

2005 ENGINE

Engine Exhaust - Cavalier & Sunfire

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Exhaust Manifold Heat Shield Bolt	25 N.m	18 lb ft
Exhaust Manifold to Cylinder Head Nuts	13 N.m	115 lb in
Exhaust Manifold Pipe Nuts	30 N.m	22 lb ft
Intermediate Pipe Nuts	30 N.m	22 lb ft
Muffler Hanger Bolt	16 N.m	12 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: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.

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**. 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.

Restricted Exhaust

Step	Action	Value(s)	Yes	No
1	Did you verify the customers complaint?	-	Go to Step 2	-
2	Did you review the exhaust symptoms diagnostic information and perform the necessary inspections?	-	Go to Step 3	Go to Symptoms - Engine Exhaust
3	Is the system equipped with dual exhaust?	-	Go to Diagnostic Aids	Go to Step 4
	1. Remove the O2S that is in front of and closest to the catalytic converter. Refer to Heated Oxygen Sensor (HO2S) Replacement (Pre Catalytic			

<p>4</p>	<p><u>Converter) or Heated Oxygen Sensor (HO2S) Replacement (Post Catalytic Converter) .</u></p> <ol style="list-style-type: none"> 2. Install the J 35314-A in place of the O2S sensor. See <u>Special Tools</u>. 3. Start the engine. 4. Observe the exhaust system back pressure reading on the gauge. <p>Does the reading exceed the specified value?</p>	<p>14 kPa (2 psi)</p>		
<p>5</p>	<ol style="list-style-type: none"> 1. Turn the engine off and place the ignition in the lock position. 2. Remove the J 35314-A still installed increase and monitor engine speed to 2,000 RPM. See <u>Special Tools</u>. 3. Re-install the O2S sensor. Refer to <u>Heated Oxygen Sensor (HO2S) Replacement (Pre Catalytic Converter) or Heated Oxygen Sensor (HO2S) Replacement (Post Catalytic Converter) .</u> 4. Remove the post-catalyst HO2S sensor. Refer to <u>Heated Oxygen Sensor (HO2S) Replacement (Pre Catalytic Converter) or Heated Oxygen Sensor (HO2S) Replacement (Post Catalytic Converter) .</u> 5. Install the J 35314-A in place of the post HO2S sensor. See <u>Special Tools</u>. 6. Start the engine. 7. Increase and monitor the engine speed at 2,000 RPM. 8. Observe the exhaust system back pressure reading on the gauge. 	<p>14 kPa (2 psi)</p>	<p>Go to Step 5</p>	<p>Go to Step 8</p>

	Does the reading exceed the specified value?		Go to Step 6	Go to Step 7
6	<p>Inspect the exhaust system for the following conditions:</p> <ul style="list-style-type: none"> • Damage in the exhaust pipe • Debris in the exhaust pipe • Muffler or resonator internal failure • Two-layer exhaust pipe separation <p>Did you find and correct the condition?</p>	-		-
7	<p>Replace the catalytic converter. Refer to Catalytic Converter Replacement. Did you find and correct the condition?</p>	-	Go to Step 8	-
8	<ol style="list-style-type: none"> 1. Remove the J 35314-A and reinstall the HO2S sensor. See Special Tools. Refer to Heated Oxygen Sensor (HO2S) Replacement (Pre Catalytic Converter) or Heated Oxygen Sensor (HO2S) Replacement (Post Catalytic Converter) . 2. Clear any codes. 3. Road test the vehicle in order to verify the repair. <p>Did you correct the condition?</p>	-	System OK	Go to Step 2

EXHAUST LEAKAGE

Exhaust Leakage

Problem	Action
<p>CAUTION: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.</p>	
<p>DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand close to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise. Refer to Symptoms - Engine Exhaust prior to beginning this table.</p>	

Misaligned or improperly installed exhaust system components	Align and tighten the components to the specifications. Refer to <u>Fastener Tightening Specifications</u> .
Exhaust leaks at the following connections: <ul style="list-style-type: none"> • Exhaust manifold to pipe • Flanges • Pipe clamps 	Tighten the components to the specifications. Refer to <u>Fastener Tightening Specifications</u> .
Seals or gaskets leaking. <ul style="list-style-type: none"> • 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.
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 (2.2L (L61))</u> .
Exhaust system component connection welds leaking	Replace the leaking component. Refer to the affected component's procedure for service.
Muffler or resonator, if equipped, damaged or leaking at the seams	Replace the affected muffler. Refer to <u>Muffler Replacement</u> .

EXHAUST NOISE

Exhaust Noise

Condition	Action
<p>CAUTION: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.</p> <p>DEFINITION: An audible or physical noise due to a faulty component or damaged</p>	

components causing a loose or misaligned exhaust system resulting in a rattle or vibration noise, i.e. buzz, groan, hum. Refer to [Symptoms - Engine Exhaust](#) prior to beginning this table.

