

2003 Cadillac CTS

2003 ENGINE Engine Exhaust - CTS

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Engine Exhaust - CTS

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Application	Specification	
	Metric	English
Afterboil Coolant Pump Bolt	10 N·m	89 lb in
Bumper Nut	25 N·m	18 lb ft
Catalytic Converter Hanger Bracket Bolt	50 N·m	37 lb ft
Catalytic Converter Hanger Bracket Nut	25 N·m	18 lb ft
Catalytic Converter Nut	15 N·m	11 lb ft
Center Bearing Heat Shield Bolt	8 N·m	71 lb in
Exhaust Manifold Nut	20 N·m	15 lb ft
Exhaust Manifold Pipe Nut	22 N·m	16 lb ft
Floor Panel Tunnel Brace Bolt	25 N·m	18 lb ft

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Fig. 1: Fastener Tightening Specifications
Courtesy of GENERAL MOTORS CORP.

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

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- 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

Tools Required

J 35314-A Exhaust Back Pressure Gage. See **Special Tools and Equipment** .

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*.

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

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the opposite exhaust pipe.

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
4	1. Remove the HO2S that is in front of the catalytic converter. Refer to <i>Heated Oxygen Sensor</i> in Removal & Installation. 2. Install the J 35314-A in place of the HO2S sensor. 3. Start the engine. 4. Increase and monitor the engine speed at 2,500 RPM. 5. Observe the exhaust system back pressure reading on the gauge. Does the reading exceed the specified value?	9 kPa (1.25 psi)	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. 3. Re-install the HO2S sensor. Refer to <i>Heated Oxygen Sensor</i> in Removal & Installation 4. Remove the post-catalyst HO2S sensor. Refer to <i>Heated Oxygen Sensor</i> in Removal & Installation. 5. Install the J 35314-A in place of the post HO2S sensor. 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 gauge. Does the reading exceed the specified value?	9 kPa (1.25 psi)	Go to Step 6	Go to Step 7

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Fig. 2: Restricted Exhaust Specification (Steps 1 - 2)
Courtesy of GENERAL MOTORS CORP.

Step	Action	Value(s)	Yes	No
6	Inspect the exhaust system for the following conditions: • Damage in the exhaust pipe • Debris in the exhaust pipe • Muffler or resonator internal failure • Two-layer exhaust pipe separation Did you find and correct the condition?	—	Go to Step 8	—
7	Replace the catalytic converter. Refer to <i>Catalytic Converter Replacement - Left</i> or <i>Catalytic Converter Replacement - Right</i> . Did you find and correct the condition?	—	Go to Step 8	—
8	1. Remove the J 35314-A. 2. Reinstall the applicable HO2S sensor. Refer to the following: • <i>Heated Oxygen Sensor</i> in Removal & Installation. 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

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Fig. 3: Restricted Exhaust Specification (Steps 1 - 2)
Courtesy of GENERAL MOTORS CORP.

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EXHAUST LEAKAGE

Condition	Action
Caution: Refer to Hot Exhaust System Caution 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 <i>Symptoms - Engine Exhaust</i> prior to beginning this table.	
Misaligned or improperly installed exhaust system components	- Align and tighten the exhaust system components to the specifications. Refer to <i>Fastener Tightening Specifications</i>. - Ensure the exhaust hangers are in the proper locations and not loose. Refer to <i>Exhaust Hanger Replacement</i>.
Exhaust leaks at the following connections: - Exhaust manifold to pipe - Flanges - Pipe clamps	Tighten the components to the specifications. Refer to <i>Fastener Tightening Specifications</i> .
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 <i>Exhaust Manifold Replacement - Left</i> or <i>Exhaust Manifold Replacement - Right</i> .
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 or resonator, if equipped. Refer to <i>Exhaust System Replacement</i> .

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Fig. 4: Exhaust Leakage Specification
Courtesy of GENERAL MOTORS CORP.

EXHAUST NOISE

Condition	Action
Caution: Refer to Hot Exhaust System Caution 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 <i>Symptoms - Engine Exhaust</i> prior to beginning this table.	
Popping or hissing noise	Exhaust leak — Refer to <i>Exhaust Leakage</i> .
Loud exhaust	- Compare to a known good vehicle. - Inspect for a damaged or failed muffler or resonator, if equipped. - Replace the faulty muffler or resonator (if equipped). Refer to <i>Exhaust System Replacement</i>.
External rattle or vibration noise	- Inspect for a bent or loose hanger, loose heat shield, or loose clamp. - Inspect for a exhaust pipe causing interference. - Repair or replace the affected component. Refer to the affected component's service procedure.
Internal rattle	- Test the components by tapping with a rubber mallet to confirm a rattle. - Replace the faulty catalytic converter, resonator, if equipped, or muffler. Refer to <i>Exhaust System Replacement</i>.

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Fig. 5: Exhaust Noise Specification

Courtesy of GENERAL MOTORS CORP.

REPAIR INSTRUCTIONS

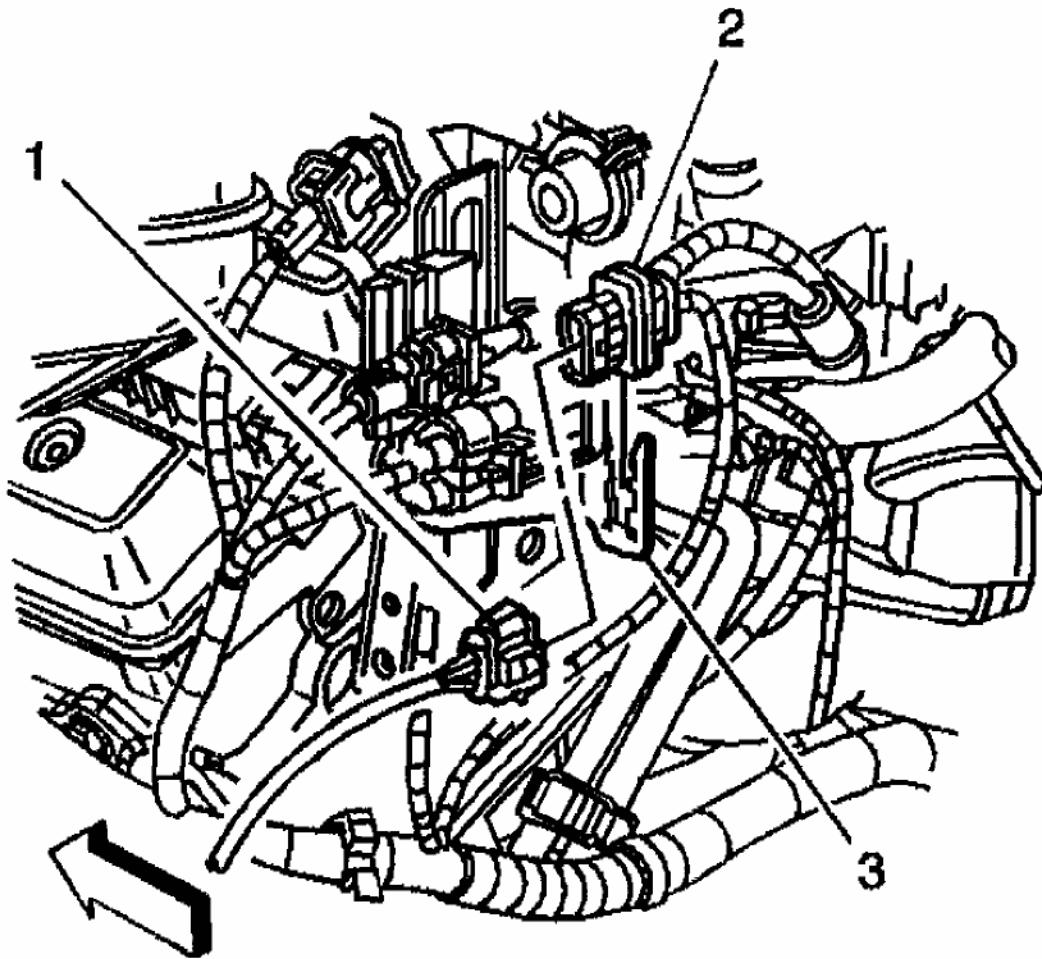
EXHAUST MANIFOLD REPLACEMENT - LEFT

Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

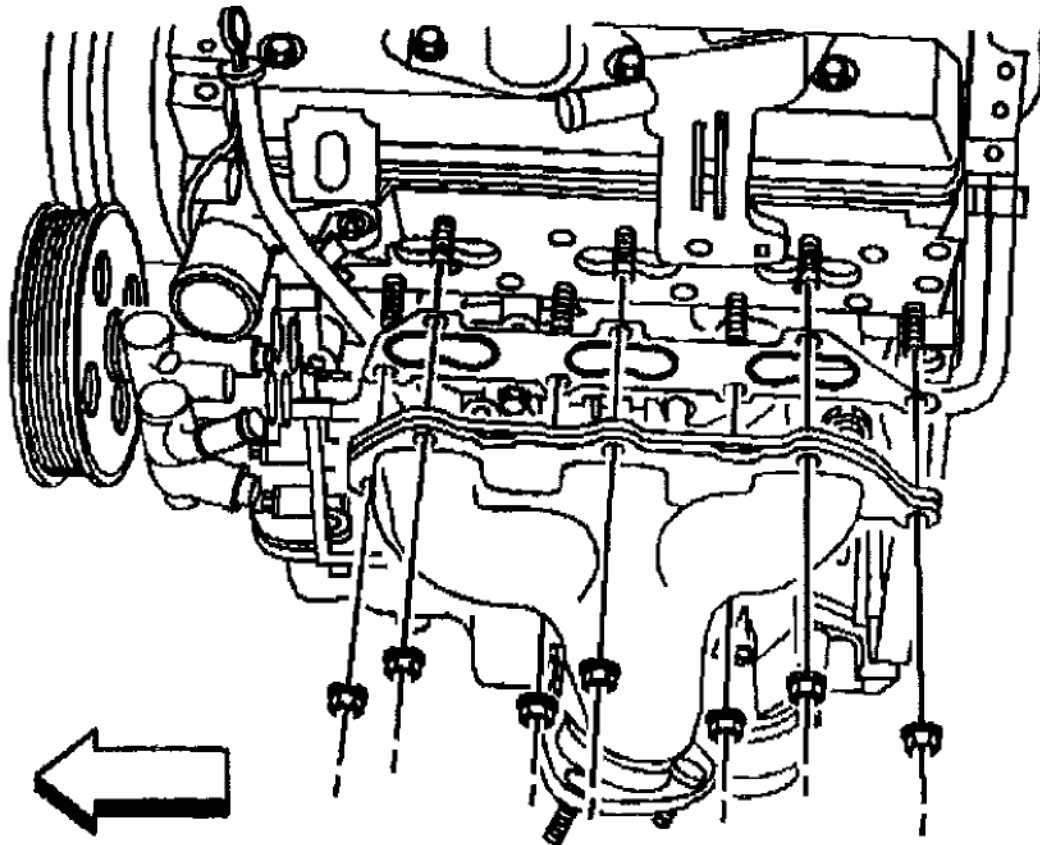
1. Remove the accessory mounting bracket. Refer to ACCESSORY MOUNTING BRACKETS REPLACEMENT in Engine Mechanical - 2.6L and 3.2L.
2. Disconnect the heated oxygen sensor pigtail (1) from the wiring harness connector (2).
3. Remove the left catalytic converter. Refer to CATALYTIC CONVERTER REPLACEMENT - LEFT.
4. Remove the heated oxygen sensor if replacement is necessary. Refer to HEATED OXYGEN SENSOR in Removal & Installation.



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Fig. 6: Disconnecting Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

5. Remove the left exhaust manifold retaining nuts.



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Fig. 7: Removing Left Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

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 in Engine Mechanical - 2.6L and 3.2L.

Installation Procedure

1. Place a NEW exhaust manifold gasket over the cylinder head studs.
2. Position the left exhaust manifold to the left cylinder head.

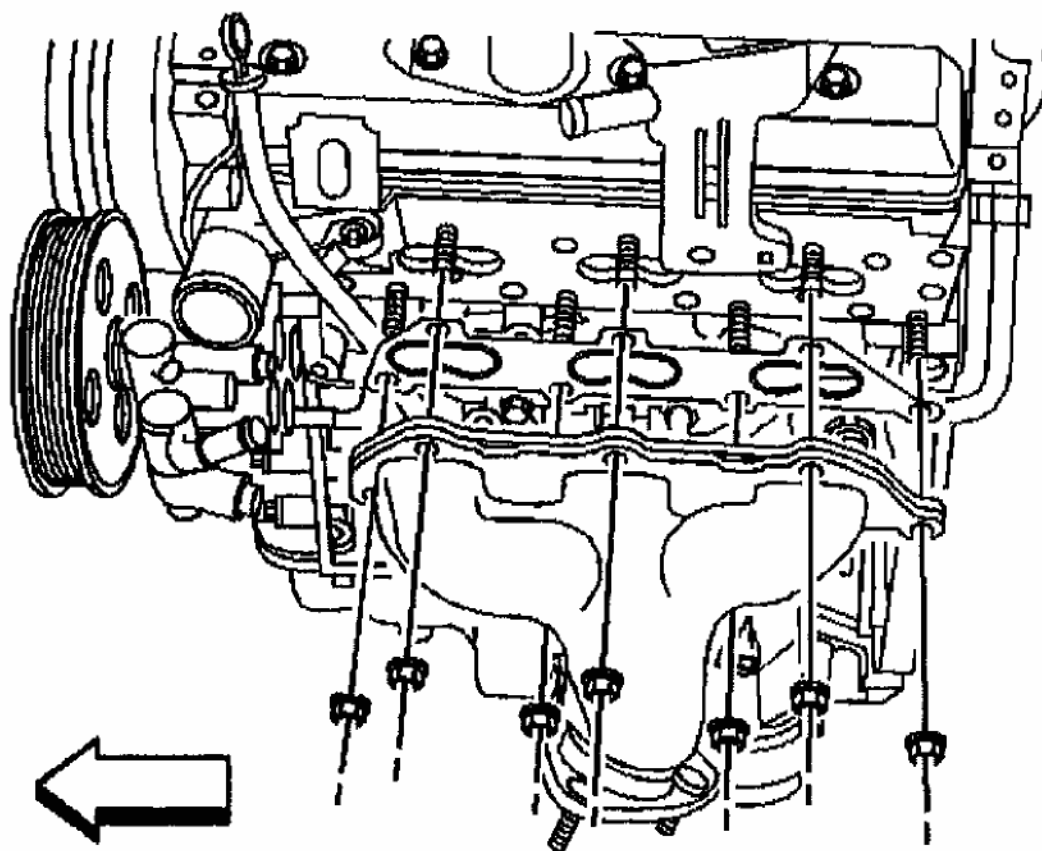
NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

3. Install the left exhaust manifold nuts.

Tighten

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

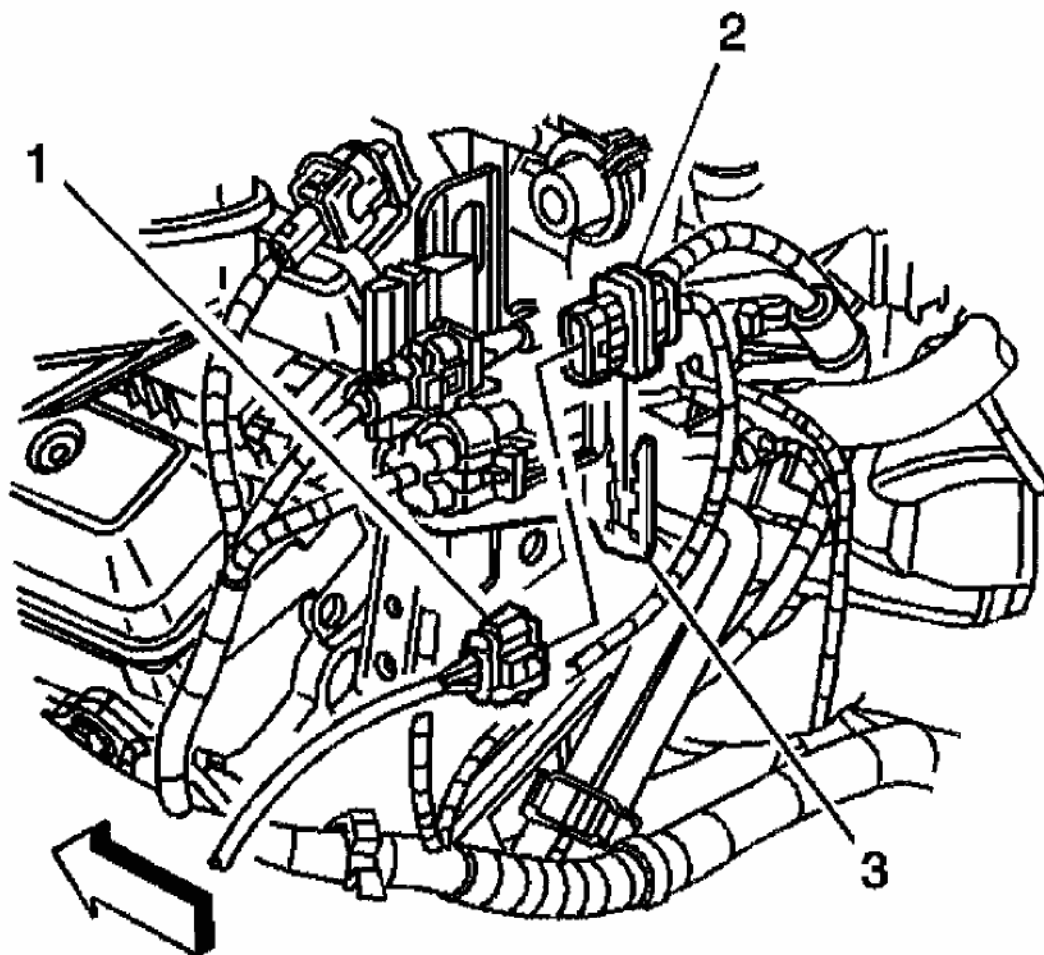
4. Install the heated oxygen sensor if previously removed. Refer to **HEATED OXYGEN SENSOR** in Removal & Installation.
5. Install the left catalytic converter. Refer to **CATALYTIC CONVERTER REPLACEMENT - LEFT**.



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Fig. 8: Installing Left Exhaust Manifold Nuts
Courtesy of GENERAL MOTORS CORP.

6. Connect the heated oxygen sensor pigtail (1) to the wiring harness connector (2).



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Fig. 9: Connecting Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

7. Install the accessory mounting bracket. Refer to ACCESSORY MOUNTING BRACKETS REPLACEMENT in Engine Mechanical - 2.6L and 3.2L.

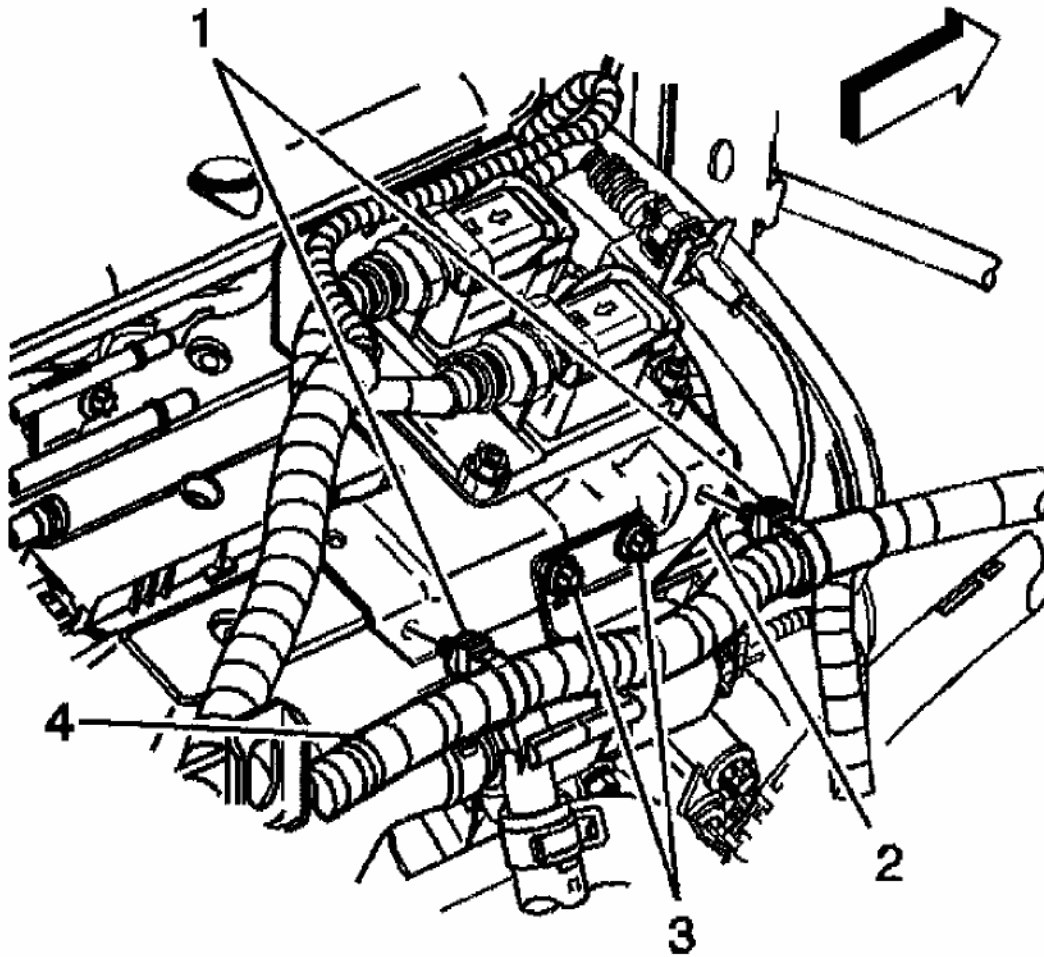
EXHAUST MANIFOLD REPLACEMENT - RIGHT

Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

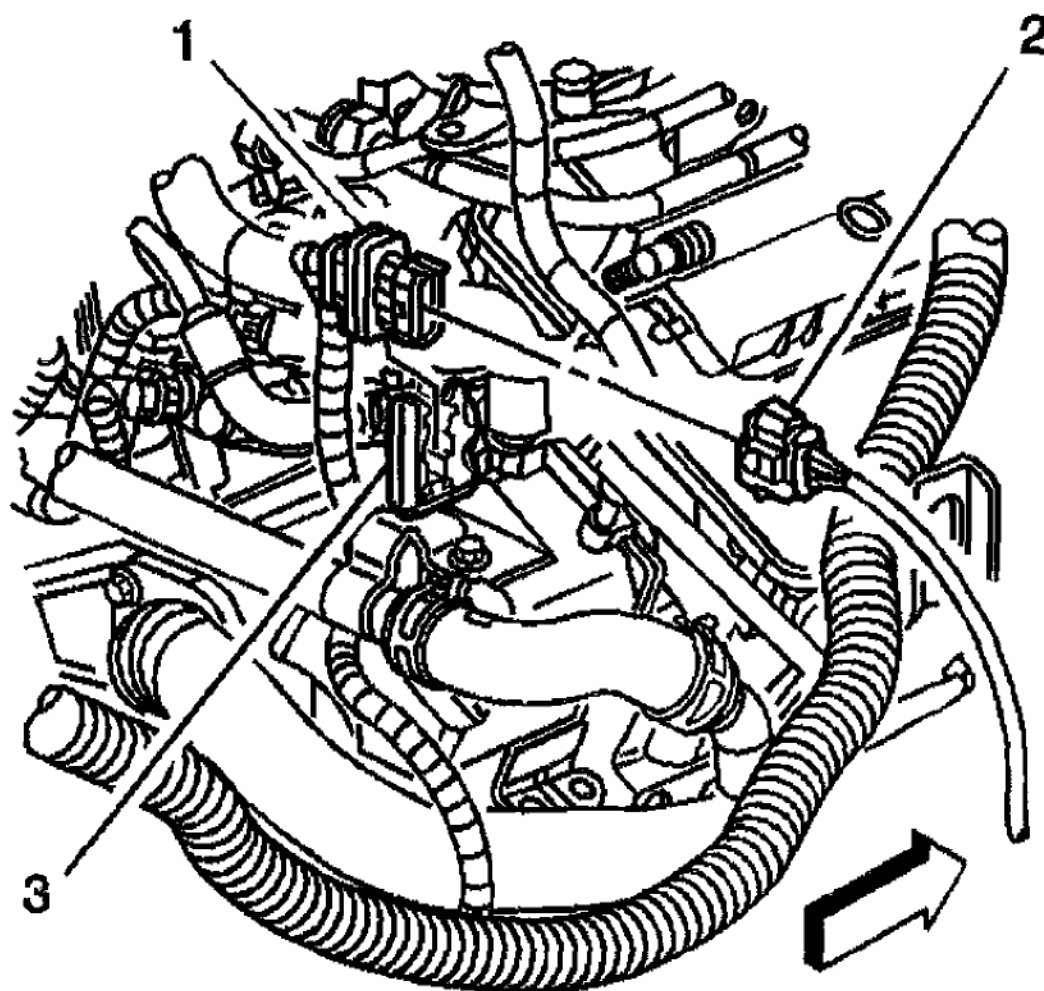
1. Remove the drive belt tensioner. Refer to DRIVE BELT TENSIONER REPLACEMENT in Engine Mechanical - 2.6L and 3.2L.
2. Disconnect the 2 cable harness clips (1) securing the engine wiring harness (4) to the ECM bracket (2) and position aside.
3. Remove the 2 bolts (3) securing the after boil coolant pump to the ECM bracket, and position aside.



