

EXHAUST SYSTEM AND INTAKE MANIFOLD

CONTENTS

	page		page
GENERAL INFORMATION		EXHAUST MANIFOLD	9
CATALYTIC CONVERTER	1	EXHAUST PIPE	3
EXHAUST SYSTEM	1	HEAT SHIELDS	5
HEAT SHIELDS	1	INTAKE MANIFOLD	6
DESCRIPTION AND OPERATION		MUFFLER	4
EXHAUST MANIFOLD	2	TAILPIPE	5
INTAKE MANIFOLD	2	CLEANING AND INSPECTION	
DIAGNOSIS AND TESTING		EXHAUST MANIFOLD	11
EXHAUST SYSTEM	2	INTAKE MANIFOLD	11
REMOVAL AND INSTALLATION		SPECIFICATIONS	
CATALYTIC CONVERTER	3	TORQUE SPECIFICATIONS	11

GENERAL INFORMATION

EXHAUST SYSTEM

The basic exhaust system consists of exhaust manifold(s), exhaust pipe, catalytic converter, heat shield(s), muffler and tailpipe.

The exhaust system uses a single muffler with a single monolithic-type catalytic converter.

The exhaust manifolds are equipped with ball flange outlets to assure a tight seal and strain free connections.

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.

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.

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.

HEAT SHIELDS

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.

CAUTION: Avoid application of rust prevention compounds or undercoating materials to exhaust system floor pan heat shields. Light overspray near the edges is permitted. Application of coating will result in excessive floor pan temperatures and objectionable fumes.

DESCRIPTION AND OPERATION

INTAKE MANIFOLD

The aluminum intake manifold is a single plane design with equal length runners. The manifold is sealed by flange side gaskets with front and rear cross-over gaskets.

EXHAUST MANIFOLD

The exhaust manifolds are constructed of cast iron and are LOG type with balanced flow.

DIAGNOSIS AND TESTING

EXHAUST SYSTEM

EXHAUST SYSTEM DIAGNOSIS CHART

CONDITION	POSSIBLE CAUSE	CORRECTION
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.
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, WEAR PROTECTIVE EYE COVERING AND DO NOT ALLOW THE FLAME NEAR THE FUEL LINES.

CAUTION: When servicing or replacing exhaust system components, be sure to disconnect all oxygen sensor connectors. Allowing the exhaust system to hang by the harness will damage the wiring and/or sensor.

REMOVAL

- (1) Disconnect battery negative cable.
- (2) Raise vehicle on hoist.
- (3) Remove front driveshaft assembly. (Refer to Group 21, Transmission and Transfer Case for the correct procedures)
- (4) Disconnect upstream oxygen sensor.
- (5) Remove exhaust pipe to manifold nuts (Fig. 1).
- (6) Remove exhaust pipe to catalytic converter clamp (Fig. 1).
- (7) Heat exhaust pipe to converter connection with an oxygen/acetylene torch and twist converter out of exhaust pipe.
- (8) Remove exhaust pipe.
- (9) If replacing exhaust pipe, remove upstream oxygen sensor and transfer to new pipe.

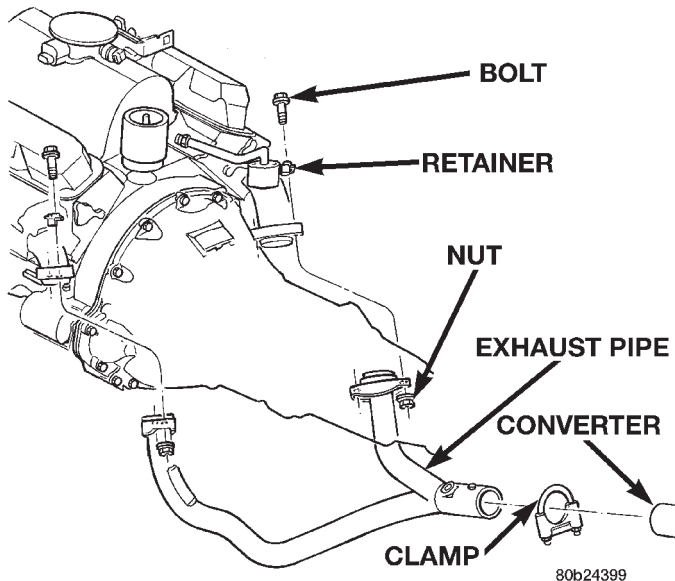


Fig. 1 Exhaust Pipe Removal/Installation

INSTALLATION

- (1) Install exhaust pipe and start the pipe to manifold nuts by hand. (DO NOT TIGHTEN).

- (2) Connect exhaust pipe to catalytic converter and install exhaust clamp. Start nuts by hand.

- (3) Align exhaust pipe and tighten exhaust pipe to manifold nuts to 34 N·m (25 ft. lbs.).

- (4) Tighten exhaust pipe to catalytic converter clamp nuts to 43 N·m (32 ft. lbs.).

- (5) If removed, install oxygen sensor and tighten to 30 N·m (22 ft. lbs.).

- (6) Connect oxygen sensor connector.

- (7) Install front driveshaft. (Refer to Group 21, Transmission and Transfer Case for the correct procedure)

- (8) Lower vehicle and connect battery negative cable.

- (9) Start engine and inspect for exhaust leaks

CATALYTIC CONVERTER

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

CAUTION: When servicing or replacing exhaust system components, be sure to disconnect all oxygen sensor connectors. Allowing the exhaust system to hang by the harness will damage the wiring and/or sensor.

