

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

2006 ENGINE**Engine - 4.6L (3V) - Explorer & Mountaineer****SPECIFICATIONS****GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Item	Specification
Lubricants and Sealants	
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXP-5W20-LSP12) or equivalent	WSS-M2C930-A
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or equivalent (yellow color)	WSS-M97B51-A1
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Silicone Gasket and Sealant TA-30 or equivalent	WSE-M4G323-A4
Engine	
Displacement	4.6L (281 CID)
Number of cylinders	8
Bore	90.2 mm (3.55 in)
Stroke	90.0 mm (3.54 in)
Firing order	1-3-7-2-6-5-4-8
Oil pressure minimum at 2,000 RPM (engine at normal operating temperature)	517 kPa (75 psi)
Oil capacity	6.0 liters (6.5 quarts) with filter
Compression ratio	9.8:1
Cylinder Head and Valve Train	
Combustion chamber volume	48.1-51.1 cc (2.94-3.12 cu in)
Valve arrangement (front to rear) - LH	I-E-I-I-E-I-I-E-I-I-E-I
Valve arrangement (front to rear) - RH	I-E-I-I-E-I-I-E-I-I-E-I
Valve guide bore diameter	6.015-6.044 mm (0.237-0.238 in)
Valve stem diameter - intake	5.975-5.995 mm (0.235-0.236 in)
Valve stem diameter - exhaust	5.95-5.97 mm (0.234-0.235 in)
Valve stem-to-guide clearance - intake	0.020-0.069 mm (0.001-0.003 in)

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Valve stem-to-guide clearance - exhaust	0.045-0.094 mm (0.002-0.004 in)
Valve head diameter - intake	33.62-33.98 mm (1.324-1.338 in)
Valve head diameter - exhaust	37.32-37.68 mm (1.469-1.483 in)
Valve face runout	0.05 mm (0.002 in)
Valve face angle	45.5 degrees
Valve seat width - intake	1.2-1.4 mm (0.047-0.055 in)
Valve seat width - exhaust	1.4-1.6 mm (0.055-0.063 in)
Valve seat angle	44.5-45.0 degrees
Valve spring free length	56.5 mm (2.22 in)
Valve spring compression pressure (maximum lift)	760 N (171 lbs) ± 39.0 N (8.8 lbs) @ 31.04 mm (1.22 in)
Valve spring installed height	42.04 mm (1.66 in)
Valve spring installed pressure	350 N (79 lbs) ± 17.5 N (4 lbs) @ 42.04 mm (1.66 in)
Hydraulic Lash Adjuster	
Diameter	15.988-16.000 mm (0.6294-0.6299 in)
Clearance-to-bore	0.018-0.069 mm (0.0007-0.0027 in)
Service limit	-
Collapsed lash adjuster gap	0.45-0.85 (0.018-0.033)
Camshaft	
Theoretical valve lift @ diameter - intake	11.166 mm (0.439 in)
Theoretical valve lift @ diameter - exhaust	11.066 mm (0.436 in)
Lobe lift - intake	5.520 mm (0.217 in)
Lobe lift - exhaust	5.506 mm (0.217 in)
Allowable lobe lift loss	0.00127 mm (0.00005 in)
Journal diameter	28.607-28.633 mm (1.126-1.127 in)
Camshaft journal bore inside diameter	28.657-28.682 mm (1.128-1.129 in)
Camshaft journal-to-bearing clearance	0.024-0.075 mm (0.001-0.003 in)
Runout	0.03 mm (0.001 in)
End play	0.0050-0.250 mm (0.0002-0.009 in)
Cylinder Block	
Cylinder bore diameter - grade 1	90.200-90.210 mm (3.5512-3.5516 in)
	90.210-90.220 mm (3.5516-

