FUEL SYSTEMS

FUEL SYSTEM SAFETY PRECAUTIONS

Safe Fuel Handling Practices

CAUTION: Fuel in fuel system remains under high pressure even when engine is not running. To avoid injury or fire, release fuel pressure from fuel system before disconnecting any fuel line. To release pressure from system perform FUEL SYSTEM PRESSURE RELEASE procedure. To avoid unnecessary fuel spillage and fire hazard, any time fuel lines are disconnected, ignition switch must be in OFF position unless fuel pump operation is required for test purposes.

WARNING: Use care to prevent combustion from fuel spillage. No smoking, open flames or any kind of arcing.

Fire

- Report all fires to proper authorities.
- Flames from methanol or methanol-gasoline blends can be invisible.
- Know locations of portable fire extinguishers, fire blankets, fire alarms and eye/wash shower facilities and learn how to use them.
- Use a "B" or "AFFF" (light water) type fire extinguisher to fight flammable liquid fires.

First Aid

- If gasoline has been swallowed, do not induce vomiting. Seek medical attention immediately!
- If methanol or a methanol/gasoline blend has been swallowed, induce vomiting under the direction of a physician or Poison Control Center. Seek medical attention immediately!
- When overcome by vapors, if safe, move victim to fresh air. If not breathing, give artificial respiration or CPR (Cardiopulmonary Resuscitation) as appropriate. Seek medical attention immediately!
- If splashed in eyes, flush with large amounts of water for 15 minutes. Remove contact lenses, if worn. Seek medical attention.
- If splashed on skin, remove contaminated clothing. Wash skin thoroughly with soap and water.

Health

- All fuels can be harmful or fatal if swallowed.
- Be aware, if fuel is swallowed, onset of serious health effects can be delayed 12 to 24 hours.
- Fuels and products containing methanol (e.g. windshield washer fluid) can cause blindness if swallowed.
- All fuel vapors can be harmful if inhaled.
- All fuels can be harmful if absorbed through skin.

- All fuels are irritating to eyes and respiratory system.
- Some fuels made with gasoline contain benzene which is a cancer causing agent.

Handling

- Use flammable liquid handling precautions.
- Wear chemical goggles and nitrile gloves (additional protective clothing and equipment may be necessary in some instances).
- Keep flammable liquids in approved, labeled, closed containers.
- Use in well ventilated areas and control vapors. Be aware that vapors are not visible, are heavier than air, can travel along floor, and will settle in lower areas.
- When transferring flammable liquids, bond receiving container to source and ground source to earth.
- DO NOT smoke or use heat or spark producing equipment near vapors.
- DO NOT eat, smoke or drink where these products are handled, processed or stored.
- Never siphon by mouth.
- Wash hands thoroughly after handling any fuel.

Spills

- Notify proper authorities in the event of any spill you have not been trained to clean up.
- Stop, contain, and clean up small spills with an absorbent material.

Inertia Fuel Shutoff Switch Reset Procedure

WARNING: If you see or smell gasoline at any time other than during fueling, DO NOT reset Inertia Fuel Shutoff (IFS) switch.

NOTE: With IFS in CLOSED position, reset button can be depressed an additional 1/16" against the spring.

Turn ignition switch to OFF position. Check for fuel leaks in engine compartment. If no leak is present, reset IFS switch by pushing reset button on top of switch. Turn ignition switch to ON position or START position for a few seconds, then to OFF position again. Again, check for leaking fuel.

FUEL SYSTEM PRESSURE RELEASE

WARNING: ALWAYS relieve fuel pressure before disconnecting any component under fuel pressure. DO NOT allow fuel to contact engine or electrical components.

1. Remove fuel tank cap. Using Fuel Pressure Gauge (T80L-9974-B), release pressure from system at pressure relief valve (Schrader valve) located on fuel injection manifold rail.
2. If fuel pressure gauge is not available, disconnect Inertia Fuel Shutoff (IFS) switch. IFS switch is located

behind right side of instrument panel. Remove fuel filler cap to release fuel tank pressure. Crank engine for 15 seconds to release system pressure.

