

**2018 ENGINE**  
**Exhaust - Traverse**

## **SPECIFICATIONS**

### **FASTENER SPECIFICATIONS**

#### **Single Use Non-Threaded Fasteners/Components**

| <b>NOTE:</b><br><i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i> |  |
|-----------------------------------------------------------------------------------------------------------------------------|--|
| Application                                                                                                                 |  |
| Catalytic Converter Gasket                                                                                                  |  |
| Exhaust Front Pipe Gasket                                                                                                   |  |
| Exhaust Gasket                                                                                                              |  |
| Exhaust Manifold Gasket                                                                                                     |  |

#### **Single Use Threaded Fastener/Component Tightening Specifications**

| <b>NOTE:</b><br><i>All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i> |                   |
|-----------------------------------------------------------------------------------------------------------------------------|-------------------|
| Application                                                                                                                 | Specification     |
|                                                                                                                             | Metric (English)  |
| Exhaust Manifold Fastener                                                                                                   |                   |
| First Pass:                                                                                                                 | 20 N.m (15 lb ft) |
| Second Pass:                                                                                                                | 20 N.m (15 lb ft) |
| Final Pass:                                                                                                                 | 20 N.m (15 lb ft) |
| Warm Up Three-Way Catalytic Converter Nut (LFY)                                                                             | 58 N.m (43 lb ft) |

#### **Reusable Threaded Fastener Tightening Specifications**

| <b>NOTE:</b><br><i>All fasteners listed in this table can be reused after removal.</i> |                    |
|----------------------------------------------------------------------------------------|--------------------|
| Application                                                                            | Specification      |
|                                                                                        | Metric (English)   |
| Catalytic Converter Brace Bracket Bolt                                                 | 22 N.m (16 lb ft)  |
| Catalytic Converter Heat Shield Bolt                                                   | 10 N.m (89 lb in)  |
| Catalytic Converter Nut at Catalytic Converter                                         | 22 N.m (16 lb ft)  |
| Catalytic Converter Nut at Exhaust Manifold                                            | 50 N.m (37 lb ft)  |
| Exhaust Front Pipe Bracket Bolt                                                        | 22 N.m (16 lb ft)  |
| Exhaust Front Pipe Nut at Exhaust Muffler                                              | 22 N.m (16 lb ft)  |
| Exhaust Front Pipe Nut (LFY)                                                           | 58 N.m (43 lb ft)  |
| Exhaust Front Pipe Nut at Catalytic Converter                                          | 58 N.m (43 lb ft)  |
| Exhaust Front Underbody Heat Shield Retainer                                           | 1.5 N.m (13 lb in) |
| Exhaust Intermediate Hanger Bolt                                                       | 22 N.m (16 lb ft)  |
| Exhaust Manifold Brace Fastener                                                        | 25 N.m (18 lb ft)  |
| Exhaust Manifold Heat Shield Fastener                                                  | 14 N.m (10 lb ft)  |
| Exhaust Muffler Flange Nut                                                             | 22 N.m (16 lb ft)  |

**NOTE:**

*All fasteners listed in this table can be reused after removal.*

| Application                               | Specification      |
|-------------------------------------------|--------------------|
|                                           | Metric (English)   |
| Exhaust Pipe Front Hanger Bracket Bolt    | 22 N.m (16 lb ft)  |
| Exhaust Rear Muffler Heat Shield Retainer | 1.5 N.m (13 lb in) |
| Exhaust Rear Muffler Rear Hanger Bolt     | 22 N.m (16 lb ft)  |
| Front Cradle Brace Bolt                   | 58 N.m (43 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.
- 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:** In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

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.

| Step | Action                                                                                            | Value (s) | Yes                   | No                                              |
|------|---------------------------------------------------------------------------------------------------|-----------|-----------------------|-------------------------------------------------|
| 1    | Did you verify the customers complaint?                                                           | -         | Go to <b>Step 2</b>   | -                                               |
| 2    | Did you review the exhaust symptoms diagnostic information and perform the necessary inspections? | -         | Go to <b>Step 3</b>   | Go to <a href="#">Symptoms - Engine Exhaust</a> |
| 3    | Is the system equipped with dual exhaust?                                                         | -         | Go to Diagnostic Aids | Go to <b>Step 4</b>                             |

| Step | Action                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Value (s)      | Yes                 | No                  |
|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------|---------------------|
| 4    | <ol style="list-style-type: none"> <li>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.</li> <li>2. Install the <b>J-35314-A</b> Exhaust Back Pressure Gauge in place of the AIR check valve or HO2S sensor.</li> <li>3. Start the engine.</li> <li>4. Increase and monitor the engine speed at 2, 000 RPM.</li> <li>5. Observe the exhaust system back pressure reading on the gauge.</li> </ol> <p>Does the reading exceed the specified value?</p>                                                                                                                                    | 14 kPa (2 psi) | Go to <b>Step 5</b> | Go to <b>Step 8</b> |
| 5    | <ol style="list-style-type: none"> <li>1. Turn the engine off and place the ignition in the lock position.</li> <li>2. Remove the <b>J-35314-A</b> Exhaust Back Pressure Gauge.</li> <li>3. Re-install the AIR check valve/HO2S sensor. Refer to the affected component's service procedure.</li> <li>4. Remove the post-catalyst HO2S sensor. Refer to the affected component's service procedure.</li> <li>5. Install the <b>J-35314-A</b> Exhaust Back Pressure Gauge in place of the post HO2S sensor.</li> <li>6. Start the engine.</li> <li>7. Increase and monitor the engine speed at 2, 000 RPM.</li> <li>8. Observe the exhaust system back pressure reading on the gauge.</li> </ol> <p>Does the reading exceed the specified value?</p> | 14 kPa (2 psi) | Go to <b>Step 6</b> | Go to <b>Step 7</b> |
| 6    | <p>Inspect the exhaust system for the following conditions:</p> <ul style="list-style-type: none"> <li>• Damage in the exhaust pipe</li> <li>• Debris in the exhaust pipe</li> <li>• Muffler or resonator internal failure</li> <li>• Two-layer exhaust pipe separation</li> </ul> <p>Did you find and correct the condition?</p>                                                                                                                                                                                                                                                                                                                                                                                                                   | -              | Go to <b>Step 8</b> | -                   |
| 7    | <p>Replace the catalytic converter. Refer to the affected component's service procedure.</p> <p>Did you find and correct the condition?</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | -              | Go to <b>Step 8</b> | -                   |

| Step | Action                                                                                                                                                                                                                                                                                                                                      | Value (s) | Yes       | No                  |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-----------|---------------------|
| 8    | <ol style="list-style-type: none"> <li>1. Remove the <b>J-35314-A</b> Exhaust Back Pressure Gauge.</li> <li>2. Reinstall the AIR check valve or the post-catalyst HO2S sensor. Refer to the affected component's service procedure</li> <li>3. Clear any codes.</li> <li>4. Road test the vehicle in order to verify the repair.</li> </ol> | -         |           |                     |
|      | Did you correct the condition?                                                                                                                                                                                                                                                                                                              |           | System OK | Go to <b>Step 2</b> |

## EXHAUST LEAKAGE

| Problem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Action                                                                                                                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br><b>While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.</b><br><br>DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand near to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise. DIAGNOSTIC AID: Use the <b>GE-41413-A</b> Smoke Machine or equivalent to apply smoke to the exhaust system at the tailpipe sealed with a shop towel. Inspect for leaks using the <b>GE-41413-151</b> Combination Light or suitable White/LV Light. If a leak is detected, repair or replace the affected component as necessary. Refer to <a href="#">Symptoms - Engine Exhaust</a> prior to beginning this table. |                                                                                                                                                                                                                                                     |
| Misaligned or improperly installed exhaust system components                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>• Align and tighten the exhaust system components to the specifications. <a href="#">Fastener Specifications</a></li> <li>• Ensure the exhaust hangers are in the proper locations and not loose.</li> </ul> |
| Exhaust leaks at the following connections: <ul style="list-style-type: none"> <li>• Exhaust manifold to pipe</li> <li>• Flanges</li> <li>• Pipe clamps</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Tighten the components to the specifications. <a href="#">Fastener Specifications</a>                                                                                                                                                               |
| Seals or gaskets leaking <ul style="list-style-type: none"> <li>• Exhaust manifold to cylinder head</li> <li>• Exhaust pipes to exhaust manifold</li> <li>• Catalytic converter connection</li> <li>• EGR connections</li> <li>• AIR connections to the exhaust manifold or cylinder head</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 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.                                                                                                                                                              |

| Problem                                                            | Action                                                                                              |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 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

| Problem                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Action                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br><b>While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                 |
| <p>DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand near to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise. DIAGNOSTIC AID: Use the <b>GE-41413-A</b> Smoke Machine or equivalent to apply smoke to the exhaust system at the tailpipe sealed with a shop towel. Inspect for leaks using the <b>GE-41413-151</b> Combination Light or suitable White/LV Light. If a leak is detected, repair or replace the affected component as necessary. Refer to <a href="#">Symptoms - Engine Exhaust</a> prior to beginning this table.</p> |                                                                                                                                                                                                                                                 |
| Misaligned or improperly installed exhaust system components                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | <ul style="list-style-type: none"> <li>Align and tighten the exhaust system components to the specifications. <a href="#">Fastener Specifications</a></li> <li>Ensure the exhaust hangers are in the proper locations and not loose.</li> </ul> |
| Exhaust leaks at the following connections: <ul style="list-style-type: none"> <li>Exhaust manifold to pipe</li> <li>Flanges</li> <li>Pipe clamps</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Tighten the components to the specifications. <a href="#">Fastener Specifications</a>                                                                                                                                                           |
| Seals or gaskets leaking <ul style="list-style-type: none"> <li>Exhaust manifold to cylinder head</li> <li>Exhaust pipes to exhaust manifold</li> <li>Catalytic converter connection</li> <li>EGR connections</li> <li>AIR connections to the exhaust manifold or cylinder head</li> </ul>                                                                                                                                                                                                                                                                                                                                               | 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.                                                                                                                                             |

## REPAIR INSTRUCTIONS

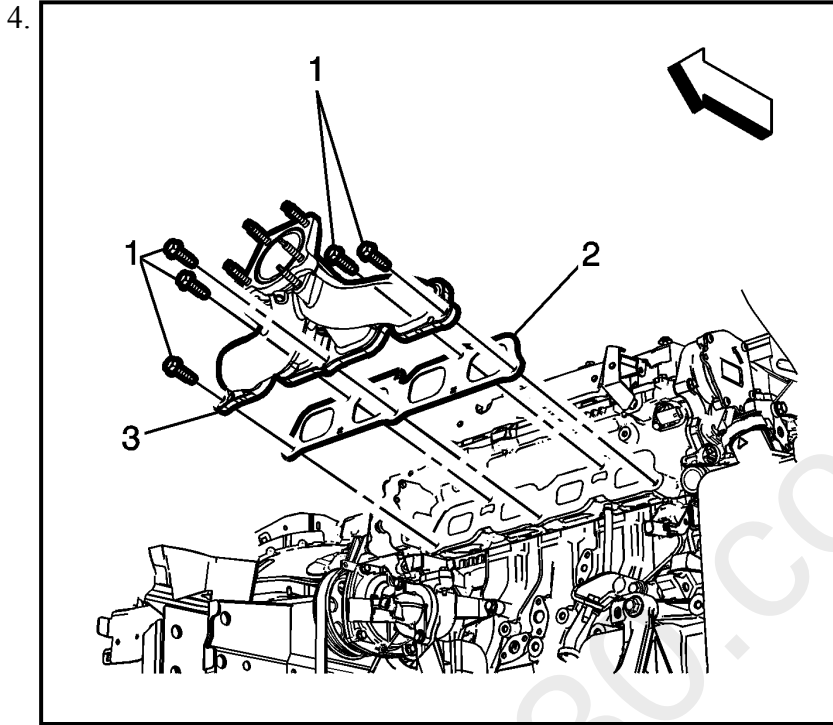
# EXHAUST MANIFOLD REPLACEMENT

## 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](#).
2. Remove the turbocharger. Refer to [Turbocharger Replacement](#) .
3. Remove the exhaust manifold brace. Refer to [Exhaust Manifold Brace Replacement](#).

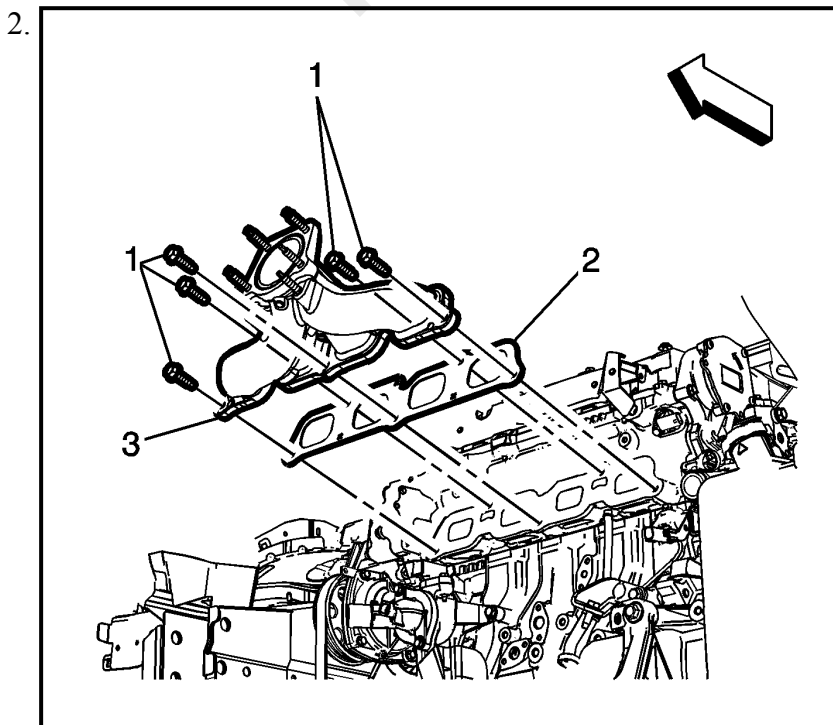


Remove the exhaust manifold fasteners (1) and discard.

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

## Installation Procedure

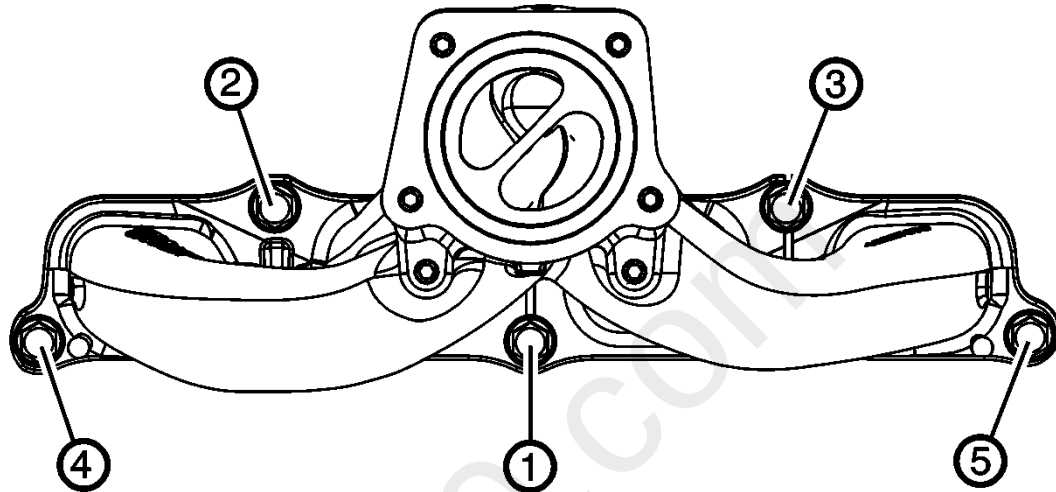
1. Clean all mating surfaces.



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.



- 4.

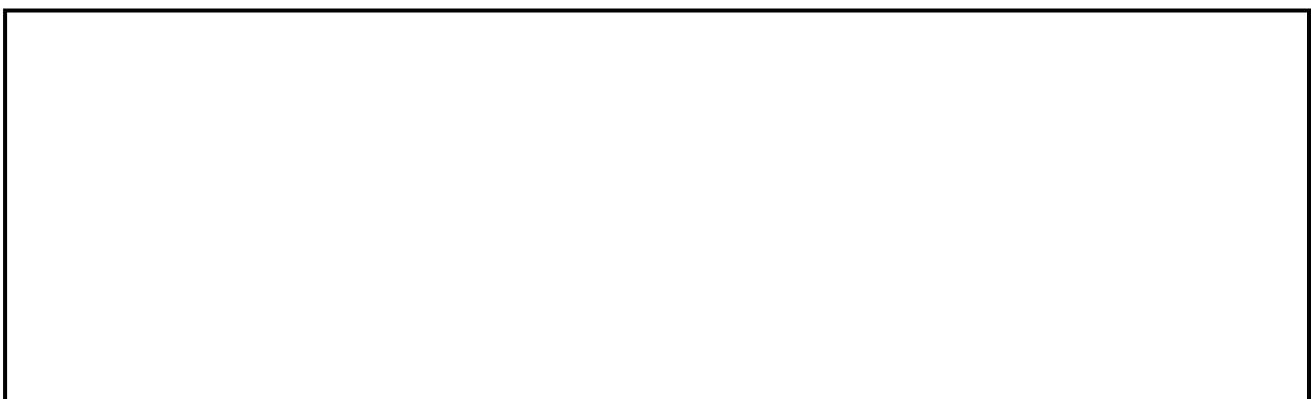
**Fig. 1: Exhaust Manifold Bolt Tightening Sequence**  
Courtesy of GENERAL MOTORS COMPANY

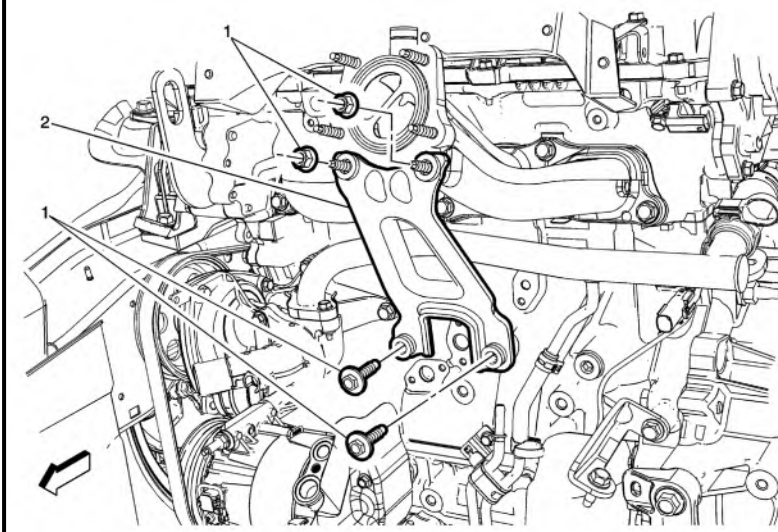
**CAUTION:** Refer to [Fastener Caution](#) .

Tighten the exhaust manifold fasteners in 3 passes in the sequence shown to 20 N.m (15 lb ft).

5. Install the exhaust manifold brace. Refer to [Exhaust Manifold Brace Replacement](#).
6. Install the turbocharger. Refer to [Turbocharger Replacement](#) .
7. Install the exhaust manifold heat shield. Refer to [Exhaust Manifold Heat Shield Replacement](#).

