

Engine

Exhaust - CTS Sedan

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Catalytic Converter Brace (LTG)	22 N.m	16 lb ft
Catalytic Converter Brace Bracket (LFX)	22 N.m	16 lb ft
Catalytic Converter to Cylinder Head (LFX)	46 N.m	34 lb ft
Catalytic Converter Support Brace (LTG)	22 N.m	16 lb ft
Catalytic Converter to Turbocharger Fasteners (LTG)	50 N.m	37 lb ft
Exhaust Clamp (Torca) - Service	50 N.m	37 lb ft
Exhaust Manifold Brace (LTG)	25 N.m	18 lb ft
Exhaust Manifold Fasteners (LTG)		
First Pass	20 N.m	15 lb ft
Second Pass	20 N.m	15 lb ft
Final Pass	20 N.m	15 lb ft
Exhaust Manifold Heat Shield Fasteners (LTG)	14 N.m	10 lb ft
Exhaust Muffler to Catalytic Converter (LFX,LTG)	50 N.m	37 lb ft
Exhaust Pipe Rear Hanger Bracket Fasteners	40 N.m	30 lb ft
Floor Panel Cross Bar Fasteners	22 N.m	16 lb ft
Front Axle Propeller Shaft Heat Shield	9 N.m	80 lb in
Front Body Exhaust Heat Shield Fasteners	9 N.m	80 lb in
Intermediate Body Exhaust Heat Shield Fasteners	9 N.m	80 lb in
Rear Body Exhaust Heat Shield to Body Fasteners	9 N.m	80 lb in
Rear Body Exhaust Heat Shield to Fascia Fasteners	3 N.m	26 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

Diagnostic Aids

WARNING: Refer to **Exhaust Service 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.

NOTE: This will not apply if the dual exhaust is equipped with an "H" pipe or similar configuration in which the exhaust flow would be equalized.

Test Description

The numbers below refer to the step numbers on the diagnostic table.

4

The exhaust system has very low back pressure under normal conditions. If the exhaust system is restricted, a significant increase in the exhaust pressure is noticed on the **J-35314-A** Exhaust Back Pressure Gauge.

Removing the AIR check valve or 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 secondary air injection (AIR) check valve or the heated oxygen sensor (HO2S) that is in front of and closest to the catalytic converter. Refer to the affected component's service procedure. 2. Install the J-35314-A Exhaust Back Pressure Gauge in place of the AIR check valve or HO2S sensor. 3. Start the engine. 4. Increase and monitor the engine speed at 2,000 RPM. 5. Observe the exhaust system back pressure reading on the gauge.	14 kPa (2 psi)		
	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 Exhaust Back Pressure Gauge. 3. Re-install the AIR check valve/HO2S sensor. Refer to the affected component's service procedure. 4. Remove the post-catalyst HO2S sensor. Refer to the affected component's service procedure. 5. Install the J-35314-A Exhaust Back Pressure Gauge in place of the post HO2S sensor. 6. Start the engine. 7. Increase and monitor the engine speed at 2,000 RPM.	14 kPa (2 psi)		

	8. Observe the exhaust system back pressure reading on the gauge.			
	Does the reading exceed the specified value?		Go to Step 6	Go to Step 7
6	Inspect the exhaust system for the following conditions: • Damage in the exhaust pipe • Debris in the exhaust pipe • Muffler or resonator internal failure • Two-layer exhaust pipe separation	-		-
	Did you find and correct the condition?		Go to Step 8	
7	Replace the catalytic converter. Refer to the affected component's service procedure. Did you find and correct the condition?	-	Go to Step 8	-
8	1. Remove the J-35314-A Exhaust Back Pressure Gauge. 2. Reinstall the AIR check valve or the post-catalyst HO2S sensor. Refer to the affected component's service procedure 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

Problem	Action
WARNING: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.	
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 <u>Fastener Tightening Specifications</u> .
Seals or gaskets leaking • Exhaust manifold to cylinder head • Exhaust pipes to exhaust manifold • Catalytic converter connection • EGR connections • AIR connections to the exhaust manifold or cylinder head	Replace the leaking seal or gasket. Refer to the affected components procedure for service.
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 the affected component's procedure for service.
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. Refer to the affected component's procedure for service.

EXHAUST NOISE

Exhaust Noise

Condition	Action
WARNING: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.	
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 <u>Exhaust Leakage</u> .
Loud exhaust	1. Compare to a known good vehicle. 2. Inspect for a damaged or failed muffler. 3. Repair or replace the affected component. Refer to the affected component's service procedure.

External rattle or vibration noise	1. Inspect for a bent or loose hanger, loose heat shield, or loose clamp. 2. Inspect for an 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. Repair or replace the affected component. Refer to the affected component's service procedure.

REPAIR INSTRUCTIONS

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. Refer to Exhaust Manifold Brace Replacement (LTG).

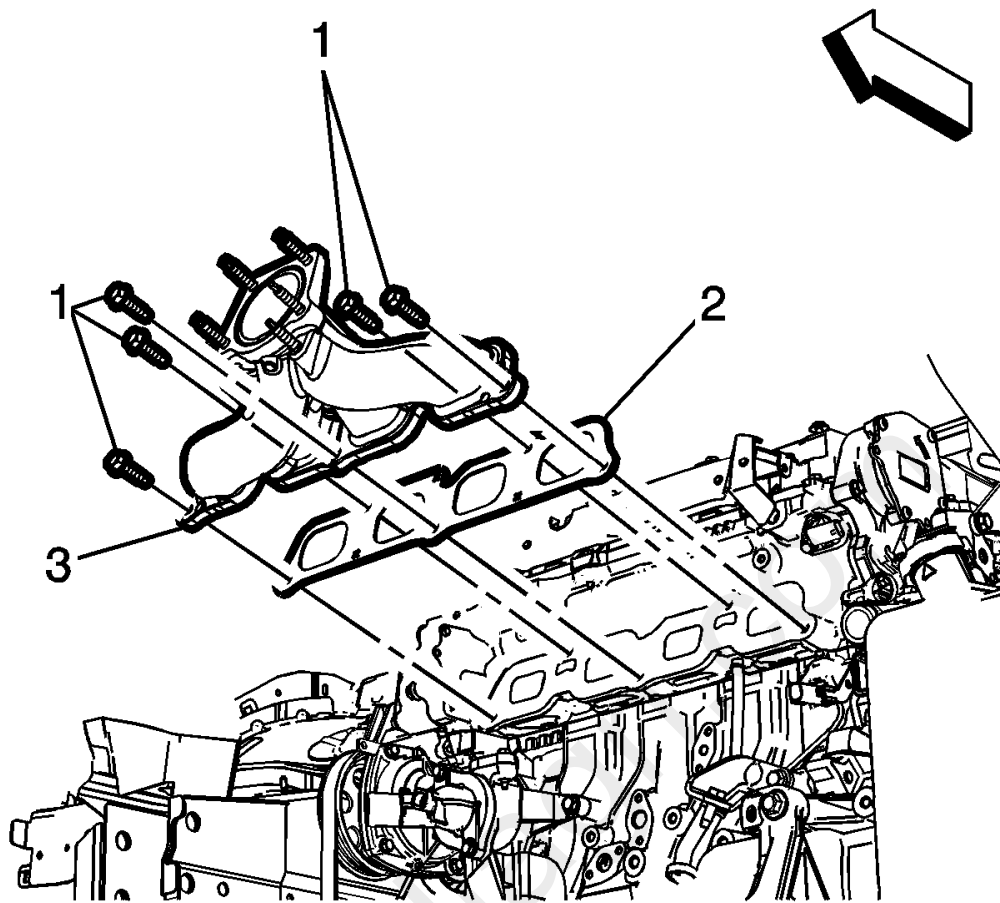


Fig. 1: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

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.

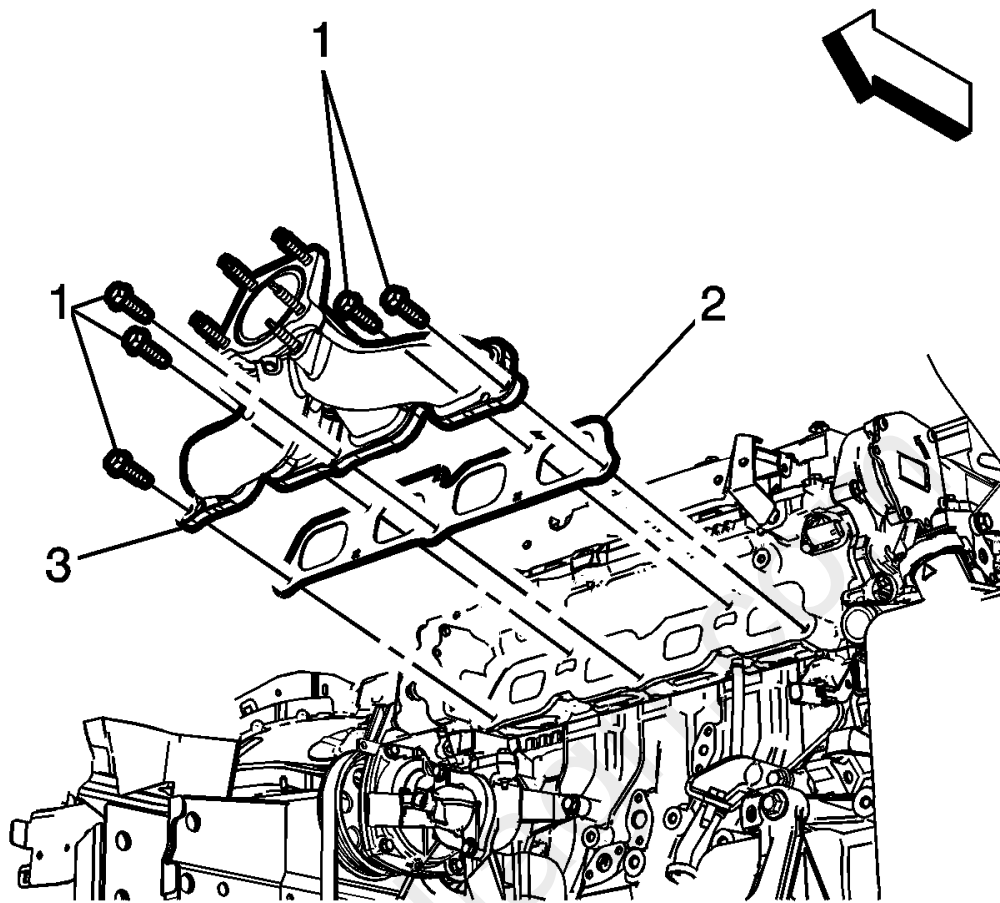


Fig. 2: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

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.

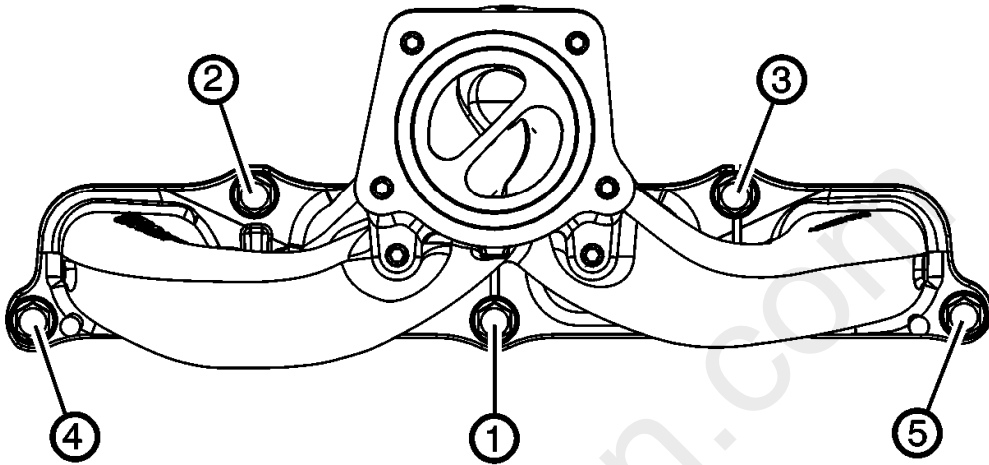


Fig. 3: Cylinder Head Retaining Bolts
Courtesy of GENERAL MOTORS COMPANY

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. Refer to Exhaust Manifold Brace Replacement (LTG).
6. Install the turbocharger. Refer to Turbocharger Replacement .
7. Install the exhaust manifold heat shield. Refer to Exhaust Manifold Heat Shield Replacement (LTG).

EXHAUST MANIFOLD BRACE REPLACEMENT (LTG)

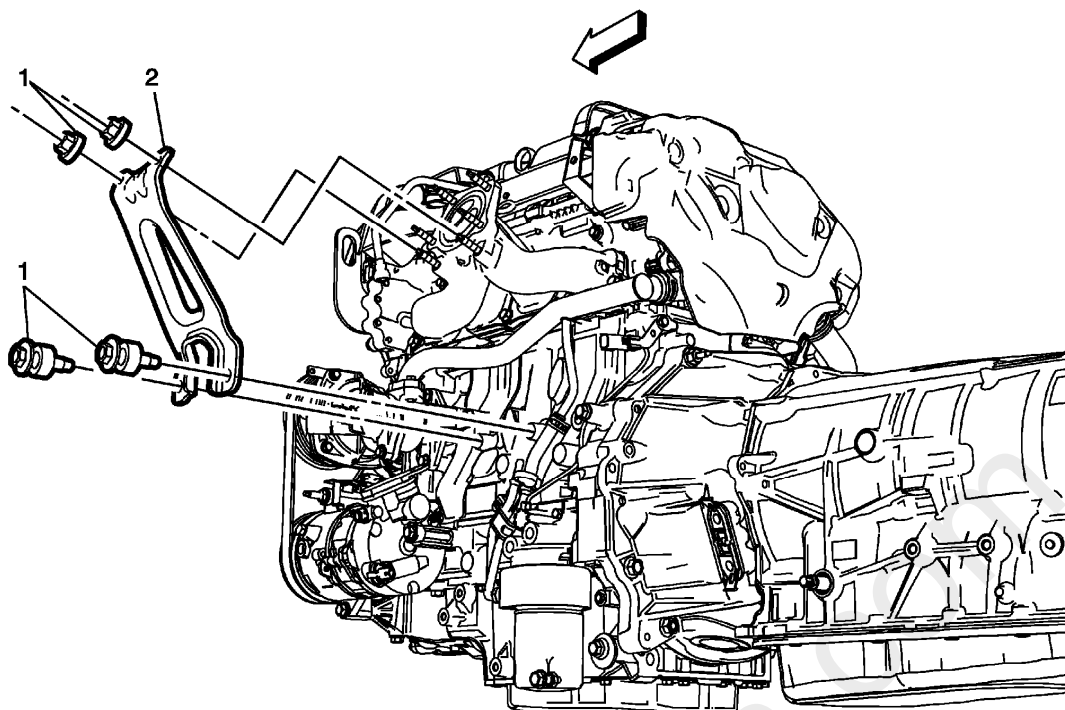


Fig. 4: Exhaust Manifold Brace (LTG)
 Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Brace Replacement (LTG)

Callout	Component Name
WARNING: Refer to <u>Hot Exhaust System Warning</u> .	
Preliminary Procedure Remove the turbocharger. Refer to <u>Turbocharger Replacement</u> .	
1	Exhaust Manifold Brace Fasteners (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 25 (18 lb ft)
2	Exhaust Manifold Brace

EXHAUST SYSTEM REPLACEMENT (LF3)

Removal Procedure

WARNING: In order to avoid being burned, do not service the exhaust system while it

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

WARNING: Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Remove the rear bumper fascia. Refer to Rear Bumper Fascia Replacement .
2. Remove the catalytic converters. Refer to Catalytic Converter Replacement - Left Side (LF3), Catalytic Converter Replacement - Right Side (LF3).

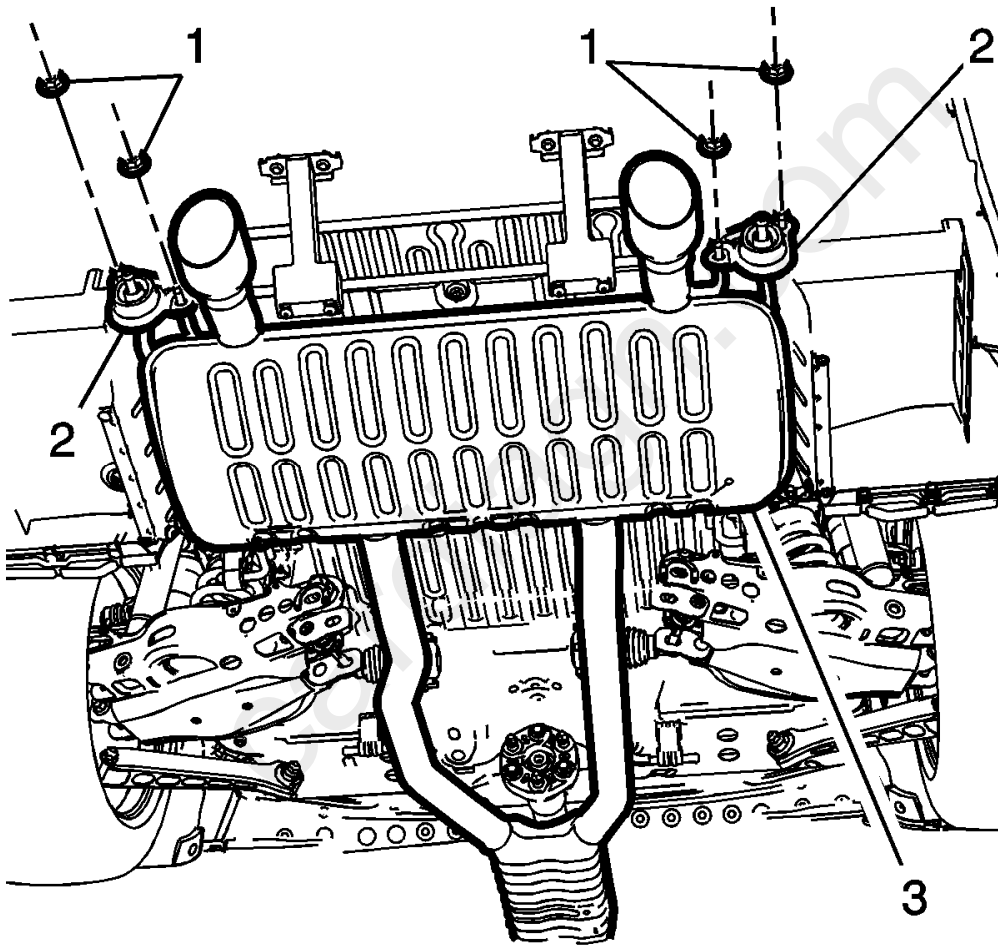


Fig. 5: Rear Exhaust Isolator Bracket Fasteners
Courtesy of GENERAL MOTORS COMPANY

3. Remove the rear exhaust isolator bracket fasteners (1) and remove the exhaust muffler (3) with the exhaust isolators (2).

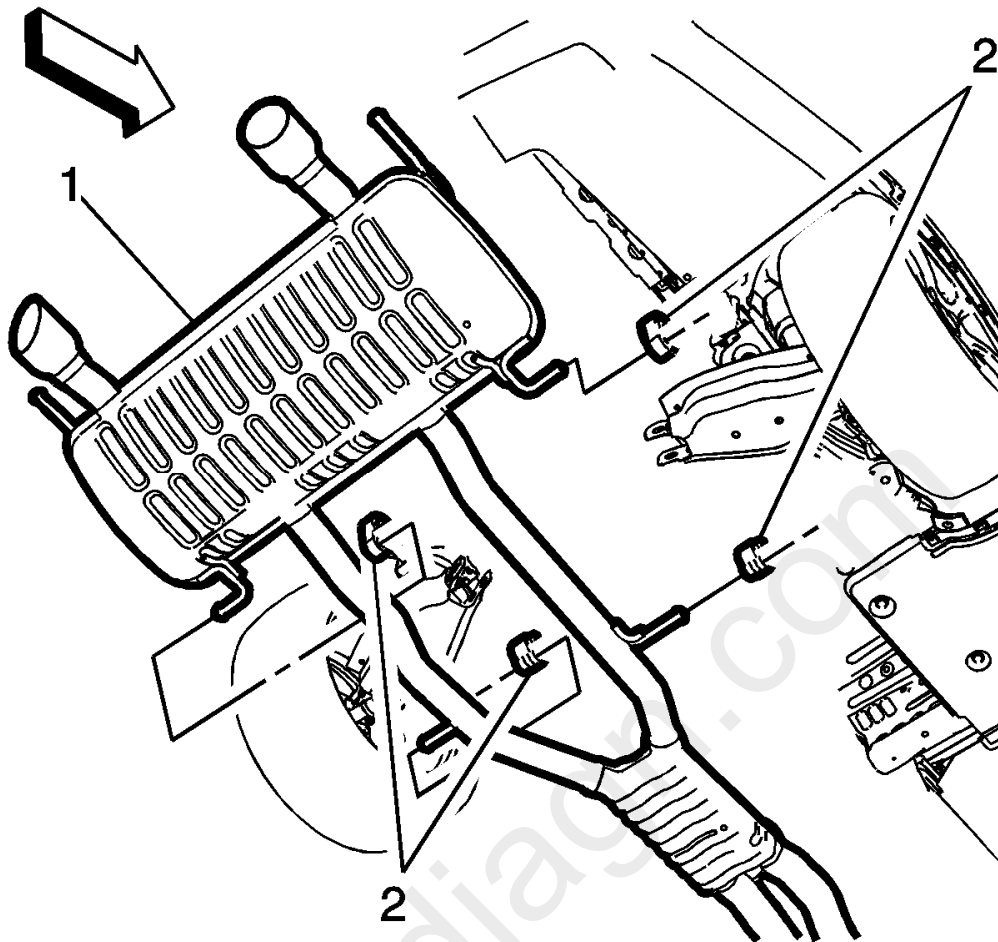


Fig. 6: Exhaust Muffler
Courtesy of GENERAL MOTORS COMPANY

4. Disengage the exhaust muffler (1) from the exhaust isolators (2) by pulling the exhaust system forward.

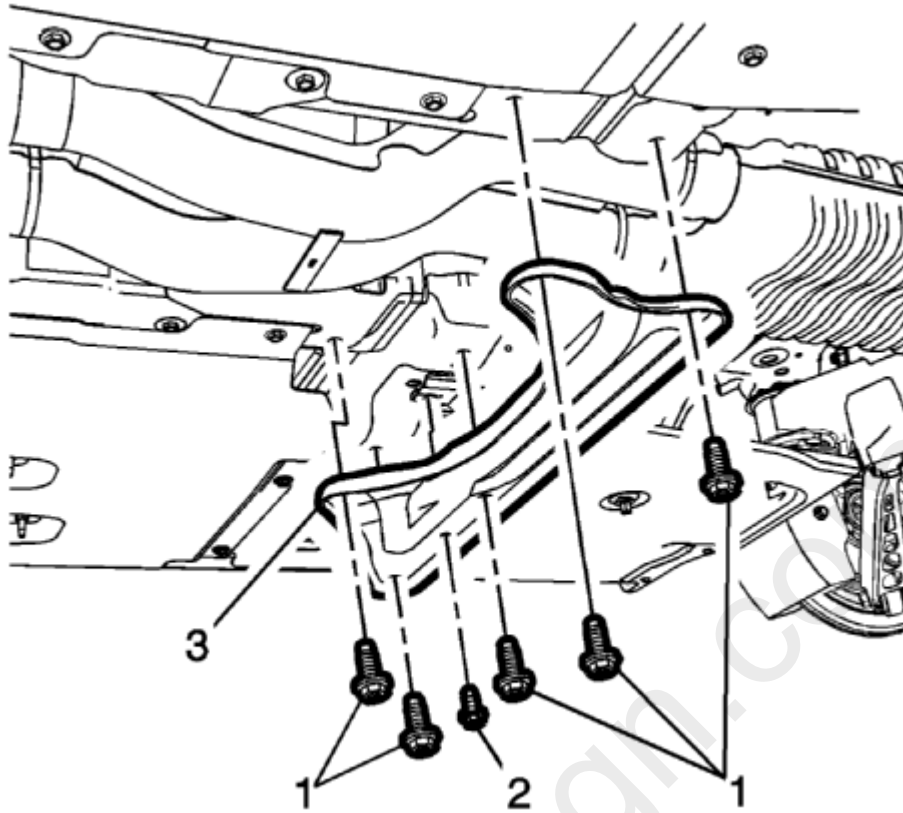


Fig. 7: Floor Panel Cross Bar

Courtesy of GENERAL MOTORS COMPANY

5. Remove the floor panel reinforcement cross bar fasteners (1),(2) and remove the floor panel cross bar (3).

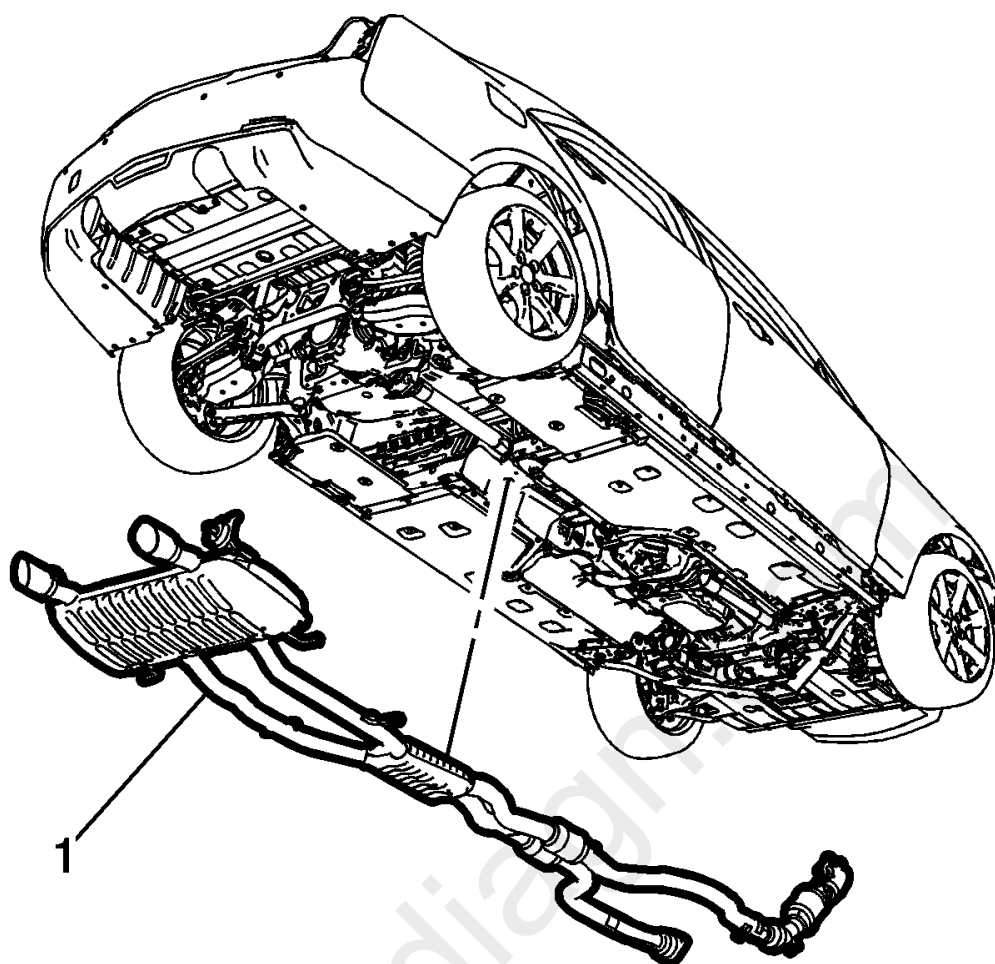


Fig. 8: Exhaust Muffler System
Courtesy of GENERAL MOTORS COMPANY

6. With the help of a second technician, lower the exhaust muffler system (1) to the floor.

Installation Procedure

1. Clean and lubricate the exhaust rods for ease of installation.

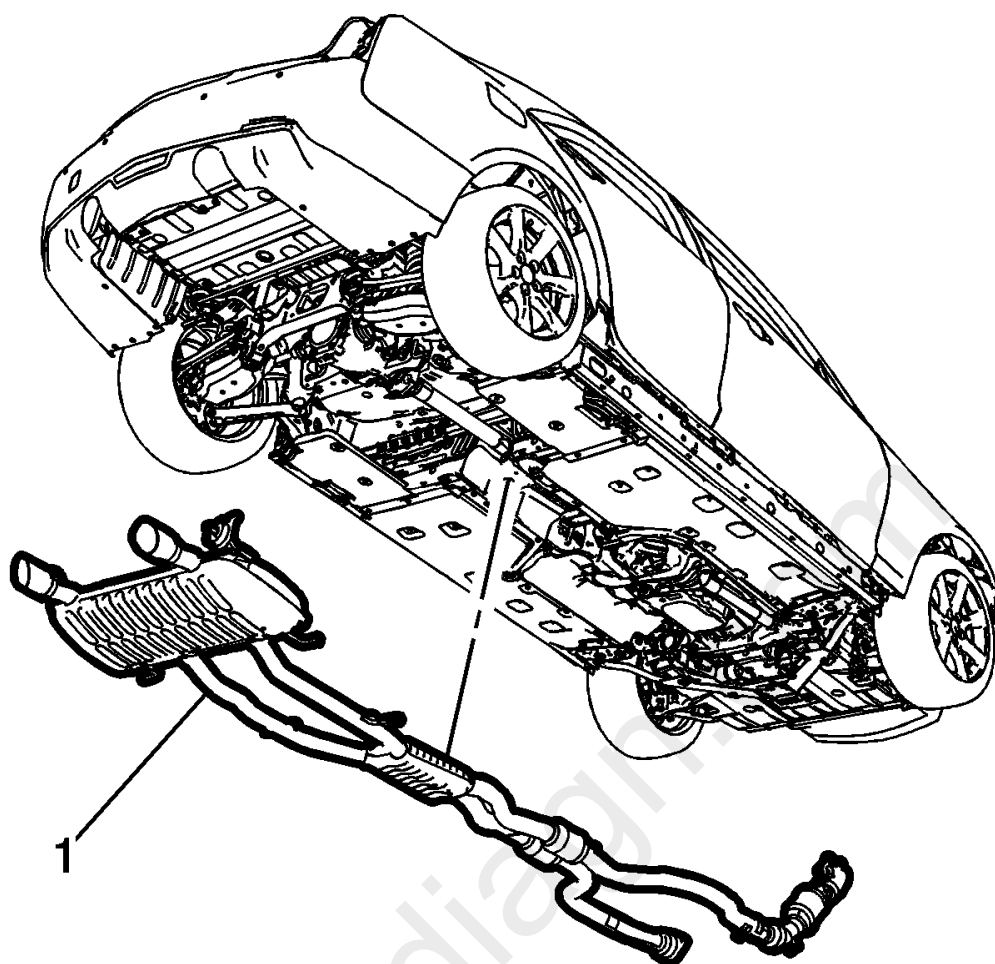


Fig. 9: Exhaust Muffler System
Courtesy of GENERAL MOTORS COMPANY

2. With the help of a second technician, raise the exhaust muffler system (1) into position.

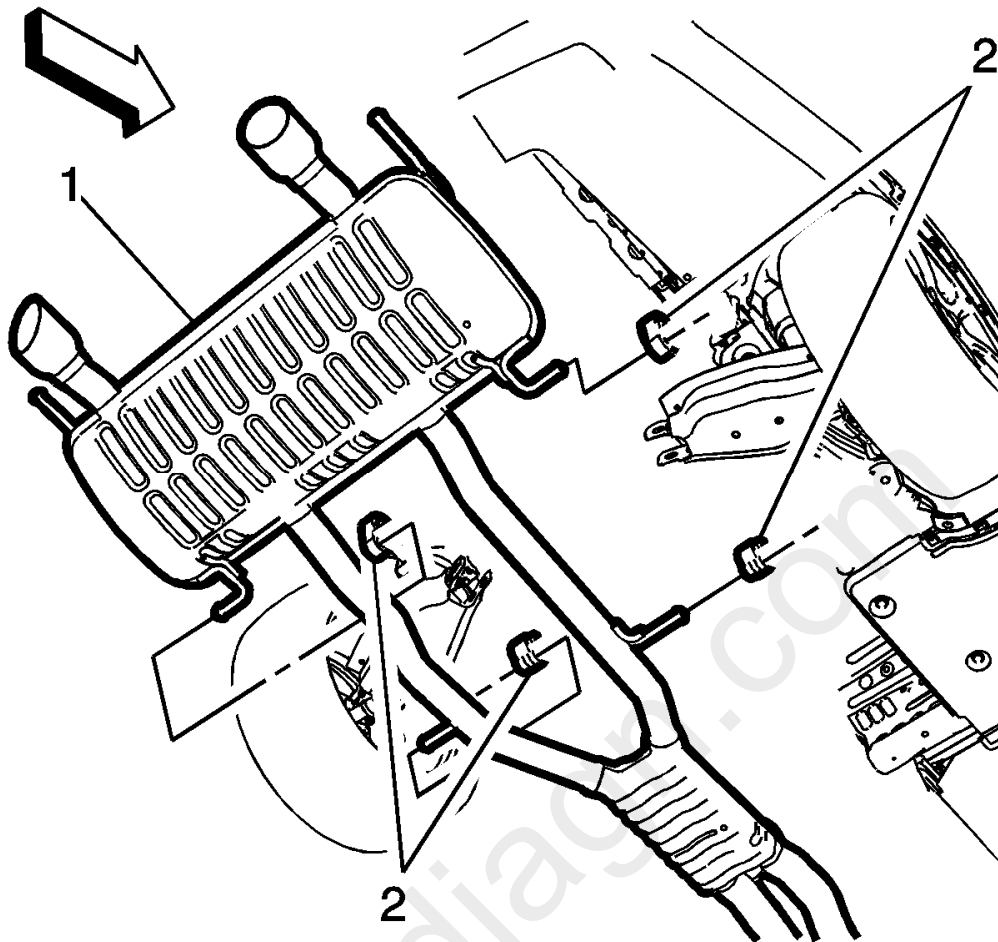


Fig. 10: Exhaust Muffler
Courtesy of GENERAL MOTORS COMPANY

3. Install the rear exhaust muffler (1) into the exhaust isolators (2).

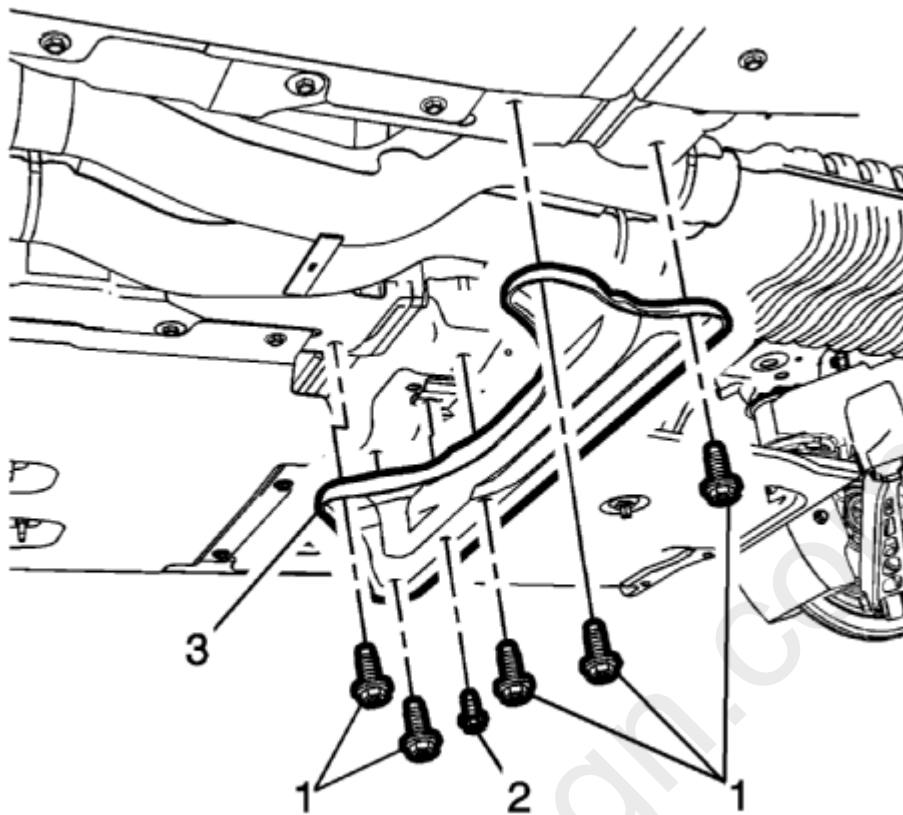


Fig. 11: Floor Panel Cross Bar

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

4. Install the floor panel reinforcement cross bar (3) and tighten the four fasteners (1) to 22 (16 lb ft) and the remaining fastener (2) to 9 (80 lb in).

