

EXHAUST SYSTEM

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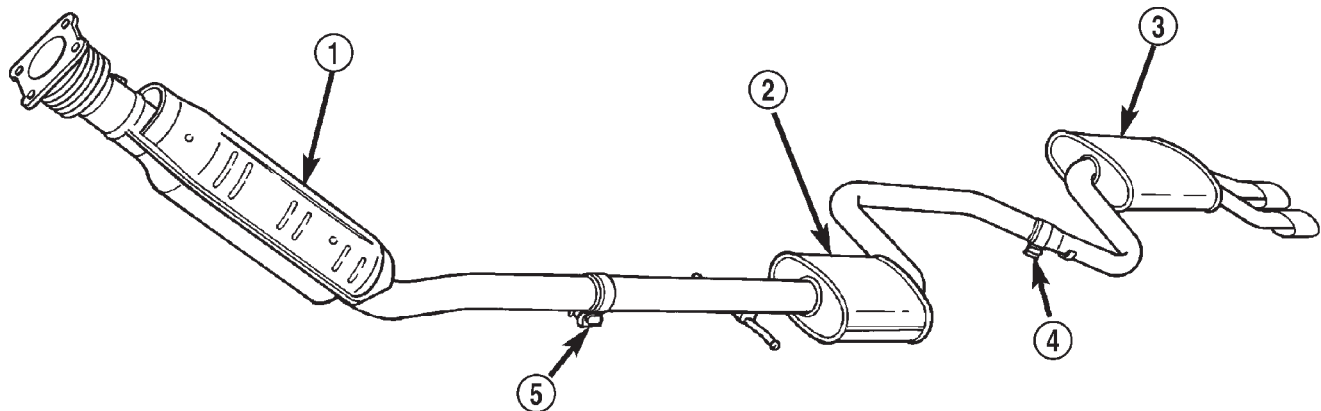
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DESCRIPTION AND OPERATION

EXHAUST SYSTEM

DESCRIPTION

The exhaust system has a front mounted catalytic converter with flex-joint, center mounted resonator, and rear muffler (Fig. 1). Band clamps are used in two locations to connect system components (Fig. 2).



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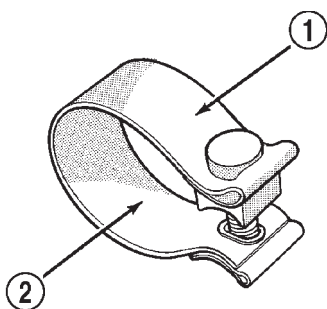
Fig. 1 Exhaust System

- 1 - CATALYTIC CONVERTER
- 2 - RESONATOR
- 3 - MUFFLER

- 4 - CLAMP
- 5 - CLAMP

DESCRIPTION AND OPERATION (Continued)

CATALYTIC CONVERTER



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Fig. 2 Band Clamp

1 - CLAMP SIZE

2 - TORQUE SPECIFICATION

DESCRIPTION

The under-floor, three-way catalytic converter inlet is connected to the exhaust manifold by use of a flex joint and gasket. The outlet connects to the exhaust system.

OPERATION

The three-way catalytic converter simultaneously converts three exhaust emissions into harmless gases. Specifically, HC and CO emissions are converted into water (H₂O) and carbon dioxide (CO₂). Oxides of Nitrogen (NO_x) are converted into elemental Nitrogen (N) and water. The three-way catalyst is most efficient in converting HC, CO and NO_x at the stoichiometric air fuel ratio of 14.7:1.

The oxygen content in a catalyst is important for efficient conversion of exhaust gases. When a high oxygen content (lean) air/fuel ratio is present for an extended period, oxygen content in a catalyst can reach a maximum. When a rich air/fuel ratio is present for an extended period, the oxygen content in the catalyst can become totally depleted. When this occurs, the catalyst fails to convert the gases. This is known as catalyst "punch through."

Catalyst operation is dependent on its ability to store and release the oxygen needed to complete the

emissions-reducing chemical reactions. As a catalyst deteriorates, its ability to store oxygen is reduced. Since the catalyst's ability to store oxygen is somewhat related to proper operation, oxygen storage can be used as an indicator of catalyst performance. Refer to the appropriate Powertrain Diagnostic Procedure for diagnosis of a catalyst related Diagnostic Trouble Code (DTC).

The combustion reaction caused by the catalyst releases additional heat in the exhaust system, causing temperature increases in the area of the reactor under severe operating conditions. 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, if exhaust system is equipped with a catalytic converter. Failure of the catalytic converter can occur due to temperature increases caused by unburned fuel passing through the converter. This deterioration of the catalyst core can result in excessively high emission levels, noise complaints, and exhaust restrictions.

