2014 Engine

Engine Exhaust - Regal

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Catalytic Converter Brace Fastener (LUK)	22 N.m	16 lb ft
Catalytic Converter Brace Fastener (LTG Lower)	22 N.m	16 lb ft
Catalytic Converter Brace Fastener (LTG Upper)	22 N.m	16 lb ft
Catalytic Converter Brace Bracket Fastener (LTG)	22 N.m	16 lb ft
Catalytic Converter-to-Exhaust Manifold Fastener (LUK)	50 N.m	37 lb ft
Catalytic Converter-to-Exhaust Front Pipe Fastener (LUK, LTG)	25 N.m	18 lb ft
Catalytic Converter-to-Turbocharger Fasteners (LTG)	22 N.m	16 lb ft
Exhaust Front Pipe Hanger Bracket Fastener (LUK)	60 N.m	44 lb ft
Exhaust Front Pipe Hanger Bracket Fastener (LTG)	22 N.m	16 lb ft
Exhaust Front Pipe-to-Muffler Fastener (LUK, LTG)	18 N.m	13 lb ft
Exhaust Isolator Fastener (LTG)	35 N.m	26 lb ft
Exhaust Manifold Fastener (LTG)	20 N.m	15 lb ft
Exhaust Manifold Fastener (LUK)	14 N.m	10 lb ft
Exhaust Manifold Heat Shield Fastener (LUK)	10 N.m	89 lb in
Exhaust Manifold Heat Shield Fastener (LTG)	14 N.m	10 lb ft
Exhaust Rear Muffler Heat Shield Fastener (LTG)	1.5 N.m	13 lb in
Exhaust Rear Pipe Hanger Bracket Fastener	20 N.m	15 lb ft
Turbocharger Studs (LTG)	10 N.m	89 lb in

ADHESIVES, FLUIDS, LUBRICANTS, AND SEALERS

Adhesives, Fluids, Lubricants, and Sealers

Application	Type of Material	GM Part Number	
		United States	Canada
Anti-Seize	Lubricant	88862477	88862478

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - ENGINE EXHAUST

- Review the exhaust system description in order to familiarize yourself with the exhaust system components and the intended function of the components. Refer to **Exhaust System Description**.
- All diagnostics on a vehicle should follow a logical process. Strategy Based Diagnostics is a uniform

approach for repairing all systems. The diagnostic flow is the place to start when repairs are necessary and may always be used in order to resolve a system problem. For a detailed explanation, refer to **Strategy Based Diagnosis** .

Visual/Physical Inspection

- Inspect for aftermarket or non-OEM devices such as, but not limited to; tailpipe extensions, headers, and exhaust cutouts. Any aftermarket exhaust system devices 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

Special Tools

J-35314-A Exhaust Back Pressure Gauge

Refer to **Special Tools**.

Diagnostic Aids

WARNING: Refer to Hot Exhaust System Warning .

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** gauge.

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**
4	1. Remove the heated oxygen sensor (HO2S) that is in front of the catalytic converter. Refer to the appropriate procedure. Refer to **Heated Oxygen Sensor Replacement - Sensor 1** , for the 2.0L engine or **Heated Oxygen Sensor Replacement - Sensor 1** for the 2.4L engine. 2. Install the **J-35314-A** Exhaust Back Pressure Gauge in place of the HO2S sensor. 3. Start the engine. 4. Increase and monitor the engine speed at 2,500 RPM.	9 kPa (1.25 psi)		

	5. Observe the exhaust system back pressure reading on the gauge. 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** gauge. 3. Reinstall the HO2S sensor. Refer to **Heated Oxygen Sensor Replacement - Sensor 1** , for the 2.0L engine or **Heated Oxygen Sensor Replacement - Sensor 1** for the 2.4L engine. . 4. Remove the post-catalyst HO2S sensor. Refer to the appropriate procedure. Refer to **HEATED OXYGEN SENSOR REPLACEMENT - SENSOR 2** , for the 2.0L engine or **Heated Oxygen Sensor Replacement - Sensor 2** for the 2.4L engine. 5. Install the **J-35314-A** gauge 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**
6	Inspect the exhaust system for the following conditions: • Secondary catalytic converter restricted • Damage in the exhaust pipe • Debris in the exhaust pipe • Muffler or resonator internal failure • Two-layer exhaust pipe separation Did you find and correct the condition?	-	Go to **Step 8**	-
7	Replace the catalytic converter. Refer to **Catalytic Converter Replacement (LTG)**, **Catalytic Converter Replacement (LUK)**. Did you find and correct the condition?	-	Go to **Step 8**	-
	1. Remove the **J-35314-A** gauge. 2. Reinstall the applicable HO2S sensor. Refer to the appropriate procedure:			

8	• **Heated Oxygen Sensor Replacement - Sensor 1** for the 2.0L engine • **Heated Oxygen Sensor Replacement - Sensor 2** for the 2.0L engine • **Heated Oxygen Sensor Replacement - Sensor 1** for the 2.4L engine • **Heated Oxygen Sensor Replacement - Sensor 2** for the 2.4L engine 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

Condition	Action
WARNING: **Refer to Hot Exhaust System Warning .** DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand close to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise.Refer to **Symptoms - Engine Exhaust** prior to beginning this table.	
Misaligned or improperly installed exhaust system components	• Align and tighten the exhaust system components to the specifications. Refer to **Fastener Tightening Specifications**. • Ensure the exhaust hangers are in the proper locations and not loose.
Exhaust leaks at the following connections: • Exhaust manifold to pipe • Flanges • Pipe clamps	Tighten the components to the specifications. Refer to **Fastener Tightening Specifications**.
Seals or gaskets leaking; • Exhaust manifold to cylinder head • Exhaust pipes to exhaust manifold • Catalytic converter connection	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.
Catalytic Converter cracked or broken	Replace the catalytic converter. Refer to **Catalytic Converter Replacement (LTG)**, **Catalytic Converter Replacement (LUK)**.
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 **Exhaust Muffler Replacement (Dual)**, **Exhaust Muffler Replacement (Single)**.

EXHAUST NOISE

Exhaust Noise

Condition	Action
WARNING: **Refer to Hot Exhaust System Warning .** 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 **Symptoms - Engine Exhaust** prior to beginning this table.	
Popping or hissing noise	Exhaust leak-Refer to **Exhaust Leakage**.
Loud exhaust	1. Compare to a known good vehicle. 2. Inspect for a damaged or failed muffler or resonator, if equipped. 3. Replace the faulty muffler or resonator (if equipped). Refer to **Exhaust Muffler Replacement (Dual)**, **Exhaust Muffler Replacement (Single)**.
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 **Exhaust Muffler Replacement (Dual)**, **Exhaust Muffler Replacement (Single)**.

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT (LUK/LEA)

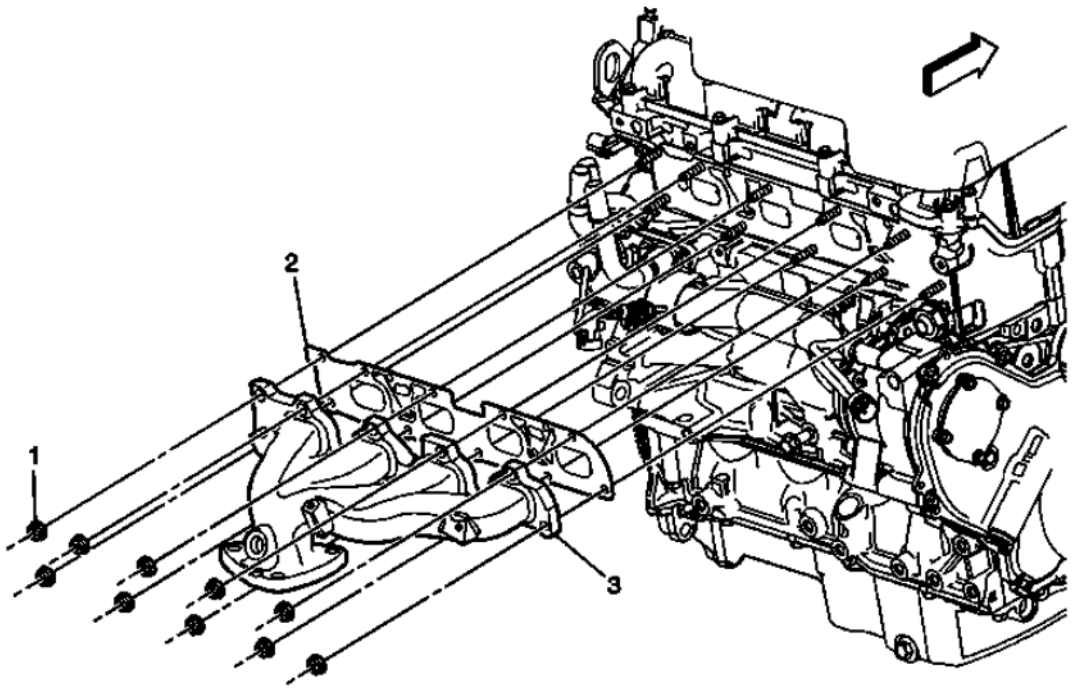


Fig. 1: Exhaust Manifold (LUK/LEA)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Replacement (LUK/LEA)

Callout	Component Name
	WARNING: **Refer to Hot Exhaust System Warning .** **Preliminary Procedures** 1. Remove the catalytic converter. Refer to **Catalytic Converter Replacement (LUK)**. 2. Remove the secondary air injection pipe (LEA), if equipped. Refer to **Secondary Air Injection Pipe Replacement (LEA)** . 3. Remove both secondary air injection valves (LUK), if equipped. Refer to **SECONDARY AIR INJECTION CHECK VALVE REPLACEMENT - LEFT SIDE (LUK)** and **SECONDARY AIR INJECTION CHECK VALVE REPLACEMENT - RIGHT SIDE (LUK)** **Secondary Air Injection Check Valve Replacement (LEA)** . 4. Remove the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement (LUK)**. 5. Remove the exhaust manifold heated oxygen sensor. Refer to **Heated Oxygen Sensor Replacement - Sensor 1** .
1	Exhaust Manifold Nut (Qty: 10) **CAUTION:** **Refer to Fastener Caution .**

	Tighten • First Pass: 14 (10 lb ft) • Final Pass: 14 (10 lb ft)
2	Exhaust Manifold Gasket **NOTE:** **Replace with a NEW exhaust manifold gasket.** **Procedure** Remove the secondary air injection check valve pipe adapters (LUK), if equipped. Refer to **Secondary Air Injection Check Valve Pipe Adapter Replacement - Left Side (LUK)** .
3	Exhaust Manifold **Procedure** 1. Remove and discard the exhaust manifold gasket. 2. Clean any exhaust manifold gasket debris from the cylinder head and exhaust manifold. 3. Install new exhaust manifold gasket. 4. Tighten the exhaust manifold nuts working from the center out.

EXHAUST MANIFOLD REPLACEMENT (LTG)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Eye Protection Warning .

1. Remove the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement (LTG)**.
2. Remove the turbocharger. Refer to **Turbocharger Replacement** .
3. Remove the exhaust manifold brace.

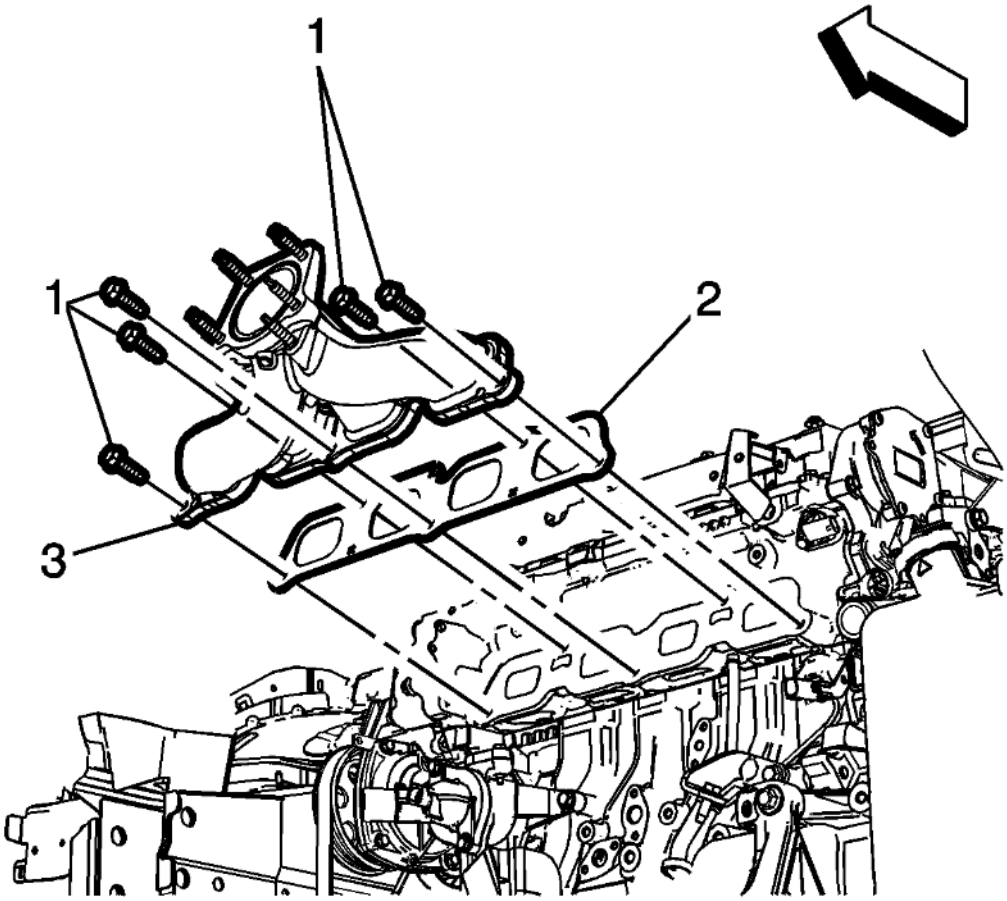


Fig. 2: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

4. Remove the exhaust manifold fasteners (1) and discard.
5. Remove the exhaust manifold (3) and discard the exhaust manifold gasket (2).

Installation Procedure

1. Clean all mating surfaces.

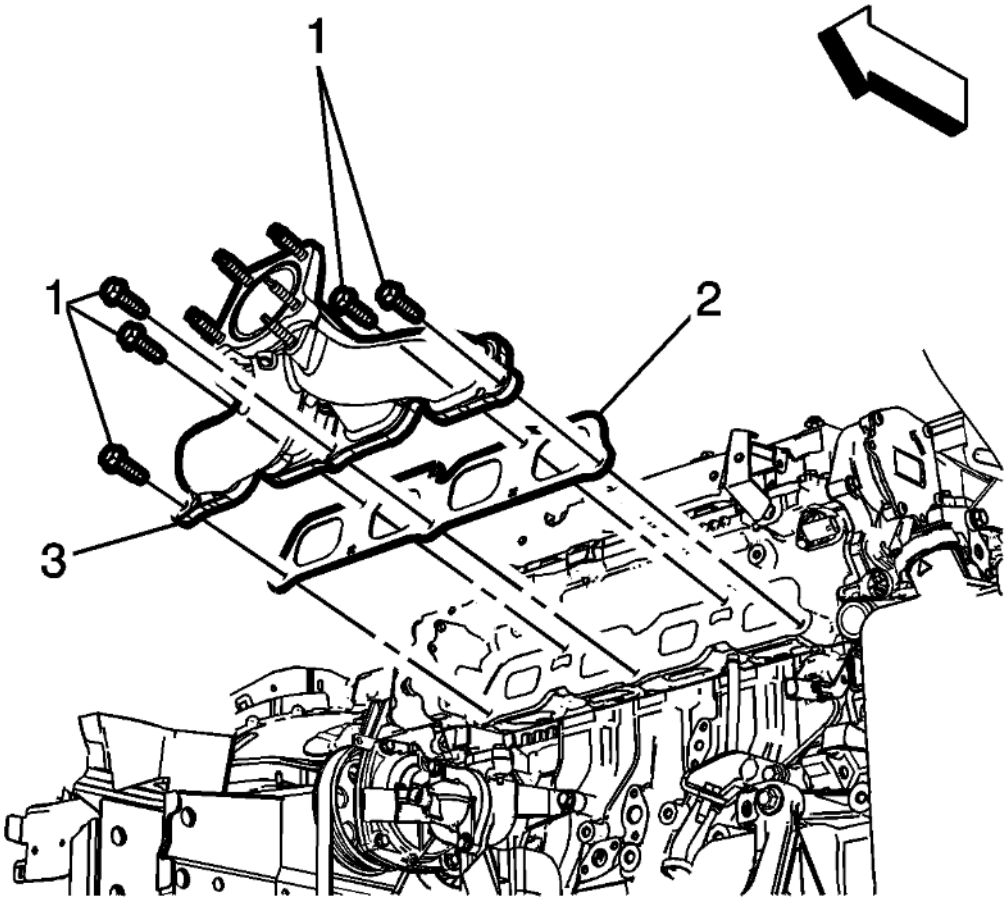


Fig. 3: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

2. Install the exhaust manifold (3) to the cylinder head with a NEW gasket (2).

NOTE: **Fasteners have adhesive patch and must be tightened to final torque within 5 minutes.**

3. Install NEW fasteners (1) and hand tighten.

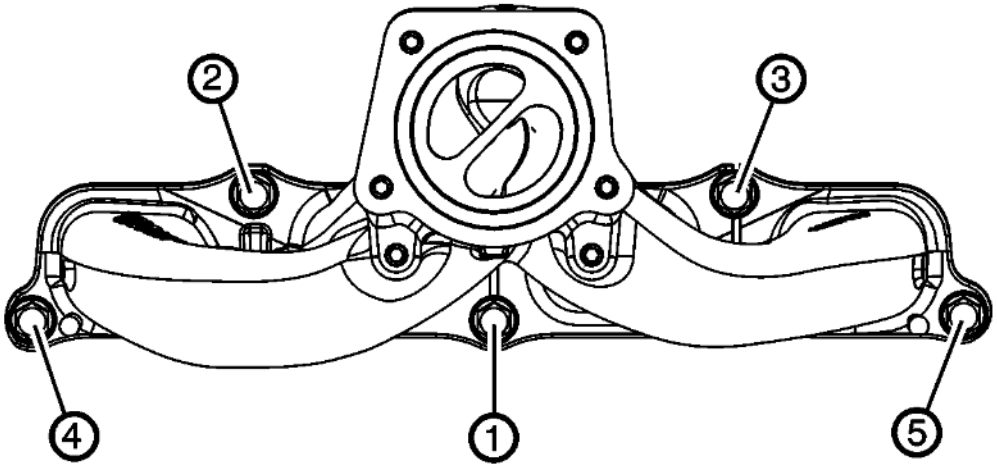


Fig. 4: Cylinder Head Retaining Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

4. Tighten the exhaust manifold fasteners in 3 passes in the sequence shown to 20 (15 lb ft).
5. Install the exhaust manifold brace.
6. Install the turbocharger. Refer to **Turbocharger Replacement** .
7. Install the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement (LTG)**.

EXHAUST FRONT PIPE REPLACEMENT (LTG)

Removal Procedure

WARNING: Refer to Moving Parts and Hot Surfaces Warning .

WARNING: Refer to Safety Glasses Warning .

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

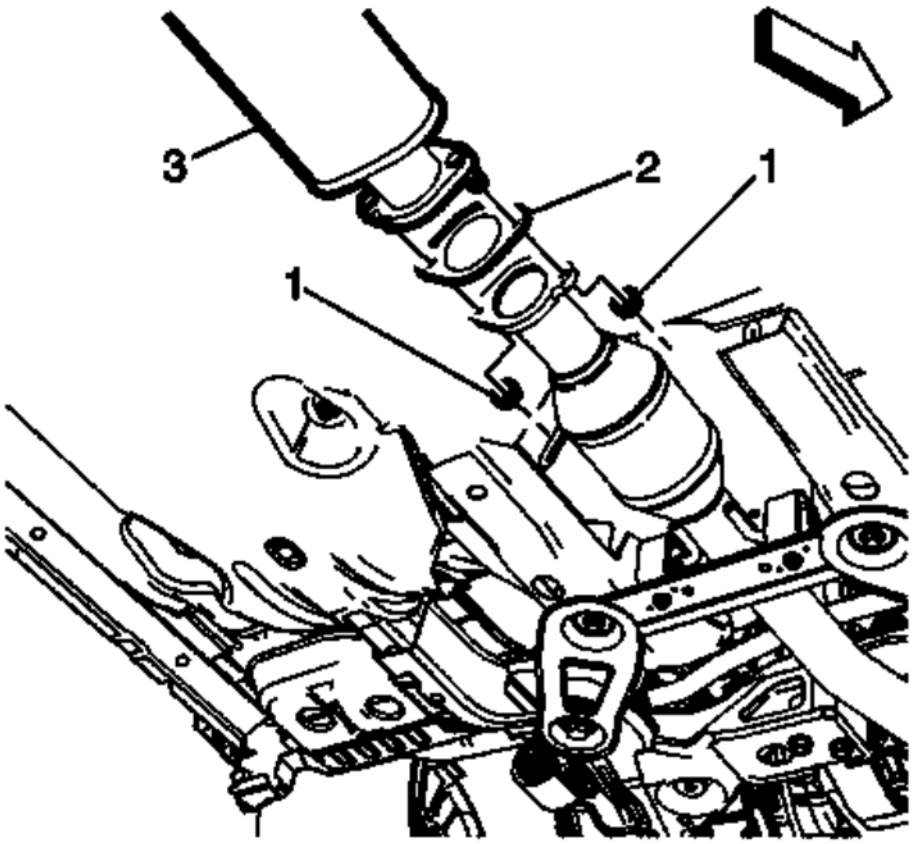


Fig. 5: Exhaust Front Pipe And Exhaust Muffler Fasteners
Courtesy of GENERAL MOTORS COMPANY

2. Remove the exhaust front pipe to the exhaust muffler fasteners (1) and discard the exhaust gasket (2).
3. Support the exhaust muffler (3) with mechanics wire.