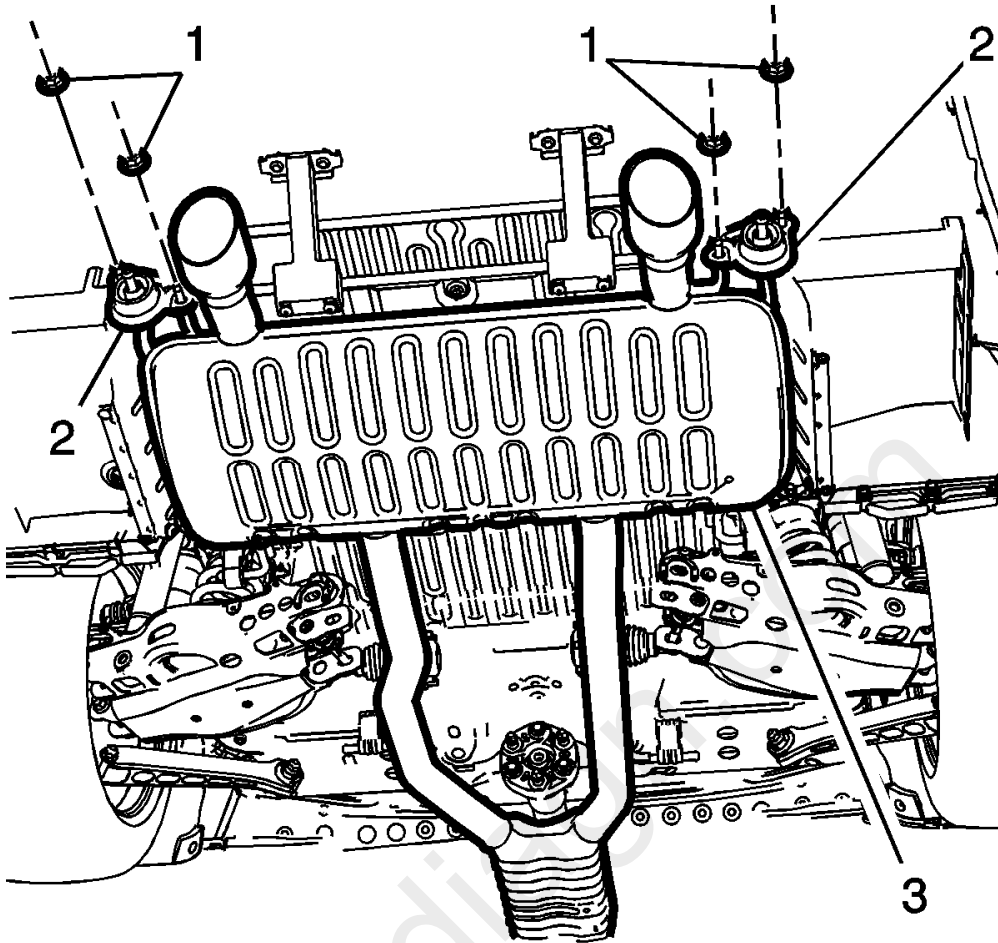


Fig. 12: Rear Exhaust Isolator Bracket Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Install the rear exhaust isolator brackets (2) to the frame and tighten the fasteners (1) to 40 (30 lb ft).
6. Install the catalytic converters. Refer to Catalytic Converter Replacement - Left Side (LF3), and Catalytic Converter Replacement - Right Side (LF3).
7. Install the rear bumper fascia. Refer to Rear Bumper Fascia Replacement.

EXHAUST SYSTEM REPLACEMENT (LFX)

Removal Procedure

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

WARNING: Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Remove the intake manifold cover. Refer to **Intake Manifold Cover Replacement (LFX)** .
2. Remove the secondary air injection bypass valve bank 1. Refer to **Secondary Air Injection Bypass Valve Replacement - Bank 1** .
3. Disconnect the heated oxygen sensor - bank 1 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LFX)** .
4. Disconnect the heated oxygen sensor - bank 1 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LFX)** .

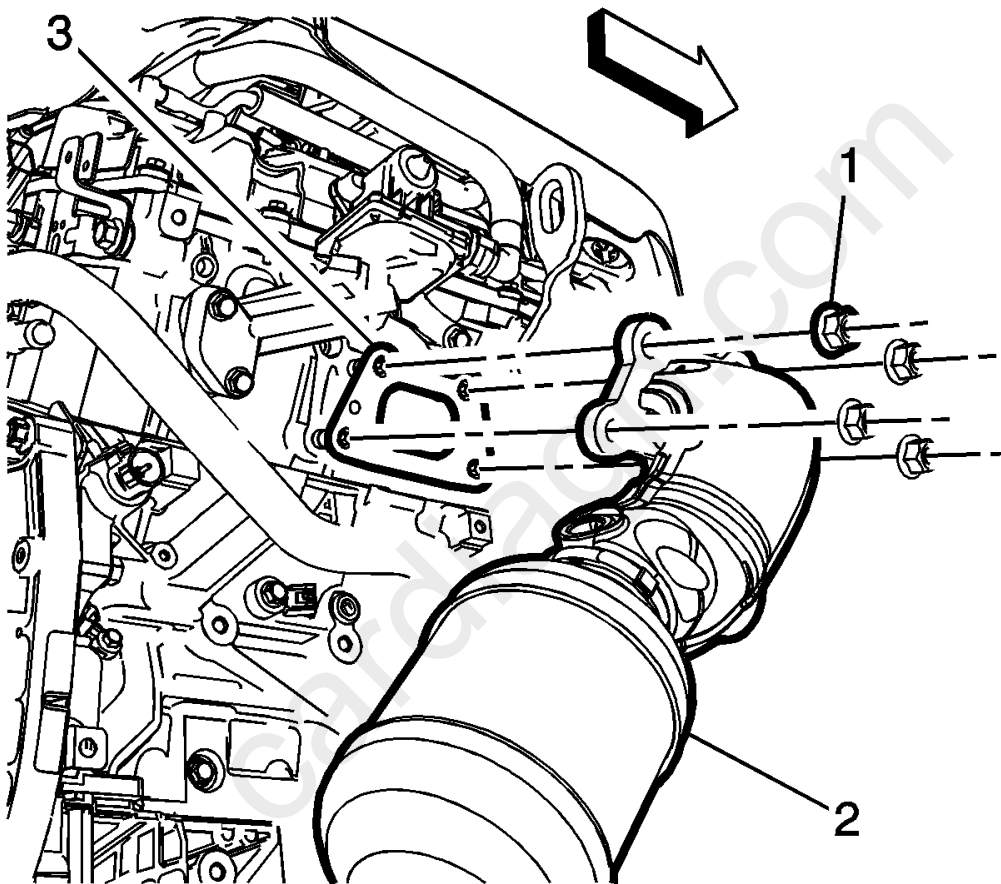


Fig. 13: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

NOTE: The exhaust muffler can be removed with the right catalytic converter attached for servicing components that need the exhaust muffler removed. The Torca clamp attached to the right catalytic converter is a one time used clamp. The welded on clamp bracket has to be cut off and replaced with a NEW service clamp. Refer to right catalytic converter replacement procedure.

5. Remove the right catalytic converter fasteners (1) and remove the right catalytic converter from the cylinder head.
6. Discard the exhaust gasket (3).
7. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
8. Remove the rear bumper fascia. Refer to Rear Bumper Fascia Replacement .

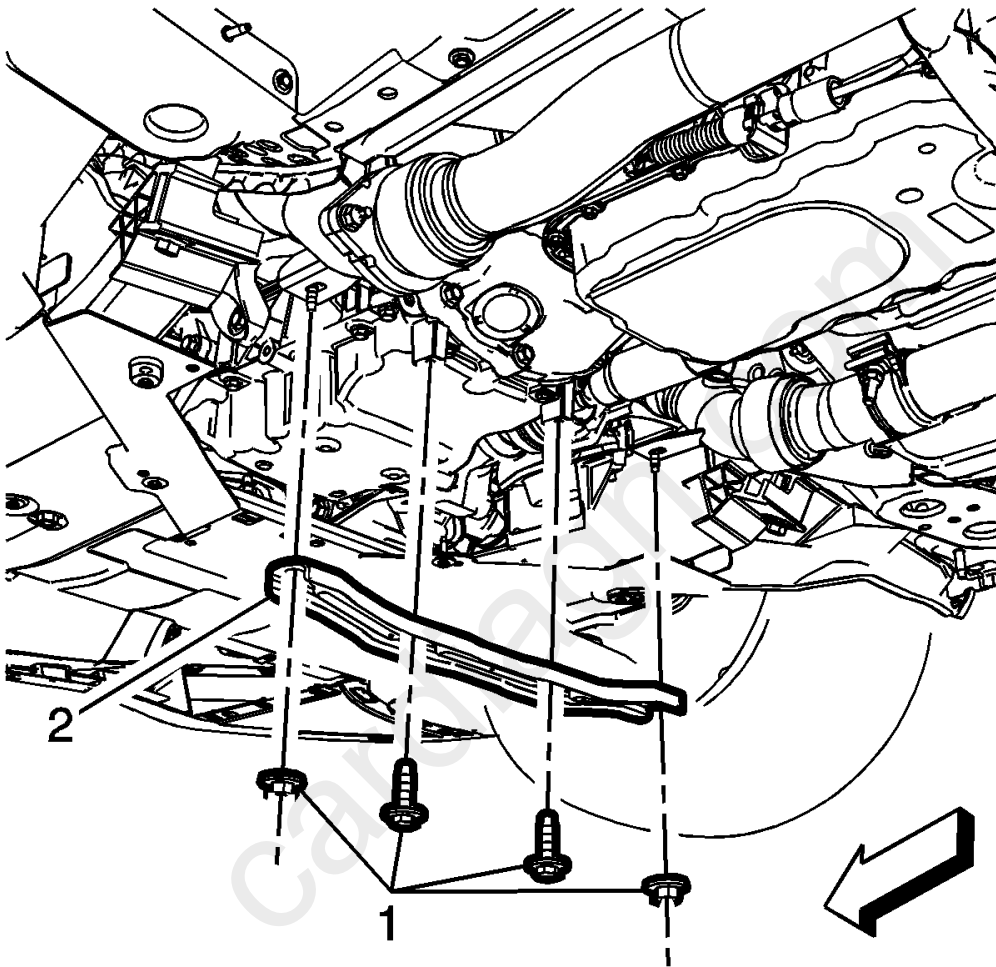


Fig. 14: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

9. Remove the catalytic converter brace bracket fasteners (1) and remove the catalytic converter brace bracket (2).

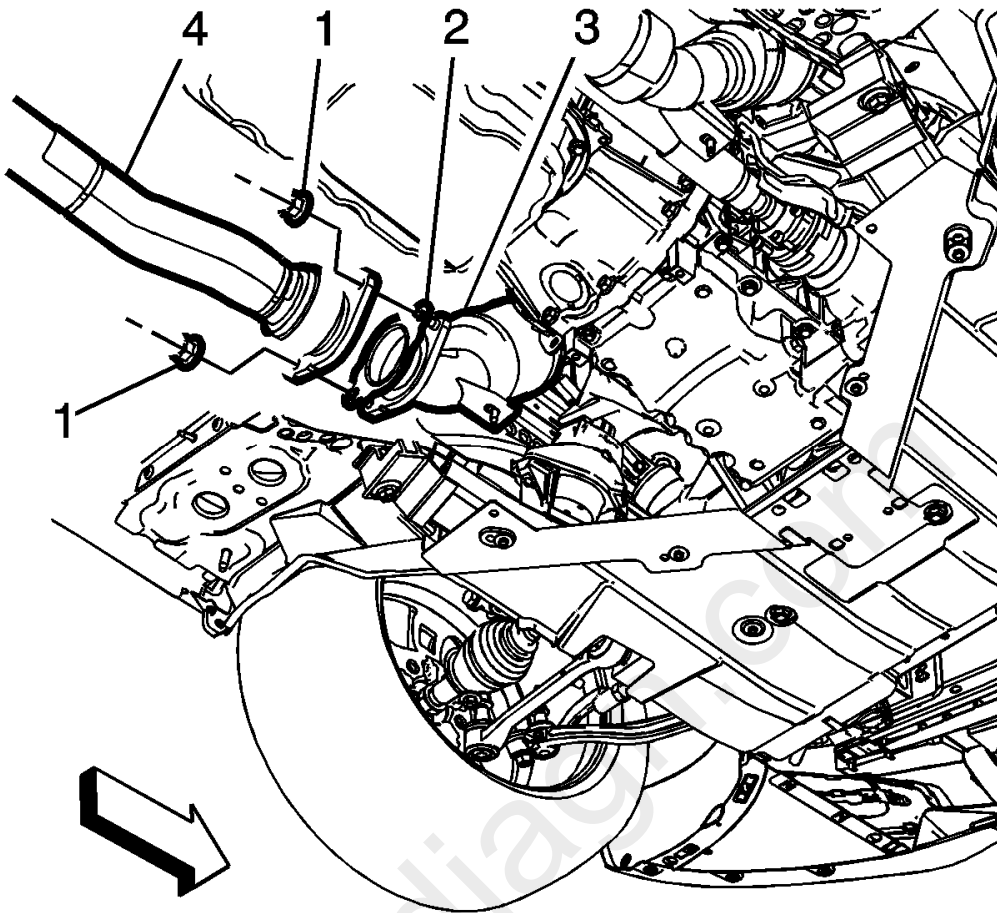


Fig. 15: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

10. Remove the left catalytic converter fasteners (1) and remove the exhaust muffler (4) from the left catalytic converter (3).
11. Discard the exhaust gasket (2).

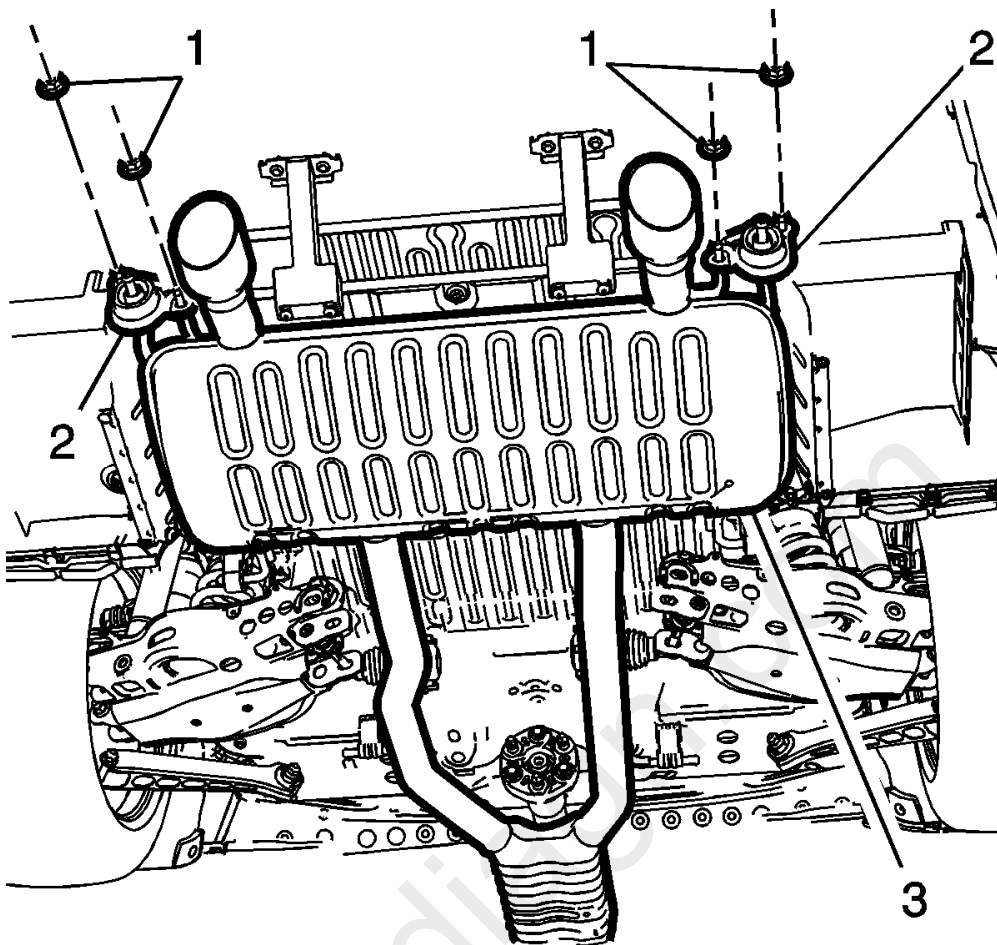


Fig. 16: Rear Exhaust Isolator Bracket Fasteners
Courtesy of GENERAL MOTORS COMPANY

12. Remove the rear exhaust isolator bracket fasteners (1) and remove the exhaust muffler (3) with the exhaust isolators (2).

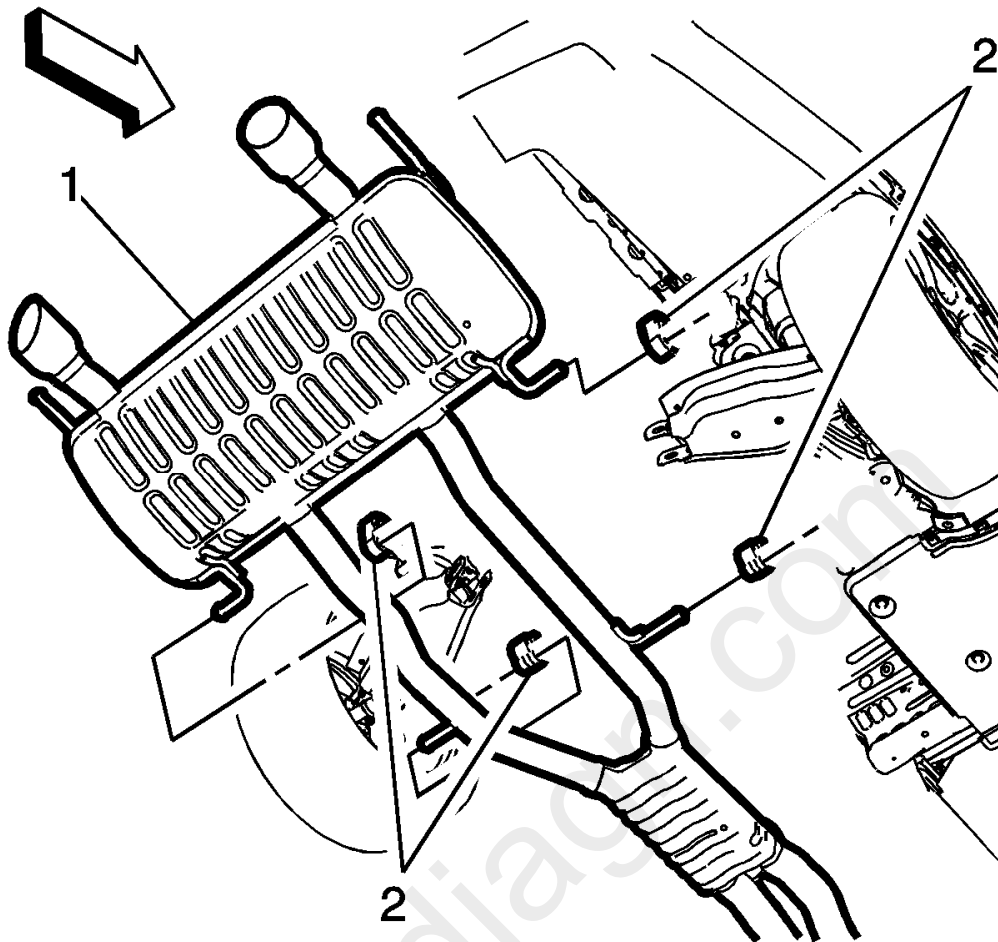


Fig. 17: Exhaust Muffler
Courtesy of GENERAL MOTORS COMPANY

13. Disengage the exhaust muffler (1) from the exhaust isolators (2) by pulling the exhaust system forward.

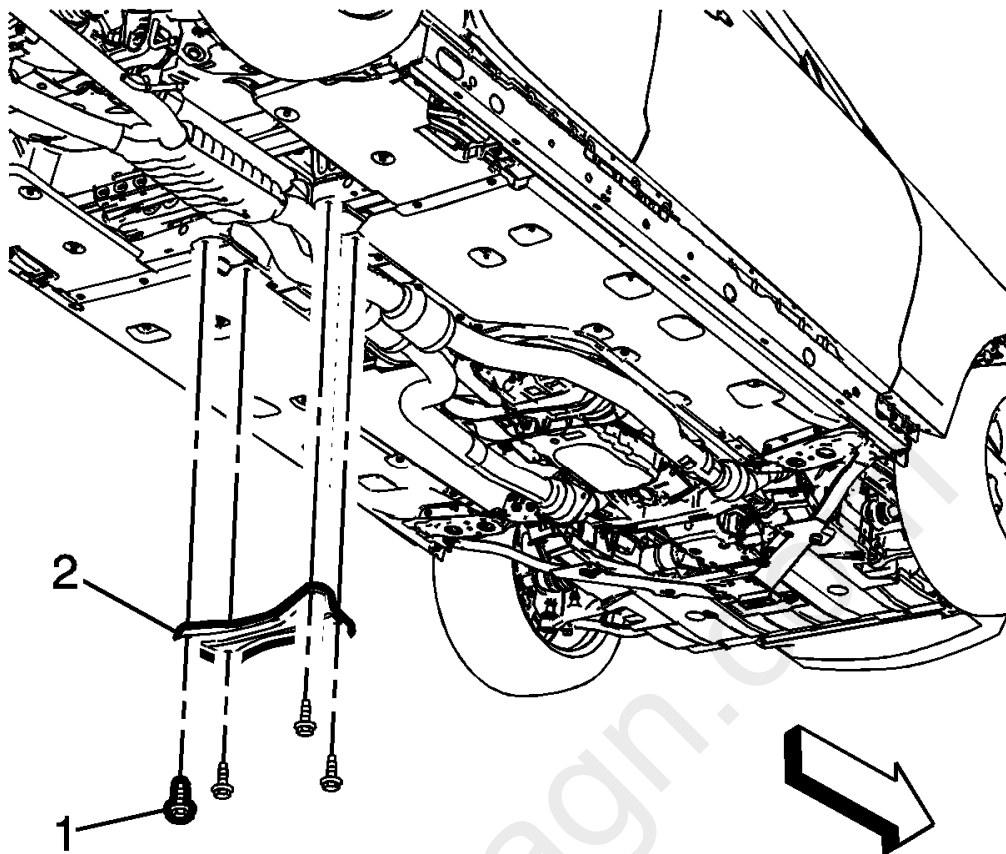


Fig. 18: Floor Panel Cross Bar
Courtesy of GENERAL MOTORS COMPANY

14. Remove the floor panel cross bar fasteners (1) and remove the floor panel cross bar (2).

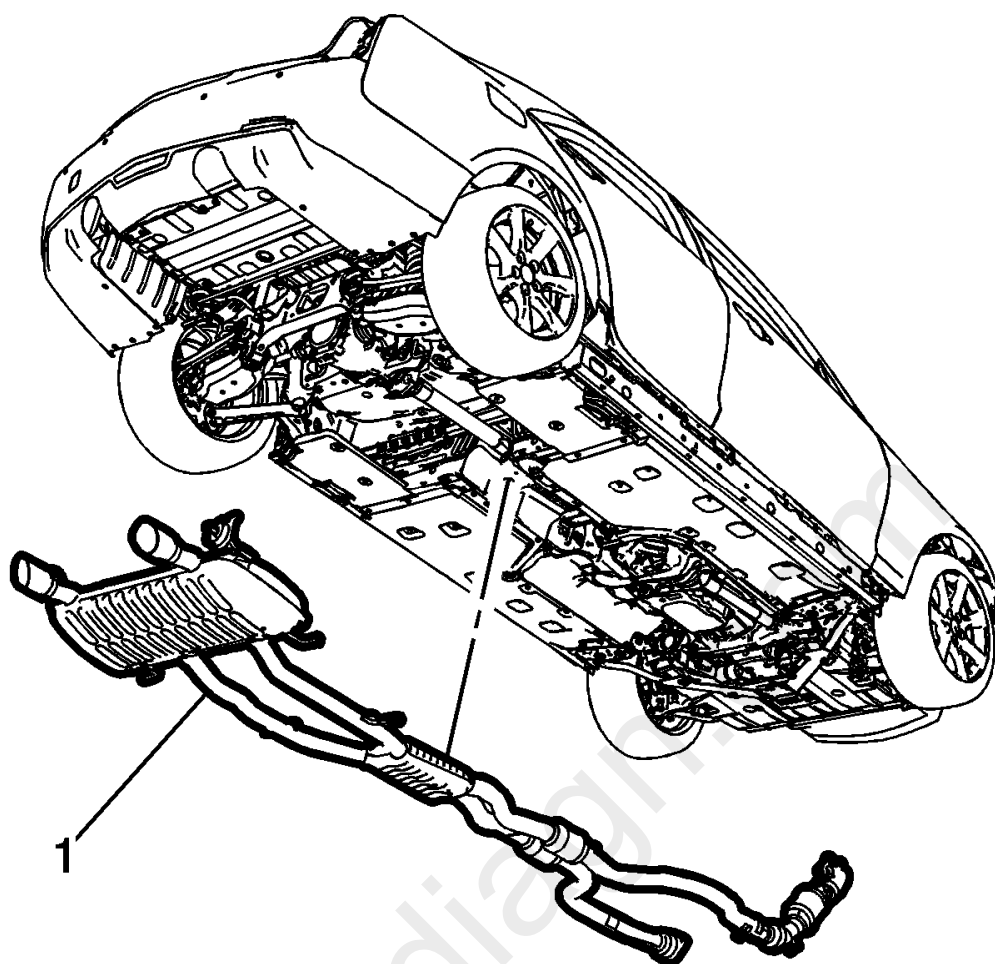


Fig. 19: Exhaust Muffler System
Courtesy of GENERAL MOTORS COMPANY

NOTE: The aid of a second technician is required.

15. With the help of a second technician, lower the exhaust muffler system (1) to the floor.

Installation Procedure

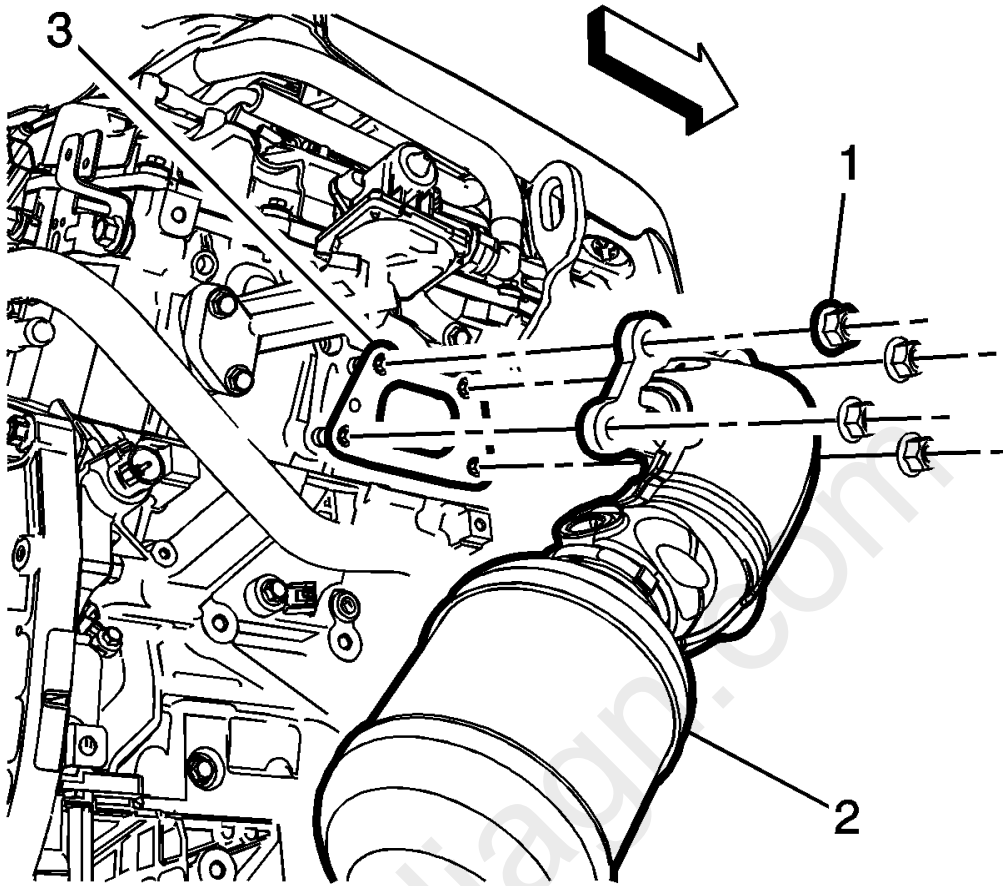


Fig. 20: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

NOTE: Clean and lubricate the exhaust rods for ease of installation.

1. With the help of a second technician, install the right catalytic converter (2) to the cylinder head with a NEW gasket (3) and loosely tighten the fasteners (1).

