from fire or burns, perform the following:

1. **Do not connect any shop exhaust removal hoses to the vehicle's tailpipe.**
2. **Park the vehicle outdoors and keep people, other vehicles, and combustible material away during service regeneration.**
3. **Do not leave the vehicle unattended.**

CAUTION: To avoid extremely elevated exhaust temperatures, inspect

and remove any debris or mud build up at the exhaust cooler located at the tailpipe.

NOTE: Due to the elevated engine temperatures created while performing this procedure it is imperative to keep the front of vehicle in an open environment, with the hood open, away from any walls or buildings. This will ensure proper airflow across the radiator.

Conditions for Running

The following conditions must be met in order to enable DPF Service Regeneration:

IMPORTANT: Do not refuel the vehicle during DPF Service Regeneration.

- There are no active DTCs displayed.
- The battery voltage is greater than 10 volts.
- The engine speed is between 600-1,250 RPM.
- The exhaust gas temperature (EGT) sensors 1 and 2 are less than 400°C (752°F).
- The engine coolant temperature (ECT) sensor 1 is between 70-115°C (158-239°F).
- The brake pedal and accelerator pedal are in the released position.
- The transmission is in Park or Neutral.

Test Procedure

1. Clear all DTCs with a scan tool before proceeding with DPF Service Regeneration.
2. Observe the scan tool DPF Regenerations Completed parameter and record the value.
3. Check the following fluid levels before and after this procedure:
    - Engine oil
    - Engine coolant
    - Power steering
    - Transmission
    - Fuel level should be over 15 percent to ensure a successful regeneration.
4. Park the vehicle outside the facility, away from any obstacles, place the transmission in Park and apply the parking brake.
5. Ensure the hood is open.
6. Select DPF Service Regeneration in the Output Controls menu and follow the instruction on

the scan tool.

7. Command the DPF Service Regeneration with the scan tool.
8. The DPF Service Regeneration will take approximately 35 minutes consisting of the following:
    1. 8 minutes for the exhaust system to warm up, with the engine speed slowly increasing to 1,600 RPM, then 2,200 RPM and finally 2,500 RPM
    2. 20 minutes for the DPF to regenerate at 2,500 RPM
    3. 3 minutes for the exhaust system to cool down with the engine speed will slowly returning to 1,400 RPM
    4. 3 minutes at 800 RPM, then idle speed of 680 RPM
9. The DPF Service Regeneration will be terminated if any of the following actions are performed:
    - Applying the brake pedal
    - Applying the accelerator pedal
    - Selecting Drive or Reverse
    - Commanding DPF Service Regeneration OFF using the scan tool or disconnecting the scan tool from the vehicle

IMPORTANT:

- **The DPF Service Regeneration will be automatically terminated if certain DTCs are set or if the DPF or ECT temperatures exceed a calibrated threshold.**
- **Temporary blue, gray, or white smoke during this procedure may be an indication of a fuel with high sulfur content.**

10. After the service regeneration completes, allow the vehicle to idle for an additional 2 minutes while monitoring the scan tool DTC information. There should be no additional DTCs setting.
    - If DTC P244B sets, replace the Exhaust Particulate Filter.
    - If service regeneration aborted or failed, repair the vehicle for the condition indicated by the scan tool DPF Regen Inhibit Reason parameter. Refer to the Service Regeneration Fault Table below.
11. Ignition OFF for 90 seconds, perform the following within 10 minutes of a completed service regeneration. Operate the vehicle within the following conditions to run the DTC. Refer to **DTC P2002** .
    - If DTC P2002 sets, replace the Exhaust Particulate Filter.

12. Verify that the scan tool DPF Soot Mass parameter is less than 10 grams.
    - If greater than the specified range, refer to **Service Regeneration Unsuccessful**.
13. Verify that the scan tool DPF Regenerations Completed parameter has increased by one.
    - If the value has not increased by one, refer to **Service Regeneration Unsuccessful**.

Service Regeneration Unsuccessful

- The scan tool DPF Regen Inhibit Reason parameter, will display a reason for not enabling DPF Service Regeneration. Refer to the parameters that are displayed.
- The scan tool DPF Regeneration Status parameter will display Active or Required depending on the current commanded state of regeneration.
- The scan tool DPF Regenerations Completed parameter did not increment.
- The scan tool DPF Soot Mass parameter, will display greater than 10 grams, indicating excessive particulate matter is still present in the filter.

Service Regeneration Status Fault Table

DPF Regeneration Parameters	Successful Regeneration	Unsuccessful Regeneration
DPF Regeneration Status	Complete	Active or Required
DPF Regeneration Reason	None	Fuel Used Engine Run Time Distance Traveled DPF Pressure Soot Mass Calculated Soot
DPF Regeneration Inhibit Reason	None	Varies
DPF Soot Mass	Less than 10 grams	Greater than 10 grams

EXHAUST PARTICULATE FILTER REPLACEMENT (6.6L - PICKUP)

Removal Procedure

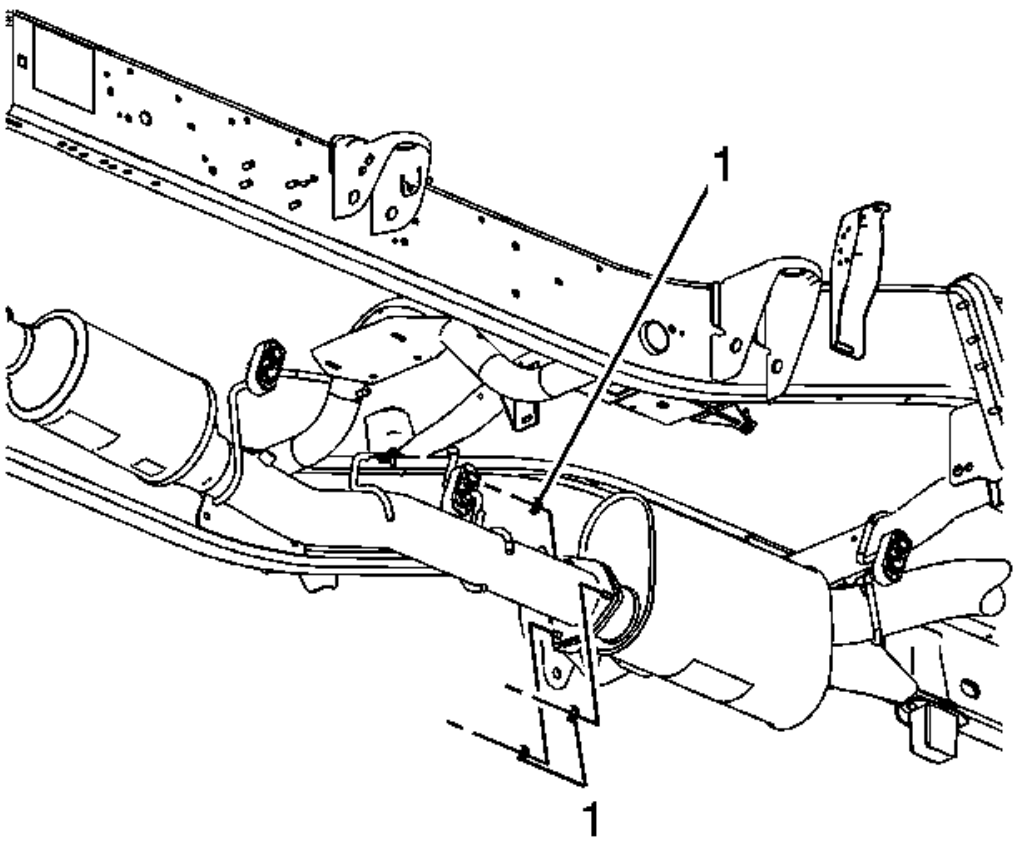


Fig. 152: View Of Exhaust Particulate Filter Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.
2. Remove the exhaust temperature sensors. Refer to **Exhaust Temperature Sensor Replacement - Position 1** and **Exhaust Temperature Sensor Replacement - Position 2** .
3. Remove the exhaust pressure differential sensor pipe. Refer to **Exhaust Pressure Differential Sensor Pipe Replacement (Pickup)** or **Exhaust Pressure Differential Sensor Pipe Replacement (Cab/Chassis)** .
4. Remove the exhaust muffler to exhaust particulate filter nuts (1).

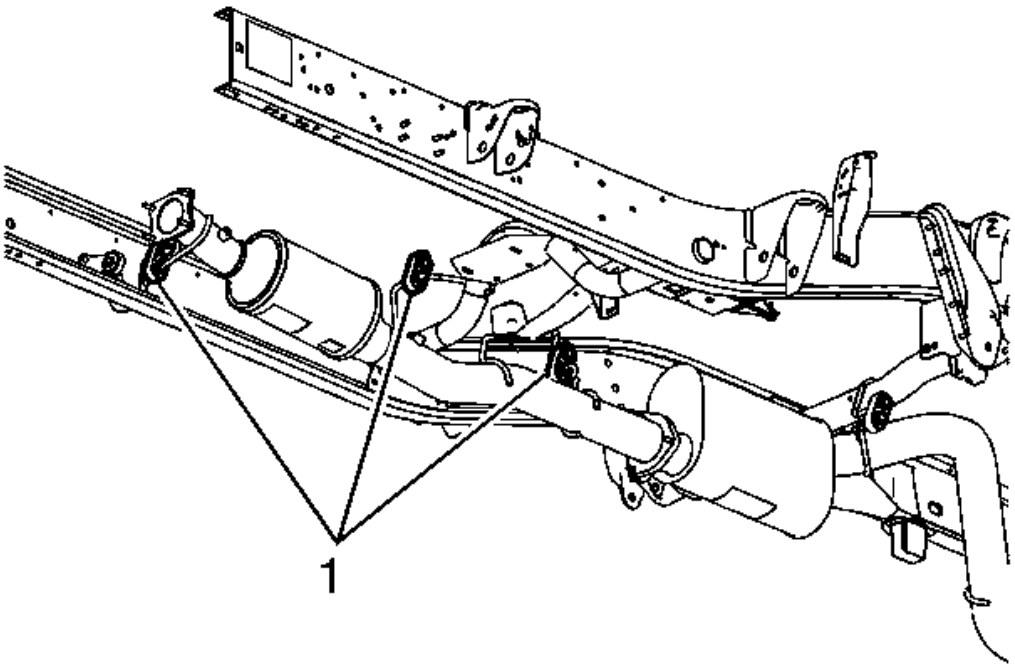


Fig. 153: View Of Exhaust Insulators
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust particulate filter hangers from the exhaust insulators (1).

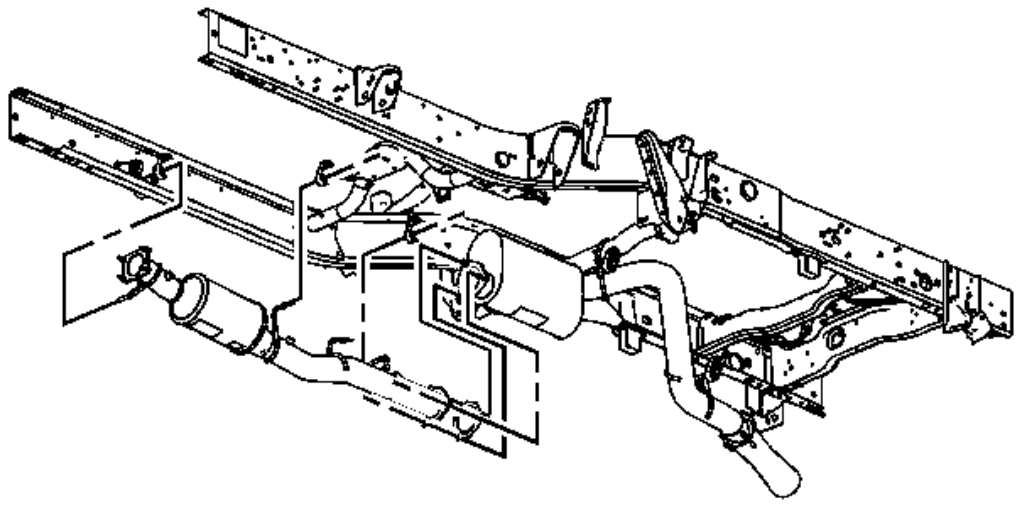


Fig. 154: View Of Exhaust Particulate Filter
Courtesy of GENERAL MOTORS CORP.

6. Remove the exhaust particulate filter. (2500/3500 crew cab shown, regular/extended cabs similar).
7. Remove and discard the exhaust particulate filter to muffler gasket.

Installation Procedure

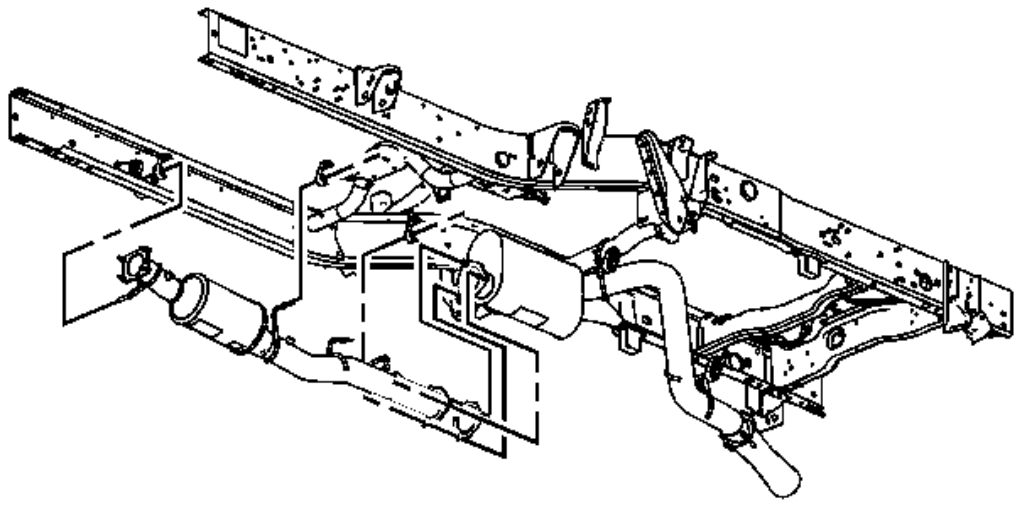


Fig. 155: View Of Exhaust Particulate Filter
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW gasket onto the exhaust muffler studs.
2. Install the exhaust particulate filter to the muffler studs.

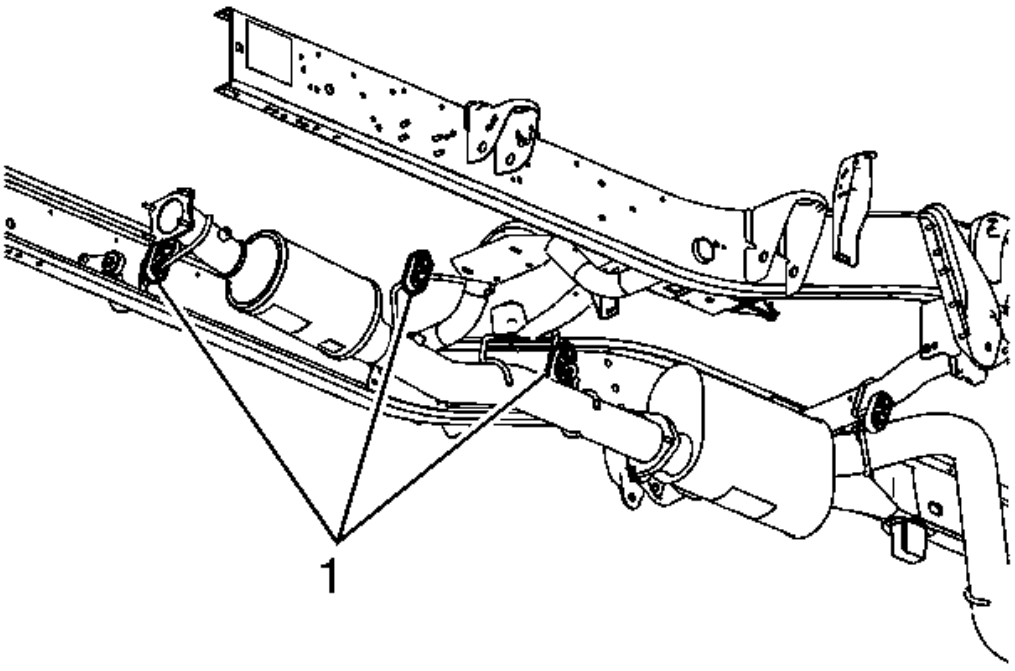


Fig. 156: View Of Exhaust Insulators
Courtesy of GENERAL MOTORS CORP.

3. Install the exhaust particulate filter hangers to the exhaust insulators (1).

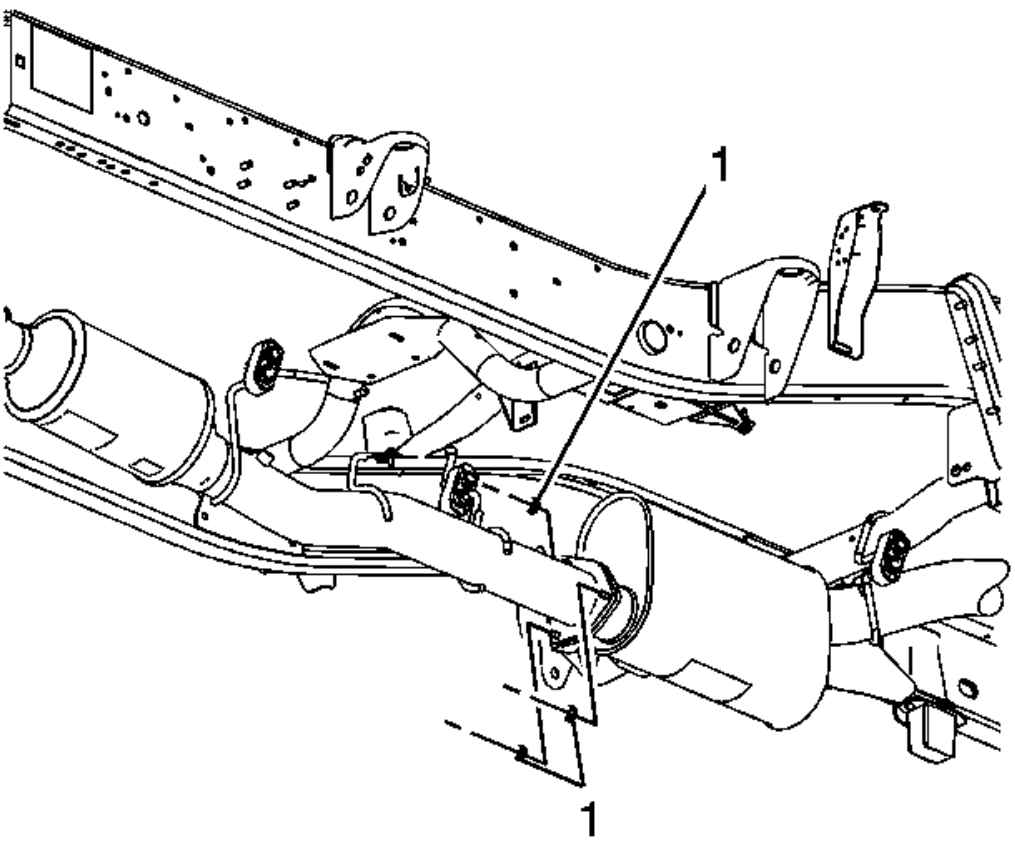


Fig. 157: View Of Exhaust Particulate Filter Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

4. Install the exhaust muffler to exhaust particulate filter nuts (1).

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

5. Install the exhaust pressure differential sensor pipe. Refer to **Exhaust Pressure Differential Sensor Pipe Replacement (Pickup)** or **Exhaust Pressure Differential Sensor Pipe Replacement (Cab/Chassis)** .
6. Install the exhaust temperature sensors. Refer to **Exhaust Temperature Sensor Replacement - Position 1** and **Exhaust Temperature Sensor Replacement - Position**

2 .

7. Install the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.
8. Using a scan tool, perform the DPF Reset For Replace DPF.

EXHAUST PARTICULATE FILTER REPLACEMENT (6.6L - CAB/CHASSIS)

Removal Procedure

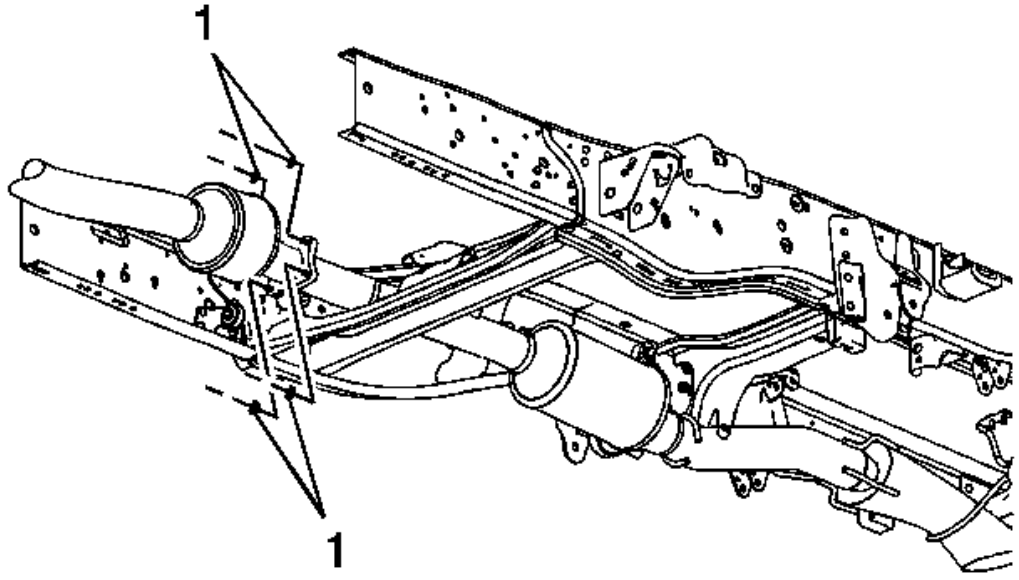


Fig. 158: View Of Exhaust Particulate Filter Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the exhaust temperature sensors. Refer to **Exhaust Temperature Sensor Replacement - Position 1** and **Exhaust Temperature Sensor Replacement - Position 2** .
2. Remove the exhaust pressure differential sensor pipe. Refer to **Exhaust Pressure Differential Sensor Pipe Replacement (Pickup)** or **Exhaust Pressure Differential Sensor Pipe Replacement (Cab/Chassis)** .
3. Remove the catalytic converter to exhaust particulate filter nuts (1).

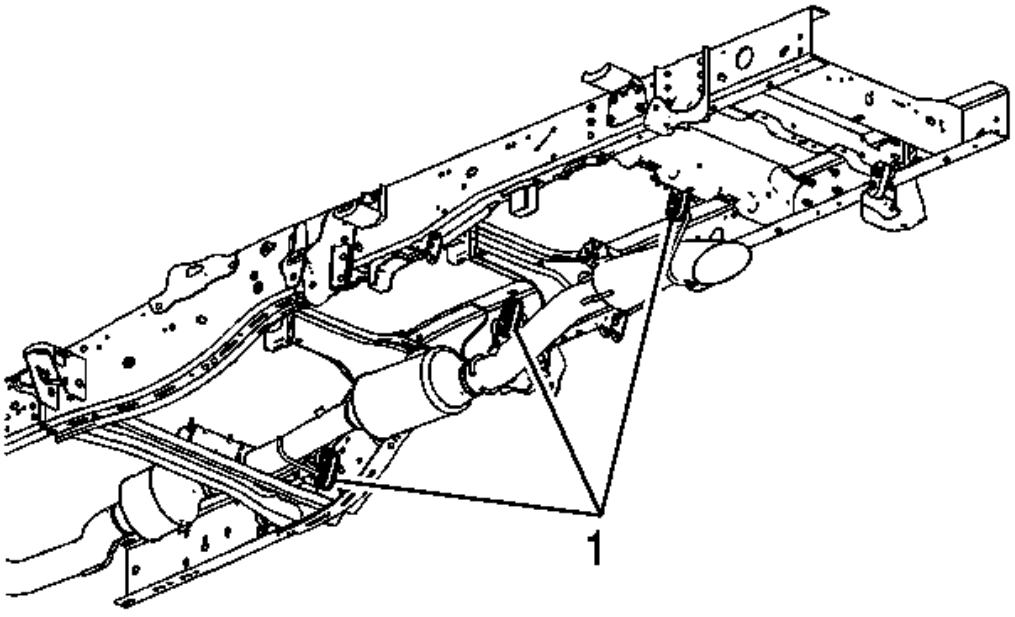


Fig. 159: View Of Exhaust Insulators
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust particulate filter hangers from the exhaust insulators (1).

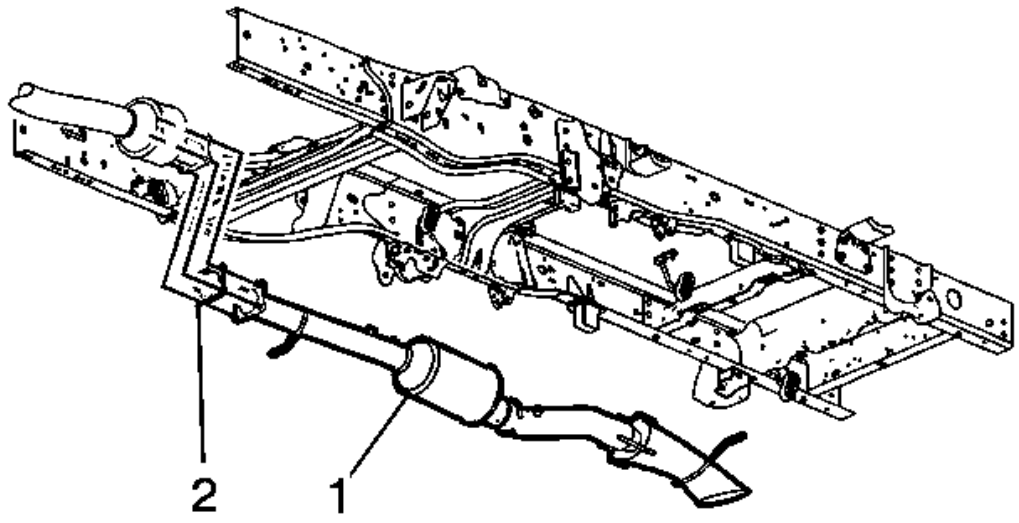


Fig. 160: View Of Exhaust Particulate Filter & Gasket
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust particulate filter (1).
6. Remove and discard the catalytic converter to particulate filter gasket (2).

Installation Procedure

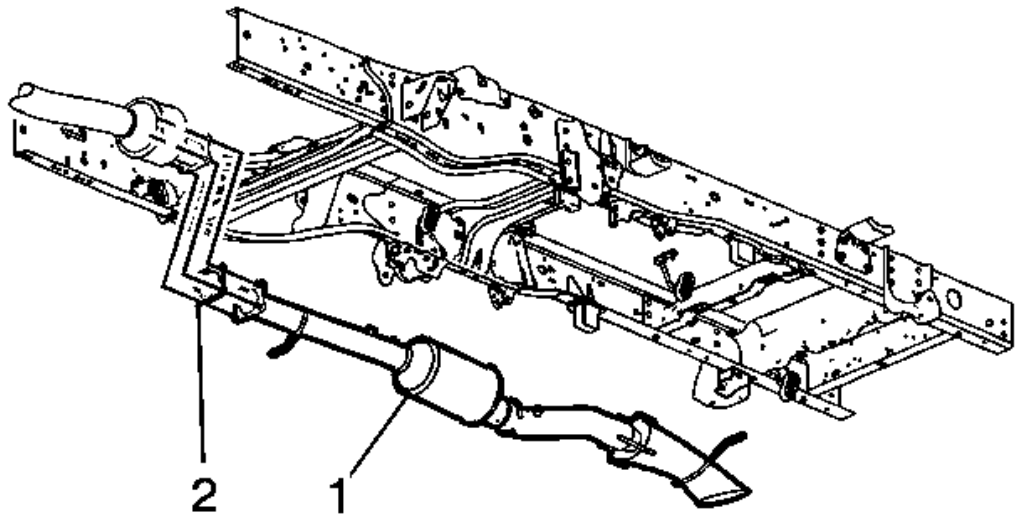


Fig. 161: View Of Exhaust Particulate Filter & Gasket
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW gasket (2) onto the exhaust particulate filter studs.
2. Install the exhaust particulate filter (1) to the catalytic converter.

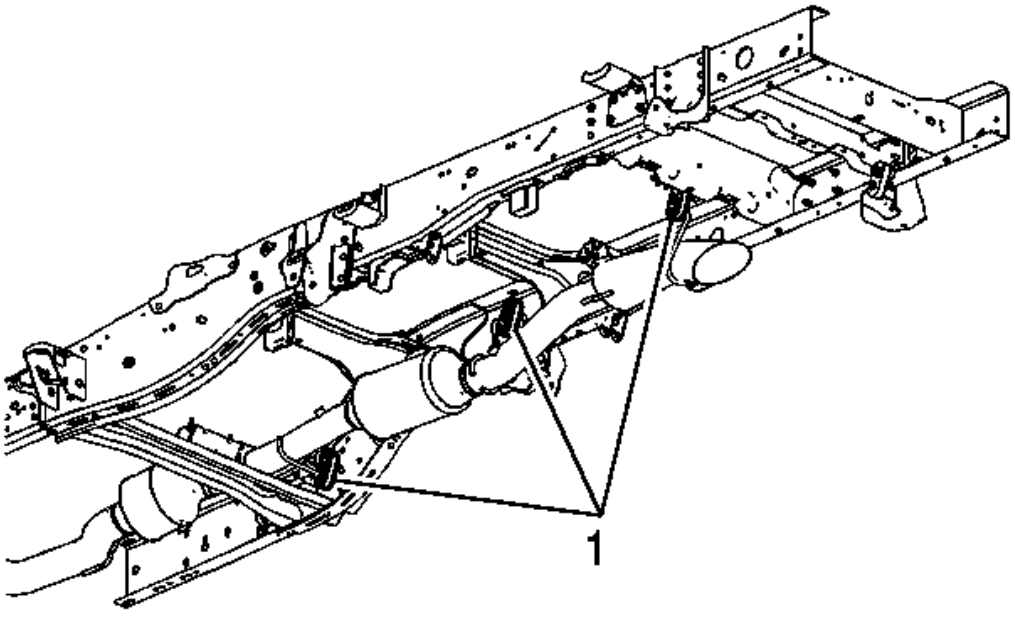


Fig. 162: View Of Exhaust Insulators
Courtesy of GENERAL MOTORS CORP.