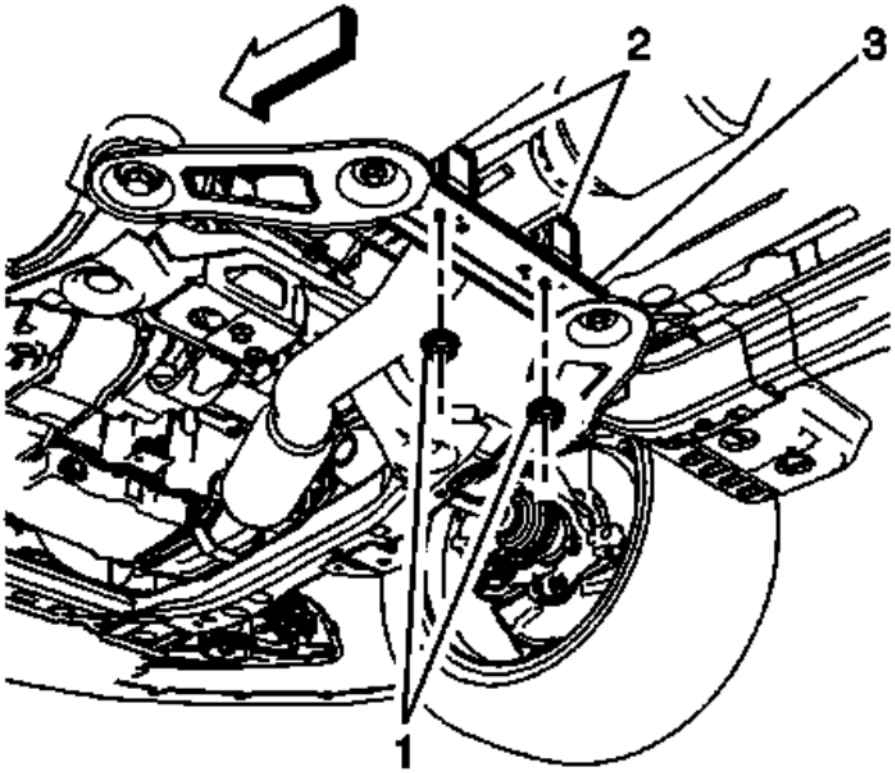


Fig. 6: Fasteners And Exhaust Isolators
Courtesy of GENERAL MOTORS COMPANY

4. Remove the fasteners (1) securing the exhaust isolators (2) to the front hanger bracket (3).

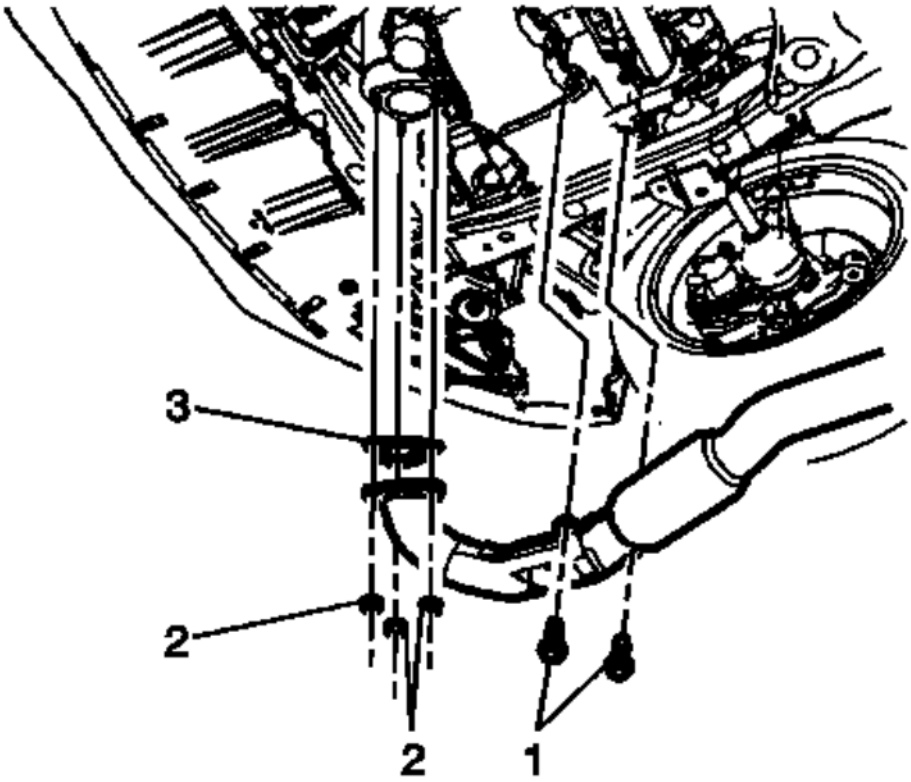


Fig. 7: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Remove the catalytic converter fasteners (2) and discard the exhaust gasket (3).
6. Remove the exhaust front pipe bracket fasteners (1).

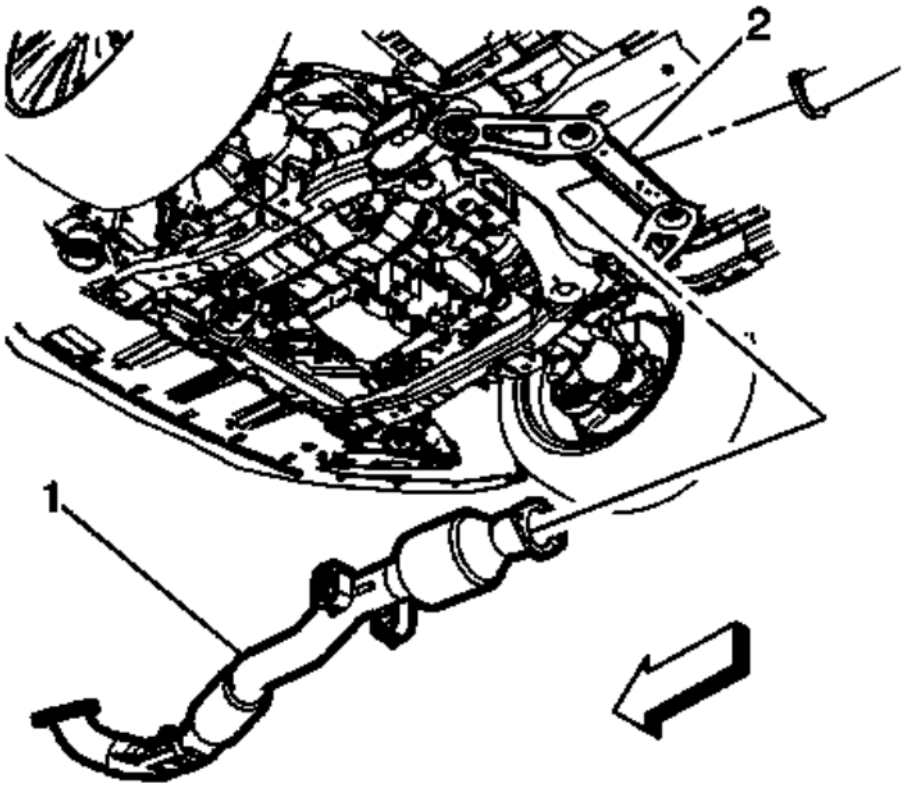


Fig. 8: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

7. Slide the exhaust front pipe (1) from above the front hanger bracket (2) and lower the exhaust front pipe to the floor.

Installation Procedure

1. Clean the exhaust front pipe mating surfaces.

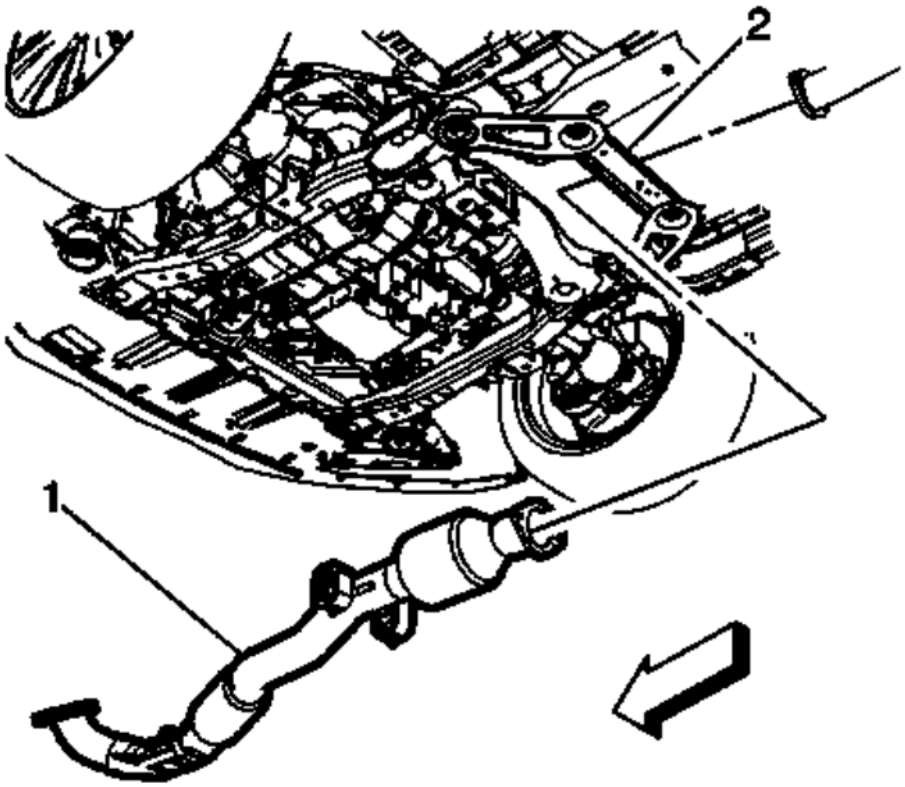


Fig. 9: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

2. Install the exhaust front pipe (1) into position above the exhaust front hanger bracket (2).

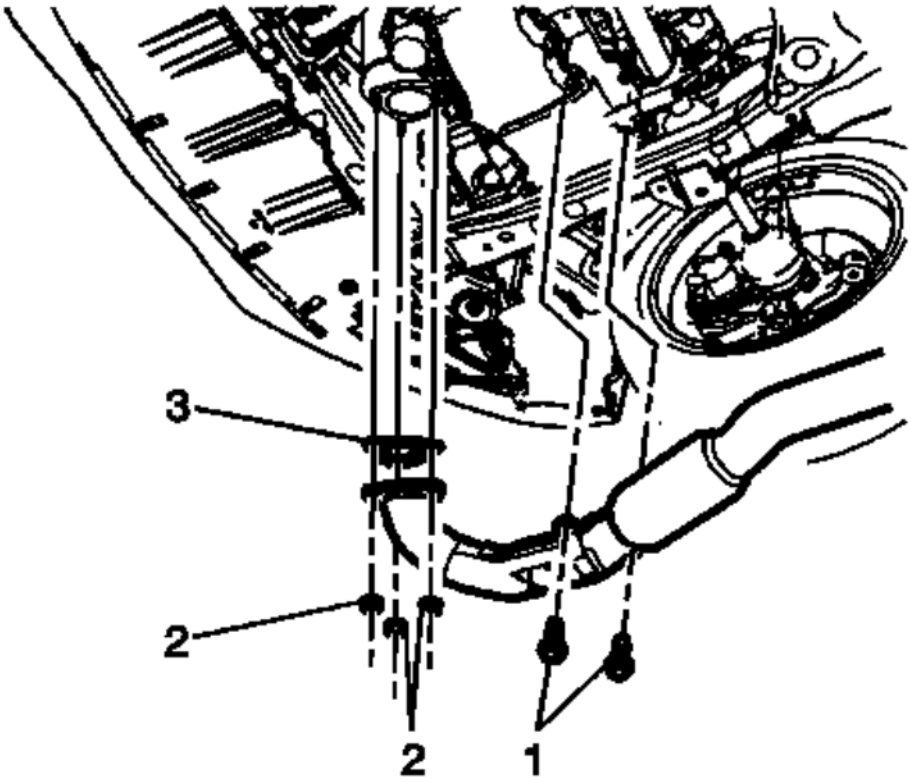


Fig. 10: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the exhaust front pipe to the catalytic converter with a NEW gasket (3) and tighten the fasteners (2) to 25 (18 lb ft).
4. Install the exhaust front pipe bracket fasteners (1) and tighten to 22 (16 lb ft).

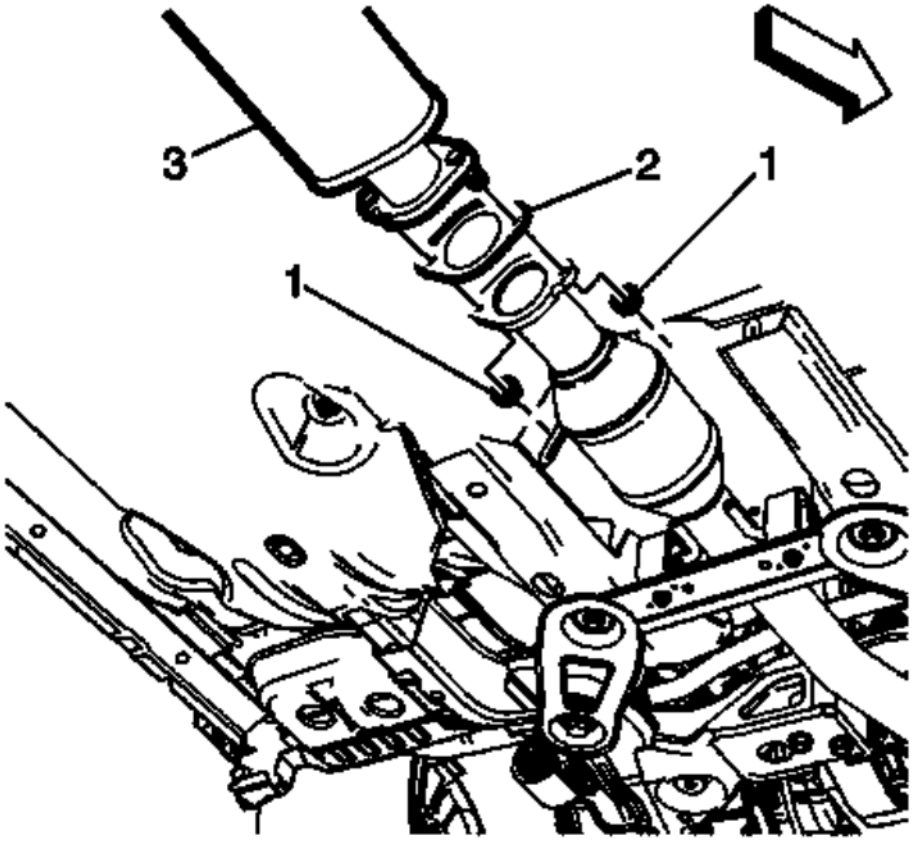


Fig. 11: Exhaust Front Pipe And Exhaust Muffler Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Install the exhaust front pipe to the muffler (3) with a NEW gasket (2) and tighten the fasteners (1) to 18 (13 lb ft).

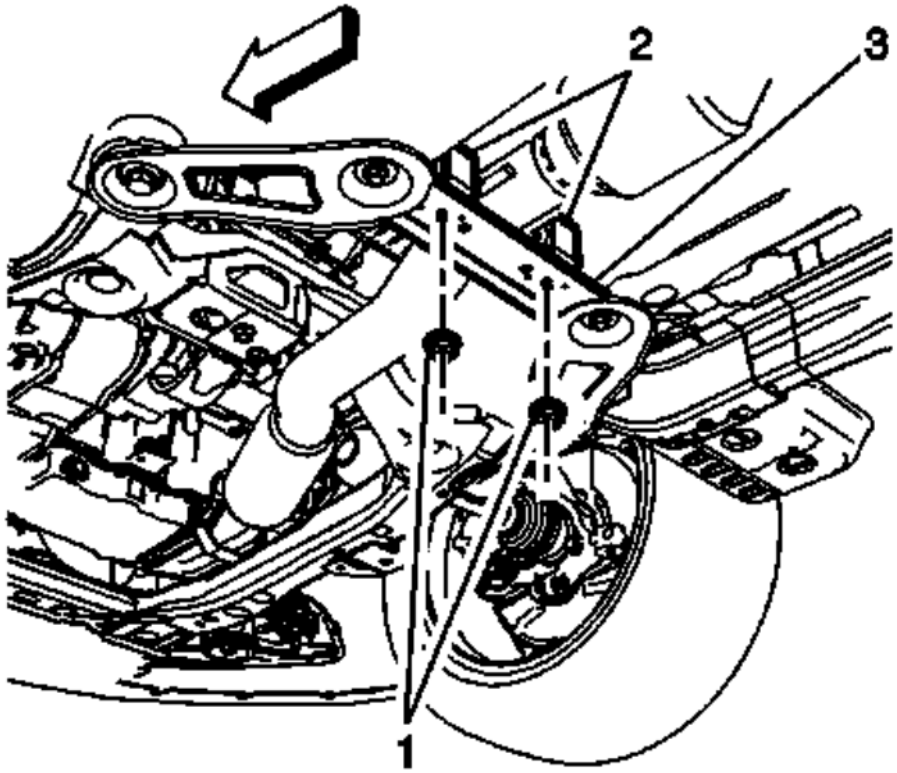


Fig. 12: Fasteners And Exhaust Isolators
Courtesy of GENERAL MOTORS COMPANY

6. Install the exhaust isolator fasteners (1) and tighten to 35 (26 lb ft).
7. Lower the vehicle.
8. Start the engine and check for exhaust leaks.

EXHAUST FRONT PIPE REPLACEMENT (LUK)

Removal Procedure

WARNING: Refer to Hot Exhaust System Warning .

WARNING: Refer to Safety Glasses Warning .

1. Disconnect the oxygen sensors after the catalytic converter.

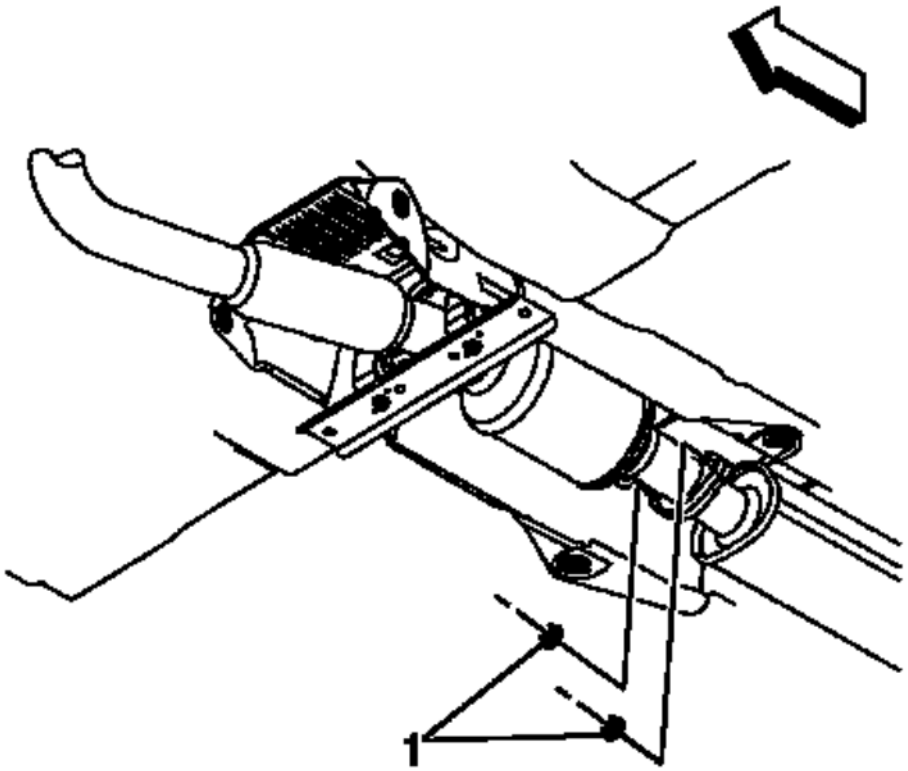


Fig. 13: Front Exhaust Nuts At Rear Muffler Pipe
Courtesy of GENERAL MOTORS COMPANY

2. Remove the front exhaust nuts (1) from the rear muffler pipe.
3. Support the exhaust muffler with a suitable jack or mechanics wire.