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Fig. 10: Removing Cable Harness Clips & After Boil Coolant Pump Retaining Bolts
Courtesy of GENERAL MOTORS CORP.

4. Disconnect the heated oxygen sensor pigtail (2) from the wiring harness connector (1).

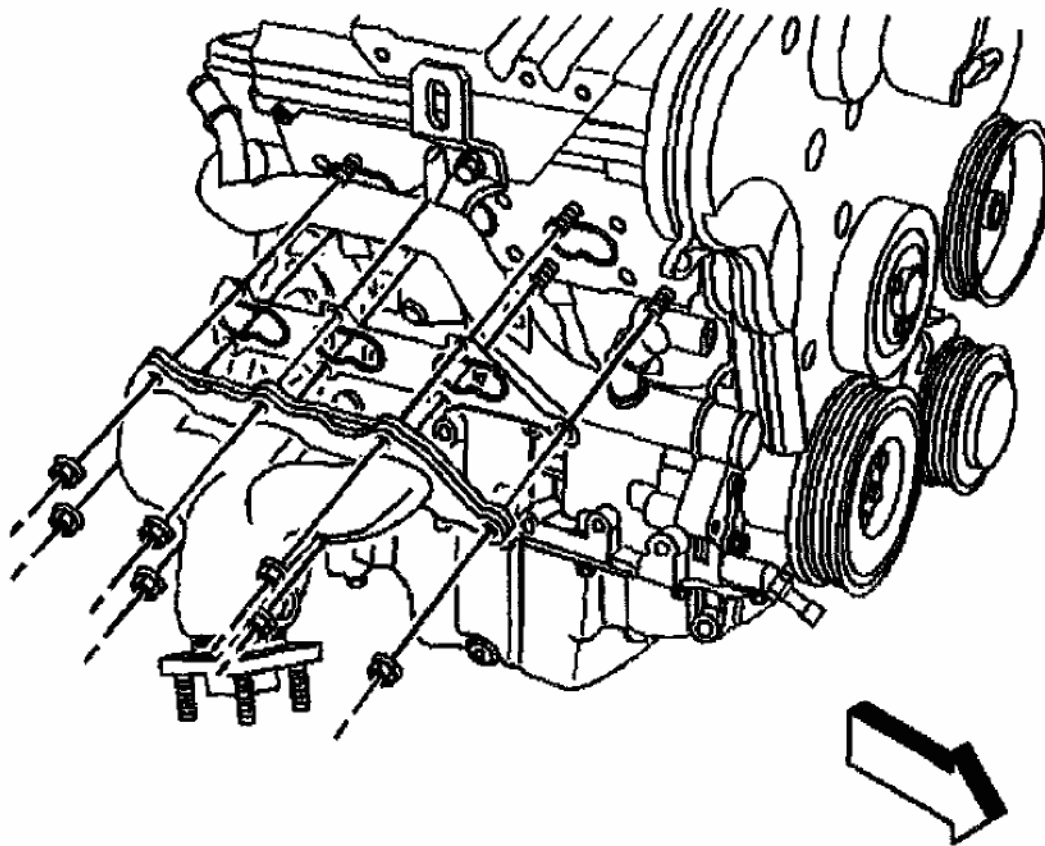


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Fig. 11: Disconnecting Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

5. Remove the following right exhaust manifold retaining nuts:
 - The 3 upper
 - The front lower
6. Remove the starter. Refer to **STARTER** in Starters.
7. Remove the heated oxygen sensor if replacement is necessary. Refer to **HEATED OXYGEN SENSOR** in Removal & Installation.
8. Remove the remaining right exhaust manifold retaining nuts.

9. Remove the right exhaust manifold and the gasket from the engine. Do not reuse the gasket.



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Fig. 12: Removing Right Exhaust Manifold, Nuts & Gasket
Courtesy of GENERAL MOTORS CORP.

10. Clean and inspect the right exhaust manifold. Refer to EXHAUST MANIFOLD CLEANING AND INSPECTION in Engine Mechanical - 2.6L and 3.2L.

Installation Procedure

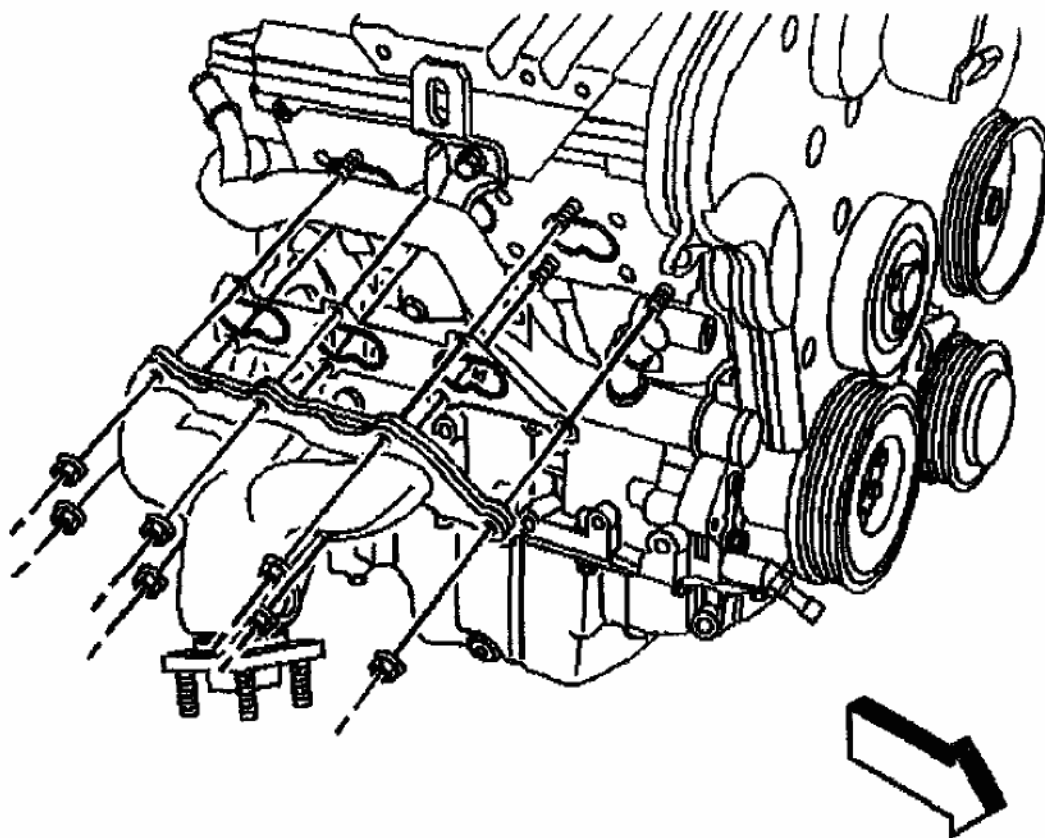
1. Place a NEW exhaust manifold gasket over the cylinder head studs.
2. Position the right exhaust manifold to the right cylinder head.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

3. Install the right exhaust manifold 3 lower nuts.

Tighten

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



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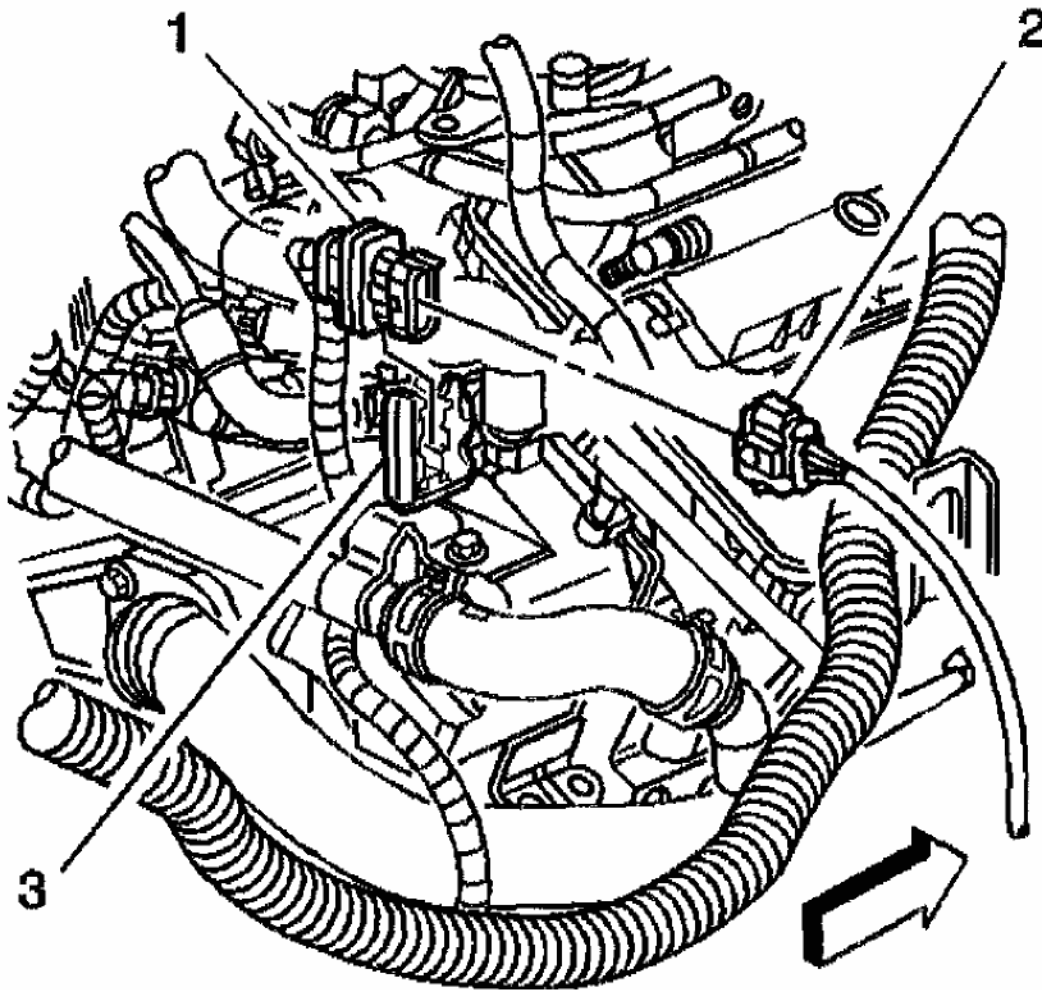
Fig. 13: Installing Right Exhaust Manifold, Nuts & Gasket
Courtesy of GENERAL MOTORS CORP.

4. Install the heated oxygen sensor if previously removed. Refer to **HEATED OXYGEN SENSOR** in Removal & Installation.
5. Install the starter. Refer to **STARTER** in Starters.
6. Install the remaining right exhaust manifold nuts.

Tighten

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

7. Connect the heated oxygen sensor pigtail (2) to the wiring harness connector (1).



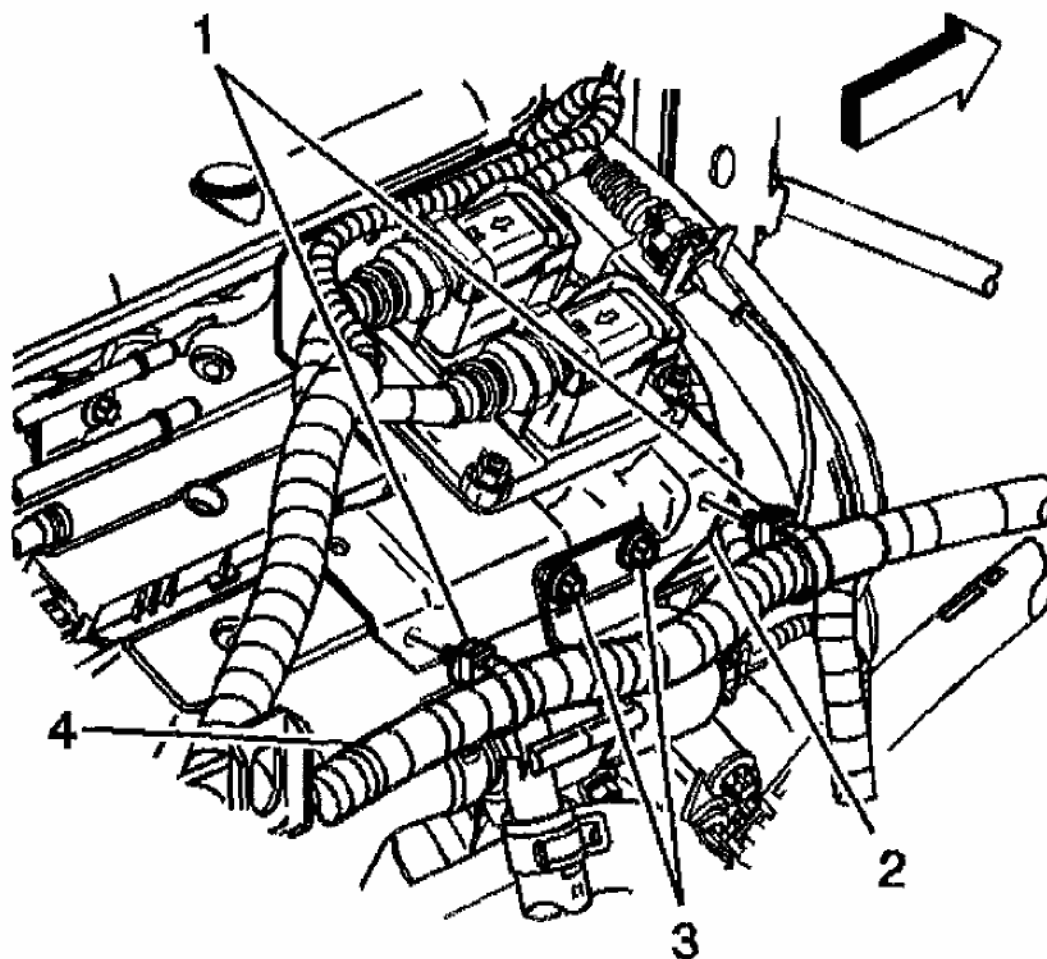
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Fig. 14: Connecting Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

8. Install the 2 bolts (3) securing the after boil coolant pump to the ECM bracket.

Tighten

Tighten the afterboil coolant pump bolts to 10 N.m (89 lb in).



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Fig. 15: Installing Cable Harness Clips & After Boil Coolant Pump Retaining Bolts
Courtesy of GENERAL MOTORS CORP.

9. Connect the 2 cable harness clips (1) securing the engine wiring harness (4) to the ECM bracket (2).
10. Install the drive belt tensioner. Refer to DRIVE BELT TENSIONER REPLACEMENT in Engine Mechanical - 2.6L and 3.2L.

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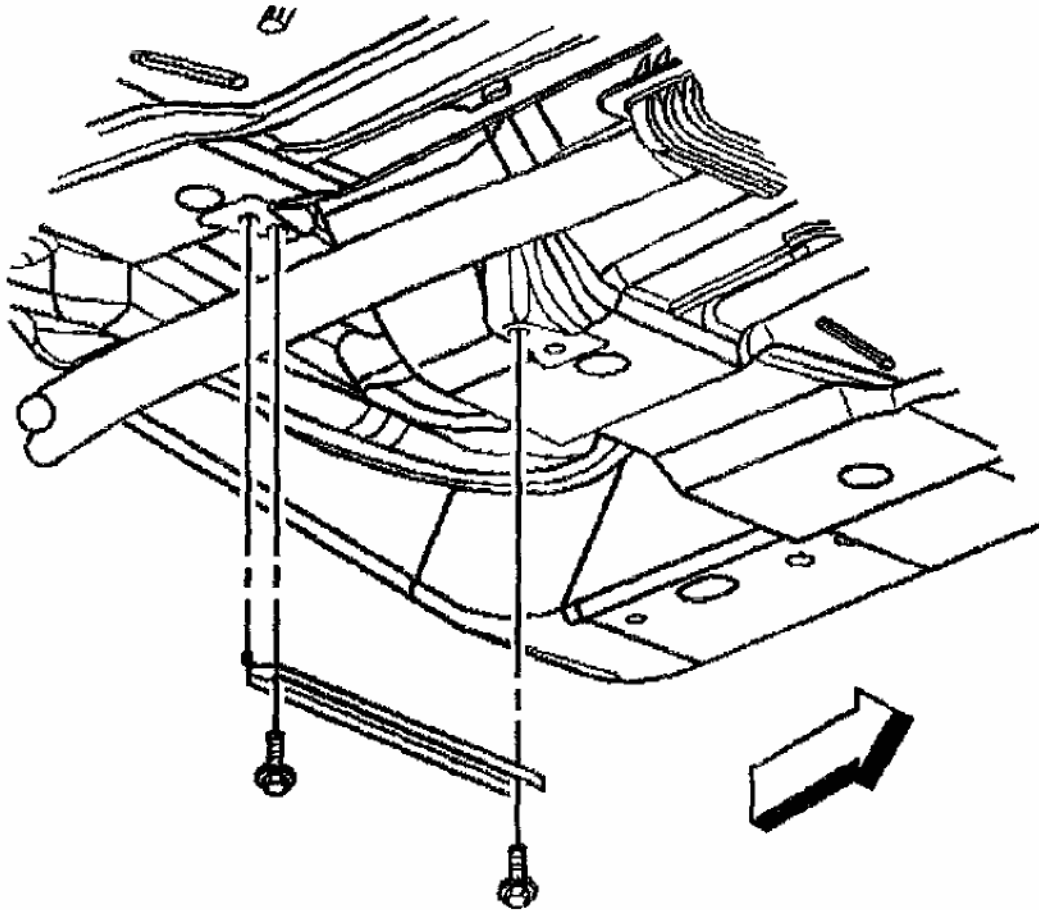
Servicing of the muffler, resonator or pipe requires the replacement of the exhaust system as a complete one-piece unit.

Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

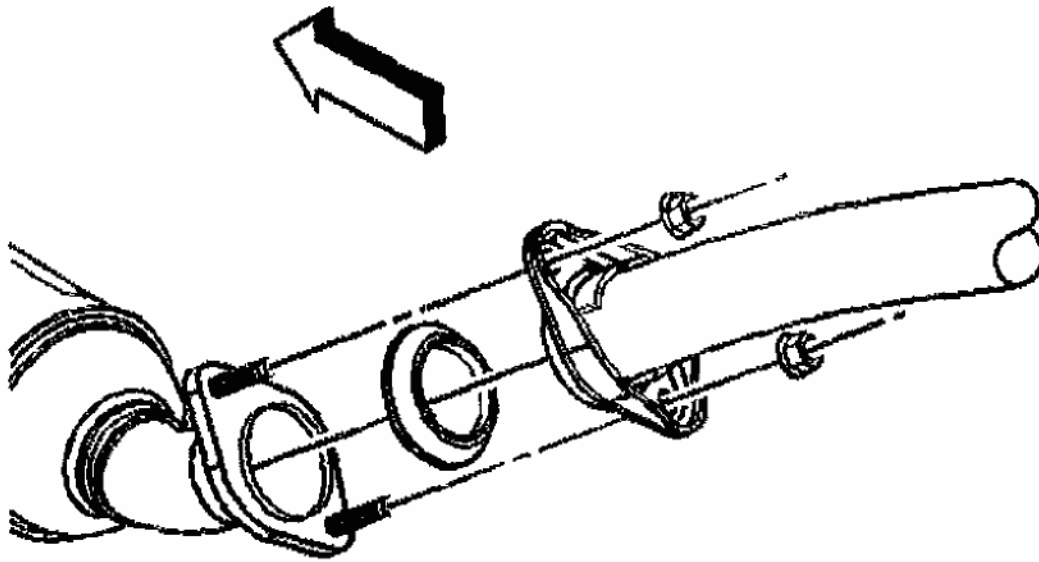
1. Raise and support the vehicle. Refer to LIFTING AND JACKING THE VEHICLE in General Information.
2. Remove the 2 bolts securing the floor panel tunnel brace to the floor panel.
3. Remove the floor panel tunnel brace from the floor panel.