3. Install the exhaust particulate filter hangers to the exhaust insulators (1).

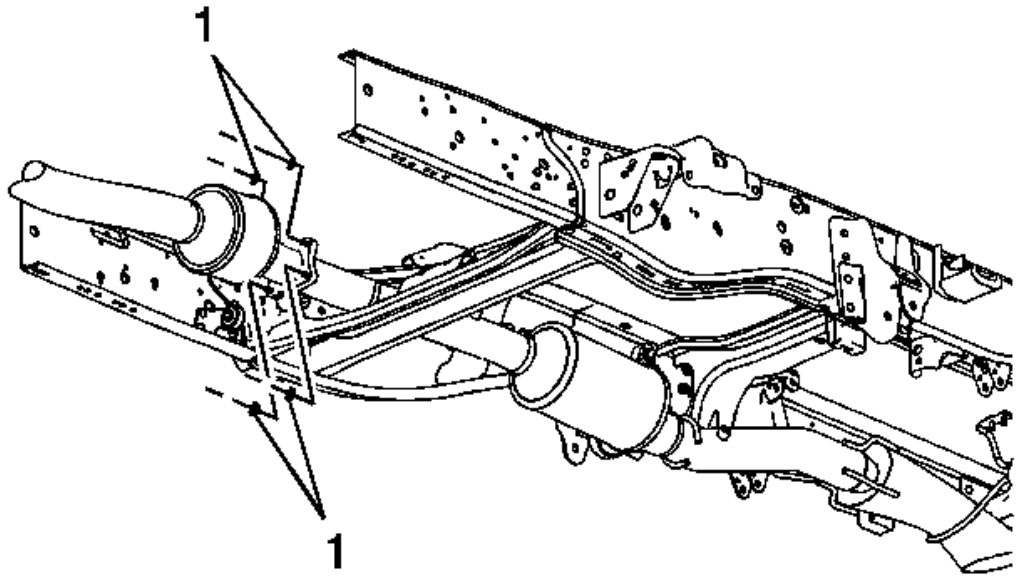


Fig. 163: View Of Exhaust Particulate Filter Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

4. Install the exhaust particulate filter to catalytic converter nuts (1).

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

5. Install the exhaust pressure differential sensor pipe. Refer to **Exhaust Pressure Differential Sensor Pipe Replacement (Pickup)** or **Exhaust Pressure Differential Sensor Pipe Replacement (Cab/Chassis)** .
6. Install the exhaust temperature sensors. Refer to **Exhaust Temperature Sensor Replacement - Position 1** and **Exhaust Temperature Sensor Replacement - Position 2** .
7. Using a scan tool, perform the DPF Reset For Replace DPF.

EXHAUST HANGER MOUNTING BRACKET REPLACEMENT (6.0L, 6.6L)

Removal Procedure

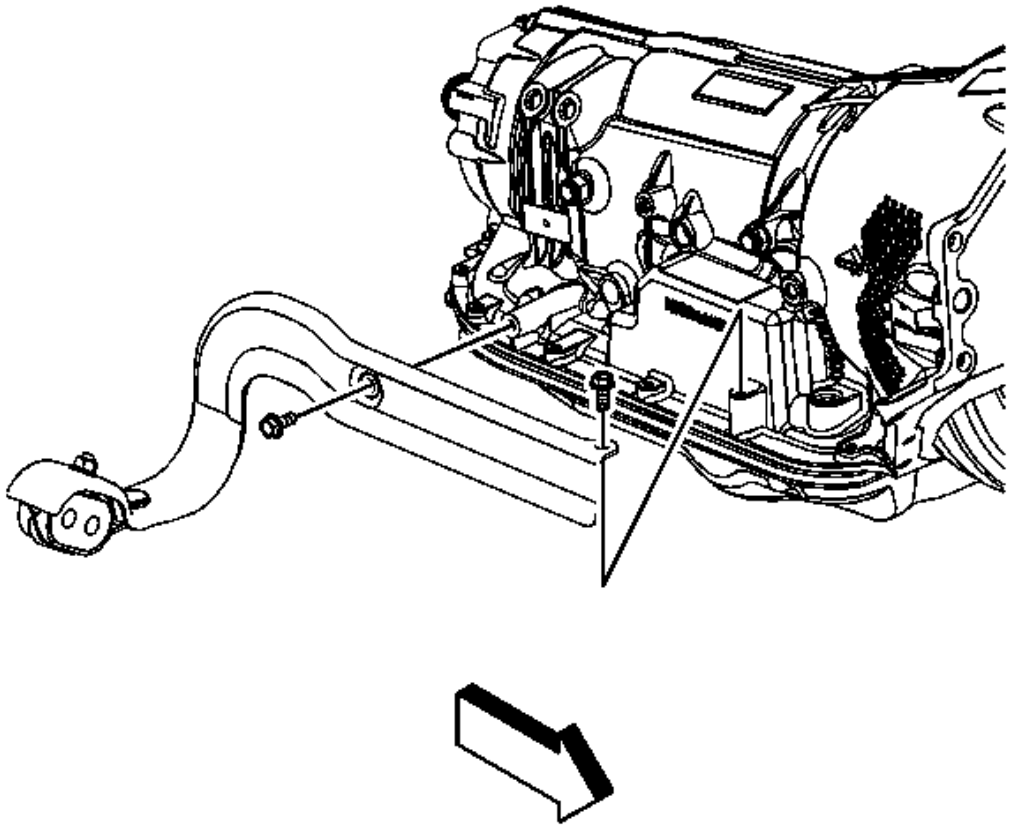


Fig. 164: View Of Exhaust Pipe Hanger Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

1. If equipped with a 6.0L engine, remove the exhaust manifold pipe. Refer to **Exhaust Manifold Pipe Replacement (6.0L - Cab/Chassis)**.
2. If equipped with a 6.0L engine, remove the left catalytic converter. Refer to **Catalytic Converter Replacement - Left Side (6.0L - Cab/Chassis)**.
3. If equipped with a 6.6L engine, remove the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.
4. If equipped with a 4L80-E automatic transmission, regular production option (RPO) MT1, remove the exhaust pipe hanger bracket bolts and bracket.

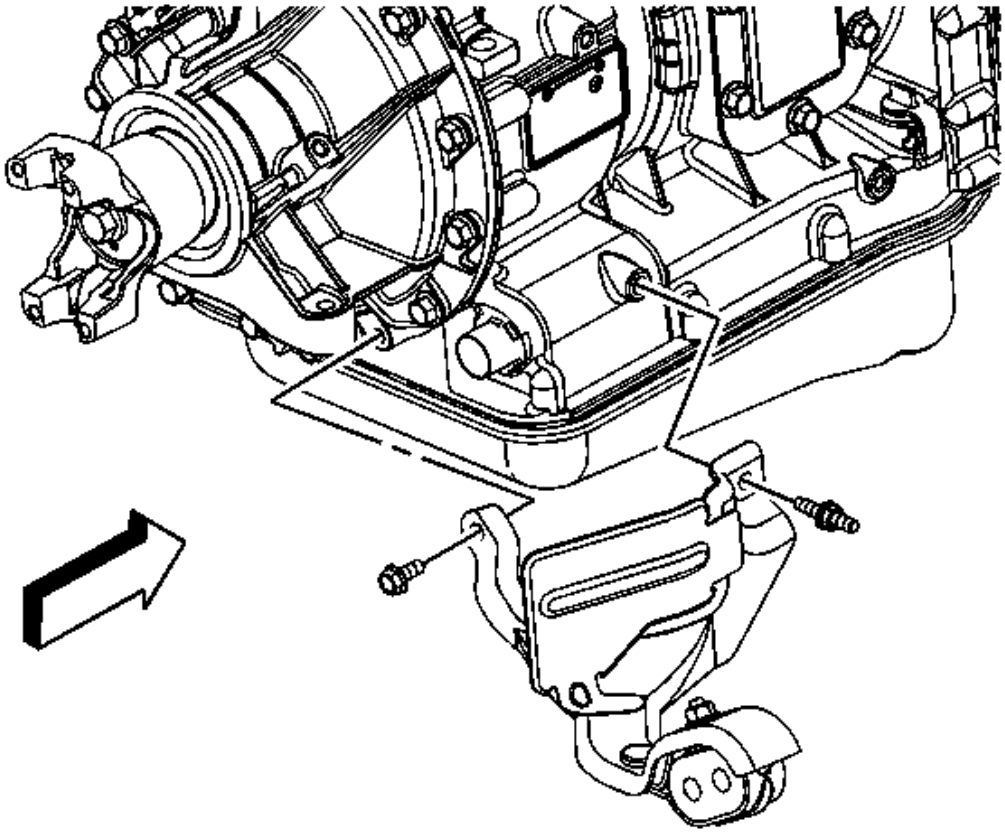


Fig. 165: View Of RPO MW7 Exhaust Pipe Hanger Bracket, Bolts & Studs
Courtesy of GENERAL MOTORS CORP.

5. If equipped with a Allison® automatic transmission, RPO MW7, remove the exhaust pipe hanger bracket bolt/stud and bracket.

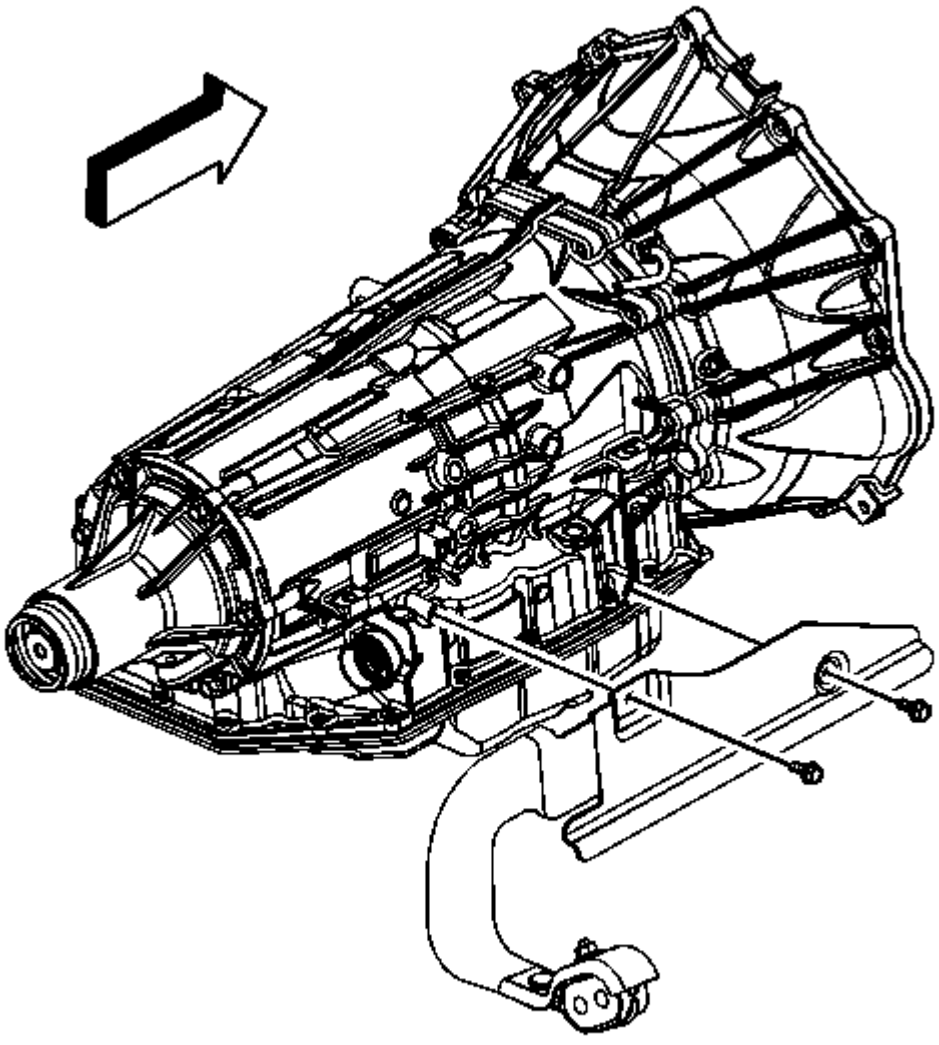


Fig. 166: View Of 6L90-E Exhaust Pipe Hanger Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

6. If equipped with a 6L90-E automatic transmission, RPO MYD, remove the exhaust pipe hanger bracket bolts and bracket.

Installation Procedure

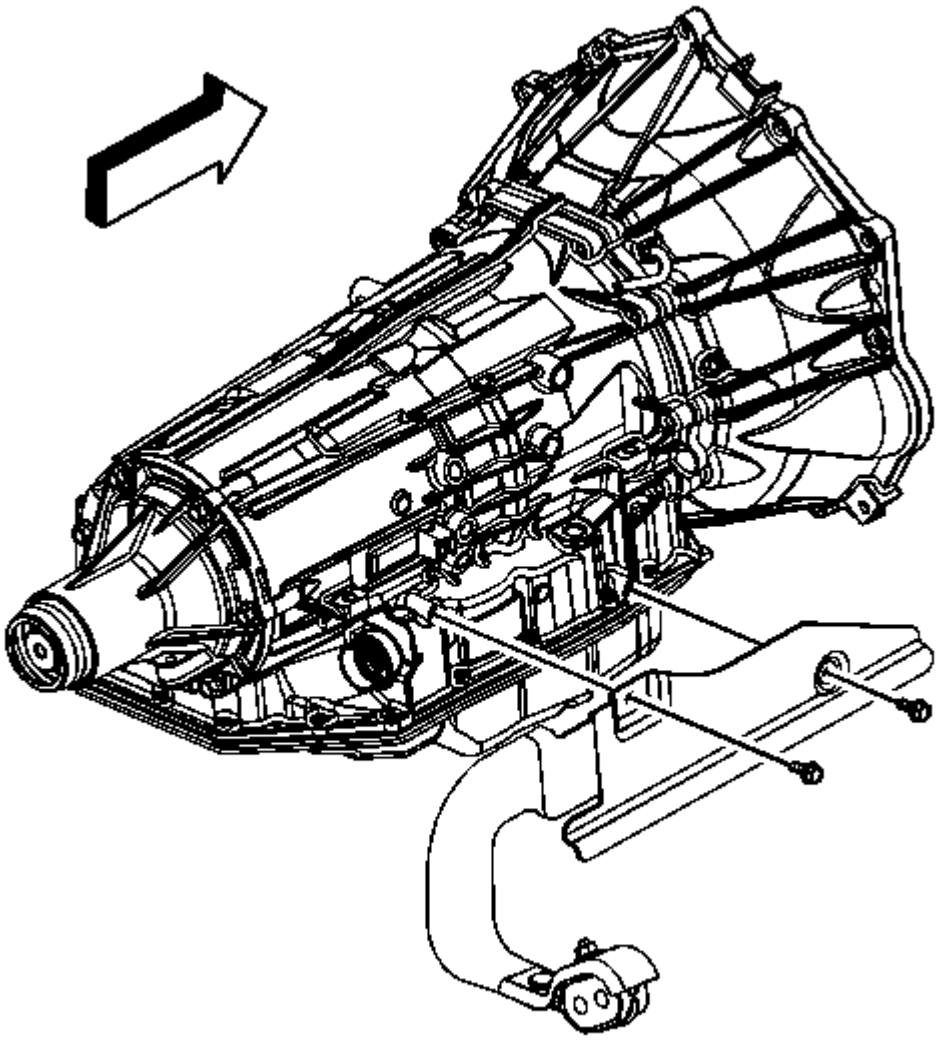


Fig. 167: View Of 6L90-E Exhaust Pipe Hanger Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. If equipped with a 6L90-E automatic transmission, RPO MYD, install the exhaust pipe hanger bracket and bolts.

Tighten: Tighten the bolts to 25 N.m (18 lb ft).

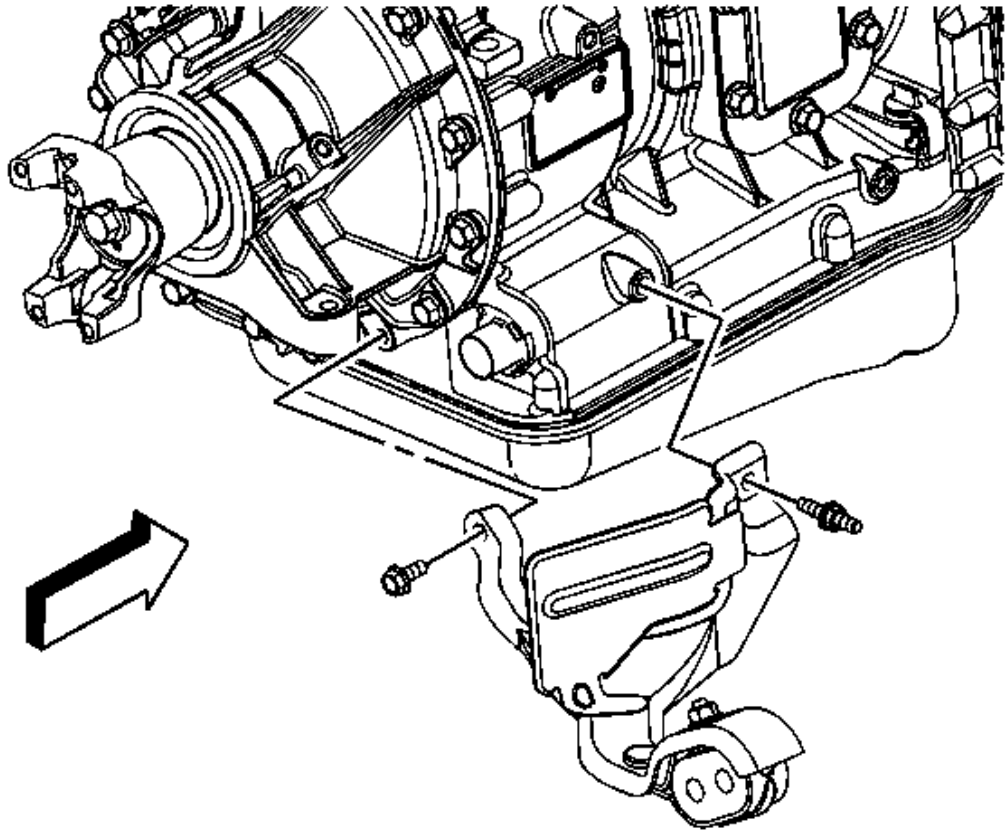


Fig. 168: View Of RPO MW7 Exhaust Pipe Hanger Bracket, Bolts & Studs
Courtesy of GENERAL MOTORS CORP.

2. If equipped with a Allison® automatic transmission, RPO MW7, install the exhaust pipe hanger bracket and bolt/stud.

   Tighten: Tighten the bolt/stud to 25 N.m (18 lb ft).

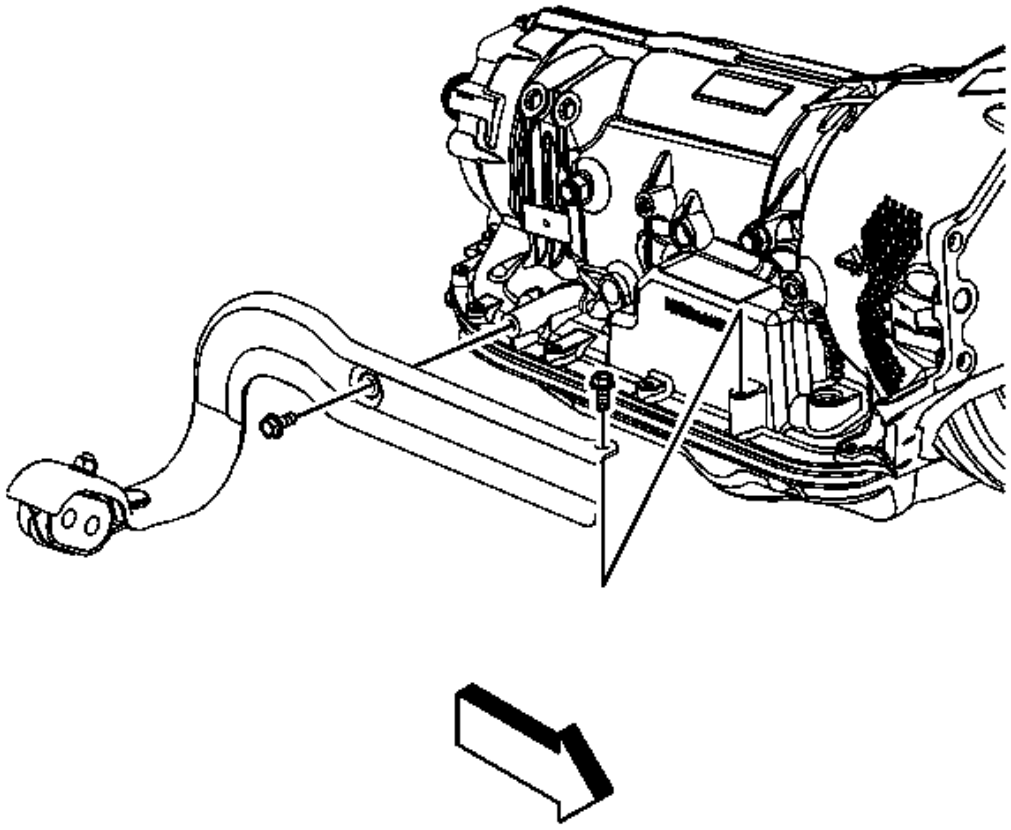


Fig. 169: View Of Exhaust Pipe Hanger Bracket & Bolts
Courtesy of GENERAL MOTORS CORP.

3. If equipped with a 4L80-E automatic transmission, RPO MT1, install the exhaust pipe hanger bracket and bolts.

   Tighten: Tighten the bolts to 25 N.m (18 lb ft).

4. If equipped with a 6.6L engine, install the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.
5. If equipped with a 6.0L engine, install the left catalytic converter. Refer to **Catalytic Converter Replacement - Left Side (6.0L - Cab/Chassis)**.
6. If equipped with a 6.0L engine, install the exhaust manifold pipe. Refer to **Exhaust**

Manifold Pipe Replacement (6.0L - Cab/Chassis).

MUFFLER REPLACEMENT (1500 SERIES W/4.3L, 4.8L, 5.3L, 6.0L)

Removal Procedure

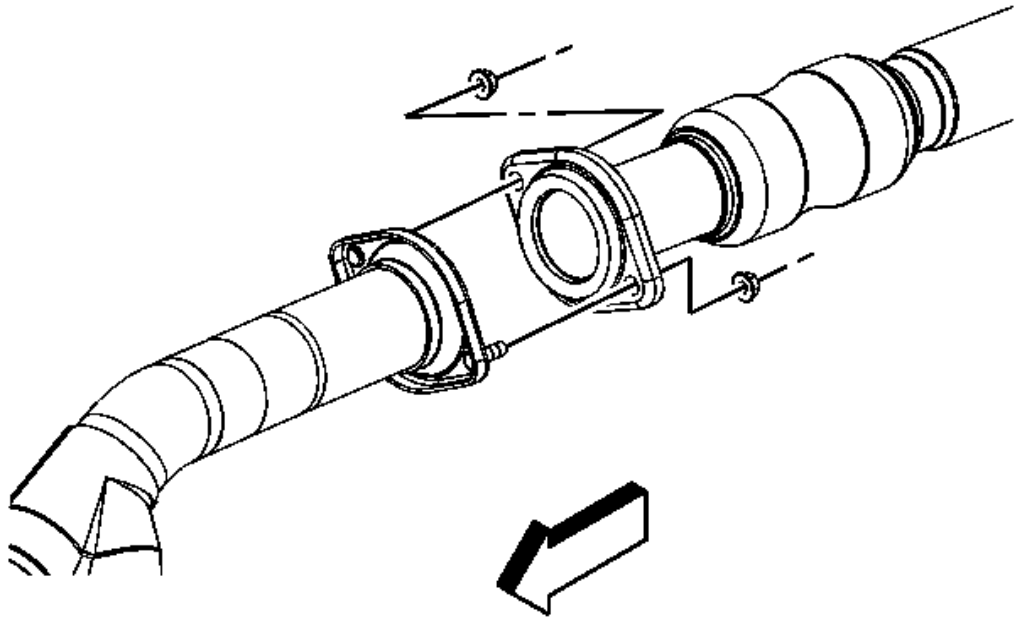


Fig. 170: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Lower the spare tire.
3. Remove the catalytic converter to exhaust muffler nuts.

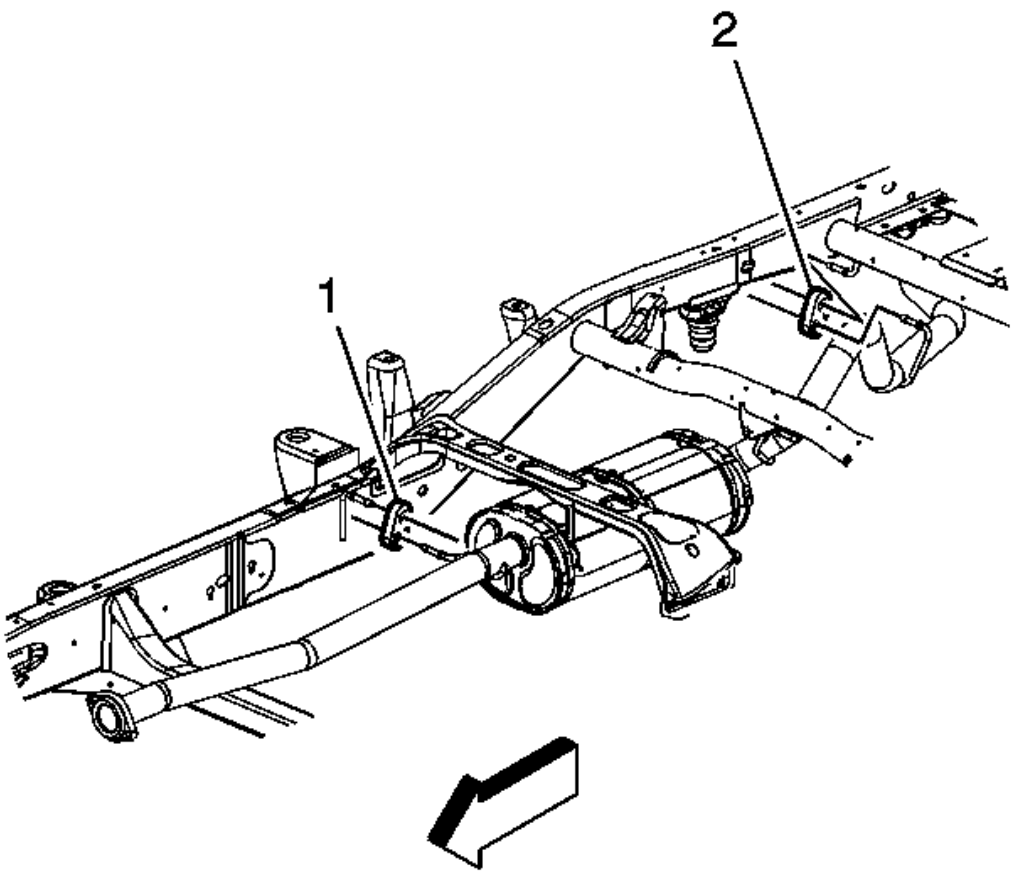


Fig. 171: View Of Rear Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

4. If equipped with a 4.8L engine, perform the following steps, otherwise proceed to step 7.
5. Lubricate the 3 insulators where the muffler assembly hangers are inserted in order to ease removal.
6. With the aid of an assistant, remove the insulators (1, 2) from the front and rear muffler assembly hangers.

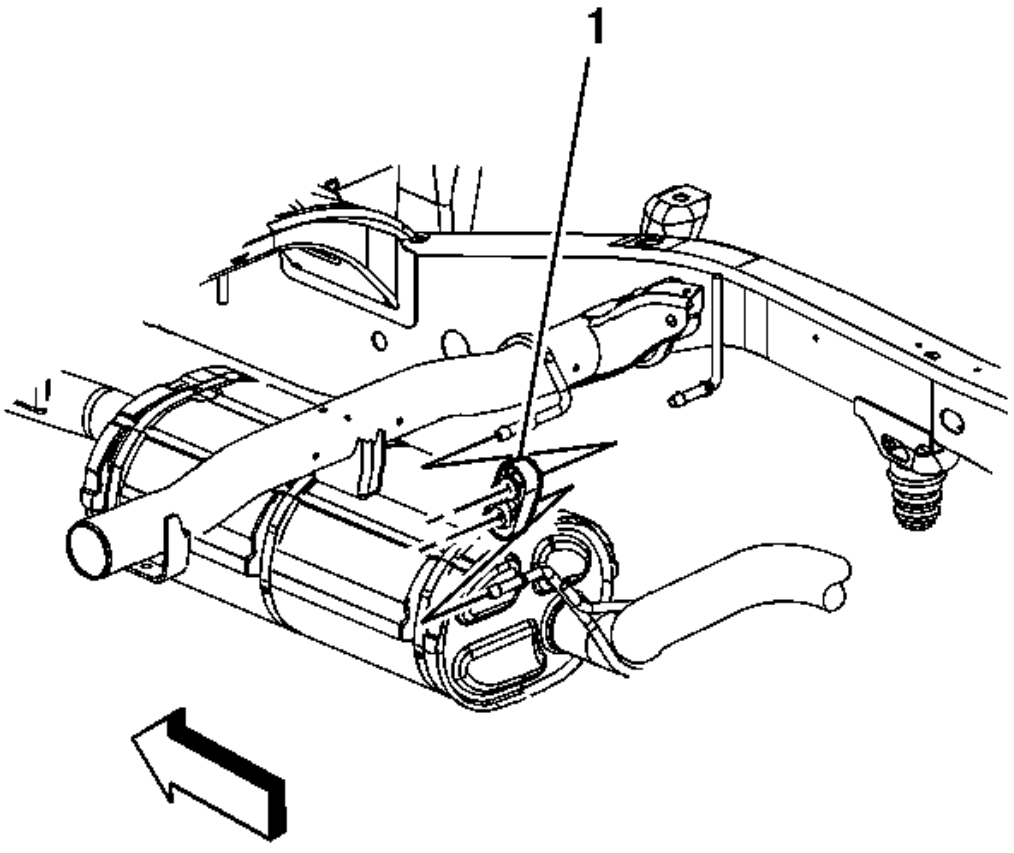


Fig. 172: View Of Intermediate Muffler Assembly Insulator
Courtesy of GENERAL MOTORS CORP.

7. Remove the insulator (1) from the intermediate muffler assembly hanger and remove the muffler assembly.

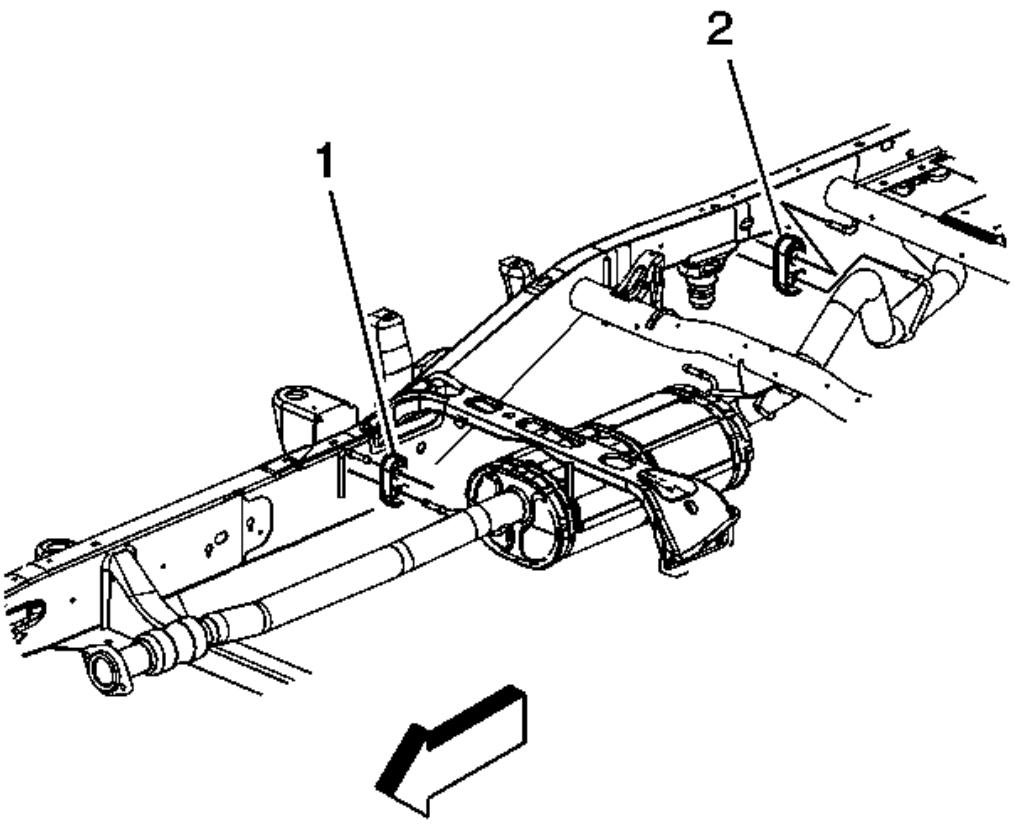


Fig. 173: View Of Front & Rear Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

8. If equipped with a 5.3L, or a 6.0L engine, perform the following steps.
9. Lubricate the 3 insulators where the muffler assembly hangers are inserted in order to ease removal.
10. With the aid of an assistant, remove the insulators (1, 2) from the front and rear muffler assembly hangers.

