EXHAUST SYSTEM AND INTAKE MANIFOLD

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GENERAL INFORMATION

EXHAUST SYSTEMS

The exhaust system has an underfloor catalytic converter, tail pipe, and muffler (Fig. 1).

EXHAUST BALL JOINT COUPLING

An exhaust ball joint coupling (Fig. 2) is used to secure the exhaust pipe to the engine exhaust manifold. This flexible joint 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 ball joint consists of two bolts, two springs, and a ball joint seal ring, which is a separate part from the exhaust pipe.

CATALYTIC CONVERTER

There is no regularly scheduled maintenance on any Chrysler catalytic converter (Fig. 3). If damaged, the converter must be replaced.

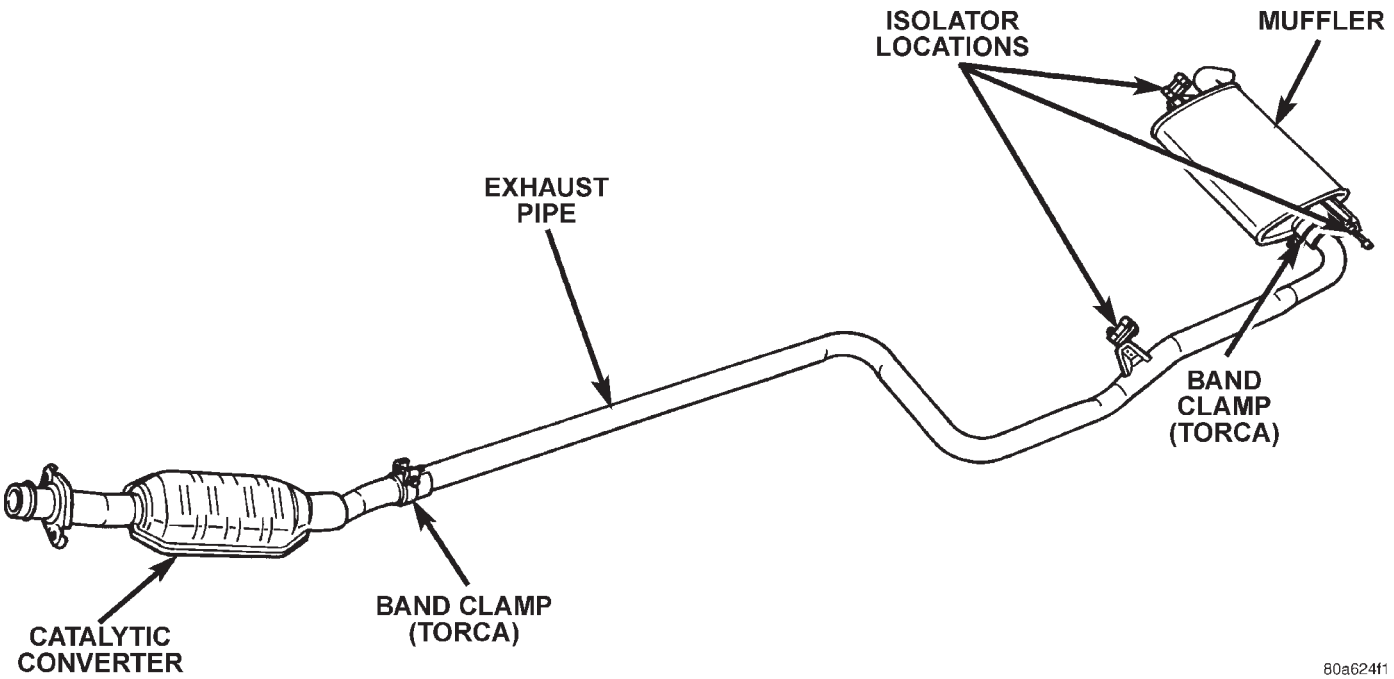

Fig. 1 Exhaust System

GENERAL INFORMATION (Continued)

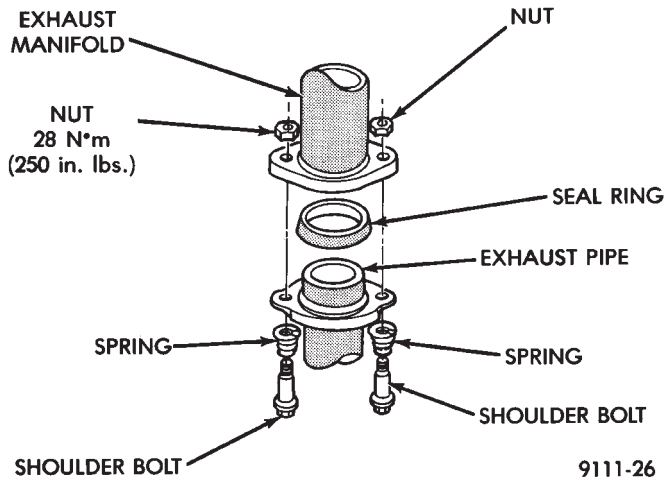

Fig. 2 Ball Joint Connection

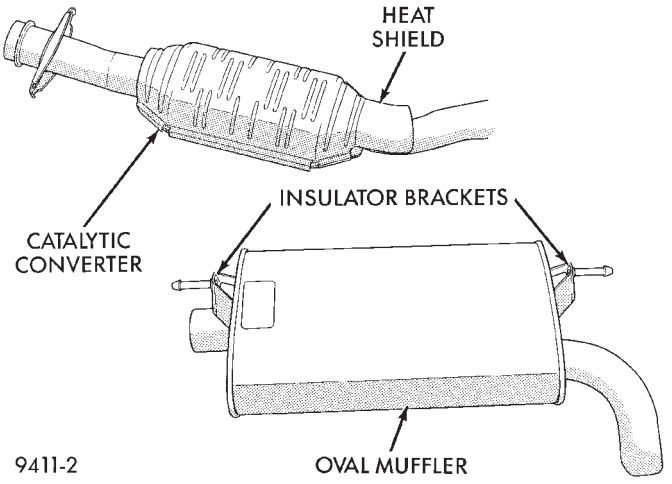

Fig. 3 Exhaust System Components

CAUTION: Due to exterior physical similarities of some catalytic converters with pipe assemblies, extreme care should be taken with replacement parts.