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Fig. 16: Removing Floor Panel Tunnel Brace & Bolts
Courtesy of GENERAL MOTORS CORP.

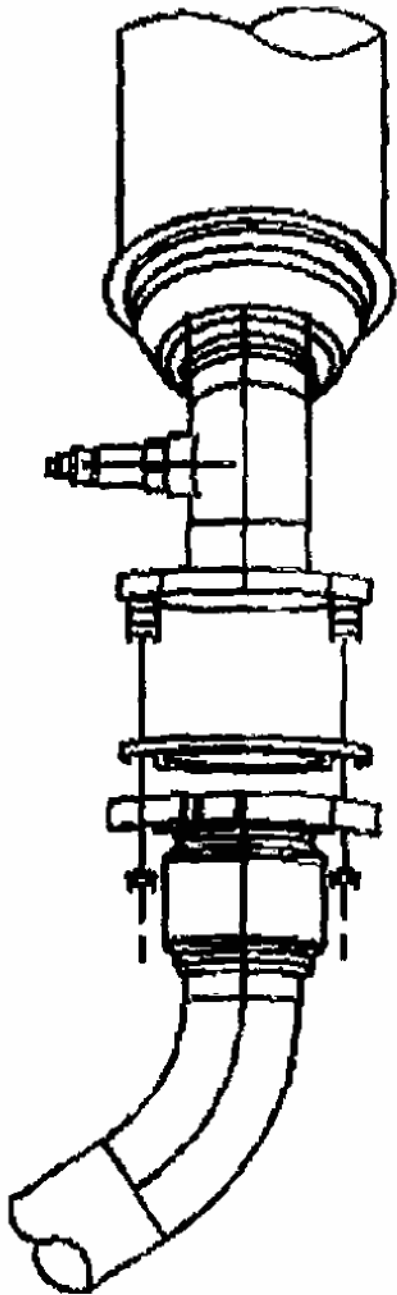
4. Remove the nuts securing the exhaust pipe to the left catalytic converter.



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Fig. 17: Removing Exhaust Pipe To Left Catalytic Converter Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

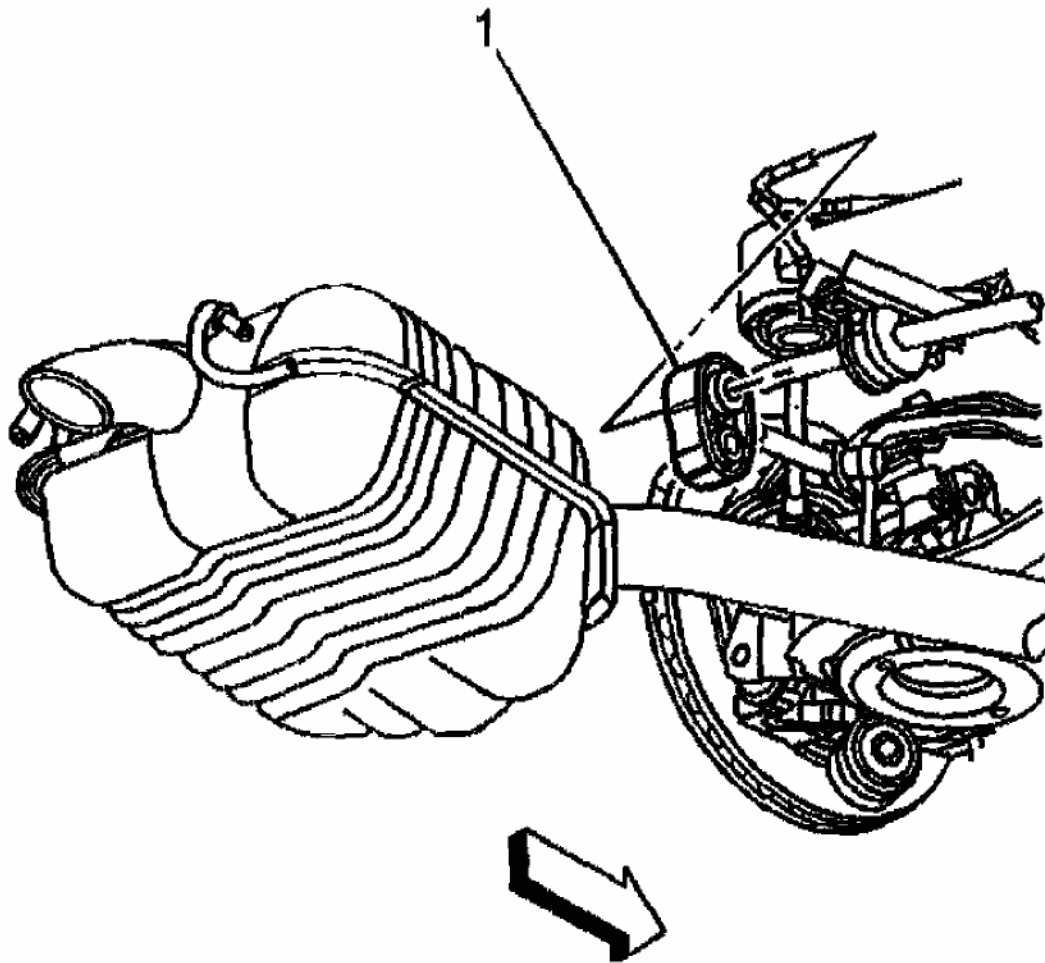
5. Remove the nuts securing the exhaust pipe to the right catalytic converter.
6. Suitably support the exhaust system.



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Fig. 18: Removing Exhaust Pipe To Right Catalytic Converter Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

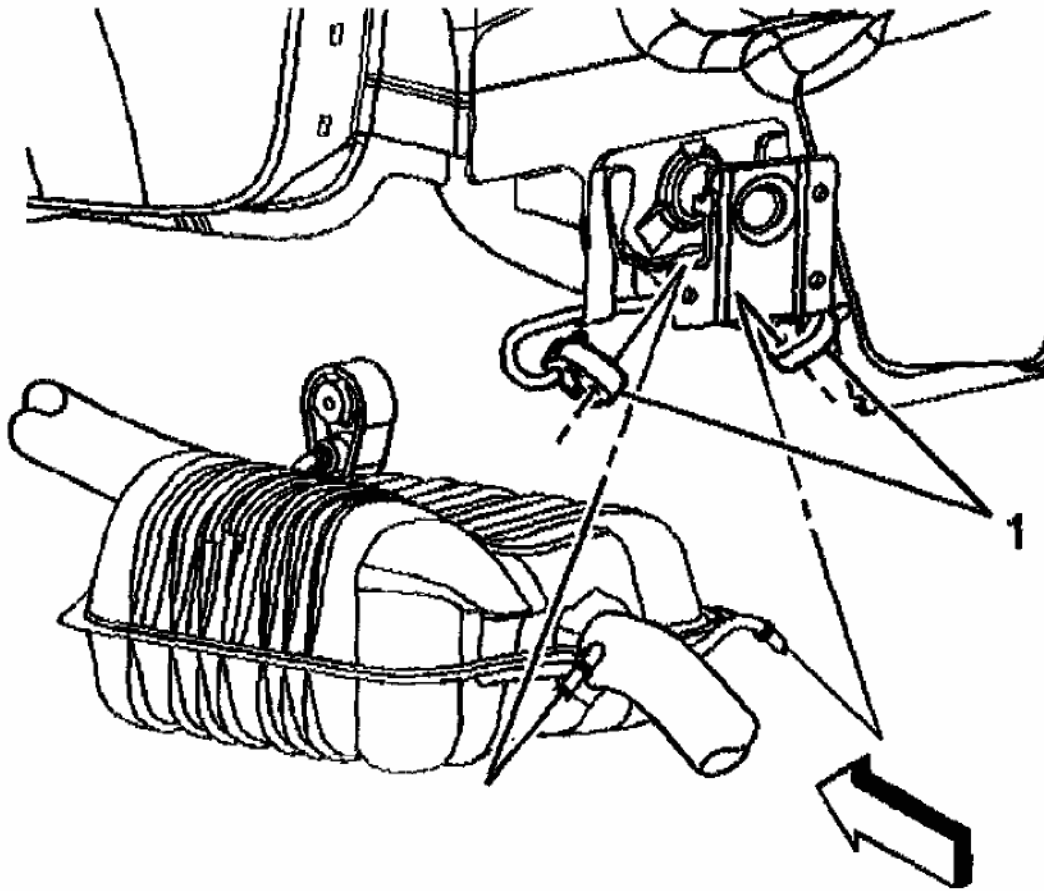
7. Pry the front exhaust hanger (1) free from the rear suspension hanger rod.



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Fig. 19: Removing Front Exhaust Hanger
Courtesy of GENERAL MOTORS CORP.

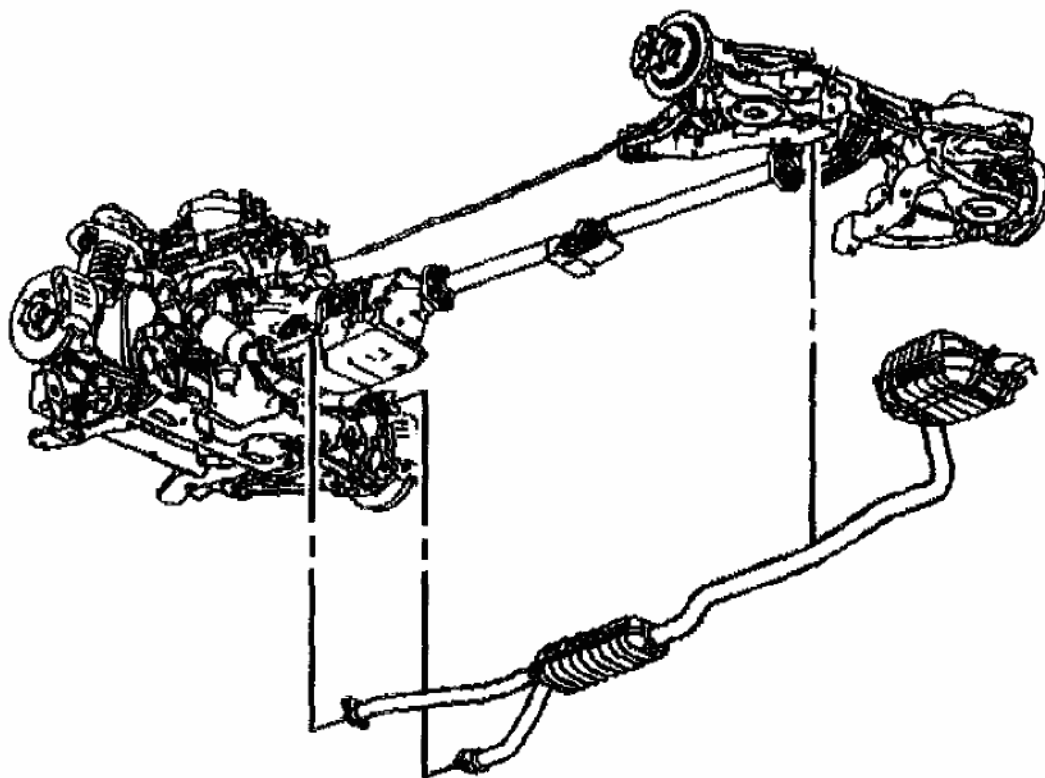
8. Apply a suitable lubricant to the tail pipe hanger rods in order to ease the removal of the tail pipe hangers (1).
9. Pry the tail pipe hangers (1) free from the tail pipe hanger rods.



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Fig. 20: Removing Tail Pipe Hangers
Courtesy of GENERAL MOTORS CORP.

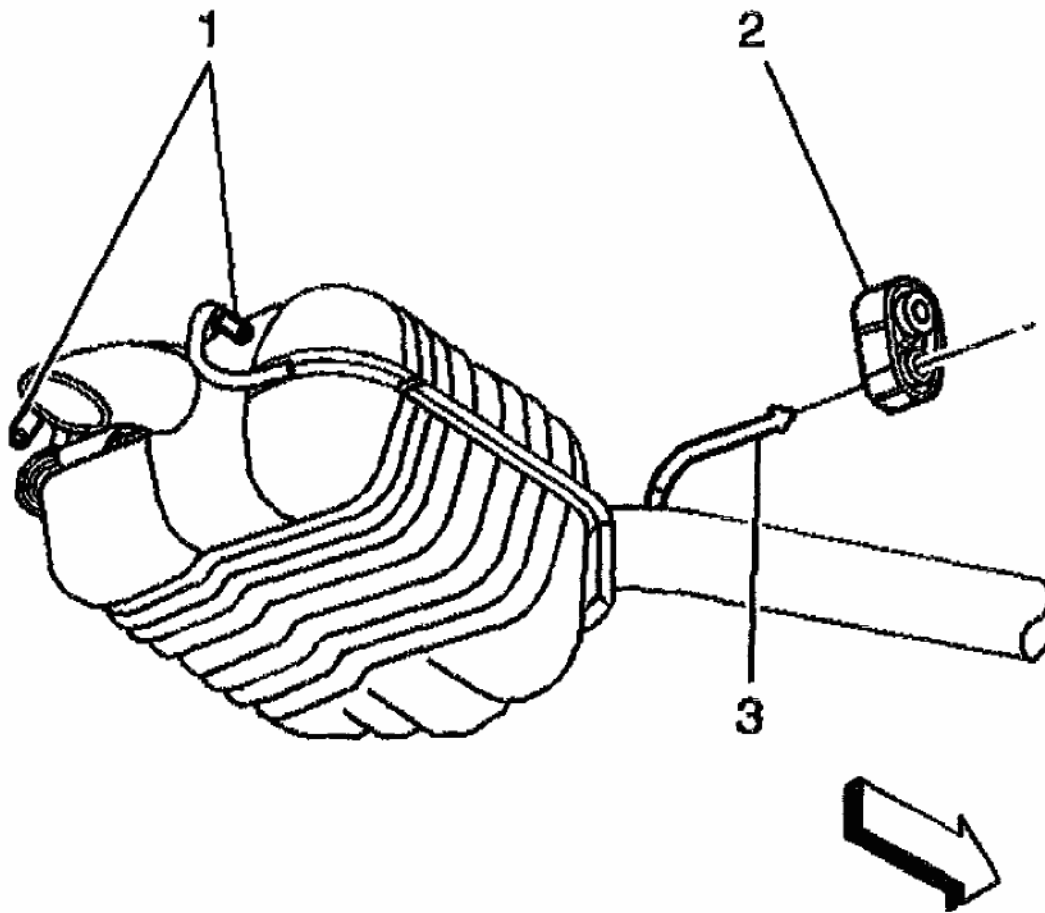
10. With the aid of an assistant, lower the exhaust system.



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Fig. 21: Lowering Exhaust System
Courtesy of GENERAL MOTORS CORP.

11. Remove the left side catalytic converter seal. Do not reuse the seal.
12. Remove the right side catalytic converter gasket. Do not reuse the gasket.
13. While the exhaust system is on the floor complete the following:
14. Apply a suitable lubricant to the exhaust pipe hanger rod (3) in order to ease the removal of the front exhaust hanger (2).
15. Pull the front exhaust hanger (2) from the exhaust pipe hanger rod.



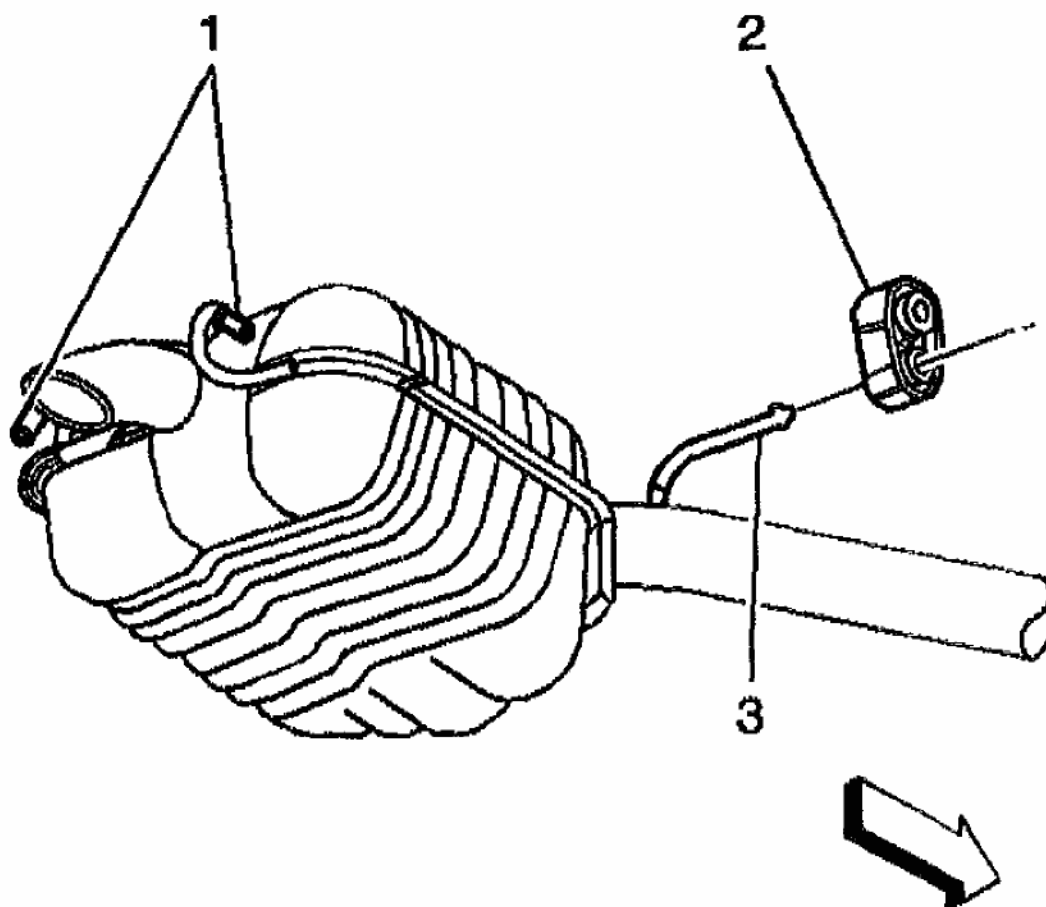
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Fig. 22: Removing Front Exhaust Hanger
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

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

1.2 Press the front exhaust hanger (2) over the exhaust pipe hanger rod (3).



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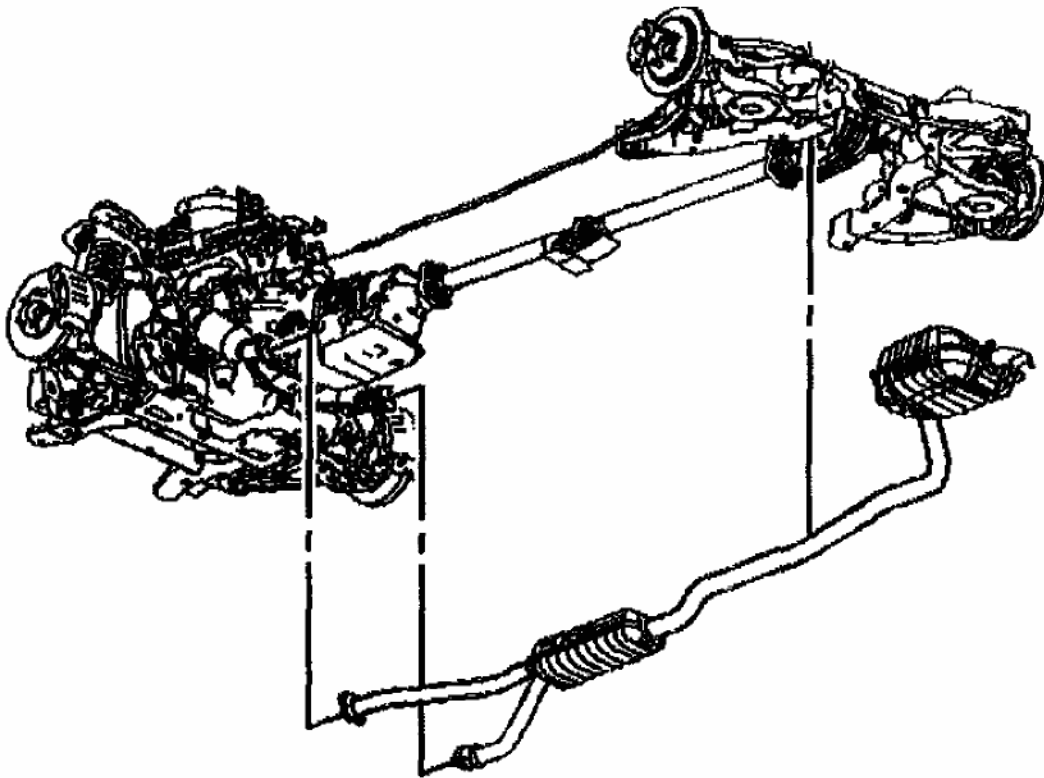
Fig. 23: Installing Exhaust Hanger
Courtesy of GENERAL MOTORS CORP.

2. Place a NEW seal on the left catalytic converter flange.
3. Place a NEW gasket over the right catalytic converter studs.

NOTE: Refer to EXHAUST SYSTEM INSPECTION NOTICE in Cautions and Notices.

NOTE: Refer to FLEX DECOUPLER NOTICE in Cautions and Notices.

