

2008 Buick LaCrosse CXL

2008 ENGINE Engine Exhaust - LaCrosse

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SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Catalytic Converter Bolt	45 N.m	33 lb ft
Catalytic Converter Nuts	60 N.m	44 lb ft
EGR Adapter Pipe to Exhaust Manifold Bolt	29 N.m	21 lb ft
Engine Lift Bracket Bolt/Nut	30 N.m	22 lb ft
Exhaust Crossover Pipe Bolt/Nut	25 N.m	18 lb ft
Exhaust Crossover Pipe Bolt/Stud	20 N.m	15 lb ft
Exhaust Crossover Pipe Heat Shield Bolt	10 N.m	89 lb in
Exhaust Crossover Pipe Heat Shield Nut	20 N.m	15 lb ft
Exhaust Manifold Bolt/Nut	30 N.m	22 lb ft
Exhaust Manifold Heat Shield Bolt	10 N.m	89 lb in
Exhaust Manifold Heat Shield Nuts	20 N.m	15 lb ft
Exhaust Manifold Nut	16 N.m	12 lb ft
Exhaust Manifold Pipe Stud Nut	35 N.m	26 lb ft
Exhaust Pipe Rear Hanger Bolt	25 N.m	18 lb ft
Fuel Injector Sight Shield Bracket Nut	30 N.m	22 lb ft
Rear Bumper Impact Bar Bolt	25 N.m	18 lb ft

DIAGNOSTIC INFORMATION AND PROCEDURES

DIAGNOSTIC STARTING POINT - ENGINE EXHAUST

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

system.

SYMPTOMS - ENGINE EXHAUST

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

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

- Loss of power-Refer to **Restricted Exhaust**.
- Poor acceleration-Refer to **Restricted Exhaust**.
- Poor fuel economy-Refer to **Restricted Exhaust**.
- Excessive smoke-diesel-Refer to **Restricted Exhaust**.

- Exhaust hissing noise-Refer to **Exhaust Leakage**.
- Exhaust popping noise-Refer to **Exhaust Leakage**.
- Exhaust rattle noise-Refer to **Exhaust Noise**.
- Loud exhaust noise-Refer to **Exhaust Noise**
- Exhaust buzz, groan, hum noise-Refer to **Exhaust Noise**.

RESTRICTED EXHAUST

Diagnostic Aids

For dual exhaust systems a quick check of exhaust flow will help determine which side of the exhaust system is restricted. The side that has less exhaust flow is the side that will be suspect, and the diagnosis should begin there.

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** Exhaust Back Pressure Gage. See **Special Tools**. Removing the 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.

9: Confirming that the condition has been fixed is essential. If the symptom still exists, proceed to Step 2 and repeat the diagnostic procedure.

Restricted Exhaust

Step	Action	Value(s)	Yes	No
1	Did you verify the customers complaint?	-	Go to Step 2	-
	Did you review the exhaust			Go to

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2	symptoms diagnostic information and perform the necessary inspections?	-	Go to Step 3	Symptoms - Engine Exhaust
3	Is the system equipped with dual exhaust?	-	Go to Diagnostic Aids	Go to Step 4
4	CAUTION: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system. 1. Remove the pre-catalyst HO2S sensor. Refer to <u>Heated Oxygen Sensor 1 Replacement</u> . 2. Install the J 35314-A Exhaust Back Pressure Gage in place of the HO2S sensor. See <u>Special Tools</u>. 3. Start and run the engine. 4. Increase and monitor the engine speed at 2500 RPM. 5. Observe the exhaust system back pressure reading on the gage. Does the reading exceed the specified value?	9 kPa (1.25 psi)	Go to Step 5	Go to Step 9
	1. Turn the engine off and place the ignition in the lock position. 2. Remove the J 35314-A .			

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5	See Special Tools. 3. Install the pre-catalyst HO2S sensor. Refer to Heated Oxygen Sensor 1 Replacement . 4. Remove the post-catalyst HO2S sensor. Refer to Heated Oxygen Sensor 2 Replacement . 5. Install the J 35314-A in place of the post HO2S sensor. See Special Tools. 6. Start and run the engine. 7. Increase and monitor the engine speed at 2500 RPM. 8. Observe the exhaust system back pressure reading on the gage.	9 kPa (1.25 psi)	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	-		-

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	Did you find and correct the condition?		Go to Step 8	
7	Replace the catalytic converter. Refer to Catalytic Converter Replacement . Did you find and correct the condition?	-	Go to Step 8	-
8	1. Remove the J 35314-A . See Special Tools. 2. Install the post-catalyst HO2S sensor. Refer to Heated Oxygen Sensor 2 Replacement . 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
9	1. Remove the J 35314-A . See Special Tools. 2. Install the pre-catalyst HO2S sensor. Refer to Heated Oxygen Sensor 1 Replacement . 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
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CAUTION:

Refer to **Hot Exhaust System Caution** .

IMPORTANT:

Refer to **Symptoms - Engine Exhaust** prior to beginning this table.

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.

Misaligned or improperly installed exhaust system components	NOTE: Refer to FASTENER NOTICE . Align and tighten the components to the specifications. Refer to Fastener Tightening Specifications .
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 • AIR connections to the exhaust manifold or cylinder head	Replace the leaking seal or gasket. Refer to the affected components procedure for service.

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Exhaust manifold cracked or broken	Replace the exhaust manifold. Refer to <u>Exhaust Manifold Replacement - Left Side (3.8L)</u> or <u>Exhaust Manifold Replacement - Left Side (RPO LY7)</u> or <u>Exhaust Manifold Replacement - Right Side (3.8L)</u> or <u>Exhaust Manifold Replacement - Right Side (RPO LY7)</u> .
Exhaust system component connection welds leaking	Replace the leaking component. Refer to the affected component's procedure for service.
Muffler is damaged or leaking at the seams	Replace the affected muffler. Refer to <u>Muffler Replacement (3.8L L26)</u> or <u>Muffler Replacement (3.6L LY7)</u> .

EXHAUST NOISE

Condition	Action
CAUTION: Refer to <u>Hot Exhaust System Caution</u> .	
IMPORTANT: Refer to <u>Symptoms - Engine Exhaust</u> prior to beginning this table.	
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.	
Popping or hissing noise	Exhaust leak. Refer to <u>Exhaust Leakage</u> .
Loud exhaust	1. Compare to a known good vehicle. 2. Inspect for a damaged or failed muffler. 3. Replace the faulty muffler. Refer to <u>Muffler Replacement (3.8L L26)</u> or <u>Muffler Replacement (3.6L LY7)</u>.
External rattle or vibration	1. Inspect for a bent or loose hanger, loose heat shield, or loose clamp. 2. Inspect for a exhaust pipe causing interference.

noise	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, resonator, or muffler. Refer to one of the following procedures: • <u>Catalytic Converter Replacement</u> • <u>Muffler Replacement (3.8L L26)</u> <u>Muffler Replacement (3.6L LY7)</u>

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (3.8L)

Removal Procedure

1. Turn the ignition OFF.
2. Remove the left and the right torque strut bolts at the engine strut bracket.

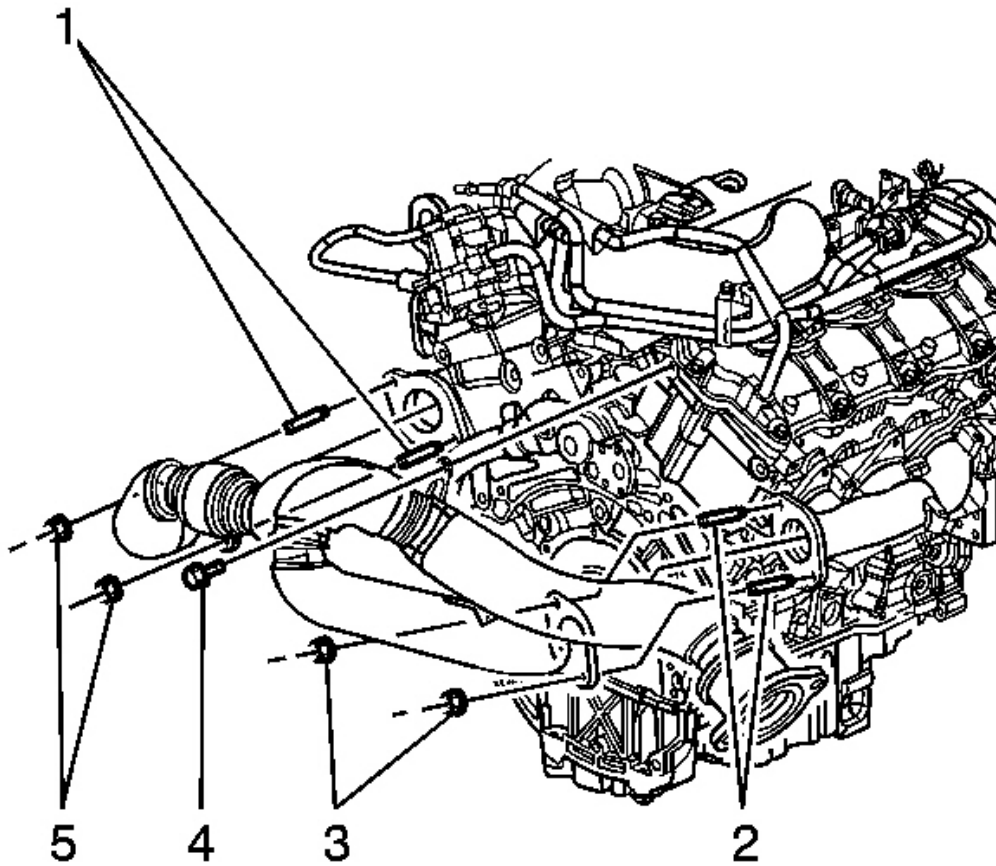


Fig. 1: Identifying Exhaust Crossover Pipe Nuts & Studs
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust crossover pipe to left bank exhaust manifold nuts (5).
4. Remove the oil level indicator and tube. Refer to **Oil Level Indicator and Tube Replacement** .

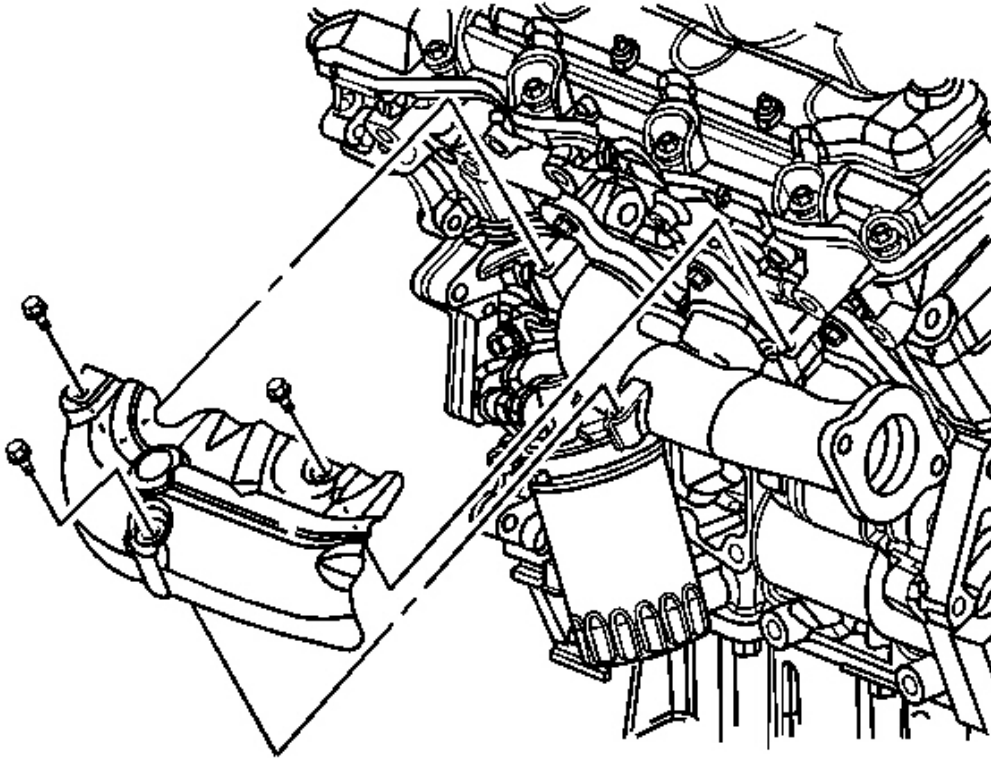


Fig. 2: Identifying Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust manifold heat shield bolts.
6. Remove the exhaust manifold heat shield.

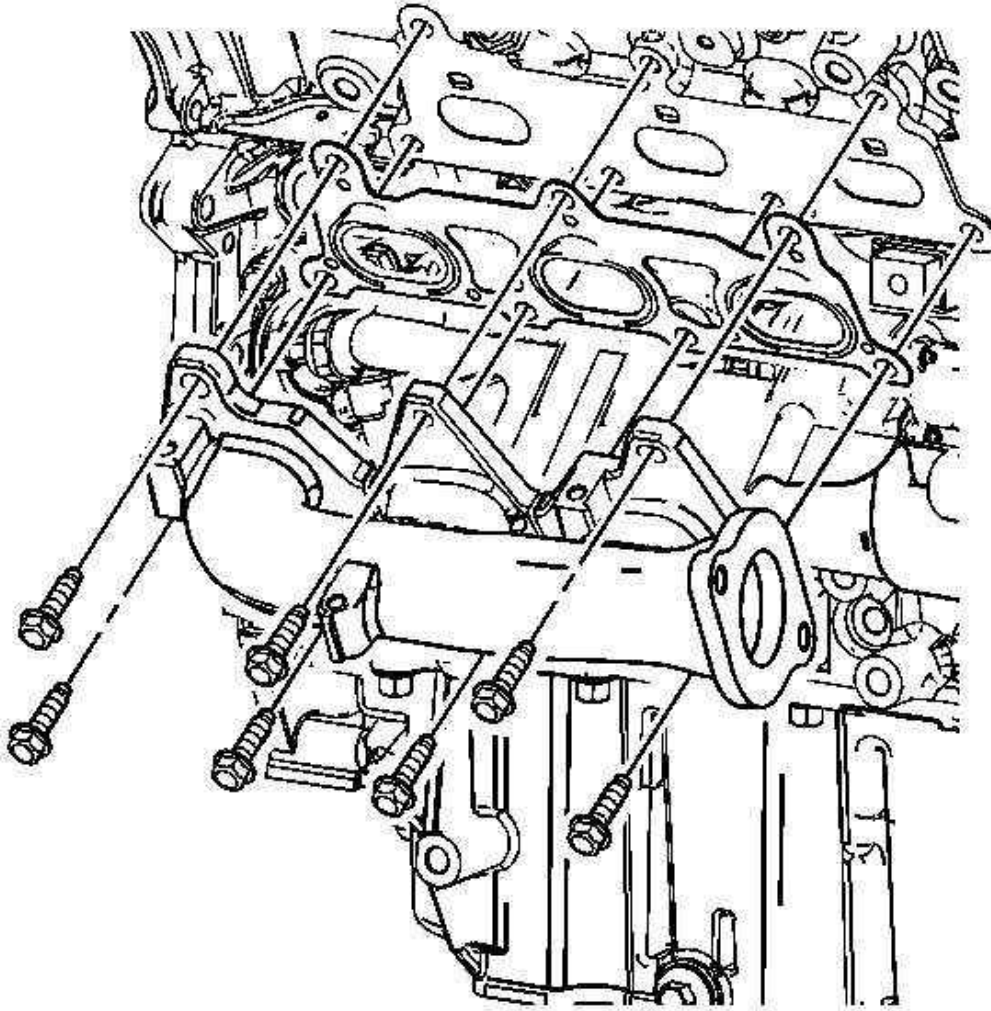


Fig. 3: View Of Exhaust Manifold Bolts
Courtesy of GENERAL MOTORS CORP.

7. Remove the exhaust manifold bolts.
8. Remove the exhaust manifold.
9. Remove and discard the exhaust manifold gasket.
10. Clean and inspect the exhaust manifold and the sealing surfaces. Refer to **Exhaust Manifold Cleaning and Inspection - Left Side** .

Installation Procedure

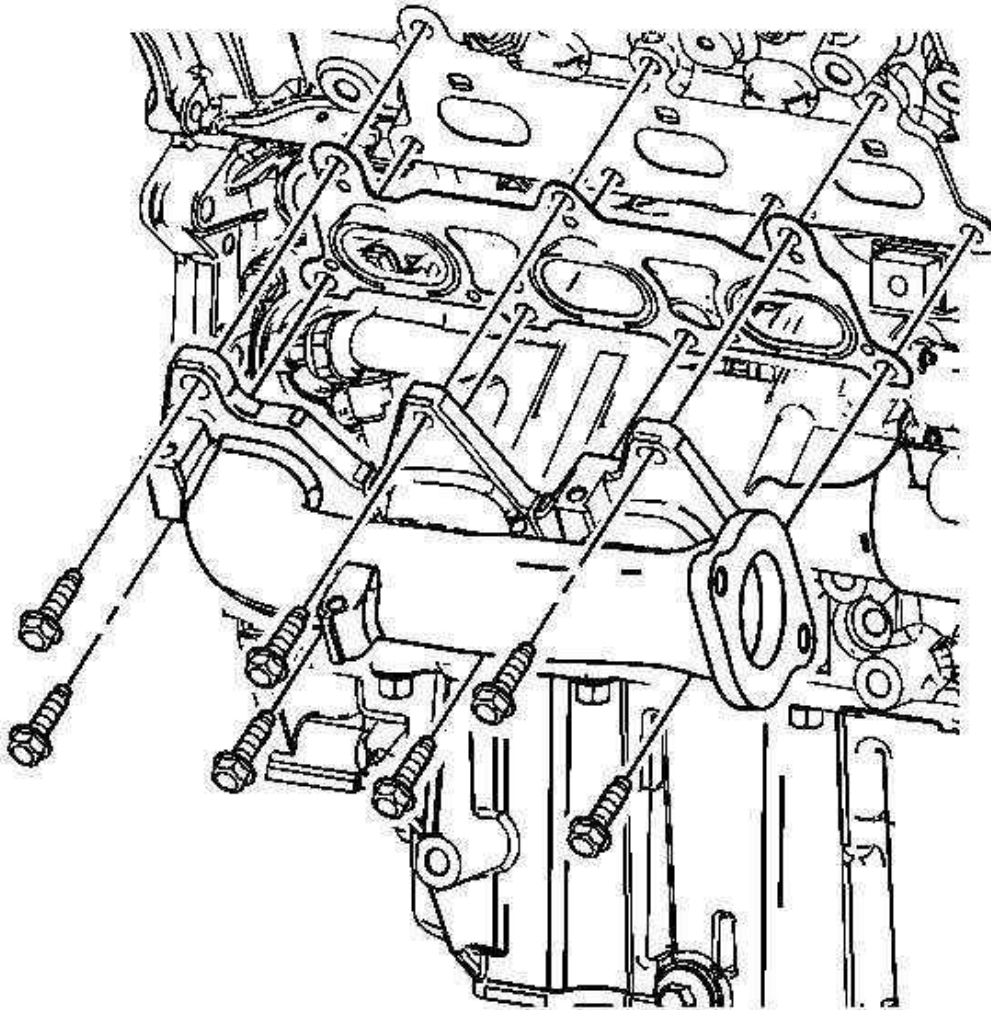


Fig. 4: View Of Exhaust Manifold Bolts
Courtesy of GENERAL MOTORS CORP.

1. Install the NEW exhaust manifold gasket.
2. Install the exhaust manifold.

NOTE: Refer to Fastener Notice .

3. Install the exhaust manifold bolts.

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

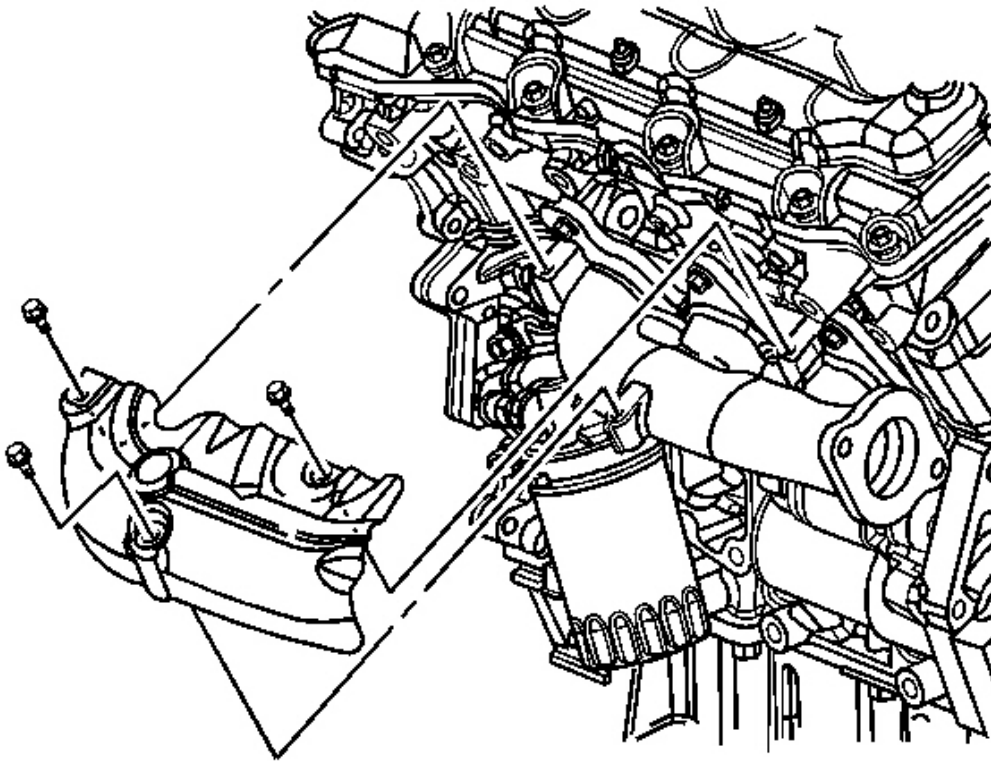


Fig. 5: Identifying Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

4. Install the exhaust manifold heat shield.
5. Install the exhaust manifold heat shield bolts.

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

6. Install the oil level indicator and tube. Refer to **Oil Level Indicator and Tube Replacement** .

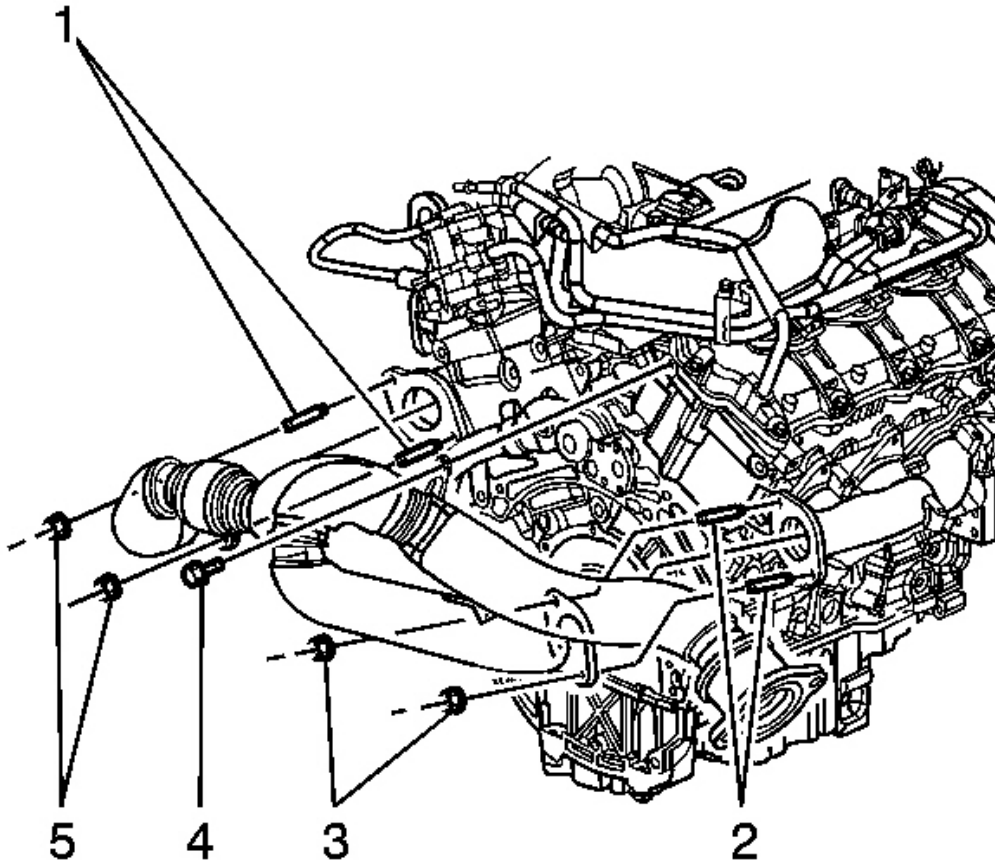


Fig. 6: Identifying Exhaust Crossover Pipe Nuts & Studs
Courtesy of GENERAL MOTORS CORP.

7. Install the exhaust crossover pipe to left bank exhaust manifold nuts (5). Refer to **Exhaust Crossover Pipe Replacement (3.6L)** or **Exhaust Crossover Pipe Replacement (3.8L)**.
8. Install the left and the right torque strut at the engine. Secure with the strut bolts.

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

Removal Procedure

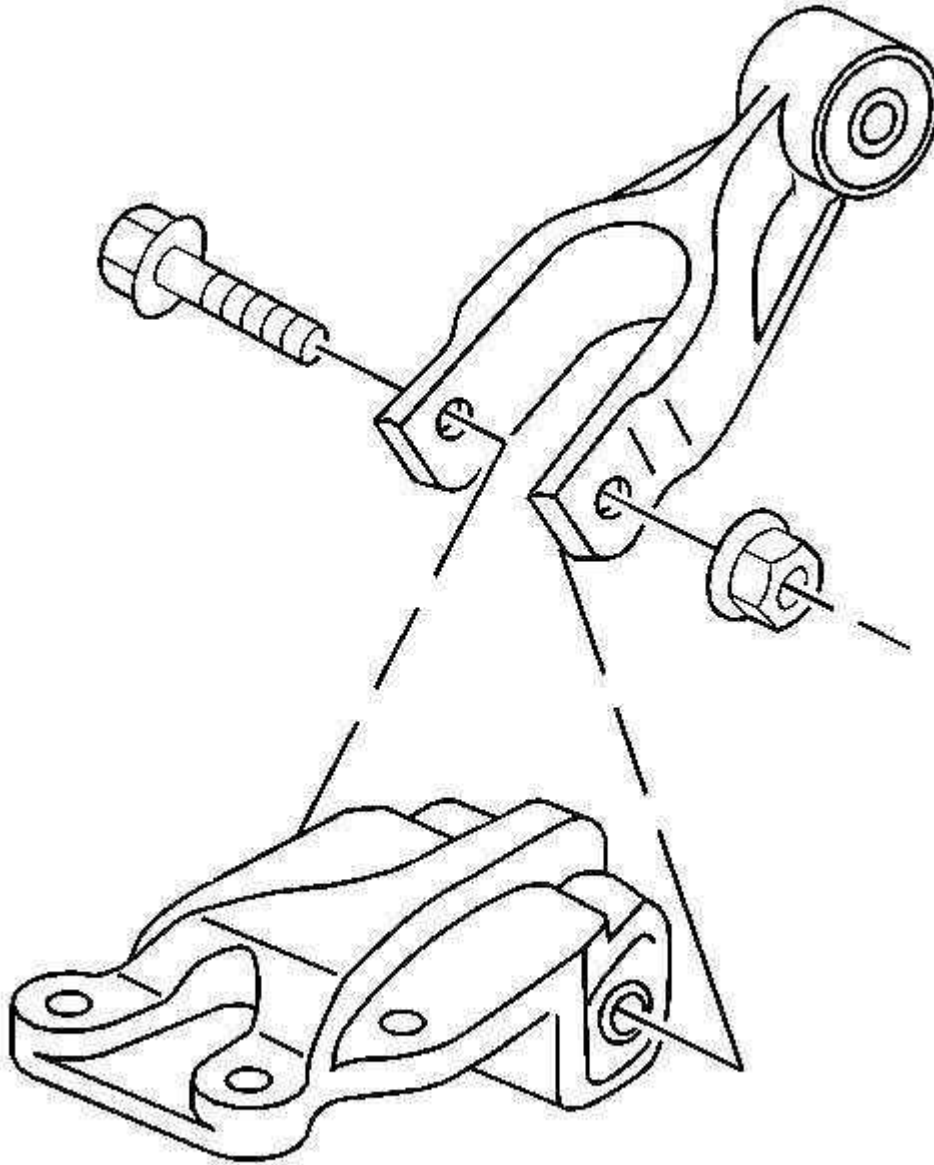


Fig. 7: View Of Bolt & Nut For Engine Mount Strut At Engine Mount Strut Bracket On Upper Radiator Support
Courtesy of GENERAL MOTORS CORP.

1. Remove the oil level indicator and tube. Refer to **Oil Level Indicator and Tube Replacement** .
2. Remove the left and right engine mount strut through bolts.

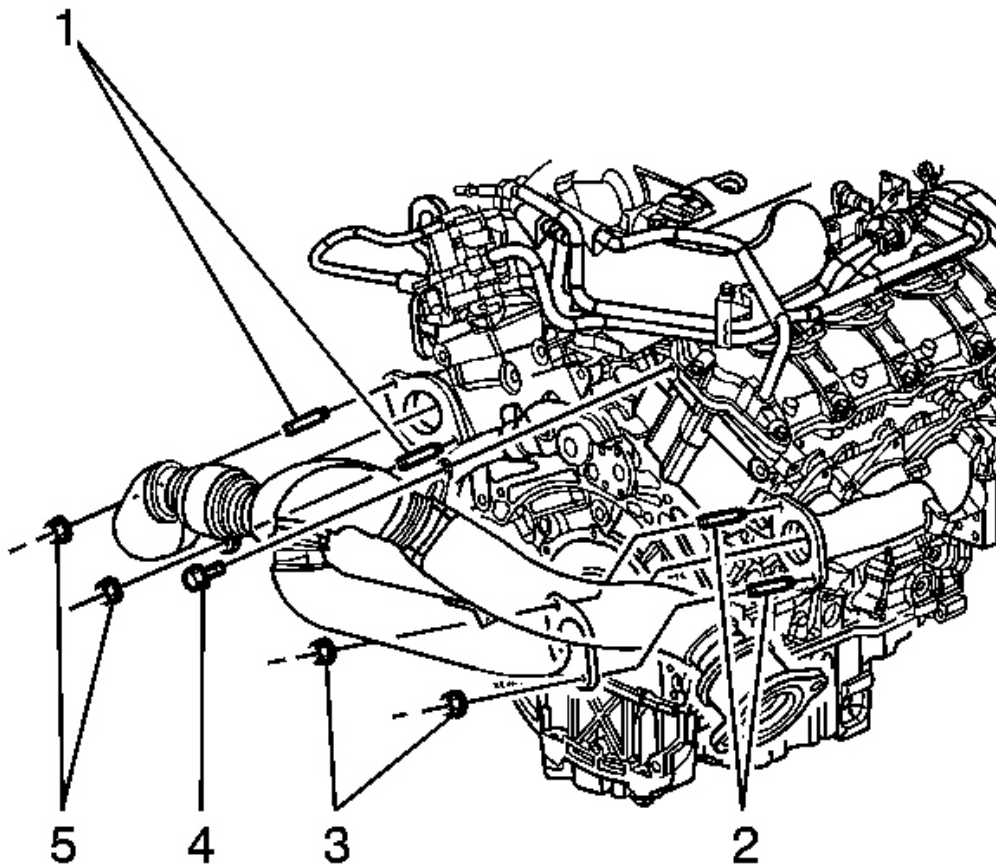


Fig. 8: Identifying Exhaust Crossover Pipe Nuts & Studs
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust crossover pipe to left exhaust manifold nuts (5).

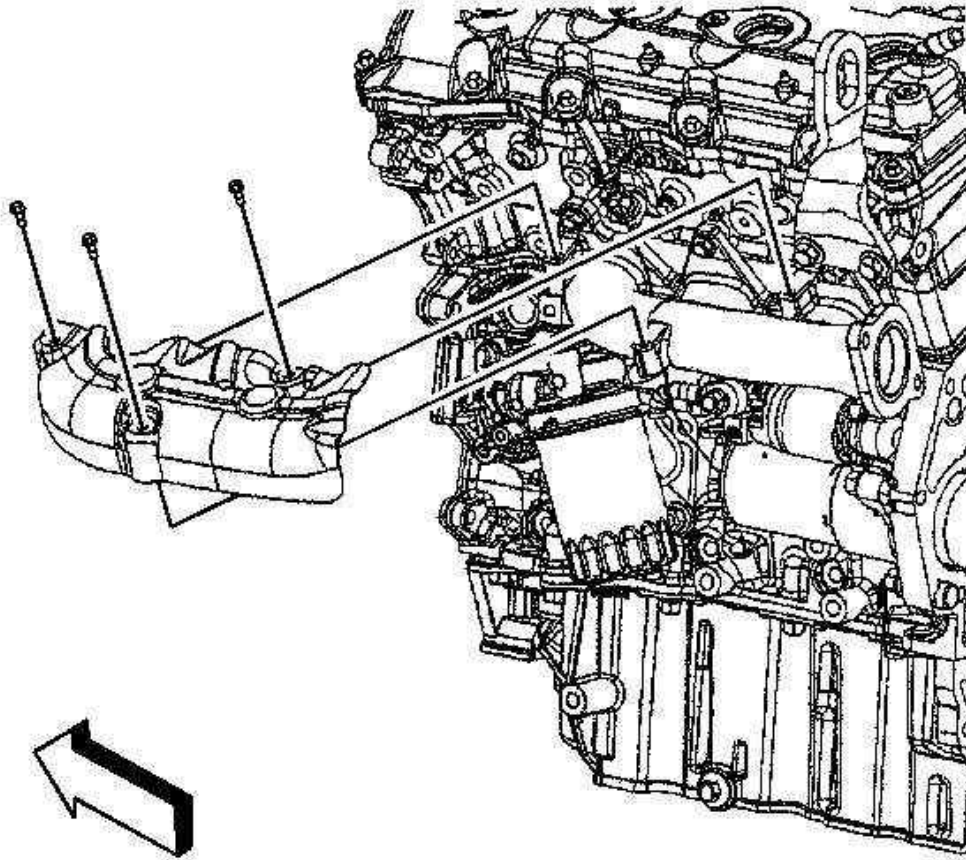


Fig. 9: Identifying Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust manifold heat shield bolts.
5. Remove the exhaust manifold heat shield.