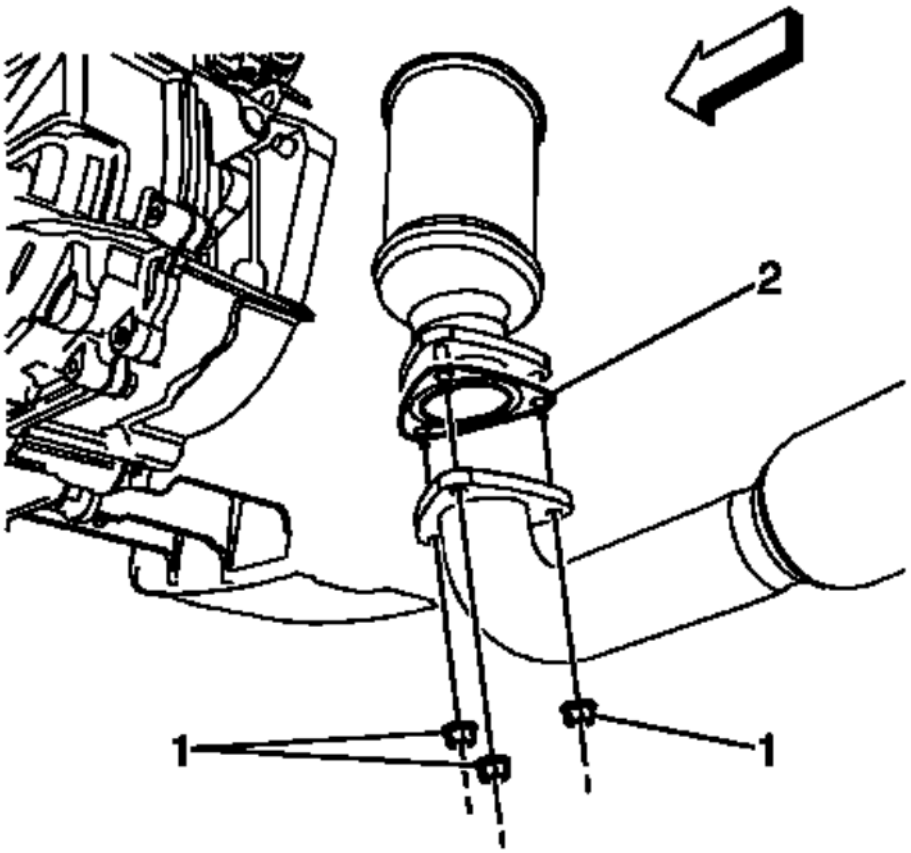


Fig. 14: Lower Catalytic Converter, Nuts And Gasket
Courtesy of GENERAL MOTORS COMPANY

4. Remove the nuts (1) and gasket (2) from the lower catalytic converter.

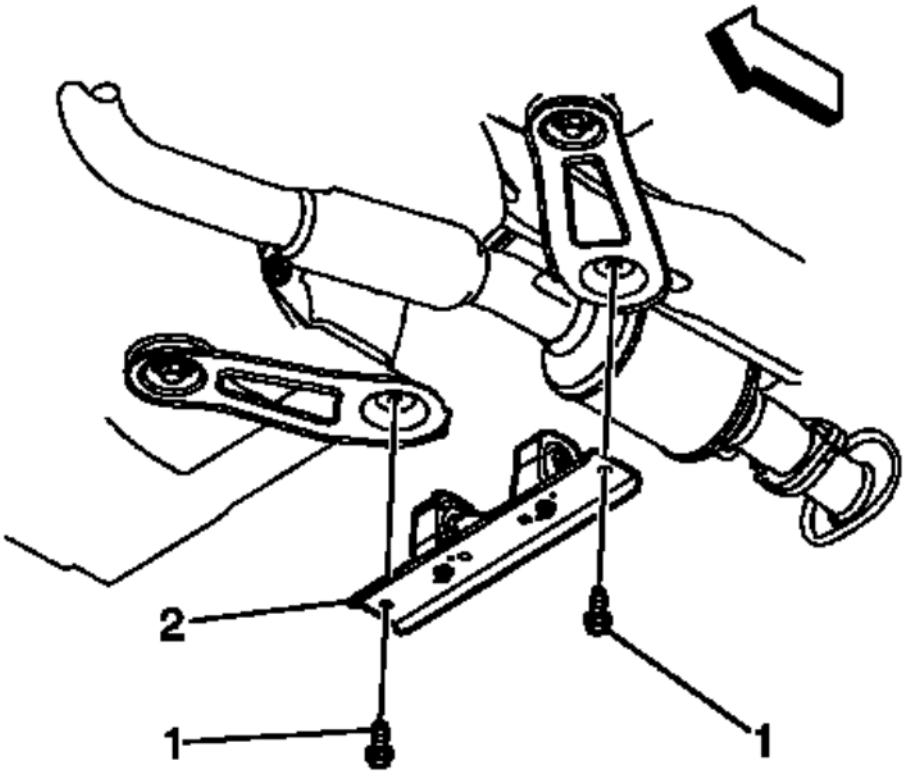


Fig. 15: Front Exhaust Pipe Hanger Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

5. Remove the bolts (1) from the front exhaust pipe hanger bracket (2).

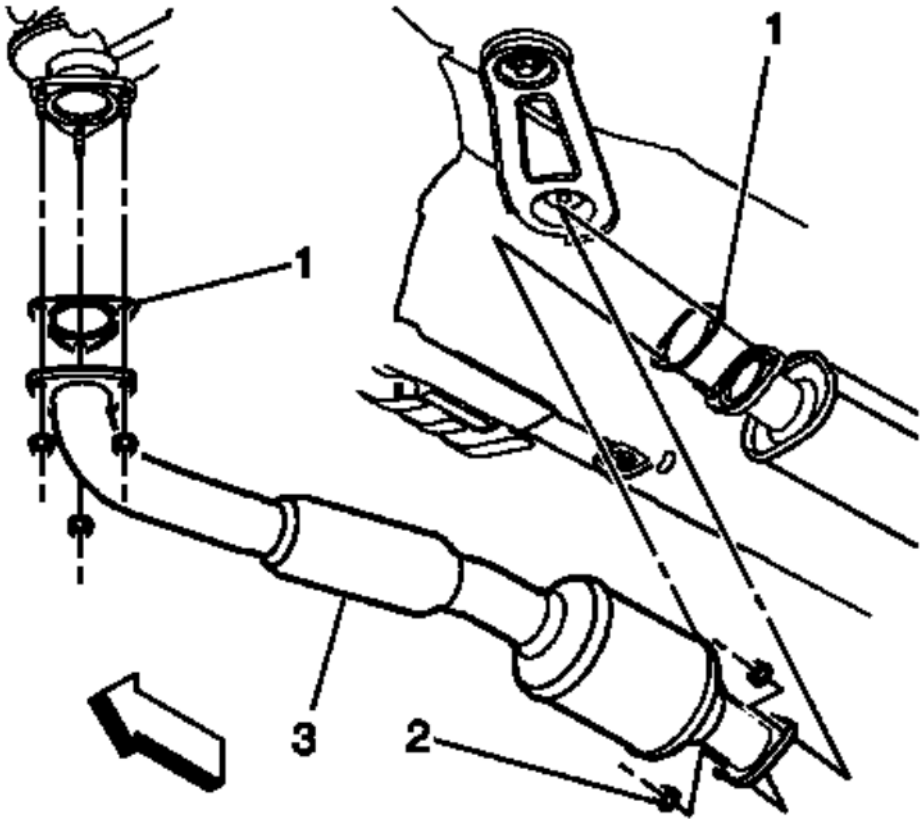


Fig. 16: Front Exhaust Pipe Components
Courtesy of GENERAL MOTORS COMPANY

6. Carefully lower the front exhaust pipe (3).

Installation Procedure

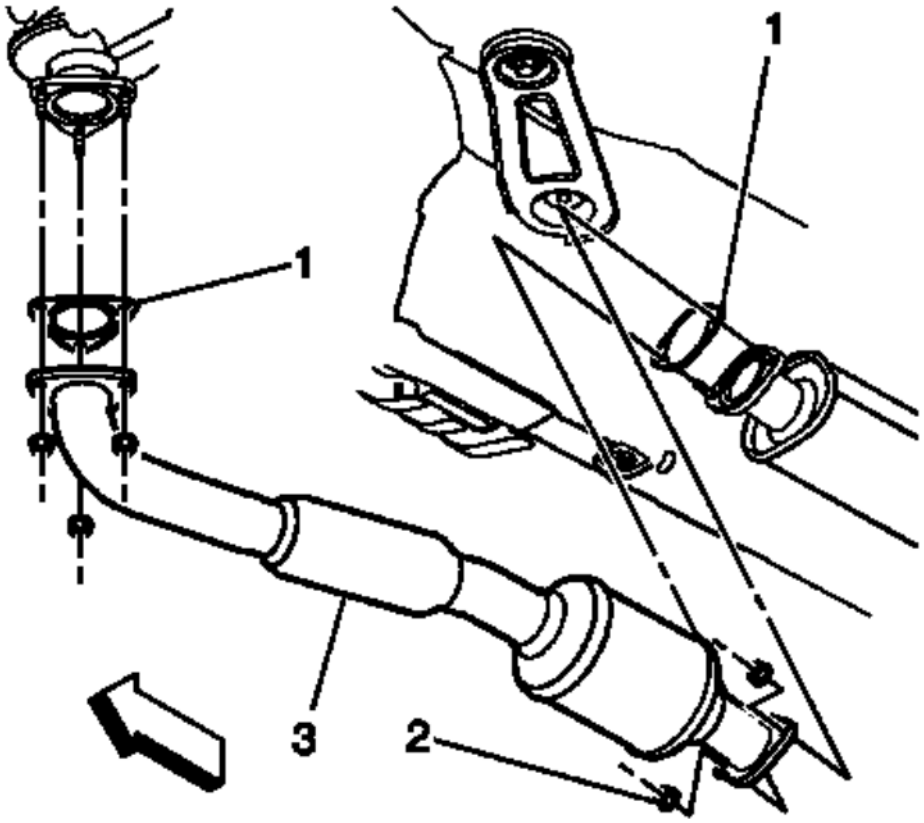


Fig. 17: Front Exhaust Pipe Components
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the front exhaust pipe nuts (2) and gasket (1), to the rear muffler pipe and tighten to 18 N.m (13 lb ft).

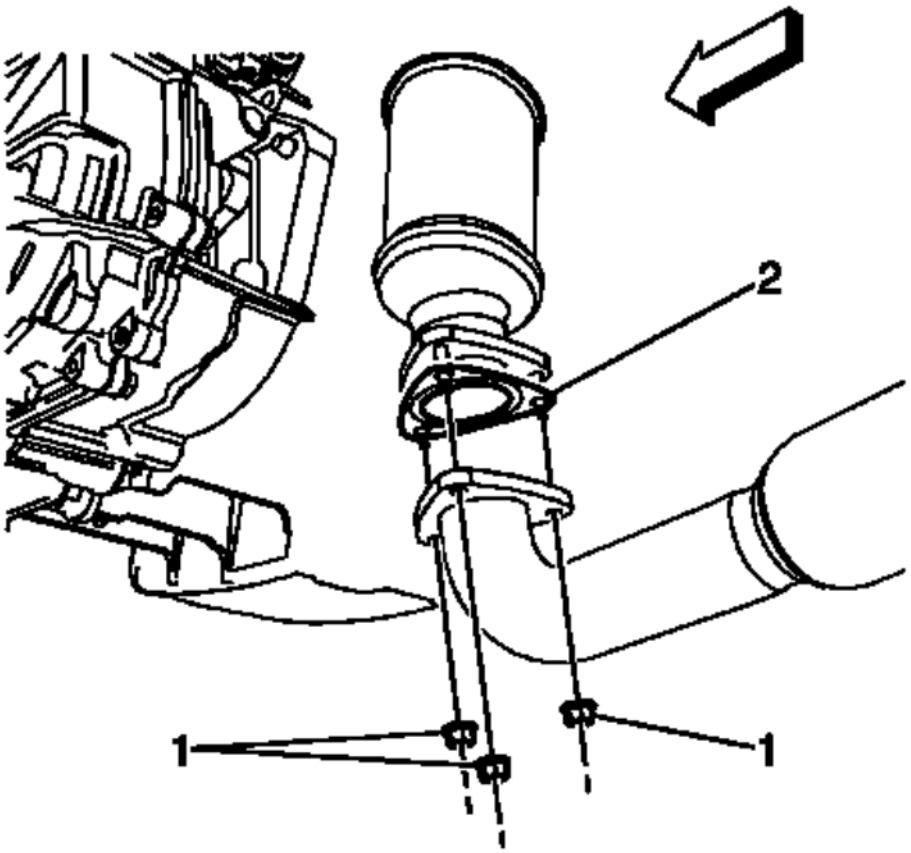


Fig. 18: Lower Catalytic Converter, Nuts And Gasket
Courtesy of GENERAL MOTORS COMPANY

2. Install the nuts (1) of the front exhaust pipe to the lower catalytic converter and tighten to 25 N.m (18 lb ft).

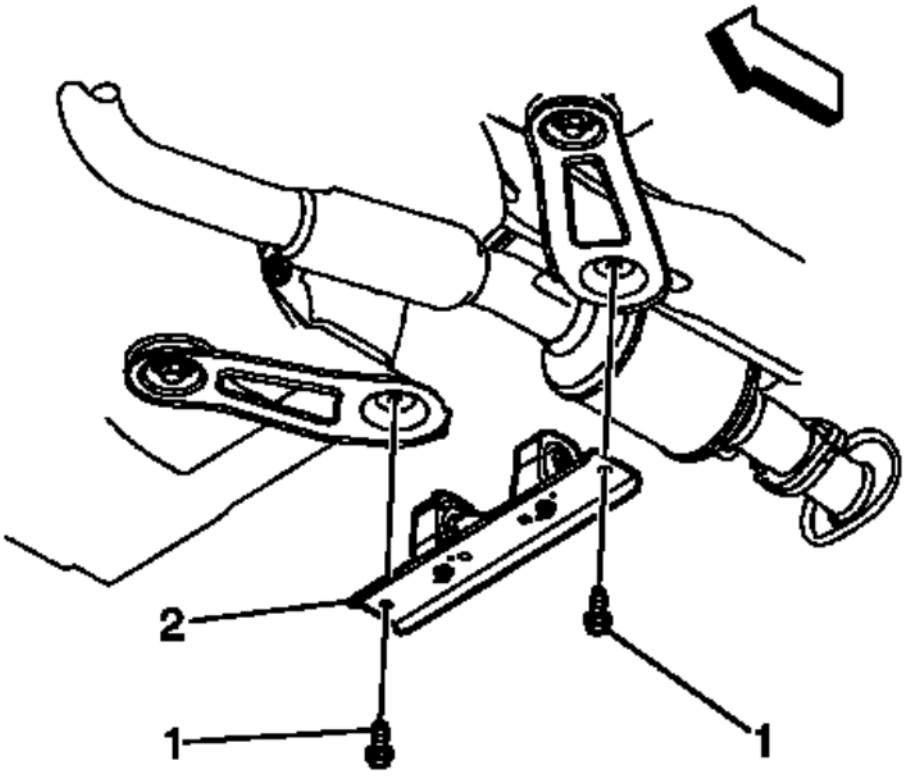


Fig. 19: Front Exhaust Pipe Hanger Bracket And Bolts
Courtesy of GENERAL MOTORS COMPANY

3. Install the bolts (1) to the front exhaust pipe hanger bracket (2) and tighten to 60 N.m (44 lb ft).
4. Connect the oxygen sensor electrical sensors.
5. Inspect the exhaust system for leaks.

EXHAUST FRONT PIPE REPLACEMENT (LTG AWD)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
2. Remove the heated oxygen sensor, sensor 2. Refer to **Heated Oxygen Sensor Replacement - Sensor 2** .

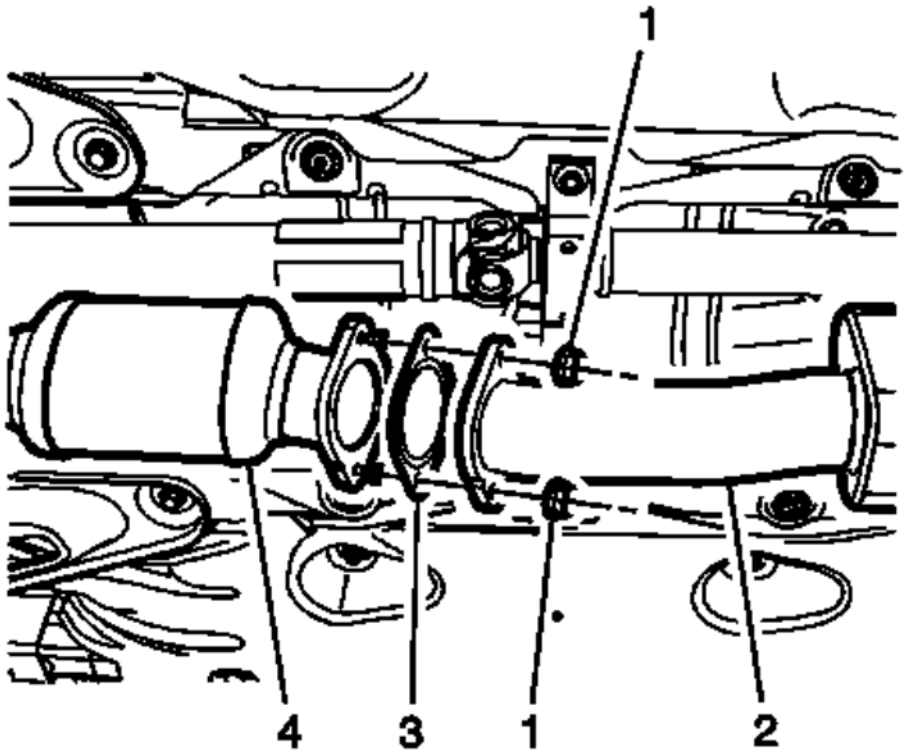


Fig. 20: Fasteners Securing Rear Muffler To Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

3. Remove the fasteners (1) securing the rear muffler (2) to the exhaust front pipe (4) and discard the exhaust gasket (3).

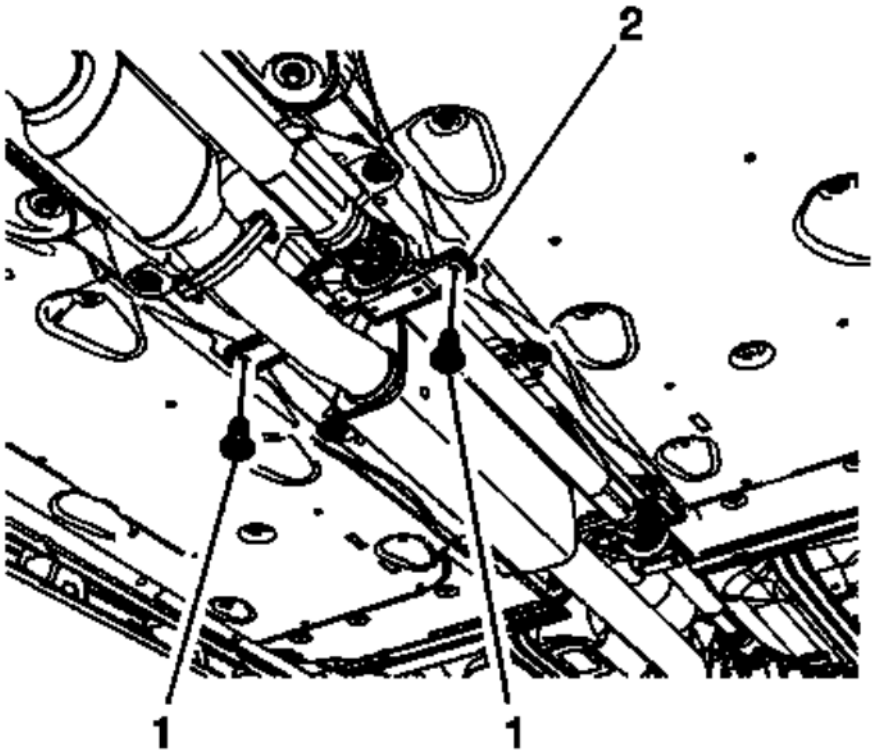


Fig. 21: Prop Shaft Bearing Bracket
Courtesy of GENERAL MOTORS COMPANY

4. If equipped with AWD, to aid in removing the exhaust front pipe hanger bracket, remove the fasteners (1) from the prop shaft bearing bracket (2) and allow the prop shaft to hang down.

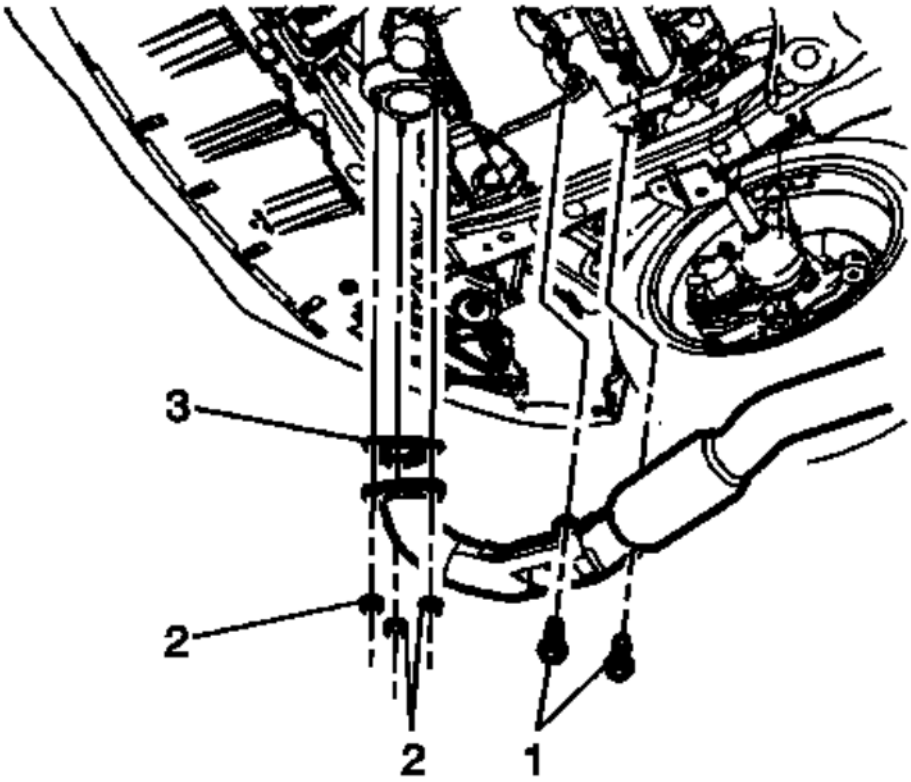


Fig. 22: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Remove the exhaust front pipe fasteners (2) from the front catalytic converter and DISCARD the exhaust gasket (3).
6. Remove the exhaust front pipe bracket fasteners (1).

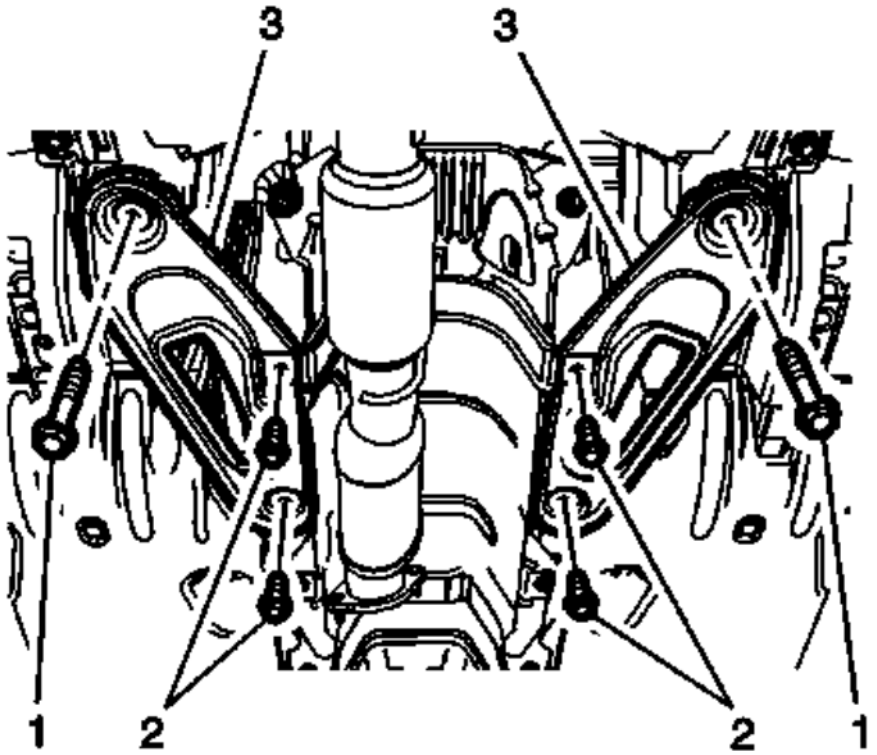


Fig. 23: Left And Right Drivetrain And Front Suspension Frame Support
Courtesy of GENERAL MOTORS COMPANY

7. Loosen the frame cradle fasteners (1) and remove the remaining fasteners (2) of the left and right drivetrain and front suspension frame support (3).

