SPECIFICATIONS

FASTENER SPECIFICATIONS

Application	Specification	
	Metric	English
Catalytic Converter to Exhaust Manifold Fasteners (L83, L86, L96)	50 N.m	37 lb ft
Exhaust Manifold Fasteners (L83, L86)		
• Installing to existing cylinder head	23 N.m	17 lb ft
• Installing to NEW cylinder head	27 N.m	20 lb ft
Exhaust Manifold Fasteners (L96)		
• First pass	15 N.m	11 lb ft
• Second Pass	20 N.m	15 lb ft
Exhaust Manifold Heat Shield Fasteners (L83, L86, L96)	10 N.m	89 lb in
Exhaust Manifold Stud (L83, L86, L96)	10 N.m	89 lb in
Exhaust Muffler Pipe Clamp Nut (L83, L86, L96)	30 N.m	22 lb ft
Front Body Exhaust Heat Shield Fastener (L83, L86, L96)	9 N.m	80 lb in
Rear Body Exhaust Heat Shield Fastener (L83, L86, L96)	9 N.m	80 lb in

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.

cardiagn.com

- 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**

cardiagn.com

- 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

- 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

cardiagn.com

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**

EXHAUST LEAKAGE

cardiagn.com

Problem	Action
WARNING: **While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.** DEFINITION: An exhaust leak may show stains at the area of the leak. The leak may be felt by holding a hand close to the suspected areas or using a smoke pencil. The leak may make a popping or hissing noise.Refer to **Symptoms - Engine Exhaust** prior to beginning this table.	
Misaligned or improperly installed exhaust system components	• Align and tighten the exhaust system components to the specifications. Refer to **Fastener Specifications**. • Ensure the exhaust hangers are in the proper locations and not loose.
Exhaust leaks at the following connections: • Exhaust manifold to pipe • Flanges • Pipe clamps	Tighten the components to the specifications. Refer to **Fastener Specifications**.
Seals or gaskets leaking • Exhaust manifold to cylinder head • Exhaust pipes to exhaust manifold • Catalytic converter connection • EGR connections • AIR connections to the exhaust	Replace the leaking seal or gasket. Refer to the affected components procedure for service.

cardiagn.com

Problem	Action
manifold or cylinder head	
Irregularities at the mating surfaces on the flange connections	Repair as required or replace the affected component. Refer to the affected components procedure for service.
Exhaust manifold cracked or broken	Replace the exhaust manifold. Refer to the affected component's procedure for service.
Exhaust system component connection welds leaking	Replace the leaking component. Refer to the affected component's procedure for service.
Muffler or resonator (if equipped) damaged or leaking at the seams	Replace the affected muffler or resonator. Refer to the affected component's procedure for service.

EXHAUST NOISE

Condition	Action
WARNING: **While engine is operating, the exhaust system will become extremely hot. To prevent burns avoid contacting a hot exhaust system.** DEFINITION: An audible or physical noise due to a faulty component or damaged components causing a loose or misaligned exhaust system resulting in a rattle or vibration noise, i.e. buzz, groan, hum.Refer to **Symptoms - Engine Exhaust** prior to beginning this table.	
Popping or hissing noise	Exhaust leak. Refer to **Exhaust Leakage**.
Loud exhaust	1. Compare to a known good vehicle. 2. Inspect for a damaged or failed muffler. 3. Repair or replace the affected component. Refer to the affected

cardiagn.com

Condition	Action
	component's service procedure.
External rattle or vibration noise	1. Inspect for a bent or loose hanger, loose heat shield, or loose clamp. 2. Inspect for an exhaust pipe causing interference. 3. Repair or replace the affected component. Refer to the affected component's service procedure.
Internal rattle	1. Test the components by tapping with a rubber mallet to confirm a rattle. 2. Repair or replace the affected component. Refer to the affected component's service procedure.

REPAIR INSTRUCTIONS

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (L83, L86)

cardiagn.com

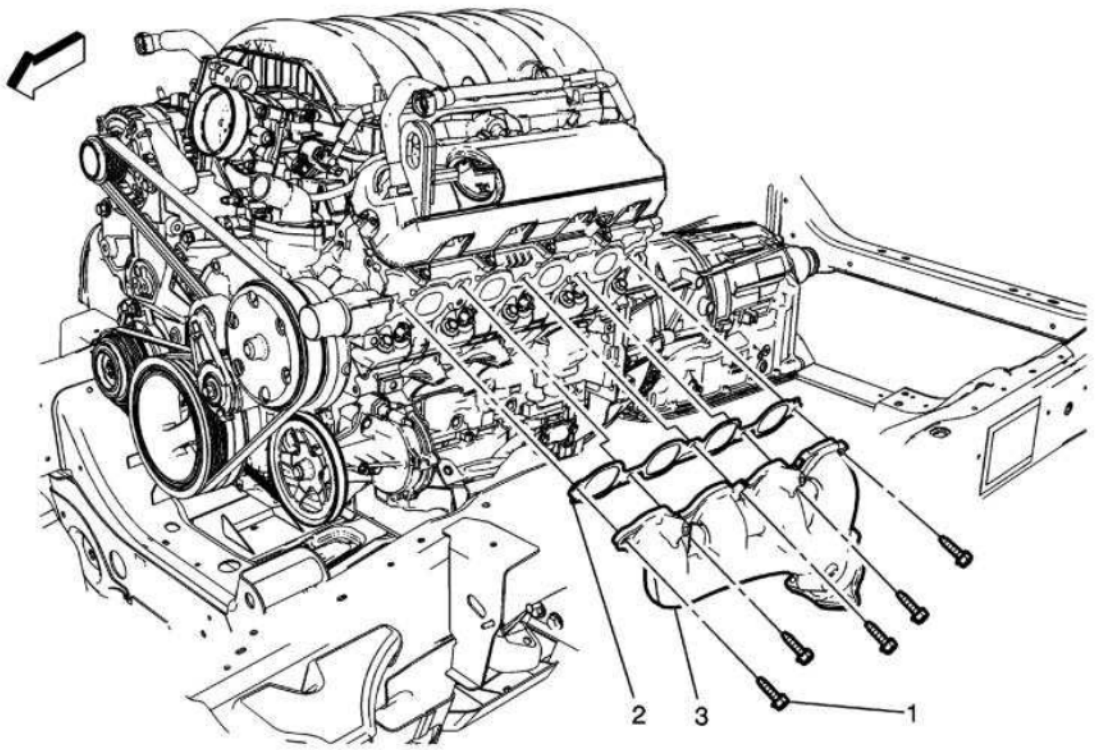


Fig. 1: Exhaust Manifold - Left Side (L83, L86)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: Refer to Hot Exhaust System Warning **Preliminary Procedure** 1. Refer to **Intermediate Steering Shaft Replacement** 2. Disconnect the spark plug wire at the spark plug.	

cardiagn.com

Callout	Component Name
3. Remove Oil Level Indicator Tube. Refer to **Oil Level Indicator Tube Replacement** 4. Remove Front Wheelhouse Liner. Refer to **Front Wheelhouse Liner Replacement - Left Side (Cadillac)** **Front Wheelhouse Liner Replacement - Left Side (GMC)** **Front Wheelhouse Liner Replacement - Left Side (Chevrolet)** 5. Remove Exhaust Manifold Heat Shield. Refer to **Exhaust Manifold Heat Shield Replacement - Left Side (L83, L86)** 6. Disconnect Three-Way Catalytic Converter. Refer to **Three-Way Catalytic Converter Replacement**	
1	Exhaust Manifold Fastener (Qty: 5) **CAUTION:** **Refer to Fastener Caution .** • When installing exhaust manifold to the existing cylinder head: **Tighten** 23 N.m (17 lb ft) • When installing exhaust manifold to a NEW cylinder head: **Tighten** 27 N.m (20 lb ft)
2	Gasket
3	Exhaust Manifold **Procedure** Install a NEW exhaust manifold gasket.

EXHAUST MANIFOLD REPLACEMENT - LEFT SIDE (L96)

Removal Procedure

WARNING: Refer to Hot Exhaust System Warning

cardiagn.com

1. Remove Spark Plugs. Refer to **Spark Plug Replacement**
2. Disconnect Three-Way Catalytic Converter @ Exhaust Manifold. Refer to **Three-Way Catalytic Converter Replacement**

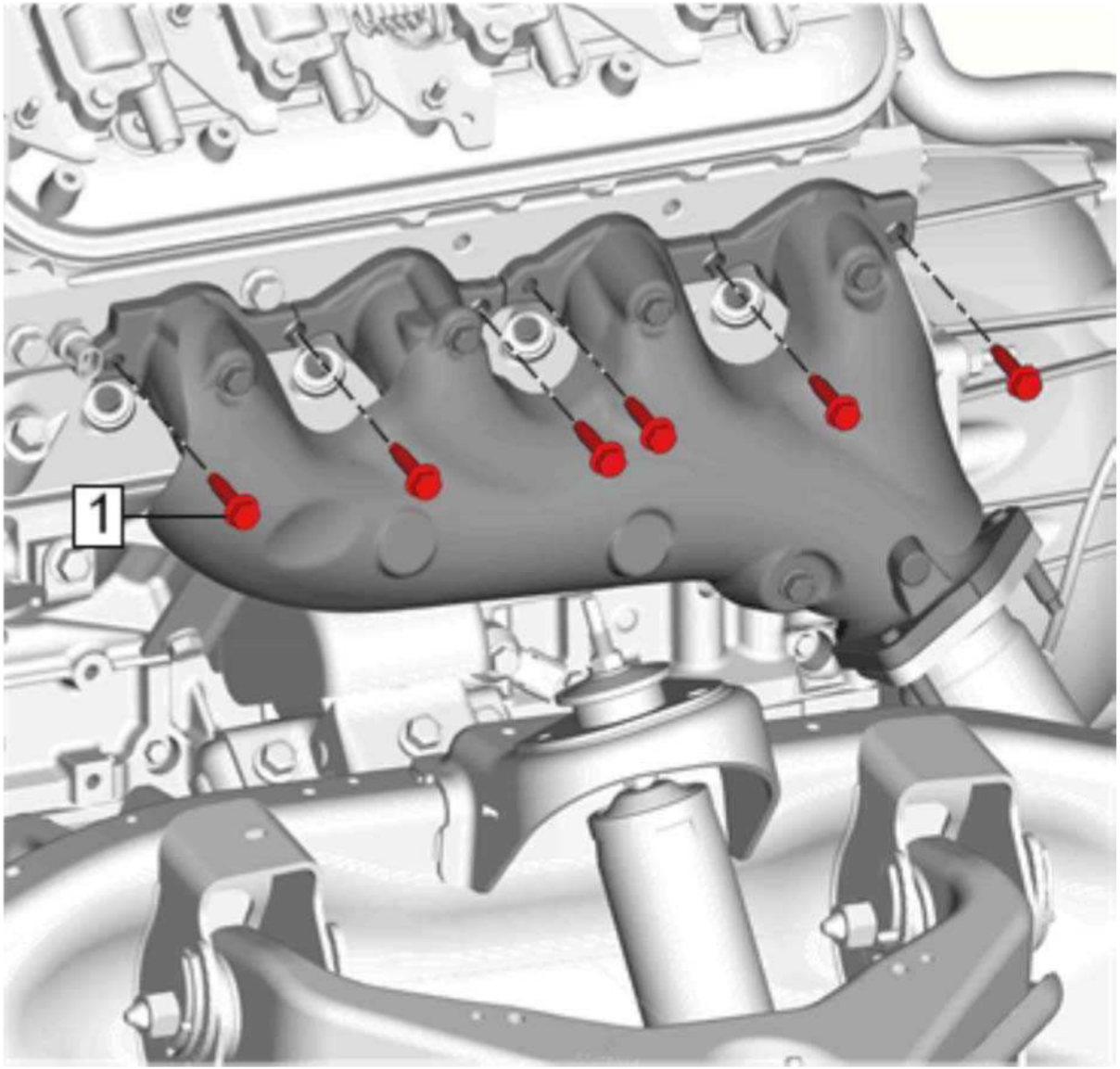


Fig. 2: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

cardiagn.com

3. Remove Exhaust Manifold Fastener (1) (Qty: 6)

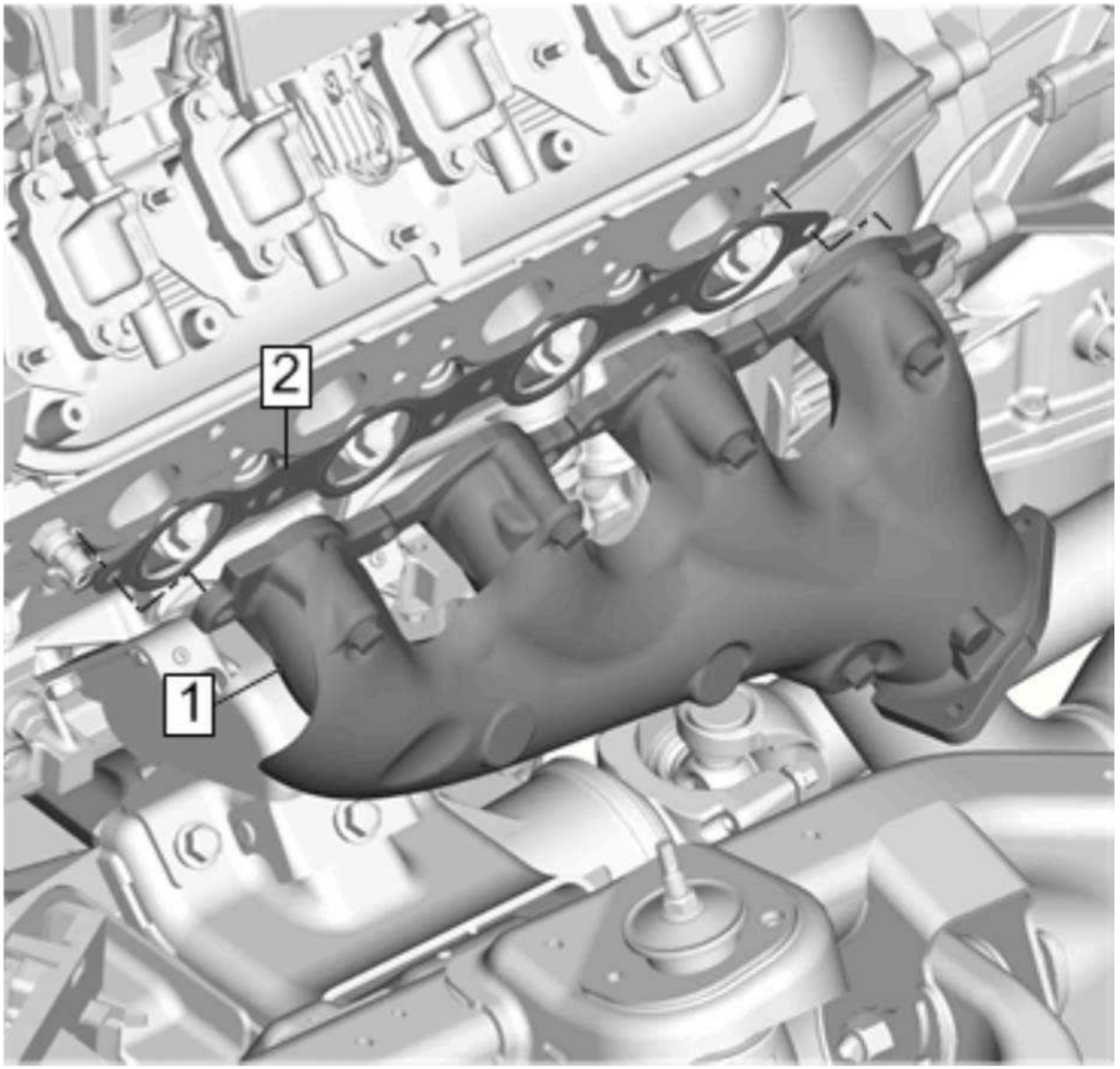


Fig. 3: Exhaust Manifold And Gasket
Courtesy of GENERAL MOTORS COMPANY

4. Remove Exhaust Manifold (1)

cardiagn.com

5. Remove and DISCARD Exhaust Manifold Gasket (2)

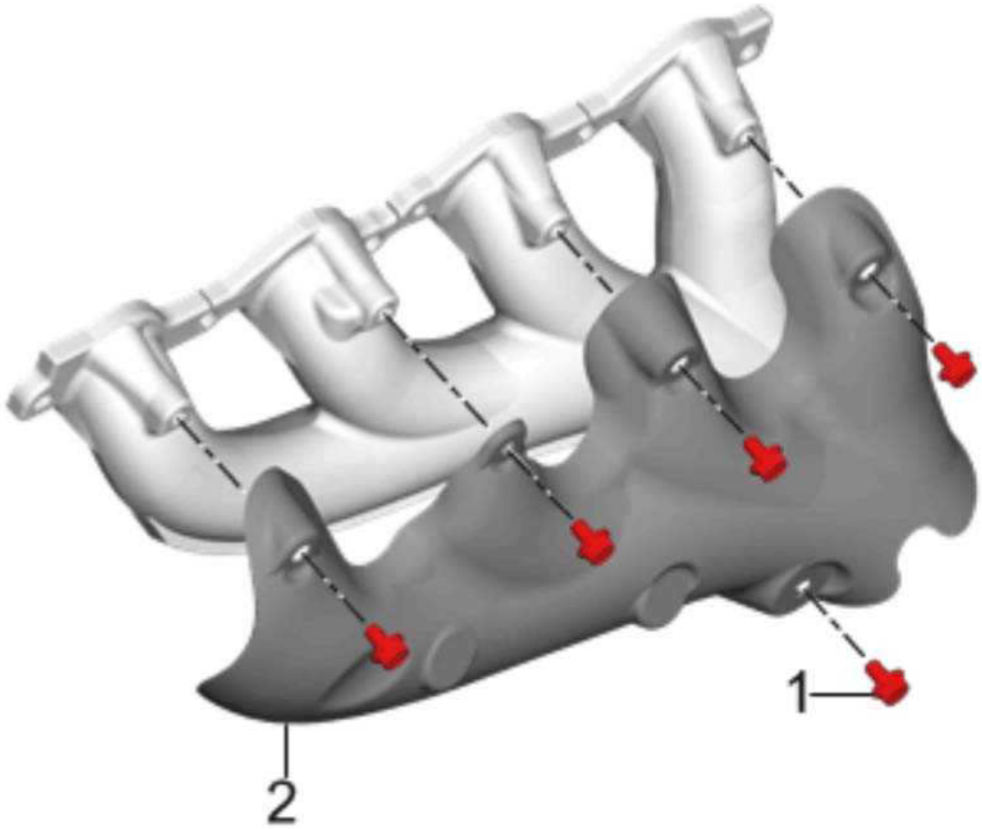


Fig. 4: Exhaust Manifold Heat Shield And Bolts
Courtesy of GENERAL MOTORS COMPANY

6. Remove Exhaust Manifold Heat Shield Bolt (1) (Qty: 5)

cardiagn.com

7. Remove Exhaust Manifold Heat Shield (2)

Installation Procedure

1. Clean the exhaust manifold sealing surface.

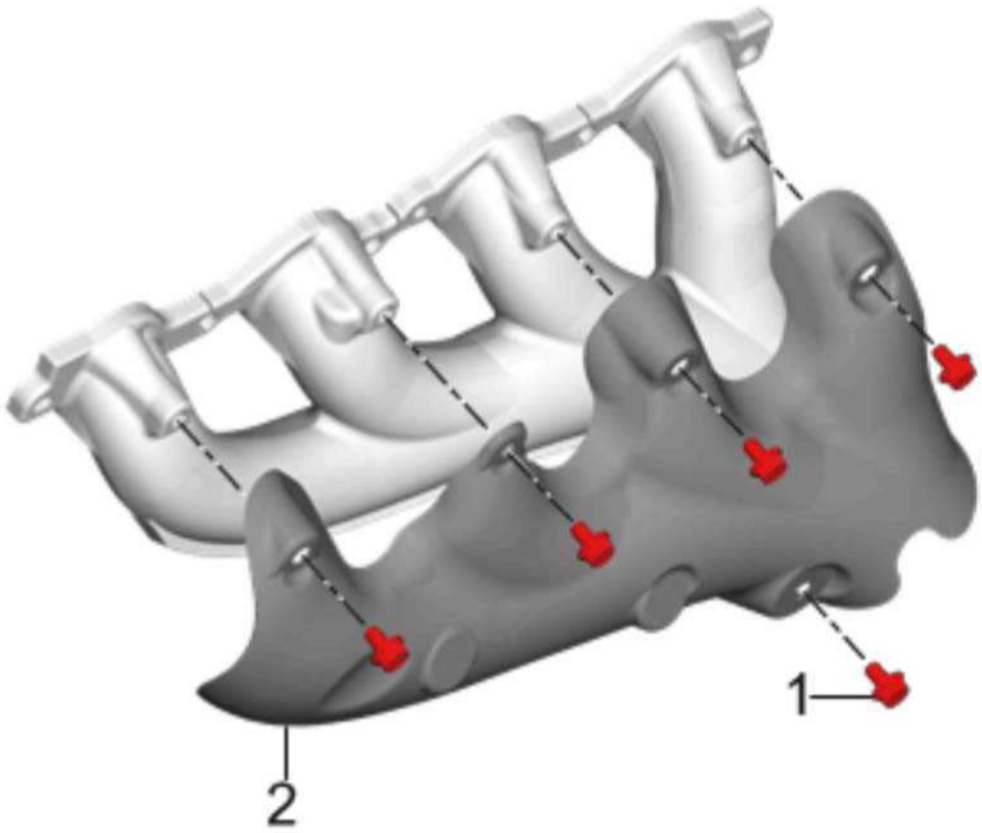


Fig. 5: Exhaust Manifold Heat Shield And Bolts

cardiagn.com

Courtesy of GENERAL MOTORS COMPANY

2. Install Exhaust Manifold Heat Shield (2)

CAUTION: **Refer to Fastener Caution .**

3. Install and tighten Exhaust Manifold Heat Shield Bolt (1) (Qty: 5) to 10 N.m (89 lb in)

cardiagn.com

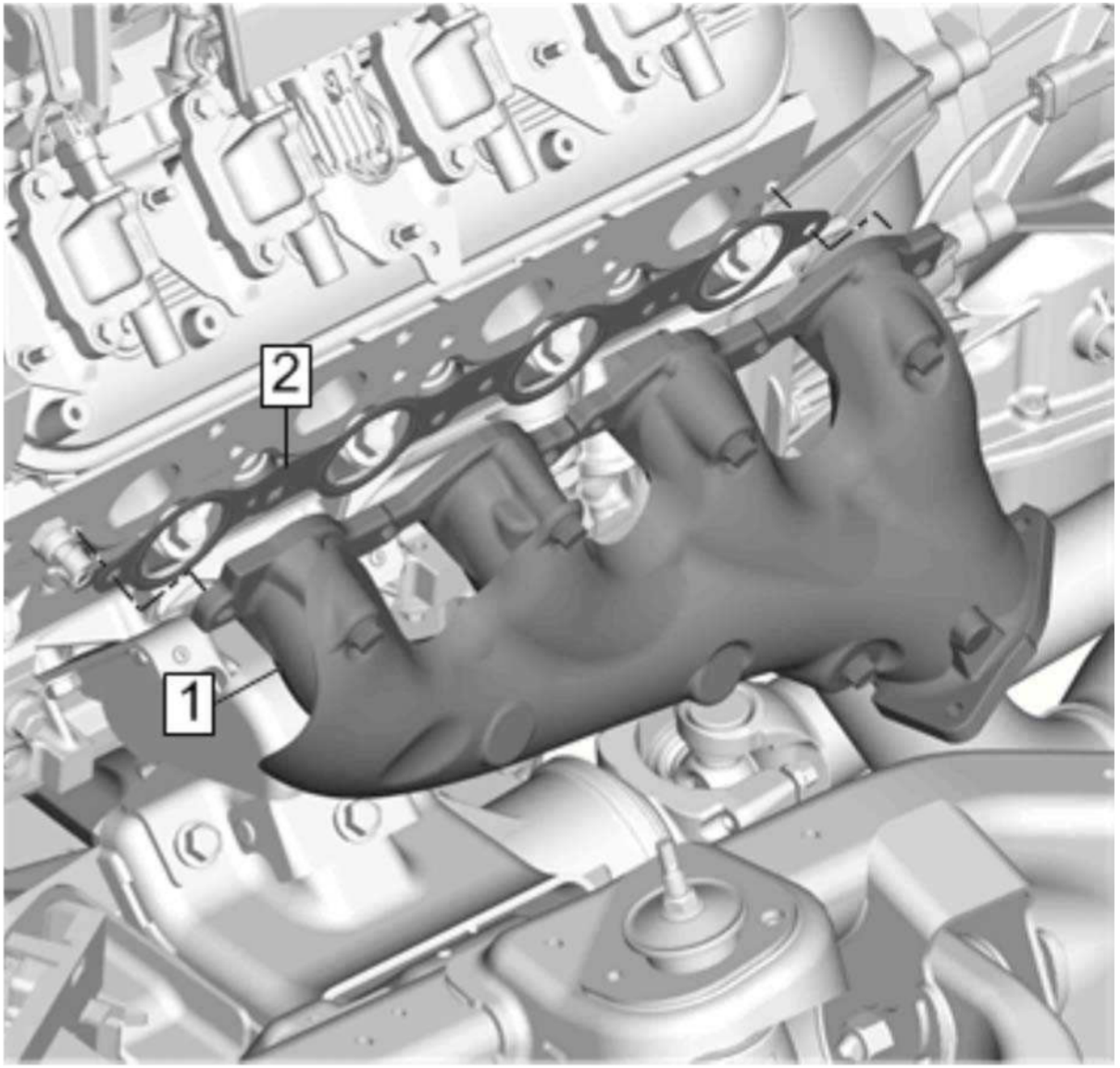


Fig. 6: Exhaust Manifold And Gasket
Courtesy of GENERAL MOTORS COMPANY

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

4. Install Exhaust Manifold Gasket (2)

cardiagn.com

5. Install Exhaust Manifold (1)

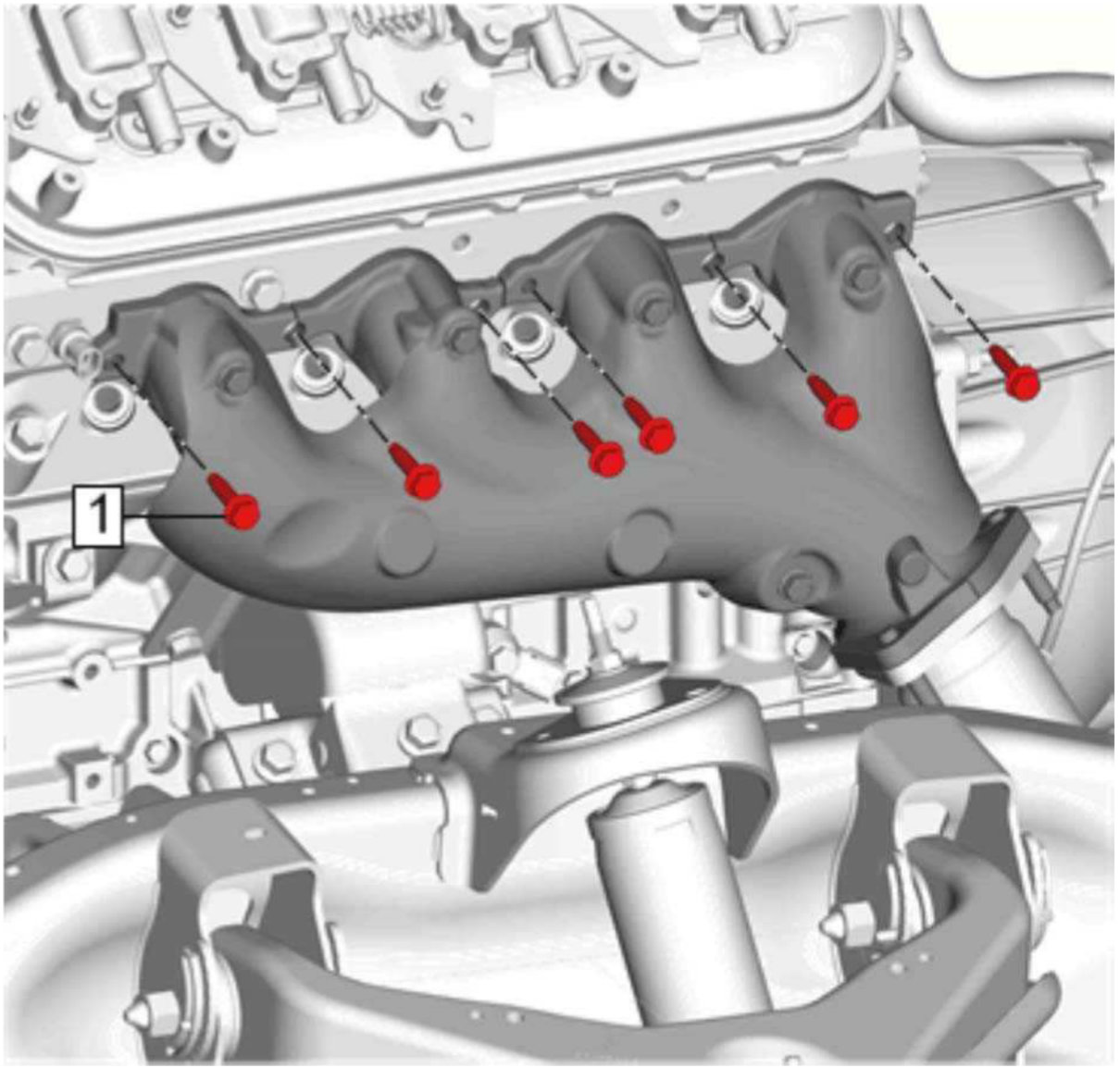


Fig. 7: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

6. Tighten Exhaust Manifold Fastener (1) in sequence (Qty: 6)

cardiagn.com

1. Tighten the exhaust manifold bolts a first pass to 15 N.m (11 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.
2. Tighten the exhaust manifold bolts a final pass to 20 N.m (15 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.

