

Engine

Exhaust - CTS Coupe & Wagon

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Catalytic Converter Nut (LSA)	50 N.m	37 lb ft
Catalytic Converter Nut (LFW/LFX)-First Pass	20 N.m	15 lb ft
Catalytic Converter (LFW/LFX)-Final Pass	46 N.m	34 lb ft
Exhaust Cylinder Head Studs (LFW/LFX)	22 N.m	16 lb ft
Exhaust Hanger Mounting Bracket Bolts (LFW/LFX)	22 N.m	16 lb ft
Exhaust Hanger Mounting Bracket Bumper Nuts	22 N.m	16 lb ft
Exhaust Manifold Bolt (LFW)	20 N.m	15 lb ft
Exhaust Manifold Heat Shield Bolt (LP1, LFX, LFW)	10 N.m	89 lb in
Exhaust Manifold Heat Shield Bolt (LSA)	9 N.m	80 lb in
Exhaust Pipe Front Hanger Bracket Bolt (LFW/LFX - AWD)	65 N.m	48 lb ft
Exhaust Pipe Front Hanger Bracket Bolt (LFW/LFX - RWD)	22 N.m	16 lb ft
Exhaust Pipe Nut	17 N.m	13 lb ft
Floor Panel Tunnel Brace Bolt	25 N.m	18 lb ft

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

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** Exhaust Back Pressure 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 <u>Symptoms - Engine Exhaust</u>
3	Is the system equipped with dual exhaust?	-	Go to Diagnostic Aids	Go to Step 4

4	1. Remove the heated oxygen sensor (HO2S) that is in front of the catalytic converter. Refer <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 1</u> , or <u>Heated Oxygen Sensor Replacement - Bank 2 Sensor 1</u> . 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. 5. Observe the exhaust system back pressure reading on the gauge. Does the reading exceed the specified value?	9 kPa (1.25 psi)	Go to Step 5	Go to Step 8
5	1. Turn the engine off and place the ignition in the lock position. 2. Remove the J 35314-A Exhaust Back Pressure Gauge. 3. Re-install the HO2S sensor. Refer to <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 1</u> , or <u>Heated Oxygen Sensor Replacement - Bank 2 Sensor 1</u> . 4. Remove the post-catalyst HO2S sensor. Refer to <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 2</u> , or <u>Heated Oxygen Sensor Replacement - Bank 2 Sensor 2</u> . 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 2,500 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 catalyst 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?	-		Replace the exhaust muffler or resonator. Refer to <u>Exhaust System Replacement (LSA-Coupe), Exhaust System Replacement (LSA-Wagon), Exhaust System Replacement (Single Exhaust), Exhaust System Replacement (LFX/LFW-Coupe), Exhaust System Replacement (LFX/LFW-Wagon).</u> Go to Step 8
7	Replace the catalytic converter. Refer to <u>Catalytic Converter Replacement - Left Side (LSA), Catalytic Converter Replacement - Left Side (LFW,LFX), or Catalytic Converter Replacement - Right Side (LFW,LFX), Catalytic Converter Replacement - Right Side (LSA).</u> Did you find and correct the condition?	-		-
8	1. Remove the J 35314-A Exhaust Back Pressure Gauge. 2. Reinstall the applicable HO2S sensor. Refer to <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 2</u> , or <u>Heated Oxygen Sensor Replacement - Bank 2 Sensor 2</u> . 3. Clear any codes. 4. Road test the vehicle in order to verify the repair. Did you correct the condition?	-		System OK Go to Step 2

EXHAUST LEAKAGE

Exhaust Leakage

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Condition	Action
WARNING: Refer to <u>Hot Exhaust System Warning</u> .	
DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand close to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise. Refer to <u>Symptoms - Engine Exhaust</u> prior to beginning this table.	
Misaligned or improperly installed exhaust system components	- Align and tighten the exhaust system components to the specifications. Refer to <u>Fastener Tightening Specifications</u>. - Ensure the exhaust hangers are in the proper locations and not loose. Refer to <u>Exhaust System Insulator, Hanger, Bracket Replacement</u>, or <u>Exhaust Hanger Mounting Bracket Replacement (LSA-Wagon)</u>, <u>Exhaust Hanger Mounting Bracket Replacement (LFX,LSA-Coupe)</u>.
Exhaust leaks at the following connections: - Exhaust manifold to pipe - Flanges - Pipe clamps	Tighten the components to the specifications. Refer to <u>Fastener Tightening Specifications</u> .
Seals or gaskets leaking; - Exhaust manifold to cylinder head - Exhaust pipes to exhaust manifold - Catalytic converter connection	Replace the leaking seal or gasket. Refer to the affected components procedure for service.
Irregularities at the mating surfaces on the flange connections	Repair as required or replace the affected component. Refer to the affected components procedure for service.
Exhaust manifold cracked or broken	Replace the exhaust manifold. Refer to <u>Exhaust Manifold Replacement - Left Side (LSA)</u> , or <u>Exhaust Manifold Replacement - Right Side (LSA)</u> .
Exhaust system component connection welds leaking	Replace the leaking component. Refer to the affected component's procedure for service.
Muffler or resonator, if equipped, damaged or leaking at the seams	Replace the affected muffler or resonator, if equipped. Refer to <u>Exhaust System Replacement (LSA-Coupe)</u> , <u>Exhaust System Replacement (LSA-Wagon)</u> , <u>Exhaust System Replacement (Single Exhaust)</u> , <u>Exhaust System Replacement (LFX/LFW-Coupe)</u> , <u>Exhaust System Replacement (LFX/LFW-Wagon)</u>

EXHAUST NOISE

Exhaust Noise

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Condition	Action
WARNING: Refer to <u>Hot Exhaust System Warning</u> .	
DEFINITION: An audible or physical noise due to a faulty component or damaged components causing a loose or misaligned exhaust system resulting in a rattle or vibration noise, i.e. buzz, groan, hum. Refer to <u>Symptoms - Engine Exhaust</u> prior to beginning this table.	
Popping or hissing noise	Exhaust leak-Refer to <u>Exhaust Leakage</u> .
Loud exhaust	1. Compare to a known good vehicle. 2. Inspect for a damaged or failed muffler or resonator, if equipped. 3. Replace the faulty muffler or resonator (if equipped). Refer to <u>Exhaust System Replacement (LSA-Coupe)</u>, <u>Exhaust System Replacement (LSA-Wagon)</u>, <u>Exhaust System Replacement (Single Exhaust)</u>, <u>Exhaust System Replacement (LFX/LFW-Coupe)</u>, <u>Exhaust System Replacement (LFX/LFW-Wagon)</u>.
External rattle or vibration noise	1. Inspect for a bent or loose hanger, loose heat shield, or loose clamp. 2. Inspect for a exhaust pipe causing interference. 3. Repair or replace the affected component. Refer to <u>Exhaust Pipe Front Hanger Bracket Replacement (AWD)</u>, or <u>Exhaust Hanger Mounting Bracket Replacement (LSA-Wagon)</u>, <u>Exhaust Hanger Mounting Bracket Replacement (LFX,LSA-Coupe)</u>.
Internal rattle	1. Test the components by tapping with a rubber mallet to confirm a rattle. 2. Replace the faulty catalytic converter, resonator, if equipped, or muffler. Refer to <u>Catalytic Converter Replacement - Left Side (LSA)</u>, <u>Catalytic Converter Replacement - Left Side (LFW,LFX)</u>, <u>Catalytic Converter Replacement - Right Side (LFW,LFX)</u>, <u>Catalytic Converter Replacement - Right Side (LSA)</u>, or <u>Exhaust System Replacement (LSA-Coupe)</u>, <u>Exhaust System Replacement (LSA-Wagon)</u>, <u>Exhaust System Replacement (Single Exhaust)</u>, <u>Exhaust System Replacement (LFX/LFW-Coupe)</u>, <u>Exhaust System Replacement (LFX/LFW-Wagon)</u>.

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (LSA)

Removal Procedure

1. Remove the engine sight shield. Refer to **Intake Manifold Cover Replacement - Front** .
2. Remove the left bank coil assembly. Refer to **Ignition Coil Replacement** .

3. Remove the left bank spark plugs. Refer to **Spark Plug Replacement** .
4. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

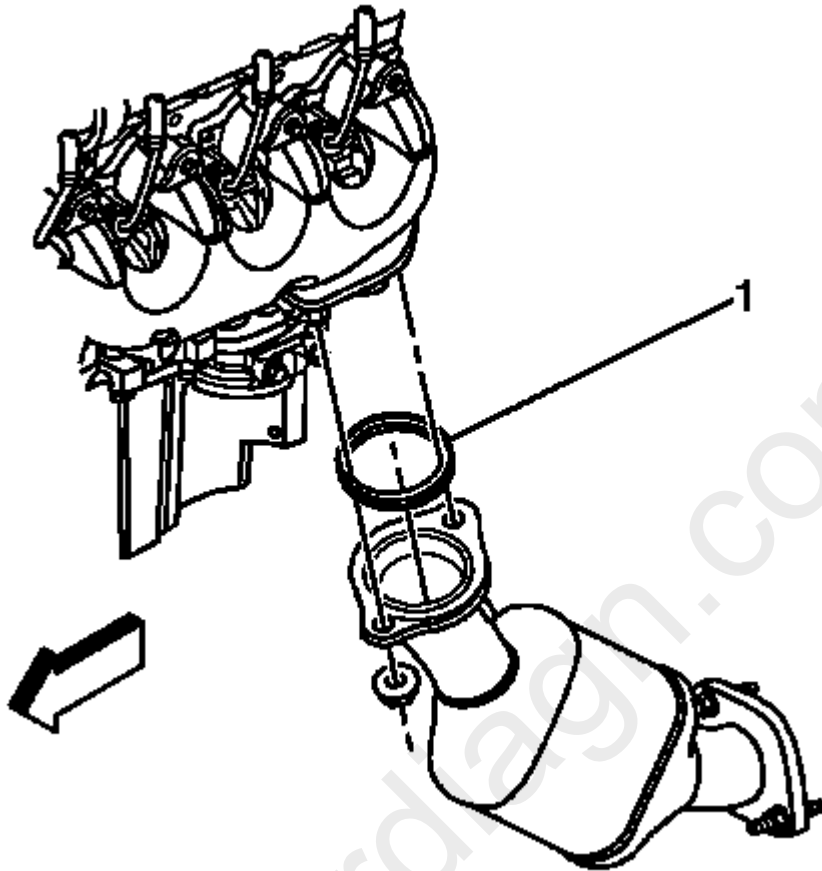


Fig. 1: Left Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

5. Remove the left catalytic converter and seal (1). Refer to **Catalytic Converter Replacement - Left Side (LSA)**.

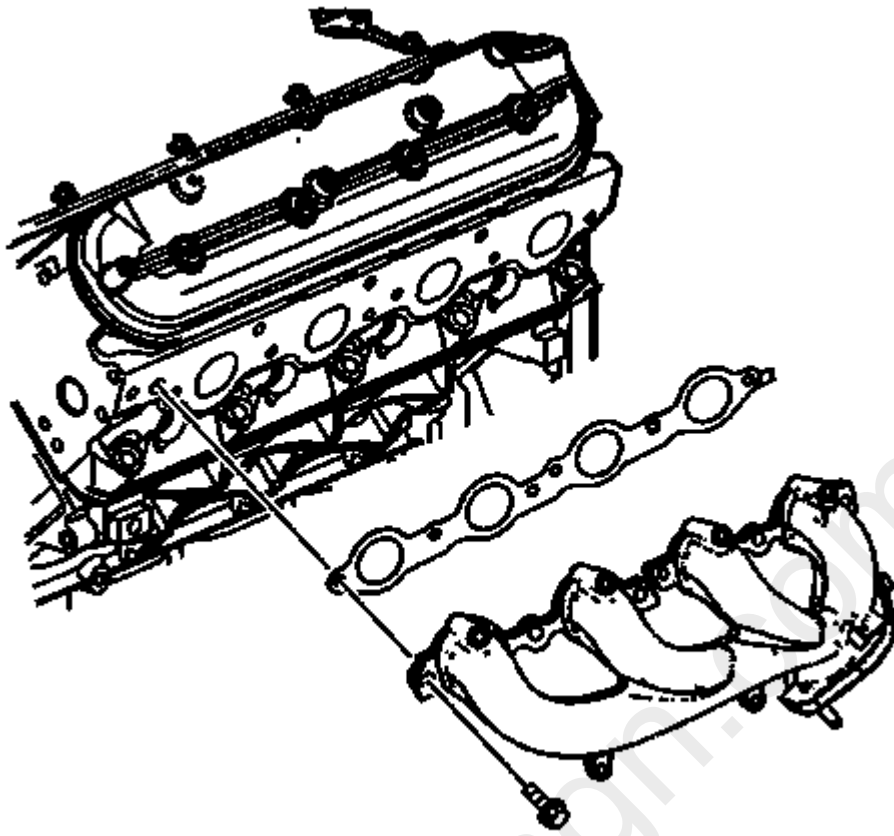


Fig. 2: View Of Left Exhaust Manifold, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Disconnect the center steering shaft from the lower steering shaft. Separate the shafts and position aside to provide a removal envelope for the manifold. Refer to **Intermediate Steering Shaft Replacement** .
7. Lower the vehicle.
8. Remove the exhaust manifold bolts.
9. Remove the exhaust manifold, bolts, and gasket. Discard the gasket.
10. Remove the heat shield from the manifold, if required.
11. Clean and inspect the exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection** .

Installation Procedure

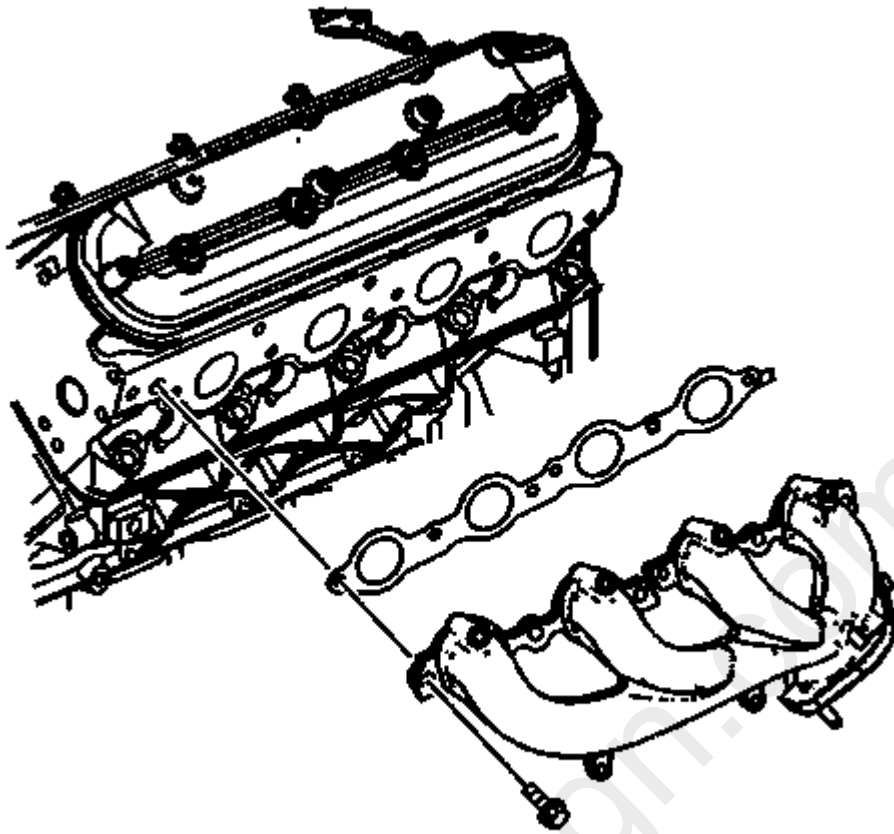


Fig. 3: View Of Left Exhaust Manifold, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: Tighten the exhaust manifold bolts as specified in the service procedure. Improperly installed and/or leaking exhaust manifold gaskets may effect vehicle emissions and/or On-Board Diagnostics (OBD) II system performance.

1. If necessary, install the exhaust manifold heat shield and bolts and tighten to 10 N.m (89 lb in).
2. Position the exhaust manifold and a NEW gasket into place.
3. Lower the vehicle.
4. Install the exhaust manifold bolts. Refer to Exhaust Manifold Installation - Left Side .
5. Connect the center steering shaft to the lower steering shaft. Refer to Intermediate Steering Shaft Replacement .

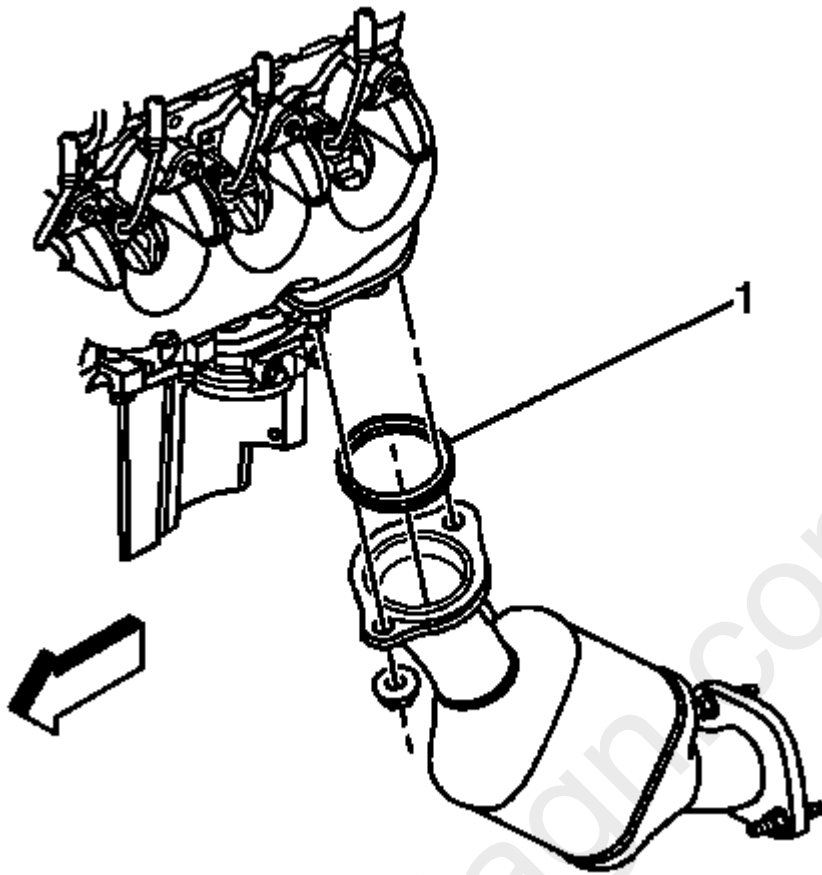


Fig. 4: Left Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

6. Install the left catalytic converter and seal (1) . Refer to **Catalytic Converter Replacement - Left Side (LSA)**.
7. Lower the vehicle.
8. Install the left bank spark plugs. Refer to **Spark Plug Replacement** .
9. Install the left bank coil assembly. Refer to **Ignition Coil Replacement** .
10. Install the engine sight shield. Refer to **Intake Manifold Cover Replacement - Front** .

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (LSA)

Removal Procedure

1. Remove the engine sight shield. Refer to **Intake Manifold Cover Replacement - Front** .
2. Remove the right bank coil assembly. Refer to **Ignition Coil Replacement** .
3. Remove the right bank spark plugs. Refer to **Spark Plug Replacement** .
4. Remove the oil level dipstick tube. Refer to **Oil Level Indicator Tube Replacement** .
5. Raise and suitably support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
6. Remove the right catalytic converter. Refer to **Catalytic Converter Replacement - Right Side (LSA)**.