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Cylinder bore diameter - grade 2	3.5520 in)
Cylinder bore diameter - grade 3	90.220-90.230 mm (3.5520-3.5524 in)
Cylinder bore maximum taper	0.006 mm (0.0002 in)
Cylinder bore maximum out-of-round	0.020 mm (0.0008 in)
Main bearing bore inside diameter	72.400-72.424 mm (2.850-2.851 in)
Crankshaft	
Main bearing journal diameter	67.481-67.505 mm (2.6567-2.6576 in)
Main bearing journal maximum taper	0.004 mm (0.0002 in)
Main bearing journal maximum out-of-round	0.0075 mm (0.0003 in) between cross sections
Main bearing journal-to-cylinder block clearance	0.048-0.024 mm (0.0019-0.0009 in)
Connecting rod journal diameter	53.003-52.983 mm (2.0867-2.0859 in)
Connecting rod journal maximum taper	0.004 mm (0.0002 in)
Connecting rod journal maximum out-of-round	0.0075 mm (0.0003 in) between cross sections
Crankshaft maximum end play	0.075-0.377 mm (0.0030-0.0148 in)
Piston and Connecting Rod	
Piston diameter - grade 1 (at right angle to pin bore) (uncoated)	90.182-90.167 mm (3.5504-3.5499 in)
Piston diameter - grade 2 (at right angle to pin bore) (uncoated)	90.196-90.179 mm (3.551-3.5503 in)
Piston diameter - grade 3 (at right angle to pin bore) (uncoated)	90.208-90.193 mm (3.5515-3.551 in)
Piston-to-cylinder bore clearance (at grade size)	0.017-0.047 mm (0.0007-0.0019 in)
Piston ring end gap - top	0.15-0.30 mm (0.006-0.012 in)
Piston ring end gap - intermediate	0.25-0.50 mm (0.0098-0.0197 in)
Piston ring end gap - oil control	0.15-0.65 mm (0.0059-0.0256 in)
Piston ring groove width - top	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - intermediate	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - oil control	3.030-3.056 mm (0.1193-0.1203 in)
	1.50-1.48 mm (0.0590-0.0582 in)

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Piston ring width - top and intermediate	in)
Piston ring-to-groove clearance - top	0.020-0.060 mm (0.0008-0.0020 in)
Piston ring-to-groove clearance - intermediate	0.020-0.060 mm (0.0008-0.0020 in)
Piston pin bore diameter	22.0125-22.0175 mm (0.8666-0.8668 in)
Piston pin diameter	22.0010-22.0030 mm (0.8662-0.8663 in)
Piston pin length	61.8 mm (2.433 in)
Piston pin-to-piston fit	0.0095-0.023 mm (0.0004-0.0009 in)
Connecting rod-to-pin clearance	0.009-0.023 mm (0.0004-0.0009 in)
Connecting rod pin bore diameter	22.012-22.024 mm (0.8666-0.8671 in)
Connecting rod length (center-to-center)	150.7 mm (5.933 in)
Connecting rod maximum allowed bend	± 0.038 mm (0.0015 in)
Connecting rod maximum allowed twist ⁽¹⁾	± 0.05 mm (0.0020 in)
Connecting rod bearing bore diameter (with assembled liners)	53.049-53.027 mm (2.0885-2.0877 in)
Connecting rod bearing-to-crankshaft clearance	0.024-0.066 mm (0.0009-0.0026 in)
Connecting rod side clearance	0.5-0.15 mm (0.02-0.006 in)
(1) The pin bore and crank bearing bore must be parallel and in the same vertical plane within the specified total difference when measured at the ends of a 203 mm bar, 105.5 mm on each side of rod centerline.	

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
A/C compressor stud bolt	25	18	-
A/C compressor nuts	25	18	-
A/C hose bracket-to-A/C compressor nut	20	15	-
Accessory drive belt idler pulley bolts	25	18	-
Accessory drive belt tensioner bolts	25	18	-
Alternator lower mounting nuts	25	18	-
Alternator mounting bracket bolts	10	-	89
Battery cable bracket-to-engine front cover nut	10	-	89
Battery cable bracket-to-engine support insulator bracket bolt	15	11	-
Battery cable bracket-to-power steering pump nuts	10	-	89

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Camshaft bearing cap bolts ⁽¹⁾	-	-	-
Camshaft phaser sprocket assembly bolts ⁽¹⁾	-	-	-
Camshaft position (CMP) sensor bolt	10	-	89
Catalytic converter-to-exhaust manifold nuts	40	30	-
Connecting rod cap bolts ⁽¹⁾	-	-	-
Coolant pump bolts	25	18	-
Coolant pump pulley bolts	25	18	-
Cooling fan wiring harness bracket nut	25	18	-
Crankshaft main bearing cap bolts ⁽¹⁾	-	-	-
Crankshaft main bearing cap side bolts ⁽¹⁾	-	-	-
Crankshaft main bearing cap jack screws ⁽¹⁾	-	-	-
Crankshaft main bearing cap stud bolt ⁽¹⁾	-	-	-
Crankshaft position (CKP) sensor bolt	10	-	89
Crankshaft pulley bolt ⁽¹⁾	-	-	-
Crankshaft rear seal retainer bolts ⁽¹⁾	-	-	-
Cylinder heads bolts ⁽¹⁾	-	-	-
Cylinder head temperature sensor (CHT)	26	19	-
Engine front cover bolts ⁽¹⁾	-	-	-
Engine support insulator bracket bolts	72	53	-
Engine support insulator nuts	90	66	-
Engine support insulator through bolt	103	76	-
Exhaust manifold heat shield bolts	10	-	89
Exhaust manifold nuts ⁽¹⁾	-	-	-
Exhaust manifold studs	12	9	-
Flexplate bolts ⁽¹⁾	-	-	-
Front axle housing bolts	66	49	-
Ground strap-to-heater supply tube nut	10	-	89
Ground strap-to-cowl nut	12	9	-
Heater supply tube stud bolt	10	-	89
Hood hinge bolts	12	9	-
Ignition coil bolts	6	-	53
Intake manifold bolts ⁽¹⁾	-	-	-
Oil drain splash shield	12	9	-
Oil filter adapter bolts	25	18	-
Oil level indicator tube bolt	10	-	89
Oil pan bolts ⁽¹⁾	-	-	-
Oil pan drain plug	26	19	-
Oil pump bolts	10	-	89

