

2004 Cadillac SRX

2004 ENGINE Engine Exhaust - SRX

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Engine Exhaust - SRX

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Bumper Nuts	25 N.m	18 lb ft
Catalytic Converter-to-Exhaust Manifold Nuts	50 N.m	37 lb ft
Drive Shaft Center Bearing Heat Shield Bolts	8 N.m	71 lb in
Exhaust Manifold Heat Shield Bolts	10 N.m	89 lb in
Exhaust Manifold-to-Cylinder Head Bolts (LH2)	25 N.m	18 lb ft
Exhaust Manifold-to-Cylinder Head Bolts (LY7)	20 N.m	15 lb ft
Exhaust Manifold-to-Cylinder Head Nuts (LH2)	30 N.m	22 lb ft
Exhaust Manifold-to-Cylinder Head Studs (LH2)	6 N.m	53 lb in
Muffler Exhaust Pipe-to-Exhaust Manifold Nuts (LH2)	30 N.m	22 lb ft
Muffler Nuts (LY7)	22 N.m	16 lb ft
Tunnel Brace Bolts	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** in General Information.

Visual/Physical Inspection

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

Intermittent

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

Symptom List

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

- Loss of Power

Refer to **Restricted Exhaust**.

- Poor acceleration

Refer to **Restricted Exhaust**.

- Poor fuel economy

Refer to **Restricted Exhaust**.

- Excessive smoke-diesel

Refer to **Restricted Exhaust**.

- Exhaust hissing noise

Refer to **Exhaust Leakage**.

- Exhaust popping noise

Refer to **Exhaust Leakage**.

- Exhaust rattle noise

Refer to **Exhaust Noise**.

- Loud exhaust noise

Refer to **Exhaust Noise**.

- Exhaust buzz, groan, hum noise

Refer to **Exhaust Noise**.

RESTRICTED EXHAUST

Diagnostic Aids

CAUTION: Refer to **Hot Exhaust System Caution** in Cautions and Notices.

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 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**. See **Special Tools and Equipment**. Removing the heated oxygen (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.

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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 <u>Symptoms - Engine Exhaust</u>
3	Is the system equipped with dual exhaust?	-	Go to Diagnostic Aids	Go to Step 4
4	1. Remove the heated oxygen sensor (HO2S) that is in front of the catalytic converter. Refer to the appropriate procedure: • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1</u> in Engine Controls-4.6L • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1</u> in Engine Controls-4.6L • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1</u> in Engine Controls-3.6L • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1</u> in Engine Controls-3.6L 2. Install the J 35314-A in place of the HO2S sensor. See <u>Special Tools and Equipment</u>. 3. Start the engine. 4. Increase and monitor the engine speed at 2,500 RPM. 5. Observe the exhaust system back	9 kPa (1.25 psi)		

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	pressure reading on the gage.			
	Does the reading exceed the specified value?		Go to Step 5	Go to Step 8
5	1. Turn the engine off and place the ignition in the lock position. 2. Remove the J 35314-A . See <u>Special Tools and Equipment</u>. 3. Re-install the HO2S sensor. Refer to the appropriate procedure: • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1</u> in Engine Controls-4.6L • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1</u> in Engine Controls-4.6L • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1</u> in Engine Controls-3.6. • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1</u> in Engine Controls-3.6L 4. Remove the post-catalyst HO2S sensor. Refer to the appropriate procedure: • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2</u> in Engine Controls-4.6L • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2</u> in Engine Controls-4.6L	9 kPa (1.25 psi)		

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	• <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2</u> in Engine Controls-3.6L • <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2</u> in Engine Controls-3.6L 5. Install the J 35314-A in place of the post HO2S sensor. See <u>Special Tools and Equipment</u>. 6. Start the engine. 7. Increase and monitor the engine speed at 2,500 RPM. 8. Observe the exhaust system back pressure reading on the gage. Does the reading exceed the specified value?			
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 6	Go to Step 7
7	Replace the catalytic converter. Refer to the appropriate procedure: • <u>Catalytic Converter Replacement - Left (LY7)</u> • <u>Catalytic Converter Replacement - Right (LY7)</u> • <u>Exhaust Manifold Replacement -</u>	-	Go to Step 8	-

	<u>Left (LY7) or Exhaust Manifold Replacement - Left (LH2)</u> <u>Exhaust Manifold Replacement - Right (LY7) or Exhaust Manifold Replacement - Right (LH2)</u>			
	Did you find and correct the condition?		Go to Step 8	-
8	1. Remove the J 35314-A . See <u>Special Tools and Equipment.</u> 2. Reinstall the applicable HO2S sensor. Refer to the following: <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2</u> in Engine Controls-4.6L <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2</u> in Engine Controls-4.6L <u>Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2</u> in Engine Controls-3.6L <u>Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2</u> in Engine Controls-3.6L 3. Clear any codes. 4. Road test the vehicle in order to verify the repair.	-		
	Did you correct the condition?		System OK	Go to Step 2

EXHAUST LEAKAGE

Exhaust Leakage

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Condition	Action
CAUTION: Refer to <u>Hot Exhaust System Caution</u> in Cautions and Notices.	
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 <u>Symptoms - Engine Exhaust</u> prior to beginning this table.	
Misaligned or improperly installed exhaust system components	- Align and tighten the exhaust system components to the specifications. Refer to <u>Fastener Tightening Specifications</u>. - Ensure the exhaust hangers are in the proper locations and not loose. Refer to <u>Exhaust Hanger Replacement</u>.
Exhaust leaks at the following connections: - Exhaust manifold to pipe - Flanges - Pipe clamps	Tighten the components to the specifications. Refer to <u>Fastener Tightening Specifications</u> .
Seals or gaskets leaking; - Exhaust manifold to cylinder head - Exhaust pipes to exhaust manifold - Catalytic converter connection	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 <u>Exhaust Manifold Replacement - Left (LY7)</u> or <u>Exhaust Manifold Replacement - Left (LH2)</u> or <u>Exhaust Manifold Replacement - Right (LY7)</u> or <u>Exhaust Manifold Replacement - Right (LH2)</u> .
Exhaust system component	Replace the leaking component. Refer to the affected

connection welds leaking	component's procedure for service.
Muffler or resonator, if equipped, damaged or leaking at the seams	Replace the affected muffler or resonator, if equipped. Refer to <u>Exhaust System Replacement</u> .

EXHAUST NOISE

Exhaust Noise

Condition	Action
CAUTION: Refer to <u>Hot Exhaust System Caution</u> in Cautions and Notices.	
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, i.e. buzz, groan, hum.Refer to <u>Symptoms - Engine Exhaust</u> prior to beginning this table.	
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 or resonator, if equipped. 3. Replace the faulty muffler or resonator (if equipped). Refer to <u>Exhaust System Replacement</u>.
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, resonator, if equipped, or muffler. Refer to <u>Exhaust System Replacement</u>

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT - LEFT (LY7)

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

1. Remove the exhaust manifold heat shield. Refer to Exhaust Manifold Heat Shield Replacement - Left (LY7) or Exhaust Manifold Heat Shield Replacement - Left (LH2).
2. Remove the oil level indicator. Refer to Oil Level Indicator and Tube Replacement in Engine Mechanical - 3.6L (LY7).

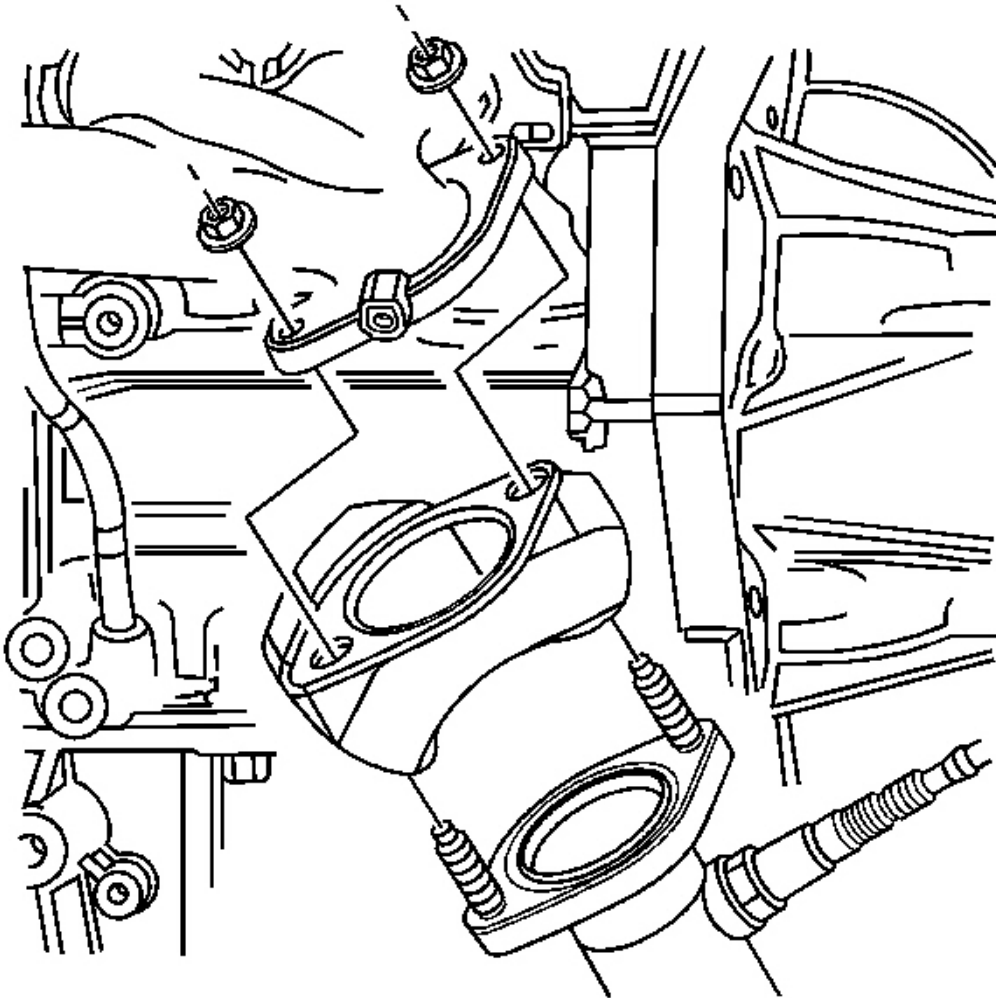


Fig. 1: View Of Left Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

3. Remove the catalytic converter nuts.

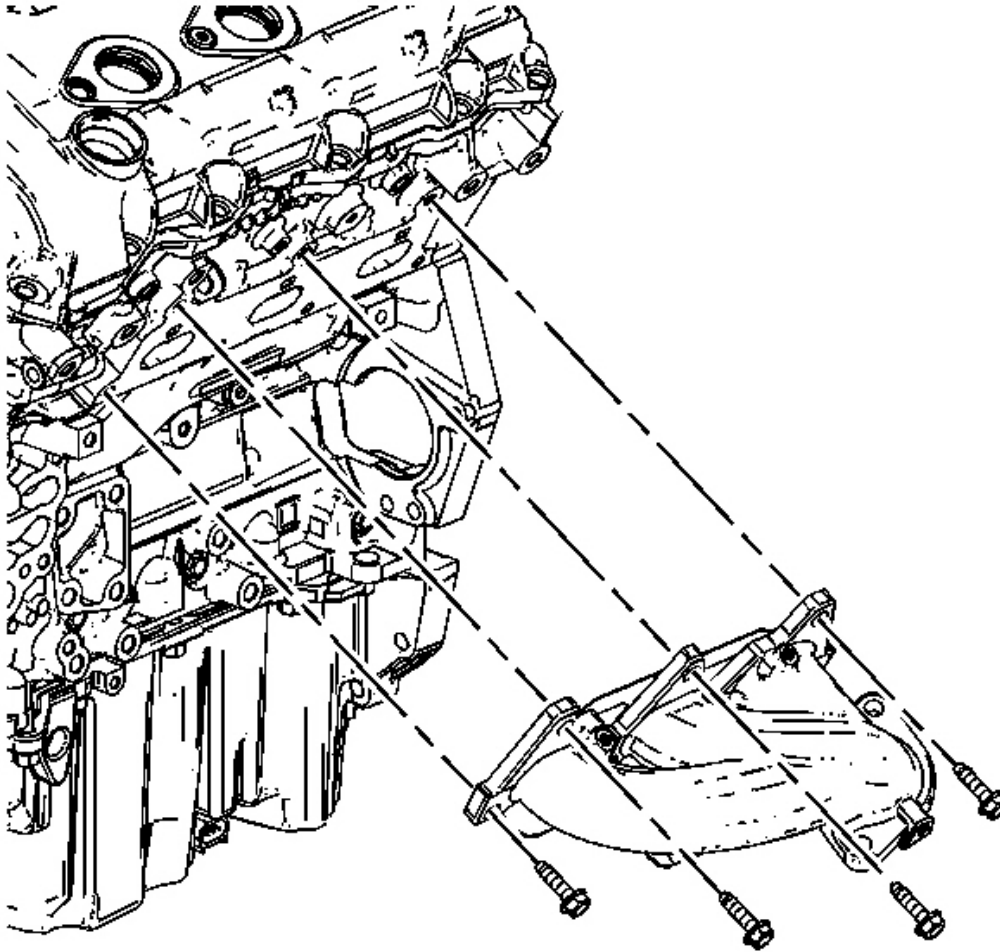


Fig. 2: View Of Left Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

4. Remove the exhaust manifold bolts.

IMPORTANT: Do not reuse the gasket.

5. Remove the exhaust manifold and discard the exhaust manifold gasket.
6. Clean and inspect the exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection - Left** in Engine Mechanical - 3.6L.

Installation Procedure

IMPORTANT: Inspect the catalytic converter seal/heat shield sealing surface. Replace the seal/heat shield if the sealing surface is worn or damaged.

1. Install the catalytic converter seal/heat shield to the catalytic converter.

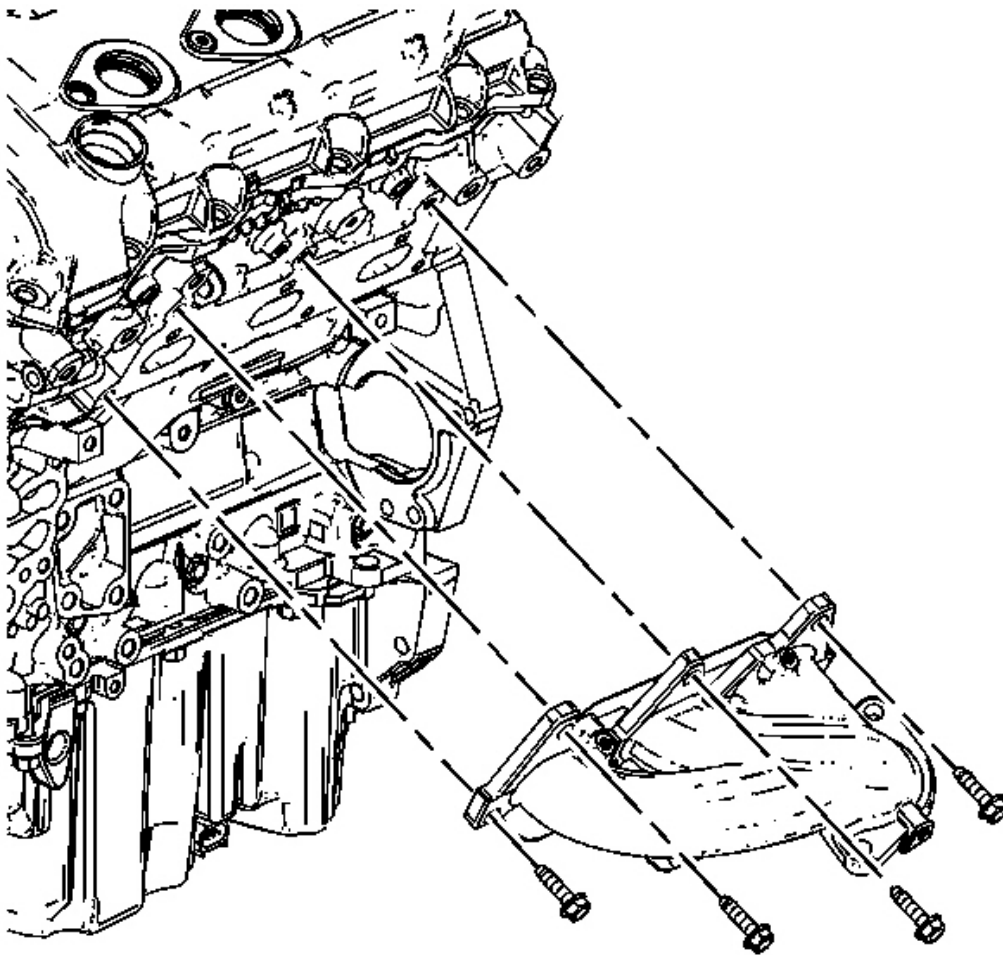


Fig. 3: View Of Left Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

2. Install a NEW exhaust manifold gasket to the exhaust manifold.

3. Install the exhaust manifold with the gasket to the catalytic converter and the cylinder head.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the exhaust manifold bolts.

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

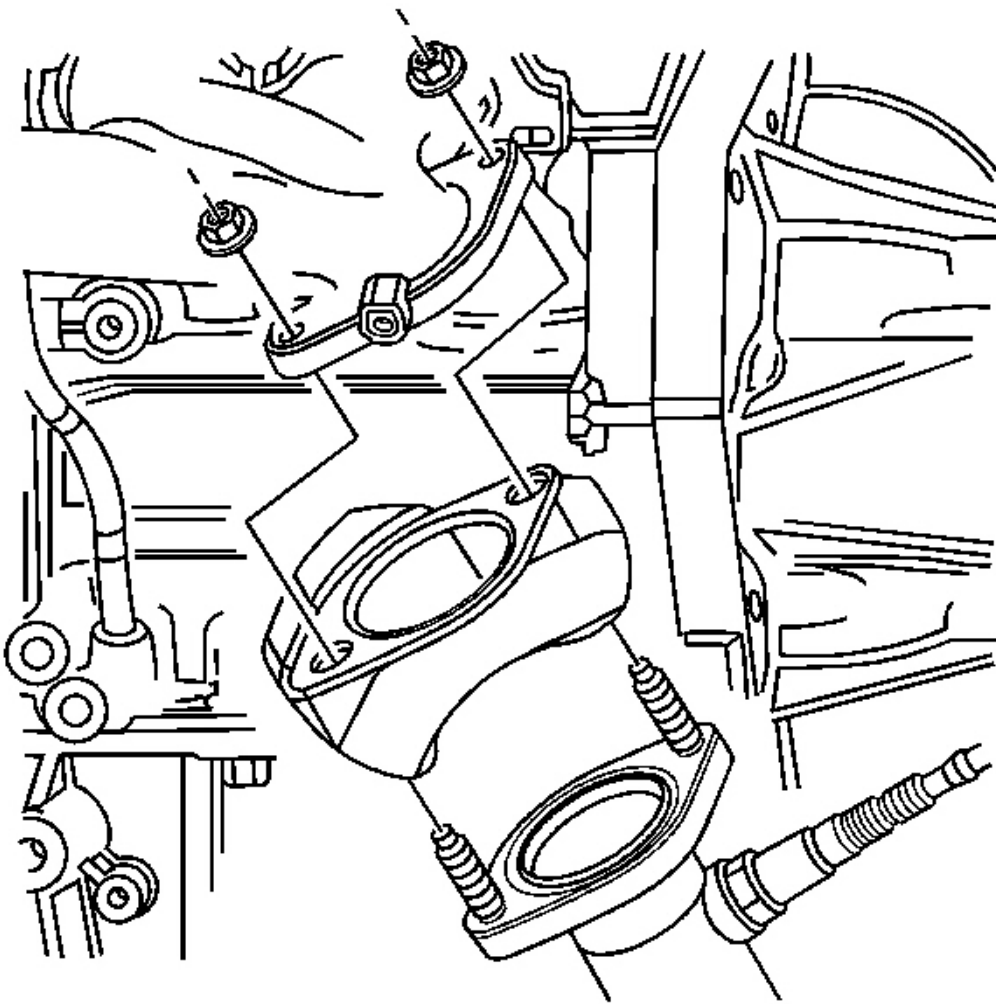


Fig. 4: View Of Left Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

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5. Install the catalytic converter nuts.

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

6. Install the oil level indicator. Refer to **Oil Level Indicator and Tube Replacement** in Engine Mechanical - 3.6L (LY7).
7. Install the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Left (LY7)** or **Exhaust Manifold Heat Shield Replacement - Left (LH2)**.

EXHAUST MANIFOLD REPLACEMENT - LEFT (LH2)

Removal Procedure

CAUTION: Refer to **Exhaust Service Caution** in Cautions and Notices.

CAUTION: Refer to **Protective Goggles and Glove Caution** in Cautions and Notices.

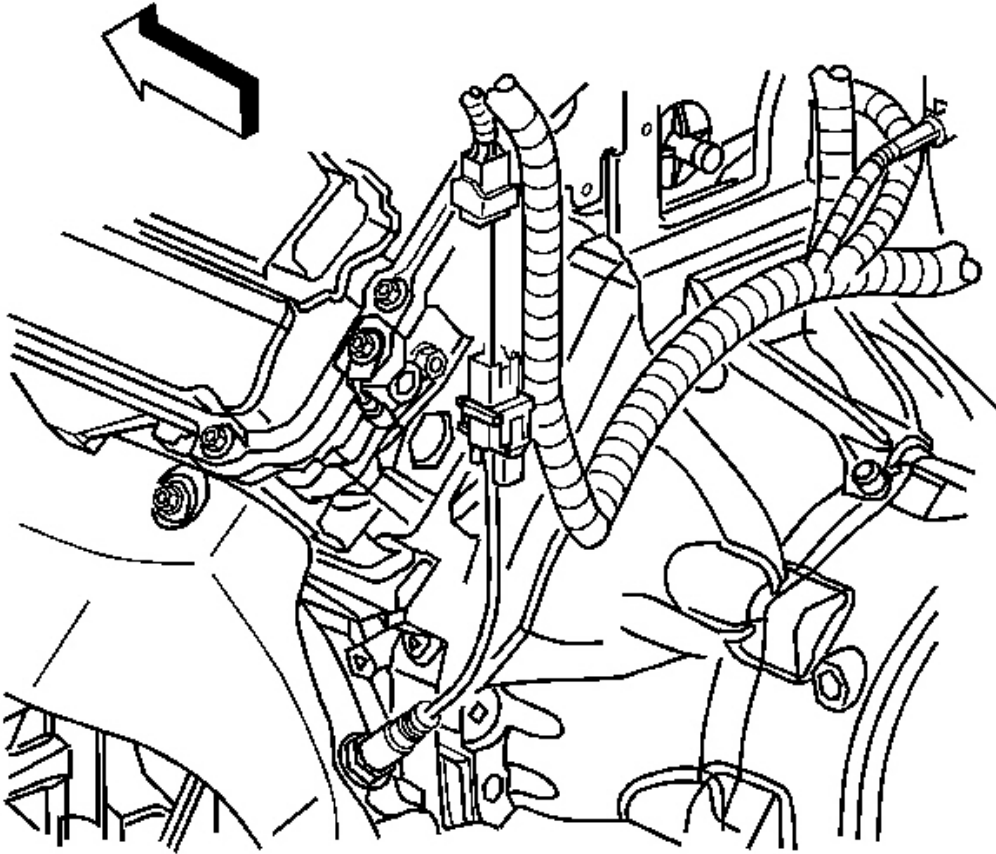


Fig. 5: View Of Left Heated Oxygen Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the heated oxygen sensor pigtail from the wiring harness connector.

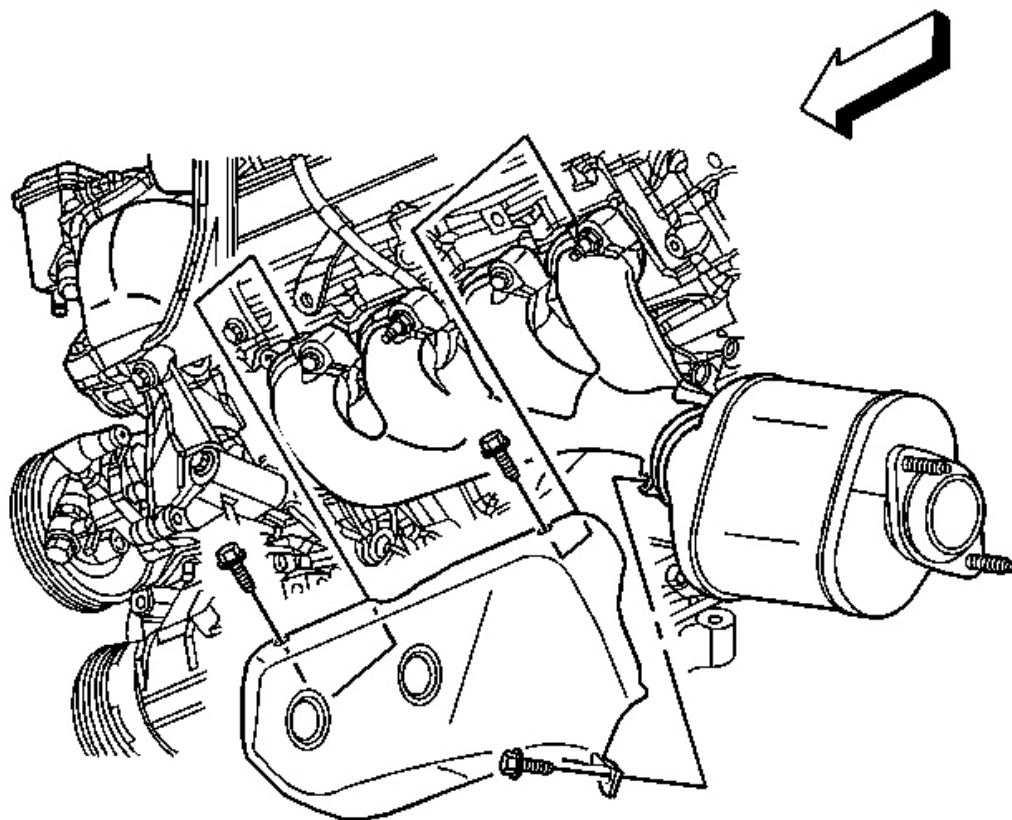


Fig. 6: View Of Left Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

2. Remove the left exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Left (LY7)** or **Exhaust Manifold Heat Shield Replacement - Left (LH2)**.
3. Remove the heated oxygen sensor, if necessary. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** in Engine Controls - 4.6L.

