GENERAL INFORMATION

EXHAUST SYSTEM
The basic exhaust system consists of an engine exhaust manifold, exhaust pipe with oxygen sensor, catalytic converter with oxygen sensor, exhaust heat shield(s), muffler and exhaust tailpipe (Fig. 1) (Fig. 2).

The exhaust system uses a single muffler with a catalytic converter consisting of dual ceramic monoliths.

The 4.0L engines use a seal between the engine exhaust manifold and exhaust pipe to assure a tight seal and strain free connections (Fig. 2).

The exhaust system must be properly aligned to prevent stress, leakage and body contact. If the system contacts any body panel, it may amplify objectionable noises originating from the engine or body.

When inspecting an exhaust system, critically inspect for cracked or loose joints, stripped screw or bolt threads, corrosion damage and worn, cracked or broken hangers. Replace all components that are badly corroded or damaged. DO NOT attempt to repair.

When replacement is required, use original equipment parts (or their equivalent). This will assure proper alignment and provide acceptable exhaust noise levels.

CAUTION: Avoid application of rust prevention compounds or undercoating materials to exhaust system floor pan exhaust heat shields. Light over spray near the edges is permitted. Application of coating will result in excessive floor pan temperatures and objectionable fumes.
Fig. 1 Exhaust System—2.5L Engine

Fig. 2 Exhaust System—4.0L Engine
CATALYTIC CONVERTER

The stainless steel catalytic converter body is designed to last the life of the vehicle. Excessive heat can result in bulging or other distortion, but excessive heat will not be the fault of the converter. If unburned fuel enters the converter, overheating may occur. If a converter is heat-damaged, correct the cause of the damage at the same time the converter is replaced. Also, inspect all other components of the exhaust system for heat damage.

Unleaded gasoline must be used to avoid contaminating the catalyst core.

EXHAUST HEAT SHIELDS

Exhaust heat shields are needed to protect both the vehicle and the environment from the high temperatures developed by the catalytic converter. The catalytic converter releases additional heat into the exhaust system. Under severe operating conditions, the temperature increases in the area of the converter. Such conditions can exist when the engine misfires or otherwise does not operate at peak efficiency.

DO NOT remove spark plug wires from plugs or by any other means short out cylinders. Failure of the catalytic converter can occur due to a temperature increase caused by unburned fuel passing through the converter.

DO NOT allow the engine to operate at fast idle for extended periods (over 5 minutes). This condition may result in excessive temperatures in the exhaust system and on the floor pan.

DIAGNOSIS AND TESTING

EXHAUST SYSTEM

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## EXHAUST SYSTEM DIAGNOSIS CHART

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>POSSIBLE CAUSE</th>
</tr>
</thead>
</table>
| EXCESSIVE EXHAUST NOISE OR LEAKING EXHAUST GASES | 1. Leaks at pipe joints.  
2. Rusted or blown out muffler.  
3. Broken or rusted out exhaust pipe.  
4. Exhaust pipe leaking at manifold flange.  
5. Exhaust manifold cracked or broken.  
6. Leak between exhaust manifold and cylinder head.  
7. Catalytic converter rusted or blown out.  
8. Restriction in exhaust system. |
|                                        | 1. Tighten clamps/bolts at leaking joints.  
2. Replace muffler. Inspect exhaust system.  
3. Replace exhaust pipe.  
4. Tighten/replace flange attaching nuts/bolts.  
5. Replace exhaust manifold.  
6. Tighten exhaust manifold to cylinder head bolts.  
7. Replace catalytic converter assy.  
8. Remove restriction, if possible. Replace restricted part if necessary. |

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CAUTION: When servicing and replacing exhaust system components, disconnect the oxygen sensor connector(s). Allowing the exhaust to hang by the oxygen sensor wires will damage the harness and/or sensor.
REMOVAL AND INSTALLATION

EXHAUST PIPE

WARNING: IF TORCHES ARE USED WHEN WORKING ON THE EXHAUST SYSTEM, DO NOT ALLOW THE FLAME NEAR THE FUEL LINES.

