

2013 Chevrolet Cruze

2013 ENGINE Engine Exhaust - Cruze

2013 ENGINE**Engine Exhaust - Cruze****SPECIFICATIONS****FASTENER TIGHTENING SPECIFICATIONS (1.4L LUV)****Fastener Tightening Specifications (1.4L LUV)**

Application	Specification	
	Metric	English
Catalytic Converter to Warm Up Three Way Catalytic Converter (LUJ, LUH)	22 N.m	16 lb ft
Exhaust Front Hanger Bracket Bolt M8	20 N.m	15 lb ft
Exhaust Front Hanger Bracket Bolt M10	60 N.m +30° - 45° (1)	44 lb ft +30° - 45° (1)
Exhaust Front Hanger Bracket Nut	20 N.m	15 lb ft
Exhaust Manifold/Catalytic Converter to Bracket (LDD)	10 N.m	89 lb in
Exhaust Front Pipe to Exhaust Manifold/Catalytic Converter Flange Nut (LDD)	17 N.m (1)	13 lb ft (1)
Exhaust Front Pipe to Exhaust Muffler Flange Nut (LDD)	17 N.m (1)	13 lb ft (1)
Exhaust Manifold to Cylinder Head (LDD)	22 N.m	16 lb ft
Exhaust Manifold Heat Shield Bolts (LUJ, LUH)	8 N.m	71 lb in
Turbocharger to Cylinder Head	8 N.m	71 lb in
Warm Up Three Way Catalytic Converter Heat Shield Bolts	10 N.m	89 lb in
Warm Up Three Way Catalytic Converter Bracket to Cylinder Block (LUJ, LUH)	22 N.m	16 lb ft
Warm Up Three Way Catalytic Converter to Bracket LUJ, LUH)	22 N.m	16 lb ft
Warm Up Three Way Catalytic Converter to Turbocharger (V-Clamp) LUJ, LUH	13 N.m	115 lb in

1 = Use NEW Fastener.

FASTENER TIGHTENING SPECIFICATIONS (1.8L LUW AND LWE)**Fastener Tightening Specifications (1.8L LUW and LWE)**

Application	Specification	
	Metric	English
Catalytic Converter to Cylinder Head Nut	20	15 lb ft
Catalytic Converter to Exhaust Front Pipe Nut	22	16 lb ft
Engine Lift Bracket Bolt	25	19 lb ft
Engine Lift Bracket Stud and Nut	25	19 lb ft
Exhaust Front Hanger Bracket Bolt M8	22	16 lb ft

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Exhaust Front Hanger Bracket Bolt M10 (1)

First Pass	60	44 lb ft
Final Pass	30-45 Degrees	
Exhaust Front Hanger Insulator Nut	17	13 lb ft
Exhaust Front Pipe to Exhaust Muffler Nut	17	13 lb ft
Exhaust Front Pipe-to-Underbody Shield Nut	2.5	22 lb in
Exhaust Front/Rear Muffler Shield Nut	2.5	22 lb in
Exhaust Manifold Brace Bolt (Catalytic Converter To Brace)	20	15 lb ft
Exhaust Manifold Brace Bolt (Brace To Engine Block) (1)		
First Pass	20	15 lb ft
Final Pass	30 - 45 Degrees	
Exhaust Manifold Heat Shield Bolt (bottom)	8	71 lb in
Exhaust Manifold Heat Shield Bolt (top)	15	11 lb ft
Exhaust Manifold Nut (1)	20	15 lb ft
Exhaust Pipe Clamp	30	22 lb ft
Heated Oxygen Sensor (2)	42	31 lb ft
Tank Heat Shield Bolt	2.5	22 lb in
Wiring Harness Bracket Bolt	15	11 lb ft

1 = Use NEW Fastener.

2 = Use assembly paste (refer to Electronic Parts Catalog).

DIAGNOSTIC INFORMATION AND PROCEDURES

SYMPTOMS - ENGINE EXHAUST

- Review the Exhaust System Description and Operation in order to familiarize yourself with the system functions. Refer to **Exhaust System Description (1.8L LUW and LWE)**.
- 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.

Visual/Physical Inspection

- Inspect for aftermarket or non-OEM devices such as, but not including; tailpipe extensions, headers, and exhaust cutouts. This 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.

Intermittents

Test the vehicle under the same conditions that the customer reported in order to verify the system is operating

as designed.

Symptom List

- 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-35314-A Exhaust Back Pressure Gage

For equivalent regional tools. Refer to **Special Tools**.

Diagnostic Aids

A quick check of exhaust flow will help determine for gasoline engines.

Test Description

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

3

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-35314-A** gauge.

Removing the heated oxygen sensor may set a DTC. When finishing this diagnostic table, be sure to clear all codes.

4

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

7

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.

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Restricted Exhaust

Step	Action	Value(s)	Yes	No
1	Did you verify the customers complaint?	-	Go to Step 2	-
2	Did you review the exhaust symptoms diagnostic information and perform the necessary inspections?	-	Go to Step 3	Go to Symptoms - Engine Exhaust
3	- Remove the heated oxygen sensor 1. Refer to: 1.4L LUJ <u>Heated Oxygen Sensor Replacement - Sensor 1</u> 1.8L LUW <u>Heated Oxygen Sensor Replacement - Sensor 1</u> - Install the EN-35314-A gauge in place of the heated oxygen sensor 1. - Start the engine. - Increase and monitor the engine speed at 2, 000 RPM. - Observe the exhaust system back pressure reading on the gauge. Does the reading exceed the specified value?	14 kPa (2 psi)	Go to Step 4	Go to Step 7
4	- Turn the engine off and place the ignition in the lock position. - Remove the EN-35314-A gauge. - Install the heated oxygen sensor 1. Refer to: 1.4L LUJ <u>Heated Oxygen Sensor Replacement - Sensor 1</u> 1.8L LUW <u>Heated Oxygen Sensor Replacement - Sensor 1</u> - Remove the heated oxygen sensor 2. Refer to: 1.4L LUJ <u>Heated Oxygen Sensor Replacement - Sensor 2</u> 1.8L LUW <u>Heated Oxygen Sensor Replacement - Sensor 2</u> - Install the EN-35314-A gauge in place of the heated oxygen sensor 2. - Start the engine. - Increase and monitor the engine speed at 2, 000 RPM. - Observe the exhaust system back pressure	-		

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	reading on the gauge.			
	Does the reading exceed the specified value?		Go to Step 5	Go to Step 6
5	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	-
6	Replace the catalytic converter. Refer to <u>Catalytic Converter Replacement (1.4L LUV), Catalytic Converter Replacement (1.8L LUW and LWE)</u>. Did you find and correct the condition?	-	Go to Step 7	-
7	1. Remove the EN-35314-A gauge. 2. Install the heated oxygen sensor 2. Refer to: • 1.4L LUJ <u>Heated Oxygen Sensor Replacement - Sensor 2</u> • 1.8L LUW <u>Heated Oxygen Sensor Replacement - Sensor 2</u> 3. Clear any DTCs. 4. Road test the vehicle in order to verify the repair. Did you correct the condition?	-	System OK	Go to Step 2

EXHAUST LEAKAGE

Exhaust Leakage

Problem	Action
WARNING: While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system. DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand close to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise. Refer to <u>Symptoms - Engine Exhaust</u> prior to beginning this table.	
Misaligned or improperly installed exhaust system components	Align and tighten the components to the specifications. Refer to <u>Fastener Tightening</u>

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	<u>Specifications (1.4L LUV), Fastener Tightening Specifications (1.8L LUW and LWE).</u>
Exhaust leaks at the following connections: • Exhaust manifold to pipe • Flanges • Pipe clamps	Tighten the components to the specifications. Refer to <u>Fastener Tightening Specifications (1.4L LUV), Fastener Tightening Specifications (1.8L LUW and LWE).</u>
Seals or gaskets leaking. • Exhaust manifold to cylinder head • Exhaust pipes to exhaust manifold • Catalytic converter connection • AIR connections to the exhaust manifold or cylinder head	Replace the leaking seal or gasket. Refer to the affected components procedure for service.
Irregularities at the mating surfaces on the flange connections	Repair as required or replace the affected component. Refer to the affected components procedure for service.
Exhaust manifold cracked or broken	Replace the exhaust manifold. Refer to <u>Exhaust Manifold Replacement</u> .
Exhaust system component connection welds leaking	Replace the leaking component. Refer to the affected component's procedure for service.

EXHAUST NOISE

Exhaust Noise

Conditions	Action
DEFINITION: An audible or physical noise due to a faulty component or damaged components causing a loose or misaligned exhaust system resulting in a rattle or vibration noise, i.e. buzz, groan, hum. Refer to <u>Symptoms - Engine Exhaust</u> prior to beginning this table.	
Popping or hissing noise	Exhaust leak. Refer to <u>Exhaust Leakage</u> .
Loud exhaust	1. Compare to a known good vehicle. 2. Inspect for a damaged or failed muffler. 3. Replace the faulty muffler. Refer to <u>Exhaust System Replacement</u>.
External rattle or vibration noise	1. Inspect for a bent or loose hanger, loose heat shield, or loose clamp. 2. Inspect for an exhaust pipe causing interference. 3. Repair or replace the affected component. Refer to the affected component's service procedure.
	1. Test the components by tapping with a rubber mallet to confirm a rattle.

Internal rattle

2. Replace the faulty catalytic converter, or muffler. Refer to one of the following procedures:

- Catalytic Converter Replacement (1.4L LUV), Catalytic Converter Replacement (1.8L LUW and LWE)
- Exhaust System Replacement

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT

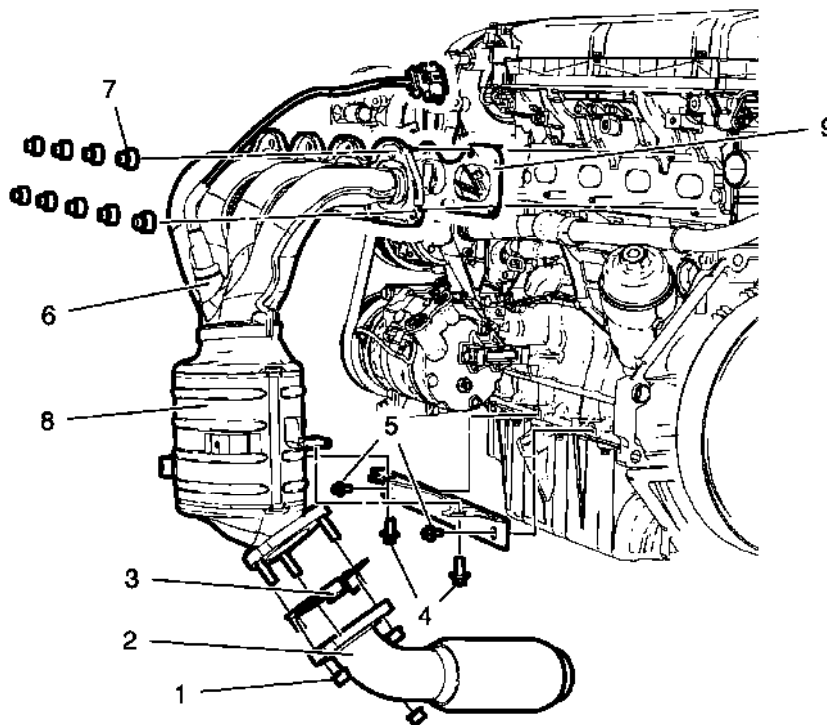


Fig. 1: Exhaust Manifold Replacement Components

Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Replacement

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> . WARNING: Refer to <u>Protective Goggles and Glove Warning</u> . Preliminary Procedure Remove the catalytic converter heat shield. Refer to <u>Catalytic Converter Heat Shield Replacement (1.4L LUV), Catalytic Converter Heat Shield Replacement (1.8L LUW and</u>	

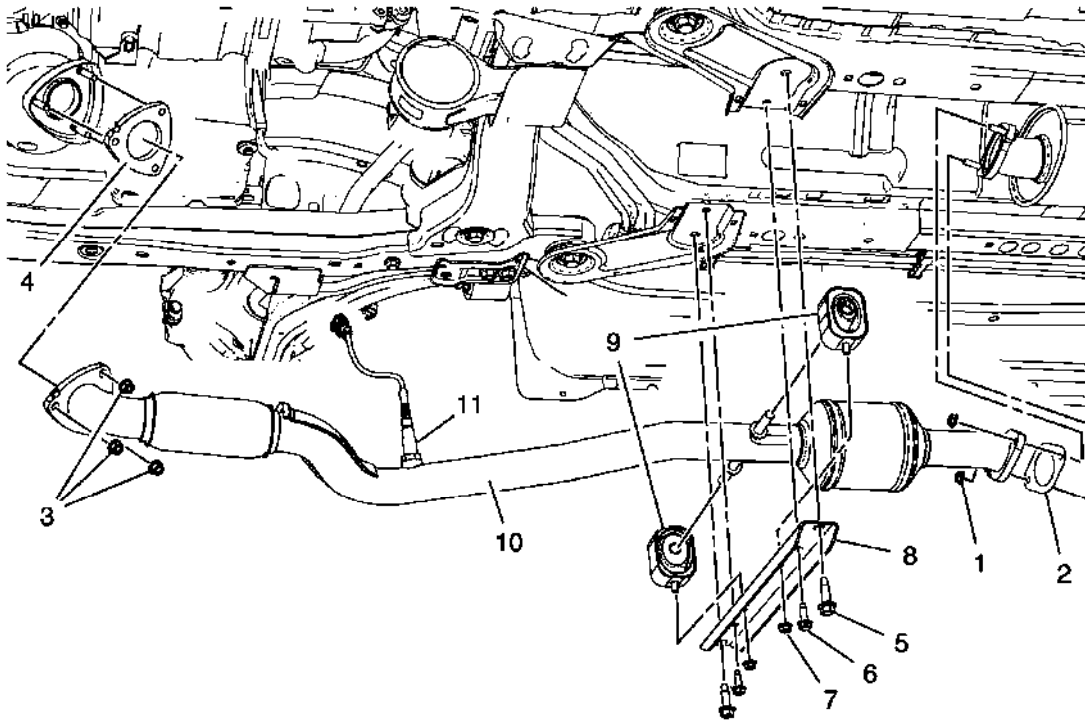
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LWE).