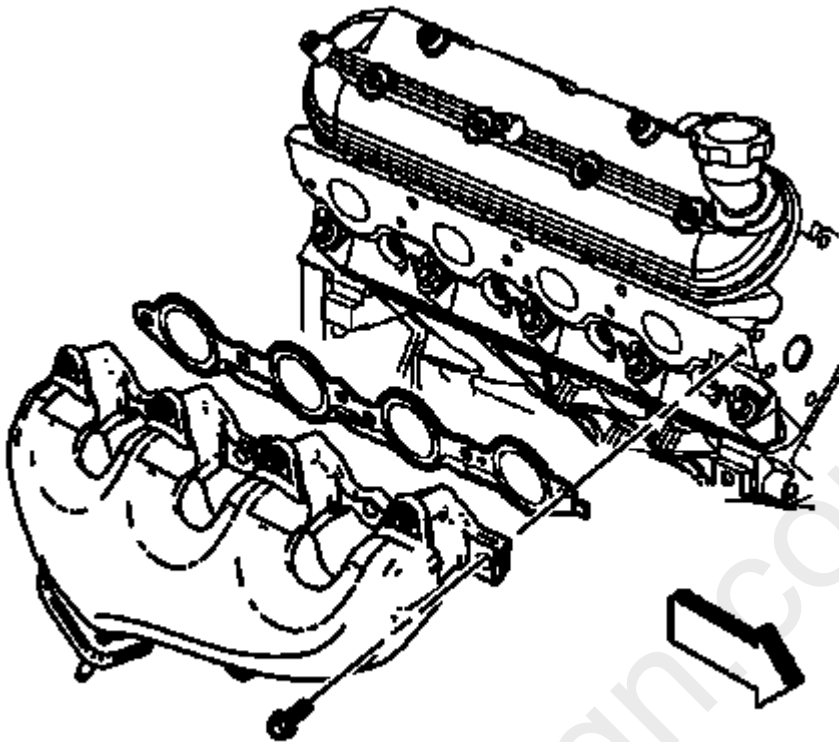


Fig. 5: Identifying Right Exhaust Manifold, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove the starter motor. Refer to **Starter Replacement (LSA)** .
8. Remove the exhaust manifold bolts.
9. Remove the exhaust manifold, bolts, and gasket. Discard the gasket.
10. Remove the heat shield from the manifold, if required.
11. Clean and inspect the exhaust manifold. Refer to **Exhaust Manifold Cleaning and Inspection** .

Installation Procedure

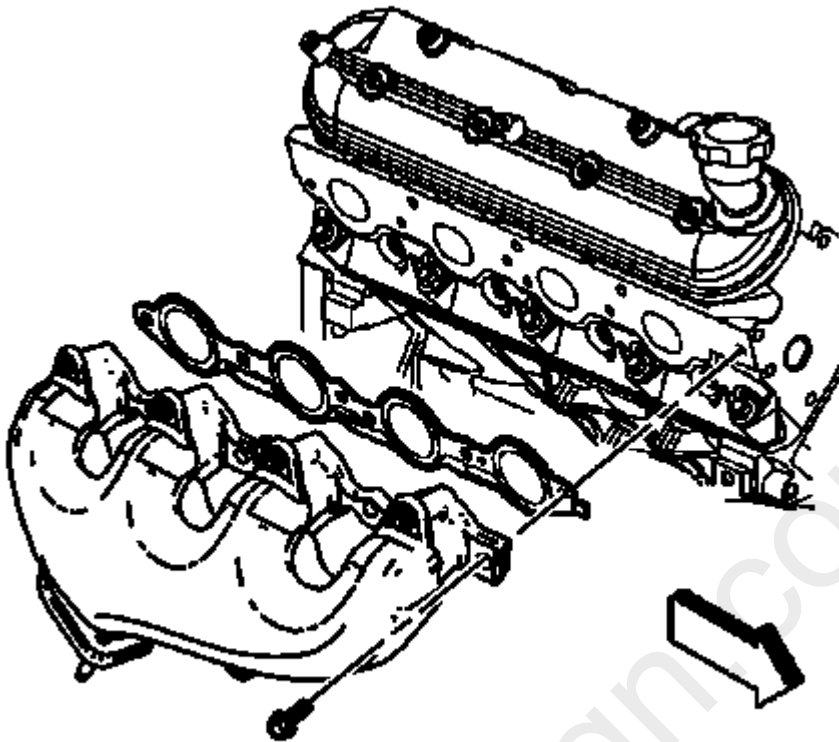


Fig. 6: Identifying Right Exhaust Manifold, Gasket & Bolts
Courtesy of GENERAL MOTORS COMPANY

CAUTION: Refer to Fastener Caution .

NOTE: Tighten the exhaust manifold bolts as specified in the service procedure. Improperly installed and/or leaking exhaust manifold gaskets may effect vehicle emissions and/or On-Board Diagnostics (OBD) II system performance.

1. If necessary, install the exhaust manifold heat shield and bolts and tighten to 9 N.m (80 lb in).
2. Position the exhaust manifold and a NEW gasket into place.
3. Install the exhaust manifold bolts. Refer to Exhaust Manifold Installation - Right Side .
4. Install the starter motor. Refer to Starter Replacement (LSA) .
5. Install the right catalytic converter. Refer to Catalytic Converter Replacement - Right Side (LSA).
6. Lower the vehicle.
7. Install the right bank spark plugs. Refer to Spark Plug Replacement .
8. Install the right bank coil assembly. Refer to Ignition Coil Replacement .

9. Install the oil level dipstick tube. Refer to Oil Level Indicator Tube Replacement .
10. Install the engine sight shield. Refer to Intake Manifold Cover Replacement - Front .

EXHAUST SYSTEM REPLACEMENT (LSA-COUPE)

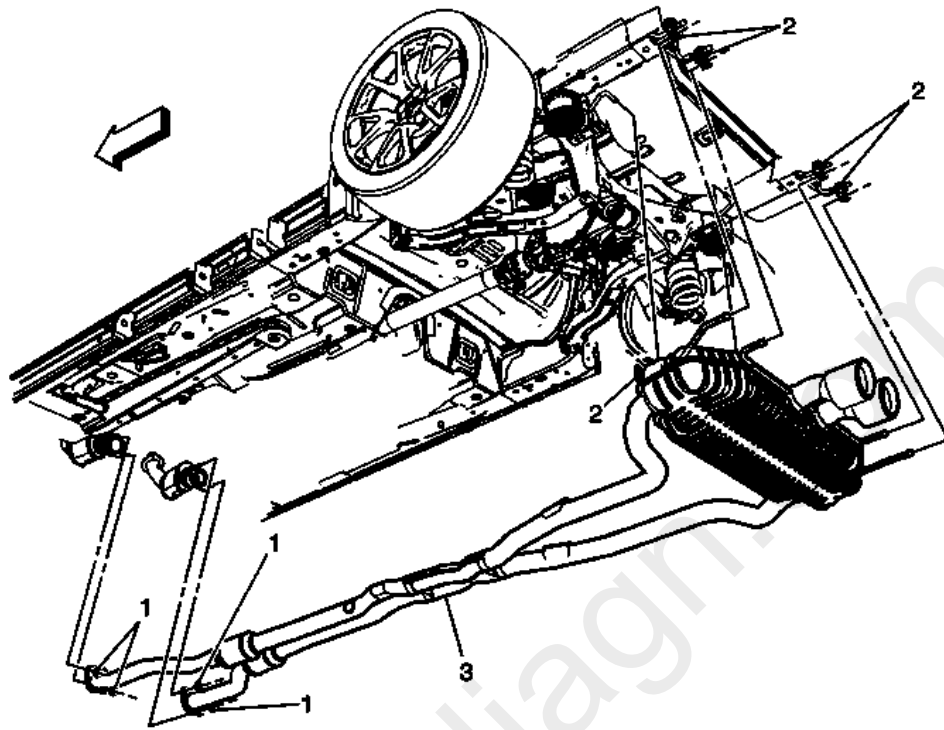


Fig. 7: Exhaust System (LSA-Coupe)
Courtesy of GENERAL MOTORS COMPANY

Exhaust System Replacement (LSA-Coupe)

Callout	Component Name
WARNING: Refer to <u>Protective Goggles and Glove Warning</u> .	
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 floor panel tunnel brace.	
	Exhaust Pipe Nut (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> .

1	Tighten 17 N.m (12 lb ft).
2	Exhaust Insulators (Qty: 6)
3	Exhaust Muffler and Converters

EXHAUST SYSTEM REPLACEMENT (LSA-WAGON)

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

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Remove the bolts securing the floor panel tunnel brace to the floor panel.
3. Remove the floor panel tunnel brace from the floor panel.
4. Suitably support the exhaust system.
5. Remove the exhaust pipe nuts securing the exhaust pipes to the catalytic converters.

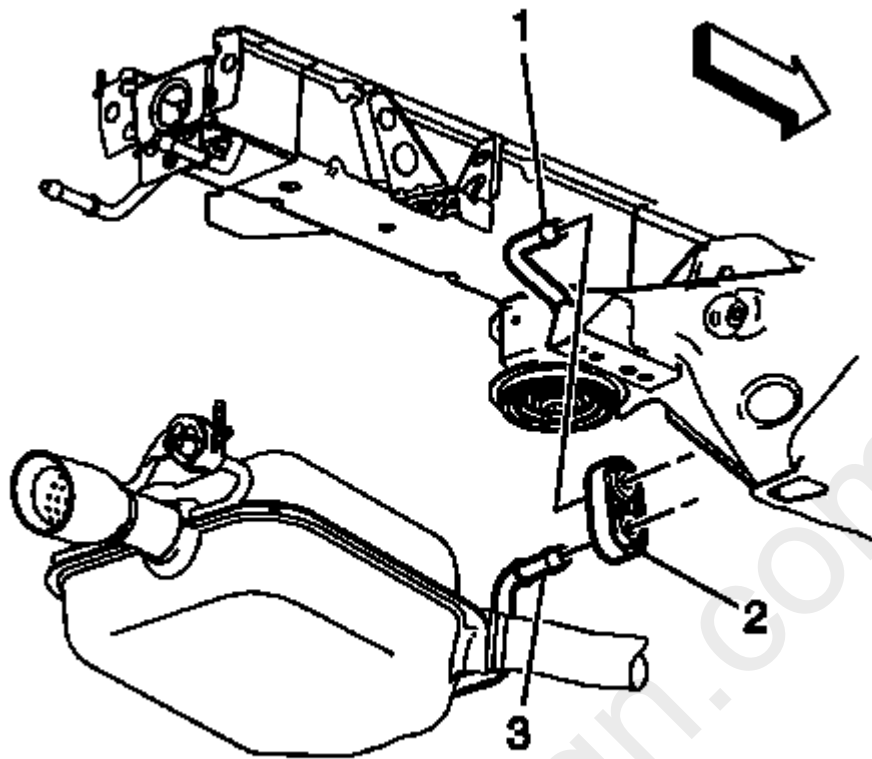


Fig. 8: Identifying Front Exhaust Hangers And Rear Suspension Hanger Rods
Courtesy of GENERAL MOTORS COMPANY

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

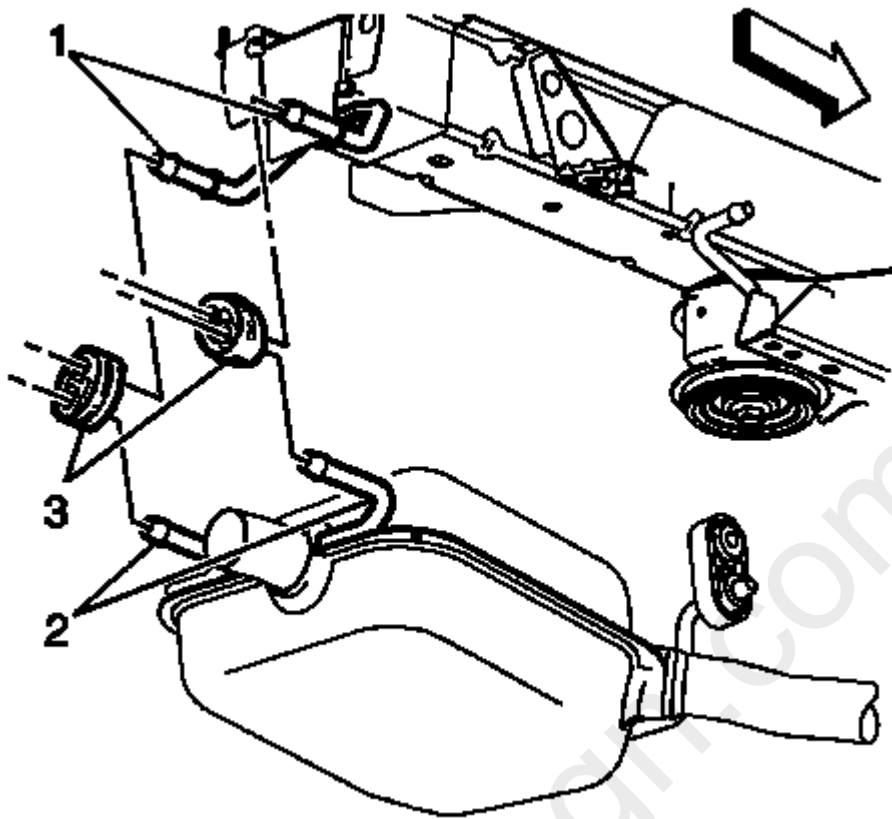


Fig. 9: View Tail Pipe Hangers And Tail Pipe Insulators
Courtesy of GENERAL MOTORS COMPANY

7. Apply a suitable lubricant to the tail pipe hanger rods in order to ease the removal of the tail pipe hanger Insulators (3).
8. Pry the tail pipe hangers (1) free from the tail pipe insulators (3).

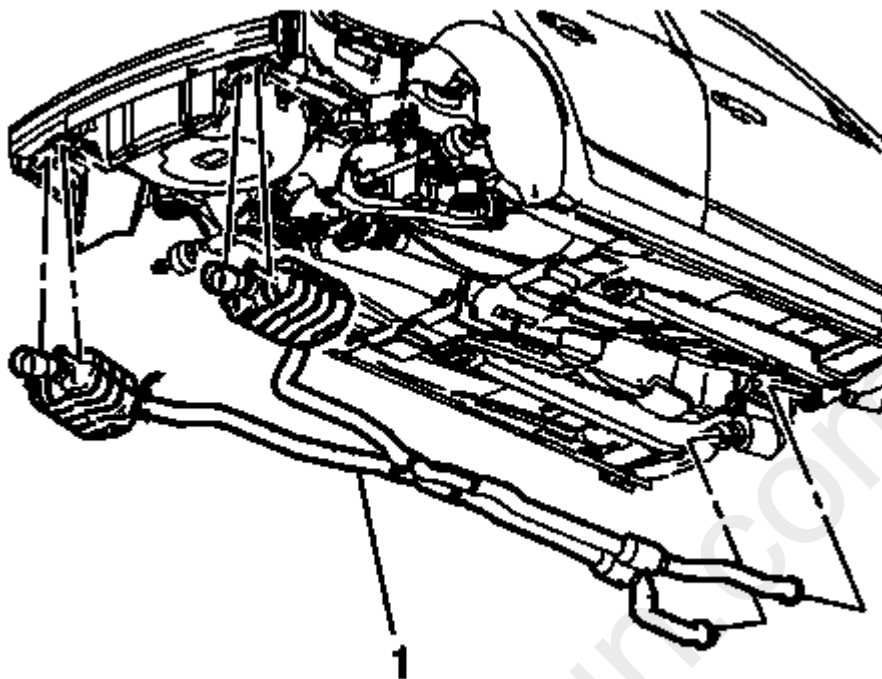


Fig. 10: Identifying Exhaust System

Courtesy of GENERAL MOTORS COMPANY

9. With the aid of an assistant, lower the exhaust system (1).
10. Remove the catalytic converter seals. Do not reuse the seals.

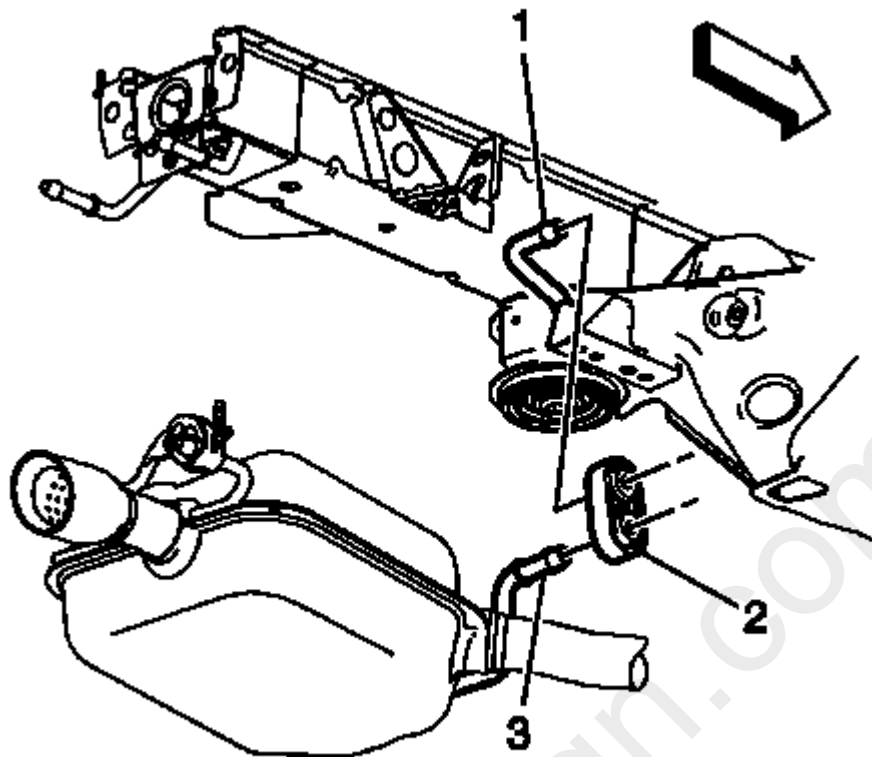


Fig. 11: Identifying Front Exhaust Hangers And Rear Suspension Hanger Rods
Courtesy of GENERAL MOTORS COMPANY

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

Installation Procedure

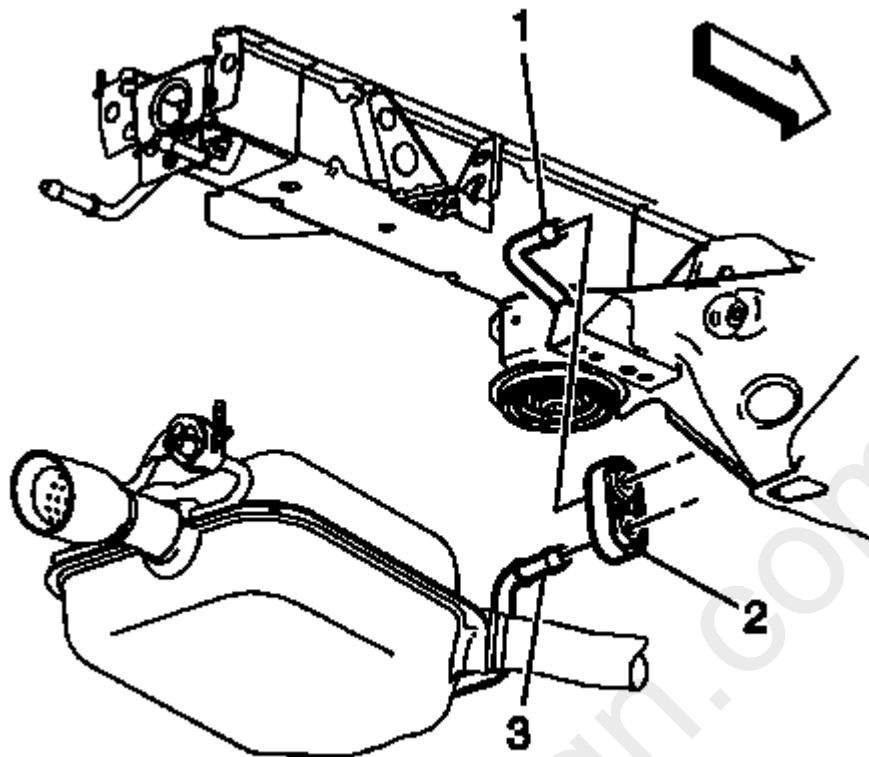


Fig. 12: Identifying Front Exhaust Hangers And Rear Suspension Hanger Rods
Courtesy of GENERAL MOTORS COMPANY

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

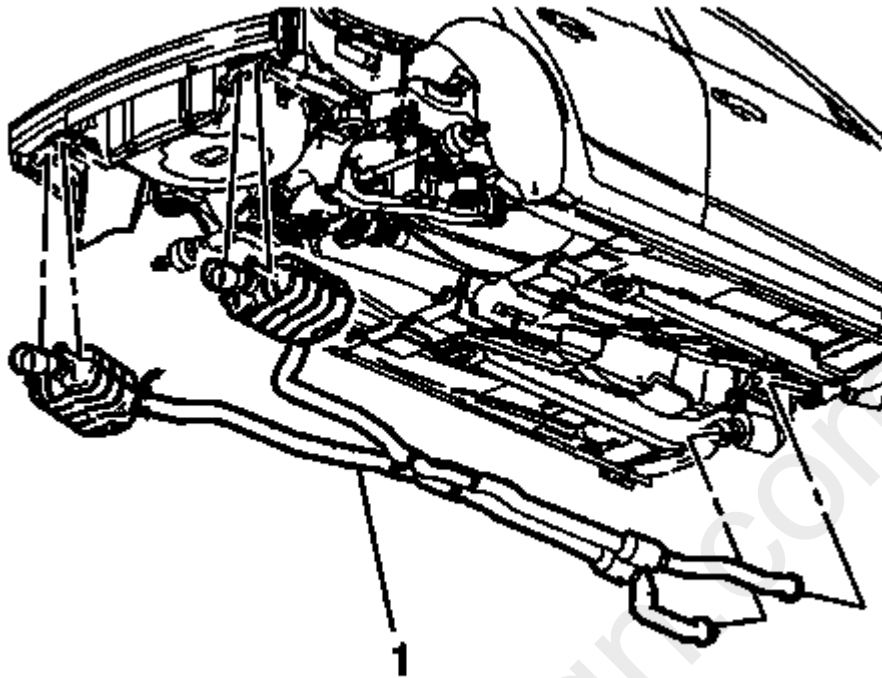


Fig. 13: Identifying Exhaust System
Courtesy of GENERAL MOTORS COMPANY

3. With the aid of an assistant, raise the exhaust system (1) into position, aligning the exhaust pipe flanges with the studs located in the rear of the catalytic converters.
4. Finger tighten the exhaust pipe nuts to the catalytic converter studs.