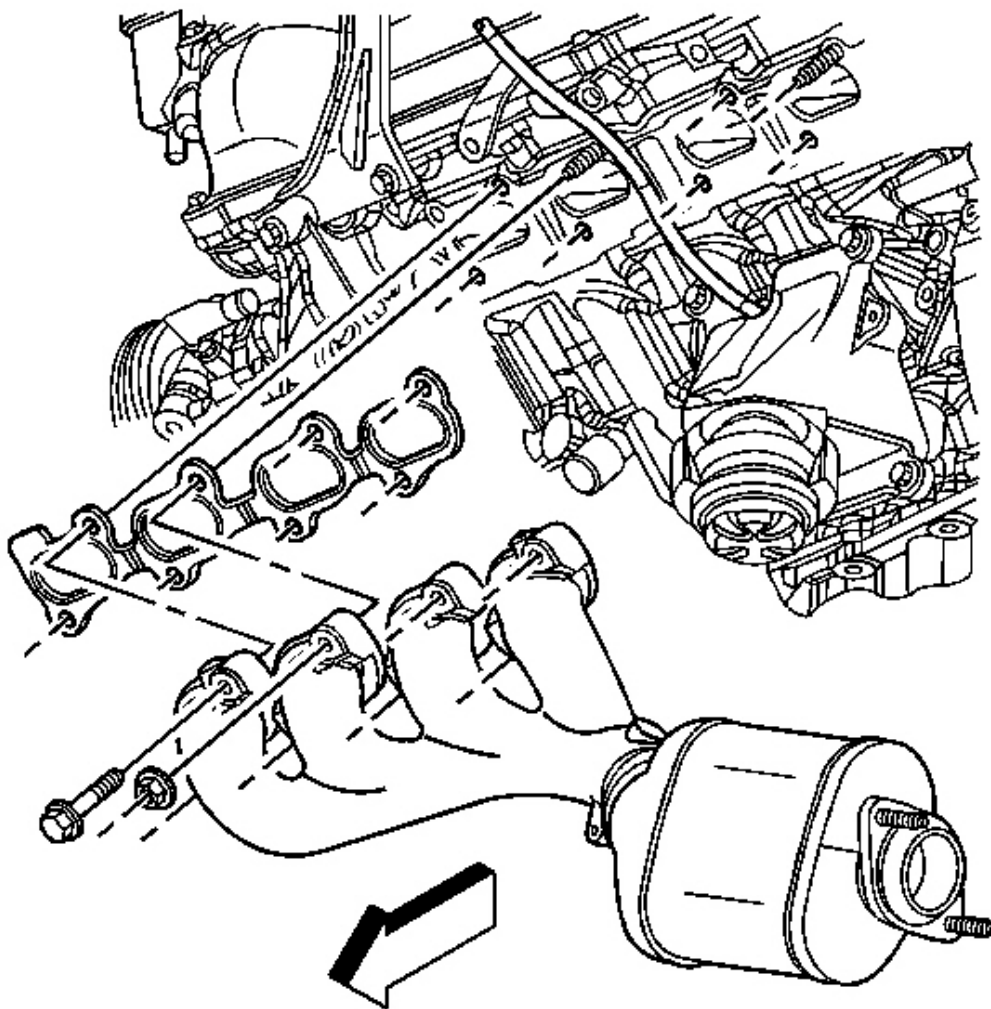


Fig. 7: View Of Left Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

4. Remove the left exhaust manifold bolts and nuts. Discard the exhaust manifold bolts.
5. Remove the exhaust manifold studs, if necessary.
6. Remove the left exhaust manifold and the gasket from the engine. Do not reuse the gasket.
7. Clean and inspect the left exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection - Left** in Engine Mechanical - 4.6L (LH2).

Installation Procedure

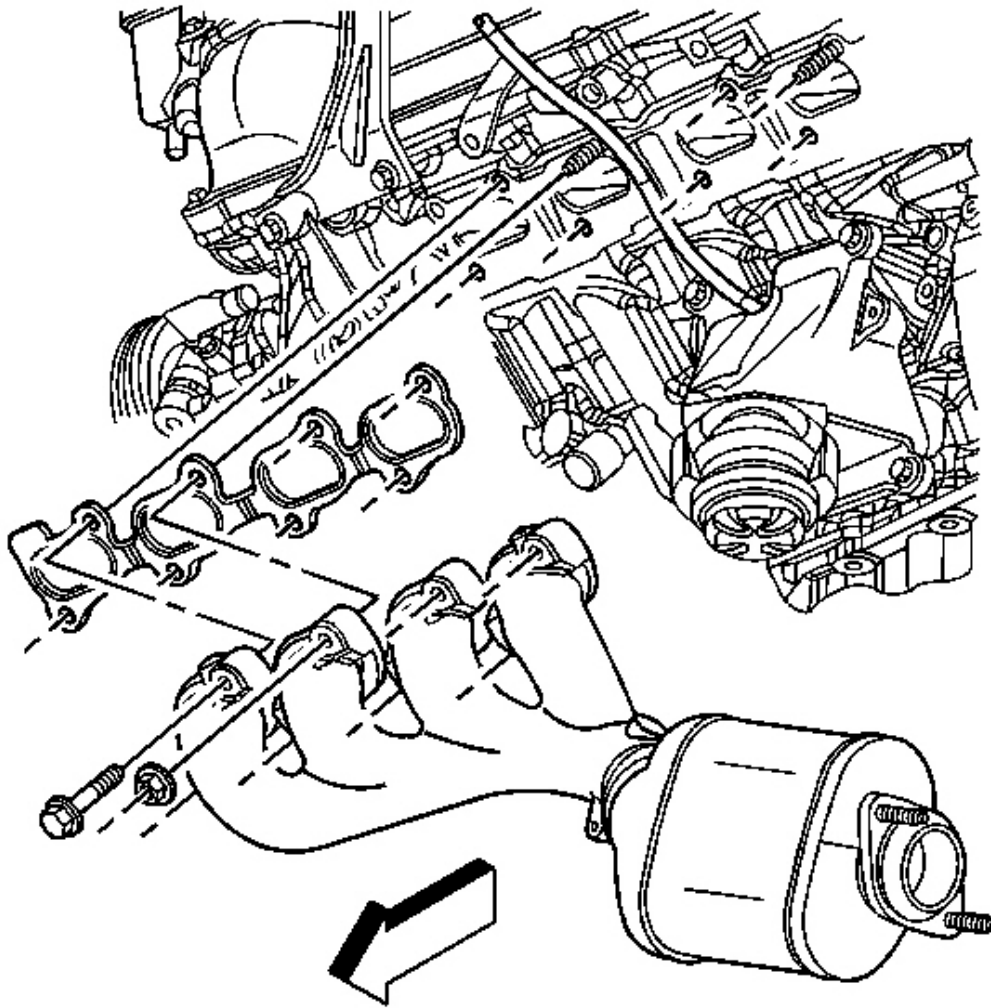


Fig. 8: View Of Left Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW exhaust manifold gasket.
2. Position the left exhaust manifold and gasket to the left cylinder head.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the left exhaust manifold studs, nuts and NEW bolts.

Tighten:

- Tighten the exhaust manifold studs to 6 N.m (53 lb in).
 - Tighten the exhaust manifold nuts to 25 N.m (18 lb ft).
 - Tighten the exhaust manifold bolts to 25 N.m (18 lb ft).
4. Install the heated oxygen sensor, if previously removed. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** in Engine Controls - 4.6L (LH2).

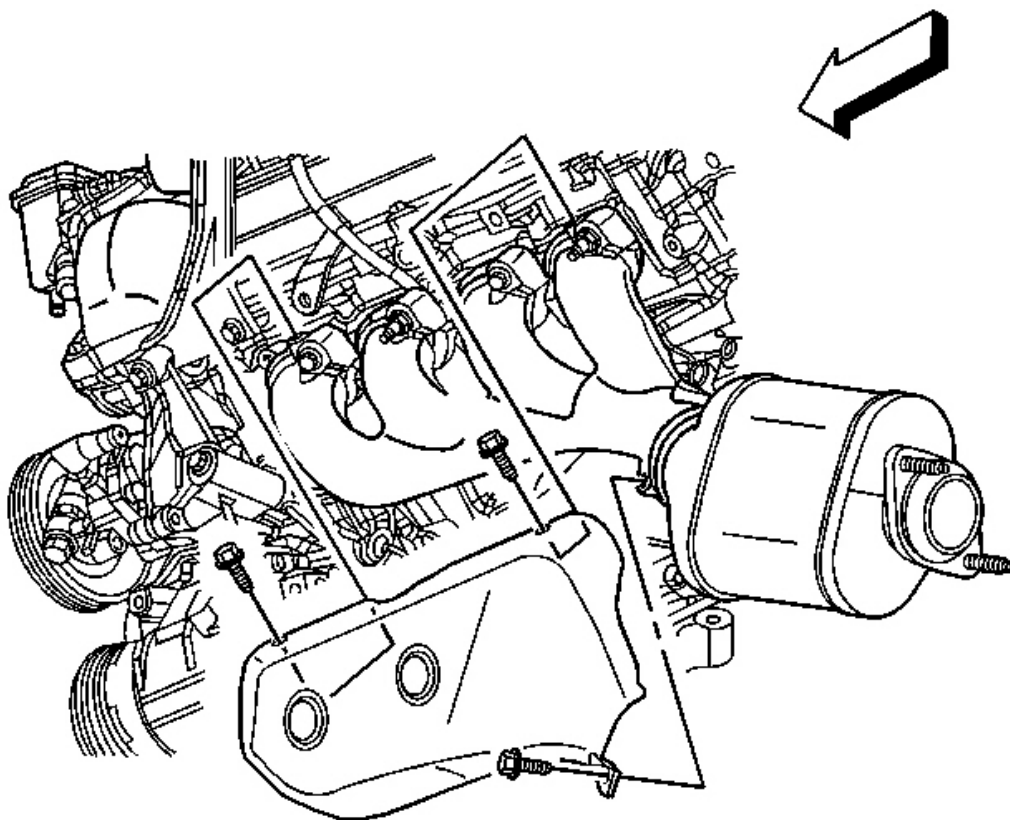


Fig. 9: View Of Left Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

5. Install the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield**

Replacement - Left (LY7) or Exhaust Manifold Heat Shield Replacement - Left (LH2).

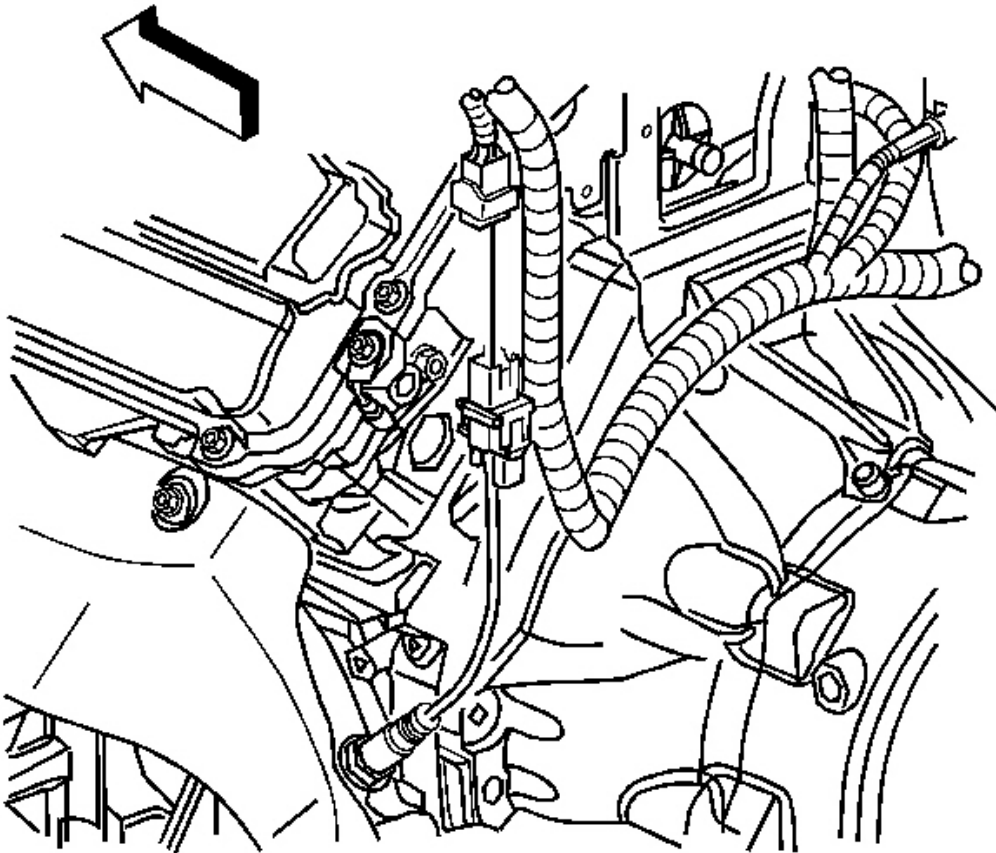


Fig. 10: View Of Heated Oxygen Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

6. Connect the heated oxygen sensor pigtail to the wiring harness connector.

EXHAUST MANIFOLD REPLACEMENT - RIGHT (LY7)

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

1. Remove the exhaust manifold heat shield. Refer to Exhaust Manifold Heat Shield Replacement - Right (LY7) or Exhaust Manifold Heat Shield Replacement - Right (LH2).

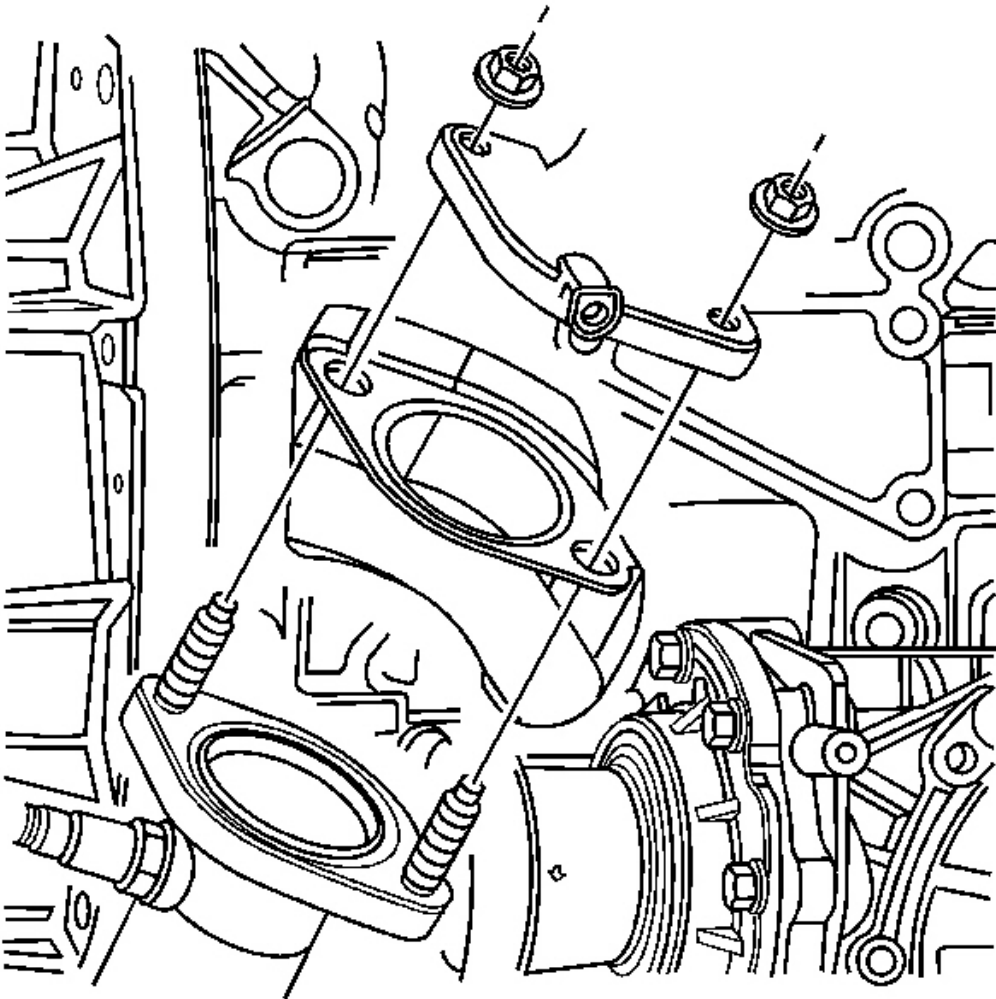


Fig. 11: View Of Right Catalytic Converter - LY7
Courtesy of GENERAL MOTORS CORP.

2. Remove the catalytic converter nuts.

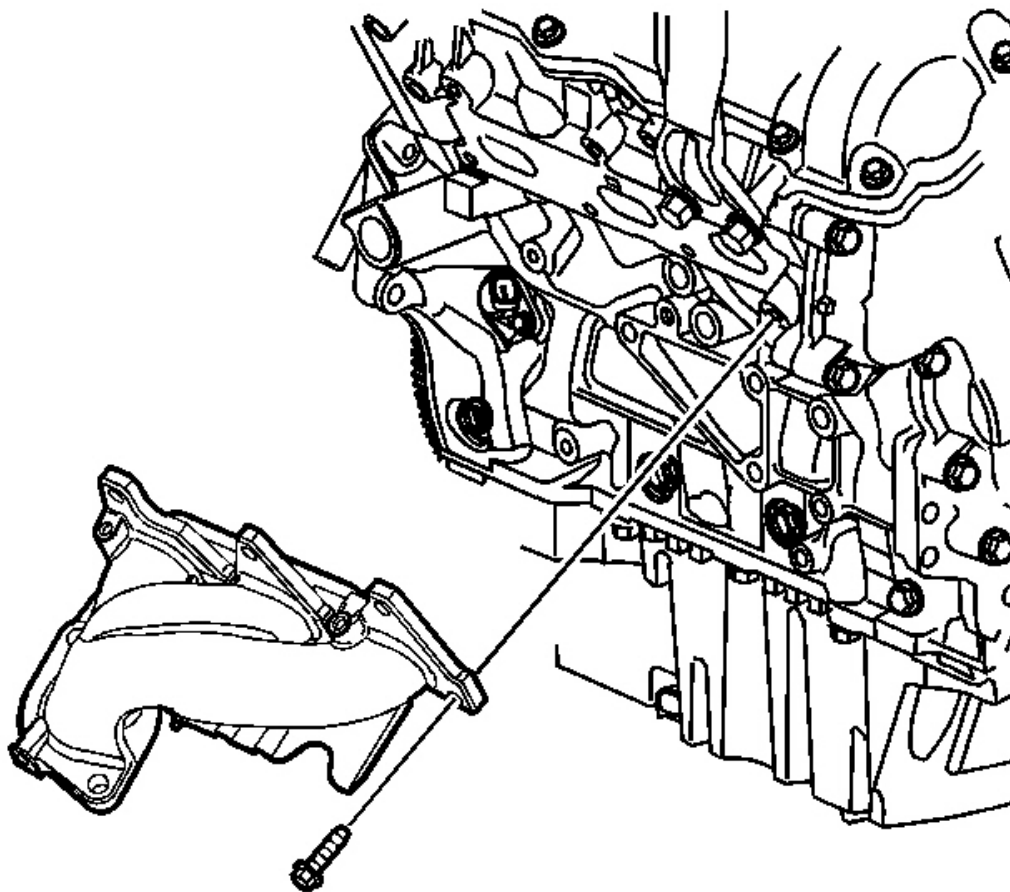


Fig. 12: Removing & Installing Right Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

3. Remove the exhaust manifold bolts.

IMPORTANT: Do not reuse the gasket.

4. Remove the exhaust manifold and discard the exhaust manifold gasket.
5. Clean and inspect the exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection - Left** in Engine Mechanical - 3.6L.

Installation Procedure

IMPORTANT: Inspect the catalytic converter seal/heat shield sealing surface. Replace the seal/heat shield if the sealing surface is worn or damaged.

1. Install the catalytic converter seal/heat shield to the catalytic converter.

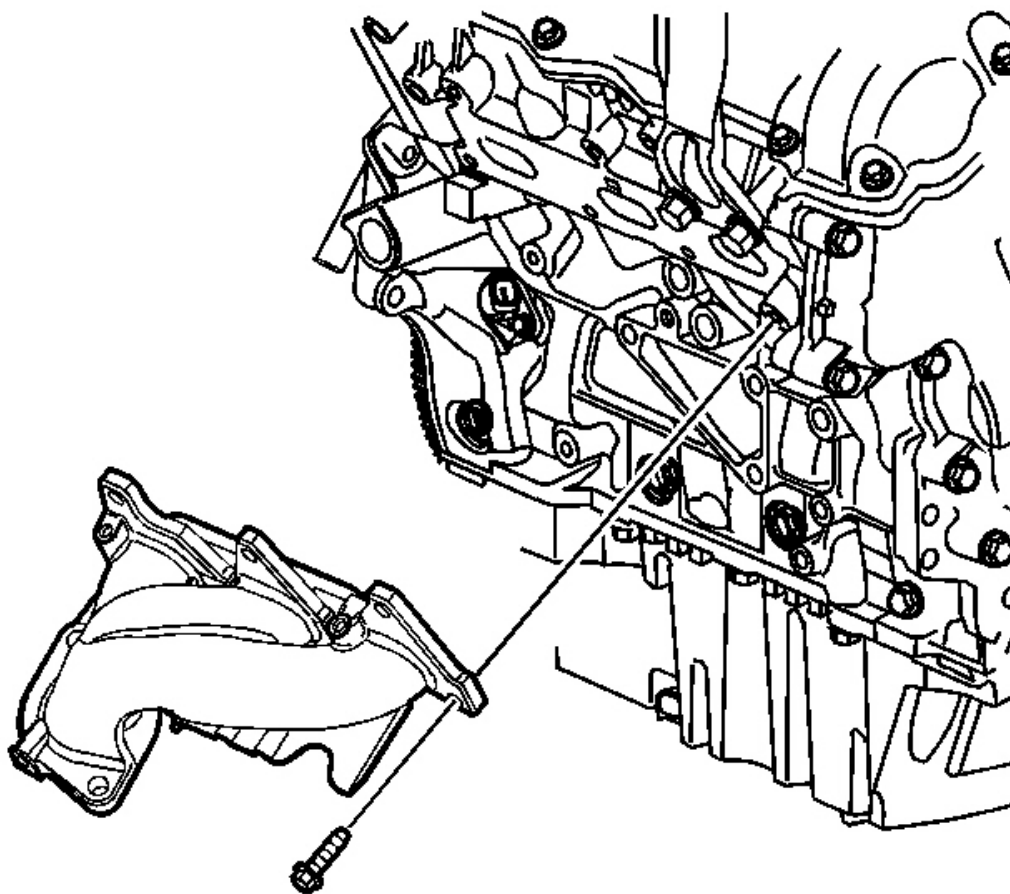


Fig. 13: Removing & Installing Right Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

2. Install a NEW exhaust manifold gasket to the exhaust manifold.
3. Install the exhaust manifold with the gasket to the catalytic converter and the cylinder head.

NOTE: Refer to Fastener Notice in Cautions and Notices.

4. Install the exhaust manifold bolts.

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

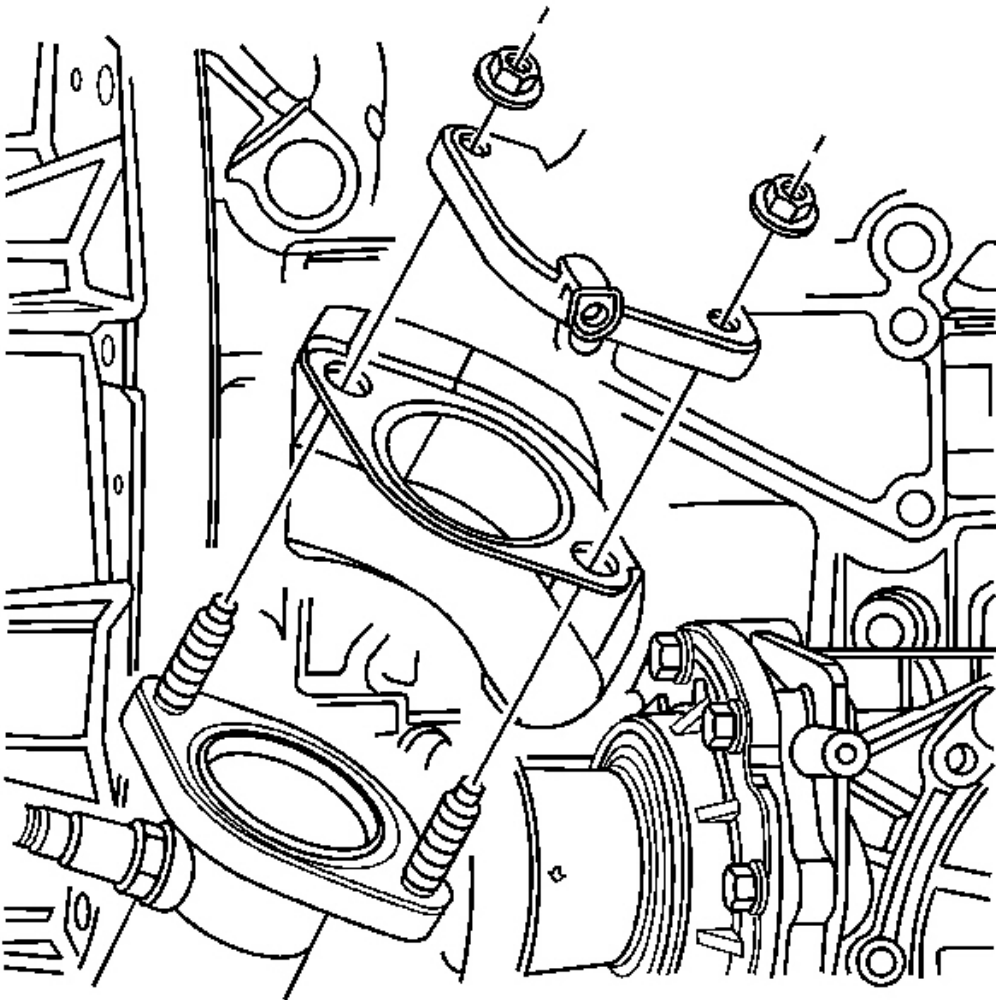


Fig. 14: View Of Right Catalytic Converter - LY7
Courtesy of GENERAL MOTORS CORP.

5. Install the catalytic converter nuts.

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

6. Install the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Right (LY7)** or **Exhaust Manifold Heat Shield Replacement - Right (LH2)**.

EXHAUST MANIFOLD REPLACEMENT - RIGHT (LH2)

Removal Procedure

CAUTION: Refer to **Exhaust Service Caution** in Cautions and Notices.