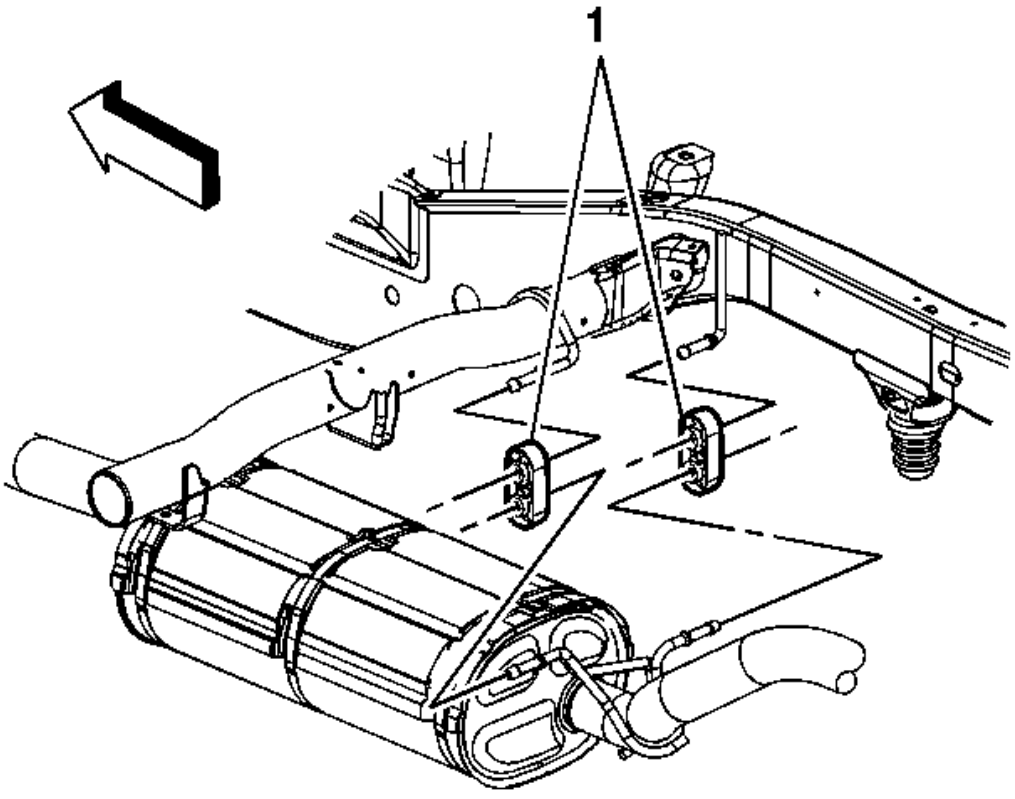


Fig. 174: View Of Intermediate Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

NOTE: During removal or installation, do not over extend the flex couple as internal damage may occur.

11. Remove the insulators (1) from the intermediate muffler assembly hangers and remove the muffler assembly. Pull the muffler assembly rearward until the flange is able to clear the front frame crossmember, and remove the muffler toward the front of the vehicle.

Installation Procedure

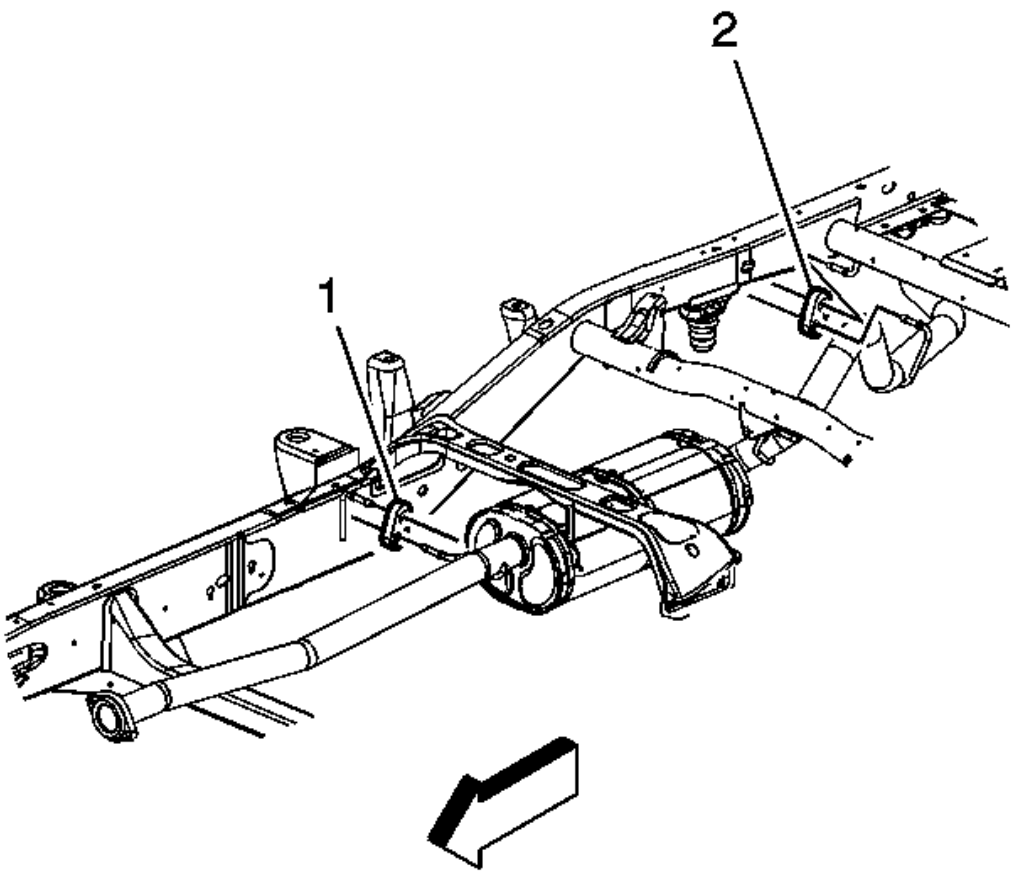


Fig. 175: View Of Rear Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

1. If equipped with a 4.8L engine, perform the following steps, otherwise proceed to step 6.
2. Lubricate the 3 insulators where the muffler assembly hangers are inserted in order to ease installation.

NOTE: During removal or installation, do not over extend the flex couple as internal damage may occur.

3. With the aid of an assistant, position and install the muffler assembly.
4. Install the insulators (1, 2) to the front and rear muffler assembly hangers.

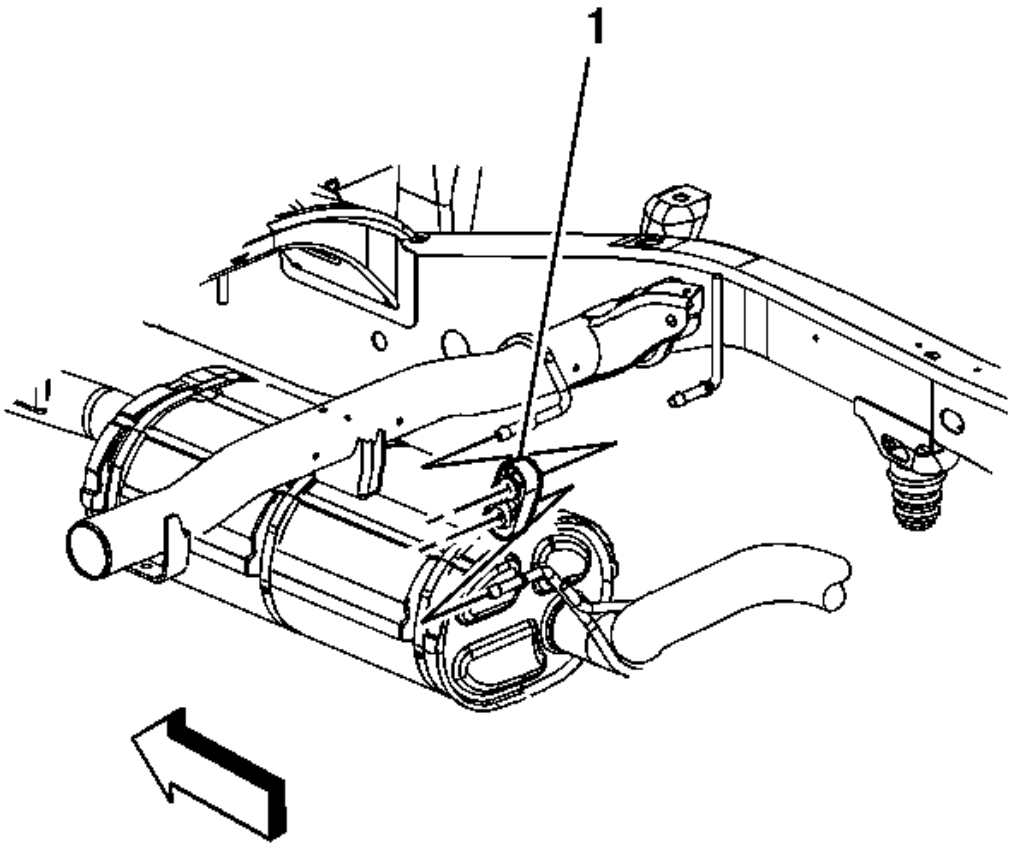


Fig. 176: View Of Intermediate Muffler Assembly Insulator
Courtesy of GENERAL MOTORS CORP.

5. Install the insulator (1) to the intermediate muffler assembly hanger.

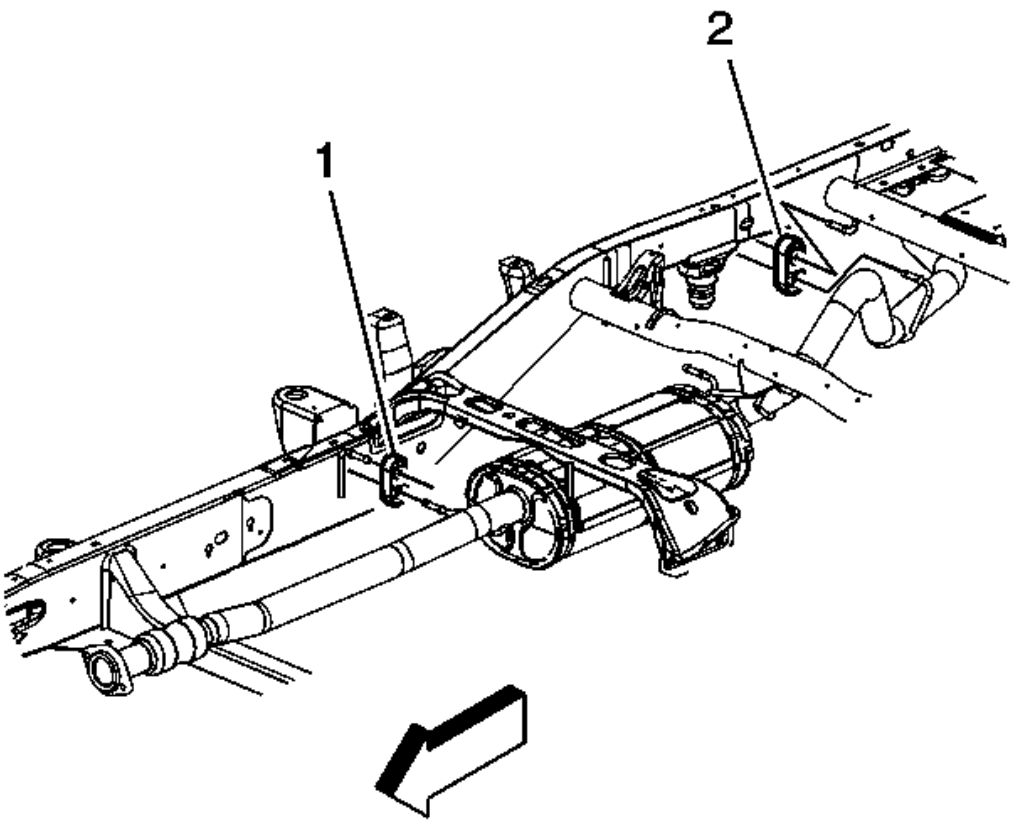


Fig. 177: View Of Front & Rear Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

6. If equipped with a 5.3L, or a 6.0L engine, perform the following steps.
7. Lubricate the 3 insulators where the muffler assembly hangers are inserted in order to ease installation.
8. With the aid of an assistant, position and install the muffler assembly.
9. Install the insulators (1, 2) to the front and rear muffler assembly hangers.

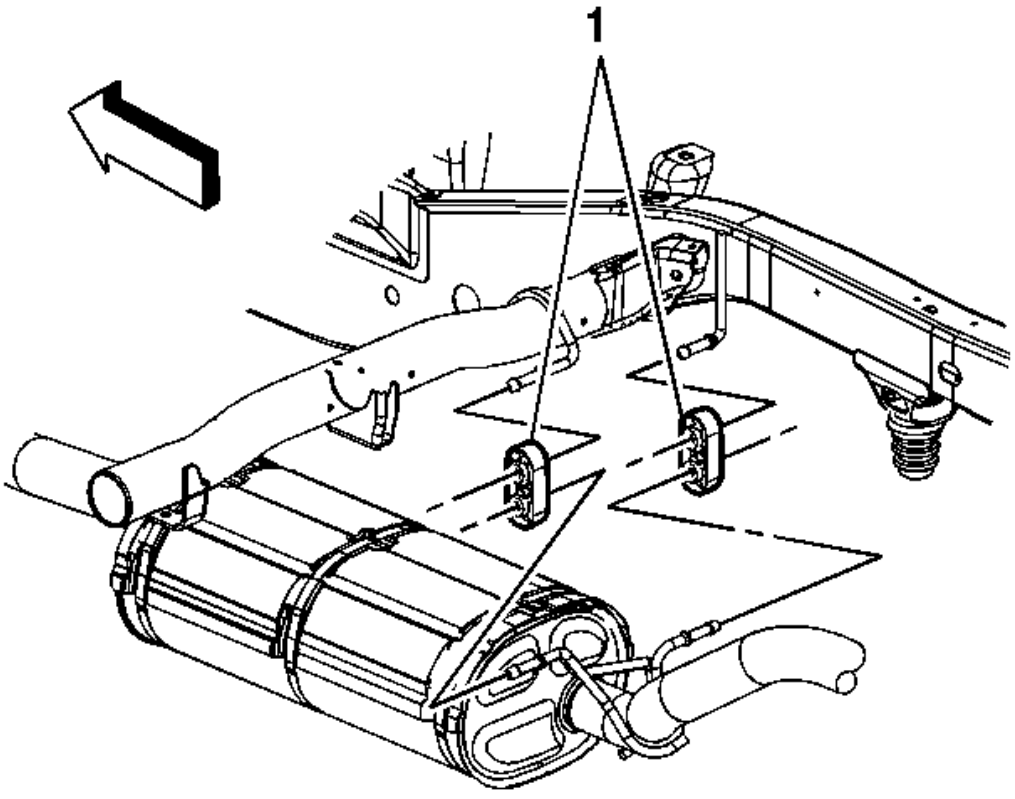


Fig. 178: View Of Intermediate Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

10. Install the insulator (1) to the intermediate muffler assembly hanger.

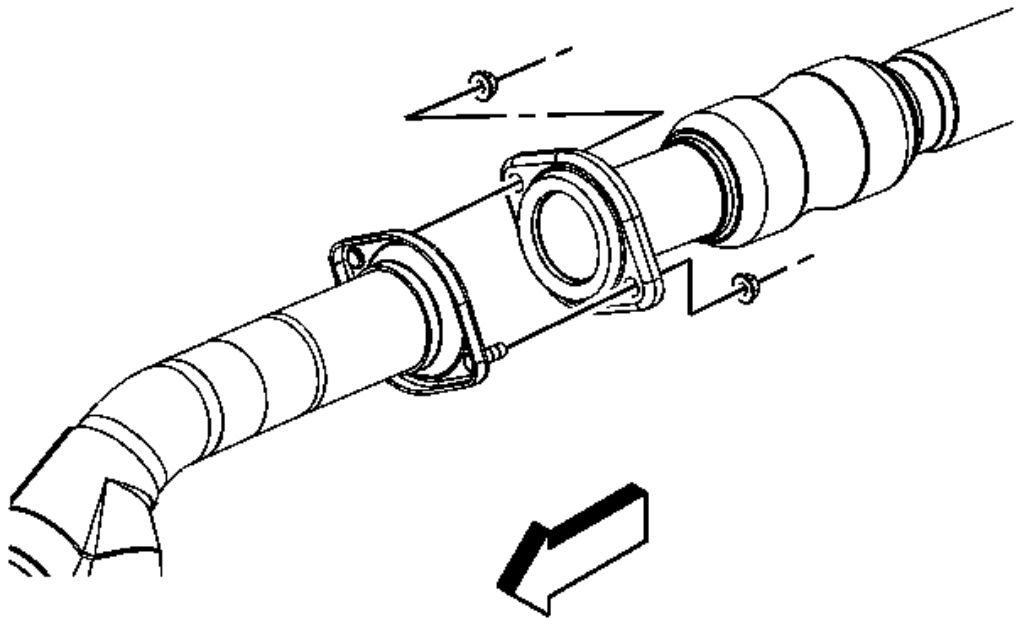


Fig. 179: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

11. Install the catalytic converter to exhaust muffler nuts.

    Tighten: Tighten the nuts to 45 N.m (33 lb ft).

12. Return the spare tire to the original position.
13. Lower the vehicle.

MUFFLER REPLACEMENT (1500 SERIES W/6.2L)

Removal Procedure

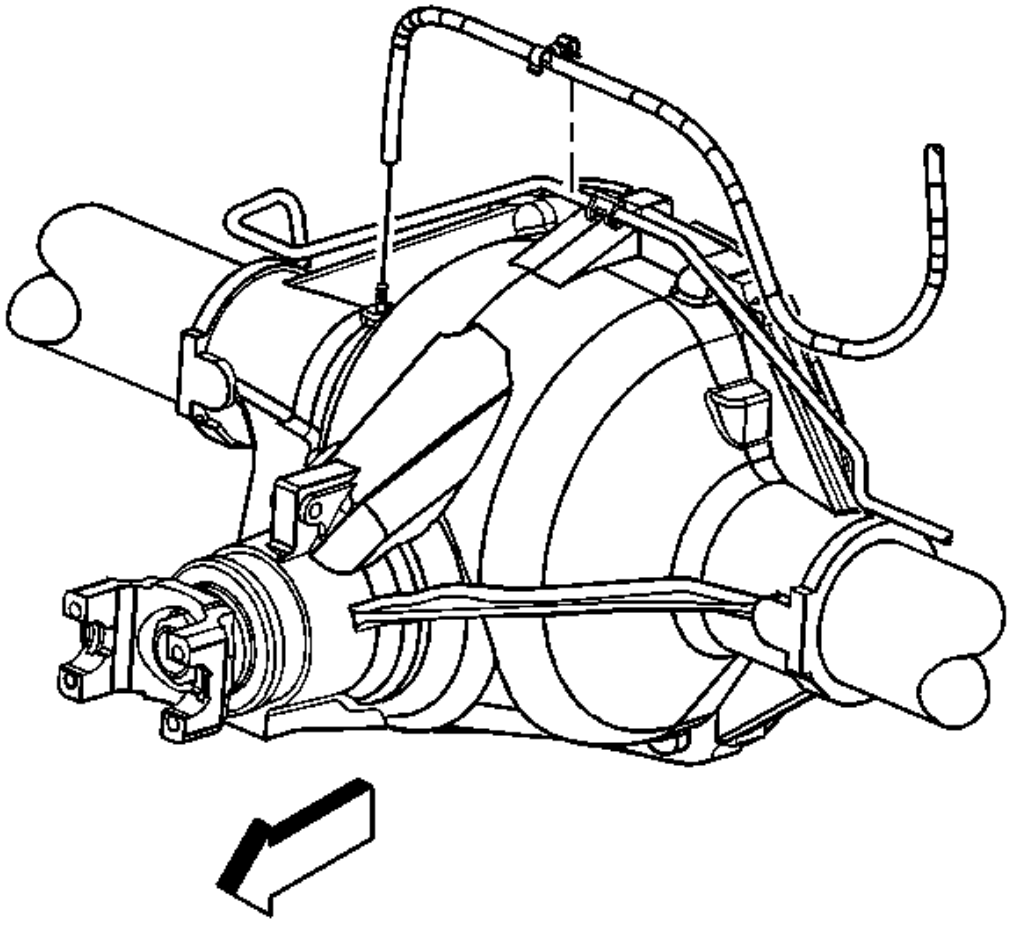


Fig. 180: Rear Axle Vent Hose (8.6 or 9.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the spare tire, if necessary.
3. Install adjustable jack stands under the rear axle, if necessary.
4. If equipped with a 8.6 or a 9.5 inch ring gear, remove the rear axle vent hose from the rear axle, if necessary.
5. Remove the vent hose swivel clip from the rear brake crossover pipe, if necessary.

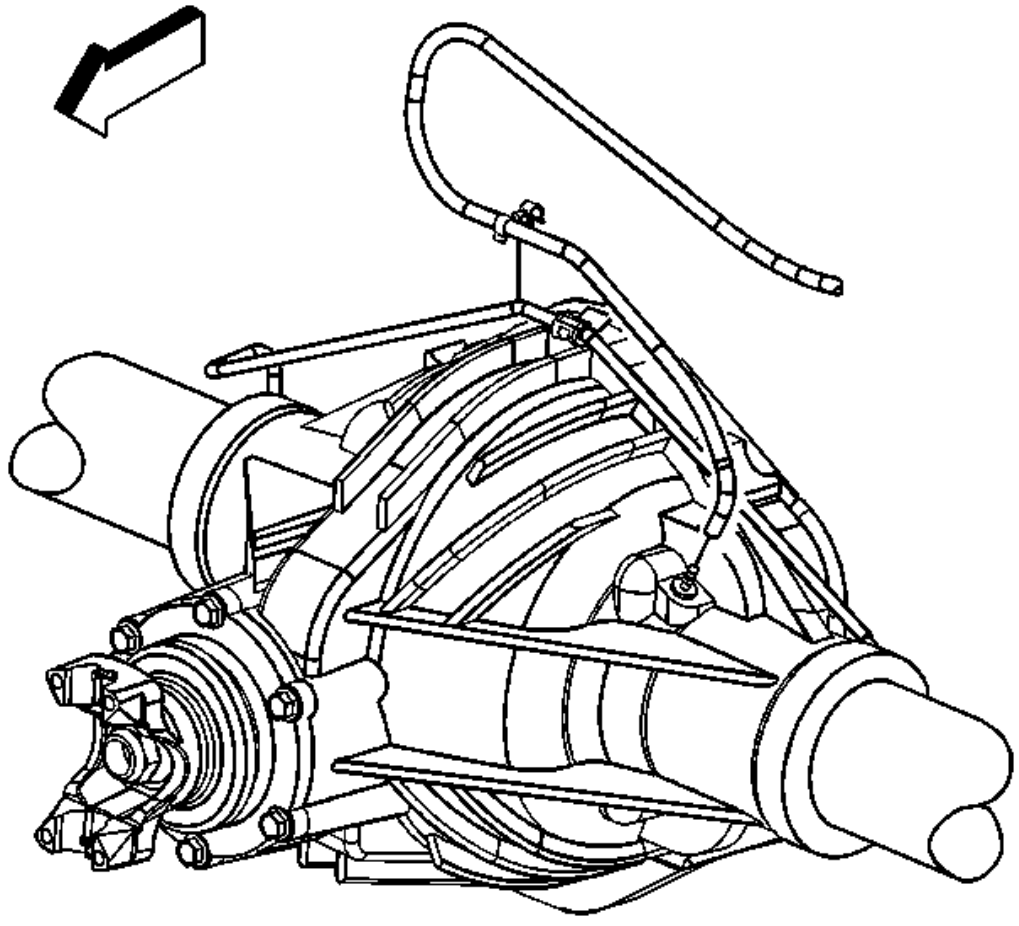


Fig. 181: Rear Axle Vent Hose (10.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

6. If equipped with a 10.5 inch ring gear, remove the rear axle vent hose from the rear axle, if necessary.
7. Remove the vent hose swivel clip from the rear brake crossover pipe, if necessary.

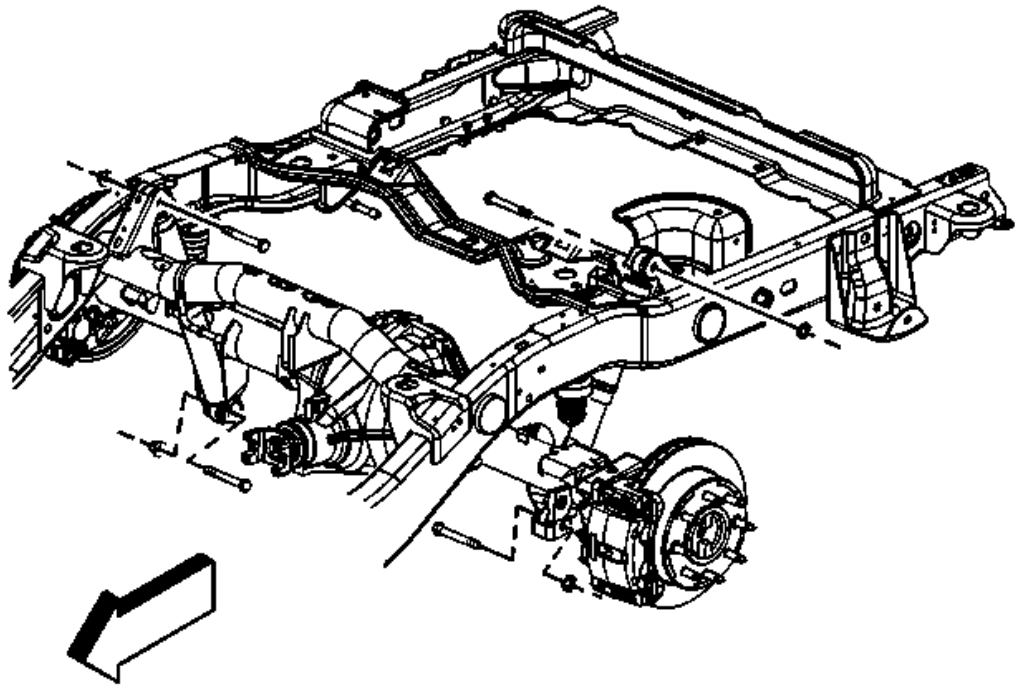


Fig. 182: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

8. Remove the rear shock absorber lower bolts and nuts, if necessary.
9. Lower the rear axle using the adjustable jack stands, if necessary.

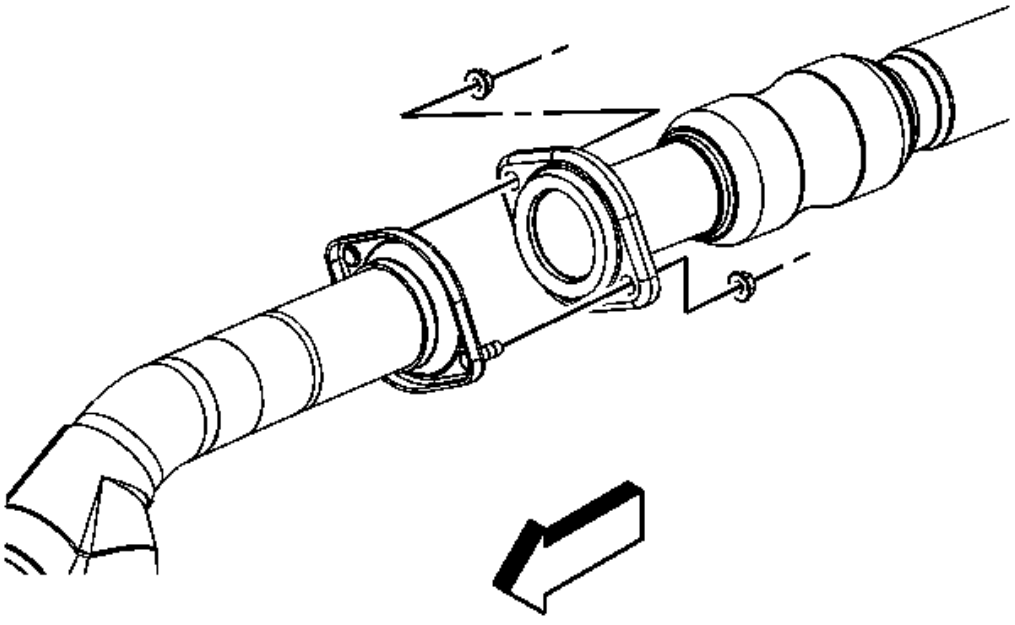


Fig. 183: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

10. Remove the catalytic converter to muffler nuts.

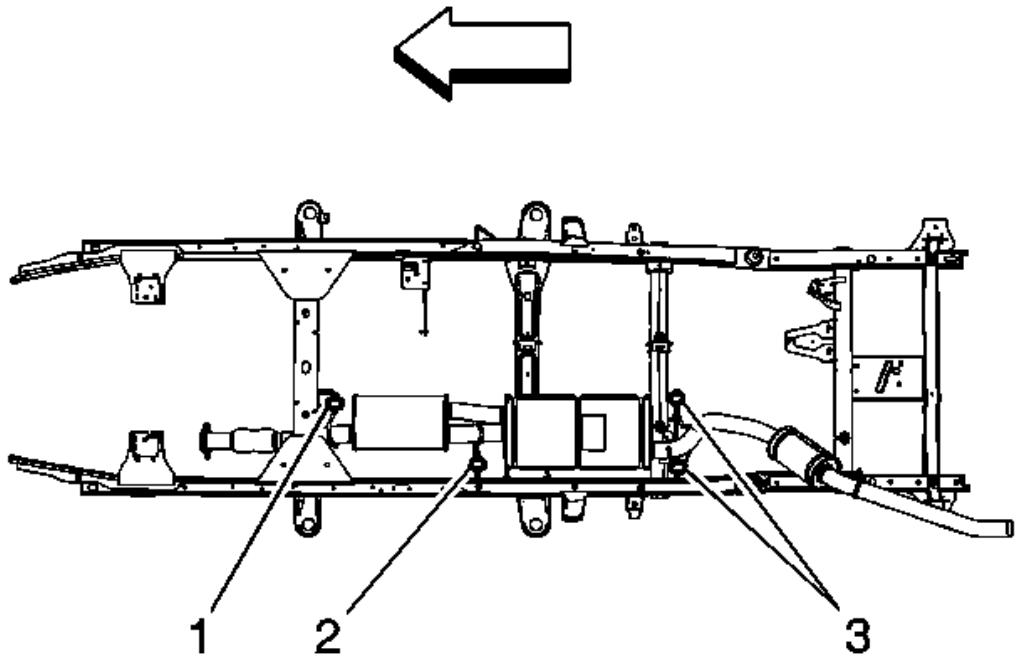


Fig. 184: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

11. Lubricate the 5 insulators where the muffler assembly hangers are inserted in order to ease removal.
12. With the aid of an assistant, remove the insulators (1-3) from the front, intermediate and rear muffler assembly hangers.

