EMISSION CONTROL SYSTEMS

CONTENTS

EVAPORATIVE EMISSION CONTROLS

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GENERAL INFORMATION

Vehicle Emissions Control Information Label

All vehicles are equipped with a Vehicle Emission Control Information label (Fig. 1 and Fig. 2). The label, which is located in the engine compartment, lists the vehicles' engine family and displacement, evaporative family, emission control system, certification application, engine timing specifications, idle speeds (if adjustable), and spark plug gap. If any differences occur between the information on the Vehicle Emission Control Information label and the service manual, the information on the label should be used.

The label shown (Fig. 2) is for vacuum hose routing information only.

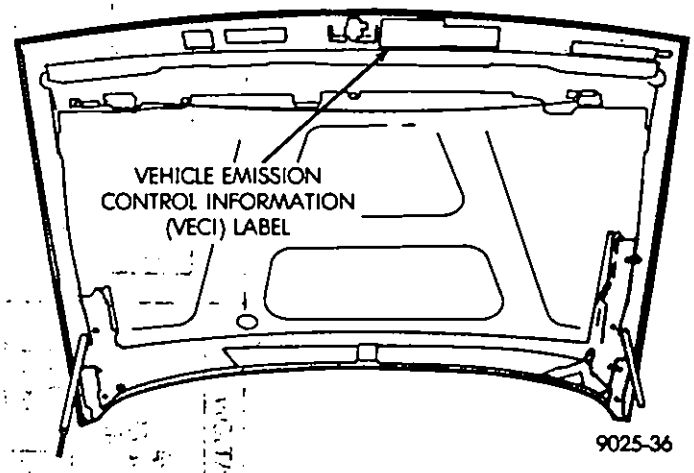


Fig. 1—Underhood Label Location

JEEP EAGLE CORPORATION

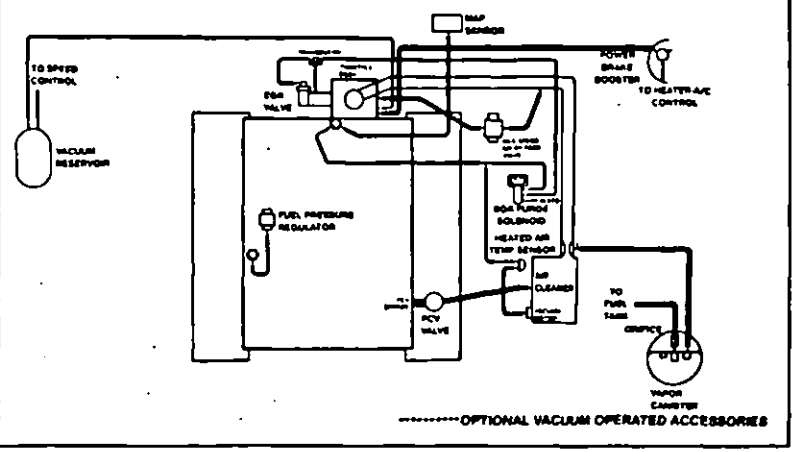
5980BTCD

For Position Only

VEHICLE EMISSION CONTROL INFORMATION

THIS VEHICLE CONFORMS TO U.S. EPA REGULATIONS APPLICABLE TO 1990 MODEL YEAR NEW MOTOR VEHICLES AT ALL ALTITUDES.

	3.0 LITER	SPARK PLUGS
• BASIC IGNITION TIMING AND IDLE FUEL/AIR MIXTURE HAVE BEEN PRESET AT THE FACTORY. SEE THE SERVICE MANUAL FOR PROPER PROCEDURES AND OTHER ADDITIONAL INFORMATION.	LAM3.0VSLYE1 LV-3.0J-1P	.035 In. GAP RS9YCX
• ADJUSTMENTS MADE BY OTHER THAN APPROVED SERVICE MANUAL PROCEDURES MAY VIOLATE FEDERAL AND STATE LAWS. CAUTION: APPLY PARKING BRAKE WHEN SERVICING VEHICLE	NO ADJUSTMENTS NEEDED	
4405371 CATALYST		



9025-37

Fig. 2—Vehicle Emission Control Information Label

EVAPORATION CONTROL SYSTEM

The evaporative emission control system prevents the release of unburned hydrocarbons, from liquid gasoline or gasoline vapor, into the atmosphere. When pressure in the fuel tank is below 21kPa (3psi), the rollover valves open allowing fuel vapors to flow to the evaporative canister where they are absorbed by a charcoal mixture. This prevents excessive pressure build-up in the fuel tank. Most canisters are equipped with a calibrated restrictor at the inlet to the canister. Refer to the appropriate vacuum hose routing schematic for restrictor size and location.

Fuel vapors stored in the canister are consumed in the combustion process during engine operation.

Canister Purge Function

The 3.0L engine utilizes a venturi in the air cleaner assembly as a purge line vacuum source (Fig. 3).

The effect of the venturi increases the speed of the intake air flowing by the purge inlet slots in the venturi wall. This creates a low pressure area at the inlet slots that draws vapors from the canister into the airstream flowing through the venturi (Fig. 4). The vapors pass through the intake manifold into the combustion chambers where they are consumed during combustion.

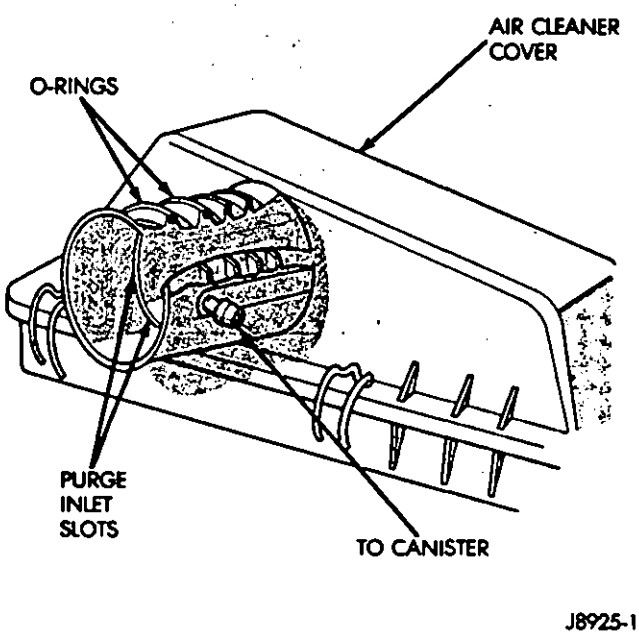


Fig. 3—Air Cleaner Venturi

Rollover Valve

The fuel tank is equipped with two rollover valves. The dual function valves relieve fuel tank pressure and prevent fuel flow through the fuel tank vent hoses in the event of vehicle rollover.