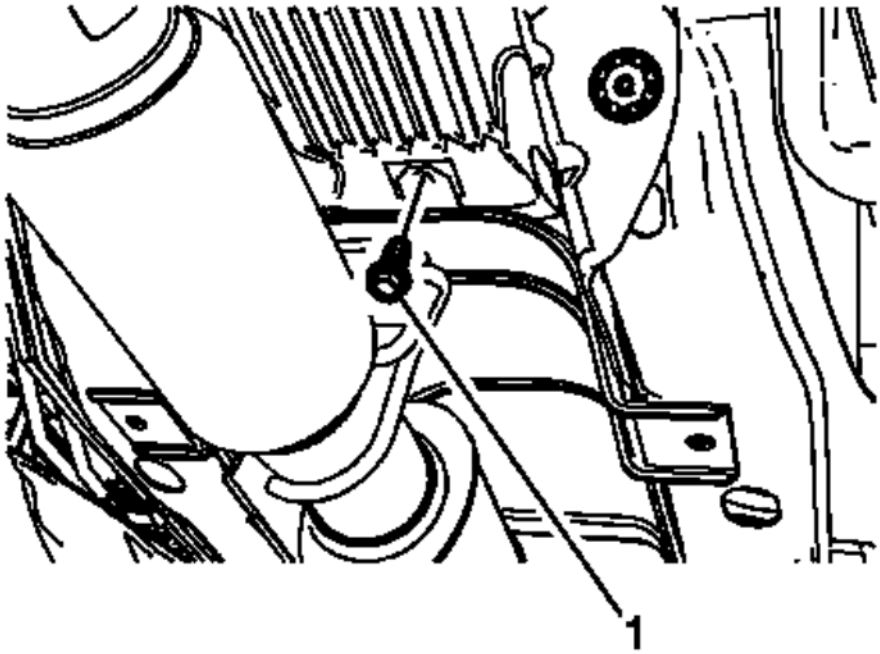


Fig. 24: Exhaust Pipe Front Hanger Bracket Fastener
Courtesy of GENERAL MOTORS COMPANY

8. Remove the exhaust pipe front hanger bracket fastener (1).
9. Lower the exhaust front pipe.
10. Discard the exhaust gaskets.
11. If replacing the exhaust front pipe, remove the exhaust pipe front hanger insulator bracket.

Installation Procedure

1. If replacing the exhaust front pipe, install the exhaust pipe front hanger insulator bracket.

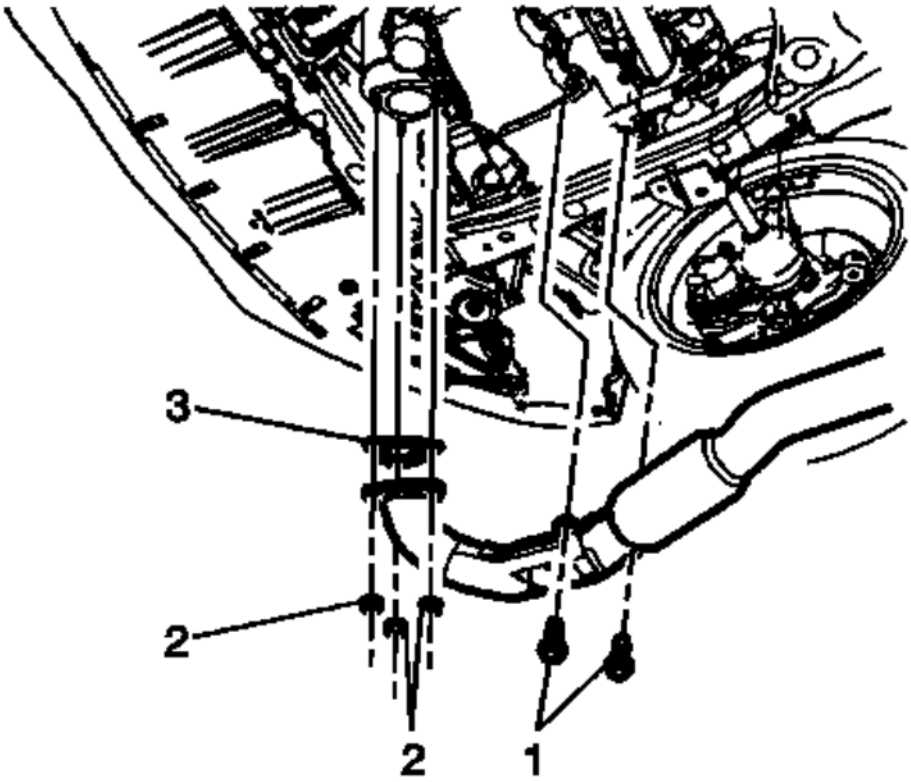


Fig. 25: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

2. Position the exhaust front pipe to the vehicle.

CAUTION: Refer to Fastener Caution .

3. Install the catalytic converter exhaust front pipe fasteners (2) using a NEW gasket (3) and tighten to 25 (18 lb ft).
4. Install the exhaust front pipe bracket fasteners (1) using and tighten to 22 (16 lb ft).

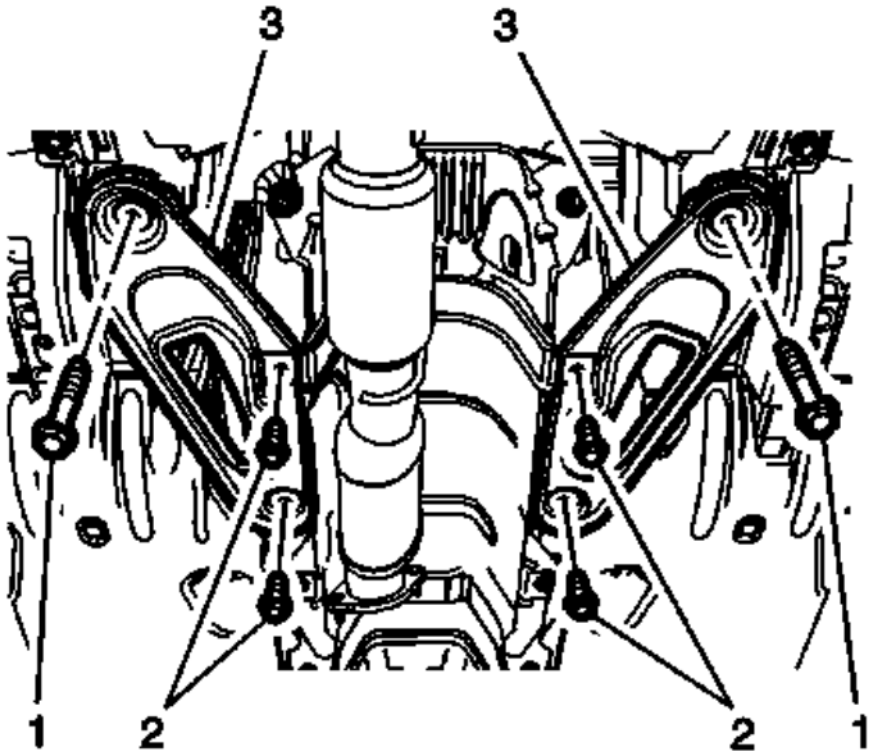


Fig. 26: Left And Right Drivetrain And Front Suspension Frame Supports
Courtesy of GENERAL MOTORS COMPANY

5. Install the fasteners (2) to the left and right drivetrain and front suspension frame supports (3) and tighten to 35 (26 lb ft).
6. Tighten the front fastener (1) to 160 (118 lb ft).

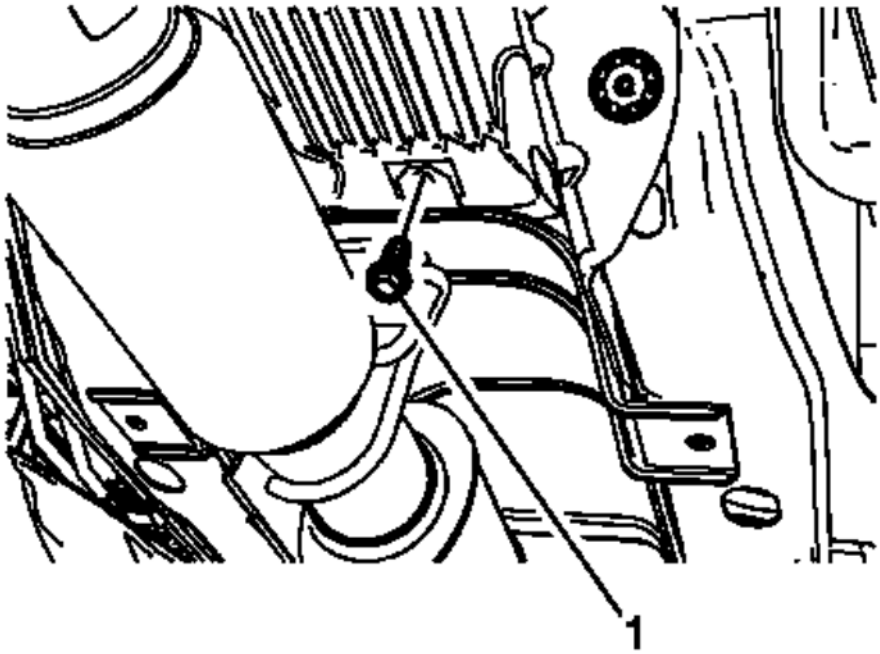


Fig. 27: Exhaust Pipe Front Hanger Bracket Fastener
Courtesy of GENERAL MOTORS COMPANY

7. Install the exhaust pipe front hanger bracket fastener (1) and tighten to 22 (16 lb ft).

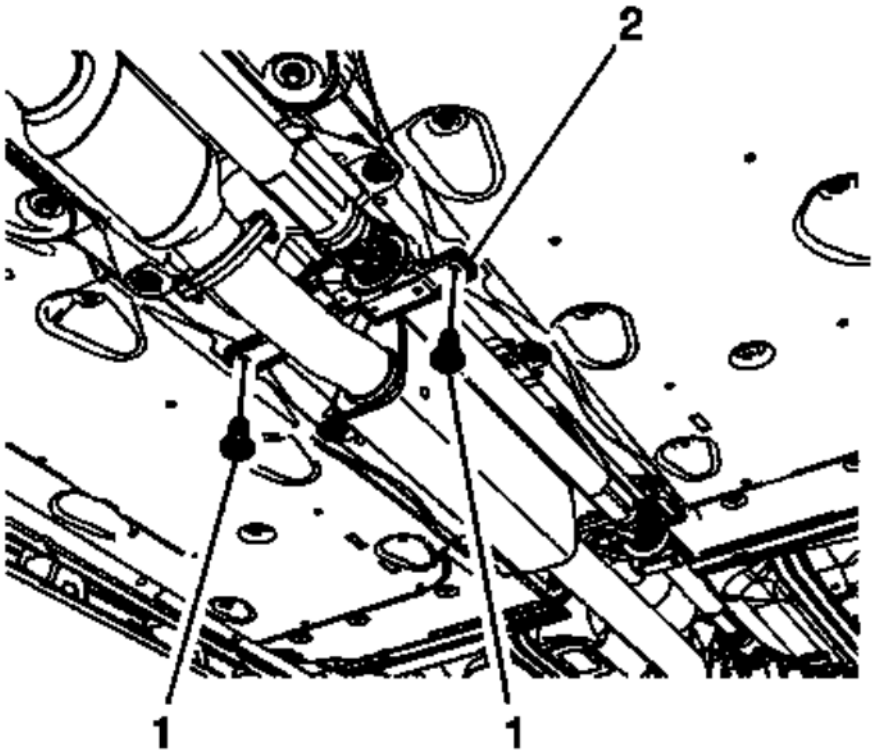


Fig. 28: Prop Shaft Bearing Bracket
Courtesy of GENERAL MOTORS COMPANY

8. If equipped with AWD, install the fasteners (1) to the prop shaft bearing bracket (2) and tighten to 22 (16 lb ft).

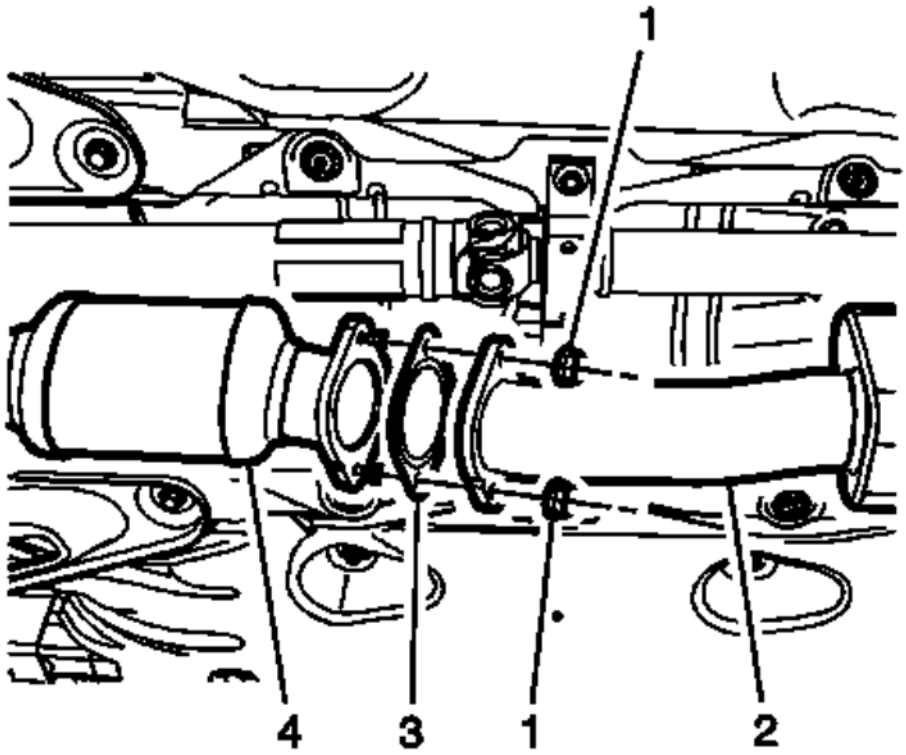


Fig. 29: Fasteners Securing Rear Muffler To Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

9. Install the fasteners (1) securing the rear muffler (2) to the exhaust front pipe (4) using a NEW exhaust gasket (3). Tighten the fasteners to 18 (13 lb ft).
10. Install the heated oxygen sensor, sensor 2. Refer to **Heated Oxygen Sensor Replacement - Sensor 2** .
11. Lower the vehicle.
12. Start the engine and check for exhaust leaks.

CATALYTIC CONVERTER REPLACEMENT (LTG)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

1. Disconnect the heated oxygen sensor - 1. Refer to **Heated Oxygen Sensor Replacement - Sensor 1** .
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

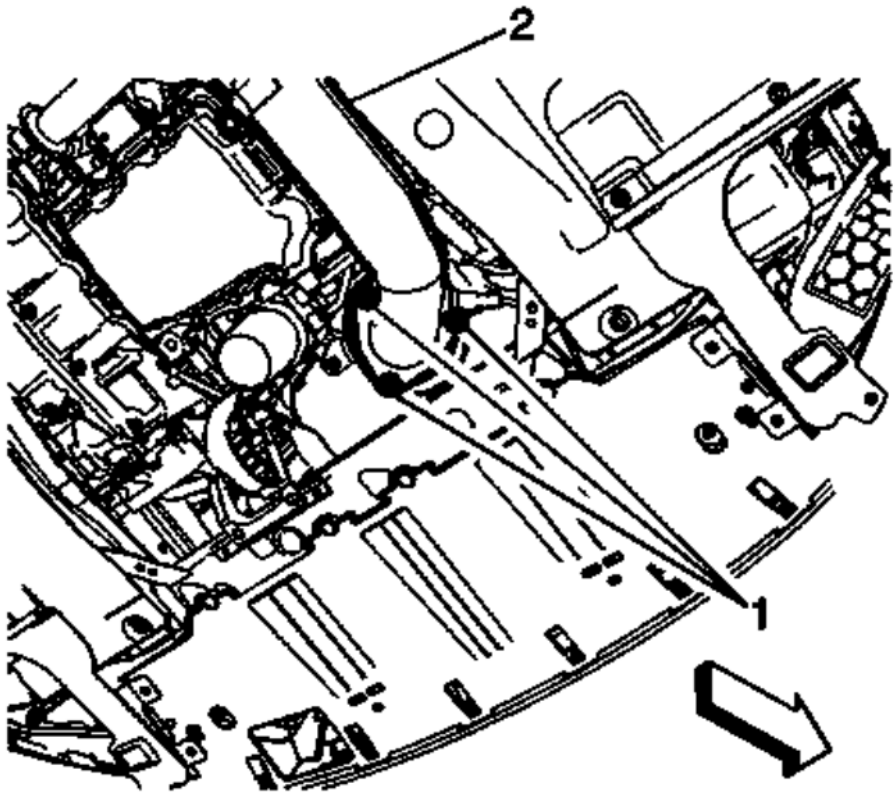


Fig. 30: Fasteners And Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

3. Remove the 3 fasteners (1) securing the exhaust front pipe (2) to the catalytic converter.

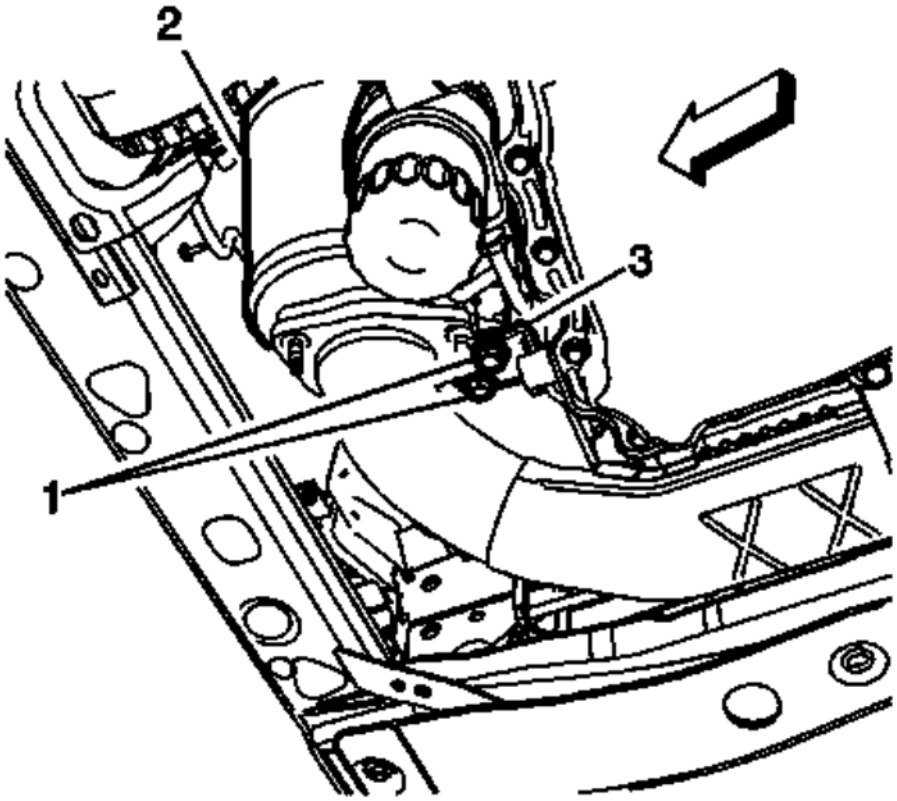


Fig. 31: Catalytic Converter Brace Fasteners
Courtesy of GENERAL MOTORS COMPANY

4. Remove the catalytic converter bracket fasteners (1) and remove the catalytic converter bracket (3).
5. Lower the vehicle.

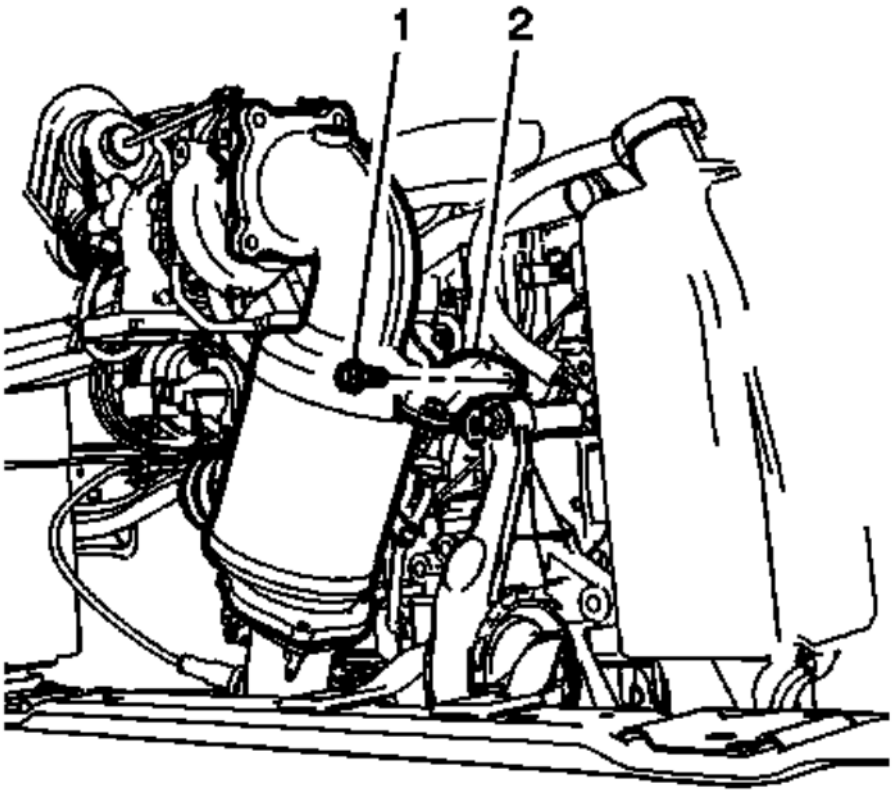


Fig. 32: Catalytic Converter Brace Bracket Fastener
Courtesy of GENERAL MOTORS COMPANY

6. Remove the catalytic converter brace bracket fasteners (1).
7. Remove the catalytic converter brace bracket (2) securing the catalytic converter to the engine block.

