EXHAUST SYSTEM AND INTAKE MANIFOLD

CONTENTS

GENERAL INFORMATION

EXHAUST SYSTEM

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).

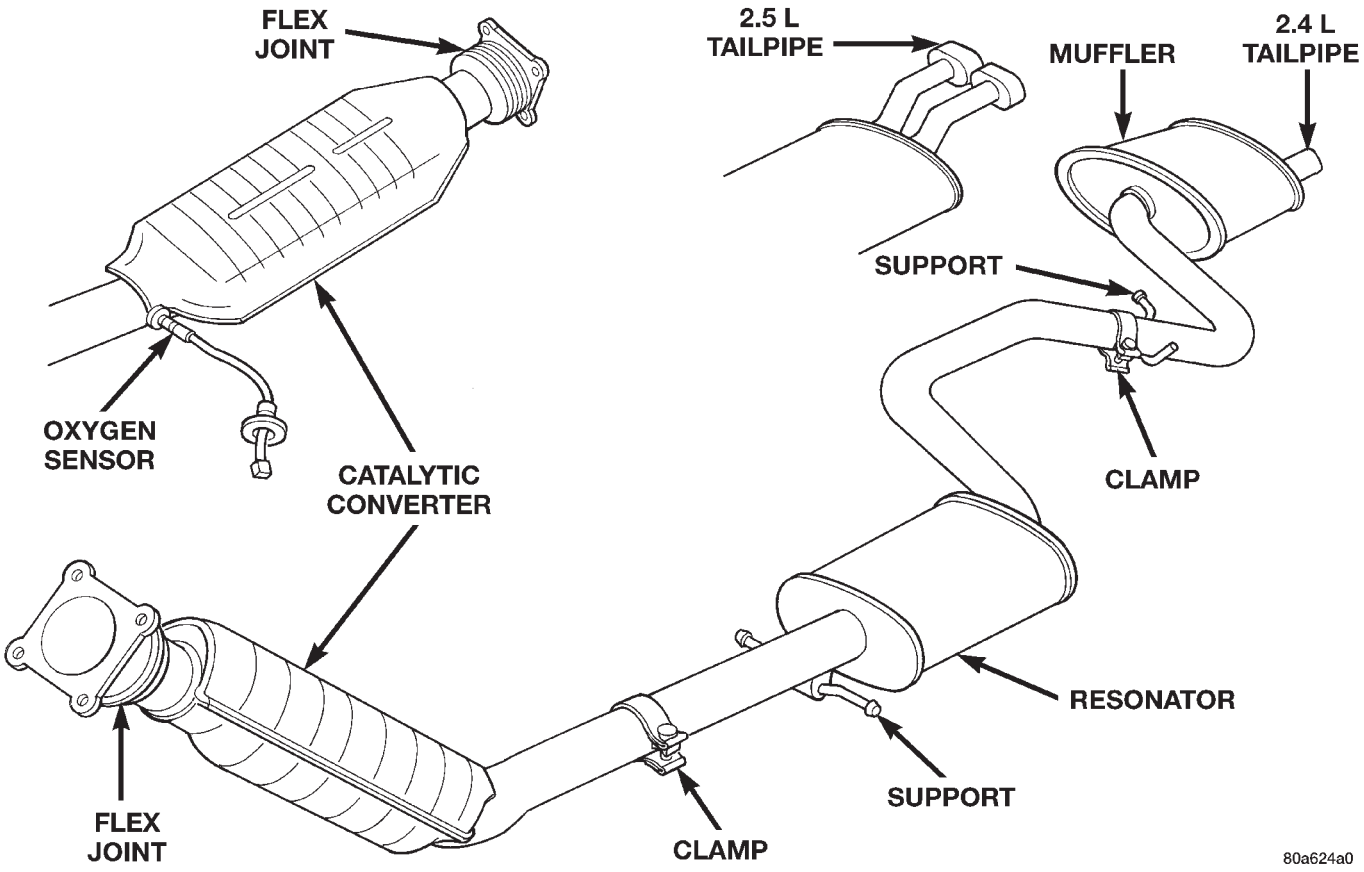

Fig. 1 Exhaust System—JX

GENERAL INFORMATION (Continued)

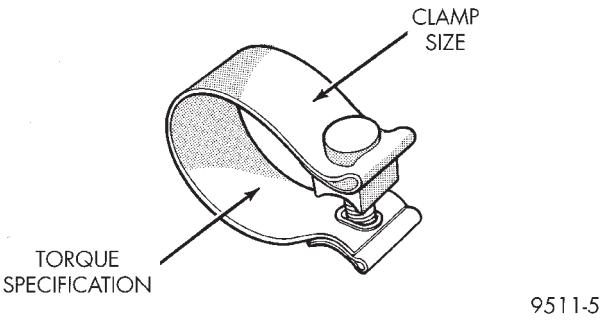

Fig. 2 Band Clamp

CATALYTIC CONVERTERS

There is no regularly scheduled maintenance on any Chrysler catalytic converter. If damaged, the converter must be replaced.

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 California vehicles).

CATALYTIC CONVERTER

Models equipped with 2.5L engine have both oxygen sensor located in the converter (Fig. 3).

NOTE: 2.0L SOHC model is used only in Europe.

EXHAUST GAS RECIRCULATION (EGR)

To assist in the control of oxides of nitrogen (NOx) in engine exhaust, all engines are equipped with an exhaust gas recirculation system. The use of exhaust gas to dilute incoming air/fuel mixtures lowers peak flame temperatures during combustion, thus limiting the formation of NOx.

Exhaust gases are taken from opening in the exhaust manifold passage to the intake manifold. Refer to Section 25 for a complete description, Diagnosis and Service Procedures on the exhaust gas recirculation system and components.

HEAT SHIELD

Heat shields are needed to protect both the vehicle and the environment from the high temperatures developed near the catalytic converters (Fig. 4). All engines are equipped with a heat shield crimped on the top of the convertor.

Refer to Group 23, Body and Sheet Metal for service procedures. **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**

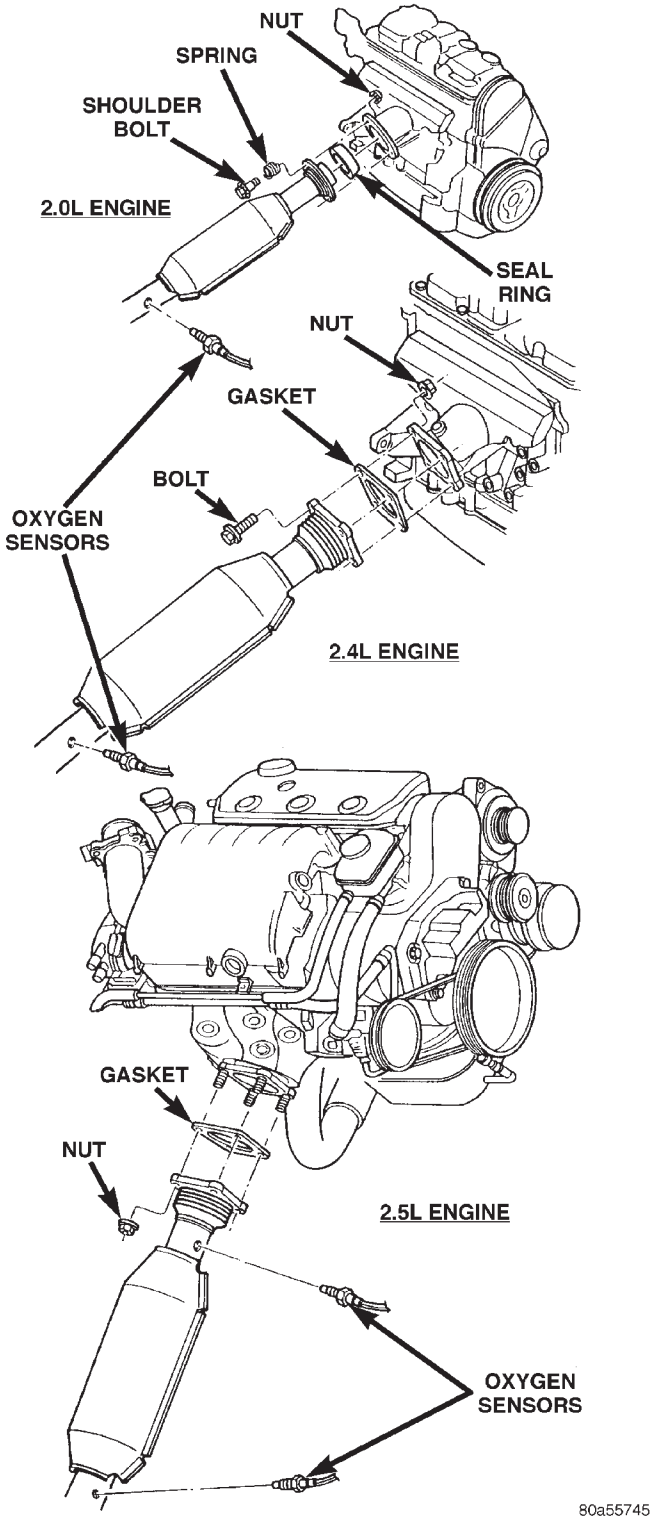

Fig. 3 Oxygen Sensor Location

permitted. Application of coating will greatly reduce the efficiency of the heat shields resulting in excessive floor pan temperatures and objectionable fumes.