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.

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 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.

HEAT SHIELDS

The heat shield (Fig. 4) is needed to protect both the car and the environment from the high temperatures developed in the vicinity of the catalytic converter.

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

CAUTION: Avoid application of rust prevention compounds or undercoating materials to exhaust system floor pan heat shield on cars if 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.

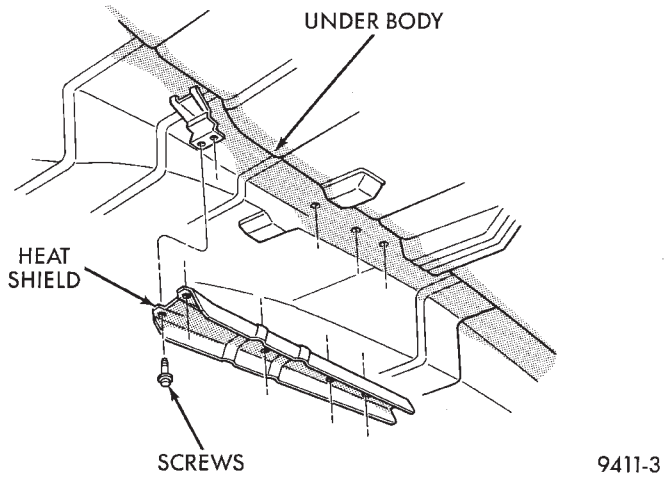

Fig. 4 Heat Shield Installation

EXHAUST GAS RECIRCULATION (EGR) SYSTEM

To assist in the control of oxides of nitrogen (NOx) in engine exhaust, some 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 the number four exhaust port through a hole in the end of the cylinder head. REFER TO GROUP 25, EMISSION SYSTEMS FOR A COMPLETE DESCRIPTION, DIAGNOSIS AND SERVICE PROCEDURES ON THE EXHAUST GAS RECIRCULATION SYSTEM AND COMPONENTS.

DESCRIPTION AND OPERATION

INTAKE MANIFOLD SOHC

The intake manifold is a molded plastic composition, attached to the cylinder head with ten fasteners. This long branch design enhances low and midrange torque. If removing the intake manifold for any reason, the fasteners can not be reused.

INTAKE MANIFOLD DOHC

The intake manifold is a two piece aluminum casting, attached to the cylinder head with ten fasteners. This long branch fan design enhances low and midrange torque.

EXHAUST MANIFOLD

The exhaust manifold is made of nodular cast iron for strength and high temperatures. Exhaust gasses exit through a machined, articulated joint connection to the exhaust pipe.

DIAGNOSIS AND TESTING

EXHAUST SYSTEM DIAGNOSIS

Condition	Possible Cause	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 Leakage a, EGR Valve to Manifold Gasket b, EGR Valve to EGR Tube Gasket c, EGR Tube to Manifold Tube Nut	(c) a, Tighten nuts or replace gasket b, Tighten nuts or replace gasket c, Tighten tube nut
	(d) Exhaust Flex Joint a, Spring height, installed not correct	(d) a, Check spring height, both sides (specification is 32.5 mm, 1.28 inch) look for source of spring height variation if out of specification.
	b, Exhaust sealing ring defective	b, Inspect seal for damage on round spherical surface. If no damage is evident, check for exhaust obstruction causing high back pressure on heavy acceleration.
	(e) Pipe and shell noise from front exhaust pipe	(e) Characteristic of single wall pipes.
EXCESSIVE EXHAUST NOISE	(a) Leaks at pipe joints	(a) Tighten clamps at leaking joints
	(b) Burned or blown or rusted out muffler, tailpipe of exhaust pipe.	(b) Replace muffler or muffler tailpipe or exhaust pipe.
	(c) Restriction in muffler or tailpipe	(c) Remove restriction, if possible or replace as necessary.
	(d) Converter material in muffler	(d) 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 band clamp fastener of component being removed (Fig. 5).

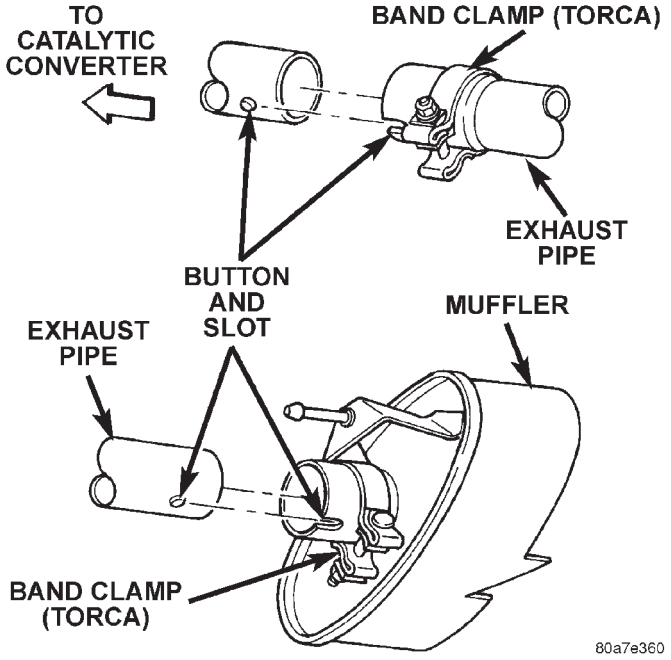

Fig. 5 Slip Joint Connection

NOTE: Do not use petroleum-based lubricants when removing/installing muffler or exhaust pipe isolators as it may compromise the life of the part. A suitable substitute is a mixture of liquid dish soap and water.

(2) Loosen band clamp and remove support insulators at muffler (Fig. 6). Remove muffler from exhaust pipe.

(3) Disconnect downstream heated oxygen sensor from the catalytic converter pipe.

(4) Remove clamp at the catalytic converter to exhaust pipe slip joint (Fig. 7). Separate at slip joint.

(5) When removing exhaust pipe, raise rear of vehicle to relieve body weight from rear suspension to provide clearance between pipe and lateral arms.

(6) Remove catalytic converter to exhaust manifold attaching bolts (Fig. 8).

(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: When replacement is required on any component of the exhaust system, you must use original equipment parts (or their equivalent).