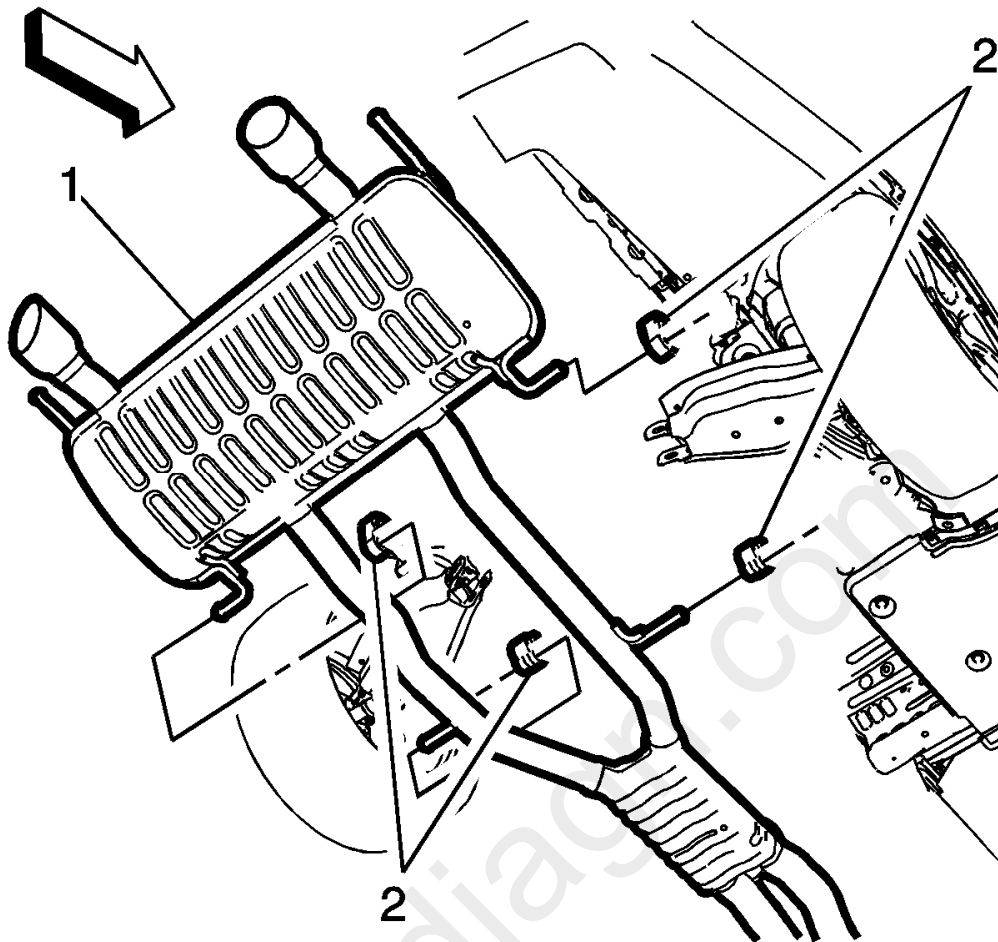


Fig. 21: Exhaust Muffler
Courtesy of GENERAL MOTORS COMPANY

2. Install the rear exhaust muffler (1) into the exhaust isolators (2).

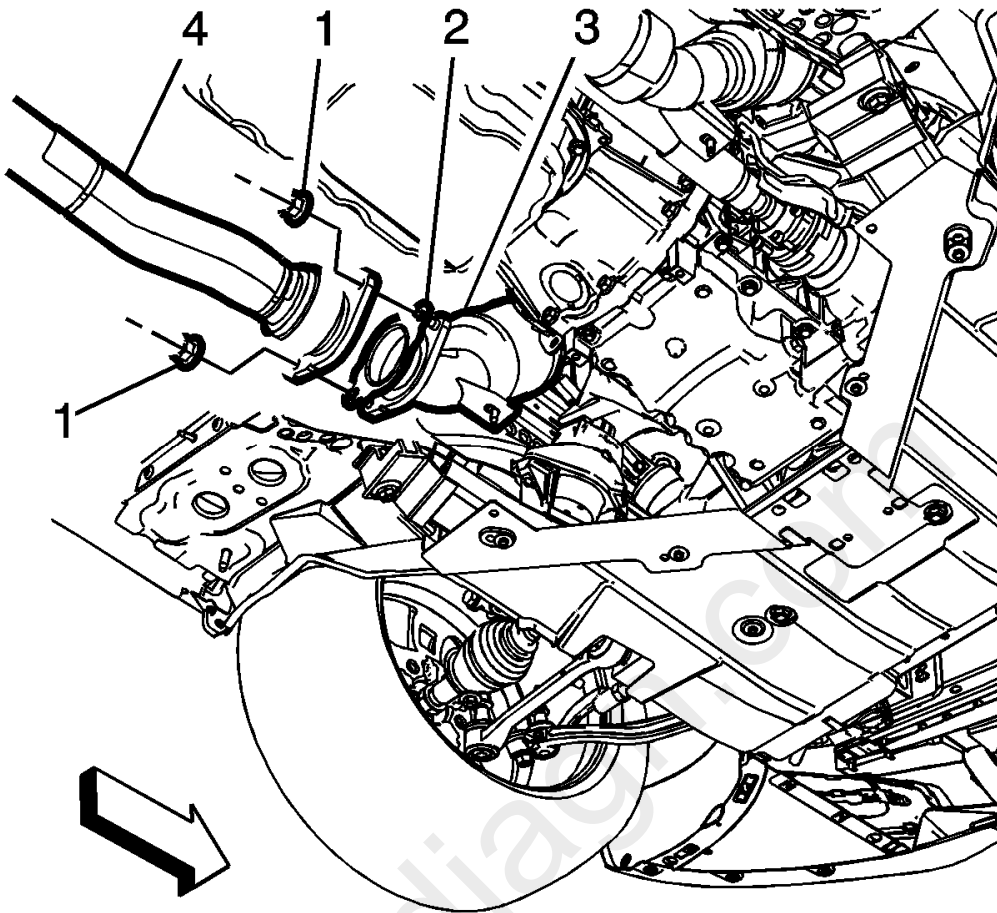


Fig. 22: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the exhaust muffler (4) to the left catalytic converter (3) with a NEW gasket (2). Tighten the fasteners (1) to 50 (37 lb ft).

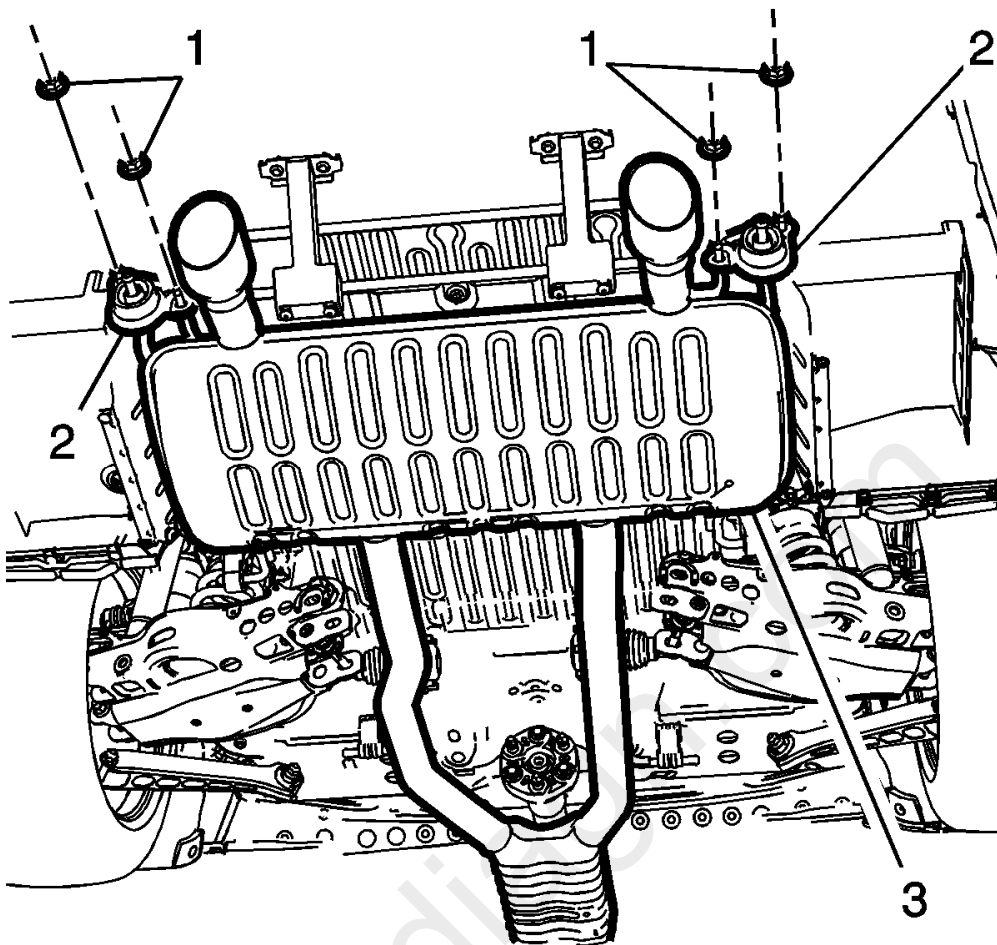


Fig. 23: Rear Exhaust Isolator Bracket Fasteners
Courtesy of GENERAL MOTORS COMPANY

4. Install the rear exhaust isolator brackets (2) to the frame and tighten the fasteners (1) to 40 (30 lb ft).

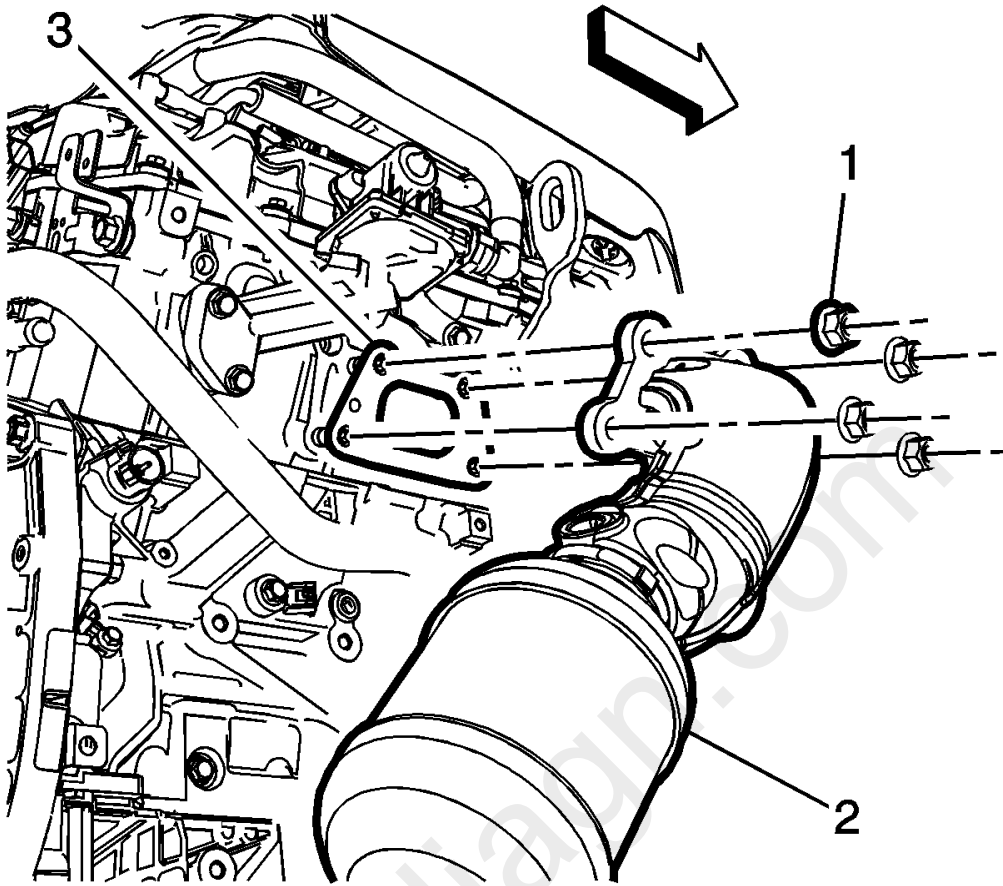


Fig. 24: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

5. Tighten the right catalytic converter fasteners (1) to 46 (34 lb ft).

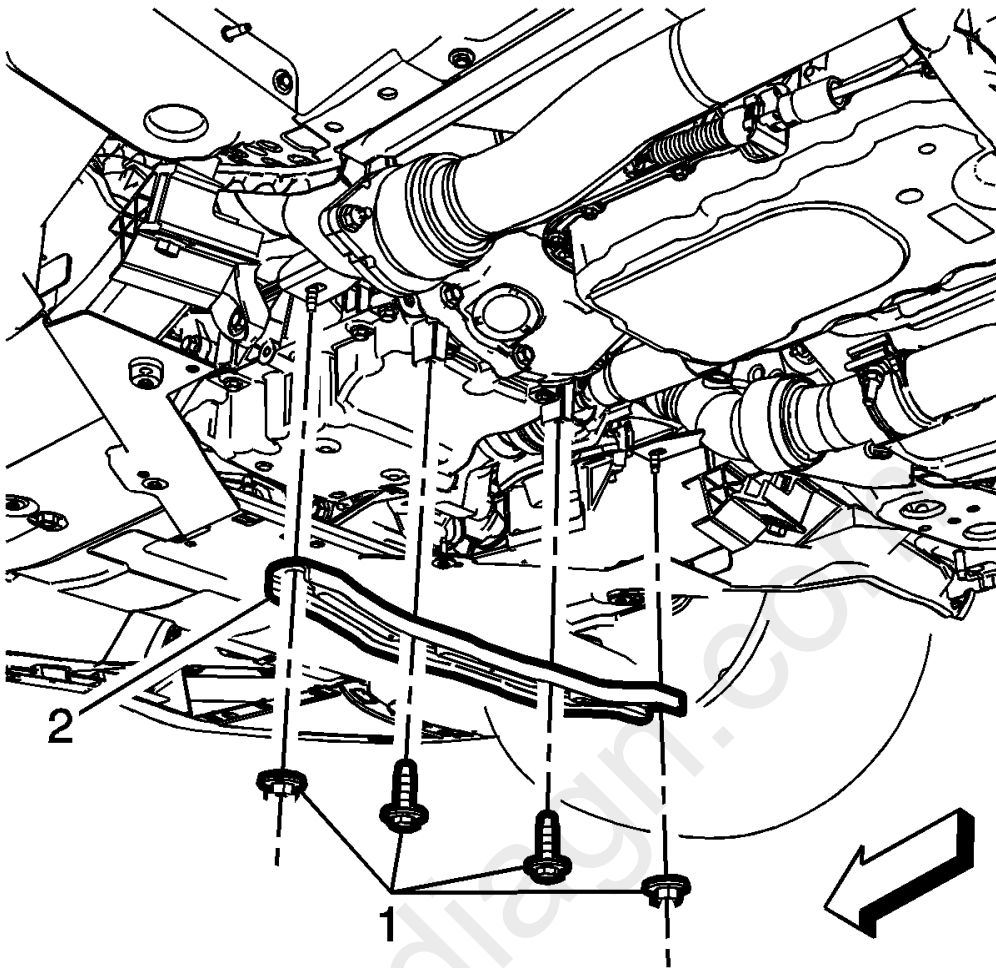


Fig. 25: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

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

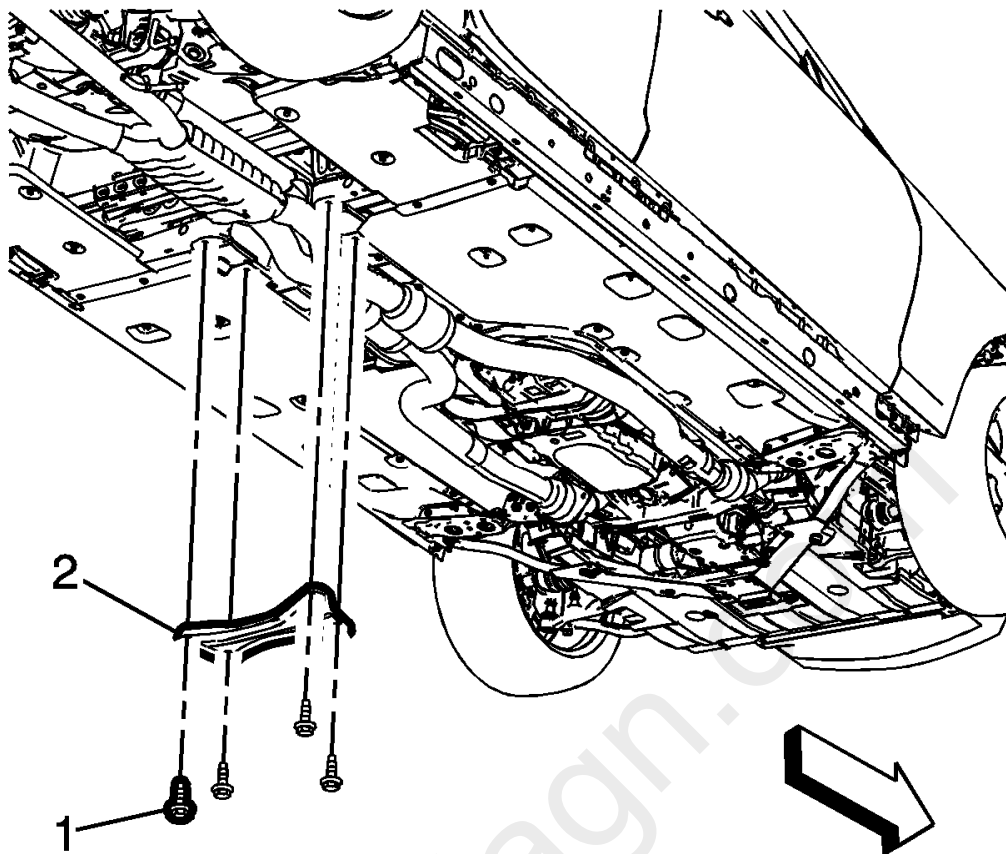


Fig. 26: Floor Panel Cross Bar
 Courtesy of GENERAL MOTORS COMPANY

7. Install the floor panel cross bar (2) and tighten the fasteners (1) to 22 (16 lb ft).
8. Install the rear bumper fascia. Refer to **Rear Bumper Fascia Replacement** .
9. Connect the heated oxygen sensor - bank 1 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LFX)** .
10. Connect the heated oxygen sensor - bank 1 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LFX)** .
11. Install the secondary air injection bypass valve bank 1. Refer to **Secondary Air Injection Bypass Valve Replacement - Bank 1** .
12. Install the intake manifold cover. Refer to **Intake Manifold Cover Replacement (LFX)** .

CATALYTIC CONVERTER REPLACEMENT (LTG)

Removal Procedure

WARNING: Refer to **Moving Parts and Hot Surfaces Warning** .

WARNING: Refer to Safety Glasses Warning .

1. Remove the intake manifold cover. Refer to Intake Manifold Cover Replacement .
2. Remove the fuel pump insulator. Refer to Fuel Pump Insulator Replacement (Inner) , Fuel Pump Insulator Replacement (Outer) .
3. Disconnect the heated oxygen sensor - 1.
4. Remove the turbocharger heat shield. Refer to Turbocharger Heat Shield Replacement .
5. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
6. Disconnect the heated oxygen sensor - 2.

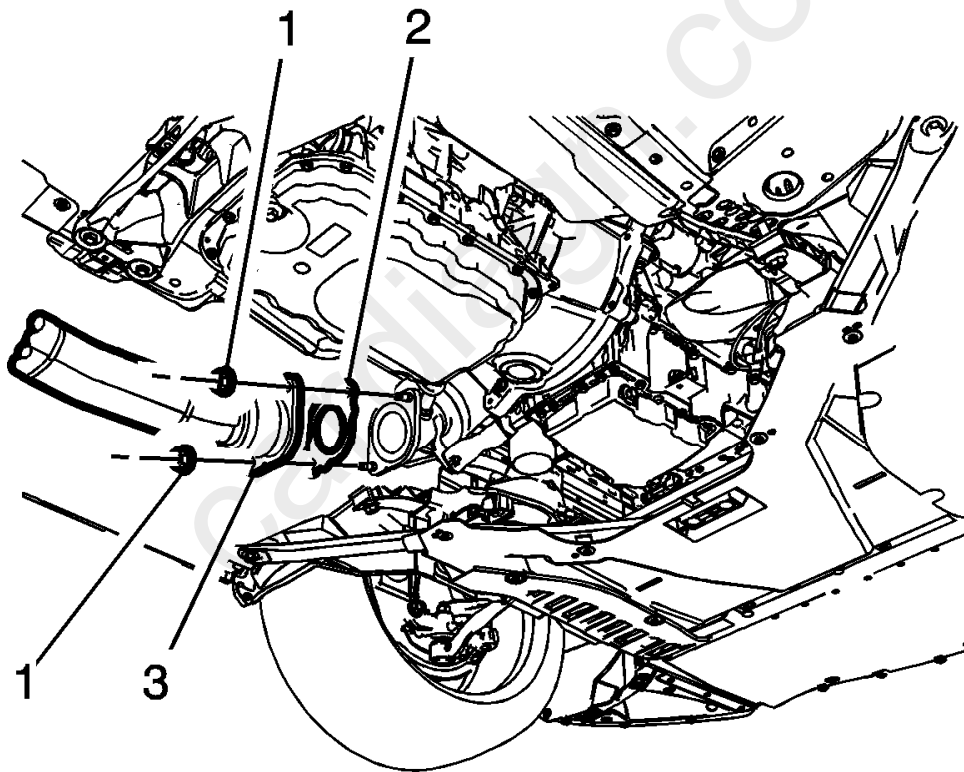


Fig. 27: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

7. Remove the catalytic converter fasteners (1) and remove the exhaust muffler (3).
8. Discard the catalytic converter gasket (2).
9. Support the front exhaust muffler pipe (3) with mechanics wire.

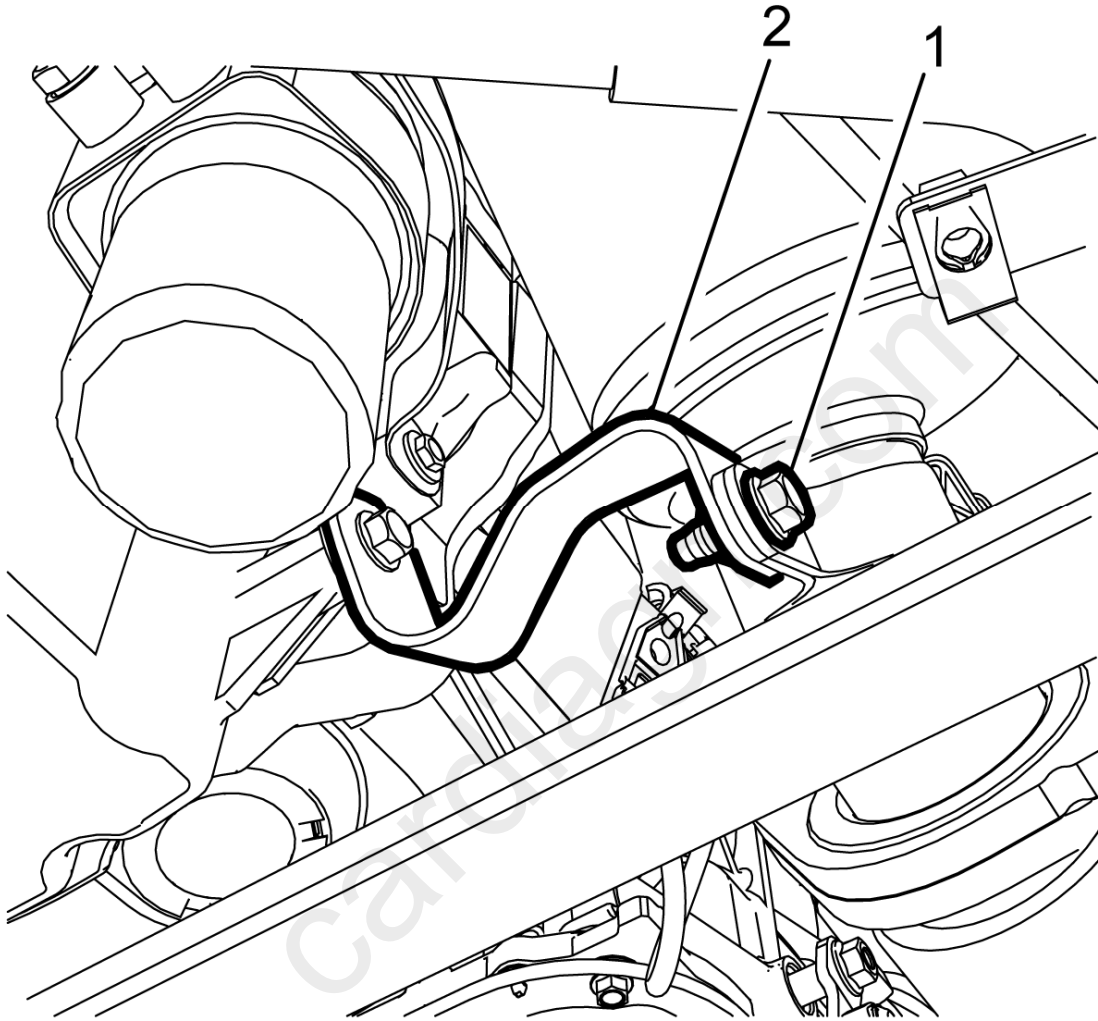


Fig. 28: Catalytic Converter Support Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

10. Remove the catalytic converter support brace bracket fastener (1) that secures the catalytic converter to the brace bracket (2).

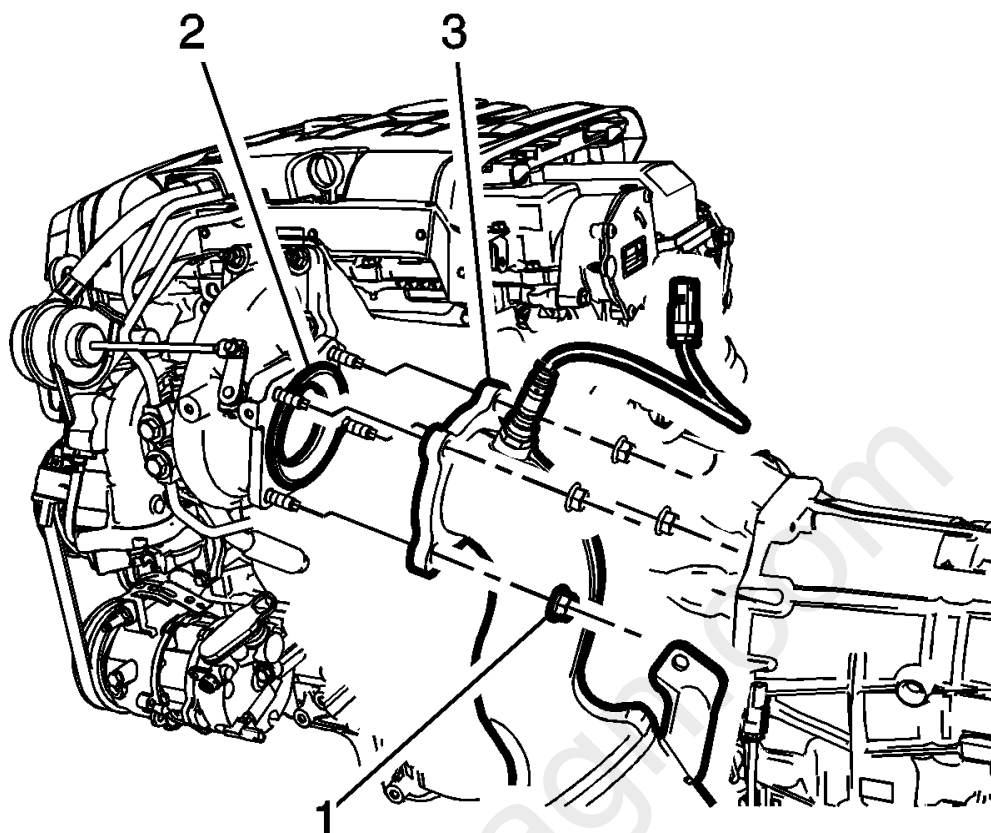


Fig. 29: Turbocharger Seal And Fasteners
Courtesy of GENERAL MOTORS COMPANY

11. Remove the turbocharger fasteners (1) and discard the turbocharger seal (2).

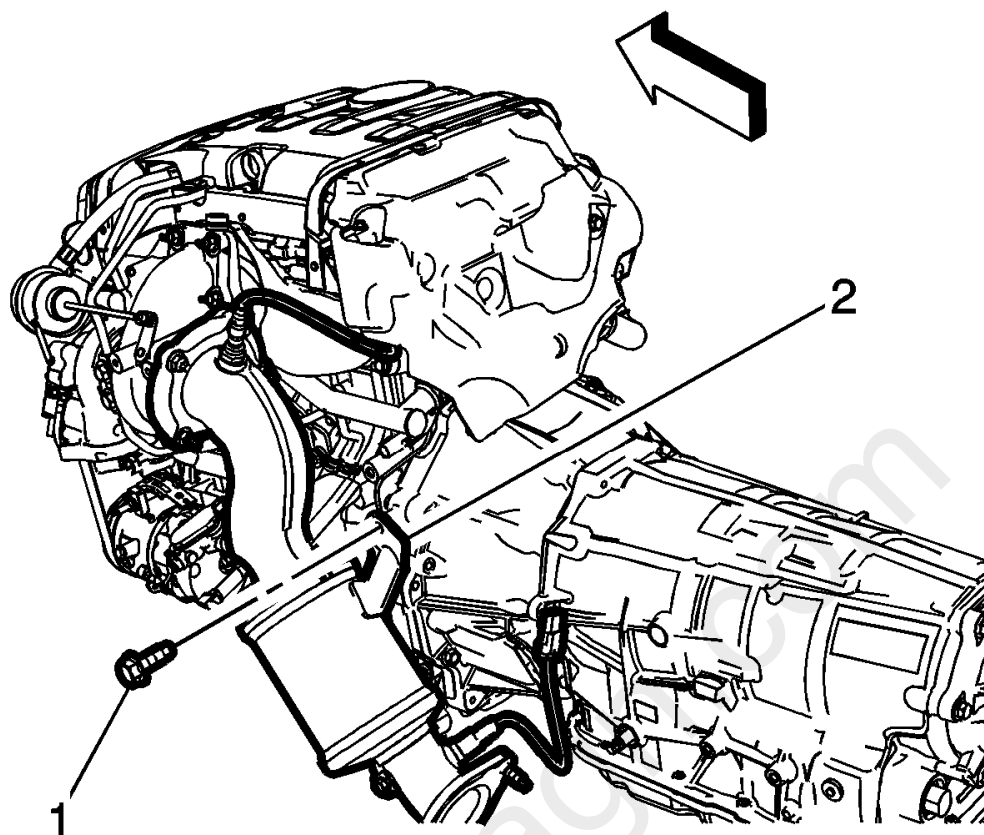


Fig. 30: Catalytic Support Brace
Courtesy of GENERAL MOTORS COMPANY

NOTE: Mark the catalytic converter lower brace bracket before transferring to the **NEW** catalytic converter, for ease of muffler alignment.

12. Remove the catalytic support brace fastener (1) and lower the catalytic converter to the floor.
13. If replacing the catalytic converter, transfer parts as necessary.

Installation Procedure

1. Clean the catalytic converter mating surfaces.

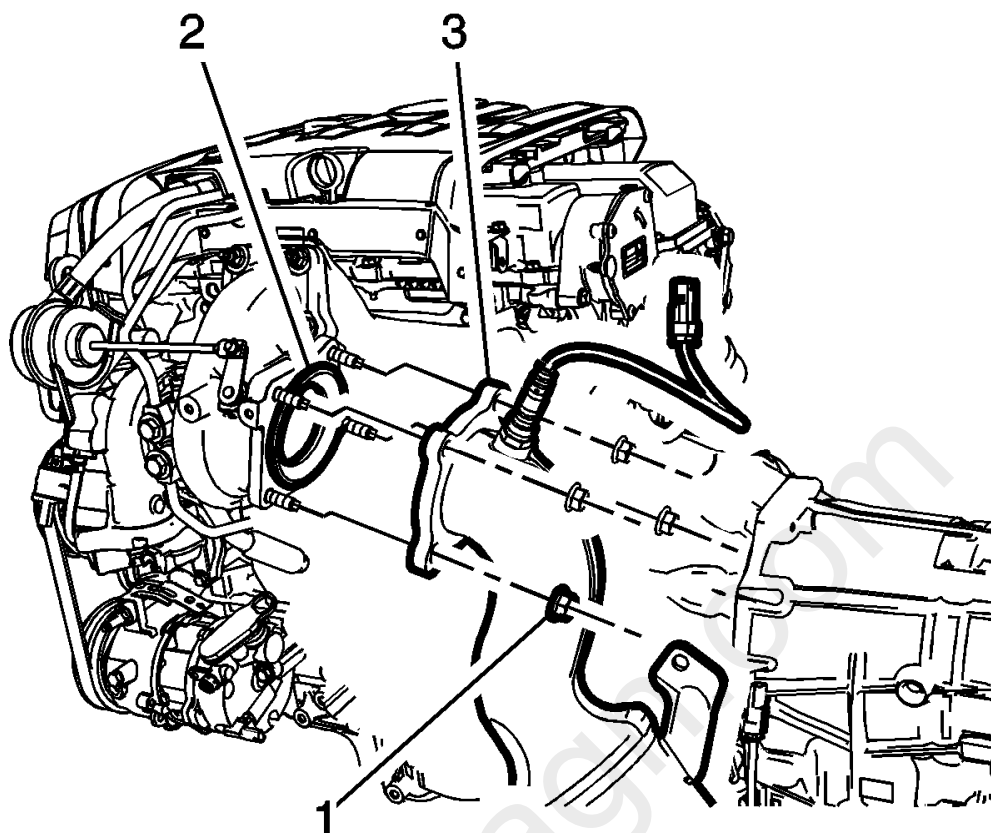


Fig. 31: Turbocharger Seal And Fasteners
Courtesy of GENERAL MOTORS COMPANY

2. Install the catalytic converter (3) to the turbocharger with a NEW seal (2).
3. Loosely tighten the turbocharger fasteners (1).