The combustion reaction caused by the catalyst releases additional heat in the exhaust system. Caus-

GENERAL INFORMATION (Continued)

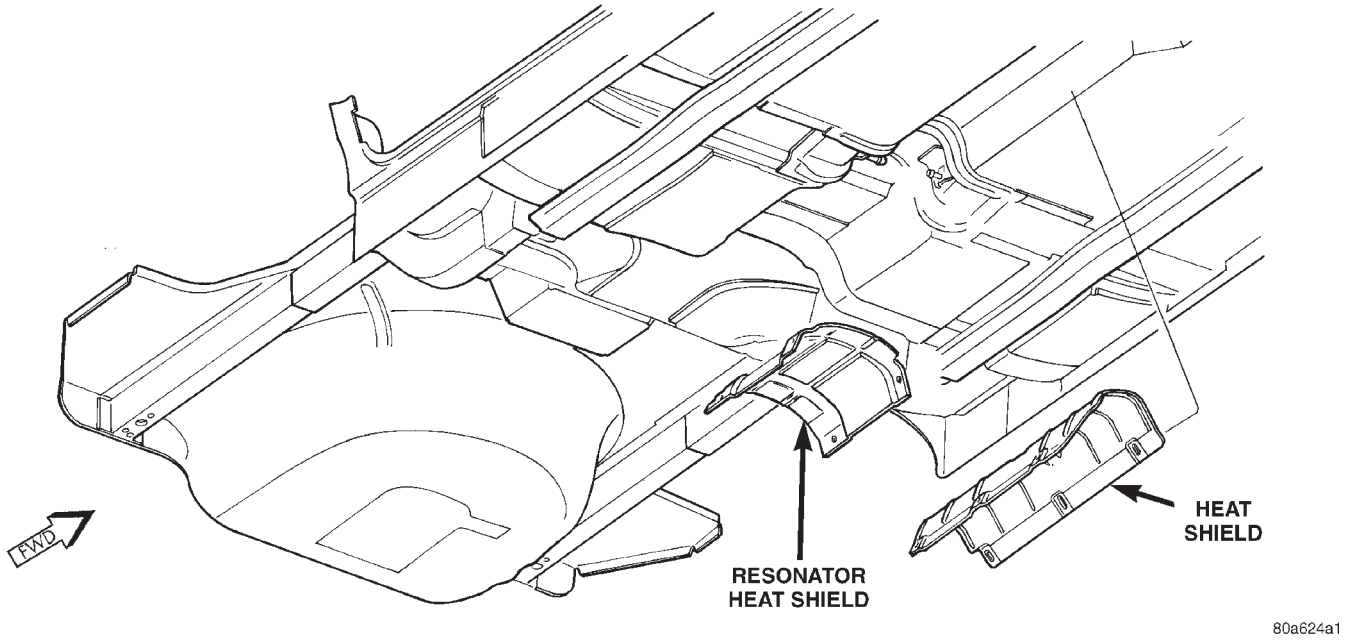

Fig. 4 Heat Shield—JX

ing temperature increases in the area of the catalytic convertor 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 catalytic converter. Failure of the catalytic converter can occur due to temperature increases caused by unburned fuel passing through the converter.

The use of the catalysts also involves some non-automotive problems. Unleaded gasoline must be used to avoid poisoning the catalyst core. Do not allow engine to operate at fast idle for extended periods (over 5 minutes). This condition may result in excessive exhaust system and floor pan temperatures.

GROUND STRAP

All vehicles are equipped with a ground strap on the exhaust system. The ground strap is attached from the rear muffler bracket to the body (Fig. 9). The ground strap is used to suppress radio frequency interference/static.

EXHAUST FLEX-JOINT COUPLING

A exhaust flex-joint coupling (Fig. 5) 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.

The exhaust flex-joint is welded to the catalytic converter.

CAUTION: When servicing, care must be exercised not to dent or bend the bellows of the flex-joint. Should this occur, the flex-joint will eventually fail and require the catalytic converter be replaced.

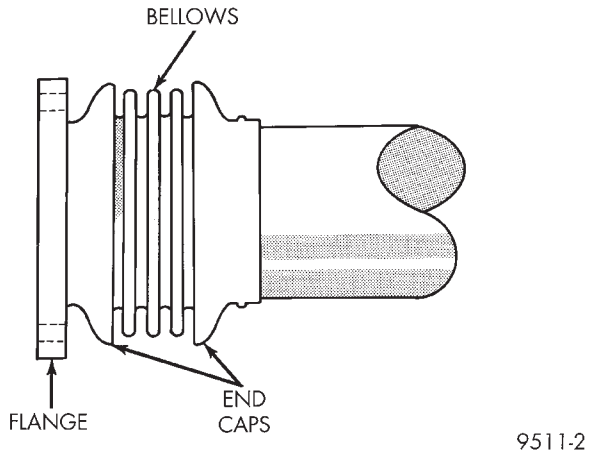

Fig. 5 Flex-Joint Coupling

DESCRIPTION AND OPERATION

INTAKE/EXHAUST MANIFOLD—2.4L ENGINE

The intake manifold is a tuned aluminum casting with individual primary runners leading from a plenum to the cylinders. The manifold is designed to boost torque which is desired for excellent engine response and usable power output.

The intake manifold is also cored with an EGR passage for balanced cylinder to cylinder EGR distribution.

The exhaust manifold is made of nodular cast iron for strength and high temperatures.

INTAKE/EXHAUST MANIFOLD—2.5L ENGINE

The intake system has a large air intake plenum of aluminum alloy and a cross type intake manifold (Fig. 6).

The exhaust manifolds are made of ductile cast iron with the front bank and rear bank independent of each other. The exhaust from the front bank exhaust manifold is fed through a exhaust crossover pipe to be combined with the rear bank exhaust at the exhaust outlet to the exhaust pipe.