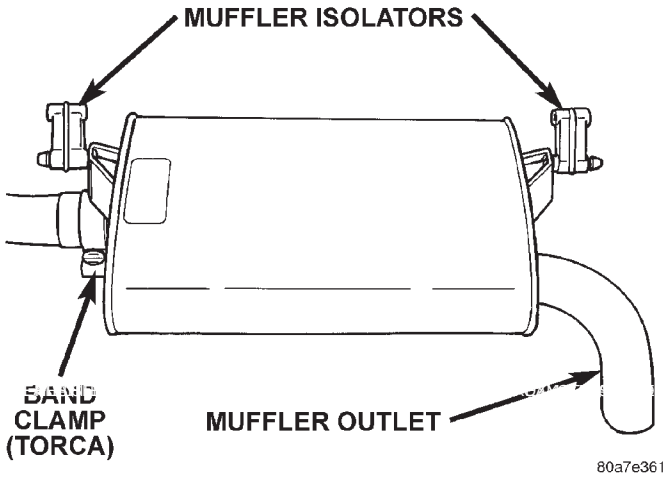

Fig. 6 Exhaust Pipe and Muffler Support Insulators

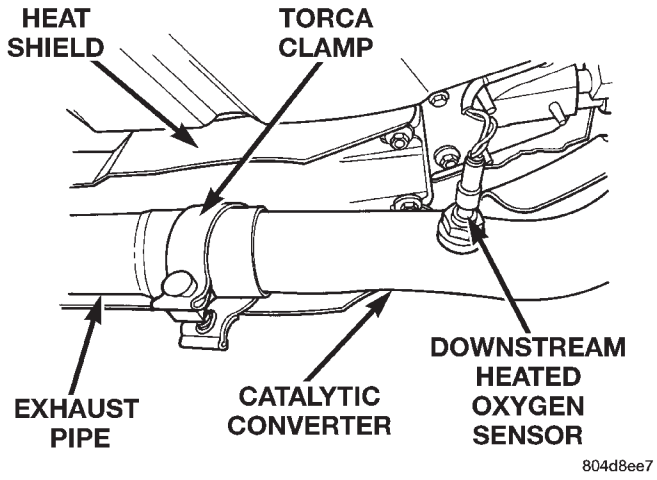

Fig. 7 Catalytic Converter to Exhaust Pipe Connection

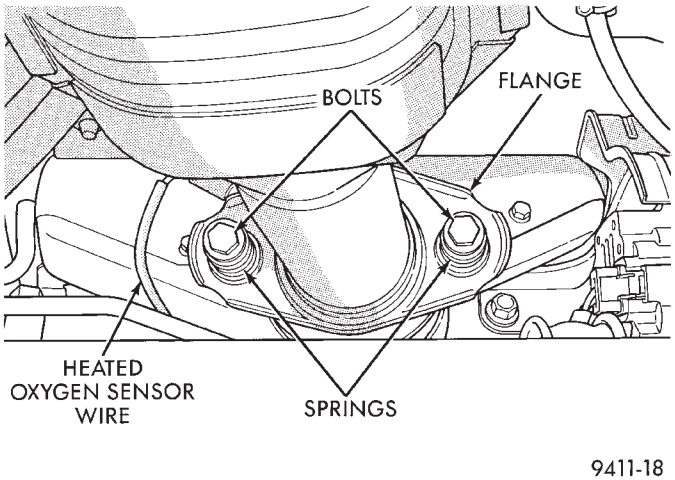

Fig. 8 Catalytic Converter to Exhaust Manifold Connection

REMOVAL AND INSTALLATION (Continued)

INSTALLATION

When assembling exhaust system **do not** tighten clamps until components are aligned and clearances are checked.

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

(2) Assemble exhaust pipe to catalytic convertor and the support to the underbody

(3) Install the muffler to exhaust pipe and the supports to the underbody.

(4) Working from the front of system;

(5) Align and tighten the catalytic convertor to exhaust manifold ball joint bolts (Fig. 8).

(6) Align each component to maintain position and proper clearance with underbody parts and tighten clamps to specifications (Fig. 9).

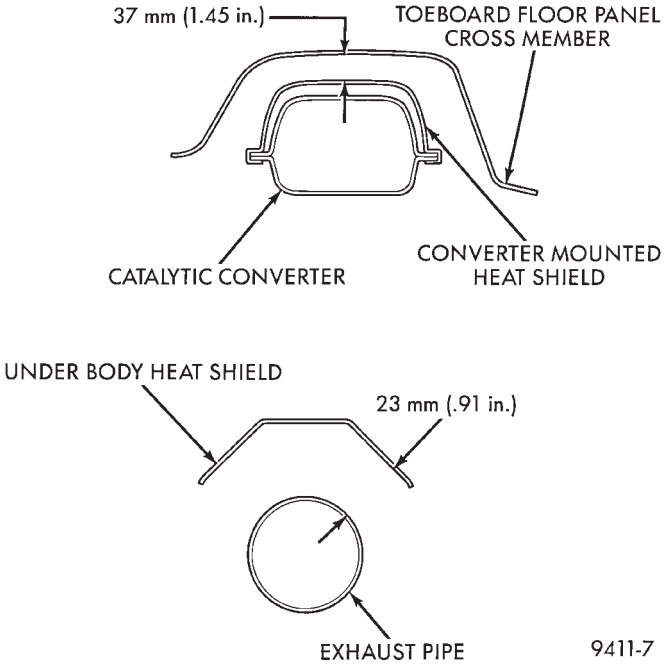

Fig. 9 Exhaust Clearance

(7) Connect the downstream heated oxygen sensor.

(8) A new style band clamp (Torca) will be used on the PL exhaust system (Fig. 10).

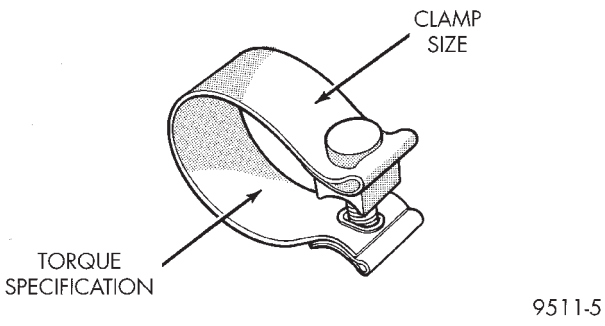

Fig. 10 Band Clamp (Torca)

INTAKE MANIFOLD—SINGLE OVERHEAD CAM ENGINE (SOHC)

REMOVAL

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.

