

oil from the charge air cooler system before installing the new turbocharger. Failure to clean debris from the charge air cooler system will cause severe turbocharger and engine damage upon startup.

1. Remove the intake manifold cover. Refer to [Intake Manifold Cover Replacement](#).
2. Remove the air cleaner outlet duct. Refer to [Air Cleaner Outlet Duct Replacement \(LCV\)](#) [Air Cleaner Outlet Duct Replacement \(LTG\)](#).
3. Drain the coolant system. Refer to [Cooling System Draining and Filling \(Static\)](#) [Cooling System Draining and Filling \(GE 47716\)](#).

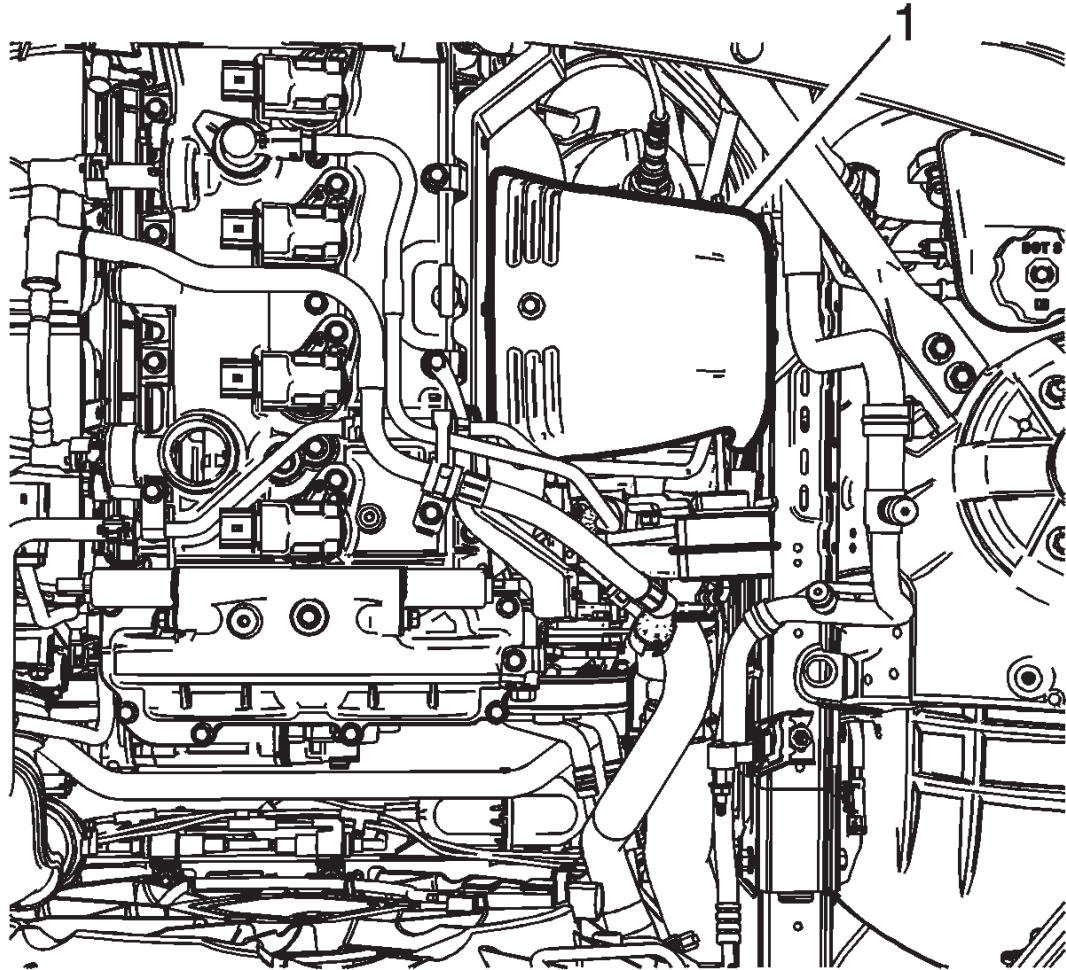


Fig. 43: Turbocharger Heat Shield
Courtesy of GENERAL MOTORS COMPANY

4. Remove the turbocharger heat shield (1). Refer to [Turbocharger Heat Shield Replacement](#).
5. Remove the catalytic converter. Refer to [Catalytic Converter Replacement \(LCV\)](#) [Catalytic Converter Replacement \(LTG\)](#).
6. Remove the charger air cooler inlet air tube. Refer to [Charge Air Cooler Inlet Air Tube Replacement \(LTG\)](#).