FUEL LINE FITTINGS

Push Connect Coupling

1. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect safety clip from male hose. See **Fig. 3**. Install Fuel Line Disconnect (T90T-9550-S) and push it into fitting. Separate fittings.
2. Before installation, lubricate tube end with clean engine oil. Align tube to fitting and push until a click is heard. Pull on fitting to ensure engagement. Install safety clip.

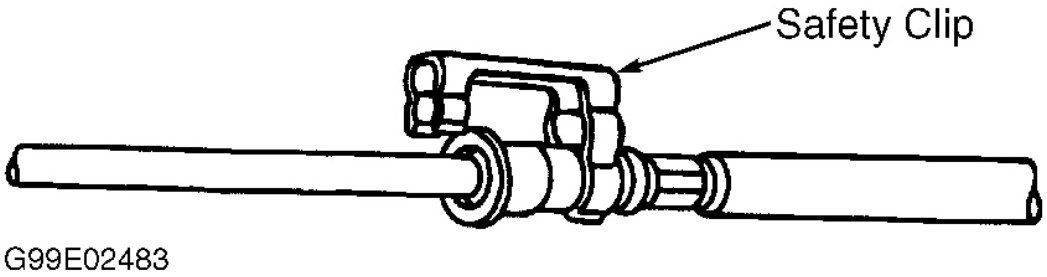

Fig. 3: Disconnecting Fuel Lines With Push Connect Coupling
Courtesy of FORD MOTOR CO.

"R" Clip Coupling

1. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Remove shipping tab by bending tab downward. Spread "R" clip and push clip into fitting. See **Fig. 4**. Separate fitting from tube.
2. Before installation, lubricate male tube end with clean engine oil. Insert "R" clip into fitting. Align tube and fitting. Insert tube into fitting and push together until a click is heard. Pull on connection to ensure engagement.

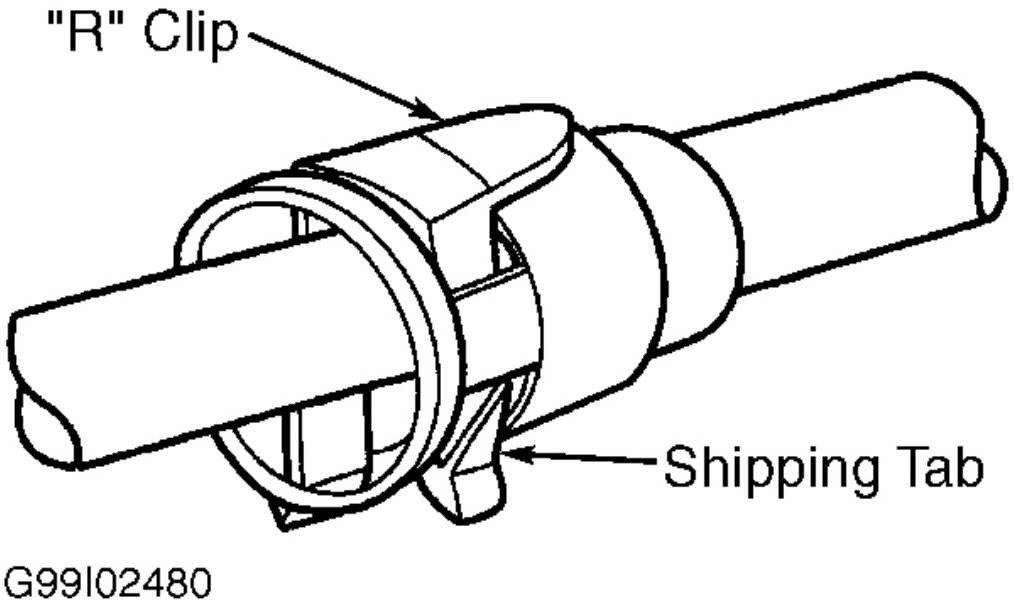

Fig. 4: Disconnecting Fuel Lines With "R" Clip Coupling
Courtesy of FORD MOTOR CO.