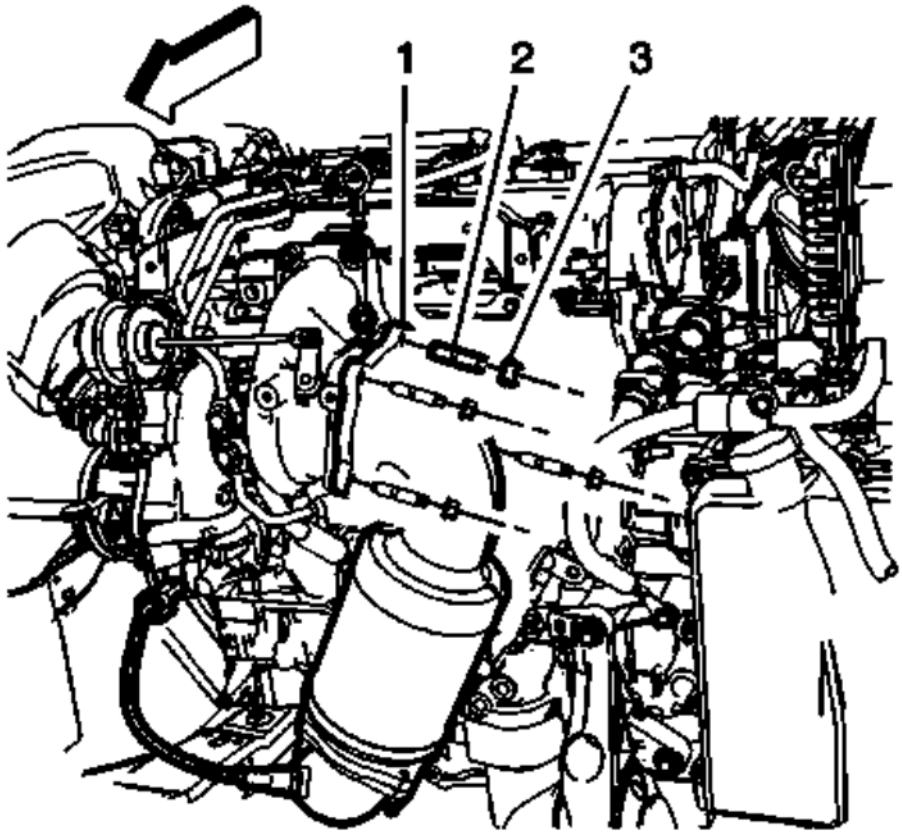


Fig. 33: Fasteners And Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

8. Remove the 4 fasteners (3) securing the catalytic converter (1) to the turbocharger.
9. Inspect the exhaust manifold studs (2) for damage and replace as necessary.

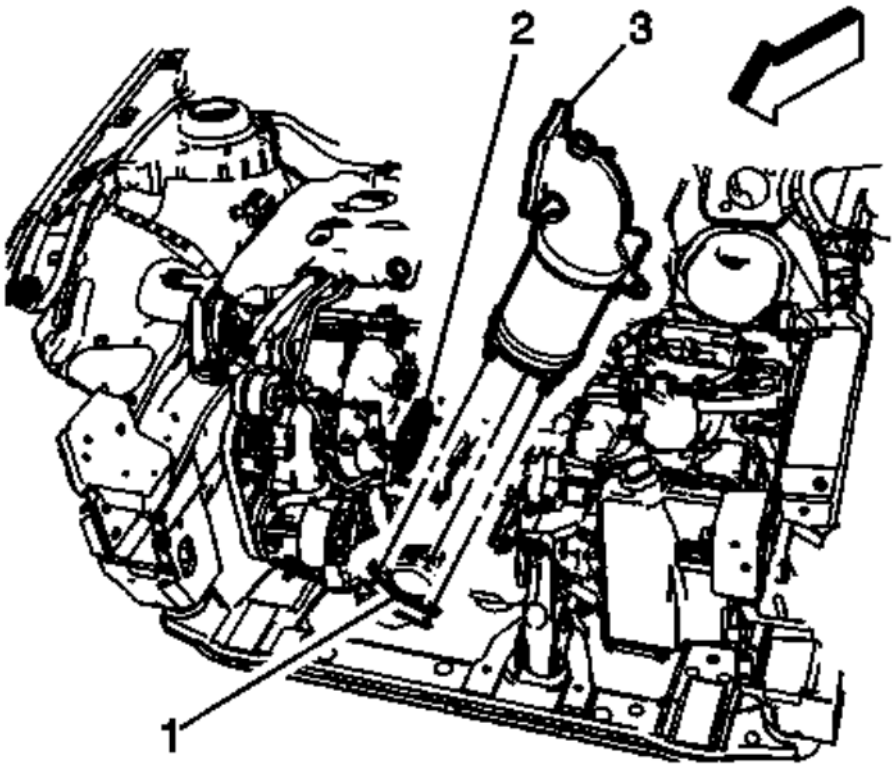


Fig. 34: Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

10. Remove the catalytic converter (3) from the engine compartment.
11. Discard the turbocharger seal (2) and the exhaust front pipe gasket (1).
12. If replacing the catalytic converter, transfer the catalytic converter brace to the NEW catalytic converter.

Installation Procedure

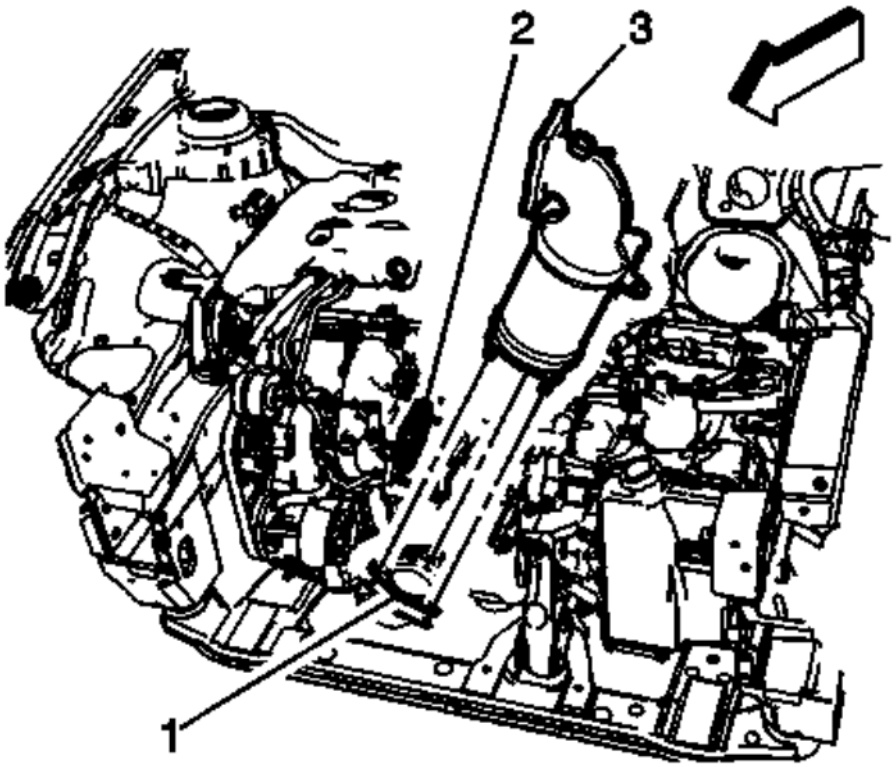


Fig. 35: Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

1. Install a NEW seal (2) to the turbocharger and a NEW gasket (1) to the exhaust front pipe.
2. Install the catalytic converter (3) into the exhaust front pipe flange and the turbocharger.

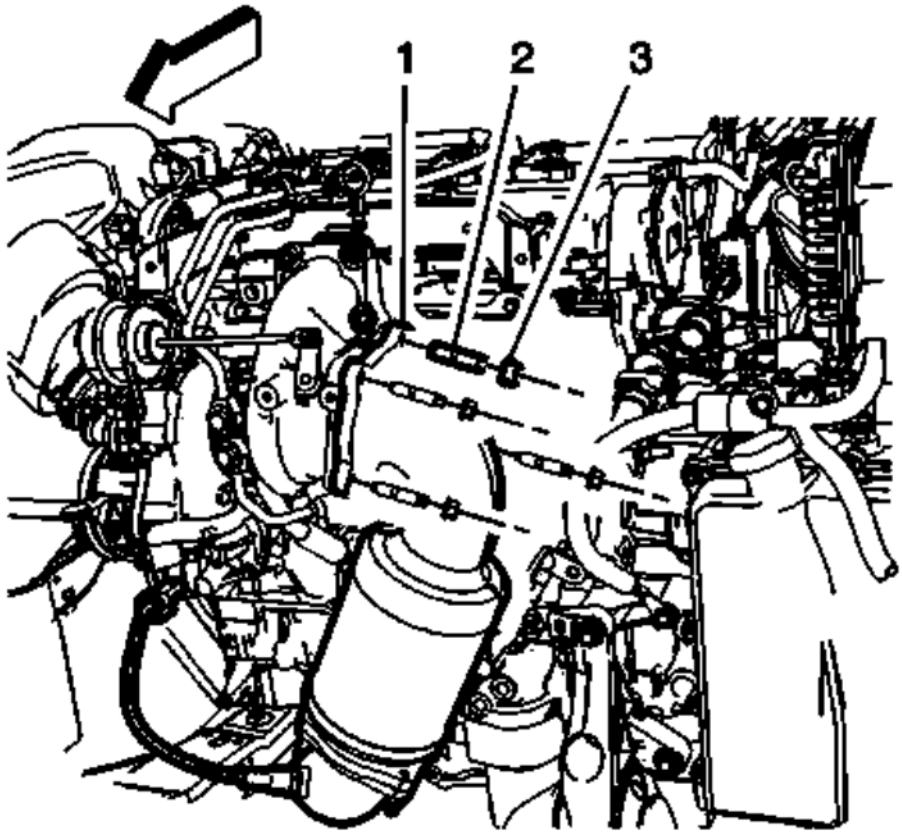


Fig. 36: Fasteners And Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. If replacing, install the turbocharger studs (2) and tighten to 10 (89 lb in).
4. Install the turbocharger fasteners (3) and tighten in a criss-cross pattern to 22 (16 lb ft).

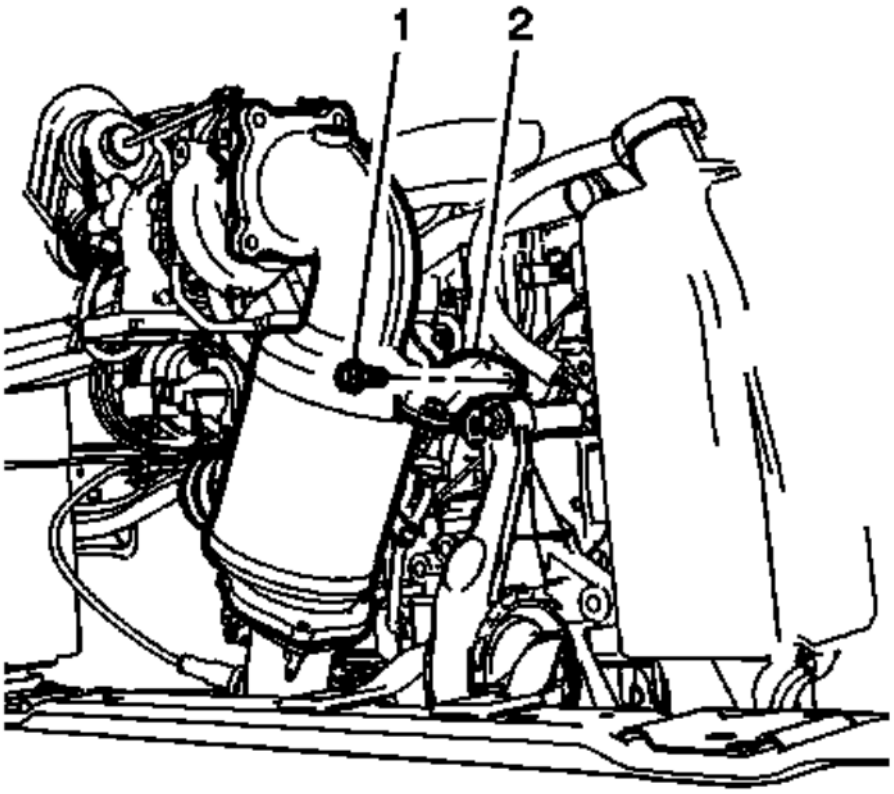


Fig. 37: Catalytic Converter Brace Bracket Fastener
Courtesy of GENERAL MOTORS COMPANY

5. Position the catalytic converter brace bracket (2), to the engine block, and tighten the fastener (1) to 22 (16 lb ft).
6. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

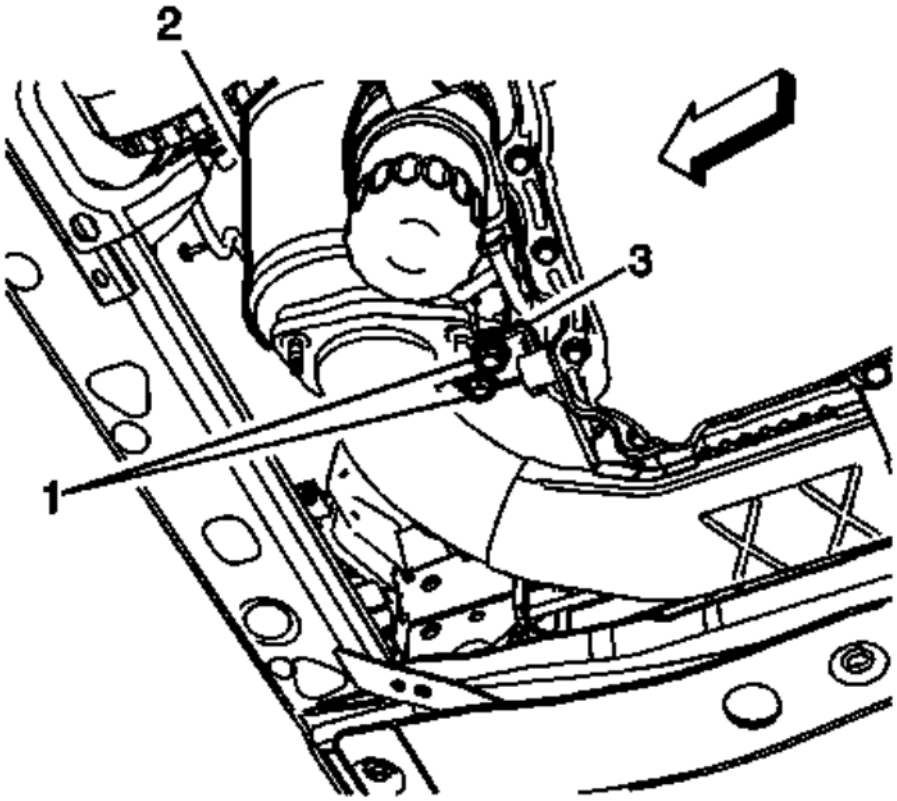


Fig. 38: Catalytic Converter Brace Fasteners
Courtesy of GENERAL MOTORS COMPANY

7. Install the catalytic converter bracket and fasteners (1) and tighten to 25 (18 lb ft).

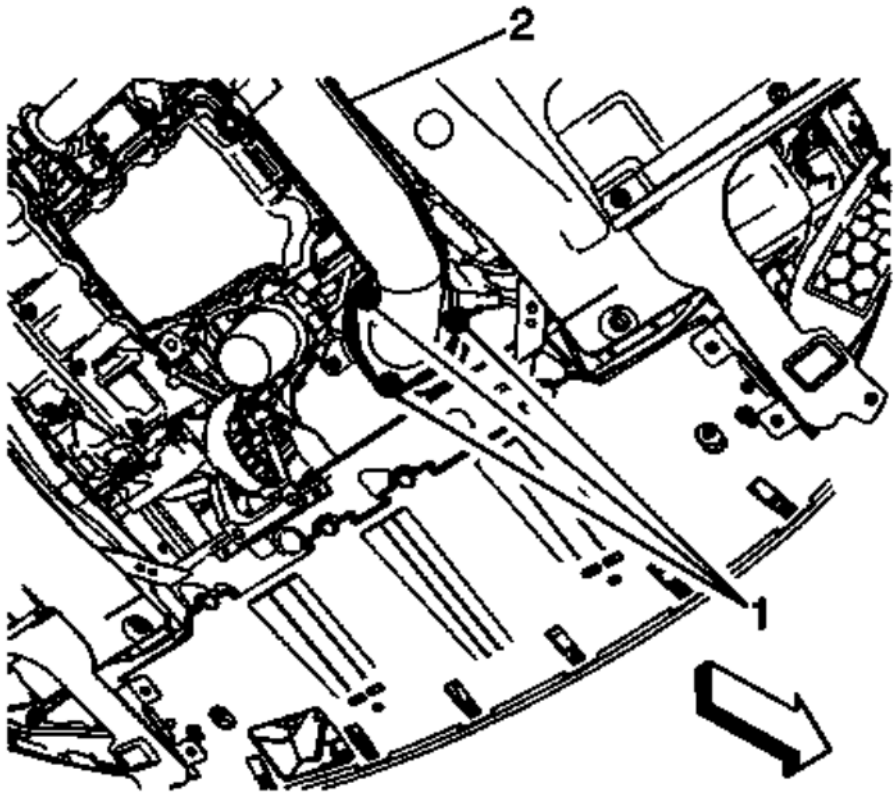


Fig. 39: Fasteners And Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

8. Install the catalytic converter fasteners (1) and tighten to 28 (21 lb ft).
9. Lower the vehicle.
10. Connect the heated oxygen sensor - 1. Refer to **Heated Oxygen Sensor Replacement - Sensor 1** .
11. Start the engine and check for exhaust leaks.

CATALYTIC CONVERTER REPLACEMENT (LUK)

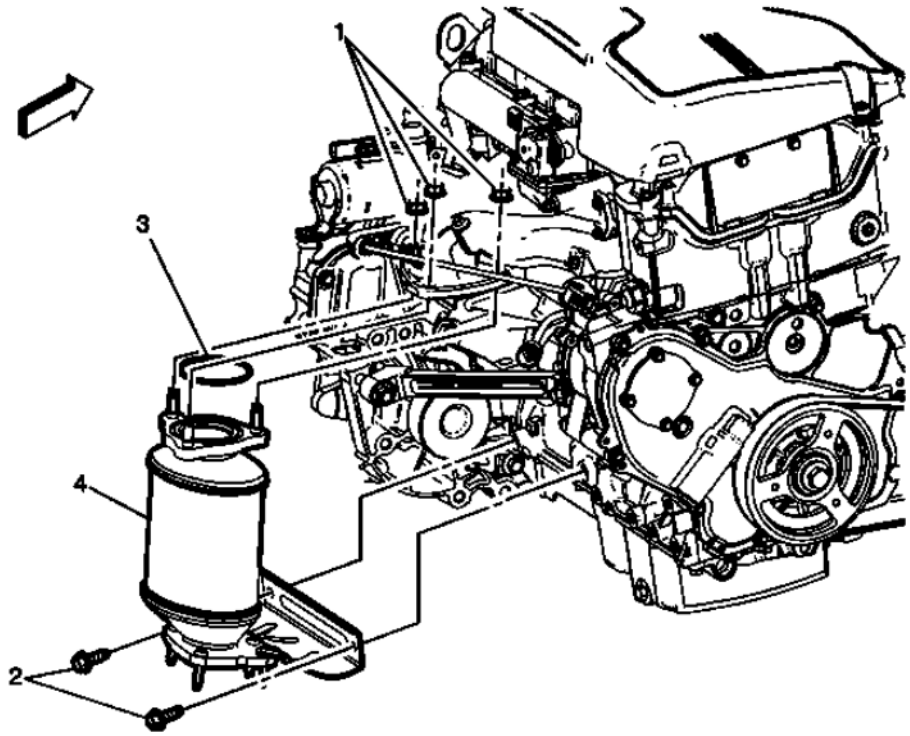


Fig. 40: Catalytic Converter Components (LUK)
Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Replacement (LUK)

Callout	Component Name
	WARNING: **Refer to Exhaust Service Warning .** **WARNING:** **Refer to Eye Protection Warning .** **Preliminary Procedures** 1. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** . 2. Remove the exhaust front pipe. Refer to **Exhaust Front Pipe Replacement (LUK)**.
1	Catalytic Converter Fasteners (Qty: 3) **Tighten** 50 (36 lb ft)
2	Catalytic Converter Brace Fastener (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 58 (43 lb ft)
3	Exhaust Seal

4	Catalytic Converter

CATALYTIC CONVERTER BRACE REPLACEMENT (LUK)

Removal Procedure

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

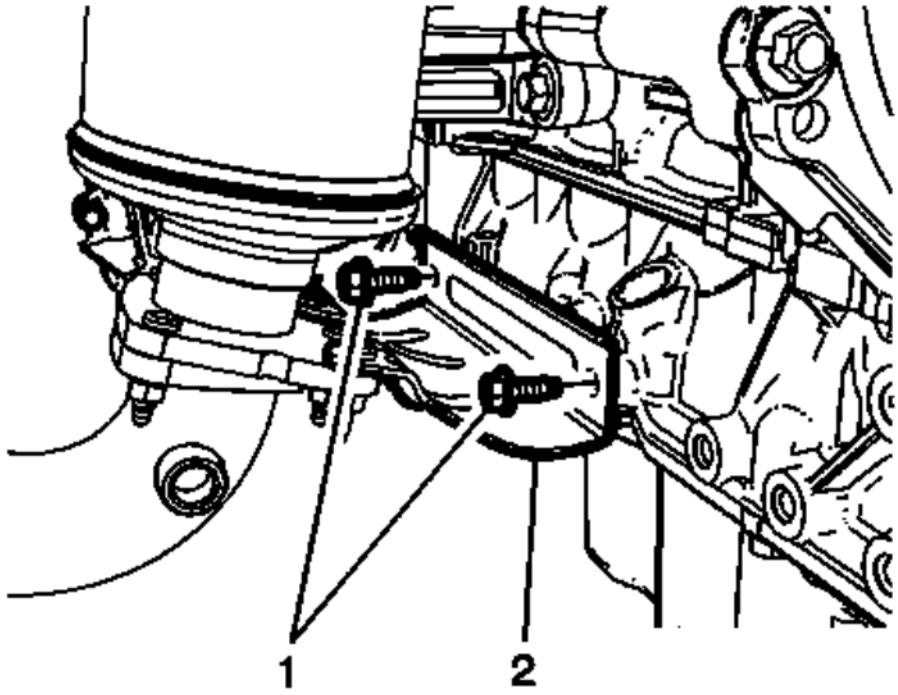


Fig. 41: Catalytic Converter Brace
Courtesy of GENERAL MOTORS COMPANY

2. Remove the fasteners (1) securing the catalytic converter brace (2) to the engine.

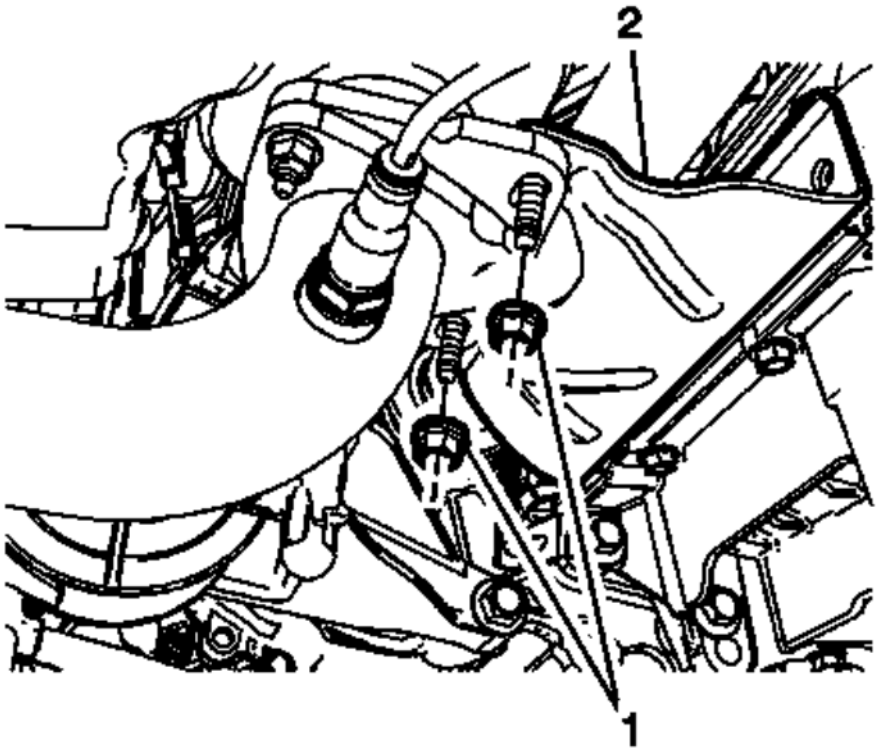


Fig. 42: Fasteners Securing Catalytic Converter Brace To Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