1	Catalytic Converter to Flexible Exhaust Pipe Nut (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> Tighten 22 (16 lb ft)
2	Flexible Exhaust Pipe
3	Catalytic Converter to Flexible Exhaust Pipe Gasket
4	Exhaust Manifold Brace Bolt (Catalytic Converter To Brace) (Qty: 2) Tighten 20 (15 lb ft)
5	Exhaust Manifold Brace Bolt (Brace To Engine Block) (Qty: 2) Procedure NOTE: NOT necessary to remove the brace. Loosen the exhaust manifold brace bolts. Tighten 20 (15 lb ft) + 30 degrees + 15 degrees
6	Heated Oxygen Sensor Tighten 42 (31 lb ft)
7	Catalytic Converter to Cylinder Head Nut (Qty: 9) Tighten 20 (15 lb ft)
8	Catalytic Converter
9	Catalytic Converter To Cylinder Head Gasket

EXHAUST FRONT PIPE REPLACEMENT

**Fig. 2: Exhaust Front Pipe**

Courtesy of GENERAL MOTORS COMPANY

Exhaust Front Pipe Replacement

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
WARNING: Refer to <u>Protective Goggles and Glove Warning</u> .	
Preliminary Procedures 1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . 2. Disconnect the heated oxygen sensor.	
1	Exhaust Front Pipe to Exhaust Muffler Nut (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 17 N.m (13 lb ft)
2	Exhaust Front Pipe Gasket to Exhaust Muffler

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3	Catalytic Converter to Exhaust Front Pipe Nut (Qty: 3) Tighten 22 N.m (16 lb ft)
4	Catalytic Converter to Exhaust Front Pipe Gasket
5	Drivetrain and Front Suspension Frame Support Bolts - M10 (Qty: 2) CAUTION: Refer to <u>Torque-to-Yield Fastener Caution</u> . Procedure Install NEW support bolts, do NOT reuse old bolts. Tighten 60 N.m (44 lb ft) +30°-45°
6	Exhaust Pipe Front Hanger Bracket Bolt - M8 (Qty: 2) Tighten 22 N.m (16 lb ft)
7	Exhaust Pipe Front Hanger Insulator Nut (Qty: 2) Tighten 17 N.m (13 lb ft)
8	Exhaust Pipe Front Hanger Bracket
9	Exhaust Muffler Insulator (Qty: 2)
10	Exhaust Front Pipe
11	Heated Oxygen Sensor Tighten 42 N.m (31 lb ft)

EXHAUST SYSTEM REPLACEMENT

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: Always wear protective goggles and gloves when removing exhaust parts as falling rust and sharp edges from worn exhaust components could result in serious personal injury.

1. Read the exhaust system cutting instructions. .
2. Remove the exhaust rear muffler. Refer to **Exhaust Rear Muffler Replacement**.

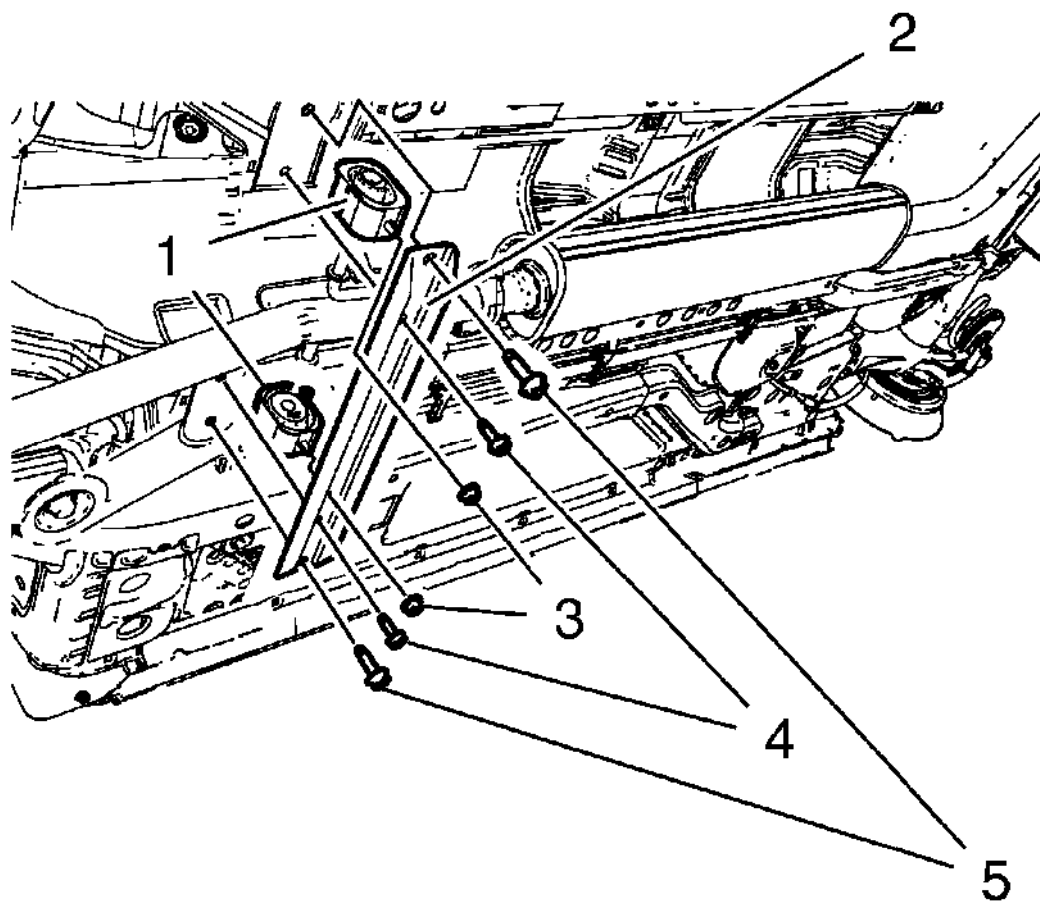


Fig. 3: Exhaust Pipe Front Hanger Bracket, Insulators, Nuts And Bolts
Courtesy of GENERAL MOTORS COMPANY

NOTE: A second technician is required.

3. Remove the 4 exhaust pipe front hanger bracket bolts (4, 5).
4. Remove the 2 exhaust pipe front hanger bracket insulator nuts (3).
5. Remove the exhaust pipe front hanger bracket (2).
6. Remove the 2 exhaust pipe front hanger bracket insulators (1).

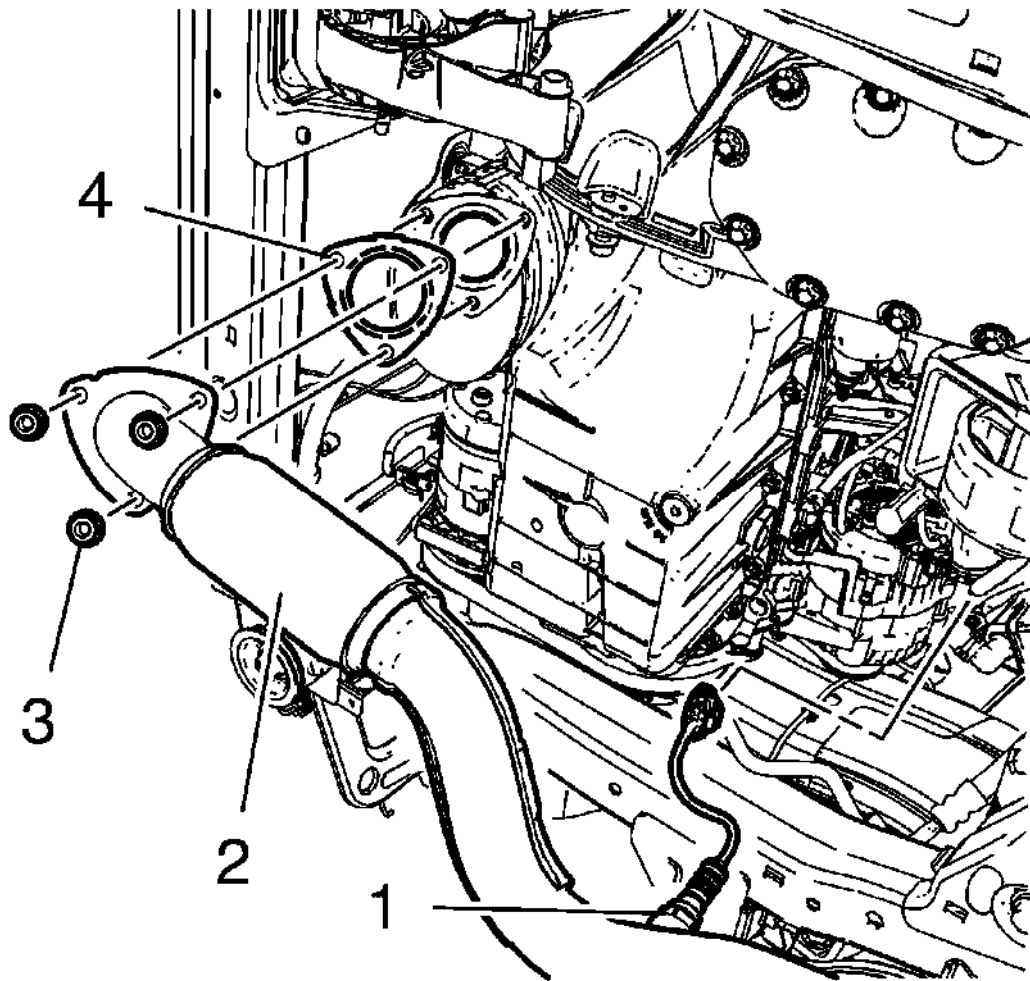


Fig. 4: Heated Oxygen Sensor

Courtesy of GENERAL MOTORS COMPANY

NOTE: A second technician is required.

7. Remove the heated oxygen sensor (1).
8. Remove and DISCARD the 3 catalytic converter nuts (3).
9. Remove the exhaust front pipe gasket (4) from the catalytic converter and exhaust front pipe (2).
10. Remove the exhaust system.

Installation Procedure

NOTE: A second technician is required.

1. Install the exhaust system.

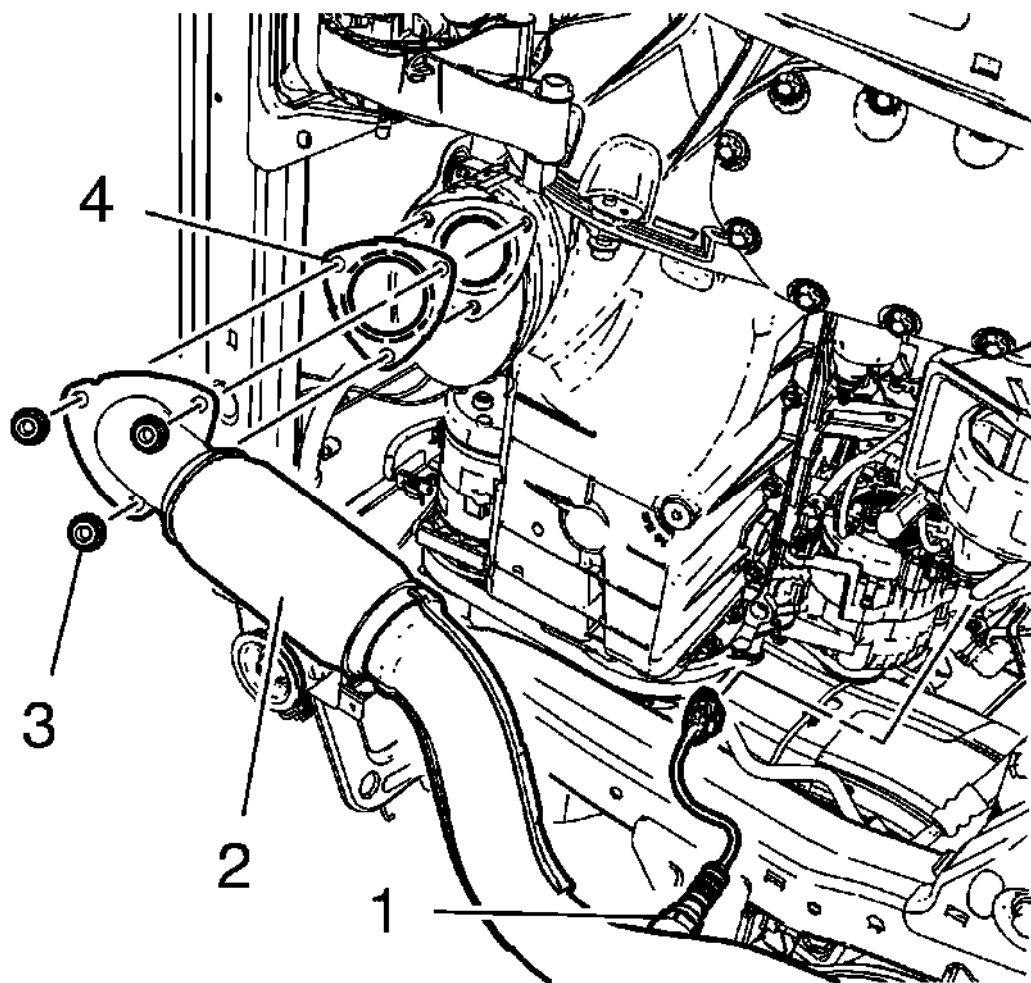


Fig. 5: Heated Oxygen Sensor

Courtesy of GENERAL MOTORS COMPANY

2. Install the NEW exhaust front pipe gasket (4).

CAUTION: Refer to Fastener Caution .

CAUTION: Refer to Torque-to-Yield Fastener Caution .

3. Install the 3 NEW catalytic converter nuts (3) to the exhaust front pipe (2) and tighten to 22 N.m (16 lb ft).
4. Install the heated oxygen sensor (1) and tighten to 42 N.m (31 lb ft).