CAUTION: When servicing exhaust system components, disconnect the oxygen sensor connector(s). Allowing the exhaust system to hang by the oxygen sensor harness will damage the wiring and/or sensor.

REMOVAL
(1) Raise and support the vehicle.
(2) Saturate the studs and nuts with heat valve lubricant. Allow 5 minutes for penetration (Fig. 3) (Fig. 4).
(3) Remove the oxygen sensors from the exhaust pipe and the catalytic converter (Fig. 3) (Fig. 4).
(4) Disconnect the exhaust pipe from the engine exhaust manifold. Discard the seal (4.0L engine, only) (Fig. 4).
(5) Support the transmission and remove the rear crossmember.
(6) Remove the clamp from the catalytic converter and muffler connection.
(7) Heat the catalytic converter and muffler connection with an oxyacetylene torch until the metal becomes cherry red.
(8) While the metal is still cherry red, twist the muffler assembly back and forth to separate it from the catalytic converter.

INSTALLATION
(1) Assemble catalytic converter and muffler loosely to permit proper alignment of all parts.
(2) Use a new clamp and tighten the nut to 48 N·m (35 ft. lbs.) torque.
(3) Connect the exhaust pipe to the engine exhaust manifold. Install a new seal between the exhaust manifold and the exhaust pipe (4.0L engine, only). Tighten the nuts to 31 N·m (23 ft. lbs.) torque.
(4) Install the rear crossmember. Tighten the crossmember-to-sill bolts to 41 N·m (30 ft. lbs.) torque. Remove the support from the transmission.
(5) Coat the oxygen sensors with anti-seize compound. Install the sensors and tighten the nut to 48 N·m (35 ft. lbs.) torque.
(6) Lower the vehicle.
(7) Start the engine and inspect for exhaust leaks and exhaust system contact with the body panels. Adjust the alignment, if needed.

MUFFLER AND TAILPIPE ASSEMBLY

WARNING: IF TORCHES ARE USED WHEN WORKING ON THE EXHAUST SYSTEM, DO NOT ALLOW THE FLAME NEAR THE FUEL LINES.
REMOVAL AND INSTALLATION (Continued)

CAUTION: When servicing exhaust system components, disconnect the oxygen sensor connector(s). Allowing the exhaust system to hang by the oxygen sensor harness will damage the wiring and/or sensor.

All original equipment exhaust systems are manufactured with the exhaust tailpipe welded to the muffler. Service replacement mufflers and exhaust tailpipes are either clamped together or welded together.

REMOVAL
(1) Raise the vehicle and support the rear of the vehicle by the side rails and allow the axle to hang free.
(2) Remove the clamp from the catalytic converter and muffler connection (Fig. 5).
(3) Remove the tailpipe hangers from the insulators (Fig. 6).
(4) Heat the catalytic converter-to-muffler connection with an oxyacetylene torch until the metal becomes cherry red.
(5) While the metal is still cherry red, twist the exhaust tailpipe/muffler assembly back and forth to separate it from the catalytic converter.
- To separate an original equipment exhaust tailpipe/muffler combination, cut the exhaust tailpipe close to the muffler. Collapse the part remaining in the muffler and remove.
- To remove a service exhaust tailpipe/muffler combination, apply heat until the metal becomes cherry red. Remove the exhaust tailpipe/muffler clamp and twist the exhaust tailpipe out of the muffler.

INSTALLATION
(1) Assemble catalytic converter and muffler loosely to permit proper alignment of all parts.
REMOVAL AND INSTALLATION (Continued)

(2) Install the exhaust tailpipe into the rear of the muffler.
(3) Install the exhaust tailpipe/muffler assembly on the rear exhaust tailpipe hanger. Make sure that the exhaust tailpipe has sufficient clearance from the floor pan.
(4) Tighten the nut on the muffler-to-catalytic converter clamp to 48 N·m (35 ft. lbs.) torque.
(5) Insert rods into isolators.
(6) Lower the vehicle.
(7) Start the engine and inspect for exhaust leaks and exhaust system contact with the body panels. Adjust the alignment, if needed.