7. Connect Three-Way Catalytic Converter @ Exhaust Manifold. Refer to **Three-Way Catalytic Converter Replacement**
8. Install Spark Plugs. Refer to **Spark Plug Replacement**

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (L83, L86)

Removal Procedure

WARNING: Refer to Hot Exhaust System Warning

1. Remove Valve Rocker Arm Cover Insulator - Right Side. Refer to **Valve Rocker Arm Cover Insulator Replacement - Right Side**
Â»Remove

cardiagn.com

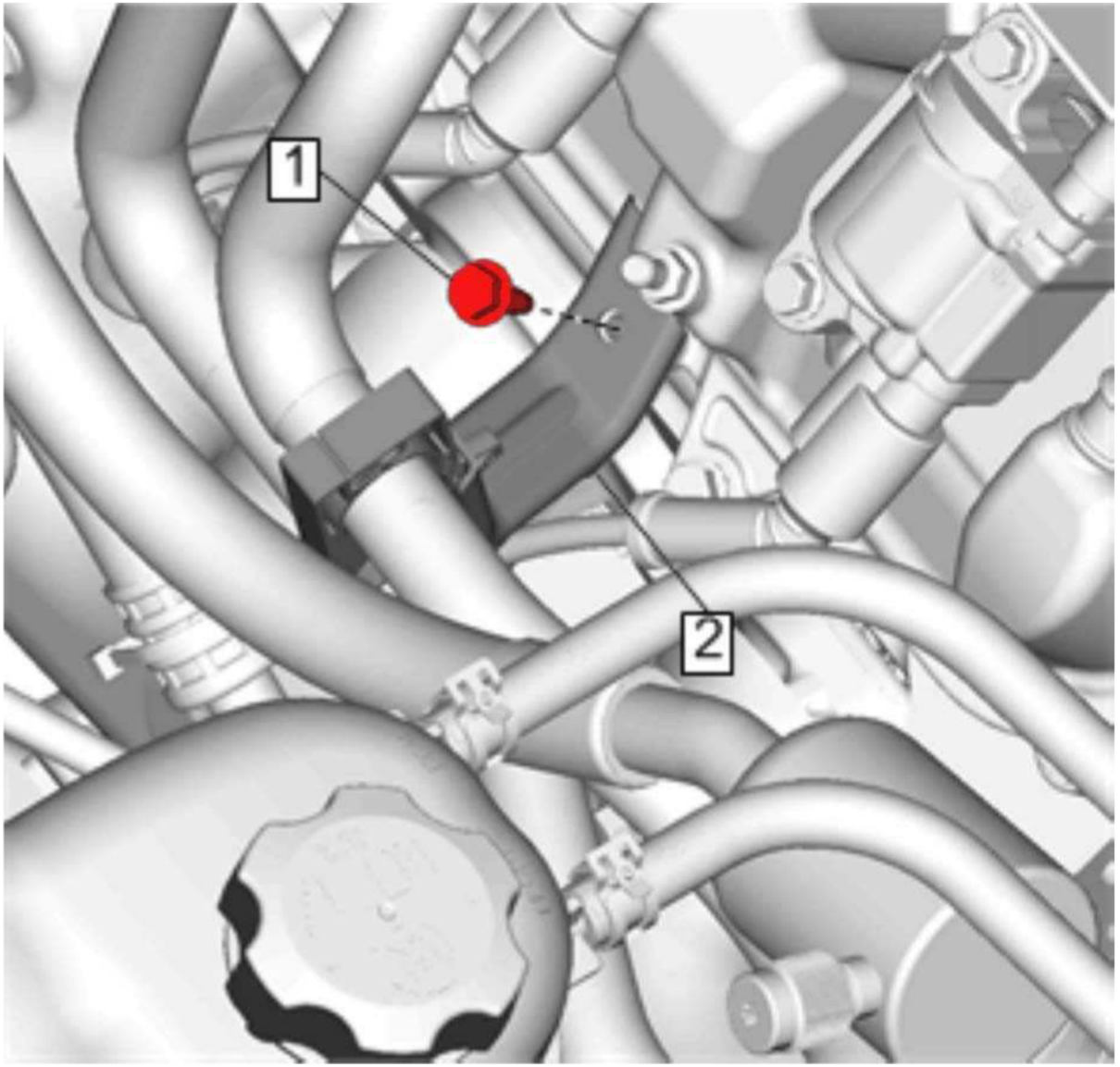


Fig. 8: Heater Inlet and Outlet Hose Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

2. Remove Heater Inlet and Outlet Hose Bracket Bolt (1)
3. Reposition Heater Inlet and Outlet Hose Bracket (2)

cardiagn.com

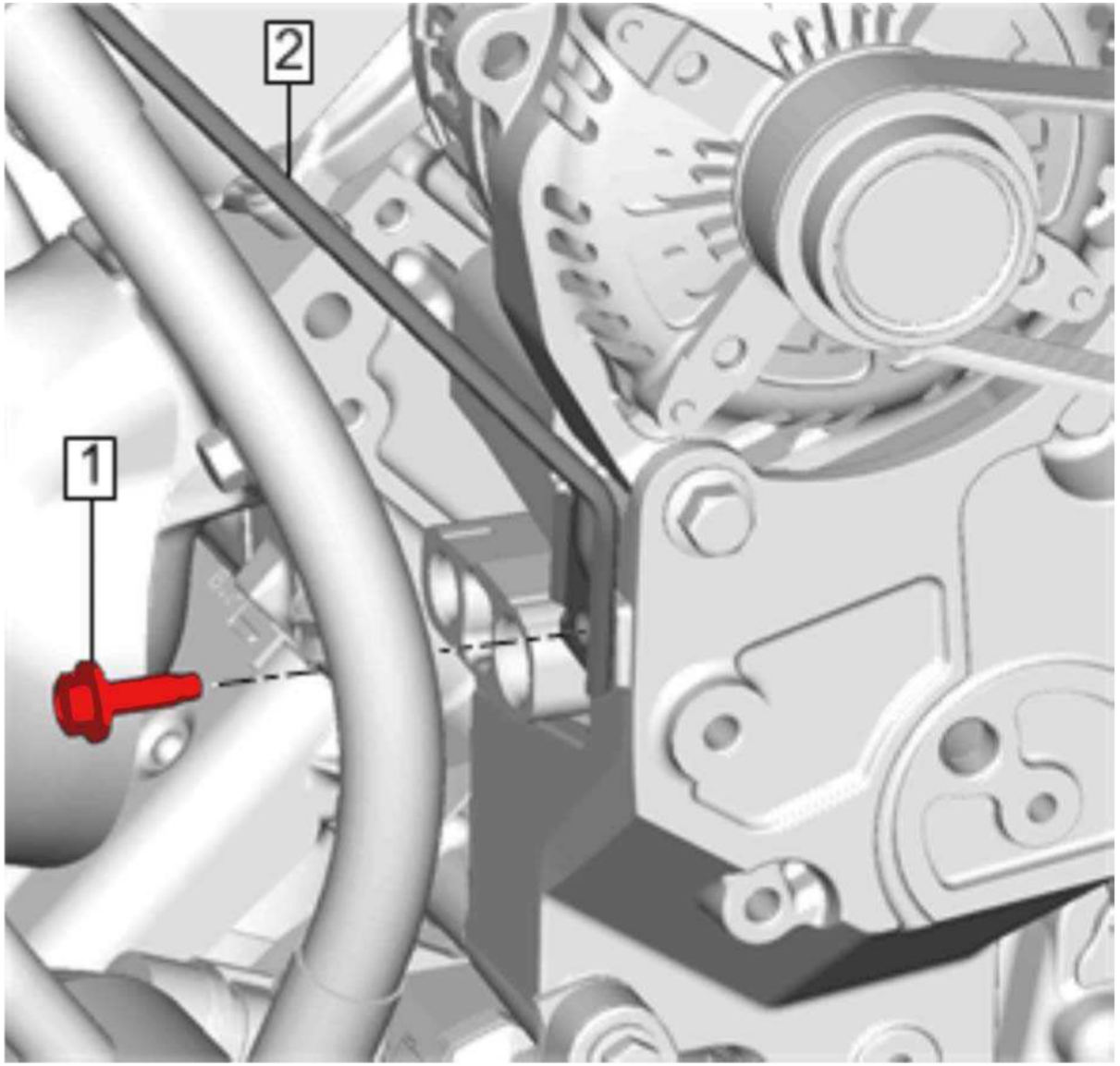


Fig. 9: Air Conditioning Evaporator Hose Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

4. Remove Air Conditioning Evaporator Hose Bracket Bolt (1) @ Generator Bracket
5. Reposition Air Conditioning Evaporator Hose Bracket (2)
6. Disconnect the spark plug wire at the spark plug.

cardiagn.com

7. Remove Front Wheelhouse Liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (Cadillac)** **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** **Front Wheelhouse Liner Replacement - Right Side (GMC)**
8. Remove Three-Way Catalytic Converter. Refer to **Three-Way Catalytic Converter Replacement**

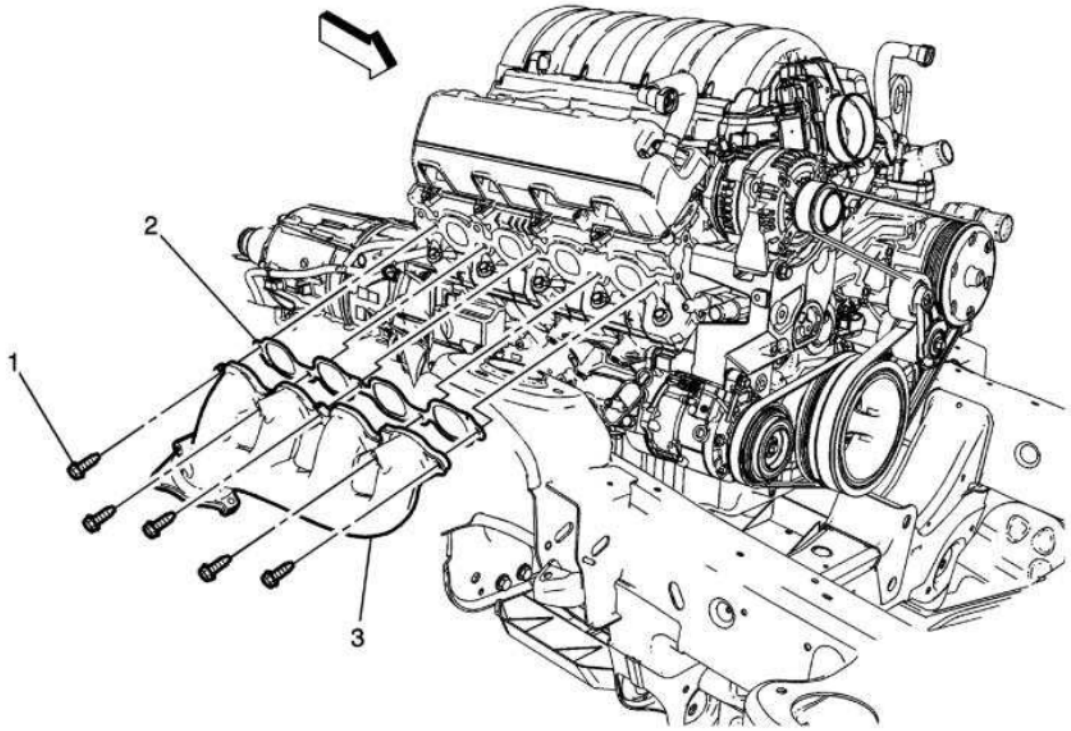


Fig. 10: Exhaust Manifold - Right Side (L83, L86)
Courtesy of GENERAL MOTORS COMPANY

9. Remove Exhaust Manifold Fastener (1) (Qty: 5)
10. Remove Exhaust Manifold (3)
11. Remove and DISCARD Gasket (2)
12. Remove Exhaust Manifold Heat Shield. Refer to **Exhaust Manifold Heat Shield Replacement - Right Side (L83, L86)**

Installation Procedure

cardiagn.com

1. Install Exhaust Manifold Heat Shield - Right Side. Refer to **Exhaust Manifold Heat Shield Replacement - Right Side (L83, L86)**

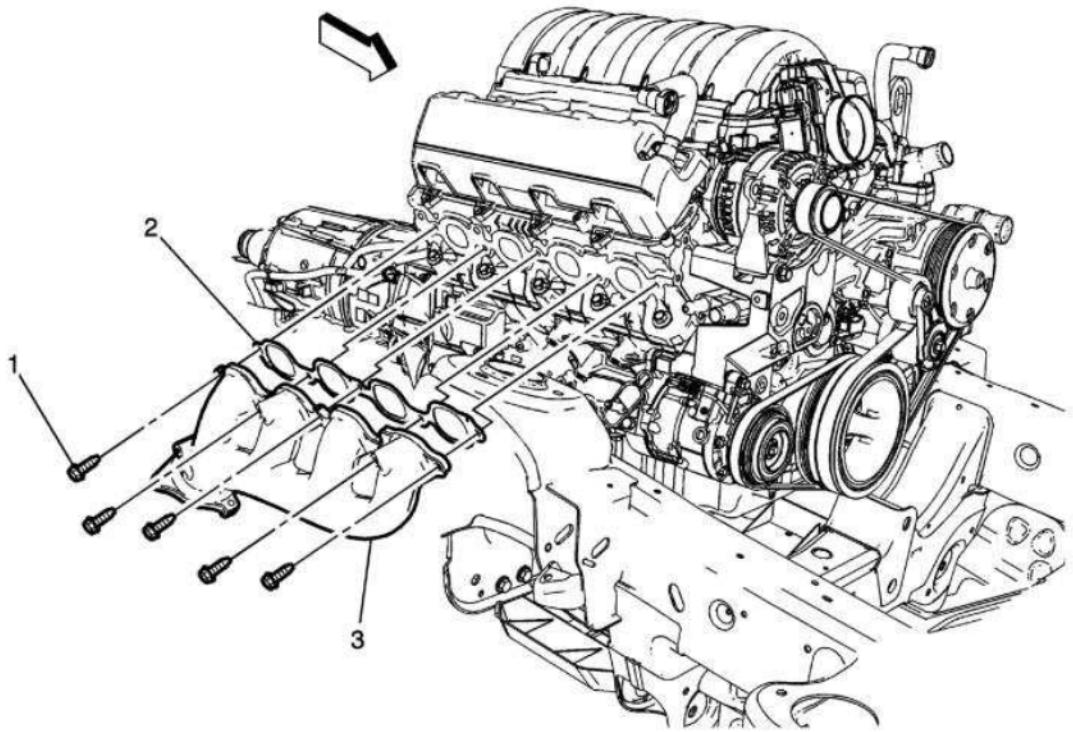


Fig. 11: Exhaust Manifold - Right Side (L83, L86)
Courtesy of GENERAL MOTORS COMPANY

2. Install a NEW exhaust manifold gasket. (2)
3. Install Exhaust Manifold (3)

CAUTION: Refer to Fastener Caution .

4. Install Exhaust Manifold Fastener (1) (Qty: 5)
   - When installing exhaust manifold to the existing cylinder head:

     Tighten

cardiagn.com

23 N.m (17 lb ft)

- When installing exhaust manifold to a NEW cylinder head:

  Tighten

  27 N.m (20 lb ft)

5. Install Three-Way Catalytic Converter. Refer to **Three-Way Catalytic Converter Replacement**
6. Install Front Wheelhouse Liner. Refer to **Front Wheelhouse Liner Replacement - Right Side (Cadillac)** **Front Wheelhouse Liner Replacement - Right Side (Chevrolet)** **Front Wheelhouse Liner Replacement - Right Side (GMC)**
7. Install the spark plug wire to the spark plug.

cardiagn.com

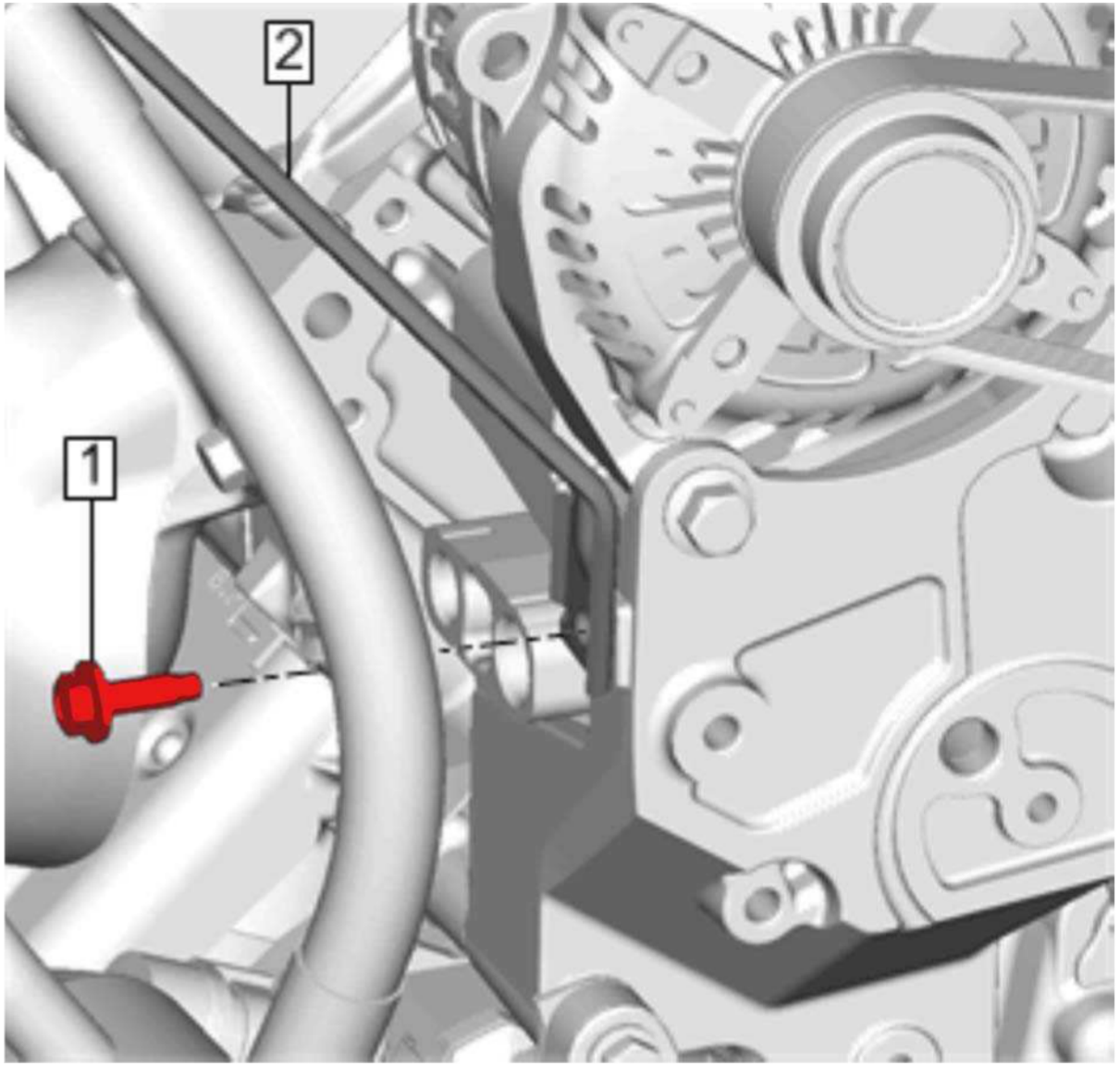


Fig. 12: Air Conditioning Evaporator Hose Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

8. Install Air Conditioning Evaporator Hose Bracket (2)
9. Install and tighten Air Conditioning Evaporator Hose Bracket Bolt (1) @ Generator Bracket to 22 N.m (16 lb ft)

cardiagn.com

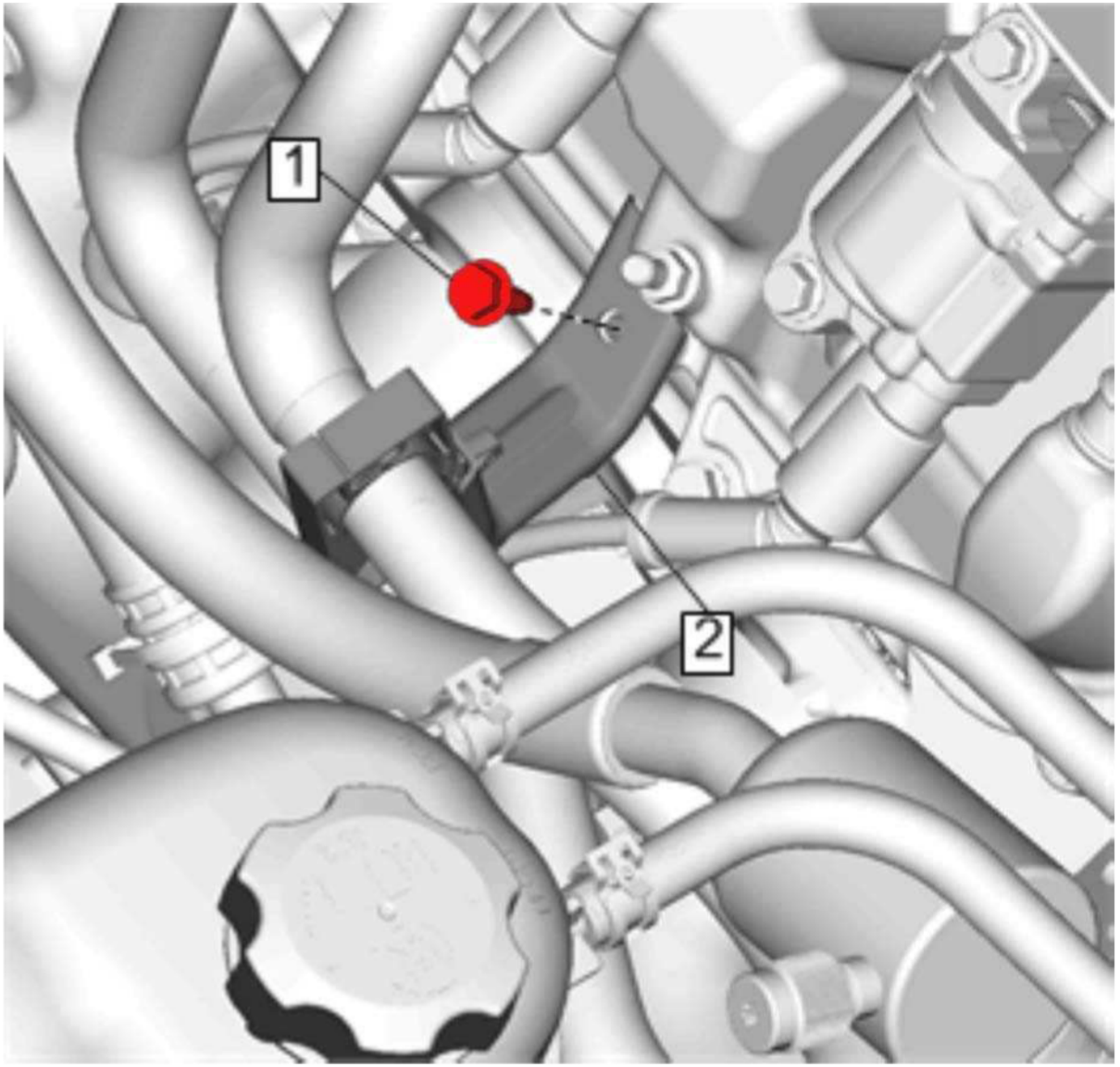


Fig. 13: Heater Inlet and Outlet Hose Bracket Bolt
Courtesy of GENERAL MOTORS COMPANY

10. Install Heater Inlet and Outlet Hose Bracket (2)
11. Install and tighten Heater Inlet and Outlet Hose Bracket Bolt (1) to 9 N.m (80 lb in)
12. Install Valve Rocker Arm Cover Insulator. Refer to **Valve Rocker Arm Cover Insulator Replacement - Right Side**

cardiagn.com

EXHAUST MANIFOLD REPLACEMENT - RIGHT SIDE (L96)