Spring Lock Coupling

1. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Place indicated spring lock coupler over coupling. See **SPRING LOCK COUPLER IDENTIFICATION** table. To release female fitting from garter spring, push coupler along tube into coupling. See **Fig. 5**.
2. Pull spring lock coupling apart. Remove coupler from disconnected spring lock coupling. Check for damaged garter spring and "O" rings. Wipe end of lines with clean cloth.
3. To install, place NEW "O" rings onto tube. Lubricate ends of lines with clean engine oil. Locate White indicator ring (if equipped), which may have slipped down length of tube. Insert White indicator ring into cage of male fitting.
4. Push fitting together with a slight twisting motion. White indicator ring will pop free of cage to indicate that male fitting is properly seated over flared end of female fitting.

SPRING LOCK COUPLER IDENTIFICATION

Application	Tool Number
3/8" Line	D87L-9280-A
1/2" Line	D87L-9280-B
5/8" Line	T83P-19623-C

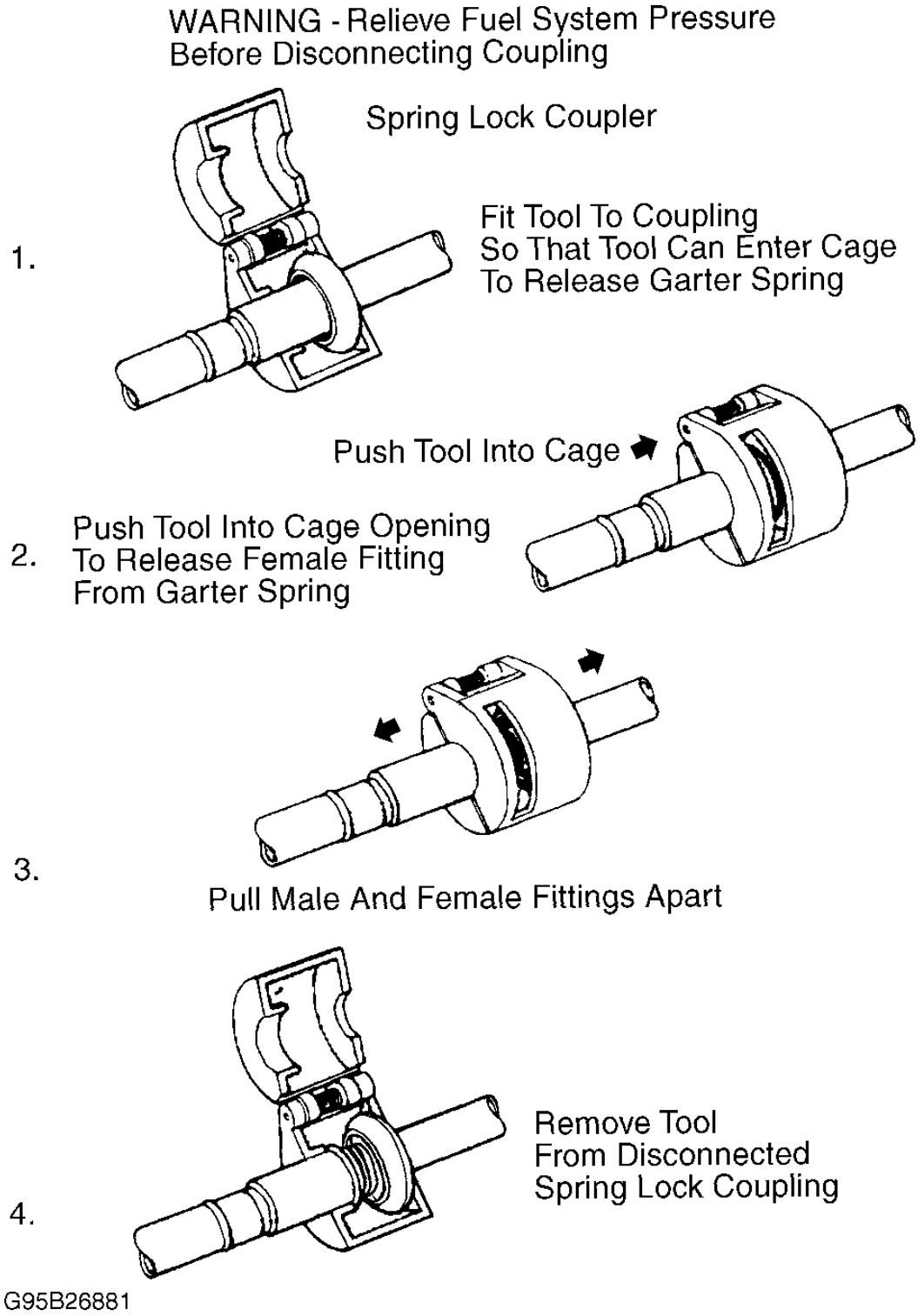

Fig. 5: Disconnecting Fuel Lines With Spring Lock Coupler

Courtesy of FORD MOTOR CO.

CAMSHAFT POSITION SENSOR

Camshaft Position (CMP) sensor is used for timing pulsing of fuel injectors. CMP sensor signal is also used by Powertrain Control Module (PCM) to determine firing of spark plugs. See CAMSHAFT POSITION SENSOR or CAMSHAFT POSITION SYNCHRONIZER under **IGNITION SYSTEMS**.

FUEL FILTER

Removal & Installation (EXPLORER & MOUNTAINEER)

WARNING: Fuel supply lines on all vehicles equipped with fuel injected engines will remain pressurized for long periods of time after engine shutdown. Fuel system pressure must be relieved prior to fuel system service to prevent possible personal injury or a fire hazard.

1. Relieve the fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**