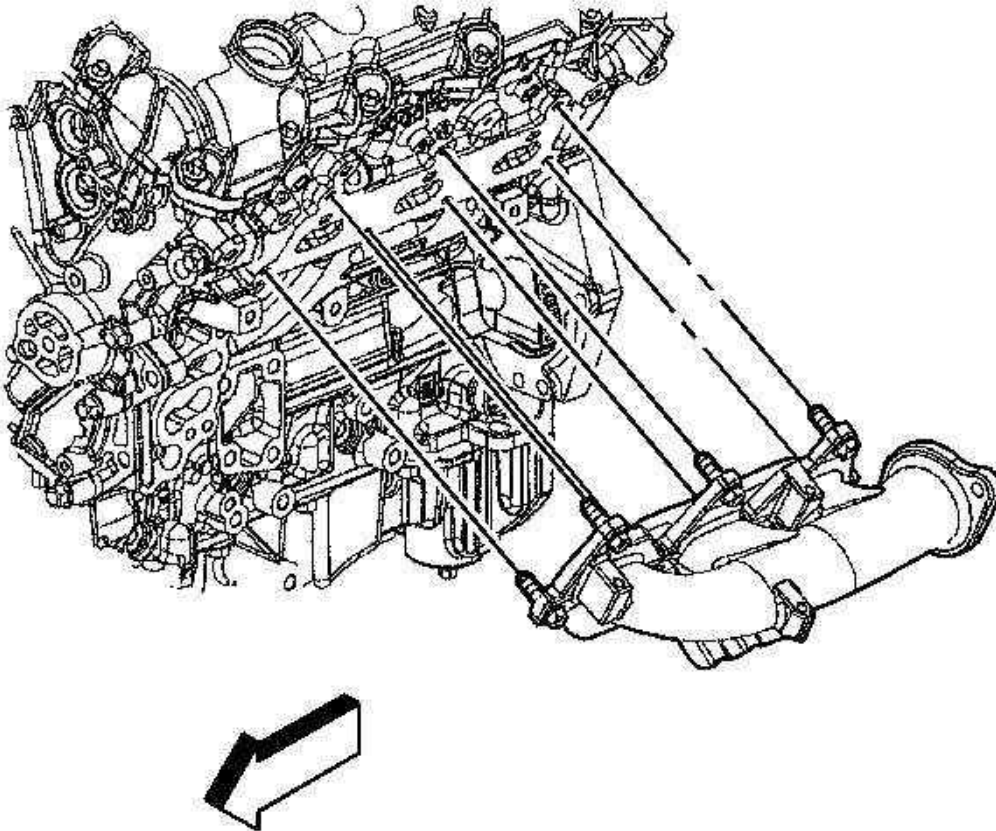


Fig. 10: View Of Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

6. Remove the exhaust manifold bolts.
7. Remove the exhaust manifold.
8. Remove and discard the exhaust manifold gasket.
9. Clean the exhaust manifold sealing surfaces.

Installation Procedure

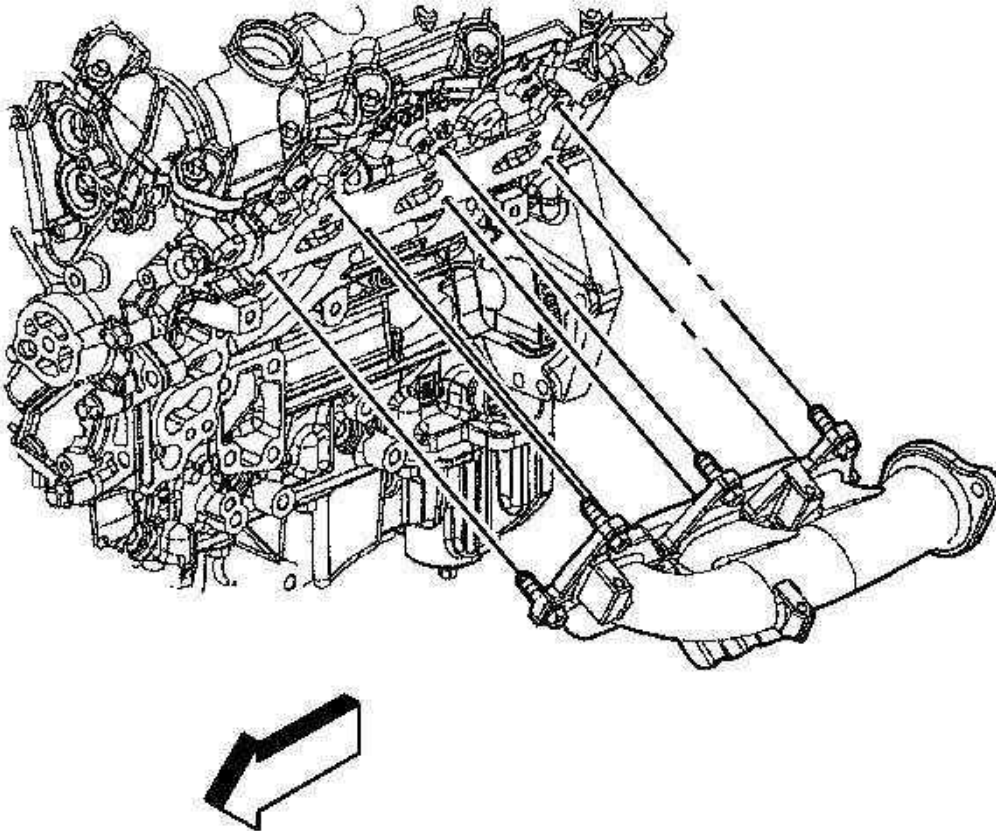


Fig. 11: View Of Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

1. Install one exhaust manifold bolt through a bolt hole in the manifold.
2. Install the NEW exhaust manifold gasket onto the bolt.
3. Position the exhaust manifold to the cylinder head.
4. Install the exhaust manifold using the one installed bolt until snug.

NOTE: **Refer to Fastener Notice .**

5. Install the remaining exhaust manifold bolts.

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

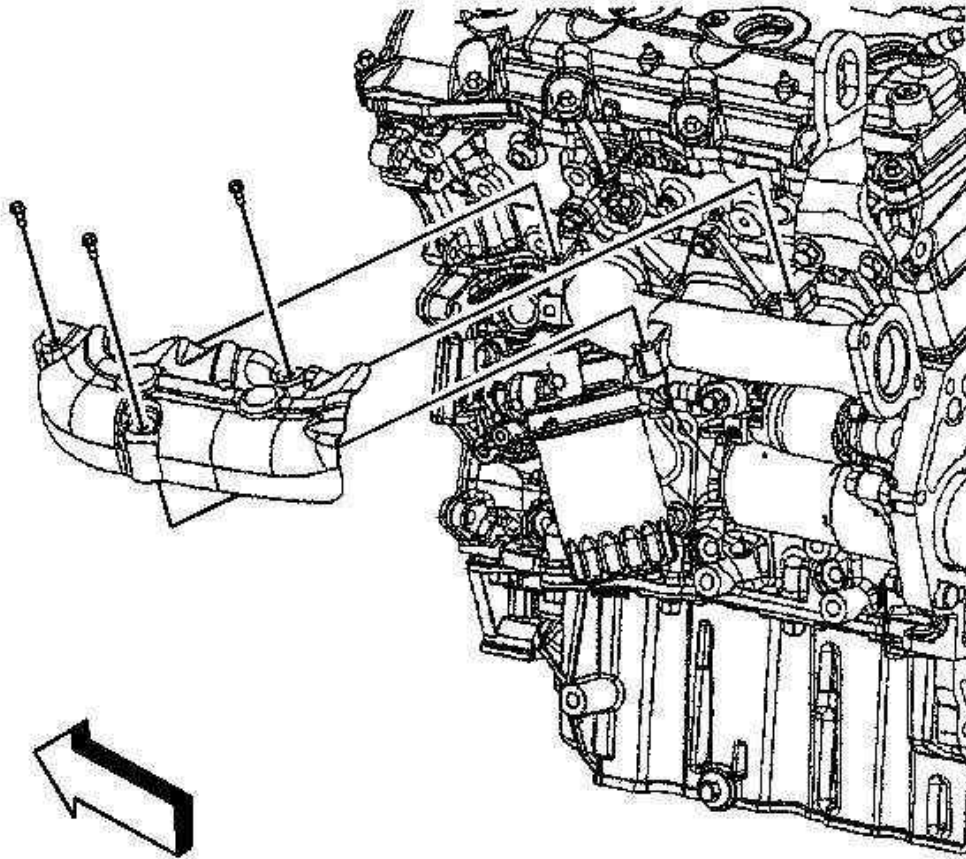


Fig. 12: Identifying Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

6. Install the exhaust manifold heat shield.
7. Install the exhaust manifold heat shield bolts.

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

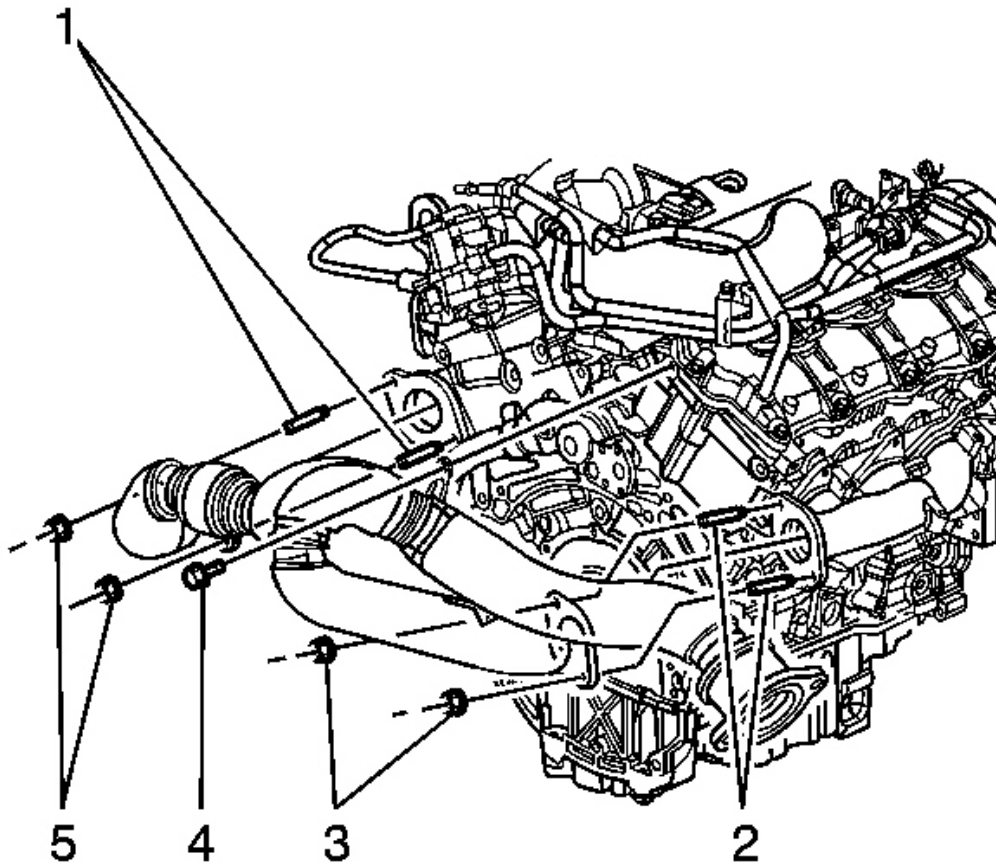


Fig. 13: Identifying Exhaust Crossover Pipe Nuts & Studs
Courtesy of GENERAL MOTORS CORP.

8. Install the exhaust crossover pipe to exhaust manifold nuts (5).

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

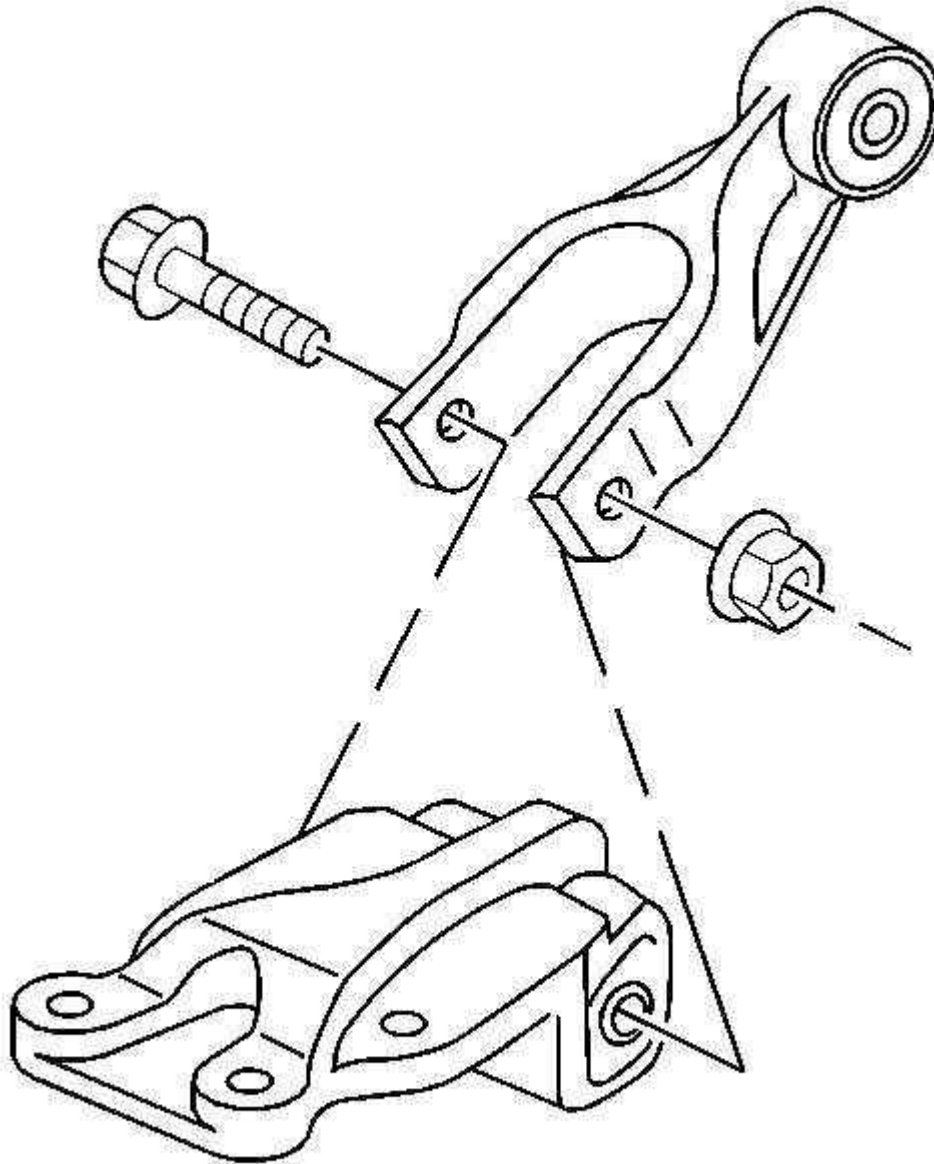


Fig. 14: View Of Bolt & Nut For Engine Mount Strut At Engine Mount Strut Bracket On Upper Radiator Support
Courtesy of GENERAL MOTORS CORP.

9. Install the left and right engine mount strut through bolts.

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

10. Install the oil level indicator and tube. Refer to **Oil Level Indicator and Tube Replacement** .

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (3.8L)

Removal Procedure

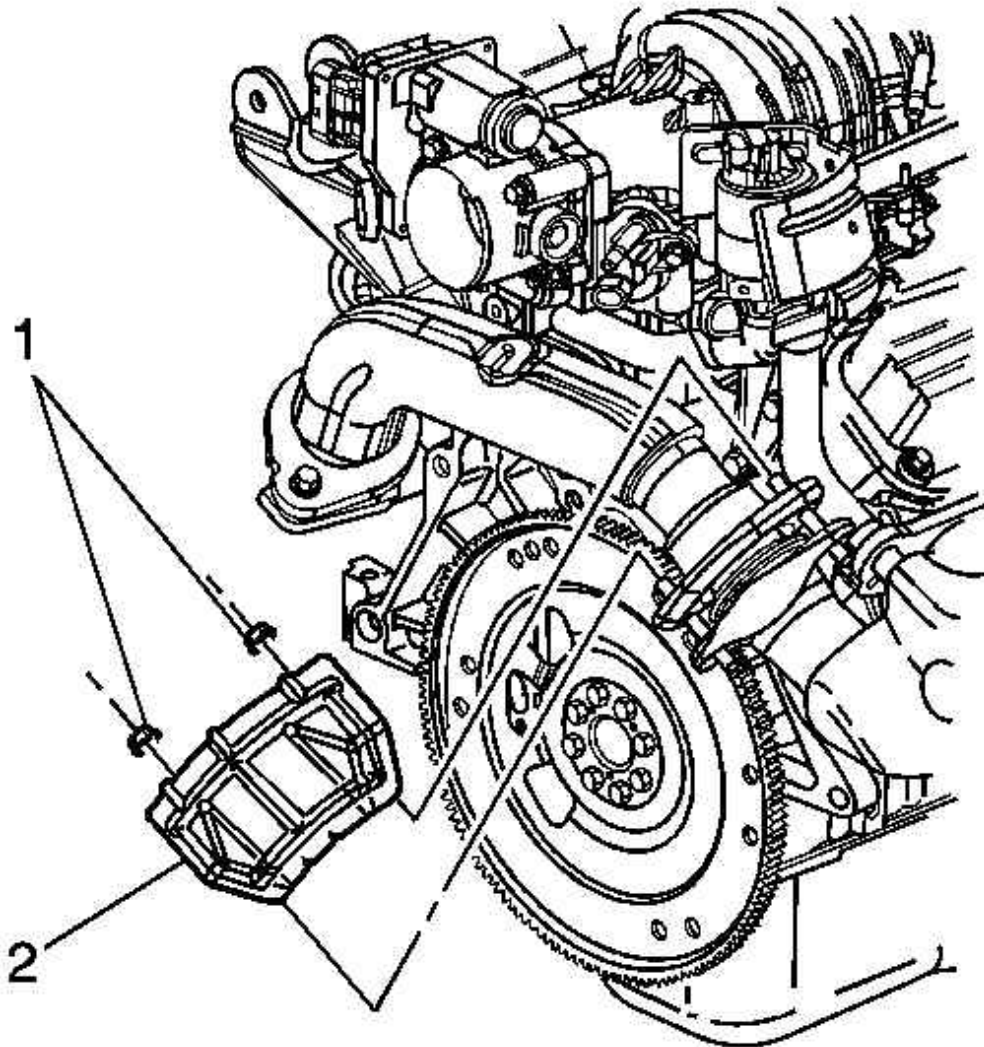


Fig. 15: View Of Right Exhaust Crossover Heat Shield
Courtesy of GENERAL MOTORS CORP.

1. Remove the fuel injector sight shield. Refer to **Fuel Injector Sight Shield Replacement** .
2. Remove the exhaust crossover heat shield nuts (1).
3. Remove the exhaust crossover heat shield (2).

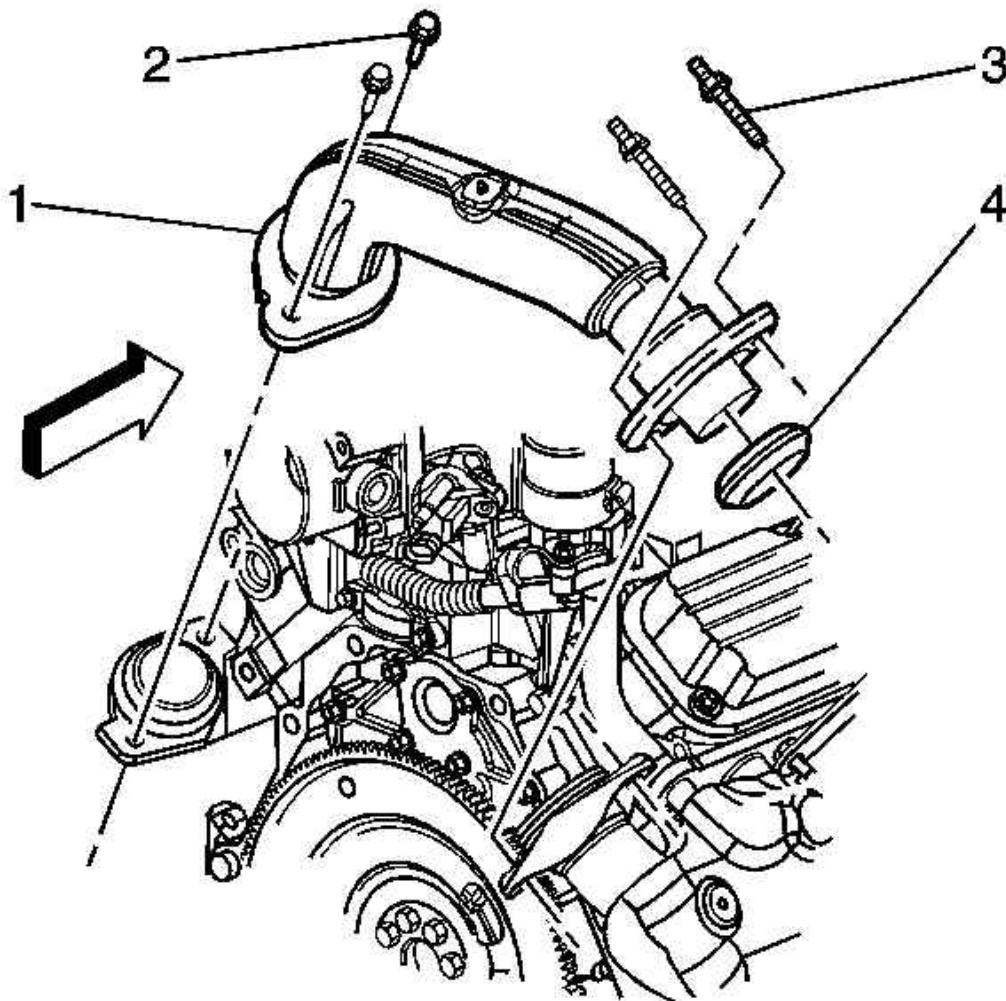


Fig. 16: View Of Exhaust Crossover Pipe

Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust crossover pipe studs (3) from the right exhaust manifold.
5. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

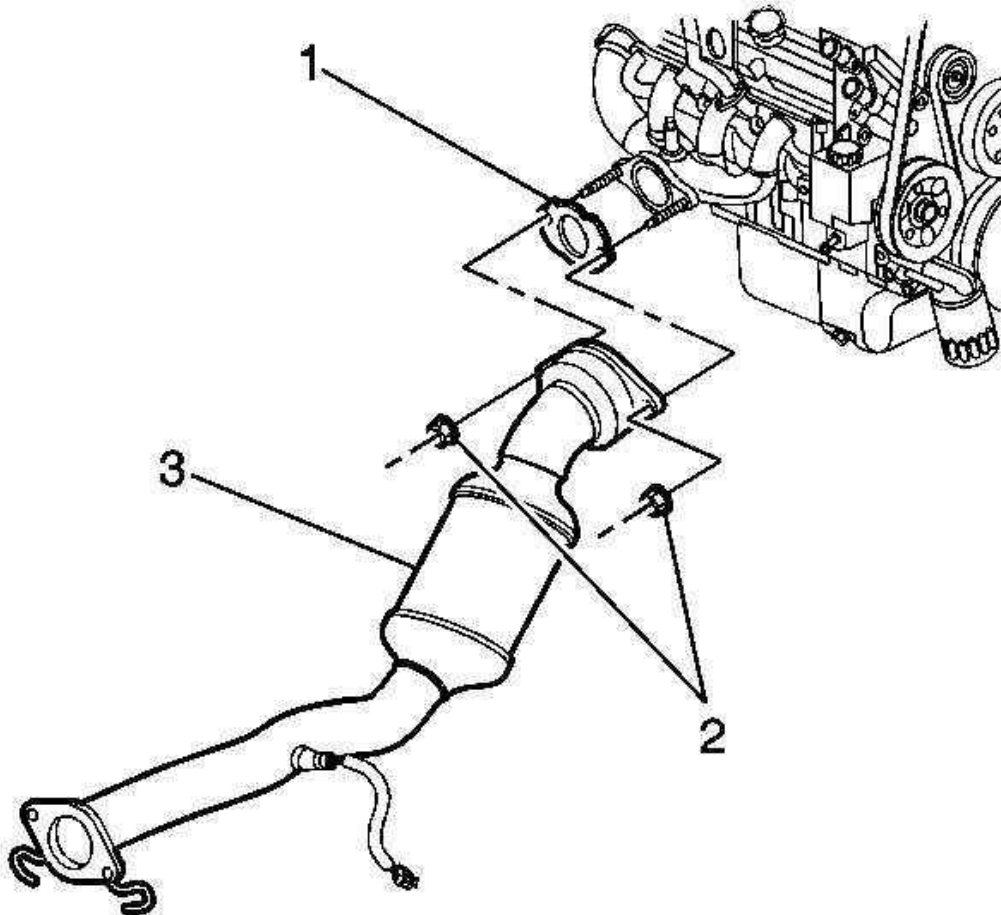


Fig. 17: View Of Right Exhaust Manifold & Catalytic Converter Pipe
Courtesy of GENERAL MOTORS CORP.

6. Remove the exhaust manifold pipe stud nuts (2) and the catalytic converter pipe (3) from the right exhaust manifold.
7. Lower the vehicle.

8. Rotate the engine to access the right side of the engine. Refer to **Rotating the Engine for Service Access** .

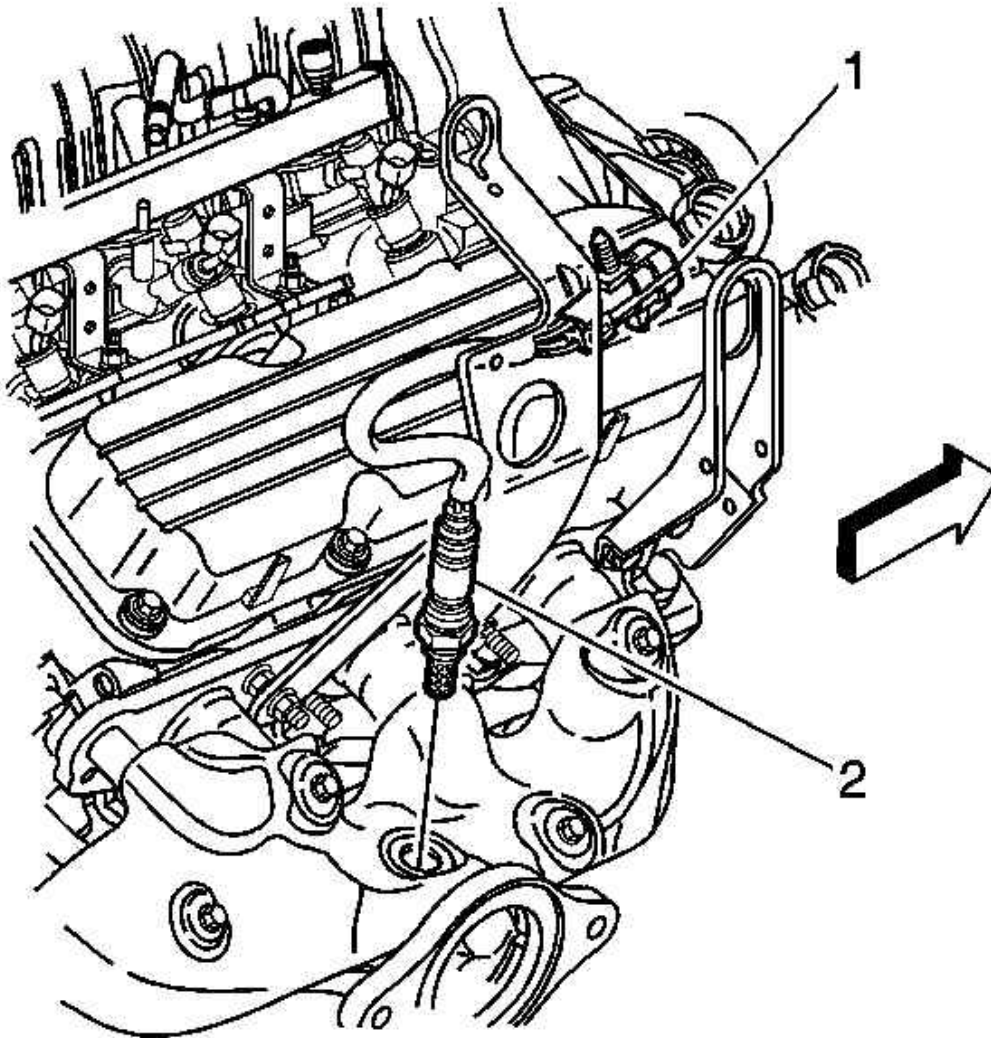


Fig. 18: View Of HO2S Electrical Connector & Right Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

9. Disconnect the heated oxygen sensor (HO2S) electrical connector (1).
10. Remove the HO2S electrical connector (1) from the engine sight shield

bracket.

11. Remove the HO2S (2) from the right exhaust manifold. Refer to **Heated Oxygen Sensor 1 Replacement** .
12. Remove the right side spark plugs from cylinders 2, 4 and 6. Refer to **Spark Plug Replacement** .

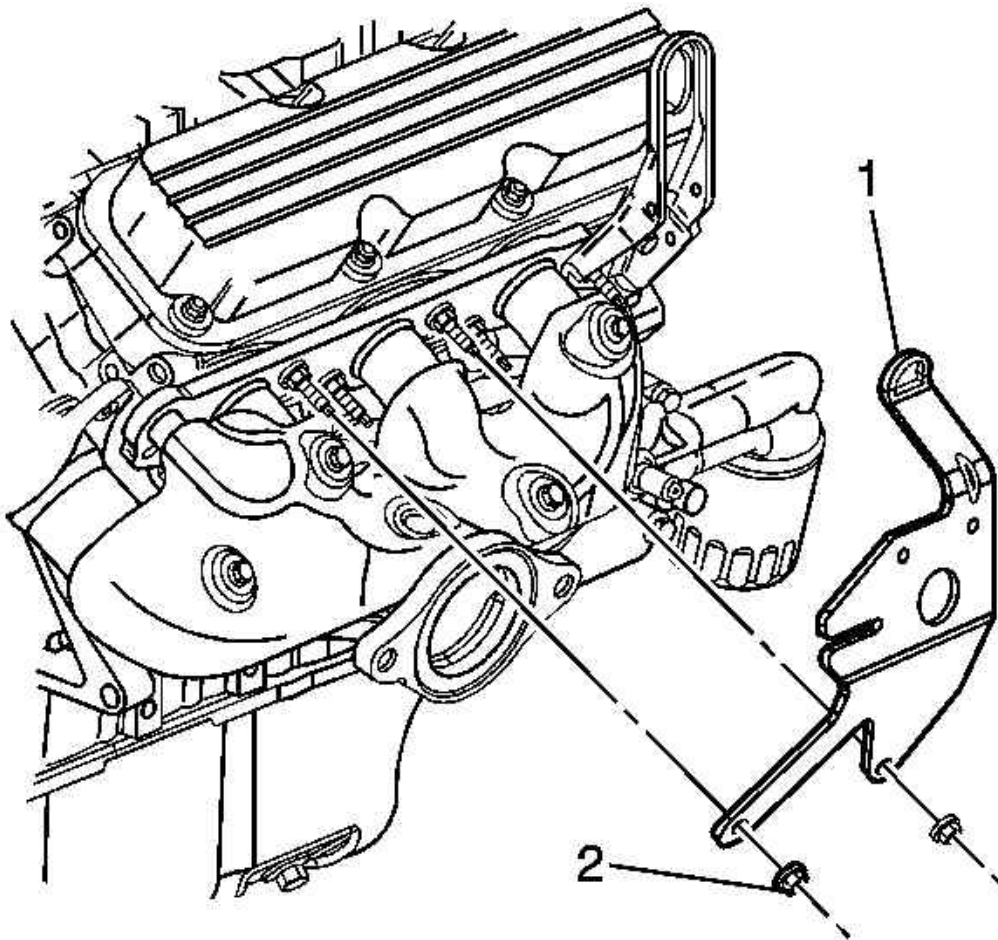


Fig. 19: Identifying Fuel Injector Sight Shield Bracket & Nuts
Courtesy of GENERAL MOTORS CORP.

