

N - REMOVE/INSTALL/OVERHAUL**1997 ENGINE PERFORMANCE Ford Motor Co. - Removal, Overhaul & Installation - 3.0L****INTRODUCTION**

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in the **GENERAL INFORMATION** section before disconnecting battery.

Removal, overhaul, and installation procedures are covered in this article. If component removal and installation is primarily an unbolt and bolt-on procedure, only a torque specification may be furnished.

IGNITION SYSTEM**DISTRIBUTOR****Removal**

1. Remove high tension leads and distributor cap. Rotate crankshaft in direction of normal rotation until piston No. 1 is at TDC of compression stroke. Disconnect negative battery cable.
2. Ensure timing marks are aligned. Disconnect distributor wiring from harness. Mark distributor rotor-to-housing and housing-to-engine position for installation reference. Remove distributor hold-down bolt(s) and clamp.
3. If necessary, use Distributor Hold-Down Wrench (T82L-12270-A) to remove bolt. Remove distributor. Inspect distributor "O" ring and replace if necessary.

Installation

1. Ensure engine is at TDC of compression stroke. Rotate distributor rotor so reference marks nearly align. Insert distributor drive into engine.
2. When installing distributor, rotor will rotate. Ensure reference marks are aligned when distributor is fully engaged in engine. To complete installation, reverse removal procedure. Set base ignition timing. See **ADJUSTMENTS** article.

Distributor Overhaul

NOTE: Distributor overhaul is not recommended. Replace as a unit if necessary.

CAMSHAFT POSITION (CMP) SENSOR

See CAMSHAFT POSITION (CMP) SENSOR under **FUEL SYSTEM** .

CRANKSHAFT POSITION (CKP) SENSOR

NOTE: Engine front cover design precisely locates CKP sensor. No CKP sensor adjustment is necessary.

Removal & Installation

Disconnect negative battery cable. Raise and support vehicle. Unplug Crankshaft Position (CKP) sensor wire connector from engine harness. See **Fig. 1** . Remove CKP sensor mounting screws. Remove CKP sensor. To install, reverse removal procedure.

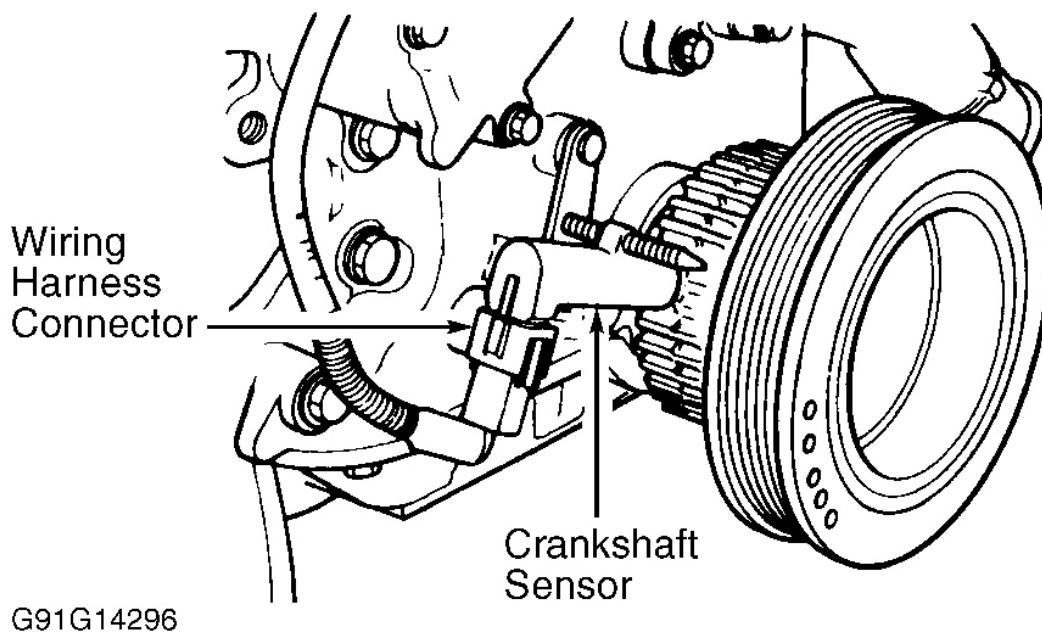


Fig. 1: Locating Crankshaft Position (CKP) Sensor (Typical)
Courtesy of FORD MOTOR CO.