The valve consists of a plunger, spring, and an orifice and guide plate (Fig. 5). The valve is normally open. In the closed position, force applied by spring pressure seats the plunger against the guide plate, shutting off the flow of fuel vapor from the fuel tank to the evaporative canister. When fuel does not reach the valve, the spring pressure is overcome and the plunger moves away from the guide plate allowing fuel vapor to flow through the valve orifice.

In vehicle rollover the valve is inverted. In this position the plunger is forced against the guide plate and raw fuel is prevented from flowing through the valve orifice into the fuel tank vent tube.

Removal

(1) Disconnect battery negative cable from the battery.

(2) Remove the fuel filler cap and drain fuel tank. Refer to Draining Fuel Tank in Group 14.

(3) Remove fuel tank. Refer to Fuel Tank Removal in Group 14.

(4) The rollover valve is seated in a grommet. Remove by prying one side upward and then roll the grommet out of tank (Fig. 6).

Installation

(1) Start one side of grommet into opening in fuel tank and roll grommet into place. Using finger pressure only, press valve/grommet into place. A light coat of power steering fluid or a spray of silicon lubricant may be used to ease assembly.

(2) Install fuel tank. Refer to Fuel Tank Installation.

(3) Fill fuel tank. Install fuel tank filler cap.

(4) Connect battery negative cable to battery.

(5) Start vehicle and check for leaks.

Evaporative Canister

The evaporative canisters of Premier vehicles are filled with granules of an activated carbon mixture. Fuel vapors entering the canister are absorbed by the granules.

The evaporative canisters used on vehicles equipped with MPI (3.0L engine) have one inlet that is connected to the rollover valves of the fuel tank through fuel hose and tubes. The canister is connected to the air cleaner snorkel.

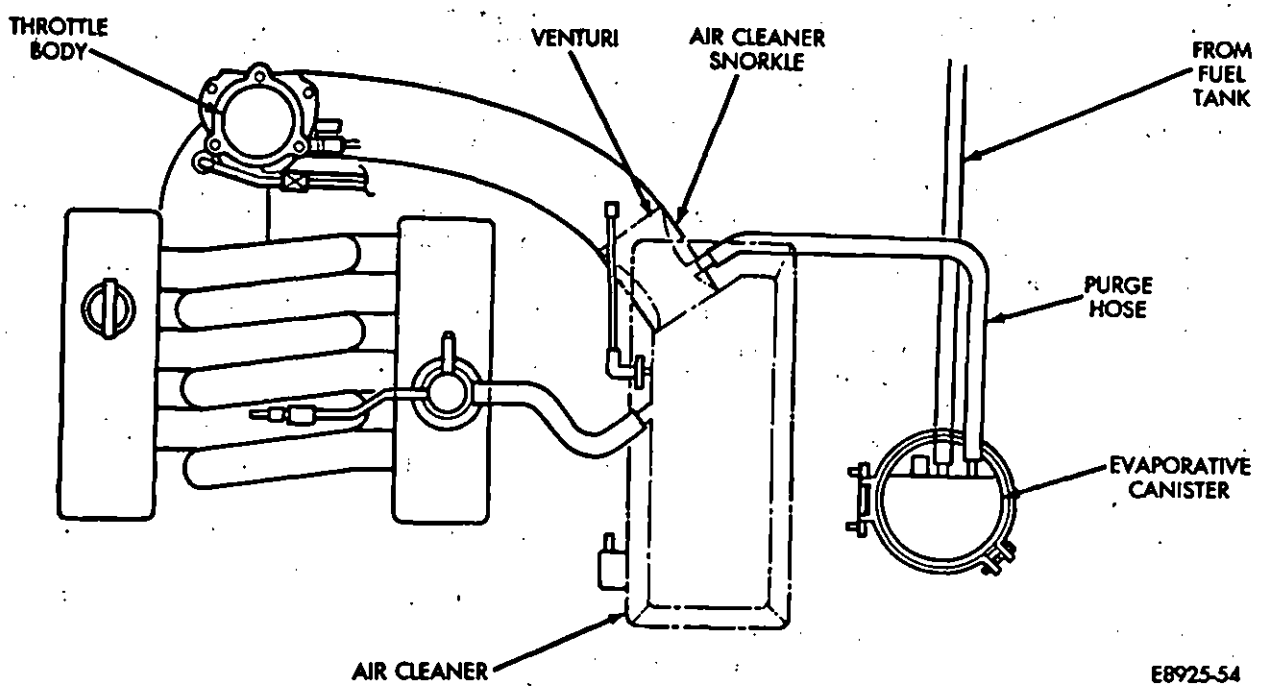


Fig. 4—Air Cleaner Venturi and Canister Purge Operation—3.0L Engine

When the engine is operating, the canister purge function draws fresh air through the filter at the bottom of the canister causing the stored vapors to be drawn out of the canister into the airstream in the air cleaner snorkel. The vapors are then drawn into the engine where they are consumed during combustion.

Pressure-Vacuum Fuel Tank Filler Cap

The fuel filler cap incorporates a two-way relief valve that is closed to atmosphere during normal operating conditions. The relief valve used in Premier fuel filler caps is calibrated to open only when a pressure of 10 kPa (1.5 psi) or a vacuum of 6 kPa (1.8 in. Hg) occurs within the fuel tank. When the pressure or vacuum is relieved the valve returns to the normally closed position.