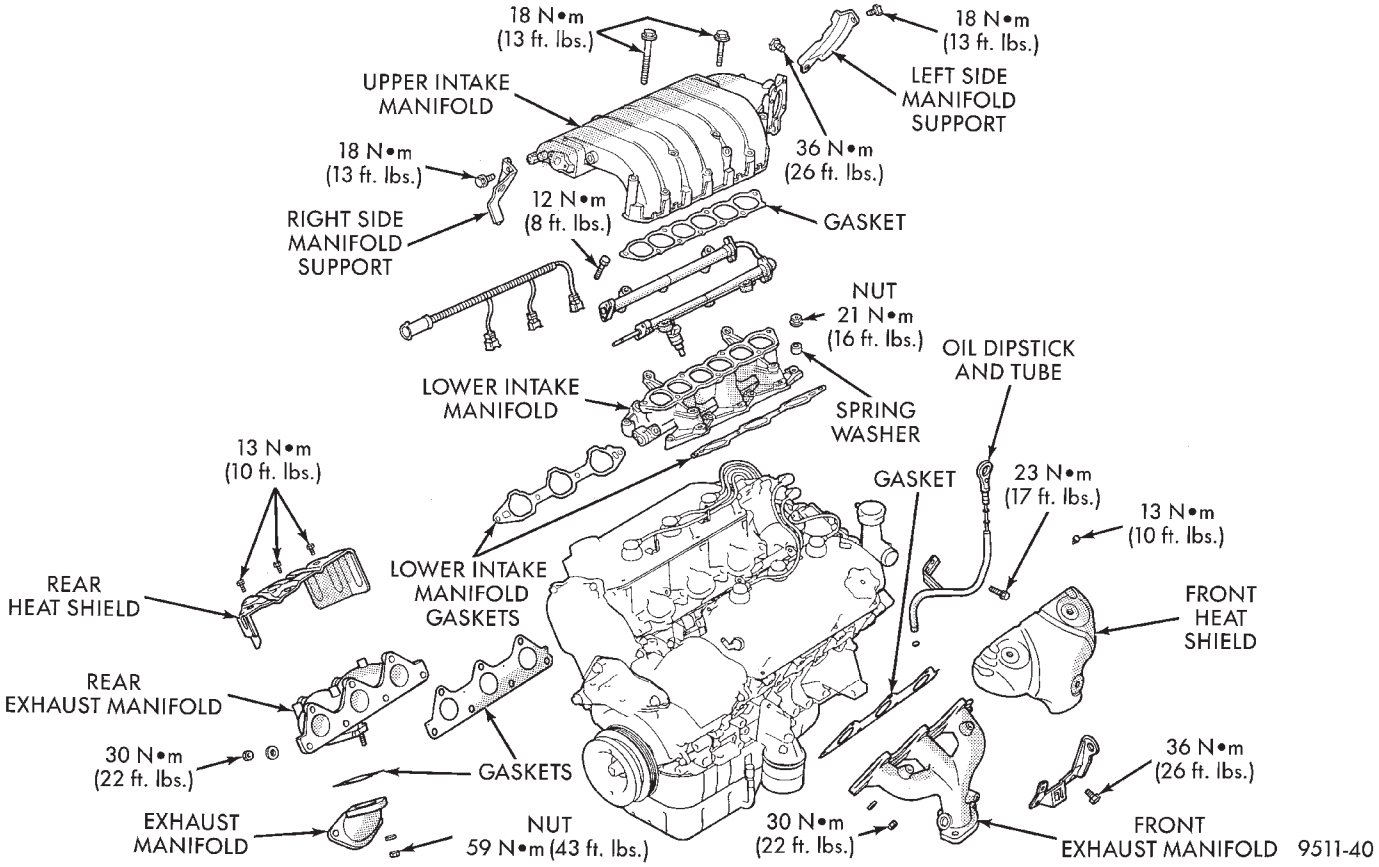

Fig. 6 Intake and Exhaust Manifolds—2.5L Engine

DIAGNOSIS AND TESTING

EXHAUST SYSTEM

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

REMOVAL AND INSTALLATION

EXHAUST PIPE AND MUFFLER

REMOVAL

(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. 7). Remove muffler from resonator pipe.

(3) Remove ground strap (Fig. 9).

(4) Remove clamp and supports at the resonator pipe to catalytic converter slip joint (Fig. 7). Separate at slip joint and remove the resonator assembly.

(5) Disconnect downstream heated oxygen sensor from the catalytic converter pipe (Fig. 8).

(6) Vehicle equipped with 2.5L engine disconnect upstream heated oxygen sensor.

(7) Remove catalytic converter to exhaust manifold attaching fasteners (Fig. 8). Remove catalytic converter from vehicle.

(8) 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: 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.

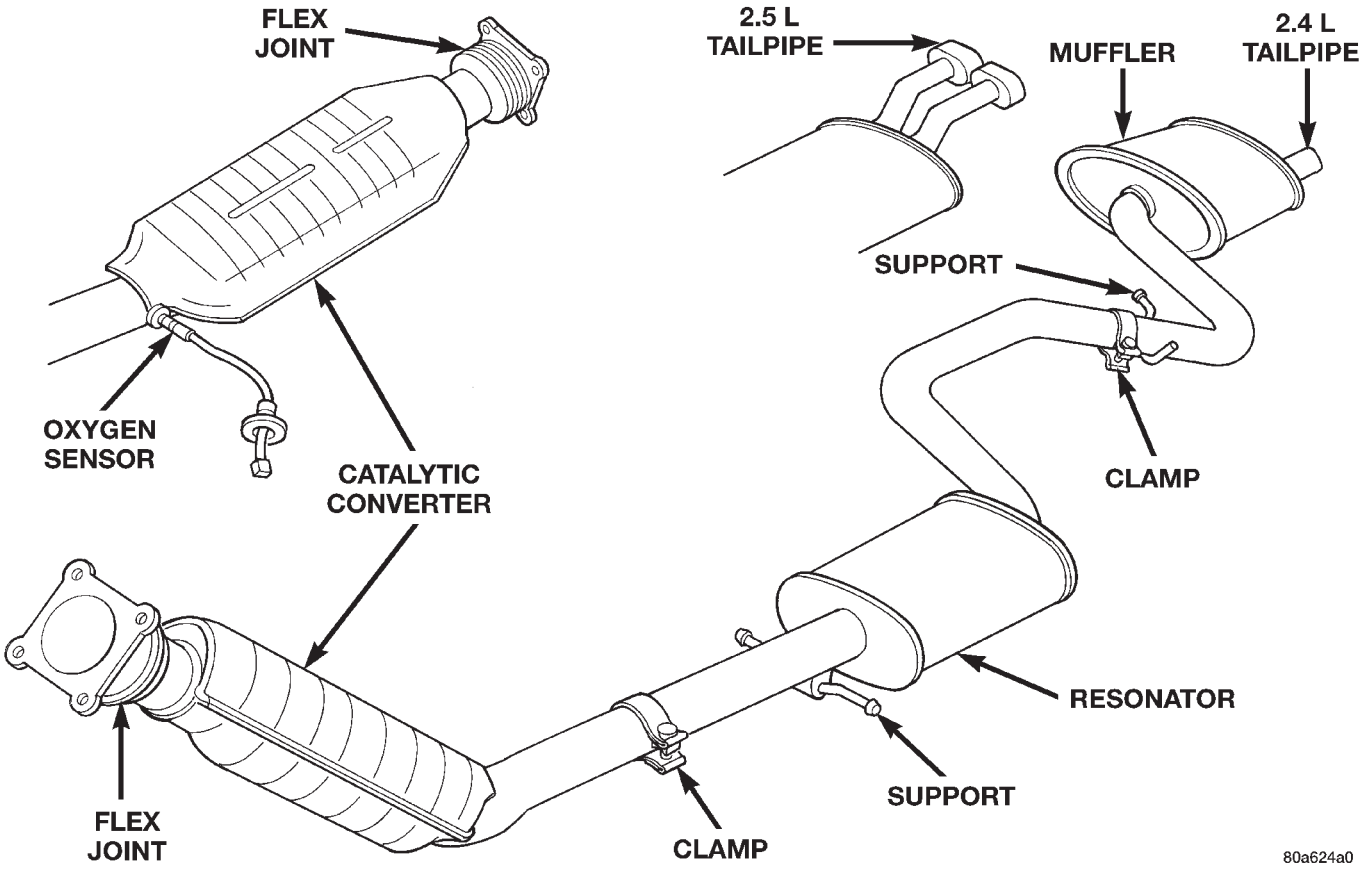

Fig. 7 Exhaust System Components

REMOVAL AND INSTALLATION (Continued)

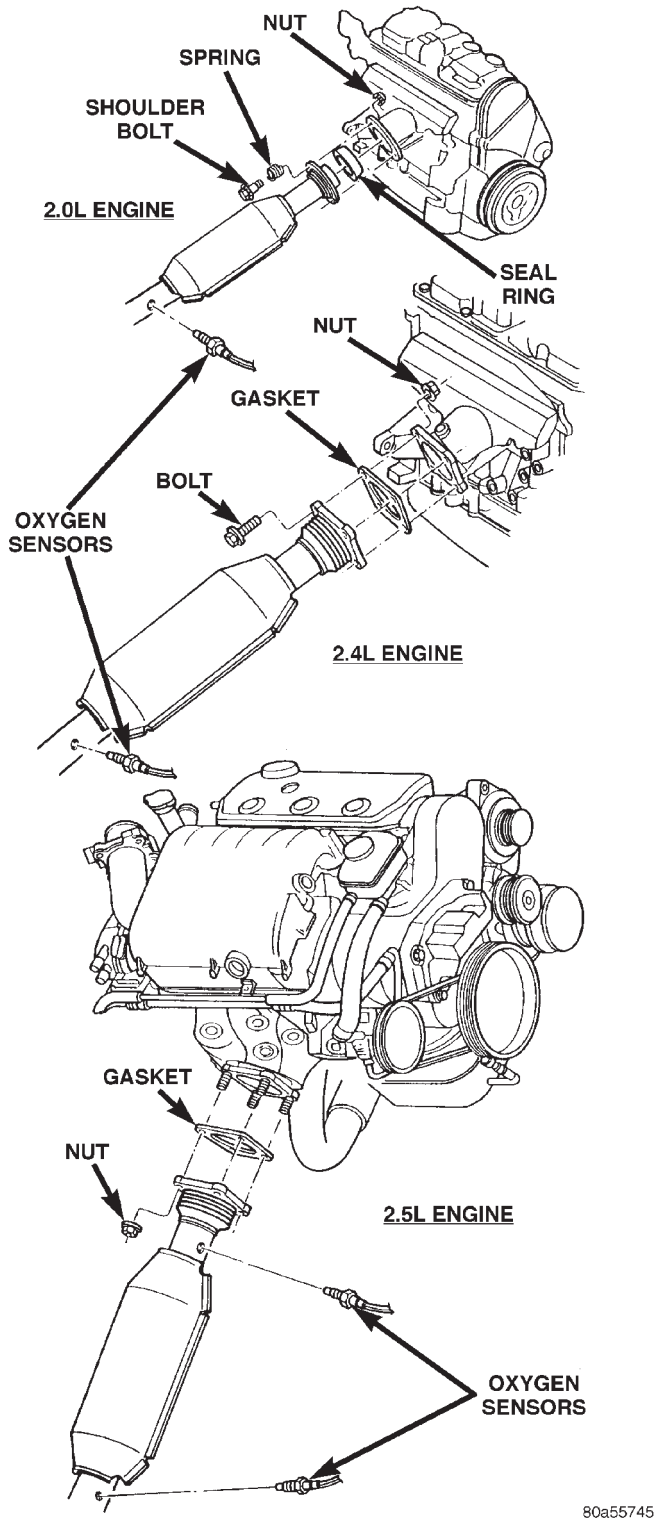

Fig. 8 Ball and Flex Joint Connections

INSTALLATION

When assembling exhaust system **do not** tighten clamps until components are aligned and supports have equal load on them (Fig. 9).