Removal Procedure

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

1. Remove Spark Plugs. Refer to **Spark Plug Replacement**
2. Remove Oil Level Indicator Tube. Refer to **Oil Level Indicator Tube Replacement**
3. Disconnect Three-Way Catalytic Converter @ Exhaust Manifold. Refer to **Three-Way Catalytic Converter Replacement**

cardiagn.com

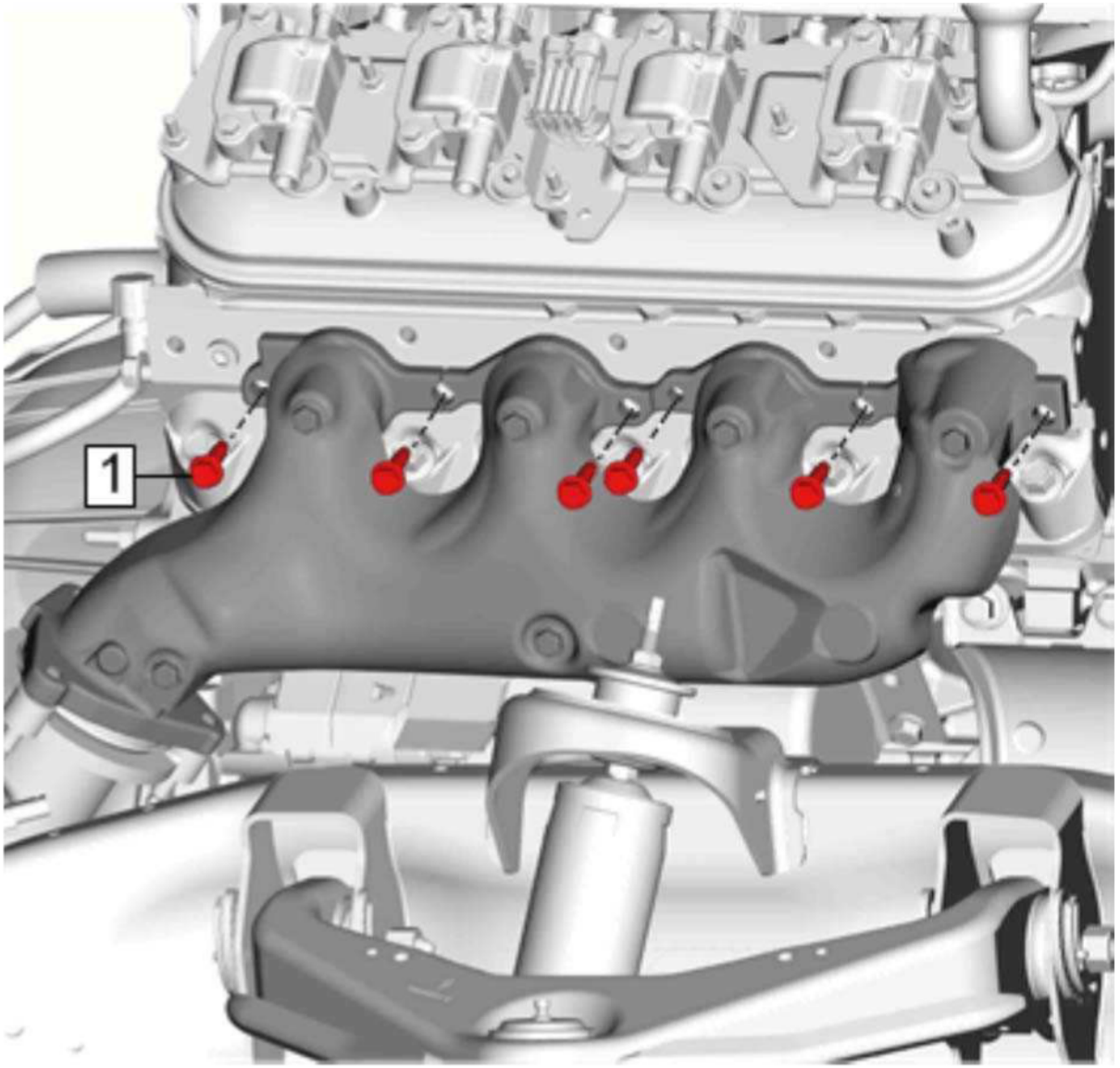


Fig. 14: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

4. Remove Exhaust Manifold Fastener (1) (Qty: 6)

cardiagn.com

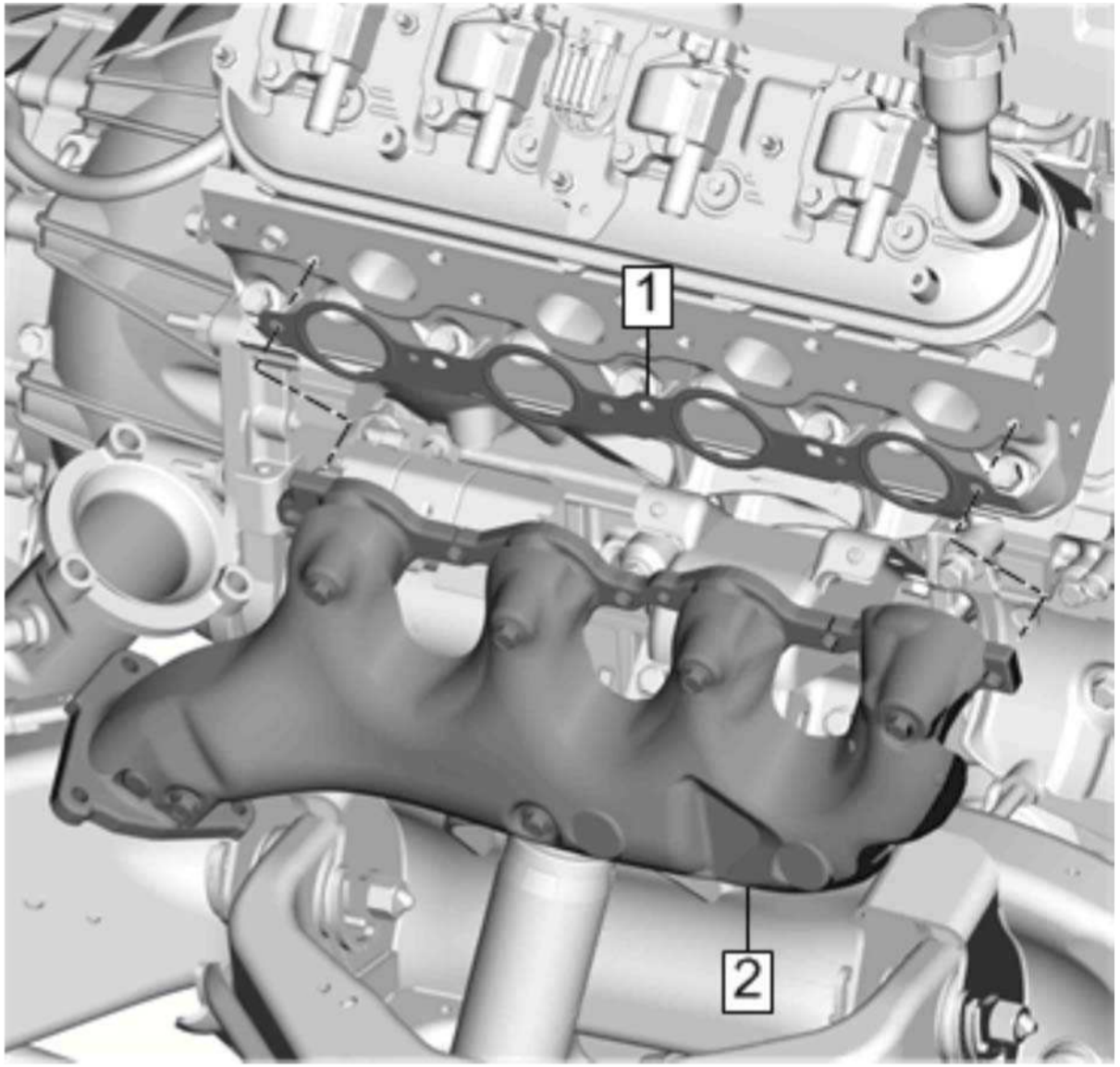


Fig. 15: Exhaust Manifold And Gasket
Courtesy of GENERAL MOTORS COMPANY

5. Remove Exhaust Manifold (2)
6. Remove and DISCARD Exhaust Manifold Gasket (1)

cardiagn.com

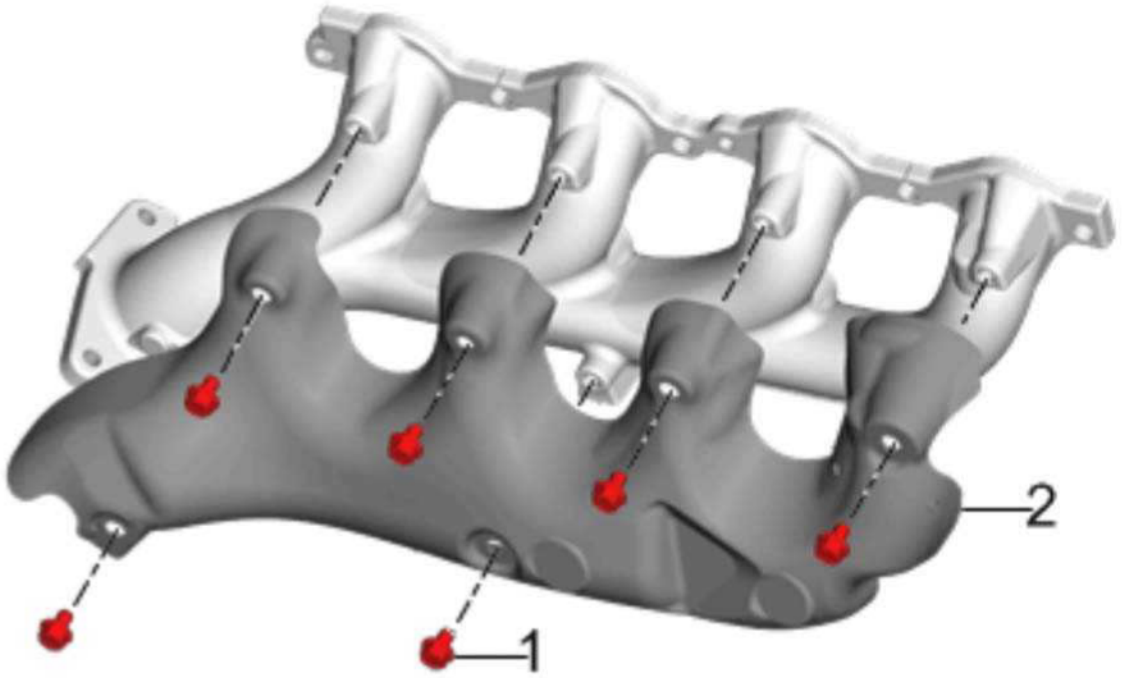


Fig. 16: Exhaust Manifold Heat Shield And Bolts
Courtesy of GENERAL MOTORS COMPANY

7. Remove Exhaust Manifold Heat Shield Bolt (1) (Qty: 6)
8. Remove Exhaust Manifold Heat Shield (2)

cardiagn.com

Installation Procedure

1. Clean the exhaust manifold sealing surface.

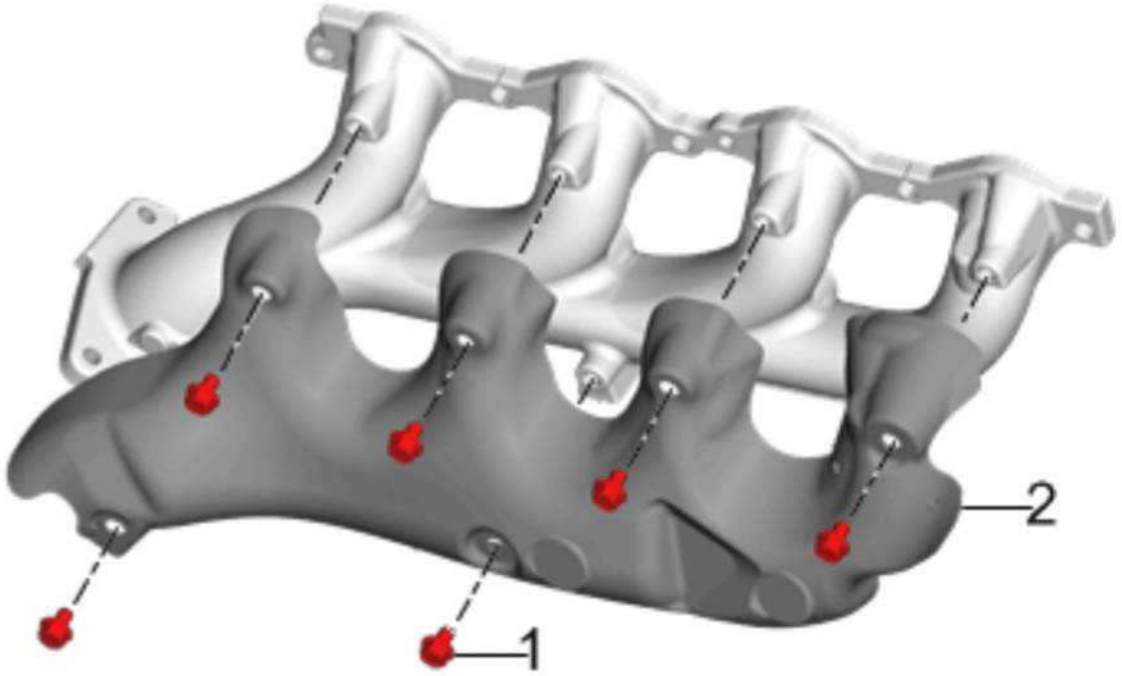


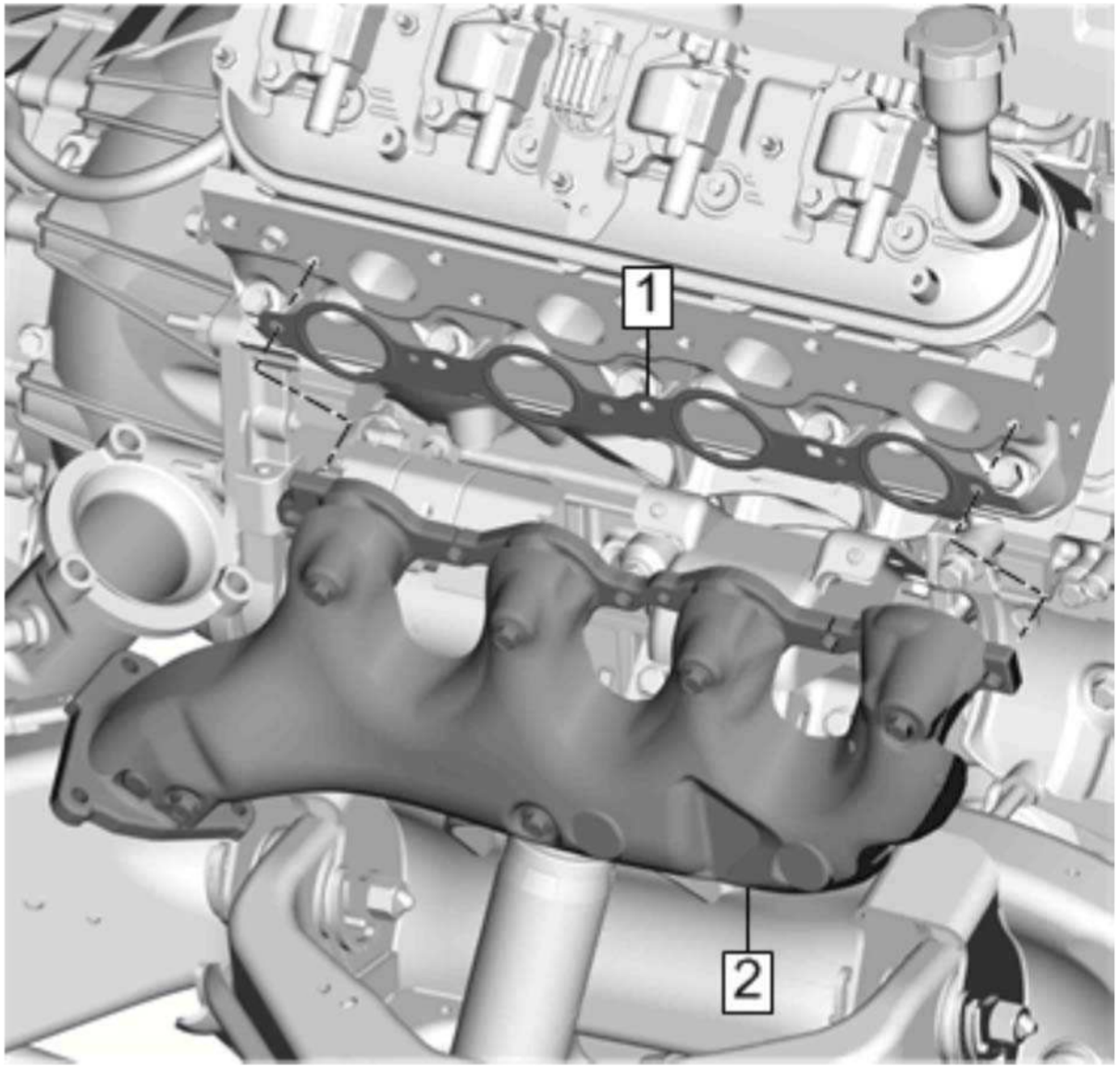
Fig. 17: Exhaust Manifold Heat Shield And Bolts
Courtesy of GENERAL MOTORS COMPANY

cardiagn.com

2. Install Exhaust Manifold Heat Shield (2)

CAUTION: **Refer to Fastener Caution .**

3. Install and tighten Exhaust Manifold Heat Shield Bolt (1) (Qty: 6) to 10 N.m (89 lb in)



cardiagn.com

Fig. 18: Exhaust Manifold And Gasket
Courtesy of GENERAL MOTORS COMPANY

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

4. Install Exhaust Manifold Gasket (1)
5. Install Exhaust Manifold (2)

cardiagn.com

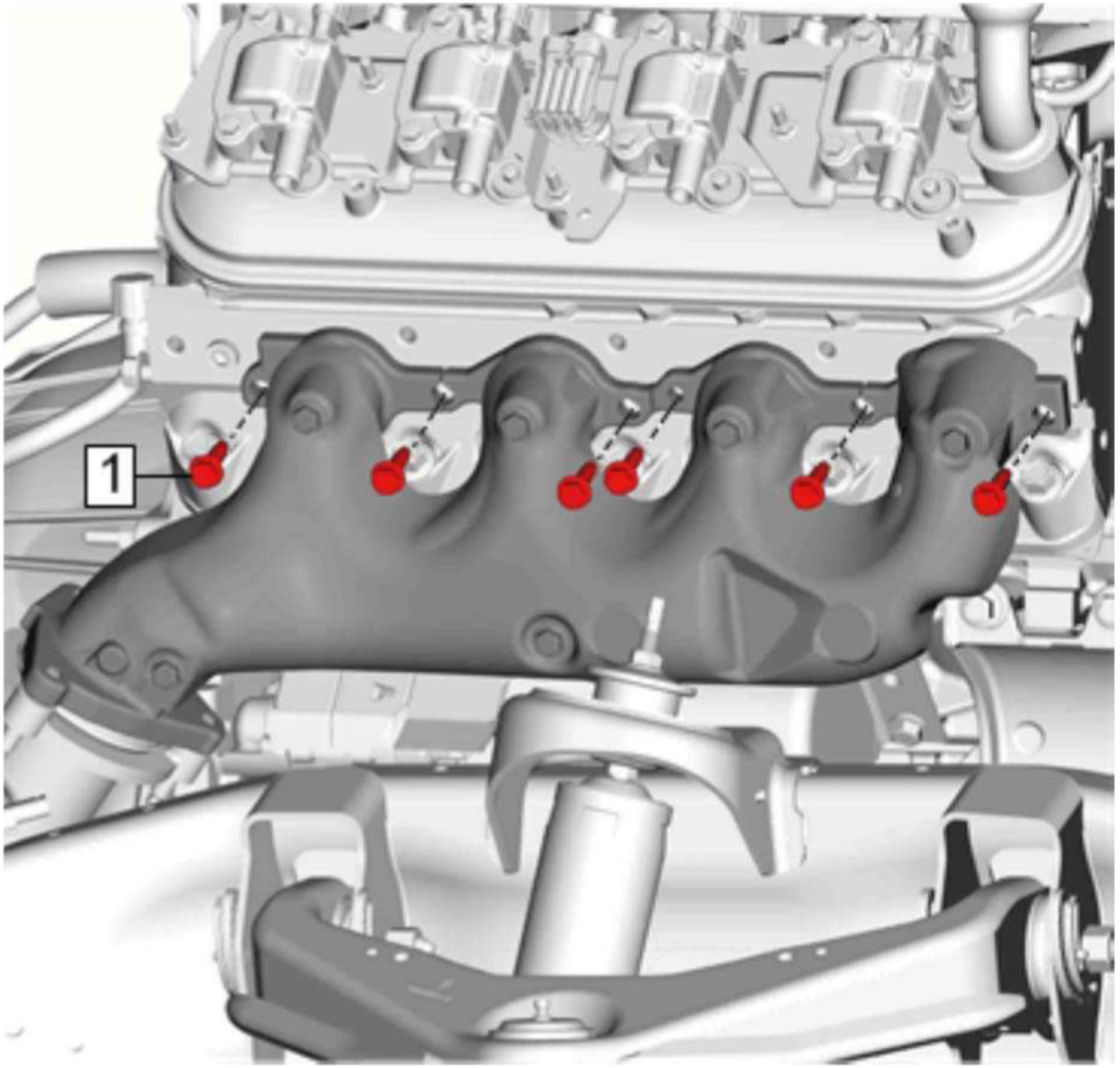


Fig. 19: Exhaust Manifold Fasteners
Courtesy of GENERAL MOTORS COMPANY

6. Tighten Exhaust Manifold Fastener (1) in sequence (Qty: 6)
    1. Tighten the exhaust manifold bolts a first pass to 15 N.m (11 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.

cardiagn.com

2. Tighten the exhaust manifold bolts a final pass to 20 N.m (15 lb ft). Tighten the exhaust manifold bolts beginning with the center 2 bolts. Alternate from side-to-side, and work toward the outside bolts.

7. Connect Three-Way Catalytic Converter @ Exhaust Manifold. Refer to **Three-Way Catalytic Converter Replacement**
8. Install Oil Level Indicator Tube. Refer to **Oil Level Indicator Tube Replacement**
9. Install Spark Plugs. Refer to **Spark Plug Replacement**

EXHAUST SEAL REPLACEMENT (L83, L86)

Removal Procedure

WARNING: Refer to Exhaust Service Warning .

WARNING: Refer to Eye Protection Warning .

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

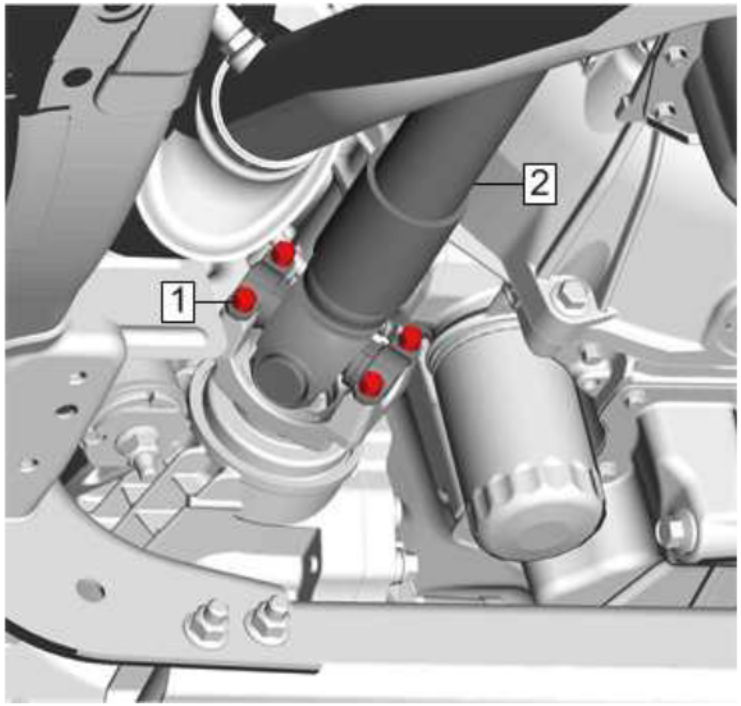


Fig. 20: Front U-joint Yoke Retainer Bolts And Front Axle Propeller Shaft

cardiagn.com

Courtesy of GENERAL MOTORS COMPANY

2. If equipped with 4WD, remove the front U-joint yoke retainer bolts (1) of the front axle propeller shaft (2) and reposition the propeller shaft. Refer to **Front Axle Propeller Shaft Replacement (NPO)** **Front Axle Propeller Shaft Replacement (NQH)** **Front Axle Propeller Shaft Replacement (Heavy Duty)** .
3. Disconnect the heated oxygen sensor bank 1 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1** .
4. Disconnect the heated oxygen sensor bank 1 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2** .
5. Disconnect the heated oxygen sensor bank 2 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** .
6. Disconnect the heated oxygen sensor bank 2 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .
7. Remove the transmission support cross member. Refer to **Transmission Support Crossmember Replacement (2WD)** **Transmission Support Crossmember Replacement (4WD)** .

cardiagn.com

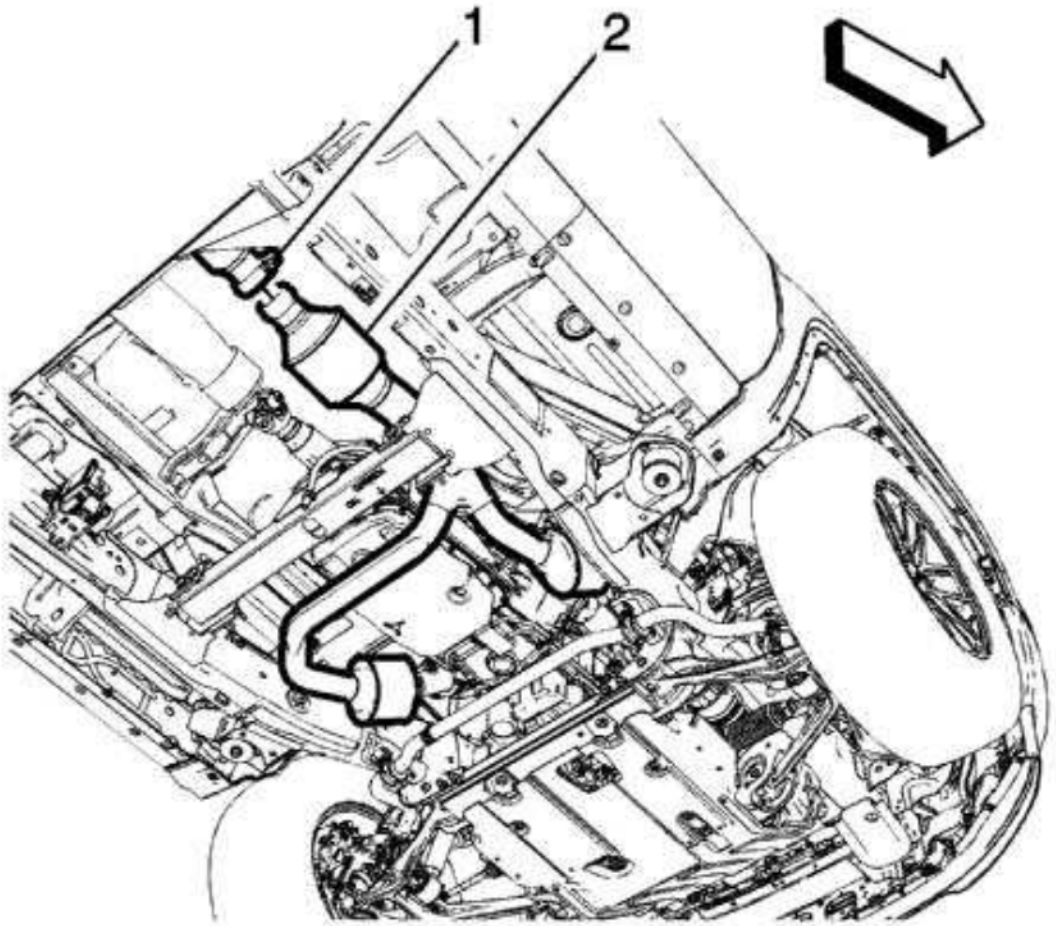


Fig. 21: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

8. Loosen the exhaust muffler clamp fastener (1) and detach the exhaust front pipe (2) from the exhaust muffler.
9. Support the exhaust front pipe (2) with mechanics wire.