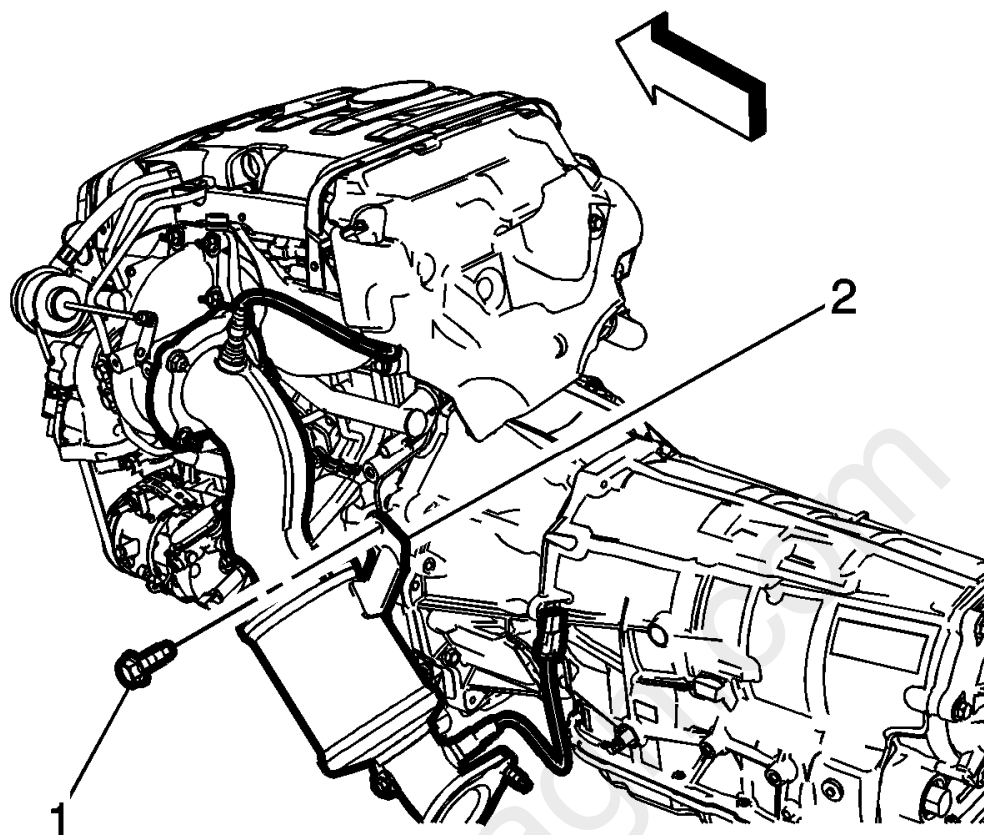


Fig. 32: Catalytic Support Brace
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

4. Install the catalytic converter support brace (2) to the engine block and tighten the fastener (1) to 22 (16 lb ft).

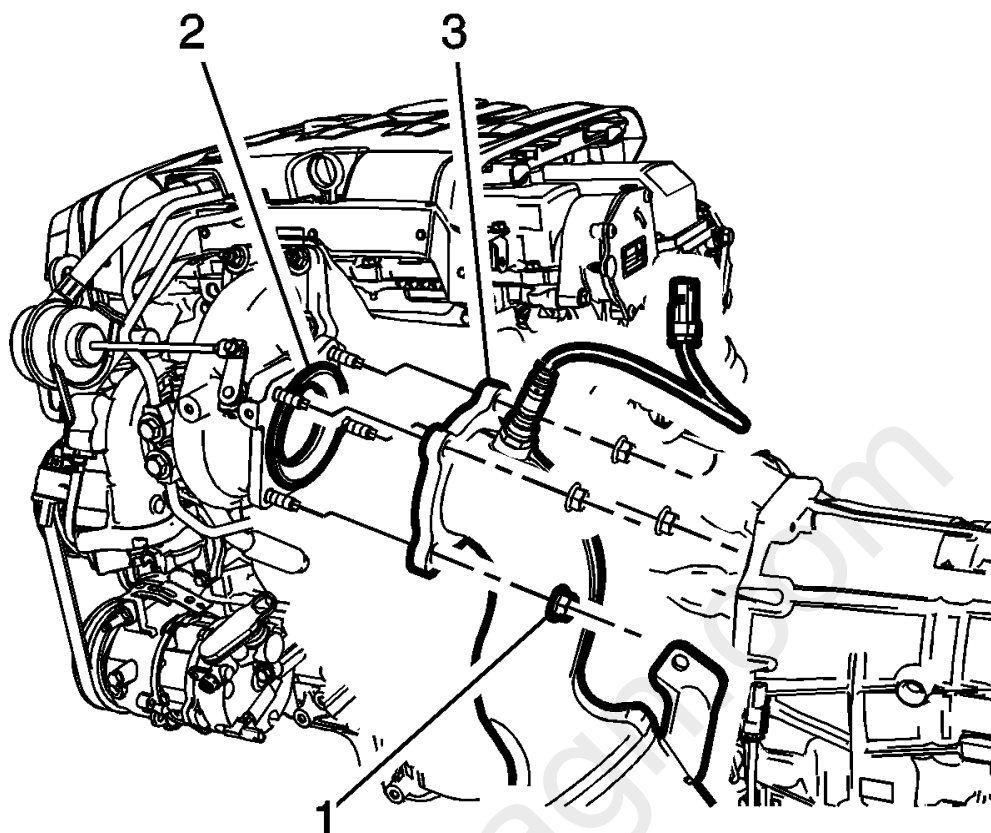


Fig. 33: Turbocharger Seal And Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Tighten the turbocharger fasteners (1) to 50 (37 lb ft).
6. Connect the heated oxygen sensor - 1.
7. Install the fuel pump insulator. Refer to **Fuel Pump Insulator Replacement (Inner)** , **Fuel Pump Insulator Replacement (Outer)** .
8. Install the turbocharger heat shield. Refer to **Turbocharger Heat Shield Replacement** .
9. Install the intake manifold cover. Refer to **Intake Manifold Cover Replacement** .

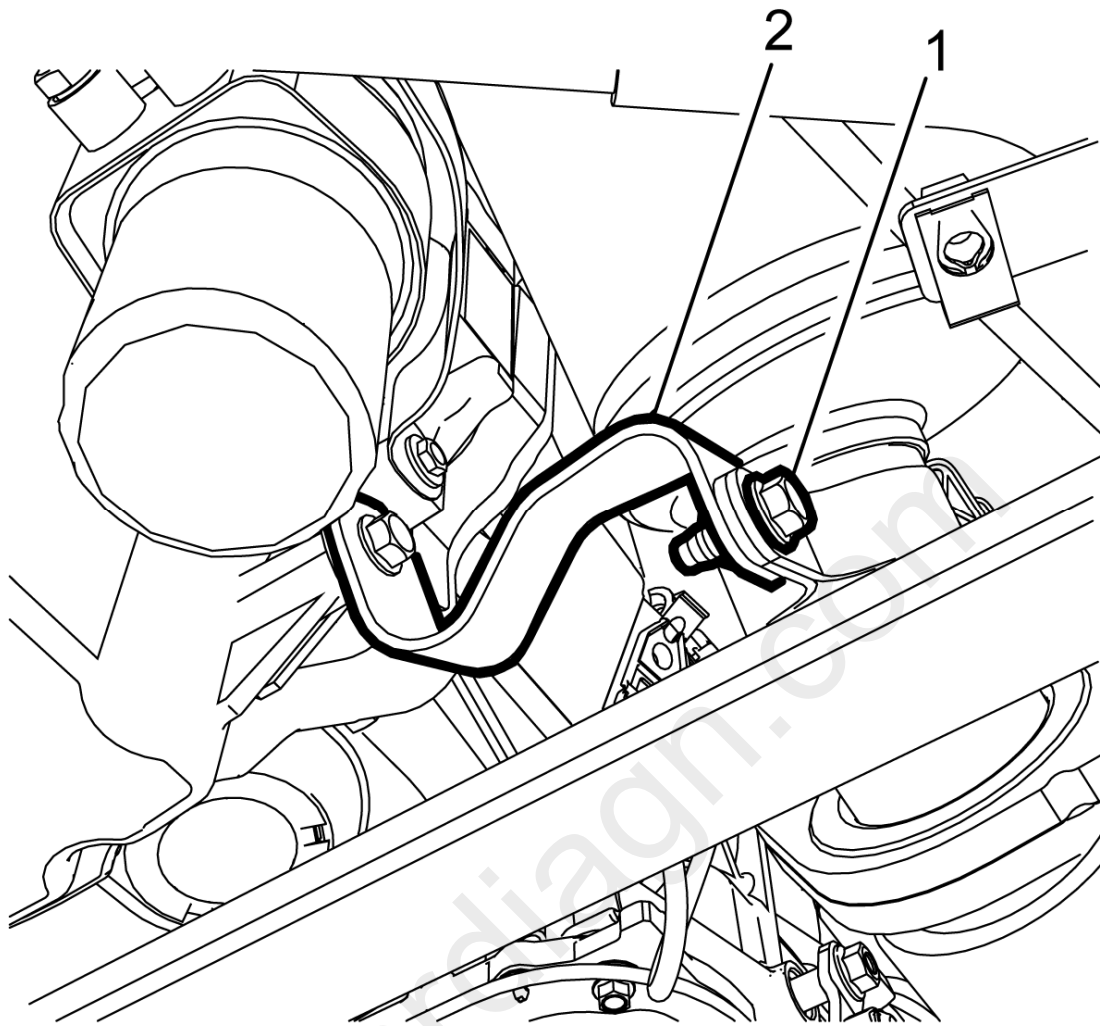


Fig. 34: Catalytic Converter Support Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

10. Install the catalytic converter brace bracket (2) fastener (1) and tighten to 22 (16 lb ft).

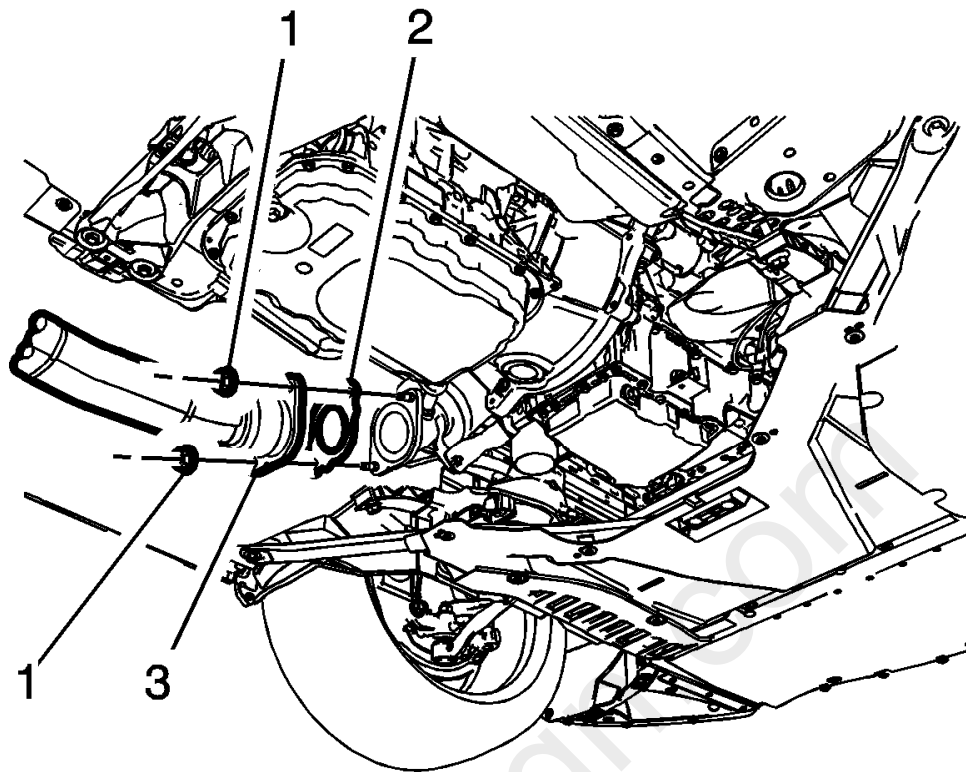


Fig. 35: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

11. Install the exhaust muffler (3) to the catalytic converter with a NEW gasket (2). Tighten the fasteners (1) to 50 (37 lb ft).
12. Connect the heated oxygen sensor - 2.
13. Start the engine and check for exhaust leaks.

CATALYTIC CONVERTER REPLACEMENT - LEFT SIDE (LFX)

Removal Procedure

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

WARNING: Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

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

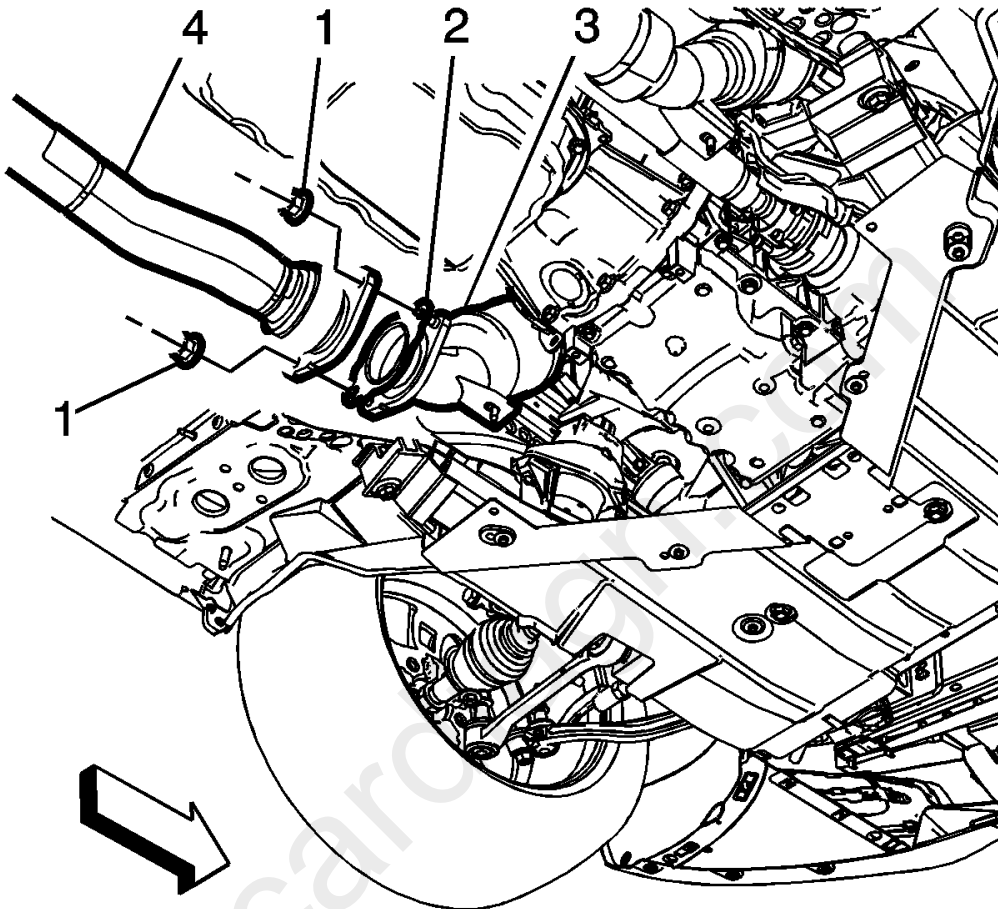


Fig. 36: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

4. Remove the exhaust muffler fasteners (1) and remove the exhaust muffler (4) from the left catalytic converter (3).
5. Discard the exhaust muffler gasket (2).

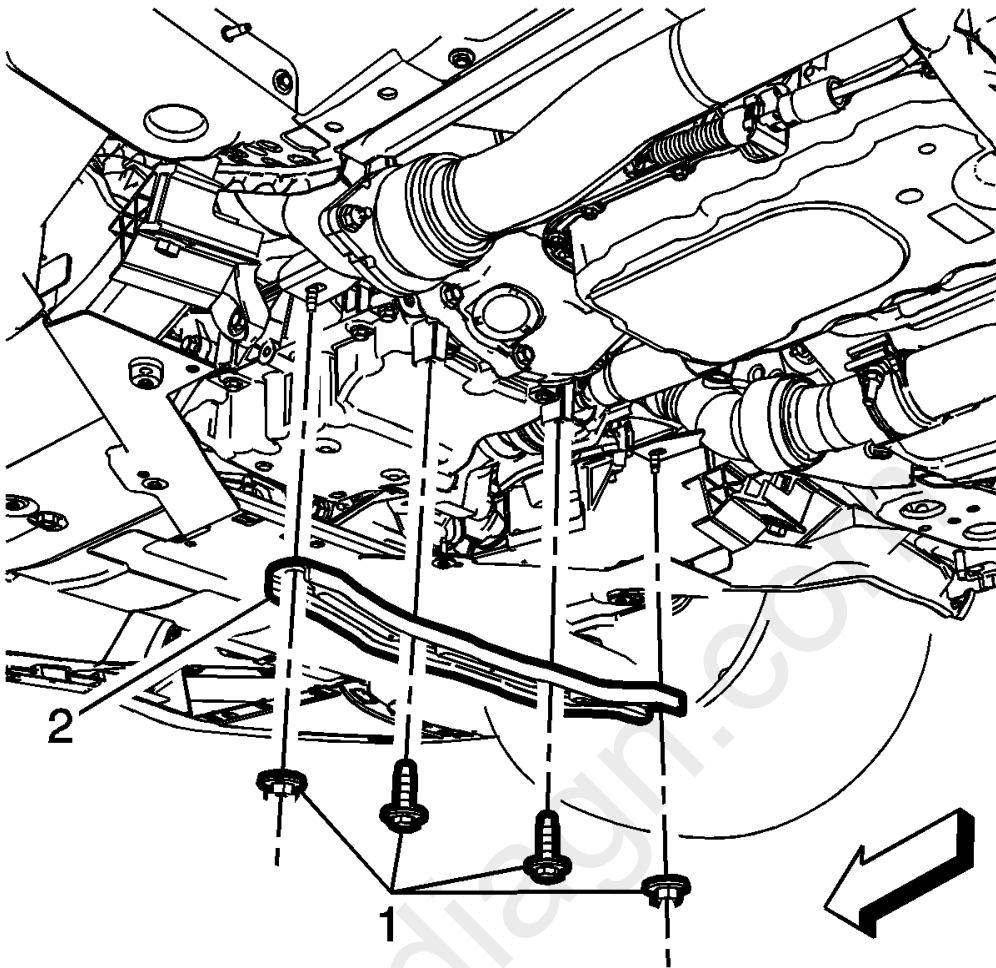


Fig. 37: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Remove the catalytic converter brace bracket fasteners (1) and remove the catalytic converter brace bracket (2).

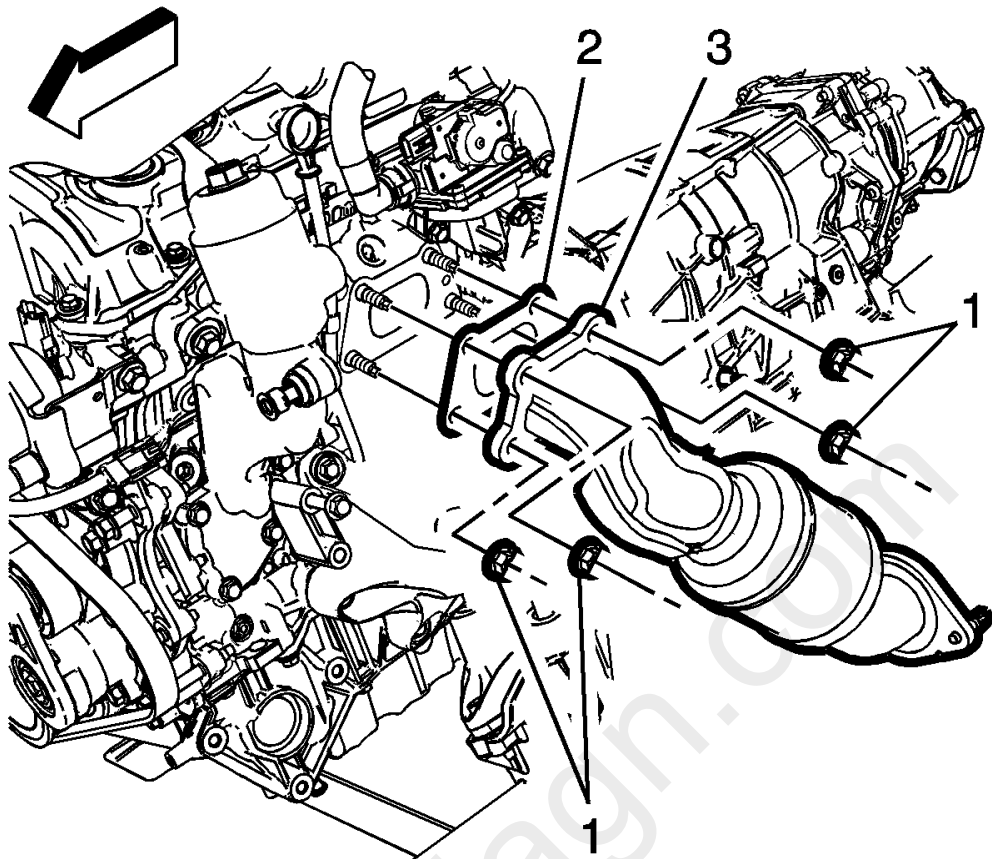


Fig. 38: Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

7. Remove the left catalytic converter fasteners (1) and remove the catalytic converter (3) from the engine compartment.
8. Discard the exhaust gasket (2).
9. If replacing the left catalytic converter, transfer the heated oxygen sensors. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (LFX)** and **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (LFX)** .

Installation Procedure

1. Clean all mating surfaces.

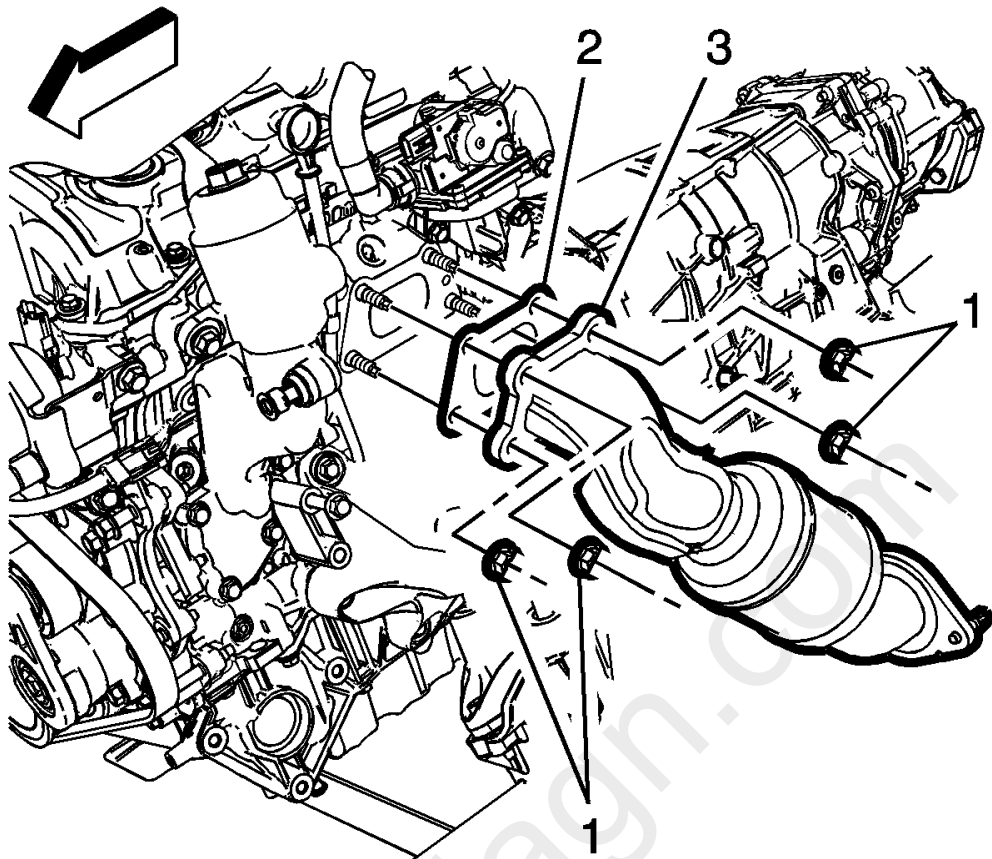


Fig. 39: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

2. Install the left catalytic converter (3) to the cylinder head with a NEW gasket (2) and loosely tighten the fasteners (1).

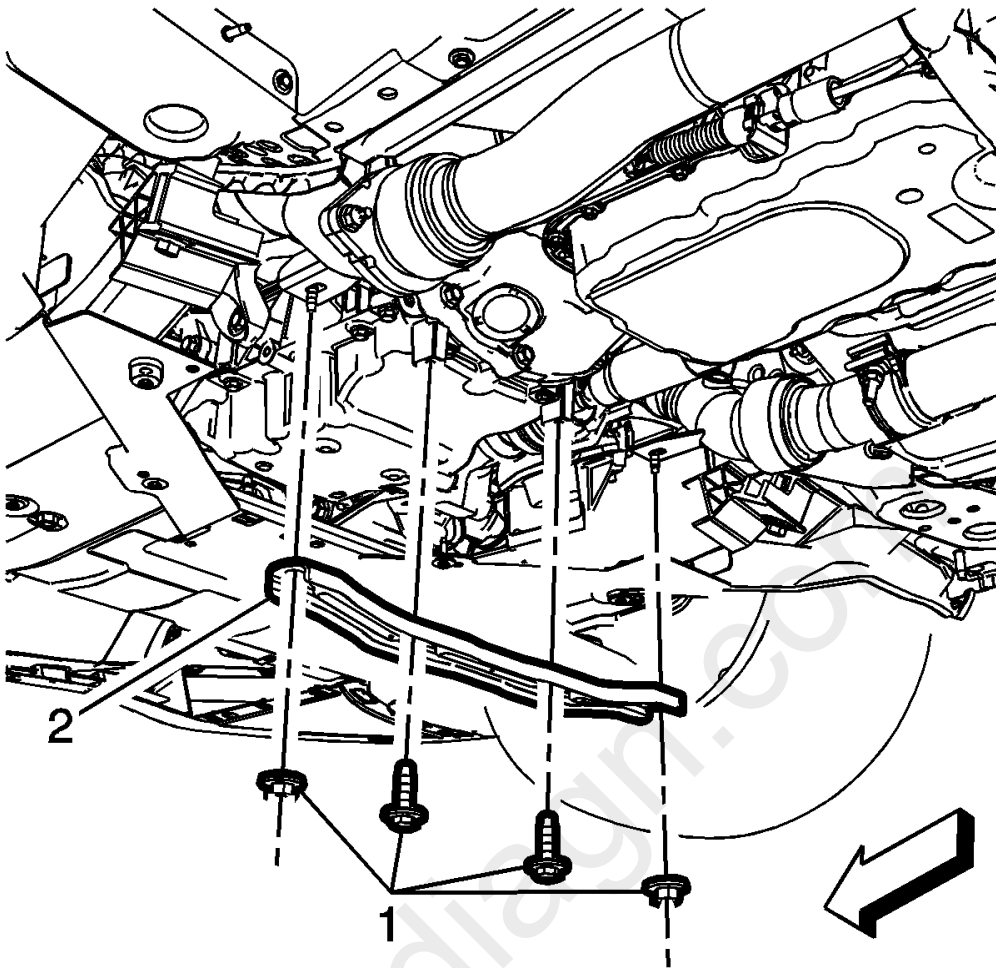


Fig. 40: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the catalytic converter brace bracket (2) and tighten the fasteners (1) to 22 (16 lb ft).
4. Connect the heated oxygen sensor - Bank 2 - Sensor 2.

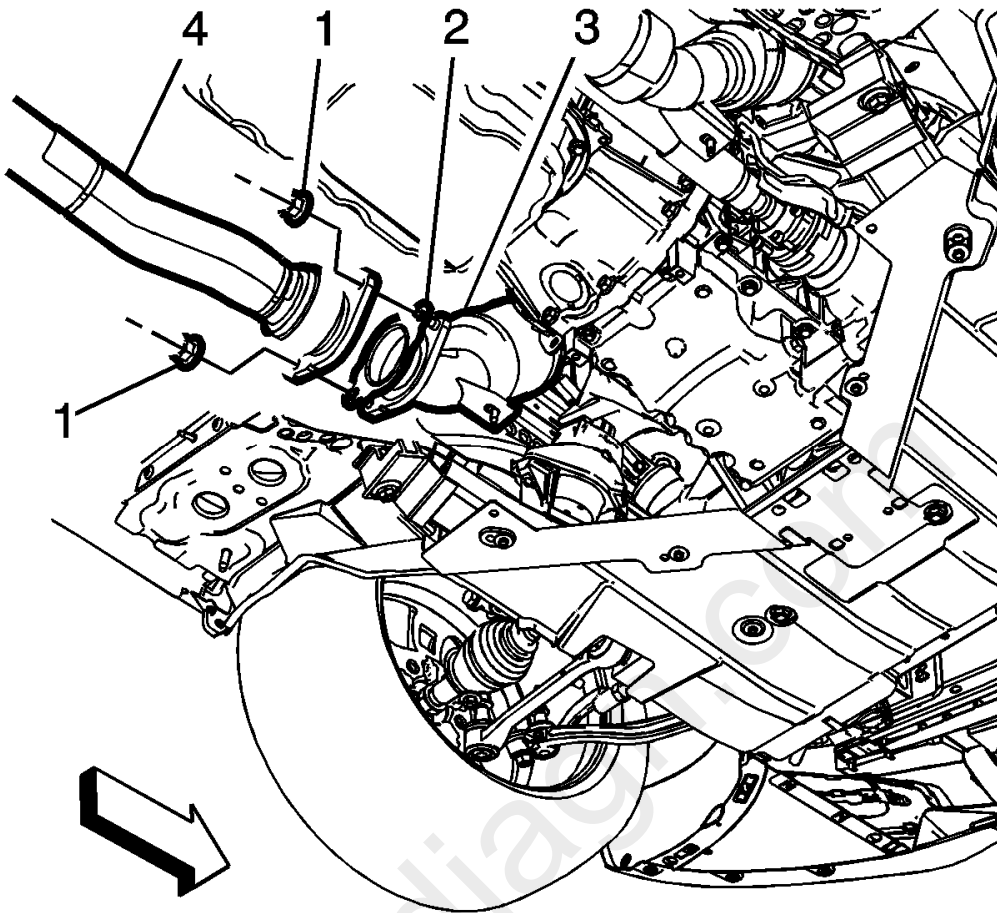


Fig. 41: Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

5. Install the exhaust muffler (4) to the left catalytic converter (3) with a NEW gasket (2). Tighten the fasteners (1) to 50 (37 lb ft).
6. Lower the vehicle.

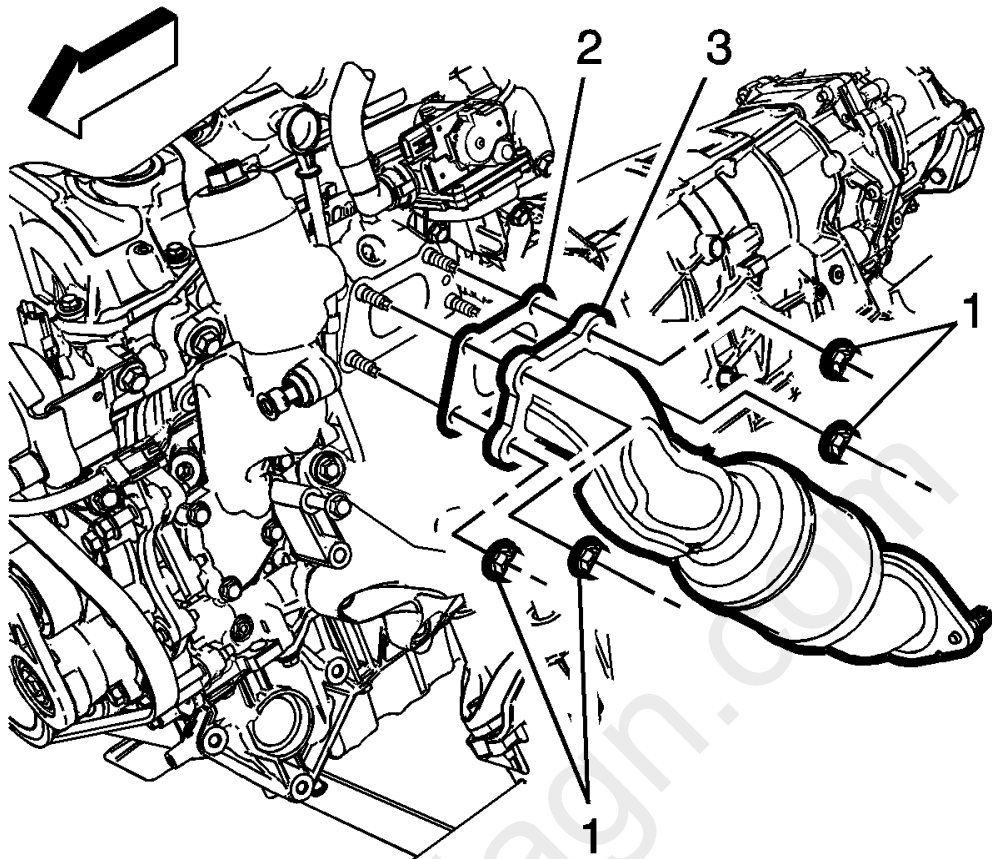


Fig. 42: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

7. Tighten the catalytic converter fasteners (1) to 46 (34 lb ft).
8. Connect the heated oxygen sensor - Bank 2 - Sensor 1.
9. Start the engine and check for exhaust leaks.