REMOVAL

- (1) Disconnect battery negative cable.
- (2) Remove passenger front seat track left rear mounting bolt.
- (3) Raise vehicle on hoist.
- (4) Remove tailpipe from rear hanger isolators.
- (5) Remove muffler to catalytic converter exhaust clamp.
- (6) Heat connection with an oxygen/acetylene torch and separate muffler from catalytic converter.
- (7) Disconnect catalytic converter rear hanger from isolators.
- (8) Disconnect downstream oxygen sensor.
- (9) Remove catalytic converter to exhaust pipe clamp (Fig. 2).
- (10) Heat connection with oxygen/acetylene and separate muffler from catalytic converter.
- (11) Remove front axle propeller shaft. Refer to Group 21, Transmission and Transfer Case for the correct procedure.
- (12) Disconnect upstream oxygen sensor.
- (13) Remove upper exhaust pipe to manifold bolts (one from each side) and allow exhaust pipe to hang.
- (14) Support transmission/transfer case with a stand and remove the transmission mount to cross-member nuts.

REMOVAL AND INSTALLATION (Continued)

(15) Remove transmission crossmember to frame bolts and move crossmember as far rearward (towards torsion bar crossmember) as possible.

(16) Remove catalytic converter rear hanger.

(17) Remove exhaust heat shield.

(18) Slide converter forward and out of vehicle.

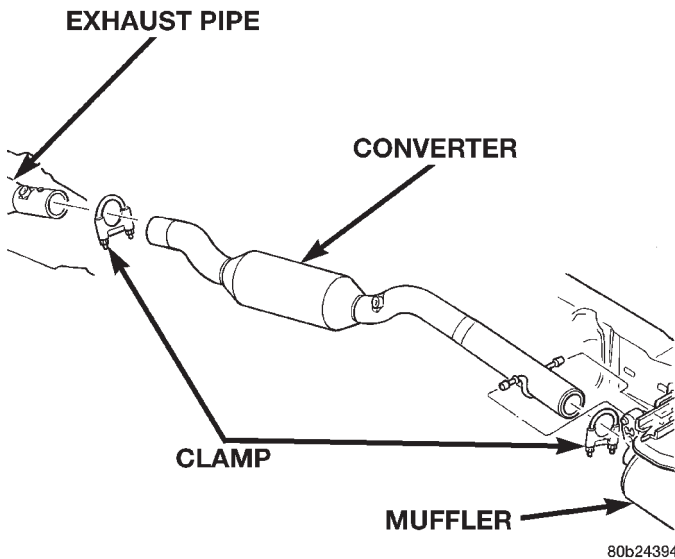


Fig. 2 Catalytic Converter Removal/Installation

INSTALLATION

(1) If the converter is being replaced, transfer oxygen sensor from old converter and tighten to 30 N·m (22 in. lbs.).

(2) Install catalytic converter into place.

(3) Slide transmission crossmember into place and tighten crossmember mounting bolts to 47 N·m (35 ft. lbs.).

(4) Lower transmission/transfer case into place and remove stand.

(5) Install and tighten transmission mount nuts to 47 N·m (35 ft. lbs.).

(6) Install heat shield and tighten to 7 N·m (60 in. lbs.).

(7) Install the converter hanger bracket and tighten bolts to 23 N·m (200 in. lbs.).

(8) Install the two exhaust pipe to manifold bolts and tighten by hand.

(9) Install catalytic converter to exhaust pipe with a new exhaust clamp. Start nuts by hand.

(10) Install catalytic converter into hanger isolators.

(11) Install muffler onto catalytic converter with a new clamp. Tighten nuts by hand.

(12) Install muffler into rear hanger isolators.

(13) Install tailpipe hanger into isolator.

(14) Inspect exhaust system for contact with body or drivetrain components. Align as necessary.

(15) Tighten exhaust pipe to manifold bolts to 34 N·m (25 ft. lbs.).

(16) Tighten converter to exhaust pipe clamp to 43 N·m (32 ft. lbs.).

(17) Tighten muffler to converter clamp to 43 N·m (32 ft. lbs.).

(18) Lower vehicle.

(19) Install passenger front seat track left rear mounting bolt.

(20) Connect battery negative cable.

(21) Start engine and check for exhaust leaks.

MUFFLER

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

CAUTION: When servicing or replacing exhaust system components, be sure to disconnect all oxygen sensor connectors. Allowing the exhaust system to hang by the harness will damage the wiring and/or sensor.

REMOVAL

(1) Disconnect battery negative cable.

(2) Raise vehicle on hoist.

(3) Remove muffler to catalytic converter and tailpipe clamps (Fig. 3).

(4) Remove tailpipe from hanger isolator. Heat muffler to tailpipe with an oxygen/acetylene torch and twist tailpipe out of muffler.

(5) Disconnect muffler from hanger isolators (Fig. 3).

(6) Heat muffler to catalytic converter connection and twist muffler off of converter pipe.

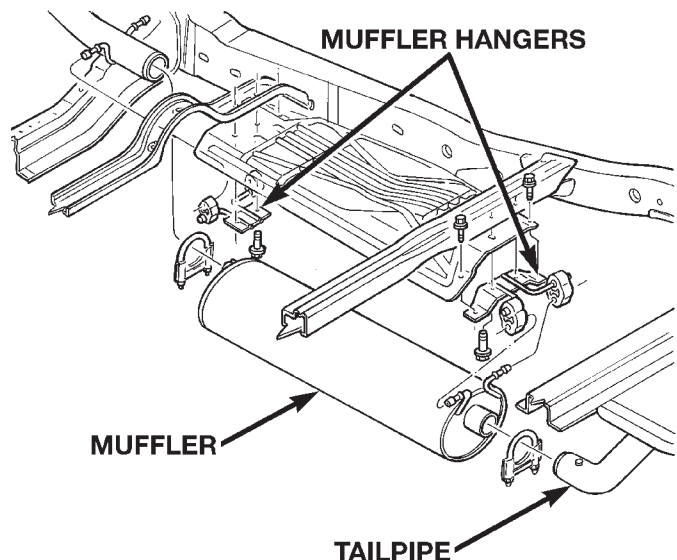


Fig. 3 Muffler Removal/Installation

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

- (1) Install muffler to catalytic converter and tailpipe. Install exhaust clamps and start nuts by hand.
- (2) Connect muffler to rear muffler hanger.
- (3) Connect tailpipe to rear hanger.
- (4) Align muffler and tighten exhaust clamp nuts to 43 N·m (32 ft. lbs.).
- (5) Lower vehicle and connect battery negative cable.
- (6) Start engine and check for exhaust leaks.