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Oil pump screen and pickup tube spacer	25	18	-
Oil pump screen and pickup tube-to-oil pump bolts	10	-	89
Oil pump screen and pickup tube-to-spacer bolt	25	18	-
Oil temperature sensor	15	11	-
Power steering pressure hose-to-battery cable bracket nut	10	-	89
Power steering pump stud bolts	25	18	-
Radio interference capacitor nuts	25	18	-
Spark plugs	34	25	-
Stabilizer bar bracket bolts	70	52	-
Steering intermediate shaft coupling bolt	48	35	-
Throttle body bolts	10	-	89
Timing chain guide bolts	10	-	89
Timing chain hydraulic tensioner bolts	25	18	-
Transmission cooler tube bracket-to-engine front cover nut	12	9	-
Valve cover bolts ⁽¹⁾	-	-	-
Variable camshaft timing (VCT) housing bolts	10	-	89
Wiring harness terminals-to-power distribution box nuts	12	9	-
(1) Refer to the appropriate procedure.			

DESCRIPTION AND OPERATION

ENGINE

NOTE: Refer to the exploded view under the **ASSEMBLY** procedure.

The 4.6L (3V) is a V-8 engine with the following features:

- Single overhead camshafts
- Three valves per cylinder
- Sequential multi-port fuel injection (SFI)
- Aluminum cylinder heads
- Cast iron cylinder block
- Variable camshaft timing (VCT)
- Individually chain-driven camshafts with a hydraulic timing chain tensioner on each timing chain
- Distributorless ignition system
- Electronic returnless fuel system

Identification

Always refer to these labels when installation of new parts is necessary, or when checking engine calibrations. The engine parts often differ within a CID family. Verification of the identification codes will make sure that

the correct parts are obtained. These codes contain all of the pertinent information relating to the dates, optional equipment and revisions. The Ford Master Parts Catalog contains a complete listing of the codes and their applications.

Code Information

The engine code information label, located on the side of the valve cover and the front side of the valve cover, contains the following:

- Engine build date
- Engine plant code
- Engine code

Induction System

The sequential multi-port fuel injection (SFI) provides the fuel/air mixture needed for combustion in the cylinders. The 8 solenoid-operated fuel injectors:

- Are mounted in the intake manifold.
- Meter fuel into the air intake stream in accordance with engine demand.
- Are positioned so that their tips direct fuel just ahead of the engine intake valves.
- Are connected in series with the fuel rail pressure and temperature sensor.
- Supply fuel from the fuel tank with a fuel pump mounted in the fuel tank.

A constant fuel pressure is maintained across the fuel injectors by the fuel rail pressure and temperature sensor. The fuel rail pressure and temperature sensor:

- Is positioned upstream from the fuel injectors on the fuel rail.

Valve Train

The valve train operates as follows:

- Ball-tip hydraulic lash adjusters provide automatic lash adjustment.
- Roller followers ride on the camshaft lobe, transferring the up-and-down motion of the camshafts to the valves in the cylinder heads.

Positive Crankcase Ventilation System

All engines are equipped with a closed-type positive crankcase ventilation system recycling the crankcase vapors to the upper intake manifold.