CATALYTIC CONVERTER REPLACEMENT - LEFT SIDE (LF3)

Removal Procedure

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

WARNING: Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Disconnect the heated oxygen sensor bank 2 sensor 1 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (LF3)** .
2. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
3. Disconnect the heated oxygen sensor bank 2 sensor 2 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (LF3)** .

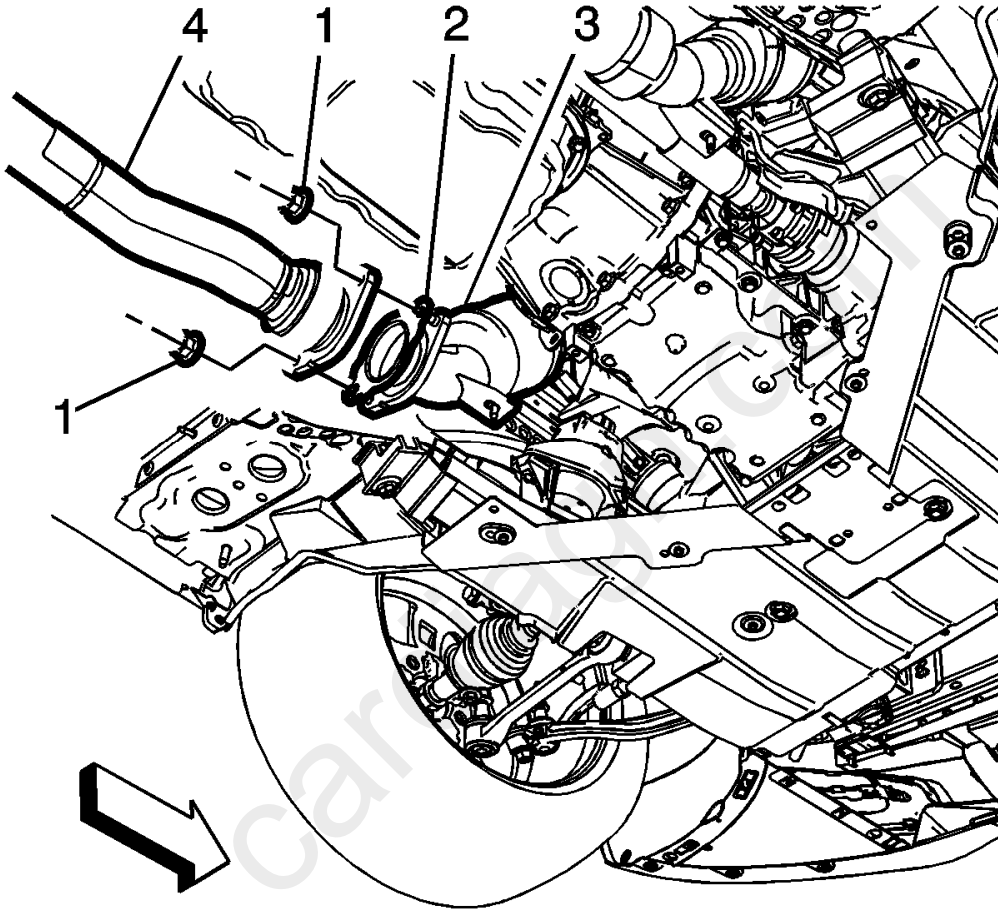


Fig. 43: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

4. Remove the exhaust muffler fasteners (1) and remove the exhaust muffler (4) from the left catalytic converter (3).
5. DISCARD the exhaust muffler gasket (2).

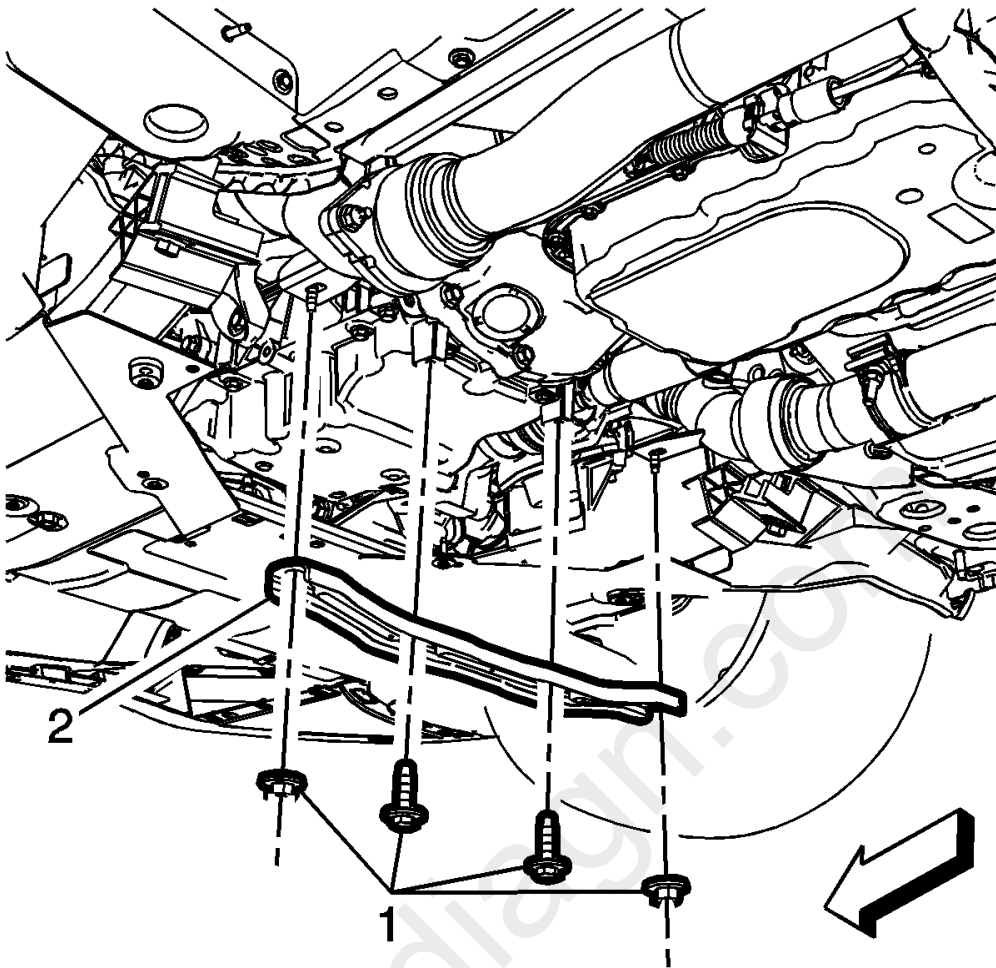


Fig. 44: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

6. Remove the catalytic converter brace bracket fasteners (1) and remove the catalytic converter brace bracket (2).

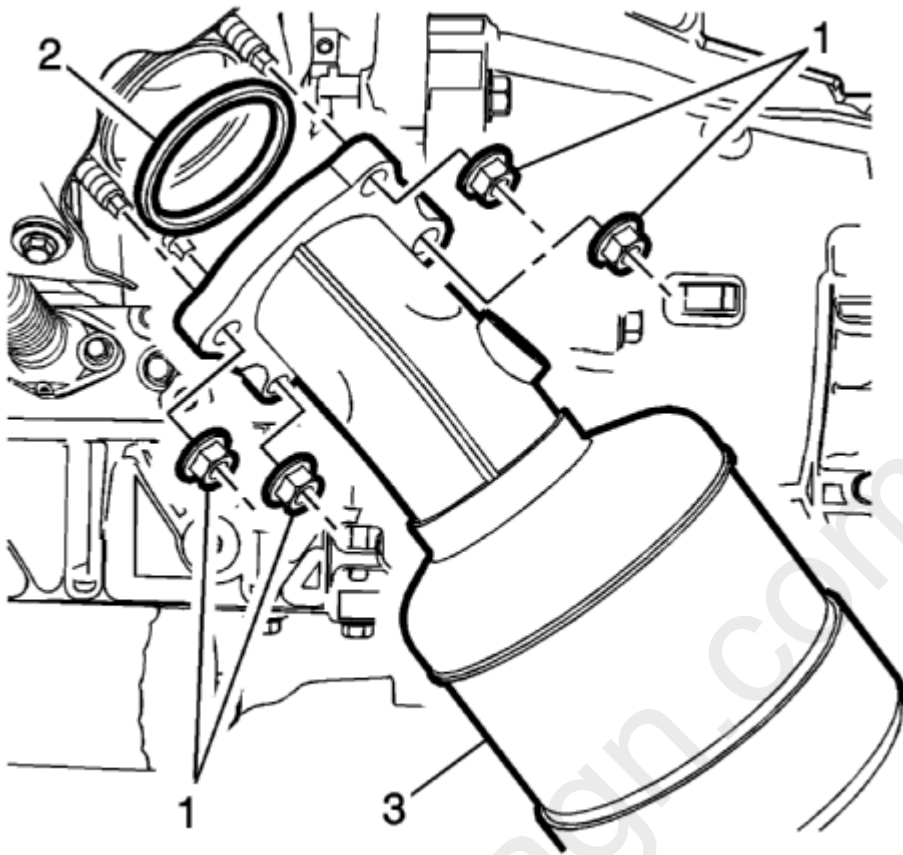


Fig. 45: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

7. Remove the left catalytic converter fasteners (1) and remove the catalytic converter (3) from the engine compartment.
8. DISCARD the exhaust gasket (2).
9. If replacing the left catalytic converter, transfer the heated oxygen sensors. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (LF3)** , and **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (LF3)** .

Installation Procedure

1. Clean all mating surfaces.

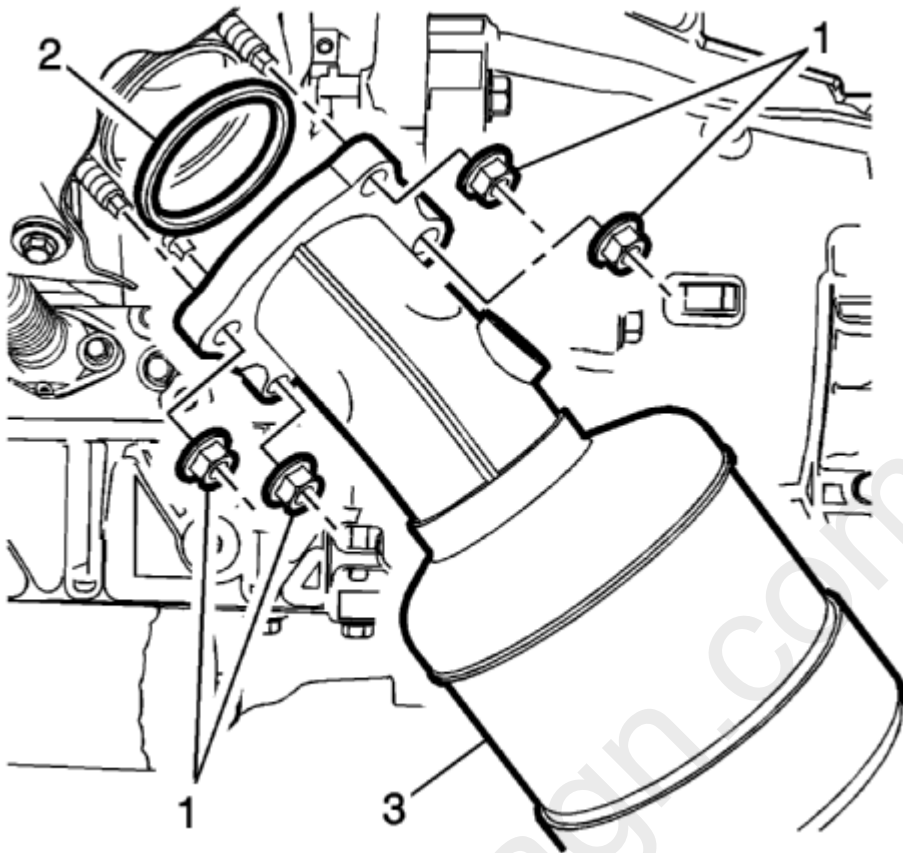


Fig. 46: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

2. Install the left catalytic converter (3) to the cylinder head with a NEW gasket (2) and loosely tighten the fasteners (1).

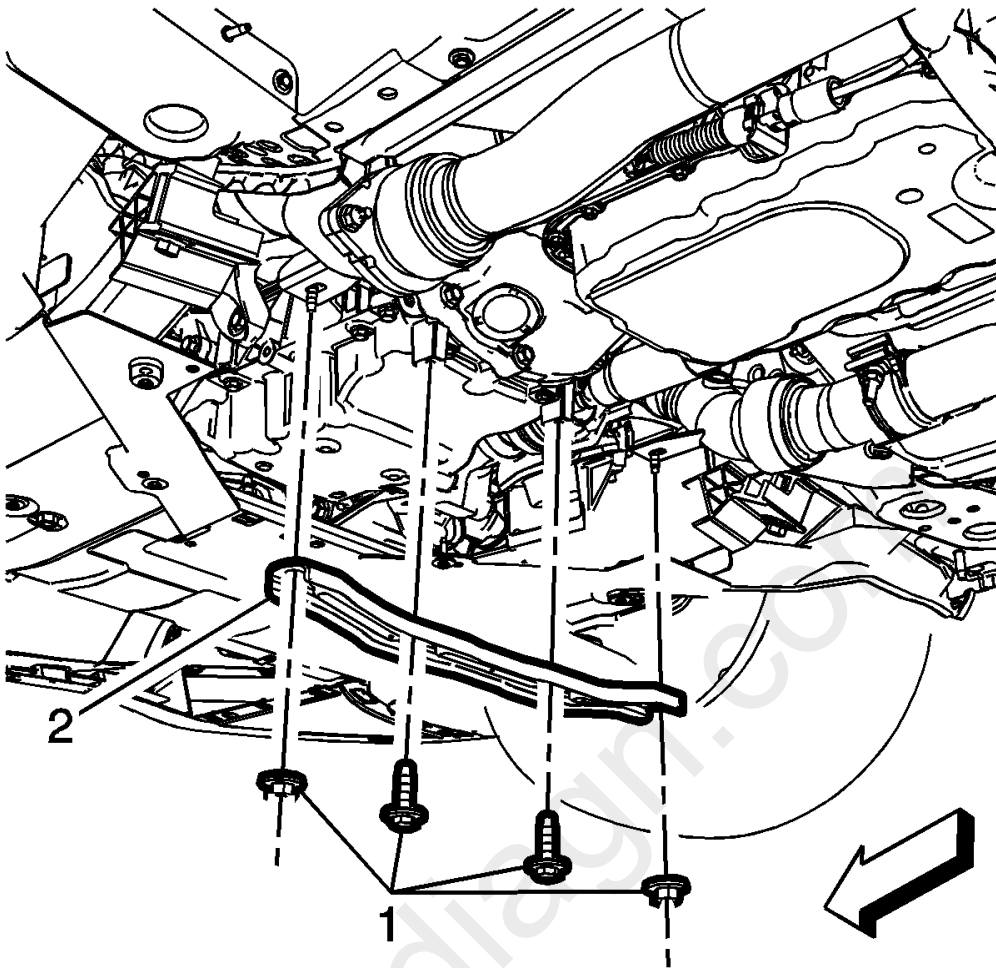


Fig. 47: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the catalytic converter brace bracket (2) and tighten the fasteners (1) to 22 (16 lb ft).
4. Connect the heated oxygen sensor bank 2 sensor 2 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (LF3)** .

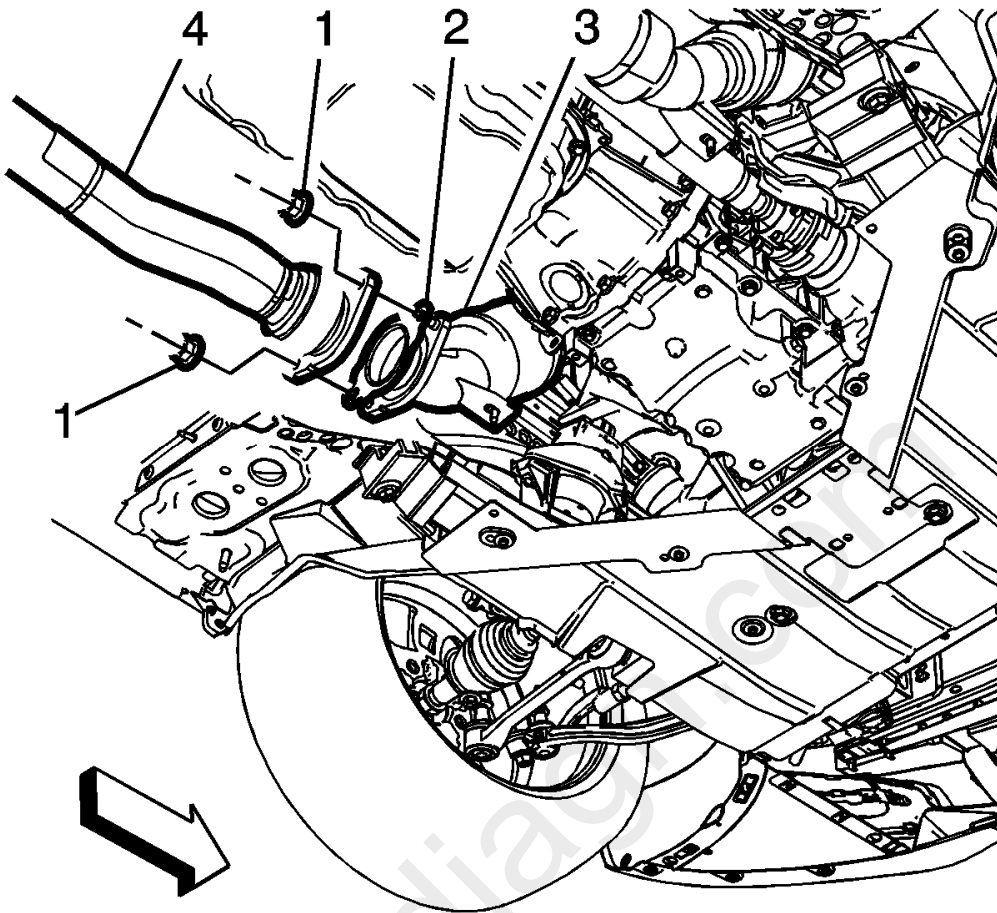


Fig. 48: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

5. Install the exhaust muffler (4) to the left catalytic converter (3) with a NEW gasket (2). Tighten the fasteners (1) to 50 (37 lb ft).

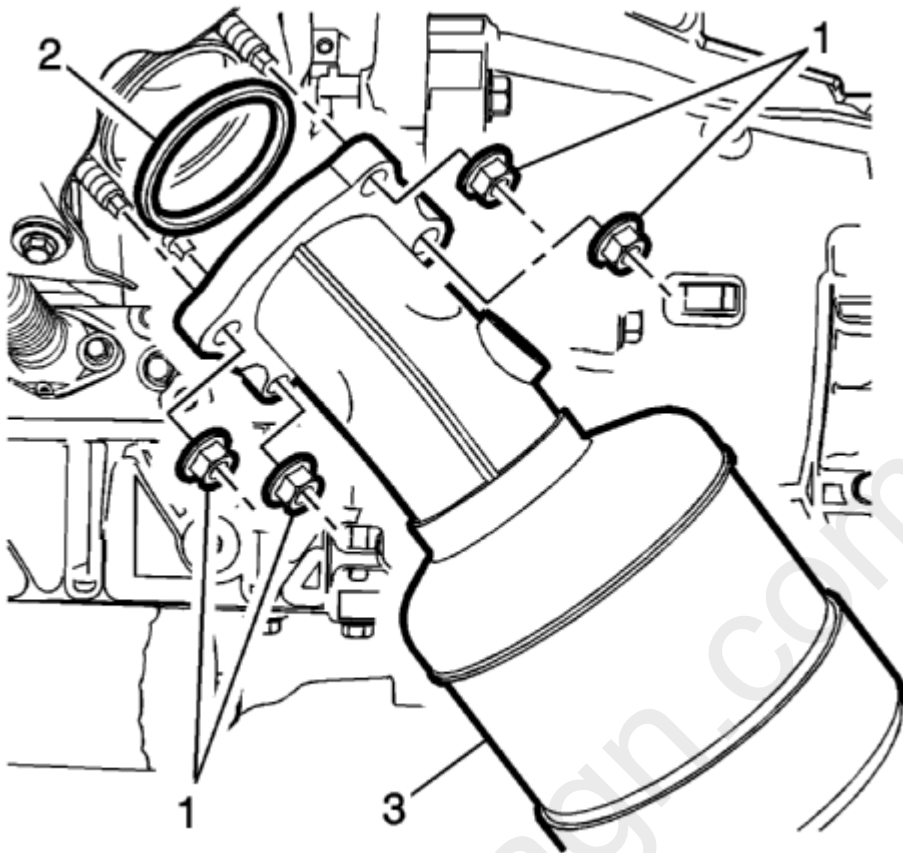


Fig. 49: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

6. Tighten the catalytic converter fasteners (1) to 46 (34 lb ft).
7. Lower the vehicle.
8. Connect the heated oxygen sensor bank 2 sensor 1 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (LF3)** .
9. Start the engine and check for exhaust leaks.

CATALYTIC CONVERTER REPLACEMENT - RIGHT SIDE (LFX)

Removal Procedure

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

WARNING: Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Remove the intake manifold cover. Refer to **Intake Manifold Cover Replacement (LFX)** .

2. Remove the secondary air injection bypass valve-right side , if equipped. Refer to **Secondary Air Injection Bypass Valve Replacement - Bank 1** .
3. Disconnect the heated oxygen sensor - bank 1 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LFX)** .
4. Disconnect the heated oxygen sensor - bank 1 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LFX)** .
5. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

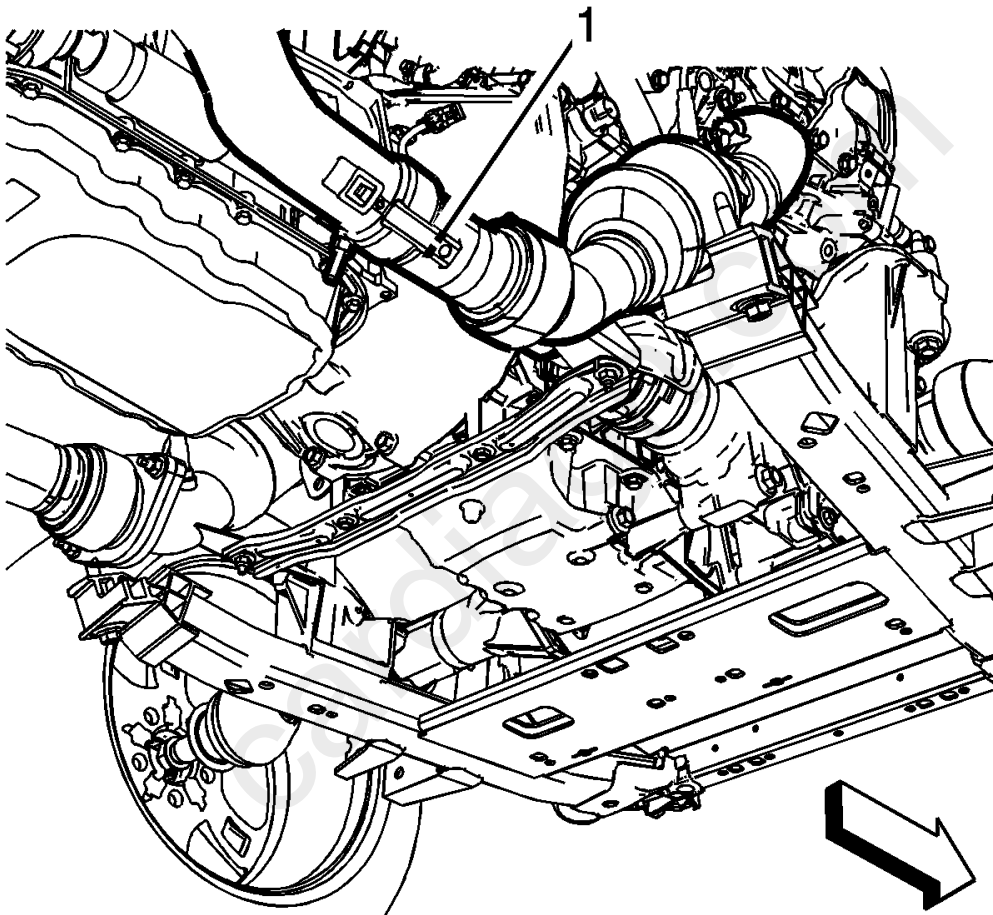


Fig. 50: Clamp Welded Bracket
Courtesy of GENERAL MOTORS COMPANY

NOTE: The production clamp has a bracket that is welded to the right catalytic converter assembly. The production clamp welded bracket will have to be cut in order to replace serviceable components.

6. Using a metal cut off wheel, make a cut at the clamp welded bracket shown above (1).

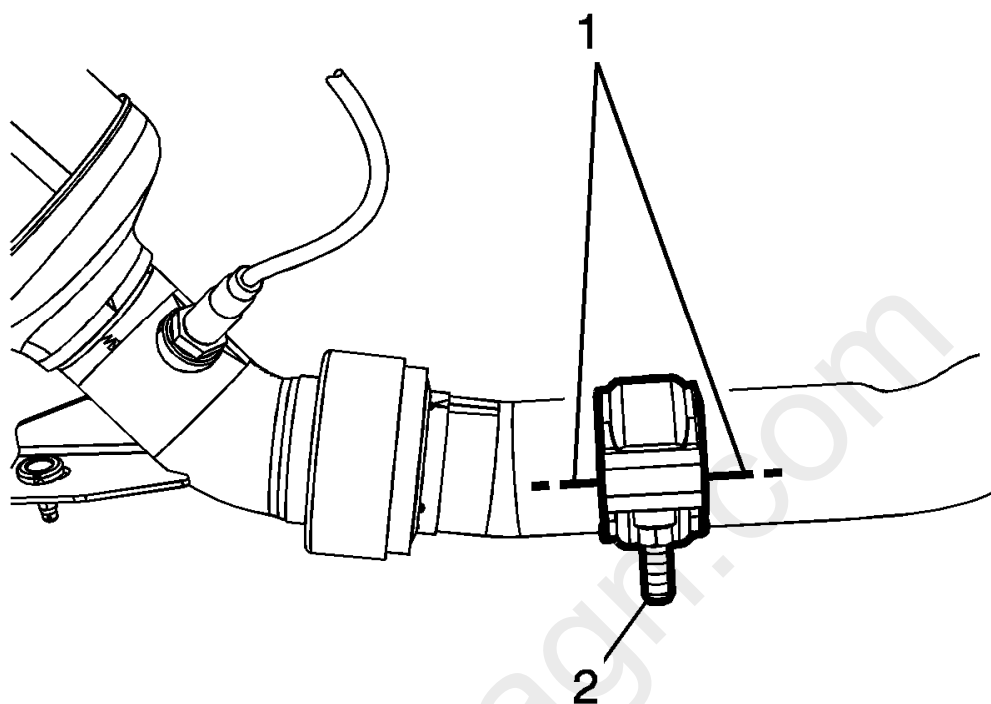


Fig. 51: Production Exhaust Clamp
Courtesy of GENERAL MOTORS COMPANY

NOTE: The serviceable Torca clamp comes with the replaced right catalytic converter.

7. Mark either side of the production clamp (1), for proper alignment of replacement clamp location and muffler alignment.
8. Loosen the exhaust clamp fastener (2).

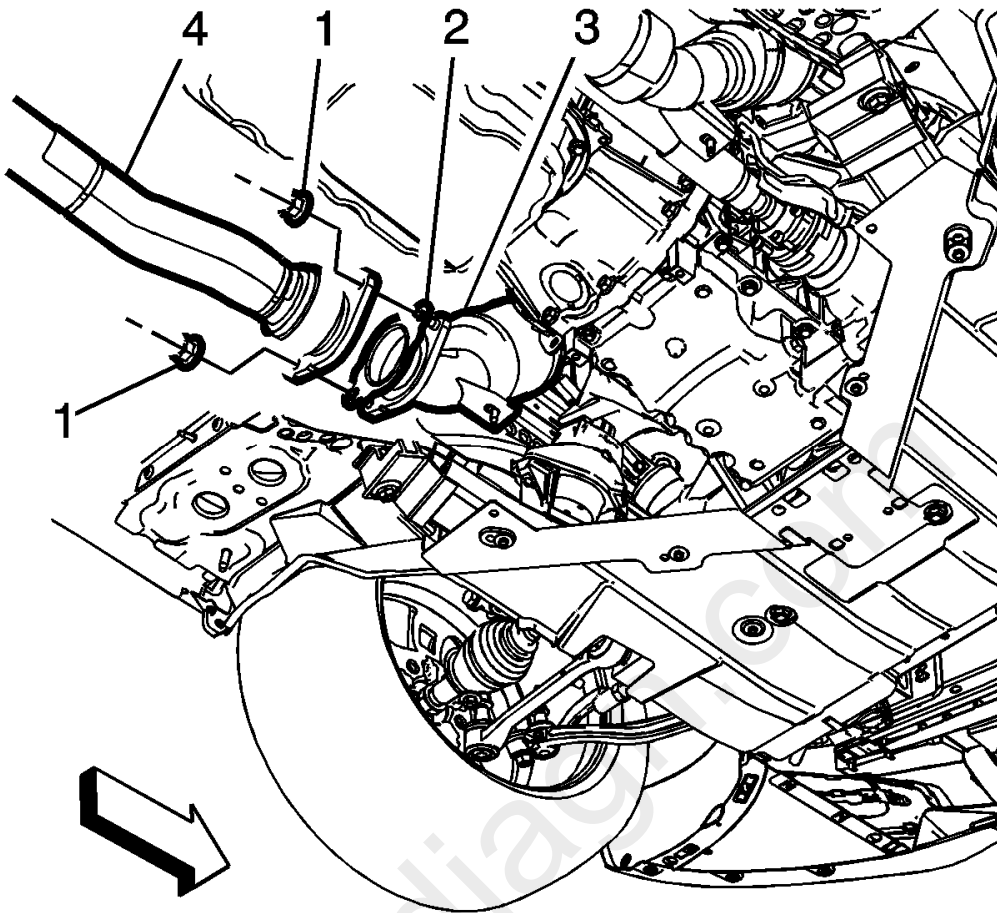


Fig. 52: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

9. Remove the left catalytic converter fasteners (1) and remove the exhaust muffler (4) from the left catalytic converter (3).
10. Discard the exhaust gasket (2).

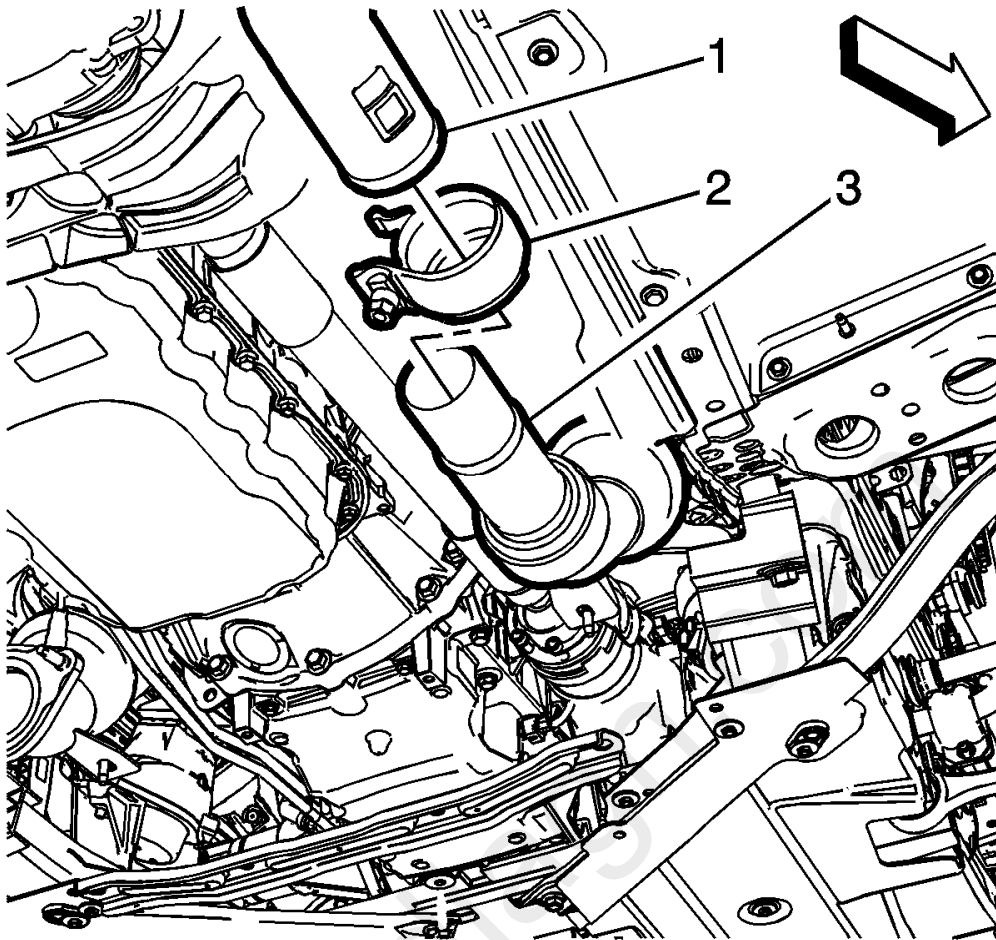


Fig. 53: Production Torca Clamp
Courtesy of GENERAL MOTORS COMPANY

NOTE: It may be necessary to remove the old graphite Torca clamp sleeve with emery cloth or a wire brush.