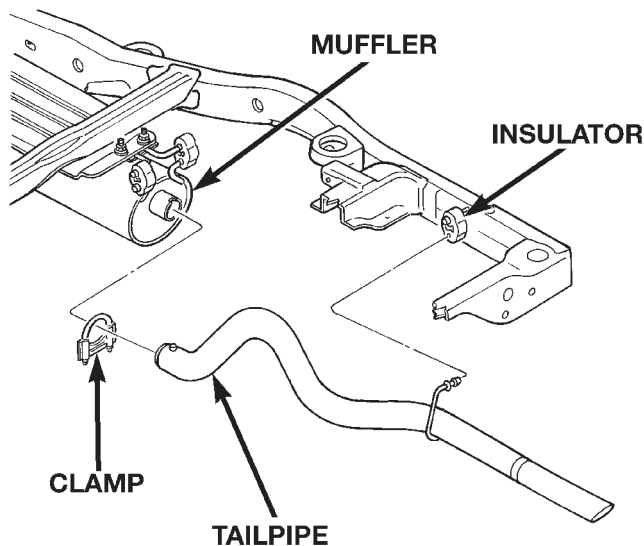
TAILPIPE

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

CAUTION: When servicing or replacing exhaust system components, be sure to disconnect all oxygen sensor connectors. Allowing the exhaust system to hang by the harness will damage the wiring and/or sensor.

REMOVAL

- (1) Disconnect battery negative cable.
- (2) Raise vehicle on hoist.
- (3) Disconnect tailpipe from rear hanger bracket (Fig. 4).
- (4) Remove muffler to tailpipe exhaust clamp (Fig. 4).
- (5) Heat connection with an oxygen/acetylene torch and twist tailpipe out of muffler.



80b24398

Fig. 4 Tailpipe Removal/Installation

INSTALLATION

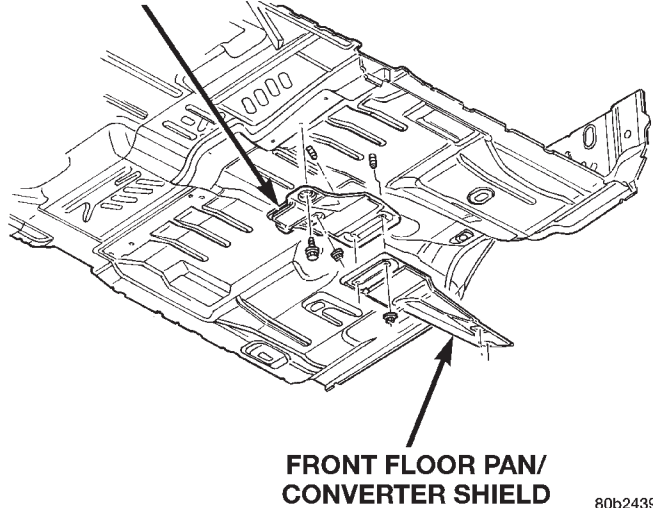
- (1) Install tailpipe to muffler. Install exhaust clamp and start nuts by hand.
- (2) Connect tailpipe hanger.
- (3) Align tailpipe and tighten exhaust clamp nuts to 43 N·m (32 ft. lbs.).
- (4) Lower vehicle and connect battery negative cable.
- (5) Start engine and check for exhaust leaks.

HEAT SHIELDS

REMOVAL

- (1) Raise and support the vehicle.
- (2) Remove the screws and nuts holding the heat shields to the frame and floor pan (Fig. 5)(Fig. 6)(Fig. 7). When removing muffler heat shield, the muffler front and rear support hangers must be removed first (Fig. 8). **Be sure to disconnect both oxygen sensor connectors.**
- (3) Slide the shield out around the exhaust system.