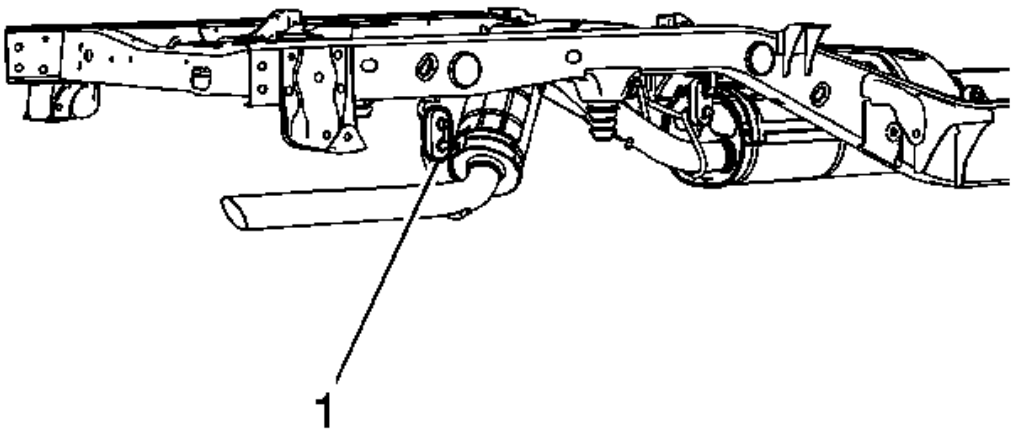


Fig. 185: View Of Tail Pipe Hanger Insulator
Courtesy of GENERAL MOTORS CORP.

13. Remove the insulator (1) from the tail pipe hanger and remove the muffler assembly.

Installation Procedure

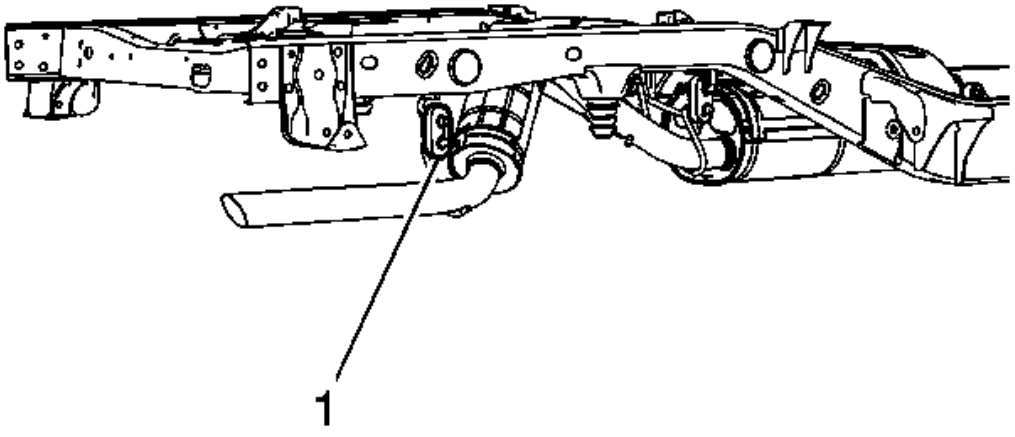


Fig. 186: View Of Tail Pipe Hanger Insulator

Courtesy of GENERAL MOTORS CORP.

1. Lubricate the 5 insulators where the muffler assembly hangers are inserted in order to ease installation.
2. With the aid of an assistant, position and install the muffler assembly.
3. Install the insulator (1) to the rear tail pipe hanger.

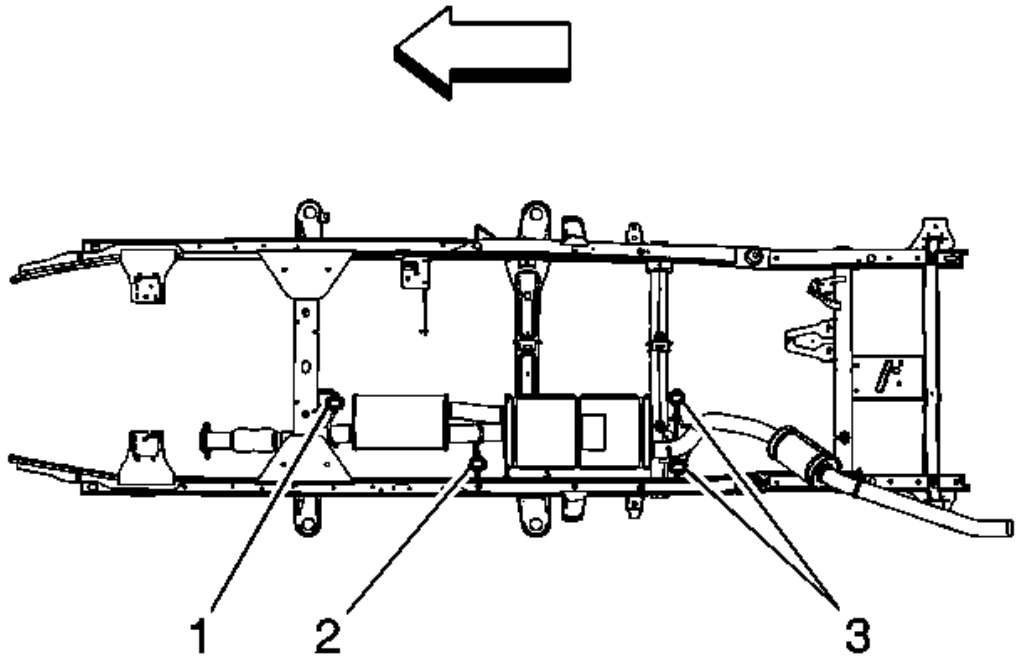


Fig. 187: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

4. Install the insulators (1-3) to the front, intermediate, and rear muffler assembly hangers.

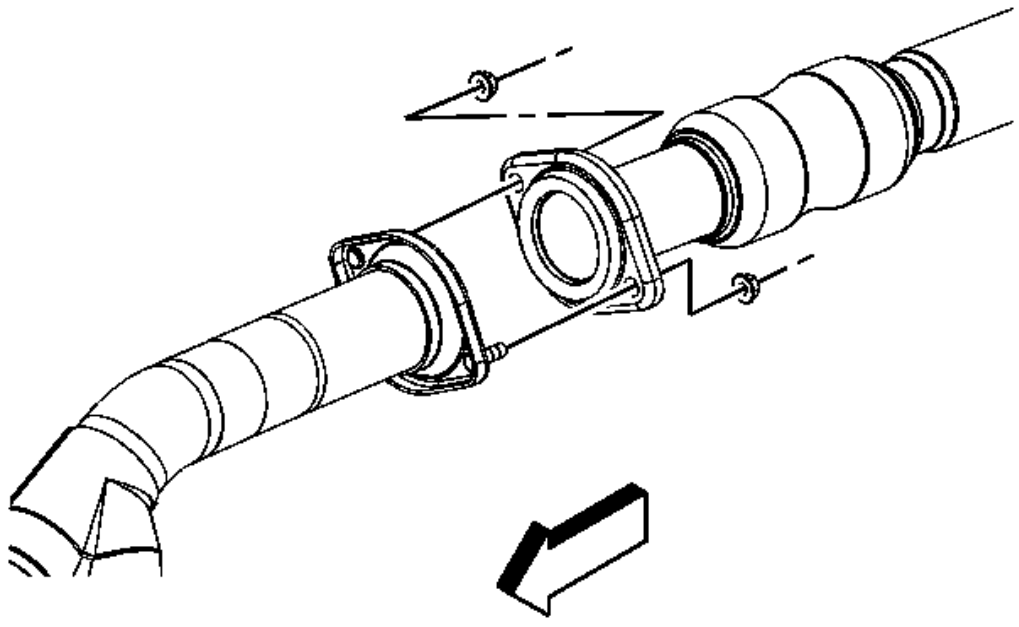


Fig. 188: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

5. Install the catalytic converter to muffler nuts.

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

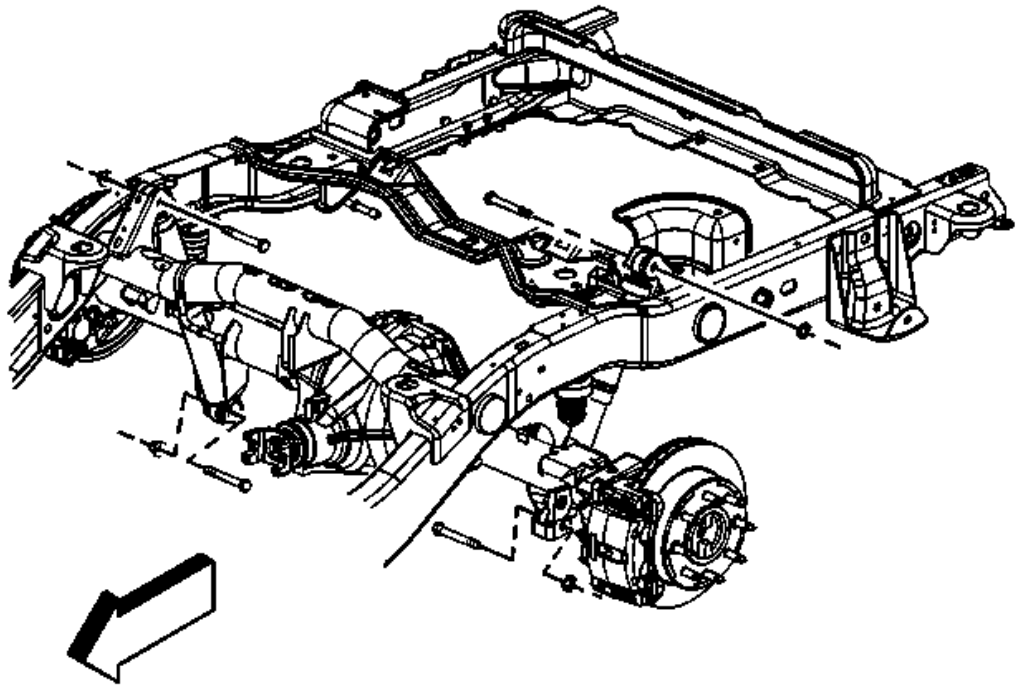


Fig. 189: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

6. Raise the rear axle using the adjustable jack stands, if necessary.
7. Install the rear shock absorber lower bolts and nuts, if necessary.

Tighten: Tighten the bolts to 95 N.m (70 lb ft).

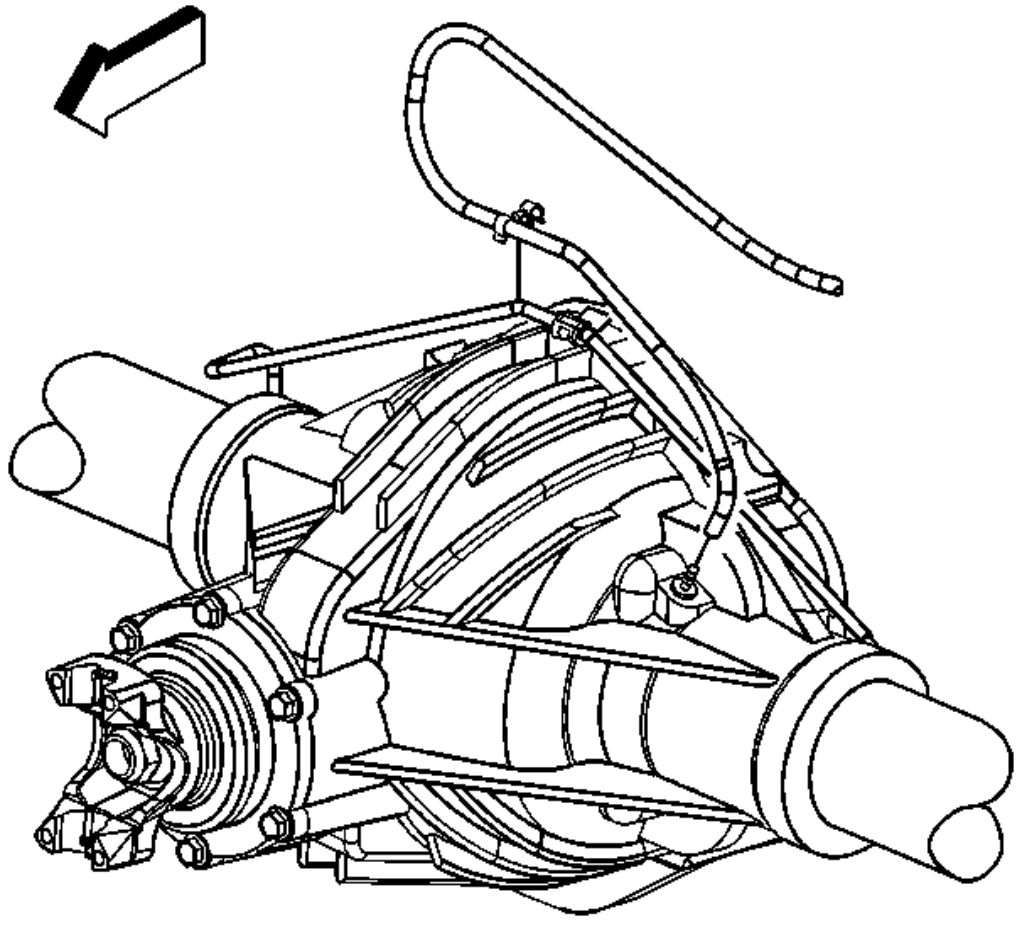


Fig. 190: Rear Axle Vent Hose (10.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

8. If equipped with a 10.5 inch ring gear, install the rear axle vent hose to the rear axle, if necessary.
9. Connect the vent hose swivel clip to the rear brake crossover pipe, if necessary.

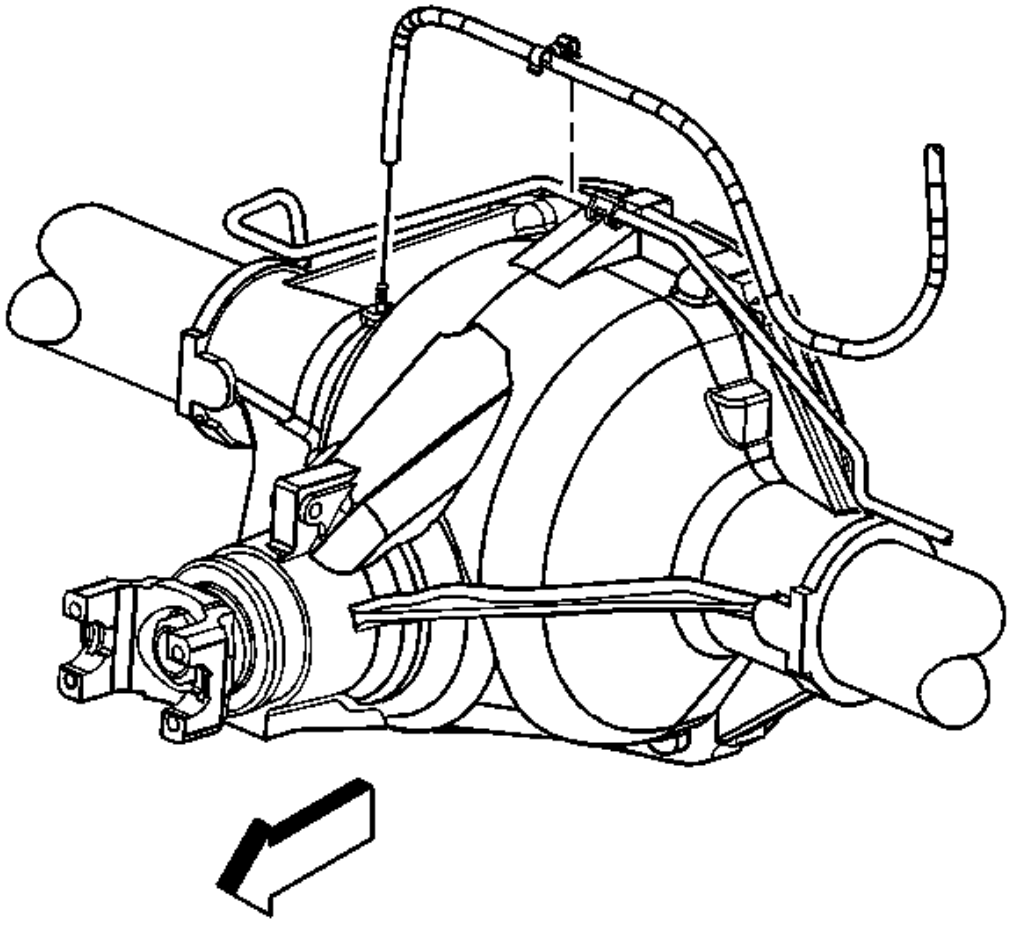


Fig. 191: Rear Axle Vent Hose (8.6 or 9.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

10. If equipped with a 8.6 or a 9.5 inch ring gear, install the rear axle vent hose to the rear axle, if necessary.
11. Install the vent hose swivel clip to the rear brake crossover pipe, if necessary.
12. Remove the adjustable jack stands from under the rear axle, if necessary.
13. Install the spare tire, if necessary.
14. Lower the vehicle.

MUFFLER REPLACEMENT (2500/3500 SERIES W/6.0L)

Removal Procedure

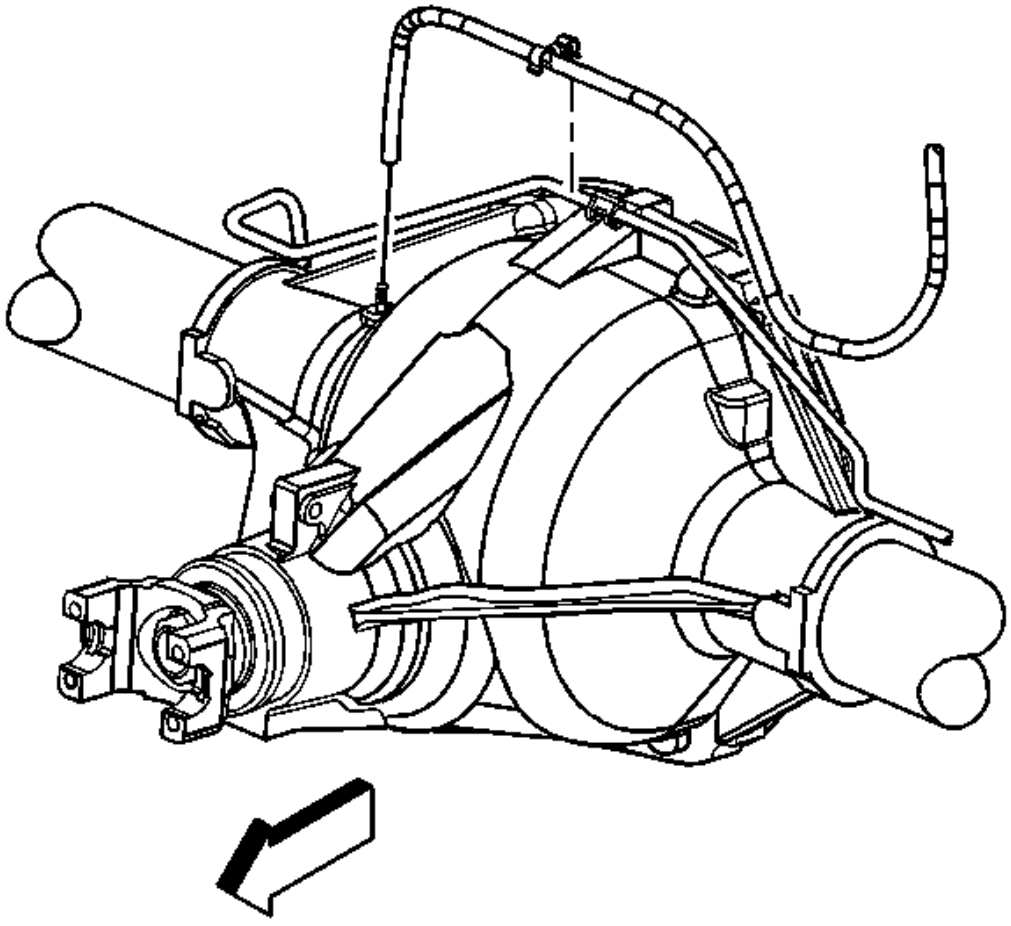


Fig. 192: Rear Axle Vent Hose (8.6 or 9.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the spare tire, if necessary.
3. Install adjustable jack stands under the rear axle, if necessary.
4. If equipped with a 8.6 or a 9.5 inch ring gear, remove the rear axle vent hose from the rear axle, if necessary.
5. Remove the vent hose swivel clip from the rear brake crossover pipe, if necessary.

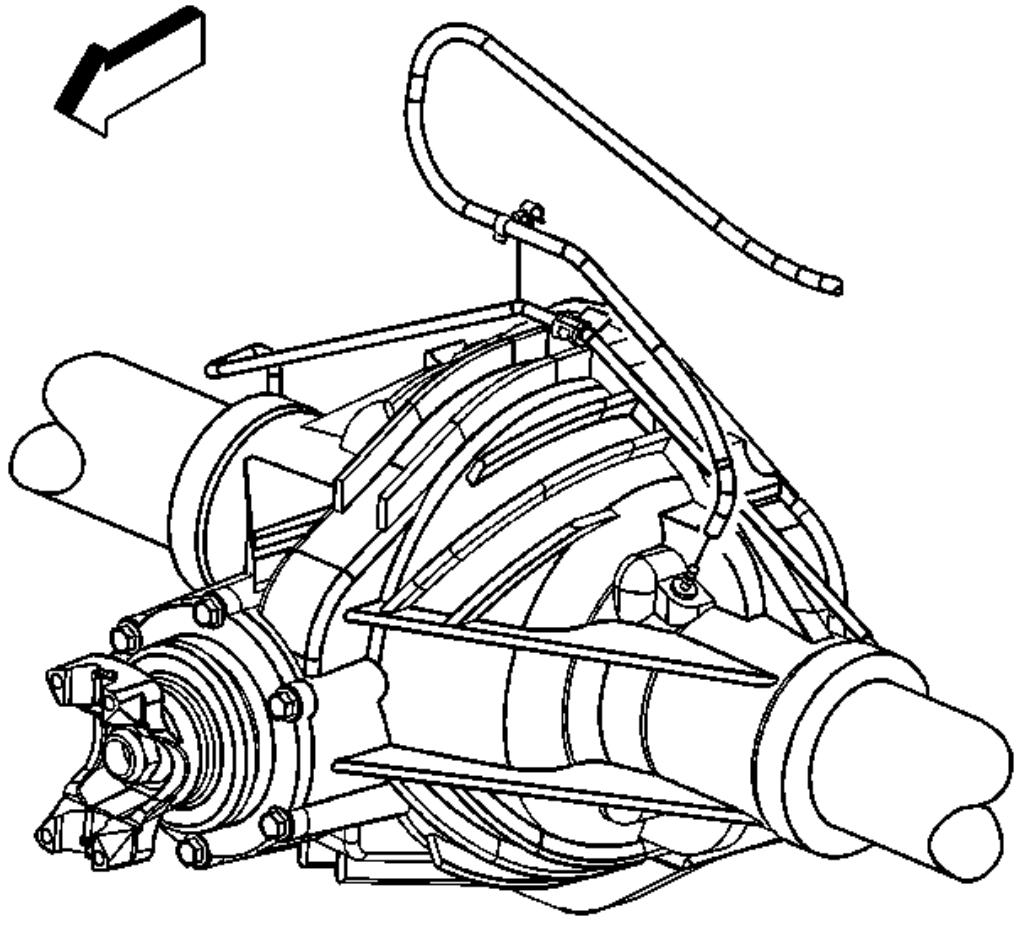


Fig. 193: Rear Axle Vent Hose (10.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

6. If equipped with a 10.5 inch ring gear, remove the rear axle vent hose from the rear axle, if necessary.
7. Remove the vent hose swivel clip from the rear brake crossover pipe, if necessary.

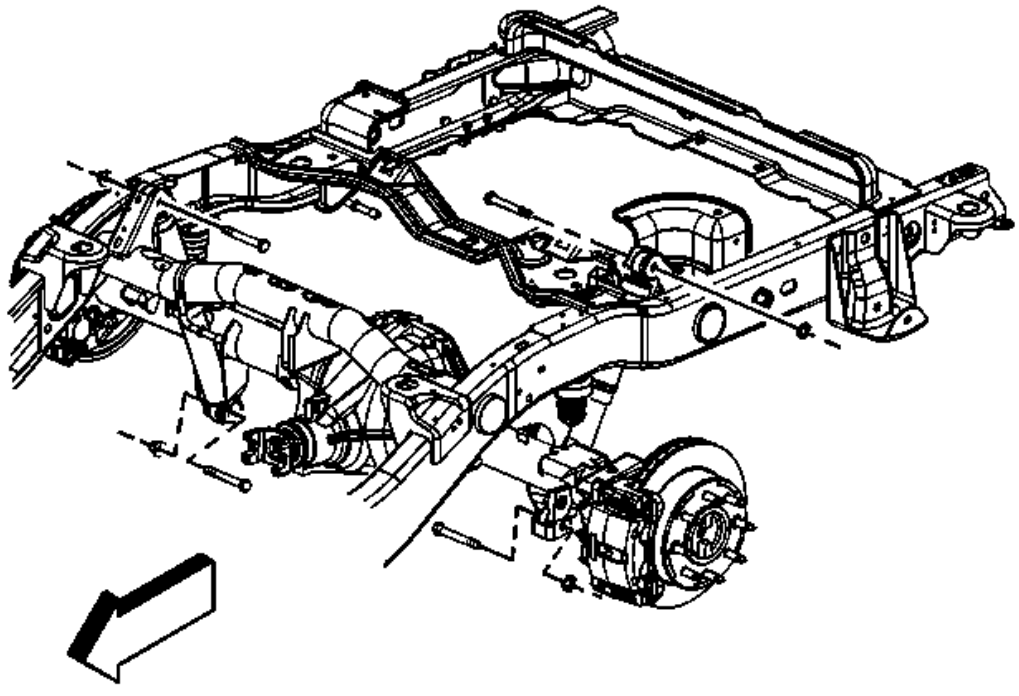


Fig. 194: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

8. Remove the rear shock absorber lower bolts and nuts, if necessary.
9. Lower the rear axle using the adjustable jack stands, if necessary.

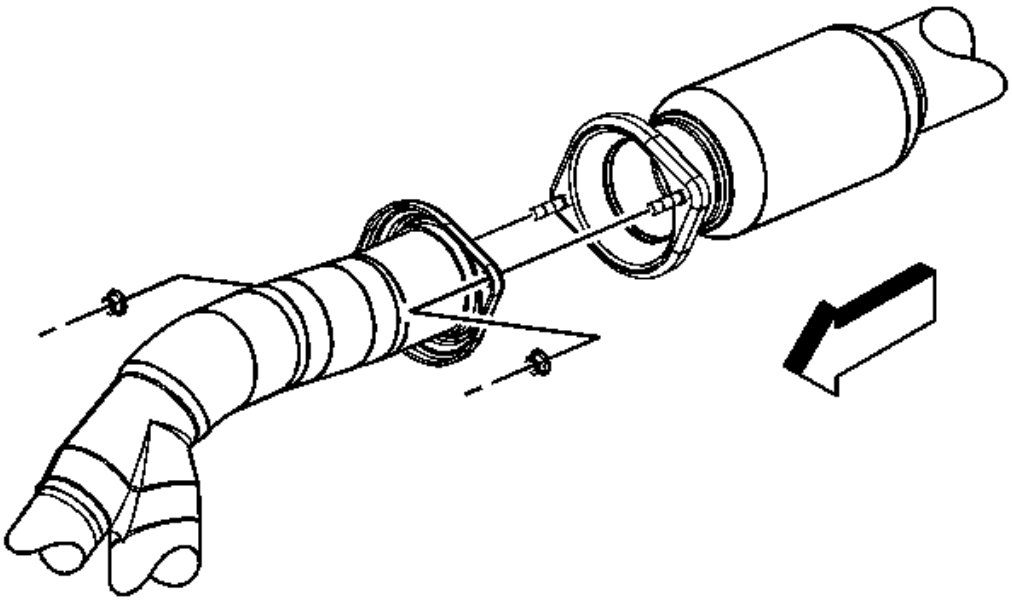


Fig. 195: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

10. Remove the muffler to catalytic converter nuts.

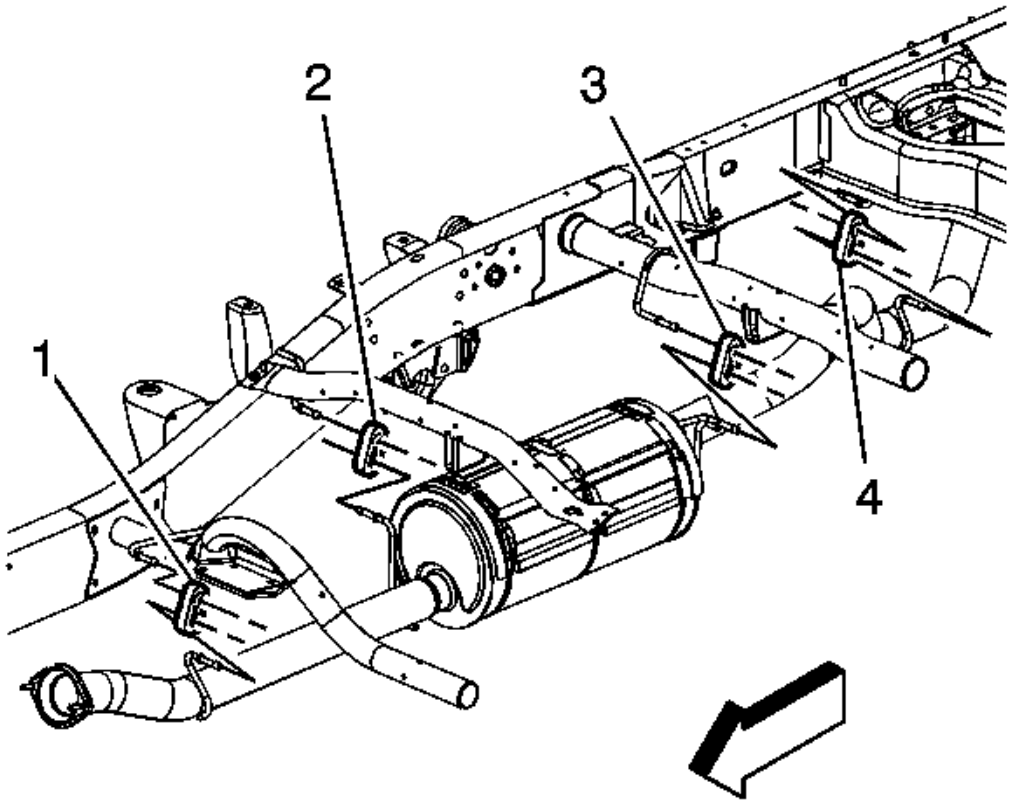


Fig. 196: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

11. If the vehicle is a non heavy duty (HD), perform the following steps, otherwise proceed to step 14:
12. Lubricate the 4 insulators where the muffler assembly hangers are inserted in order to ease removal.
13. With the aid of an assistant, remove the insulators (1-4) from the front, intermediate, and rear muffler assembly hangers and remove the muffler assembly.