WARNING: THE FUEL FILLER CAP MUST BE REMOVED TO RELIEVE FUEL TANK PRESSURE PRIOR TO DISCONNECTING ANY FUEL SYSTEM COMPONENT.

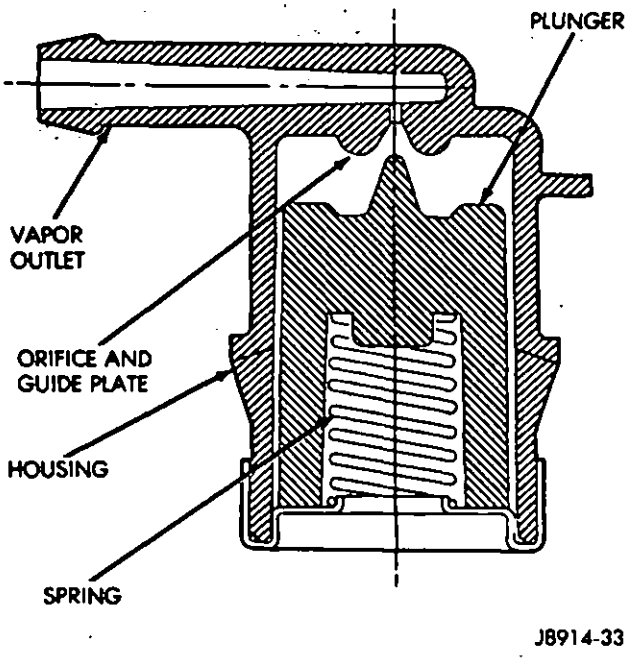


Fig. 5—Rollover Valve Operation

Crankcase Ventilation (CCV) Systems

The 3.0L engines are equipped with a Crankcase Ventilation System (Fig. 7). The Crankcase Ventilation System (CCV) mixes crankcase vapors with fresh air from the air cleaner. This mixture is drawn into the intake manifold via a metered orifice.

The CCV system performs the same function as a conventional PCV system, but does not use a vacuum controlled valve.

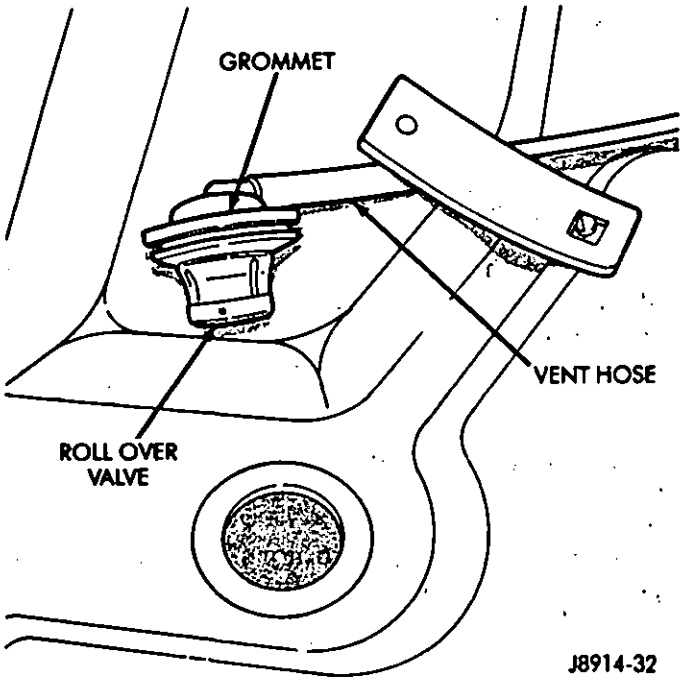


Fig. 6—Rollover Valve

The CCV system consists of a fitting in the intake manifold connected to the outlet nipple of the oil vapor separator (Fig. 7). The nipple contains a 2.2 mm orifice that meters the amount of crankcase vapors drawn out of the engine through the oil separator. A hose from the air cleaner that is connected to the other side of the oil separator supplies fresh air from the air cleaner to the oil separator.

When the engine is operating, vacuum from the intake manifold draws on the oil separator causing vapors from the engine and fresh air from the air cleaner to mix. The vapor/air mixture is drawn into the intake manifold through the metered orifice in the oil separator outlet nipple. The vapors are consumed during combustion.

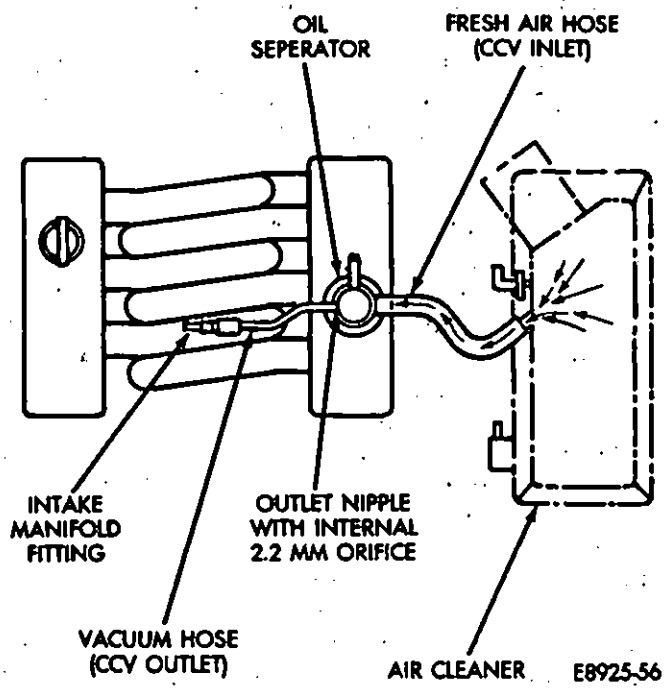


Fig. 7—CCV System

EXHAUST EMISSION CONTROLS

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THERMOSTATIC AIR CLEANER (TAC)

The thermostatically controlled air cleaner (TAC) system provides heated air to the throttle body during engine warm-up.