(1) Assemble catalytic convertor to exhaust manifold connection (Fig. 8).

(2) Assemble resonator pipe to catalytic convertor and attach to the supports on the underbody (Fig. 9).

(3) Install the muffler to resonator pipe and attach to the supports on the underbody (Fig. 9).

(4) Working from the front of system;

(5) Align and tighten the catalytic convertor to exhaust manifold fasteners (Fig. 8). On 2.0L engine torque shoulder bolts to 28 N·m (250 in. lbs.). On 2.4/2.5L engines torque fasteners to 32 N·m (24 ft. lbs.).

(6) Align each component to maintain position and proper clearance with underbody parts and that all supports have equal load on them. Tighten clamps to 80 N·m (60 ft. lbs.) (Fig. 10).

(7) Connect ground strap.

(8) Connect the downstream heated oxygen sensor.

(9) Connect the upstream heated oxygen sensor, on 2.5L engine.

INTAKE MANIFOLD—2.4L ENGINE

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING SYSTEM COMPONENTS. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

To release fuel pressure, refer to Group 14, Fuel System for procedure.

REMOVAL

(1) Perform fuel system pressure release procedure **before attempting any repairs.**

(2) Disconnect negative cable from auxiliary jumper terminal (Fig. 11).

(3) Remove Air Inlet Resonator. Refer to Group 14, Fuel System Air Inlet Resonator for procedure.

(4) Disconnect the fuel supply line quick connect at the fuel rail assembly. Refer to Group 14, Fuel System Quick Connect Fittings procedure.

WARNING: WRAP SHOP TOWELS AROUND HOSE TO CATCH ANY GASOLINE SPILLAGE.

(5) Remove fuel rail assembly attaching screws and remove fuel rail assembly from engine. Cover injector holes with suitable covering.

CAUTION: Do not set fuel injectors on their tips, damage may occur to the injectors

REMOVAL AND INSTALLATION (Continued)

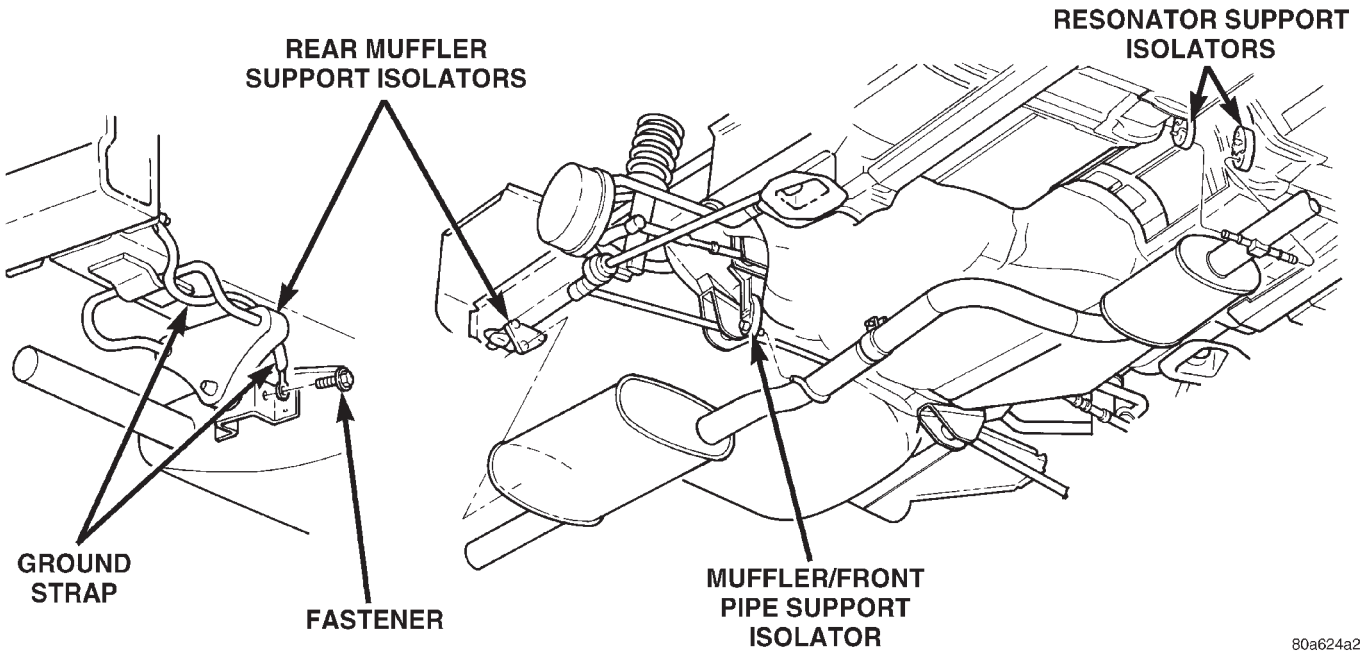

Fig. 9 Exhaust System Support Insulators—JX

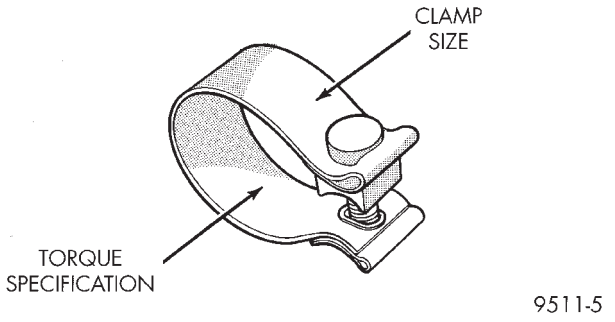

Fig. 10 Band Clamp

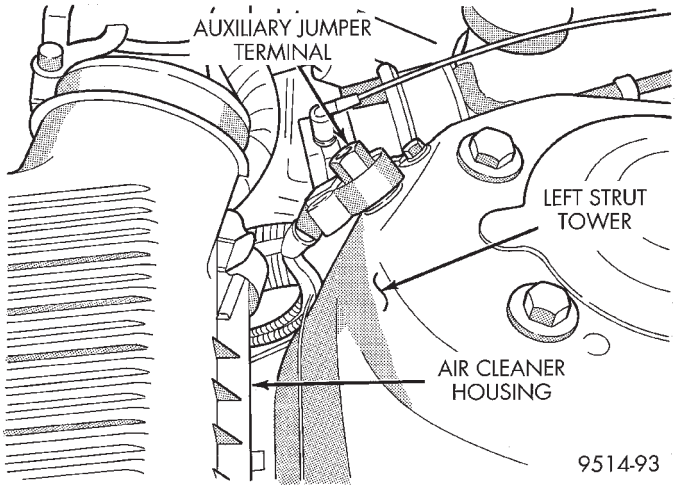

Fig. 11 Auxiliary Jumper Terminal

(6) Remove accelerator, kickdown and speed control cables from throttle lever and bracket. Refer to Group 14, Fuel System for procedures.

(7) Disconnect idle air control (IAC) motor and throttle position sensor (TPS) wiring connectors (Fig. 13).

(8) Disconnect intake air temperature sensor, leak detection pump and PCV hoses (Fig. 12).