Popping or hissing noise	Exhaust leak-Refer to Exhaust Leakage .
Loud exhaust	<ol style="list-style-type: none">1. Compare to a known good vehicle.2. Inspect for a damaged or failed muffler.3. Replace the faulty muffler. Refer to Muffler Replacement.
External rattle or vibration noise	<ol style="list-style-type: none">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	<ol style="list-style-type: none">1. Test the components by tapping with a rubber mallet to confirm a rattle.2. Replace the faulty catalytic converter, or muffler. Refer to one of the following procedures:<ul style="list-style-type: none">• Catalytic Converter Replacement• Muffler Replacement

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT (2.2L (L61))

Removal Procedure

1. Disconnect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure** in Engine Electrical.

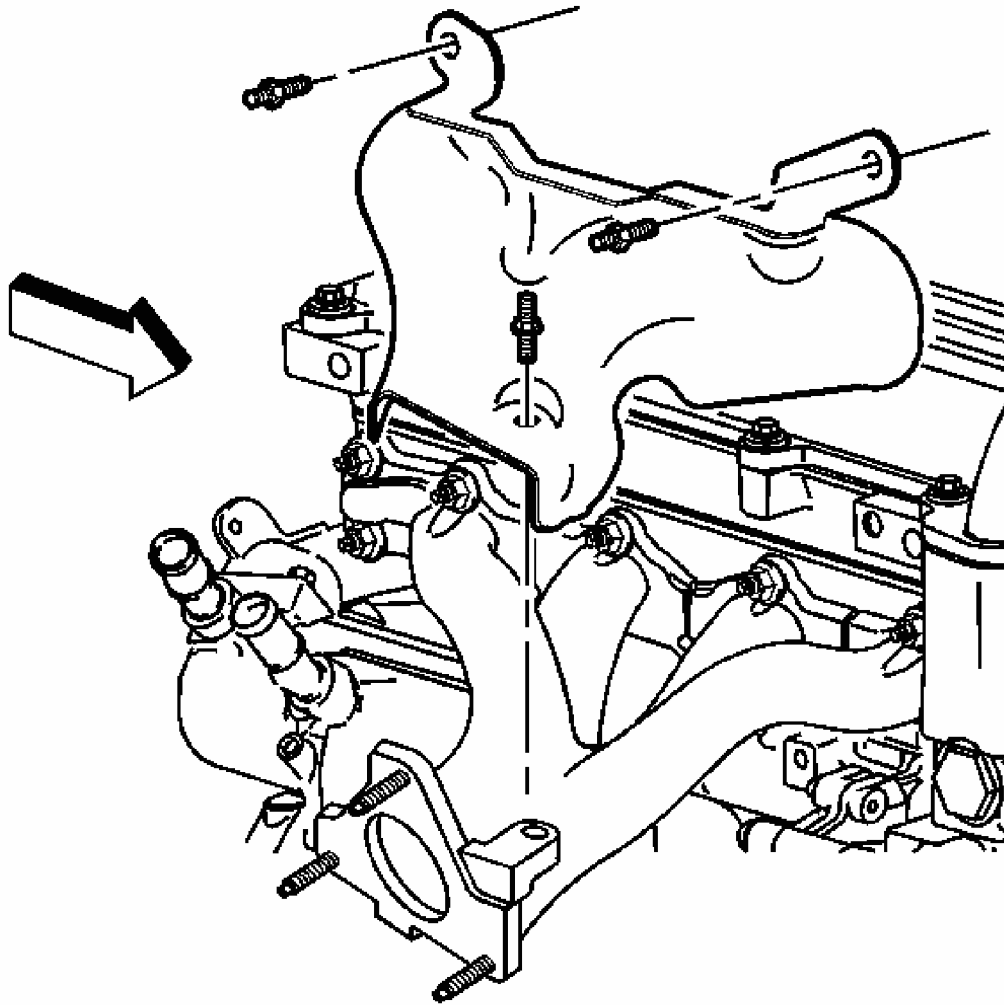


Fig. 1: Removing & Installing Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