The TAC system is comprised of a heat stove that wraps around the exhaust manifold, a heated air tube, an air temperature sensor, and a vacuum motor operated air valve.

The air valve in the air cleaner blends air warmed from the heat stove on the air cleaner with ambient (outside) air. The air valve can close the opening to either air source or blend a mixture of both depending upon operating conditions.

The air valve in the air cleaner closes off the preheated air opening when vacuum is not applied to the air valve vacuum motor. When the engine is started, the temperature of the air in the air cleaner is monitored by the air temperature sensor. The air temperature sensor is located in the air cleaner cover on 3.0L engines. If the air temperature is below the calibrated opening point of the sensor, vacuum will be applied to the air valve vacuum motor to move the air valve towards the ambient air opening and only warmed air from the heat stove on the exhaust manifold will enter the air cleaner. As the exhaust manifold warms up and the temperature of the air entering the throttle body bonnet from the heat stove rises, the air temperature sensor begins to open and vacuum is bled off. This causes the air valve to start moving away from the ambient air opening towards the heat stove air opening. In this way, ambient air and heated air from the heat stove are blended for optimum engine performance and emission control.

Air Valve Vacuum Motor

Functional Test

(1) With the engine not operating, observe the ambient air inlet duct at the air cleaner and observe the position of the air valve. The air valve should be fully open to incoming ambient air (heat OFF position—Fig. 1).

WARNING: USE EXTREME CAUTION WHEN THE ENGINE IS OPERATING. DO NOT STAND IN DIRECT LINE WITH THE FAN. DO NOT PUT HANDS NEAR THE PULLEYS, BELTS OR FAN. DO NOT WEAR LOOSE FITTING CLOTHING.

(2) Start the engine and observe the position of the air valve. It should be fully closed to incoming ambient air (heat ON position—Fig. 2) below approximately 21°C (70°F) on 3.0L engines.

(3) Depress the throttle rapidly (1/2-3/4 position) and release. The air valve should briefly remain stationary and then move toward the heat OFF position and then back to the heat ON position.

(4) Warm the engine to normal operating temperature. Observe the ambient air duct and air valve. The air valve should be fully open to ambient air above 21°C (70°F) on 3.0L engines.

(5) Stop the engine.

(6) If the air valve does not function as described in the previous test, inspect for a mechanical bind in the snorkel, disconnected or leaking vacuum hoses, and vacuum leaks at the vacuum motor; air temperature sensor or intake manifold.

(7) If the air valve manually operates freely and the hoses are not leaking or disconnected, connect a vacuum hose from an intake manifold vacuum source directly to the vacuum motor and start the engine.

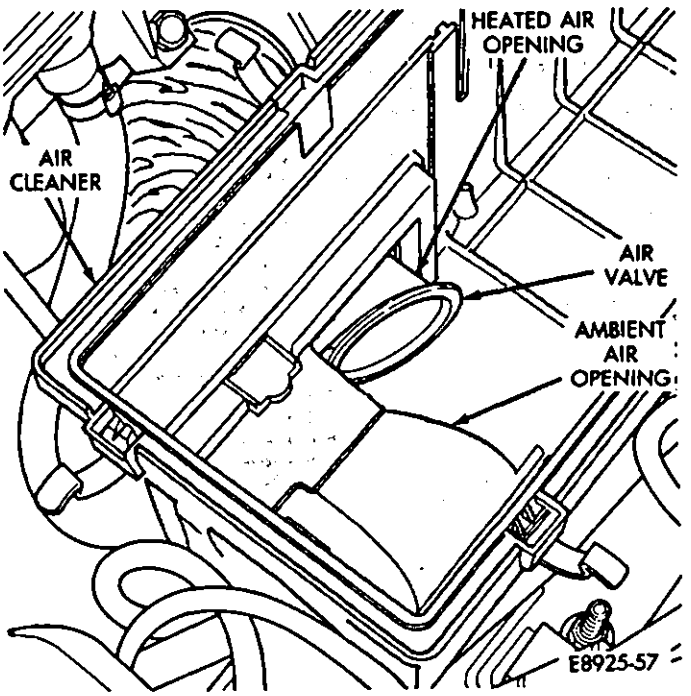

Fig. 1—Air Cleaner In Heat Off Position

(8) If the air valve closes, the air temperature sensor is defective and must be replaced. If the air valve does not close, replace the vacuum motor.

Air Valve Vacuum Motor Removal

(1) Remove the air cleaner.
(2) Disconnect the vacuum hose from the air valve motor.
(3) Remove the rivet attaching the air valve vacuum motor to the snorkel.
(4) Lift the motor, tilt it to one side to disconnect the motor linkage from the air valve assembly and remove the motor.

Air Valve Vacuum Motor Installation

(1) Insert the replacement vacuum motor linkage into the air valve assembly and position it in the snorkel.
(2) Attach the motor to the snorkel with a rivet. Ensure that the rivet does not interfere with the movement of the air valve.
(3) Connect the vacuum hose. Install the air cleaner assembly and test for proper operation of the TAC system.

Air Temperature Sensor

Functional Test

(1) Disconnect the vacuum hoses from the air temperature sensor (located on the air cleaner cover on 3.0L engines).