The use of catalysts also involves some non-automotive problems. Unleaded gasoline must be used to avoid poisoning the catalyst core. Do not allow engine to operate above 1200 RPM in neutral for extended periods over 5 minutes. This condition may result in excessive exhaust system/floor pan temperatures because of no air movement under the vehicle.

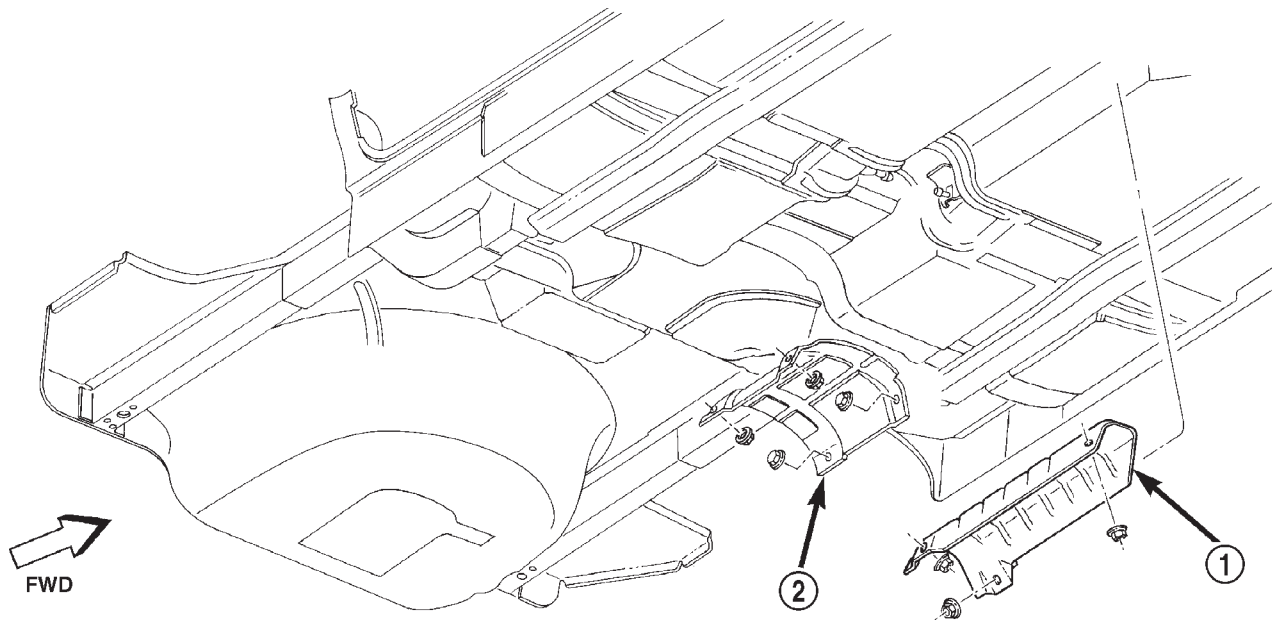
CAUTION: Due to exterior physical similarities of some catalytic converters with pipe assemblies, extreme care should be taken with replacement parts. There are internal converter differences required in some parts of the country (particularly vehicles built for States with strict emission requirements).

HEAT SHIELDS

DESCRIPTION

The exhaust system heat shields are attached to the under body of the vehicle (Fig. 3).

DESCRIPTION AND OPERATION (Continued)



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Fig. 3 Heat Shields—JX

1 – HEAT SHIELD

2 – RESONATOR HEAT SHIELD

OPERATION

Heat shields are needed to protect both the vehicle and the environment from the high temperatures developed near the catalytic converter. All engines are equipped with a heat shield crimped on the top of the converter.

Avoid application of rust prevention compounds or undercoating materials to exhaust system floor pan heat shields on cars so equipped. Light over spray near the edges is permitted. Application of coating will greatly reduce the efficiency of the heat shields resulting in excessive floor pan temperatures and objectionable fumes.

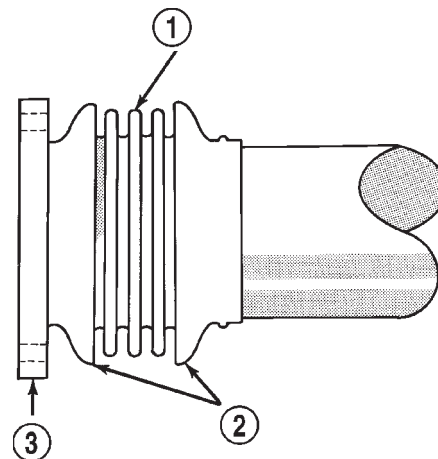
EXHAUST FLEX-JOINT COUPLING**DESCRIPTION**

The exhaust flex-joint is welded to the catalytic converter (Fig. 4).