2. Raise and support the vehicle
3. Remove the bolts and the heat shield.
4. Remove the fuel filter shield.
    1. Remove the nuts.
    2. Remove the shield.
5. Remove the fuel filter.
    1. Disconnect the two fuel line locking R-clips and one fuel line push-connect.
    2. Remove the fuel filter from the fuel filter support.
6. To install, reverse the removal procedure.

FUEL PUMP MODULE

Removal & Installation

Remove fuel tank. See **FUEL TANK**. Remove lock ring using Special Tool (310-059). Remove fuel pump module. Wipe seal area of tank clean. Position NEW seal onto fuel pump module mounting flange using grease, if necessary to hold it in position. Position fuel pump in tank to original position. Install lock ring. DO NOT overtighten lock ring, as it may leak. Install fuel tank. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS**.

FUEL RAILS & INJECTORS

Removal (4.0L)

1. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Remove intake manifold. See **INTAKE MANIFOLD** under AIR INDUCTION SYSTEMS. Disconnect fuel supply line. See **QUICK-DISCONNECT FITTINGS**. Remove bolt and bracket at fuel supply line fitting.
2. Disconnect wiring harness at fuel injectors. Disconnect vacuum hose from fuel pressure damper. Remove

fuel rail bolts. Carefully disengage fuel injectors by lifting and gently rocking rail. See **Fig. 6**.

3. Remove injectors from fuel rail, using a slight lifting/rocking motion. Place removed components in a clean container to avoid dirt or other contamination.

Installation

Lubricate NEW injector "O" rings with light oil. DO NOT use silicone grease. Carefully install fuel supply manifold and injectors into lower manifold, one side at a time. To complete installation, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS**.