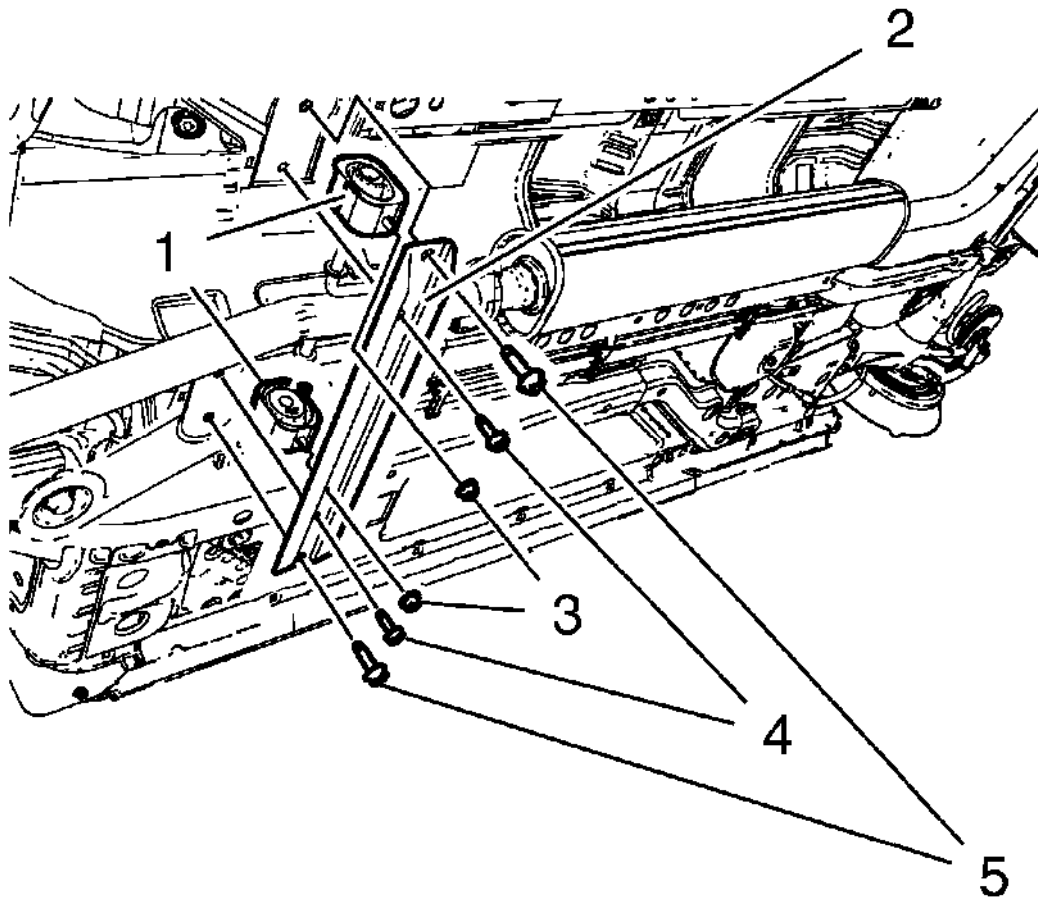
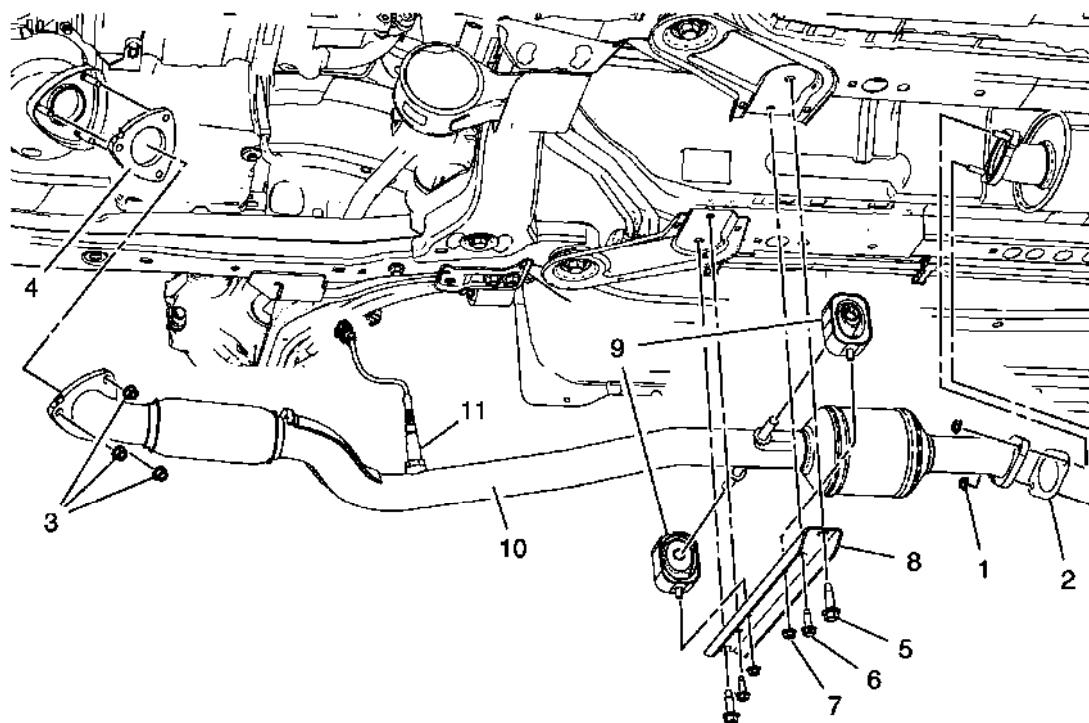


Fig. 6: Exhaust Pipe Front Hanger Bracket, Insulators, Nuts And Bolts

Courtesy of GENERAL MOTORS COMPANY

5. Install the 2 exhaust pipe front hanger bracket insulators (1).
6. Install the exhaust pipe front hanger bracket (2).
7. Install the 2 exhaust pipe front hanger bracket insulator nuts (3) and tighten to 17 N.m (13 lb ft).
8. Install the 4 exhaust pipe front hanger bracket bolts (4, 5) and tighten to 22 N.m (16 lb ft).
9. Install the 2 exhaust pipe front hanger bolts (5) - M10 and tighten to 60 N.m (44 lb ft).
10. Install the exhaust rear muffler. Refer to **Exhaust Rear Muffler Replacement**.

CATALYTIC CONVERTER REPLACEMENT (1.4L LUV)

**Fig. 7: Catalytic Converter (1.4L LUV)**

Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Replacement (1.4L LUV)

Callout	Component Name
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: Always wear protective goggles and gloves when removing exhaust parts as falling rust and sharp edges from worn exhaust components could result in serious personal injury.	
CAUTION: Do not bend the exhaust flex pipe more than 10 degrees in any direction. Bending of more than 10 degrees or twisting in a range of ± 0.5 degrees will damage the exhaust flex decoupler.	
Preliminary Procedures 1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u>. 2. Disconnect the heated oxygen sensor wiring harness plug.	
	Exhaust Front Pipe to Exhaust Muffler Nut (Qty: 2) CAUTION:

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1	Refer to <u>Fastener Caution</u> .
	CAUTION: Refer to <u>Torque-to-Yield Fastener Caution</u> .
	Procedure 1. Support exhaust muffler with a jack. 2. Install NEW nuts, do NOT reuse old nuts. Tighten 17 N.m (13 lb ft)
2	Exhaust Front Pipe Gasket to Exhaust Muffler
3	Catalytic Converter to Exhaust Front Pipe Nuts (Qty: 3) Procedure Install NEW nuts, do NOT reuse old nuts. Tighten 22 N.m (16 lb ft)
4	Catalytic Converter to Exhaust Front Pipe Gasket
5	Drivetrain and Front Suspension Frame Support Bolts - M10 (Qty: 2) Procedure Install NEW bolts, do NOT reuse old bolts. Tighten 60 N.m (44 lb ft) +30°-45°
6	Exhaust Pipe Front Hanger Bracket Bolts - M8 (Qty: 2) Tighten 22 N.m (16 lb ft)
7	Exhaust Pipe Front Hanger Insulator Nuts (Qty: 2) Tighten 17 N.m (13 lb ft)
8	Exhaust Pipe Front Hanger Bracket
9	Exhaust Muffler Insulator (Qty: 2)
10	Exhaust Front Pipe Assembly
11	Heated Oxygen Sensor Tighten 42 N.m (31 lb ft)

CATALYTIC CONVERTER REPLACEMENT (1.8L LUW AND LWE)

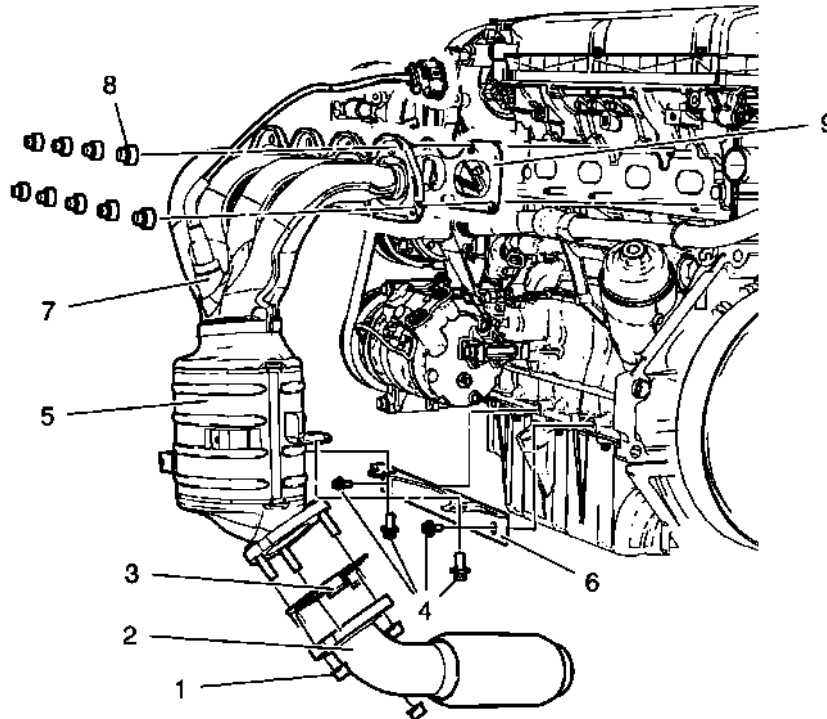


Fig. 8: Catalytic Converter (1.8L LUW and LWE)

Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Replacement (1.8L LUW and LWE)

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
WARNING: Refer to <u>Protective Goggles and Glove Warning</u> .	
Preliminary Procedure Remove the catalytic converter heat shield. Refer to <u>Catalytic Converter Heat Shield Replacement (1.4L LUV)</u> , <u>Catalytic Converter Heat Shield Replacement (1.8L LUW and LWE)</u>	
1	Catalytic Converter to Flexible Exhaust Pipe Nut (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> Tighten 22 N.m (16 lb ft)
2	Flexible Exhaust Pipe
3	Catalytic Converter to Flexible Exhaust Pipe Gasket

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4	Exhaust Manifold Brace Bolt (Qty: 4) Tighten 20 N.m (15 lb ft)
5	Catalytic Converter
6	Exhaust Manifold Brace
7	Heated Oxygen Sensor Tighten 42 N.m (31 lb ft)
8	Catalytic Converter to Cylinder Head Nut (Qty: 9) Tighten 20 N.m (15 lb ft)
9	Catalytic Converter to Cylinder Head Gasket

WARM UP THREE-WAY CATALYTIC CONVERTER REPLACEMENT

Removal Procedure

1. Disconnect battery negative cable. Refer to **Battery Negative Cable Disconnection and Connection** .
2. Disconnect the heated oxygen sensor 1 wiring harness connector. Refer to **Heated Oxygen Sensor Replacement - Sensor 1** .
3. Remove the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement (1.4L LUV)**, **Exhaust Manifold Heat Shield Replacement (1.8L LUW and LWE)**.

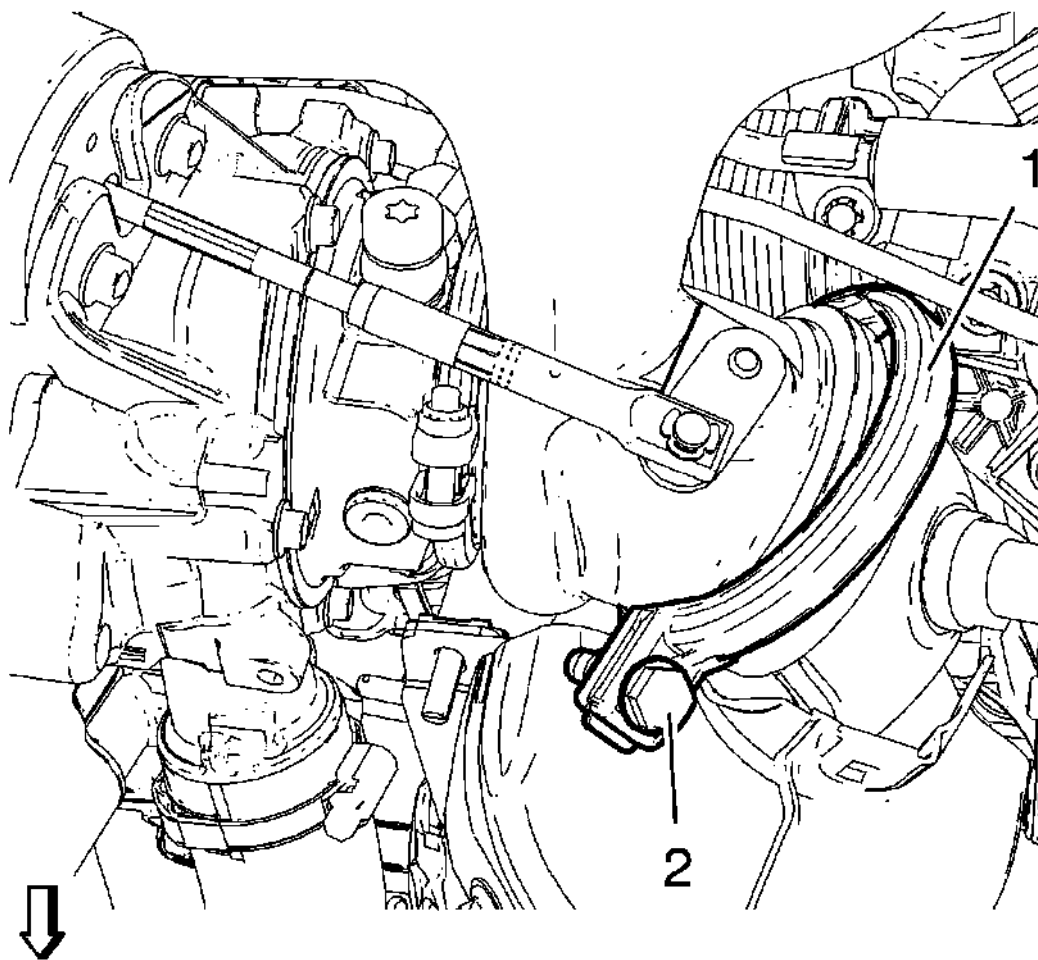


Fig. 9: V-Clamp And Bolt

Courtesy of GENERAL MOTORS COMPANY

4. Loosen the three way warm up catalytic converter V-clamp bolt (2) so that the three way warm up catalytic converter V-clamp (1) can be removed from catalytic converter to turbocharger flange.
5. Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .
6. Remove the engine front compartment insulator if equipped. Refer to **Front Compartment Insulator Replacement**