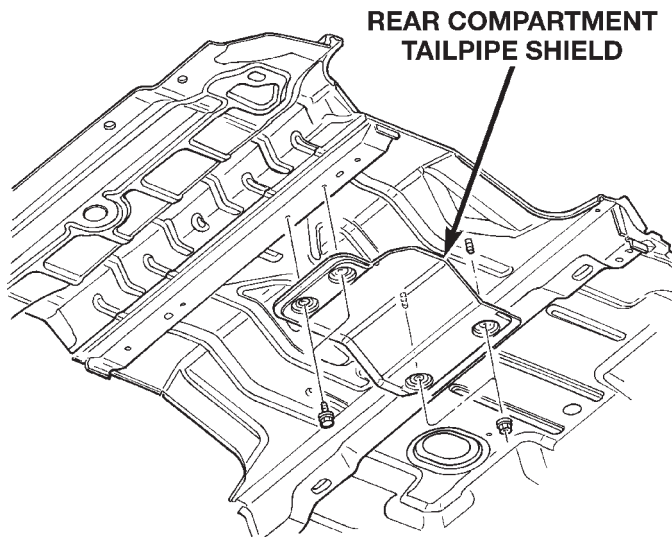
REAR FLOOR PAN/ CONVERTER SHIELD



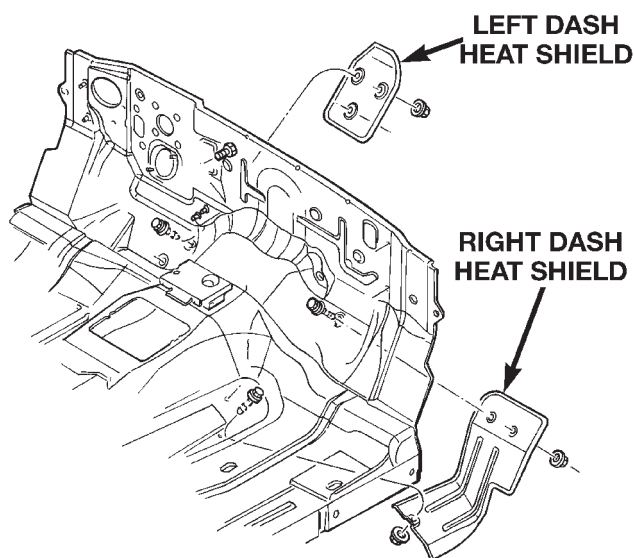
80b24390

Fig. 5 Front and Rear Floor Pan/Converter Shields

REMOVAL AND INSTALLATION (Continued)



80b24391

Fig. 6 Rear Compartment/Tailpipe Heat Shield

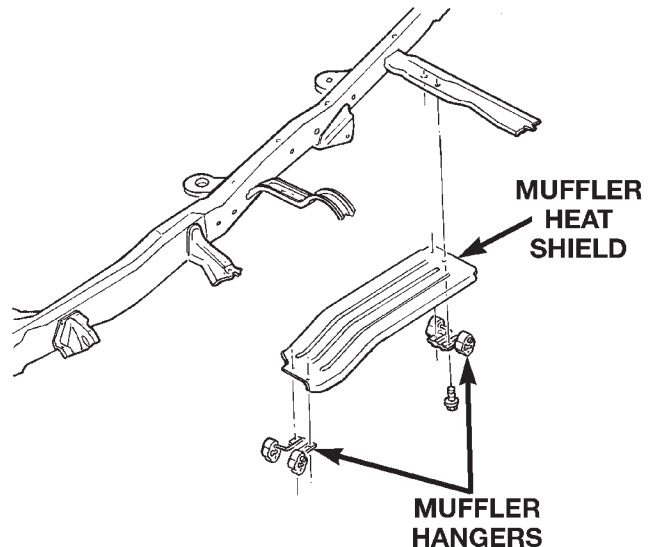
80b24392

Fig. 7 Left and Right Dash Heat Shield**INSTALLATION**

- (1) Position the heat shields to the floor pan or the frame and install the screws and nuts.
- (2) Tighten the screws/nuts to 7 N·m (60 in. lbs.) torque. Tighten the muffler hangers to 23 N·m (200 in. lbs.).
- (3) Lower the vehicle.

INTAKE MANIFOLD**REMOVAL**

- (1) Disconnect the battery negative cable.
- (2) Drain the cooling system (refer to Group 7, Cooling System for the proper procedures).
- (3) Remove the accessory drive belt.
- (4) Remove the generator.



80b24393

Fig. 8 Muffler Heat Shield

- (5) Remove the air cleaner.
- (6) Remove the A/C compressor bracket.
- (7) Disconnect the accelerator linkage and if so equipped, the speed control and transmission kick-down cables.
- (8) Disconnect the MAP, IAC, and TPS sensor connectors.
- (9) Disconnect the fuel injector connectors.
- (10) Disconnect the coolant temperature sending unit connector(s).
- (11) Remove the distributor cap and wires.
- (12) Disconnect the heater hoses and bypass hose.
- (13) Disconnect the PCV, HVAC, and Speed Control vacuum supply hoses.
- (14) Perform the Fuel System Pressure Release procedure (refer to Group 14, Fuel Systems).
- (15) Disconnect the fuel supply line. Refer to Group 14, Quick Connect Fittings for the correct procedures.
- (16) Remove intake manifold bolts.
- (17) Lift the intake manifold and throttle body out of the engine compartment as an assembly.
- (18) Remove and discard the flange side gaskets and the front and rear cross-over gaskets.
- (19) Remove the throttle body bolts and lift the throttle body off the intake manifold (Fig. 9). Discard the gasket.
- (20) Remove the plenum pan as follows:
 - (a) Turn the intake manifold upside down. Support the manifold.
 - (b) Remove the bolts and lift the pan off the manifold. Discard the gasket.

REMOVAL AND INSTALLATION (Continued)

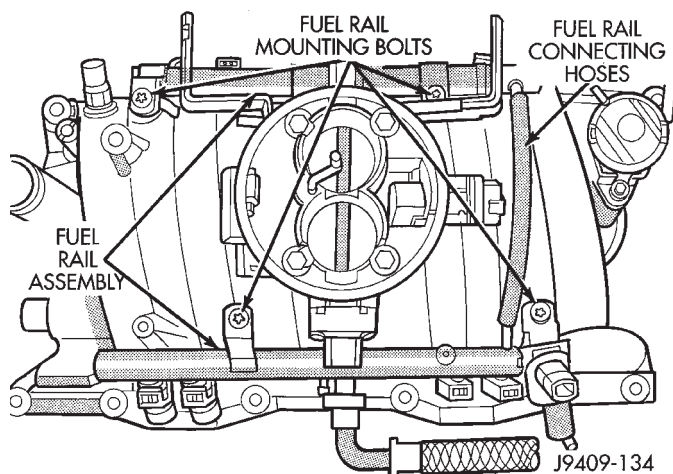


Fig. 9 Throttle Body Assembly—MPI

INSTALLATION

(1) Install the plenum pan, if removed, as follows:

(a) Turn the intake manifold upside down. Support the manifold.

(b) Place a new plenum pan gasket onto the seal rail of the intake manifold. Position the pan over the gasket. Align all the gasket and pan holes with the intake manifold.

(c) Hand start all bolts.