cardiagn.com

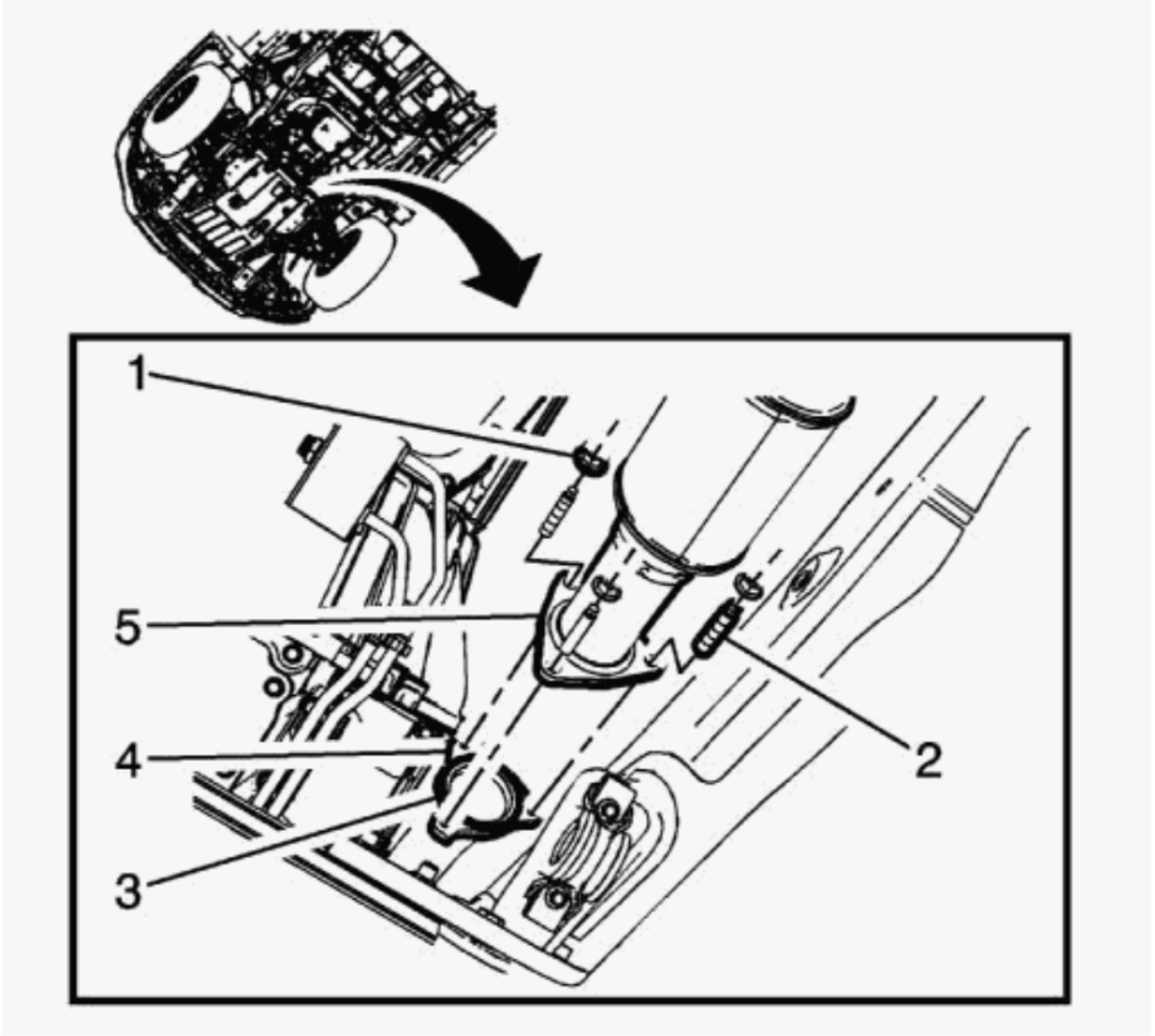


Fig. 22: Exhaust Front Pipe Right Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

10. Remove the exhaust front pipe right catalytic converter fasteners (1) and if necessary, remove the exhaust manifold studs (2).
11. Remove the right catalytic converter (5), from the right exhaust manifold (4), and discard the exhaust manifold seal (3).

cardiagn.com

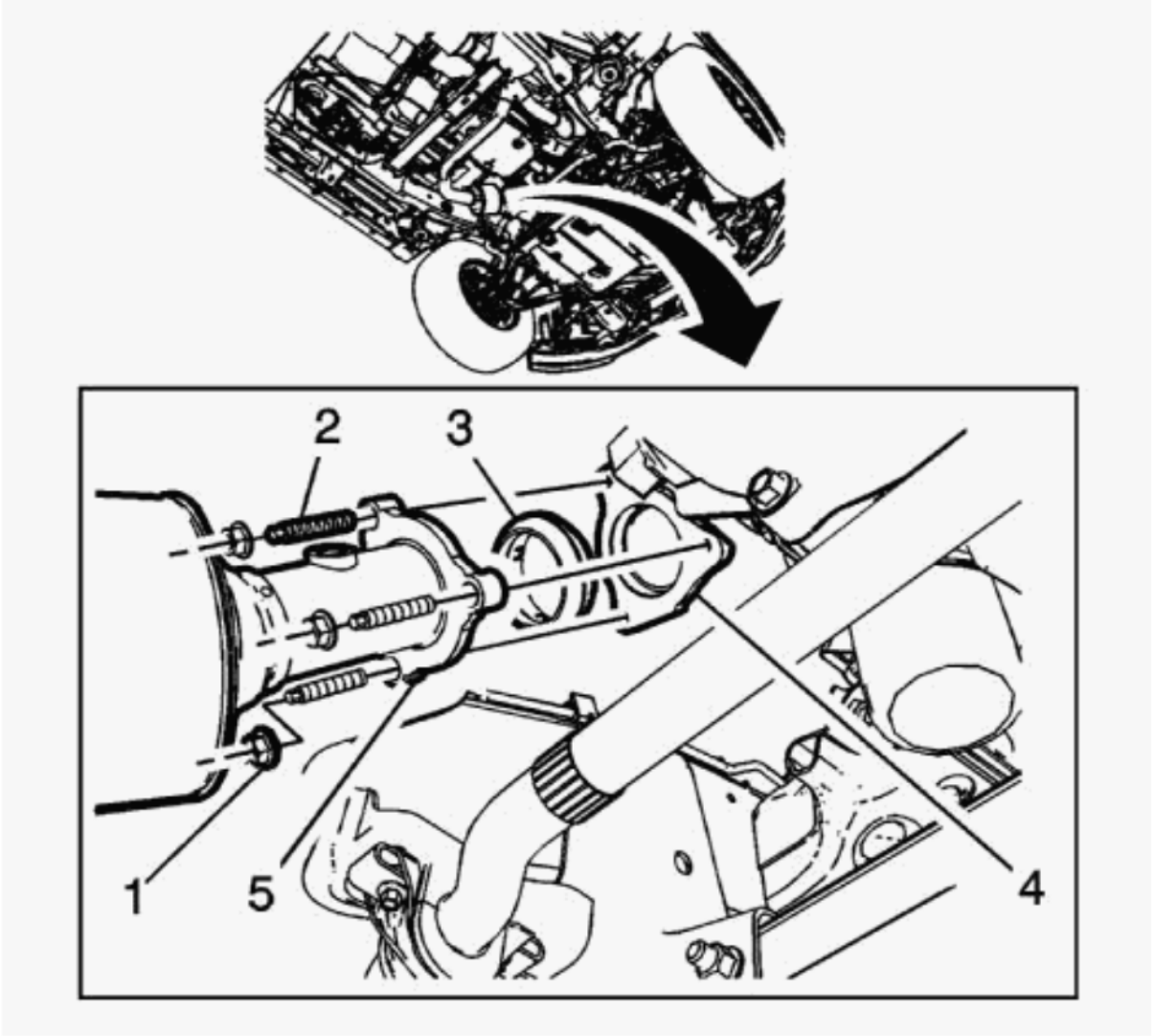


Fig. 23: Exhaust Front Pipe Left Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

12. Remove the exhaust front pipe left catalytic converter fasteners (1) and if necessary, remove the left exhaust manifold studs (2).
13. Remove the left catalytic converter (5), from the left exhaust manifold (4), and discard the exhaust manifold seal (3).

cardiagn.com

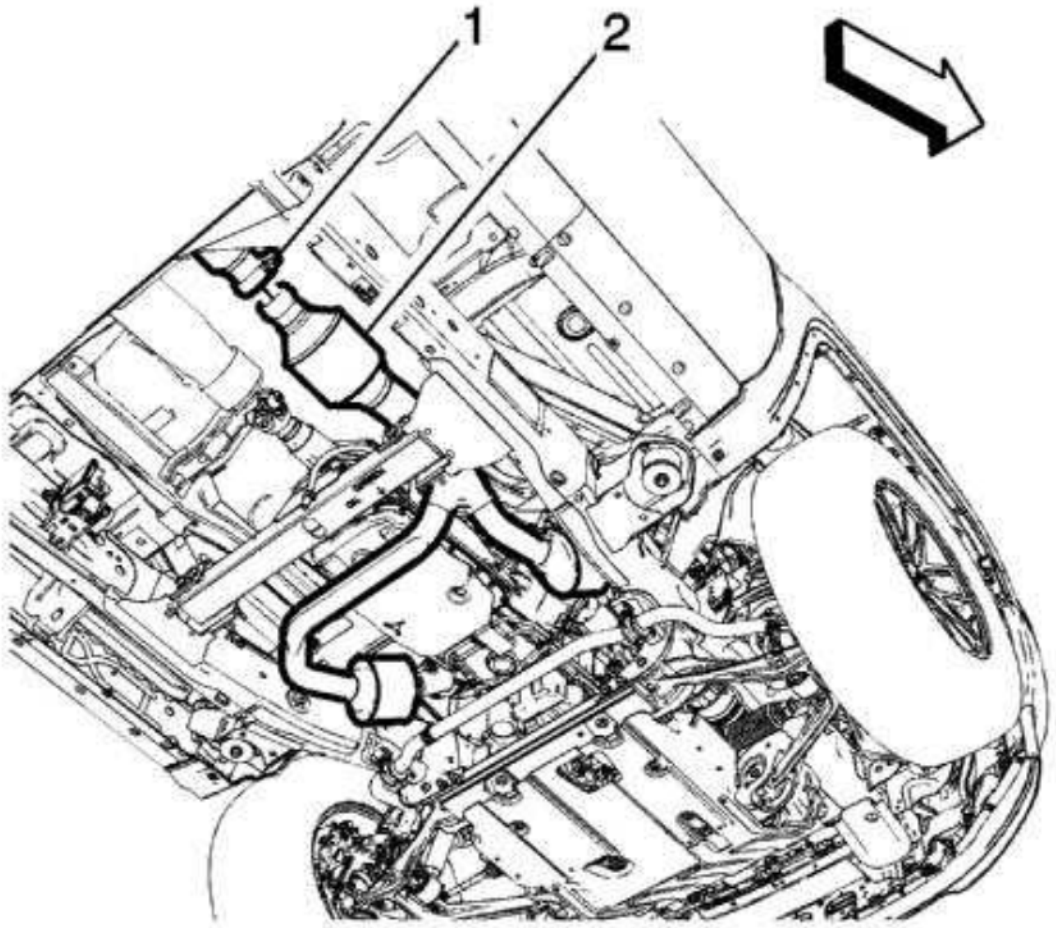


Fig. 24: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If replacing the exhaust front pipe, transfer the heated oxygen sensors to the NEW exhaust front pipe.**

14. Lower the exhaust front pipe (2) to the floor.

Installation Procedure

cardiagn.com

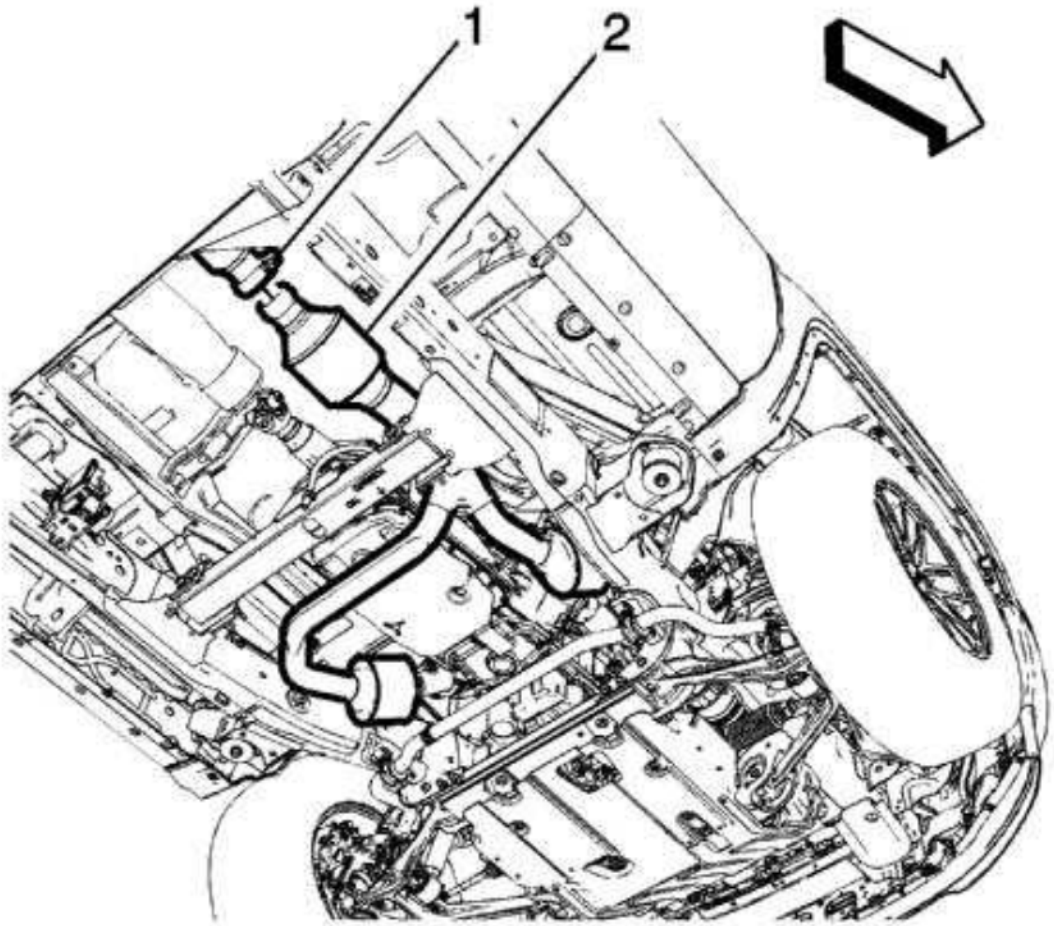


Fig. 25: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

1. Install the exhaust front pipe (2) into position.

cardiagn.com

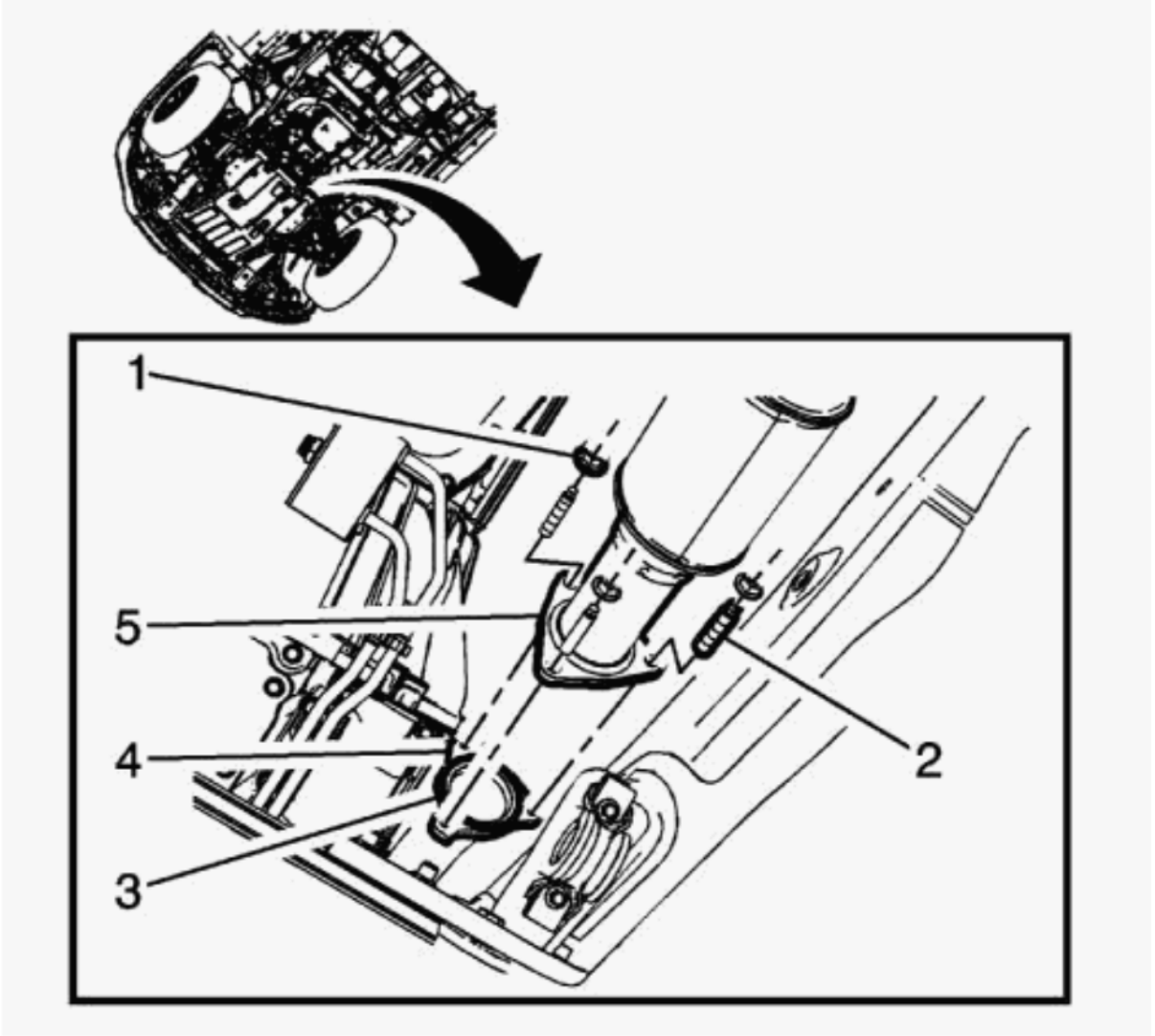


Fig. 26: Exhaust Front Pipe Right Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

2. Install the exhaust front pipe right catalytic converter (5) to the right exhaust manifold (4) with a NEW seal (3.).

CAUTION: Refer to Fastener Caution .

3. Install the exhaust manifold studs and tighten to 10 N.m (89 lb in).

cardiagn.com

4. Install the right catalytic converter fasteners (1) and tighten to 50 N.m (37 lb ft).

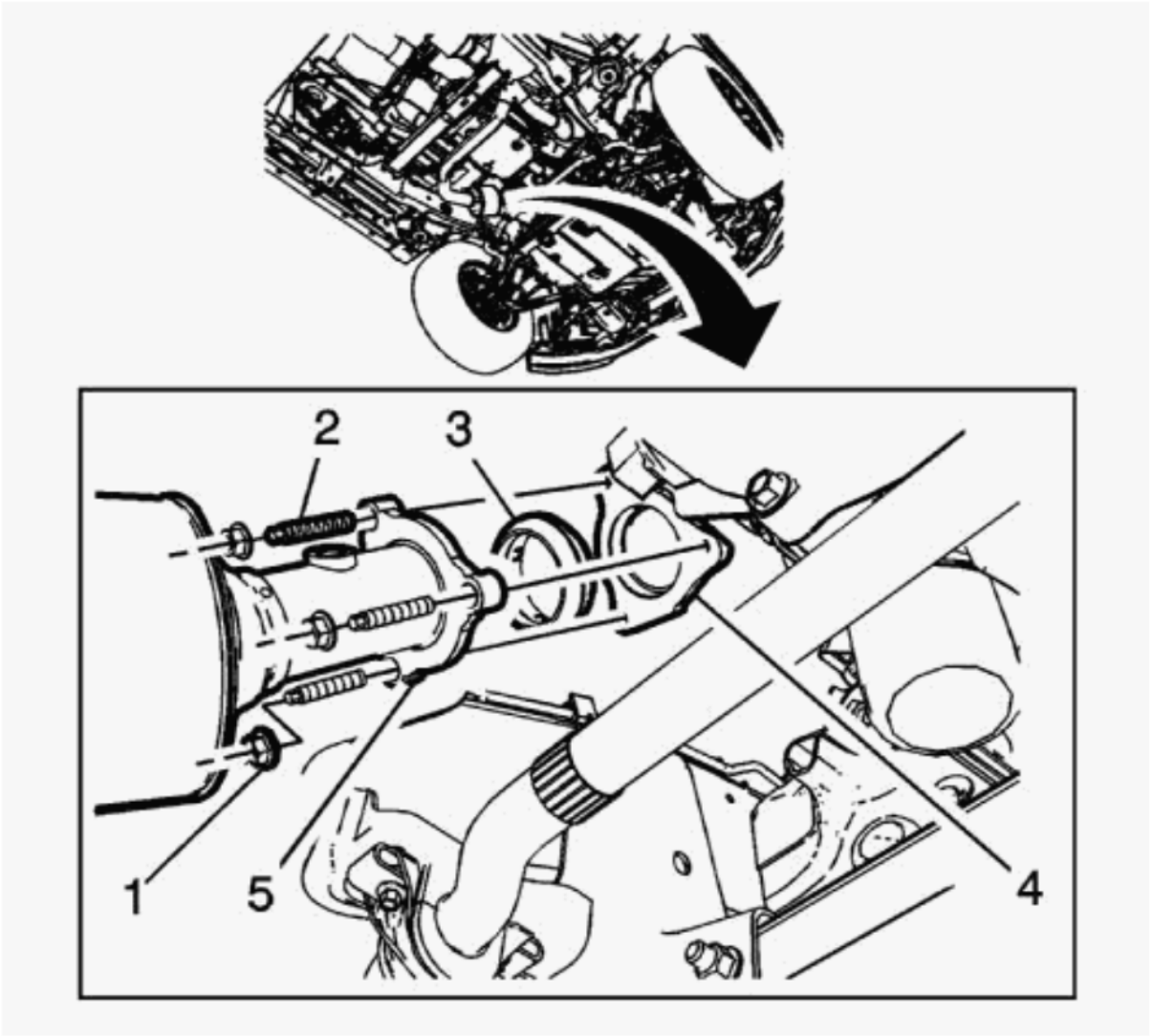


Fig. 27: Exhaust Front Pipe Left Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Install the exhaust front pipe left catalytic converter (5) to the left exhaust manifold (4) with a NEW seal (3).
6. Install the exhaust manifold studs (2) and tighten to 10 N.m (89 lb in).
7. Install the left catalytic converter fasteners (1) and tighten to 50 N.m (37 lb ft).

cardiagn.com

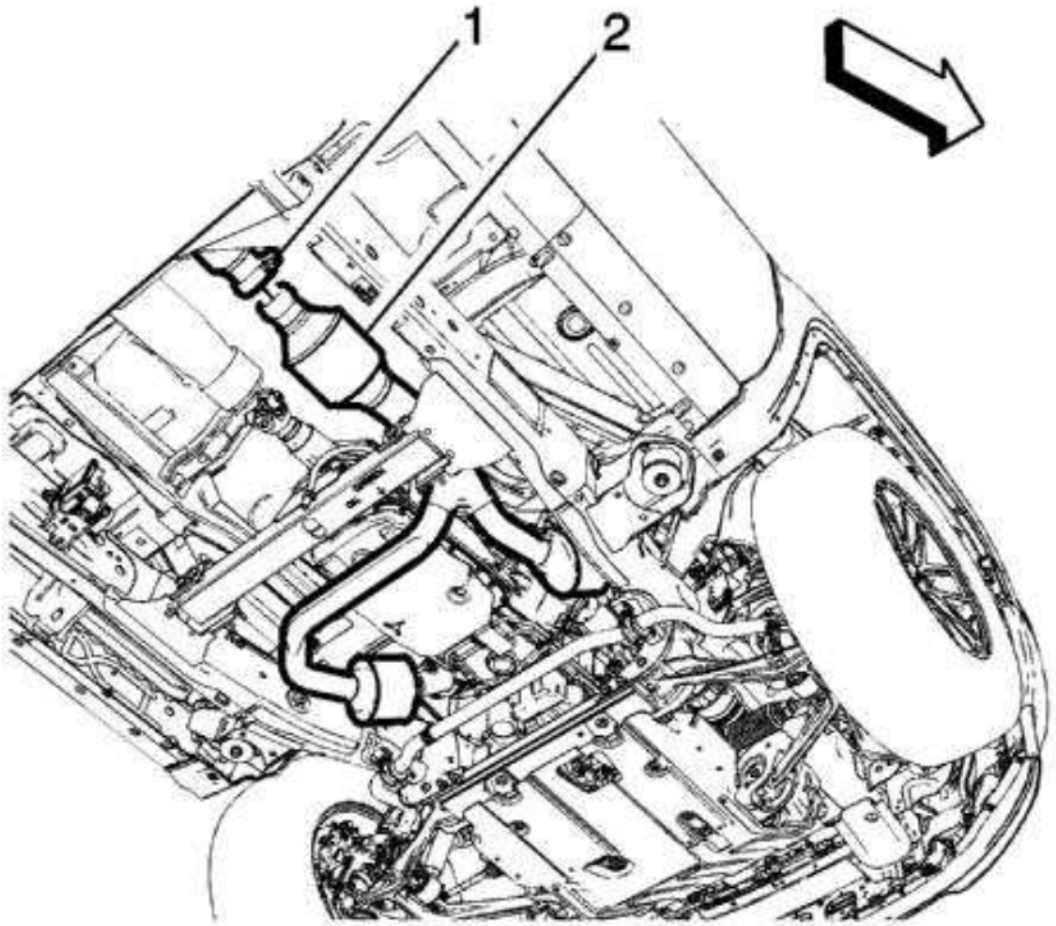


Fig. 28: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

8. Install the exhaust front pipe (2) into the exhaust muffler and tighten the exhaust clamp (1) to 30 N.m (22 lb ft).
9. Install the transmission support cross member. Refer to **Transmission Support Crossmember Replacement (2WD)** **Transmission Support Crossmember Replacement (4WD)** .
10. Connect the heated oxygen sensor bank 1 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1** .

cardiagn.com

11. Connect the heated oxygen sensor bank 1 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2** .
12. Connect the heated oxygen sensor bank 2 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** .
13. Connect the heated oxygen sensor bank 2 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .

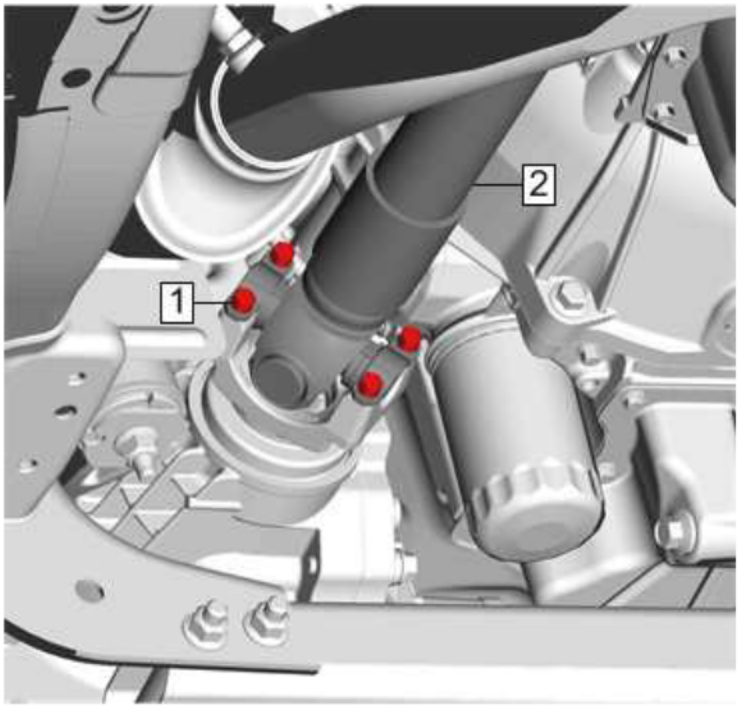


Fig. 29: Front U-joint Yoke Retainer Bolts And Front Axle Propeller Shaft
Courtesy of GENERAL MOTORS COMPANY

14. If equipped with 4WD, install the front axle propeller shaft (2) and tighten the U-joint yoke retainer bolts (1) to 25 N.m (18 lb ft). Refer to **Front Axle Propeller Shaft Replacement (NPO)** **Front Axle Propeller Shaft Replacement (NQH)** **Front Axle Propeller Shaft Replacement (Heavy Duty)** .
15. Start the engine and check for exhaust leaks.

EXHAUST SEAL REPLACEMENT (L96)

Removal Procedure

WARNING: Refer to Exhaust Service Warning

cardiagn.com

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

1. Disconnect the heated oxygen sensor (HO2S). Refer to the following:
   - **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1**
   - **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2**
   - **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1**
   - **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2**
2. Support the transmission with a suitable transmission jack.
3. Remove the transmission support crossmember. Refer to **Transmission Support Crossmember Replacement (2WD)** **Transmission Support Crossmember Replacement (4WD)**

cardiagn.com

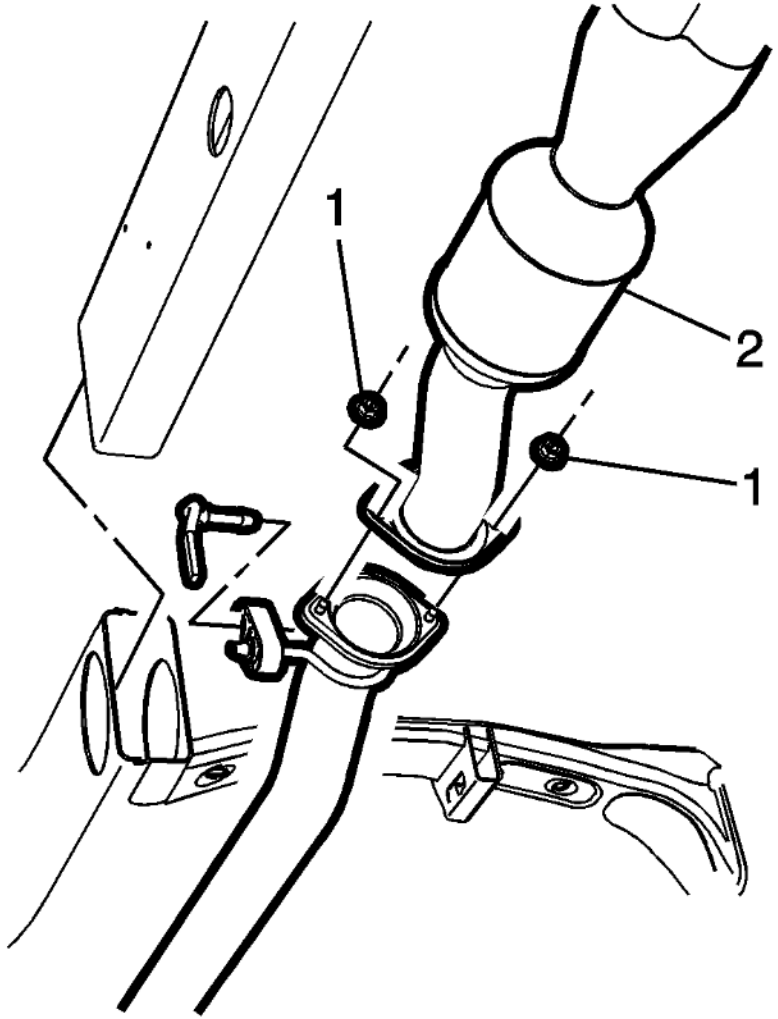


Fig. 30: Exhaust Manifold Pipe Nuts
Courtesy of GENERAL MOTORS COMPANY

4. Remove the exhaust muffler to exhaust manifold pipe nuts (1).

cardiagn.com

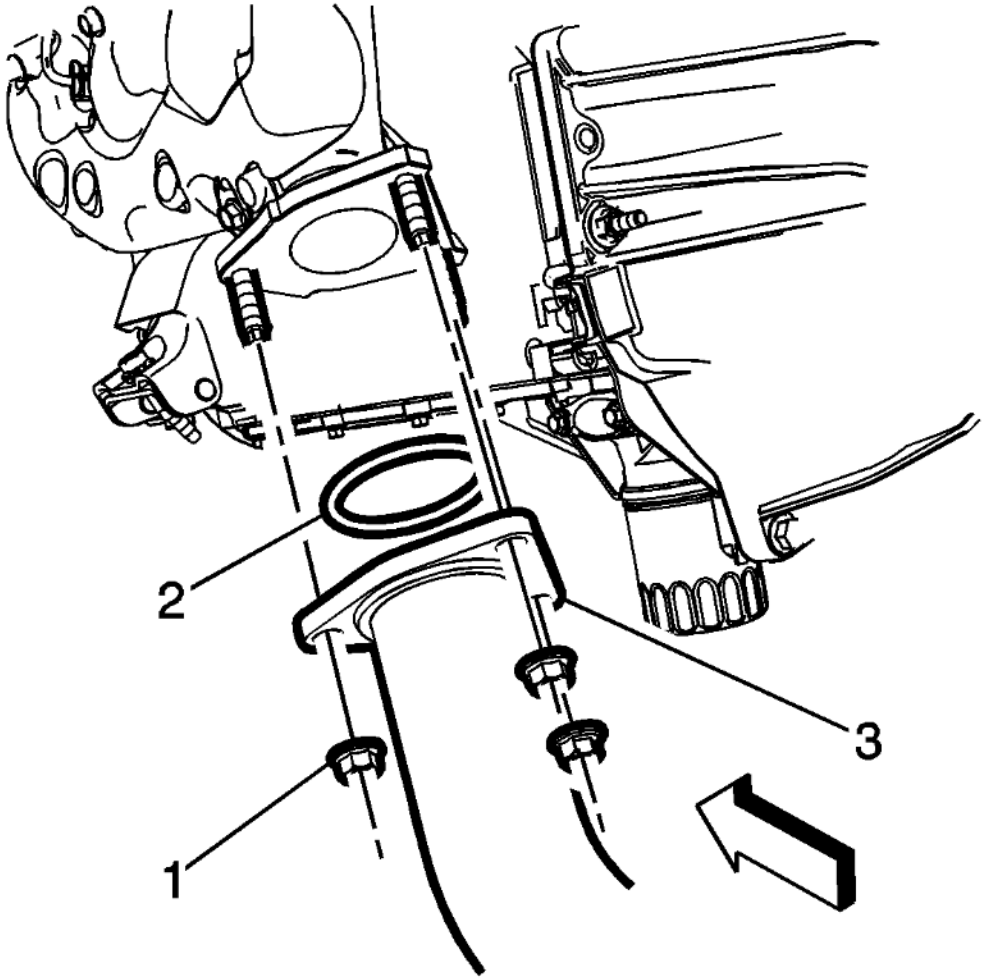


Fig. 31: Exhaust Manifold Nuts And Seal
Courtesy of GENERAL MOTORS COMPANY

5. Remove the exhaust manifold pipe to exhaust manifold nuts (1) and replace the seal (2) with a NEW one.

cardiagn.com

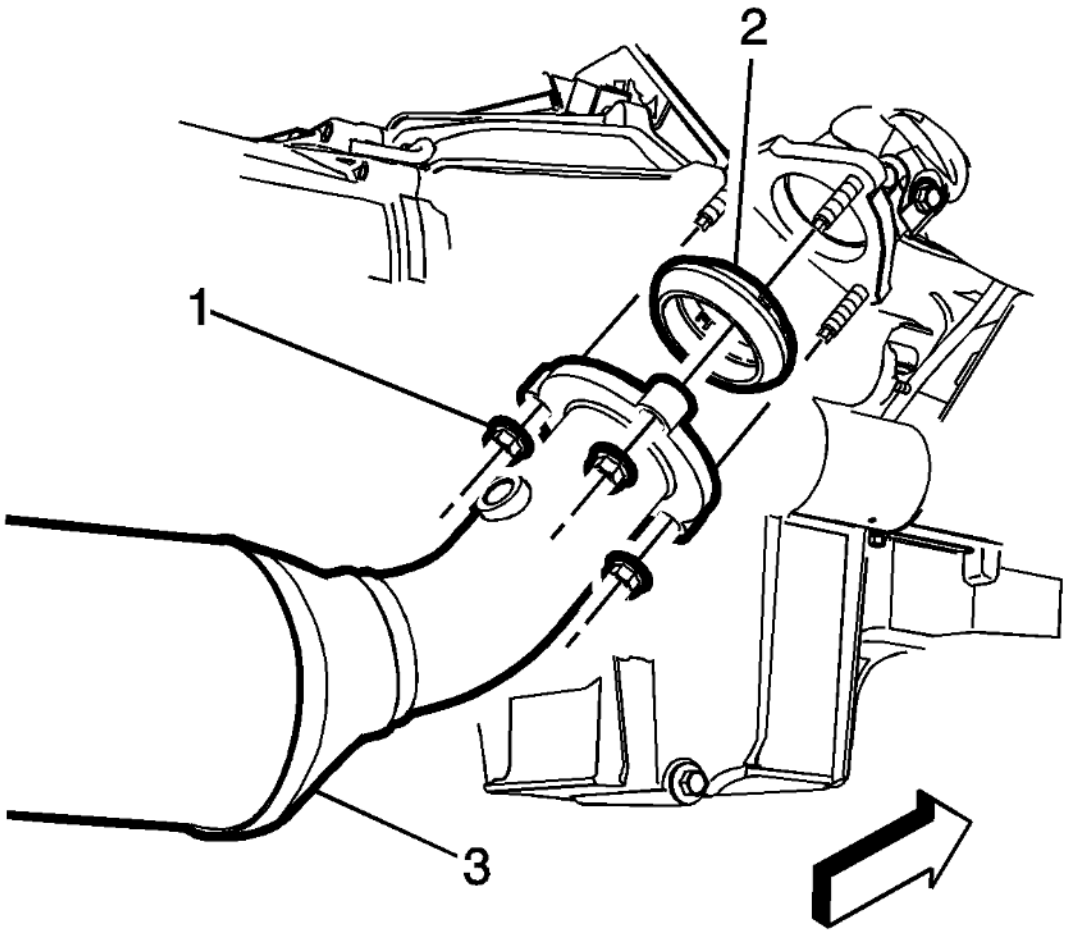


Fig. 32: Catalytic Converter And Nuts
Courtesy of GENERAL MOTORS COMPANY

6. Remove the right catalytic converter (3) from the exhaust manifold studs with the nuts (1).

Installation Procedure

cardiagn.com

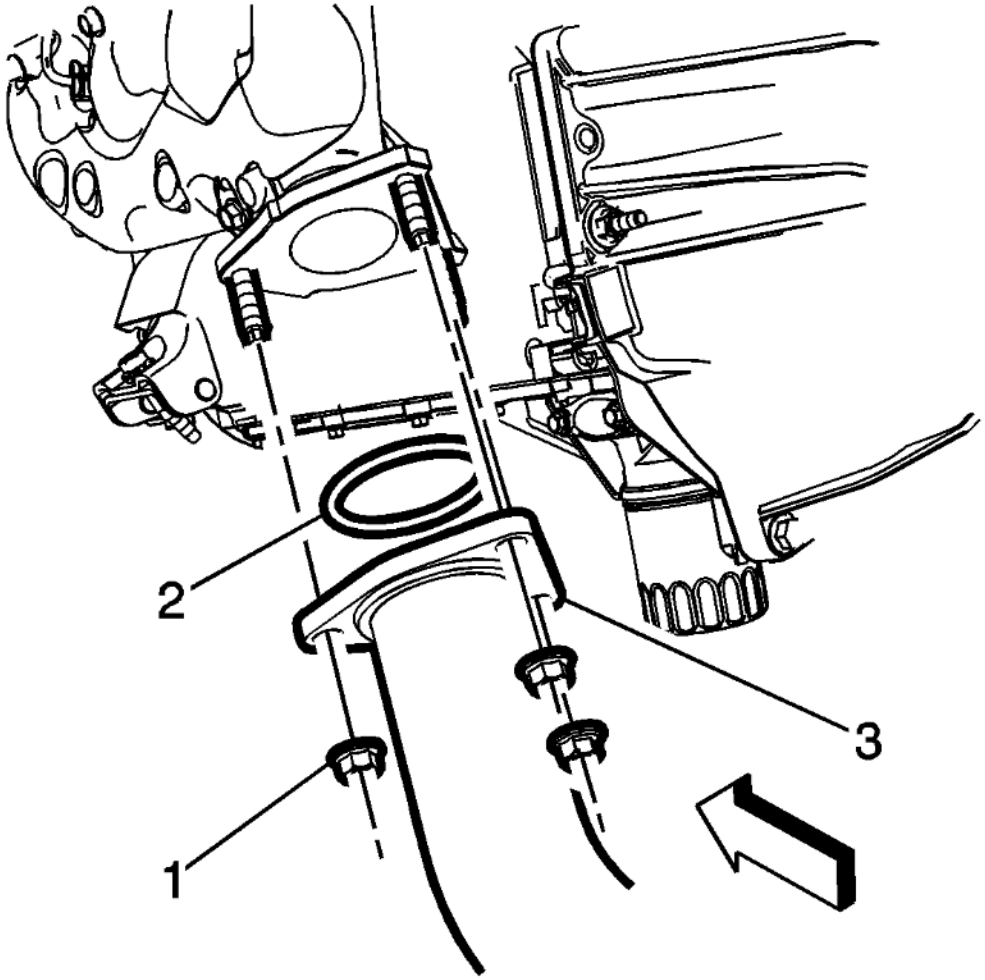


Fig. 33: Exhaust Manifold Nuts And Seal
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

1. Install a NEW seal (2) to the left manifold exhaust pipe. Tighten the nuts (1) to 50 N.m (37 lb ft)

cardiagn.com

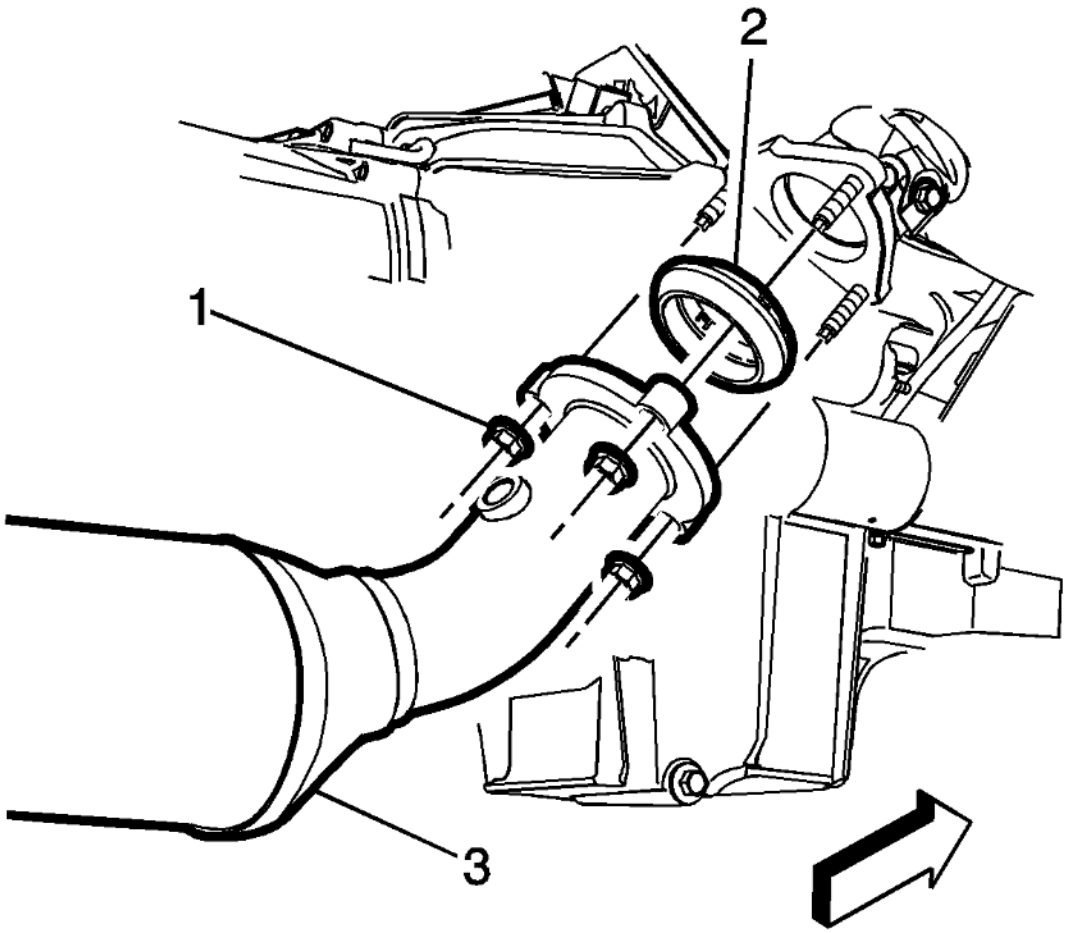


Fig. 34: Catalytic Converter And Nuts
Courtesy of GENERAL MOTORS COMPANY

2. Inspect the seal (2) and replace if worn or damaged.
3. Install the right catalytic converter to the exhaust manifold with nuts (1) and tighten to 50 N.m (37 lb ft).

cardiagn.com

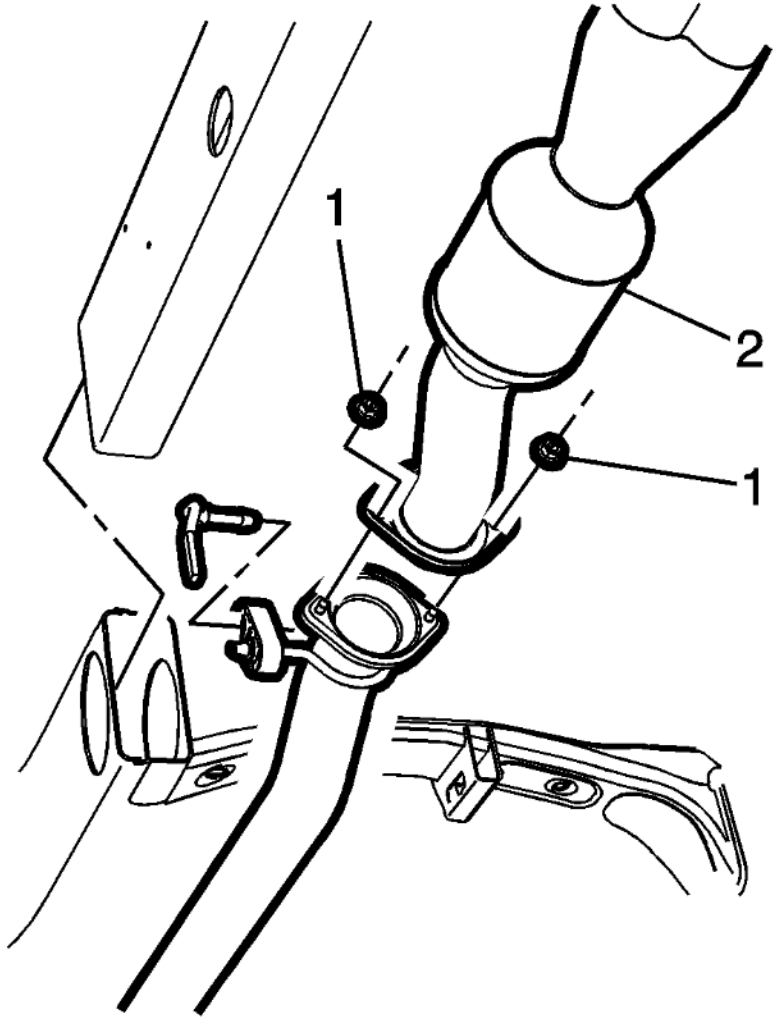


Fig. 35: Exhaust Manifold Pipe Nuts
Courtesy of GENERAL MOTORS COMPANY

4. Install the exhaust muffler to catalytic converter (2) with nuts (1) and tighten to 45 N.m (33 lb ft).
5. Install the transmission support crossmember. Refer to **Transmission Support Crossmember Replacement (2WD)** **Transmission Support Crossmember Replacement (4WD)**
6. Remove the support from the transmission.

cardiagn.com

7. Connect the HO2S sensors. Refer to the following:
    - **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1**
    - **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2**
    - **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1**
    - **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2**
8. Start the engine and check the front exhaust system for leaks.

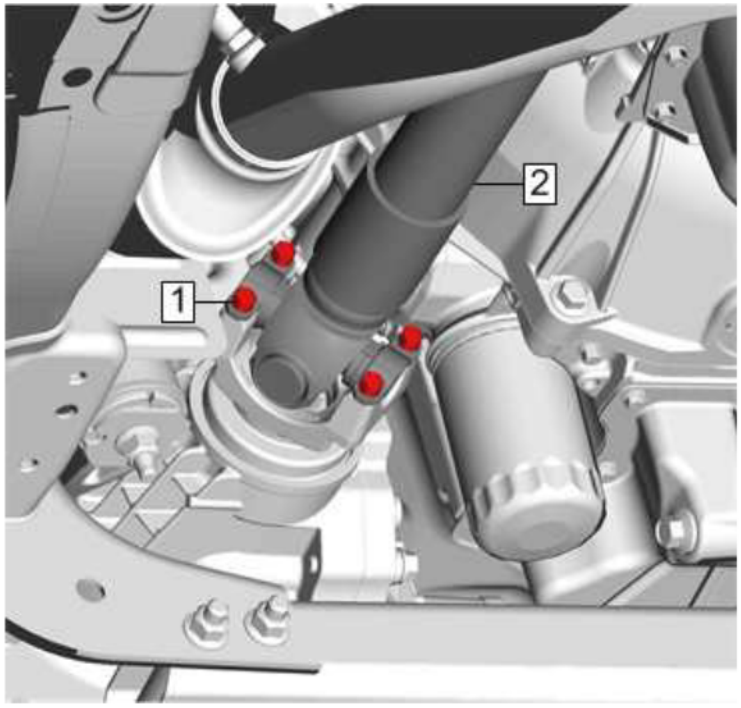
THREE-WAY CATALYTIC CONVERTER REPLACEMENT

Removal Procedure

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

WARNING: **Refer to Eye Protection Warning .**

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



cardiagn.com

Fig. 36: Front U-joint Yoke Retainer Bolts And Front Axle Propeller Shaft
Courtesy of GENERAL MOTORS COMPANY

2. If equipped with 4WD, remove the front U-joint yoke retainer bolts (1) of the front axle propeller shaft (2) and reposition the propeller shaft. Refer to **Front Axle Propeller Shaft Replacement (NPO)** **Front Axle Propeller Shaft Replacement (NQH)** **Front Axle Propeller Shaft Replacement (Heavy Duty)** .
3. Disconnect the heated oxygen sensor bank 1 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1** .
4. Disconnect the heated oxygen sensor bank 1 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2** .
5. Disconnect the heated oxygen sensor bank 2 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** .
6. Disconnect the heated oxygen sensor bank 2 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .
7. Remove the transmission support cross member. Refer to **Transmission Support Crossmember Replacement (2WD)** **Transmission Support Crossmember Replacement (4WD)** .

cardiagn.com

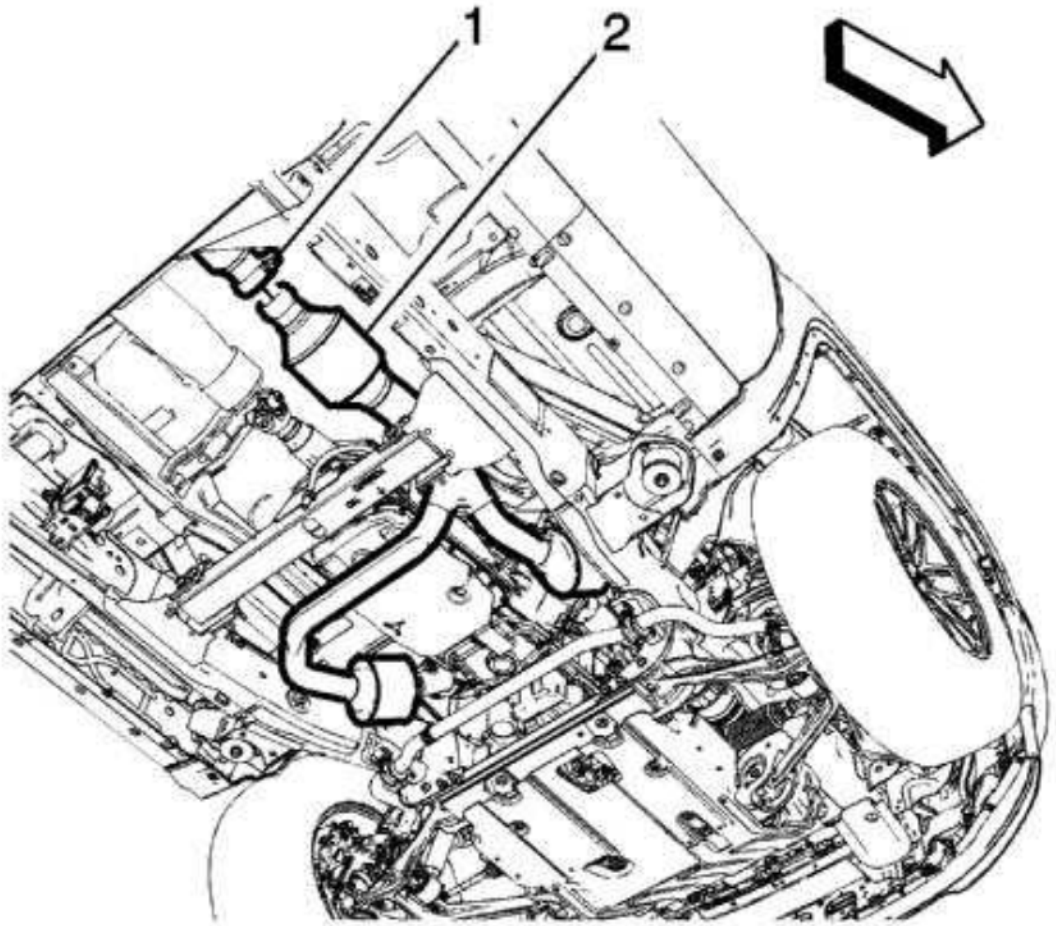


Fig. 37: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

8. Loosen the exhaust muffler clamp fastener (1) and detach the exhaust front pipe (2) from the exhaust muffler.
9. Support the exhaust front pipe (2) with mechanics wire.