13. Remove the fuel injector sight shield bracket nuts (2).

14. Remove the fuel injector sight shield bracket (1).

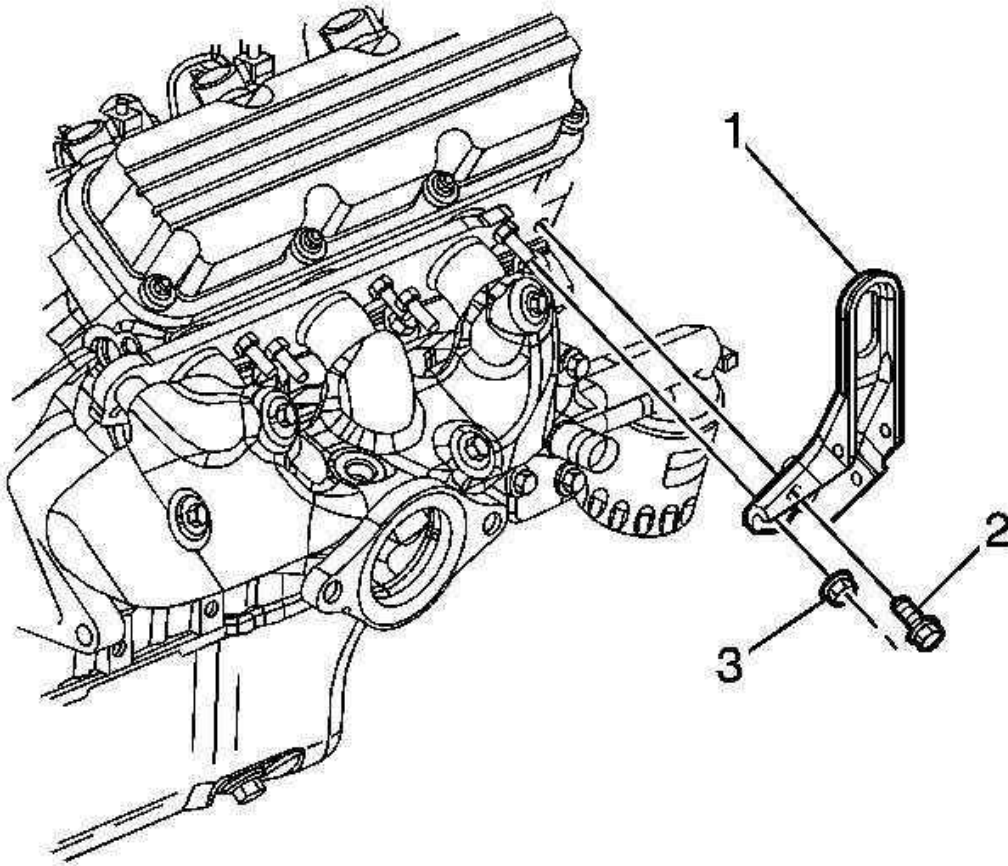


Fig. 20: Identifying Right Engine Lift Bracket Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

15. Remove the right engine lift bracket bolt (2) and the nut (3).

16. Remove the right engine lift bracket (1).

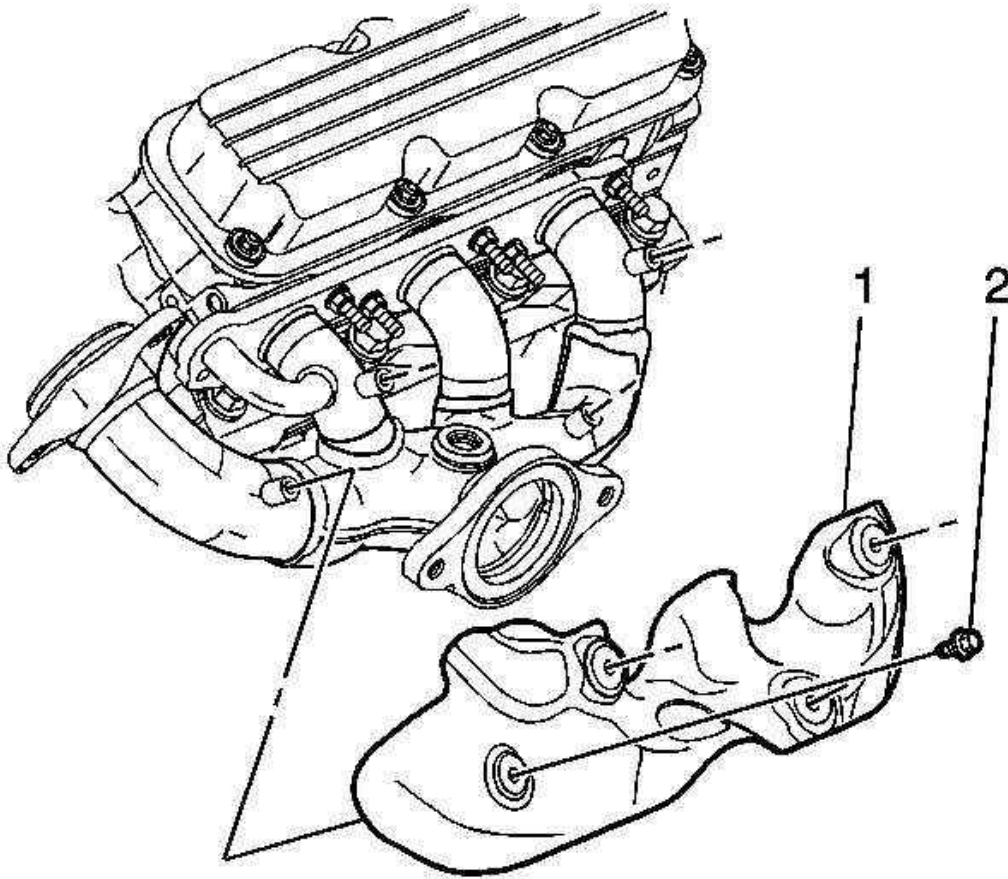


Fig. 21: Identifying Right Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

17. Remove the right exhaust manifold heat shield bolts (2).
18. Remove the right exhaust manifold heat shield (1).
19. Raise the vehicle.

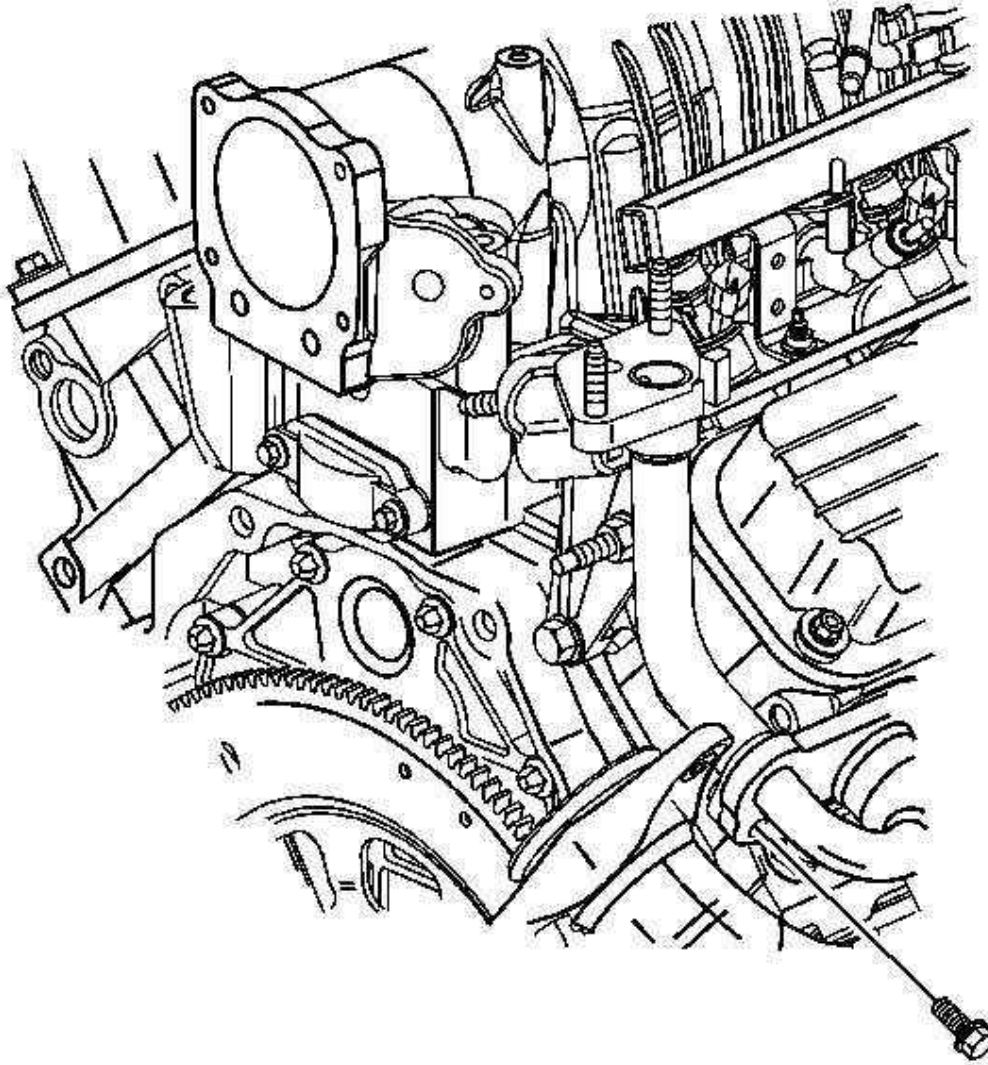


Fig. 22: Identifying EGR Valve Adapter Bolt & Right Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

20. Remove the exhaust gas recirculation (EGR) valve inlet adapter pipe bolt (1) from the right exhaust manifold.
21. Lower the vehicle.

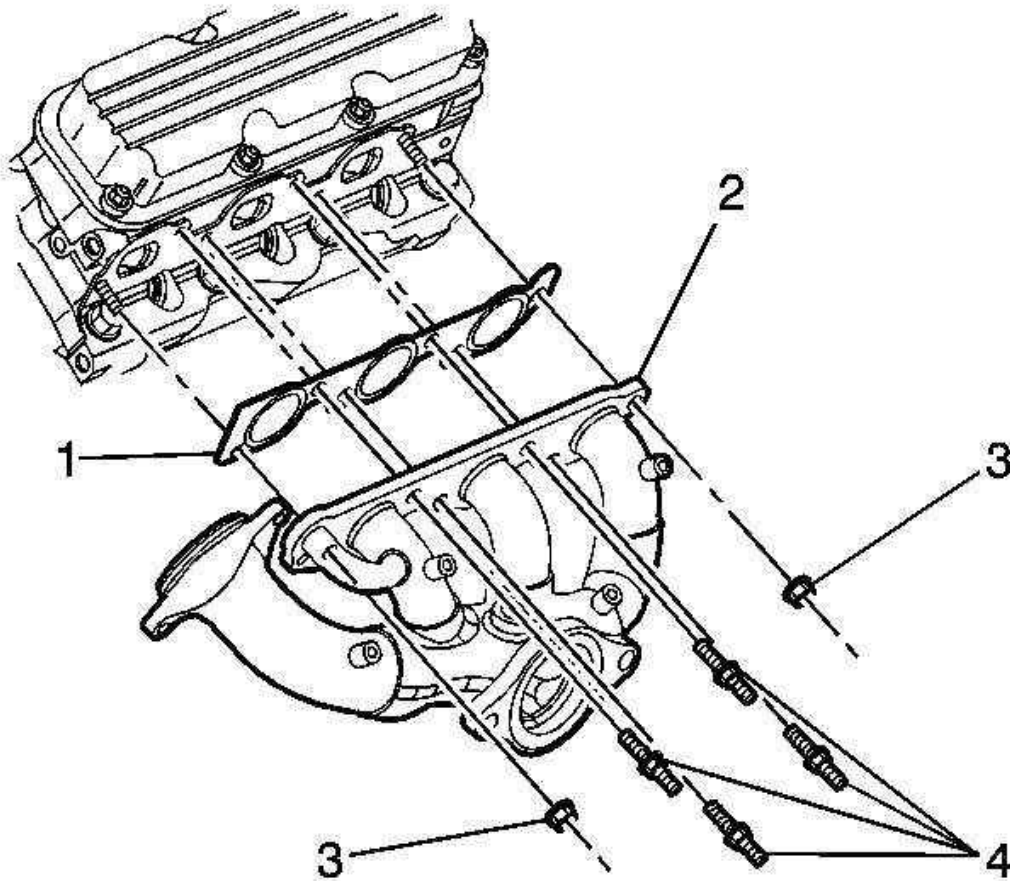


Fig. 23: Right Exhaust Manifold Gasket
Courtesy of GENERAL MOTORS CORP.

22. Remove the right exhaust manifold studs (4) and the nuts (3).
23. Remove the right exhaust manifold (2).
24. Remove the right exhaust manifold gasket (1).

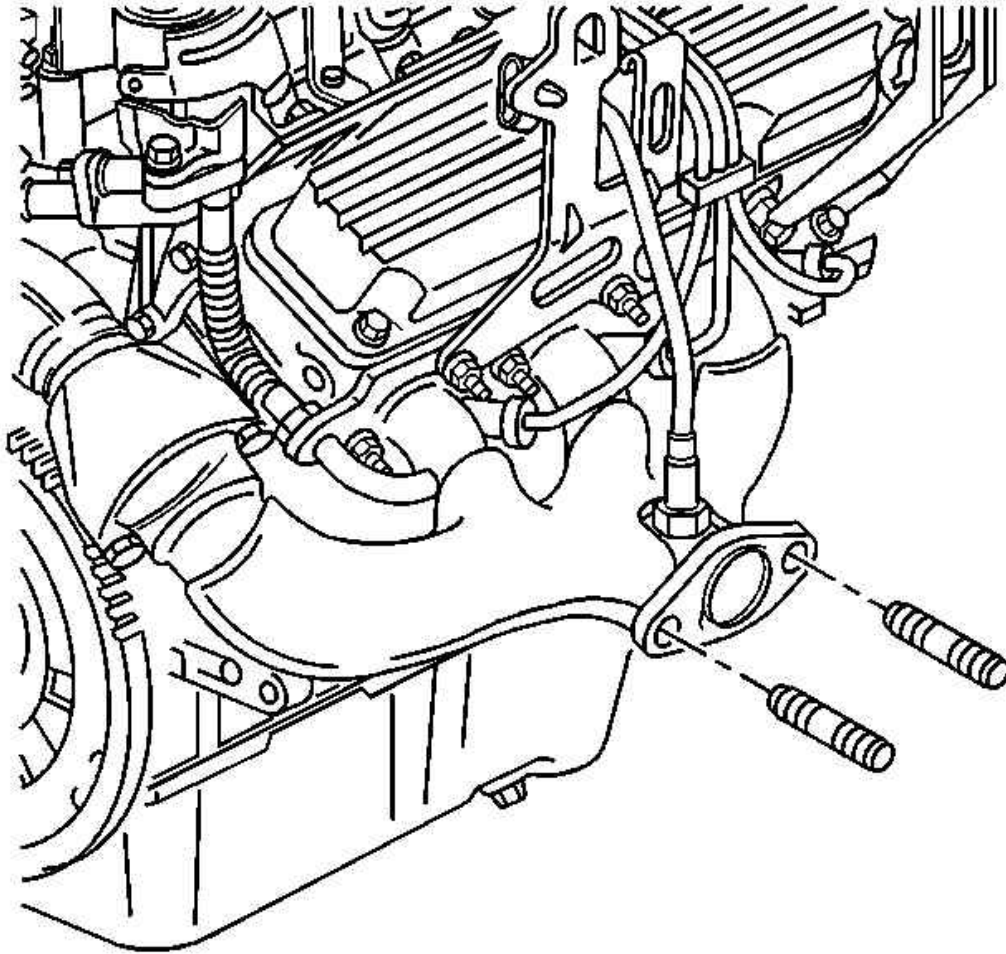


Fig. 24: Locating Exhaust Manifold Studs
Courtesy of GENERAL MOTORS CORP.

25. Remove the exhaust manifold studs if damaged.
26. Clean and Inspect the right exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection** .

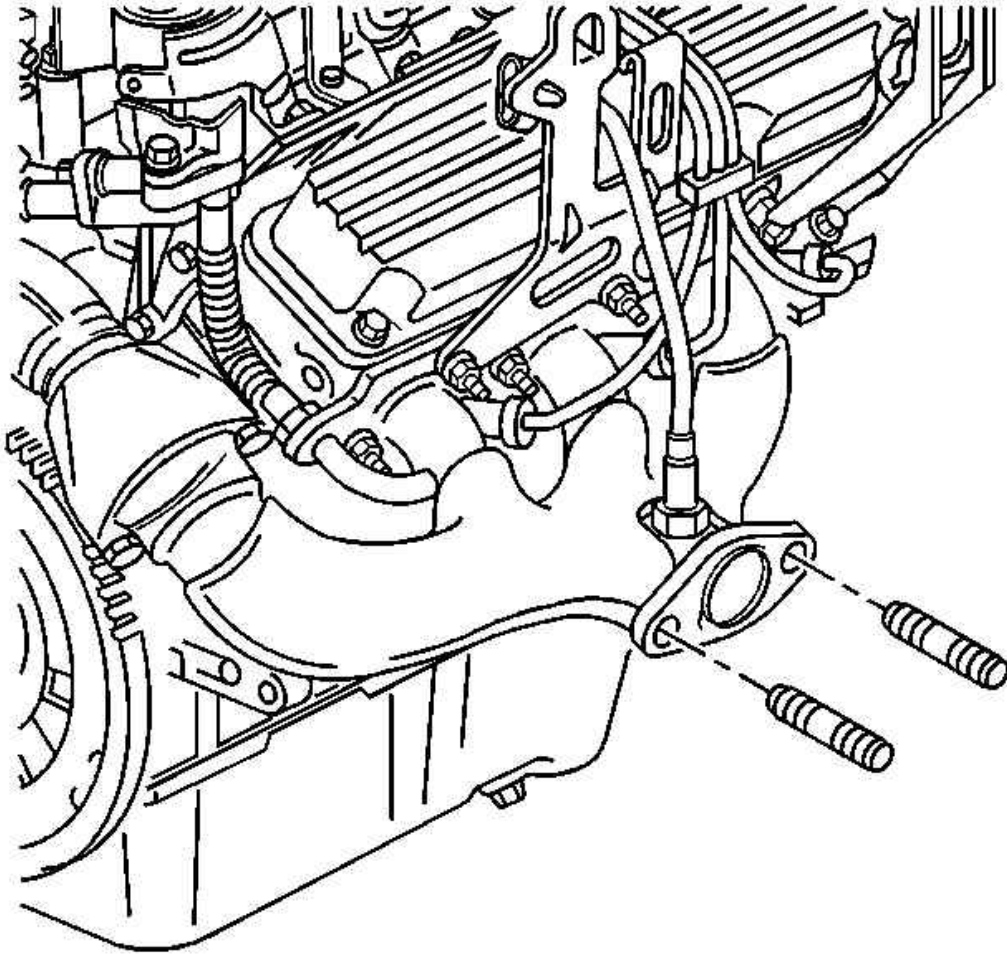


Fig. 25: Locating Exhaust Manifold Studs
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust manifold studs if removed.

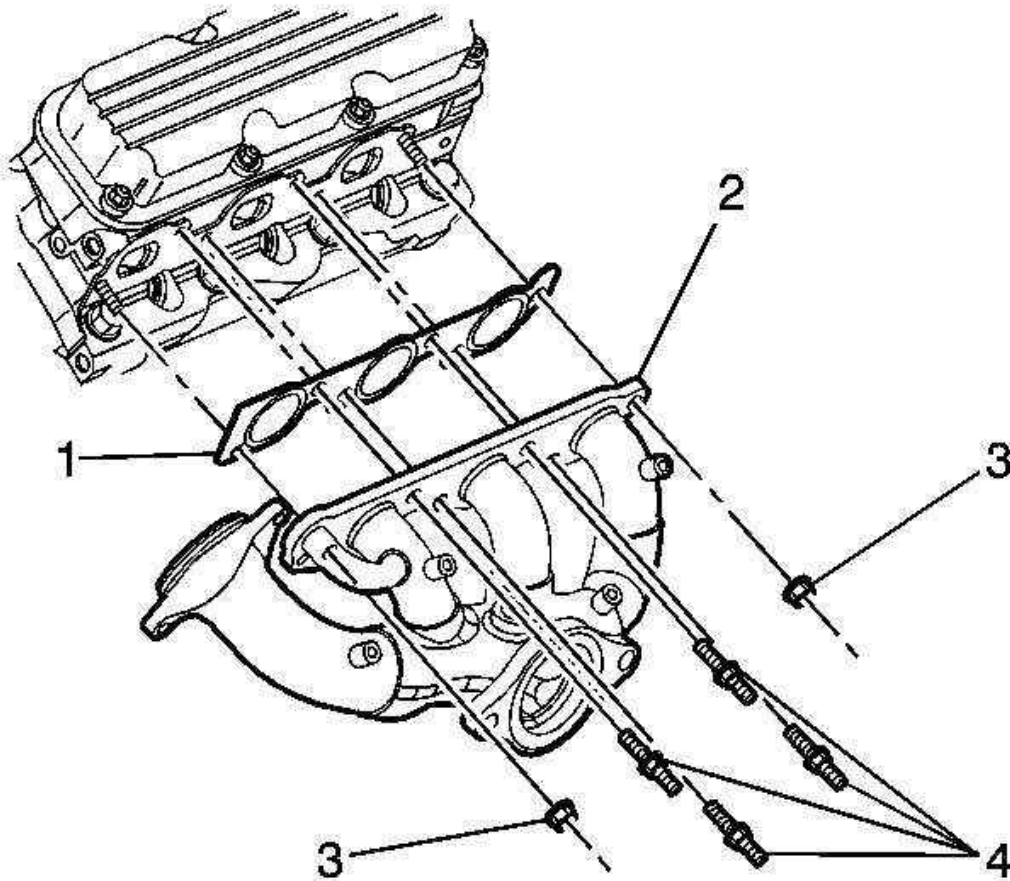


Fig. 26: Right Exhaust Manifold Gasket
Courtesy of GENERAL MOTORS CORP.

2. Install the right exhaust manifold gasket (1).
3. Install the right exhaust manifold (2).

NOTE: Refer to **FASTENER NOTICE** .

4. Install the right exhaust manifold studs (4) and the nuts (3).

Tighten: Tighten the studs and the nuts to 30 N.m (22 lb ft).

5. Raise the vehicle.

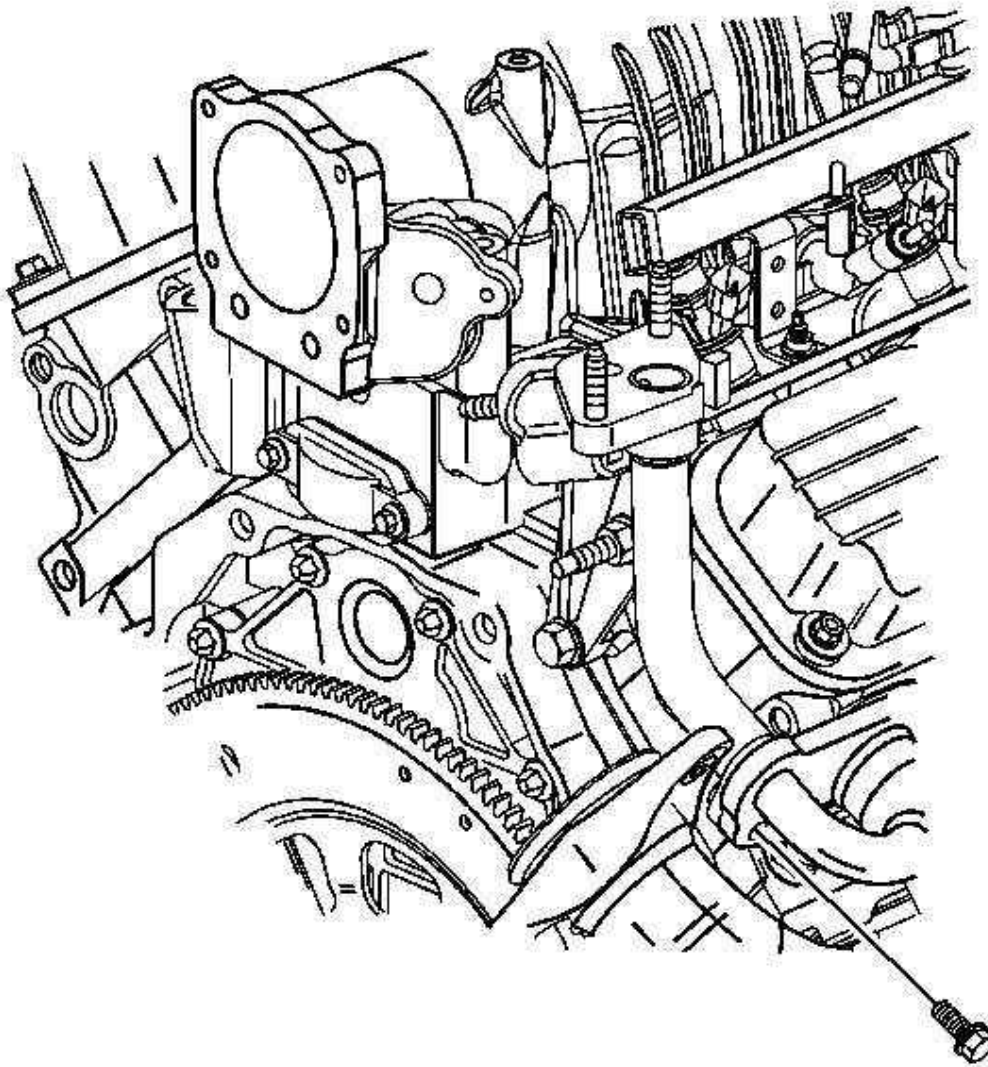


Fig. 27: Identifying EGR Valve Adapter Bolt & Right Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

6. Install the exhaust gas recirculation (EGR) valve inlet adapter pipe bolt (1) to the right exhaust manifold.

Tighten: Tighten the bolt to 29 N.m (21 lb ft).

7. Lower the vehicle.

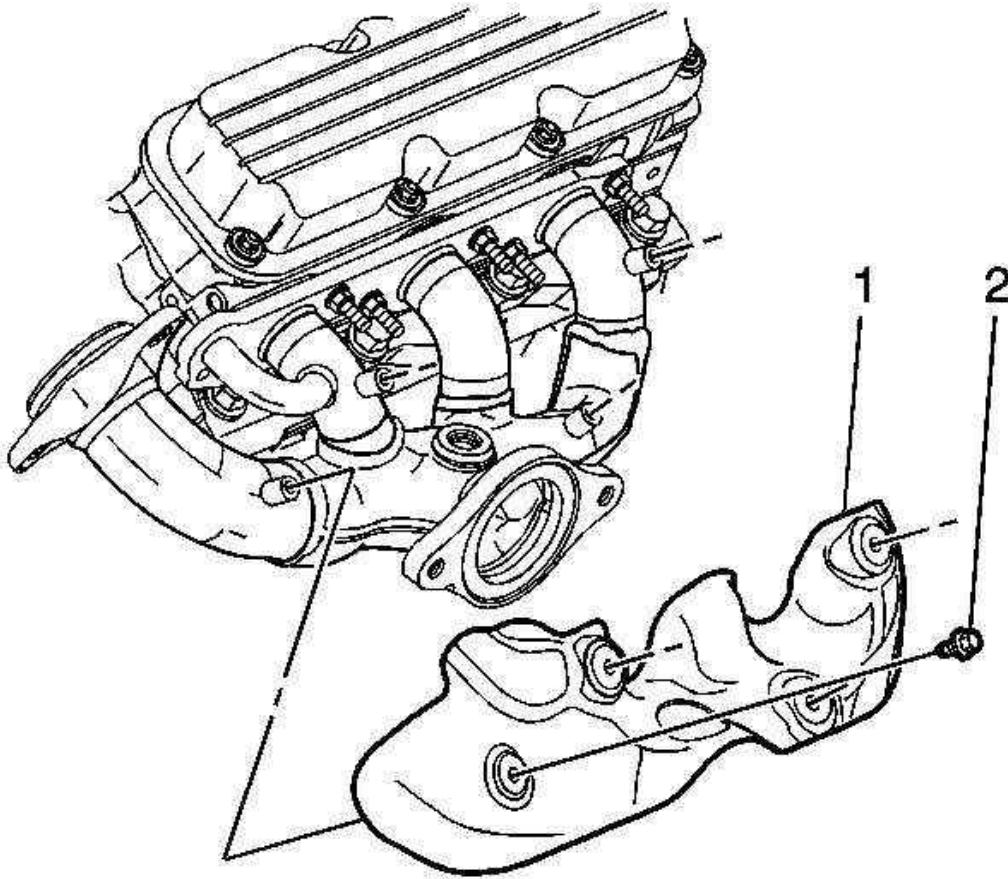


Fig. 28: Identifying Right Exhaust Manifold Heat Shield & Bolts
Courtesy of GENERAL MOTORS CORP.

8. Install the right exhaust manifold heat shield (1).
9. Install the right exhaust manifold heat shield bolts (2).

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

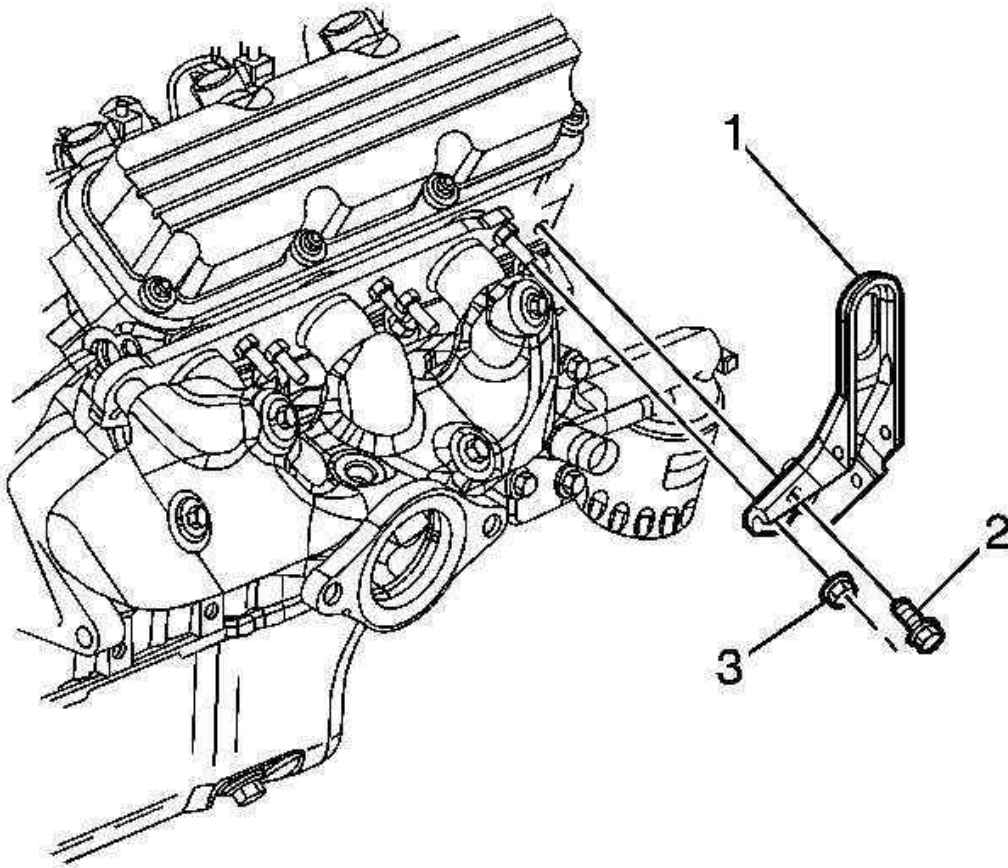


Fig. 29: Identifying Right Engine Lift Bracket Bolt & Nut
Courtesy of GENERAL MOTORS CORP.

10. Install the right engine lift bracket (1).
11. Install the right engine lift bracket bolt (2) and the nut (3).

Tighten: Tighten the bolt and the nut to 30 N.m (22 lb ft).

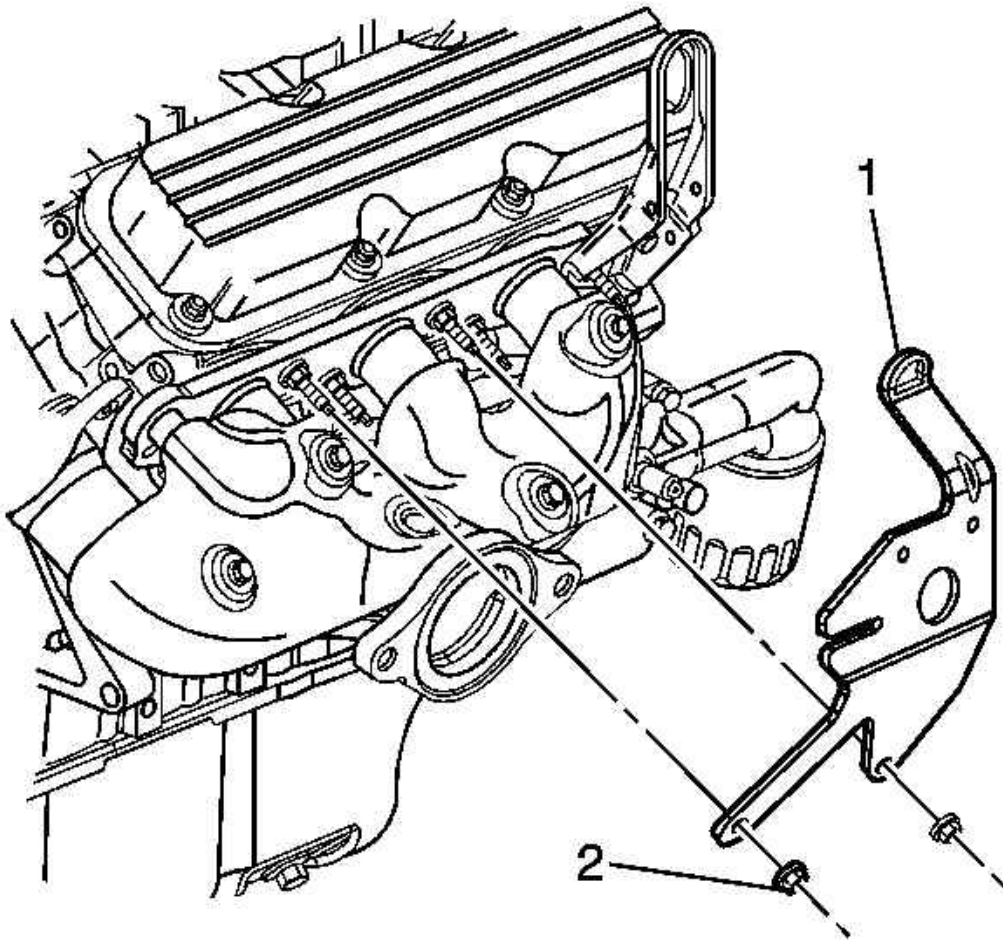


Fig. 30: Identifying Fuel Injector Sight Shield Bracket & Nuts
Courtesy of GENERAL MOTORS CORP.

12. Install the fuel injector sight shield bracket (1).
13. Install the fuel injector sight shield bracket nuts (2).

Tighten: Tighten the nuts to 30 N.m (22 lb ft).

14. Install the right side spark plugs to cylinders 2, 4 and 6. Refer to **Spark Plug Replacement** .

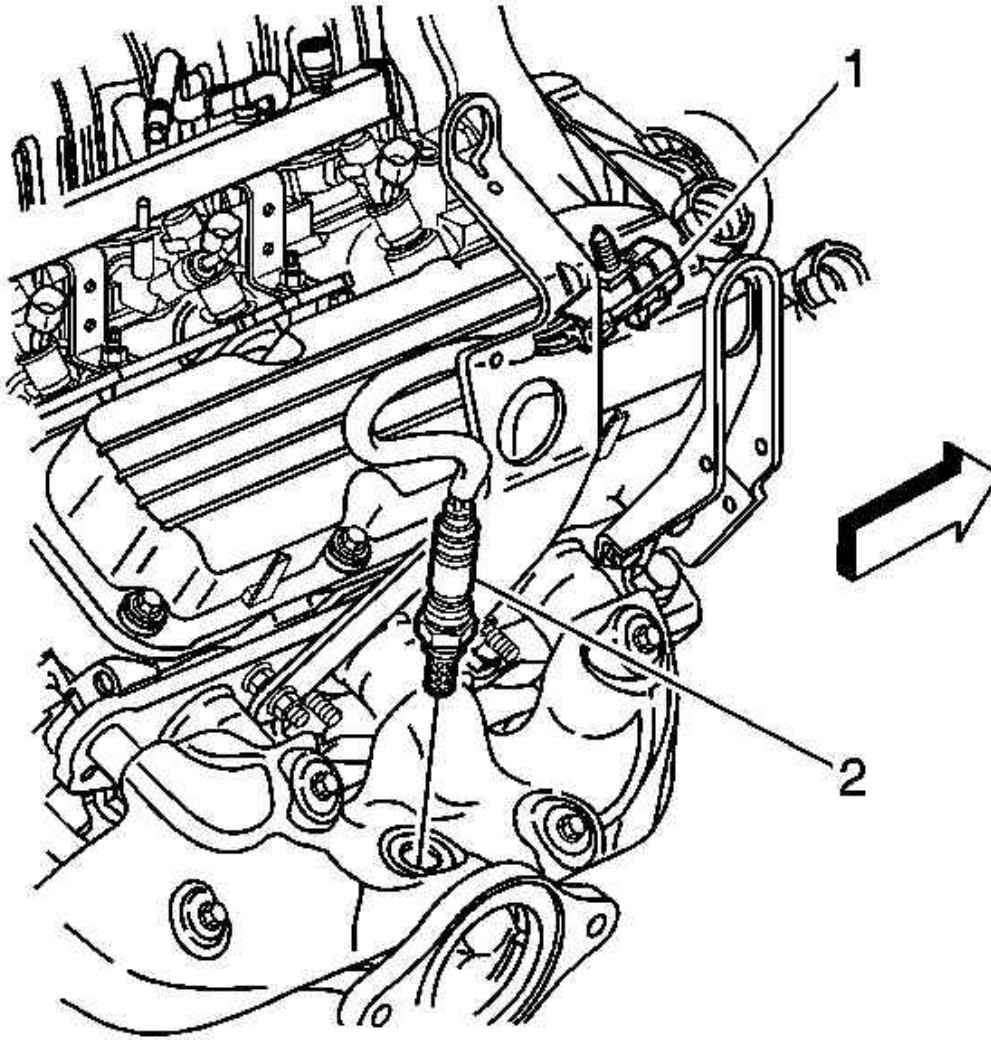


Fig. 31: View Of HO2S Electrical Connector & Right Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

15. Install the HO2S (2) to the right exhaust manifold. Refer to **Heated Oxygen Sensor 1 Replacement**
16. Install the HO2S electrical connector (1) to the engine sight shield bracket.
17. Connect the HO2S electrical connector (1).