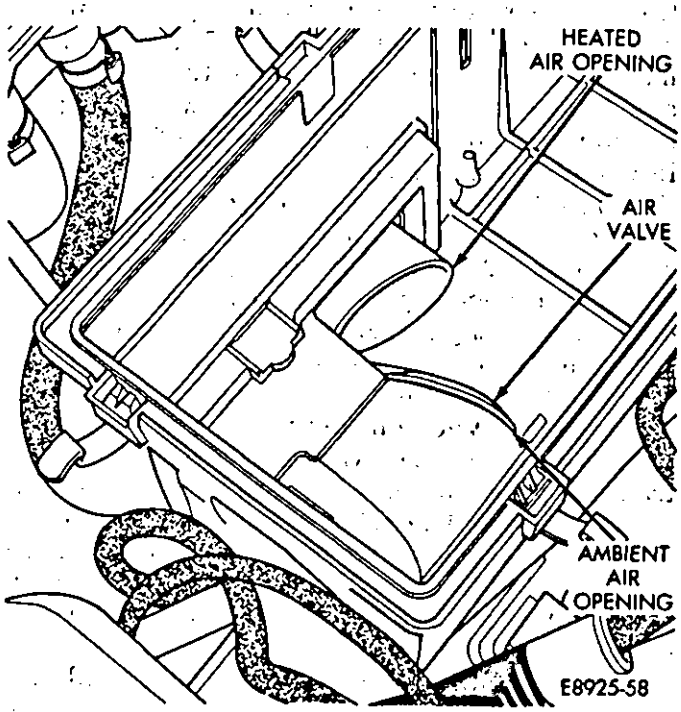

Fig. 2—Air Cleaner In Heat On Position

(2) Connect a hand operated vacuum pump to the vacuum source side of the sensor and a vacuum gauge to the vacuum motor side of the sensor.
(3) Apply 47 kPa (16 in. Hg) vacuum to the sensor.
(4) With the sensor at temperature below 10°C (50°F) on 3.0L engines, vacuum should be maintained.
(5) Warm the sensor to above 21°C (70°F) on 3.0L engines. The vacuum should not be maintained by the sensor. Replace the sensor if defective.

Removal

On 3.0L engines, the air temperature sensor is located in the air cleaner cover.
(1) Mark air temperature sensor vacuum tubes for installation reference (Fig. 3). Remove vacuum tubes from air temperature sensor.
(2) Remove the air cleaner cover.
(3) Remove air temperature sensor retaining clips (Fig. 4). Remove sensor.

Installation

(1) Install air temperature sensor in air cleaner cover. Secure with retaining clips.
(2) Install air cleaner cover to air cleaner.
(3) Connect vacuum tubes to air temperature sensor.

HEATED OXYGEN SENSOR (O_2 SENSOR)

The oxygen sensor (Fig. 5) is located in the exhaust manifold and provides an input voltage to the engines' Electronic Control Unit (ECU) relating the oxygen content of the exhaust gas. The ECU uses this information to vary the air-fuel ratio. A lean air/fuel mixture causes a greater

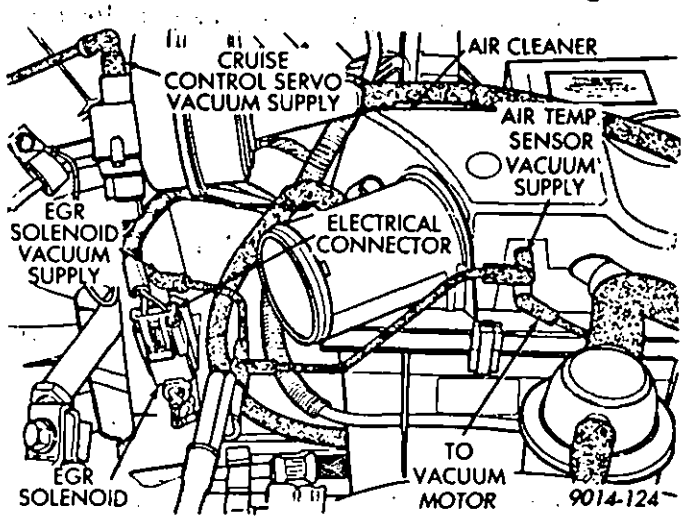

Fig. 3—Air Temperature Sensor Vacuum Tube Connections

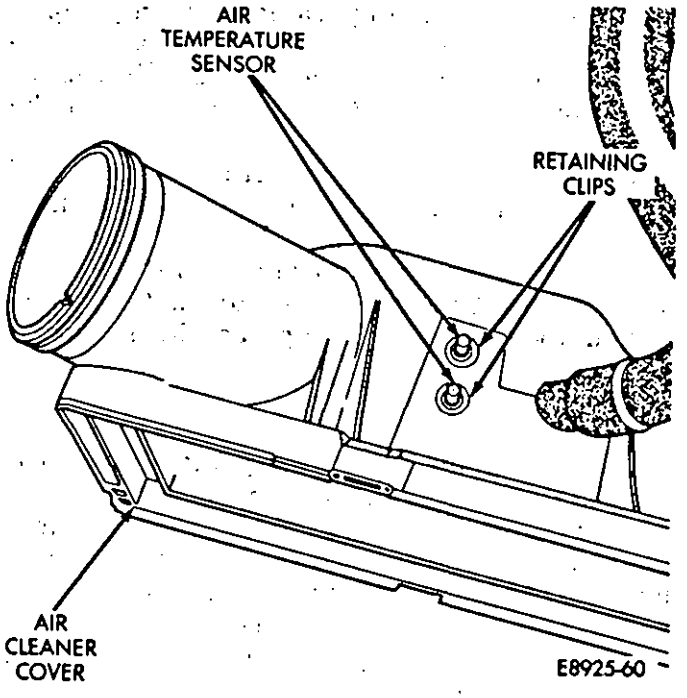

Fig. 4—Air Temperature Sensor Removal/Installation

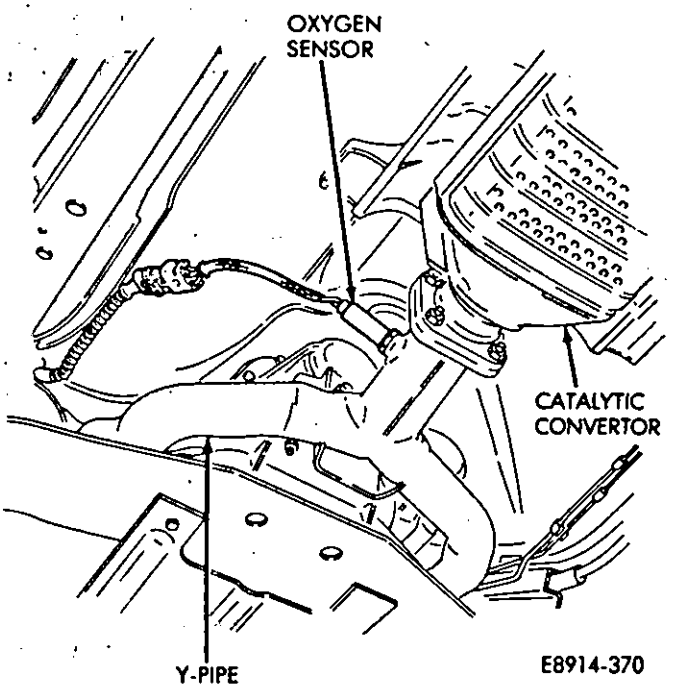

Fig. 5—Heated Oxygen Sensor—3.0L Engine

oxygen content in the exhaust gas and a rich air/fuel mixture causes less oxygen content.