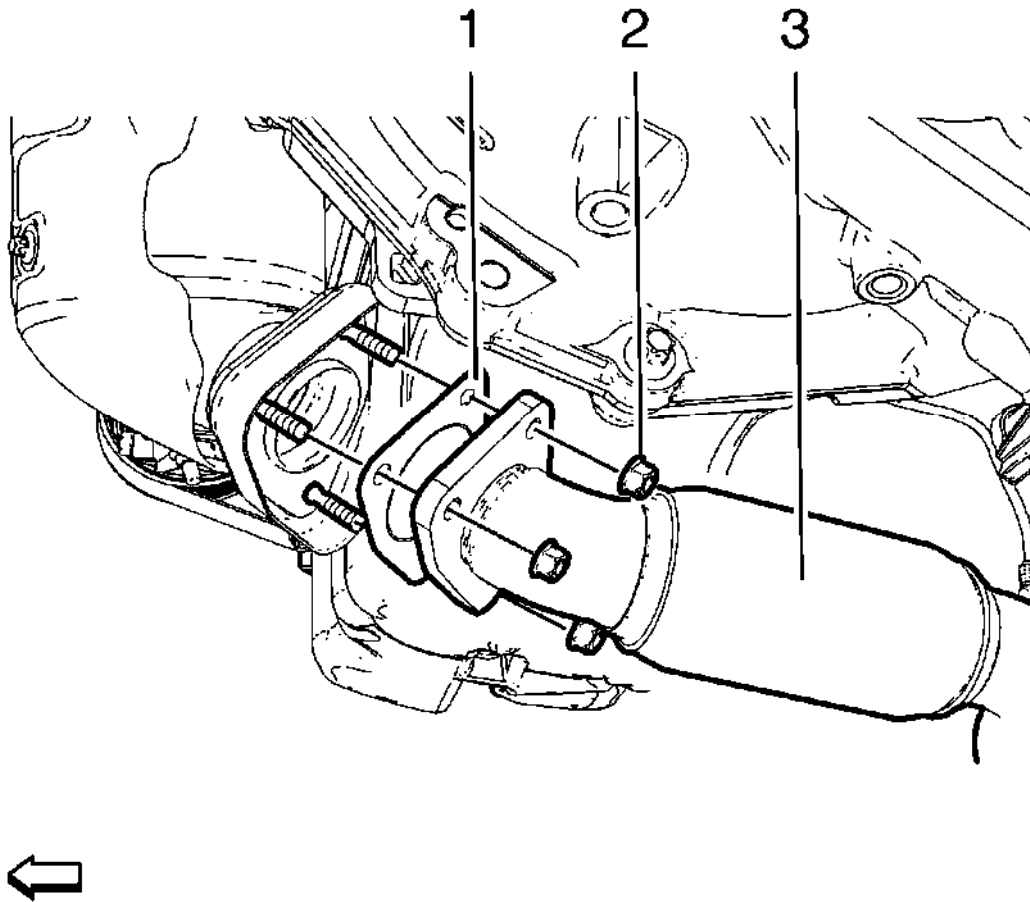


Fig. 10: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

WARNING: Always wear protective goggles and gloves when removing exhaust parts as falling rust and sharp edges from worn exhaust components could result in serious personal injury.

CAUTION: Do not bend the exhaust flex pipe more than 10 degrees in any direction. Bending of more than 10 degrees or twisting in a range of ± 0.5 degrees will damage the exhaust flex decoupler.

7. Remove and DISCARD the 3 catalytic converter flange nuts (2).
8. Remove the catalytic converter (3) from the three way warm up catalytic converter and hang aside.
9. Remove the catalytic converter gasket (1).

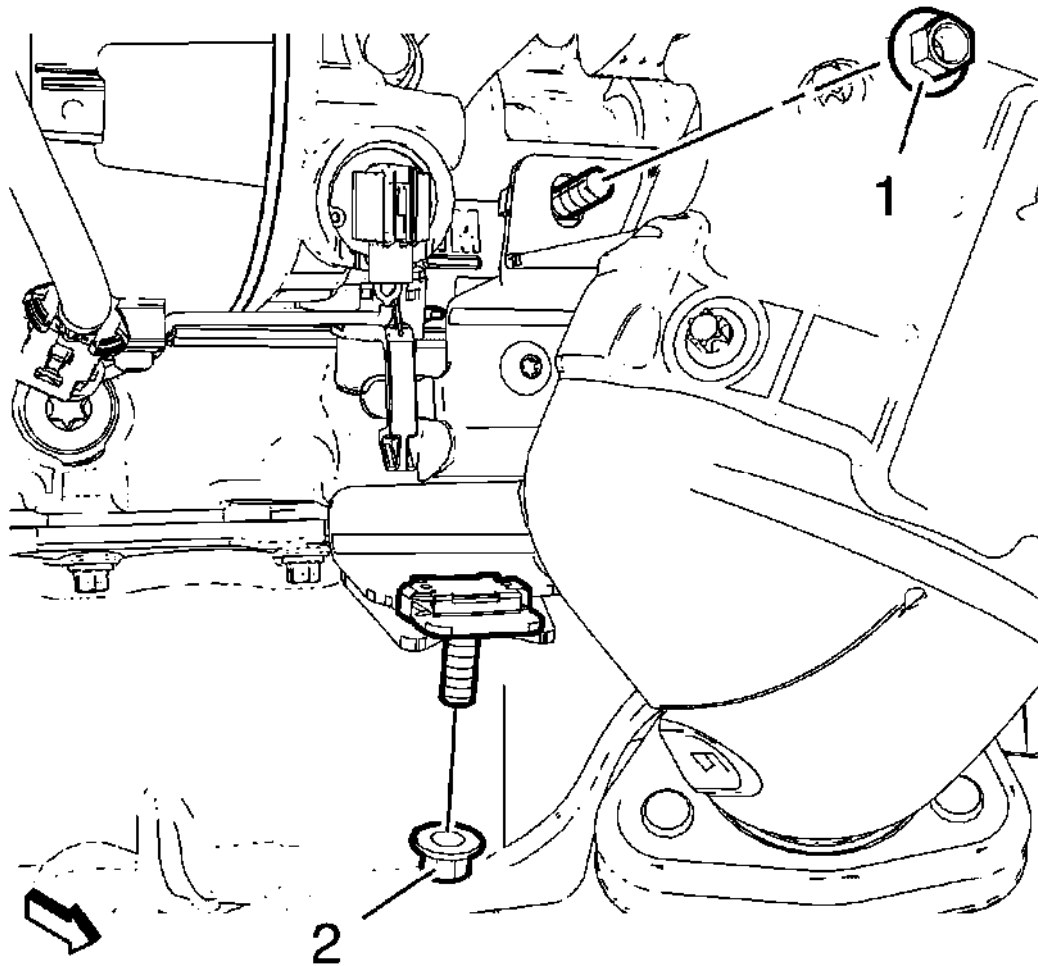


Fig. 11: Catalytic Converter Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

10. Remove the 2 three way warm up catalytic converter bracket nuts (1) and (2).
11. Remove the three way warm up catalytic converter and the three way warm up catalytic converter to turbocharger seal ring.
12. Remove the heated oxygen sensor 1 from the three way warm up catalytic converter. Refer to **Heated Oxygen Sensor Replacement - Sensor 1**.

Installation Procedure

1. Install the heated oxygen sensor 1 to the three way warm up catalytic converter. Refer to **Heated Oxygen Sensor Replacement - Sensor 1**.

NOTE: Never re-use the V-clamp.

2. Pre-install a NEW three way warm up catalytic converter V-clamp.

3. Install the three way warm up catalytic converter to the turbocharger and the three way warm up catalytic converter brackets. Install a NEW three way warm up catalytic converter to turbocharger seal ring.

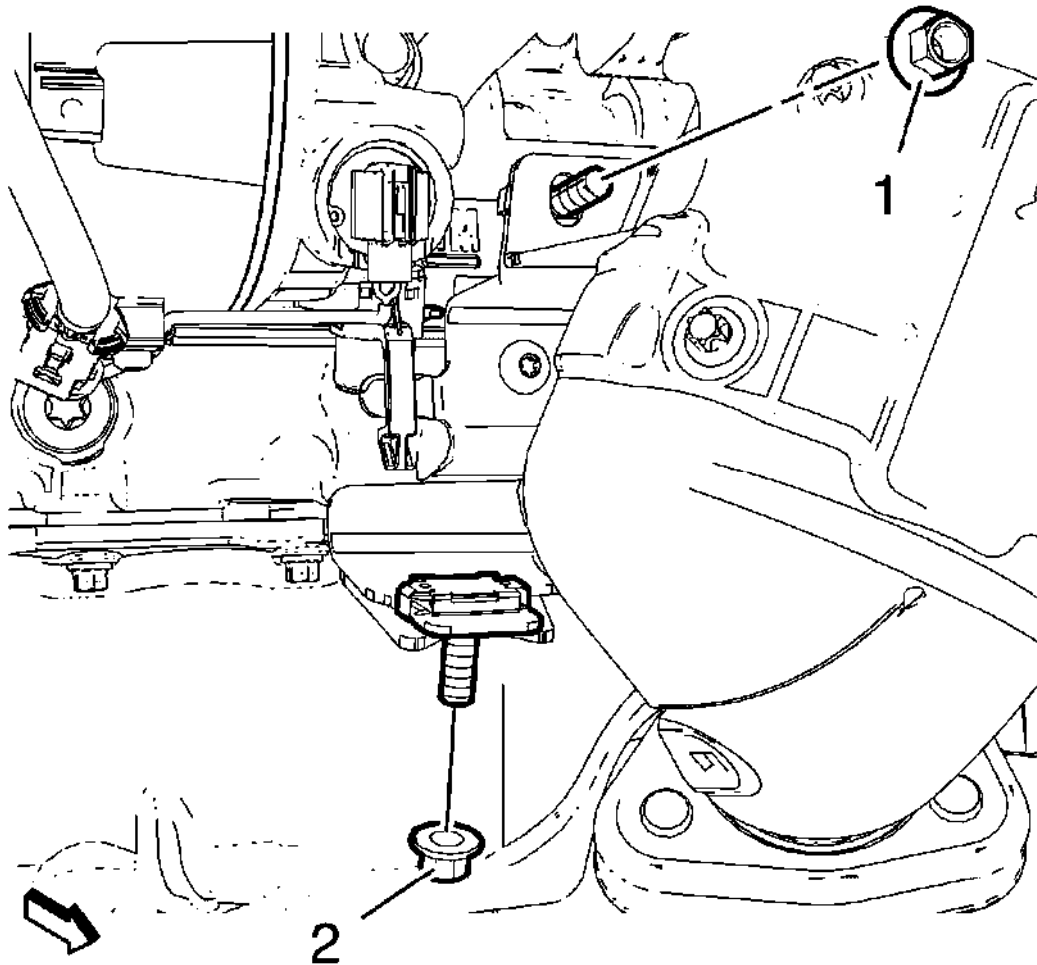


Fig. 12: Catalytic Converter Bracket Nuts
Courtesy of GENERAL MOTORS COMPANY

4. Install and hand-tighten the 2 three way warm up catalytic converter bracket nuts (1) and (2).
5. Lower the vehicle.
6. Install the three way warm up catalytic converter V-clamp to the catalytic converter to turbocharger flange.

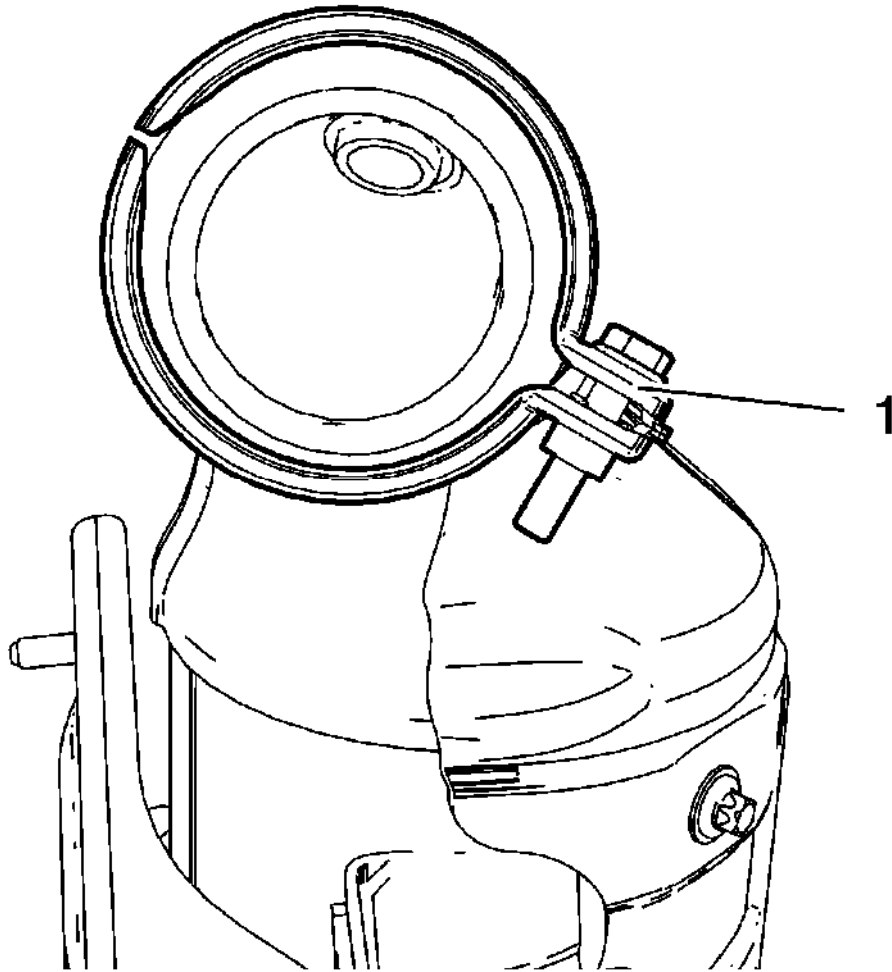


Fig. 13: Catalytic Converter V-Clamp
Courtesy of GENERAL MOTORS COMPANY

7. The three way warm up catalytic converter V-clamp (1) should be installed in the shown position.
8. Hand-tighten the three way warm up catalytic converter V-clamp.
9. Raise and support the vehicle.