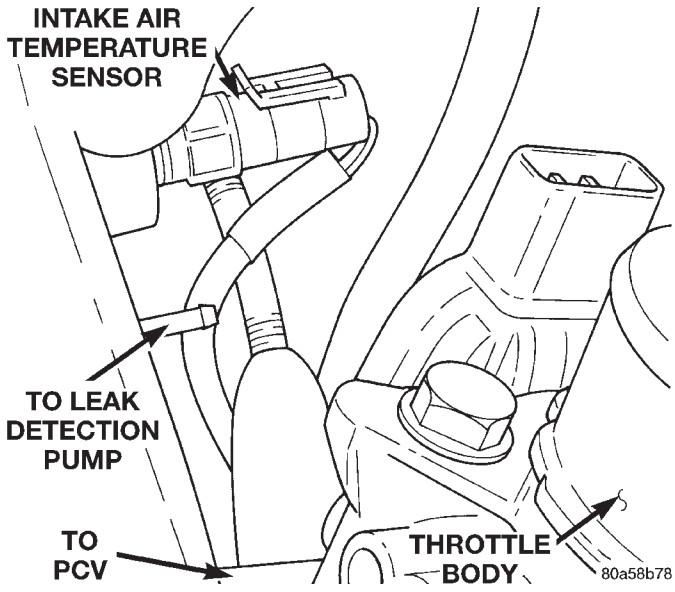

Fig. 12 Intake Air Temperature Sensor Leak Detection Pump and PCV Hoses

(9) Disconnect intake air temperature electrical connector. Disconnect leak detection pump and PCV hoses (Fig. 14)

(10) Remove transmission to throttle body support bracket fasteners at the throttle body and loosen the fastener at the transmission end.

REMOVAL AND INSTALLATION (Continued)

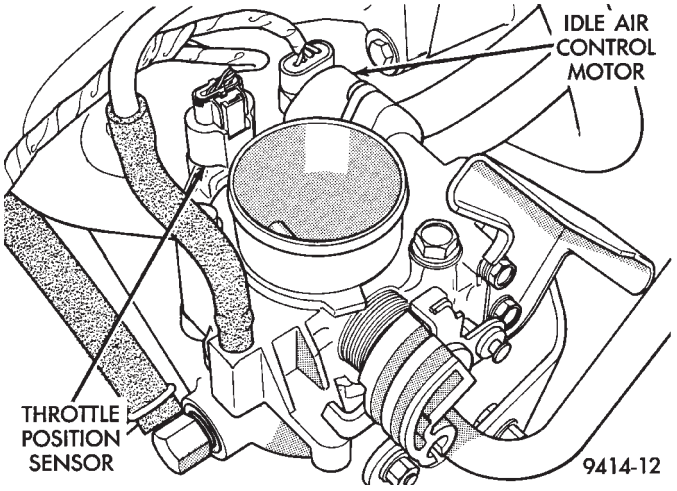

Fig. 13 Idle Air Control (IAC) Motor and Throttle Position Sensor (TPS) Wiring Connectors and Vacuum Hose Connection.

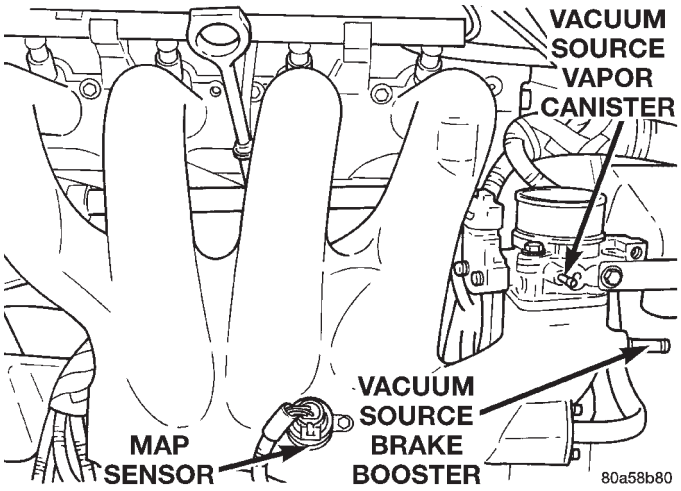

Fig. 14 Manifold Absolute Pressure (MAP) Vapor Canister and Brake Booster Hoses

(11) Remove EGR tube bolts at the valve and at the intake manifold (Fig. 15). Remove tube from engine.

(12) Remove the intake manifold support bracket.

(13) Remove intake manifold fasteners and washer assemblies. Remove intake manifold.

INSTALLATION

(1) Install new intake manifold gasket, and manifold onto cylinder head and tighten fasteners to 11.9 N·m (105 in. lbs.) in sequence shown in (Fig. 16).

(2) Remove covering from fuel injector holes and insure the holes are clean. Install fuel rail assembly to intake manifold. Tighten screws to 23 N·m (200 in. lbs.).

(3) Connect PCV and brake booster hoses.

(4) Inspect quick connect fittings for damage, replace if necessary Refer to Group 14, Fuel System for procedure. Lube tube with clean 30w engine oil,

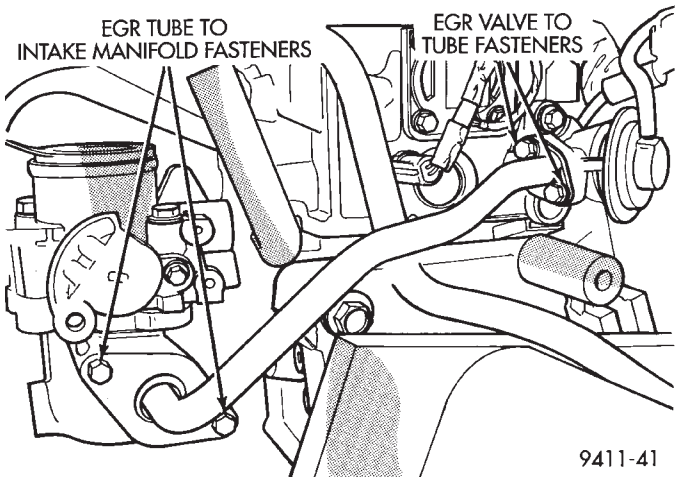

Fig. 15 Tube Assembly—Typical

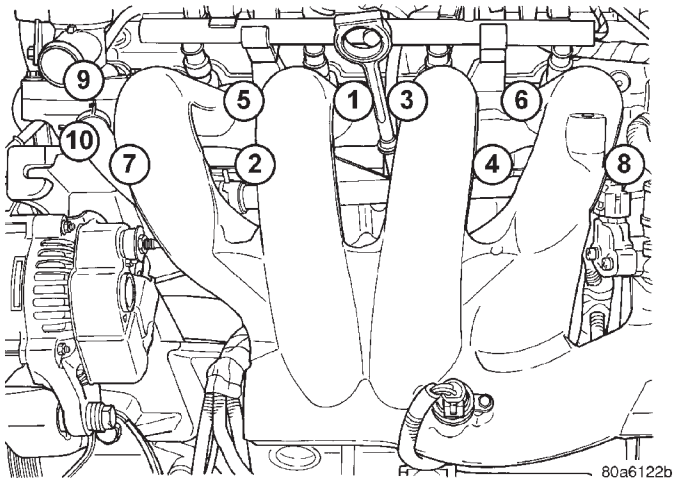

Fig. 16 Intake Manifold Tightening Sequence

Connect fuel supply hose to fuel rail assembly. Check connection by pulling on connector to insure it locked into position.

(5) Install throttle body. Tighten fastener to 22 N·m (200 in. lbs.). Install transmission to throttle body support bracket and tighten to 11.9 N·m (105 in. lbs.) at the throttle body first. Next tighten the bracket at the transmission.

(6) Connect manifold absolute pressure (MAP) and intake air temperature sensor wiring connectors.

(7) Connect knock sensor electrical and starter relay connectors. Connect wiring harness to intake manifold tab.

(8) Connect Idle Air Control (IAC) motor and Throttle Position Sensor (TPS) wiring connectors.

(9) Connect vacuum hoses to throttle body.

(10) Install accelerator, kickdown and speed control cables to their bracket and connect them to the throttle lever. Refer to Group 14, Fuel System Throttle Body Installation procedure.

(11) Loosely assemble the EGR tube onto valve and intake manifold finger tight. Tighten tube fas-

REMOVAL AND INSTALLATION (Continued)

teners at the EGR valve first to 11 N·m (95 in. lbs.) then, tighten the intake manifold side fasteners to 11 N·m (95 in. lbs.).

(12) Connect negative cable from auxiliary jumper.

(13) With the DRB scan tool use ASD Fuel System Test to pressurize system to check for leaks.

CAUTION: When using the ASD Fuel System Test, the Auto Shutdown (ASD) relay will remain energized for 7 minutes or until the ignition switch is turned to the OFF position, or Stop All Test is selected.

EXHAUST MANIFOLD—2.4L ENGINE

REMOVAL

(1) Remove exhaust pipe from manifold. It may be necessary to remove the entire exhaust system. Refer to procedure outlined in this section.

(2) Remove exhaust manifold heat shield (Fig. 17).

(3) Remove 8 exhaust manifold retaining fasteners and remove exhaust manifold (Fig. 18).