The oxygen sensors used on the 3.0L engines are equipped with a heating element that keeps the sensor at proper operating temperature during all operating modes. Maintaining correct sensor temperature at all times allows the system to enter into closed loop operation sooner and to remain in closed loop operation during periods of extended idle. Refer to MPI (3.0L) Modes of Operation section in group 14 for an explanation of OPEN and CLOSED LOOP operation.

Removal

The exhaust gas oxygen (O_2) sensor is located in the exhaust "Y" pipe before the catalytic converter (Fig. 5).

(1) Raise the vehicle on a hoist.

(2) Disconnect electrical connector from O_2 sensor (Fig. 5).

(3) Unscrew O_2 sensor from the Y-pipe.

(4) Clean the threads in the Y-pipe.

Installation

The threads of new O_2 sensors are coated with an anti-seize compound to aid in removal.

(1) Thread O_2 sensor into the Y-pipe.

(2) *Tighten the sensor to 30 N·m (22 ft-lbs)* torque.

(3) Connect electrical connector to O_2 sensor.

(4) Lower the vehicle.

EXHAUST GAS RECIRCULATION (EGR) SYSTEMS

The EGR system consists of an EGR valve solenoid, back pressure modulated vacuum transducer, and the EGR valve (Fig. 7).

The vacuum supply for the transducer and EGR valve is controlled by the EGR Valve Solenoid (Fig. 6). The solenoid is controlled by the vehicles' engine Electronic Control Unit (ECU). The ECU monitors engine coolant temperature and other operating conditions to determine when EGR operation is desired. Refer to Modes of Operation in Group 14 for a description of solenoid operation based on engine operating conditions.

If the electrical connector to the EGR solenoid is disconnected the EGR valve will operate at all times resulting in poor engine performance and reduced driveability during certain operating conditions.

Engine vacuum flows through the EGR valve solenoid to the vacuum transducer through a connecting hose. Vacuum flows only when the solenoid is not energized (no voltage applied). The transducer is connected to the EGR valve by a vacuum hose and a back-pressure hose. The transducer is controlled by exhaust back pressure and is ported to the exhaust manifold through a hose connecting it to the bottom of the EGR valve (Fig. 7).

When the EGR solenoid is not energized and the engine back pressure entering EGR valve inlet is strong enough to close the transducer bleed valve, vacuum will be supplied to the EGR