CAUTION: Refer to **Protective Goggles and Glove Caution** in Cautions and Notices.

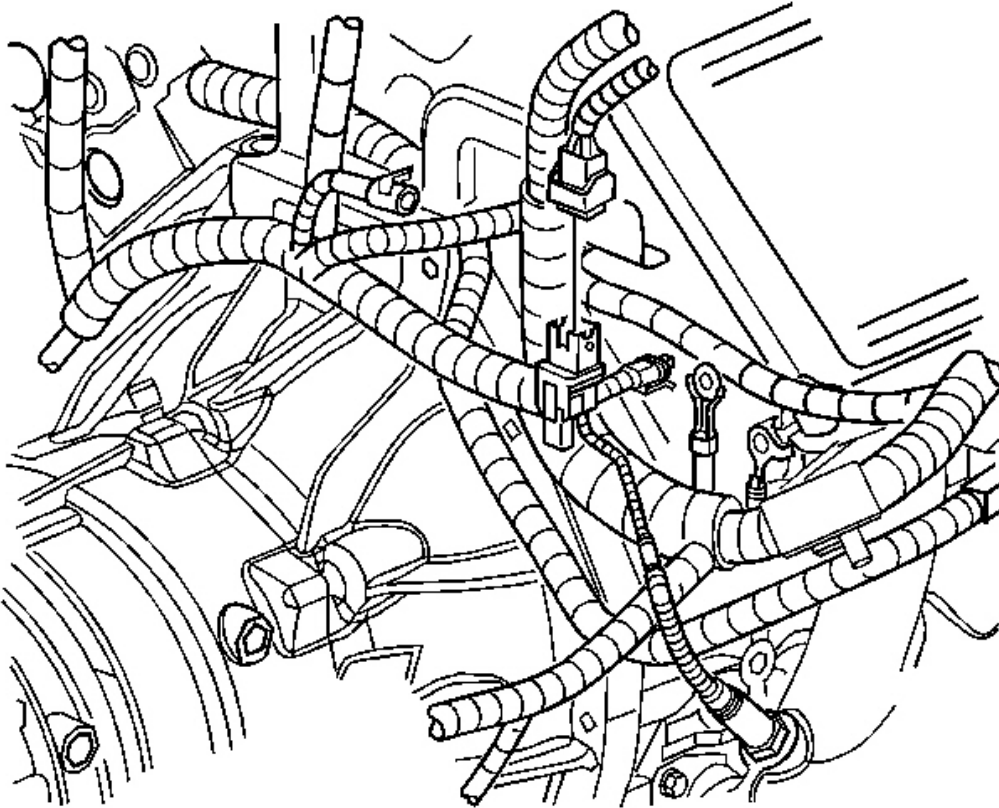


Fig. 15: View Of Right Heated Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

1. Disconnect the heated oxygen sensor pigtail from the wiring harness connector.

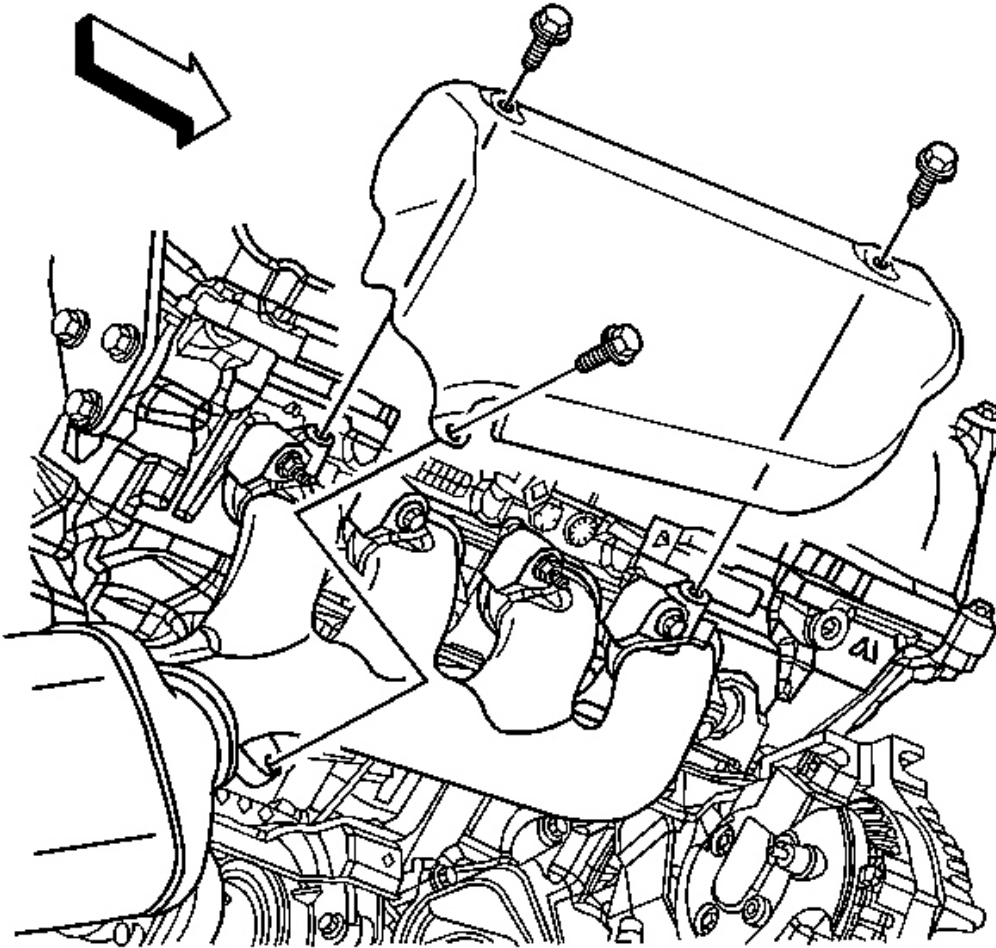


Fig. 16: View Of Right Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

2. Remove the right exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Right (LY7)** or **Exhaust Manifold Heat Shield Replacement - Right (LH2)**.
3. Remove the heated oxygen sensor, if necessary. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** in Engine Controls - 4.6L.

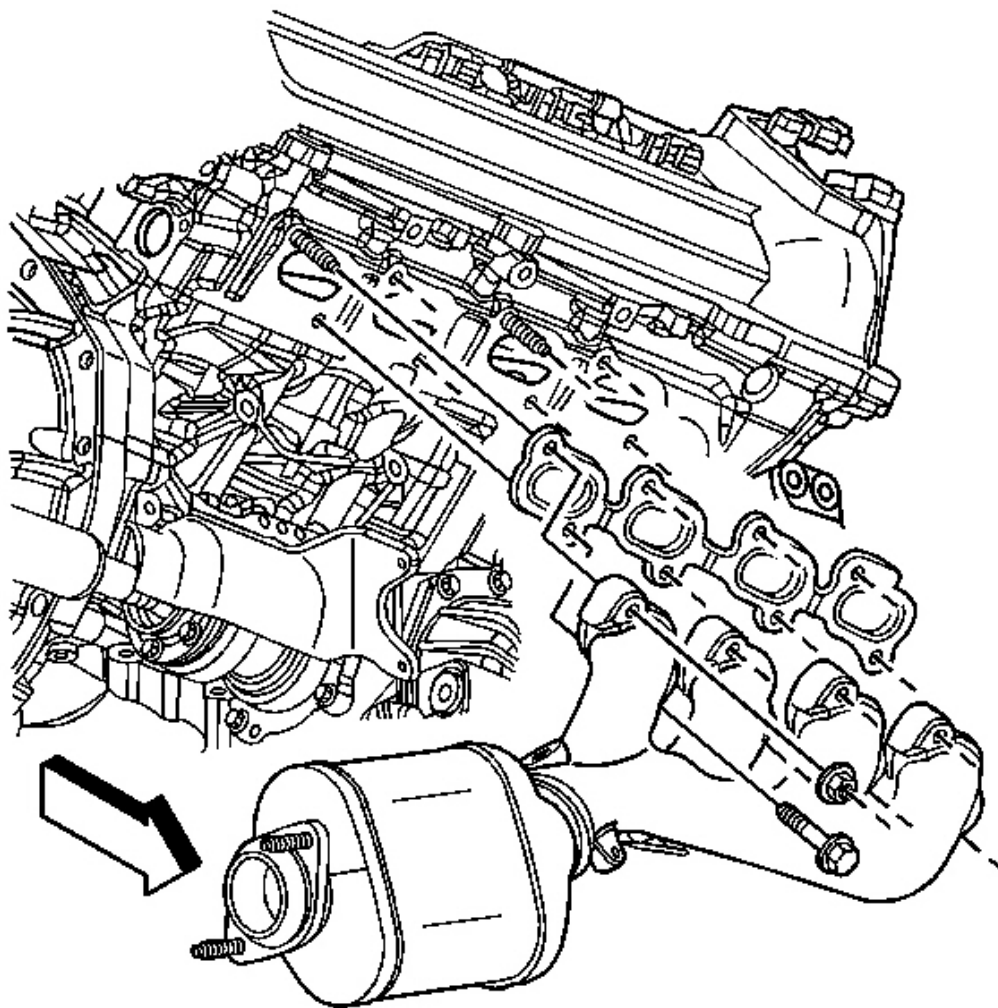


Fig. 17: View Of Right Exhaust Manifold - LH2
Courtesy of GENERAL MOTORS CORP.

4. Remove the right exhaust manifold bolts and nuts. Discard the exhaust manifold bolts.
5. Remove the exhaust manifold studs, if necessary.
6. Remove the right exhaust manifold and the gasket from the engine. Do not reuse the gasket.
7. Clean and inspect the right exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection - Right** in Engine Mechanical - 4.6L (LH2).

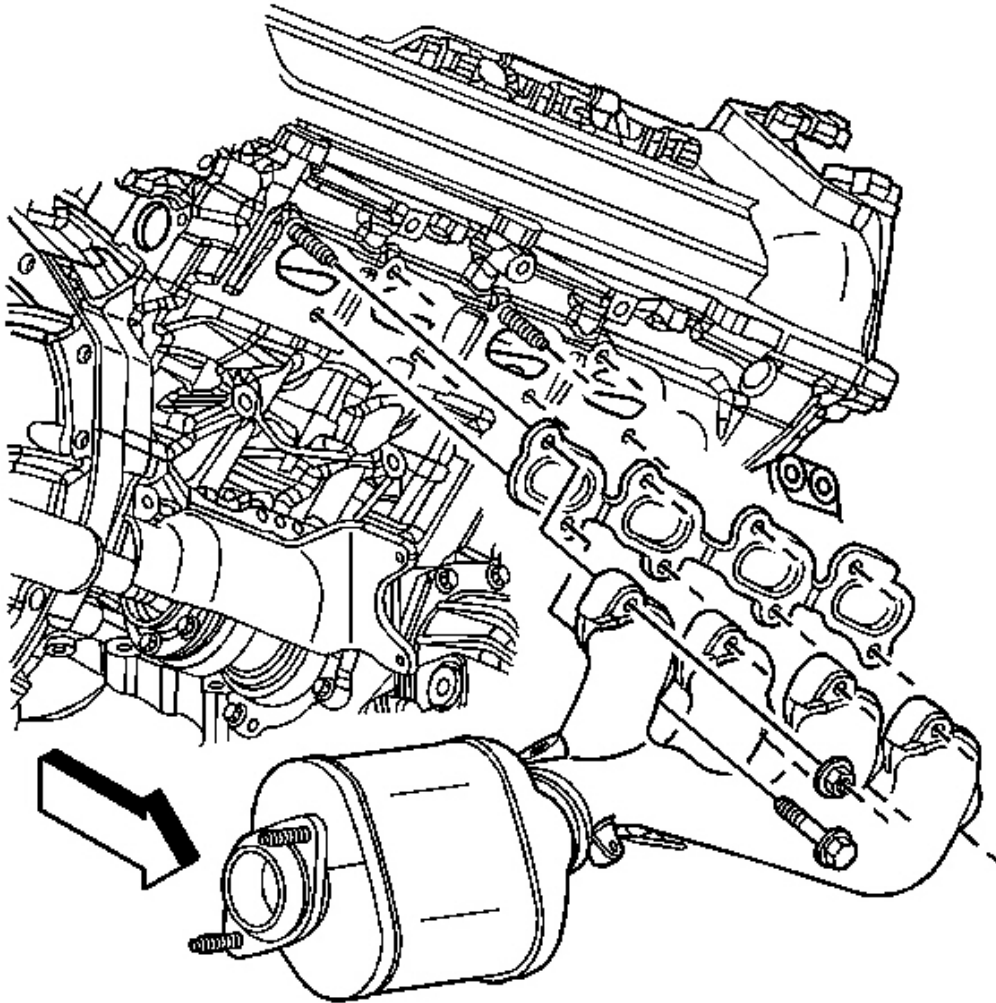


Fig. 18: View Of Right Exhaust Manifold - LH2
Courtesy of GENERAL MOTORS CORP.

1. Install a NEW exhaust manifold gasket over the cylinder head studs.
2. Position the right exhaust manifold and gasket to the right cylinder head.

NOTE: Refer to Fastener Notice in Cautions and Notices.

3. Install the right exhaust manifold studs, nuts and NEW bolts.

Tighten:

- Tighten the exhaust manifold studs to 6 N.m (53 lb in).
 - Tighten the exhaust manifold nuts to 25 N.m (18 lb ft).
 - Tighten the exhaust manifold bolts to 25 N.m (18 lb ft).
4. Install the heated oxygen sensor, if previously removed. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** in Engine Controls - 4.6L (LH2).

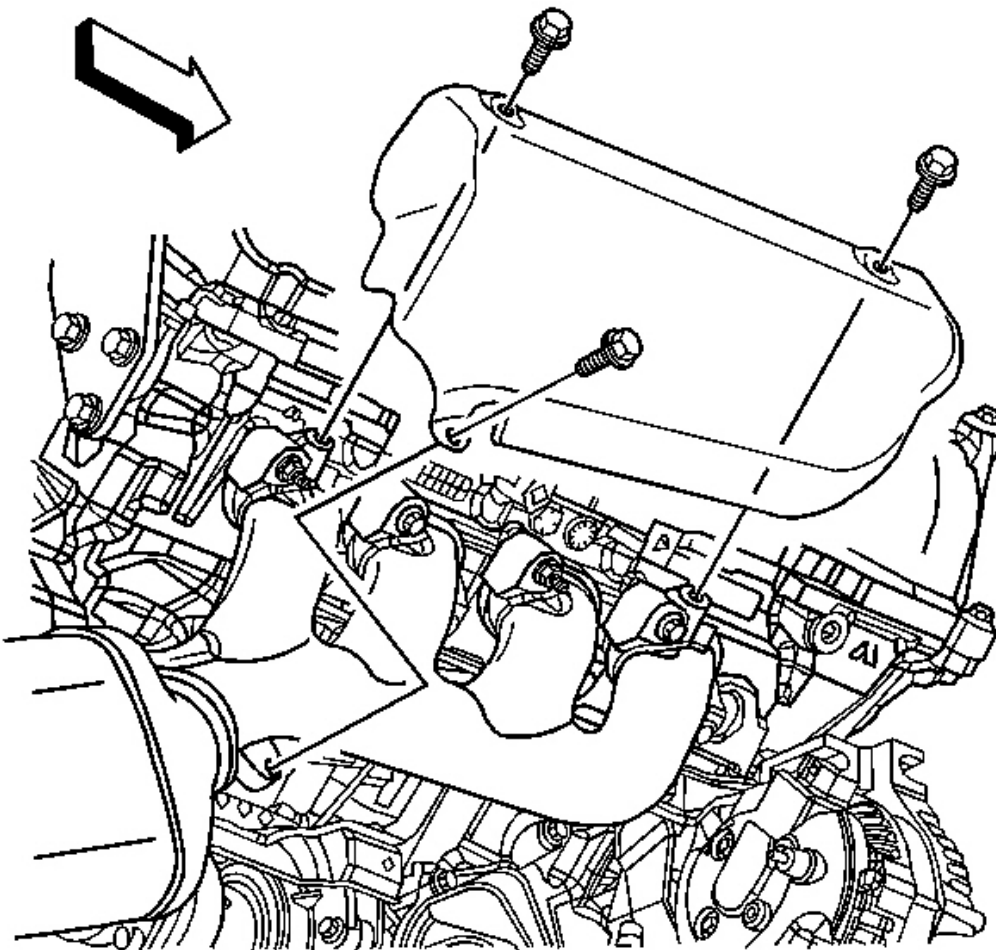


Fig. 19: View Of Right Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

5. Install the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Right (LY7)** or **Exhaust Manifold Heat Shield Replacement - Right (LH2)**.

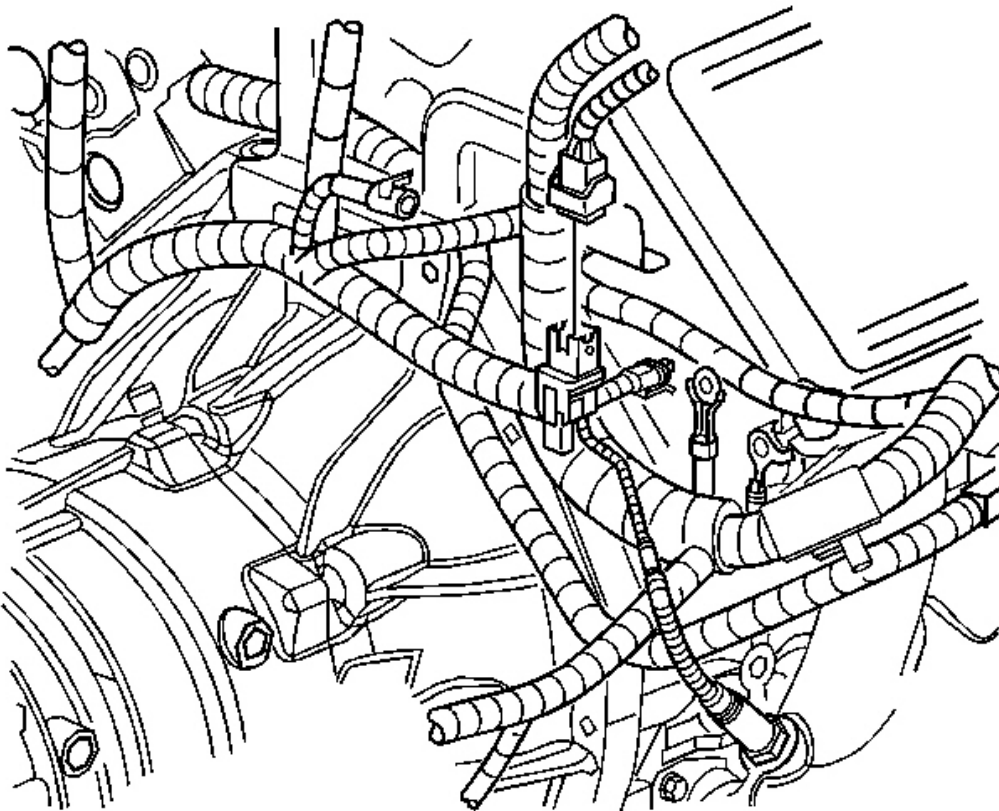


Fig. 20: View Of Right Heated Sensor Electrical Connector
Courtesy of GENERAL MOTORS CORP.

6. Connect the heated oxygen sensor pigtail to the wiring harness connector.

EXHAUST SYSTEM REPLACEMENT

Servicing of the muffler, resonator or pipe requires the replacement of the exhaust system as a complete one-piece unit.

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

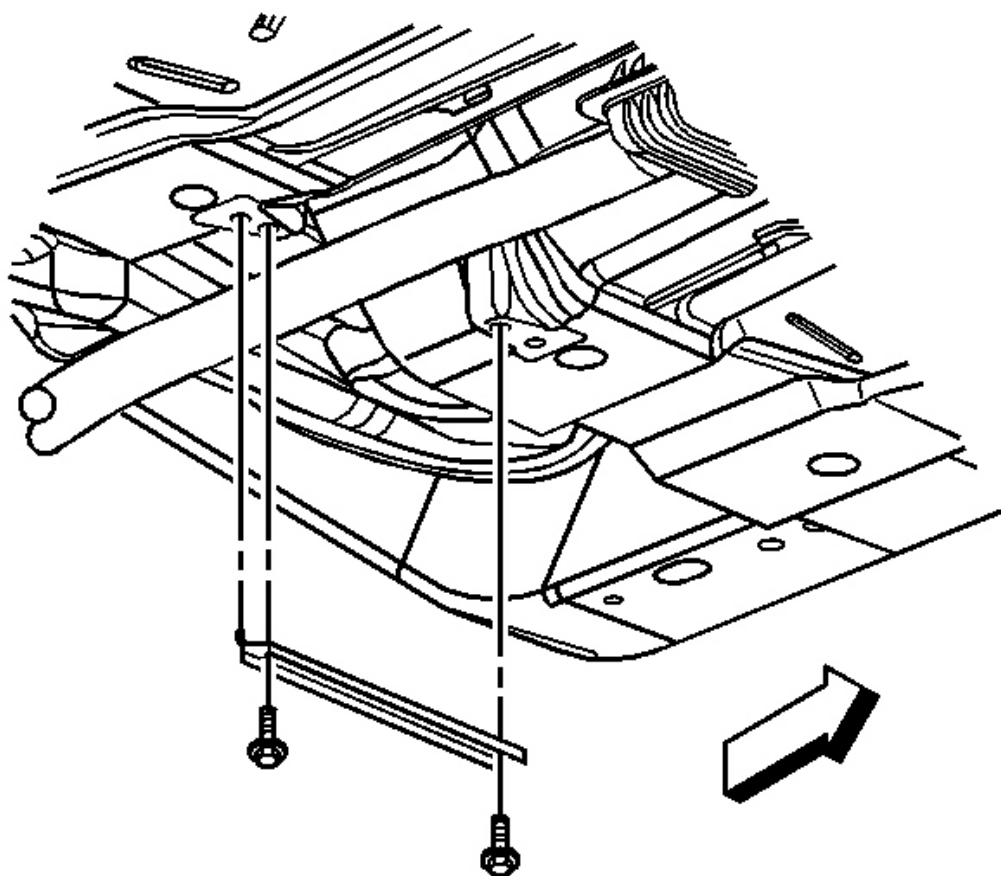


Fig. 21: View Of Floor Panel Tunnel Brace
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle in General Information.
2. Remove the heated oxygen sensors from the exhaust pipes. Refer to Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2 and Heated Oxygen Sensor (HO2S)

Replacement Bank 2 Sensor 2 in Engine Controls - 4.6L.

3. Remove the 2 bolts securing the floor panel tunnel brace to the floor panel.
4. Remove the floor panel tunnel brace from the floor panel.

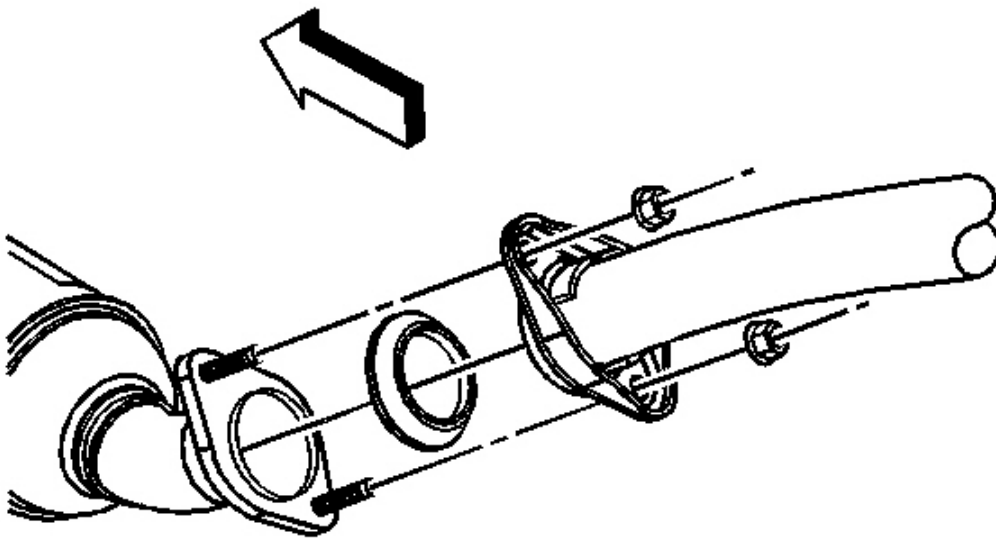


Fig. 22: View Of Exhaust Pipe-To-Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

5. Suitably support the exhaust system.
6. Remove the nuts securing the exhaust pipes to the exhaust manifolds.

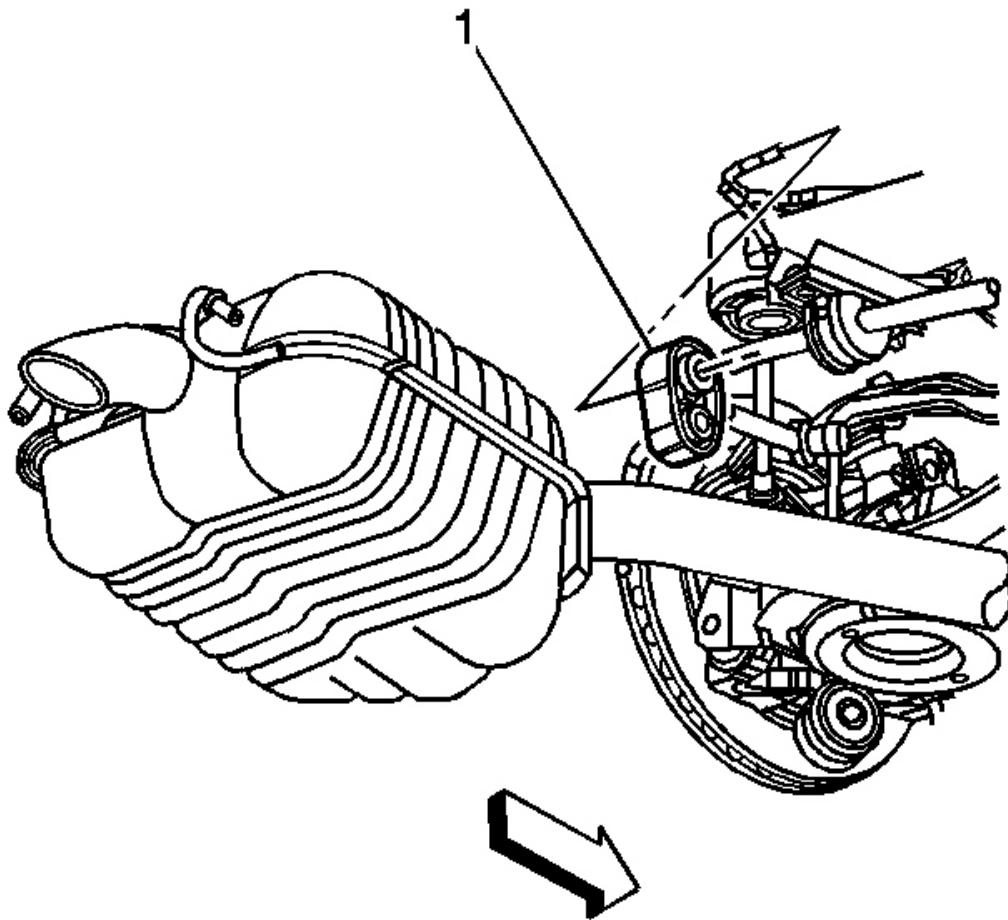


Fig. 23: Locating Front Exhaust Hangers
Courtesy of GENERAL MOTORS CORP.