## EXHAUST MANIFOLD BRACE REPLACEMENT





| Callout                                                                                                   | Component Name                                                                                                                                              |
|-----------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>Refer to <a href="#">Hot Exhaust System Warning</a> .                                  |                                                                                                                                                             |
| <b>Preliminary Procedure</b> Remove the turbocharger. Refer to <a href="#">Turbocharger Replacement</a> . |                                                                                                                                                             |
| 1                                                                                                         | Exhaust Manifold Brace Fasteners (Qty: 4)<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten:</b><br>25 N.m (18 lb ft) |
| 2                                                                                                         | Exhaust Manifold Brace                                                                                                                                      |

## EXHAUST FRONT PIPE REPLACEMENT (LTG)

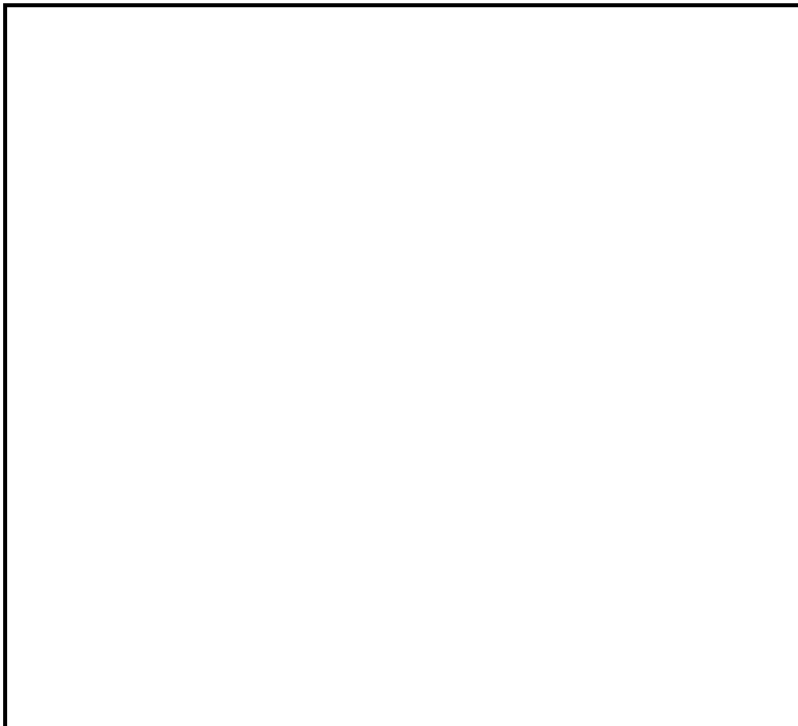
### Removal Procedure

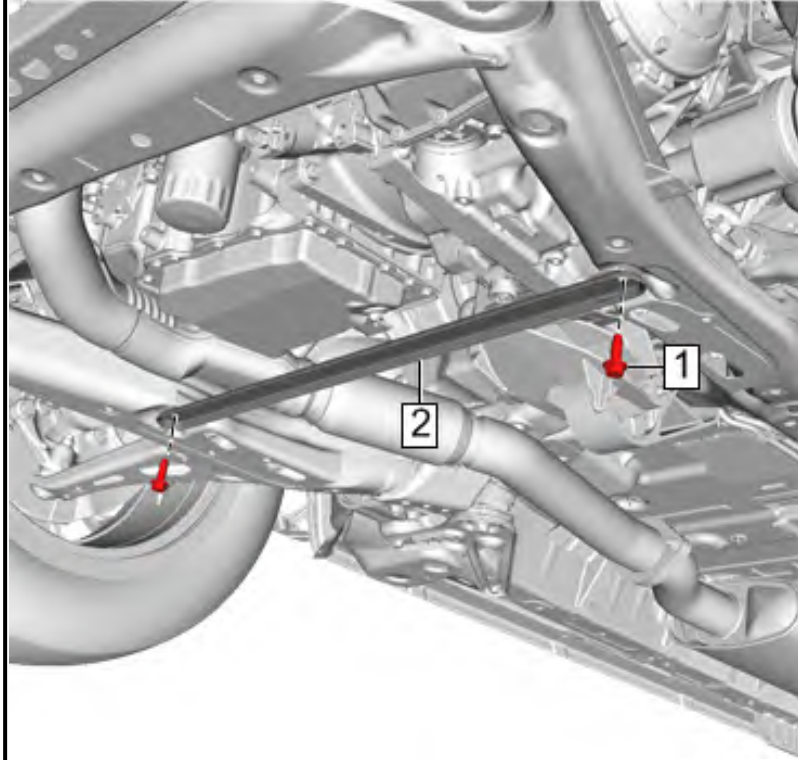
**WARNING:** Refer to [Hot Exhaust System Warning](#) .

**WARNING:** Refer to [Safety Glasses Warning](#) .

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)

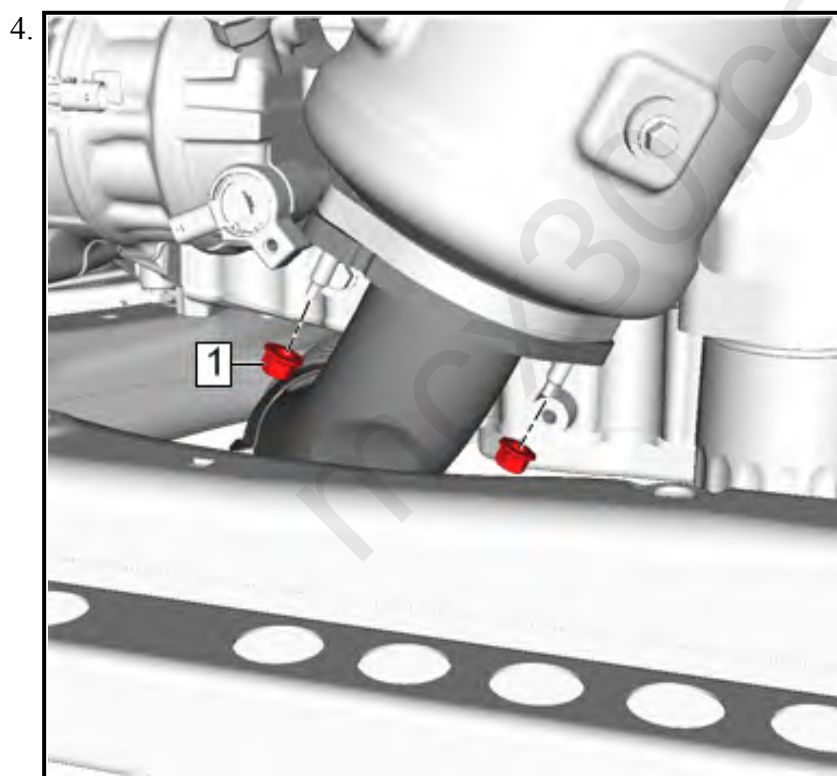
2.





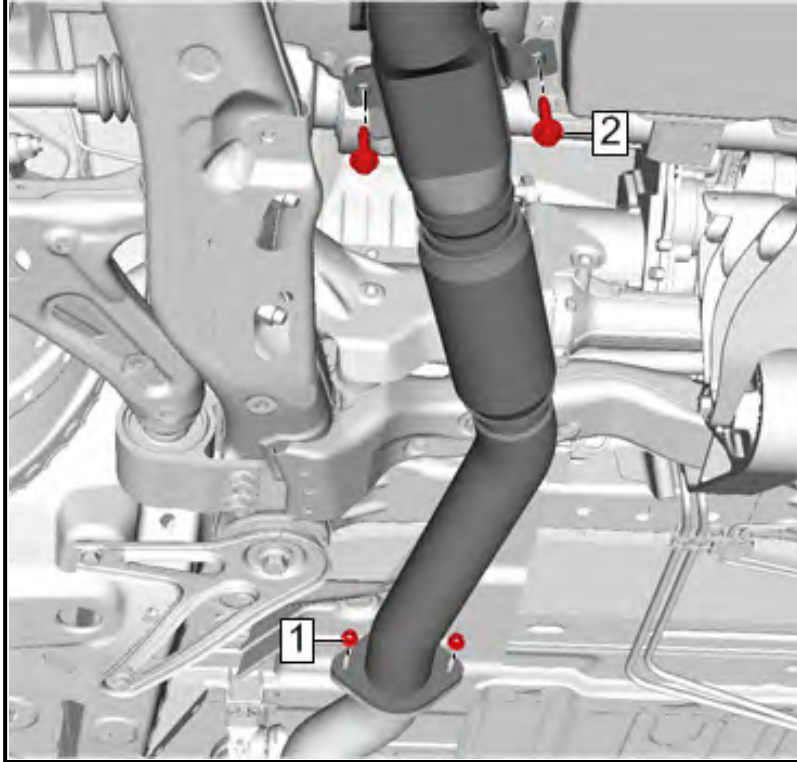
Front Cradle Brace Bolt (1) - Remove [2x]

3. Front Cradle Brace (2) - Remove



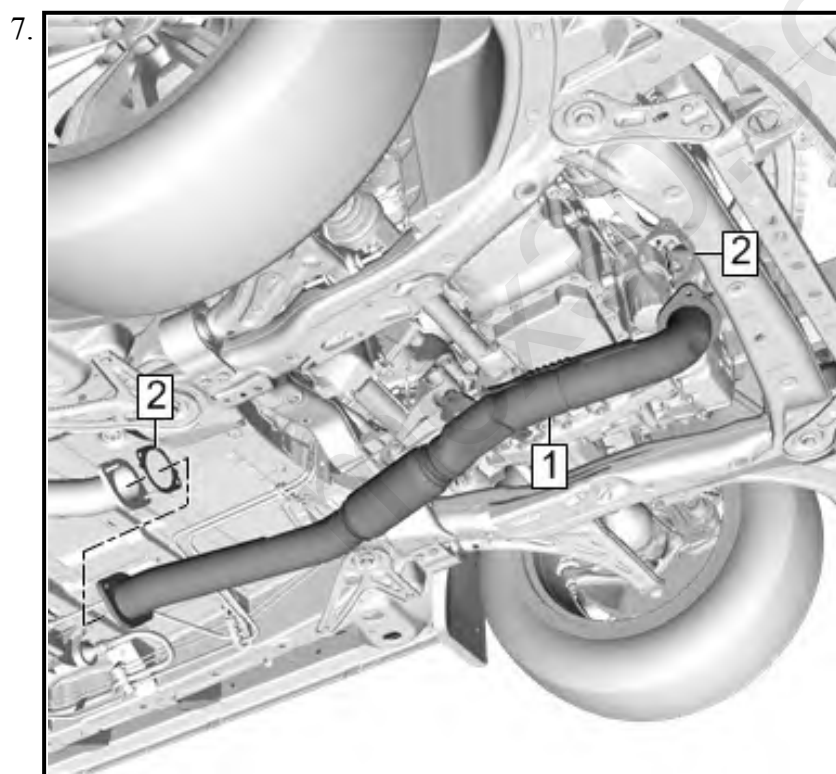
Catalytic Converter Nut (1) - Remove [2x]





Exhaust Front Pipe Nut (1) - Remove [2x]

6. Exhaust Front Pipe Bracket Bolt (2) - Remove [2x]

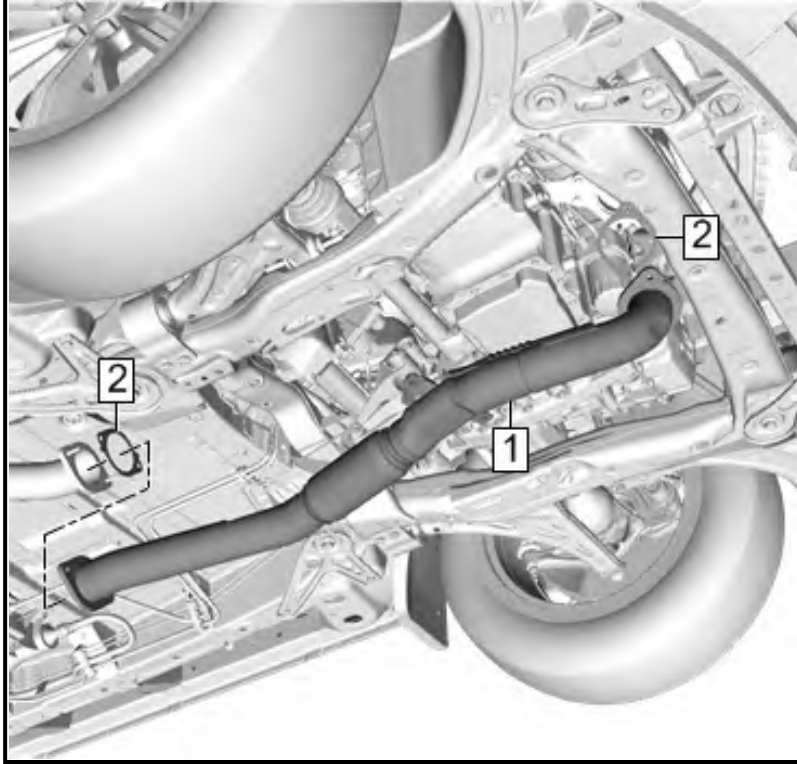


Exhaust Front Pipe (1) - Remove

8. Exhaust Gasket (2) - Remove and DISCARD [2x]

### Installation Procedure



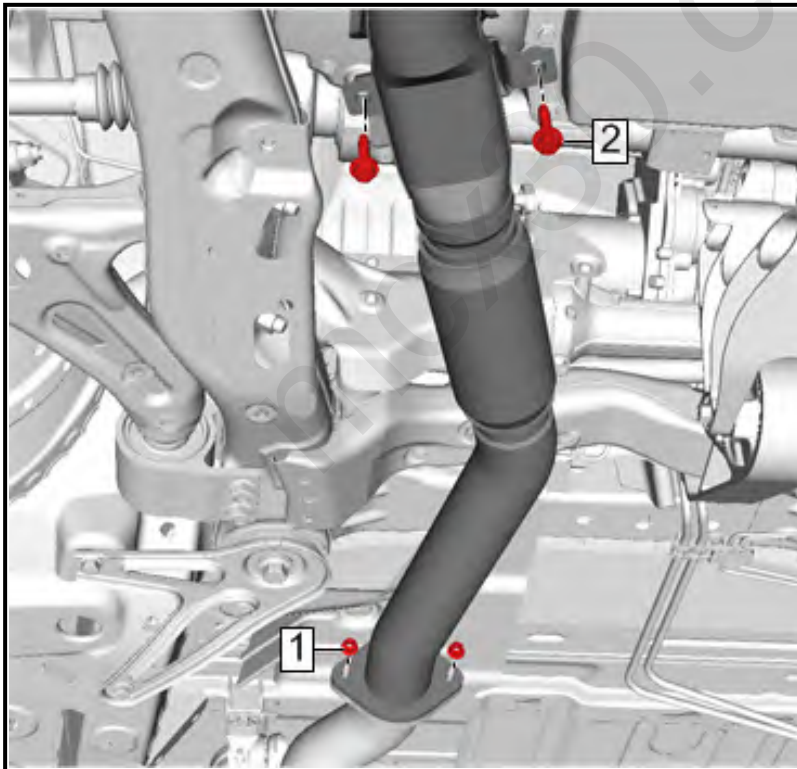


**NOTE:** Install a **NEW** gasket.

Exhaust Gasket (2) - Install [2x]

2. Exhaust Front Pipe (1) - Install

3.



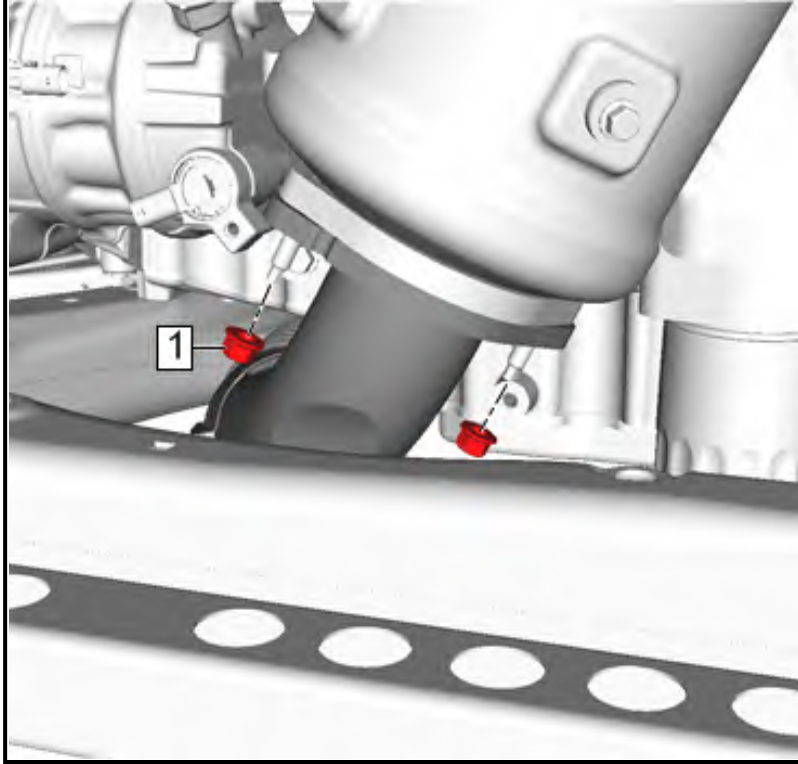
**CAUTION:** Refer to **Fastener Caution** .

Exhaust Front Pipe Bracket Bolt (2) - Install and tighten [2x] 22 N.m (16 lb ft)

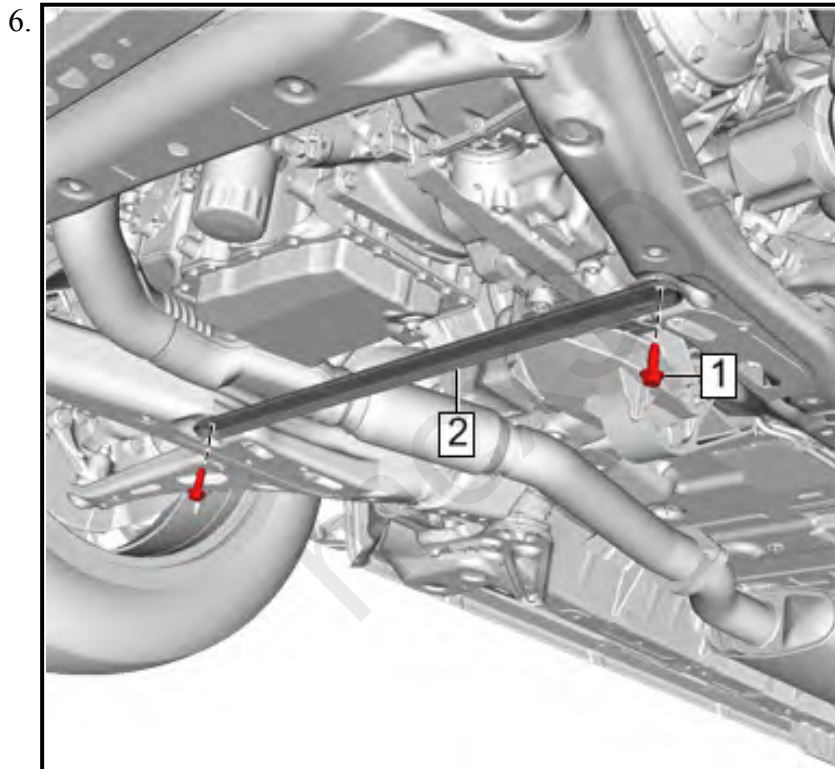
4. Exhaust Front Pipe Nut (1) - Install and tighten [2x] 22 N.m (16 lb ft)

5.