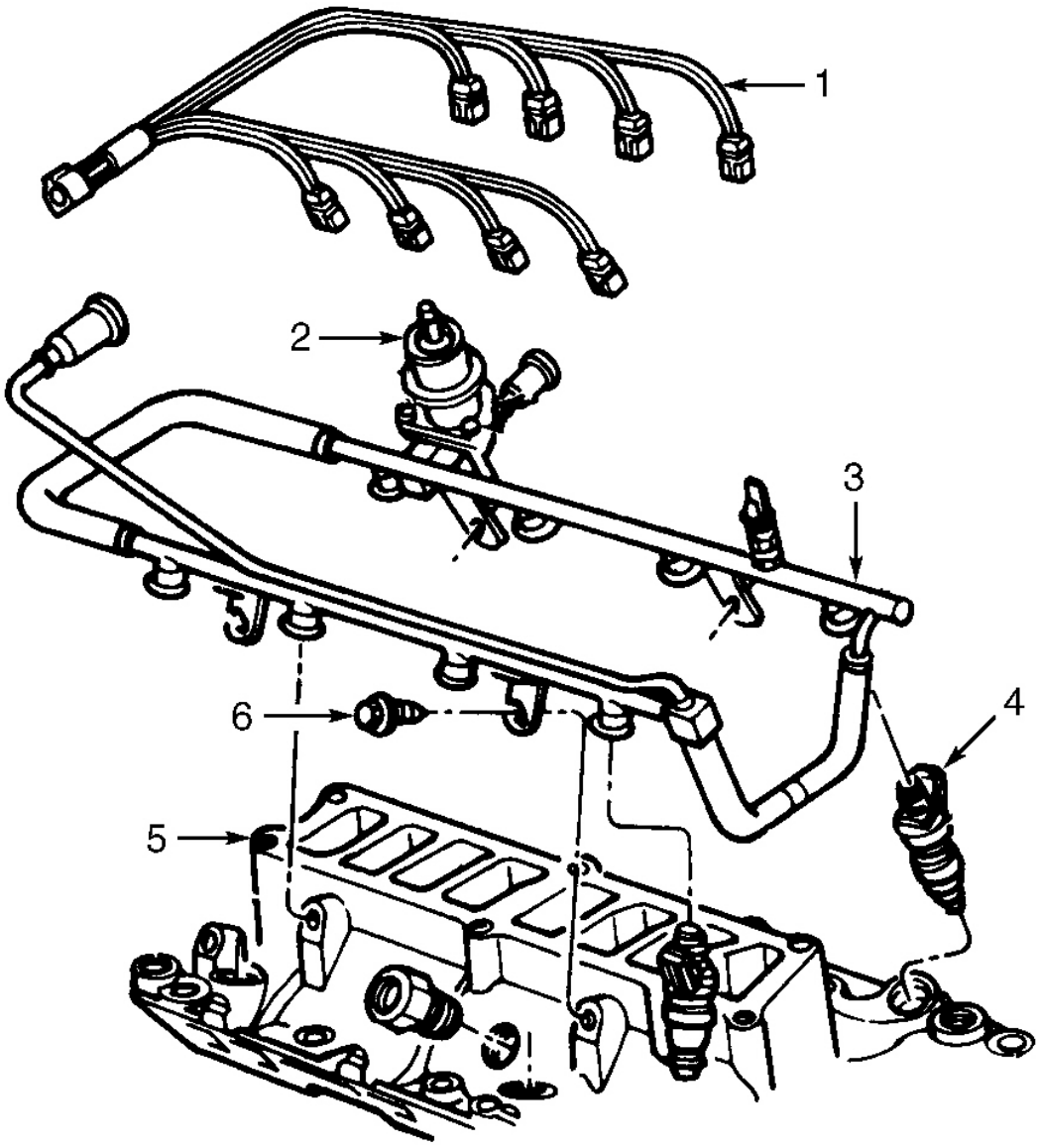

Fig. 6: Exploded View Of Typical Fuel Injection System
Courtesy of FORD MOTOR CO.