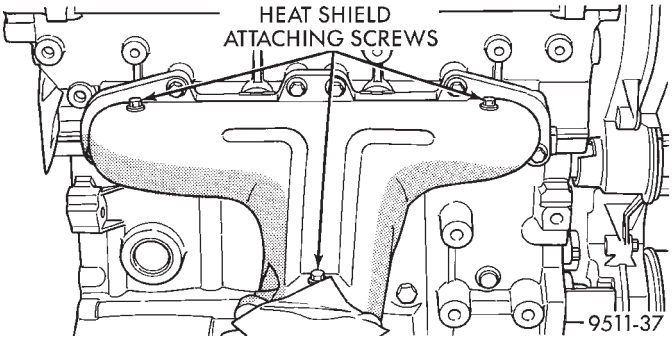

Fig. 17 Exhaust Manifold Heat Shield—2.4L Engine

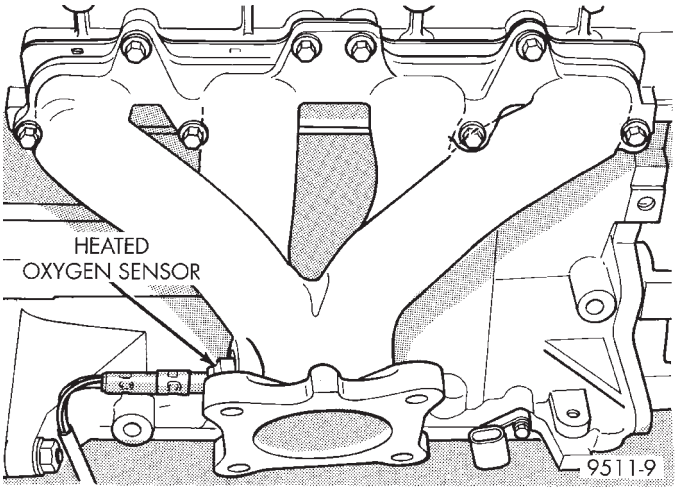

Fig. 18 Exhaust Manifold—2.4L Engine

INSTALLATION

(1) Install new manifold gasket. **DO NOT APPLY SEALER** .

(2) Set exhaust manifold in place. Tighten fasteners, starting at center and progressing outward in both directions to 23 N·m (200 in. lbs.) torque. Repeat this procedure until all fasteners are at specified torque.

(3) Install exhaust manifold heat shield.

(4) Attach exhaust pipe and tighten fasteners to 28 N·m (250 in. lbs.)

REMOVAL AND INSTALLATION (Continued)

INTAKE MANIFOLD/PLENUM—2.5L ENGINE

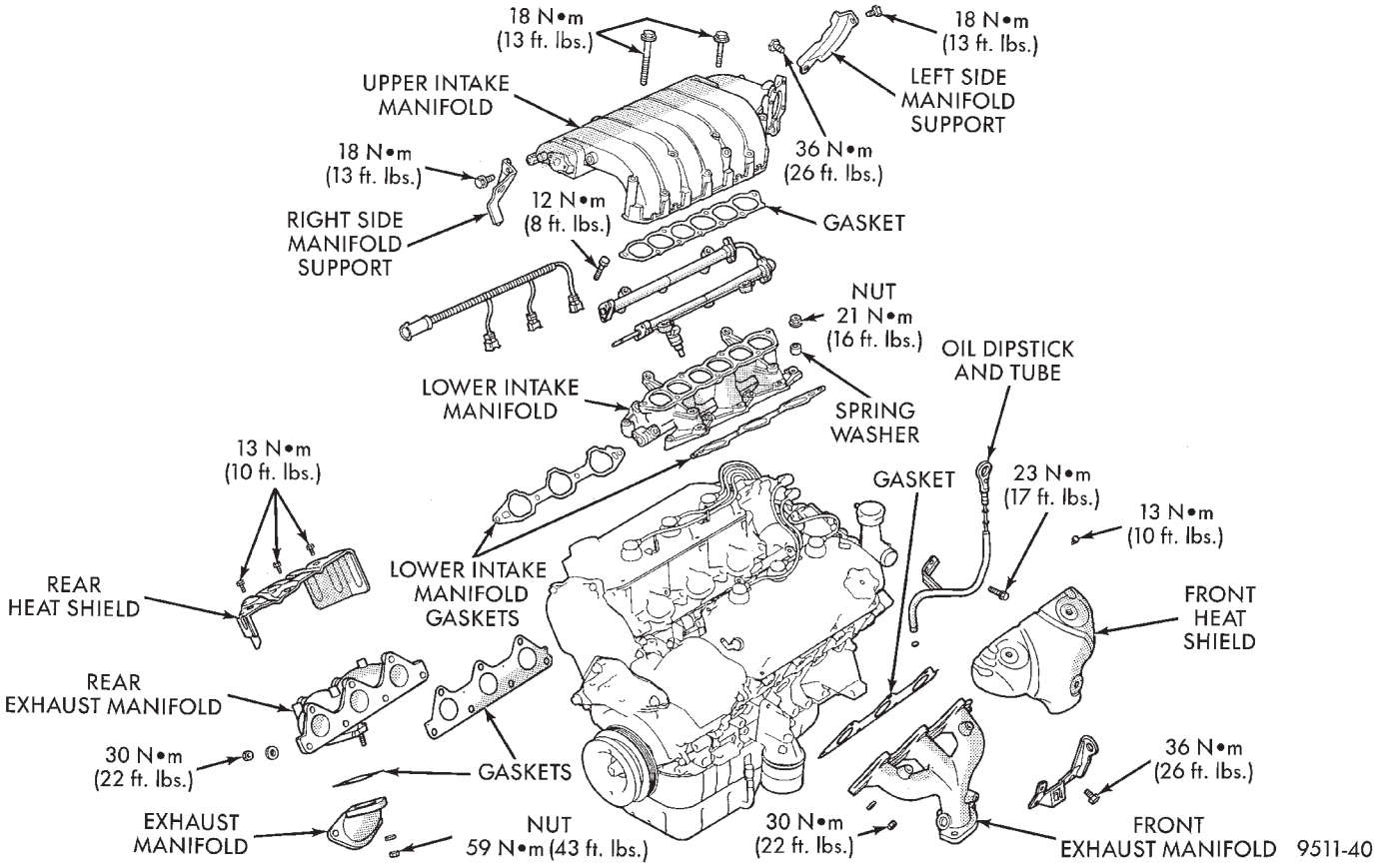

Fig. 19 Intake and Exhaust Manifolds—2.5L Engine

REMOVAL

(1) Disconnect negative cable from auxiliary jumper terminal (Fig. 20).

WARNING: RELEASE FUEL SYSTEM PRESSURE BEFORE SERVICING FUEL SYSTEM COMPONENTS. SERVICE VEHICLES IN WELL VENTILATED AREAS AND AVOID IGNITION SOURCES. NEVER SMOKE WHILE SERVICING THE VEHICLE.

(2) Release fuel system pressure. Refer to Fuel System Pressure Release procedure in this section.

WARNING: WRAP SHOP TOWELS AROUND HOSE TO CATCH ANY GASOLINE SPILLAGE.

(3) Disconnect fuel supply tube from rail. Refer to Quick-Connect Fittings in the Fuel Delivery section of this group.

(4) Unplug connectors from MAP and intake air temperature sensors (Fig. 22).

(5) Remove plenum support bracket bolt located rearward of MAP sensor (Fig. 22).

(6) Remove bolt holding air inlet resonator to intake manifold (Fig. 21).

(7) Loosen throttle body air inlet hose clamp.

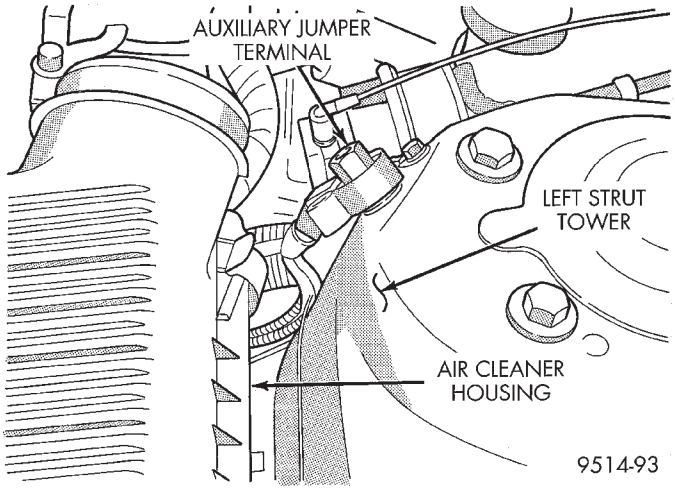

Fig. 20 Auxiliary Jumper Terminal

(8) Release snaps holding air cleaner housing cover to housing.

(9) Remove air cleaner cover and inlet hoses from engine.

(10) Unplug TPS and idle air control motor connectors (Fig. 23) and (Fig. 24).

(11) Squeeze retainer tab on throttle cable and slide cable out of bracket (Fig. 25).