18. Return the engine to the original position.
19. Raise the vehicle.

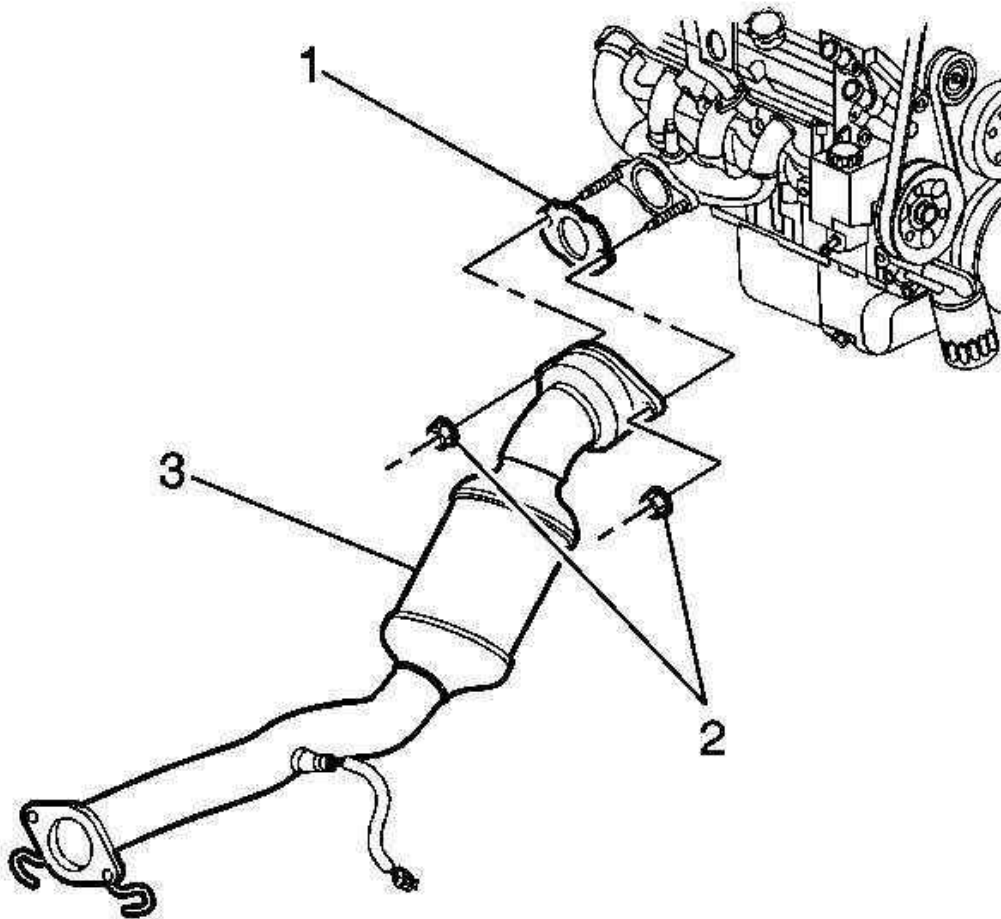


Fig. 32: View Of Right Exhaust Manifold & Catalytic Converter Pipe
Courtesy of GENERAL MOTORS CORP.

20. Install the catalytic converter pipe (3) to the right exhaust manifold.
21. Install the catalytic converter pipe stud nuts (2) to the right exhaust manifold.

Tighten: Tighten the stud nuts to 35 N.m (26 lb ft).

22. Lower the vehicle.

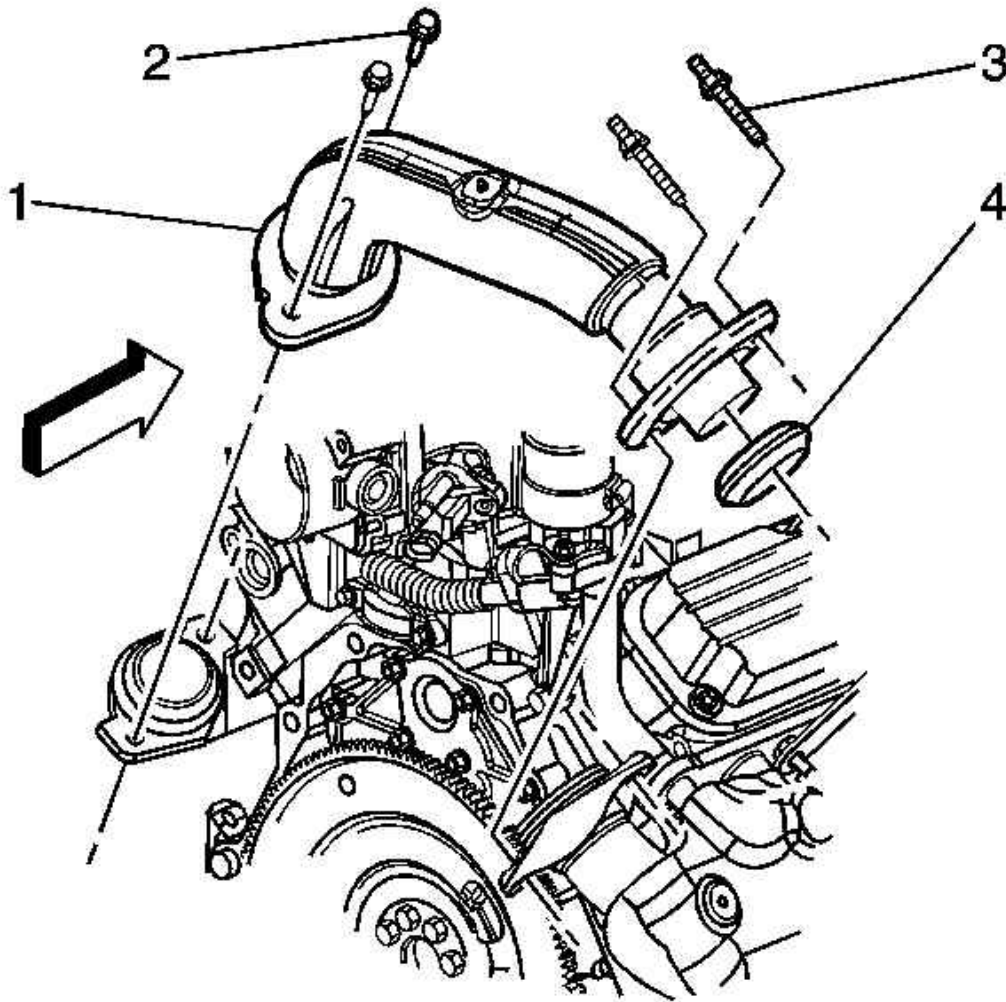


Fig. 33: View Of Exhaust Crossover Pipe
Courtesy of GENERAL MOTORS CORP.

23. Install the exhaust crossover pipe studs (3) to the right exhaust manifold.

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

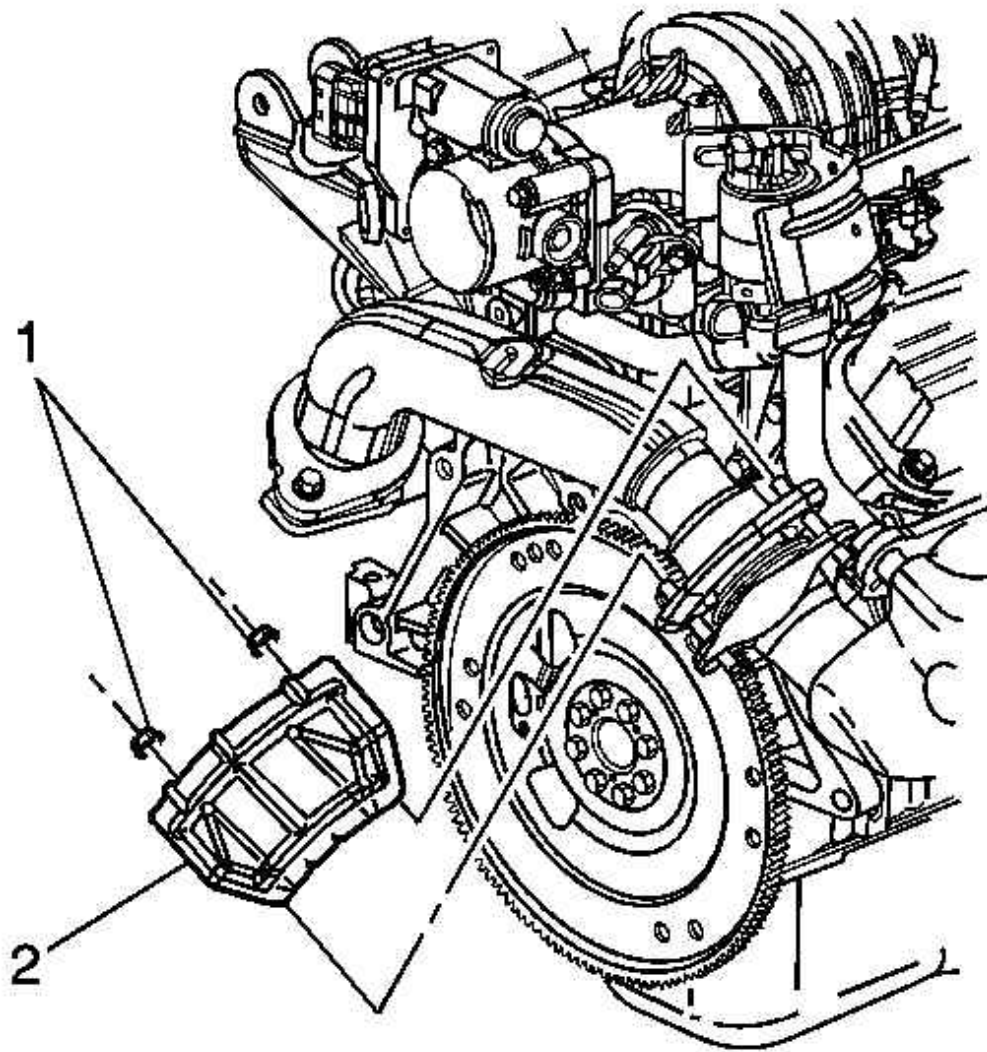


Fig. 34: View Of Right Exhaust Crossover Heat Shield
Courtesy of GENERAL MOTORS CORP.

24. Install the exhaust crossover heat shield (2).
25. Install the exhaust crossover heat shield nuts (1).

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

2008 Buick LaCrosse CXL
2008 ENGINE Engine Exhaust - LaCrosse

26. Install the engine mount struts. Refer to **Engine Mount Strut Replacement - Right Side** and **Engine Mount Strut Replacement - Left Side** .
27. Install the fuel injector sight shield. Refer to **Fuel Injector Sight Shield Replacement** .

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (RPO LY7)

Removal Procedure

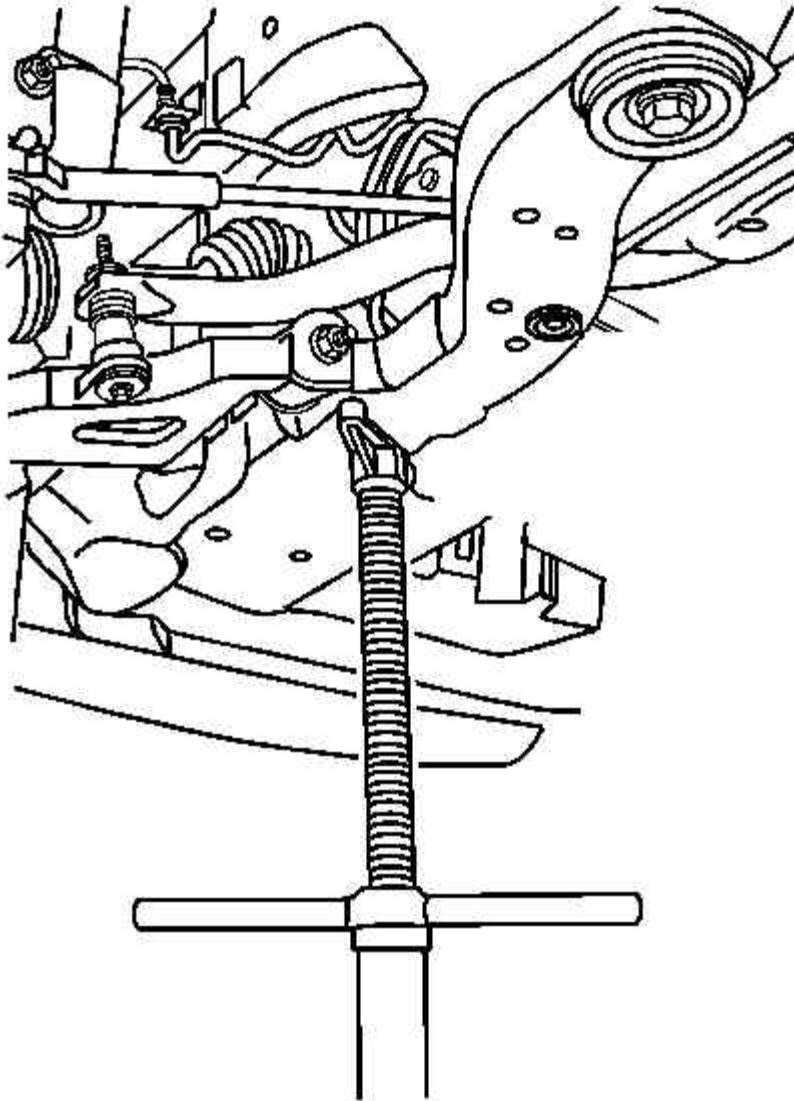


Fig. 35: Supporting Powertrain With Utility Stand At Center Of Left Frame

Courtesy of GENERAL MOTORS CORP.

1. Remove the air inlet duct. Refer to **Air Cleaner Inlet Duct Replacement** .
2. Remove the master cylinder fluid level sensor in order to provide clearance for

lowering the powertrain. Refer to **Brake Fluid Level Indicator Switch Replacement** .

3. Remove the engine mount struts. Refer to **Engine Mount Strut Replacement - Left Side** and **Engine Mount Strut Replacement - Right Side** .
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
5. Remove the catalytic converter. Refer to **Catalytic Converter Replacement**.

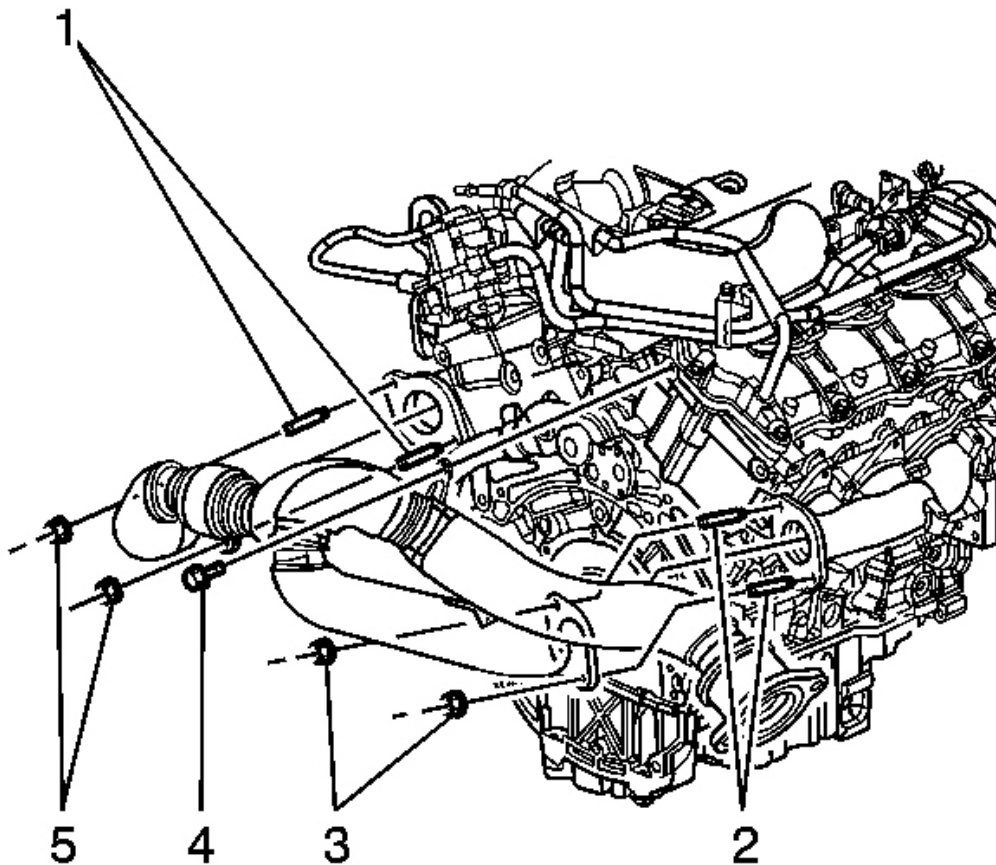


Fig. 36: Identifying Exhaust Crossover Pipe Nuts & Studs
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Use a long extension in order to remove the exhaust

crossover pipe nuts.

6. Remove the exhaust crossover pipe to right bank exhaust manifold nuts (3).

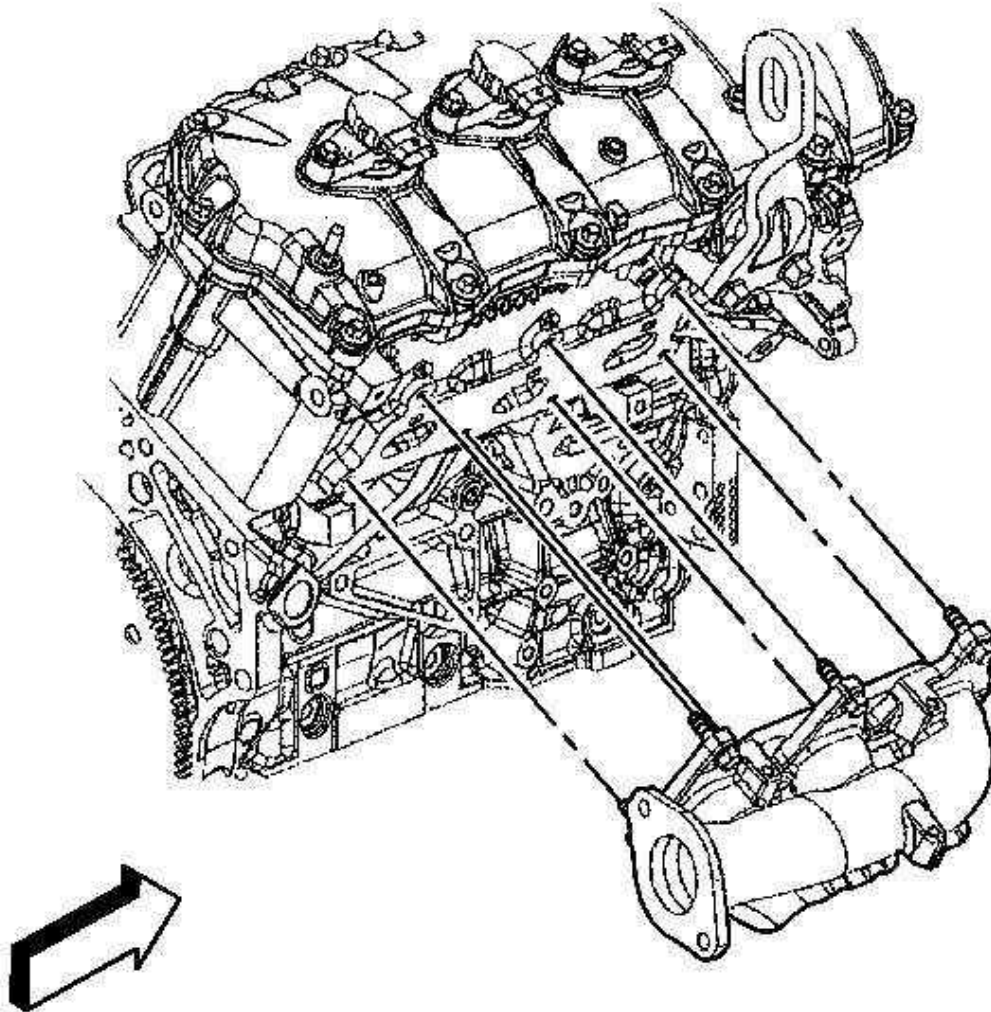


Fig. 37: View Of Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

7. Remove the exhaust manifold bolts.

8. Remove the exhaust manifold.
9. Remove and discard the exhaust manifold gasket.

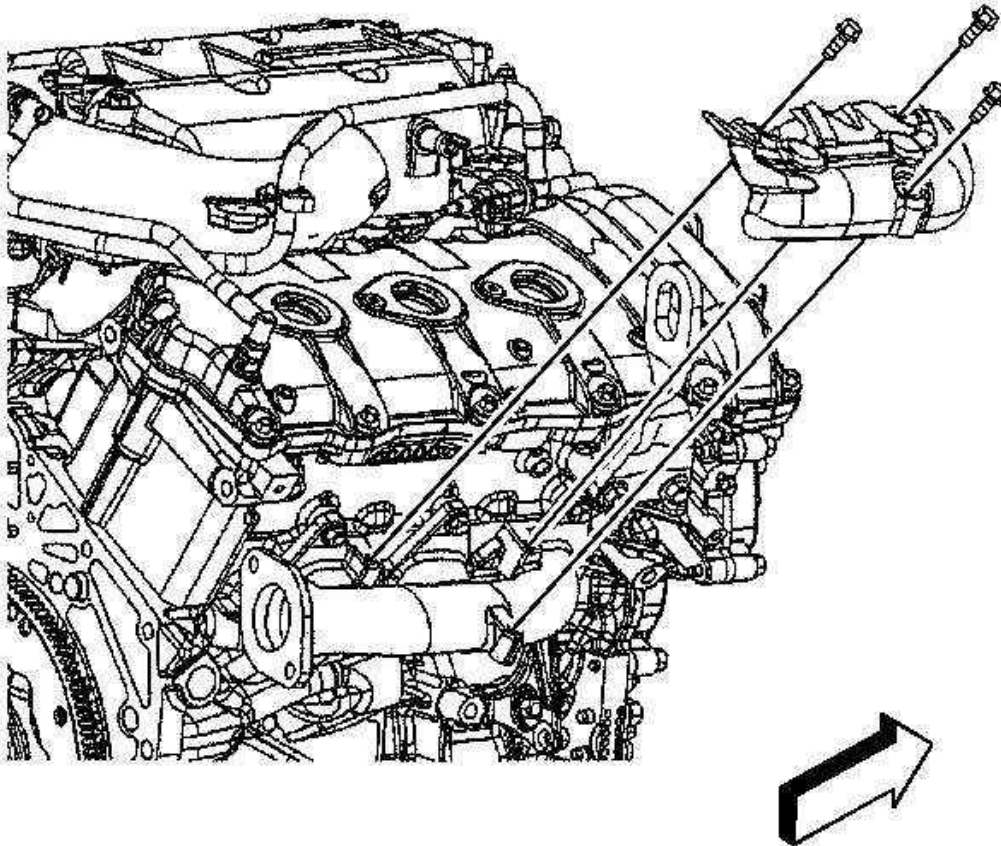


Fig. 38: View Of Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

10. If replacing the exhaust manifold, remove the exhaust manifold heat shield bolts and the heat shield.
11. Clean the exhaust manifold sealing surfaces.

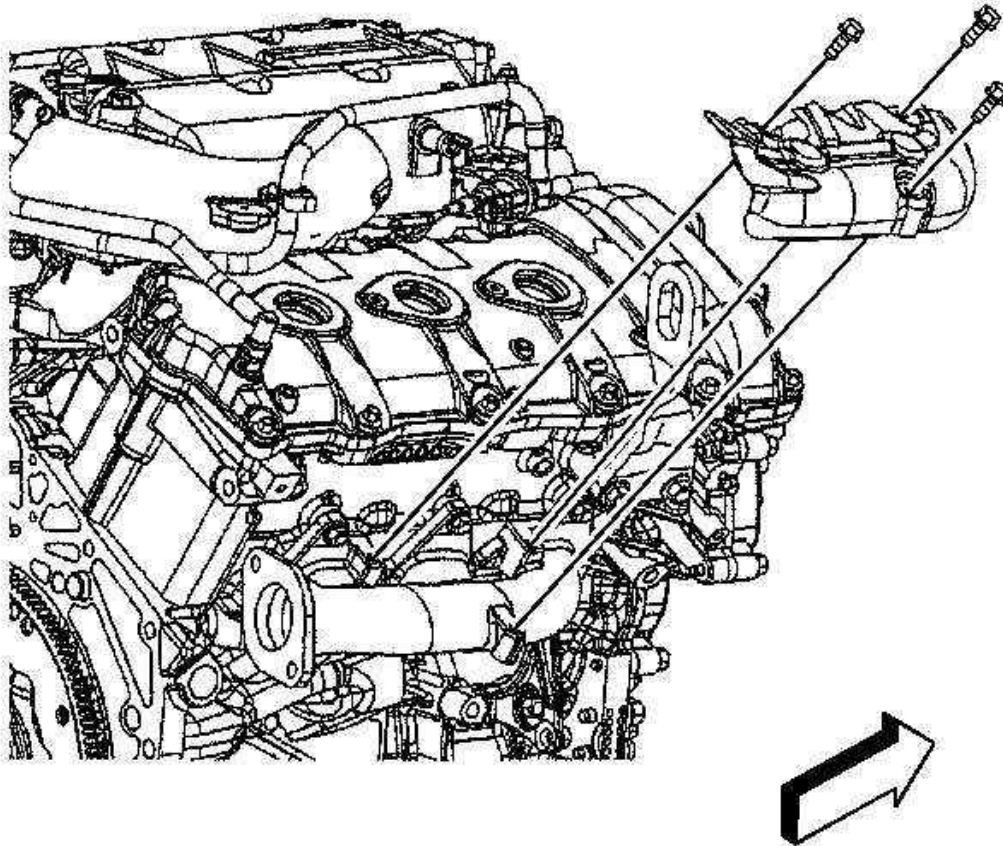


Fig. 39: View Of Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Fastener Notice .

2. Install the exhaust manifold heat shield bolts.

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

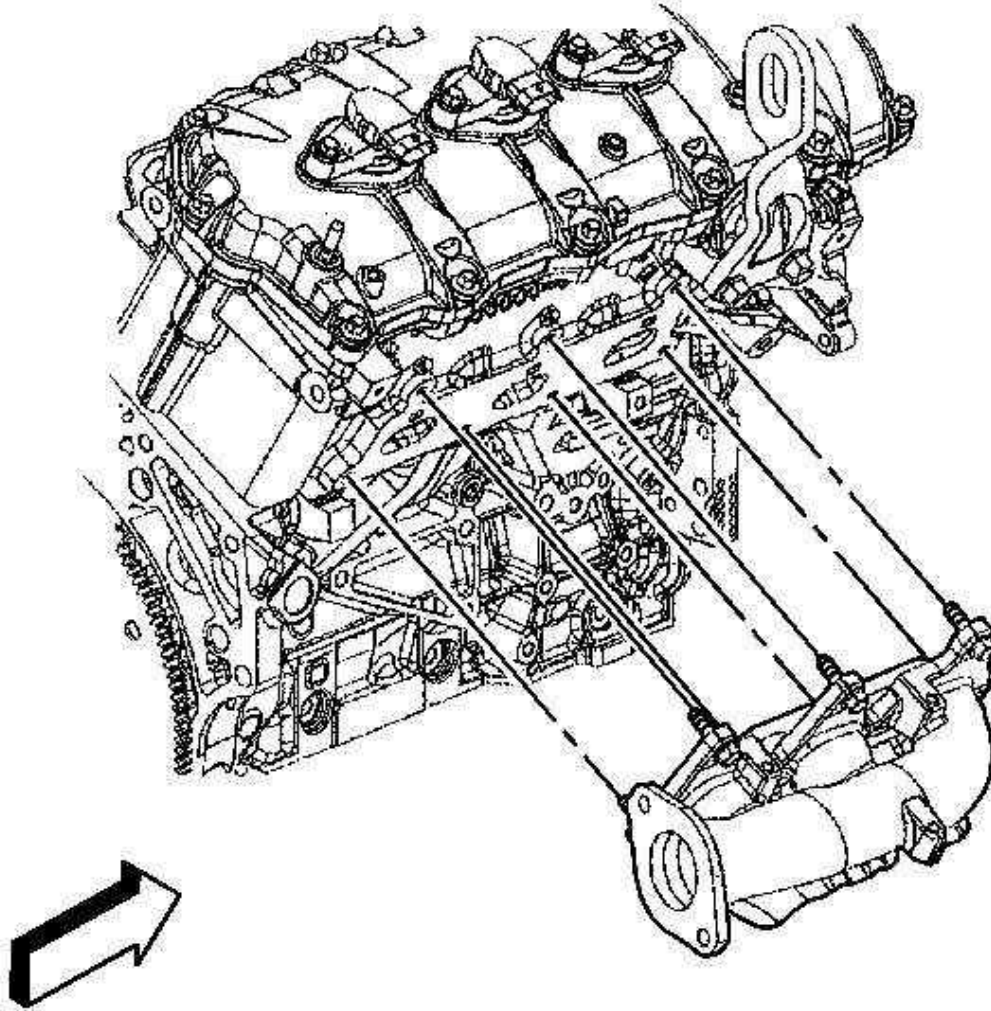


Fig. 40: View Of Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

3. Insert one bolt through a bolt hole in the exhaust manifold.
4. Position the NEW exhaust manifold gasket over the bolt.
5. Position the exhaust manifold to the cylinder head.
6. Tighten the bolt until snug.
7. Install the remaining exhaust manifold bolts.

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

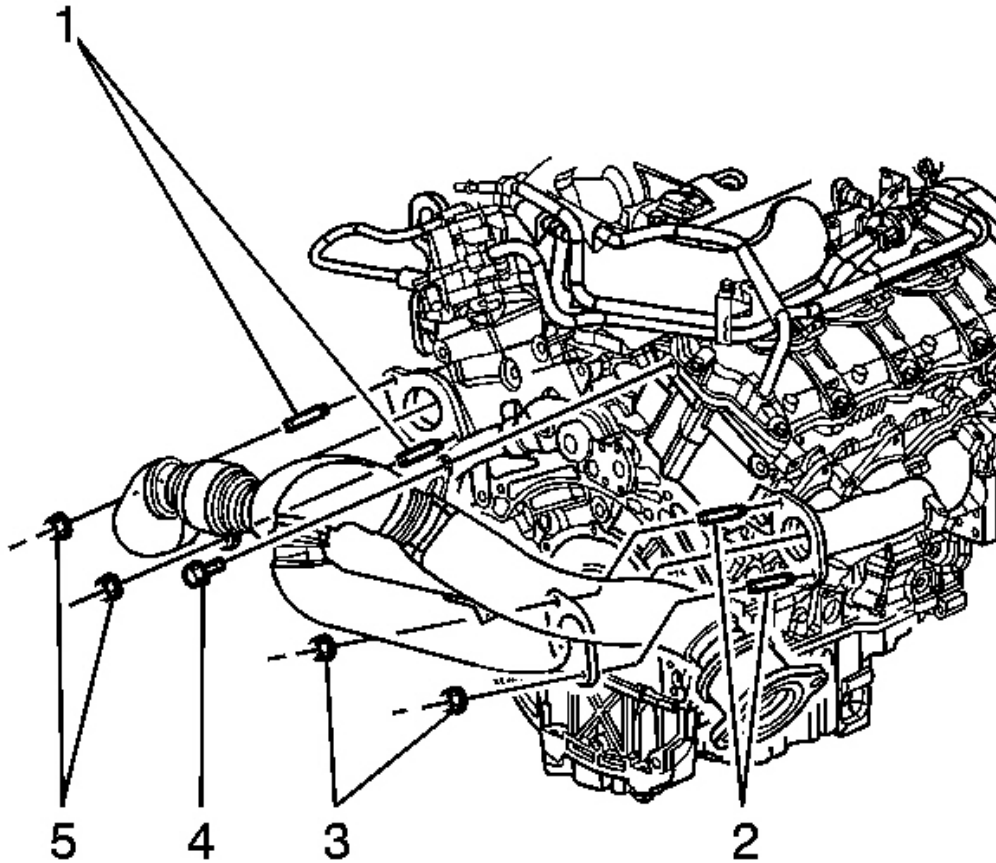


Fig. 41: Identifying Exhaust Crossover Pipe Nuts & Studs
Courtesy of GENERAL MOTORS CORP.

8. Install the exhaust crossover pipe to right bank exhaust manifold nuts (3).

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

9. Install the catalytic converter. Refer to **Catalytic Converter Replacement**.
10. Connect the intermediate steering shaft to the steering gear. Refer to **Intermediate Steering Shaft Replacement**.

11. Lower the vehicle.
12. Install the engine mount struts. Refer to **Engine Mount Strut Replacement - Left Side** and **Engine Mount Strut Replacement - Right Side** .
13. Install the master cylinder fluid level sensor. Refer to **Brake Fluid Level Indicator Switch Replacement** .
14. Install the air inlet duct. Refer to **Air Cleaner Inlet Duct Replacement** .

