

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

2002 ENGINE**Engine - 2.0L Duratec-St (Zetec) - Focus****SPECIFICATIONS****ENGINE DATA****ENGINE DATA SPECIFICATIONS**

Description	2.0L DOHC 16V
Engine management	EEC V/SEFI
Firing order	1-3-4-2
Bore	84.8 mm
Stroke	88.0 mm
Number of main bearings	5
Cubic capacity (cm ³)	1,988
Compression ratio	10.2:1
Maximum engine power	170 hp
Maximum engine speed	7,000 RPM
Maximum engine torque at 5,500 RPM	198 lb ft

ENGINE OIL**ENGINE OIL SPECIFICATION**

Viscosity/ambient temperature	Description	Specification
Recommended engine oil SAE 5W-30 / below -20°C to over +40°C	Engine oil GF3	WSS-M2C915-A

If engine oils of this specification are not available, engine oils of specification API SH/EC, ACEA A2/B2 or ACEA A3/B3 may also be used.

CAPACITIES**CAPACITIES SPECIFICATION**

	Litres
Engine oil, initial fill including filter	4.35
Engine oil, oil change including filter	4.25
Engine oil, oil change excluding filter	3.75

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LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES**LUBRICANTS, FLUIDS, SEALERS AND ADHESIVES SPECIFICATION**

Item	Specification
Sealant, camshaft bearing caps	WSK-M2G348-A5
Sealant, cylinder block mating faces (Hylosil 502)	WSK-M4G320-A
Sealant, cylinder block mating faces (Loctite Ultrablack) (alternative)	WSE-M4G320-A2
Sealant, crankshaft position sensor	ESW-1C155-A
Sealant, crankshaft position sensor (alternative)	WSD-M1C-226-A
Sealant, oil pan	WSE-M4G323-A6
Thread locking compound	SDM-M4G9107-A
Spark plug thread lubricant (Never Seeze)	WSD-M13P8-A1
Lubricant, injection nozzle O -rings	WSEM-2C903-A1
Silicone grease for spark plug connector seal	A696-M1C171-AA
High -temperature grease for clutch disc engagement splines	ESD-M1C220-A

CYLINDER BLOCK**CYLINDER BLOCK SPECIFICATION**

Description	mm
Cylinder bore diameter, class 1.	84.800 - 84.810
Cylinder bore diameter, class 2.	84.810 - 84.820
Cylinder bore diameter, class 3.	84.820 - 84.830
Inner diameter, main bearing shells installed	58.011 - 58.038
Inner diameter, main bearing shells installed (main bearing shells with stepped sizes)	58.008 - 58.031
Main bearing radial clearance	0.011 - 0.058
Main bearing radial clearance (main bearing shells with stepped sizes)	0.020 - 0.042
Main bearing parent bore	62.287 - 62.300

PISTONS**PISTONS SPECIFICATION**

Description	mm
Piston diameter, class 1.	84.770 - 84.780
Piston diameter, class 2.	84.780 - 84.790

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Piston diameter, class 3.	84.790 - 84.800
Piston clearance in cylinder bore	0.010 - 0.030
Piston ring gaps (installed)	
- upper compression ring	0.300 - 0.500
- lower compression ring	0.300 - 0.500
- oil scraper ring	0.400 - 1.400

Ring gap position: The piston ring gaps must be distributed evenly around the circumference of the piston. This also applies to the oil scraper ring elements. Align the ring gaps at 120 degrees to each other.

CRANKSHAFT

CRANKSHAFT SPECIFICATION

Description	mm
Main bearing journal diameter	57.980 - 58.000
Main bearing journal end float	0.090 - 0.260
Connecting rod bearing journal diameter	46.890 - 46.910

CYLINDER BLOCK AND LOWER CRANKCASE SPACERS

CYLINDER BLOCK AND LOWER CRANKCASE SPACERS SPECIFICATION

Description	mm
Required spacer thickness if there is a gap between the cylinder block and the lower crankcase of:	
0.26 mm - 0.50 mm	0.25
0.51 mm - 0.75 mm	0.50

CONNECTING ROD

CONNECTING ROD SPECIFICATION

Connecting rod	mm
Big end bore diameter	49.890 - 49.910
Small end bore diameter	19.951 - 19.981
Inner diameter, connecting rod bearing shells installed	46.926 - 46.960
Radial connecting rod bearing clearance	0.016 - 0.070
Axial connecting rod bearing clearance	0.090 - 0.320

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PISTON PIN

PISTON PIN SPECIFICATION

Description	mm
Piston pin length	55.800 - 56.200
Piston pin diameter, white	19.997 - 20.000
Piston pin diameter, red	20.625 - 20.628
Piston pin clearance in piston	0.010 - 0.019
Piston pin clearance in connecting rod	0.016 - 0.049

CAMSHAFT

CAMSHAFT SPECIFICATION

Description	mm
Bearing journal diameter	25.960 - 25.980
Camshaft bearing radial clearance	0.020 - 0.070
Camshaft end float	0.080 - 0.220

VALVES

VALVES SPECIFICATION

Valves	mm
Intake valve clearance in the valve guide	0.017 - 0.064
Exhaust valve clearance in the valve guide	0.017 - 0.064
Intake valve clearance (at 20°C +/- 5°C)	0.110 - 0.180
Exhaust valve clearance (at 20 °C +/- 5°C)	0.270 - 0.340

CYLINDER HEAD

CYLINDER HEAD SPECIFICATION

Cylinder head	
Maximum distortion (mating surface)	0.1 mm
Height of mating surface	1.76mm - 2.12 mm
Peak-to-valley height of mating surface (reference length 2.5 mm vertical to groove direction)	$R_{3z} = 6.0$ "MU"m
Oil pressure at 800 RPM - 850 RPM	1.3 bar - 2.5 bar
Oil pressure at 4000 RPM	3.7 bar - 5.5 bar

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TORQUE SPECIFICATIONS**TIGHTENING TORQUE SPECIFICATION**

Description	N.m	lb-ft	lb-in
Hose clamps	4	-	35
Intake manifold studs	5	-	44
Intake manifold bolts and nuts	18	13	-
Heat shield to exhaust manifold	10	-	89
Exhaust manifold studs	5	-	44
Exhaust manifold nuts	16	12	-
Exhaust manifold bolts	18	13	-
Catalytic converter to exhaust manifold	48	35	-
Catalytic converter to exhaust	47	35	-
Generator to bracket	25	18	-
Generator bracket to upper cylinder block bolts	25	18	-
Generator bracket to lower cylinder block bolts	65	48	-
Transmission flange bolts	47	35	-
Starter motor to transmission	35	26	-
Flywheel bolts	112	83	-
Clutch pressure plate	29	21	-
Engine roll restrictor to transmission	48	35	-
Engine roll restrictor to subframe	48	35	-
Engine rear mount to body	48	35	-
Engine rear mount (nut on transmission mount bracket)	133	98	-
Engine front mount to engine	80	59	-
Engine front mount to body	48	35	-
Power steering pump bracket	48	35	-
Cylinder head	(1)	-	-
Camshaft bearing cap	15	11	-
Cylinder head cover	(1)	-	-
Spark plugs	15	11	-
Timing belt tensioner	25	18	-
Camshaft timing belt pulley	68	50	-
Camshaft VCT unit	120	89	-
Camshaft VCT unit plug	38	25	-

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Upper timing belt cover	8	-	71
Ignition coil (EI) bracket to cylinder head	21	15	-
Thermostat housing	20	15	-
Fuel rail	10	-	89
Engine rear lifting eye	20	15	-
Engine rear lifting eye studs	7	-	62
Engine front lifting eye	35	26	-
Engine oil drain plug	25	18	-
Oil pressure switch	27	20	-
Cylinder block oil gallery blanking plugs	23	17	-
Heater pipe bracket to oil pan	10	-	89
Oil pan to lower crankcase	(1)	-	-
Lower crankcase to cylinder block	30	22	-
Oil pump	(1)	-	-
Oil intake pipe to oil pump	10	-	89
Main bearing cap bolts	(1)	-	-
Connecting rod bearing cap bolts	(1)	-	-
Coolant pump	20	15	-
Rear crankshaft oil seal carrier	20	15	-
Drive belt idler pulley	40	30	-
Crankcase ventilation pipe bracket	23	17	-
Crankcase ventilation	10	-	89
Coolant pump pulley	24	18	-
Crankshaft belt pulley	115	85	-
Crankshaft position sensor bracket	21	15	-
Crankshaft position sensor to bracket	8	-	71
Timing belt idler pulley	38	25	-
Knock sensor	20	15	-

(1) Refer to the procedure in this section.

DESCRIPTION AND OPERATION**ENGINE**

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The 2.0L Duratec ST engine is based on the 2.0L Zetec-E engine. In comparison to the 2.0L Zetec -E engine the modifications are:

Cylinder Block

part modified to include piston spray jets.

Cylinder Head

Inlet Port: - High flow design with new manifold break-out.

Exhaust Port: - Standard port but with secondary air feed to the back of the exhaust valve.

Water Jacket: - Revised flow around ports.

Oil feed arrangement for variable valve timing installation.

Incorporation of VCT (variable camshaft timing) solenoid in front camshaft bearing cap.

Inlet Valves

33.5 mm diameter with revised spacing to maintain bridge material and longer length for new port.

Exhaust Valves

Standard diameter but longer to commonise tappet with the inlet side.

Inlet Camshaft

Increased lift and duration with variable timing.

Trigger wheel fitted to indicate cam position.

Exhaust Camshaft

Increased lift and duration.

Tappet

Series of sizes commencing with unique graded part to suit new length valve and revised cam profile.

Valve Springs

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Inlet and Exhaust unique parts to suit new valve lengths and revised cam profiles.

Power Cell Assembly

Piston with 20 mm diameter gudgeon pin.

Connecting Rod - Forged fracture-split design.

Top piston ring - Internal bevel to reduce blow-by of combustion gasses and negative ovality of the ring ends to reduce wear.

Cam Cover Assembly

Re-styled and revised to suit new VCT solenoid installation. Cam Cover and Gasket Assembly.

Upper Timing Belt Cover Assembly

Re-styled to include VCT pulley.

Front Engine Mount

Mounting studs moved to clear VCT pulley.

Alternator Bracket

Modified to accommodate revised engine mount.

Intake Manifold

Made up of two assemblies replacing the single piece manifold with fixed length tracts.

- Plenum Assembly
- Housing Assembly -Manifold-Injectors
- Variable-length intake runner design.

The unit is in the short runner position with the engine off and then switches to the long runner position when the engine starts. The runners then switch to short runner position above 6000 RPM.

Throttle Body

Modified 63 mm diameter part.

Injectors

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Increased flow items specified as 224.8 g/min at 2.7 bar (normal fuel rail pressure)

Fuel Rail

Redesigned part with integral damper and no fuel return connection. The fuel inlet to the rail has been repositioned requiring a new fuel feed hose assembly.

Flywheel Assembly

Dual mass flywheel.

Clutch Assembly

Friction plate - increased diameter.

Pressure plate - increased diameter.

Oil Cooler

Modine type.

Variable Cam Timing System

- Variable Timing Unit Assembly
- Solenoid Assembly

Oil Separator Assembly

Internal changes to improve performance under high cornering loads - to be introduced onto base engine.

Exhaust System

Tuned 4-2-1 system with the catalyst located under the oil pan.

DIAGNOSIS AND TESTING

ENGINE

REFER to ENGINE SYSTEM-GENERAL INFORMATION article .

GENERAL PROCEDURES

VALVE CLEARANCE

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Material

MATERIAL SPECIFICATION

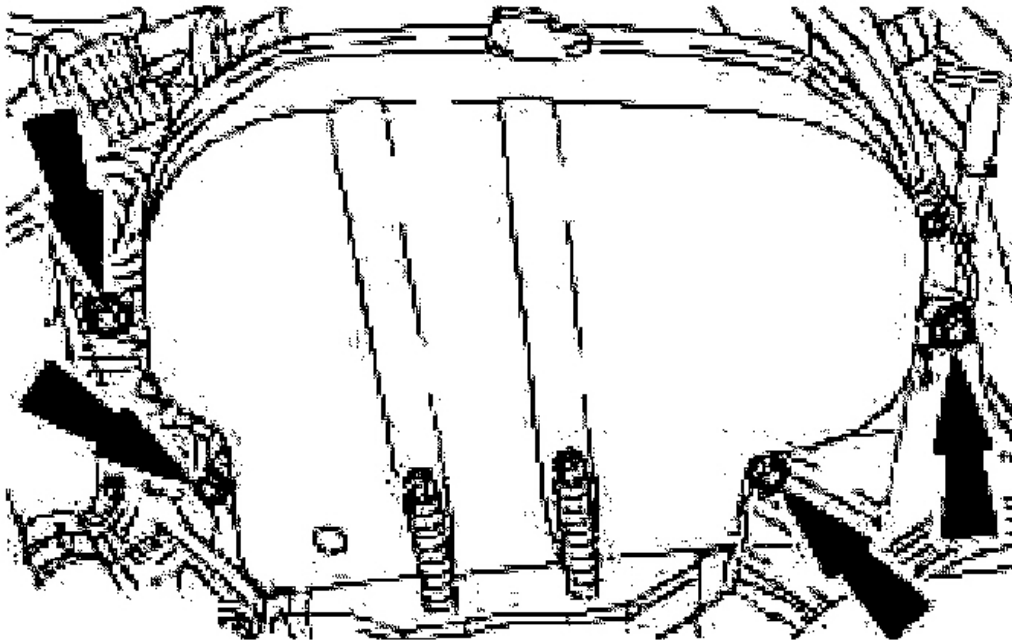
Cable ties	A960-M1C171-AA
Silicone grease for spark plug connector seal	

Adjust

NOTE: Exchange the tappets to correct the valve clearance.

1. Disconnect the battery ground cable.

NOTE: Do not remove the timing belt upper cover at this stage.

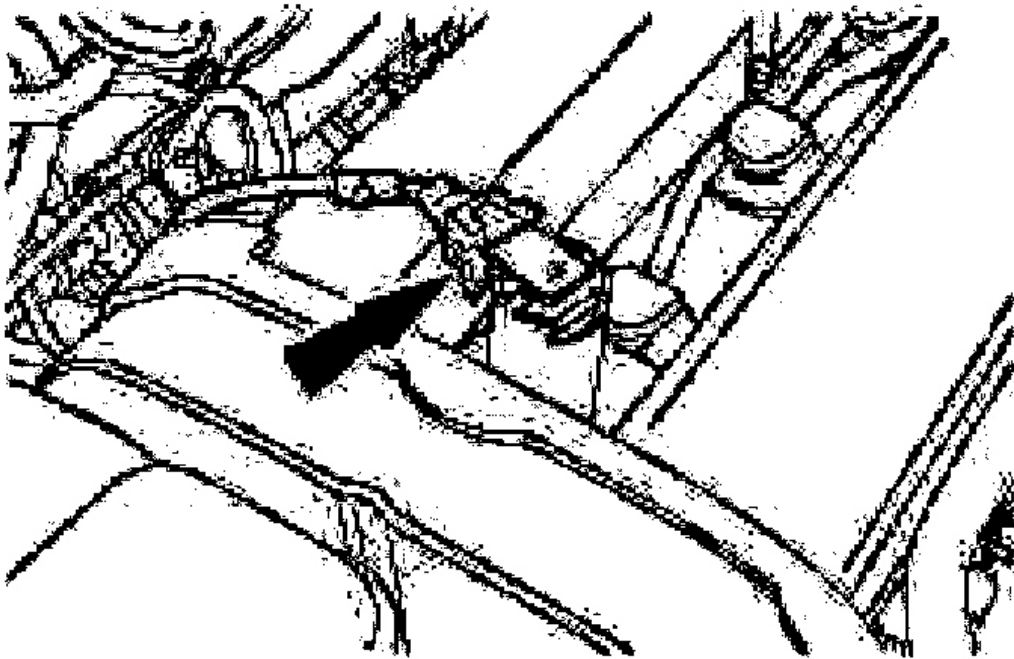


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Fig. 1: Removing Timing Belt Upper Cover Retaining Bolts
Courtesy of FORD MOTOR CO.

2. Remove the timing belt upper cover retaining bolts.

3. Disconnect the variable camshaft timing (VCT) valve electrical connector.



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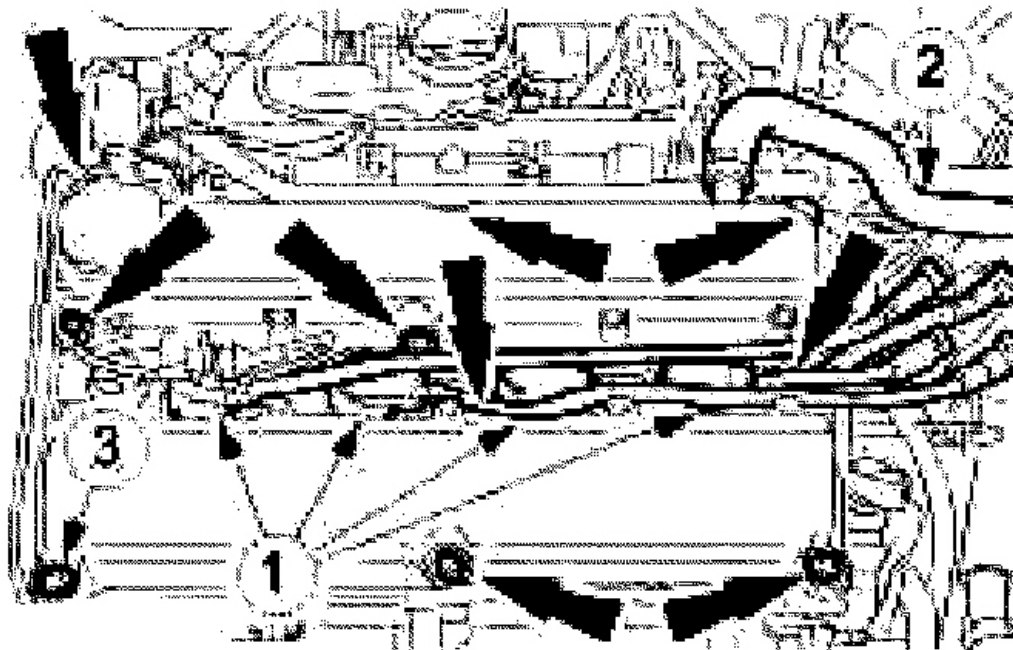
Fig. 2: Disconnecting Variable Camshaft Timing (VCT) Valve Electrical Connector
Courtesy of FORD MOTOR CO.

CAUTION: Do not pull the spark plug connectors by the ignition wires when removing them. If necessary pull off the ignition wires from the ignition coils to prevent kinking the ignition wires. Slightly twist the spark plug connectors before removing them in order to loosen the seals.

CAUTION: Pull off the spark plug connectors in line with the spark plugs.

NOTE: Loosening sequence: from the outside to the inside, working diagonally.

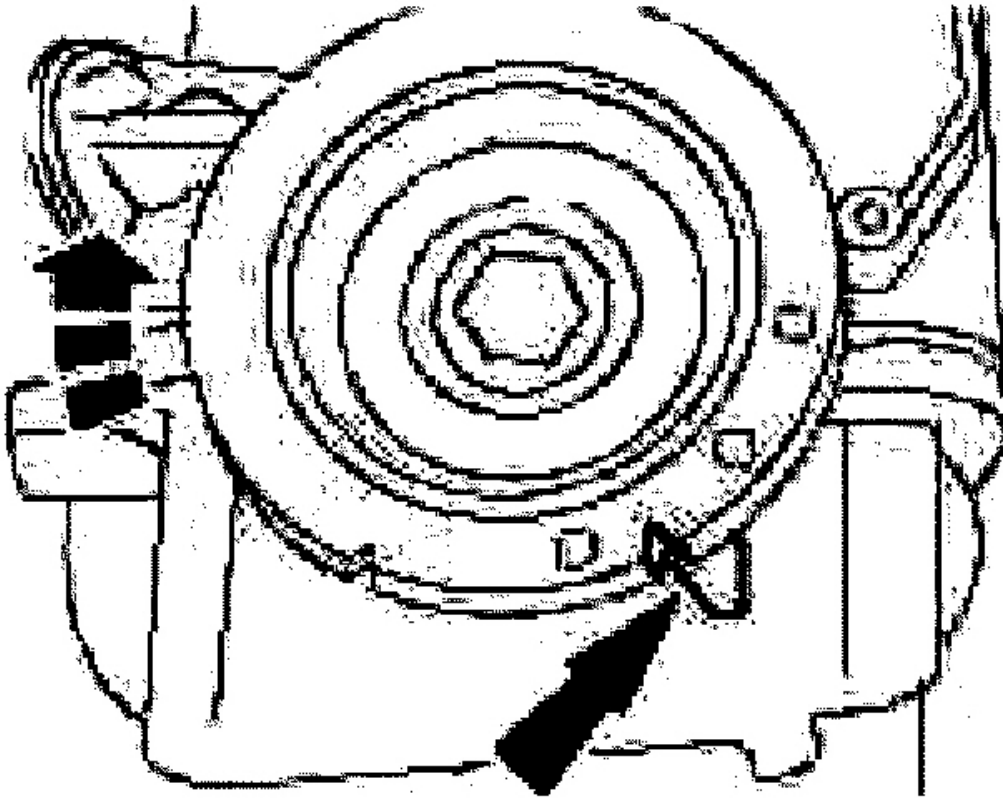
4. Remove the valve cover.
 1. Disconnect the spark plug electrical connectors.
 2. Disconnect the positive crankcase ventilation (PCV) hose from the valve cover.
 3. Remove the bolts.



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Fig. 3: Removing Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Only rotate the crankshaft in the normal direction of rotation.



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Fig. 4: Rotating Crankshaft Till Piston No. 1 At Top Dead Center (TDC)
Courtesy of FORD MOTOR CO.

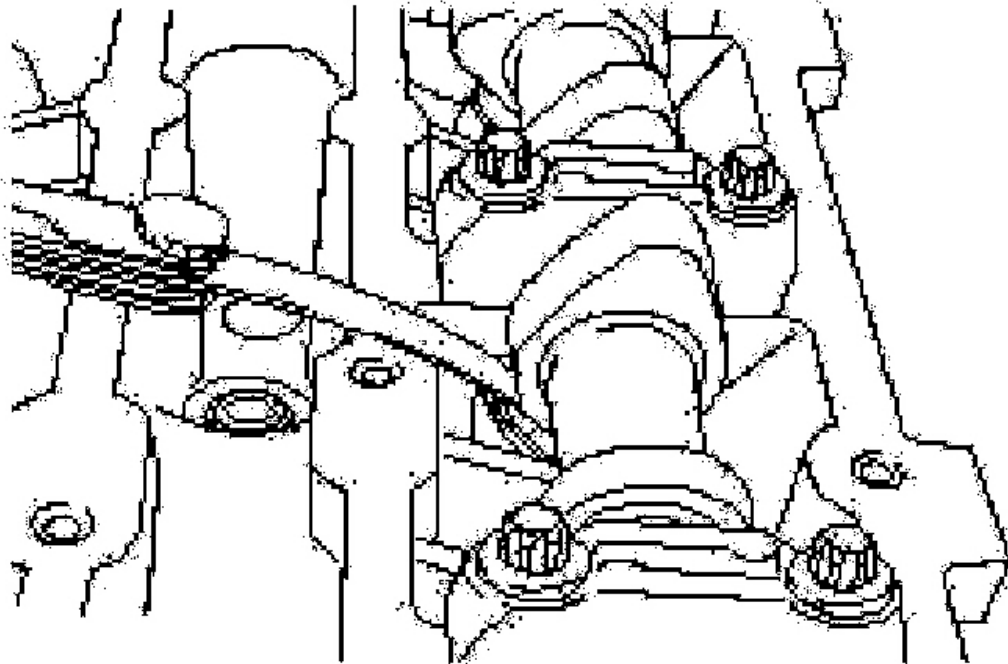
5. Rotate the crankshaft until piston No. 1 is at top dead center (TDC).

NOTE: **Note down each cylinder number and the valve clearances measured.**

NOTE: **Only rotate the crankshaft in the normal direction of rotation.**

6. Using a suitable set of feeler gauges, measure the valve clearance.
 - Permitted valve clearance: inlet (0.21 - 0.29 mm)
 - Permitted valve clearance: exhaust (0.32 - 0.40 mm)

- Rotate the crankshaft a further 180 degrees. In this instance, the measuring sequence follows the firing order 1-3-4-2.



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Fig. 5: Measuring Valve Clearance Using Suitable Set Of Feeler Gauges
Courtesy of FORD MOTOR CO.

NOTE: Only carry out the following steps when the valve clearance(s) require adjustment.

7. Remove the camshafts. For additional information, refer to CAMSHAFT .

NOTE: Aim to set the valve clearance to the middle of the range (inlet 0.25 mm; exhaust 0.36 mm)

NOTE: The number on the valve tappet indicates the valve tappet thickness.

8. Determine the tappet thickness required.

- Remove the valve tappet and read the thickness from the underside.
- Calculate the valve tappet thickness required and insert the correct tappet.
 - Inlet valves: tappet thickness required = thickness of currently installed tappets + measured valve clearance - 0.25 mm.
 - Exhaust valves: tappet thickness required = thickness of currently installed tappets + measured valve clearance - 0.36 mm.

CAUTION: Rotate the crankshaft until piston No. 1 is approximately 25 mm before TDC (BTDC).

NOTE: Do not install the timing belt at this stage.

9. Install the camshafts. For additional information, refer to CAMSHAFT .

NOTE: Rotate the camshafts to measure the valve clearance.

10. Recheck the valve clearance.

11. Install the timing belt. For additional information, refer to TIMING BELT .

NOTE: Apply silicone grease to the inside of the spark plug connectors to a depth of 5-10 mm.

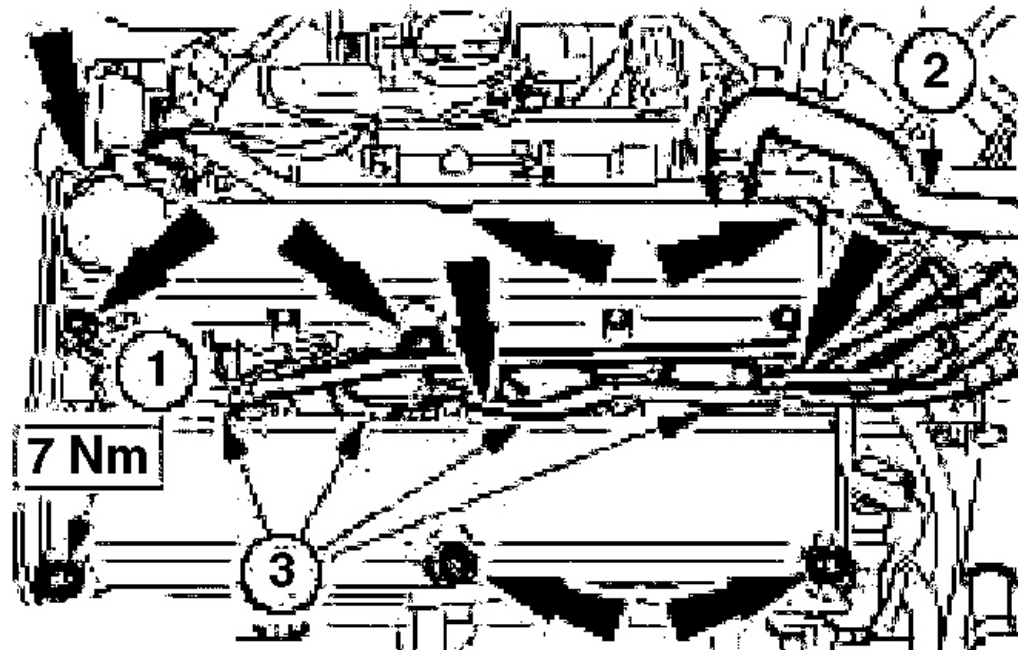
12. Install the valve cover.

1. Install the valve cover retaining bolts

- Tighten the retaining bolts in two stages.
- Stage 1: 2 N.m
- Stage 2: 7 N.m

5. Connect the PCV hose to the valve cover.

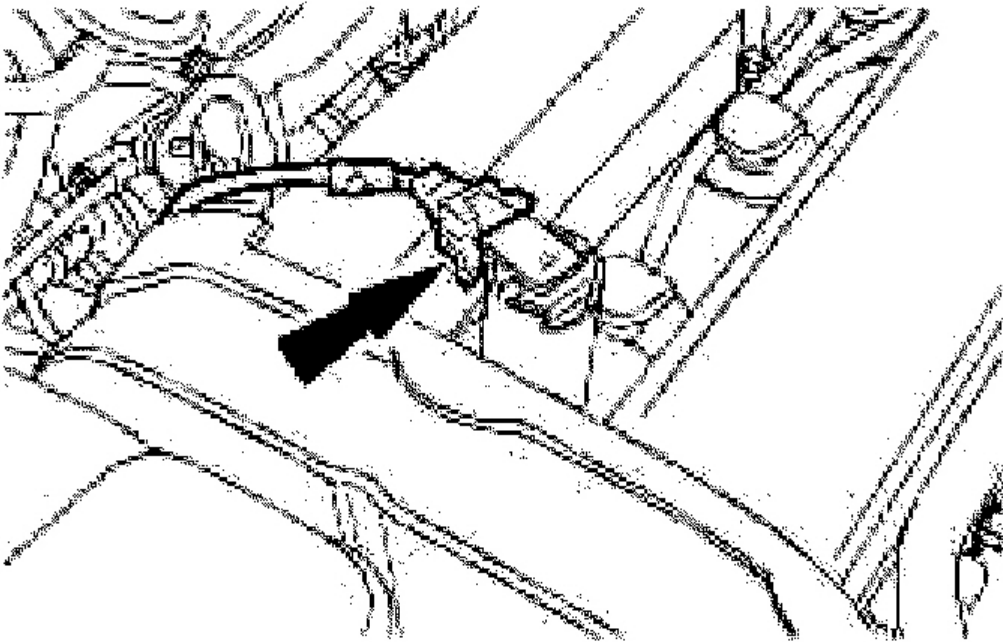
6. Connect the spark plug electrical connectors.



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Fig. 6: Installing Valve Cover Retaining Bolt
Courtesy of FORD MOTOR CO.

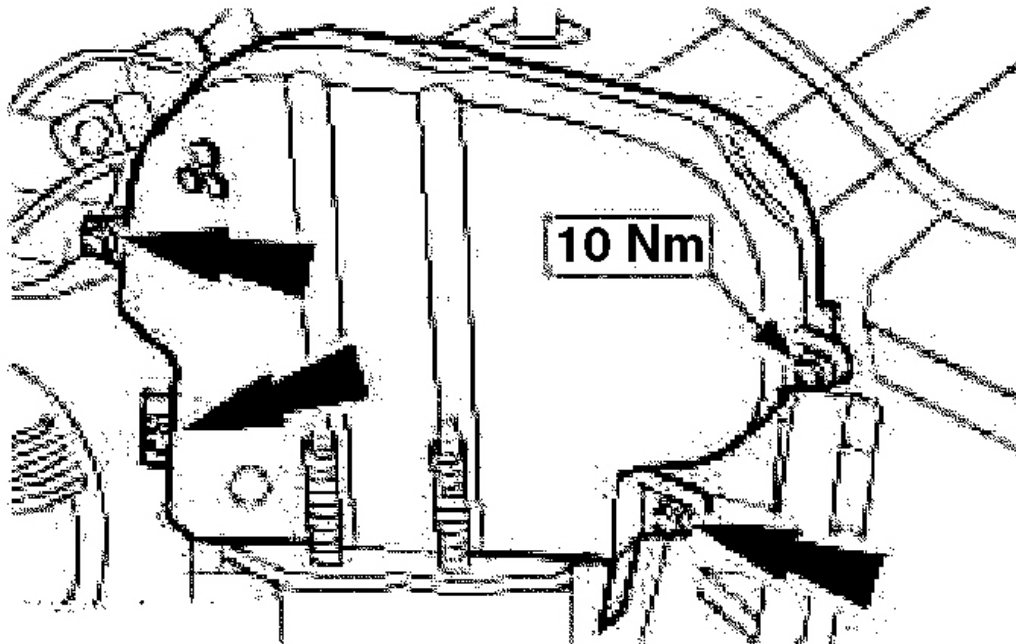
13. Connect the VCT valve electrical connector.



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Fig. 7: Connecting VCT Valve Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: Check that the gasket on the upper timing belt cover is seated correctly and adjust if necessary.



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Fig. 8: Installing Timing Belt Upper Cover Retaining Bolts
Courtesy of FORD MOTOR CO.

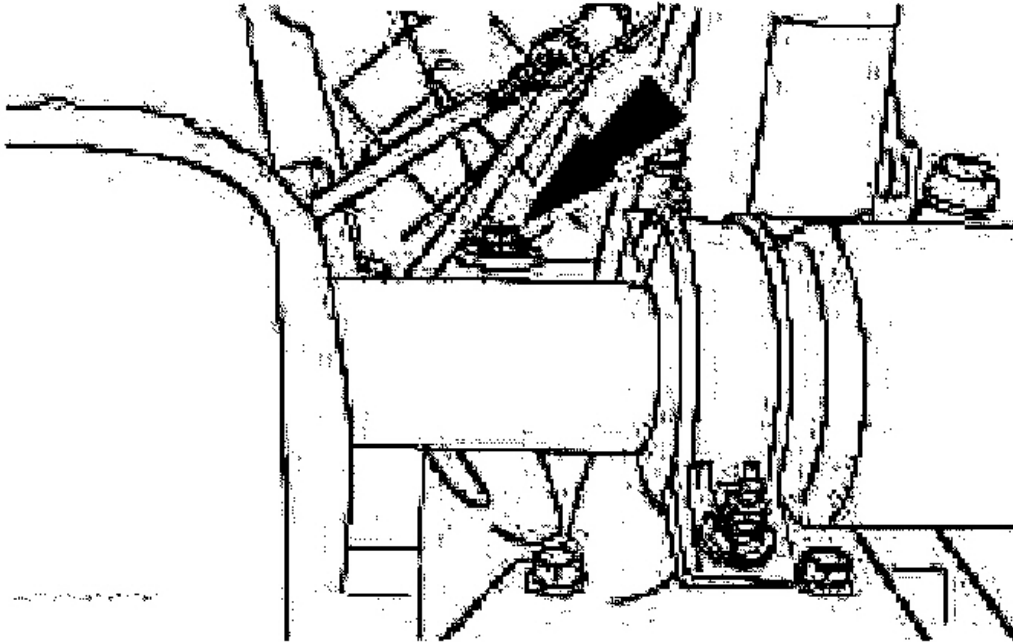
14. Install the timing belt upper cover retaining bolts.
15. Connect the battery ground cable.

IN-VEHICLE REPAIR

INTAKE MANIFOLD

Removal

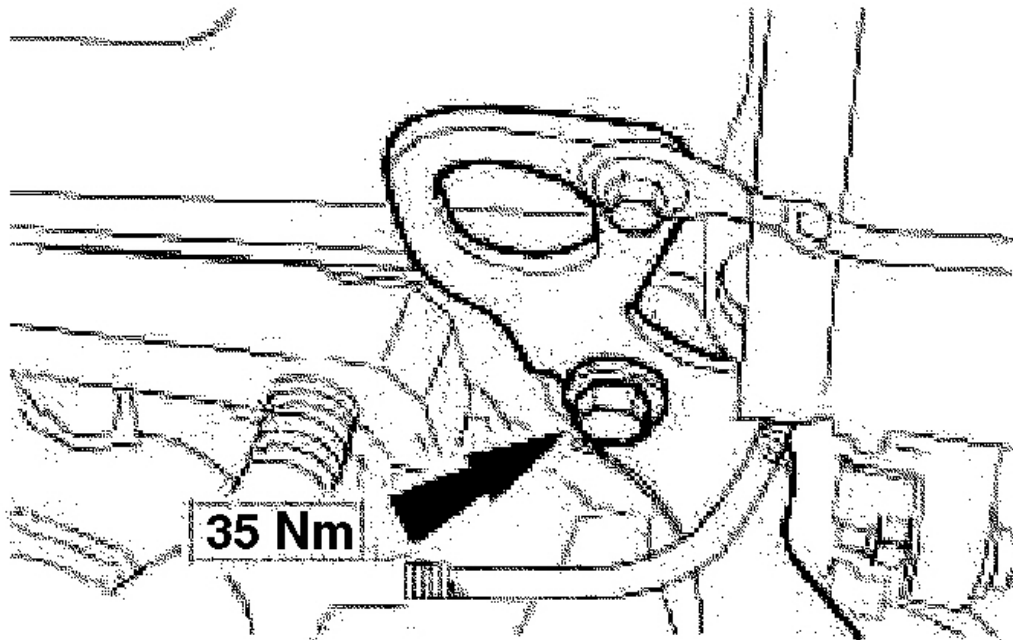
1. Remove the fuel injection supply manifold. For additional information, refer to **FUEL INJECTION SUPPLY MANIFOLD & INJECTORS** .
2. Raise and support the vehicle.
3. Remove the intake manifold lower retaining bolt.



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Fig. 9: Removing Intake Manifold Lower Retaining Bolt
Courtesy of FORD MOTOR CO.

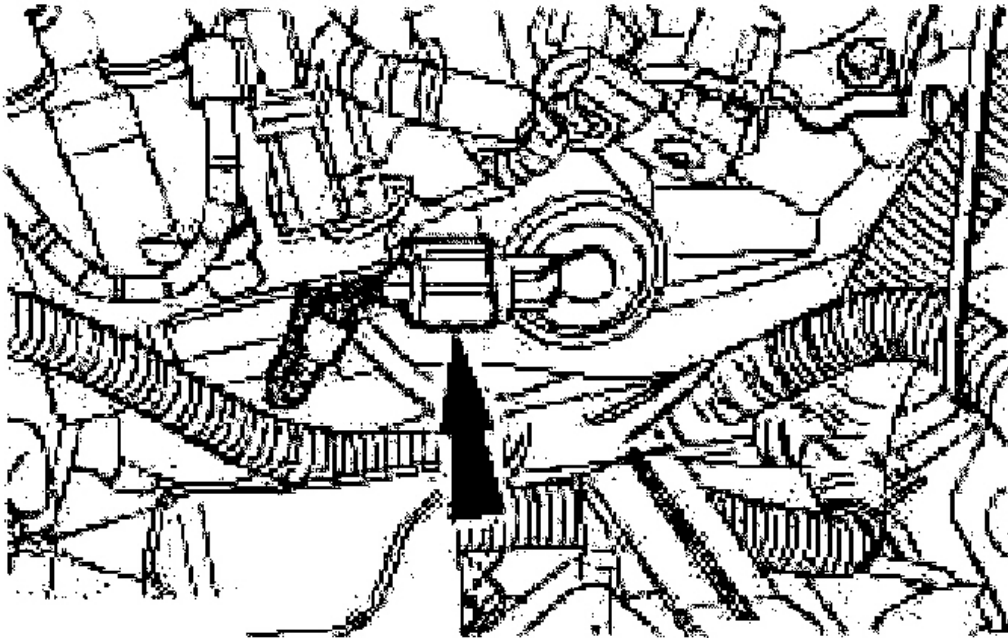
4. Lower the vehicle.
5. Detach the engine lifting eye from the cylinder head.



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Fig. 10: Detaching Engine Lifting Eye From Cylinder Head
Courtesy of FORD MOTOR CO.

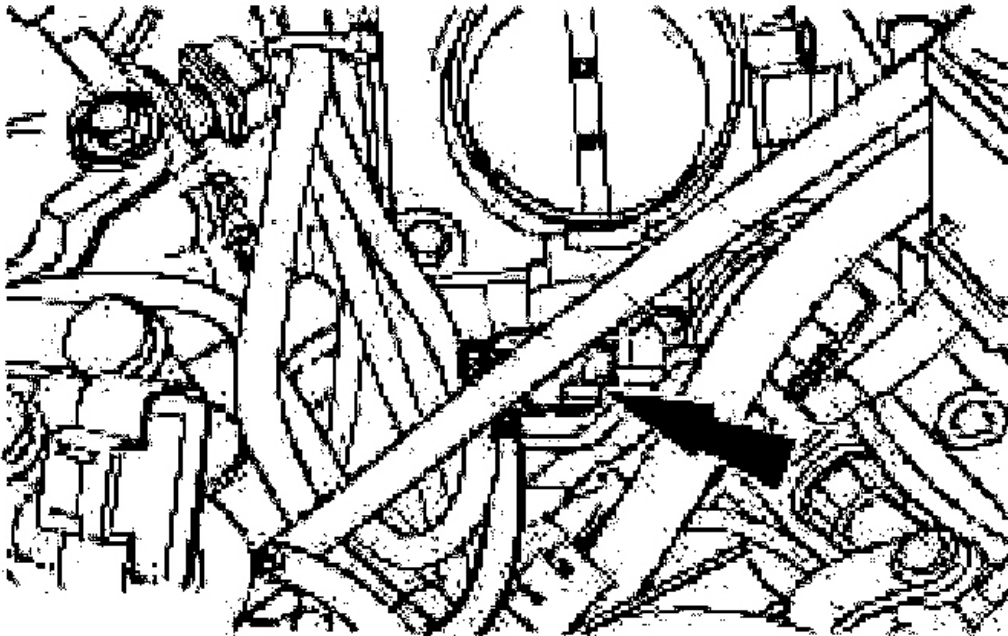
6. Disconnect the idle air control (IAC) sensor electrical connector.



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Fig. 11: Disconnecting Idle Air Control (IAC) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

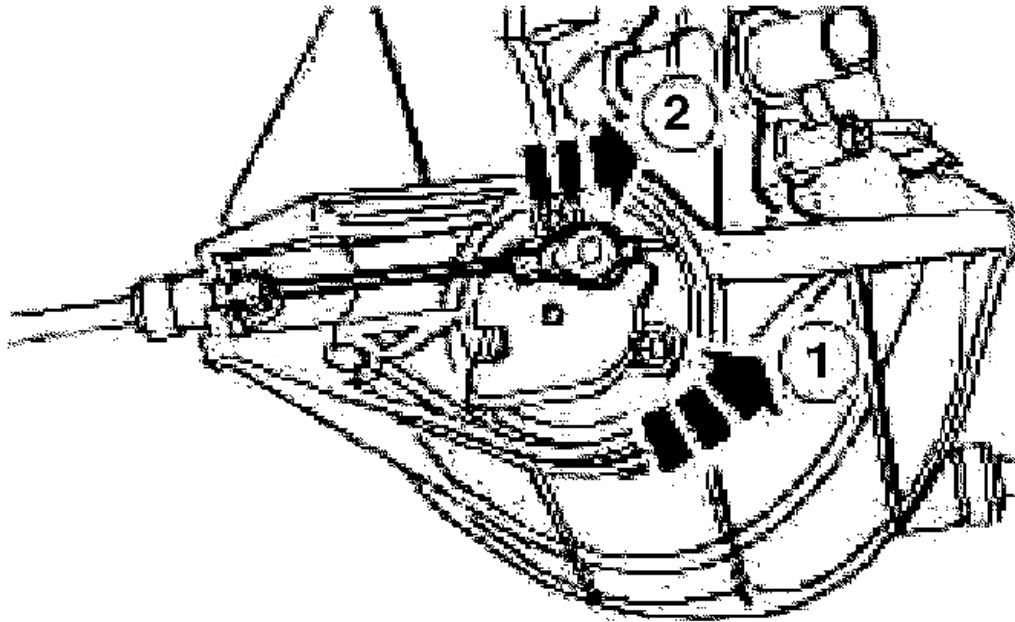
7. Disconnect the throttle position (TP) sensor electrical connector.



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Fig. 12: Disconnecting Throttle Position (TP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

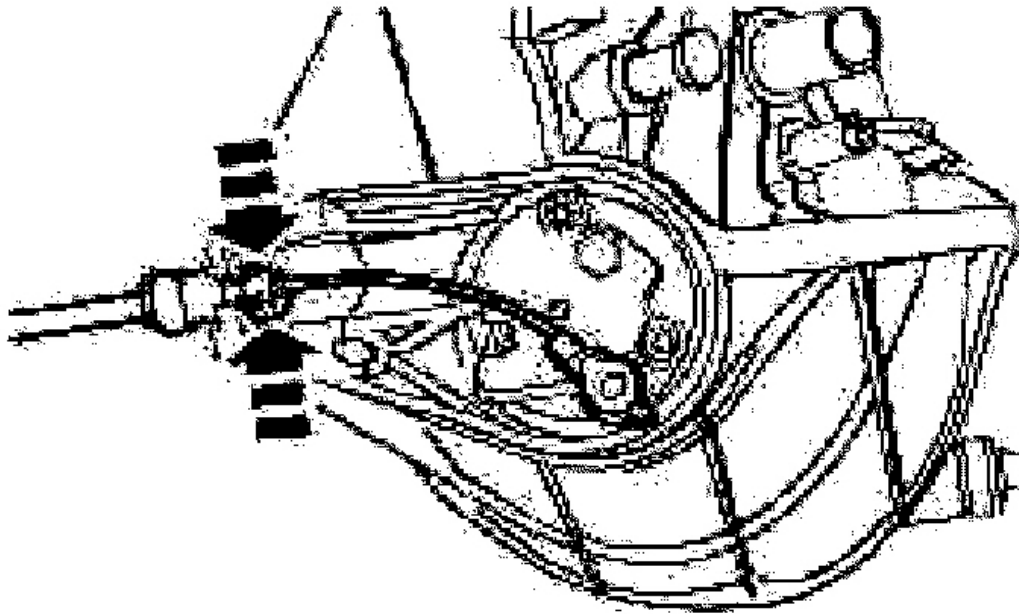
8. Detach the intake manifold runner control (IMRC) actuator cable from the IMRC lever (intake manifold assembly shown removed for clarity).
 1. Rotate the IMRC lever.
 2. Remove the IMRC actuator cable.



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Fig. 13: Removing IMRC Actuator Cable
Courtesy of FORD MOTOR CO.

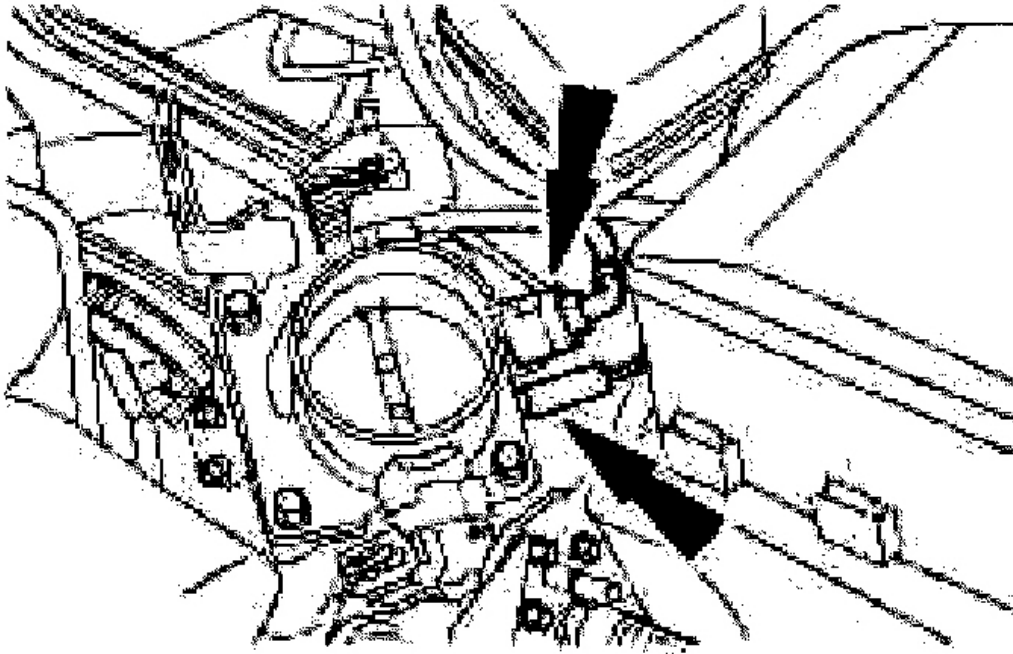
9. Disconnect the IMRC actuator cable from the intake manifold assembly (intake manifold assembly shown removed for clarity).
 - Release the IMRC actuator cable locking tangs.



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Fig. 14: Releasing IMRC Actuator Cable Locking Tangs
Courtesy of FORD MOTOR CO.

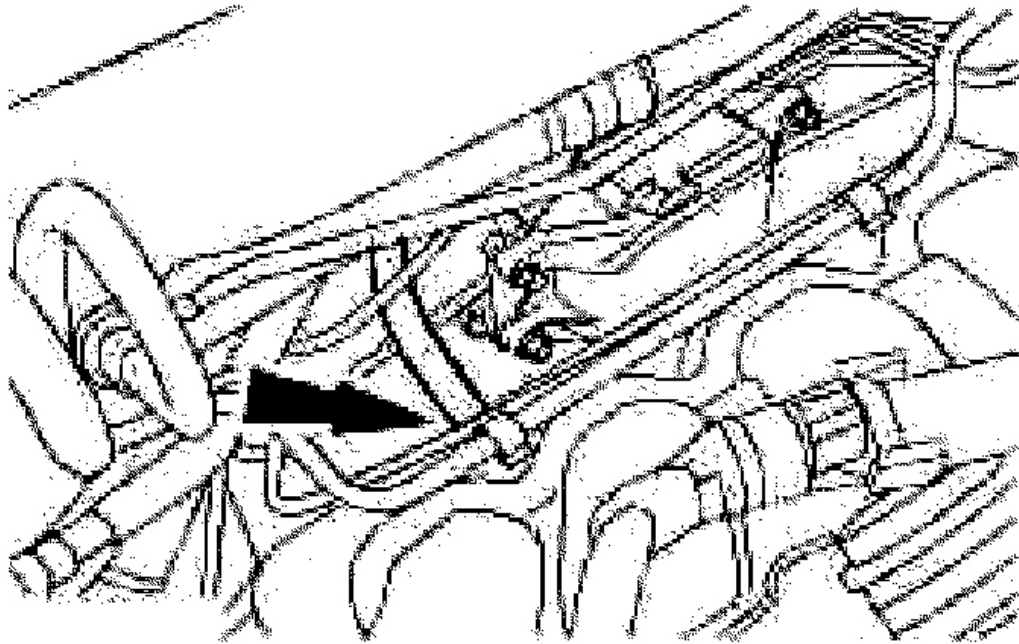
10. Disconnect the vacuum hoses from the throttle body.



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Fig. 15: Disconnecting Vacuum Hoses From Throttle Body
Courtesy of FORD MOTOR CO.

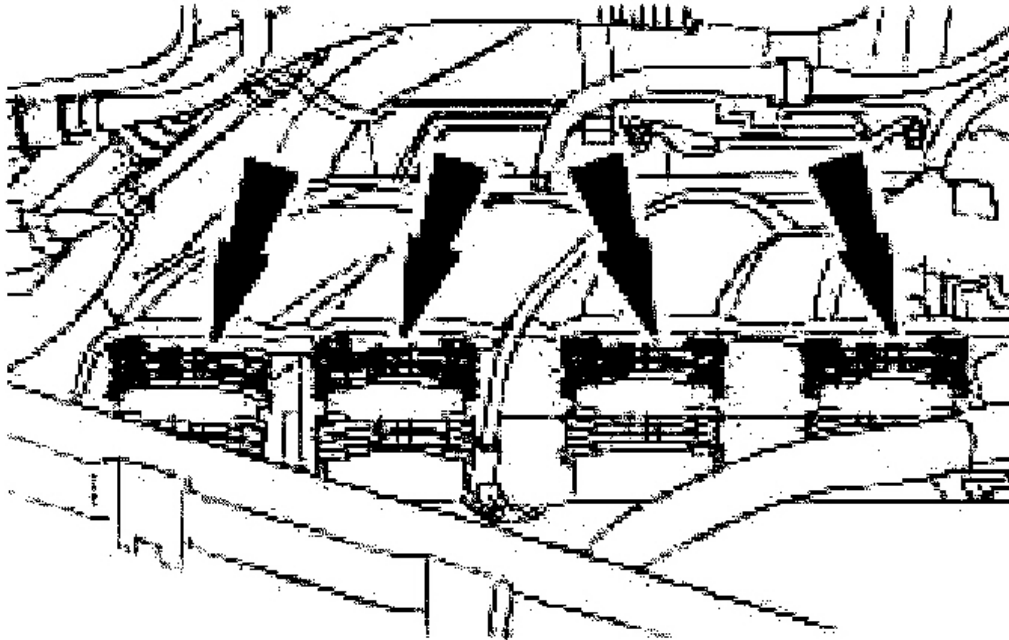
11. Detach the brake booster pipe from the intake manifold.
 - Release the quick release coupling and pull out the brake booster pipe.



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Fig. 16: Detaching Brake Booster Pipe From Intake Manifold
Courtesy of FORD MOTOR CO.

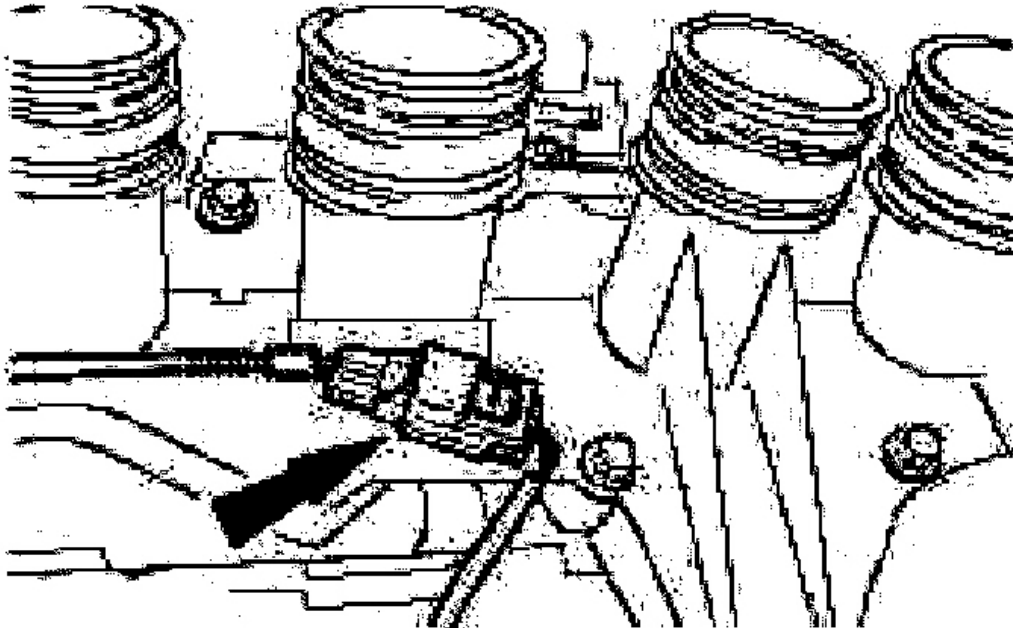
12. Separate the two sections of the intake manifold.



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Fig. 17: Separating Two Sections Of Intake Manifold
Courtesy of FORD MOTOR CO.

13. Detach the knock sensor (KS) electrical connector from the intake manifold inner section.

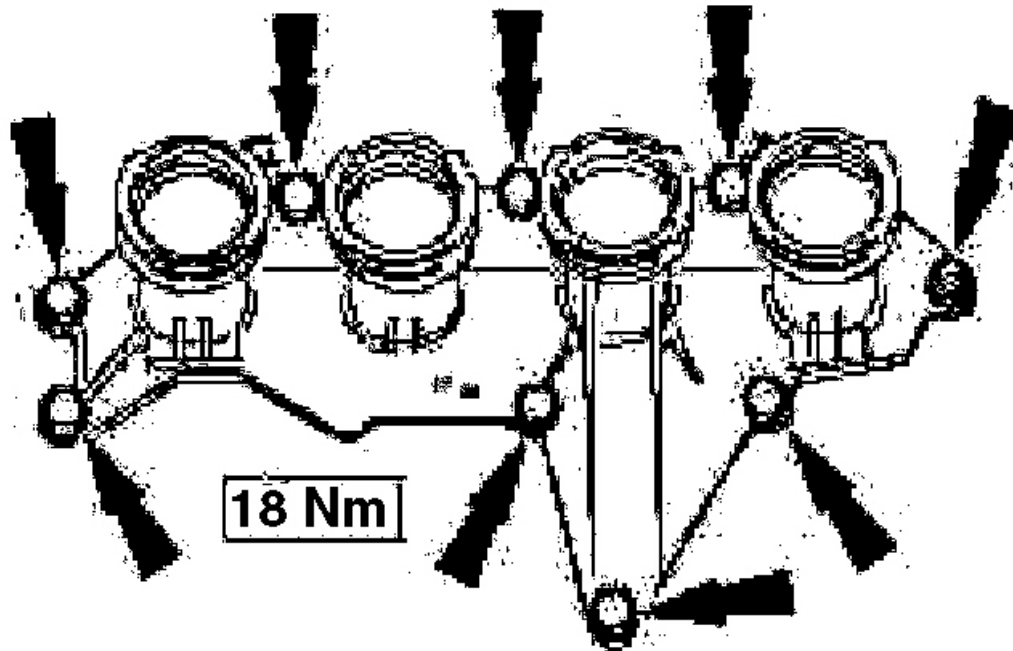


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Fig. 18: Detaching Knock Sensor (KS) Electrical Connector From Intake Manifold Inner Section

Courtesy of FORD MOTOR CO.

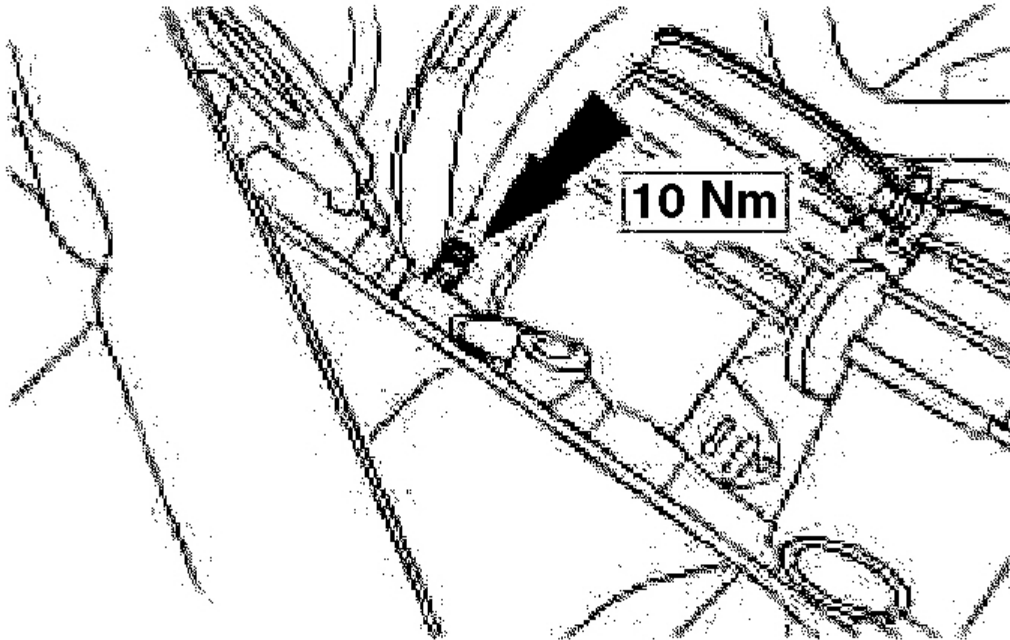
14. Remove the intake manifold inner section locknut and bolts (intake manifold shown removed for clarity).
 - Discard the locknut.



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Fig. 19: Removing Intake Manifold Inner Section Locknut And Bolts
Courtesy of FORD MOTOR CO.

15. Remove the intake manifold inner section retaining stud.



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Fig. 20: Removing Intake Manifold Inner Section Retaining Stud
Courtesy of FORD MOTOR CO.

16. Remove the intake manifold sections.

Installation

NOTE: Clean and inspect the intake manifold gasket. Install a new intake manifold gasket if necessary.

NOTE: Install a new intake manifold locknut.

1. To install, reverse the removal procedure.

CRANKSHAFT FRONT SEAL

Special Tool(s)

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	Installer, Crankshaft Front Oil Seal 303-164 (T81P-6700-A)
	Remover, Oil Seal 303-409 (T92C-6700-CH)

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Fig. 21: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

Material

MATERIAL SPECIFICATION

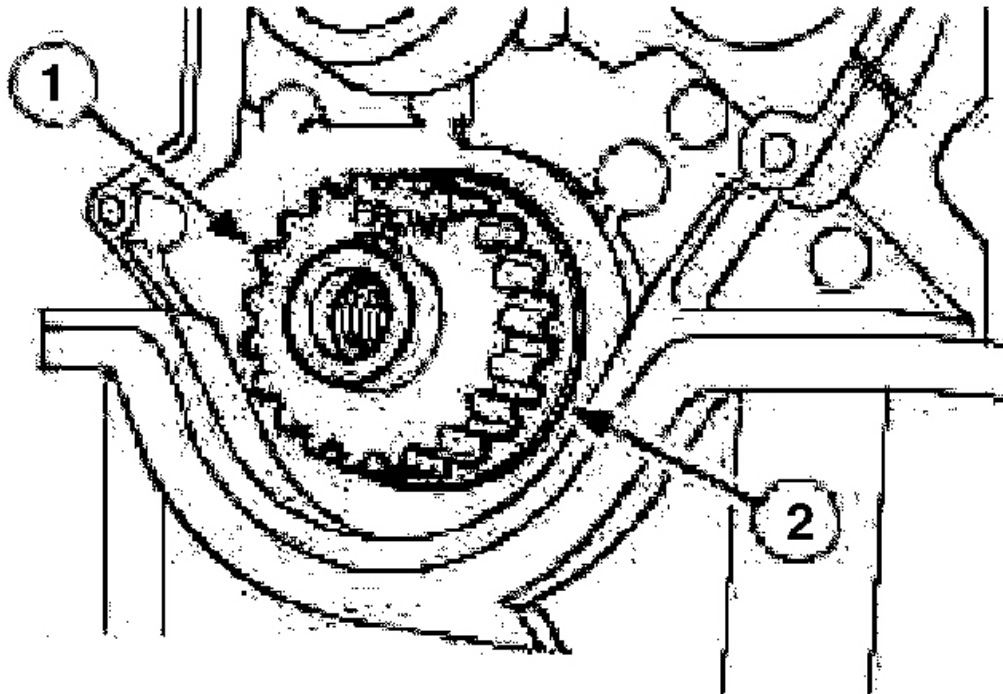
Engine Oil - 5W-30	WSS-M2C153-G
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Removal

1. Remove the timing belt. For additional information, refer to **TIMING BELT** .

NOTE: **FRONT marking and thrust washer installation position.**

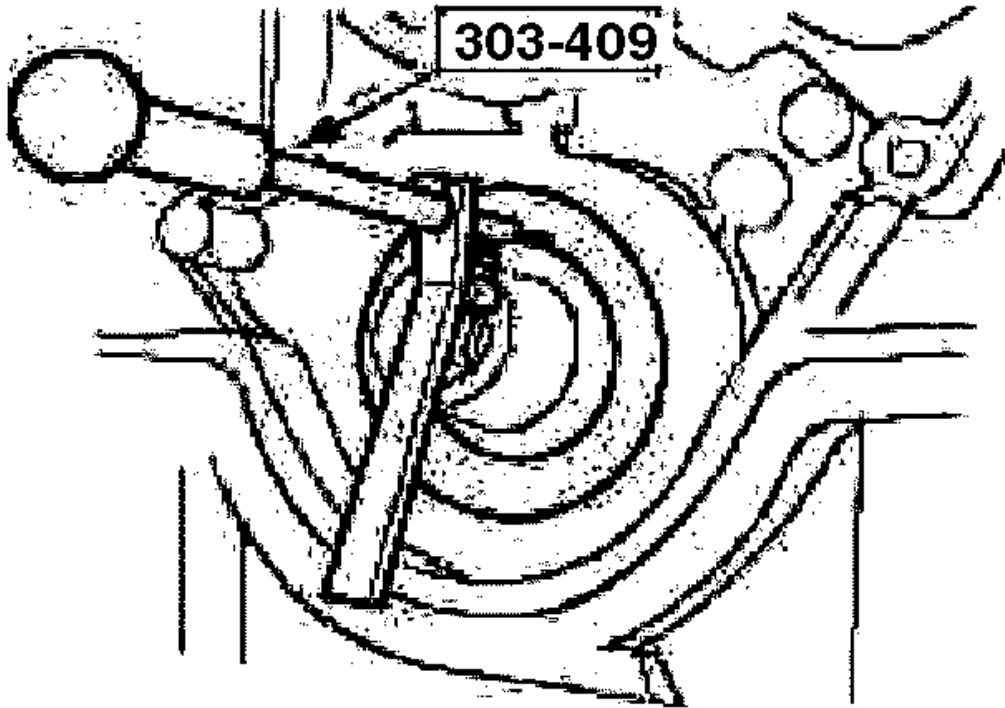
2. Detach the crankshaft timing belt.
 1. Remove the crankshaft pulley hub.
 2. Remove the timing belt thrust washer.



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Fig. 22: Removing Crankshaft Pulley Hub
Courtesy of FORD MOTOR CO.

3. Using the special tool remove the crankshaft front oil seal.



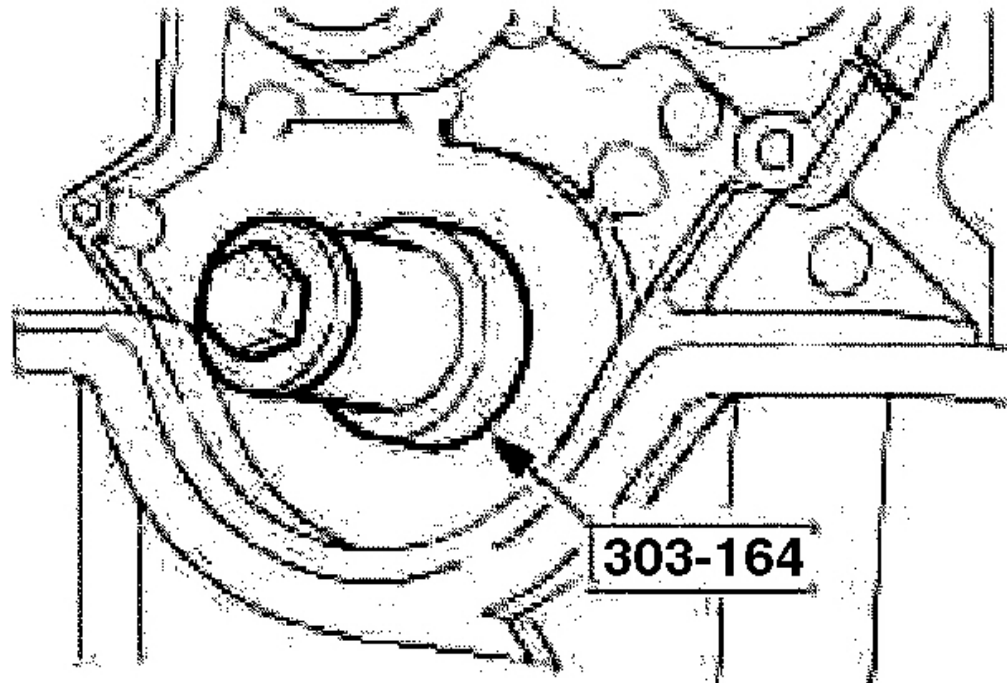
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Fig. 23: Removing Crankshaft Front Oil Seal Using Special Tool
Courtesy of FORD MOTOR CO.

Installation

NOTE: Use the crankshaft pulley hub bolt and washer.

1. Using the special tool install the crankshaft front oil seal.
 - Coat the oil seal lip and crankshaft running surface with engine oil.

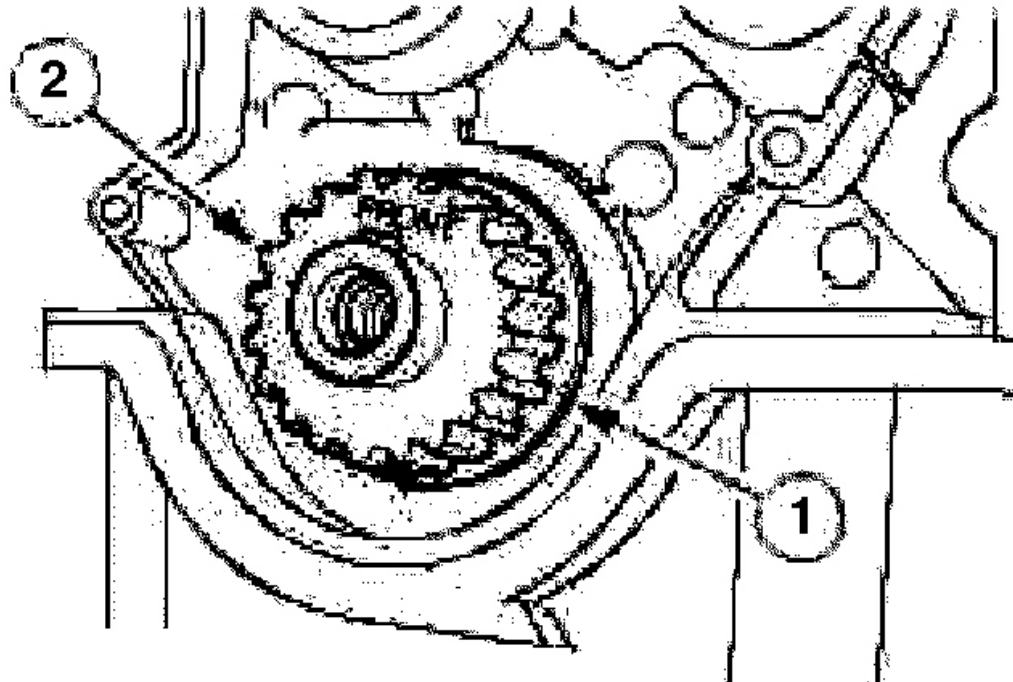


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Fig. 24: Installing Crankshaft Front Oil Seal Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: FRONT marking and thrust washer installation position.

2. Install the crankshaft pulley hub.
 1. Install the timing belt thrust washer.
 2. Install the crankshaft pulley hub.



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Fig. 25: Installing Crankshaft Pulley Hub
Courtesy of FORD MOTOR CO.

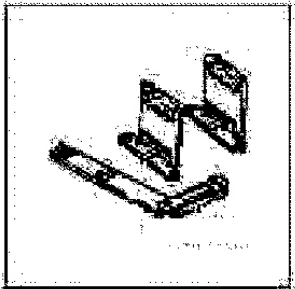
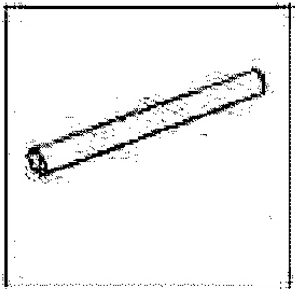
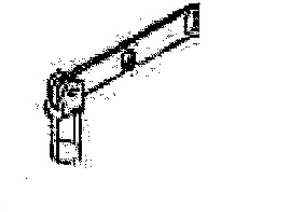
3. Install the timing belt. For additional information, refer to **TIMING BELT** .

VALVE SPRINGS

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Compressor, Valve Spring 303-350 (T89P-6565-A)
	Compressor, Valve Spring 303-300 (T87C-6565-A)
	Compressor, Valve Spring 303-472 (T94P-6565-AH)

G03432609

Fig. 26: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

Removal

1. Remove the valve tappets.

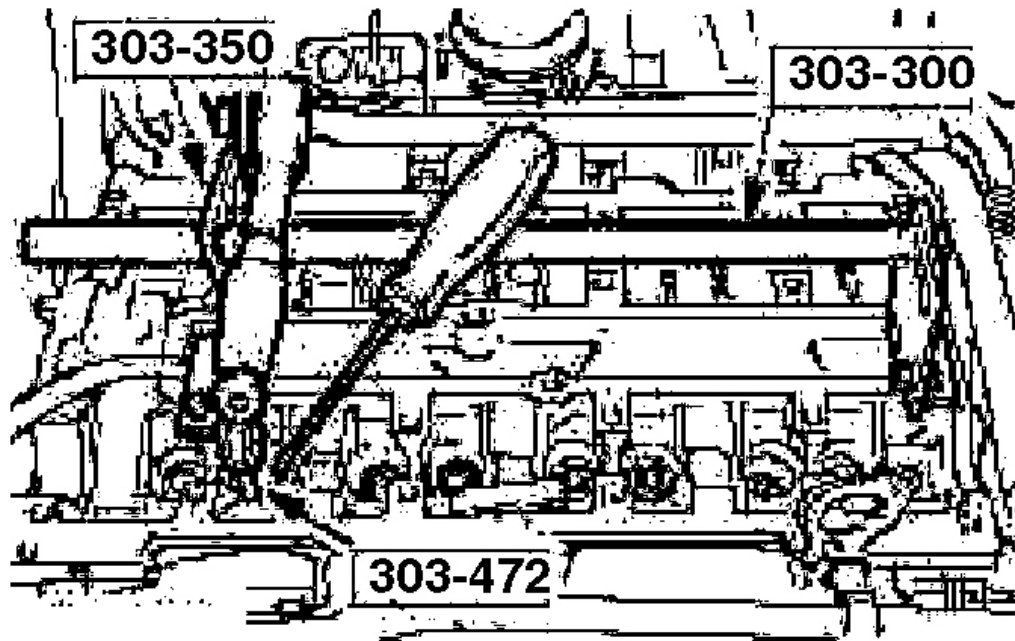
WARNING: Always wear protective goggles when working with compressed air. This can prevent injury. Failure to follow these instructions may result in personal injury.

2. Using special tools, remove the valve springs.
 - Apply compressed air to the cylinders.
 - Compress the valve springs and remove the valve collets.

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

- Remove the valve spring retainers and the valve springs and place them in order to one side. To remove the collets use some grease and a small screw driver.



G03432610

Fig. 27: Removing Valve Springs Using Special Tools
Courtesy of FORD MOTOR CO.

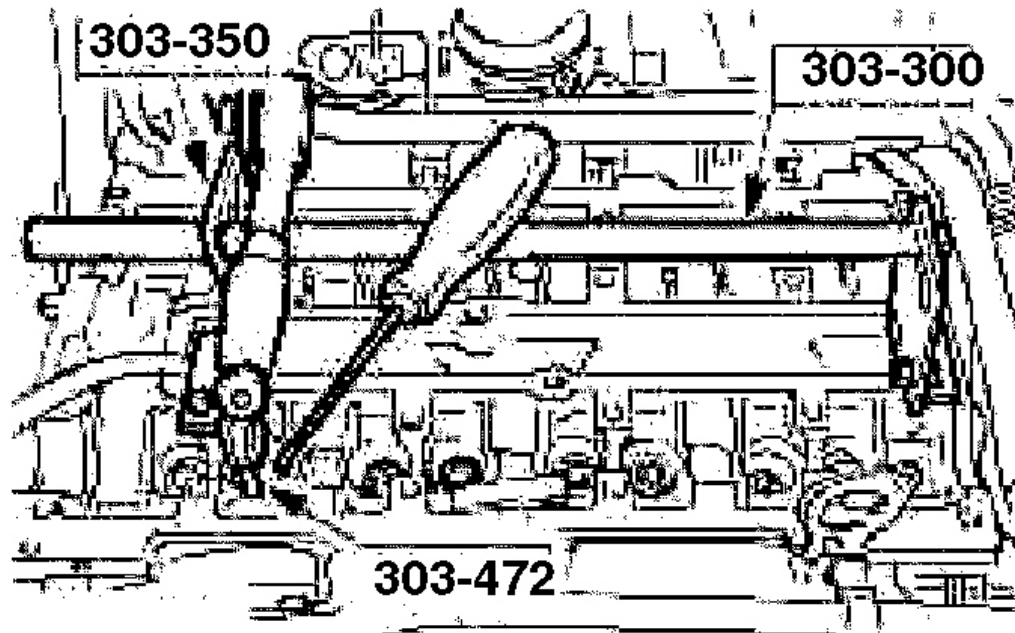
Installation

NOTE: Check that there is no dirt or particles within the valve stem grooves. Check the seating of the valve collets.

1. Using special tools install the valve springs.
 - Insert the valve springs and the valve spring retainers.
 - Compress the valve springs and install the valve collets.
 - Disconnect and remove the air supply.

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432611

Fig. 28: Installing Valve Springs Using Special Tools
Courtesy of FORD MOTOR CO.

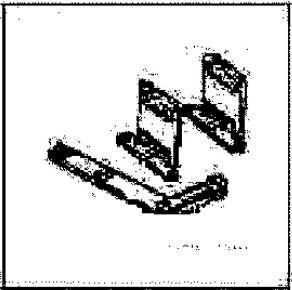

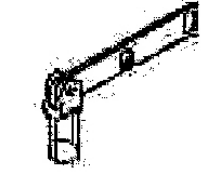

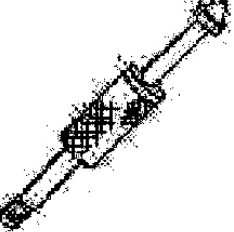
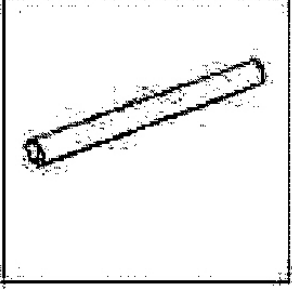
2. Install the valve tappets.

VALVE SEALS

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Compressor, Valve Spring 303-350 (T89P-6565-A)
	Remover, Oil Seal, Valve Stem 303-468 (T94P-6510-AH)
	Compressor, Valve Spring 303-472 (T94P-6565-AH)
	Installer, Oil Seal, Valve Stem 303-470 (T94P-6510-CH)
	Impact Slide Hammer 307-005 (T59L-100-B)
	Compressor, Valve Spring 303-300 (T87C-6565-A)

2002 Ford Focus LX
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

Fig. 29: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

Material

MATERIAL SPECIFICATION

Engine oil	WSS-M2C153-H
------------	--------------

Removal

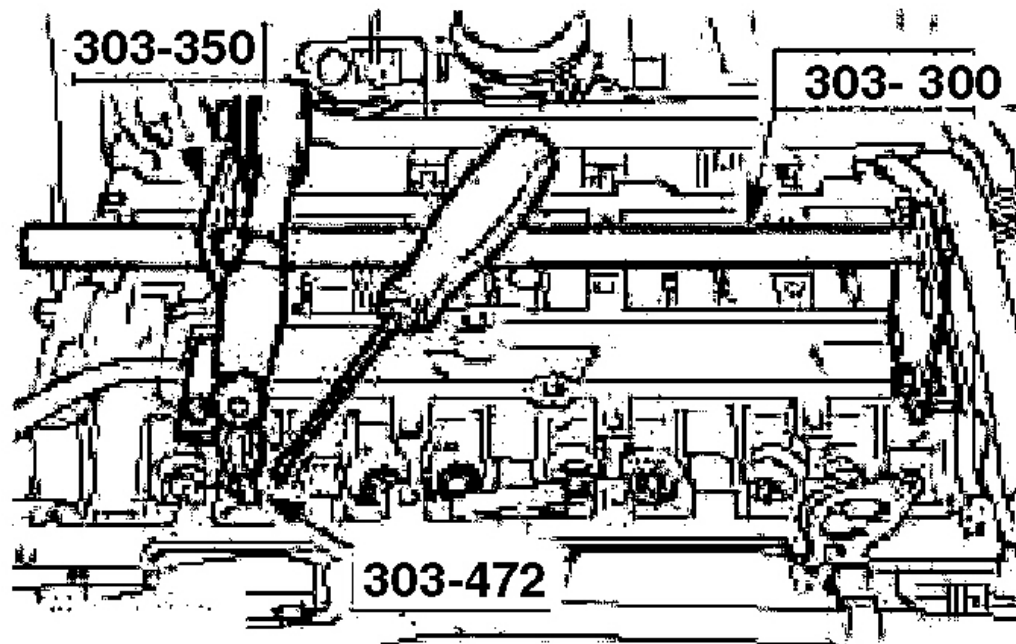
1. Remove the camshafts. For additional information, refer to **CAMSHAFTS** .
 - Remove the valve tappets and place them in order to one side.

WARNING: Always wear protective goggles when working with compressed air. This can prevent injury. Failure to follow these instructions may result in personal injury.

2. Unscrew the spark plug on cylinder No. 1 and connect the compressed air supply.

CAUTION: Use compressed air at 7 to 10 bars.

3. Using the special tools and apply compressed air to the cylinder.
 - Using the special tools, compress the valve springs and remove the valve collets using some grease and a small screwdriver.
 - Remove the valve spring retainers and the valve springs.

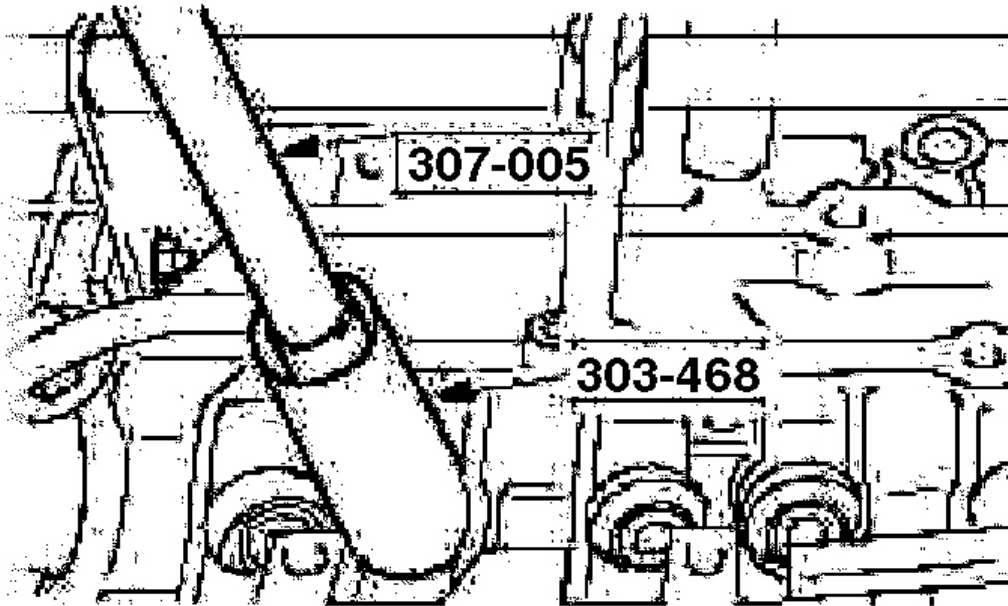


G03432613

Fig. 30: Removing Valve Spring Retainers And Valve Springs
Courtesy of FORD MOTOR CO.

NOTE: Place all parts in order to one side.

4. Remove the valve springs.
5. Using special tools, remove the valve stem seals.

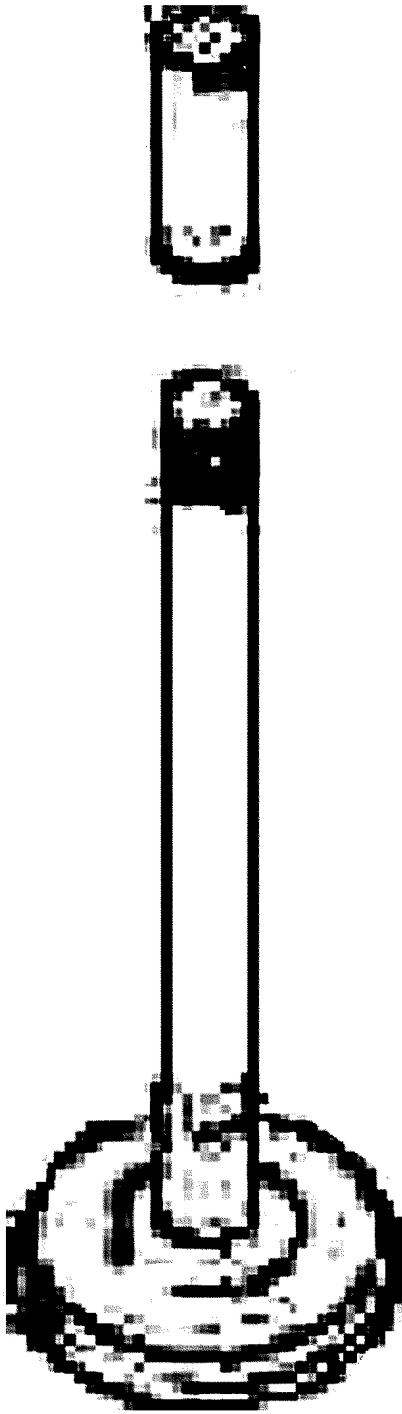


G03432614

Fig. 31: Removing Valve Stem Seals Using Special Tools
Courtesy of FORD MOTOR CO.

Installation

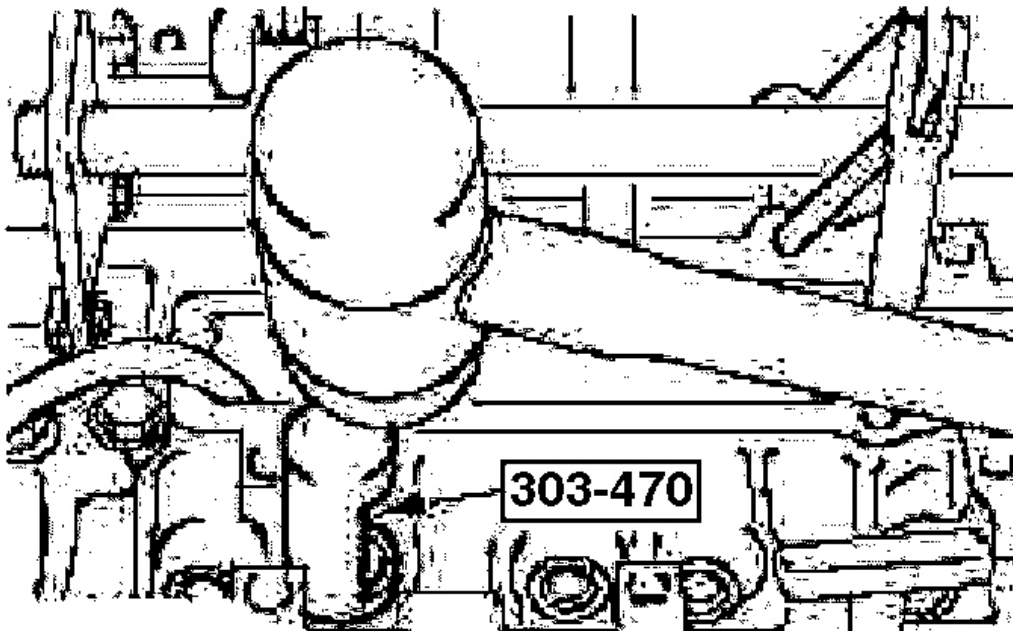
1. Valve stem seal installation sleeve.



G03432615

Fig. 32: Identifying Valve Stem Seal Installation Sleeve
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the valve stem oil seals.

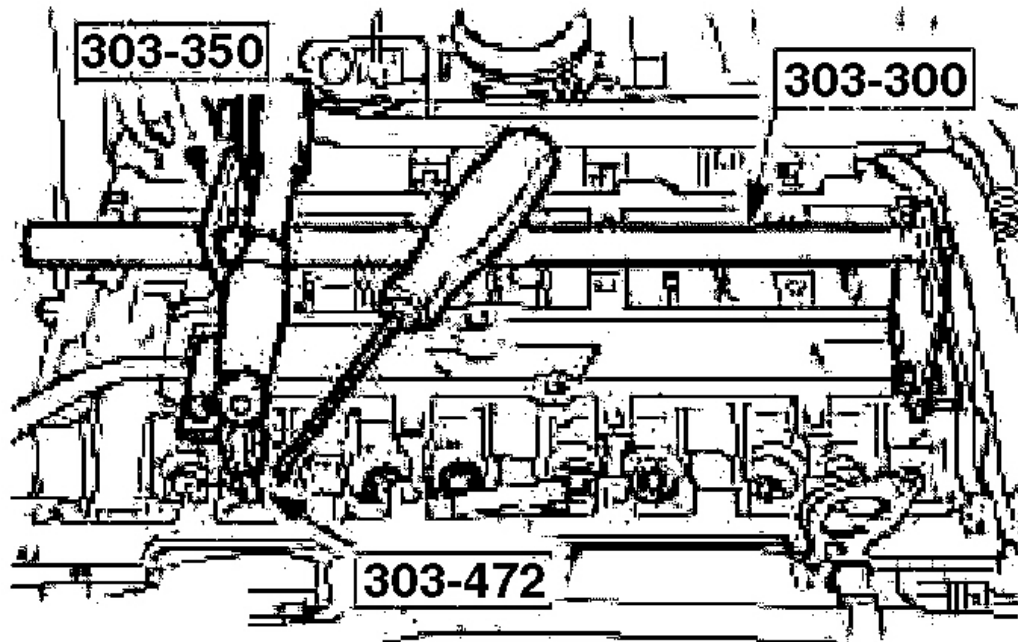


G03432616

Fig. 33: Installing Valve Stem Oil Seals Using Special Tools
Courtesy of FORD MOTOR CO.

NOTE: Check the seating of the valve collets.

3. Using the special tools, install the valve springs.
 - Insert the valve springs and the valve spring retainers.
 - Compress the valve springs and install the valve collets using some grease and a small screwdriver.



G03432617

Fig. 34: Installing Valve Springs Using Special Tools
Courtesy of FORD MOTOR CO.

NOTE: Do not tighten the spark plug at this stage.

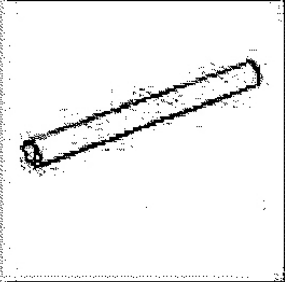
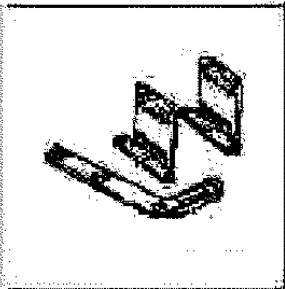

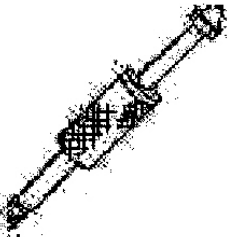
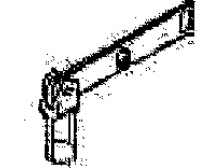

4. Disconnect the compressed air supply and screw in the spark plug.
5. Repeat appropriate steps for all the other cylinders.
6. Coat the valve tappets with engine oil and insert them.
7. Install the camshafts. For additional information, refer to **CAMSHAFTS** .

VALVES

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Compressor, Valve Spring (303-300) T87C-6565-A)
	Compressor, Valve Spring 303-350 (T89P-6565-A)
	Remover, Oil Seal, Valve Stem 303-468 (T94P-6510-AH)
	Impact Slide Hammer 307-005 (T59L-100-B)
	Compressor, Valve Spring 303-472 (T94P-6565-AH)
	Installer, Oil Seal, Valve Stem 303-470 (T94P-6510-CH)

2002 Ford Focus LX
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

Fig. 35: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

Material

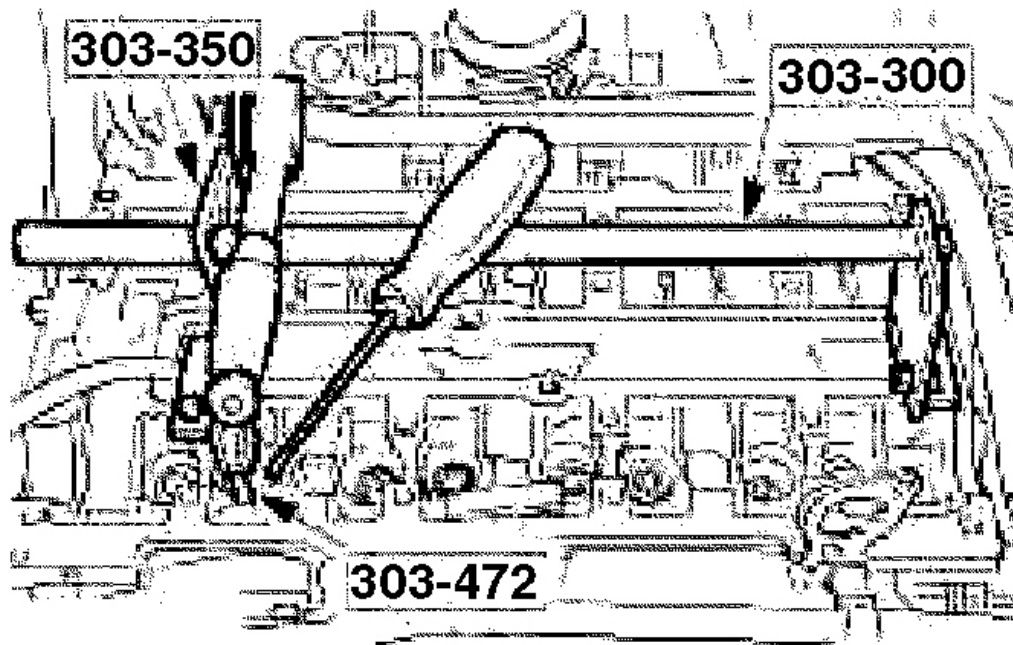
MATERIAL SPECIFICATION

Engine oil	WSS-M2C153-H
------------	--------------

Removal

- NOTE:** Place the cylinder head onto a clean support on the workbench.
- NOTE:** Place wooden wedges in the combustion chamber recesses in the cylinder head to stop the valves from opening during removal.

1. Using the special tools, compress the valve springs.
 - Compress the valve springs and remove the valve collets using some grease and a small screwdriver.
 - Remove the valve spring retainers and the valve springs.

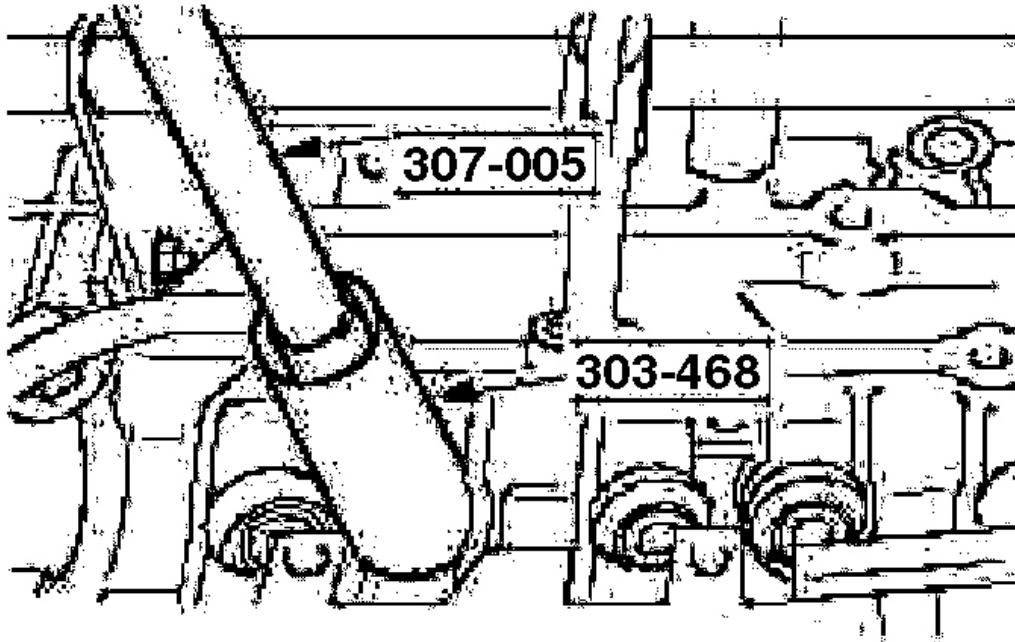


G03432619

Fig. 36: Removing Valve Spring Retainers And Valve Springs
Courtesy of FORD MOTOR CO.

NOTE: Place all parts in order to one side.

2. Remove the valve springs.
3. Using the special tools, remove the valve stem seals.



G03432620

Fig. 37: Removing Valve Stem Seals Using Special Tools
Courtesy of FORD MOTOR CO.

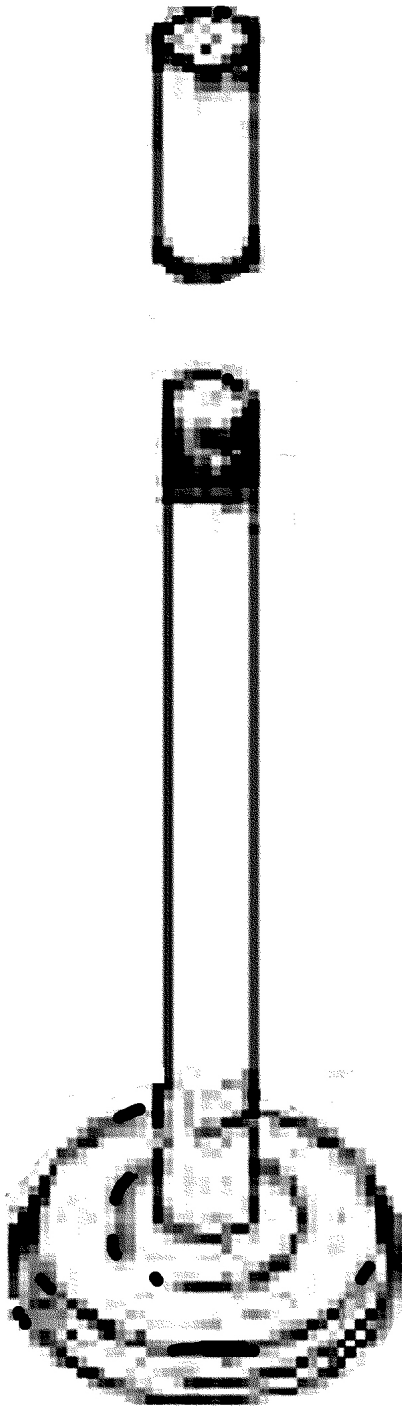
4. Remove the valves and place them in order to one side.

Installation

NOTE: Follow the procedure recommended by the grinding paste manufacturer.

NOTE: Install each valve in the same position from which it was removed.

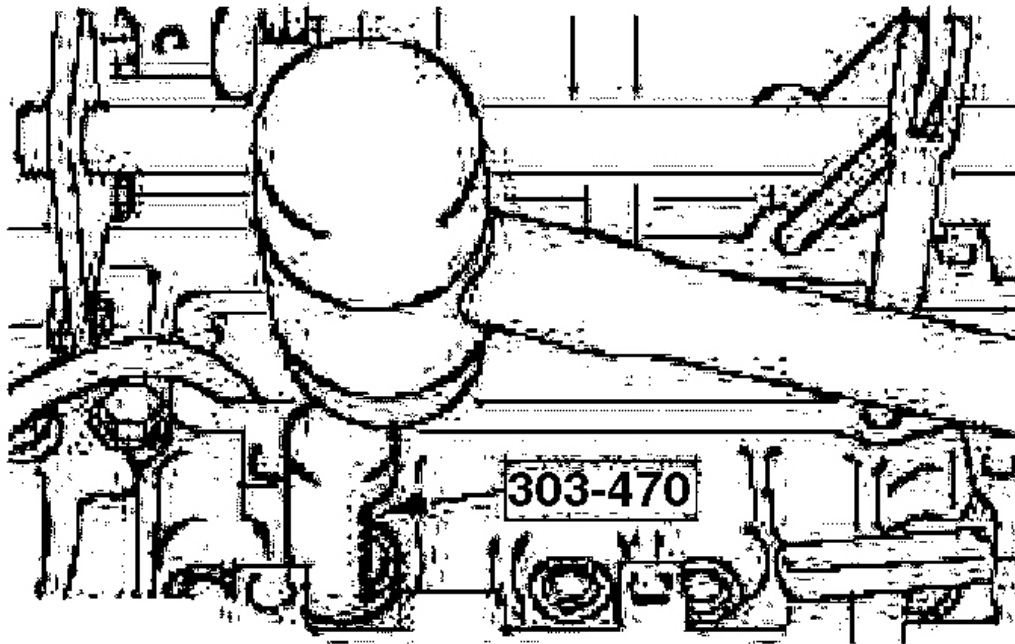
1. Regrind the valves.
2. Thoroughly clean off any traces of sealer and grinding paste from all components.
3. Coat the valve stems with engine oil and insert them in the valve guides.
4. Valve stem seal installation sleeve.



G03432621

Fig. 38: Identifying Valve Stem Seal Installation Sleeve
Courtesy of FORD MOTOR CO.

5. Using the special tool, install new valve stem oil seals.



G03432622

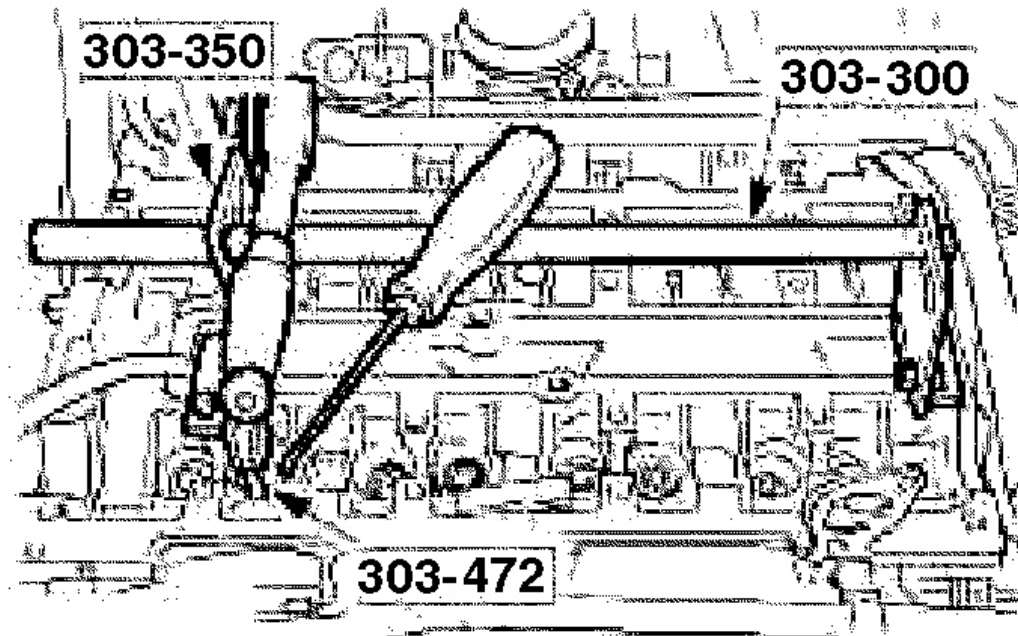
Fig. 39: Installing New Valve Stem Oil Seals Using Special Tools
Courtesy of FORD MOTOR CO.

NOTE: Check the seating of the valve collets.

6. Using the special tools, install the valve springs.
 - Insert the valve springs and the valve spring retainers.
 - Compress the valve springs and install the valve collets using some grease and a small screwdriver.

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

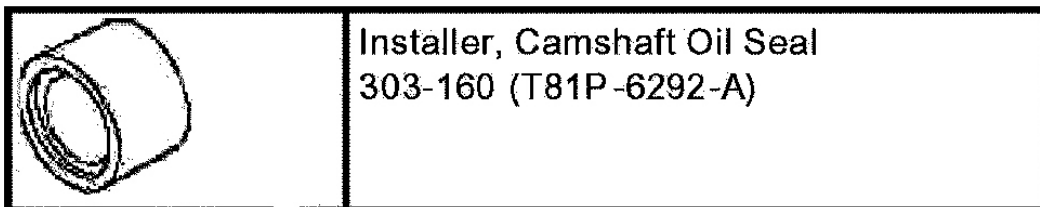


G03432623

Fig. 40: Installing Valve Springs Using Special Tools
Courtesy of FORD MOTOR CO.

CAMSHAFTS

Special Tool(s)



G03432624

Fig. 41: Identifying Special Tool(s)

2002 Ford Focus LX	
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus	

Courtesy of FORD MOTOR CO.

Material

MATERIAL SPECIFICATION

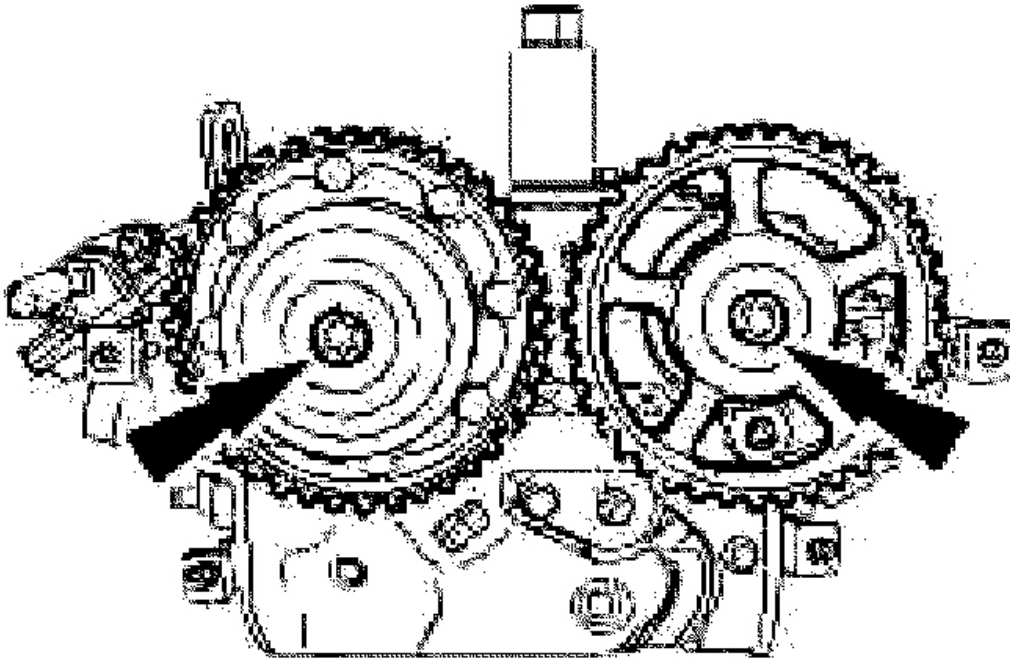
WSK-M2G348-A5	
Engine Oil - 5W-30	WSS-M2C153-G

Removal

CAUTION: Since the engine is not free-wheeling, timing procedures must be followed exactly or piston and valve damage can occur.

- 1. Check the valve clearance. For additional information, refer to VALVE CLEARANCE .
- 2. Remove the timing belt. For additional information, refer to TIMING BELT .

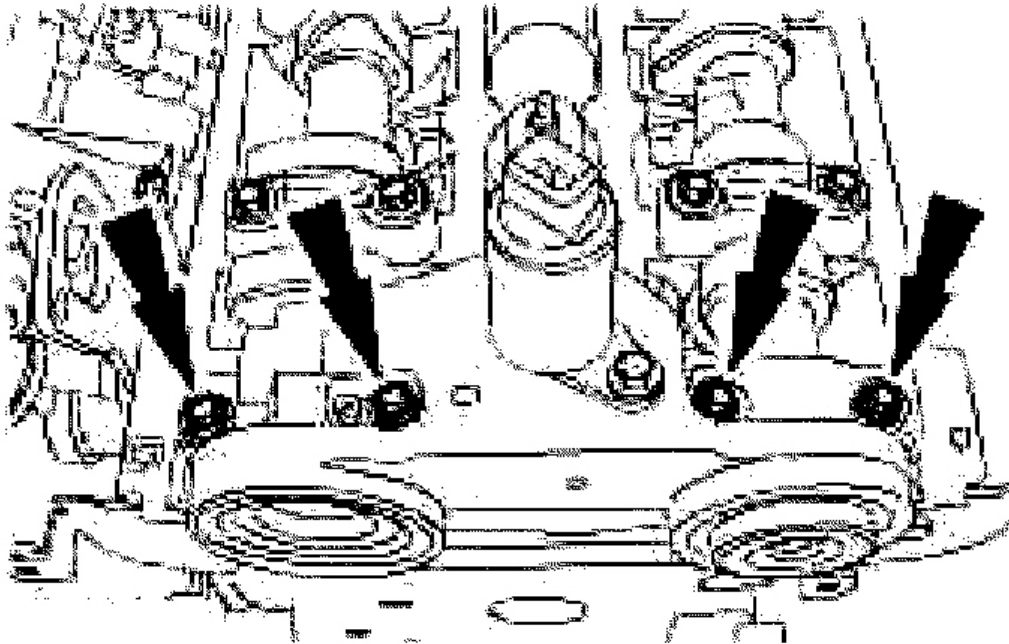
NOTE: Hold the camshafts by the hexagon with an open ended wrench or a suitable pair of locking pliers to stop them from rotating.



G03432625

Fig. 42: Removing Camshaft Pulleys
Courtesy of FORD MOTOR CO.

3. Remove the camshaft pulleys.
4. Remove the oil feed flange.
 - Discard the camshaft oil seals.
 - Discard the oil feed flange oil seal.

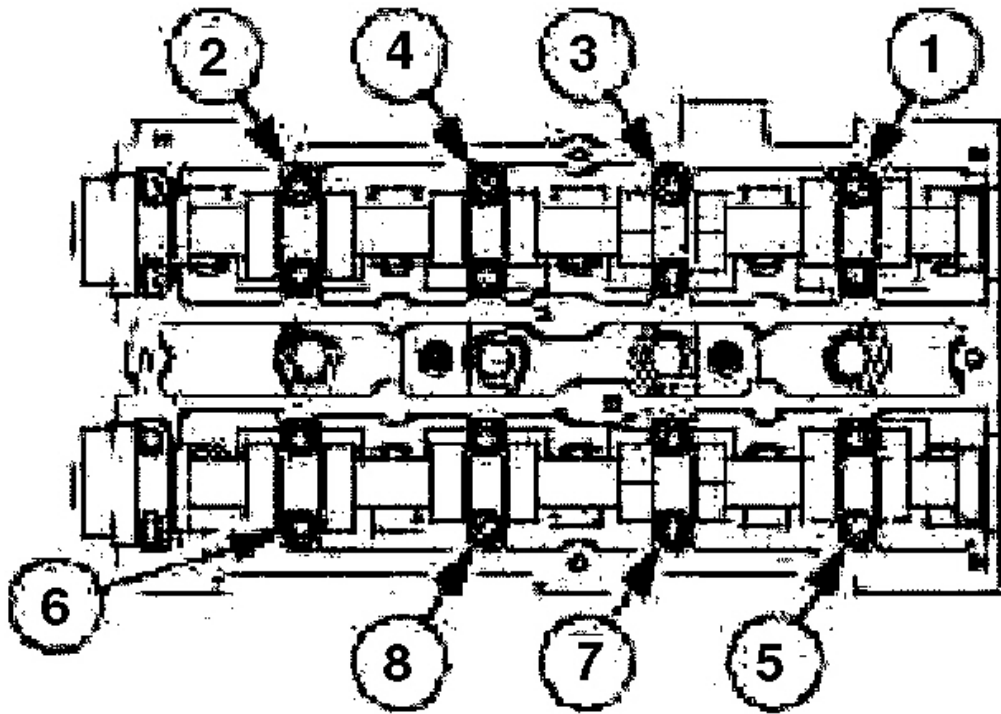


G03432626

Fig. 43: Removing Oil Feed Flange
Courtesy of FORD MOTOR CO.

CAUTION: Loosen the camshaft bearing caps in the sequence shown.

- NOTE:** Working in several stages, evenly loosen each bolt two turns at a time in the indicated sequence and remove the bolts.
- NOTE:** Mark the position of the camshaft bearing caps prior to removal and reinstall the camshaft bearing caps in the same position after installation of the camshaft.



G03432627

Fig. 44: Removing Camshafts
Courtesy of FORD MOTOR CO.

5. Remove the camshafts.

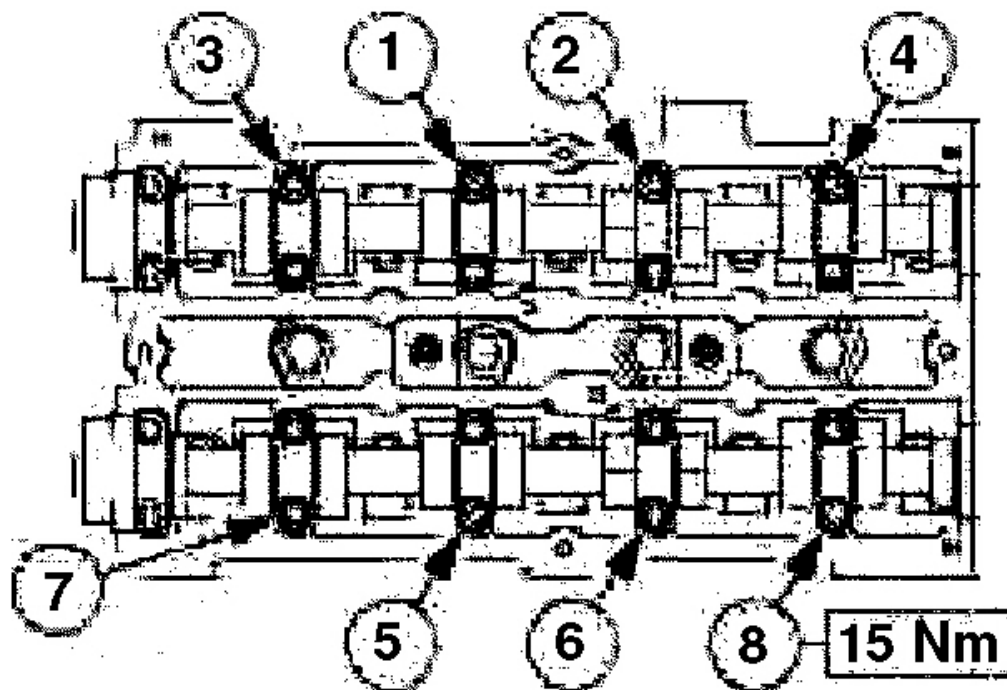
Installation

CAUTION: Since the engine is not free-wheeling, timing procedures must be followed exactly or piston and valve damage can occur.

CAUTION: The camshaft must be held stationary with an open ended wrench or a suitable pair of locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.

NOTE: Working in several stages, install the camshaft bearing caps in the indicated sequence, tighten the bolts evenly half a turn at a time.

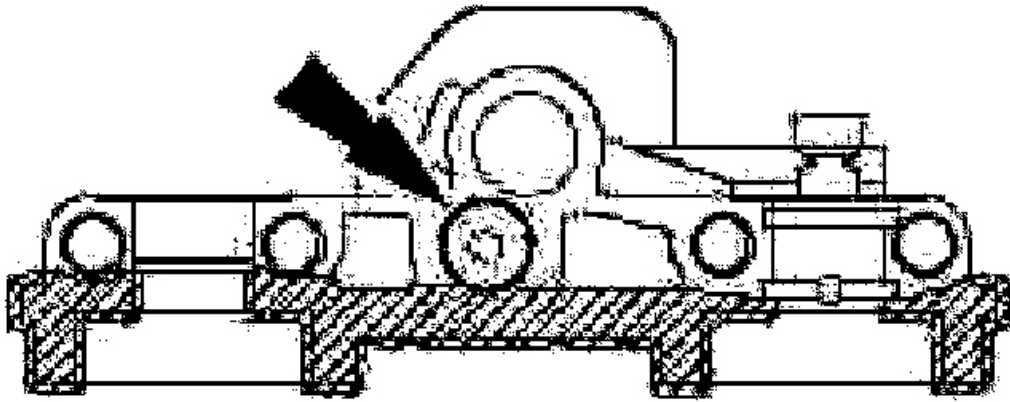
1. Install the camshafts.
 - Tighten the bolts in the sequence shown.



G03432628

Fig. 45: Tightening Sequence of Camshaft Bolts
Courtesy of FORD MOTOR CO.

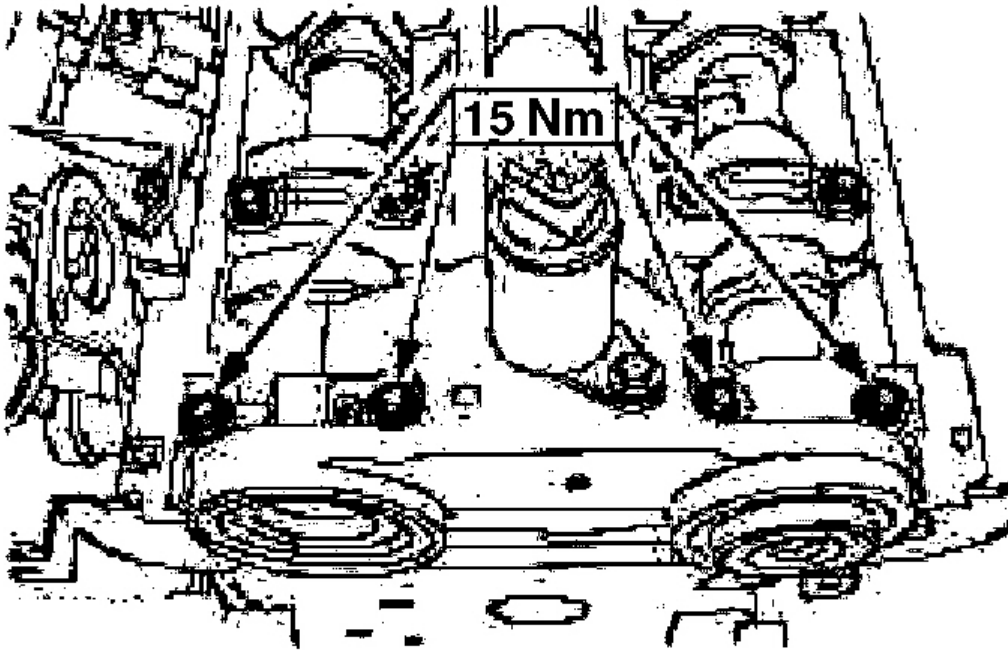
NOTE: Install a new oil feed flange seal.



G03432629

Fig. 46: Installing New Oil Feed Flange Seal
Courtesy of FORD MOTOR CO.

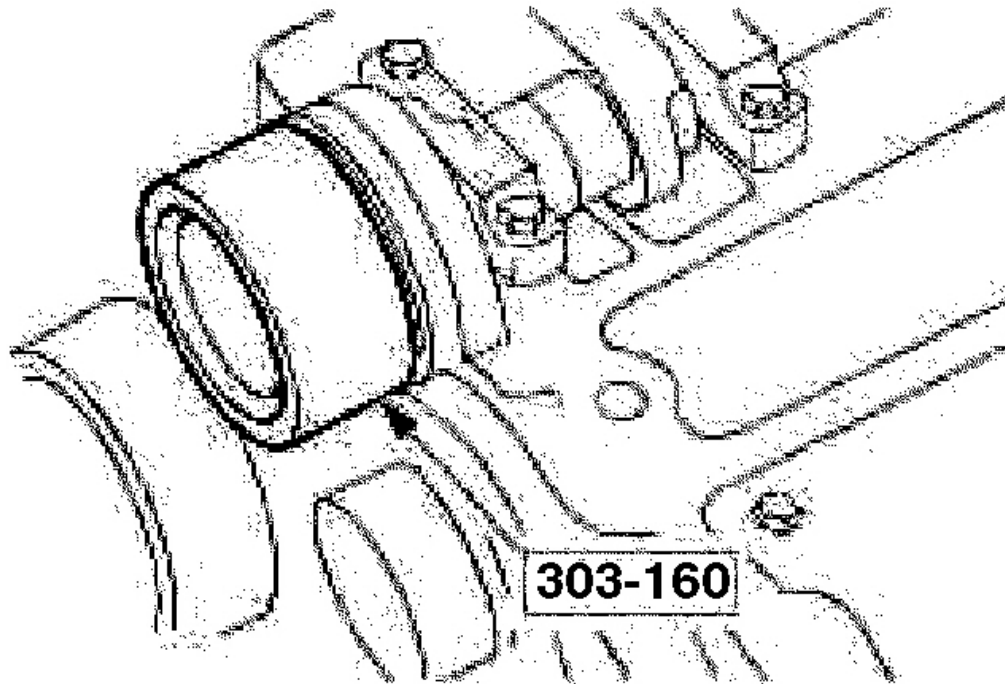
2. Apply sealer to the marked areas on the oil feed flange.
3. Install the oil feed flange.



G03432630

Fig. 47: Installing Oil Feed Flange
Courtesy of FORD MOTOR CO.

4. Check the valve clearance and if necessary adjust. For additional information, refer to **VALVE CLEARANCE**.
5. Using the special tool, install the exhaust camshaft seal.
 - Lubricate the camshaft and oil seal lip with clean engine oil.



G03432631

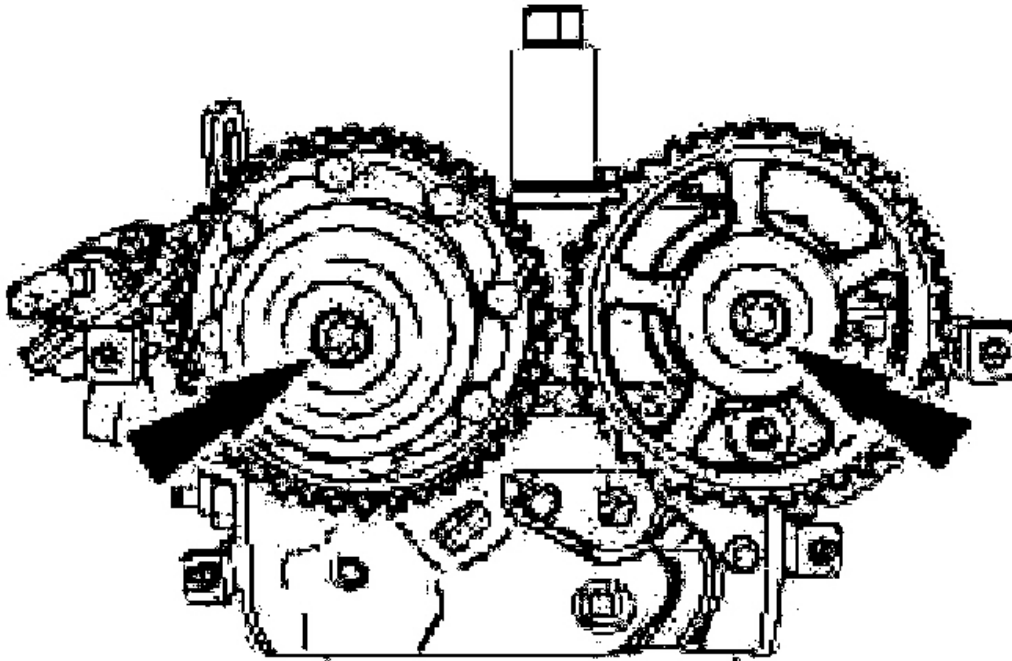
Fig. 48: Installing Exhaust Camshaft Seal Using Special Tools
Courtesy of FORD MOTOR CO.

6. Install the intake camshaft seal.

NOTE: Do not tighten the camshaft pulley retaining bolts at this stage.

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432632

Fig. 49: Installing Camshaft Pulleys
Courtesy of FORD MOTOR CO.

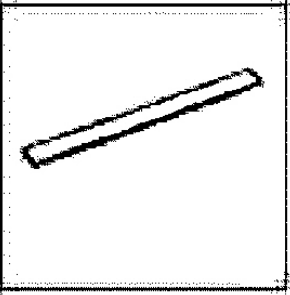

7. Install the camshaft pulleys.
8. Install the timing belt. For additional information, refer to **TIMING BELT** .

TIMING BELT

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Alignment Plate, Camshaft 303-465 (T94P -6256-CH)
	Timing Peg, Crankshaft 303-574 (T97P -6000-A)

G03432633

Fig. 50: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

General Equipment

GENERAL EQUIPMENT

Cable Ties

Hydraulic Jack

Material

MATERIAL SPECIFICATION

ESE-M1244-A

Removal

CAUTION: Since the engine is not free-wheeling, timing procedures must be followed exactly or piston and valve damage can occur.

CAUTION: The camshaft must be held stationary with an open ended wrench or a suitable pair of locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.

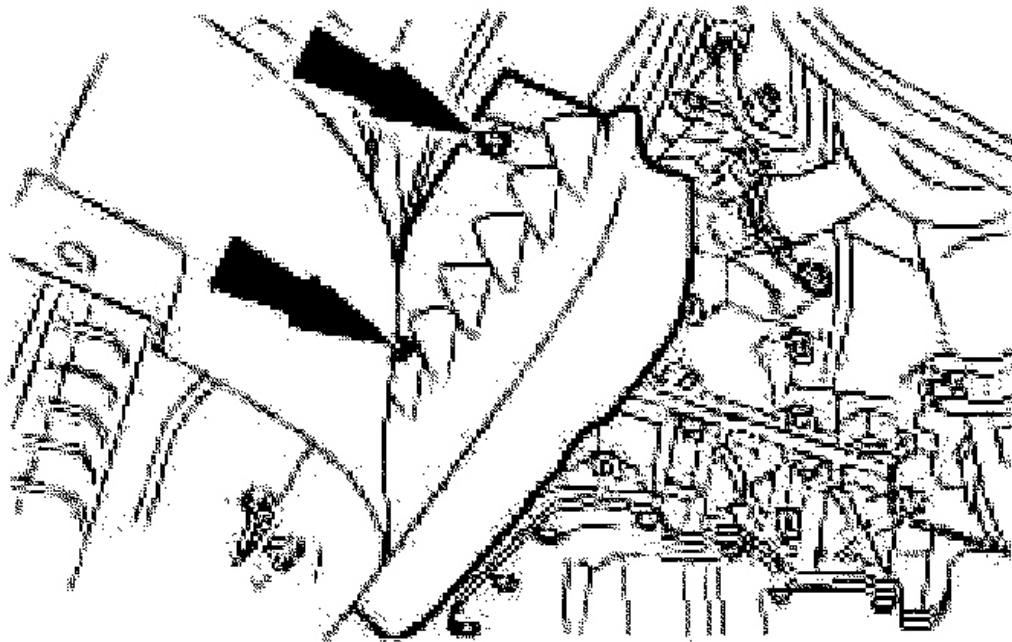
1. General Instructions.

- The positions of the engine mounting and the engine roll restrictor are described looking from the transmission towards the engine.
- If necessary, use Special Tool 412-108 to remove coolant and ventilation hoses.
- Owing to special model variants, some steps do not apply to all vehicles. These are clearly marked in the text.
- If necessary, cut the cable ties and install new cable ties on installation.

2. Disconnect the battery. .

3. Raise and support the vehicle.

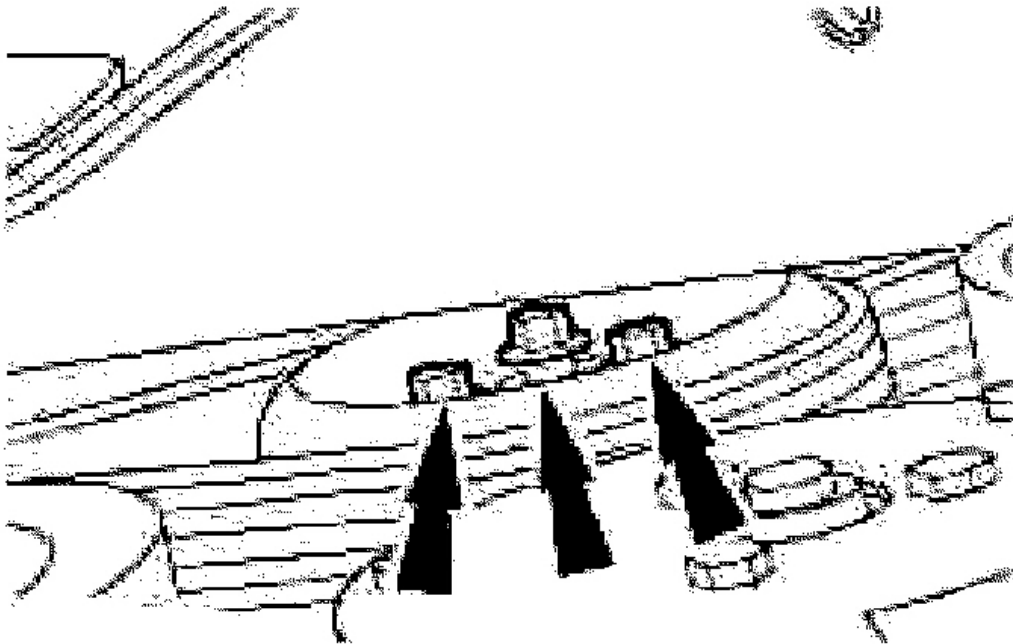
4. Detach the drive belt cover.



G03432634

Fig. 51: Detaching Drive Belt Cover
Courtesy of FORD MOTOR CO.

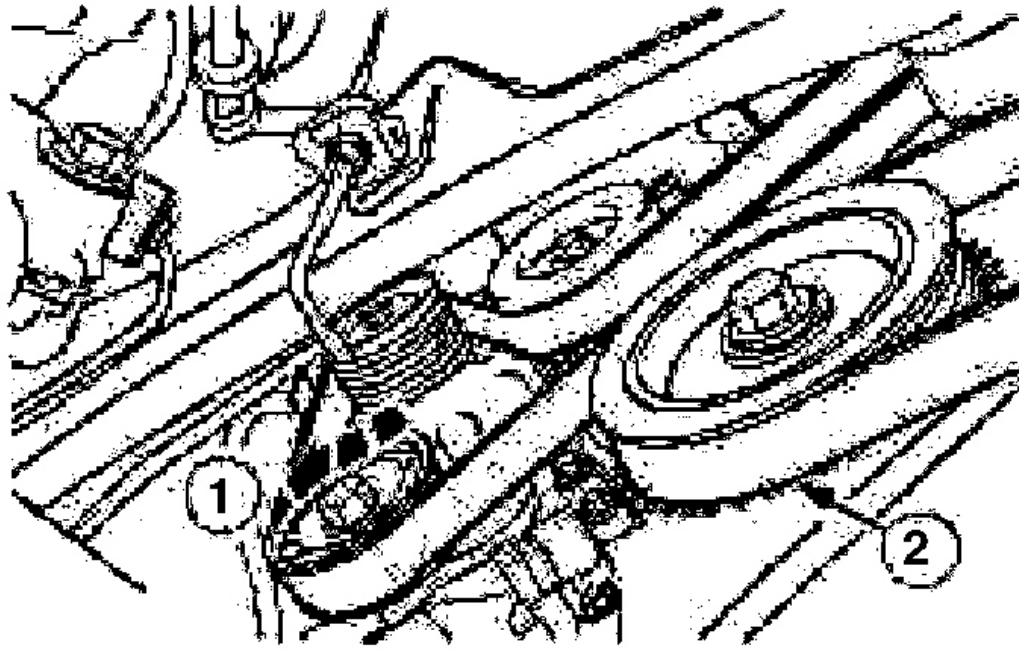
5. Loosen the coolant pump pulley retaining bolts.



G03432635

Fig. 52: Loosening Coolant Pump Pulley Retaining Bolts
Courtesy of FORD MOTOR CO.