(1) Disconnect negative cable from battery.

(2) Remove fuel filler cap.

(3) Remove the fresh air duct (Fig. 13).

(4) Remove the protective cap from the fuel pressure test port on the fuel rail (Fig. 11).

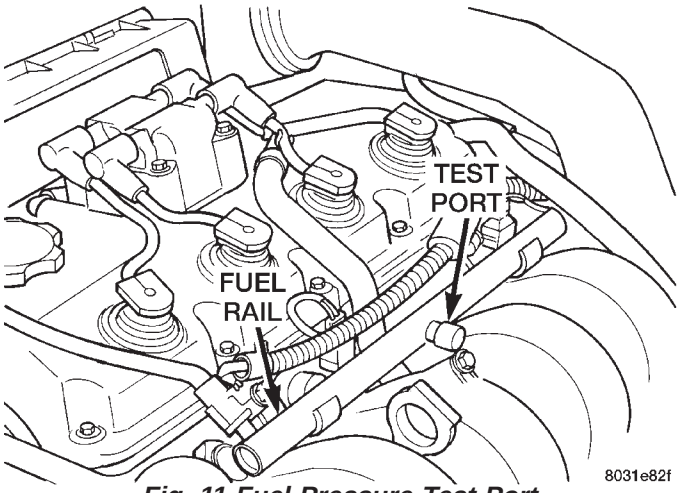

Fig. 11 Fuel Pressure Test Port

(5) Place the open end of fuel pressure release hose, tool number C-4799-1, into an approved gasoline container. Connect the other end of hose to the fuel pressure test port (Fig. 12). Fuel pressure will bleed off through the hose into the gasoline container. Fuel gauge C-4799-A contains hose C-4799-1.

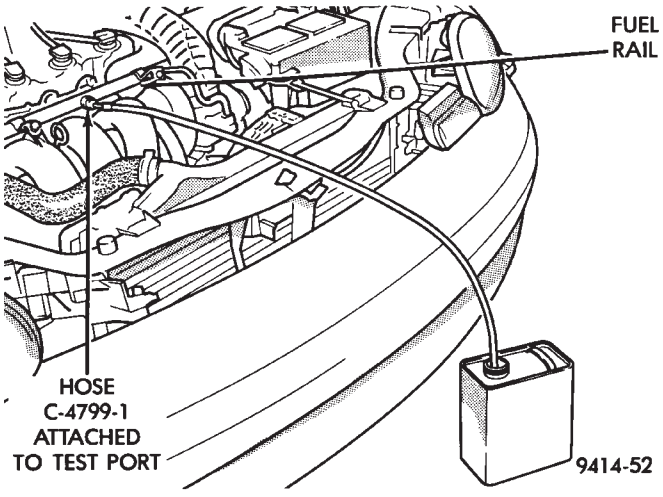

Fig. 12 Releasing Fuel Pressure

REMOVAL AND INSTALLATION (Continued)

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

(7) Disconnect the fuel supply line quick connect at the fuel tube assembly.

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

(8) 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

(9) Remove clean air duct and upper air filter housing (Fig. 13).

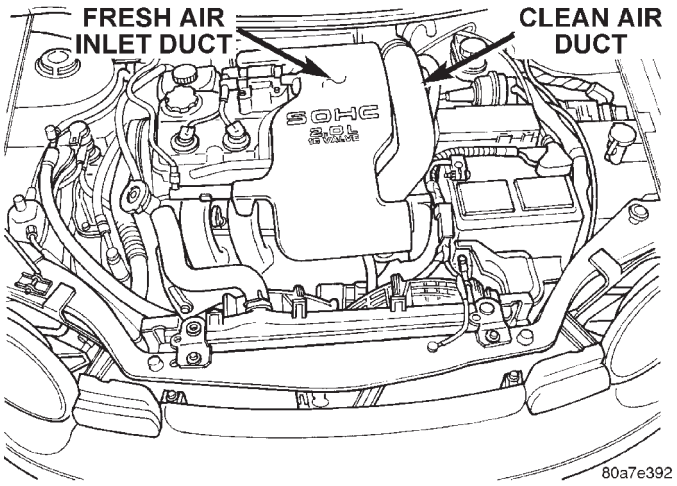

Fig. 13 Clean Air Duct to Throttle Body Assembly

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

(11) Disconnect Idle Air Control (IAC) motor and Throttle Position Sensor (TPS) wiring connectors (Fig. 14).

(12) Disconnect vacuum hoses from throttle body (Fig. 14).

(13) Disconnect Manifold Absolute Pressure/Intake Air Temperature Sensor (TMAP), electrical connector (Fig. 15). Disconnect vapor and brake booster hoses.

(14) Disconnect knock sensor electrical connector (Fig. 16) and disconnect wiring harness from tab located on the intake manifold.

(15) Disconnect wiring at starter.

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

(17) Remove throttle body.

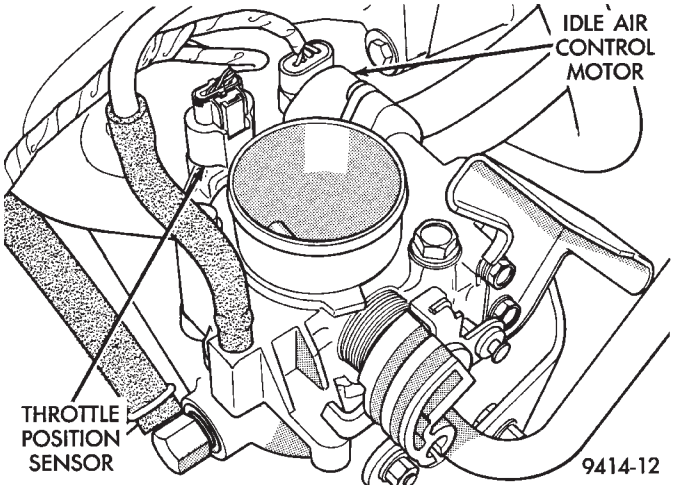

Fig. 14 Idle Air Control (IAC) Motor and Throttle Position Sensor (TPS) Wiring Connectors and Vacuum Hose Connection