cardiagn.com

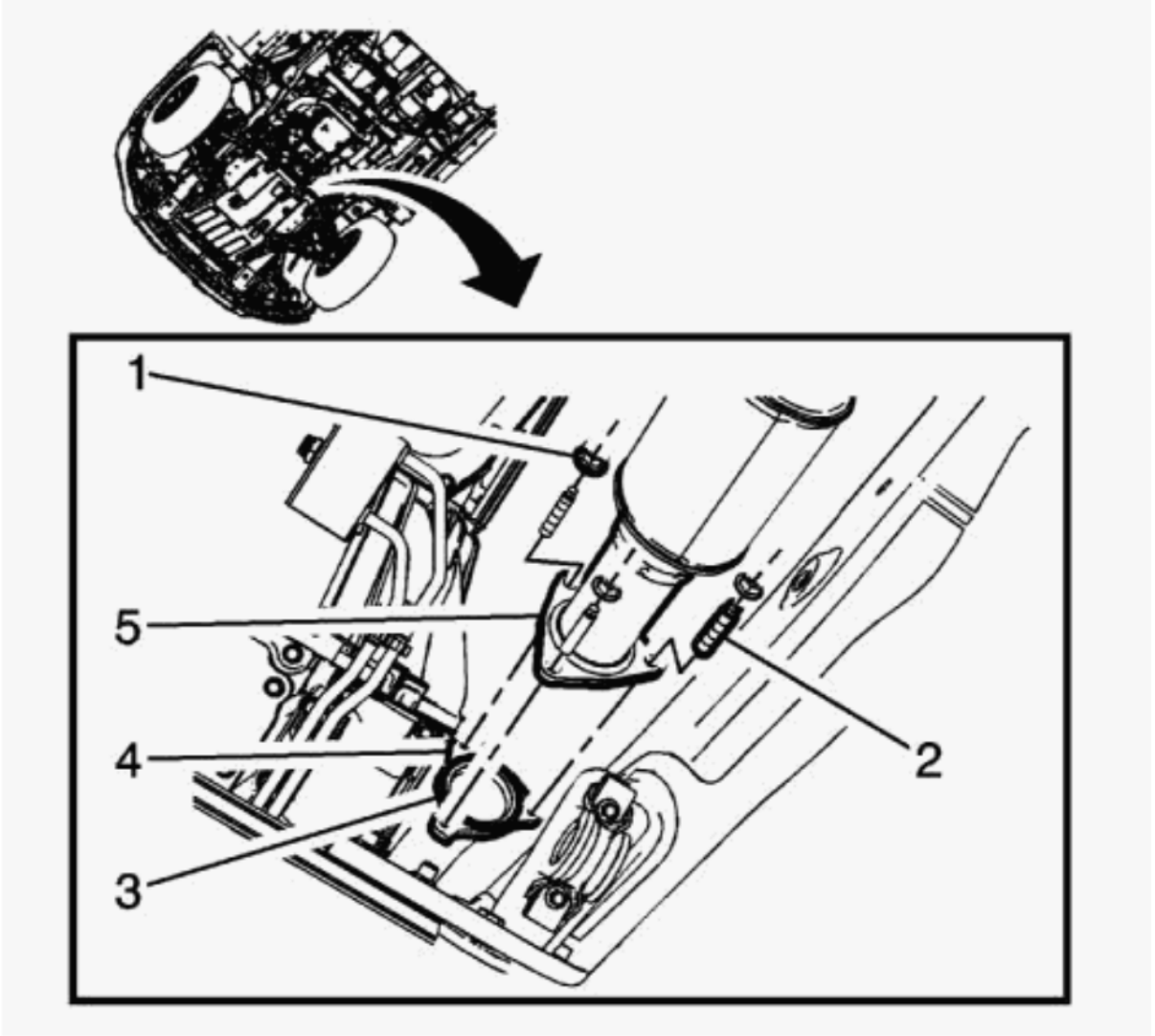


Fig. 38: Exhaust Front Pipe Right Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

10. Remove the exhaust front pipe right catalytic converter fasteners (1) and if necessary, remove the exhaust manifold studs (2).
11. Remove the right catalytic converter (5), from the right exhaust manifold (4), and discard the exhaust manifold seal (3).

cardiagn.com

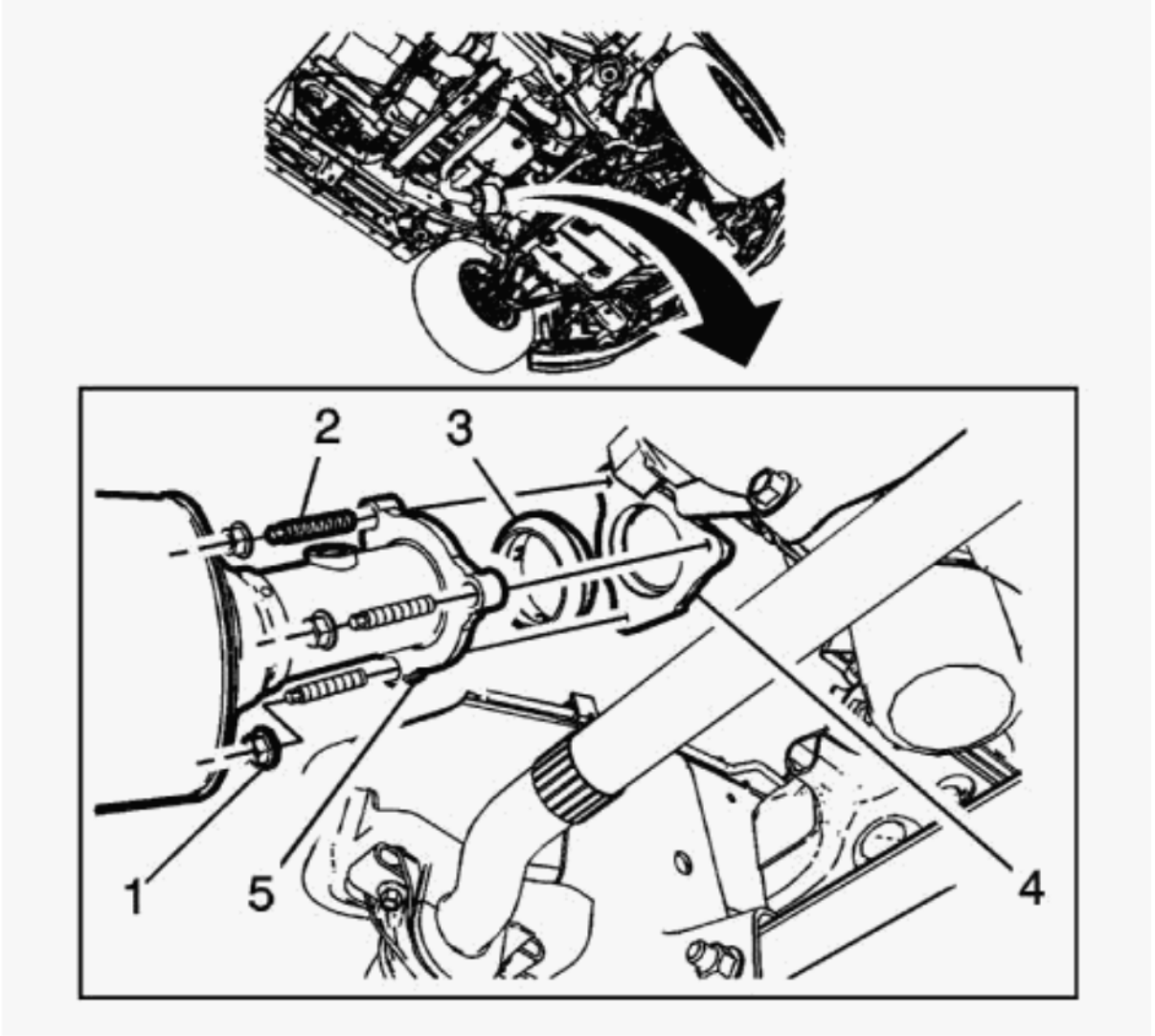


Fig. 39: Exhaust Front Pipe Left Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

12. Remove the exhaust front pipe left catalytic converter fasteners (1) and if necessary, remove the left exhaust manifold studs (2).
13. Remove the left catalytic converter (5), from the left exhaust manifold (4), and discard the exhaust manifold seal (3).

cardiagn.com

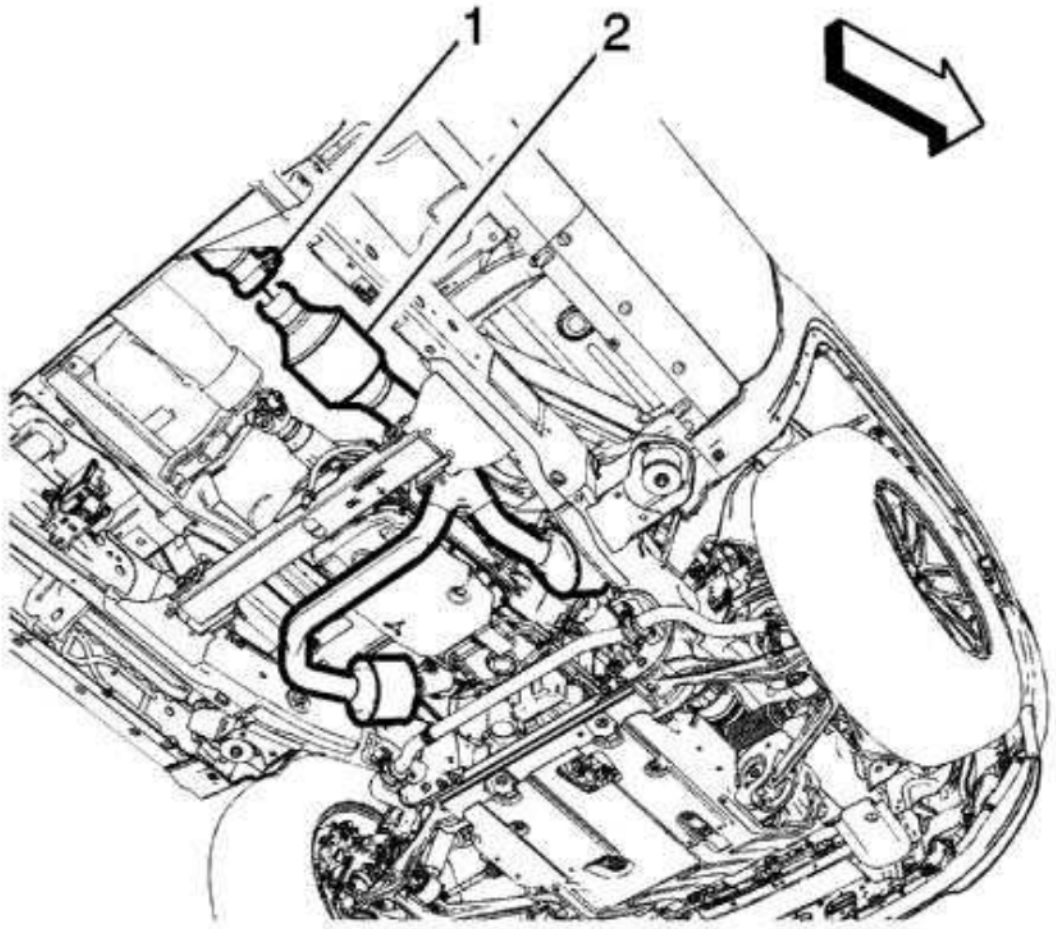


Fig. 40: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

NOTE: **If replacing the exhaust front pipe, transfer the heated oxygen sensors to the NEW exhaust front pipe.**

14. Lower the exhaust front pipe (2) to the floor.

Installation Procedure

cardiagn.com

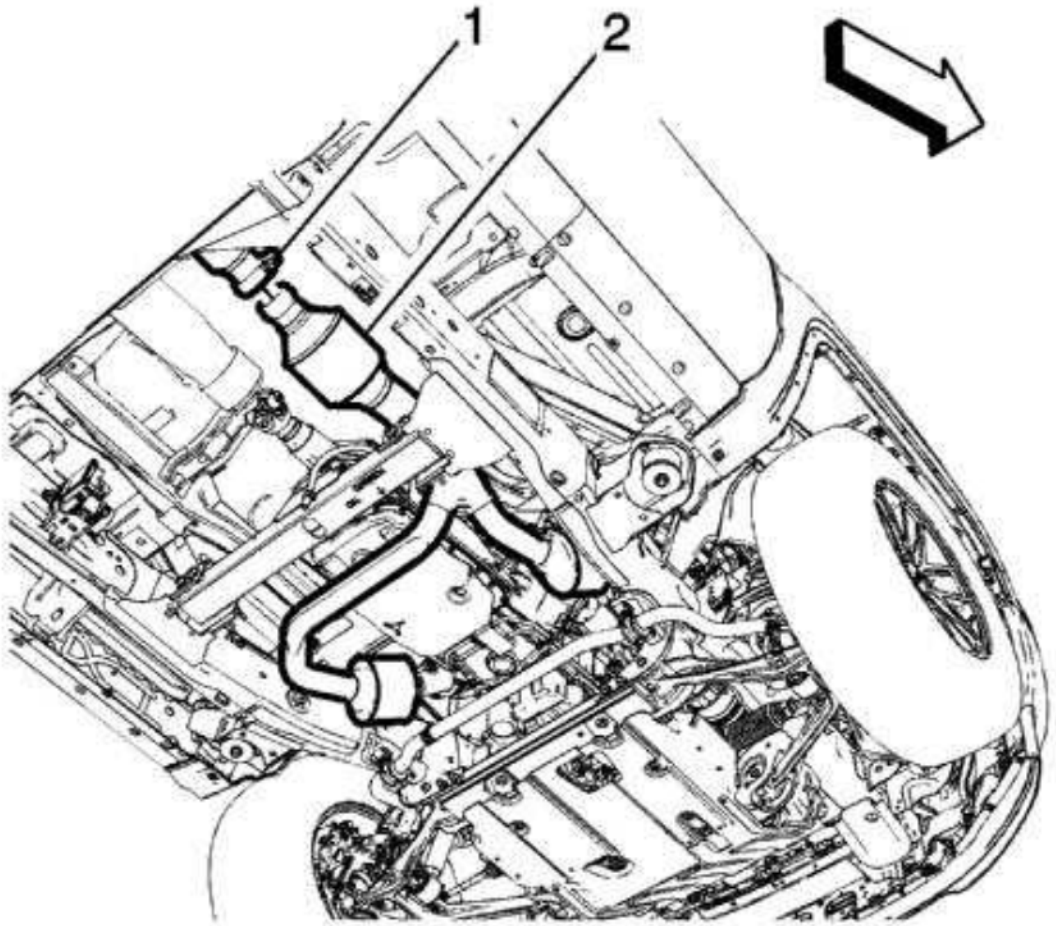


Fig. 41: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

1. Install the exhaust front pipe (2) into position.

cardiagn.com

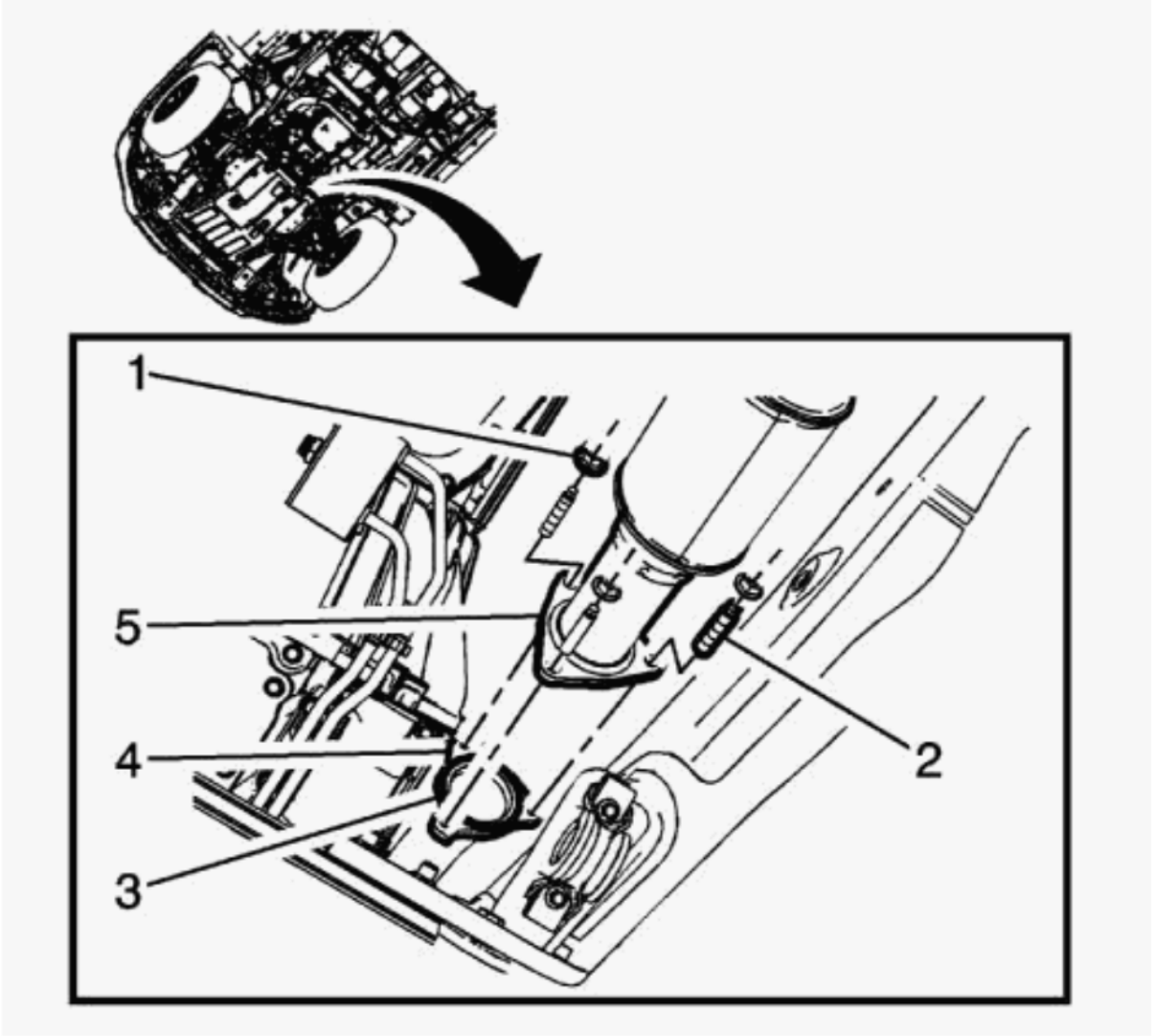


Fig. 42: Exhaust Front Pipe Right Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

2. Install the exhaust front pipe right catalytic converter (5) to the right exhaust manifold (4) with a NEW seal (3.).

CAUTION: Refer to Fastener Caution .

3. Install the exhaust manifold studs and tighten to 10 N.m (89 lb in).

cardiagn.com

4. Install the right catalytic converter fasteners (1) and tighten to 50 N.m (37 lb ft).

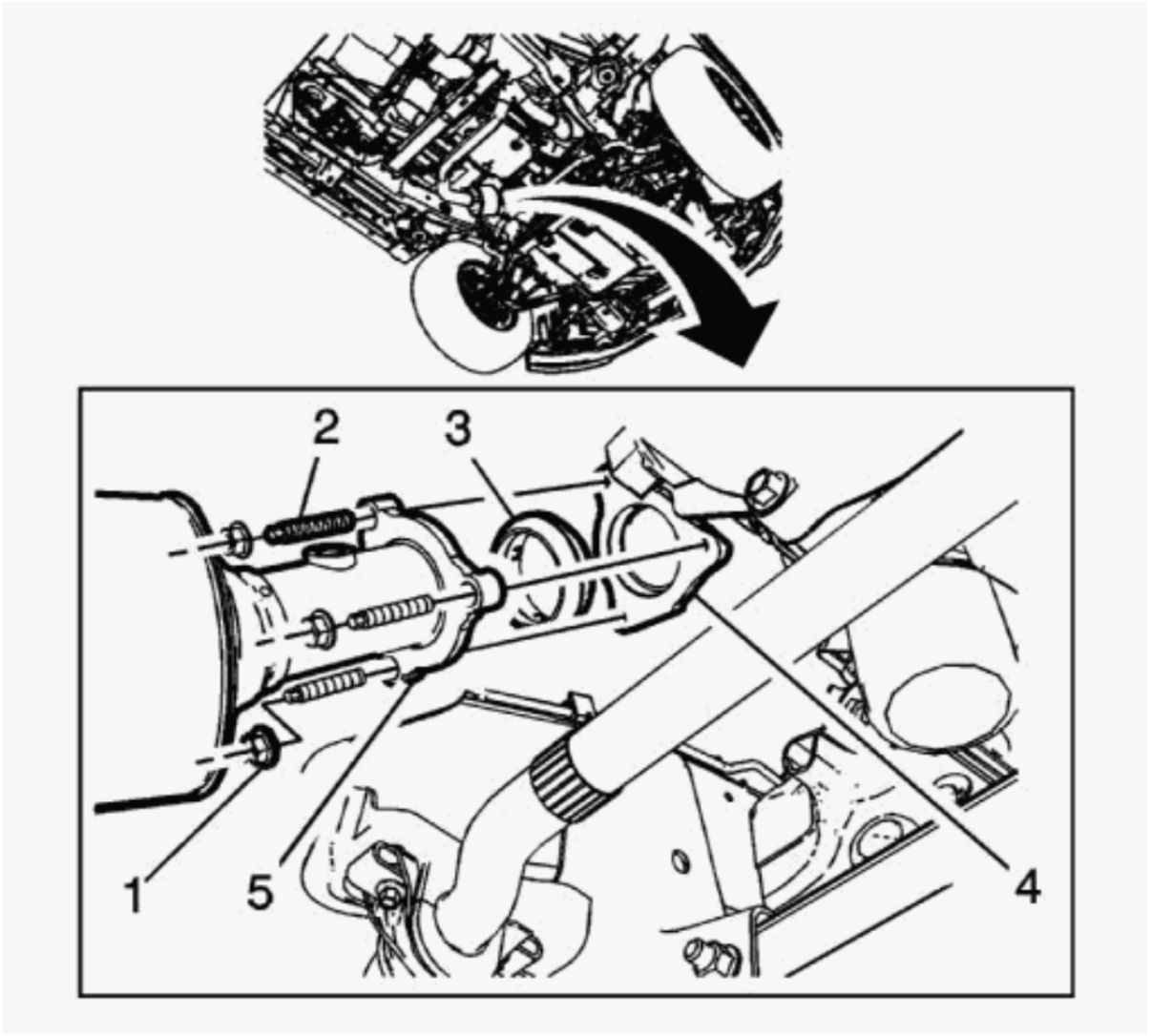


Fig. 43: Exhaust Front Pipe Left Catalytic Converter Fasteners
Courtesy of GENERAL MOTORS COMPANY

5. Install the exhaust front pipe left catalytic converter (5) to the left exhaust manifold (4) with a NEW seal (3).
6. Install the exhaust manifold studs (2) and tighten to 10 N.m (89 lb in).
7. Install the left catalytic converter fasteners (1) and tighten to 50 N.m (37 lb ft).

cardiagn.com

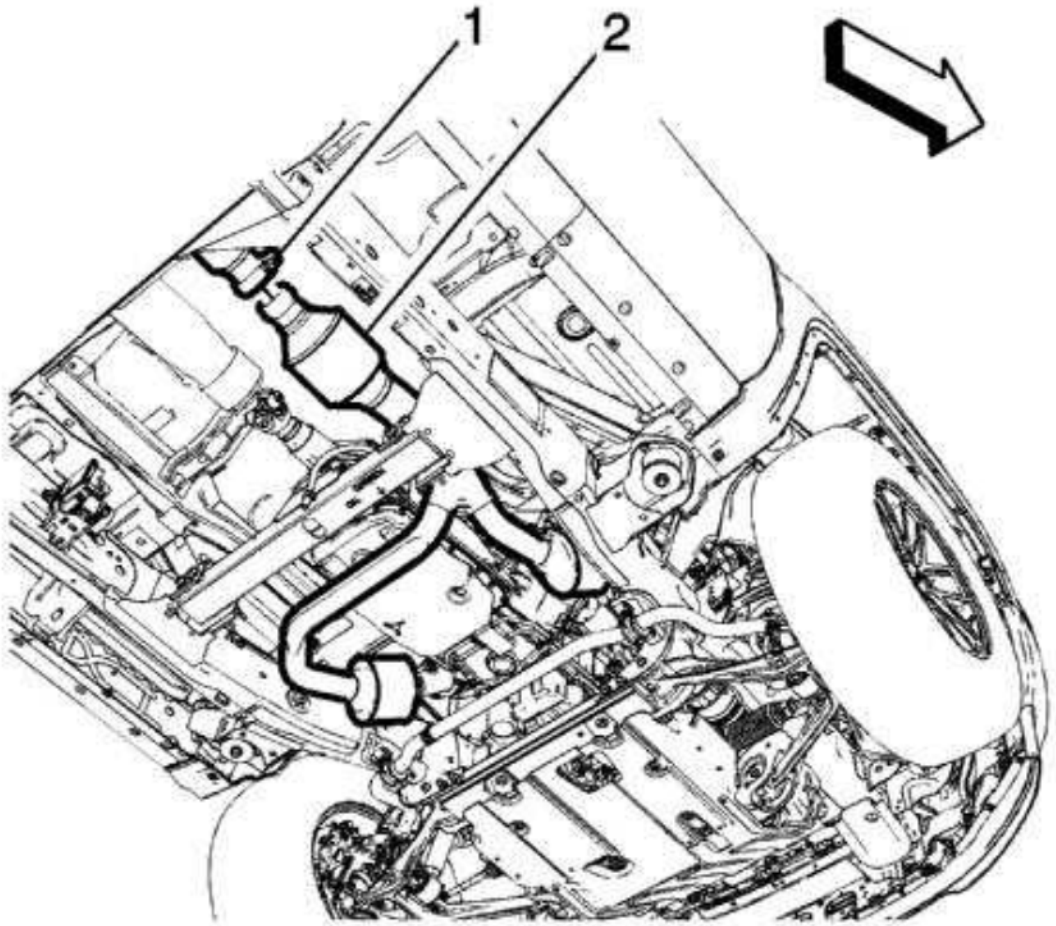


Fig. 44: Exhaust Front Pipe
Courtesy of GENERAL MOTORS COMPANY

8. Install the exhaust front pipe (2) into the exhaust muffler and tighten the exhaust clamp (1) to 30 N.m (22 lb ft).
9. Install the transmission support cross member. Refer to **Transmission Support Crossmember Replacement (2WD)** **Transmission Support Crossmember Replacement (4WD)** .
10. Connect the heated oxygen sensor bank 1 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 1** .

cardiagn.com

11. Connect the heated oxygen sensor bank 1 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 1 Sensor 2** .
12. Connect the heated oxygen sensor bank 2 sensor 1. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 1** .
13. Connect the heated oxygen sensor bank 2 sensor 2. Refer to **Heated Oxygen Sensor Replacement - Bank 2 Sensor 2** .