7. Pry the front exhaust hangers (1) free from the rear suspension hanger rods.

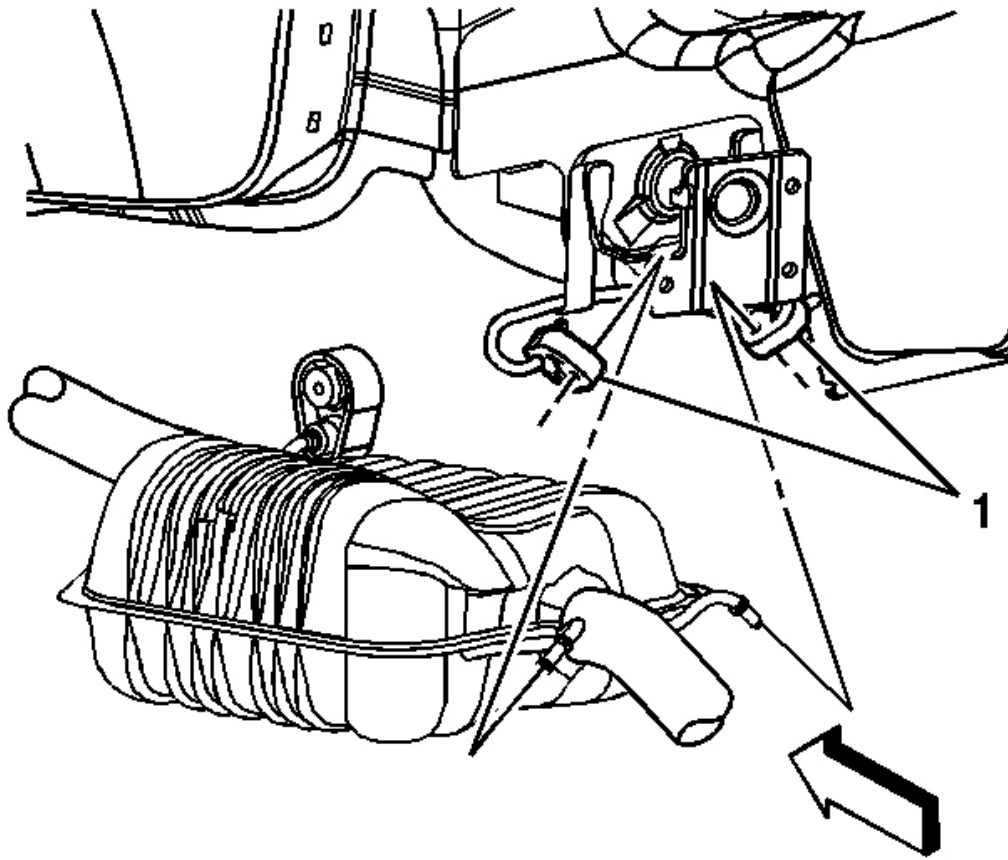


Fig. 24: Locating Tail Pipe Hangers
Courtesy of GENERAL MOTORS CORP.

8. Apply a suitable lubricant to the tail pipe hanger rods in order to ease the removal of the tail pipe hangers (1).
9. Pry the tail pipe hangers (1) free from the tail pipe hanger rods.

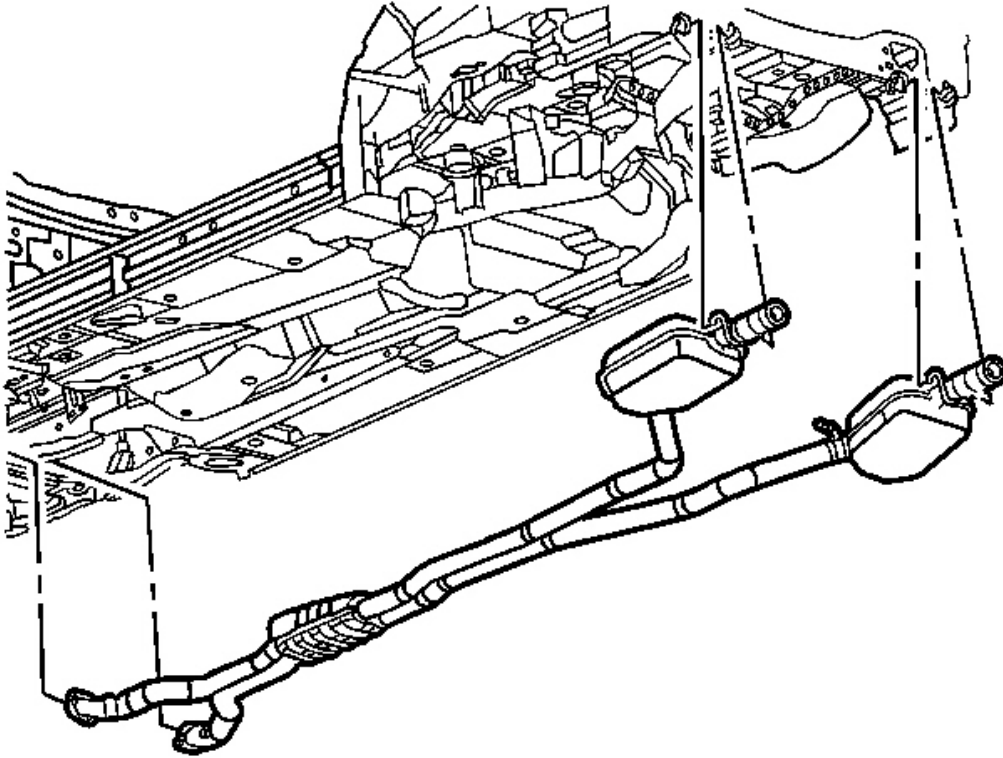


Fig. 25: View Of Exhaust System
Courtesy of GENERAL MOTORS CORP.

10. With the aid of an assistant, lower the exhaust system.
11. Remove the exhaust manifold seals. Do not reuse the seals.

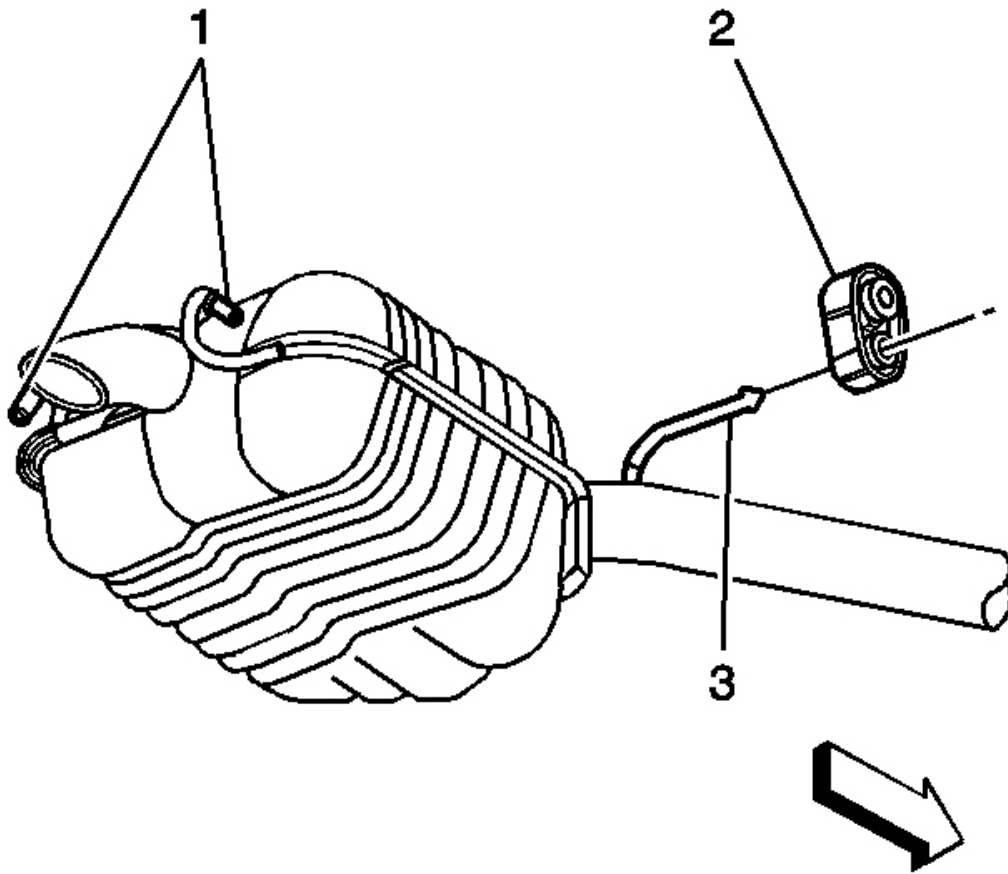


Fig. 26: View Of Exhaust System Components
Courtesy of GENERAL MOTORS CORP.

12. While the exhaust system is on the floor complete the following:
 1. Apply a suitable lubricant to the exhaust pipe hanger rods (3) in order to ease the removal of the front exhaust hangers (2).
 2. Pull the front exhaust hangers (2) from the exhaust pipe hanger rods.

Installation Procedure

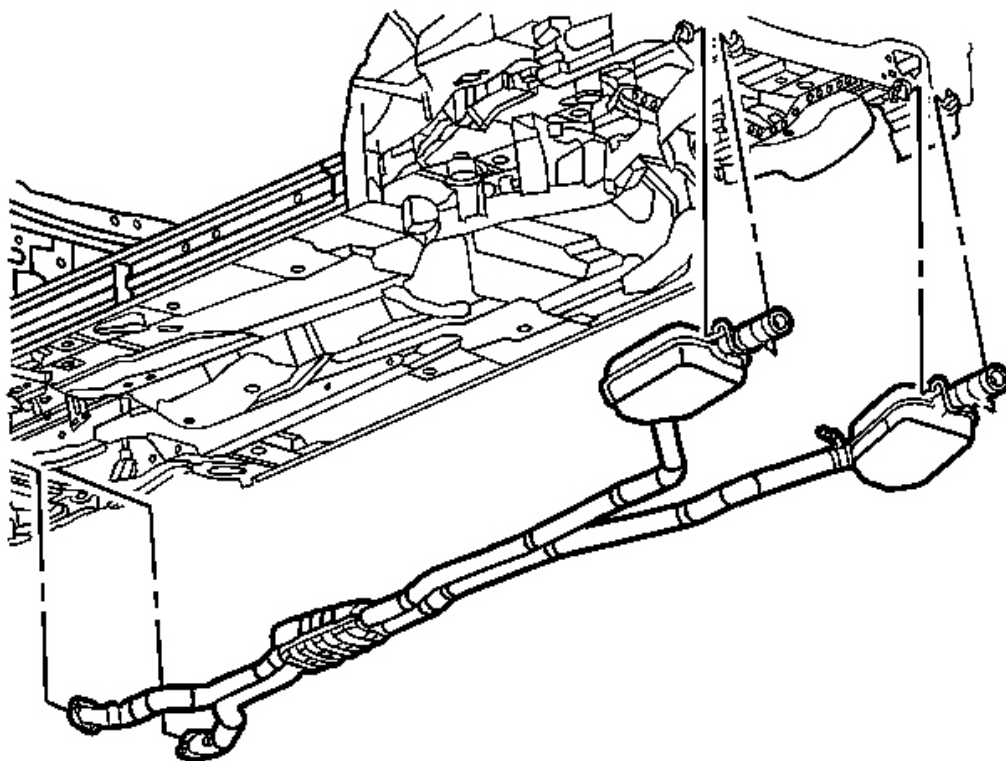


Fig. 27: View Of Exhaust System
Courtesy of GENERAL MOTORS CORP.

1. While the exhaust system is on the floor complete the following:
 1. Apply a soapy solution to the following in order to ease the installation of the hangers:
 - The inner diameter of the front exhaust hangers (2)
 - The exhaust pipe hanger rods (3)
 - The inner diameter of the tail pipe hangers
 - The tail pipe hanger rods (1)
 2. Press the front exhaust hangers (2) over the exhaust pipe hanger rods (3).
2. Place NEW seals on the exhaust manifold flanges.

NOTE: Refer to Exhaust System Inspection Notice in Cautions and Notices.

3. With the aid of an assistant, raise the exhaust system into position, aligning the exhaust pipe flanges with the studs located in the rear of the exhaust manifolds.
4. Finger tighten the nuts to the exhaust manifold studs.

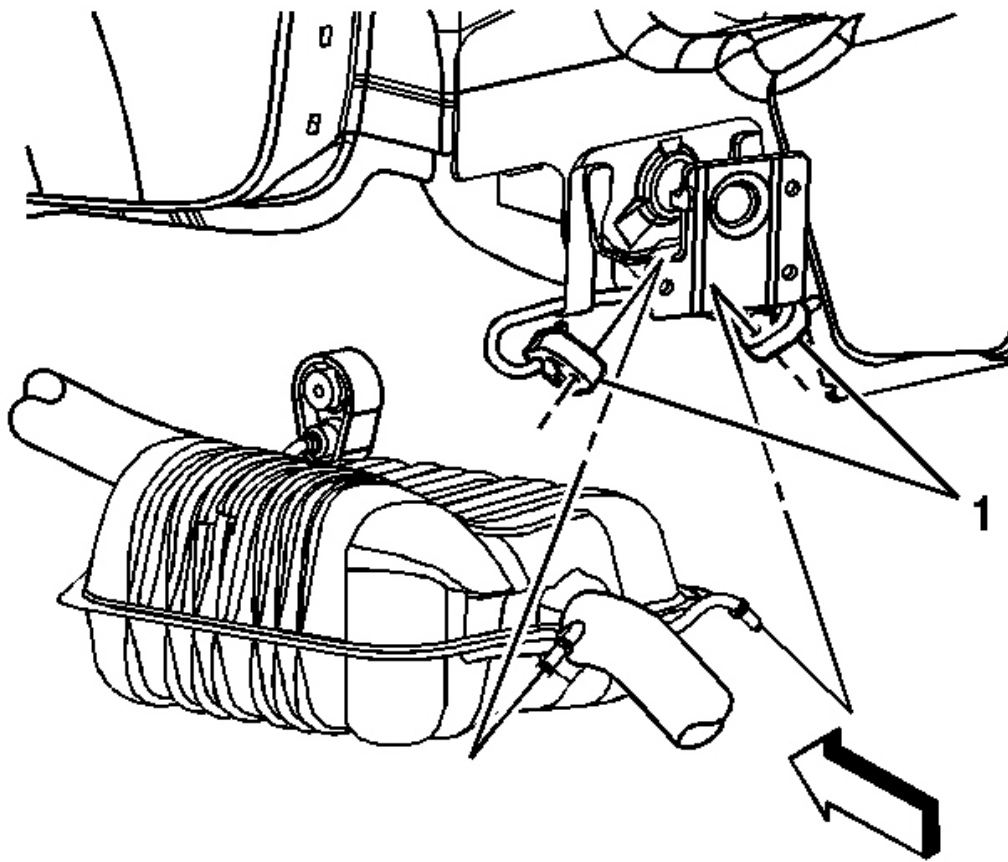


Fig. 28: Locating Tail Pipe Hangers
Courtesy of GENERAL MOTORS CORP.

5. Press the tail pipe hangers (1) over the tail pipe hanger rods.

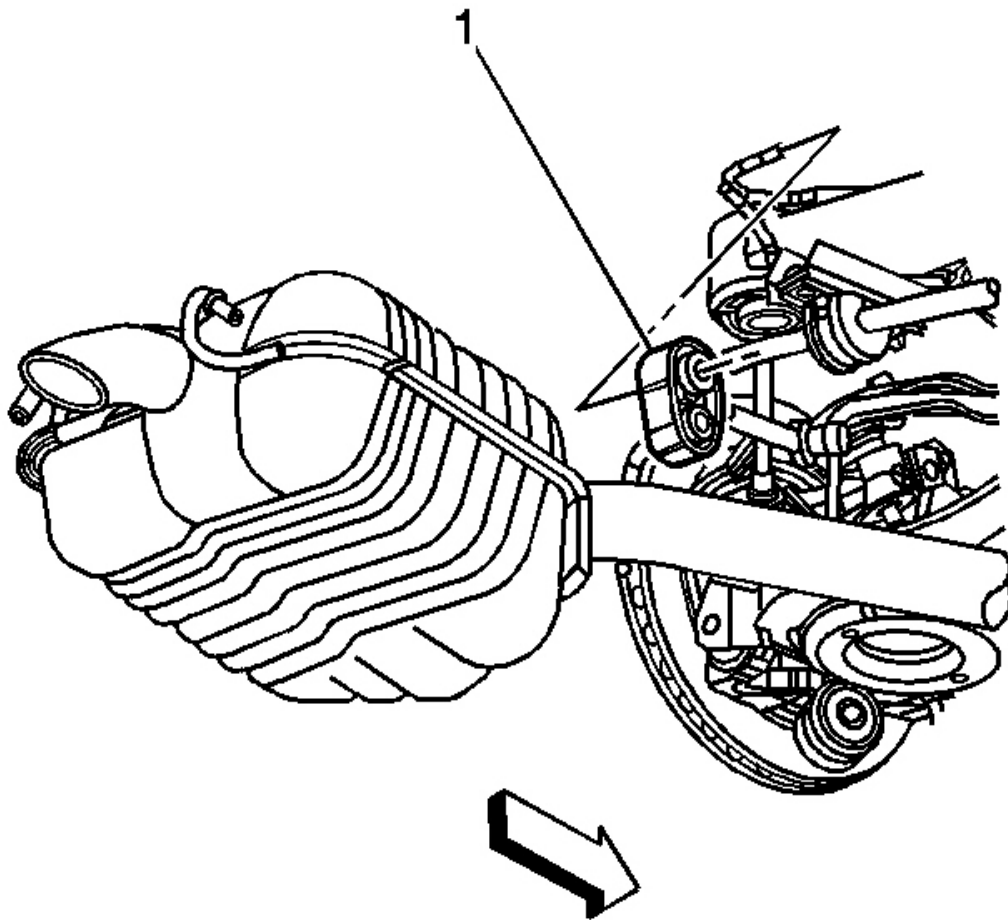


Fig. 29: Locating Front Exhaust Hangers
Courtesy of GENERAL MOTORS CORP.

6. Press the front exhaust hangers (1) over the rear suspension hanger rods.

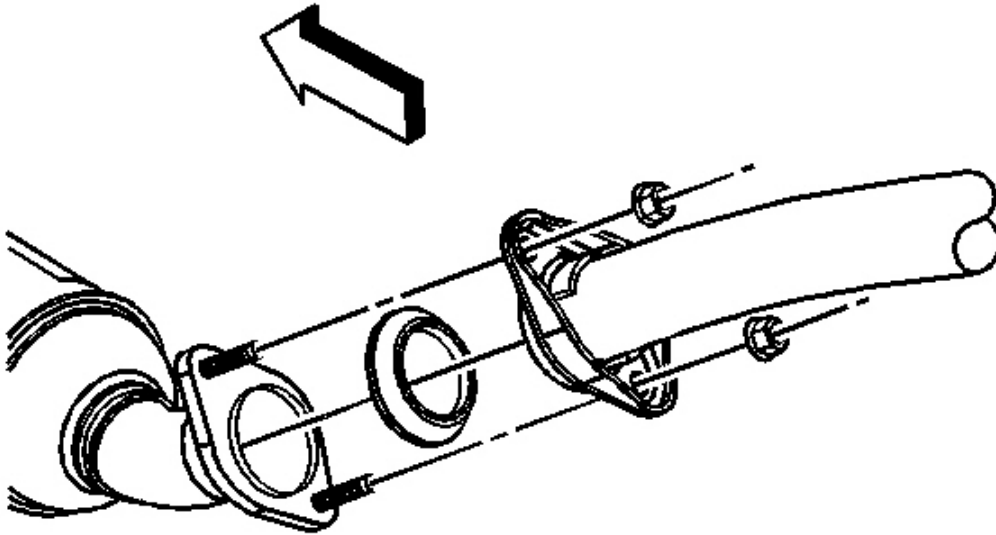


Fig. 30: View Of Exhaust Pipe-To-Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

7. Tighten the exhaust pipes to exhaust manifold nuts.

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

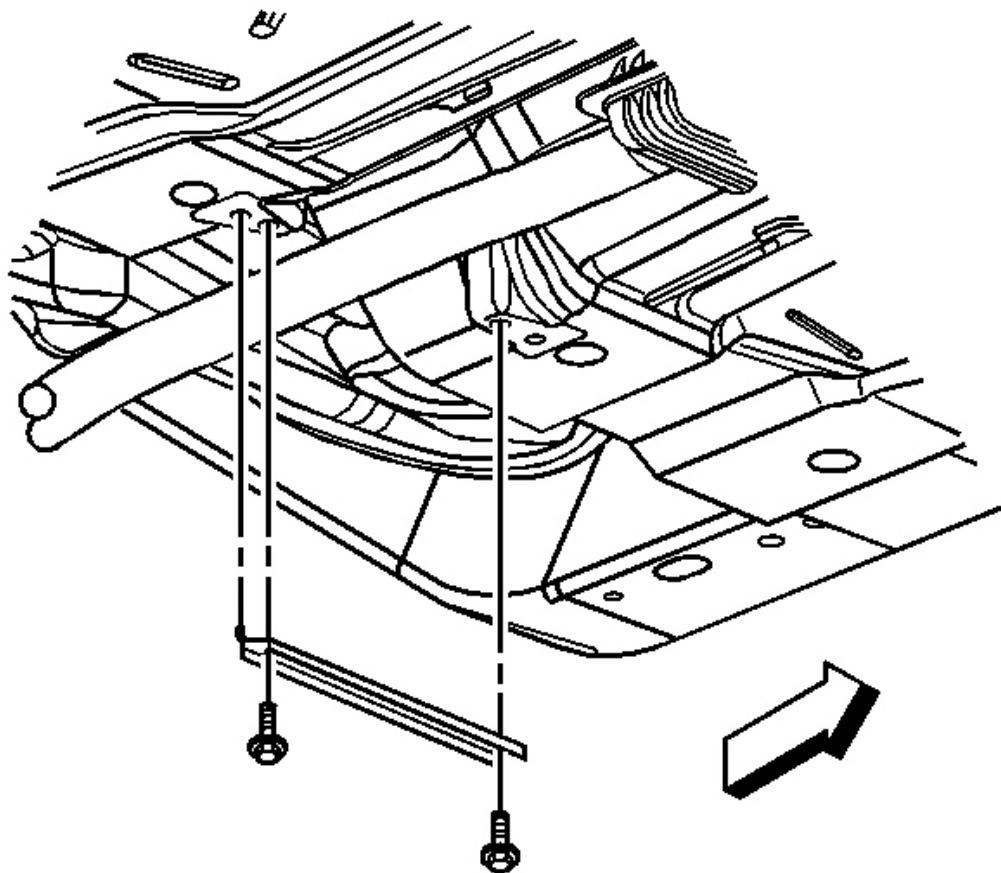


Fig. 31: View Of Floor Panel Tunnel Brace
Courtesy of GENERAL MOTORS CORP.

8. Position the floor panel tunnel brace to the floor panel.
9. Install the 2 bolts securing the floor panel tunnel brace to the floor panel.

Tighten: Tighten the floor panel tunnel brace bolts to 25 N.m (18 lb ft).

10. Install the heated oxygen sensors to the exhaust pipes. Refer to Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 2 and Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 2 in Engine Controls - 4.6L.
11. Lower the vehicle.

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CATALYTIC CONVERTER REPLACEMENT - LEFT (LY7)

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

1. Remove the left bank exhaust manifold heat shield. Refer to Exhaust Manifold Heat Shield Replacement - Left (LY7) or Exhaust Manifold Heat Shield Replacement - Left (LH2).

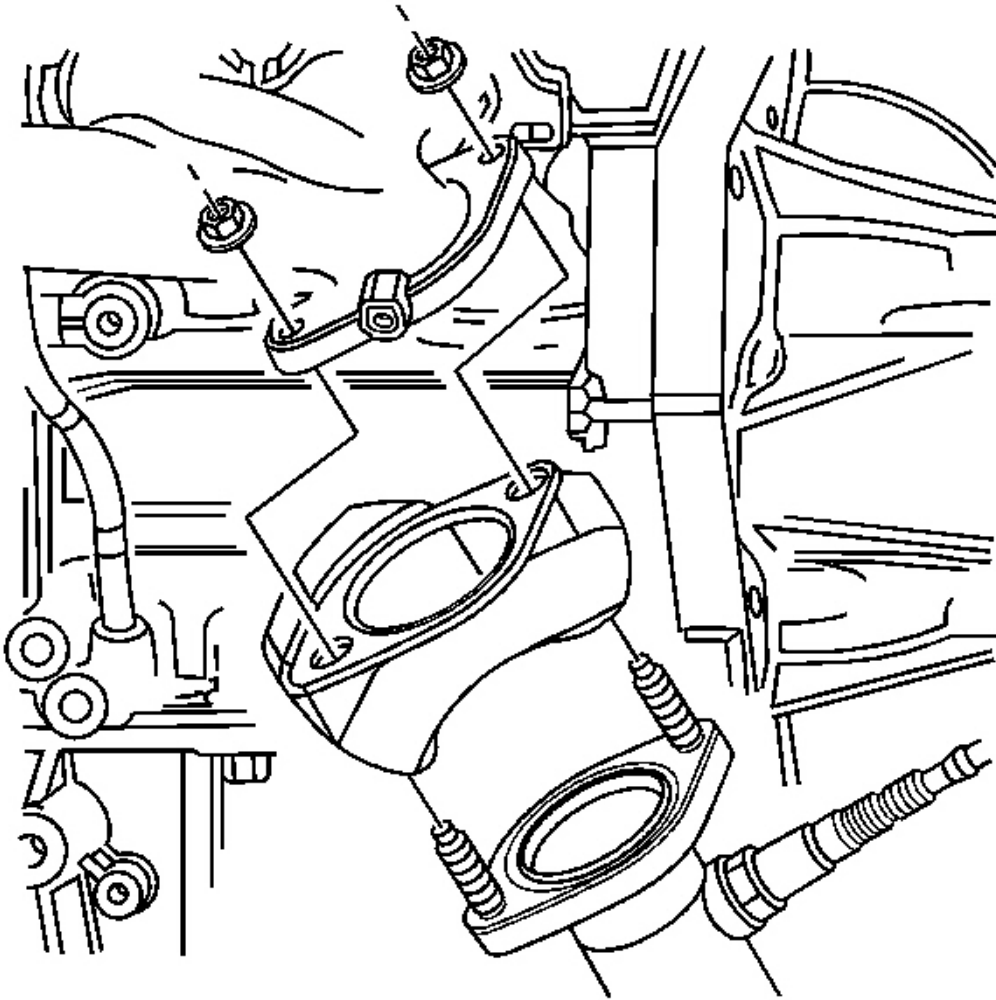


Fig. 32: View Of Left Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

2. Remove the catalytic converter nuts.
3. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
4. Disconnect the oxygen sensor electrical connector.