Catalytic Converter Nut (1) - Install and tighten [2x] 22 N.m (16 lb ft)



Front Cradle Brace (2) - Install

7. Front Cradle Brace Bolt (1) - Install and tighten [2x] 58 N.m (43 lb ft)

8. Start the engine and check for exhaust leaks.

## EXHAUST FRONT PIPE REPLACEMENT (LFY)

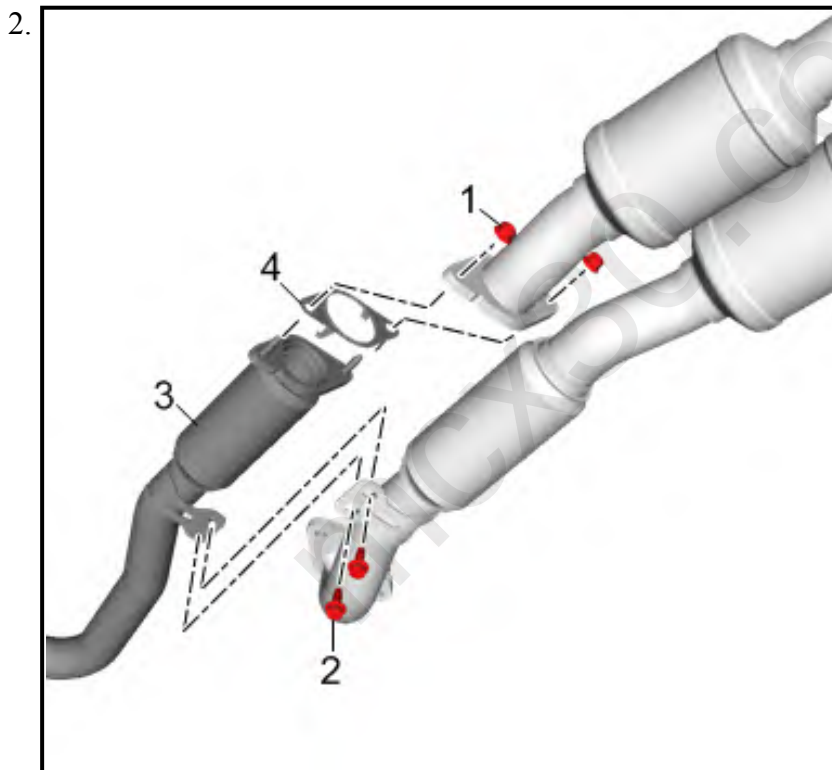
### Removal Procedure

**WARNING:** Refer to [Exhaust Service Warning](#) .





Exhaust Front Muffler (1) - Remove - [Exhaust Front Muffler Replacement \(LFY\)](#)



Exhaust Front Pipe Nut (1) - Remove [2x]

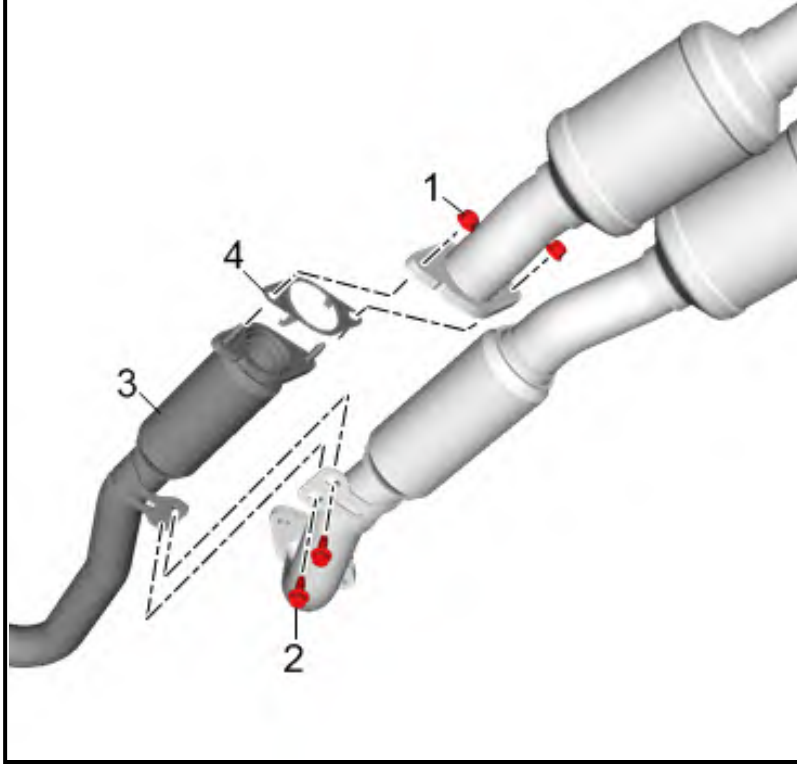
3. Exhaust Front Pipe Bracket Bolt (2) - Remove [2x]

4. Exhaust Front Pipe (3) - Remove

5. Exhaust Front Pipe Gasket (4) - Remove and DISCARD

### Installation Procedure





**NOTE:** Install NEW gaskets.

Exhaust Front Pipe Gasket (4) - Install

2. Exhaust Front Pipe (3) - Install

**CAUTION:** Refer to [Fastener Caution](#) .

3. Exhaust Front Pipe Bracket Bolt (2) - Install and hand tighten [2x]

4. Exhaust Front Pipe Nut (1) - Install and tighten [2x] 22 N.m (16 lb ft)

5. Exhaust Front Pipe Bracket Bolt (2) - Tighten [2x] 22 N.m (16 lb ft)

6.



Exhaust Front Muffler (1) - Install - [Exhaust Front Muffler Replacement \(LFY\)](#)

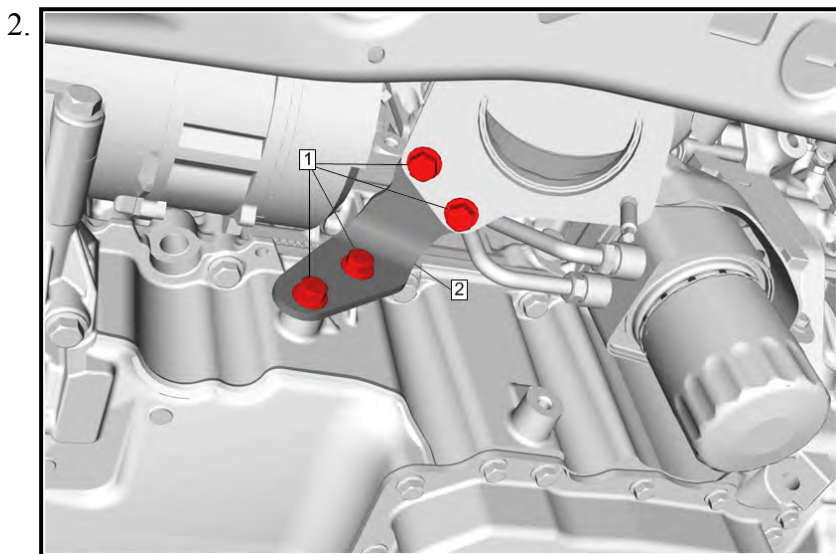
**WARM UP THREE-WAY CATALYTIC CONVERTER REPLACEMENT (LTG)**

[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.

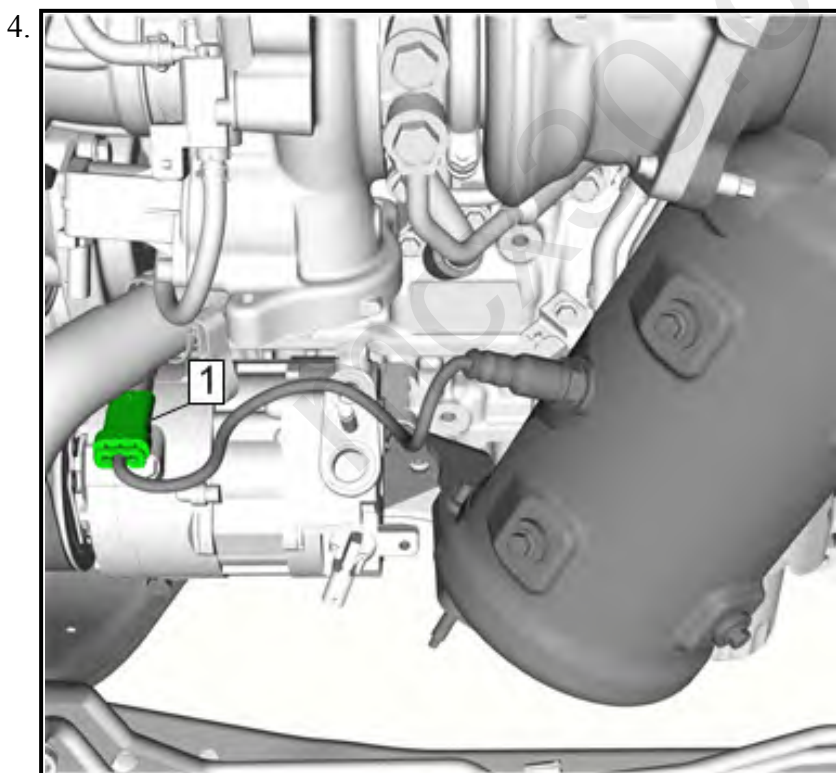
**WARNING:** Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Exhaust Front Pipe - Remove - [Exhaust Front Pipe Replacement \(LTG\)](#)



Catalytic Converter Brace Bracket Bolt (1) - Remove [4x]

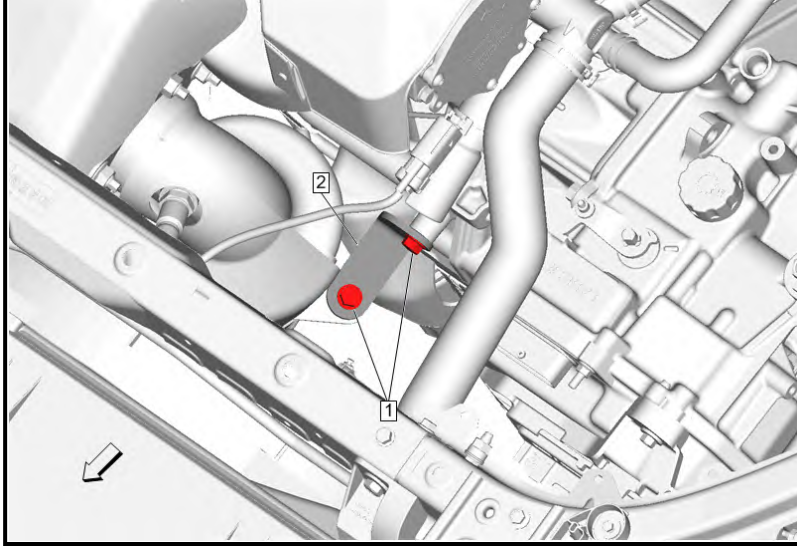
3. Catalytic Converter Brace Bracket-Lower (2) - Remove



Heated Oxygen Sensor Electrical Connector (1) - Disconnect

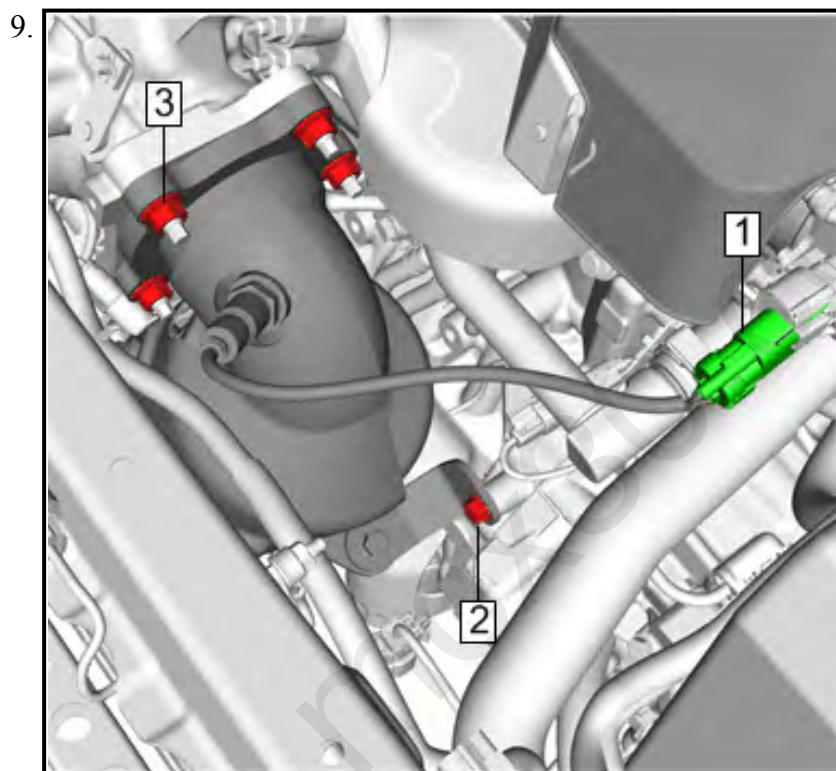
5. Lower the vehicle.
6. Turbocharger Heat Shield - Remove - [Turbocharger Heat Shield Replacement](#)





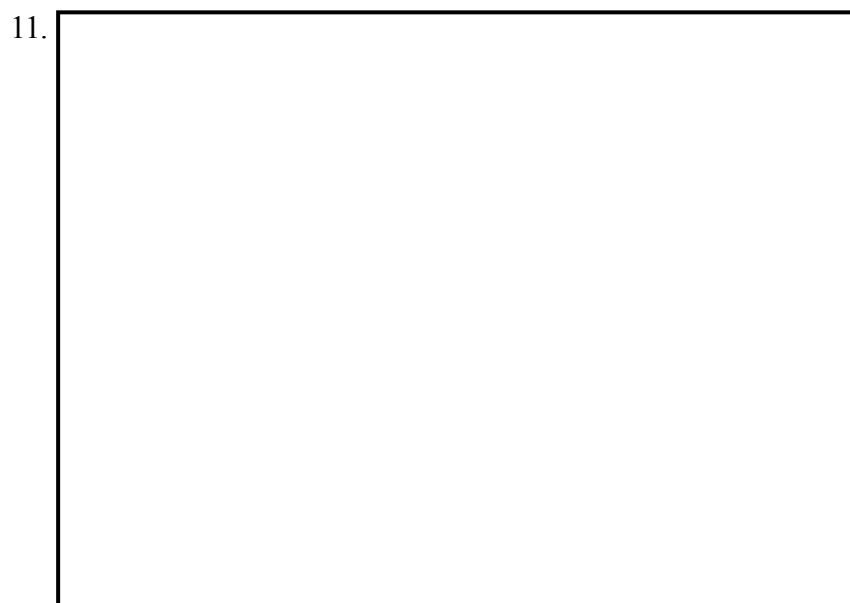
Catalytic Converter Brace Bracket Bolt (1) - Remove [2x]

8. Catalytic Converter Brace Bracket-Upper (2) - Remove

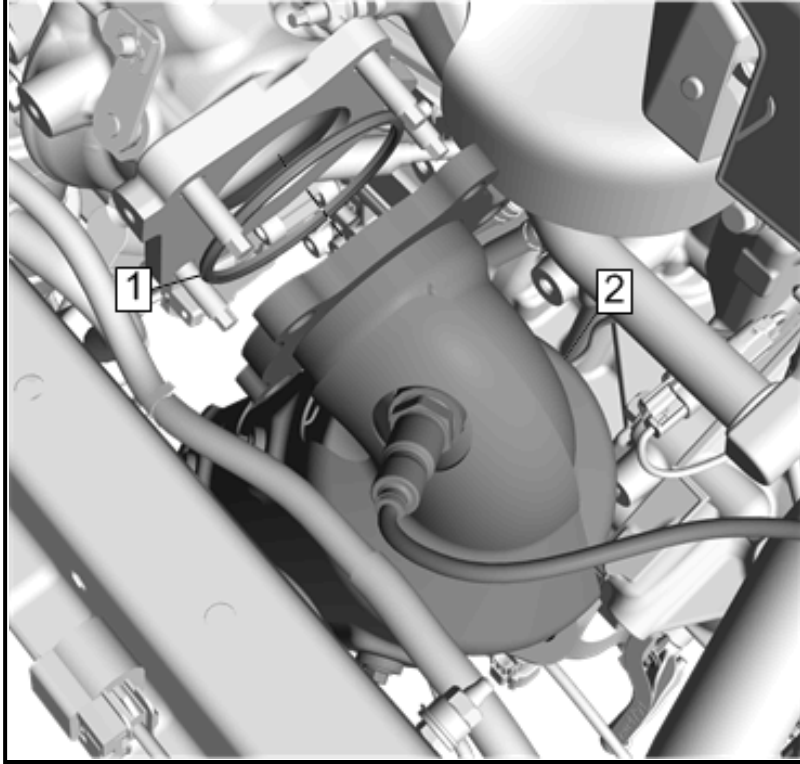


Heated Oxygen Sensor Electrical Connector (1) - Disconnect

10. Catalytic Converter Nut (3) - Remove [4x]



11.

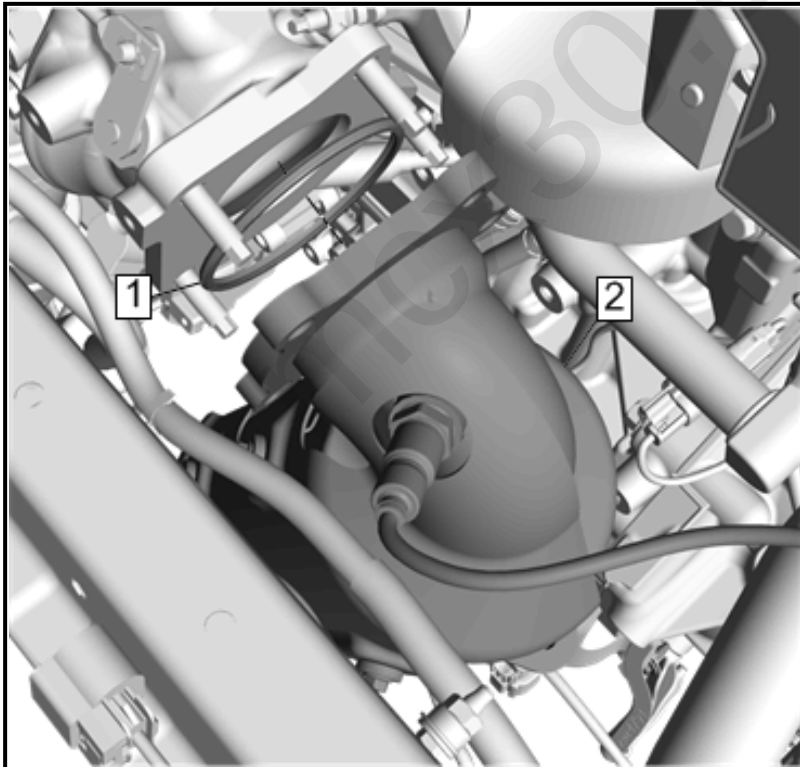


Warm Up Three-Way Catalytic Converter (2) - Remove

12. Catalytic Converter Gasket (1) - Remove and DISCARD
13. Transfer components as necessary.

#### Installation Procedure

1.

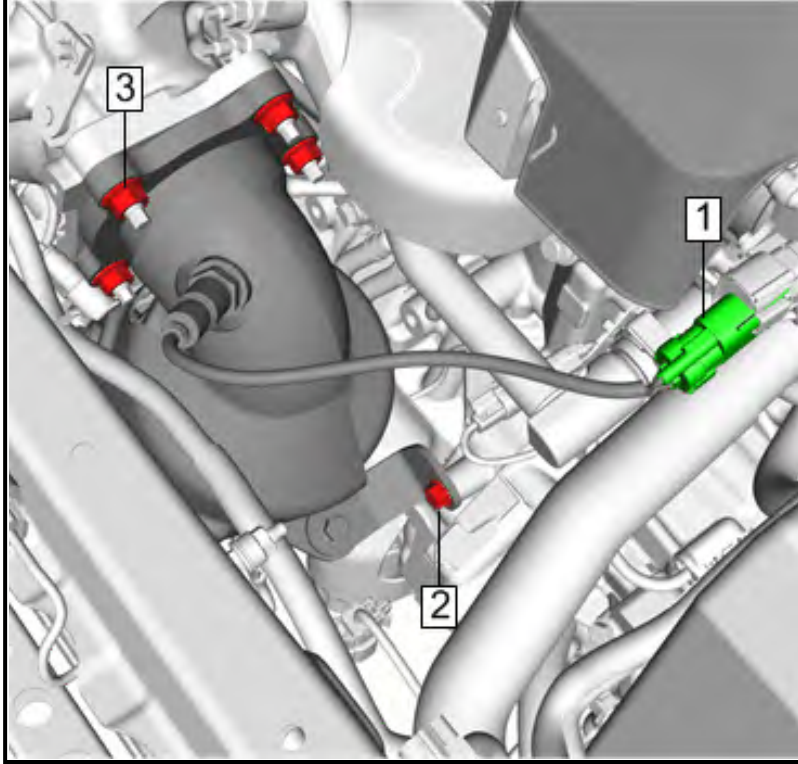


Catalytic Converter Gasket (1) - Install a NEW gasket.

2. Warm Up Three-Way Catalytic Converter (2) - Install

3.



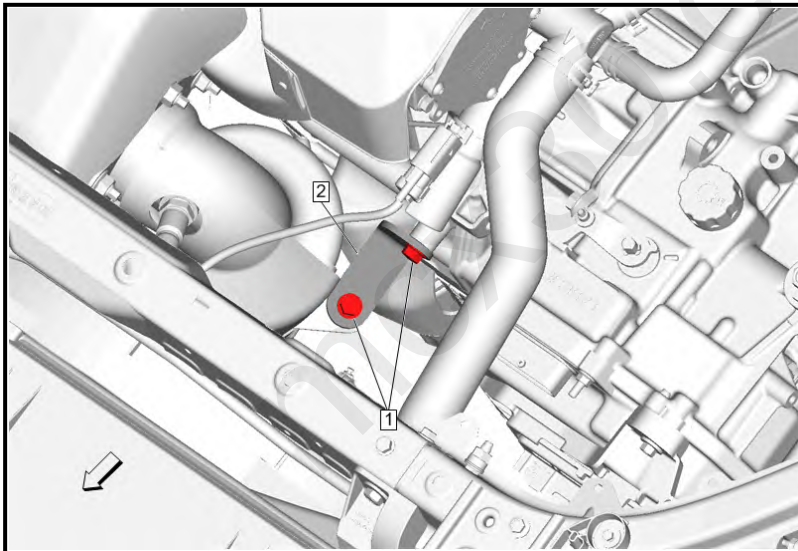


**CAUTION:** Refer to [Fastener Caution](#) .

Catalytic Converter Nut (3) - Install and tighten [4x] 50 N.m (37 lb ft)

4. Heated Oxygen Sensor Electrical Connector (1) - Connect

5.