3. Remove the fasteners (1) securing the catalytic converter brace (2) to the catalytic converter.

Installation Procedure

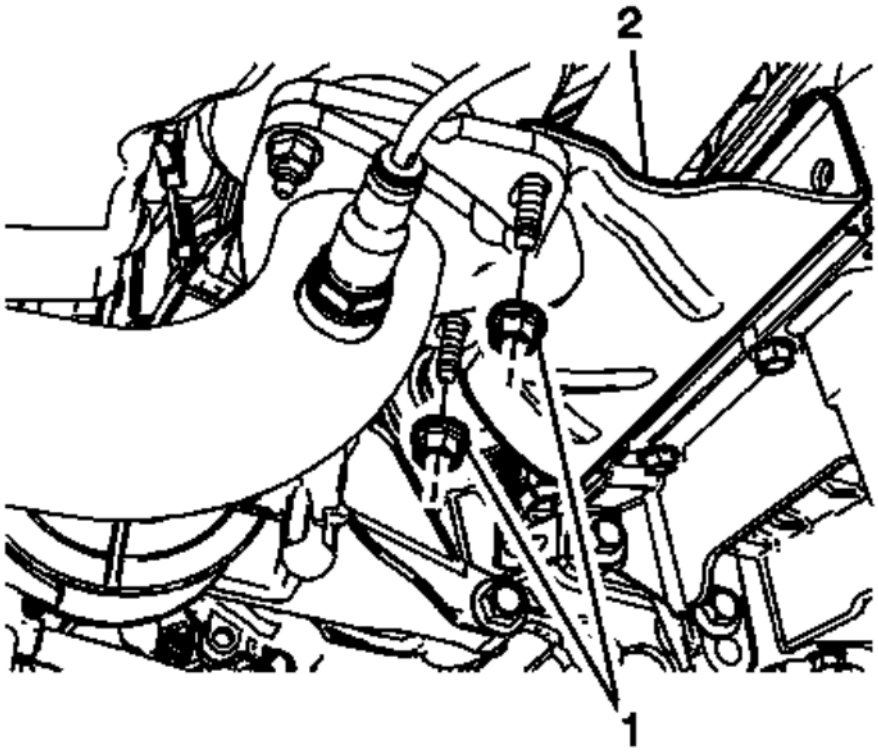


Fig. 43: Fasteners Securing Catalytic Converter Brace To Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the fasteners (1) securing the catalytic converter brace (2) to the catalytic converter and tighten to 22 (16 lb ft).

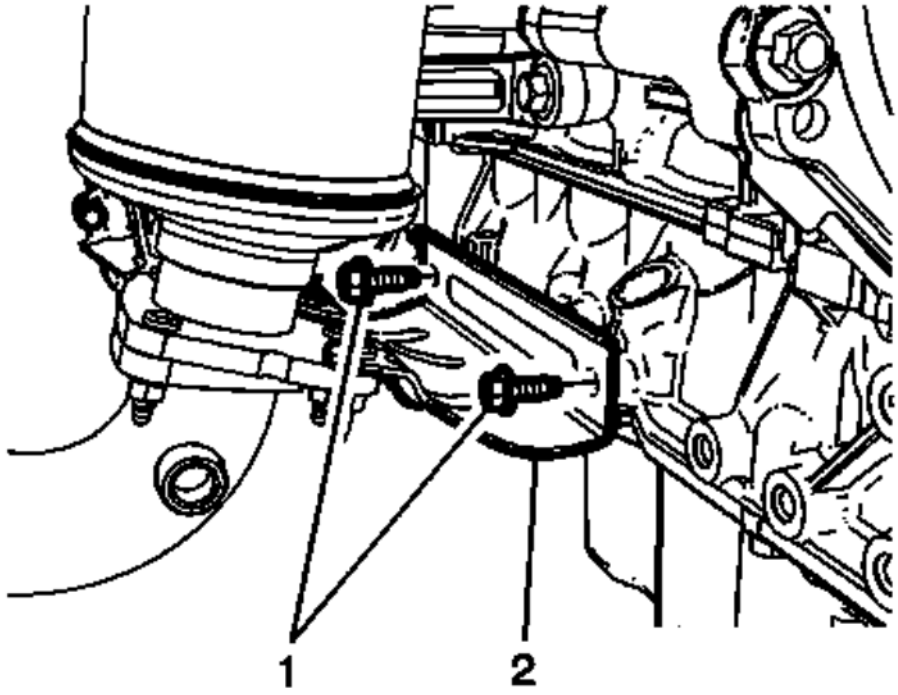


Fig. 44: Catalytic Converter Brace
Courtesy of GENERAL MOTORS COMPANY

2. Install the fasteners (1) securing the catalytic converter brace (2) to the engine and tighten to 22 (16 lb ft).
3. Lower the vehicle.

CATALYTIC CONVERTER BRACE REPLACEMENT (LTG LOWER)

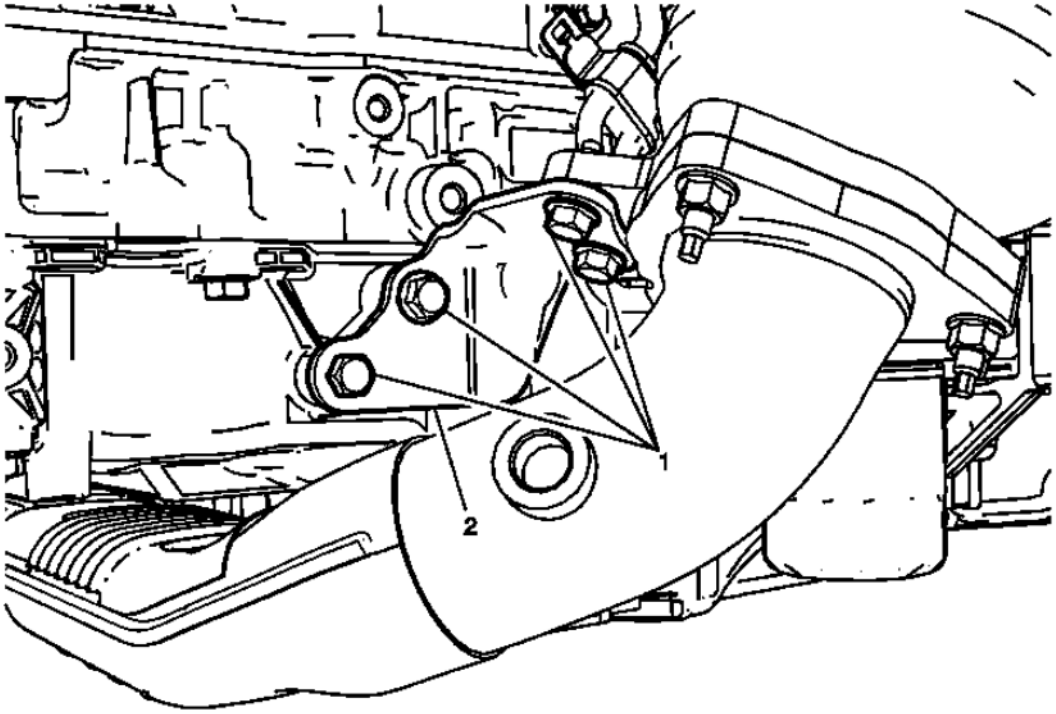


Fig. 45: Catalytic Converter Brace (LTG Lower)
Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Brace Replacement (LTG Lower)

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .	
1	Catalytic Converter Brace Fasteners (Qty: 4) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 22 (16 lb ft)
2	Catalytic Converter Brace

CATALYTIC CONVERTER BRACE REPLACEMENT (LTG UPPER)

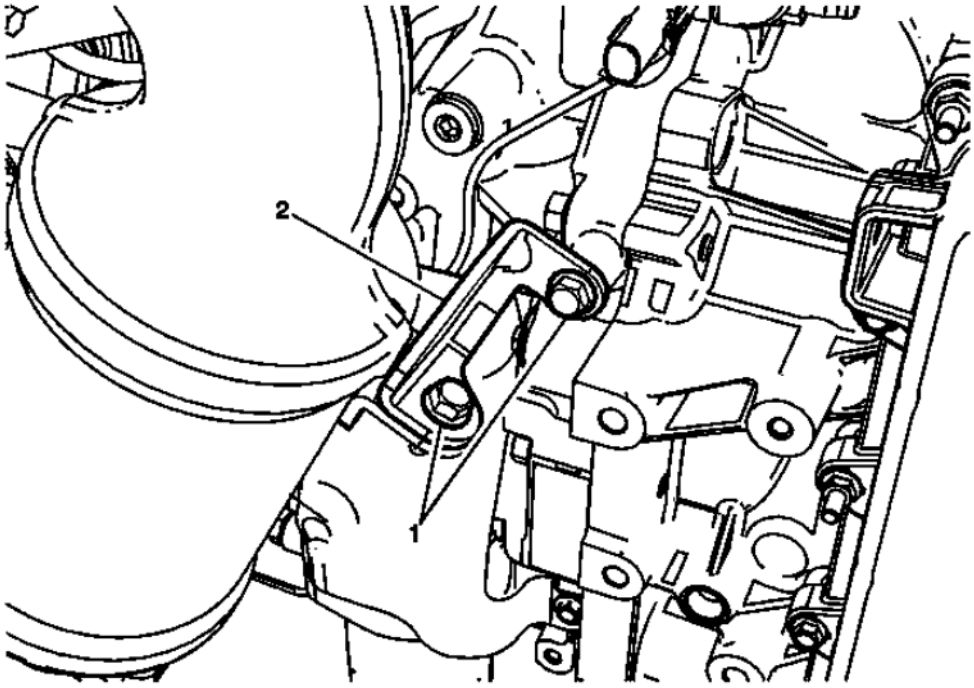


Fig. 46: Catalytic Converter Brace (LTG Upper)
Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Brace Replacement (LTG Upper)

Callout	Component Name
1	Catalytic Converter Brace Fasteners (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 22 (16 lb ft)
2	Catalytic Converter Brace

EXHAUST MUFFLER REPLACEMENT (DUAL)

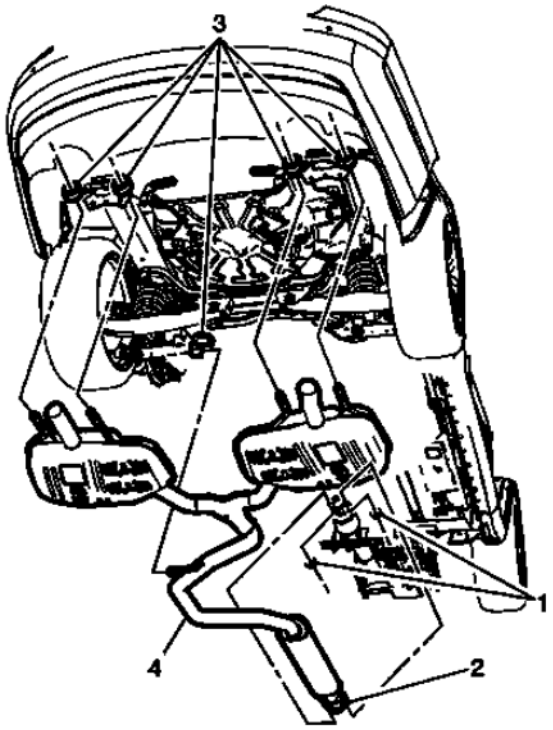


Fig. 47: Exhaust Muffler (Dual)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Muffler Replacement (Dual)

Callout	Component Name
WARNING: **Refer to Eye Protection Warning .** **WARNING:** **Refer to Hot Exhaust System Warning .** **Preliminary Procedure** Lift and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .	
1	Rear Exhaust Muffler to Exhaust Front Pipe Nut (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 18 N.m (13 lb ft)
2	Exhaust Gasket **NOTE:** **Replace exhaust gasket with a NEW exhaust gasket.**
3	Exhaust Isolator **NOTE:**

	Clean and lubricate exhaust isolators for ease of installation.
4	Exhaust Muffler

EXHAUST MUFFLER REPLACEMENT (SINGLE)

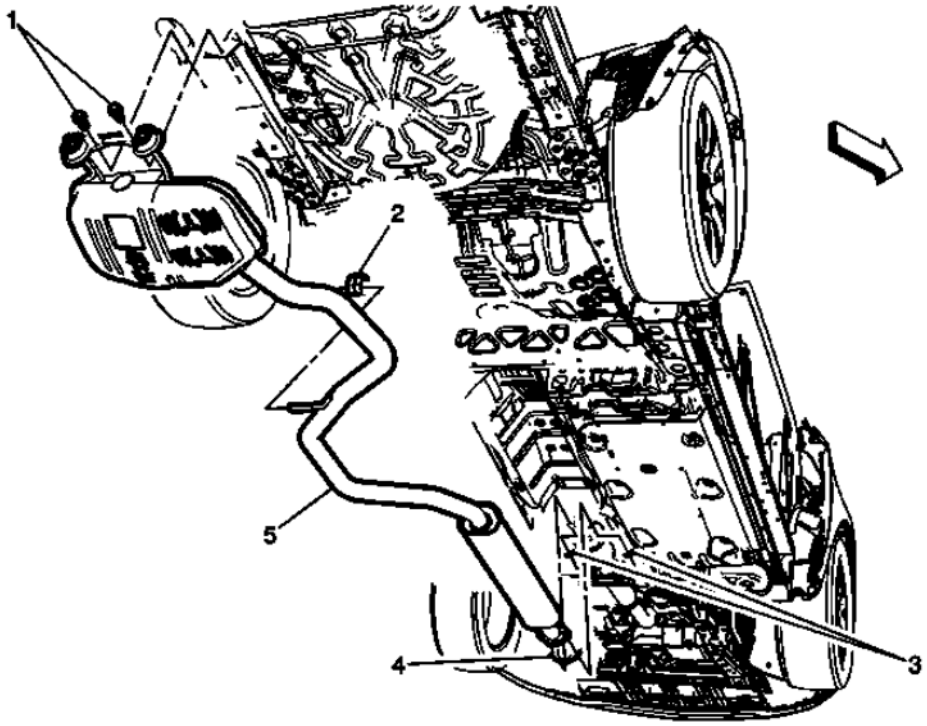


Fig. 48: Exhaust Muffler (Single)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Muffler Replacement (Single)

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .	
1	Exhaust Muffler Rear Hanger Fastener (Qty: 2) **WARNING:** **Refer to Eye Protection Warning .** **WARNING:** **Refer to Hot Exhaust System Warning .** **CAUTION:** **Refer to Fastener Caution .** **Tighten** 22 N.m (16 lb ft)
2	Exhaust Isolator

3	Exhaust Front Pipe Fastener **Tighten** 18 N.m (13 lb ft)
4	Exhaust Gasket **NOTE:** **Replace the gasket with a NEW gasket.**
5	Exhaust Muffler with Resonator

EXHAUST MUFFLER CENTER HEAT SHIELD REPLACEMENT

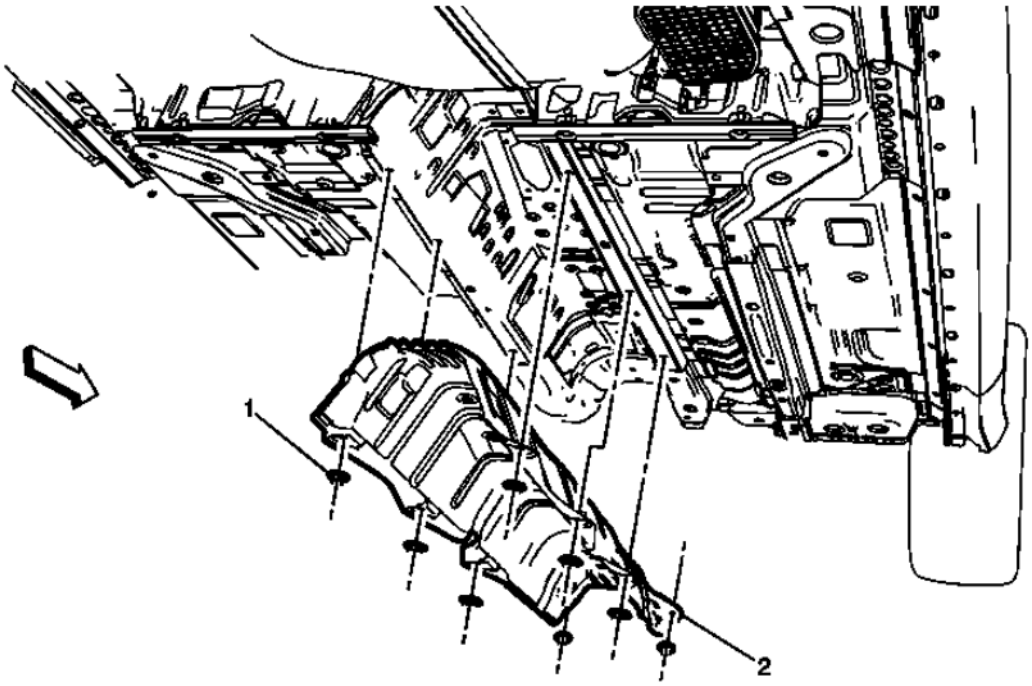


Fig. 49: Exhaust Muffler Center Heat Shield & Fasteners
Courtesy of GENERAL MOTORS COMPANY

Exhaust Muffler Center Heat Shield Replacement

Callout	Component Name
Preliminary Procedures 1. Remove the exhaust muffler. Refer to **Exhaust Muffler Replacement (Dual)**, **Exhaust Muffler Replacement (Single)**. 2. Remove the exhaust front pipe. Refer to **Exhaust Front Pipe Replacement (LTG)**, **Exhaust Front Pipe Replacement (LUK)**, **Exhaust Front Pipe Replacement (LTG AWD)**.	
1	Fastener (Qty: 8)
2	Exhaust Pipe Heat Shield

FUEL TANK HEAT SHIELD REPLACEMENT

Removal Procedure

1. Relieve the fuel system pressure. Refer to **FUEL PRESSURE RELIEF** for 2.0L or **FUEL PRESSURE RELIEF** for 2.4L.
2. Drain the fuel tank. Refer to **FUEL TANK DRAINING** for 2.0L or **FUEL TANK DRAINING (NON E-85)** or **FUEL TANK DRAINING (E-85)** for 2.4L.
3. Remove the right rear wheel. Refer to **Tire and Wheel Removal and Installation** .
4. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
5. Remove the exhaust rear muffler. .

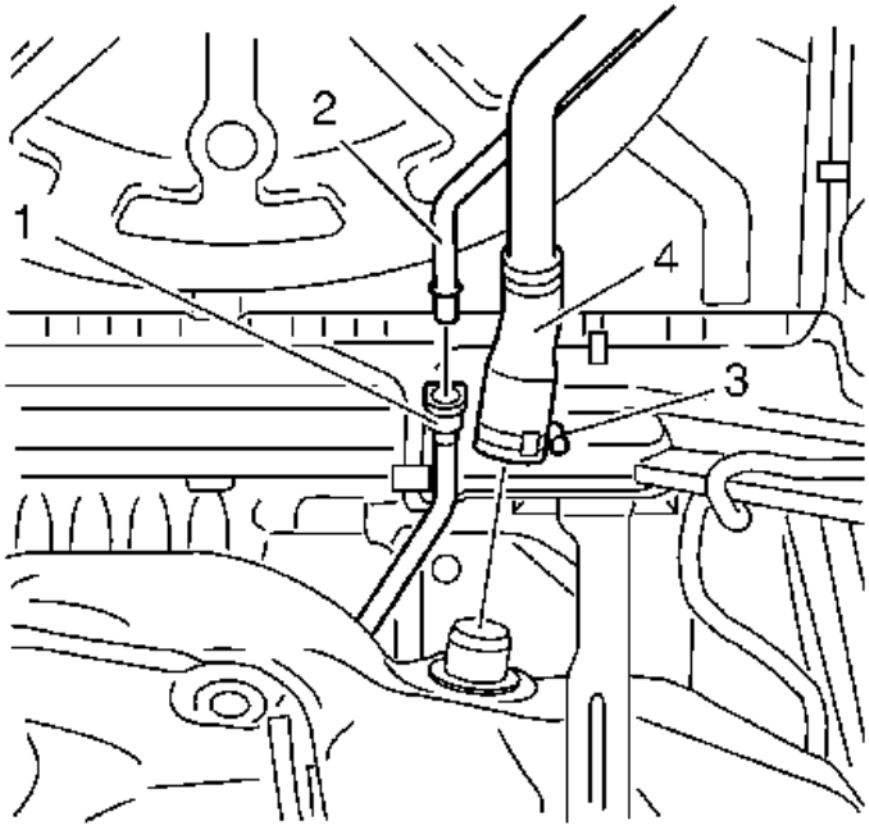


Fig. 50: Chassis Fuel Feed Pipe, Quick Connect Fitting, Fuel Pipe & Retainer
Courtesy of GENERAL MOTORS COMPANY

6. Disconnect the fuel tank filler pipe quick connect fitting (1) from the chassis fuel feed pipe (2).
7. Disconnect the fuel tank filler pipe retainer (3) from the chassis fuel pipe (4).