EXHAUST CROSSOVER PIPE REPLACEMENT (3.6L)

Removal Procedure

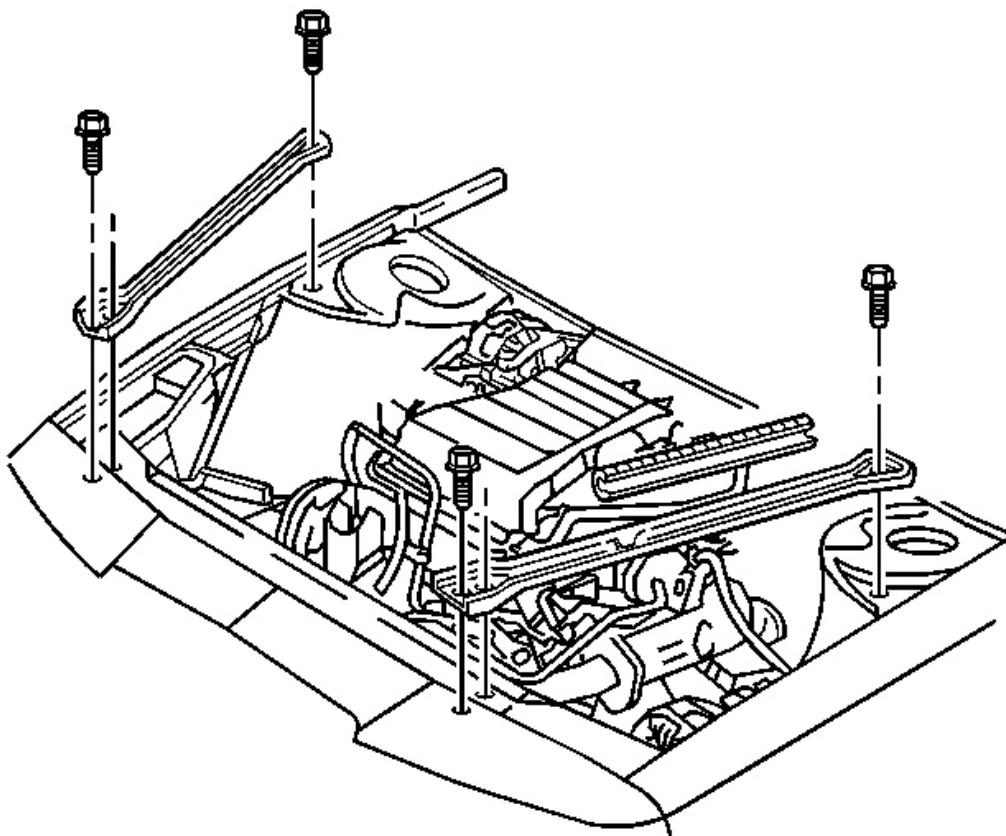


Fig. 42: View Of Front Fender Upper Diagonal Brace
Courtesy of GENERAL MOTORS CORP.

1. Remove the left inner fender brace. Refer to **Front Fender Upper Diagonal Brace Replacement** .
2. Remove the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** .

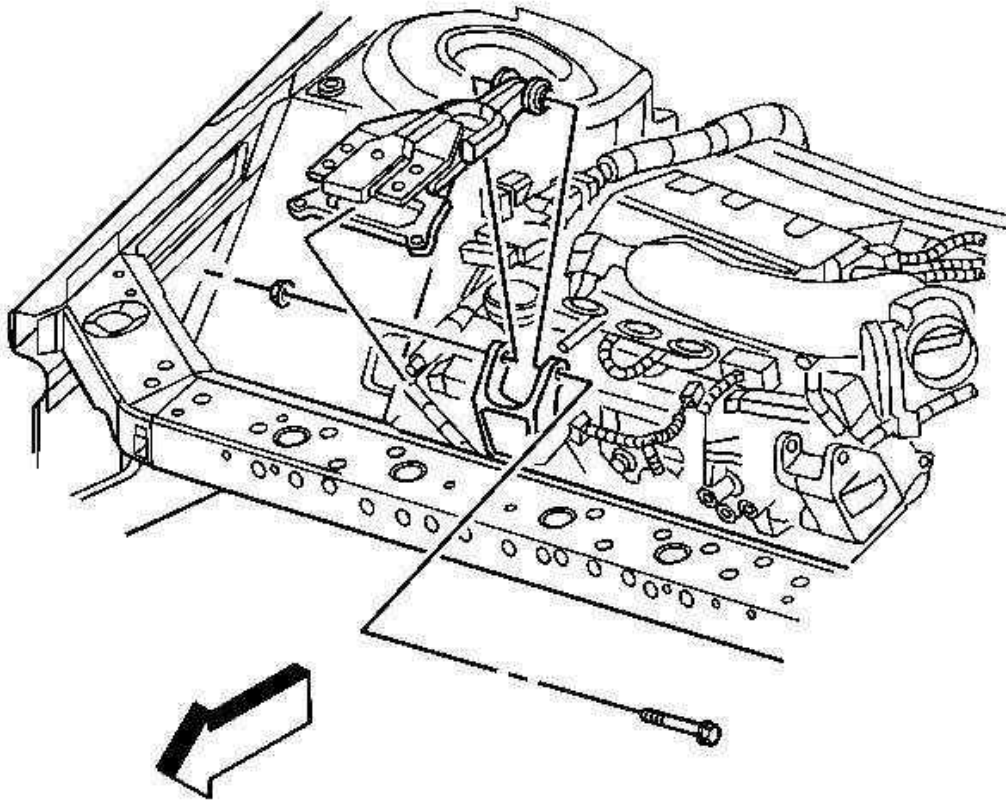


Fig. 43: Identifying Right Engine Mount Strut
Courtesy of GENERAL MOTORS CORP.

3. Remove the left front engine mount strut. Refer to **Engine Mount Strut Replacement - Left Side** .

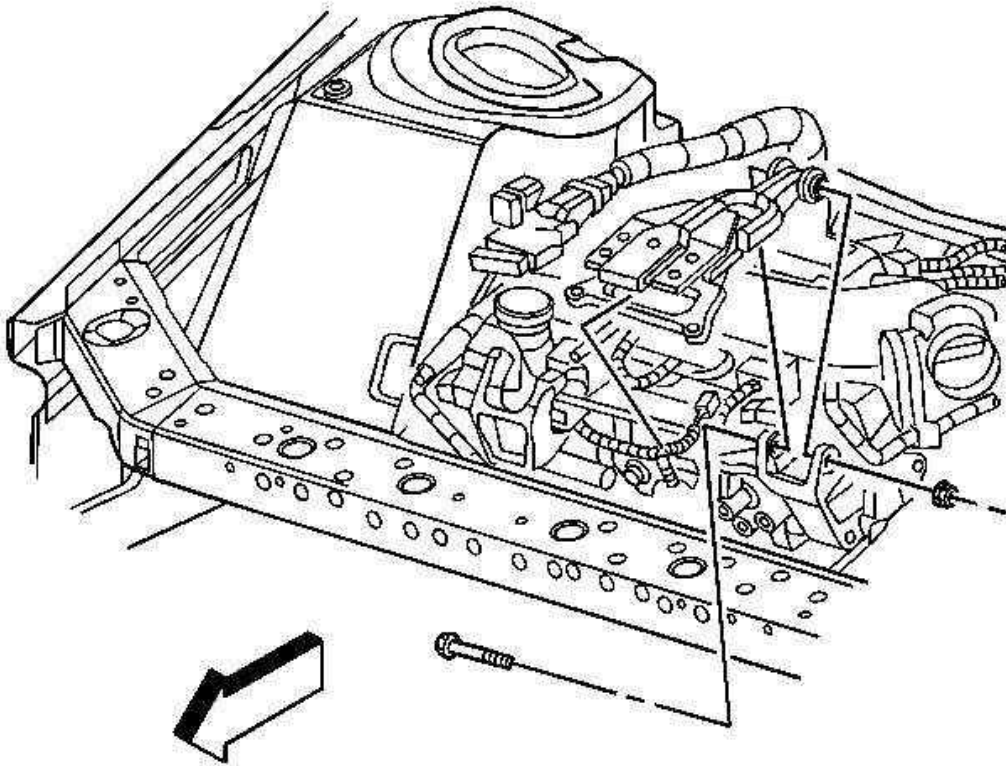


Fig. 44: Identifying Left Engine Mount Strut
Courtesy of GENERAL MOTORS CORP.

4. Remove the right front engine mount strut. Refer to **Engine Mount Strut Replacement - Right Side** .

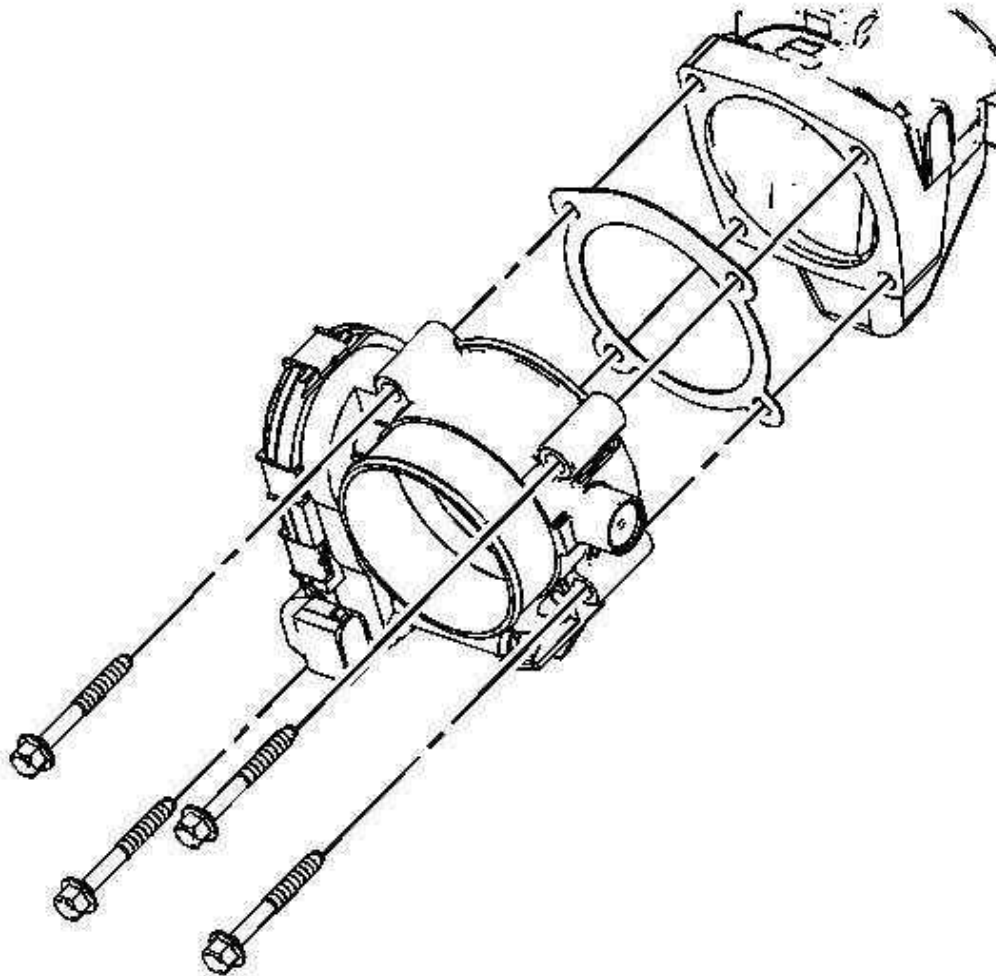


Fig. 45: View Of Throttle Body
Courtesy of GENERAL MOTORS CORP.

5. Remove the throttle body. Refer to **Throttle Body Assembly Replacement** .
6. Rotate the engine forward as far as possible.
7. Secure the engine with tie down straps.
8. Remove the downpipe attaching nuts.
9. Remove the two left bank and front right bank crossover pipe nuts.

10. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
11. Remove the left front tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
12. Remove the left inner fender splash shield. Refer to **Front Fender Replacement** .
13. Remove the intermediate shaft bolt and separate the shaft from the steering gear. Refer to **Intermediate Steering Shaft Replacement**
14. Support the left fail rail with a jack stand.

IMPORTANT: DO NOT loosen the right side frame to body bolts.

15. Remove only the left two frame to body bolts. Refer to **Frame Replacement** .
16. Lower the frame with the jack stand and remove the jack stand.
17. Remove the fourth exhaust crossover pipe nut.
18. Lower the vehicle.

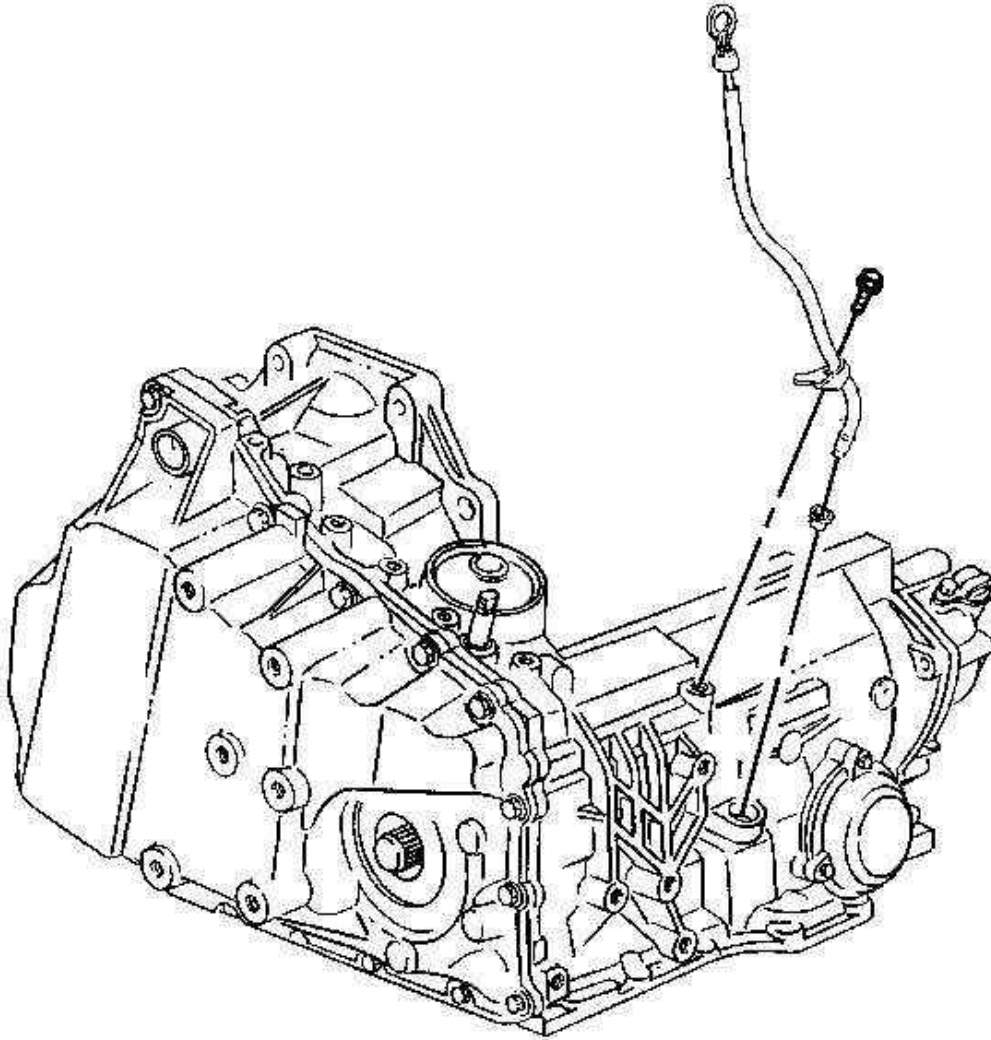


Fig. 46: View Of Fluid Filler Tube & Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

19. Remove the transmission fluid filler tube. Refer to **Transmission Fluid Filler Tube Replacement** .

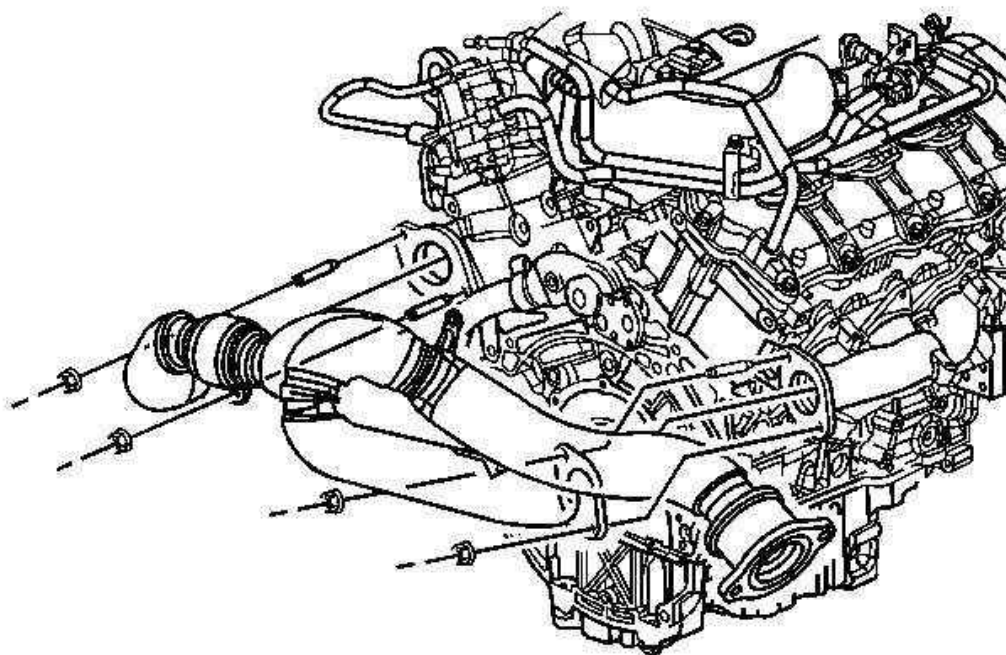


Fig. 47: View Of Crossover Pipe
Courtesy of GENERAL MOTORS CORP.

20. Remove the crossover pipe.

Installation Procedure

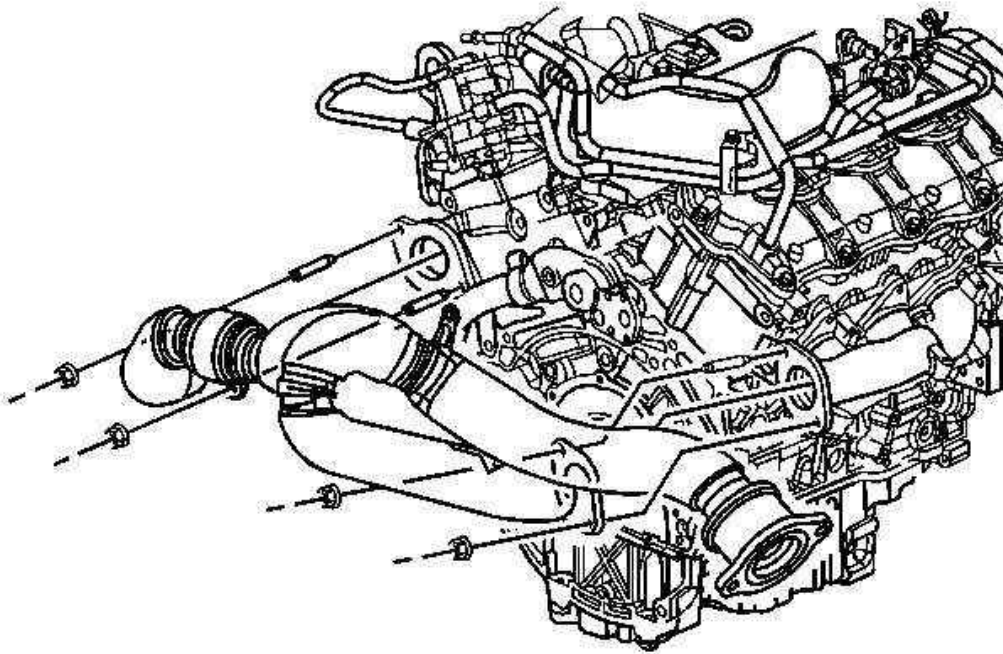


Fig. 48: View Of Crossover Pipe
Courtesy of GENERAL MOTORS CORP.

1. Install the crossover pipe.

NOTE: Refer to Fastener Notice .

2. Install the crossover nuts.

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

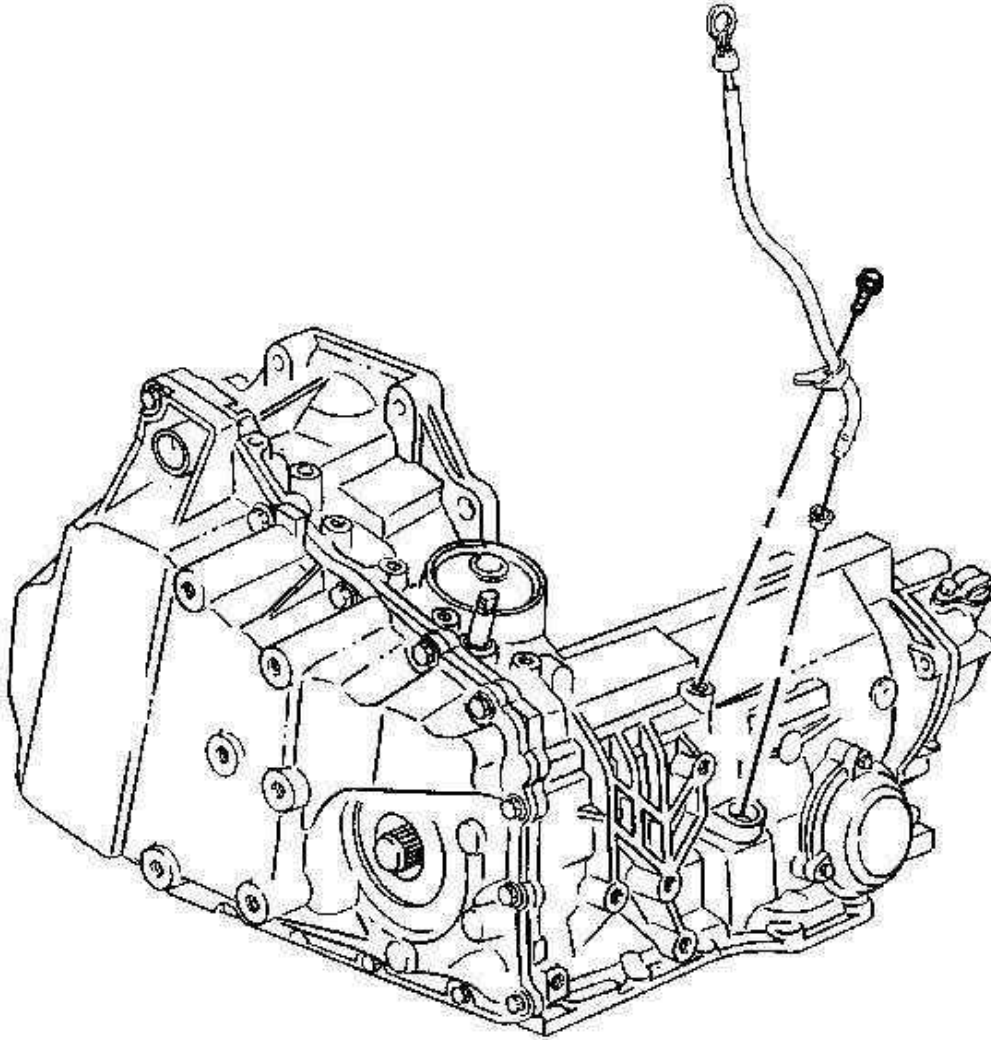


Fig. 49: View Of Fluid Filler Tube & Bracket Bolt
Courtesy of GENERAL MOTORS CORP.

3. Install the transmission fluid filler tube. Refer to **Transmission Fluid Filler Tube Replacement** .
4. Raise and support the vehicle.
5. Using a jack stand, raise the frame.

6. Install the left two frame bolts. Refer to **Frame Replacement** .
7. Remove the jack stand.
8. Install the intermediate shaft to the steering gear. Refer to **Intermediate Steering Shaft Replacement** .
9. Install the left inner fender splash shield. Refer to **Front Fender Replacement** .
10. Install the left front tire and wheel. Refer to **Tire and Wheel Removal and Installation** .
11. Lower the veils.
12. Install the two left bank and front right bank crossover pipe nuts.
13. Install the downpipe attaching nuts.
14. Remove the engine with tie down straps.
15. Rotate the engine back into the proper position.

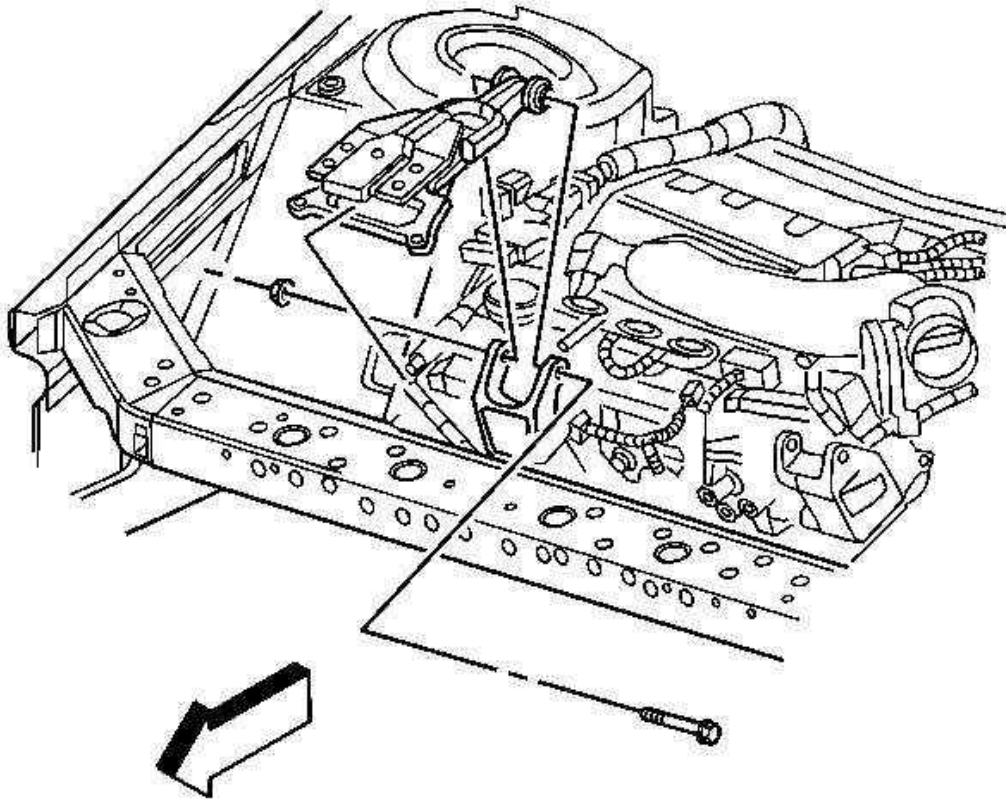


Fig. 50: Identifying Right Engine Mount Strut
Courtesy of GENERAL MOTORS CORP.

16. Install the left front engine mount strut. Refer to **Engine Mount Strut Replacement - Left Side**

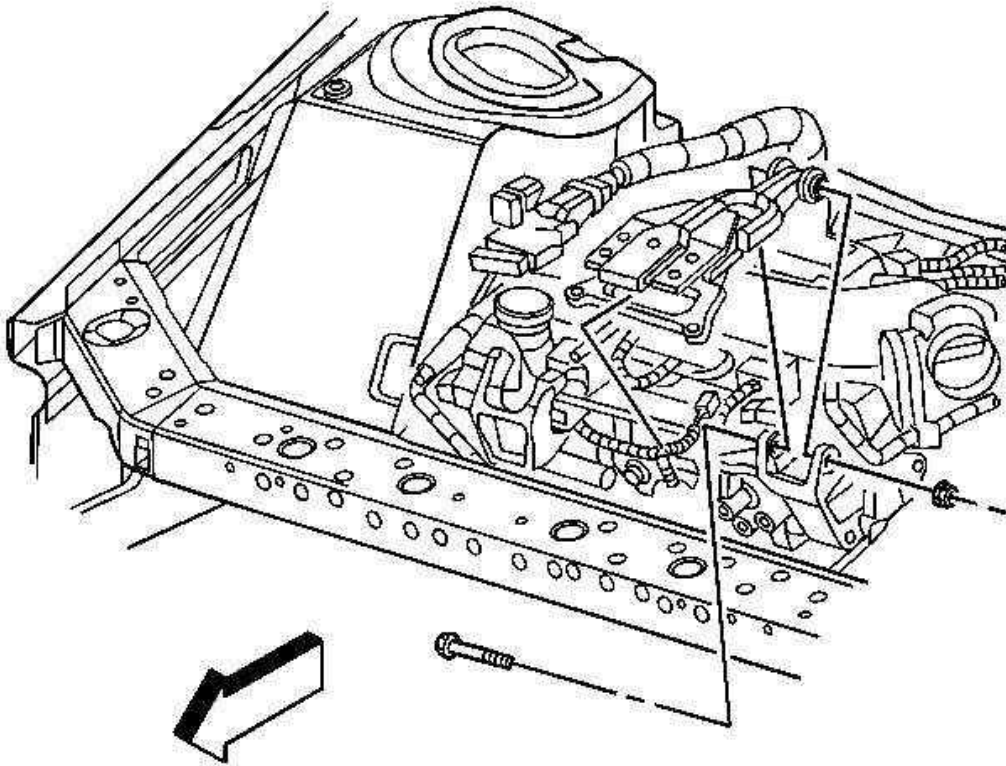


Fig. 51: Identifying Left Engine Mount Strut
Courtesy of GENERAL MOTORS CORP.

17. Install the right front engine mount strut. Refer to **Engine Mount Strut Replacement - Right Side**

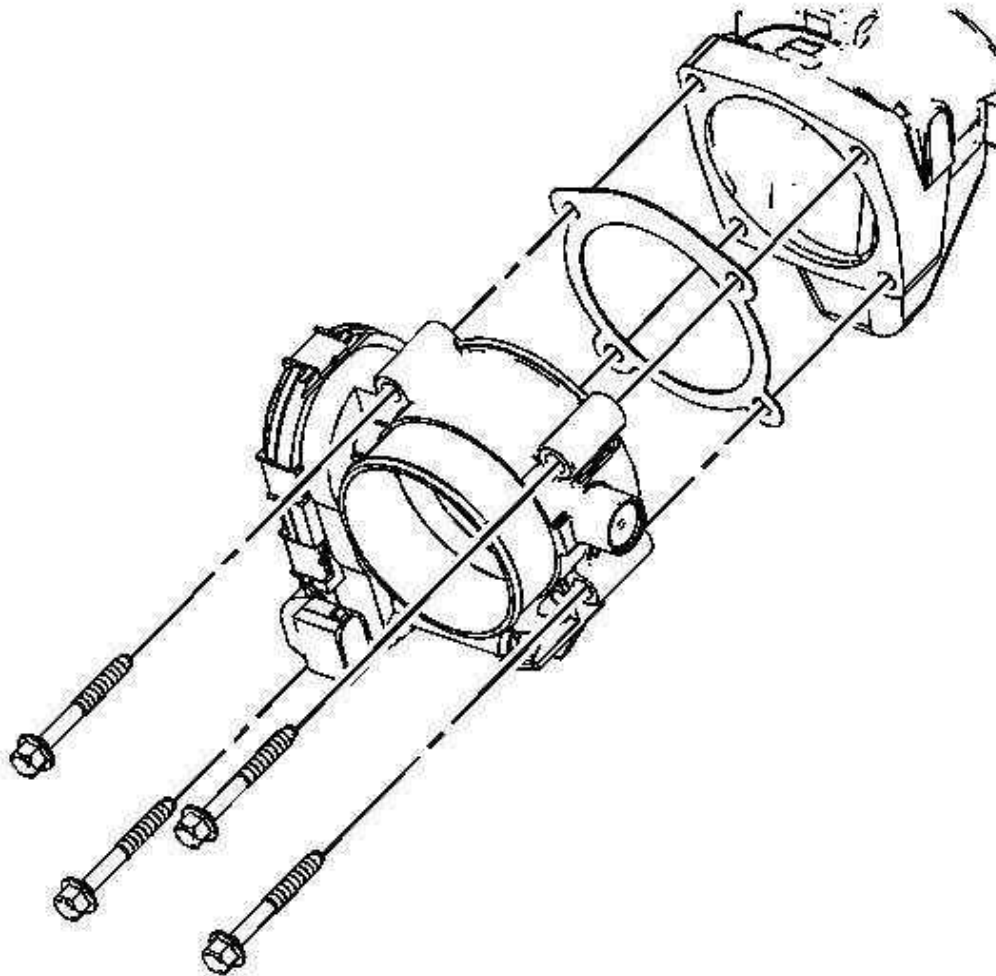


Fig. 52: View Of Throttle Body
Courtesy of GENERAL MOTORS CORP.

18. Install the throttle body. Refer to **Throttle Body Assembly Replacement** .
19. Install the air cleaner assembly. Refer to **Air Cleaner Assembly Replacement** .

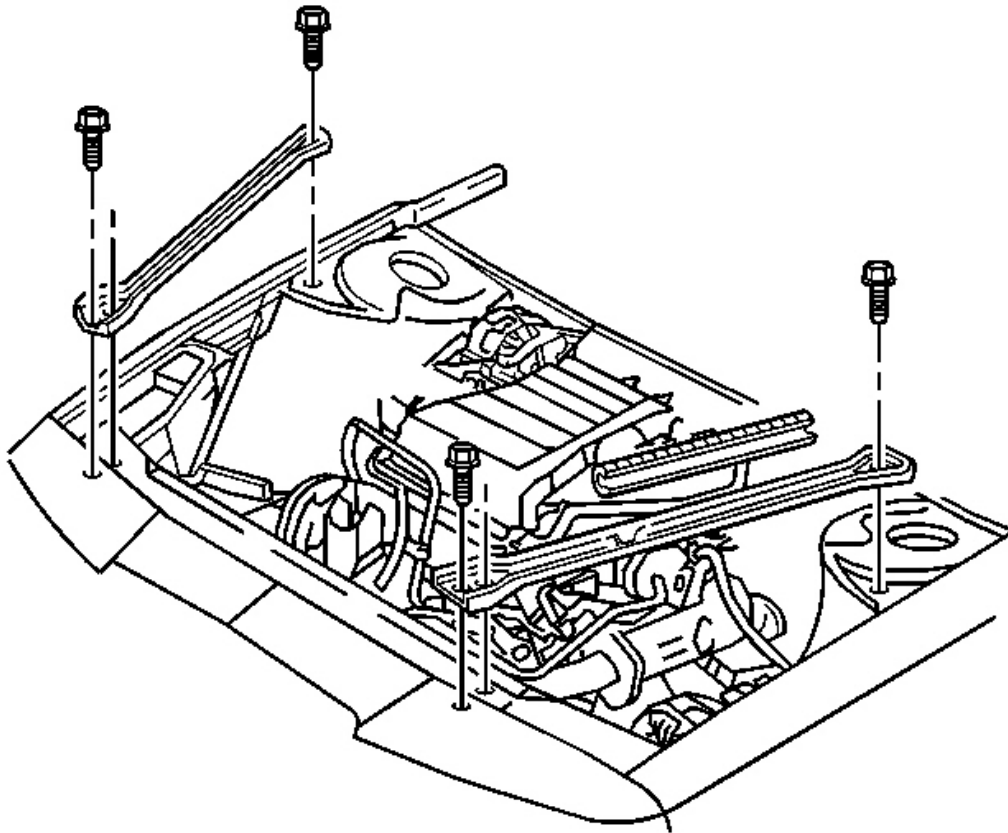


Fig. 53: View Of Front Fender Upper Diagonal Brace
Courtesy of GENERAL MOTORS CORP.