Lubrication System

The engine lubrication system operates as follows:

- Oil is drawn into the oil pump through the oil pump screen cover and tube in the sump of the oil pan.
- Oil is pumped through the oil filter on the left front side of the cylinder block.
- Oil enters the main gallery where it is distributed to the crankshaft main journals and to both cylinder heads.
- From the main journals, the oil is routed through cross-drilled passages in the crankshaft to lubricate the connecting rod bearings. Controlled leakage through the crankshaft main bearings and connecting rod bearings is slung radially outward to cool and lubricate the cylinder walls as well as the entire connecting rod, piston and piston ring assembly.
- The left cylinder head is fed from a drilling into the supply passage feeding the main gallery at the front of the cylinder block. The right cylinder head is fed from a drilling into the rear of the main gallery. Main gallery pressure is reduced as it enters the cylinder head galleries through fixed non-serviceable orifices, located at the upper part of the feed passages. It is this reduced pressure in the cylinder head galleries which feeds the camshaft journals, the hydraulic lash adjusters and the primary and secondary timing chain tensioners.
- The camshaft lobe and roller followers are lubricated by splash created through valve train operation.

Oil Pump

The lubrication system of the 4.6L (3V) engine is designed to provide optimum oil flow to critical components of the engine through its entire operating range. The heart of the system is a positive displacement internal gear oil pump using top seal rotors. Generically this design is known as a gerotor pump, which operates as follows:

- The oil pump is mounted on the front face of the cylinder block
- The inner rotor is piloted on the crankshaft post and is driven through flats on the crankshaft
- System pressure is limited by an integral, internally-vented relief valve which directs the bypassed oil back to the inlet side of the oil pump
- Oil pump displacement has been selected to provide adequate volume to make sure of correct oil pressure, both at hot idle and maximum speed
- The relief valve calibration protects the system from excessive pressure during high viscosity conditions
- The relief valve is designed to provide adequate connecting rod bearing lubrication under high-temperature and high-speed conditions

DIAGNOSIS AND TESTING

ENGINE

For basic engine mechanical concerns, refer to **ENGINE SYSTEM-GENERAL INFORMATION** . For driveability concerns, refer to the **INTRODUCTION - GASOLINE** article.

IN-VEHICLE REPAIR

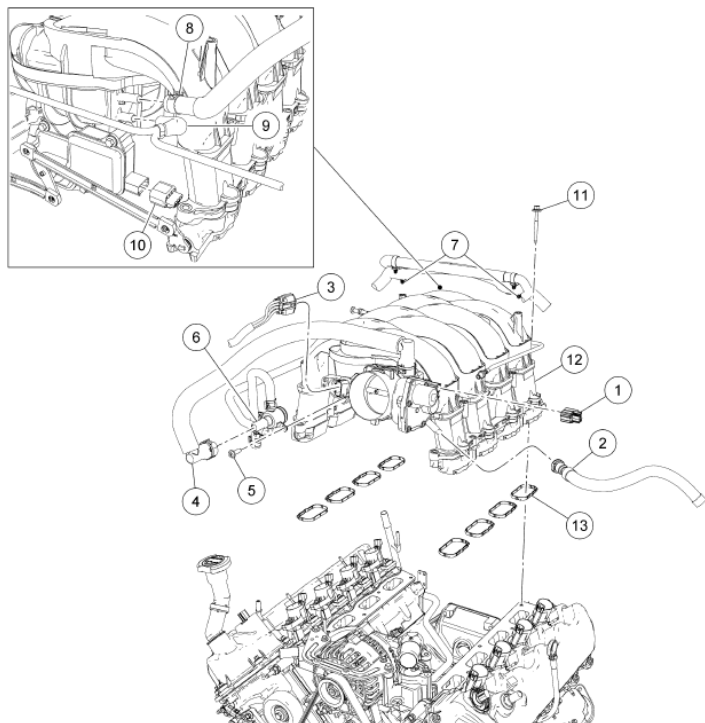
INTAKE MANIFOLD

MATERIAL

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Item	Specification
Motorcraft Metal Surface Prep ZC-31	-



N0038994

Item	Part Number	Description
1	14A464	Electronic throttle body (TB) electrical connector (part of 12B637)
2	9D289	Evaporative emissions (EVAP) hose
3	14A464	Throttle position (TP) sensor electrical connector (part of 12B637)
4	6K817	Positive crankcase ventilation (PCV) hose
5	W706975	Heated PCV fitting bolt (2 required)
6	9A474	Heated PCV fitting
7	13A506	Wiring harness retainers (part of 12B637)
8	9C482	Brake booster vacuum hose
9	4E498	Vacuum hose
10	14A464	Charge motion control valve (CMCV) electrical connector (part of 12B637)
11	W709552	Intake manifold bolt (10 required)
12	9425	Intake manifold
13	9439	Intake manifold gasket (8 required)

Fig. 1: Identifying Intake Manifold Components Location
Courtesy of FORD MOTOR CO.