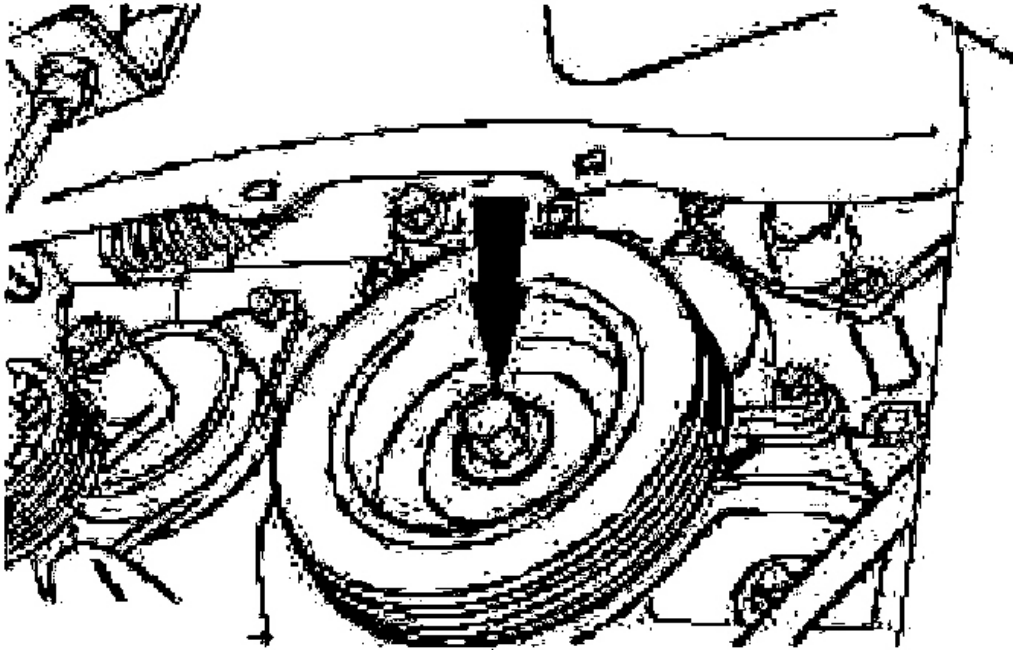
6. Remove the accessory drive belt.
 1. Rotate the accessory drive belt tensioner clockwise.
 2. Remove the accessory drive belt.



G03432636

Fig. 53: Removing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

7. Remove the crankshaft pulley.



G03432637

Fig. 54: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

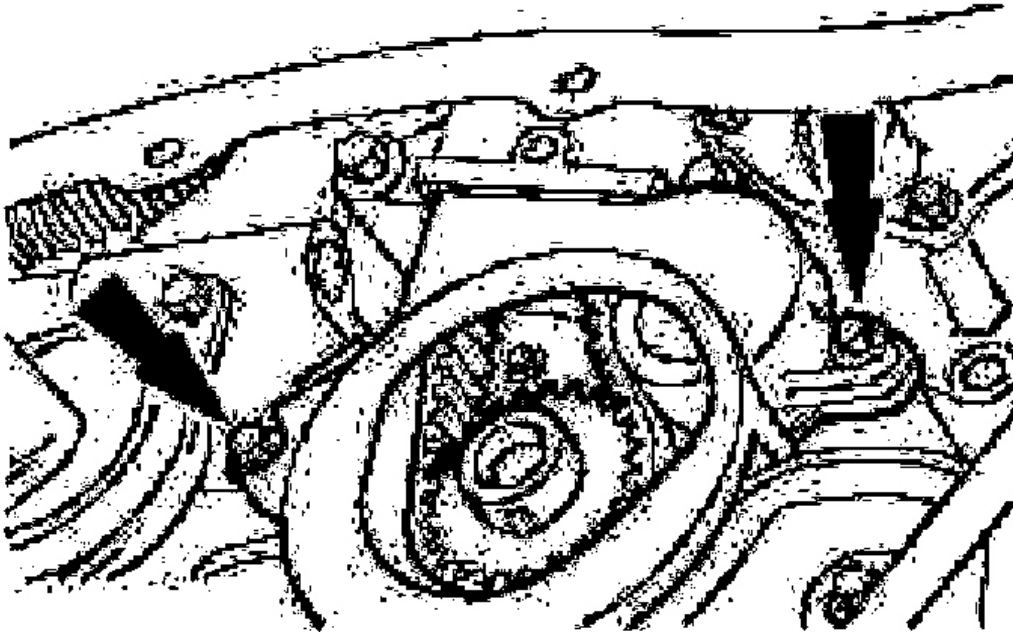
8. Remove the coolant pump pulley.



G03432638

Fig. 55: Removing Coolant Pump Pulley
Courtesy of FORD MOTOR CO.

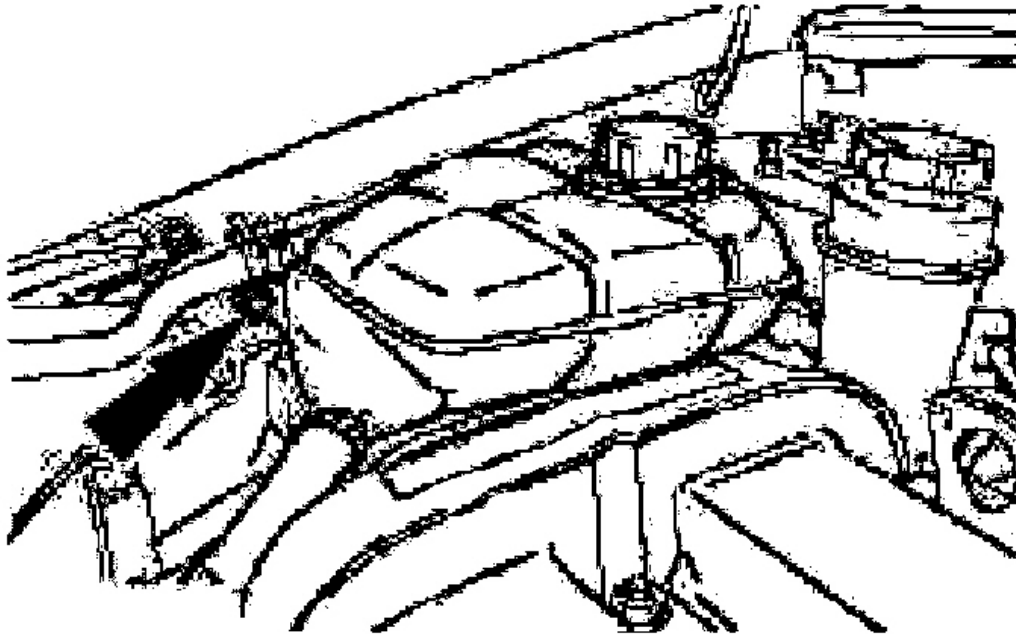
CAUTION: The removal of the lower part of the engine front cover is necessary to avoid damage to the timing belt.



G03432639

Fig. 56: Detaching Lower Timing Belt Cover
Courtesy of FORD MOTOR CO.

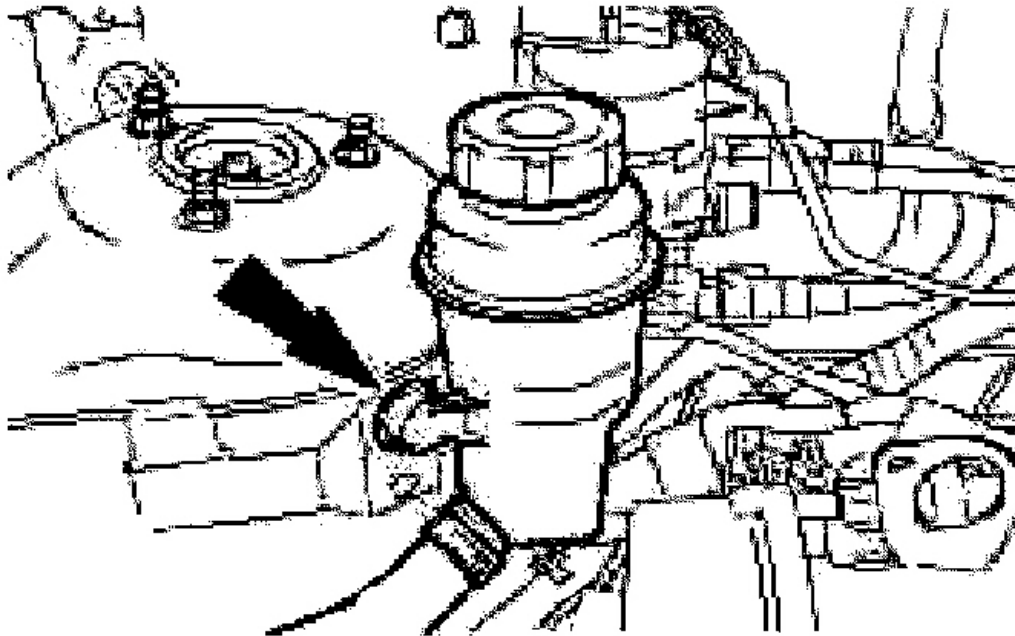
9. Detach the lower timing belt cover.
10. Lower the vehicle.
11. Detach the coolant expansion tank and position it to one side.



G03432640

Fig. 57: Detaching Coolant Expansion Tank And Position To One Side
Courtesy of FORD MOTOR CO.

12. Detach the PAS reservoir and position it to one side.



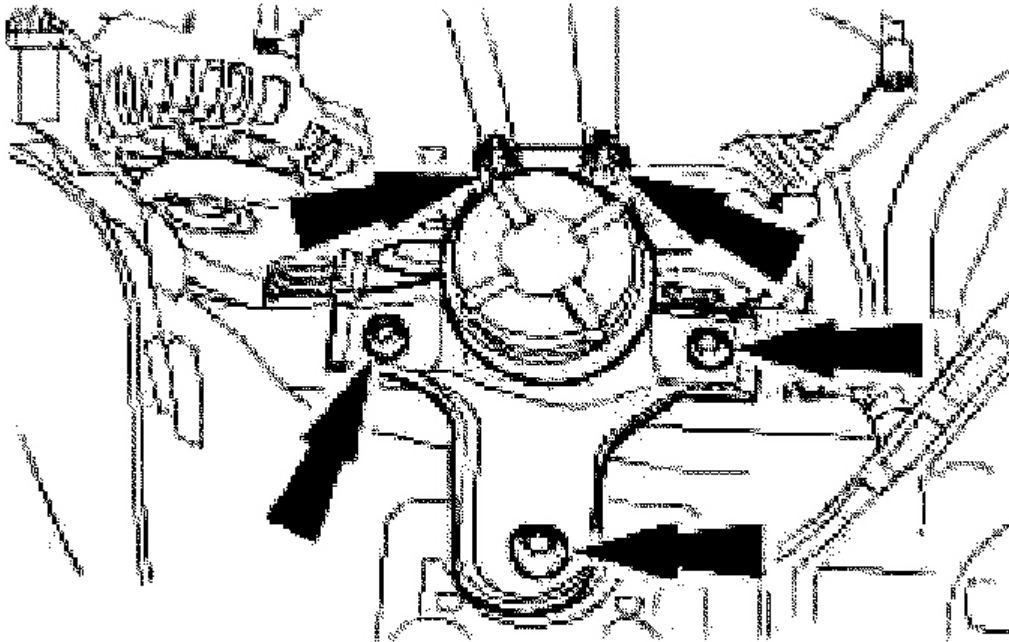
G03432641

Fig. 58: Detaching PAS Reservoir And Position To One Side
Courtesy of FORD MOTOR CO.

CAUTION: Insert a suitable wooden block between the oil pan and the hydraulic jack.

13. Position the hydraulic jack with the wooden block under the oil pan and raise so that the engine front mount is free from load.

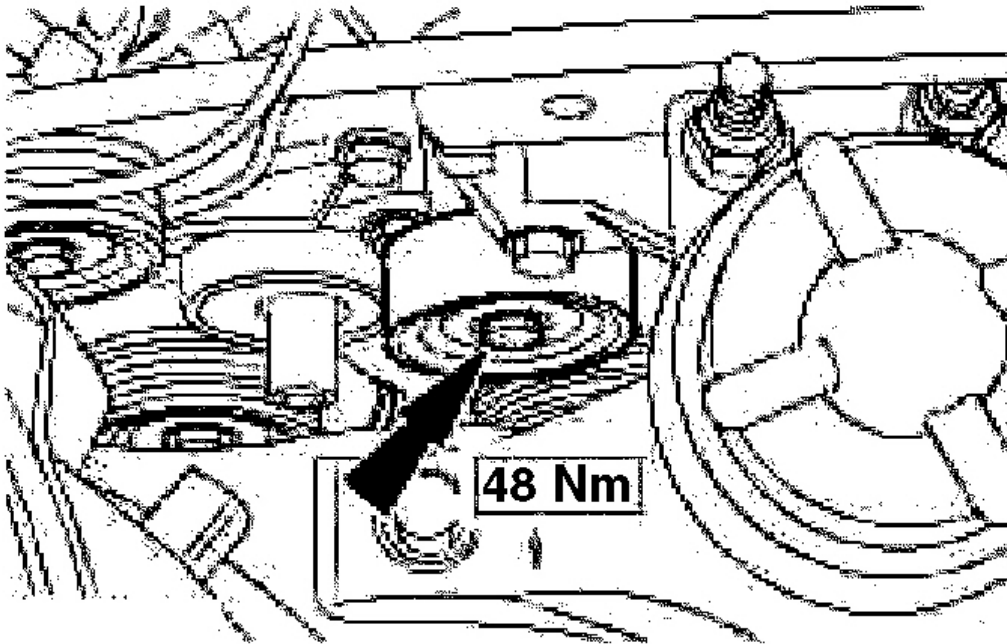
NOTE: Mark the position of the engine front mount.



G03432642

Fig. 59: Removing Engine Front Mount
Courtesy of FORD MOTOR CO.

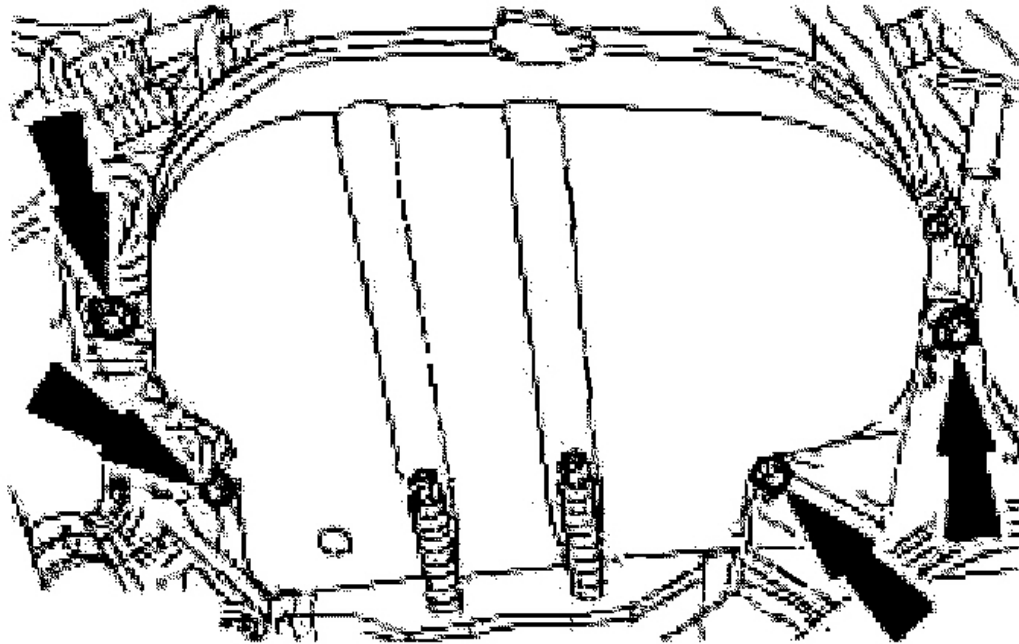
14. Remove the engine front mount.
15. Remove the accessory drive belt idler pulley.



G03432643

Fig. 60: Removing Accessory Drive Belt Idler Pulley
Courtesy of FORD MOTOR CO.

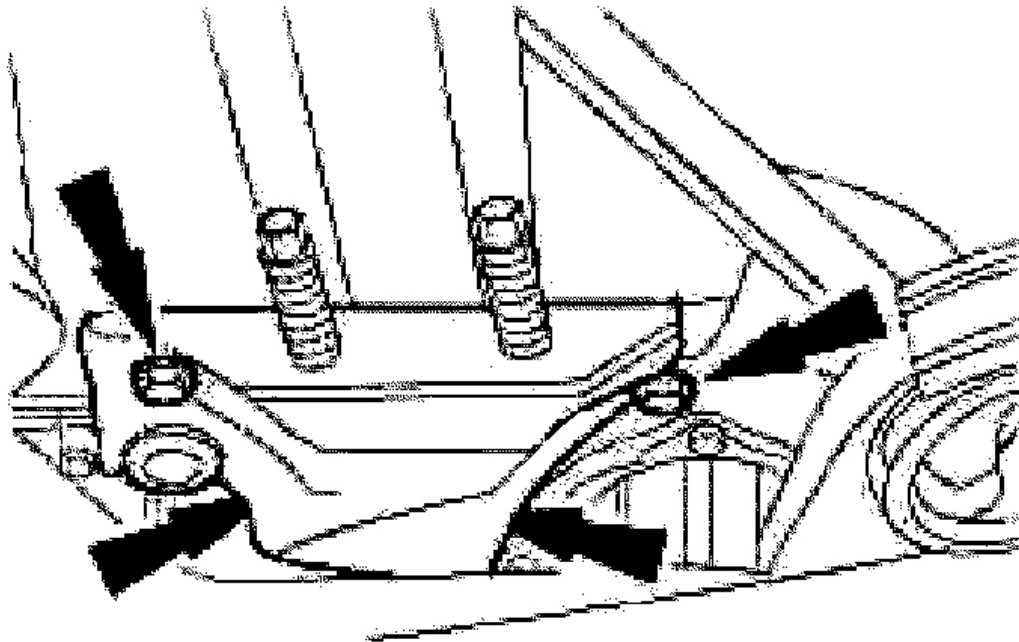
16. Detach the timing belt upper cover.
 - Leave the timing belt cover in its installed position.



G03432644

Fig. 61: Detaching Timing Belt Upper Cover
Courtesy of FORD MOTOR CO.

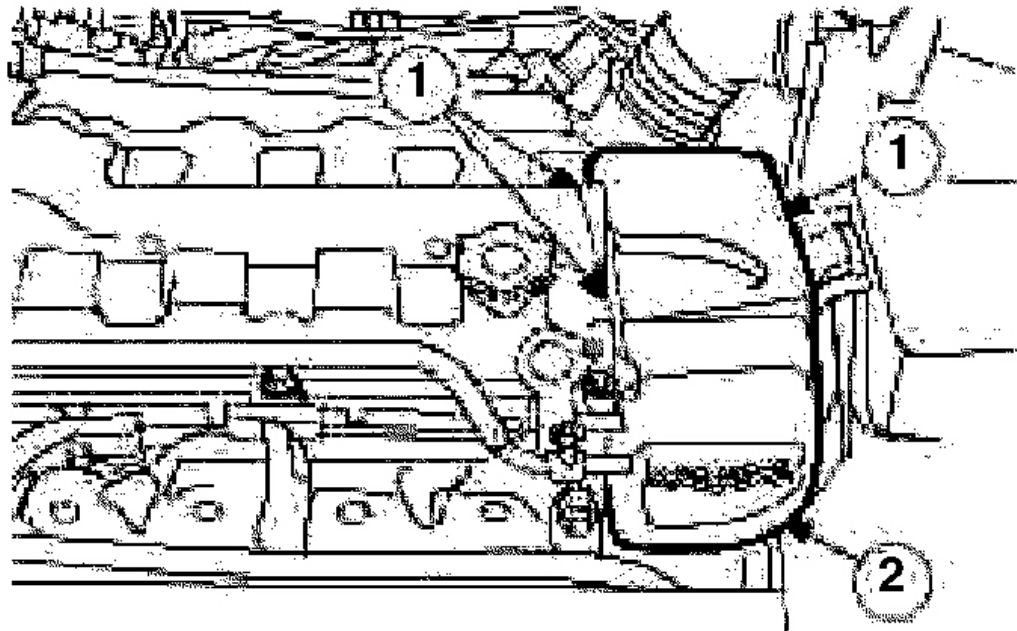
17. Remove the engine front mount bracket.
 - Remove the timing belt upper cover.



G03432645

Fig. 62: Removing Engine Front Mount Bracket
Courtesy of FORD MOTOR CO.

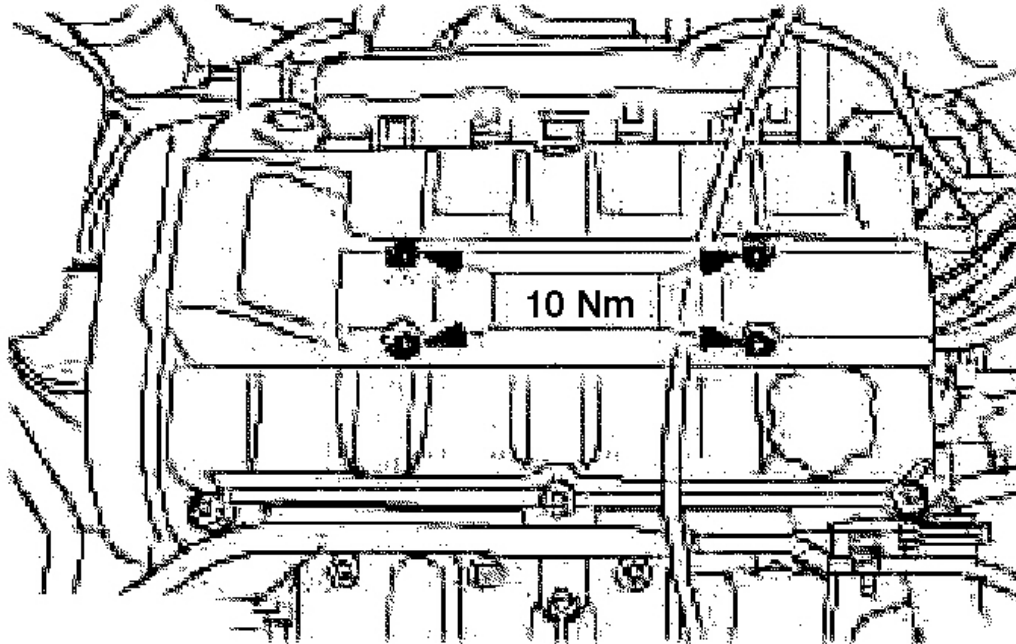
18. Remove the ignition coil pack cover.
 1. Detach the retaining clips.
 2. Detach the coolant pipe from the retaining clip.



G03432646

Fig. 63: Removing Ignition Coil Pack Cover
Courtesy of FORD MOTOR CO.

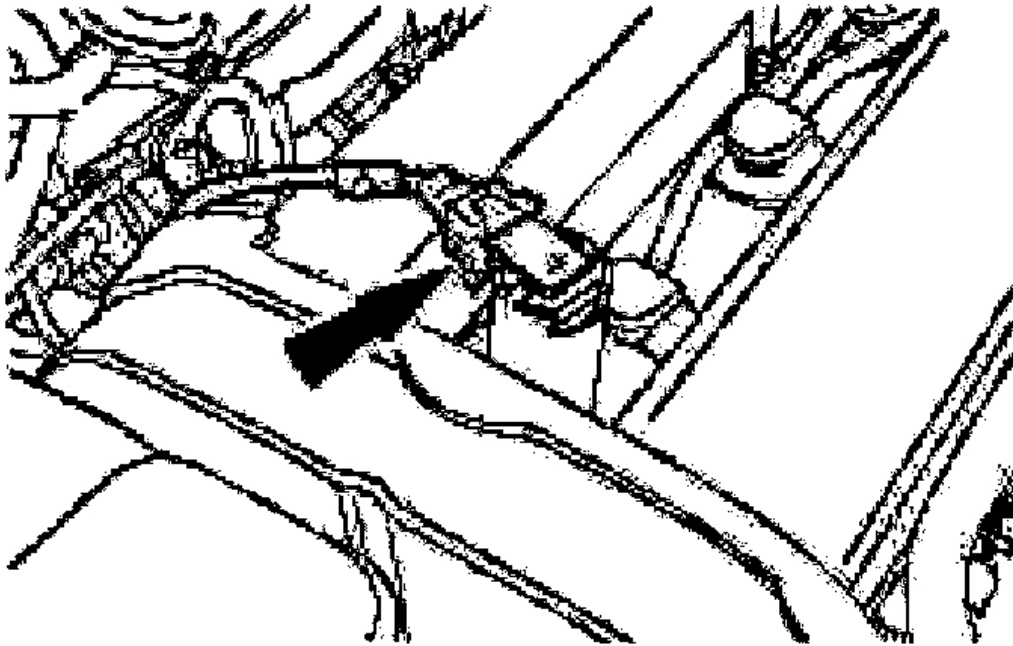
19. Remove the engine cover.



G03432647

Fig. 64: Removing Engine Cover
Courtesy of FORD MOTOR CO.

20. Disconnect the VCT valve electrical connector.



G03432648

Fig. 65: Disconnecting VCT Valve Electrical Connector
Courtesy of FORD MOTOR CO.

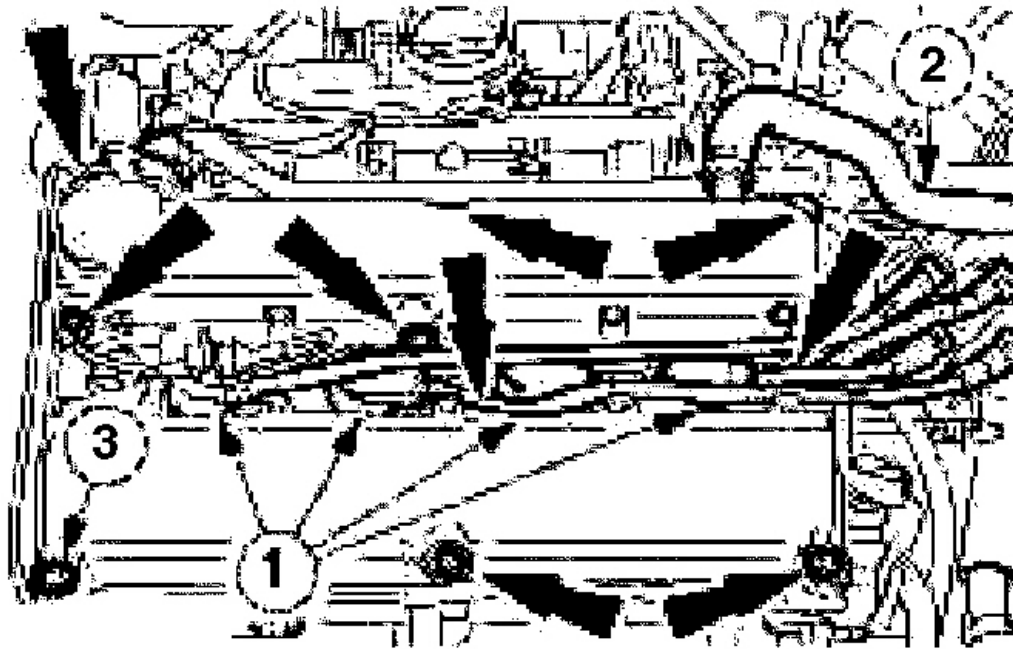
CAUTION: Do not pull the cable when removing the spark plug connectors. If necessary, remove the ignition cables from the ignition coil to avoid kinking the cables. Turn the spark plug connectors slightly before removing to loosen the seal.

CAUTION: Pull off the spark plug connectors in line with the spark plugs.

NOTE: Loosening sequence: from the outside to the inside, working diagonally.

21. Remove the valve cover.
 1. Disconnect the spark plug connectors.

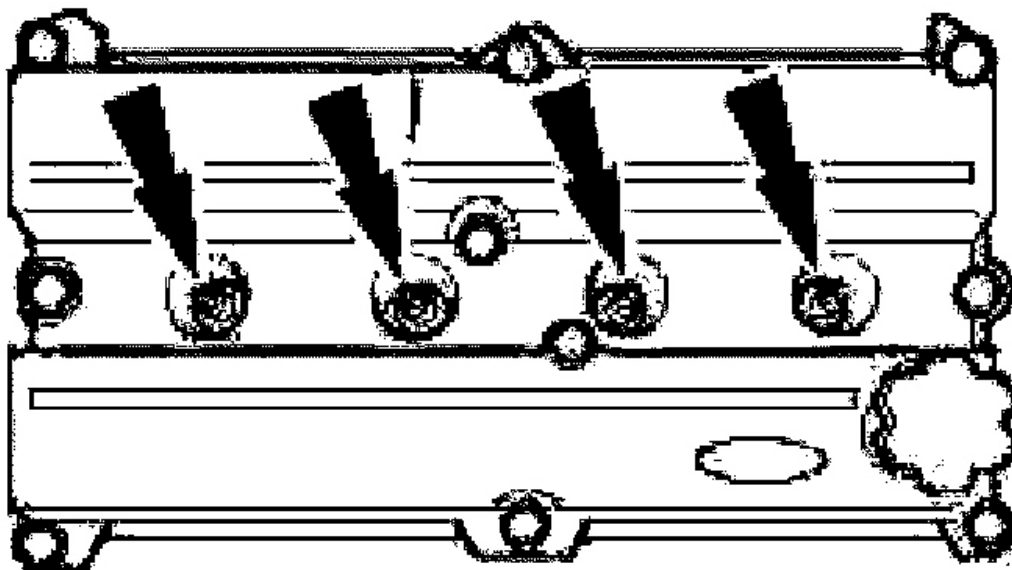
2. Detach the positive crankcase ventilation (PCV) hose.
3. Fully loosen ten bolts.



G03432649

Fig. 66: Disconnecting Spark Plug Connectors
Courtesy of FORD MOTOR CO.

22. Remove the spark plugs.



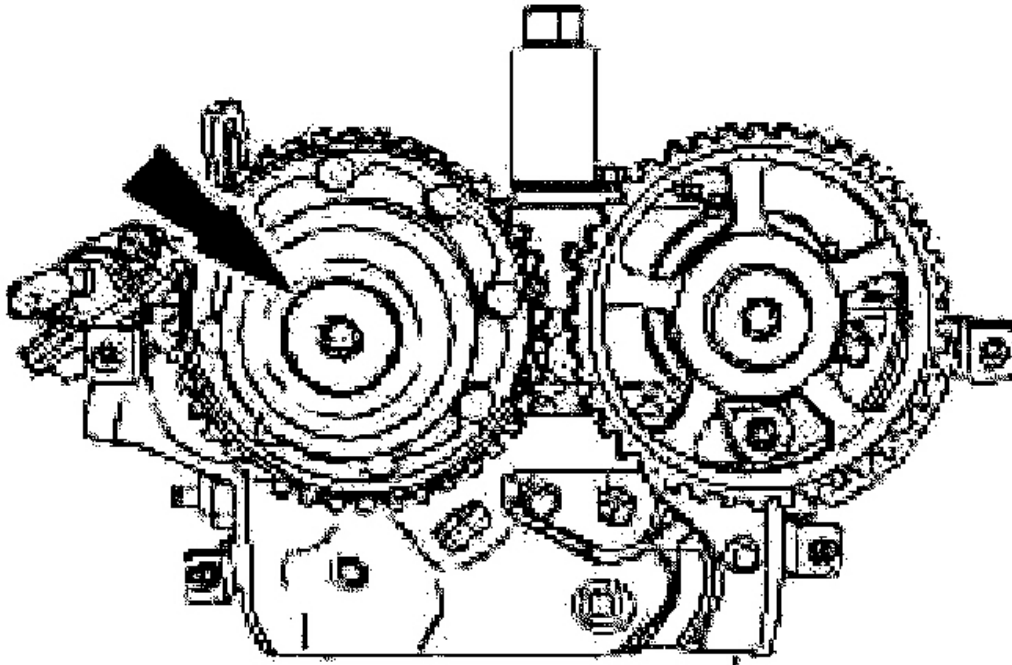
G03432650

Fig. 67: Removing Spark Plugs
Courtesy of FORD MOTOR CO.

NOTE: At TDC the crankshaft keyway is in the 12 o' clock position.

23. Turn the engine to 60 degrees BTDC on cylinder number 1.

NOTE: Use an open ended wrench or suitable pliers to prevent the camshaft rotating from rotating.

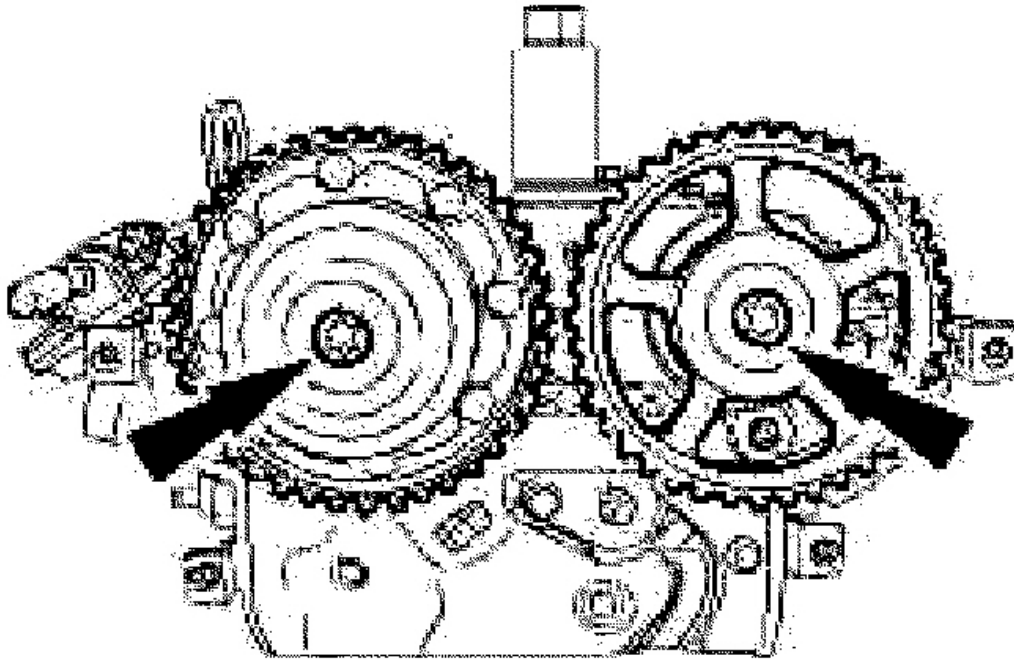


G03432651

Fig. 68: Removing Intake Camshaft Pulley Blanking Plug
Courtesy of FORD MOTOR CO.

24. Remove the intake camshaft pulley blanking plug.

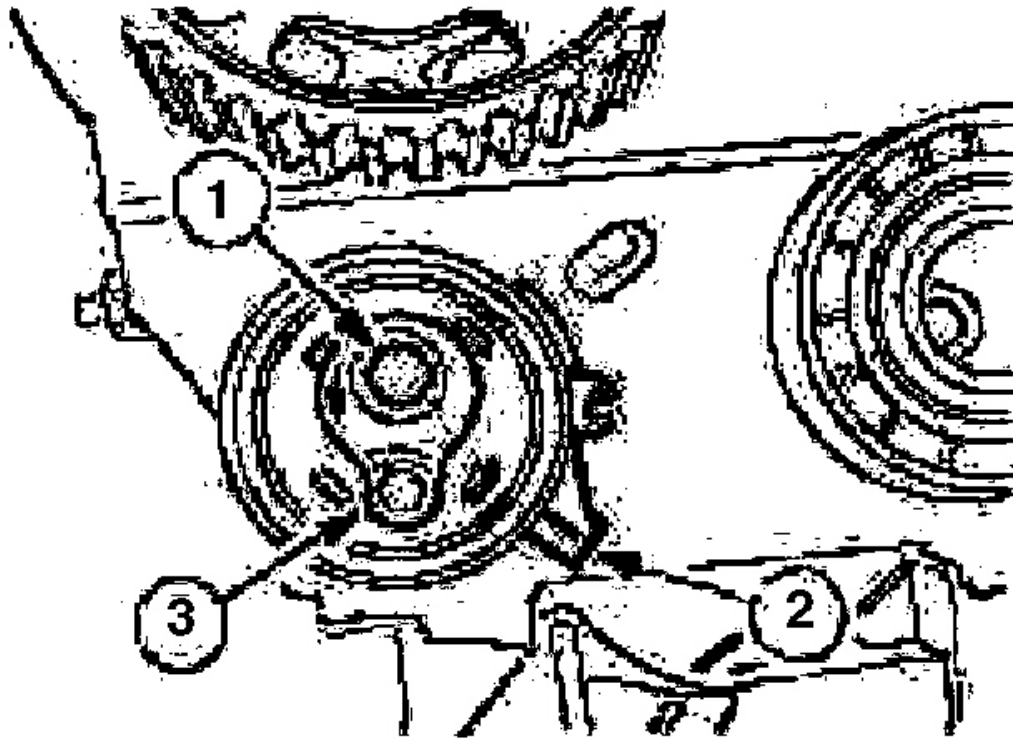
NOTE: Use an open ended wrench or suitable pliers to prevent the camshaft rotating from rotating.



G03432652

Fig. 69: Loosening Camshaft Pulley Retaining Bolts
Courtesy of FORD MOTOR CO.

25. Loosen the camshaft pulley retaining bolts.
26. Detension the timing belt (timing belt removed for clarity).
 1. Loosen the bolt four turns.
 2. Position the tensioner so the locating tab is at approximately the 4 o'clock position.
 3. Line up the hexagonal key slot in the tensioner adjusting washer with the pointer that is located behind the pulley.



G03432653

Fig. 70: Detensioning Timing Belt
Courtesy of FORD MOTOR CO.

27. Remove the timing belt.

Installation

CAUTION: Since the engine is not free-wheeling, timing procedures must be followed exactly or piston and valve damage can occur.

CAUTION: The camshaft must be held stationary with an open ended wrench or a suitable pair of locking pliers. Do not use the alignment tool to hold the camshaft in position or damage to the camshaft may occur.

NOTE: Do not tighten the bolts. The camshaft timing pulleys must be able to turn freely on the camshafts.

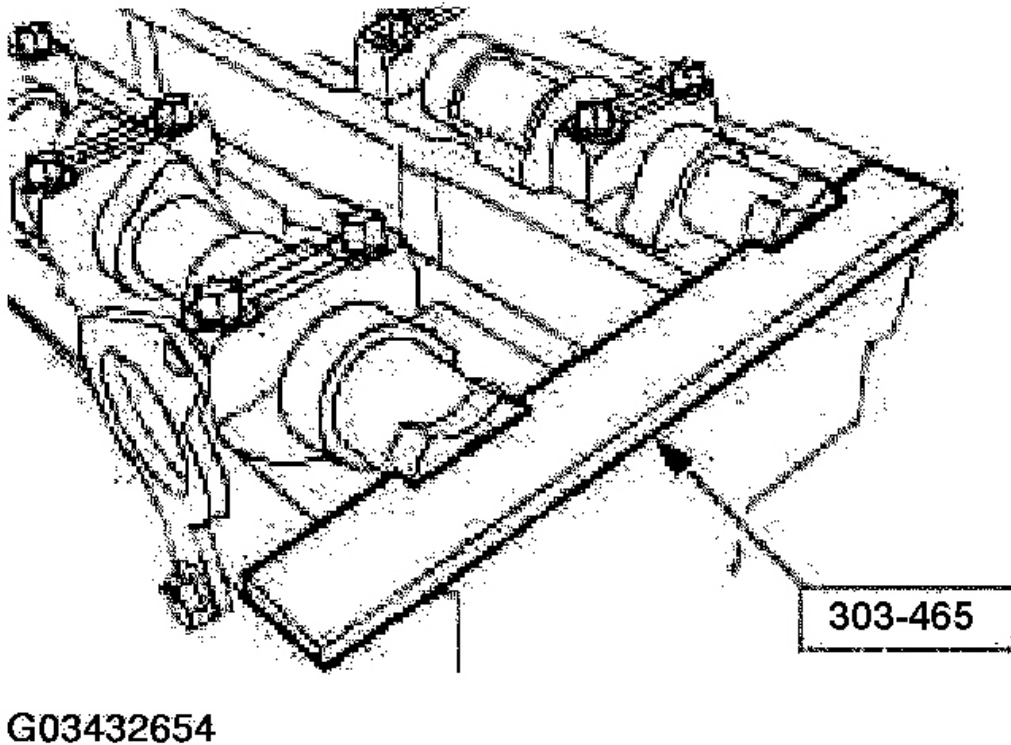
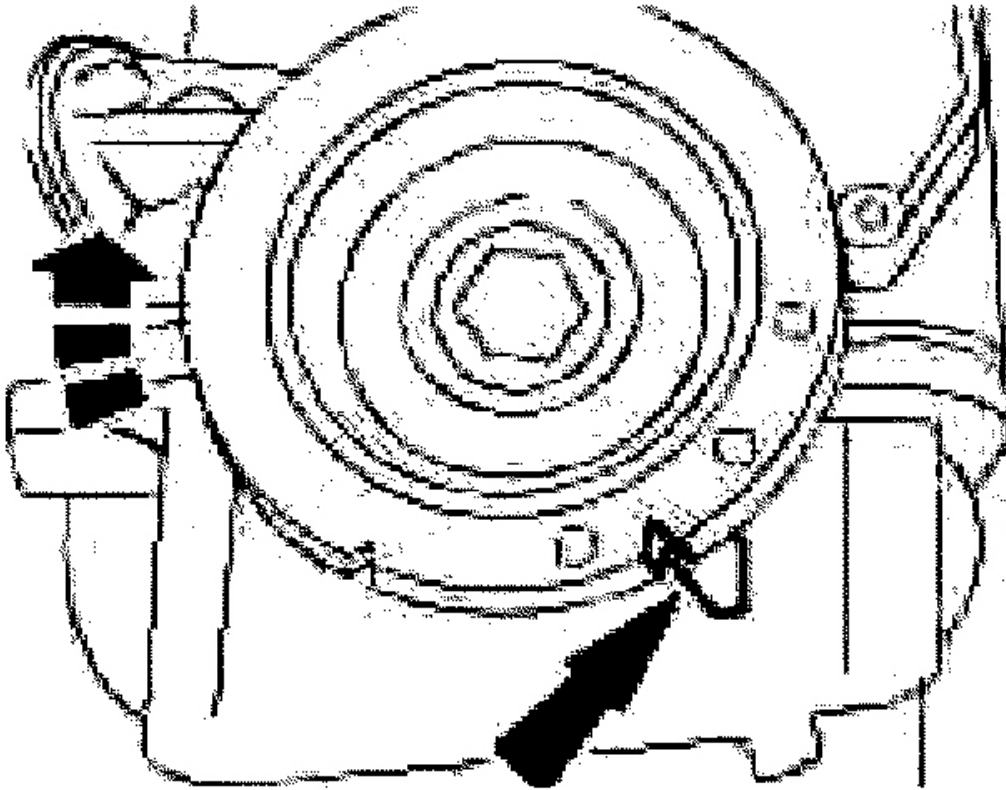


Fig. 71: Inserting Special Tool Into Camshafts
Courtesy of FORD MOTOR CO.

1. Turn the camshafts to ignition position on cylinder number 1 and insert the special tool into the camshafts.

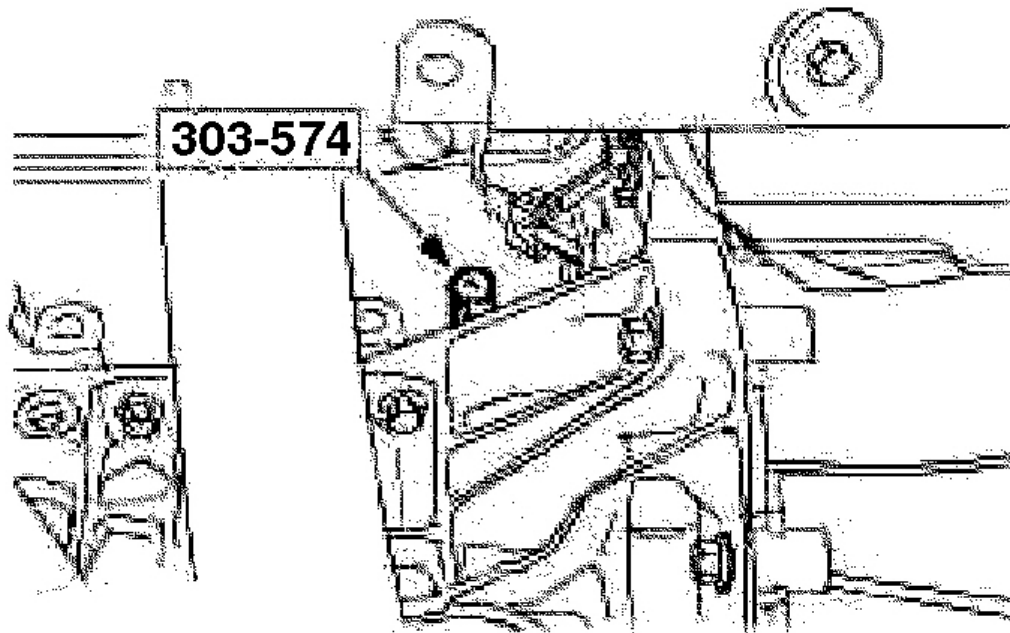
NOTE: Rotate the crankshaft clockwise.



G03432655

Fig. 72: Rotating Crankshaft To TDC On Cylinder Number 1
Courtesy of FORD MOTOR CO.

2. Rotate the crankshaft to TDC on cylinder number 1.
3. Remove the blanking plug and using the special tool, align the crankshaft to TDC on cylinder number 1.



G03432656

Fig. 73: Removing Blanking Plug Using Special Tool
Courtesy of FORD MOTOR CO.

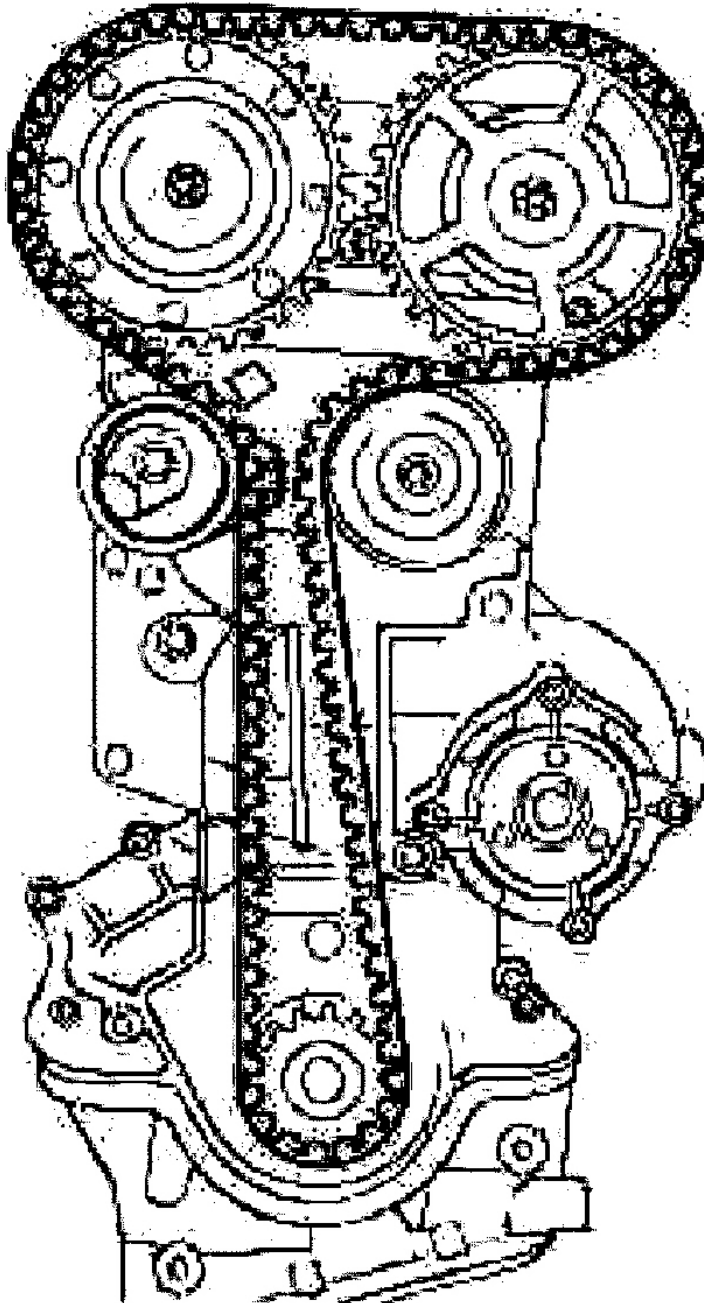
CAUTION: Do not kink the timing belt (do not bend the timing belt less than a diameter of 35 mm).

CAUTION: Do not rotate the crankshaft, check that it is still resting against the timing pin.

NOTE: The lug of the belt tensioner must not be hooked into the sheet metal cover during timing belt installation.

4. Install a new timing belt.

- Starting from the crankshaft timing belt pulley and working counterclockwise install the timing belt, keeping it under tension.



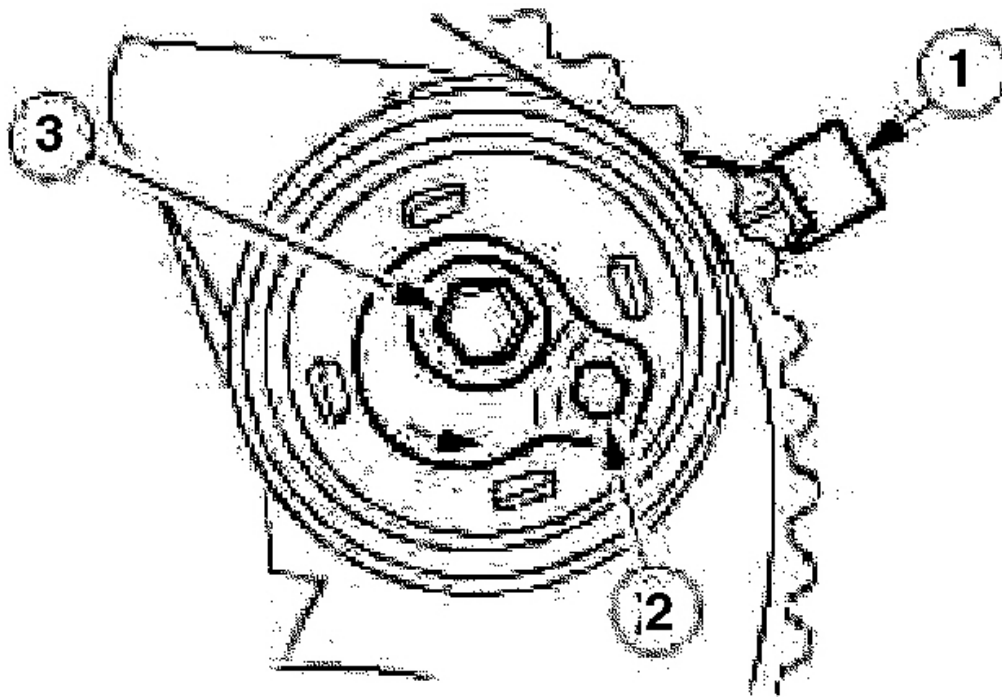
G03432657

Fig. 74: Installing New Timing Belt
Courtesy of FORD MOTOR CO.

CAUTION: Incorrect timing belt tension will result in incorrect valve timing.

5. Pretension the timing belt.

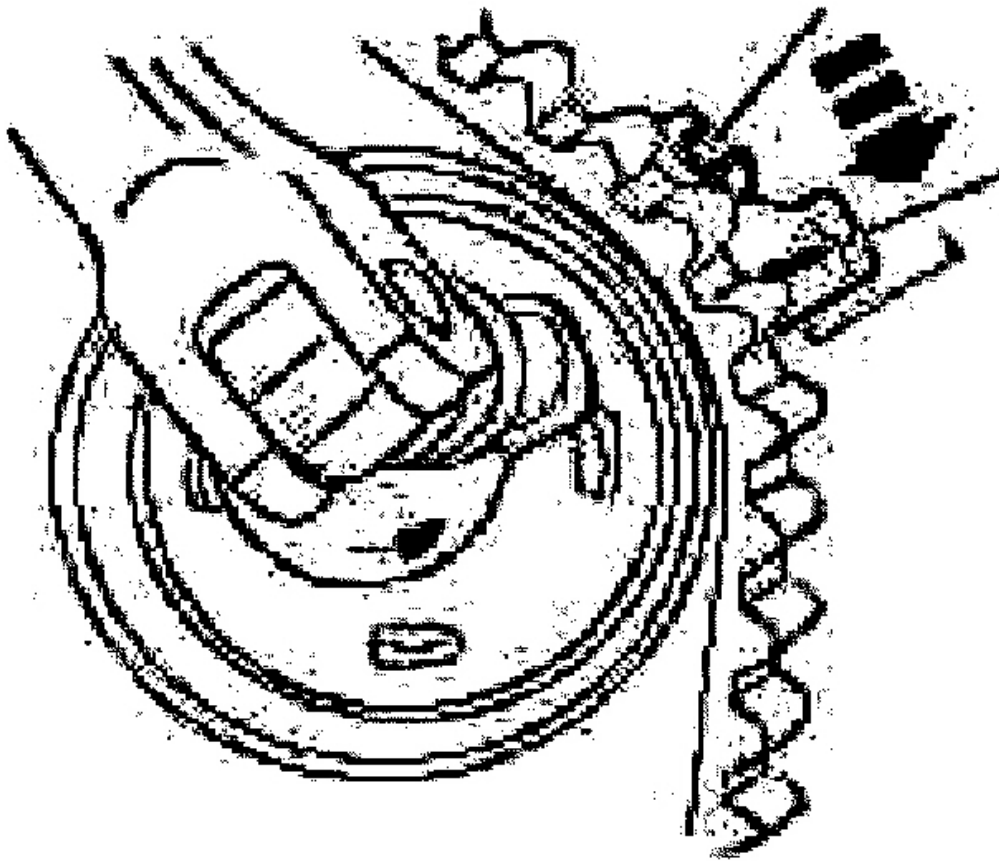
1. Rotate the tensioner locating tab counterclockwise and insert the locating tab into the slot in the rear timing cover.
2. Position the hexagonal key slot in the tensioner adjusting washer to the 4 o'clock position.
3. Tighten the attaching bolt enough to seat the tensioner firmly against the rear timing cover, but still allow the tensioner adjusting washer to be rotated using a 6 mm hexagonal key.



G03432658

Fig. 75: Pretensioning Timing Belt
Courtesy of FORD MOTOR CO.

CAUTION: Tension the timing belt, working counterclockwise.



G03432659

Fig. 76: Rotating Adjusting Washer Counterclockwise Using Hexagonal Key
Courtesy of FORD MOTOR CO.

6. Using the hexagonal key, rotate the adjusting washer counterclockwise until the notch in the pointer is centered over the index line on the locating tab (the pointer will move clockwise during adjustment).
7. Tighten the bolt, while holding the adjusting washer in position.

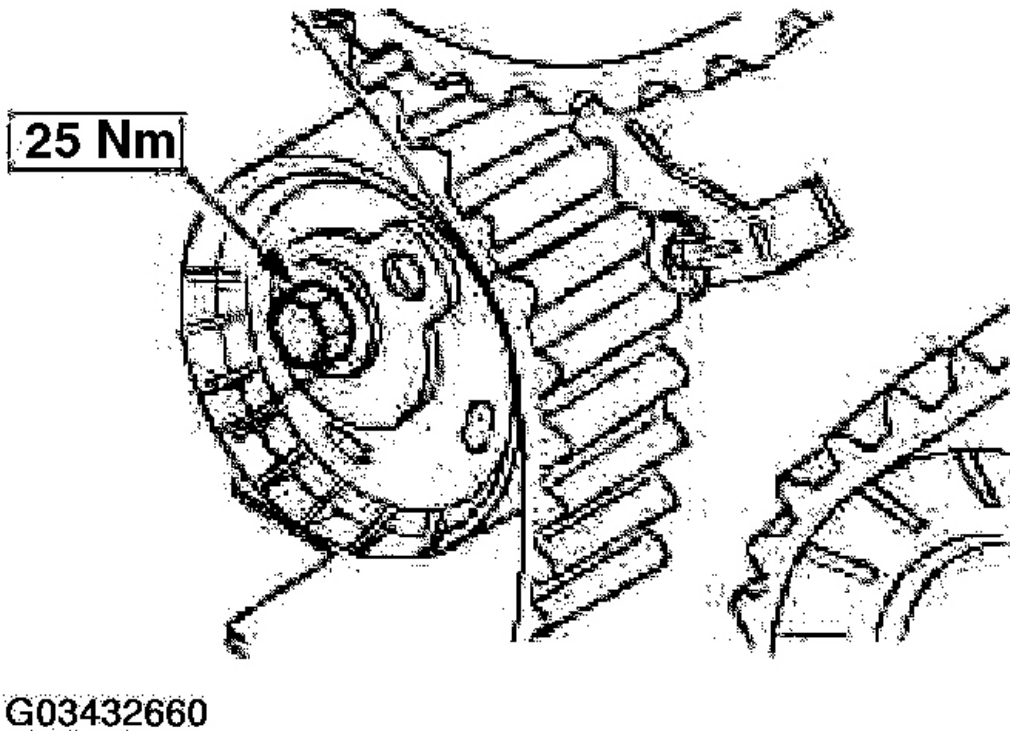
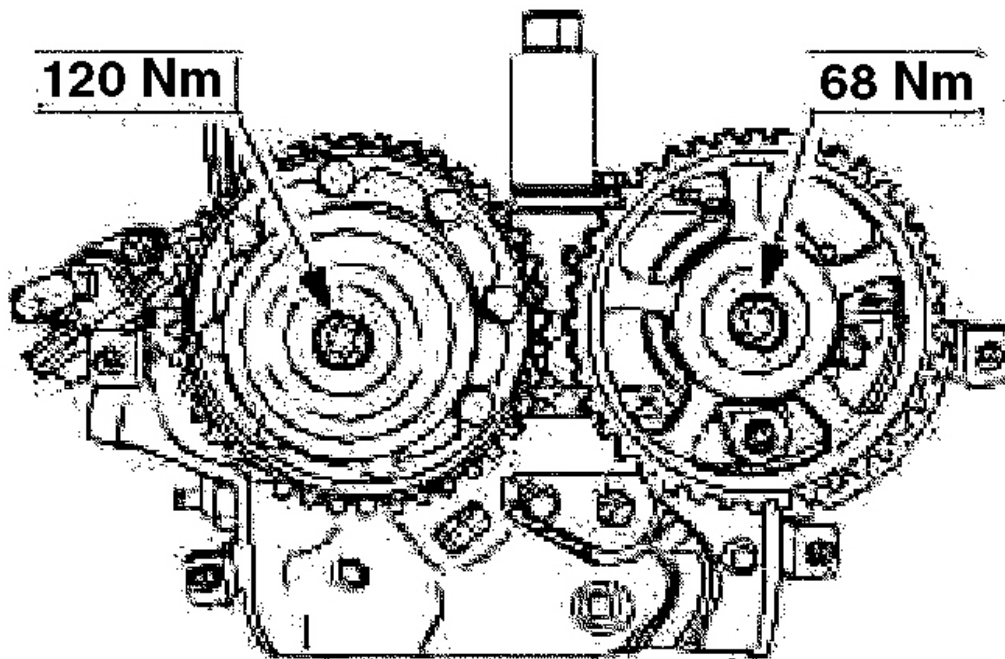


Fig. 77: Tightening Bolt While Holding Adjusting Washer In Position
Courtesy of FORD MOTOR CO.

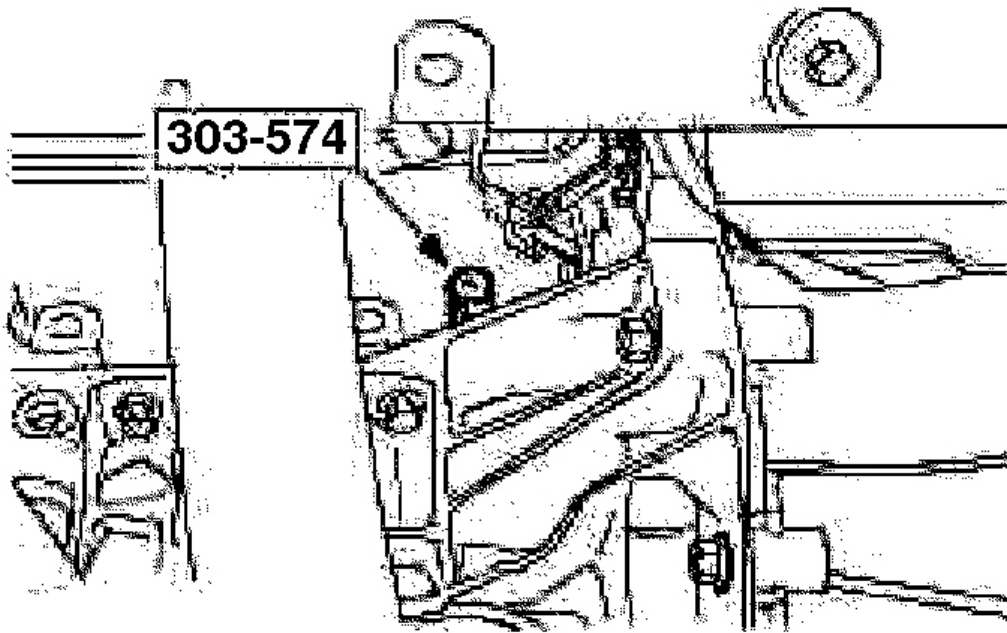
NOTE: Use an open ended wrench or suitable locking pliers to prevent the camshaft rotating from rotating.



G03432661

Fig. 78: Tightening Camshaft Pulley Retaining Bolts
Courtesy of FORD MOTOR CO.

8. Tighten the camshaft pulley retaining bolts.
9. Remove the special tool.



G03432662

Fig. 79: Removing Special Tool
Courtesy of FORD MOTOR CO.

10. Remove special tool.

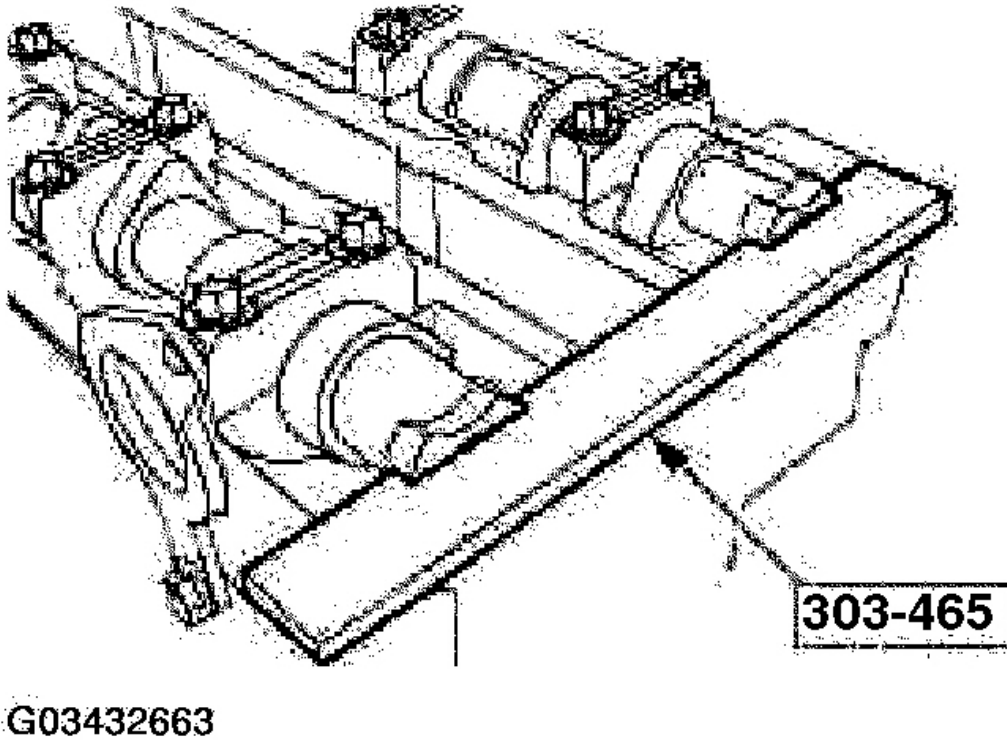
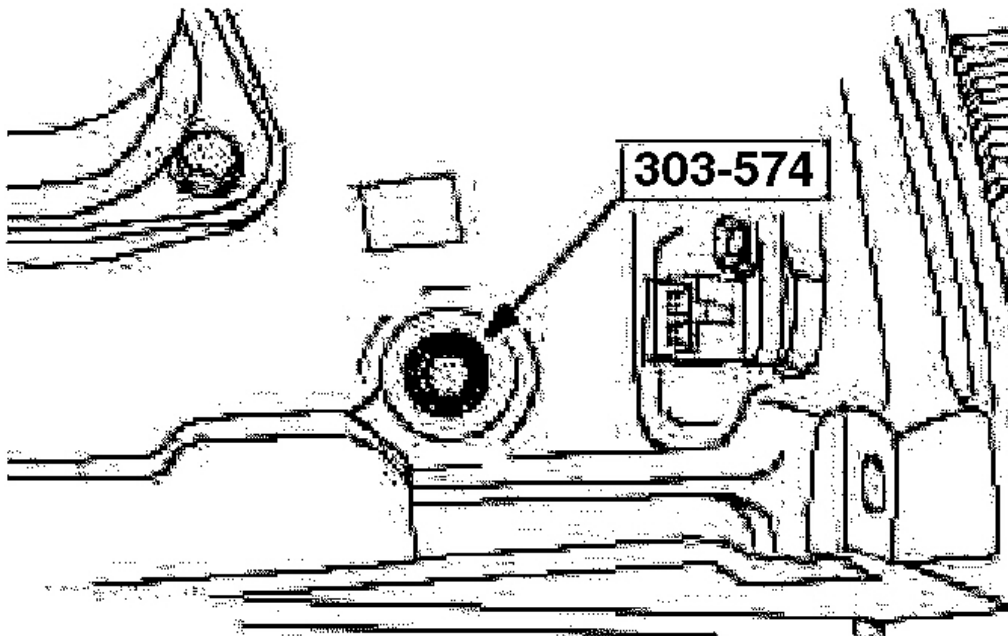


Fig. 80: Removing Special Tool
Courtesy of FORD MOTOR CO.

NOTE: Only rotate the crankshaft in the normal direction of rotation.

11. Rotate the engine two revolutions.
12. Using the special tool, align the crankshaft to TDC.



G03432664

Fig. 81: Aligning Crankshaft To TDC Using Special Tools
Courtesy of FORD MOTOR CO.

NOTE: If its not possible to install the special tool, correct the valve timing.

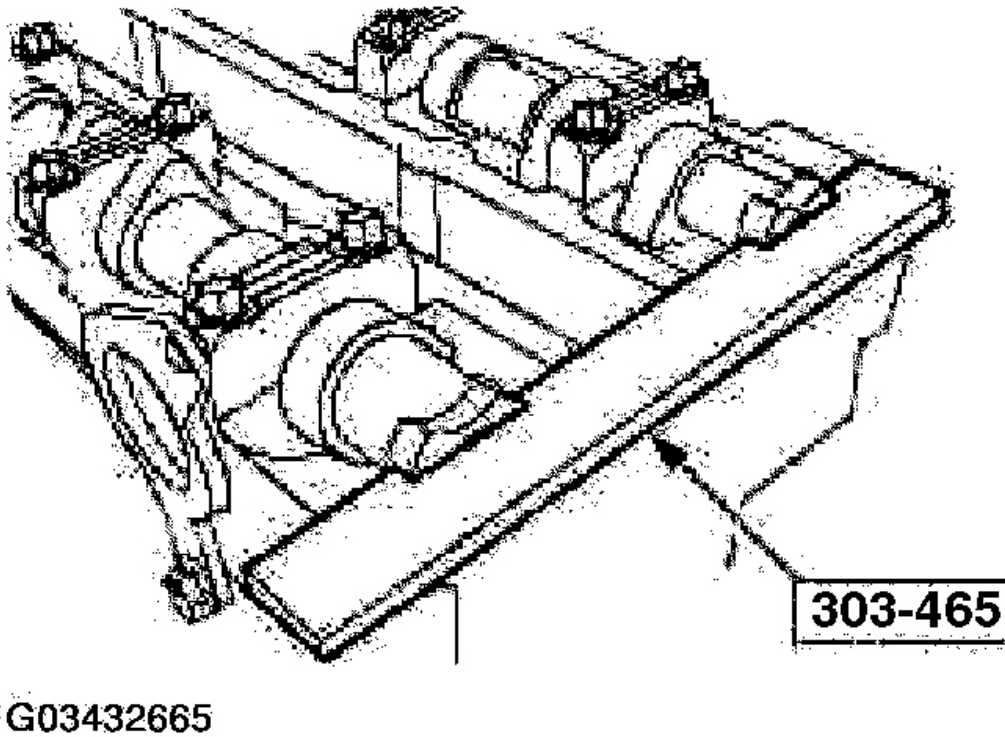


Fig. 82: Checking Position Of Camshafts Using Special Tool
Courtesy of FORD MOTOR CO.

13. Using the special tool, check the position of the camshafts, if necessary loosen the timing pulleys and correct the camshaft alignment.

NOTE: Use an open ended wrench or suitable locking pliers to prevent the camshaft rotating from rotating.

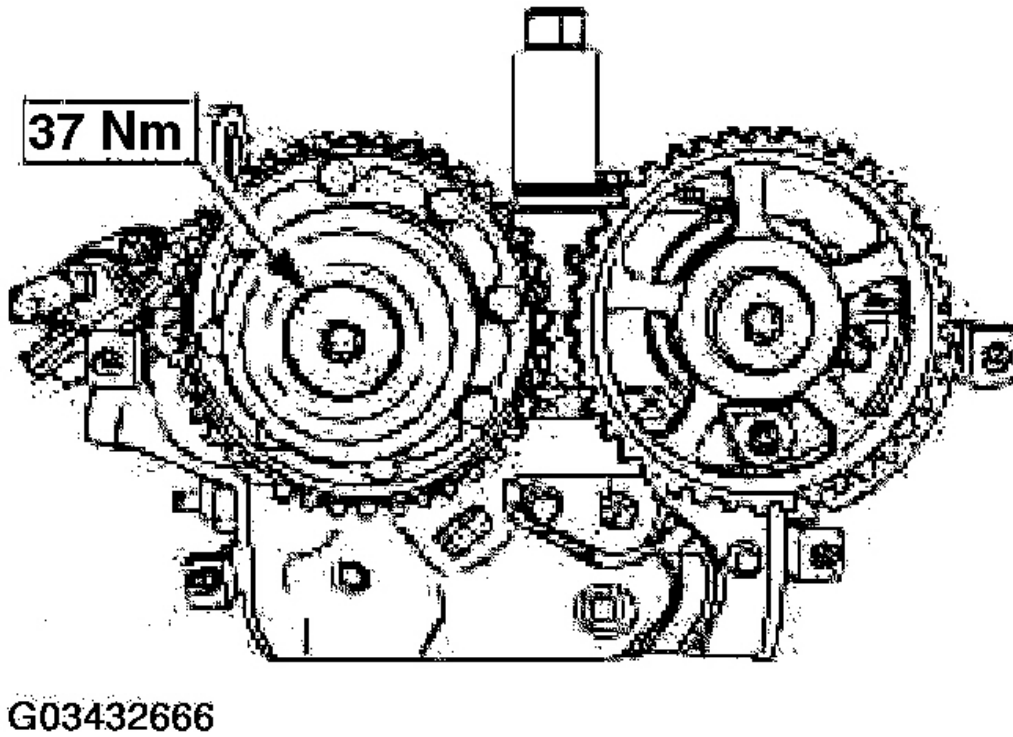
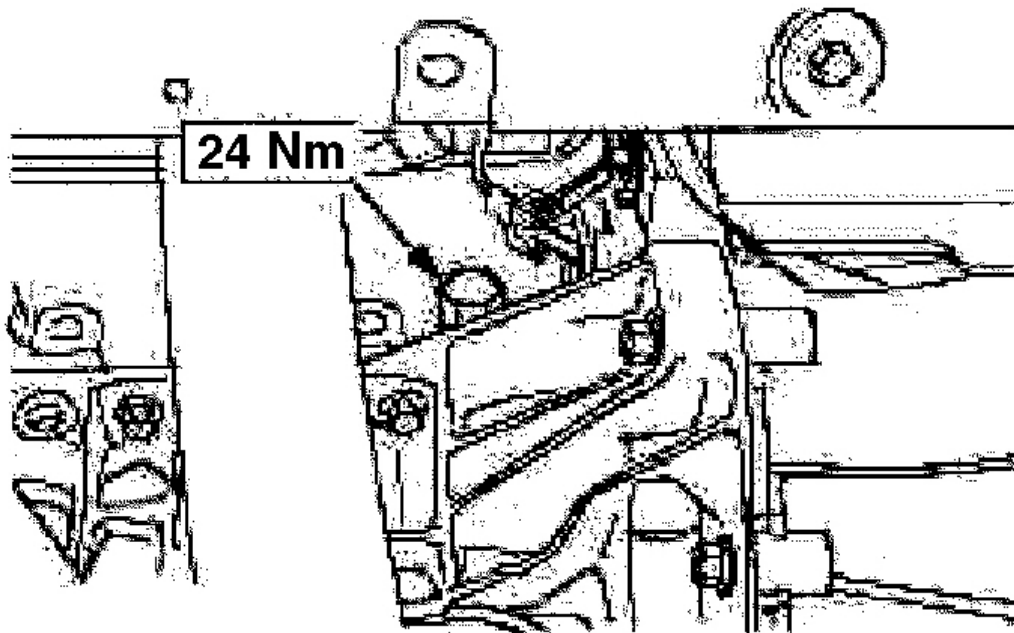


Fig. 83: Installing Intake Camshaft Pulley Blanking Plug
Courtesy of FORD MOTOR CO.

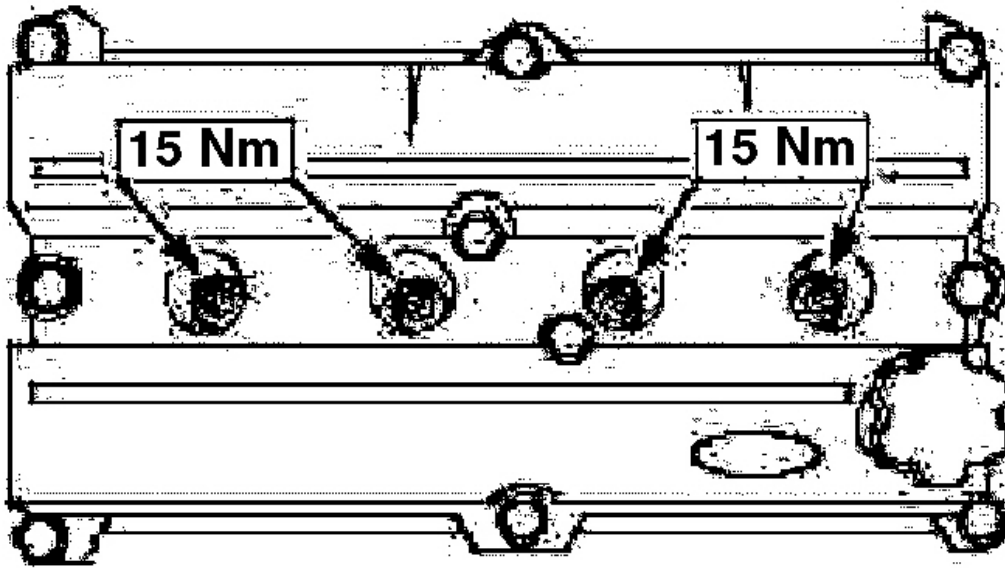
14. Install the intake camshaft pulley blanking plug.
15. Remove the special tools.
16. Install the blanking plug.



G03432667

Fig. 84: Installing Blanking Plug
Courtesy of FORD MOTOR CO.

17. Install the spark plugs.



G03432668

Fig. 85: Installing Spark Plugs
Courtesy of FORD MOTOR CO.

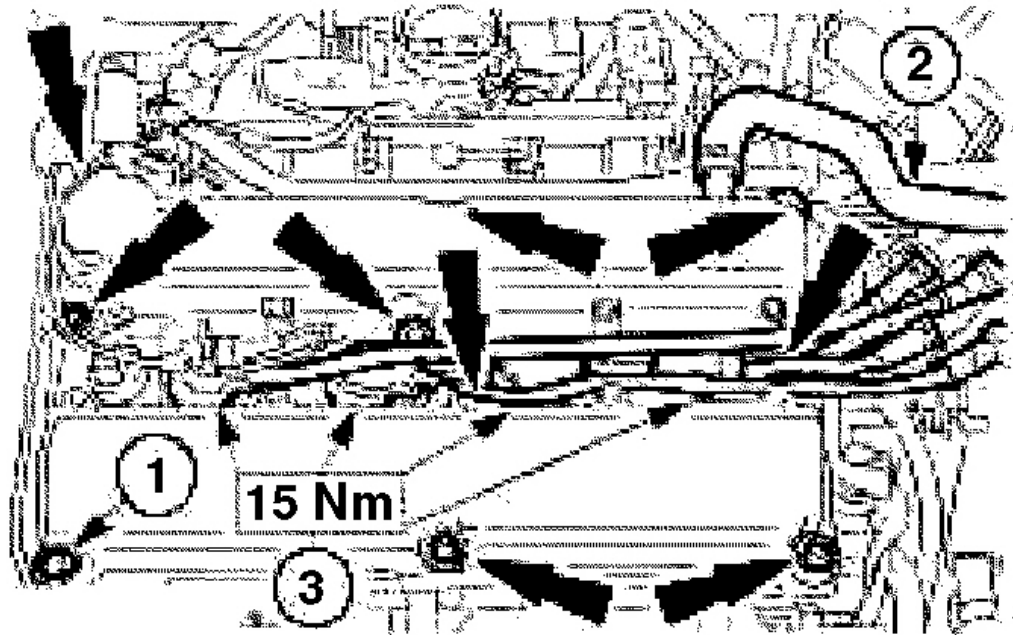
CAUTION: Use a blunt object (a plastic cable tie) to apply the silicone grease, to avoid damaging the spark plug connectors.

CAUTION: Push on the spark plug connectors, keeping them in line with the spark plugs.

NOTE: Coat the inside of the spark plug connectors with silicone grease to a depth of 5-10 mm.

18. Install the valve cover.
 1. Tighten the bolts in two stages.
 - Stage 1: 2 N.m
 - Stage 2: 7 N.m
 2. Attach the PCV hose to the valve cover.

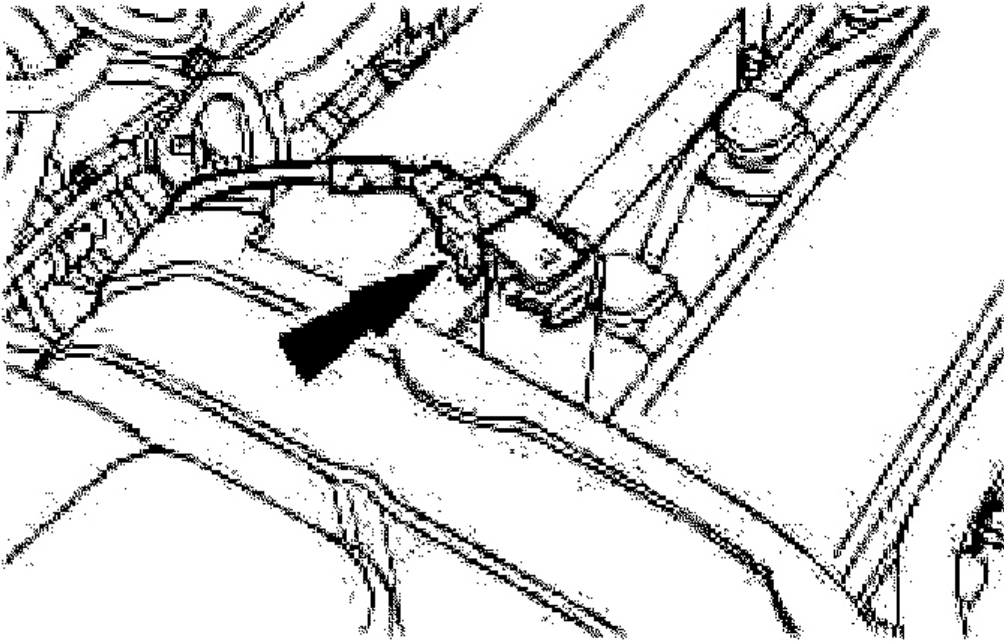
3. Coat the spark plug thread with Never Seeze, screw in the spark plugs and push in the spark plug connector until it engages.



G03432669

Fig. 86: Tightening Valve Cover Bolts
Courtesy of FORD MOTOR CO.

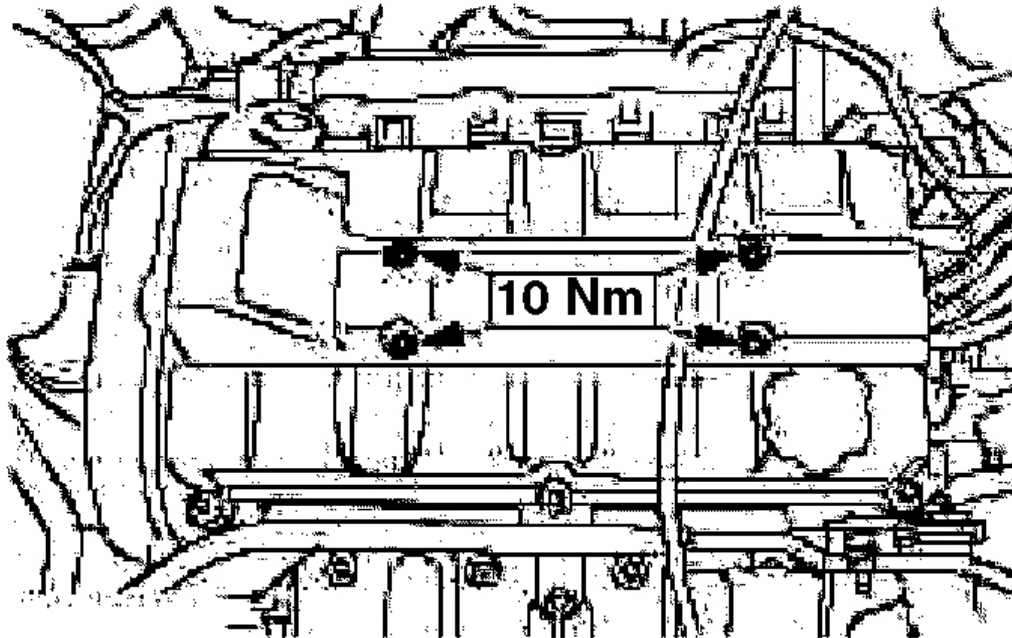
19. Connect the VCT valve electrical connector.



G03432670

Fig. 87: Connecting VCT Valve Electrical Connector
Courtesy of FORD MOTOR CO.

20. Install the engine cover.



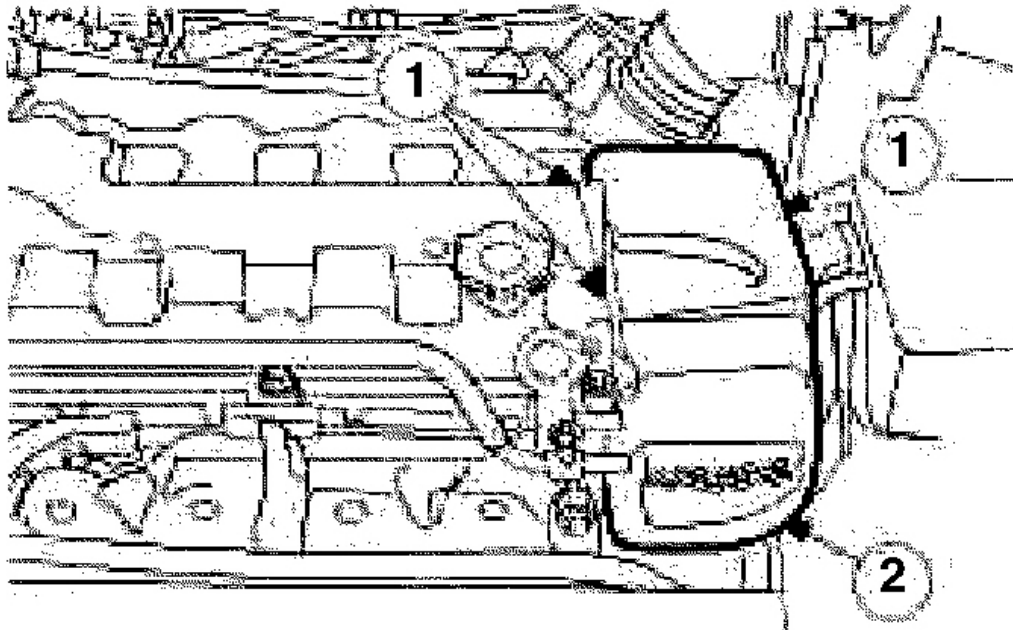
G03432671

Fig. 88: Installing Engine Cover
Courtesy of FORD MOTOR CO.

21. Install the ignition coil pack cover.
 1. Attach the retaining clips.
 2. Attach the coolant pipe to the retaining clip.

2002 Ford Focus LX

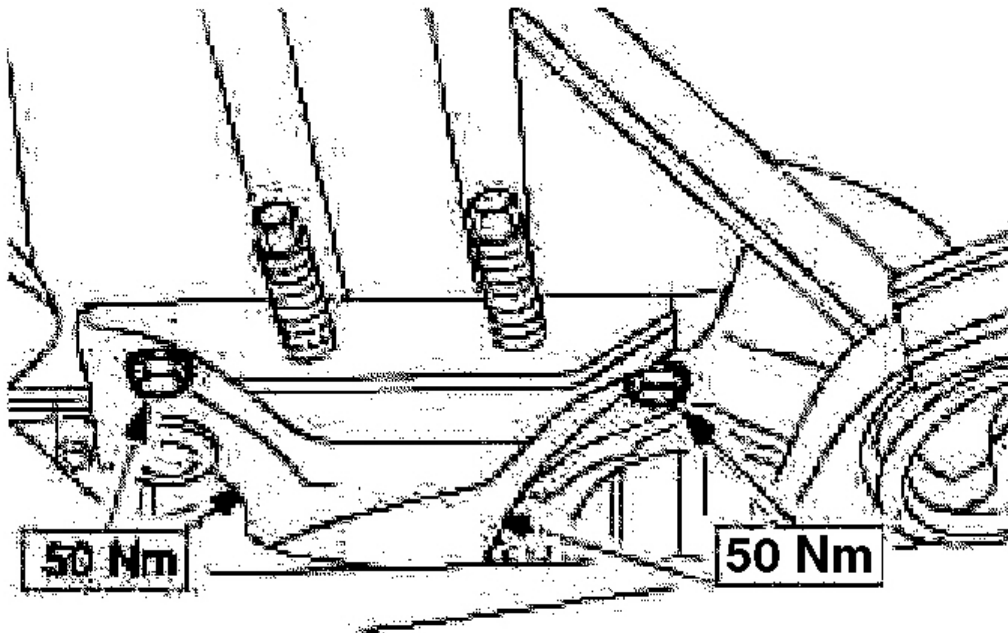
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432672

Fig. 89: Installing Ignition Coil Pack Cover
Courtesy of FORD MOTOR CO.

NOTE: Position the upper timing belt cover and the center timing belt.



G03432673

Fig. 90: Installing Engine Front Mount Bracket
Courtesy of FORD MOTOR CO.

22. Install the engine front mount bracket.

NOTE: Check the seating of the timing belt upper cover gasket and correct as necessary.

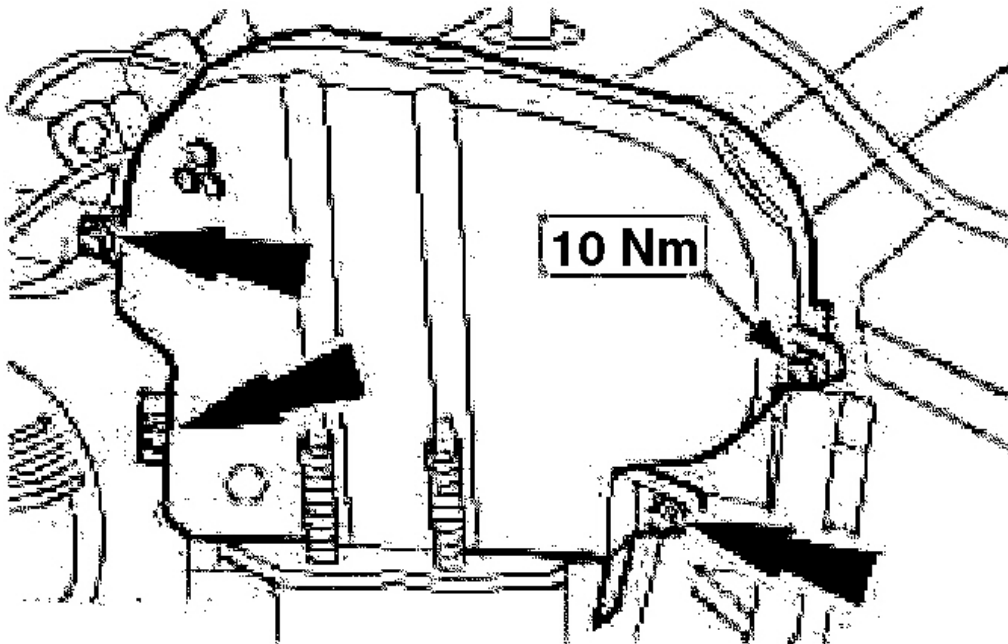
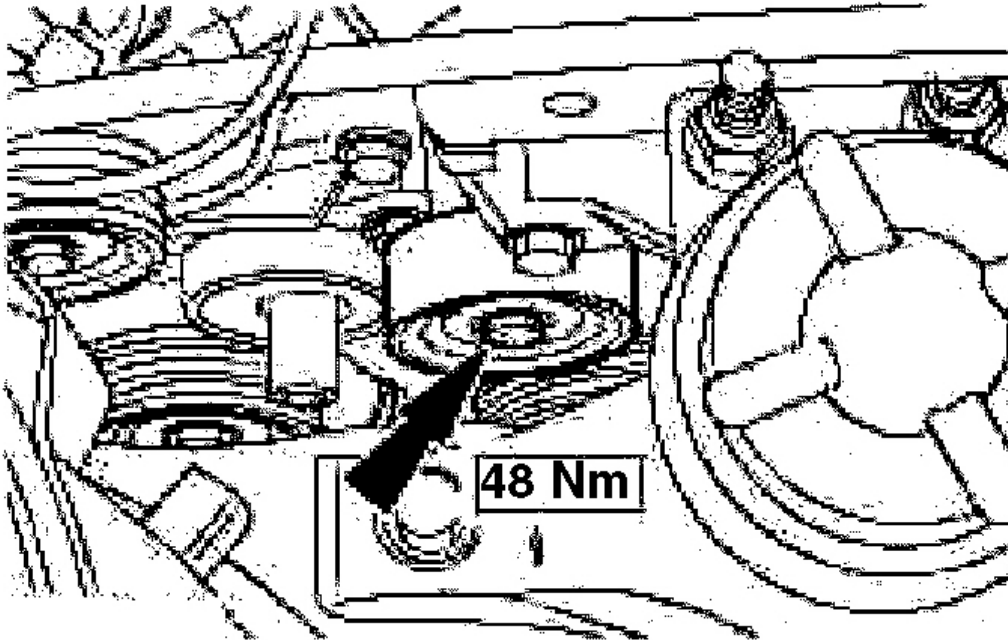


Fig. 91: Attaching Timing Belt Upper Cover
Courtesy of FORD MOTOR CO.

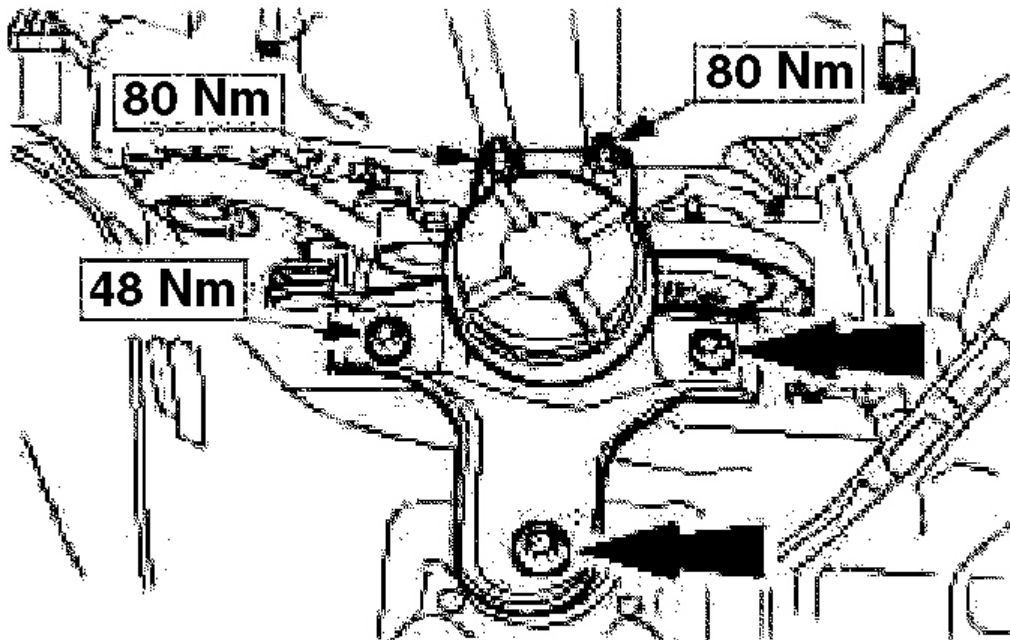
23. Attach the timing belt upper cover.
24. Install the accessory drive belt idler.



G03432675

Fig. 92: Installing Accessory Drive Belt Idler
Courtesy of FORD MOTOR CO.

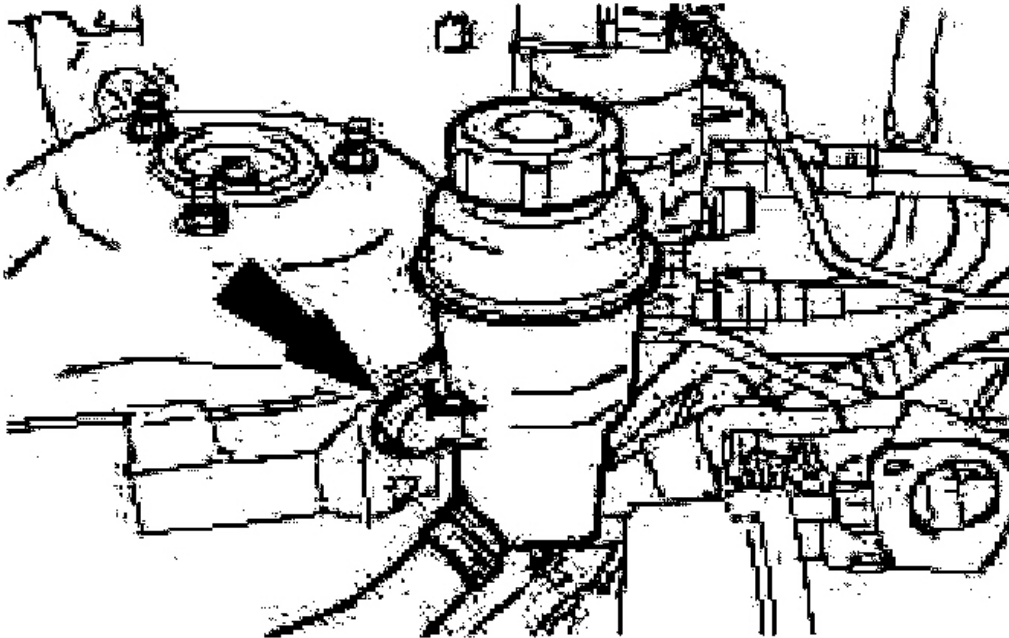
25. Install the engine front mount.



G03432676

Fig. 93: Installing Engine Front Mount
Courtesy of FORD MOTOR CO.

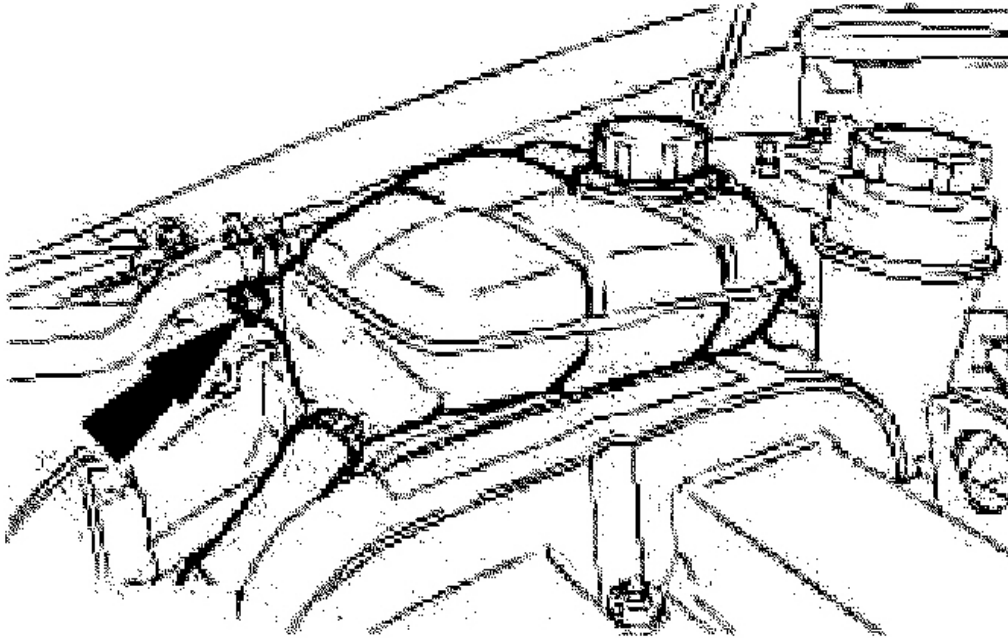
26. Attach the PAS reservoir.



G03432677

Fig. 94: Attaching PAS Reservoir
Courtesy of FORD MOTOR CO.

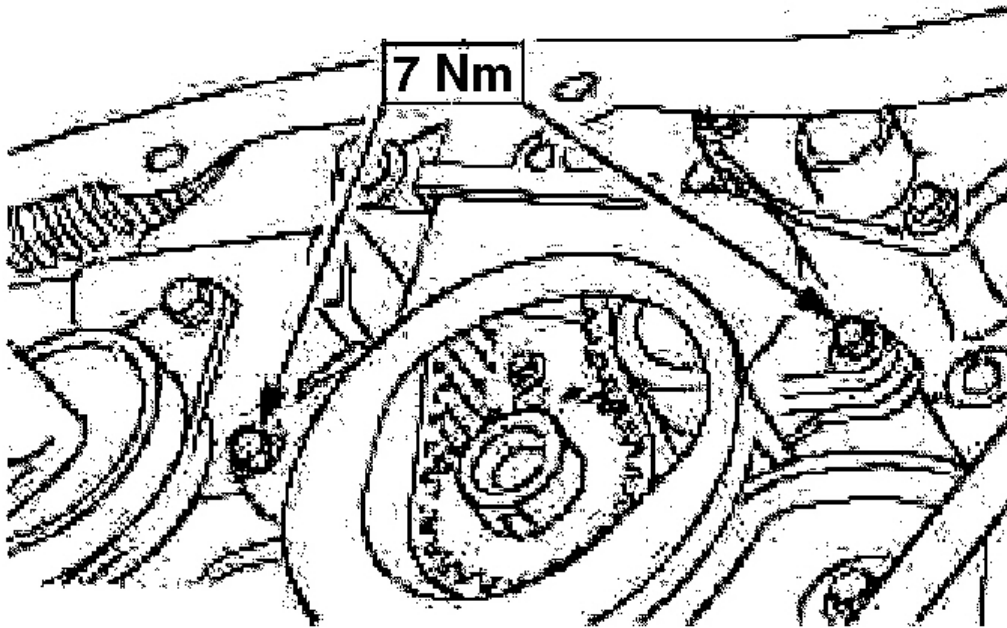
27. Attach the coolant expansion tank.



G03432678

Fig. 95: Attaching Coolant Expansion Tank
Courtesy of FORD MOTOR CO.

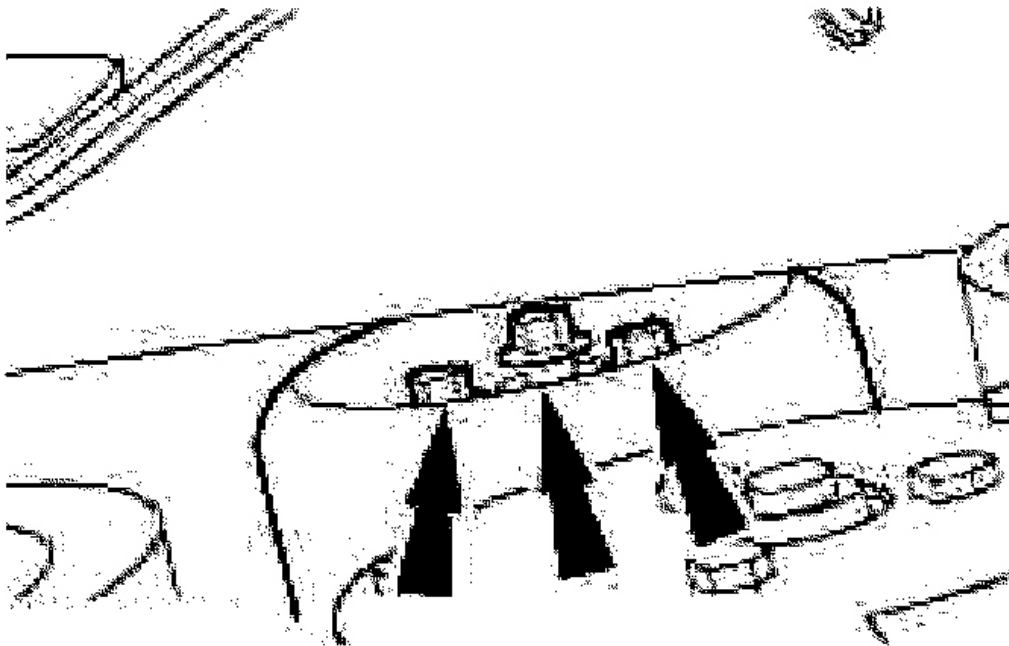
28. Remove the hydraulic jack and wooden block.
29. Raise and support the vehicle.
30. Attach the lower timing belt cover.



G03432679

Fig. 96: Attaching Lower Timing Belt Cover
Courtesy of FORD MOTOR CO.

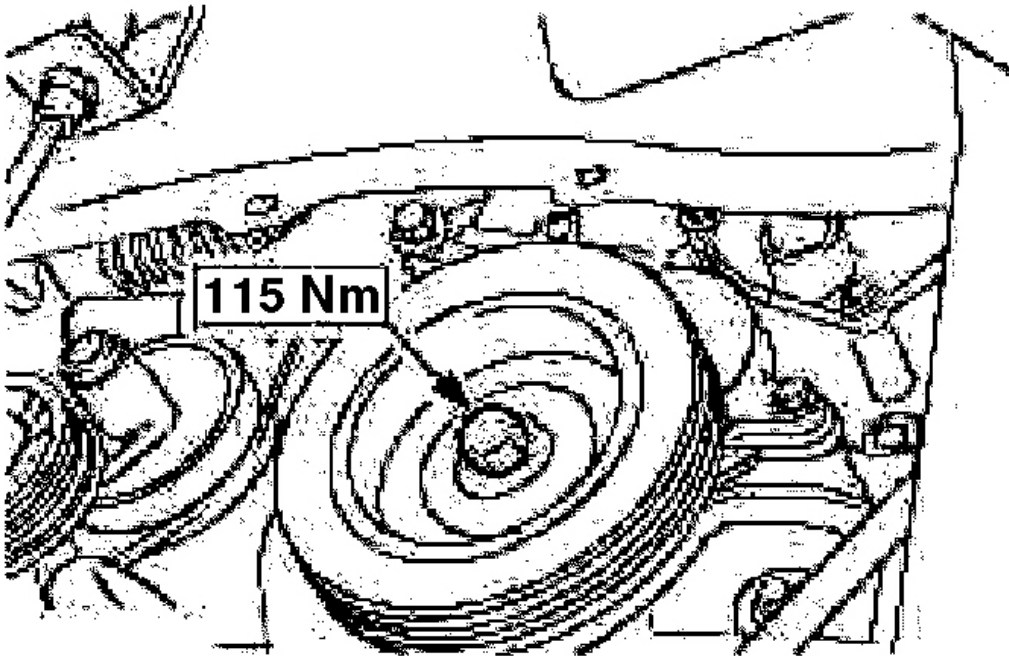
NOTE: Do not tighten the bolts at this stage.



G03432680

Fig. 97: Installing Coolant Pump Pulley Retaining Bolts
Courtesy of FORD MOTOR CO.

31. Install the coolant pump pulley retaining bolts.
32. Install the crankshaft pulley.

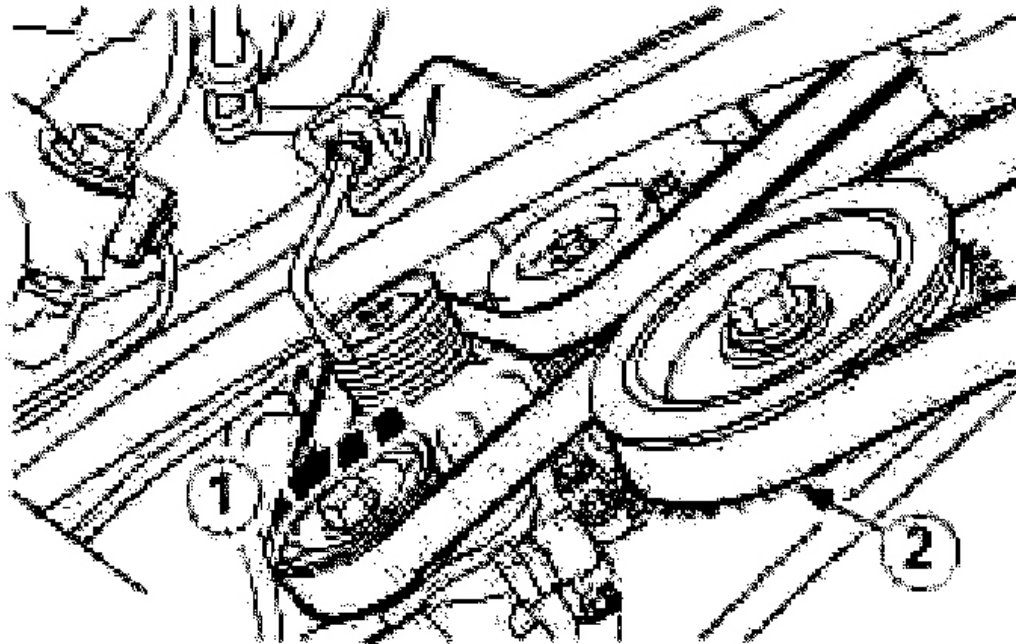


G03432681

Fig. 98: Installing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

NOTE: **Direction of travel on a used accessory drive belt.**

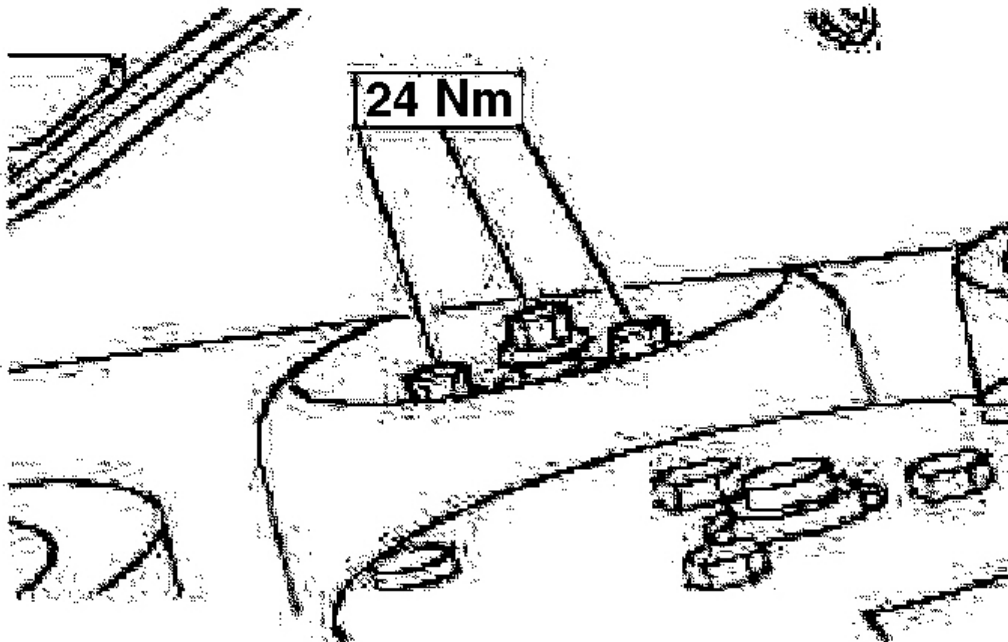
33. Install the accessory drive belt.
 1. Rotate the accessory drive belt tensioner clockwise.
 2. Install the accessory drive belt.



G03432682

Fig. 99: Installing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

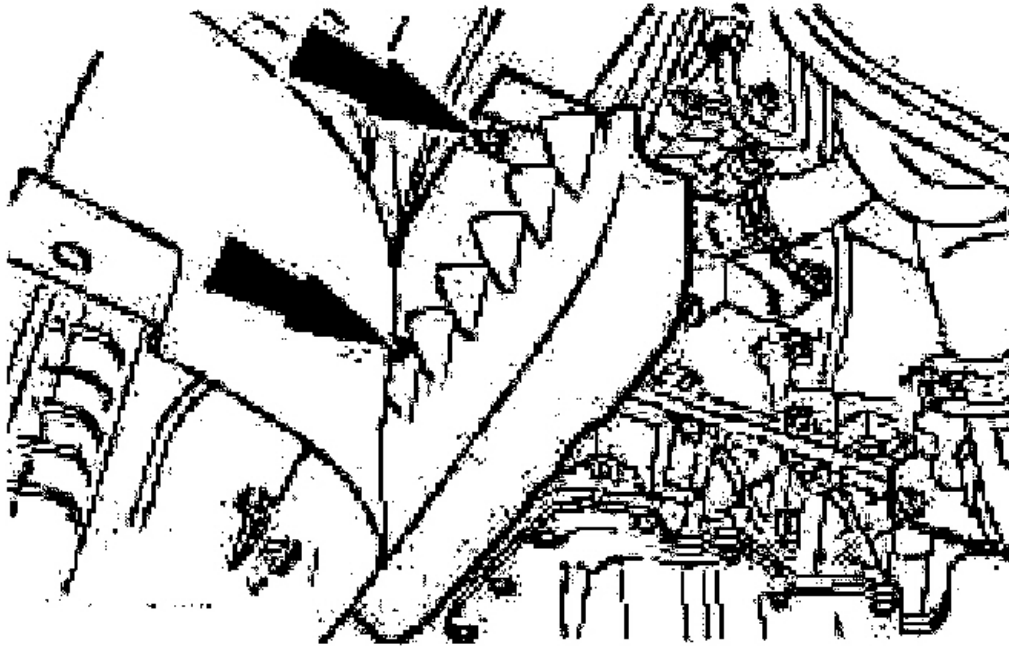
34. Tighten the bolts on the coolant pump pulley.



G03432683

Fig. 100: Tightening Bolts On Coolant Pump Pulley
Courtesy of FORD MOTOR CO.

35. Attach the drive belt cover.



G03432684

Fig. 101: Attaching Drive Belt Cover
Courtesy of FORD MOTOR CO.

36. Lower the vehicle.
37. Connect the battery. .

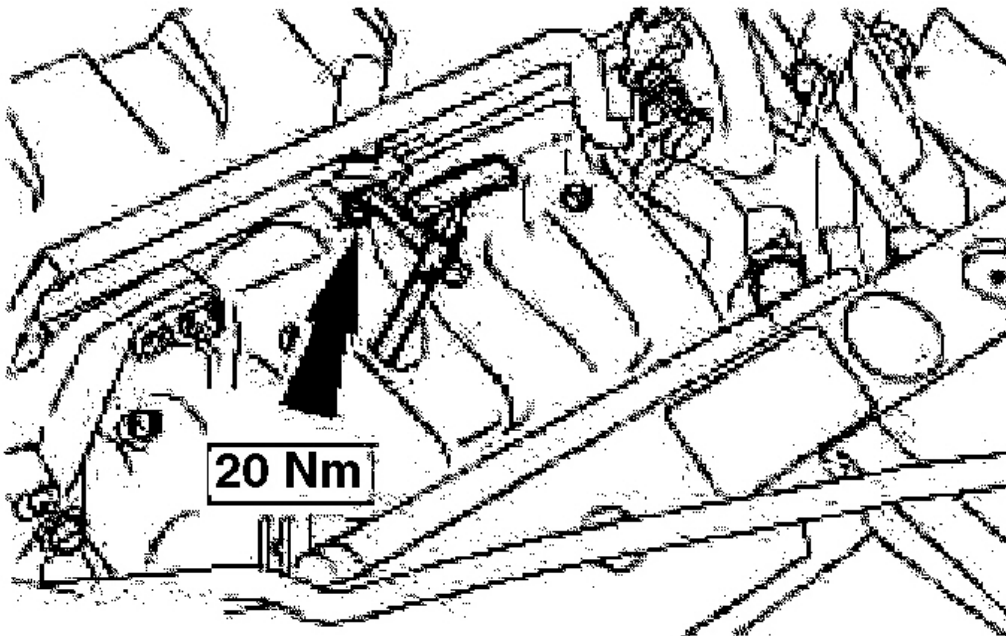
NOTE: When the battery has been disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 miles) or more to relearn the strategy.

38. Standard finishing operations:
 - Connect the battery negative cable.
 - Install the battery cover.
 - Check fluid levels and correct if necessary.
 - Check the routing of vacuum hoses and cables and secure them with cable ties.

EXHAUST MANIFOLD

Removal

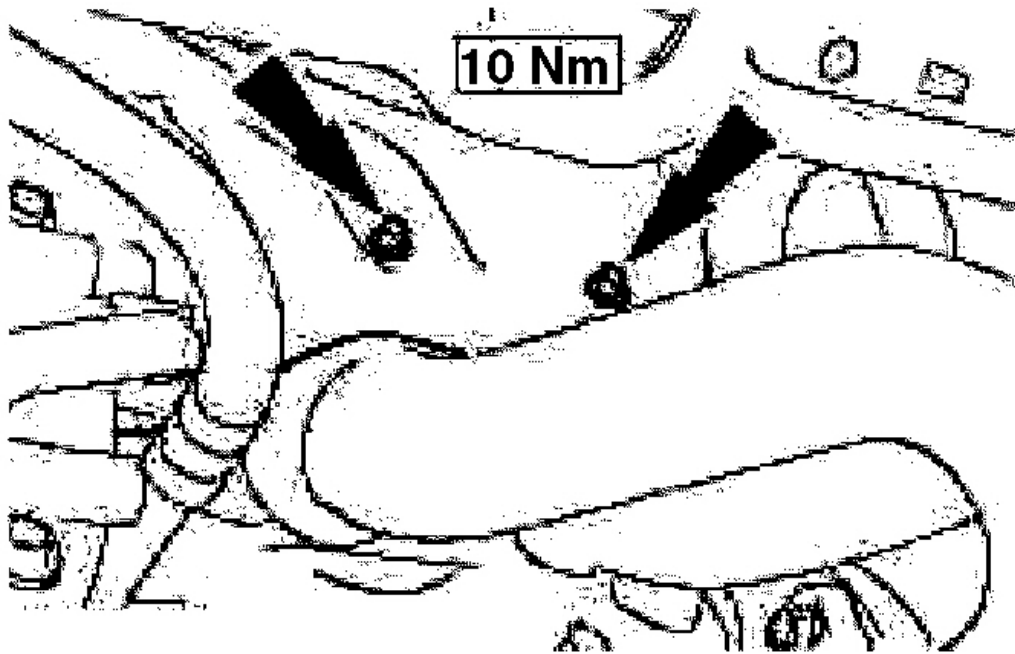
1. Remove the oil level indicator and tube.



G03432685

Fig. 102: Removing Oil Level Indicator And Tube
Courtesy of FORD MOTOR CO.

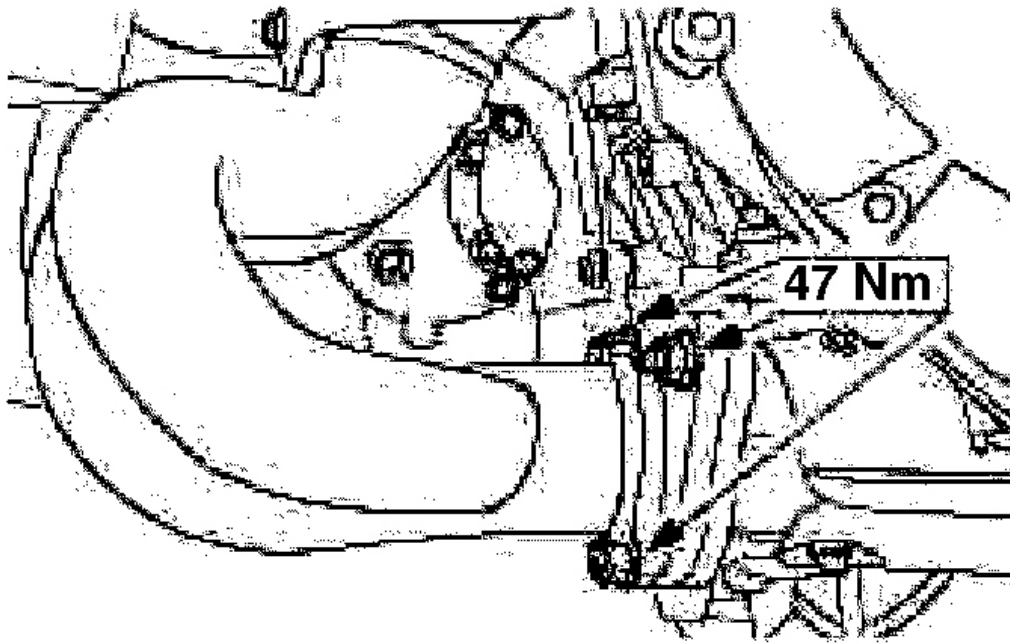
2. Remove the radiator fan and shroud. For additional information, refer to ENGINE COOLING article.
3. Remove the exhaust manifold heat shield lower retaining bolts.



G03432686

Fig. 103: Removing Exhaust Manifold Heat Shield Lower Retaining Bolts
Courtesy of FORD MOTOR CO.

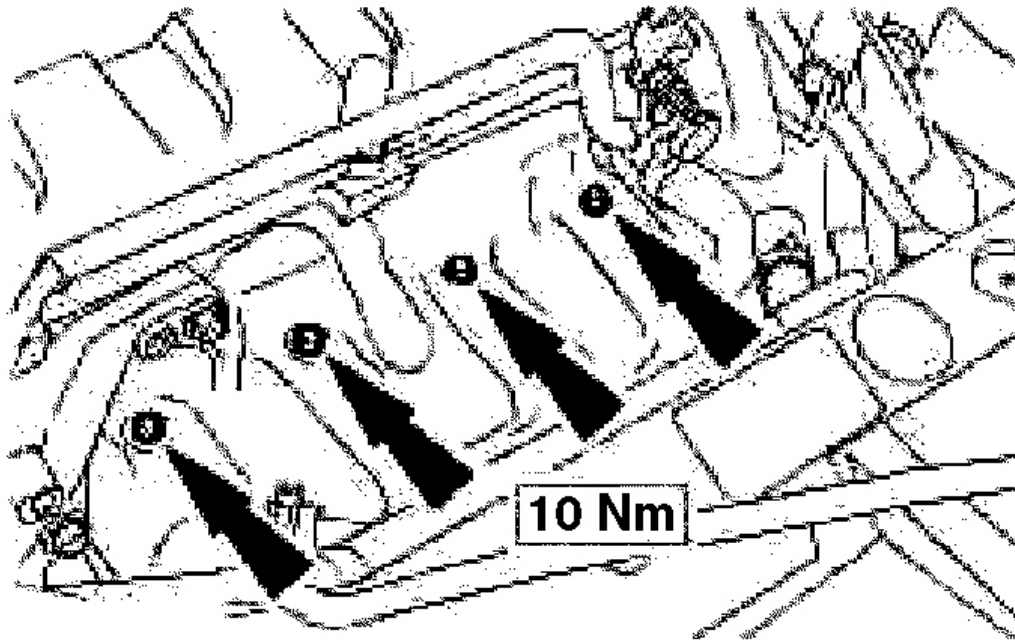
4. Detach the exhaust manifold from the catalytic converter.



G03432687

Fig. 104: Detaching Exhaust Manifold From Catalytic Converter
Courtesy of FORD MOTOR CO.

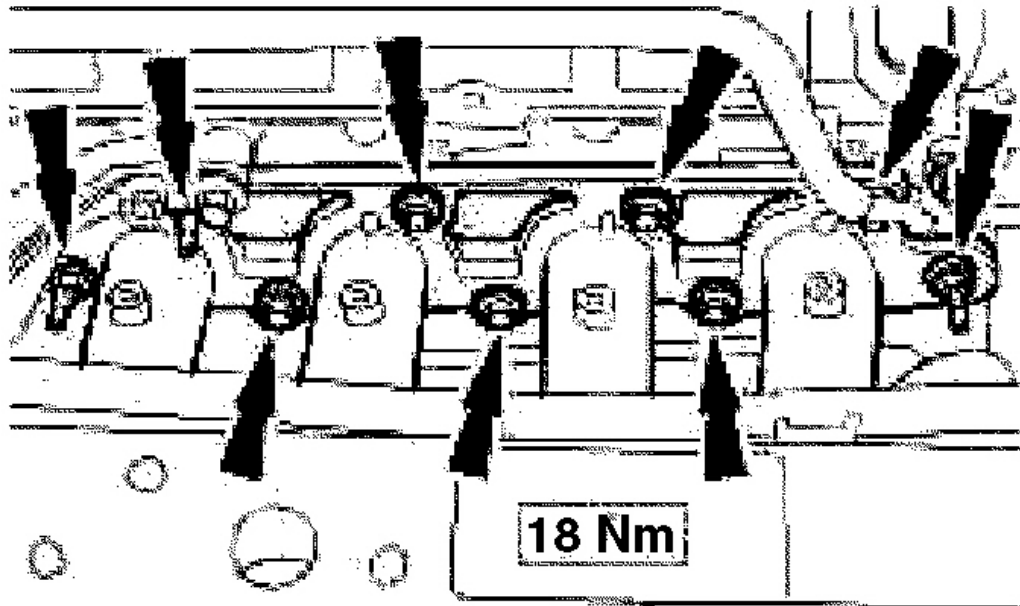
5. Lower the vehicle.
6. Remove the exhaust manifold heat shield.



G03432688

Fig. 105: Removing Exhaust Manifold Heat Shield
Courtesy of FORD MOTOR CO.

7. Remove the exhaust manifold.
 - Remove the exhaust manifold downwards.
 - Discard the gaskets.



G03432689

Fig. 106: Removing Exhaust Manifold
Courtesy of FORD MOTOR CO.


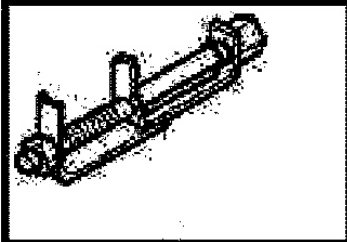
Installation

NOTE: Install new exhaust manifold gaskets.

1. To install, reverse the removal procedure.

CYLINDER HEAD

Special Tool(s)

	Installer Camshaft, Oil Seal 303-160 (T81P-6292-A)
	Remover/Installer, Hose Clamp 412-108 (T96P-18539-A)

G03432690

Fig. 107: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

General Equipment

GENERAL EQUIPMENT

Spatula

Material

MATERIAL SPECIFICATION

Engine Oil - 5W-30	WSS-M2C153-G
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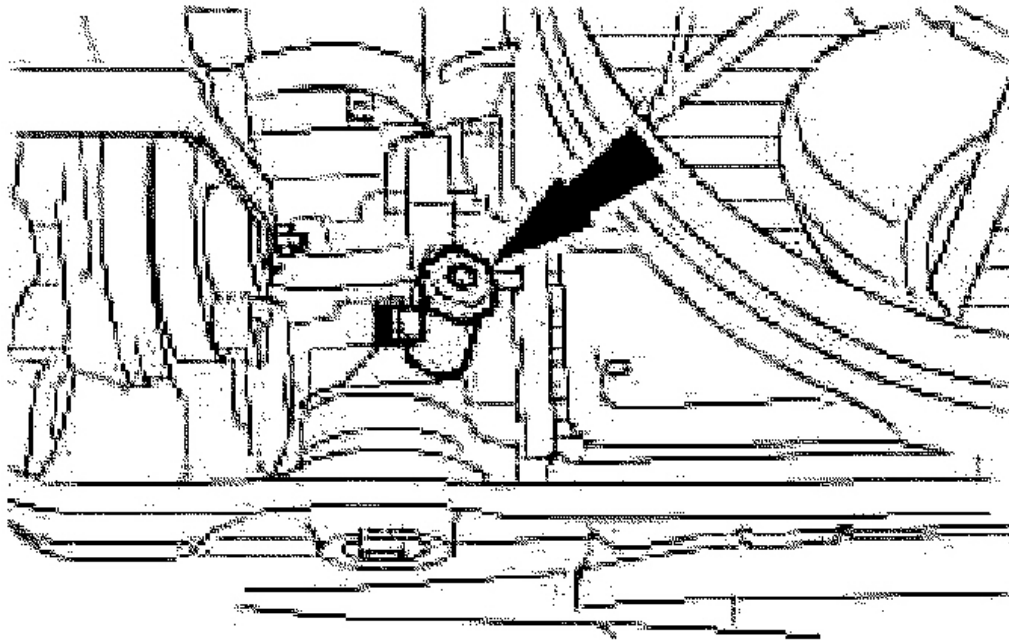
Removal

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM PRESSURE RELEASE** .
2. Disconnect the battery. .

WARNING: To prevent the risk of scalding, place a thick cloth over the filler cap before opening the cooling circuit. Failure to do so may result in personal injury.

3. Release the coolant system pressure.

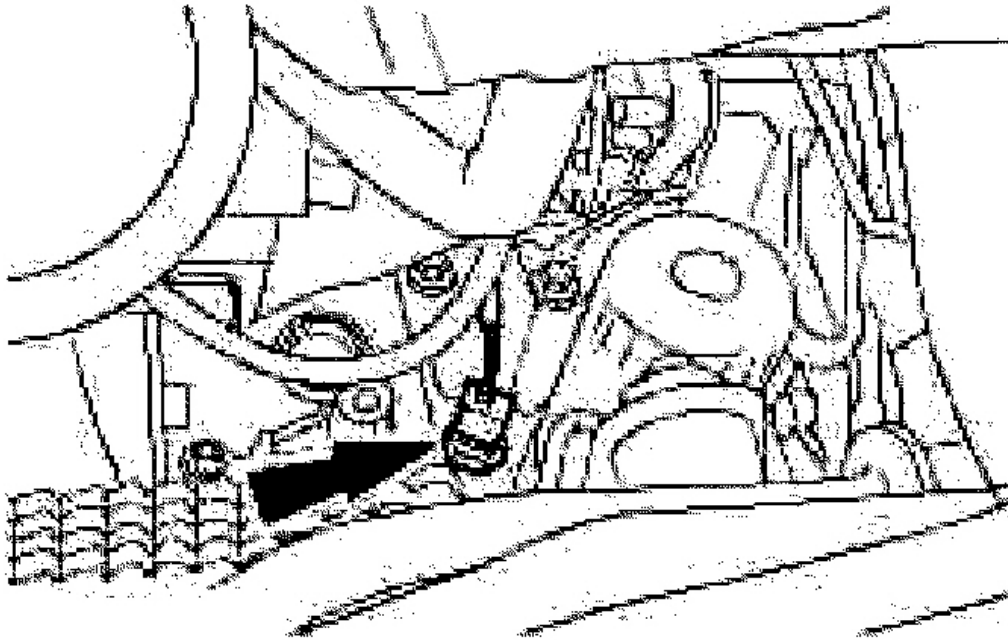
4. Raise and support the vehicle.
5. Drain the coolant from the radiator.
 - Allow the coolant to drain into a suitable container.
 - Install the radiator drain plug after draining the coolant.



G03432691

Fig. 108: Installing Radiator Drain Plug After Draining Coolant
Courtesy of FORD MOTOR CO.

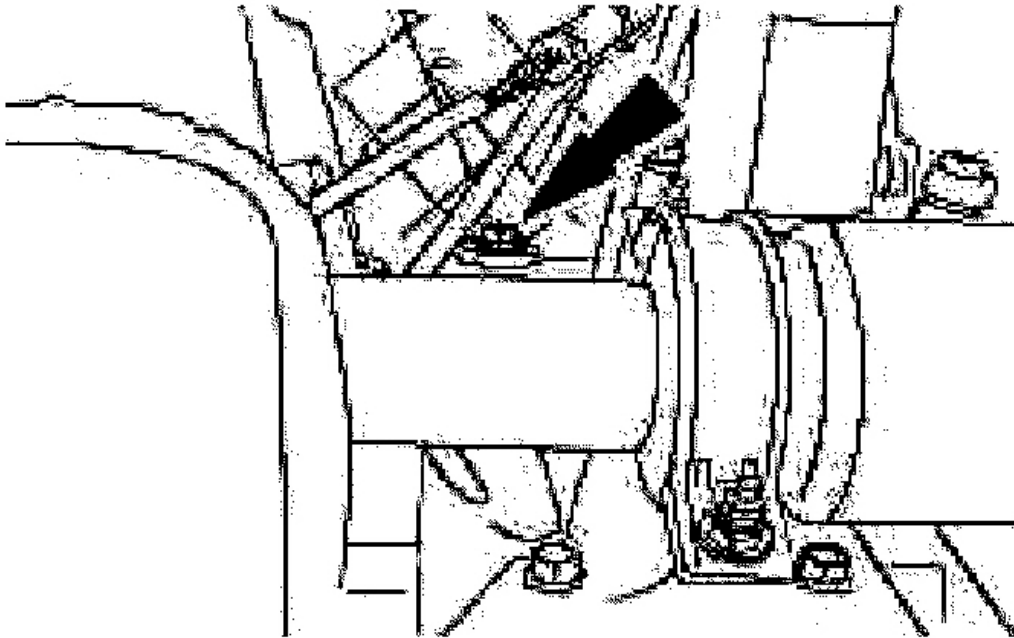
6. Disconnect the oil pressure switch electrical connector.