Catalytic Converter Brace Bracket-Upper (2) - Install

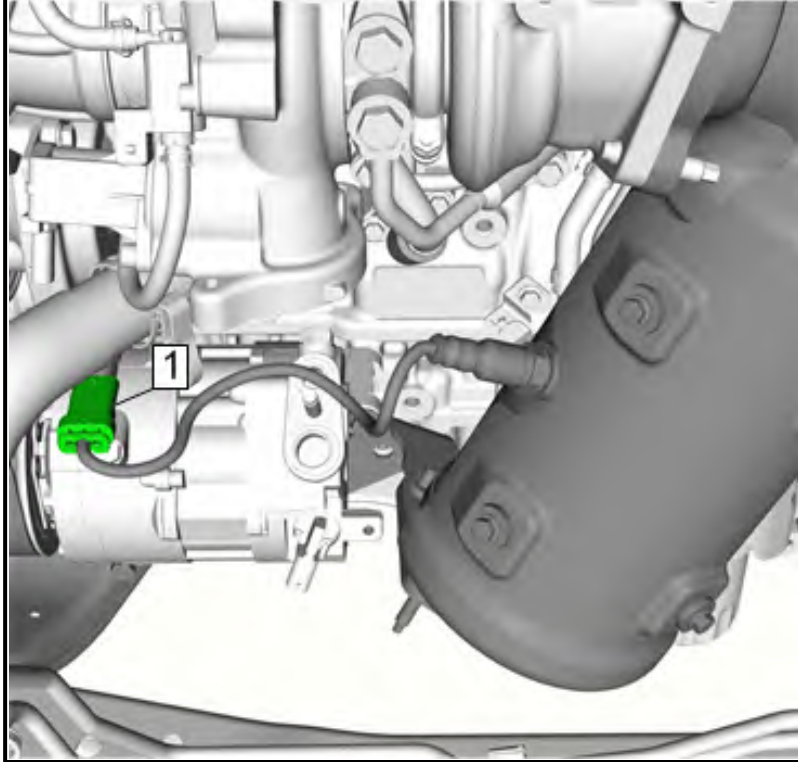
6. Catalytic Converter Brace Bracket Bolt (2) - Install and tighten [2x] - [Catalytic Converter Brace Bracket Replacement](#)

7. Turbocharger Heat Shield - Install - [Turbocharger Heat Shield Replacement](#)

8. Raise and support the vehicle.

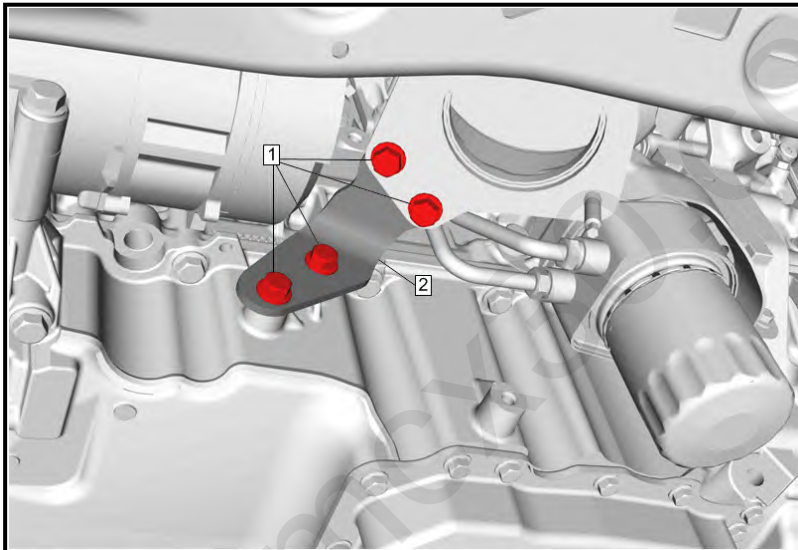
9.





Heated Oxygen Sensor Electrical Connector (1) - Connect

10.



Catalytic Converter Brace Bracket-Lower (2) - Install

11. Catalytic Converter Brace Bracket Bolt (1) - Install and tighten [4x] - [Catalytic Converter Brace Bracket Replacement](#)
12. Exhaust Front Pipe - Install - [Exhaust Front Pipe Replacement \(LTG\)](#)
13. Start the engine and check for exhaust leaks.

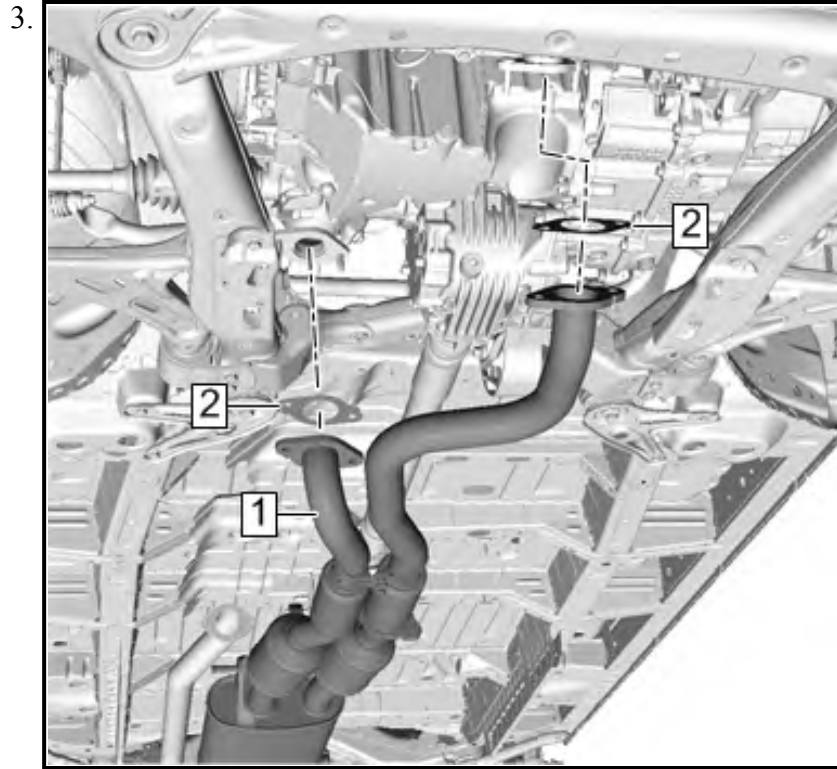
## WARM UP THREE-WAY CATALYTIC CONVERTER REPLACEMENT (LFY BANK 2)

### Removal Procedure

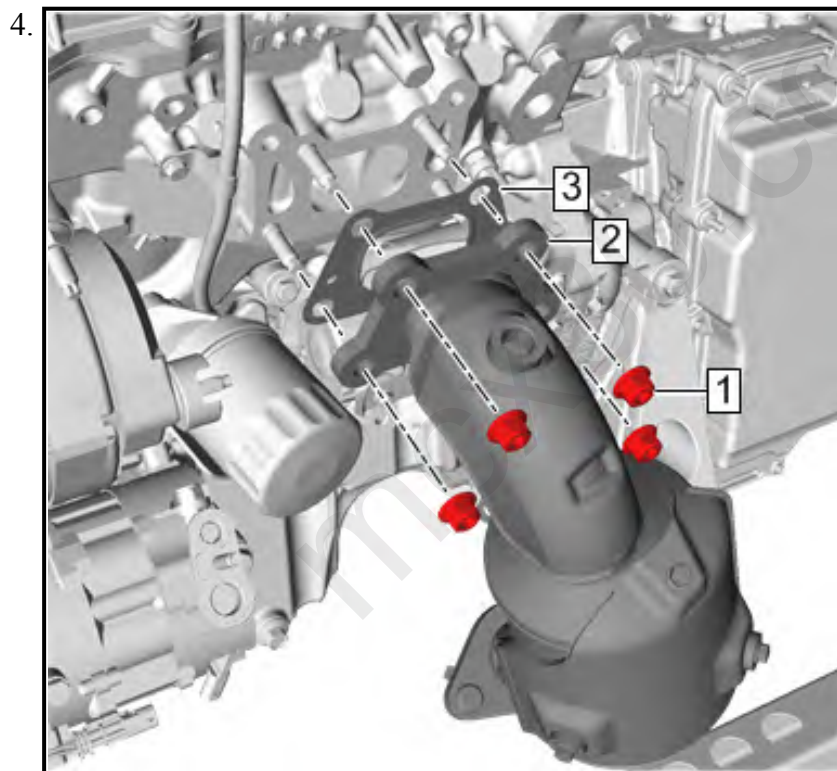
**WARNING:** In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

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

1. Heated Oxygen Sensor-Bank 2 Sensor 1 - Disconnect - [Heated Oxygen Sensor Replacement - Bank 2 Sensor 1](#)
2. Heated Oxygen Sensor-Bank 2 Sensor 2 - Disconnect - [Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 \(AWD\)](#) [Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 \(FWD\)](#)



Exhaust Front Muffler (1) - Remove - [Exhaust Front Muffler Replacement \(LFY\)](#)

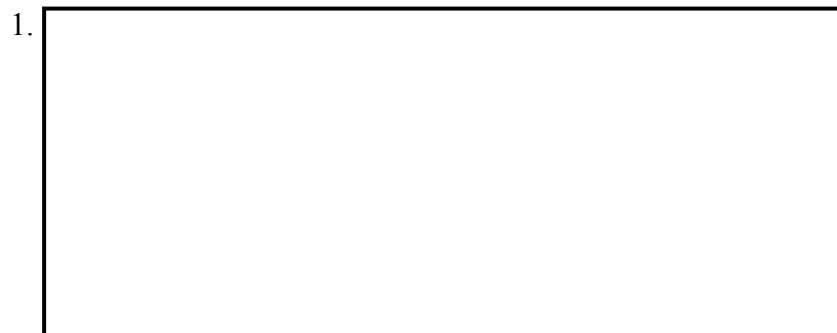


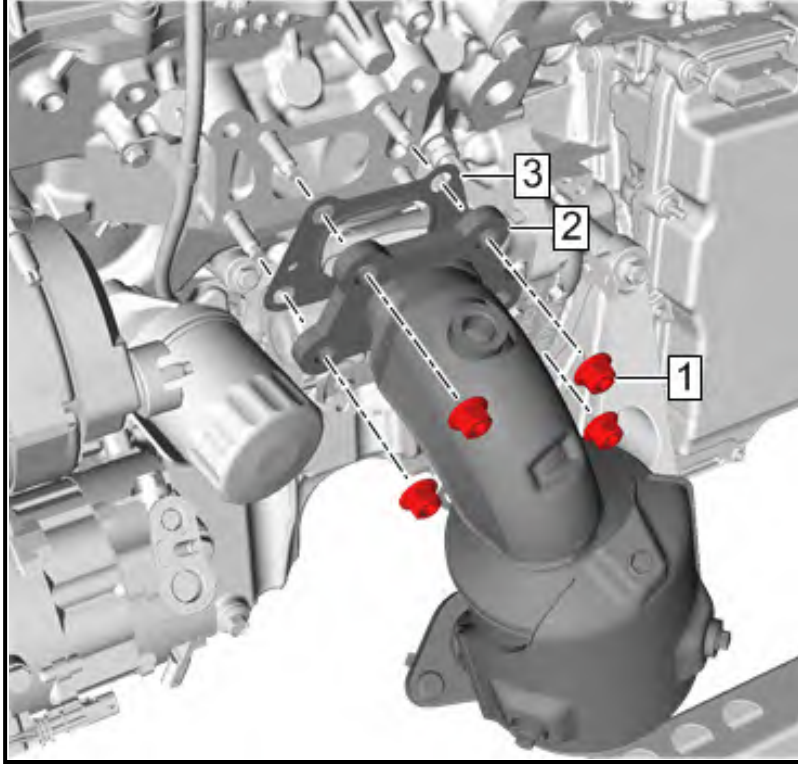
Warm Up Three-Way Catalytic Converter Nut (1) - Remove and DISCARD [4x]

5. Warm Up Three-Way Catalytic Converter (2) - Remove

6. Catalytic Converter Gasket (3) - Remove and DISCARD

### Installation Procedure





**NOTE:** Install a NEW gasket.

Catalytic Converter Gasket (3) - Install

2. Warm Up Three-Way Catalytic Converter (2) - Install

**CAUTION:** Refer to [Fastener Caution](#) .

**NOTE:** Install NEW nuts.

3. Warm Up Three-Way Catalytic Converter Nut (1) - Install and tighten [4x] 58 N.m (43 lb ft)

4.



Exhaust Front Muffler (1) - Install - [Exhaust Front Muffler Replacement \(LFY\)](#)

5. Heated Oxygen Sensor-Bank 2 Sensor 2 - Install - [Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 \(AWD\)](#), [Heated Oxygen Sensor Replacement - Bank 2 Sensor 2 \(FWD\)](#)

6. Heated Oxygen Sensor-Bank 2 Sensor 1 - Install - [Heated Oxygen Sensor Replacement - Bank 2 Sensor 1](#)
7. Start the engine and check for exhaust leaks.

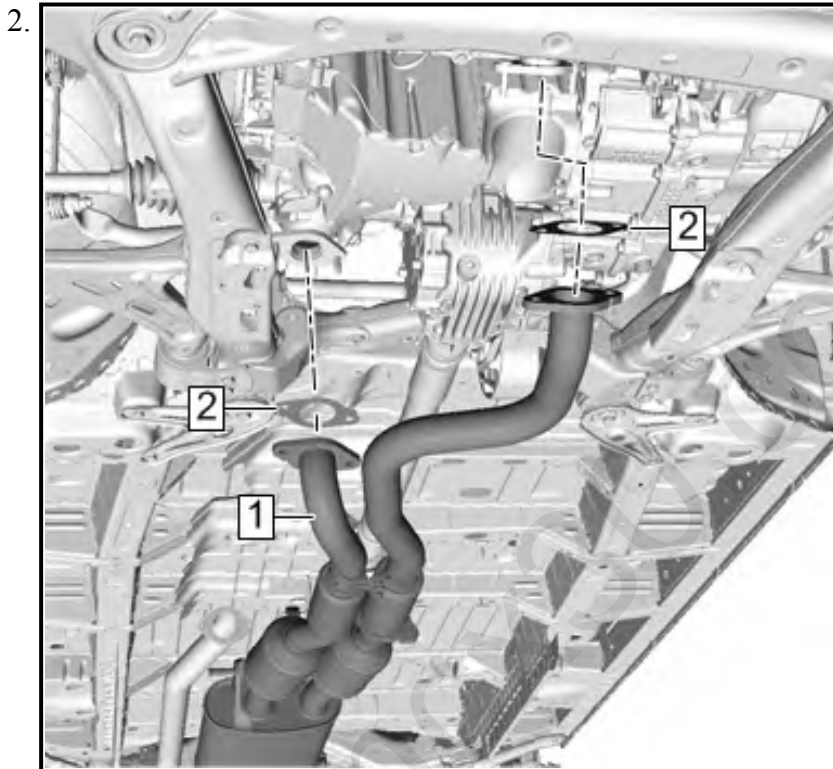
## WARM UP THREE-WAY CATALYTIC CONVERTER REPLACEMENT (LFY BANK 1 AWD)

### Removal Procedure

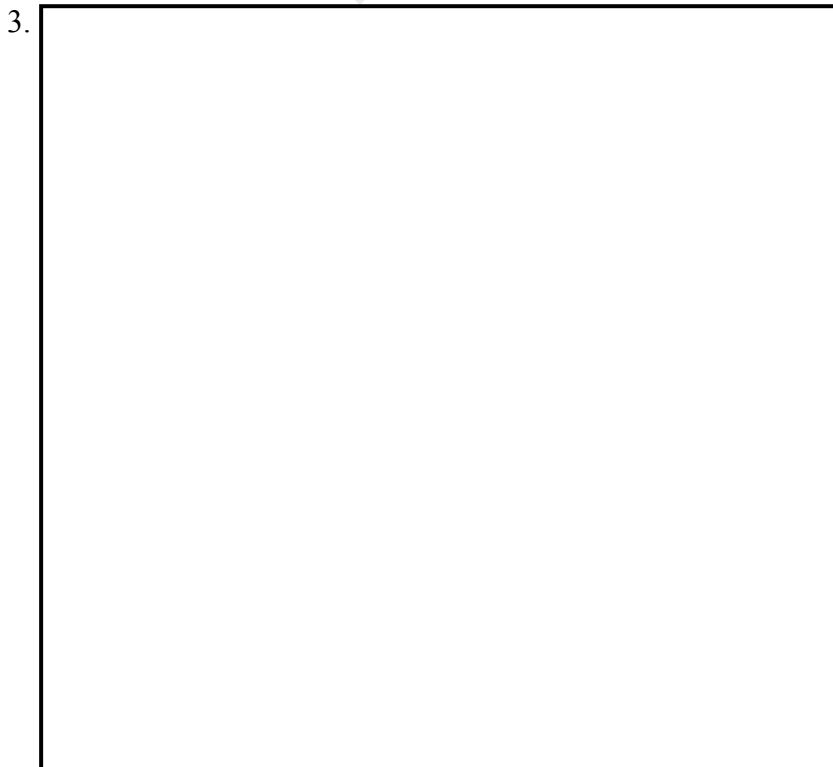
**WARNING:** In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.

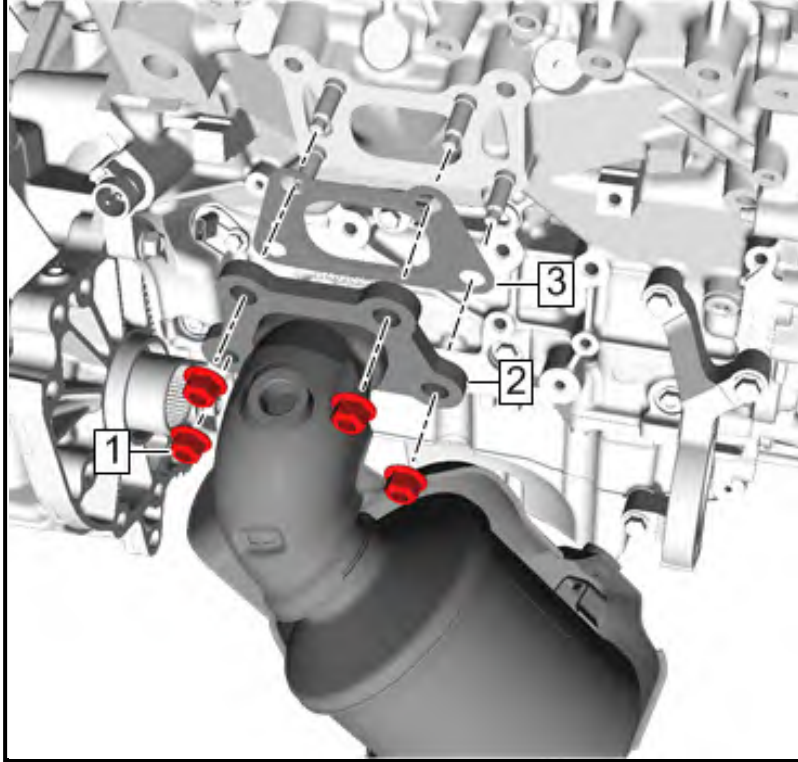
**WARNING:** Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Heated Oxygen Sensor-Bank 1 Sensor 1 - Disconnect - [Heated Oxygen Sensor Replacement - Bank 1 Sensor 1](#)



Exhaust Front Muffler (1) - Remove - [Exhaust Front Muffler Replacement \(LFY\)](#)