OPERATION

The exhaust flex-joint coupling is used to secure the catalytic converter to the engine manifold. This joint actually moves back and forth as the engine moves, preventing breakage that could occur from

the back-and-forth motion of a transverse mounted engine.



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Fig. 4 Flex-Joint Coupling—2.5L Engine

- 1 – BELLOWS
- 2 – END CAPS
- 3 – FLANGE

DIAGNOSIS AND TESTING

EXHAUST SYSTEM

CONDITION	POSSIBLE CAUSES	CORRECTION
EXCESSIVE EXHAUST NOISE (UNDER HOOD)	1. Exhaust manifold cracked or broken. 2. Manifold to cylinder head leak. 3. EGR Valve to manifold gasket leakage. 4. EGR Valve to EGR tube gasket leakage. 5. EGR tube to manifold tube leakage. 6. Exhaust flex-joint to manifold leak. 7. Exhaust flex-joint. 8. Pipe and shell noise from front exhaust pipe.	1. Replace manifold. 2. Tighten manifold and/or replace gasket. 3. Tighten fasteners or replace gasket. 4. Tighten fasteners or replace gasket. 5. Tighten tube nut. 6. Tighten joint fasteners and/or replace gasket. 7. Replace catalytic converter assembly. 8. Characteristic of single wall pipe.
EXCESSIVE EXHAUST NOISE	1. Leak at exhaust pipe joints. 2. Burned or rusted out muffler assembly or exhaust pipe. 3. Burned or rusted out resonator. 4. Restriction in exhaust system. 5. Converter material in muffler.	1. Tighten clamps at leaking joints. 2. Replace muffler resonator tailpipe assembly or exhaust pipe with catalytic converter assembly. 3. Replace muffler resonator tailpipe assembly. 4. Remove restriction if possible, or replace component as necessary. 5. Replace muffler and converter assemblies. Check fuel injection and ignition systems for proper operation.

REMOVAL AND INSTALLATION

EXHAUST SYSTEM

REMOVAL

WARNING: THE NORMAL OPERATING TEMPERATURE OF THE EXHAUST SYSTEM IS VERY HIGH. THEREFORE, NEVER WORK AROUND OR ATTEMPT TO SERVICE ANY PART OF THE EXHAUST SYSTEM UNTIL IT IS COOLED. SPECIAL CARE SHOULD BE TAKEN WHEN WORKING NEAR THE CATALYTIC CONVERTER. THE TEMPERATURE OF THE CONVERTER RISES TO A HIGH LEVEL AFTER A SHORT PERIOD OF ENGINE OPERATION TIME.

(1) Raise vehicle on hoist and apply penetrating oil to clamp nuts of component being removed.

(2) Remove clamp and supports at muffler to resonator assembly (Fig. 5). Remove muffler from resonator pipe.

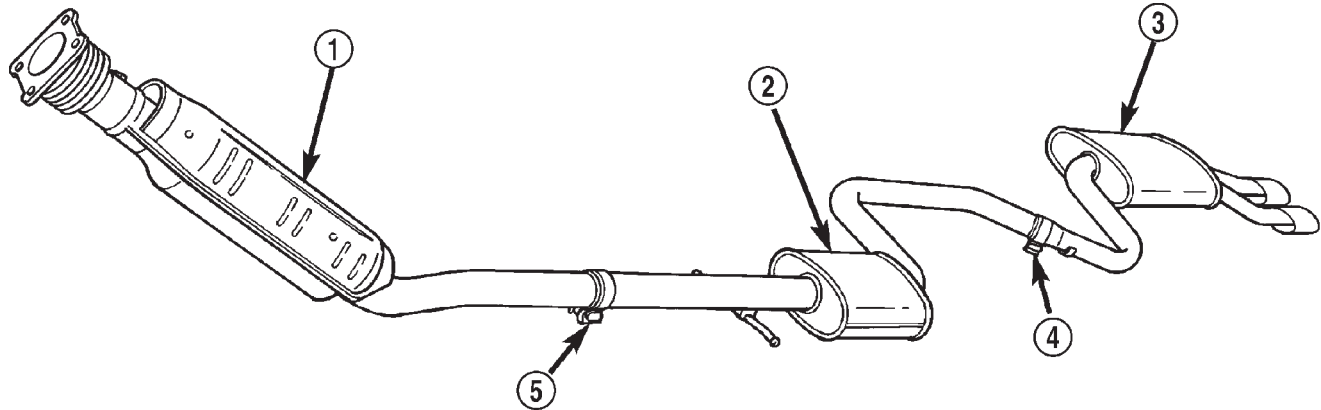
(3) Remove ground strap (Fig. 7).