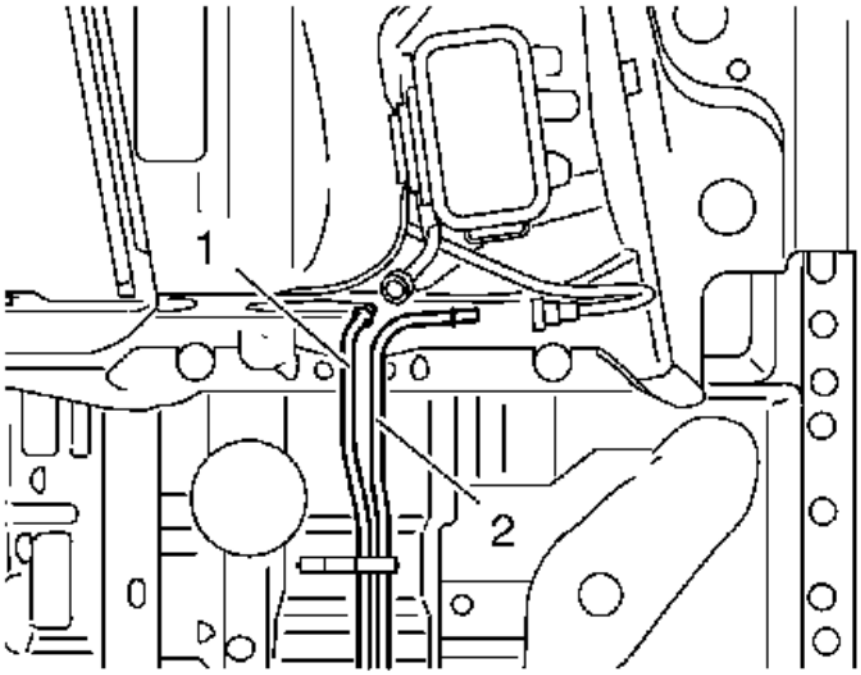


Fig. 51: Evaporative Emission Canister Purge Pipe & Fuel Feed Pipe
Courtesy of GENERAL MOTORS COMPANY

8. Disconnect the evaporative emission canister purge pipe (1).
9. Disconnect the fuel feed pipe (2).

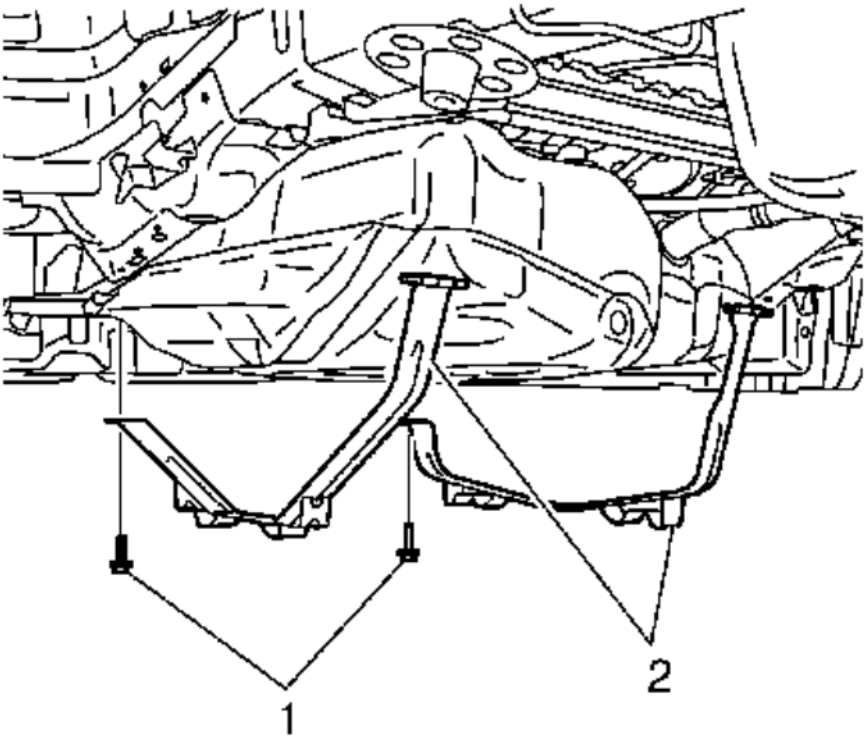


Fig. 52: Fuel Tank Straps & Fastener
Courtesy of GENERAL MOTORS COMPANY

10. Have assistants support either side of the fuel tank.
11. Place a suitable adjustable jack under the fuel tank.
12. Remove fuel tank strap fastener (1) and straps (2).
13. Have the assistants rest the fuel tank on the adjustable jack.

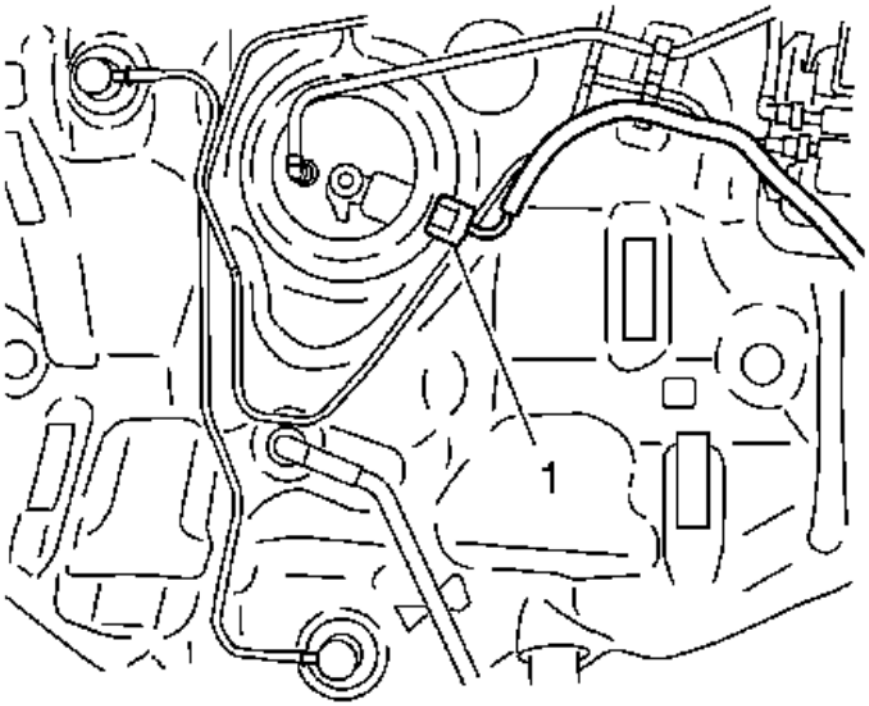


Fig. 53: Fuel Pump Module Wiring Harness Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

14. Disconnect the fuel tank fuel pump module wiring harness electrical connector (1), from the fuel tank fuel pump module.
15. Once the tank is clear of the frame, lower the fuel tank down and remove forward toward the right side of the vehicle.

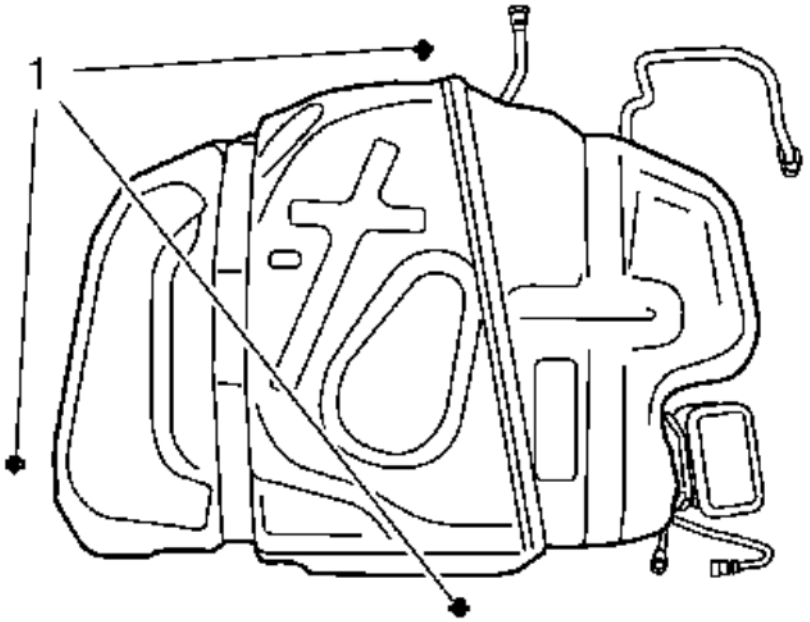


Fig. 54: Fuel Tank Shield Retainer
Courtesy of GENERAL MOTORS COMPANY

16. Detach the fuel tank shield retainer (1).

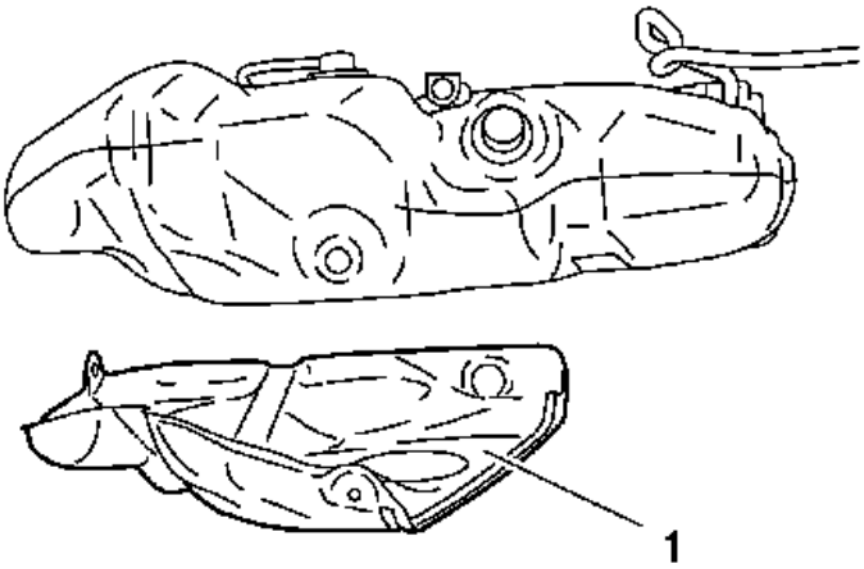


Fig. 55: Fuel Tank Shield
Courtesy of GENERAL MOTORS COMPANY

17. Remove the fuel tank shield (1).

Installation Procedure

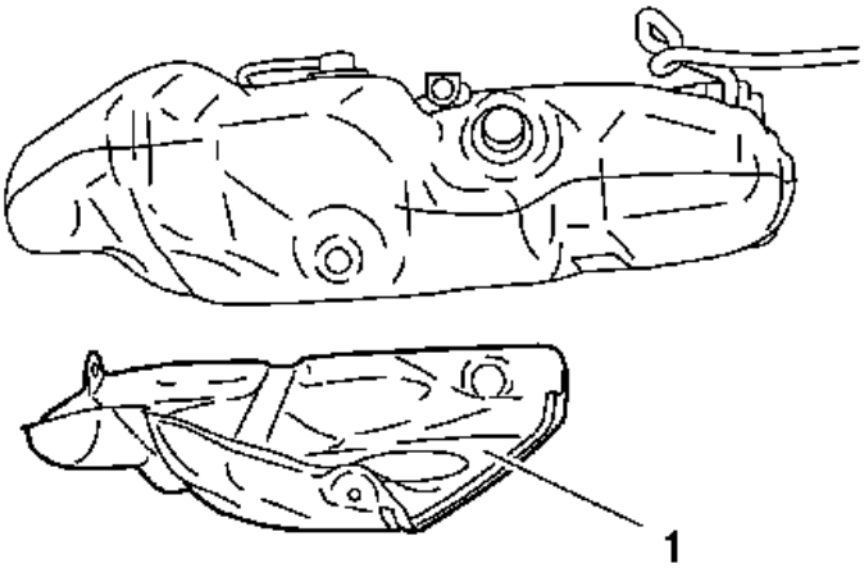


Fig. 56: Fuel Tank Shield
Courtesy of GENERAL MOTORS COMPANY

1. Attach the fuel tank shield (1).

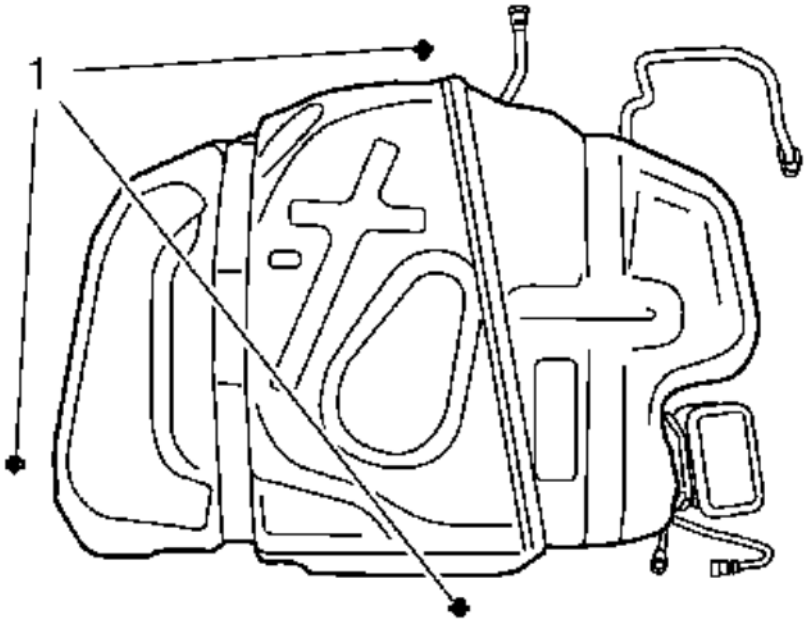


Fig. 57: Fuel Tank Shield Retainer
Courtesy of GENERAL MOTORS COMPANY

2. Insert the fuel tank shield retainer (1).
3. Have assistants support either side of the fuel tank.
4. Place a suitable adjustable jack under the fuel tank.
5. Have the assistants rest the fuel tank on the adjustable jack.
6. Once the tank is clear of the frame, upper the fuel tank high.

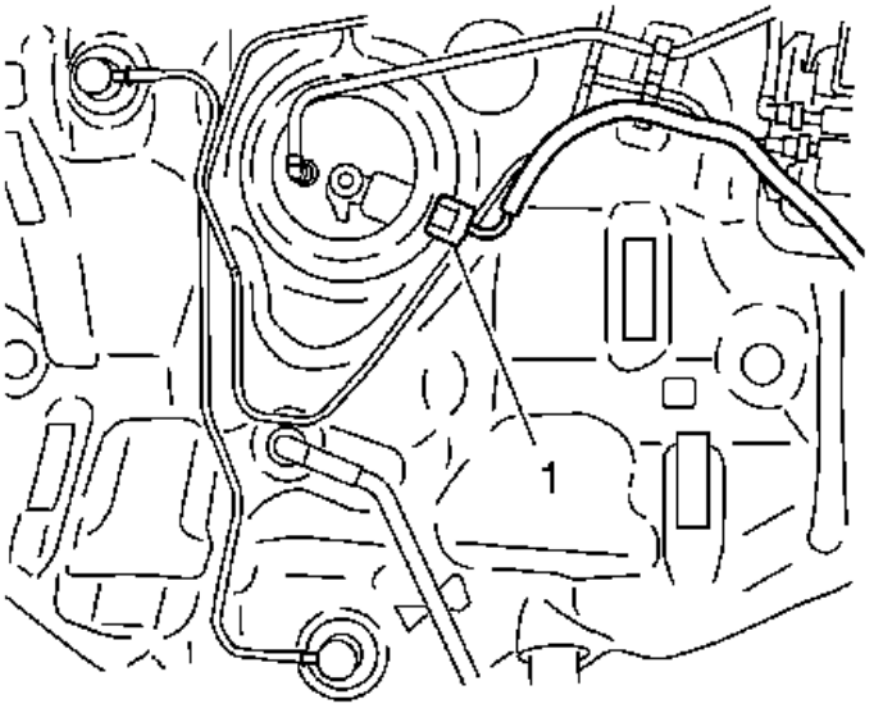


Fig. 58: Fuel Pump Module Wiring Harness Electrical Connector
Courtesy of GENERAL MOTORS COMPANY

7. Disconnect the fuel tank fuel pump module wiring harness electrical connector (1), from the fuel tank fuel pump module.

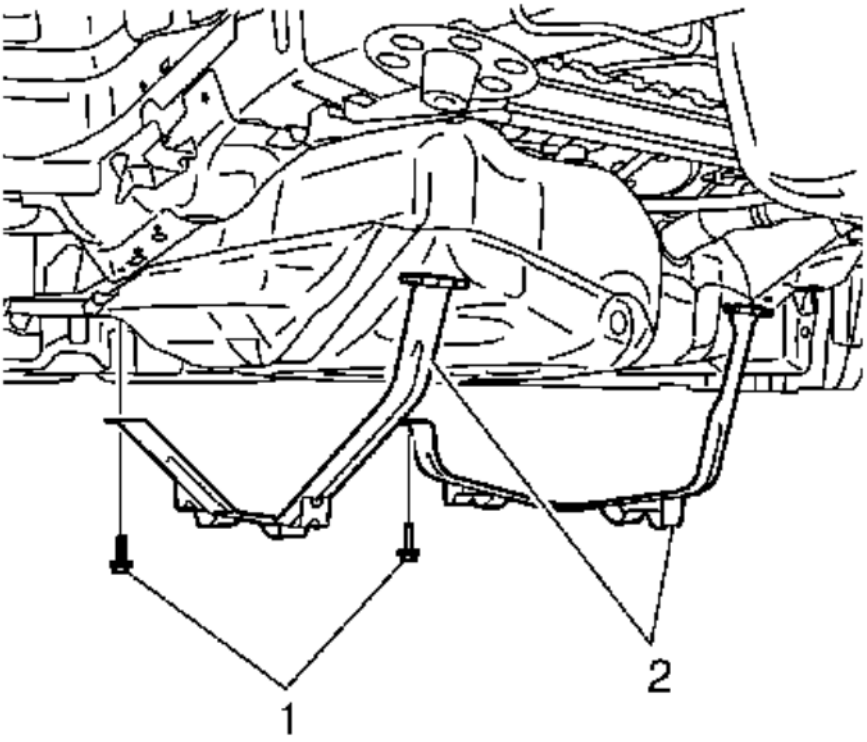


Fig. 59: Fuel Tank Straps & Fastener
Courtesy of GENERAL MOTORS COMPANY

8. Install the fuel tank straps fastener (2) and fastener (1).

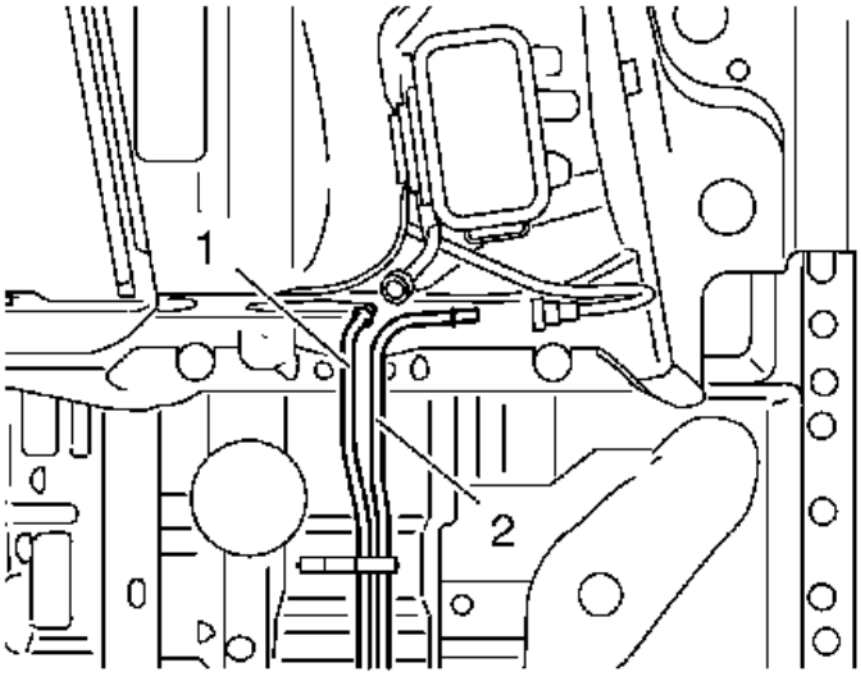


Fig. 60: Evaporative Emission Canister Purge Pipe & Fuel Feed Pipe
Courtesy of GENERAL MOTORS COMPANY

9. Connect the evaporative emission canister purge pipe (1)..
10. Connect the fuel feed pipe (2).

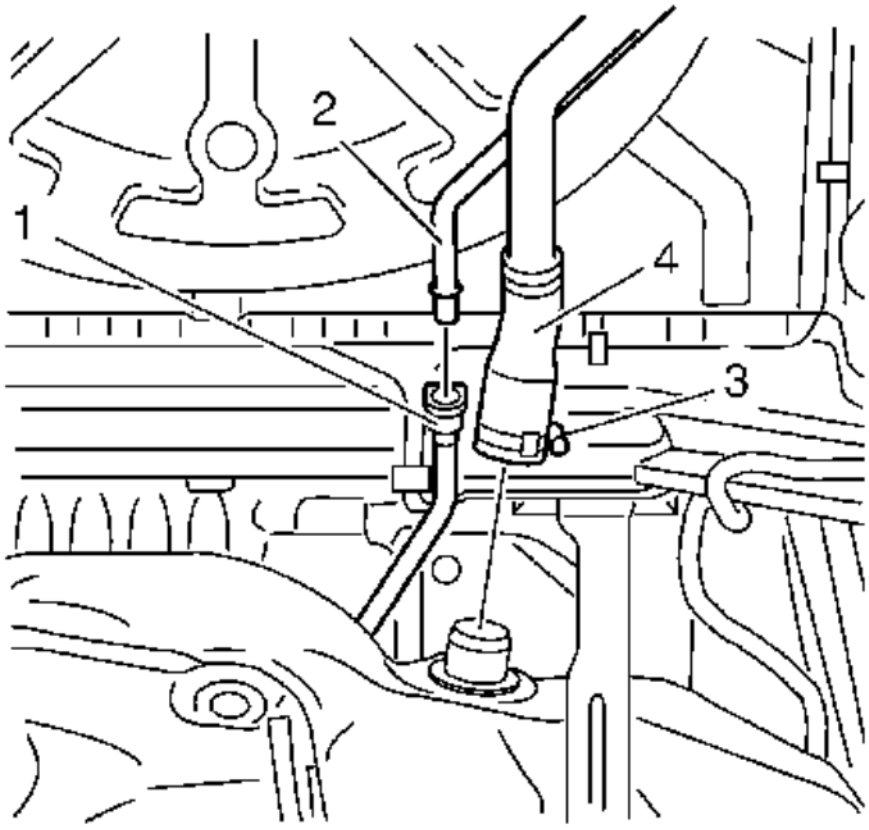


Fig. 61: Chassis Fuel Feed Pipe, Quick Connect Fitting, Fuel Pipe & Retainer
Courtesy of GENERAL MOTORS COMPANY

11. Connect the fuel tank feed pipe (2) and lock quick connect fitting (1).

CAUTION: Refer to Fastener Caution .