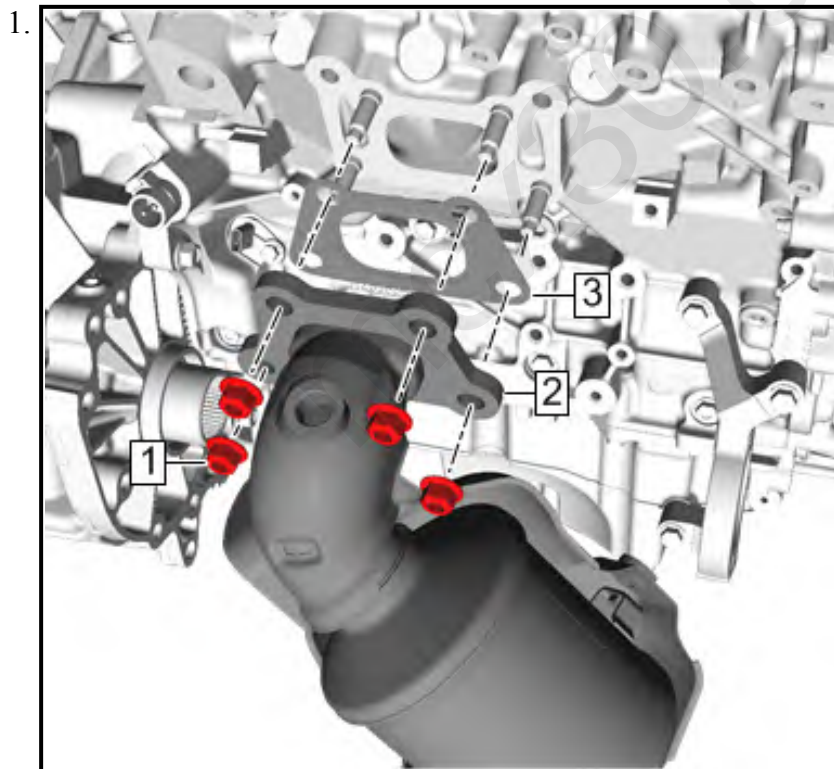




Warm Up Three-Way Catalytic Converter Nut (1) - Remove and DISCARD [4x]

4. Warm Up Three-Way Catalytic Converter (2) - Remove
5. Catalytic Converter Gasket (3) - Remove and DISCARD

#### Installation Procedure



**NOTE:** Install a **NEW** gasket.

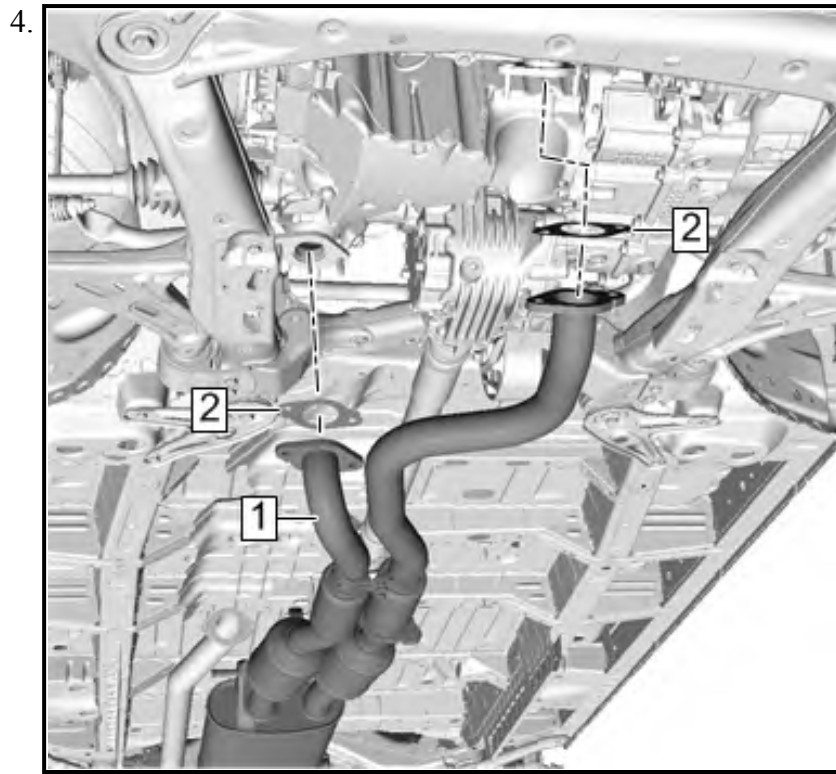
Catalytic Converter Gasket (3) - Install

2. Warm Up Three-Way Catalytic Converter (2) - Install

**CAUTION:** Refer to **Fastener Caution** .

**NOTE:** Install **NEW** nuts.

3. Warm Up Three-Way Catalytic Converter Nut (1) - Install and tighten [4x] 58 N.m (43 lb ft)



Exhaust Front Muffler (1) - Install - [Exhaust Front Muffler Replacement \(LFY\)](#)

5. Heated Oxygen Sensor-Bank 1 Sensor 1 - Install - [Heated Oxygen Sensor Replacement - Bank 1 Sensor 1](#)

6. Start the engine and check for exhaust leaks.

### **WARM UP THREE-WAY CATALYTIC CONVERTER REPLACEMENT (LFY BANK 1 2WD)**

#### **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.

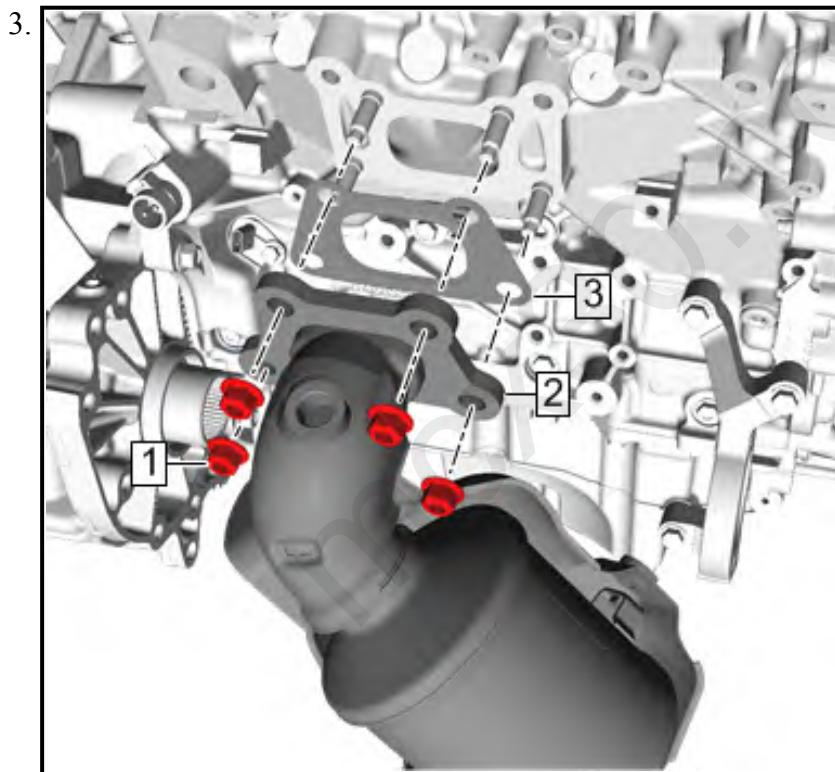
**WARNING:** Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.

1. Heated Oxygen Sensor-Bank 1 Sensor 1 - Disconnect - [Heated Oxygen Sensor Replacement - Bank 1 Sensor 1](#)





Exhaust Front Muffler (1) - Remove - [Exhaust Front Muffler Replacement \(LFY\)](#)

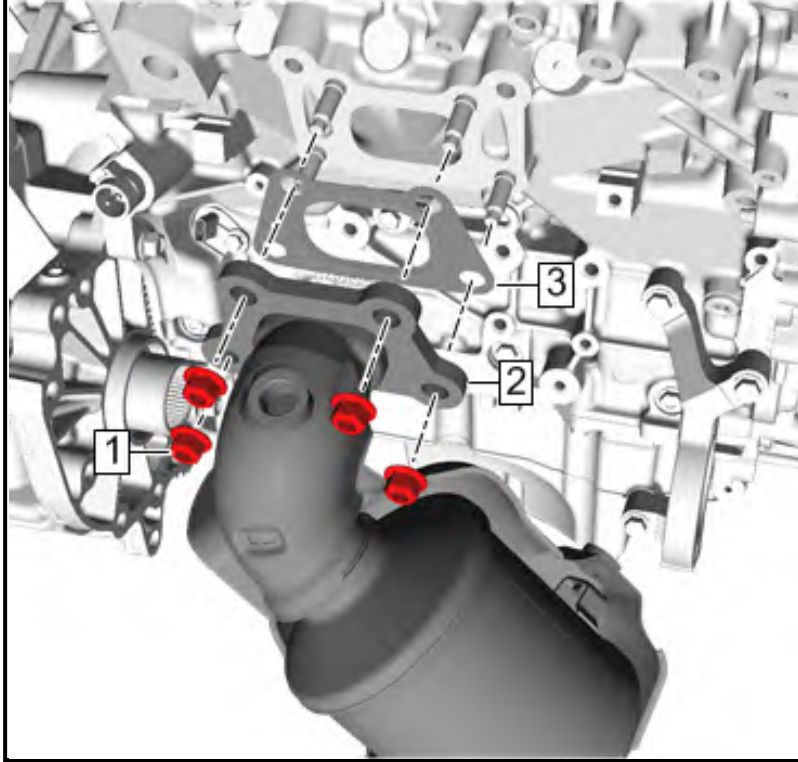


Warm Up Three-Way Catalytic Converter Nut (1) - Remove and DISCARD [4x]

4. Warm Up Three-Way Catalytic Converter (2) - Remove
5. Catalytic Converter Gasket (3) - Remove and DISCARD

### Installation Procedure





**NOTE:** Install a **NEW** gasket.

Catalytic Converter Gasket (3) - Install

2. Warm Up Three-Way Catalytic Converter (2) - Install

**CAUTION:** Refer to [Fastener Caution](#) .

**NOTE:** Install **NEW** nuts.

3. Warm Up Three-Way Catalytic Converter Nut (1) - Install and tighten [4x] 58 N.m (43 lb ft)

4.

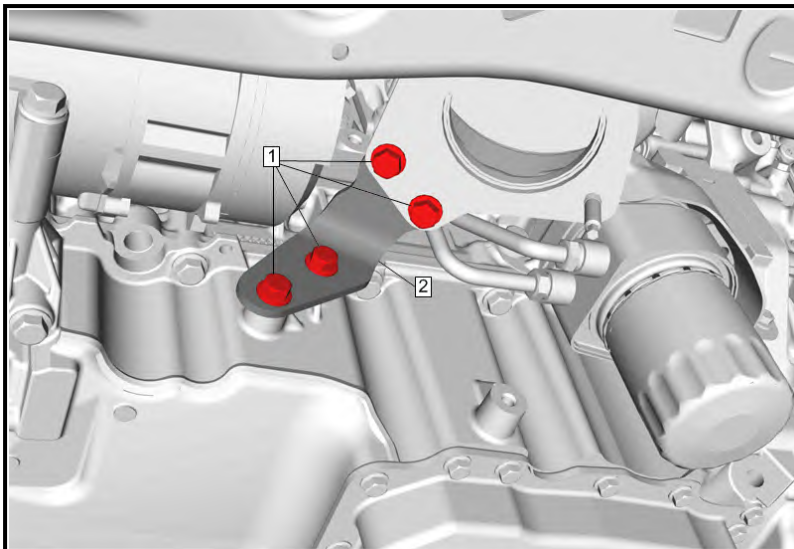


Exhaust Front Muffler (1) - Install - [Exhaust Front Muffler Replacement \(LFY\)](#)

5. Heated Oxygen Sensor-Bank 1 Sensor 1 - Install - [Heated Oxygen Sensor Replacement - Bank 1 Sensor 1](#)

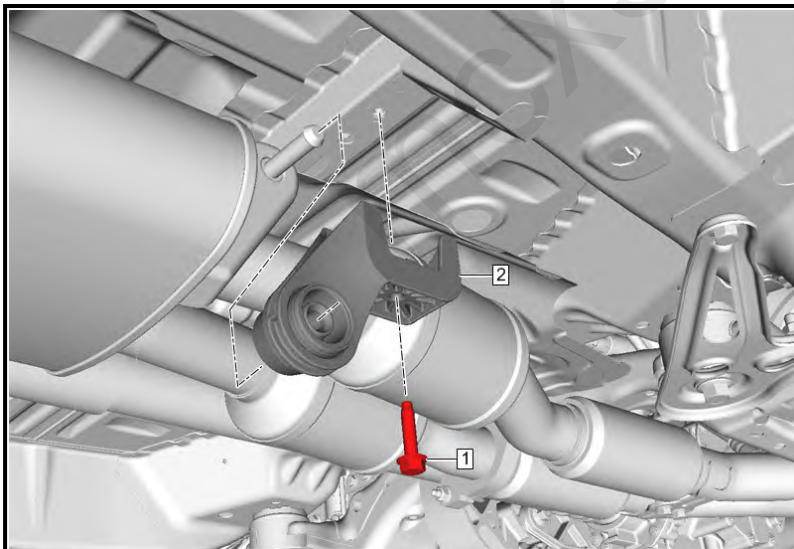
6. Start the engine and check for exhaust leaks.

## CATALYTIC CONVERTER BRACE BRACKET REPLACEMENT



| Callout                                                                | Component Name                                                                                                                                      |
|------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Lifting and Jacking the Vehicle</u> |                                                                                                                                                     |
| 1                                                                      | Exhaust Pipe Front Hanger Bracket Bolt [4x]<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>22 N.m (16 lb ft) |
| 2                                                                      | Catalytic Converter Brace Bracket                                                                                                                   |

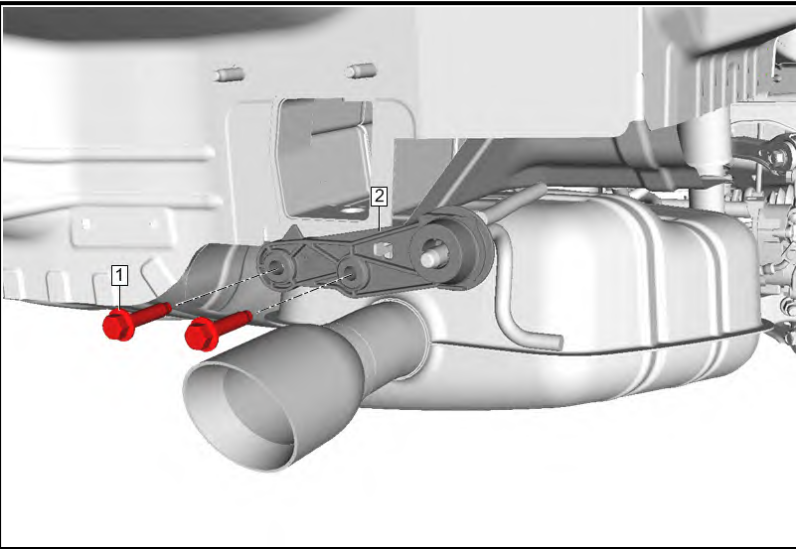
## EXHAUST INTERMEDIATE HANGER REPLACEMENT (LFY)



| Callout                                                                | Component Name                                                                                                                           |
|------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Lifting and Jacking the Vehicle</u> |                                                                                                                                          |
| 1                                                                      | Exhaust Intermediate Hanger Bolt<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>22 N.m (16 lb ft) |

| Callout | Component Name              |
|---------|-----------------------------|
| 2       | Exhaust Intermediate Hanger |

### EXHAUST REAR MUFFLER REAR HANGER REPLACEMENT (LFY)

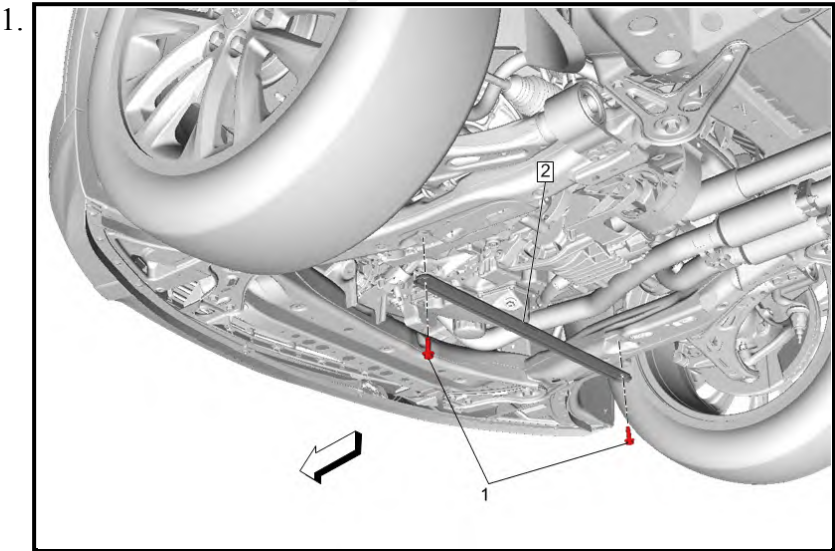


| Callout                                                                | Component Name                                                                                                                                     |
|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Preliminary Procedure</b><br><u>Lifting and Jacking the Vehicle</u> |                                                                                                                                                    |
| 1                                                                      | Exhaust Rear Muffler Rear Hanger Bolt [2x]<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>22 N.m (16 lb ft) |
| 2                                                                      | Exhaust Rear Muffler Rear Hanger                                                                                                                   |

### EXHAUST FRONT MUFFLER REPLACEMENT (LFY)

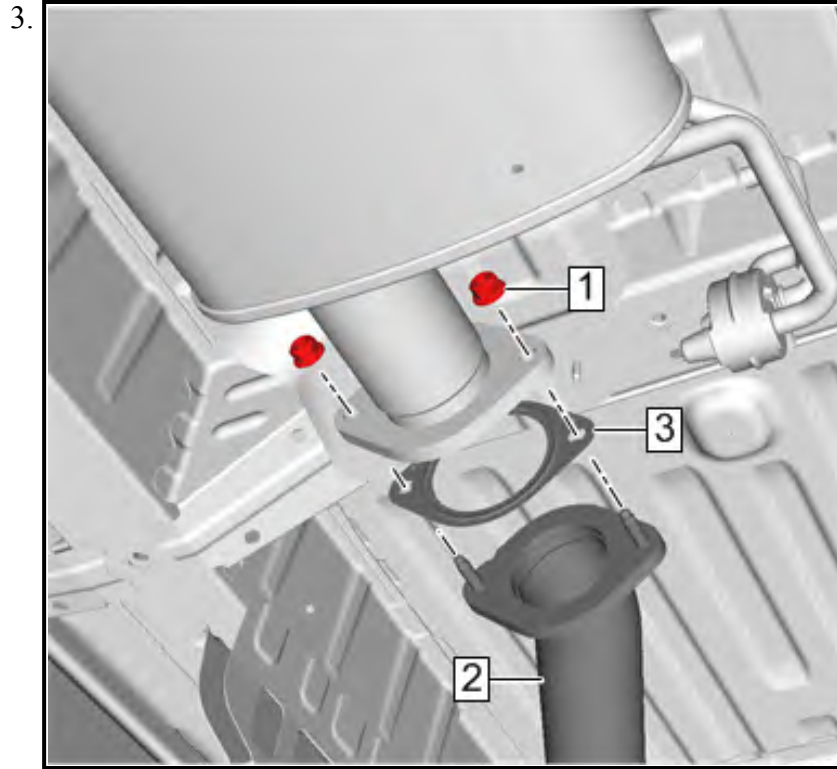
#### Removal Procedure

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

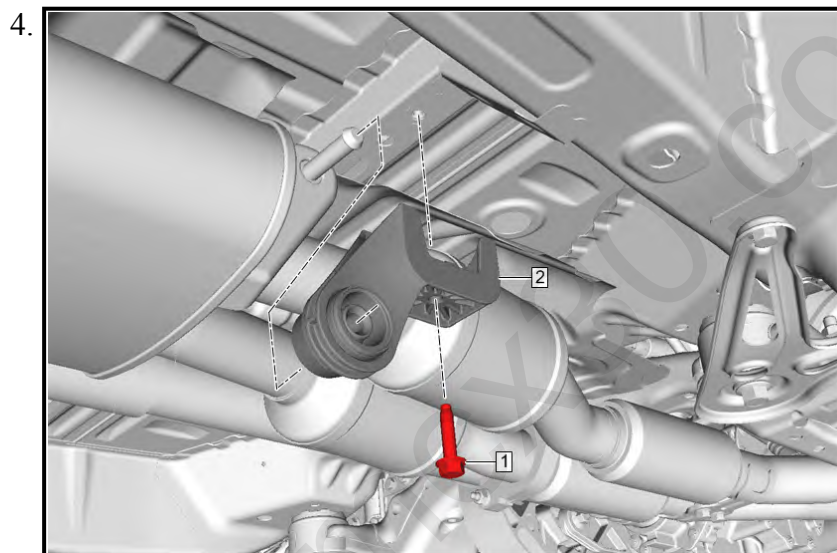


Front Cradle Brace (2) - Remove - [Front Cradle Brace Replacement](#)

- Heated Oxygen Sensor-Bank 1 Sensor 2 - Disconnect - [Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 \(AWD\)](#), [Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 \(FWD\)](#)

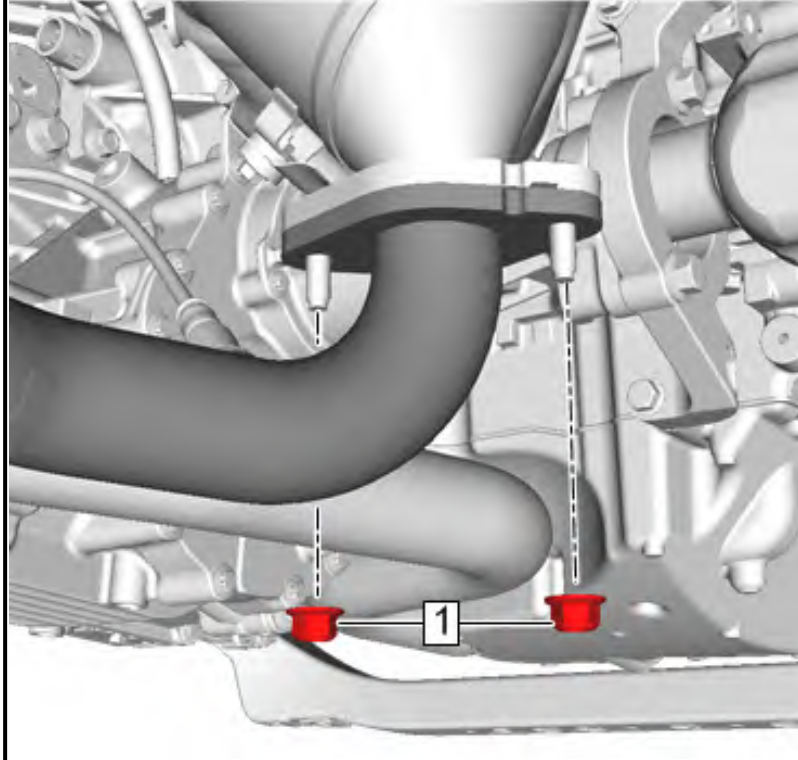


Exhaust Muffler (2) @ Exhaust Front Muffler - Disconnect - [Exhaust Muffler Replacement \(LFY\)](#).

