

2010 Cadillac SRX

2010 ENGINE Engine Exhaust - SRX

2010 ENGINE**Engine Exhaust - SRX****SPECIFICATIONS****FASTENER TIGHTENING SPECIFICATIONS**

Application	Specification	
	Metric	English
Catalytic Converter to the Cylinder Head	4 N.m	34 lb ft
Catalytic Converter to the Turbocharger (LA)	25 N.m	1 lb ft
Catalytic Converter Race to the Engine Block (LA)	20 N.m	15 lb ft
Catalytic Converter Race to the Catalytic Converter Outlet Flange (LA)	20 N.m	15 lb ft
Catalytic Converter Bracket Nut (LA)	43 N.m	32 lb ft
Catalytic Converter Support Bracket Bolt (LA)	22 N.m	1 lb ft
Catalytic Converter Heat Shield Bolt (LA)	10 N.m	7 lb ft
Catalytic Converter-Left to the Exhaust Muffler	4 N.m	34 lb ft
Catalytic Converter-Right to the Left Catalytic Converter Pipe	4 N.m	34 lb ft
Catalytic Converter to the Front Flexible Pipe Nut (LA)	1 N.m	13 lb ft
Catalytic Converter Upper Mounting Bracket Bolt (LA)	20 N.m	15 lb ft
Exhaust Flexible Pipe Service Clamp	4 N.m	35 lb ft
Exhaust Manifold to Cylinder Head Bolt (LA)	20 N.m	15 lb ft
Exhaust Manifold Lower Heat Shield Upper Bolt	N.m	0 lb in
Exhaust Manifold Lower Heat Shield Lower Bolt	5 N.m	43 lb ft
Exhaust Pipe Heat Shield Retainers	1.5 N.m	13 lb in
Exhaust Turbocharger Inlet Pipe to the Exhaust Manifold Nut (LA)	25 N.m	1 lb ft
Exhaust Turbocharger Inlet Pipe to the Turbocharger Nut (LA)	25 N.m	1 lb ft
Front Flex Pipe to Muffler Assembly Nut (LA)	4 N.m	34 lb ft
Three-Way Catalytic Converter Service Clamp (LA)	54 N.m	40 lb ft
Three-Way Catalytic Converter Service Clamp (LF1)	4 N.m	35 lb ft
Transmission Race to Engine Block (M 4)	5 N.m	43 lb ft
Transmission Race to Transmission (M 4)	5 N.m	43 lb ft
Transmission Heat Shield Bolt (LA)	10 N.m	7 lb ft

ADHESIVES FLUIDS LUBRICANTS AND SEALERS

Application	Type of Material	GM Part Number	
		United States	Canada

Anti-Seize

Lubricant

123713

021 45

DIAGNOSTIC INFORMATION AND PROCEDURES

S MPTOMS - 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

EN 3 31 -A: Exhaust Back Pressure Gauge.

For equivalent regional tools, refer to **Special Tools**.

Diagnostic Aids

WARNING: Refer to **Hot Exhaust System Warning** .

For dual exhaust systems a quick check of exhaust flow will help determine which side of the exhaust system is restricted. The side that has less exhaust flow is the side that will be suspect, and diagnosis should begin there.

Test Description

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

: 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 **EN 3 31 -A:** gauge . Removing the O2S sensor may set a DTC. When finishing this diagnostic table, be sure to clear all codes.

: This step will isolate the catalytic converter from the remainder of the exhaust system.

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: 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.

Step	Action	Value(s)	es	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
	1. Remove the heated oxygen sensor (O2S) that is in front of the catalytic converter. Refer to the appropriate procedure. Refer to <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LF1) or Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (LF1)</u> . 2. Install the EN 3 31 -A: Exhaust back Pressure Gauge in place of the O2S 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.	kPa (1.25 psi)		
	Does the reading exceed the specified value		Go to Step	Go to Step
	1. Turn the engine OFF and place the ignition in the lock position. 2. Remove the EN 3 31 -A: gauge. 3. Reinstall the O2S sensor. Refer to <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 1 (LF1) or Heated Oxygen Sensor Replacement - Bank 2 Sensor 1 (LF1)</u> . 4. Remove the post-catalyst O2S sensor. Refer to the appropriate procedure. Refer to <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LF1) or Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (LF1)</u> . 5. Install the EN 3 31 -A: gauge in place of the post O2S sensor.	kPa (1.25 psi)		

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	- Start the engine. 7. Increase and monitor the engine speed at 2,500 RPM. - Observe the exhaust system back pressure reading on the gauge.			
	Does the reading exceed the specified value		Go to Step	Go to Step
	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	-
7	Replace the catalytic converter. Refer to <u>Catalytic Converter Replacement - Left Side (LF1)</u> or <u>Catalytic Converter Replacement - Right Side (LF1)</u>.	-		
	Did you find and correct the condition		Go to Step	-
	- Remove the EN 3 31 -A: gauge. - Reinstall the applicable O2S sensor. Refer to <u>Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 (LF1)</u> or <u>Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 (LF1)</u>. - Clear any codes. - Road test the vehicle in order to verify the repair.	-		
	Did you correct the condition		System O	Go to Step 2

EXHAUST LEAKAGE

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.	

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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.
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.
Catalytic Converter cracked or broken	Replace the catalytic converter. Refer to <u>Catalytic Converter Replacement - Left Side (LF1)</u> or <u>Catalytic Converter Replacement - Right Side (LF1)</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 Muffler Replacement (LF1)</u> or <u>Exhaust Muffler Replacement (LAU)</u> .

EXHAUST NOISE

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	- Compare to a known good vehicle. - Inspect for a damaged or failed muffler or resonator, if equipped. - Replace the faulty muffler or resonator (if equipped). Refer to

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	<u>Exhaust Muffler Replacement (LF1)</u> or <u>Exhaust Muffler Replacement (LAU)</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 the affected component's service procedure.
Internal rattle	1. Test the components by tapping with a rubber mallet to confirm a rattle. 2. Replace the faulty catalytic converter, resonator, if equipped, or muffler. Refer to <u>Exhaust Muffler Replacement (LF1)</u> or <u>Exhaust Muffler Replacement (LAU)</u>.

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (LAU)

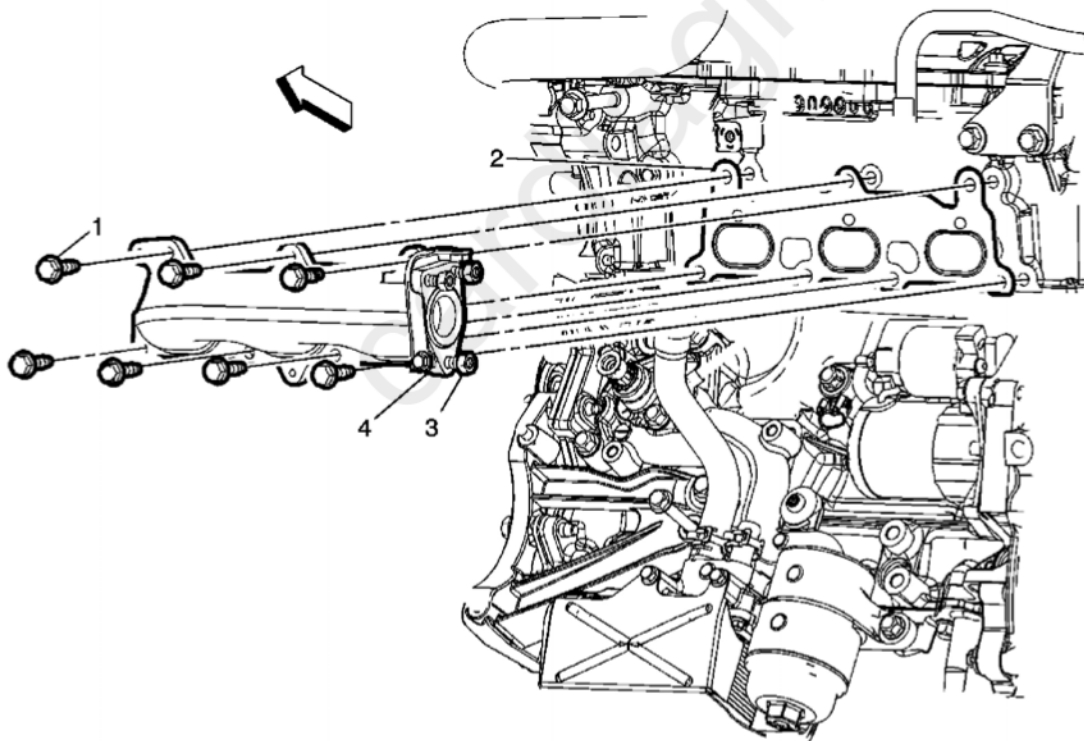


Fig. 1: View Of Exhaust Manifold - Left Side (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	

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1. Remove the secondary air injection pump pipe. Refer to **Secondary Air Injection Pump Pipe Replacement** .
2. Remove the secondary air injection pump hose. Refer to **Secondary Air Injection Pump Hose Replacement** .
3. Remove the left exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement - Left Side (LAU)**.
4. Remove the secondary air injection pipe bolts from the manifold. Refer to **Secondary Air Injection Pipe Replacement** .
5. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .

1	Nut (Qty: 7) WARNING: Refer to <u>Hot Exhaust System Warning</u> . CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 20 N.m (15 lb ft)
2	Gasket
3	Exhaust Turbocharger Inlet Pipe Nuts Tighten: 20 N.m (15 lb ft)
4	Exhaust Manifold Procedure 1. Remove and discard the exhaust manifold gasket. 2. Clean any exhaust manifold gasket debris from the cylinder head and exhaust manifold. 3. Tighten the exhaust manifold nuts working from the center out.