2. Remove the exhaust manifold heat shield.

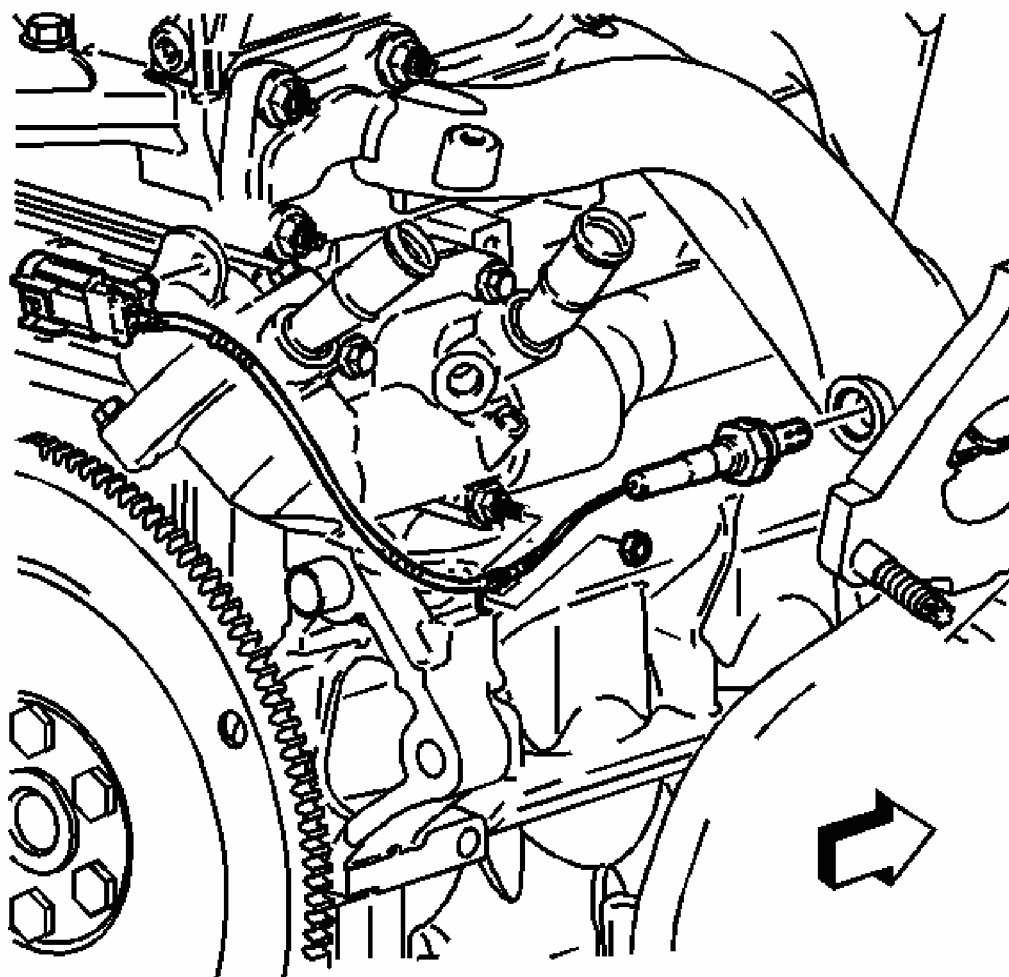


Fig. 2: Oxygen Sensor & Harness Connector
Courtesy of GENERAL MOTORS CORP.

3. Remove the oxygen sensor. Refer to **Heated Oxygen Sensor (HO2S) Replacement (Pre Catalytic Converter)** or **Heated Oxygen Sensor (HO2S) Replacement (Post Catalytic Converter)** in Engine Controls-2.2L (L61).
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.