CAUTION: Refer to Fastener Caution .

10. Tighten the 2 three way catalytic converter bracket nuts to 22 (16 lb ft).

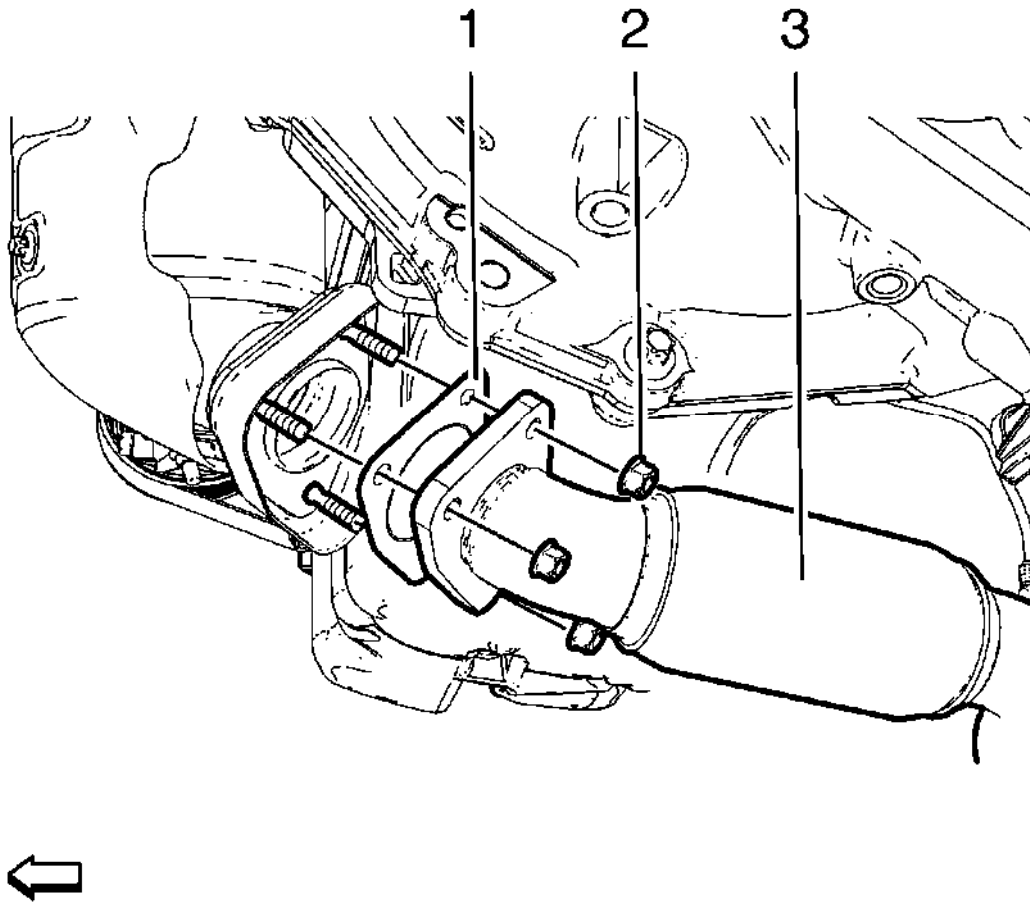


Fig. 14: Catalytic Converter

Courtesy of GENERAL MOTORS COMPANY

11. Install the catalytic converter (3) and a NEW catalytic converter gasket (1) to the three way warm up catalytic converter.
12. Install the 3 NEW catalytic converter flange nuts (2) and tighten to 22 (16 lb ft).
13. Install the engine front compartment insulator if equipped. Refer to **Front Compartment Insulator Replacement**
14. Lower the vehicle.
15. Tighten the three way catalytic converter V-clamp bolt to 13 (115 lb in).
16. Install the exhaust manifold heat shield. Refer to **Exhaust Manifold Heat Shield Replacement (1.4L LUV)**, **Exhaust Manifold Heat Shield Replacement (1.8L LUW and LWE)**.
17. Connect the heated oxygen sensor 1 wiring harness plug. Refer to **Heated Oxygen Sensor Replacement - Sensor 1**.
18. Connect battery negative cable. Refer to **Battery Negative Cable Disconnection and Connection**.

19. Close the hood.

EXHAUST PIPE FRONT HANGER BRACKET REPLACEMENT

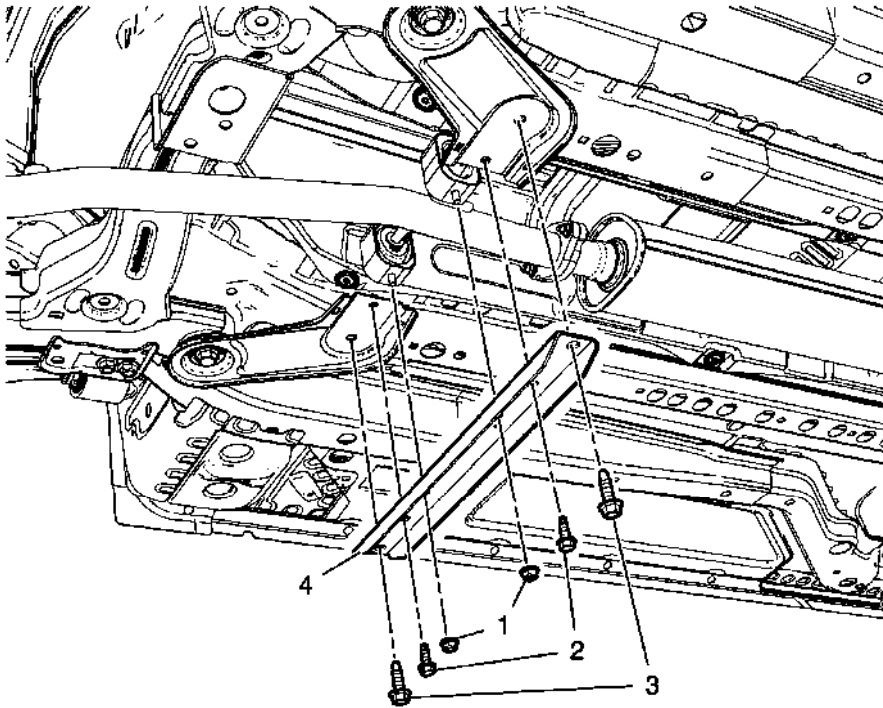


Fig. 15: Exhaust Pipe Front Hanger Bracket
Courtesy of GENERAL MOTORS COMPANY

Exhaust Pipe Front Hanger Bracket Replacement

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
WARNING: Refer to <u>Protective Goggles and Glove Warning</u> .	
Preliminary Procedure Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> . Special Tools EN-45059 Angle MeterFor equivalent regional tools, refer to <u>Special Tools</u> .	
1	Exhaust Pipe Front Hanger Insulator Nut (Qty: 2) CAUTION: Refer to <u>Fastener Caution</u> . Tighten

	17 N.m (13 lb ft)
2	Exhaust Pipe Front Hanger Bracket Bolt (Qty: 2) CAUTION: Refer to <u>Torque-to-Yield Fastener Caution</u> . Procedure Install NEW bolts, do NOT reuse old bolts. Tighten • First Pass: 22 N.m (16 lb ft). • Final Pass: 30-45 degrees, using the EN-45059 meter.
3	Drivetrain and Front Suspension Frame Support Bolt (Qty: 2) Procedure Install NEW bolts, do NOT reuse old bolts. Tighten • First Pass: 60 N.m (44 lb ft). • Final Pass: 30-45 degrees, using the EN-45059 meter.
4	Exhaust Pipe Front Hanger Bracket

CATALYTIC CONVERTER HEAT SHIELD REPLACEMENT (1.4L LUV)

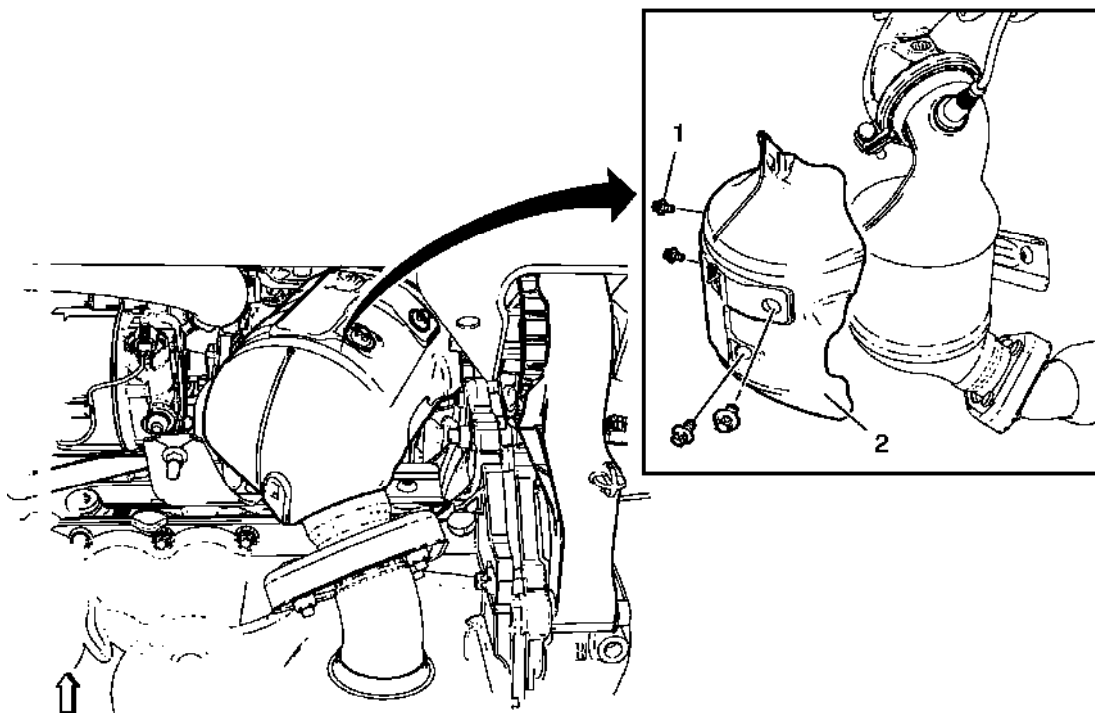


Fig. 16: Catalytic Converter Heat Shield (1.4L LUV)
Courtesy of GENERAL MOTORS COMPANY

Catalytic Converter Heat Shield Replacement (1.4L LUV)

Callout	Component Name
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: Always wear protective goggles and gloves when removing exhaust parts as falling rust and sharp edges from worn exhaust components could result in serious personal injury.	
Preliminary Procedure	
1. Open the hood.	
2. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u>	
1	Catalytic Converter Heat Shield Bolt (Qty: 4) CAUTION: Refer to <u>Fastener Caution</u> . Tighten: 10 N.m (89 lb in)

2013 Chevrolet Cruze

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2

Catalytic Converter Heat Shield

CATALYTIC CONVERTER HEAT SHIELD REPLACEMENT (1.8L LUW AND LWE)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

1. Open the hood.
2. Disconnect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Disconnect the heated oxygen sensor wiring harness plug.
4. Remove the oil level indicator tube. Refer to Oil Level Indicator Tube Replacement .

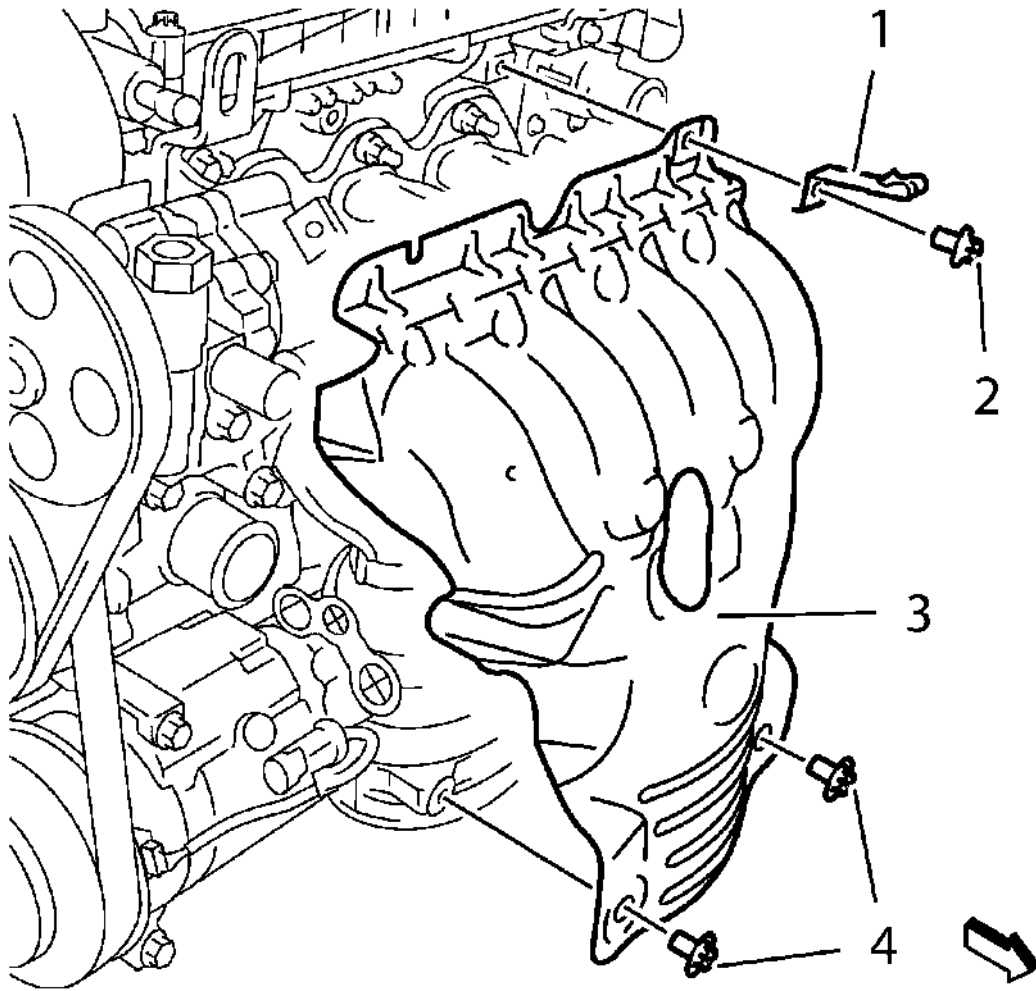


Fig. 17: Wiring Harness Bracket

Courtesy of GENERAL MOTORS COMPANY

5. Remove the wiring harness bracket bolt (2) and the wiring harness bracket (1).
6. Remove the 2 exhaust manifold heat shield bolts (4).
7. Remove the exhaust manifold heat shield (3).