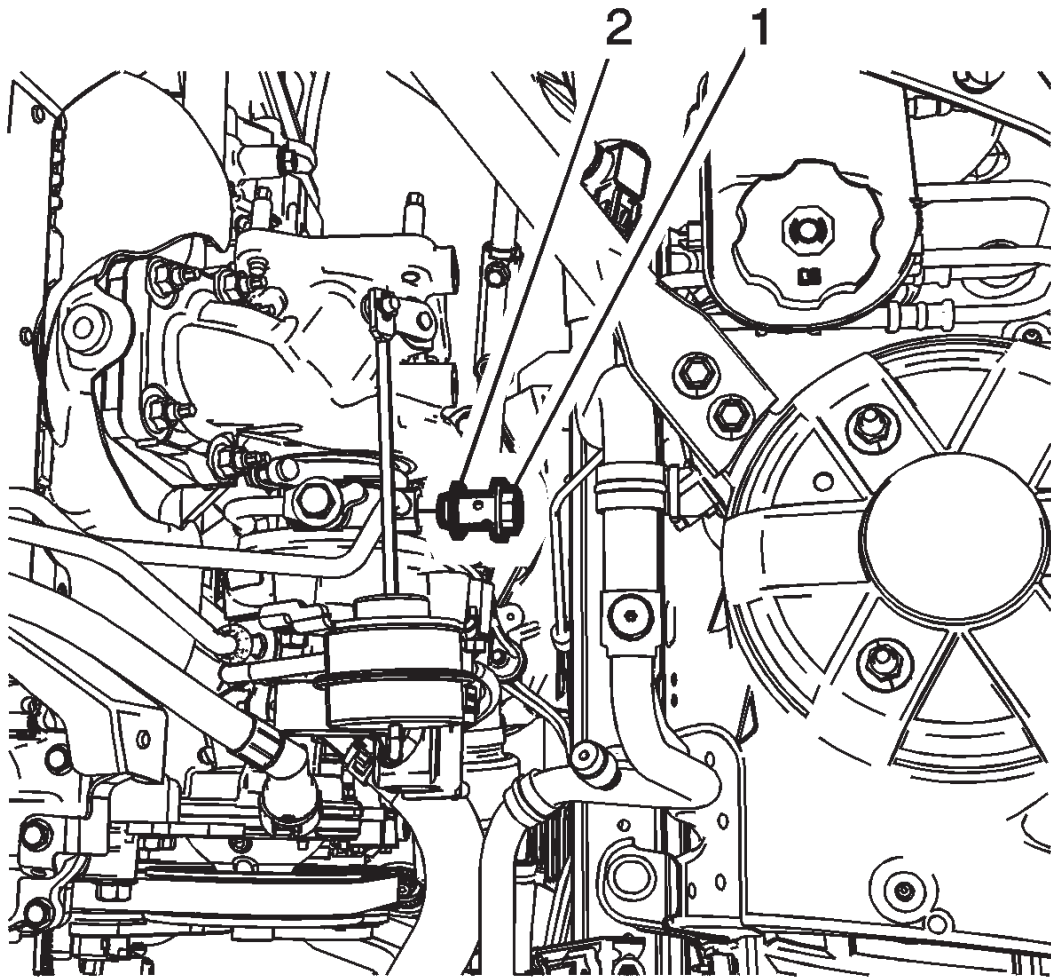


Fig. 44: Turbocharger Coolant Return Pipe
Courtesy of GENERAL MOTORS COMPANY

7. Remove the turbocharger coolant return pipe bolts (1) and DISCARD gasket (2).

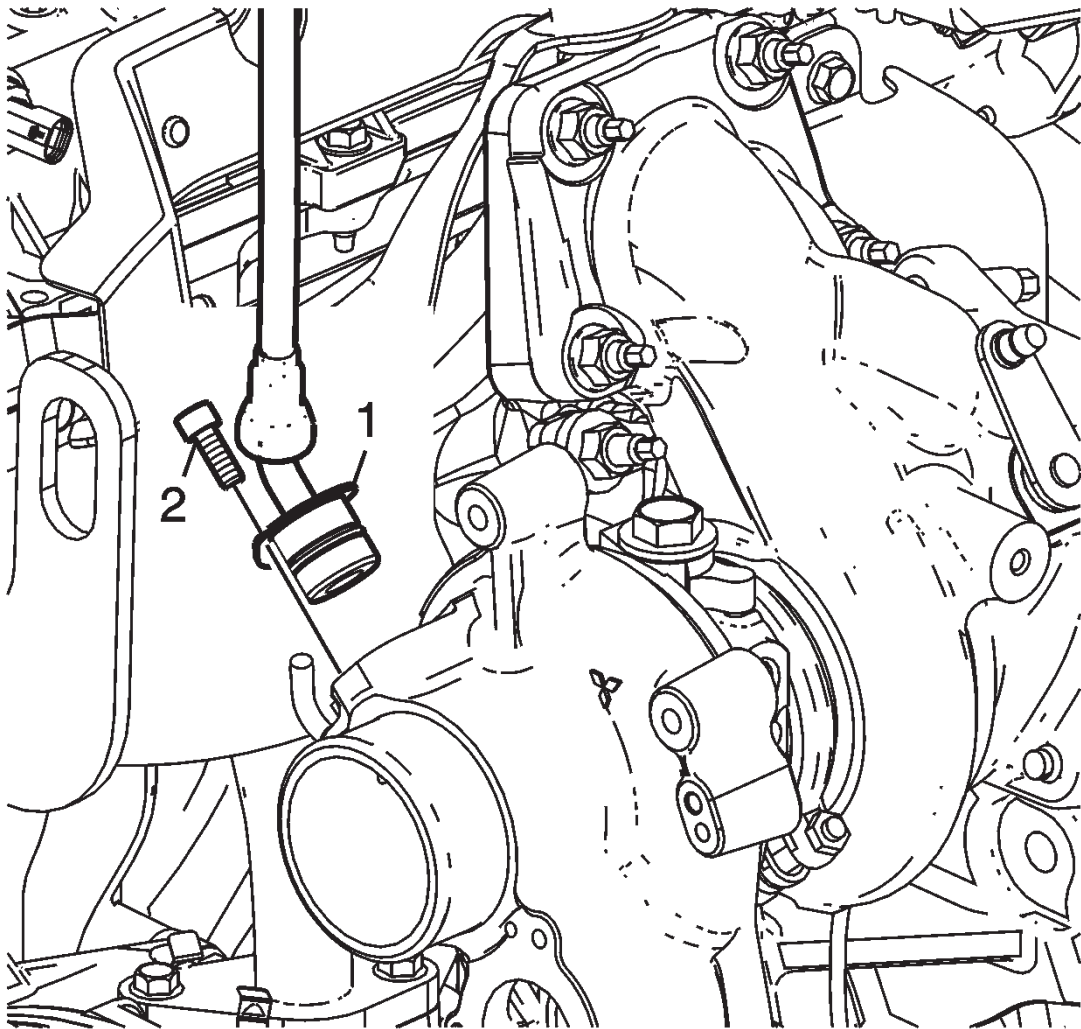


Fig. 45: PCV Hose Fitting Bolt

Courtesy of GENERAL MOTORS COMPANY

8. Remove the PCV bolt (2) and hose (1).

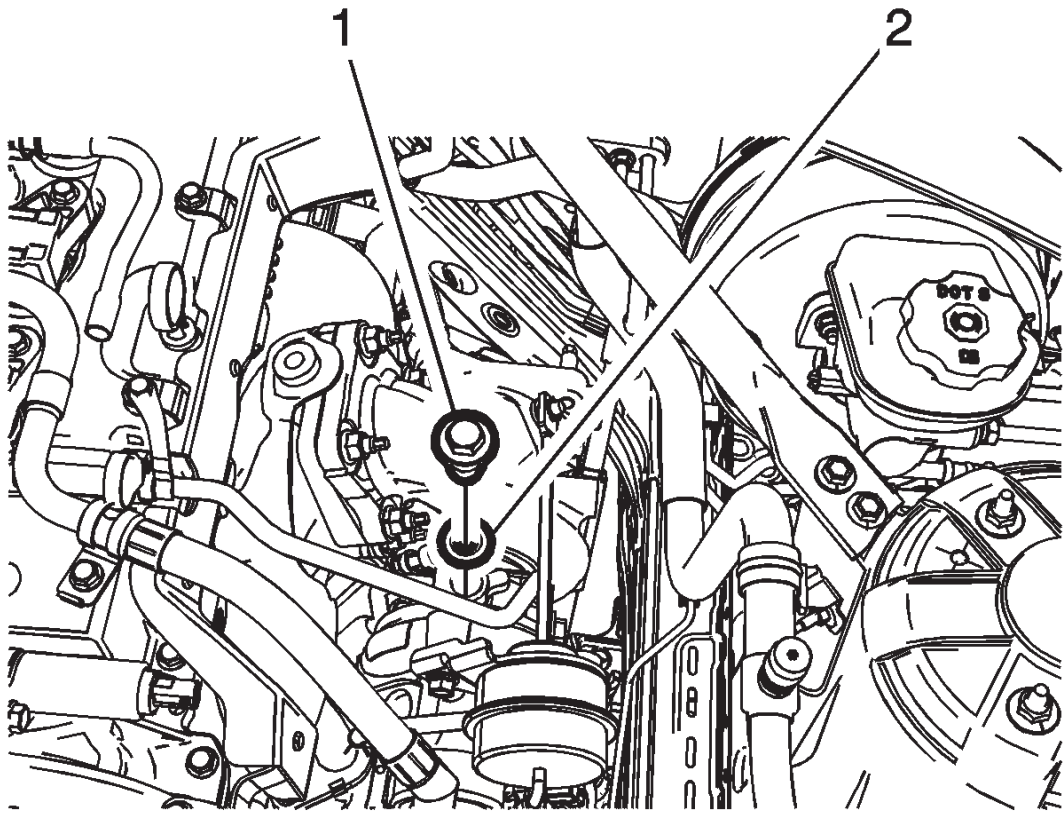


Fig. 46: Turbocharger Oil Feed Pipe
Courtesy of GENERAL MOTORS COMPANY

9. Remove the turbocharger oil feed pipe bolts (1) and DISCARD gasket (2).

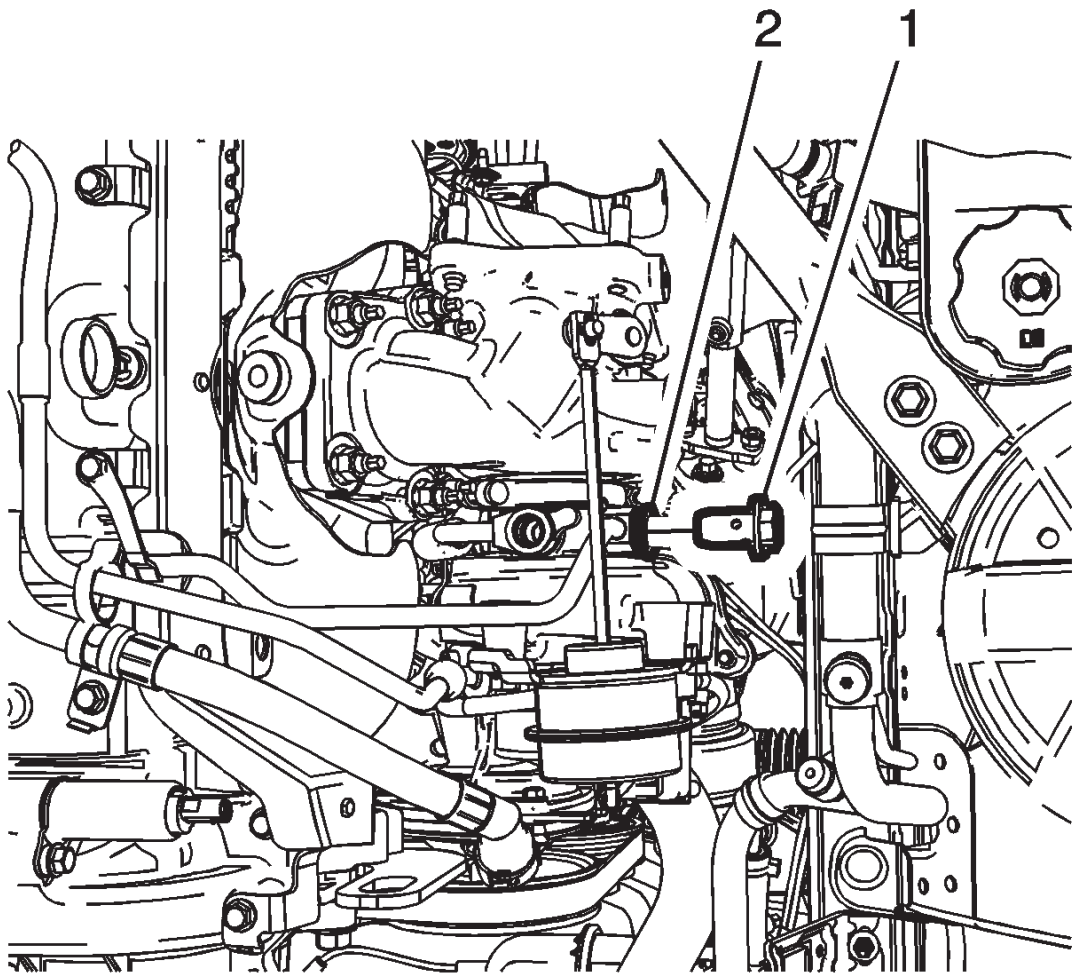