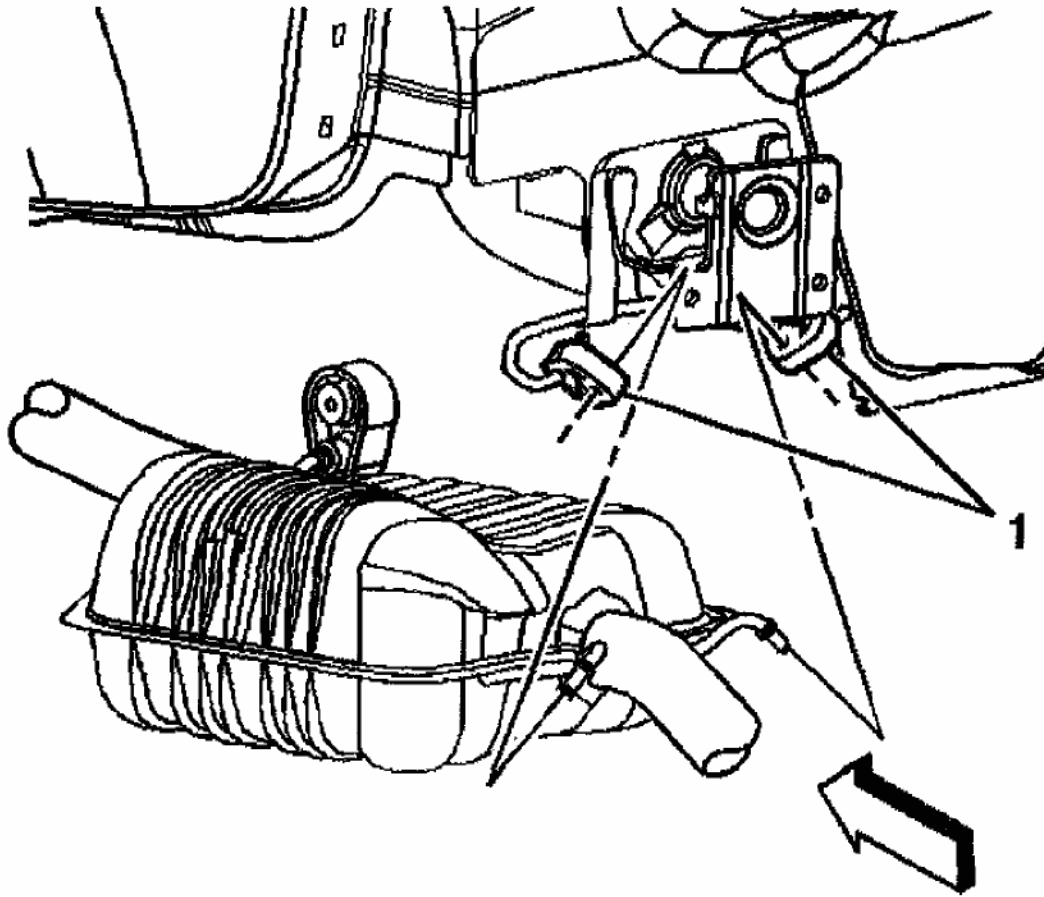
4. With the aid of an assistant, raise the exhaust system into position, aligning the exhaust pipe flanges with the studs located in the rear of the catalytic converters.
5. Finger tighten the 4 nuts to the catalytic converter studs.



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Fig. 24: Installing Exhaust System
Courtesy of GENERAL MOTORS CORP.

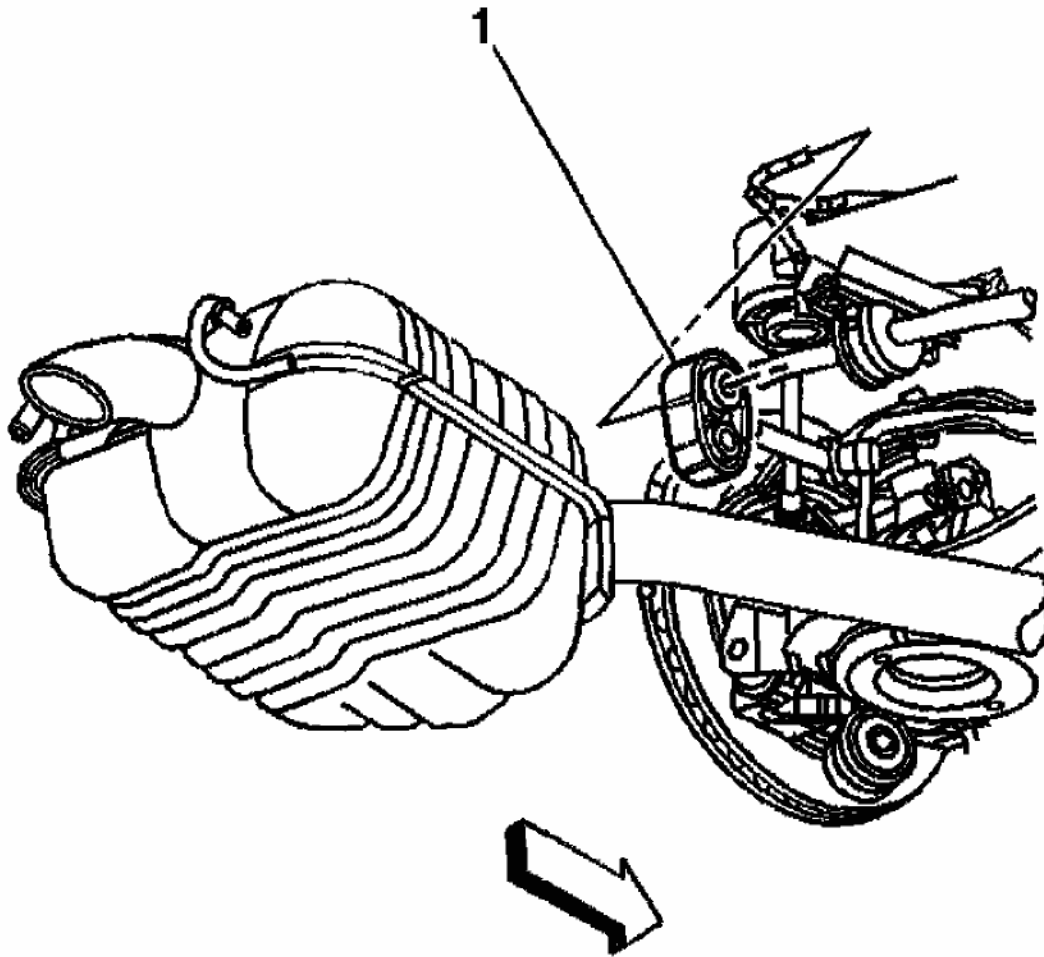
6. Press the tail pipe hangers (1) over the tail pipe hanger rods.



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Fig. 25: Installing Tail Pipe Hangers Rods
Courtesy of GENERAL MOTORS CORP.

7. Press the front exhaust hanger (1) over the rear suspension hanger rod.



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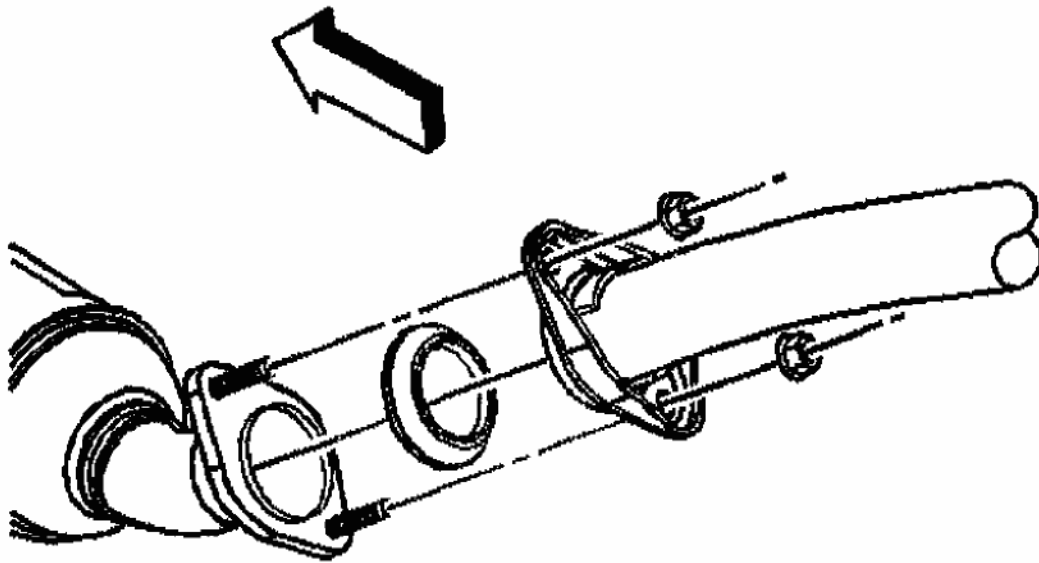
Fig. 26: Installing Front Exhaust Hanger
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

8. Tighten the 2 left catalytic converter nuts previously installed in step 5.

Tighten

Tighten the catalytic converter nuts to 15 N.m (11 lb ft).



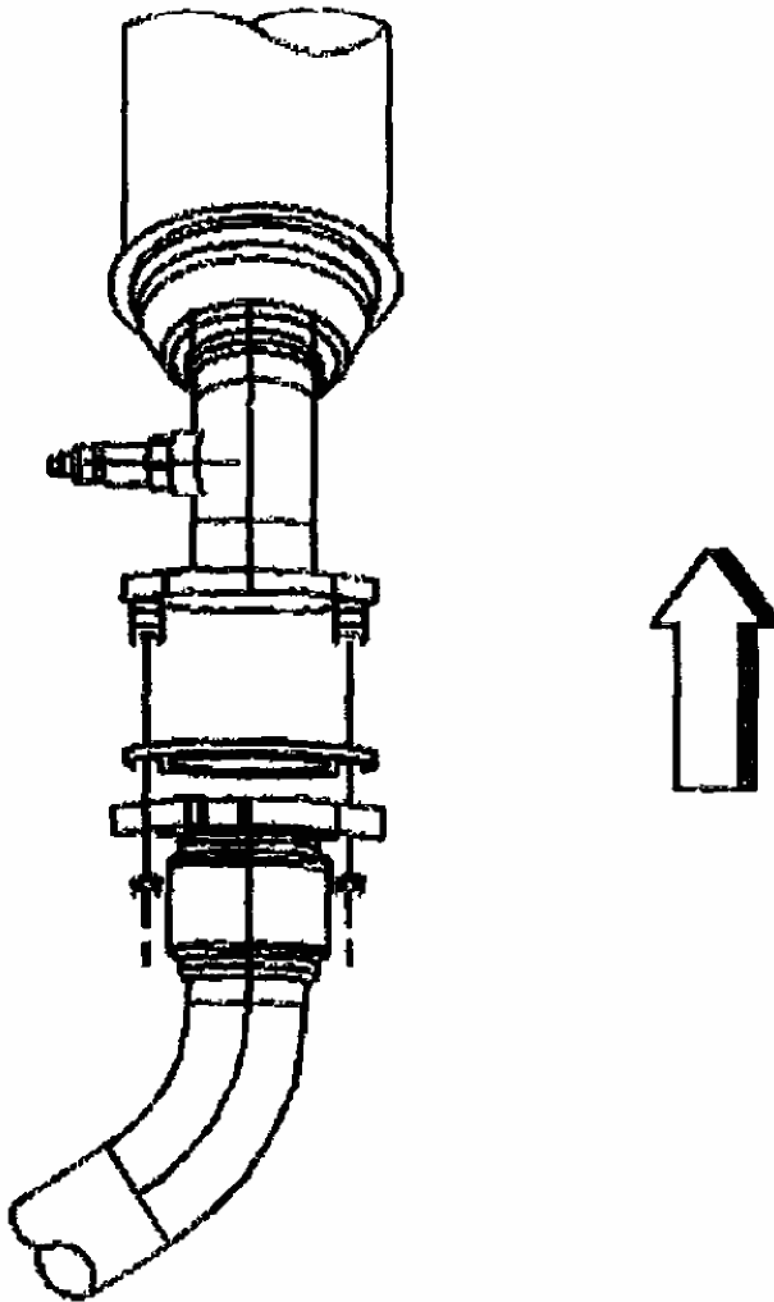
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Fig. 27: Installing Left Catalytic Converter & Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

9. Tighten the 2 right catalytic converter nuts previously installed in step 5.

Tighten

Tighten the catalytic converter nuts to 15 N.m (11 lb ft).



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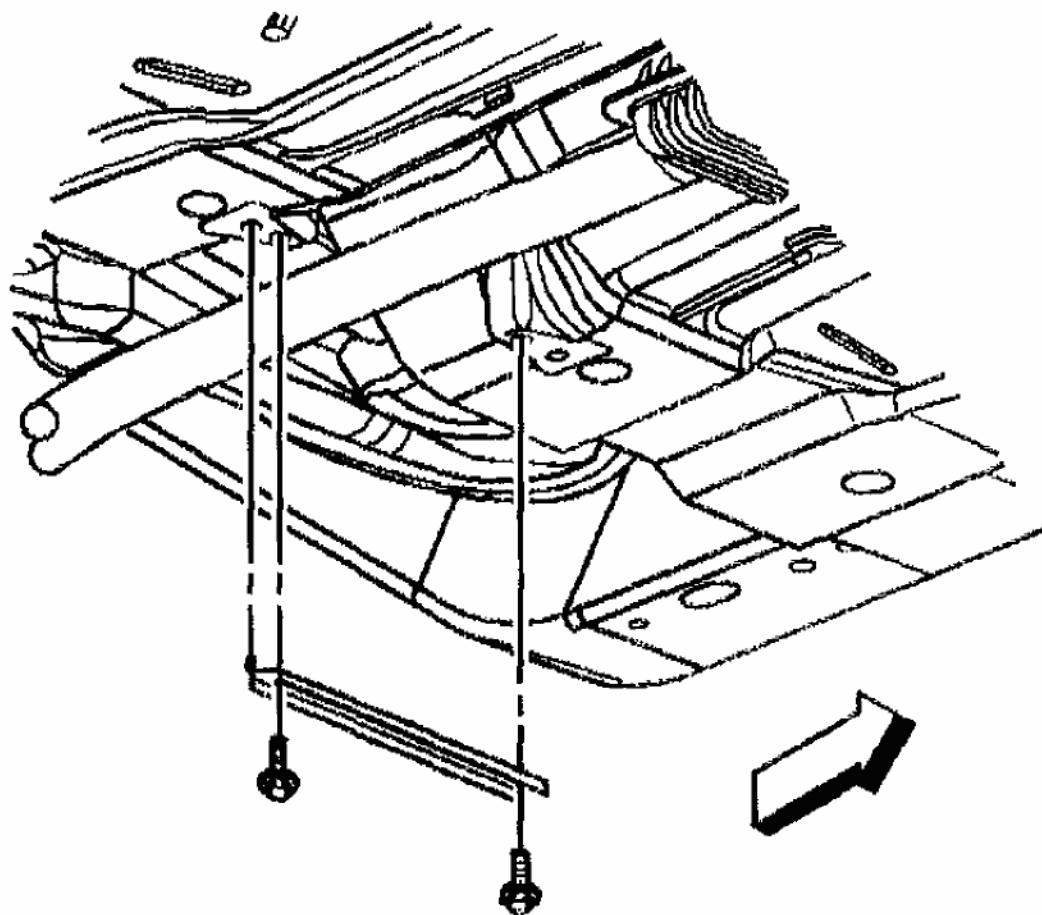
Fig. 28: Installing Right Catalytic Converter & Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

10. Position the floor panel tunnel brace to the floor panel.

11. 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).



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Fig. 29: Installing Floor Panel Tunnel Brace & Bolts
Courtesy of GENERAL MOTORS CORP.

12. Lower the vehicle.

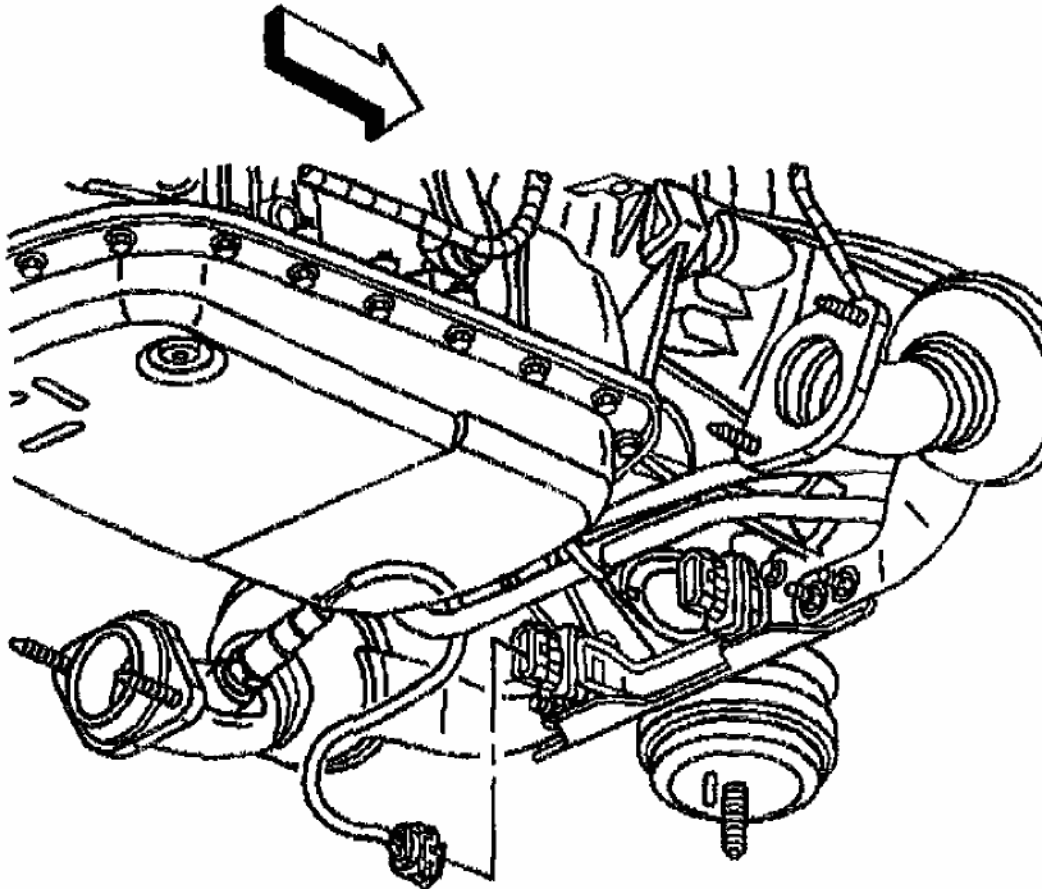
CATALYTIC CONVERTER REPLACEMENT - LEFT

Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

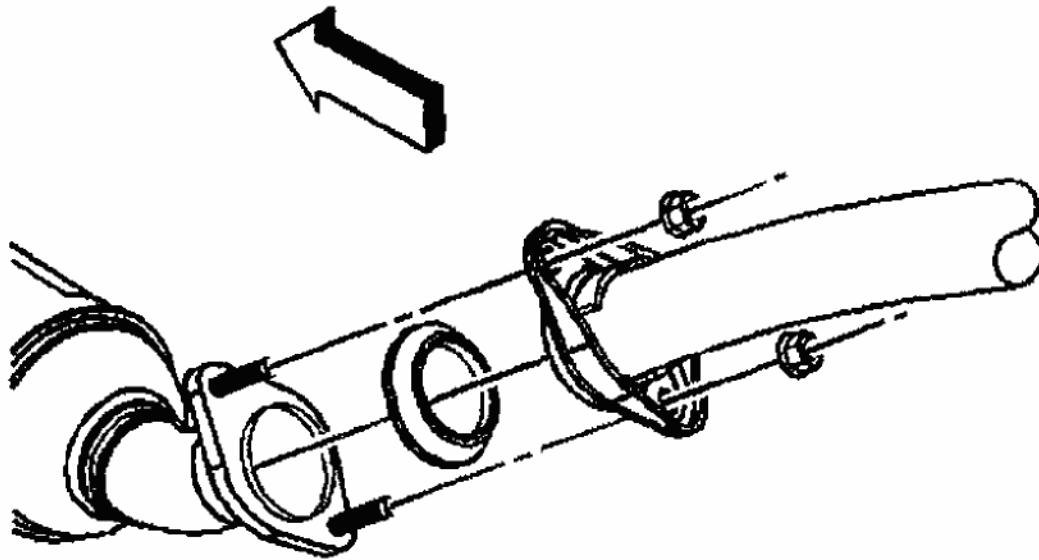
1. Raise and support the vehicle. Refer to LIFTING AND JACKING THE VEHICLE in General Information.
2. Disconnect the heated oxygen sensor at the sensor pigtail.



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Fig. 30: Disconnecting Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

3. Remove the heated oxygen sensor if replacement is necessary. Refer to **HEATED OXYGEN SENSOR** in Removal & Installation.
4. Remove the nuts securing the exhaust pipe to the left catalytic converter.



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Fig. 31: Removing Exhaust Pipe To Left Catalytic Converter Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

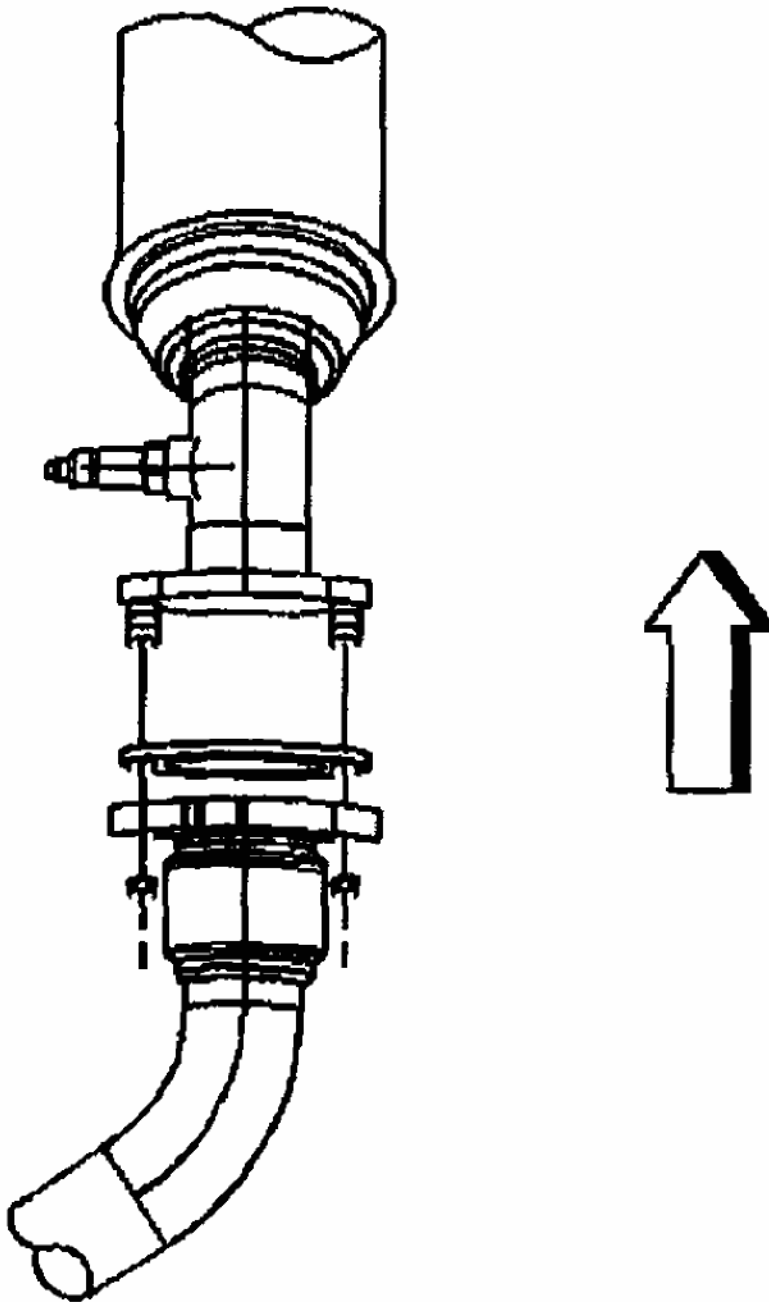
5. Remove the nuts securing the exhaust pipe to the right catalytic converter.