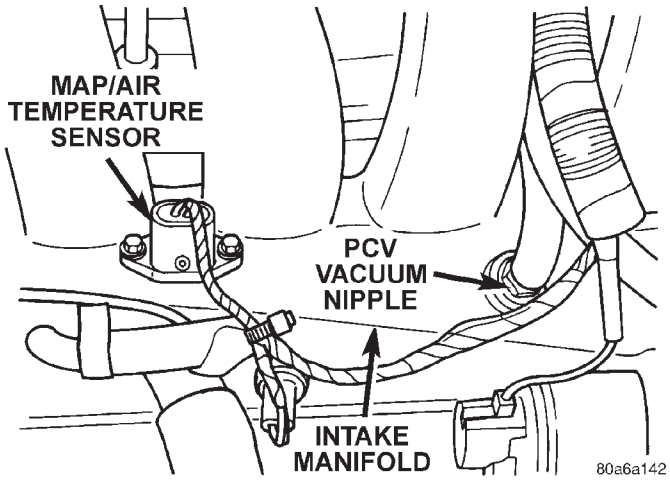

Fig. 15 Intake Manifold Electrical and Vacuum Hose Connections

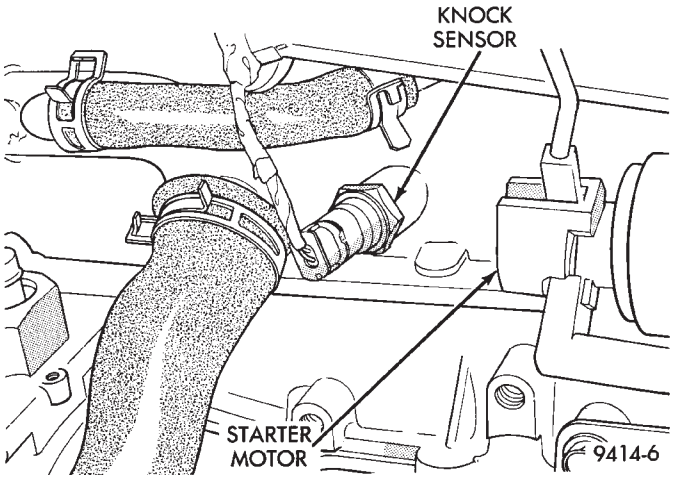

Fig. 16 Knock Sensor

REMOVAL AND INSTALLATION (Continued)

(18) Remove EGR tube bolts at the valve and at the intake manifold (Fig. 17). Remove tube from engine.

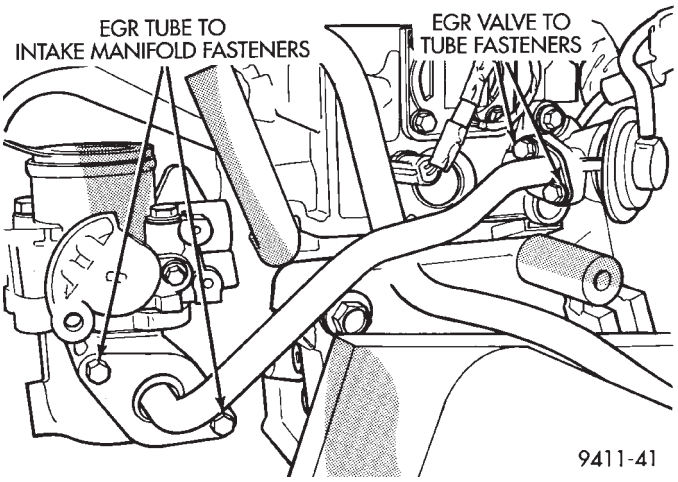

Fig. 17 EGR Tube Assembly

(19) Remove the intake manifold to inlet water tube support fastener (Fig. 18).

(20) Remove 10 intake manifold screw and washer. Discard the fasteners. Remove intake manifold.

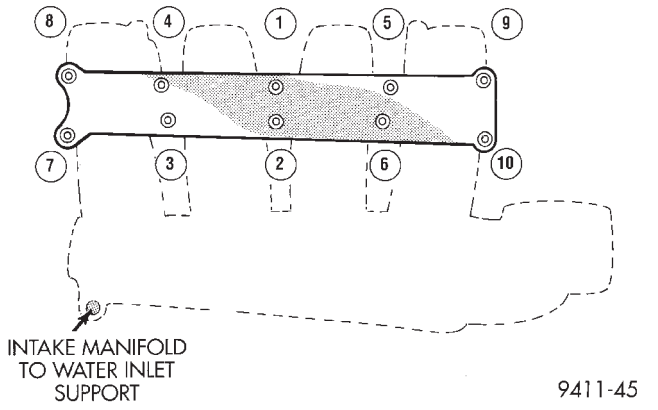

Fig. 18 Intake Manifold Tightening Sequence

INSTALLATION

Before installing manifold. Clean all mating surfaces. Replace all seals, with new seals. All intake manifold fasteners and washers are to be discarded and **NEW** fasteners and washers are to be used.

(1) Install intake manifold onto cylinder head and tighten fasteners to 12 N·m (105 in. lbs.) in sequence shown in (Fig. 18).

(2) Install intake manifold to water inlet support fastener (Fig. 18) tighten to 12 N·m (105 in. lbs.).

(3) 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.).

(4) Connect PCV and brake booster hoses.

(5) Inspect quick connect fittings for damage, replace if necessary Refer to Group 14, Fuel System for procedure. Lube tube with clean 30w engine oil, Connect fuel supply hose to fuel rail assembly. Check connection by pulling on connector to insure it locked into position.

(6) 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.

(7) Connect Manifold Absolute Pressure/Intake Air Temperature Sensor (TMAP) wiring connector.

(8) Connect knock sensor connector, and wiring at starter. Connect wiring harness to intake manifold tab.

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

(10) Connect vacuum hoses to throttle body.

(11) 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 for procedure.

(12) Loose assemble the EGR tube onto valve and intake manifold finger tight. Tighten tube fasteners 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.).

(13) Install clean air duct to air filter housing. Tighten clamp to 3 N·m (30 in. lbs.).

(14) Connect negative battery cable.