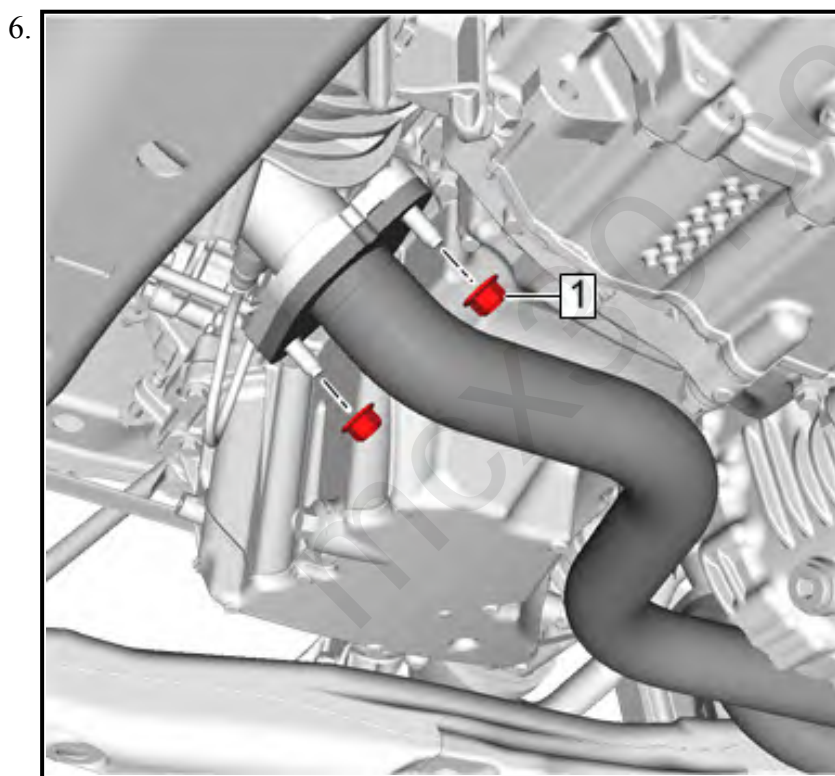


Exhaust Intermediate Hanger (2) - Remove - [Exhaust Intermediate Hanger Replacement \(LFY\)](#).





Exhaust Front Pipe Nut (1) - Remove [2x]



Exhaust Front Pipe Nut (1) - Remove [2x]





With the aid of an assistant, lower the exhaust front muffler assembly (1) from the vehicle.

8. Catalytic Converter Gasket (2) - Remove and DISCARD [2x]
9. Transfer components as necessary.

#### Installation Procedure

1.



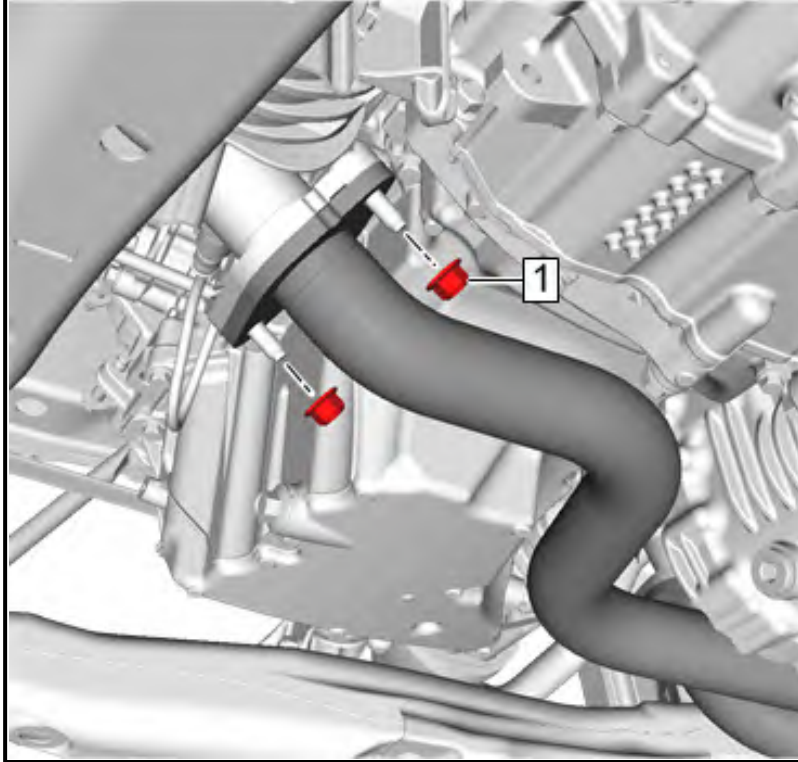
**NOTE:** Install NEW gaskets.

Catalytic Converter Gasket (2) - Install [2x]

2. With the aid of an assistant, fit the exhaust front muffler assembly (1) to the vehicle.

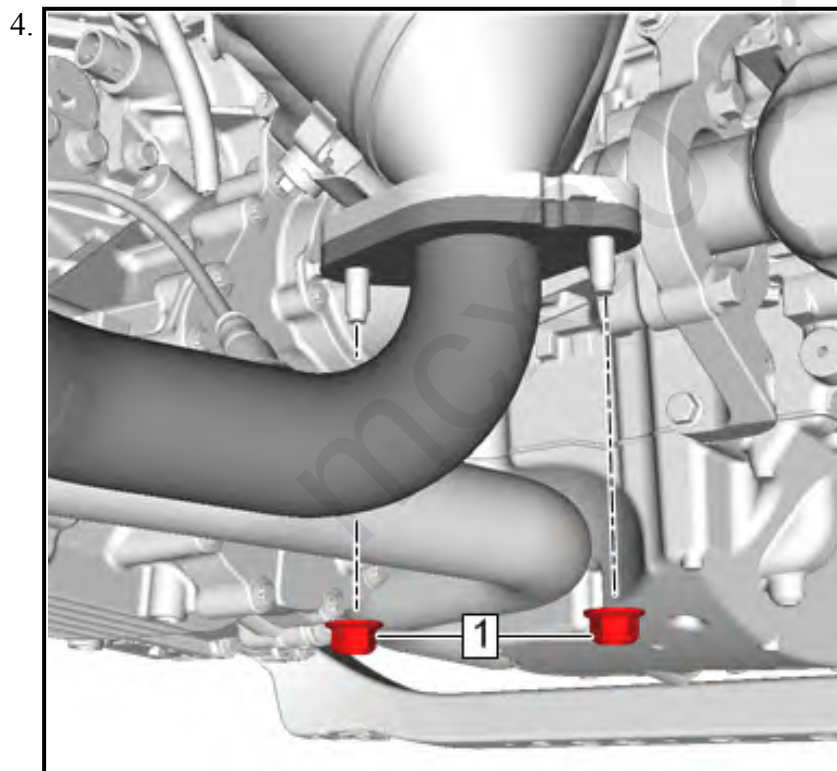
3.





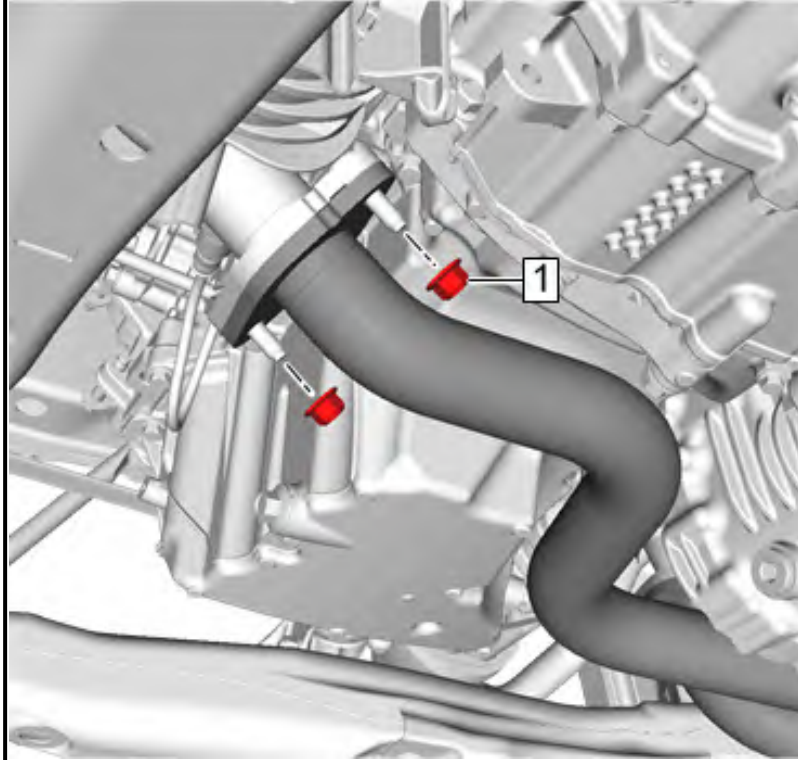
**CAUTION:** Refer to [Fastener Caution](#) .

Exhaust Front Pipe Nut (1) - Install and hand tighten [2x]

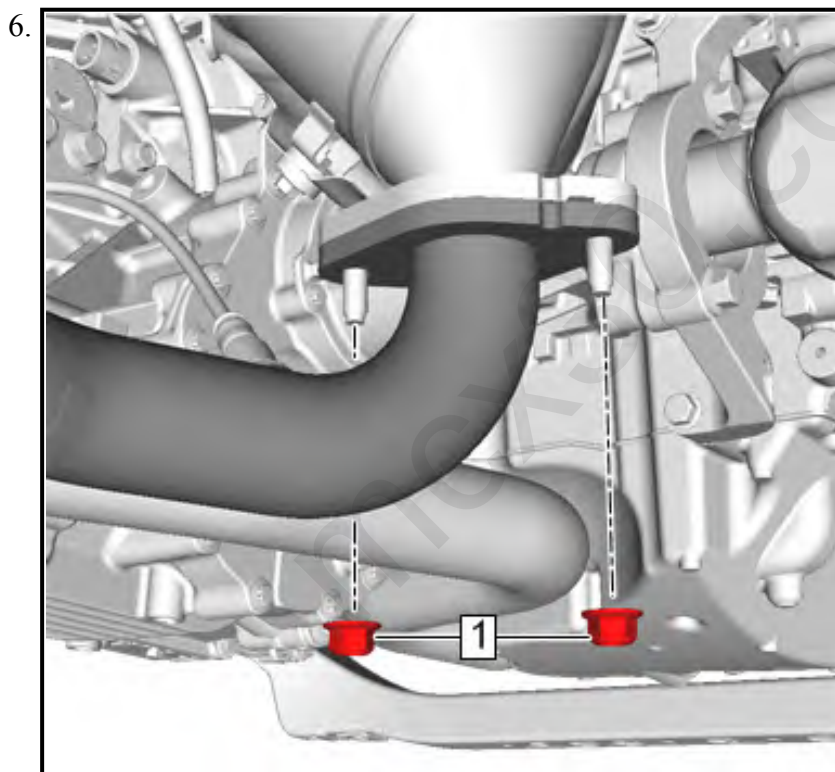


Exhaust Front Pipe Nut (1) - Install and hand tighten [2x]



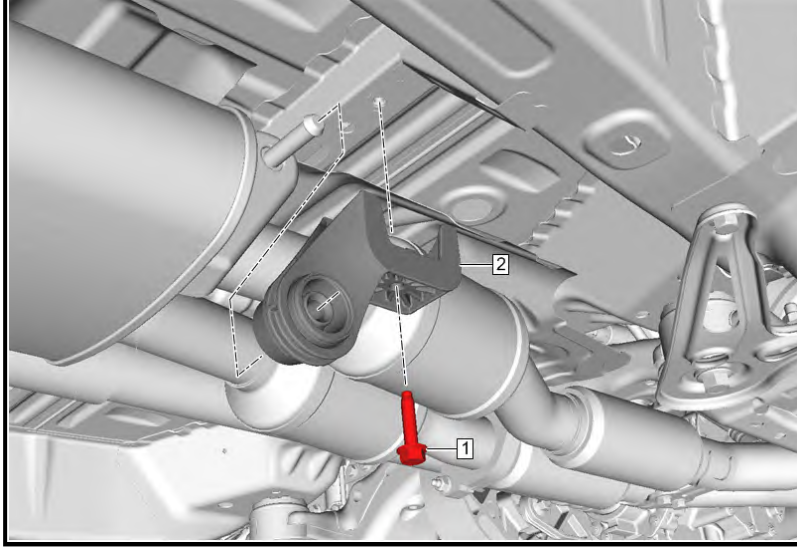


Exhaust Front Pipe Nut (1) - Tighten [2x] 58 N.m (43 lb ft)

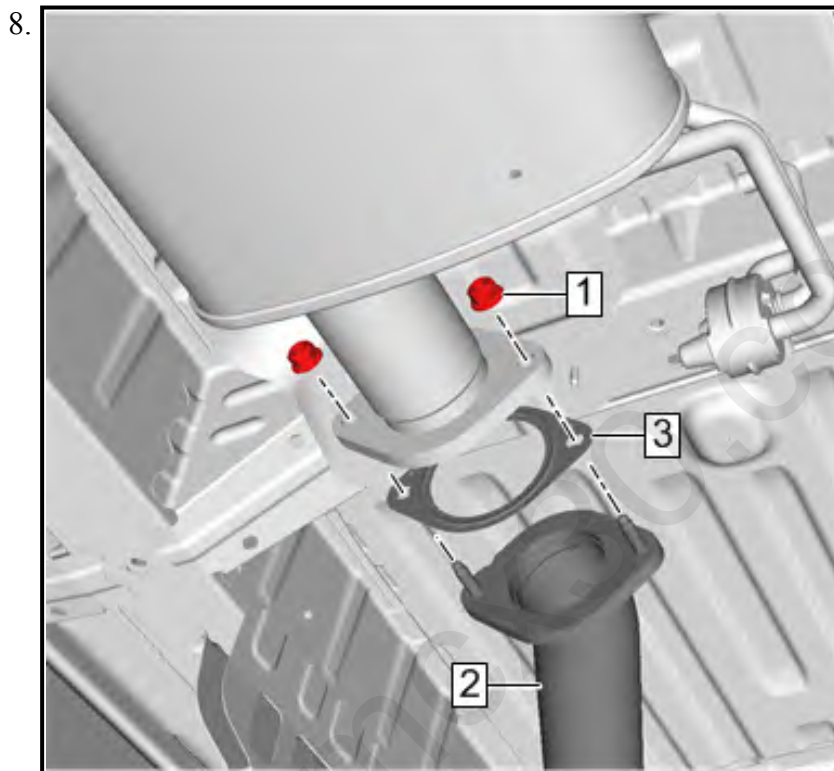


Exhaust Front Pipe Nut (1) - Tighten [2x] 58 N.m (43 lb ft)



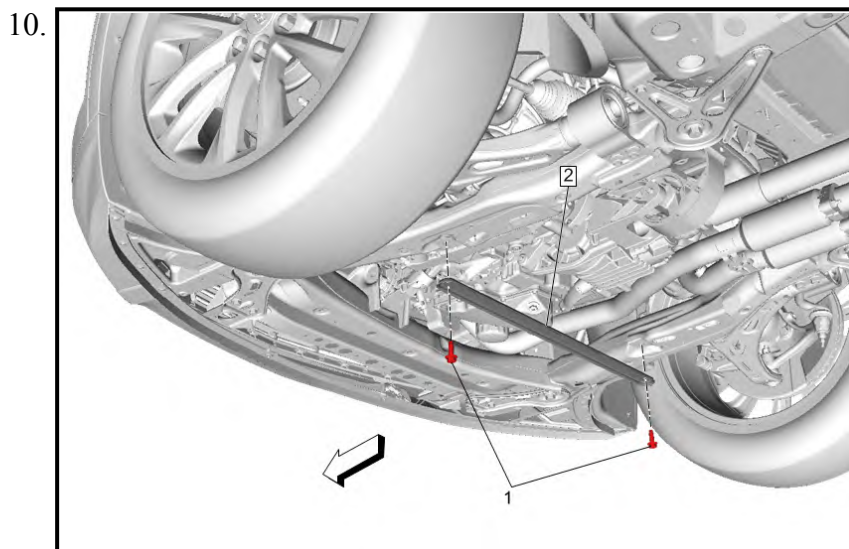


Exhaust Intermediate Hanger (2) - Install - [Exhaust Intermediate Hanger Replacement \(LFY\)](#)



Exhaust Muffler (2) @ Exhaust Front Muffler - Connect - [Exhaust Muffler Replacement \(LFY\)](#)

9. Heated Oxygen Sensor-Bank 1 Sensor 2 - Connect - [Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 \(AWD\)](#) [Heated Oxygen Sensor Replacement - Bank 1 Sensor 2 \(FWD\)](#)



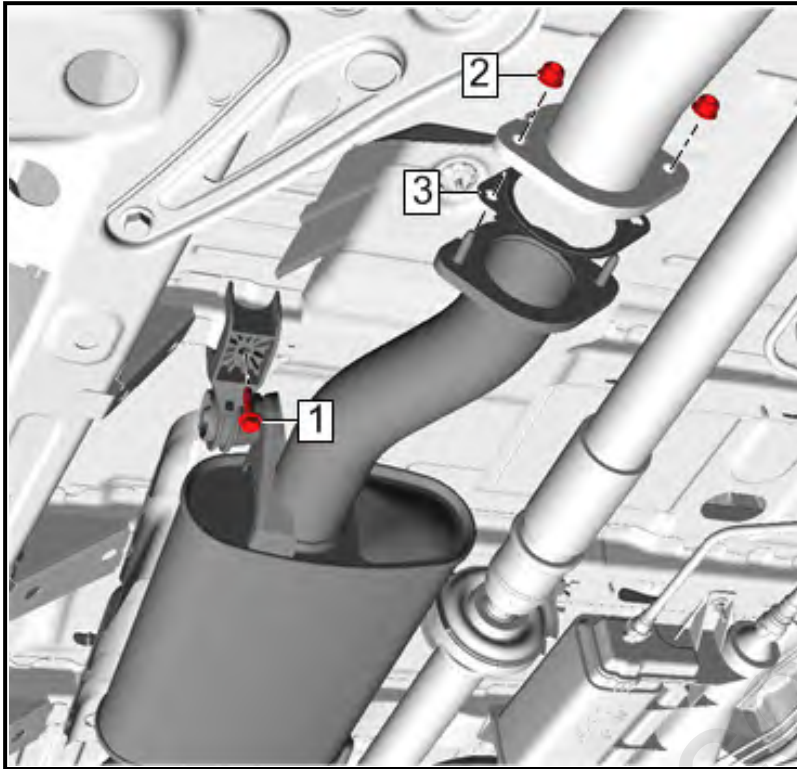
Front Cradle Brace (2) - Install - [Front Cradle Brace Replacement](#)

# EXHAUST MUFFLER REPLACEMENT (LTG)

## Removal Procedure

1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)
2. Support the exhaust muffler with a suitable jack.