Removal & Installation (4.6L)

1. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. Remove air cleaner outlet tube. Disconnect Throttle Position (TP) sensor and Idle Air Control (IAC) solenoid electrical connectors. Disconnect accelerator cable, speed control actuator cable (if equipped) and return spring. Disconnect the eight fuel injector electrical connectors. Disconnect brake booster vacuum hose. Disconnect EGR valve and EVAP canister purge solenoid vacuum hoses.
2. Disconnect throttle body adapter and fuel pressure regulator vacuum hoses. Disconnect vapor hose from throttle body adapter. Disconnect EGR tube from EGR valve. Remove Idle Air Control (IAC) and crankcase air inlet tubes. Remove PCV valve and tube. Disconnect fuel supply and return line connections at fuel supply manifold.
3. Disconnect coolant inlet hose. Disconnect fuel injector and ignition coil wiring harness connectors. Remove coolant hose. Remove brake booster bracket and tube. Remove PCV hose. Remove bolts and throttle body adapter from intake manifold. Detach harness routing clip from the rear of intake manifold. Remove harness ground. Remove fuel injection supply manifold bolts and fuel injection supply manifold.
4. Remove injectors by using a rocking motion. See **Fig. 6**. To install, reverse removal procedure. Install new "O" rings on the fuel injectors. Lubricate the new fuel injector "O" rings with clean engine oil. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS**. Bleed cooling system. See **COOLING SYSTEM BLEEDING** under COOLING SYSTEM.

FUEL PRESSURE RELIEF VALVE

Removal

Disconnect negative battery cable. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Remove fuel supply manifold. See **FUEL RAILS & INJECTORS**. Remove 2 mounting bolts from fuel pressure relief valve. Remove fuel pressure relief valve. Remove and discard "O" ring.

Installation

Lubricate NEW "O" ring with light oil. DO NOT use silicone grease. Ensure fuel pressure relief valve and manifold gasket surfaces are clean and dry. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

FUEL PULSE DAMPER

Removal

Disconnect negative battery cable. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Remove fuel supply manifold. See **FUEL RAILS & INJECTORS**. Remove 2 mounting bolts from fuel pulse damper. Remove fuel pulse damper. Remove and discard "O" ring.

Installation

Lubricate NEW "O" ring with light oil. DO NOT use silicone grease. Ensure fuel pulse damper and manifold gasket surfaces are clean and dry. To complete installation, reverse removal procedure. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**.

FUEL TANK

Removal & Installation

Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE**. Disconnect negative battery cable. Raise and support vehicle. Remove fuel tank skid plate, if equipped. Disconnect filler tube and vent hose from fuel tank. Remove fuel from fuel tank using Tanker (034-00004), connected to lower filler hose. Support fuel tank using suitable jack. Remove fuel tank straps. Partially lower fuel tank. Disconnect fuel lines, evaporative hoses and electrical connectors from fuel tank. Remove fuel tank. To install, reverse removal procedure. Tighten fasteners to specification. See **TORQUE SPECIFICATIONS**.

HEATED OXYGEN SENSOR

Removal

Unplug electrical connector from Heated Oxygen Sensor (HO2S). Sensor may be difficult to remove when engine temperature is less than 120°F (48°C). Carefully remove HO2S sensor from exhaust pipe.

Installation

When replacing HO2S, coat threads with anti-seize compound before installation. New sensors should already have this compound applied to threads. Install HO2S sensor. Tighten HO2S sensor to specification. See **TORQUE SPECIFICATIONS**. Reconnect wiring connector to HO2S. Reconnect negative battery cable. To complete installation, reverse removal procedure.

THROTTLE BODY

Removal

Remove air cleaner and duct assembly. Disconnect accelerator cable from throttle lever. Disconnect cruise control actuator (if equipped). Remove accelerator cable bracket and set aside. Disconnect electrical connectors, vacuum lines and vapor hose as necessary. Remove 4 bolts retaining throttle body assembly to intake manifold. Remove throttle body.

Installation

Clean gasket mating surfaces. Clean and oil bolt threads. Install NEW gasket. Tighten bolts to specification. See **TORQUE SPECIFICATIONS**. To complete installation, reverse removal procedure.