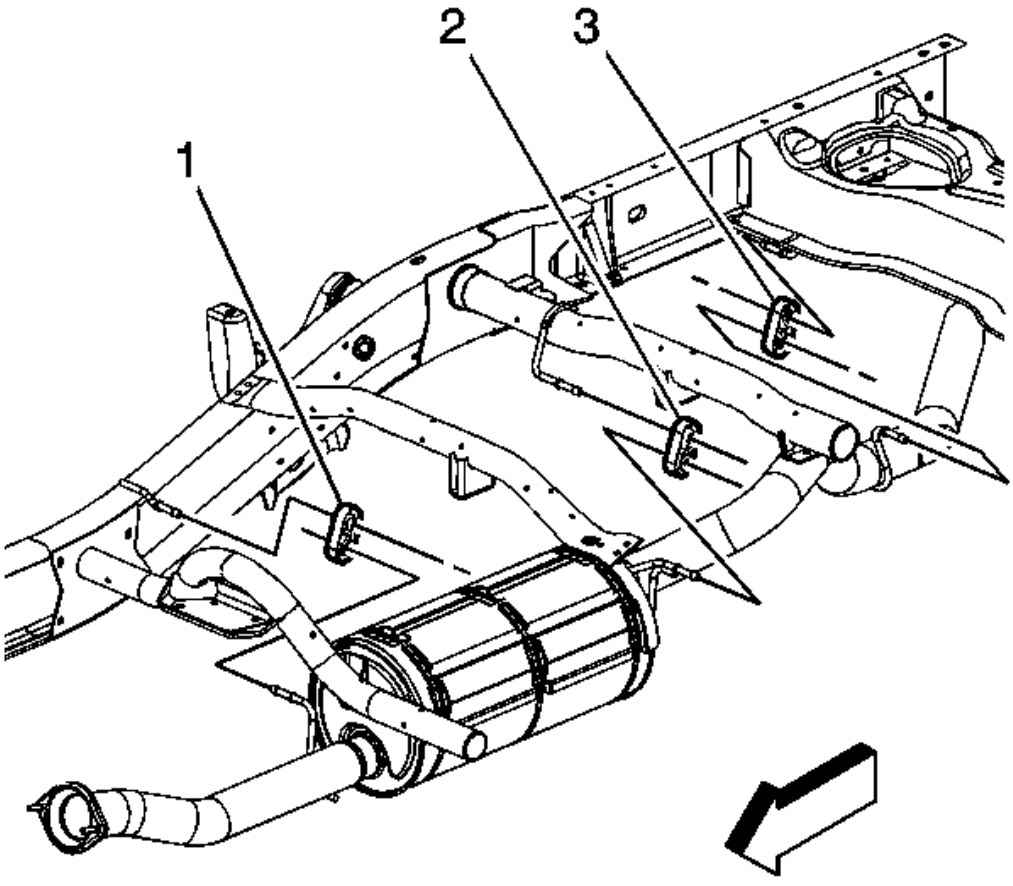


Fig. 197: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

14. If the vehicle is a heavy duty (HD) perform the following steps:
15. Lubricate the 3 insulators where the muffler assembly hangers are inserted in order to ease removal.
16. With the aid of an assistant, remove the insulators (1-3) from the front, intermediate, and rear muffler assembly hangers and remove the muffler assembly.

Installation Procedure

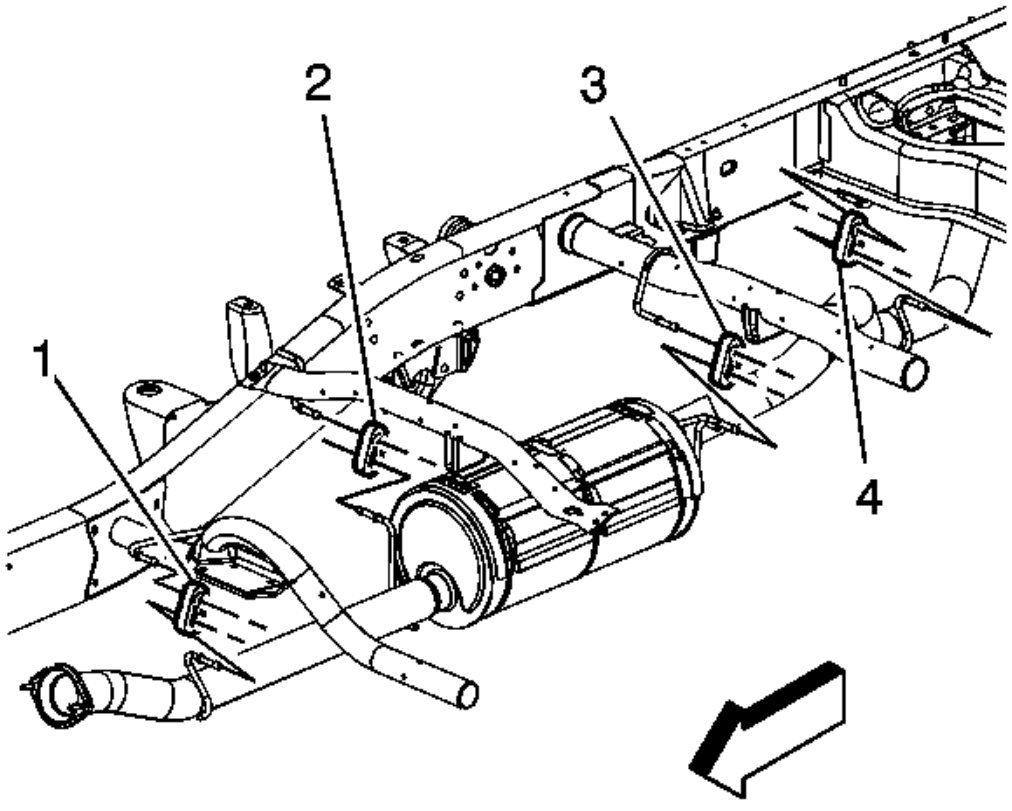


Fig. 198: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

1. If the vehicle is a non HD, perform the following steps, otherwise proceed to step 5:
2. Lubricate the 4 insulators where the muffler assembly hangers are inserted in order to ease installation.
3. With the aid of an assistant, position and install the muffler assembly.
4. Install the insulators (1-4) to the front, intermediate, and rear muffler assembly hangers.

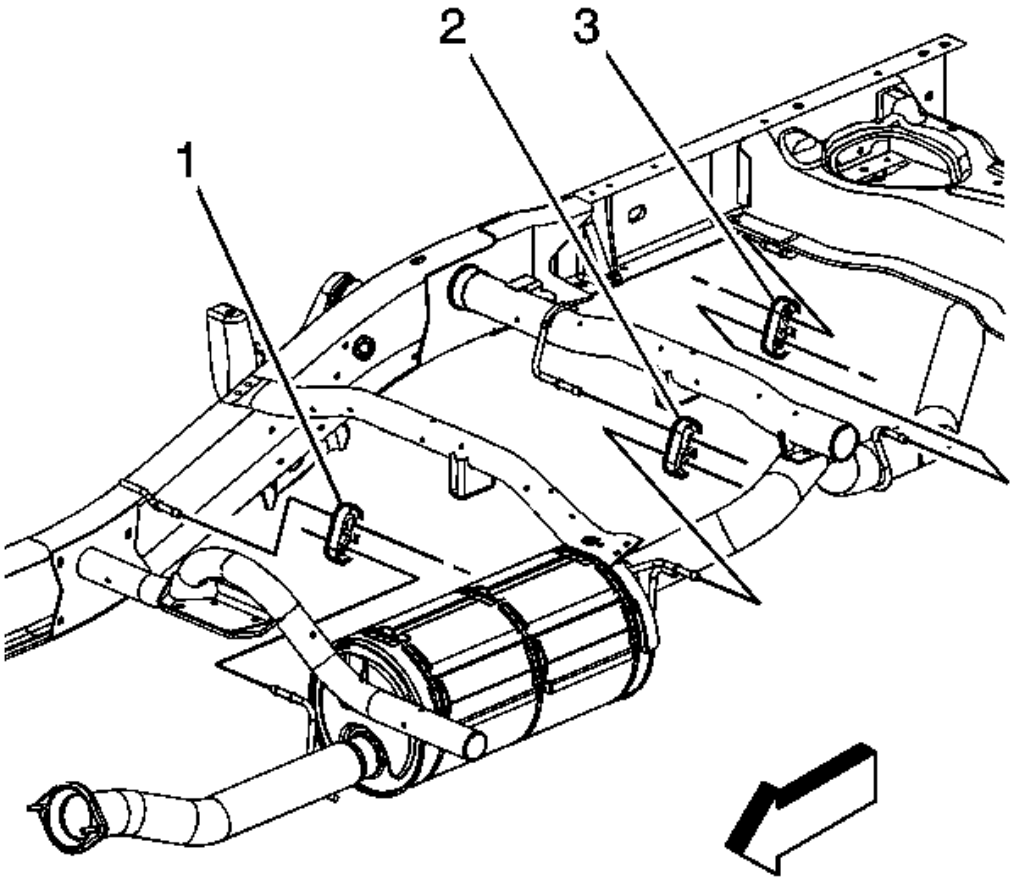


Fig. 199: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

5. If the vehicle is a HD, perform the following steps:
6. Lubricate the 3 insulators where the muffler assembly hangers are inserted in order to ease installation.
7. With the aid of an assistant, position and install the muffler assembly.
8. Install the insulators (1-3) to the front, intermediate, and rear muffler assembly hangers.

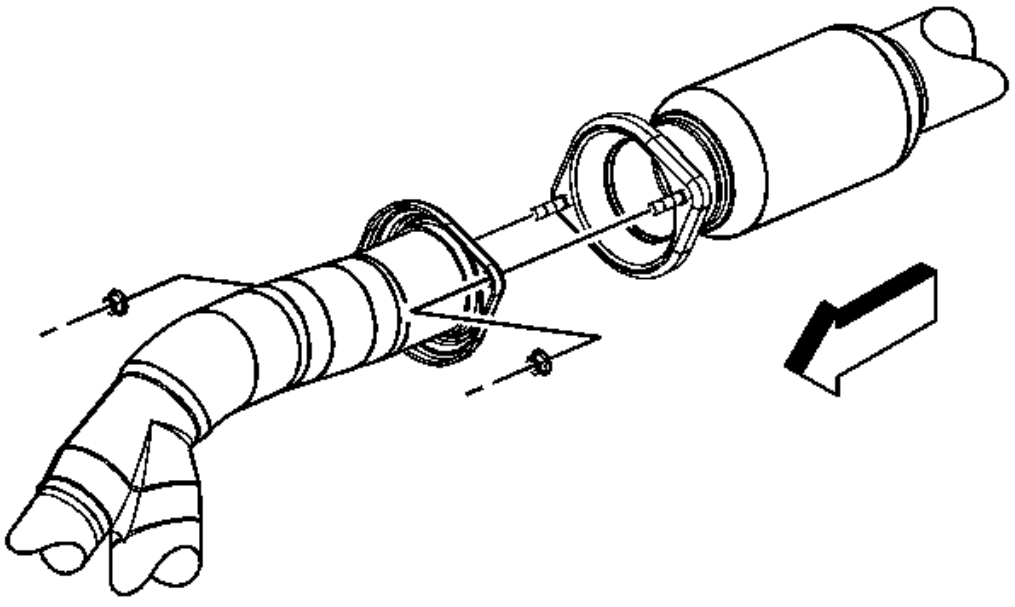


Fig. 200: View Of Catalytic Converter To Muffler Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

9. Install the catalytic converter to exhaust muffler nuts.

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

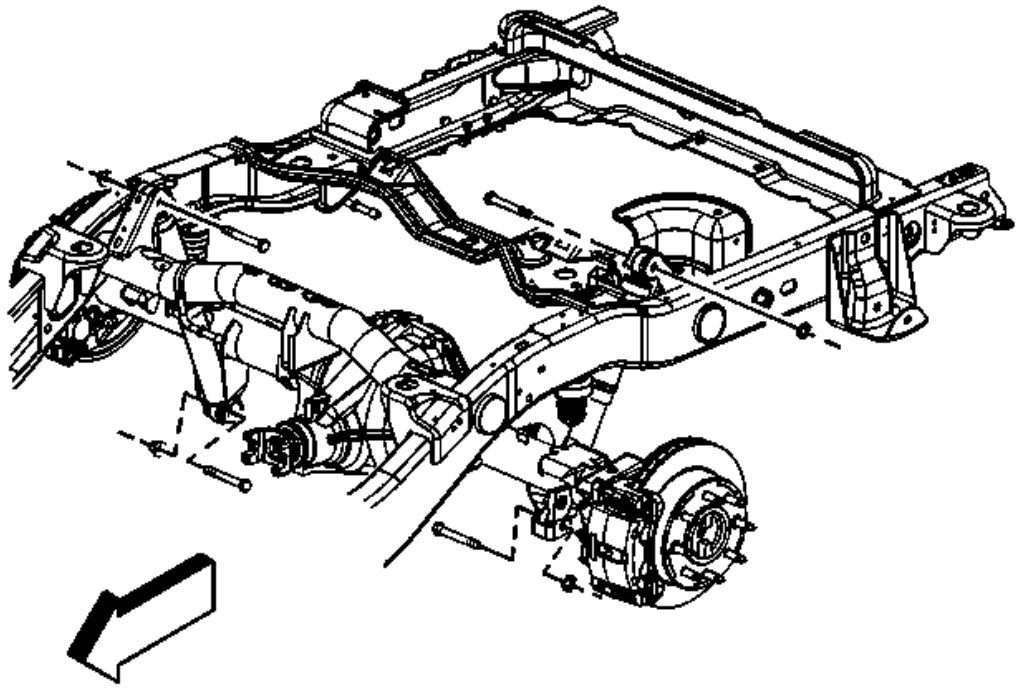


Fig. 201: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

10. Raise the rear axle using the adjustable jack stands, if necessary.
11. Install the rear shock absorber lower bolts and nuts, if necessary.

Tighten: Tighten the bolts to 95 N.m (70 lb ft).

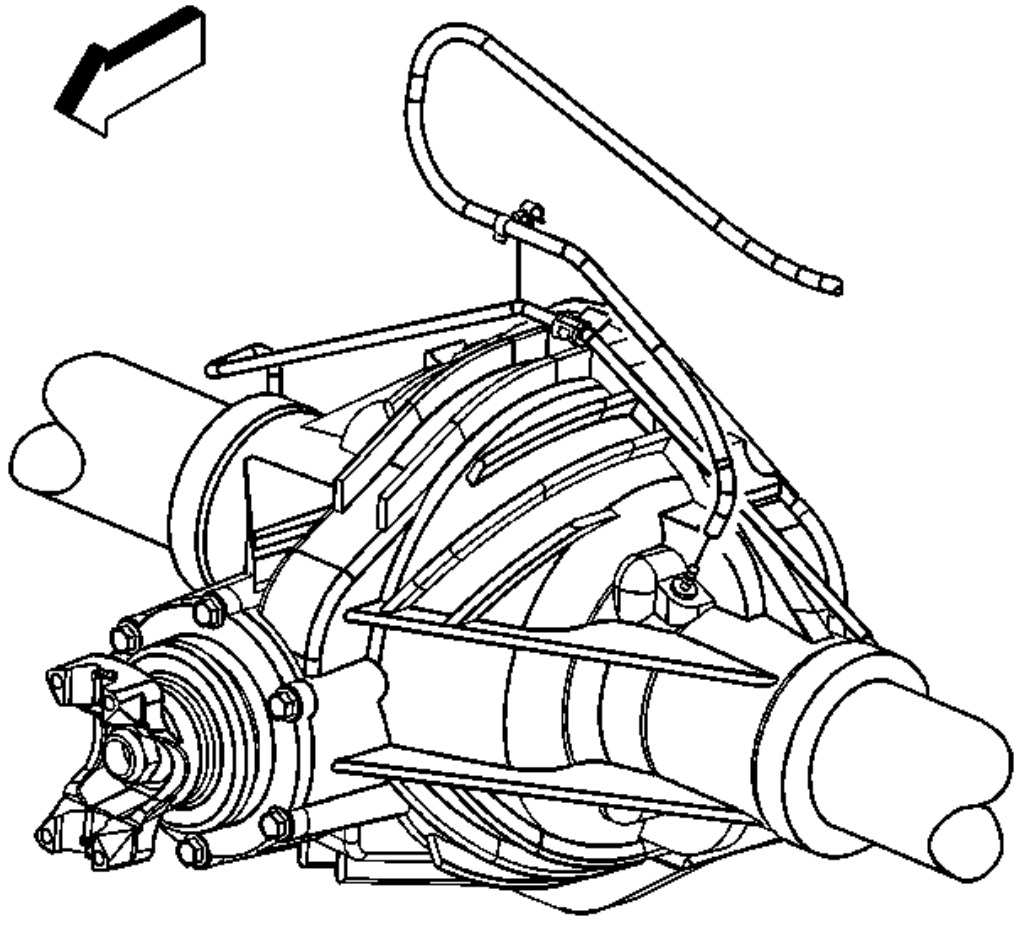


Fig. 202: Rear Axle Vent Hose (10.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

12. If equipped with a 10.5 inch ring gear, install the rear axle vent hose to the rear axle, if necessary.
13. Connect the vent hose swivel clip to the rear brake crossover pipe, if necessary.

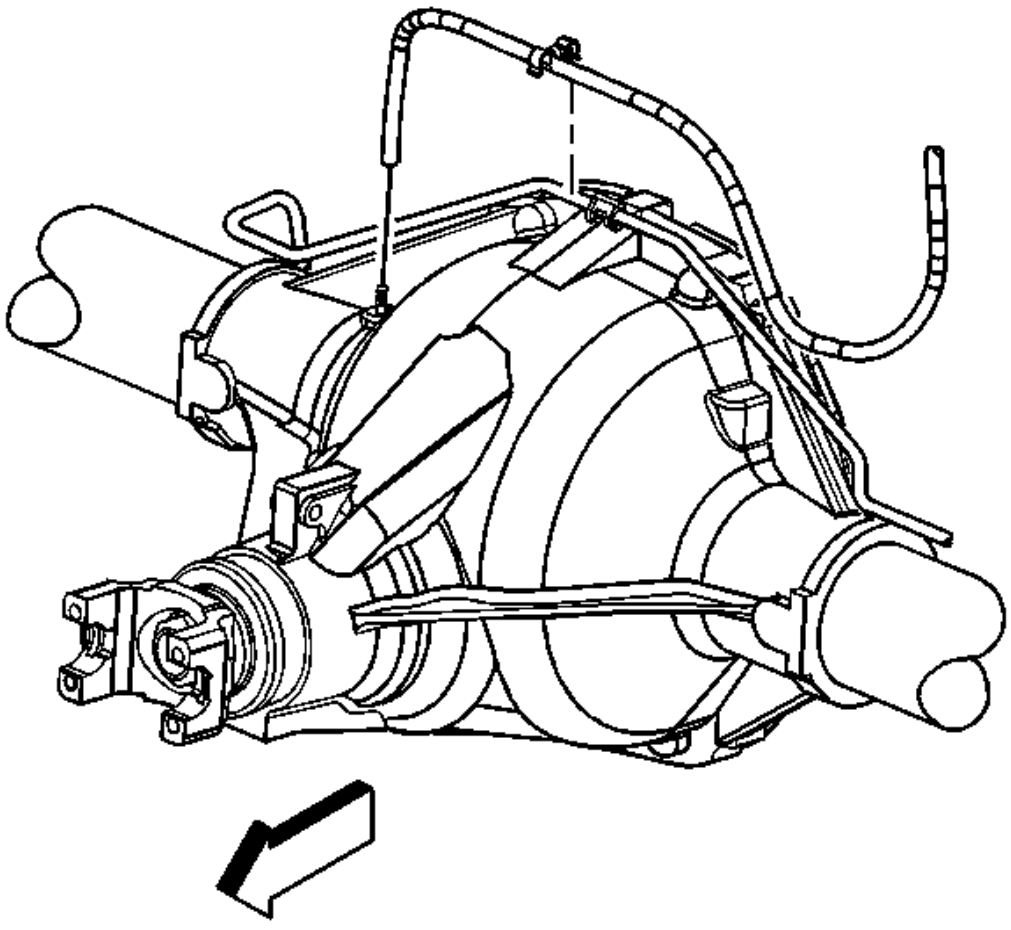


Fig. 203: Rear Axle Vent Hose (8.6 or 9.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

14. If equipped with a 8.6 or a 9.5 inch ring gear, install the rear axle vent hose to the rear axle, if necessary.
15. Install the vent hose swivel clip to the rear brake crossover pipe, if necessary.
16. Remove the adjustable jack stands from under the rear axle, if necessary.
17. Install the spare tire, if necessary.
18. Lower the vehicle.

MUFFLER REPLACEMENT (2500/3500 - CAB/CHASSIS W/6.0L)

Removal Procedure

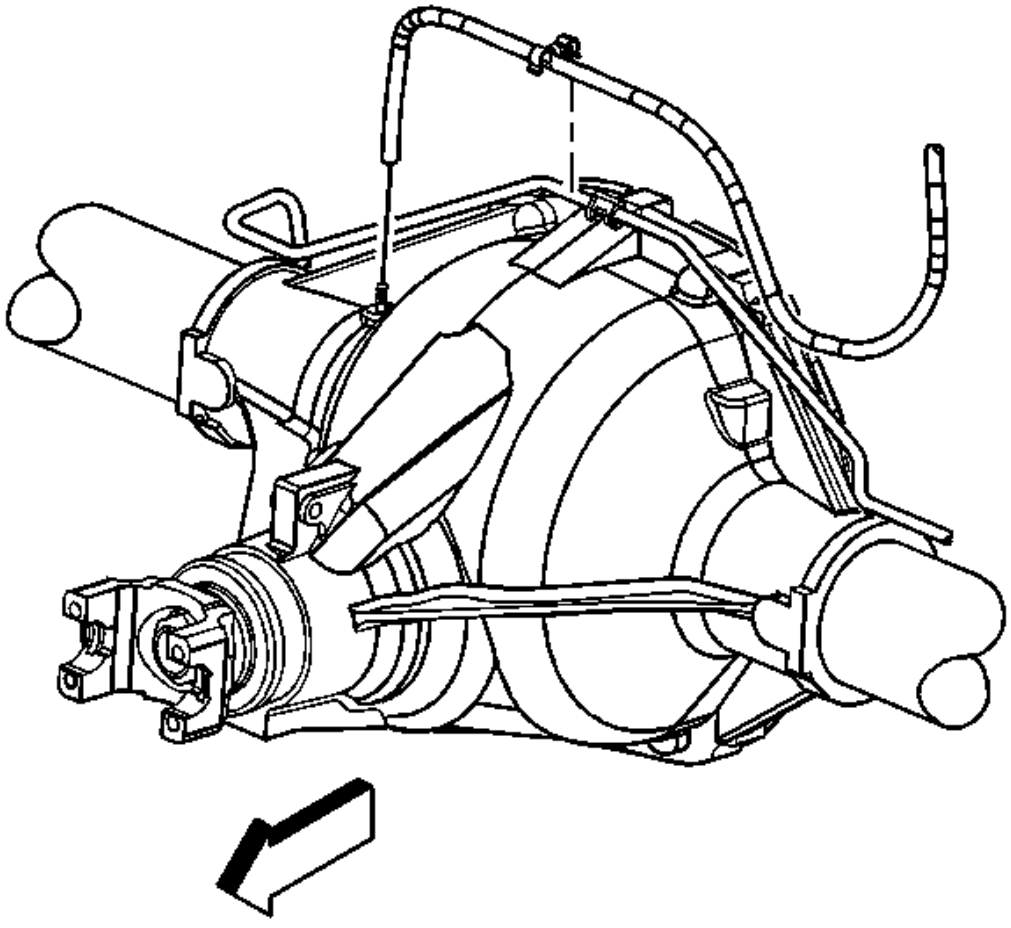


Fig. 204: Rear Axle Vent Hose (8.6 or 9.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the spare tire, if necessary.
3. Install adjustable jack stands under the rear axle, if necessary.
4. If equipped with a 8.6 or a 9.5 inch ring gear, remove the rear axle vent hose from the rear axle, if necessary.
5. Remove the vent hose swivel clip from the rear brake crossover pipe, if necessary.

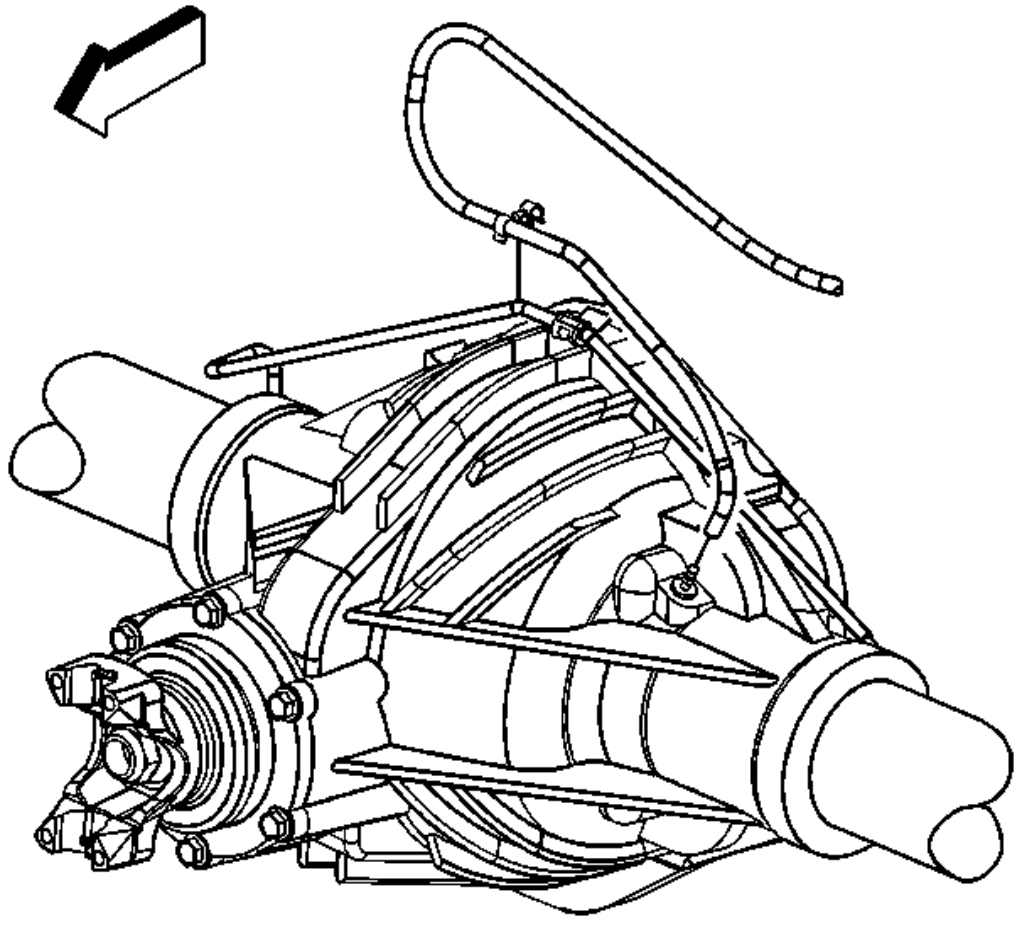


Fig. 205: Rear Axle Vent Hose (10.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

6. If equipped with a 10.5 inch ring gear, remove the rear axle vent hose from the rear axle, if necessary.
7. Remove the vent hose swivel clip from the rear brake crossover pipe, if necessary.

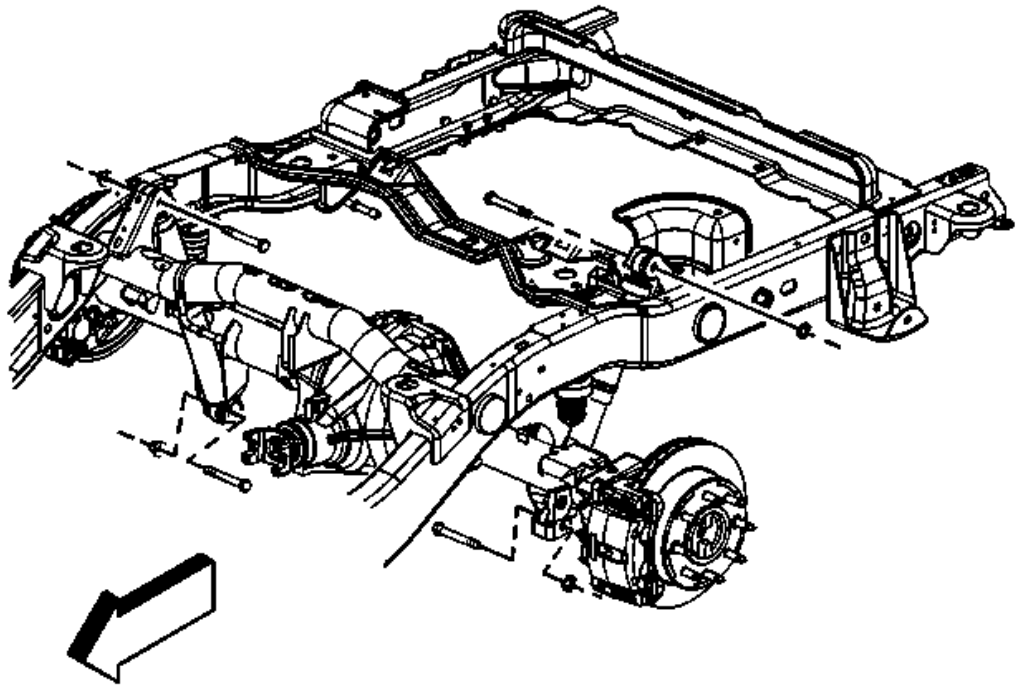


Fig. 206: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

8. Remove the rear shock absorber lower bolts and nuts, if necessary.
9. Lower the rear axle using the adjustable jack stands, if necessary.

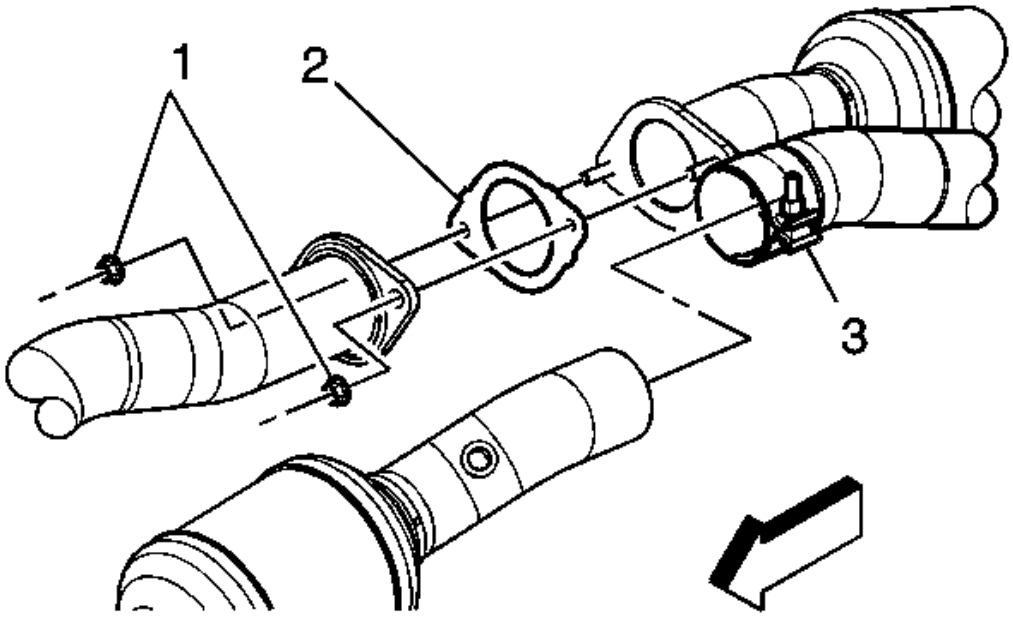


Fig. 207: View Of Exhaust Muffler, Exhaust Manifold Pipe, Gasket & Nuts
Courtesy of GENERAL MOTORS CORP.