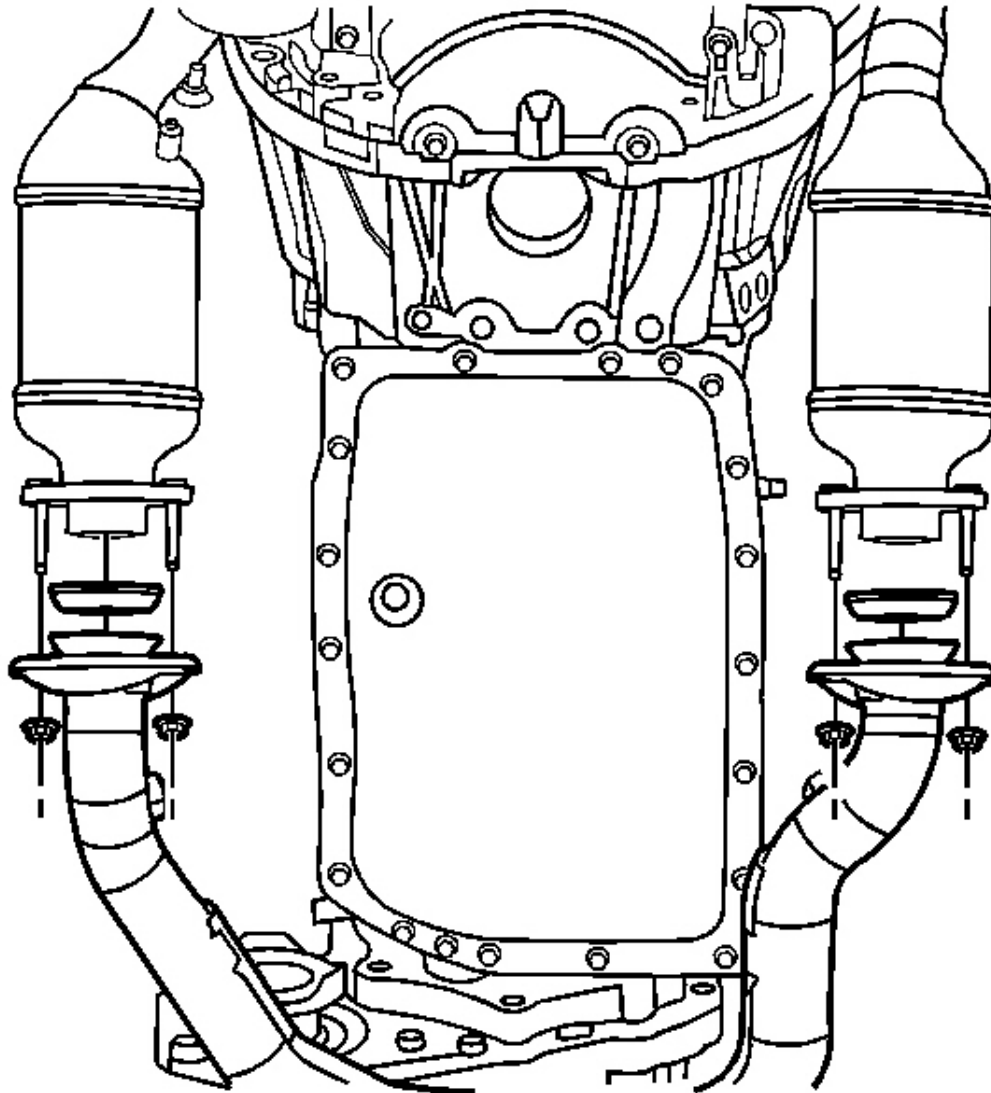


Fig. 33: Identifying Muffler Pipes At Left And Right Side Catalytic Converters
Courtesy of GENERAL MOTORS CORP.

5. Disconnect the muffler pipe from the left and right side catalytic converters.
6. Remove the exhaust pipe to right bank catalytic converter fasteners.
7. Carefully remove the catalytic converter with the seal/heat shield and oxygen sensor from the exhaust manifold.

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8. Remove the oxygen sensor from the catalytic converter. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** in Engine Controls - 3.6L (LY7).

Installation Procedure

1. Install the oxygen sensor to the catalytic converter. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 2 Sensor 1** in Engine Controls - 3.6L (LY7).

IMPORTANT: Inspect the catalytic converter seal/heat shield sealing surface. Replace the seal/heat shield if the sealing surface is worn or damaged.

2. Install the catalytic converter seal/heat shield to the catalytic converter.

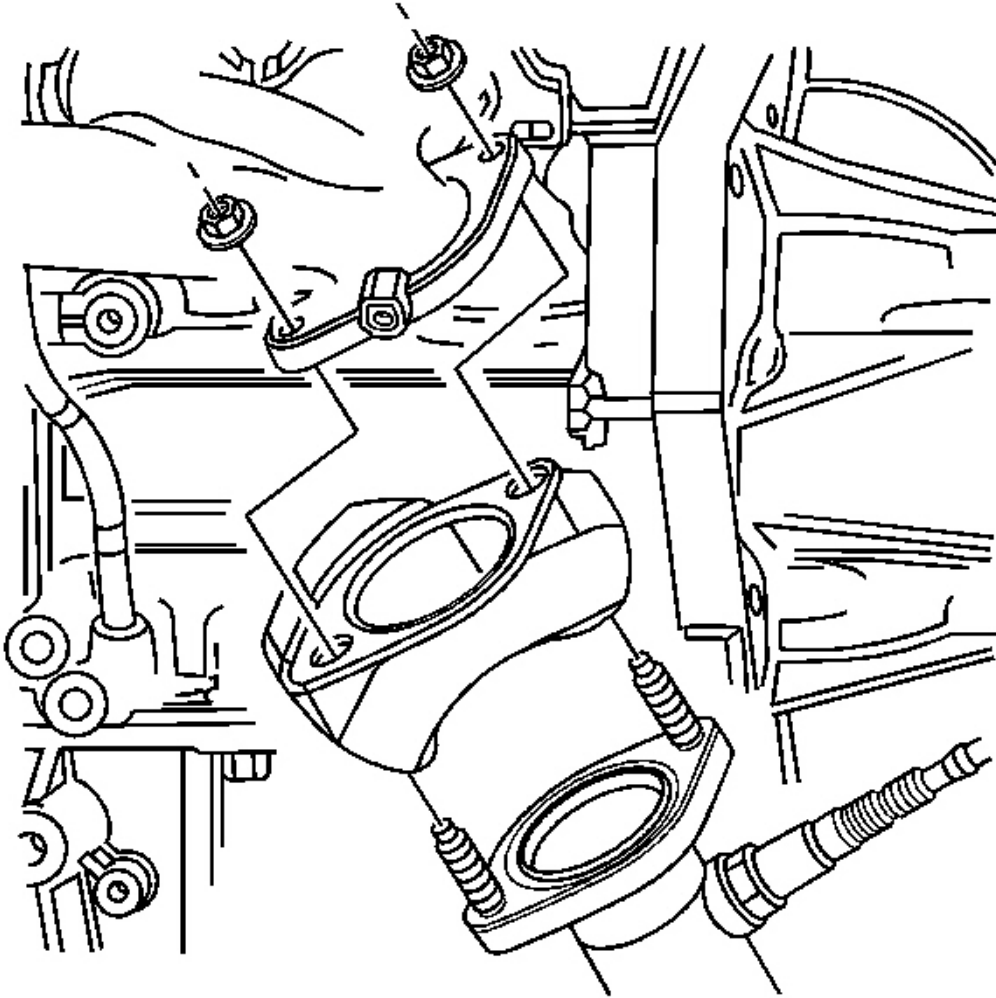


Fig. 34: View Of Left Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

3. Carefully install the catalytic converter to the exhaust manifold.
4. Install the catalytic converter nuts.
5. Connect the oxygen sensor electrical connector.

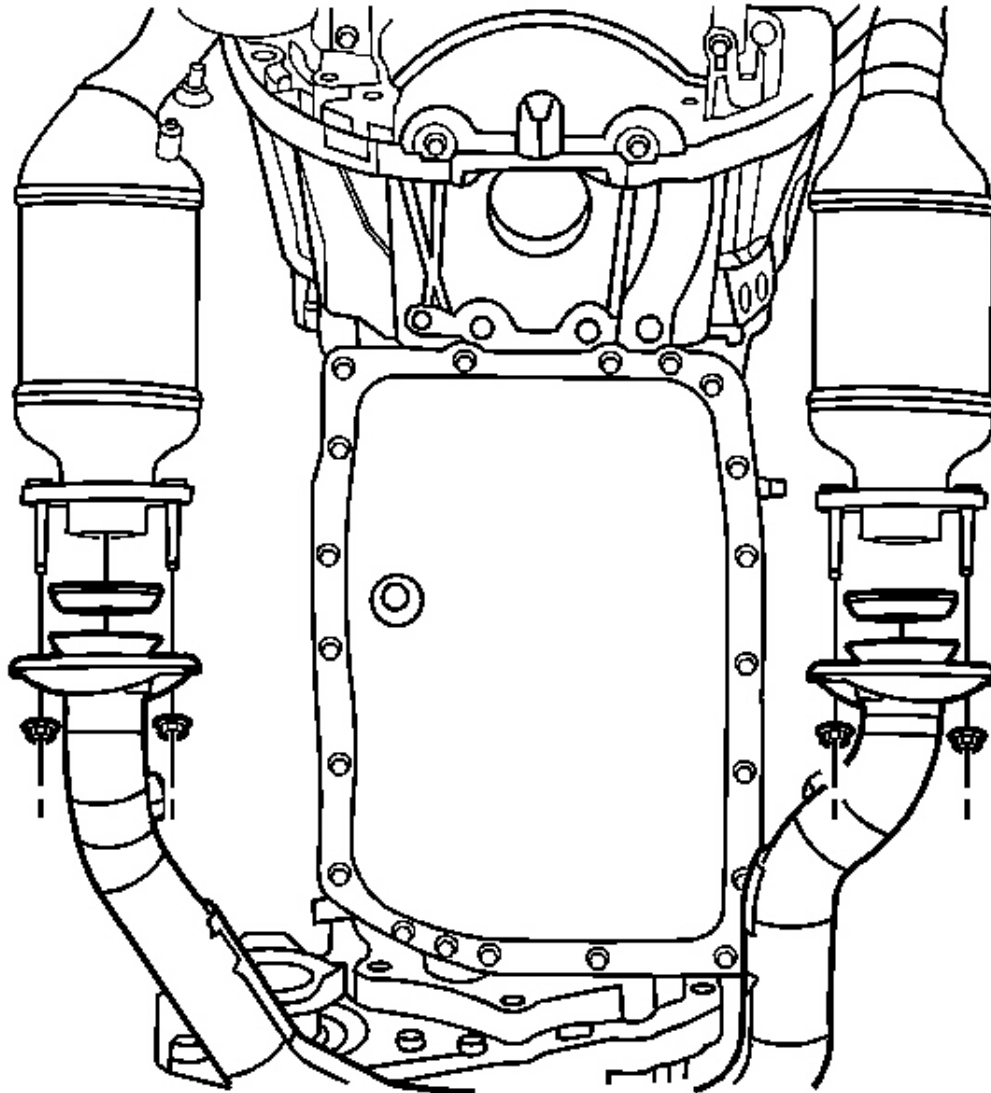


Fig. 35: Identifying Muffler Pipes At Left And Right Side Catalytic Converters
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Inspect the catalytic converter seals. Replace the seals if they are worn or damaged.

6. Connect the muffler pipes to the left and right side catalytic converters.

Tighten: Tighten the muffler nuts to 22 N.m (16 lb ft).

7. Lower the vehicle.
8. Tighten the catalytic converter to exhaust manifold fasteners.

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

9. Install the right bank exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Left (LY7)** or **Exhaust Manifold Heat Shield Replacement - Left (LH2)**.

CATALYTIC CONVERTER REPLACEMENT - RIGHT (LY7)

Removal Procedure

CAUTION: Refer to **Exhaust Service Caution** in Cautions and Notices.

CAUTION: Refer to **Protective Goggles and Glove Caution** in Cautions and Notices.

1. Remove the right bank exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Right (LY7)** or **Exhaust Manifold Heat Shield Replacement - Right (LH2)**.

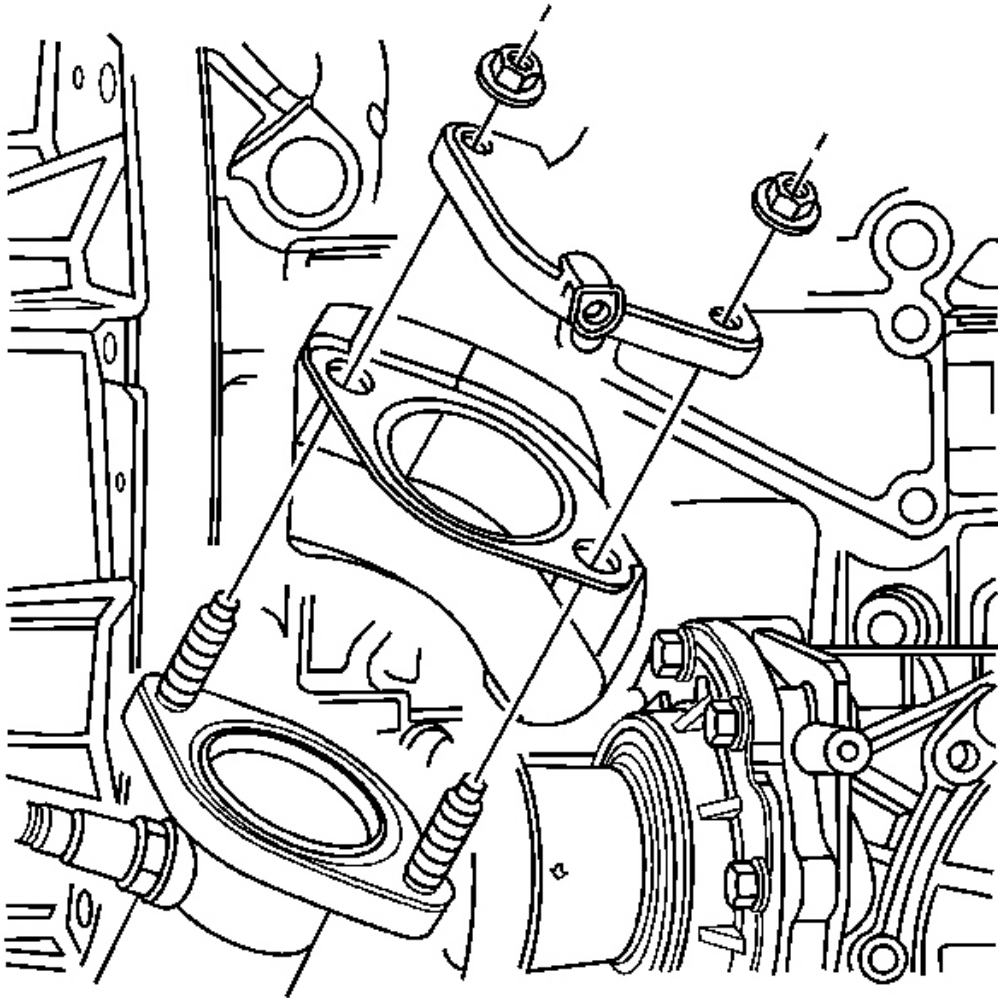


Fig. 36: View Of Right Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

2. Remove the catalytic converter nuts.
3. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
4. If equipped with AWD, remove the front driveshaft. Refer to **Propeller Shaft Replacement - Front** in Propeller Shaft.
5. Disconnect the oxygen sensor electrical connector.

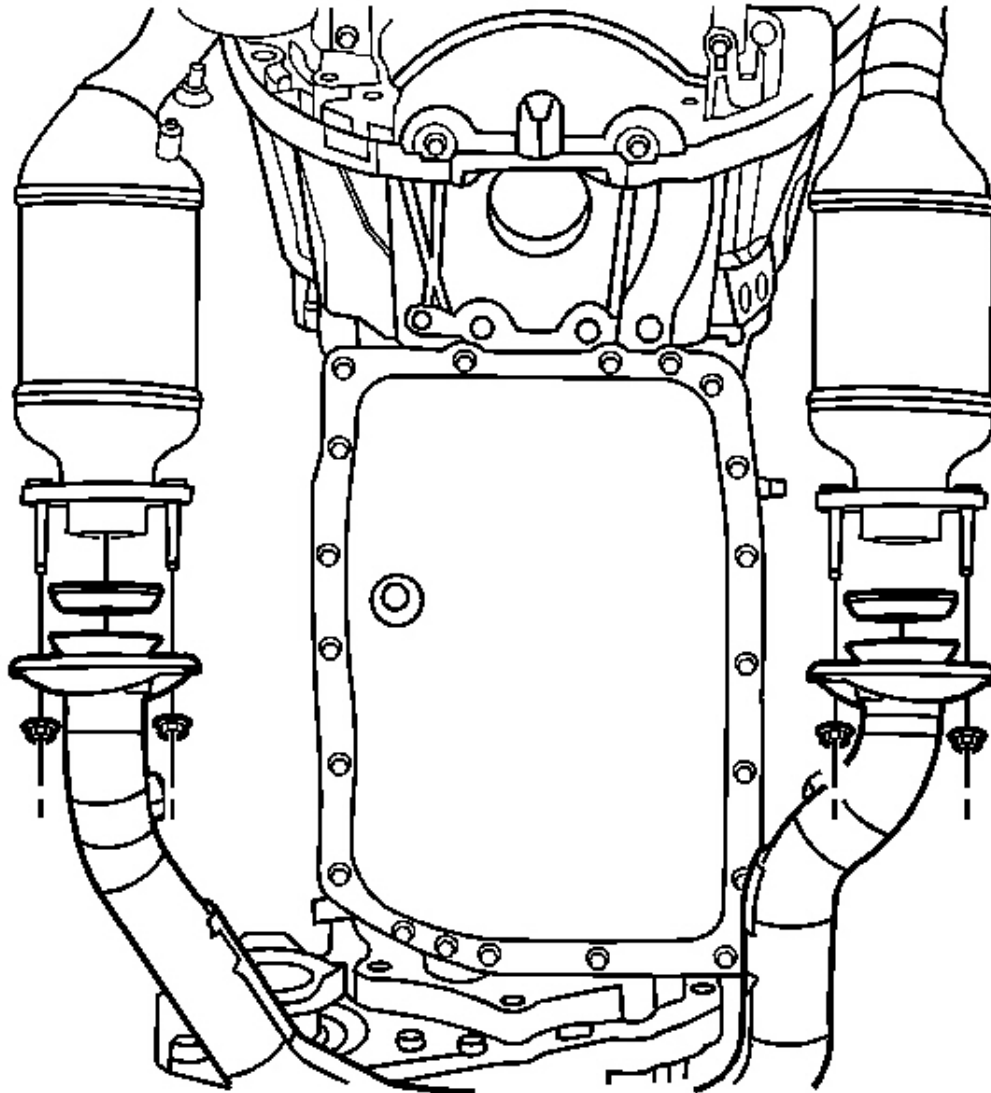


Fig. 37: Identifying Muffler Pipes At Left And Right Side Catalytic Converters
Courtesy of GENERAL MOTORS CORP.

6. Disconnect the muffler pipe from the left and right side catalytic converters.
7. Remove the exhaust pipe to right bank catalytic converter fasteners.
8. Carefully remove the catalytic converter with the seal/heat shield and oxygen sensor from the exhaust manifold.

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9. Remove the oxygen sensor from the catalytic converter. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** in Engine Controls - 3.6L (LY7).

Installation Procedure

1. Install the oxygen sensor to the catalytic converter. Refer to **Heated Oxygen Sensor (HO2S) Replacement Bank 1 Sensor 1** in Engine Controls - 3.6L (LY7).

IMPORTANT: Inspect the catalytic converter seal/heat shield sealing surface. Replace the seal/heat shield if the sealing surface is worn or damaged.

2. Install the catalytic converter seal/heat shield to the catalytic converter.

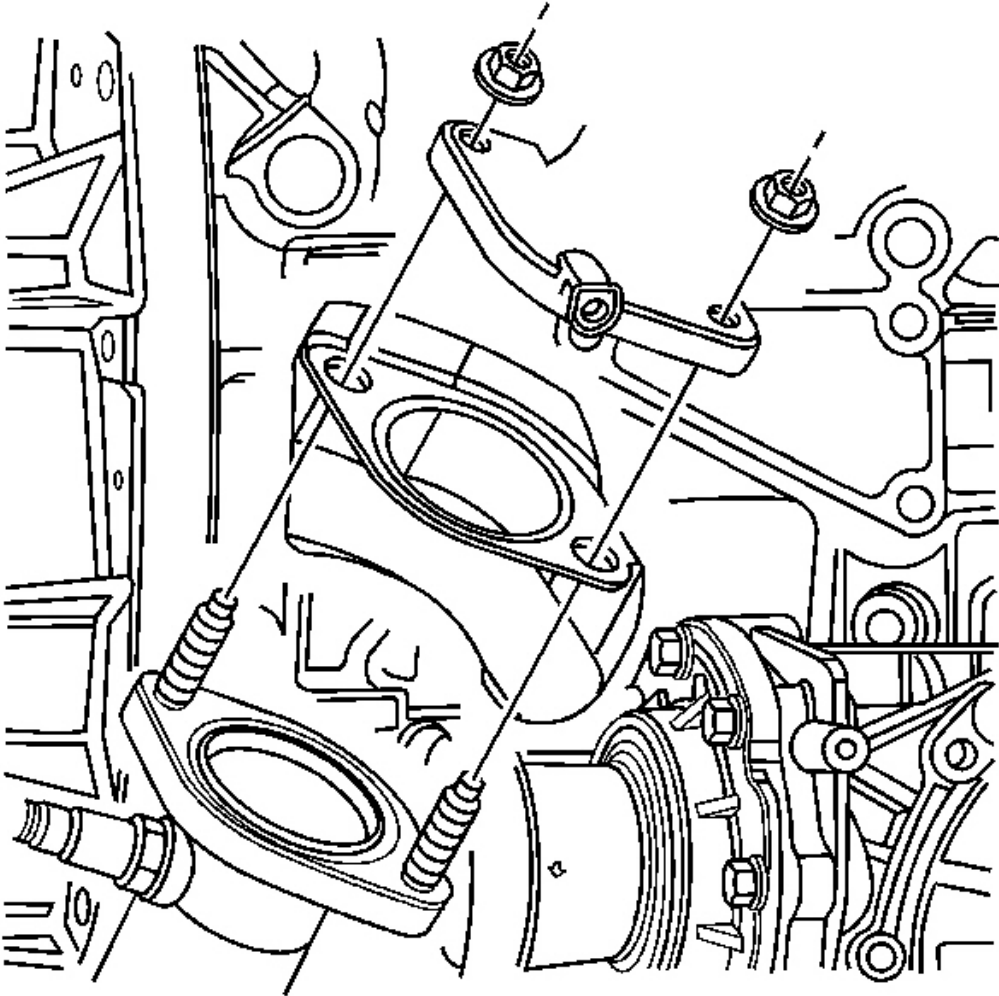


Fig. 38: View Of Right Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

3. Carefully install the catalytic converter to the exhaust manifold.
4. Install the catalytic converter to exhaust manifold fasteners.
5. Connect the oxygen sensor electrical connector.

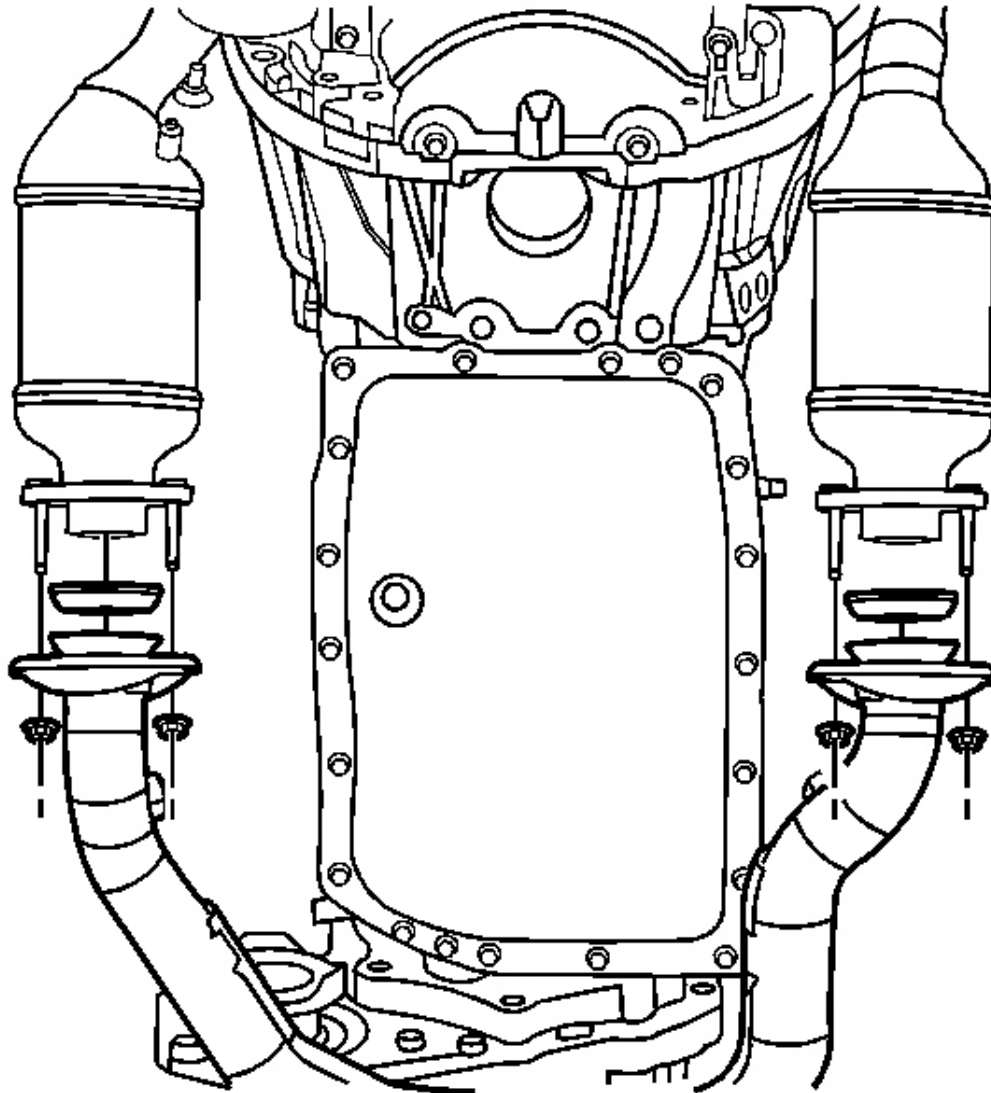


Fig. 39: Identifying Muffler Pipes At Left And Right Side Catalytic Converters
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Inspect the catalytic converter seal. Replace the seal if it is worn or damaged.