G03432692

Fig. 109: Disconnecting Oil Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

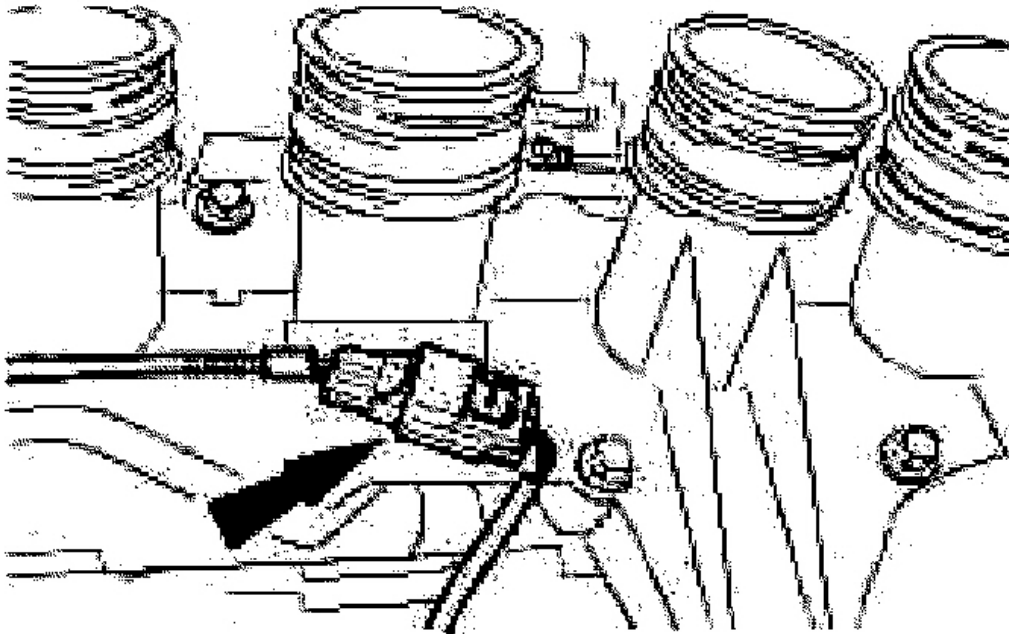
7. Remove the intake manifold lower retaining bolt.



G03432693

Fig. 110: Removing Intake Manifold Lower Retaining Bolt
Courtesy of FORD MOTOR CO.

8. Disconnect the knock sensor electrical connector and separate it from the intake manifold.

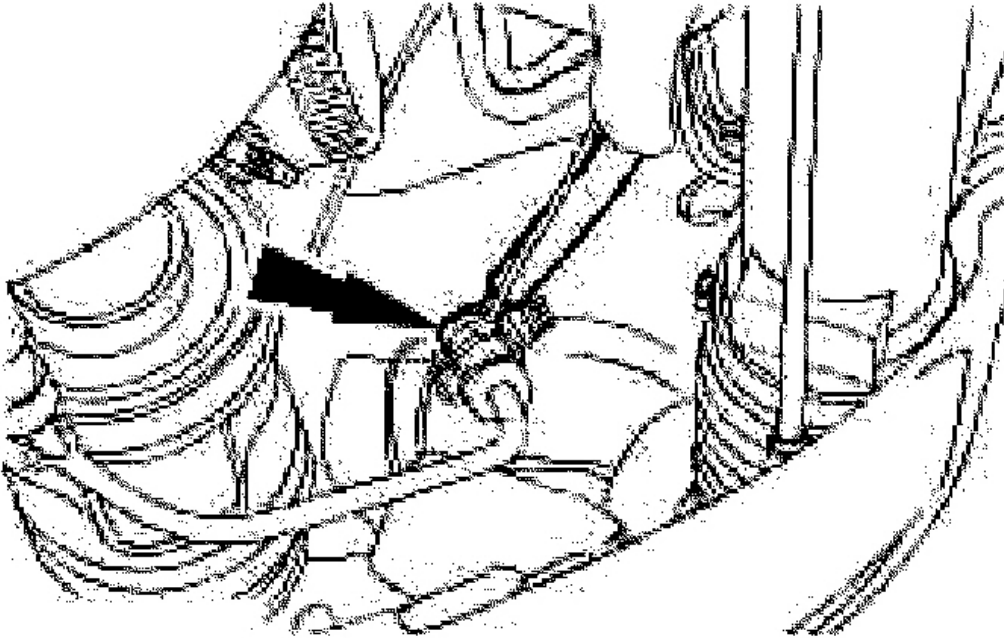


G03432694

Fig. 111: Disconnecting Knock Sensor Electrical Connector And Separating From Intake Manifold

Courtesy of FORD MOTOR CO.

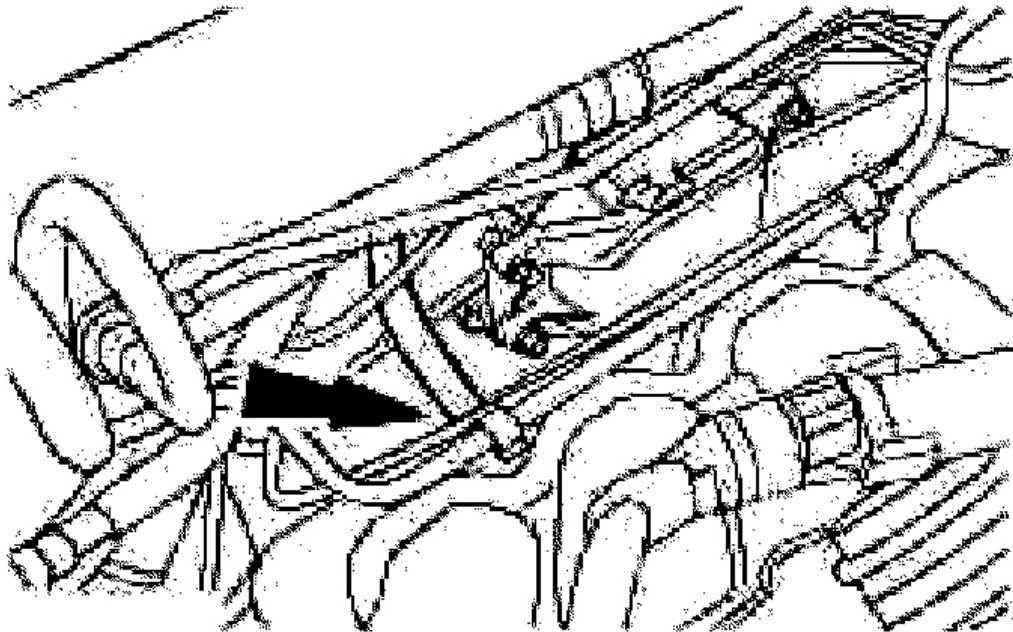
9. Disconnect the catalyst monitor sensor electrical connector and separate from the bracket.



G03432695

Fig. 112: Disconnecting Catalyst Monitor Sensor Electrical Connector And Separating From Bracket
Courtesy of FORD MOTOR CO.

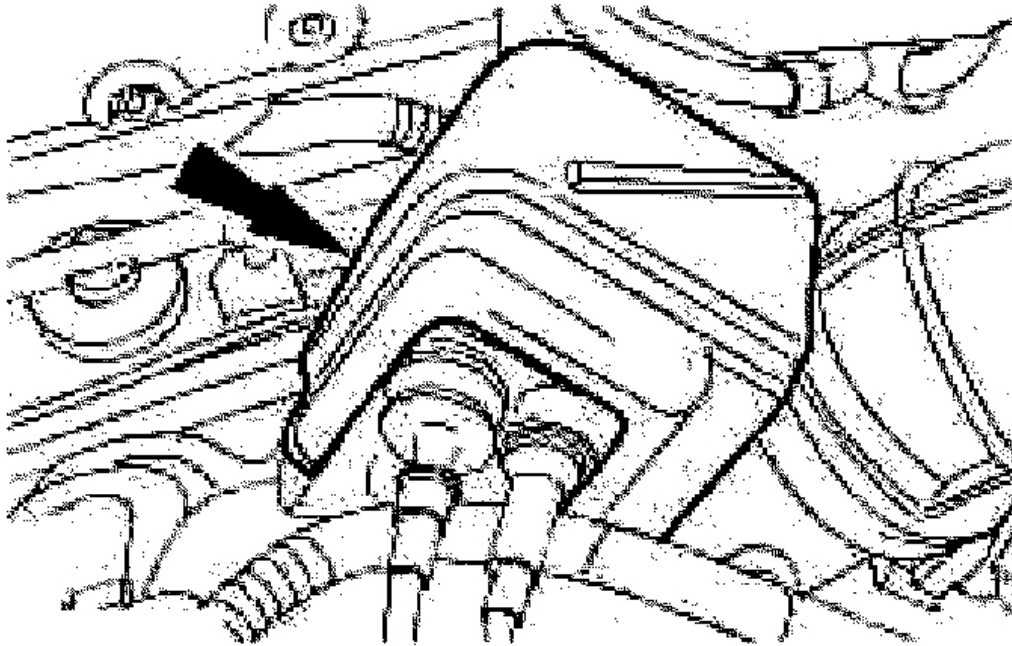
10. Lower the vehicle.
11. Detach the brake booster pipe from the intake manifold.
 - Release the quick release coupling and detach the brake booster pipe.



G03432696

Fig. 113: Detaching Brake Booster Pipe From Intake Manifold
Courtesy of FORD MOTOR CO.

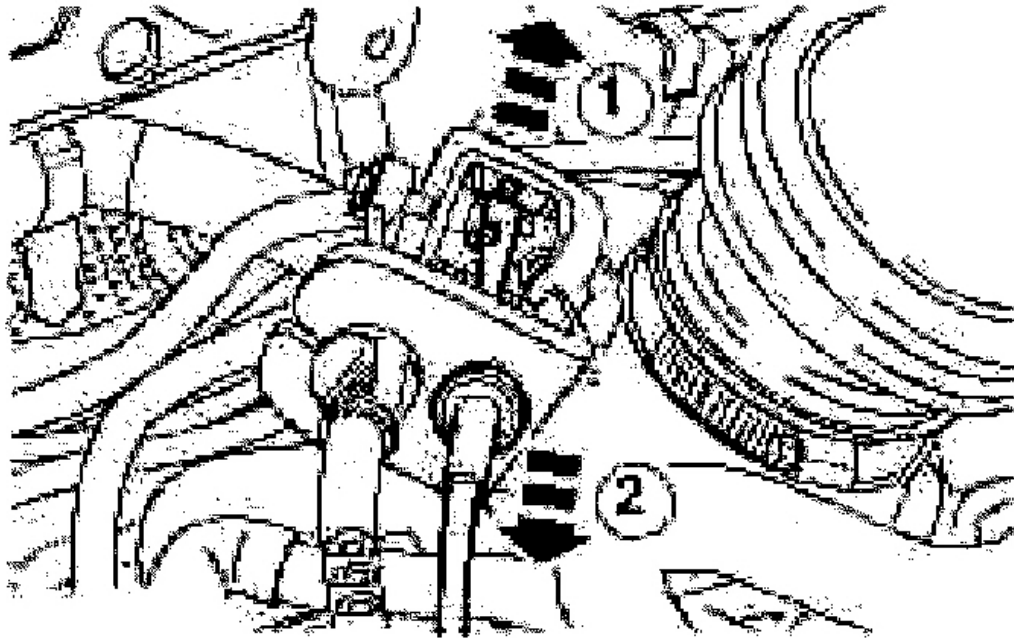
12. Remove the air cleaner. .
13. Remove the splash shield.



G03432697

Fig. 114: Removing Splash Shield
Courtesy of FORD MOTOR CO.

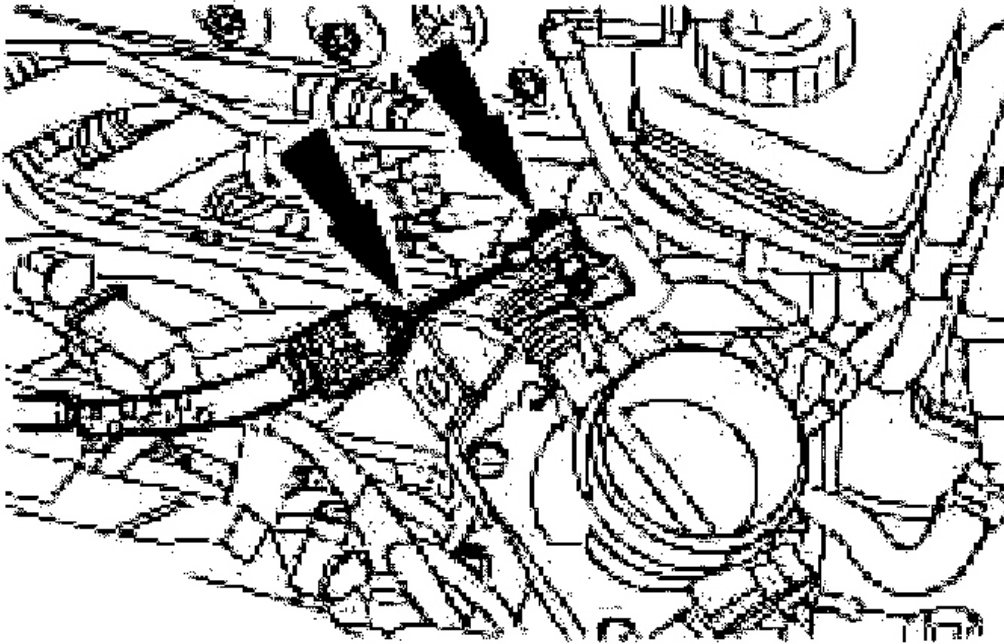
14. Disconnect the vehicle speed control cable.
 1. Disconnect the inner cable from the throttle body.
 2. Detach the vehicle speed control cable from the throttle body.



G03432698

Fig. 115: Detaching Vehicle Speed Control Cable From Throttle Body
Courtesy of FORD MOTOR CO.

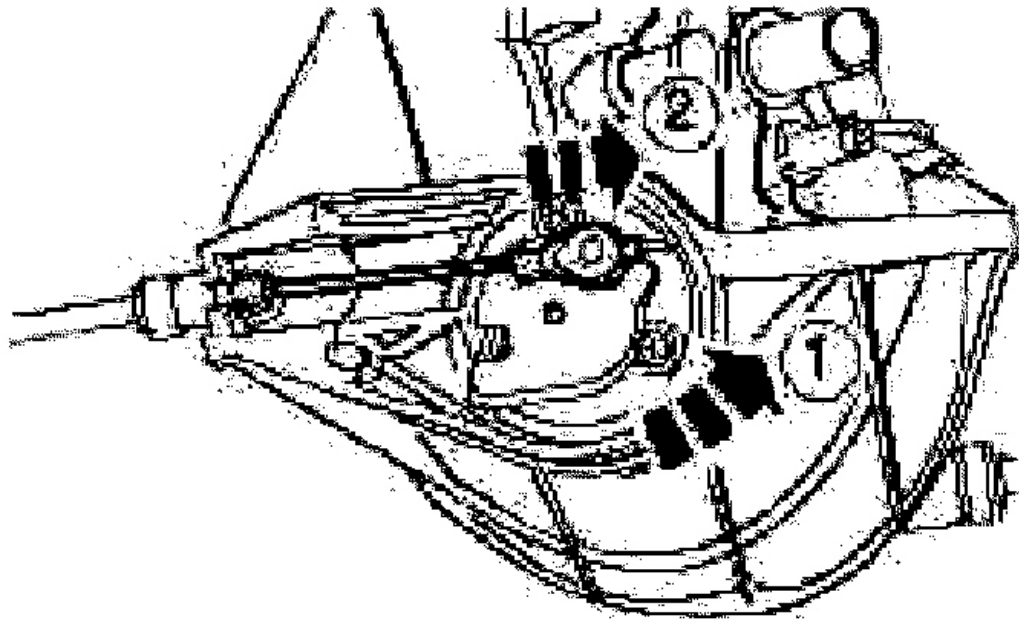
15. Detach the accelerator cable from the throttle body.



G03432699

Fig. 116: Detaching Accelerator Cable From Throttle Body
Courtesy of FORD MOTOR CO.

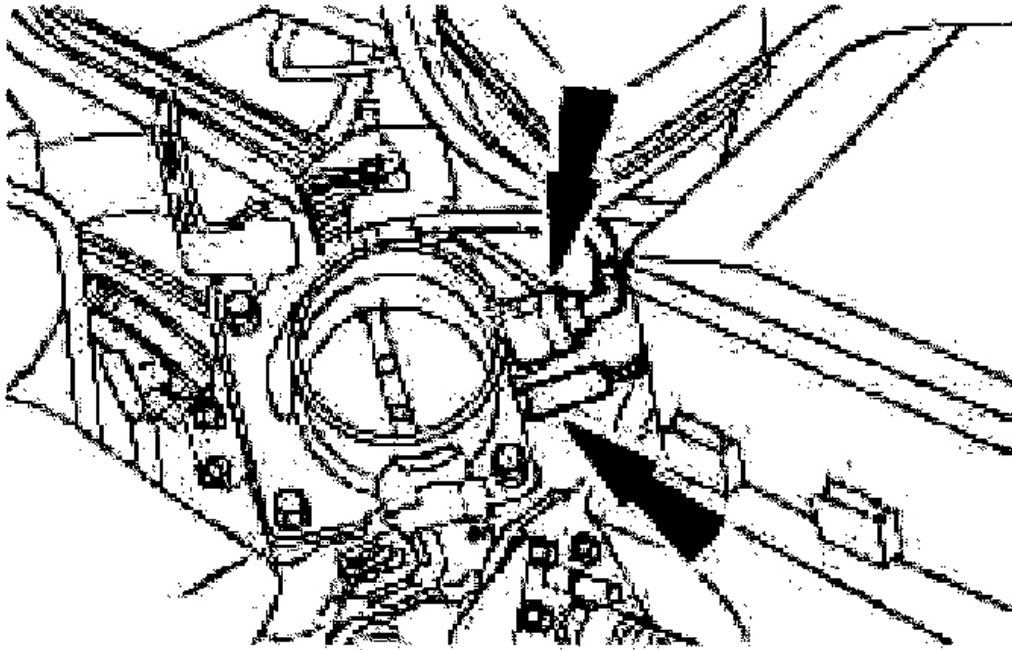
16. Detach the intake manifold runner control (IMRC) actuator cable from the IMRC lever (intake manifold assembly shown removed for clarity).
 1. Rotate the IMRC lever.
 2. Remove the IMRC actuator cable



G03432700

Fig. 117: Removing IMRC Actuator Cable
Courtesy of FORD MOTOR CO.

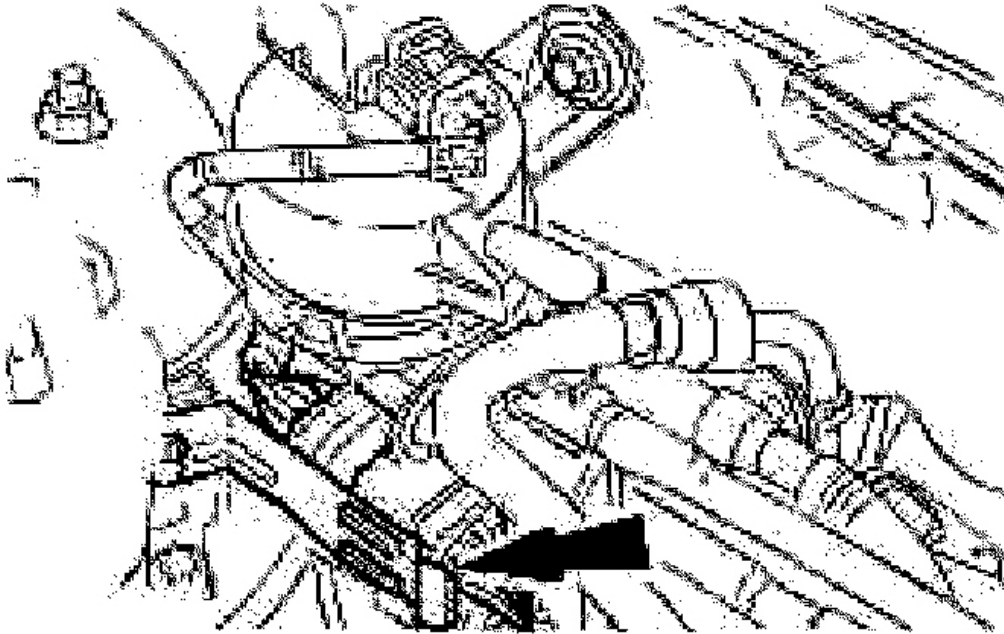
17. Disconnect the vacuum hoses from the intake manifold.



G03432701

Fig. 118: Disconnecting Vacuum Hoses From Intake Manifold
Courtesy of FORD MOTOR CO.

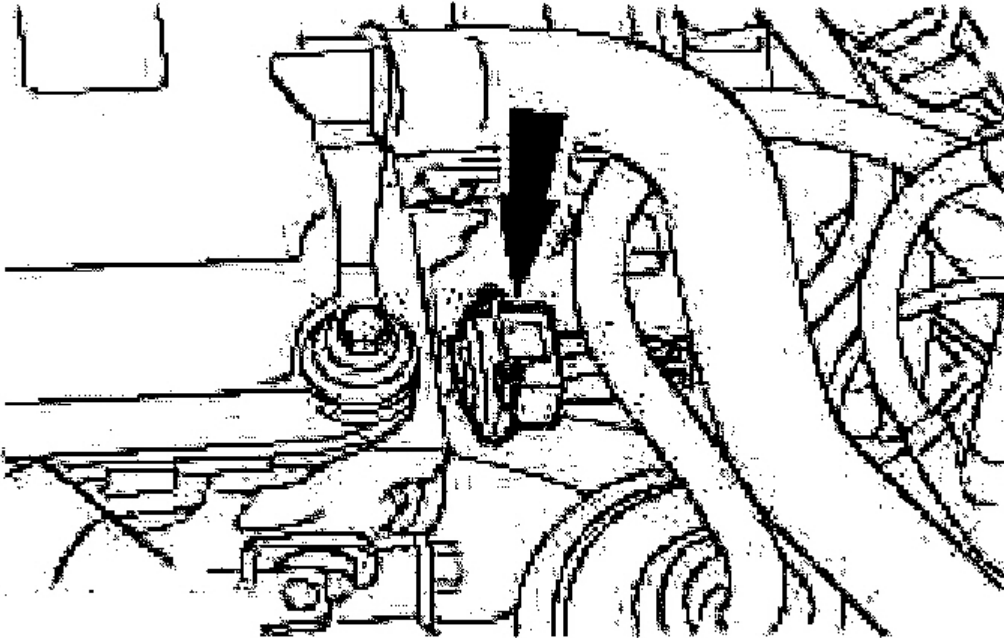
18. Disconnect the fuel injector wiring harness.



G03432702

Fig. 119: Disconnecting Fuel Injector Wiring Harness
Courtesy of FORD MOTOR CO.

19. Disconnect the camshaft position (CMP) sensor electrical connector.

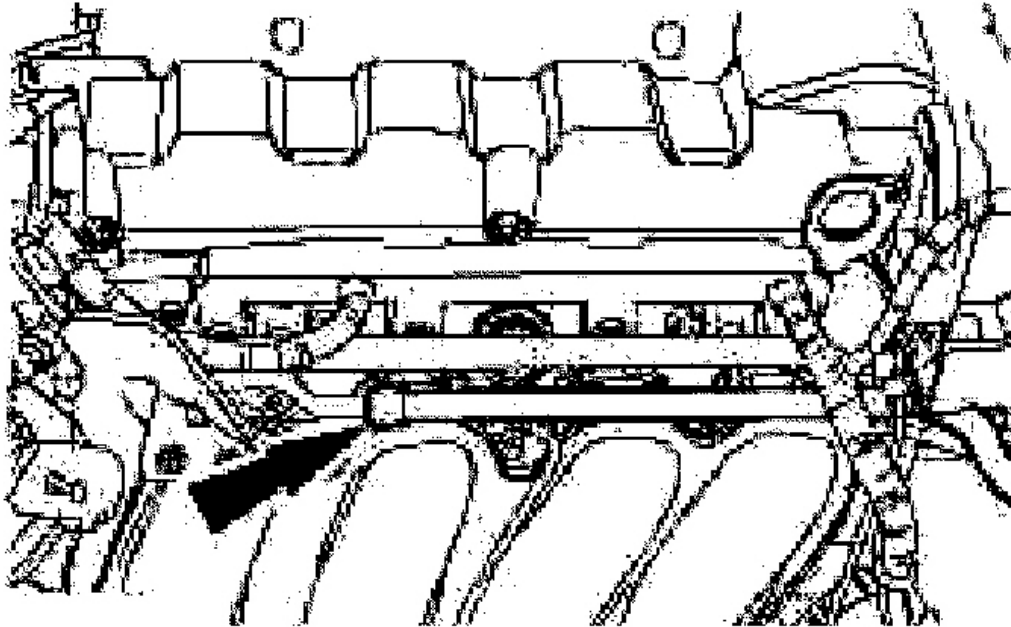


G03432703

Fig. 120: Disconnecting Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

WARNING: Escaping fuel. Observe the safety regulations for working with fuel.

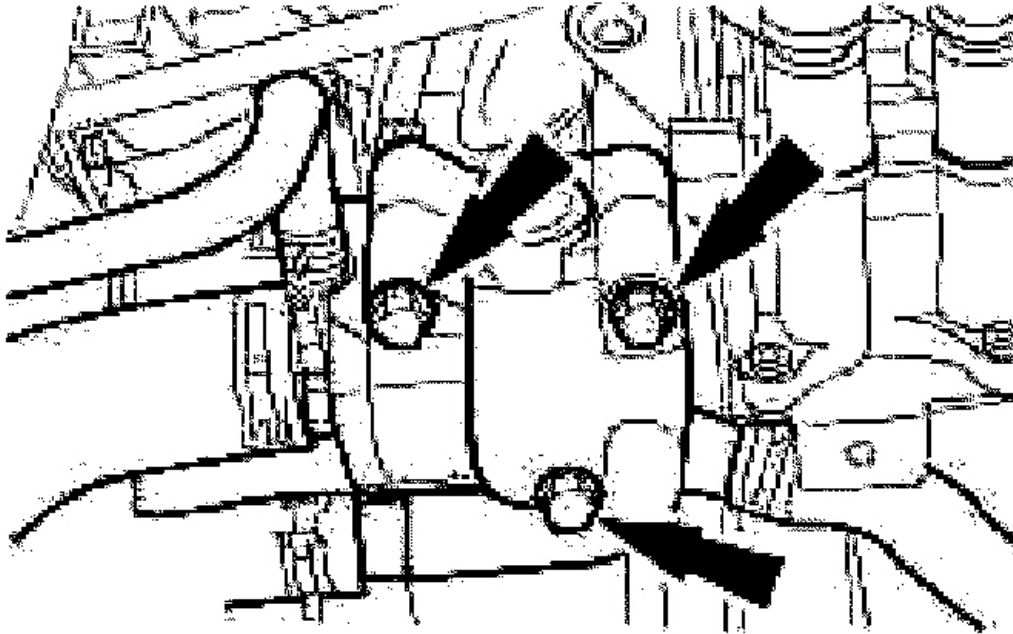
20. Detach the fuel lines.
 - Detach the ground cable from the engine lifting eye.



G03432704

Fig. 121: Detaching Ground Cable From Engine Lifting Eye
Courtesy of FORD MOTOR CO.

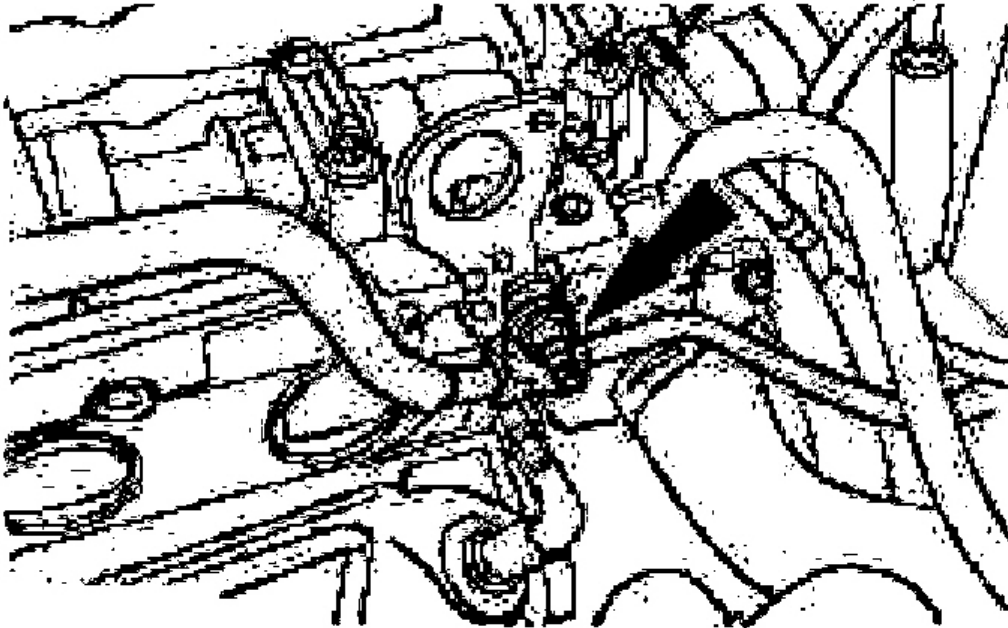
21. Remove the exhaust manifold. For additional information, refer to **EXHAUST MANIFOLD** .
22. Detach the thermostat housing.



G03432705

Fig. 122: Detaching Thermostat Housing
Courtesy of FORD MOTOR CO.

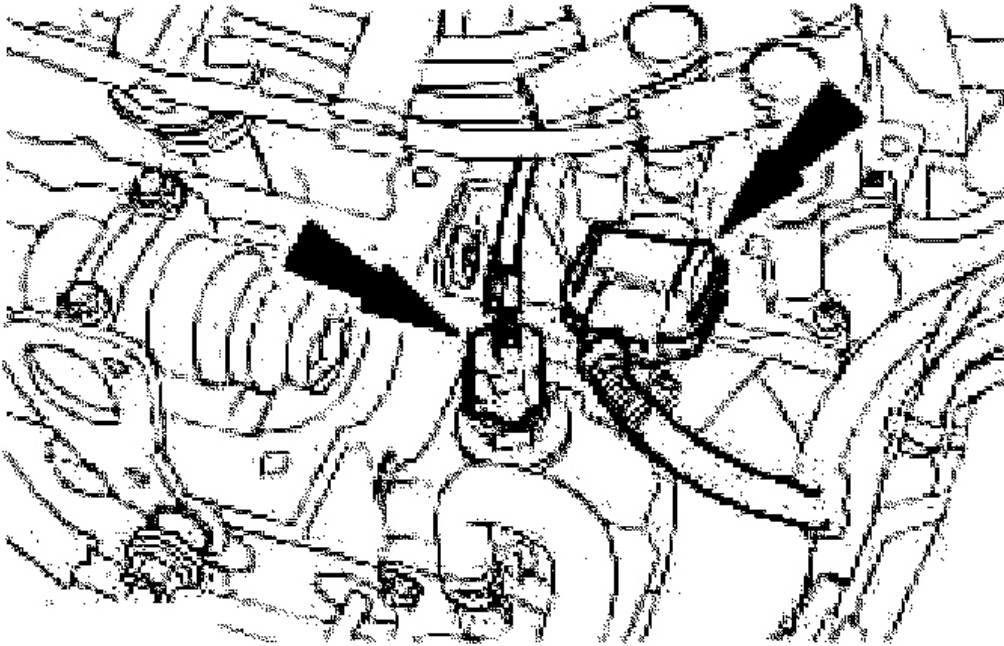
23. Detach the power steering pipe bracket from the cylinder head.



G03432706

Fig. 123: Detaching Power Steering Pipe Bracket From Cylinder Head
Courtesy of FORD MOTOR CO.

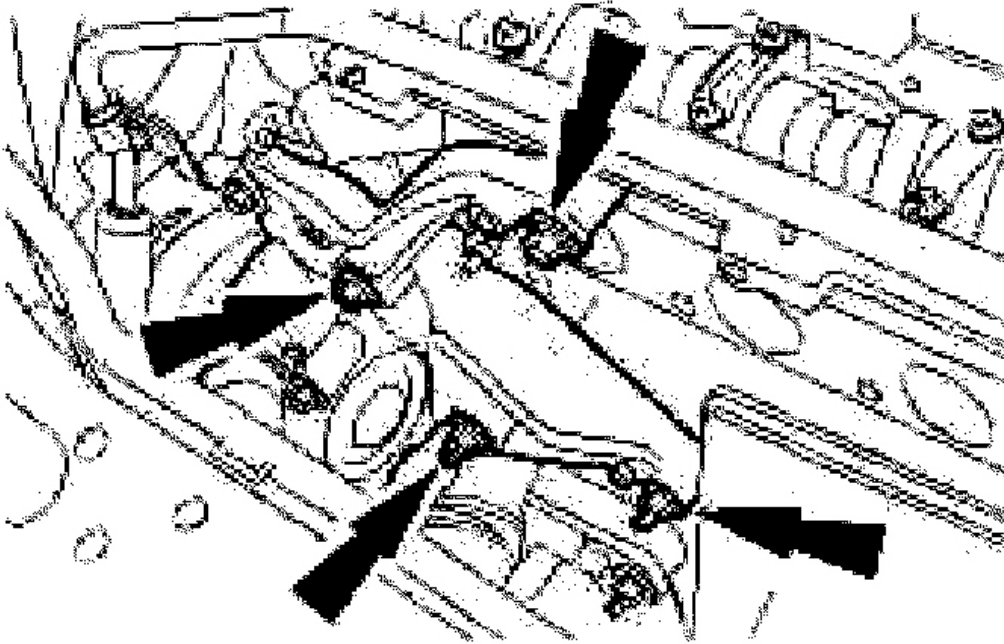
24. Disconnect the wiring harness from the electronic ignition (EI) coil, from the noise suppressor capacitor and from the engine coolant temperature (ECT) sensor.



G03432707

Fig. 124: Disconnecting Wiring Harness From Electronic Ignition Coil
Courtesy of FORD MOTOR CO.

25. Remove the camshafts. For additional information, refer to **CAMSHAFTS** .
26. Detach the power steering pump bracket from the cylinder head and cylinder block.

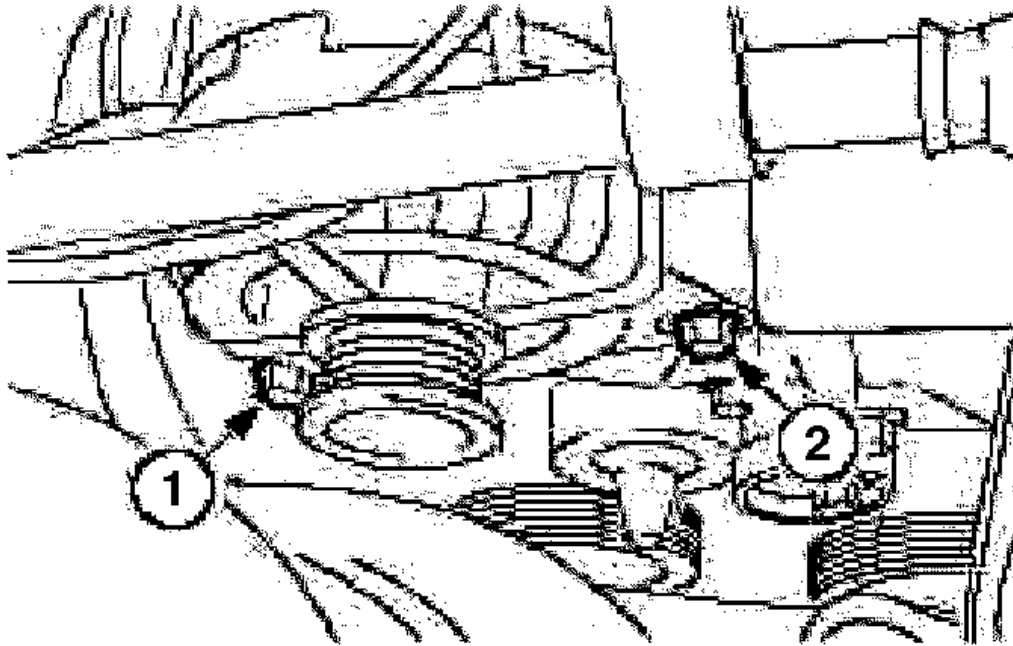


G03432708

Fig. 125: Detaching Power Steering Pump Bracket From Cylinder Head And Cylinder Block

Courtesy of FORD MOTOR CO.

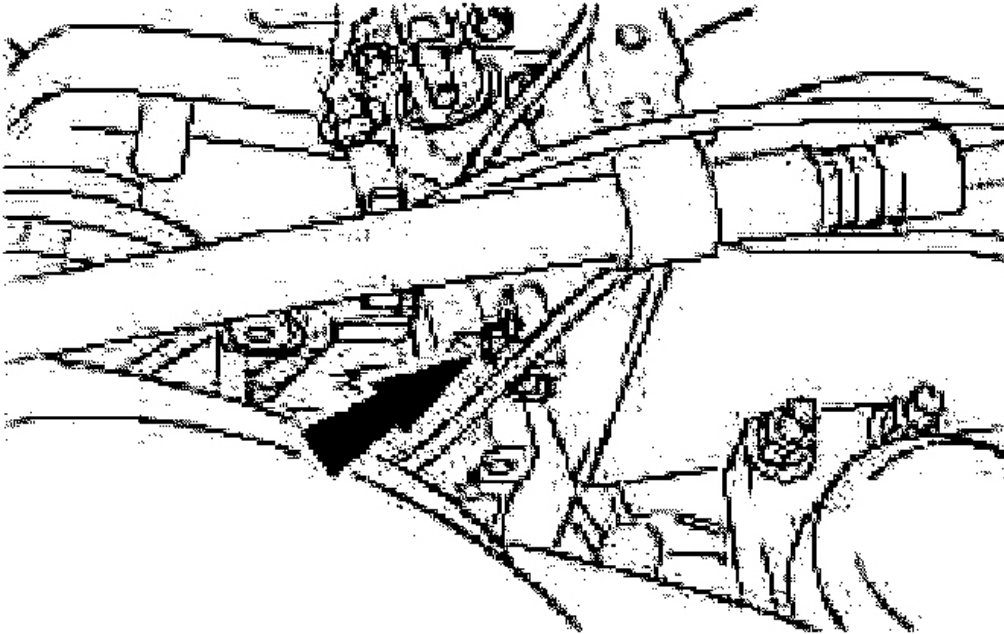
27. Detach the generator.
 1. Loosen the bolt.
 2. Remove the bolt.



G03432709

Fig. 126: Detaching Generator
Courtesy of FORD MOTOR CO.

28. Remove the upper bolt from the generator bracket.



G03432710

Fig. 127: Removing Upper Bolt From Generator Bracket
Courtesy of FORD MOTOR CO.

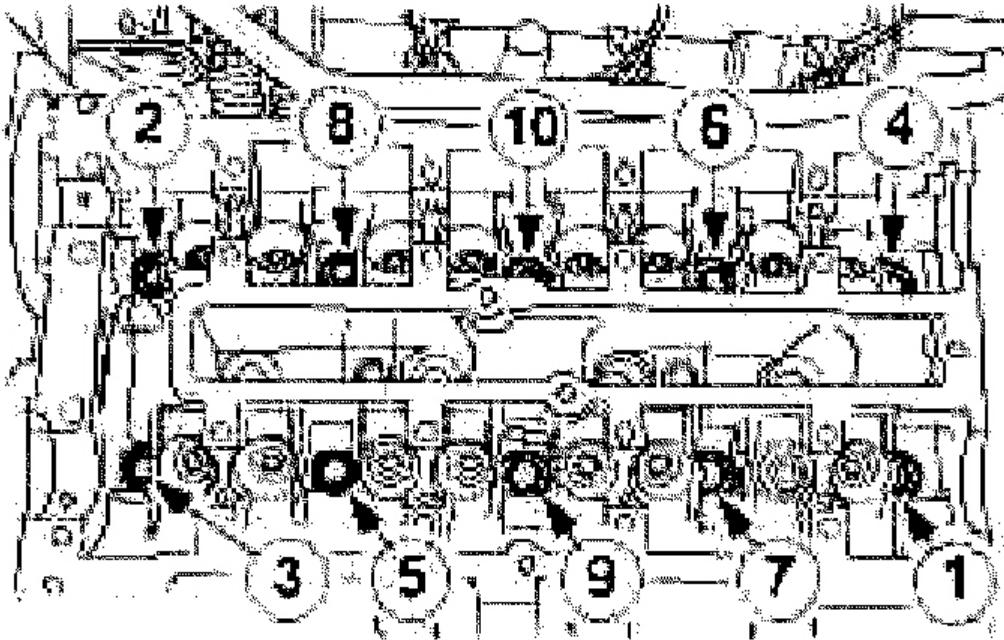
CAUTION: Keep the valve tappets in order for installation.

29. Remove the valve tappets.

CAUTION: Cylinder head bolts can only be used twice, mark the bolts to indicate usage.

CAUTION: The cylinder head must be cooled to ambient temperature.

NOTE: Evenly loosen the cylinder head bolts in the sequence shown.



G03432711

Fig. 128: Loosening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

30. Remove the cylinder head bolts.
31. Remove the cylinder head.

Installation

1. Using a spatula remove the gasket residue.
 - Thoroughly clean the threaded holes of the cylinder head bolts.
2. Check the cylinder head distortion. For additional information, refer to Cylinder Head Distortion (**ENGINE SYSTEM-GENERAL INFORMATION**).
3. Make up two locating studs as shown.

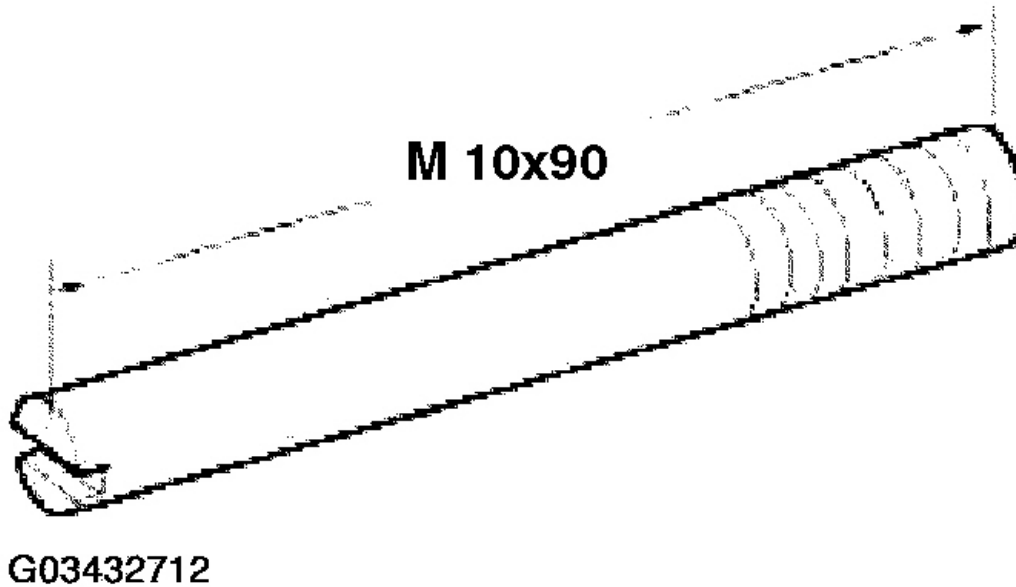
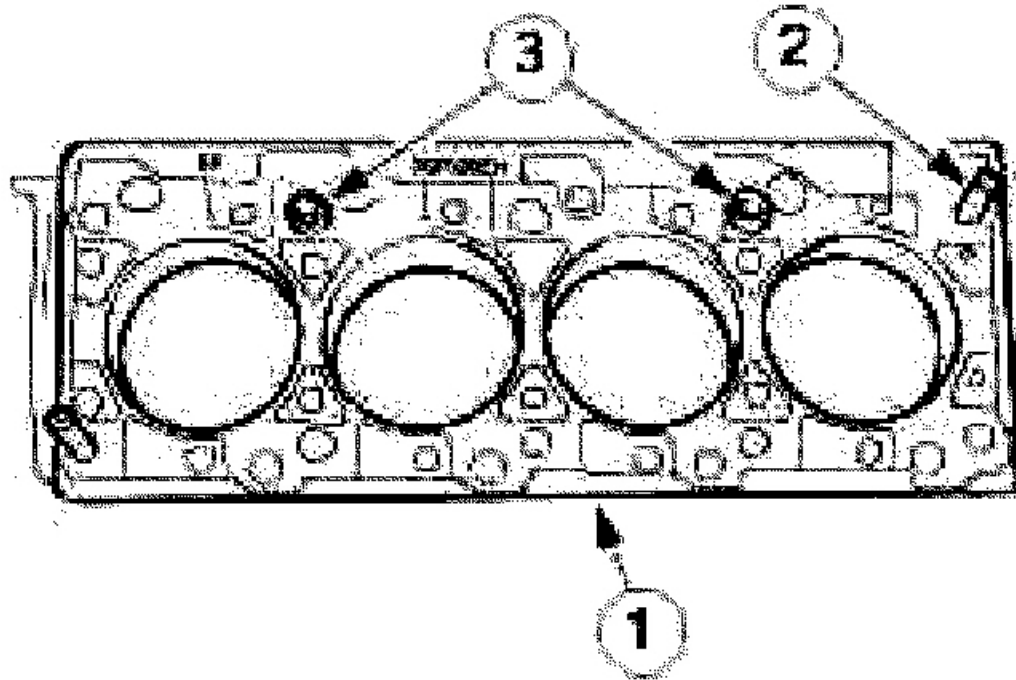


Fig. 129: Identifying Locating Studs
Courtesy of FORD MOTOR CO.

NOTE: **Install a new cylinder head gasket.**

4. Install the cylinder head gasket.
 1. Position the cylinder head gasket.
 2. Insert the fabricated locating studs.
 3. Check that the locating studs are seated correctly.



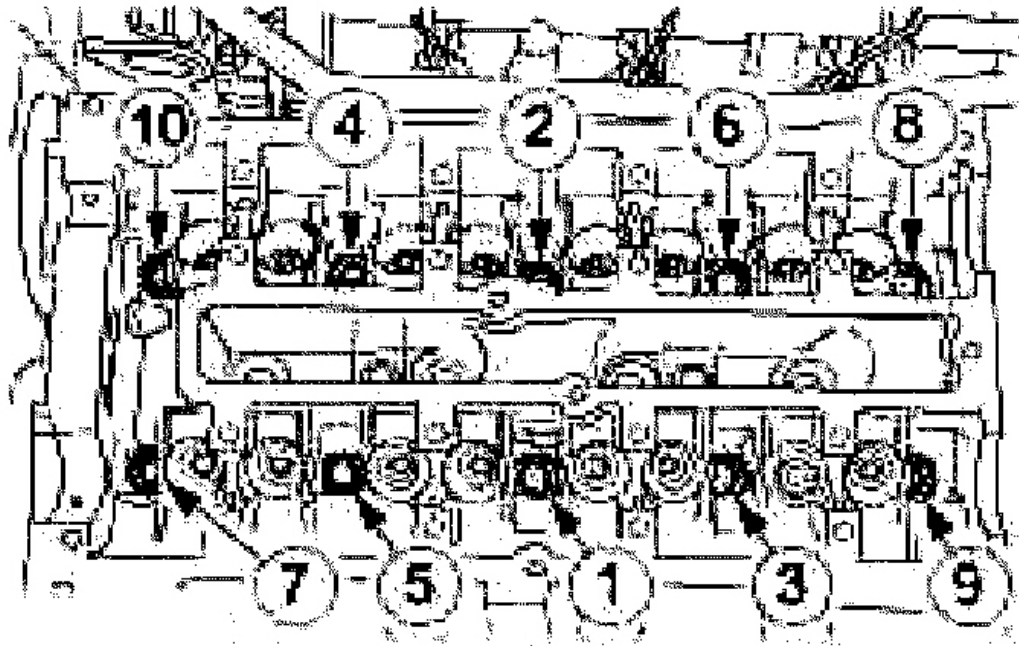
G03432713

Fig. 130: Installing Cylinder Head Gasket
Courtesy of FORD MOTOR CO.

5. Install the cylinder head.

CAUTION: Do not retighten the cylinder head bolts.

6. Tighten the cylinder head bolts in three stages in the sequence indicated.
- Stage 1: 20 N.m.
 - Stage 2: 40 N.m.
 - Stage 3: 90 degrees.

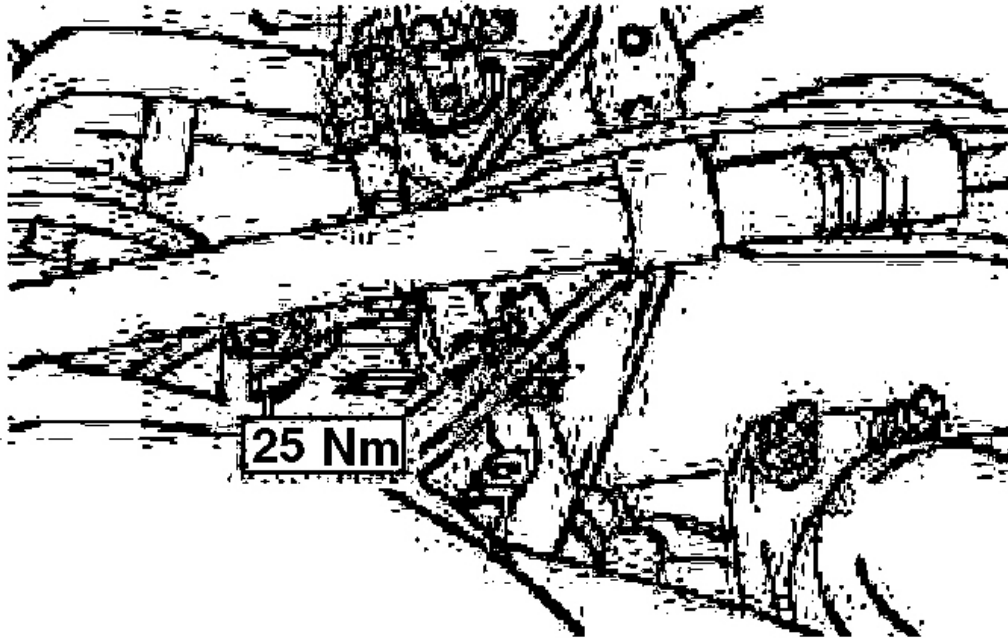


G03432714

Fig. 131: Tightening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

NOTE: Coat the valve tappets with clean engine oil before installation.

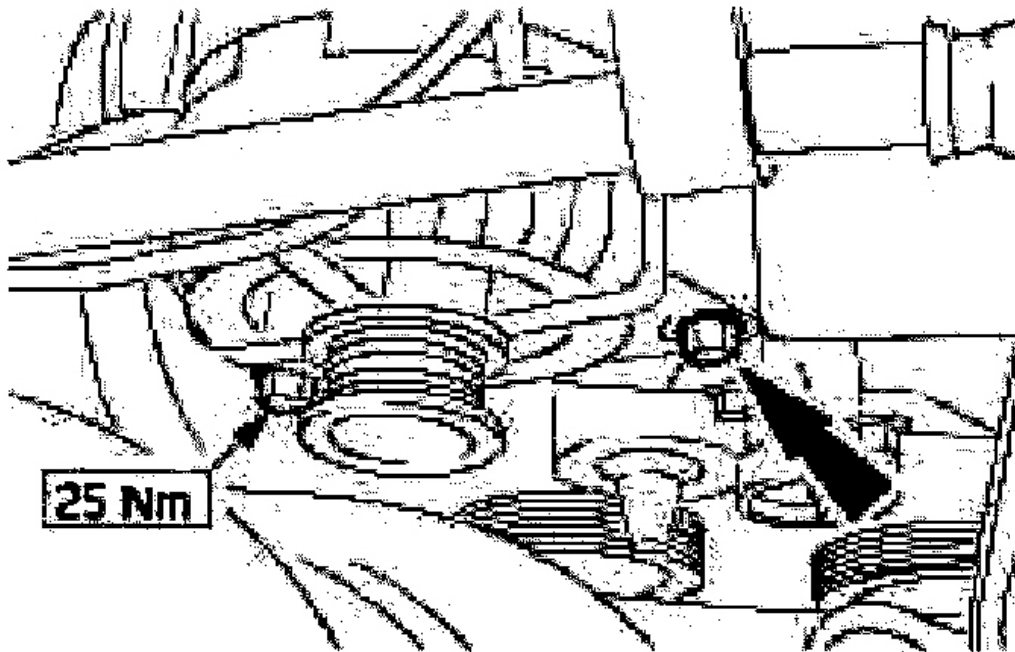
7. Install the valve tappets in order.
8. Install the generator bracket bolt.



G03432715

Fig. 132: Installing Generator Bracket Bolt
Courtesy of FORD MOTOR CO.

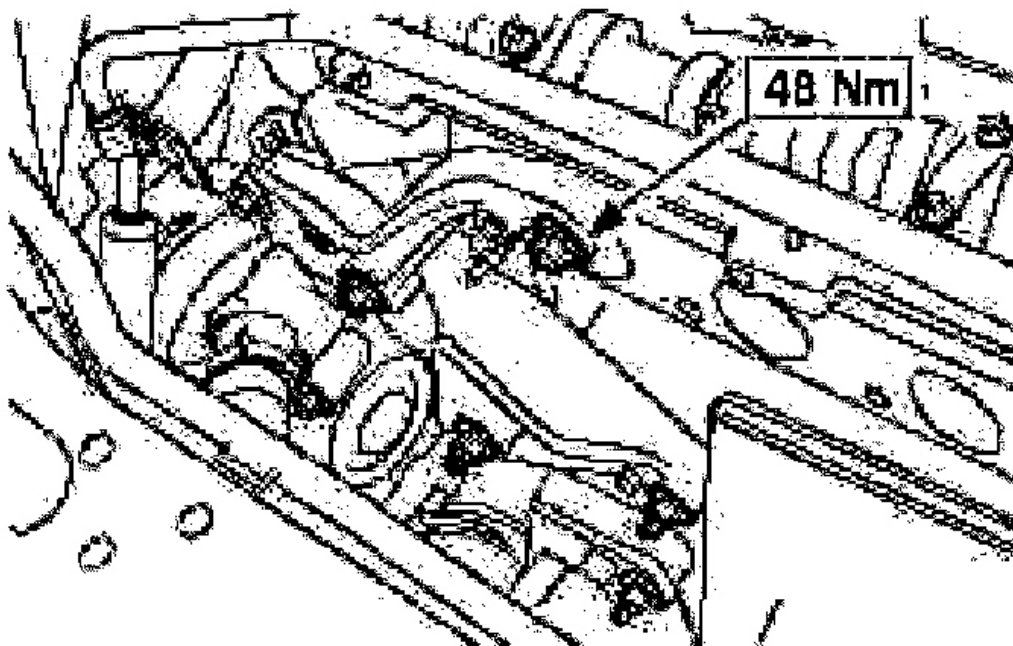
9. Attach the generator.



G03432716

Fig. 133: Attaching Generator
Courtesy of FORD MOTOR CO.

10. Attach the power steering pump bracket to the cylinder head and cylinder block.

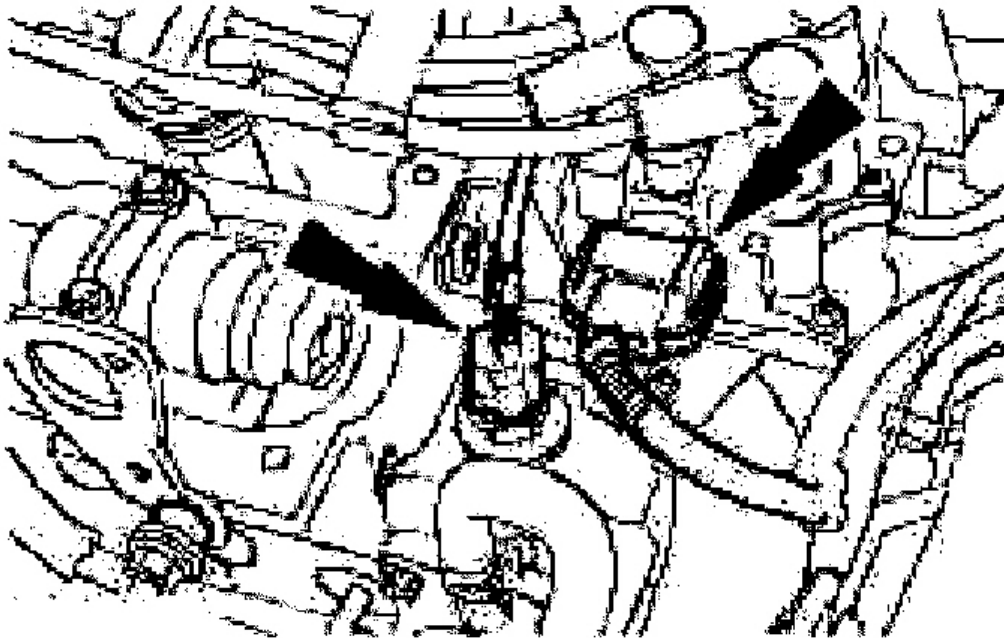


G03432717

Fig. 134: Attaching Power Steering Pump Bracket To Cylinder Head And Cylinder Block

Courtesy of FORD MOTOR CO.

11. Install the camshafts. For additional information, refer to **CAMSHAFTS** .
12. Check the valve clearance and if necessary adjust. For additional information, refer to **VALVE CLEARANCE** .
13. Connect the wiring harness to the electric ignition (EI) coil, to the noise suppressor capacitor and to the engine coolant temperature (ECT) sensor.

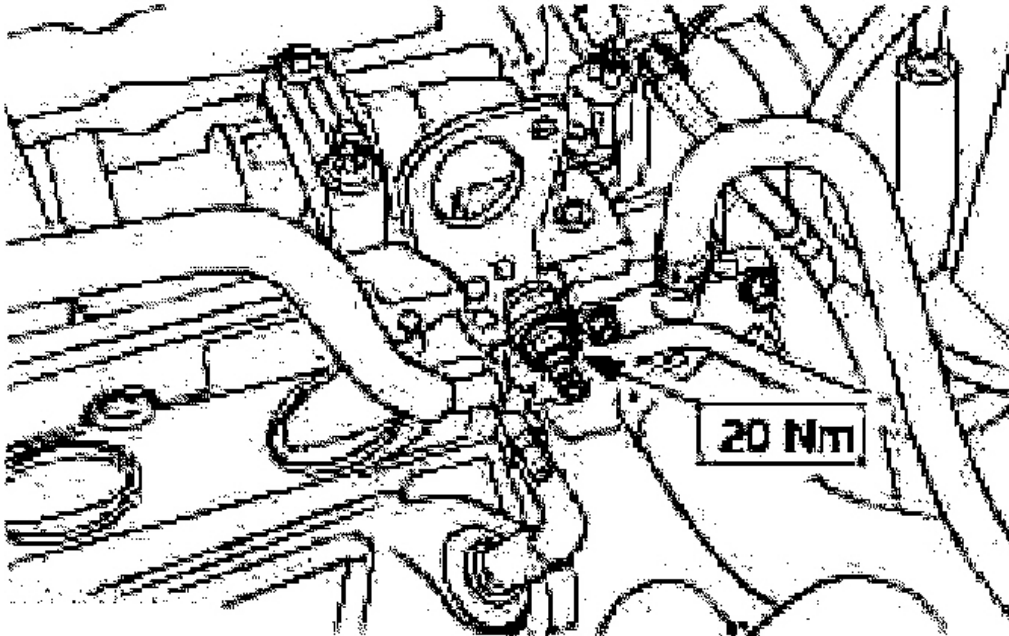


G03432718

Fig. 135: Connecting Wiring Harness To Electric Ignition Coil To Noise Suppressor Capacitor

Courtesy of FORD MOTOR CO.

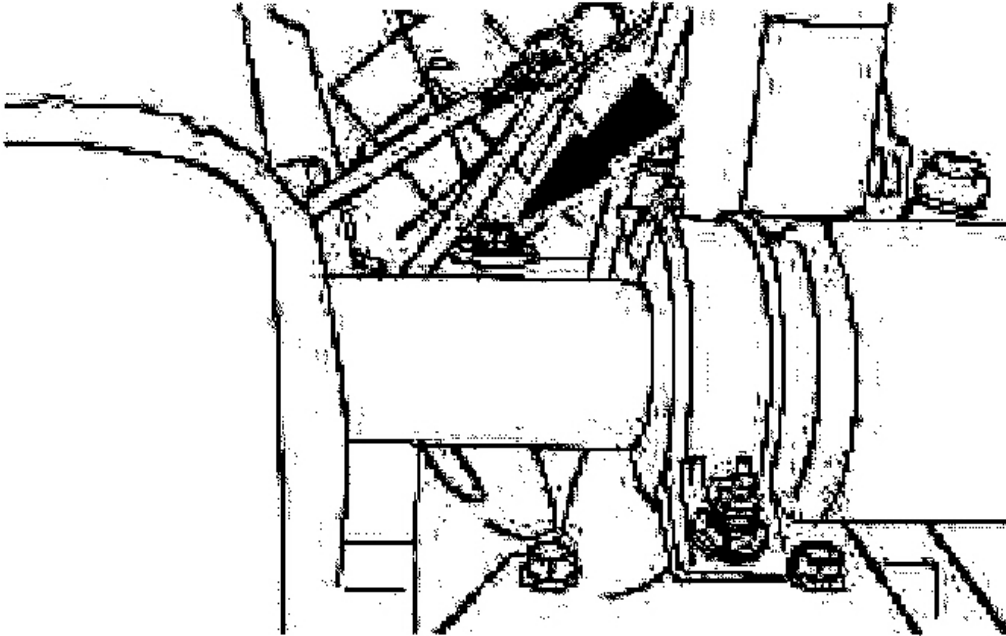
14. Attach the power steering pipe bracket to the cylinder head.



G03432719

Fig. 136: Attaching Power Steering Pipe Bracket To Cylinder Head
Courtesy of FORD MOTOR CO.

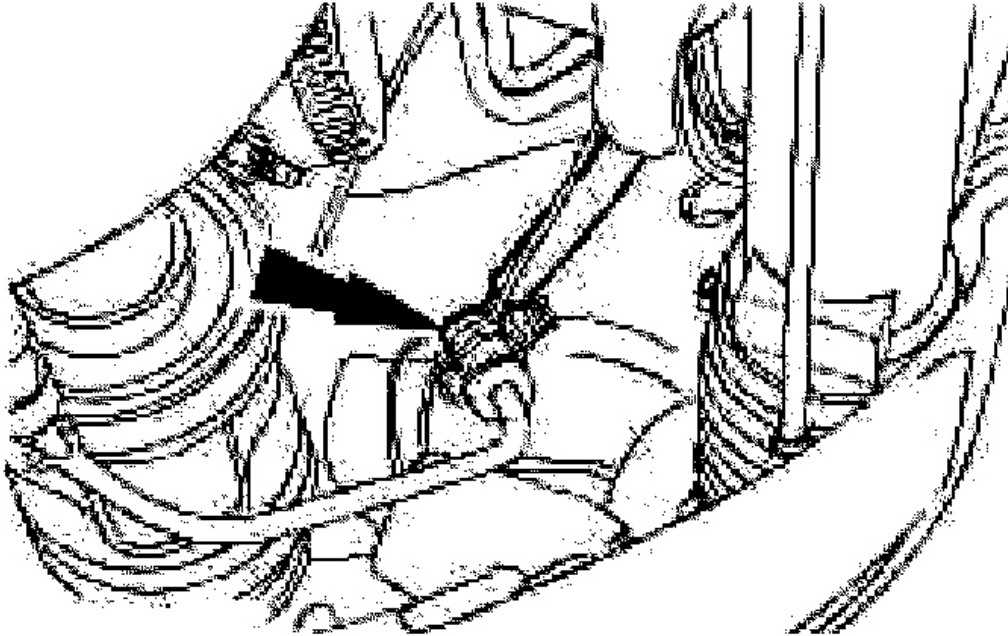
15. Install the intake manifold lower retaining bolt.



G03432720

Fig. 137: Installing Intake Manifold Lower Retaining Bolt
Courtesy of FORD MOTOR CO.

16. Connect the catalyst monitor sensor electrical connector and attach it to the bracket.

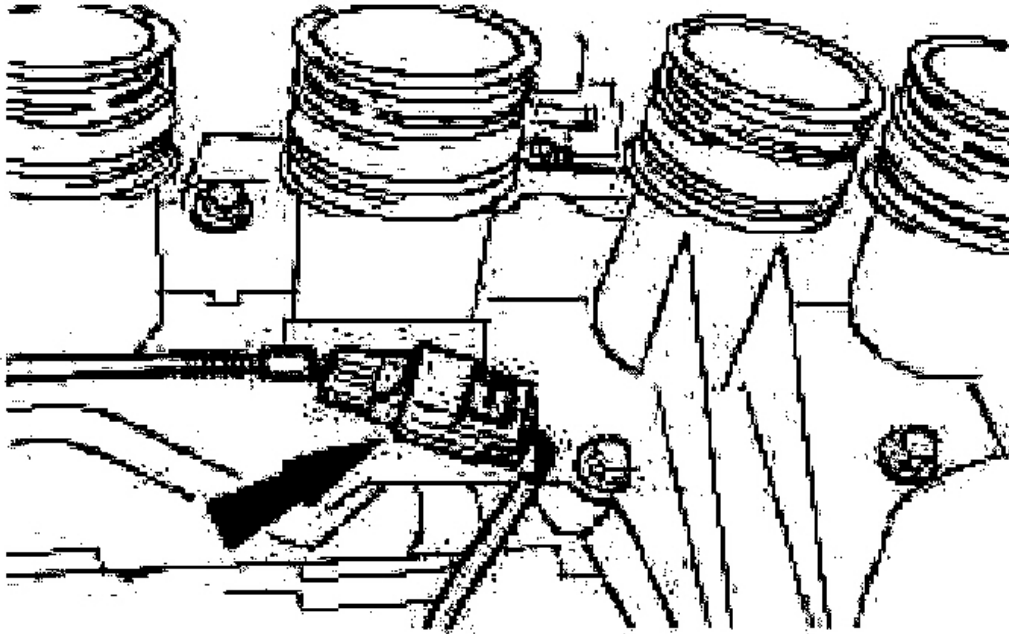


G03432721

Fig. 138: Connecting Catalyst Monitor Sensor Electrical Connector And Attaching To Bracket

Courtesy of FORD MOTOR CO.

17. Connect the knock sensor electrical connector.

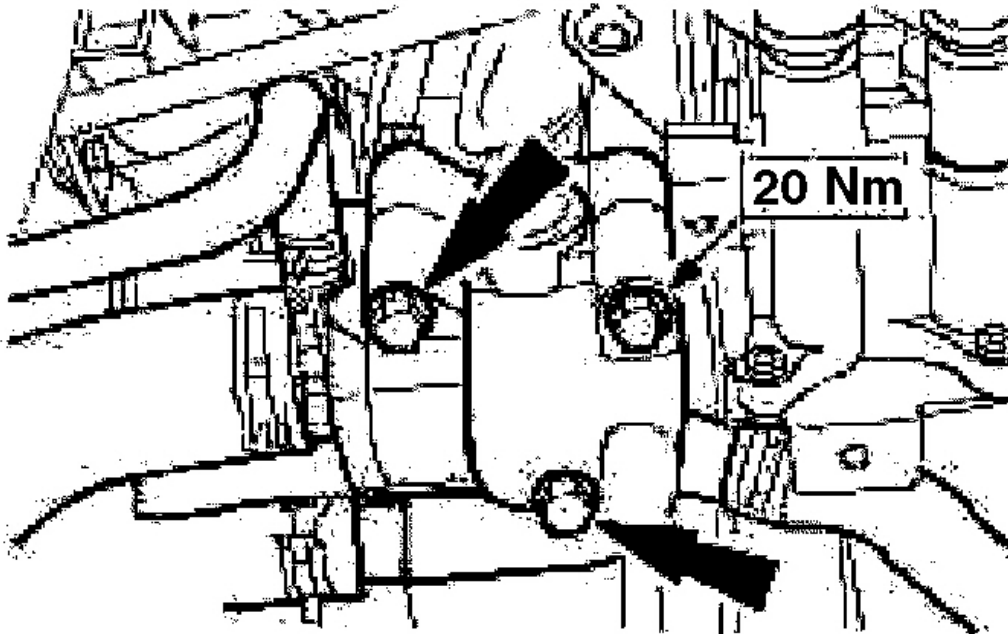


G03432722

Fig. 139: Connecting Knock Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

18. Install the exhaust manifold. For additional information, refer to **EXHAUST MANIFOLD** .

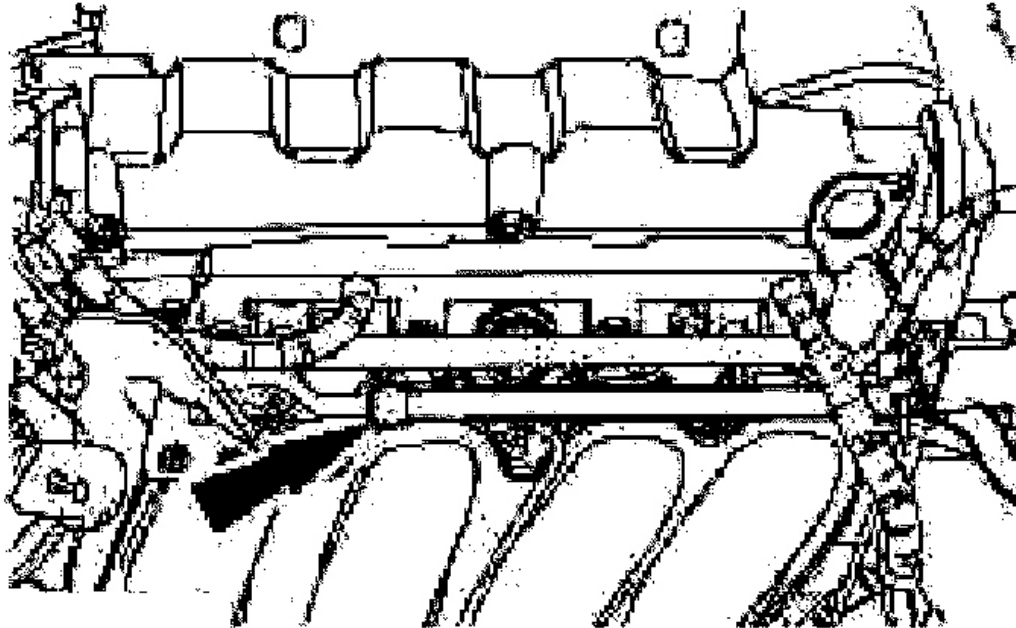
NOTE: Install a new thermostat housing gasket.



G03432723

Fig. 140: Attaching Thermostat Housing
Courtesy of FORD MOTOR CO.

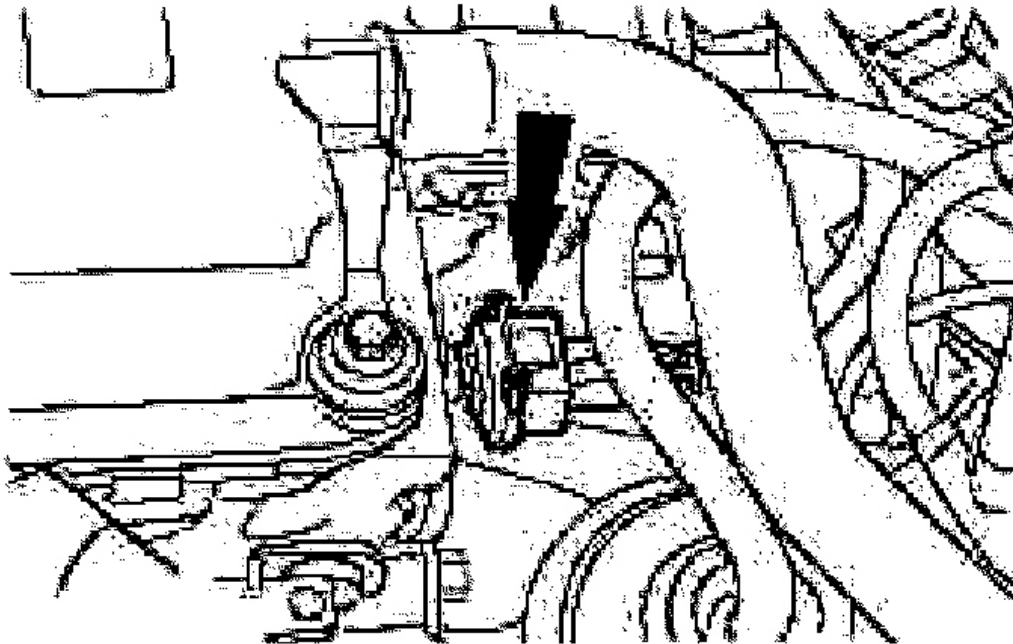
19. Attach the thermostat housing.
20. Attach the fuel lines.
 - Attach the ground cable to the engine lifting bracket.



G03432724

Fig. 141: Attaching Fuel Lines
Courtesy of FORD MOTOR CO.

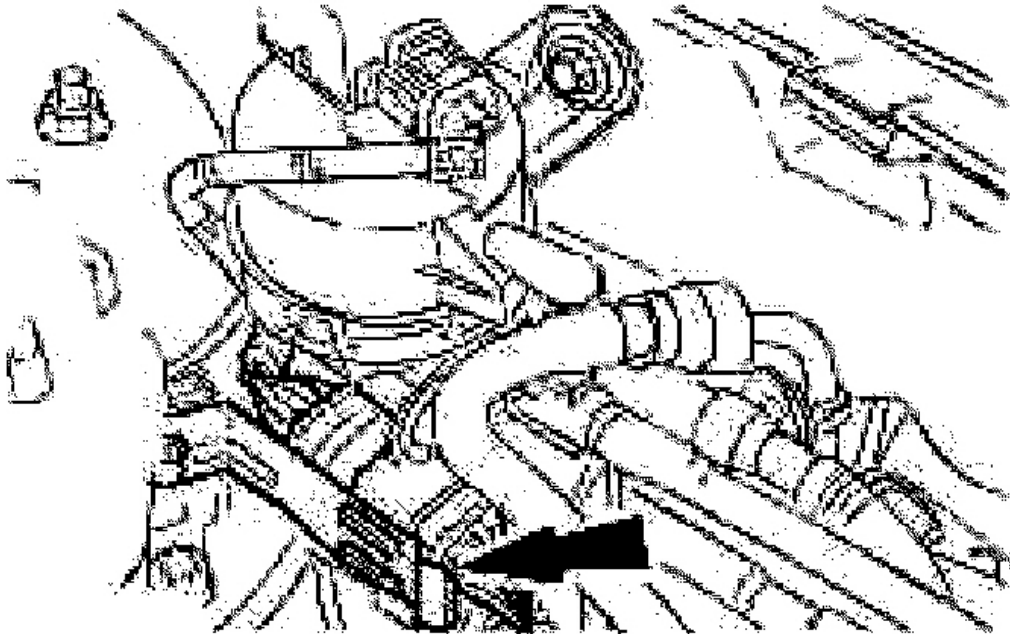
21. Connect the camshaft position (CMP) sensor connector.



G03432725

Fig. 142: Connecting Camshaft Position (CMP) Sensor Connector
Courtesy of FORD MOTOR CO.

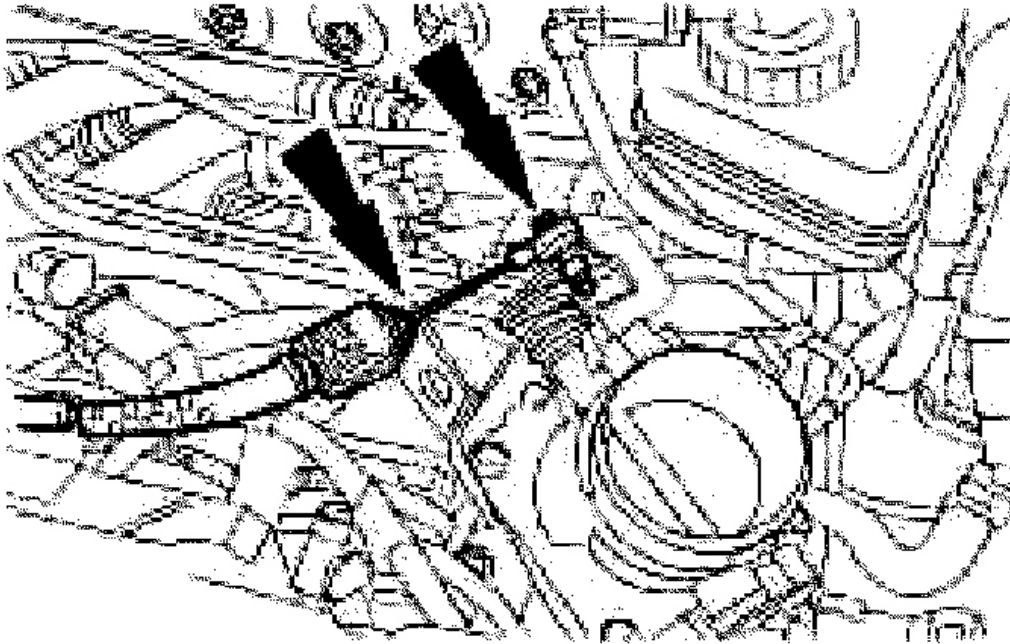
22. Connect the fuel injector wiring harness.



G03432726

Fig. 143: Connecting Fuel Injector Wiring Harness
Courtesy of FORD MOTOR CO.

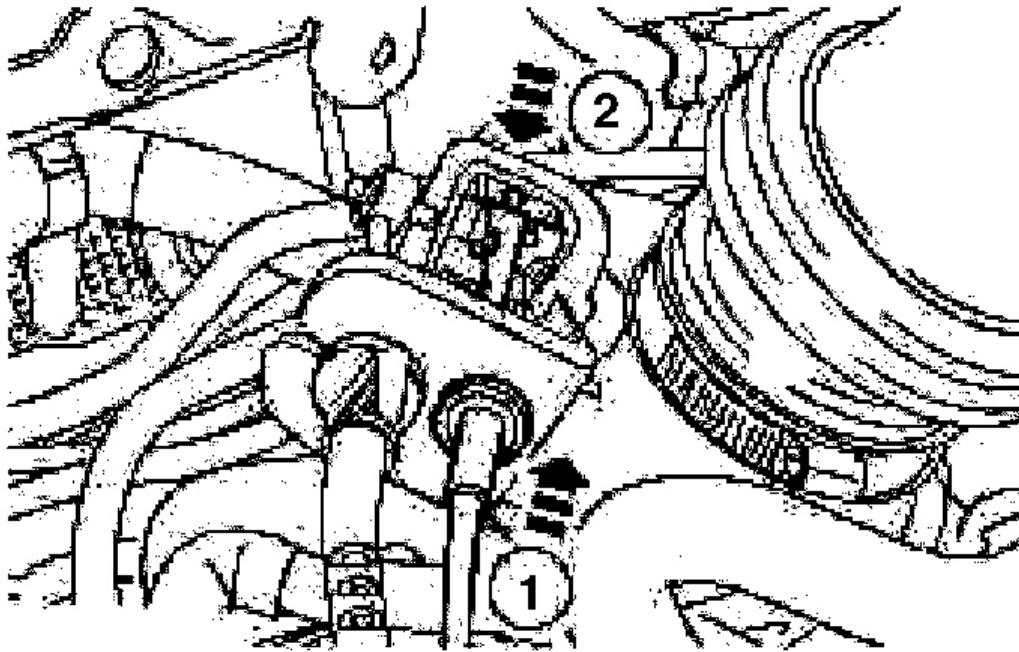
23. Attach the accelerator cable and the speed control cable (if equipped) to the throttle body.



G03432727

Fig. 144: Attaching Accelerator Cable And Speed Control Cable To Throttle Body
Courtesy of FORD MOTOR CO.

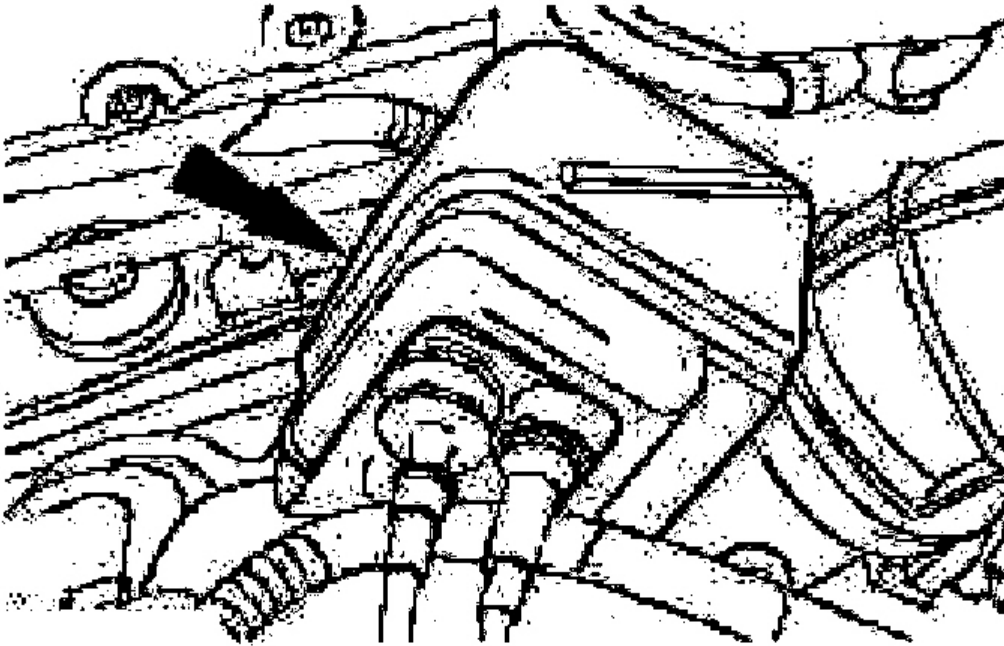
24. Connect the vehicle speed control cable.
 1. Attach the vehicle speed control cable to the throttle body.
 2. Connect the inner cable from the throttle body.



G03432728

Fig. 145: Attaching Vehicle Speed Control Cable To Throttle Body
Courtesy of FORD MOTOR CO.

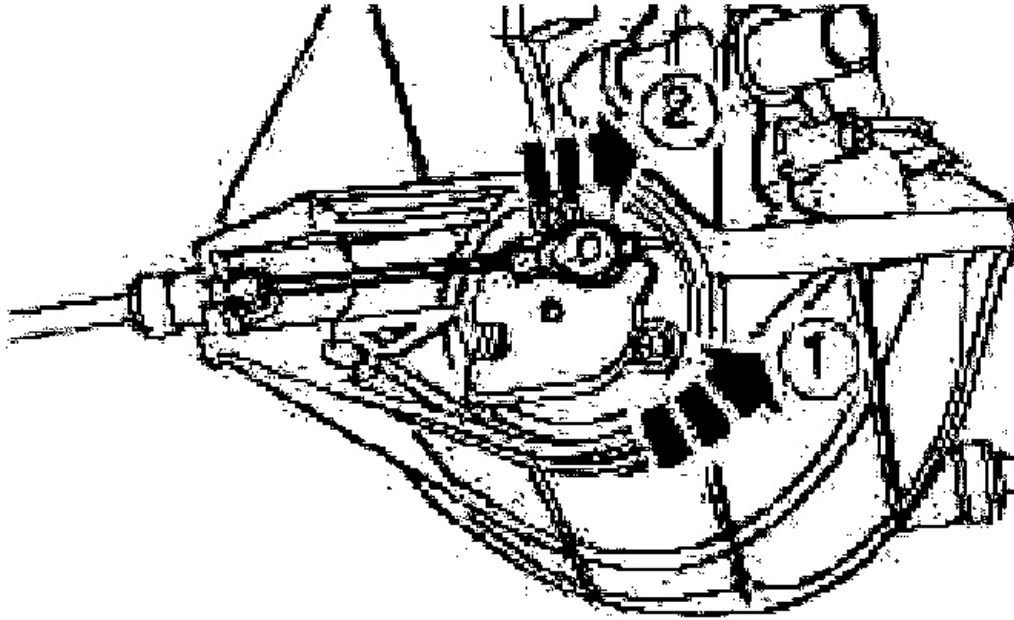
25. Install the splash shield.



G03432729

Fig. 146: Installing Splash Shield
Courtesy of FORD MOTOR CO.

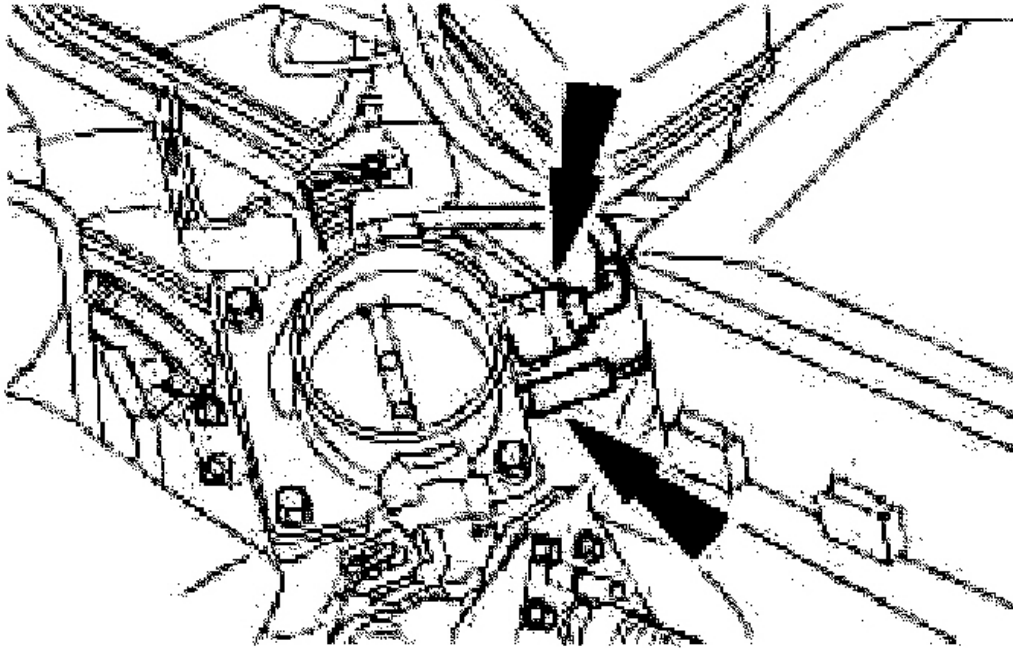
26. Attach the intake manifold runner control (IMRC) actuator cable to the IMRC lever (intake manifold assembly shown removed for clarity).
 1. Rotate the IMRC lever.
 2. Install the IMRC actuator cable



G03432730

Fig. 147: Attaching Intake Manifold Runner Control Actuator Cable To IMRC Lever
Courtesy of FORD MOTOR CO.

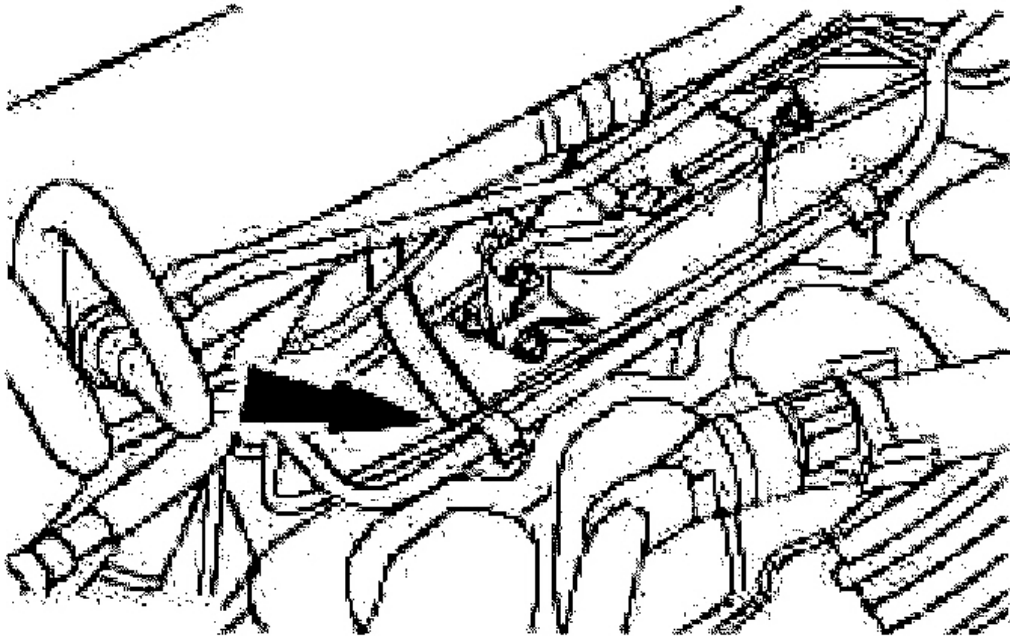
27. Attach the vacuum hoses to the intake manifold.



G03432731

Fig. 148: Attaching Vacuum Hoses To Intake Manifold
Courtesy of FORD MOTOR CO.

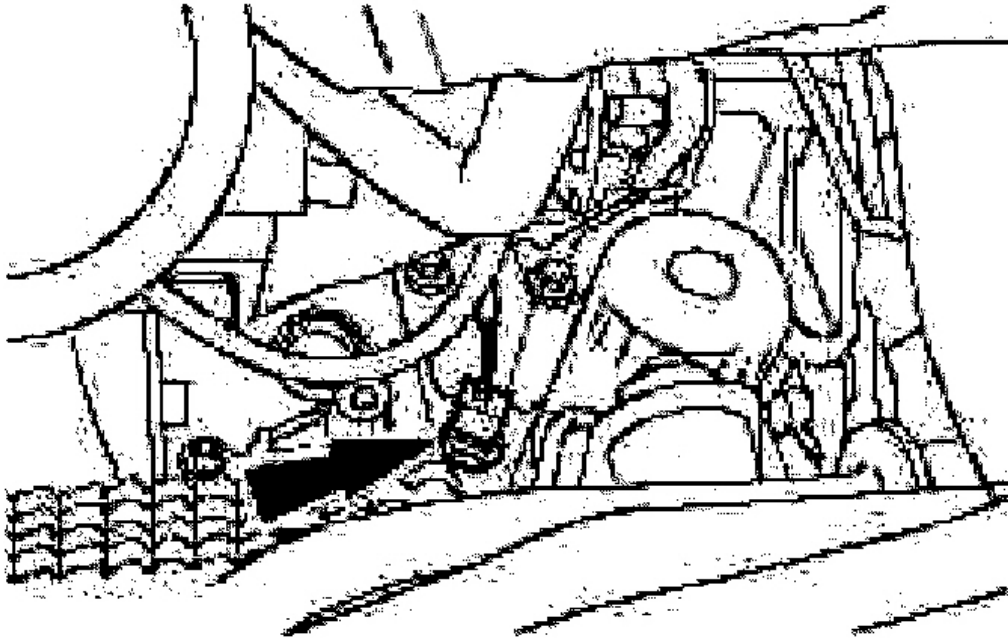
28. Install the air cleaner. .
29. Attach the brake booster pipe to the intake manifold.



G03432732

Fig. 149: Attaching Brake Booster Pipe To Intake Manifold
Courtesy of FORD MOTOR CO.

30. Raise and support the vehicle.
31. Connect the oil pressure switch electrical connector.



G03432733

Fig. 150: Connecting Oil Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

32. Drain and fill the engine with clean engine oil.
33. Connect the battery. .
34. Fill and bleed the cooling system. For additional information, refer to Cooling System Draining, Filling and Bleeding (ENGINE COOLING article).

OIL PAN

General Equipment

GENERAL EQUIPMENT

Spatula

Ten M6 x 20 mm studs

Material

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

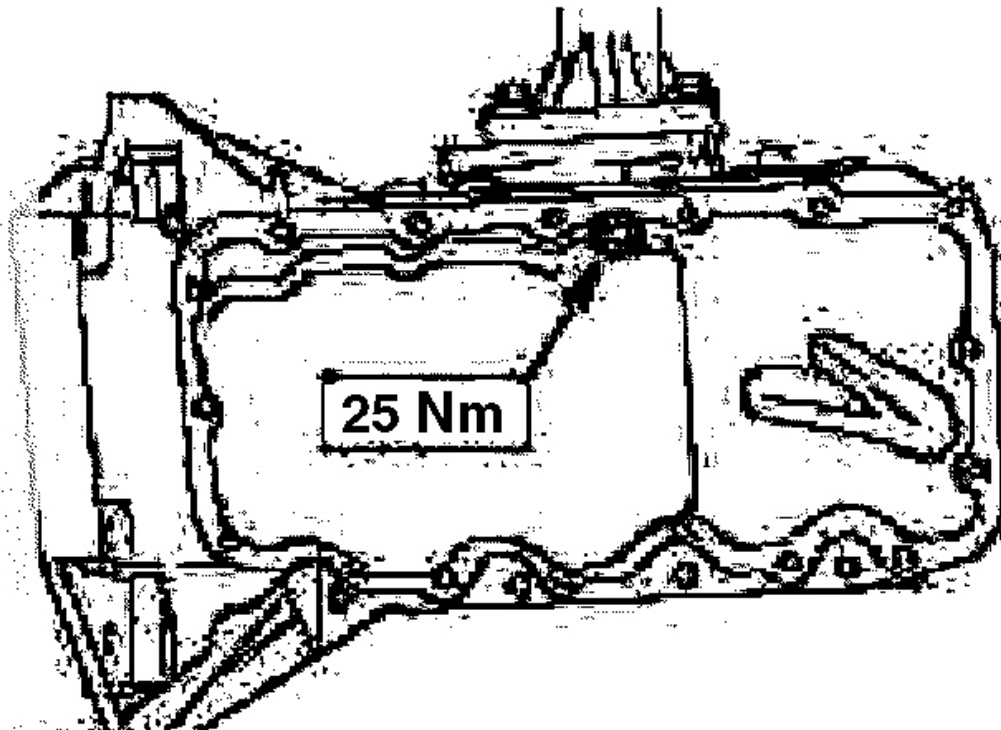
MATERIAL SPECIFICATION

Silicone Sealant	WSE-M4G323-A4
Engine Oil - 5W-30	WSS-M2C153-G

Removal

1. Remove the catalytic converter. .
2. Drain the engine.
 - Allow the oil to drain into a suitable container.

NOTE: Inspect the oil drain plug seal for damage. Install a new oil drain plug seal if necessary.

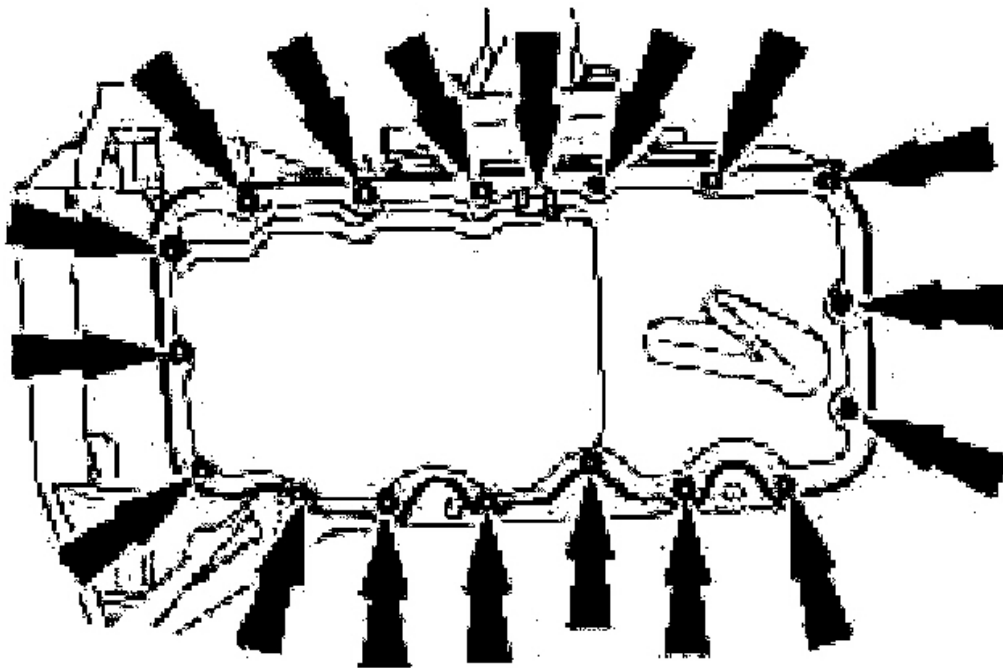


G03432734

Fig. 151: Installing Oil Pan Drain Plug

Courtesy of FORD MOTOR CO.

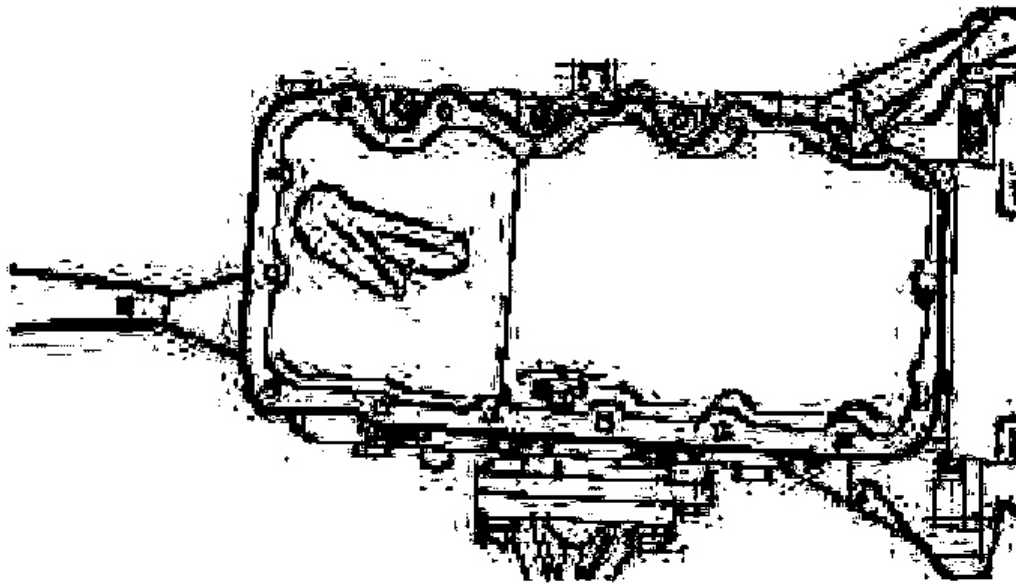
3. Install the oil pan drain plug (engine shown removed for clarity).
4. Remove the oil pan retaining bolts (engine shown removed for clarity).



G03432735

Fig. 152: Removing Oil Pan Retaining Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the mating faces of the oil pan and the lower crankcase.



G03432736

Fig. 153: Removing Oil Pan Using Suitable Spatula
Courtesy of FORD MOTOR CO.

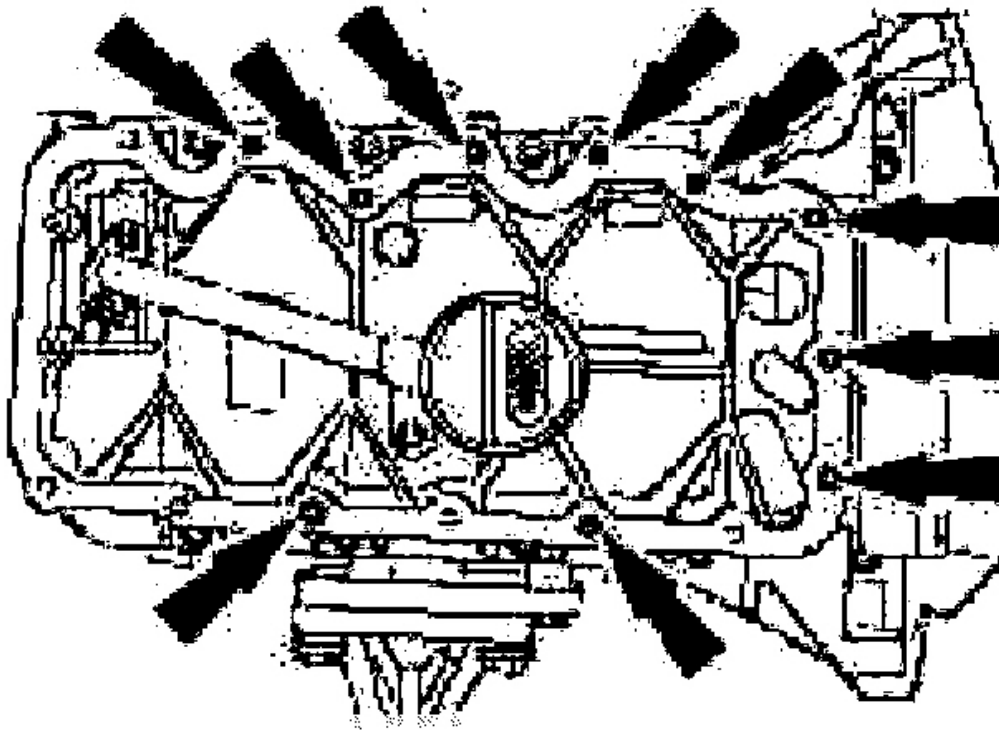
5. Using a suitable spatula, remove the oil pan (engine shown removed for clarity).

Installation

NOTE: The mating faces of the oil pan and the lower crankcase must be free from oil and sealant residue.

1. Clean the mating faces of the oil pan and the lower crankcase.
2. Clean all traces of oil residue and oil sludge from the oil pan.

CAUTION: The lower crankcase may be damaged if sealant enters the blind holes.



G03432737

Fig. 154: Installing Ten M6 X 20 Mm Studs Into Blind Holes
Courtesy of FORD MOTOR CO.

3. Install ten M6 x 20 mm studs into the blind holes shown (engine shown removed for clarity).

NOTE: **Attach the oil pan within ten minutes of applying the sealant.**

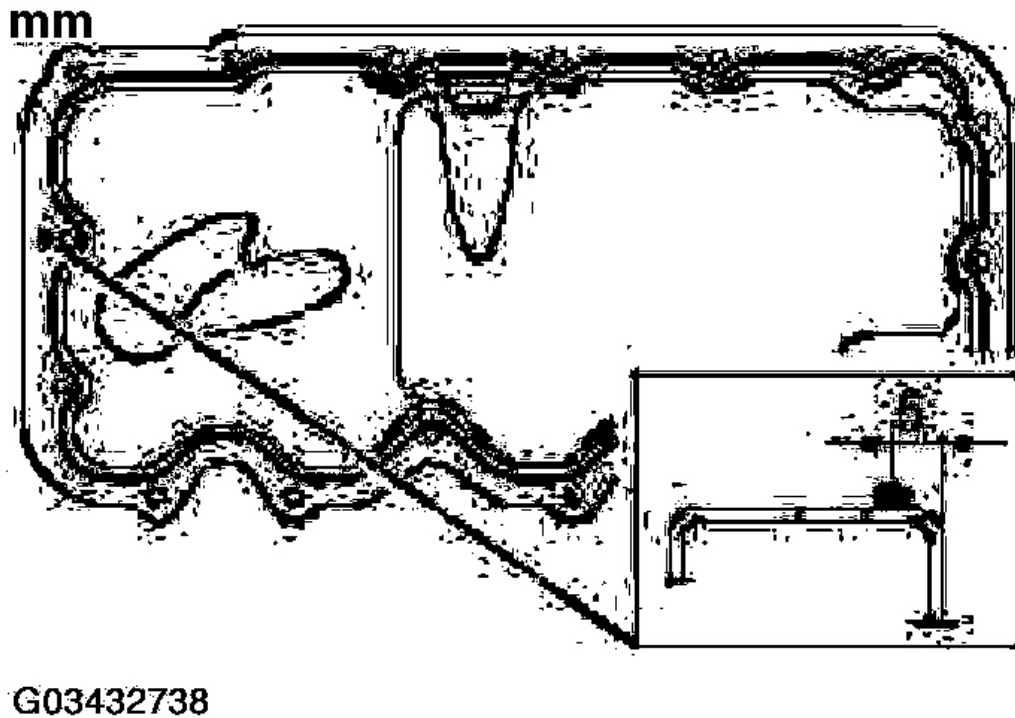
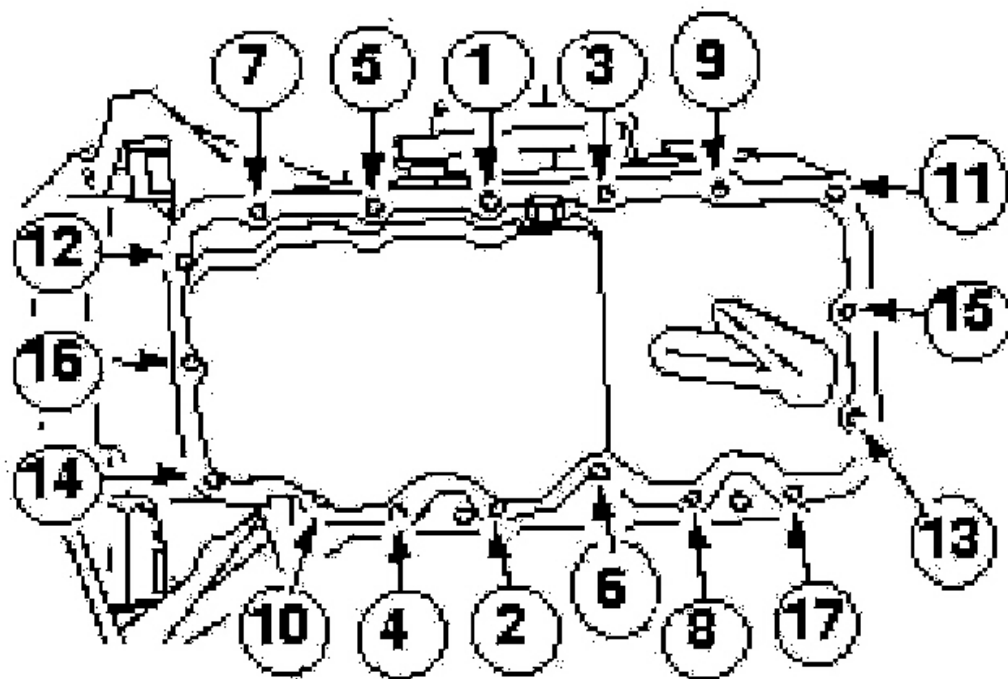


Fig. 155: Applying 3 mm Diameter Bead Of Sealant To Mating Face Of Oil Pan
Courtesy of FORD MOTOR CO.

4. Apply a 3 mm diameter bead of sealant to the mating face of the oil pan.

NOTE: **The oil pan must not be removed once it comes into contact with the lower crankcase housing.**

5. Attach the oil pan to the lower crankcase housing.
 - Remove the studs.
6. Install the oil pan retaining bolts.
 - Tighten the oil pan retaining bolts in the sequence shown in two stages.
 - Stage 1: 6 N.m.
 - Stage 2: 10 N.m.



G03432739

Fig. 156: Tightening Sequence Of Oil Pan Retaining Bolts
Courtesy of FORD MOTOR CO.

NOTE: Inspect the oil drain plug and gasket. Install a new oil drain plug and gasket if necessary.

7. Install the oil pan drain plug.
8. Install the catalytic converter. .
9. Fill the engine with engine oil.

OIL PUMP

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



Installer, Crankshaft Front Oil Seal
303-164 (T81P -6700 -A)

G03432740

Fig. 157: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

General Equipment

GENERAL EQUIPMENT

Hydraulic jack

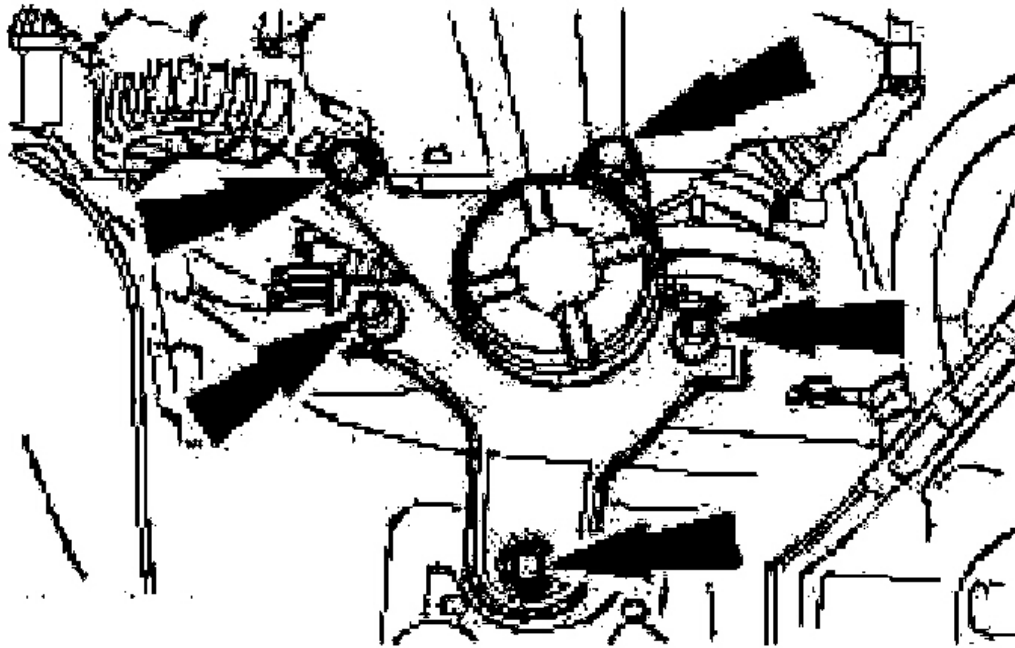
Material

MATERIAL SPECIFICATION

Engine Oil - 5W-30	WSS-M2C153-G
	WSK-M4G320-A

Removal

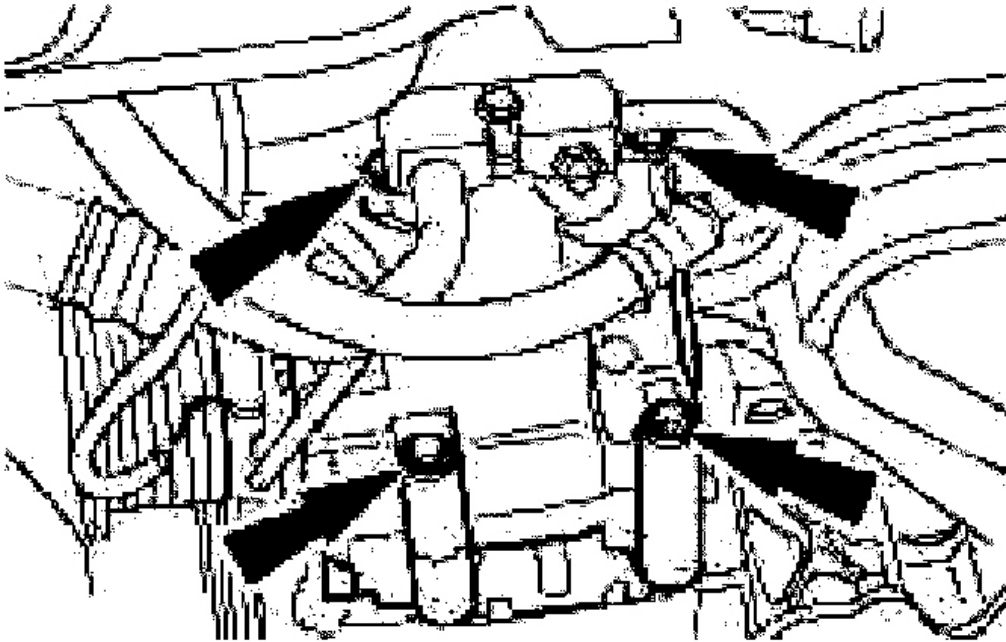
1. Remove the crankshaft front seal. For additional information, refer to **CRANKSHAFT FRONT SEAL** .
2. Install the engine front mount.



G03432741

Fig. 158: Installing Engine Front Mount
Courtesy of FORD MOTOR CO.

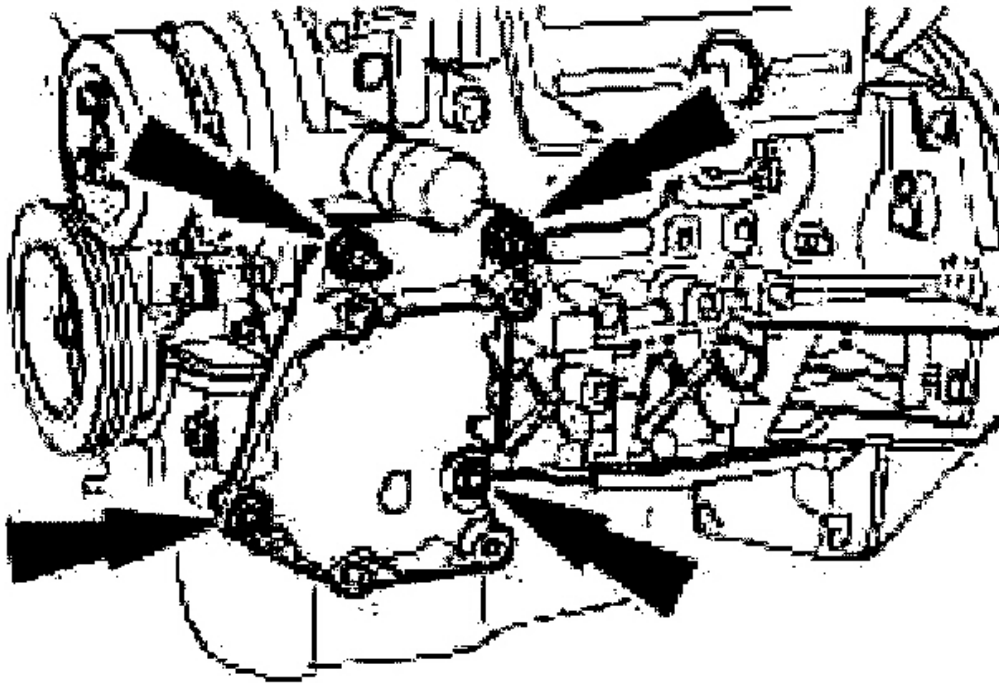
3. Raise and support the vehicle.
4. Detach the air conditioning (A/C) compressor from the bracket and secure it on the radiator crossmember.



G03432742

Fig. 159: Detaching Air Conditioning (A/C) Compressor From Bracket And Securing On Radiator Crossmember
Courtesy of FORD MOTOR CO.

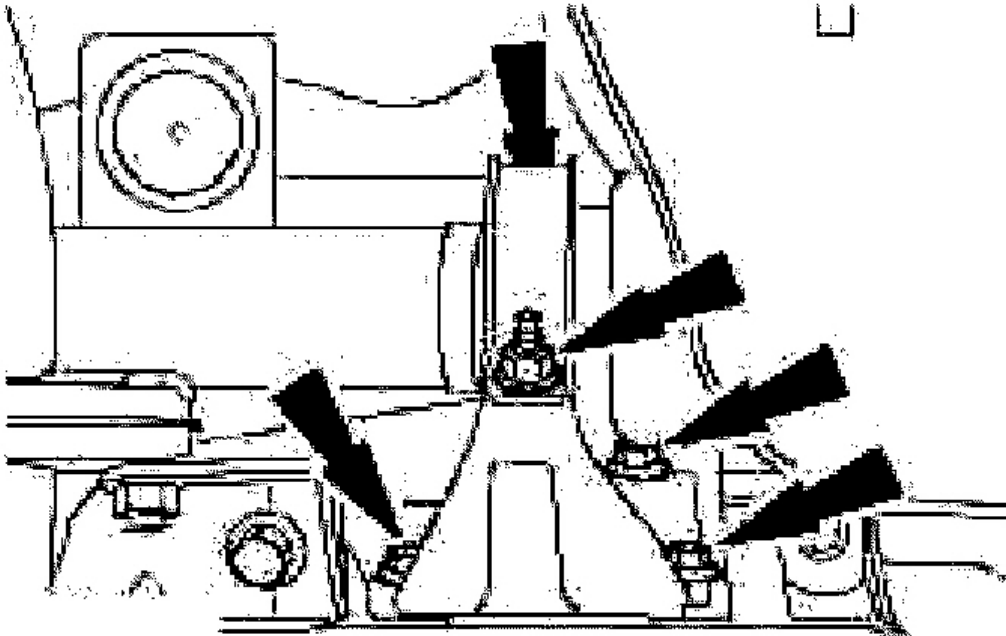
5. Remove the A/C compressor bracket (engine shown removed for clarity).



G03432743

Fig. 160: Removing A/C Compressor Bracket
Courtesy of FORD MOTOR CO.

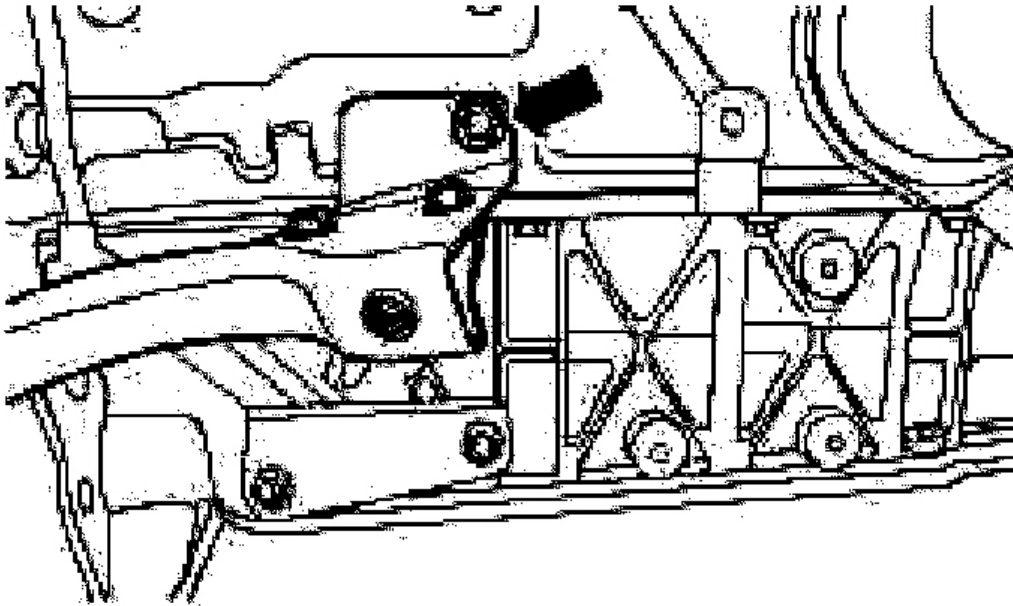
6. Remove the intermediate shaft center bearing bracket.



G03432744

Fig. 161: Removing Intermediate Shaft Center Bearing Bracket
Courtesy of FORD MOTOR CO.

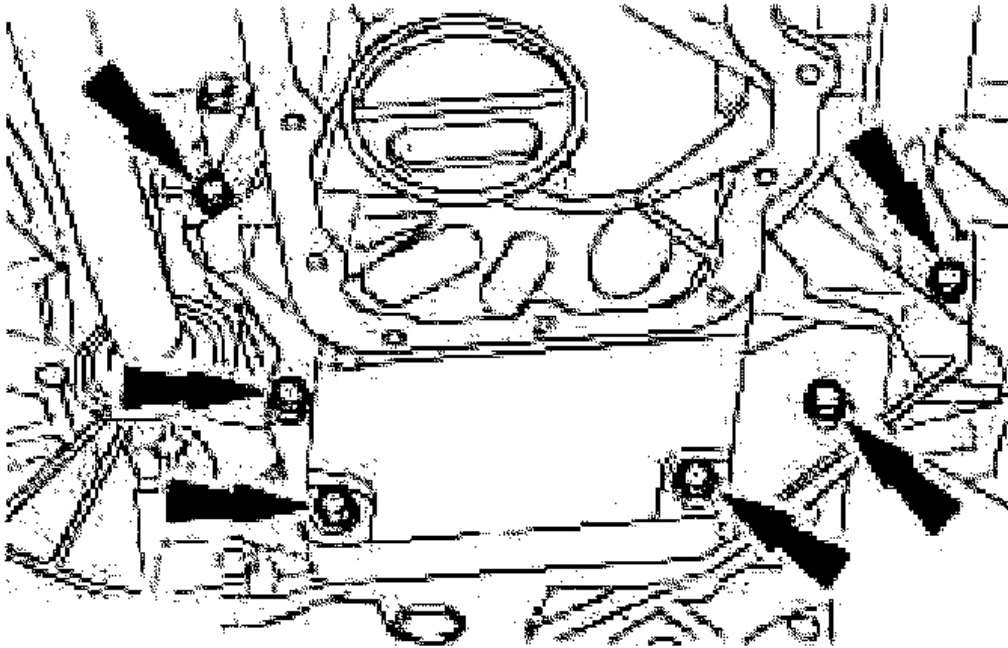
7. Remove the catalytic converter bracket (engine shown removed for clarity).



G03432745

Fig. 162: Removing Catalytic Converter Bracket
Courtesy of FORD MOTOR CO.

8. Remove the oil pan. For additional information, refer to **OIL PAN** .
9. Remove the lower crankcase to transmission bolts.

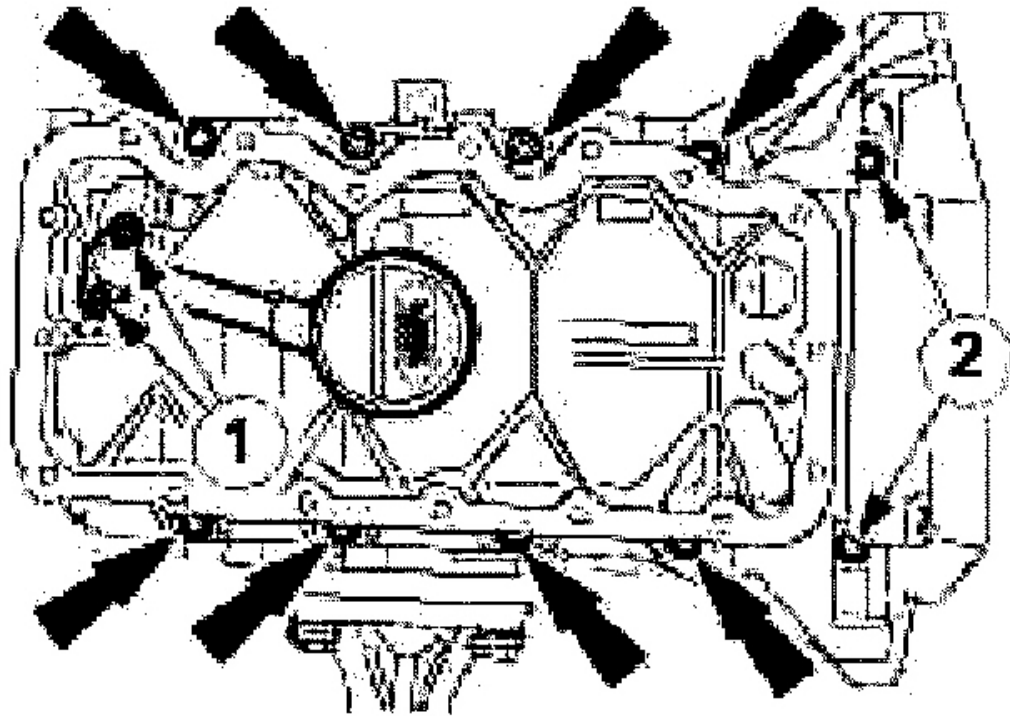


G03432746

Fig. 163: Removing Lower Crankcase To Transmission Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Note the location of any spacer shims between the transaxle and the lower crankcase to aid installation. The spacer shims must be installed in the same location during oil pump installation.

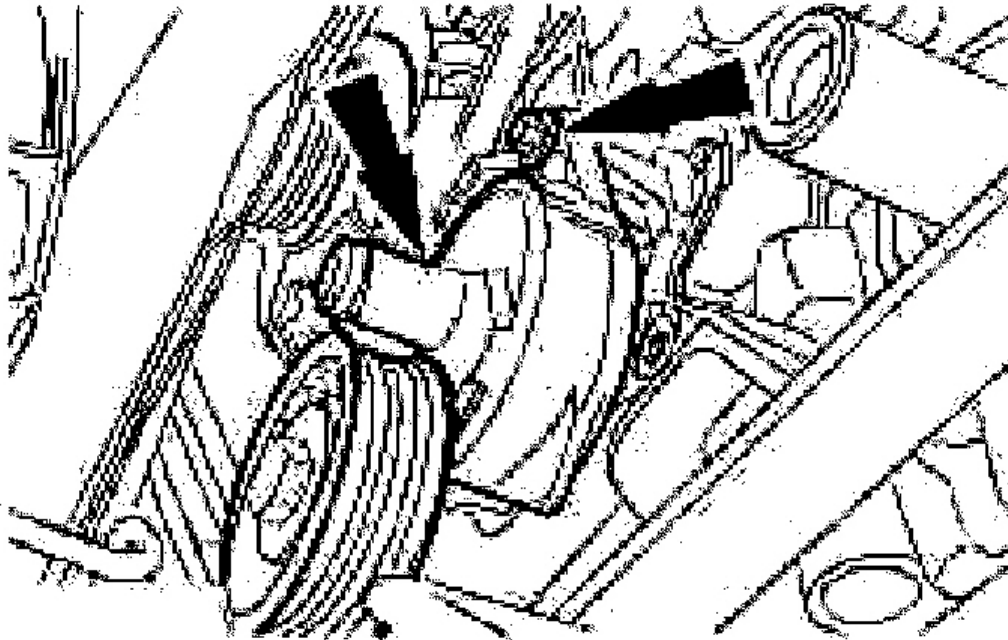
10. Remove the lower crankcase (engine shown removed for clarity).
 1. Remove the oil pick-up tube.
 2. Remove the lower crankcase retaining bolts.
 - Discard the gasket.



G03432747

Fig. 164: Removing Lower Crankcase Retaining Bolts
Courtesy of FORD MOTOR CO.

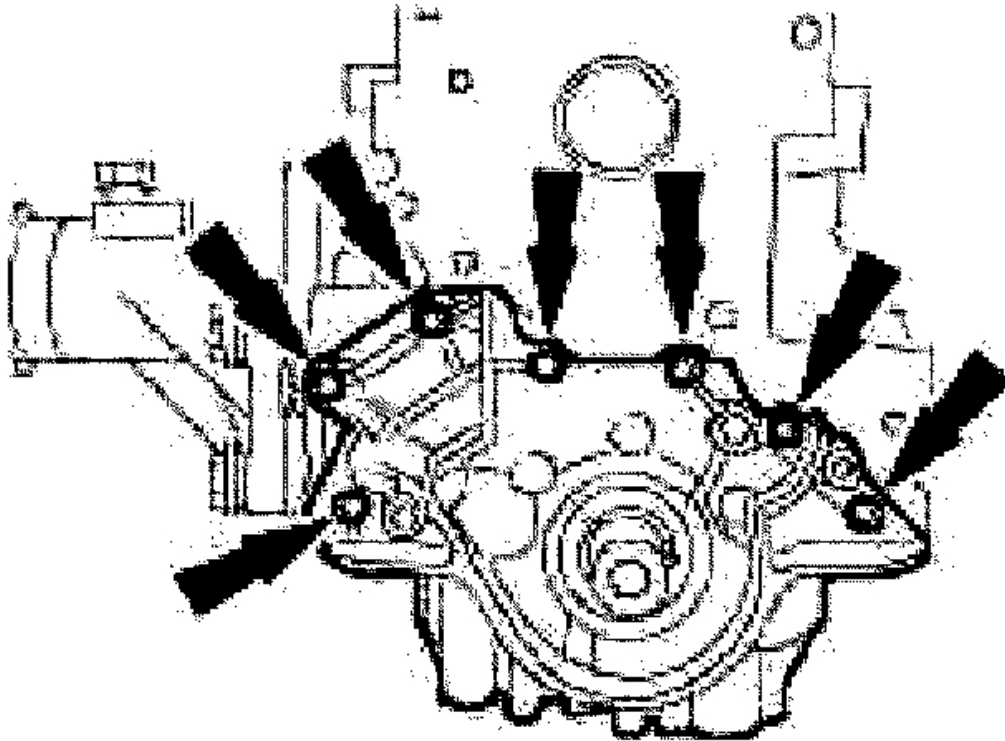
11. Remove the accessory drive belt tensioner.



G03432748

Fig. 165: Removing Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

12. Remove the oil pump (engine shown removed for clarity).
 - Discard the gasket.



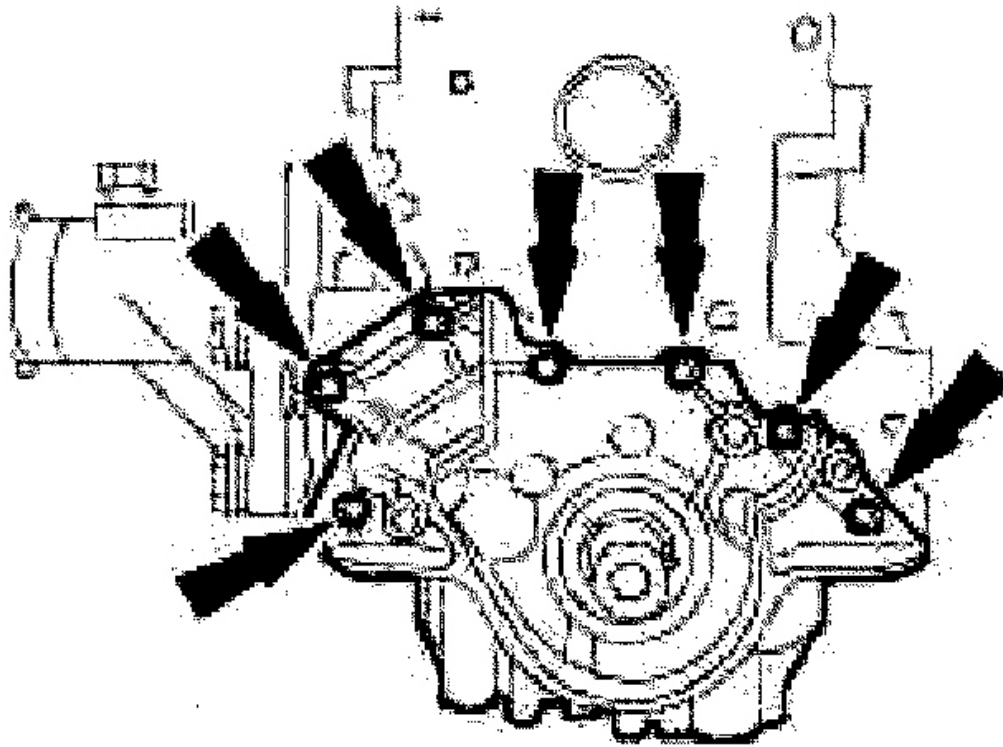
G03432749

Fig. 166: Removing Oil Pump
Courtesy of FORD MOTOR CO.