(d) Tighten the bolts, in sequence, as follows:

V6 & V8 ENGINES

(Fig. 10)

• Step 1—Tighten bolts to 2.7 N·m (24 in. lbs.) torque.

• Step 2—Tighten bolts to 5.4 N·m (48 in. lbs.) torque.

• Step 3—Tighten bolts to 9.5 N·m (84 in. lbs.) torque.

• Step 4—Check that all bolts are tighten to 9.5 N·m (84 in. lbs.) torque.

(2) Using a new gasket, install the throttle body onto the intake manifold. Tighten the bolts to 23 N·m (200 in. lbs.) torque.

(3) Place the 4 plastic locator dowels into the holes in the block (Fig. 11) .

(4) Apply Mopar Silicone Rubber Adhesive Sealant, or equivalent, to the four corner joints. An excessive amount of sealant is not required to ensure a leak proof seal. However, an excessive amount of sealant may reduce the effectiveness of the flange gasket. The sealant should be slightly higher than the cross-over gaskets, approx. 5 mm (0.2 in).

(5) Install the front and rear cross-over gaskets onto the dowels (Fig. 11).

(6) Install the flange gaskets. Ensure that the vertical port alignment tab is resting on the deck face of the block. Also the horizontal alignment tabs must be in position with the mating cylinder head gasket tabs

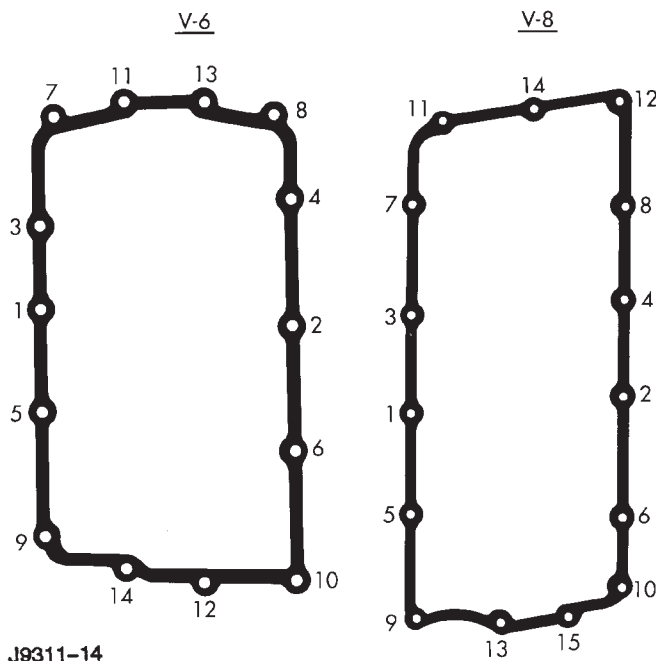


Fig. 10 Plenum Pan Bolt Tightening Sequence

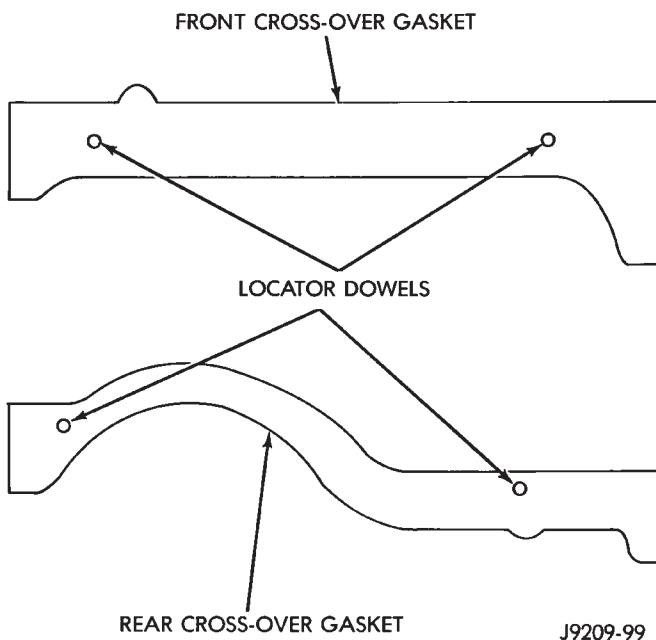
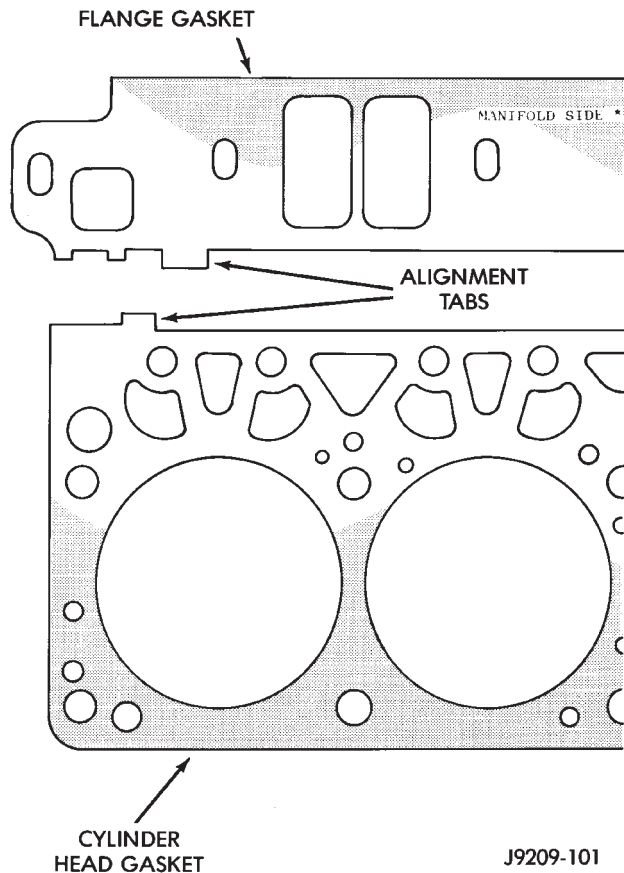


Fig. 11 Cross-Over Gaskets and Locator Dowels

(Fig. 12). The words MANIFOLD SIDE should be visible on the center of each flange gasket.