Fig. 47: Turbocharger Coolant Return Pipe

Courtesy of GENERAL MOTORS COMPANY

10. Remove the turbocharger coolant return pipe bolts (1) and DISCARD gasket (2).
11. Raise and support the vehicle. Refer to [Lifting and Jacking the Vehicle \(Base\)](#) [Lifting and Jacking the Vehicle \(V-Series\)](#) .

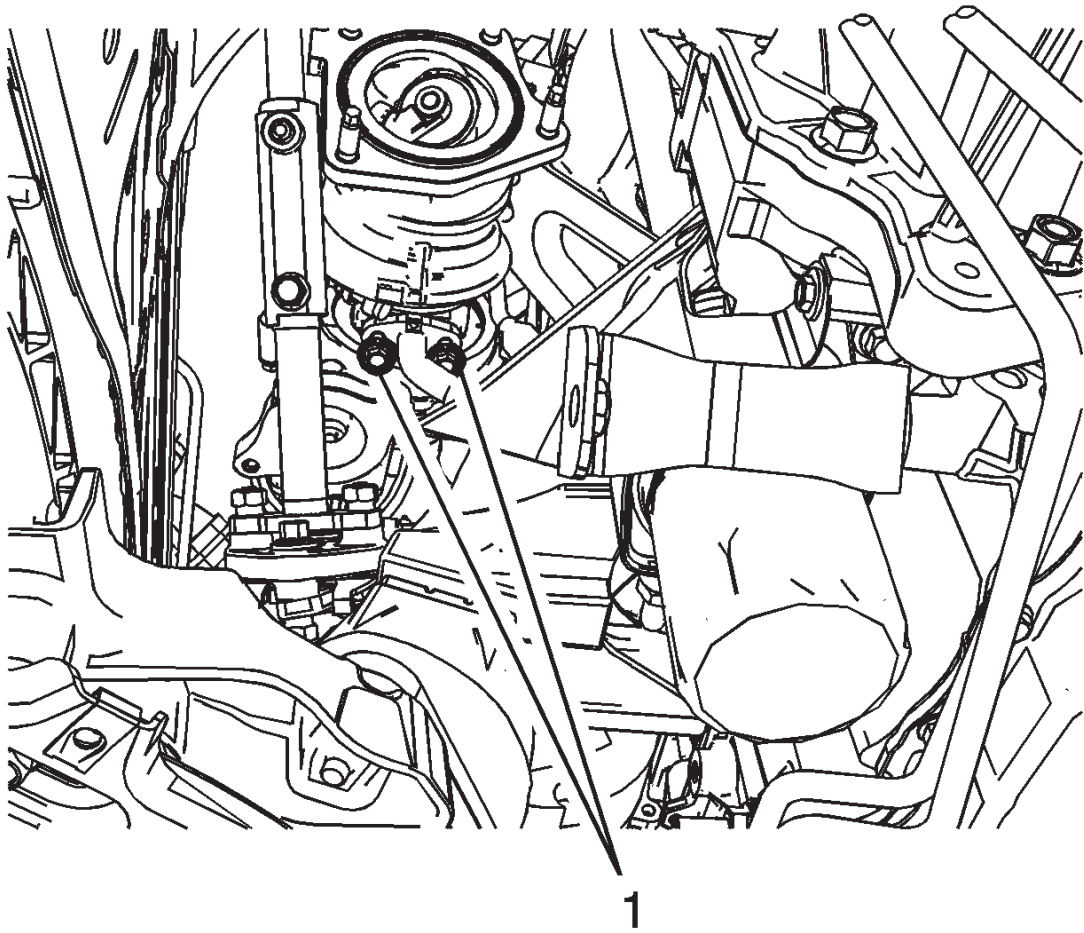


Fig. 48: Turbocharger Oil Return Pipe
Courtesy of GENERAL MOTORS COMPANY

12. Remove the turbocharger oil return pipe bolts (1).
13. Lower the vehicle.
14. Disconnect the electrical connectors at the turbocharger.