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (LAU)

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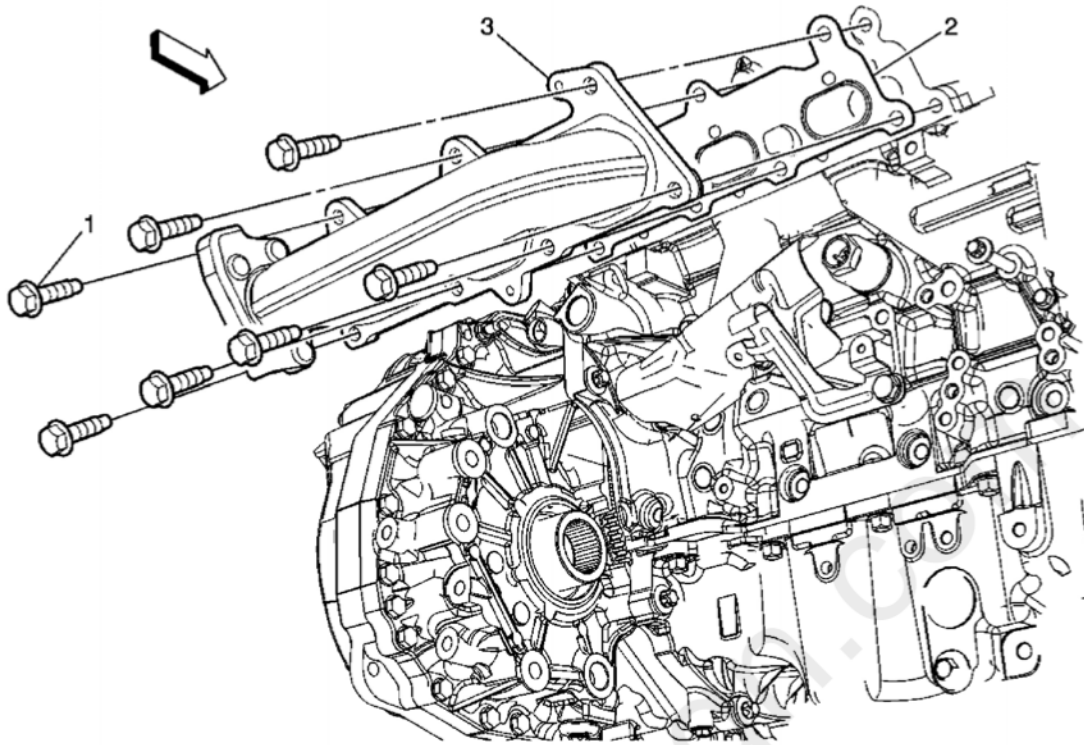


Fig. 2: Identifying Exhaust Manifold - Right Side (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Remove the catalytic converter. Refer to <u>Catalytic Converter Replacement (LAU)</u> .	
2. Remove the right catalytic converter heat shield. Refer to <u>Exhaust Manifold Heat Shield Replacement - Right Side (LAU)</u> .	
3. Disconnect the exhaust turbocharger inlet pipe bank 2. Refer to <u>Exhaust Turbocharger Inlet Pipe Replacement - Bank 2 (LAU)</u>	
4. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
1	Nut (Qty: 7) WARNING: Refer to <u>Hot Exhaust System Warning</u> . CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 20 N.m (15 lb ft)
2	Gasket

Exhaust Manifold

Procedure

3

1. Remove and discard the exhaust manifold gasket.
2. Clean any exhaust manifold gasket debris from the cylinder head and exhaust manifold.
3. Tighten the exhaust manifold nuts working from the center out.

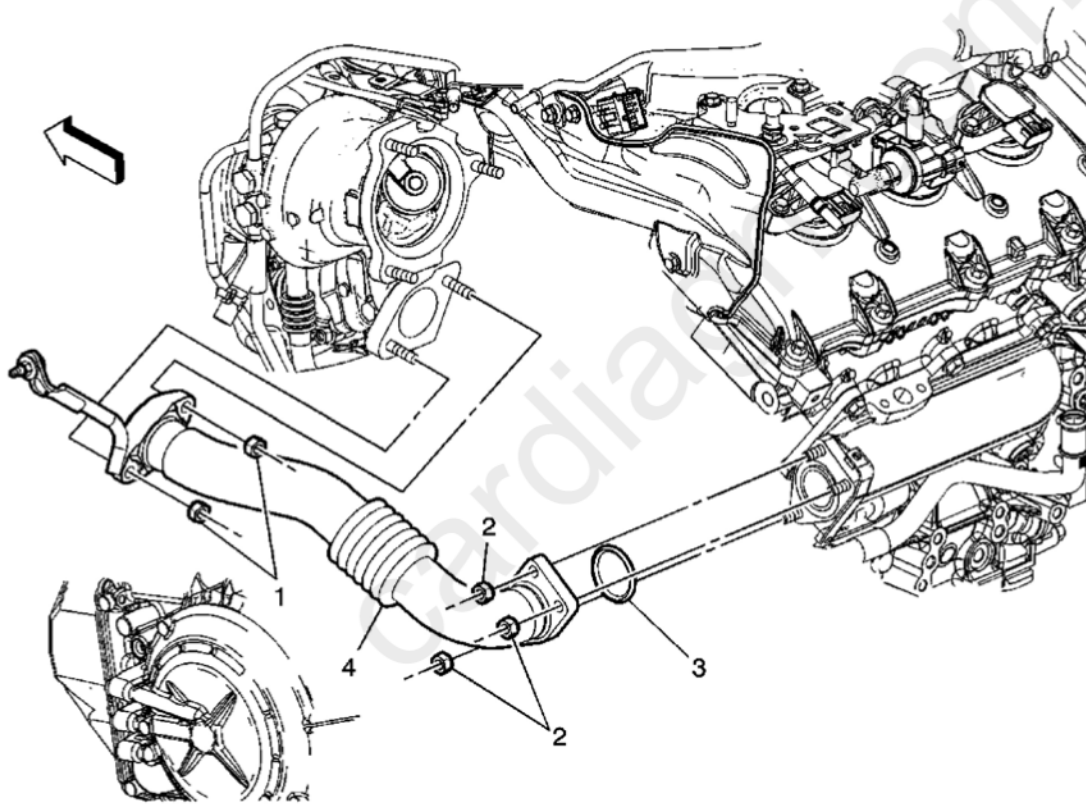
EXHAUST TURBOCHARGER INLET PIPE REPLACEMENT - BANK 1 (LAU)

Fig. 3: Identifying Exhaust Turbocharger Inlet Pipe - Bank 1 (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1.	Remove the catalytic converter heat shield. Refer to <u>Catalytic Converter Heat Shield Replacement (LAU)</u> .
2.	Remove the catalytic converter. Refer to <u>Catalytic Converter Replacement (LAU)</u> .
3.	Remove the right exhaust manifold heat shield. Refer to <u>Exhaust Manifold Heat Shield</u>

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Replacement - Right Side (LA).

4. Remove the transmission heat shield. Refer to Transmission Heat Shield Replacement (LA).

1	Exhaust Turbocharger Inlet Pipe Bolt (Qty: 2) WARNING: Refer to <u>Hot Exhaust System Warning</u> . CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 30 N.m (22 lb ft)
2	Exhaust Turbocharger Inlet Pipe Bolt (Qty: 3) Tighten: 20 N.m (17 lb ft)
3	Seal Tip: Replace the exhaust turbocharger inlet pipe seal.
4	Exhaust Turbocharger Inlet Pipe

EXHAUST TURBOCHARGER INLET PIPE REPLACEMENT - RAN (LA)

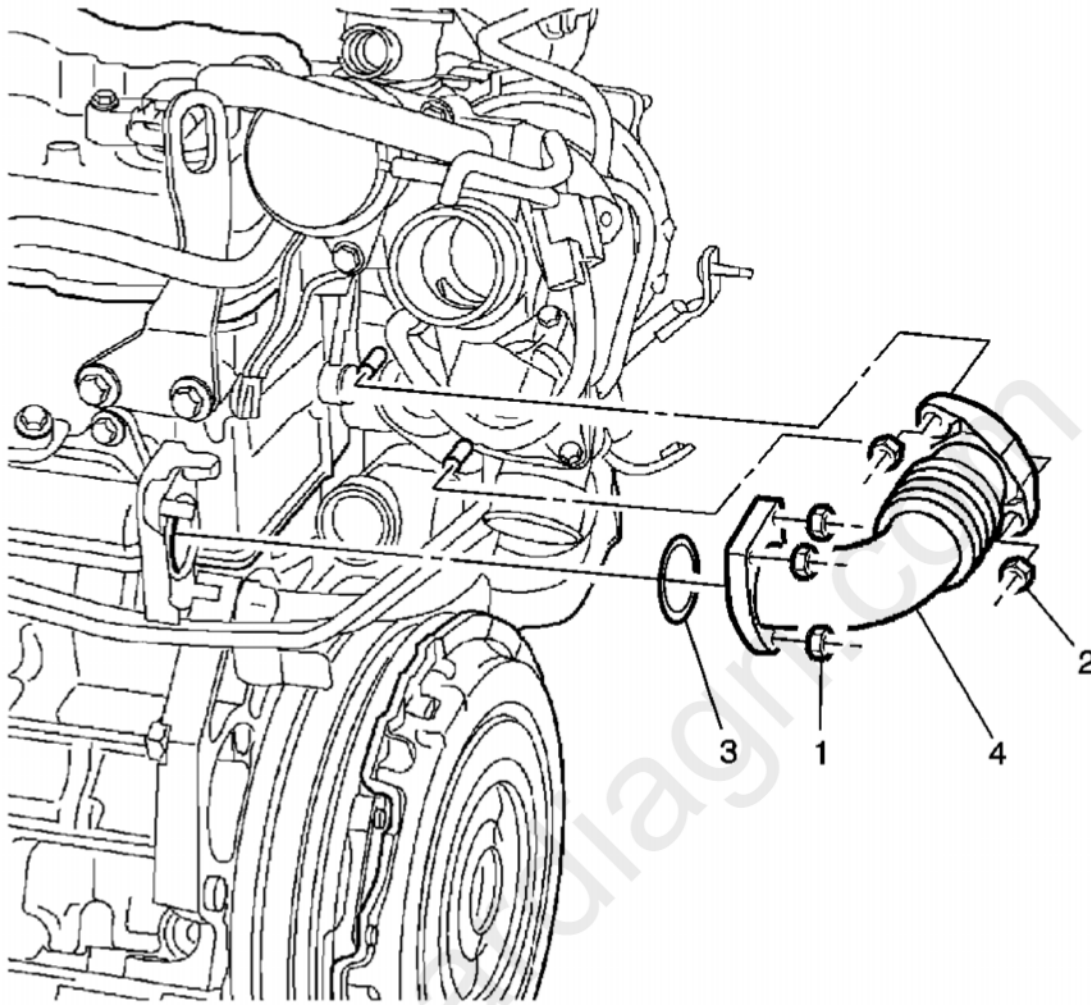


Fig. : View Of Exhaust Turbocharger Inlet Pipe - an (LA)
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> Exhaust Service Warning.	
WARNING: Refer to <u>Hot Exhaust System Warning</u> .	
Preliminary procedures	
1. Remove the radiator outlet pipe. Refer to <u>Radiator Outlet Pipe Replacement (LA)</u> .	
2. Remove the left side exhaust manifold heat shield. Refer to <u>Exhaust Manifold Heat Shield Replacement - Left Side (LA)</u>	
	Exhaust Turbocharger Inlet Pipe Nut (Qty 3)

1	CAUTION: Refer to Fastener Caution . Tighten: 20 N.m (15 lb ft)
2	Turbocharger Nut (Qty: 2) Tighten: 20 N.m (15 lb ft)
3	eal
4	xhaust Turbocharger Inlet Pipe - ank 2

CATALYTIC CONVERTER REPLACEMENT (LA)