10. Remove the exhaust muffler to exhaust manifold pipe nuts (1).
11. Loosen the exhaust muffler clamp (3).
12. Remove the heated oxygen sensor (HO2S). Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series - Cab/Chassis)** .

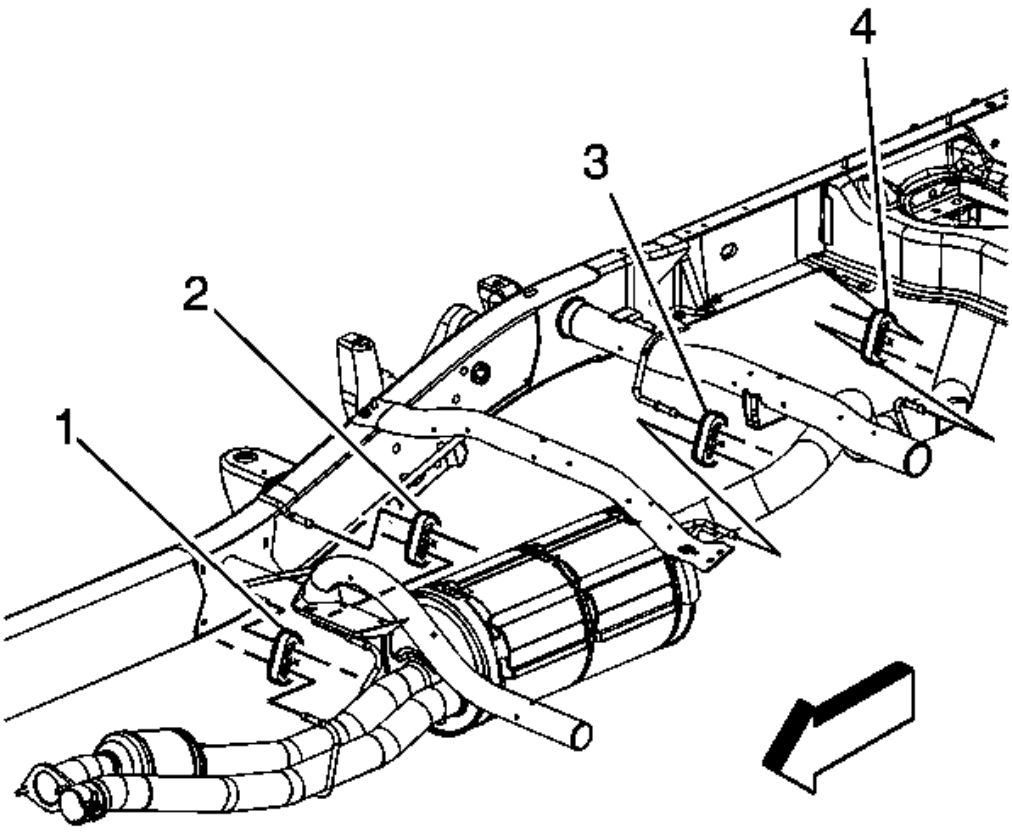


Fig. 208: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

13. Lubricate the 4 insulators where the muffler assembly hangers are inserted in order to ease removal.
14. With the aid of an assistant, remove the insulators (1-4) from the front, intermediate, and rear muffler assembly hangers and remove the muffler assembly.

Installation Procedure

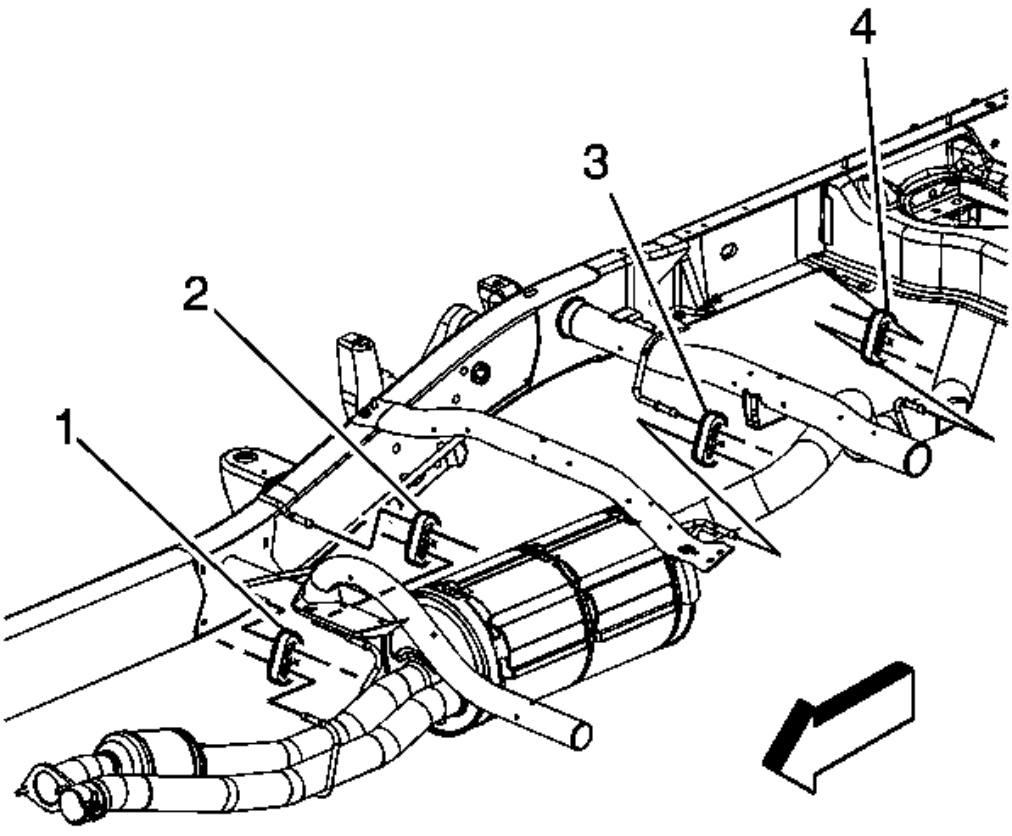


Fig. 209: View Of Muffler Assembly Insulators
Courtesy of GENERAL MOTORS CORP.

1. Lubricate the 4 insulators where the muffler assembly hangers are inserted in order to ease installation.
2. With the aid of an assistant, position and install the muffler assembly.
3. Install the insulators (1-4) to the front, intermediate, and rear muffler assembly hangers.

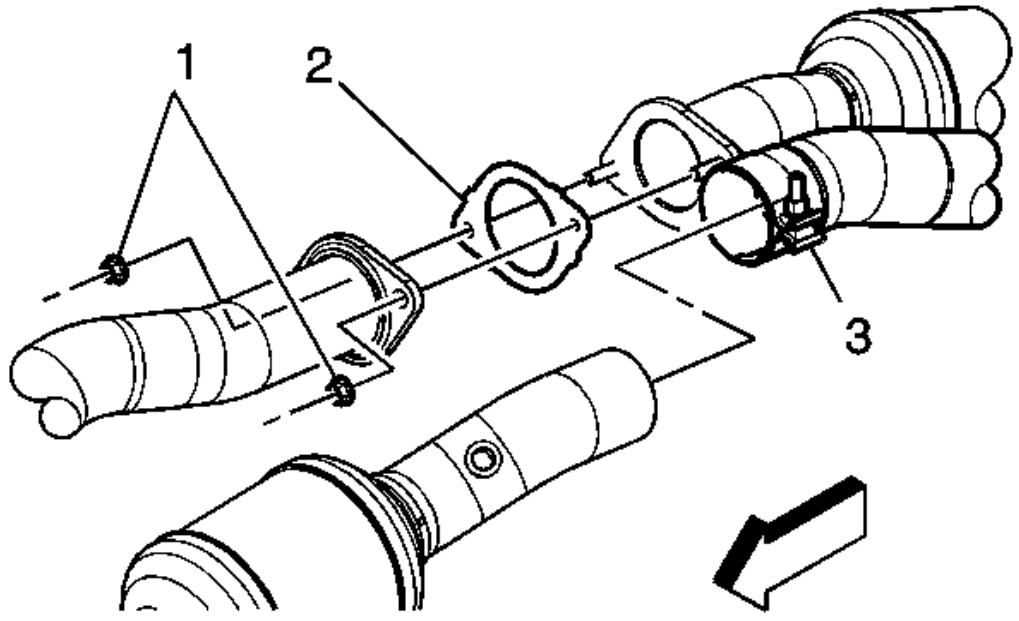


Fig. 210: View Of Exhaust Muffler, Exhaust Manifold Pipe, Gasket & Nuts
Courtesy of GENERAL MOTORS CORP.

4. Install the HO2S. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (1500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series)** or **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (2500 Series - Cab/Chassis)** .

   NOTE: Refer to Fastener Notice .

5. Tighten the exhaust muffler clamp (3).

   Tighten: Tighten the nuts to 47 N.m (35 lb ft).

6. Install the exhaust muffler to exhaust manifold pipe nuts (1).

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

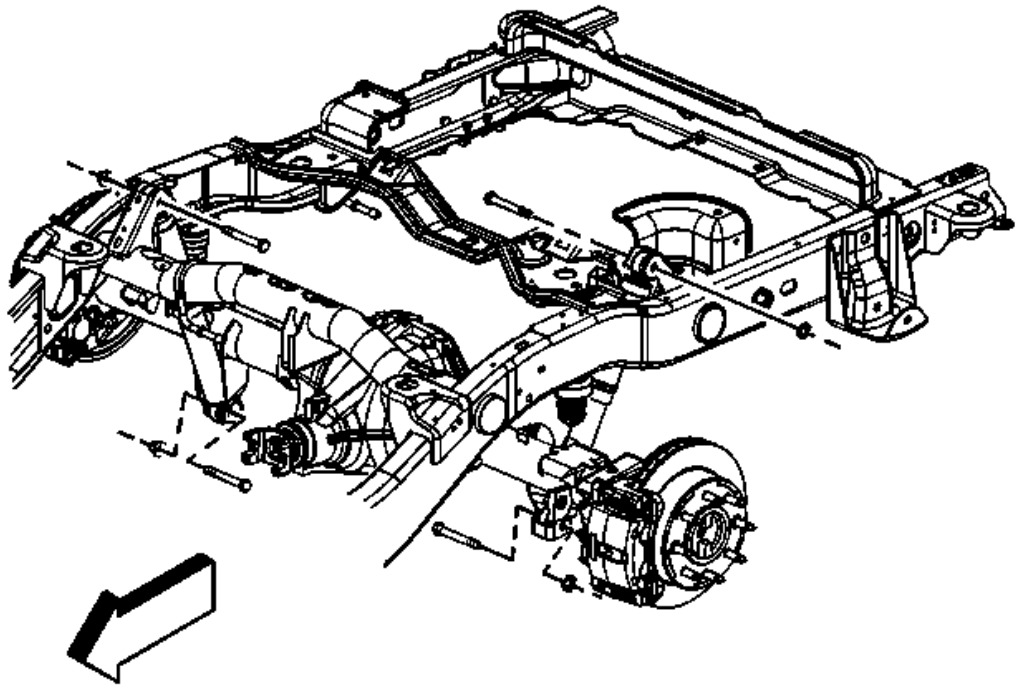


Fig. 211: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

7. Raise the rear axle using the adjustable jack stands, if necessary.
8. Install the rear shock absorber lower bolts and nuts, if necessary.

   Tighten: Tighten the bolts to 95 N.m (70 lb ft).

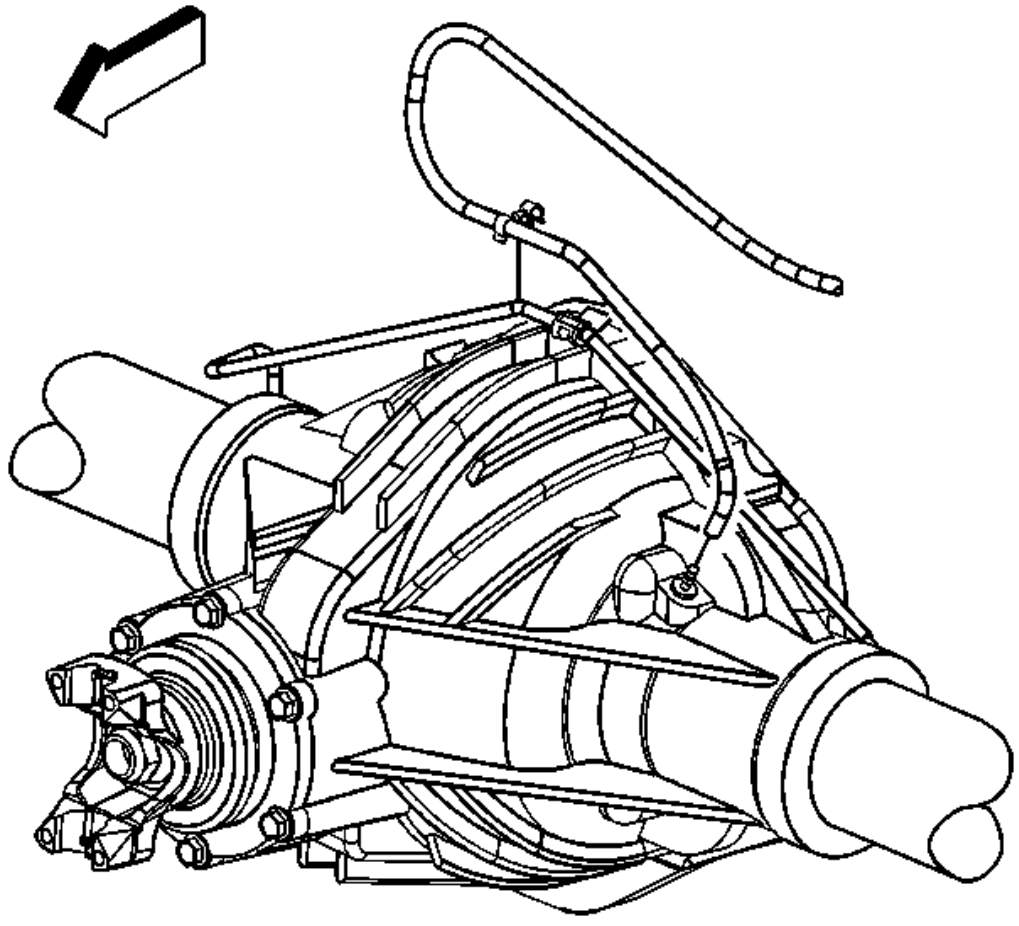


Fig. 212: Rear Axle Vent Hose (10.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

9. If equipped with a 10.5 inch ring gear, install the rear axle vent hose to the rear axle, if necessary.
10. Connect the vent hose swivel clip to the rear brake crossover pipe, if necessary.

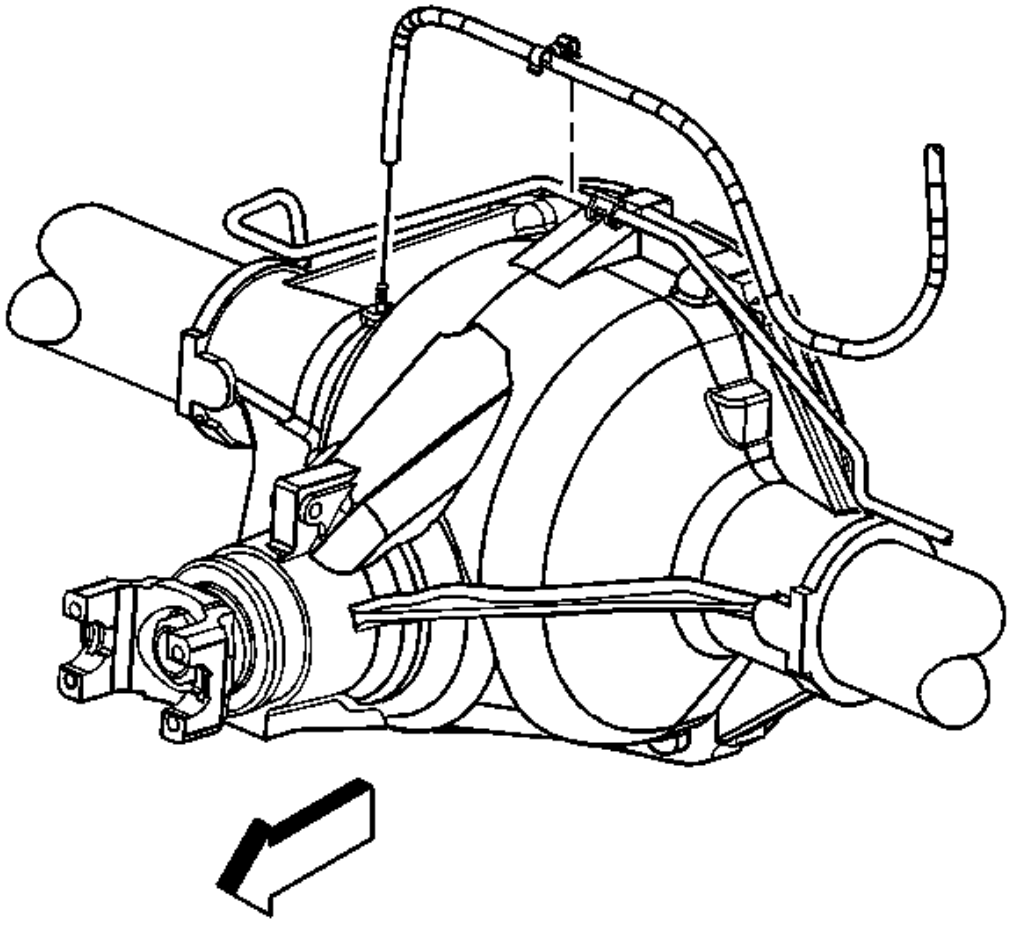


Fig. 213: Rear Axle Vent Hose (8.6 or 9.5 Inch Ring Gear)
Courtesy of GENERAL MOTORS CORP.

11. If equipped with a 8.6 or a 9.5 inch ring gear, install the rear axle vent hose to the rear axle, if necessary.
12. Install the vent hose swivel clip to the rear brake crossover pipe, if necessary.
13. Remove the adjustable jack stands from under the rear axle, if necessary.
14. Install the spare tire, if necessary.
15. Lower the vehicle.

MUFFLER REPLACEMENT (6.6L)

Removal Procedure

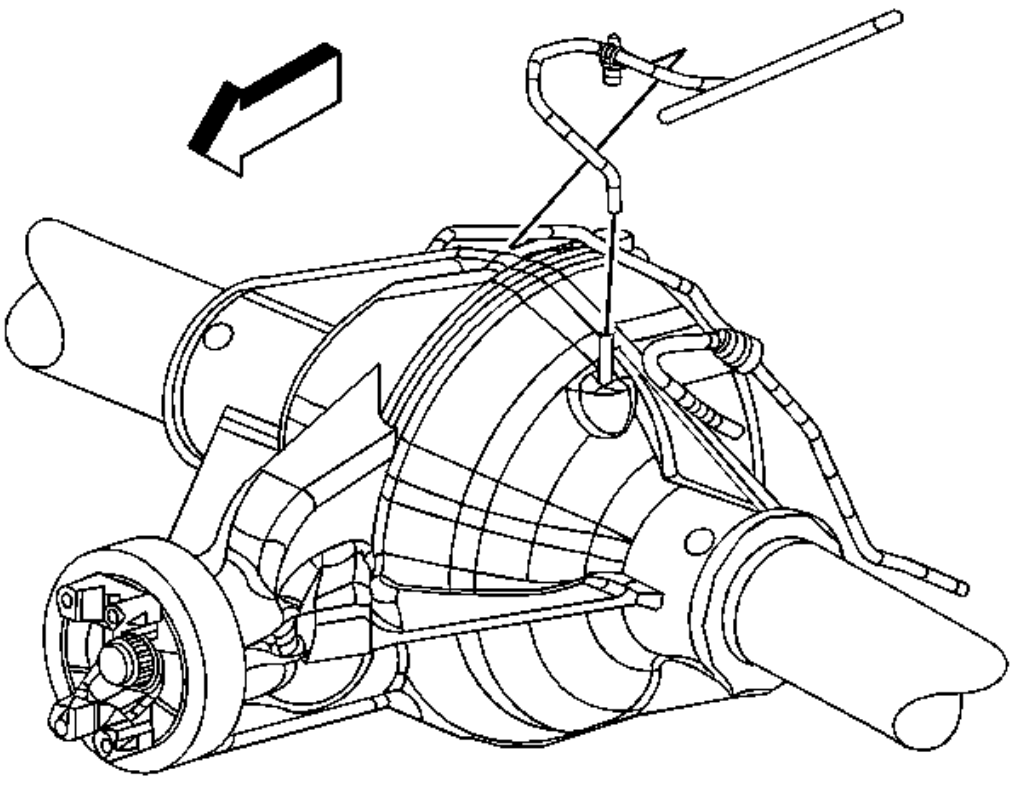


Fig. 214: View Of Vent Hose Swivel Clip & Rear Brake Crossover Pipe
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the spare tire, if necessary.
3. Install adjustable jack stands under the rear axle, if necessary.
4. Remove the rear axle vent hose from the rear axle, if necessary.
5. Remove the vent hose swivel clip from the rear brake crossover pipe, if necessary.

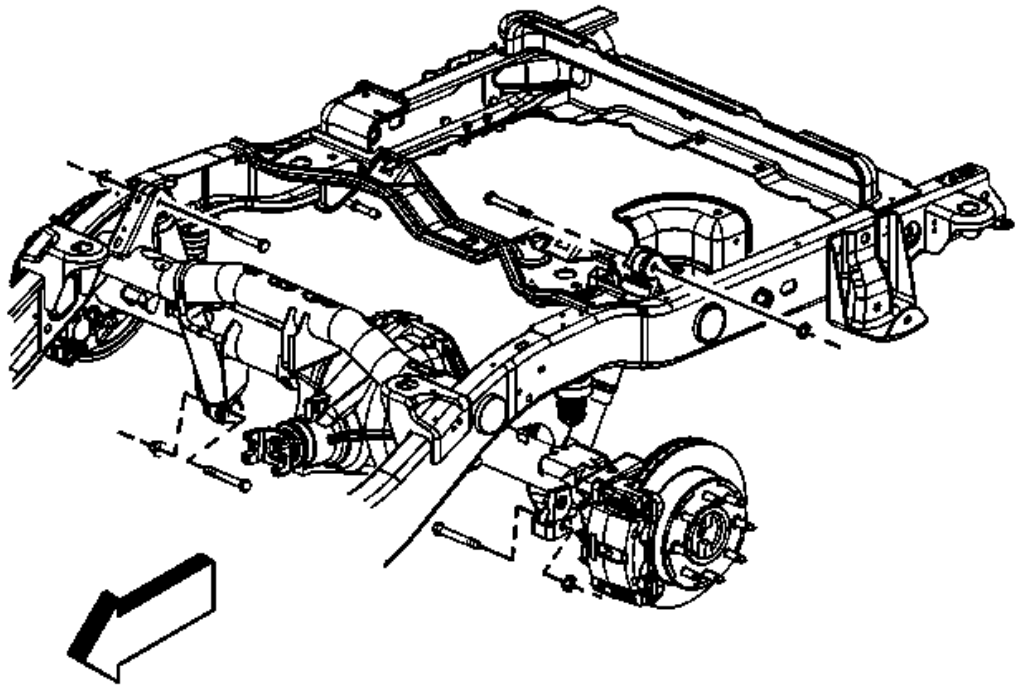


Fig. 215: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

6. Remove the rear shock absorbers lower bolts and nuts, if necessary.
7. Lower the rear axle using the adjustable jack stands, if necessary.

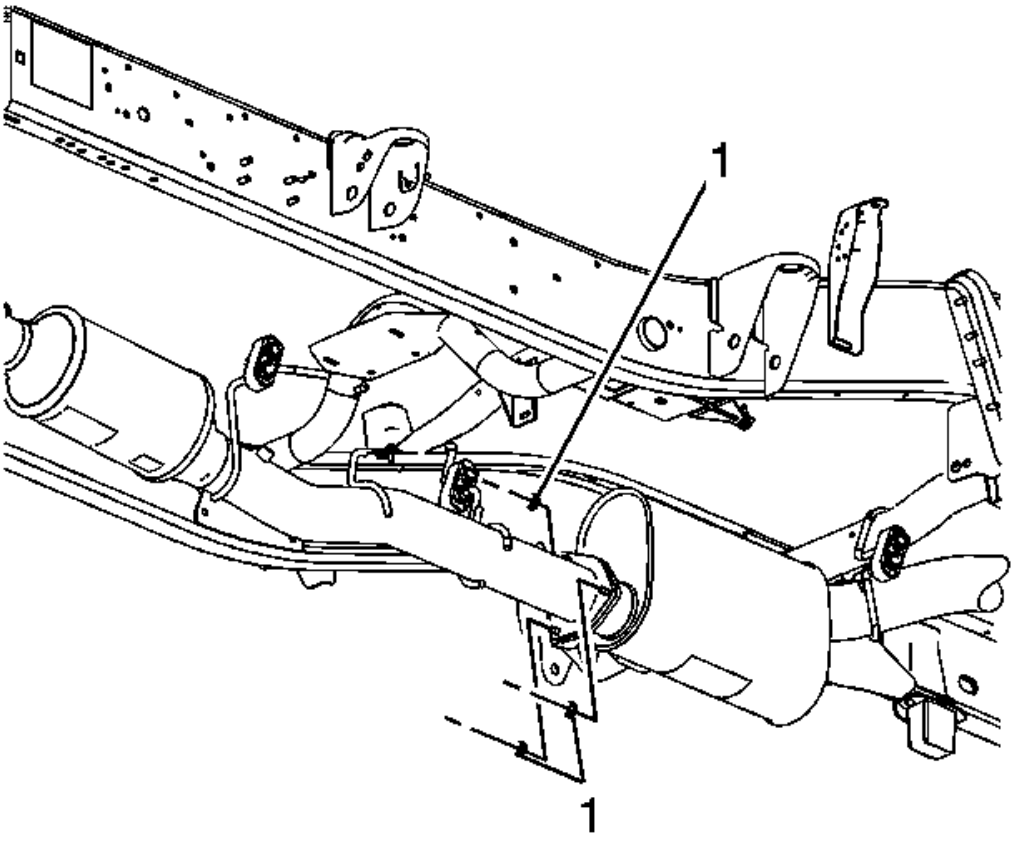


Fig. 216: View Of Exhaust Particulate Filter Nuts
Courtesy of GENERAL MOTORS CORP.

8. Remove the exhaust muffler to exhaust particulate filter nuts (1).
9. With the aid of an assistant, support the exhaust muffler.

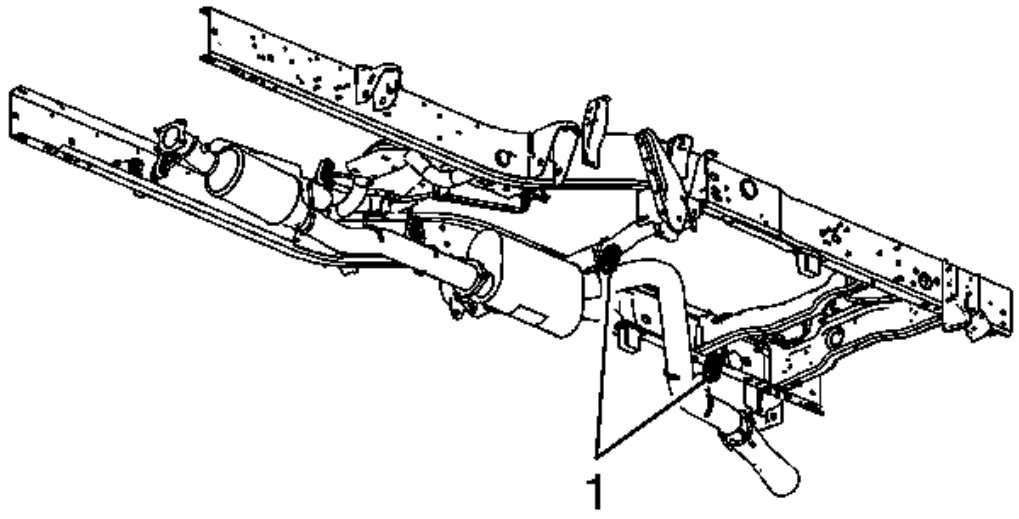


Fig. 217: View Of Exhaust Insulators
Courtesy of GENERAL MOTORS CORP.

10. Remove the exhaust muffler hangers from the exhaust insulators (1).

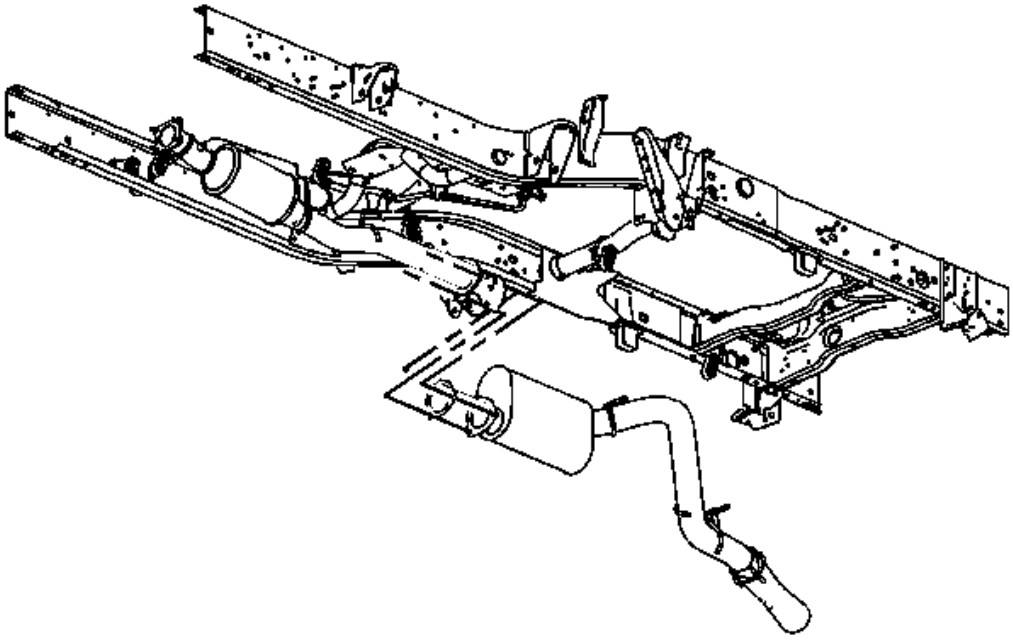


Fig. 218: View Of Exhaust Muffler & Gasket
Courtesy of GENERAL MOTORS CORP.

11. Remove the exhaust muffler. (2500/3500 crew cab shown, regular/extended cabs similar).
12. Remove and discard the exhaust particulate filter to muffler gasket.