6. Connect the muffler pipes to the left and right side catalytic converters.

Tighten: Tighten the muffler nuts to 22 N.m (16 lb ft).

7. If equipped with AWD, install the front driveshaft. Refer to **Propeller Shaft Replacement - Front** in Propeller Shaft.
8. Lower the vehicle.
9. Tighten the catalytic converter nuts.

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

10. Install the right bank exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Right (LY7)** or **Exhaust Manifold Heat Shield Replacement - Right (LH2)**.

EXHAUST HANGER REPLACEMENT

Service the exhaust hangers individually in order to retain the support of the exhaust system.

Removal Procedure

CAUTION: Refer to **Exhaust Service Caution** in Cautions and Notices.

CAUTION: Refer to **Protective Goggles and Glove Caution** in Cautions and Notices.

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

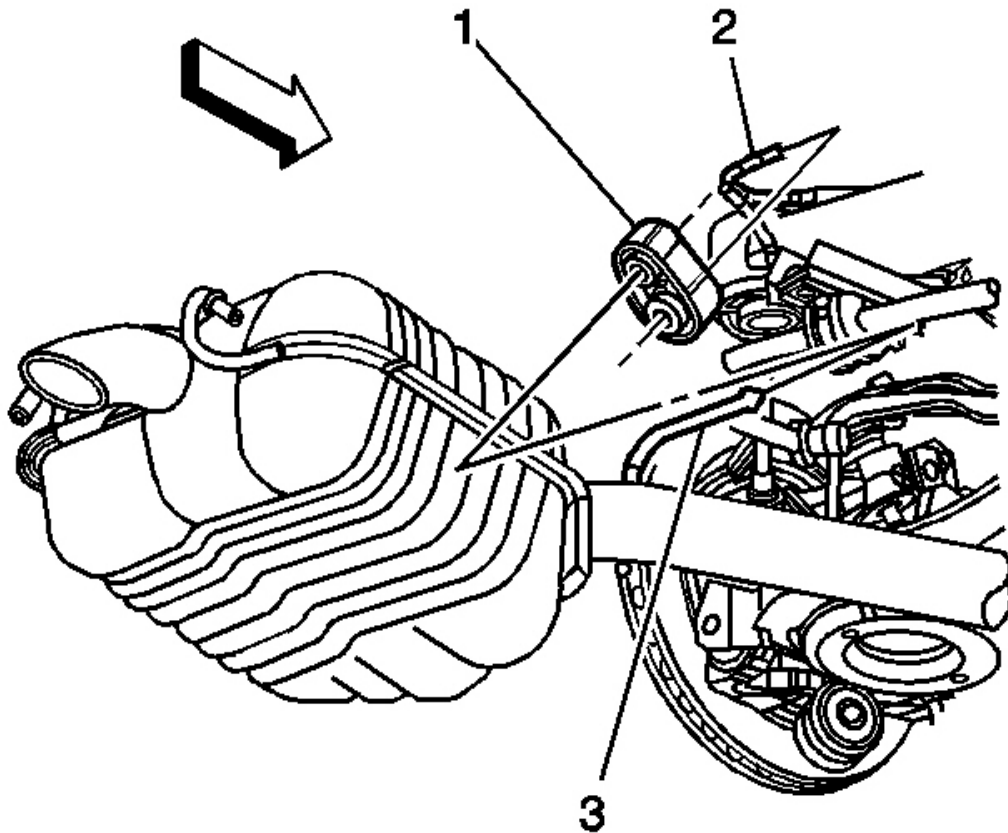


Fig. 40: View Of Front Exhaust, Rear Suspension & Exhaust Pipe Hanger Rods
Courtesy of GENERAL MOTORS CORP.

2. Pry the front exhaust hanger (1) free from the rear suspension hanger rod (2).
3. Apply a suitable lubricant to the exhaust pipe hanger rod (3) in order to ease the removal of the hanger (1).
4. Pry the front exhaust hanger (1) free from the exhaust pipe hanger rod (3).

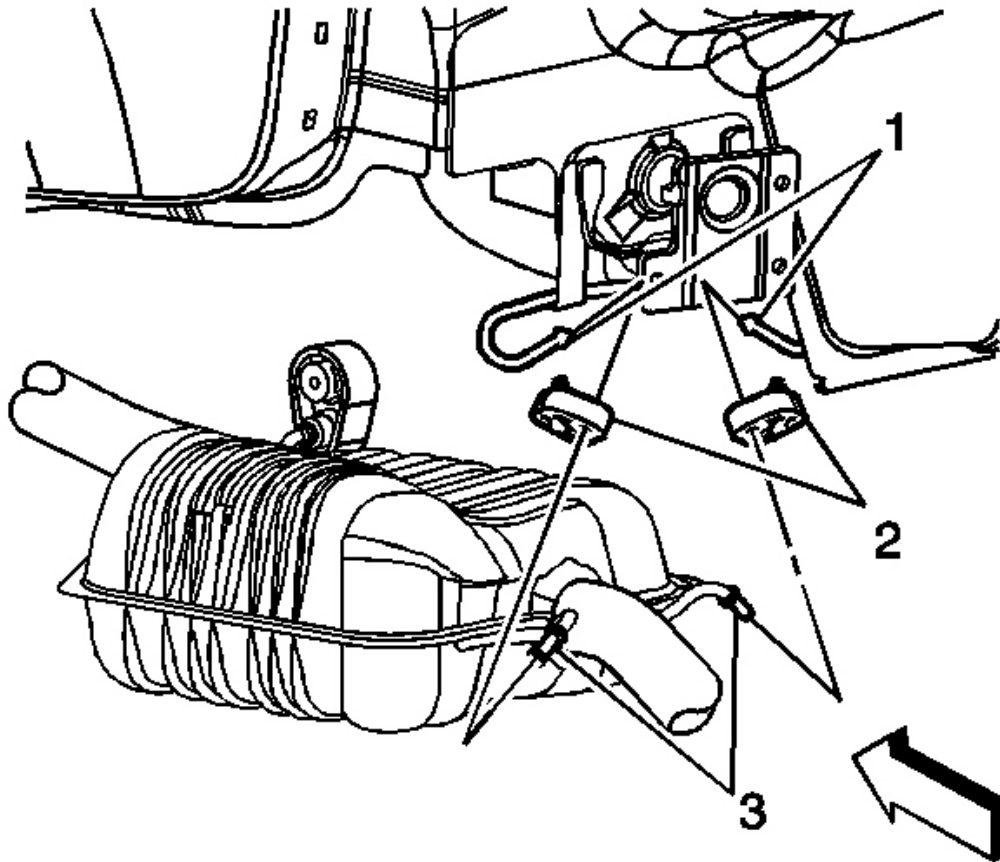


Fig. 41: View Of Body Support Bracket Rod, Tail Pipe Hanger Rod & Tail Pipe Hanger

Courtesy of GENERAL MOTORS CORP.

5. Apply a suitable lubricant to the following in order to ease the removal of the hanger (2):
 - The body support bracket rod (1)
 - The tail pipe hanger rod (3)
6. Pry the tail pipe hanger (2) free from the tail pipe hanger rod (3).
7. Pry the tail pipe hanger (2) free from the body support bracket rod (1).

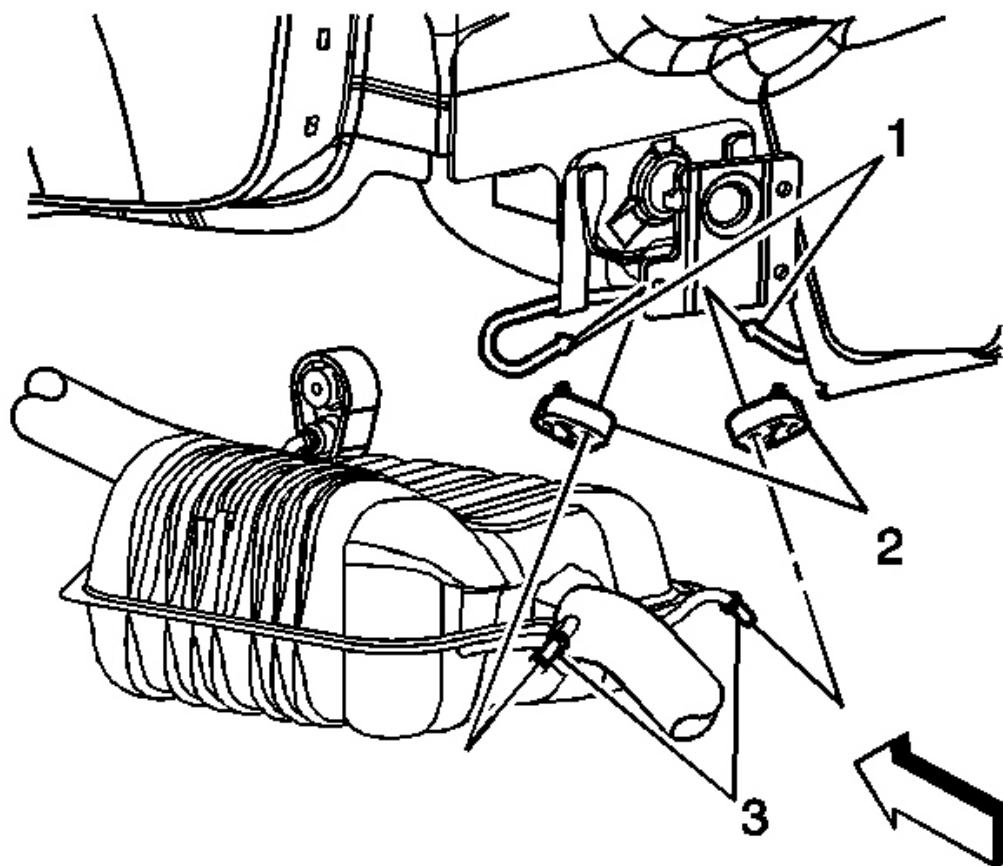


Fig. 42: View Of Body Support Bracket Rod, Tail Pipe Hanger Rod & Tail Pipe Hanger

Courtesy of GENERAL MOTORS CORP.

1. Apply a soapy solution to the following in order to ease the installation of the hanger:
 - The body support bracket rod (1)
 - The inner diameter of the tail pipe hanger (2)
 - The tail pipe hanger rod (3)
2. Press the tail pipe hanger (2) over the tail pipe hanger rod (3).
3. Press the tail pipe hanger (2) over the body support bracket rod (1).

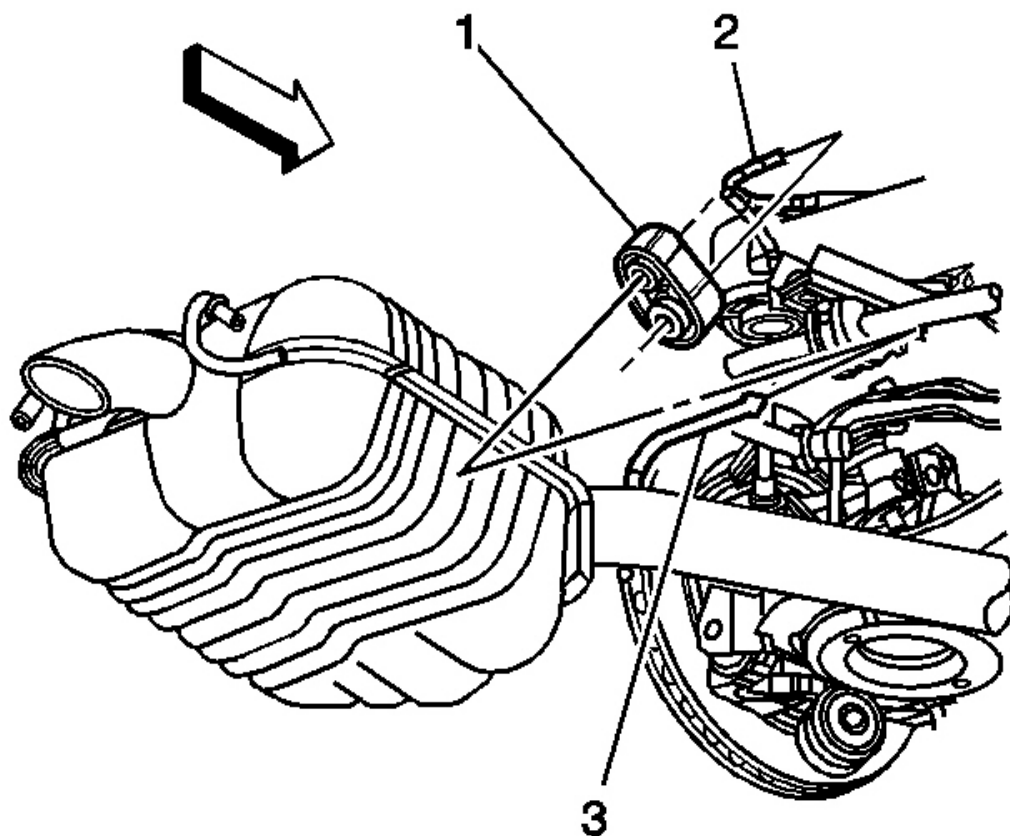


Fig. 43: View Of Front Exhaust, Rear Suspension & Exhaust Pipe Hanger Rods
Courtesy of GENERAL MOTORS CORP.

4. Apply a soapy solution to the exhaust pipe hanger rod (3) and the inner diameter of the front exhaust hanger (1) in order to ease the installation of the hanger (1).
5. Press the front exhaust hanger (1) over the exhaust pipe hanger rod (3).
6. Press the front exhaust hanger (1) over the rear suspension hanger rod (2).
7. Lower the vehicle.

EXHAUST HANGER MOUNTING BRACKET REPLACEMENT

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

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

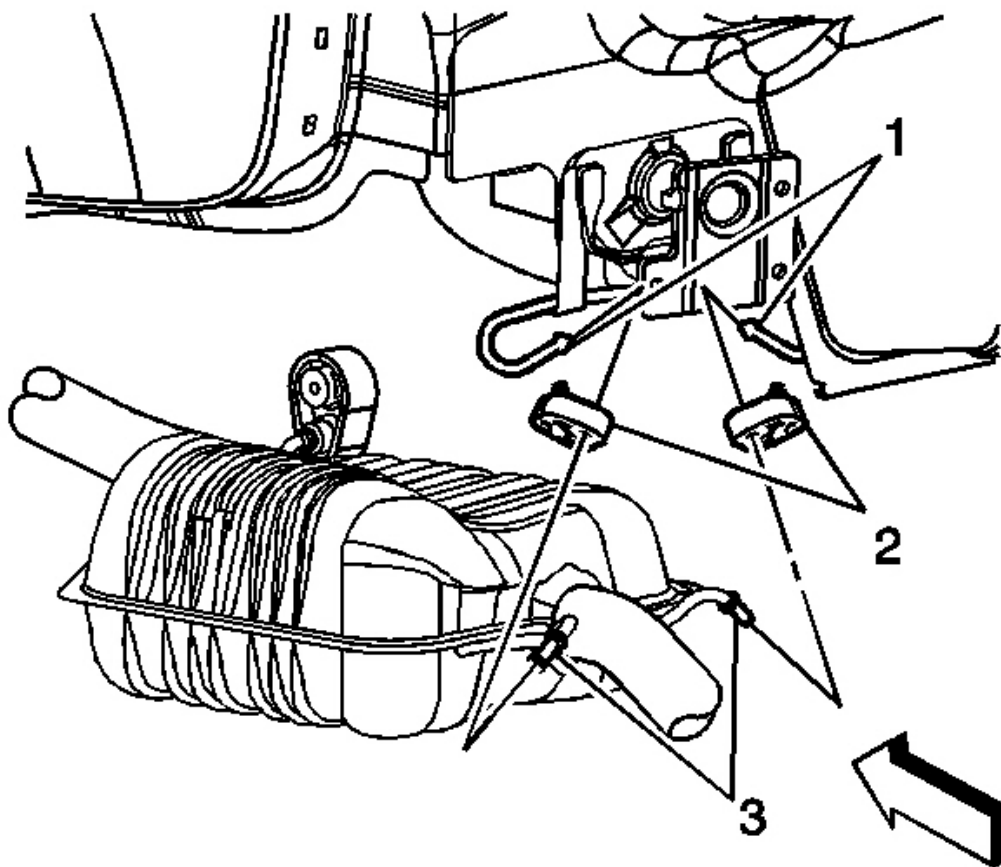


Fig. 44: View Of Body Support Bracket Rod, Tail Pipe Hanger Rod & Tail Pipe Hanger

Courtesy of GENERAL MOTORS CORP.

2. Apply a suitable lubricant to the following in order to ease the removal of the hangers (2):
 - The left exhaust hanger mounting bracket rod (1)

- The tail pipe hanger rods (3)
3. Pry the tail pipe hangers (2) free from the tail pipe hanger rods (3).
 4. Pry the tail pipe hangers (2) free from the exhaust hanger mounting bracket rods (1).

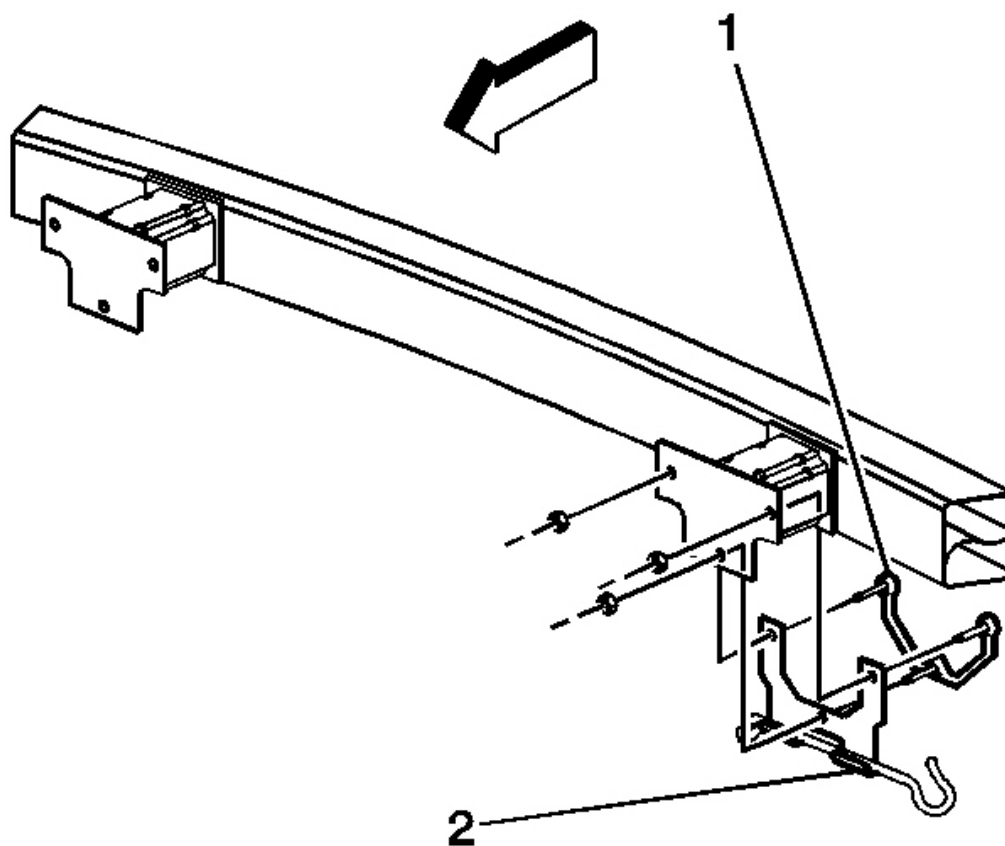


Fig. 45: View Of Stud Plate & Exhaust Hanger Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

5. Remove the nuts securing the rear energy absorber and the exhaust hanger mounting bracket (2) to the rear compartment rail.
6. Remove the stud plate (1) from the rear energy absorber.
7. Remove the exhaust hanger mounting bracket from the rear energy absorber.

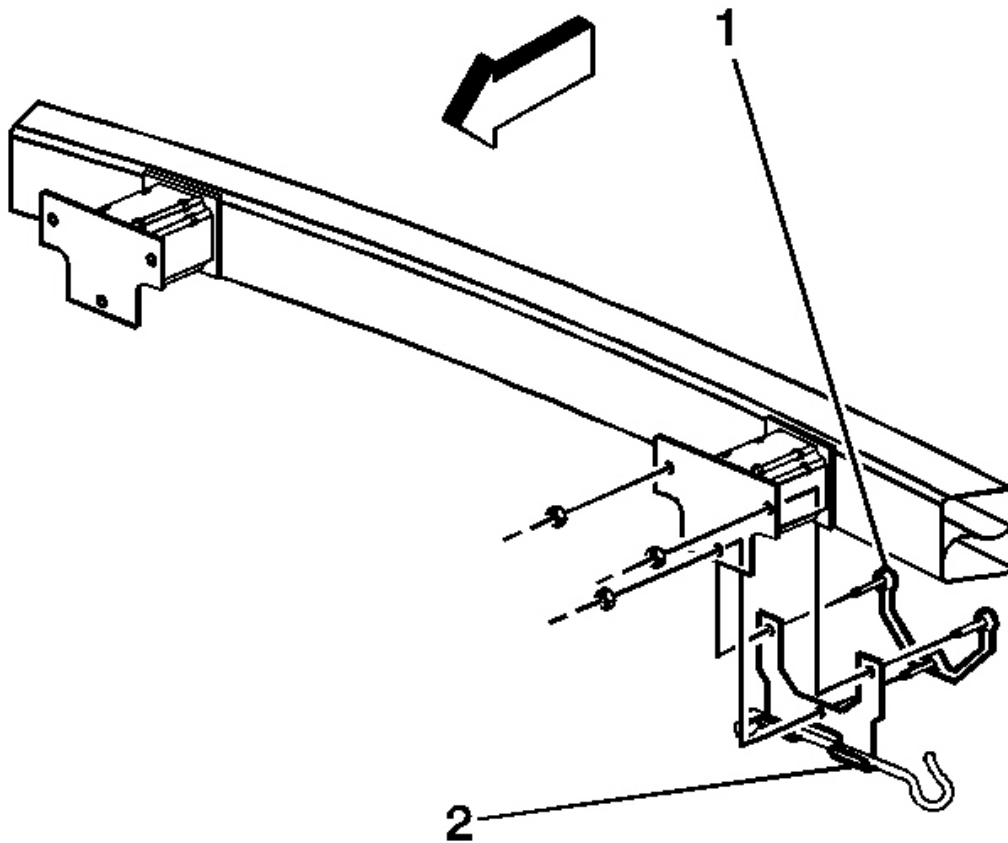


Fig. 46: View Of Stud Plate & Exhaust Hanger Mounting Bracket
Courtesy of GENERAL MOTORS CORP.

1. Position the exhaust hanger mounting bracket (2) between the rear energy absorber and the stud plate (1).

Insert the stud plate (1) through the exhaust hanger mounting bracket (2), the rear energy absorber and the rear compartment rail.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the nuts securing the rear energy absorber and the exhaust hanger mounting bracket (2) to the rear compartment rail.

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

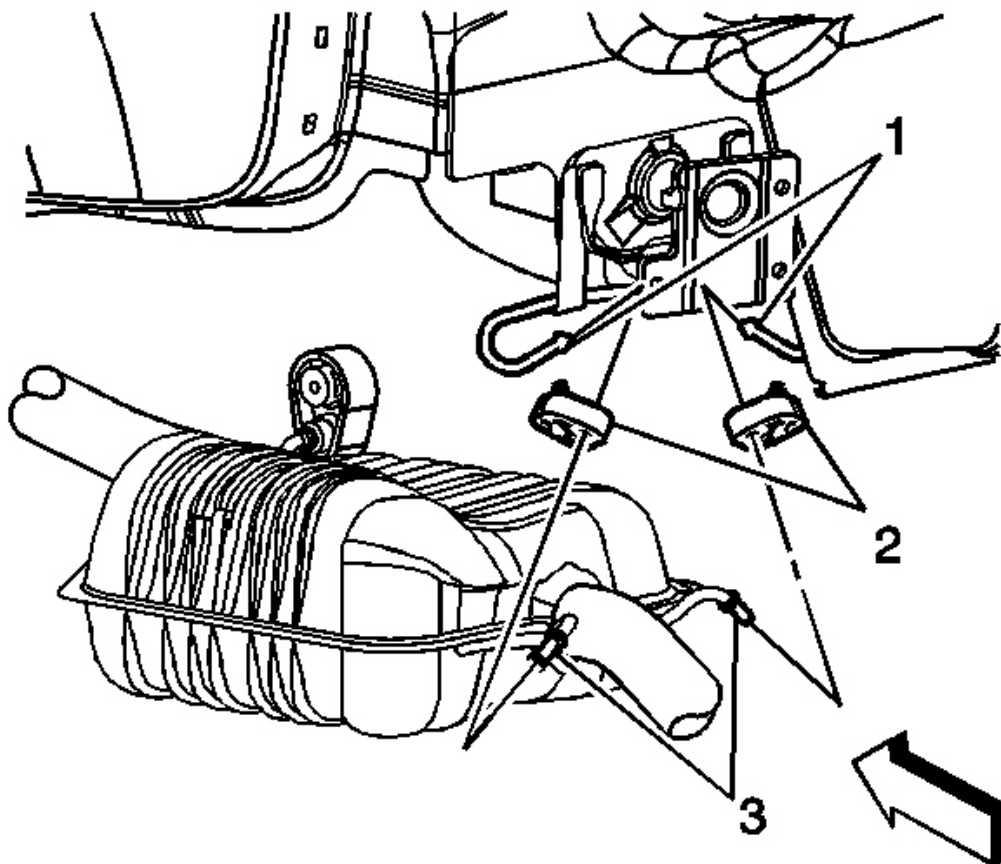


Fig. 47: View Of Body Support Bracket Rod, Tail Pipe Hanger Rod & Tail Pipe Hanger

Courtesy of GENERAL MOTORS CORP.