REMOVAL AND INSTALLATION (Continued)

**Fig. 12 Intake Manifold Flange Gasket Alignment**

(7) Carefully lower intake manifold into position on the cylinder block and cylinder heads. Use the alignment dowels in the cross-over gaskets to position the intake manifold. After intake manifold is in place, inspect to make sure seals are in place.

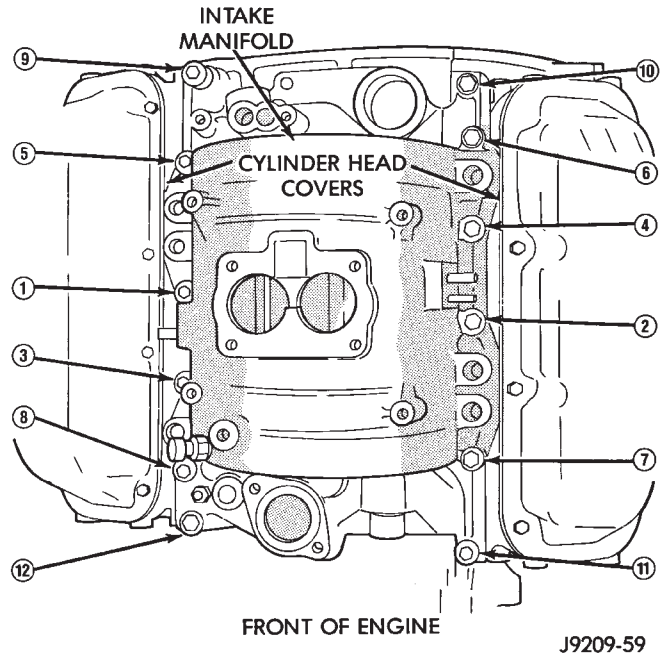
(8) Install the intake manifold bolts and tighten as follows:

V-6 ENGINE**(Fig. 13)**

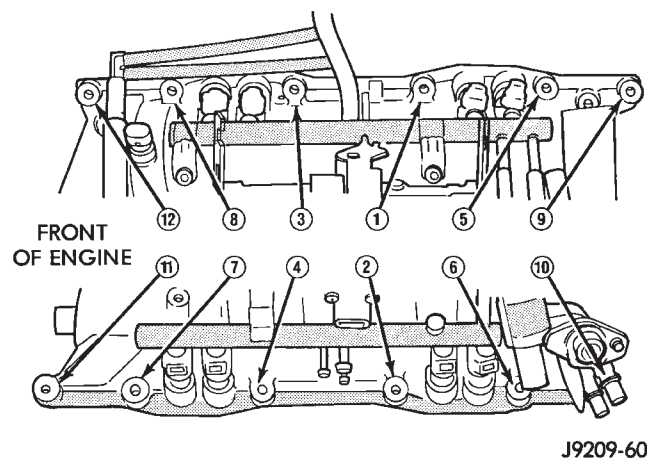
- Step 1—Tighten bolts 1 and 2 to 8 N·m (72 in. lbs.) torque. Tighten in alternating steps 1.4 N·m (12 in. lbs.) torque at a time.
- Step 2—Tighten bolts 3 through 12, in sequence, to 8 N·m (72 in. lbs.) torque.
- Step 3—Check that all bolts are tightened to 8 N·m (72 in. lbs.) torque.
- Step 4—Tighten all bolts, in sequence, to 16 N·m (12 ft. lbs.) torque.
- Step 5—Check that all bolts are tightened to 16 N·m (12 ft. lbs.) torque.

V-8 ENGINE**(Fig. 14)**

- Step 1—Tighten bolts 1 through 4, in sequence, to 8 N·m (72 in. lbs.) torque. Tighten in alternating steps 1.4 N·m (12 in. lbs.) torque at a time.

**Fig. 13 Intake Manifold Bolt Torque Sequence — (V-6)**

- Step 2—Tighten bolts 5 through 12, in sequence, to 8 N·m (72 in. lbs.) torque.
- Step 3—Check that all bolts are tighten to 8 N·m (72 in. lbs.) torque.
- Step 4—Tighten all bolts, in sequence, to 16 N·m (12 ft. lbs.) torque.
- Step 5—Check that all bolts are tighten to 16 N·m (12 ft. lbs.) torque.

**Fig. 14 Intake Manifold Bolt Torque Sequence — (V-8)**

(9) Install the fuel supply line. Push until an audible "click" is heard. Verify connection by moderately pulling out on connector.

(10) Install distributor cap and wires.

(11) Connect the coolant temperature sending unit connector.

REMOVAL AND INSTALLATION (Continued)

- (12) Connect the fuel injector connectors.
- (13) Connect the accelerator linkage and if so equipped, the speed control and transmission kick-down cables.
- (14) Connect the MAP, TPS, and IAC connectors.
- (15) Connect the brake booster, HVAC, speed control, and PCV vacuum supply hoses to the intake manifold.
- (16) Connect the heater hoses and bypass hose.
- (17) Install the generator and drive belt. Tighten generator mounting bolt to 41 N·m (30 ft. lbs.) torque. Tighten the adjusting strap bolt to 23 N·m (200 in. lbs.) torque. Refer to Group 7, Cooling System for the correct procedures and belt routing schematics.
- (18) Install the air cleaner.
- (19) Fill cooling system (refer to Group 7, Cooling System for the proper procedure).
- (20) Connect the battery negative cable.