Removal

WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

WARNING: Fuel in the fuel system remains under high pressure even when the engine is not running. Before servicing or disconnecting any of the fuel lines or fuel system components, the fuel system pressure must be relieved to prevent accidental spraying of fuel, causing a fire hazard. Failure to follow these instructions may result in personal injury.

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM-GENERAL INFORMATION**.
2. Remove the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**.
3. Remove the fuel rail and injectors. For additional information, refer to **FUEL CHARGING &**

CONTROLS - 4.6L (3V) .

4. Disconnect the electronic throttle body (TB) electrical connector.
5. Disconnect the evaporative emissions (EVAP) tube from the intake manifold.
6. Disconnect the throttle position (TP) sensor electrical connector.
7. Disconnect the positive crankcase ventilation (PCV) hose from the heated PCV fitting on the intake manifold.
8. Remove the bolts and position the heated PCV fitting aside.
 - Remove and discard the O-ring seal.
9. Detach the wiring harness retainers from the intake manifold.
10. Disconnect the charge motion control valve (CMCV) electrical connector.
11. Remove the bolts and position the intake manifold forward.
12. Disconnect the brake booster vacuum hose from the rear of the intake manifold.
13. Disconnect the vacuum hose from the rear of the intake manifold.
14. Remove the intake manifold and the gaskets.
 - Discard the gaskets.

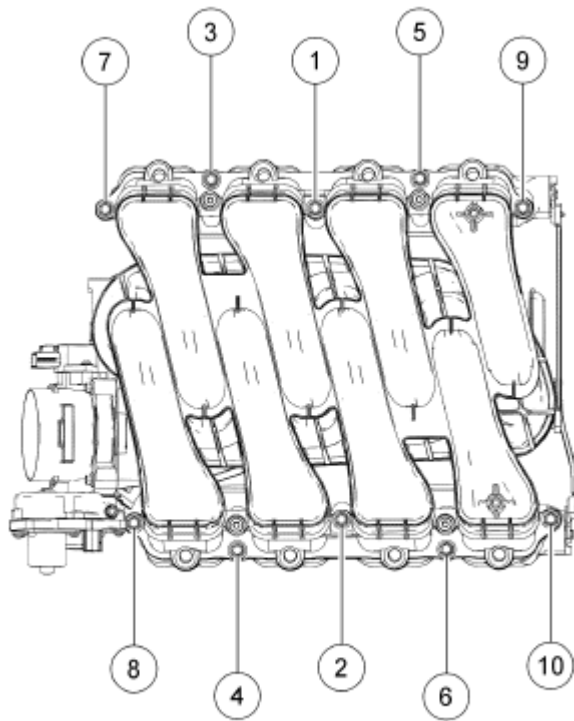
Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old gaskets.

NOTE: Clean and inspect the sealing surfaces with metal surface prep. Follow the directions on the packaging.

NOTE: Electrical and vacuum harnesses must not restrict movement of the CMCV control rods at the rear of the intake manifold. Use extreme care during the installation of the intake manifold to prevent any pinching of electrical and vacuum harnesses.

1. Using new intake manifold gaskets, position the intake manifold.
2. Connect the vacuum hose to the rear of the intake manifold.
3. Connect the brake booster hose to the rear of the intake manifold.
4. Install the intake manifold bolts and tighten the bolts in the sequence shown in 2 stages.
 - Stage 1: Tighten to 2 N.m (18 lb-in).
 - Stage 2: Tighten to 10 N.m (89 lb-in).



N0038995

Fig. 2: Identifying Tightening Sequence Of Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

5. Connect the CMCV electrical connector.
6. Attach the wiring harness retainers to the intake manifold.
7. Install a new O-ring seal, position the heated PCV fitting and install the bolts.
8. Connect the PCV hose to the heated PCV fitting on the intake manifold.
9. Connect the TP sensor electrical connector.
10. Connect the EVAP hose to the intake manifold.
11. Connect the electronic TB electrical connector.
12. Install the fuel rail and injectors. For additional information, refer to **FUEL CHARGING & CONTROLS - 4.6L (3V)**.
13. Install the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**.