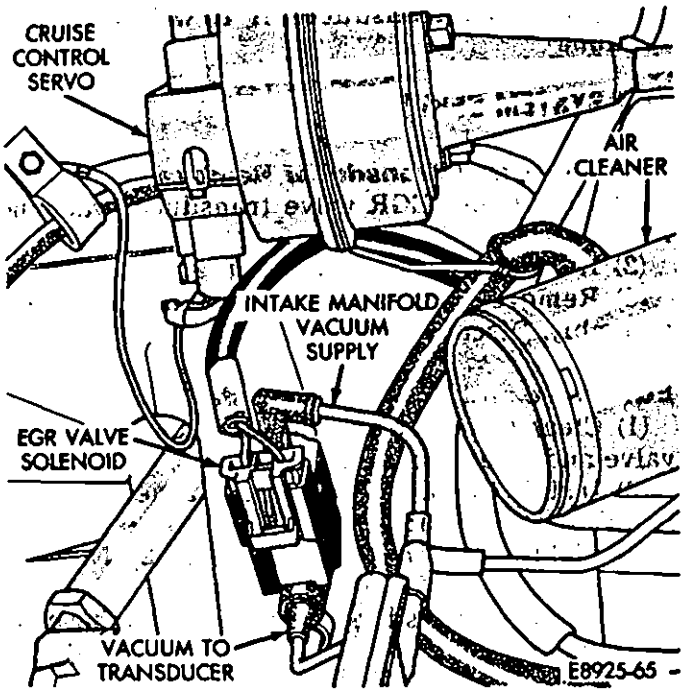

Fig. 6—EGR Valve Solenoid

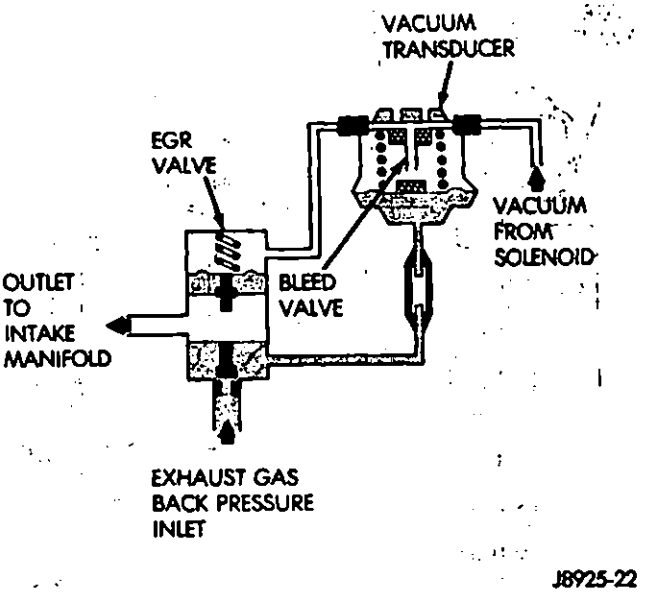

Fig. 8—EGR System Operation

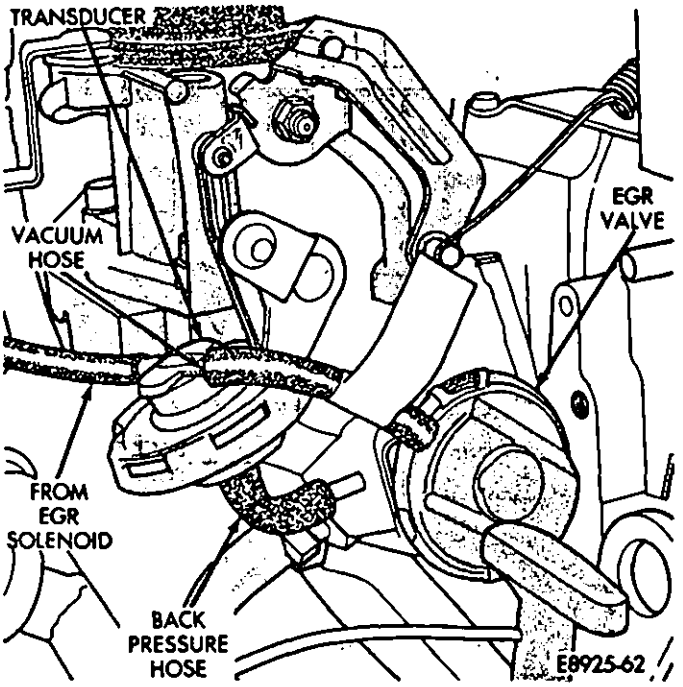

Fig. 7—EGR Valve and Transducer—3.0L Engine

valve and EGR operation will begin. If back pressure is not strong enough to close the transducer bleed valve, the transducer will bleed off the vacuum preventing EGR operation (Fig. 8).

When the EGR solenoid is de-energized by the ECU, vacuum flows to the transducer. The transducer is connected to the engine exhaust system by a small hose that connects to the base of the EGR valve.

EGR System Component Testing

(1) Bring the engine to normal operating temperature. Operate at idle speed. Test the EGR solenoid as follows:

(2) Check vacuum at solenoid vacuum source (Fig. 9). Disconnect the hose and attach a vacuum gauge to it.

(3) Vacuum should be a minimum of 15 inches.

- If vacuum is low, check the line for kinks, twists, or a loose connection at vacuum connector or intake manifold (Fig. 9).
- If vacuum is OK, remove gauge, reconnect the line and proceed to next step.

(4) Check vacuum at solenoid output port (Fig. 9).

(5) Disconnect the line and attach a vacuum gauge to output port (Fig. 9). Vacuum reading should be zero (no vacuum) at this side of solenoid.

- If vacuum reading is zero, leave the gauge connected and proceed to next step. However, if vacuum is present, check solenoid/ECU operation with the DRBII Service Diagnostic Tester and repair as necessary.

(6) Disconnect electrical connector at solenoid and note vacuum at solenoid output port. Vacuum should now be present at output port (Fig. 9).

- If vacuum is present, proceed to EGR valve test. However, if vacuum is not present, replace the solenoid.

Test the EGR valve as follows:

(1) Leave solenoid electrical connector disconnected. Bypass the vacuum transducer and con-

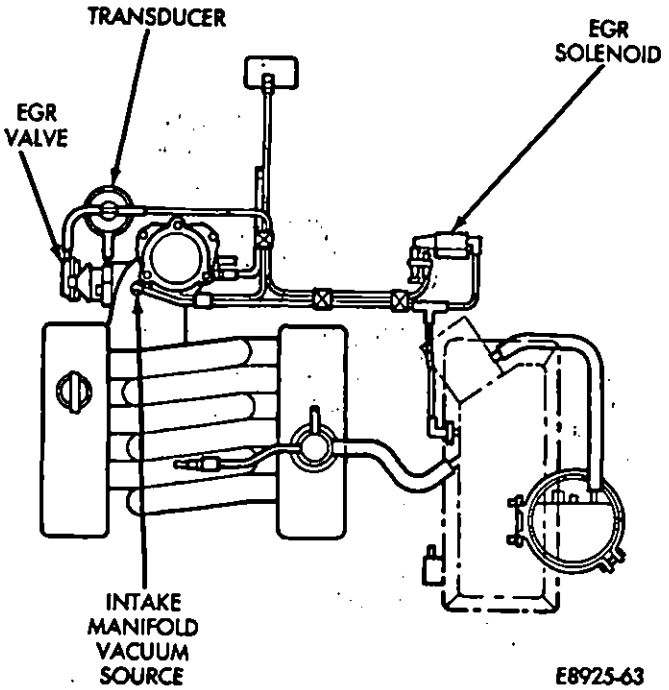

Fig. 9—EGR System Testing—3.0L Engine

nect the EGR valve solenoid output hose directly to the nipple on the EGR valve and note engine idle.

• The engine should now idle roughly or stall. If this occurs, the valve is OK. Proceed to Vacuum Transducer Test. However, if idle does not change, proceed to next step.

(2) Disconnect hose from EGR valve and connect a hand vacuum pump to EGR valve nipple (Fig. 9).

(3) Apply a minimum of 12 inches vacuum to the valve and note engine idle. If engine now idles roughly, inspect vacuum lines between vacuum connector on intake manifold (Fig. 9) and EGR valve, and back-pressure hose from EGR valve base to transducer for leaks. If no leaks are found proceed to vacuum transducer test.

(4) If the idle did not change, remove the EGR valve and inspect the valve and the exhaust passage in the manifold for blockage, repair as necessary. If no blockage is present replace the EGR valve.

Test the Vacuum Transducer as follows:

(1) Disconnect the transducer vacuum lines and back-pressure line. Remove transducer.

(2) Plug transducer output port (Fig. 10).

(3) Apply 1-2 pounds air pressure to transducer back-pressure port. Air pressure can be supplied with a hand operated air pump or compressed air (regulated to correct psi).

(4) Apply a minimum of 12 inches vacuum to input port.