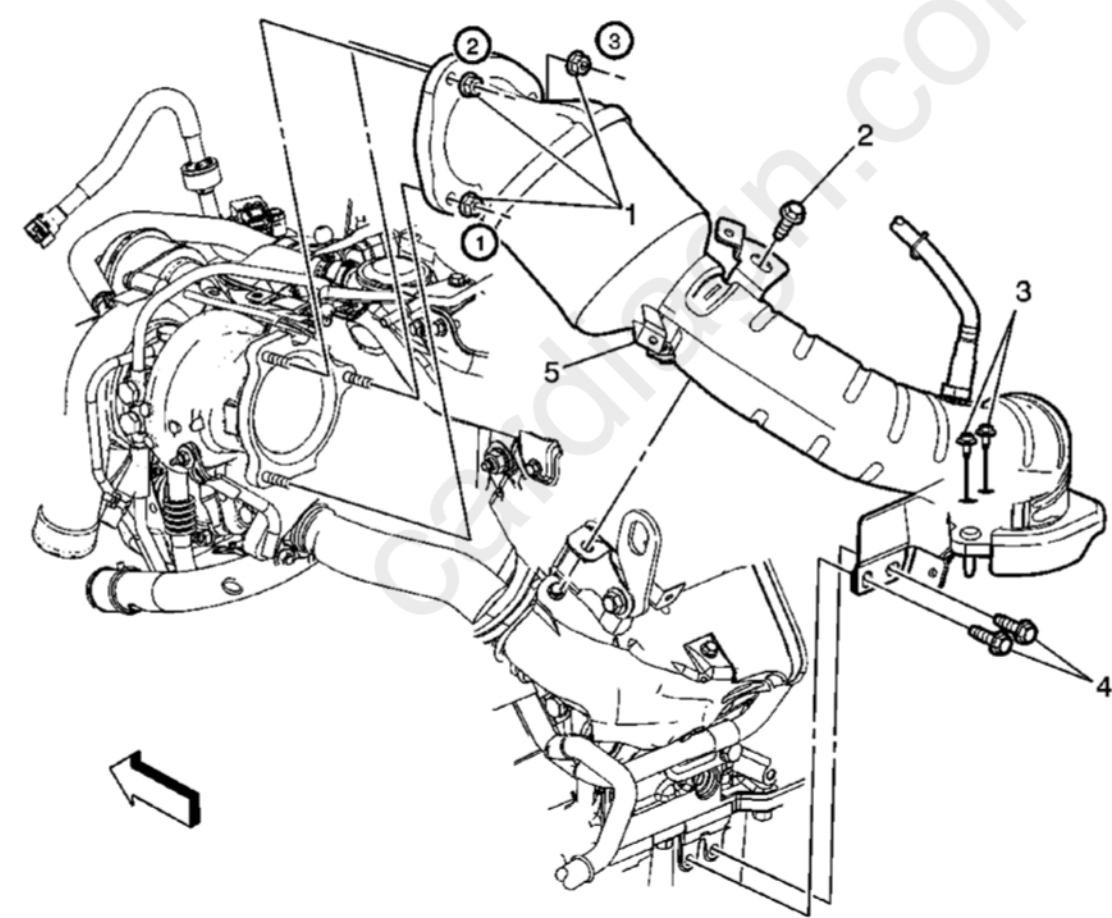


Fig. : Identifying Catalytic Converter (LA)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	

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1. Remove the catalytic converter heat shield. Refer to **Catalytic Converter Heat Shield Replacement (LA)**.
2. Remove the transmission heat shield. Refer to **Transmission Heat Shield Replacement (LA)**.
3. Remove the master cylinder heat shield.
4. Remove the oxygen sensors. Refer to **Heated Oxygen Sensor Replacement - Sensor 1 (LA)** and **Heated Oxygen Sensor Replacement - Sensor (LA)**.
5. Remove the exhaust flexible pipe. Refer to **Exhaust Flexible Pipe Replacement (LF1- Service)** or **Exhaust Flexible Pipe Replacement (LA)**.

1

Catalytic Converter Nut (Qty: 3)

WARNING:Refer to **Hot Exhaust System Warning**.**CAUTION:**Refer to **Fastener Caution**.**Tighten:** 25 N.m (1 lb ft)

2

Catalytic Converter support bolt

Tighten: 22 N.m (16 lb ft)

3

Catalytic Converter brace Nut (Qty: 2)

Tighten: 20 N.m (15 lb ft)

4

Catalytic brace-to- lock bolt (Qty: 2)

Tighten: 22 N.m (16 lb ft)

5

Catalytic Converter

Procedure:

1. Apply lubricant to the turbocharger stud bolts. Refer to **Adhesives Fluids Lubricants and Sealers**.
2. Torque the catalytic converter bolts in the following sequence:

Tighten:

- Tighten 1 to 15 N.m (11 lb ft). Turn 270° counterclockwise.
- Tighten 2 to 15 N.m (11 lb ft). Turn 270° counterclockwise.
- Tighten 3 to 20 N.m (15 lb ft).
- Tighten 1 to 25 N.m (1 lb ft).
- Tighten 2 to 25 N.m (1 lb ft).

3. Tighten the catalytic bracket bolts (4).

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Tighten: 20 N.m (15 lb ft)

4. Tighten the catalytic bracket bolts (3).

Tighten: 20 N.m (15 lb ft)

5. Tighten the catalytic support bolt (2).

Tighten: 22 N.m (16 lb ft)

CATALYTIC CONVERTER REPLACEMENT - LEFT SIDE (LF1)

Removal Procedure

WARNING: Refer to Hot Exhaust System Warning .

WARNING: Refer to Safety Glasses Warning .

1. Disconnect the heated oxygen sensor before and after the left catalytic converter.

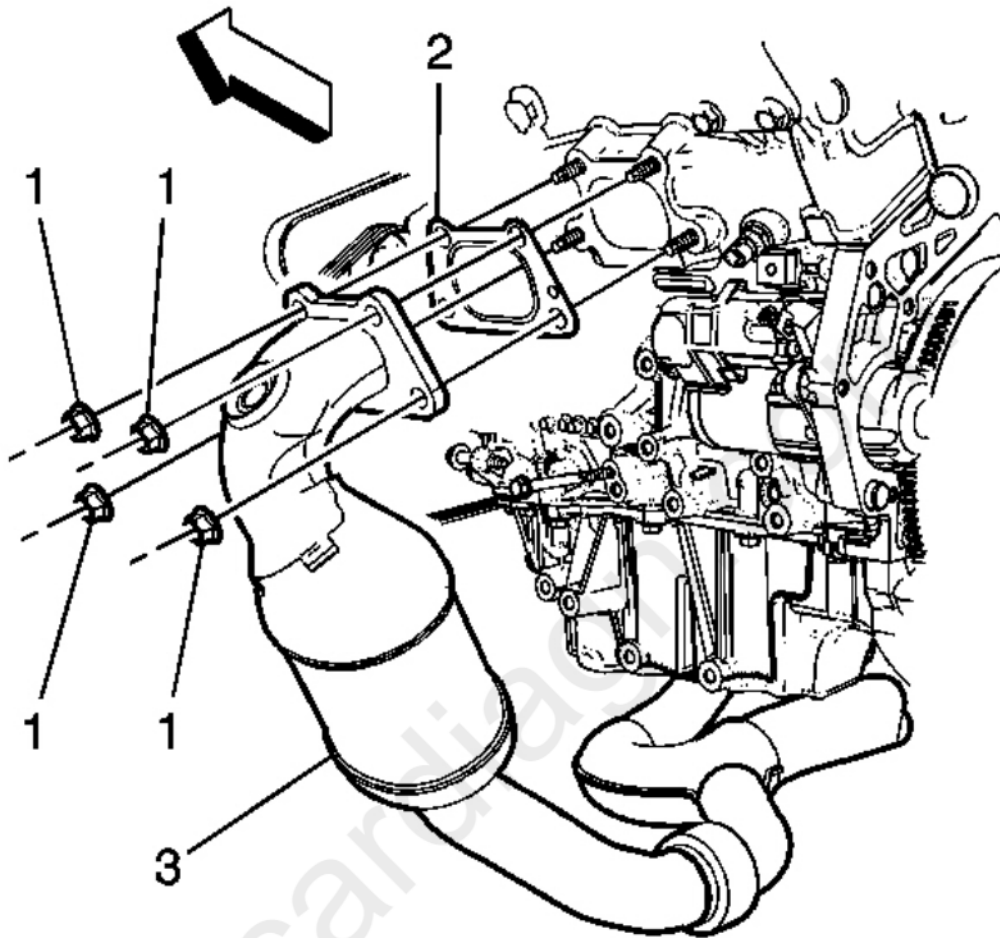


Fig. 6: View Of Left Catalytic Converter & Nuts
Courtesy of GENERAL MOTORS CORP.

2. Remove the left catalytic converter nuts (1) to left cylinder head. Replace gasket (2) with a new one.

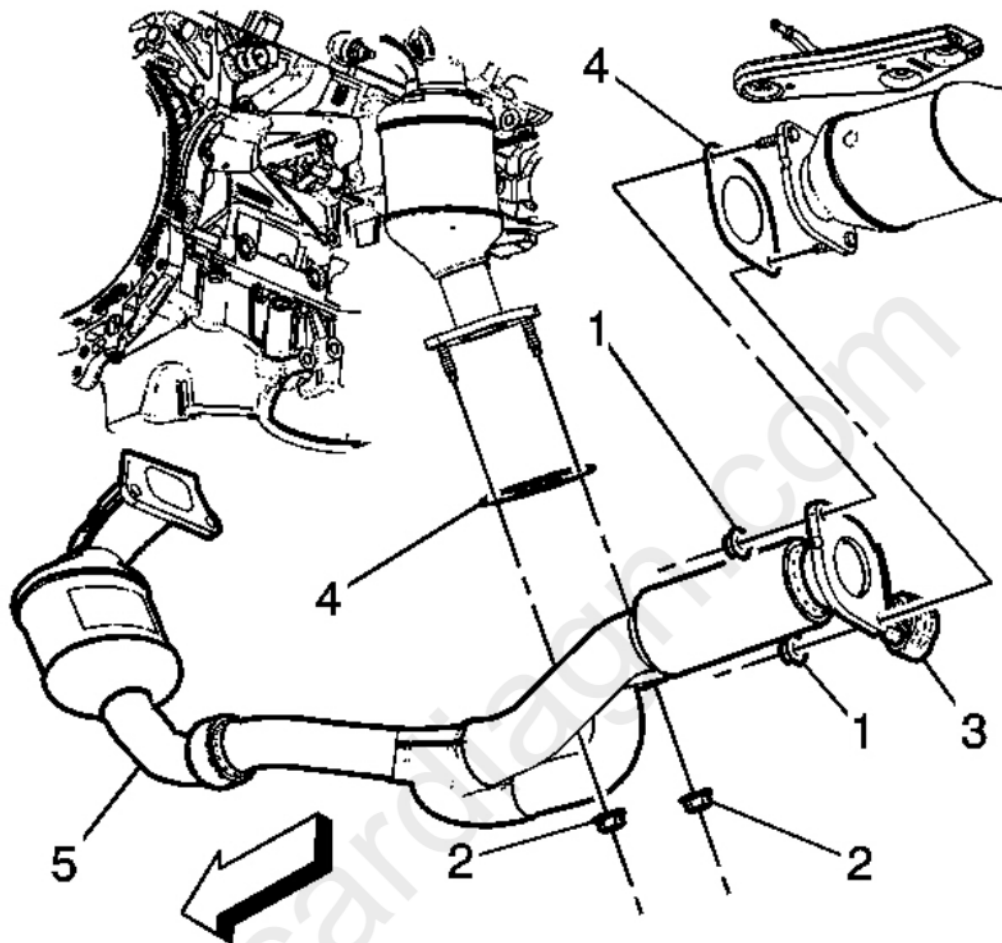


Fig. 7: View Of Left Catalytic Converter & Muffler Assembly
 Courtesy of GENERAL MOTORS CORP.