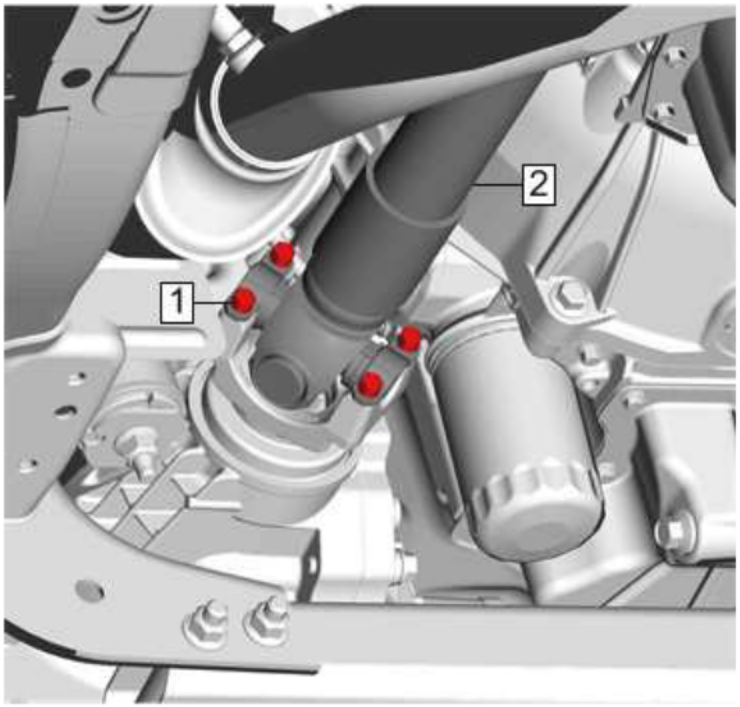


Fig. 45: Front U-joint Yoke Retainer Bolts And Front Axle Propeller Shaft
Courtesy of GENERAL MOTORS COMPANY

14. If equipped with 4WD, install the front axle propeller shaft (2) and tighten the U-joint yoke retainer bolts (1) to 25 N.m (18 lb ft). Refer to **Front Axle Propeller Shaft Replacement (NPO)** **Front Axle Propeller Shaft Replacement (NQH)** **Front Axle Propeller Shaft Replacement (Heavy Duty)** .
15. Start the engine and check for exhaust leaks.

EXHAUST MUFFLER WITH RESONATOR, EXHAUST, AND TAIL PIPE REPLACEMENT

cardiagn.com

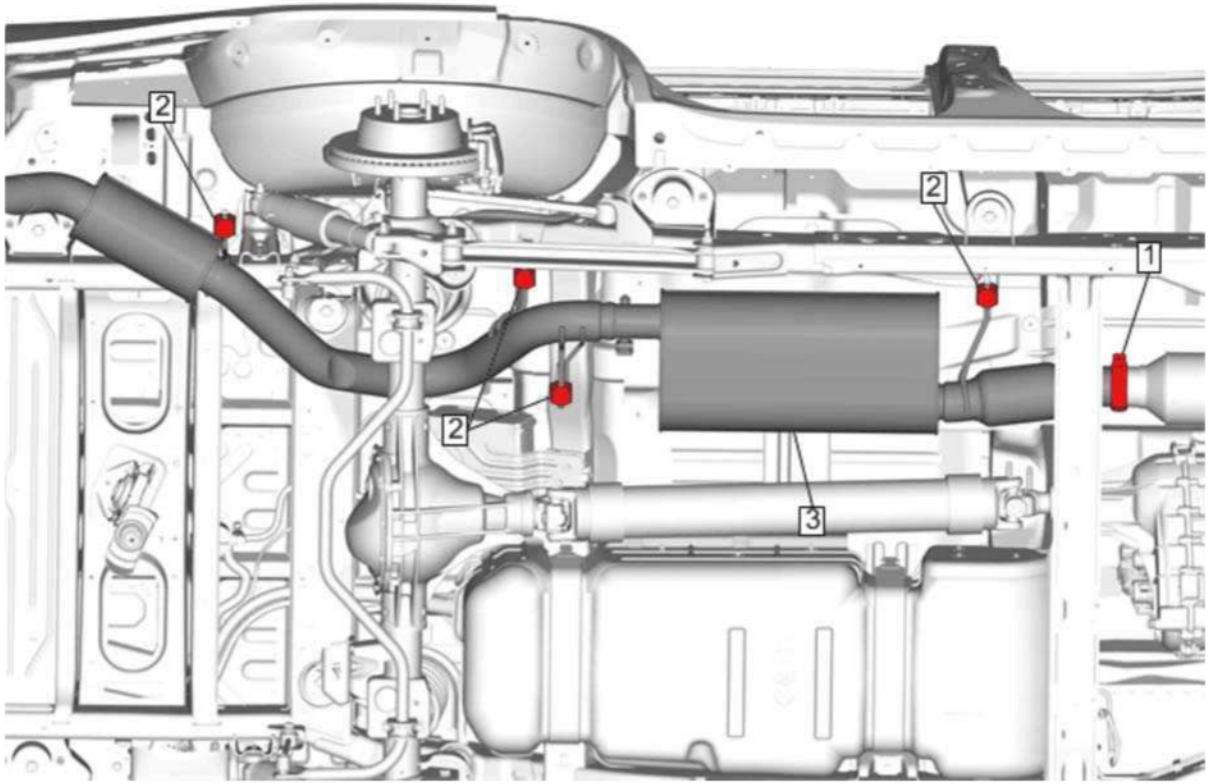


Fig. 46: Exhaust Muffler with Resonator, Exhaust, and Tail Pipe
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure 1. Remove Rear Suspension Lateral Link. Refer to **Rear Suspension Lateral Link Replacement** 2. Remove Spare Wheel Hoist. Refer to **Spare Wheel Hoist Replacement** 3. Remove Spare Wheel Heat Shield. refer to **Spare Wheel Heat Shield Replacement**	
1	Exhaust Muffler Clamp Fastener **WARNING:**

cardiagn.com

Callout	Component Name
	Refer to Hot Exhaust System Warning . **WARNING:** Refer to Eye Protection Warning . **CAUTION:** Refer to Fastener Caution . **Tighten** 30 N.m (22 lb ft)
2	Exhaust Muffler Isolator (Qty: 4) **NOTE:** **Clean and lubricate the exhaust isolators for ease of installation.**
3	Exhaust Muffler **Procedure** With the aid of an assistant, lower the exhaust system from the vehicle.

INTERMEDIATE BODY EXHAUST HEAT SHIELD REPLACEMENT

Removal Procedure

cardiagn.com

1. Lower the exhaust muffler with resonator, exhaust, and tail pipe assembly, as required. Refer to **Exhaust Muffler with Resonator, Exhaust, and Tail Pipe Replacement**.
2. Remove the left front floor panel exhaust heat shield nuts and heat shield, as required.

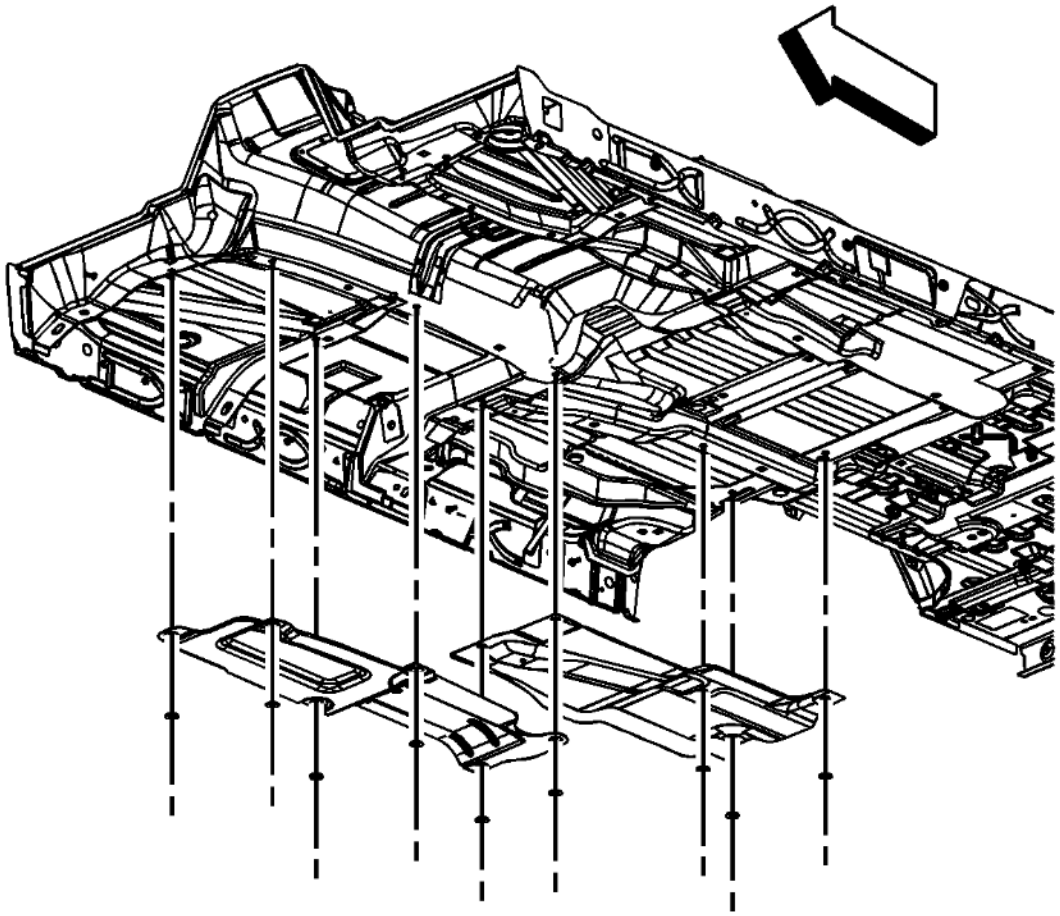


Fig. 47: Floor Panel Exhaust Heat Shield Nuts And Heat Shields
Courtesy of GENERAL MOTORS COMPANY

3. If the vehicle is a Tahoe, Yukon, Yukon Denali, or a Escalade, remove the exhaust heat shield nuts and heat shields, as required.

cardiagn.com

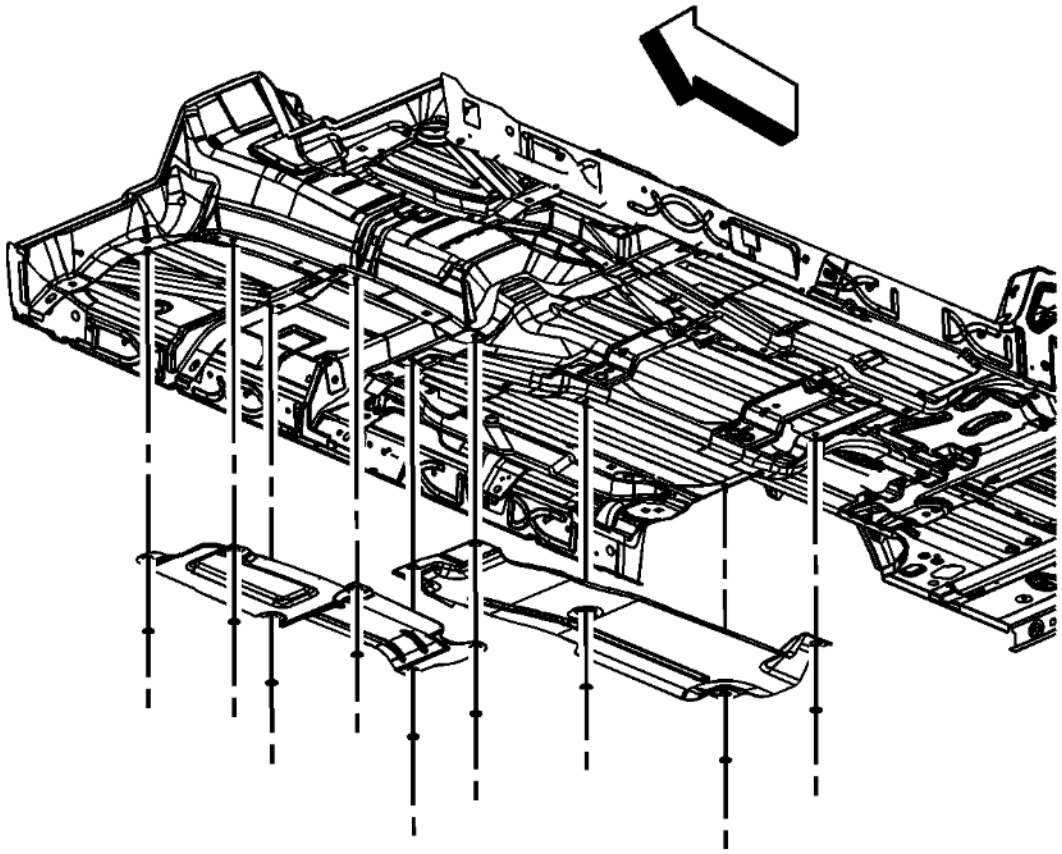


Fig. 48: Floor Panel Exhaust Heat Shield Nuts & Heat Shields
Courtesy of GENERAL MOTORS COMPANY

4. If the vehicle is a Suburban, Yukon XL, Yukon Denali XL, Escalade ESV, Escalade EXT or a Avalanche, remove the exhaust heat shield nuts and heat shields, as required.

cardiagn.com

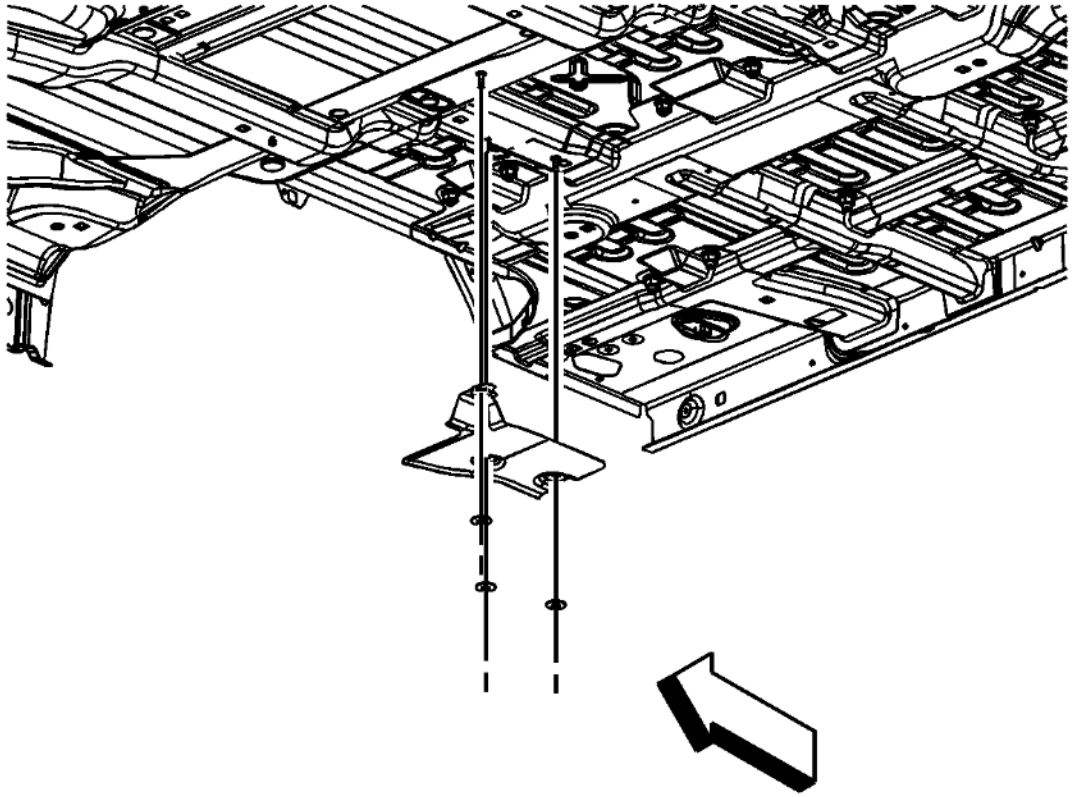


Fig. 49: Rear Floor Panel Exhaust Heat Shield Nuts And Heat Shield
Courtesy of GENERAL MOTORS COMPANY

5. Remove the rear floor panel exhaust heat shield nuts and heat shield, as required

Installation Procedure

cardiagn.com

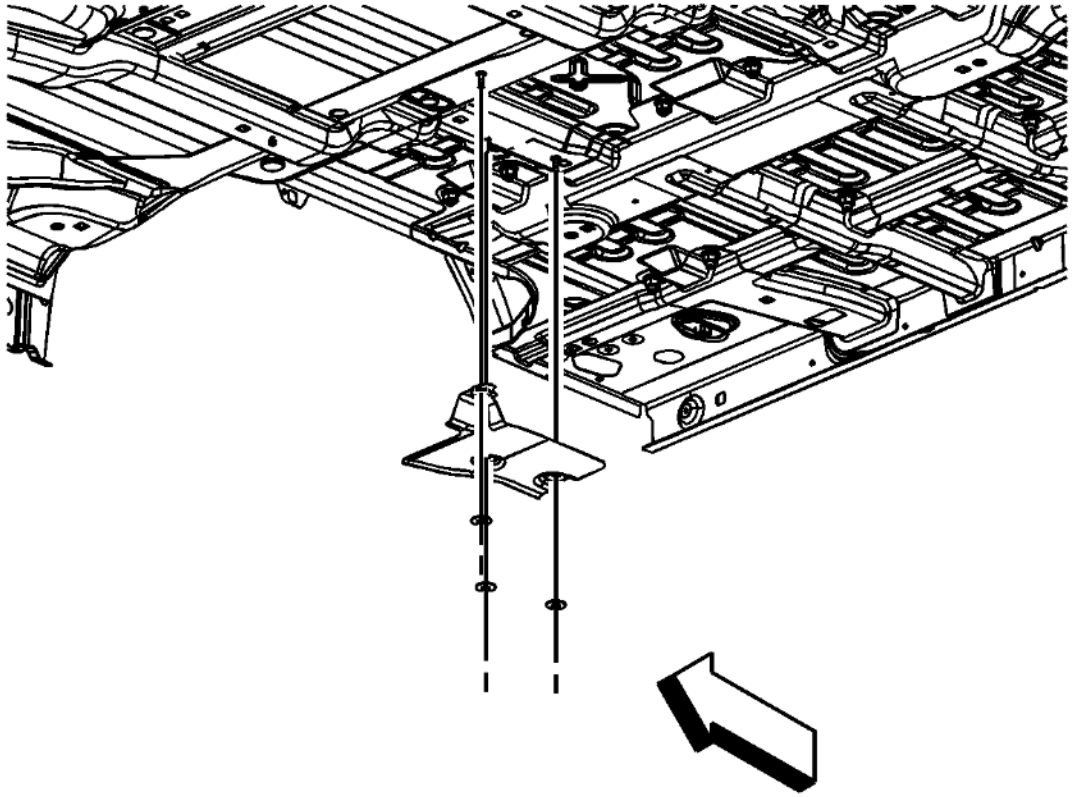


Fig. 50: Rear Floor Panel Exhaust Heat Shield Nuts And Heat Shield
Courtesy of GENERAL MOTORS COMPANY

CAUTION: **Refer to Fastener Caution .**

1. Position the rear floor panel exhaust heat shield to the studs and install the heat shield nuts and tighten to 9 N.m (80 lb in).

cardiagn.com

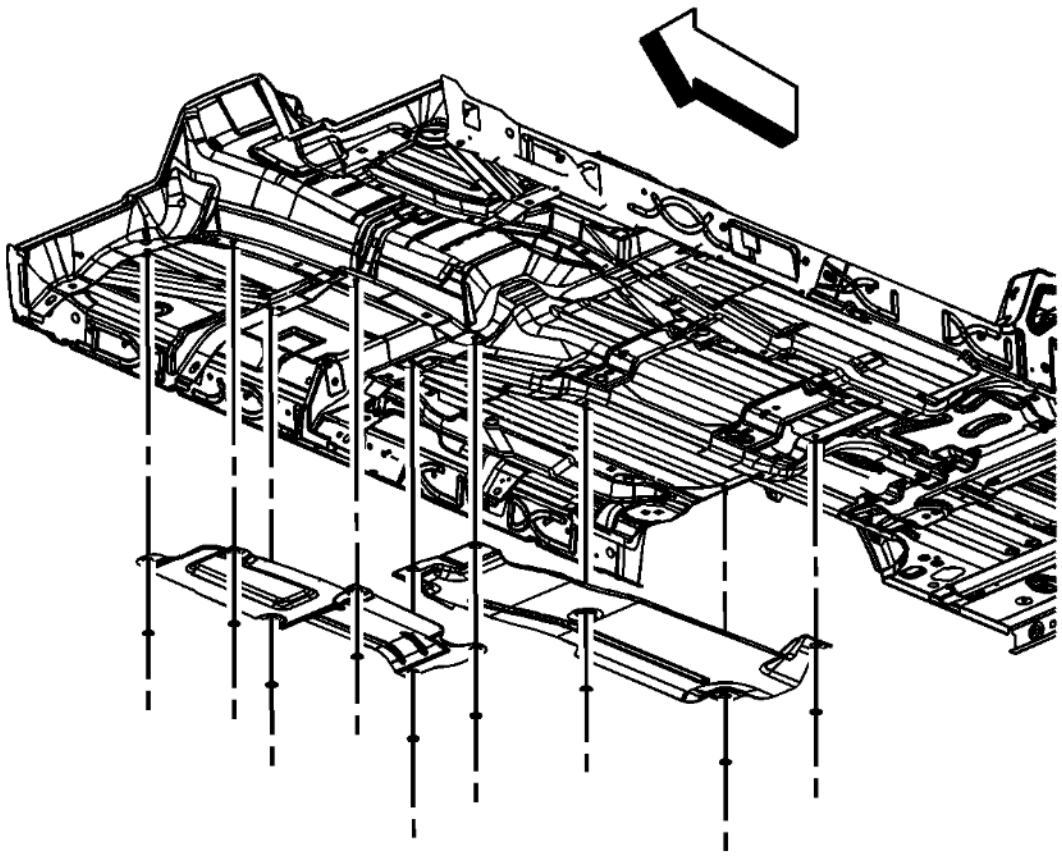


Fig. 51: Floor Panel Exhaust Heat Shield Nuts & Heat Shields
Courtesy of GENERAL MOTORS COMPANY

2. If the vehicle is a Suburban, Yukon XL, Yukon Denali XL, Escalade ESV, Escalade EXT or a Avalanche, position the exhaust heat shield to the studs and install the heat shield nuts, as required and tighten to 9 N.m (80 lb in).

cardiagn.com

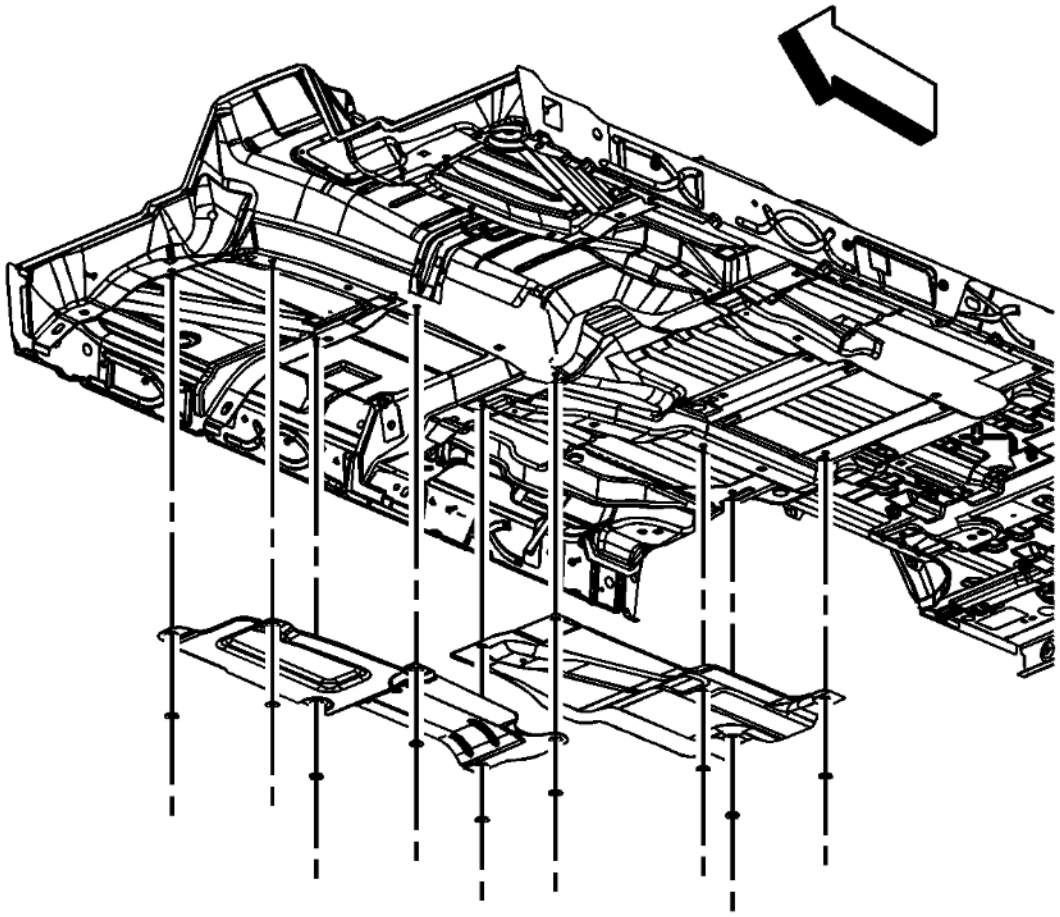


Fig. 52: Floor Panel Exhaust Heat Shield Nuts And Heat Shields
Courtesy of GENERAL MOTORS COMPANY

3. If the vehicle is a Tahoe, Yukon, Yukon Denali, or a Escalade, position the exhaust heat shield to the studs and install the heat shield nuts, as required and tighten to 9 N.m (80 lb in).

cardiagn.com

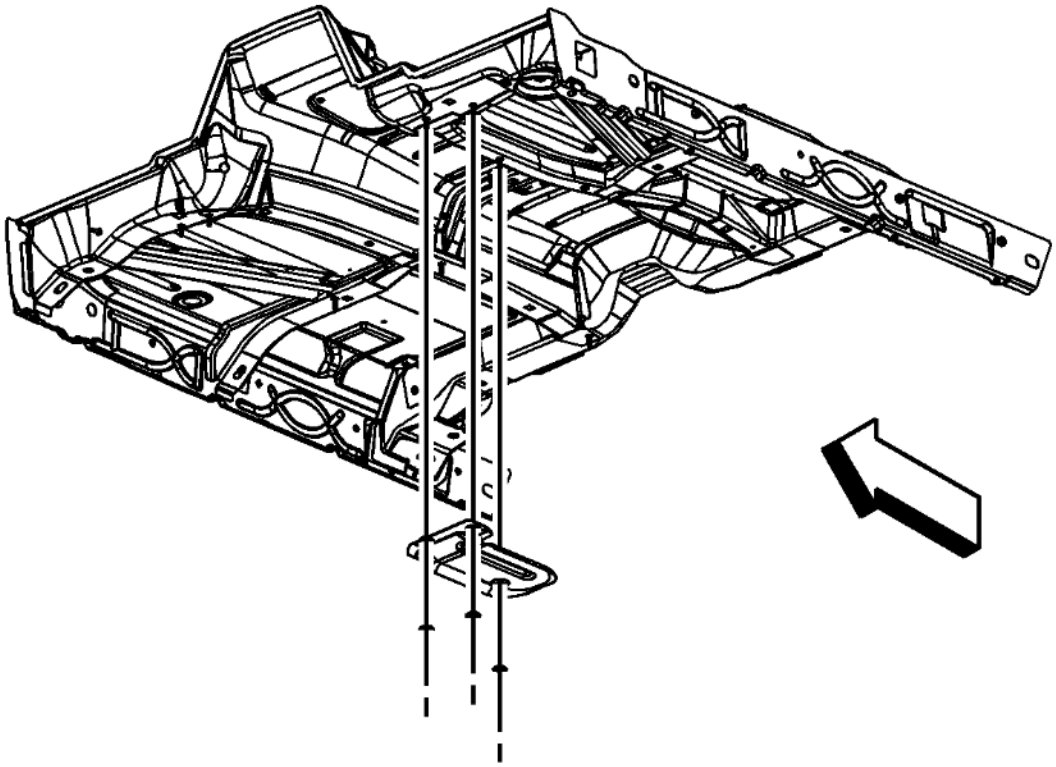


Fig. 53: Left Front Floor Panel Exhaust Heat Shield Nuts And Heat Shield
Courtesy of GENERAL MOTORS COMPANY

4. Position the left front floor panel exhaust heat shield to the studs and install the heat shield nuts and tighten to 9 N.m (80 lb in).
5. Install the exhaust muffler with resonator, exhaust, and tail pipe assembly, as required. Refer to **Exhaust Muffler with Resonator, Exhaust, and Tail Pipe Replacement**.