Installation Procedure

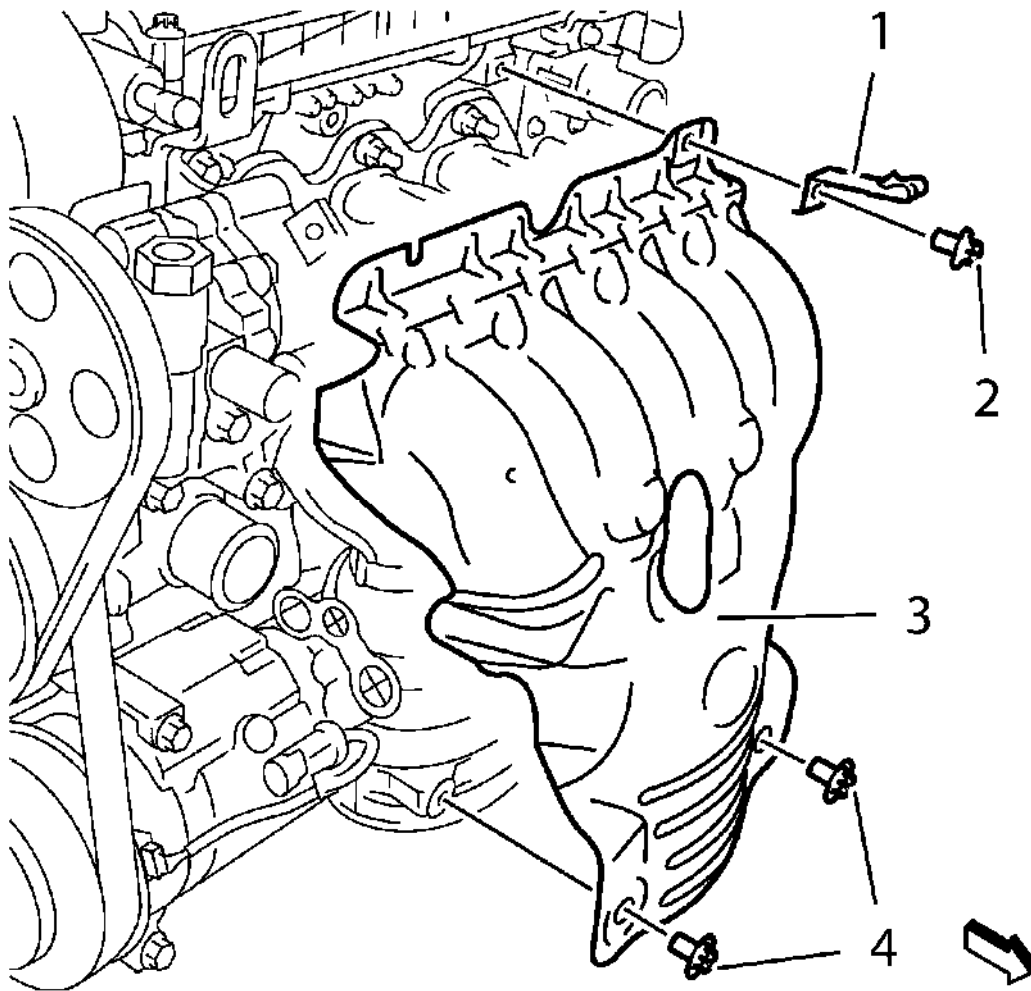


Fig. 18: Wiring Harness Bracket

Courtesy of GENERAL MOTORS COMPANY

1. Install the exhaust manifold heat shield (3).

CAUTION: Refer to Fastener Caution .

2. Install the 2 exhaust manifold heat shield bolts (4) and tighten to 8 N.m (71 lb in).
3. Install the wiring harness bracket (1) and the wiring harness bracket bolt (2) and tighten to 15 N.m (11 lb ft).
4. Install the oil level indicator tube. Refer to Oil Level Indicator Tube Replacement .
5. Connect the heated oxygen sensor wiring harness plug.
6. Connect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection .
7. Close the hood.

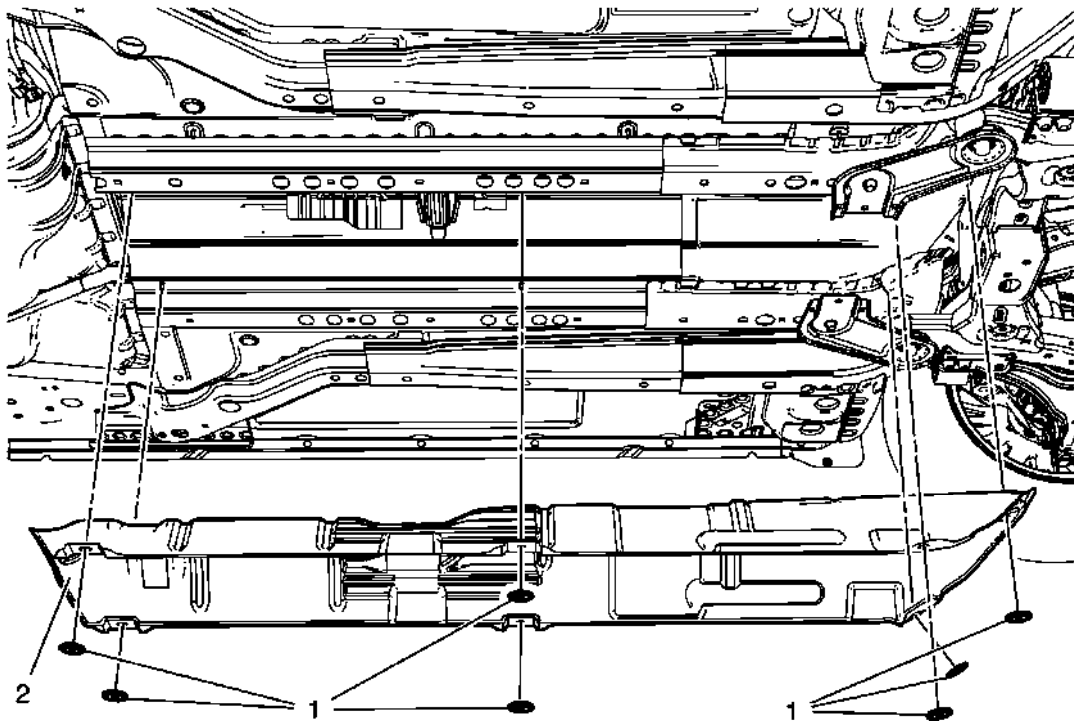
EXHAUST HEAT SHIELD REPLACEMENT

Fig. 19: Exhaust Heat Shield And Retainers
Courtesy of GENERAL MOTORS COMPANY

Exhaust Heat Shield Replacement

Callout	Component Name
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: Always wear protective goggles and gloves when removing exhaust parts as falling rust and sharp edges from worn exhaust components could result in serious personal injury.	
Preliminary Procedure Remove the exhaust front pipe. Refer to <u>Exhaust Front Pipe Replacement</u> .	
1	Heat Shield Retainer (Qty: 7)
2	Heat Shield

FUEL TANK HEAT SHIELD REPLACEMENT

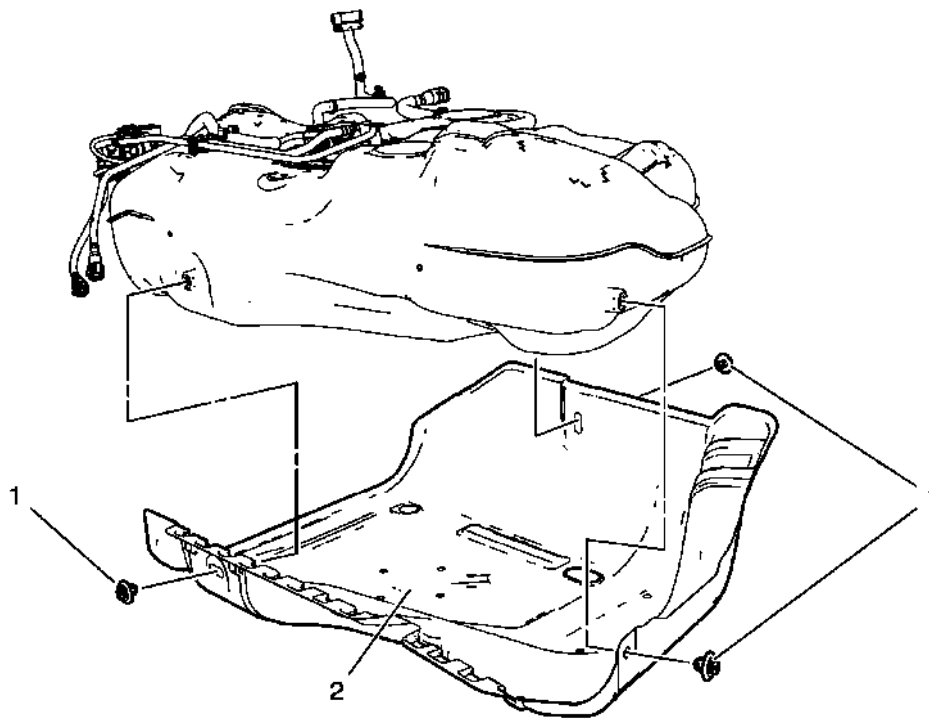


Fig. 20: Fuel Tank Heat Shield (Gasoline)

Courtesy of GENERAL MOTORS COMPANY

Fuel Tank Heat Shield Replacement

Callout	Component Name
WARNING: Refer to <u>Safety Goggles and Fuel Warning</u> .	
WARNING: Refer to <u>Actions to Take When Working with Fuel Warning</u> .	
Preliminary Procedure Remove the fuel tank. Refer to Fuel Tank Replacement .	
1	Fuel Tank Heat Shield Retaining Clamp (Qty: 3)
2	Fuel Tank Heat Shield

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT (1.4L LUV)

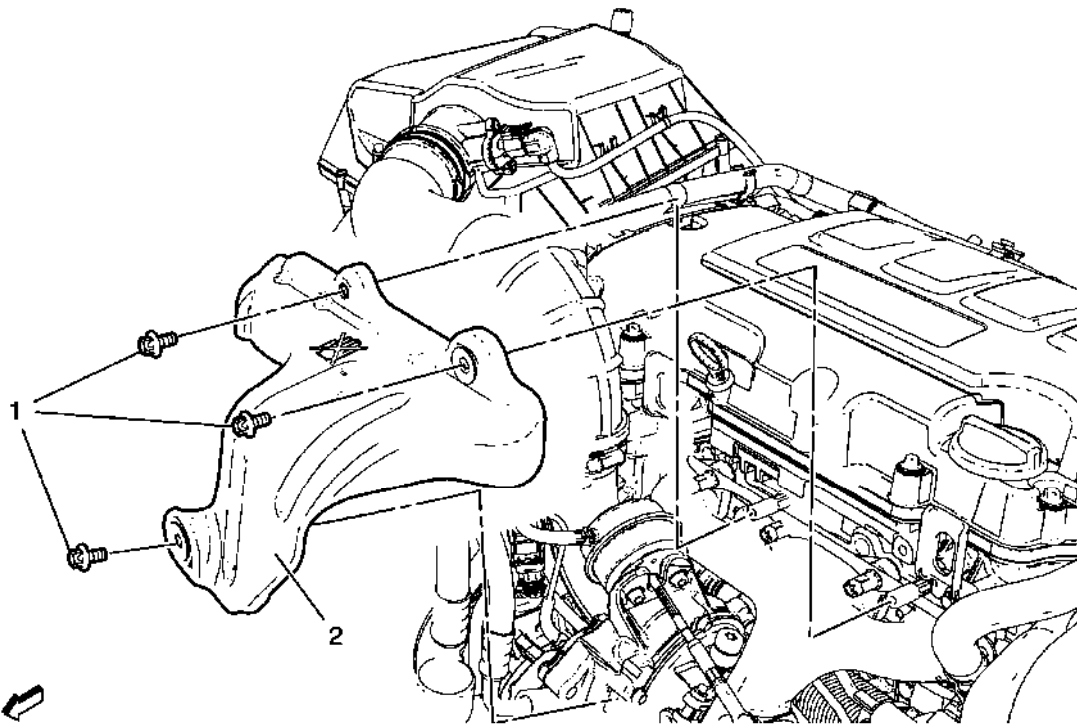


Fig. 21: Exhaust Manifold Heat Shield (1.4L LUV)

Courtesy of GENERAL MOTORS COMPANY

Exhaust Manifold Heat Shield Replacement (1.4L LUV)

Callout	Component Name
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.	
1	Exhaust Manifold Heat Shield Bolts (Qty: 3) CAUTION: Refer to <u>Fastener Caution</u> . Tighten 8 N.m (71 lb in)
2	Exhaust Manifold Heat Shield

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT (1.8L LUW AND LWE)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

1. Open the hood.
2. Disconnect the battery negative cable. Refer to Battery Negative Cable Disconnection and Connection .
3. Disconnect the heated oxygen sensor wiring harness plug.
4. Remove the oil level indicator tube. Refer to Oil Level Indicator Tube Replacement .