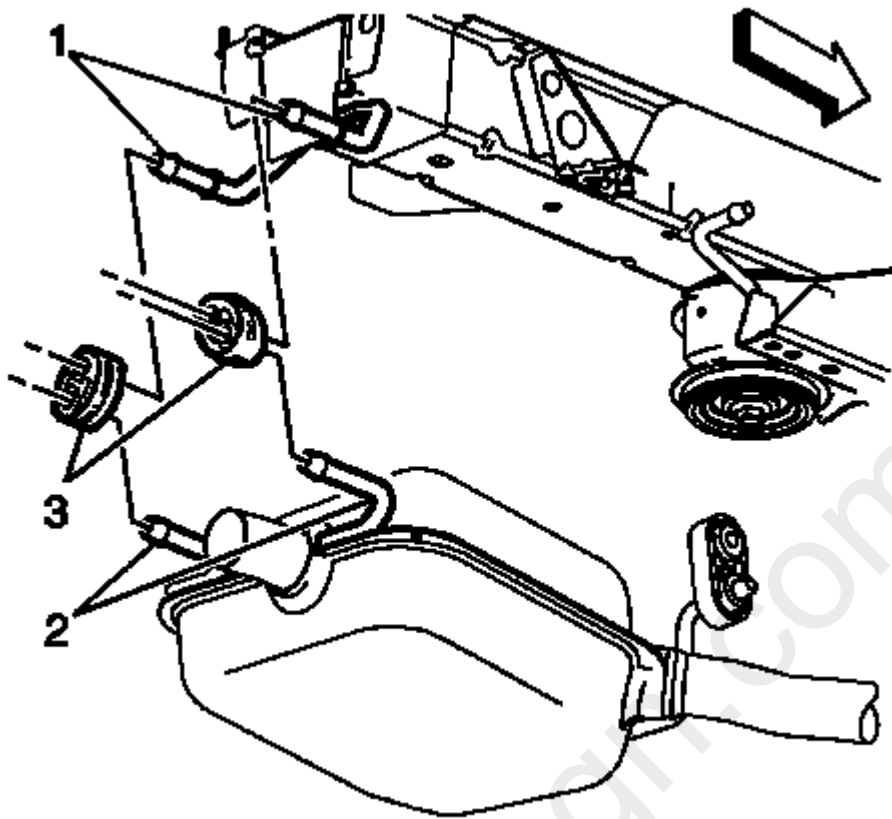


Fig. 14: View Tail Pipe Hangers And Tail Pipe Insulators
Courtesy of GENERAL MOTORS COMPANY

5. Press the tail pipe hanger insulators (3) over the tail pipe hanger rods.

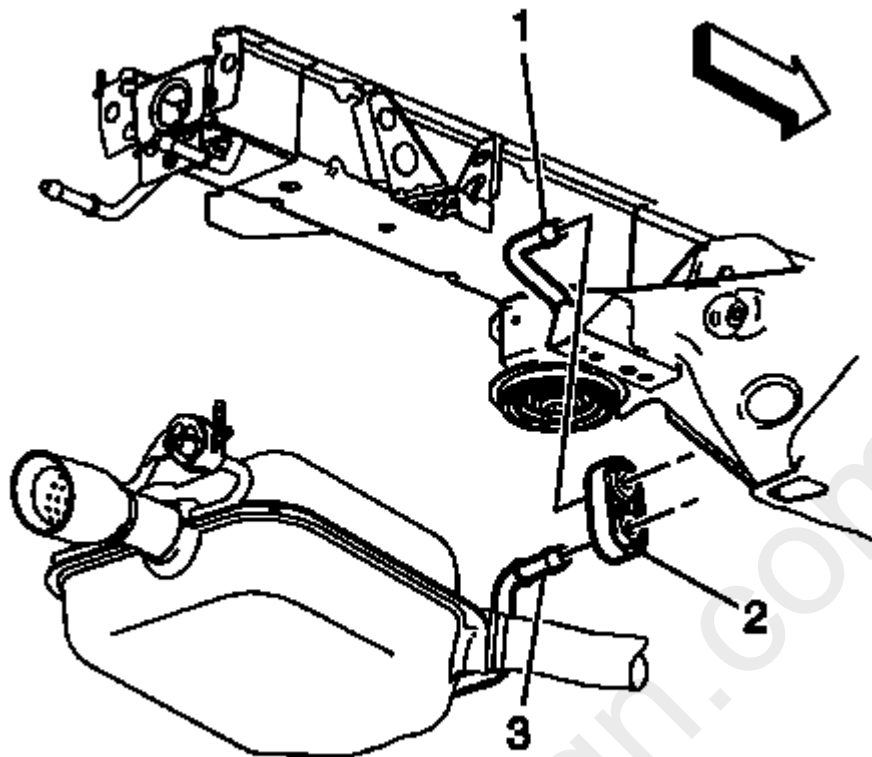


Fig. 15: Identifying Front Exhaust Hangers And Rear Suspension Hanger Rods
 Courtesy of GENERAL MOTORS COMPANY

6. Press the front exhaust hanger insulators (2) over the rear suspension hanger rods (1).

CAUTION: Refer to Fastener Caution .

7. Tighten the exhaust pipe nuts to 17 N.m (13 lb ft).
8. Position the floor panel tunnel brace to the floor panel.
9. Install the bolts securing the floor panel tunnel brace to the floor panel and tighten to 25 N.m (18 lb ft).
10. Lower the vehicle.

EXHAUST SYSTEM REPLACEMENT (LFX/LFW-WAGON)

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

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

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

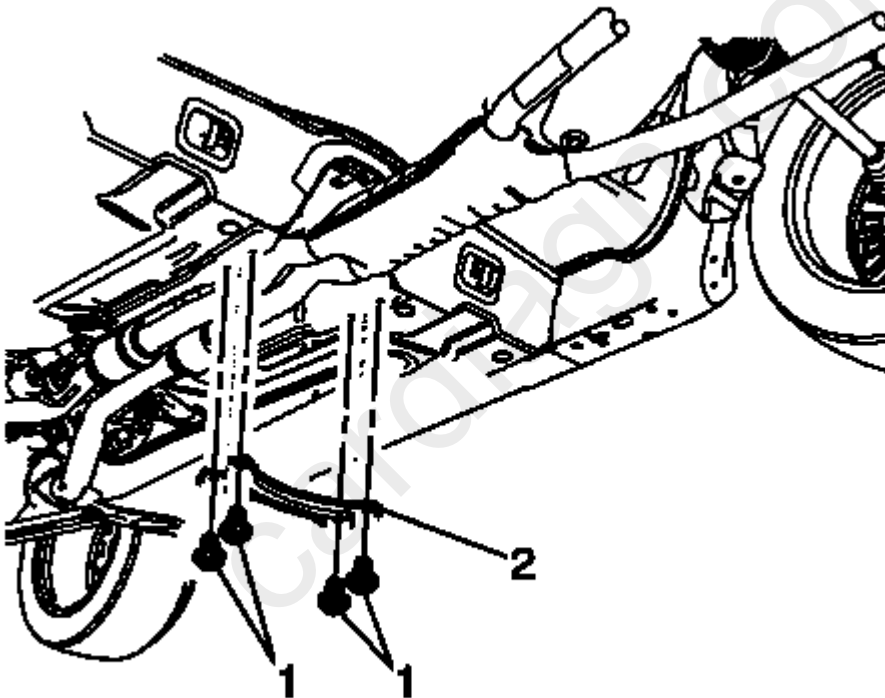


Fig. 16: Floor Panel Tunnel Brace & Fasteners
Courtesy of GENERAL MOTORS COMPANY

4. Remove the fasteners (1) securing the floor panel tunnel brace (2) to the floor panel.
5. Remove the floor panel tunnel brace from the floor panel.
6. Suitably support the exhaust system.

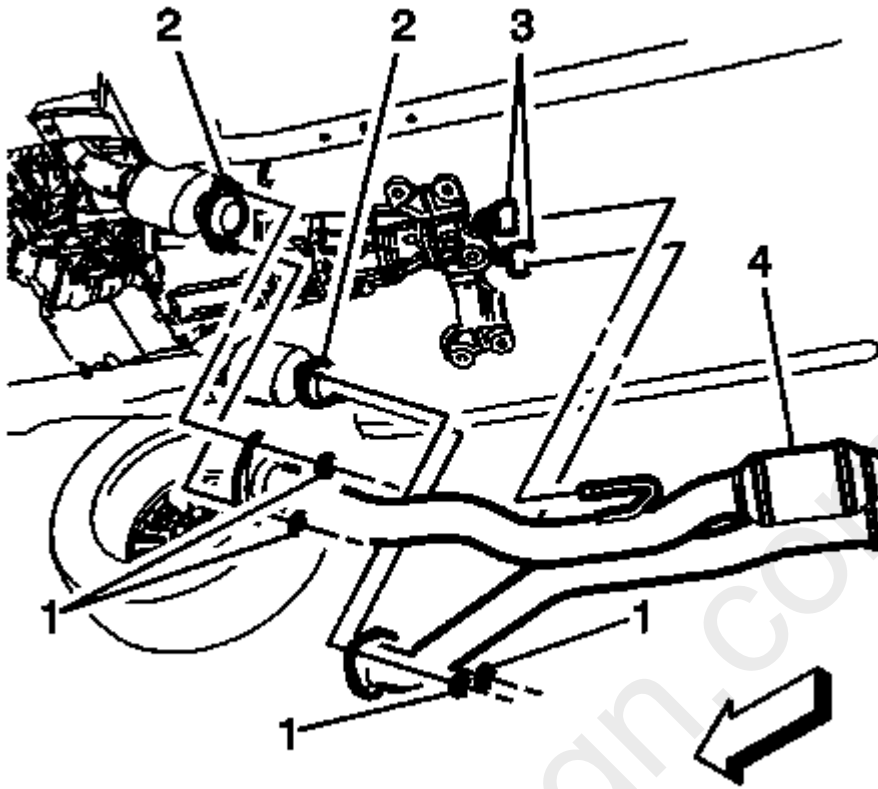


Fig. 17: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

7. For AWD, remove the exhaust pipe fasteners (1) securing the exhaust pipes to the catalytic converters.
8. Remove the exhaust muffler (4) from the exhaust isolators (3) and discard the exhaust seals (2).

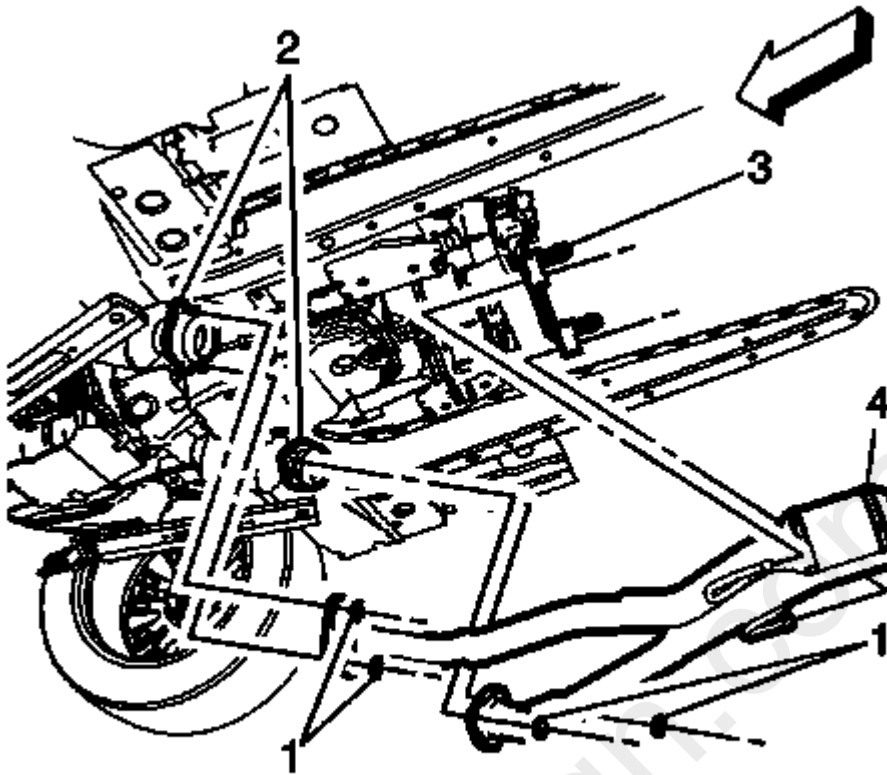


Fig. 18: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

9. For RWD, remove the exhaust pipe fasteners (1) securing the exhaust pipes to the catalytic converters.
10. Remove the exhaust muffler (4) from the exhaust isolators (3) and discard the exhaust seals (2).

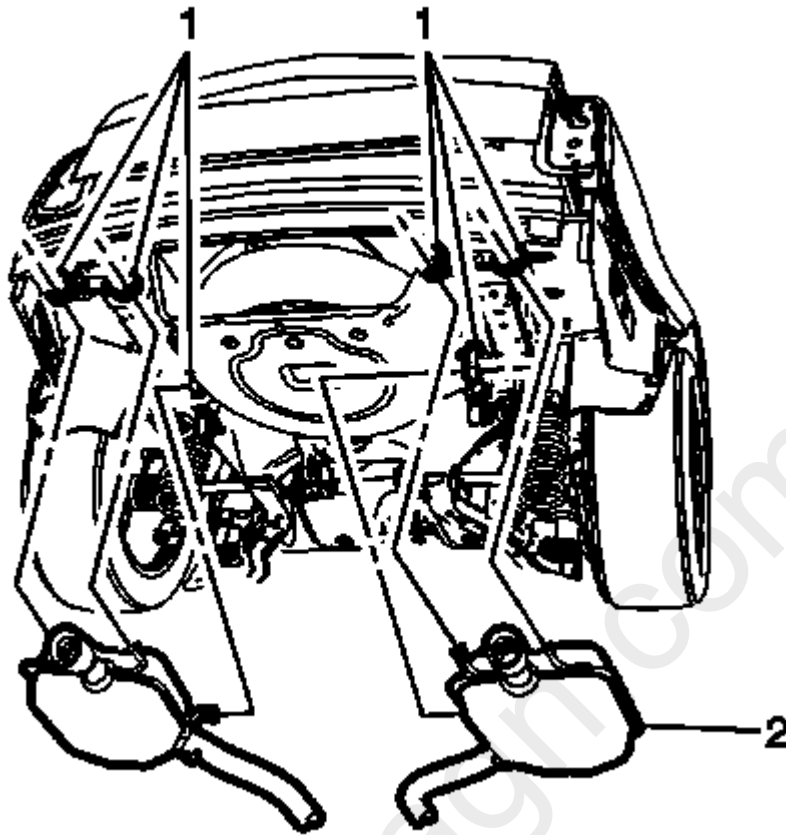


Fig. 19: Exhaust Mufflers & Isolators
Courtesy of GENERAL MOTORS COMPANY

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

11. Remove the rear exhaust mufflers (2) from the exhaust muffler isolators (1) and lower the exhaust system to the floor.