VALVE COVER - LH

MATERIAL

Item	Specification
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover	-

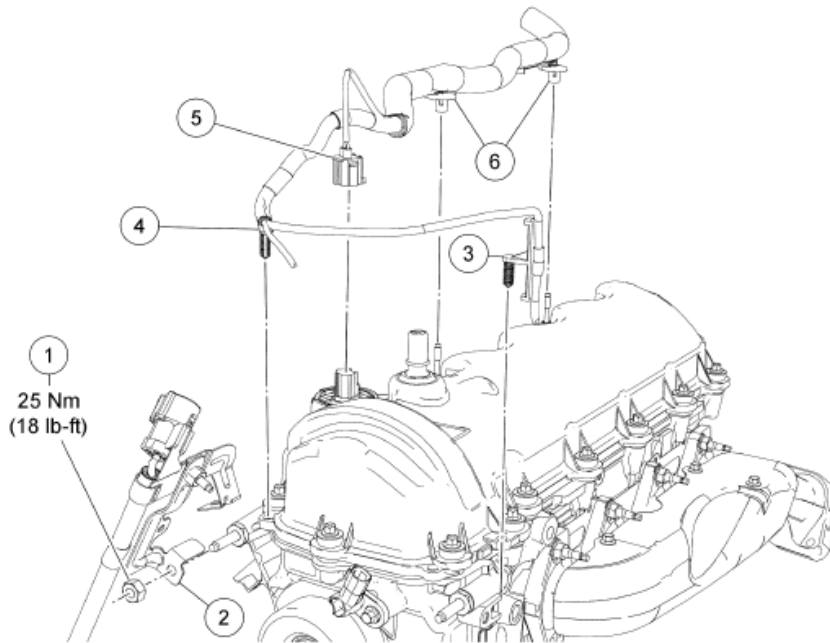
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ZC-30

Silicone Gasket and Sealant
TA-30

WSE-M4G323-A4



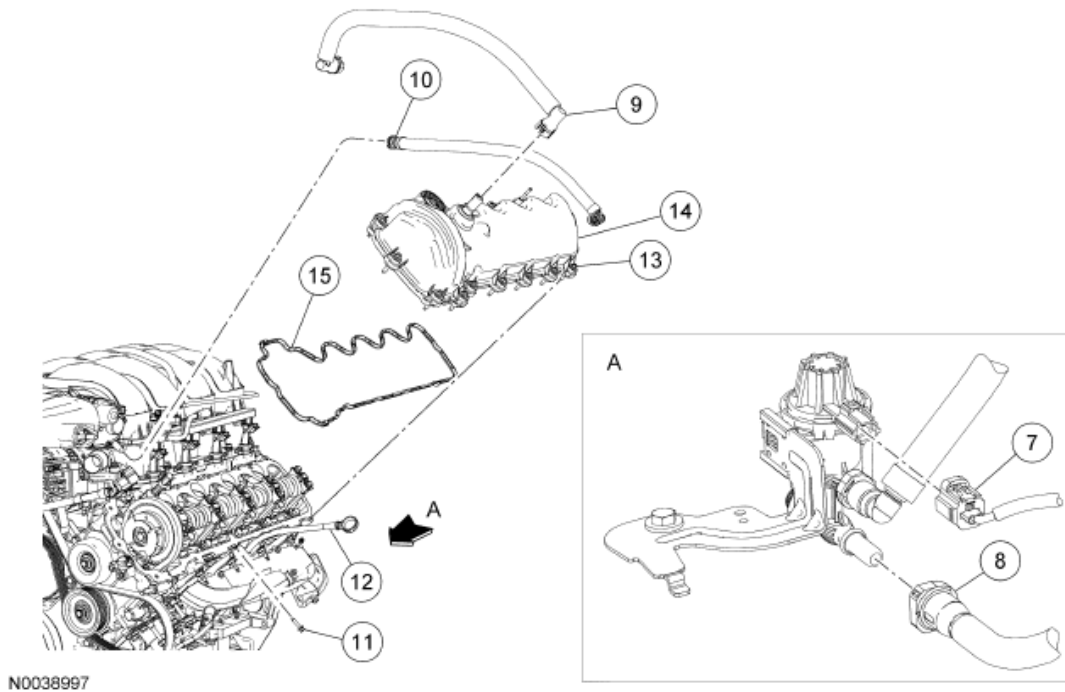
Item	Part Number	Description
1	N804758	Electric cooling fan clutch wiring harness bracket nut
2	14W163	Electric cooling fan clutch wiring harness bracket
3	13A506	Wiring harness retainer (part of 12B637)
4	13A506	Wiring harness retainer (part of 12B637)

Item	Part Number	Description
5	14A464	LH variable camshaft timing (VCT) solenoid electrical connector (part of 12B637)
6	14A163	Wiring harness retainers (2 required) (part of 12B637)

Fig. 3: Identifying Valve Cover - LH Components Location (With Torque Specifications) (Items 1-6)
Courtesy of FORD MOTOR CO.