20. Install the left inner fender brace. Refer to **Front Fender Upper Diagonal Brace Replacement** .

EXHAUST CROSSOVER PIPE REPLACEMENT (3.8L)

Removal Procedure

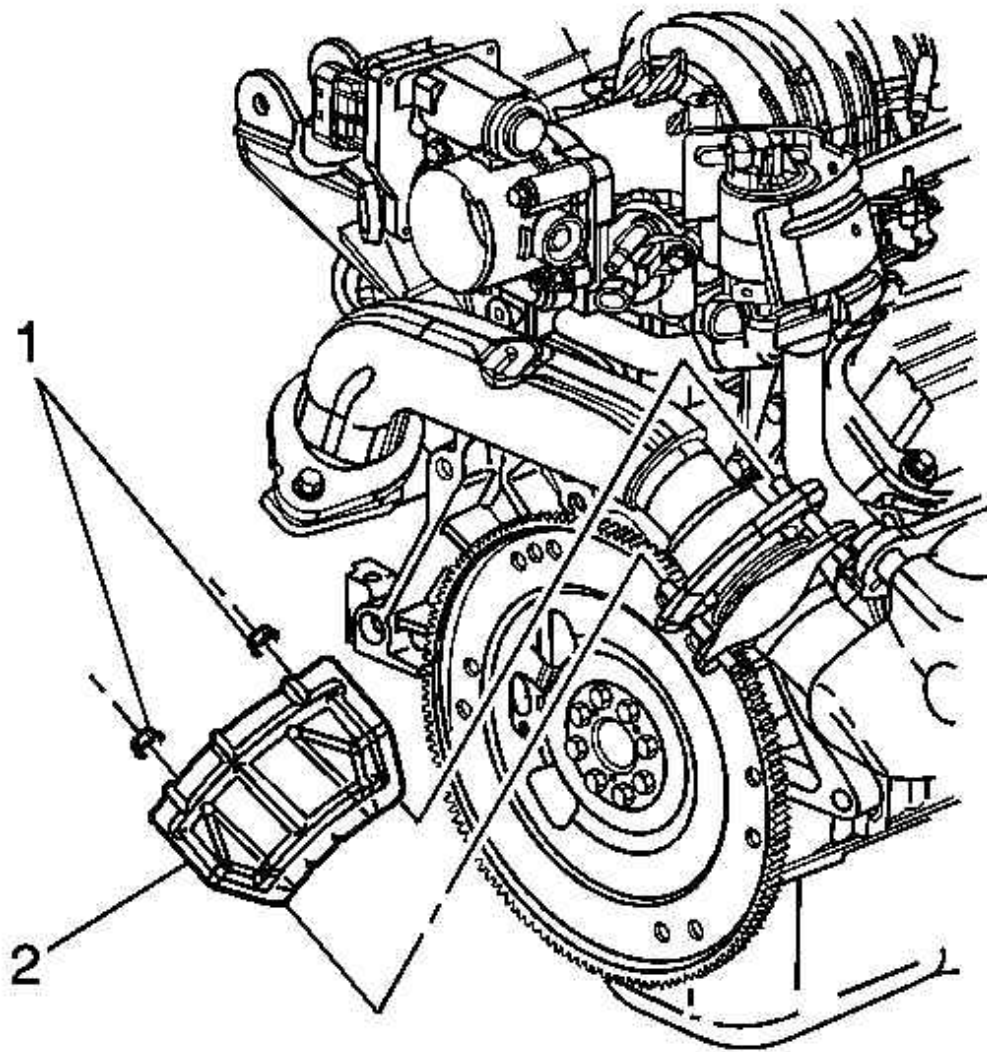


Fig. 54: View Of Right Exhaust Crossover Heat Shield
Courtesy of GENERAL MOTORS CORP.

1. Remove the fuel injector sight shield. Refer to **Fuel Injector Sight Shield Replacement** .
2. Remove the air cleaner intake duct. Refer to **Air Cleaner Inlet Duct Replacement** .

3. Remove the exhaust crossover heat shield nuts (1).
4. Remove the exhaust crossover heat shield (2).

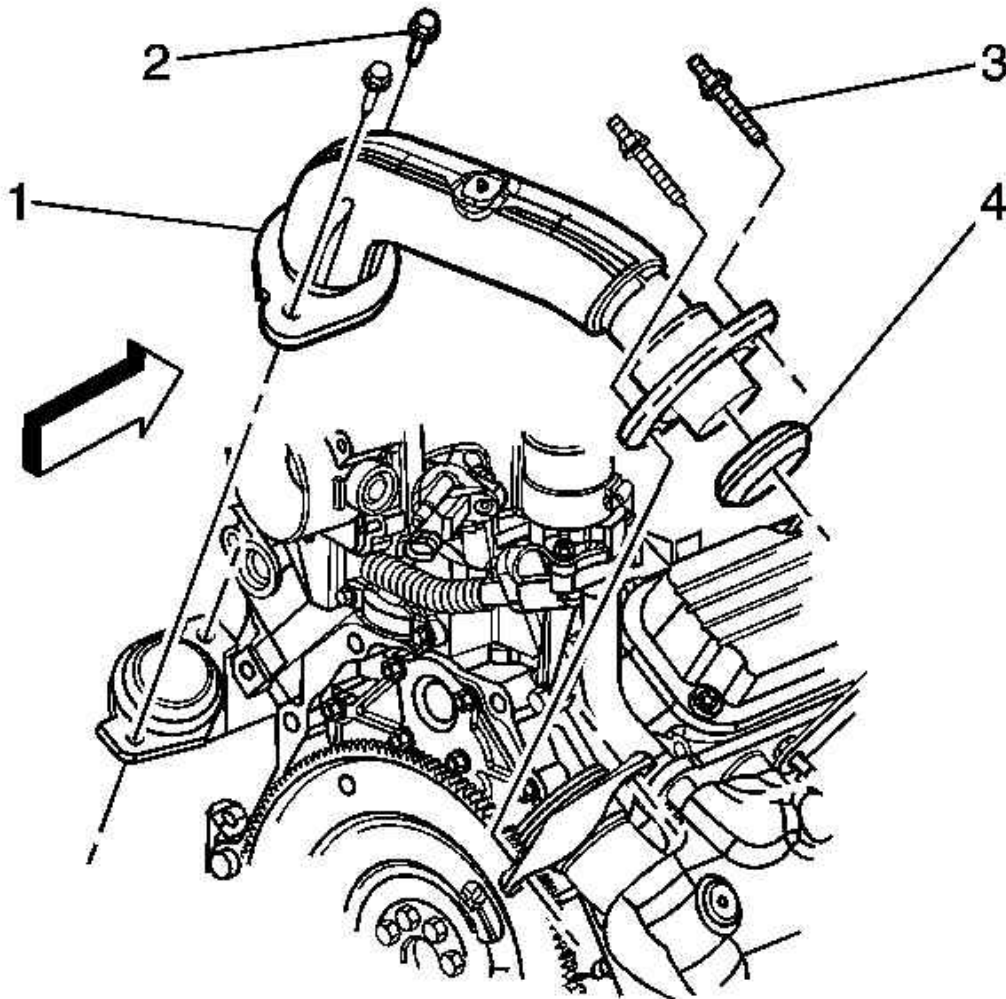


Fig. 55: View Of Exhaust Crossover Pipe
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust crossover pipe studs (3) and the bolts (2).
6. Remove the exhaust crossover pipe (1).

7. Remove the exhaust crossover pipe seal (4).

Installation Procedure

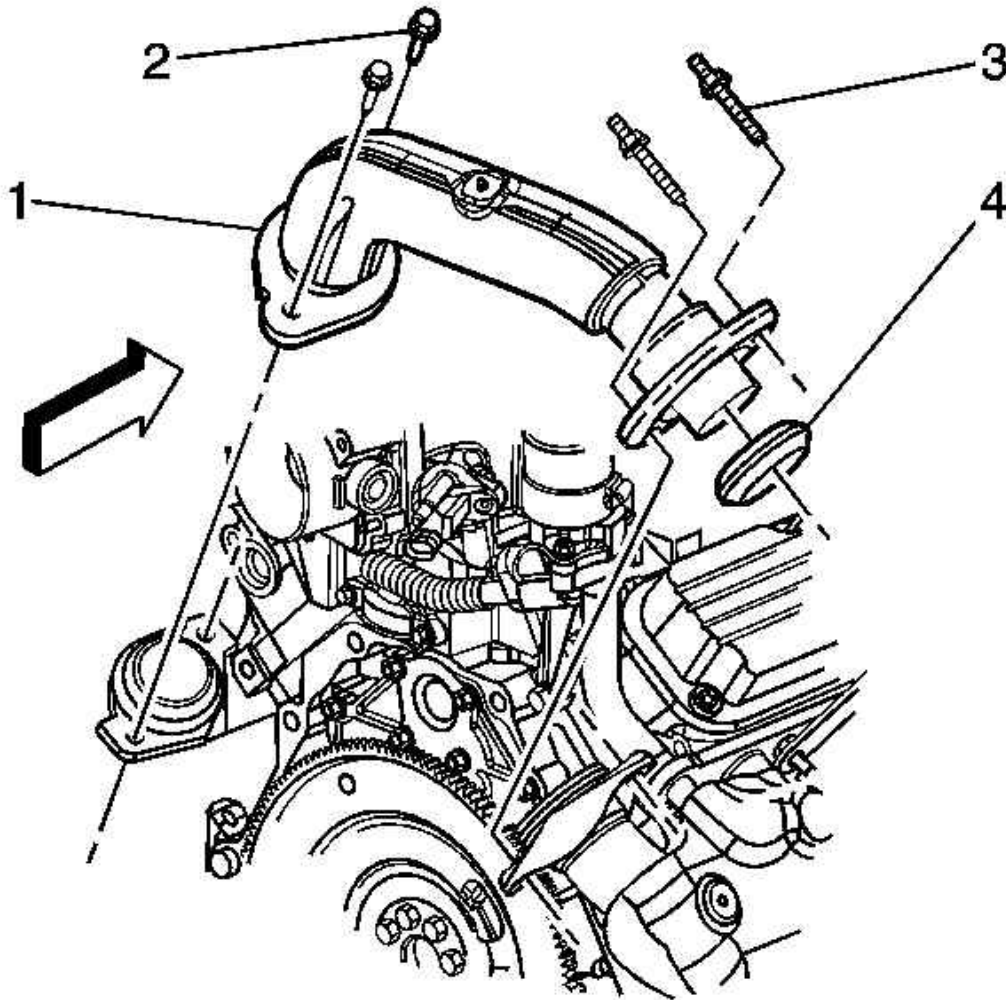


Fig. 56: View Of Exhaust Crossover Pipe
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust crossover pipe seal (4) to the exhaust crossover pipe (1) at the right exhaust manifold connection.

2. Install the exhaust crossover pipe (1).

NOTE: Refer to FASTENER NOTICE .

3. Install the exhaust crossover pipe studs (3) and the bolts (2).

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

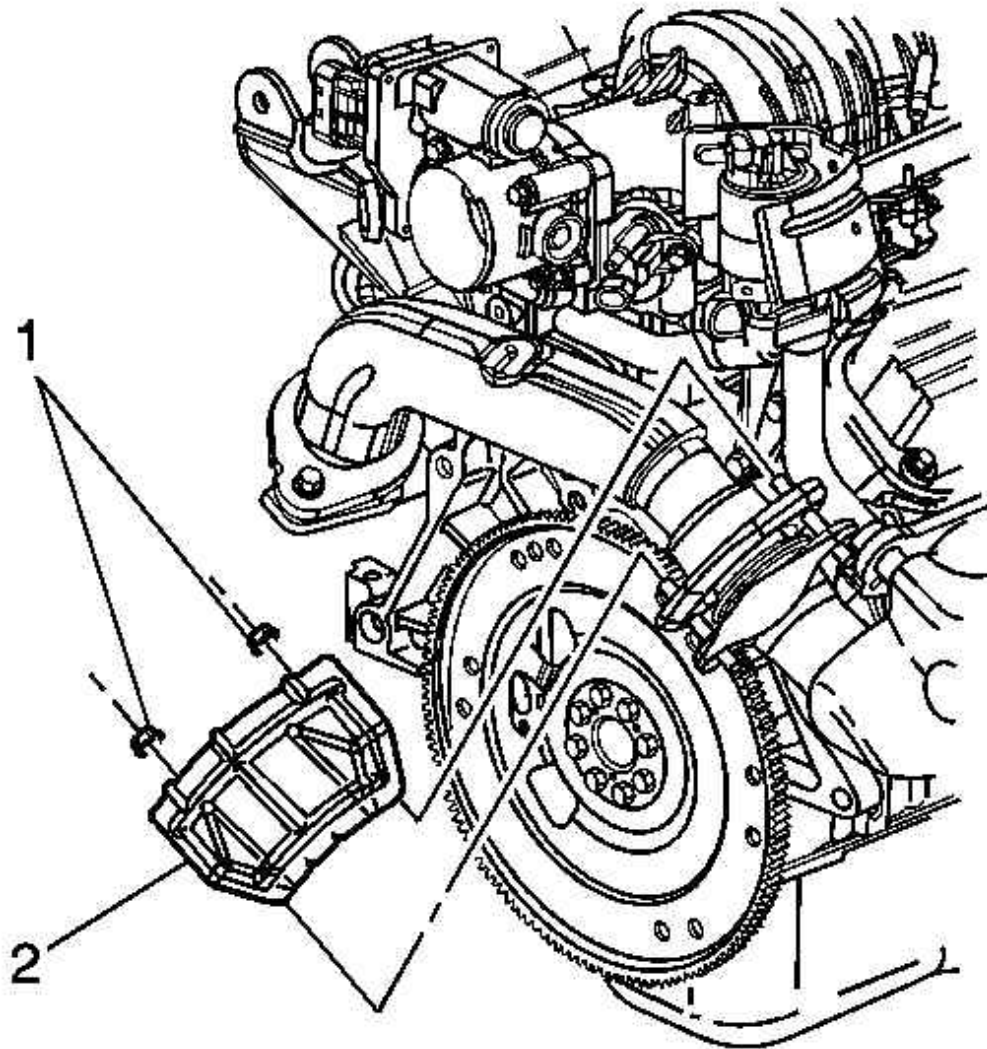


Fig. 57: View Of Right Exhaust Crossover Heat Shield
Courtesy of GENERAL MOTORS CORP.

4. Install the exhaust crossover heat shield (2).
5. Install the exhaust crossover heat shield nuts (1).

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

6. Install the air cleaner intake duct. Refer to **Air Cleaner Inlet Duct Replacement** .
7. Install the fuel injector sight shield. Refer to **Fuel Injector Sight Shield Replacement** .

EXHAUST SEAL REPLACEMENT (3.8L)

Removal Procedure

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

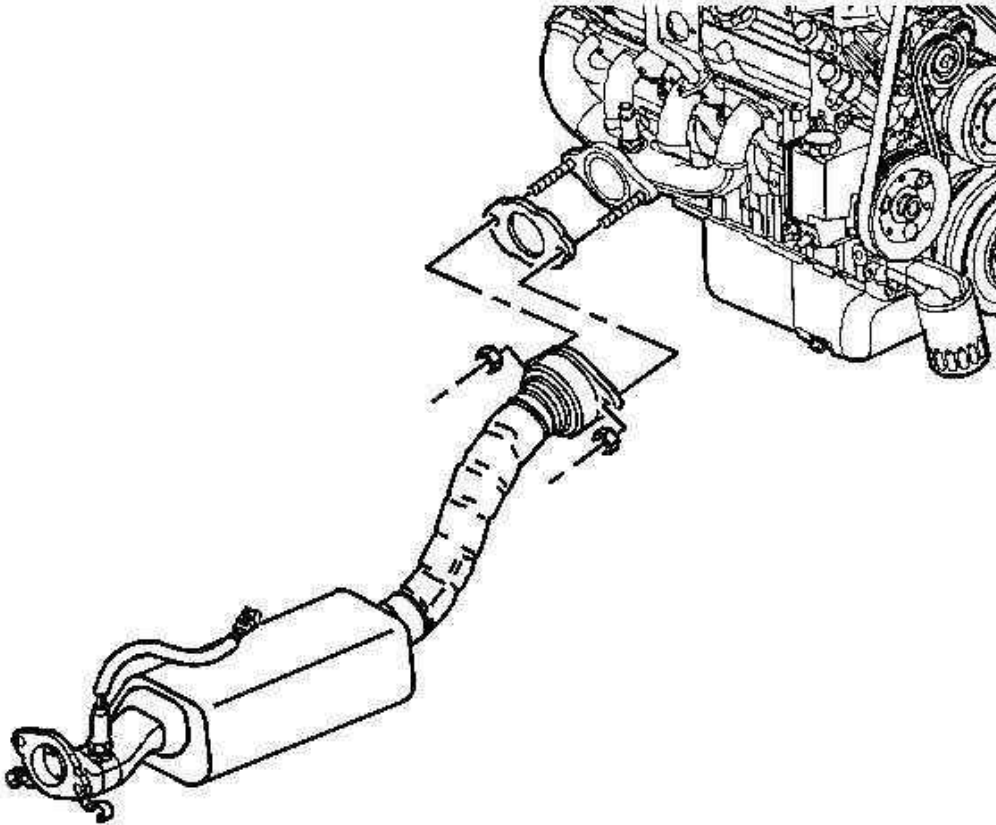


Fig. 58: View Of Catalytic Converter & Exhaust Manifold Pipe Stud Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Catalytic Converter Movement Notice .

IMPORTANT: Exercise caution handling the pipe that contains an oxygen sensor. Do not cut the wire. For removal or repositioning disconnect the connector.

2. Remove the exhaust manifold nuts from the exhaust manifold pipe studs.

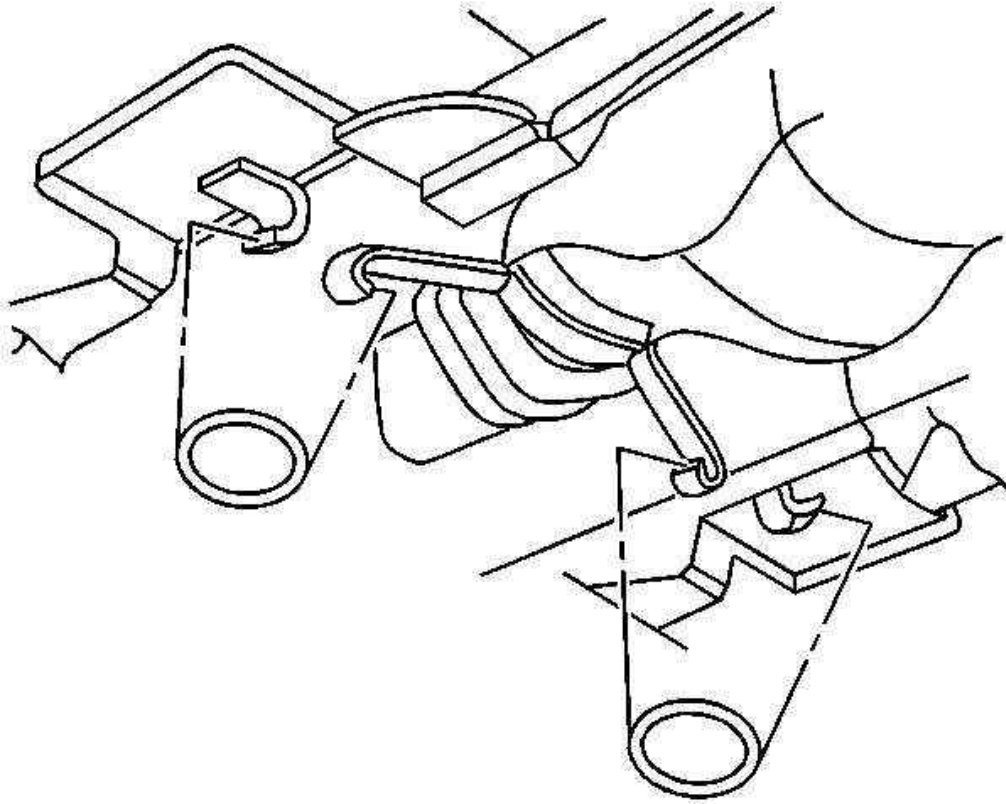


Fig. 59: View Of Catalytic Converter Hangers
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: Support the exhaust system where hangers are removed.

3. Remove the catalytic converter exhaust hangers.
4. Reposition the exhaust system.
5. Remove the exhaust manifold pipe gasket.

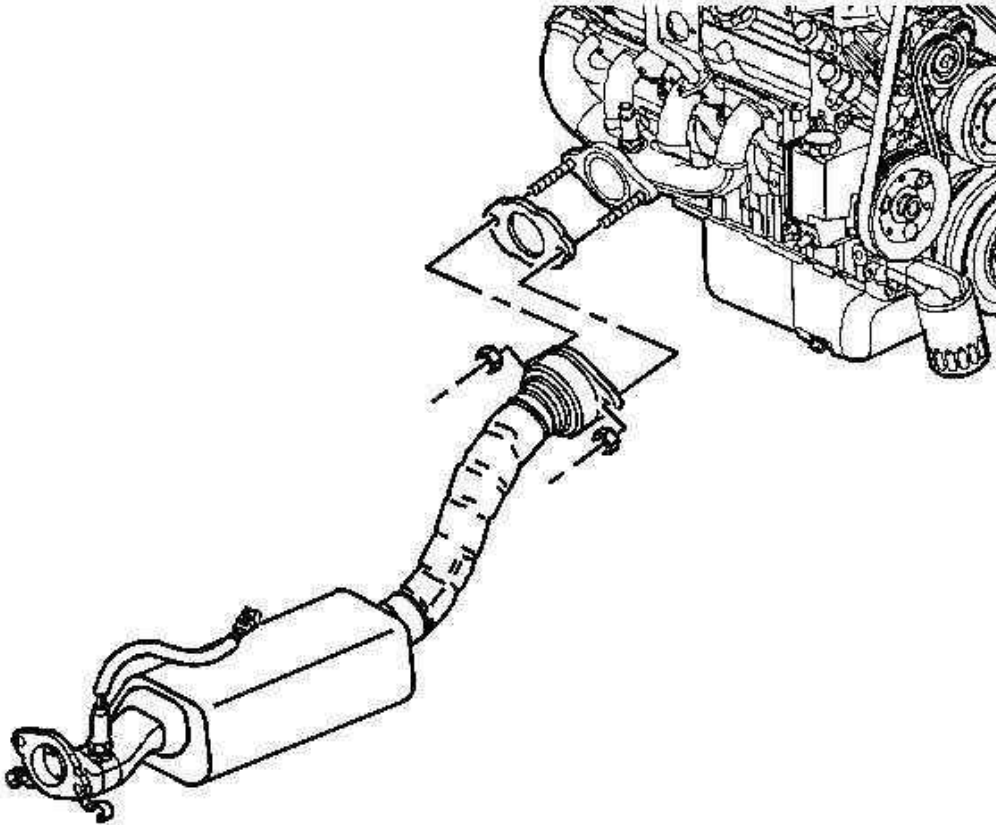


Fig. 60: View Of Catalytic Converter & Exhaust Manifold Pipe Stud Nuts
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust manifold pipe gasket.
2. Install the exhaust system to the original position

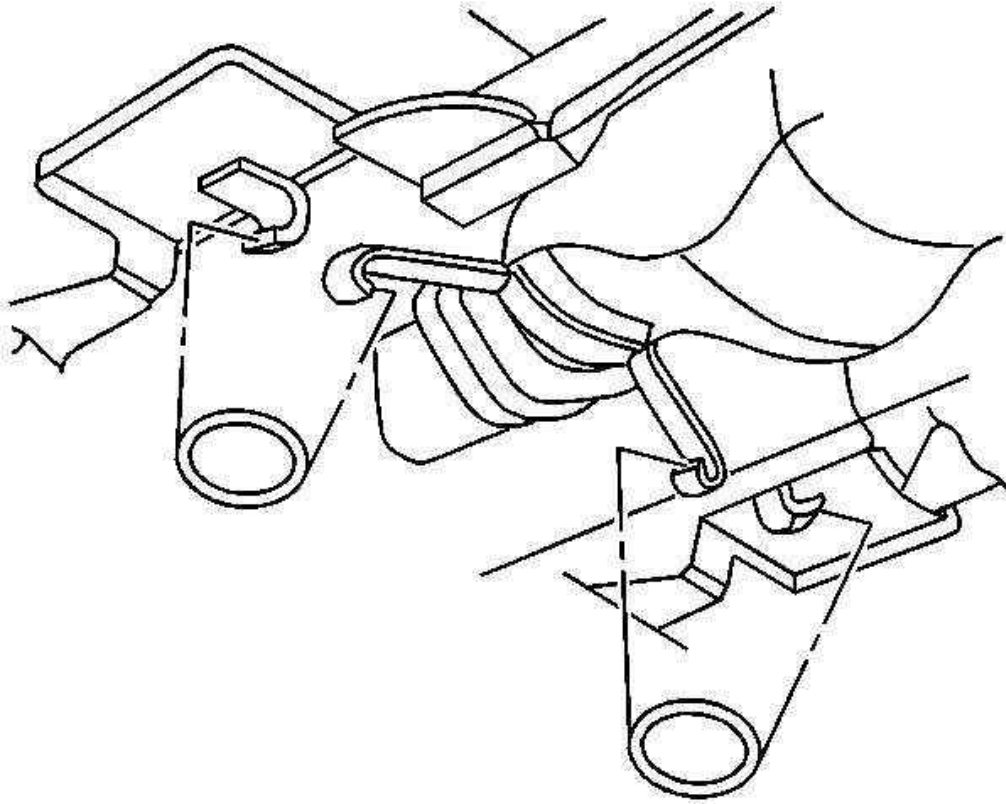


Fig. 61: View Of Catalytic Converter Hangers
Courtesy of GENERAL MOTORS CORP.

3. Install the catalytic converter exhaust hangers.
4. Remove the support from the exhaust system.

NOTE: Refer to **FASTENER NOTICE** .

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

Tighten: Tighten the nuts to 35 N.m (26 lb ft).

6. Inspect the exhaust system for leaks and underbody contact.
7. Lower the vehicle.

CATALYTIC CONVERTER REPLACEMENT

Removal Procedure

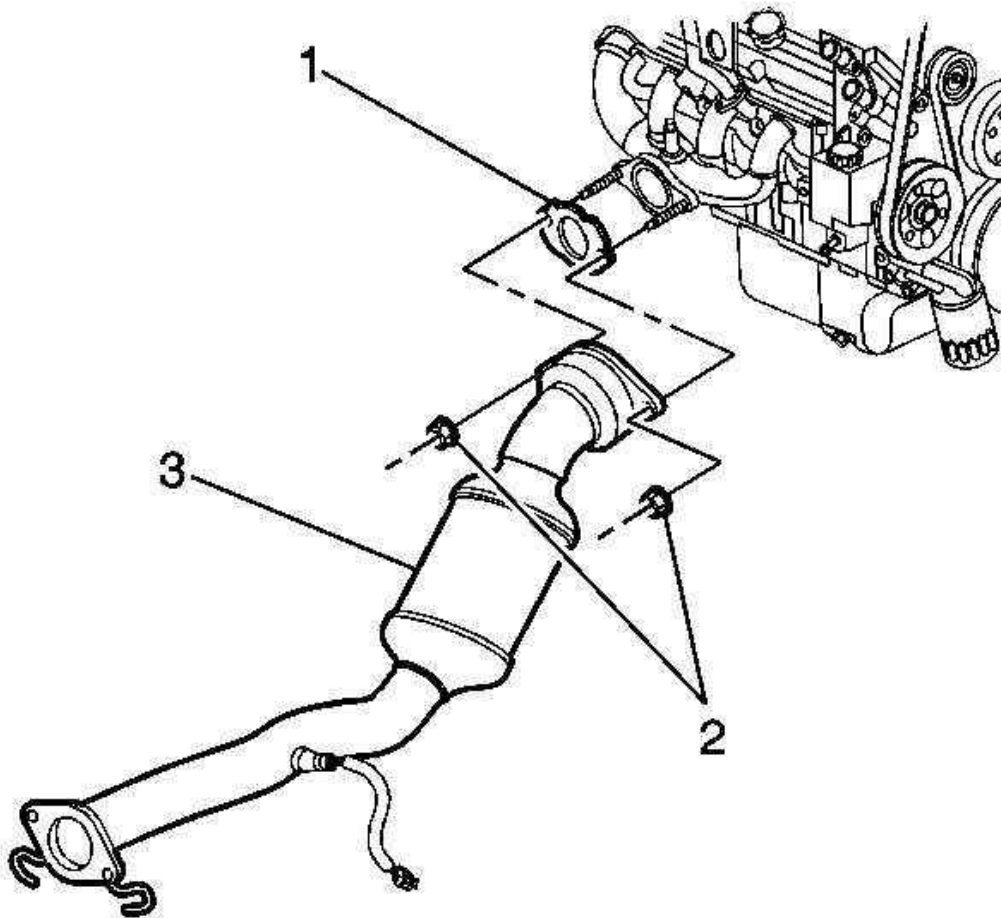


Fig. 62: View Of Right Exhaust Manifold & Catalytic Converter Pipe
Courtesy of GENERAL MOTORS CORP.

IMPORTANT: The catalytic converter is serviced by replacing the entire assembly. Always replace the gaskets at the front and rear flanges when servicing the catalytic converter. Never install the original gasket.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Disconnect the heated oxygen sensor (HO2S) electrical connector.
3. Remove the exhaust manifold pipe stud nuts (2).
4. Remove the exhaust manifold pipe gasket (1).
5. Support the exhaust system.

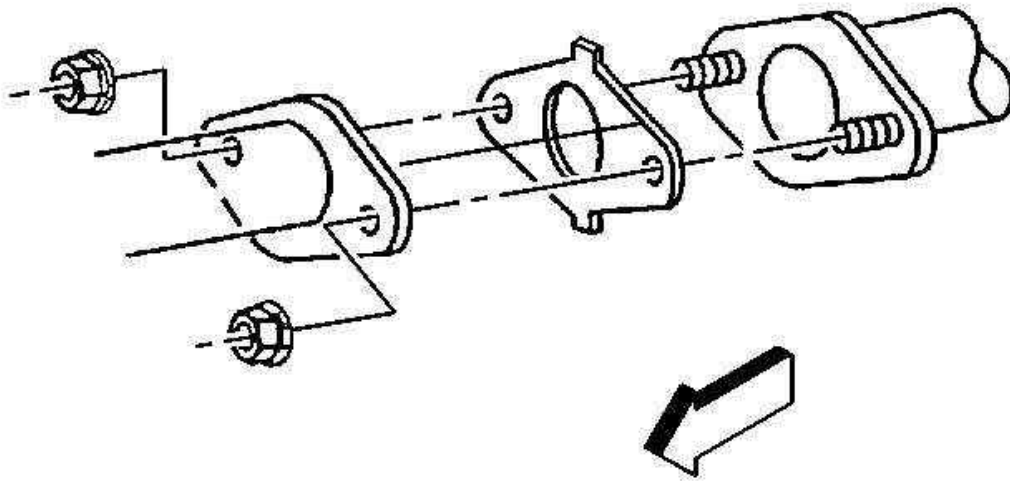


Fig. 63: View Of Catalytic Converter Mounting Nuts
Courtesy of GENERAL MOTORS CORP.

6. Remove the catalytic converter nuts.

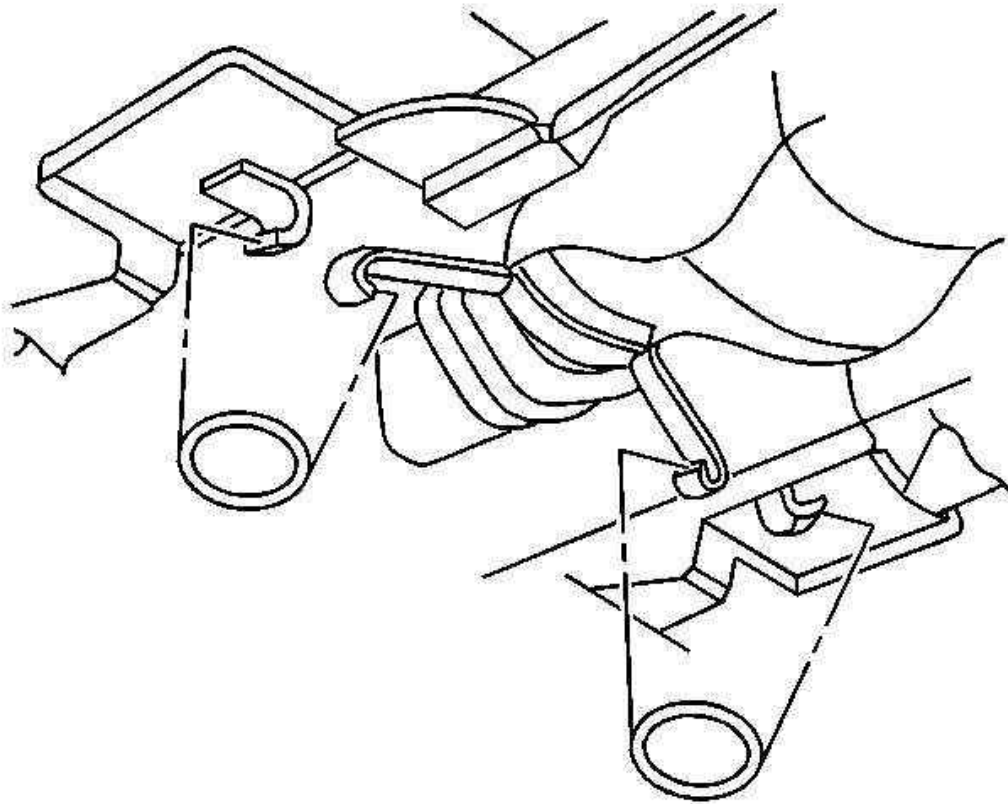


Fig. 64: View Of Catalytic Converter Hangers
Courtesy of GENERAL MOTORS CORP.

7. Remove the catalytic converter hangers.
8. Remove the catalytic converter.
9. Remove the catalytic converter gasket.
10. Clean and inspect the exhaust manifold and the exhaust pipe gasket mating surfaces.
11. Remove the HO2S. Refer to **Heated Oxygen Sensor 2 Replacement** .