CAUTION: When battery is disconnected, vehicle computer and memory systems may lose memory data. Driveability problems may exist until computer systems have completed a relearn cycle. See **COMPUTER RELEARN PROCEDURES** article in the GENERAL INFORMATION section before disconnecting battery.

KNOCK SENSOR

Removal & Installation

Remove the lower intake manifold. See REMOVAL & INSTALLATION in 3.0L SOHC V6 - VIN (W) article in ENGINES. Disconnect the heater core hose from the coolant crossover tube. Release the clamp and remove the lower radiator hose from the coolant crossover tube. Remove the water bypass hose from the thermostat housing. Remove the coolant crossover tube. See **Fig. 2** . Disconnect the Knock Sensor (KS) electrical connector. Remove the KS bolt and remove KS.

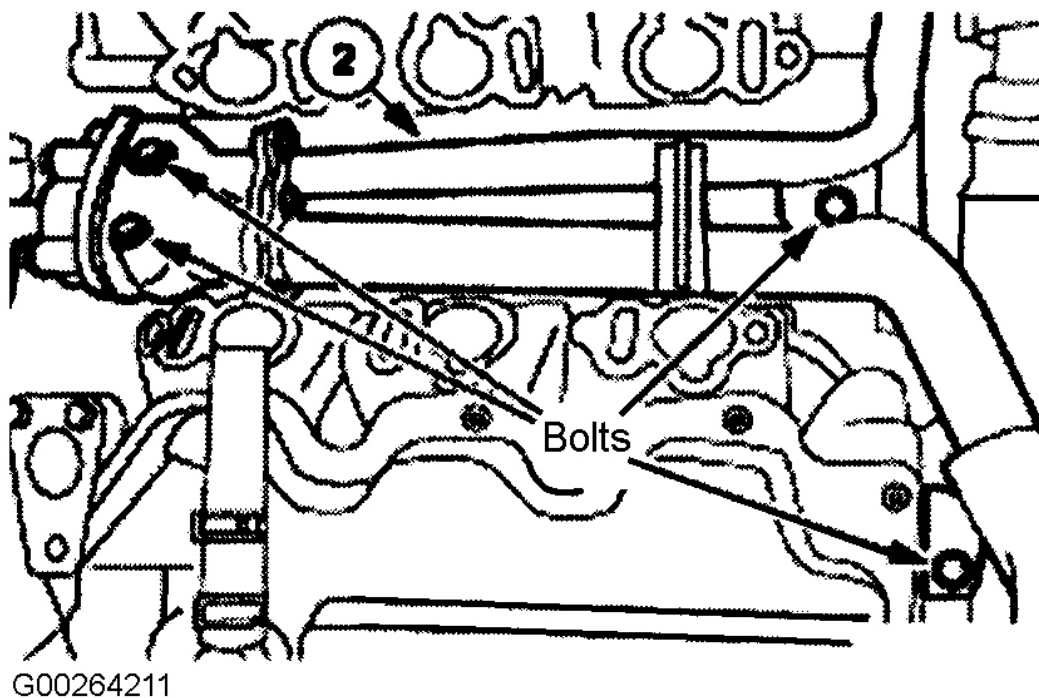


Fig. 2: Removing Coolant Crossover Tube
Courtesy of FORD MOTOR CO.

POWERTRAIN CONTROL MODULE

Removal & Installation

Disconnect negative battery cable. Remove any component necessary to gain access to PCM. For PCM location, see PCM LOCATION table. Loosen PCM connector retaining bolt (if equipped). Unplug harness connector from PCM. Remove 2 PCM mounting bolts. Remove PCM cover and PCM. To install, reverse removal procedure.