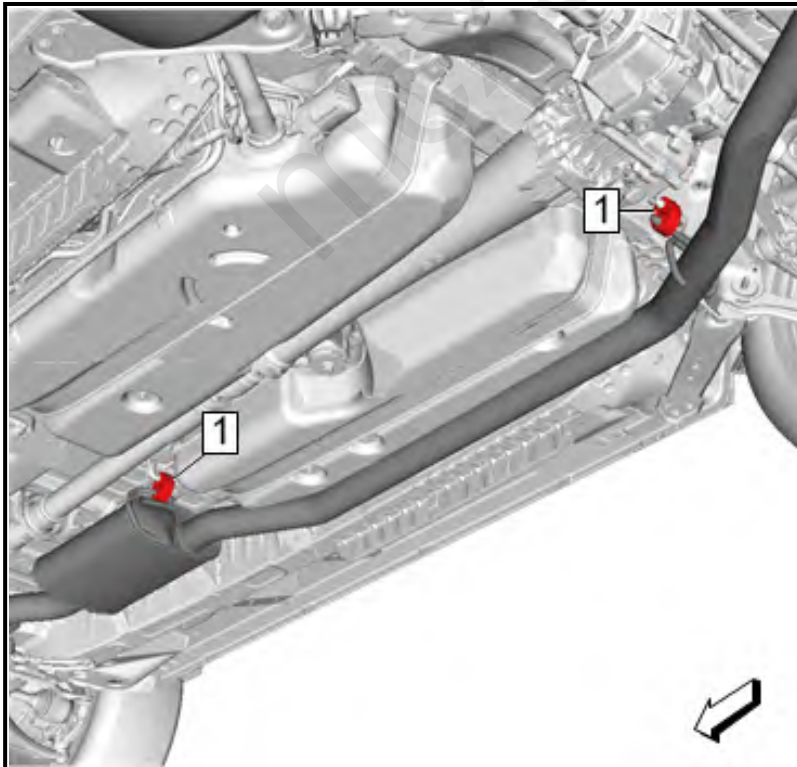
3.



Exhaust Intermediate Hanger Bolt (1) - Remove

4. Exhaust Front Pipe Nut (2) @ Exhaust Muffler - Remove [2x]
5. Exhaust Gasket (3) - Remove and DISCARD

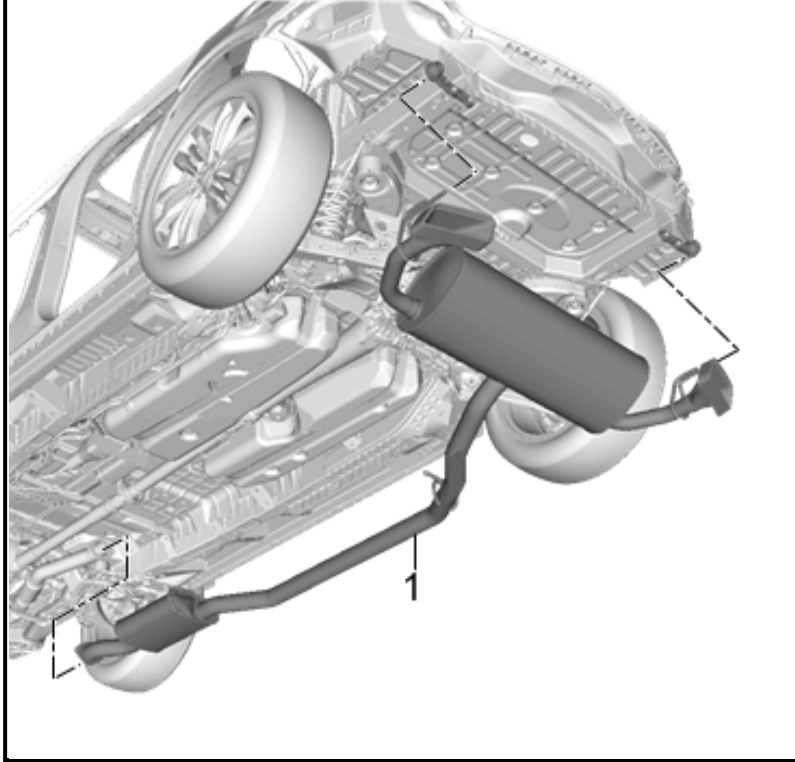
6.



Exhaust Muffler Isolator (1) - Disconnect [2x]

7.



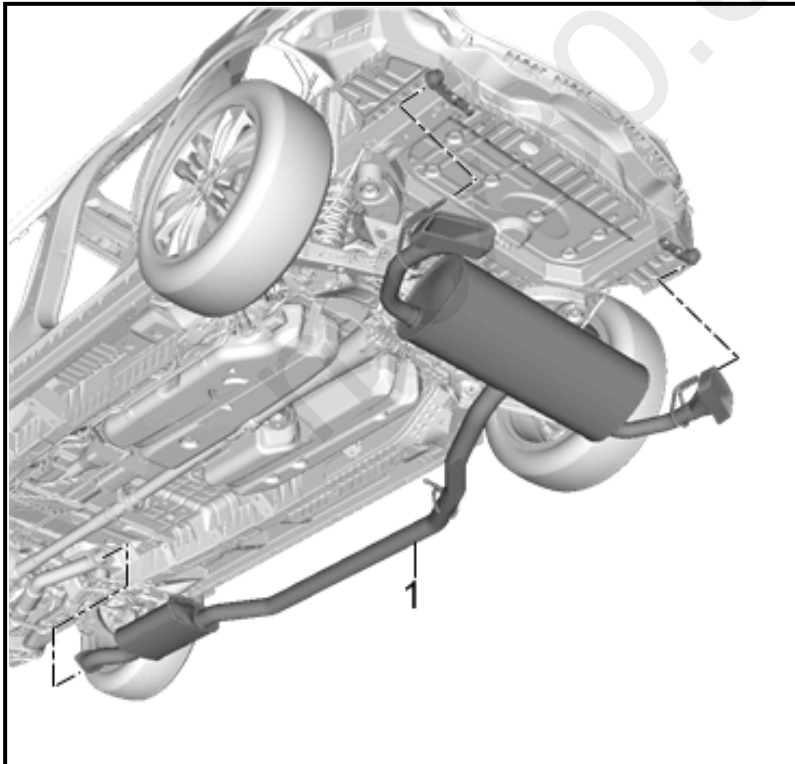


**NOTE:** With the aid of an assistant, carefully remove the exhaust muffler assembly from the vehicle.

Exhaust Muffler Assembly (1) - Remove

#### Installation Procedure

1.



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

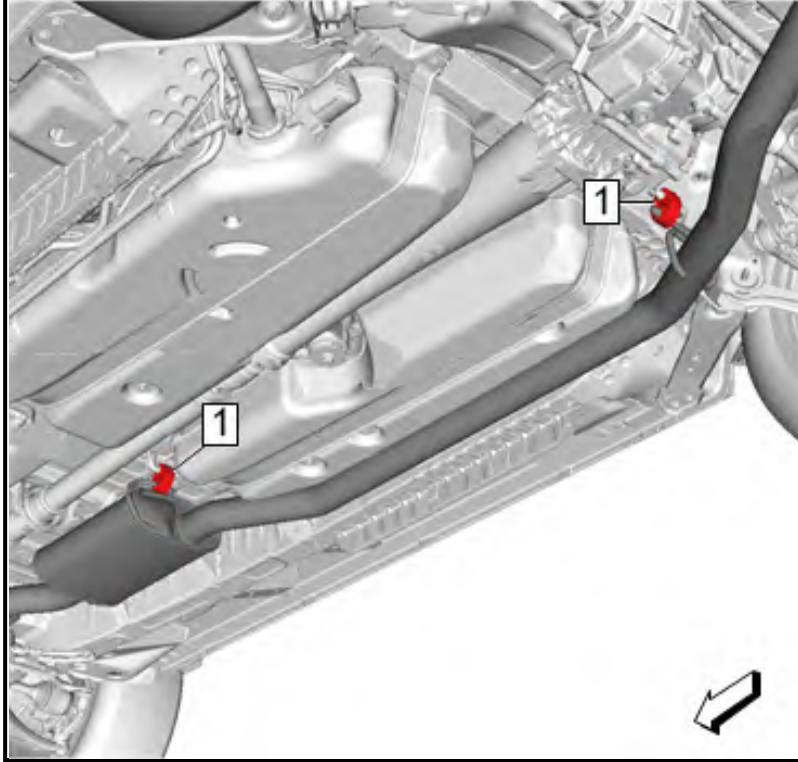
**NOTE:** With the aid of an assistant, carefully position the exhaust muffler assembly to the vehicle.

Exhaust Muffler Assembly (1) - Install

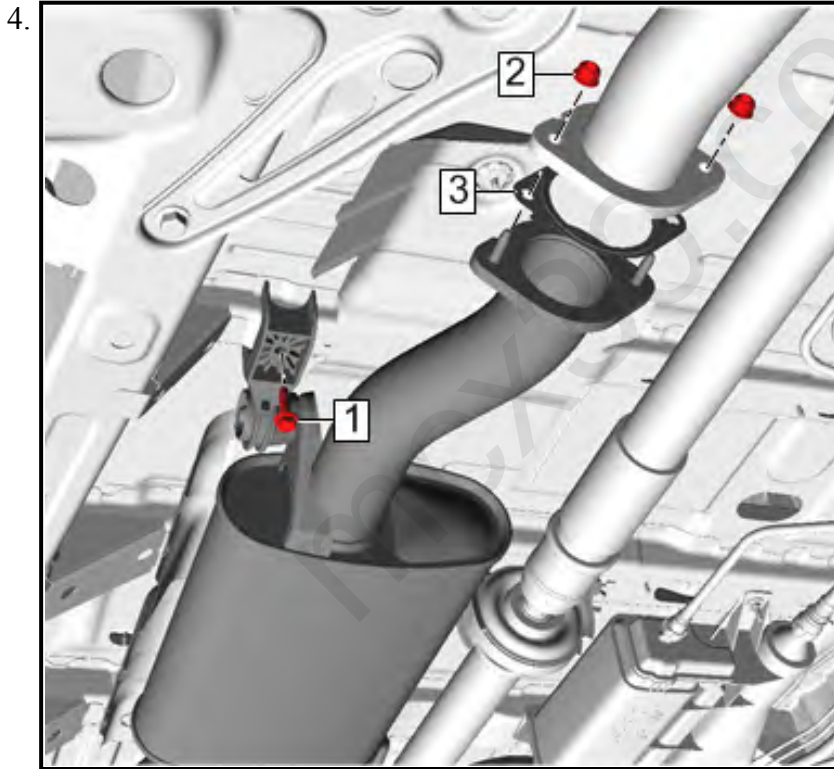
2. Support the exhaust muffler with a suitable jack.

3.





Exhaust Muffler Isolator (1) - Connect [2x]



**NOTE:** Install a NEW gasket.

Exhaust Gasket (3) - Install

**CAUTION:** Refer to [Fastener Caution](#) .

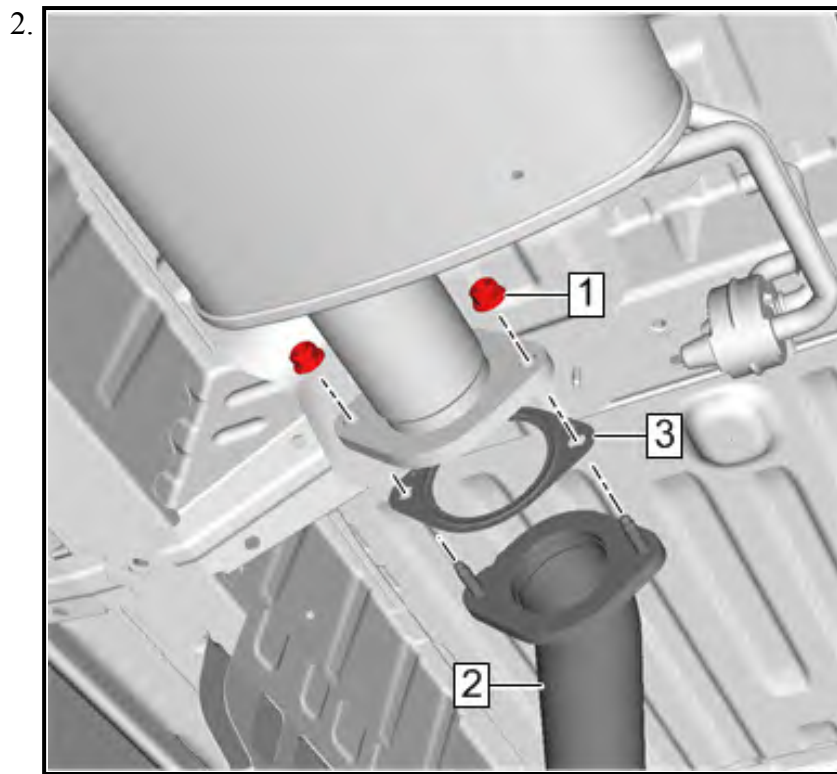
5. Exhaust Front Pipe Nut (2) @ Exhaust Muffler - Install and tighten [2x] 22 N.m (16 lb ft)
6. Exhaust Intermediate Hanger Bolt (1) - Install and tighten 22 N.m (16 lb ft)
7. Start the engine and check for exhaust leaks.

## EXHAUST MUFFLER REPLACEMENT (LFY)

### Removal Procedure

**WARNING:** Refer to [Exhaust Service Warning](#) .

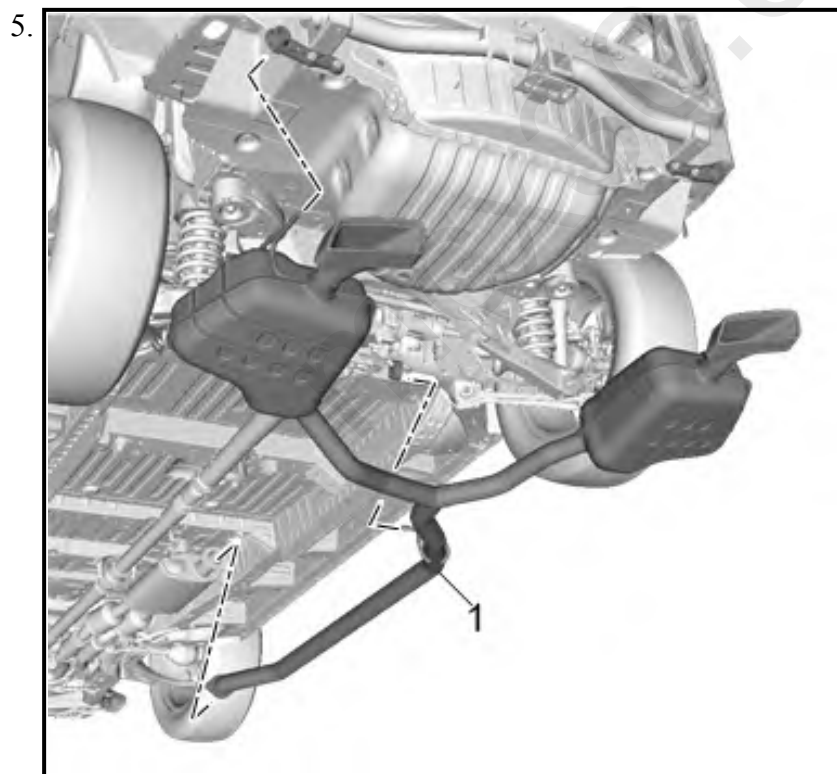
1. Raise and support the vehicle. [Lifting and Jacking the Vehicle](#)



Exhaust Muffler Flange Nut (1) - Remove [2x]

3. Exhaust Muffler (2) - Disconnect

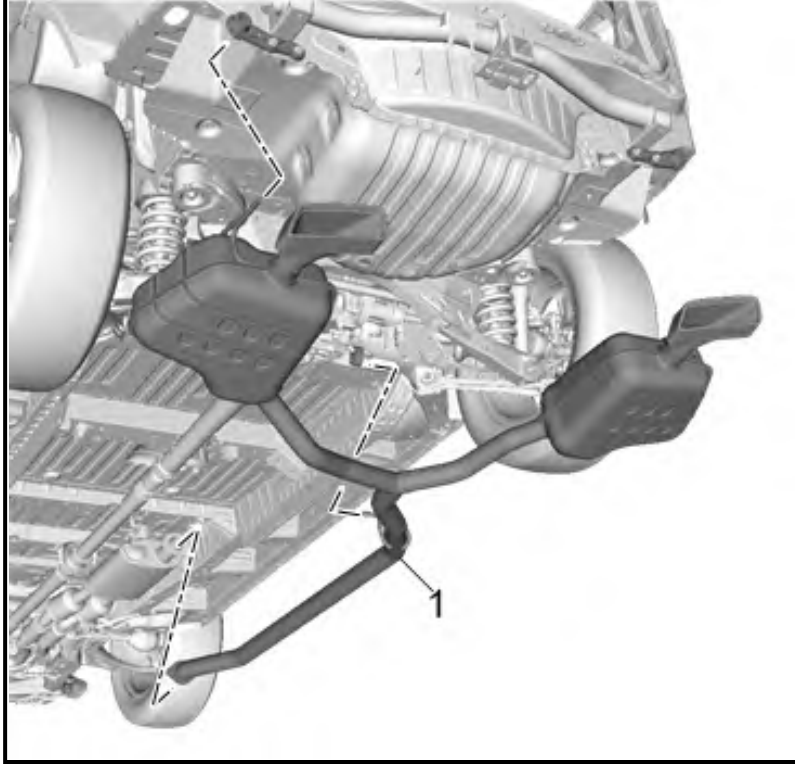
4. Exhaust Gasket (3) - Remove and DISCARD



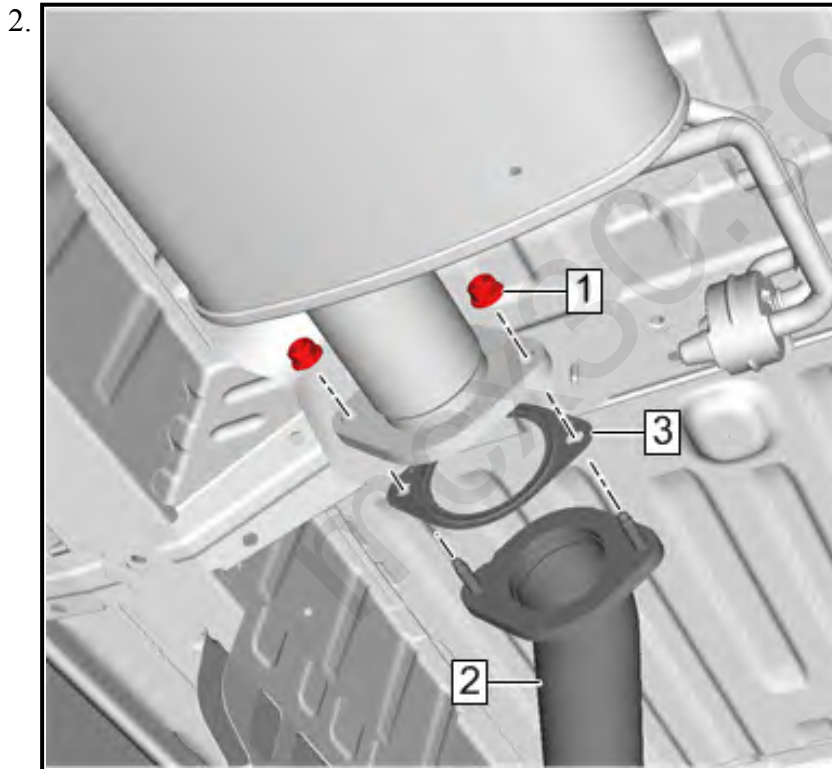
With the aid of an assistant, lower the exhaust muffler (1) from the vehicle.

### Installation Procedure





With the aid of an assistant, install the exhaust muffler (1) to the vehicle.