REMOVAL AND INSTALLATION (Continued)

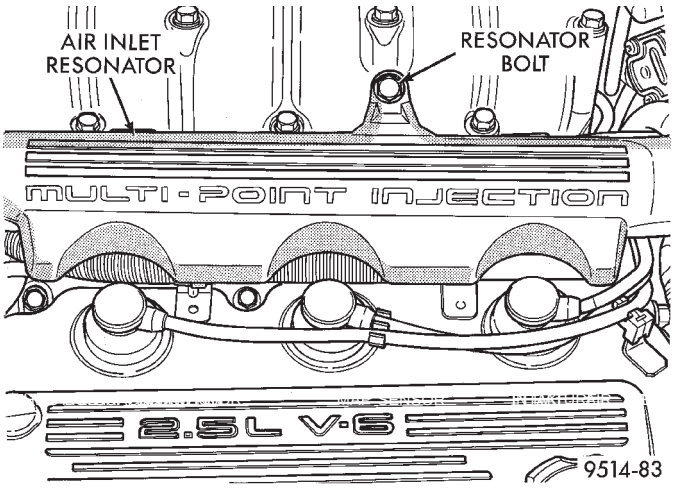

Fig. 21 Air Inlet Resonator

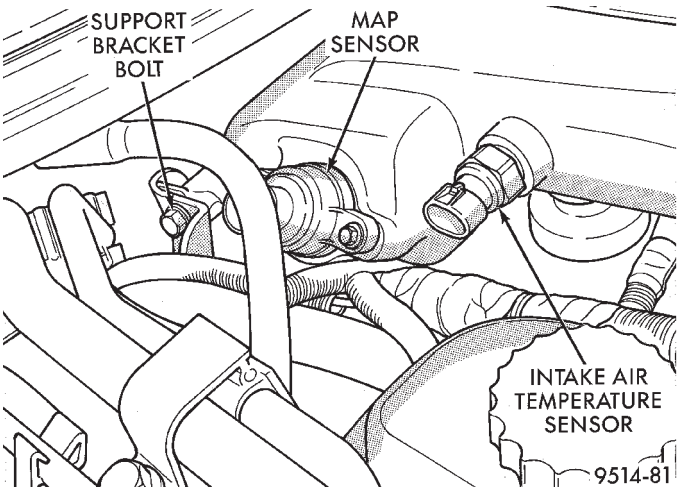

Fig. 22 Intake Manifold Sensors and Left Manifold Support Bolt

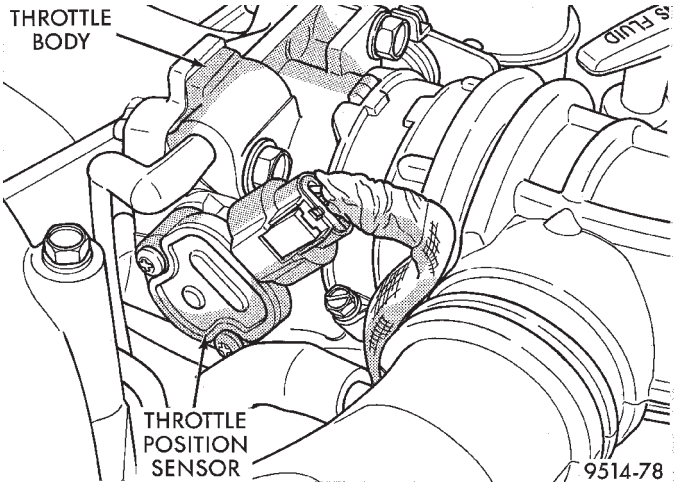

Fig. 23 Throttle Position Sensor

(12) Slide Speed control cable out of bracket, if equipped (Fig. 25).

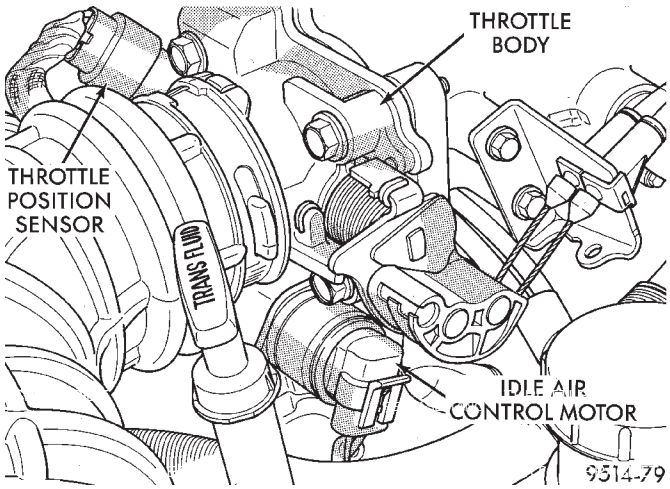

Fig. 24 Idle Air Control Motor

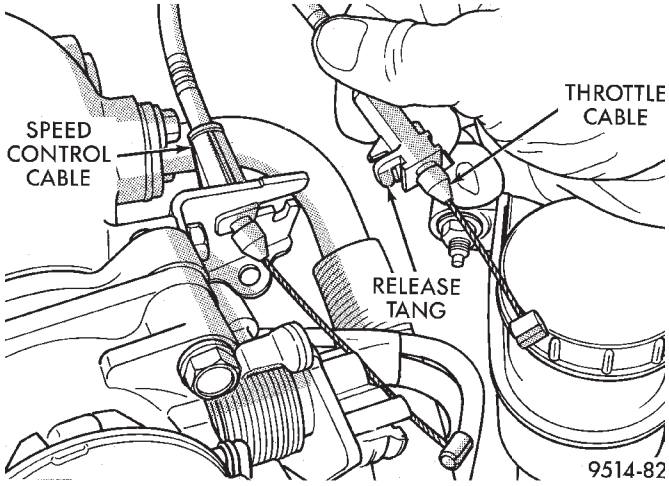

Fig. 25 Throttle Cable Attachment

(13) Remove EGR tube from intake manifold (Fig. 26).

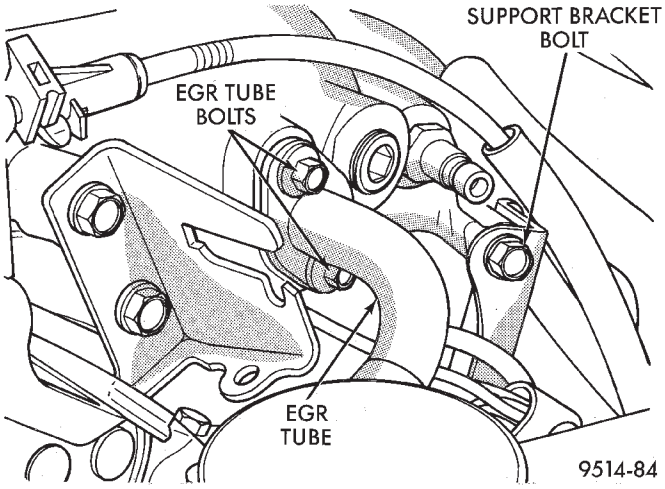

Fig. 26 EGR Tube and Right Manifold Support Bolt

(14) Remove plenum support bracket bolt located rearward of EGR tube (Fig. 26).

REMOVAL AND INSTALLATION (Continued)

(15) Remove 7 bolts holding upper intake plenum and remove plenum (Fig. 19).

(16) Disconnect electrical connectors from fuel injectors.

(17) Remove 4 bolts holding fuel rail (Fig. 27).

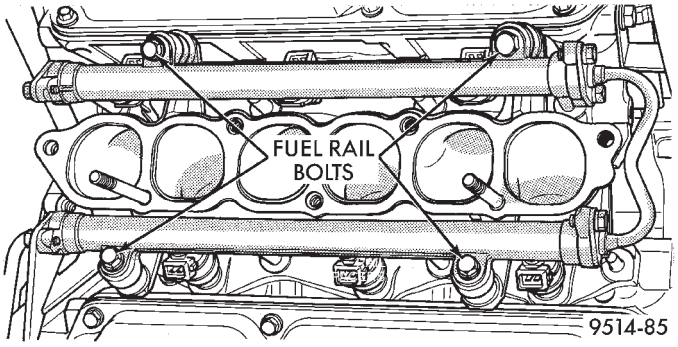

Fig. 27 Fuel Rail Attachment

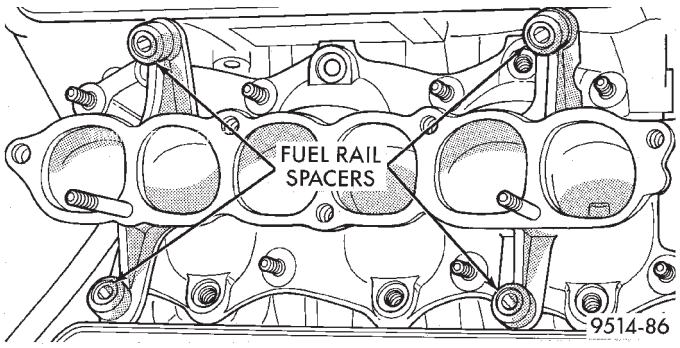

Fig. 28 Fuel Rail Spacers

(18) Lift fuel rail off engine. **There are spacers under each fuel rail bolt (Fig. 28).**

(19) Remove lower intake manifold attaching bolts. Remove intake manifold.