NOTE: Refer to **FLEX DECOUPLER NOTICE** in Cautions and Notices.

6. Position the exhaust system rearward, enough to allow the studs located in the rear of the catalytic converters to clear the exhaust pipe flange.

Allow the exhaust system to rest on the floor panel tunnel brace.

7. Remove the left side catalytic converter seal. Do not reuse the seal.
8. Remove the right side catalytic converter gasket. Do not reuse the gasket.



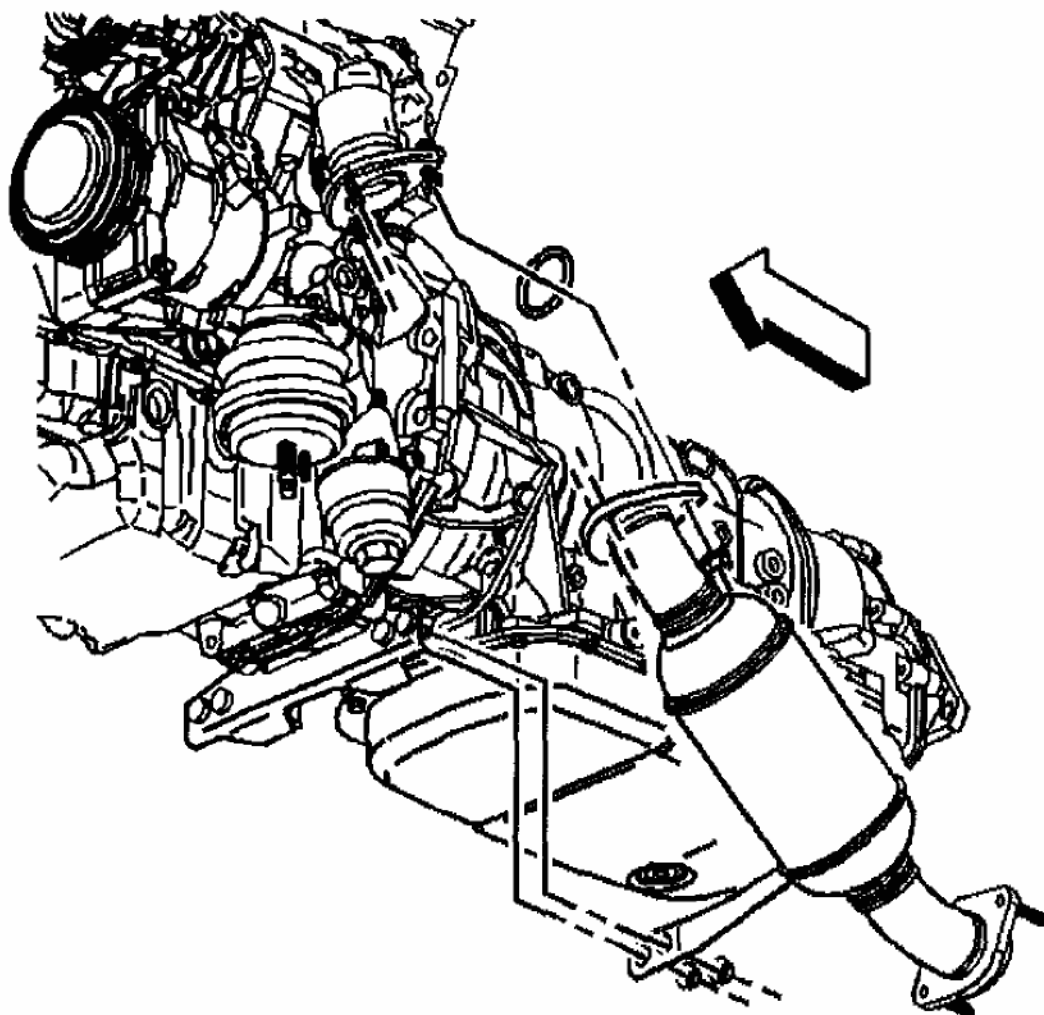
G02087415

Fig. 32: Removing Exhaust Pipe To Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

9. Remove the 2 nuts attaching the catalytic converter to the catalytic converter hanger

bracket.

10. Remove the 3 nuts attaching the catalytic converter to the exhaust manifold.
11. Remove the catalytic converter and the seal. Do not reuse the seal.



G02087416

Fig. 33: Removing Catalytic Converter & Seal
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Insert a NEW seal into the seal groove of the catalytic converter.

NOTE: Refer to **EXHAUST SYSTEM INSPECTION NOTICE** in Cautions and Notices.

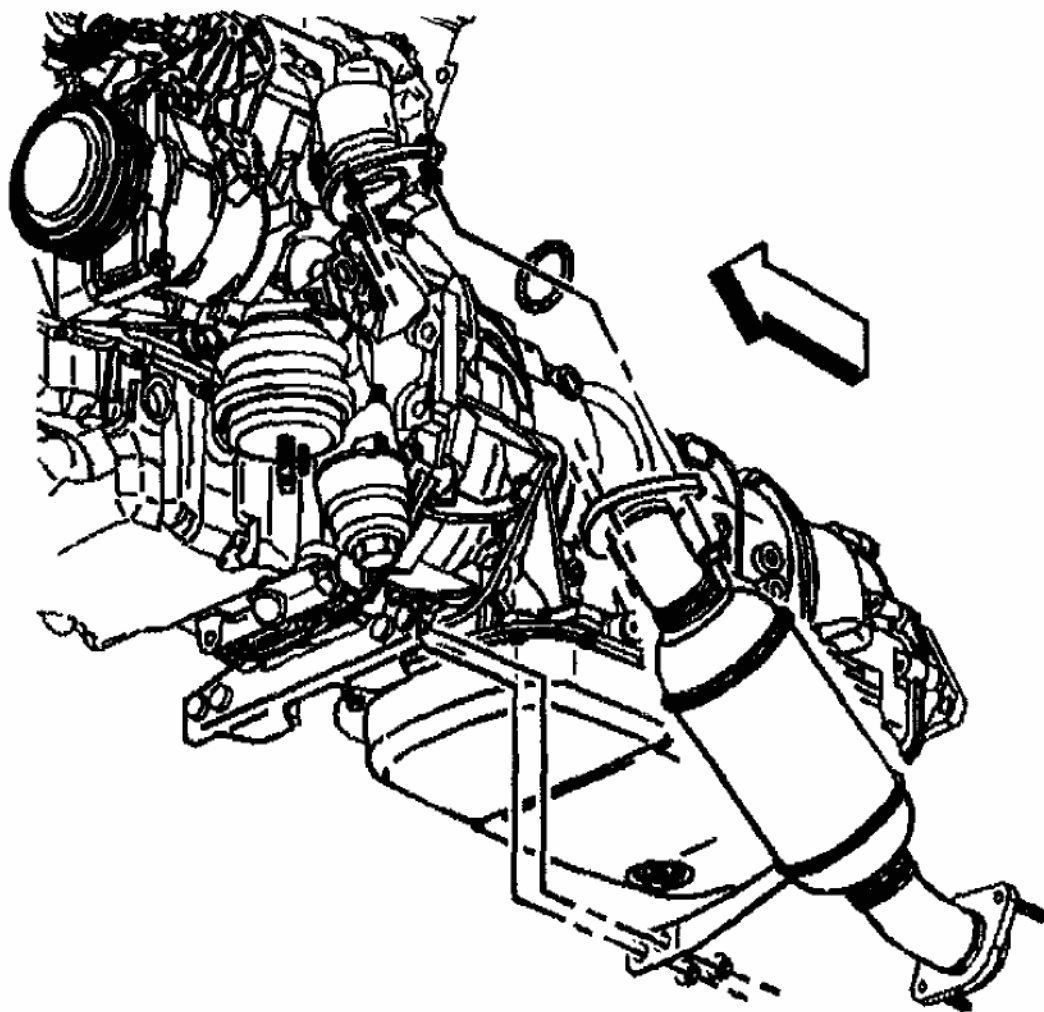
2. Position the catalytic converter to the exhaust manifold and catalytic converter hanger bracket.

NOTE: Refer to **FASTENER NOTICE** in Cautions and Notices.

3. Install the 3 nuts attaching the catalytic converter to the exhaust manifold.

Tighten

Tighten the exhaust manifold pipe nuts to 22 N.m (16 lb ft).



G02087417

Fig. 34: Installing Catalytic Converter To Exhaust Manifold
Courtesy of GENERAL MOTORS CORP.

4. Install the 2 nuts attaching the catalytic converter to the catalytic converter hanger bracket.

Tighten

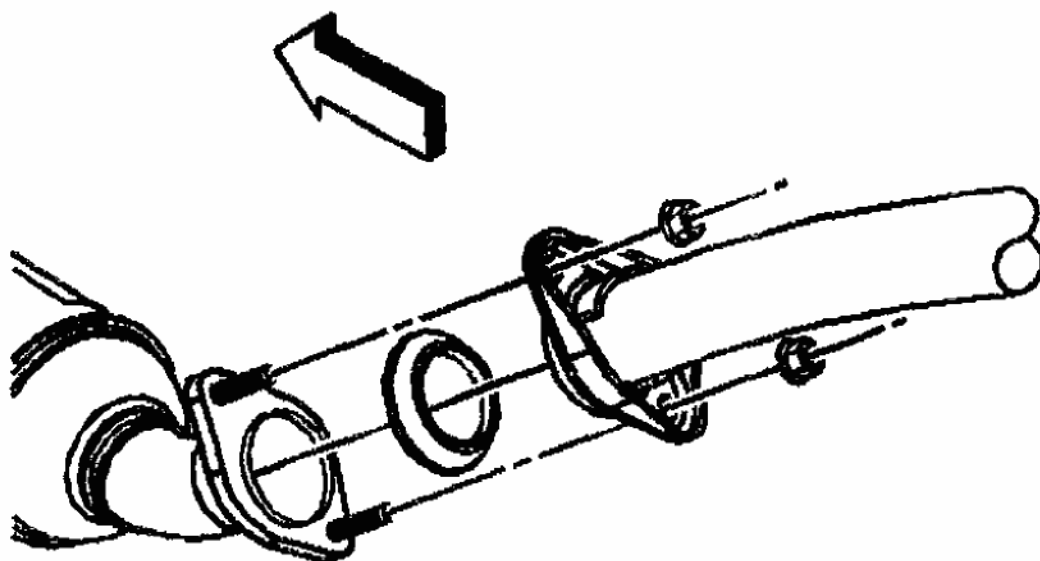
Tighten the catalytic converter hanger bracket nuts to 25 N.m (18 lb ft).

5. Place a NEW seal on the left side catalytic converter flange.
6. Place a NEW gasket over the right side catalytic converter studs.

7. Align the exhaust pipe flanges with the studs located in the rear of the catalytic converters.
8. Install the 2 nuts securing the exhaust pipe to the left catalytic converter.

Tighten

Tighten the catalytic converter nuts to 15 N.m (11 lb ft).



G02087418

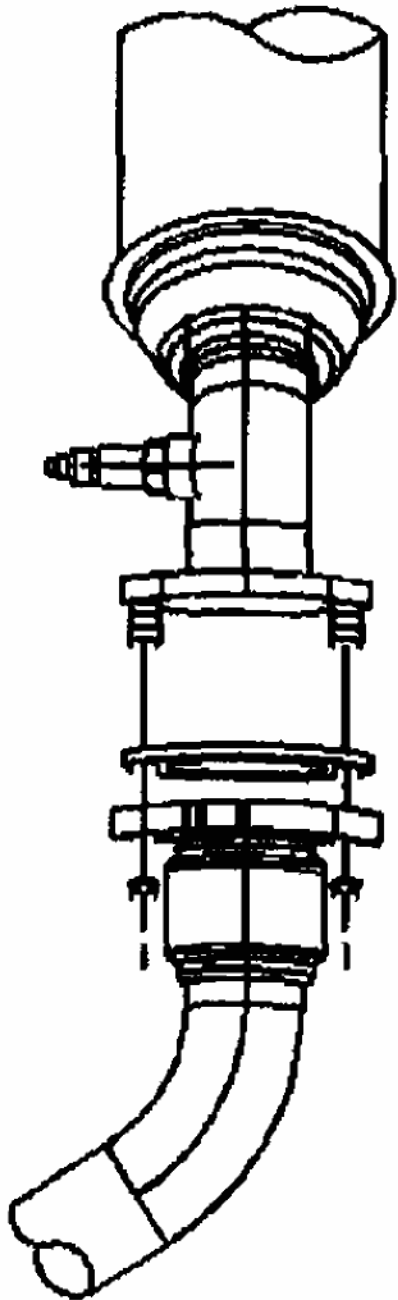
Fig. 35: Installing Exhaust Pipe To Left Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to **FLEX DECOUPLER NOTICE** in Cautions and Notices.

9. Install the 2 nuts securing the exhaust pipe to the right catalytic converter.

Tighten

Tighten the catalytic converter nuts to 15 N.m (11 lb ft).



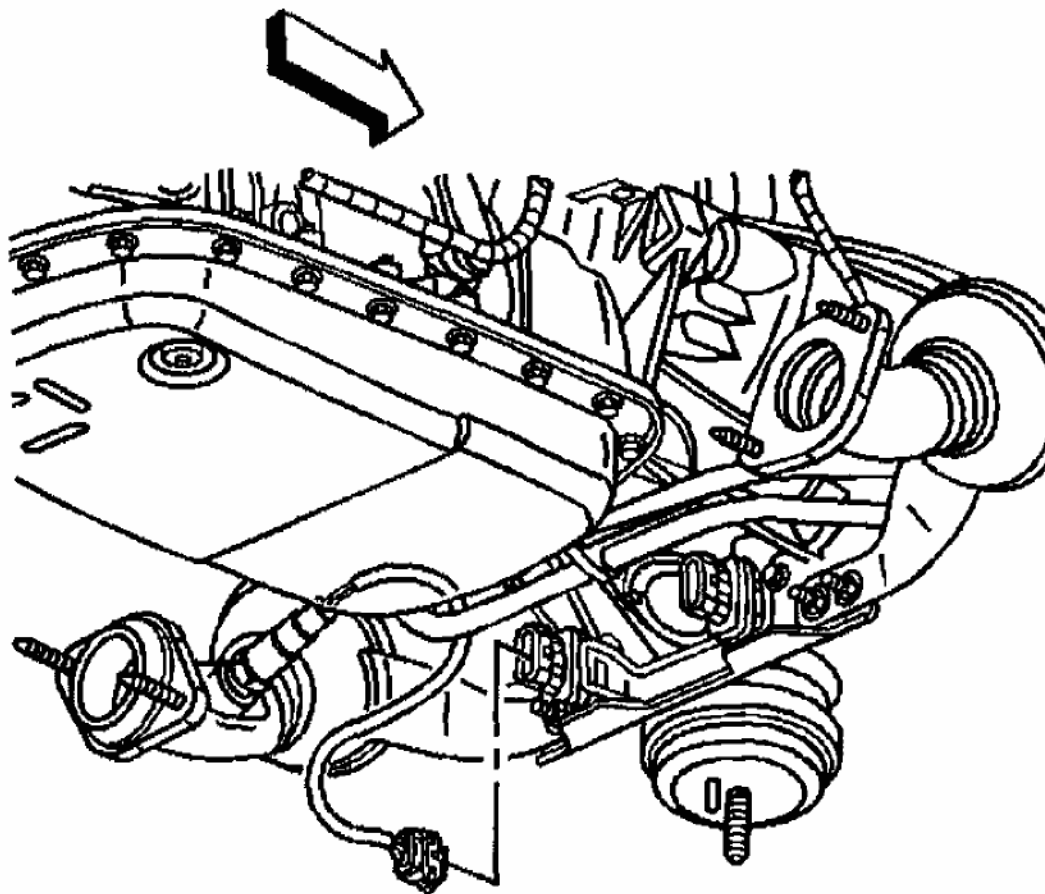
G02087419

Fig. 36: Installing Exhaust Pipe To Right Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

10. Install the heated oxygen sensor if previously removed. Refer to **HEATED OXYGEN**

SENSOR in Removal & Installation.

11. Connect the heated oxygen sensor at the sensor pigtail.



G02087420

Fig. 37: Installing Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

12. Lower the vehicle.

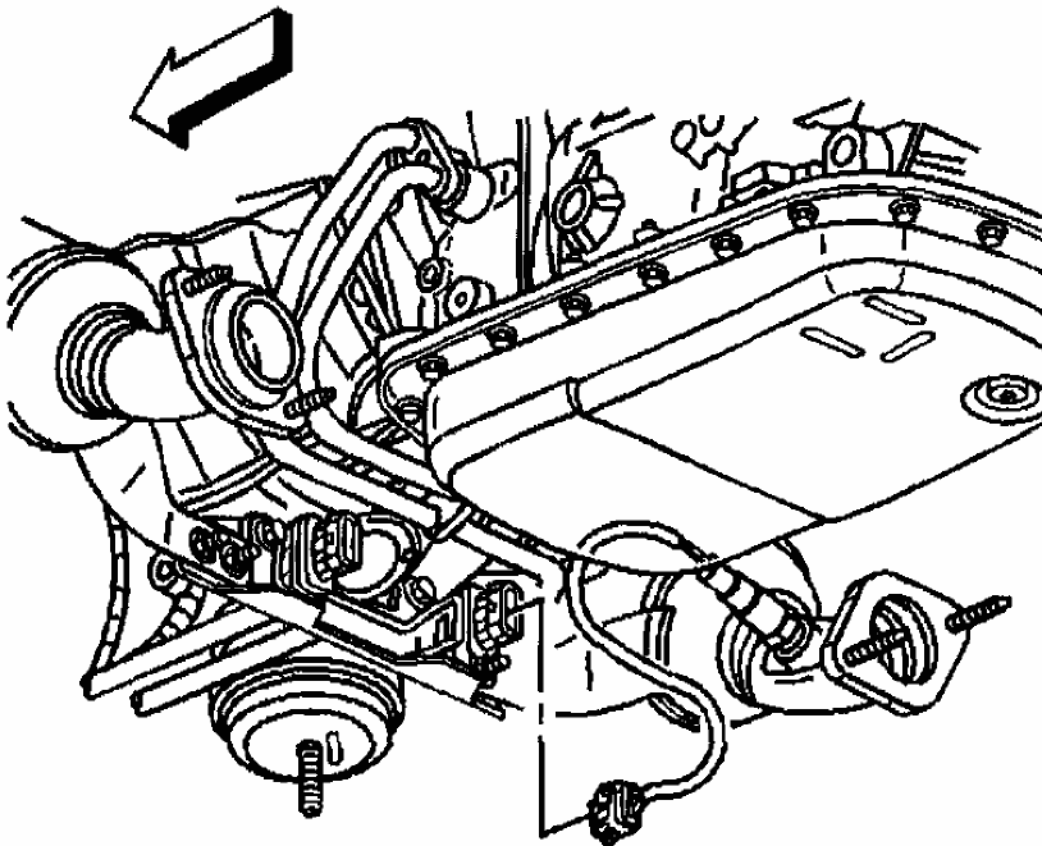
CATALYTIC CONVERTER REPLACEMENT - RIGHT

Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

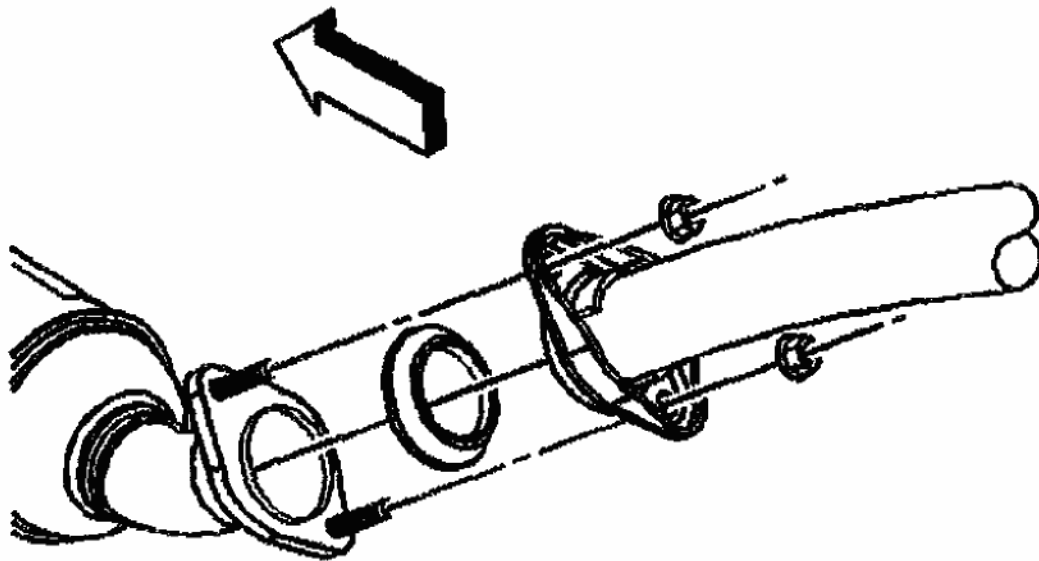
1. Raise and support the vehicle. Refer to LIFTING AND JACKING THE VEHICLE in General Information.
2. Disconnect the Heated oxygen sensor at the sensor pigtail.
3. Remove the heated oxygen sensor if replacement is necessary. Refer to HEATED OXYGEN SENSOR in Removal & Installation.