11. Remove the exhaust muffler (1) from the right catalytic converter (3) and discard the production Torca clamp (2).

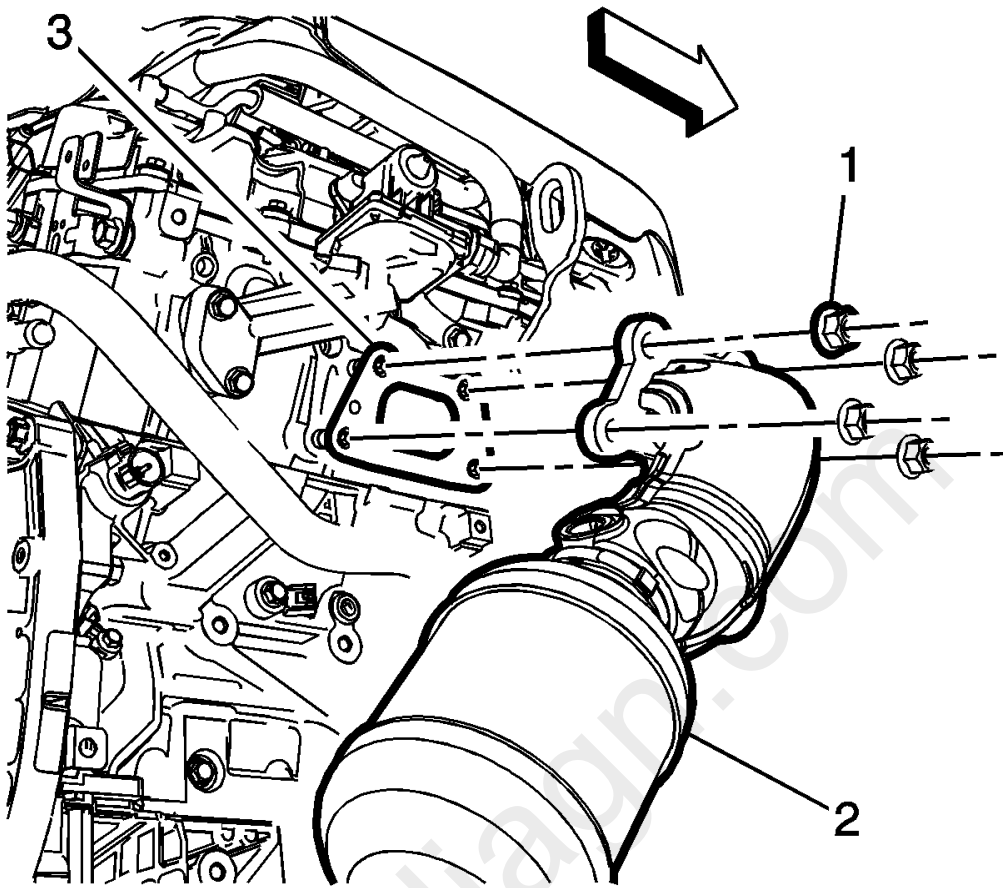


Fig. 54: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

12. Remove the right catalytic converter fasteners (1) and remove the right catalytic converter (2) from the cylinder head.
13. Discard the exhaust gasket (3).

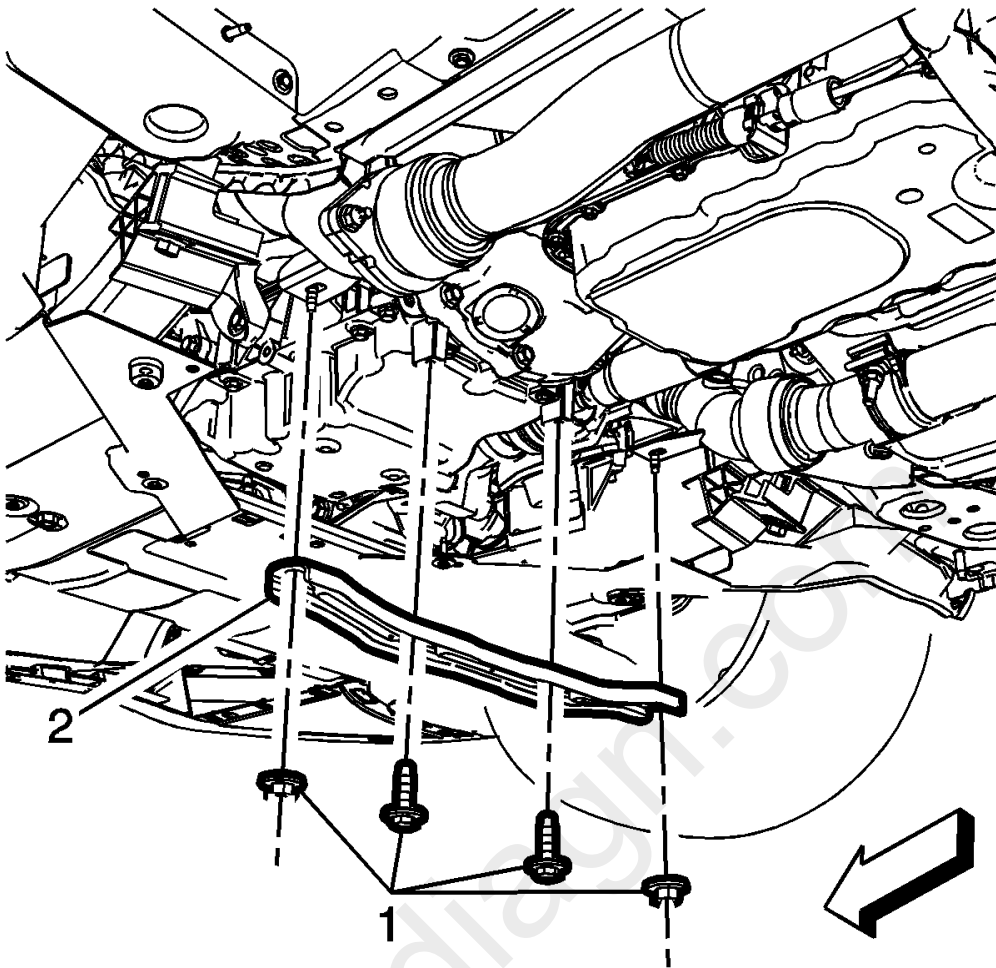


Fig. 55: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

14. Remove the catalytic converter brace bracket fasteners (1) and remove the catalytic converter brace bracket (2).
15. Remove the right catalytic converter.
16. If replacing the catalytic converter, transfer the oxygen sensors to the NEW catalytic converter.

Installation Procedure

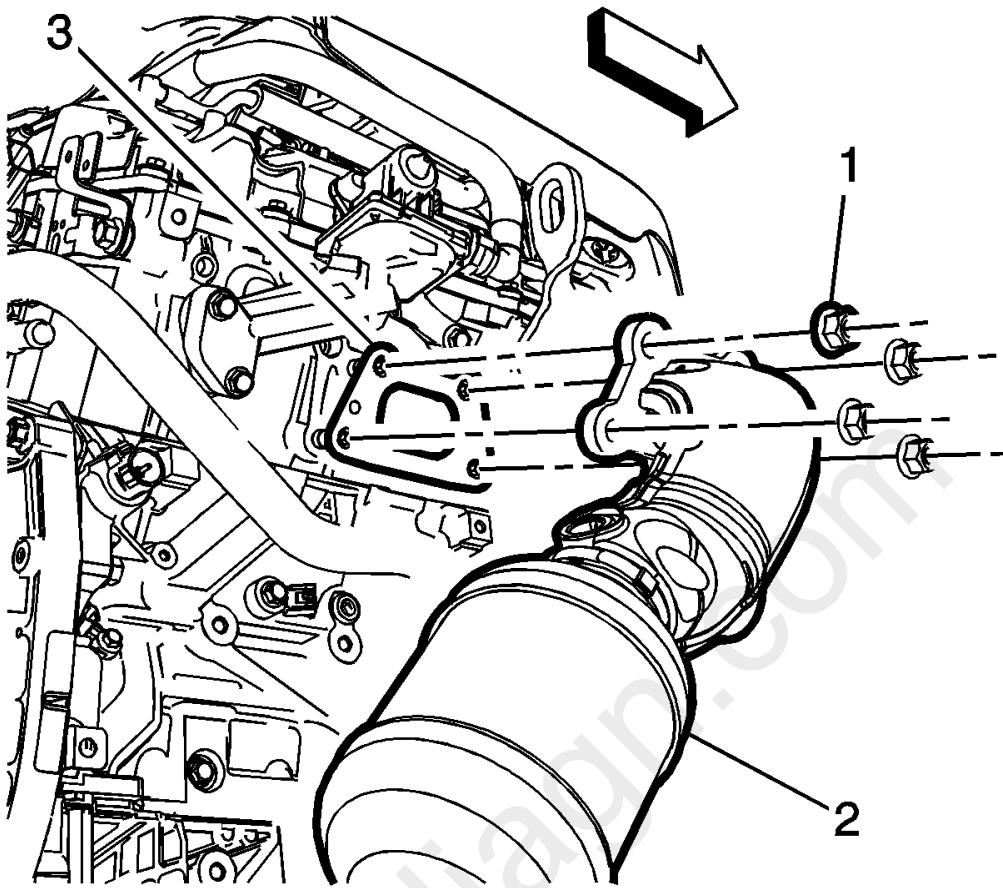


Fig. 56: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

1. Install the right catalytic converter (2) to the cylinder head with a NEW gasket (3). Tighten the fasteners (1) to 46 (34 lb ft).
2. Install the heated oxygen sensor - bank 1 sensor 1. Refer to Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LFX) .
3. Install the heated oxygen sensor - bank 1 sensor 2. Refer to Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LFX) .
4. Install the secondary air injection bypass valve-right side. Refer to Secondary Air Injection Bypass Valve Replacement - Bank 1 .
5. Install the intake manifold cover. Refer to Intake Manifold Cover Replacement (LFX) .

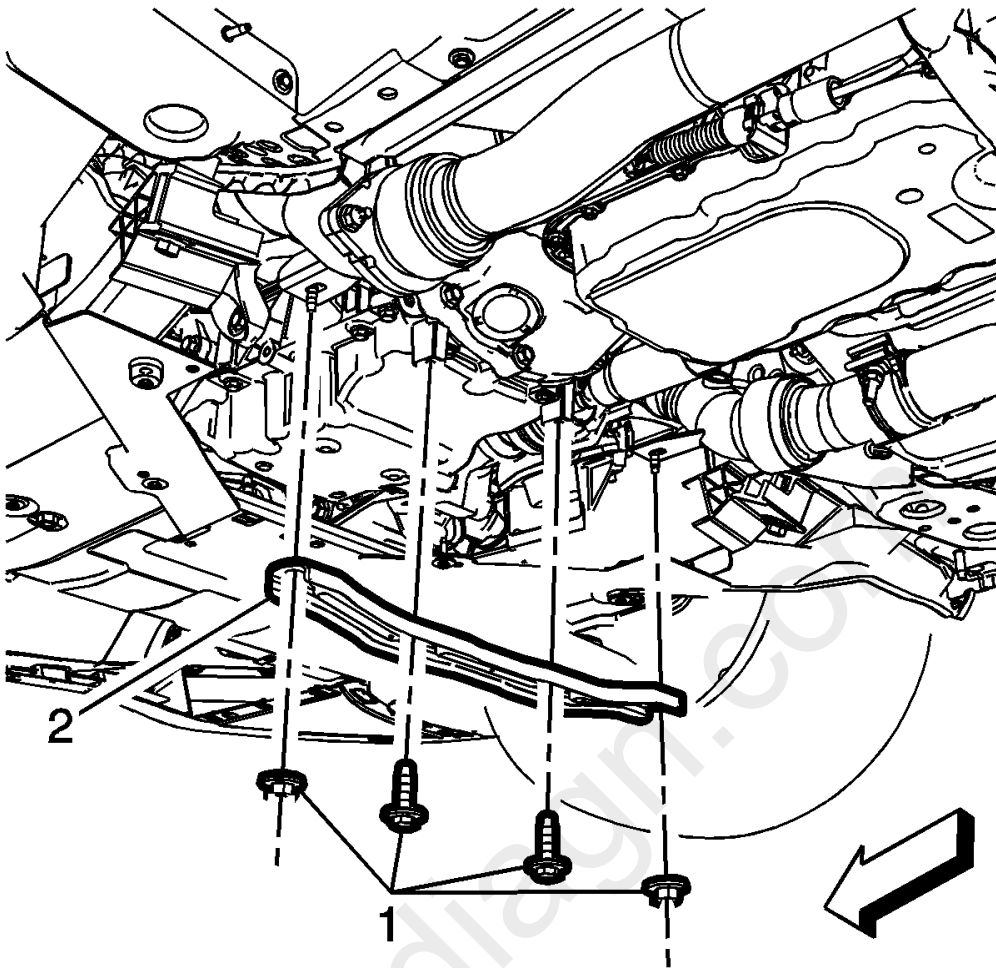


Fig. 57: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

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

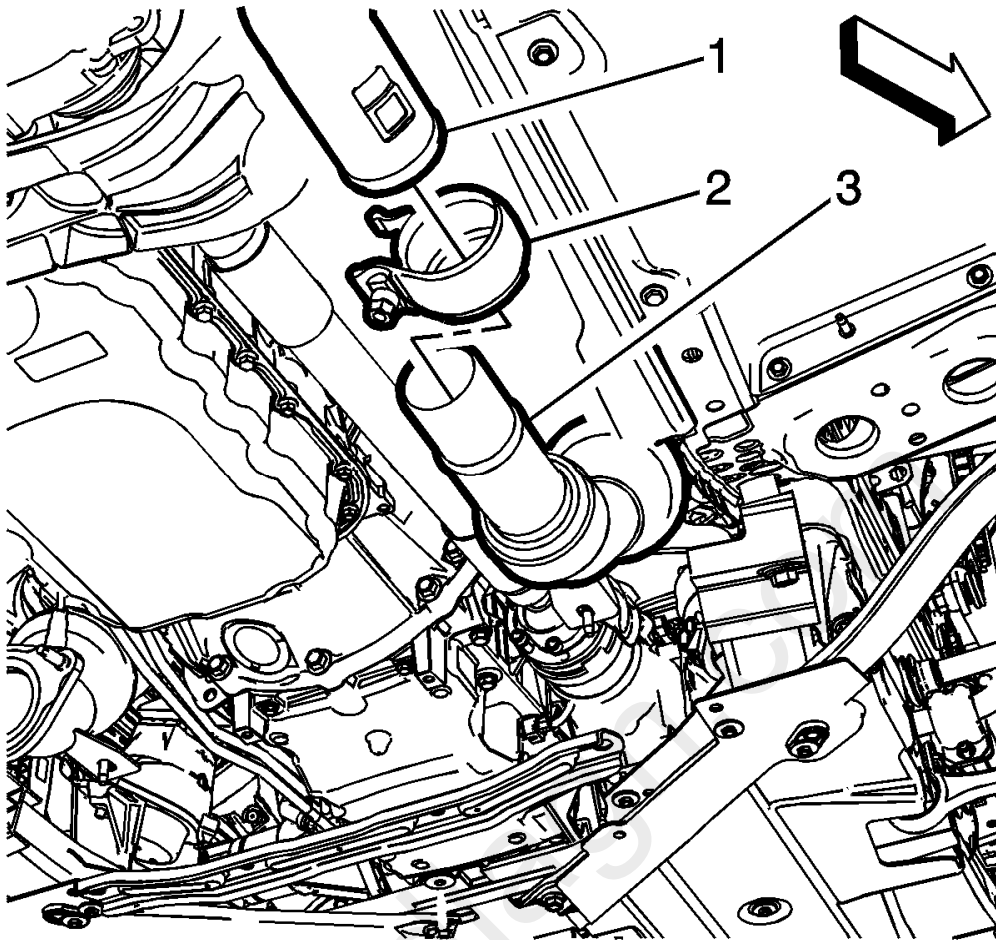


Fig. 58: Production Torca Clamp
Courtesy of GENERAL MOTORS COMPANY

7. Install the NEW Torca clamp (2) onto the right catalytic converter (3) and insert the exhaust muffler (1) into the exhaust Torca clamp.

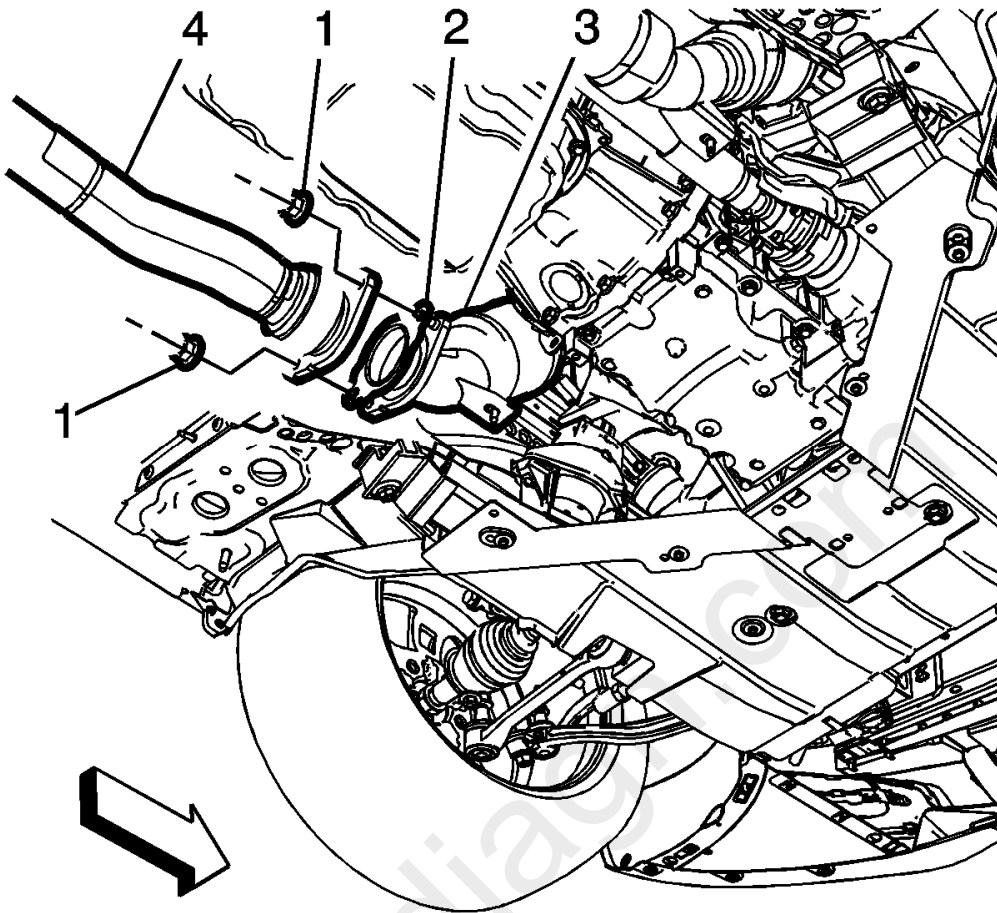


Fig. 59: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

8. Install the exhaust muffler (4) to the left catalytic converter (3) with a NEW gasket (2). Tighten the fasteners (1) to 50 (37 lb ft).

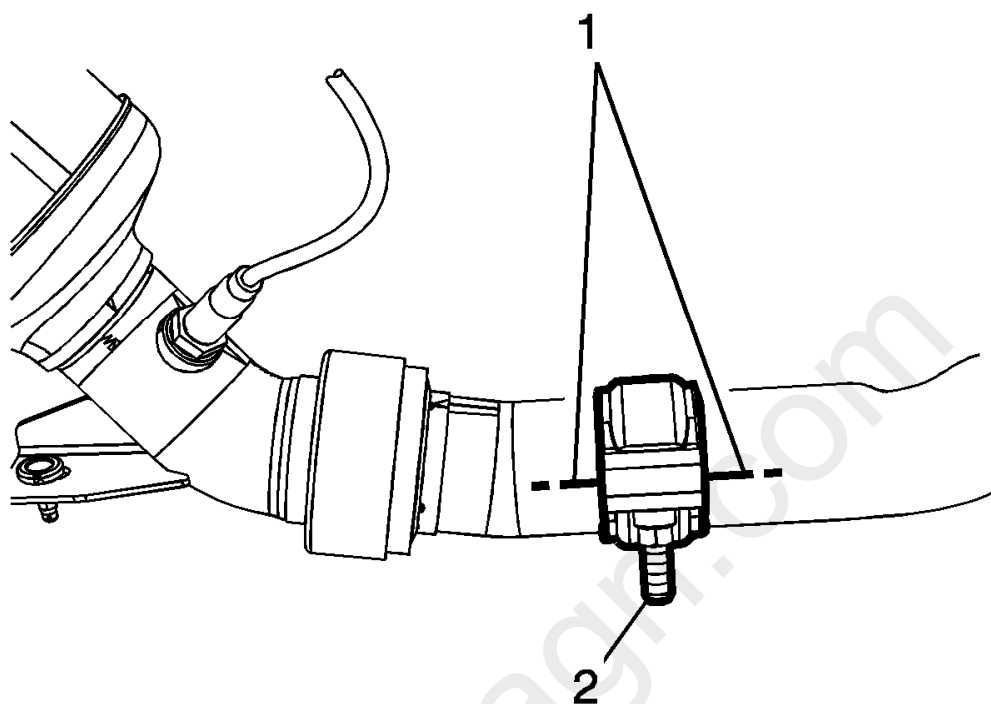


Fig. 60: Production Exhaust Clamp
Courtesy of GENERAL MOTORS COMPANY

9. Tighten the NEW Torca clamp fastener (2) to 50 (37 lb ft).
10. Start the engine and check for exhaust leaks.

CATALYTIC CONVERTER REPLACEMENT - RIGHT SIDE (LF3)

Removal Procedure

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

WARNING: Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Remove the right side turbocharger heat shield. Refer to **Turbocharger Heat Shield Replacement (LF3**

Bank 1), Turbocharger Heat Shield Replacement (LF3 Bank 2).

2. Disconnect the heated oxygen sensor bank 1 sensor 1 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LF3)** .
3. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
4. Disconnect the heated oxygen sensor bank 1 sensor 2 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LF3)** .

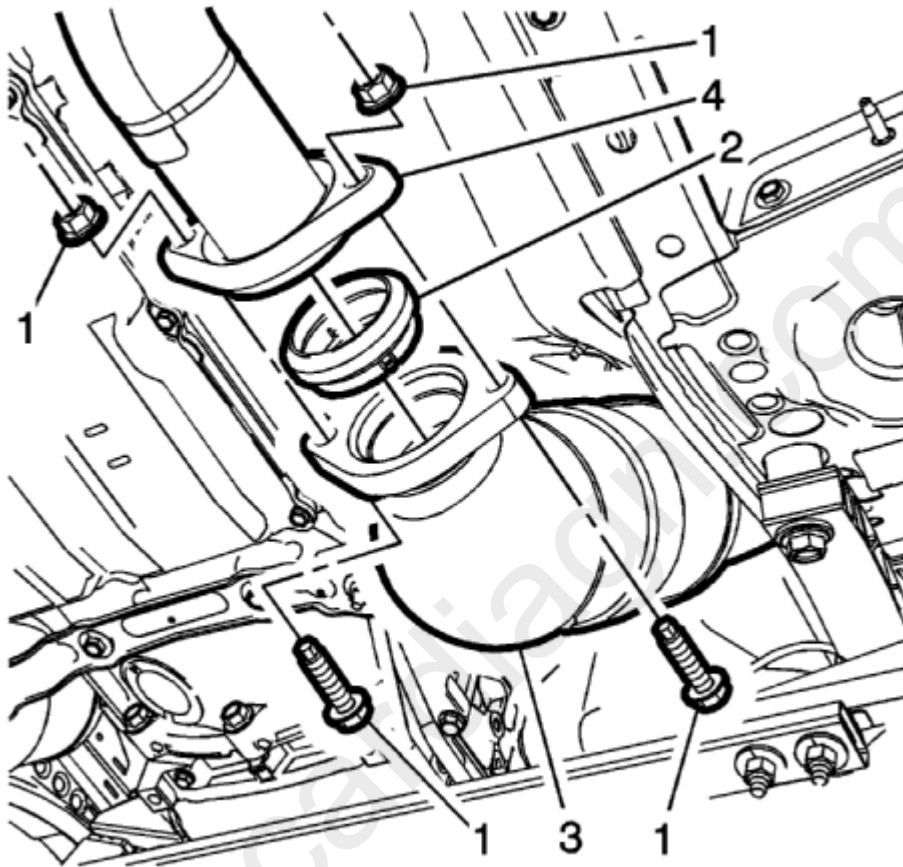


Fig. 61: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

5. Remove the exhaust muffler fasteners (1) and remove the exhaust muffler (4) from the right catalytic converter (3).
6. DISCARD the exhaust muffler gasket (2).

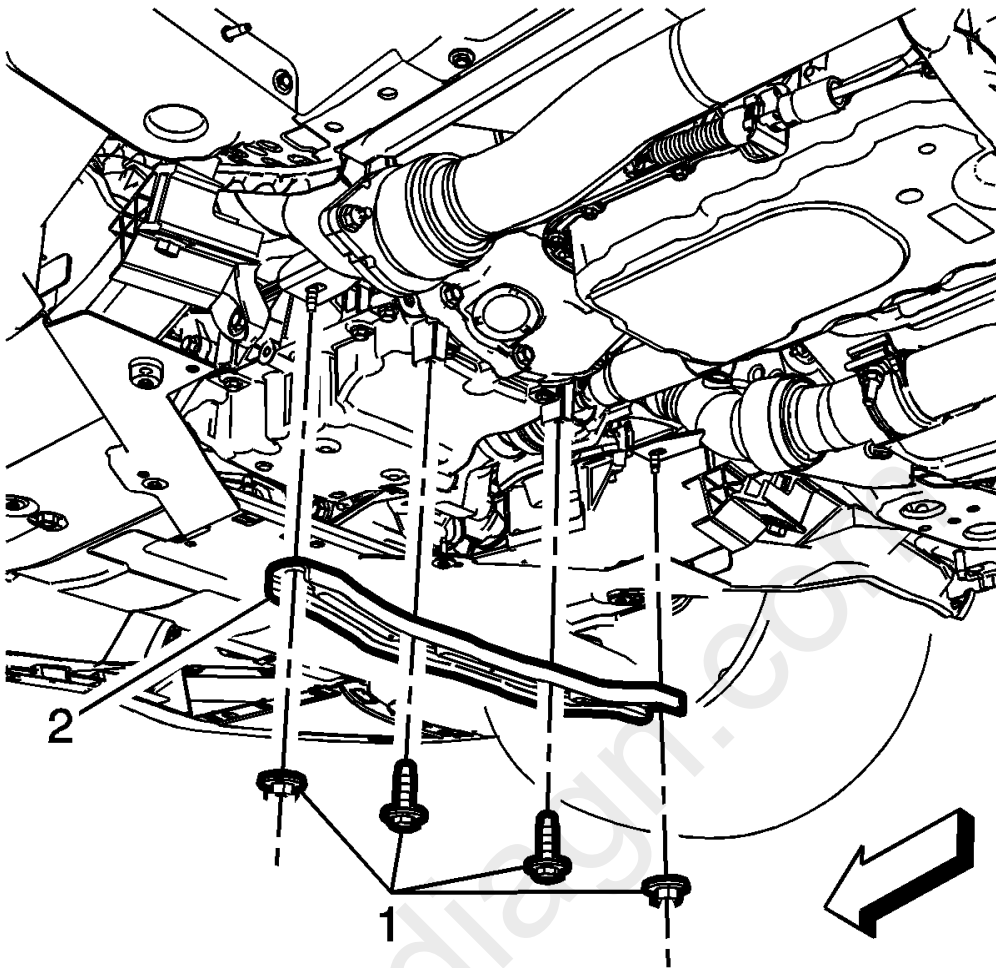


Fig. 62: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

7. Remove the catalytic converter brace bracket fasteners (1) and remove the catalytic converter brace bracket (2).

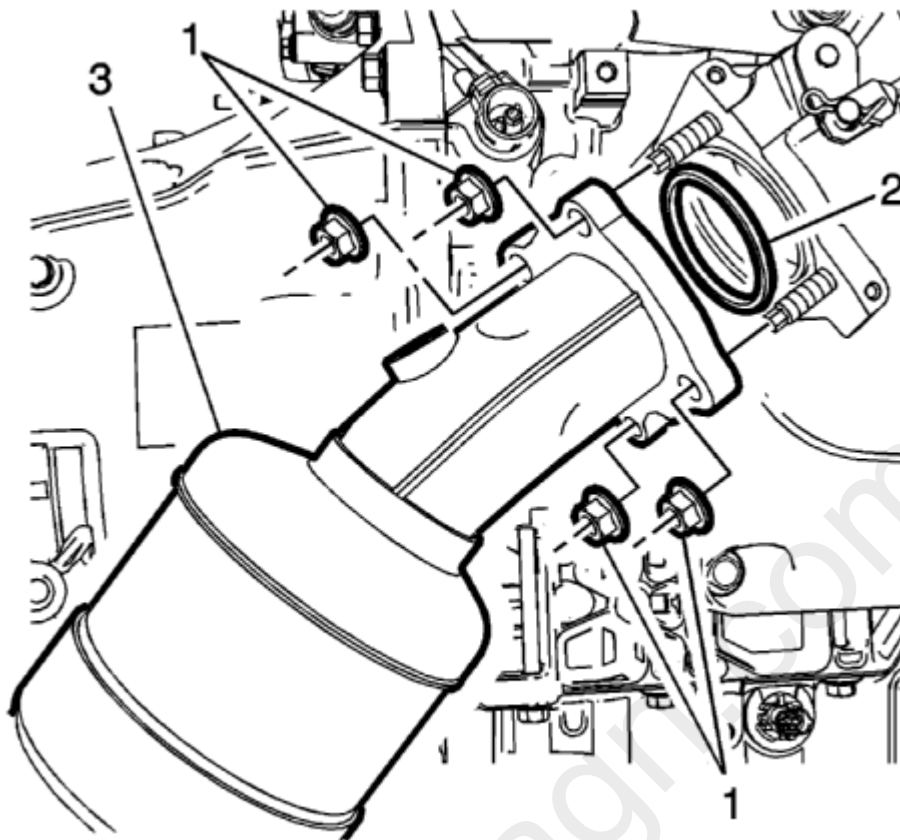


Fig. 63: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

8. Remove the right catalytic converter fasteners (1) and remove the catalytic converter (3) from the engine compartment.
9. DISCARD the exhaust gasket (2).
10. If replacing the right catalytic converter, transfer the heated oxygen sensors. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LF3)** , and **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LF3)** .

Installation Procedure

1. Clean all mating surfaces.

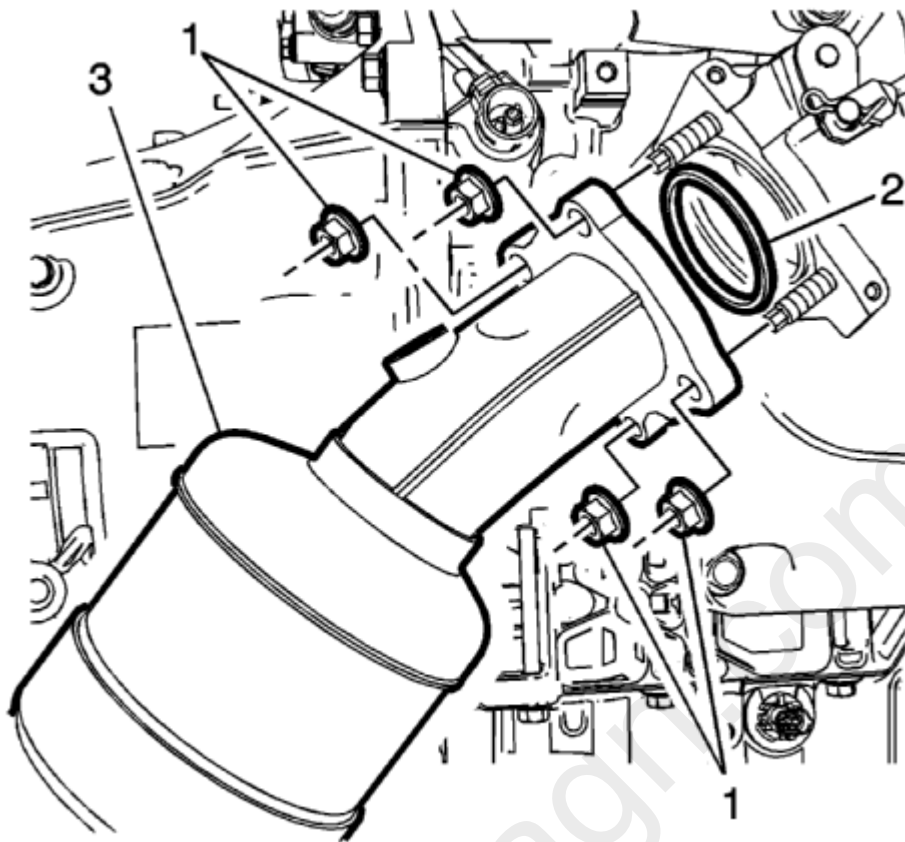


Fig. 64: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

2. Install the right catalytic converter (3) to the cylinder head with a NEW gasket (2) and loosely tighten the fasteners (1).