(4) Remove clamp and supports at the resonator pipe to catalytic converter slip joint (Fig. 5). Separate at slip joint and remove the resonator assembly.

(5) Disconnect downstream and upstream heated oxygen sensors from the catalytic converter pipe (Fig. 6).

(6) Remove catalytic converter to exhaust manifold attaching fasteners (Fig. 6). Remove catalytic converter from vehicle.

REMOVAL AND INSTALLATION (Continued)

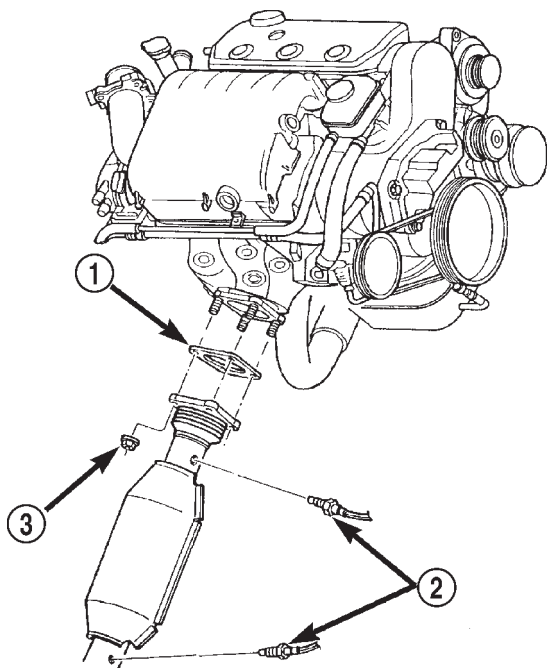


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Fig. 5 Exhaust System Components

- 1 - CATALYTIC CONVERTER
2 - RESONATOR
3 - MUFFLER

- 4 - CLAMP
5 - CLAMP



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Fig. 6 Flex-Joint Connection

- 1 - GASKET
2 - OXYGEN SENSORS
3 - NUT

(7) Clean ends of pipes and/or muffler to assure mating of all parts. Discard broken or worn insulators, rusted clamps, supports and attaching parts.

NOTE: Band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off the exhaust pipe.

NOTE: When replacement is required on any component of the exhaust system, it is most important that original equipment parts (or their equivalent) be used to:

- insure proper alignment with other parts in the system.
- provide acceptable exhaust noise levels and does not change exhaust system back pressure that could affect emissions and performance.

INSTALLATION

When assembling exhaust system **do not** tighten clamps until components are aligned and supports have equal load on them (Fig. 7).

- (1) Assemble catalytic converter to exhaust manifold connection (Fig. 6).
- (2) Assemble resonator pipe to catalytic converter and attach to the supports on the underbody (Fig. 7).
- (3) Install the muffler to resonator pipe and attach to the supports on the underbody (Fig. 7).

NOTE: Always work from the front to rear of exhaust system when aligning and tightening exhaust system components.

(4) Align and tighten the catalytic converter to exhaust manifold fasteners (Fig. 6). Tighten fasteners to 28 N·m (250 in. lbs.).