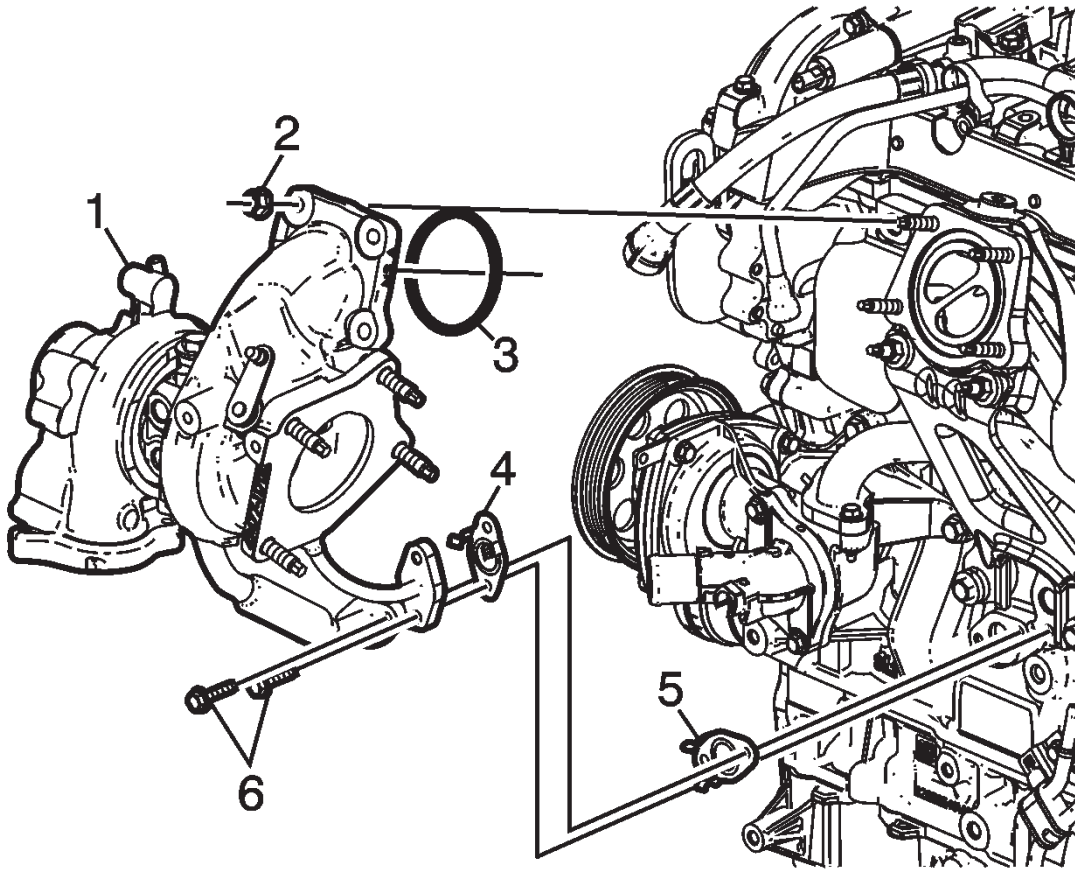


Fig. 49: Exploded View Of Turbocharger
Courtesy of GENERAL MOTORS COMPANY

15. Remove the turbocharger nuts (2) and discard.
16. Remove the turbocharger (1).
17. Remove the turbocharger gasket (3) and discard.
18. For turbocharger cleaning and inspection. Refer to [Turbocharger Cleaning and Inspection](#) .
19. If replacing the turbocharger, transfer any necessary components.

Installation Procedure

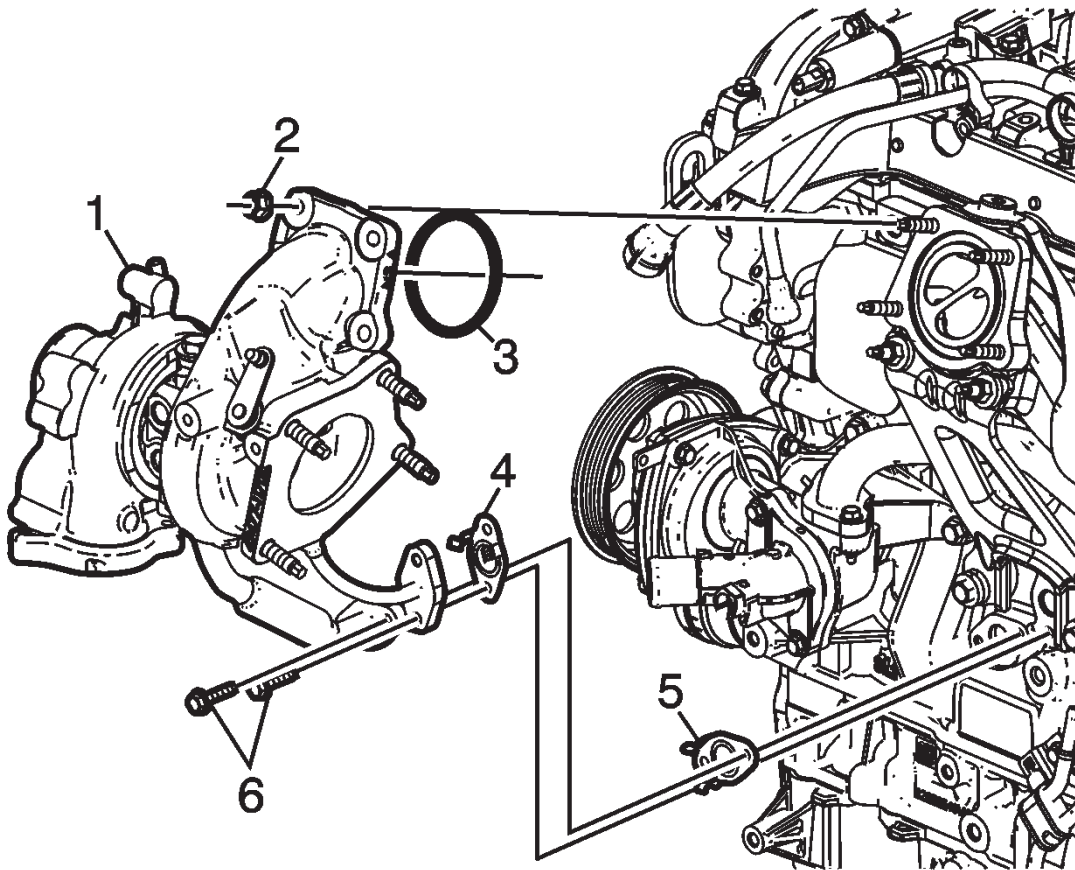


Fig. 50: Exploded View Of Turbocharger
Courtesy of GENERAL MOTORS COMPANY

CAUTION: This component uses torque-to-yield bolts. When servicing this component do not reuse the bolts, New torque-to-yield bolts must be installed. Reusing used torque-to-yield bolts will not provide proper bolt torque and clamp load. Failure to install NEW torque-to-yield bolts may lead to engine damage.

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

NOTE: The exhaust pipe studs do not come installed on new turbochargers. If the turbocharger is being replaced, new studs will need to be installed.

1. Install a NEW turbocharger gasket (3) on the turbocharger.
2. Install NEW turbocharger oil feed and oil return pipe gaskets (4, 5).
3. Install the turbocharger (1).
4. Install NEW turbocharger nuts (2) finger tight.
5. Install the turbocharger oil feed and return pipe bolts (6) at the engine block. tighten the bolts to 10 N.m (89 lb in).