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Item	Part Number	Description
7	14A464	Evaporative emission (EVAP) canister purge valve electrical connector
8	9D676	EVAP canister-to-EVAP canister purge valve hose
9	6K817	Positive crankcase ventilation (PCV) hose
10	9D289	EVAP tube
11	N806155	Oil level indicator tube bracket bolt
12	—	Oil level indicator tube (part of 6754)
13	6C519	LH valve cover bolt (15 required)
14	6A513	LH valve cover
15	6A559	LH valve cover gasket

Fig. 4: Identifying Valve Cover - LH Components Location (Items 7-15)
Courtesy of FORD MOTOR CO.

Removal

1. Remove the LH ignition coils. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.
2. Remove the bolt and position the oil level indicator and tube aside.
3. Disconnect the evaporative emissions (EVAP) tube from the intake manifold.
4. Disconnect the positive crankcase ventilation (PCV) hose from the valve cover.
5. Remove the nut and position the cooling fan wiring harness bracket aside.
6. Disconnect the 2 pin-type retainers from the valve cover.

7. Disconnect the variable camshaft timing (VCT) solenoid electrical connector.
8. Detach the wiring harness retainers from the valve cover studs.
9. Disconnect the EVAP canister purge valve electrical connector.
10. Disconnect the EVAP canister-to-EVAP canister purge valve EVAP hose from the EVAP canister purge valve.
11. Loosen the 15 bolts and remove the LH valve cover and gasket.
 - Discard the gasket.

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

1. Clean the gasket mating surfaces.
 - Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
 - Clean the valve cover gasket groove in the valve cover with soap and water or a suitable solvent.
2. Install a new gasket on the LH valve cover.

NOTE: If the valve cover is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface cleaner. Failure to follow this procedure can cause future oil leakage.

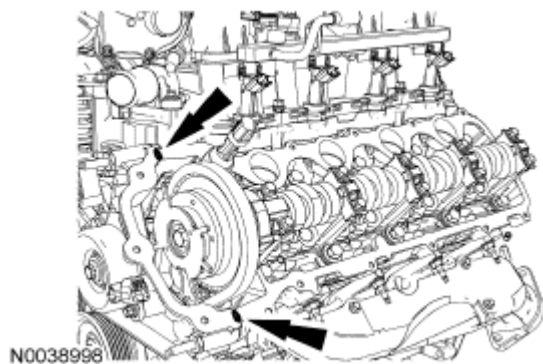
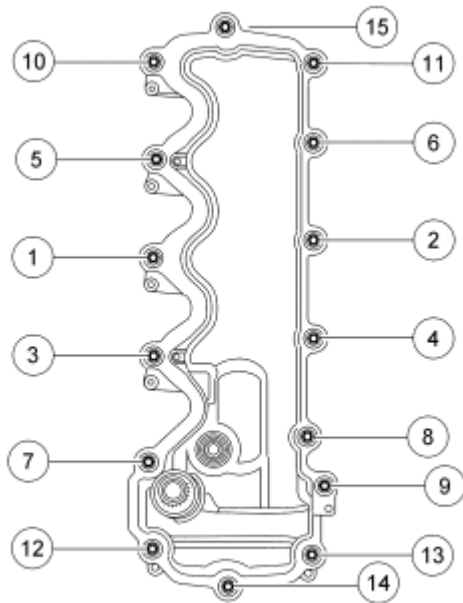


Fig. 5: Identifying Silicone Gasket And Sealant Locations
Courtesy of FORD MOTOR CO.

3. Apply a bead of silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.
4. Position the LH valve cover with a new gasket and tighten the bolts in the sequence shown.
 - Tighten to 10 N.m (89 lb-in).



N0006318

Fig. 6: Identifying Tighten Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

5. Connect the EVAP canister-to-EVAP canister purge valve EVAP hose to the EVAP canister purge valve.
6. Connect the EVAP canister purge valve electrical connector.
7. Attach the wiring harness retainers to the valve cover studs.
8. Connect the VCT solenoid electrical connector.
9. Connect the 2 pin-type retainers to the valve cover.
10. Position the cooling fan wiring harness bracket and install the nut.
 - Tighten to 25 N.m (18 lb-ft).
11. Connect the PCV hose to the valve cover.
12. Connect the EVAP tube to the intake manifold.
13. Position the oil level indicator tube and install the bolt.
 - Tighten to 10 N.m (89 lb-in).
14. Install the LH ignition coils. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.