EXHAUST MANIFOLD

REMOVAL

- (1) Disconnect the battery negative cable.
- (2) Raise vehicle on hoist.
- (3) Remove the exhaust pipe to manifold nuts.
- (4) Lower the vehicle.
- (5) Remove the manifold heat shield nuts, shield, washers and extensions (Fig. 17)(Fig. 18).
- (6) Disconnect the EGR tube from the right side manifold. Remove bolts, nuts and washers attaching manifold to cylinder head.
- (7) Remove manifold from the cylinder head.

INSTALLATION

CAUTION: If the studs came out with the nuts when removing the exhaust manifold, install new studs.

- (1) Position the exhaust manifolds on the two studs located on the cylinder head. Install conical washers and nuts on these studs (Fig. 15) or (Fig. 16).
- (2) Install new bolt and washer assemblies in the remaining holes (Fig. 15) or (Fig. 16). Start at the center arm and work outward. Tighten the bolts and nuts to 24 N·m (18 ft. lbs.) torque.

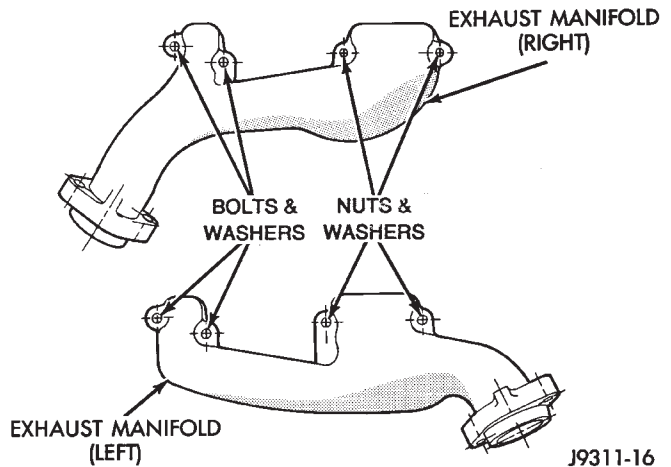


Fig. 15 Exhaust Manifold Installation—3.9L Engines

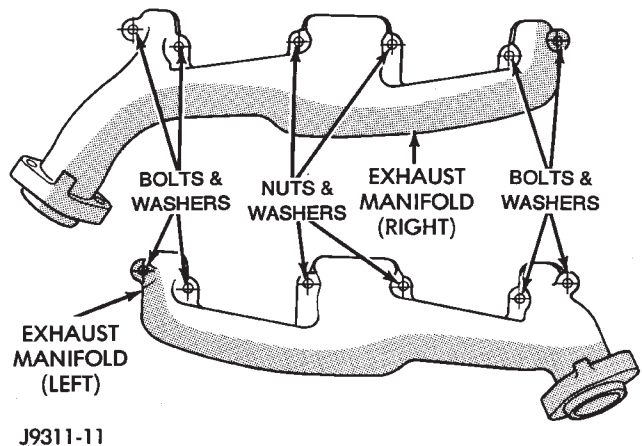
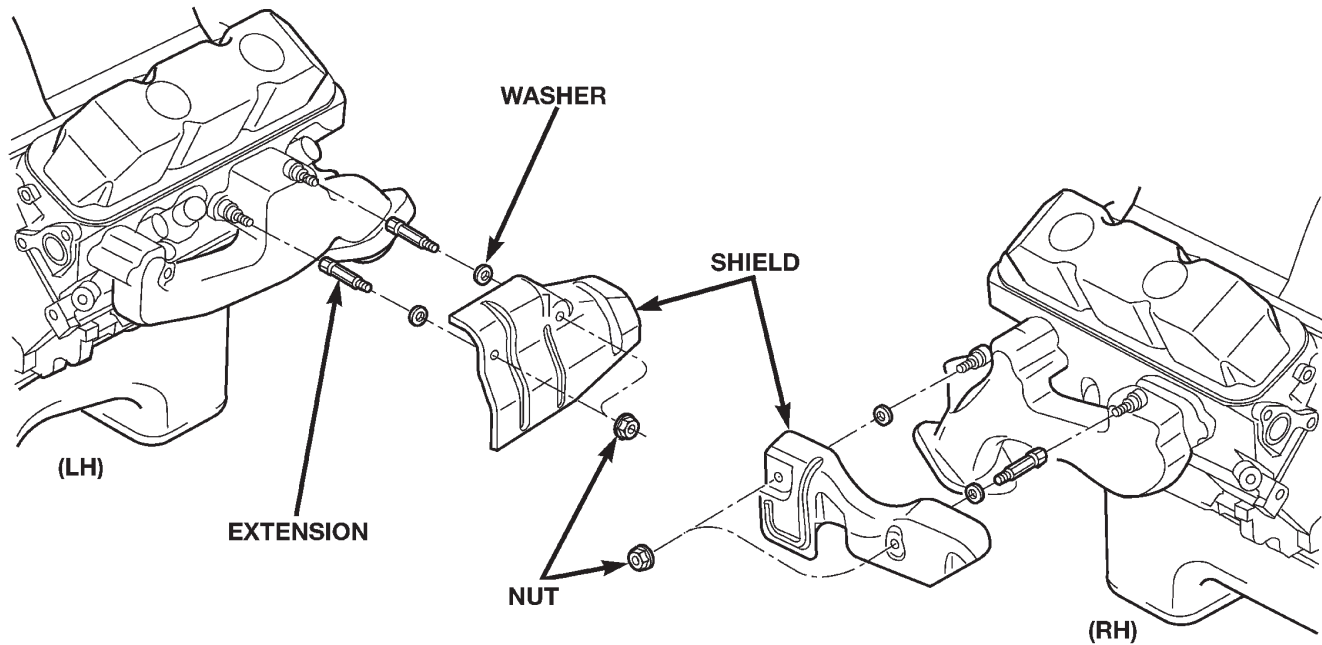