3. Remove the nuts (1) to the rear muffler assembly.
4. Remove the nuts (2) from the right catalytic converter.

NOTE: It may be easier to remove catalytic converter by removing the left cylinder studs.

5. Remove the exhaust bracket insulator (3) from the hanger and lower catalytic converter (5).
6. Carefully lower the catalytic converter to the floor.
7. Transfer oxygen sensors if replacing catalytic converter.

Installation Procedure

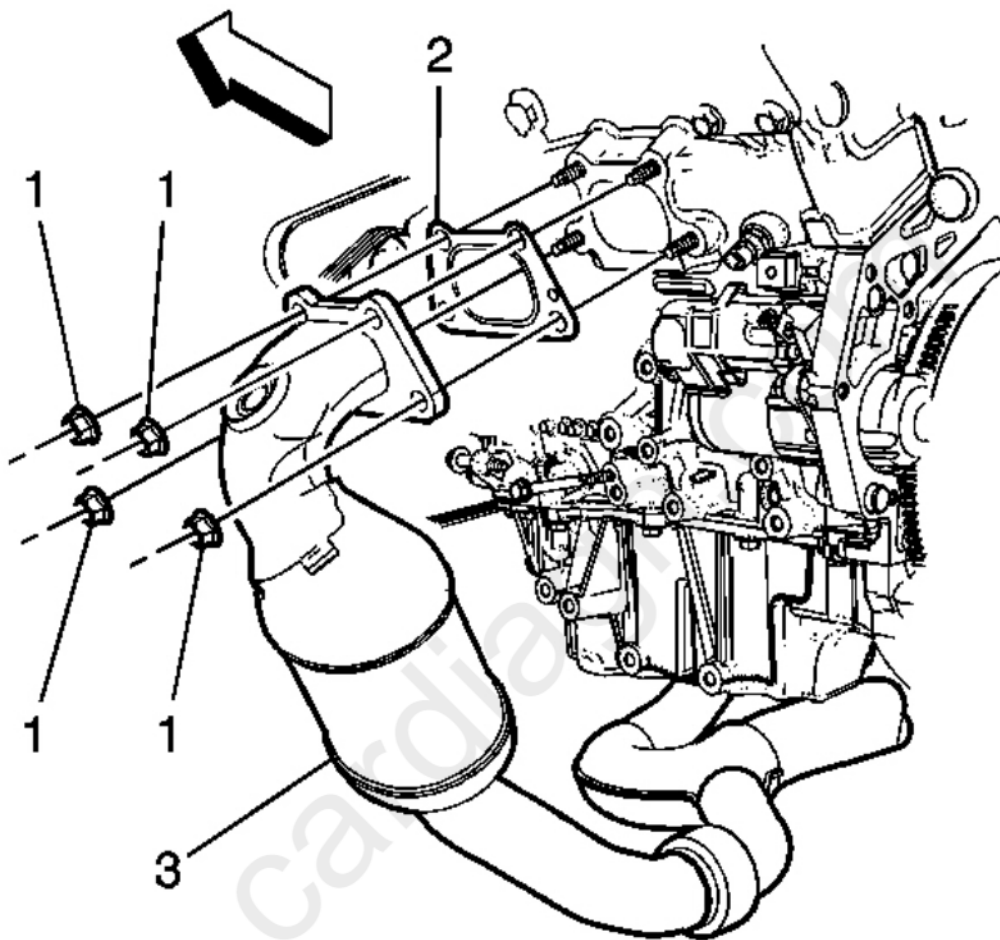


Fig. 8: View Of Left Catalytic Converter & Nuts
Courtesy of GENERAL MOTORS CORP.

CAUTION: Refer to Fastener Caution .

CAUTION: To prevent damage to the exhaust manifold flange or stud make sure the flange is fully seated before tightening.

NOTE: Replace the left catalytic to cylinder head nuts and gas jets with new ones.

1. Install the left catalytic converter nuts to the left cylinder head. Tighten nuts (1) in a criss-cross pattern.

Tighten:

- First Pass: 20 N.m (15 lb ft)
- Final Pass: 46 N.m (34 lb ft)

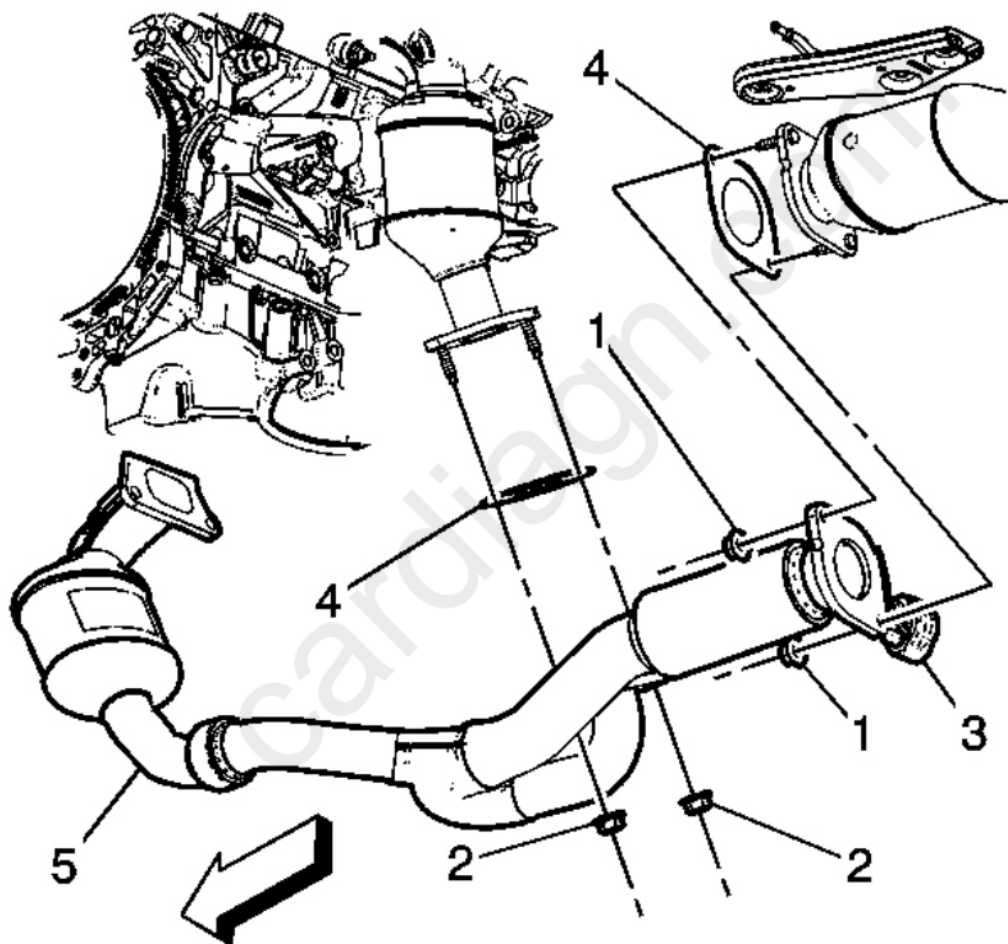


Fig. 9: View Of Left Catalytic Converter & Muffler Assembly
Courtesy of GENERAL MOTORS CORP.

2. Attach left catalytic converter to insulator hanger bracket (3).
3. Install the left catalytic converter nuts (1) to the rear muffler assembly. Tighten to 46 N.m (34 lb ft).
4. Install nuts (2) to the right catalytic converter. Tighten to 46 N.m (34 lb ft).
5. Connect the heated oxygen sensor.

NOTE: Improperly installed and or leaking exhaust manifold gaskets may affect vehicle emissions and or On-board Diagnostics OBD II system performance.

6. Inspect the exhaust system for leaks.

CATALYTIC CONVERTER REPLACEMENT - RIGHT SIDE (LF1)

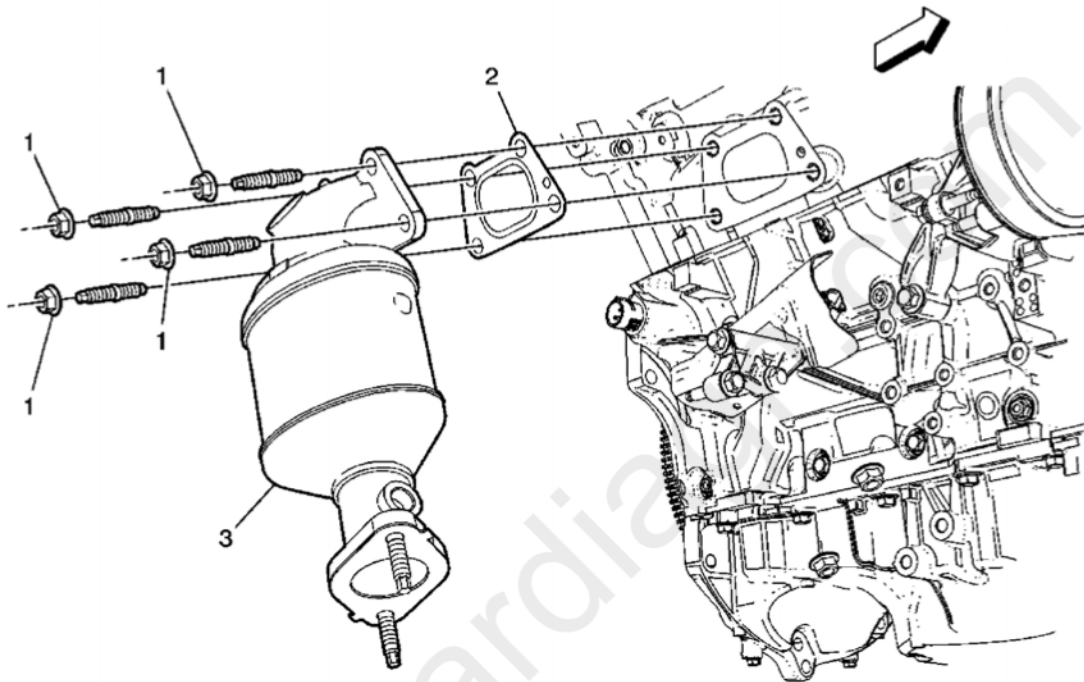


Fig. 10: View Of Catalytic Converter - Right Side (LF1)

Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure	
1. Remove the left side catalytic converter. Refer to <u>Catalytic Converter Replacement - Left Side (LF1)</u>	
2. Disconnect the heated oxygen sensors before and after the right 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

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	seated before tightening.
	Procedure
1	1. Remove the right exhaust manifold nuts (1). 2. Remove the right exhaust manifold studs on the right cylinder head (if necessary). 3. Replace the nuts (1) and gasket (2). 4. Clean and inspect the studs on the engine cylinder head. Replace as necessary. 5. Verify that the studs are fully seated. Stud collar should touch the surface of the engine cylinder head. 6. Tighten nuts in a criss-cross pattern.
	Tighten:
	• First Pass: 2 N.m (15 lb ft) • Final Pass: 46 N.m (34 lb ft)
2	asket Tip: Improperly installed and or leaking exhaust manifold gaskets may affect vehicle emissions and or on-board diagnostics () II system performance.
3	Catalytic Converter

THREE- WAY CATALYTIC CONVERTER REPLACEMENT (SERVICE)

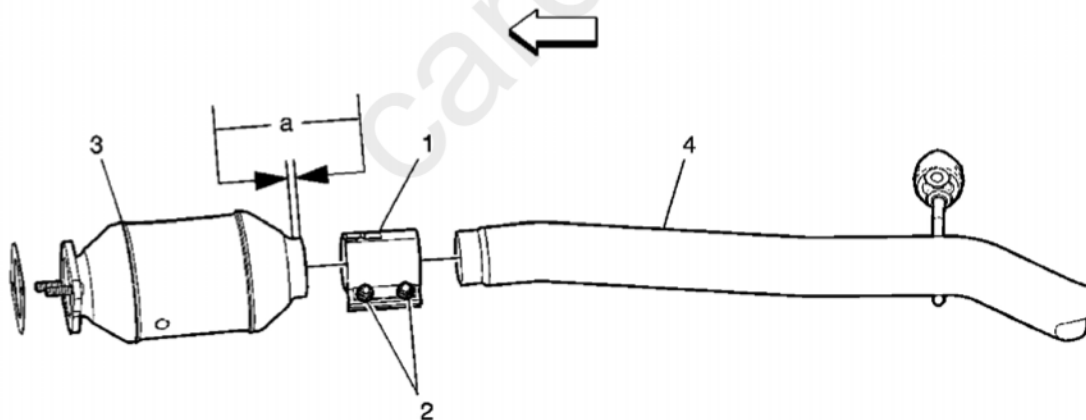


Fig. 11: View Of Three- way Catalytic Converter
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	

CAUTION:

Refer to Three-Way Catalytic Converter Damage Caution .

Preliminary Procedure

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Cut the three-way catalytic converter 13.55 mm (.5 inch) from the weld spot (a).

1	Service Clamp
2	Nut (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 48 N.m (35 lb ft)
3	Three-Way Catalytic Converter
4	Exhaust Muffler

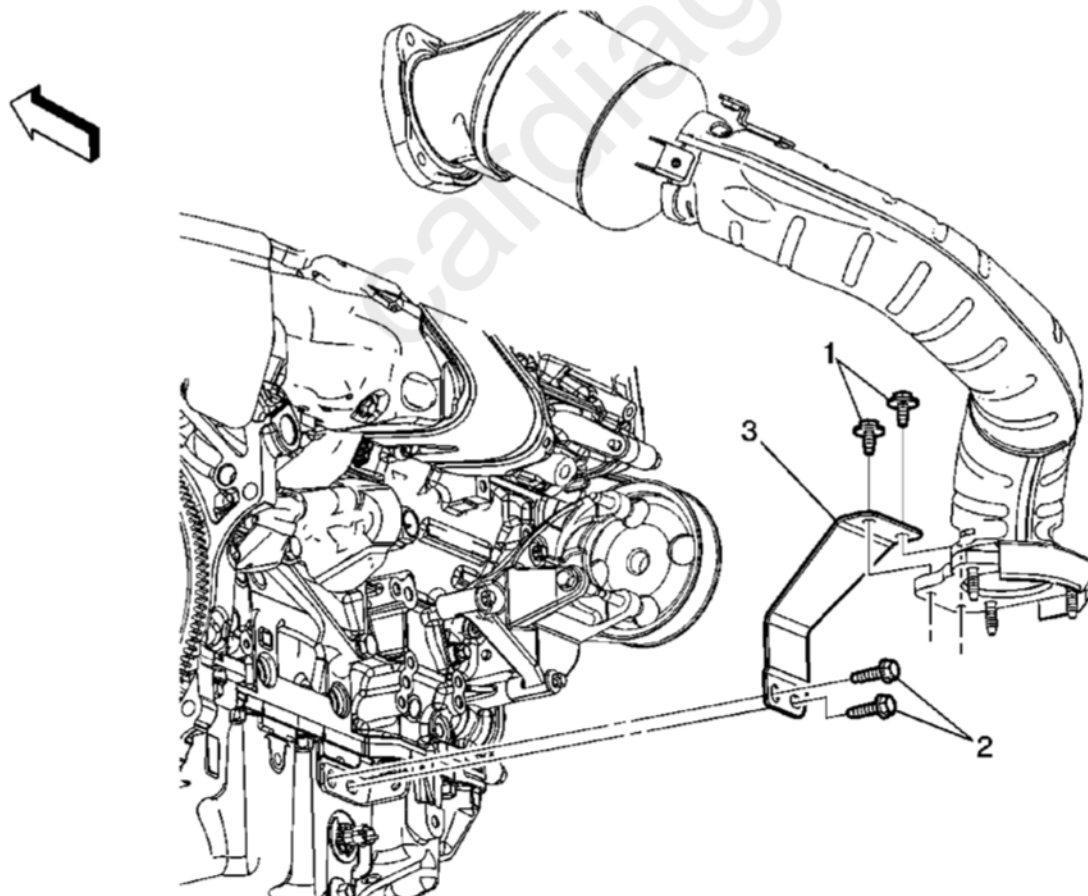
CATALYTIC CONVERTER BRACE REPLACEMENT (LAU)

Fig. 1 : View Of Catalytic Converter Brace (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures - Remove the catalytic converter heat shield. Refer to <u>Catalytic Converter Heat Shield Replacement (LAU)</u>. - Remove the catalytic converter. Refer to <u>Catalytic Converter Replacement (LAU)</u>.	
1	Catalytic Converter race olt (Qty: 2) WARNING: Refer to <u>Hot Exhaust System Warning</u> . CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 2 N.m (1 lb ft)
2	Catalytic Converter race olt (Qty: 2) Tighten: 2 N.m (1 lb ft)
3	Catalytic Converter race

EXHAUST SYSTEM INSULATOR HANGER BRAC ET REPLACEMENT (BRAC ET - LAU)

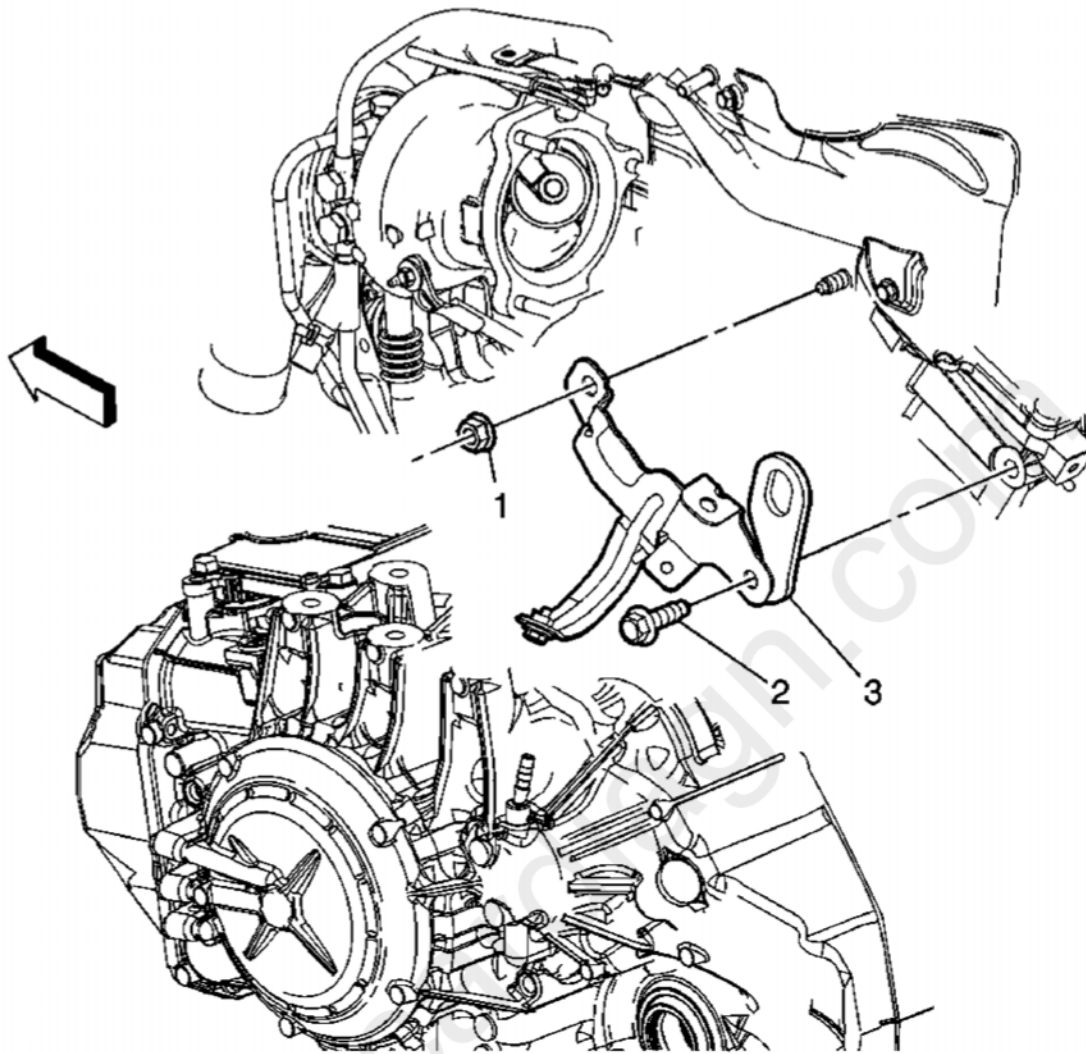


Fig. 1 : Identifying Exhaust System Insulator Hanger Bracket - (LAU)
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1. Remove the catalytic converter heat shield. Refer to <u>Catalytic Converter Heat Shield Replacement (LAU)</u> . 2. Remove the catalytic converter. Refer to <u>Catalytic Converter Replacement (LAU)</u> .	
1	Catalytic Converter Hanger Bracket Nut WARNING: Refer to <u>Hot Exhaust System Warning</u> . CAUTION:

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	Refer to <u>Fastener Caution</u> .
	Tighten: 43 N.m (32 lb ft)
2	Catalytic Converter racket olt
	Tighten: 58 N.m (43 lb ft)
3	Catalytic Converter racket

EXHAUST MUFFLER REPLACEMENT (LF1)

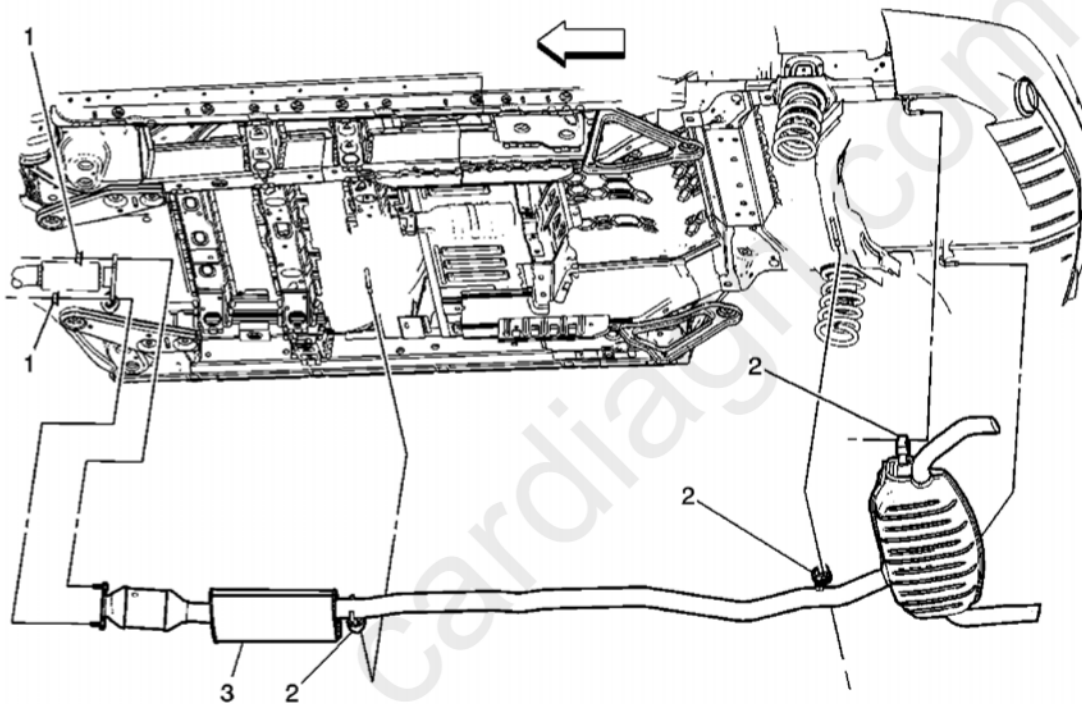


Fig. 1 : View Of Exhaust Muffler (LF1)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
CAUTION: Refer to <u>Exhaust System Inspection Caution</u> .	
Preliminary Procedure: Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
	Nut (Qty: 2)

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1	CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 46 N.m (34 lb ft)
2	Exhaust Muffler Insulator Tip: Use an appropriate tool to remove the muffler rods from the insulator. Inspect for worn, torn or damaged insulator, replace as necessary.
3	Exhaust Muffler Tip: With the aide of an assistant, lower the muffler assembly.

EXHAUST MUFFLER REPLACEMENT (LAU)

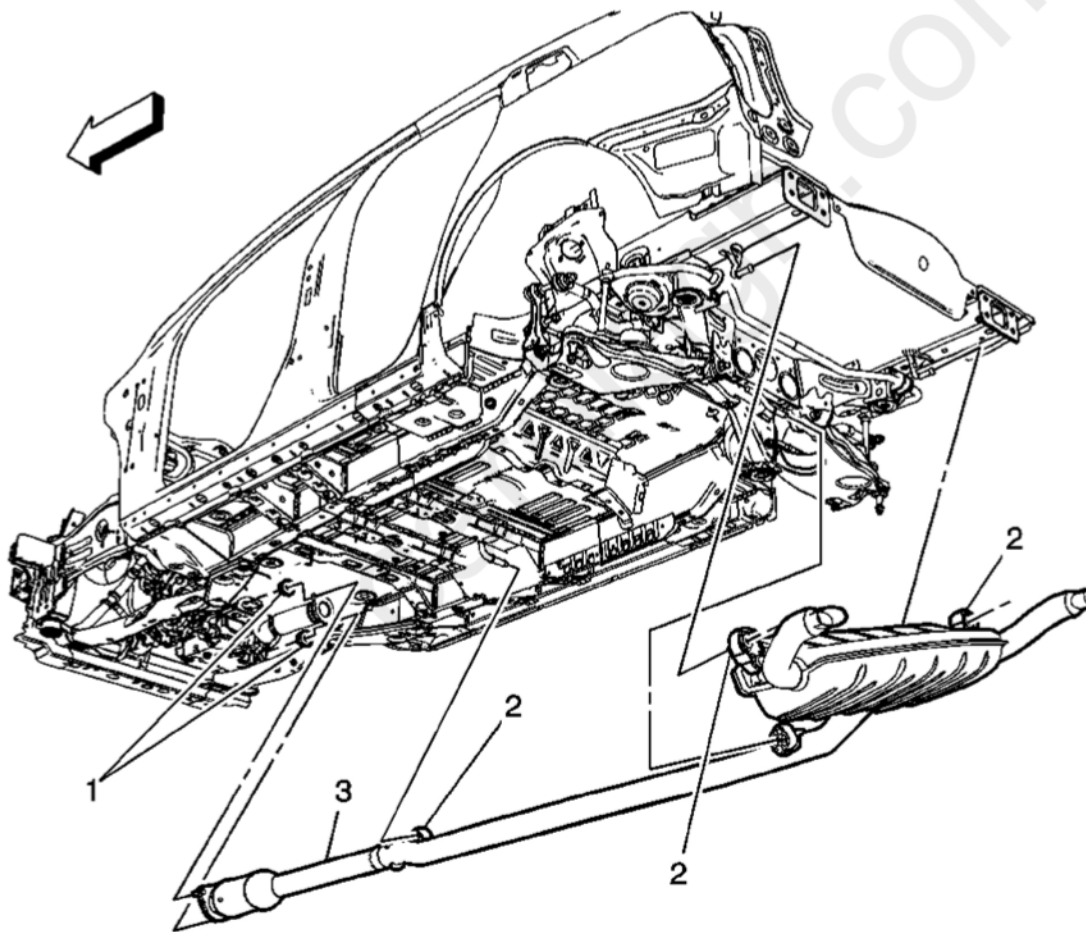


Fig. 15: View Of Exhaust Muffler (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	

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CAUTION:

Refer to Exhaust System Inspection Caution .

Preliminary Procedure: Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .

1	Nut (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 46 N.m (34 lb ft)
2	Exhaust Muffler Insulator Tip: Use an appropriate tool to remove the muffler rods from the insulator, so as not to damage the insulator. Inspect for worn, torn or damaged insulator, replace as necessary.
3	Exhaust Muffler Tip: With the aide of an assistant, lower the muffler assembly.

EXHAUST FLEXIBLE PIPE REPLACEMENT (LF1- SERVICE)

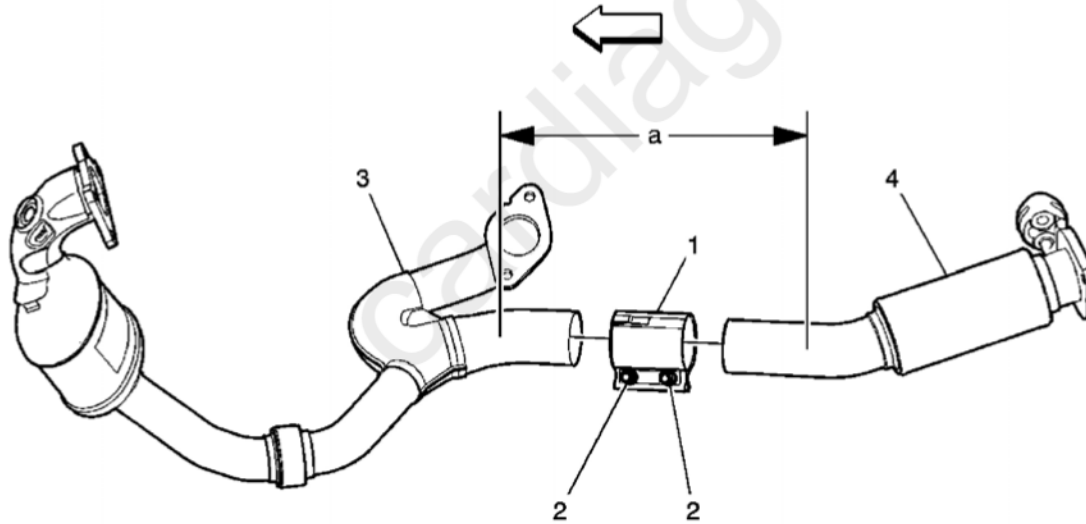


Fig. 16: View Of Exhaust Flexible Pipe (LF1)

Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
	Service Exhaust Clamp WARNING: Refer to <u>Exhaust Service Warning</u> .