(15) Install fresh air duct to air cleaner and tighten wing nut.

(16) 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.

INTAKE MANIFOLD—DUAL OVERHEAD CAM ENGINE (DOHC)

REMOVAL

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.

(1) Disconnect negative cable from battery.

(2) Remove fuel filler cap.

REMOVAL AND INSTALLATION (Continued)

(3) Remove fresh air inlet duct (Fig. 21). Remove wing nut on intake.

(4) Remove the protective cap from the fuel pressure test port on the fuel rail (Fig. 19).

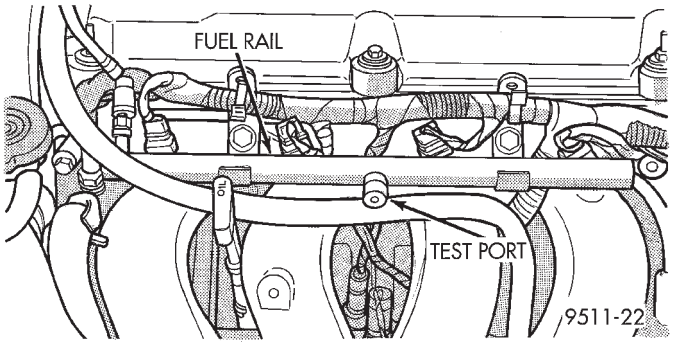

Fig. 19 Fuel Pressure Test Port

(5) Place the open end of fuel pressure release hose, tool number C- 4799-1, into an approved gasoline container. Connect the other end of hose to the fuel pressure test port (Fig. 20). Fuel pressure will bleed off through the hose into the gasoline container. Fuel gauge C-4799-A contains hose C-4799-1.

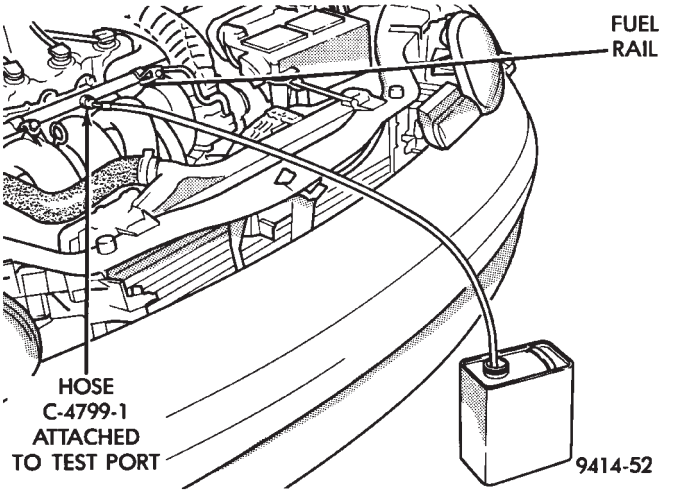

Fig. 20 Releasing Fuel Pressure—Typical

(6) Disconnect the fuel supply line-connect at the fuel tube assembly.

(7) Remove clean air inlet duct.

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

(8) Disconnect the coolant temperature sensor (Fig. 22).

(9) 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

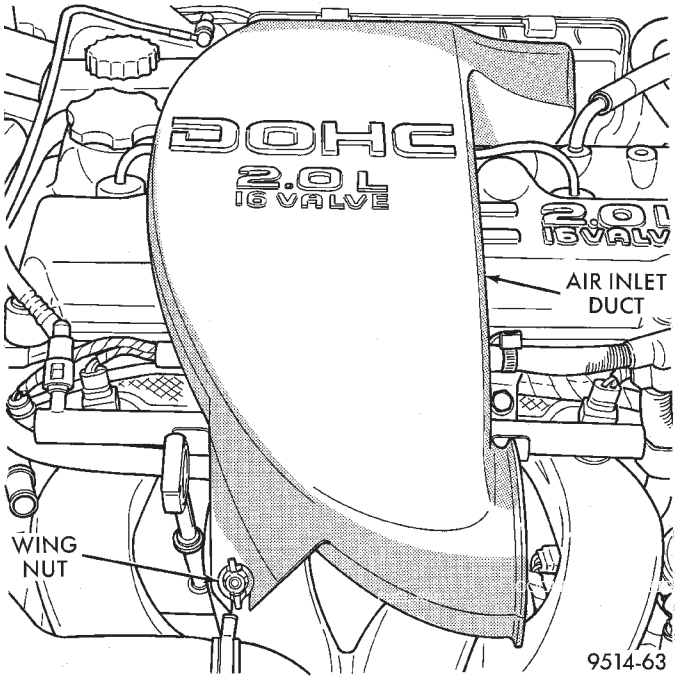

Fig. 21 Fresh Air Inlet Duct

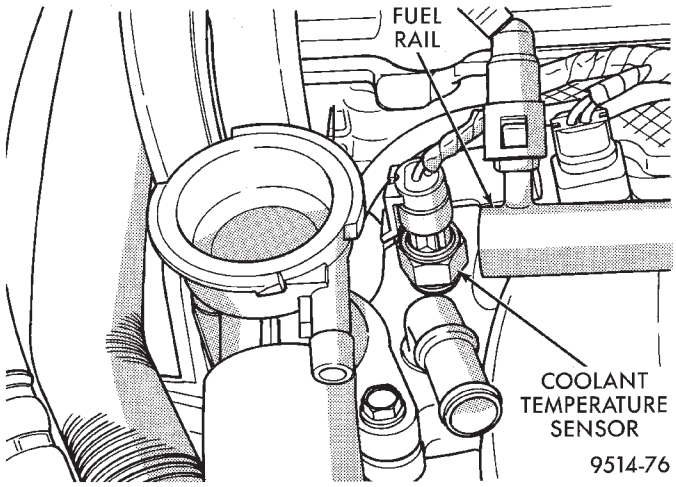

Fig. 22 Engine Coolant Temperature Sensor

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

(11) Remove throttle body.

(12) Disconnect Idle Air Control (IAC) motor and Throttle Position Sensor (TPS) wiring connectors (Fig. 23).

(13) Disconnect vacuum hoses from throttle body.

(14) Disconnect Manifold Absolute Pressure/Intake Air Temperature sensor (TMAP) electrical connector. Disconnect vapor and brake booster hoses (Fig. 24).