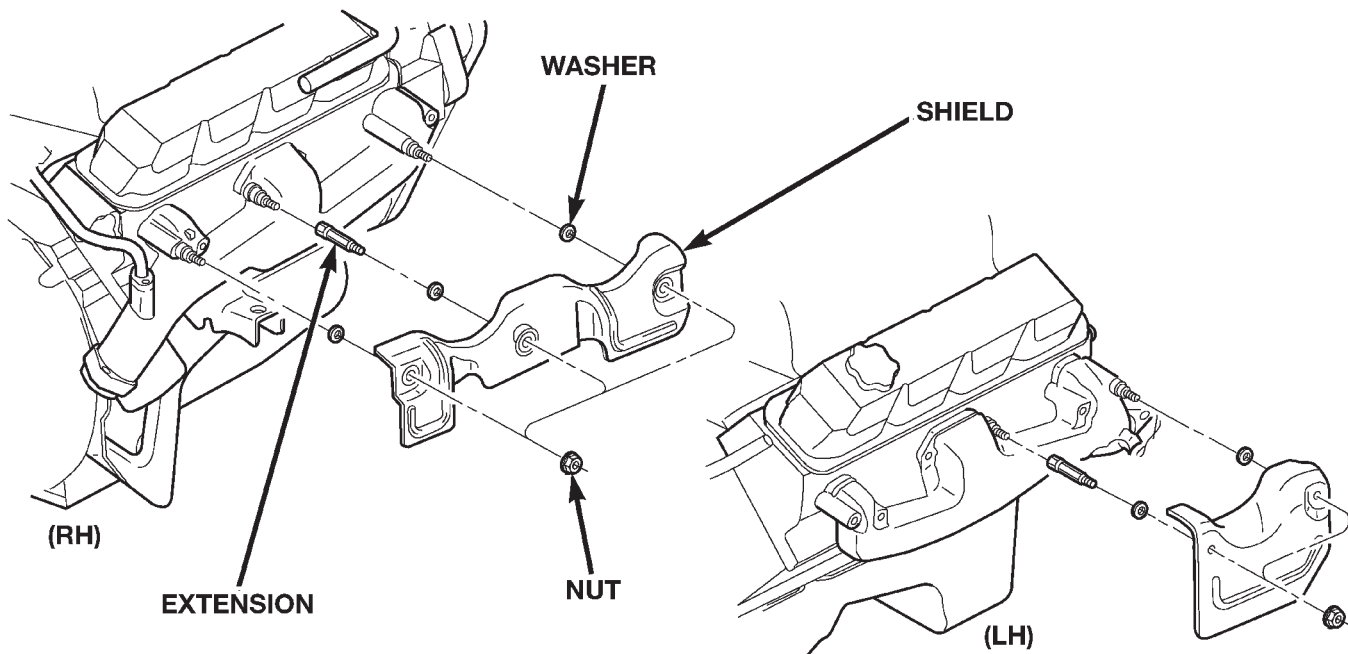
Fig. 16 Exhaust Manifold Installation—5.2L/5.9L Engines

- (3) Install the manifold heat shield extensions (Fig. 17)(Fig. 18) and torque to 24 N·m (210 in. lbs.)
- (4) Install the washers, shields, and nuts (Fig. 17)(Fig. 18) and torque the nuts to 14 N·m (120 in. lbs.)
- (5) Raise the vehicle.
- (6) Assemble the exhaust pipe to the exhaust manifold and secure with bolts, nuts and washers. Tighten these nuts to 27 N·m (20 ft. lbs.) torque.
- (7) Lower the vehicle.
- (8) Connect the battery negative cable.
- (9) Start vehicle and inspect for exhaust leaks.

REMOVAL AND INSTALLATION (Continued)



80b11ce1

Fig. 17 Exhaust Manifold Heat Shield(s)—3.9L Engines

80b11ce2

Fig. 18 Exhaust Manifold Heat Shield(s)—5.2L/5.9L Engines

CLEANING AND INSPECTION

INTAKE MANIFOLD

CLEANING

Clean manifold in solvent and blow dry with compressed air.

Clean cylinder block front and rear gasket surfaces using a suitable solvent.

The plenum pan rail must be clean and dry (free of all foreign material).

INSPECTION

Inspect manifold for cracks.

Inspect mating surfaces of manifold for flatness with a straightedge.

EXHAUST MANIFOLD

CLEANING

Clean mating surfaces on cylinder head and manifold, wash with solvent and blow dry with compressed air. Inspect manifold for cracks.

INSPECTION

Inspect mating surfaces of manifold for flatness with a straight edge. Seal surfaces must be flat within 0.1 mm (0.004 inch) overall.

SPECIFICATIONS

TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
EGR Tube	
Bolts	23 N·m (200 in. lbs.)
Exhaust Clamps (All)	
Nuts	43 N·m (32 ft. lbs.)
Exhaust Manifold	
Bolts/Nuts	24 N·m (18 ft. lbs.)
Exhaust Pipe to Manifold	
Nuts	32 N·m (25 ft. lbs.)
Generator Mounting	
Bolt	41 N·m (30 ft. lbs.)
Heat Shield (to body)	
Nuts	7 N·m (60 in. lbs.)
Heat Shield (manifolds)	
Screws	14 N·m (120 in. lbs.)
Intake Manifold	
Bolts	Refer to procedure in this section
Muffler Hanger	
Bolts	23 N·m (200 in. lbs.)
Oxygen Sensor	
Sensor	30 N·m (22 ft. lbs.)
Tailpipe Hanger	
Bolt	23 N·m (200 in. lbs.)
Throttle Body (All)	
Bolts	23 N·m (200 in. lbs.)