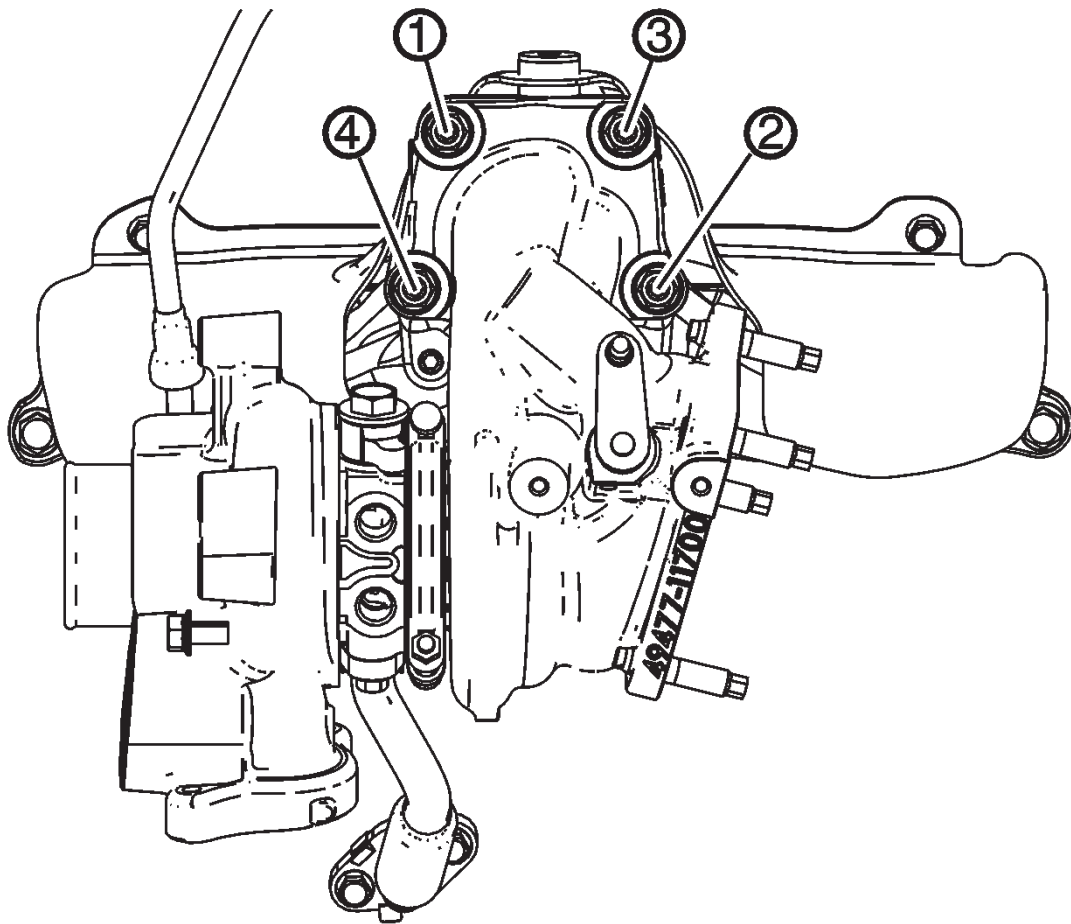


Fig. 51: Turbocharger Nut Tightening Sequence
Courtesy of GENERAL MOTORS COMPANY

6. Tighten the turbocharger nuts in sequence:
 1. First pass 30 N.m (22 lb ft).
 2. Final pass plus 90 degrees.

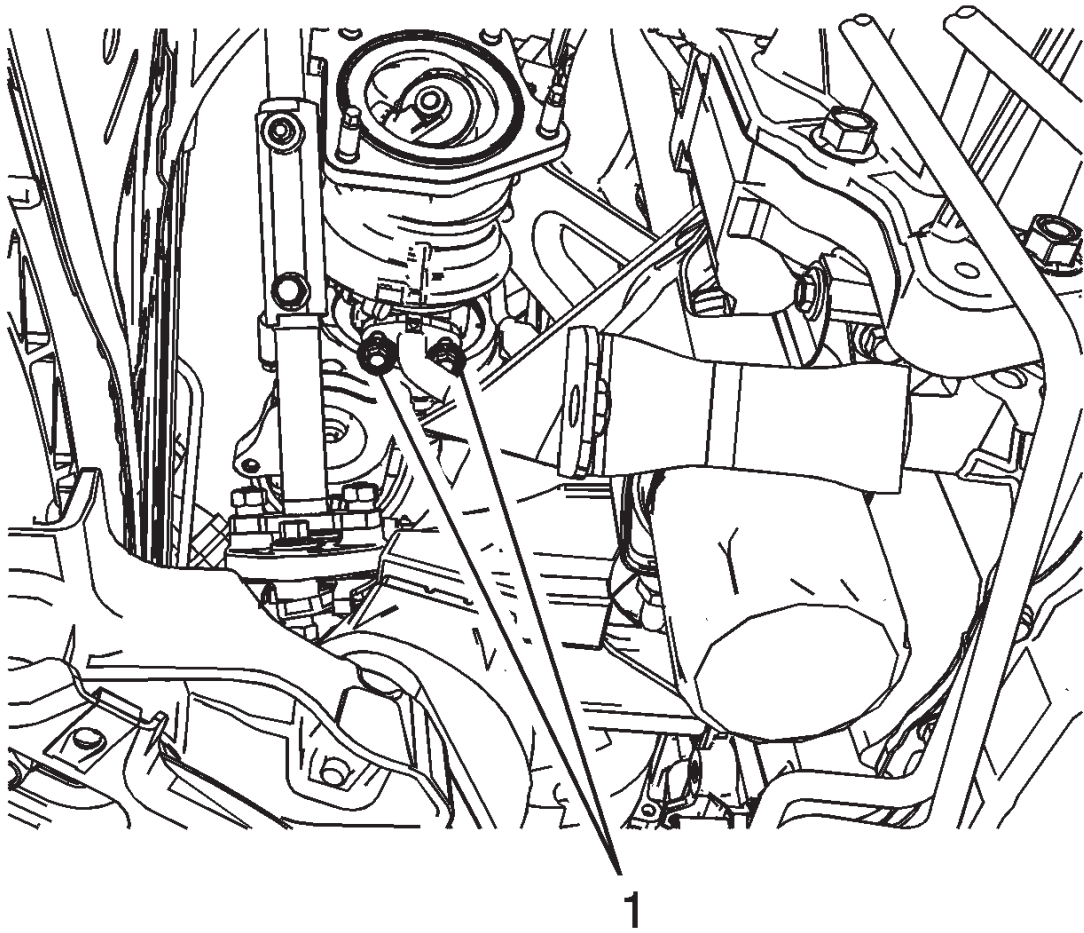


Fig. 52: Turbocharger Oil Return Pipe
Courtesy of GENERAL MOTORS COMPANY

7. Install the turbocharger oil return pipe bolts (1) and a NEW gasket and tighten the bolt to 10 N.m (89 lb in).

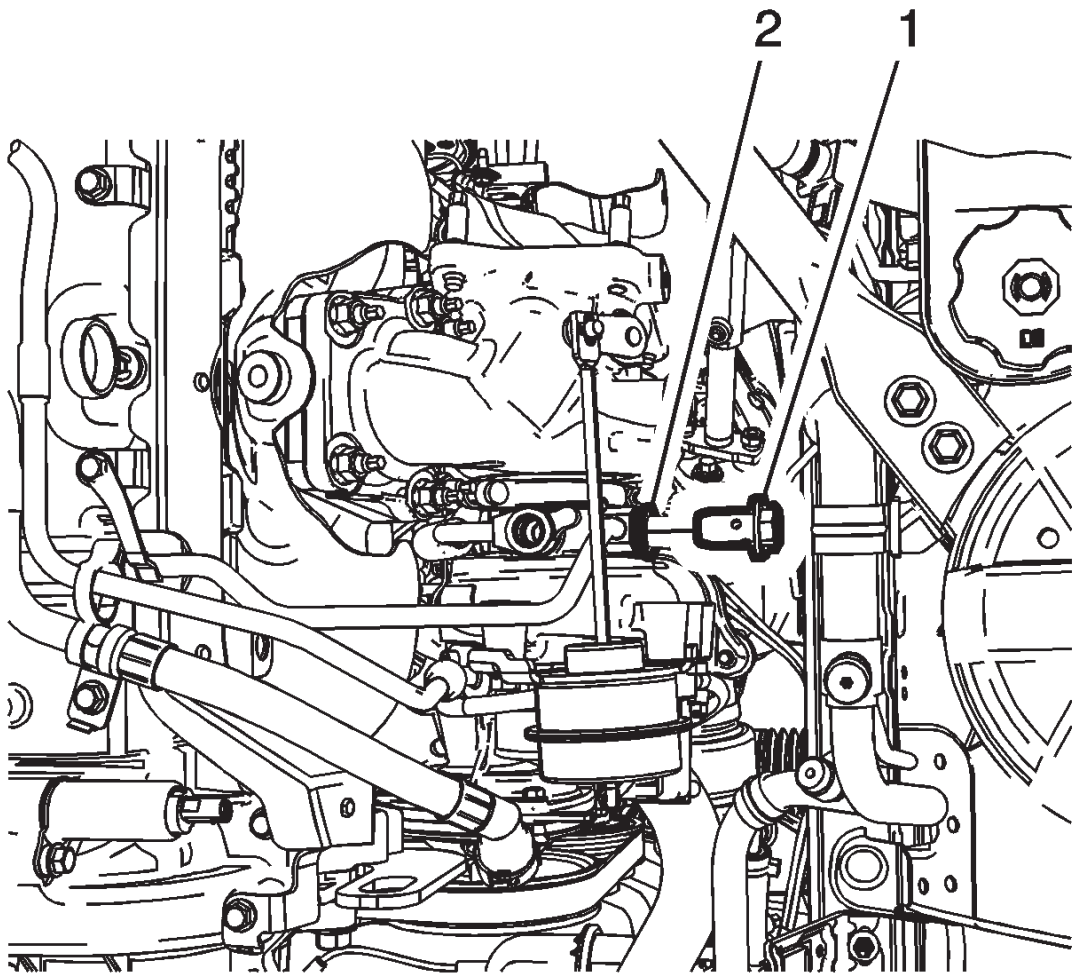


Fig. 53: Turbocharger Coolant Return Pipe