(15) Disconnect knock sensor electrical connector and disconnect wiring harness from tab located on the intake manifold (Fig. 25).

REMOVAL AND INSTALLATION (Continued)

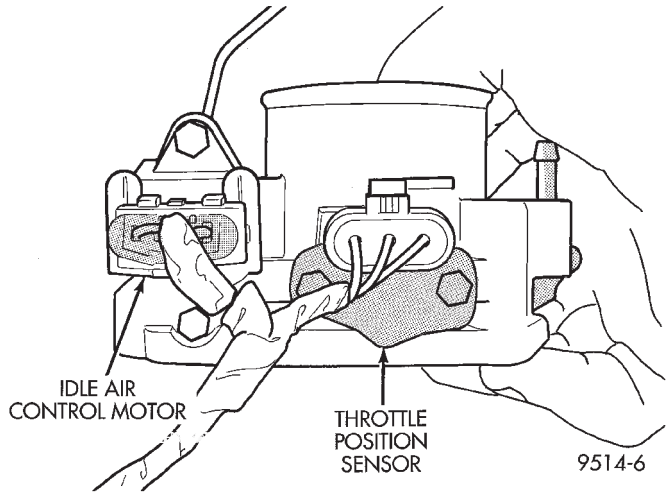

Fig. 23 Idle Air Control (IAC) Motor and Throttle Position Sensor (TPS) Wiring Connectors

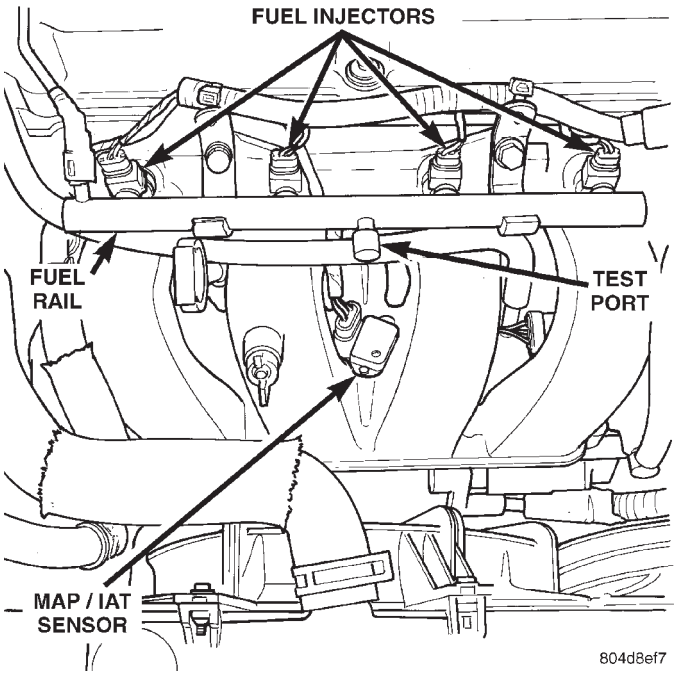

Fig. 24 Manifold Absolute Pressure/Intake Air Temperature Sensor (TMAP) Electrical Connector

(16) Disconnect wiring from starter.

(17) Remove EGR tube bolts at the valve and at the intake manifold (Fig. 26). Remove tube from engine.

(18) Remove intake manifold fastener. Remove intake manifold.

INSTALLATION

Before installing manifold. Clean all mating surfaces. Replace all gaskets, with new.

(1) Install intake manifold onto cylinder head and tighten fasteners to 28 N·m (250 in. lbs.) in sequence shown in (Fig. 27).

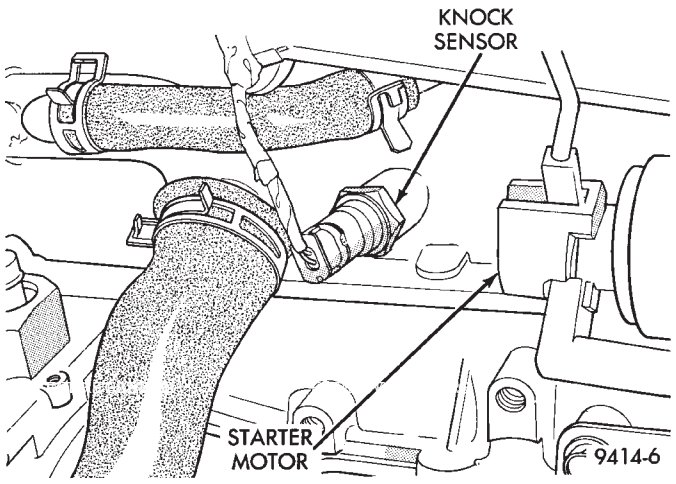

Fig. 25 Knock Sensor Electrical

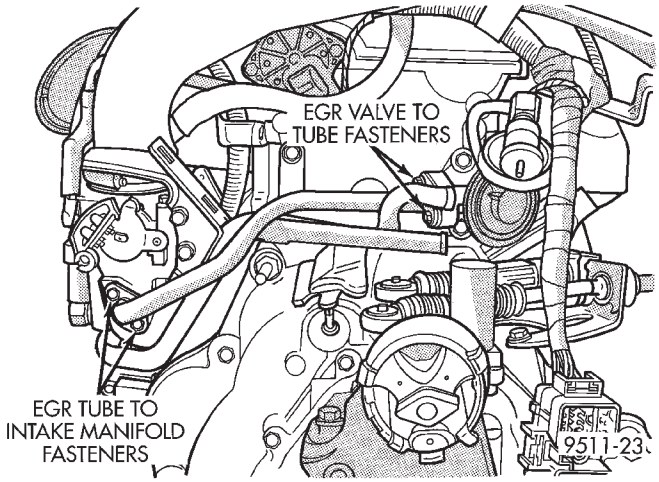

Fig. 26 EGR Tube Assembly

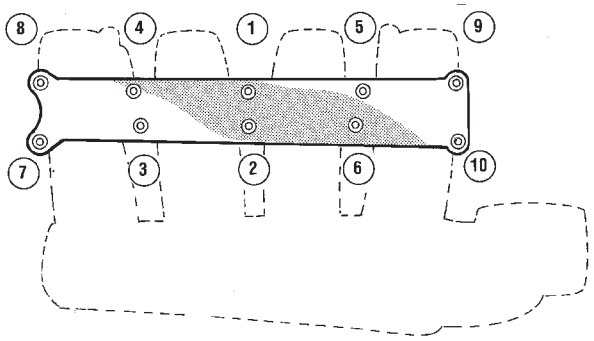

Fig. 27 Intake Manifold Tightening Sequence

(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.