PCM LOCATION

Model	Location
Villager	Behind Glove Box

FUEL SYSTEM

CAMSHAFT POSITION (CMP) SENSOR

Removal & Installation

CMP sensor is located inside of distributor and is not serviceable. If CMP sensor is defective, replace distributor.

CMP SYNCHRONIZER

CAUTION: Synchro Positioner (T95T-12200-A) is required to properly install synchronizer. See Fig. 3 . Failure to use synchro positioner during installation will cause fuel injection to be out of time and may cause engine damage.

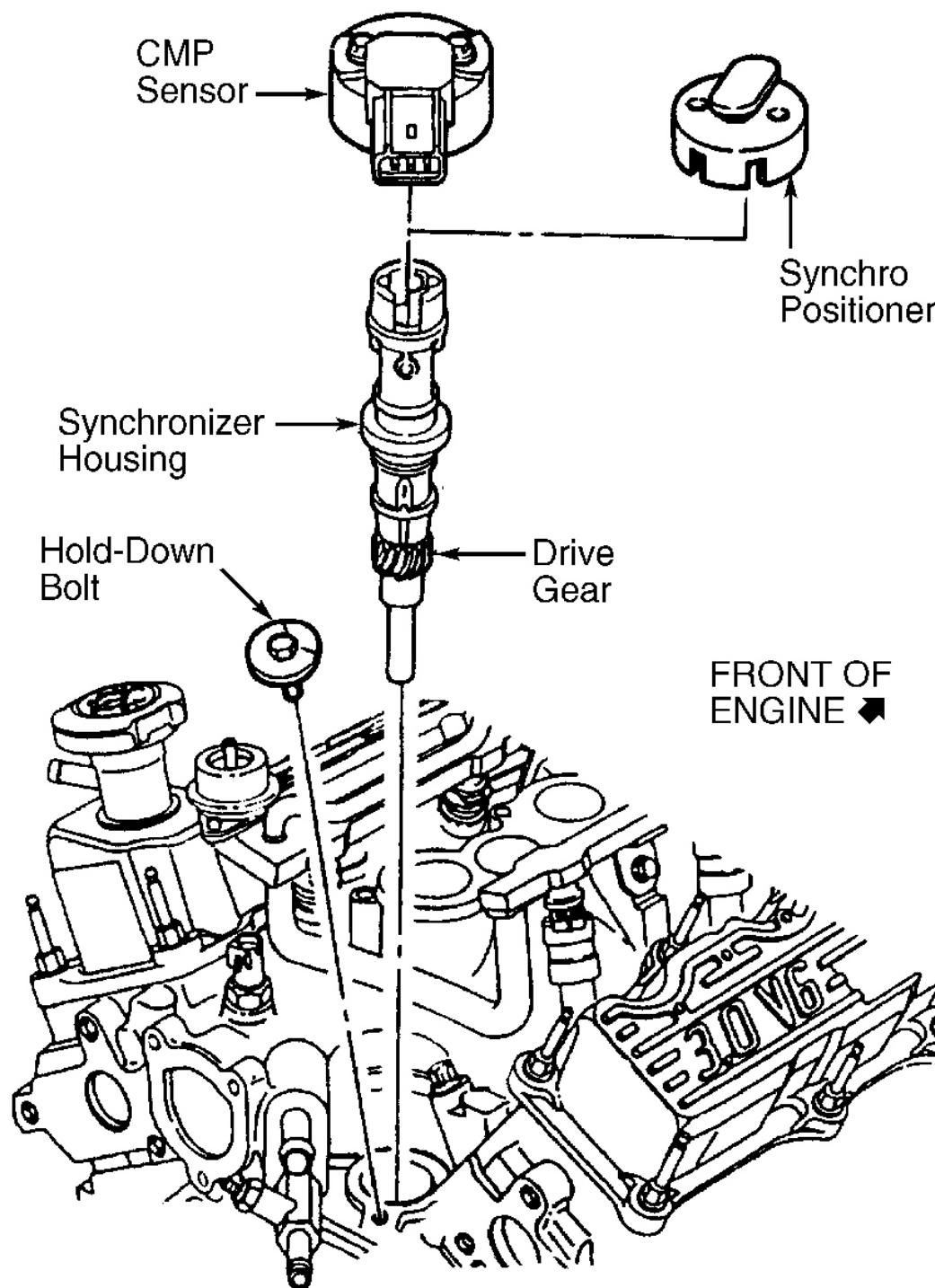
Removal

1. Position crankshaft to TDC of cylinder No. 1, on compression stroke. Note position of electrical connector on CMP sensor.
2. Disconnect negative battery cable. Unplug harness connector from CMP sensor. Remove CMP sensor screws and CMP sensor from positioner. Remove synchronizer hold-down bolt and CMP synchronizer.

CAUTION: DO NOT rotate crankshaft while synchronizer is removed from engine.

Installation

1. Install Synchro Positioner (T95T-12200-A) on synchronizer housing. See **Fig. 4** . Rotate synchronizer shaft until vane on shaft aligns with slot on synchro positioner. Rotate synchro positioner until engaged into notch in housing. Dip drive gear in engine oil.
2. Rotate synchro positioner 75 degrees counterclockwise of crankshaft centerline before inserting synchronizer assembly into engine. See **Fig. 5** .



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Fig. 3: Exploded View Of CMP Synchronizer Assembly
Courtesy of FORD MOTOR CO.