Installation

NOTE: Install a new oil pump gasket

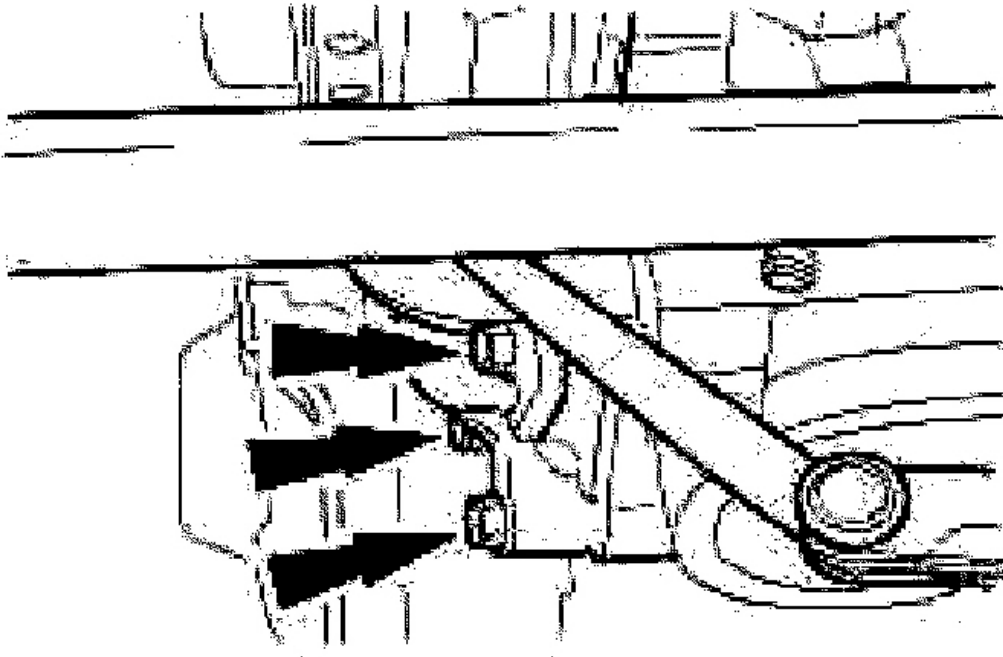
NOTE: Do not fully tighten the oil pump retaining bolts at this stage.



G03432750

Fig. 167: Installing Oil Pump
Courtesy of FORD MOTOR CO.

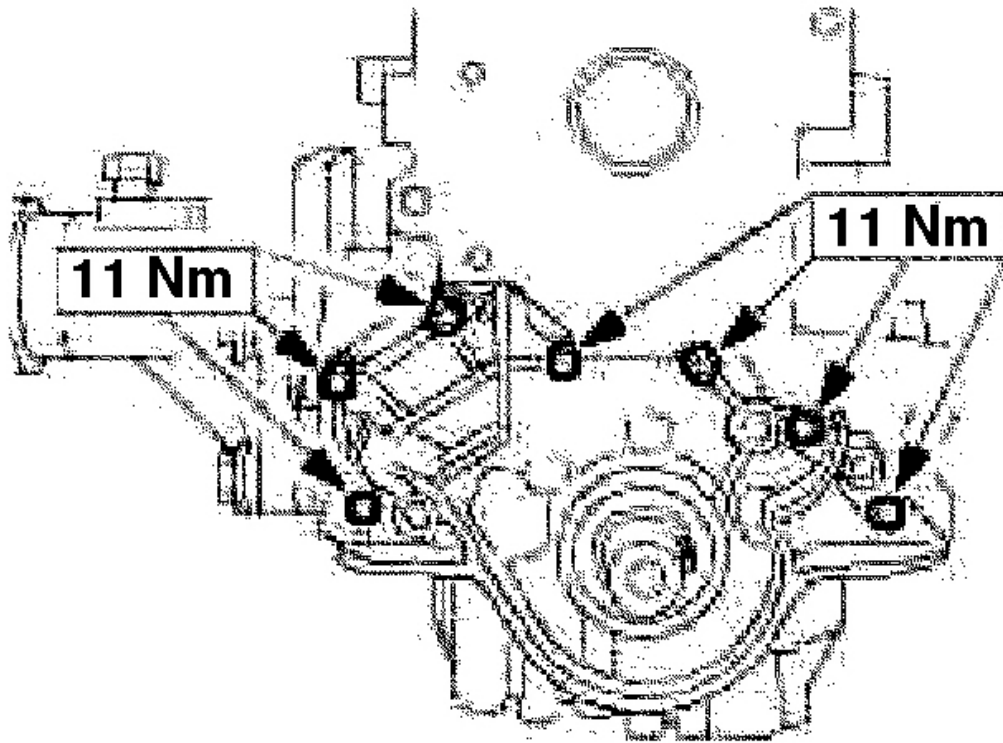
1. Install the oil pump (engine shown removed for clarity).
2. Align the oil pump on both sides so that the mating face is between 0.3 mm - 0.8 mm above the lower edge of the cylinder block.



G03432751

Fig. 168: Aligning Oil Pump On Both Sides Of Lower Edge Of Cylinder Block
Courtesy of FORD MOTOR CO.

3. Tighten the oil pump retaining bolts (engine shown removed for clarity).

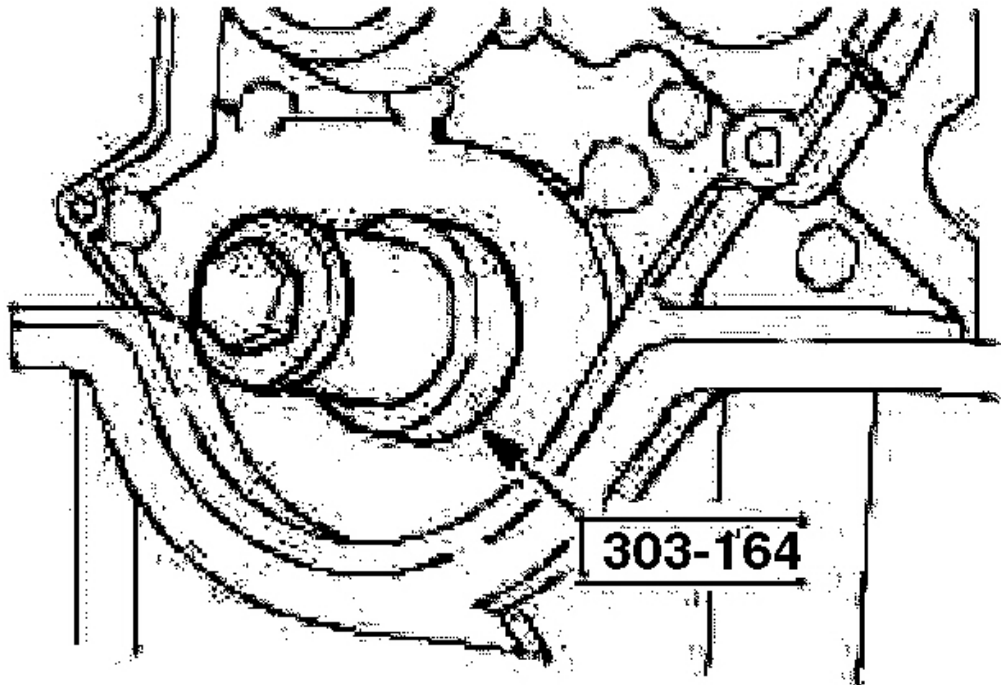


G03432752

Fig. 169: Tightening Oil Pump Retaining Bolts
Courtesy of FORD MOTOR CO.

NOTE: **Install a new crankshaft front seal.**

4. Using the special tool and the crankshaft pulley retaining bolt, install the crankshaft front seal.
 - Coat the oil seal lip and crankshaft running surface with engine oil.

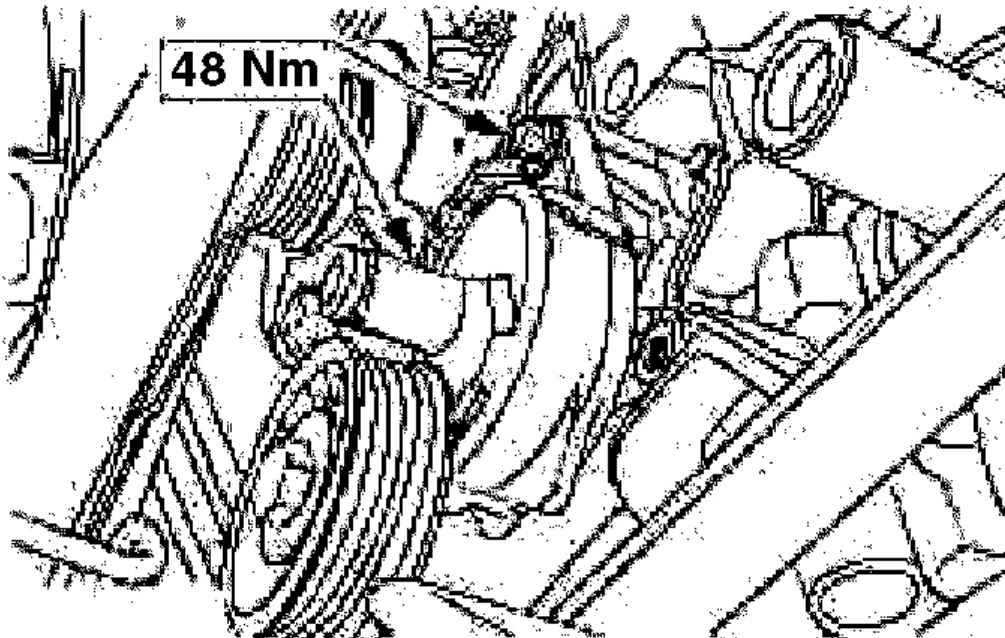


G03432753

Fig. 170: Installing Crankshaft Front Seal Using Special Tool And Crankshaft Pulley Retaining Bolt

Courtesy of FORD MOTOR CO.

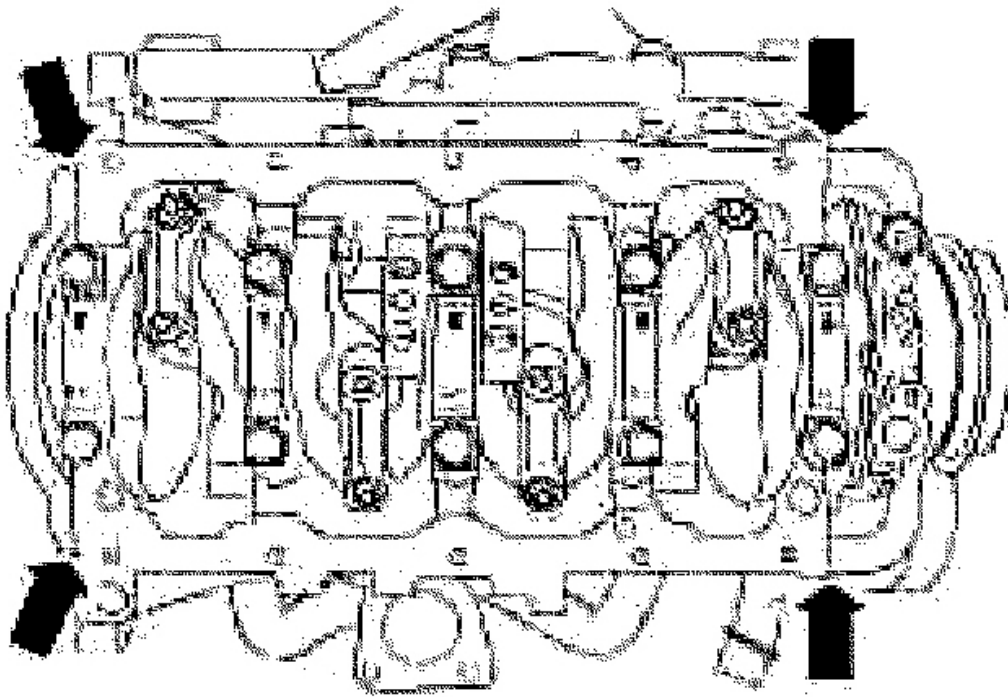
5. Install the accessory drive belt tensioner.



G03432754

Fig. 171: Installing Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

NOTE: Install the lower crankcase within 10 minutes of applying the sealer.



G03432755

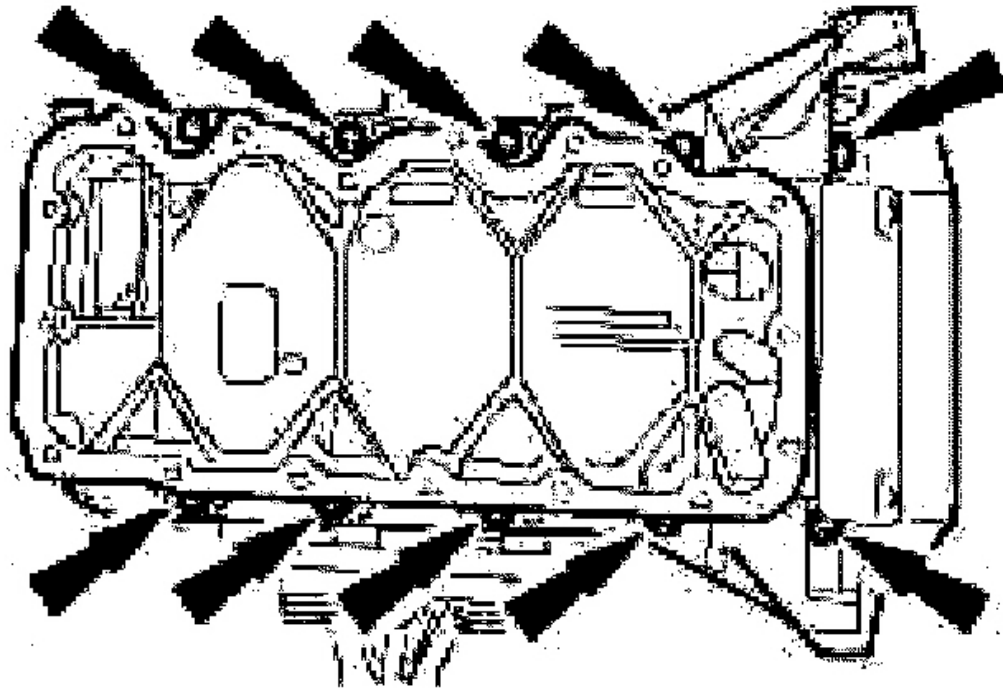
Fig. 172: Applying 4 Mm Bead Of Sealer To Shown Areas
Courtesy of FORD MOTOR CO.

6. Apply a 4 mm bead of sealer to the areas as shown.

CAUTION: Make sure that any spacer shims between the transaxle and the lower crankcase are installed in their original location.

NOTE: Do not tighten the retaining bolts at this stage.

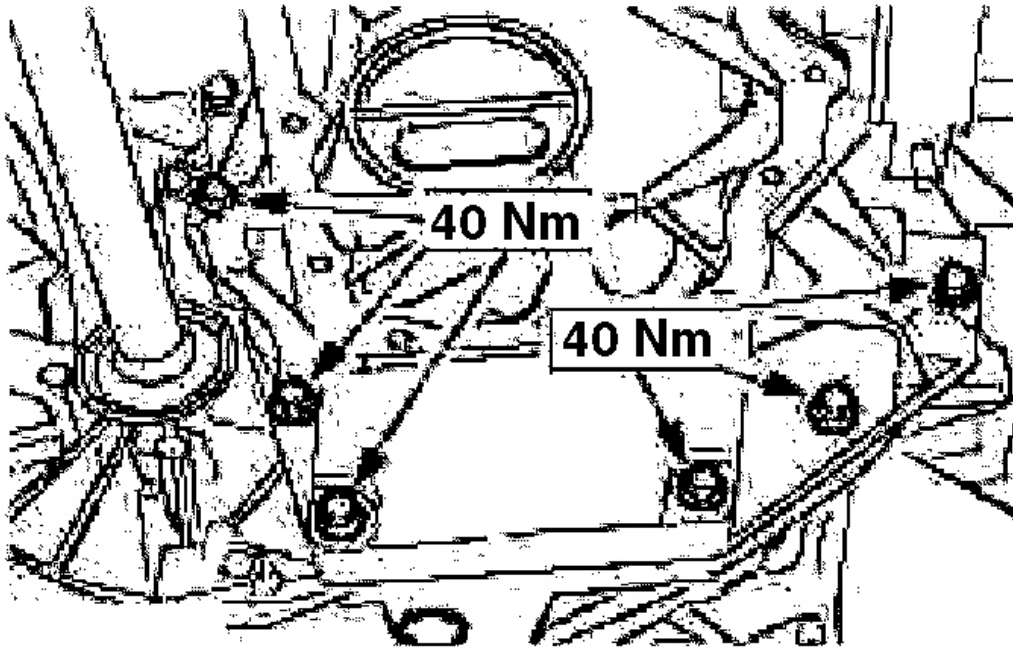
NOTE: Install a new gasket.



G03432756

Fig. 173: Installing Lower Crankcase
Courtesy of FORD MOTOR CO.

7. Install the lower crankcase (engine shown removed for clarity).
8. Tighten the lower crankcase to transaxle retaining bolts.



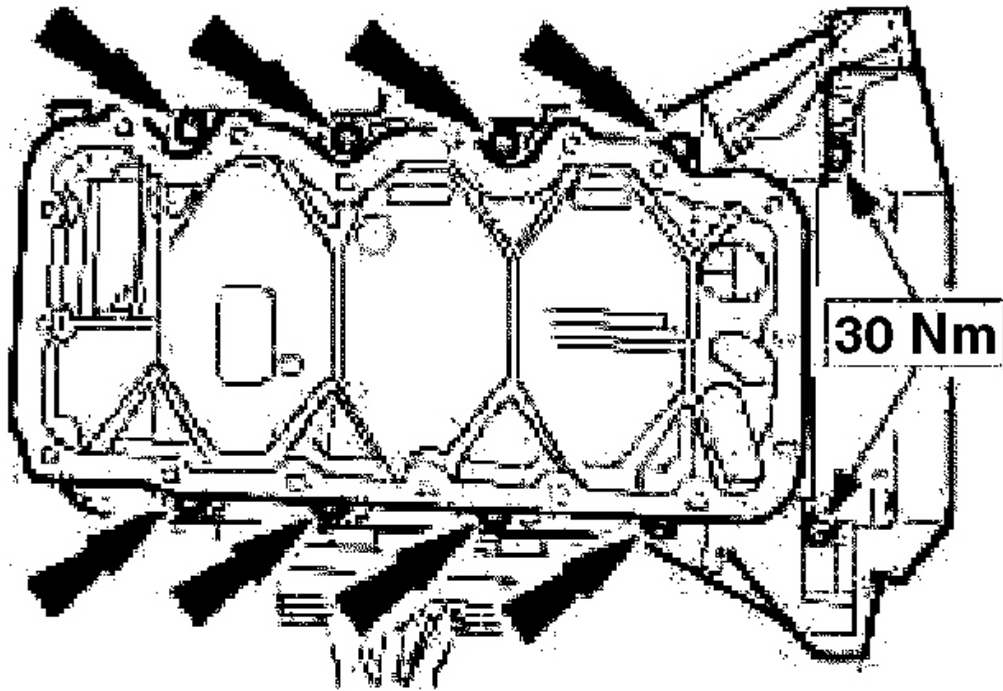
G03432757

Fig. 174: Tightening Lower Crankcase To Transaxle Retaining Bolts
Courtesy of FORD MOTOR CO.

9. Tighten the lower crankcase to cylinder block retaining bolts (engine shown removed for clarity).

2002 Ford Focus LX

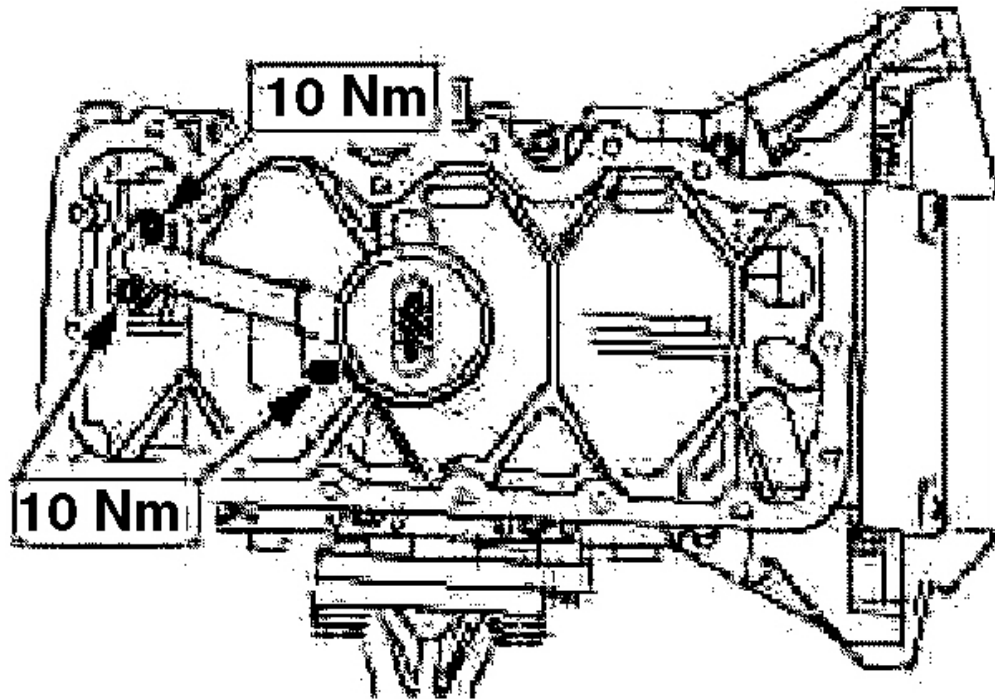
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432758

Fig. 175: Tightening Lower Crankcase To Cylinder Block Retaining Bolts
Courtesy of FORD MOTOR CO.

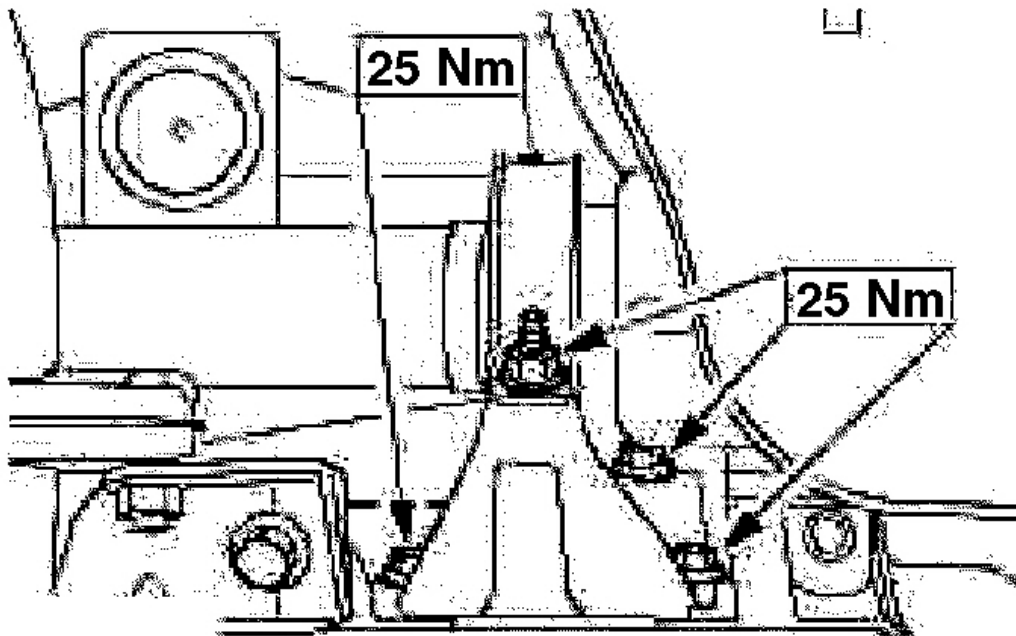
NOTE: Install a new O -ring seal.



G03432759

Fig. 176: Installing Oil Pump Pick-Up Tube
Courtesy of FORD MOTOR CO.

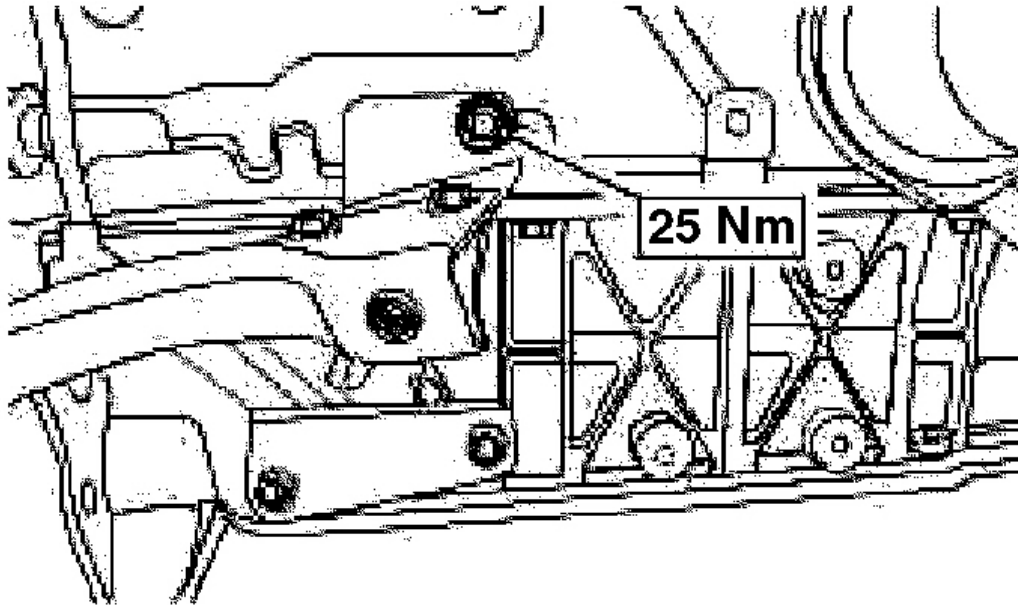
10. Install the oil pump pick-up tube.
11. Install the oil pan. For additional information, refer to **OIL PAN** .
12. Install the intermediate shaft center bearing bracket.



G03432760

Fig. 177: Installing Intermediate Shaft Center Bearing Bracket
Courtesy of FORD MOTOR CO.

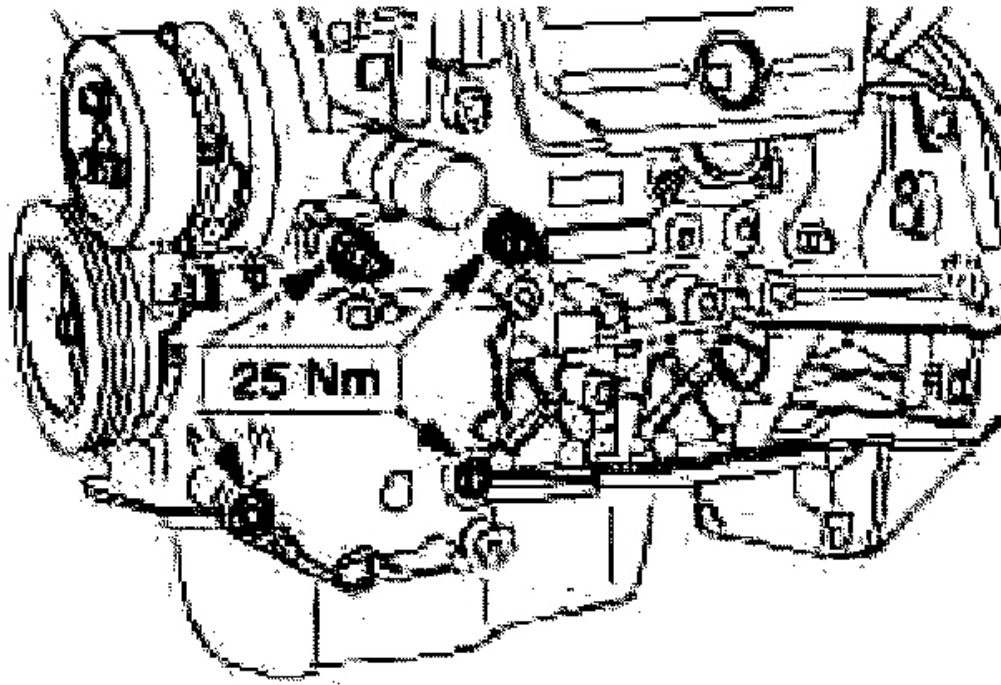
13. Install the catalytic converter bracket (engine shown removed for clarity).



G03432761

Fig. 178: Installing Catalytic Converter Bracket
Courtesy of FORD MOTOR CO.

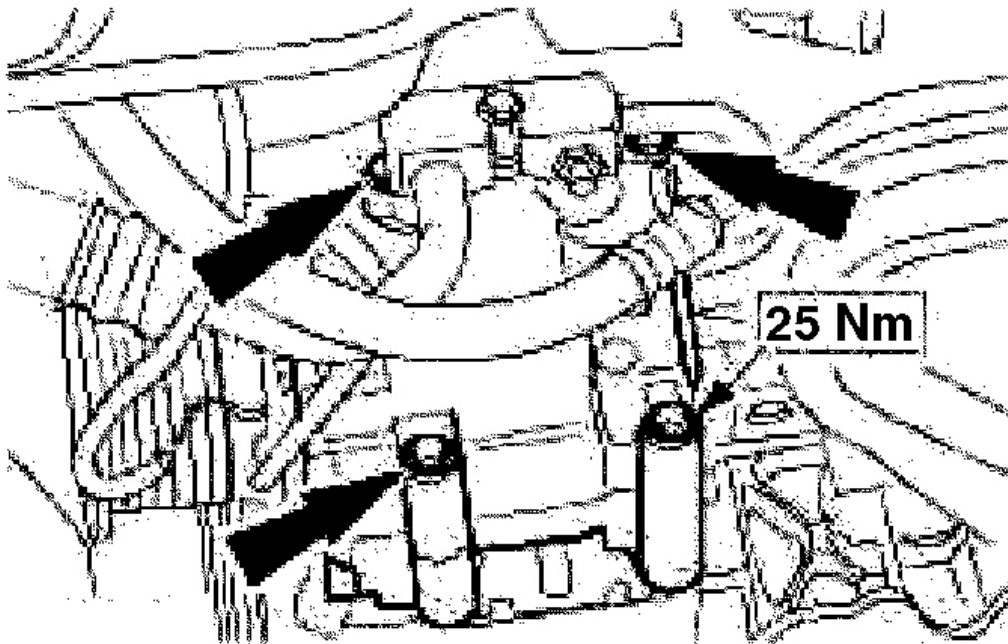
14. Install the air conditioning (A/C) compressor bracket (engine shown removed for clarity).



G03432762

Fig. 179: Installing Air Conditioning (A/C) Compressor Bracket
Courtesy of FORD MOTOR CO.

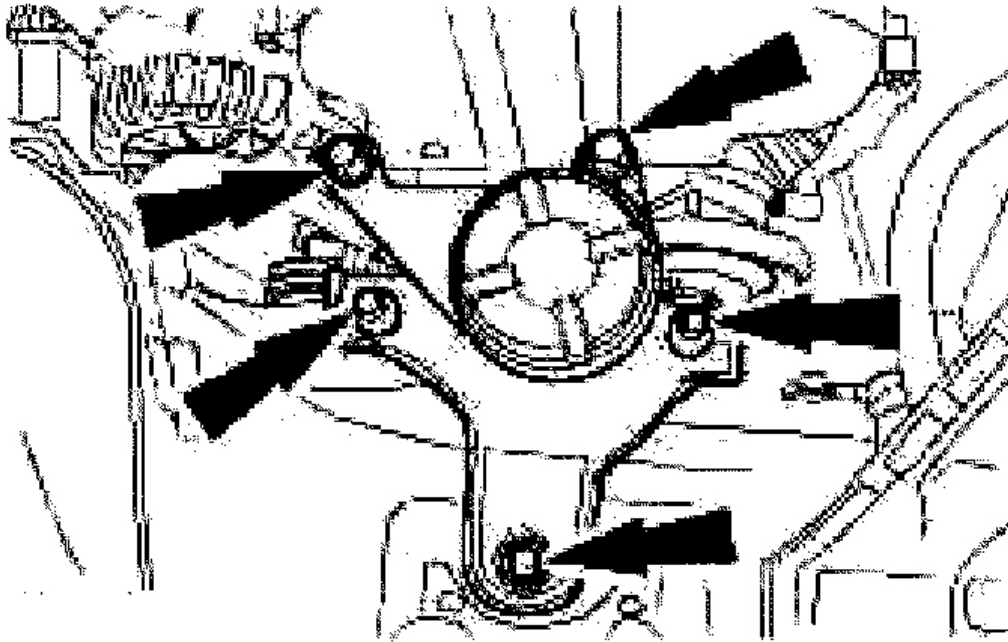
15. Attach the A/C compressor to the bracket.



G03432763

Fig. 180: Attaching A/C Compressor To Bracket
Courtesy of FORD MOTOR CO.

16. Lower the vehicle.
17. Position the hydraulic jack with the wooden block under the oil pan and raise so that the engine front mount is free from load.
18. Remove the engine front mount.



G03432764

Fig. 181: Removing Engine Front Mount
Courtesy of FORD MOTOR CO.

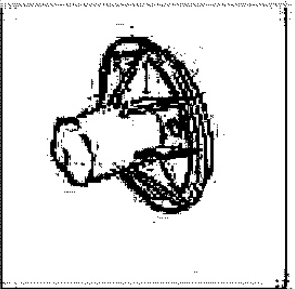


19. Install the timing belt. For additional information, refer to **TIMING BELT**).

CRANKSHAFT REAR SEAL

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Installer, Oil Seal (Rear), Crankshaft 303-328 (T88P-6701B-1)
	Locking Tool, Flywheel 303-103 (T74P-6375-A)
	Remover, Oil Seal, Crankshaft 303-409 (T92C-6700-CH)

G03432765

Fig. 182: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

Material

MATERIAL SPECIFICATION

High temperature grease	ESD-M1C220-A
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Removal

Vehicles with manual transaxle

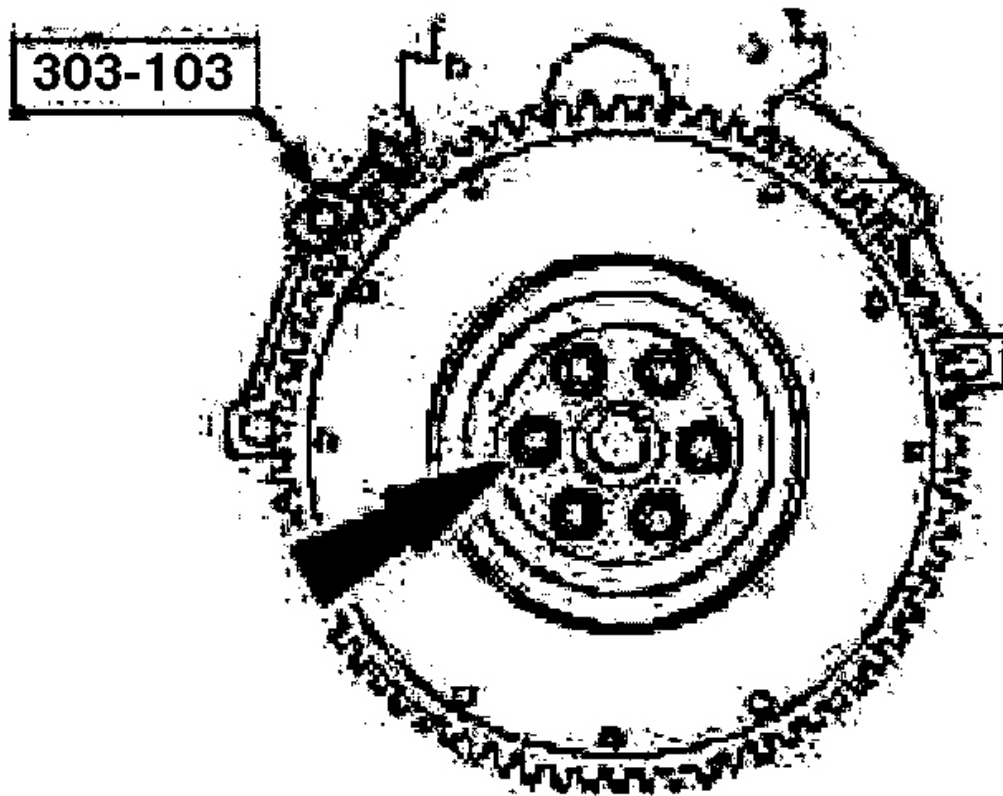
1. Remove the clutch. For additional information, refer to **REMOVAL & INSTALLATION** .

Vehicles with automatic transaxle

2. Remove the automatic transaxle. For additional information, refer to MANUAL TRANSMISSION/TRANSAXLE article .

All vehicles

3. Using the special tool, remove the flywheel/drive plate.



G03432766

Fig. 183: Removing Flywheel/Drive Plate Using Special Tools
Courtesy of FORD MOTOR CO.

4. Using the special tool, remove the oil seal.

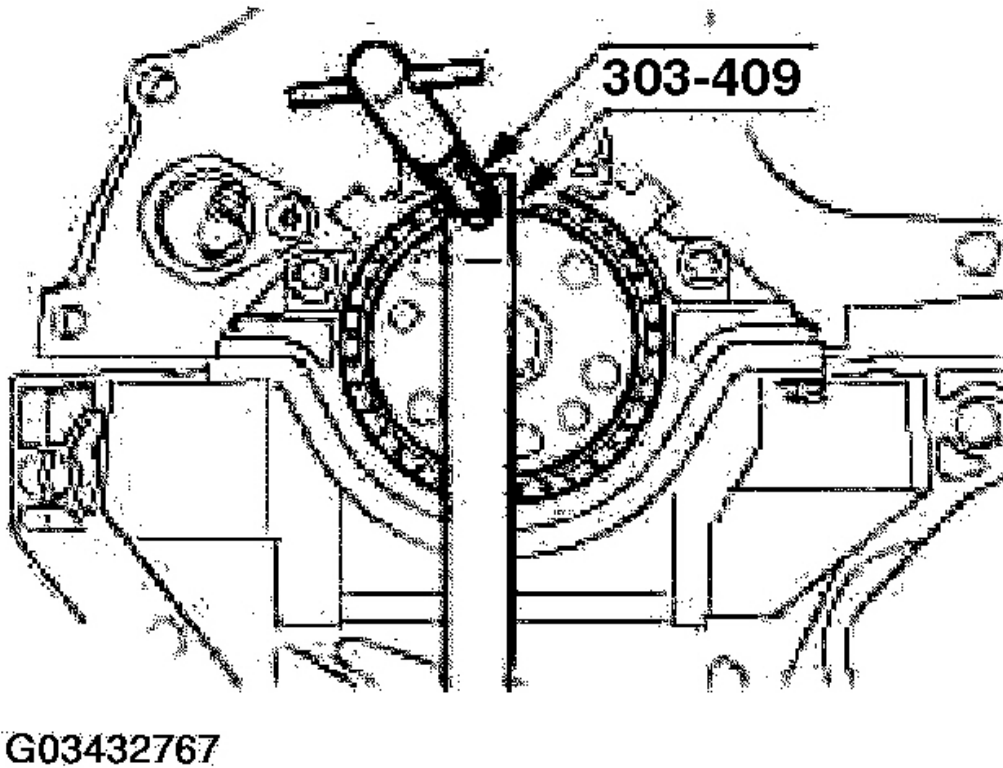


Fig. 184: Removing Oil Seal Using Special Tools
Courtesy of FORD MOTOR CO.

Installation

All vehicles

1. Using the special tool, install the oil seal.
 - Install three flywheel bolts.

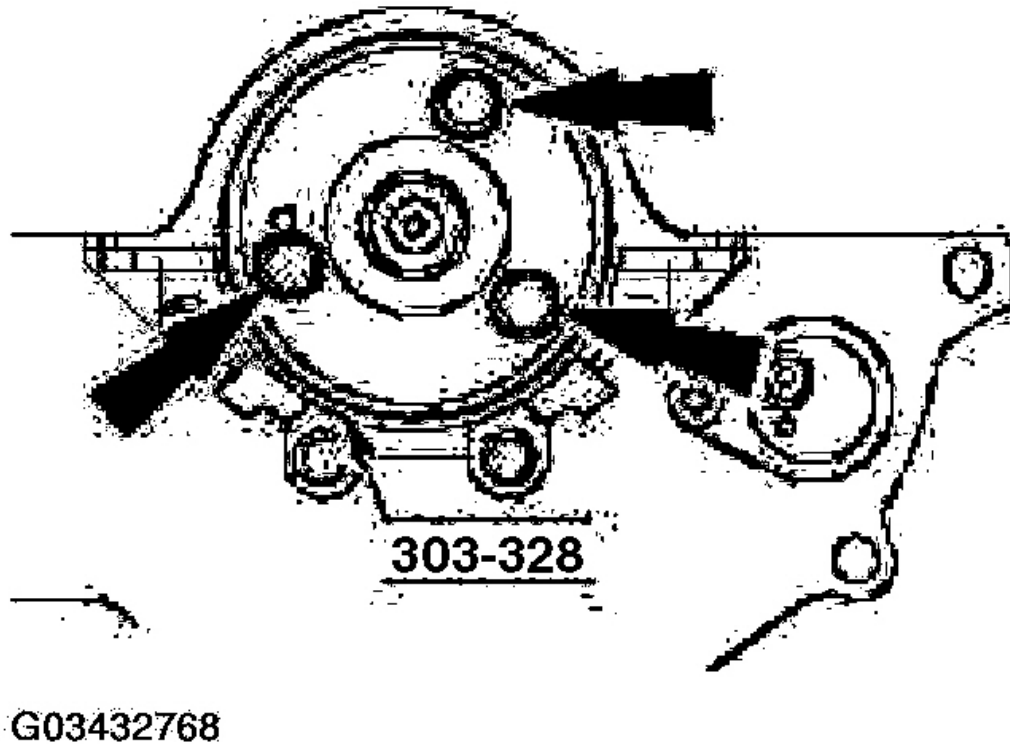
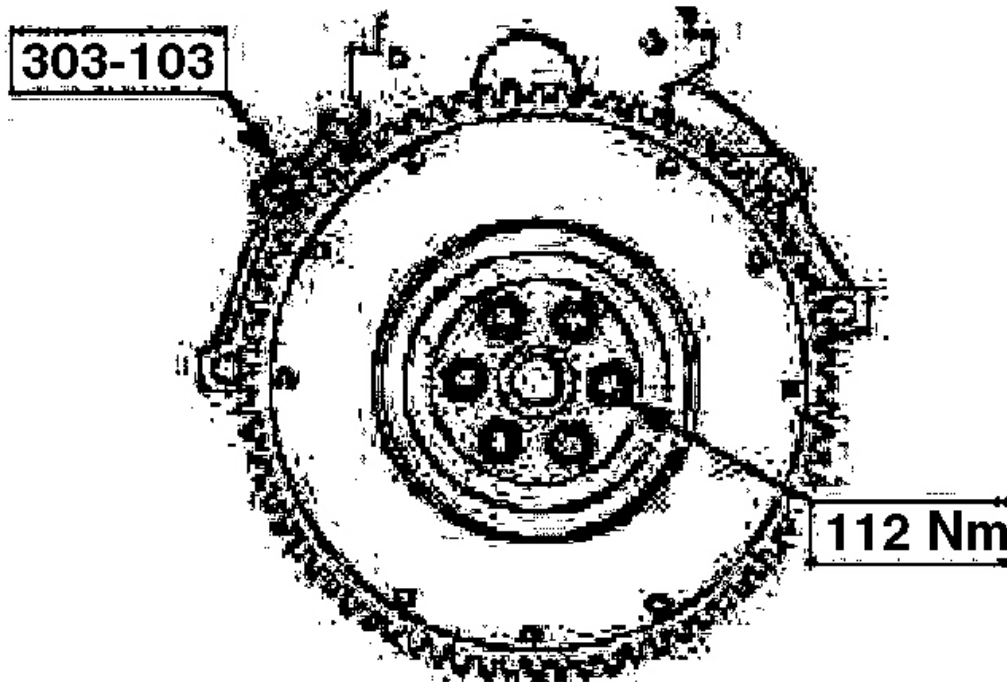


Fig. 185: Installing Three Flywheel Bolts
Courtesy of FORD MOTOR CO.

NOTE: Remove any traces of thread -locking compound from the threaded bores on the crankshaft.



G03432769

Fig. 186: Installing Flywheel/Drive Plate Using Special Tools
Courtesy of FORD MOTOR CO.

2. Using the special tool, install the flywheel/drive plate.

Vehicles with manual transaxle

3. Install the clutch. For additional information, refer to **REMOVAL & INSTALLATION**.

Vehicles with automatic transaxle

4. Install the automatic transaxle. For additional information, refer to MANUAL TRANSMISSION/TRANSAXLE article .

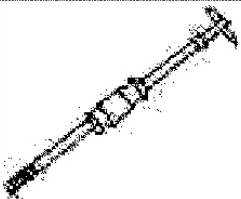
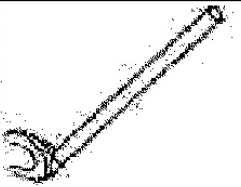

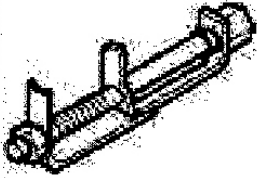
REMOVAL

ENGINE

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

Special Tool(s)

	Slide Hammer 100-001 (T50T-100-A)
	Remover, Halfshaft 205-241 (T86P-3514-A)
	Spreader Bar 303-D089 (D93P-6001-A3)
	Remover/Installer, Hose Clamp 412-108 (T96P-18539-A)

G03432770

Fig. 187: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

Material

MATERIAL SPECIFICATION

Cable ties

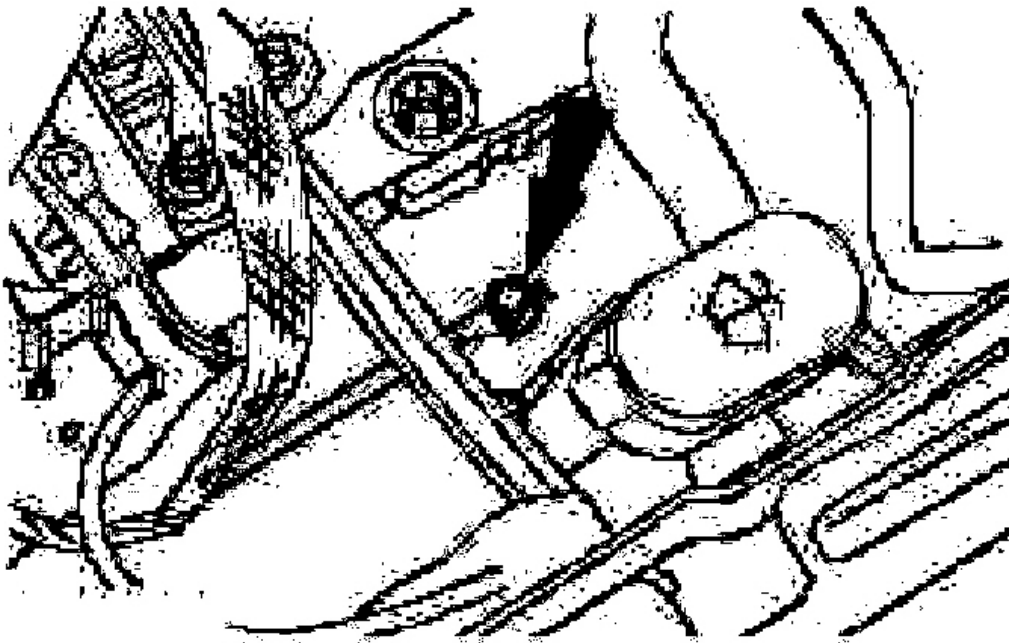
Removal

All Vehicles

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM PRESSURE RELEASE** .

WARNING: To prevent the risk of scalding, place a thick cloth over the filler cap before opening the cooling circuit. Failure to do so can result in injury.

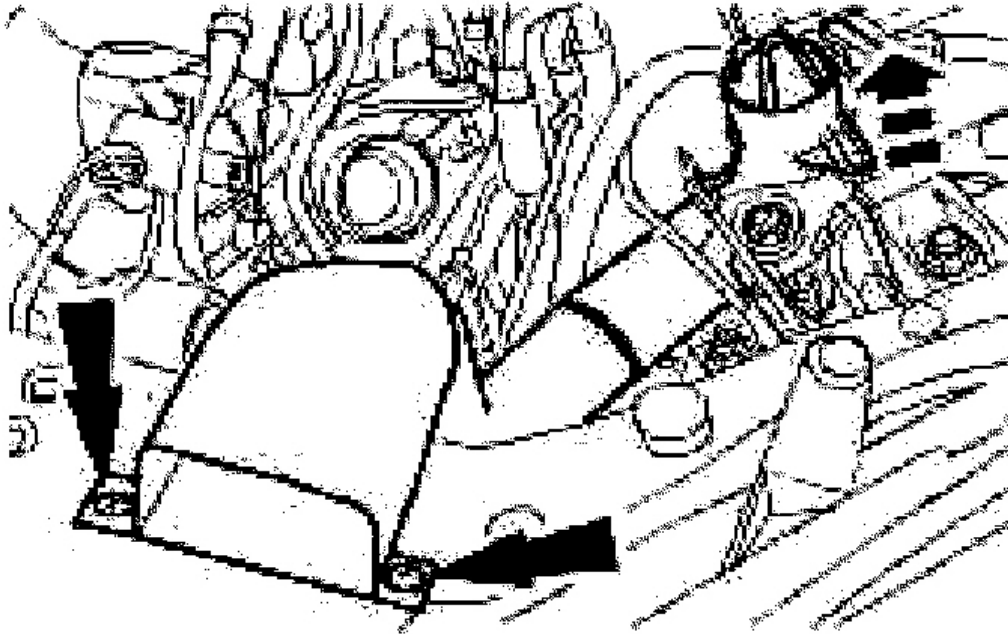
2. Release the coolant system pressure.
3. Remove the battery tray. .
4. Remove the air cleaner .
5. Detach the ground cable from the inner fender.



G03432771

Fig. 188: Detaching Ground Cable From Inner Fender
Courtesy of FORD MOTOR CO.

NOTE: The resonator is a push fit in the bracket.



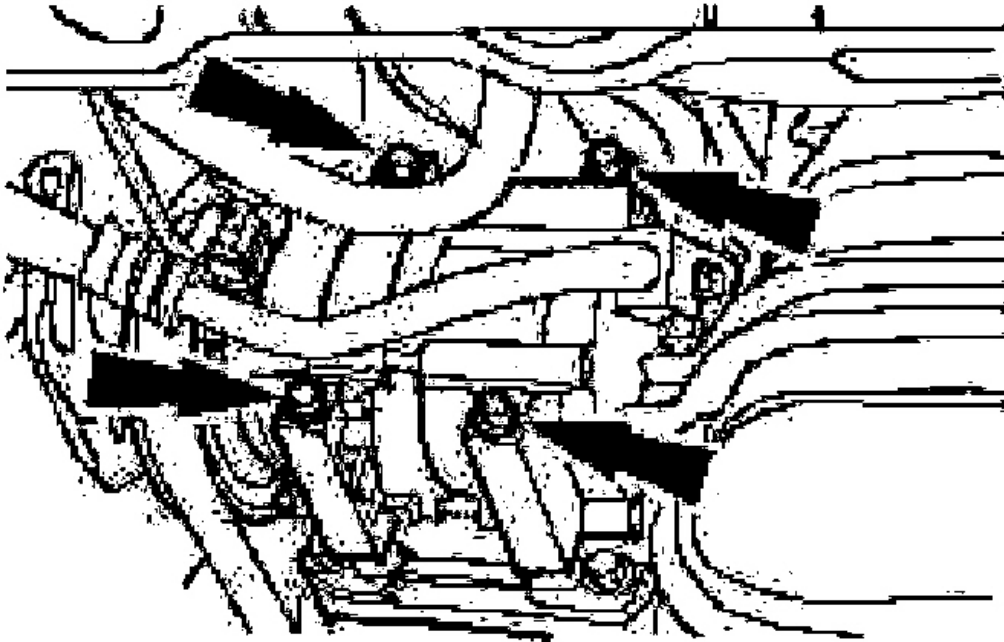
G03432772

Fig. 189: Removing Air Cleaner Intake Tube And Resonator
Courtesy of FORD MOTOR CO.

6. Remove the air cleaner intake tube and resonator.

Vehicles with air conditioning

7. Remove the air conditioning (A/C) compressor and secure it to the radiator crossmember.



G03432773

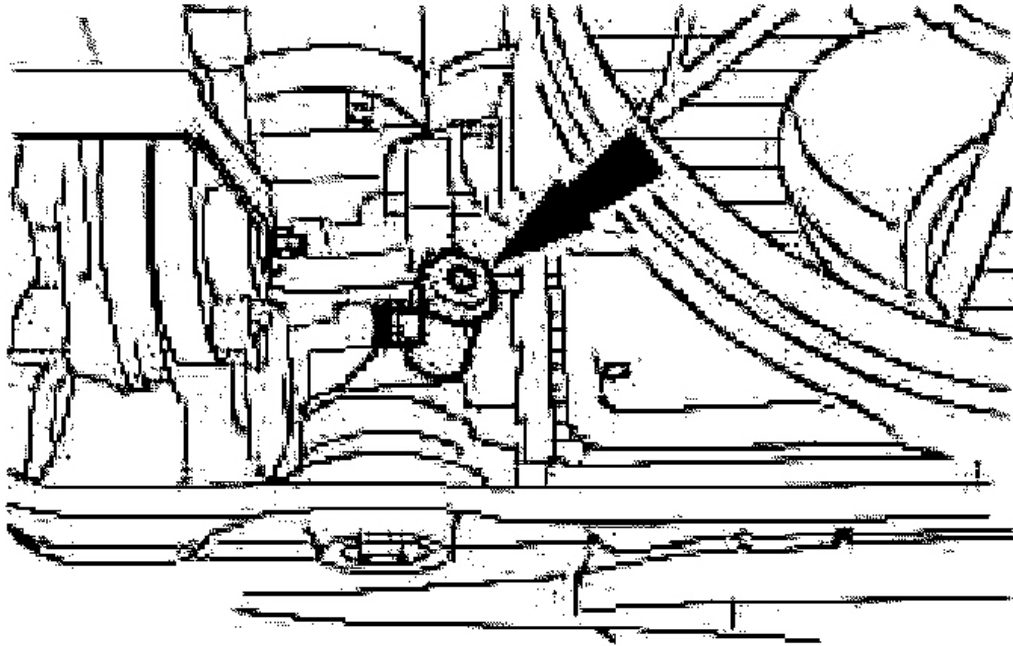
Fig. 190: Removing Air Conditioning (A/C) Compressor And Securing To Radiator Crossmember

Courtesy of FORD MOTOR CO.

All vehicles

WARNING: Danger of scalding if the engine is warm.

8. Drain the coolant (shown from below).
 - Allow the coolant to drain into a suitable container.
 - Install the drain plug after draining.

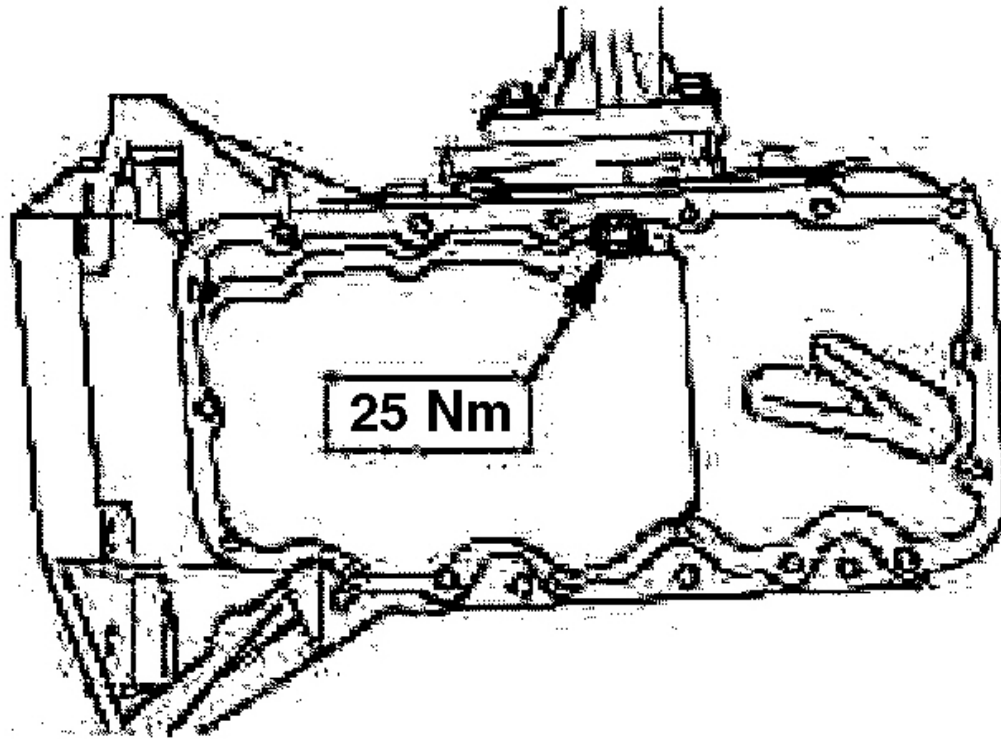


G03432774

Fig. 191: Installing Drain Plug After Draining
Courtesy of FORD MOTOR CO.

9. Drain the engine.
 - Allow the oil to drain into a suitable container.

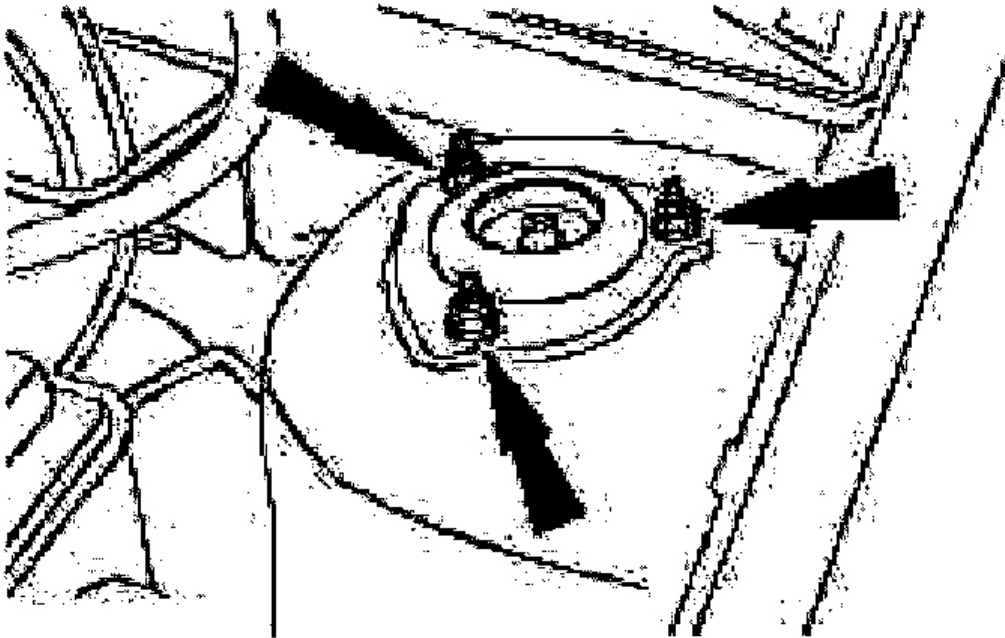
NOTE: **Inspect the oil drain plug seal for damage. Install a new oil drain plug seal if necessary.**



G03432775

Fig. 192: Installing Oil Pan Drain Plug
Courtesy of FORD MOTOR CO.

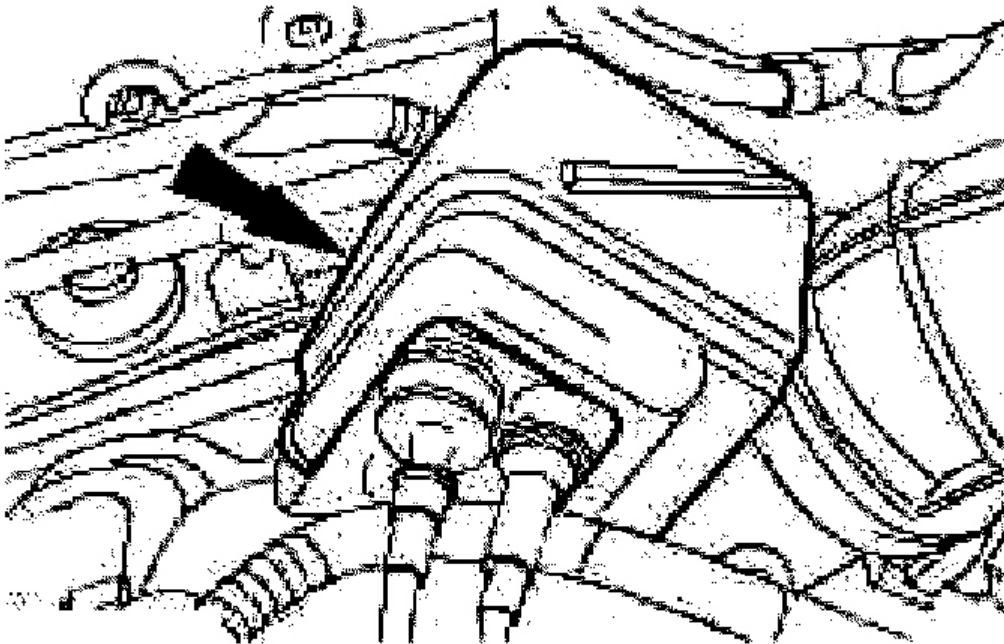
10. Install the oil pan drain plug (engine shown removed for clarity).
11. Partially lower the vehicle.
12. Loosen the strut and spring assembly upper mounting retaining nuts by five turns on both sides.



G03432776

Fig. 193: Loosening Strut And Spring Assembly Upper Mounting Retaining Nuts
Courtesy of FORD MOTOR CO.

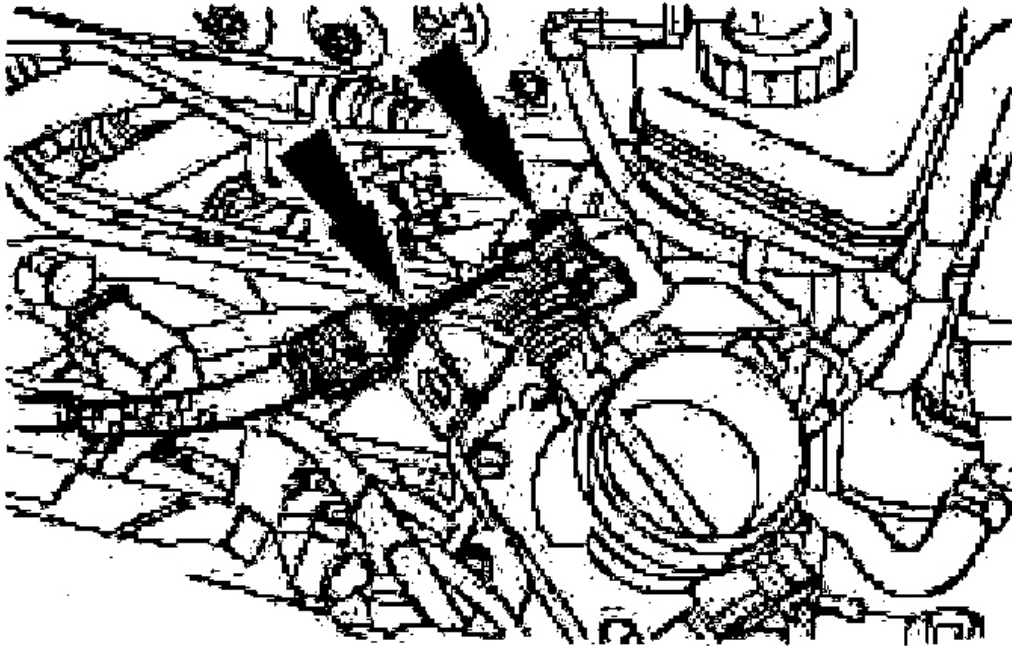
13. Remove the splash shield.



G03432777

Fig. 194: Removing Splash Shield
Courtesy of FORD MOTOR CO.

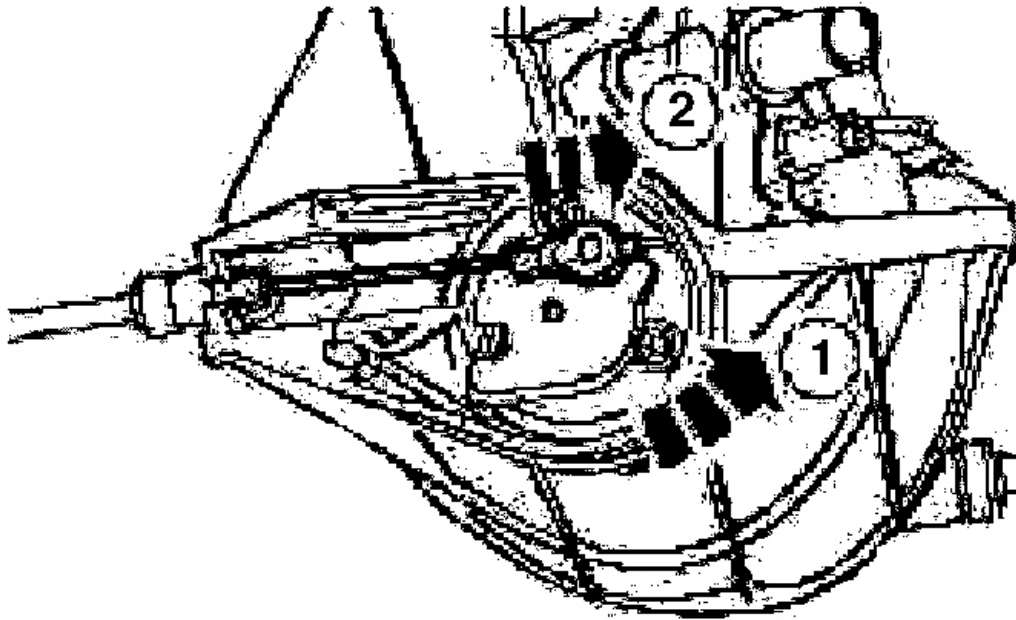
14. Detach the accelerator cable and the speed control cable (if equipped) from the throttle body.



G03432778

Fig. 195: Detaching Accelerator Cable And Speed Control Cable
Courtesy of FORD MOTOR CO.

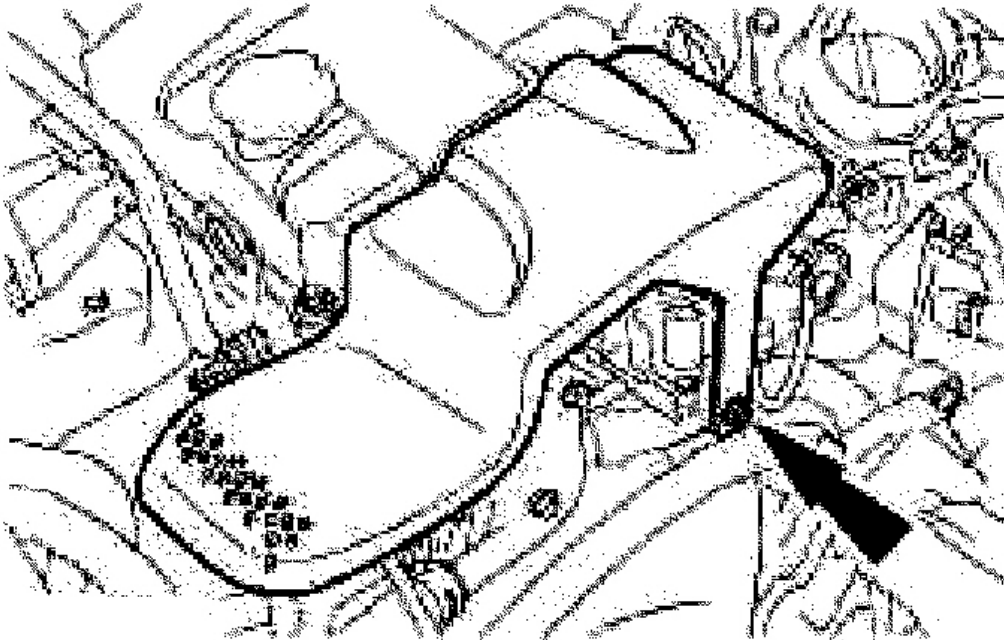
15. Detach the intake manifold runner control (IMRC) actuator cable from the IMRC lever (intake manifold assembly shown removed for clarity).
 1. Rotate the IMRC lever.
 2. Detach the IMRC actuator cable from the intake manifold.



G03432779

Fig. 196: Detaching Intake Manifold Runner Control (IMRC) Actuator Cable
Courtesy of FORD MOTOR CO.

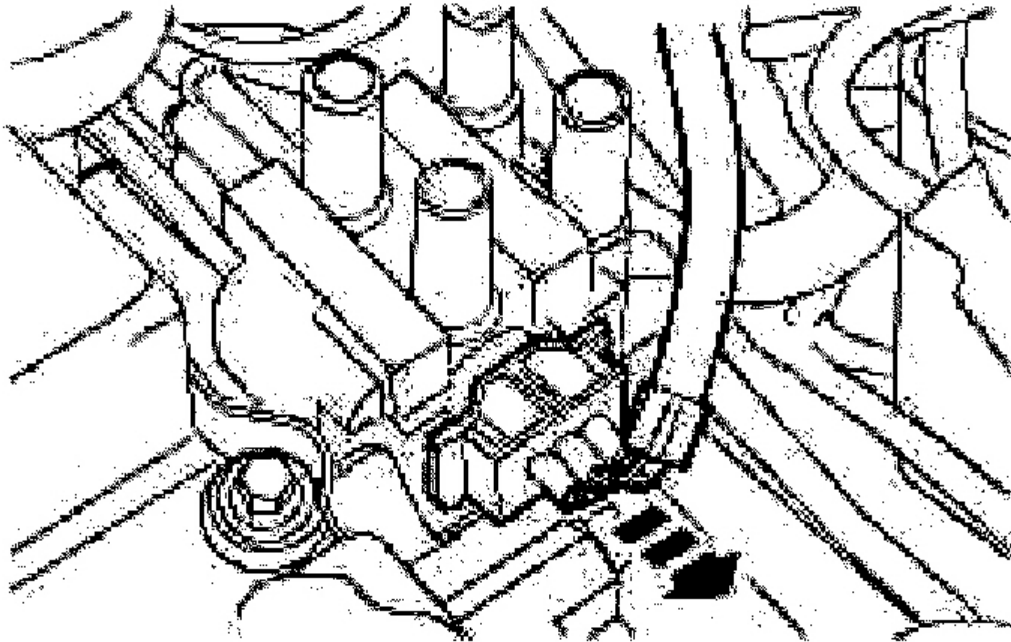
16. Remove the ignition coil pack cover.



G03432780

Fig. 197: Removing Ignition Coil Pack Cover
Courtesy of FORD MOTOR CO.

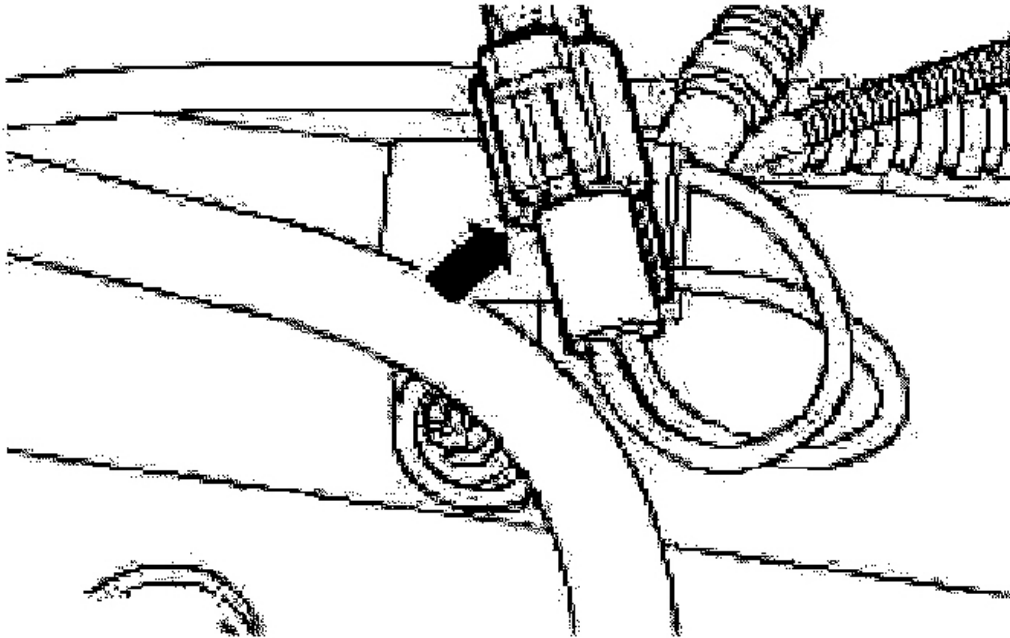
17. Disconnect the ignition coil pack electrical connector.
 - Disconnect the radio capacitor.



G03432781

Fig. 198: Disconnecting Ignition Coil Pack Electrical Connector
Courtesy of FORD MOTOR CO.

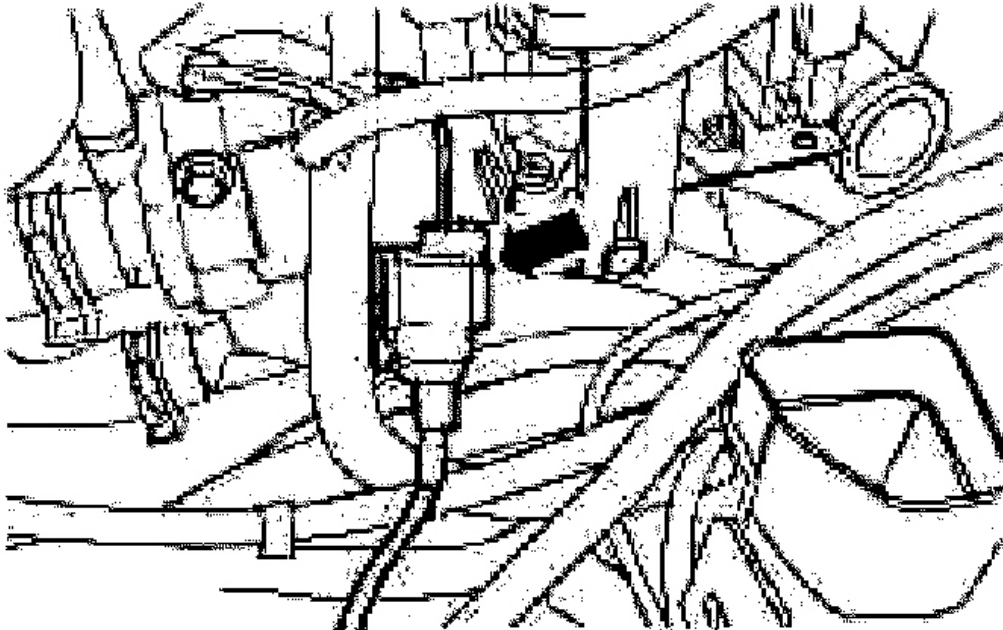
18. Disconnect the block heater harness (if equipped).



G03432782

Fig. 199: Disconnecting Block Heater Harness
Courtesy of FORD MOTOR CO.

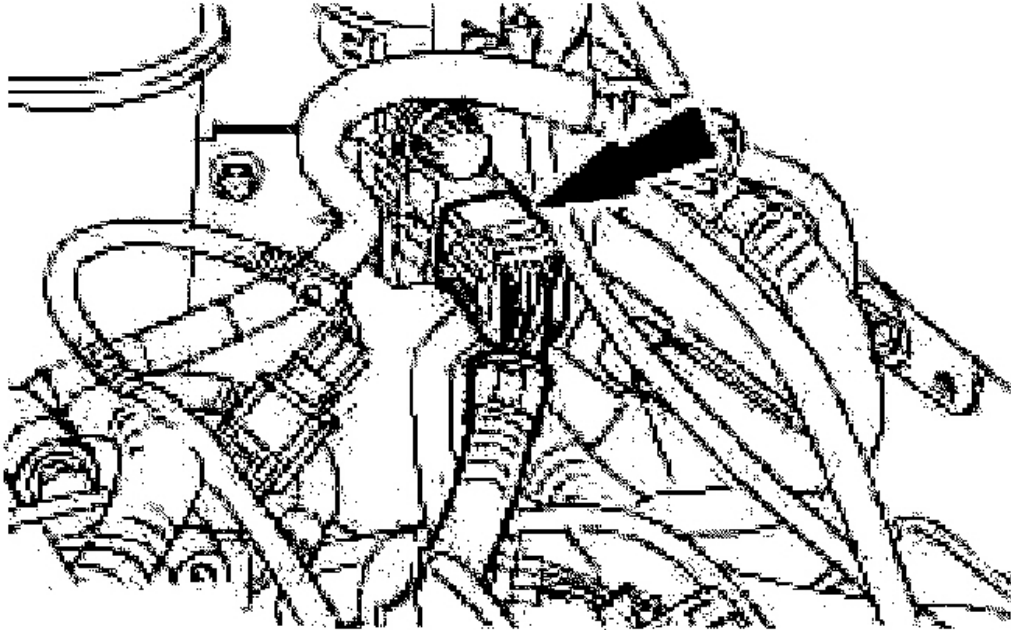
19. Disconnect the starter field wire electrical connector.



G03432783

Fig. 200: Disconnecting Starter Field Wire Electrical Connector
Courtesy of FORD MOTOR CO.

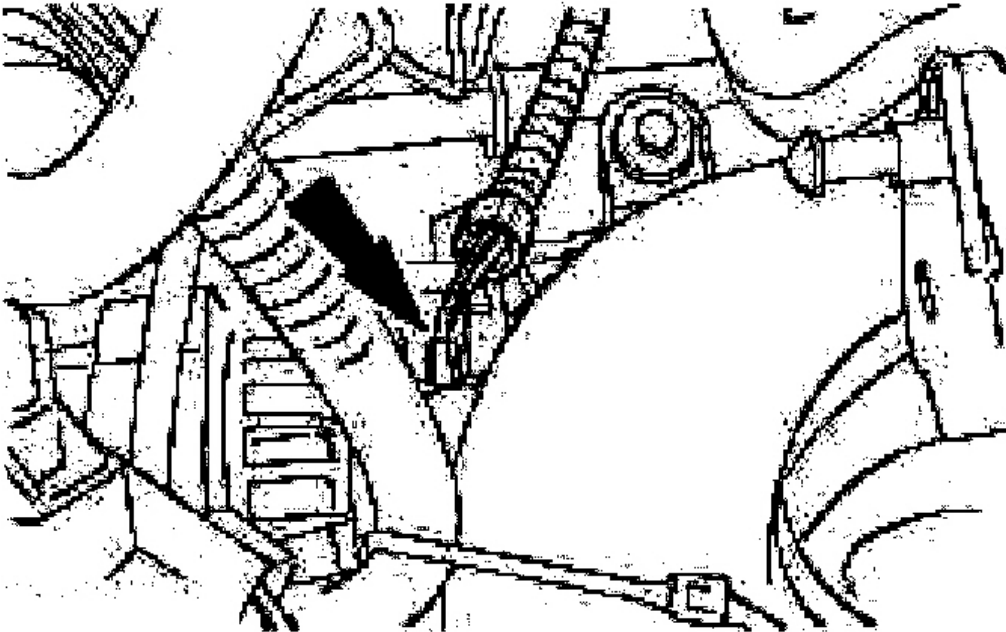
20. Disconnect the fuel injector wiring harness.



G03432784

Fig. 201: Disconnecting Fuel Injector Wiring Harness
Courtesy of FORD MOTOR CO.

21. Disconnect the ground cable from the engine lifting eye.
22. Disconnect the generator electrical connector.



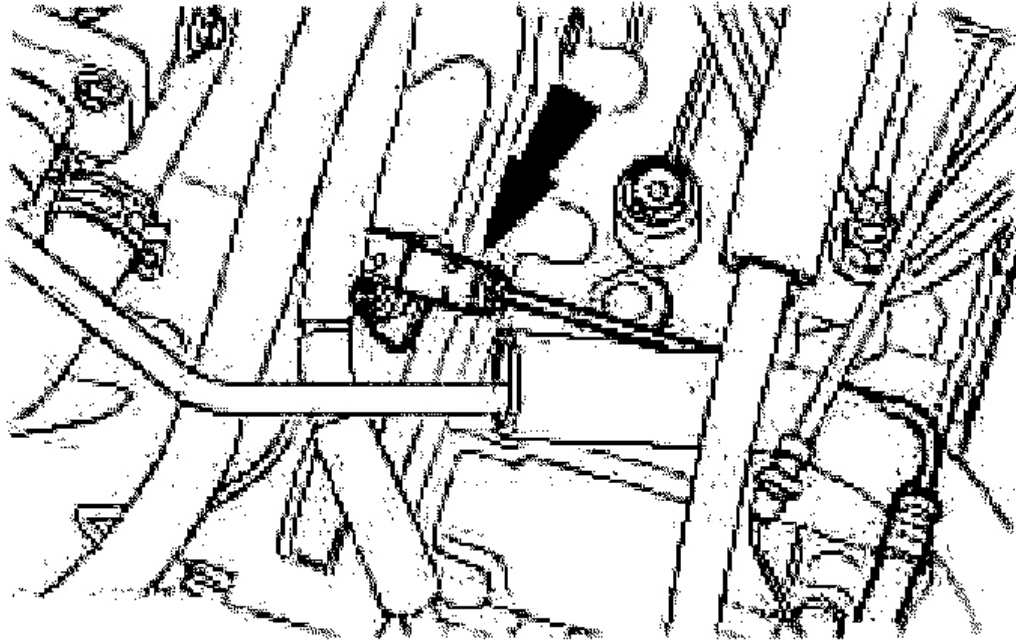
G03432785

Fig. 202: Disconnecting Generator Electrical Connector
Courtesy of FORD MOTOR CO.

WARNING: Escaping brake fluid. Do not allow brake fluid to come into contact with the skin or eyes. If brake fluid should come into contact with your skin or eyes, rinse the affected area immediately with water.

CAUTION: If any brake fluid gets on the paintwork wash it off immediately with water.

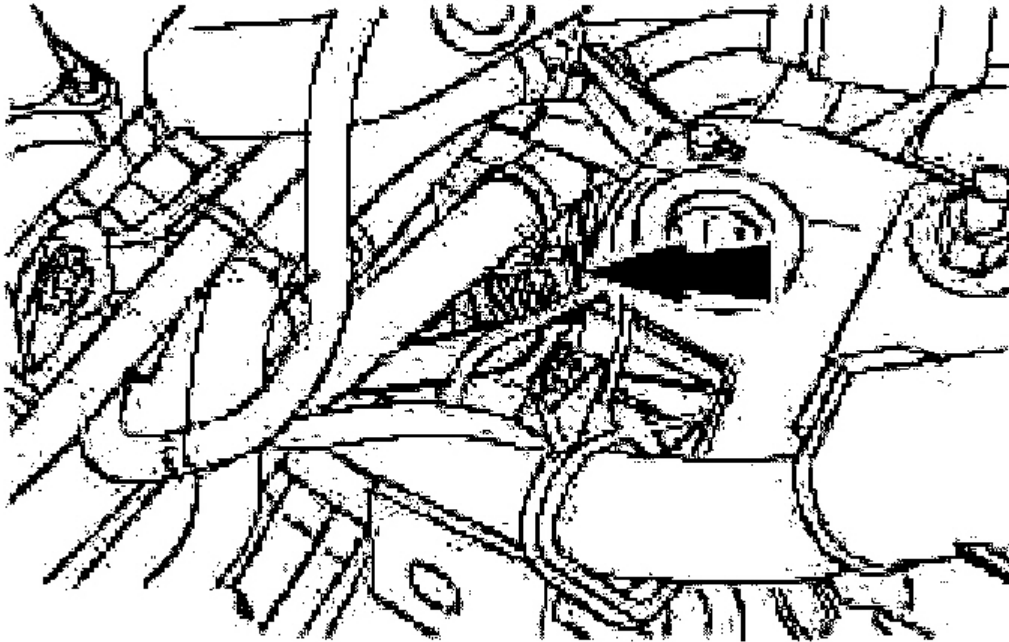
23. Detach the hydraulic line from the clutch slave cylinder.
 - Remove the clip.
 - Remove the clutch line and secure it to one side using cable ties.



G03432786

Fig. 203: Detaching Hydraulic Line From Clutch Slave Cylinder
Courtesy of FORD MOTOR CO.

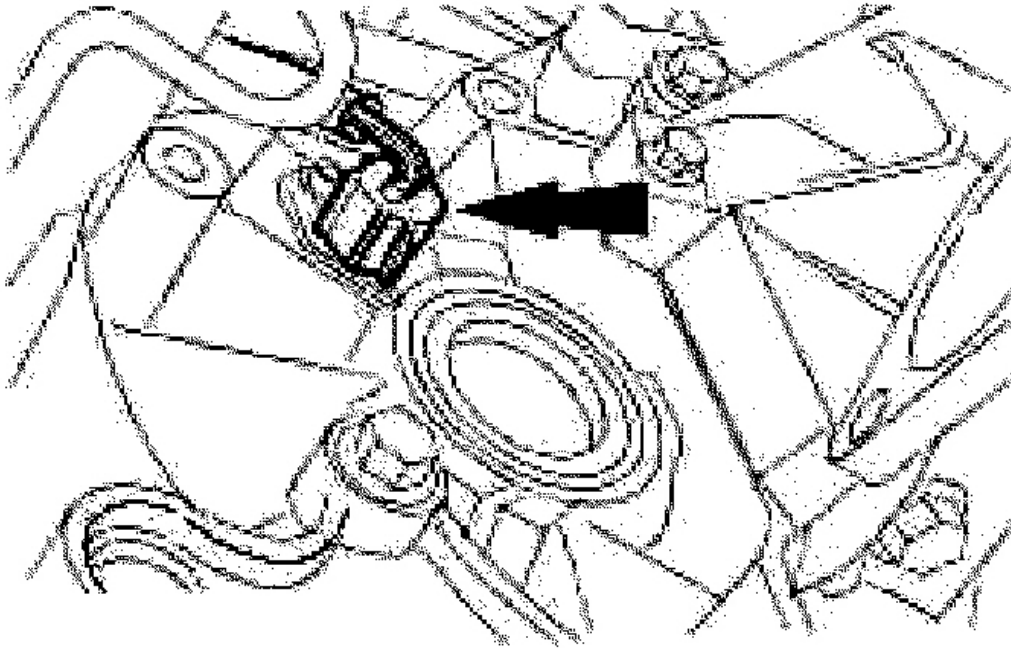
24. Disconnect the wiring harness electrical connector.



G03432787

Fig. 204: Disconnecting Wiring Harness Electrical Connector
Courtesy of FORD MOTOR CO.

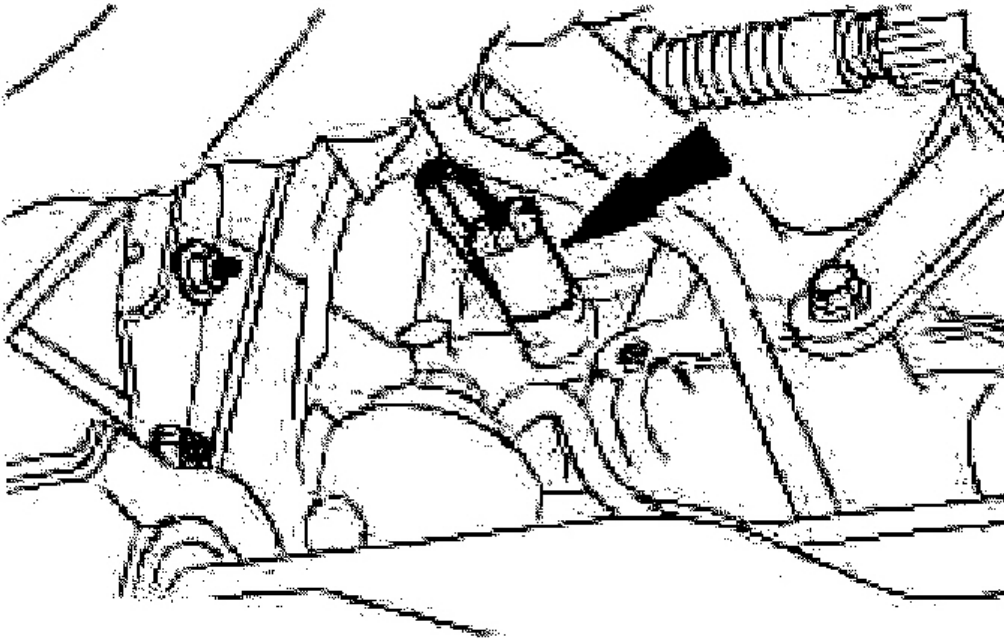
25. Raise and support the vehicle.
26. Disconnect the vehicle speed sensor (VSS) electrical connector.



G03432788

Fig. 205: Disconnecting Vehicle Speed Sensor (VSS) Electrical Connector
Courtesy of FORD MOTOR CO.

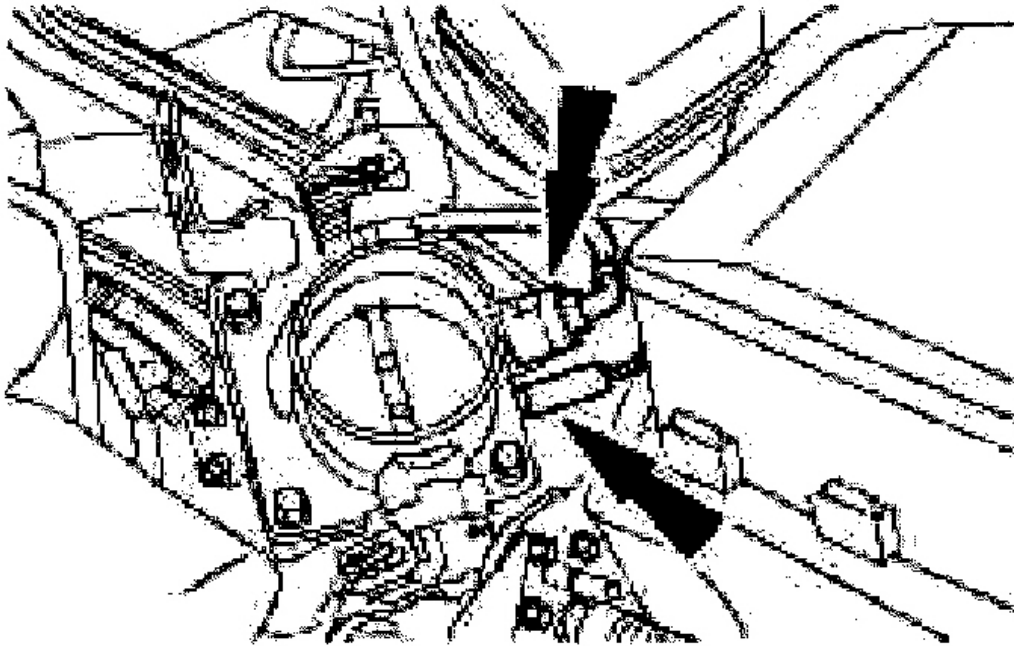
27. Disconnect the reversing lamp switch electrical connector.



G03432789

Fig. 206: Disconnecting Reversing Lamp Switch Electrical Connector
Courtesy of FORD MOTOR CO.

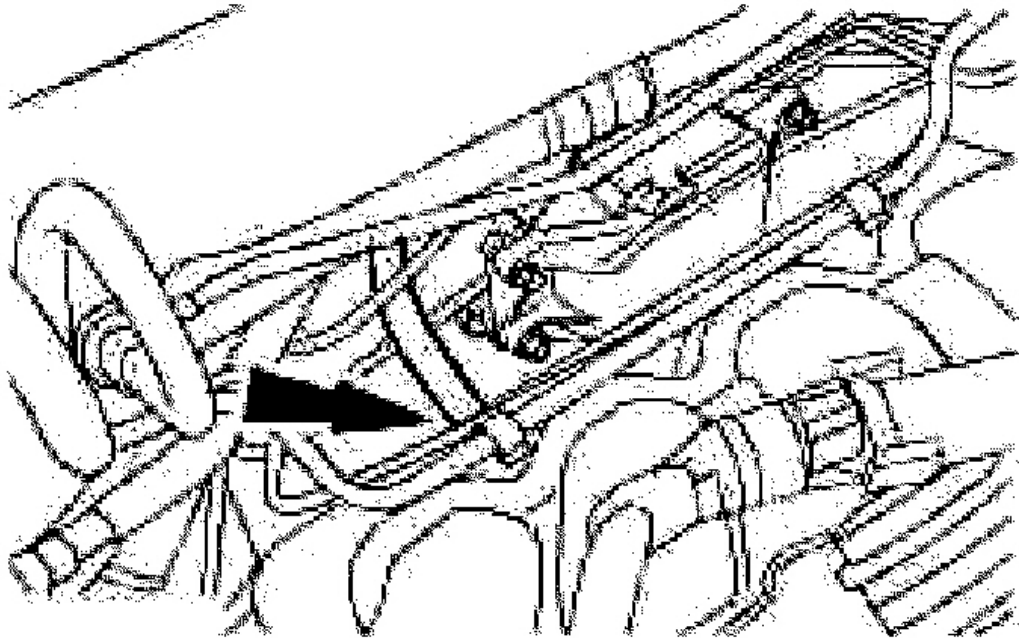
28. Partially lower the vehicle.
29. Disconnect the vacuum hoses from the intake manifold.



G03432790

Fig. 207: Disconnecting Vacuum Hoses From Intake Manifold
Courtesy of FORD MOTOR CO.

30. Detach the brake booster pipe from the intake manifold.
 - Release the quick release coupling and detach the brake booster pipe.

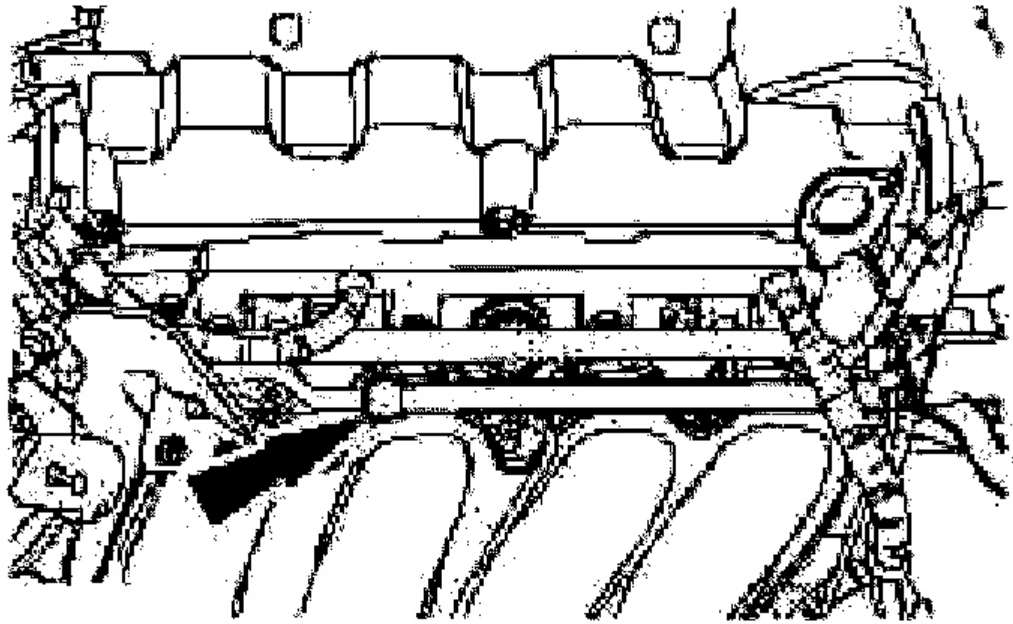


G03432791

Fig. 208: Detaching Brake Booster Pipe From Intake Manifold
Courtesy of FORD MOTOR CO.

WARNING: Escaping fuel. Observe the safety regulations for working with fuel.

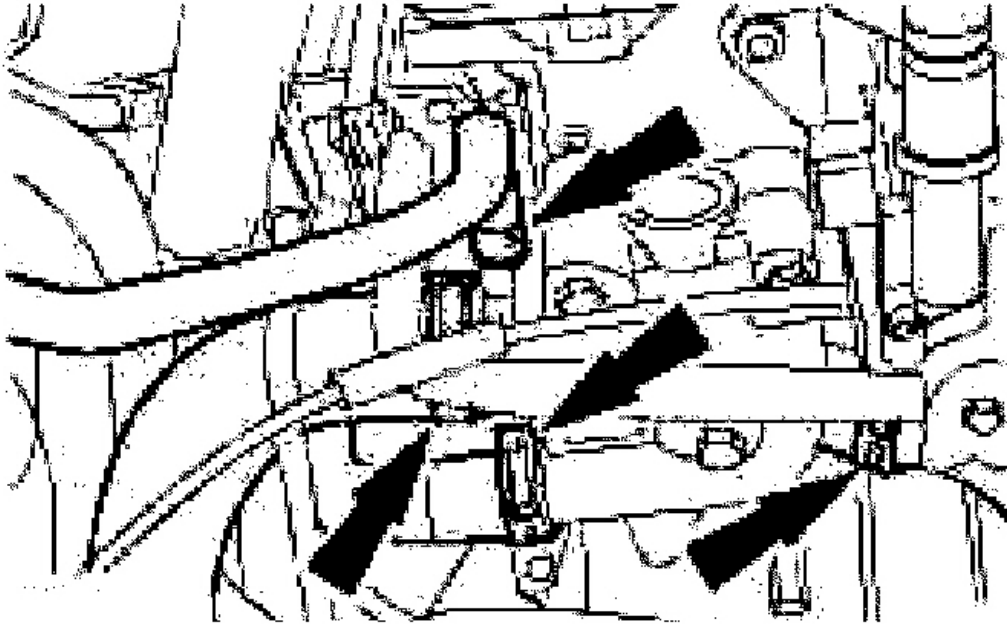
31. Detach the fuel lines.
 - Detach the ground cable.



G03432792

Fig. 209: Detaching Fuel Lines
Courtesy of FORD MOTOR CO.

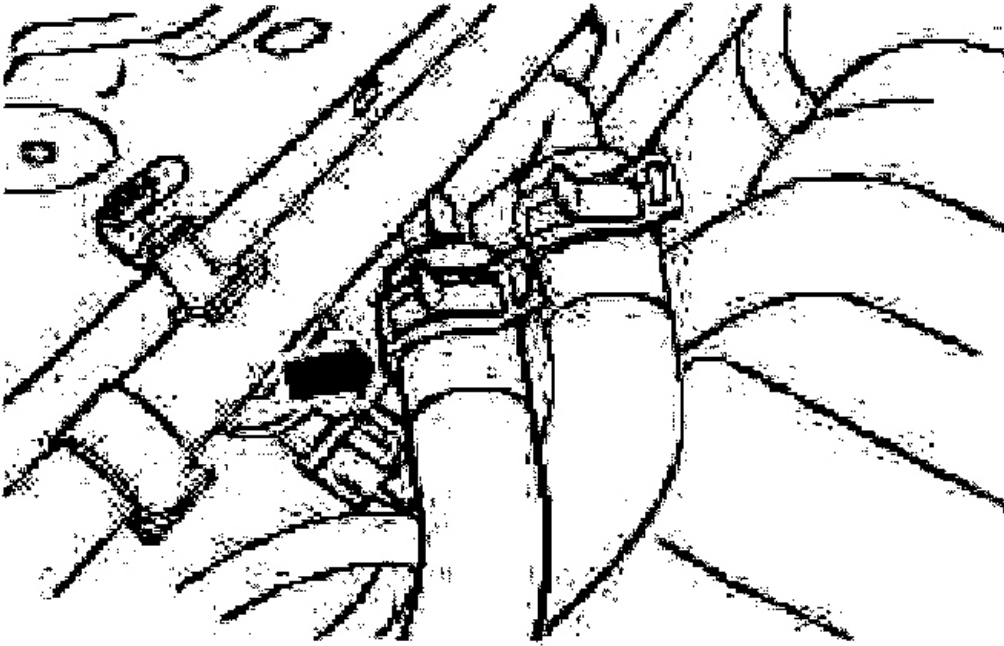
32. Detach the coolant hoses.



G03432793

Fig. 210: Detaching Coolant Hoses
Courtesy of FORD MOTOR CO.

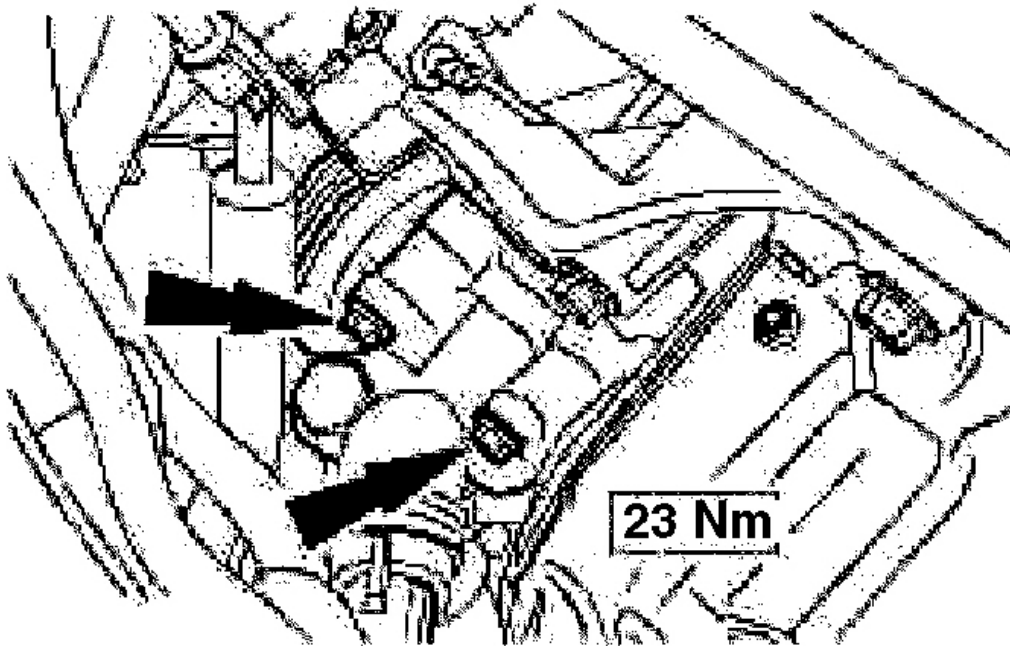
33. Disconnect the oil cooler hose.



G03432794

Fig. 211: Disconnecting Oil Cooler Hose
Courtesy of FORD MOTOR CO.

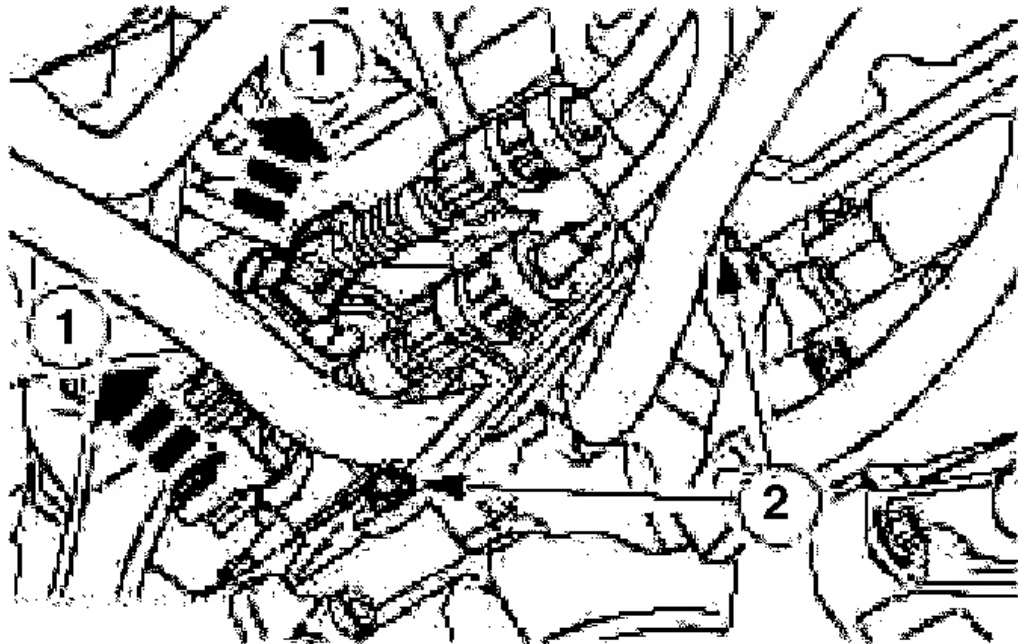
34. Remove the power steering pump upper bolts.



G03432795

Fig. 212: Removing Power Steering Pump Upper Bolts
Courtesy of FORD MOTOR CO.

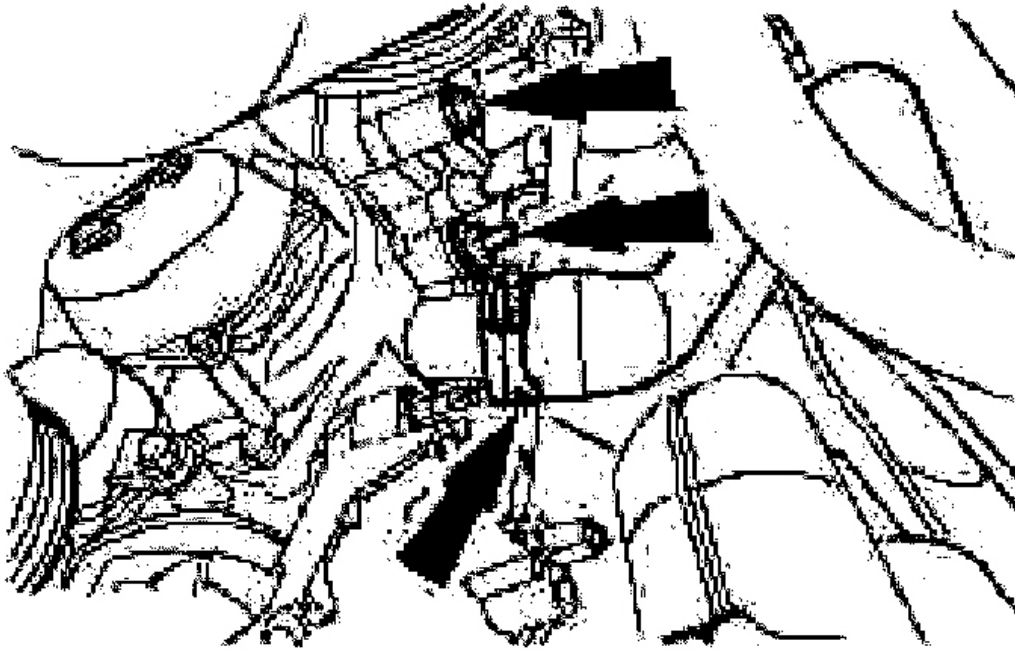
35. Detach the gearshift cables from the transaxle.
 1. Detach the gearshift cable and the selector cable from the selector levers.
 2. Detach the retaining bracket from the transaxle.



G03432796

Fig. 213: Detaching Gearshift Cables From Transaxle
Courtesy of FORD MOTOR CO.

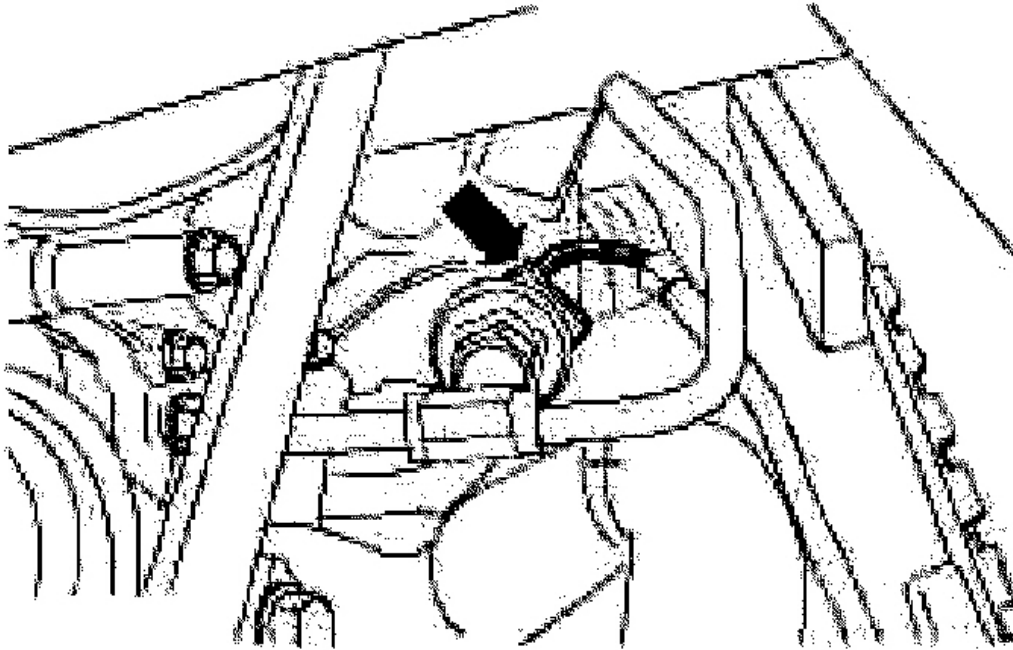
36. Raise and support the vehicle.
37. Remove the power steering pump lower retaining bolts and position aside the pump.
Disconnect the radiator lower coolant hose from the water pump housing.



G03432797

Fig. 214: Identifying Power Steering Pump Lower Retaining Bolts And Radiator Lower Coolant Hose
Courtesy of FORD MOTOR CO.

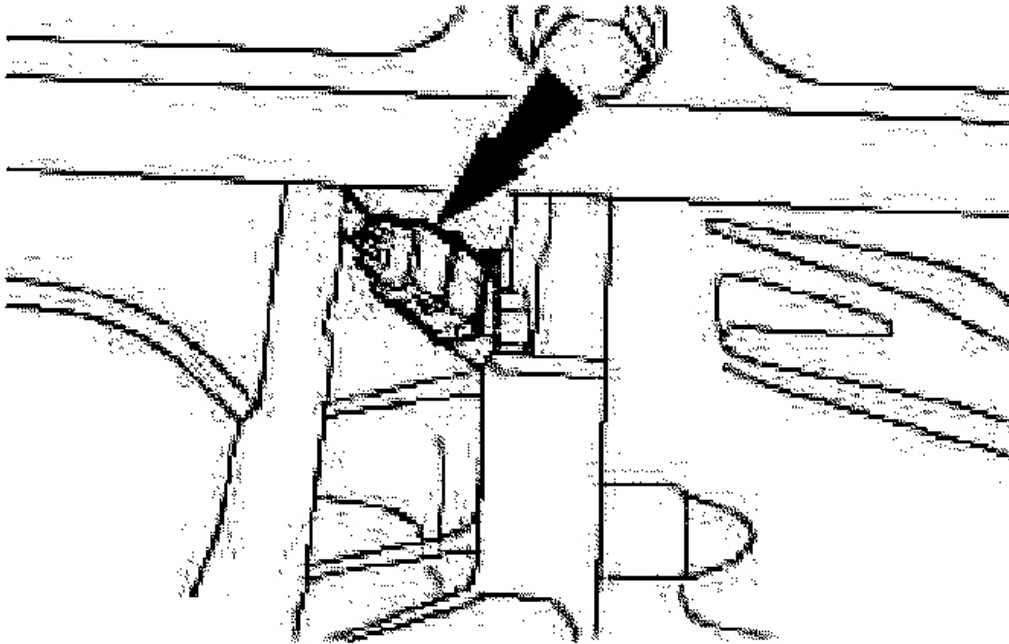
38. Disconnect the power steering pressure switch electrical connector.



G03432798

Fig. 215: Disconnecting Power Steering Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

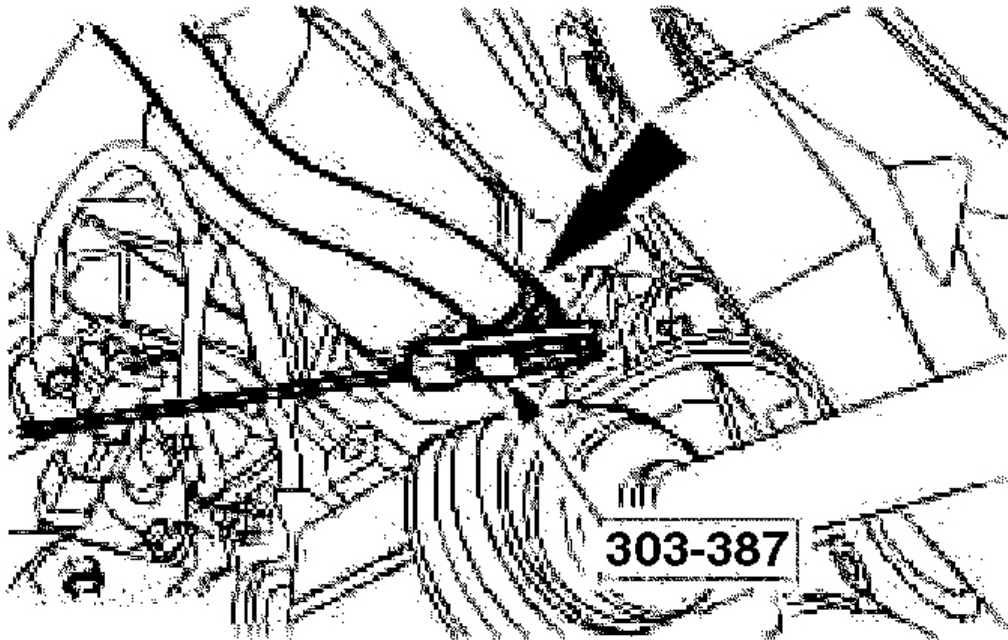
39. Disconnect the crankshaft position sensor connector.



G03432799

Fig. 216: Disconnecting Crankshaft Position Sensor Connector
Courtesy of FORD MOTOR CO.

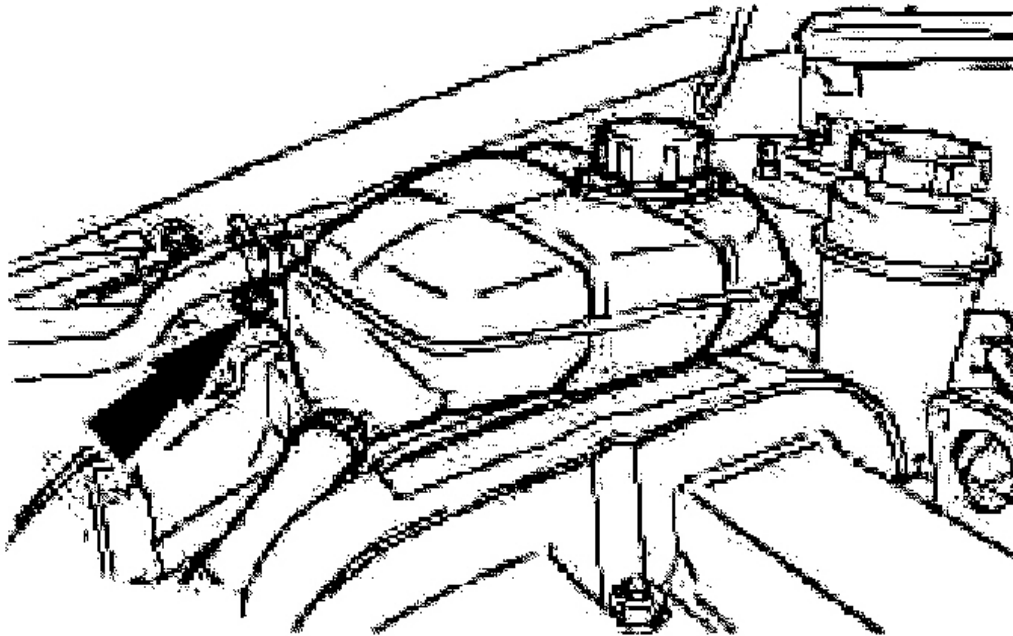
40. Detach the coolant hose from the oil cooler.



G03432800

Fig. 217: Detaching Coolant Hose From Oil Cooler
Courtesy of FORD MOTOR CO.

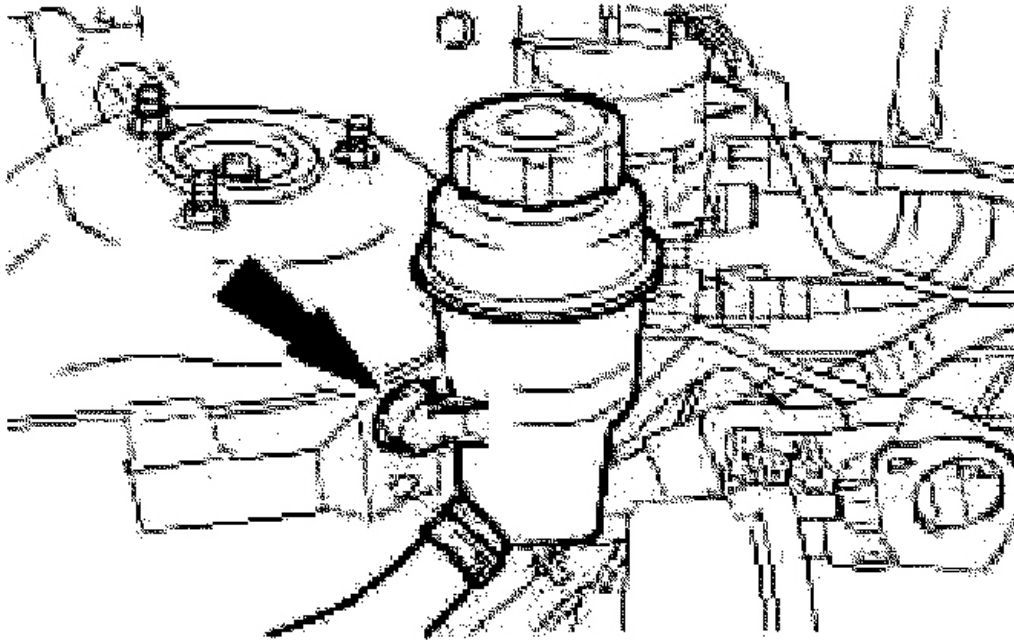
41. Lower the vehicle.
42. Detach the coolant expansion tank and position it to one side.



G03432801

Fig. 218: Detaching Coolant Expansion Tank
Courtesy of FORD MOTOR CO.

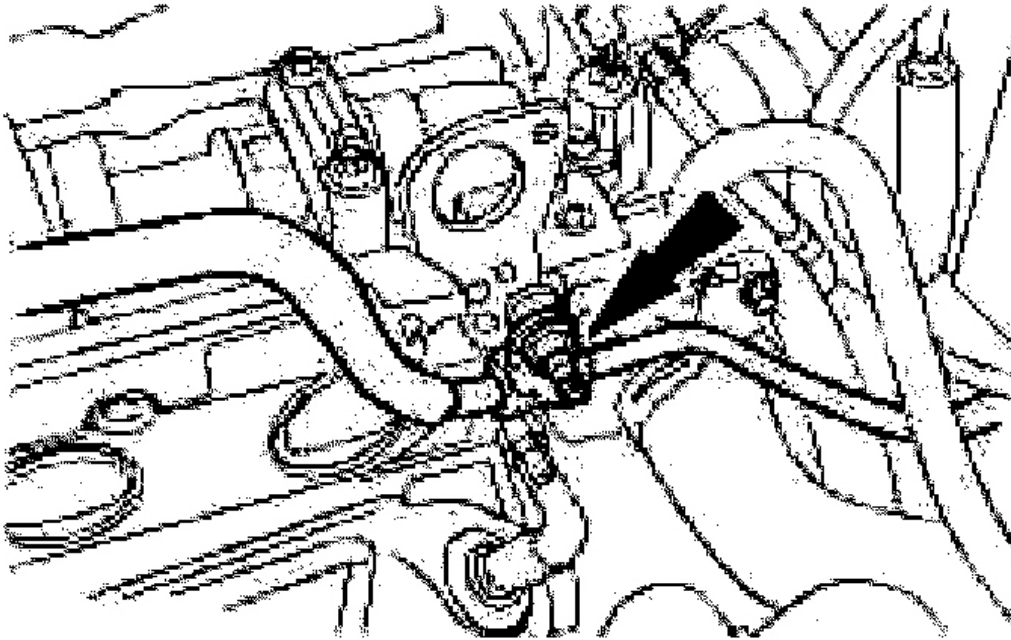
43. Drain the power assisted steering (PAS) reservoir.
44. Detach the PAS reservoir and position it to one side.



G03432802

Fig. 219: Detaching PAS Reservoir
Courtesy of FORD MOTOR CO.

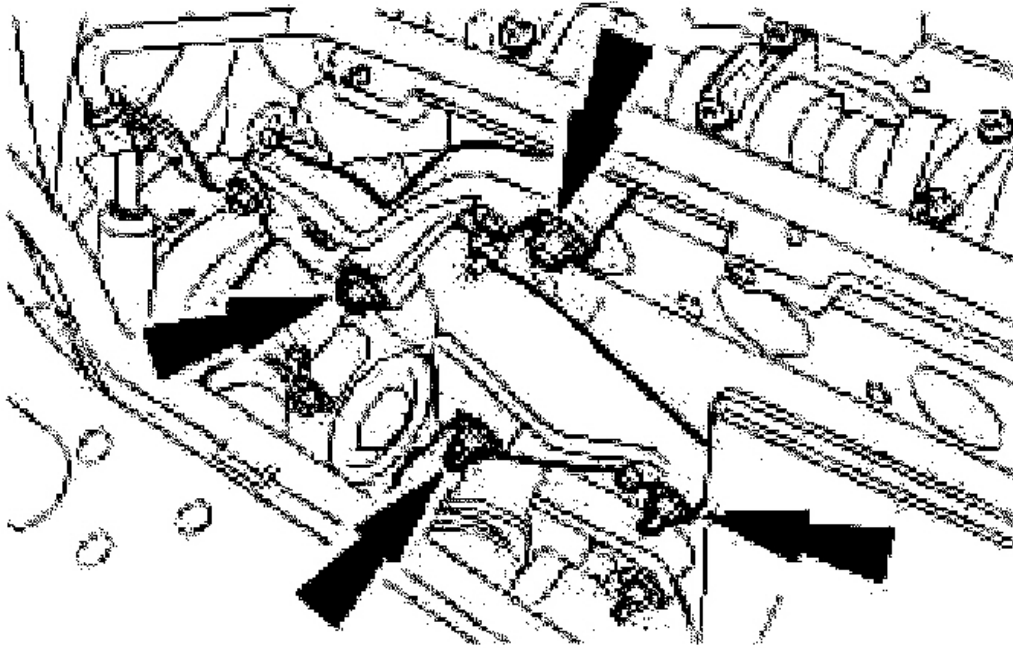
45. Detach the power steering line bracket from the cylinder head.



G03432803

Fig. 220: Detaching Power Steering Line Bracket From Cylinder Head
Courtesy of FORD MOTOR CO.

46. Remove the power steering pump bracket.



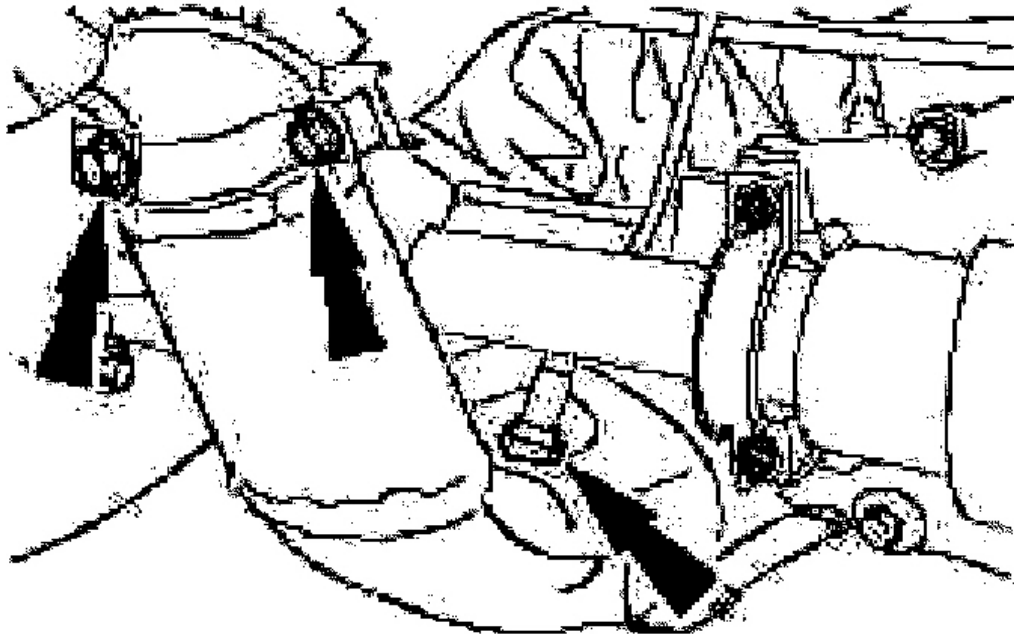
G03432804

Fig. 221: Removing Power Steering Pump Bracket
Courtesy of FORD MOTOR CO.

47. Remove the crossmember. For additional information, refer to **CROSSMEMBER** .

CAUTION: The catalytic converter must be supported while the support bracket is removed.

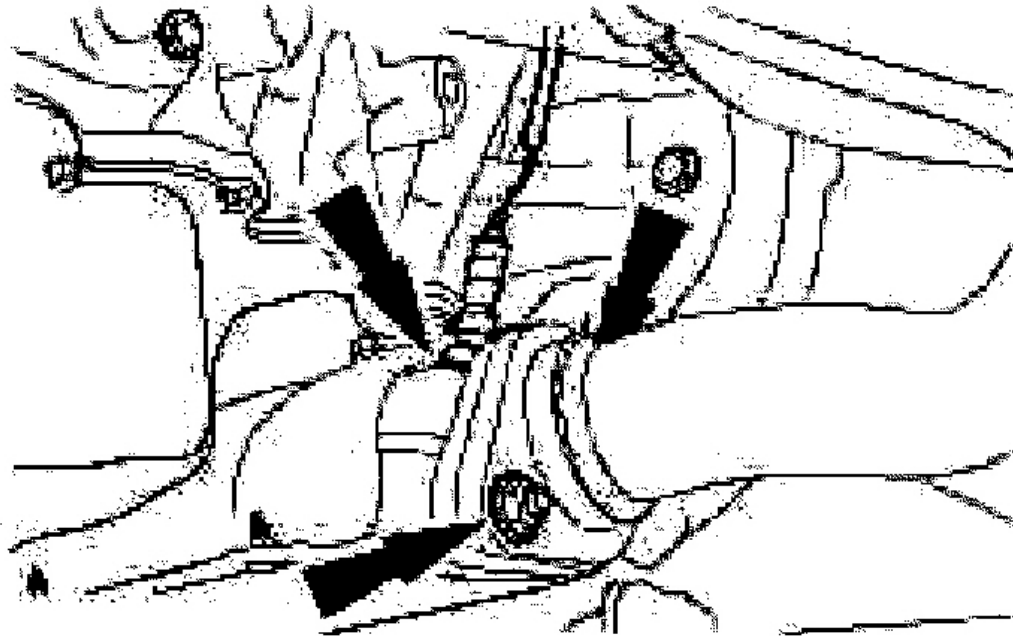
48. Remove the catalytic converter support bracket.
- Remove the catalyst monitor sensor.



G03432805

Fig. 222: Removing Catalytic Converter Support Bracket And Sensor
Courtesy of FORD MOTOR CO.

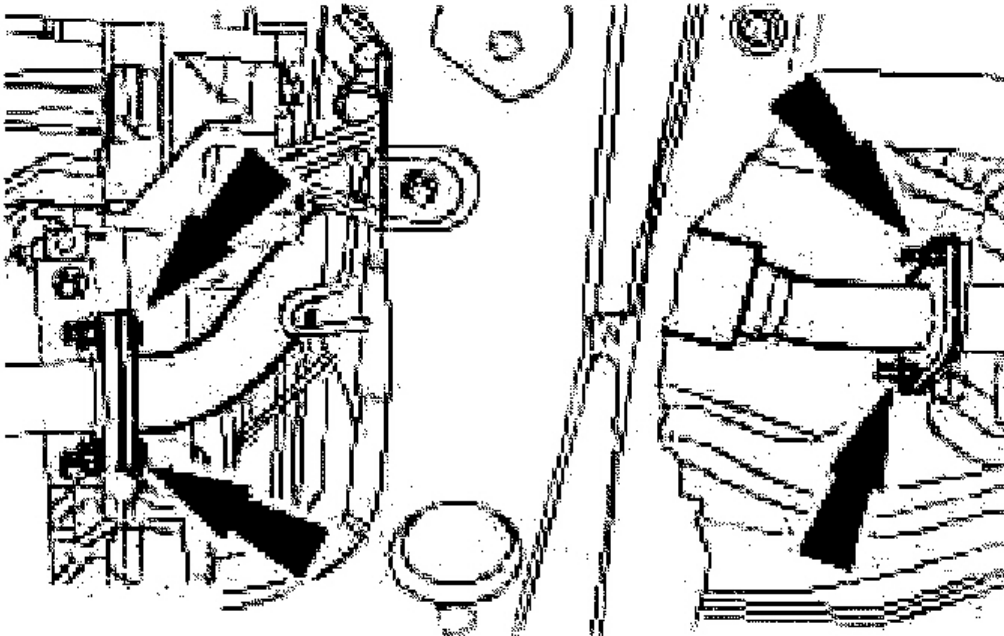
49. Detach the catalytic converter from the exhaust manifold.
 - Discard the gasket and nuts.
 - Remove the heated oxygen (HO2S) sensor.



G03432806

Fig. 223: Detaching Catalytic Converter From Exhaust Manifold
Courtesy of FORD MOTOR CO.

50. Remove the flexible exhaust pipe.



G03432807

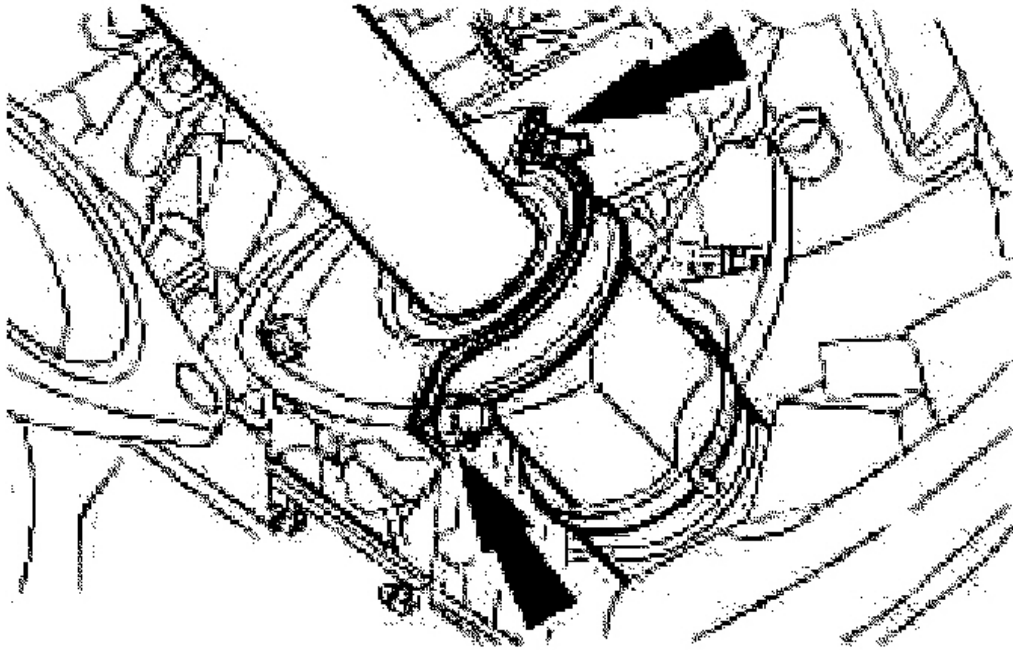
Fig. 224: Removing Flexible Exhaust Pipe
Courtesy of FORD MOTOR CO.