Courtesy of GENERAL MOTORS COMPANY

8. Install the turbocharger coolant return pipe bolts (1) and NEW gasket (2) and tighten the bolt to 10 N.m (89 lb in).

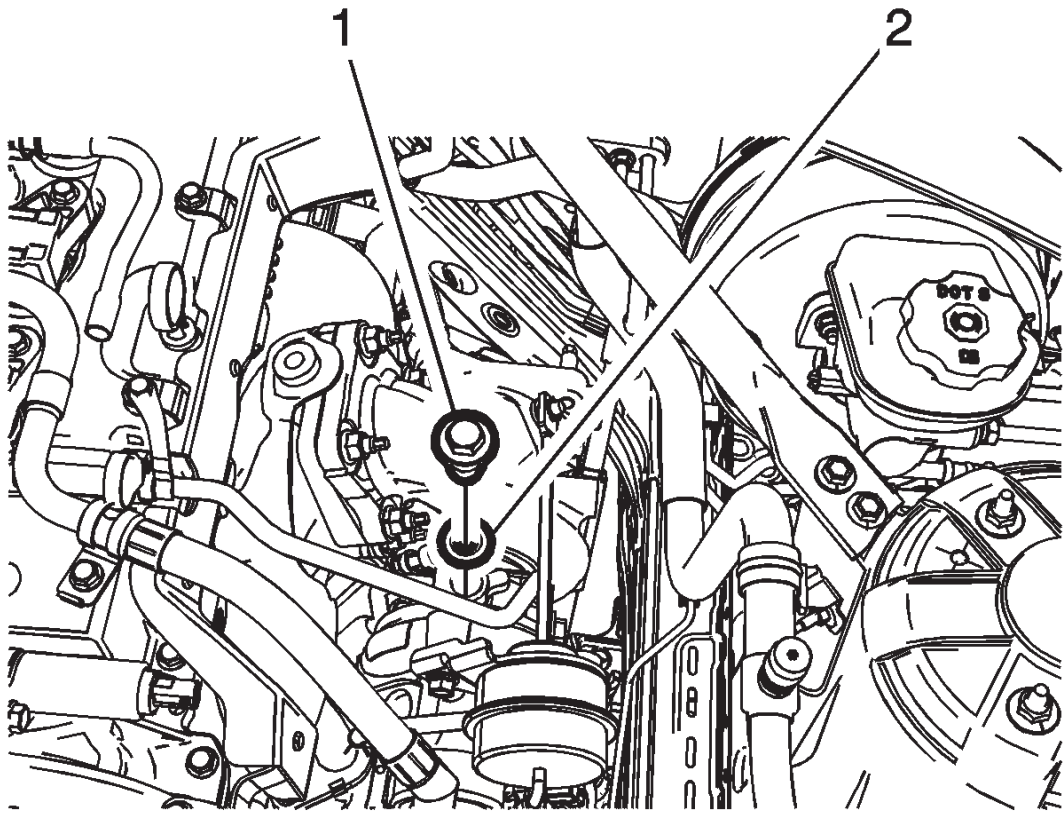


Fig. 54: Turbocharger Oil Feed Pipe

Courtesy of GENERAL MOTORS COMPANY

9. Install the turbocharger oil feed pipe bolts (1) and NEW gasket (2) and tighten the bolt to 10 N.m (89 lb in).

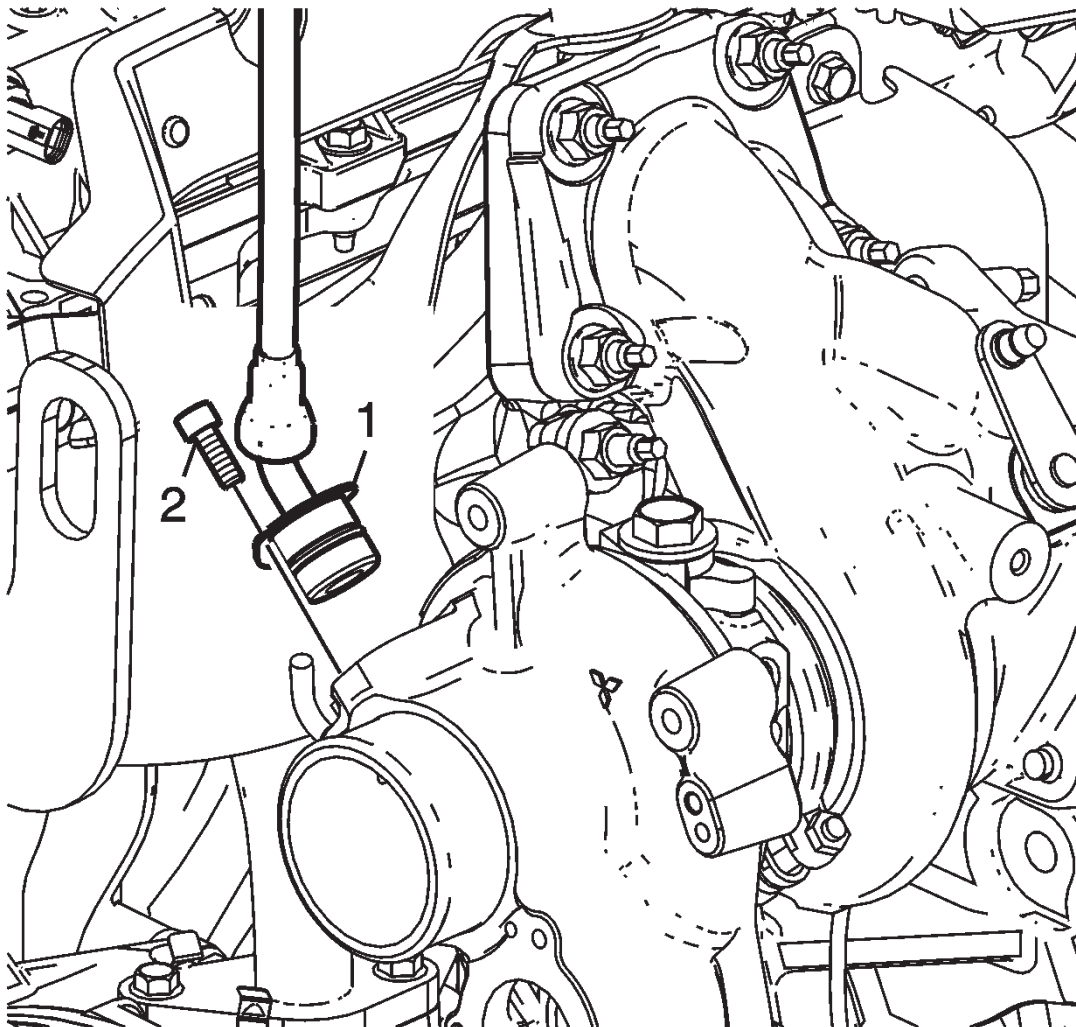


Fig. 55: PCV Hose Fitting Bolt
Courtesy of GENERAL MOTORS COMPANY

10. Install the PCV hose (1) and bolt (2). Tighten to 8 N.m (71 lb in)