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1	CAUTION: Refer to <u>Fastener Caution</u> .
2	Procedure: Cut the exhaust flex pipe in the center of the straight pipe (a).
2	Nut (Qty: 2) Tighten: 48 N.m (35 lb ft)
3	Exhaust Flex Pipe (Y-Pipe)
4	Exhaust Flex Pipe

EXHAUST FLEXIBLE PIPE REPLACEMENT (LAU)

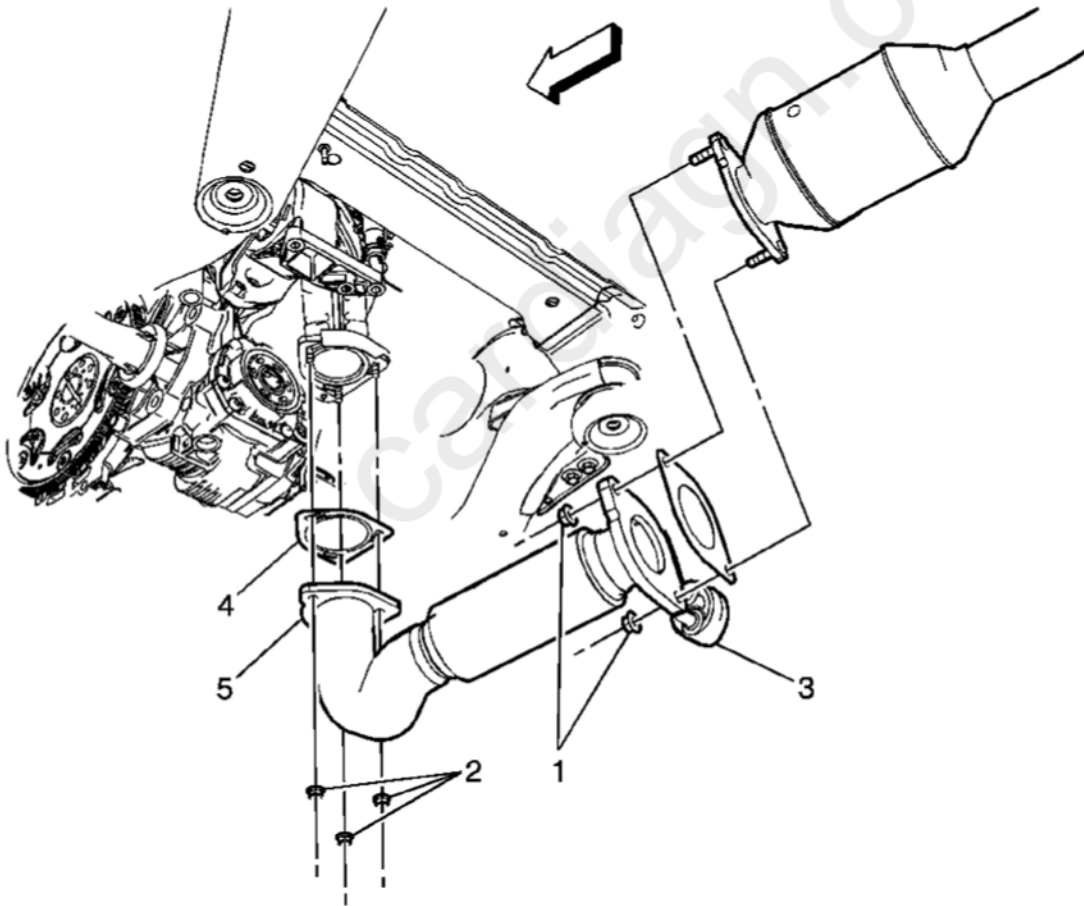


Fig. 17: Identifying Exhaust Flexible Pipe (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
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WARNING:

Refer to Exhaust Service Warning .

CAUTION:

Refer to Exhaust System Inspection Caution .

Preliminary Procedure: Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .

1	Nut (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 46 N.m (34 lb ft)
2	Nut (Qty: 3) Tighten: 18 N.m (13 lb ft)
3	Exhaust Muffler Insulators Tip: Use an isolator tool to remove the flex pipe rods from the insulator. Inspect for worn, torn or damaged insulator, replace as necessary.
4	Seal Tip: Clean the gasket surfaces and replace any worn seals.
5	Exhaust Front Flex Pipe

CATALYTIC CONVERTER HEAT SHIELD REPLACEMENT (LAU)

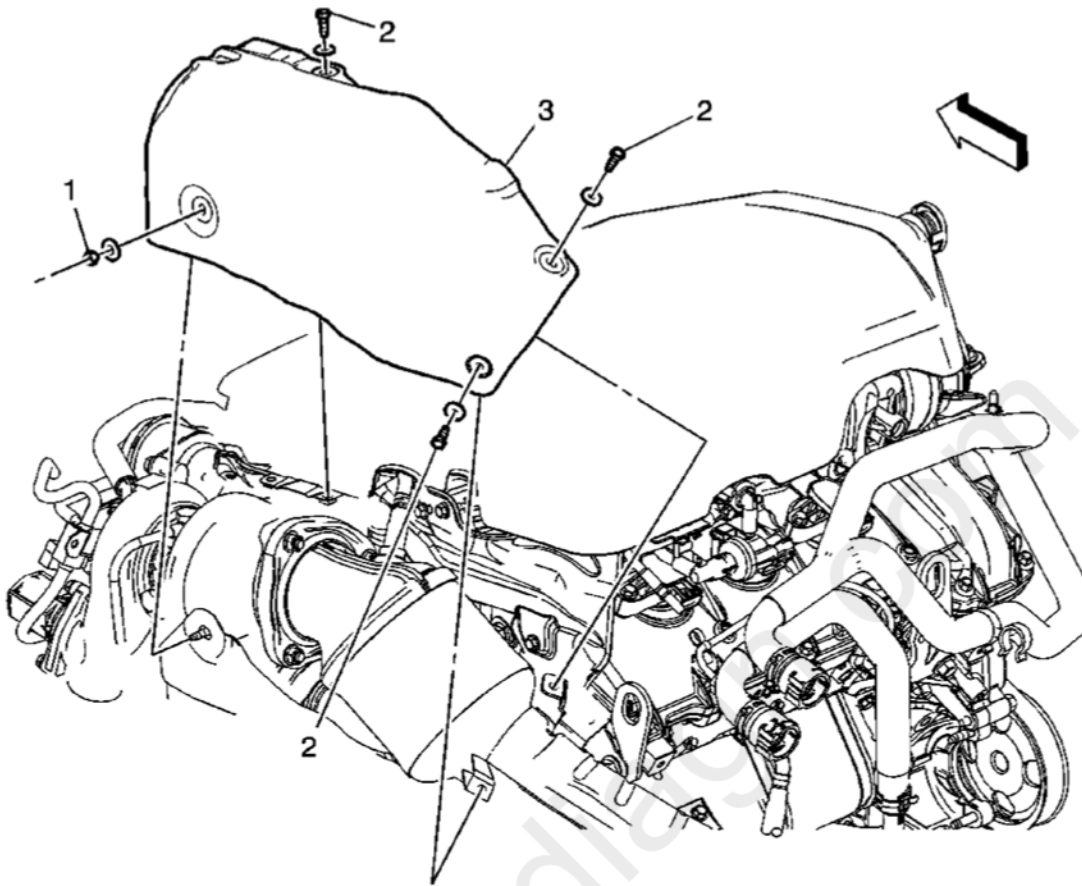


Fig. 18: Identifying Catalytic Converter Heat Shield (LAU)
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure 1. Remove the battery tray. Refer to Battery Tray Replacement. 2. Remove the radiator surge tank engine hose at the surge tank. Refer to Radiator Surge Tank Engine Hose Replacement (LAU). 3. Remove the radiator surge tank inlet hose at the surge tank. Refer to Radiator Surge Tank Inlet Hose Replacement (LF1) or Radiator Surge Tank Inlet Hose Replacement (LAU).	
1	Catalytic Converter Heat Shield Nut WARNING: Refer to Hot Exhaust System Warning . CAUTION: Refer to Fastener Caution .

	Tighten: 1 N.m (lb ft)
	Catalytic Converter Heat Shield Bolt (ty: 3)
	Tighten: 1 N.m (lb ft)
3	Catalytic Converter Heat Shield

TRANSMISSION HEAT SHIELD REPLACEMENT (LAU)

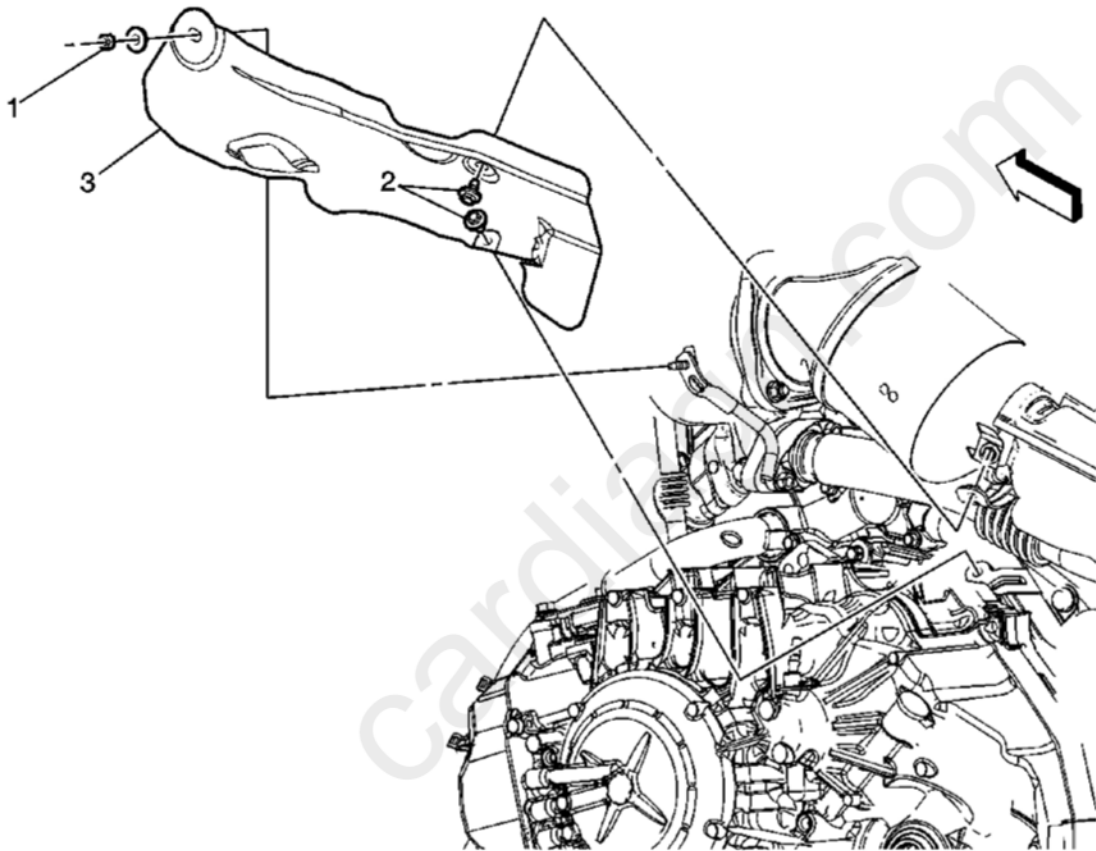


Fig. 19: View Of Transmission Heat Shield (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: Remove the catalytic converter heat shield. Refer to <u>Catalytic Converter Heat Shield Replacement (LAU)</u> .	
1	Transmission Heat Shield Nut WARNING: Refer to <u>Hot Exhaust System Warning</u> .