Installation Procedure

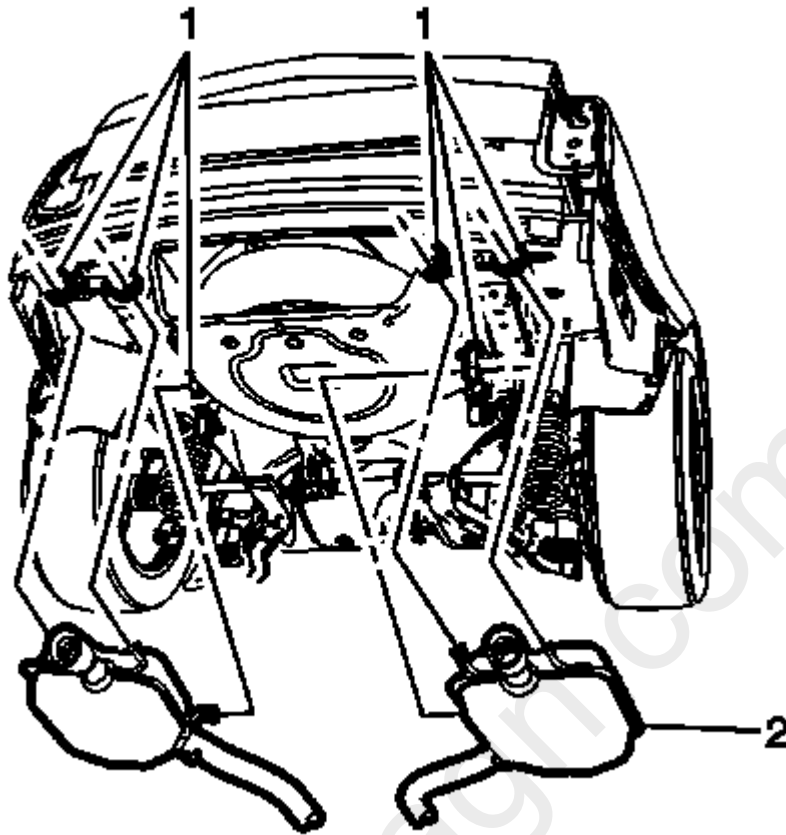


Fig. 20: Exhaust Mufflers & Isolators
Courtesy of GENERAL MOTORS COMPANY

1. With the aid of an assistant, raise the exhaust muffler (2) into the rear hanger exhaust isolators (1).

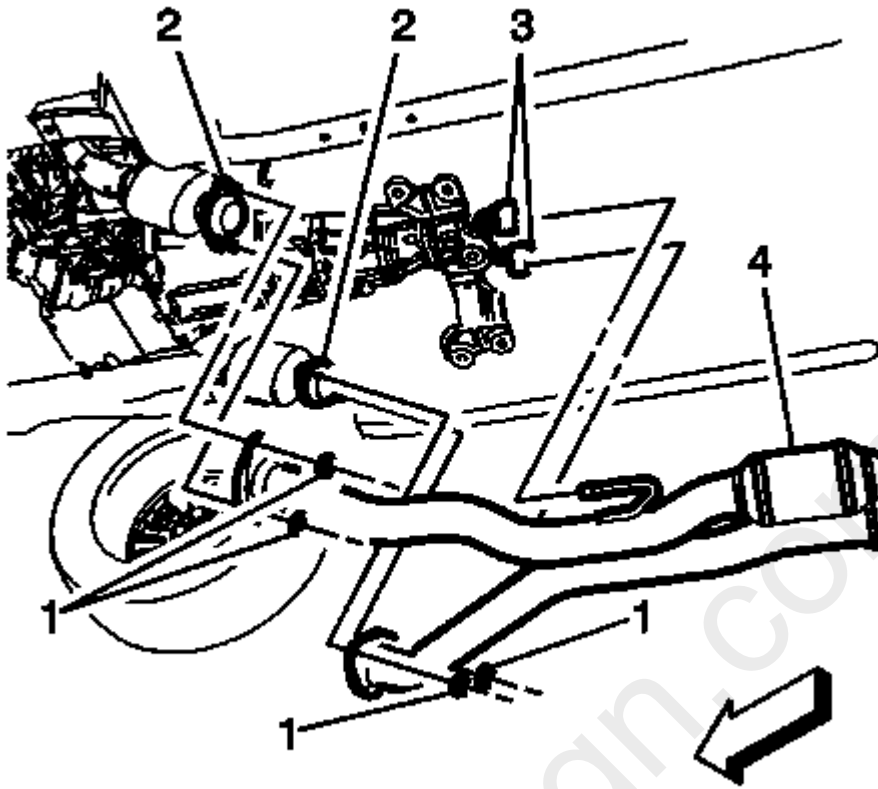


Fig. 21: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

2. For RWD, install the exhaust hanger rods into the exhaust isolators (3).

CAUTION: Refer to Fastener Caution .

3. Install the exhaust muffler into the catalytic converters with NEW seals (2) and tighten the fasteners (1) to 17 N.m (13 lb ft).

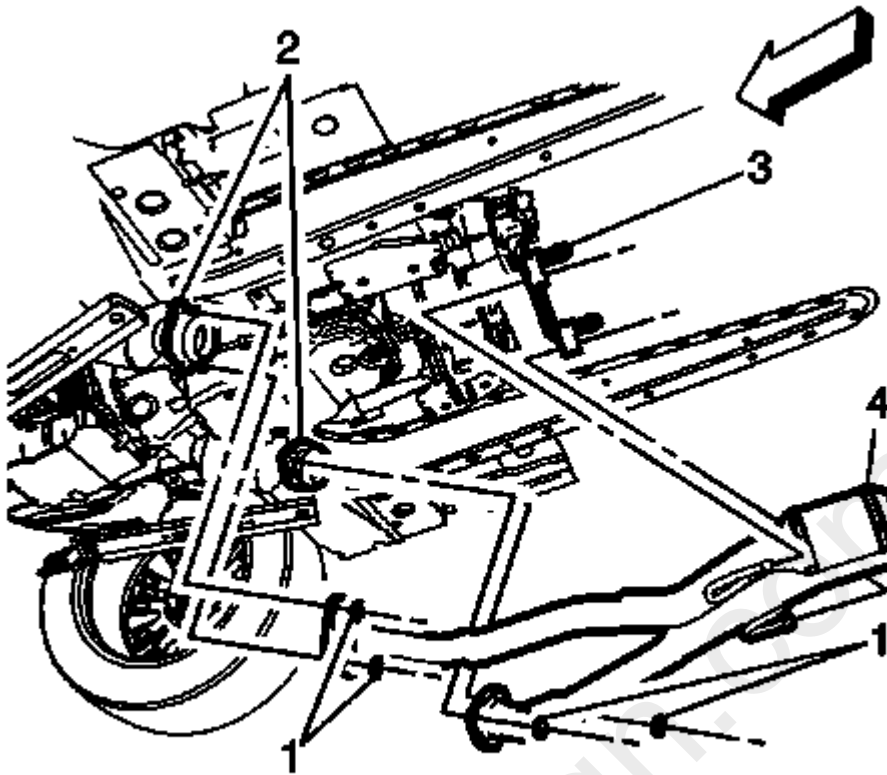


Fig. 22: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

4. For AWD, install the exhaust hanger rods into the exhaust isolators (3).
5. Install the exhaust muffler into the catalytic converters with NEW seals (2) and tighten the fasteners (1) to 17 N.m (13 lb ft).

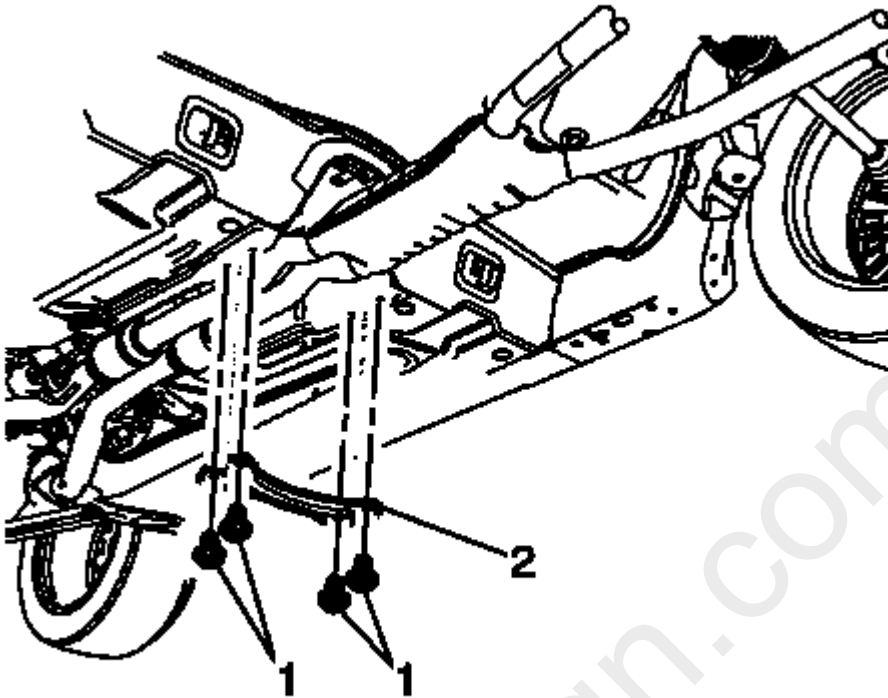


Fig. 23: Floor Panel Tunnel Brace & Fasteners
Courtesy of GENERAL MOTORS COMPANY

6. Install the exhaust underbody brace (2) and tighten the fasteners (1) to 25 N.m (18 lb ft).
7. Install the bank 1 sensor 2 heated oxygen sensor. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2** .
8. Install the bank 2 sensor 2 heated oxygen sensor. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .
9. Start the vehicle and check for exhaust leaks.

EXHAUST SYSTEM REPLACEMENT (LFX/LFW-COUPE)

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

Removal Procedure

WARNING: Refer to **Exhaust Service Warning** .

WARNING: Refer to Protective Goggles and Glove Warning .

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

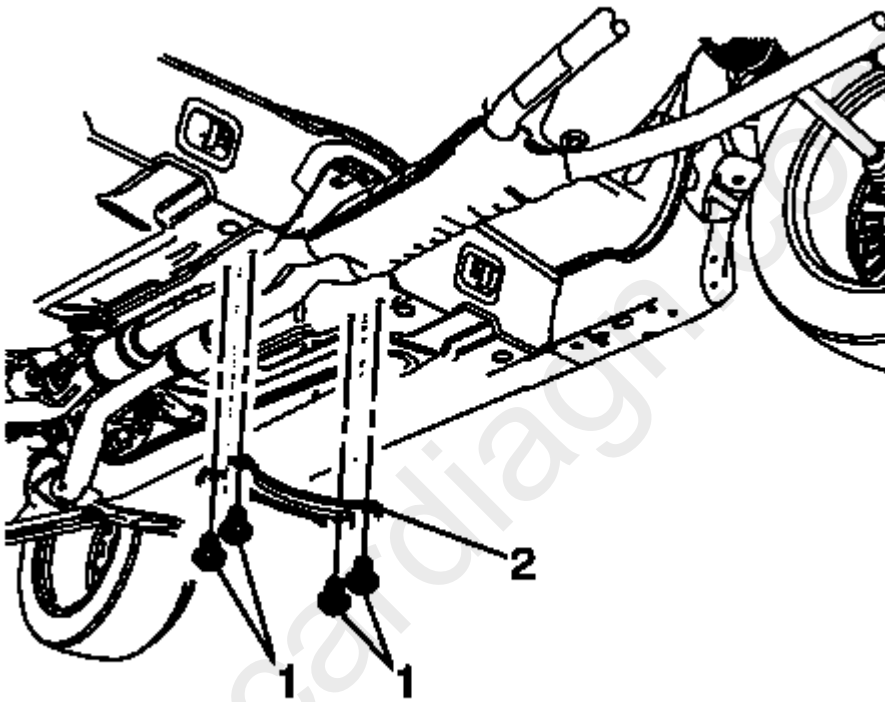


Fig. 24: Floor Panel Tunnel Brace & Fasteners
Courtesy of GENERAL MOTORS COMPANY

4. Remove the fasteners (1) securing the floor panel tunnel brace (2) to the floor panel.
5. Remove the floor panel tunnel brace from the floor panel.
6. Suitably support the exhaust system.

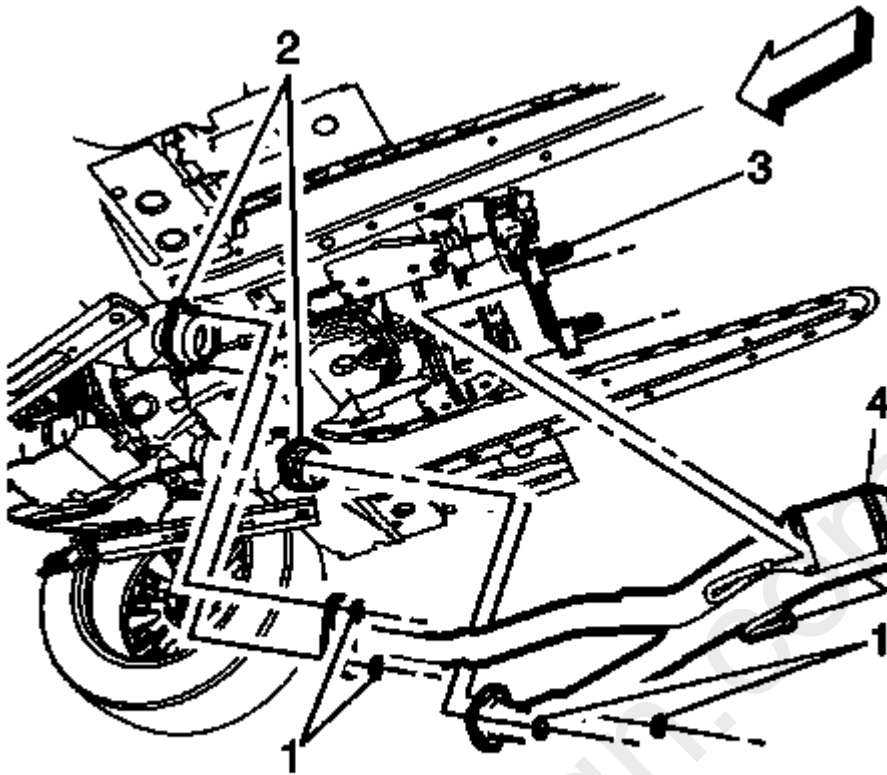


Fig. 25: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

7. For AWD, remove the exhaust pipe fasteners (1) securing the exhaust pipes to the catalytic converters.
8. Remove the exhaust muffler (4) from the exhaust isolators (3) and discard the exhaust seals (2).

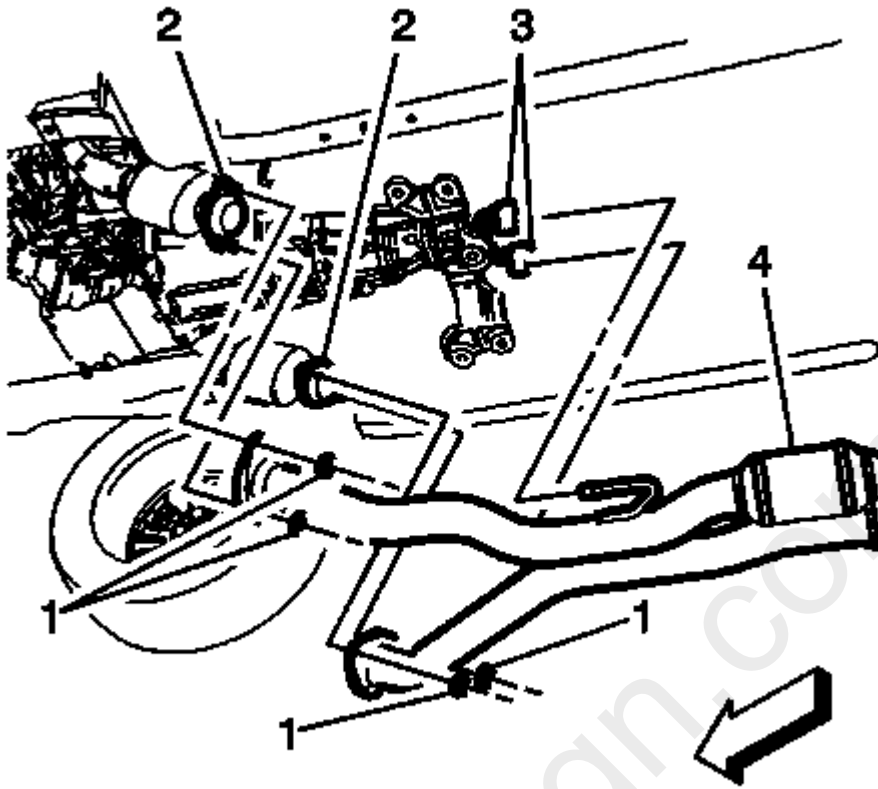


Fig. 26: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

9. For RWD, remove the exhaust pipe fasteners (1) securing the exhaust pipes to the catalytic converters.
10. Remove the exhaust muffler (4) from the exhaust isolators (3) and discard the exhaust seals (2).

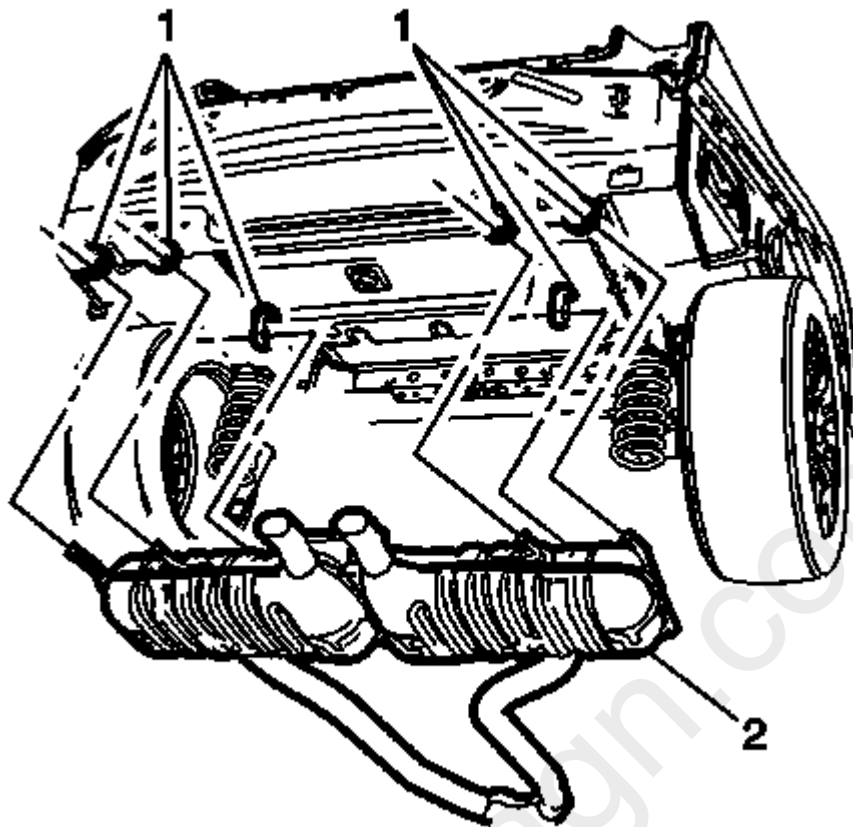


Fig. 27: Rear Exhaust Mufflers & Isolators
Courtesy of GENERAL MOTORS COMPANY

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

11. Remove the rear exhaust mufflers (2) from the exhaust muffler isolators (1) and lower the exhaust system to the floor.