Installation Procedure

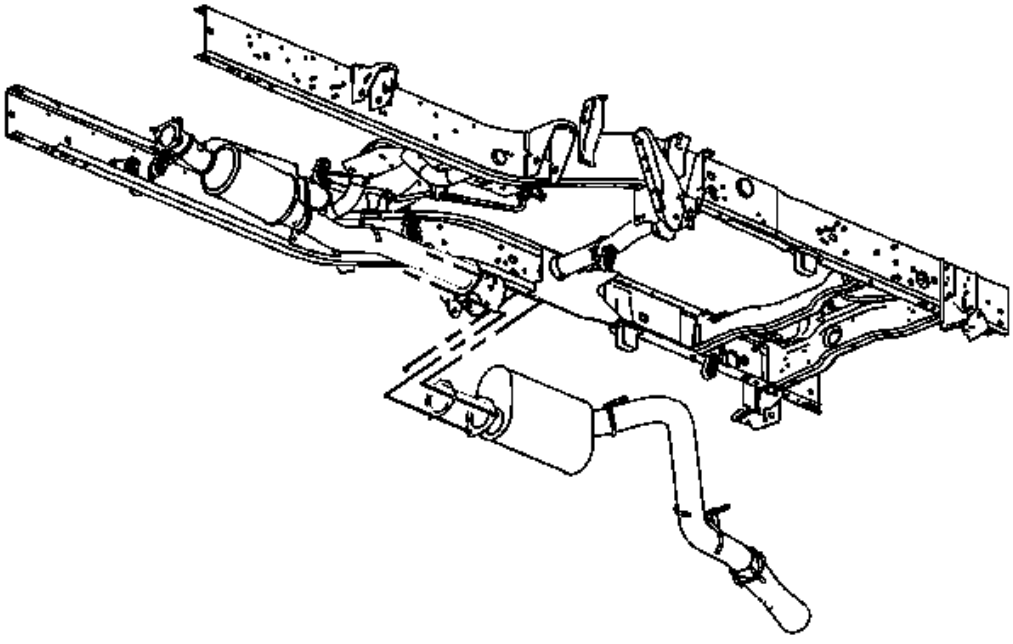


Fig. 219: View Of Exhaust Muffler & Gasket
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW gasket onto the exhaust muffler studs.
2. Install the exhaust muffler to the particulate filter.
3. With the aid of an assistant, support the exhaust muffler.

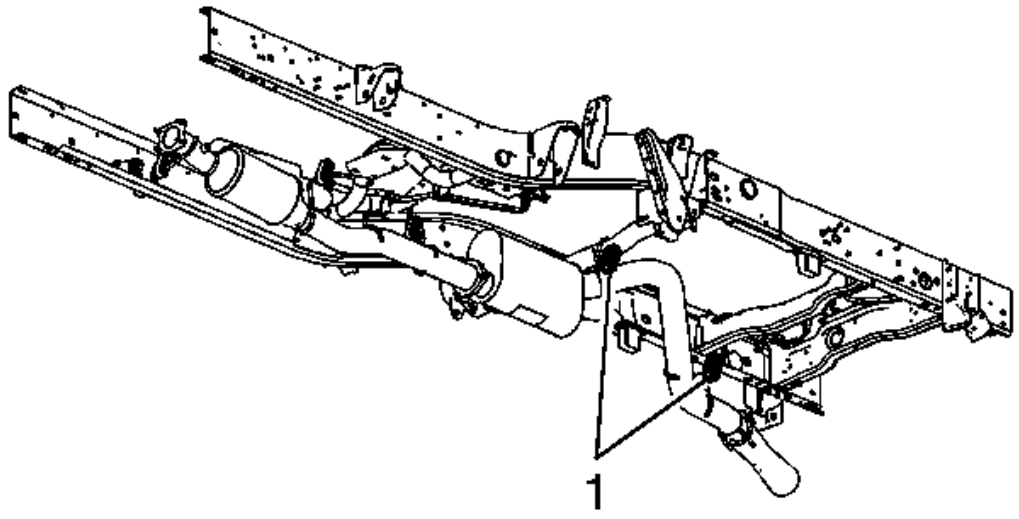


Fig. 220: View Of Exhaust Insulators
Courtesy of GENERAL MOTORS CORP.

4. Install the exhaust muffler hangers to the exhaust insulators (1).

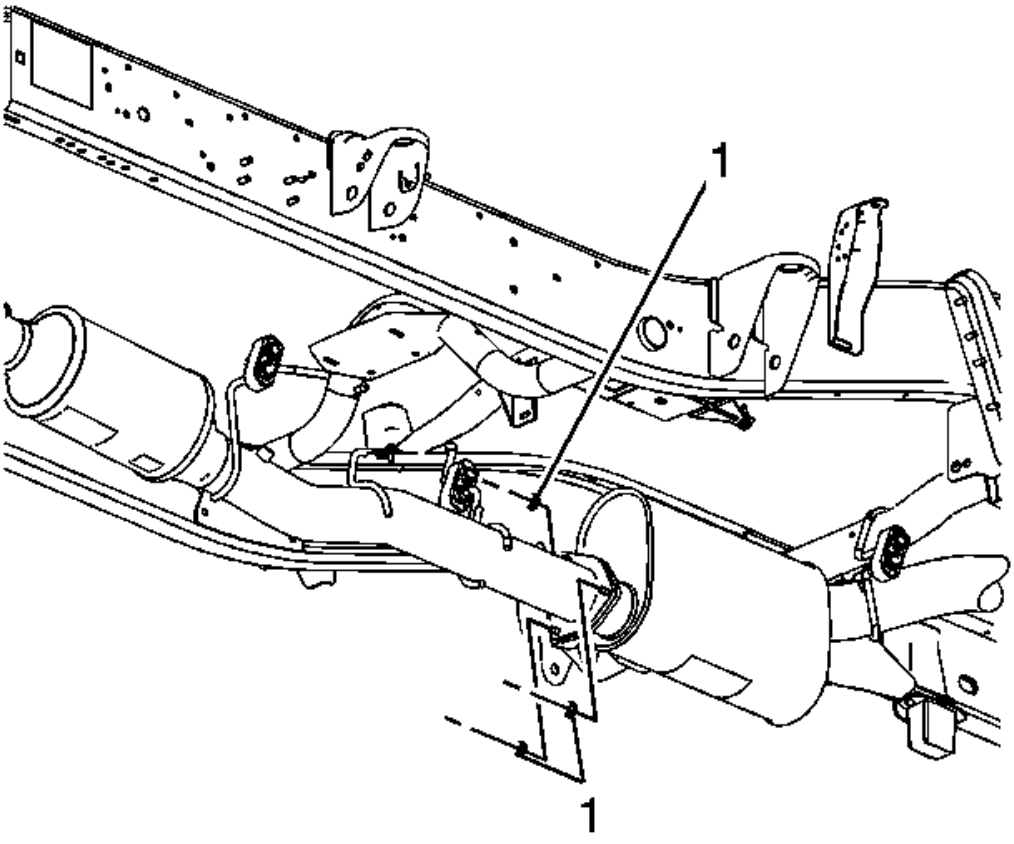


Fig. 221: View Of Exhaust Particulate Filter Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

5. Install the exhaust muffler to exhaust particulate filter nuts (1).

   Tighten: Tighten the nuts to 45 N.m (33 lb ft).

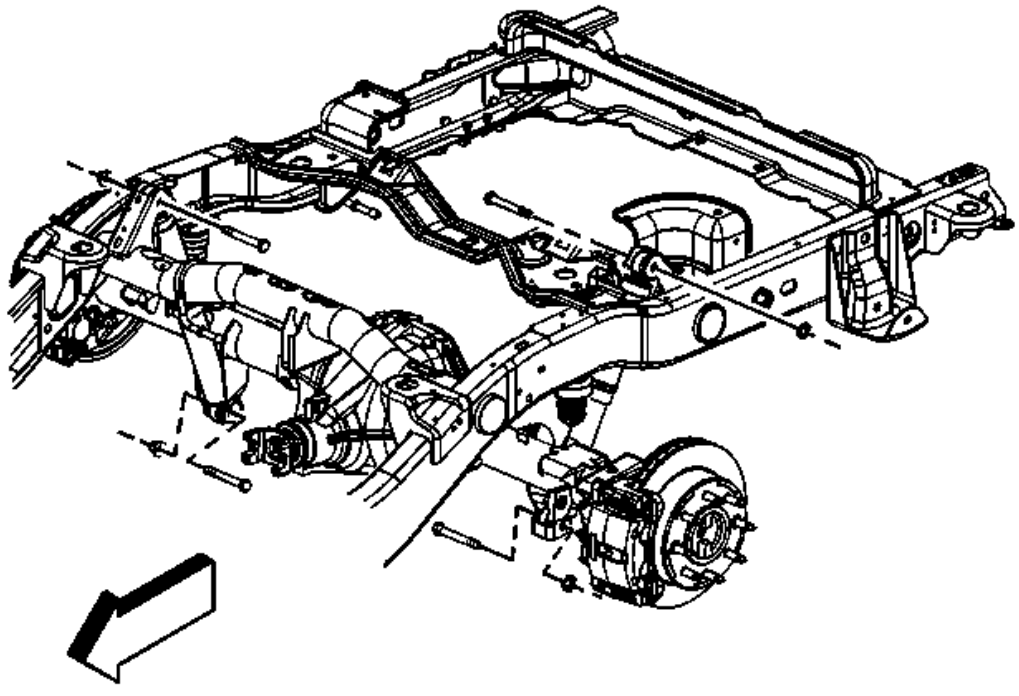


Fig. 222: Rear Shock Absorber Bolts And Nuts (6.0L, 6.6L, and 8.1L Engines)
Courtesy of GENERAL MOTORS CORP.

6. Raise the rear axle using the adjustable jack stands, if necessary.
7. Install the rear shock absorbers lower bolts and nuts, if necessary.

Tighten: Tighten the bolts to 95 N.m (70 lb ft).

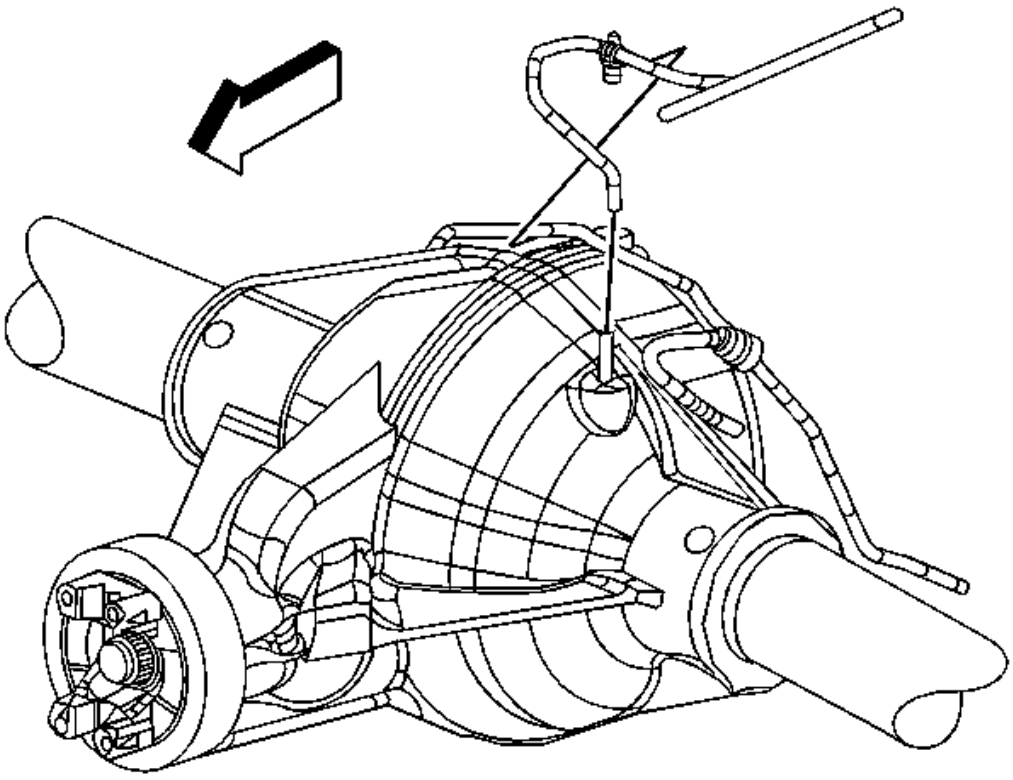


Fig. 223: View Of Vent Hose Swivel Clip & Rear Brake Crossover Pipe
Courtesy of GENERAL MOTORS CORP.

8. Install the rear axle vent hose to the rear axle, if necessary.
9. Connect the vent hose swivel clip to the rear brake crossover pipe, if necessary.
10. Remove the adjustable jack stands from under the rear axle, if necessary.
11. Install the spare tire, if necessary.
12. Lower the vehicle.

FLOOR PANEL HEAT SHIELD REPLACEMENT

Removal Procedure

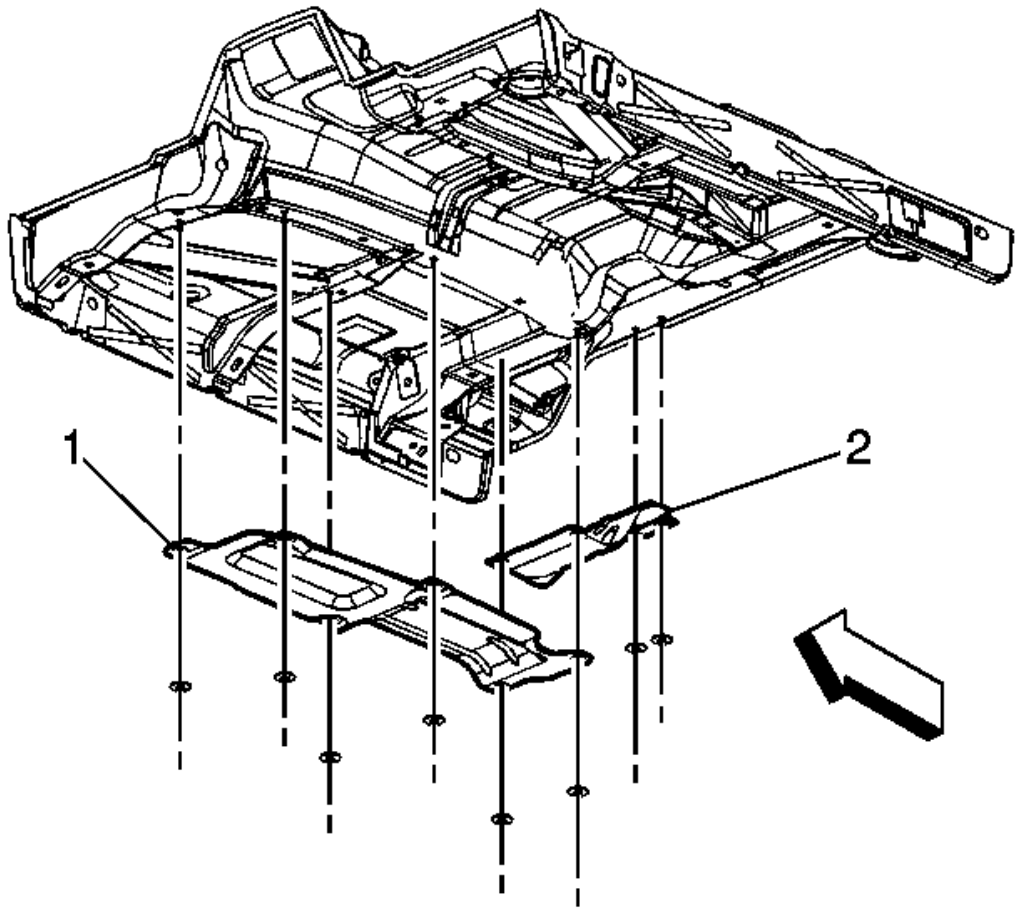


Fig. 224: View Of Front & Rear Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

1. Remove the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.
2. If vehicle has a regular cab, remove the exhaust heat shield nuts.
3. Remove the exhaust front heat shield (1) and/or the rear exhaust heat shield (2) from the studs.

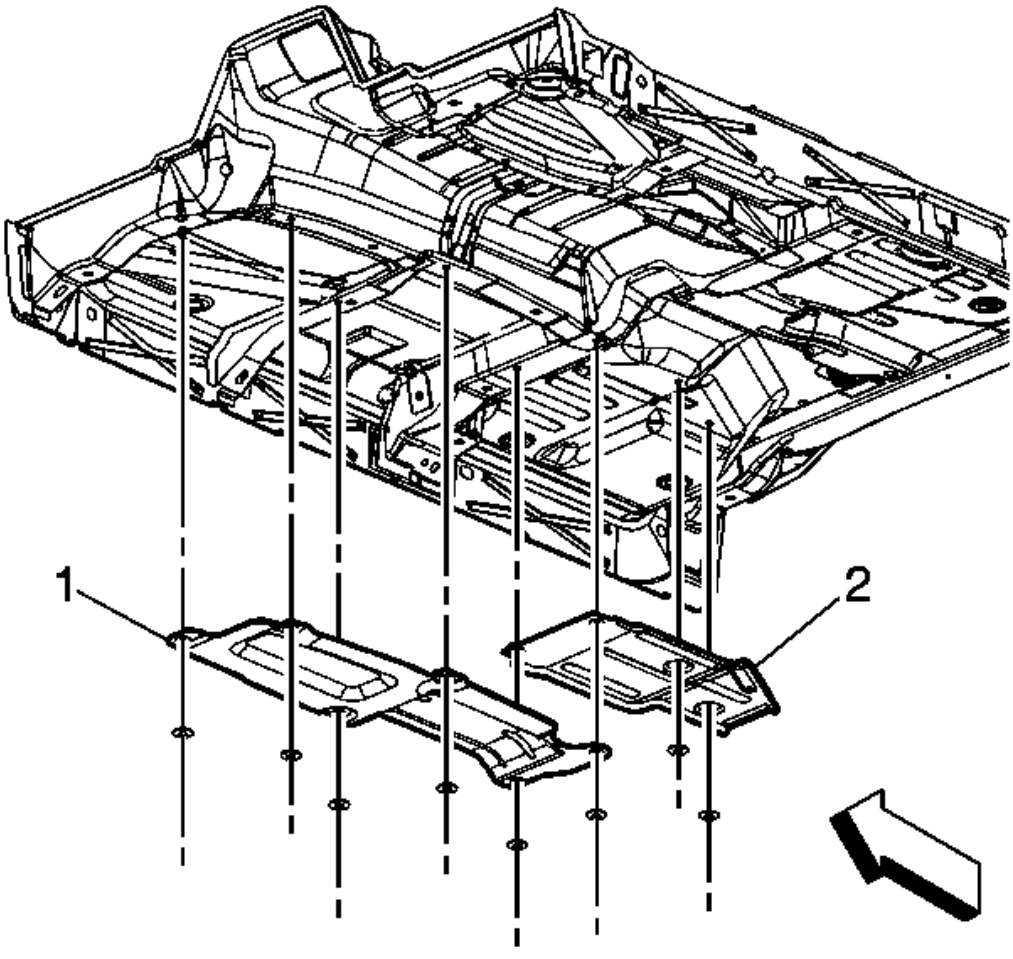


Fig. 225: View Of Front & Rear Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

4. If vehicle has extended cab, remove the exhaust heat shield nuts.
5. Remove the exhaust front heat shield (1) and/or the rear exhaust heat shield (2) from the studs.

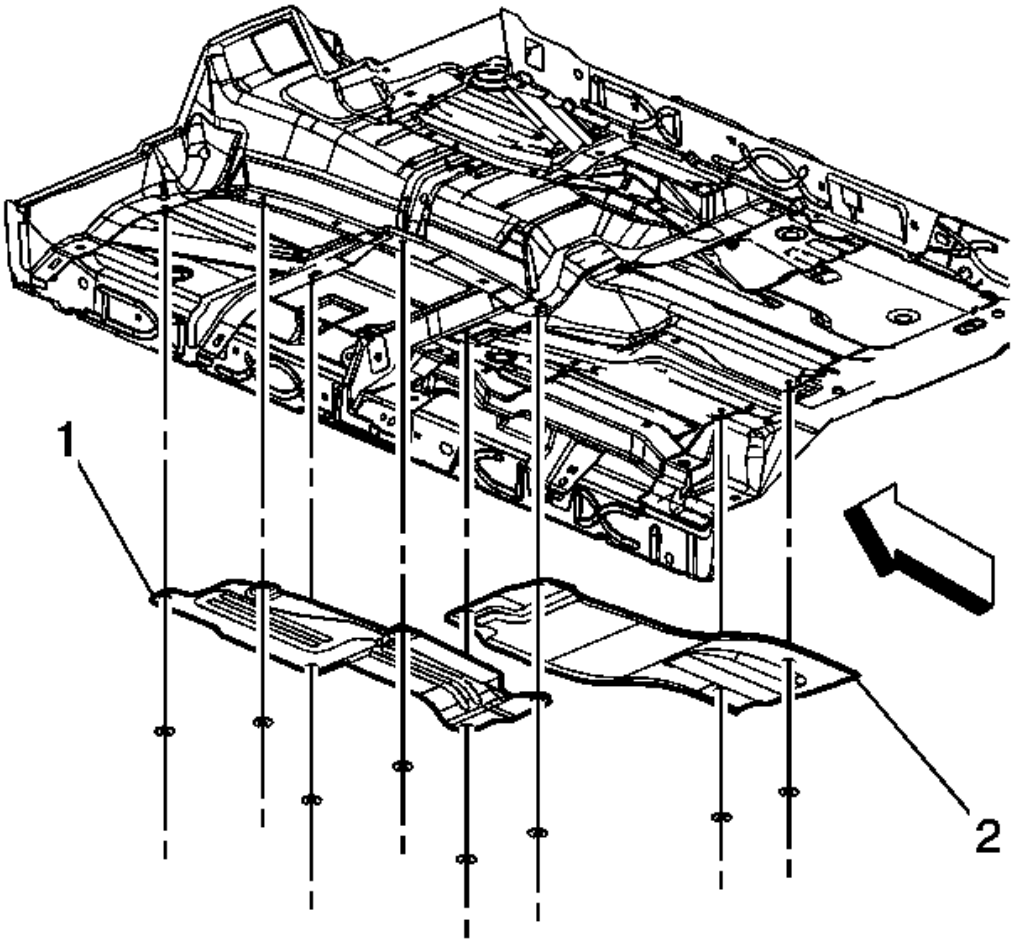


Fig. 226: View Of Front & Rear Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

6. If vehicle has a crew cab, remove the exhaust heat shield nuts.
7. Remove the exhaust front heat shield (1) and/or the rear exhaust heat shield (2) from the studs.

Installation Procedure

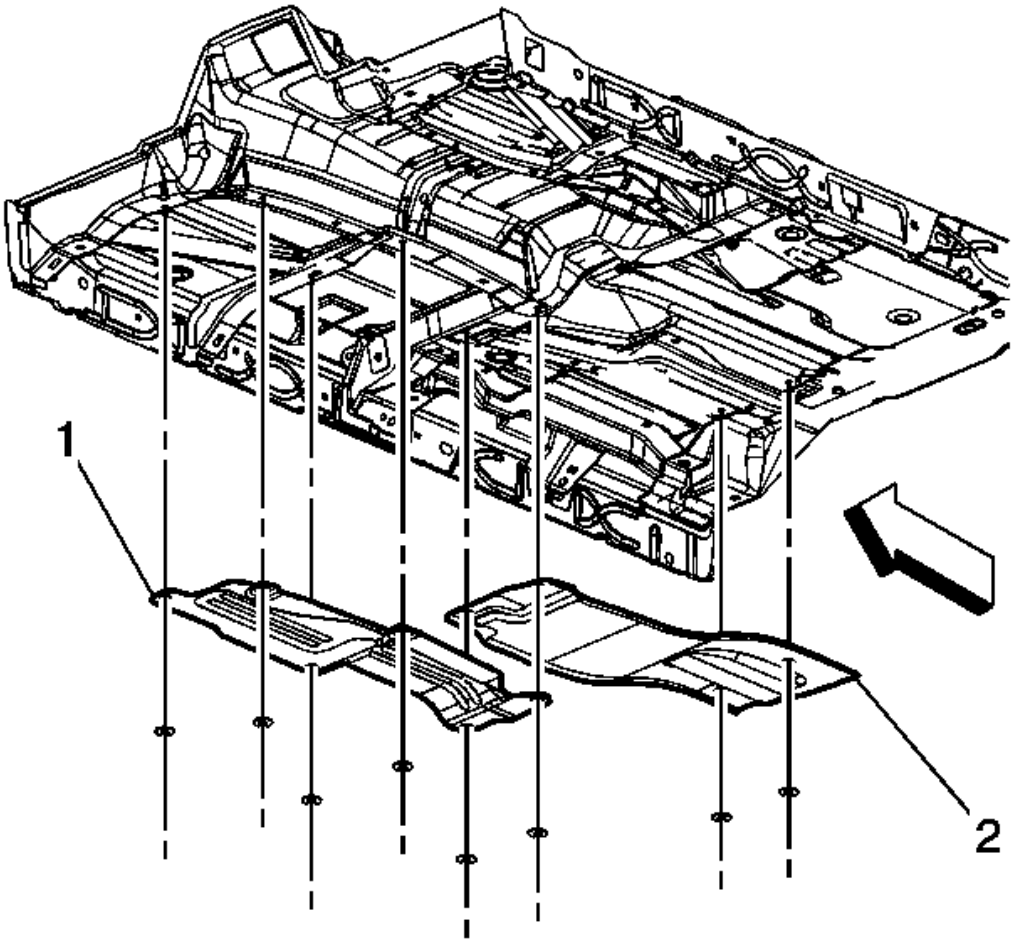


Fig. 227: View Of Front & Rear Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

1. If vehicle has a crew cab, position and install the rear exhaust heat shield (2) and/or the front exhaust heat shield (1) to the underbody studs.

NOTE: **Refer to Fastener Notice .**

2. Install the exhaust heat shield nuts.

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

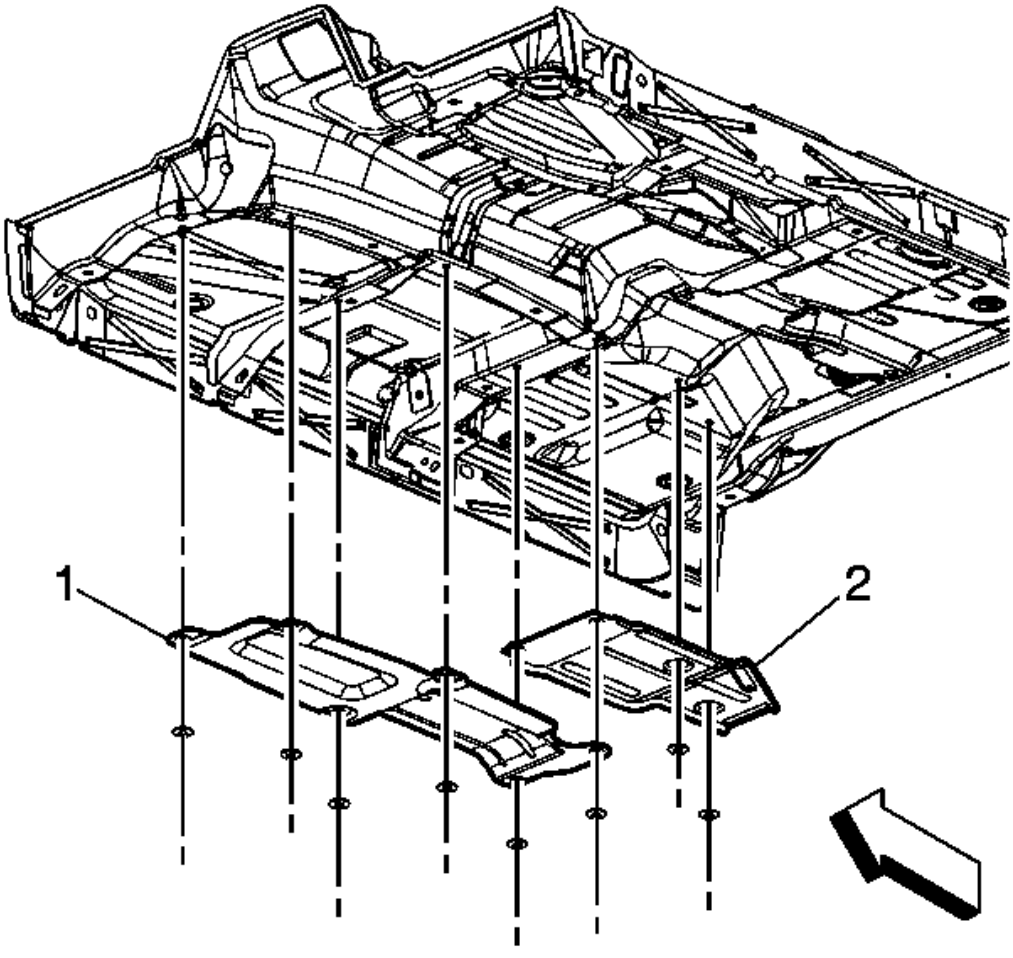


Fig. 228: View Of Front & Rear Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

3. If vehicle has a extended cab, position and install the rear exhaust heat shield (2) and/or the front exhaust heat shield (1) to the underbody studs.
4. Install the exhaust heat shield nuts.

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

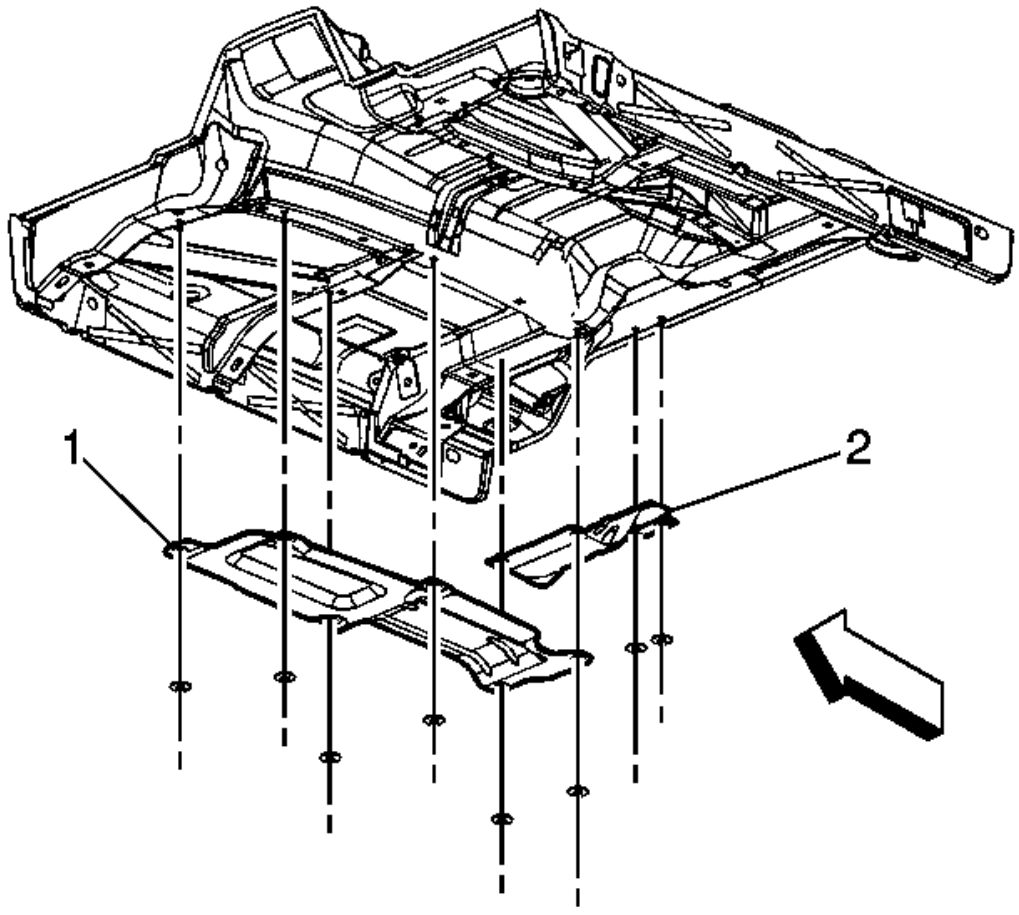


Fig. 229: View Of Front & Rear Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

5. If vehicle has a regular cab, position and install the rear exhaust heat shield (2) and/or the front exhaust heat shield (1) to the studs.
6. Install the exhaust heat shield nuts.