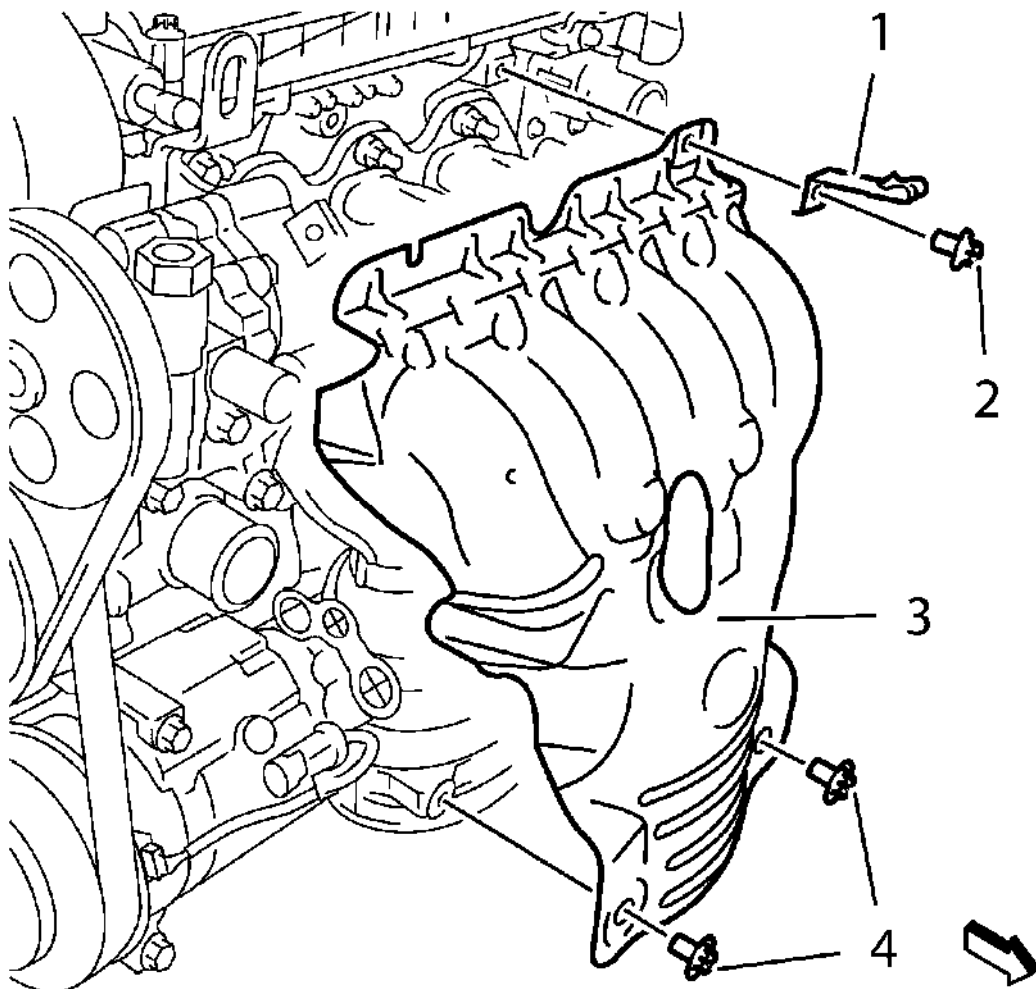


Fig. 22: Wiring Harness Bracket

Courtesy of GENERAL MOTORS COMPANY

5. Remove the wiring harness bracket bolt (2) and the wiring harness bracket (1).
6. Remove the 2 exhaust manifold heat shield bolts (4).
7. Remove the exhaust manifold heat shield (3).

Installation Procedure

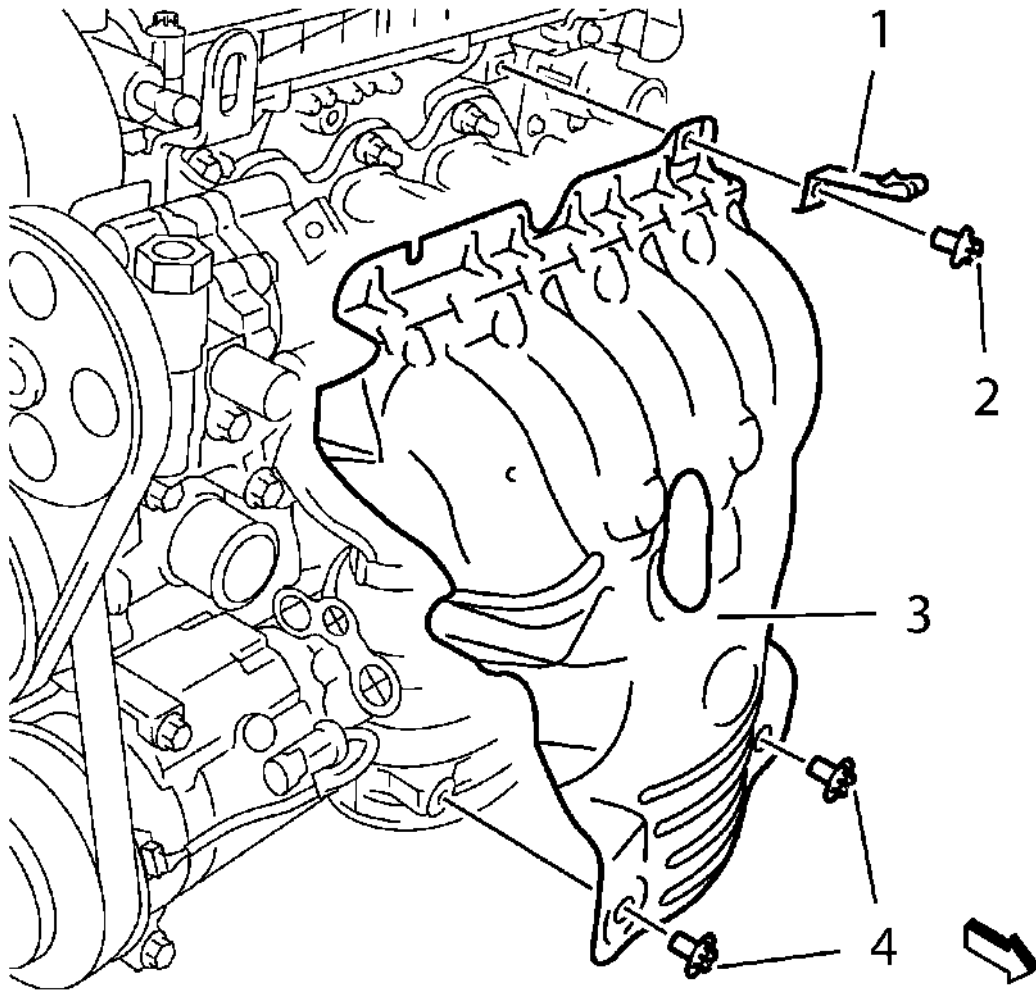


Fig. 23: Wiring Harness Bracket

Courtesy of GENERAL MOTORS COMPANY

1. Install the exhaust manifold heat shield (3).

CAUTION: Refer to Fastener Caution

2. Install the 2 exhaust manifold heat shield bolts (4) and tighten to 8 N.m (71 lb in).
3. Install the wiring harness bracket (1) and the wiring harness bracket bolt (2) and tighten to 15 N.m (11 lb ft).
4. Install the oil level indicator tube. Refer to **Oil Level Indicator Tube Replacement**.
5. Connect the heated oxygen sensor wiring harness plug.
6. Connect the battery negative cable. Refer to **Battery Negative Cable Disconnection and Connection**.

7. Close the hood.

EXHAUST REAR MUFFLER HEAT SHIELD REPLACEMENT

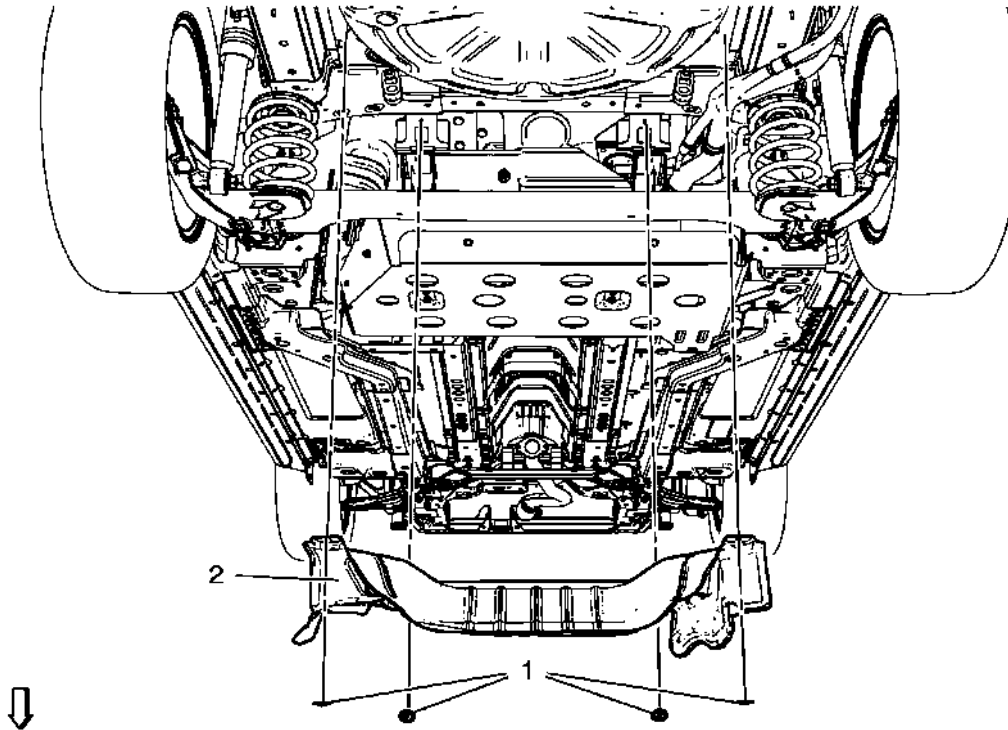


Fig. 24: Exhaust Rear Muffler Heat Shield
Courtesy of GENERAL MOTORS COMPANY

Exhaust Rear Muffler Heat Shield Replacement

Callout	Component Name
WARNING: Refer to <u>Exhaust Service Warning</u> .	
WARNING: Refer to <u>Protective Goggles and Glove Warning</u> .	
Preliminary Procedures	
1. Raise and support the vehicle. Refer to <u>Lifting and Jacking the Vehicle</u> .	
2. Separate the exhaust rear muffler from the underbody and support the exhaust system.	
1	Heat Shield Retainer (Qty: 4)
2	Exhaust Rear Muffler Heat Shield

EXHAUST REAR MUFFLER REPLACEMENT

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Protective Goggles and Glove Warning .

1. Raise and support the vehicle. Refer to Lifting and Jacking the Vehicle .
2. Read the exhaust system cutting instructions before cutting the exhaust system. .

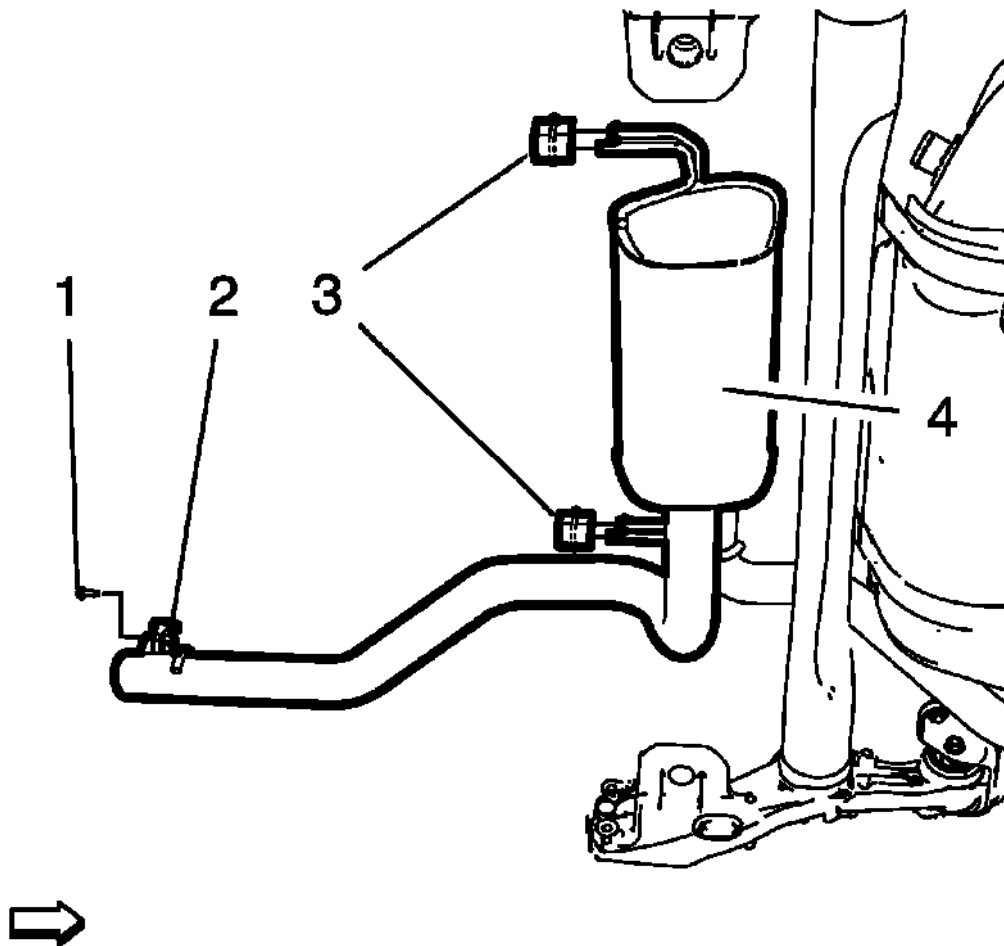


Fig. 25: Exhaust Rear Muffler, Exhaust Rear Muffler Hanger Insulators, Exhaust Rear Muffler End Pipe Bracket And Bolt
Courtesy of GENERAL MOTORS COMPANY

3. Remove the 2 exhaust rear muffler hanger insulators (3) from the exhaust rear muffler (4).

4. Remove the exhaust rear muffler end pipe bracket bolt (1) from the exhaust rear muffler end pipe bracket (2).
5. Remove the exhaust rear muffler end pipe bracket (2).