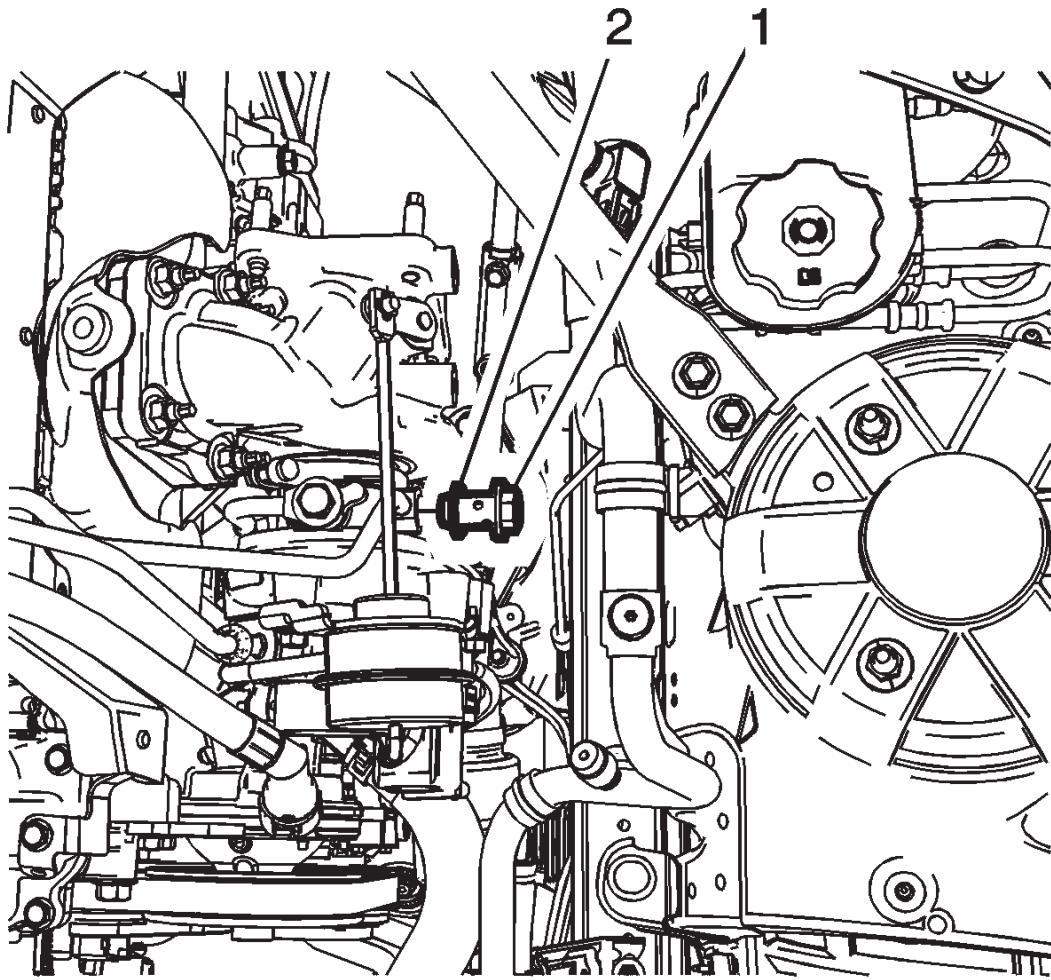


Fig. 56: Turbocharger Coolant Return Pipe
Courtesy of GENERAL MOTORS COMPANY

11. Install the turbocharger coolant return pipe bolts (1) and NEW gasket (2) and tighten the bolt to 10 N.m (89 lb in).
12. Connect electrical connectors as necessary.
13. Install the charger air cooler inlet air tube. Refer to [Charge Air Cooler Inlet Air Tube Replacement \(LTG\)](#) .
14. Install the catalytic converter. Refer to [Catalytic Converter Replacement \(LCV\) Catalytic Converter Replacement \(LTG\)](#) .