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

7. Install the catalytic converter. Refer to **Catalytic Converter Replacement (4.3L)** or **Catalytic Converter Replacement (4.8L, 5.3L, 6.0L, 6.2L)** or **Catalytic Converter Replacement (6.6L)**.

EXHAUST HEAT SHIELD REPLACEMENT - DASH PANEL

Removal Procedure

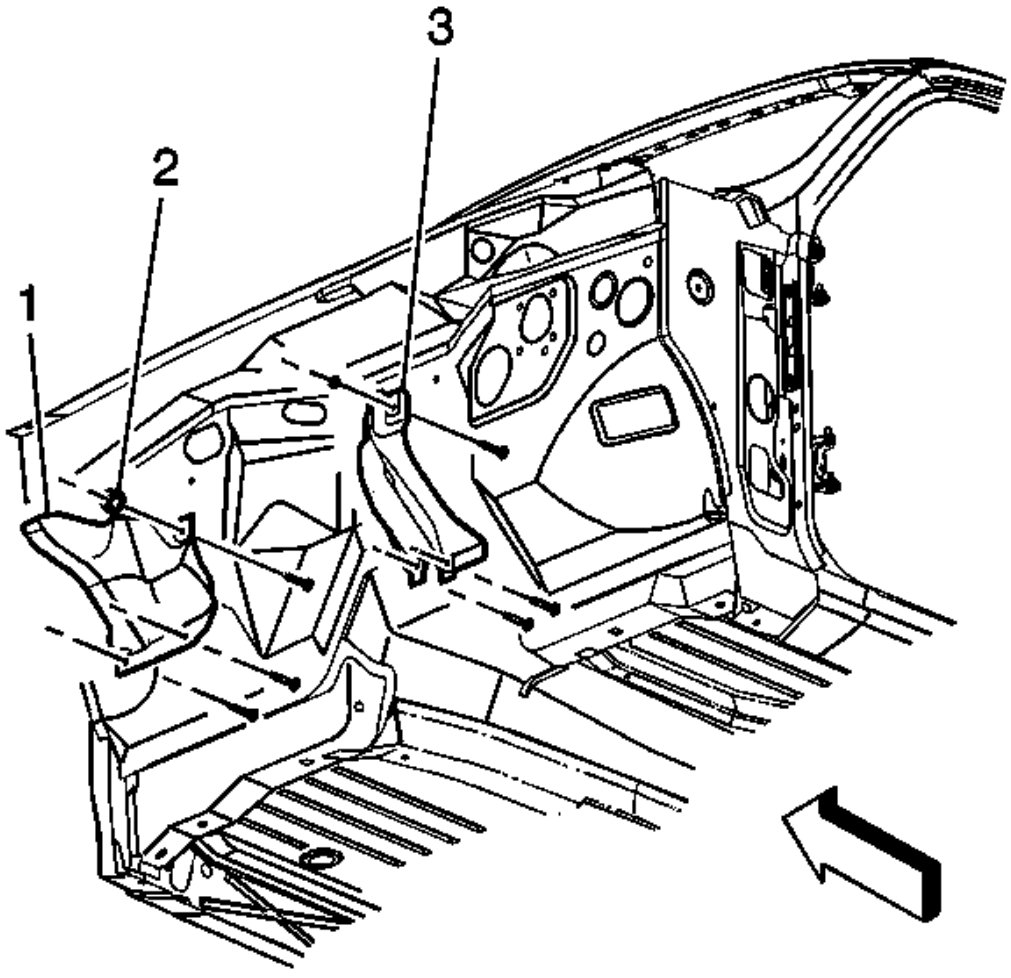


Fig. 230: View Of Left Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

1. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the exhaust heat shield nuts.
3. Remove both wheelhouse panels. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)**

and **Front Wheelhouse Liner Replacement - Left Side (Chevrolet)** or **Front Wheelhouse Liner Replacement - Left Side (GMC)** .

4. Remove the exhaust heat shield (1, 3) from the dash panel studs.
5. Remove the heat shield (1, 3) through the respective wheelwell.

Installation Procedure

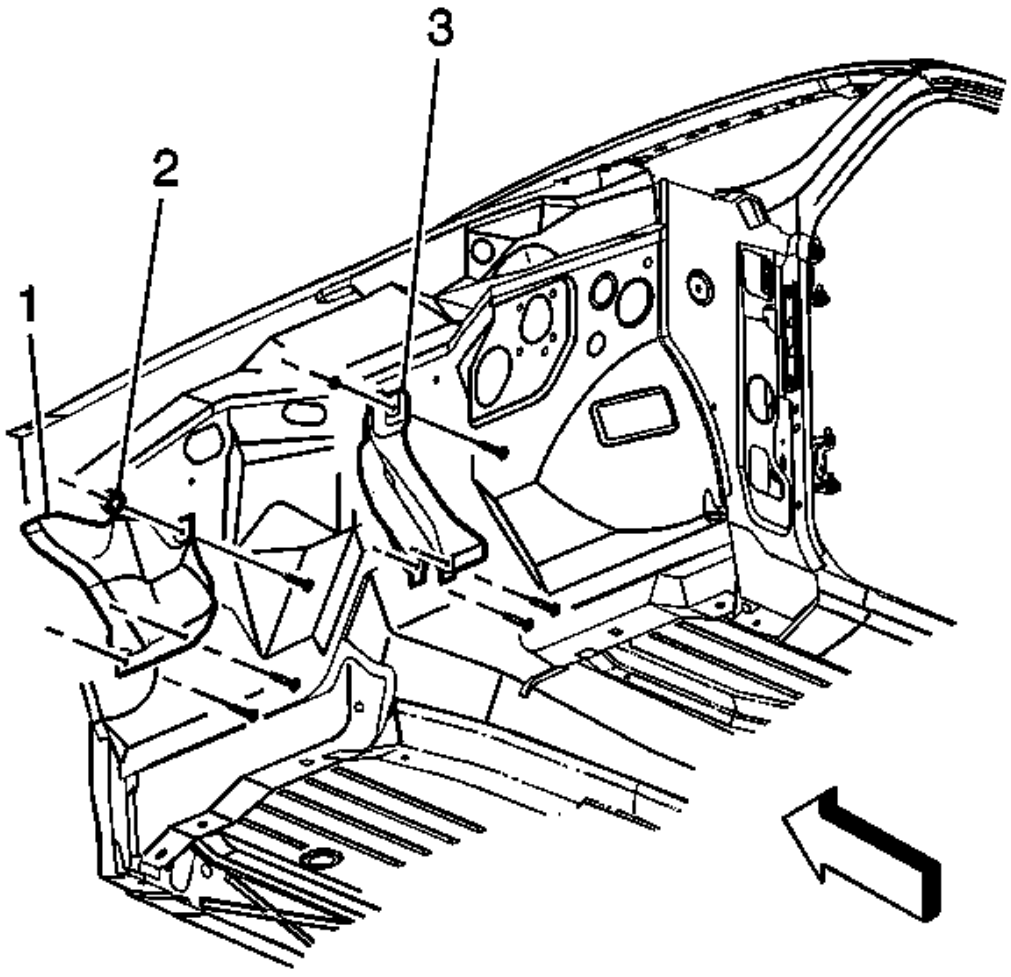


Fig. 231: View Of Left Exhaust Heat Shield & Nuts
Courtesy of GENERAL MOTORS CORP.

1. Install the heat shields (1, 3) through the respective wheelwell.

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

NOTE: Refer to Fastener Notice .

3. Install the exhaust heat shield nuts.

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

4. Lower the vehicle.

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - RIGHT SIDE (4.3L)

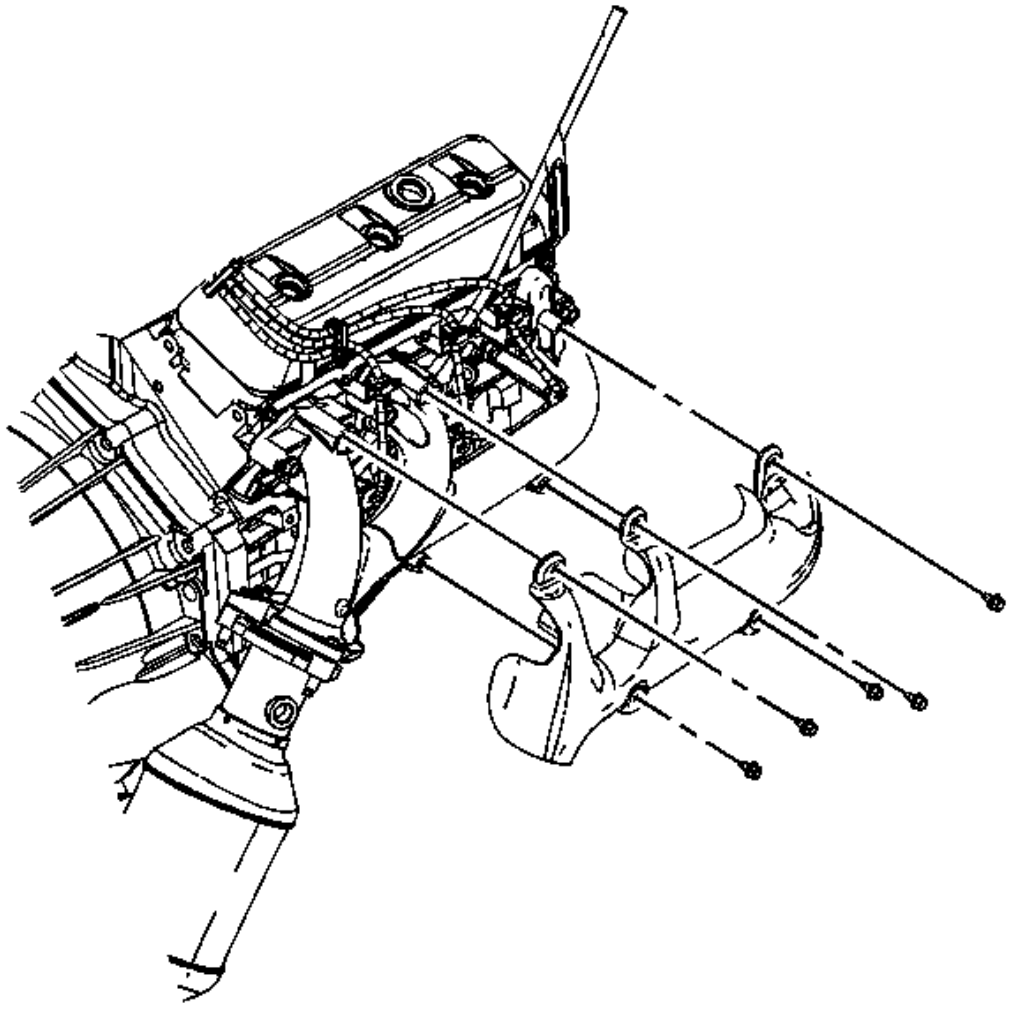


Fig. 232: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the spark plug wires. Refer to **Spark Plug Replacement** .
2. Reposition the spark plug wires out of the way, if necessary.
3. Remove the exhaust manifold heat shield bolts and heat shield from the exhaust manifold.

Installation Procedure

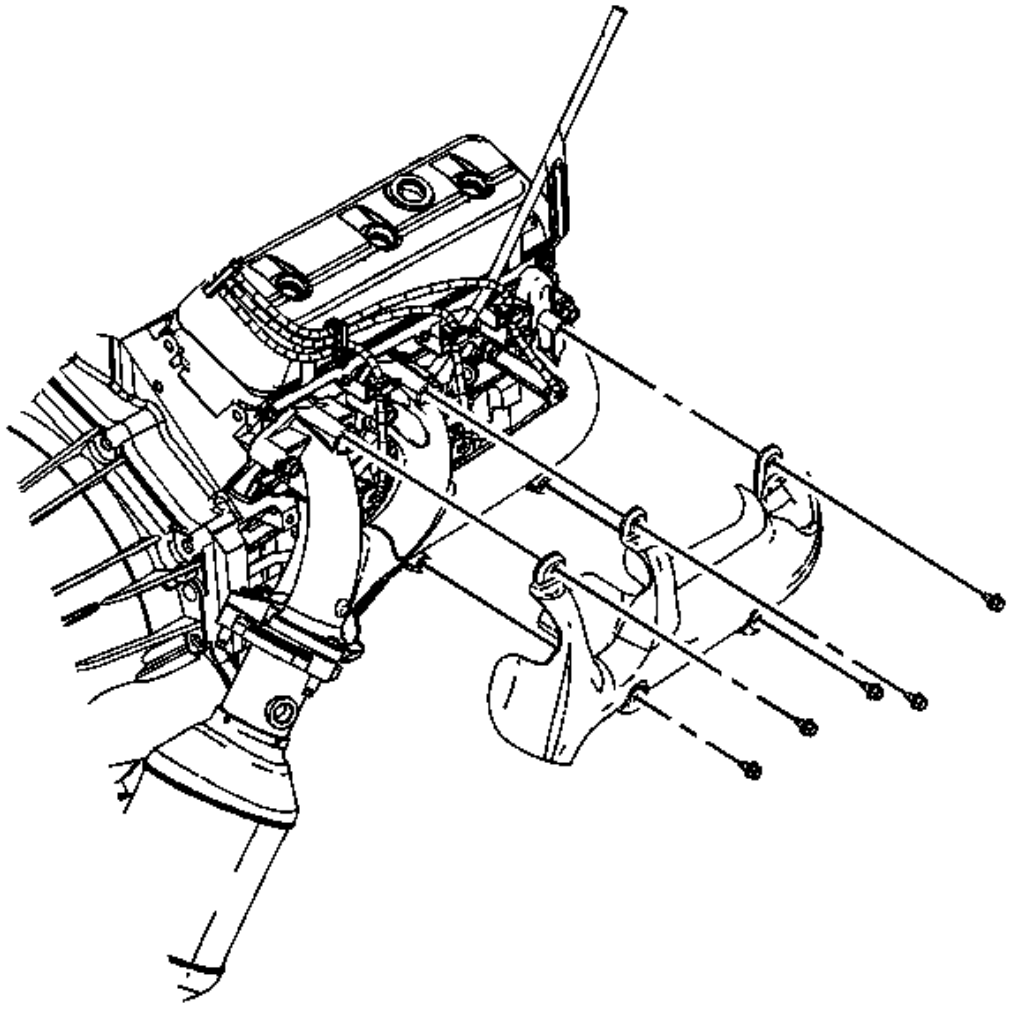


Fig. 233: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Position the exhaust manifold heat shield to the exhaust manifold and install the heat shield bolts.

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

2. Install the spark plug wires. Refer to **Spark Plug Replacement** .

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - RIGHT SIDE (4.8L, 5.3L, 6.0L, AND 6 AND 6.2L)

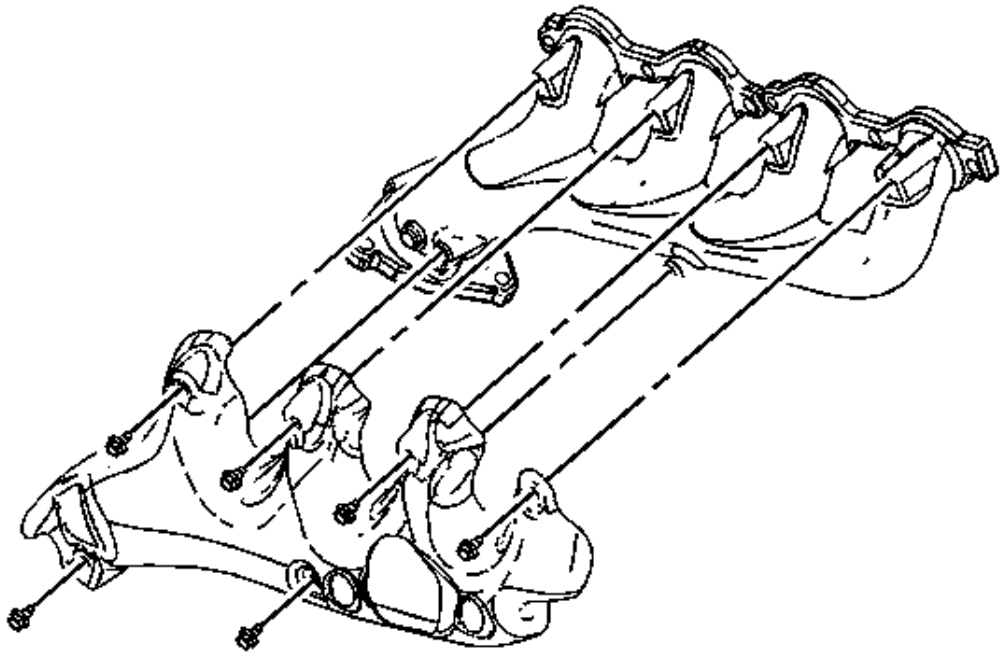


Fig. 234: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the right wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .
2. Remove the exhaust manifold heat shield bolts and heat shield from the exhaust manifold.

Installation Procedure

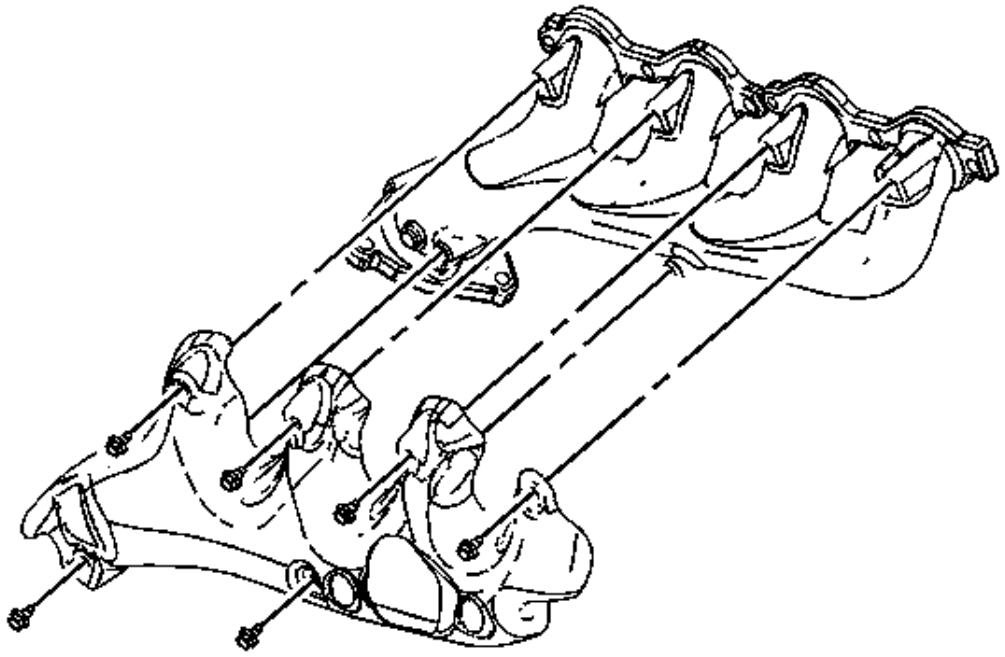


Fig. 235: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Position the exhaust manifold heat shield to the exhaust manifold and install the heat shield bolts.

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

2. Install the right wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - LEFT SIDE (4.3L)

Removal Procedure

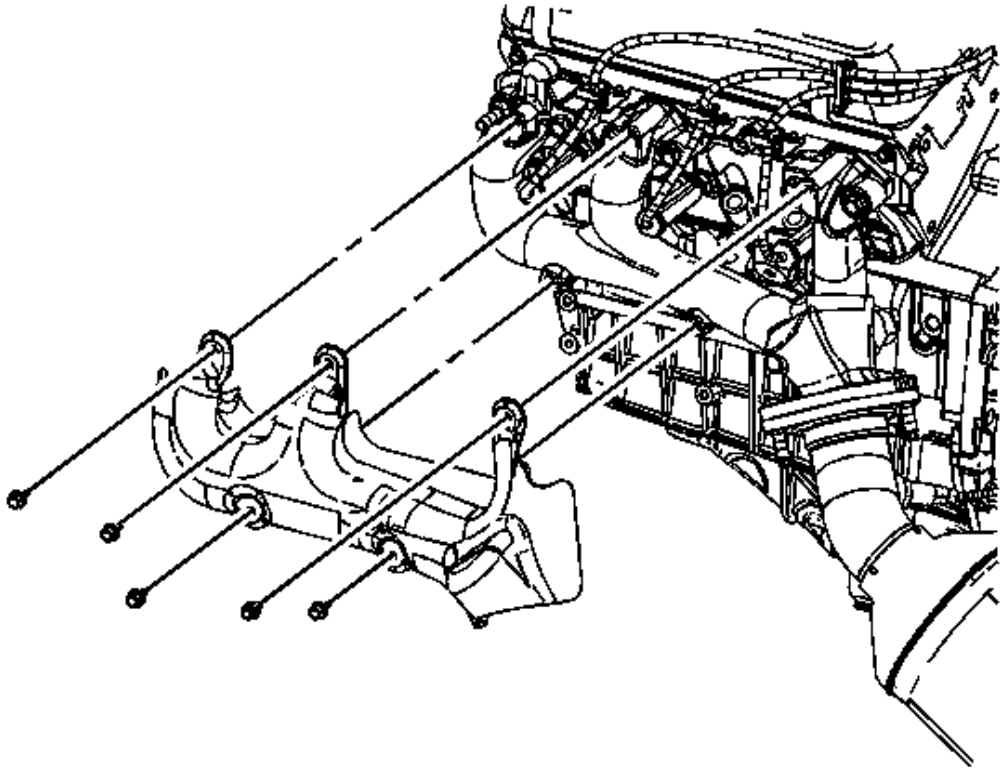


Fig. 236: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the spark plug wires. Refer to **Spark Plug Replacement** .
2. Reposition the spark plug wires out of the way, if necessary.
3. Remove the exhaust manifold heat shield bolts and heat shield from the exhaust manifold.

Installation Procedure

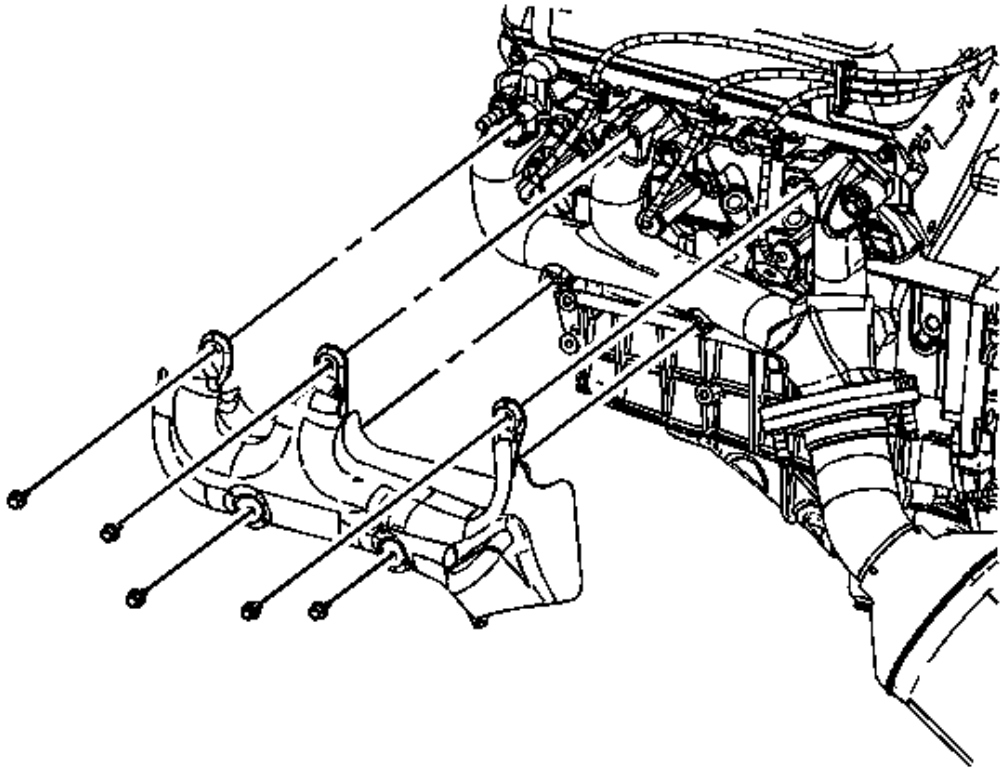


Fig. 237: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Position the exhaust manifold heat shield to the exhaust manifold and install the heat shield bolts.

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

2. Install the spark plug wires. Refer to **Spark Plug Replacement** .

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - LEFT SIDE (4.8L, 5.3L, 6.0L, AND 6.2L) 6.2L)

Removal Procedure

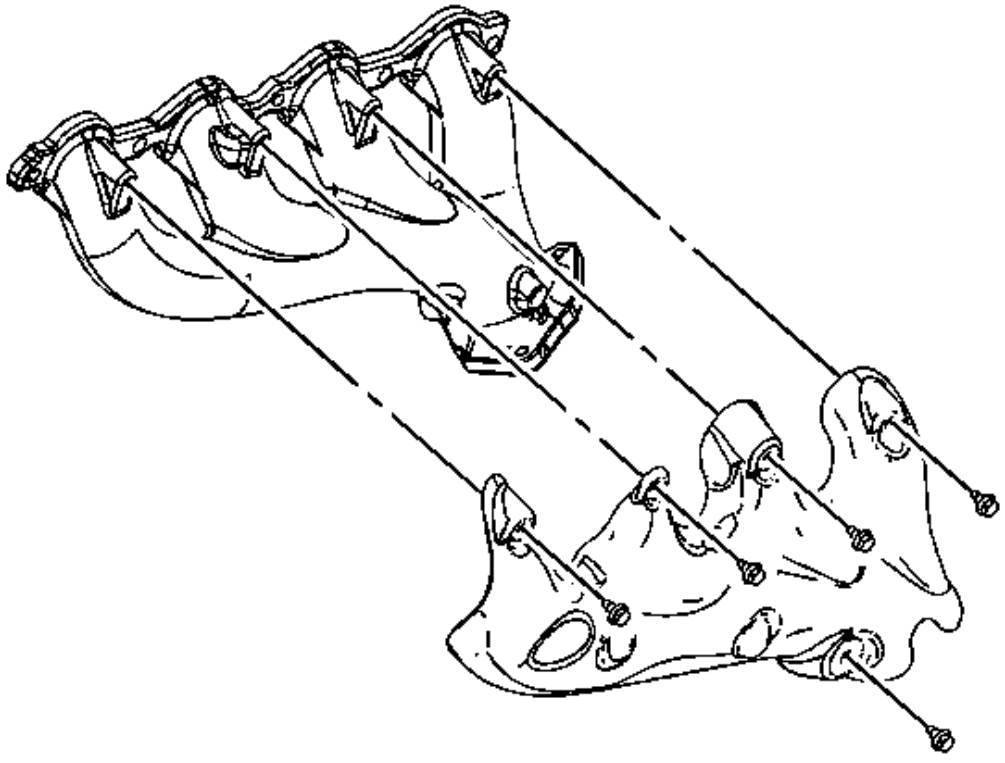


Fig. 238: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

1. Remove the right wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .
2. Remove the exhaust manifold heat shield bolts and heat shield from the exhaust manifold.

Installation Procedure

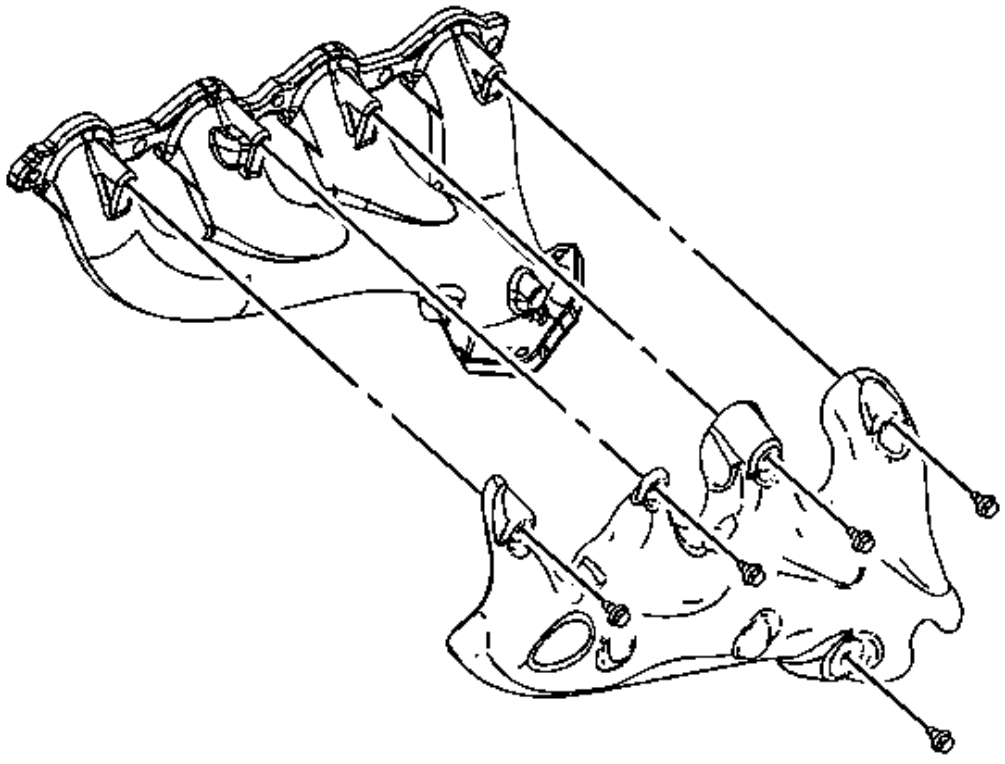


Fig. 239: View Of Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice .

1. Position the exhaust manifold heat shield to the exhaust manifold and install the heat shield bolts.

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

2. Install the right wheelhouse liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (GMC)** or **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** .

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 the muffler and into a resonator, if applicable where exhaust noise is lessened.

In order to secure the exhaust muffler assembly 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 system 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 underbody and other components from damage due to the heat from the exhaust system.

The exhaust system may be comprised of the following components:

- Catalytic converter
- Exhaust hanger
- Exhaust heat shield
- Exhaust insulator
- Exhaust manifold
- Exhaust muffler
- Exhaust pipe
- Exhaust resonator, if equipped
- Exhaust tail pipe, if equipped

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:

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

The catalyst in the converter is not serviceable.

Muffler

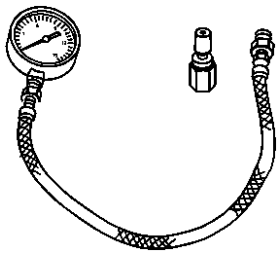
The exhaust muffler reduces the noise levels of the engine exhaust by the use of tuning tubes. The tuning tubes create channels inside the exhaust muffler that lower the sound levels created by the combustion of the engine.

Resonator

Some exhaust systems may be 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.

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

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