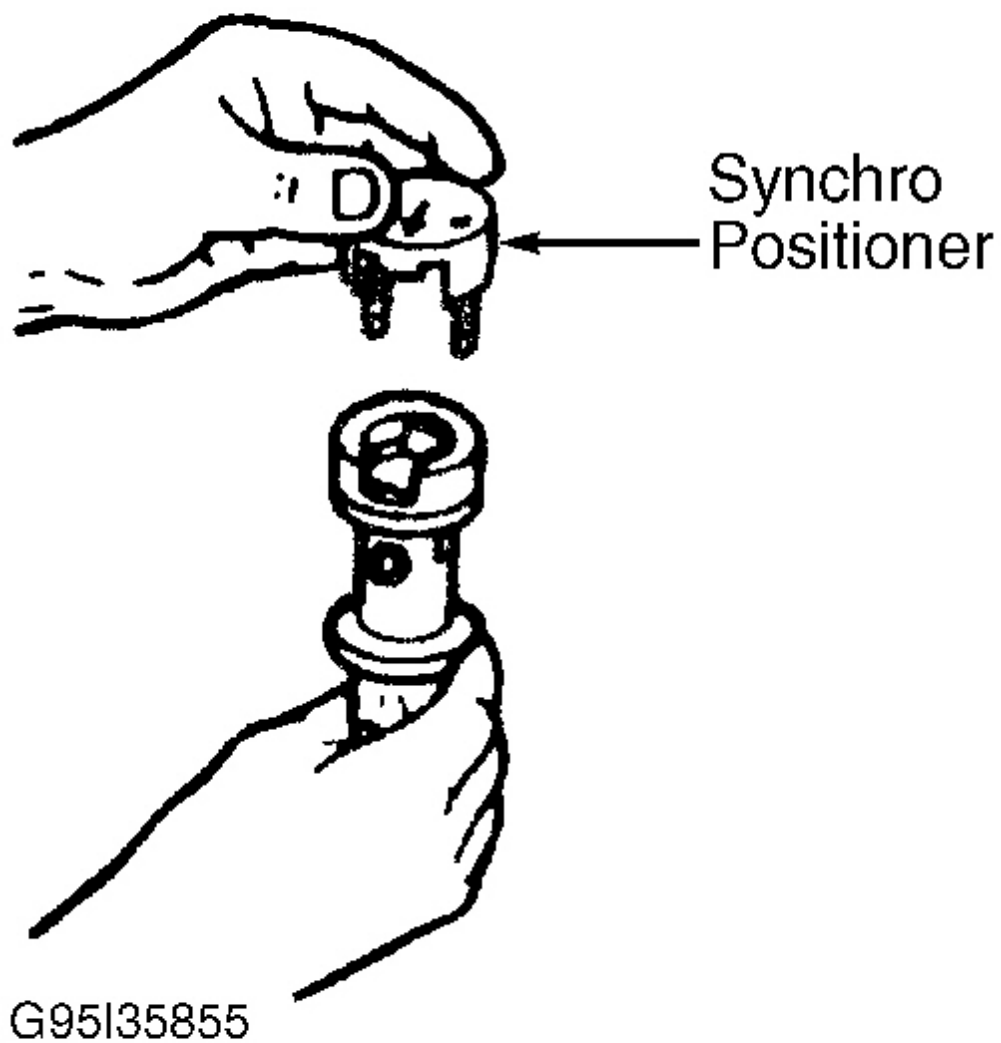
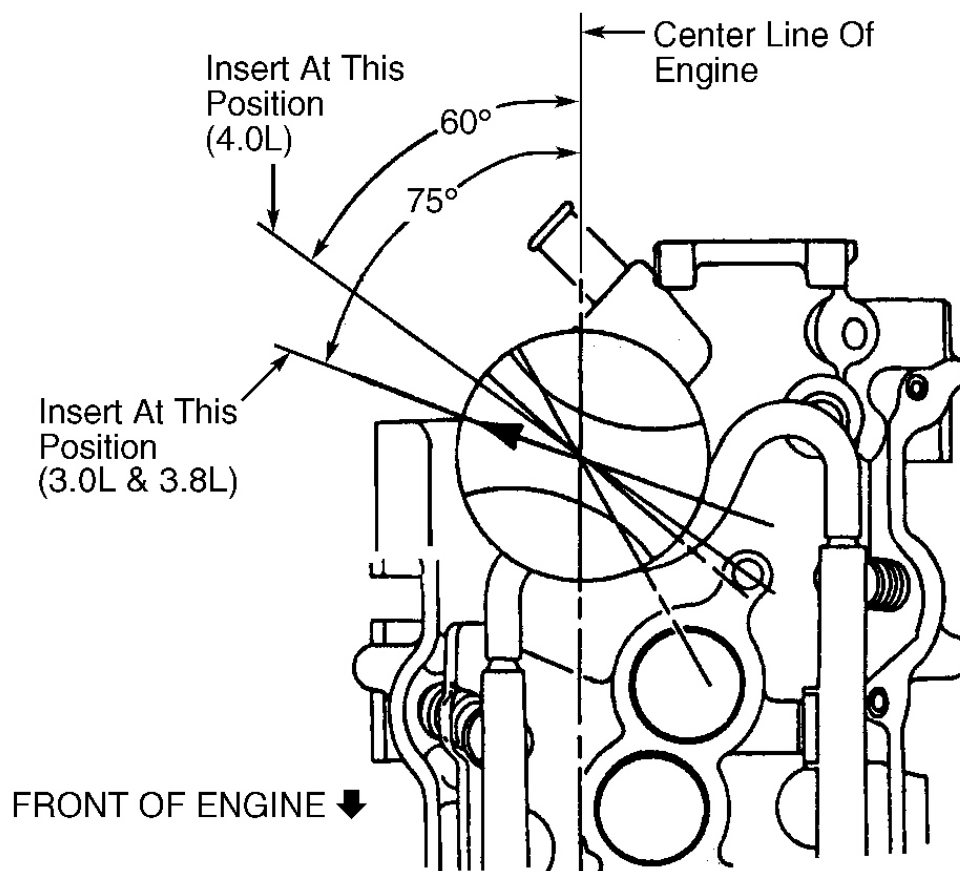


Fig. 4: Installing Synchro Positioner On Synchronizer Assembly (Typical)
Courtesy of FORD MOTOR CO.



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Fig. 5: Positioning Synchronizer For Installation
Courtesy of FORD MOTOR CO.