FRONT BODY EXHAUST HEAT SHIELD REPLACEMENT

cardiagn.com

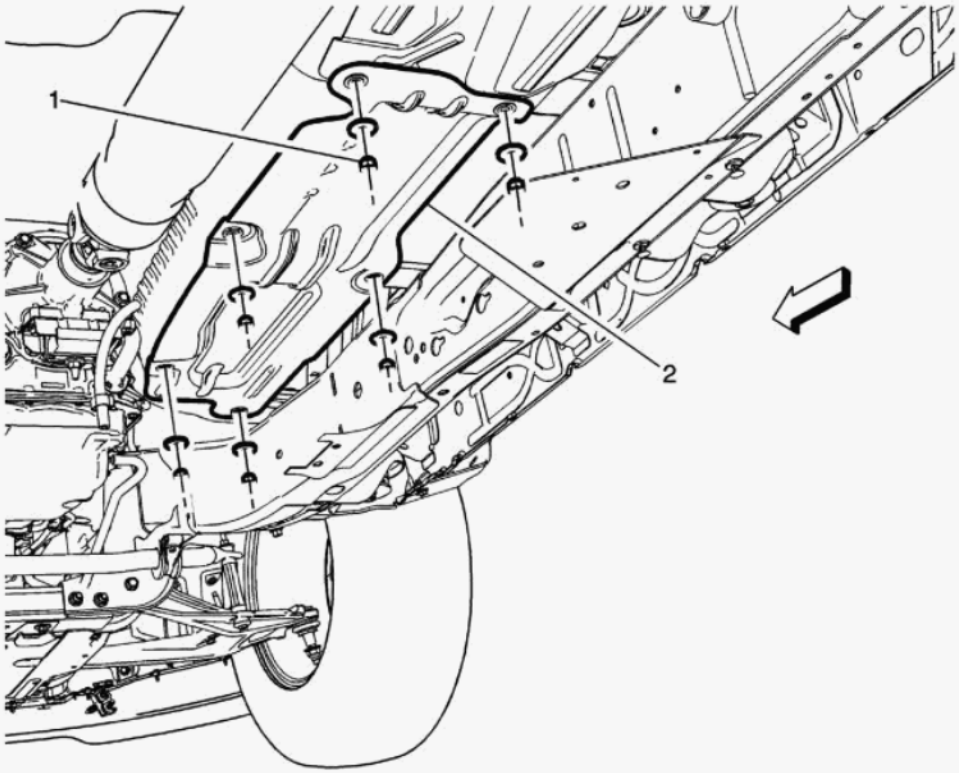


Fig. 54: Front Body Exhaust Heat Shield
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure Raise and support the vehicle. Refer to **Lifting and Jacking the Vehicle** .	
1	Front Body Exhaust Heat Shield Fasteners (Qty: 6) **WARNING:** **Refer to Hot Exhaust System Warning .**

cardiagn.com

Callout	Component Name
	CAUTION: Refer to Fastener Caution . Tighten 9 N.m (80 lb in)
2	Front Body Exhaust Heat Shield

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - RIGHT SIDE (L83, L86)

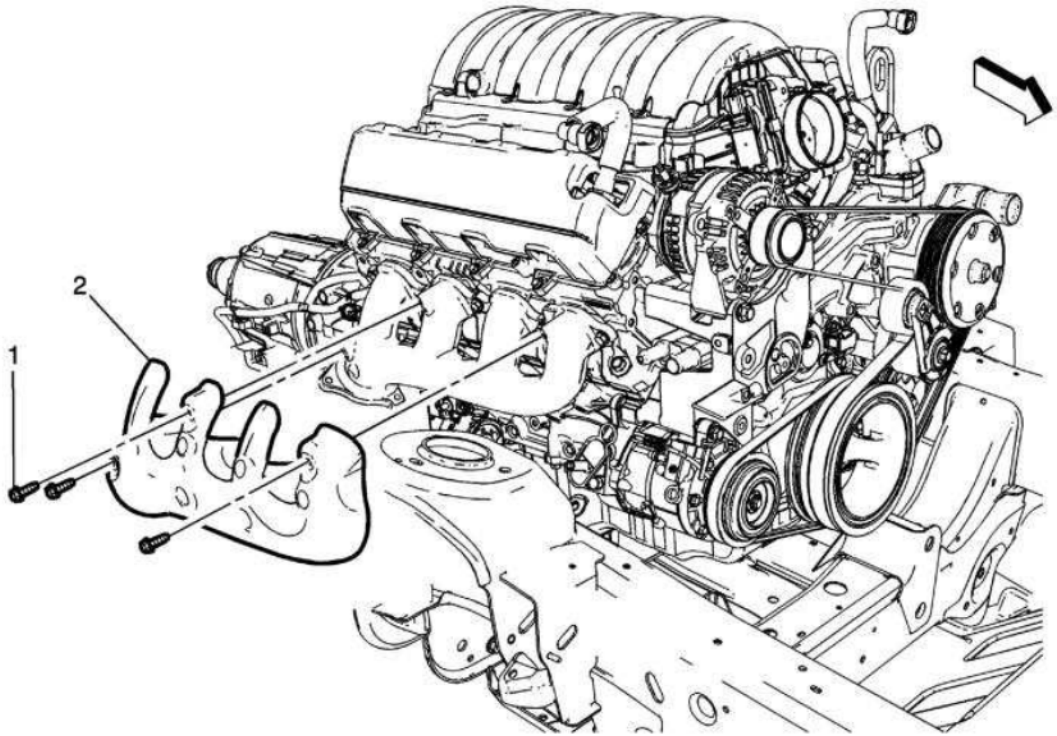


Fig. 55: Exhaust Manifold Heat Shield - Right Side (L83, L86)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name

cardiagn.com

Callout	Component Name
Preliminary Procedure Reposition the heater inlet and outlet hoses from the retaining bracket.	
1	Exhaust Manifold Heat Shield - Right Fasteners (Qty: 3) **WARNING:** **Refer to Hot Exhaust System Warning .** **CAUTION:** **Refer to Fastener Caution .** **Tighten** 10 N.m (89 lb in)
2	Exhaust Manifold Heat Shield - Right

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - RIGHT SIDE (L96)

cardiagn.com

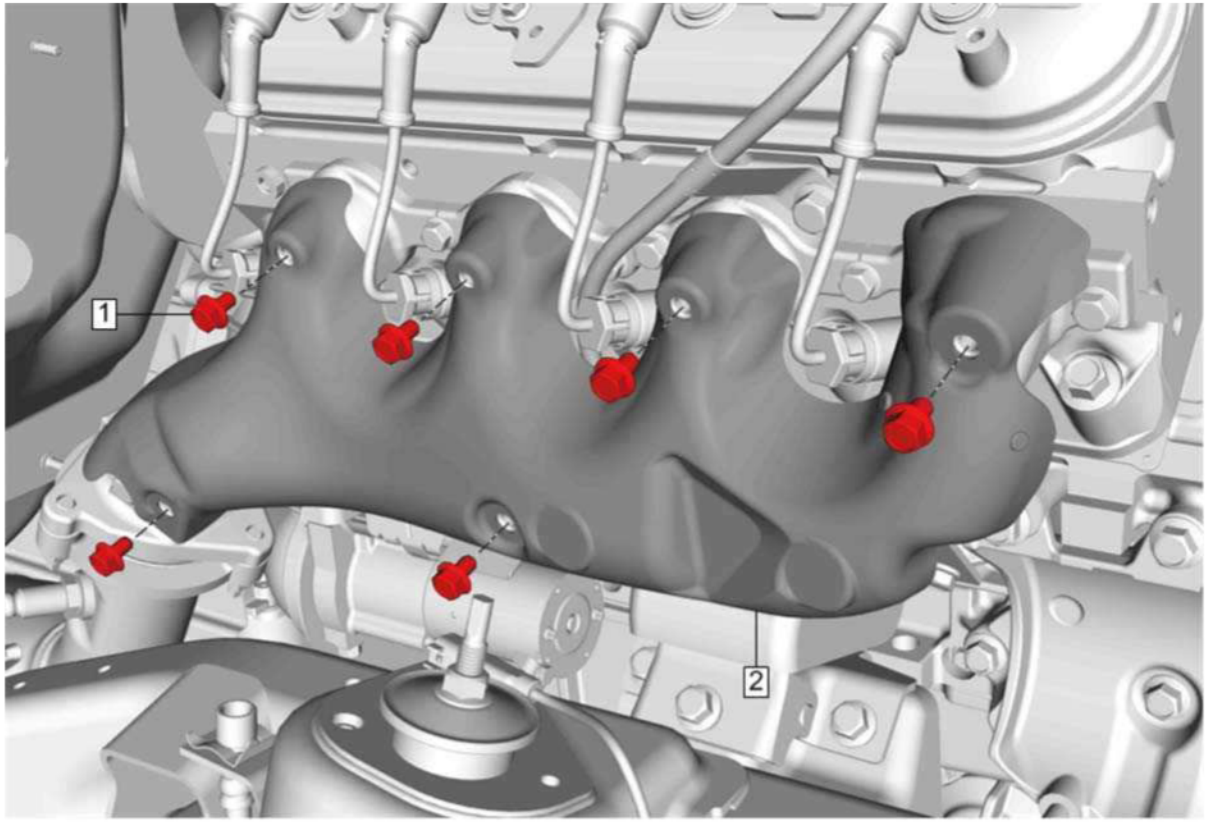


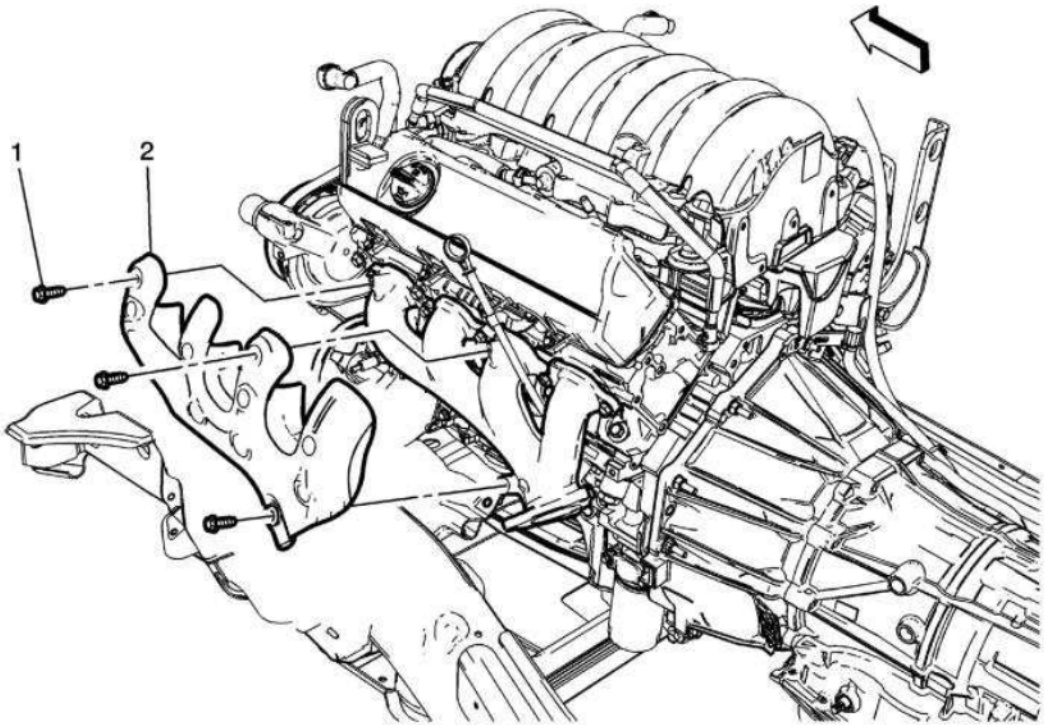
Fig. 56: Exhaust Manifold Heat Shield - Right Side (L96)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
Preliminary Procedure **WARNING:** **Refer to Hot Exhaust System Warning .** 1. Reposition the heater hose, and secure hose away from exhaust manifold heat shield.	

cardiagn.com

Callout	Component Name
1	Exhaust Manifold Heat Shield Bolt (Qty: 6) **CAUTION:** **Refer to** **Fastener Caution** . **Tighten** 10 N.m (89 lb in)
2	Exhaust Manifold Heat Shield

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - LEFT SIDE (L83, L86)



cardiagn.com

Fig. 57: Exhaust Manifold Heat Shield - Left Side (L83, L86)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
1	Exhaust Manifold Heat Shield - Left Fasteners (Qty: 3) **WARNING:** **Refer to Hot Exhaust System Warning .** **CAUTION:** **Refer to Fastener Caution .** **Tighten** 10 N.m (89 lb in)
2	Exhaust Manifold Heat Shield - Left

EXHAUST MANIFOLD HEAT SHIELD REPLACEMENT - LEFT SIDE (L96)

cardiagn.com

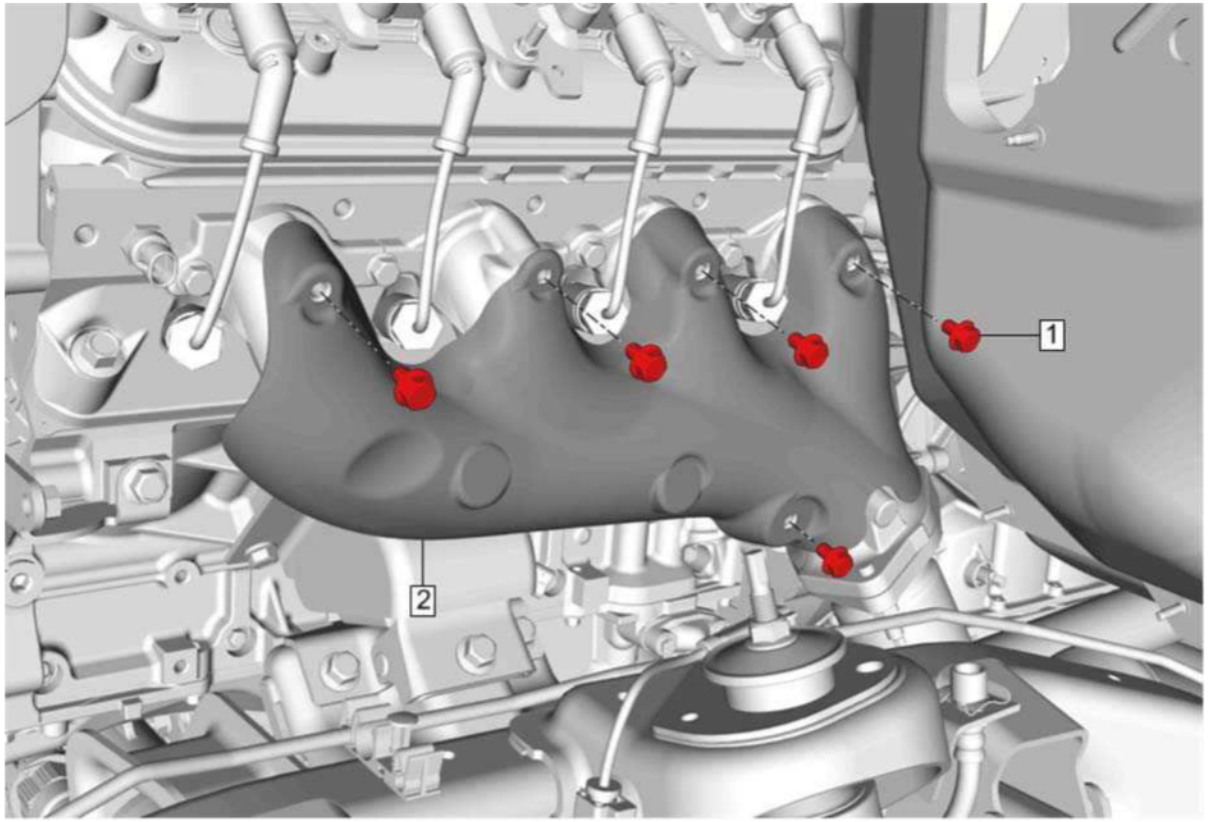


Fig. 58: Exhaust Manifold Heat Shield - Left Side (L96)
Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
WARNING: Refer to Hot Exhaust System Warning .	
1	Exhaust Manifold Heat Shield Bolt (Qty: 5) **CAUTION:** **Refer to**

cardiagn.com

Callout	Component Name
	Fastener Caution . **Tighten** 10 N.m (89 lb in)
2	Exhaust Manifold 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 the muffler and into a resonator, if applicable where exhaust noise is lessened.

In order to secure the exhaust muffler assembly 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 system 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 underbody and other components from damage due to the heat from the exhaust system.

The exhaust system may be comprised of the following components:

- Catalytic converter
- Exhaust hanger
- Exhaust heat shield
- Exhaust insulator

cardiagn.com

- Exhaust manifold
- Exhaust muffler
- Exhaust pipe
- Exhaust resonator, if equipped
- Exhaust tail pipe, if equipped

Catalytic Converter

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

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

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

The catalyst in the converter is not serviceable.

Muffler

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

Passive Exhaust Valve

Equipped on all Light Duty trucks, the passive valve, located rear of the muffler, acts as a broadband tuner in both V4 and V8 mode for a more refined sound.

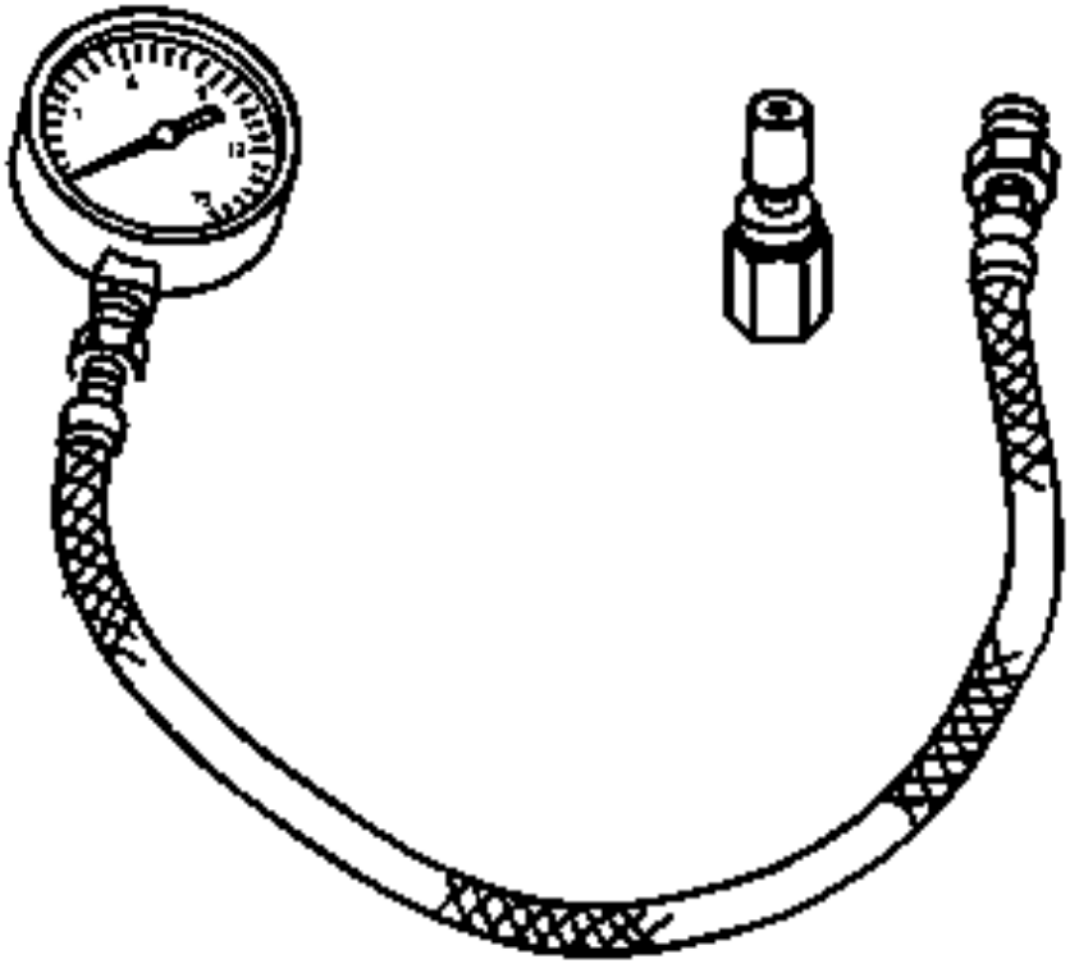
Resonator

Some exhaust systems may be 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.

SPECIAL TOOLS AND EQUIPMENT

cardiagn.com

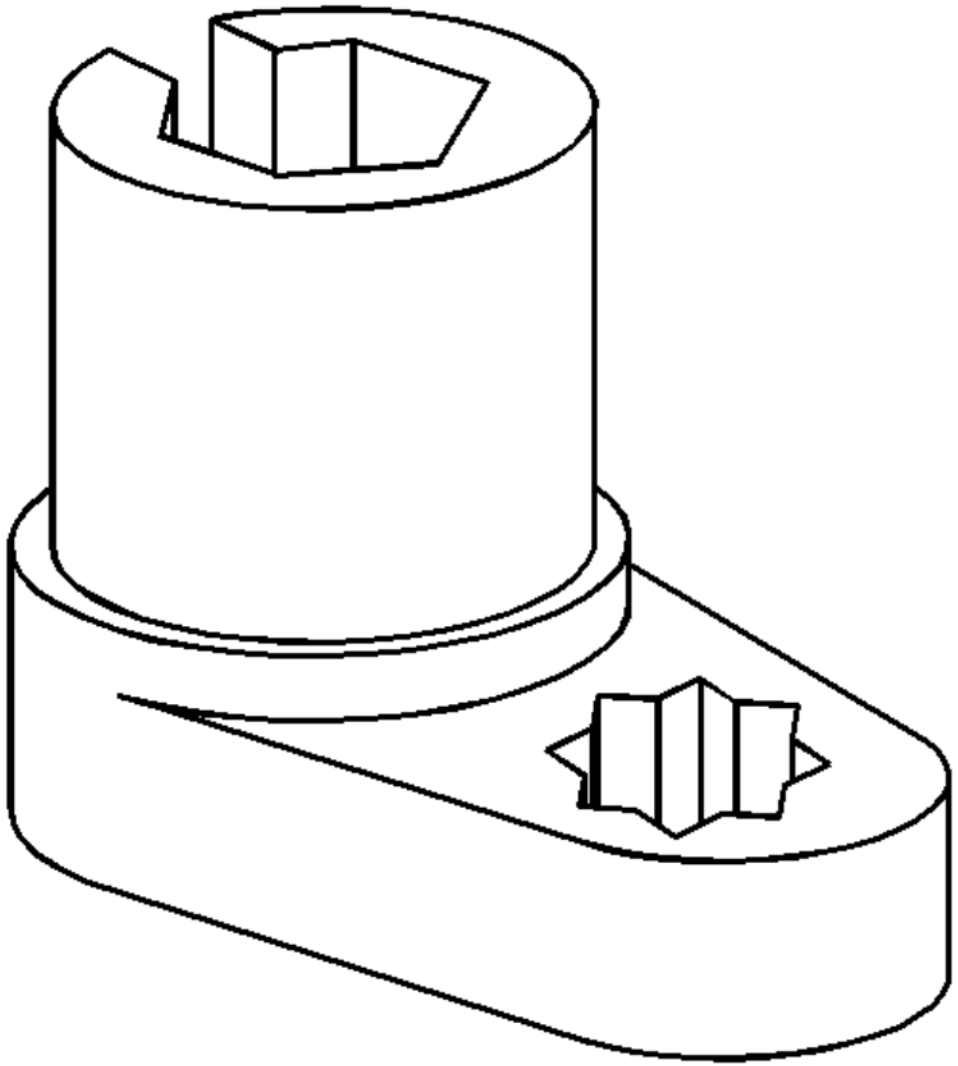
SPECIAL TOOLS

Illustration	Tool Number/Description
	J 35314-A/BT-8515/BT-8515A Exhaust Back Pressure Tester

cardiagn.com

Illustration	Tool Number/Description
	J 38185 Hose Clamp Pliers

cardiagn.com

Illustration	Tool Number/Description
	J 44626 Oxygen Sensor Socket

cardiagn.com