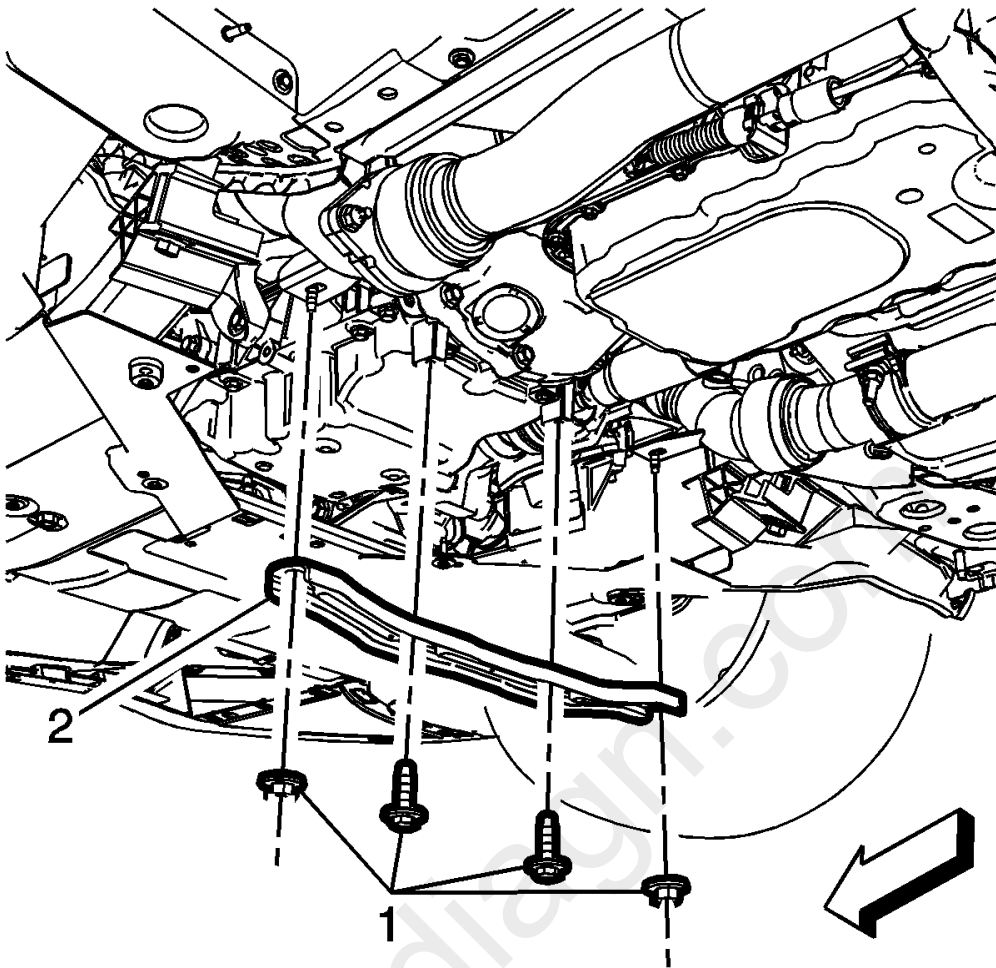


Fig. 65: Catalytic Converter Brace Bracket
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the catalytic converter brace bracket (2) and tighten the fasteners (1) to 22 (16 lb ft).
4. Connect the heated oxygen sensor bank 1 sensor 2 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LF3)** .

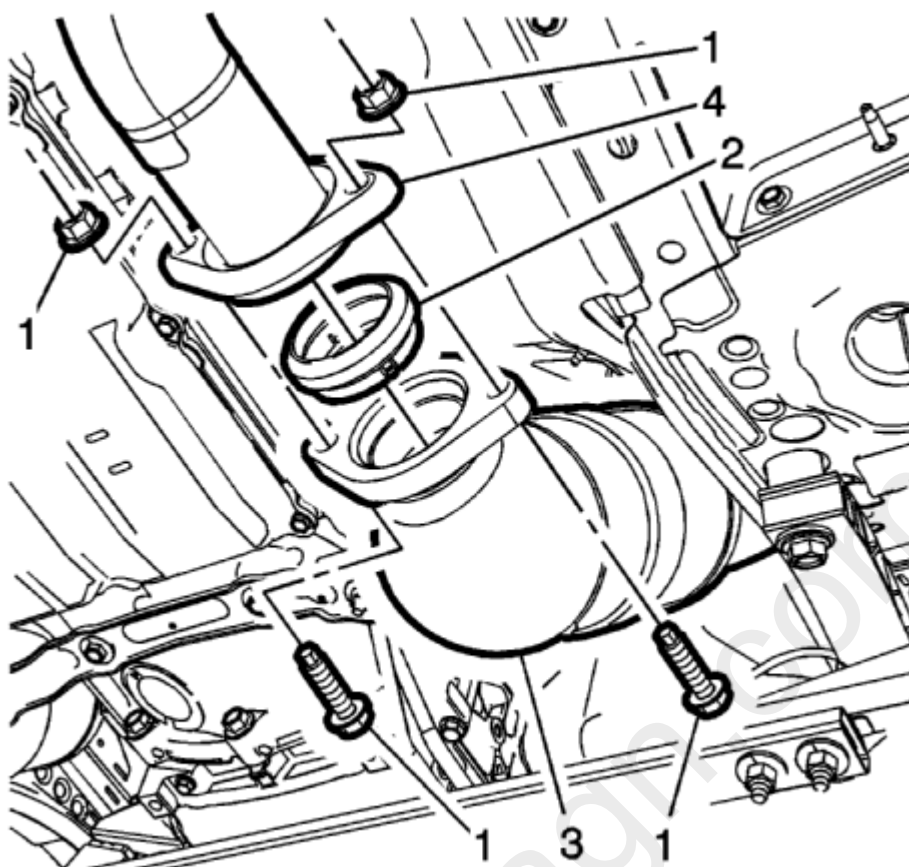


Fig. 66: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

5. Install the exhaust muffler (4) to the right catalytic converter (3) with a NEW gasket (2). Tighten the fasteners (1) to 50 (37 lb ft).

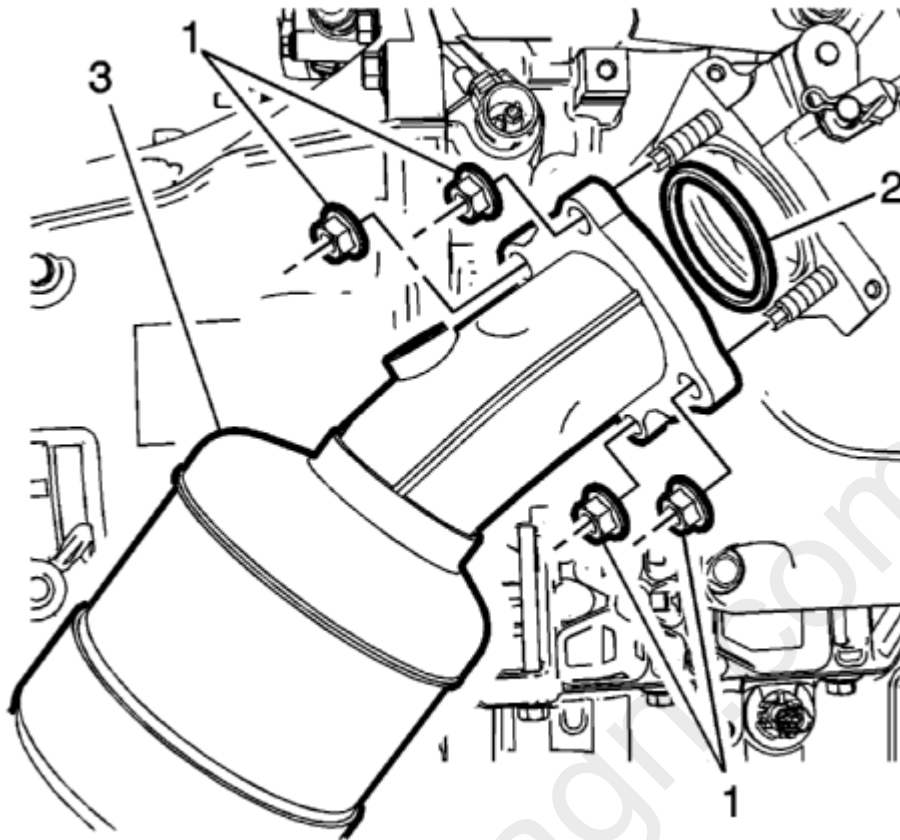


Fig. 67: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

6. Tighten the catalytic converter fasteners (1) to 46 (34 lb ft).
7. Lower the vehicle.
8. Connect the heated oxygen sensor bank 1 sensor 1 electrical wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LF3)** .
9. Start the engine and check for exhaust leaks.

EXHAUST REAR MUFFLER REAR HANGER REPLACEMENT

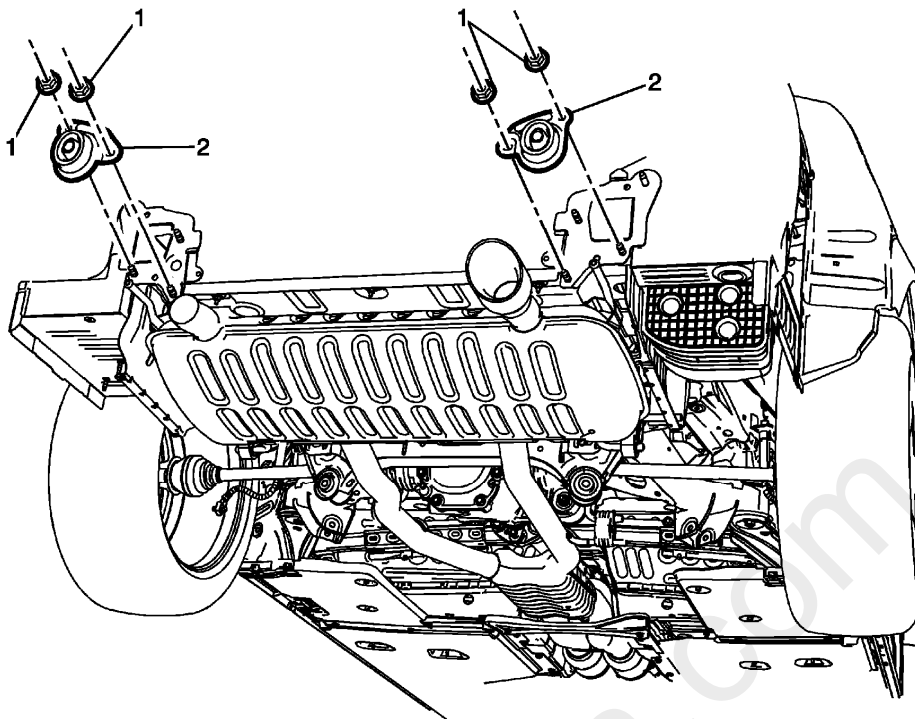


Fig. 68: Exhaust Rear Muffler Rear Hanger
 Courtesy of GENERAL MOTORS COMPANY

Exhaust Rear Muffler Rear Hanger Replacement

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
Preliminary Procedure	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Remove the rear bumper fascia. Refer to <u>Rear Bumper Fascia Replacement</u> .	
1	Exhaust Rear Muffler Hanger Bracket Fasteners (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 40 (30 lb ft)
2	Exhaust Rear Muffler Hanger Brackets (Qty: 2)

EXHAUST MUFFLER 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 .
2. Remove the rear bumper fascia. Refer to Rear Bumper Fascia Replacement .

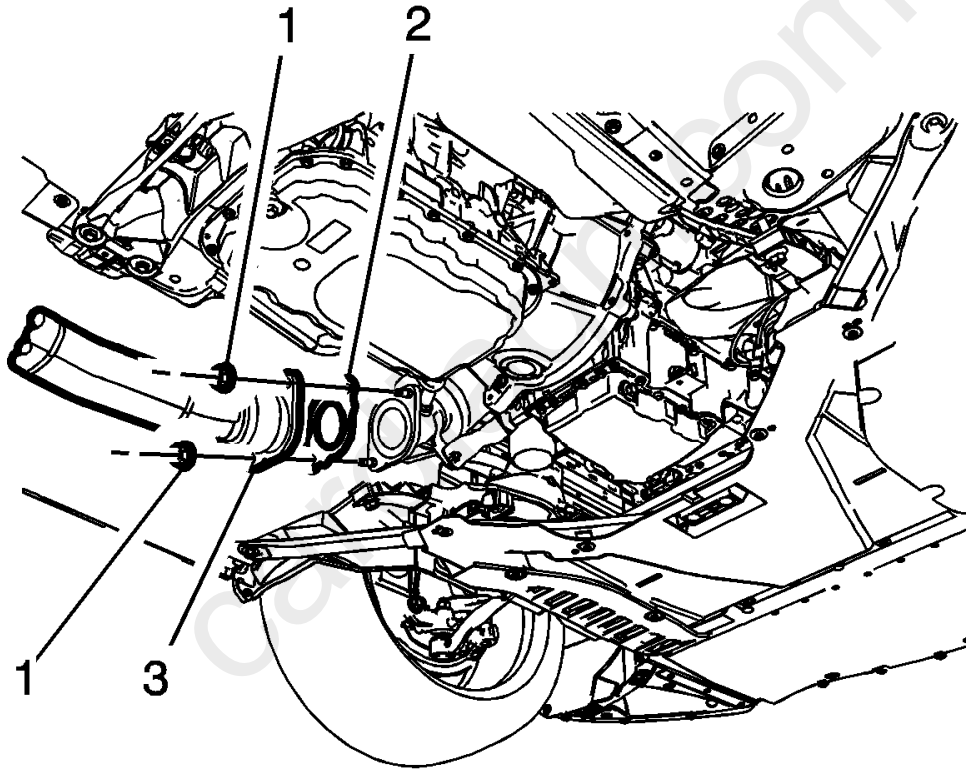


Fig. 69: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

3. Remove the catalytic converter fasteners (1) and remove the exhaust muffler (3).
4. Discard the catalytic converter gasket (2).
5. Support the front exhaust muffler pipe (3) with mechanics wire.

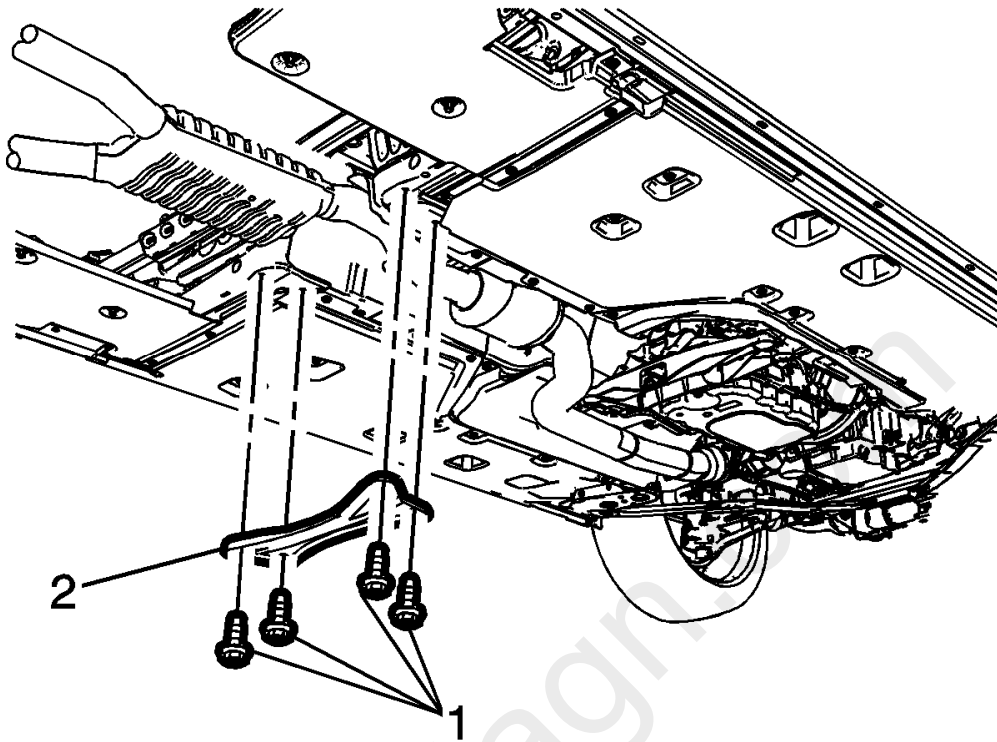


Fig. 70: Floor Panel Crossbar
Courtesy of GENERAL MOTORS COMPANY

6. Remove the floor panel crossbar fasteners (1) and remove the floor panel crossbar (2).

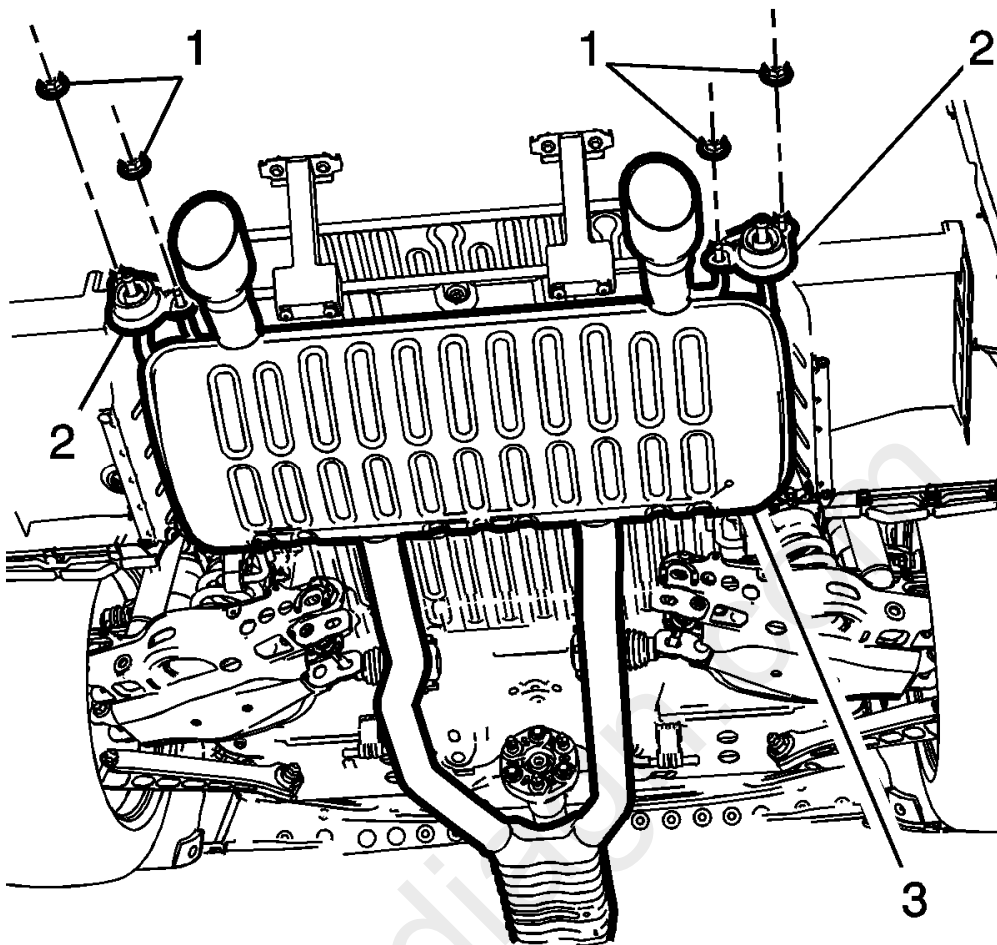


Fig. 71: Rear Exhaust Isolator Bracket Fasteners
Courtesy of GENERAL MOTORS COMPANY

7. Remove the rear exhaust isolator bracket fasteners (1) and remove the exhaust muffler (3) with the exhaust isolators (2).

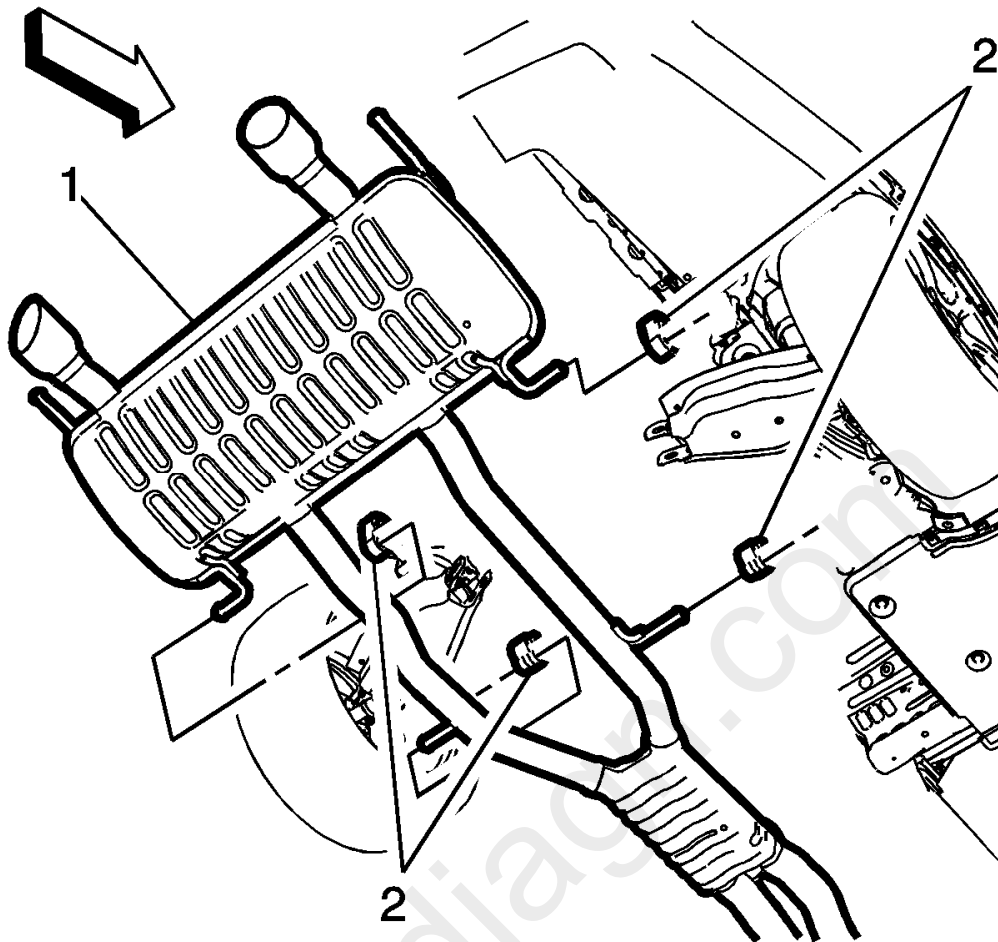


Fig. 72: Exhaust Muffler
Courtesy of GENERAL MOTORS COMPANY

8. Disengage the exhaust muffler (1) from the exhaust isolators (2) by pulling the exhaust system forward.

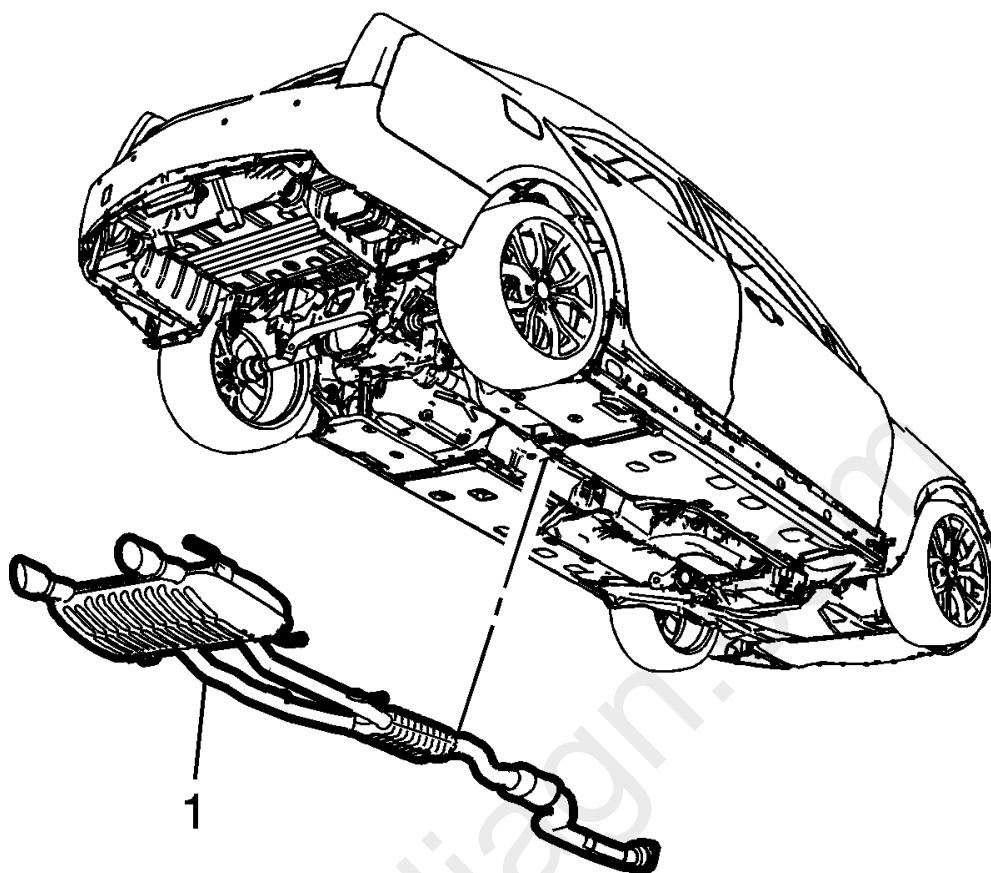


Fig. 73: Exhaust Muffler
Courtesy of GENERAL MOTORS COMPANY

9. With the aid of a second technician, lower the exhaust muffler (1) to the floor.

Installation Procedure

1. Clean the exhaust muffler mating surfaces.

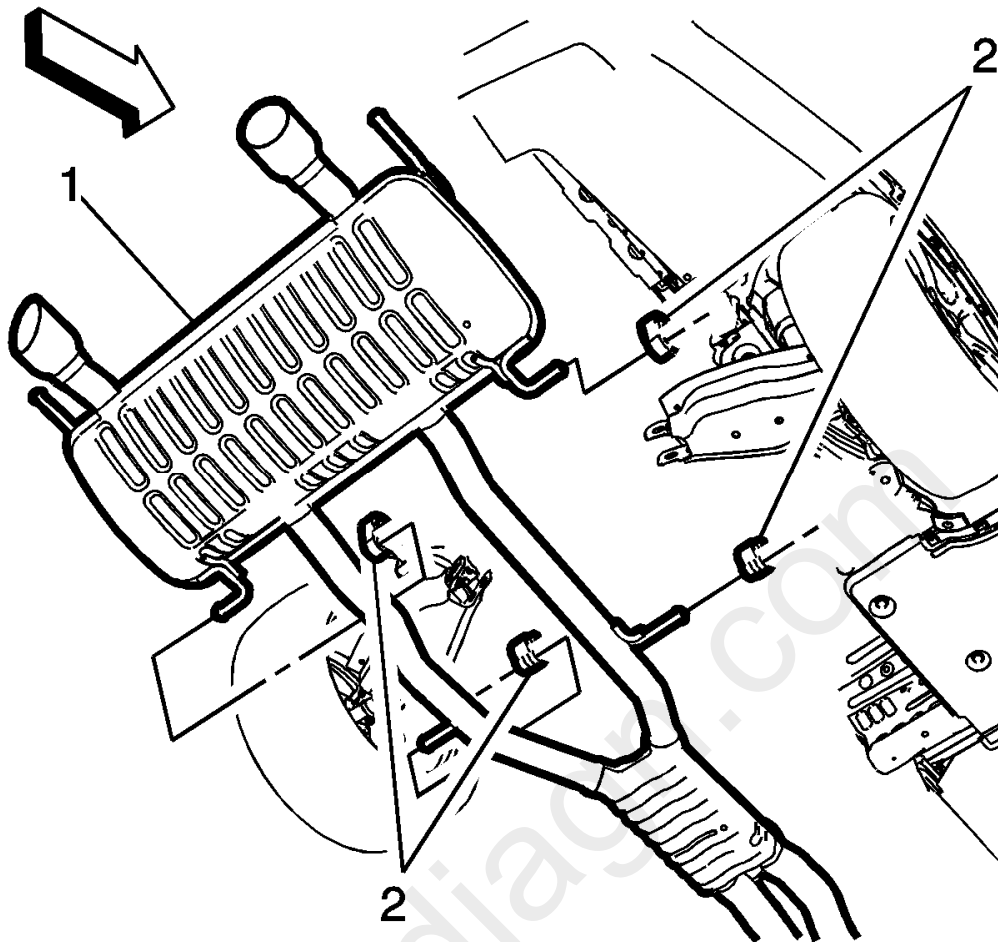


Fig. 74: Exhaust Muffler
Courtesy of GENERAL MOTORS COMPANY

2. Install the rear exhaust muffler (1) into the exhaust isolators (2).

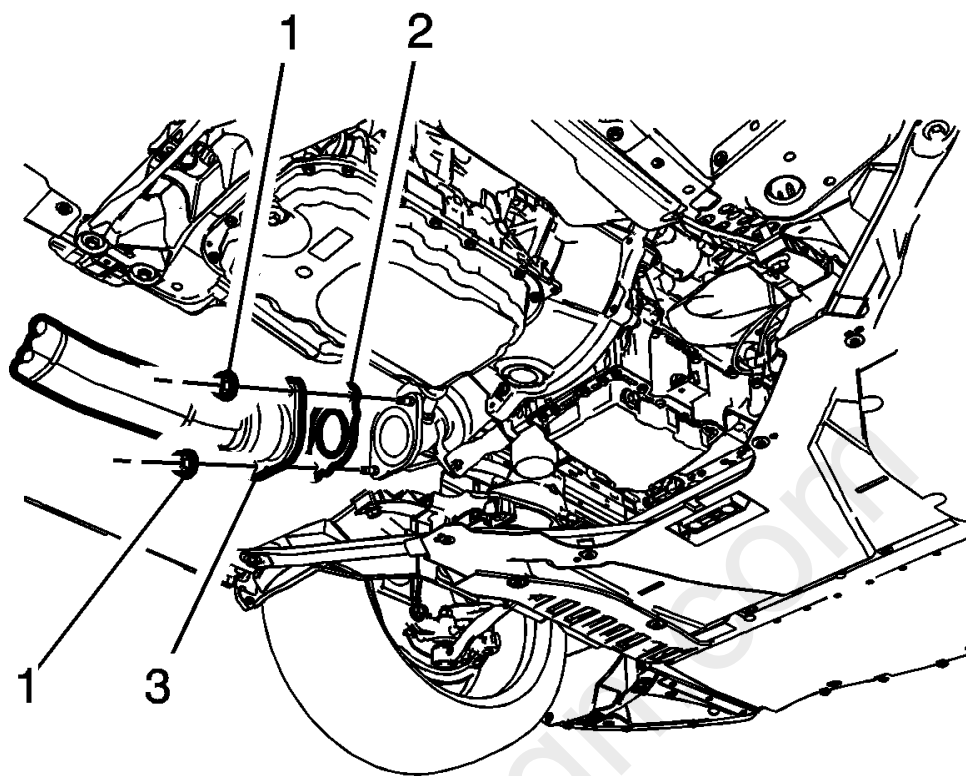


Fig. 75: Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

3. Install the exhaust muffler (3) to the catalytic converter with a NEW gasket (2). Tighten the fasteners (1) to 50 (37 lb ft).