3. As synchronizer is inserted into engine, synchronizer shaft will rotate. When seated, synchro positioner should point at about 30° offset from engine centerline. Synchronizer electrical connector should be located in original position.
4. Install hold-down clamp and tighten bolt to specification. See **TORQUE SPECIFICATIONS**. Install CMP sensor to synchronizer and tighten to specification. Reconnect wiring to CMP sensor. Connect negative battery cable.

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. See INERTIA FUEL SHUTOFF (IFS) SWITCH LOCATION table. Remove fuel cap to release fuel tank pressure. Crank engine for 15 seconds to release system pressure.

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INERTIA FUEL SHUTOFF (IFS) SWITCH LOCATION

Application	Location
Villager	Behind Left Kick Panel

FUEL PUMP

Removal & Installation

Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Remove fuel tank. Clean area around top of fuel tank. Remove 6 fuel pump retaining bolts. Carefully remove fuel pump from tank. To install, reverse removal procedure.

FUEL SUPPLY MANIFOLD

Removal

1. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Disconnect negative battery cable. Drain cooling system. Remove upper intake manifold. Disconnect wiring harness at fuel injectors. Remove breather tube. Disconnect fuel supply and return lines.
2. Remove fuel assembly manifold bolts and spacers. Carefully disengage fuel supply manifold from fuel injectors by lifting and gently rocking rail.

Installation

Lubricate NEW injector "O" rings with light oil. DO NOT use silicone grease. Carefully install fuel supply manifold and injectors into manifold. Tighten fuel supply manifold bolts to 17-20 ft. lbs. (23-27 N.m). To complete installation, reverse removal procedure.

FUEL INJECTORS

Removal

Remove fuel supply manifold. See **FUEL SUPPLY MANIFOLD** . Disconnect wiring harness from injector(s). Remove injector retaining clips(s). Remove injectors from fuel supply manifold, using a rocking/pulling motion.

Installation

Lubricate NEW injector "O" rings with light oil. DO NOT use silicone grease. To complete installation, reverse removal procedure.

FUEL PRESSURE REGULATOR

Removal

Disconnect negative battery cable. Release fuel pressure. See **FUEL SYSTEM PRESSURE RELEASE** . Remove vacuum hose at fuel pressure regulator. Remove fuel line. Remove screws from regulator housing. Remove pressure regulator, gasket, and "O" ring.

Installation

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Lubricate "O" ring with a light oil. DO NOT use silicone grease. Ensure regulator and manifold gasket surfaces are clean and dry. To complete installation, reverse removal procedure.

HEATED OXYGEN SENSOR (HO2S)

Removal

Unplug electrical connector from 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. Reconnect wiring connector to HO2S. Reconnect negative battery terminal.

PUSH-CONNECT FITTINGS

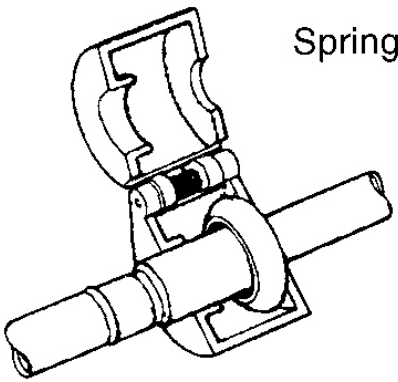
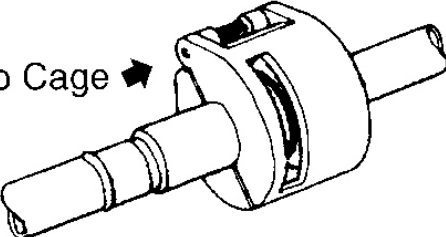
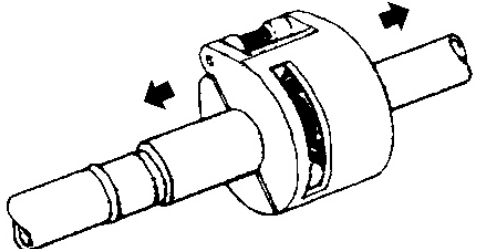
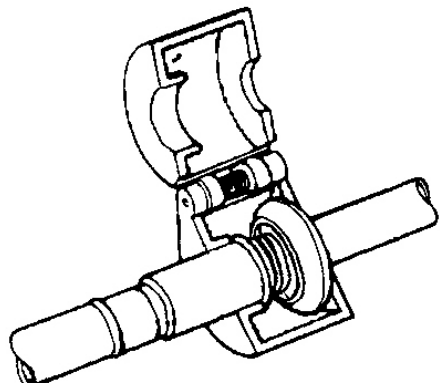
Spring Lock Coupling