CAUTION: Support the halfshaft. The inner joint must not be bent at more than 18 degrees. The outer joint must not be bent at more than 45 degrees.

CAUTION: Do not damage the halfshaft seal.

NOTE: Plug the transaxle to prevent oil loss or dirt ingress.

51. Detach the right-hand halfshaft and the intermediate shaft from the transaxle and secure it to one side.
 - Allow the oil to drain into a suitable container.
 - Discard the center bearing cap and locknuts.



G03432808

Fig. 225: Detaching Right-Hand Halfshaft And Intermediate Shaft From Transaxle

Courtesy of FORD MOTOR CO.

CAUTION: Support the halfshaft. The inner joint must not be bent at more than 18 degrees. The outer joint must not be bent at more than 45 degrees.

CAUTION: Do not damage the halfshaft seal.

NOTE: Plug the transaxle to prevent oil loss or dirt ingress.

52. Using the special tool, detach the left-hand halfshaft from the transaxle and secure it to one side.
 - Allow the oil to drain into a suitable container.

- Discard the snap ring.

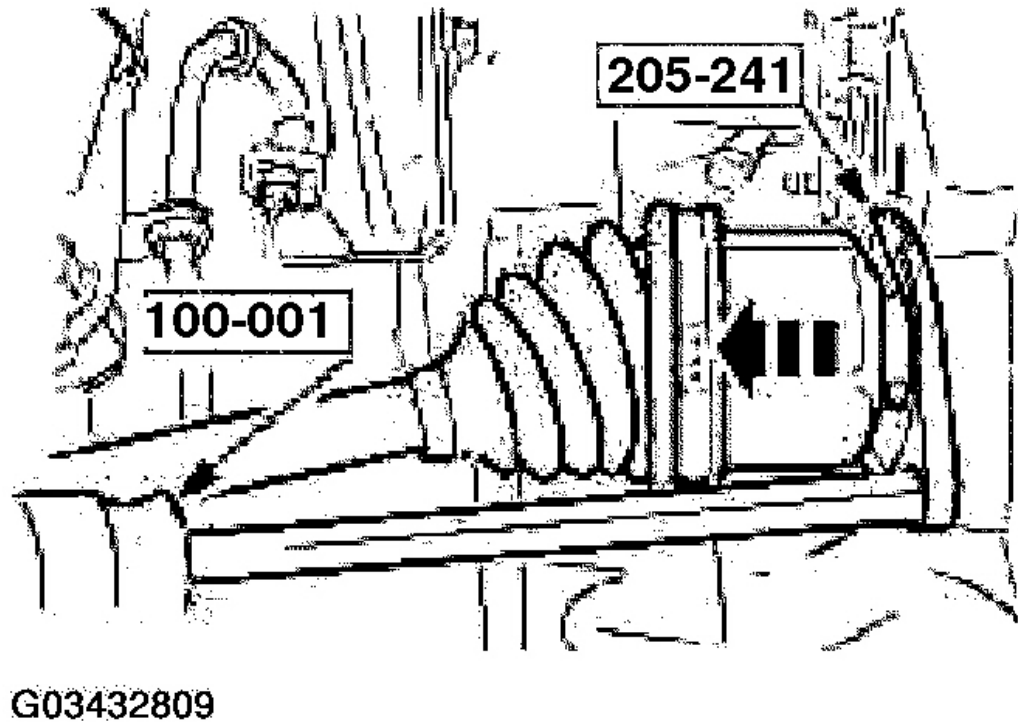
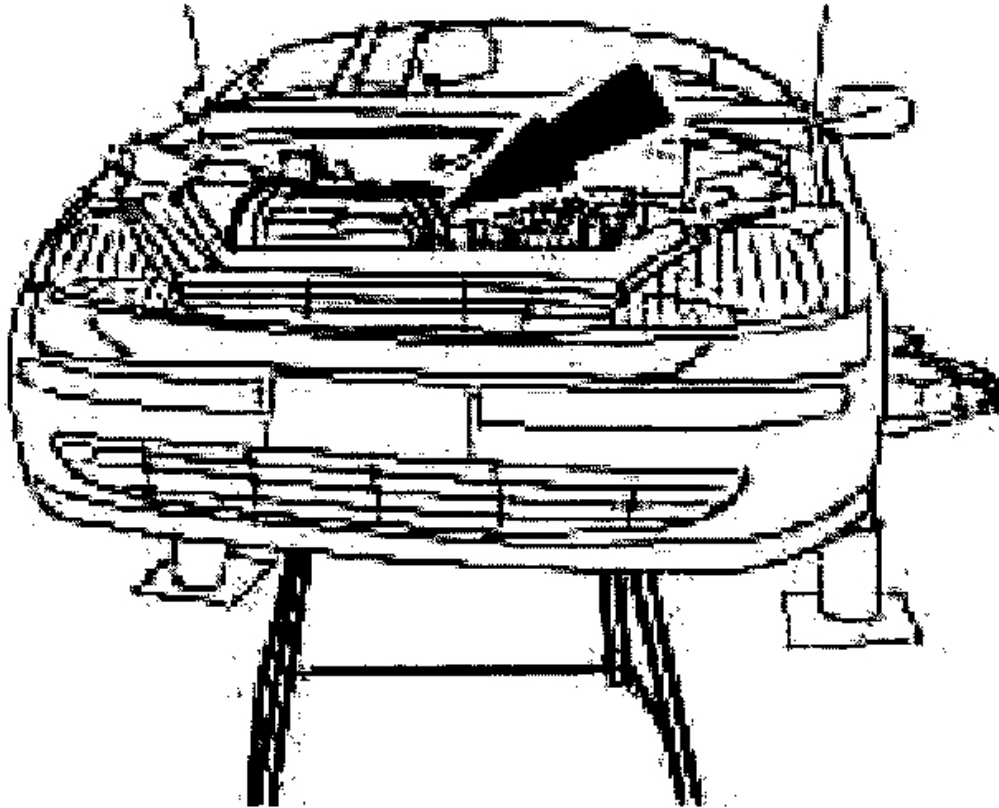


Fig. 226: Detaching Left-Hand Halfshaft From Transaxle Using Special Tool
Courtesy of FORD MOTOR CO.

53. Position the assembly table with suitable wooden blocks under the engine and transmission assembly.
54. Carefully lower the vehicle until the engine and transmission assembly is positioned on the assembly stand.
55. Secure the engine and transmission assembly to the assembly stand with a retaining strap.

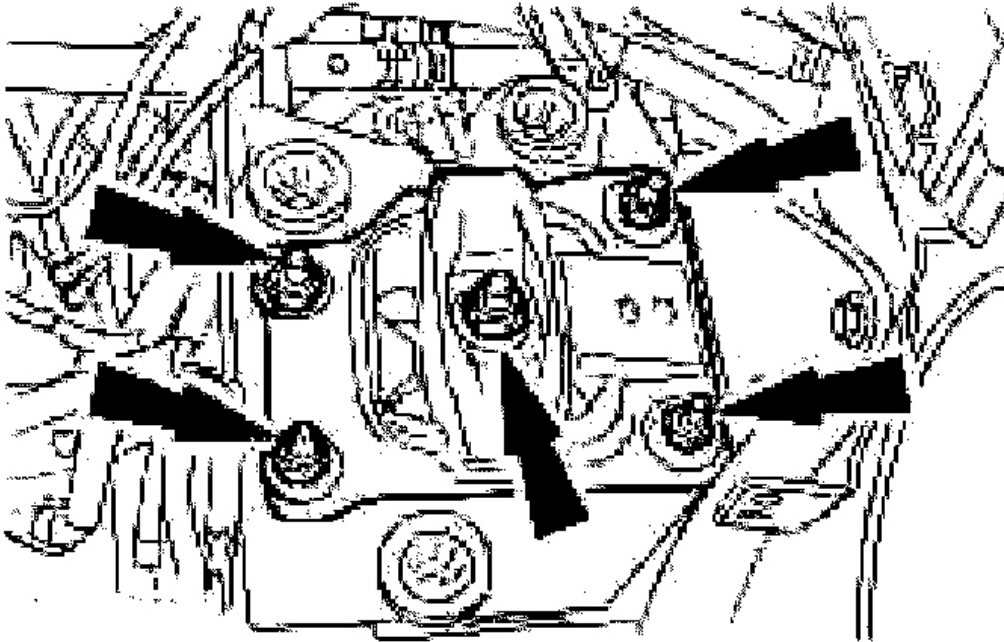


G03432810

Fig. 227: Securing Engine And Transmission Assembly To Assembly Stand Using Retaining Strap

Courtesy of FORD MOTOR CO.

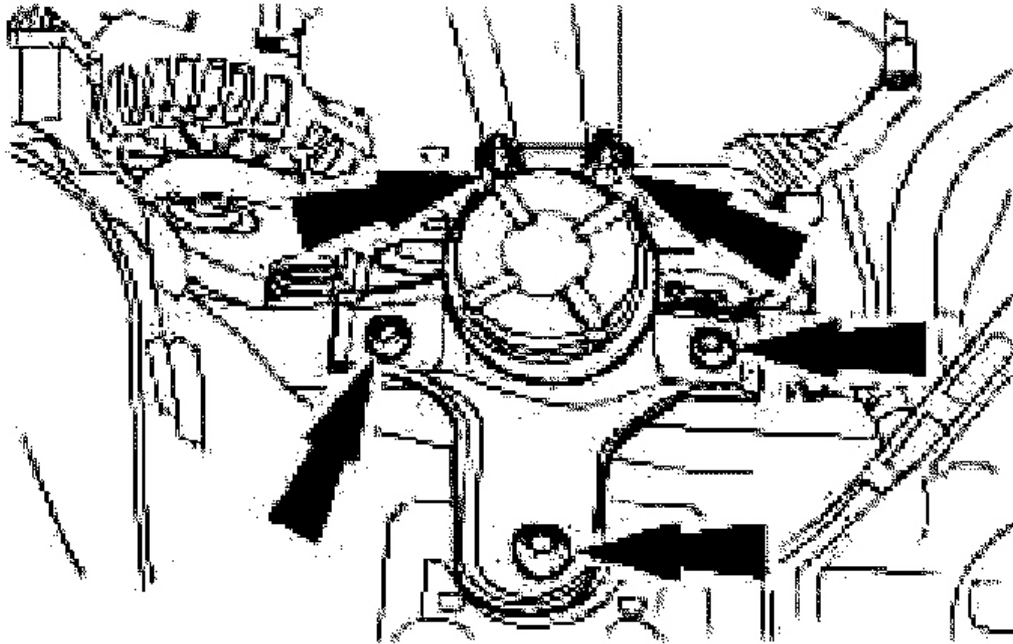
56. Remove the engine rear mount.



G03432811

Fig. 228: Removing Engine Rear Mount
Courtesy of FORD MOTOR CO.

57. Remove the engine front mount.



G03432812

Fig. 229: Removing Engine Front Mount
Courtesy of FORD MOTOR CO.

58. Carefully raise the vehicle.
 - Pull forwards the assembly stand.
59. Using the special tools, secure the engine and transmission assembly to the hoist.

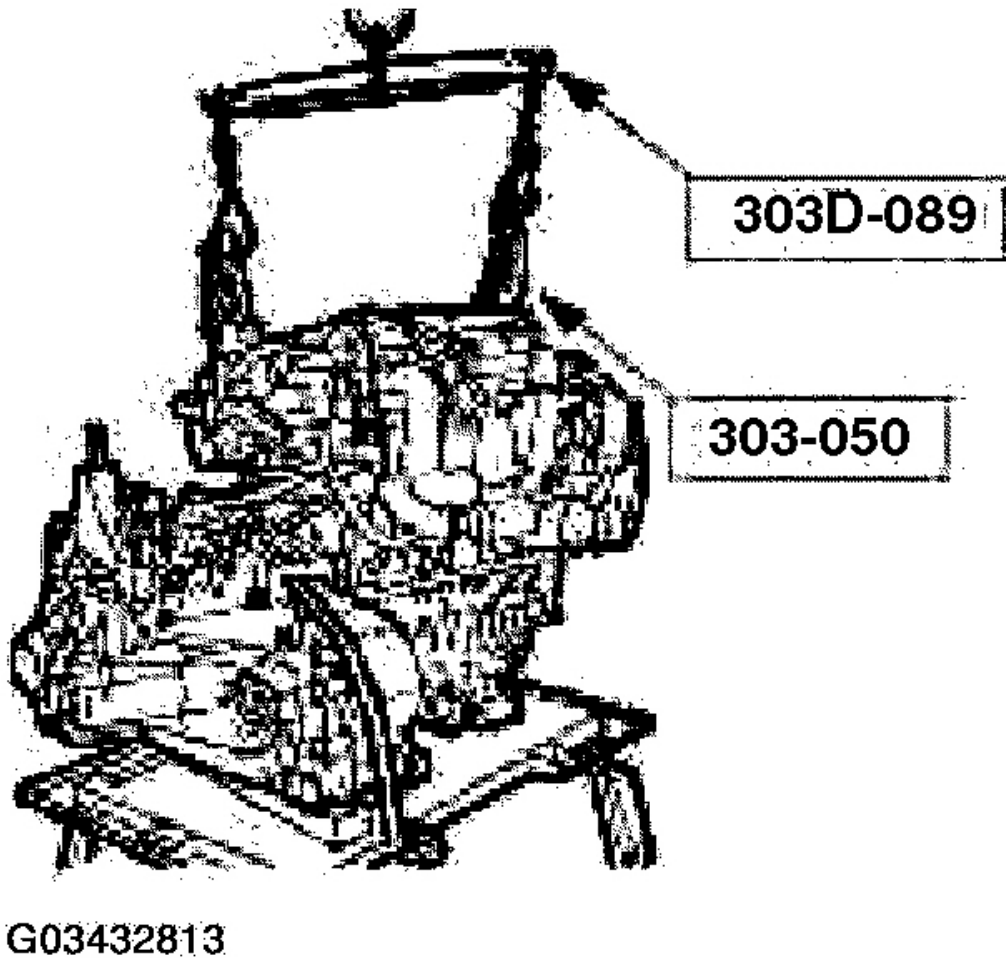
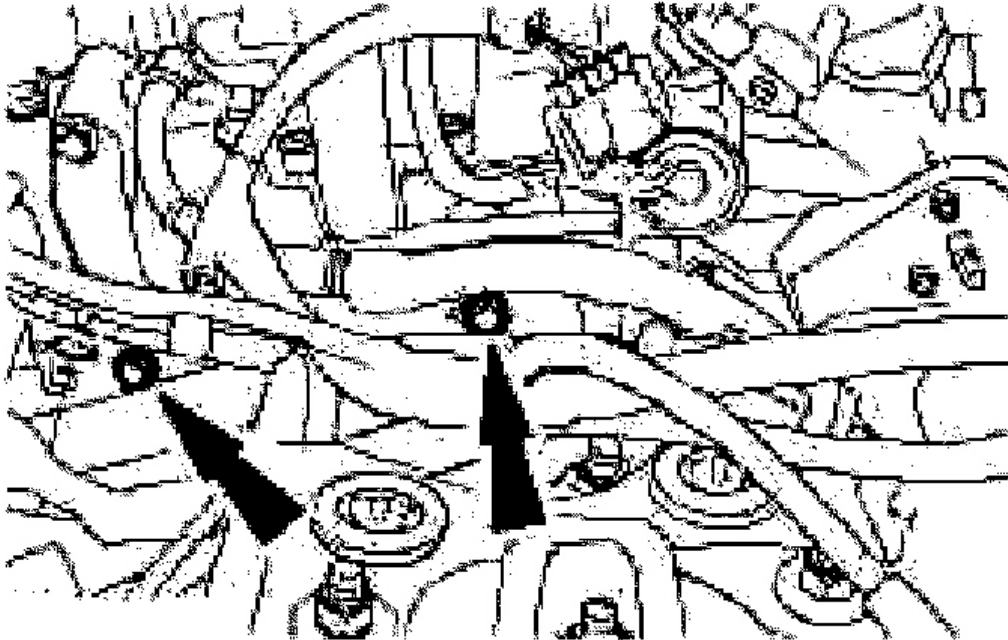


Fig. 230: Securing Engine And Transmission Assembly To Hoist Using Special Tools
Courtesy of FORD MOTOR CO.

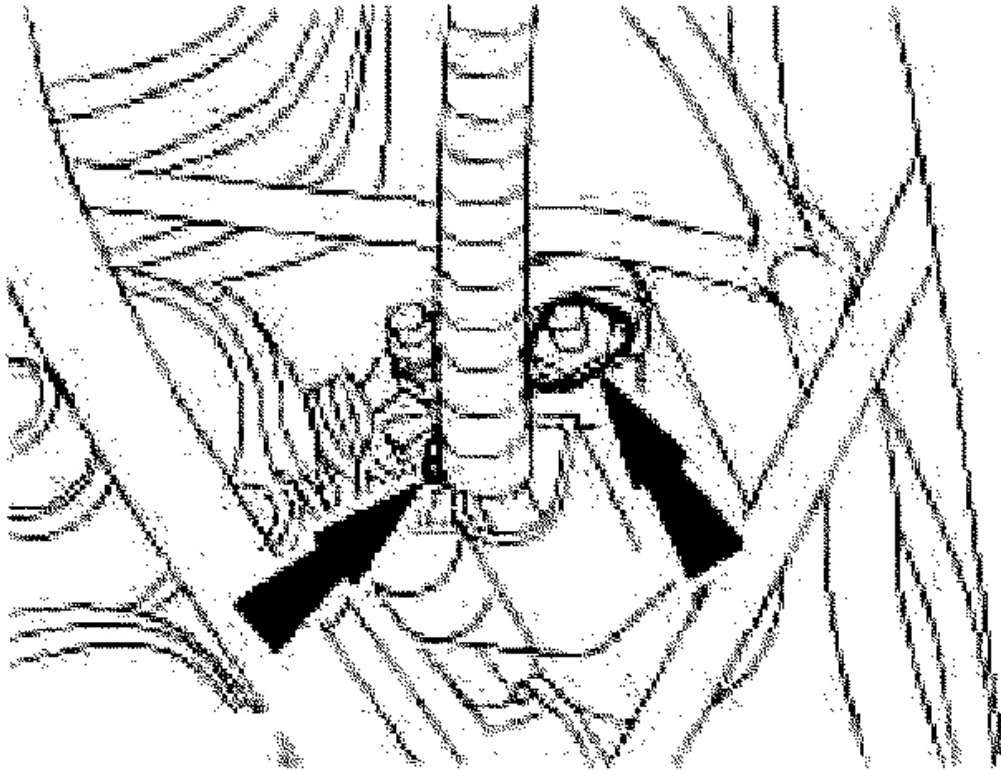
60. Remove the transaxle upper retaining bolts.



G03432814

Fig. 231: Removing Transaxle Upper Retaining Bolts
Courtesy of FORD MOTOR CO.

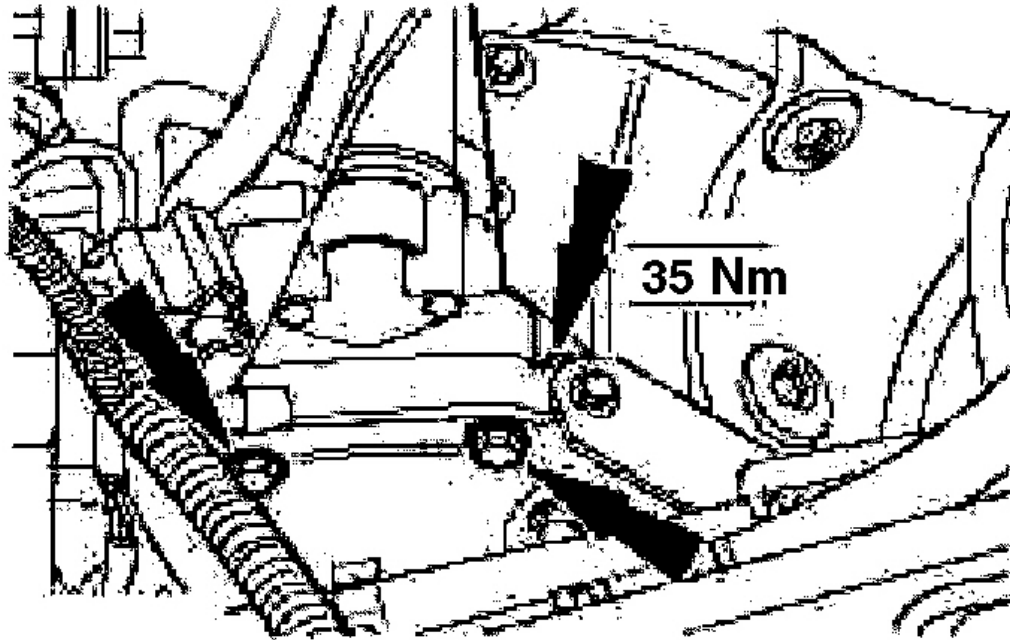
61. Disconnect the starter motor electrical connectors.



G03432815

Fig. 232: Disconnecting Starter Motor Electrical Connectors
Courtesy of FORD MOTOR CO.

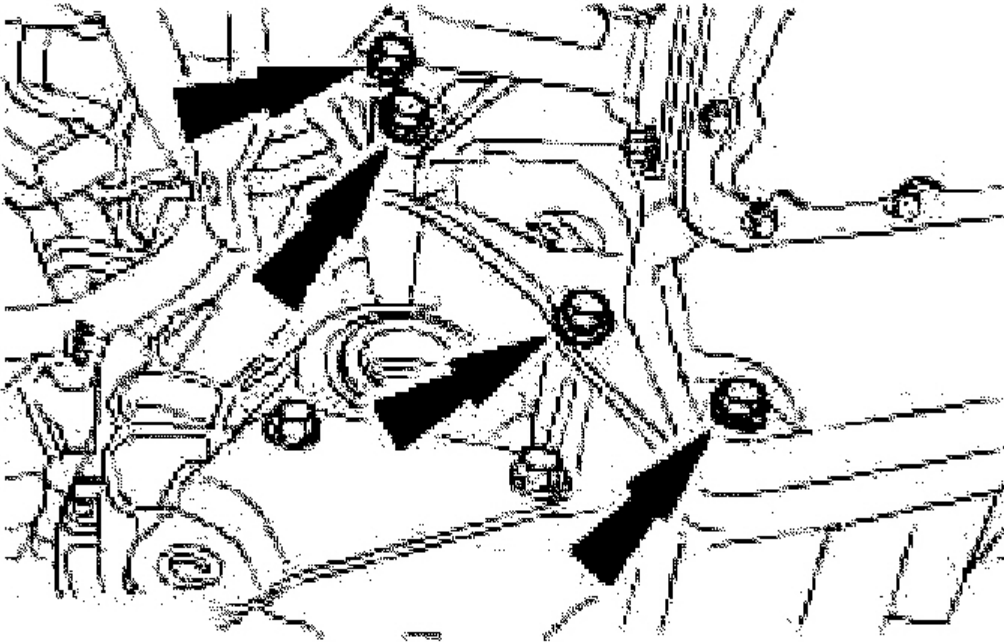
62. Remove the starter motor.
 - Detach the ground cable from the transaxle.



G03432816

Fig. 233: Removing Starter Motor
Courtesy of FORD MOTOR CO.

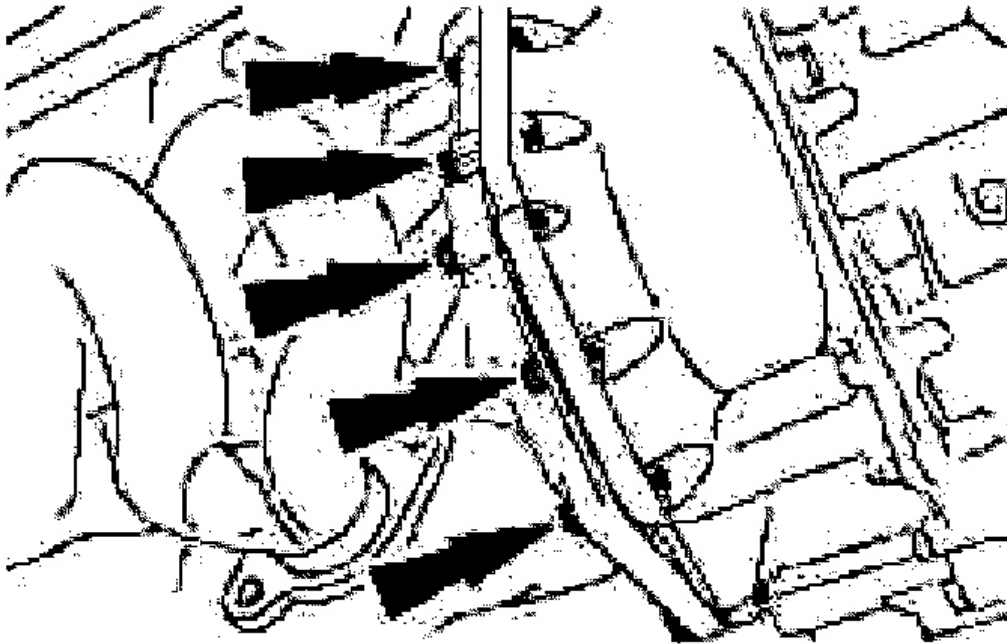
63. Remove the transaxle right-hand retaining bolts.



G03432817

Fig. 234: Removing Transaxle Right-Hand Retaining Bolts
Courtesy of FORD MOTOR CO.

64. Remove the transaxle left-hand retaining bolts.



G03432818

Fig. 235: Removing Transaxle Left-Hand Retaining Bolts
Courtesy of FORD MOTOR CO.

65. Separate the engine from the transaxle.



DISASSEMBLY

ENGINE

Special Tool(s)

2002 Ford Focus LX

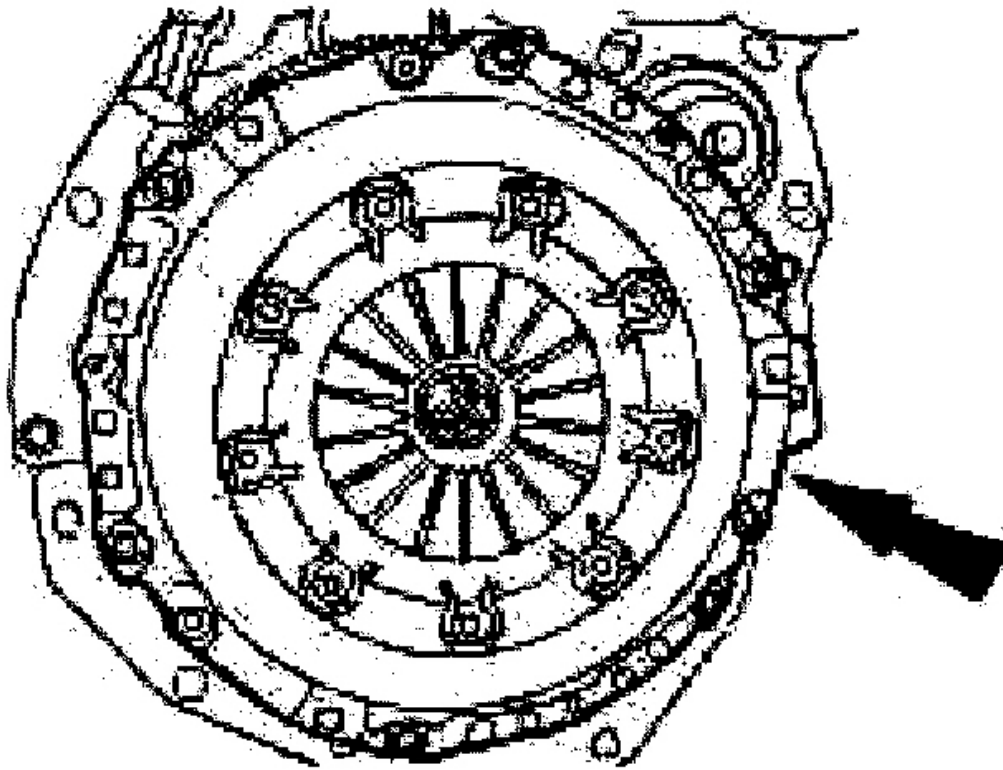
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Locking Tool, Flywheel 303-103 (T74P-6375-A)
	Cylinder Ridge Reamer 303-016 (T64-6011-EA)

G03432819

Fig. 236: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

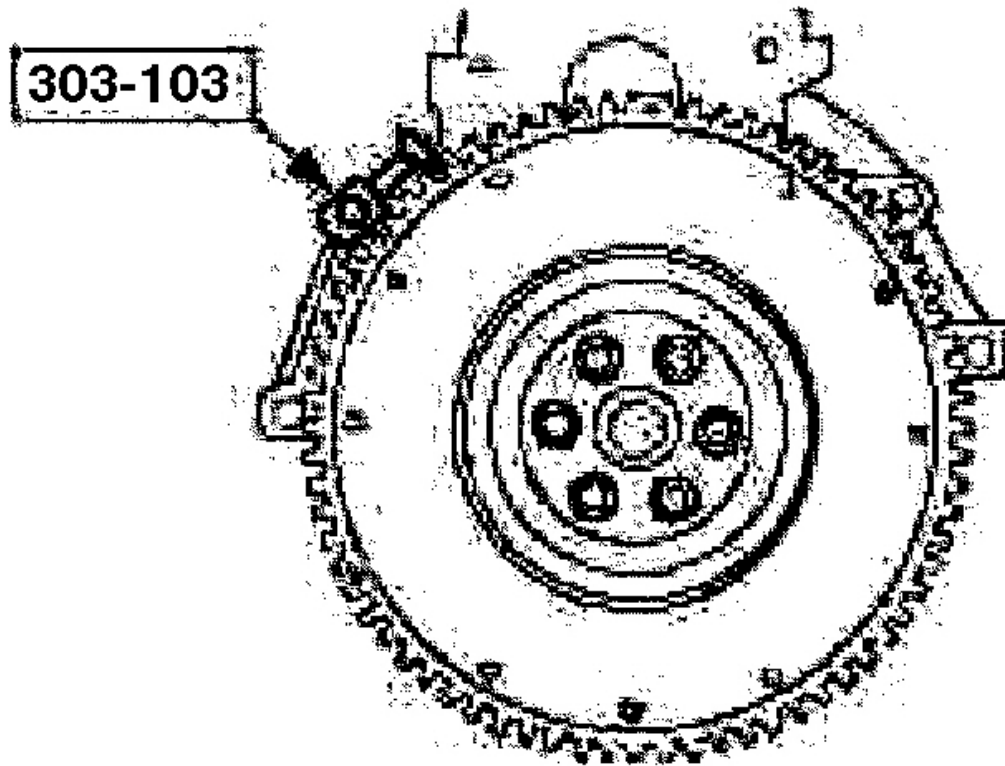
1. Remove the clutch disc and pressure plate.



G03432820

Fig. 237: Removing Clutch Disc And Pressure Plate
Courtesy of FORD MOTOR CO.

2. Using the special tool, lock the flywheel in position.



G03432821

Fig. 238: Locking Flywheel In Position
Courtesy of FORD MOTOR CO.

3. Remove the flywheel.
 - Remove the special tool.

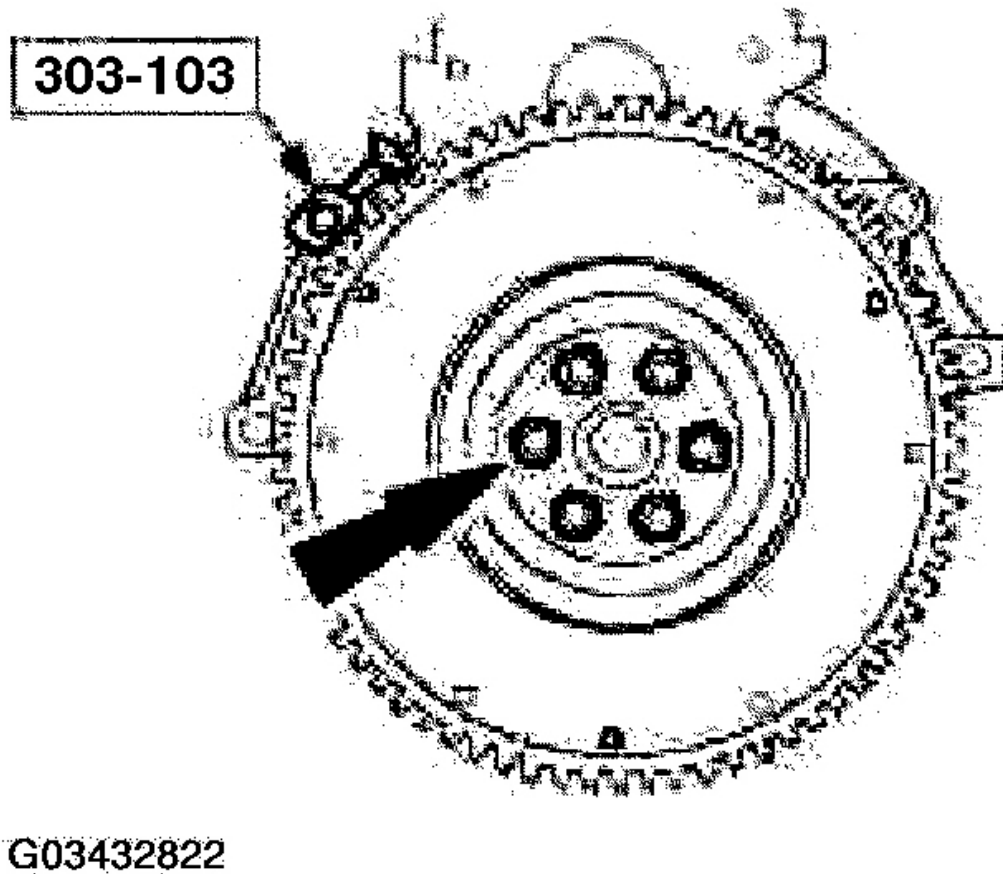
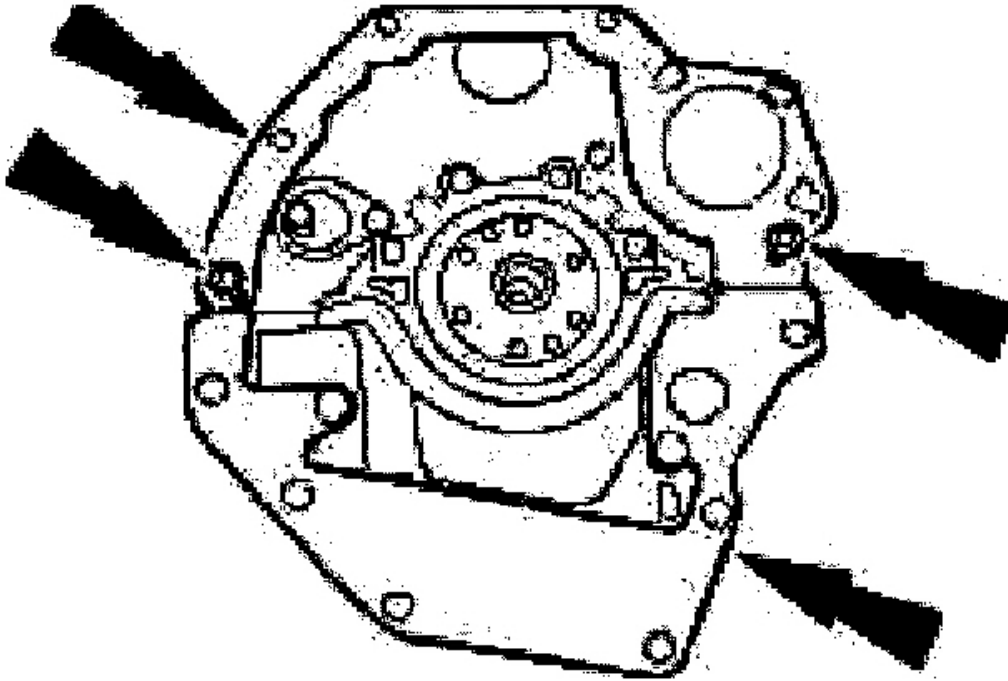


Fig. 239: Removing Special Tool
Courtesy of FORD MOTOR CO.

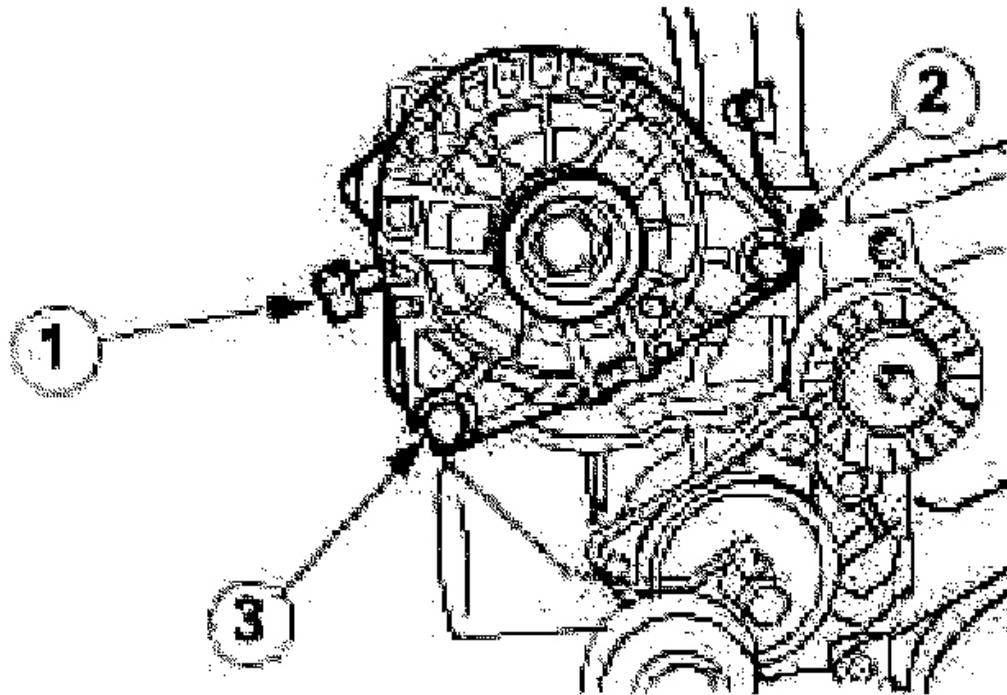
4. Remove the special tool.
5. Remove the spacer plate and the locating dowels.



G03432823

Fig. 240: Removing Spacer Plate And Locating Dowels
Courtesy of FORD MOTOR CO.

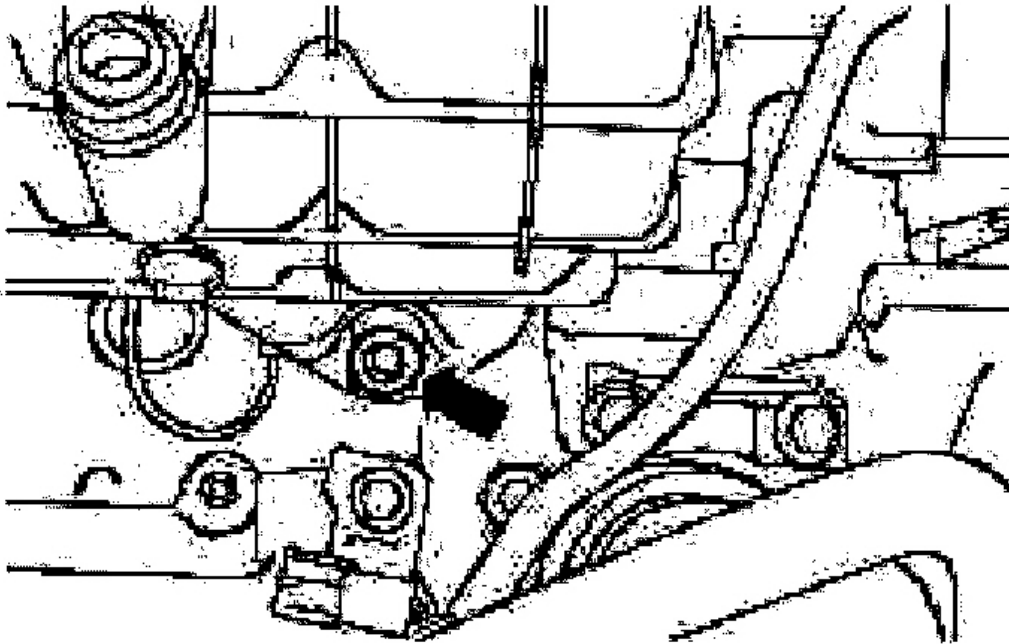
6. Mount the engine on an assembly stand.
7. Remove the generator.
 1. Disconnect the positive cable.
 2. Remove the bolt.
 3. Remove the bolt.



G03432824

Fig. 241: Removing Generator
Courtesy of FORD MOTOR CO.

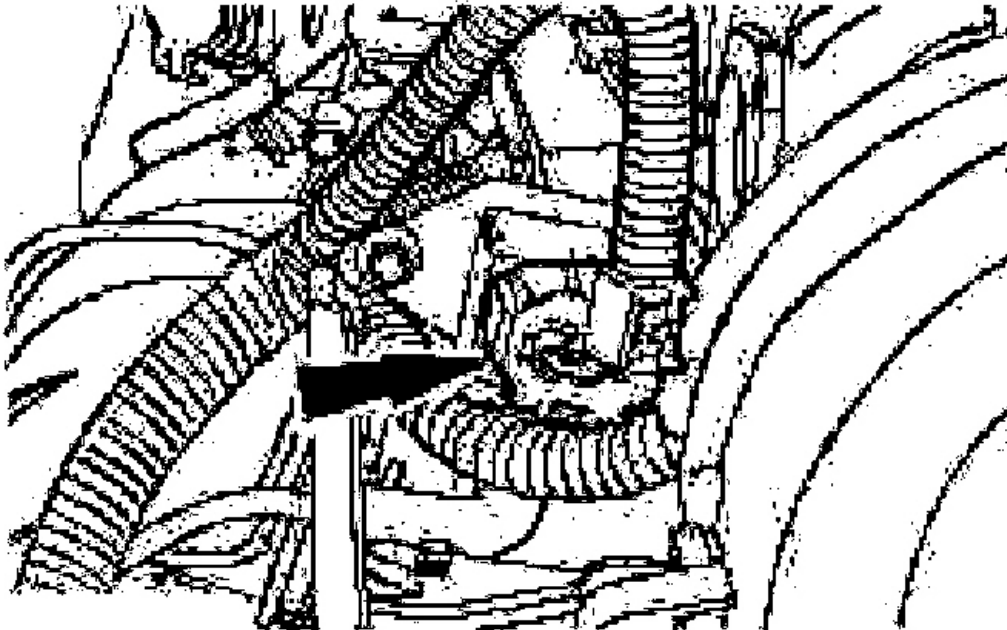
8. Remove the intake manifold lower retaining bolt.



G03432825

Fig. 242: Removing Intake Manifold Lower Retaining Bolt
Courtesy of FORD MOTOR CO.

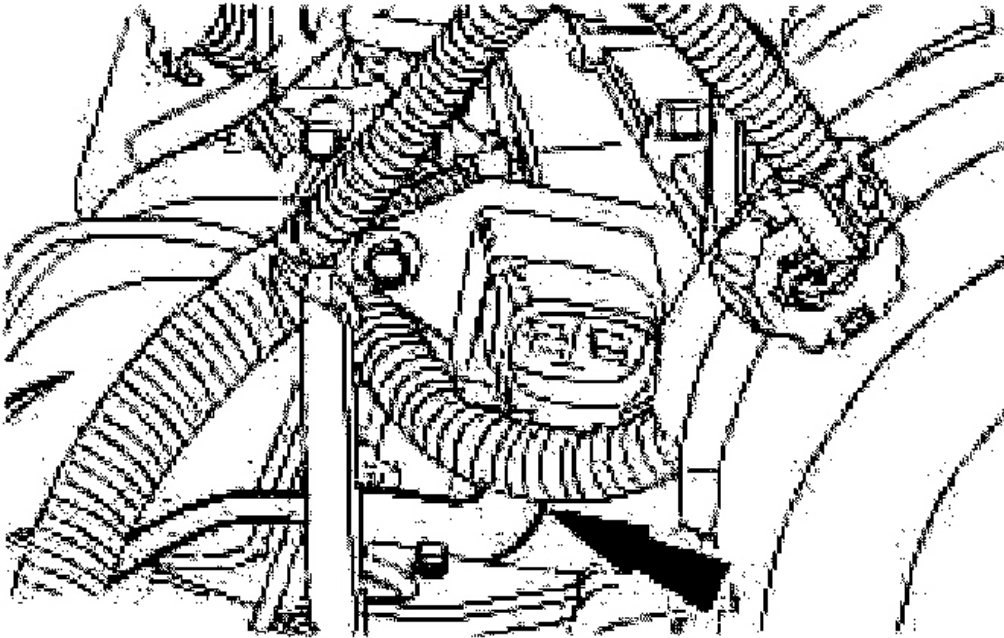
9. Disconnect the fuel pressure sensor electrical connector.



G03432826

Fig. 243: Disconnecting Fuel Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

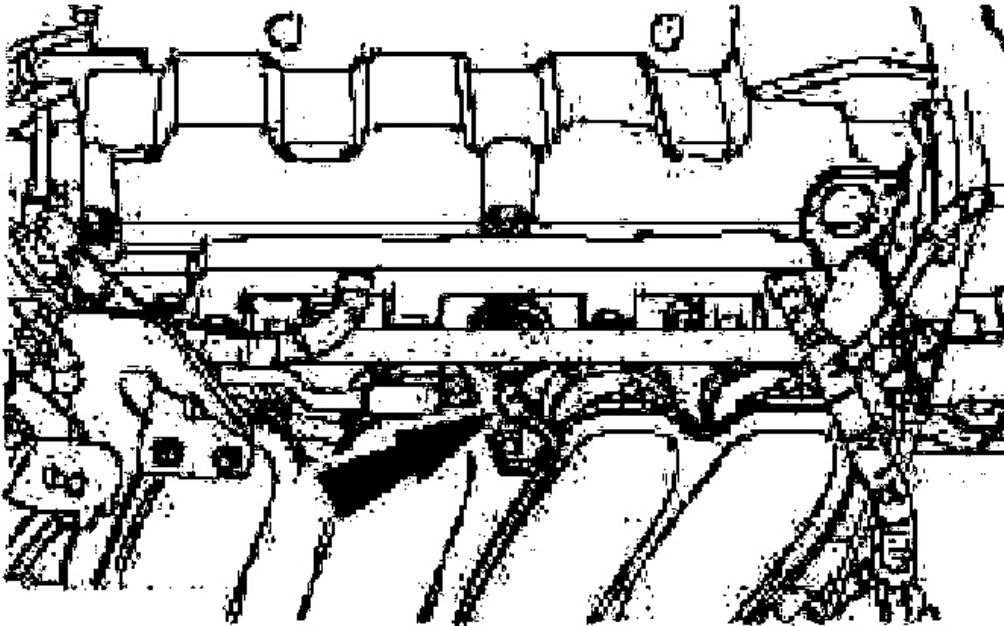
10. Disconnect the vacuum line from the fuel pressure sensor.



G03432827

Fig. 244: Disconnecting Vacuum Line From Fuel Pressure Sensor
Courtesy of FORD MOTOR CO.

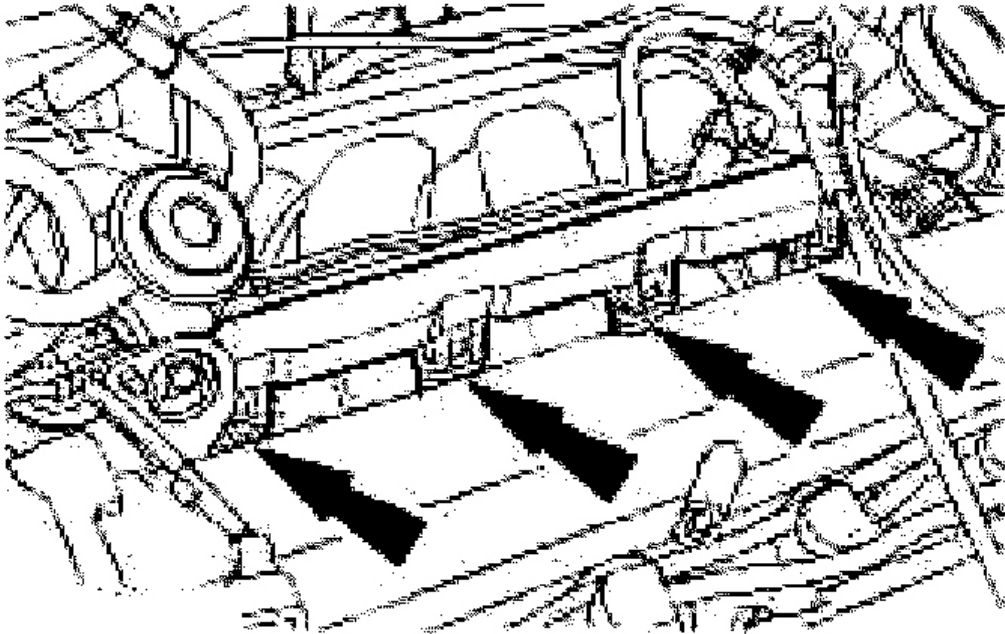
11. Disconnect the vacuum line from the fuel pulse damper.



G03432828

Fig. 245: Disconnecting Vacuum Line From Fuel Pulse Damper
Courtesy of FORD MOTOR CO.

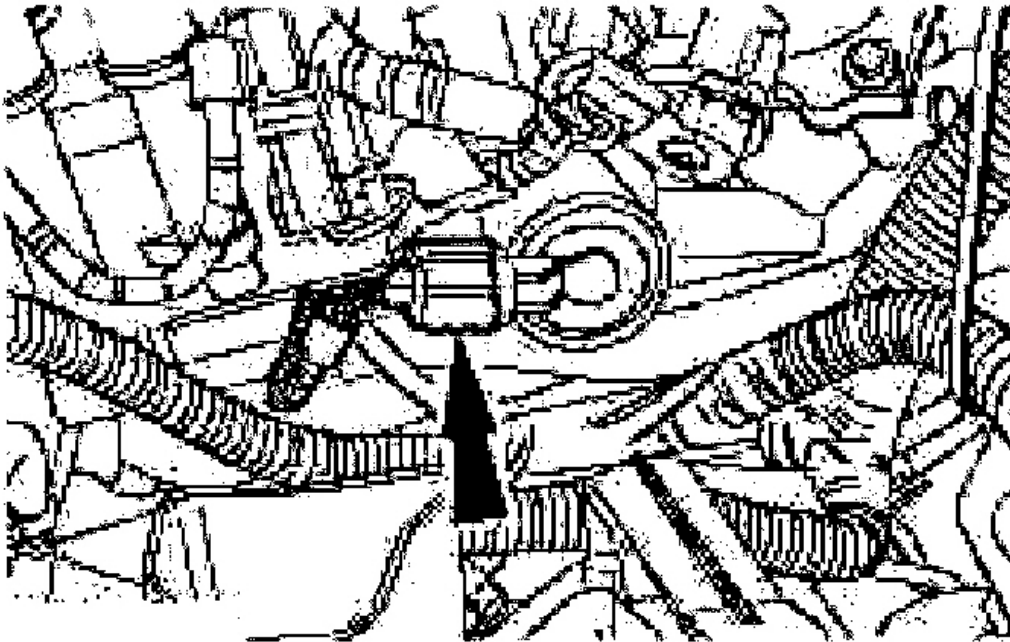
12. Disconnect the fuel injector electrical connectors.



G03432829

Fig. 246: Disconnecting Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

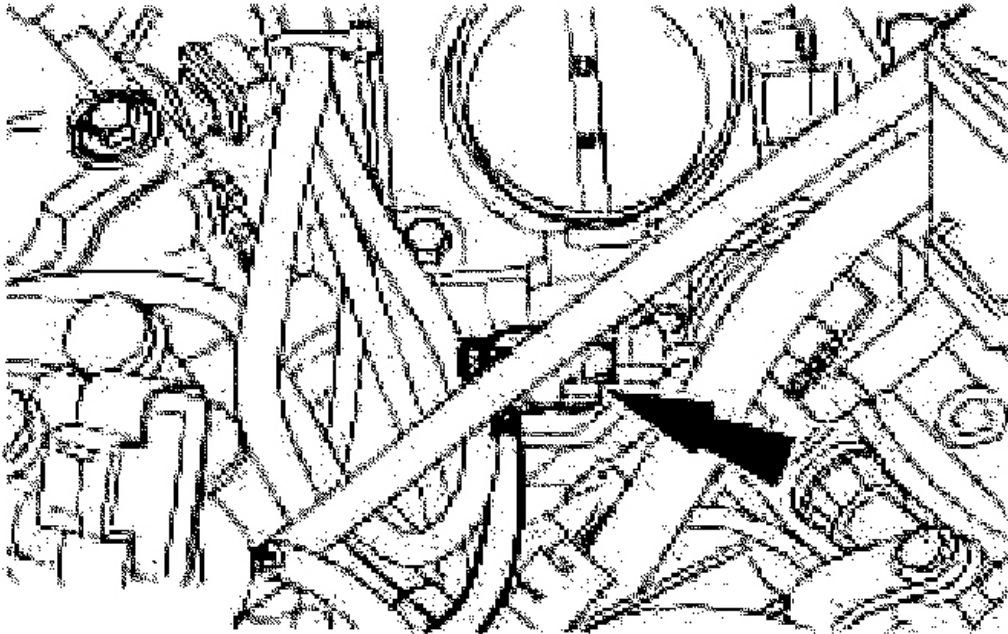
13. Disconnect the idle air control (IAC) sensor electrical connector.



G03432830

Fig. 247: Disconnecting Idle Air Control (IAC) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

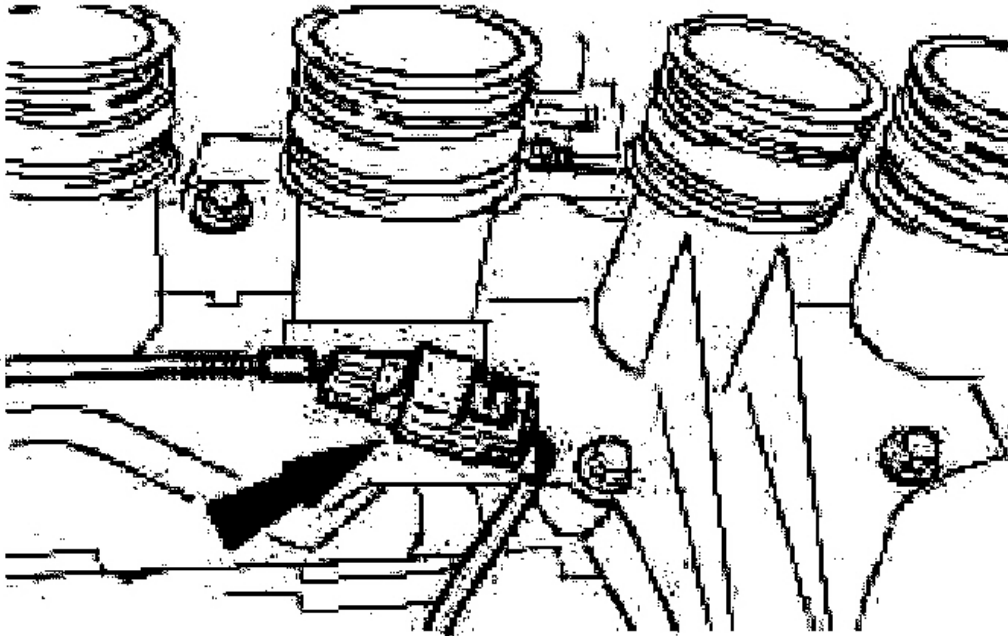
14. Disconnect the throttle position (TP) sensor electrical connector.



G03432831

Fig. 248: Disconnecting Throttle Position (TP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

15. Detach the knock sensor (KS) electrical connector from the intake manifold inner section.

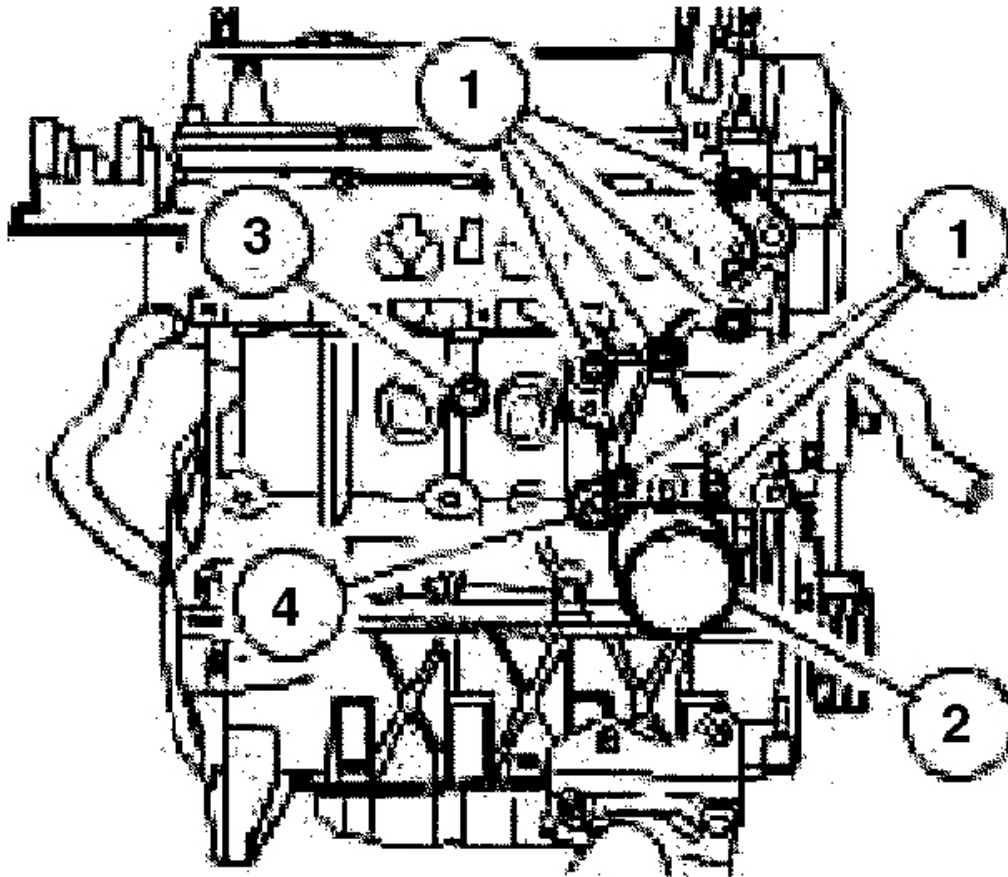


G03432832

Fig. 249: Detaching Knock Sensor (KS) Electrical Connector From Intake Manifold Inner Section

Courtesy of FORD MOTOR CO.

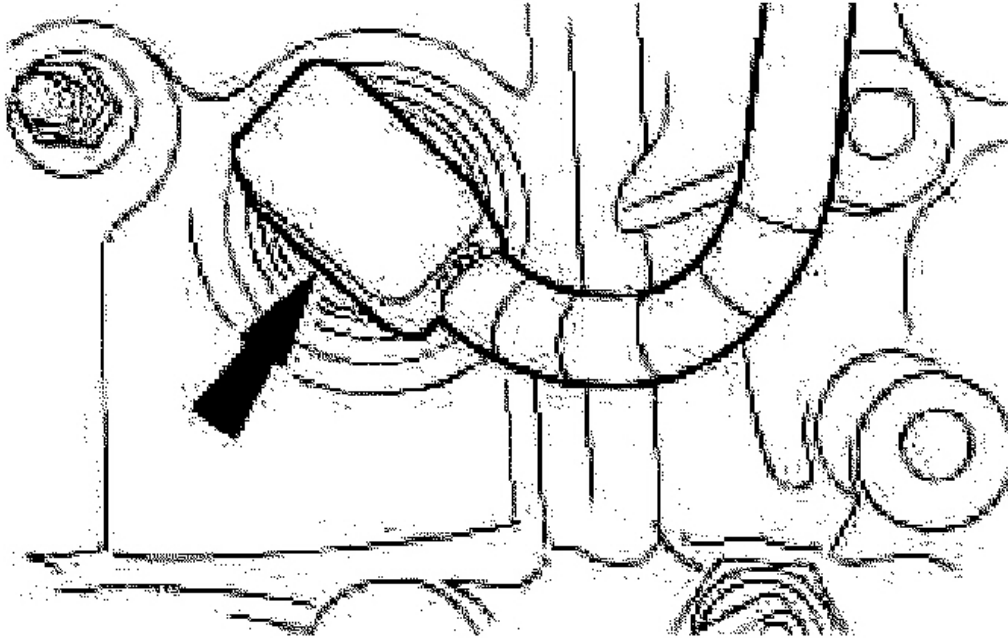
16. Remove the ancillary components on the intake side.
 1. Generator mounting bracket.
 2. Oil filter.
 3. Knock sensor (KS).
 4. Oil pressure switch.



G03432833

Fig. 250: Removing Ancillary Components On Intake Side
Courtesy of FORD MOTOR CO.

17. Disconnect the block heater electrical connector.

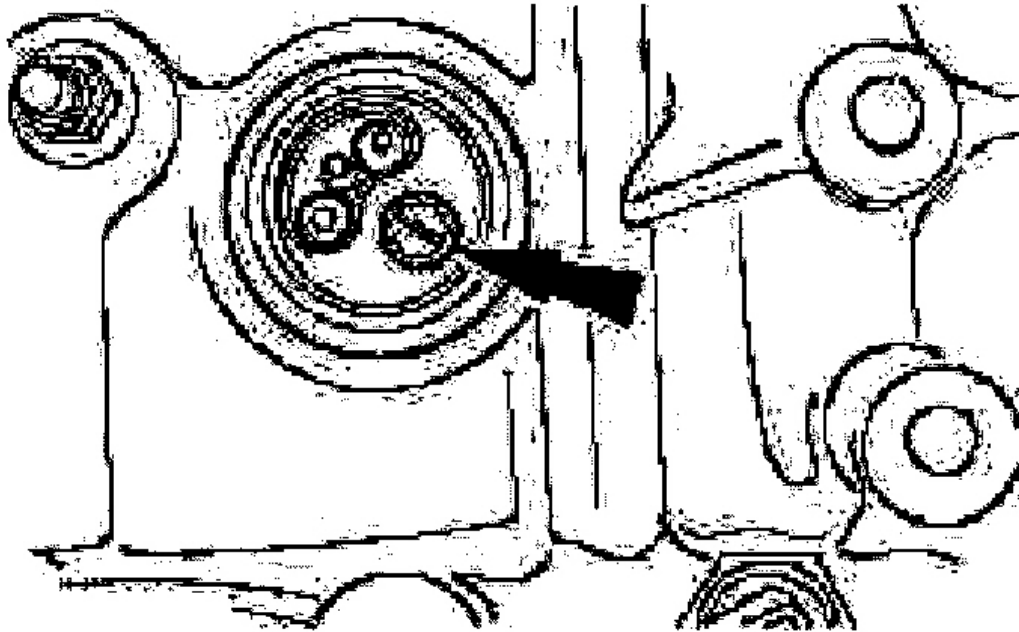


G03432834

Fig. 251: Disconnect Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

CAUTION: Make sure the cylinder block bore does not become scratched when removing the block heater. Failure to follow this instruction may result in coolant leaks.

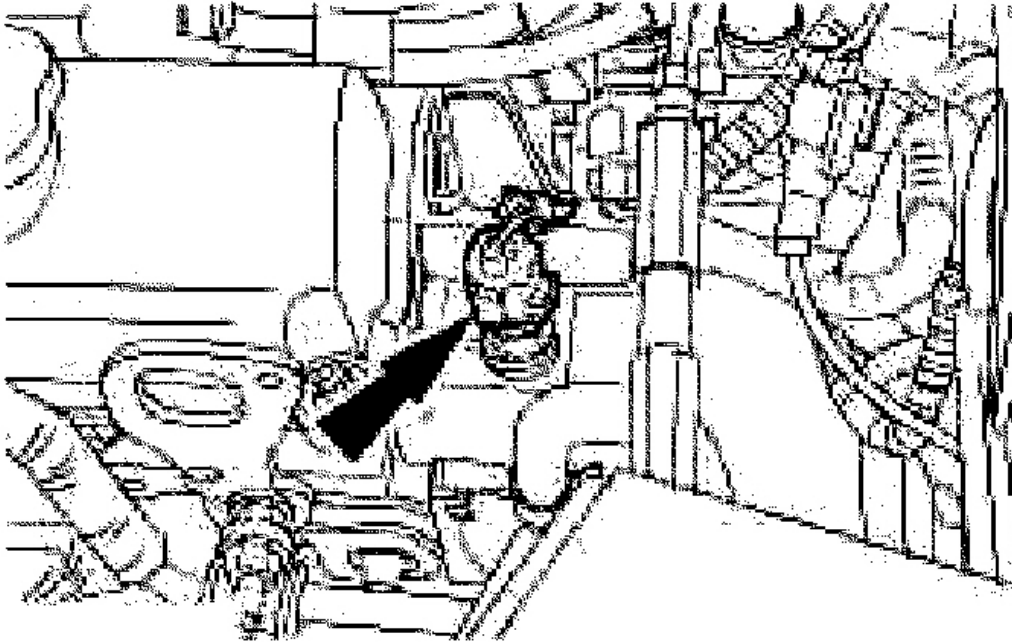
18. Remove the block heater.
 - Discard the block heater.



G03432835

Fig. 252: Removing Block Heater
Courtesy of FORD MOTOR CO.

19. Disconnect the engine coolant temperature (ECT) sensor electrical connector.

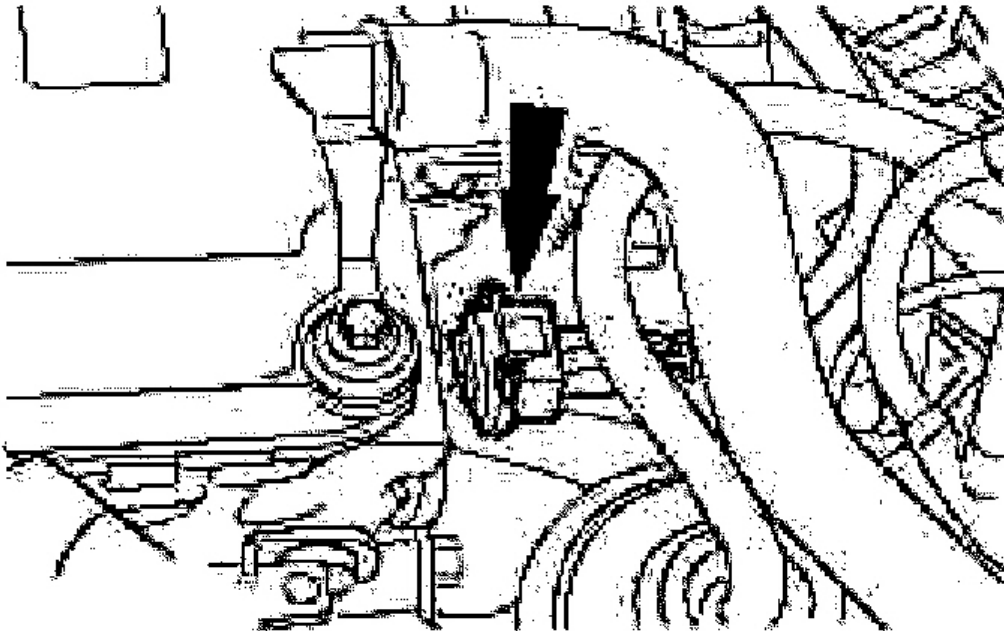


G03432836

Fig. 253: Disconnecting Engine Coolant Temperature (ECT) Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

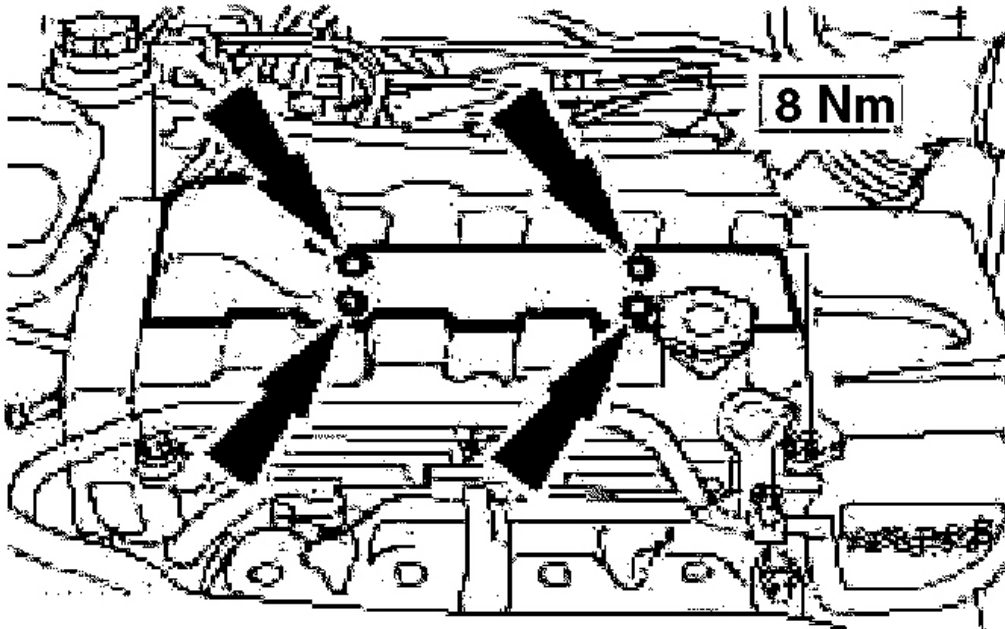
20. Disconnect the camshaft position (CMP) sensor electrical connector.



G03432837

Fig. 254: Disconnecting Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

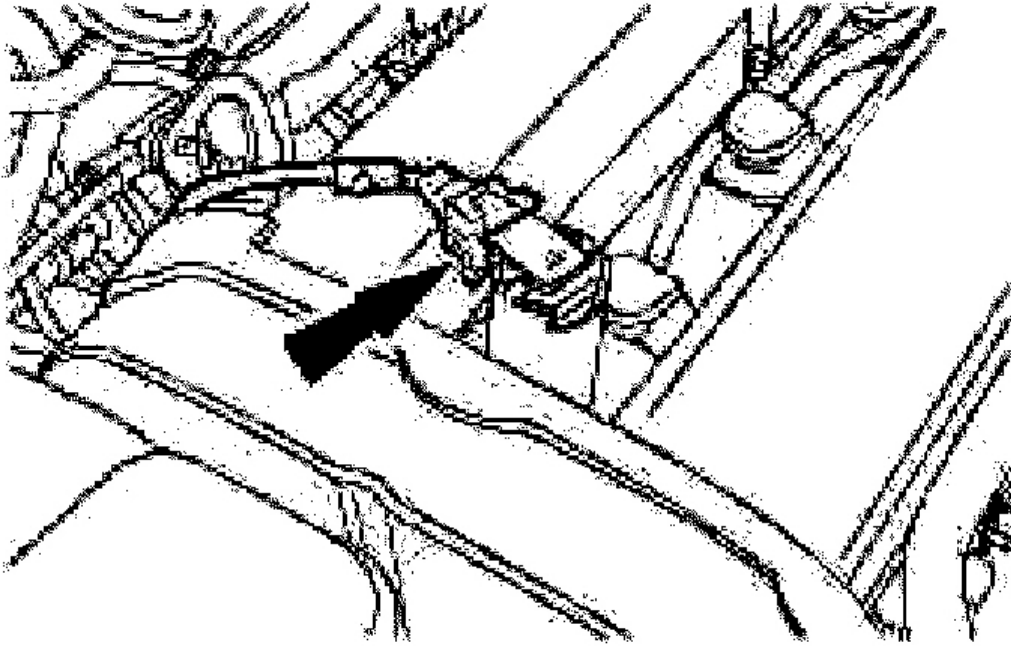
21. Remove the spark plug cables cover.



G03432838

Fig. 255: Removing Spark Plug Cables Cover
Courtesy of FORD MOTOR CO.

22. Disconnect the variable camshaft timing (VCT) sensor electrical connector.

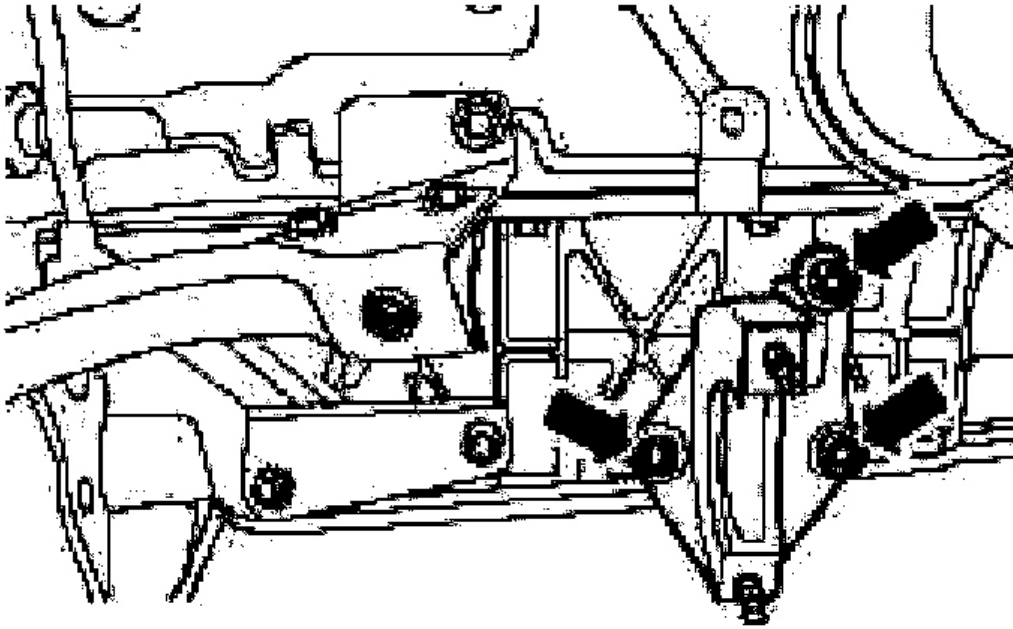


G03432839

Fig. 256: Disconnecting Variable Camshaft Timing (VCT) Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

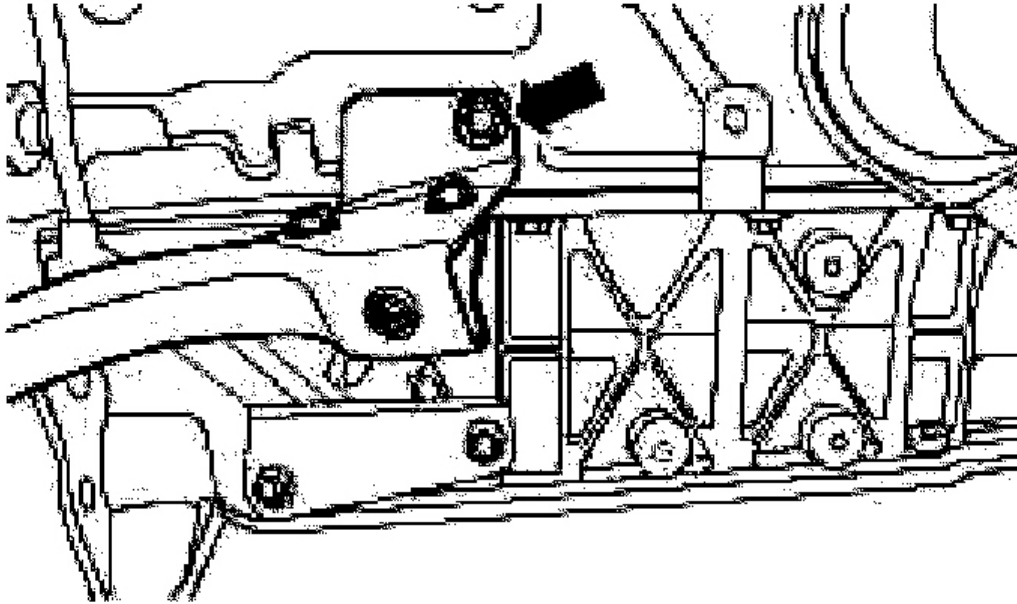
23. Remove the intermediate shaft mounting bracket.



G03432840

Fig. 257: Removing Intermediate Shaft Mounting Bracket
Courtesy of FORD MOTOR CO.

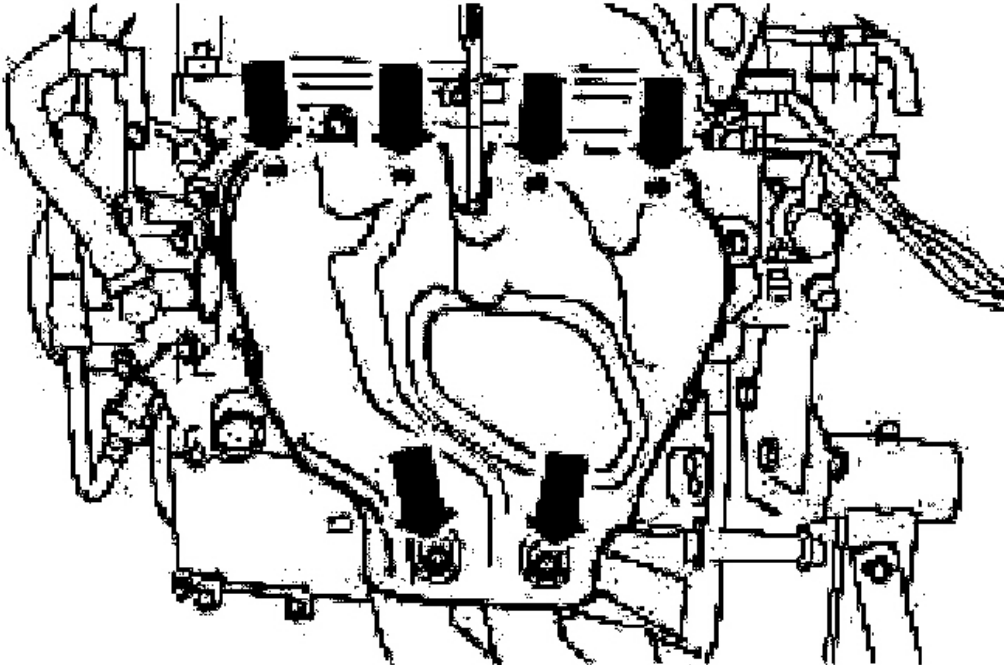
24. Remove the catalytic converter mounting bracket.



G03432841

Fig. 258: Removing Catalytic Converter Mounting Bracket
Courtesy of FORD MOTOR CO.

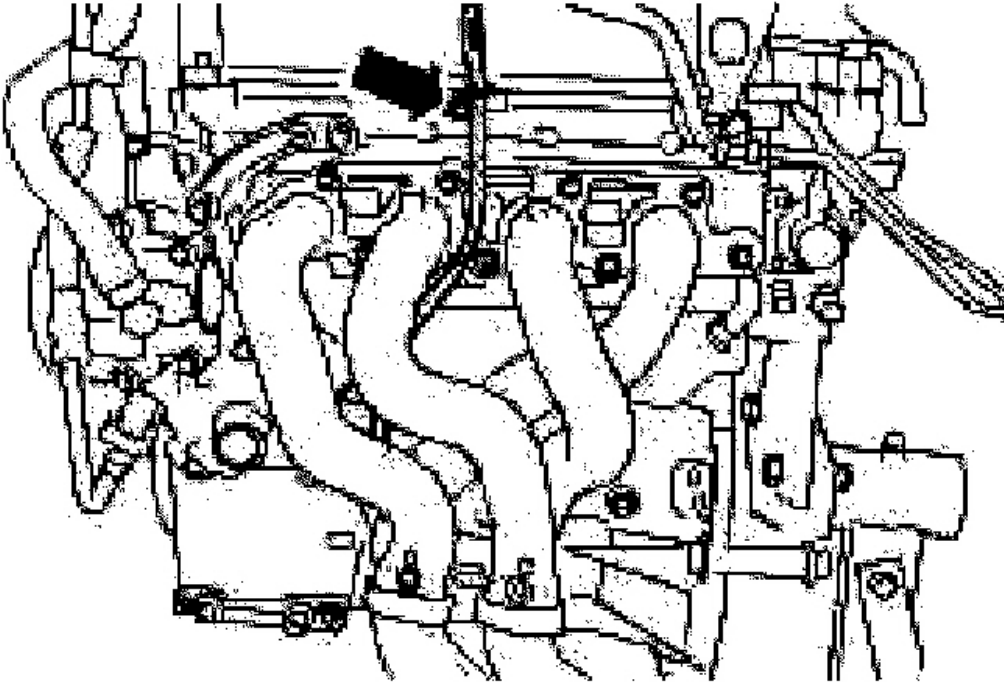
25. Remove the exhaust manifold heat shield.



G03432842

Fig. 259: Removing Exhaust Manifold Heat Shield
Courtesy of FORD MOTOR CO.

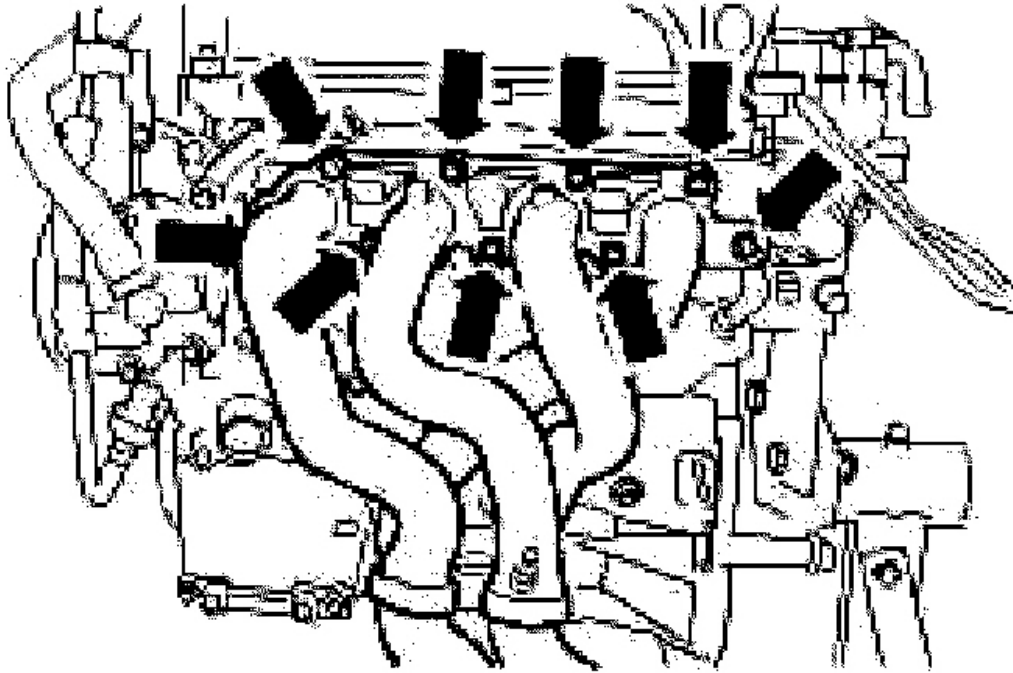
26. Remove the engine oil level indicator tube.



G03432843

Fig. 260: Removing Engine Oil Level Indicator Tube
Courtesy of FORD MOTOR CO.

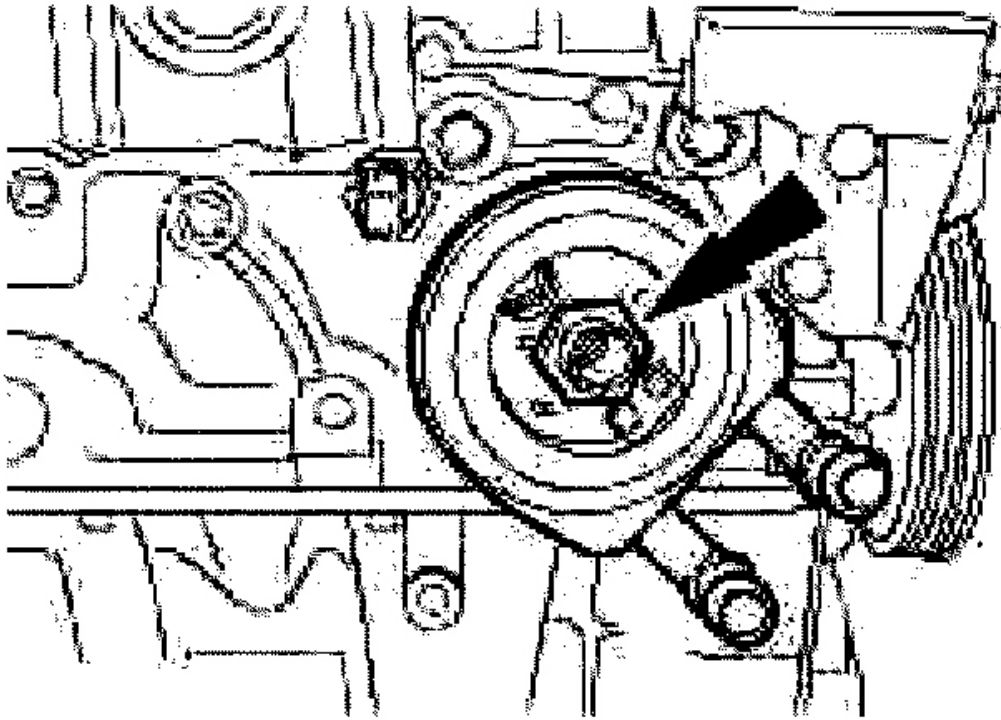
27. Remove the exhaust manifold.
 - Discard the gasket.



G03432844

Fig. 261: Removing Exhaust Manifold
Courtesy of FORD MOTOR CO.

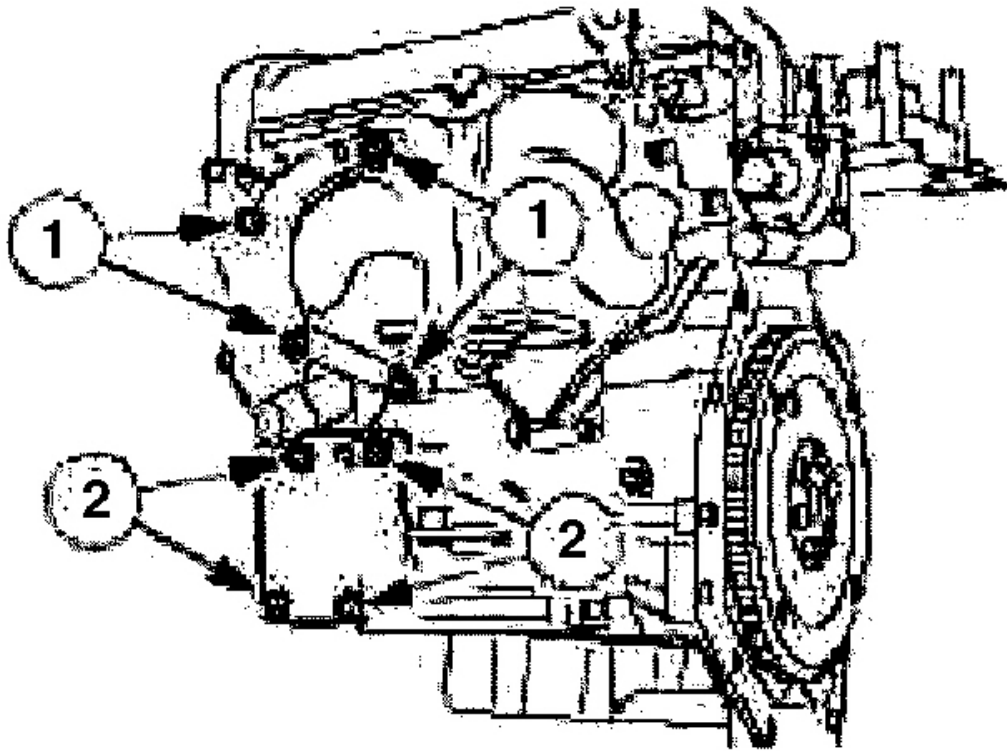
28. Remove the oil cooler.



G03432845

Fig. 262: Removing Oil Cooler
Courtesy of FORD MOTOR CO.

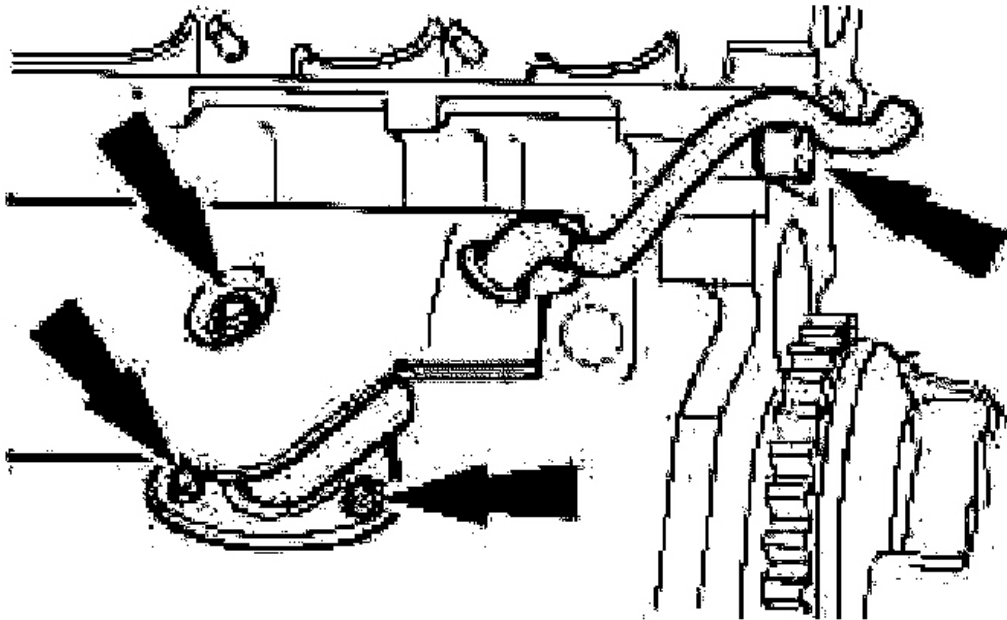
29. Remove the ancillary components on the exhaust side.
 1. Power steering pump bracket.
 2. Air conditioning compressor bracket.



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Fig. 263: Removing Air Conditioning Compressor Bracket
Courtesy of FORD MOTOR CO.

30. Disconnect the positive crankcase ventilation.



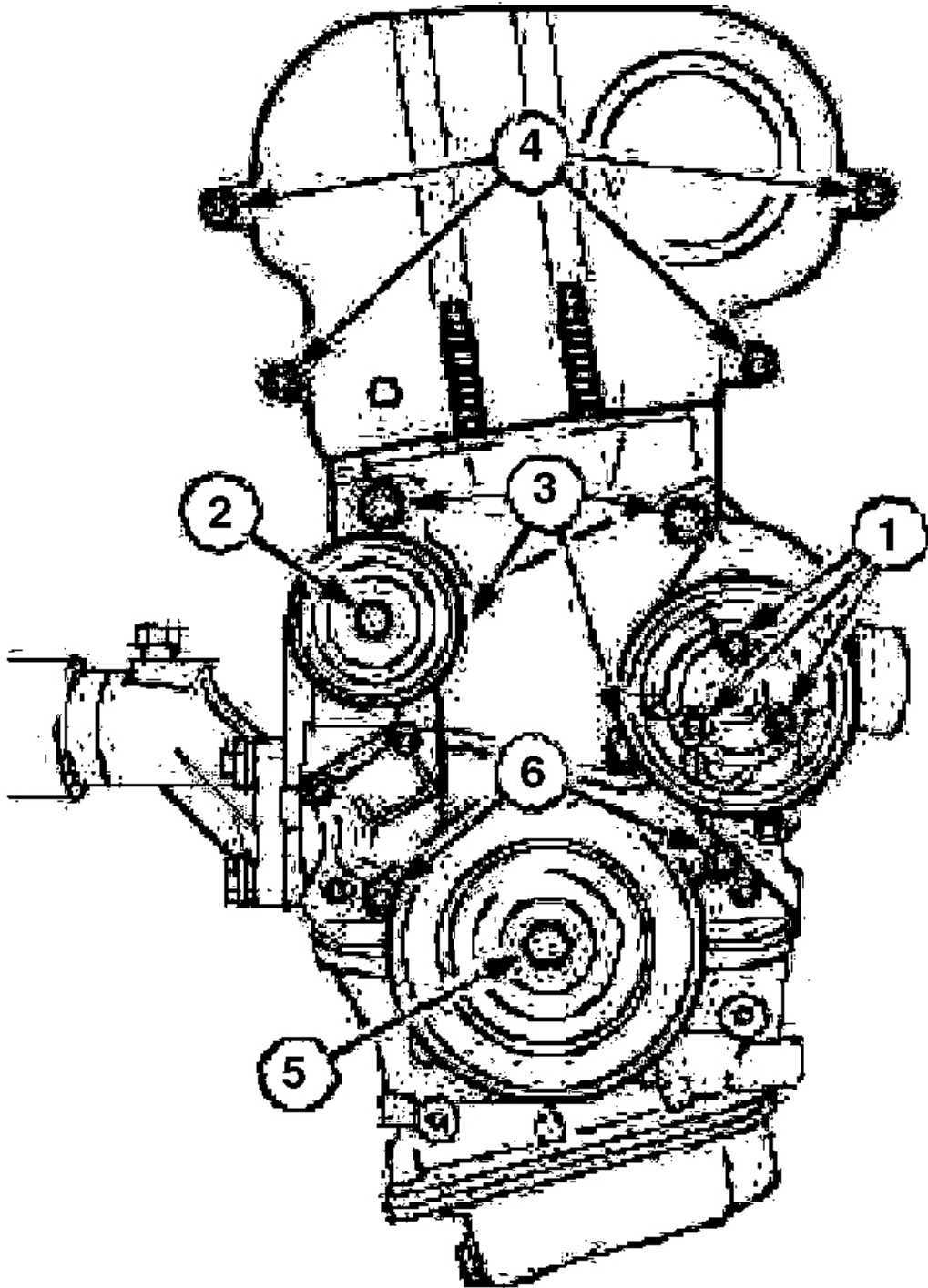
G03432847

Fig. 264: Disconnecting Positive Crankcase Ventilation
Courtesy of FORD MOTOR CO.

31. Remove the timing belt cover.
 1. Water pump belt pulley.
 2. Drive belt idler pulley.
 3. Center engine front mount bracket.
 4. Upper timing belt cover.
 5. Remove the crankshaft pulley.
 6. Lower timing belt cover.

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432848

Fig. 265: Removing Timing Belt Cover
Courtesy of FORD MOTOR CO.

CAUTION: Do not pull the spark plug electrical connectors by the ignition cables when removing them. If necessary disconnect the ignition cables from the ignition coils to prevent damage to the cables. Slightly twist the spark plug electrical connectors before removing them to loosen the seals.

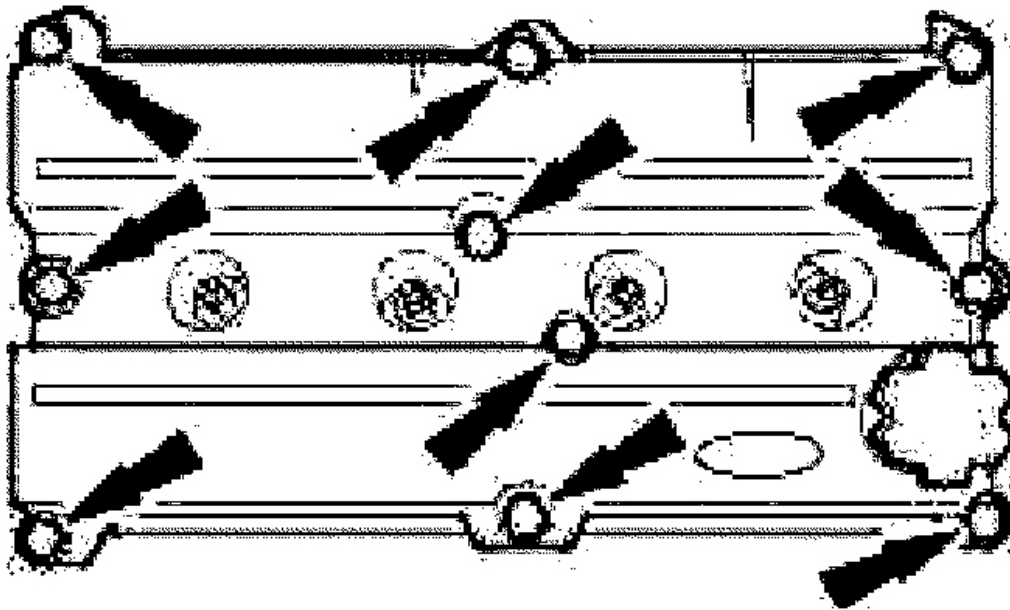
CAUTION: Pull off the spark plug electrical connectors in line with the spark plugs.



G03432849

Fig. 266: Disconnecting Spark Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

32. Disconnect the spark plug electrical connectors.
33. Remove the valve cover.



G03432850

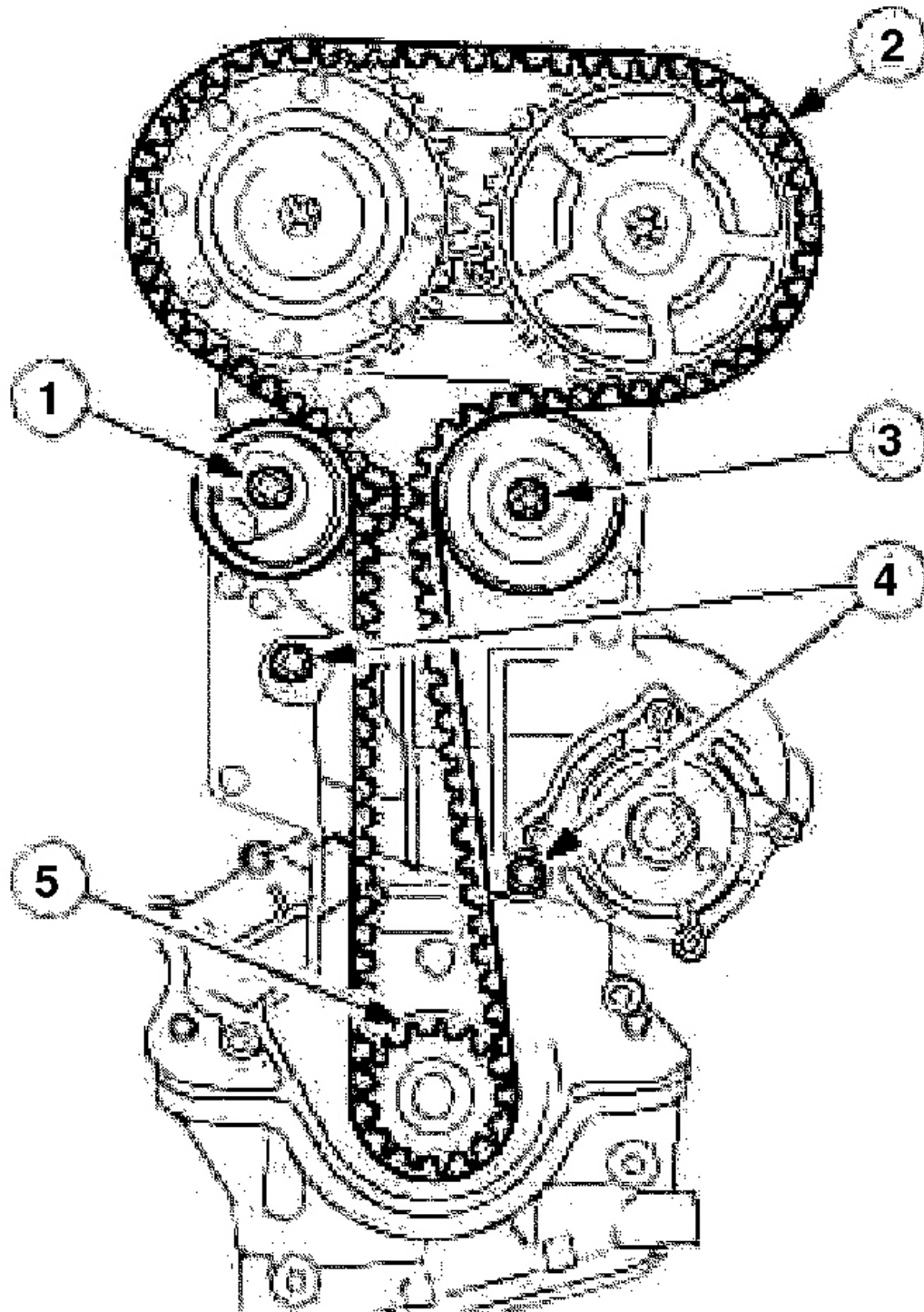
Fig. 267: Removing Valve Cover
Courtesy of FORD MOTOR CO.

NOTE: Installation position of crankshaft timing belt pulley and thrust washer.

34. Remove the timing belt drive and the coolant pump.
 1. Slacken the timing belt tensioner by twisting it counter-clockwise and remove it.
 2. Remove the timing belt.
 3. Remove the idler pulley.
 4. Remove the coolant pump.
 5. Remove the crankshaft timing pulley and the thrust washer.

2002 Ford Focus LX

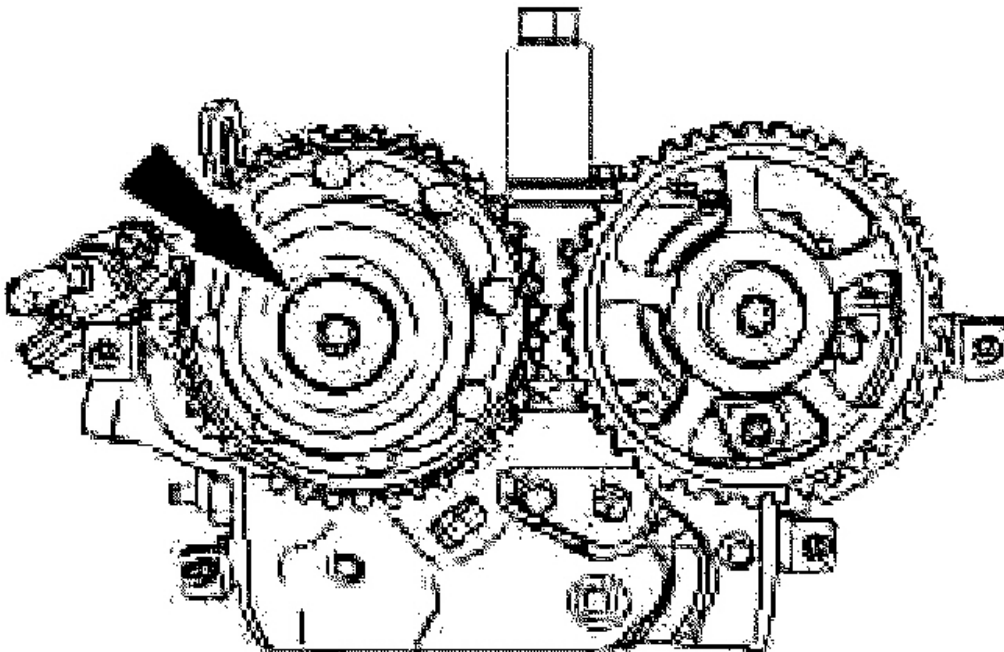
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432851

Fig. 268: Removing Timing Belt Drive And Coolant Pump
Courtesy of FORD MOTOR CO.

NOTE: Hold the camshaft by the hexagon with an open ended wrench to prevent it from rotating.

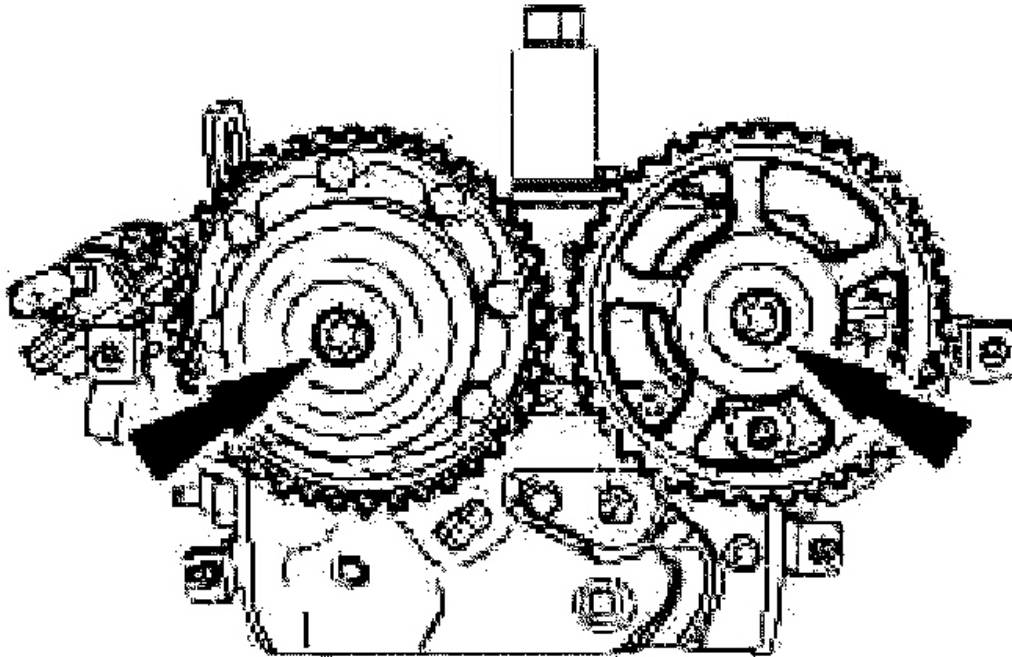


G03432852

Fig. 269: Removing Intake Camshaft Pulley Blanking Plug
Courtesy of FORD MOTOR CO.

35. Remove the intake camshaft pulley blanking plug.

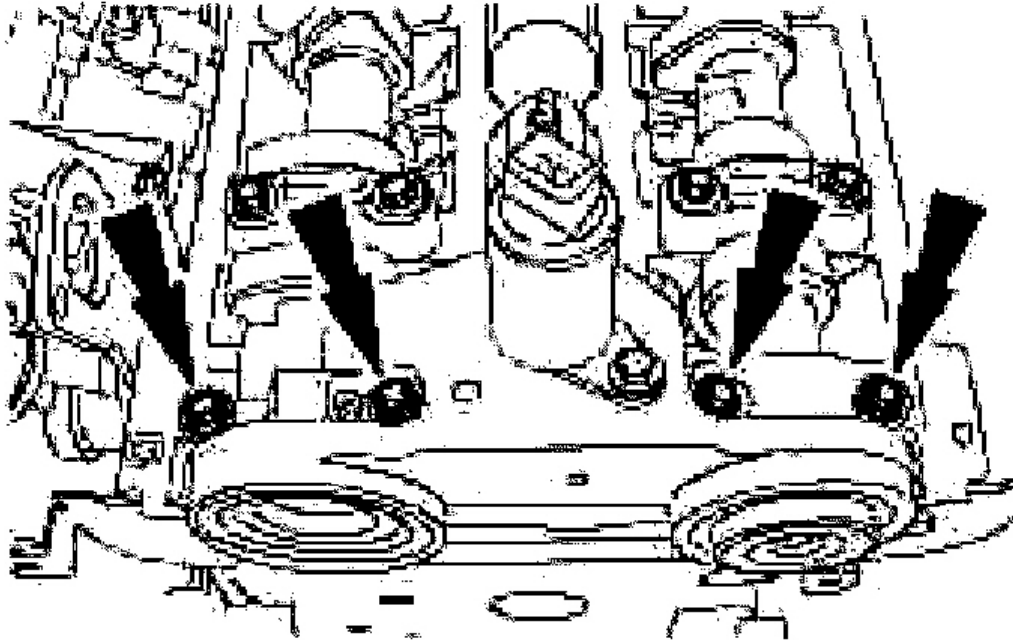
NOTE: Hold the camshafts by the hexagon with an open ended wrench or a suitable pair of locking pliers to prevent them from rotating.



G03432853

Fig. 270: Removing Camshaft Pulleys
Courtesy of FORD MOTOR CO.

36. Remove the camshaft pulleys.
37. Remove the oil feed flange.
 - Discard the camshaft seals.
 - Discard the oil feed flange seal.



G03432854

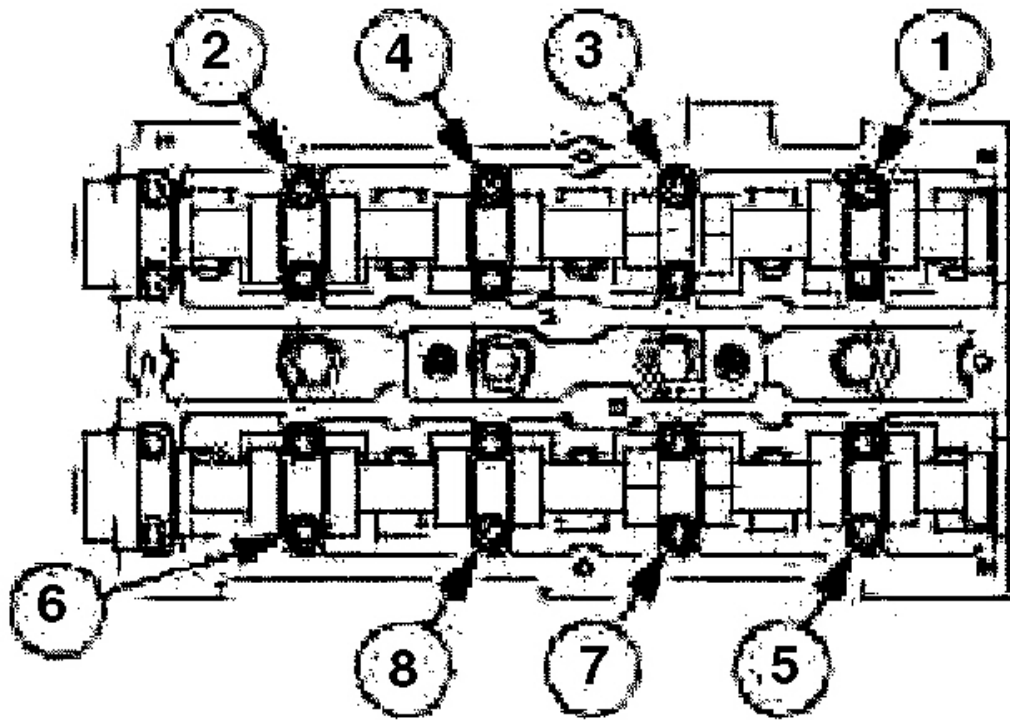
Fig. 271: Removing Oil Feed Flange
Courtesy of FORD MOTOR CO.

CAUTION: Loosen and remove the camshaft bearing cap retaining bolts in the sequence shown.

NOTE: Working in several stages, evenly loosen each bolt two turns at a time in the sequence shown.

38. Remove the camshafts.

- Remove the valve tappets and position them, in order, to one side.



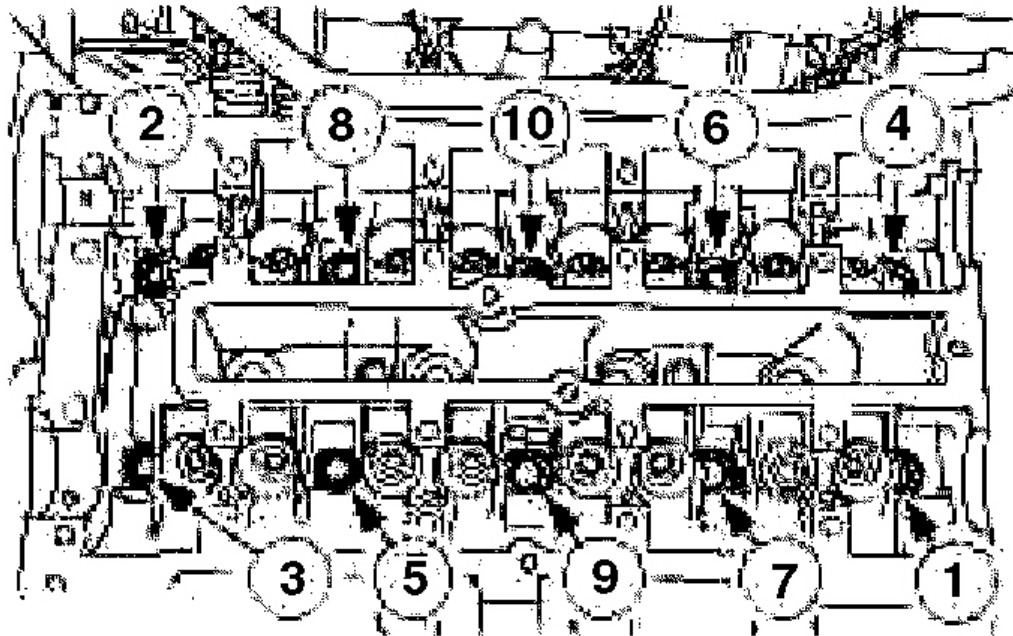
G03432855

Fig. 272: Loosening Sequence Of Camshaft Bearing Cap Retaining Bolts
Courtesy of FORD MOTOR CO.

CAUTION: The bolts can be re-used twice, center -punch the bolts.

39. Remove the cylinder head.

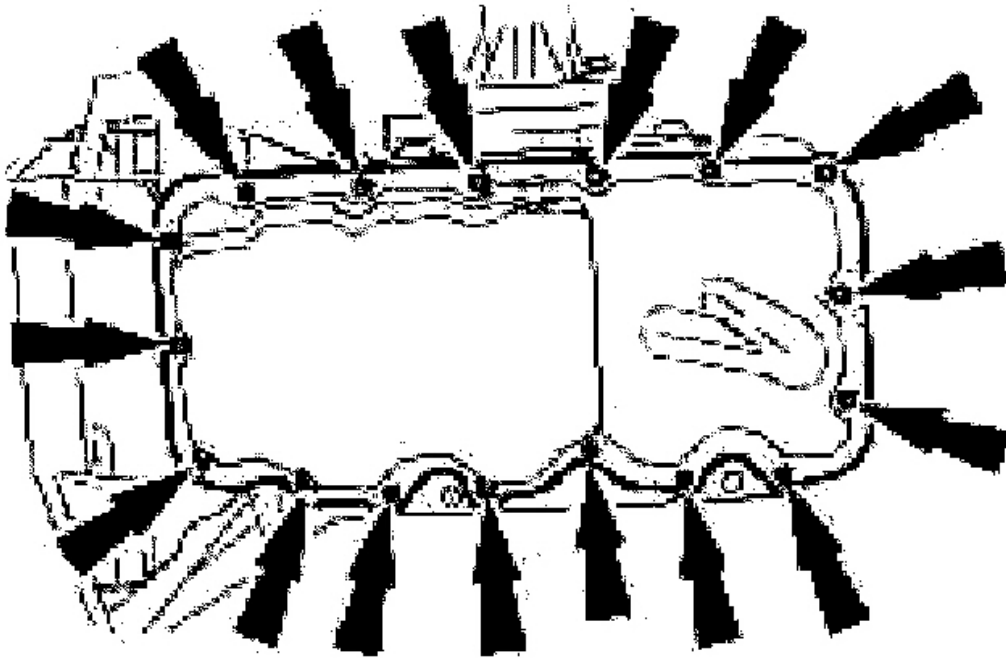
- Remove the cylinder head bolts in the sequence shown.



G03432856

Fig. 273: Removing Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

40. Remove the oil pan retaining bolts.



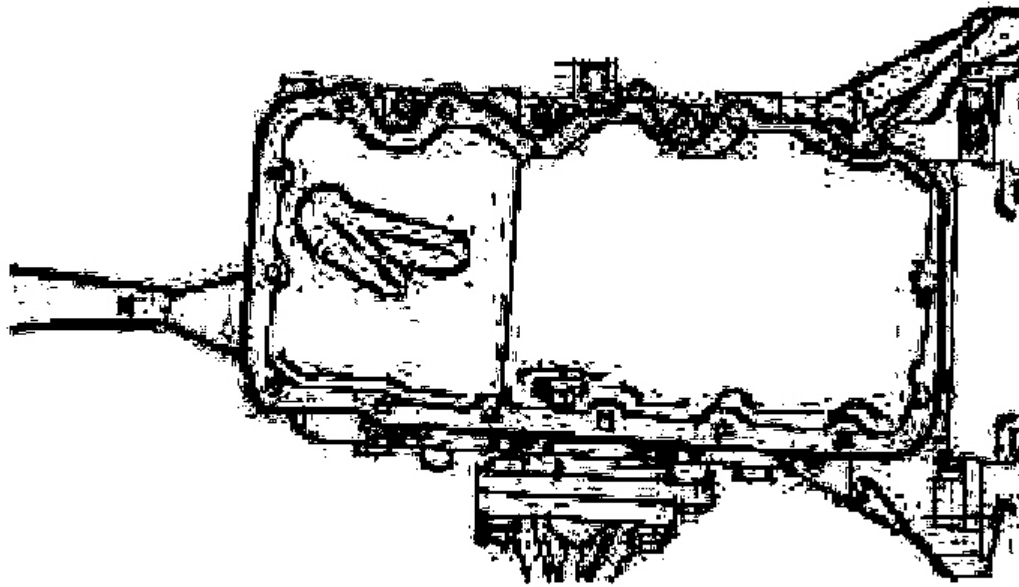
G03432857

Fig. 274: Removing Oil Pan Retaining Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the mating faces.

41. Remove the oil pan.

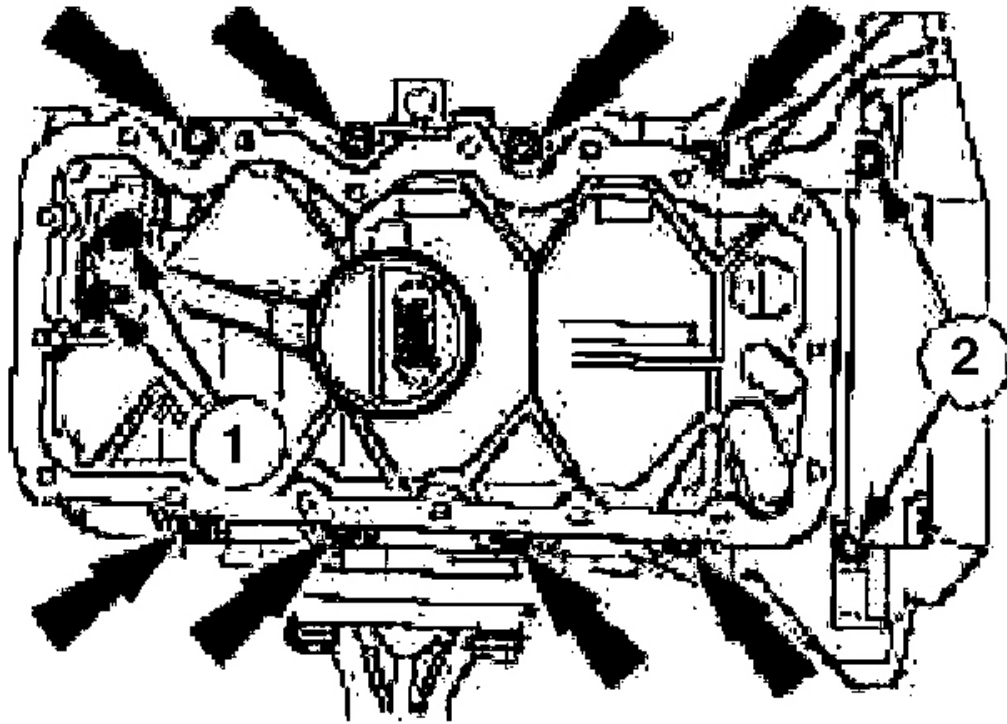
- Using a suitable spatula, separate the oil pan from the lower crankcase. Release the oil pan from the lower crankcase by lightly tapping the drain plug with a rubber hammer.



G03432858

Fig. 275: Separating Oil Pan From Lower Crankcase
Courtesy of FORD MOTOR CO.

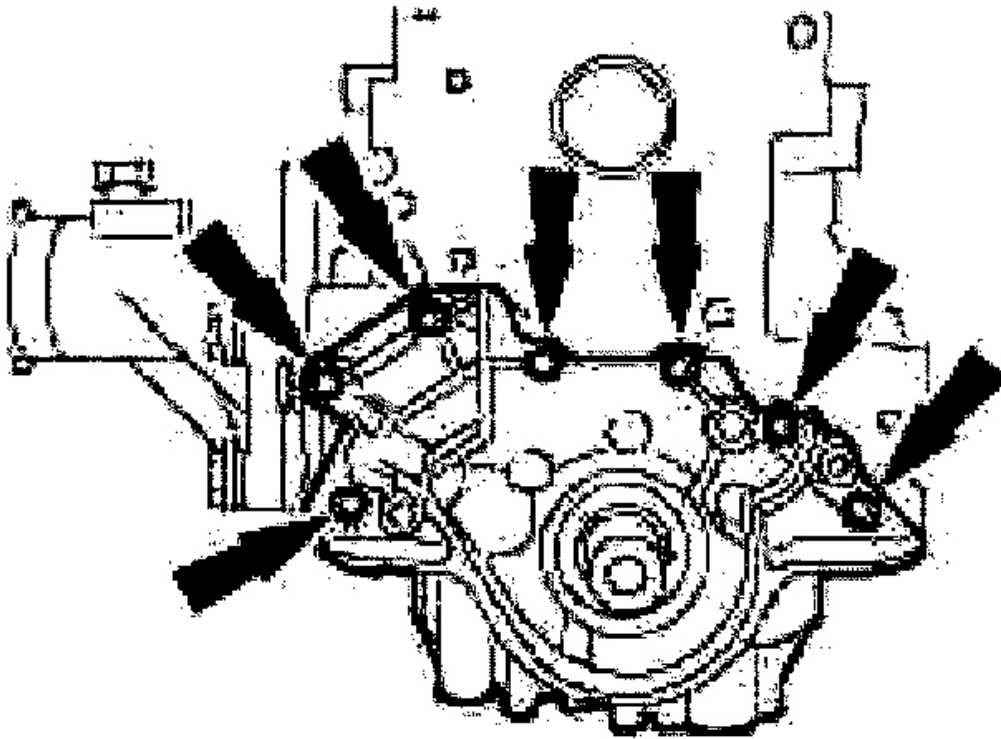
42. Remove the oil intake pipe and the lower crankcase.
 1. Oil intake pipe bolts.
 2. Lower crankcase bolts.



G03432859

Fig. 276: Removing Lower Crankcase Bolts
Courtesy of FORD MOTOR CO.

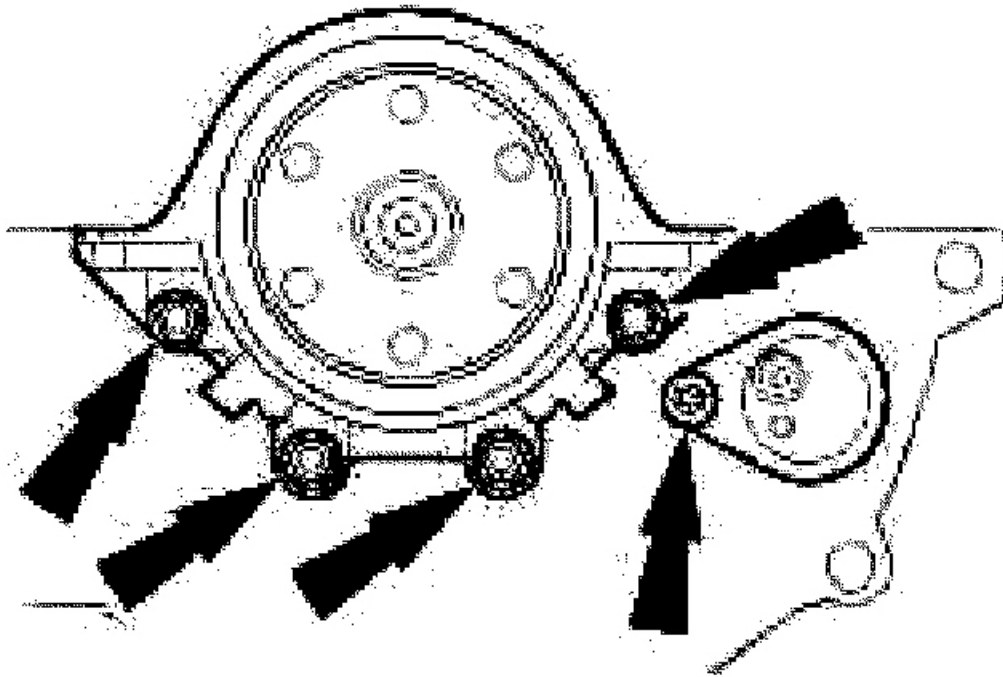
43. Remove the oil pump and the crankshaft front seal.



G03432860

Fig. 277: Removing Oil Pump And Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

44. Remove the crankshaft rear seal carrier, crankshaft position (CKP) sensor and CKP-sensor bracket.

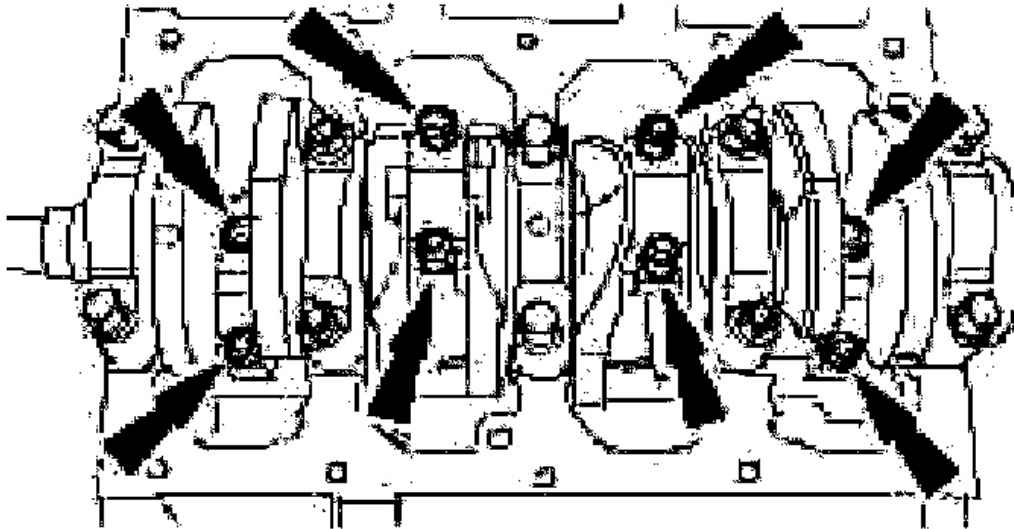


G03432861

Fig. 278: Removing Crankshaft Rear Seal Carrier, Crankshaft Position Sensor And CKP Sensor Bracket

Courtesy of FORD MOTOR CO.

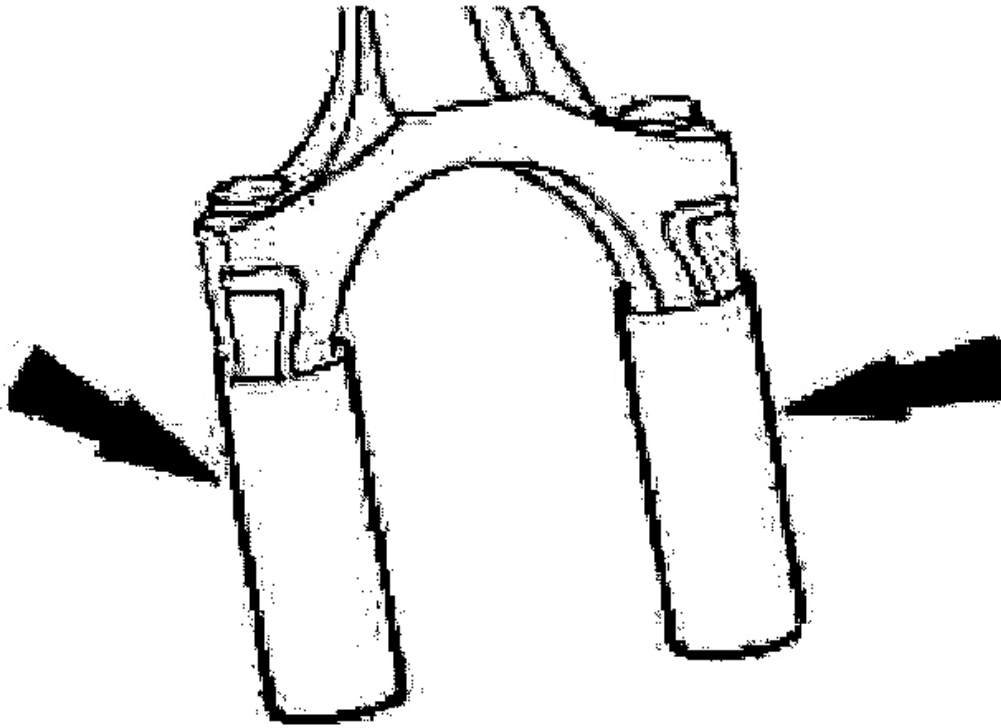
45. Remove the four connection rod caps.



G03432862

Fig. 279: Removing Four Connection Rod Caps
Courtesy of FORD MOTOR CO.

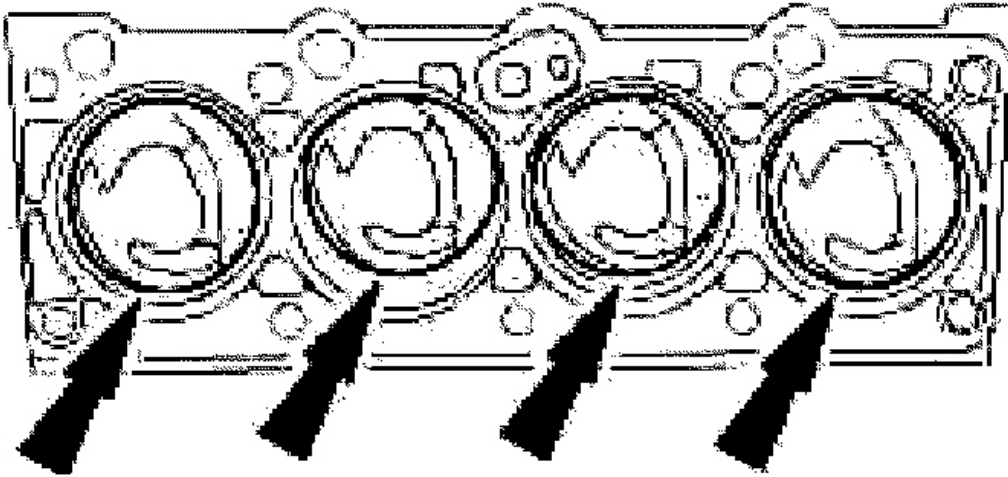
46. Install a short length of rubber tubing over the connection rod bolts to avoid damage to the crankcase journals.