INTAKE MANIFOLD—2.5L ENGINE

REMOVAL
(1) Disconnect the battery negative cable.
(2) Remove the air inlet hose and resonator from the throttle body and air cleaner housing (Fig. 7).
(3) Loosen the accessory drive belt tension and remove the belt from the power steering pump. (Refer to Group 7, Cooling for correct procedure).
(4) Remove the power steering pump and brackets from the water pump and intake manifold. Support power steering pump and bracket with mechanics wire attached to the radiator upper crossmember.
(5) Perform the fuel pressure release procedure. (Refer to Group 14, Fuel System for correct procedure)
(6) Disconnect fuel supply tube from the fuel rail. (Refer to Group 14, Fuel System - Quick Connect Fittings)
(7) Disconnect the accelerator cable from the throttle body and cable bracket.
(8) Disconnect the speed control and transmission line pressure cable from the throttle body and cable bracket (if equipped).

CAUTION: When disconnecting the speed control connector at the throttle body, DO NOT pry the connector off with pliers or screwdriver. Use finger pressure only. Prying the connector off could break it.

(9) Disconnect the electrical connectors. Pull the harnesses away from the manifold.
- The throttle position sensor.
- The idle air control motor.
- The coolant temperature sensor at the thermostat housing.
- The manifold air temperature sensor at the intake manifold.
- The fuel injectors.
- The oxygen sensor.
(10) Disconnect the crankcase ventilation (CCV) vacuum hose and manifold absolute pressure (MAP) sensor vacuum hose connector at the intake manifold.
(11) Disconnect HVAC supply vacuum hose from intake manifold.
(12) Disconnect CCV hose at the cylinder head cover (Fig. 7).

Fig. 7 Air Inlet/CCV System—2.5L Engine
(13) Remove the molded vacuum harness.
(14) Disconnect the vacuum brake booster hose at the intake manifold.
(15) Remove bolts 2 through 5 securing the intake manifold to the cylinder head (Fig. 8). LOOSEN BUT DO NOT REMOVE exhaust manifold bolt No. 1 and nuts 6 and 7.

Fig. 8 Intake/Exhaust Manifold—2.5L Engine
(16) Remove the intake manifold and gaskets. Drain the coolant from the manifold.
INSTALLATION

(1) Clean the intake manifold and cylinder head mating surfaces. **DO NOT allow foreign material to enter either the intake manifold or the ports in the cylinder head.**

(2) Install the new intake manifold gasket over the locating dowels.

(3) Position the manifold in place and finger tighten the mounting bolts.

(4) Tighten the fasteners in sequence and to the specified torque (Fig. 8).
   - Fastener No. 1—Tighten to 41 N·m (30 ft. lbs.) torque.
   - Fasteners Nos. 2 through 7—Tighten to 31 N·m (23 ft. lbs.) torque.

(5) **Before connecting the fuel line to the fuel rail inspect the fuel line O-rings and replace them if necessary.** Connect the fuel supply tube to the fuel rail inlet. Push tube until a click is heard.

(6) Pull out on fuel supply line to verify that it is properly connected. Install latch clip.

(7) Connect the molded vacuum hoses to the vacuum port on the intake manifold and the cylinder head cover.

(8) Connect the electrical connectors.
   - The throttle position sensor.
   - The idle air control motor.
   - The coolant temperature sensor at the thermostat housing.
   - The manifold air temperature sensor at the intake manifold.
   - The fuel injectors.
   - The oxygen sensor.

(9) Connect the brake booster vacuum supply hose.

(10) Connect the CCV hose and MAP sensor vacuum hose connectors to the throttle body.