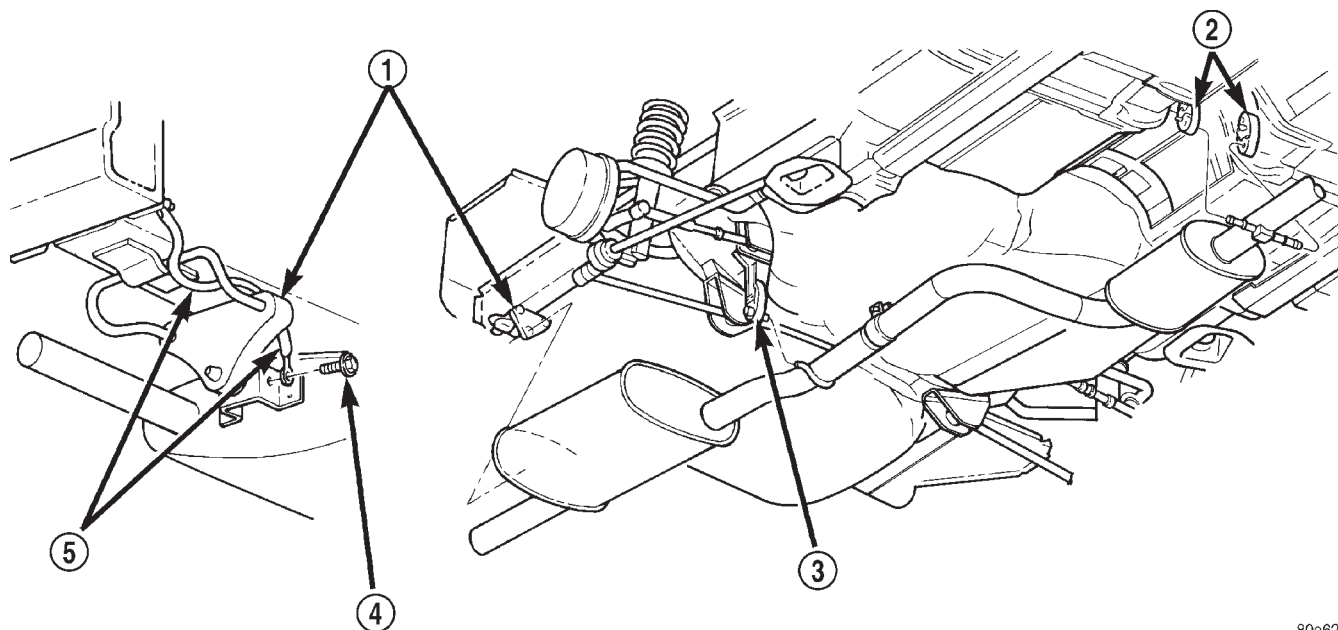
(5) Align each component to maintain position and proper clearance with underbody parts and that all supports have equal load on them. Tighten clamps to 75 N·m (55 ft. lbs.) (Fig. 8).

(6) Connect ground strap.

(7) Connect the downstream heated oxygen sensor.

(8) Connect the upstream heated oxygen sensor.

CLEANING AND INSPECTION (Continued)

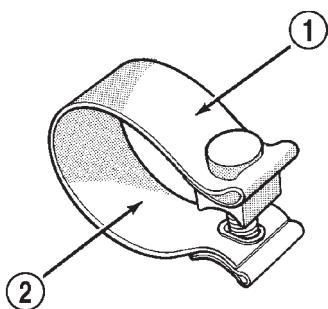


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Fig. 7 Exhaust System Support Insulators

- 1 - REAR MUFFLER SUPPORT ISOLATORS
- 2 - RESONATOR SUPPORT ISOLATORS
- 3 - MUFFLER/FRONT PIPE SUPPORT ISOLATOR

- 4 - FASTENER
- 5 - GROUND STRAP



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Fig. 8 Band Clamp

- 1 - CLAMP SIZE
- 2 - TORQUE SPECIFICATION

NOTE: Slip joint band clamps are spot welded to exhaust system. If a band clamp must be replaced, the spot weld must be ground off.

ADJUSTMENTS

EXHAUST SYSTEM ALIGNMENT

A misaligned exhaust system is usually indicated by a vibration, rattling noise, or binding of exhaust system components. These noises are sometimes hard to distinguish from other chassis noises. Inspect exhaust system for broken or loose clamps, heat shields, isolators, and brackets. Replace or tighten as necessary. It is important that exhaust system clearances and alignment be maintained.

Perform the following procedures to align the exhaust system:

- (1) Loosen clamps and support brackets.
- (2) Align the exhaust system starting at the front, working rearward.
- (3) Tighten all clamps and brackets once alignment and clearances are achieved.

CLEANING AND INSPECTION

EXHAUST SYSTEM**INSPECTION**

Inspect the exhaust pipes, catalytic converters, muffler, and resonators for cracked joints, broken welds and corrosion damage that would result in a leaking exhaust system. Inspect the clamps, support brackets, and insulators for cracks and corrosion damage.

SPECIFICATIONS

TORQUE

DESCRIPTION	N·m	Ft. Lbs.	In. Lbs.
Band Clamps—Fastener	75	55	—
Catalytic Converter to Exhaust Manifold Flange—Fasteners	32	24	—
Cross Under Pipe—Fasteners	31	—	250
Heat Shields to Body— Fasteners	5	—	40