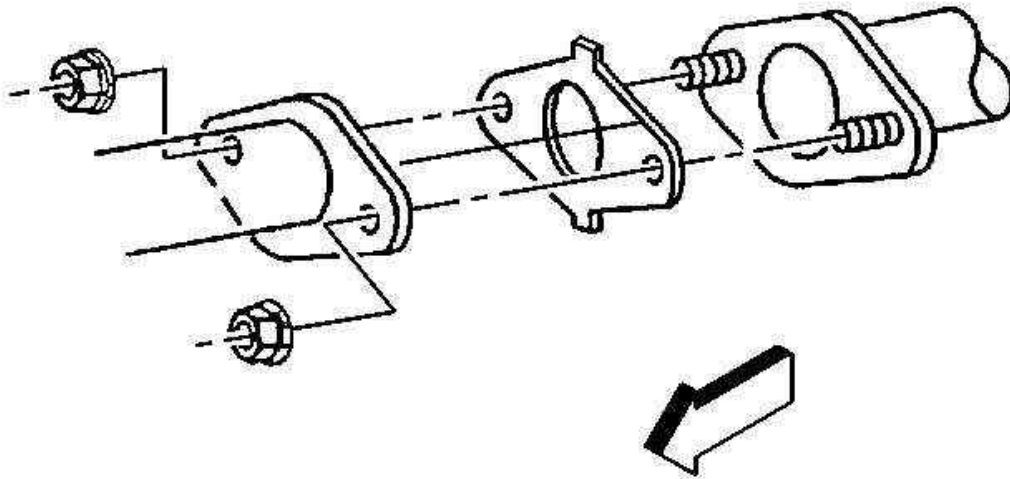


Fig. 65: View Of Catalytic Converter Mounting Nuts
Courtesy of GENERAL MOTORS CORP.

1. Install the HO2S. Refer to Heated Oxygen Sensor 2 Replacement .

NOTE: To prevent internal damage to the flexible coupling of the catalytic converter assembly, the converter must be supported. The vertical movement at the rear of the catalytic converter assembly must not exceed 6 degrees up or down.

2. Install a new gasket to the exhaust pipe studs.
3. Install and support the catalytic converter.

NOTE: Refer to FASTENER NOTICE .

4. Install the catalytic converter nuts.

Tighten: Tighten the nuts to 60 N.m (44 lb ft).

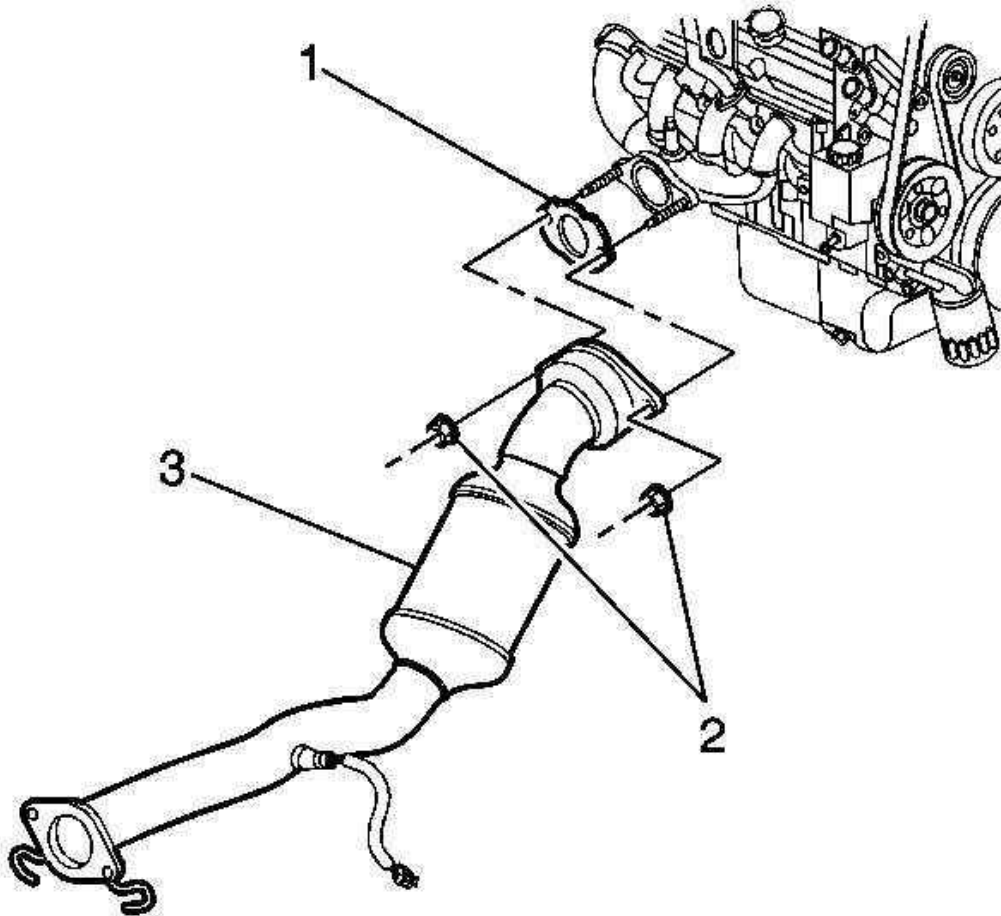


Fig. 66: View Of Right Exhaust Manifold & Catalytic Converter Pipe
Courtesy of GENERAL MOTORS CORP.

5. Install a new exhaust manifold pipe gasket (1).
6. Install the exhaust manifold pipe stud nuts (2).

Tighten: Tighten the nuts to 35 N.m (26 lb ft).

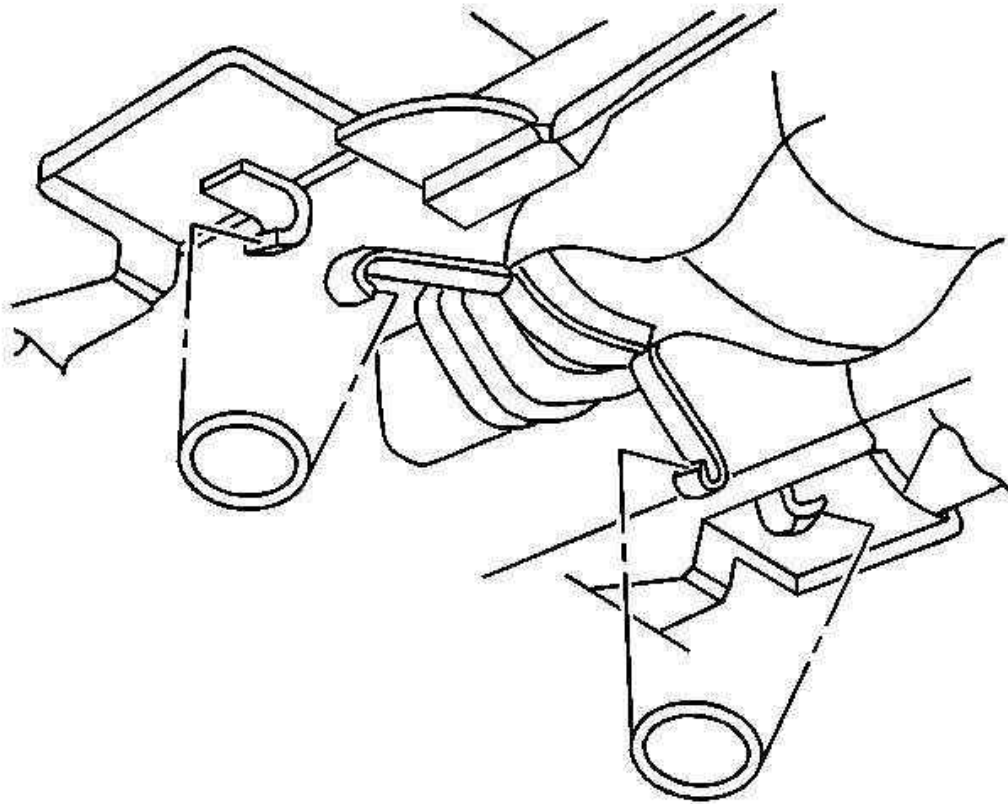


Fig. 67: View Of Catalytic Converter Hangers
Courtesy of GENERAL MOTORS CORP.

7. Install the catalytic converter hangers.
8. Remove the support from the exhaust system.
9. Connect the HO₂S electrical connector.
10. Inspect the exhaust system for leaks and underbody contact.
11. Lower the vehicle.

EXHAUST SYSTEM INSULATOR, HANGER, BRACKET REPLACEMENT

Removal Procedure

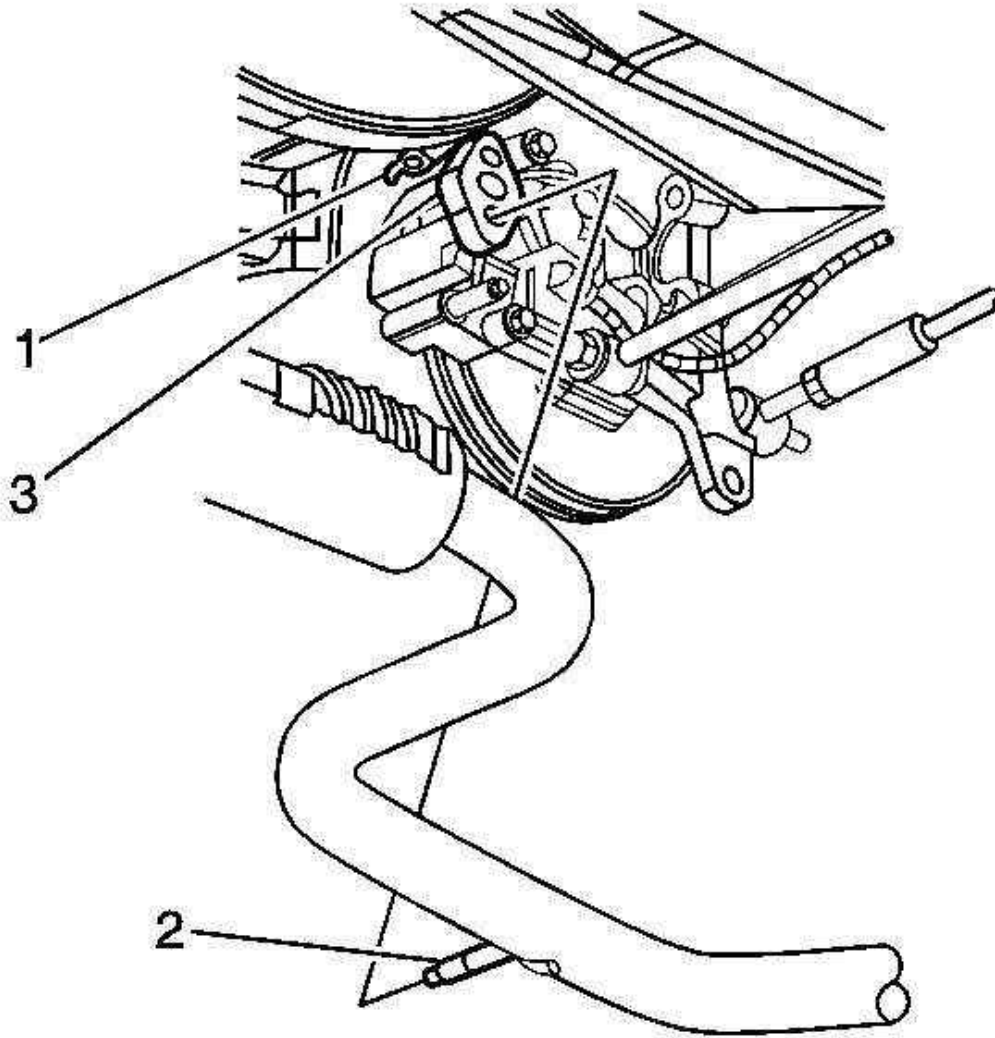


Fig. 68: Locating Exhaust Pipe Components
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Support the exhaust system.
3. Remove the exhaust pipe hanger (3) from the exhaust pipe (2) and the exhaust hanger bracket (1).

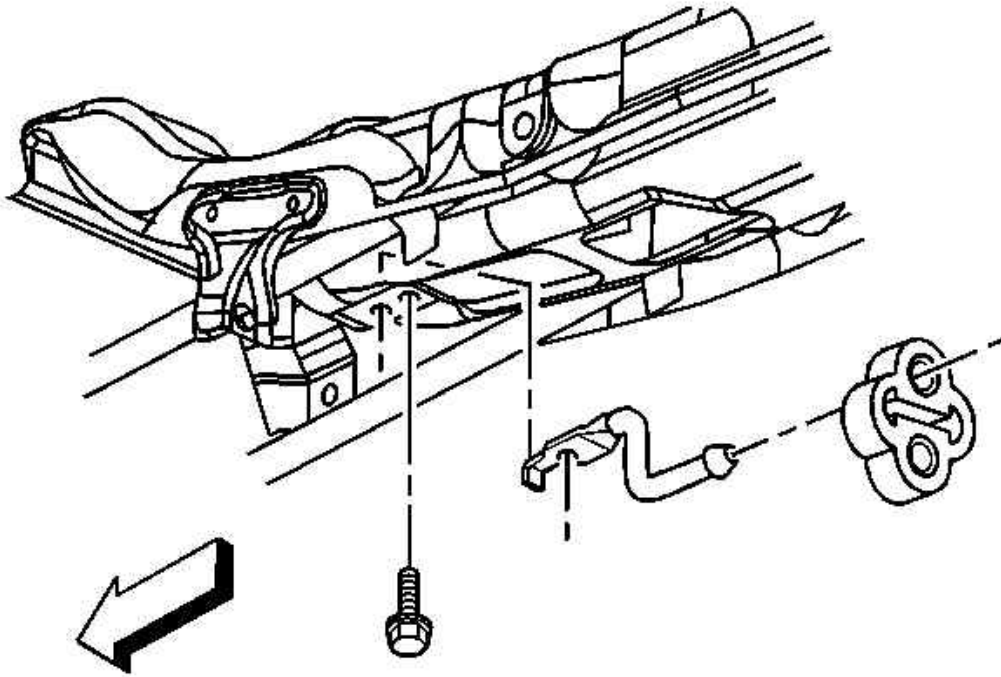


Fig. 69: View Of Exhaust Pipe Hanger
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust pipe hanger from the exhaust pipe and the exhaust hanger bracket.

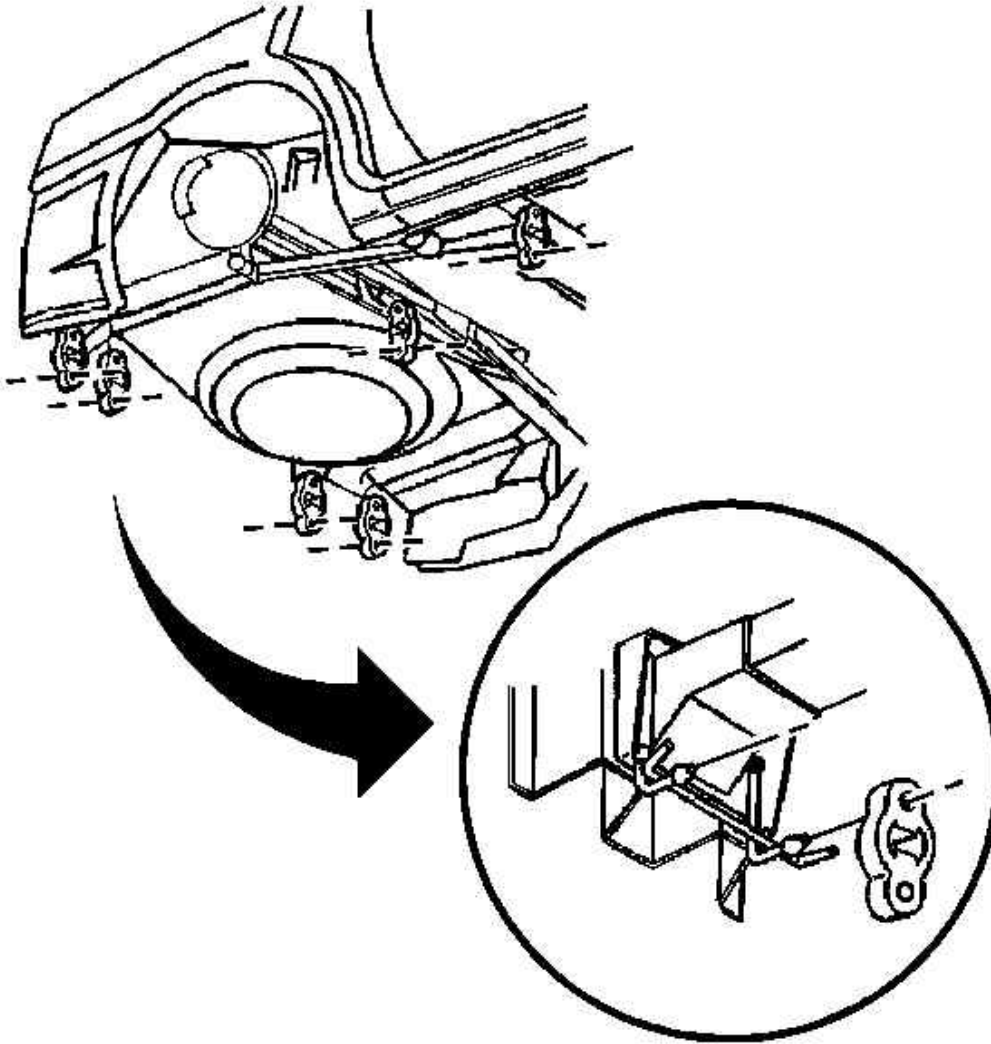


Fig. 70: View Of Exhaust Pipe Rear Hangers
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust pipe rear hangers from the muffler and the rear exhaust hanger brackets.

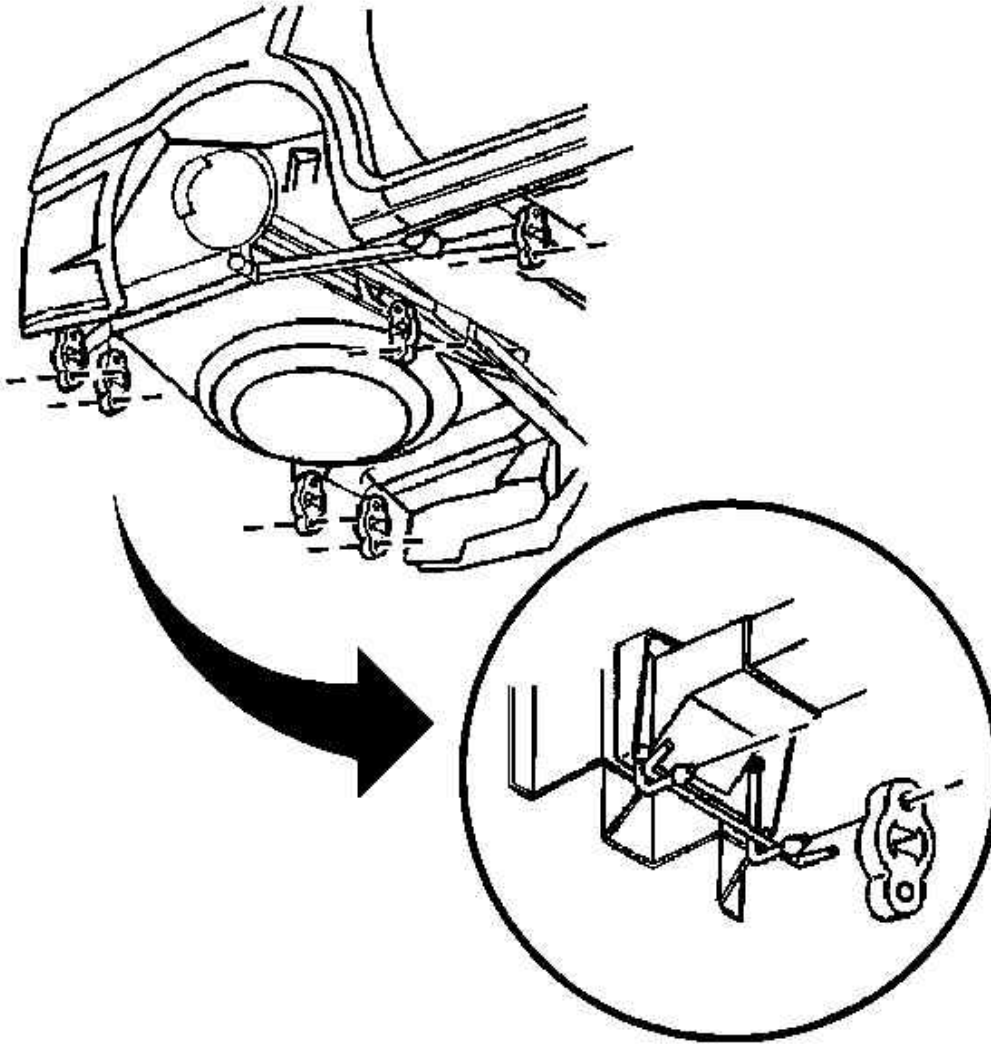


Fig. 71: View Of Exhaust Pipe Rear Hangers
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust pipe rear hangers to the muffler and the rear exhaust hanger brackets.

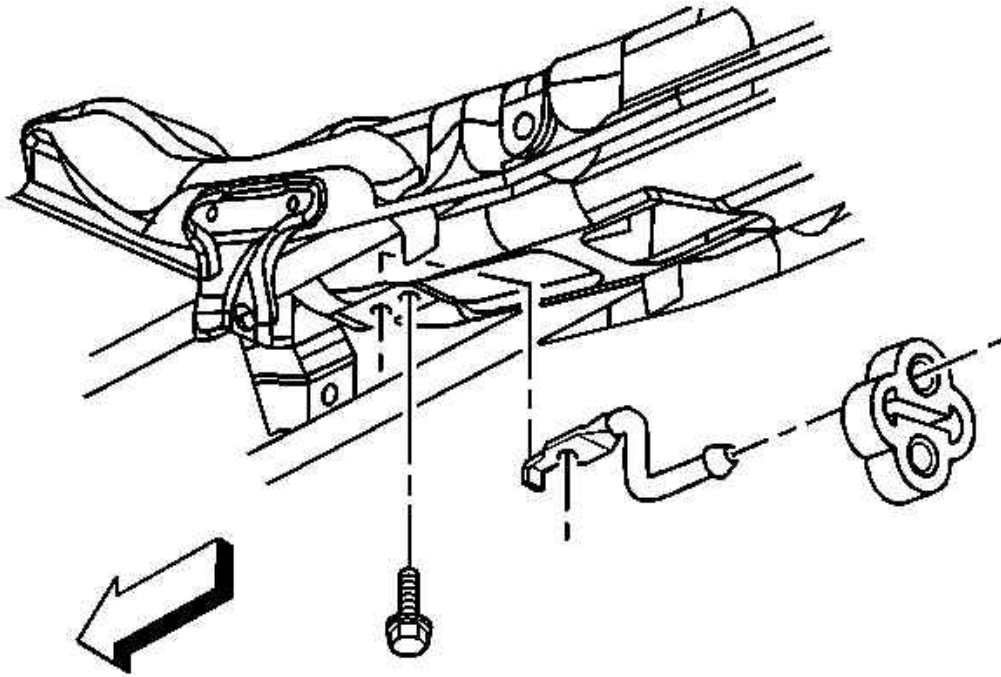


Fig. 72: View Of Exhaust Pipe Hanger
Courtesy of GENERAL MOTORS CORP.

2. Install the exhaust pipe hanger to the exhaust pipe and the exhaust hanger bracket.

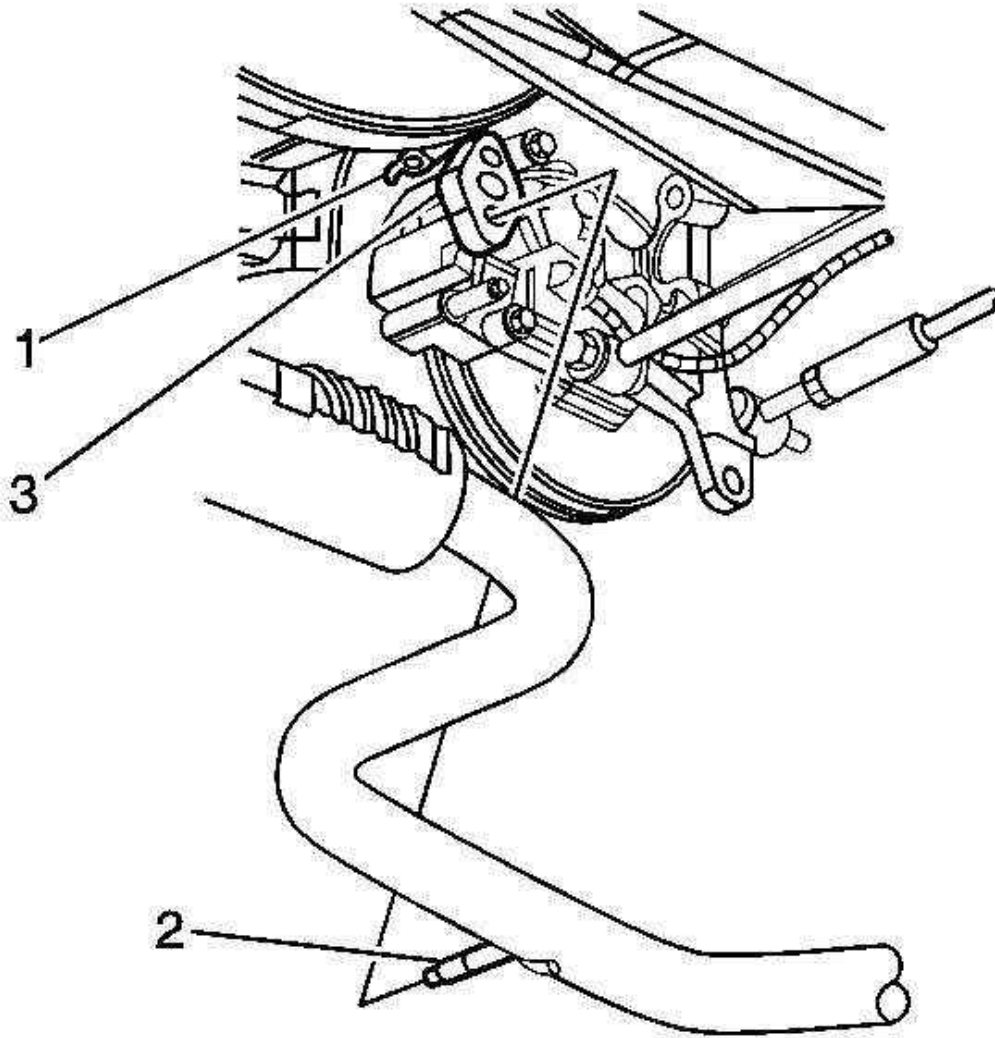


Fig. 73: Locating Exhaust Pipe Components
Courtesy of GENERAL MOTORS CORP.

3. Install the exhaust pipe hanger (3) to the exhaust pipe (2) and the exhaust hanger bracket (1).
4. Remove the support from the exhaust system.
5. Inspect the exhaust system for underbody contact.

6. Lower the vehicle.

EXHAUST HANGER MOUNTING BRACKET REPLACEMENT

Removal Procedure

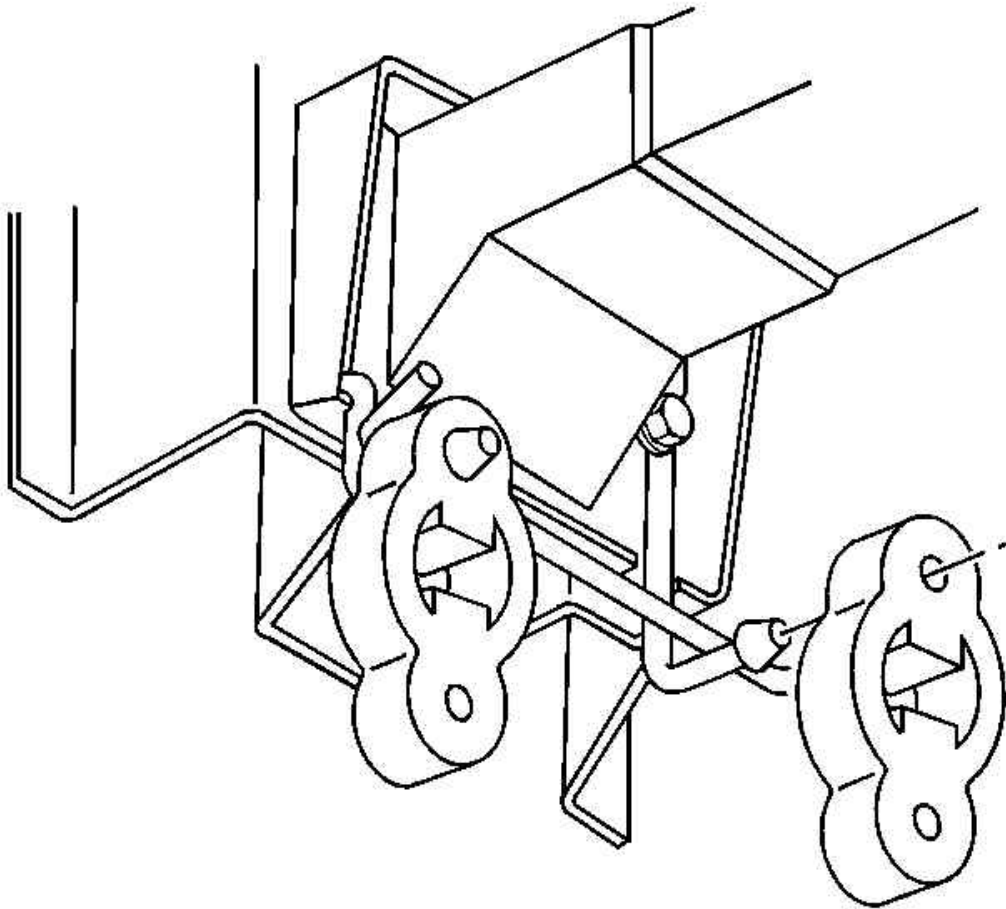


Fig. 74: View Of Exhaust Pipe Rear Hanger Insulators
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to Catalytic Converter Movement Notice .

2. Support the exhaust system.
3. Remove the exhaust pipe rear hanger insulators from the exhaust muffler rear hanger bracket.

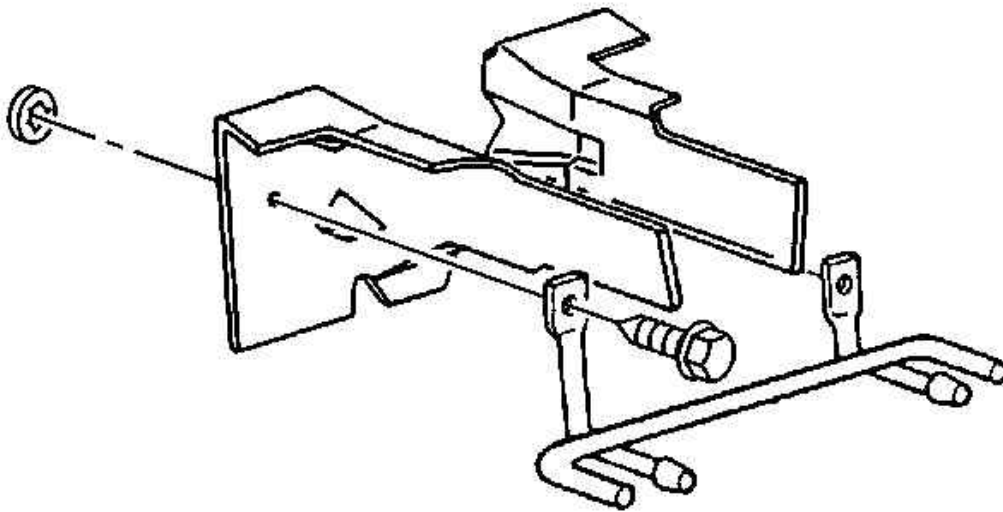


Fig. 75: View Of Exhaust Hanger Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

4. Loosen the outboard rear bumper impact bar bolt.
5. Remove the inboard rear bumper impact bar bolt.
6. Remove the exhaust muffler rear hanger bracket.

Installation Procedure

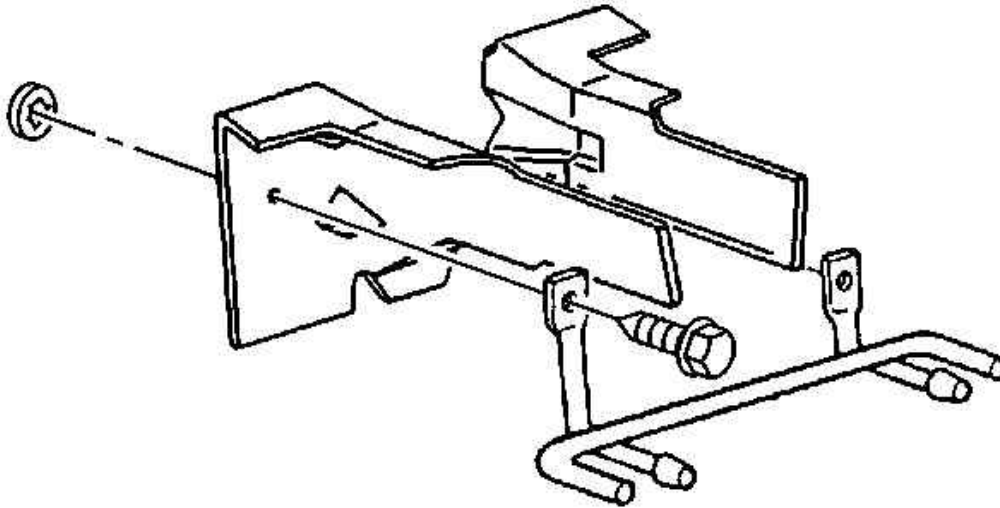


Fig. 76: View Of Exhaust Hanger Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust muffler rear hanger bracket.

NOTE: Refer to **FASTENER NOTICE** .