INSTALLATION

(1) Install intake manifold with new gaskets. Tighten in sequence shown in (Fig. 29) to 21 N·m (185 in. lbs.).

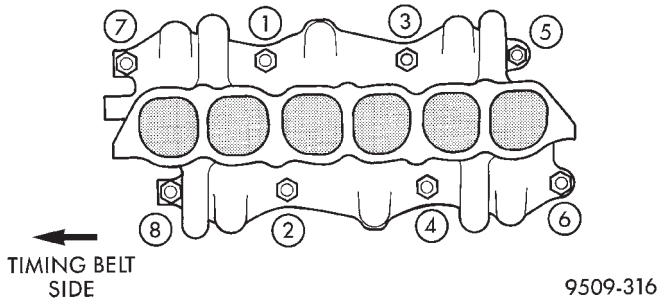

Fig. 29 Intake Manifold Tightening Sequence

(2) Apply a light coating of clean engine oil to the O-ring on the nozzle end of each injector.

(3) Insert fuel injector nozzles into openings in intake manifold. Seat the injectors in place. Tighten fuel rail bolts to 12 N·m (8 ft. lbs.).

(4) Attach electrical connectors to fuel injectors.

(5) Connect fuel supply tube to fuel rail. Refer to Quick Connect Fittings in the Fuel Delivery Section of this Group.

(6) Install new gasket and position upper intake plenum. Tighten plenum bolts to 18 N·m (13 ft. lbs.) torque.

(7) Install bolts at plenum support brackets. Tighten bolts to 18 N·m (13 ft. lbs.).

(8) Install EGR tube to plenum. Tighten EGR tube to intake manifold plenum screws to 11 N·m (95 in. lbs) torque.

(9) Install throttle cables.

(10) Attach electrical connectors to sensors.

(11) Tighten air inlet tube clamps to 3 N·m ±1 (25 in. lbs. ±5).

(12) Connect negative terminal to auxiliary jumper terminal.

EXHAUST MANIFOLDS—2.5L ENGINE

REMOVAL

(1) Raise vehicle and disconnect exhaust pipe from rear (cowl side) exhaust manifold at flex-joint. It may be necessary to remove the entire exhaust system. Refer to procedure outlined in this section.

(2) Remove bolts attaching cross-under pipe to manifolds (Fig. 30). Remove assembly.

(3) Remove heat shield from rear exhaust manifold (Fig. 31).

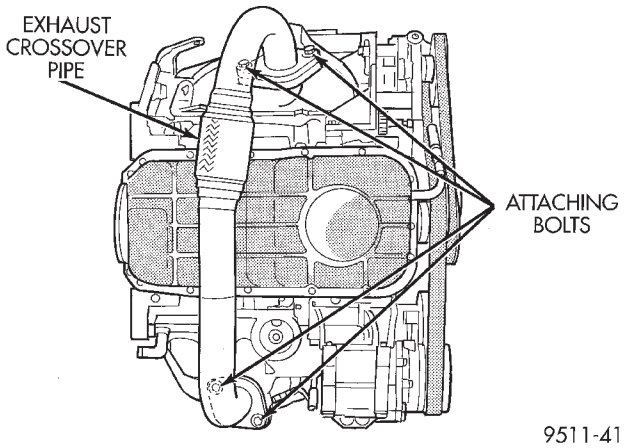

Fig. 30 Cross-Under Pipe Attaching Bolts

(4) Remove Power Steering pump bracket. Refer to Group 19 Steering for procedure.

(5) Remove nuts attaching rear manifold to cylinder head and remove manifold.

(6) Lower vehicle and remove screws attaching front heat shield to front manifold (Fig. 19).

REMOVAL AND INSTALLATION (Continued)

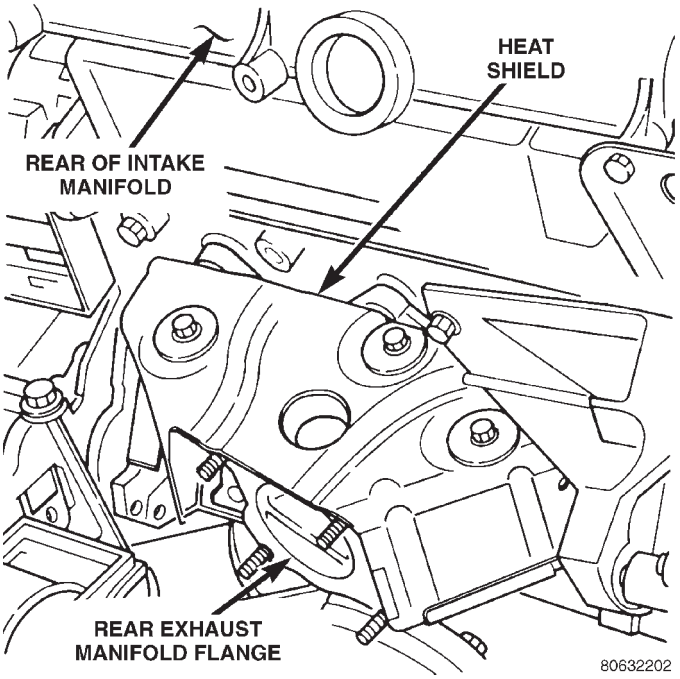

Fig. 31 Rear Exhaust Manifold—2.5L Engine

INSTALLATION

Install a new exhaust manifold gasket.

(1) Install the rear exhaust manifold and tighten attaching nuts to 30 N·m (22 ft. lbs.).

(2) Install rear exhaust manifold heat shield torque fastener to 13 N·m (115 in. lbs.).

(3) Install Power Steering Pump bracket to engine. Refer to Group 19 Steering for procedure.

(4) Attach the flex-joint exhaust manifold and tighten fasteners to 28 N·m (250 in. lbs.)

(5) Connect rear heated oxygen sensor lead.

(6) Attach cross-under pipe to exhaust manifold and tighten bolt to 31 N·m (275 in. lbs.)

(7) Install front exhaust manifold and attach exhaust cross-under pipe tighten fastener to 31 N·m (275 in. lbs.).

(8) Install front manifold heat shield and tighten attaching screws to 15 N·m (130 in. lbs.).

CLEANING AND INSPECTION

EXHAUST MANIFOLD INSPECTION—2.4L ENGINE

(1) Discard gasket and clean all gasket from surfaces of manifolds and cylinder head.

(2) Test manifold gasket surfaces for flatness with straight edge. Surface must be flat within 0.15 mm per 300 mm (.006 in. per foot) of manifold length.

(3) Inspect manifolds for cracks or distortion. Replace manifold if necessary.

INTAKE MANIFOLD—2.5L ENGINE

(1) Discard gasket and clean all gasket surfaces of manifold to cylinder heads.

(2) Check upper and lower manifold gasket surfaces for flatness with straight edge. Surface must be flat within 0.15 mm per 300 mm (.006 in. per foot) of manifold length.

(3) Inspect manifolds for cracks or distortion. Replace manifold if necessary.

EXHAUST MANIFOLD—2.5L ENGINE

Inspect exhaust manifolds for damage or cracks and check distortion of the cylinder head mounting surface and exhaust crossover mounting surface with a straightedge and thickness gauge.

SPECIFICATIONS

TORQUE

DESCRIPTION	TORQUE
Band Clamp	
Fastener	80 N·m (60 ft. lbs.)
Body Heat Shields	
Fasteners	5 N·m (40 in. lbs.)
Cross-Under Pipe	
Fasteners	31 N·m (275 in. lbs.)
Exhaust Manifold-2.4L	
Fasteners	23 N·m (200 in. lbs.)
Exhaust Manifold-2.5L	
Fasteners	44 N·m (33 ft. lbs.)
Exhaust Manifold Flange-2.4L	
Fasteners	28 N·m (250 in. lbs.)
Exhaust Manifold Flange-2.5L	
Fasteners	32 N·m (24 ft. lbs.)
Exhaust Manifold Heat Shield-2.5L	
Bolts	13 N·m (115 in. lbs.)
Intake Manifold-2.4L	
Fasteners	23 N·m (200 in. lbs.)
Intake Manifold Lower-2.5L	
Fasteners	21 N·m (185 in. lbs.)
Intake Manifold Plenum Upper-2.5L	
Bolts	18 N·m (160 in. lbs.)