(11) Install the power steering pump and bracket assembly to the water pump and intake manifold. Torque power steering pump bolts to 28 N·m (21 ft. lbs.). Torque bracket to water pump bolts to 47 N·m (35 ft. lbs.).

**CAUTION:** Ensure that the accessory drive belt is routed correctly. Failure to do so can cause the water pump to turn in the opposite direction resulting in engine overheating. Refer to Group 7, Cooling System for the proper procedure.

(12) Install and tension the accessory drive belt. (Refer to Group 7, Cooling System for the correct procedure)

(13) Connect the accelerator cable to the bracket and the throttle lever.

(14) Connect the speed control and transmission line pressure cable (if equipped) to the bracket and throttle lever.

(15) Install the air inlet hose and resonator to the throttle body and the air cleaner.

(16) Connect the battery negative cable.

(17) Start the engine and check for leaks.

INTAKE MANIFOLD—4.0L ENGINE

The intake and engine exhaust manifolds on the 4.0L engine must be removed and installed together. The two manifolds use a common gasket at the cylinder head.

REMOVAL

(1) Disconnect the battery negative cable.

(2) Remove air cleaner inlet hose from the throttle body and air cleaner assy (Fig. 9).

(3) Disconnect the accelerator cable, speed control cable (if equipped) and the transmission line pressure cable (if equipped). Remove these cables from the bracket.

(4) Disconnect the following electrical connectors:
   - Map Sensor
   - Idle Air Control Motor
   - Intake Manifold Air Temperature Sensor
   - Throttle Position Sensor
   - Oxygen Sensor Connector
   - Fuel Injector Connectors

(5) Secure the electrical harness out of the way.

(6) Disconnect the power brake booster vacuum supply hose from the intake manifold.

(7) Disconnect the CCV hose from the intake manifold.

(8) Disconnect the HVAC vacuum supply hose from the intake manifold.

(9) Disconnect canister purge vacuum supply form the intake manifold.

(10) Perform the fuel pressure release procedure (Refer to Group 14, Fuel System for correct procedure).

(11) Disconnect fuel supply line from the fuel rail assembly (Refer to Group 14, Fuel System for correct procedure).

(12) Loosen the accessory drive belt (Refer to Group 7, Cooling System). Slip the belt off of the power steering pulley.

(13) Remove the power steering pump and bracket from the intake manifold and water pump and set aside.

(14) Raise vehicle on hoist.

(15) Disconnect the exhaust pipe from the exhaust manifold. Discard the seal.

(16) Lower the vehicle.
REMOVAL AND INSTALLATION (Continued)

(17) Remove the intake manifold and exhaust manifold.

INSTALLATION

(1) Clean the mating surfaces of the cylinder head and the manifold(s). If the manifold is being replaced, ensure that all the fittings, etc. are transferred to the replacement manifold.

(2) Install a new exhaust/intake manifold gasket over the alignment dowels on the cylinder head.

(3) Position the engine exhaust manifold to the cylinder head. Install fastener No.3 and finger tighten at this time (Fig. 10).

(4) Install intake manifold on the cylinder head dowels.

(5) Install washers and fasteners Nos. 1, 2, 4, 5, 8, 9, 10 and 11 (Fig. 10).

(6) Install washers and fasteners Nos. 6 and 7 (Fig. 10).

(7) Tighten the fasteners in sequence and to the specified torque (Fig. 10).

• Fasteners Nos. 1 through 5—Tighten to 33 N·m (24 ft. lbs.) torque.
• Fasteners Nos. 6 and 7—Tighten to 31 N·m (23 ft. lbs.) torque.
• Fasteners Nos. 8 through 11—Tighten to 33 N·m (24 ft. lbs.) torque.

(8) Install the power steering pump and bracket to the intake manifold and water pump. Torque the power steering pump/bracket to manifold bolts to 28 N·m (21 ft. lbs.). Torque the power steering pump bracket to water pump bolts to 47 N·m (35 ft. lbs.).