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. 6** .
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 refrigerant 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	T81P-19623-G1
1/2" Line	T81P-19623-G2
5/8" Line	T83P-19623-C

WARNING - Relieve Fuel System Pressure Before Disconnecting Coupling

1.  Spring Lock Coupler
- Fit Tool To Coupling
So That Tool Can Enter Cage
To Release Garter Spring
2.  Push Tool Into Cage
- Push Tool Into Cage Opening
To Release Female Fitting
From Garter Spring
3.  Pull Male And Female Fittings Apart
4.  Remove Tool
From Disconnected
Spring Lock Coupling

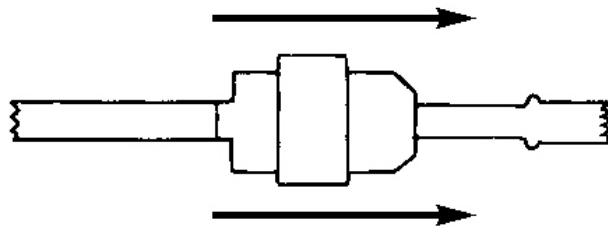
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Fig. 6: Disconnecting Fuel Lines With Spring Lock Coupler
Courtesy of FORD MOTOR CO.

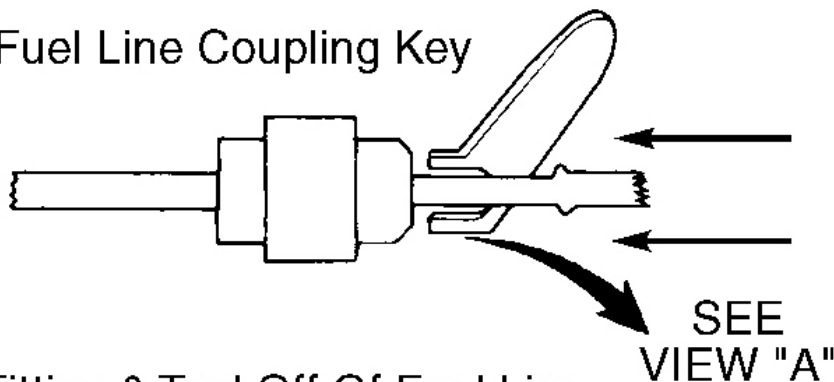
Removal & Installation (Fuel Line Coupler)

1. Disengage locking tabs on connector retainer. Separate retainer halves. Disengage fitting from regulator by pushing fitting toward regulator and inserting Fuel Line Coupling Key (T90P-9550-A). See **Fig. 7**.
2. To reconnect fuel line coupling, push coupler tube assembly firmly into coupler body recess until fully engaged. Pull gently on both ends of coupler to ensure engagement. See **FUEL SUPPLY MANIFOLD**.

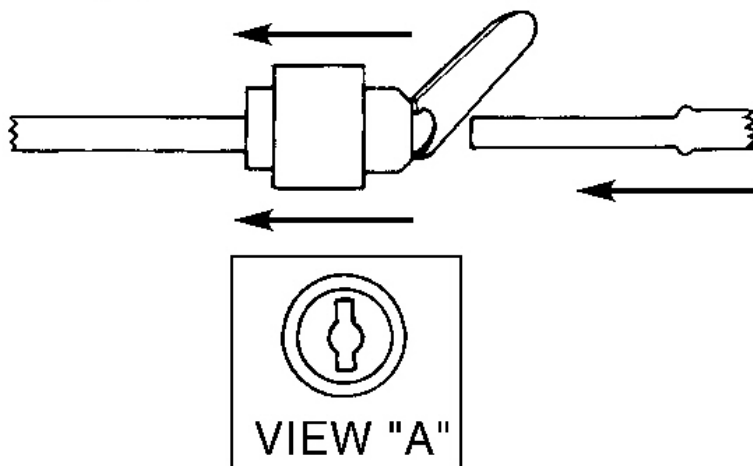
1. To Disconnect Push Fitting Toward Fuel Line