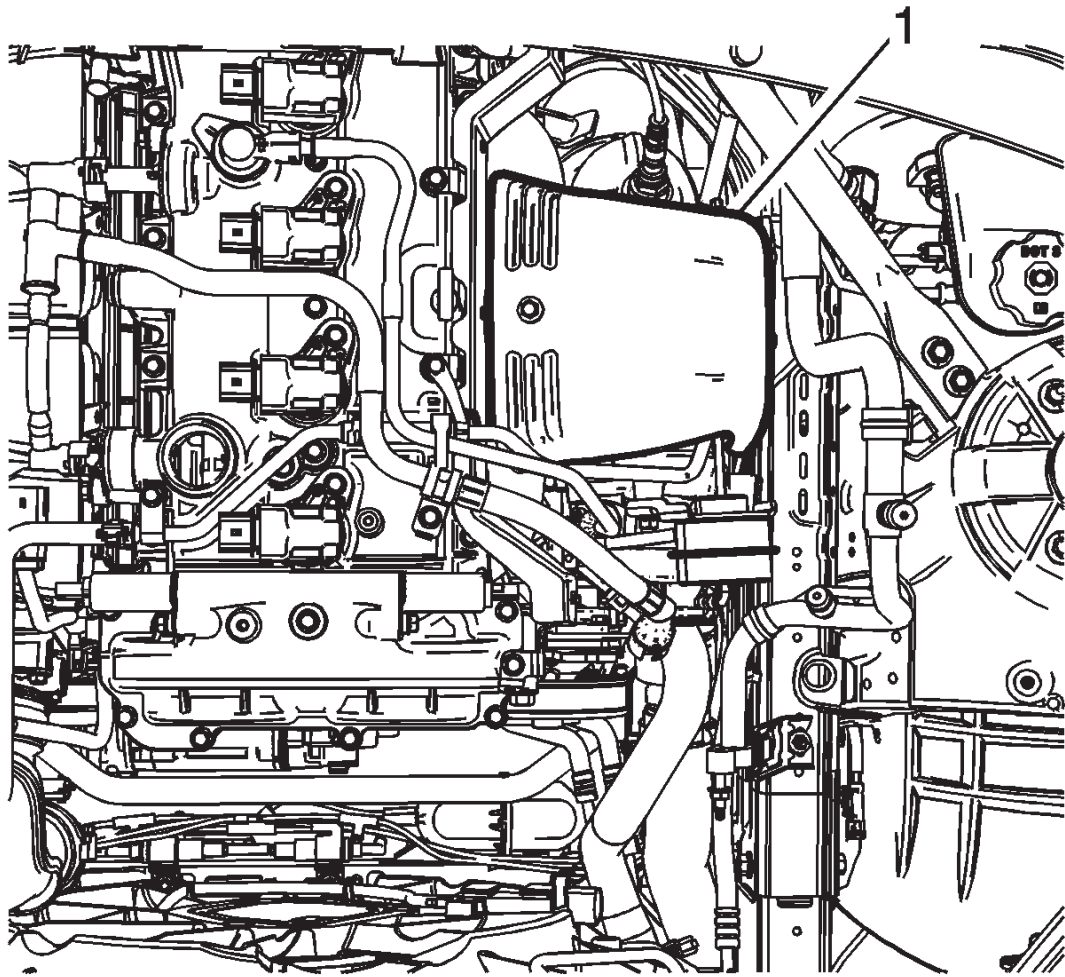


Fig. 57: Turbocharger Heat Shield

Courtesy of GENERAL MOTORS COMPANY

15. Install the turbocharger heat shield (1). Refer to [Turbocharger Heat Shield Replacement](#).
16. Fill the coolant system. Refer to [Cooling System Draining and Filling.\(Static\) Cooling System Draining and Filling.\(GE 47716\)](#) .
17. Install the air cleaner outlet duct. Refer to [Air Cleaner Outlet Duct Replacement \(LCV\)](#), [Air Cleaner Outlet Duct Replacement \(LTG\)](#) .
18. Install the intake manifold cover. Refer to [Intake Manifold Cover Replacement](#).

POSITIVE CRANKCASE VENTILATION VALVE REPLACEMENT (LTG)

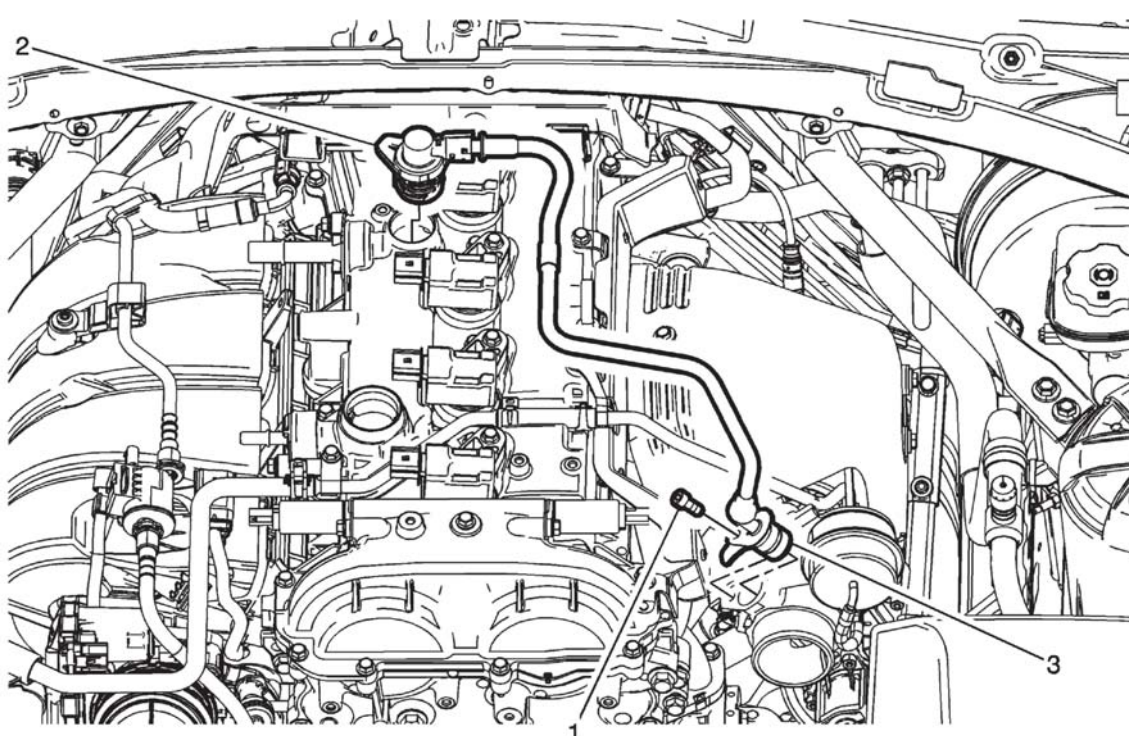


Fig. 58: Positive Crankcase Ventilation Valve (Top)_ (LTG)

Courtesy of GENERAL MOTORS COMPANY

Callout	Component Name
<p>Preliminary Procedures</p> <ol style="list-style-type: none"> 1. Intake Manifold Cover Replacement 2. Turbocharger Heat Shield Replacement <p>NOTE: Inspect each component while attached to the camshaft cover. Do not remove the PCV components unless inspection indicates a suspect component. Replace the PCV valve, PCV tube assembly, and PCV hose fitting as an assembly. The connections between these components are permanent.</p>	
1	<p>Positive Crankcase Ventilation Valve Fastener</p> <p>CAUTION: Refer to Fastener Caution .</p> <p>Tighten 10 N.m (89 lb in)</p>
2	<p>Positive Crankcase Ventilation Valve</p> <p>Procedure Inspect the PCV valve. If the PCV valve is suspect, use a suitable tool to pry the valve off of the cover. Retrieve any particles that fall onto the baffle in the cover. Discard the valve and particles.</p> <p>NOTE: When the PCV valve is removed, small particles of the valve will break and fall into the cover.</p>
3	<p>Positive Crankcase Ventilation Valve</p>

POSITIVE CRANKCASE VENTILATION VALVE REPLACEMENT (FRONT/LCV)