G02087421

Fig. 38: Disconnecting Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

4. Remove the nuts securing the exhaust pipe to the left catalytic converter.



G02087422

Fig. 39: Removing Exhaust Pipe To Left Catalytic Converter Retaining Nuts
Courtesy of GENERAL MOTORS CORP.

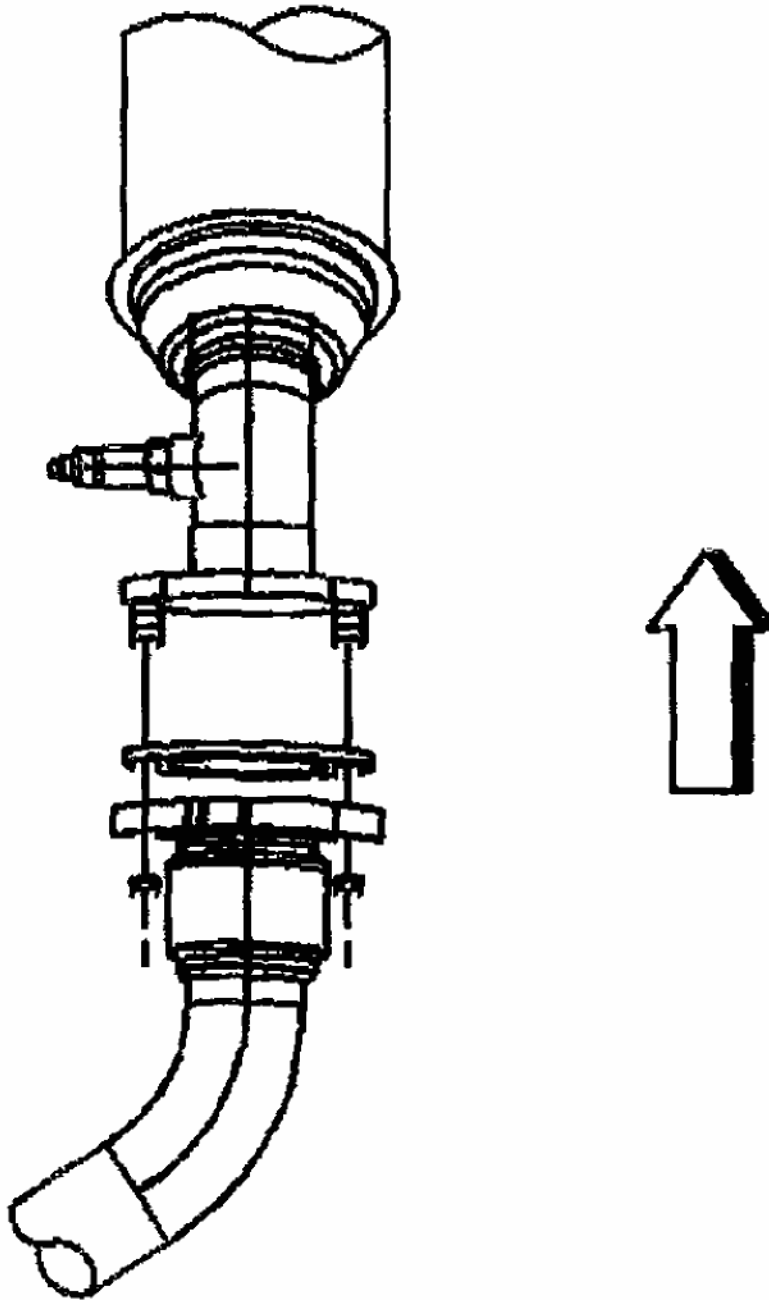
5. Remove the nuts securing the exhaust pipe to the right catalytic converter.

NOTE: Refer to **FLEX DECOUPLER NOTICE** in Cautions and Notices.

6. Position the exhaust system rearward, enough to allow the studs located in the rear of the catalytic converters to clear the exhaust pipe flange.

Allow the exhaust system to rest on the floor panel tunnel brace.

7. Remove the left side catalytic converter seal. Do not reuse the seal.
8. Remove the right side catalytic converter gasket. Do not reuse the gasket.



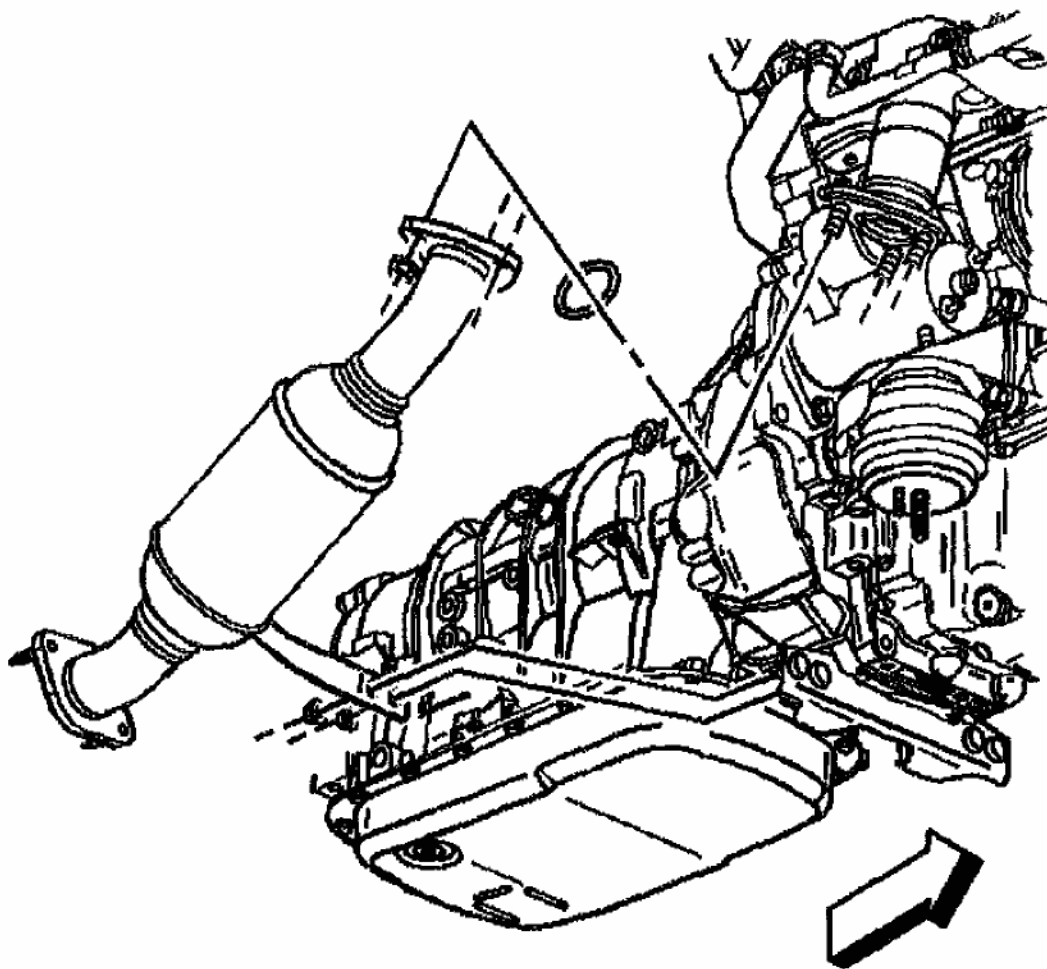
G02087423

Fig. 40: Removing Exhaust Pipe To Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

9. Remove the 2 nuts attaching the catalytic converter to the catalytic converter hanger

bracket.

10. Remove the 3 nuts attaching the catalytic converter to the exhaust manifold.
11. Remove the catalytic converter and the seal. Do not reuse the seal.



G02087424

Fig. 41: Removing Catalytic Converter & Bracket
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Insert a NEW seal into the seal grove of the catalytic converter.

NOTE: Refer to EXHAUST SYSTEM INSPECTION NOTICE in Cautions

and Notices.

2. Position the catalytic converter to the exhaust manifold and catalytic converter hanger bracket.

NOTE: Refer to **FASTENER NOTICE** in **Cautions and Notices**.

3. Install the 3 nuts attaching the catalytic converter to the exhaust manifold.

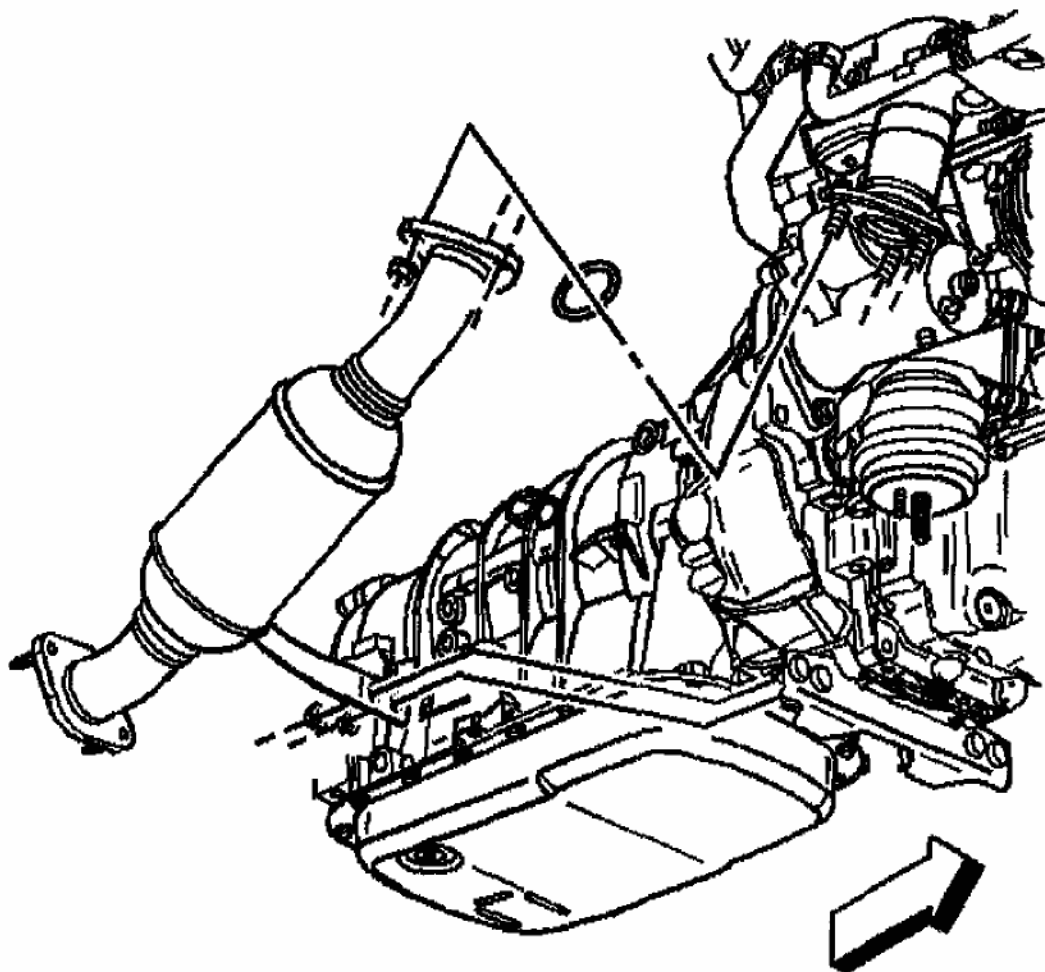
Tighten

Tighten the exhaust manifold pipe nuts to 22 N.m (16 lb ft).

4. Install the 2 nuts attaching the catalytic converter to the catalytic converter hanger bracket.

Tighten

Tighten the catalytic converter hanger bracket nuts to 25 N.m (18 lb ft).



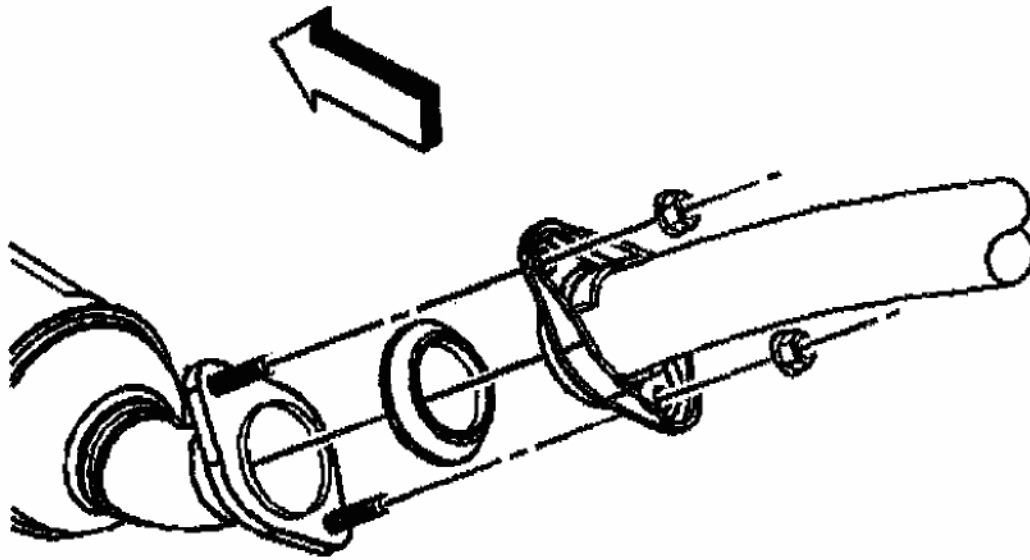
G02087425

Fig. 42: Installing Catalytic Converter To Catalytic Converter Hanger Bracket
Courtesy of GENERAL MOTORS CORP.

5. Place a NEW seal on the left side catalytic converter flange.
6. Place a NEW gasket over the right side catalytic converter studs.
7. Align the exhaust pipe flanges with the studs located in the rear of the catalytic converters.
8. Install the 2 nuts securing the exhaust pipe to the left catalytic converter.

Tighten

Tighten the catalytic converter nuts to 15 N.m (11 lb ft).



G02087426

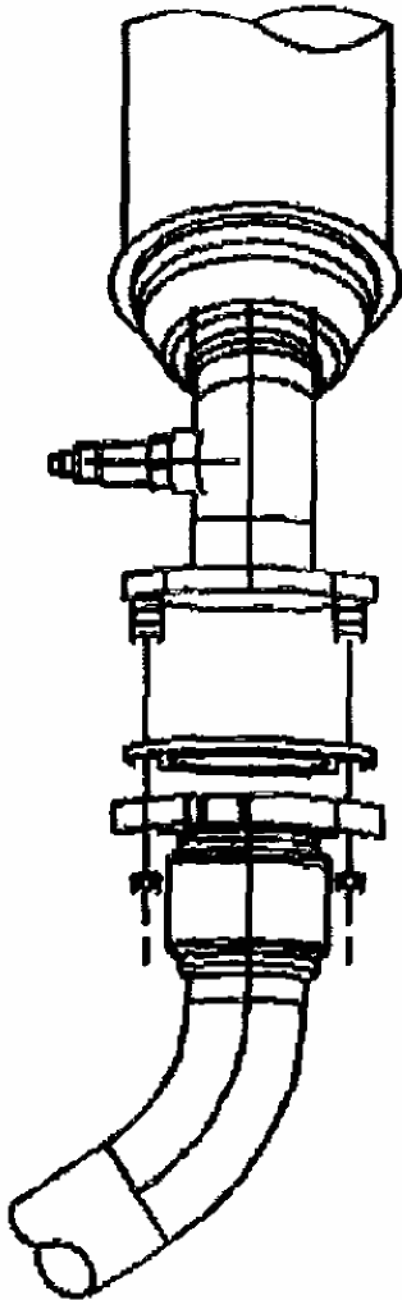
Fig. 43: Installing Exhaust Pipe To Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

NOTE: Refer to FLEX DECOUPLER NOTICE in Cautions and Notices.

9. Install the 2 nuts securing the exhaust pipe to the right catalytic converter.

Tighten

Tighten the catalytic converter nuts to 15 N.m (11 lb ft).



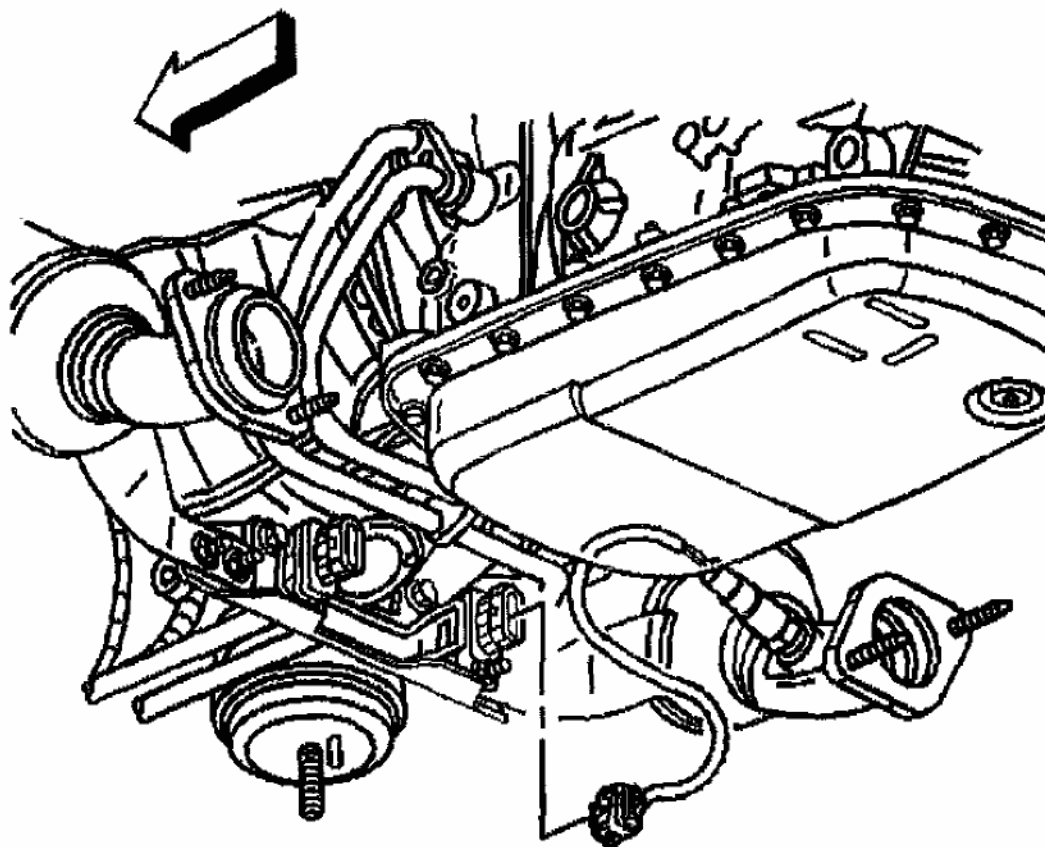
G02087427

Fig. 44: Installing Exhaust Pipe To Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

10. Install the heated oxygen sensor if previously removed. Refer to **HEATED OXYGEN**

SENSOR in Removal & Installation.

11. Connect the heated oxygen sensor at the sensor pigtail.



G02087428

Fig. 45: Installing Heated Oxygen Sensor Pigtail
Courtesy of GENERAL MOTORS CORP.

12. Lower the vehicle.

EXHAUST HANGER REPLACEMENT

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

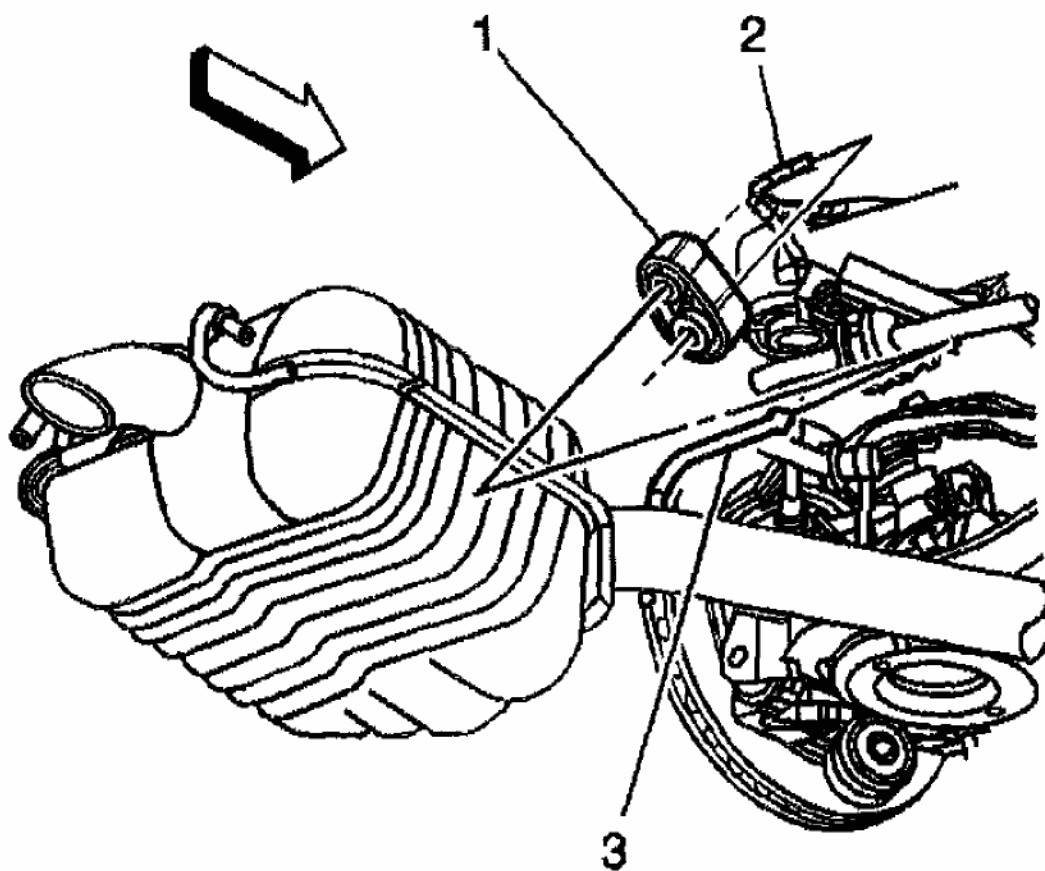
Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust

system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

1. Raise and support the vehicle. Refer to LIFTING AND JACKING THE VEHICLE in General Information.
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).