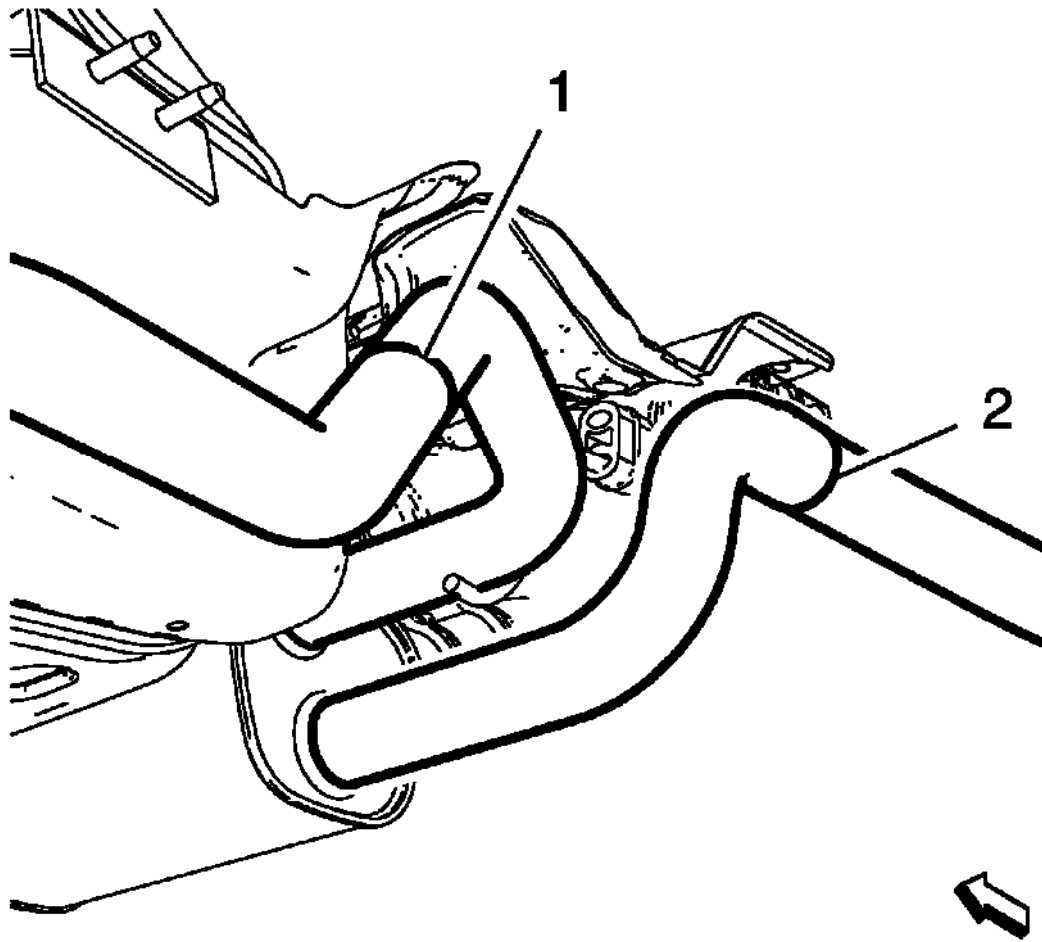


Fig. 26: Exhaust Rear Muffler Cutting Positions
Courtesy of GENERAL MOTORS COMPANY

NOTE: Support the exhaust rear muffler with a jack.

NOTE: The follow step is only necessary if the new exhaust rear muffler is not equipped with the exhaust rear muffler end pipe.

6. Cut the exhaust rear muffler at position (2) and remove the exhaust rear muffler end pipe.
7. Cut the exhaust rear muffler at position (1).
8. Remove the exhaust rear muffler.

Installation Procedure

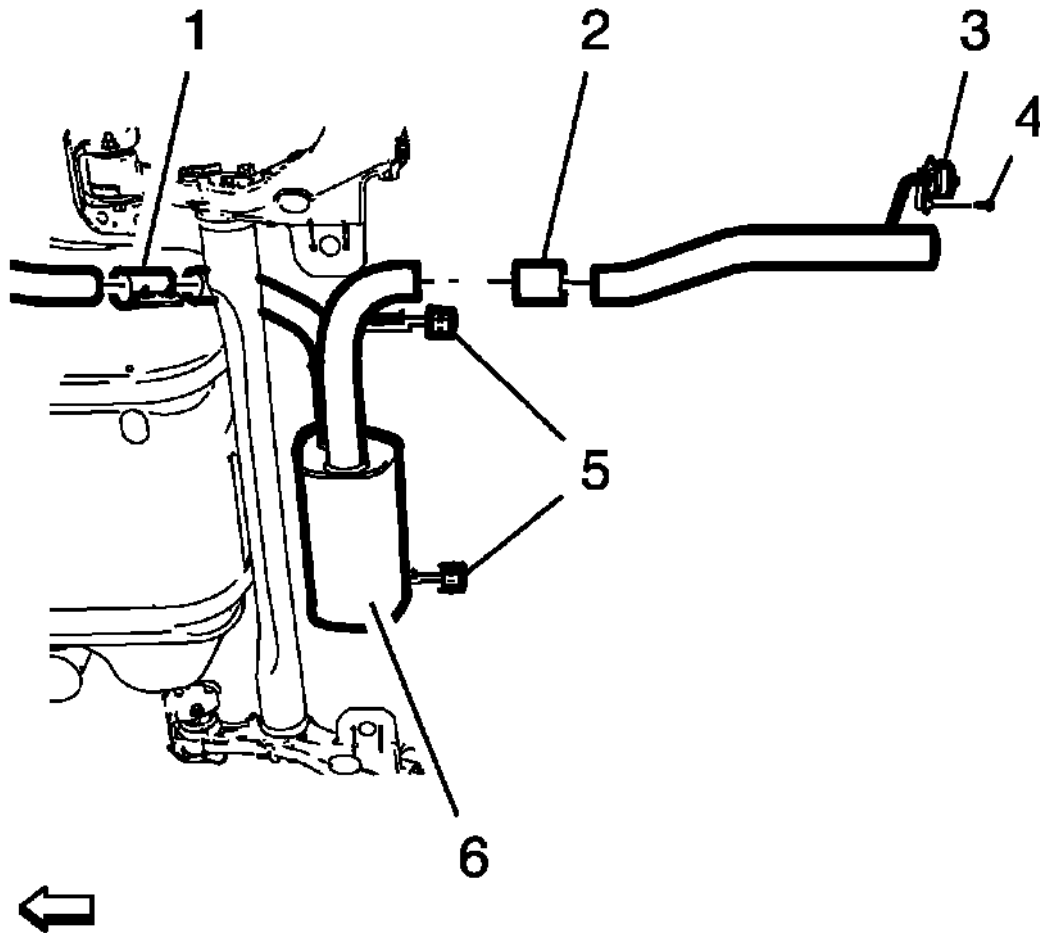


Fig. 27: Exhaust Rear Muffler Components
Courtesy of GENERAL MOTORS COMPANY

1. Install the exhaust rear muffler (6) and hang in the 2 exhaust rear muffler hanger insulators (5).
2. Install the exhaust pipe clamp (1) and loosely tighten.
3. Install the exhaust rear muffler end pipe bracket (3) to the exhaust rear muffler end pipe.

NOTE: The follow step is only necessary if the new exhaust rear muffler is not equipped with the exhaust rear muffler end pipe.

4. Install the exhaust rear muffler end pipe.

CAUTION: Refer to Fastener Caution .

5. Install the exhaust rear muffler end pipe bracket bolt (4) to the exhaust rear muffler end pipe bracket (3) and tighten to 22 N.m (16 lb ft).
6. Install the exhaust pipe clamp (2) and loosely tighten.
7. Position the exhaust rear muffler.
8. Tighten the exhaust pipe clamp (1) to 20 N.m (15 lb ft).
9. Position the exhaust rear muffler end pipe.
10. Tighten the exhaust pipe clamp (2) to 20 N.m (15 lb ft).
11. Lower the vehicle.

DESCRIPTION AND OPERATION

EXHAUST SYSTEM DESCRIPTION (1.8L LUW AND LWE)

Catalytic Converter

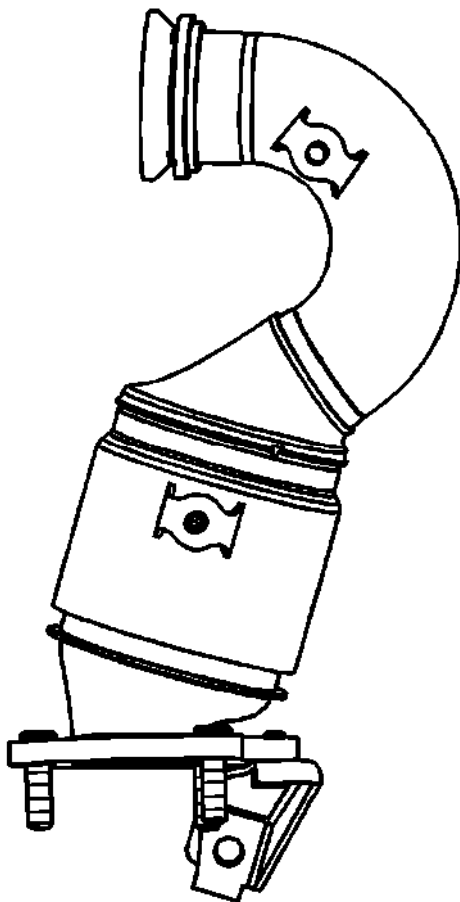


Fig. 28: View Of Pre-Catalyst
Courtesy of GENERAL MOTORS COMPANY

The catalytic converter is an emission control device added to the engine exhaust system in order to reduce hydrocarbons (HC), carbon monoxide (CO), and oxides of nitrogen (NOx) pollutants from the exhaust gas. The catalytic converter is comprised of a ceramic monolith substrate, supported in insulation and housed within a sheet metal shell. The substrate may be washcoated with 3 noble metals, Platinum (Pt), Palladium (Pd) and Rhodium (Rh). The catalyst in the converter is not serviceable.

Exhaust Rear Muffler

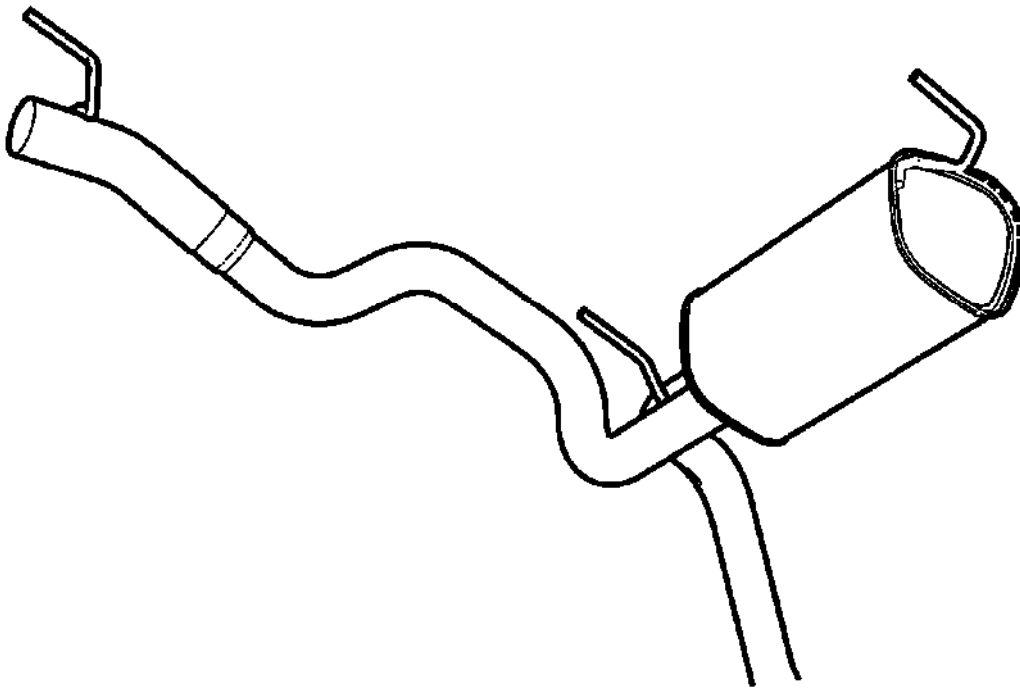


Fig. 29: Exhaust Rear Muffler

Courtesy of **GENERAL MOTORS COMPANY**

The rear muffler is to reduce broad band engine exhaust noise. It is comprised of a series of perforated tubes and baffles to break up the sound waves and reflect them.

It is made of stainless steel to protect the front muffler from corrosion.

It is mounted behind the rear wheel.

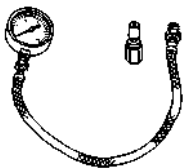
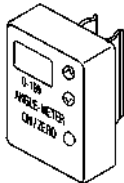
2013 Chevrolet Cruze

2013 ENGINE Engine Exhaust - Cruze

SPECIAL TOOLS AND EQUIPMENT

SPECIAL TOOLS

Special Tools

Illustration	Tool Number/Description
	EN-35314-A J-35314-A Exhaust Back Pressure Gauge
	EN-45059 J 45059 Angle Meter
	EN-6179 KM-6179 J-39174-C Heated Oxygen Sensor Remover/Installer