G03432863

Fig. 280: Installing Short Length Of Rubber Tubing Over Connection Rod Bolts
Courtesy of FORD MOTOR CO.

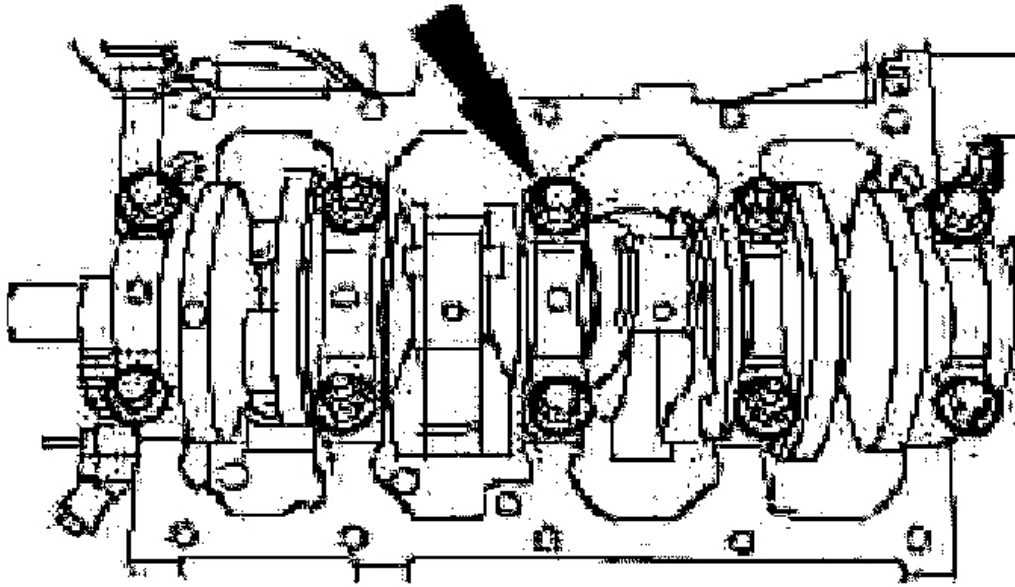
47. Inspect the top of each cylinder bore before removing the piston. If a ridge has formed at the top of the cylinder, the ridge must be removed before the pistons can be removed. Remove the ridge as follows:
 - Rotate the crankshaft clockwise until the piston is at the bottom of its cylinder bore.
 - Place a clean shop cloth over the piston head to collect cuttings.
 - Using the special tool 303-016 (T64L-6011-EA), remove the ridge. Never cut into the ring travel area more than 0.8 mm (1/32 in) when removing the ridge.
48. Remove the pistons and the connection rod assemblies.



G03432864

Fig. 281: Removing Pistons And Connection Rod Assemblies
Courtesy of FORD MOTOR CO.

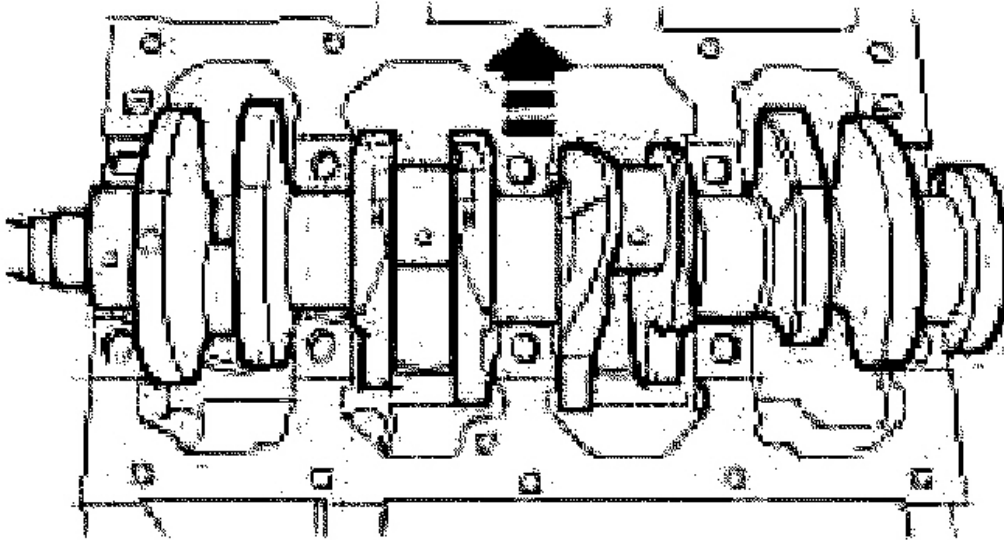
49. Remove the five main bearing caps and the lower crankshaft main bearings.



G03432865

Fig. 282: Removing Five Main Bearing Caps And Lower Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

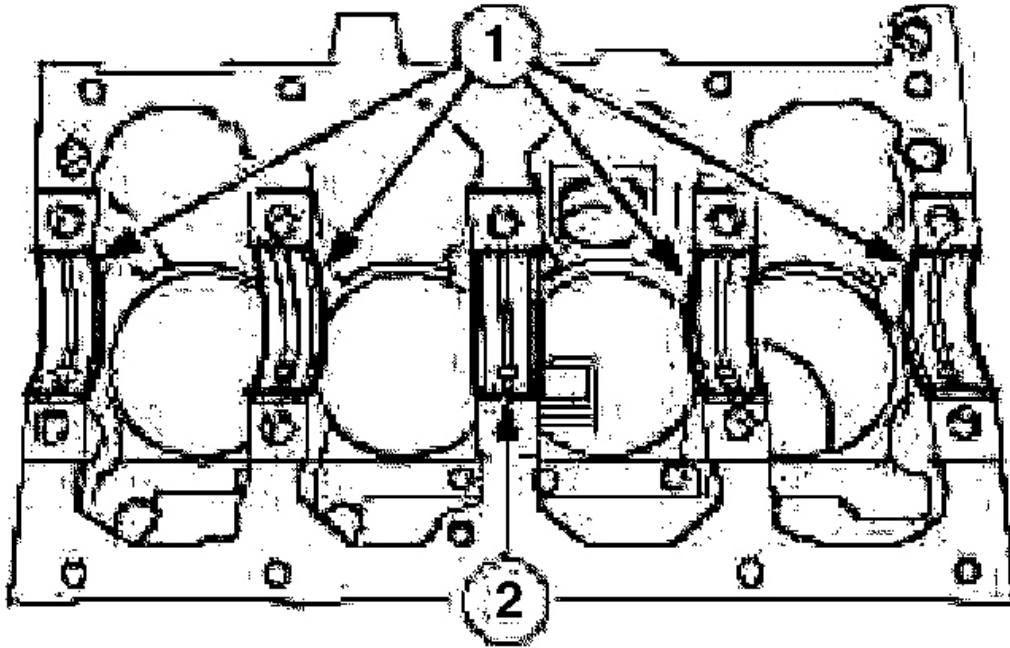
50. Remove the crankshaft.



G03432866

Fig. 283: Removing Crankshaft
Courtesy of FORD MOTOR CO.

51. Remove the bearings.
 1. Upper crankshaft main bearings.
 2. Crankshaft thrust main bearing.



G03432867

Fig. 284: Removing Upper Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

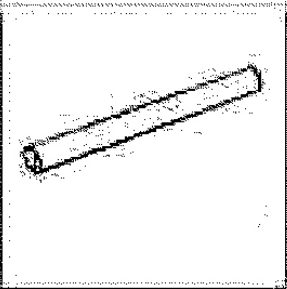
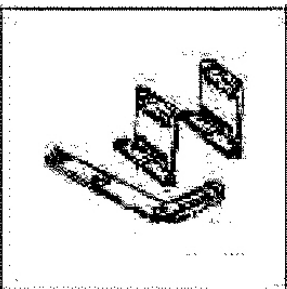


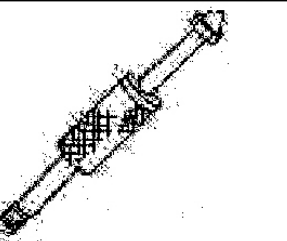
DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

CYLINDER HEAD

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Compressor, Valve Spring 303-300 (T87C-6565-A)
	Compressor, Valve Spring 303-350 (T89P-6565-A)
	Remover, Valve Stem Oil Seal 303-468 (T94P-6510-AH)
	Installer, Valve Stem Oil Seal 303-470 (T94P-6510-CH)
	Slide Hammer 307-005 (T59L-100-B)

G03432868

Fig. 285: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

Material

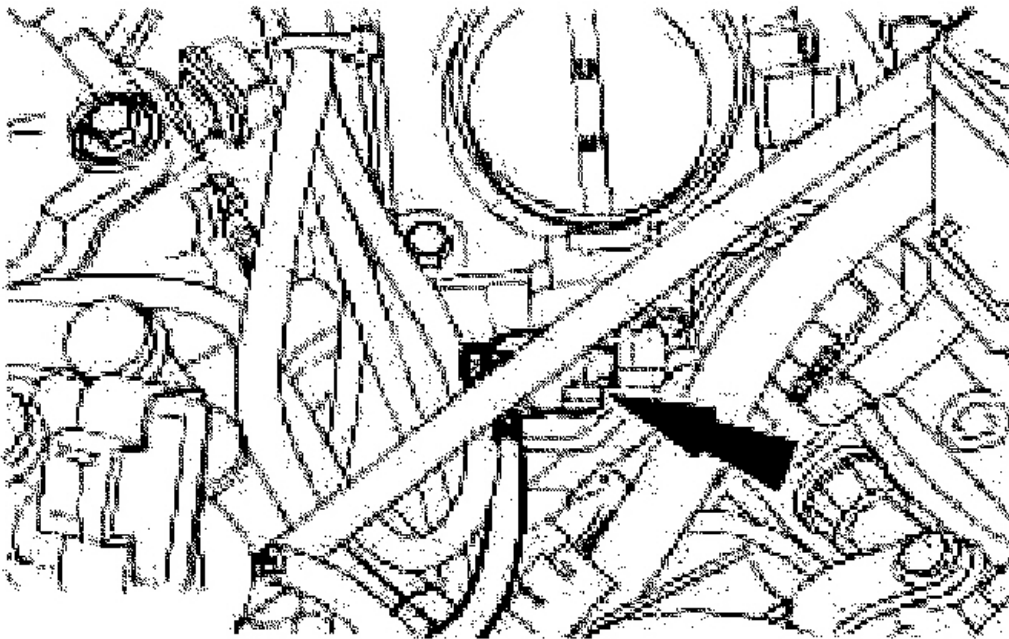
MATERIAL SPECIFICATION

Engine Oil - 5W-30

WSS-M2C153-G

Disassembly

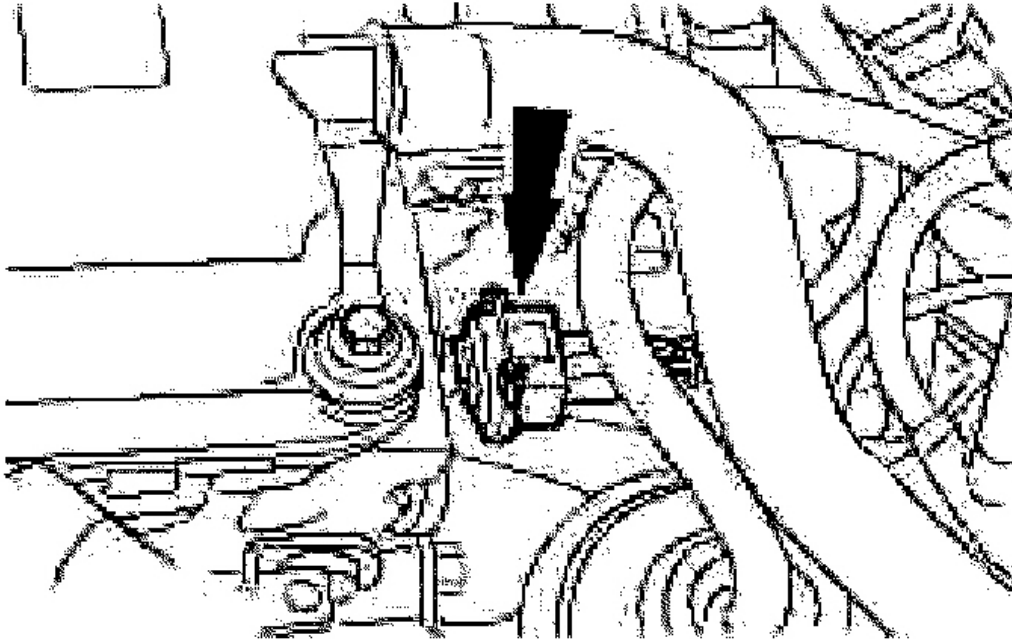
1. Disconnect the throttle position (TP) sensor electrical connector (air cleaner shown removed for clarity).



G03432869

Fig. 286: Disconnecting Throttle Position Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

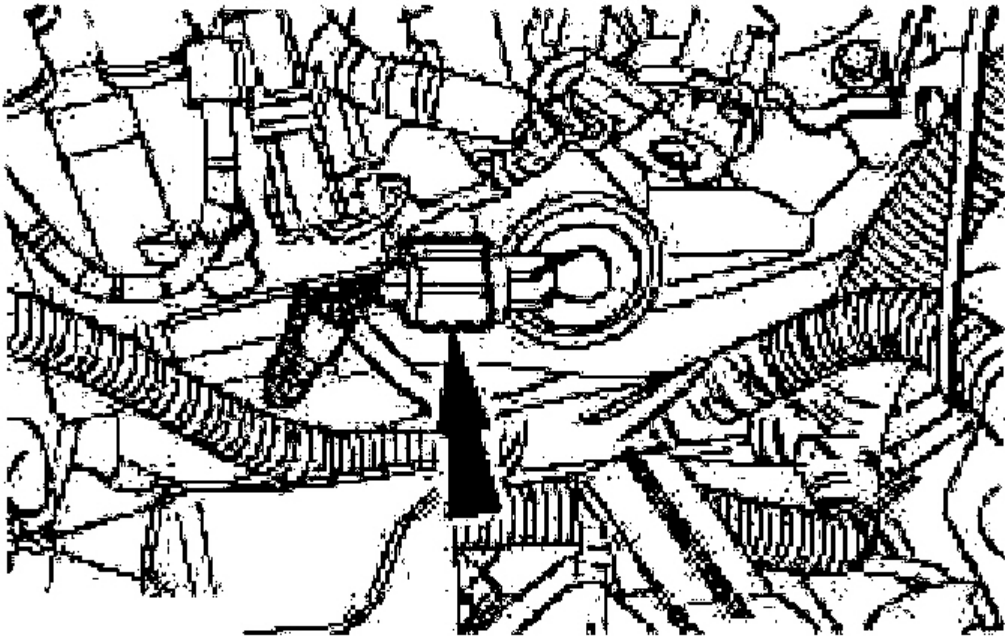
2. Disconnect the camshaft position (CMP) sensor electrical connector.



G03432870

Fig. 287: Disconnecting Camshaft Position Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

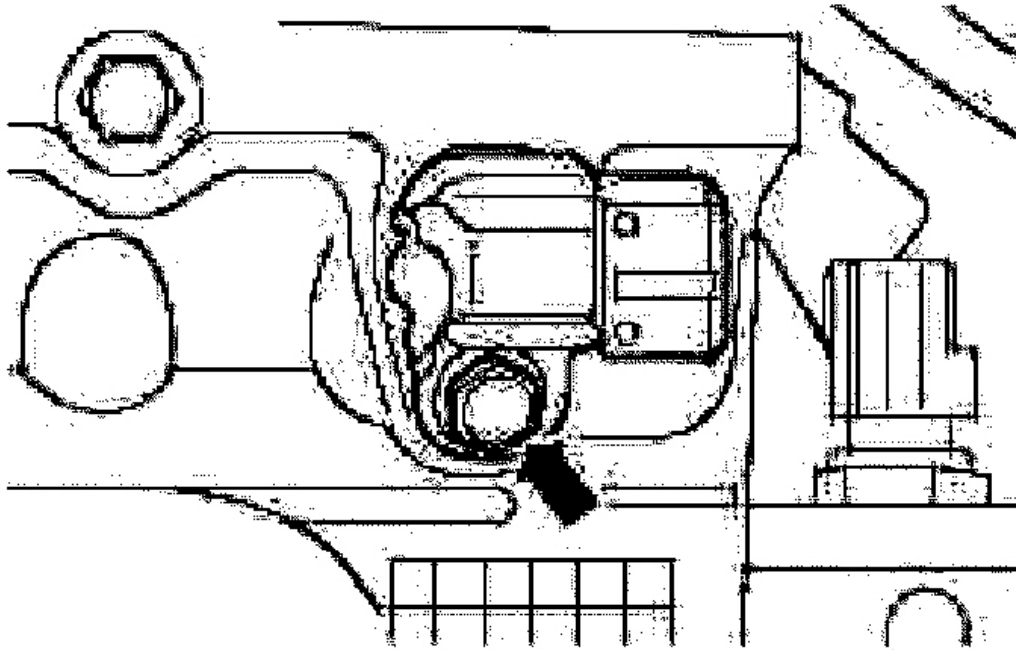
3. Disconnect the idle air control (IAC) valve electrical connector (air cleaner shown removed for clarity).



G03432871

Fig. 288: Disconnecting Idle Air Control Valve Electrical Connector
Courtesy of FORD MOTOR CO.

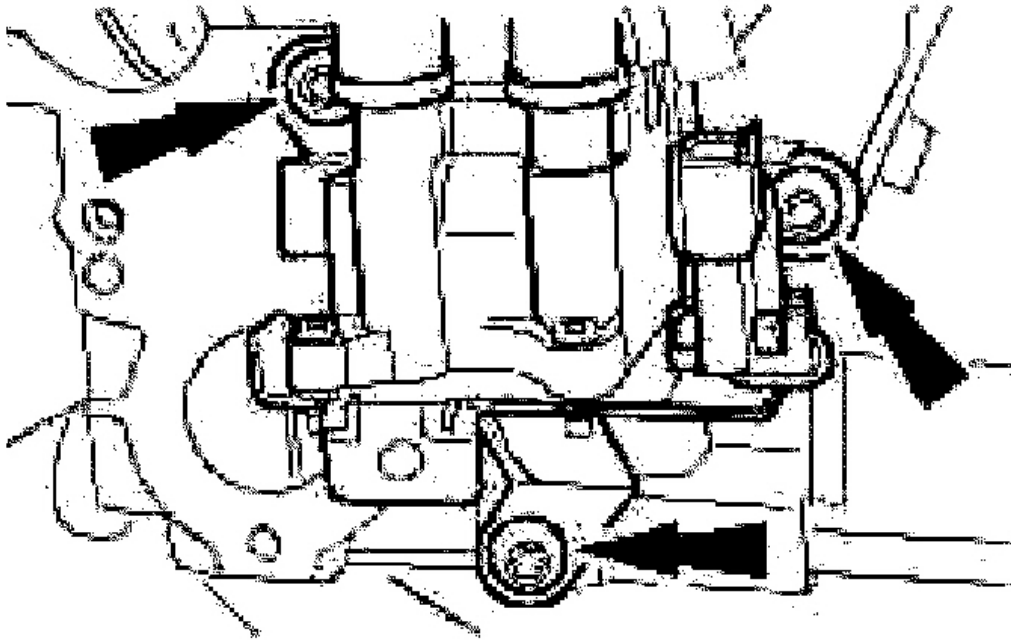
4. Remove the CMP.



G03432872

Fig. 289: Removing CMP
Courtesy of FORD MOTOR CO.

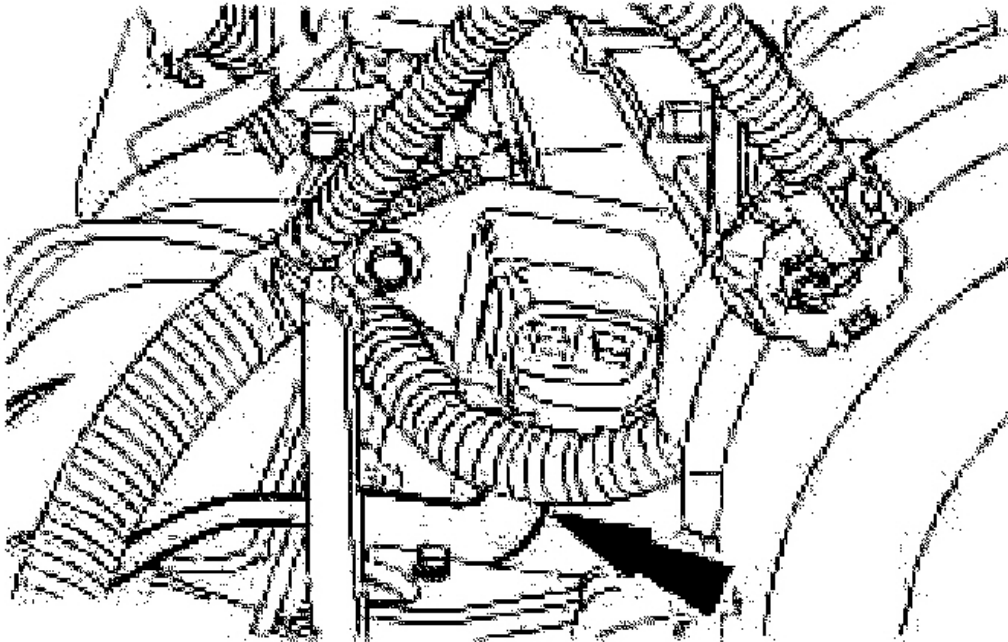
5. Remove the electronic ignition (EI) coil pack.



G03432873

Fig. 290: Removing Electronic Ignition Coil Pack
Courtesy of FORD MOTOR CO.

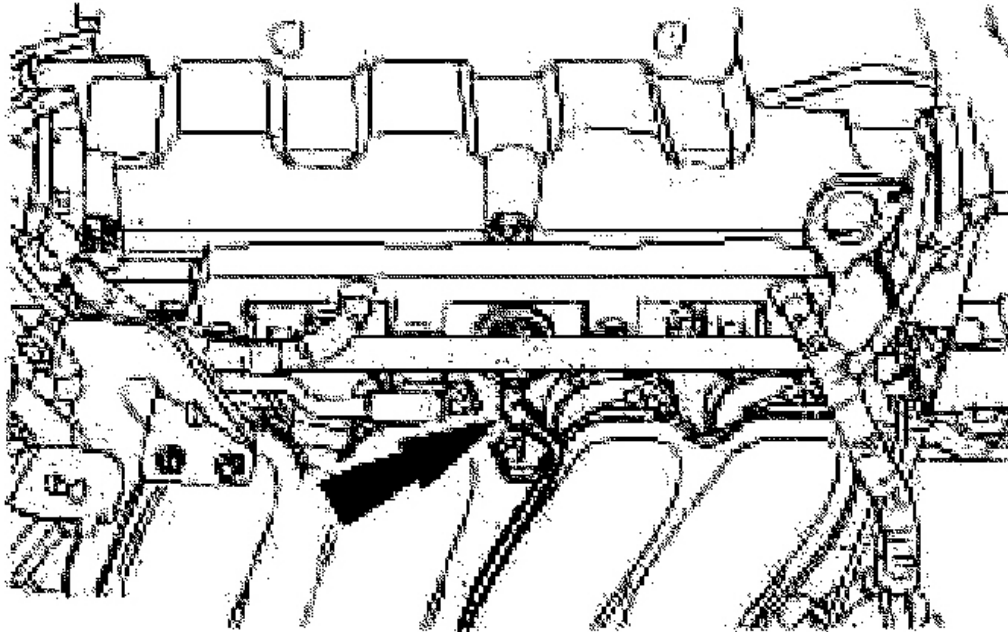
6. Disconnect the vacuum line from the fuel pressure sensor.



G03432874

Fig. 291: Disconnecting Vacuum Line From Fuel Pressure Sensor
Courtesy of FORD MOTOR CO.

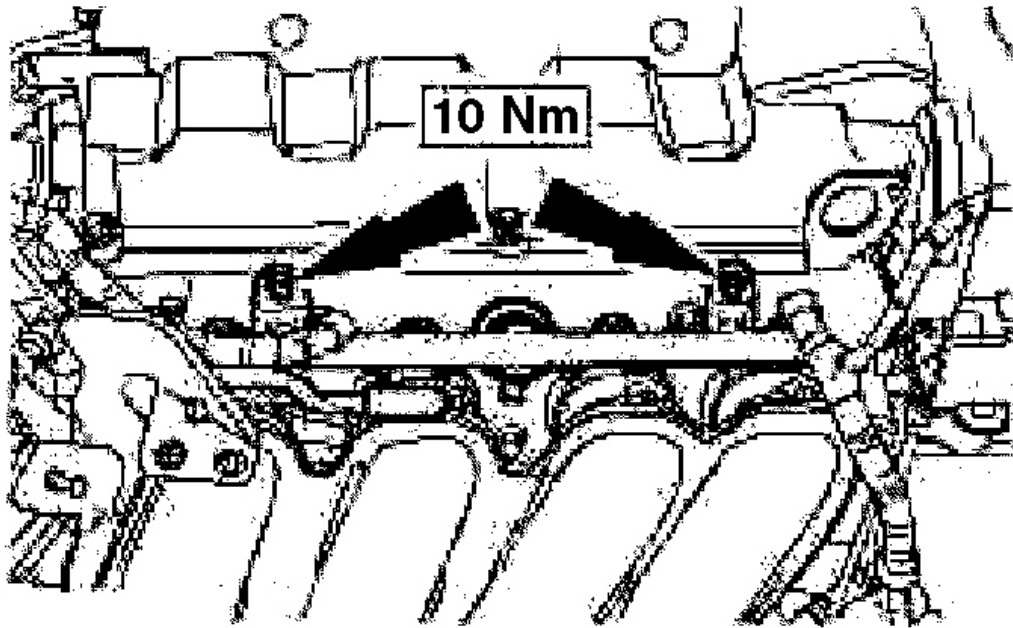
7. Disconnect the vacuum line from the fuel pulse damper.



G03432875

Fig. 292: Disconnecting Vacuum Line From Fuel Pulse Damper
Courtesy of FORD MOTOR CO.

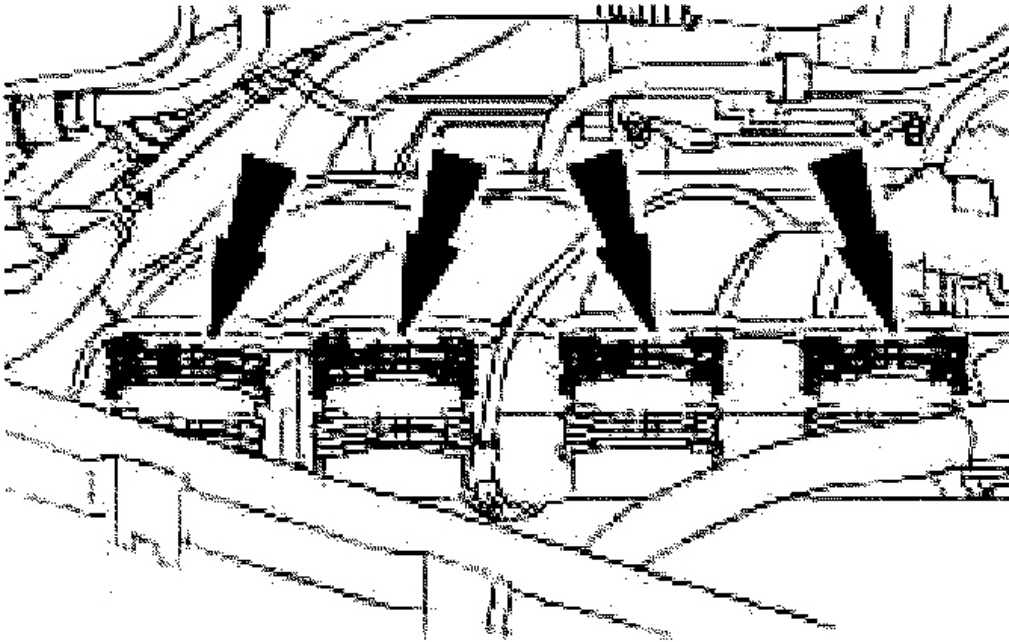
8. Remove the fuel injection supply manifold.



G03432876

Fig. 293: Removing Fuel Injection Supply Manifold
Courtesy of FORD MOTOR CO.

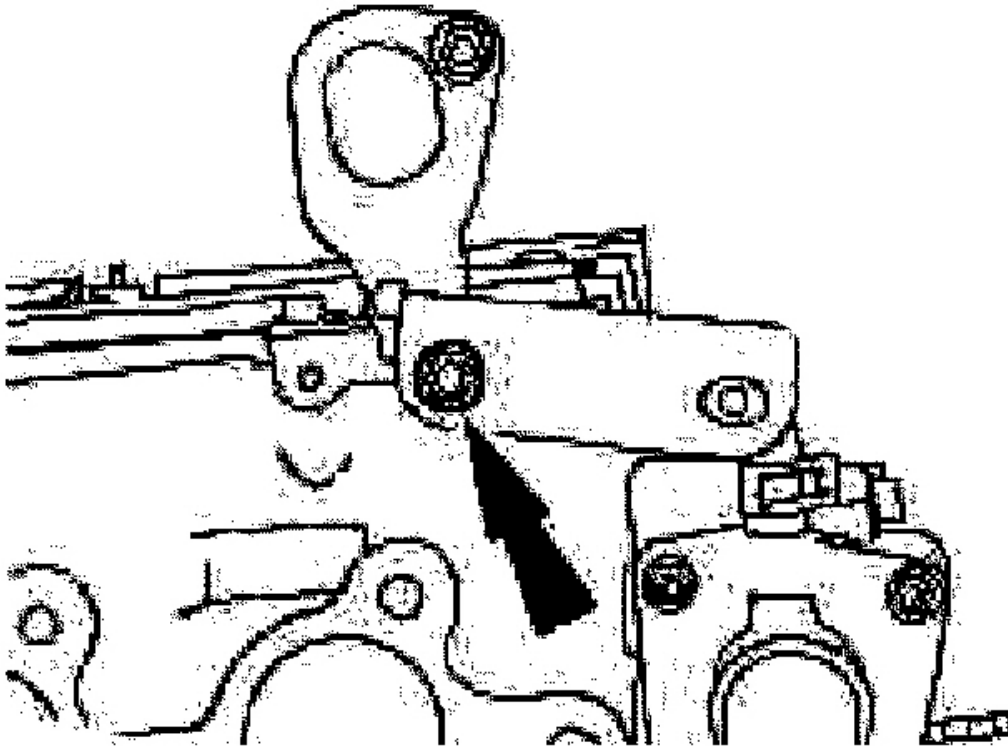
9. Separate the two sections of the intake manifold.



G03432877

Fig. 294: Separating Two Sections Of Intake Manifold
Courtesy of FORD MOTOR CO.

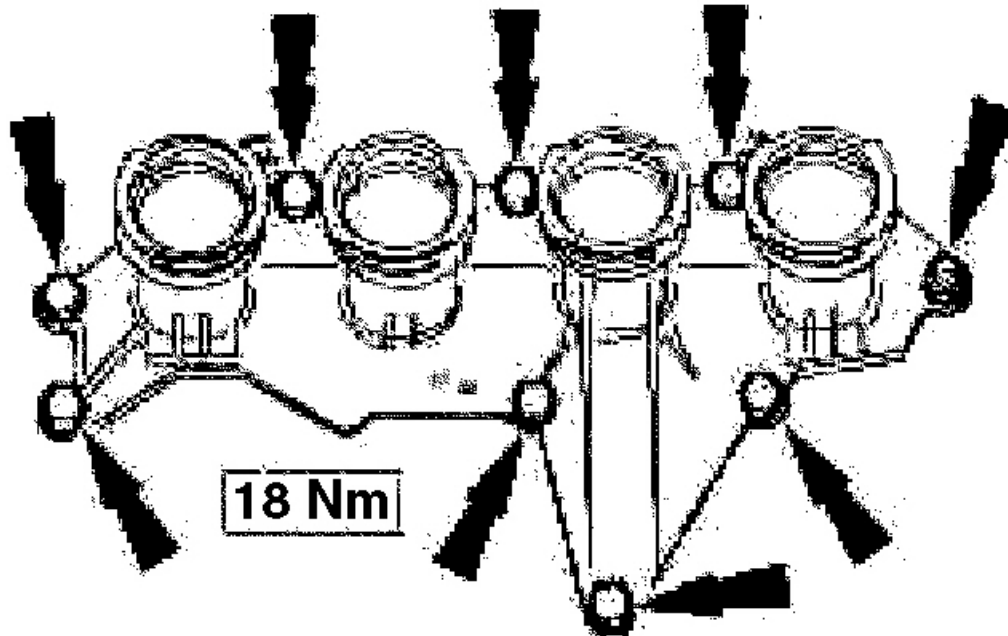
10. Remove the bracket.



G03432878

Fig. 295: Removing Bracket
Courtesy of FORD MOTOR CO.

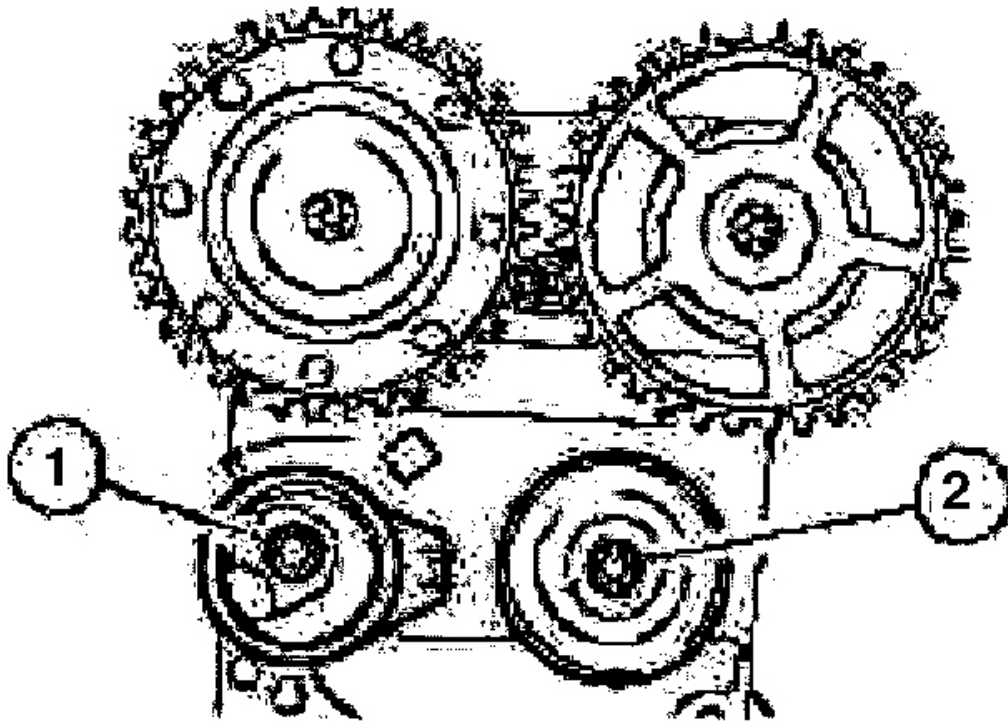
11. Remove the intake manifold inner section locknut and bolts (intake manifold shown removed for clarity).
 - Discard the locknut.



G03432879

Fig. 296: Removing Intake Manifold Inner Section Locknut And Bolts
Courtesy of FORD MOTOR CO.

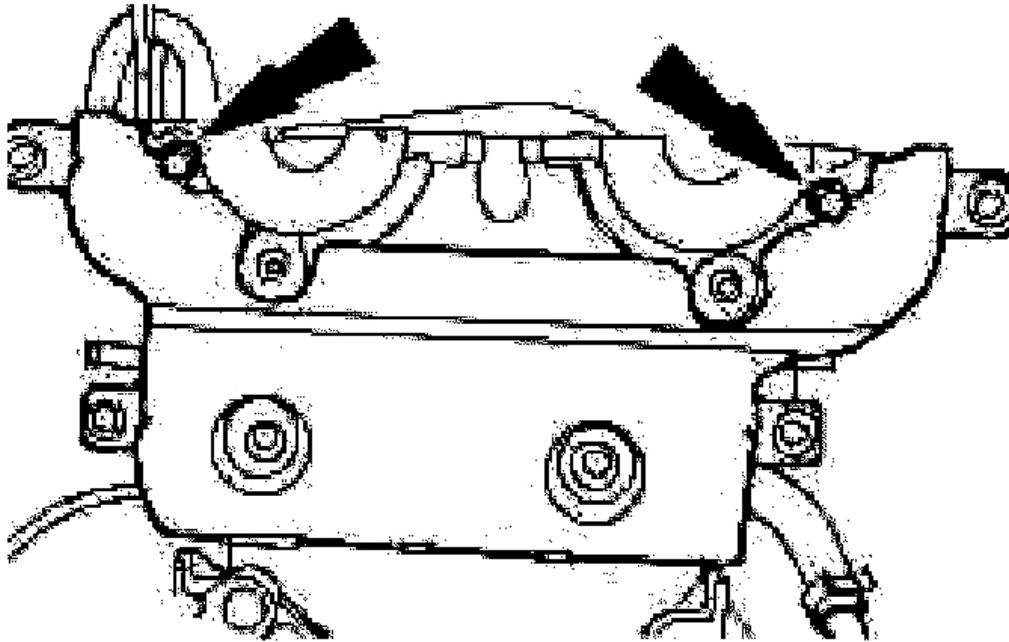
12. Remove the intake manifold inner section.
13. Remove the timing belt tensioner and idler pulley.



G03432880

Fig. 297: Removing Timing Belt Tensioner And Idler Pulley
Courtesy of FORD MOTOR CO.

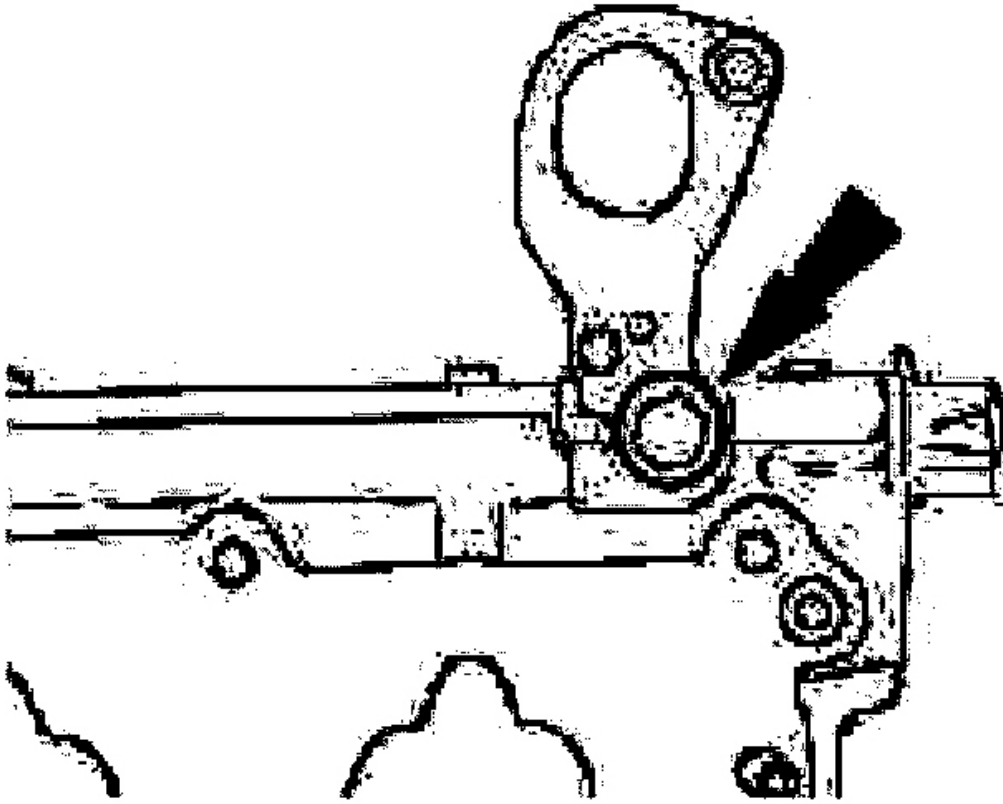
14. Remove the inner timing belt cover.



G03432881

Fig. 298: Removing Inner Timing Belt Cover
Courtesy of FORD MOTOR CO.

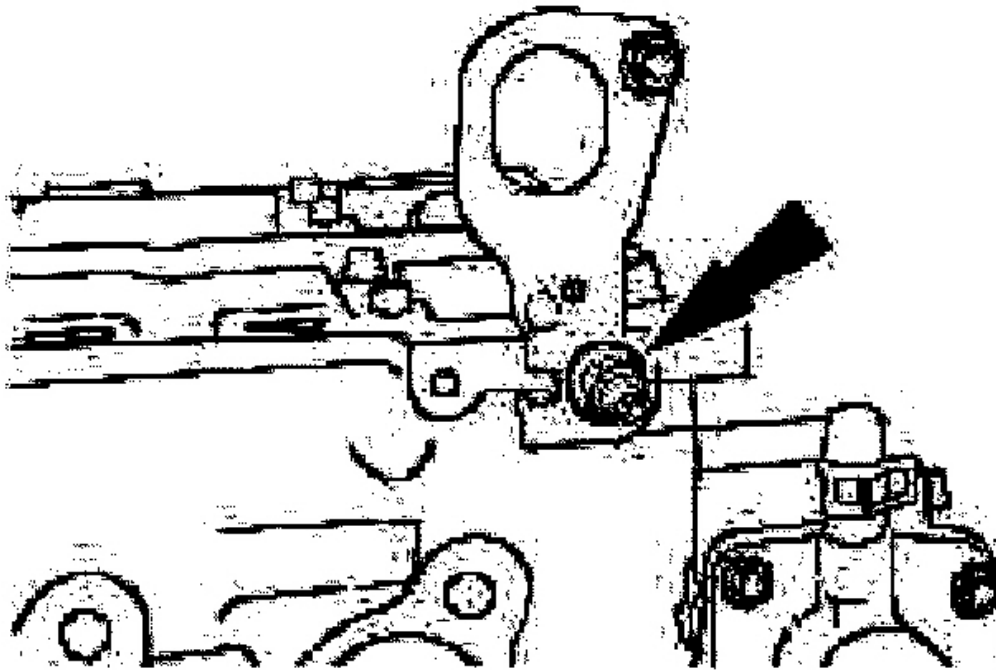
15. Remove the rear lifting eye.



G03432882

Fig. 299: Removing Rear Lifting Eye
Courtesy of FORD MOTOR CO.

16. Remove the front lifting eye.



G03432883

Fig. 300: Removing Front Lifting Eye
Courtesy of FORD MOTOR CO.

17. Using the special tools, compress the valve spring and remove the valve spring retainer keys, the valve spring retainers, and the valve springs.
 - Remove the special tools.

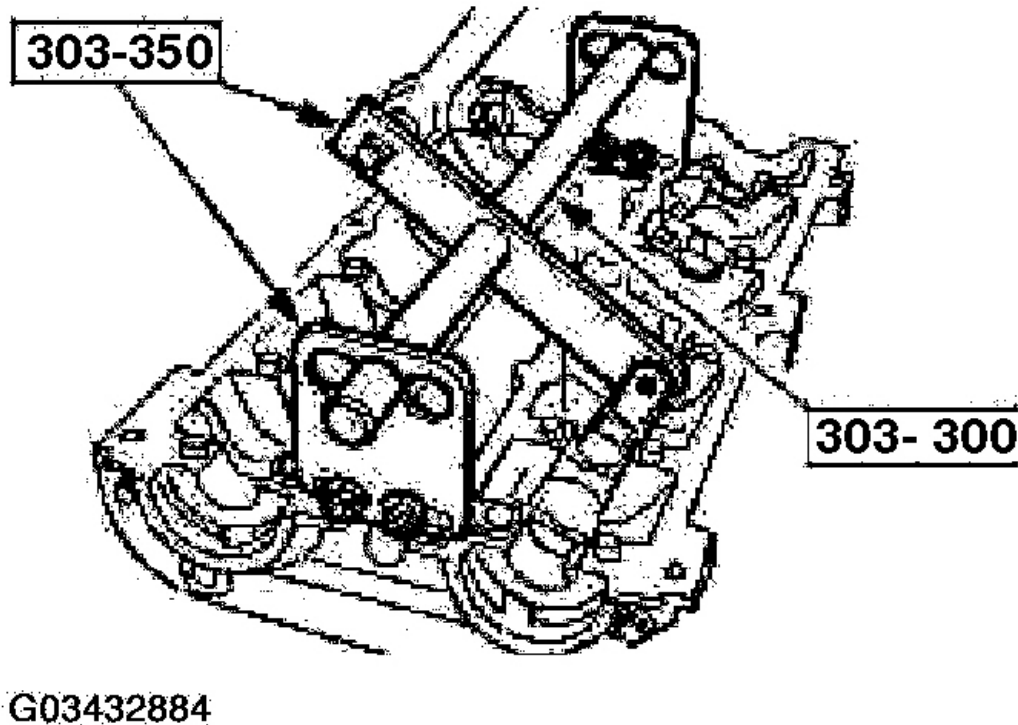
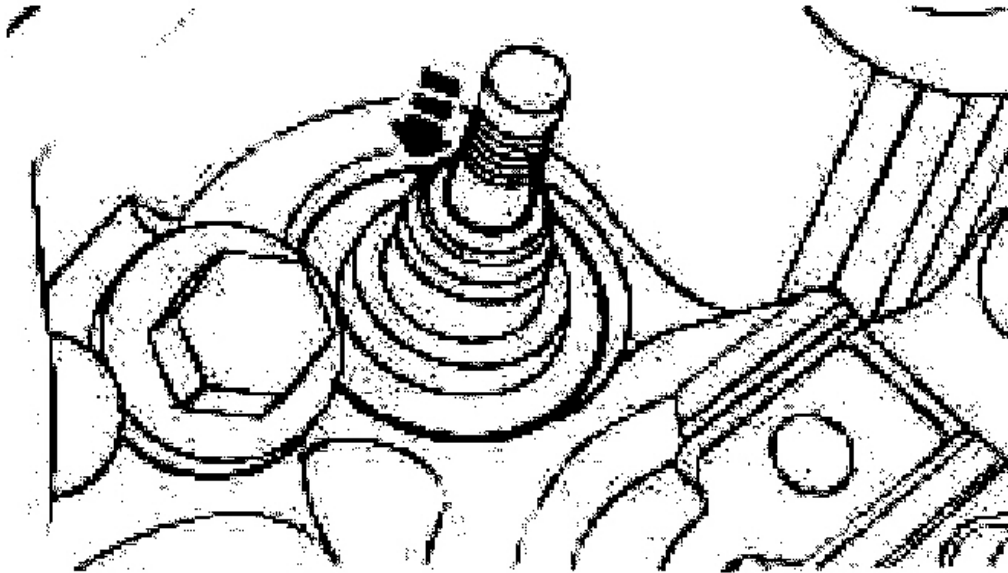


Fig. 301: Compressing Valve Spring Using Special Tool
Courtesy of FORD MOTOR CO.

18. Inspect the valve spring, valve spring retainer and valve spring retainer key. Install new parts as necessary.

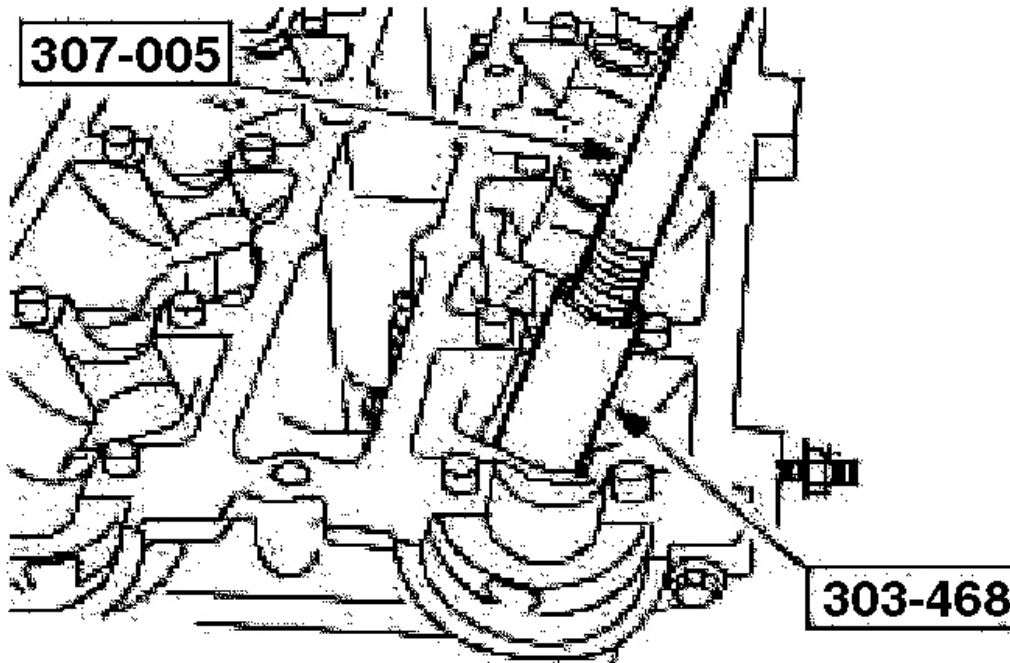
NOTE: Mark each valve if the original valves are to be used.



G03432885

Fig. 302: Removing Valves
Courtesy of FORD MOTOR CO.

19. Remove the valves.
20. Using the special tools, remove and discard the valve stem seals.



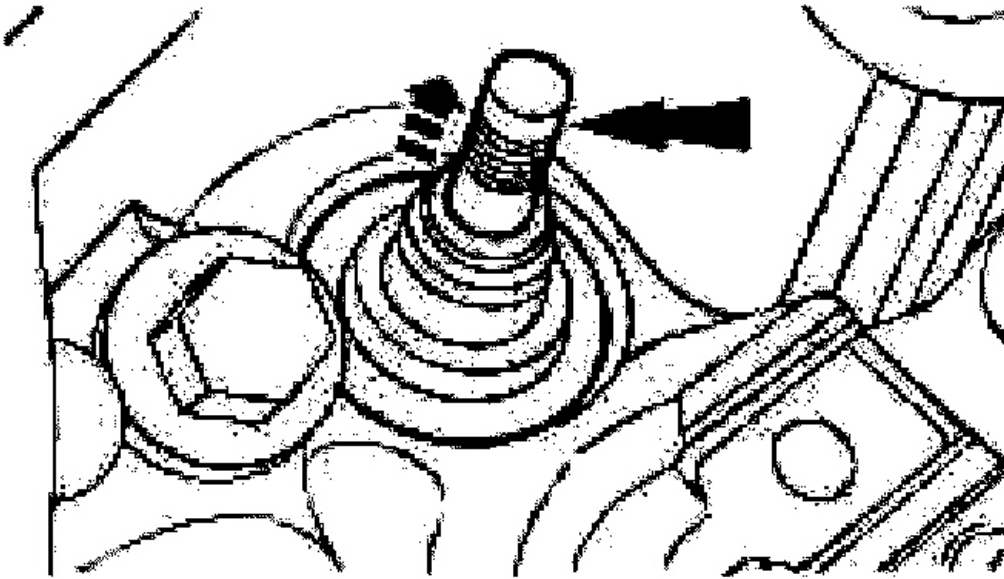
G03432886

Fig. 303: Removing And Discarding Valve Stem Seals Using Special Tools
Courtesy of FORD MOTOR CO.

21. Inspect the valves. For additional information, refer to Valve Stem Diameter (**ENGINE SYSTEM-GENERAL INFORMATION**). Install new parts as necessary.

Assembly

NOTE: If installing the original valves, make sure the valves are installed in the position from which they were removed. Coat the valve stems with 5W-30 Engine Oil or equivalent meeting Ford specification WSS-M2C153-G.

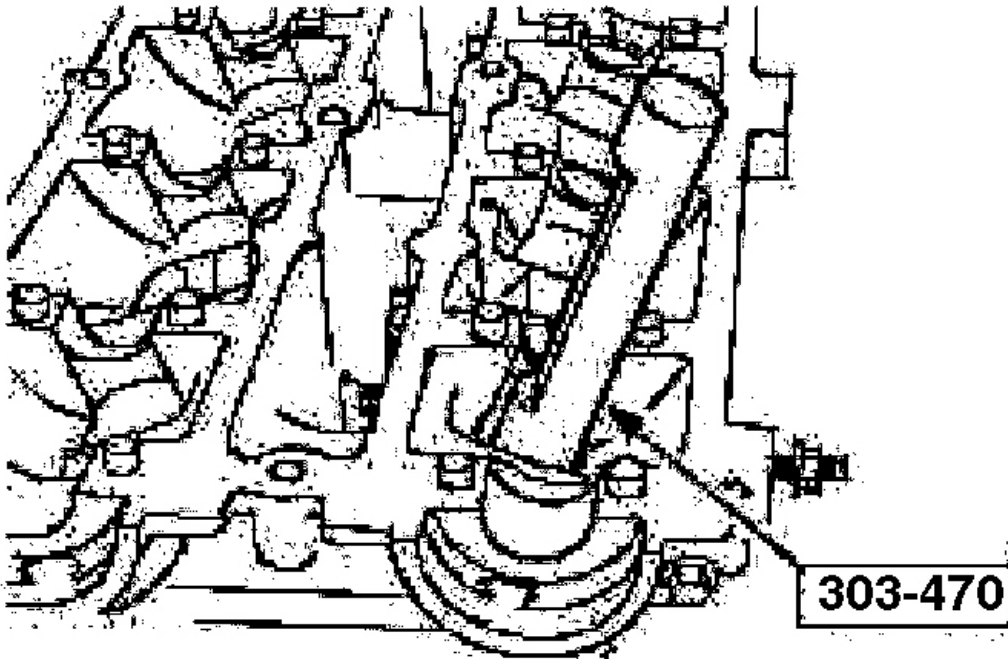


G03432887

Fig. 304: Installing Valves
Courtesy of FORD MOTOR CO.

1. Install the valves.

NOTE: Use the seal protector provided with the replacement kit to prevent damage to the valve stem seals.



G03432888

Fig. 305: Installing Valve Stem Seals Onto Cylinder Head Valve Guides Using Special Tool

Courtesy of FORD MOTOR CO.

2. Lubricate valve and guides with engine oil and using the special tool install the valve stem seals onto the cylinder head valve guides.
3. Place the valve spring in position over the valve and install the valve spring retainer.
4. Using the special tools, compress the valve spring and install the valve spring retainer keys.
 - Remove the special tools.

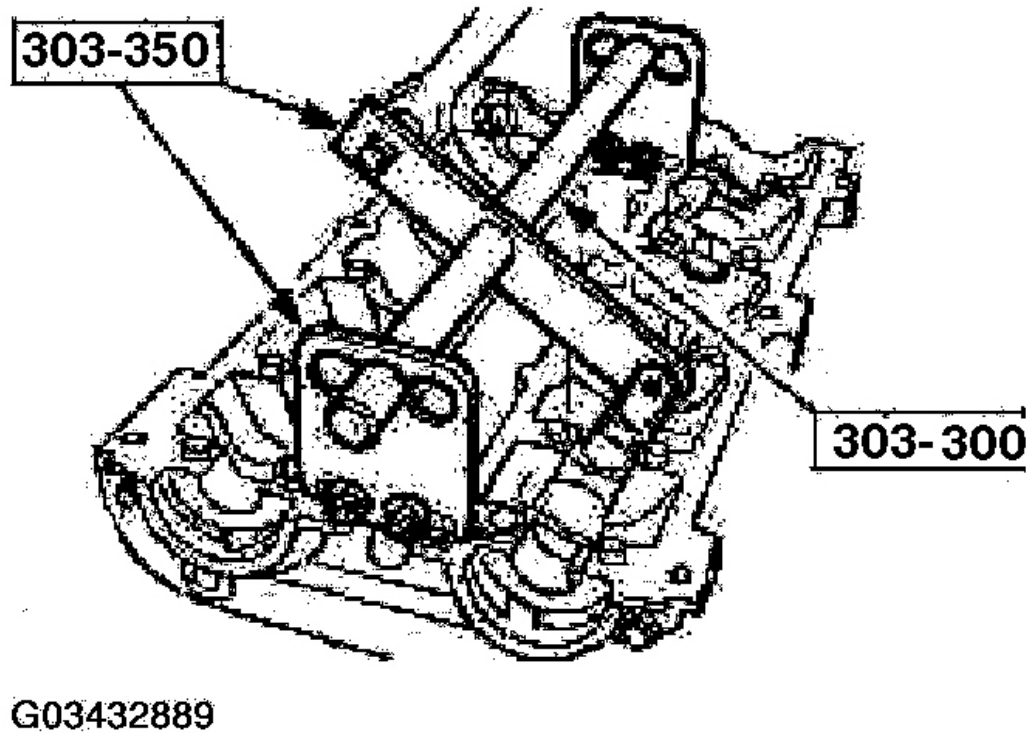


Fig. 306: Compressing Valve Spring And Installing Valve Spring Retainer Keys
Using Special Tools
Courtesy of FORD MOTOR CO.

5. Install the front lifting eye.

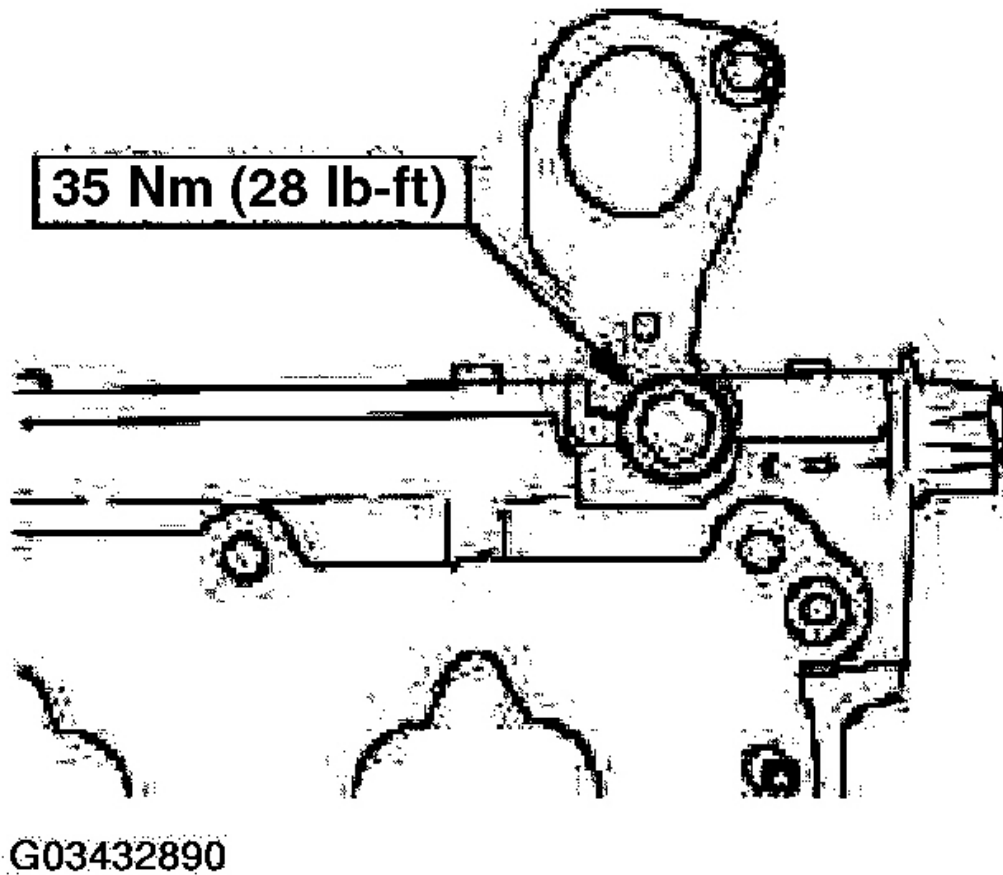


Fig. 307: Installing Front Lifting Eye
Courtesy of FORD MOTOR CO.

6. Install the rear lifting eye.

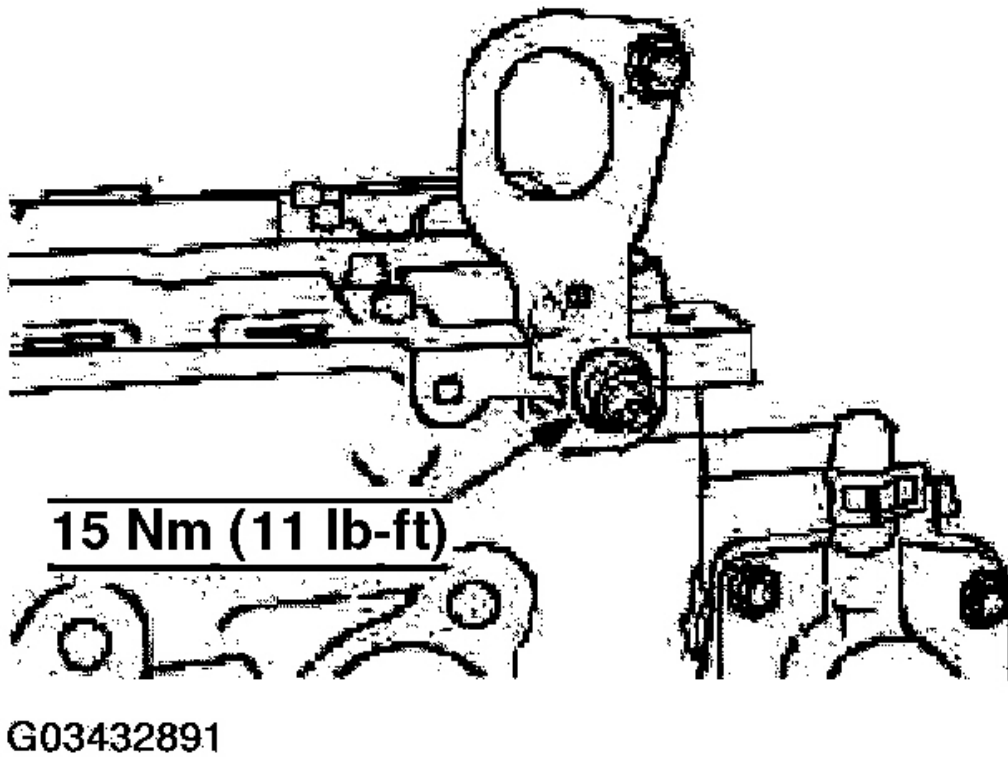
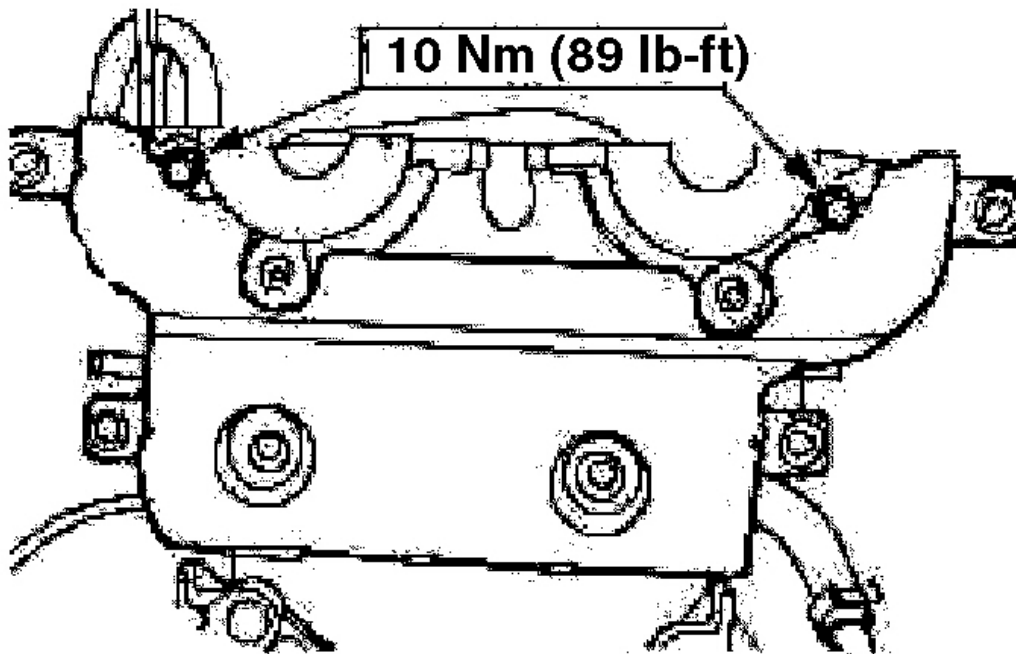


Fig. 308: Installing Rear Lifting Eye
Courtesy of FORD MOTOR CO.

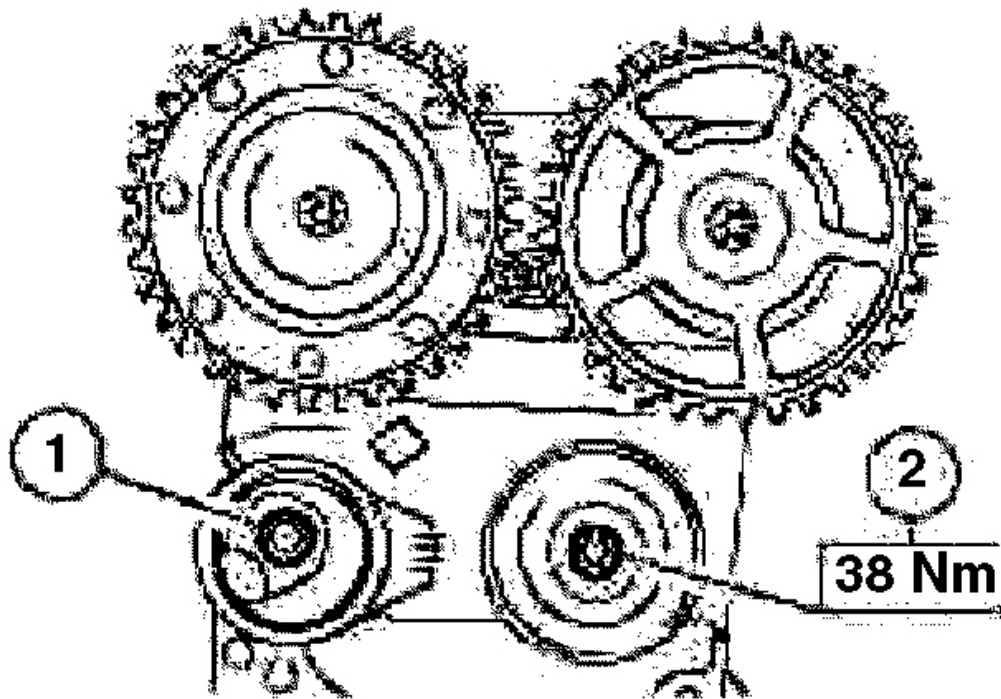
7. Install the inner timing belt cover.



G03432892

Fig. 309: Installing Inner Timing Belt Cover
Courtesy of FORD MOTOR CO.

8. Install the timing belt tensioner and the idler pulley.



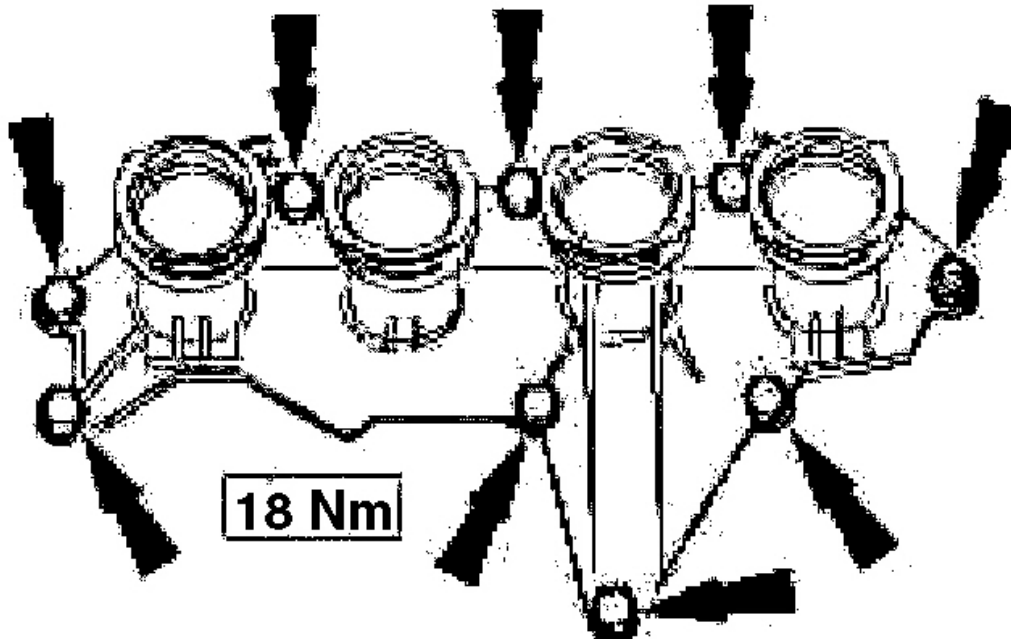
G03432893

Fig. 310: Installing Timing Belt Tensioner And Idler Pulley
Courtesy of FORD MOTOR CO.

NOTE: Clean and inspect the intake manifold gasket. Install a new intake manifold gasket if necessary.

9. Install the intake manifold inner section.

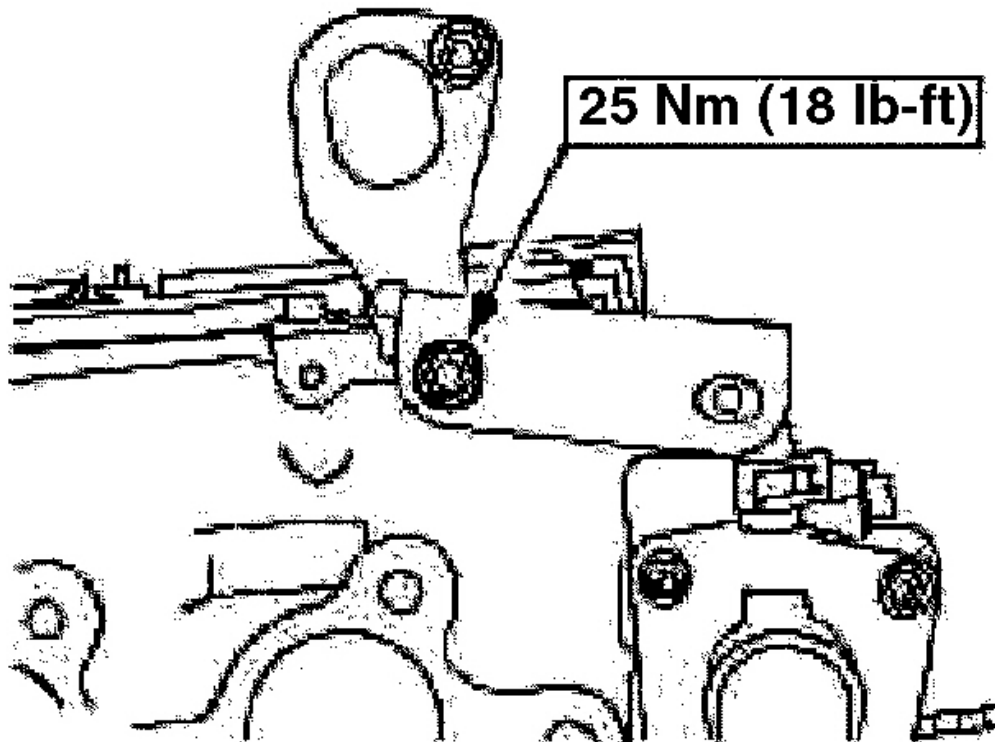
NOTE: Install a new intake manifold locknut.



G03432894

Fig. 311: Installing Intake Manifold Inner Section Locknut And Bolts
Courtesy of FORD MOTOR CO.

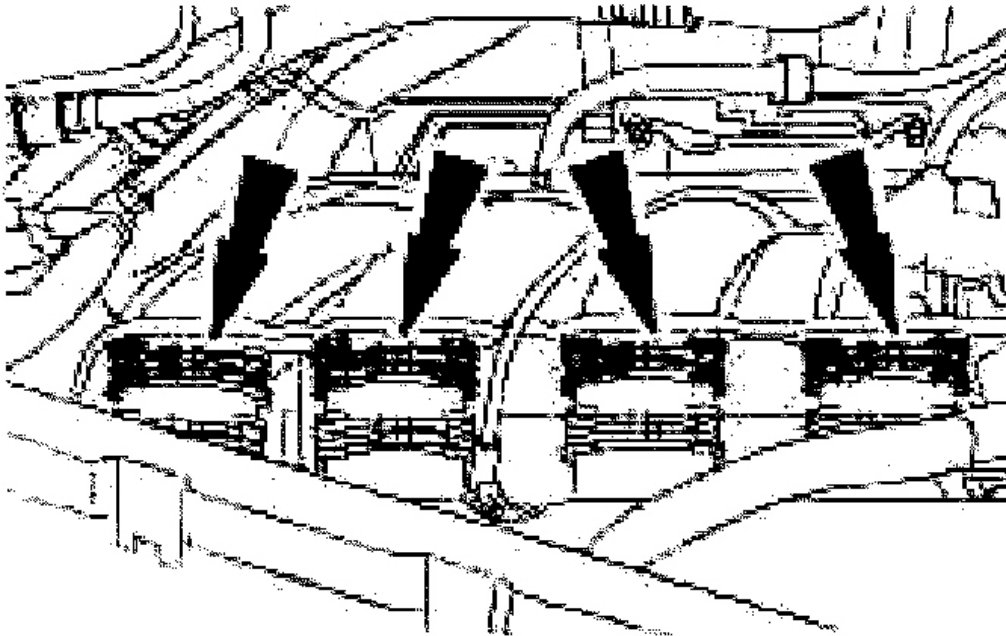
10. Install the intake manifold inner section locknut and bolts (intake manifold shown removed for clarity).
11. Install the bracket.



G03432895

Fig. 312: Installing Bracket
Courtesy of FORD MOTOR CO.

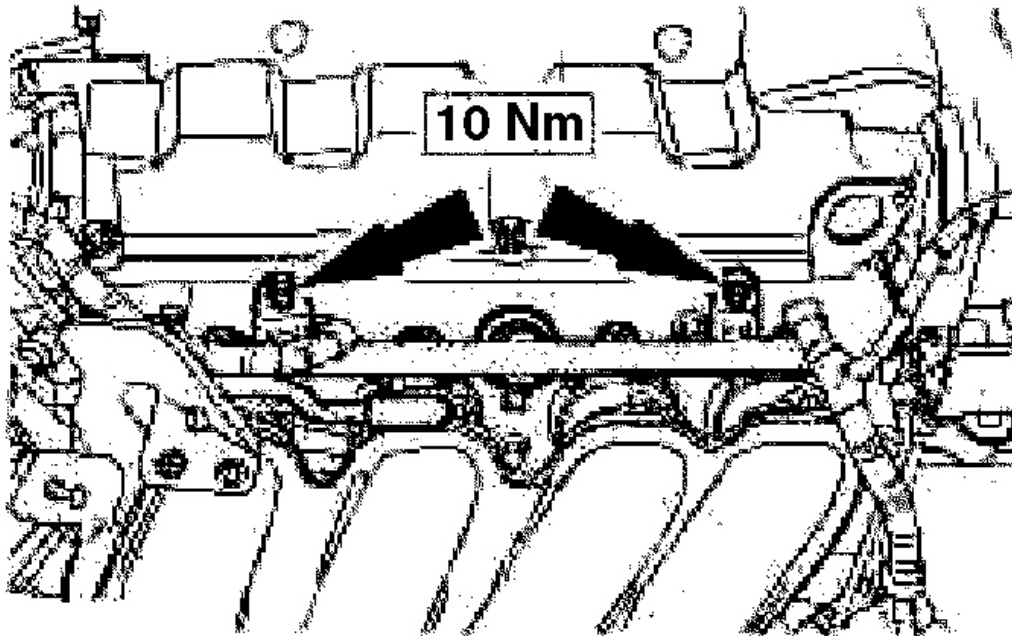
12. Assemble the two sections of the intake manifold.



G03432896

Fig. 313: Assembling Two Sections Of Intake Manifold
Courtesy of FORD MOTOR CO.

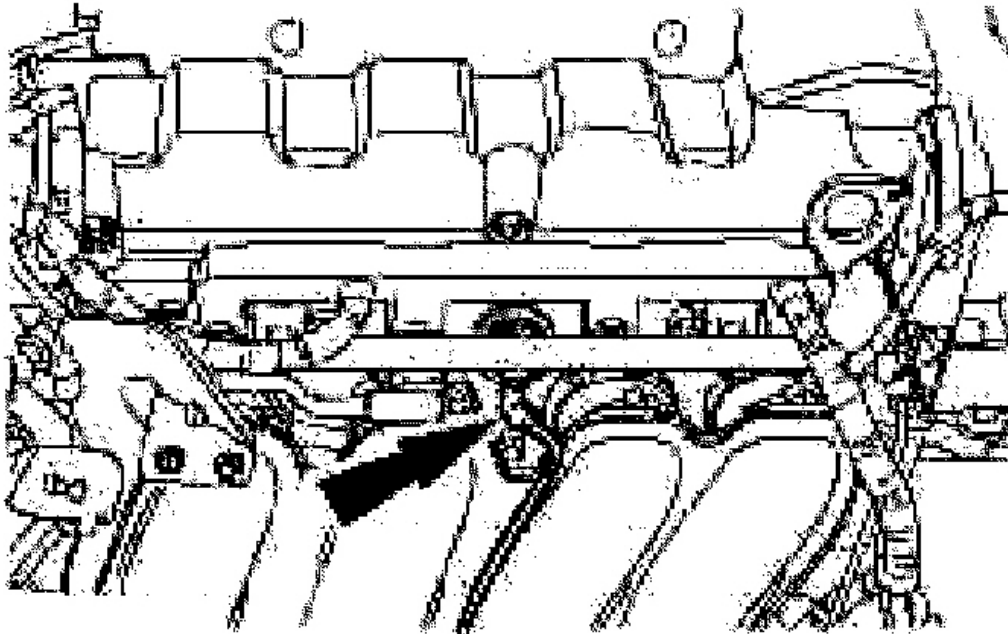
13. Install the fuel injection supply manifold.



G03432897

Fig. 314: Installing Fuel Injection Supply Manifold
Courtesy of FORD MOTOR CO.

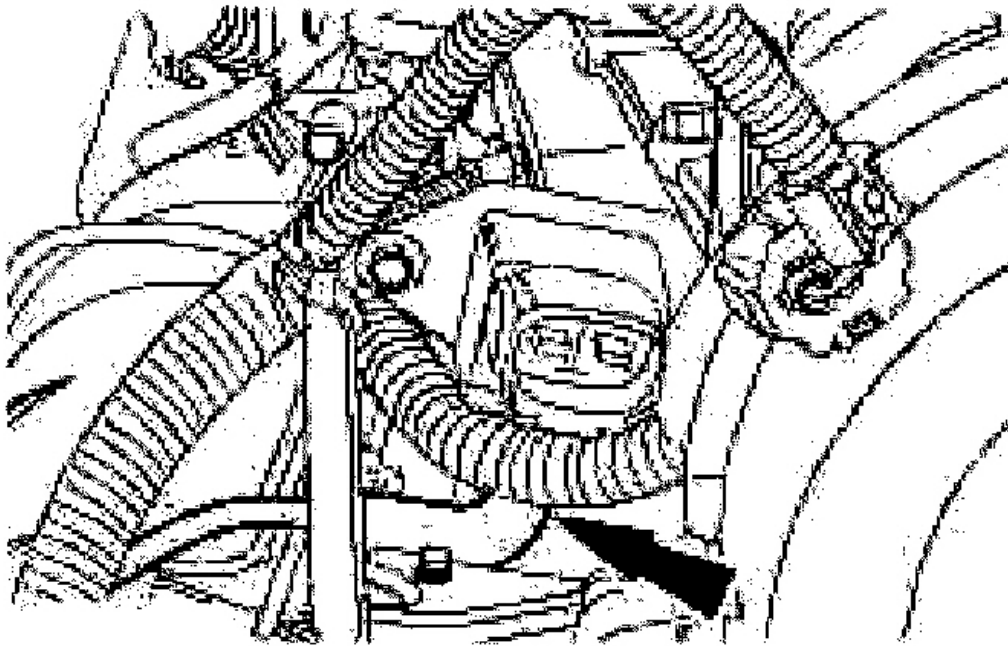
14. Connect the vacuum line to the fuel pulse damper.



G03432898

Fig. 315: Connecting Vacuum Line To Fuel Pulse Damper
Courtesy of FORD MOTOR CO.

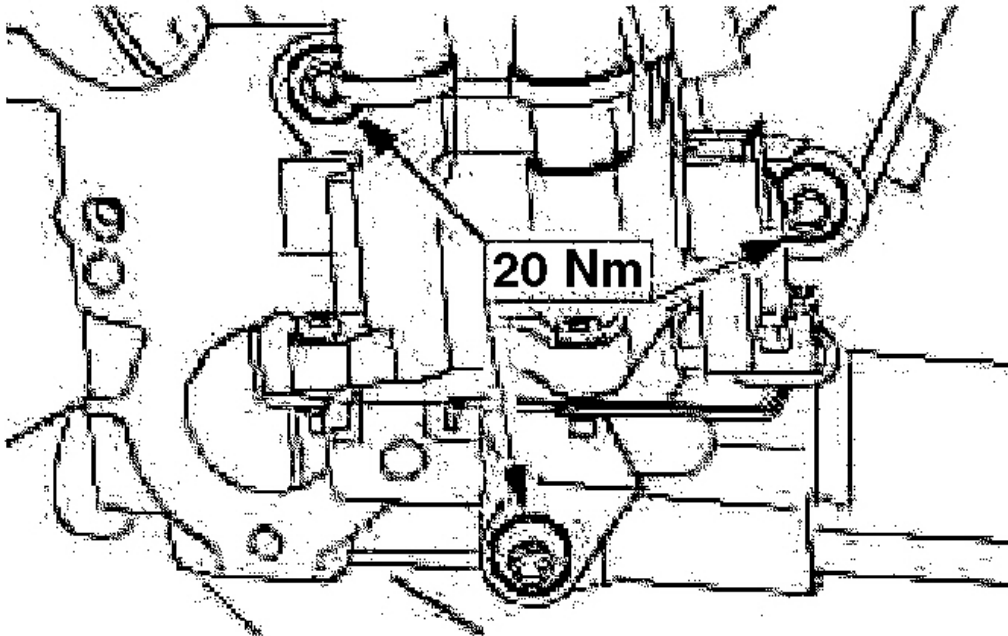
15. Connect the vacuum line to the fuel pressure sensor.



G03432899

Fig. 316: Connecting Vacuum Line To Fuel Pressure Sensor
Courtesy of FORD MOTOR CO.

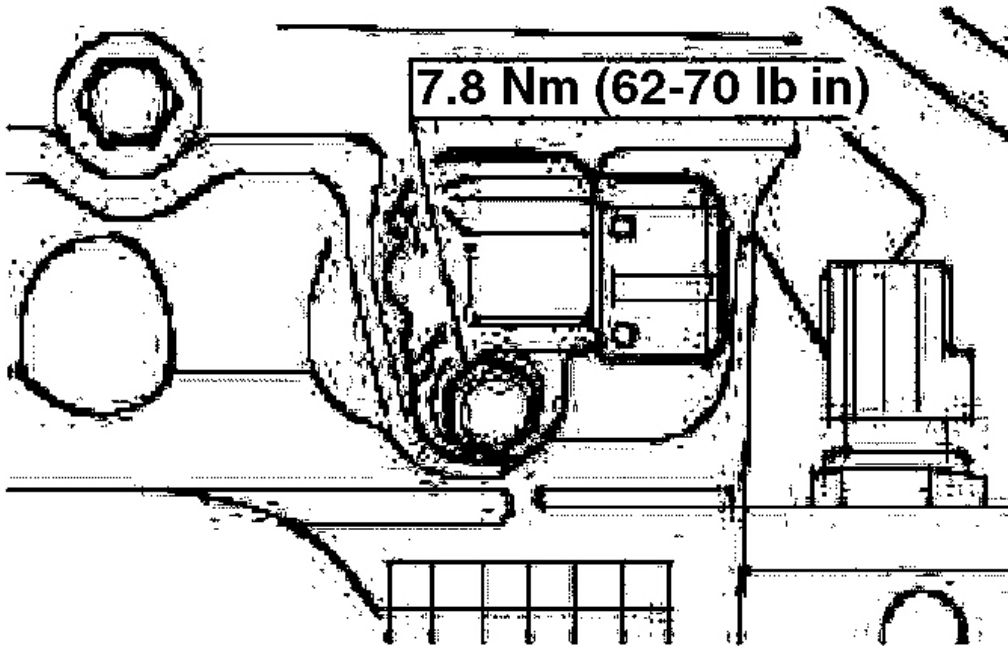
16. Install the electronic ignition (EI) coil pack.



G03432900

Fig. 317: Installing Electronic Ignition Coil Pack
Courtesy of FORD MOTOR CO.

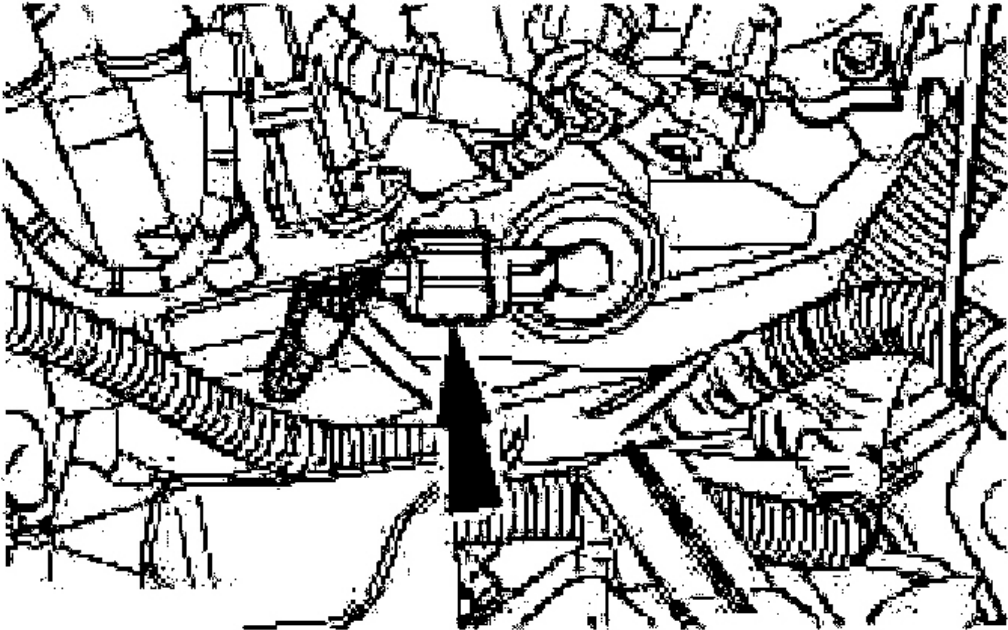
17. Install the camshaft position (CMP) sensor.



G03432901

Fig. 318: Installing Camshaft Position Sensor
Courtesy of FORD MOTOR CO.

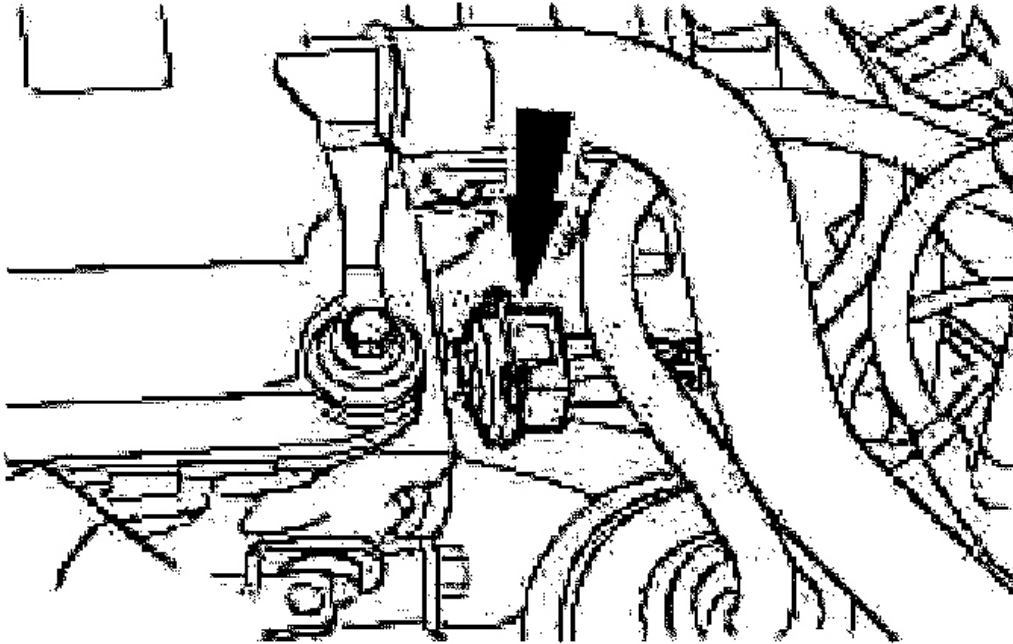
18. Connect the idle air control (IAC) valve electrical connector (air cleaner shown removed for clarity).



G03432902

Fig. 319: Connecting Idle Air Control Valve Electrical Connector
Courtesy of FORD MOTOR CO.

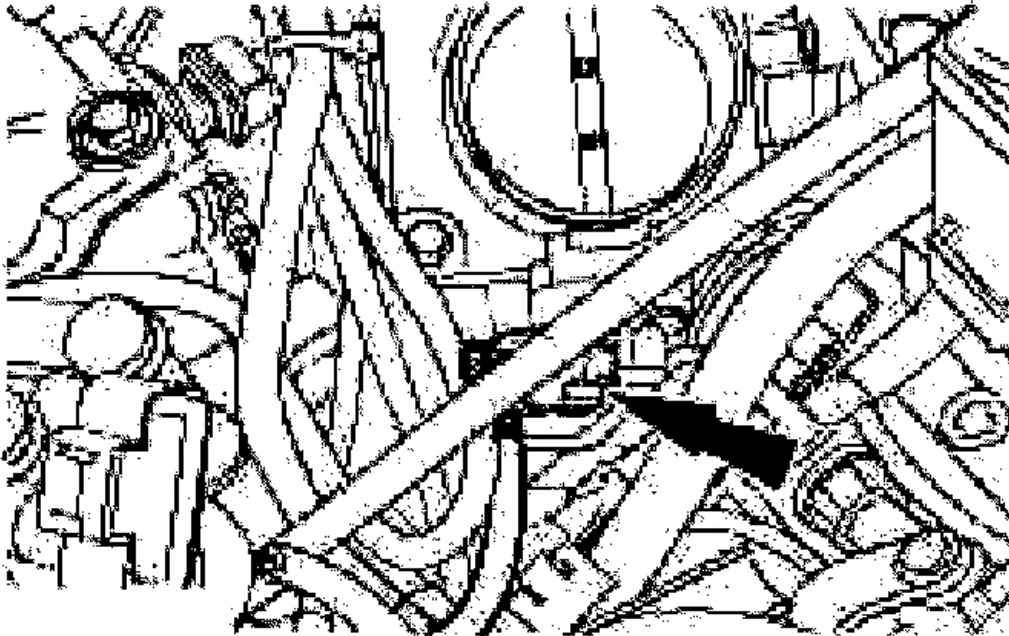
19. Connect the CMP electrical connector.



G03432903

Fig. 320: Connecting CMP Electrical Connector
Courtesy of FORD MOTOR CO.

20. Connect the throttle position (TP) sensor electrical connector (air cleaner shown removed for clarity).



G03432904

Fig. 321: Connecting Throttle Position Sensor Electrical Connector
Courtesy of FORD MOTOR CO.



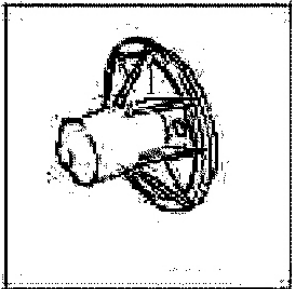
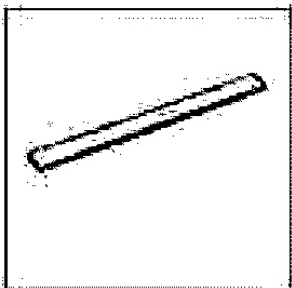

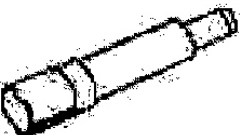
ASSEMBLY

ENGINE

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Holding Tool, Flywheel 303-103 (T74P-6375-A)
	Installer, Camshaft Oil Seal 303-160 (T81P-6292-A)
	Installer, Crankshaft Rear Main Oil Seal 303-328 (T88P-6701-B1)
	Alignment Plate, Camshaft 303-465 (T94P-6256-CH)
	Timing Peg, Crankshaft 303-574 (T97P-6000-A)
	Aligner, Clutch Disc 308-020 (T74P-7137-K)

G03432905

Fig. 322: Identifying Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

Courtesy of FORD MOTOR CO.

Material

MATERIAL SPECIFICATION

Engine Oil - 5W-30	WSS-M2C153-G
Silicone Rubber Sealant	WSK-M4G320-A
Silicone Sealant	WSE-M4G323-A4

Assembly

CAUTION: Do not damage the cylinder liner.

1. Preparatory operations.
2. Remove the carbon deposits from the upper edge of the cylinder.
3. Using a scraper and sealant remover, clean all re-usable parts and check them for damage.
4. Thoroughly clean all threaded bores.

NOTE: The main bearing shells are color coded.

5. Available sizes of main bearing shell.
 - Size A: 2.145 - 2.152 mm (green)
 - Size B: 2.142 - 2.147 mm (brown).
 - Size C: 2.135 - 2.142 mm (brown).
 - Size D: 2.130 - 2.137 mm (brown).

NOTE: Use main bearing shells of size "B" or "C" (refer to the previous step).

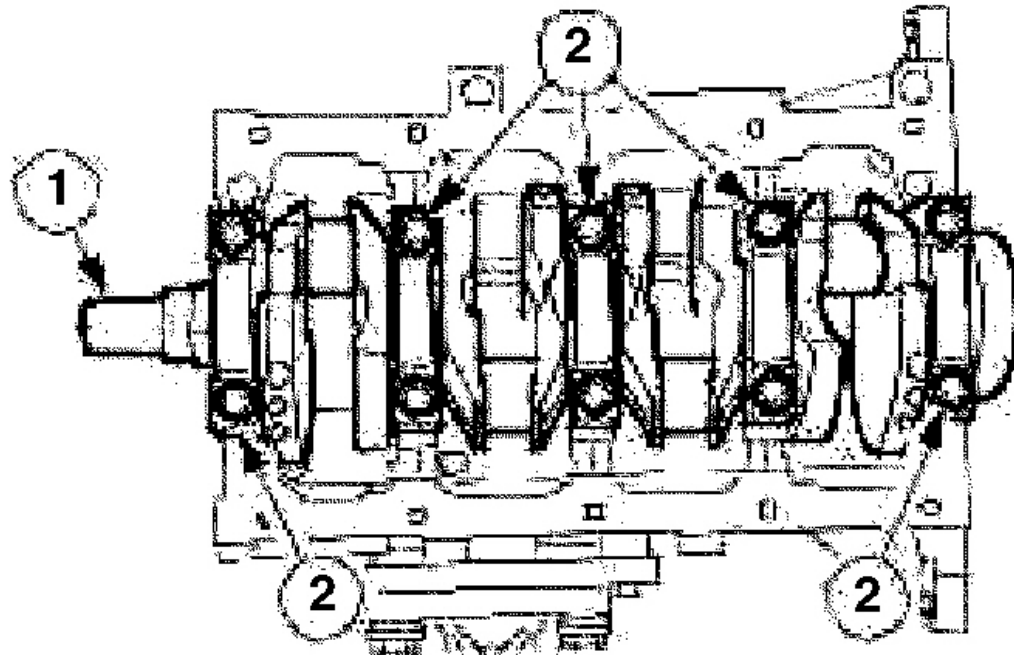
6. Measure the radial clearance of the crankshaft. For additional information, refer to Crankshaft Main Bearing Journal Clearance (**ENGINE SYSTEM-GENERAL INFORMATION**).
 - Select a bearing shell in accordance with the previous step to determine a bearing clearance of between 0.020 - 0.040 mm.
7. Measure the crankshaft end play. For additional information, refer to Crankshaft End Play (**ENGINE SYSTEM-GENERAL INFORMATION**).
8. Measure the camshaft radial clearance. For additional information, refer to Camshaft

Bearing Journal Clearance (**ENGINE SYSTEM-GENERAL INFORMATION**).

9. Measure the camshaft end play. For additional information, refer to Camshaft End Play (**ENGINE SYSTEM-GENERAL INFORMATION**).
10. Measure the crankshaft. For additional information, refer to Crankshaft Main Bearing Journal Diameter (**ENGINE SYSTEM-GENERAL INFORMATION**).
11. Measure the camshaft. For additional information, refer to Camshaft Bearing Journal Diameter (**ENGINE SYSTEM-GENERAL INFORMATION**).
12. Measure the cylinder bore. For additional information, refer to Cylinder Bore Taper (**ENGINE SYSTEM-GENERAL INFORMATION**).
13. Measure the pistons. For additional information, refer to Piston Diameter (**ENGINE SYSTEM-GENERAL INFORMATION**).
14. Measure the piston ring end gaps. For additional information, refer to Piston Ring End Gap (**ENGINE SYSTEM-GENERAL INFORMATION**).
15. Measure the piston rings to groove clearance. For additional information, refer to Piston Ring-to-Groove Clearance (**ENGINE SYSTEM-GENERAL INFORMATION**).
16. Check the cylinder head distortion. For additional information, refer to Cylinder Head Distortion (**ENGINE SYSTEM-GENERAL INFORMATION**).

NOTE: **Do not fully tighten the main bearing cap retaining bolts at this stage.**

17. Install the crankshaft.
 1. Position the crankshaft.
 2. Install the main bearing caps.
 - Position the main bearing shells, clean and free of oil, into the cylinder block and the bearing caps.
 - Coat the inner side of the bearing shells with engine oil.



G03432906

Fig. 323: Installing Crankshaft
Courtesy of FORD MOTOR CO.

NOTE: The connecting rods are numbered starting at the timing belt end. The joined valve recesses on the piston crown face the intake side.

18. Install the pistons.

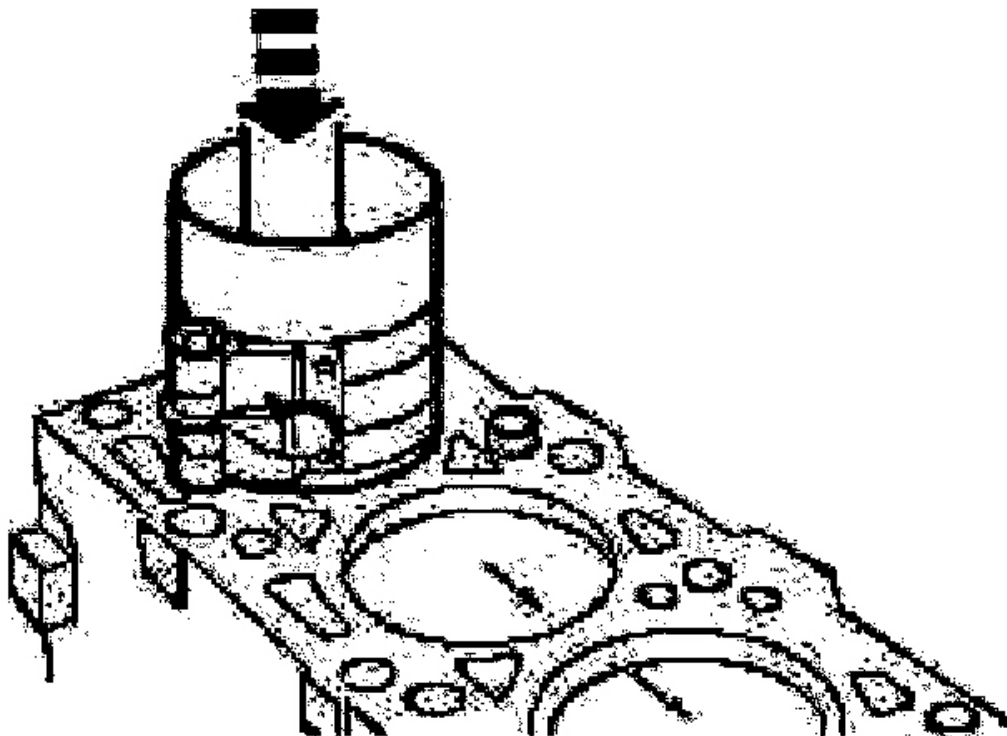
- Coat the pistons and cylinder liners with engine oil.
- Distribute the piston ring gaps and the elements of the oil scraper ring evenly around the circumference (120 degrees).
- Compress the piston rings using a suitable piston ring compressor.
- Press pistons 1 and 4 with the handle of a hammer into the cylinders. The connecting rod bearing journals for cylinders 1 and 4 must be at BDC.
- Position the corresponding bearing shells, clean and free of oil, into the connecting rod and the connecting rod bearing cap.

- Coat the inner side of the bearing shells with engine oil.

NOTE: Use new connecting rod bearing cap bolts.

NOTE: Do not fully tighten the connecting rod bearing cap bolts at this stage.

- Install the bearing caps.
- Rotate the crankshaft through 180 degrees and insert pistons 2 and 3.
- Position the corresponding bearing shells, clean and free of oil, into the connecting rod and the connecting rod bearing cap.
- Coat the inner side of the bearing shells with engine oil.



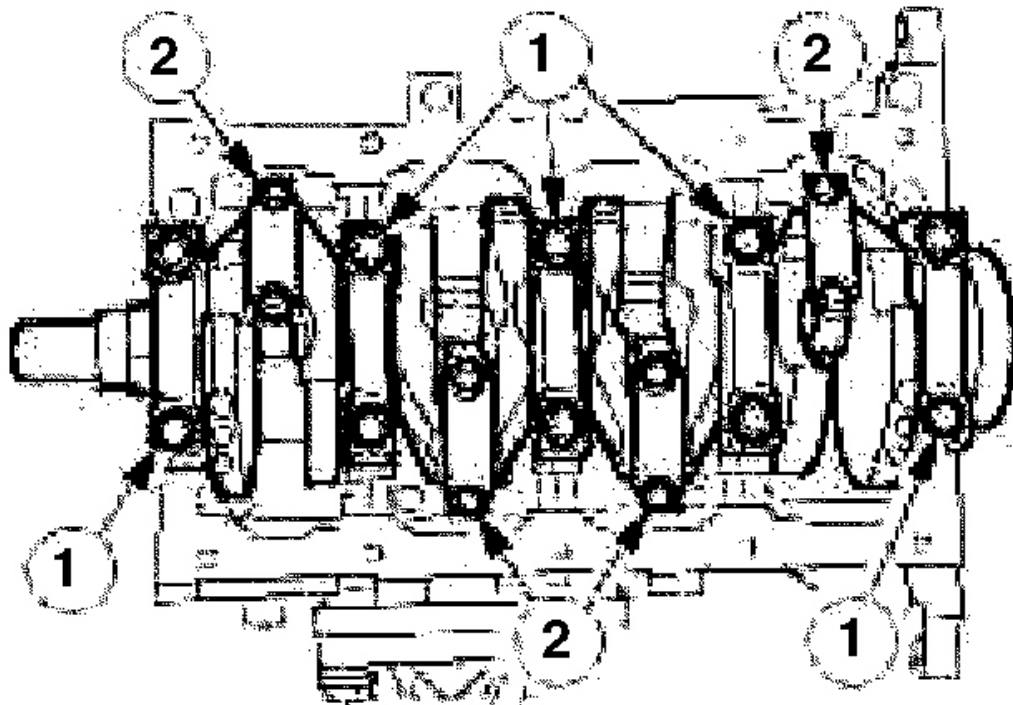
G03432907

Fig. 324: Installing Bearing Caps

Courtesy of FORD MOTOR CO.

NOTE: The crankshaft must rotate freely, if necessary check and adjust the bearing clearances.

19. Tighten the main bearing and connecting rod bearing bolts.
 1. Tighten the main bearing bolts in two stages.
 - Stage 1: 25 N.m.
 - Stage 2: 60 degrees.
 2. Tighten the connecting rod bearing bolts in two stages.
 - Stage 1: 35 N.m.
 - Stage 2: 90 degrees.



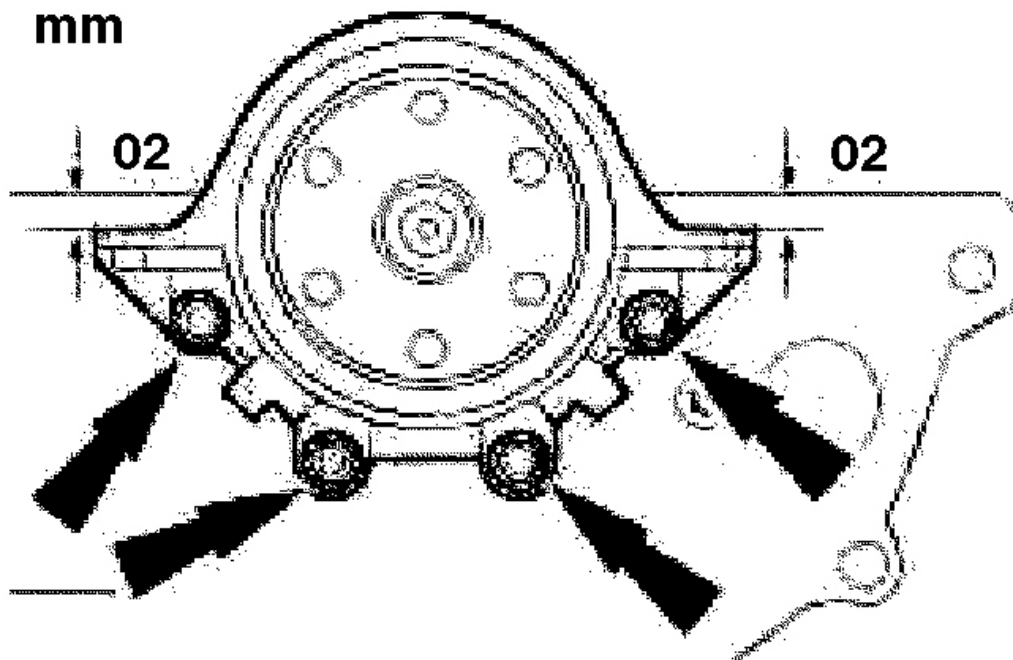
G03432908

Fig. 325: Tightening Connecting Rod Bearing Bolts In Two Stages

Courtesy of FORD MOTOR CO.

NOTE: Do not fully tighten the bolts at this stage.

NOTE: Install a new crankshaft rear seal carrier.

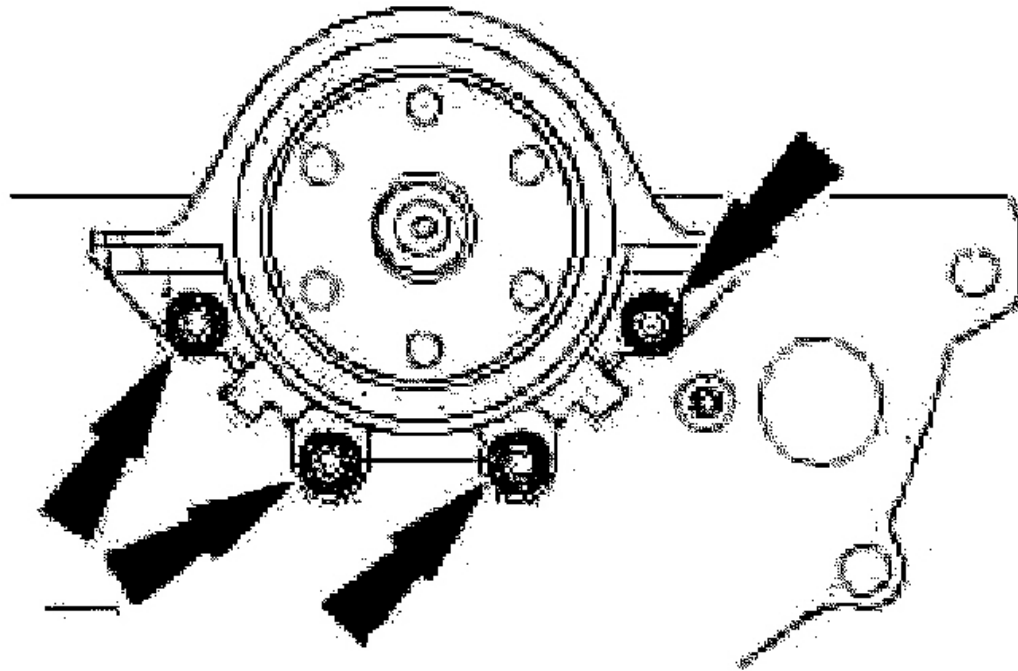


G03432909

Fig. 326: Identifying Crankshaft Rear Seal Carrier Dimension

Courtesy of FORD MOTOR CO.

20. Align the crankshaft rear seal carrier so that the mating face of the crankshaft rear seal carrier is not more than 0.2 mm below the cylinder block.
21. Tighten the crankshaft rear seal carrier retaining bolts.
 - Tighten the bolts in two stages:
 - Stage 1: 12 N.m.
 - Stage 2: 42 degrees.



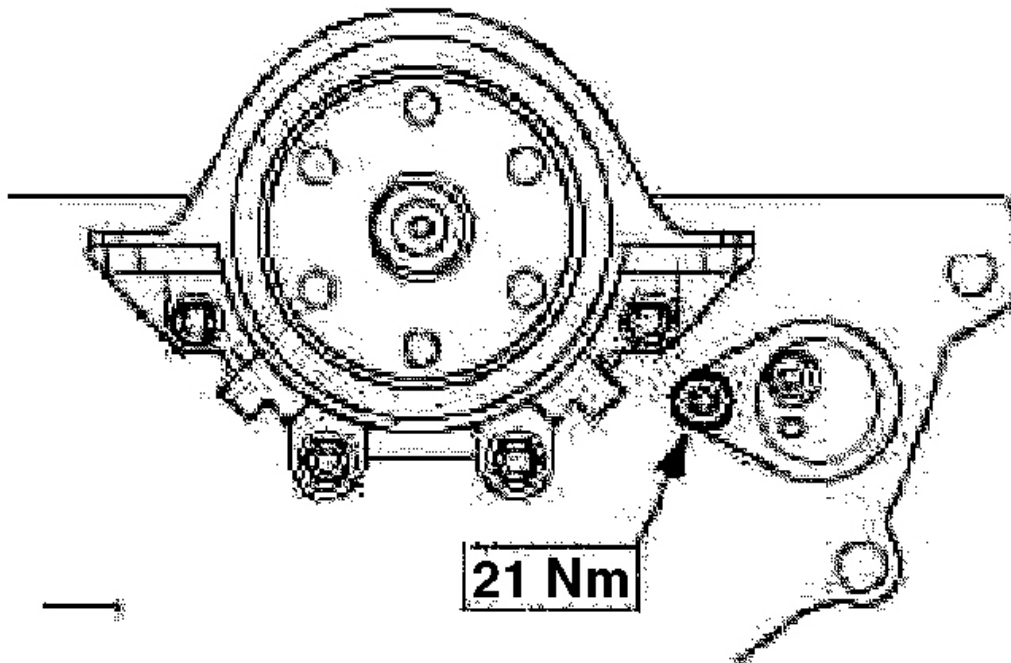
G03432910

Fig. 327: Tightening Crankshaft Rear Seal Carrier Retaining Bolts
Courtesy of FORD MOTOR CO.

22. Install the crankshaft position (CKP) sensor bracket.

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G03432911

Fig. 328: Installing Crankshaft Position (CKP) Sensor Bracket
Courtesy of FORD MOTOR CO.

NOTE: Use three flywheel bolts.

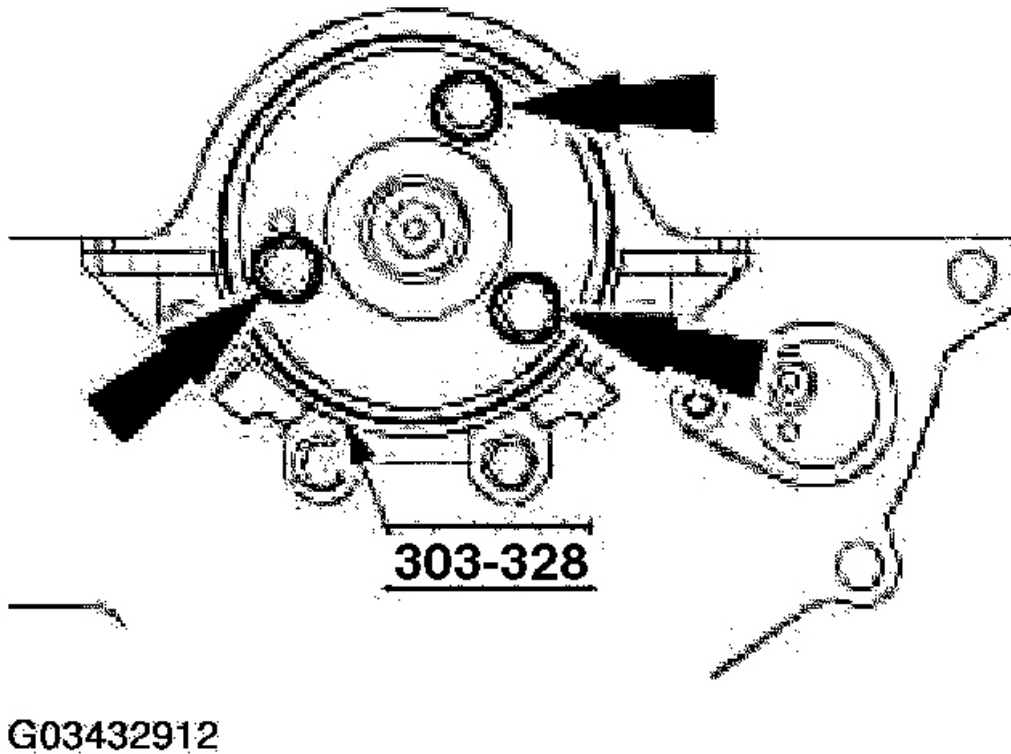


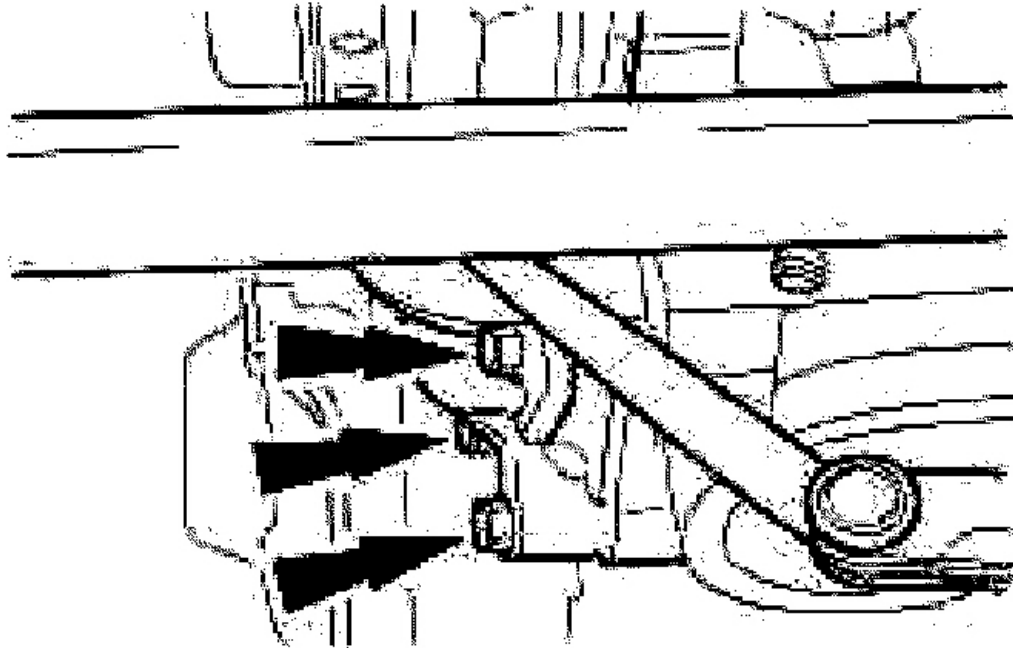
Fig. 329: Installing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

23. Using the special tool, install the crankshaft rear seal.

NOTE: **Install a new oil pump gasket.**

24. Align the oil pump.

- Position the oil pump with a new gasket and tighten the bolts finger tight.
- Align the oil pump on both sides so that the sealing surfaces are 0.3 - 0.8 mm below the cylinder block.



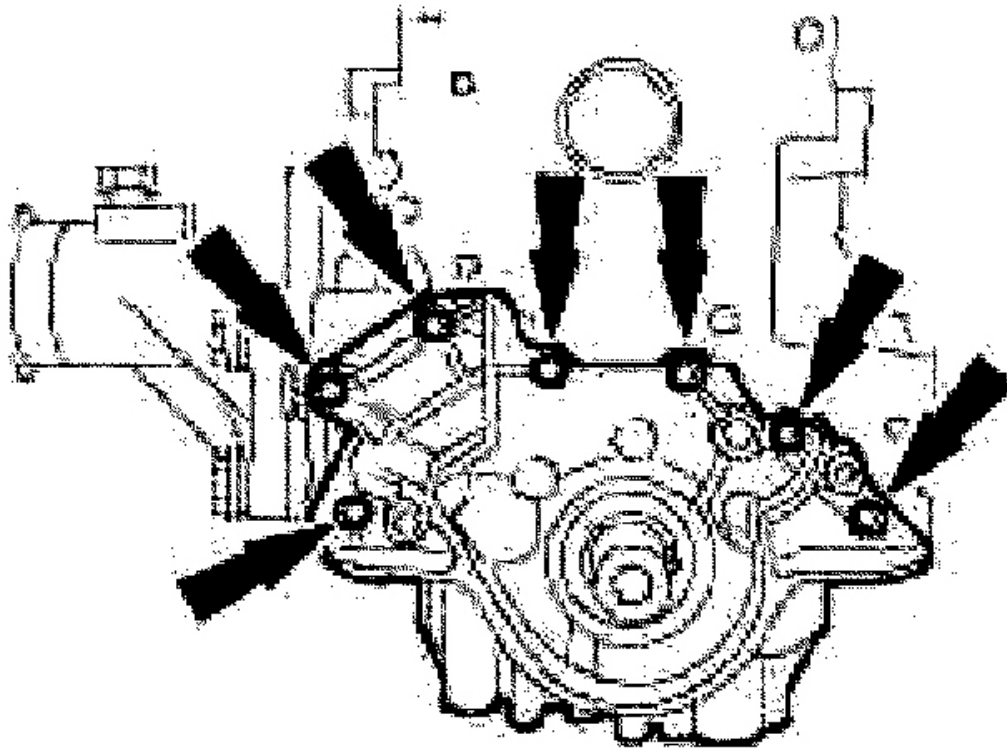
G03432913

Fig. 330: Identifying Oil Pump Bolts
Courtesy of FORD MOTOR CO.

25. Install the oil pump with a new crankshaft front seal.
 - Check the alignment as described in the previous step, and correct if necessary.
 - Tighten the bolts in two stages:
 - Stage 1: 6 N.m.
 - Stage 2: 45 degrees.

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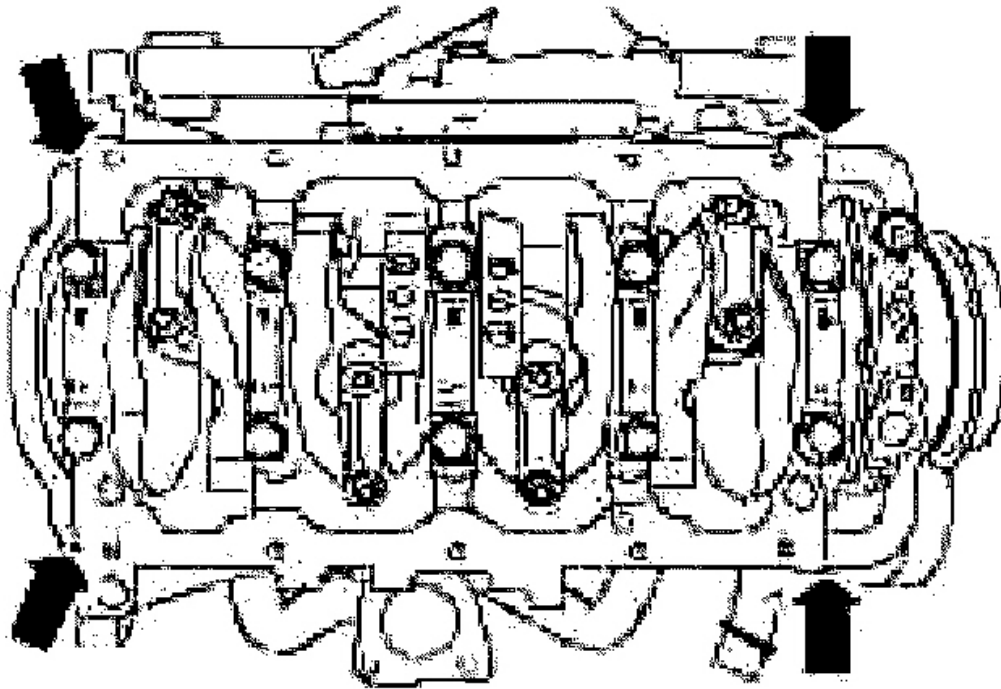
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432914

Fig. 331: Identifying Oil Pump Tightening Bolt
Courtesy of FORD MOTOR CO.

NOTE: Install the lower crankcase within 10 minutes of applying the sealer.



G03432915

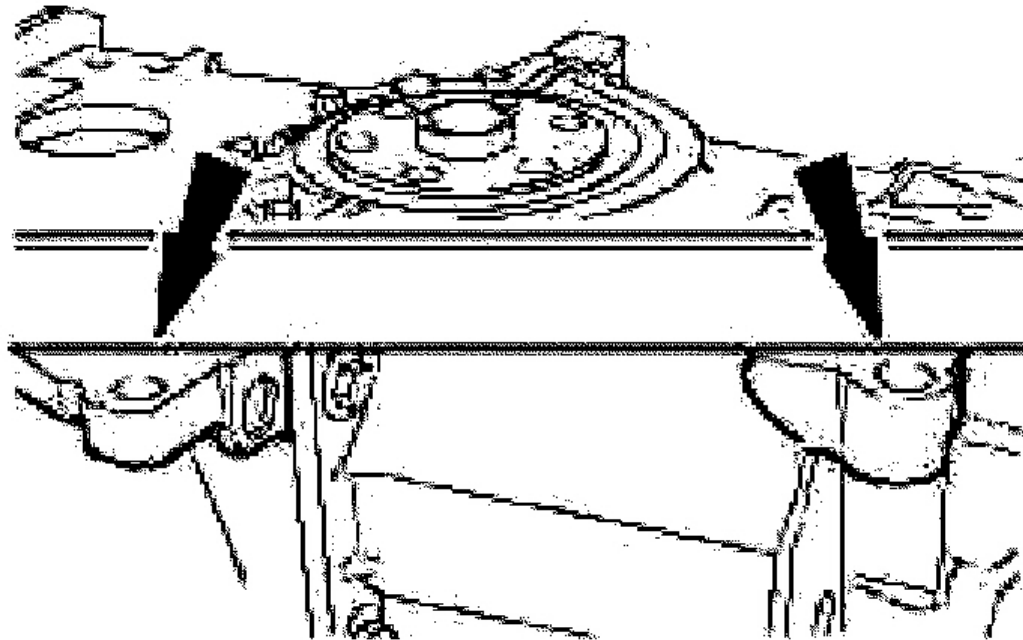
Fig. 332: Identifying Sealant Applying Area
Courtesy of FORD MOTOR CO.

26. Apply a 4 mm bead of sealant to the areas as shown.

NOTE: If the permissible amounts for protrusion or gap are exceeded, install shims as described in the following steps.

27. Align the lower crankcase.

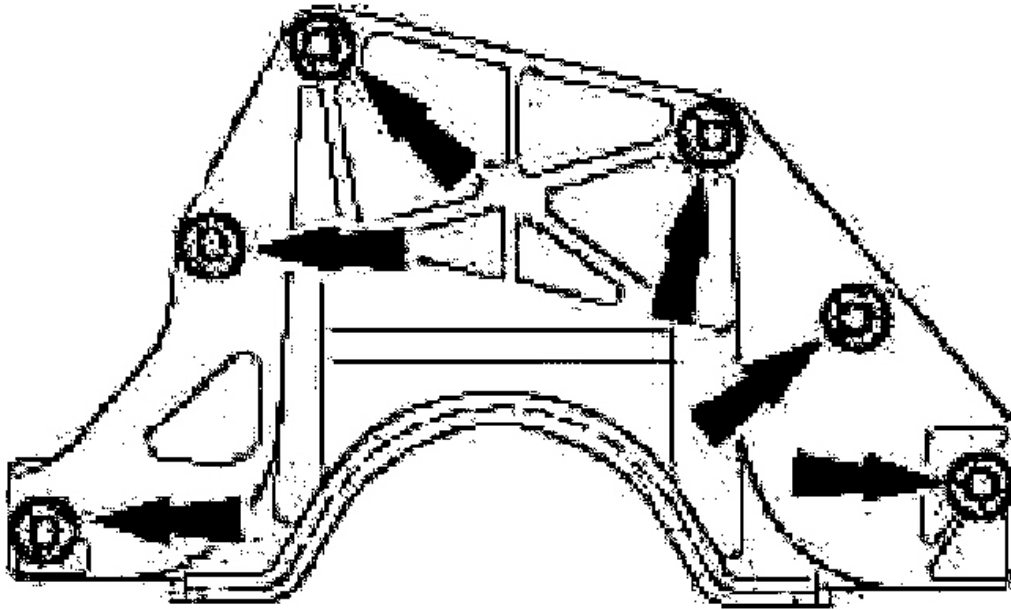
- Position the lower crankcase with a new gasket and tighten the bolts finger tight.
- Align the lower crankcase using a steel straight edge so that the cylinder block and the lower crankcase are level, or at least do not exceed the following tolerances:
 - 0.10 mm protrusion to 0.25 mm gap.



G03432916

Fig. 333: Aligning Lower Crankcase
Courtesy of FORD MOTOR CO.

28. Install lower crankcase spacer washers as necessary.
- With a gap of 0.26 - 0.50 mm, install 0.25 mm spacer washers.
 - With a gap of 0.51 - 0.75 mm, install 0.50 mm spacer washers.



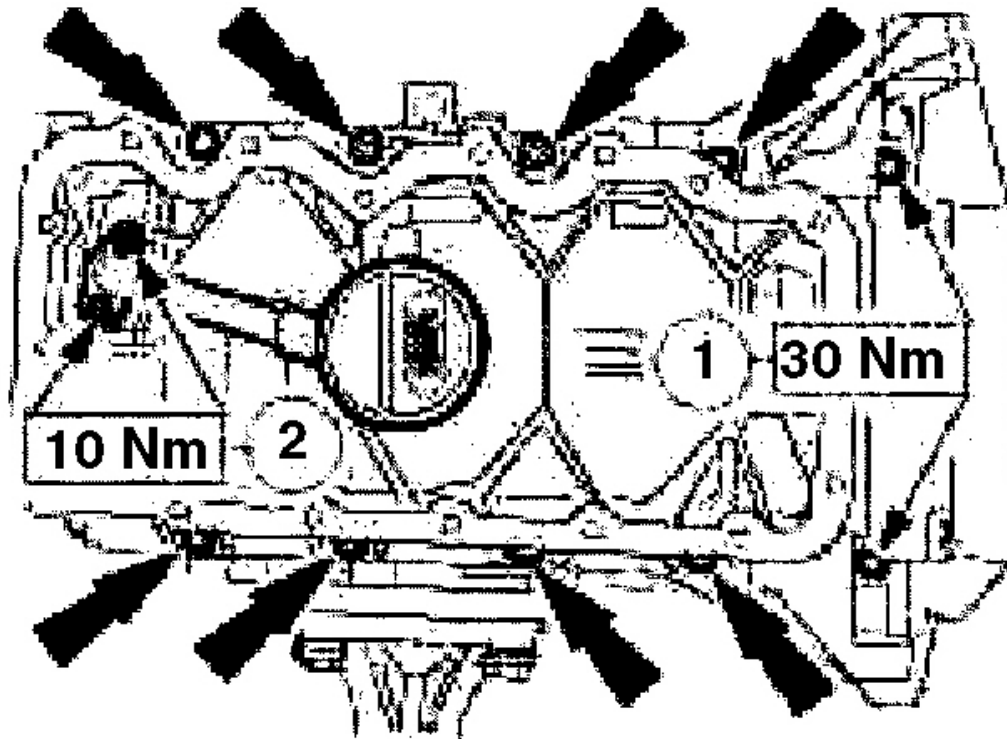
G03432917

Fig. 334: Installing Lower Crankcase Spacer Washers
Courtesy of FORD MOTOR CO.

29. Attach the lower crankcase and the oil intake pipe using a new gasket.
 1. Tighten the bolts and check the alignment as described in the previous step, correct as necessary.
 2. Oil intake pipe bolts.

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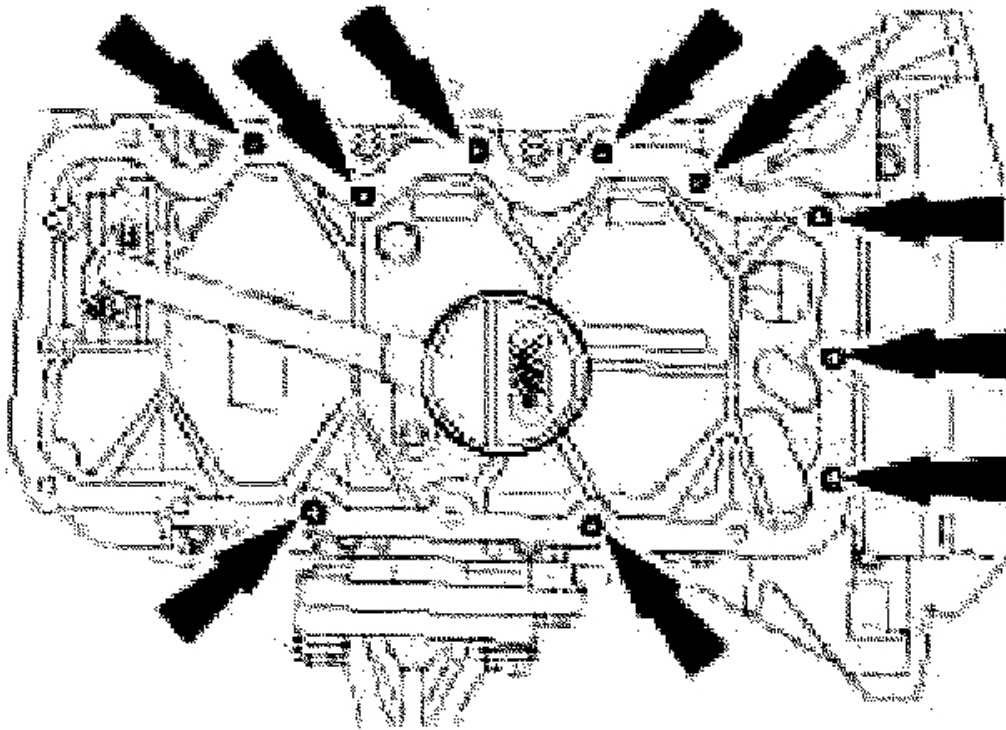


G03432918

Fig. 335: Identifying Bolts For Attaching Lower Crankcase With Oil Intake Pipe

Courtesy of FORD MOTOR CO.