(9) Install accessory drive belt and tighten to specification. (Refer to group 7, Cooling for correct procedure).

(10) Before connecting the fuel line to the fuel rail, inspect the fuel line O-rings and replace them if necessary. Connect the fuel supply line to the fuel rail assembly. (Refer to Group 14, Fuel System for the correct procedure).

(11) Connect all sensor electrical connections on the intake manifold.

• Map Sensor
• Idle Air Control Motor
• Intake Manifold Air Temperature Sensor
• Throttle Position Sensor
• Oxygen Sensor Connector
• Fuel Injector Connectors

(12) Connect the power brake booster and HVAC vacuum supply hoses.

(13) Connect the canister purge vacuum supply hose to the manifold.

(14) Install the throttle cable, cruise control cable (if equipped), and transmission line pressure (if equipped) cables into the bracket. Connect the cables to the throttle body.

(15) Connect air inlet hose to the throttle body and air cleaner housing.

(16) Raise vehicle on hoist.

(17) Using a new seal, connect the exhaust pipe to the engine exhaust manifold. Tighten the bolts to 31 N·m (23 ft. lbs.) torque.

(18) Lower the vehicle.

(19) Connect the battery negative cable.

(20) Start the engine and check for leaks.

EXHAUST MANIFOLD—2.5L ENGINE

REMOVAL

(1) Disconnect the battery negative cable.

(2) Raise the vehicle.
REMOVAL AND INSTALLATION (Continued)

(3) Disconnect the exhaust pipe from the engine exhaust manifold.
(4) Lower the vehicle.
(5) Remove the intake manifold. (Refer to procedure in this section).
(6) Remove fasteners 2 through 5 and remove the intake manifold (Fig. 11).
(7) Remove fasteners 1, 6 and 7 and remove the engine exhaust manifold (Fig. 11).

INSTALLATION

(1) Clean the intake and engine exhaust manifolds and cylinder head mating surfaces. DO NOT allow foreign material to enter either the intake manifold or the ports in the cylinder head.
(2) Install a new intake manifold gasket over the alignment dowels on the cylinder head.
(3) Install the engine exhaust manifold assembly. Exhaust manifold must be centrally located over the end studs and spacer (Fig. 11).
(4) Tighten bolt No. 1 to 41 N·m (30 ft. lbs.) torque (Fig. 11).
(5) Install the intake manifold on the cylinder head dowels (Fig. 11).
(6) Install bolts 2 through 5 (Fig. 11). Tighten these bolts to 31 N·m (23 ft. lbs.) torque.
(7) Install new engine exhaust manifold spacers over the engine exhaust manifold mounting studs in the cylinder head (Fig. 11).
(8) Tighten nuts 6 and 7 to 31 N·m (23 ft. lbs.) torque (Fig. 11).
(9) Install all components to the intake manifold.
(10) Raise the vehicle.
(11) Connect the exhaust pipe to the engine exhaust manifold. Tighten the bolts to 31 N·m (23 ft. lbs.) torque.
(12) Lower the vehicle.
(13) Connect the battery negative cable.
(14) Start the engine and check for leaks.

EXHAUST MANIFOLD—4.0L ENGINE

The intake and engine exhaust manifolds on the 4.0L engine must be removed and installed together. The manifolds use a common gasket at the cylinder head.

Refer to Intake Manifold—4.0L Engine in this section for the proper removal and installation procedures.

SPECIFICATIONS

TORQUE SPECIFICATIONS

<table>
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<tr>
<th>DESCRIPTION</th>
<th>TORQUE</th>
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<tr>
<td>Crossmember to Sill</td>
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<tr>
<td>Bolts</td>
<td>41 N·m (30 ft. lbs.)</td>
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<td>Exhaust Pipe to Manifold</td>
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<td>Nuts</td>
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<td>Exhaust Manifold Bolt #1</td>
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<td>Muffler to Catalytic Converter</td>
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<td>Bolts (to water pump)</td>
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