**NOTE:** Install NEW gaskets.

Exhaust Gasket (3) - Install

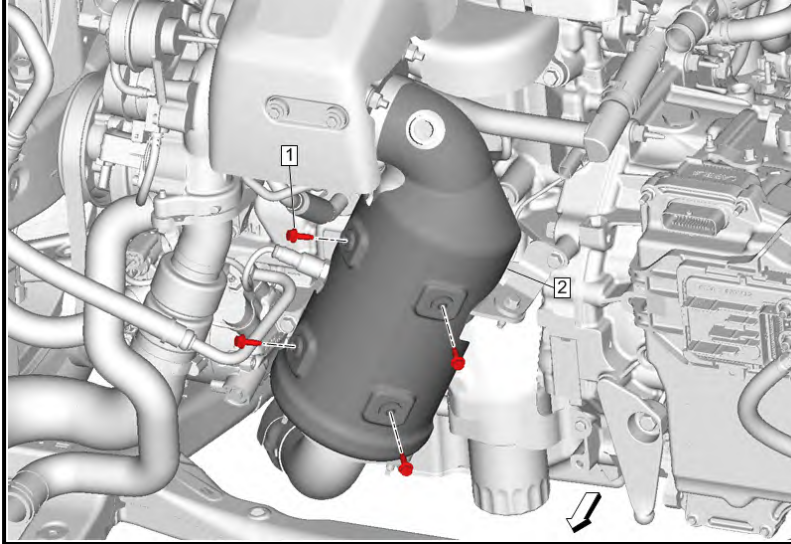
3. Exhaust Muffler (2) - Connect

**CAUTION:** Refer to [Fastener Caution](#) .

4. Exhaust Muffler Flange Nut (1) - Install and tighten [2x] 22 N.m (16 lb ft)

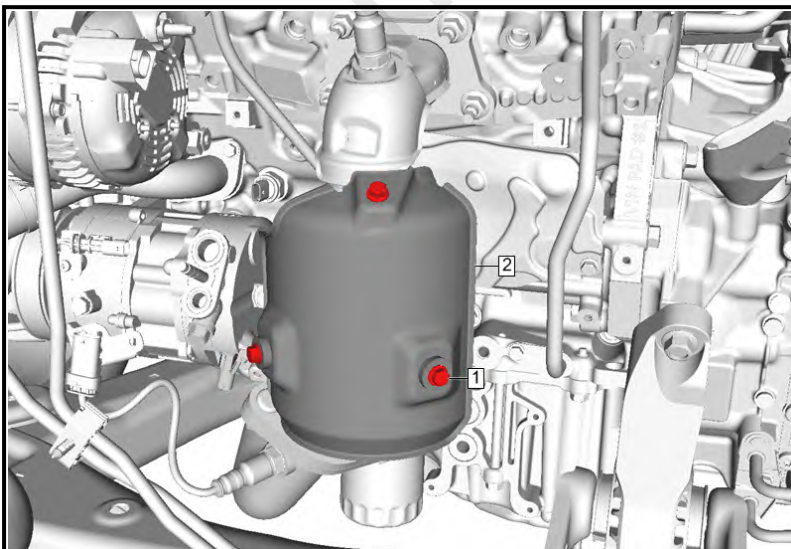
5. Lower the vehicle. [Lifting and Jacking the Vehicle](#)

## CATALYTIC CONVERTER HEAT SHIELD REPLACEMENT (LTG)



| Callout                                                                                                                                         | Component Name                                                                                                                                    |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool. |                                                                                                                                                   |
| <b>WARNING:</b><br>Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.                       |                                                                                                                                                   |
| Preliminary Procedure <u>Heated Oxygen Sensor Replacement - Sensor 1</u>                                                                        |                                                                                                                                                   |
| 1                                                                                                                                               | Catalytic Converter Heat Shield Bolt [4x]<br><br><b>CAUTION:</b><br>Refer to <u>Fastener Caution</u> .<br><br><b>Tighten</b><br>10 N.m (89 lb in) |
| 2                                                                                                                                               | Catalytic Converter Heat Shield                                                                                                                   |

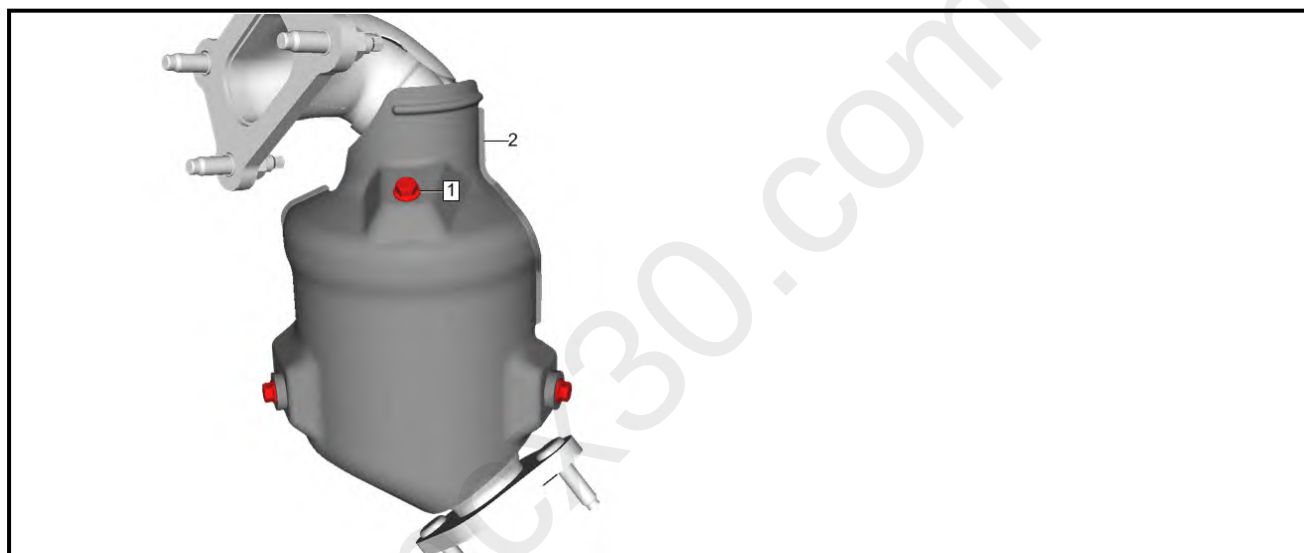
## CATALYTIC CONVERTER HEAT SHIELD REPLACEMENT (LFY BANK 2)



| Callout | Component Name |
|---------|----------------|
|         |                |

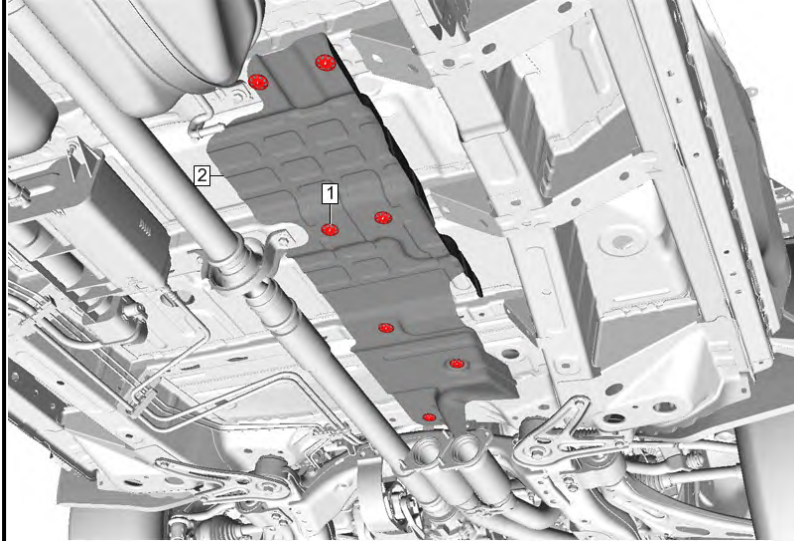
| Callout                                                                                                                                         | Component Name                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool. |                                                                                                                                                            |
| <b>WARNING:</b><br>Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.                       |                                                                                                                                                            |
| 1                                                                                                                                               | Catalytic Converter Heat Shield Bolt [3x]<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>10 N.m (89 lb in) |
| 2                                                                                                                                               | Catalytic Converter Heat Shield                                                                                                                            |

### CATALYTIC CONVERTER HEAT SHIELD REPLACEMENT (LFY BANK 1)



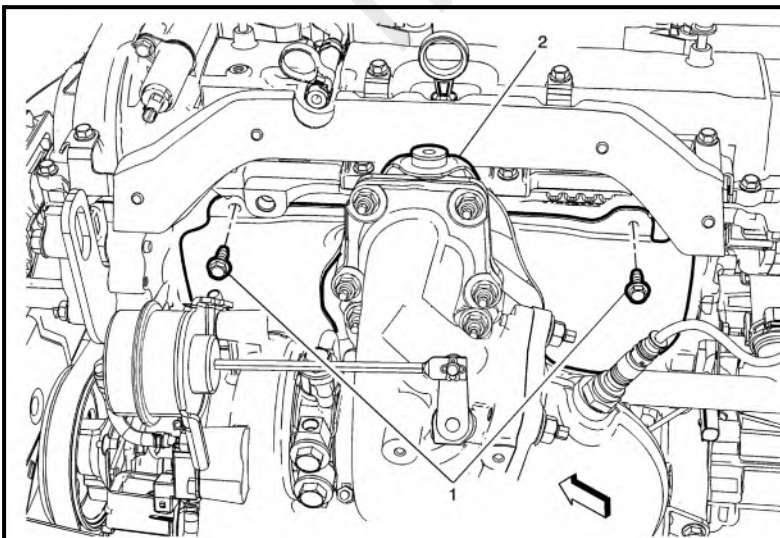
| Callout                                                                                                                                         | Component Name                                                                                                                                             |
|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool. |                                                                                                                                                            |
| <b>WARNING:</b><br>Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.                       |                                                                                                                                                            |
| 1                                                                                                                                               | Catalytic Converter Heat Shield Bolt [3x]<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>10 N.m (89 lb in) |
| 2                                                                                                                                               | Catalytic Converter Heat Shield                                                                                                                            |

### EXHAUST FRONT UNDERBODY HEAT SHIELD REPLACEMENT



| Callout                                                                                                                                         | Component Name                                                                                                                                                      |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool. |                                                                                                                                                                     |
| <b>WARNING:</b><br>Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.                       |                                                                                                                                                                     |
| Preliminary Procedure <a href="#">Exhaust Front Muffler Replacement (LFY)</a>                                                                   |                                                                                                                                                                     |
| 1                                                                                                                                               | Exhaust Front Underbody Heat Shield Retainer [7x]<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>1.5 N.m (13 lb in) |
| 2                                                                                                                                               | Exhaust Front Underbody Heat Shield                                                                                                                                 |

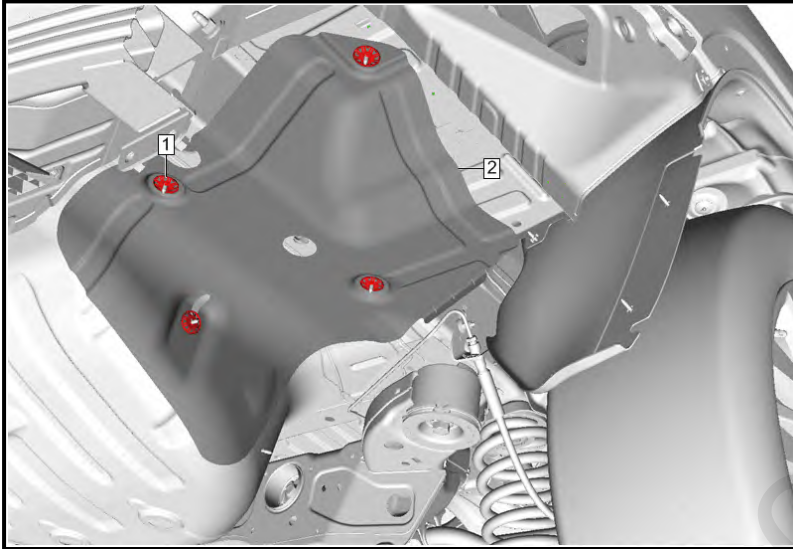
## EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT



| Callout                                                                                            | Component Name |
|----------------------------------------------------------------------------------------------------|----------------|
| <b>WARNING:</b><br>Refer to <a href="#">Hot Exhaust System Warning</a> .                           |                |
| Preliminary Procedure Remove the turbocharger. Refer to <a href="#">Turbocharger Replacement</a> . |                |

| Callout | Component Name                                                                                                                                                   |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | Exhaust Manifold Heat Shield Fasteners (Qty: 2)<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>14 N.m (10 lb ft) |
| 2       | Exhaust Manifold Heat Shield                                                                                                                                     |

## EXHAUST MUFFLER HEAT SHIELD REPLACEMENT



| Callout                                                                                                                                                                                                                                                                                                                                                                                                           | Component Name                                                                                                                                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>WARNING:</b><br>In order to avoid being burned, do not service the exhaust system while it is still hot. Service the system when it is cool.<br><br><b>WARNING:</b><br>Avoid contact with HOT components. Wear safety glasses and protective gloves to avoid personal injury.<br><br>Preliminary Procedure <a href="#">Exhaust Muffler Replacement (LTG)</a> <a href="#">Exhaust Muffler Replacement (LFY)</a> |                                                                                                                                                                  |
| 1                                                                                                                                                                                                                                                                                                                                                                                                                 | Exhaust Rear Muffler Heat Shield Retainer [4x]<br><br><b>CAUTION:</b><br>Refer to <a href="#">Fastener Caution</a> .<br><br><b>Tighten</b><br>1.5 N.m (13 lb in) |
| 2                                                                                                                                                                                                                                                                                                                                                                                                                 | Exhaust Rear Muffler 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 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.

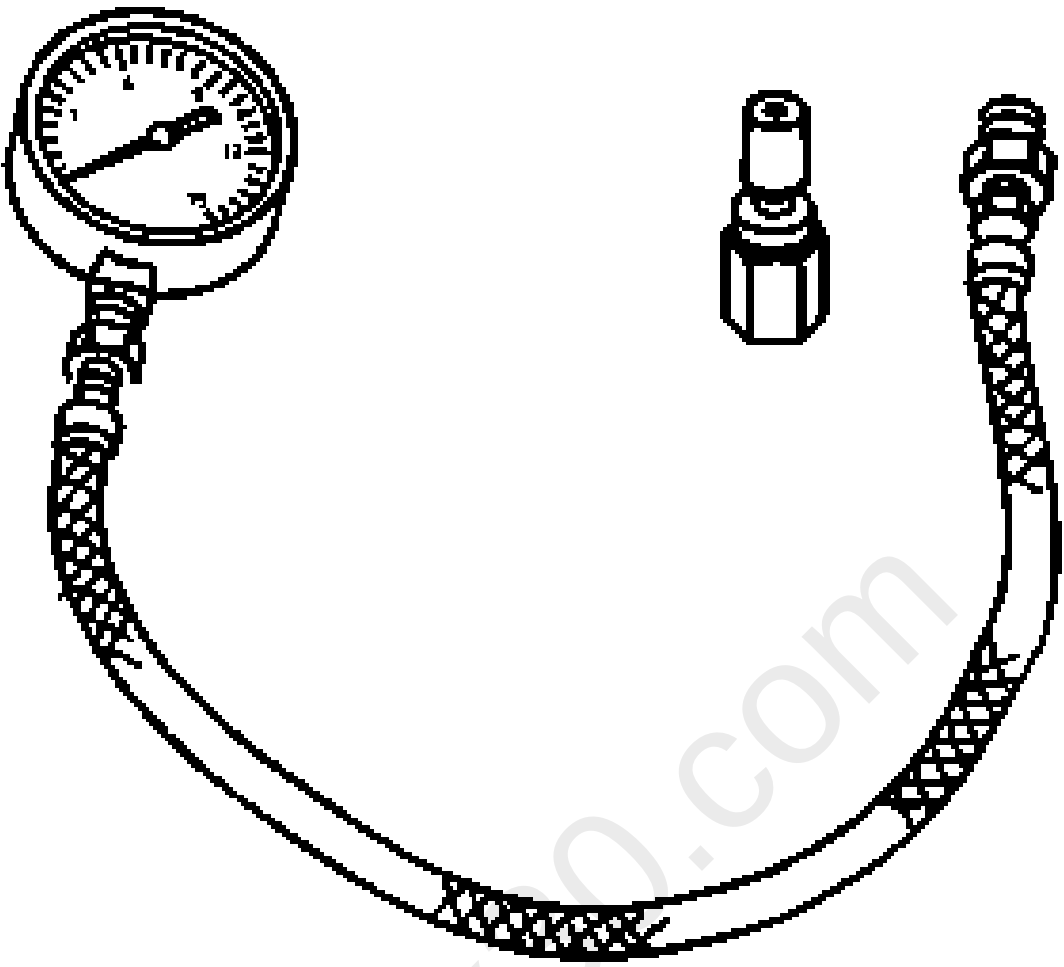
### Muffler

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.

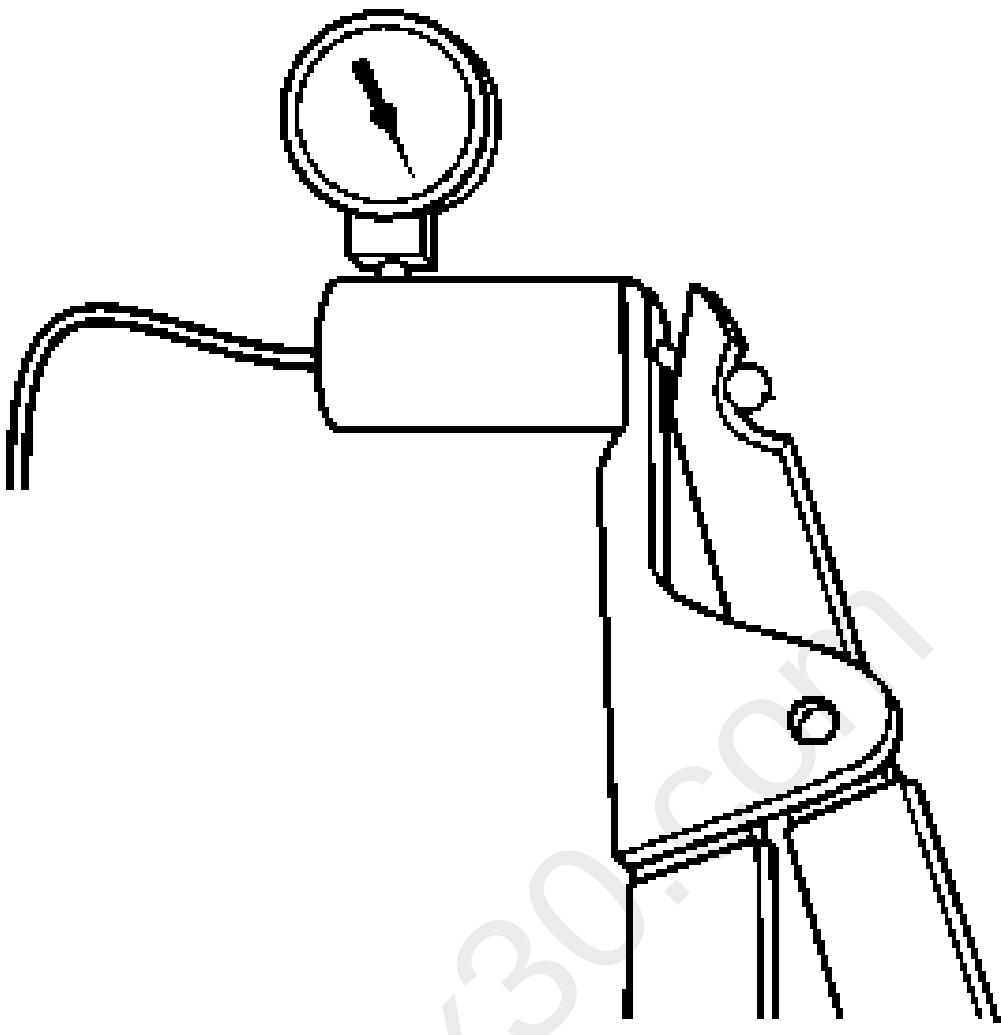
## SPECIAL TOOLS AND EQUIPMENT

### SPECIAL TOOLS

| Illustration | Tool Number/<br>Description |
|--------------|-----------------------------|
|              |                             |

| Illustration                                                                        | Tool Number/<br>Description                                     |
|-------------------------------------------------------------------------------------|-----------------------------------------------------------------|
|  | EN 35314-A<br>J 35314-A<br>Exhaust<br>Back<br>Pressure<br>Gauge |



| Illustration                                                                        | Tool Number/<br>Description |
|-------------------------------------------------------------------------------------|-----------------------------|
|  | J 35555<br>Vacuum<br>Pump   |