2. Insert Fuel Line Coupling Key



3. Slide Fitting & Tool Off Of Fuel Line



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Fig. 7: Disconnecting Fuel Line Coupler With Key
Courtesy of FORD MOTOR CO.

UPPER INTAKE MANIFOLD & THROTTLE BODY

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Removal & Installation

1. Drain cooling system. Disconnect negative battery cable. Remove air duct and resonance chamber. Disconnect TP sensor electrical connector. Remove TP sensor electrical connector from EGR Control (EGRC) bracket.
2. Disconnect idle switch electrical connector. Disconnect and plug front throttle body coolant hose. Disconnect and plug hose connected to top heater pipe. Disconnect EGRC solenoid-to-throttle body vacuum hose. Disconnect EGR valve-to-EGRC solenoid vacuum hose. Remove 2 EGRC bracket bolts, then lower EGRC bracket from upper manifold. Disconnect carbon canister-to-intake manifold vacuum hose.
3. Disconnect No. 1, 3 and 5 spark plug wires from spark plugs, then remove spark plug wire boots from between upper intake manifold runners. Remove No. 2 spark plug wire bracket bolts and brackets from upper intake manifold. Remove distributor dust cover.
4. Unscrew the 3 distributor cap screws. Remove distributor cap, and position cap and wires aside to gain access to main engine wiring harness. Disconnect rear heater valve vacuum hose (if equipped) from right side of upper intake manifold. Remove wiring harness bracket from right side of manifold and set aside.
5. Disconnect cruise control cable (if equipped) from throttle lever. Disconnect accelerator cable from throttle lever. Remove cruise control cable from hanging support (if equipped). Remove accelerator cable from bracket attached to top of upper intake manifold. Remove cruise control cable (if equipped), then accelerator cable from bracket on top of upper intake manifold and position aside.
6. Disconnect brake booster vacuum hose from left side of upper intake manifold. Remove EGR pipe from EGR valve. Disconnect EGR temperature sensor electrical connector (if equipped). Disconnect by-pass air valve electrical connector. Disconnect Idle Air Control/Fast Idle Control assembly connectors.
7. Disconnect fuel pressure regulator-to-intake manifold vacuum line from fuel pressure regulator. Disconnect main engine wiring harness clips from breather tube brackets. Remove 2 ground wire bolts from upper intake manifold, and position ground wires and main wiring harness aside.
8. Remove the 2 front breather bracket-to-upper intake manifold bolts. Disconnect front breather hose from front rocker arm cover. Remove 5 Allen-head upper intake manifold bolts. Remove upper intake manifold and discard gasket.

Installation

Ensure gasket surfaces are clean before using a NEW upper intake manifold gasket. Position upper intake manifold onto lower intake manifold. Tighten bolts to specification. See **TORQUE SPECIFICATIONS** . To complete installation, reverse removal procedure.

TORQUE SPECIFICATIONS

TORQUE SPECIFICATIONS

Application	Ft. Lbs. (N.m)
Fuel Supply Manifold Bolts	17-20 (23-27)
Throttle Body-To-Manifold Bolts	13-16 (18-22)
INCH Lbs. (N.m)	
Camshaft Position Sensor Bolts	22-31 (2.5-3.5)
Fuel Pressure Regulator Bolts	27-40 (3-4.5)
Pressure Relief Valve Cap	4-6 (.5-.7)

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Throttle Position Sensor Screws

18-21 (2.0-2.4)