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	CAUTION: Refer to Fastener Caution .
	Tighten: 1 N.m (1b ft) Transmission Heat Shield Bolt (ty:)
	Tighten: 1 N.m (1b ft)
3	Transmission Heat Shield

EXHAUST MANIFOLD LOWER HEAT SHIELD (MH2, MH4, MXE)

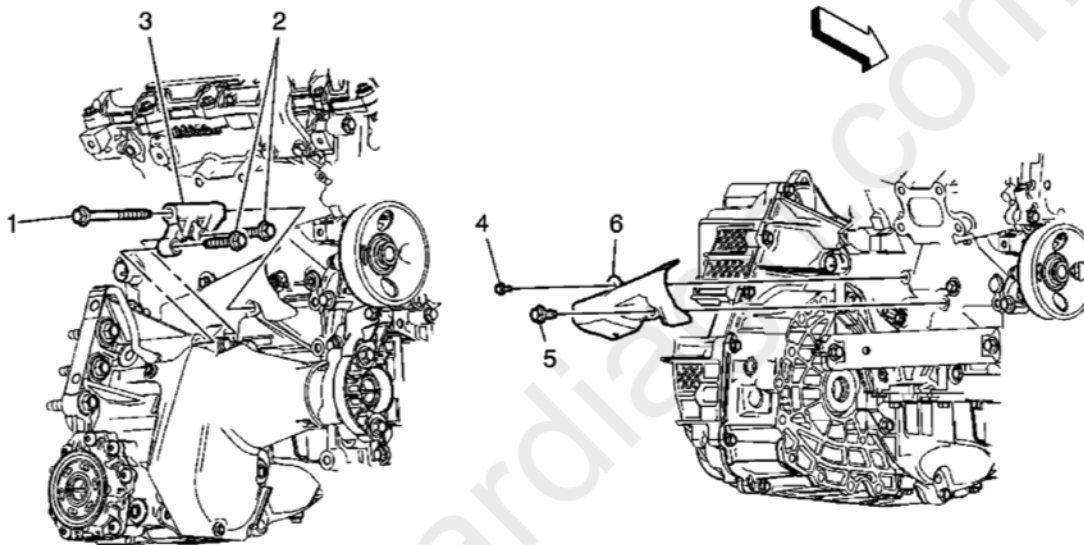


Fig. 20: View Of Exhaust Manifold Lower Heat Shield
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedure: If equipped with A , remove the right catalytic converter. Refer to Catalytic Converter Replacement - Right Side (LF1)	
1	Transmission Brace Bolt (H4) CAUTION: Refer to Exhaust Service Warning . CAUTION: Refer to Fastener Caution . Tighten: 5 N.m (43 lb ft)
	Transmission Brace Bolt (ty:)

	Tighten: 5 N.m (43 lb ft)
3	Transmission Brace (H4)
4	ower Heat Shield Bolt
	Tighten: N.m (lb in)
5	ower Heat Shield Bolt
	Tighten: 5 N.m (43 lb ft)
	Exhaust anifold ower Heat Shield (H Shown)

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - RIGHT SIDE (LAU)

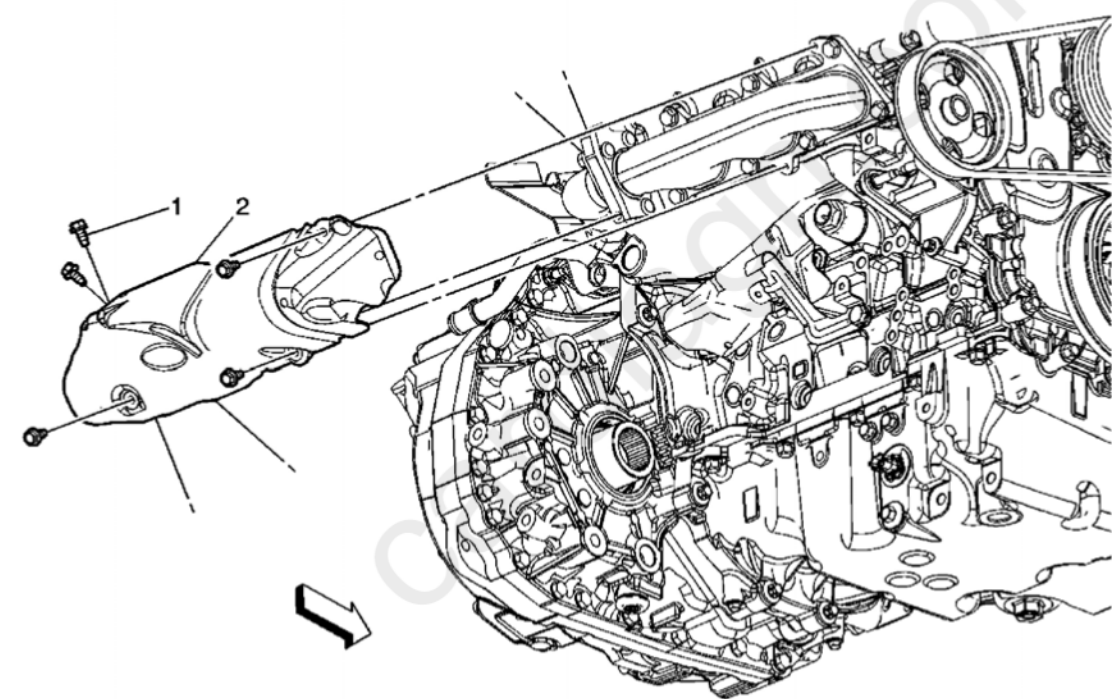


Fig. 21: Identifying Exhaust Manifold Heat Shield - Right Side (LAU)
 Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
	1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle . . Remove the catalytic converter. Refer to Catalytic Converter Replacement (LAU) .
	Exhaust anifold Heat Shield Bolt (ty: 5)
	WARNING:

1	Refer to <u>Hot Exhaust System Warning</u> .
	CAUTION: Refer to <u>Fastener Caution</u> .
	Tighten: 1 N.m (1b ft)
	Exhaust manifold Heat Shield

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - LEFT SIDE (LAU)

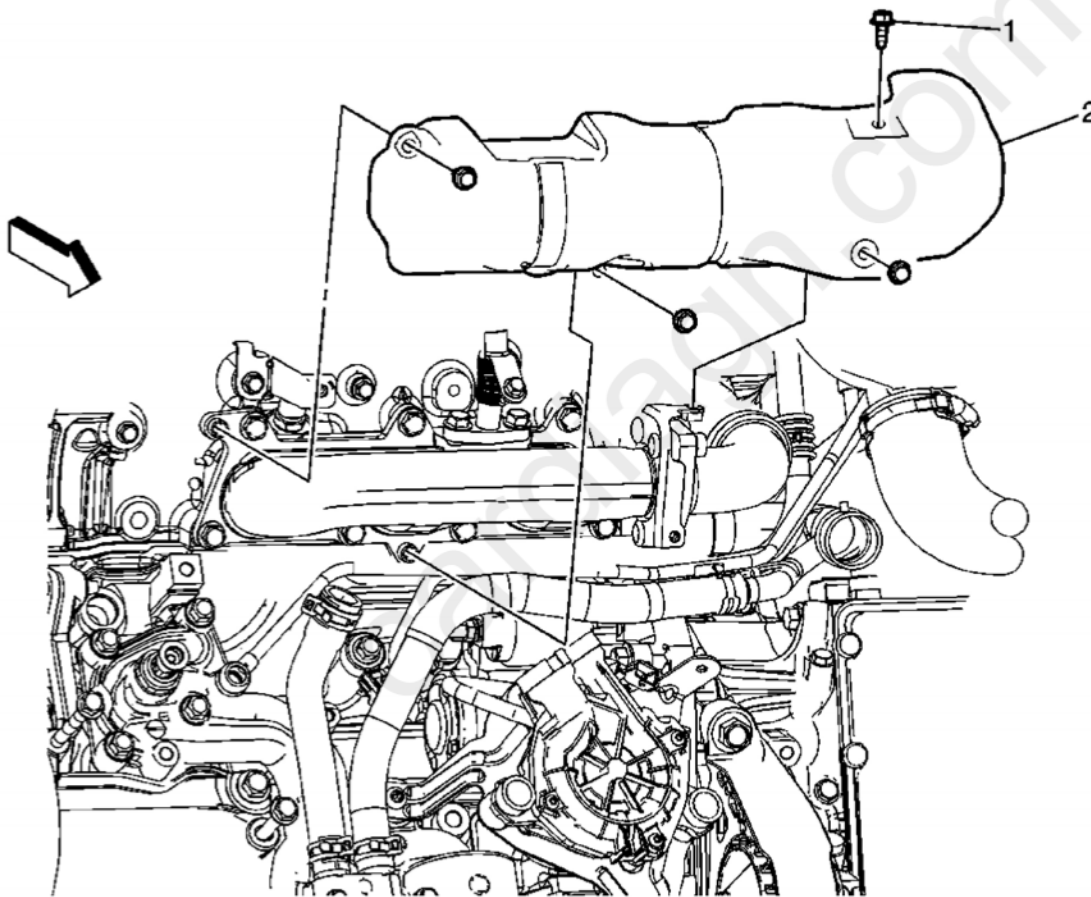


Fig. 22: Identifying Exhaust Manifold Heat Shield - Left Side (LAU)
Courtesy of GENERAL MOTORS CORP.

Callout	Component Name
Preliminary Procedures	
1.	Remove the secondary air in ection pump hose. Refer to <u>Secondary Air Injection Pump Hose Replacement</u> .
.	Remove the secondary air in ection pump pipe. Refer to <u>Secondary Air Injection Pump Pipe</u>

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Replacement .

3. Remove the oil level indicator tube. Refer to **Oil Level Indicator Tube Replacement (LF1)** or **Oil Level Indicator Tube Replacement (LAU)** .
4. Remove the harness bracket bolt above the exhaust manifold heat shield and reposition the engine harness.

1	Exhaust Manifold Heat Shield Bolt (Qty: 4) WARNING: Refer to <u>Hot Exhaust System Warning</u> . CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 1 N.m (lb ft)
	Exhaust Manifold Heat Shield

DESCRIPTION AND OPERATION

EXHAUST SYSTEM DESCRIPTION

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

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

In order to secure the exhaust pipe to the exhaust manifold, a flange and seal- oint coupling is utilized. The exhaust system may utilize a slip- oint coupling design with a clamp and a -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

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- Exhaust resonator, if equipped
- Exhaust tail pipe, if equipped
- Exhaust hangers
- Exhaust heat shields

Resonator

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

Catalytic Converter

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

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

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

The catalyst in the catalytic converter is not serviceable.

Muffler

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

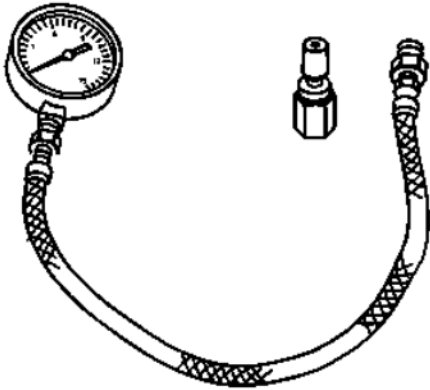
SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

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

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