3. Apply a soapy solution to the following in order to ease the installation of the hangers:
 - The left exhaust hanger mounting bracket rod (1)
 - The inner diameter of the tail pipe hangers (2)
 - The tail pipe hanger rods (3)
4. Press the tail pipe hangers (2) over the tail pipe hanger rods (3).
5. Press the tail pipe hangers (2) over the exhaust hanger mounting bracket rods (1).

6. Lower the vehicle.

TAIL PIPE EXTENSION REPLACEMENT

Removal Procedure

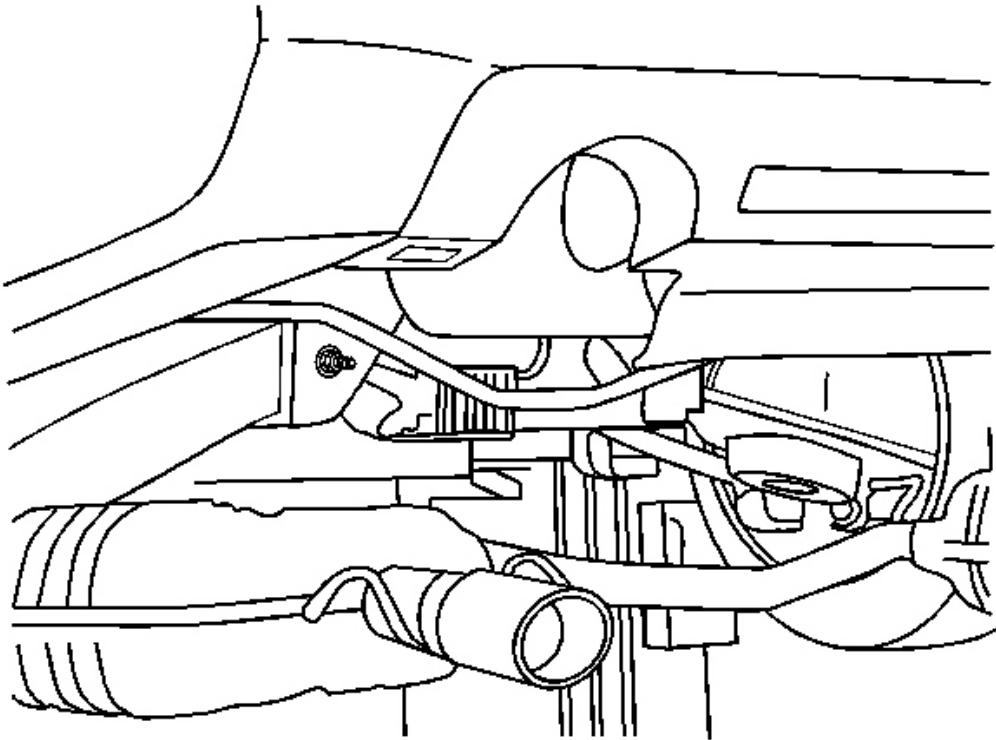


Fig. 48: Removing Exhaust System
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the exhaust system from the rear suspension hanger rods, and the tail pipe hanger rods.

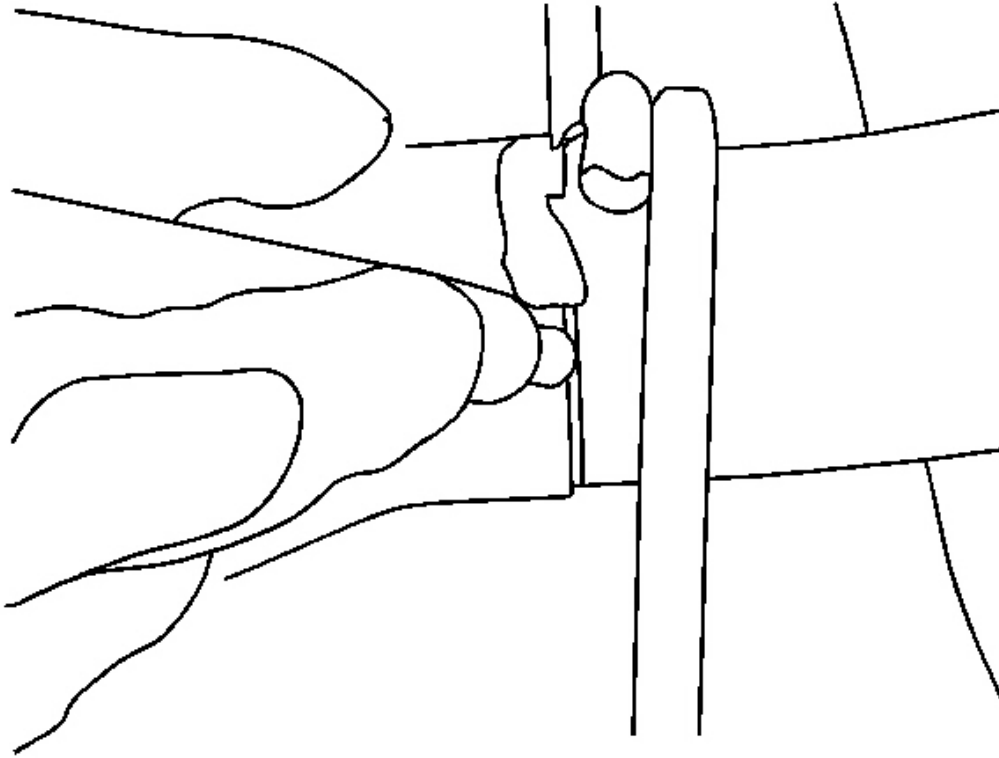


Fig. 49: Marking Location Of Exhaust Tip
Courtesy of GENERAL MOTORS CORP.

3. Mark the location of the existing exhaust tip on the exhaust pipe.

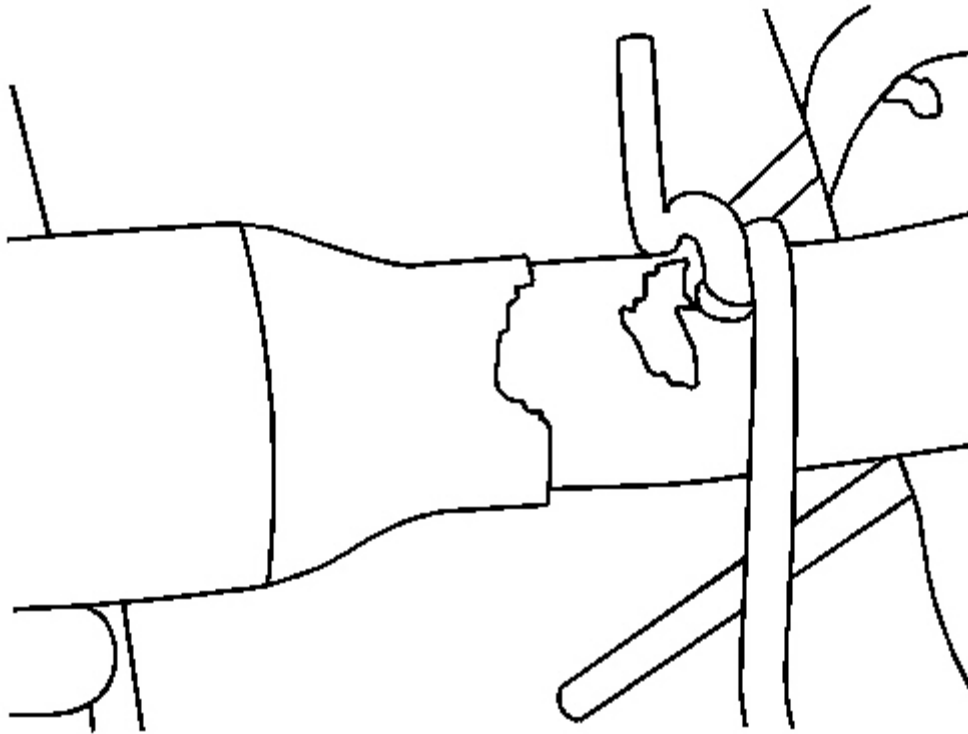


Fig. 50: Removing Weld From Exhaust Tip
Courtesy of GENERAL MOTORS CORP.

4. Remove the weld from the top and bottom of the exhaust tip.
5. Remove the exhaust tip.

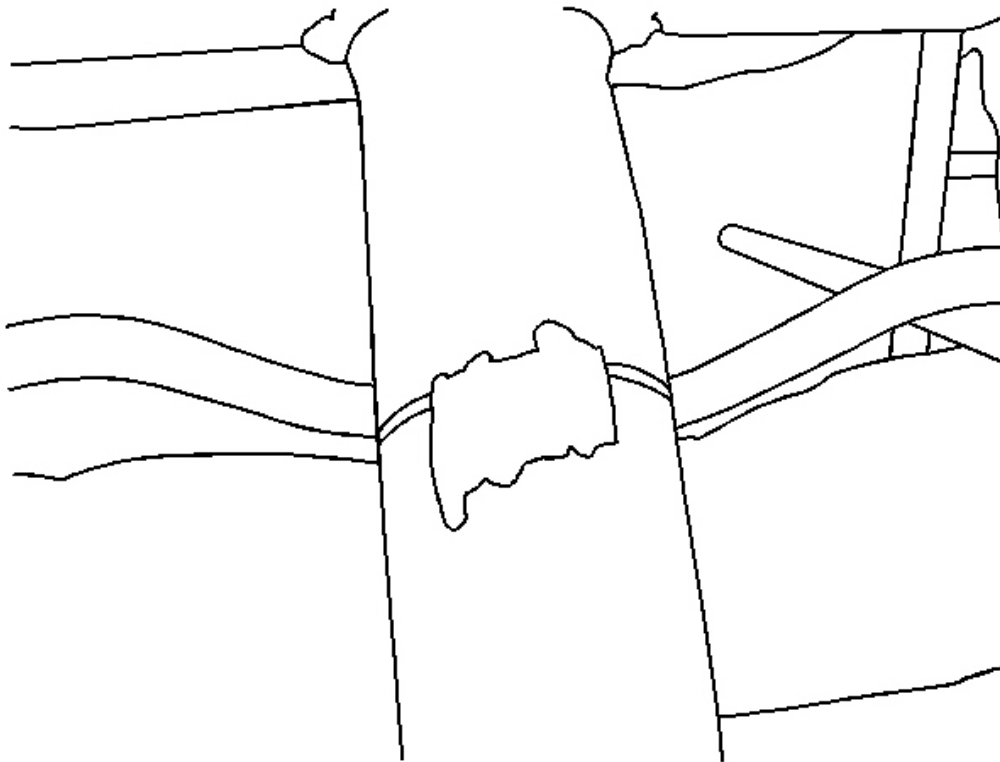


Fig. 51: Cleaning Weld From Exhaust Pipe
Courtesy of GENERAL MOTORS CORP.

6. Clean the remaining weld from the exhaust pipe.

Installation Procedure

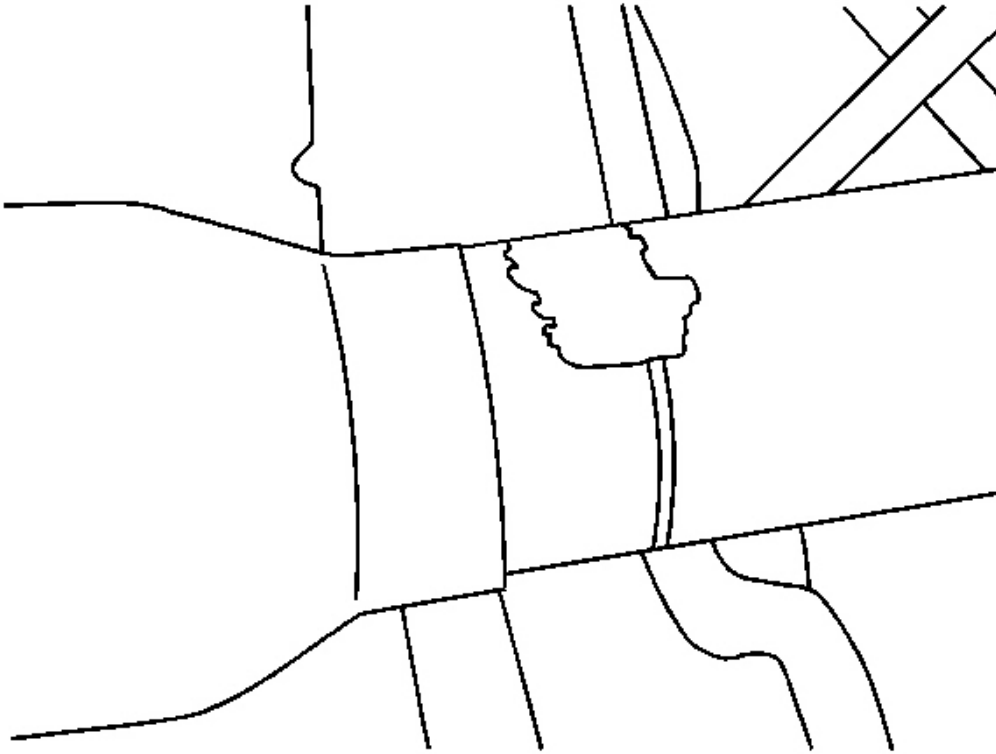


Fig. 52: Installing Exhaust Tip
Courtesy of GENERAL MOTORS CORP.

1. Install the NEW exhaust tip to the exhaust pipe, and align to the mark previously made during disassembly.
2. Re-install the exhaust system to the rear suspension hanger rods, and the tail pipe hanger rods.

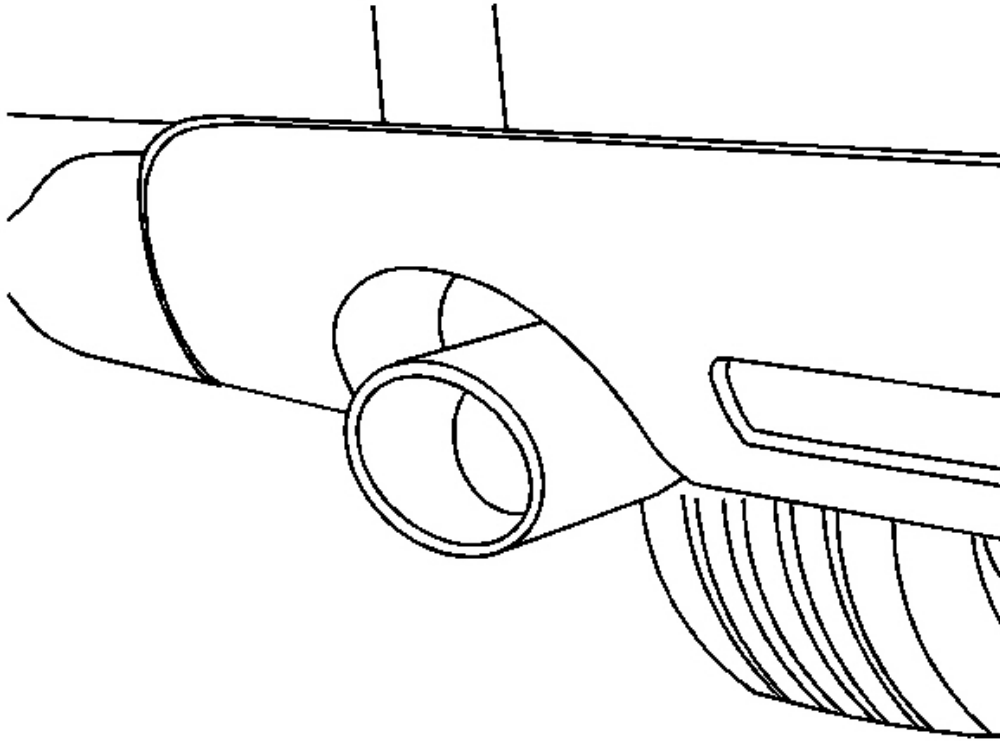


Fig. 53: Aligning Exhaust Tip
Courtesy of GENERAL MOTORS CORP.

3. Visually align the exhaust tip to the vehicle.
4. Tack weld the exhaust tip to the vehicle.

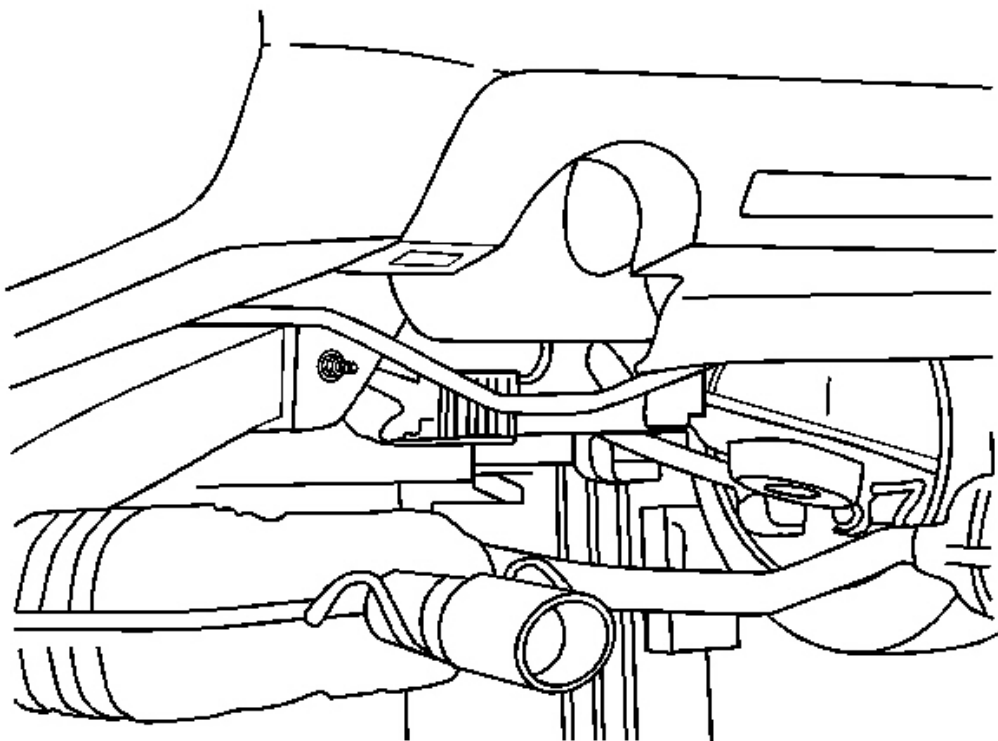


Fig. 54: Removing Exhaust System
Courtesy of GENERAL MOTORS CORP.

5. Remove the exhaust system from the rear suspension hanger rods, and the tail pipe hanger rods.
6. Weld the exhaust tip to the exhaust pipe in the same locations the original tip had been welded.
7. Re-install the exhaust system to the rear suspension hanger rods, and the tail pipe hanger rods.

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - RIGHT (LY7)

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

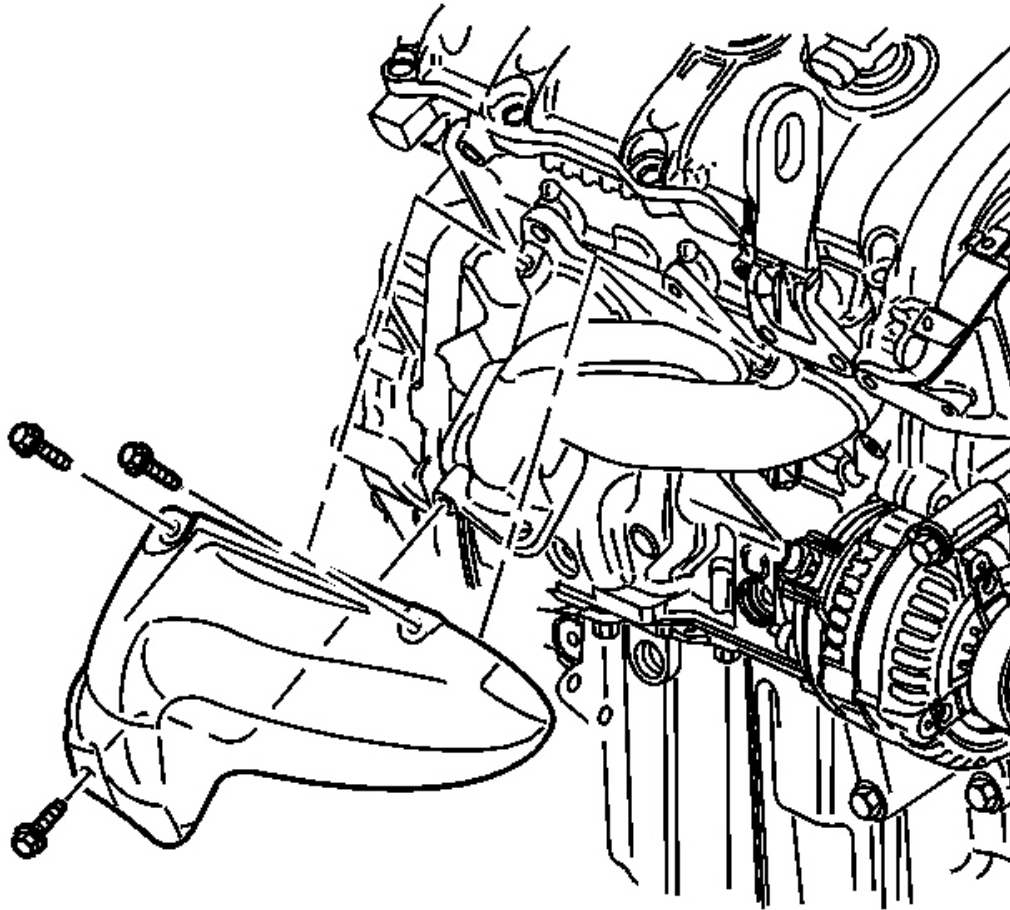


Fig. 55: View Of Right Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

1. Remove the exhaust manifold heat shield bolts.
2. Remove the exhaust manifold heat shield.

Installation Procedure

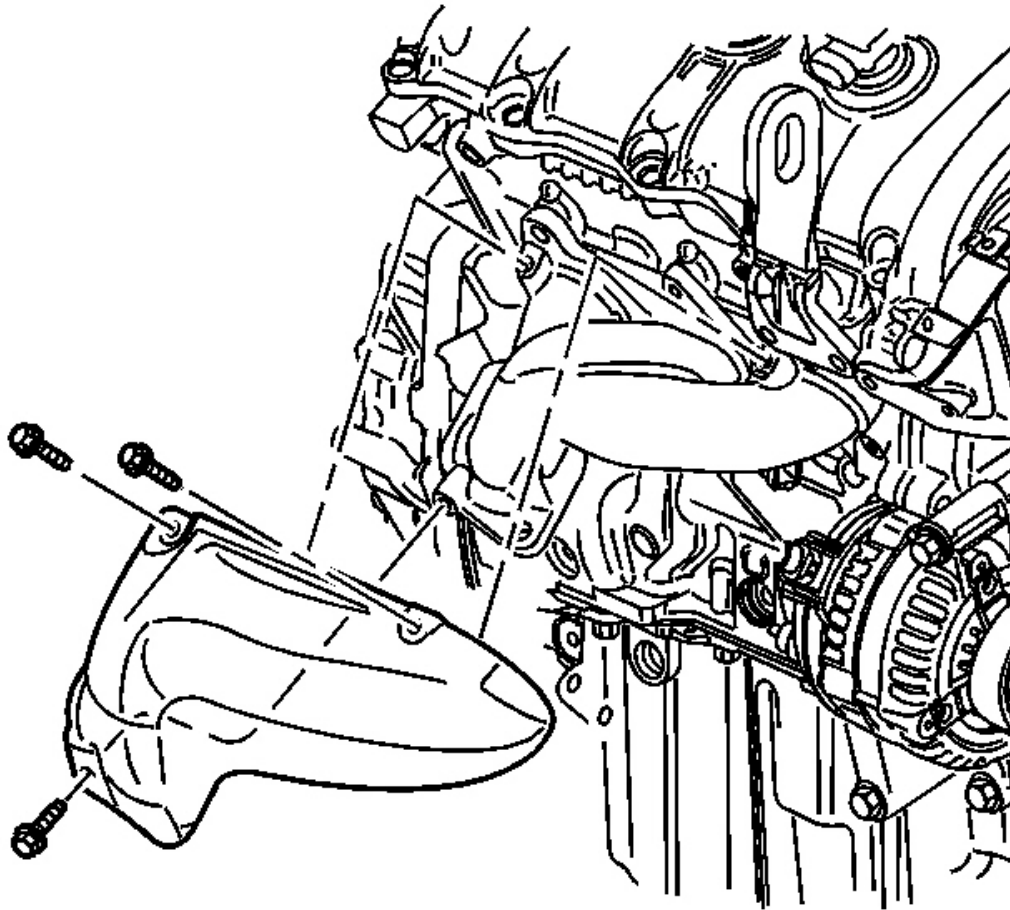


Fig. 56: View Of Right Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust manifold heat shield.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the exhaust manifold heat shield bolts.

Tighten: Tighten the exhaust manifold heat shield bolt to 10 N.m (89 lb in).