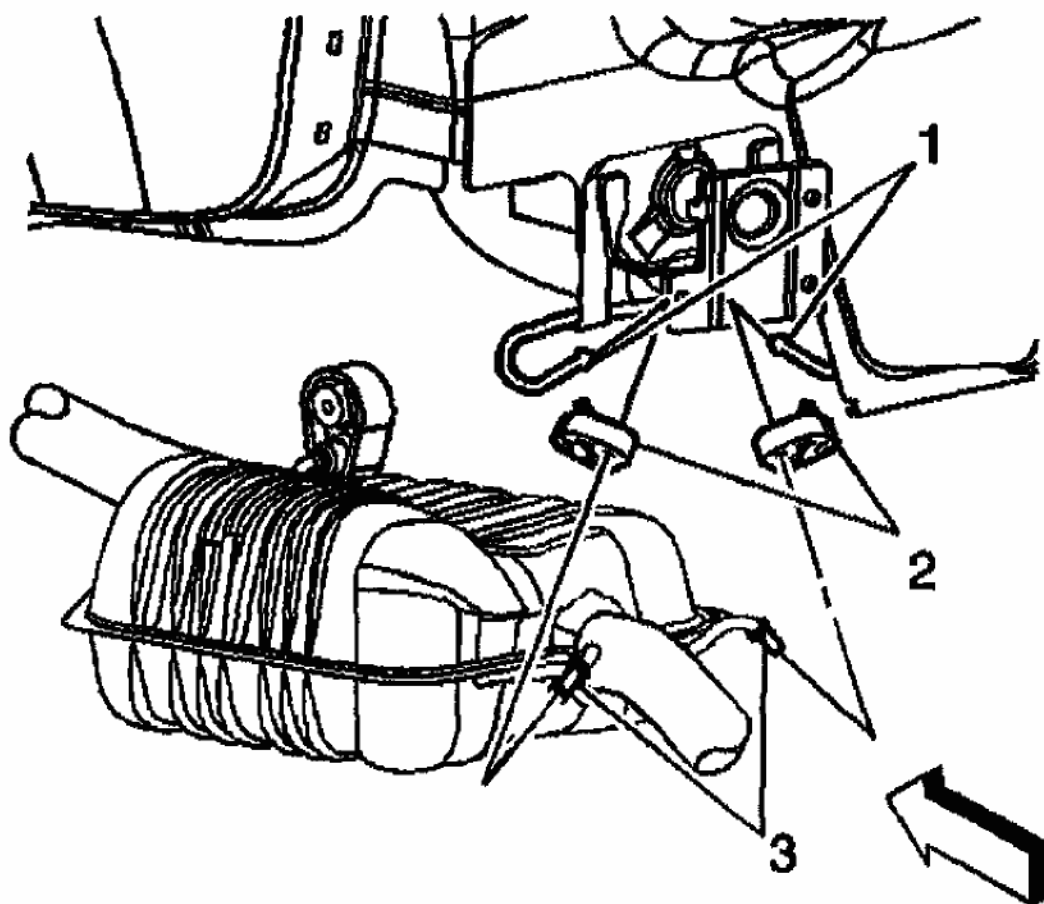


G02087429

Fig. 46: Removing Exhaust Hanger

Courtesy of GENERAL MOTORS CORP.

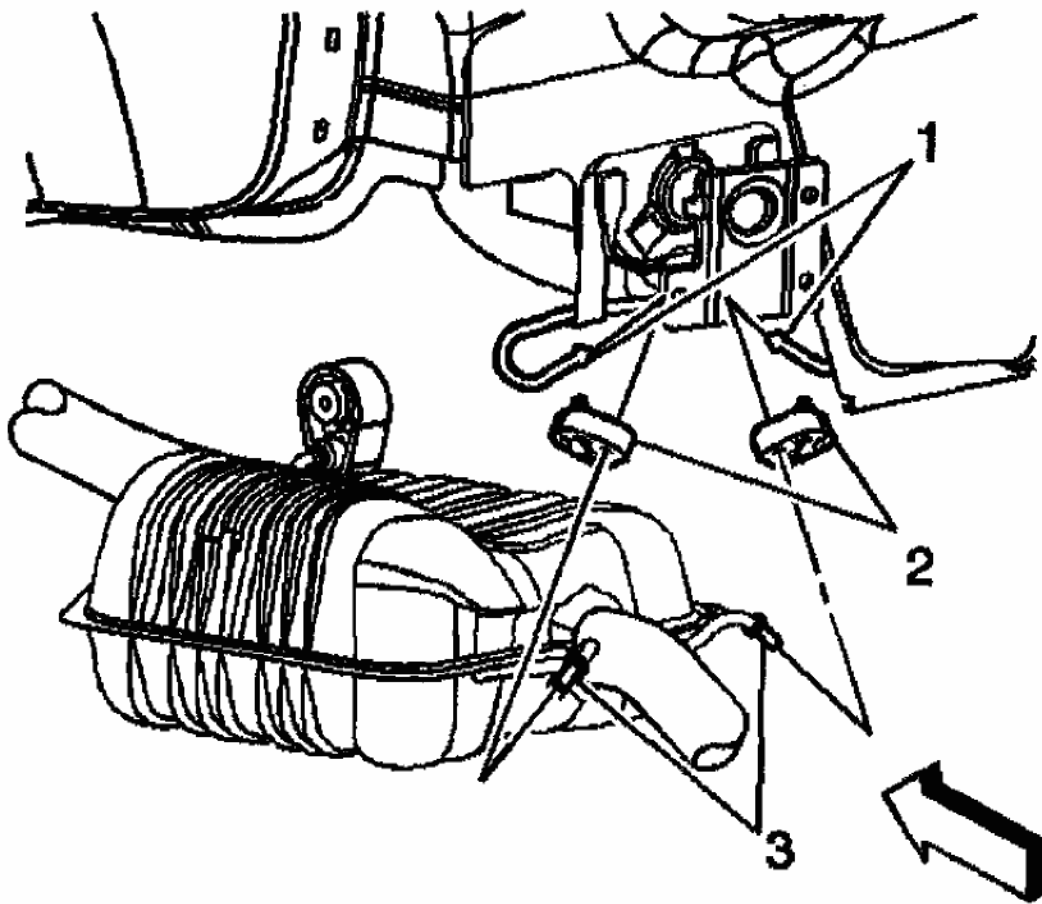
5. Apply a suitable lubricant to the following in order to ease the removal of the hanger (2):
 - The left body support bracket rod (1)
 - The tail pipe hanger rod (3)
6. Pry the tail pipe hanger (2) free from the tail pipe hanger rod (3).
7. Pry the tail pipe hanger (2) free from the body support bracket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



G02087430

Fig. 47: Removing 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 left 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).

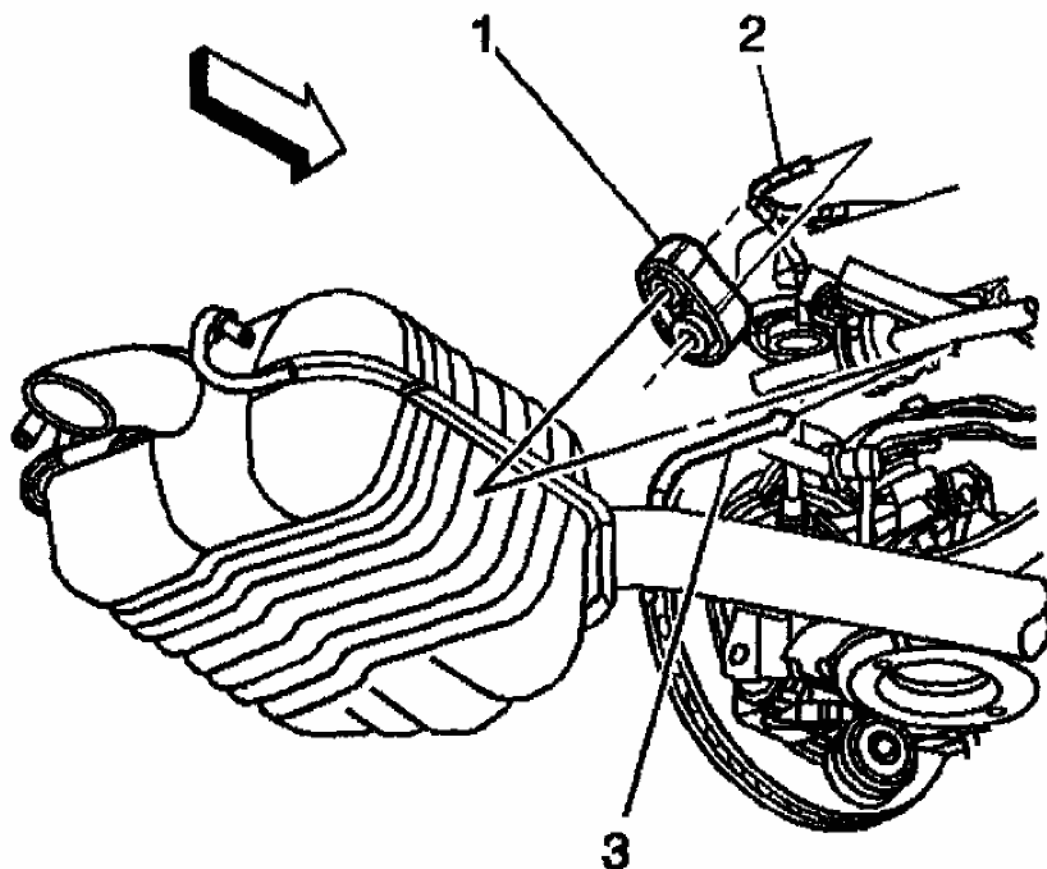


G02087431

Fig. 48: Installing Tail Pipe Hanger
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.



G02087432

Fig. 49: Installing Front Exhaust Hanger
Courtesy of GENERAL MOTORS CORP.

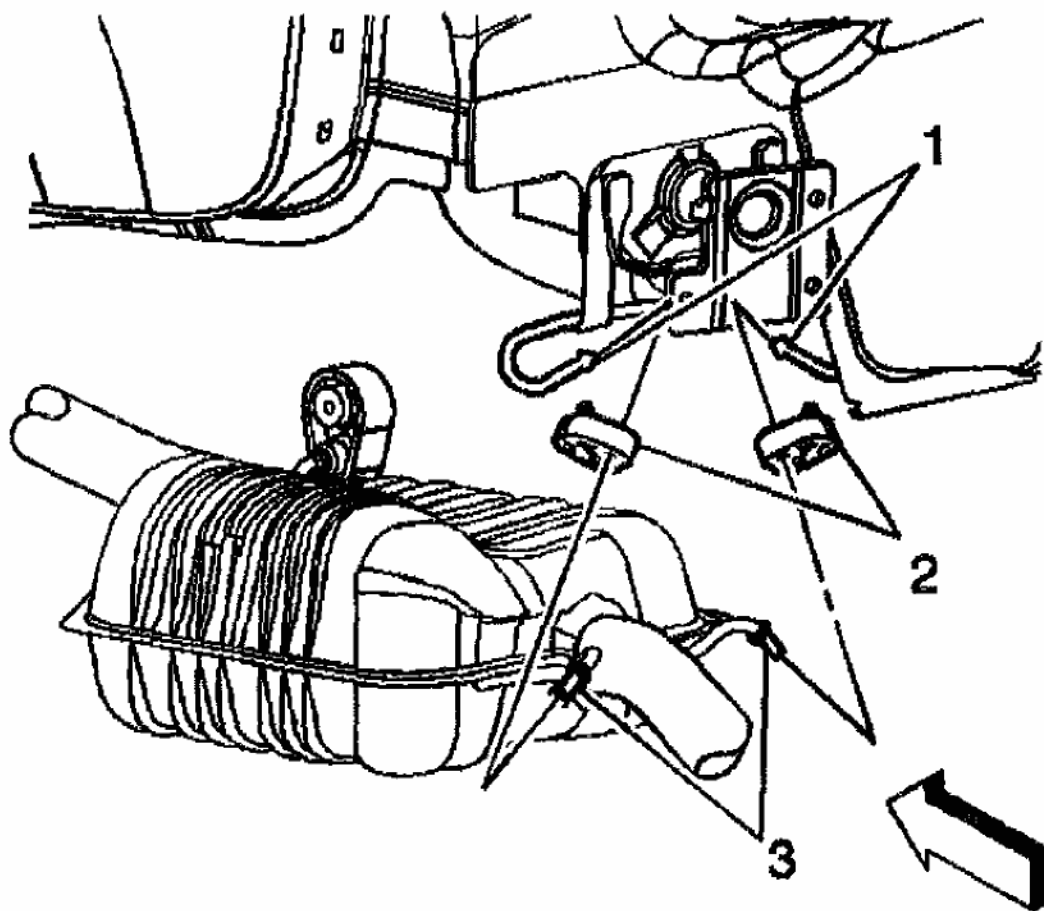
EXHAUST HANGER MOUNTING BRACKET REPLACEMENT

Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

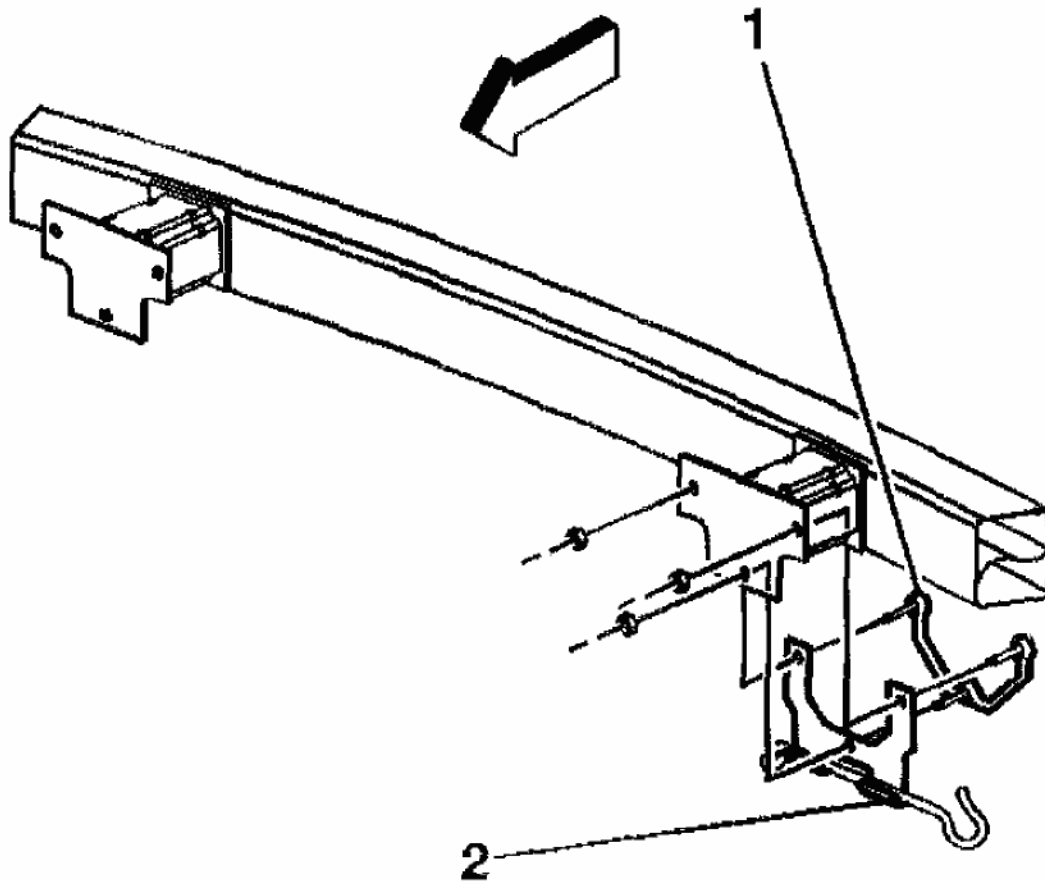
1. Raise and support the vehicle. Refer to LIFTING AND JACKING THE VEHICLE in General Information.
2. Apply a suitable lubricant to the following in order to ease the removal of the hangers (2):
 - The left exhaust hanger mounting bracket rod (1)
 - The tail pipe hanger rods (3)
3. Pry the tail pipe hangers (2) free from the tail pipe hanger rods (3).



G02087433

Fig. 50: Removing Tail Pipe Hangers
Courtesy of GENERAL MOTORS CORP.

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



G02087434

Fig. 51: Removing Exhaust Hanger Mounting Bracket & Stud Plate
Courtesy of GENERAL MOTORS CORP.

7. Remove the exhaust hanger mounting bracket from the rear energy absorber.

Installation Procedure

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

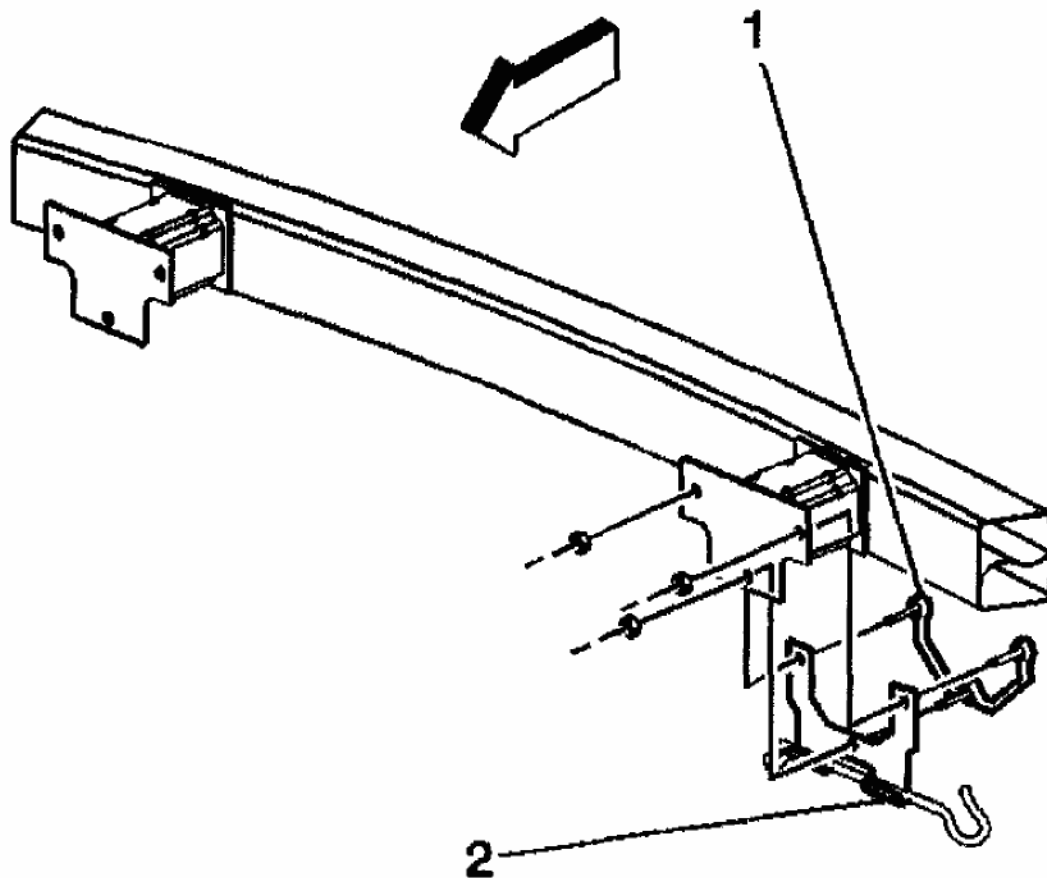
Insert the stud plate (1) through the exhaust hanger mounting bracket (2), the rear energy absorber and the rear compartment rail.

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

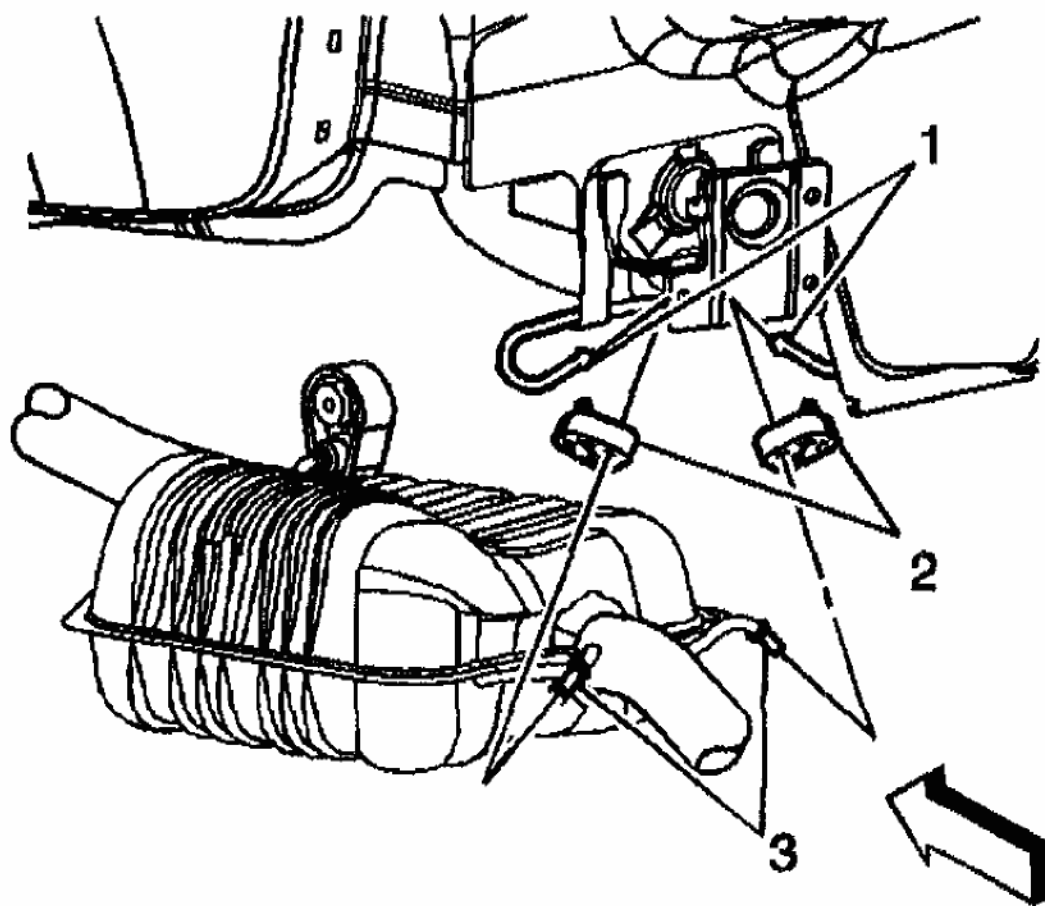
Tighten the bumper nuts to 25 N.m (18 lb ft).