CAUTION: Use studs. Sealant in the dead end bores can cause damage to the ladder frame.



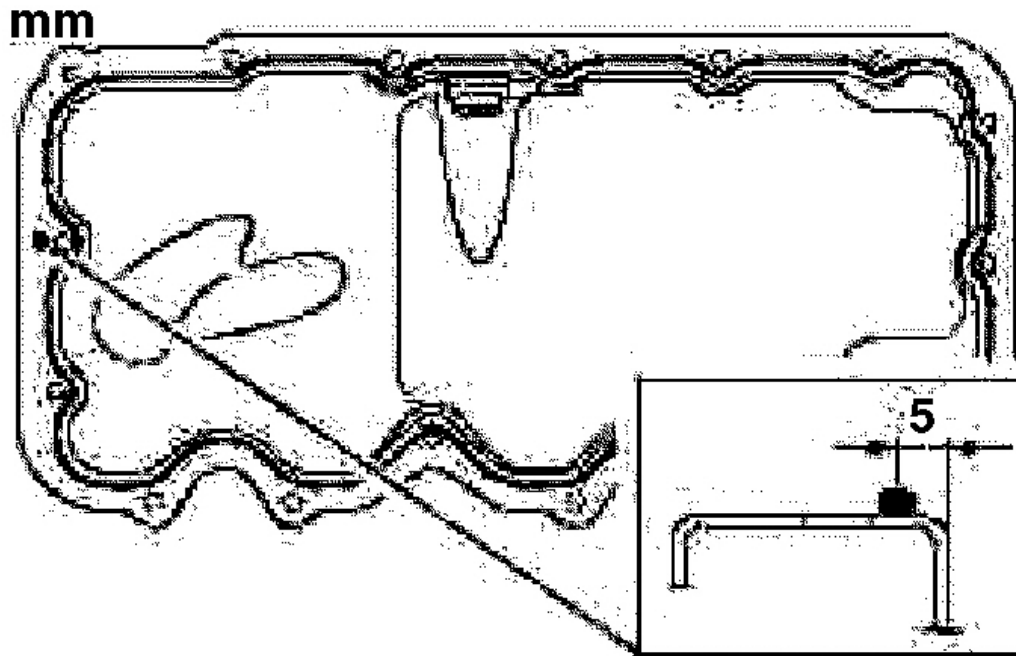
G03432919

Fig. 336: Installing Studs
Courtesy of FORD MOTOR CO.

30. Install 10 studs, M6 x 20, in the shown dead end bores.
31. Clean off any residues of oil or oil sludge from the oil pan.

NOTE: The sealing surfaces must be free of oil and sealant residue.

NOTE: Attach the oil pan within 10 minutes of applying the sealant.



G03432920

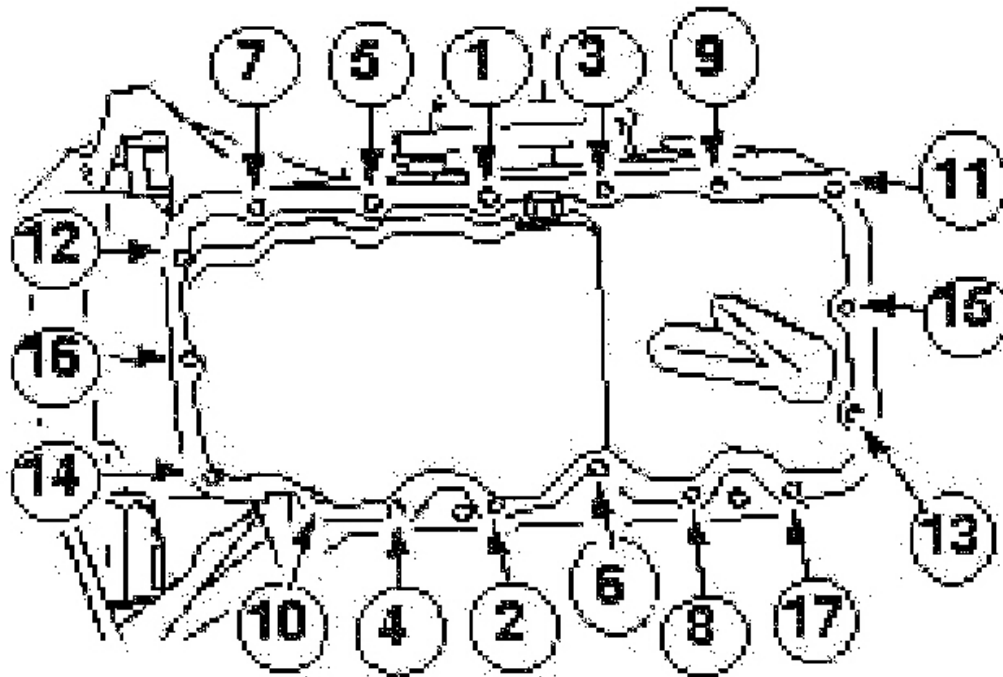
Fig. 337: Applying Sealant To Oil Pan Flange
Courtesy of FORD MOTOR CO.

32. Apply a 3 mm bead of sealant to the oil pan flange.

NOTE: Do not remove the oil pan after the first contact with the ladder frame.

33. Install the oil pan.

- Tighten the bolts in the sequence shown in two stages.
- Stage 1: 6 N.m.
- Stage 2: 12 N.m.



G03432921

Fig. 338: Identifying Oil Pan Installing Bolt Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Since the engine is not free-wheeling, timing procedures must be followed exactly or piston and valve damage can occur.

NOTE: The Woodruff key on crankshaft will be at 10 o'clock position.

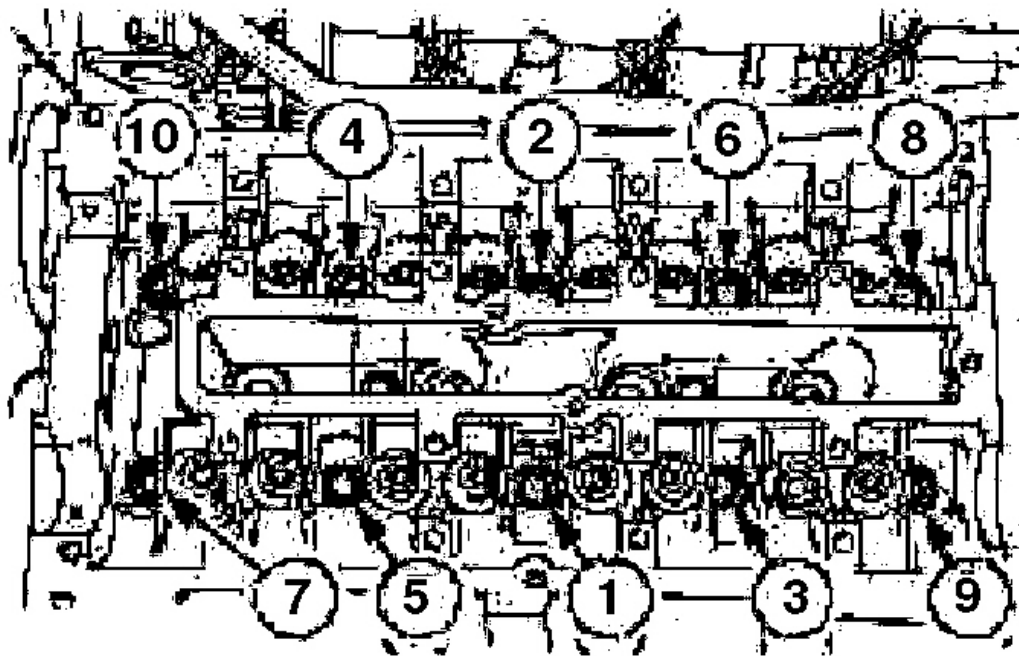
34. Rotate the crankshaft to approximately 60 degrees BTDC.

NOTE: Install a new cylinder head gasket.

NOTE: Install the cylinder head bolts free of oil.

35. Install the cylinder head.

- Tighten the cylinder head bolts in three stages in the indicated sequence.
- Stage 1: 20 N.m.
- Stage 2: 40 N.m.
- Stage 3: 90 degrees.



G03432922

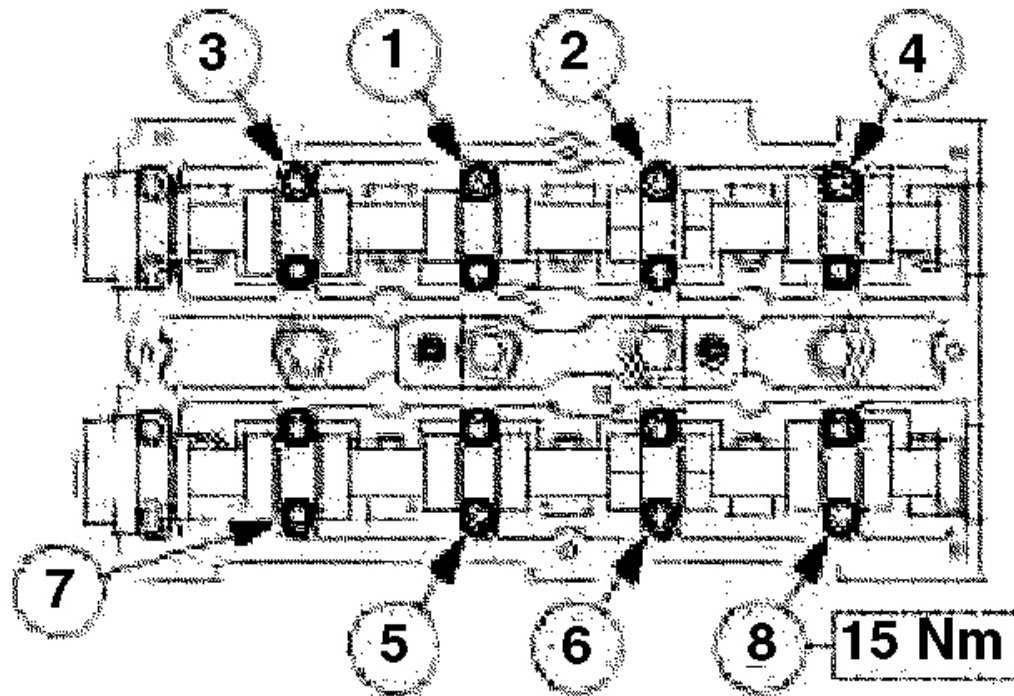
Fig. 339: Identifying Cylinder Head Bolt Installing Sequence
Courtesy of FORD MOTOR CO.

36. Lubricate the valve tappets with engine oil and install them in the correct order.
37. Install the camshafts in place with none of the cams at full lift.
38. Coat the camshafts and camshaft bearing caps with engine oil and insert them.

NOTE: Working in several stages, evenly tighten the camshaft bearing cap bolts in the indicated sequence, half a turn at a time.

39. Install the camshafts.

- Tighten the bolts in the sequence shown.

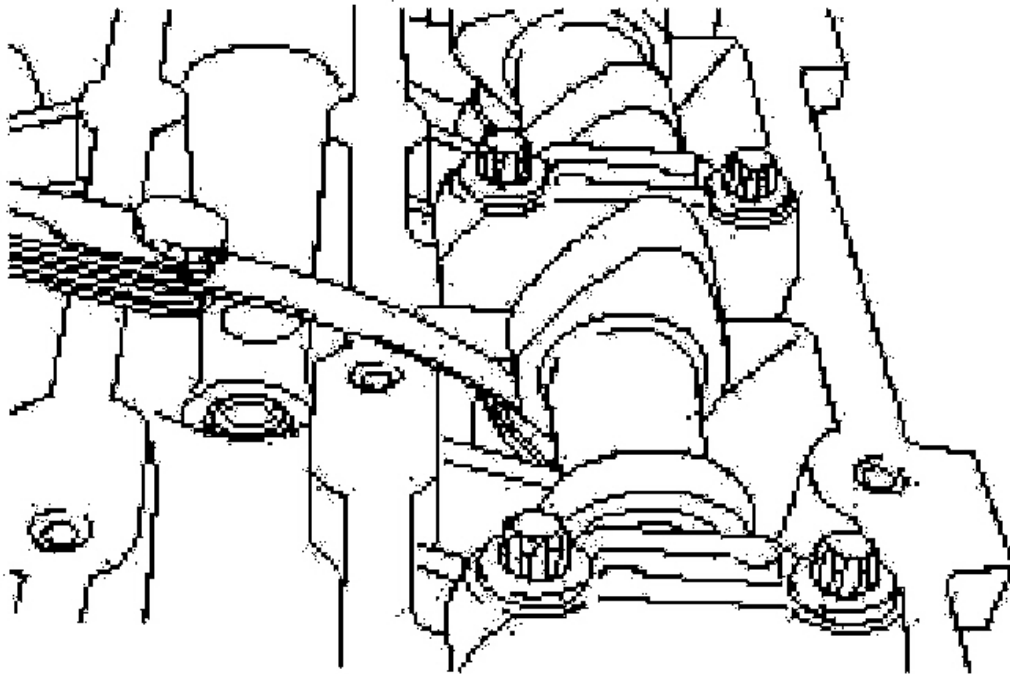


G03432923

Fig. 340: Identifying Camshaft Bolt Installing Sequence
Courtesy of FORD MOTOR CO.

- NOTE:** Note down each cylinder number and the valve clearances measured.
- NOTE:** Only rotate the camshaft in the normal direction of rotation to measure the valve clearance.

40. Using a suitable set of feeler gauges, measure the valve clearance.
- Permitted valve clearance: inlet (0.21 - 0.29 mm)
 - Permitted valve clearance: exhaust (0.32 - 0.40 mm)



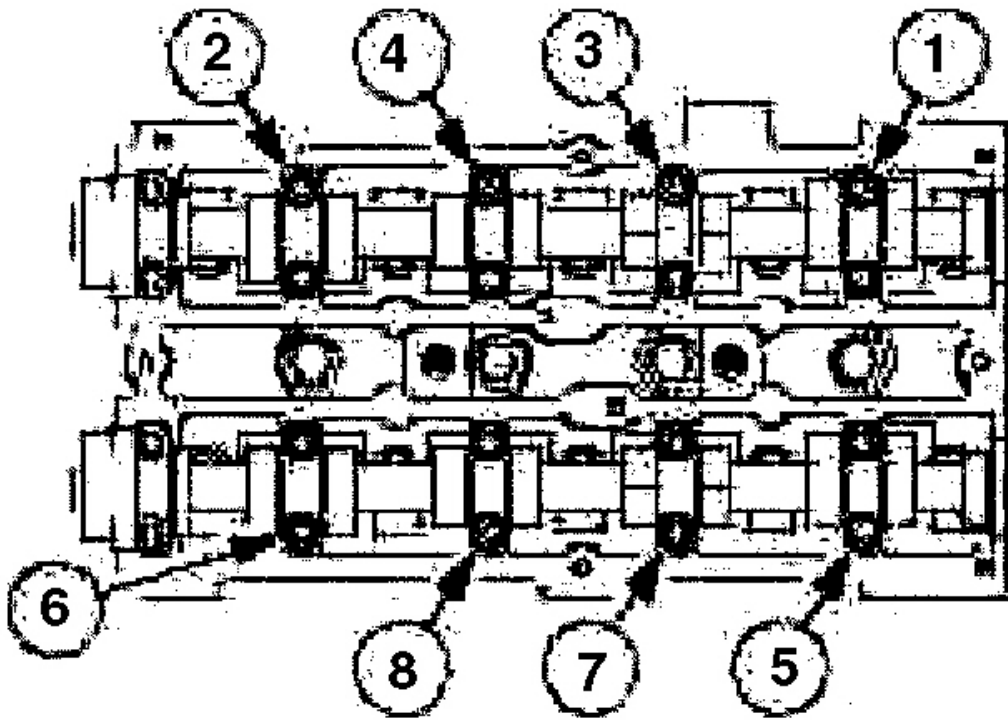
G03432924

Fig. 341: Measuring Valve Clearance
Courtesy of FORD MOTOR CO.

CAUTION: Loosen and remove the camshaft bearing cap retaining bolts in the sequence shown.

NOTE: Only carry out the following steps when the valve clearance(s) require adjustment.

NOTE: Working in several stages, evenly loosen each bolt two turns at a time in the sequence shown.



G03432925

Fig. 342: Identifying Camshafts Removing Bolts
Courtesy of FORD MOTOR CO.

41. Remove the camshafts.

NOTE: Aim to set the valve clearance to the middle of the range (inlet 0.25 mm; exhaust 0.36 mm)

NOTE: The number on the valve tappet indicates the valve tappet thickness.

42. Determine the tappet thickness required.

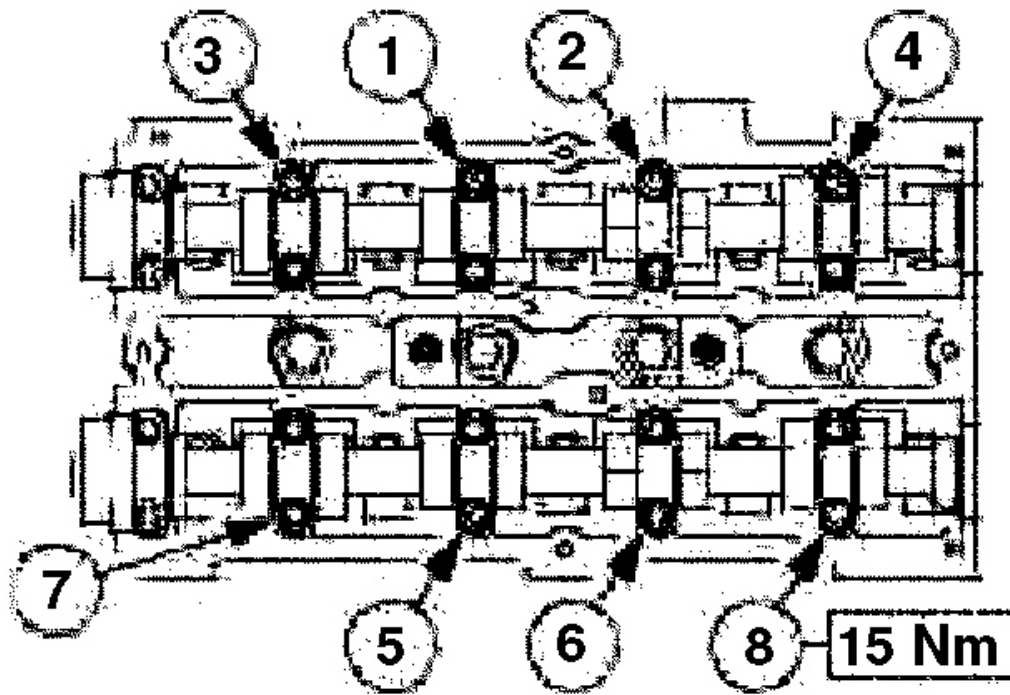
- Remove the valve tappet and read the thickness from the underside.
- Calculate the valve tappet thickness required and insert the correct tappet.

- Inlet valves: tappet thickness required = thickness of currently installed tappets + measured valve clearance - 0.25 mm.
- Exhaust valves: tappet thickness required = thickness of currently installed tappets + measured valve clearance - 0.36 mm.

NOTE: Working in several stages, evenly tighten the camshaft bearing cap bolts in the indicated sequence, half a turn at a time.

43. Install the camshafts.

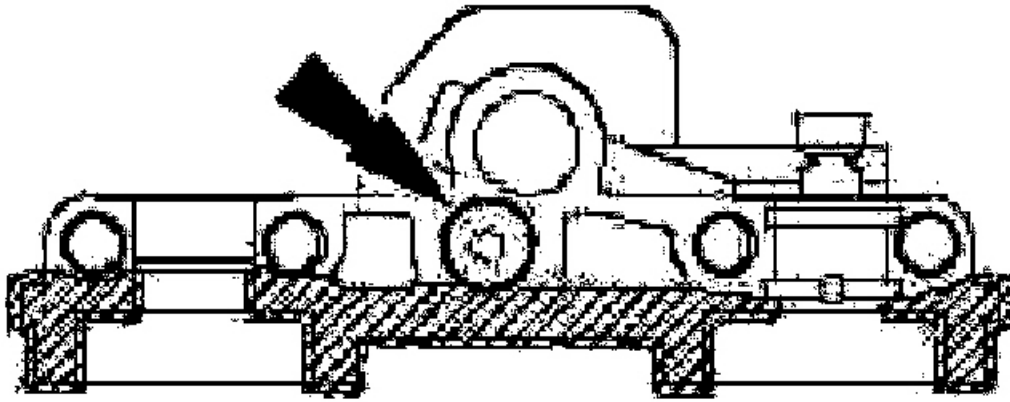
- Tighten the bolts in the sequence shown.



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Fig. 343: Identifying Camshafts Bolts Installing Sequence
Courtesy of FORD MOTOR CO.

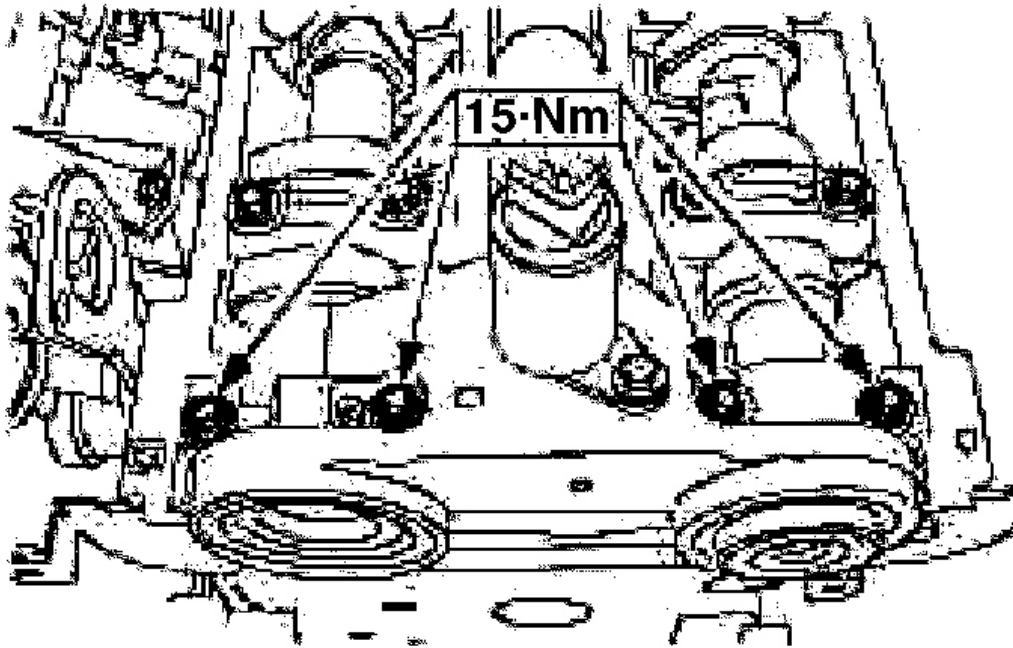
NOTE: Install a new oil feed flange seal.



G03432927

Fig. 344: Identifying Sealant Applying Area
Courtesy of FORD MOTOR CO.

44. Apply sealant to the marked areas on the oil feed flange.
45. Install the oil feed flange.

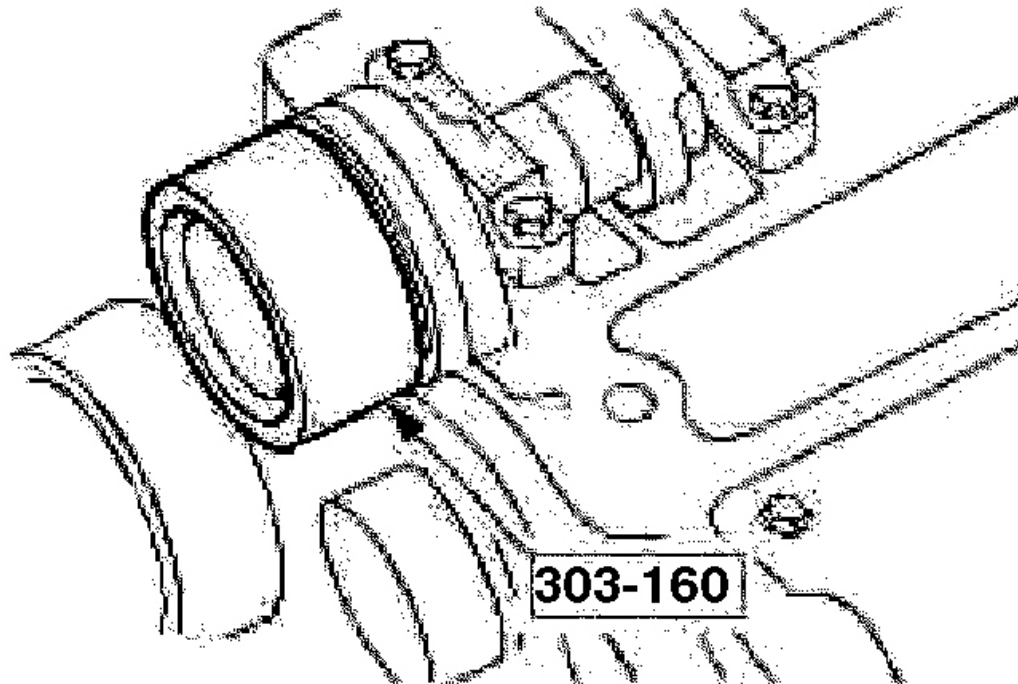


G03432928

Fig. 345: Installing Oil Feed Flange
Courtesy of FORD MOTOR CO.

NOTE: Rotate the camshafts to measure the valve clearance.

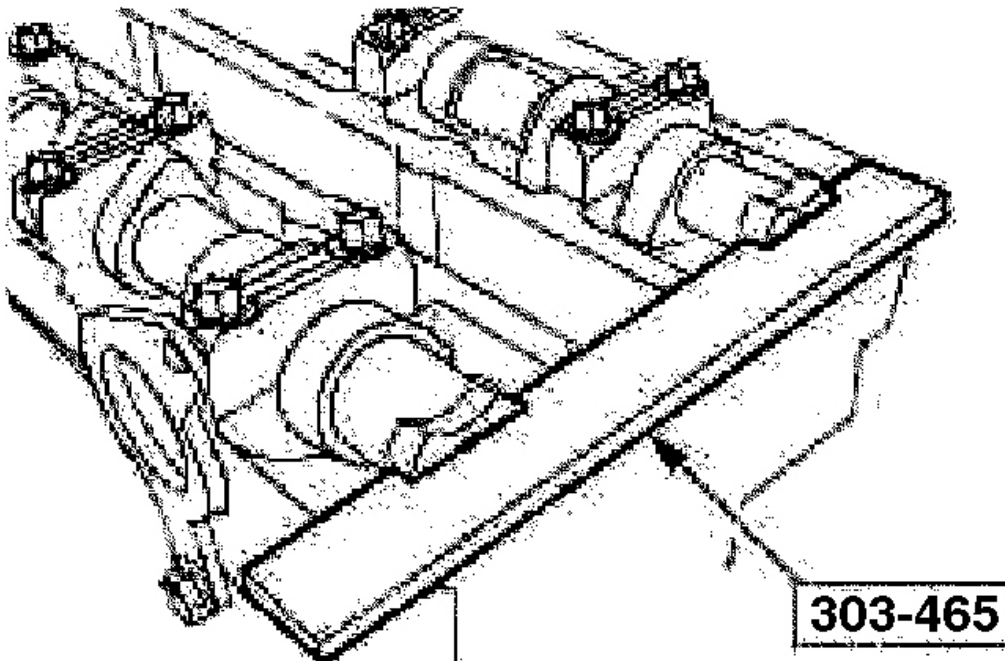
46. Recheck the valve clearance.
47. Install the exhaust camshaft seal.
 - Lubricate the camshaft and the seal lip of the seal with engine oil.
 - Draw in the new seals using the special tool, a washer and an M10 x 70 bolt.



G03432929

Fig. 346: Installing Exhaust Camshaft Seal
Courtesy of FORD MOTOR CO.

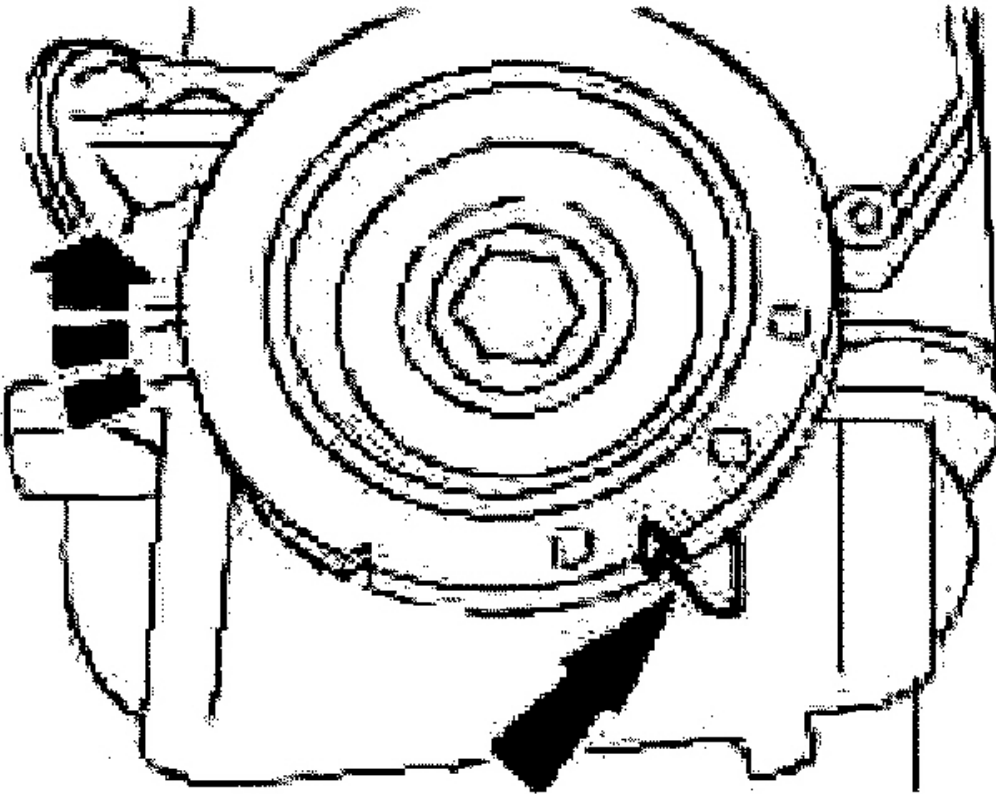
48. Rotate the camshafts to ignition point on cylinder number 1 and insert the special tool into the camshafts.



G03432930

Fig. 347: Inserting Special Tool Into Camshafts
Courtesy of FORD MOTOR CO.

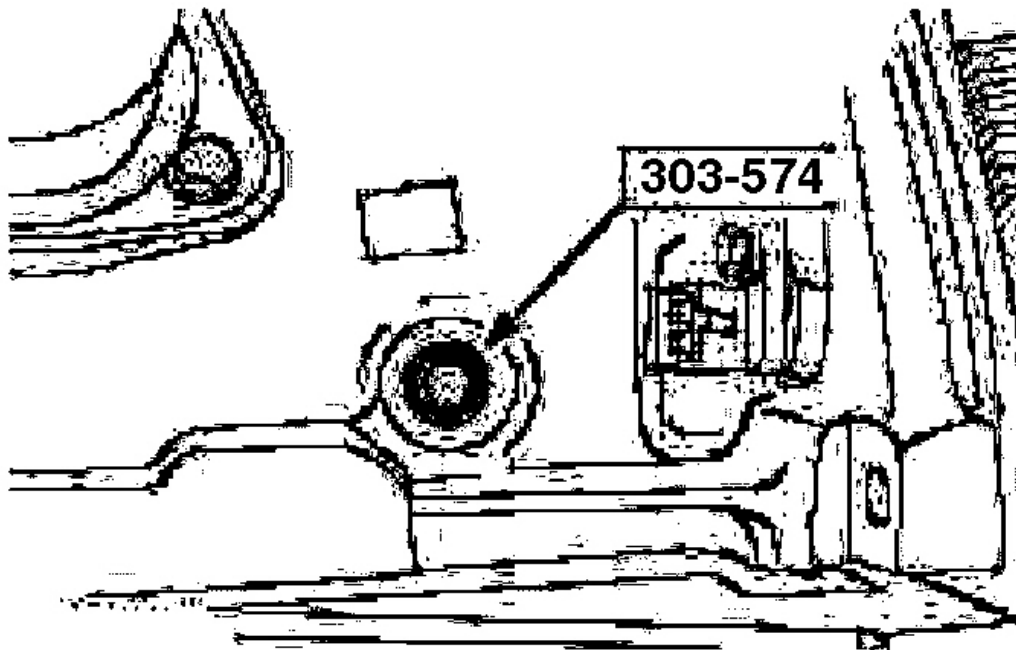
NOTE: Rotate the crankshaft clockwise.



G03432931

Fig. 348: Rotating Crankshaft Clockwise
Courtesy of FORD MOTOR CO.

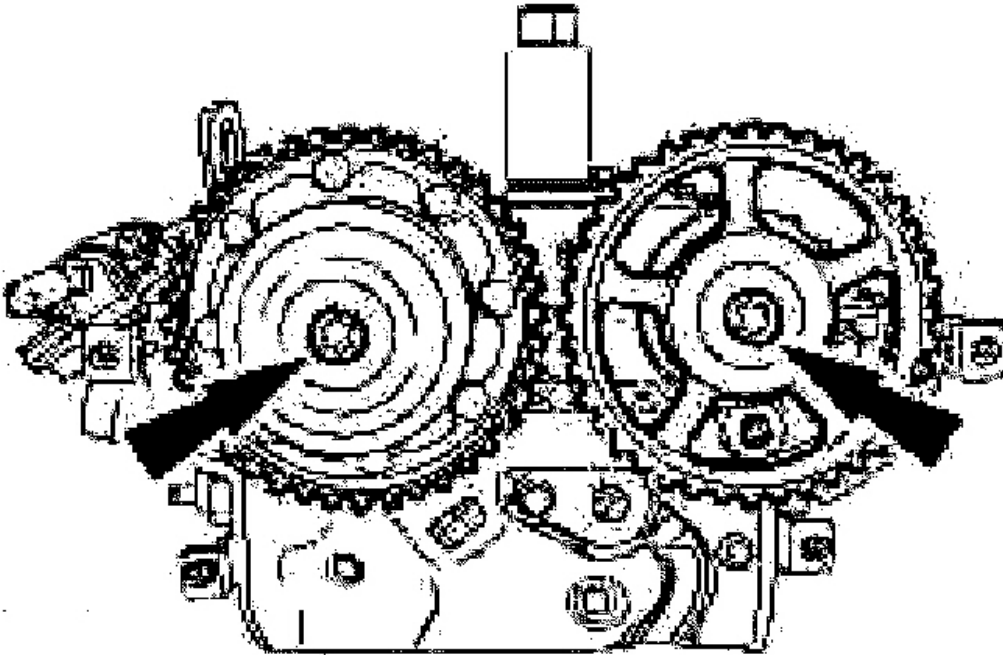
49. Rotate the crankshaft to TDC on cylinder number 1.
50. Remove the blanking plug and using the special tool, align the crankshaft to TDC.



G03432932

Fig. 349: Using Special Tool Aligning Crankshaft To TDC
Courtesy of FORD MOTOR CO.

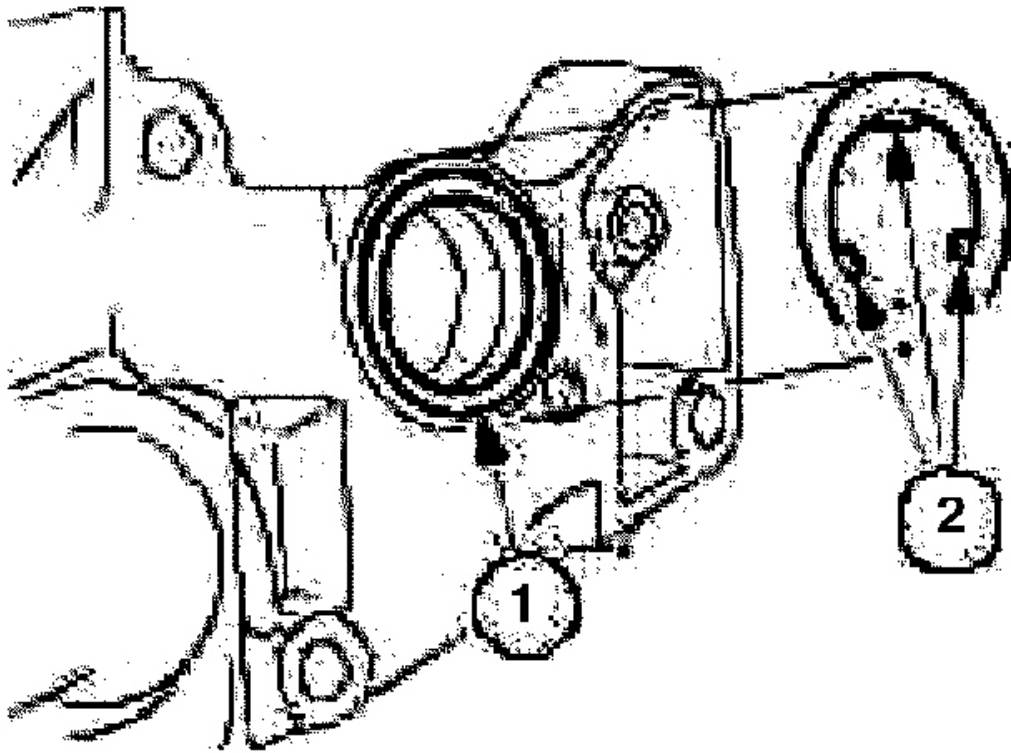
NOTE: Do not fully tighten the camshaft pulley retaining bolts at this stage.



G03432933

Fig. 350: Installing Camshaft Pulleys
Courtesy of FORD MOTOR CO.

51. Install the camshaft pulleys.
52. Install a new coolant pump gasket by bending over the tabs.
 1. Lay the gasket in place.
 2. Secure the gasket by bending over the tabs.



G03432934

Fig. 351: Installing Coolant Pump Gasket
Courtesy of FORD MOTOR CO.

CAUTION: Do not kink the timing belt (do not bend the timing belt by more than a diameter of 35 mm).

CAUTION: Do not rotate the crankshaft; check that it is still resting against the timing pin.

NOTE: The lug of the timing belt tensioner must not be hooked into the sheet metal cover during timing belt installation.

53. Install a new timing belt.

1. Slide the crankshaft timing pulley with a thrust washer onto the crankshaft.

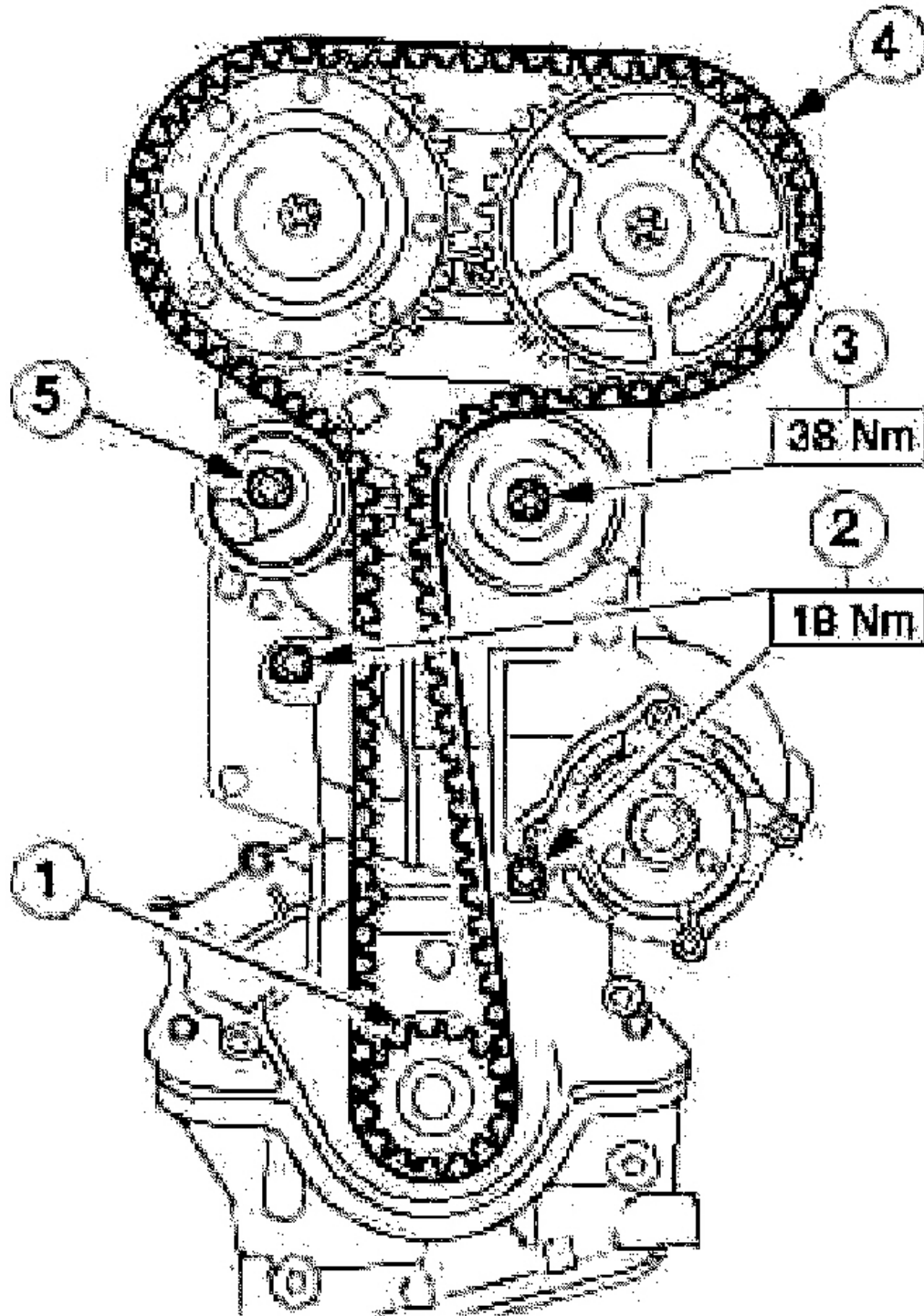
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2. Install the coolant pump.
3. Install the upper idler pulley.
4. Starting from the crankshaft timing belt pulley and working counterclockwise, position the timing belt in place while keeping it under tension.
5. Install the timing belt tensioner and tighten the bolt five turns.

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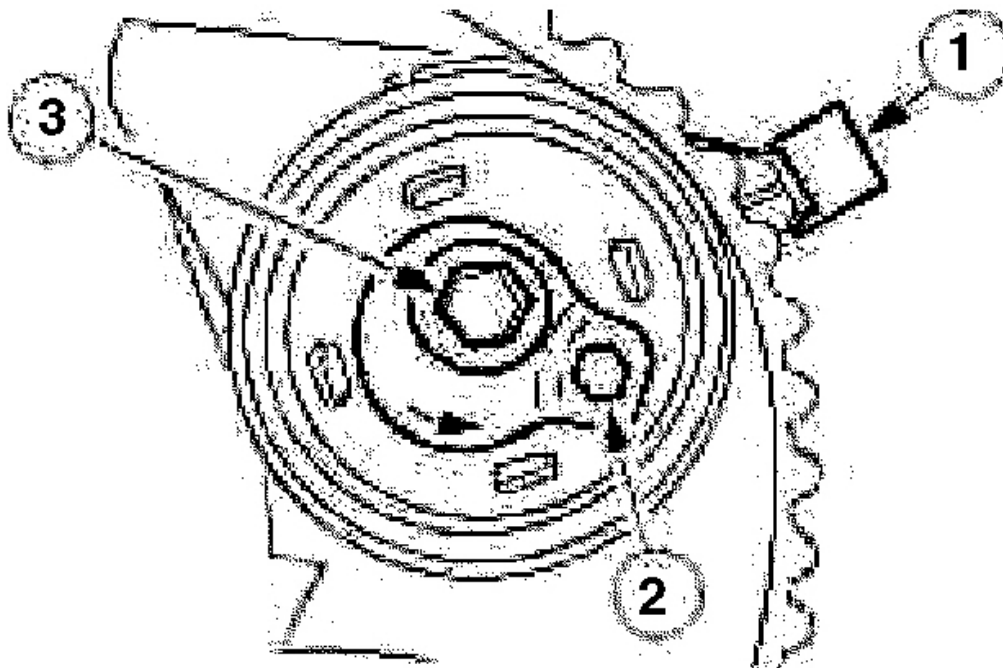
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Fig. 352: Installing Timing Belt
Courtesy of FORD MOTOR CO.

CAUTION: Incorrect timing belt tension will cause incorrect valve timing.

54. Pre tension the timing belt.

1. Rotate the tensioner locating tab counterclockwise and insert the locating tab into the slot in the rear timing cover.
2. Position the hexagonal key slot in the tensioner adjusting washer to the 4 o'clock position.
3. Using a 6 mm hexagonal key tighten the bolt enough to seat the tensioner firmly against the rear timing cover, but still allow the tensioner adjusting washer to be rotated.

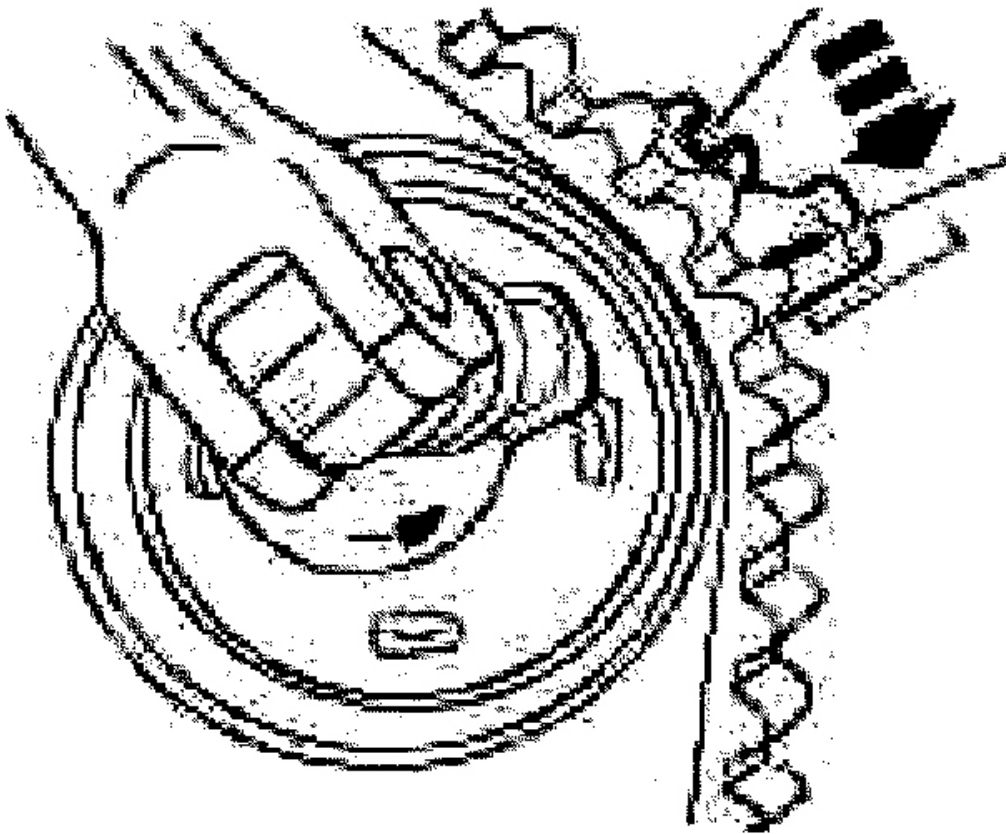


G03432936

Fig. 353: Pre Tensioning Timing Belt

Courtesy of FORD MOTOR CO.

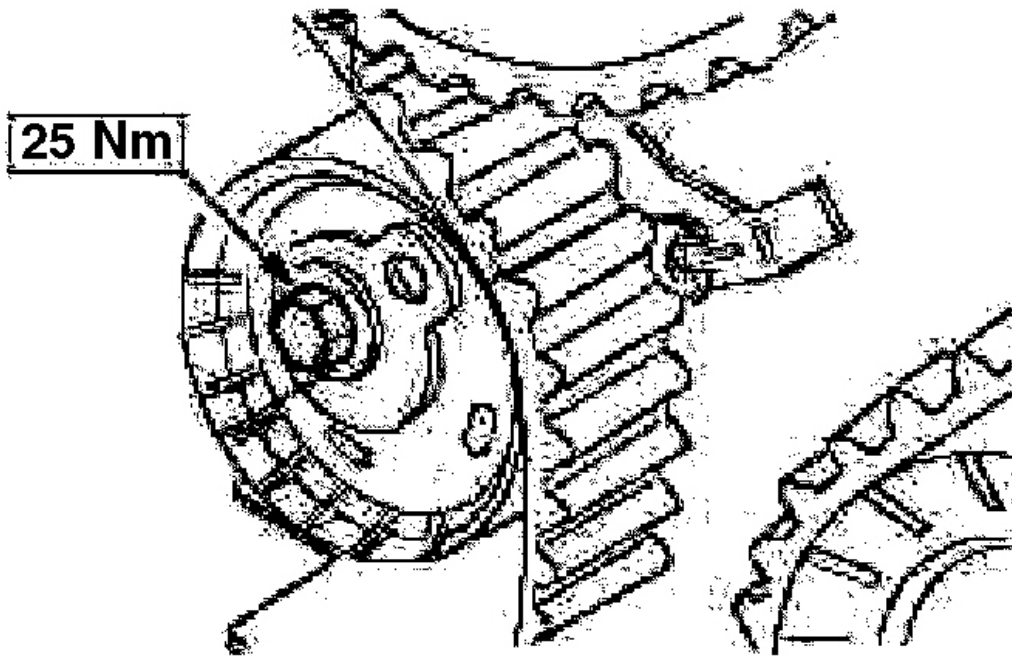
CAUTION: Tension the timing belt, working counterclockwise.



G03432937

Fig. 354: Rotating Adjusting Washer Counterclockwise
Courtesy of FORD MOTOR CO.

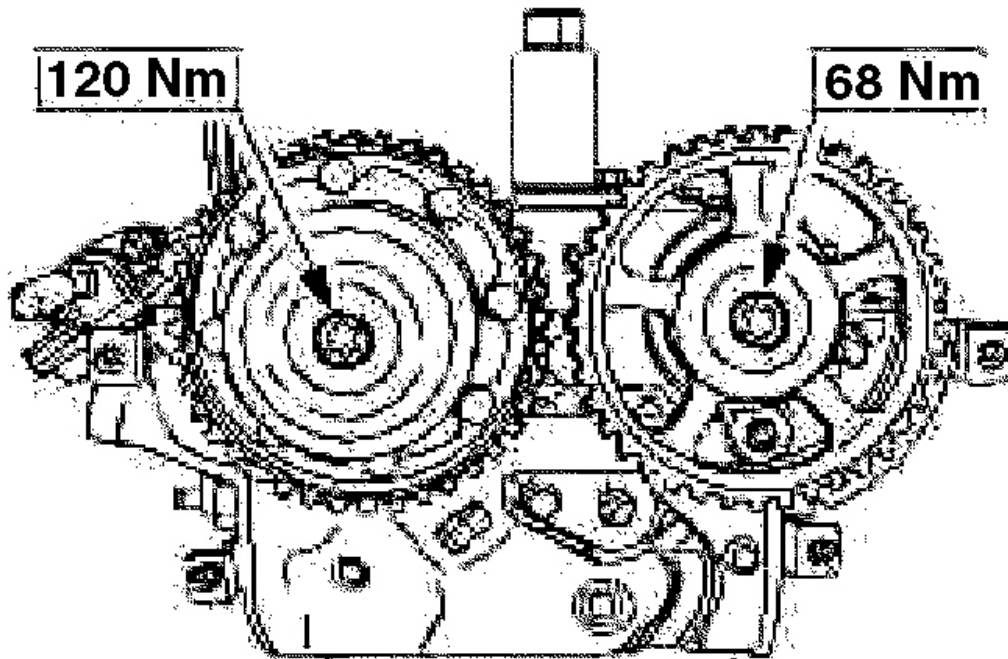
55. Using the hexagonal key, rotate the adjusting washer counterclockwise until the notch in the pointer is centered over the index line on the locating tab (the pointer will move clockwise during adjustment).
56. While holding the adjusting washer in position, tighten the bolt.



G03432938

Fig. 355: Identifying Adjusting Washer Bolt
Courtesy of FORD MOTOR CO.

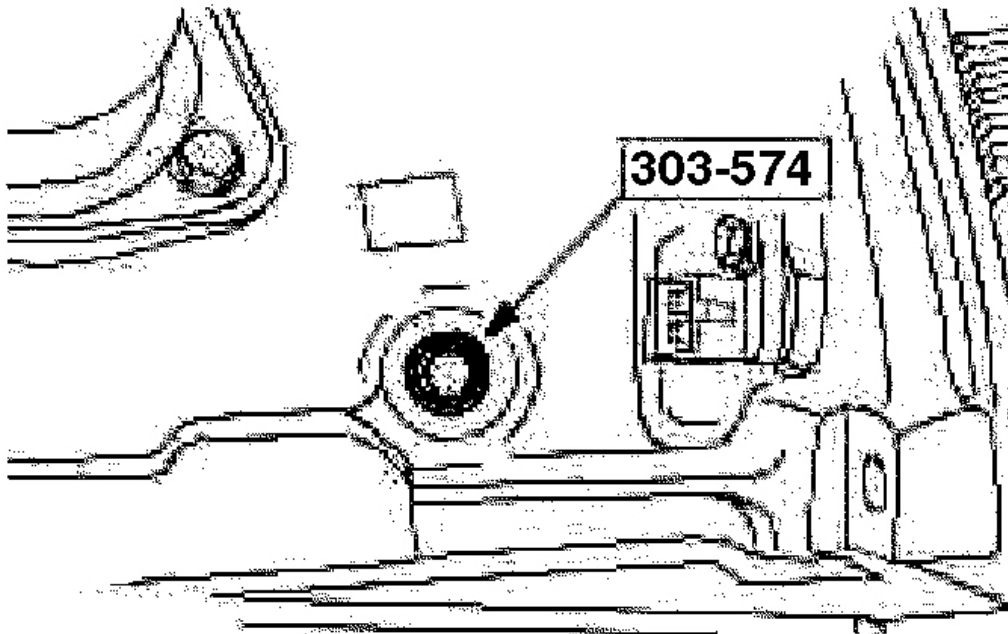
NOTE: Hold the camshafts by the hexagon with an open ended wrench or a suitable pair of locking pliers to prevent them from rotating.



G03432939

Fig. 356: Tightening Camshaft Pulley Retaining Bolts
Courtesy of FORD MOTOR CO.

57. Tighten the camshaft pulley retaining bolts.
58. Remove special tool.



G03432940

Fig. 357: Removing Special Tool
Courtesy of FORD MOTOR CO.

59. Remove special tool.

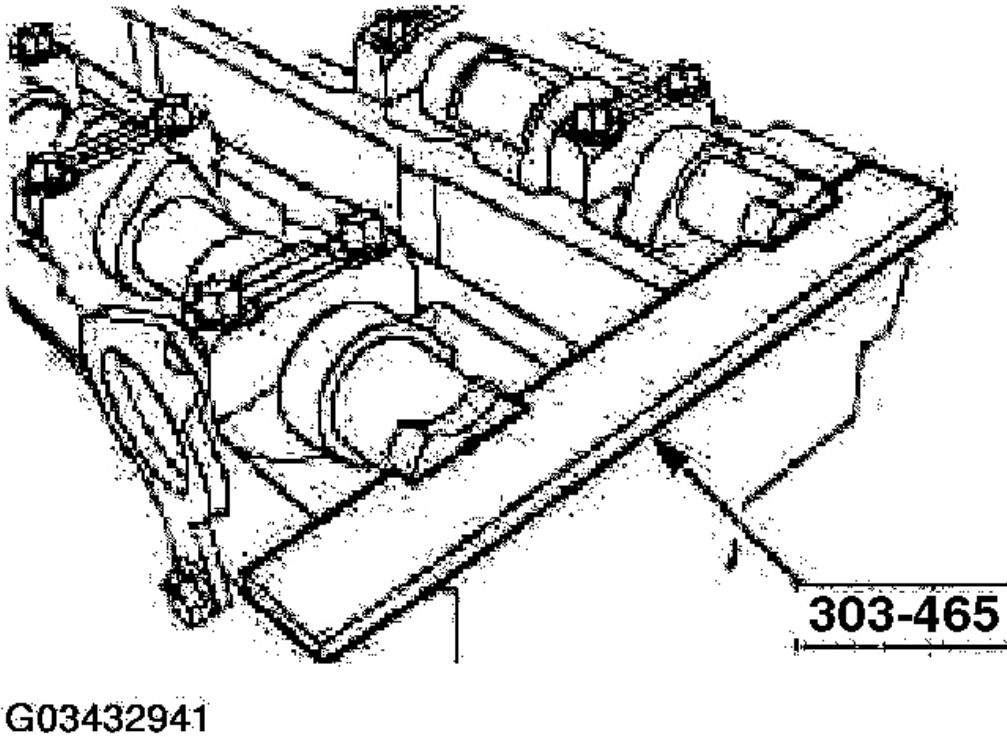
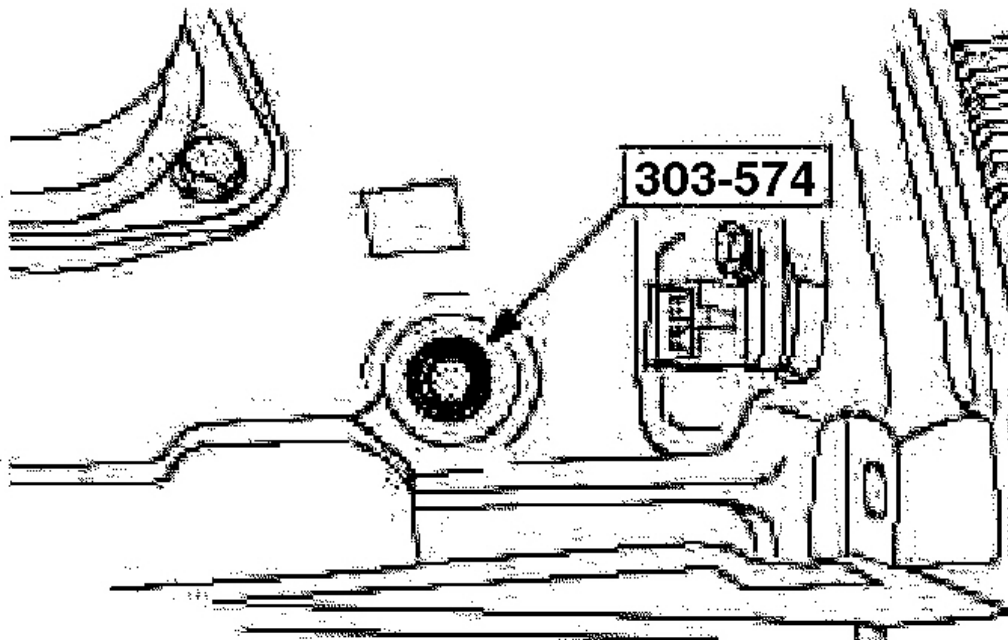


Fig. 358: Removing Special Tool
Courtesy of FORD MOTOR CO.

NOTE: Only rotate the crankshaft in the normal direction of rotation.

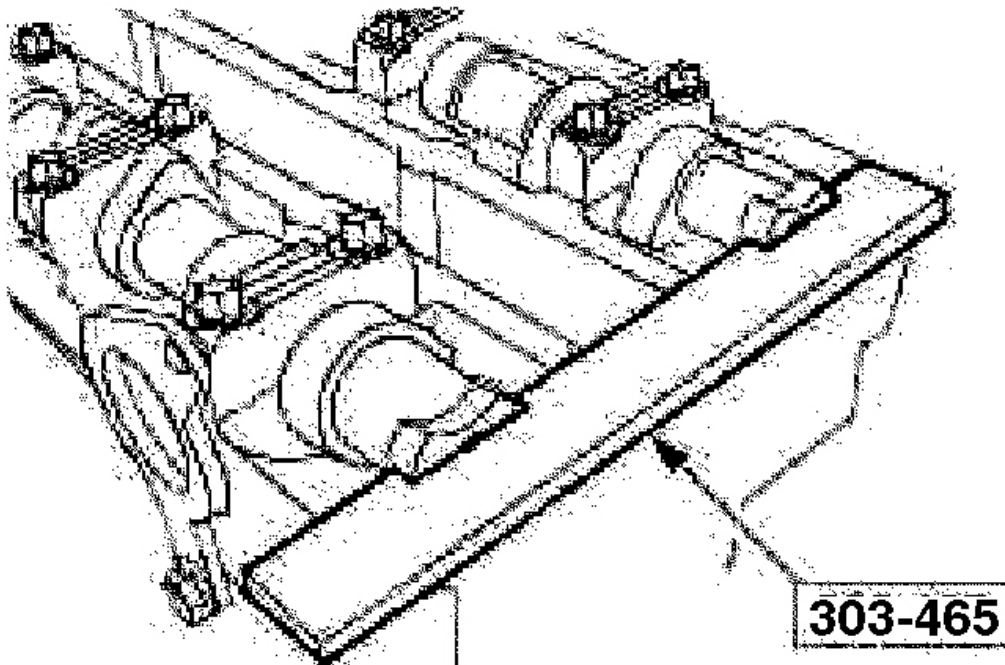
60. Rotate the engine two revolutions.
61. Using the special tool, align the crankshaft to TDC.



G03432942

Fig. 359: Aligning Crankshaft To TDC Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: If its not possible to install the special tool, correct the valve timing.

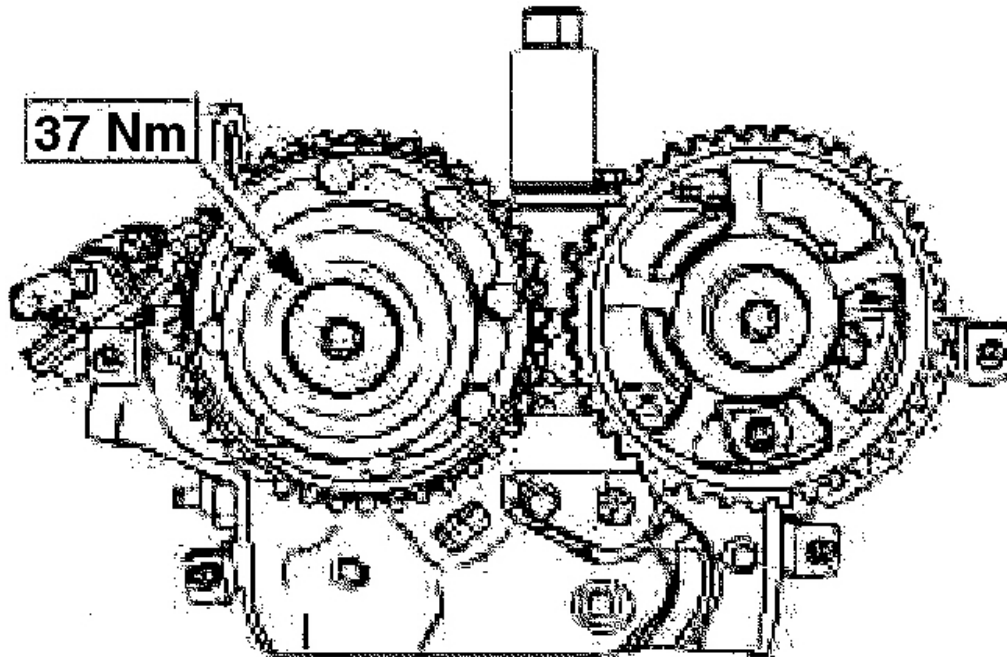


G03432943

Fig. 360: Checking Position Of Camshafts Using Special Tool
Courtesy of FORD MOTOR CO.

62. Using the special tool, check the position of the camshafts, if necessary loosen the timing pulleys and correct the camshaft alignment.

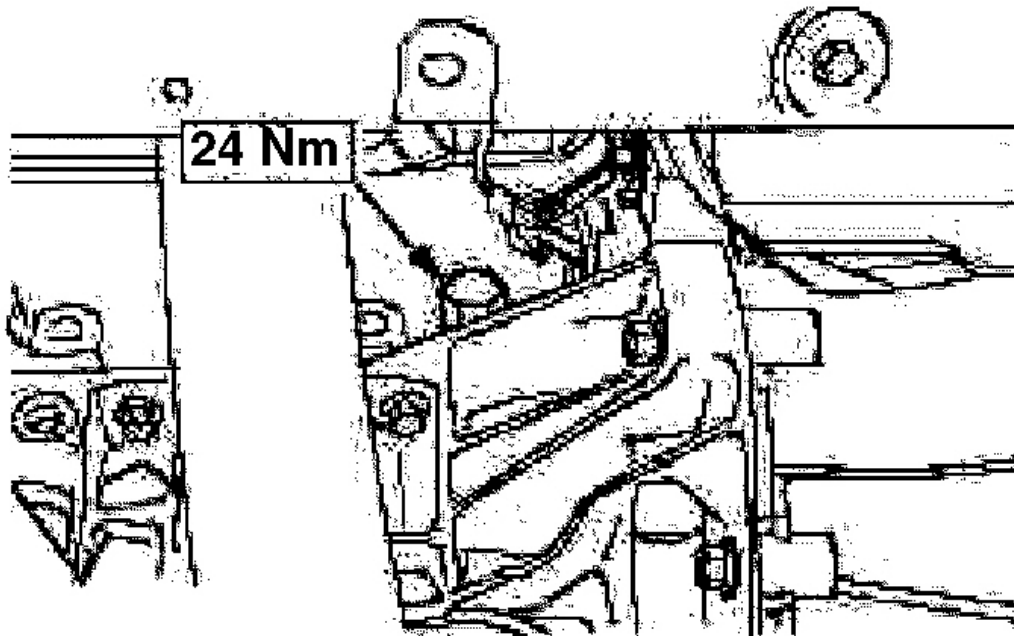
NOTE: Hold the camshaft by the hexagon with an open ended wrench or a suitable pair of locking pliers to prevent it from rotating.



G03432944

Fig. 361: Installing Intake Camshaft Pulley Blanking Plug
Courtesy of FORD MOTOR CO.

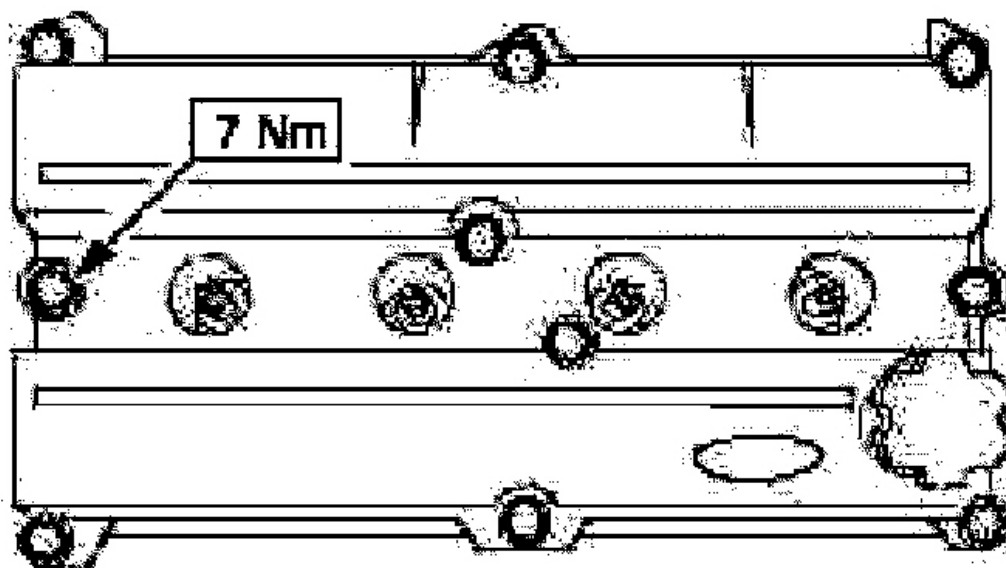
63. Install the intake camshaft pulley blanking plug.
64. Remove the special tools.
65. Install the blanking plug.



G03432945

Fig. 362: Installing Blanking Plug
Courtesy of FORD MOTOR CO.

66. Install the valve cover.



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Fig. 363: Installing Valve Cover
Courtesy of FORD MOTOR CO.

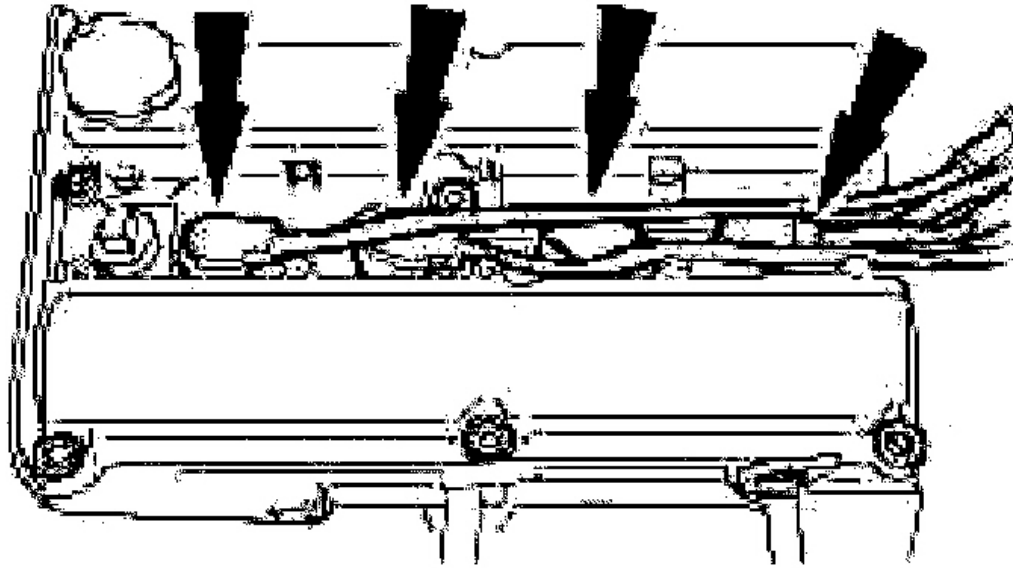
CAUTION: Use a blunt object (a plastic cable tie) to apply the silicone grease to avoid damaging the spark plug electrical connectors.

CAUTION: Push on the spark plug electrical connectors, keeping them in line with the spark plugs.

NOTE: Coat the inside of the spark plug electrical connectors to a depth of 5 - 10 mm with silicone grease.

67. Connect the spark plug electrical connectors.

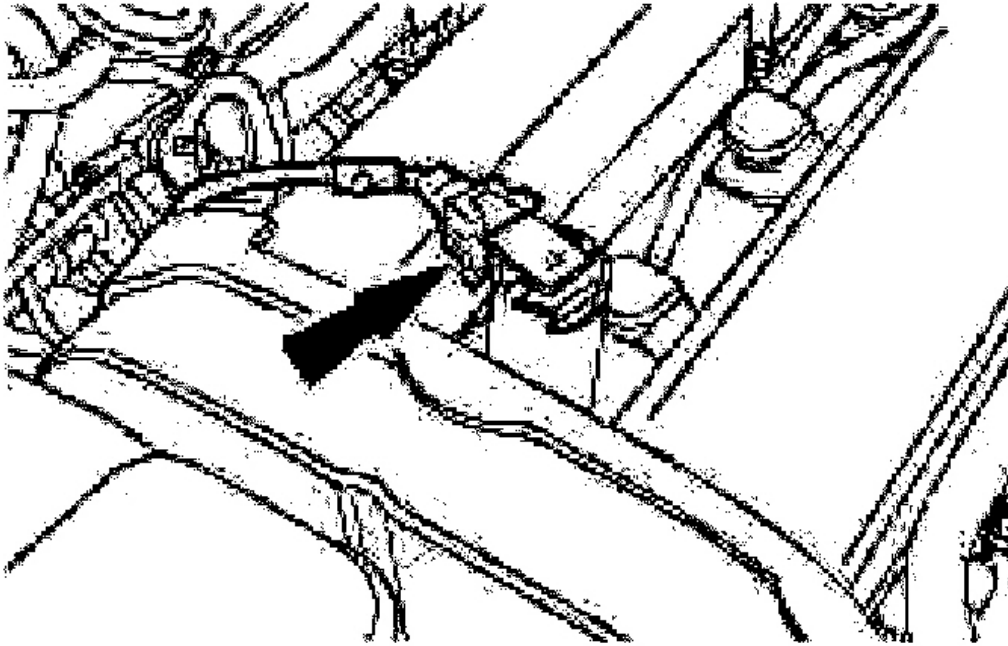
- Push on the spark plug electrical connectors until they click in place.



G03432947

Fig. 364: Connecting Spark Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

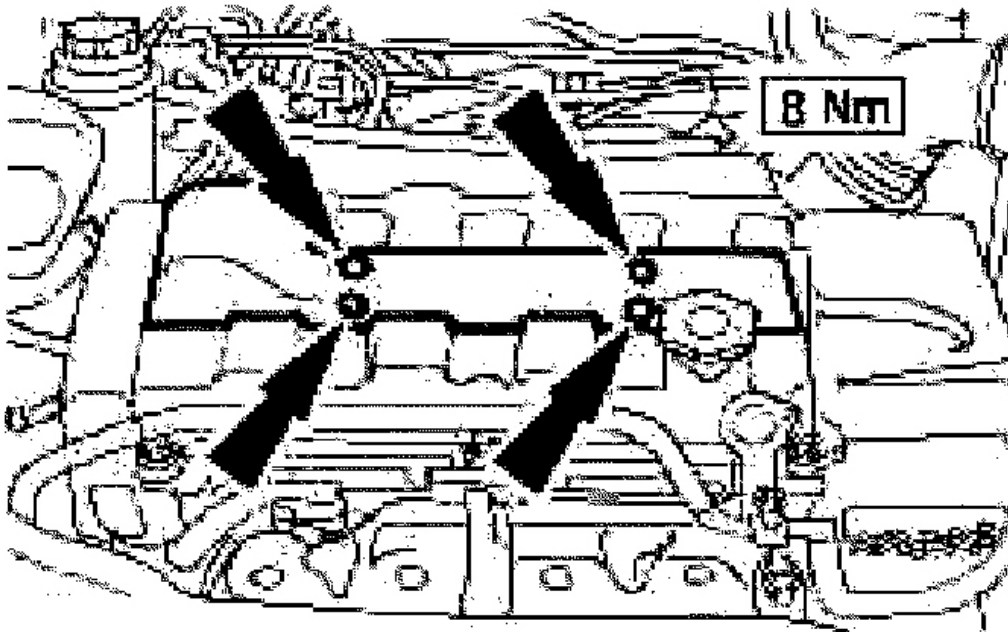
68. Connect the variable camshaft timing (VCT) sensor electrical connector.



G03432948

Fig. 365: Connecting Variable Camshaft Timing (VCT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

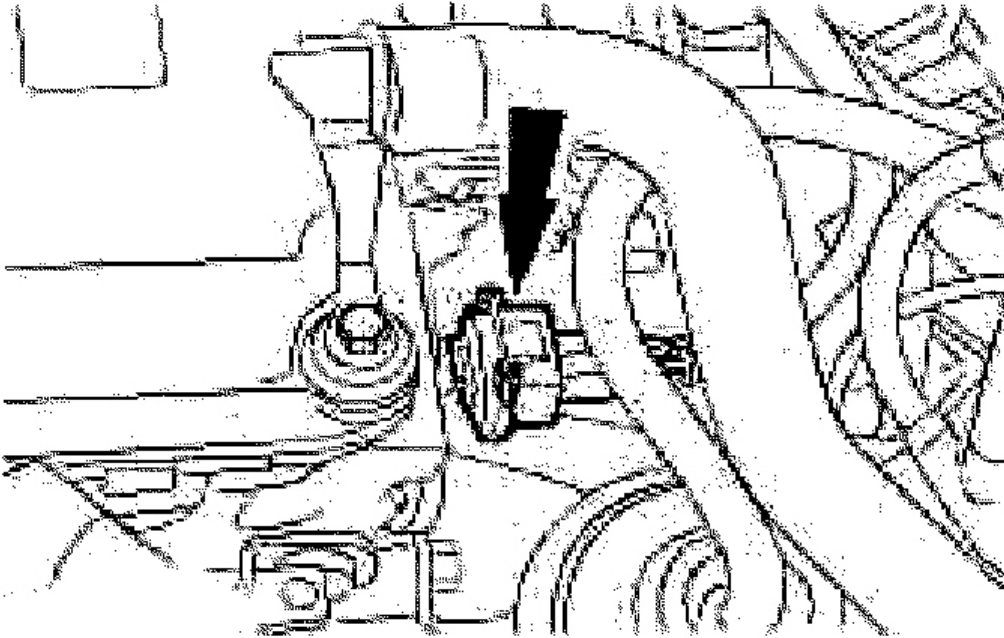
69. Install the spark plug cables cover.



G03432949

Fig. 366: Installing Spark Plug Cables Cover
Courtesy of FORD MOTOR CO.

70. Connect the camshaft position (CMP) sensor electrical connector.



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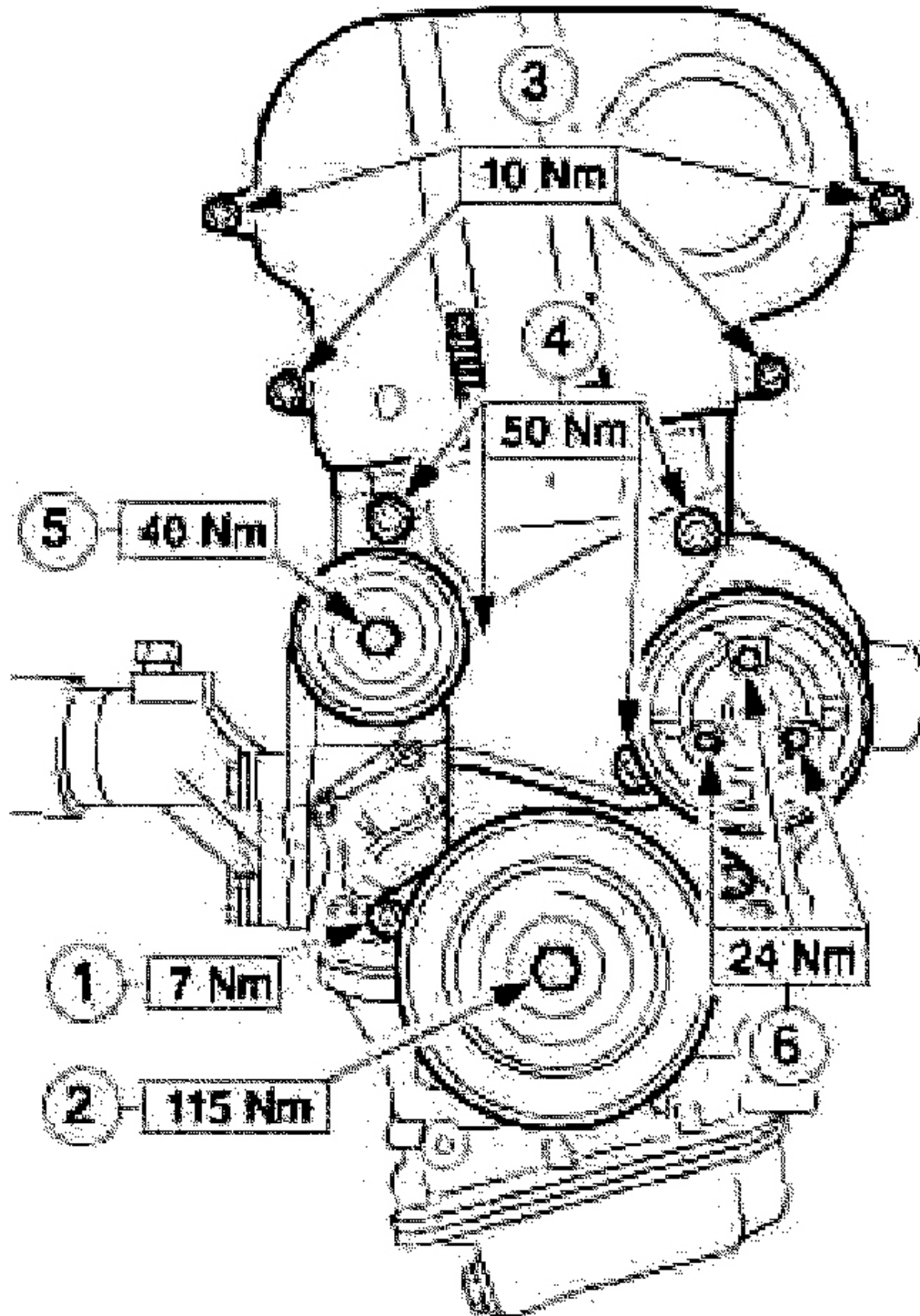
Fig. 367: Connecting Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: Check the seating of the gasket on the upper timing belt cover and correct as necessary.

71. Attach the timing belt covers and the belt pulleys.
 1. Lower timing belt cover.
 2. Crankshaft pulley.
 3. Upper timing belt cover.
 4. Center engine front mount bracket.
 5. Drive belt idler pulley.
 6. Coolant pump belt pulley.

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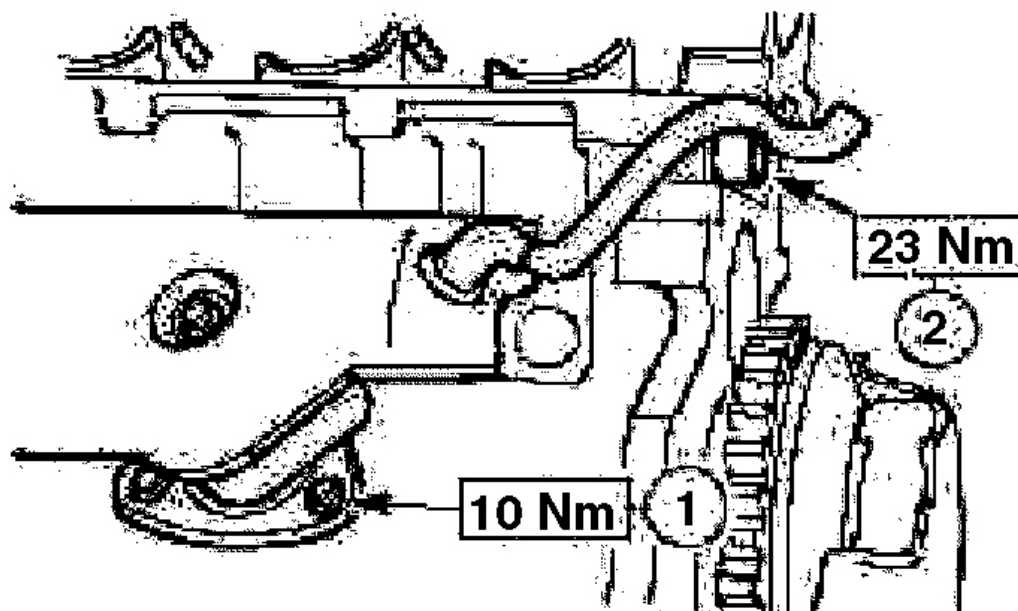
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Fig. 368: Attaching Timing Belt Covers And Belt Pulleys
Courtesy of FORD MOTOR CO.

NOTE: Install a new crankcase ventilation housing gasket.

72. Install the positive crankcase ventilation housing.

1. Three bolts.
2. One bolt.



G03432952

Fig. 369: Installing Positive Crankcase Ventilation Housing
Courtesy of FORD MOTOR CO.

73. Connect the engine coolant temperature (ECT) sensor electrical connector.

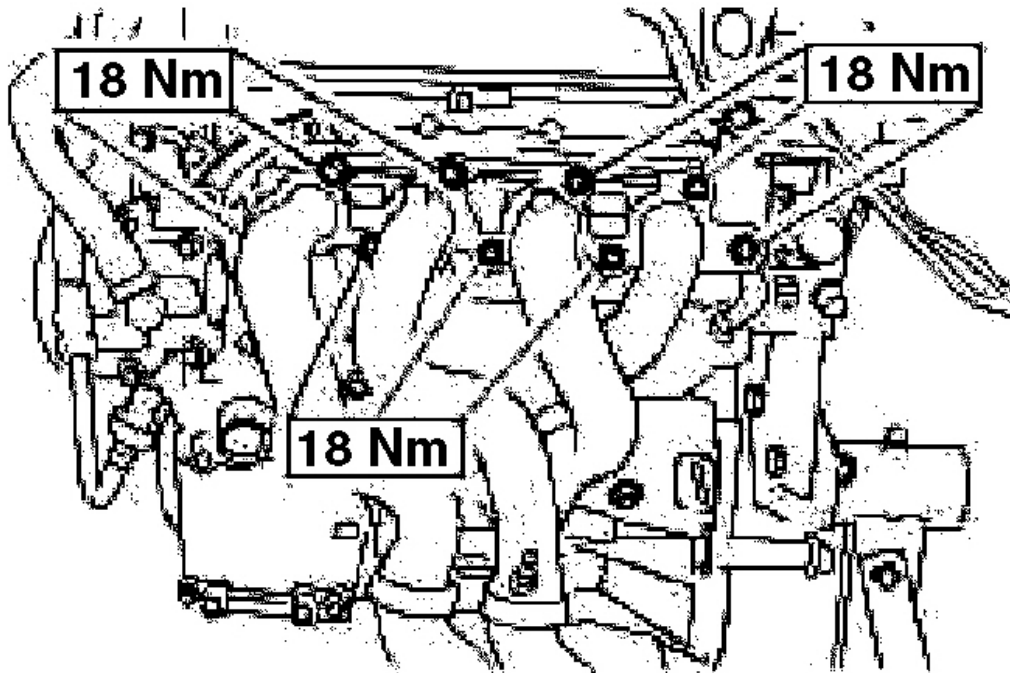


G03432953

Fig. 370: Connecting Engine Coolant Temperature (ECT) Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

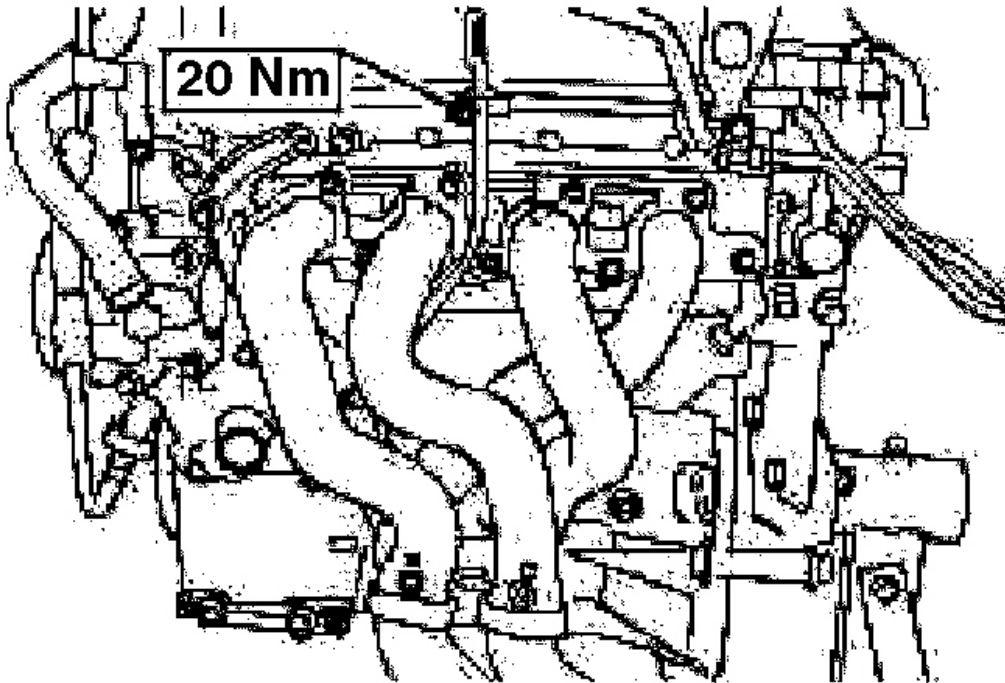
NOTE: Install a new exhaust manifold gasket.



G03432954

Fig. 371: Installing Exhaust Manifold
Courtesy of FORD MOTOR CO.

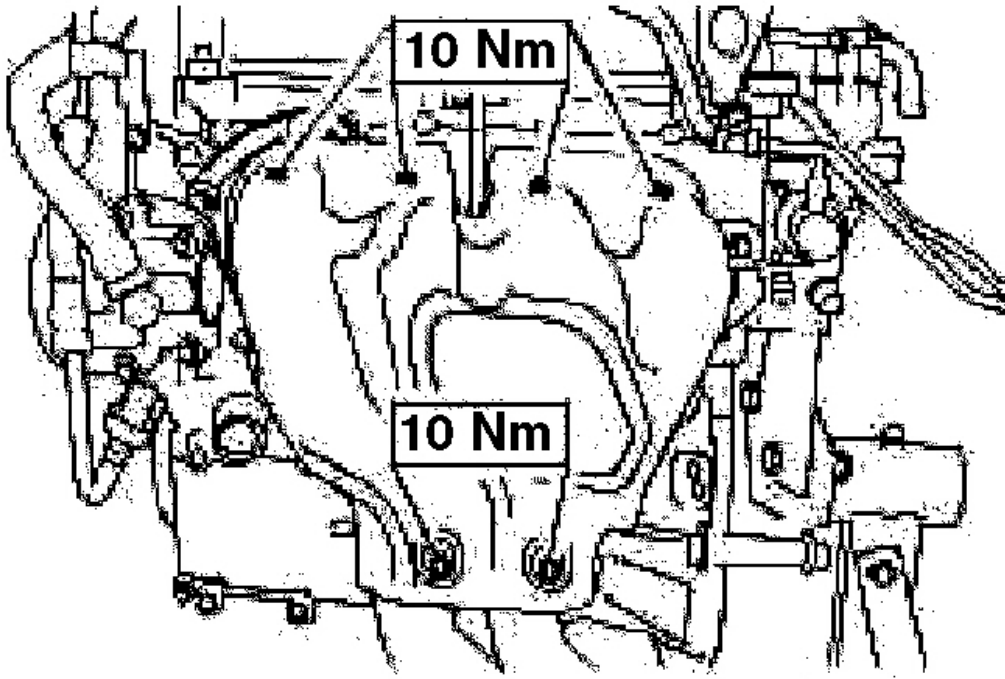
74. Install the exhaust manifold.
75. Install the engine oil level indicator tube.



G03432955

Fig. 372: Installing Engine Oil Level Indicator Tube
Courtesy of FORD MOTOR CO.

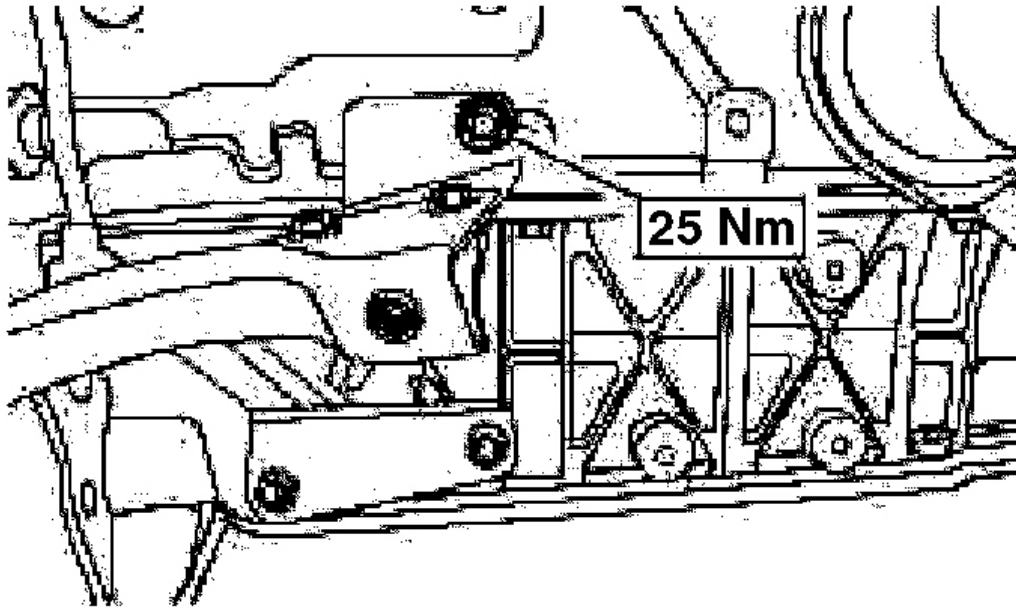
76. Install the exhaust manifold heat shield.



G03432956

Fig. 373: Installing Exhaust Manifold Heat Shield
Courtesy of FORD MOTOR CO.

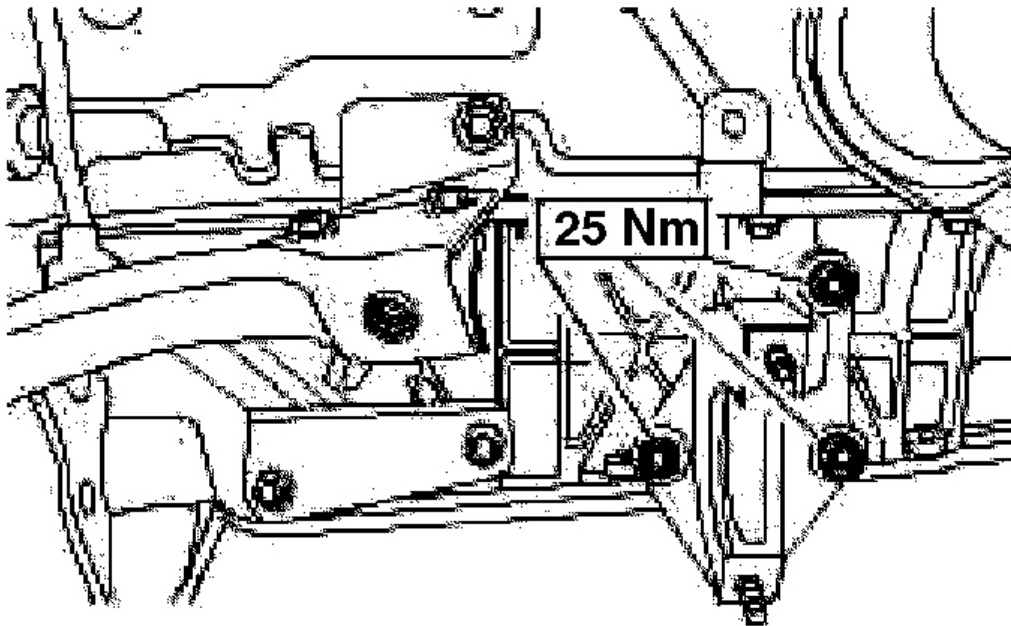
77. Install the catalytic converter mounting bracket.



G03432957

Fig. 374: Installing Catalytic Converter Mounting Bracket
Courtesy of FORD MOTOR CO.

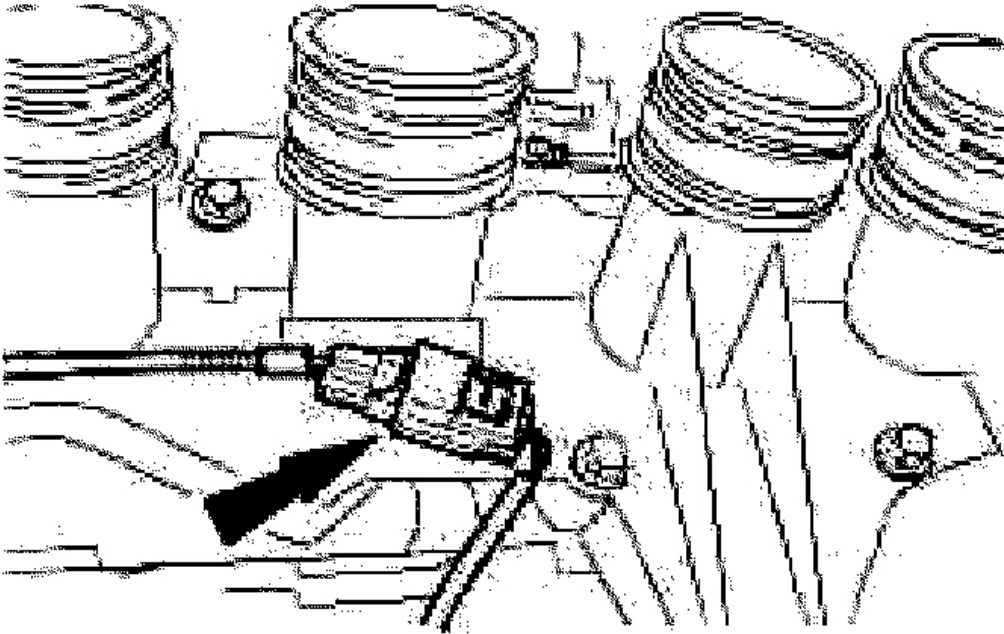
78. Install the intermediate shaft mounting bracket.



G03432958

Fig. 375: Installing Intermediate Shaft Mounting Bracket
Courtesy of FORD MOTOR CO.

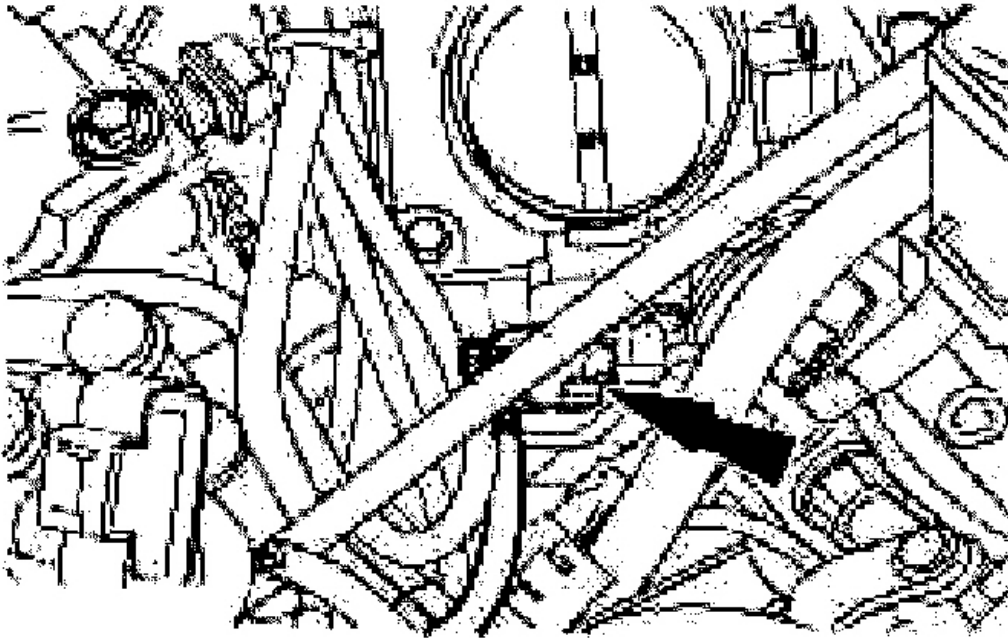
79. Attach the knock sensor (KS) electrical connector to the intake manifold inner section.



G03432959

Fig. 376: Attaching Knock Sensor (KS) Electrical Connector
Courtesy of FORD MOTOR CO.

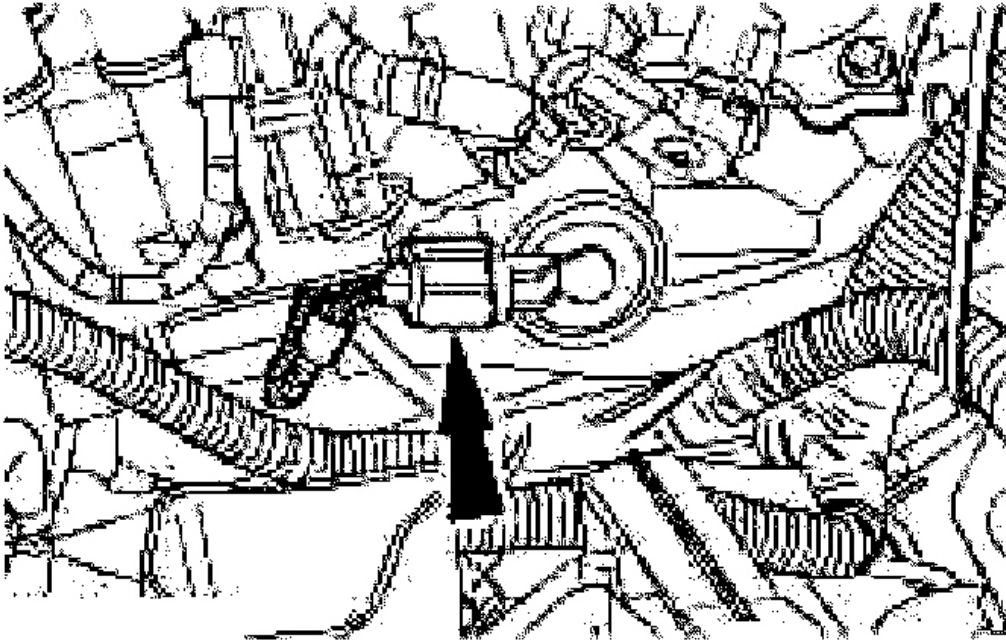
80. Connect the throttle position (TP) sensor electrical connector.



G03432960

Fig. 377: Connecting Throttle Position (TP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

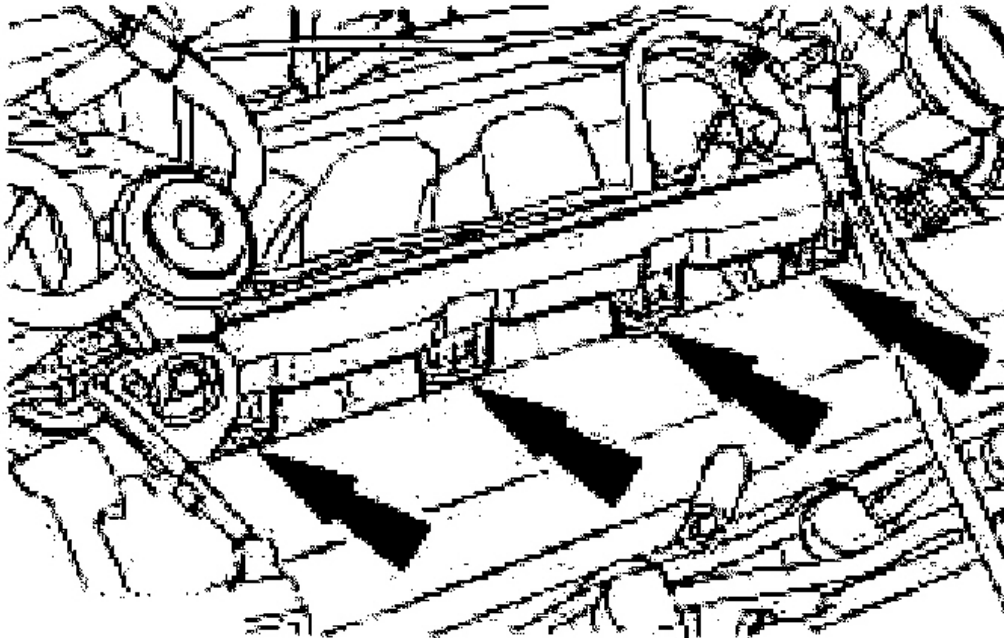
81. Connect the idle air control (IAC) sensor electrical connector.



G03432961

Fig. 378: Connecting Idle Air Control (IAC) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

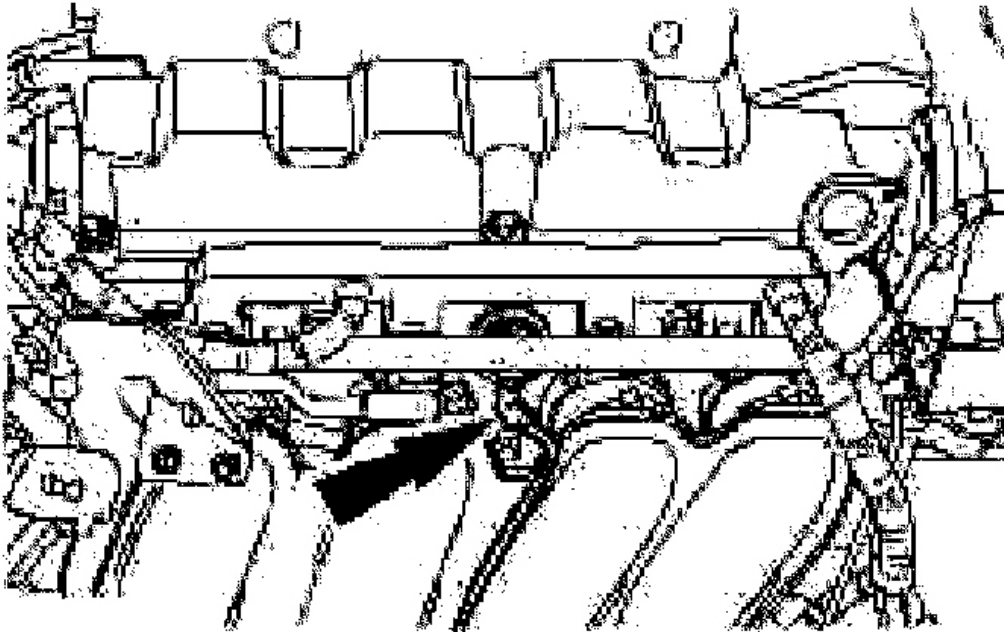
82. Connect the fuel injector electrical connectors.



G03432962

Fig. 379: Connecting Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

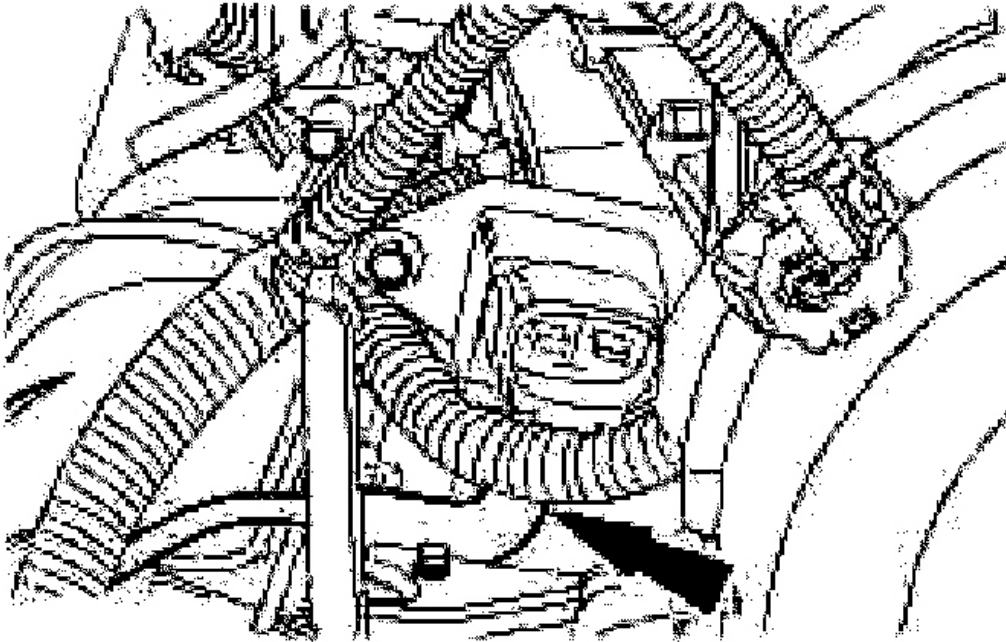
83. Connect the vacuum line to the fuel pulse damper.



G03432963

Fig. 380: Connecting Vacuum Line To Fuel Pulse Damper
Courtesy of FORD MOTOR CO.

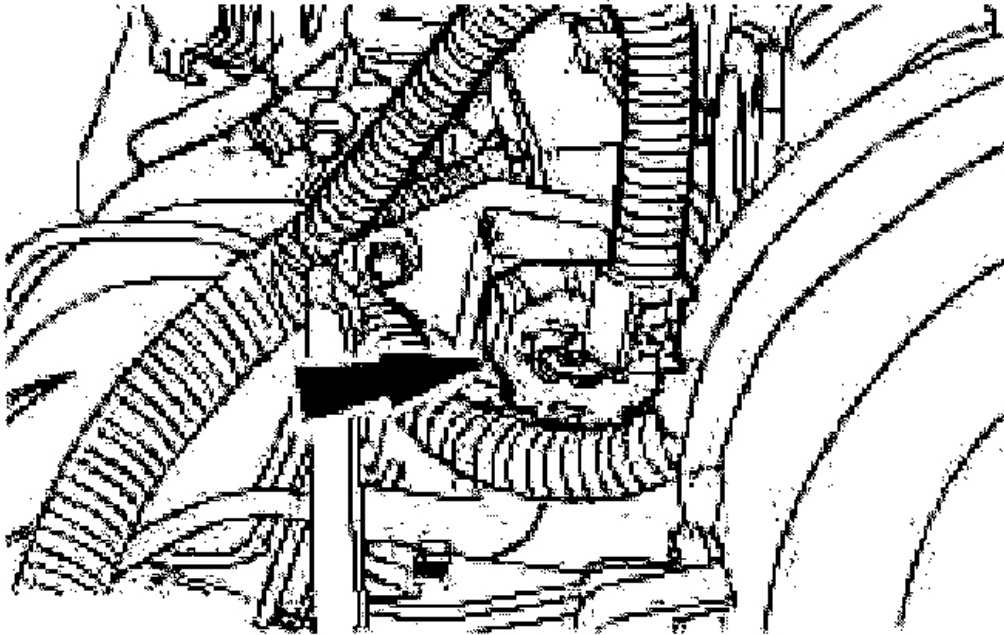
84. Connect the vacuum line to the fuel pressure sensor.



G03432964

Fig. 381: Connecting Vacuum Line To Fuel Pressure Sensor
Courtesy of FORD MOTOR CO.

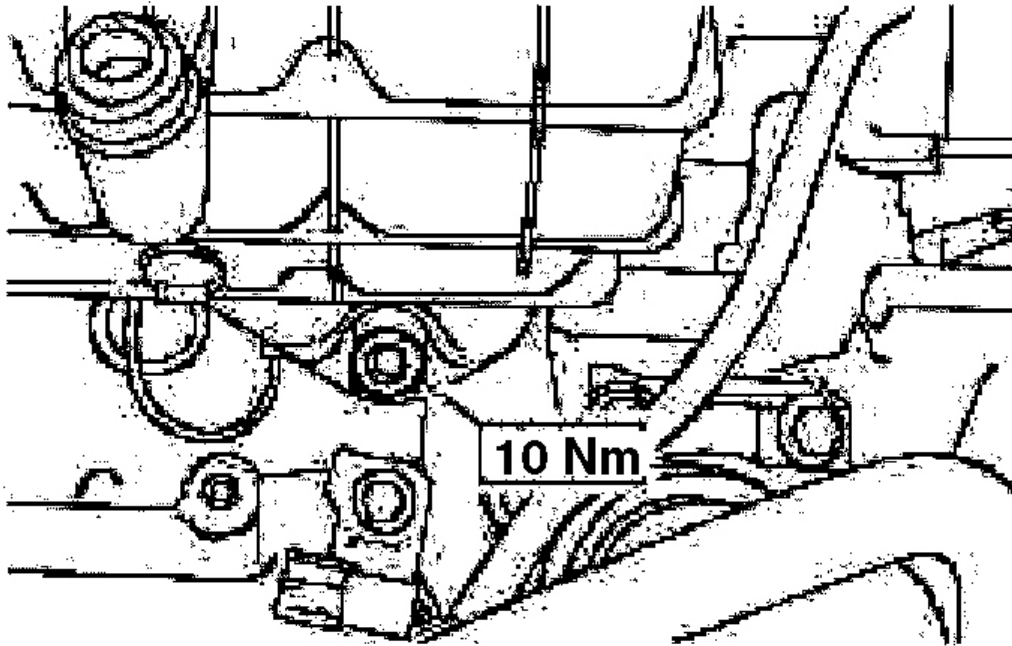
85. Connect the fuel pressure sensor electrical connector.



G03432965

Fig. 382: Connecting Fuel Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

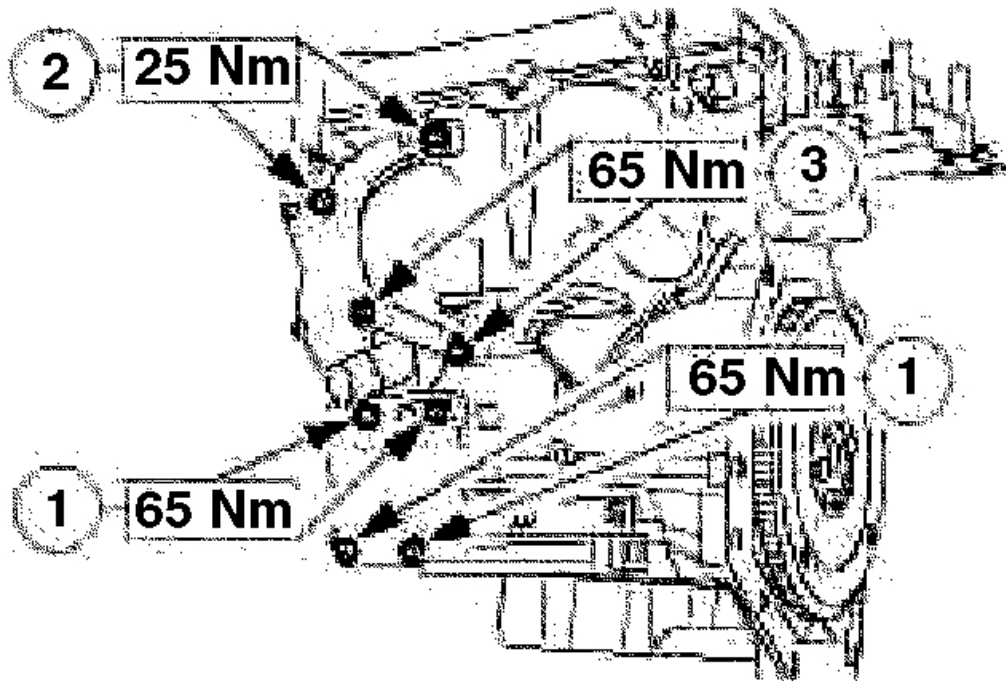
86. Install the intake manifold lower retaining bolt.



G03432966

Fig. 383: Installing Intake Manifold Lower Retaining Bolt
Courtesy of FORD MOTOR CO.

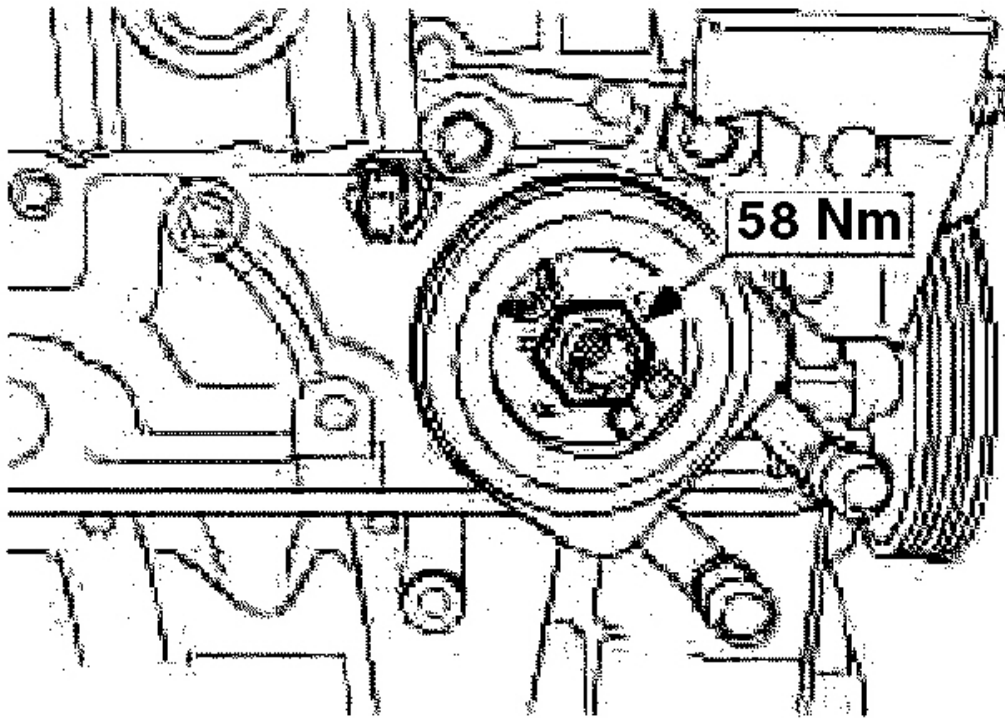
87. Attach the ancillary components on the exhaust side.
1. Air conditioning compressor bracket.
 2. Power steering pump bracket.
 3. Power steering pump to cylinder block bracket.



G03432967

Fig. 384: Attaching Ancillary Components On Exhaust Side
Courtesy of FORD MOTOR CO.

88. Install the oil cooler.

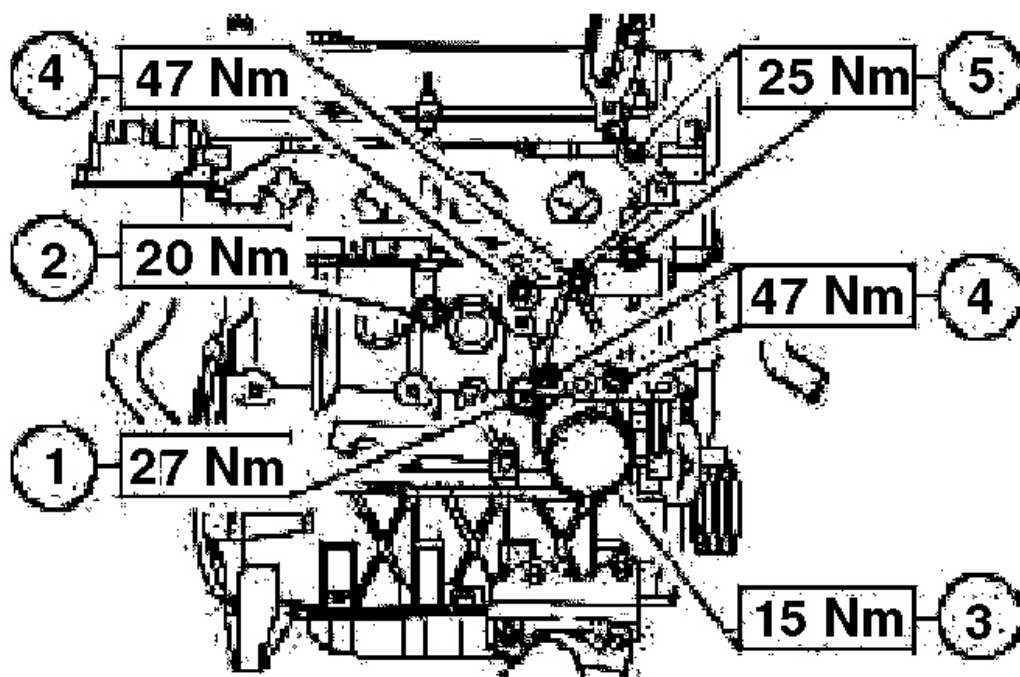


G03432968

Fig. 385: Installing Oil Cooler
Courtesy of FORD MOTOR CO.

NOTE: Coat the oil filter seal with clean engine oil.

89. Attach the ancillary components on the intake side.
 1. Oil pressure switch.
 2. KS
 3. Attach a new oil filter.
 4. Generator bracket to cylinder block.
 5. Generator bracket to cylinder head.



G03432969

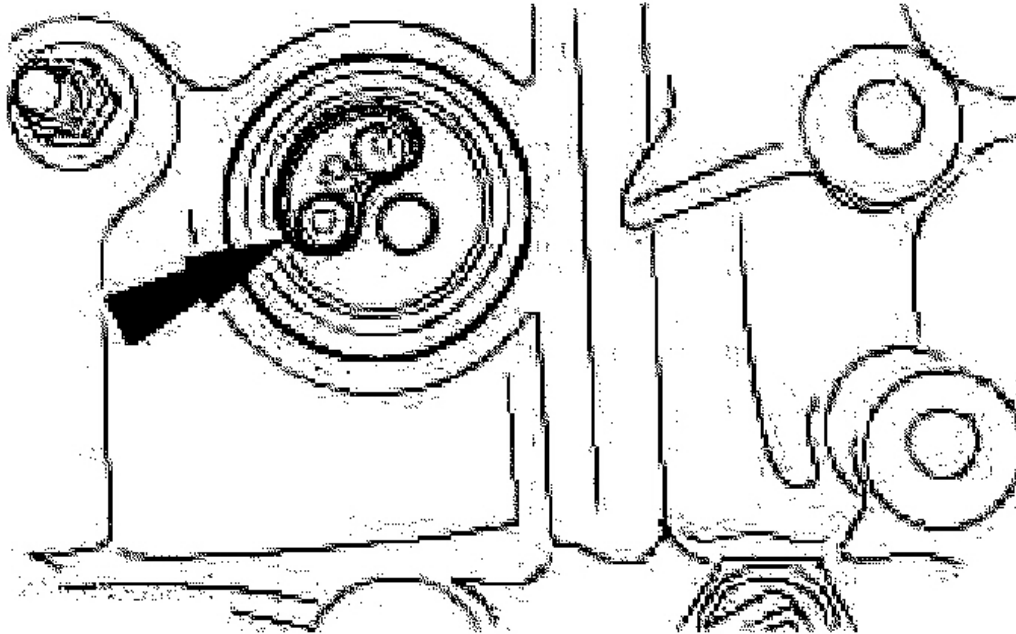
Fig. 386: Attaching Ancillary Components On Intake Side
Courtesy of FORD MOTOR CO.

90. Clean the inside diameter of the cylinder block bore and surface.

NOTE: Install a new block heater.

NOTE: Apply a small amount of engine coolant to the block heater O-ring seal before installing it to the cylinder block.

NOTE: Do not tighten the block heater at this stage.



G03432970

Fig. 387: Installing Block Heater
Courtesy of FORD MOTOR CO.

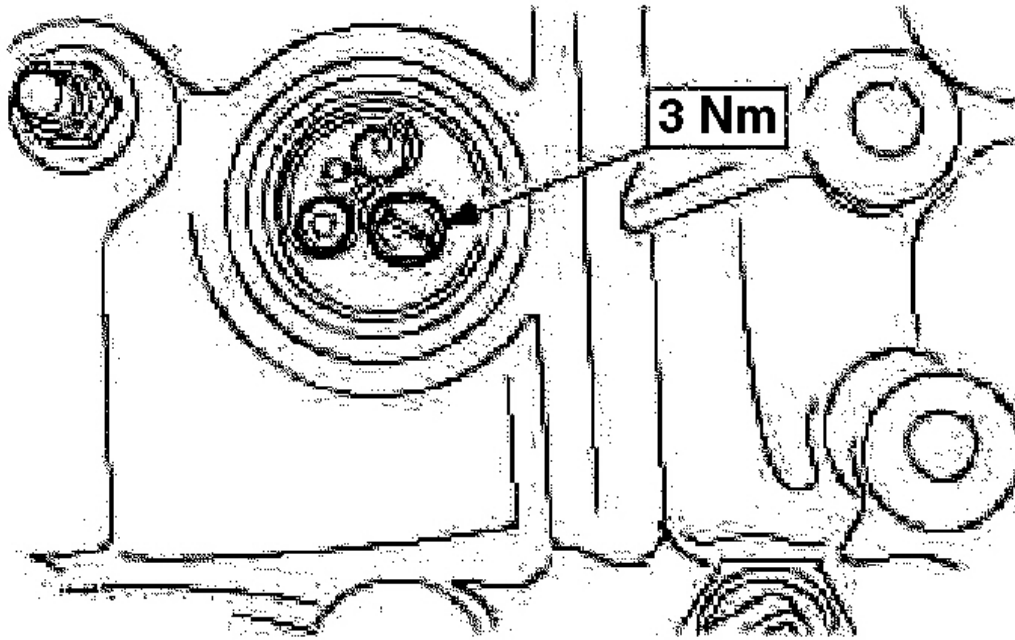
91. Install the block heater with the electrical connector of the block heater at the 9 o'clock position.

CAUTION: Do not overtighten the block heater. Failure to follow this instruction may result in coolant leaks.

CAUTION: If the block heater spins in the cylinder block bore more than 1/16 turn while tightening the screw, remove and discard the block heater. Do not attempt to turn the block heater back into position, as this will stretch the O-ring seal. Failure to follow this instruction may result in coolant leaks.

NOTE: Make sure that the block heater remains in the 9 o'clock

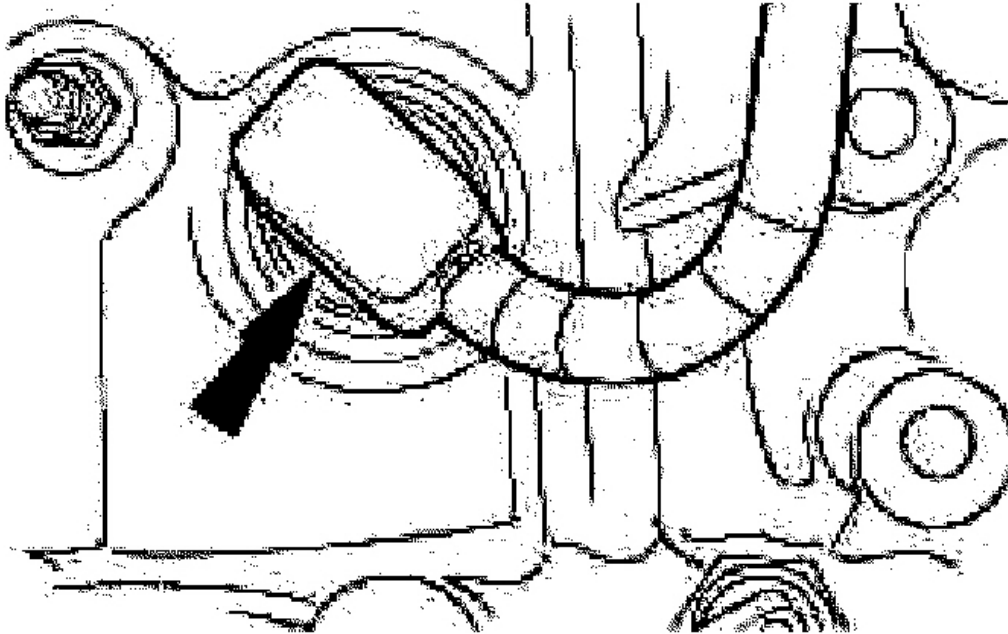
position when tightening the block heater.



G03432971

Fig. 388: Tightening Block Heater
Courtesy of FORD MOTOR CO.

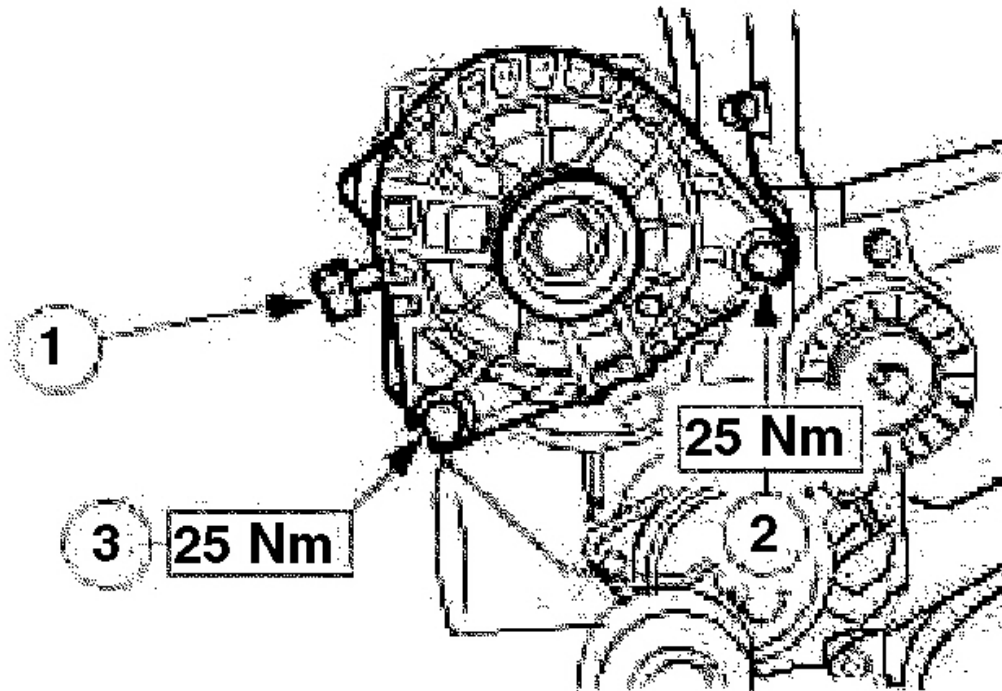
92. Tighten the block heater.
93. Connect the block heater electrical connector.



G03432972

Fig. 389: Connecting Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

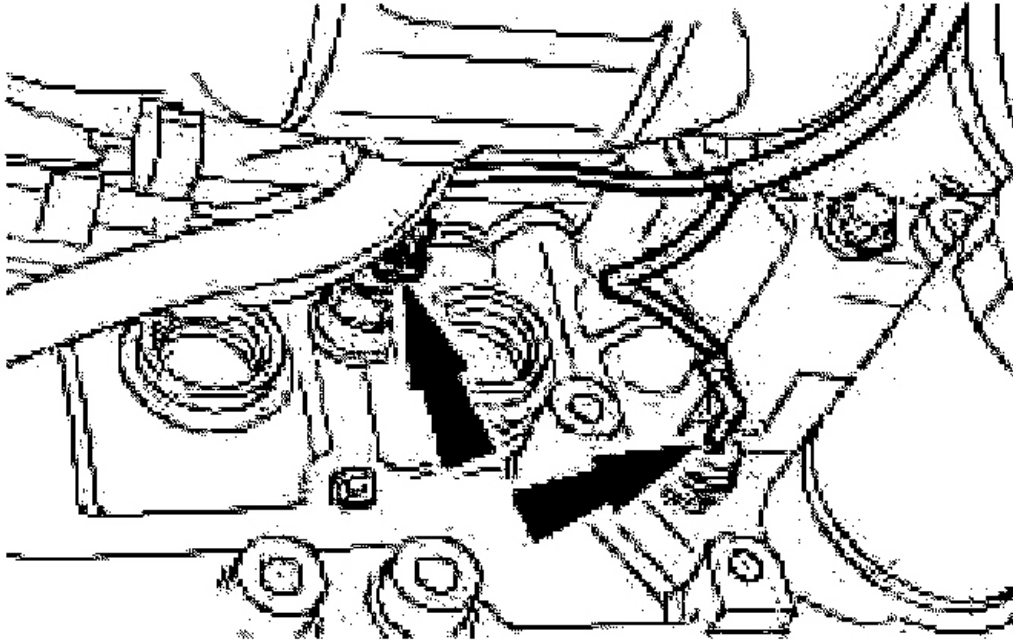
94. Install the generator.
 1. Tighten the bolt.
 2. Tighten the bolt.
 3. Connect the positive cable.