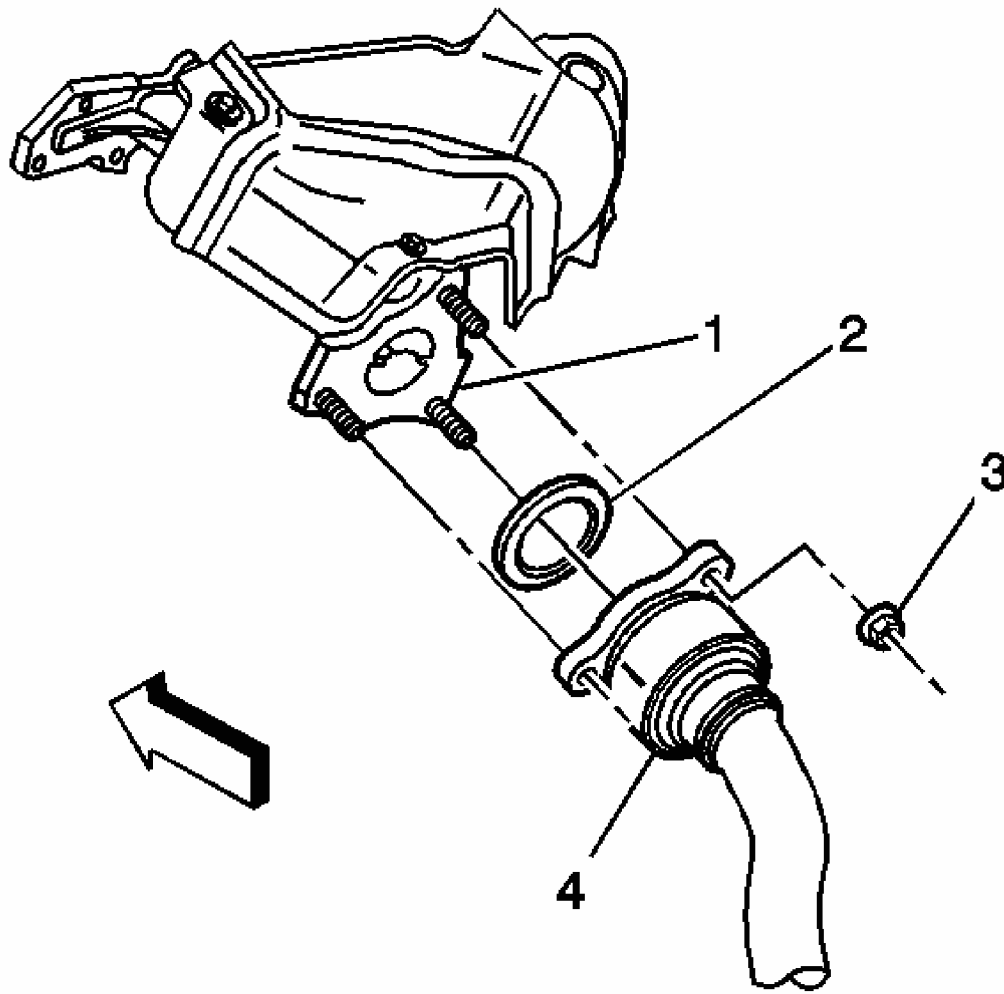


Fig. 3: Locating Exhaust Manifold To Flex Decoupler Nuts
Courtesy of GENERAL MOTORS CORP.

NOTE: Do not bend the exhaust flex decoupler more than 3 degrees in any direction. Movement of more than 3 degrees will damage the exhaust flex decoupler.

5. Remove the pipe to manifold nuts (3).
6. Pull down and back on the exhaust pipe in order to disengage the pipe from the exhaust manifold.
7. Lower the vehicle.

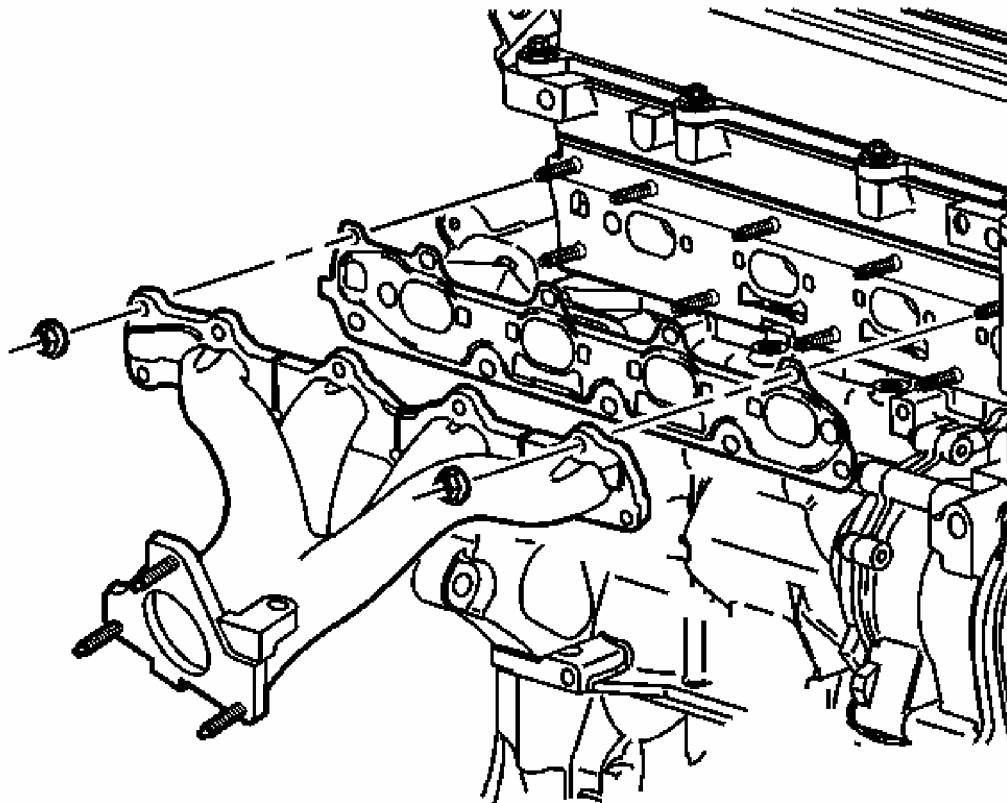


Fig. 4: View Of Exhaust Manifold & Gasket
Courtesy of GENERAL MOTORS CORP.

8. Remove the exhaust manifold to cylinder head nuts.
9. Remove the exhaust manifold.
10. Clean all the sealing surfaces.