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

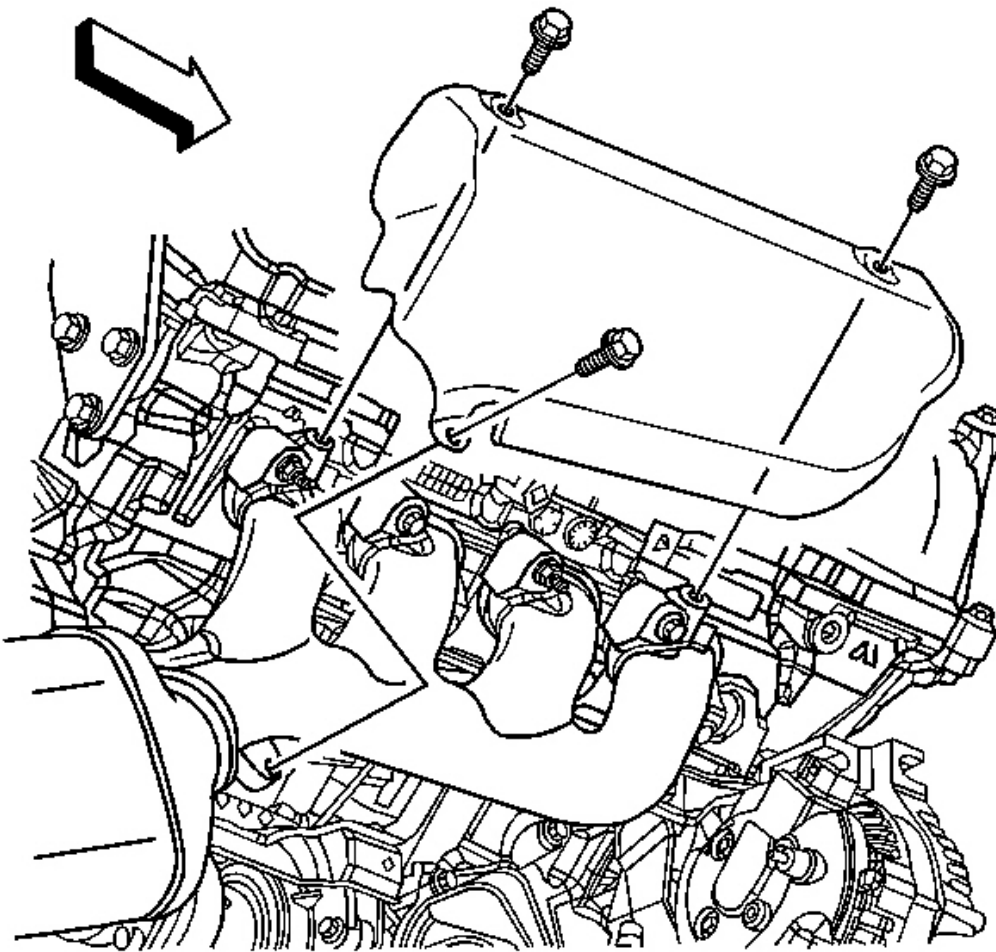


Fig. 57: View Of Right Exhaust Manifold Heat Shield - LH2
Courtesy of GENERAL MOTORS CORP.

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Disconnect the wire clips from the generator and generator bracket.
3. Remove the bolts securing the exhaust manifold heat shield to the exhaust manifold.
4. Remove the heat shield from the engine.

Installation Procedure

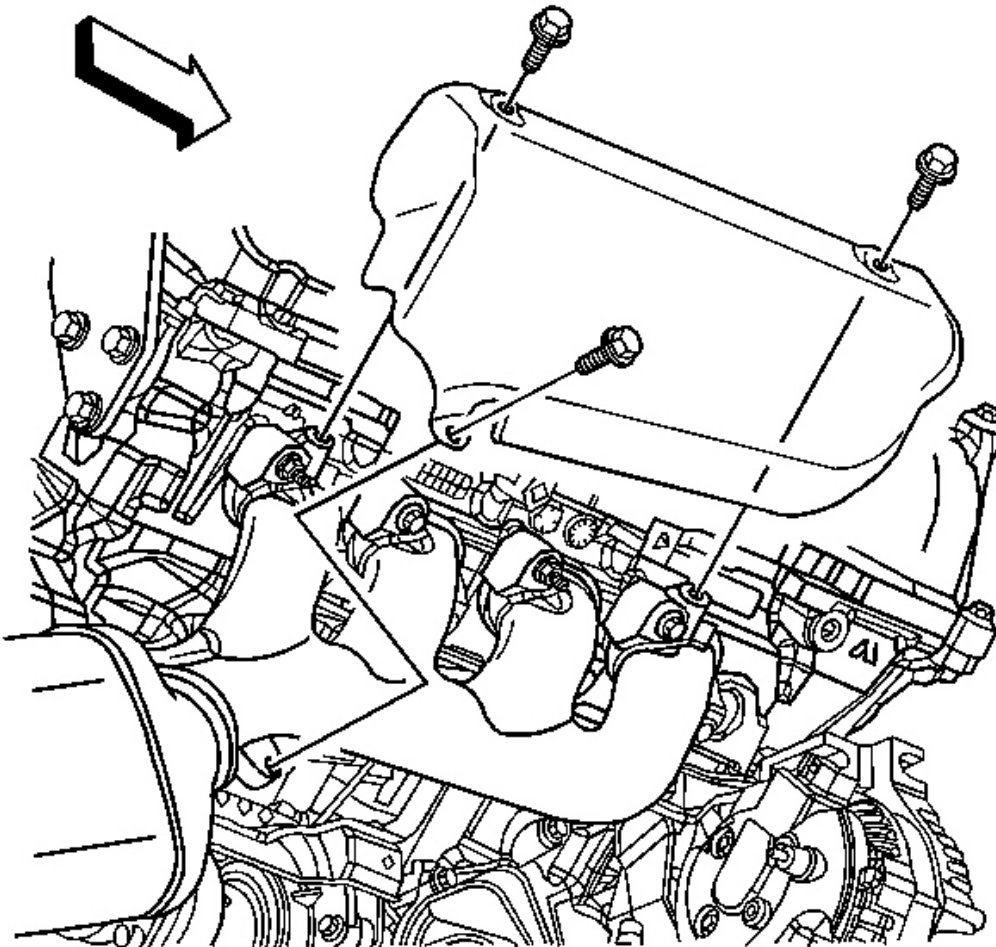


Fig. 58: View Of Right Exhaust Manifold Heat Shield - LH2
Courtesy of GENERAL MOTORS CORP.

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1. Install the exhaust manifold heat shield to the engine.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts securing the exhaust manifold heat shield to the manifold.

Tighten: Tighten the exhaust manifold heat shield bolts to 10 N.m (89 lb in).

3. Connect the wire clips to the generator and generator bracket.
4. Lower the vehicle.

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - LEFT (LY7)

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

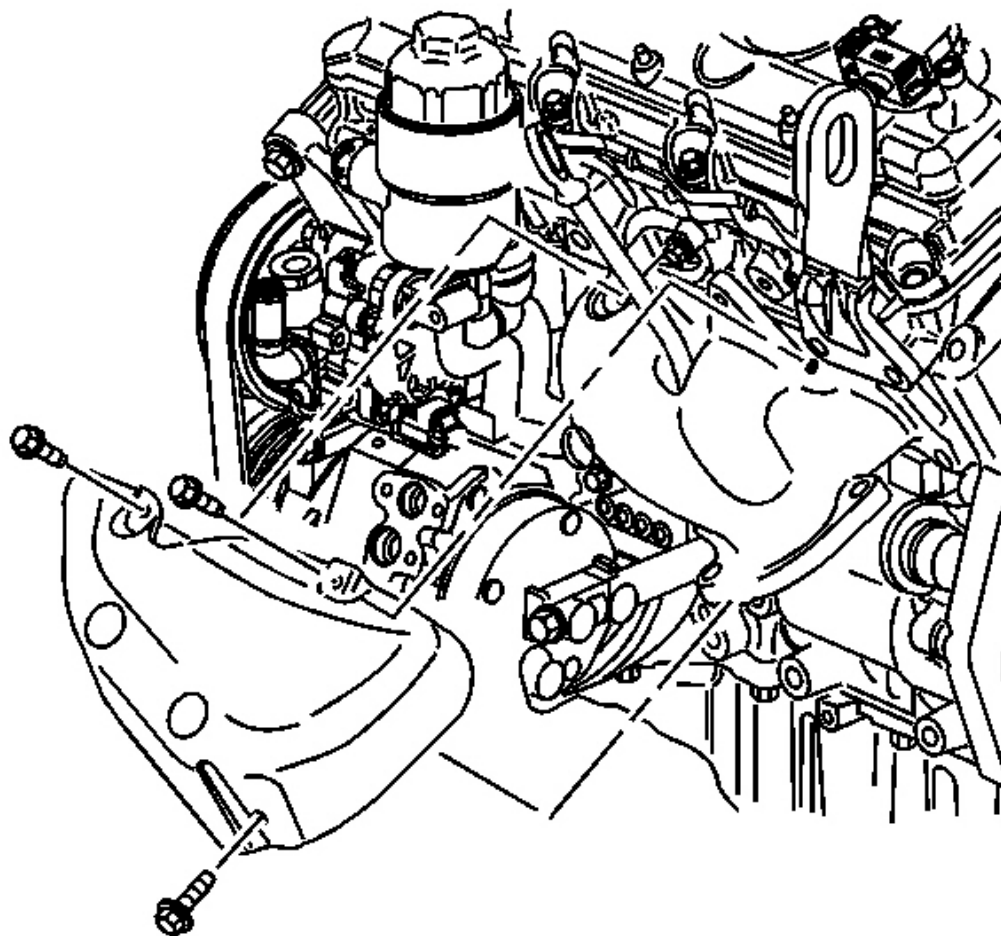


Fig. 59: View Of Left Exhaust Manifold Heat Shield - LY7
Courtesy of GENERAL MOTORS CORP.

1. Remove the exhaust manifold heat shield bolts.
2. Remove the exhaust manifold heat shield.

Installation Procedure

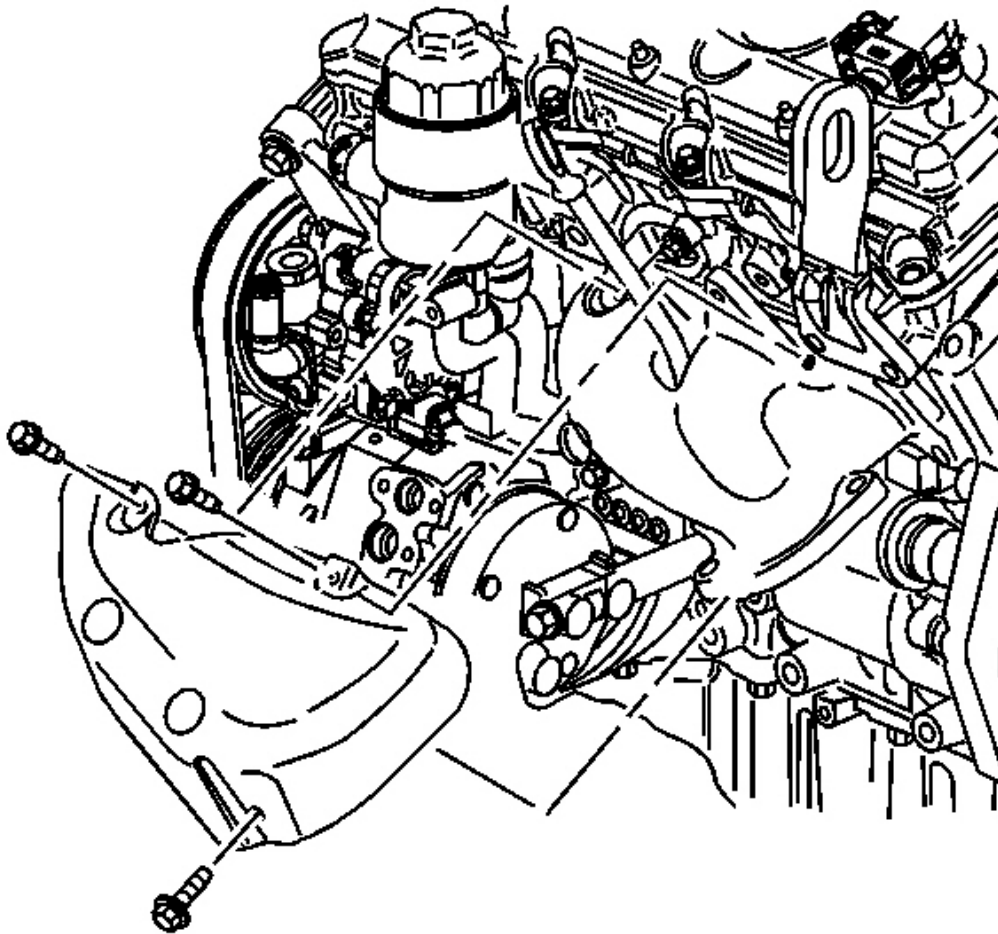


Fig. 60: View Of Left Exhaust Manifold Heat Shield - LY7
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust manifold heat shield.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the exhaust manifold heat shield bolts.

Tighten: Tighten the exhaust manifold heat shield bolt to 10 N.m (89 lb in).

Removal Procedure

CAUTION: Refer to Exhaust Service Caution in Cautions and Notices.

CAUTION: Refer to Protective Goggles and Glove Caution in Cautions and Notices.

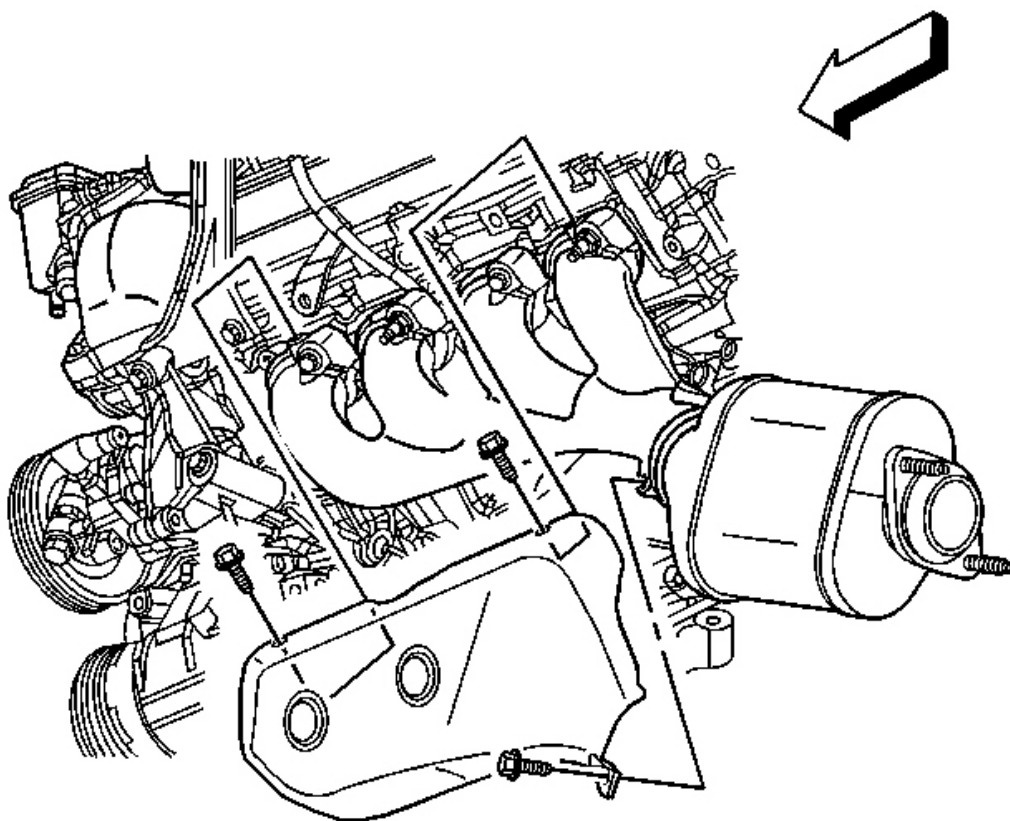


Fig. 61: View Of Left Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

1. Remove the power steering gear. Refer to Power Steering Gear Replacement in Power Steering System.
2. Remove the bolts securing the exhaust manifold heat shield to the exhaust manifold.

3. Remove the heat shield from the engine.

Installation Procedure

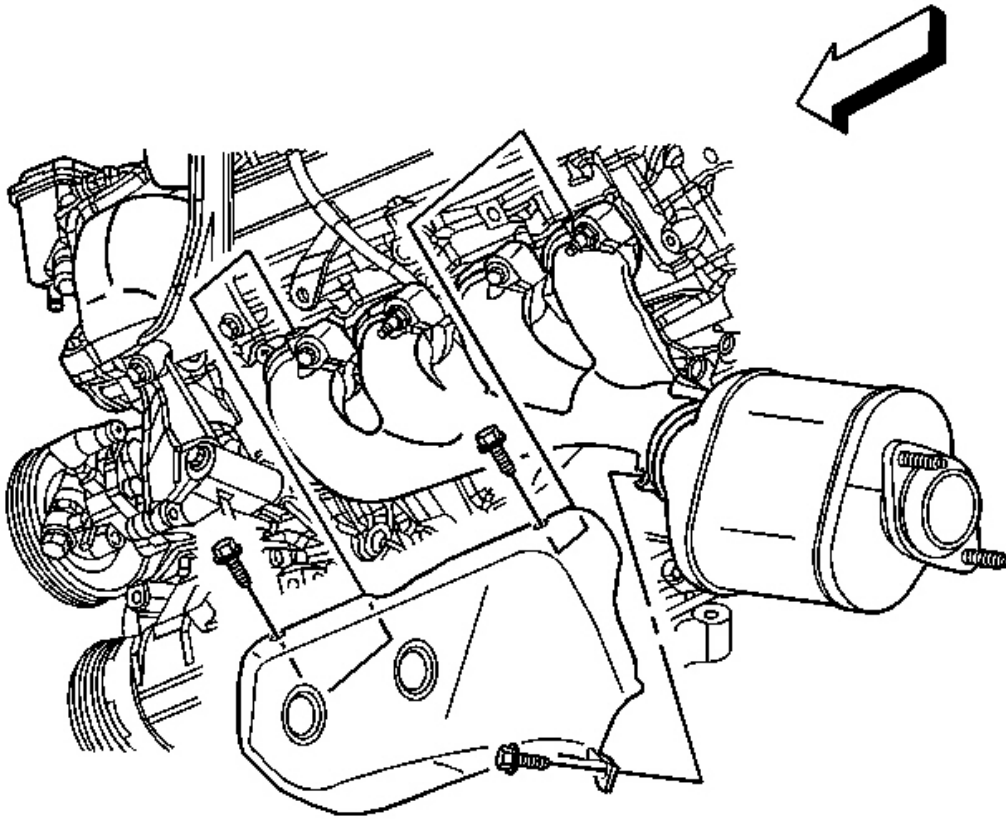


Fig. 62: View Of Left Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

1. Install the exhaust manifold heat shield to the engine.

NOTE: Refer to Fastener Notice in Cautions and Notices.

2. Install the bolts securing the exhaust manifold heat shield to the manifold.

Tighten: Tighten the exhaust manifold heat shield bolts to 10 N.m (89 lb in).

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3. Install the power steering gear. Refer to **Power Steering Gear Replacement** in Power Steering System.

EXHAUST HEAT SHIELD REPLACEMENT - CENTER BEARING

Removal Procedure

CAUTION: Refer to **Exhaust Service Caution** in Cautions and Notices.

CAUTION: Refer to **Protective Goggles and Glove Caution** in Cautions and Notices.

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

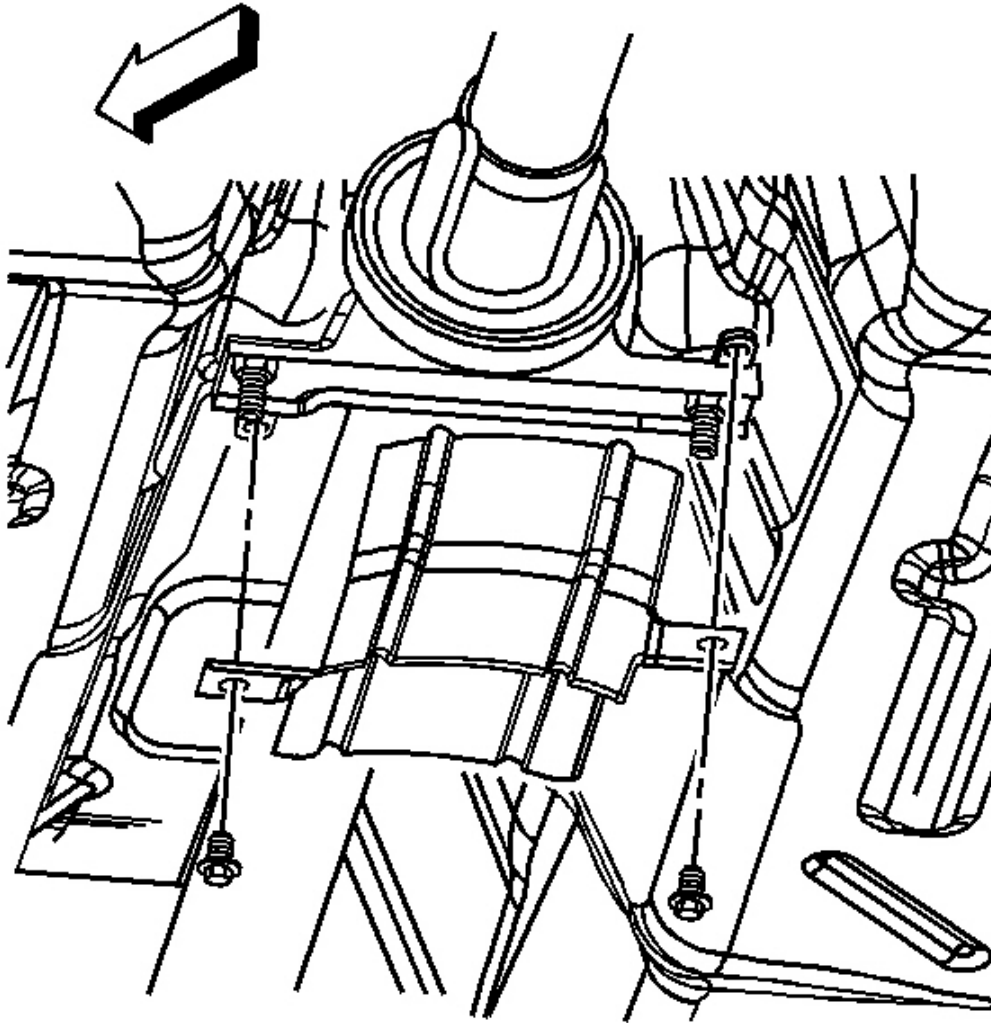


Fig. 63: View Of Center Bearing Heat Shield
Courtesy of GENERAL MOTORS CORP.

2. Remove the bolts securing the center bearing heat shield to the center bearing.
3. Remove the heat shield from the center bearing in the following order:
 1. Tilt the heat shield to either side.
 2. Slide the heat shield out from between the body, the drive shaft center bearing, and the exhaust pipes.

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3. Remove the heat shield from the vehicle.

Installation Procedure

1. Install the center bearing heat shield to the center bearing in the following order:
 1. Slide the heat shield in between the body, the drive shaft center bearing, and the exhaust pipes.
 2. Align the holes in the heat shield with the holes in the center bearing.

NOTE: Refer to Fastener Notice in Cautions and Notices.

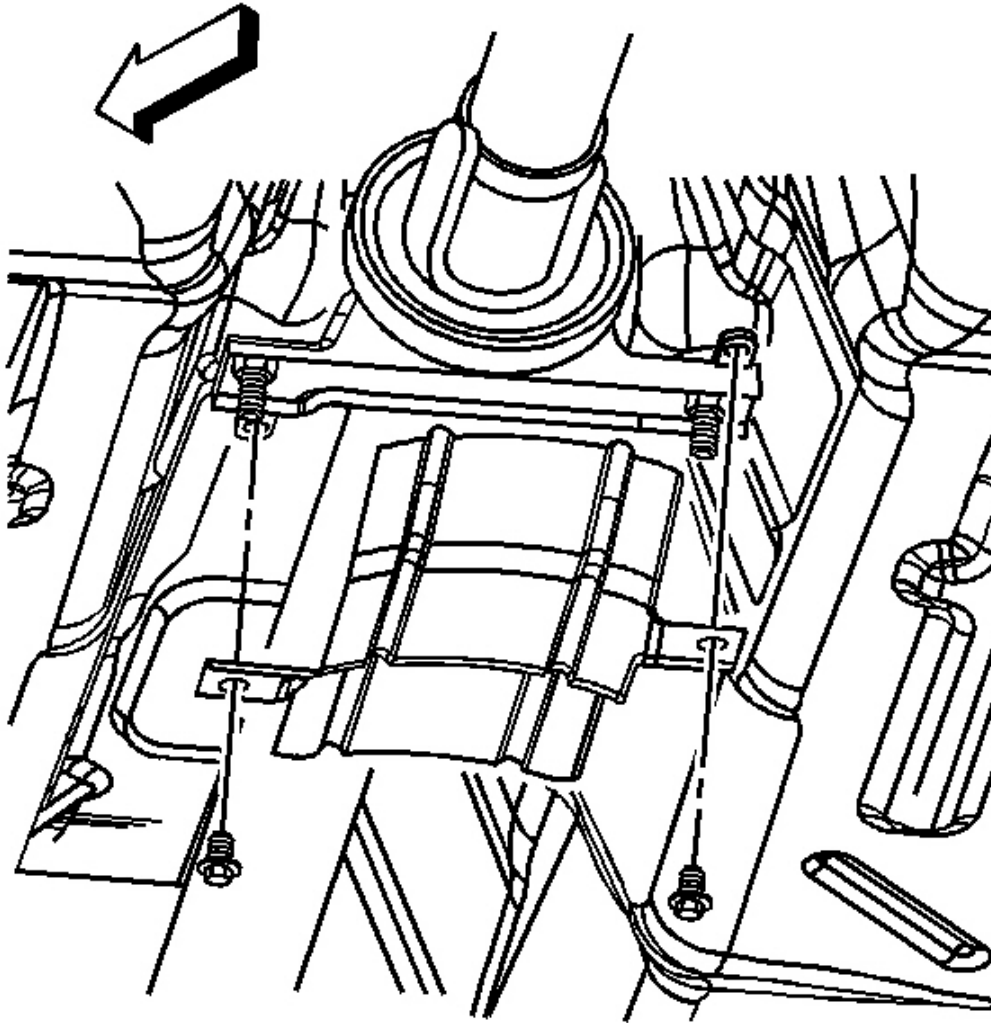


Fig. 64: View Of Center Bearing Heat Shield
Courtesy of GENERAL MOTORS CORP.

2. Install the bolts securing the center bearing heat shield to the center bearing.

Tighten: Tighten the center bearing heat shield bolts to 8 N.m (71 lb in).

3. Lower the vehicle.

DESCRIPTION AND OPERATION

EXHAUST SYSTEM DESCRIPTION

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

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

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

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

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

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

The exhaust system may be comprised of the following components:

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

Resonator

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

Catalytic Converter

The catalytic converter is an emission control device added to the engine exhaust system in order

to reduce hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) pollutants from the exhaust gas.

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

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

The catalyst in the converter is not serviceable.

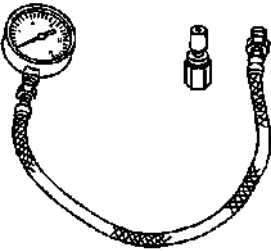
Muffler

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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

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