G03432973

Fig. 390: Installing Generator
Courtesy of FORD MOTOR CO.

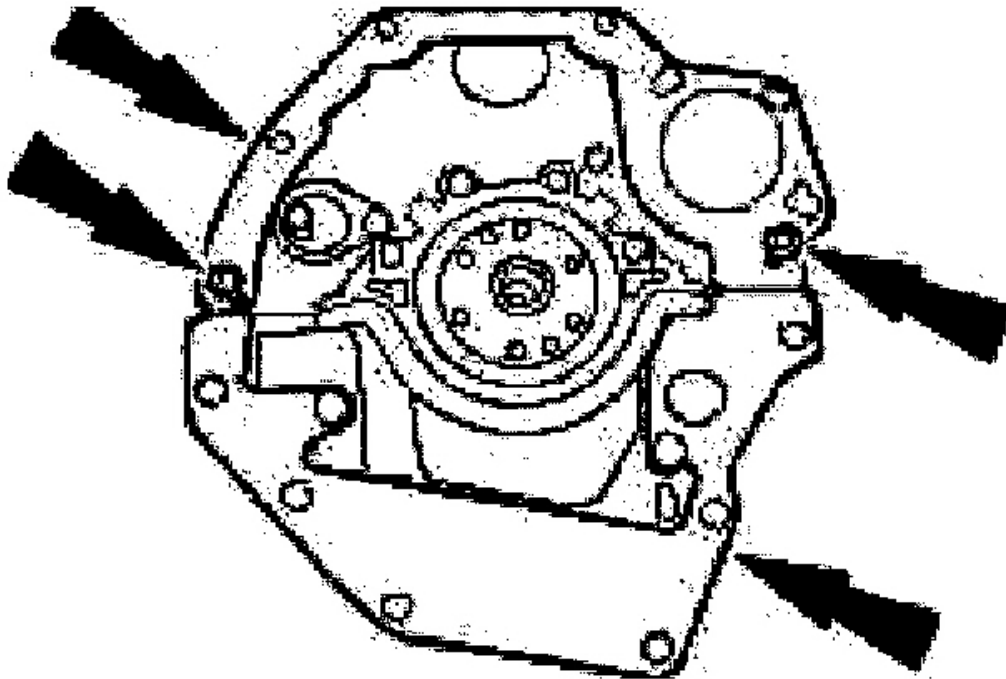
95. Connect the oil pressure switch and the KS electrical connectors.



G03432974

Fig. 391: Connecting Oil Pressure Switch And KS Electrical Connectors
Courtesy of FORD MOTOR CO.

96. Remove the engine from the engine stand.
97. Install the spacer plate and dowels.



G03432975

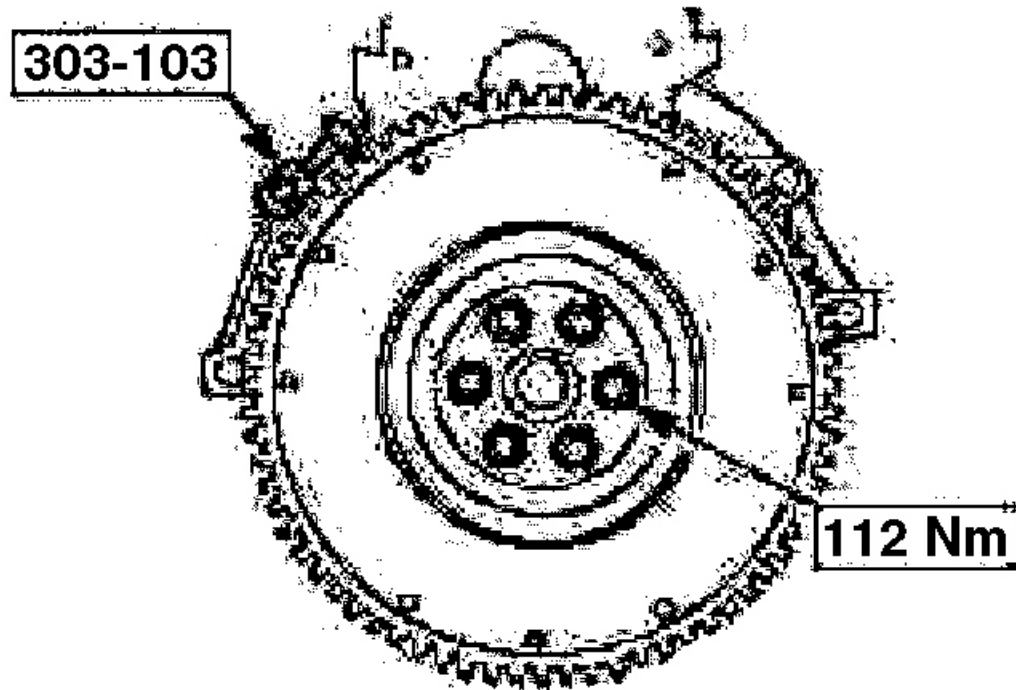
Fig. 392: Installing Spacer Plate And Dowels
Courtesy of FORD MOTOR CO.

NOTE: Install new flywheel retaining bolts.

NOTE: Remove any residual thread -locking compound from the threaded bores.

98. Install the flywheel.

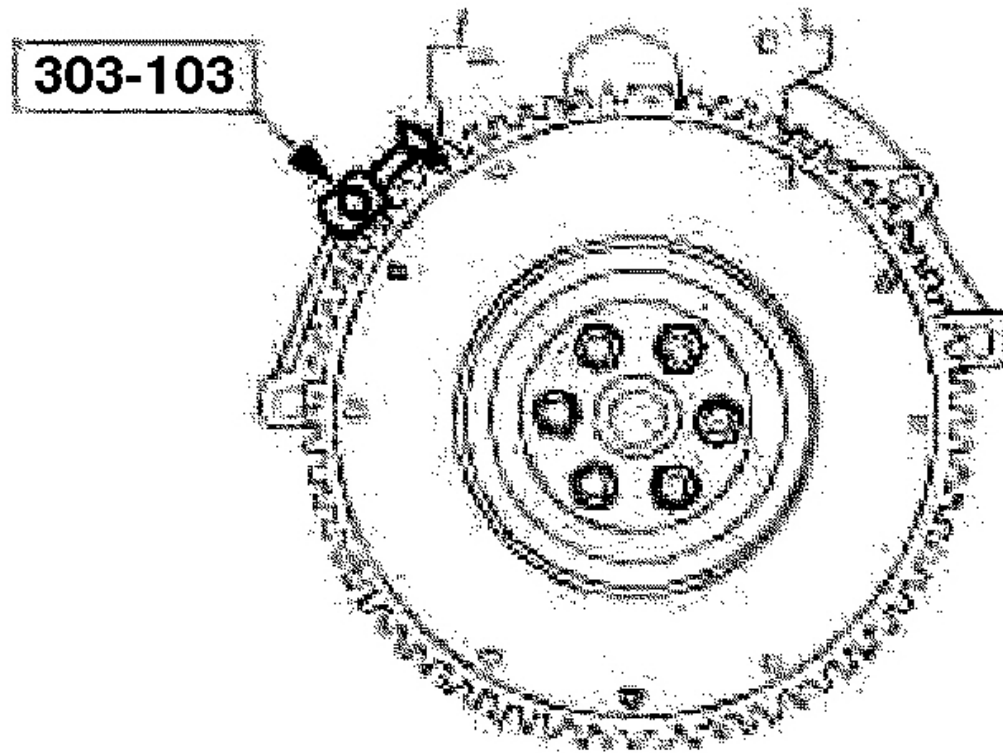
- Using the special tool, lock the flywheel in position.



G03432976

Fig. 393: Locking Flywheel In Position Using Special Tool
Courtesy of FORD MOTOR CO.

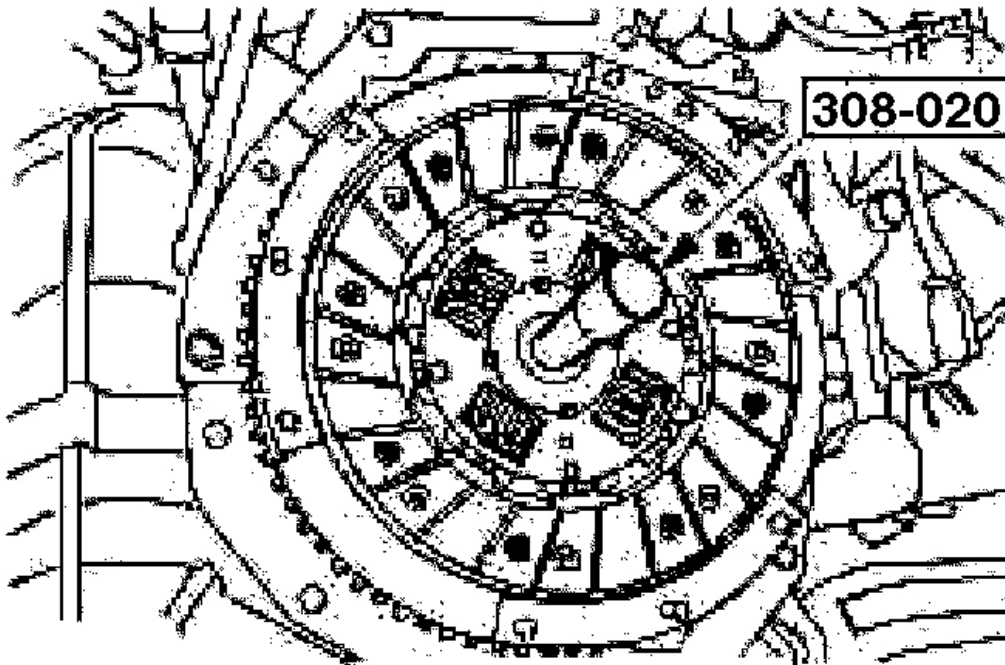
99. Remove the special tool.



G03432977

Fig. 394: Removing Special Tool
Courtesy of FORD MOTOR CO.

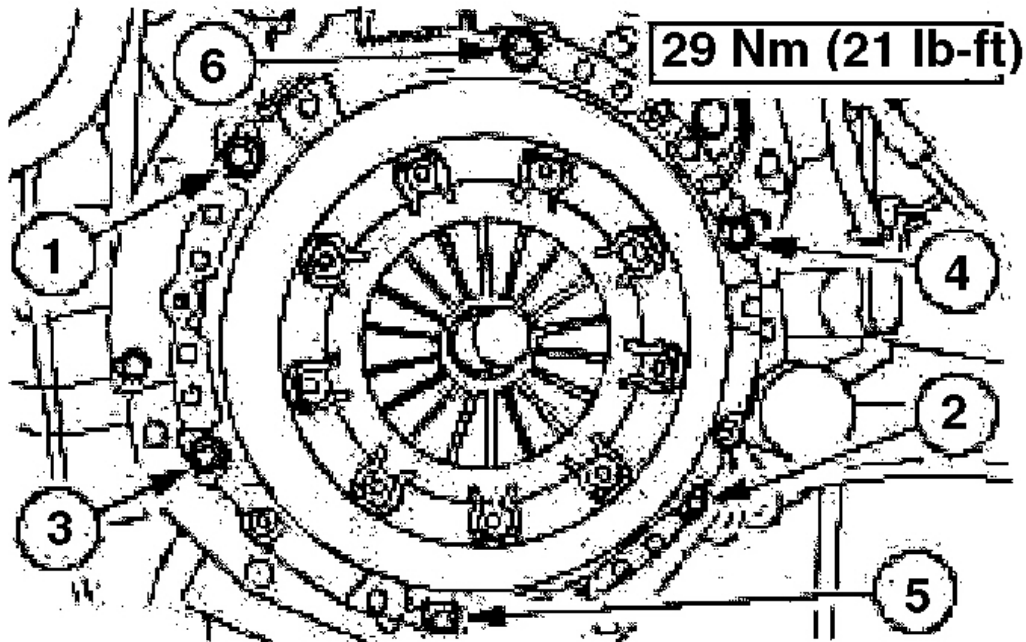
100. Using a suitable clutch disc locator, install the clutch disc and pressure plate.



G03432978

Fig. 395: Installing Clutch Disc And Pressure Plate
Courtesy of FORD MOTOR CO.

101. Tighten the clutch disc and pressure plate retaining bolts.



G03432979

Fig. 396: Tightening Clutch Disc And Pressure Plate Retaining Bolts
Courtesy of FORD MOTOR CO.

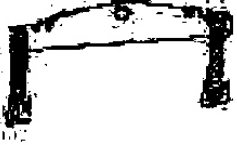
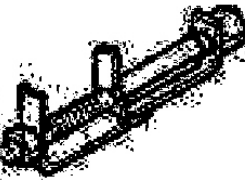

INSTALLATION

ENGINE

Special Tool(s)

2002 Ford Focus LX

2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus

	Spreader Bar 303-D089 (D93P-6001 -A3)
	Remover/Installer, Hose Clamp 412-108 (T96P-18539-A)
	Lifting Bracket, Engine 303-050 (T70P-6000)

G03432980

Fig. 397: Identifying Special Tool(s)
Courtesy of FORD MOTOR CO.

General Equipment

GENERAL EQUIPMENT CHART

Assembly Stand

Retaining Strap

Material

MATERIAL SPECIFICATION

Engine Oil - 5W-30

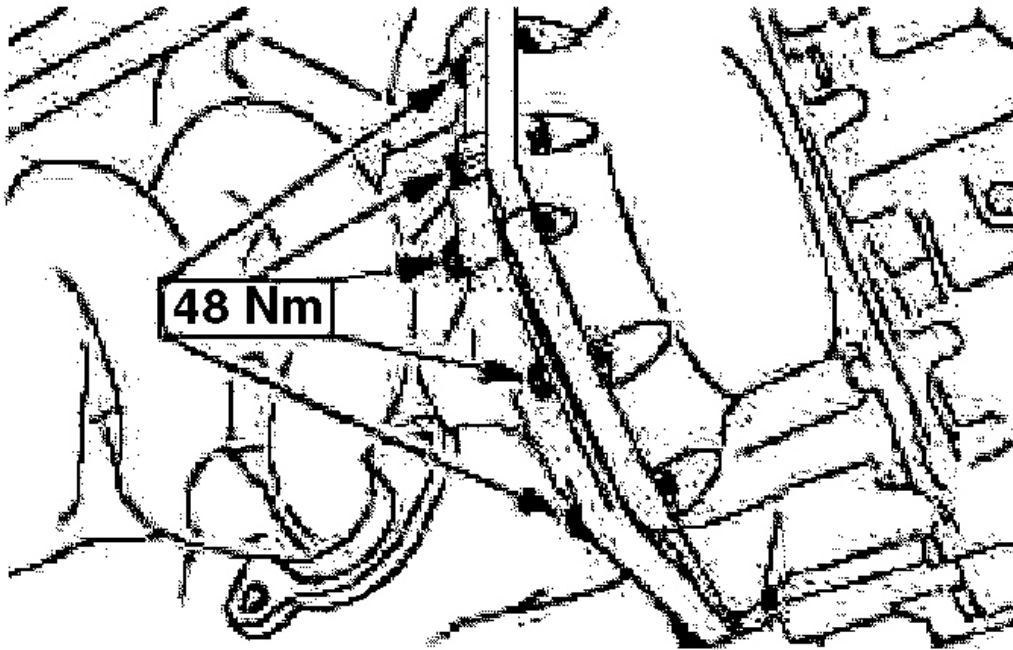
WSS-M2C153-G

Installation

All Vehicles

1. Install the transaxle.

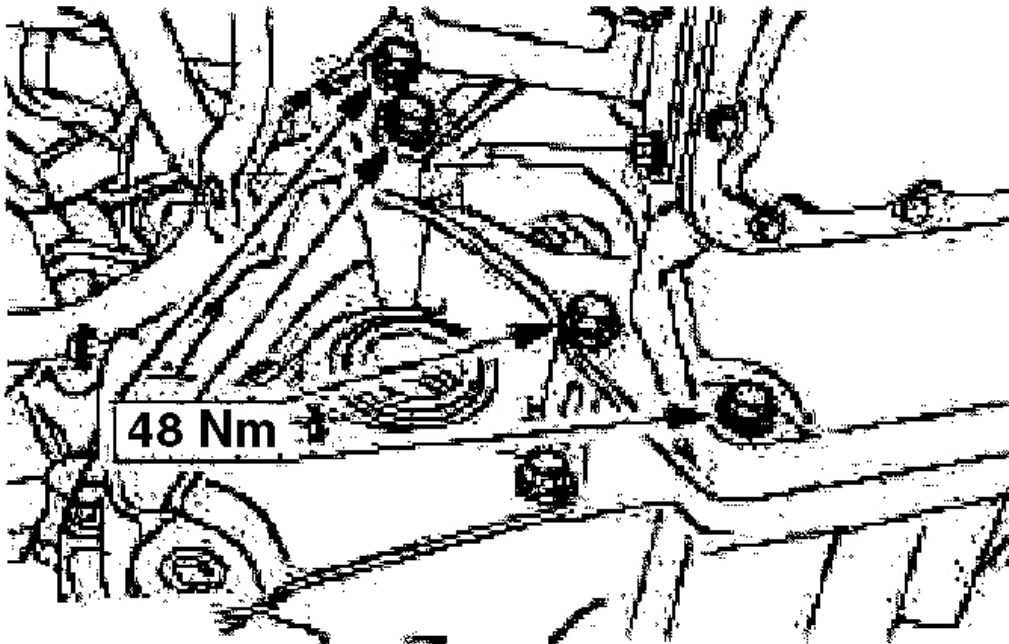
2. Install the transaxle left-hand retaining bolts.



G03432981

Fig. 398: Installing Transaxle Left-Hand Retaining Bolts
Courtesy of FORD MOTOR CO.

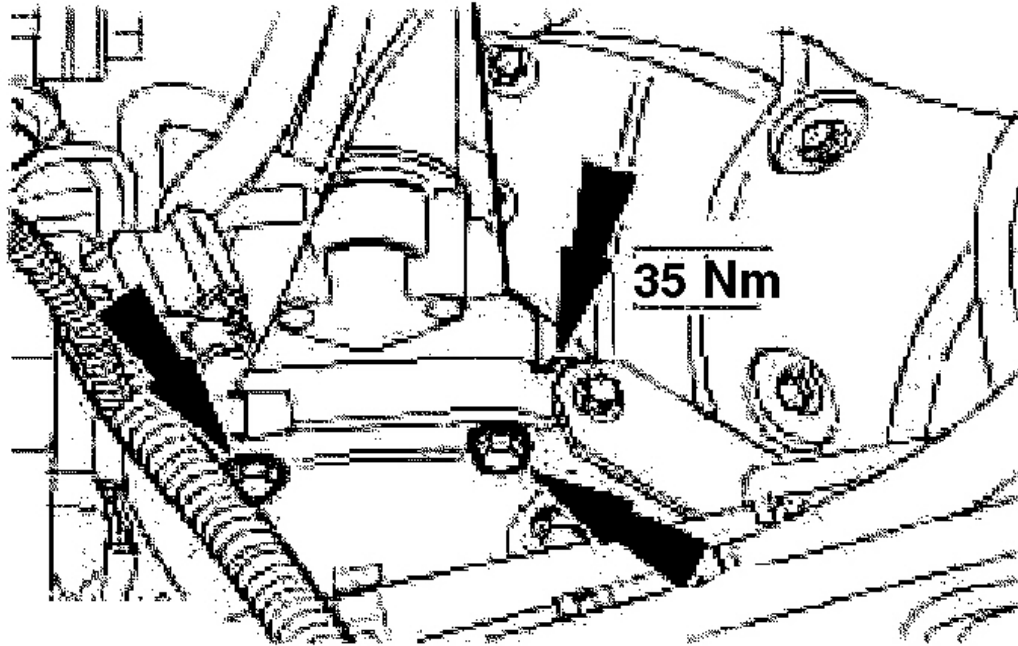
3. Install the transaxle right-hand retaining bolts.



G03432982

Fig. 399: Installing Transaxle Right-Hand Retaining Bolts
Courtesy of FORD MOTOR CO.

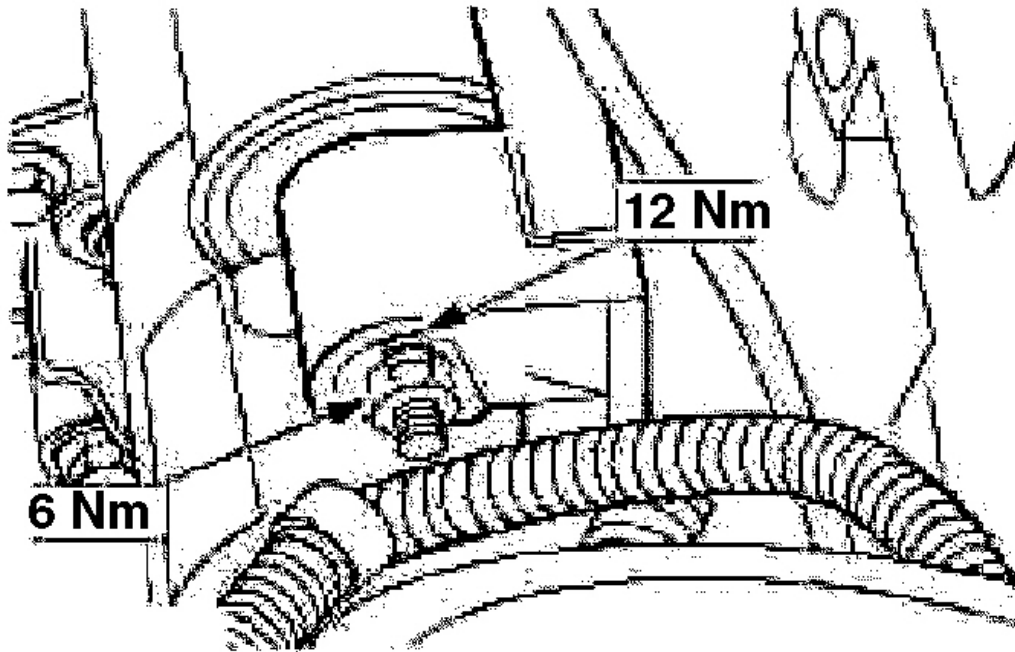
4. Install the starter motor.
 - Attach the ground cable to the transaxle.



G03432983

Fig. 400: Installing Starter Motor
Courtesy of FORD MOTOR CO.

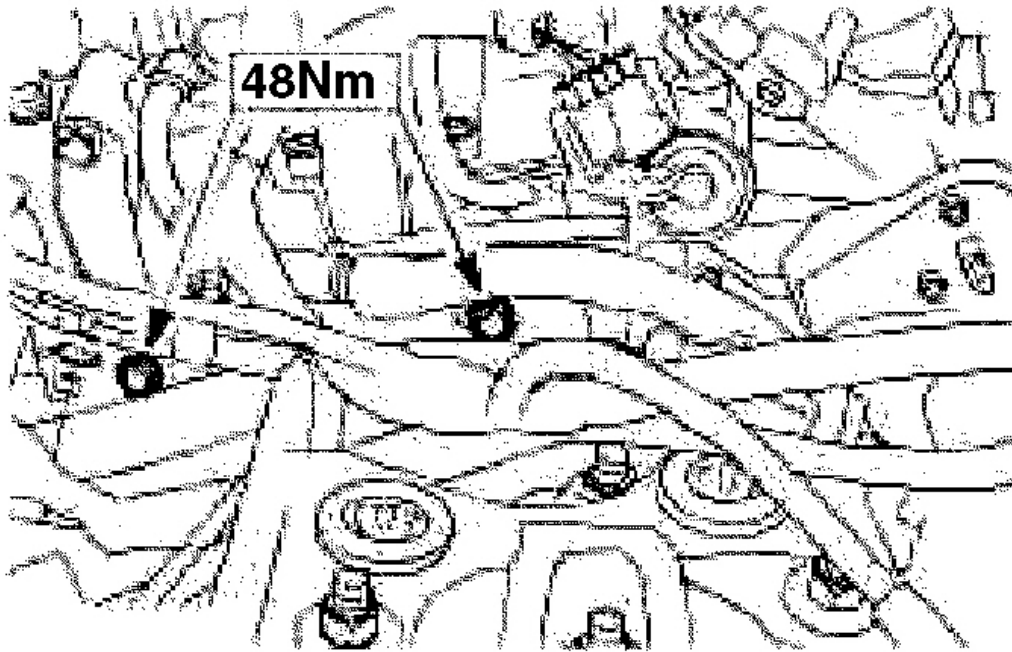
5. Connect the starter motor electrical connectors.



G03432984

Fig. 401: Connecting Starter Motor Electrical Connectors
Courtesy of FORD MOTOR CO.

6. Install the transaxle upper retaining bolts.



G03432985

Fig. 402: Installing Transaxle Upper Retaining Bolts
Courtesy of FORD MOTOR CO.

7. Using a retaining strap, secure the engine and transmission assembly on the assembly stand.
 - Remove the special tools.

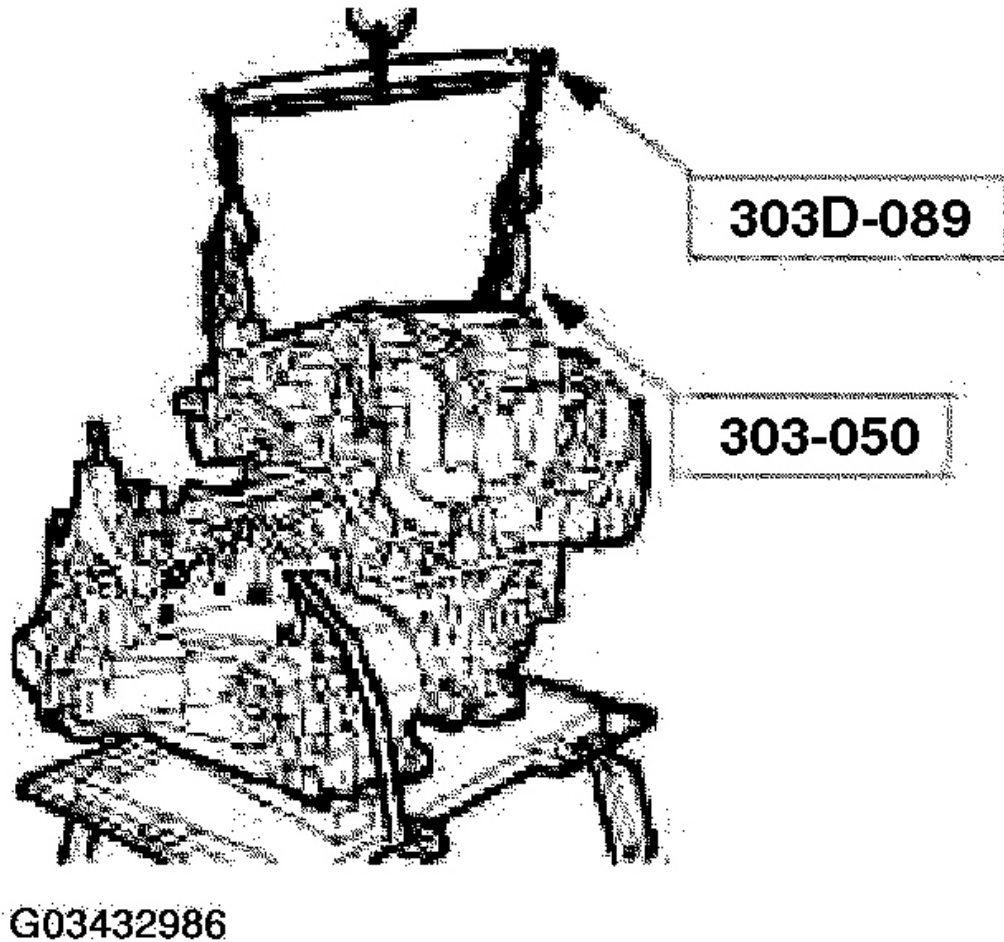
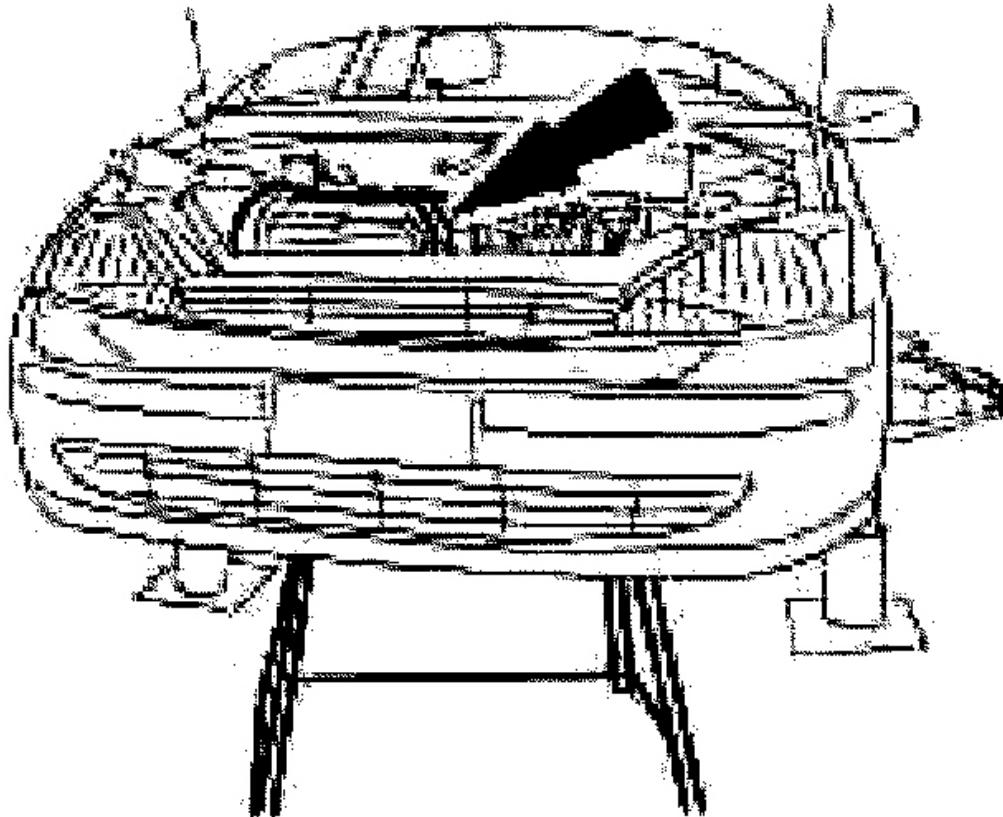


Fig. 403: Removing Special Tools
Courtesy of FORD MOTOR CO.

8. Position the engine and transaxle assembly under the vehicle.
 - Carefully lower the vehicle.

2002 Ford Focus LX

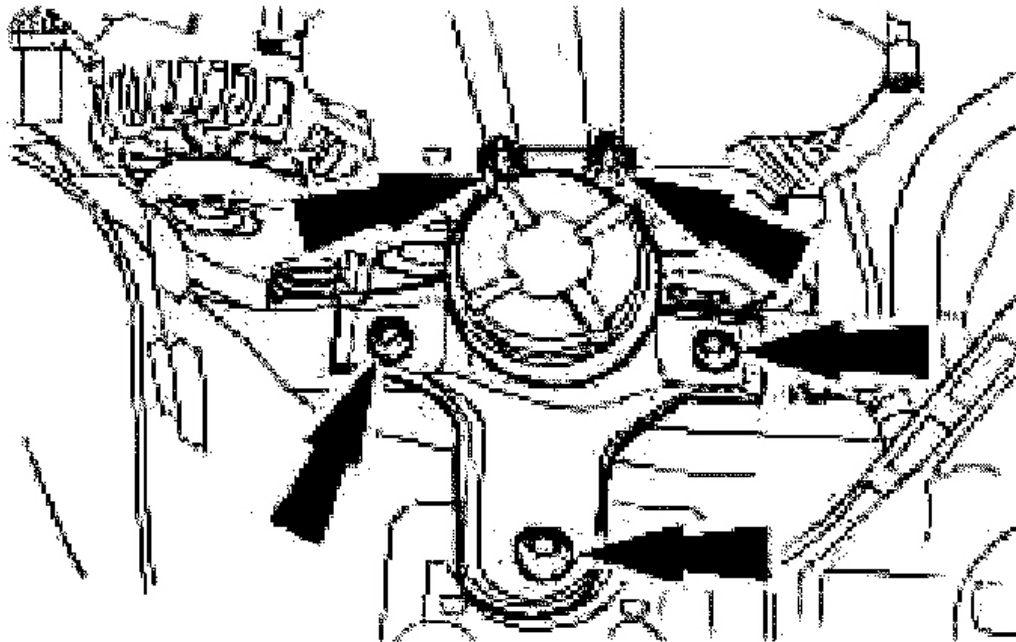
2002 ENGINE Engine - 2.0L Duratec-St (Zetec) - Focus



G03432987

Fig. 404: Positioning Engine And Transaxle Assembly Under Vehicle
Courtesy of FORD MOTOR CO.

NOTE: Do not tighten the bolts and nuts at this stage.

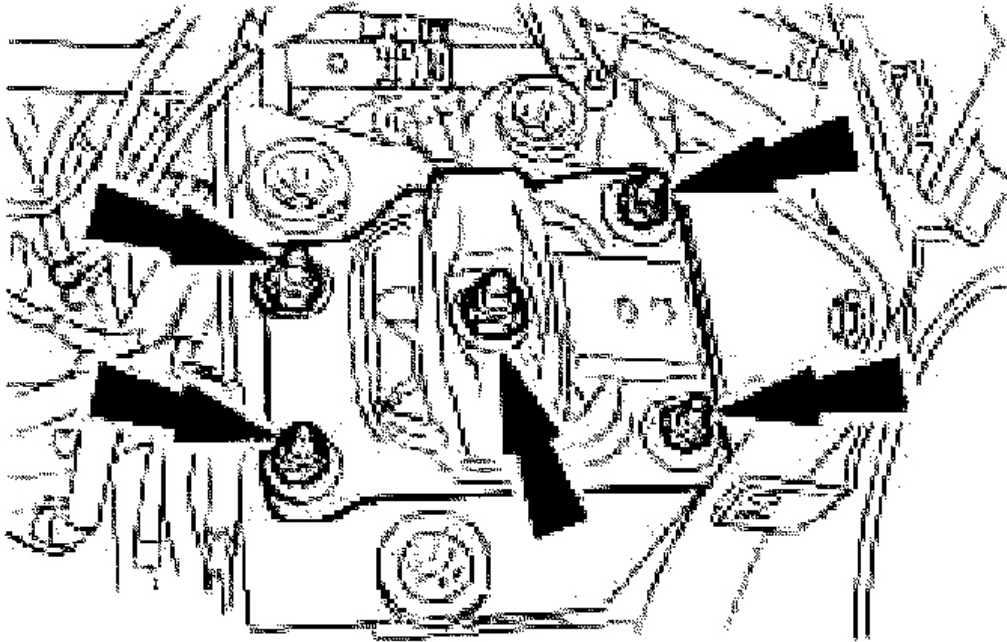


G03432988

Fig. 405: Installing Engine Front Mount
Courtesy of FORD MOTOR CO.

9. Install the engine front mount.

NOTE: Do not tighten the bolts at this stage.



G03432989

Fig. 406: Installing Engine Rear Mount
Courtesy of FORD MOTOR CO.

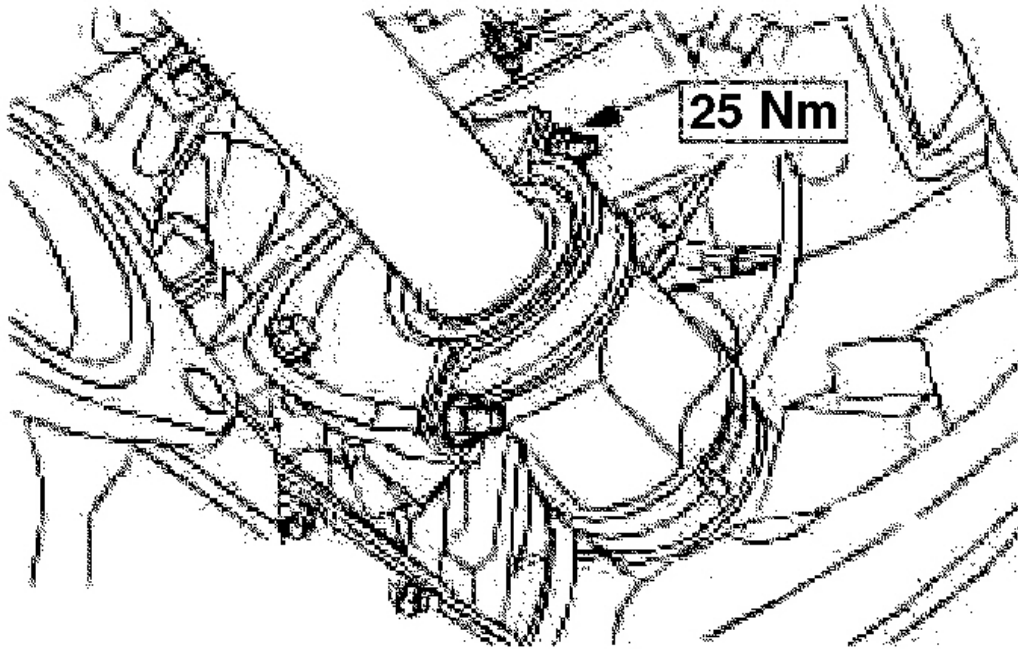
10. Install the engine rear mount.
11. Remove the retaining strap from the engine and transaxle assembly, and remove the assembly stand.
12. Raise and support the vehicle.

CAUTION: Support the halfshaft. The inner joint must not be bent more than 18 degrees. The outer joint must not be bent more than 45 degrees.

CAUTION: Do not damage the halfshaft seal.

NOTE: Install a new halfshaft center bearing cap and locknuts.

13. Attach the right-hand halfshaft and the intermediate shaft to the transaxle.
 - Install the center bearing cap.



G03432990

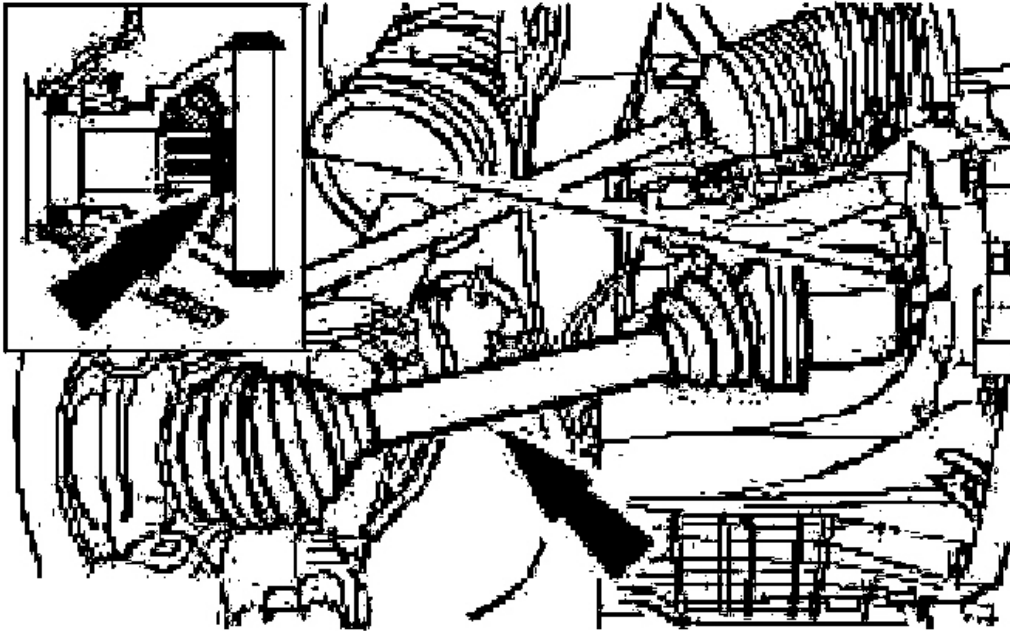
Fig. 407: Installing Center Bearing Cap
Courtesy of FORD MOTOR CO.

CAUTION: Support the halfshaft. The inner joint must not be bent more than 18 degrees. The outer joint must not be bent more than 45 degrees.

CAUTION: Do not damage the halfshaft seal.

CAUTION: Make sure the snap ring is correctly seated.

NOTE: Install a new snap ring.

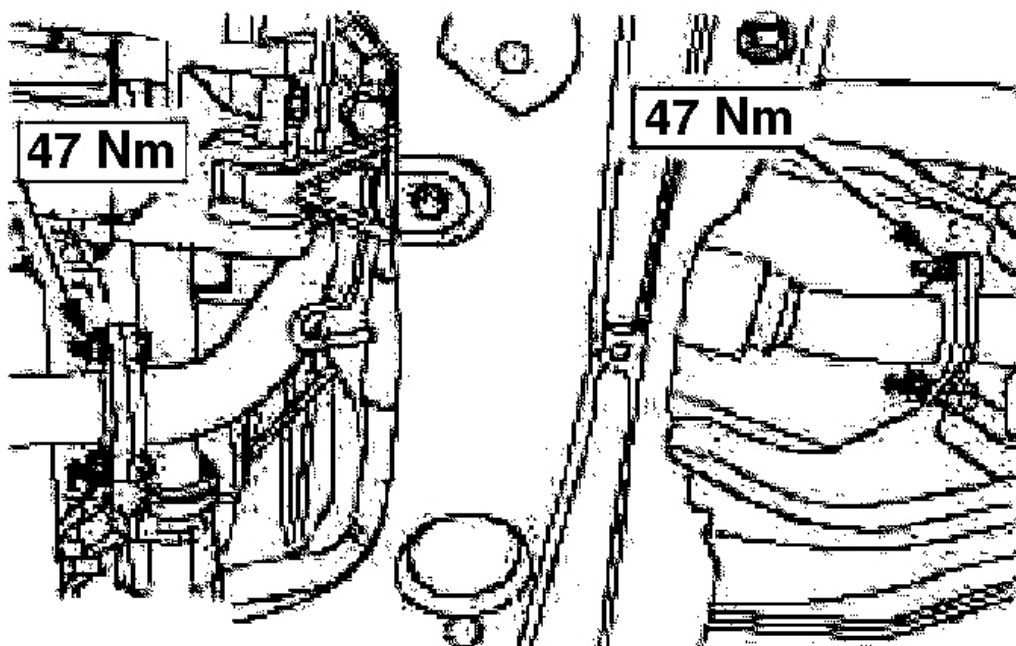


G03432991

Fig. 408: Attaching Left-Hand Halfshaft To Transaxle
Courtesy of FORD MOTOR CO.

14. Attach the left-hand halfshaft to the transaxle.

NOTE: Install a new exhaust flange gasket and new nuts.



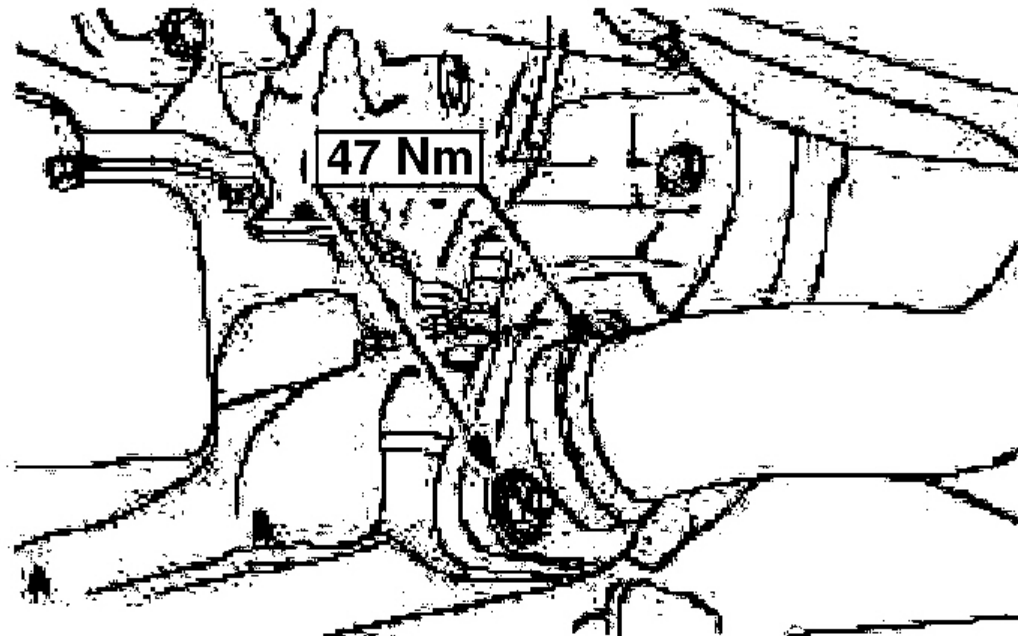
G03432992

Fig. 409: Installing Flexible Exhaust Pipe
Courtesy of FORD MOTOR CO.

15. Install the flexible exhaust pipe.

NOTE: **Install a new exhaust flange gasket and new nuts.**

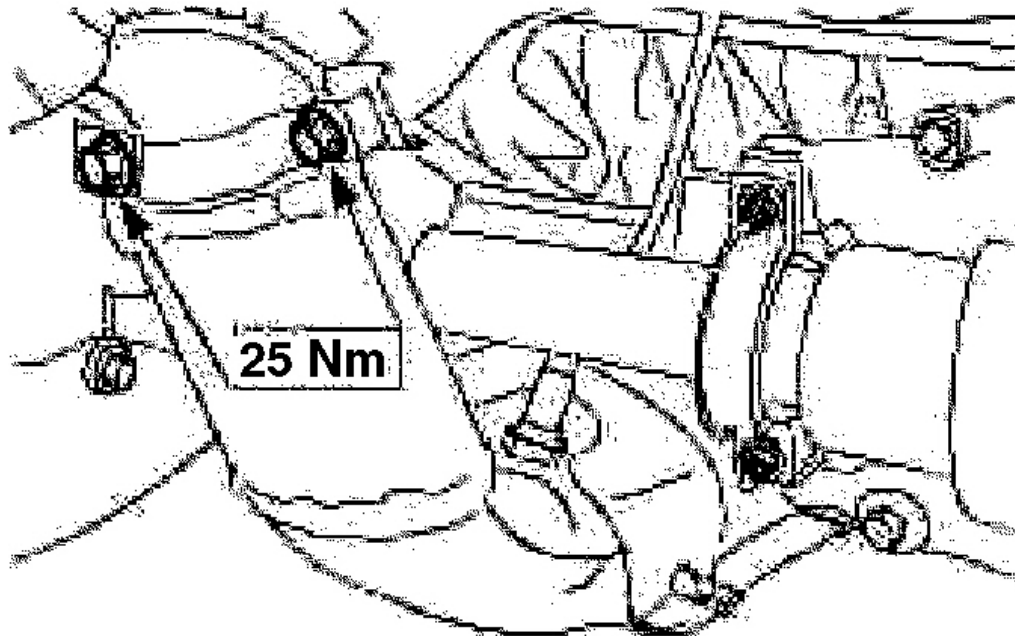
16. Attach the catalytic converter to the exhaust manifold.
 - Install the heated oxygen (HO2S) sensor.



G03432993

Fig. 410: Attaching Catalytic Converter To Exhaust Manifold
Courtesy of FORD MOTOR CO.

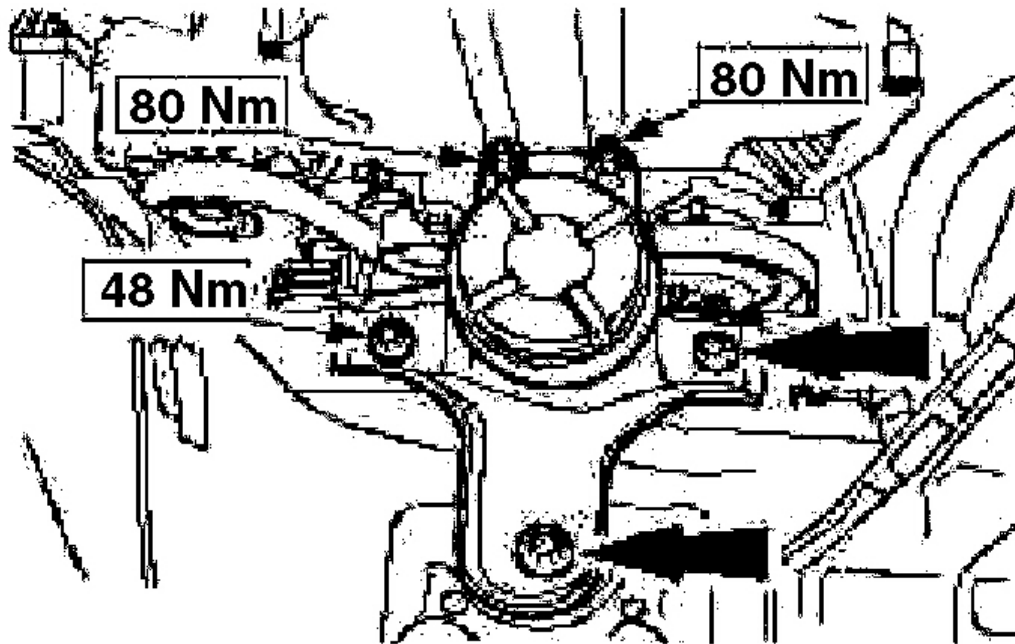
17. Install the catalytic converter bracket.
 - Install the catalytic monitor sensor.



G03432994

Fig. 411: Installing Catalytic Converter Bracket
Courtesy of FORD MOTOR CO.

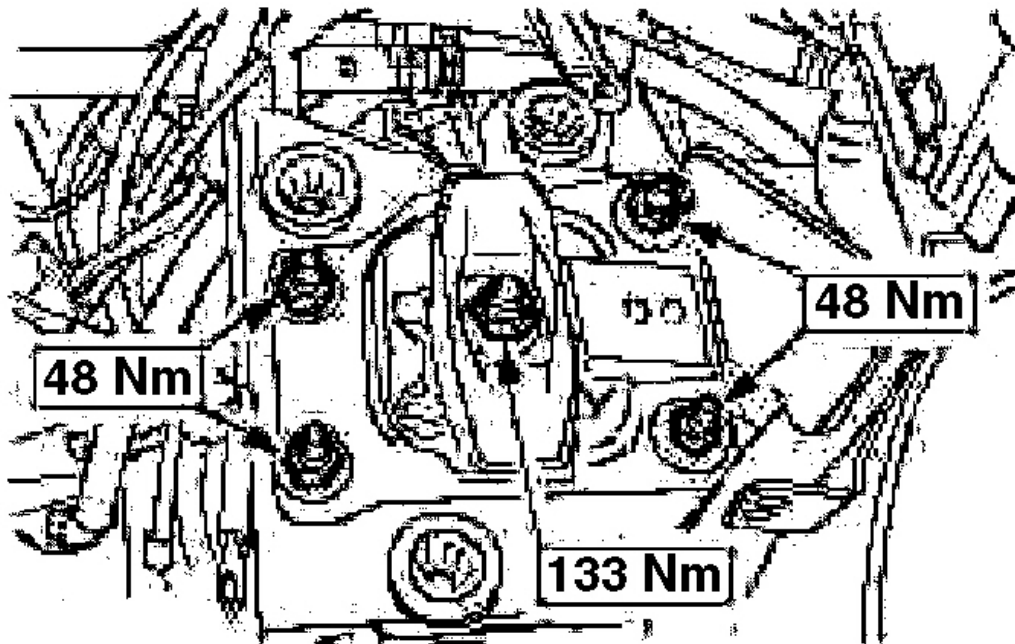
18. Lower the vehicle.
19. Tighten the engine rear mount nuts and bolts.



G03432995

Fig. 412: Tightening Engine Rear Mount Nuts And Bolts
Courtesy of FORD MOTOR CO.

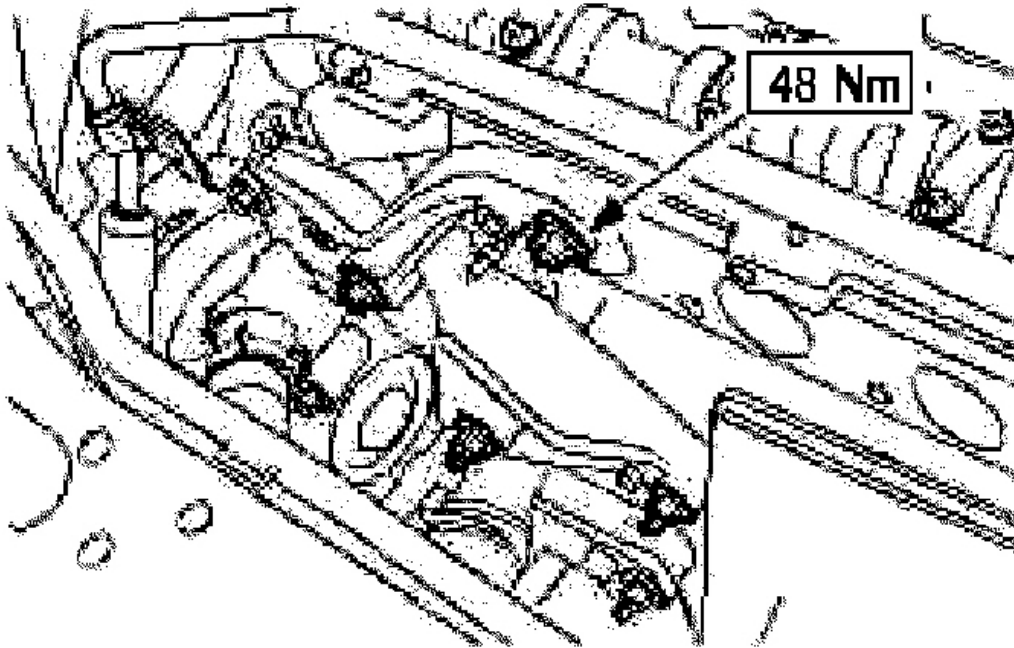
20. Tighten the engine front mount nuts.



G03432996

Fig. 413: Tightening Engine Front Mount Nuts
Courtesy of FORD MOTOR CO.

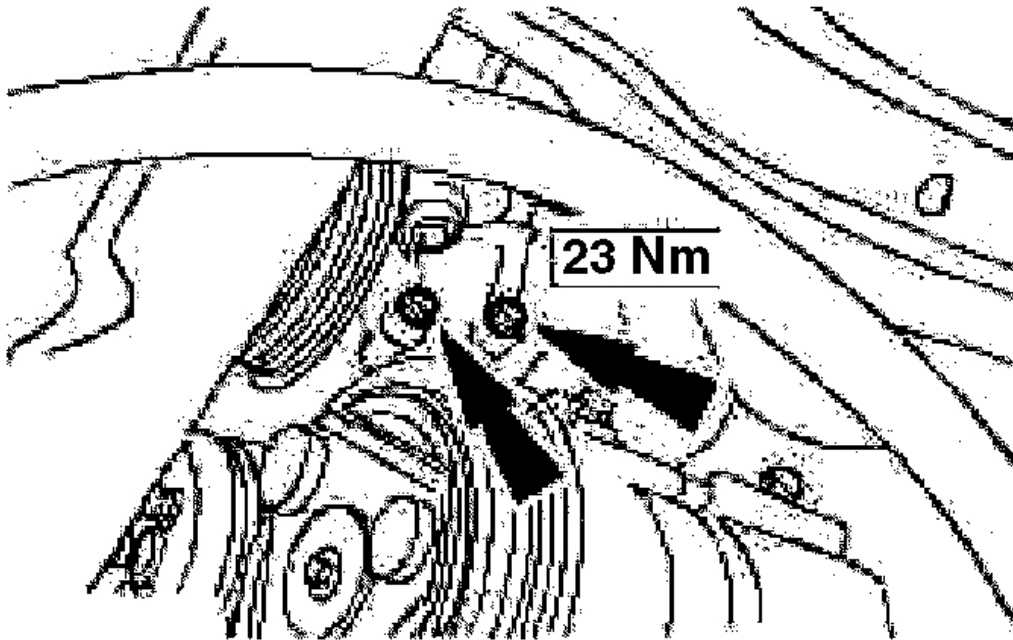
21. Install the power steering pump bracket.



G03432997

Fig. 414: Installing Power Steering Pump Bracket
Courtesy of FORD MOTOR CO.

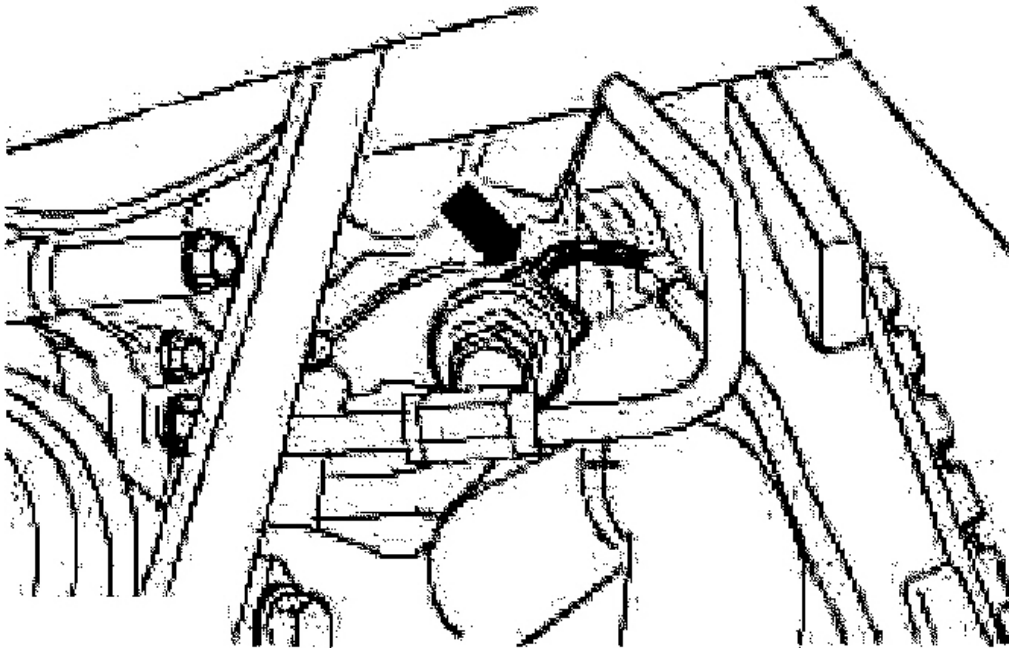
22. Raise and support the vehicle.
23. Install the power steering pump lower retaining bolts.



G03432998

Fig. 415: Installing Power Steering Pump Lower Retaining Bolts
Courtesy of FORD MOTOR CO.

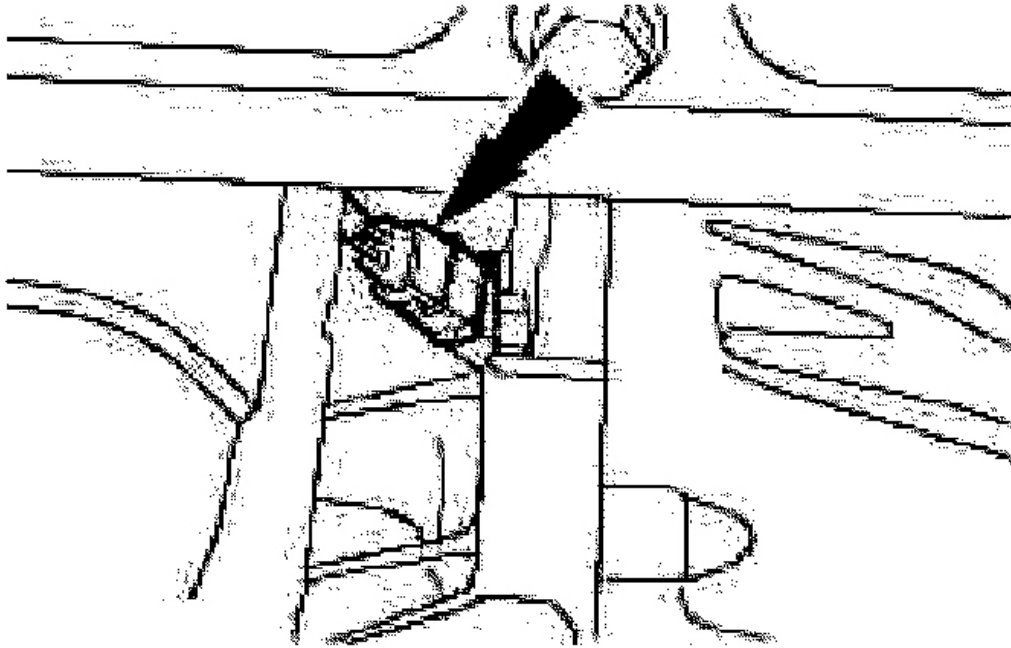
24. Connect the power steering pressure switch electrical connector.



G03432999

Fig. 416: Connecting Power Steering Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

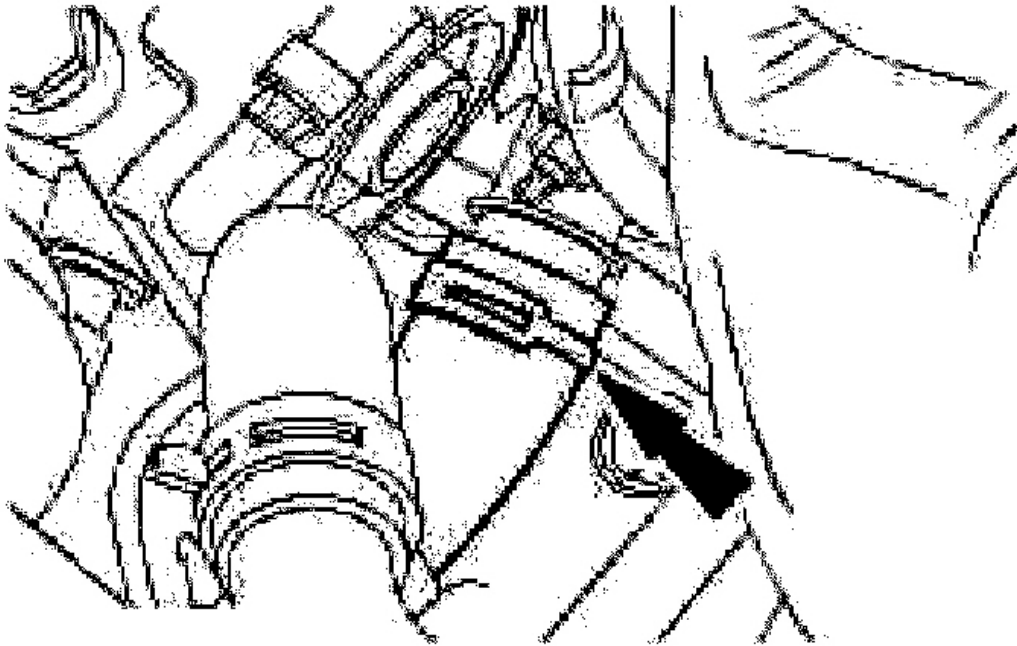
25. Connect the crankshaft position sensor electrical connector.



G03433000

Fig. 417: Connecting Crankshaft Position Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

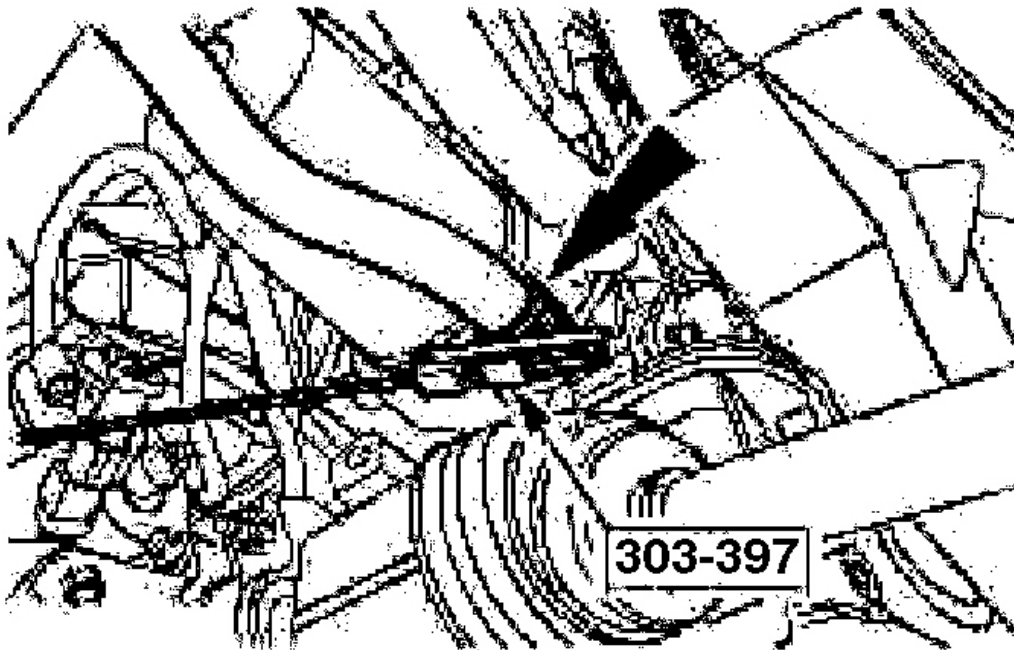
26. Connect the radiator lower coolant hose to the coolant pump housing.



G03433001

Fig. 418: Connecting Radiator Lower Coolant Hose To Coolant Pump Housing
Courtesy of FORD MOTOR CO.

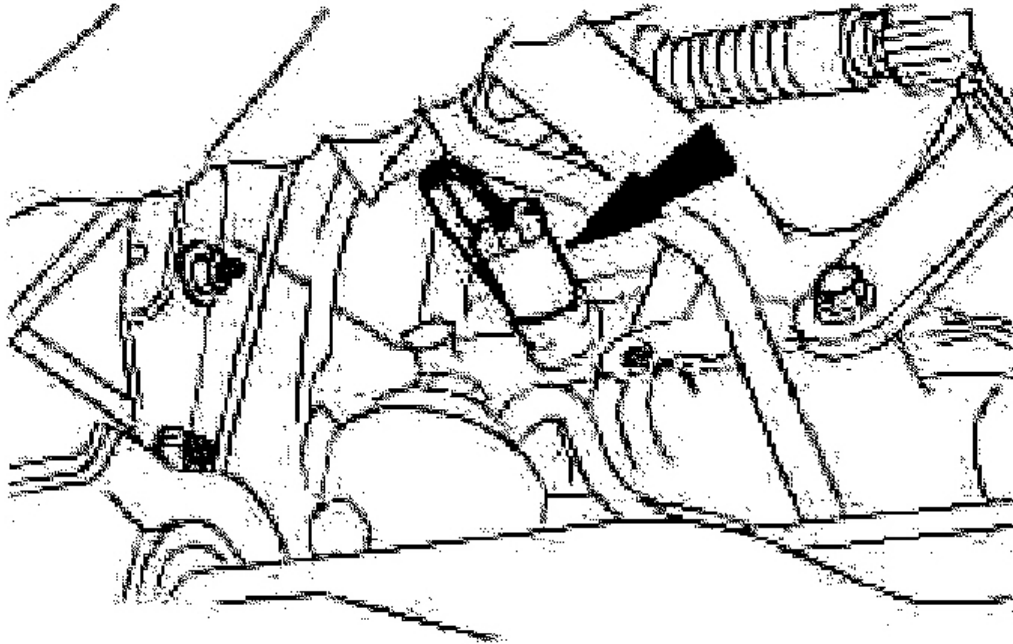
27. Connect the radiator lower coolant hose to the oil cooler.



G03433002

Fig. 419: Connecting Radiator Lower Coolant Hose To Oil Cooler
Courtesy of FORD MOTOR CO.

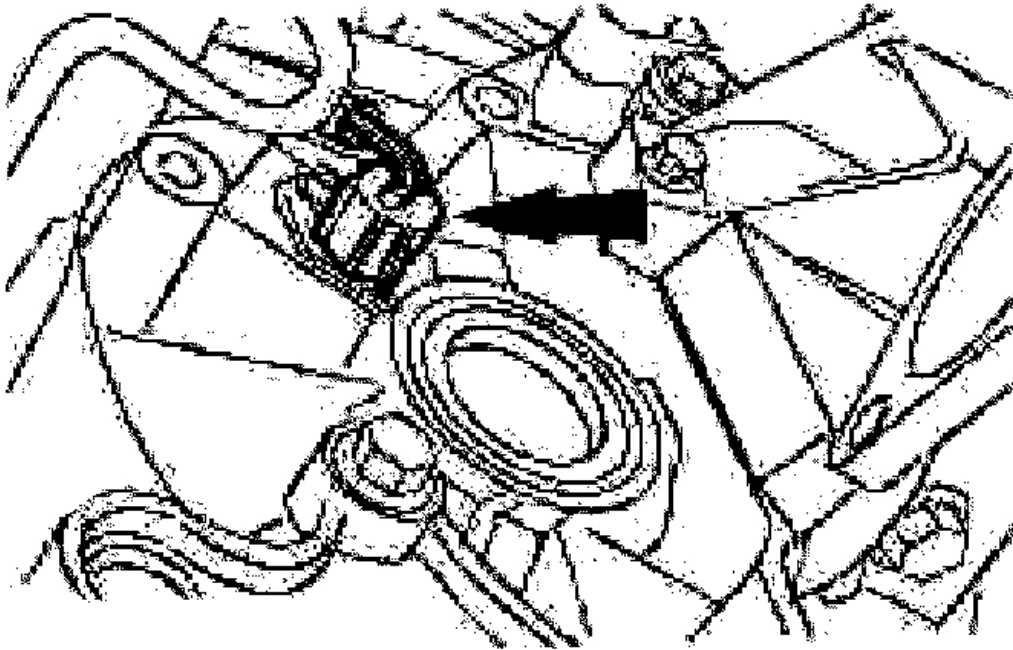
28. Connect the reversing lamp switch electrical connector.
 - Clip on the wiring loom.



G03433003

Fig. 420: Connecting Reversing Lamp Switch Electrical Connector
Courtesy of FORD MOTOR CO.

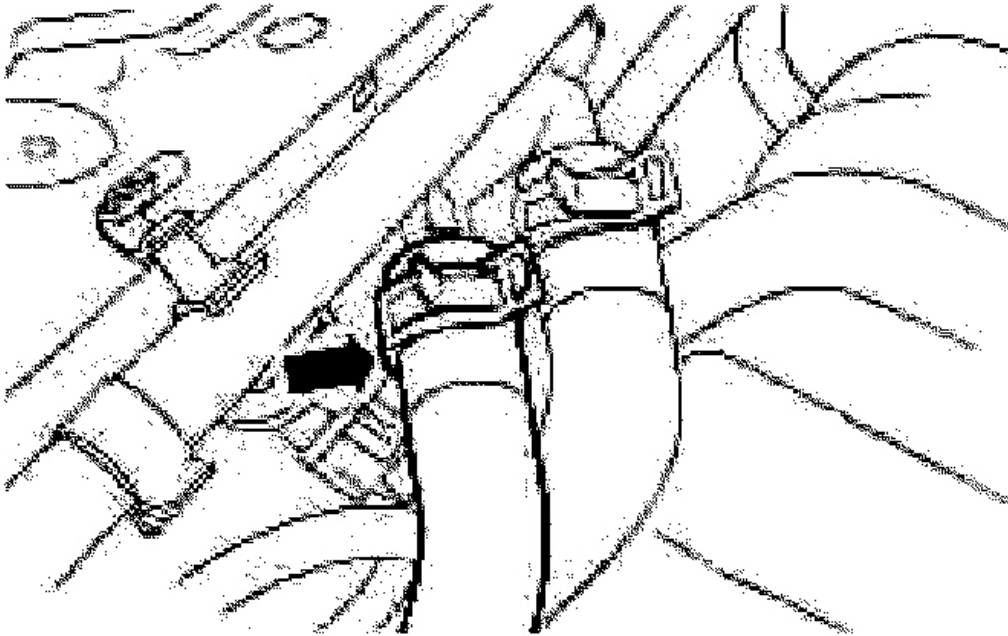
29. Connect the vehicle speed sensor (VSS) electrical connector.



G03433004

Fig. 421: Connecting Vehicle Speed Sensor (VSS) Electrical Connector
Courtesy of FORD MOTOR CO.

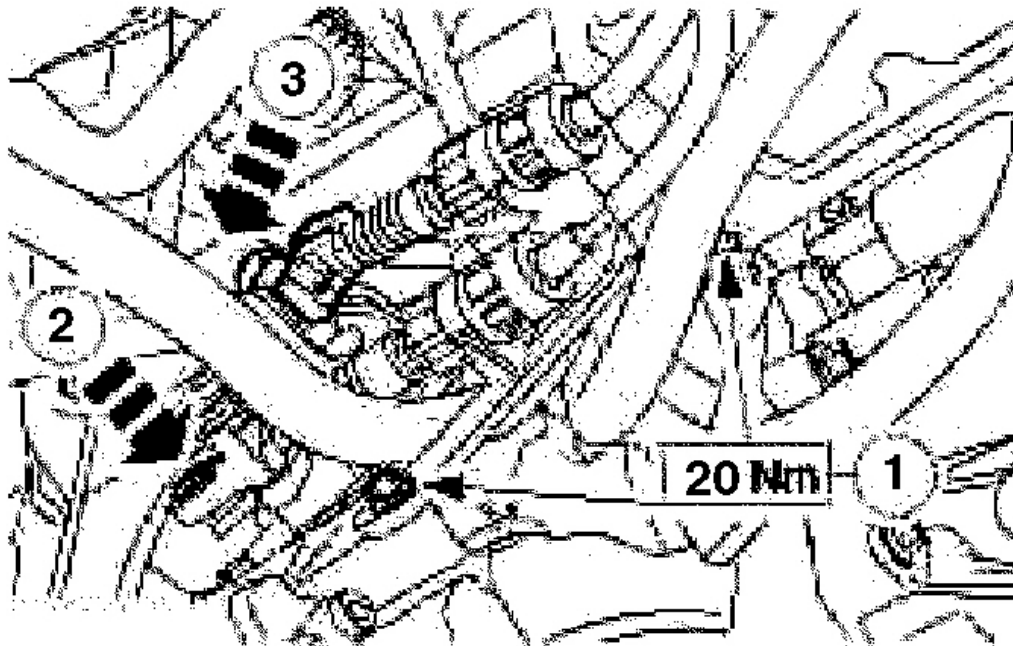
30. Install the crossmember. For additional information, refer to **CROSSMEMBER**).
31. Connect the oil cooler hose.



G03433005

Fig. 422: Connecting Oil Cooler Hose
Courtesy of FORD MOTOR CO.

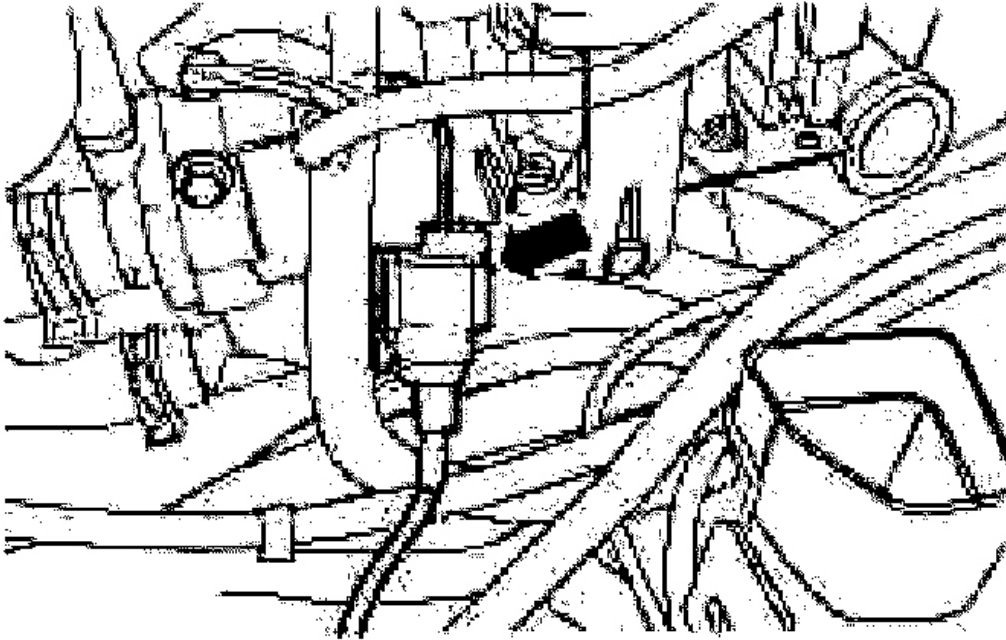
32. Attach the gearshift cables to the transaxle.
 1. Attach the retaining bracket to the transaxle.
 2. Attach the gearshift cable and the selector cable to the selector levers.



G03433006

Fig. 423: Attaching Gearshift Cables To Transaxle
Courtesy of FORD MOTOR CO.

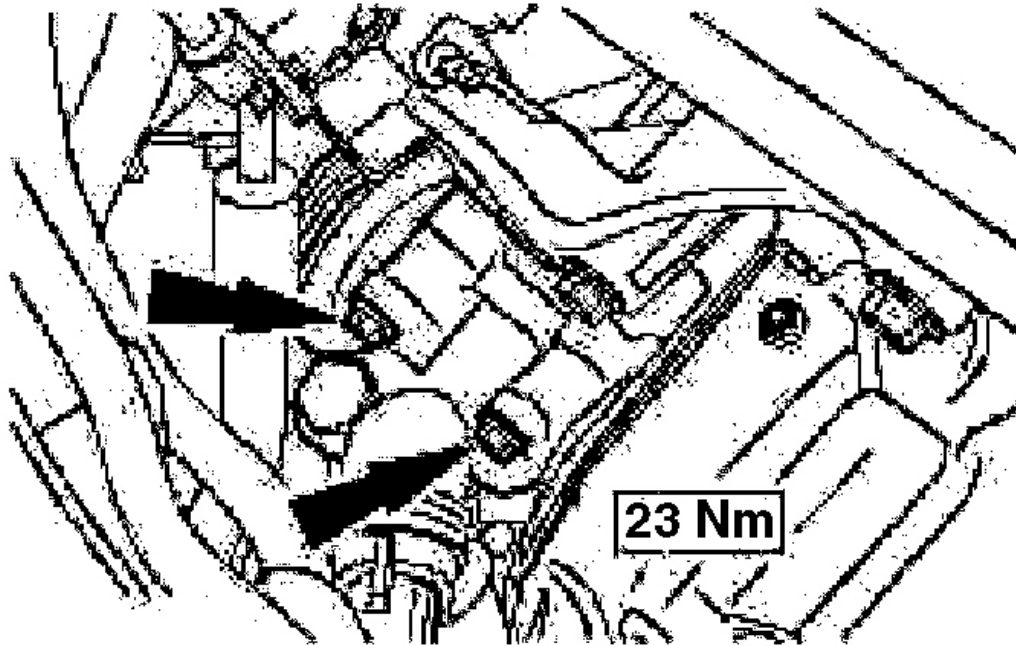
33. Connect the starter field wire electrical connector.



G03433007

Fig. 424: Connecting Starter Field Wire Electrical Connector
Courtesy of FORD MOTOR CO.

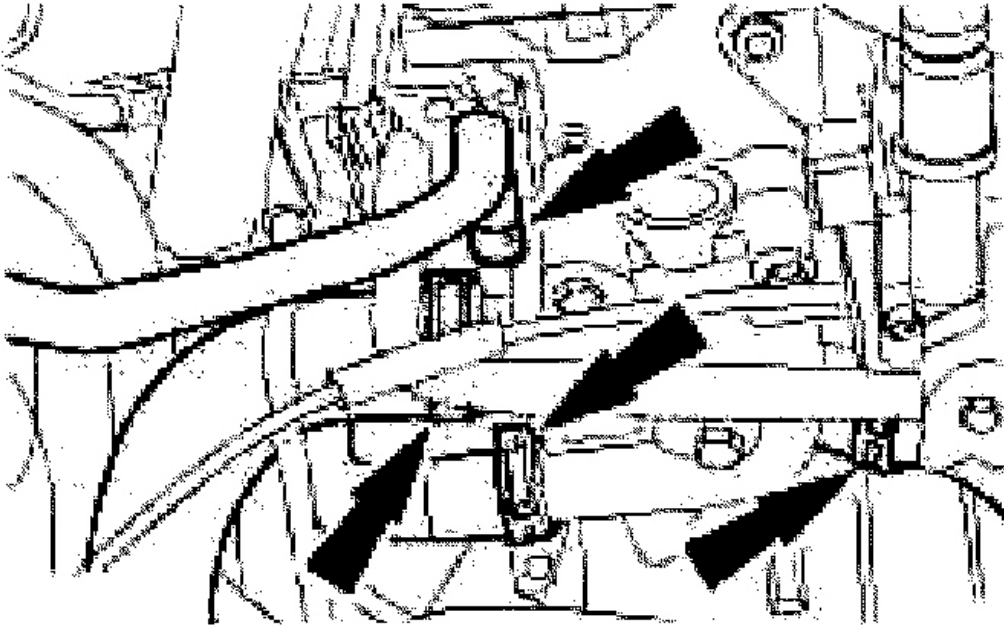
34. Install the power steering pump upper bolts.



G03433008

Fig. 425: Installing Power Steering Pump Upper Bolts
Courtesy of FORD MOTOR CO.

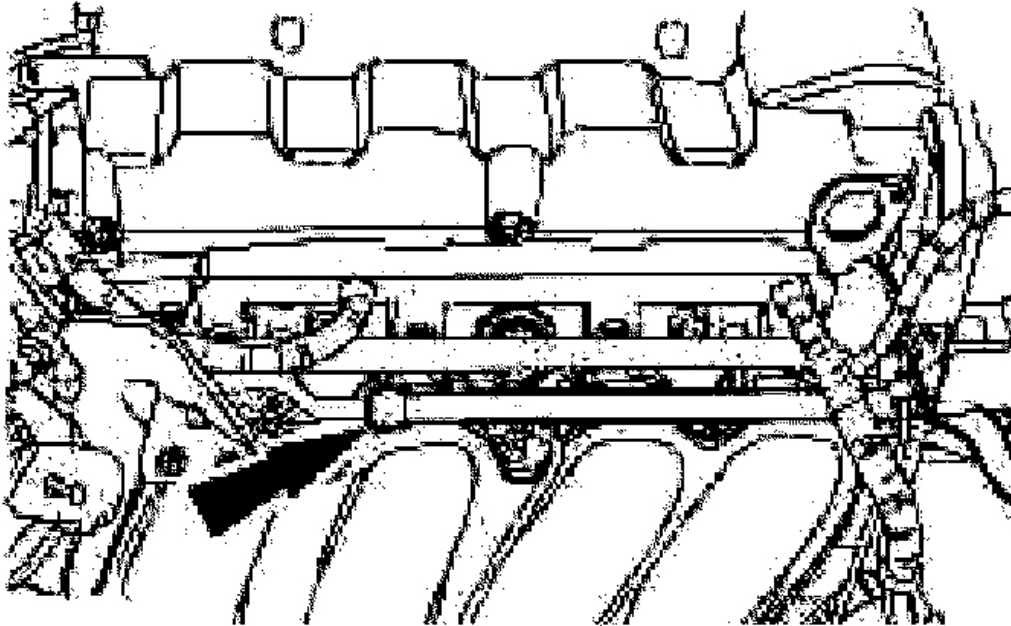
35. Attach the coolant hoses to the thermostat housing.



G03433009

Fig. 426: Attaching Coolant Hoses To Thermostat Housing
Courtesy of FORD MOTOR CO.

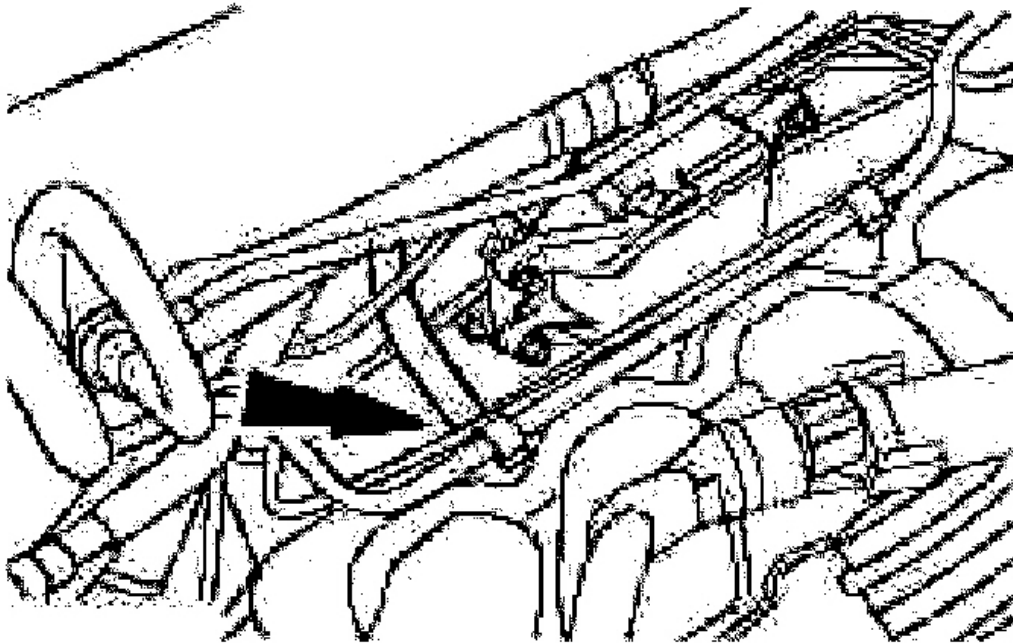
36. Attach the fuel pipes to the fuel rail.



G03433010

Fig. 427: Attaching Fuel Pipes To Fuel Rail
Courtesy of FORD MOTOR CO.

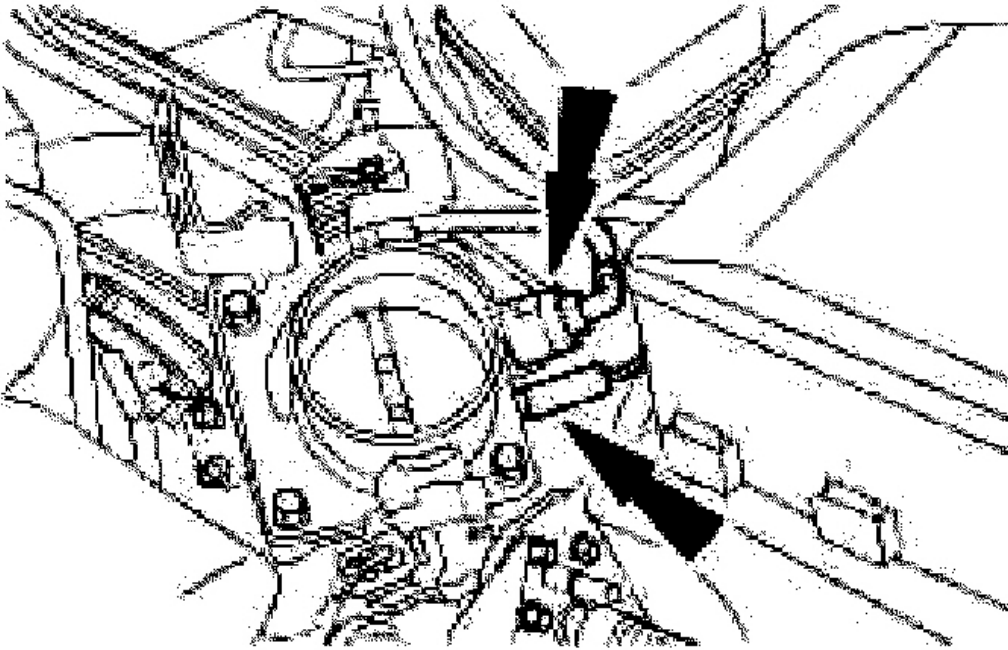
37. Attach the brake servo vacuum hose to the intake manifold.



G03433011

Fig. 428: Attaching Brake Servo Vacuum Hose To Intake Manifold
Courtesy of FORD MOTOR CO.

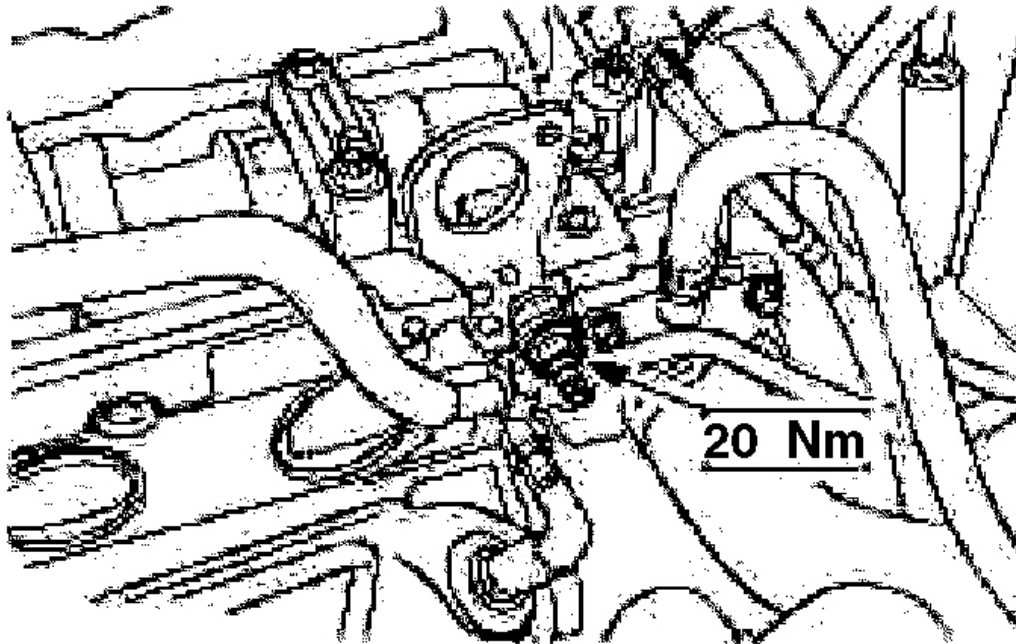
38. Attach the vacuum hoses to the throttle body.



G03433012

Fig. 429: Attaching Vacuum Hoses To Throttle Body
Courtesy of FORD MOTOR CO.

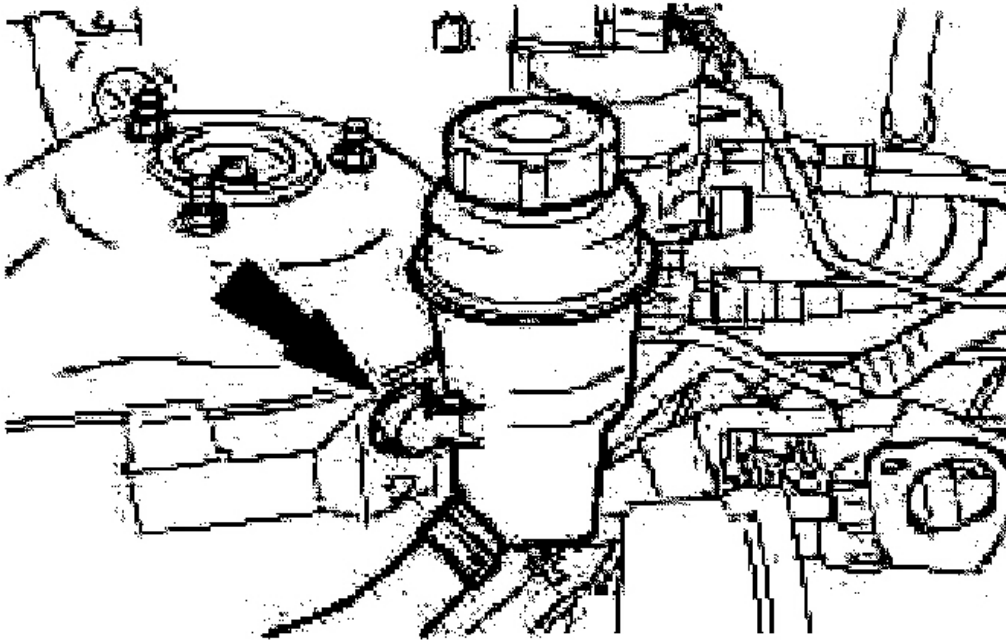
39. Attach the power steering line bracket to the cylinder head.



G03433013

Fig. 430: Attaching Power Steering Line Bracket To Cylinder Head
Courtesy of FORD MOTOR CO.

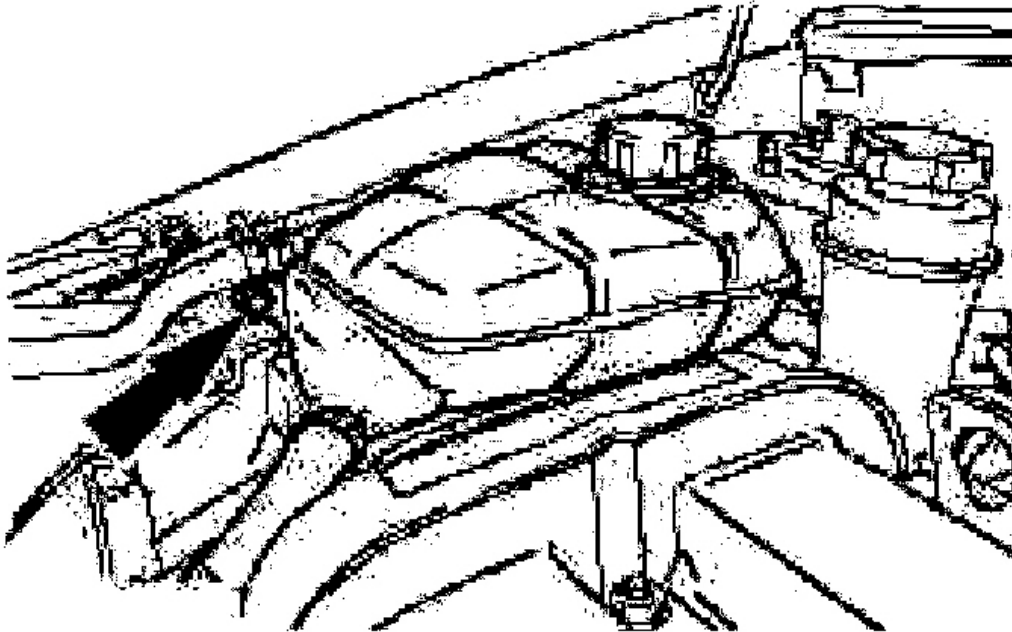
40. Install the power assisted steering (PAS) reservoir.



G03433014

Fig. 431: Installing Power Assisted Steering (PAS) Reservoir
Courtesy of FORD MOTOR CO.

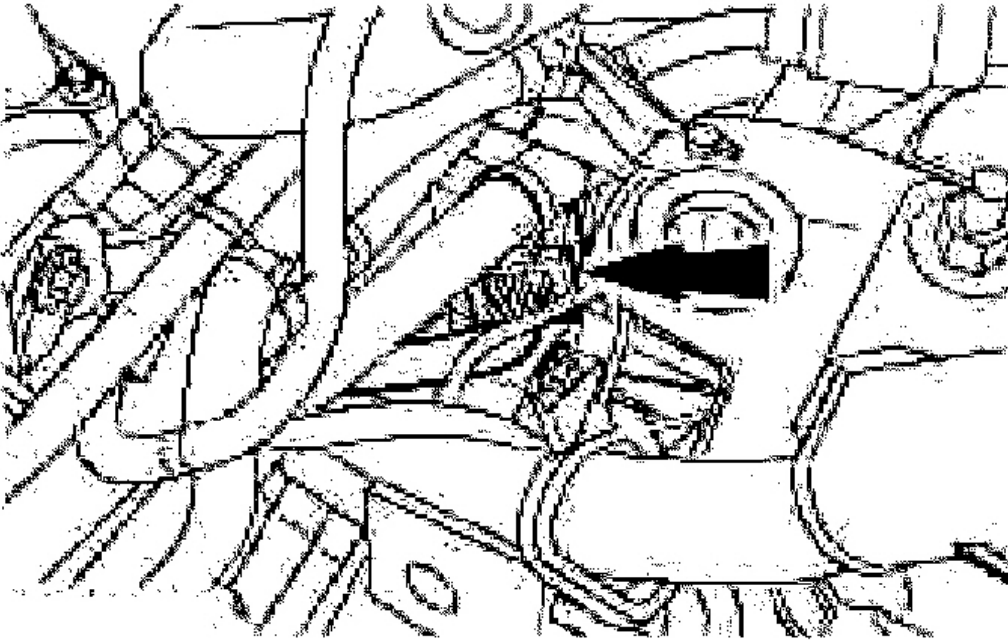
41. Install the coolant expansion tank.



G03433015

Fig. 432: Installing Coolant Expansion Tank
Courtesy of FORD MOTOR CO.

42. Connect the wiring harness connectors.



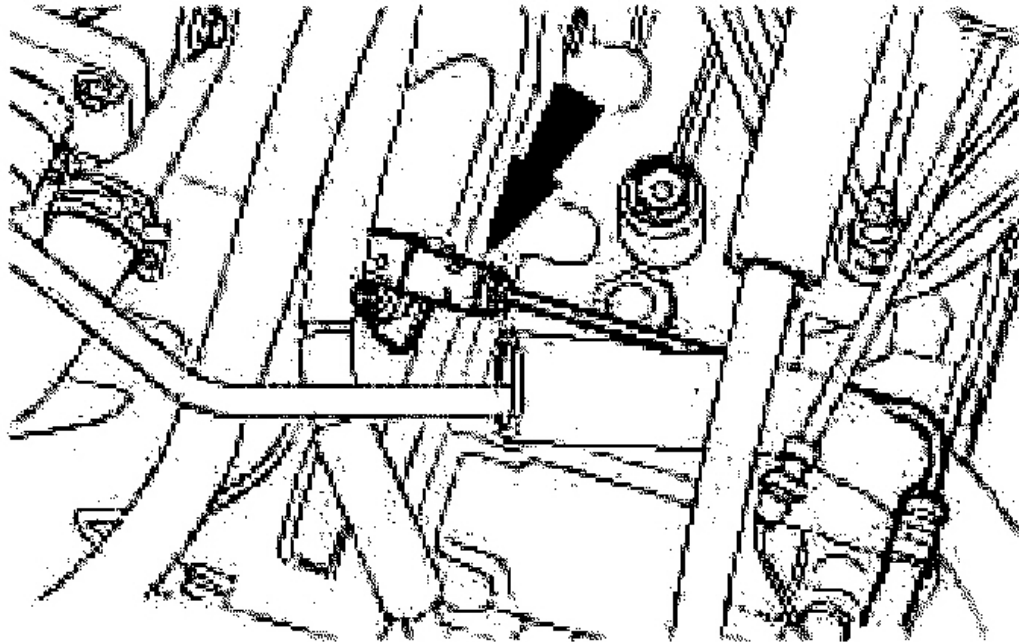
G03433016

Fig. 433: Connecting Wiring Harness Connectors
Courtesy of FORD MOTOR CO.

WARNING: Escaping brake fluid. Do not allow brake fluid to come into contact with the skin or eyes. If brake fluid should come into contact with your skin or eyes, rinse the affected area immediately with water.

CAUTION: If any brake fluid gets on the paintwork wash it off immediately with water.

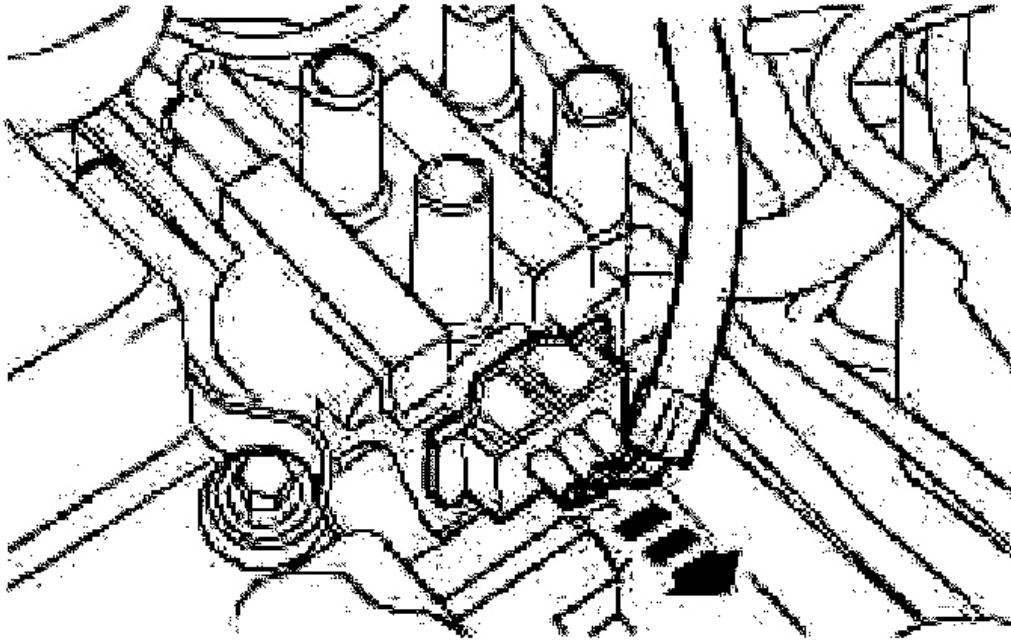
43. Attach the clutch supply line to the clutch slave cylinder.
 - Install the clip.



G03433017

Fig. 434: Attaching Clutch Supply Line To Clutch Slave Cylinder
Courtesy of FORD MOTOR CO.

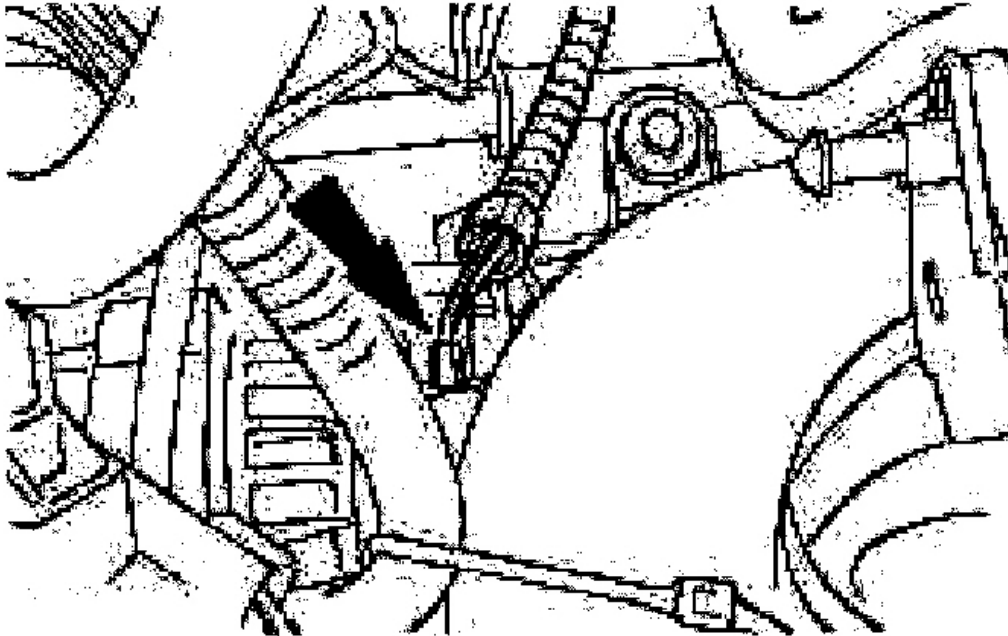
44. Bleed the hydraulic clutch operating system. **BLEEDING HYDRAULIC SYSTEM**).
45. Connect the ignition coil pack electrical connector.
 - Connect the radio capacitor.



G03433018

Fig. 435: Connecting Ignition Coil Pack Electrical Connector
Courtesy of FORD MOTOR CO.

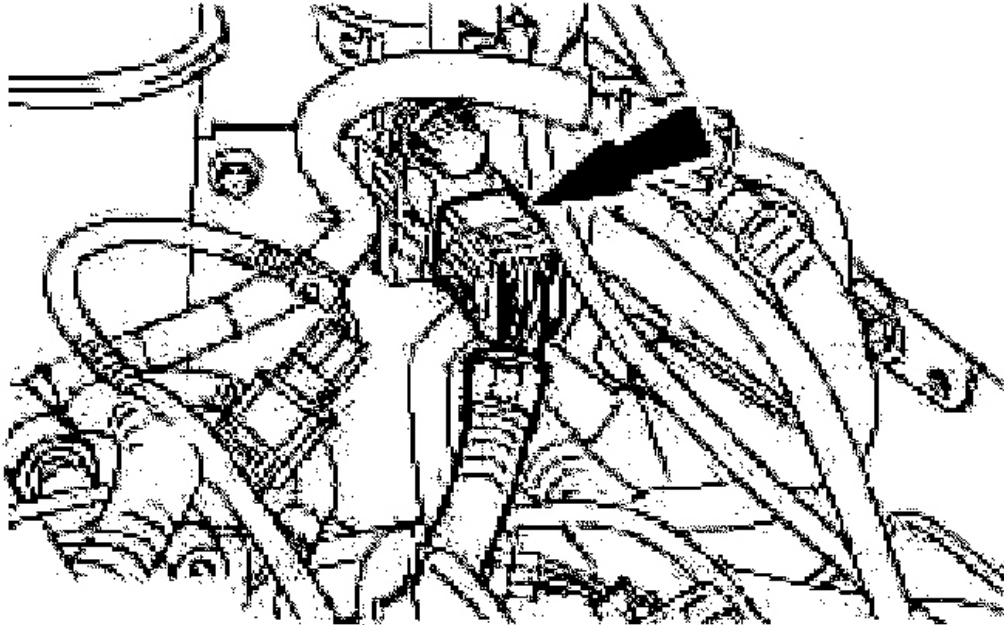
46. Connect the generator electrical connector.



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Fig. 436: Connecting Generator Electrical Connector
Courtesy of FORD MOTOR CO.

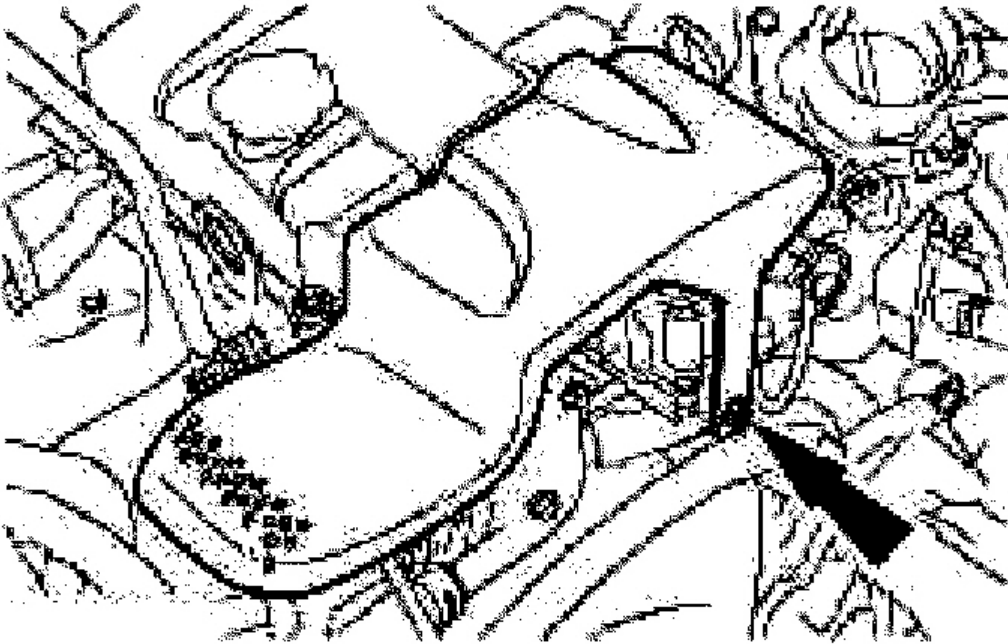
47. Connect the fuel injector wiring harness.



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Fig. 437: Connecting Fuel Injector Wiring Harness
Courtesy of FORD MOTOR CO.

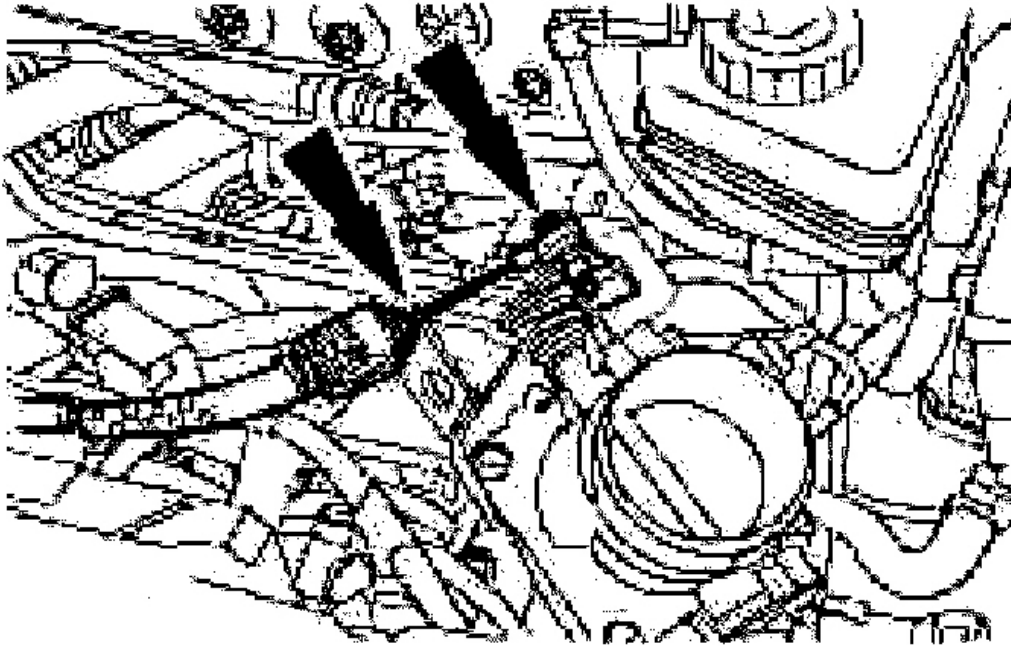
48. Install the ignition coil pack cover.



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Fig. 438: Installing Ignition Coil Pack Cover
Courtesy of FORD MOTOR CO.

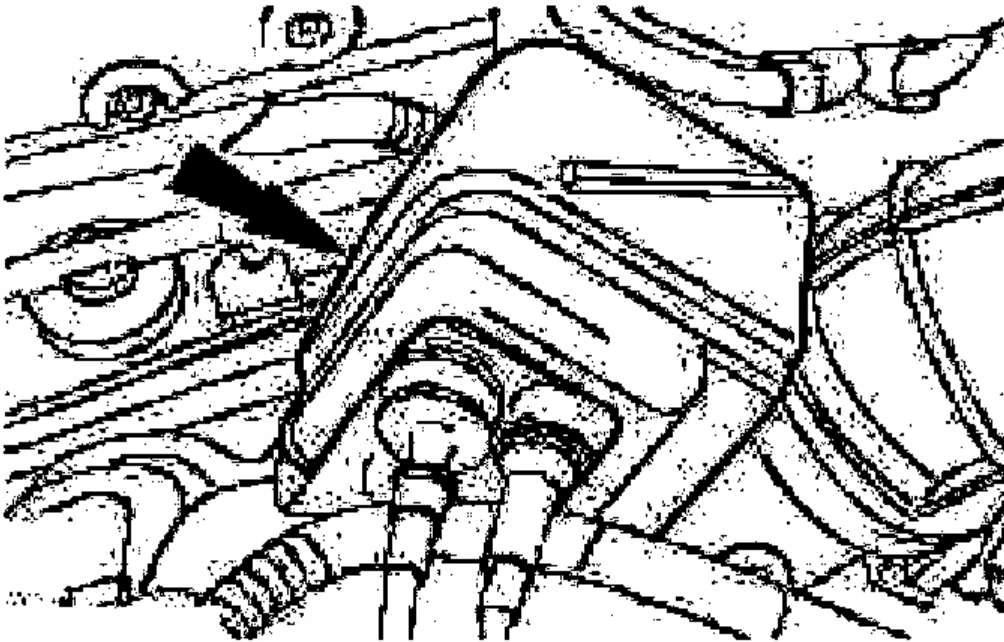
49. Attach the accelerator cable and the speed control cable (if equipped) to the throttle body.



G03433022

Fig. 439: Attaching Accelerator Cable And Speed Control Cable
Courtesy of FORD MOTOR CO.

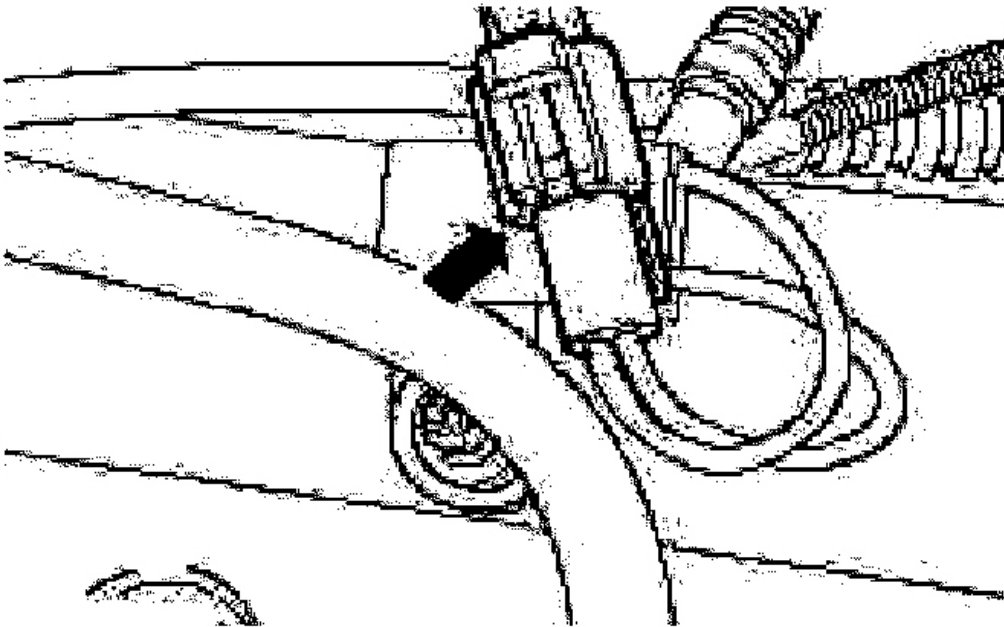
50. Install the splash shield.



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Fig. 440: Installing Splash Shield
Courtesy of FORD MOTOR CO.

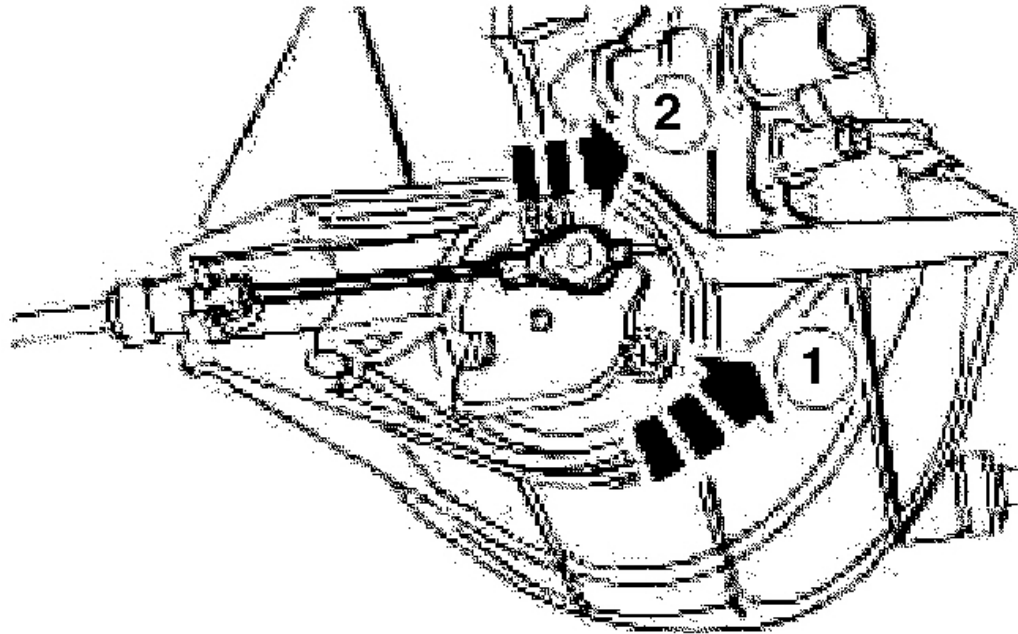
51. Connect the engine block heater (if equipped).



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Fig. 441: Connecting Engine Block Heater
Courtesy of FORD MOTOR CO.

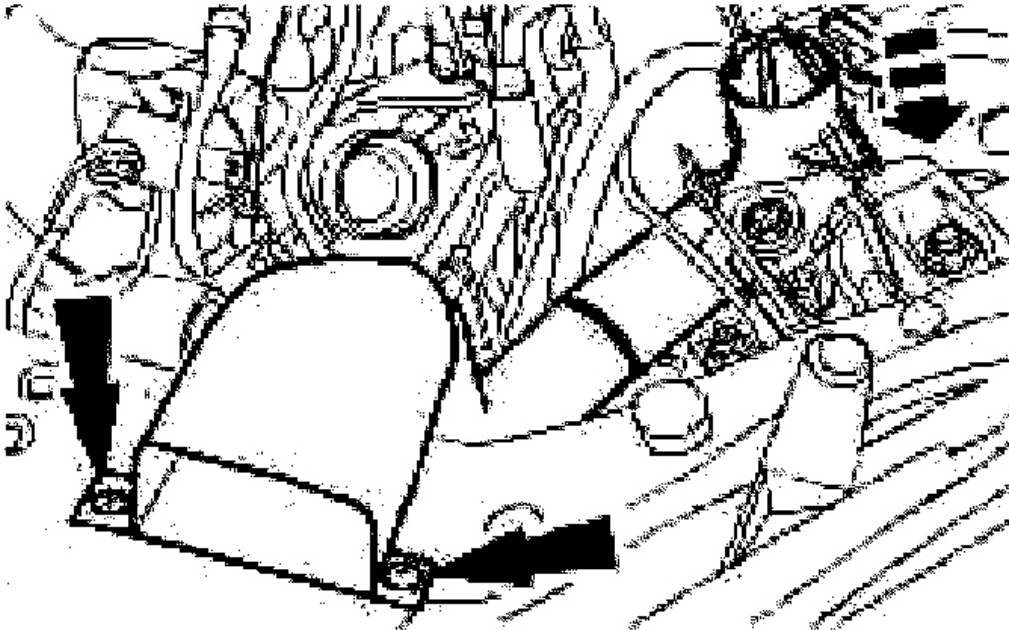
52. Connect the intake manifold runner control (IRMC).
 1. Rotate the IRMC lever.
 2. Connect the IRMC actuator cable.



G03433025

Fig. 442: Connecting Intake Manifold Runner Control (IRMC)
Courtesy of FORD MOTOR CO.

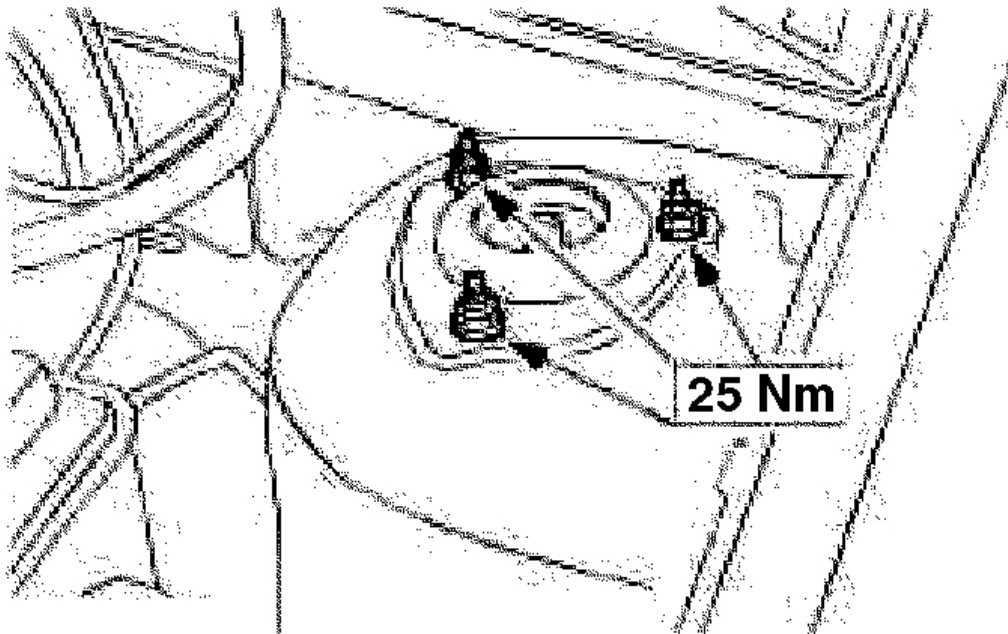
53. Install the air cleaner intake tube and resonator.



G03433026

Fig. 443: Installing Air Cleaner Intake Tube And Resonator
Courtesy of FORD MOTOR CO.

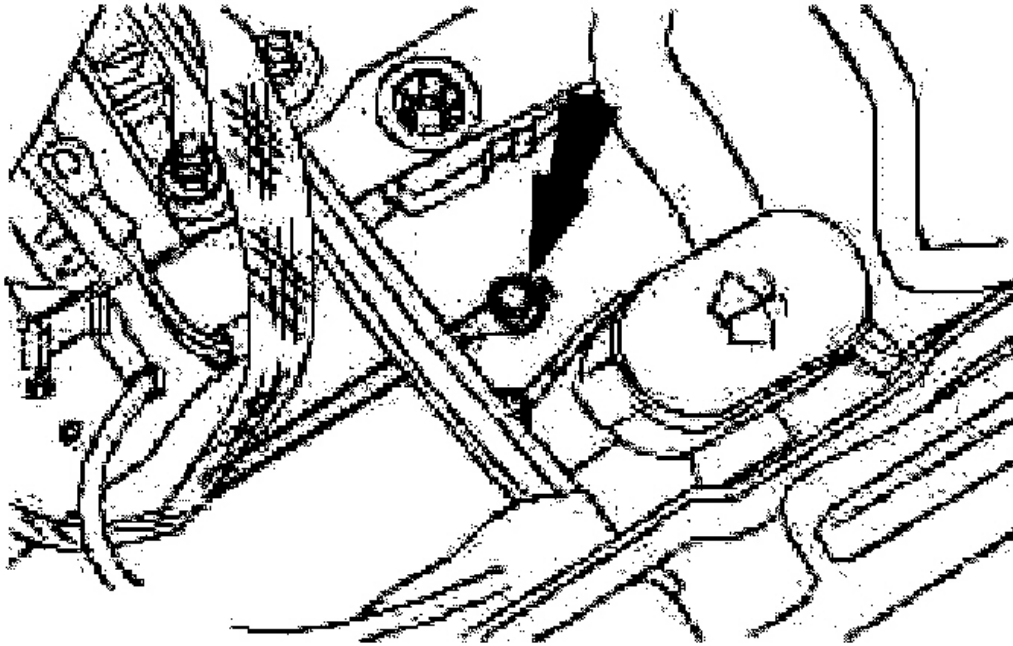
54. Tighten the strut and spring assembly upper mounting retaining nuts.



G03433027

Fig. 444: Tightening Strut And Spring Assembly Upper Mounting Retaining Nuts
Courtesy of FORD MOTOR CO.

55. Attach the ground cable to the inner fender.



G03433028

Fig. 445: Attaching Ground Cable To Inner Fender
Courtesy of FORD MOTOR CO.

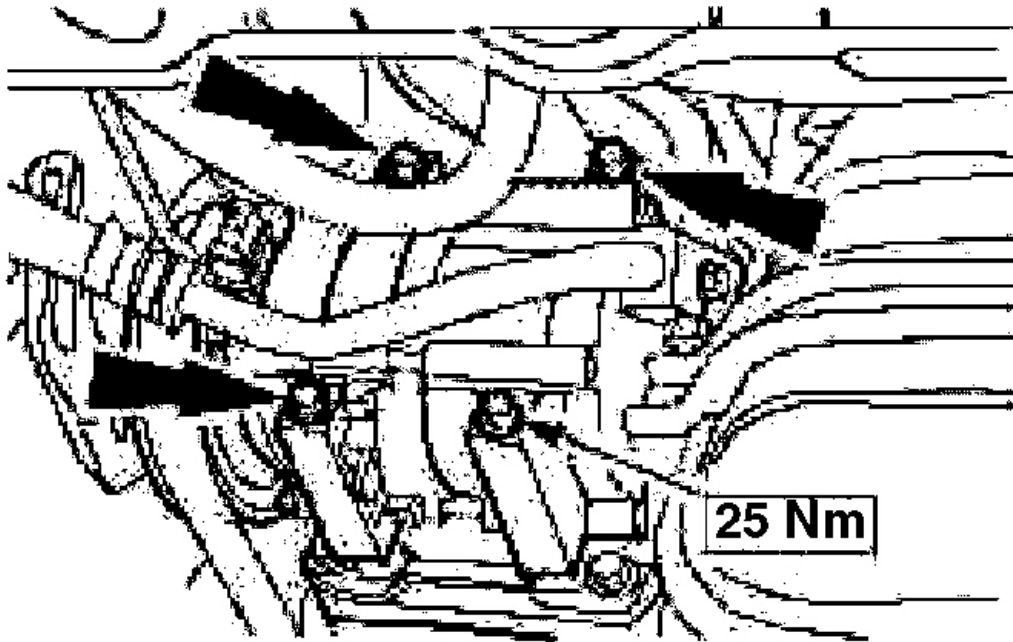
56. Install the air cleaner .
57. Install the battery tray .

CAUTION: When the battery has been disconnected and reconnected, some abnormal drive symptoms may occur while the vehicle relearns its adaptive strategy. The vehicle may need to be driven 16 km (10 miles) or more to relearn the strategy.

58. Install and connect the battery .
59. Fill the transaxle. For additional information, refer to MANUAL TRANSMISSION/TRANSAXLE .

Vehicles with air conditioning

60. Install the air conditioning (A/C) compressor.



G03433029

Fig. 446: Installing Air Conditioning (A/C) Compressor
Courtesy of FORD MOTOR CO.

All Vehicles

61. Fill the engine with engine oil.
62. Fill the cooling system. For additional information, refer to Cooling System Draining, Filling and Bleeding (ENGINE COOLING article).
63. Fill and bleed the PAS system. For additional information, refer to Power Steering System Filling (**STEERING SYSTEM-GENERAL INFORMATION**).

CROSSMEMBER

REMOVAL

NOTE: Make sure the road wheels are in the straight ahead position.

1. Centralize the steering and lock it in position.
2. Disconnect the steering column shaft from the steering gear pinion extension.
 - Discard the bolt.
3. Remove the front wheels and tires.

CAUTION: Leave the tie-rod end retaining nuts in place to protect the ball joint studs.

4. Loosen the tie-rod end retaining nut on both sides.

CAUTION: Using a soft cloth, protect the ball joint seal to prevent damage.

5. Using the special tool, detach the tie-rod end from the wheel knuckle on both sides.
 - Remove and discard the tie-rod end retaining nuts.

NOTE: Use a 5 mm Allen key to prevent the ball joint from rotating.

6. Detach the stabilizer bar connecting link from the stabilizer bar on both sides.

CAUTION: Using a soft cloth, protect the ball joint seal to prevent damage.

7. Detach the lower arm ball joint from the wheel knuckle on both sides.
 - Remove the heat shields.
8. Remove the engine support insulator to transaxle center retaining bolt.
9. Remove the steering gear heat shield (two bolts).
10. Detach the power steering line from the clamp.
 - Remove the retaining screw.
11. Detach the power steering line from the power steering gear.
 1. Remove the retaining bolt.
 2. Rotate the power steering line clamp clockwise.
 3. Remove the retaining screw.
 - Allow the oil to drain into a suitable container.

12. Using a suitable transmission jack, support the crossmember.
13. Remove the crossmember retaining bolts.
14. Remove the crossmember.

INSTALLATION

CAUTION: Make sure the crossmember ball bearing washers are installed correctly.

1. Using a suitable transmission jack and the special tool, position and align the crossmember.
 1. Insert the alignment pins through the crossmember alignment holes and the washers.
 2. Slide the locking plates on top of the washers and into the groove of the tool and tighten the alignment pin sleeve.
 3. Raise the crossmember engaging the alignment pins into the chassis aligning holes.

NOTE: Do not fully tighten the crossmember retaining bolts at this stage.

2. Install the crossmember retaining bolts.
3. Remove the alignment pins.

CAUTION: While tightening the crossmember retaining bolts, make sure the crossmember does not move.

4. Tighten the crossmember retaining bolts.

CAUTION: Make sure the crossmember is aligned correctly by inserting the alignment pins through the crossmember alignment holes.

NOTE: The alignment pins will not engage fully.

5. Insert the alignment pins.
6. Remove the alignment pins.
7. Lower and remove the transmission jack.

NOTE: Check the O-ring seals for perishing, splits or cuts.

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8. Install new O-ring seals as necessary.
9. Attach the power steering lines to the power steering gear.
 - Rotate the power steering line clamp counterclockwise.
10. Attach the power steering line to the clamp.
 - Install the retaining screw.
11. Install the steering gear heat shield (two bolts).
12. Install the engine support insulator to transaxle center retaining bolt.

CAUTION: Make sure the heat shield is installed to prevent damage to the ball joint.

13. Install the heat shield on both sides.
14. Attach the lower arm ball joint to the wheel knuckle on both sides.

NOTE: Use a 5 mm Allen key to prevent the ball joint from rotating.

15. Attach the stabilizer bar connecting link to the stabilizer bar on both sides.

NOTE: Use new retaining nuts.

16. Attach the tie-rod ends to the wheel knuckle on both sides.
17. Install the front wheels and tires.

WARNING: Use a new retaining bolt. Failure to follow this instruction may result in personal injury.

CAUTION: Make sure the road wheels are in the straight ahead position.

18. Connect the steering column shaft to the steering gear pinion extension.
19. Fill and bleed the power steering system. For additional information, refer to **STEERING SYSTEM-GENERAL INFORMATION**.