Installation Procedure

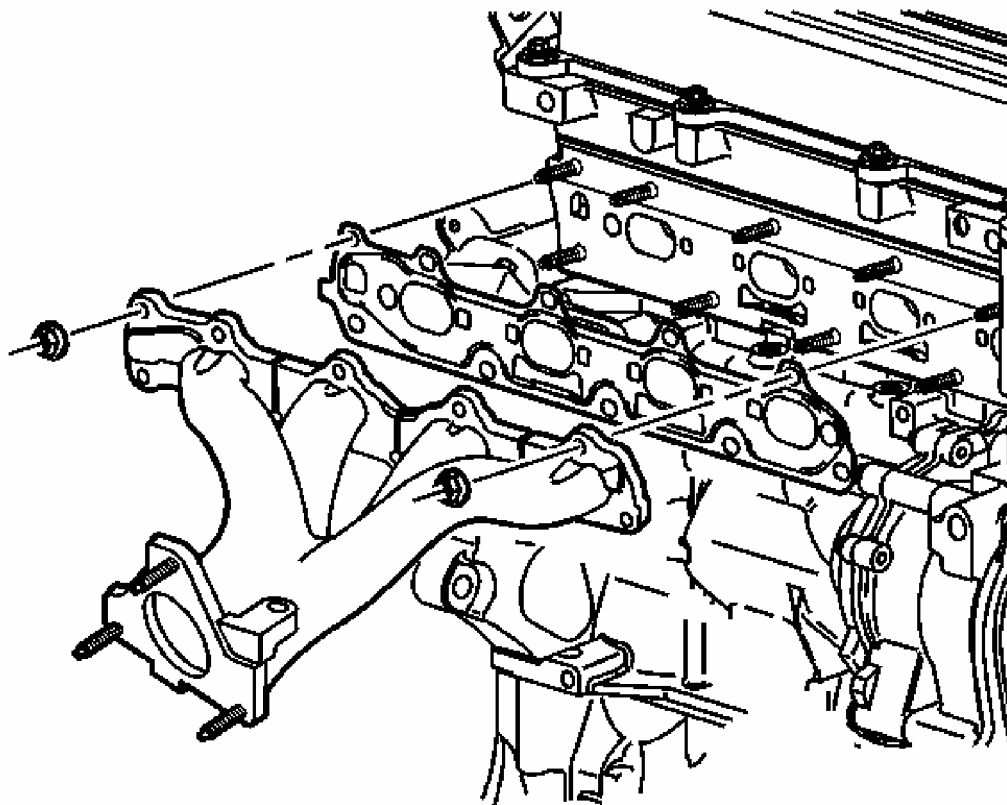


Fig. 5: View Of Exhaust Manifold & Gasket
Courtesy of GENERAL MOTORS CORP.

1. Install a new exhaust manifold gasket.
2. Install the exhaust manifold to the cylinder head.

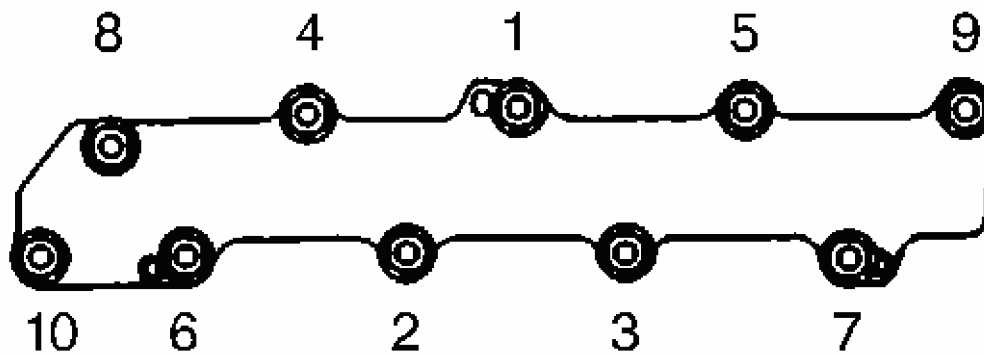


Fig. 6: Installing Exhaust Manifold Cylinder Head Retaining Nuts
 Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to Fastener Notice in Cautions and Notices.

IMPORTANT: Install the new exhaust nuts.

3. Install the new exhaust manifold to cylinder head retaining nuts. Follow the tightening sequence.

Tighten: Tighten the nuts to 13 N.m (115 lb in).