12. Connect the fuel tank filler pipe (4) to the filler pipe retainer (3) and tighten to 4 N.m (35 lb in).
13. Refill the fuel tank.

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT (LUK)

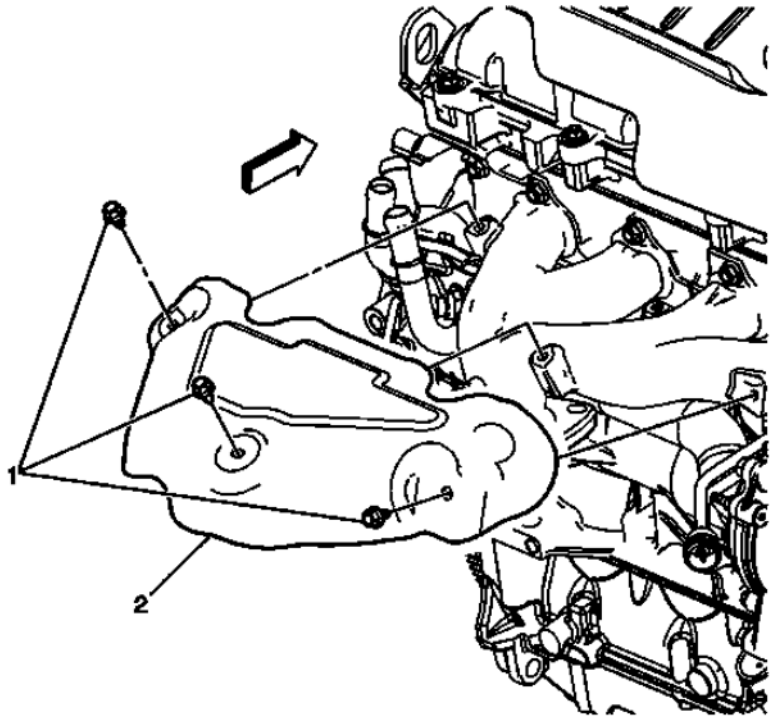


Fig. 62: View Of Exhaust Manifold Heat Shield
Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Heat Shield Replacement (LUK)

Callout	Component Name
Preliminary Procedure Remove the intake manifold cover. Refer to **Intake Manifold Cover Replacement** .	
1	Exhaust Manifold Heat Shield Bolt (Qty: 3) **WARNING:** **Refer to Hot Exhaust System Warning .** **CAUTION:** **Refer to Fastener Caution .** **Tighten** 10 N.m (89 lb in)
2	Exhaust Manifold Heat Shield

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT (LTG)

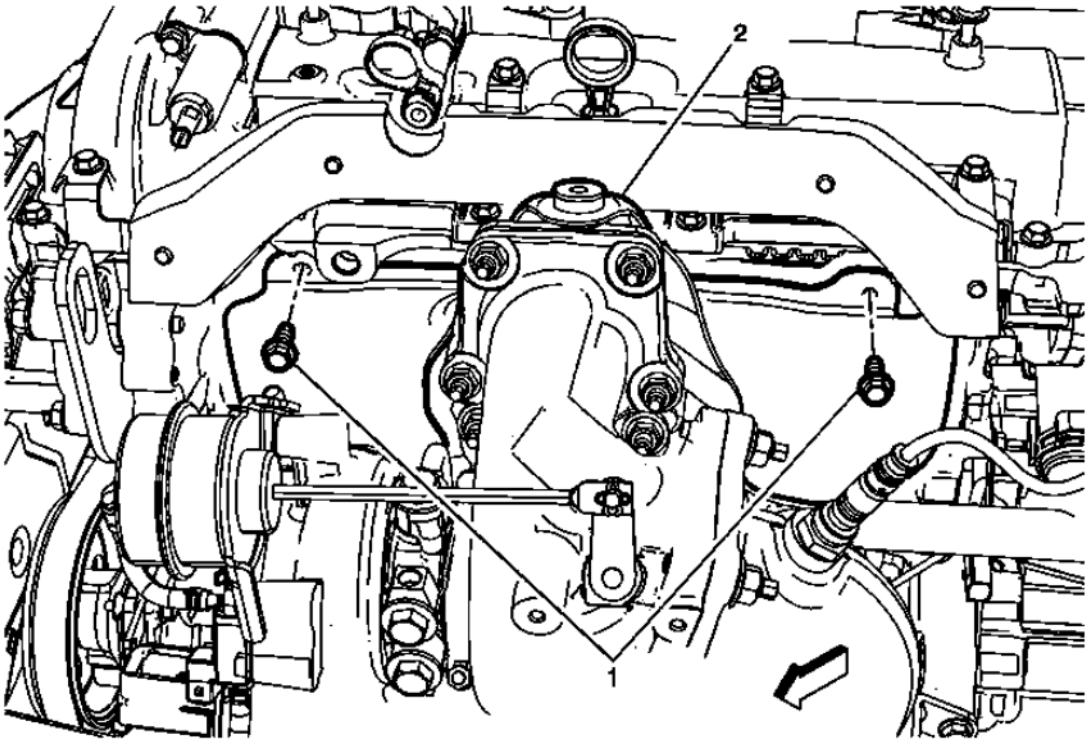


Fig. 63: Exhaust Manifold Heat Shield (LTG)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Heat Shield Replacement (LTG)

Callout	Component Name
	WARNING: **Refer to Hot Exhaust System Warning .** **Preliminary Procedure** 1. Remove the turbocharger heat shield. See **TURBOCHARGER HEAT SHIELD REPLACEMENT** 2. Remove the intake manifold cover. Refer to **Intake Manifold Cover Replacement** . 3. Remove the turbocharger. Refer to **Turbocharger Replacement**
1	Exhaust Manifold Heat Shield Fasteners (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten:** 14 (10 lb ft)
2	Exhaust Manifold Heat Shield

EXHAUST REAR MUFFLER HEAT SHIELD REPLACEMENT (LEFT OUTER-LUK)

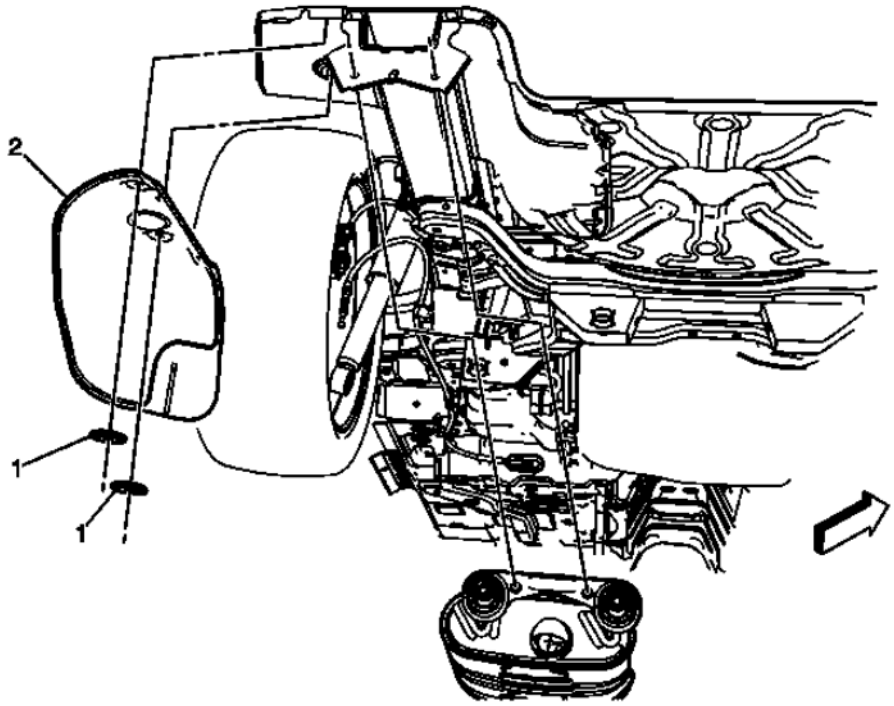


Fig. 64: Exhaust Rear Muffler Heat Shield (Left Rear Outer)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Rear Muffler Heat Shield Replacement (Left Outer-LUK)

Callout	Component Name
WARNING: **Refer to Hot Exhaust System Warning .** **Preliminary Procedure** Unclip heat shield from fender liner.	
1	Heat Shield Retainer (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 1.5 N.m (13 lb in)
2	Heat Shield - Left Rear Corner

EXHAUST REAR MUFFLER HEAT SHIELD REPLACEMENT (LEFT REAR INNER)

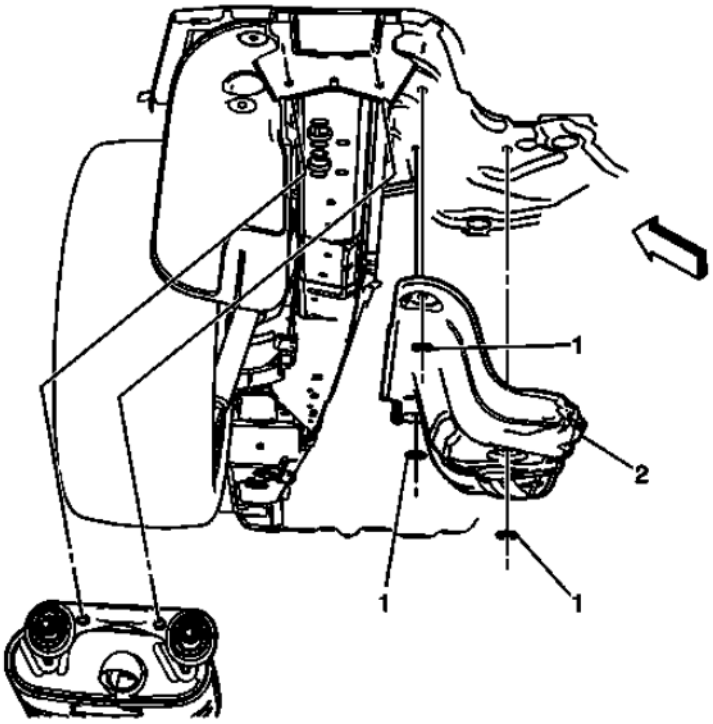


Fig. 65: Exhaust Rear Muffler Heat Shield (Left Rear Inner)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Rear Muffler Heat Shield Replacement (Left Rear Inner)

Callout	Component Name
WARNING: **Refer to Hot Exhaust System Warning .** **Preliminary Procedure** Remove the exhaust muffler. Refer to **Exhaust Muffler Replacement (Dual)**, **Exhaust Muffler Replacement (Single)**.	
1	Heat Shield Retainer (Qty: 3) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 1.5 N.m (13 lb in)
2	Heat Shield - Left Inner

EXHAUST REAR MUFFLER HEAT SHIELD REPLACEMENT (RIGHT REAR INNER)

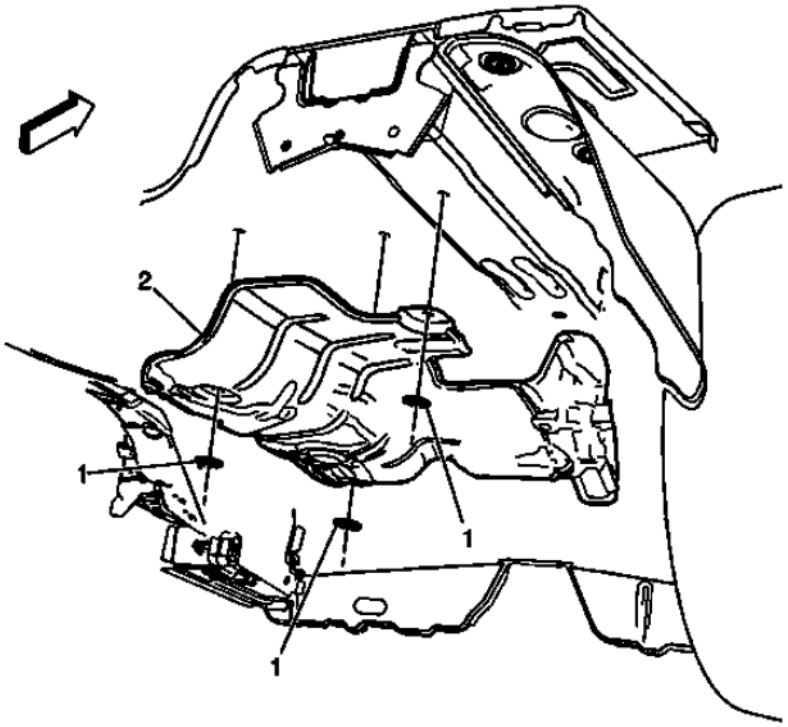


Fig. 66: Exhaust Rear Muffler Heat Shield (Right Rear Inner)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Rear Muffler Heat Shield Replacement (Right Rear Inner)

Callout	Component Name
WARNING: **Refer to Hot Exhaust System Warning .** **Preliminary Procedure** Remove the exhaust muffler. Refer to **Exhaust Muffler Replacement (Dual)**, **Exhaust Muffler Replacement (Single)**.	
1	Exhaust Heat Shield Retainer (Qty: 3) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 1.5 N.m (13 lb in)
2	Heat Shield - Inner Right Rear

EXHAUST REAR MUFFLER HEAT SHIELD REPLACEMENT (RIGHT REAR CORNER)

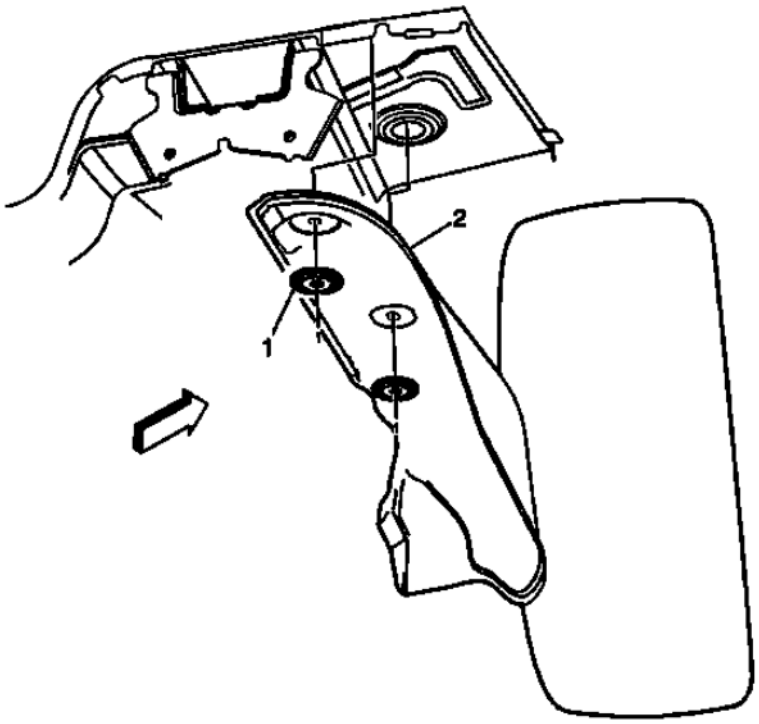


Fig. 67: Exhaust Rear Muffler Heat Shield (Right Rear Corner)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Rear Muffler Heat Shield Replacement (Right Rear Corner)

Callout	Component Name
WARNING: **Refer to Hot Exhaust System Warning .** **Preliminary Procedure** Unclip heat shield from fender liner.	
1	Heat Shield Retainer (Qty: 2) **CAUTION:** **Refer to Fastener Caution .** **Tighten** 1.5 N.m (13 lb in)
2	Heat Shield - Right Rear

DESCRIPTION AND OPERATION

EXHAUST SYSTEM DESCRIPTION

NOTE: 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 used 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:

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

The catalyst in the catalytic converter is not serviceable.

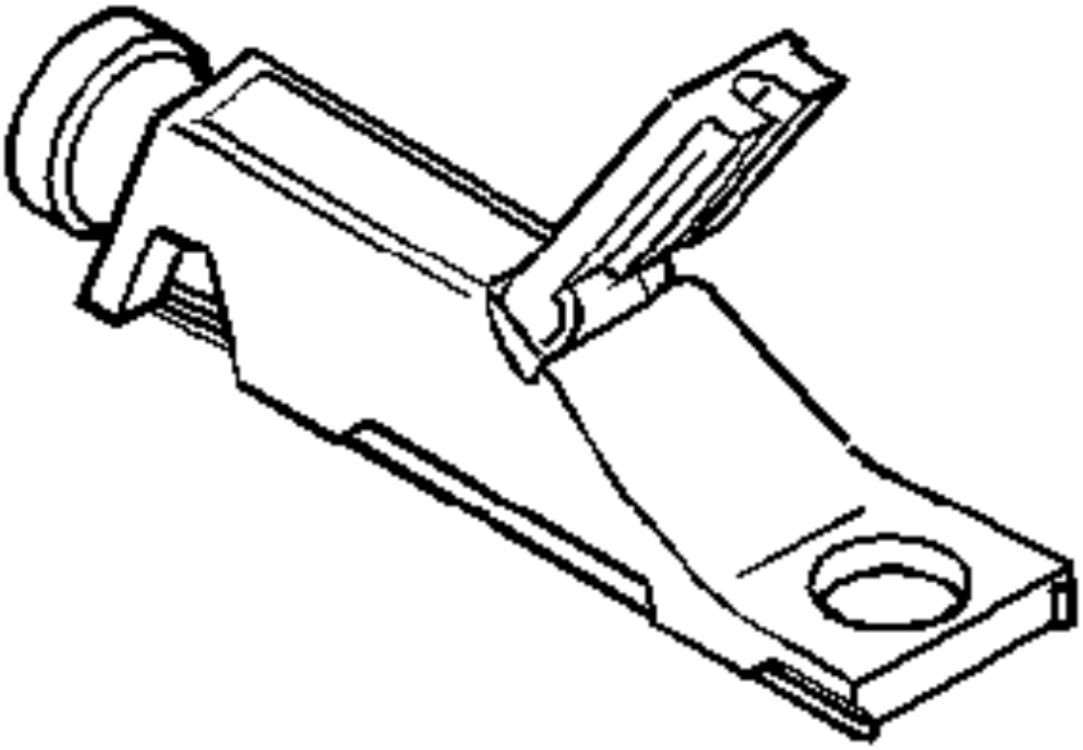
Muffler

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

engine.

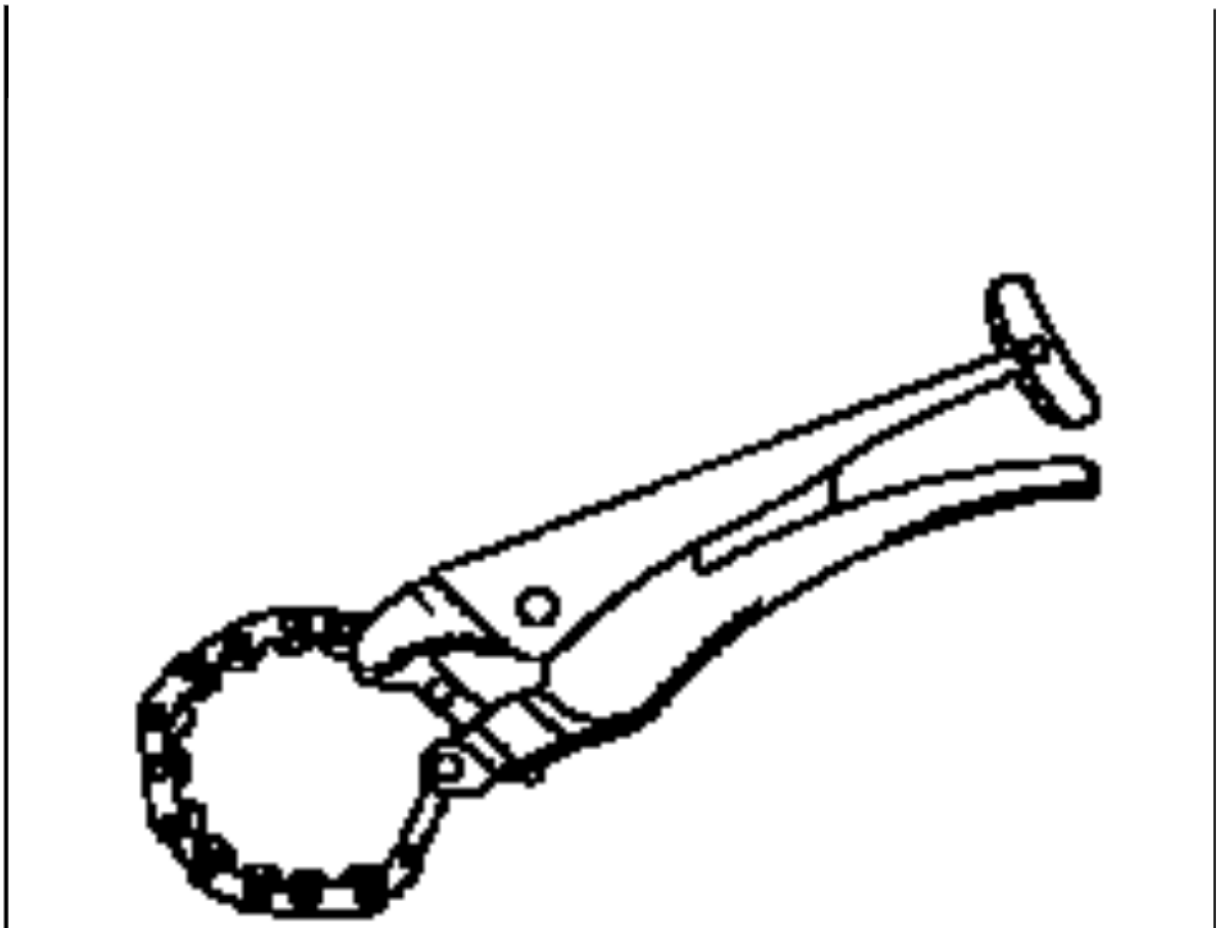
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Illustration	Tool Number/Desc
	EN-3531 J-35314- Exhaust B Pressure G

CH-617
KM-617
Heated Oxy
Sensor
Remover/Ins

CH-661
MKM-66
83 95 66



Chain-type Cutter