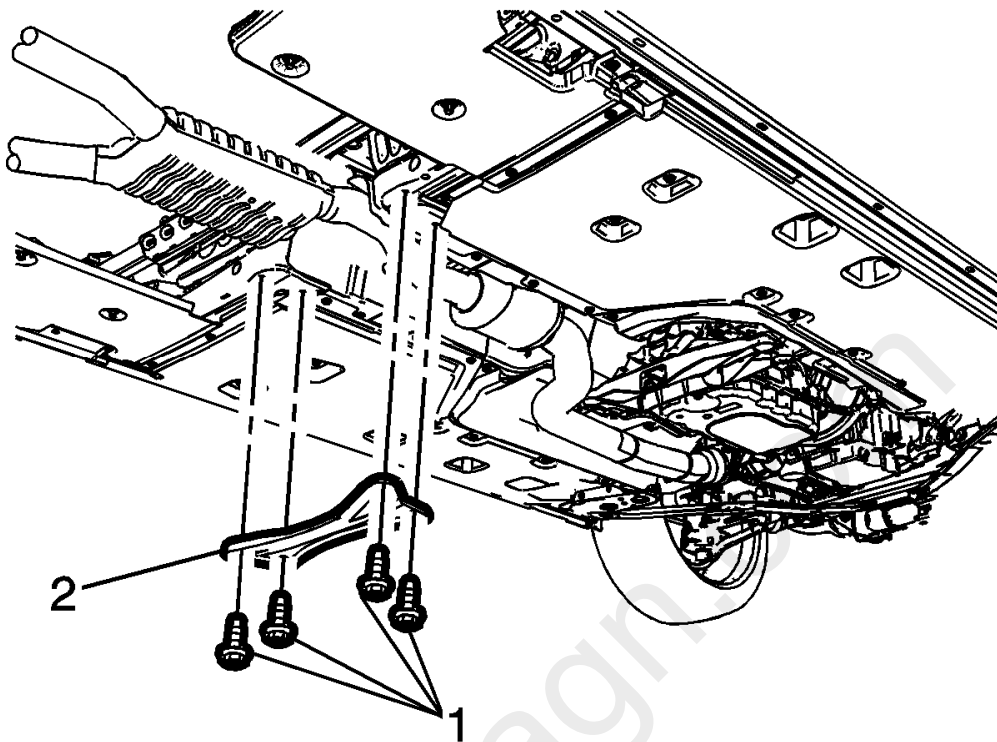


Fig. 76: Floor Panel Crossbar
Courtesy of GENERAL MOTORS COMPANY

4. Install the floor panel crossbar (2) and tighten the fasteners (1) to 22 (16 lb ft).

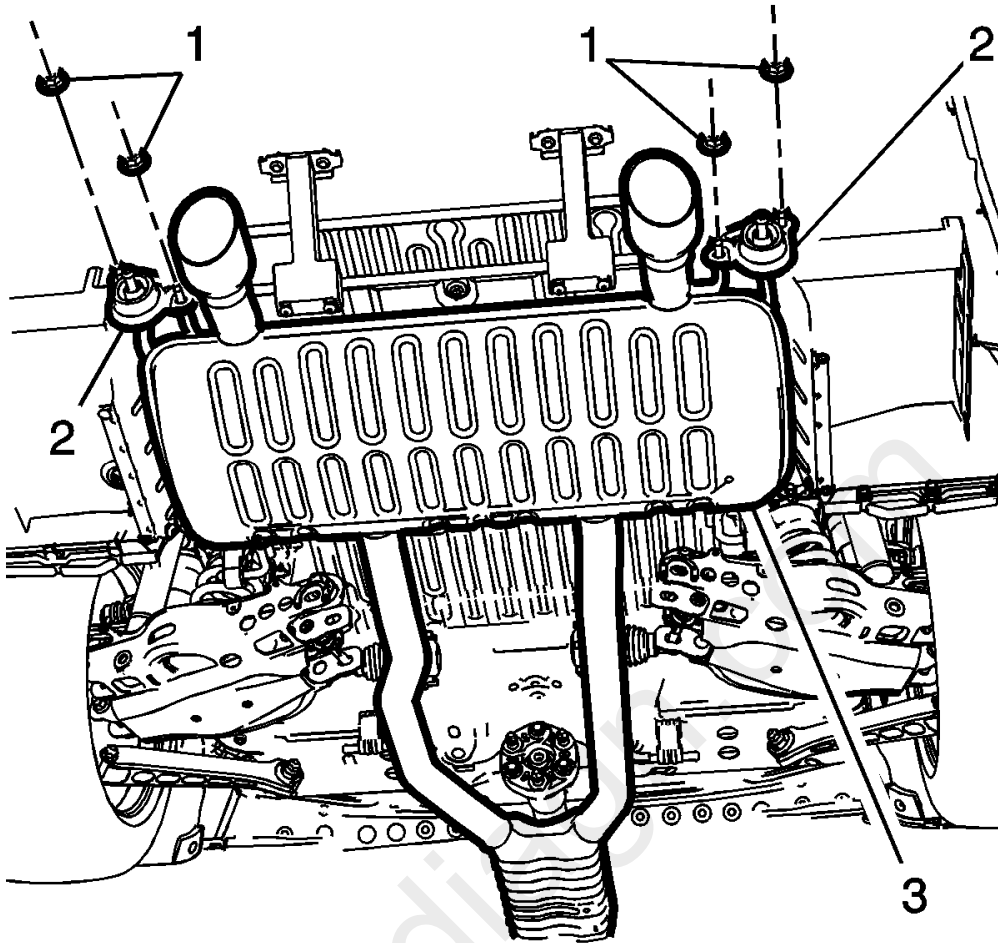


Fig. 77: Rear Exhaust Isolator Bracket Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Install the rear exhaust isolator brackets (2) to the frame and tighten the fasteners (1) to 40 (30 lb ft).
6. Install the rear bumper fascia. Refer to **Rear Bumper Fascia Replacement** .
7. Lower the vehicle.
8. Start the engine and check for exhaust leaks.

INTERMEDIATE BODY EXHAUST HEAT SHIELD REPLACEMENT

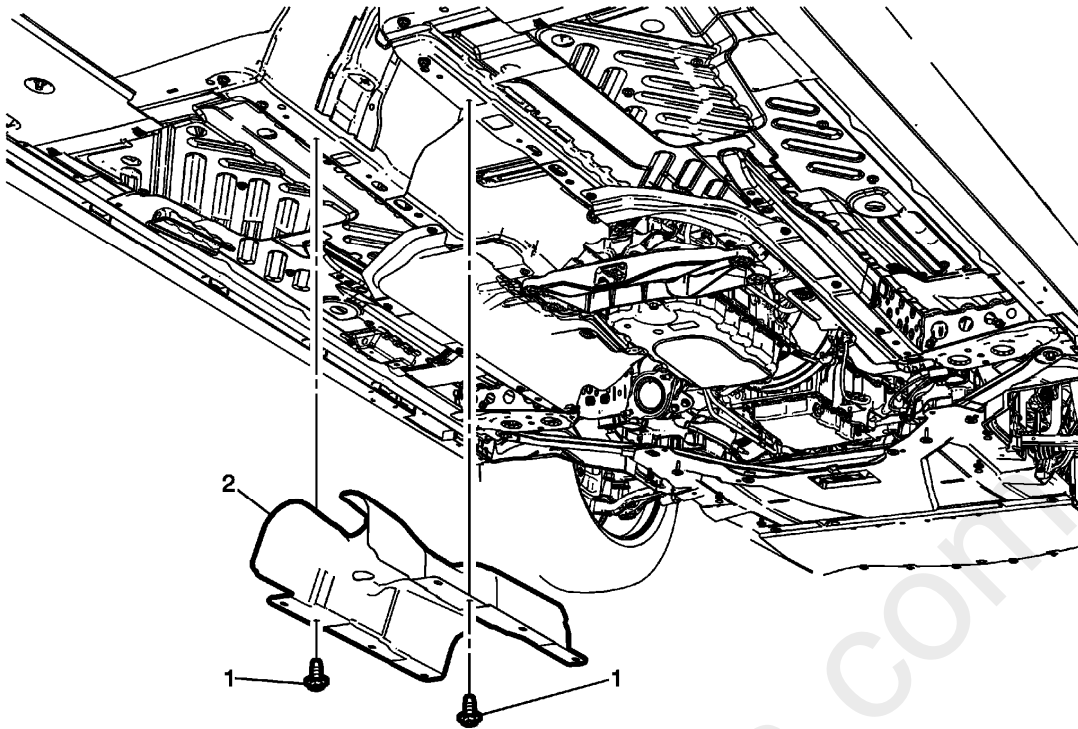


Fig. 78: Intermediate Body Exhaust Heat Shield
 Courtesy of GENERAL MOTORS COMPANY

Intermediate Body Exhaust Heat Shield Replacement

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
WARNING: Refer to <u>Eye Protection Warning</u> .	
Preliminary Procedures	
1. Remove the right side underbody front air deflector. Refer to <u>Underbody Front Air Deflector Replacement - Right Side</u> . 2. Remove the left side underbody front air deflector. Refer to <u>Underbody Front Air Deflector Replacement - Left Side</u> . 3. Lower the muffler. Refer to <u>Exhaust Muffler Replacement (LTG)</u> , or <u>Exhaust System Replacement (LF3)</u> , <u>Exhaust System Replacement (LFX)</u> .	
1	Intermediate Body Exhaust Heat Shield Fastener (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> .

	Tighten 9 (80 lb in)
2	Intermediate Body Exhaust Heat Shield

FRONT BODY EXHAUST HEAT SHIELD REPLACEMENT (RIGHT)

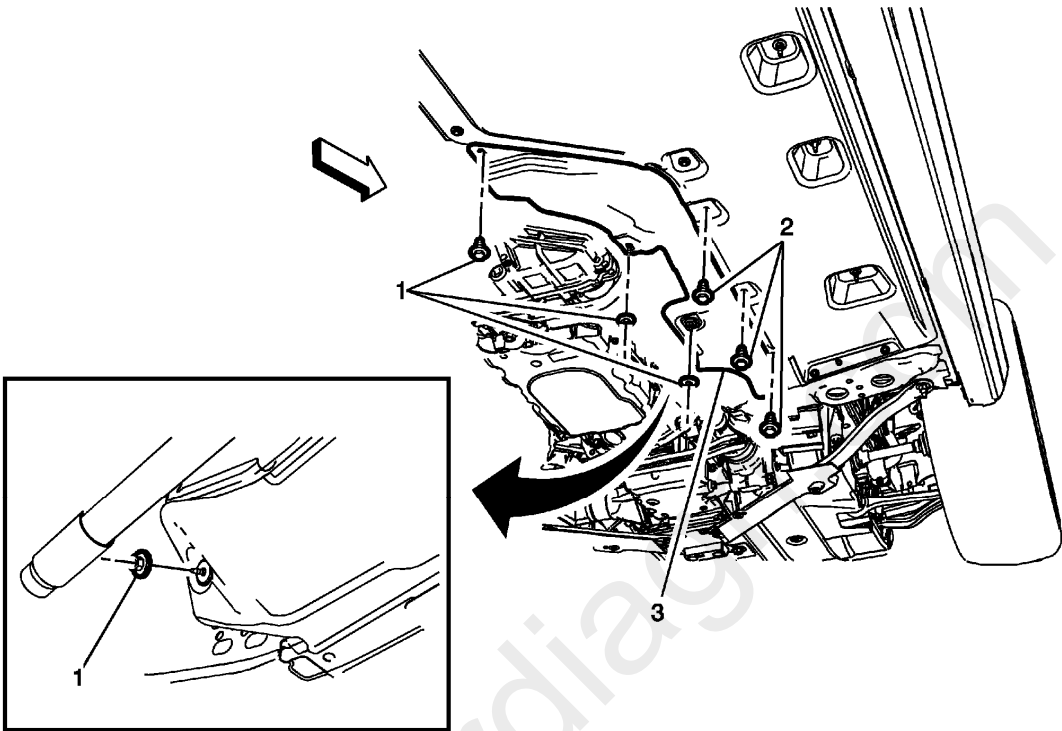


Fig. 79: Front Body Exhaust Heat Shield (Right)
 Courtesy of GENERAL MOTORS COMPANY

Front Body Exhaust Heat Shield Replacement (Right)

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
Preliminary Procedure Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
1	Front Body Exhaust Heat Shield - Right Fastener (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 (80 lb in)

2	Front Air Deflector Fastener (Qty: 3) Tighten 9 (80 lb in)
3	Front Body Exhaust Heat Shield - Right

FRONT BODY EXHAUST HEAT SHIELD REPLACEMENT (LEFT)

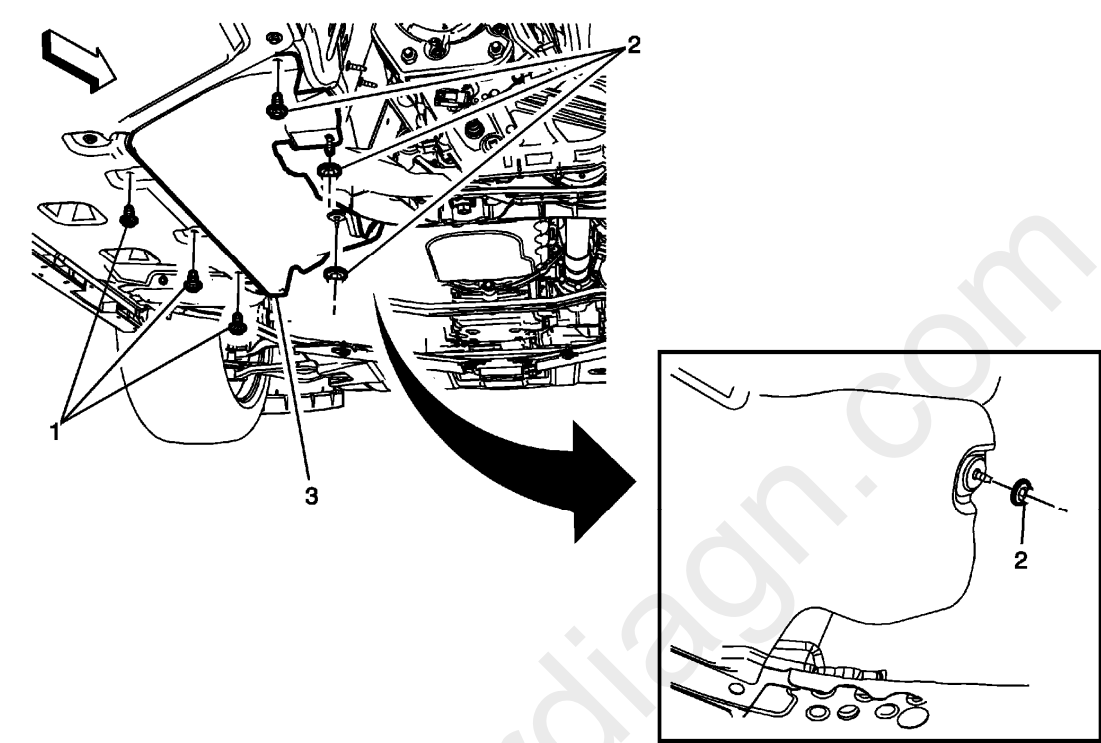


Fig. 80: Front Body Exhaust Heat Shield (Left)
 Courtesy of GENERAL MOTORS COMPANY

Front Body Exhaust Heat Shield Replacement (Left)

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
Preliminary Procedure Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
1	Front Air Deflector Fastener (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 (80 lb in)

2	Front Body Exhaust Heat Shield - Left Fastener (Qty: 4) Tighten 9 (80 lb in)
3	Front Body Exhaust Heat Shield - Left

FRONT AXLE PROPELLER SHAFT HEAT SHIELD REPLACEMENT

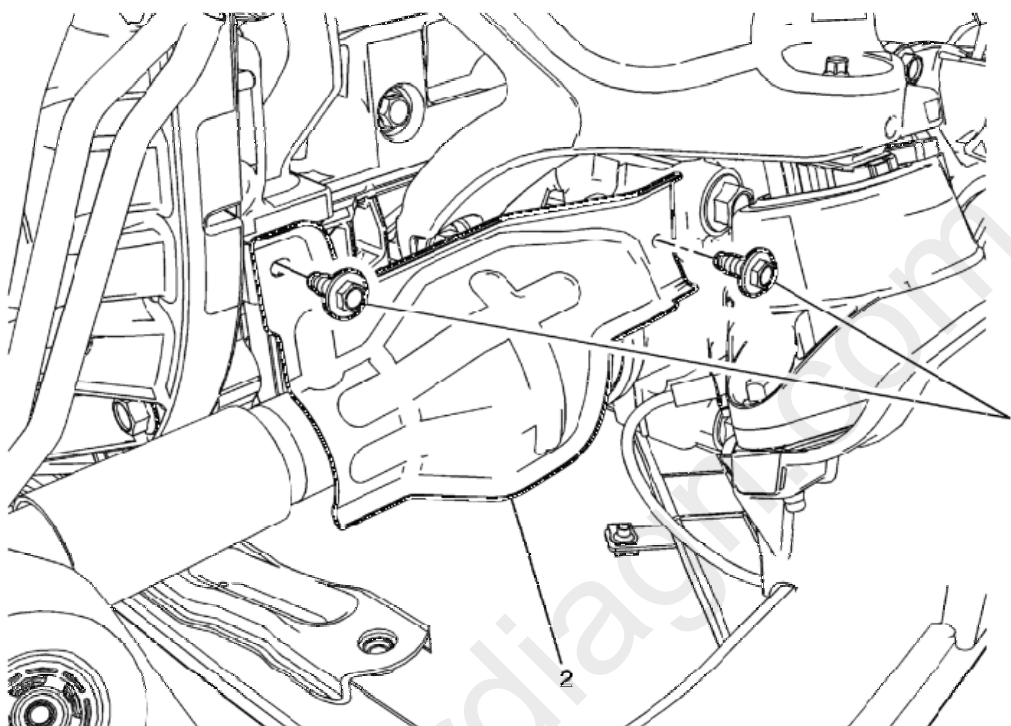


Fig. 81: Front Axle Propeller Shaft Heat Shield
Courtesy of GENERAL MOTORS COMPANY

Front Axle Propeller Shaft Heat Shield

Callout	Component Name
1	Front Axle Propeller Shaft Heat Shield Fasteners (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 (80 lb in)
2	Front Axle Propeller Shaft Heat Shield

SERVICE INFORMATION

Preliminary Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Remove the front compartment lower noise shield. Refer to Front Compartment Lower Noise Shield Replacement (AWD) , Front Compartment Lower Noise Shield Replacement (RWD) .

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT (LTG)

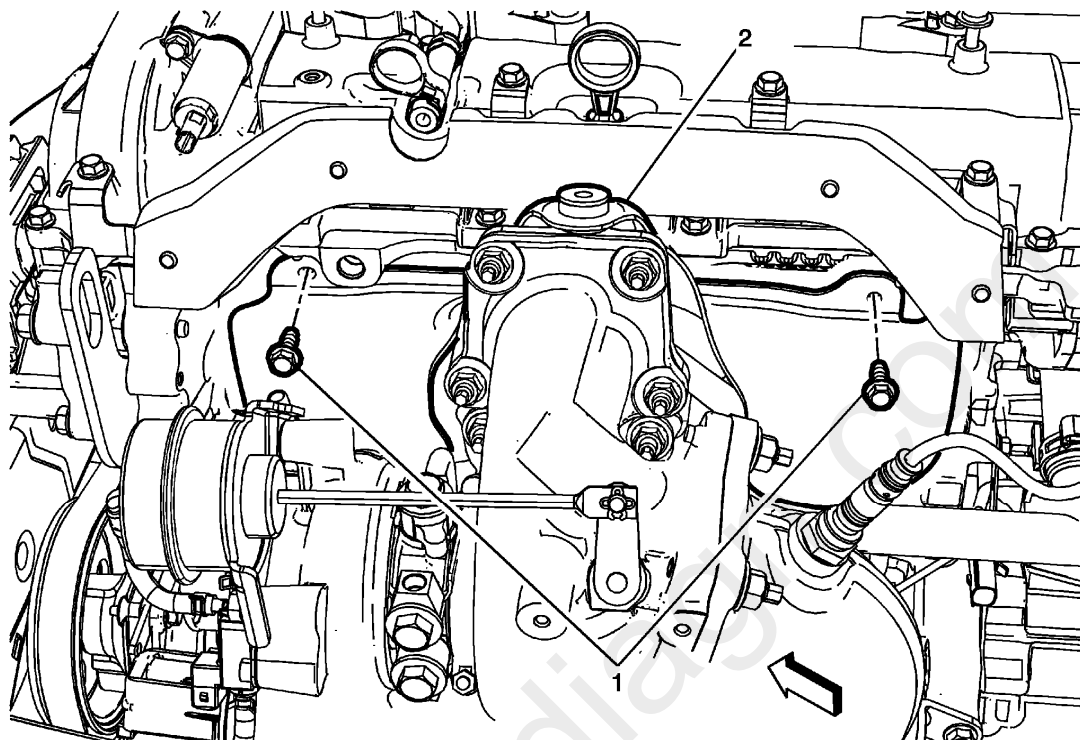


Fig. 82: Exhaust Manifold Heat Shield (LTG)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Heat Shield Replacement (LTG)

Callout	Component Name
WARNING: Refer to <u>Hot Exhaust System Warning</u> .	
Preliminary Procedure Remove the turbocharger. Refer to <u>Turbocharger Replacement</u> .	
1	Exhaust Manifold Heat Shield Fasteners (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 14 (10 lb ft)
2	Exhaust Manifold Heat Shield

TURBOCHARGER HEAT SHIELD REPLACEMENT (LF3 BANK 1)

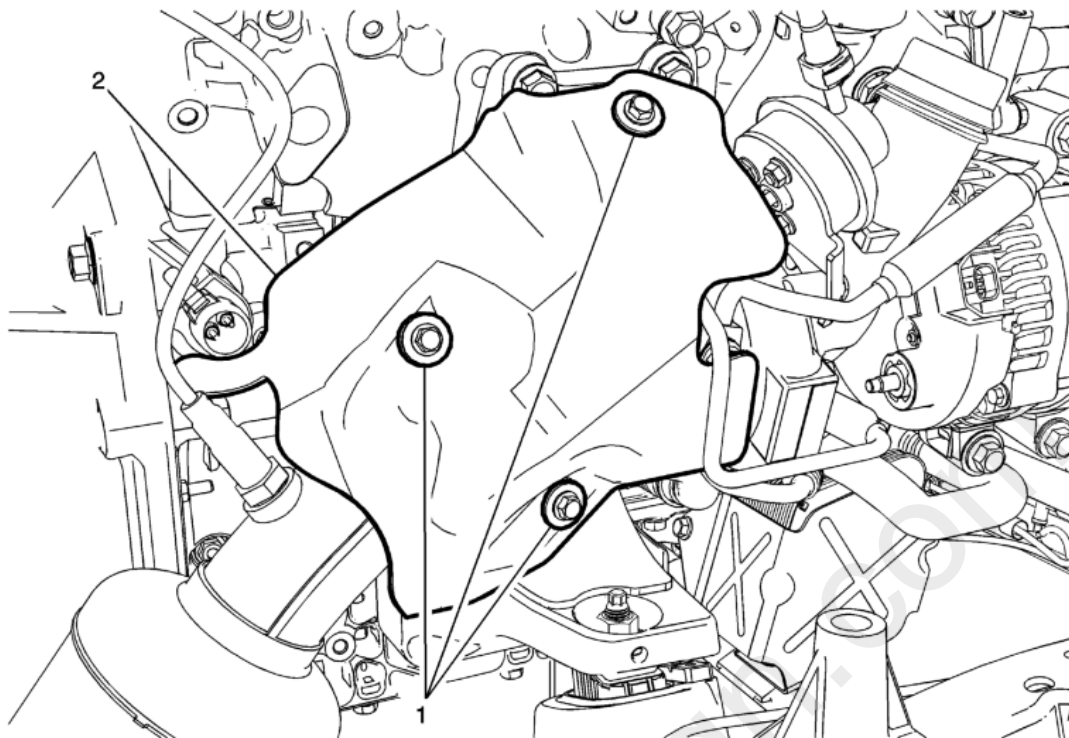


Fig. 83: Turbocharger Heat Shield (LF3 Bank 1)
Courtesy of GENERAL MOTORS COMPANY

Turbocharger Heat Shield Replacement (LF3 Bank 1)

Callout	Component Name
Preliminary Procedures Remove the radiator surge tank. Refer to <u>Radiator Surge Tank Replacement (LFX, LF3)</u> .	
1	Turbocharger Heat Shield Fasteners (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 (80 lb in)
2	Turbocharger Heat Shield

TURBOCHARGER HEAT SHIELD REPLACEMENT (LF3 BANK 2)

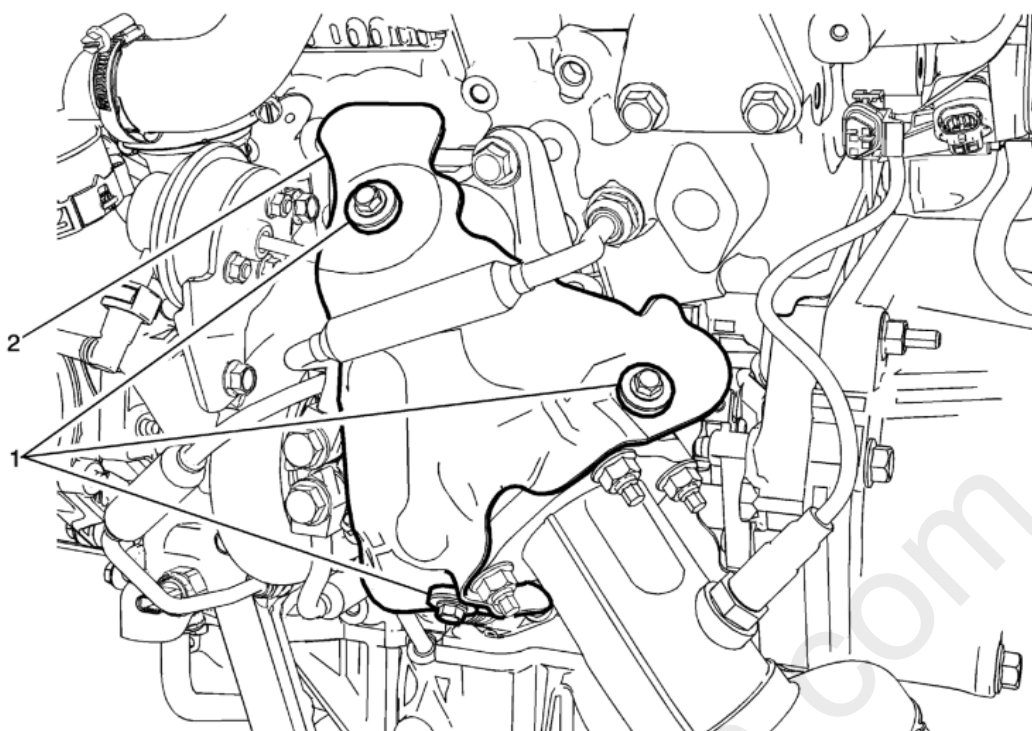


Fig. 84: Turbocharger Heat Shield (LF3 Bank 2)
 Courtesy of GENERAL MOTORS COMPANY

Turbocharger Heat Shield Replacement (LF3 Bank 2)

Callout	Component Name
1	Turbocharger Heat Shield Fasteners (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 (80 lb in)
2	Turbocharger Heat Shield

DESCRIPTION AND OPERATION

EXHAUST SYSTEM DESCRIPTION

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

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

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

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

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

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

The exhaust system may be comprised of the following components:

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

Resonator

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

Catalytic Converter

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

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

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

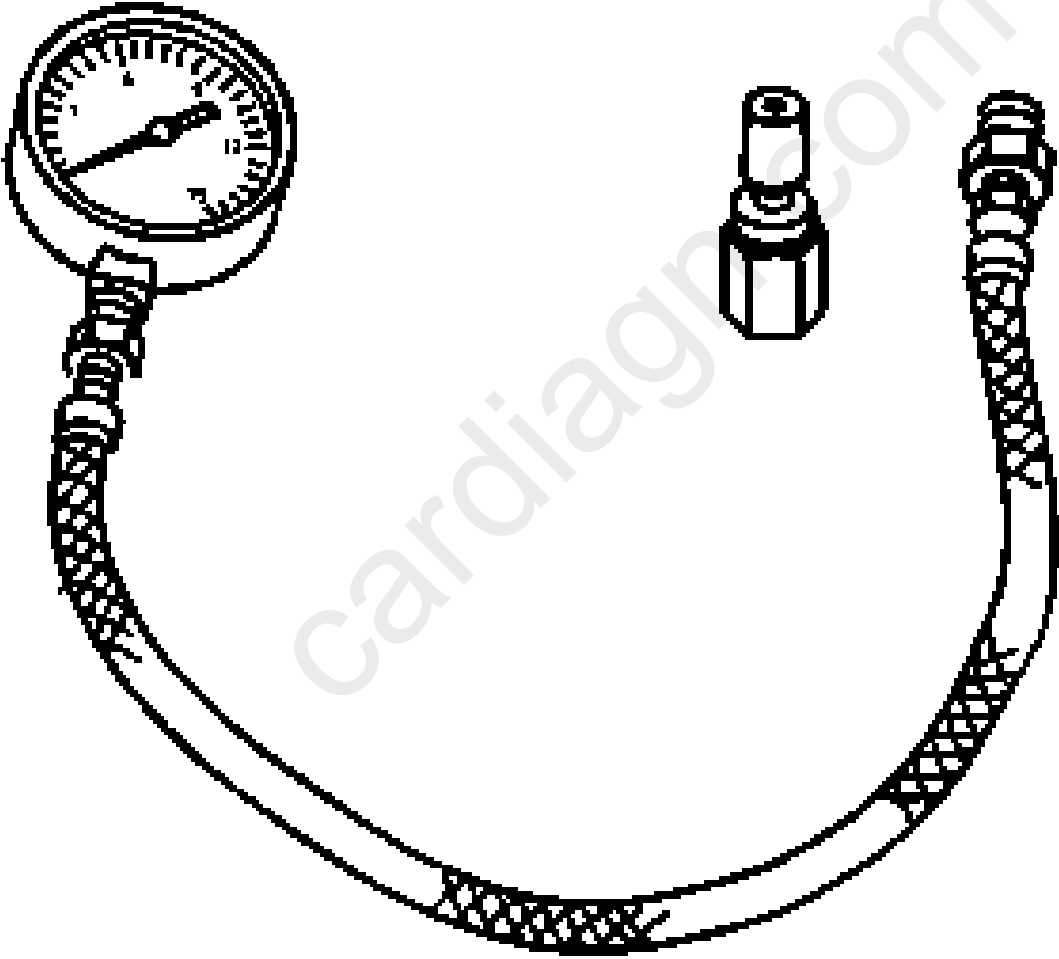
The catalyst in the converter is not serviceable.

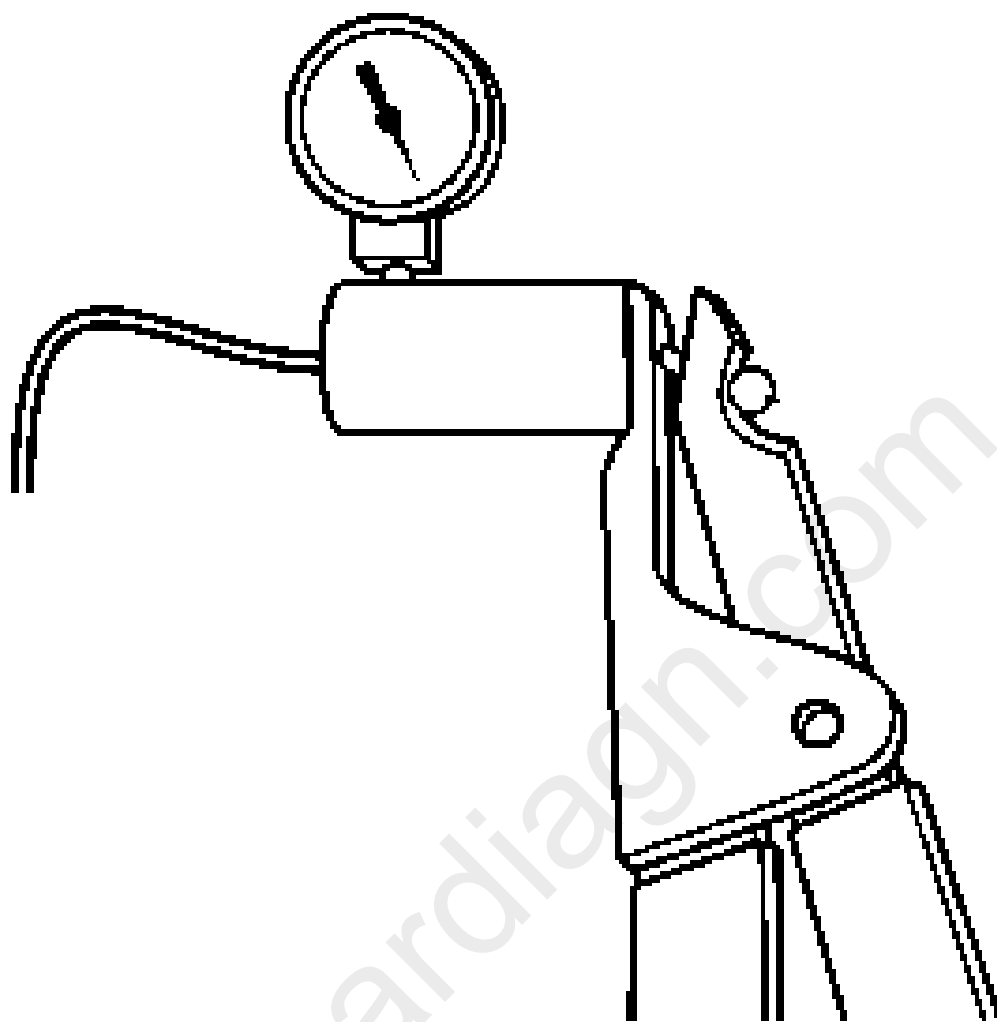
Muffler

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

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

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



J 35555
Vacuum
Pump