G02087435

Fig. 52: Installing Exhaust Hanger Mounting Bracket & Stud Plate
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).



G02087436

Fig. 53: Installing Tail Pipe Hangers
Courtesy of GENERAL MOTORS CORP.

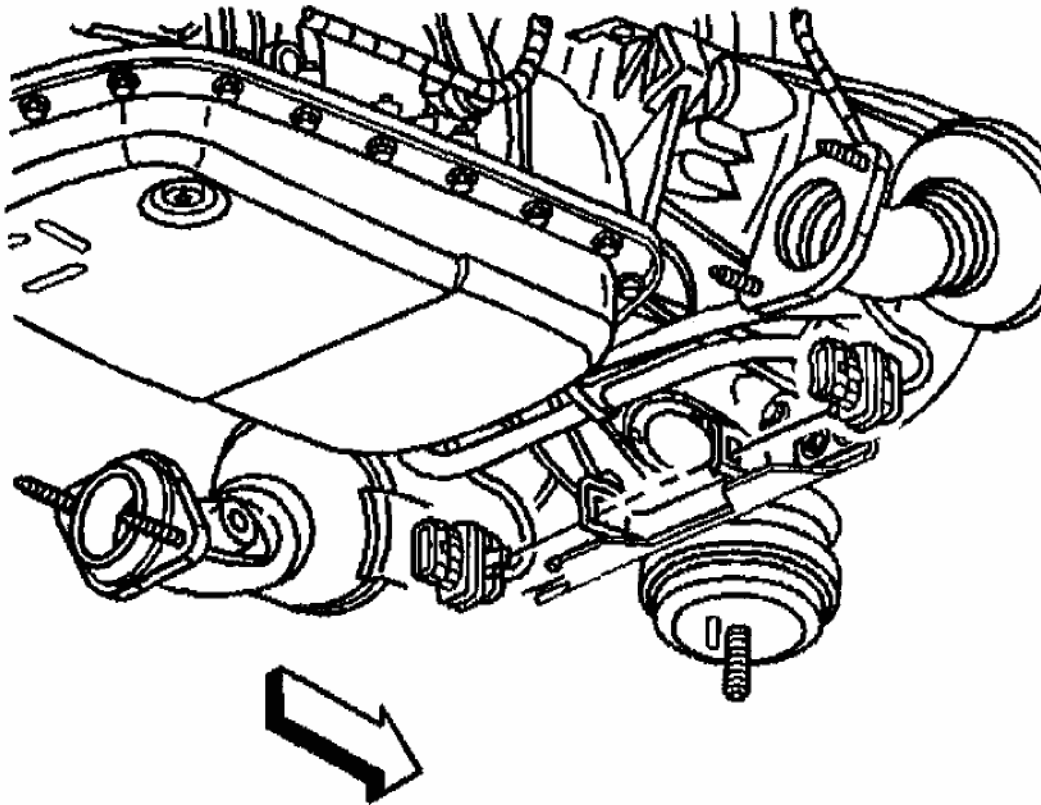
6. Lower the vehicle.

CATALYTIC CONVERTER HANGER BRACKET REPLACEMENT**Removal Procedure**

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

1. Raise and support the vehicle. Refer to LIFTING AND JACKING THE VEHICLE in General Information.
2. Disconnect the oxygen sensor retainers from the catalytic converter hanger bracket.

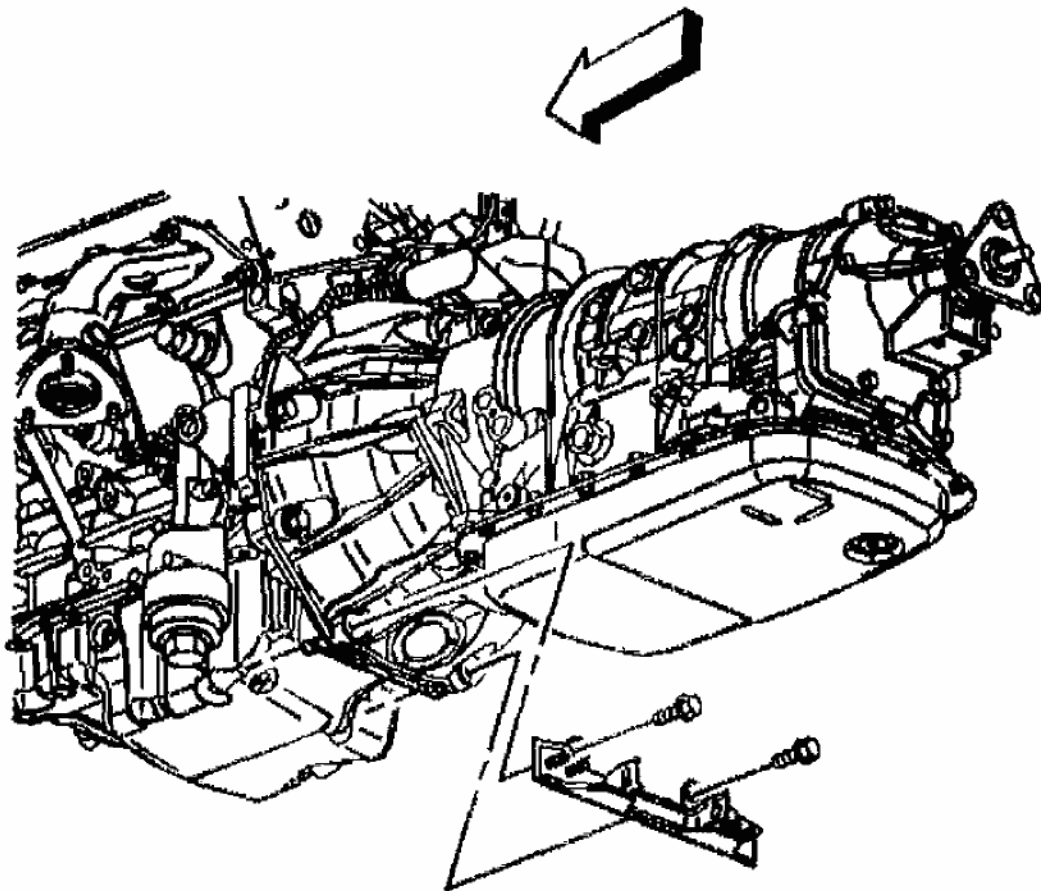


G02087437

Fig. 54: Removing Oxygen Sensor Retainers

Courtesy of GENERAL MOTORS CORP.

3. Remove the nuts securing the catalytic converters to the catalytic converter hanger bracket.
4. Remove the bolts securing the catalytic converter hanger bracket to the transmission.
5. Bend the catalytic converter braces slightly rearward, only enough to clear the hanger bracket studs.
6. Remove the catalytic converter hanger bracket from the catalytic converters.



G02087438

Fig. 55: Removing Catalytic Converters Hanger Bracket
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

1. Insert the catalytic converter hanger bracket studs through the catalytic converter braces.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

2. Install the bolts securing the catalytic converter hanger bracket to the transmission.

Tighten

Tighten the catalytic converter hanger bracket bolts to 50 N.m (37 lb ft).

3. Install the nuts securing the catalytic converters to the catalytic converter hanger bracket.

Tighten

Tighten the catalytic converter hanger bracket nuts to 25 N.m (18 lb ft).

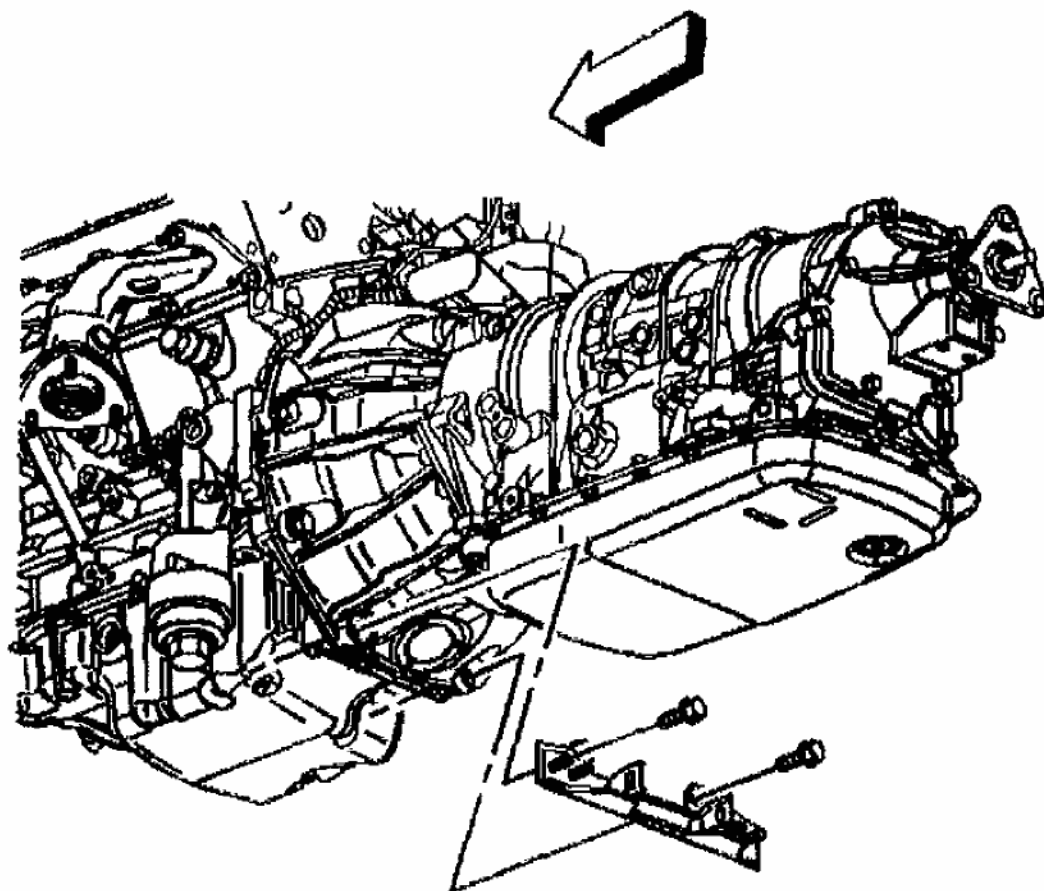
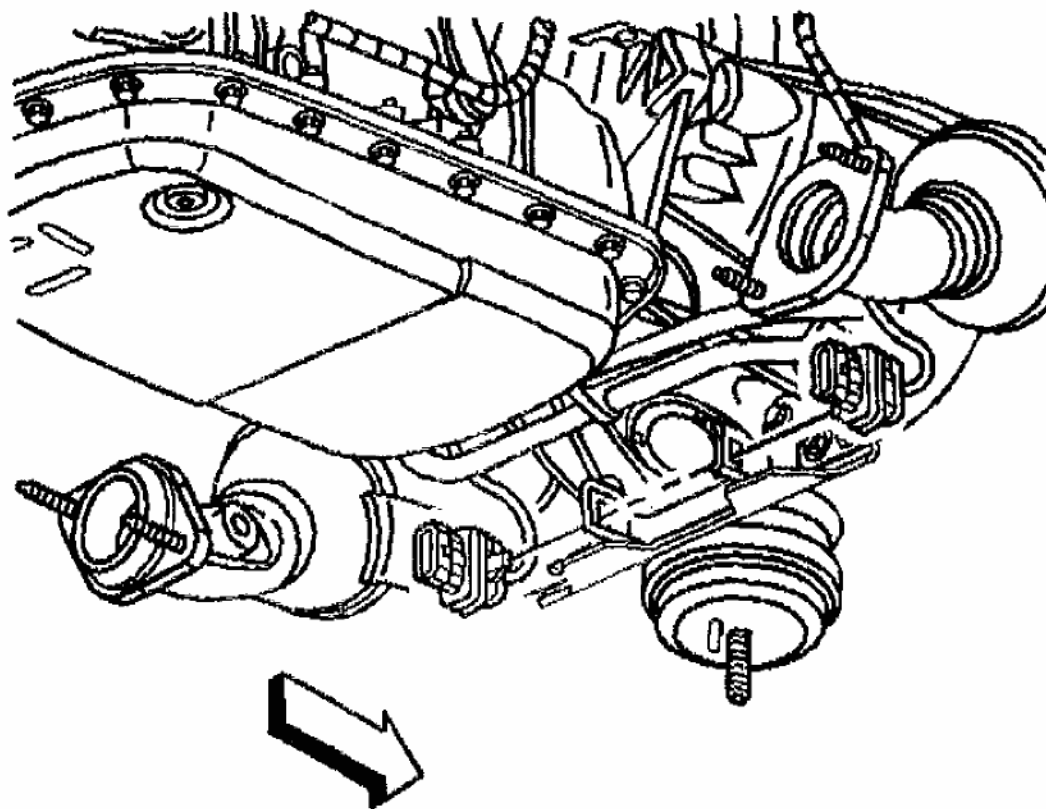


Fig. 56: Installing Catalytic Converters Hanger Bracket
Courtesy of GENERAL MOTORS CORP.

4. Snap the oxygen sensor retainers into place in the catalytic converter hanger bracket.



G02087440

Fig. 57: Installing Oxygen Sensor Retainers
Courtesy of GENERAL MOTORS CORP.

5. Lower the vehicle.

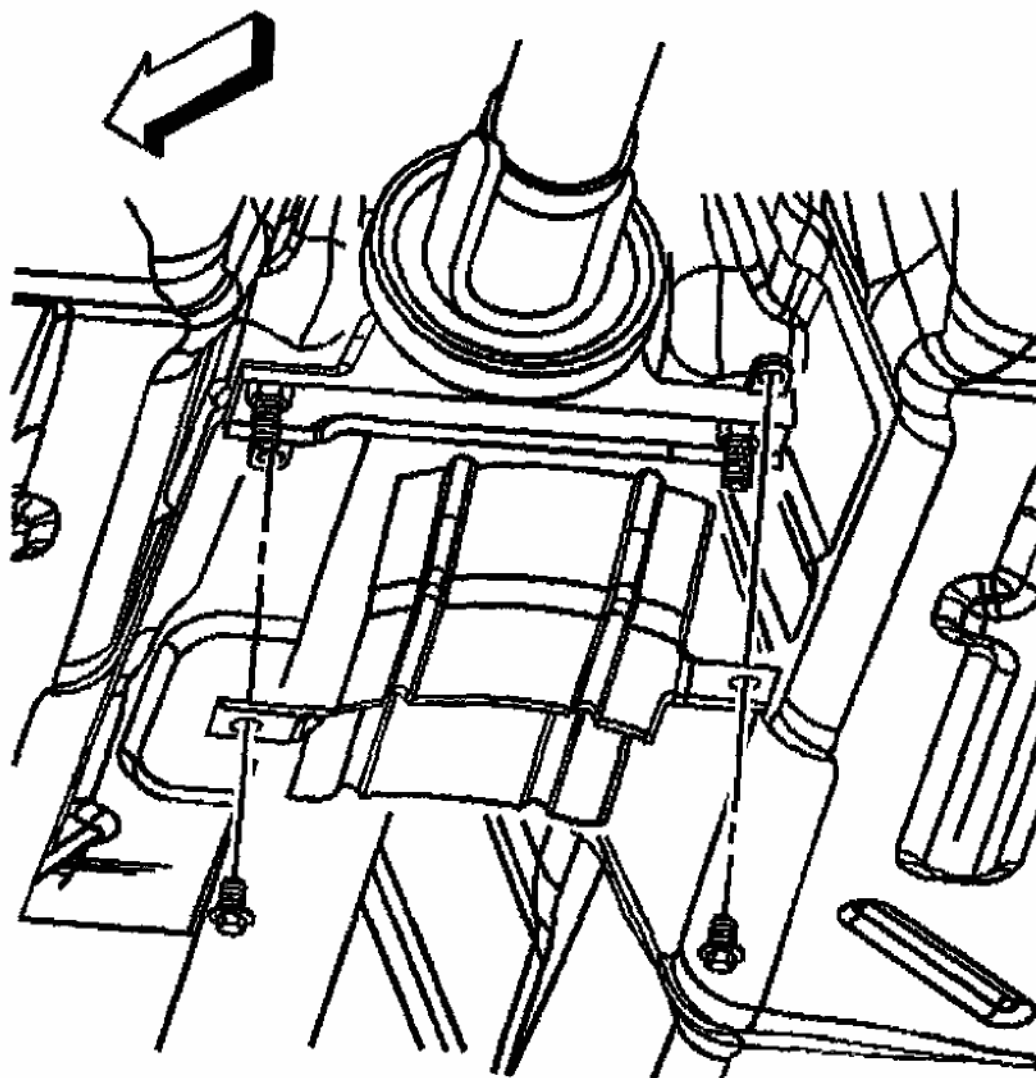
EXHAUST HEAT SHIELD REPLACEMENT - CENTER BEARING

Removal Procedure

CAUTION: In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

CAUTION: Refer to PROTECTIVE GOGGLES & GLOVE CAUTION in Cautions and Notices.

1. Raise and support the vehicle. Refer to LIFTING AND JACKING THE VEHICLE in General Information.
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:
 - 3.1 Tilt the heat shield to either side.
 - 3.2 Slide the heat shield out from between the body, the drive shaft center bearing, and the resonator.
 - 3.3 Remove the heat shield from the vehicle.



G02087441

Fig. 58: Removing Exhaust Heat Shield & Mounting Bolts
Courtesy of GENERAL MOTORS CORP.

Installation Procedure

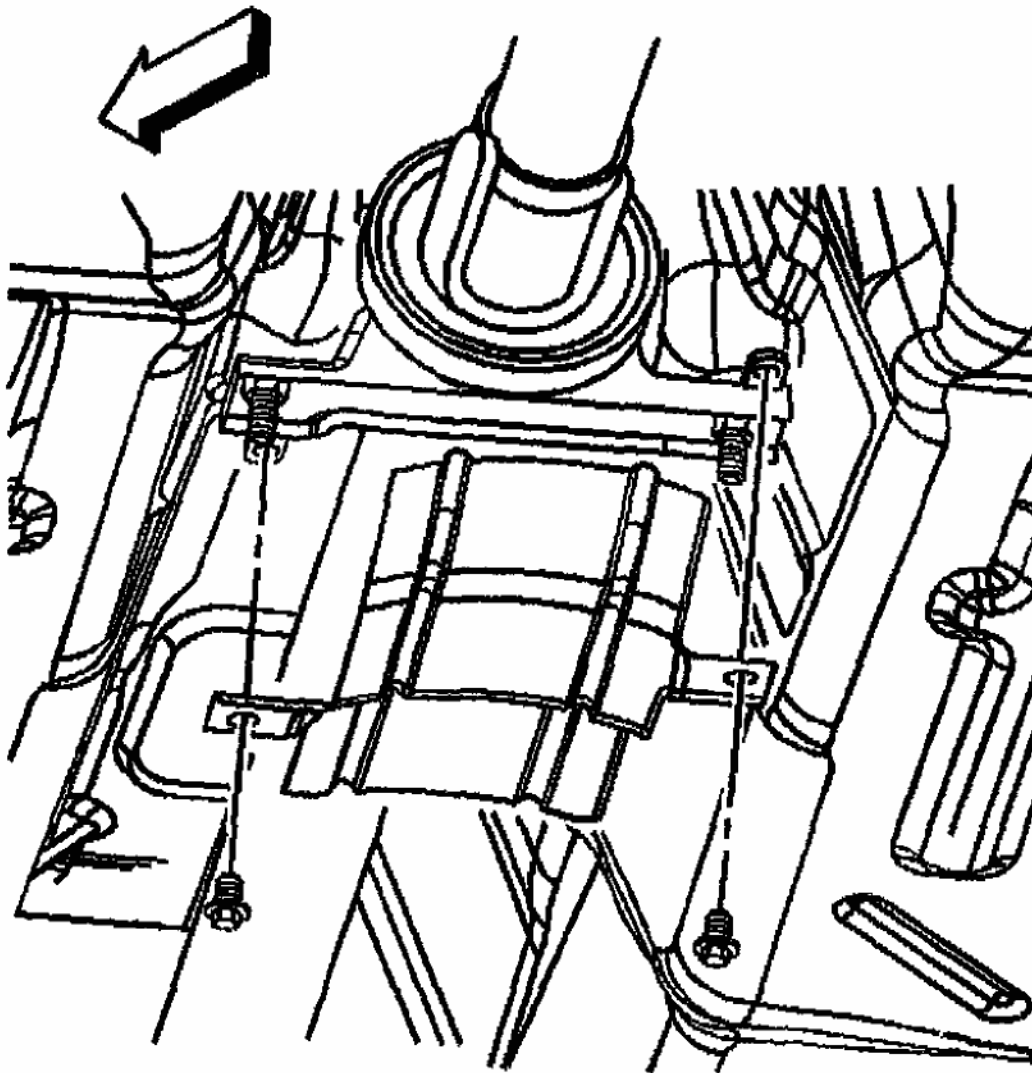
1. Install the center bearing heat shield to the center bearing in the following order:
 - 1.1 Slide the heat shield in between the body, the drive shaft center bearing, and the resonator.
 - 1.2 Align the holes in the heat shield with the holes in the center bearing.

NOTE: Refer to FASTENER NOTICE in Cautions and Notices.

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).



G02087442

Fig. 59: Installing Exhaust Heat Shield & Mounting Bolts

Courtesy of GENERAL MOTORS CORP.

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.

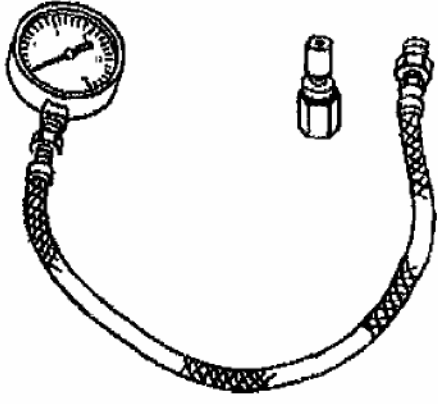
Muffler

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

2003 Cadillac CTS

2003 ENGINE Engine Exhaust - CTS

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

G02087443

Fig. 60: Special Tools & Equipment
Courtesy of GENERAL MOTORS CORP.