Installation Procedure

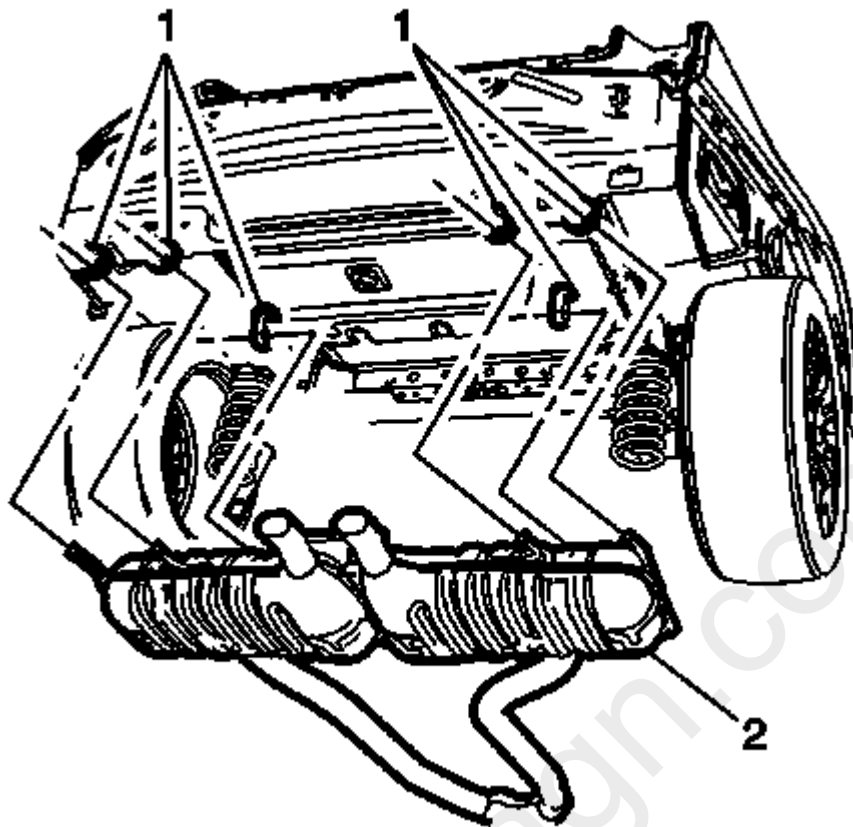


Fig. 28: Rear Exhaust Mufflers & Isolators
Courtesy of GENERAL MOTORS COMPANY

1. With the aid of an assistant, raise the exhaust muffler (2) into the rear hanger exhaust isolators (1).

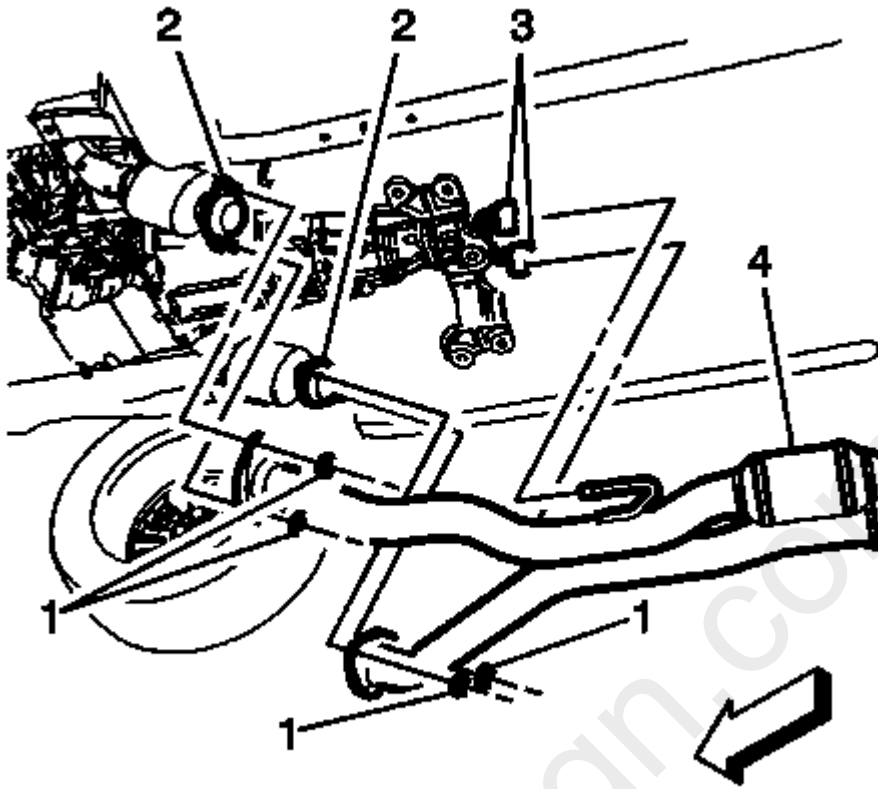


Fig. 29: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

2. For RWD, install the exhaust hanger rods into the exhaust isolators (3).

CAUTION: Refer to Fastener Caution .

3. Install the exhaust muffler into the catalytic converters with NEW seals (2) and tighten the fasteners (1) to 17 N.m (13 lb ft).

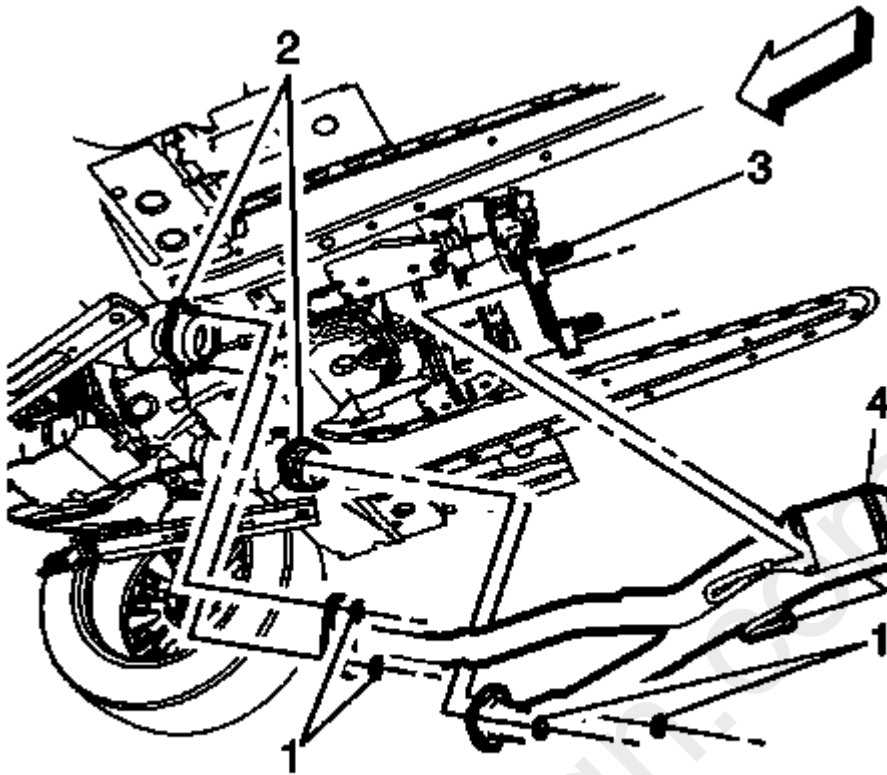


Fig. 30: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

4. For AWD, install the exhaust hanger rods into the exhaust isolators (3).
5. Install the exhaust muffler into the catalytic converters with NEW seals (2) and tighten the fasteners (1) to 17 N.m (13 lb ft).

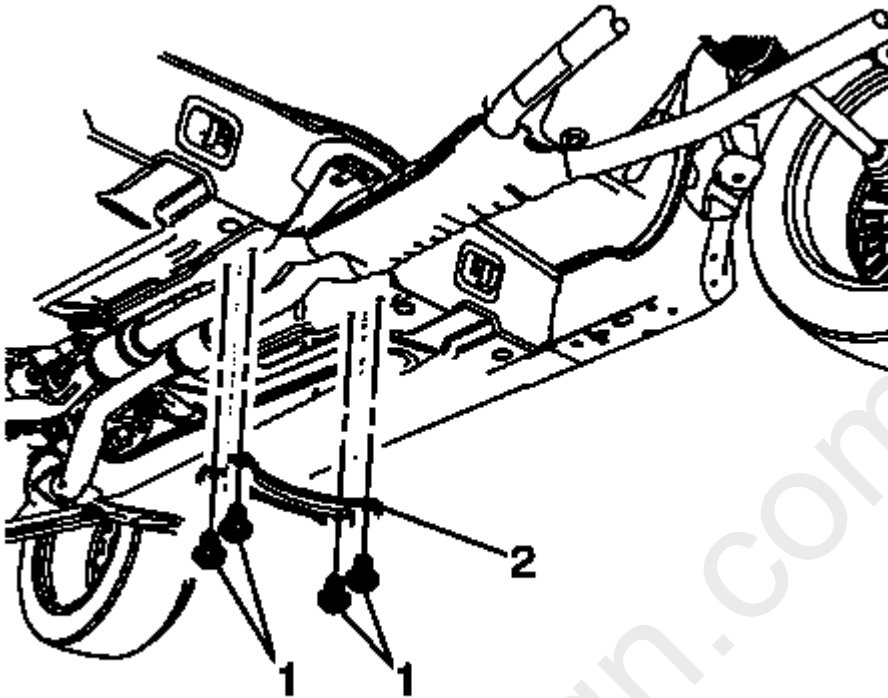


Fig. 31: Floor Panel Tunnel Brace & Fasteners
Courtesy of GENERAL MOTORS COMPANY

6. Install the exhaust underbody brace (2) and tighten the fasteners (1) to 25 N.m (18 lb ft).
7. Install the bank 1 sensor 2 heated oxygen sensor. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2** .
8. Install the bank 2 sensor 2 heated oxygen sensor. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .
9. Start the vehicle and check for exhaust leaks.

EXHAUST SYSTEM REPLACEMENT (SINGLE EXHAUST)

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

Removal Procedure

WARNING: Refer to **Exhaust Service Warning** .

WARNING: Refer to Protective Goggles and Glove Warning .

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

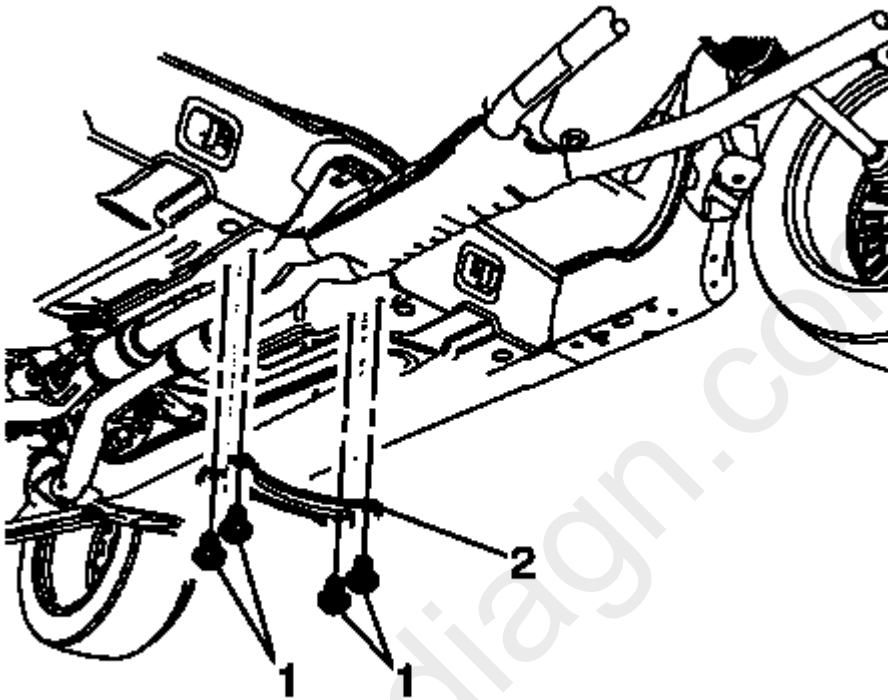


Fig. 32: Floor Panel Tunnel Brace & Fasteners
Courtesy of GENERAL MOTORS COMPANY

2. Remove the fasteners (1) securing the floor panel tunnel brace (2) to the floor panel.
3. Remove the floor panel tunnel brace from the floor panel.
4. Suitably support the exhaust system.

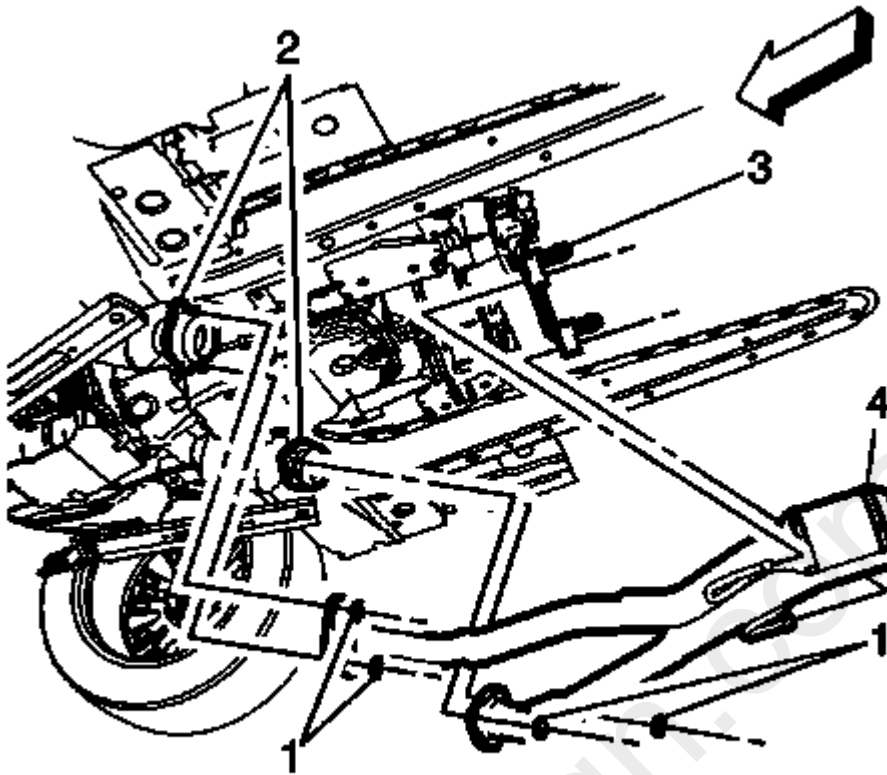


Fig. 33: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

5. For RWD, remove the exhaust pipe fasteners (1) securing the exhaust pipes to the catalytic converters.
6. Remove the exhaust muffler (4) from the exhaust isolators (3) and discard the exhaust seals (2).
7. Remove the exhaust muffler (4) from the exhaust isolators (3) and discard the exhaust seals (2).

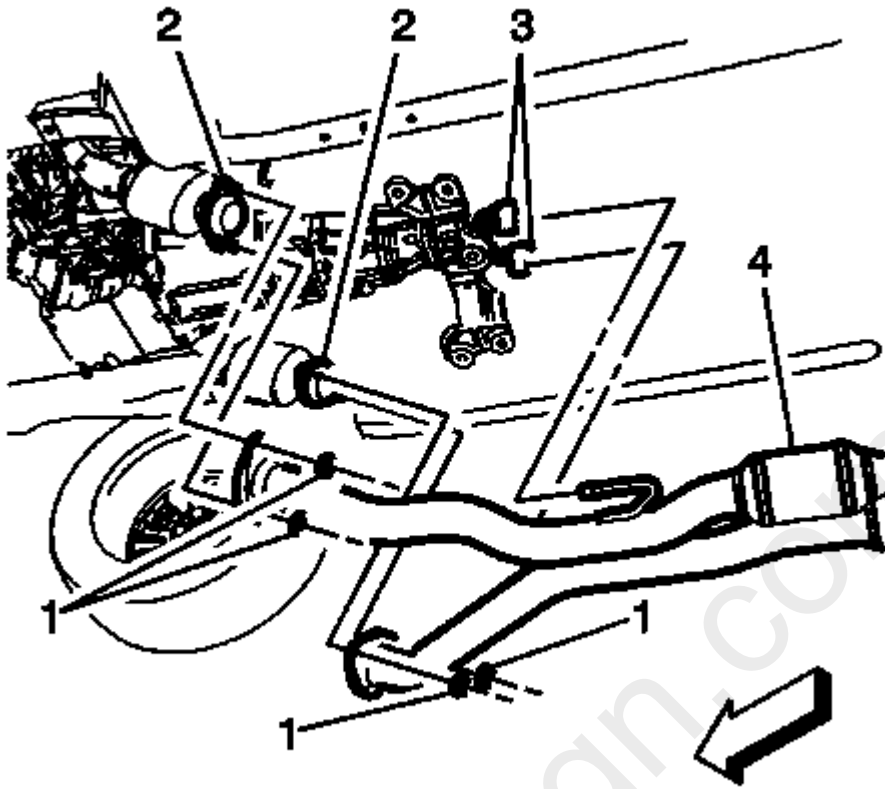


Fig. 34: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

8. For AWD, remove the exhaust pipe fasteners (1) securing the exhaust pipes to the catalytic converters.
9. Remove the exhaust muffler (4) from the exhaust isolators (3) and discard the exhaust seals (2).

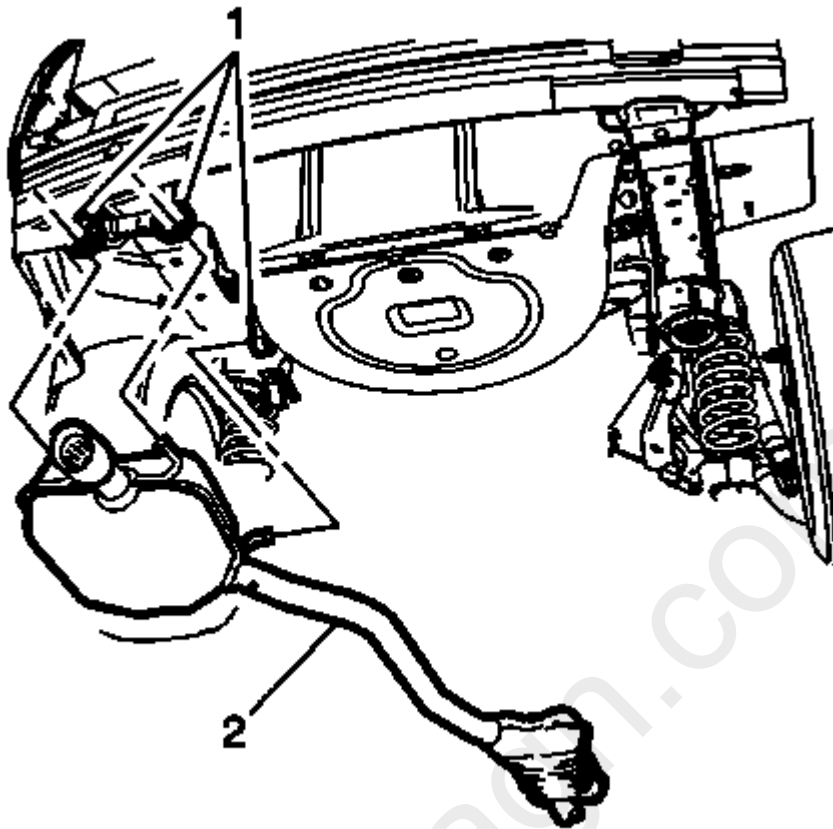


Fig. 35: Rear Exhaust Mufflers & Isolators
Courtesy of GENERAL MOTORS COMPANY

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

10. Remove the rear exhaust muffler (2) from the exhaust muffler isolators (1) and lower the exhaust system to the floor.

Installation Procedure

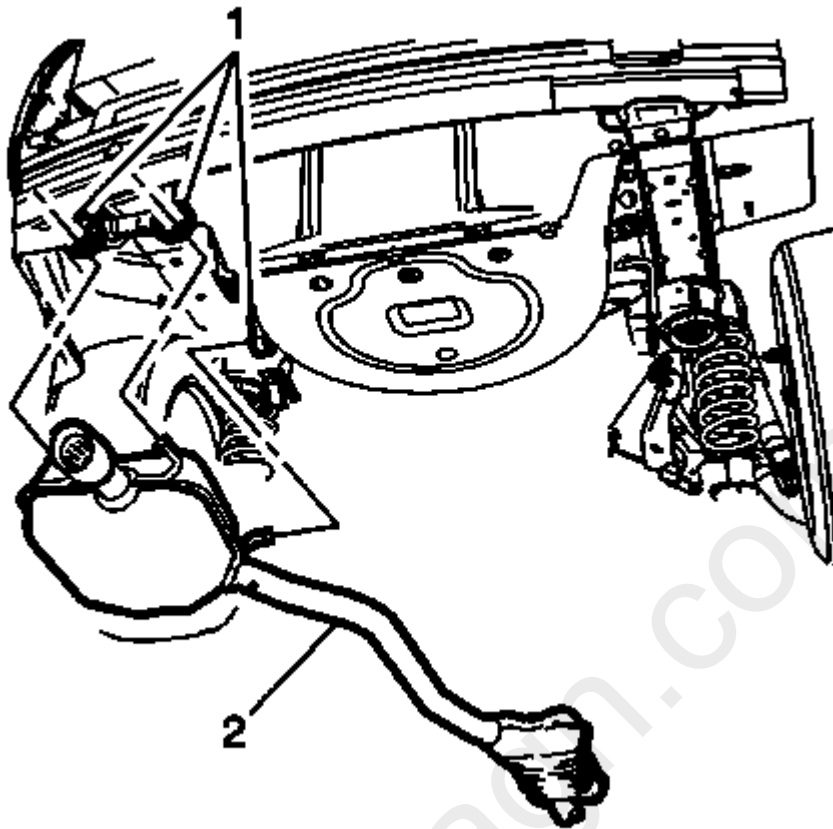


Fig. 36: Rear Exhaust Mufflers & Isolators
Courtesy of GENERAL MOTORS COMPANY

1. With the aid of an assistant, raise the exhaust muffler (2) into the rear hanger exhaust isolators (1).

CAUTION: Refer to Fastener Caution .