2. Install the inboard and the outboard rear bumper impact bar bolts.

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

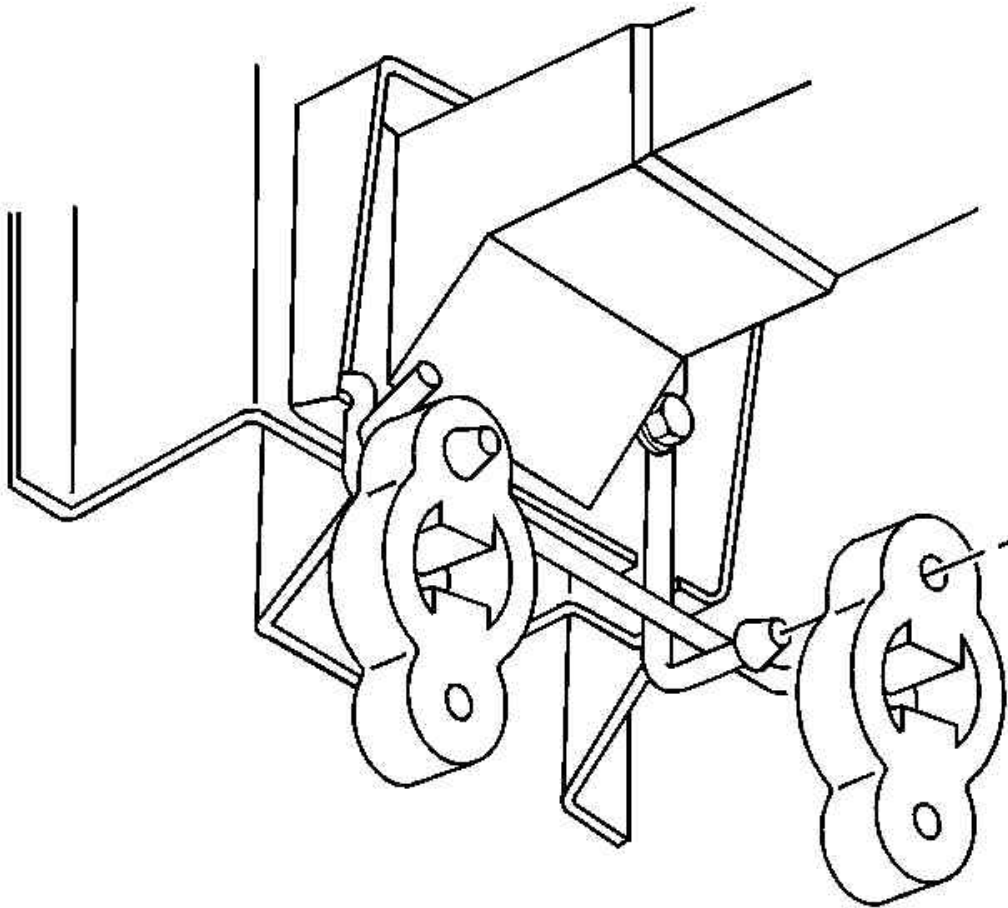


Fig. 77: View Of Exhaust Pipe Rear Hanger Insulators
Courtesy of GENERAL MOTORS CORP.

3. Install the exhaust pipe rear hanger insulators to the exhaust muffler rear hanger bracket.
4. Remove the support from the exhaust system.
5. Inspect the exhaust system for underbody contact.
6. Lower the vehicle.

MUFFLER REPLACEMENT (3.8L L26)

Removal Procedure

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

NOTE: Refer to Catalytic Converter Movement Notice .

2. Support the exhaust system.

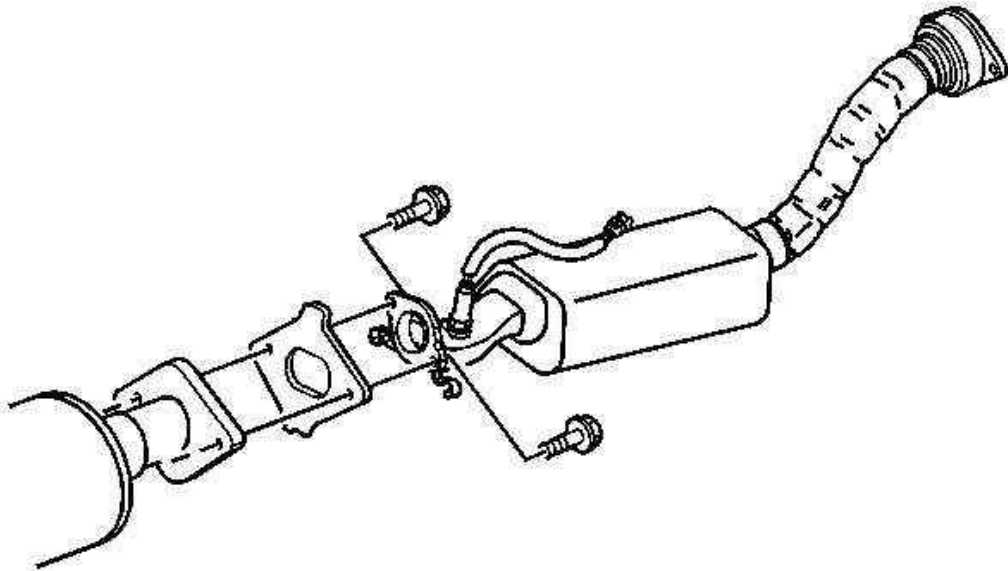


Fig. 78: Locating Catalytic Converter Bolts
Courtesy of GENERAL MOTORS CORP.

3. Remove the catalytic converter bolts.
4. Remove the catalytic converter gasket.

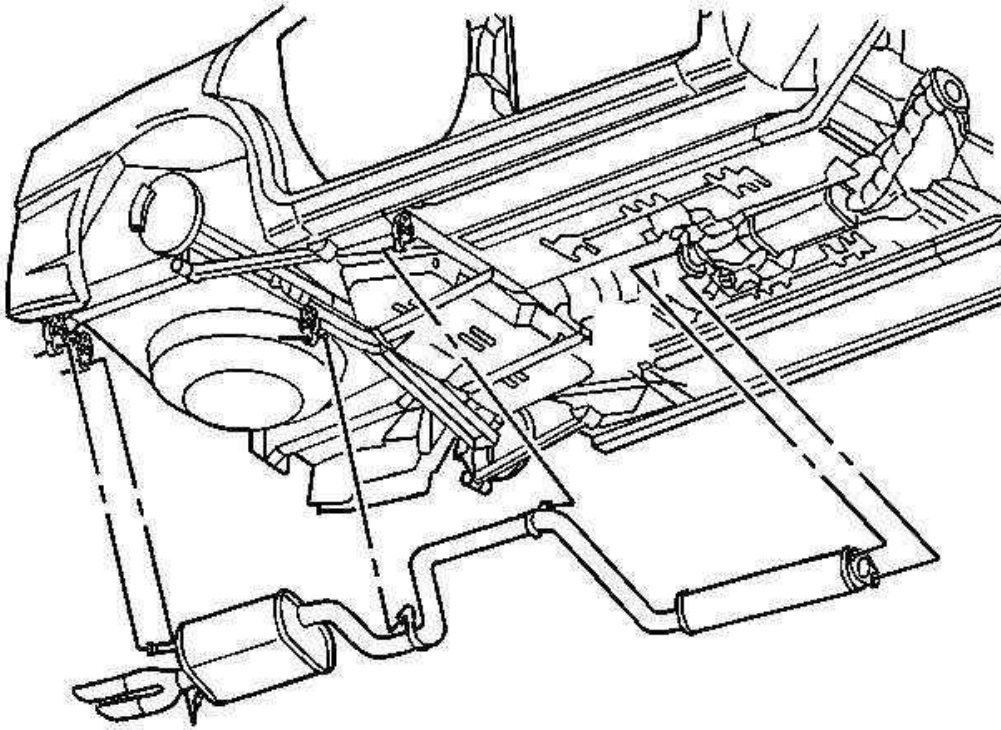


Fig. 79: View Of Muffler

Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust hanger insulators from the muffler.
6. Remove the muffler from the support.

Installation Procedure

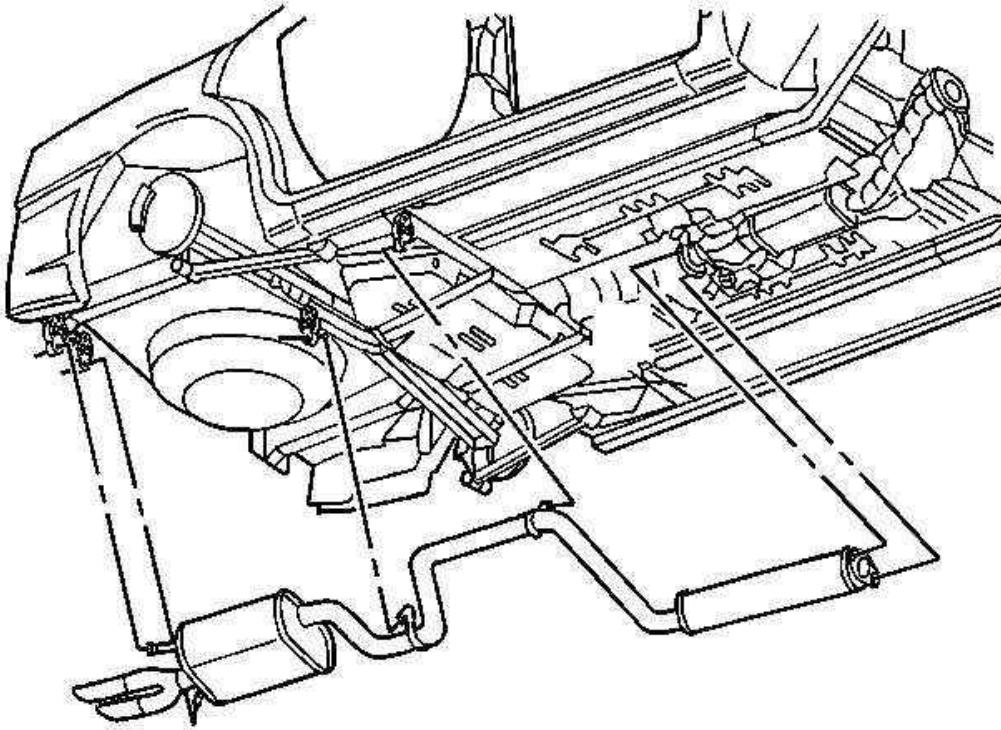


Fig. 80: View Of Muffler

Courtesy of GENERAL MOTORS CORP.

1. Install the muffler to the support.
2. Install the exhaust hanger insulators to the muffler.

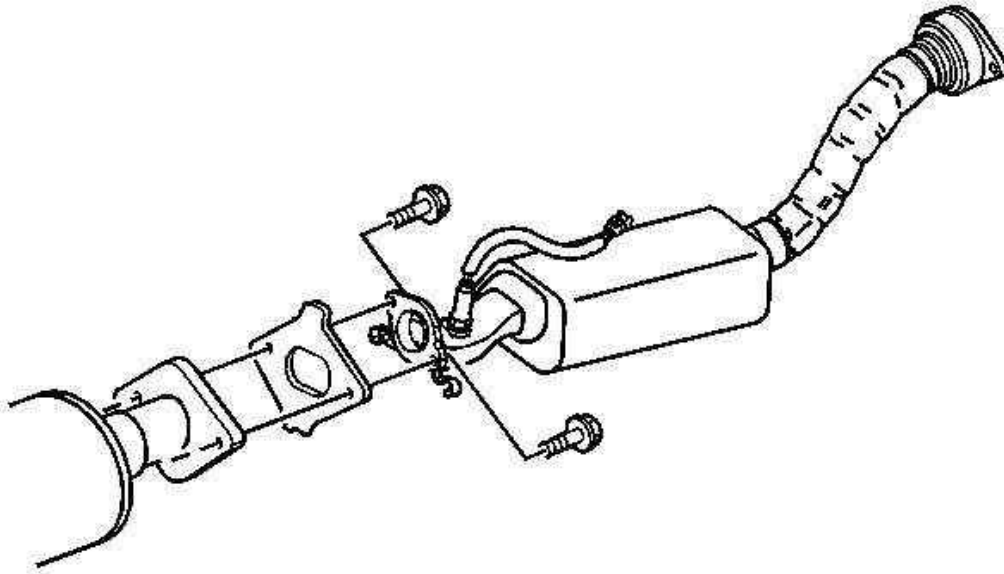


Fig. 81: Locating Catalytic Converter Bolts
Courtesy of GENERAL MOTORS CORP.

3. Install the catalytic converter gasket.

NOTE: Refer to FASTENER NOTICE .

4. Install the catalytic converter bolts.

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

5. Remove the support from the exhaust system.
6. Inspect the exhaust system for leaks and underbody contact.
7. Lower the vehicle.

MUFFLER REPLACEMENT (3.6L LY7)

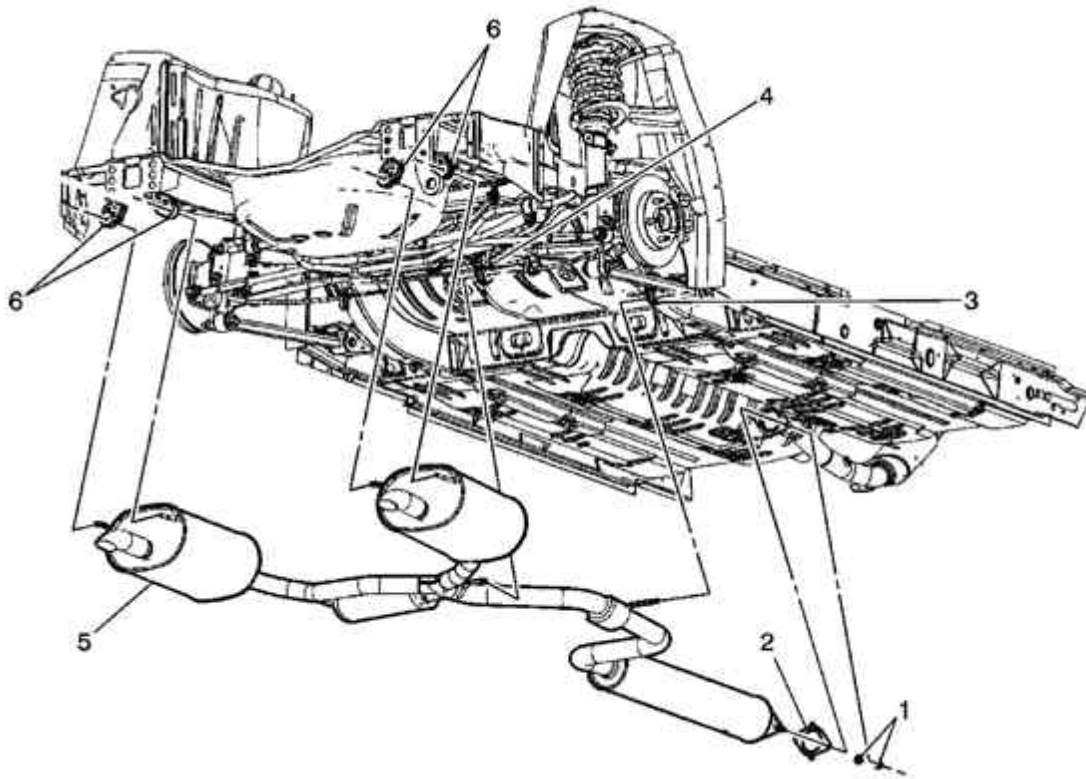


Fig. 82: View Of Muffler & Attachments
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
1	Retaining Nuts (Qty: 2) NOTE: Refer to <u>Fastener Notice</u> . Tip: Use a utility jack to support the exhaust system. Tighten: 45 N.m (33 lb ft)
2	Catalytic Convertor Gasket Tip: DO NOT re-use the gasket, replace with NEW.
	Front Insulator

2008 Buick LaCrosse CXL

2008 ENGINE Engine Exhaust - LaCrosse

3	Tip: If the insulator is found to be worn or damaged, replace the insulator.
4	Intermediate Insulator Tip: If the insulator is found to be worn or damaged, replace the insulator.
5	Muffler/Exhaust System Tip: • Remove the utility jack. • With the aid of an assistant, remove the muffler/exhaust.
6	Rear Insulator (Qty: 4) Tip: If the insulators is found to be worn or damaged, replace the insulator.

CONVERTER HANGER ASSEMBLY REPLACEMENT

Removal Procedure

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

NOTE: Refer to **Catalytic Converter Movement Notice** .

2. Support the exhaust system.

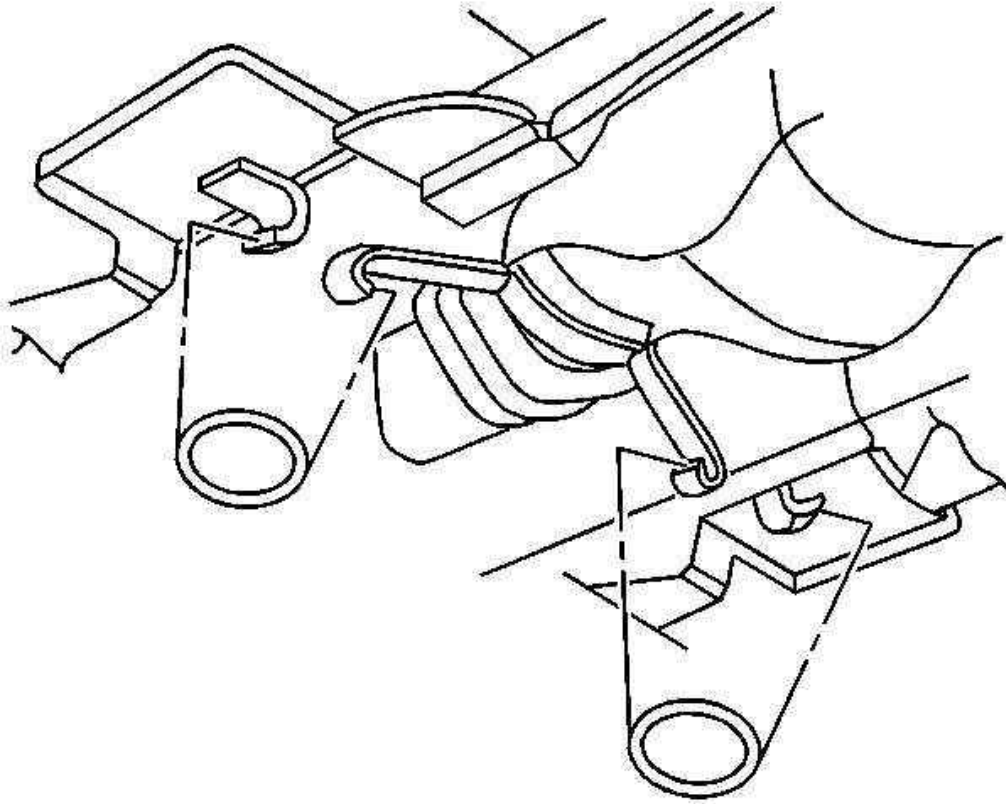


Fig. 83: View Of Catalytic Converter Hangers
Courtesy of GENERAL MOTORS CORP.

3. Remove the 3-way catalytic converter pipe hangers.
4. Inspect the 3-way catalytic converter brackets for serviceability. Repair or replace as necessary.

Installation Procedure

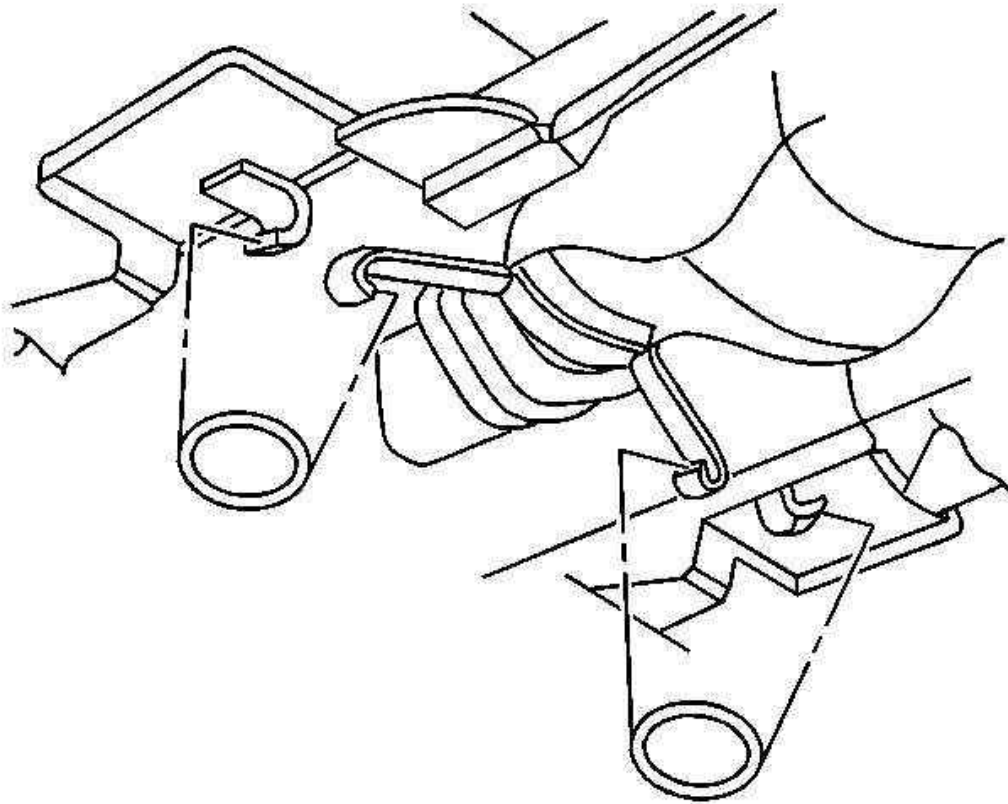


Fig. 84: View Of Catalytic Converter Hangers
Courtesy of GENERAL MOTORS CORP.

1. Install the 3-way catalytic converter pipe hangers.
2. Remove the support from the exhaust system and the vehicle.
3. Inspect the exhaust system for underbody contact.
4. Lower the vehicle.

CATALYTIC CONVERTER HEAT SHIELD REPLACEMENT

Removal Procedure

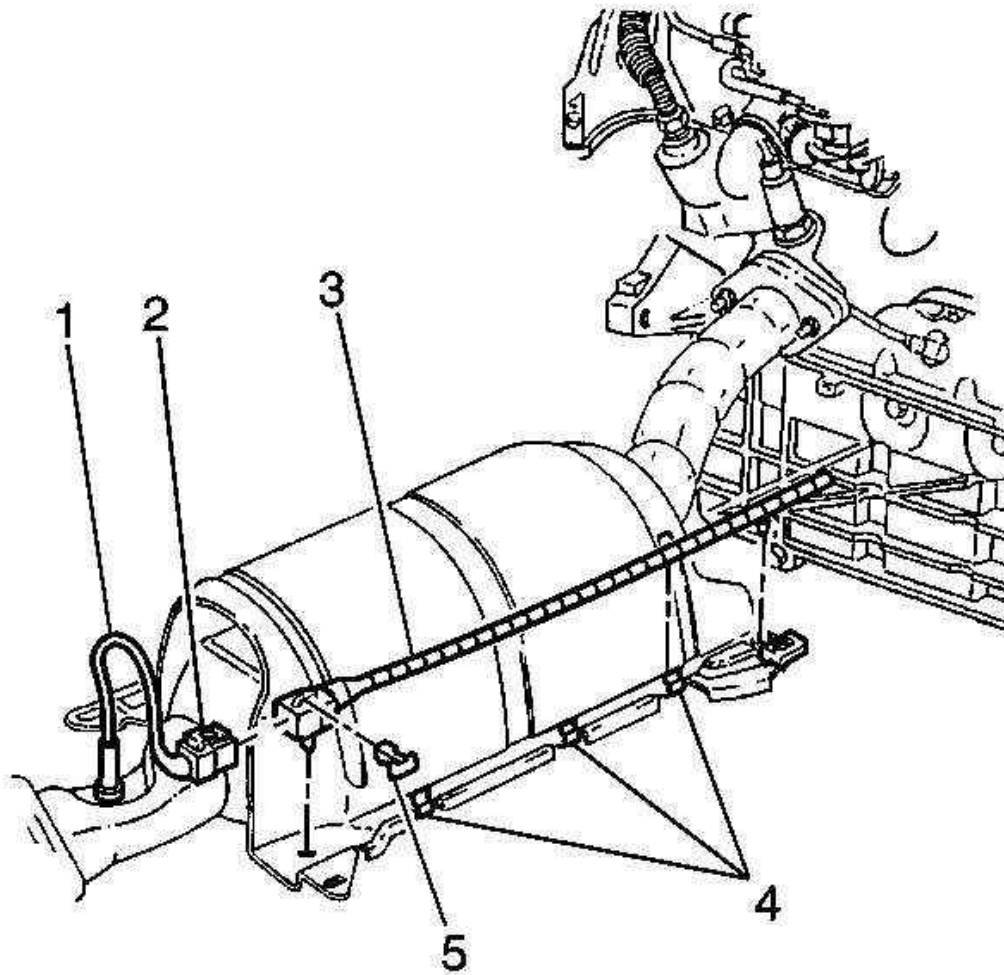


Fig. 85: Locating Oxygen Sensor Wiring Harness
Courtesy of GENERAL MOTORS CORP.

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

NOTE: Refer to **Catalytic Converter Movement Notice** .

2. Support the exhaust system.
3. Remove the catalytic converter. Refer to **Catalytic Converter Replacement**.
4. Remove the oxygen sensor wiring harness (3) from the catalytic converter heat

shield.

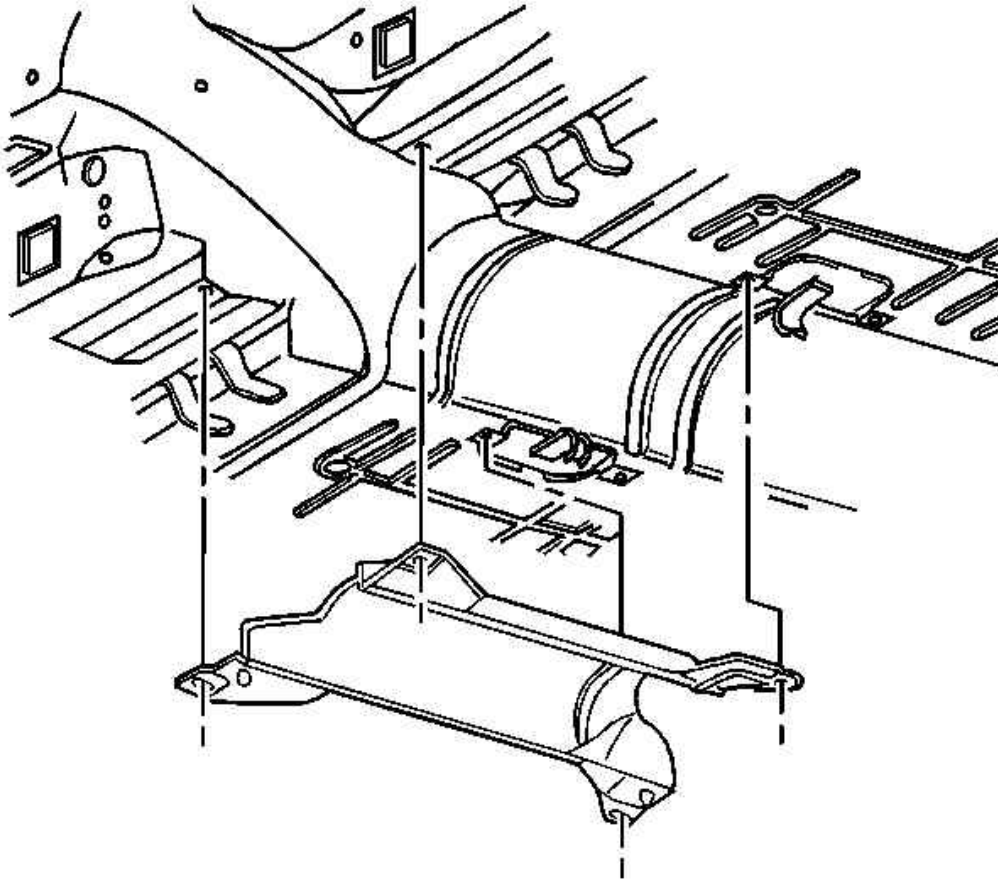


Fig. 86: View Of Catalytic Converter Heat Shield
Courtesy of GENERAL MOTORS CORP.

5. Remove the catalytic converter heat shield rivets.
6. Remove the catalytic converter heat shield.

Installation Procedure

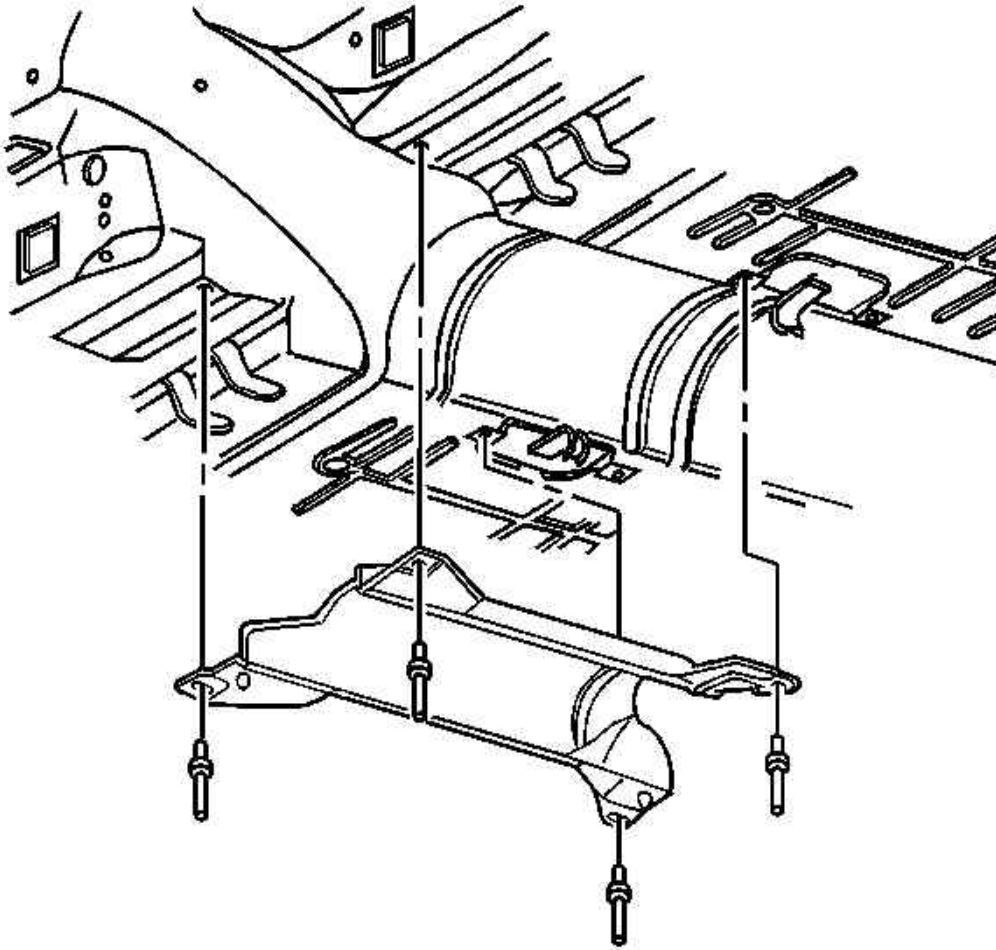


Fig. 87: View Of Catalytic Converter Heat Shield
Courtesy of GENERAL MOTORS CORP.

1. Install the catalytic converter heat shield.
2. Install the converter heat shield rivets.

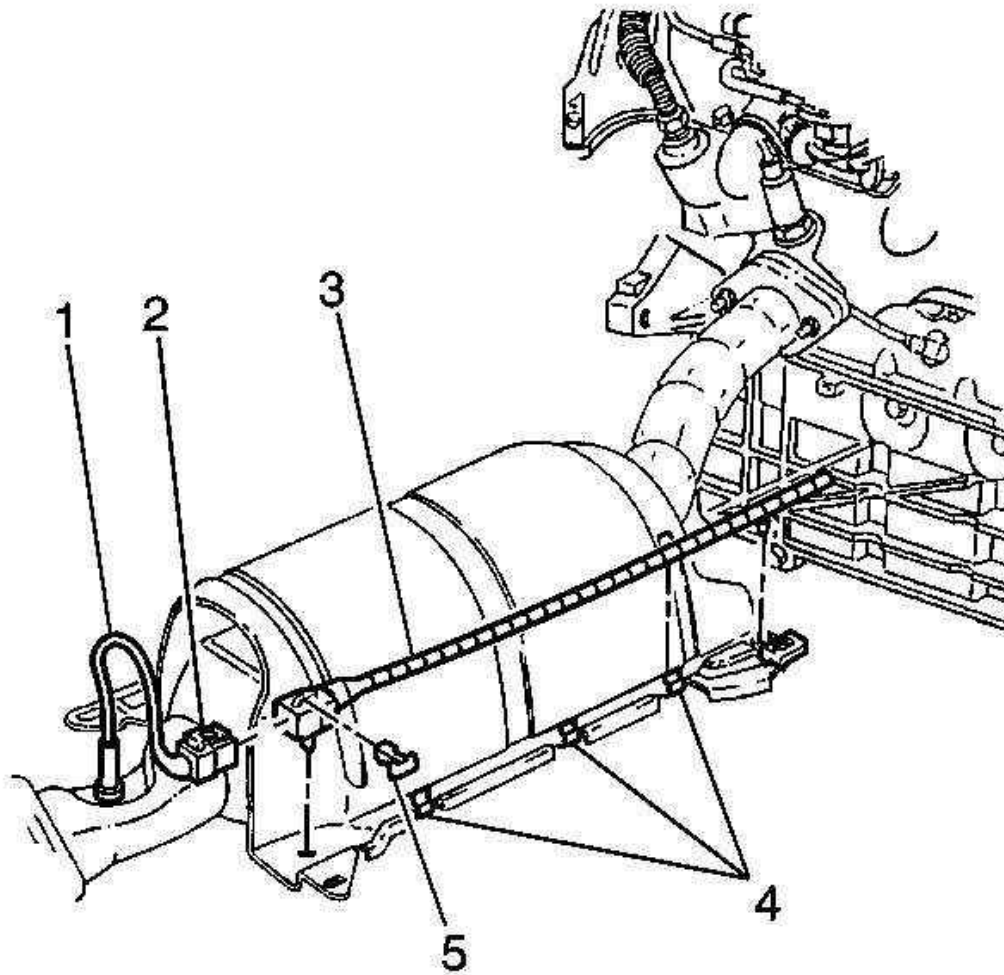


Fig. 88: Locating Oxygen Sensor Wiring Harness
Courtesy of GENERAL MOTORS CORP.

3. Install the oxygen sensor wiring harness (3) to the catalytic converter heat shield.
4. Install the catalytic converter. Refer to **Catalytic Converter Replacement**.
5. Remove the support from the exhaust system.
6. Inspect the exhaust system for leaks and underbody contact.
7. Lower the vehicle.

DESCRIPTION AND OPERATION

EXHAUST SYSTEM DESCRIPTION

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

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

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

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

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

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

The exhaust system may be comprised of the following components:

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

Resonator

Some exhaust systems are equipped with a resonator. The resonator, located either

before or after the muffler, allows the use of mufflers with less back pressure. Resonators are used when vehicle characteristics require specific exhaust tuning.

Catalytic Converter

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

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

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

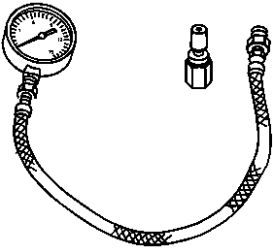
The catalyst in the converter is not serviceable.

Muffler

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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Description
	J 35314-A Exhaust Back Pressure Gage