Replace the transducer if it will not hold vacuum.

EGR SYSTEM SERVICE

EGR Valve and Transducer Removal

(1) Disconnect EGR valve transducer vacuum inlet hose (Fig. 7).

(2) Remove EGR valve mounting bolts.

(3) Remove EGR valve, gasket and transducer assembly. Discard gasket.

EGR Valve and Transducer Installation

(1) Clean the gasket mating surfaces of the EGR valve and Intake manifold.

(2) Install the EGR valve with a new gasket. Install the transducer.

(3) Tighten the mounting bolts to 27 N·m (20 ft-lbs).

(4) Connect transducer vacuum inlet hose to transducer.

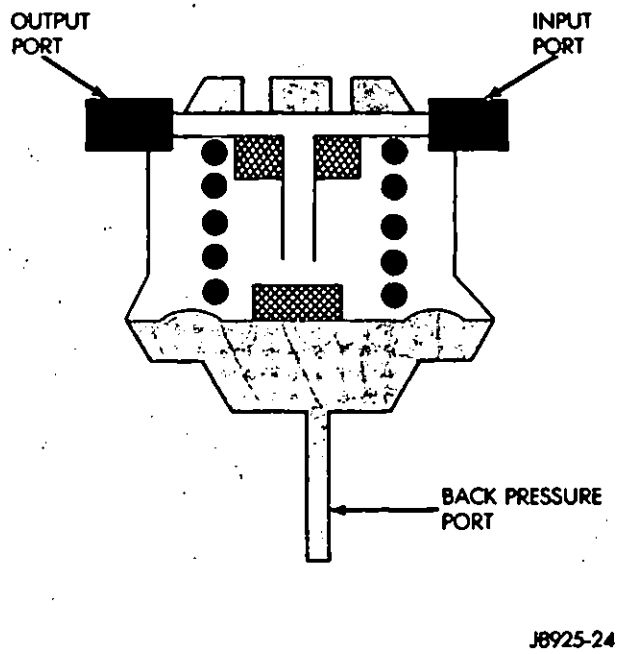

Fig. 10—Transducer Testing

Removal

The EGR tube is connected to the throttle body adapter and the right side exhaust manifold.

(1) Unscrew the EGR tube line nut from the throttle body adapter (Fig. 11).

(2) Remove the EGR flange bolts from the right side exhaust manifold (Fig. 12).

(3) Remove EGR tube.

(4) Remove any old gasket material from the exhaust manifold.

Installation

(1) Start EGR tube into throttle body adapter, but do not tighten line nut at this time.

(2) Install EGR tube flange and new gasket on exhaust manifold.

(3) Tighten flange mounting bolts to 19 N·m (14 ft-lbs) torque.

(4) Tighten line nut to 40 N·m (30 ft-lbs) torque.

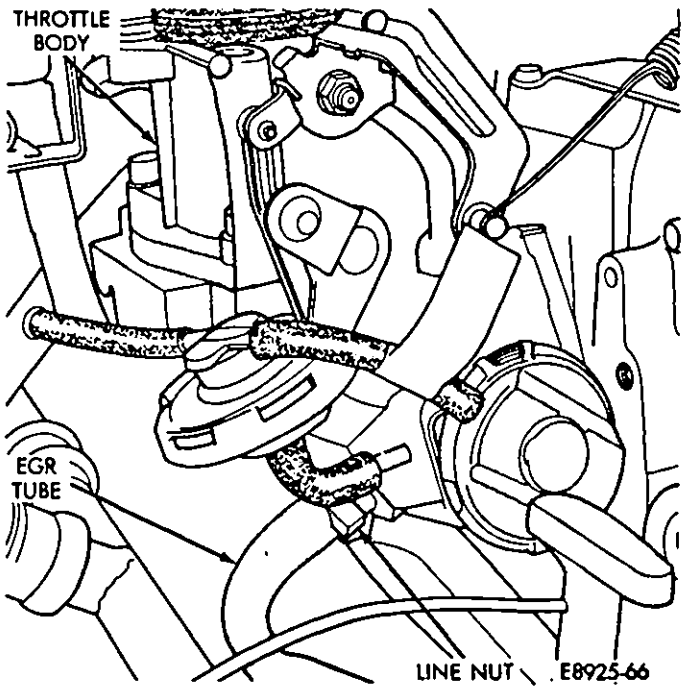

Fig. 11—EGR Tube to Throttle Body Connection

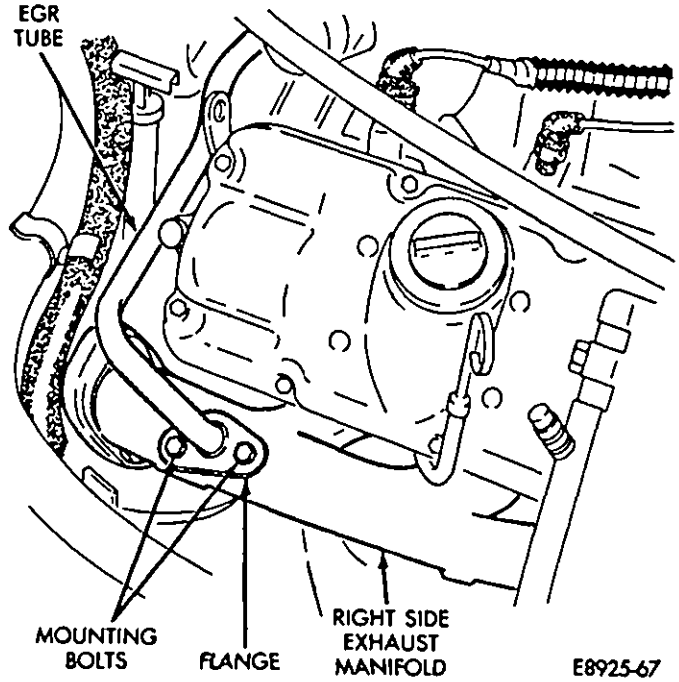

Fig. 12—EGR Tube to Exhaust Manifold Connection