2. Install the exhaust muffler into the catalytic converters with NEW seals (2) and tighten the fasteners (1) to 17 N.m (13 lb ft).

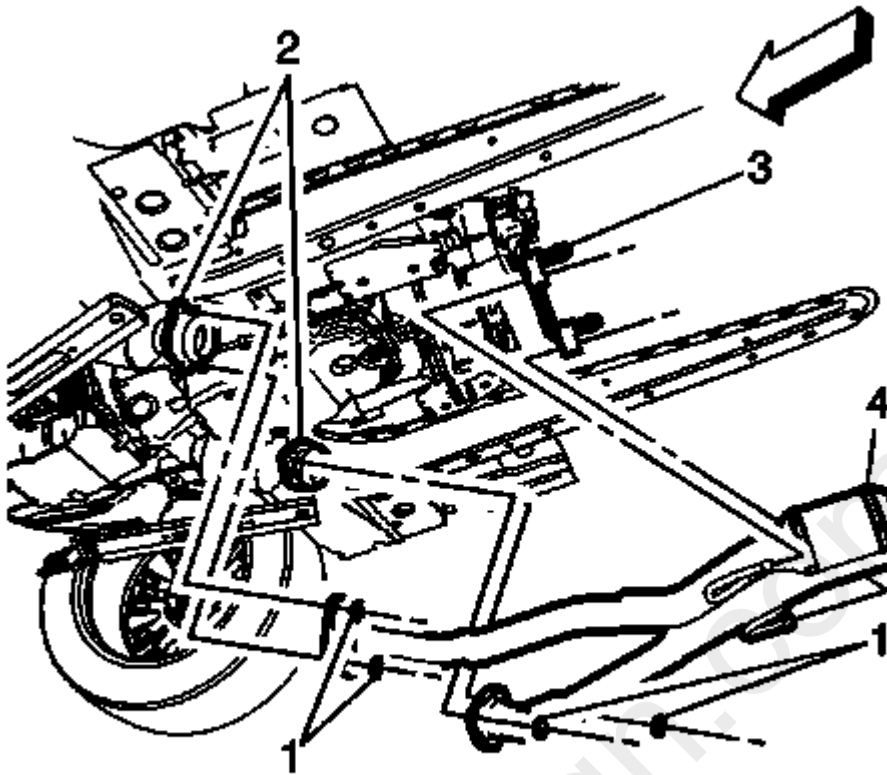


Fig. 37: Exhaust System Components
Courtesy of GENERAL MOTORS COMPANY

3. Install the exhaust hanger rods into the exhaust isolators (3).
4. Install the exhaust muffler into the catalytic converters with NEW seals (2) and tighten the fasteners (1) to 17 N.m (13 lb ft).

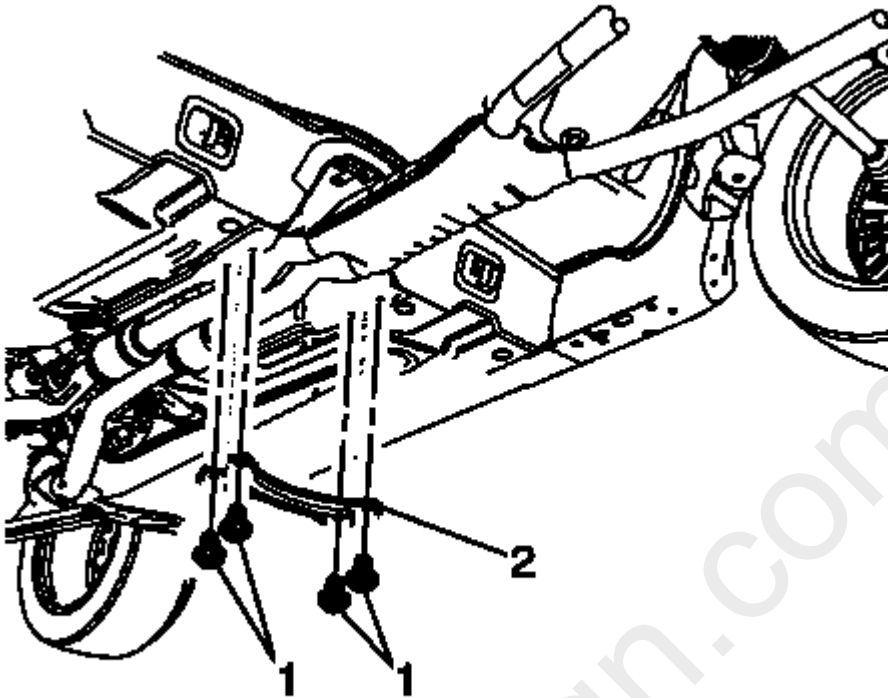


Fig. 38: Floor Panel Tunnel Brace & Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Install the exhaust underbody brace (2) and tighten the fasteners (1) to 25 N.m (18 lb ft).
6. Start the vehicle and check for exhaust leaks.

CATALYTIC CONVERTER REPLACEMENT - LEFT SIDE (LSA)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

1. Remove the rear intake manifold cover. Refer to Intake Manifold Cover Replacement - Rear .
2. Remove the left exhaust manifold heat shield. Refer to Exhaust Manifold Heat Shield Replacement - Left Side (LSA).
3. Disconnect the oxygen sensor electrical connectors.

4. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
5. Support the exhaust with a suitable screw jack.

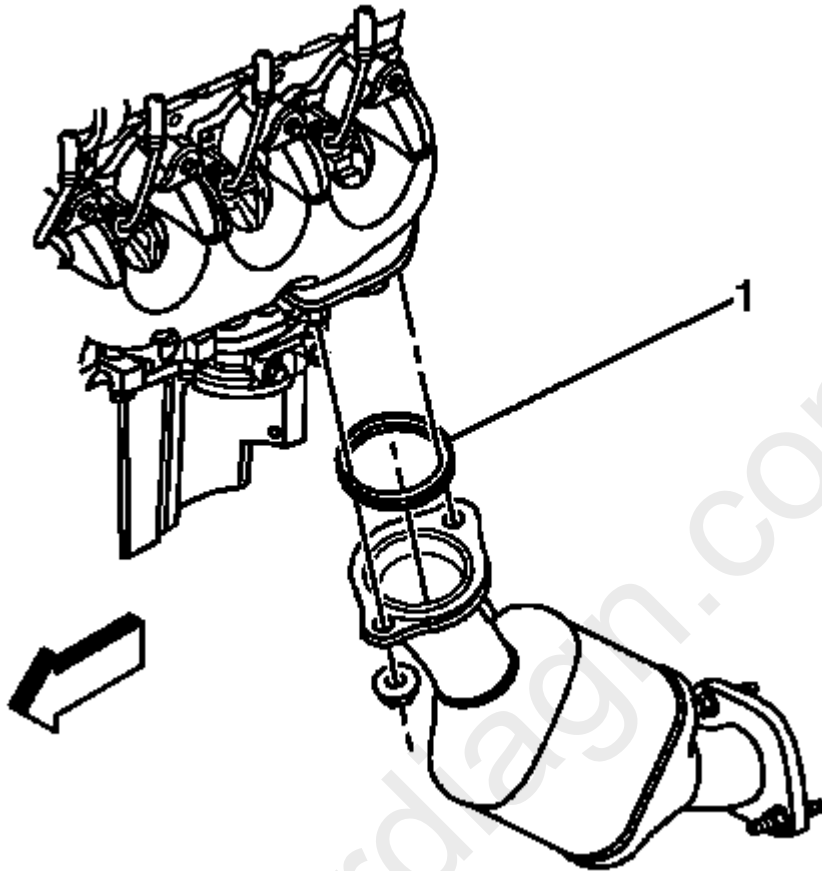


Fig. 39: Left Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

6. Disconnect the exhaust system from the left and right side catalytic converters. Refer to Exhaust System Replacement (LSA-Coupe), Exhaust System Replacement (LSA-Wagon).
7. Using the screw jack, lower the exhaust system.
8. Remove the left bank catalytic converter to exhaust manifold nuts.
9. Carefully remove the catalytic converter with the gasket (1) and oxygen sensors from the exhaust manifold.
10. Remove the oxygen sensors from the catalytic converter. Refer to Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 , and Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 .

Installation Procedure

1. Install the oxygen sensors to the catalytic converter. Refer to Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 , and Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 .

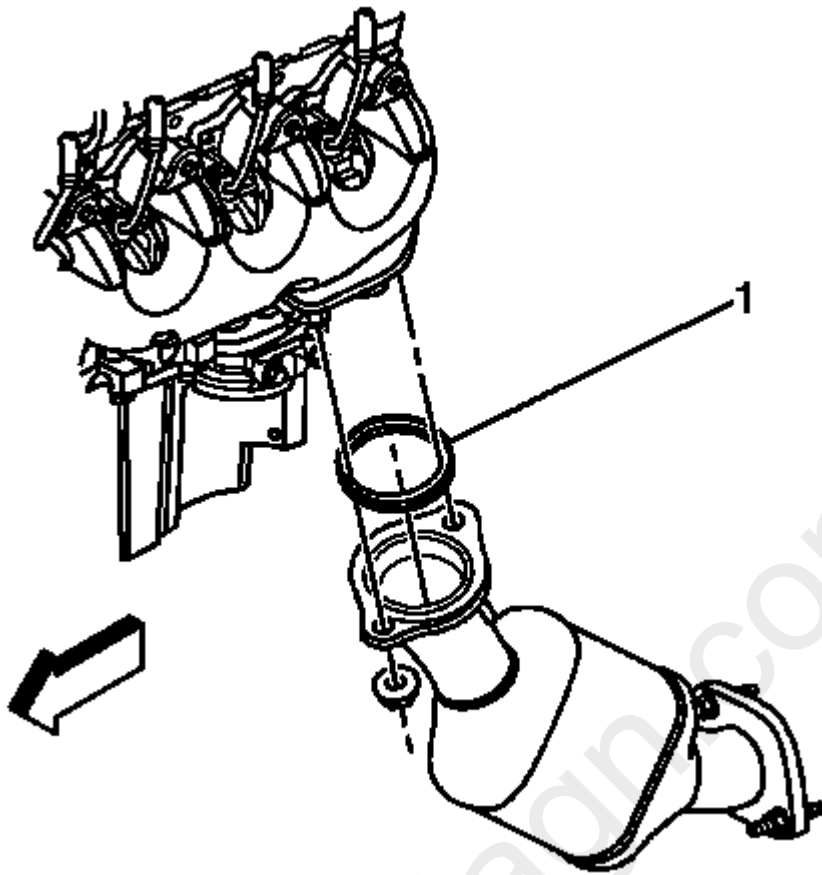


Fig. 40: Removing Left Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

2. Install the catalytic converter gasket (1) to the catalytic converter.
3. Carefully install the catalytic converter to the exhaust manifold.

CAUTION: Refer to Fastener Caution .

4. Install the catalytic converter nuts and tighten to 50 N.m (37 lb ft).
5. Using the screw jack, raise the exhaust system.
6. Install the exhaust system to the left and right side catalytic converters. Refer to **Exhaust System Replacement (LSA-Coupe)**, **Exhaust System Replacement (LSA-Wagon)**.
7. Remove the screw jack.
8. Lower the vehicle.
9. Connect the oxygen sensor electrical connectors.
10. Install the left exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Left Side (LSA)**.
11. Install the rear intake manifold cover. Refer to **Intake Manifold Cover Replacement - Rear** .

CATALYTIC CONVERTER REPLACEMENT - LEFT SIDE (LFW,LFX)

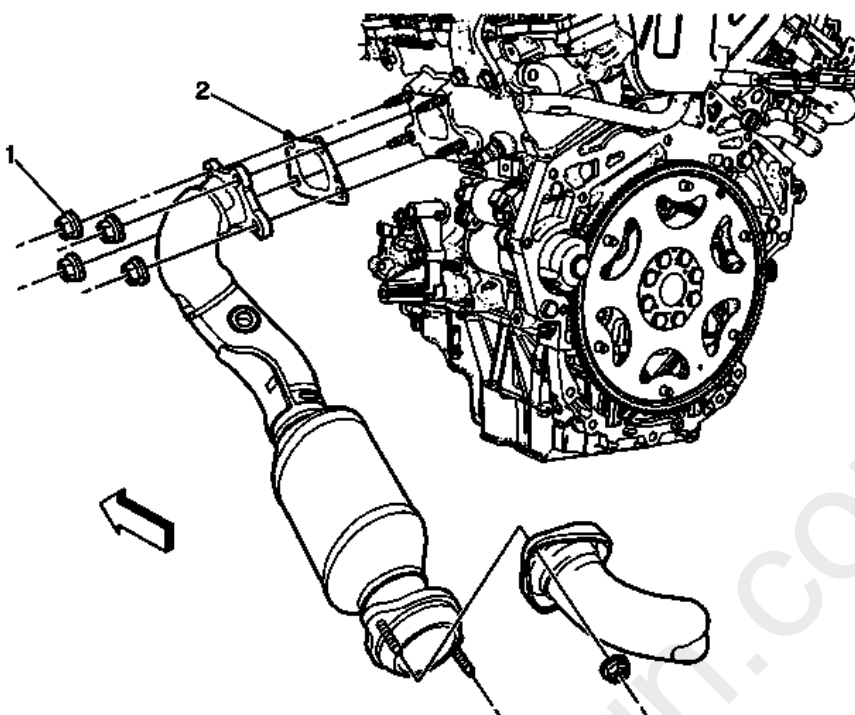


Fig. 41: Catalytic Converter, Gasket & Nuts - Left Side (LFW, LFX)
Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Replacement - Left Side (LFW,LFX)

Callout	Component Name
Preliminary Procedure Remove the exhaust muffler. Refer to <u>Exhaust System Replacement (Single Exhaust)</u> , <u>Exhaust System Replacement (LFX/LFW-Coupe)</u> , <u>Exhaust System Replacement (LFX/LFW-Wagon)</u> .	
1	Catalytic Converter Nut (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . CAUTION: To prevent damage to the exhaust manifold flange or stud, make sure the flange is fully seated before tightening. Procedure 1. Remove and inspect the nuts, replace as necessary. 2. Clean and inspect the studs on the engine cylinder head, replace as necessary. 3. Verify that the studs are fully seated. Stud collar should touch the surface of the

	engine cylinder head. 4. Tighten nuts in a criss-cross pattern. Tighten • First Pass: 20 N.m (15 lb ft) • Final Pass: 46 N.m (34 lb ft)
2	Gasket TIP: Replace the gasket with a new one.

CATALYTIC CONVERTER REPLACEMENT - RIGHT SIDE (LSA)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

1. Remove the rear intake manifold cover. Refer to Intake Manifold Cover Replacement - Rear .
2. Remove the right exhaust manifold heat shield. Refer to Exhaust Manifold Heat Shield Replacement - Right Side (LSA).
3. Disconnect the oxygen sensor electrical connectors.
4. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
5. Support the exhaust with a suitable screw jack.

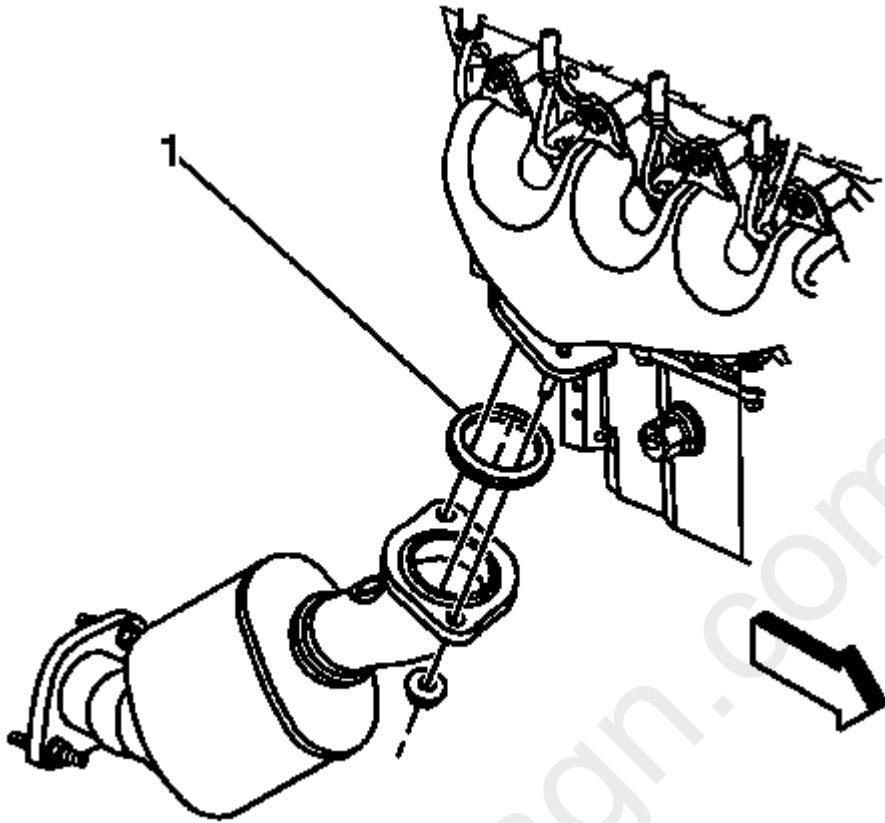


Fig. 42: View Of Right Side Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

6. Disconnect the exhaust system from the left and right side catalytic converters. Refer to **Exhaust System Replacement (LSA-Coupe)**, **Exhaust System Replacement (LSA-Wagon)**.
7. Using the screw jack, lower the exhaust system.
8. Remove the right bank catalytic converter to exhaust manifold nuts.
9. Carefully remove the catalytic converter with the gasket (1) and oxygen sensors from the exhaust manifold.
10. Remove the oxygen sensors from the catalytic converter. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** , and **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .

Installation Procedure

1. Install the oxygen sensors to the catalytic converter. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** , and **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .

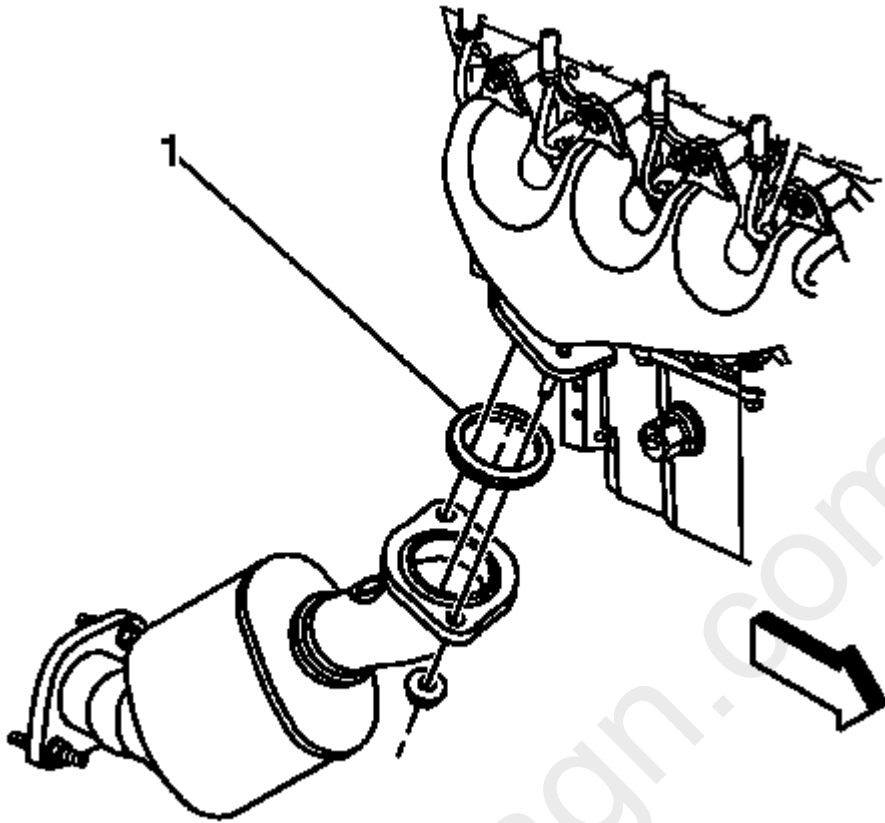


Fig. 43: View Of Right Side Catalytic Converter
Courtesy of GENERAL MOTORS COMPANY

2. Install the catalytic converter gasket (1) to the catalytic converter.
3. Carefully install the catalytic converter to the exhaust manifold.