REMOVAL AND INSTALLATION (Continued)

(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, 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.).

(6) Connect Manifold Absolute Pressure/Intake Air Temperature Sensor (TMAP) wiring connector.

(7) Connect knock sensor connector and starter wires. 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 for procedure.

(11) Loose assemble the EGR tube onto valve and intake manifold finger tight. Tighten tube fasteners 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) Install clean air duct.

(13) Install fresh air duct to air filter housing. Tighten clamp to 3 N·m (25 in. lbs.).

(14) Connect negative battery cable.

(15) 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

REMOVAL

(1) Remove air cleaner assembly and bracket.

(2) Remove exhaust manifold heat shield (Fig. 28).

(3) Disconnect upstream heated oxygen sensor connector.

(4) Remove exhaust pipe from manifold.

(5) Remove 8 exhaust manifold retaining fasteners and remove exhaust manifold (Fig. 29).

INSTALLATION

NOTE: Discard gasket and clean all gasket surfaces of manifolds and cylinder head.

(1) Set exhaust manifold and gasket in place. Apply Loctite 271 or equivalent to fasteners and tighten to 23 N·m (200 in. lbs.) starting at center and progressing outward in both directions. Repeat this procedure until all fasteners are at specified torque.

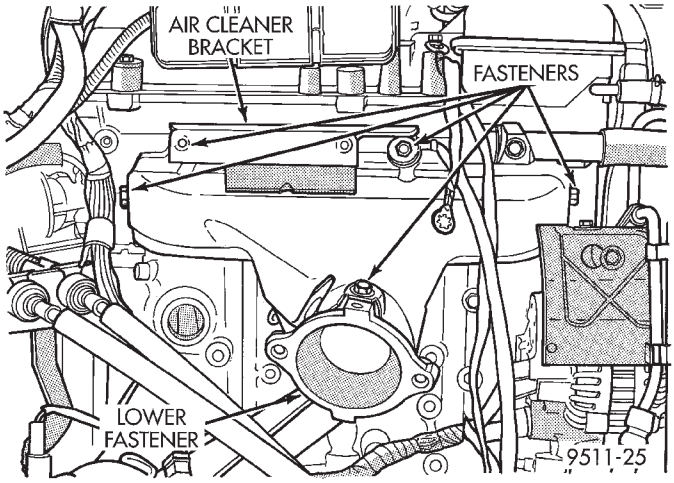

Fig. 28 Exhaust Manifold Heat Shield

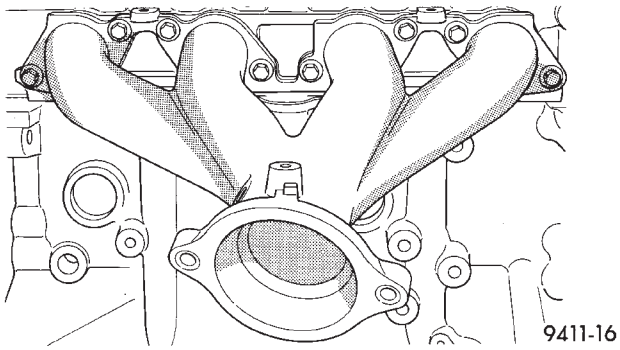

Fig. 29 Exhaust Manifold

(2) Install exhaust manifold heat shield.

(3) Connect upstream heated oxygen sensor connector.

(4) Install air cleaner bracket and assembly.

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

CLEANING AND INSPECTION

INTAKE MANIFOLD SOHC

INSPECT AND CLEAN

Check for:

- Inspect manifold for cracks or distortions.
- Check for torn or missing O-rings at the mating surface of the manifold (Fig. 30).

INTAKE MANIFOLD DOHC

INSPECT AND CLEAN

Check for:

- Inspect manifold for cracks or distortions.

CLEANING AND INSPECTION (Continued)

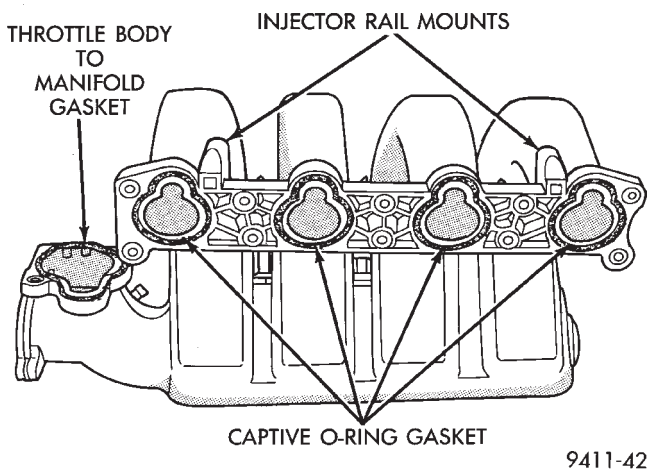

Fig. 30 Intake Manifold O-Rings

- Check for torn gasket at the mating surface of the manifold.

EXHAUST MANIFOLD

CLEAN AND INSPECT

(1) Discard gasket and clean all gasket 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.

SPECIFICATIONS

TORQUE CHART

EGR Tube Attaching
Bolts . . . . . 11 N·m (95 in. lbs.)
Exhaust Manifold to Exhaust Pipe
Nuts . . . . . 27 N·m (20 ft. lbs.)
Exhaust Manifold Mounting
Bolts . . . . . 23 N·m (200 in. lbs.)
Intake Manifold Mounting
Bolts SOHC . . . . . 12 N·m (105 in. lbs.)
Bolts DOHC . . . . . 28 N·m (250 in. lbs.)
Heat Shield Mounting (Body)
Bolts . . . . . 4 N·m (35 in. lbs.)
Exhaust System Band Clamps (Torca)
Fastener . . . . . 75 N·m (55 ft. lbs.)
Exhaust Manifold Heat Shield
Bolts . . . . . 23 N·m (200 in. lbs.)