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

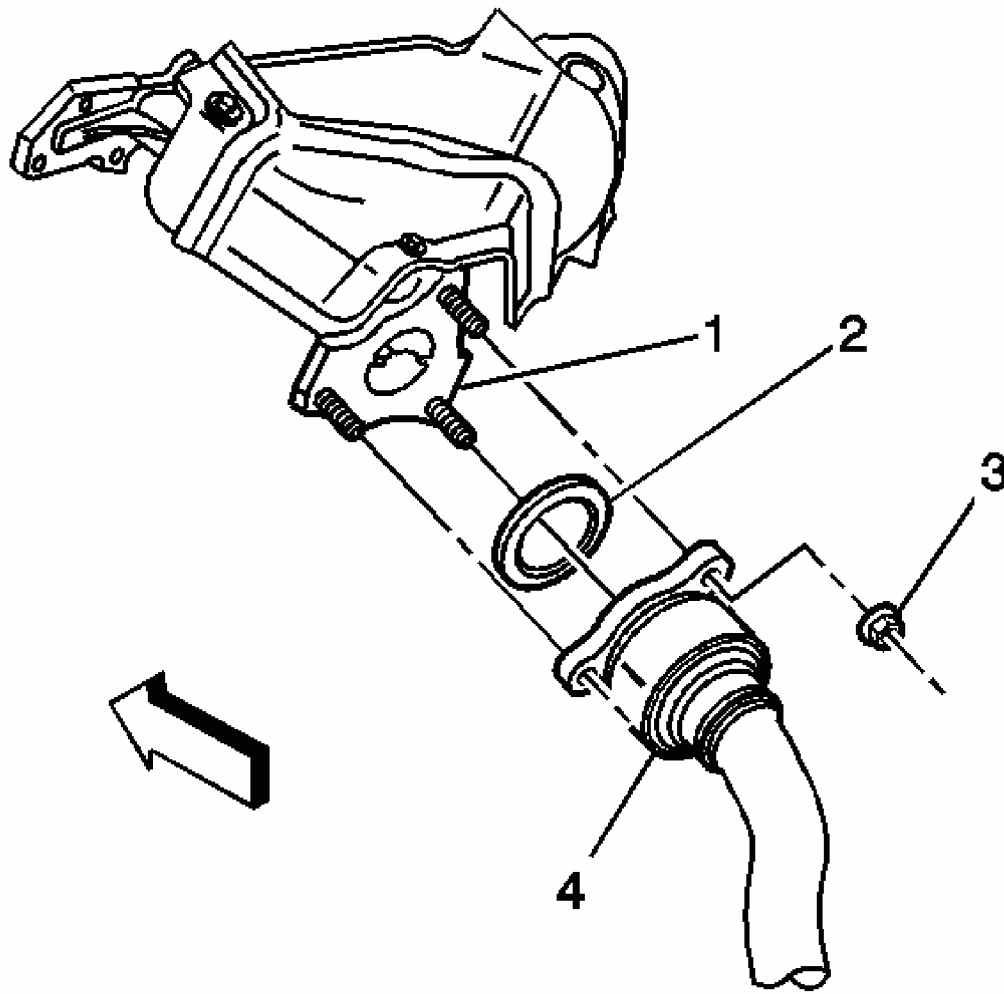


Fig. 7: Locating Exhaust Manifold To Flex Decoupler Nuts
Courtesy of GENERAL MOTORS CORP.

5. Install a new exhaust manifold to flex coupler gasket (2).
6. Push the flex coupler into position on the exhaust manifold.

IMPORTANT: Install the new exhaust nuts.