CAUTION: Refer to Fastener Caution .

4. Install the catalytic converter nuts and tighten to 50 N.m (37 lb ft).
5. Using the screw jack, raise the exhaust system.
6. Connect the exhaust system to the left and right side catalytic converters. Refer to **Exhaust System Replacement (LSA-Coupe)**, **Exhaust System Replacement (LSA-Wagon)**.
7. Remove the screw jack.
8. Lower the vehicle.
9. Connect the oxygen sensor electrical connectors.
10. Install the right exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Right Side (LSA)**.
11. Install the rear intake manifold cover. Refer to **Intake Manifold Cover Replacement - Rear** .

CATALYTIC CONVERTER REPLACEMENT - RIGHT SIDE (LFW,LFX)

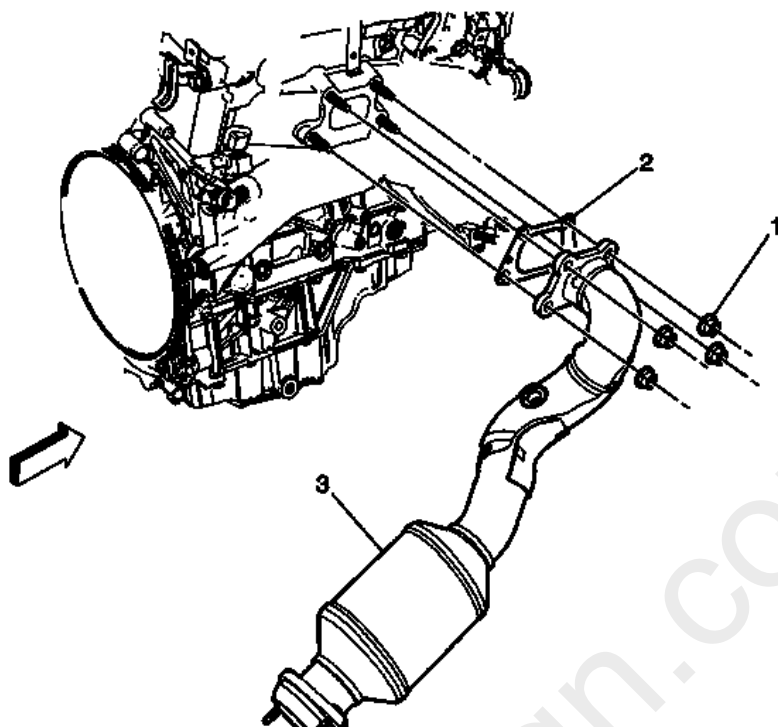


Fig. 44: Catalytic Converter, Gasket & Nuts - Right Side (LFW, LFX)
 Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Replacement - Right Side (LFW,LFX)

Callout	Component Name
Preliminary Procedure Remove the exhaust muffler. Refer to <u>Exhaust System Replacement (Single Exhaust)</u> , <u>Exhaust System Replacement (LFX/LFW-Coupe)</u> , <u>Exhaust System Replacement (LFX/LFW-Wagon)</u> .	
1	Catalytic Converter Nut (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . CAUTION: To prevent damage to the exhaust manifold flange or stud, make sure the flange is fully seated before tightening. Procedure 1. Remove and inspect the nuts, replace as necessary. 2. Clean and inspect the studs on the engine cylinder head, replace as necessary. 3. Verify that the studs are fully seated. Stud collar should touch the surface of the

	engine cylinder head. 4. Tighten nuts in a criss-cross pattern. Tighten • First Pass: 20 N.m (15 lb ft) • Final Pass: 46 N.m (34 lb ft)
2	Gasket TIP: Replace the gasket with a new one.
3	Catalytic Converter

EXHAUST SYSTEM INSULATOR, HANGER, BRACKET REPLACEMENT

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

Removal Procedure

WARNING: Refer to Protective Goggles and Glove Warning .

WARNING: Refer to Exhaust Service Warning .

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

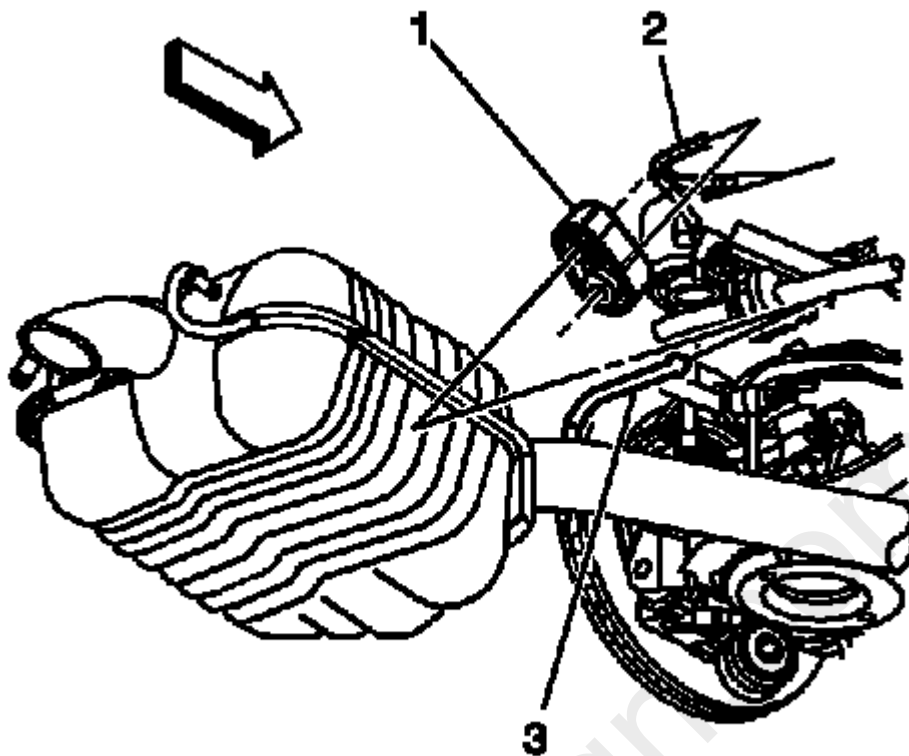


Fig. 45: View Of Front Exhaust, Rear Suspension & Exhaust Pipe Hanger Rods
Courtesy of GENERAL MOTORS COMPANY

2. Apply a non petroleum based lubricant to the insulators and the hanger rods to aid in removal.
3. Remove the muffler insulator (1) from the rear suspension hanger rod (2).
4. Remove the muffler insulator (1) from the muffler hanger rod (3).

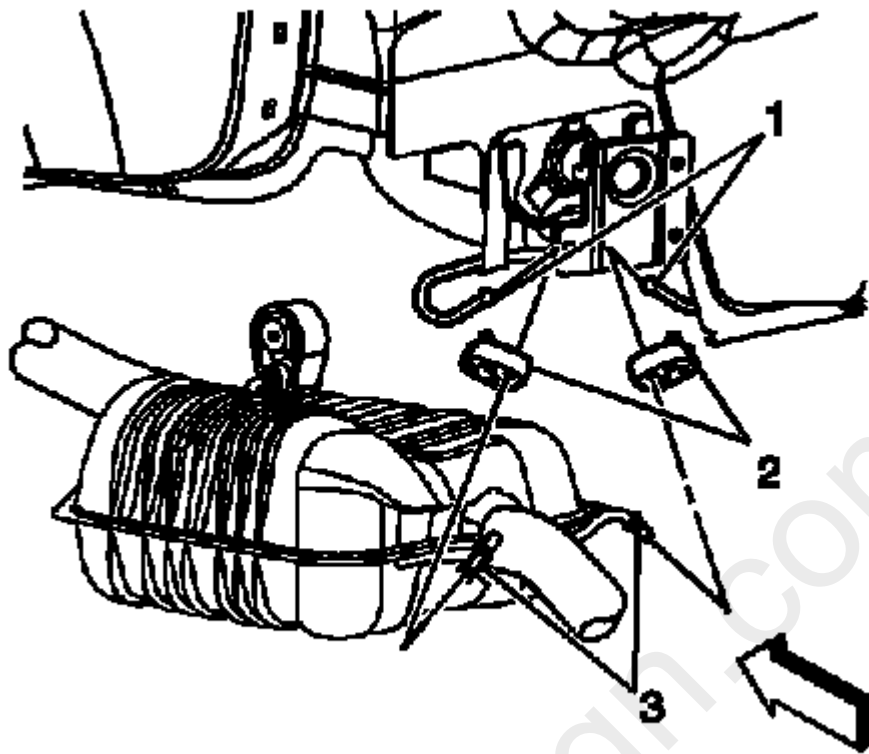


Fig. 46: View Of Body Support Bracket Rod, Tail Pipe Hanger Rod & Tail Pipe Hanger
Courtesy of GENERAL MOTORS COMPANY

5. Remove the tail pipe insulators (2) from the body support hanger rods (1).
6. Remove the tail pipe insulators (2) from the muffler hanger rods (3).

Installation Procedure

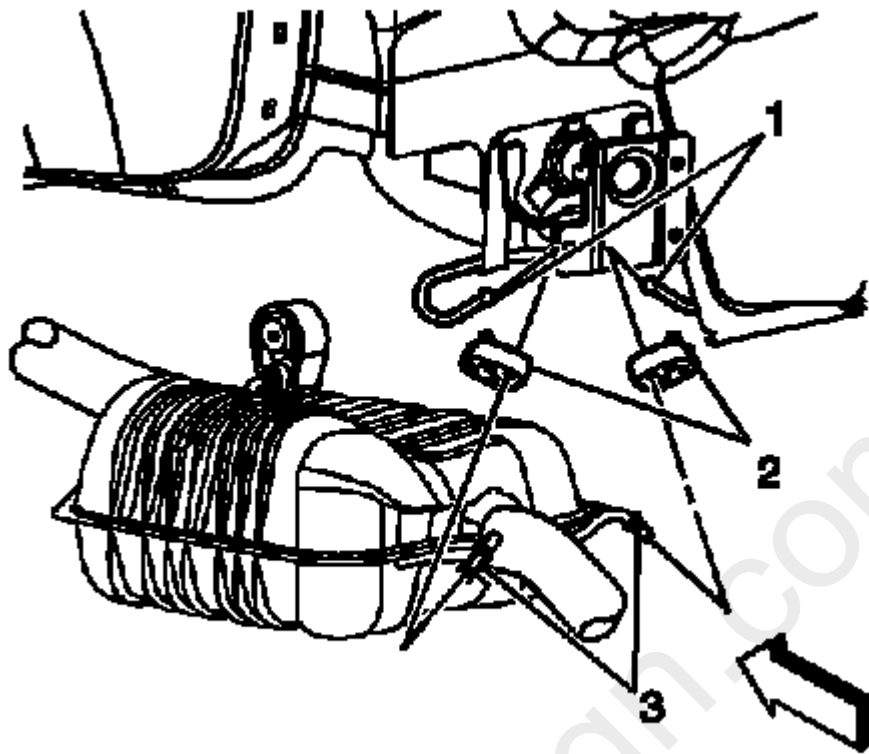


Fig. 47: View Of Body Support Bracket Rod, Tail Pipe Hanger Rod & Tail Pipe Hanger
Courtesy of GENERAL MOTORS COMPANY

1. Apply a non petroleum based lubricant to the insulators and the hanger rods to aid in installation.
2. Install the tail pipe insulators (2) to the tail pipe hanger rods (3).
3. Install the tail pipe insulators (2) over the body support bracket rods (1).

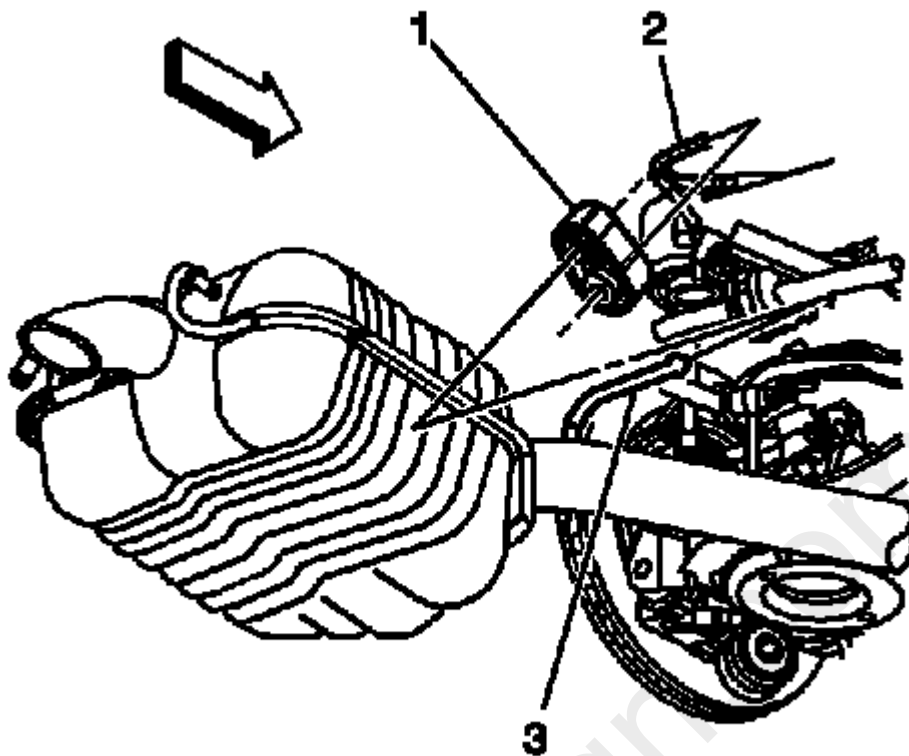


Fig. 48: View Of Front Exhaust, Rear Suspension & Exhaust Pipe Hanger Rods
Courtesy of GENERAL MOTORS COMPANY

4. Install the muffler insulator (1) to the muffler hanger rod (3).
5. Install the muffler insulator (1) to the rear suspension hanger rod (2).
6. Inspect for underbody clearance and tail pipe alignment.

EXHAUST HANGER MOUNTING BRACKET REPLACEMENT (LSA-WAGON)

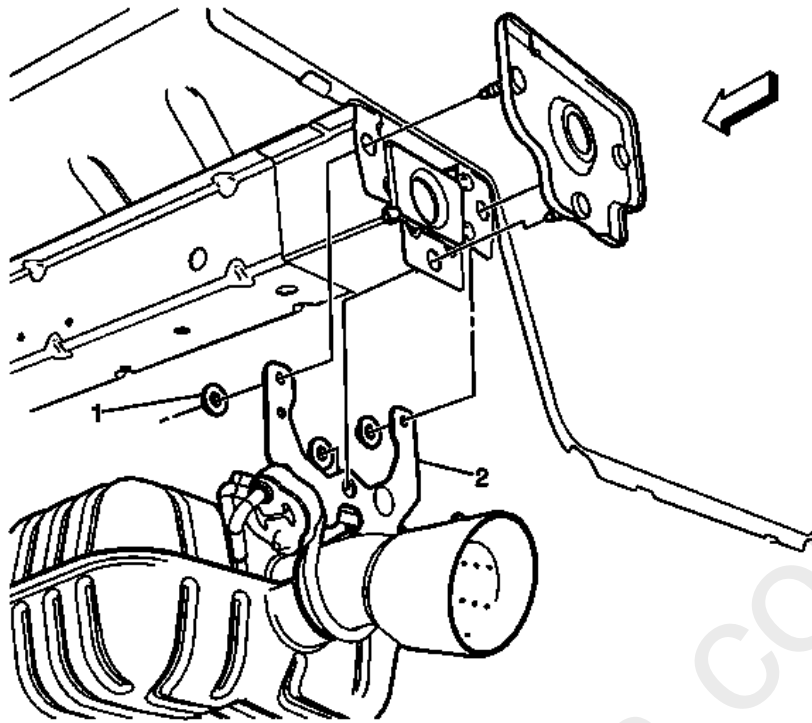


Fig. 49: Exhaust Hanger Mounting Bracket (LSA-Wagon)
 Courtesy of GENERAL MOTORS COMPANY

Exhaust Hanger Mounting Bracket Replacement (LSA-Wagon)

Callout	Component Name
Preliminary Procedure	
Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
1	Exhaust Hanger Bracket Nut (Qty: 3) WARNING: Refer to <u>Protective Goggles and Glove Warning</u> . CAUTION: Refer to <u>Fastener Caution</u> . Tighten 22 N.m (16 lb ft).
2	Exhaust Hanger Mounting Bracket

EXHAUST HANGER MOUNTING BRACKET REPLACEMENT (LFX, LSA-COUPE)

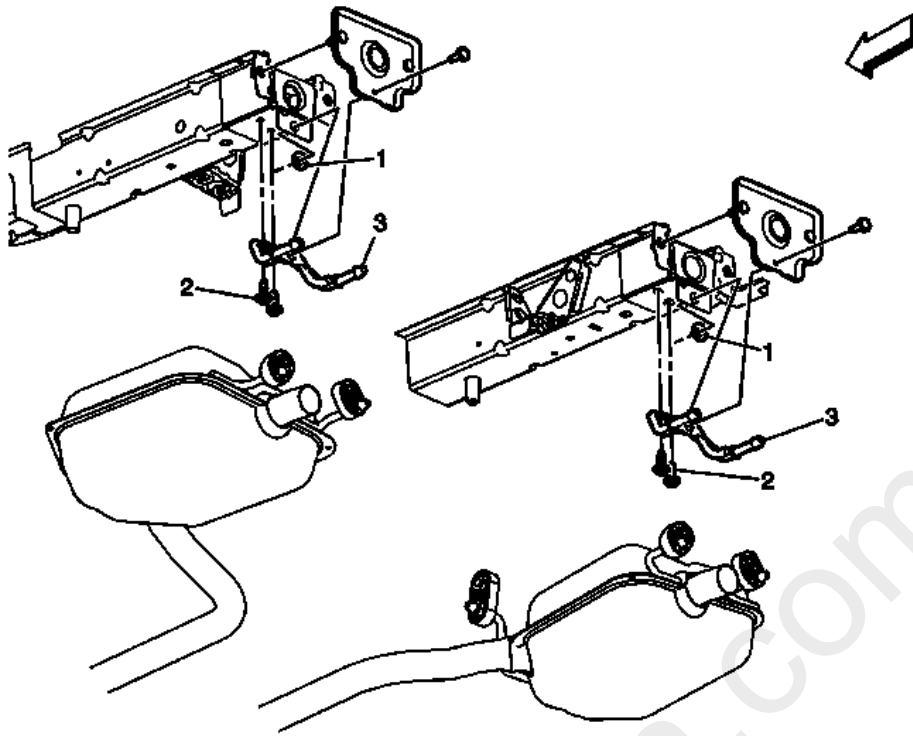


Fig. 50: Exhaust Hanger Mounting Bracket Replacement (LFX, LSA-Coupe)
 Courtesy of GENERAL MOTORS COMPANY

Exhaust Hanger Mounting Bracket Replacement (LFX, LSA-Coupe)

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
WARNING: Refer to <u>Protective Goggles and Glove Warning</u> .	
Preliminary Procedure	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Disengage the rear exhaust muffler from the insulators and support the exhaust.	
1	Exhaust Hanger Mounting Bracket Fastener CAUTION: Refer to <u>Fastener Caution</u> . Tighten 22 N.m (16 lb ft).
	Exhaust Hanger Mounting Bracket Fastener (Qty: 2)

2	Tighten 22 N.m (16 lb ft).
3	Exhaust Hanger Mounting Bracket

EXHAUST PIPE FRONT HANGER BRACKET REPLACEMENT (AWD)

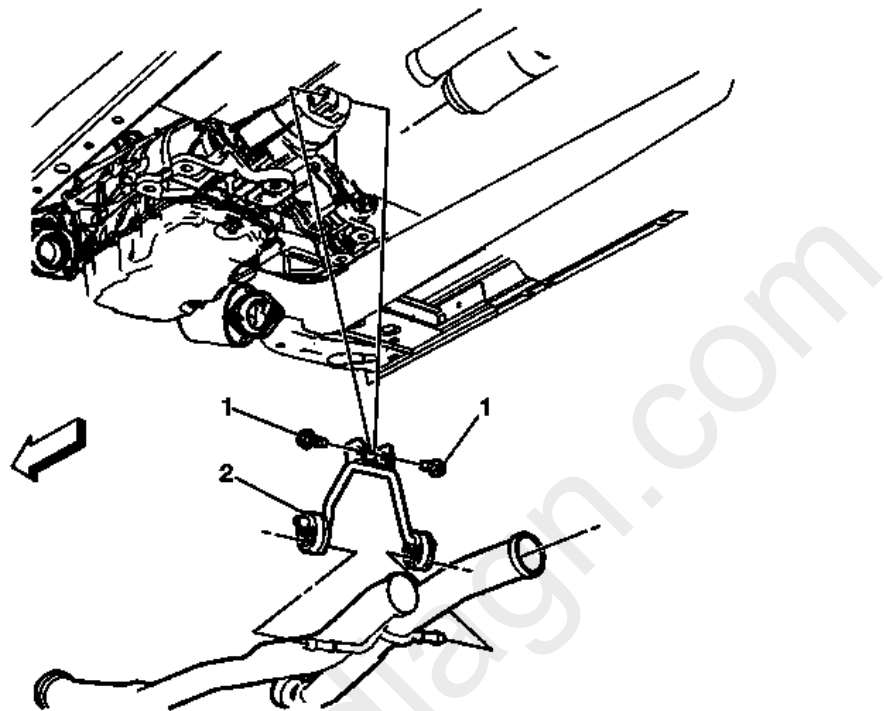


Fig. 51: Exhaust Pipe Front Hanger Bracket Replacement (AWD)
 Courtesy of GENERAL MOTORS COMPANY

Exhaust Pipe Front Hanger Bracket Replacement (AWD)

Callout	Component Name
WARNING: Refer to <u>Hot Exhaust System Warning</u> .	
Preliminary Procedures	
1. Remove the exhaust muffler from the front catalytic converters. Refer to <u>Exhaust System Replacement (LSA-Coupe)</u> , <u>Exhaust System Replacement (LSA-Wagon)</u> , <u>Exhaust System Replacement (Single Exhaust)</u> , <u>Exhaust System Replacement (LFX/LFW-Coupe)</u> , <u>Exhaust System Replacement (LFX/LFW-Wagon)</u> .	
2. Remove the exhaust muffler from the exhaust pipe front hanger bracket insulator.	
	Bolt (Qty: 2) CAUTION:

	Refer to <u>Fastener Caution</u> . Procedure 1. Hand tighten the exhaust front hanger bolts. 2. Following the sequence shown, tighten the driver side exhaust hanger bolt first and the passenger side bolt last. Tighten 65 N.m (48 lb ft)
2	Exhaust Pipe Front Hanger Bracket

EXHAUST HEAT SHIELD REPLACEMENT - REAR FASCIA (COUPE)

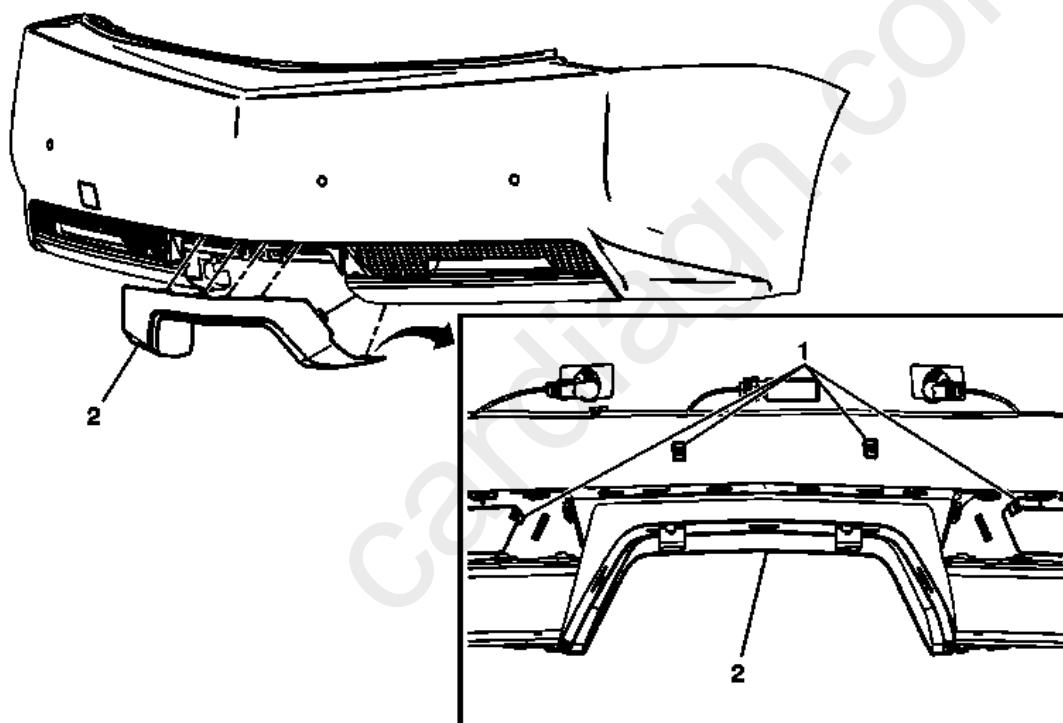


Fig. 52: Exhaust Heat Shield - Rear Fascia (Coupe)
Courtesy of GENERAL MOTORS COMPANY

Exhaust Heat Shield Replacement - Rear Fascia (Coupe)

Callout	Component Name
Preliminary Procedure Remove the rear bumper fascia energy absorber. Refer to <u>Rear Bumper Fascia Energy Absorber Replacement (Coupe)</u> .	
	Exhaust Heat Shield Insert Clip (Qty: 4)

1	Procedure Use a small flat-bladed tool to release the clips.
2	Exhaust Heat Shield- Rear Fascia

FRONT AXLE PROPELLER SHAFT HEAT SHIELD REPLACEMENT

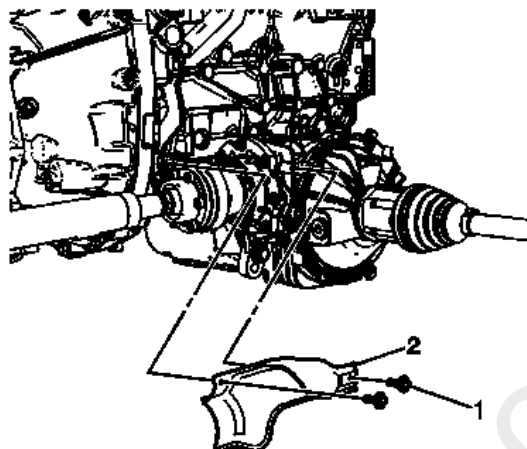


Fig. 53: Front Axle Propeller Shaft Heat Shield
Courtesy of GENERAL MOTORS COMPANY

Front Axle Propeller Shaft Heat Shield Replacement

Callout	Component Name
Preliminary Procedure 1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Remove the right catalytic convertor. Refer to <u>Catalytic Converter Replacement - Right Side (LFW,LFX)</u>, <u>Catalytic Converter Replacement - Right Side (LSA)</u>.	
1	Front Axle Propeller Shaft Heat Shield Bolt (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 9 N.m (80 lb in)
2	Front Axle Propeller Shaft Heat Shield

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - RIGHT SIDE (LSA)

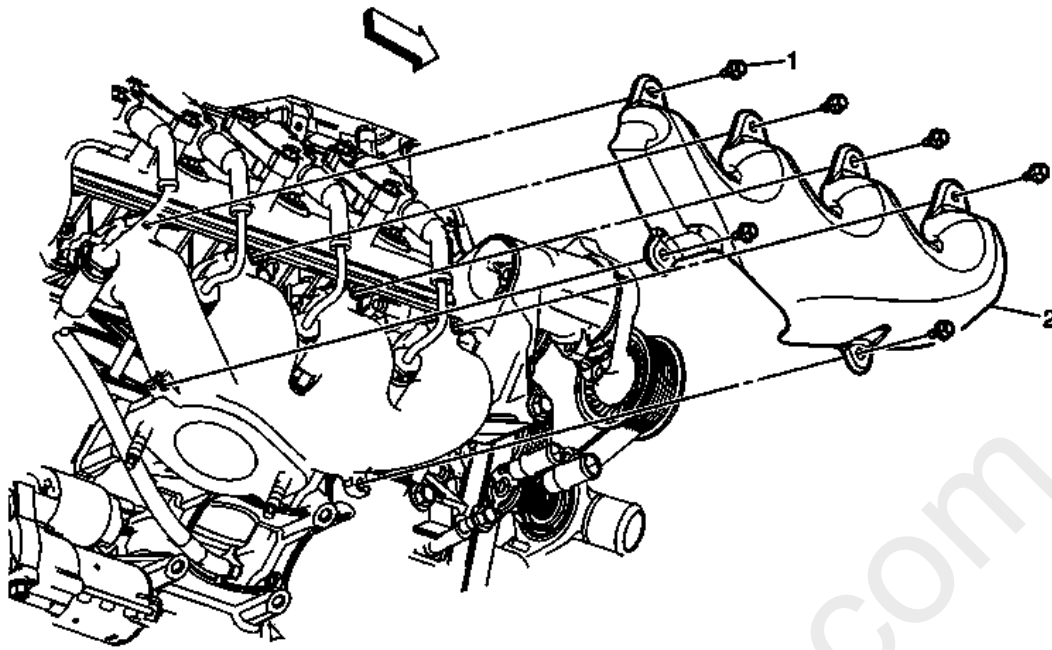


Fig. 54: Exhaust Manifold Heat Shield Replacement - Right Side (LSA)
 Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Heat Shield Replacement - Right Side (LSA)

Callout	Component Name
1	Bolt (Qty: 6) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 10 N.m (88 lb in)
2	Exhaust Manifold Heat Shield - Right

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - LEFT SIDE (LSA)

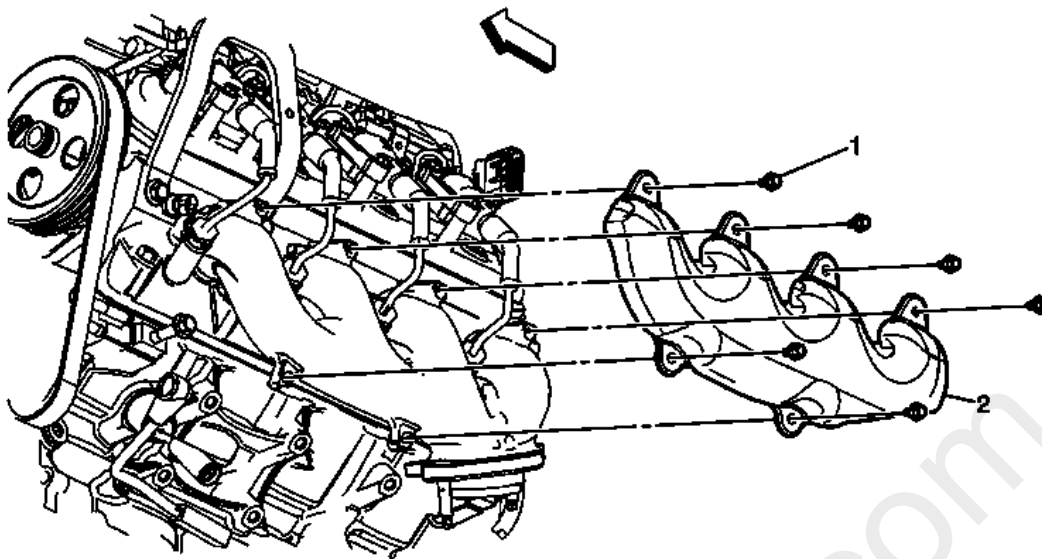


Fig. 55: Exhaust Manifold Heat Shield Replacement - Left Side (LSA)
 Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Heat Shield Replacement - Left Side (LSA)

Callout	Component Name
1	Bolt (Qty: 6) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 10 N.m (88 lb in)
2	Exhaust Manifold Heat Shield - Left

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)

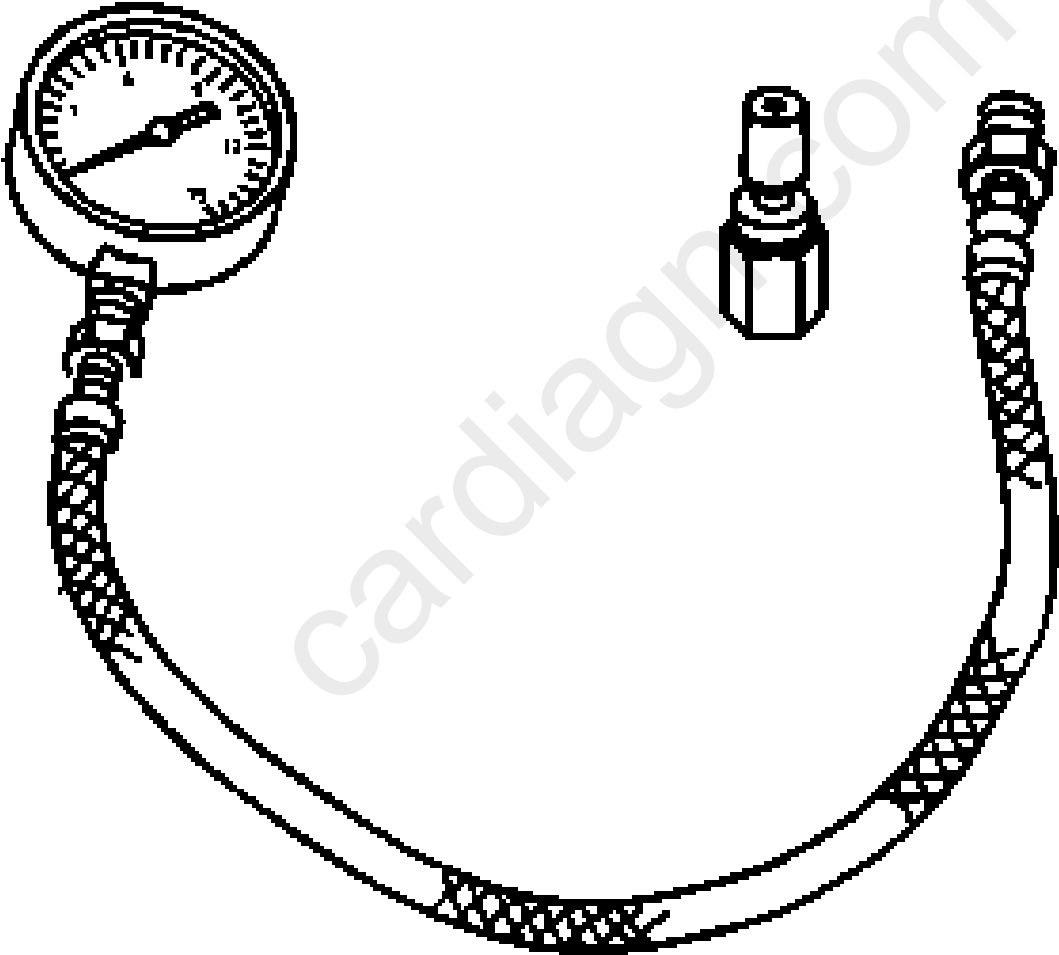
The catalyst in the converter is not serviceable.

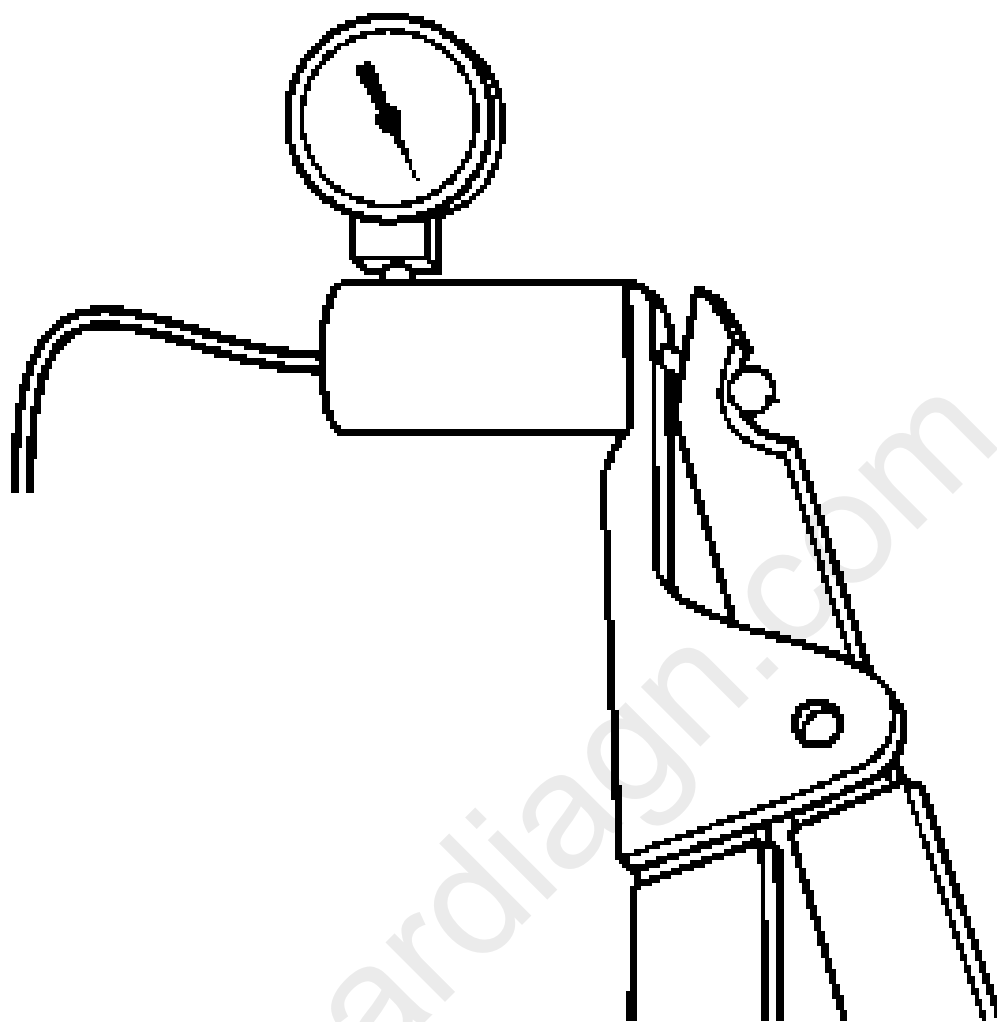
Muffler

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