7. Install the retaining nuts (3) which secure the manifold to the flex decoupler (4).

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

8. Lower the vehicle.

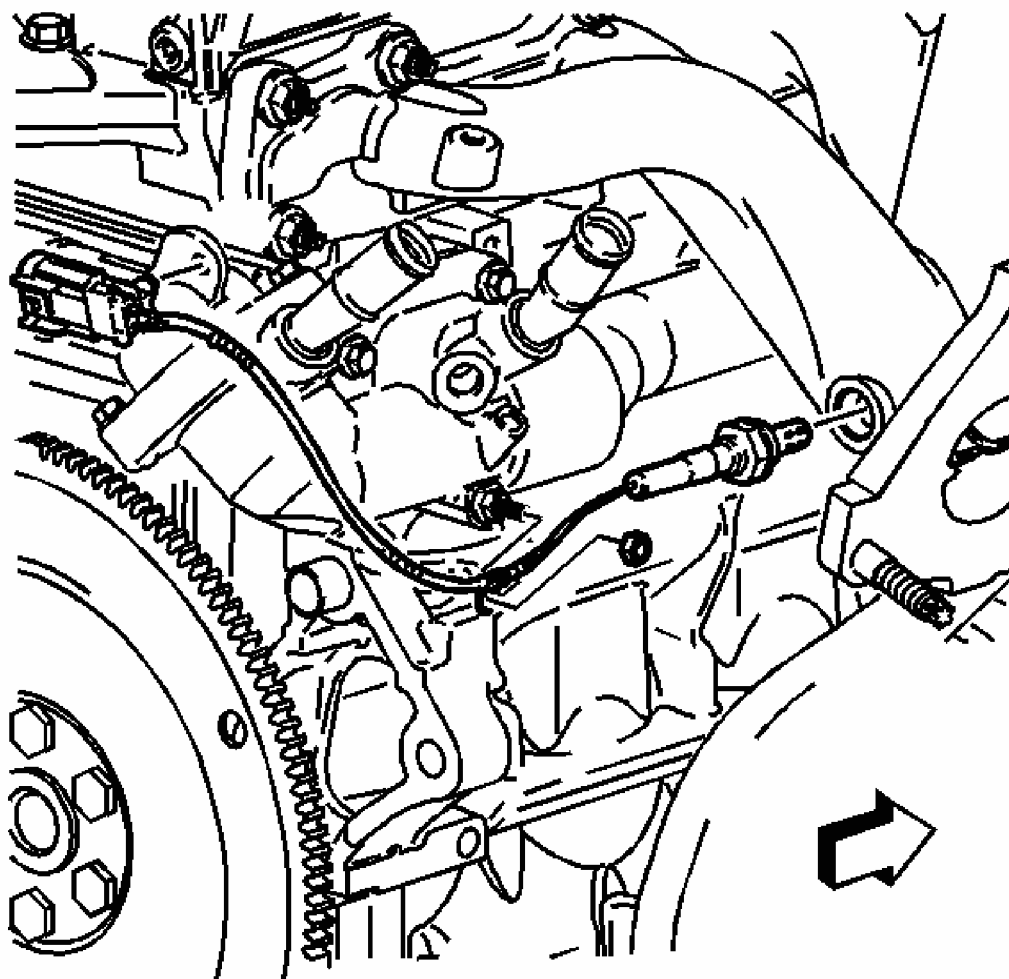


Fig. 8: Oxygen Sensor & Harness Connector
Courtesy of GENERAL MOTORS CORP.

9. Install the oxygen sensor. Refer to **Heated Oxygen Sensor (HO2S) Replacement (Pre Catalytic Converter)** or **Heated Oxygen Sensor (HO2S) Replacement (Post Catalytic Converter)** in Engine Controls-2.2L (L61).

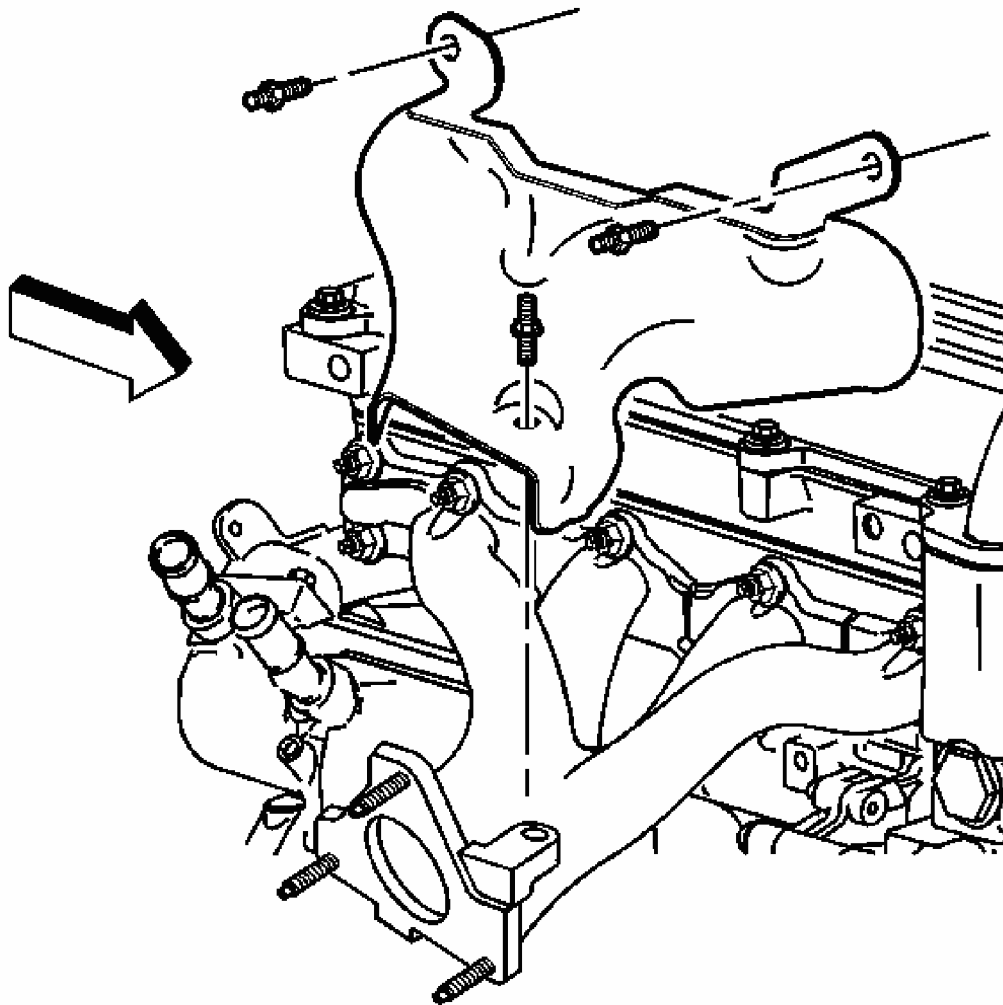


Fig. 9: Removing & Installing Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS CORP.

10. Install the exhaust manifold heat shield.

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

11. Connect the negative battery cable. Refer to **Battery Negative Cable Disconnect/Connect Procedure** in Engine Electrical.

INTERMEDIATE PIPE REPLACEMENT

Removal Procedure

NOTE: Do not over-flex or damage the flex decoupler joint when moving the flex decoupler joint from the normal mounting position. The flex decoupler joint will flex a maximum of six degrees which is equivalent to the pipes connected at the joint which move 1 inch for each foot length of pipe. A three foot pipe would move a maximum of three inches.

IMPORTANT: A service muffler will be needed when replacing the intermediate pipe on an originally equipped, welded system.

1. Raise the vehicle. Refer to **Lifting and Jacking the Vehicle** in General Information.
2. Support the three way catalytic converter.

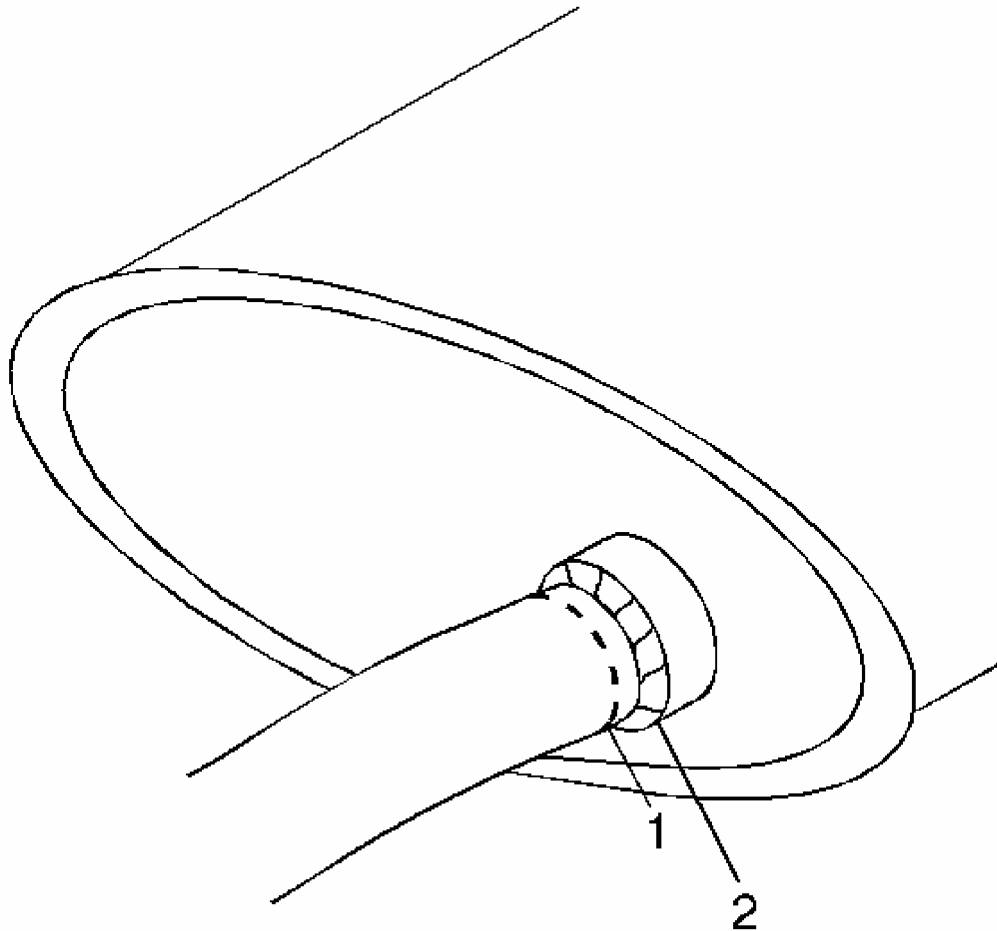


Fig. 10: Identifying Cutline On Intermediate Pipe
Courtesy of GENERAL MOTORS CORP.

3. Cut the intermediate pipe (1) at the muffler (2).

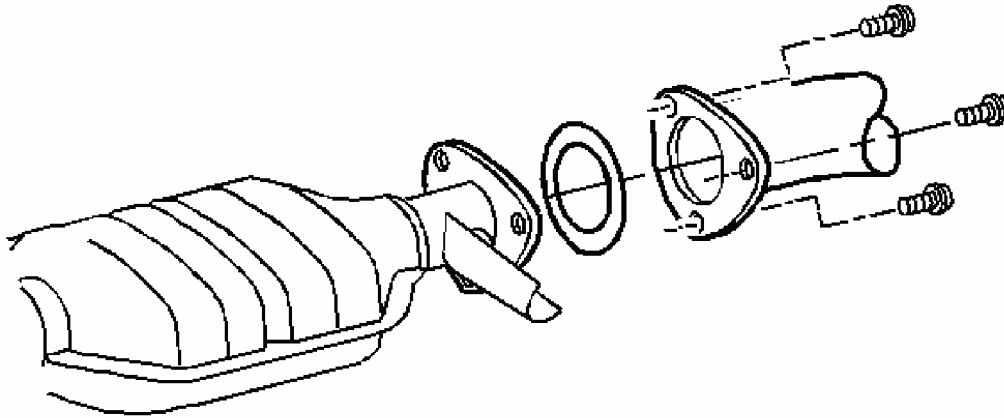


Fig. 11: Exploded View Of Intermediate Pipe Bolts
Courtesy of GENERAL MOTORS CORP.

4. Remove the intermediate pipe bolts at catalytic converter.

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