VALVE COVER - RH

MATERIAL

Item	Specification
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover	-

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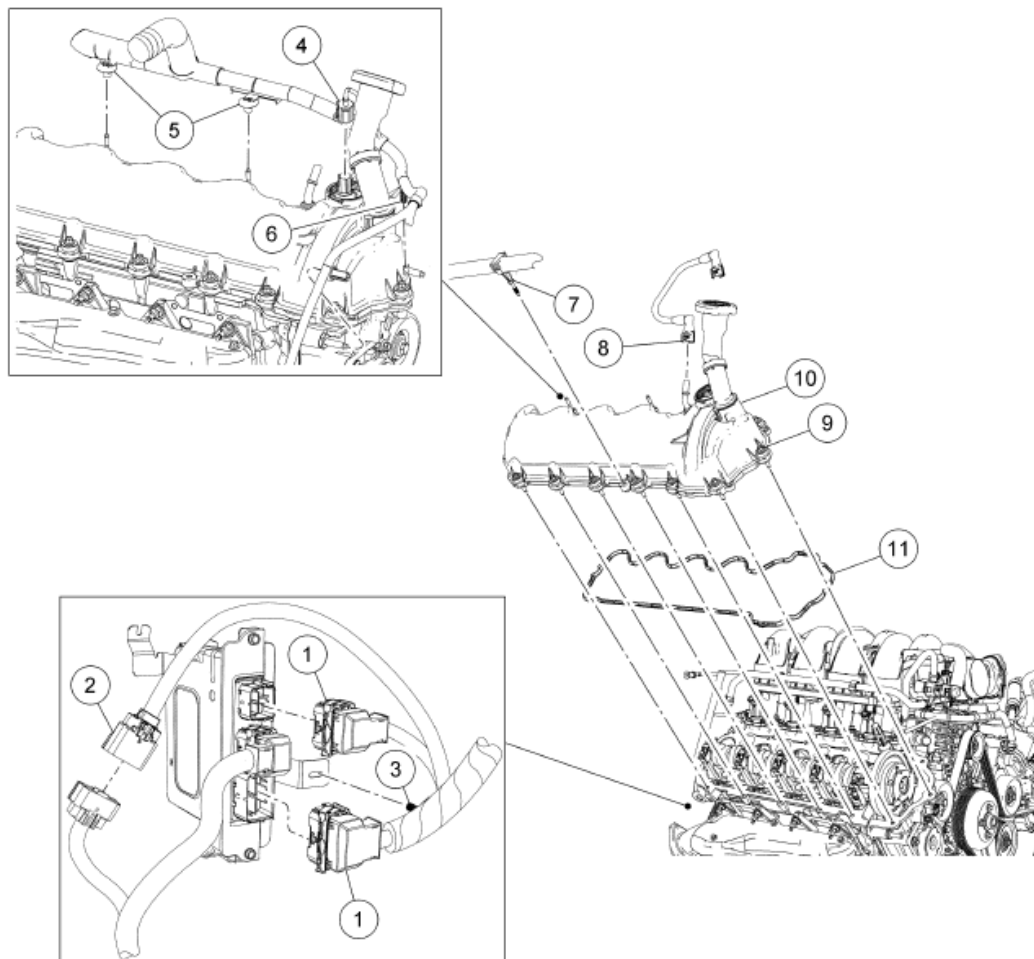
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ZC-30

Silicone Gasket and Sealant

TA-30

WSE-M4G323-A4



N0042655

Item	Part Number	Description
1	14A464	Engine wiring harness-to-powertrain control module (PCM) electrical connectors (2 required) (part of 12B637)
2	14A624	Engine wiring harness in-line electrical connector (part of 12B637)
3	13A506	Wiring harness pin-type retainer (part of 12B637)
4	14A464	RH variable camshaft timing (VCT) oil control solenoid electrical connector (part of 12B637)

Item	Part Number	Description
5	14A163	Wiring harness retainers (3 required) (part of 12B637)
6	13A506	Wiring harness pin-type retainer (part of 12B637)
7	8W287	Heater hose retainer
8	6758	Crankcase breather tube
9	6C519	RH valve cover bolts (14 required)
10	6583	RH valve cover
11	6584	RH valve cover gasket

Fig. 7: Identifying Valve Cover - RH Components Location

Courtesy of FORD MOTOR CO.

Removal

1. Remove the air cleaner and the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**.
2. Remove the RH ignition coils. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.
3. Disconnect the engine wiring harness from the powertrain control module.
 - Disconnect the 2 PCM electrical connectors.
 - Disconnect the in-line electrical connector.
 - Detach the wiring harness retainer from the PCM bracket and position the wiring harness aside.
4. Disconnect the RH variable camshaft timing (VCT) oil control solenoid electrical connector.
5. Detach the 2 wiring harness retainers from the RH valve cover studs.
6. Detach the wiring harness pin-type retainer from the front of the RH valve cover.
7. Detach the heater hose retainer from the RH valve cover.
8. Disconnect the crankcase breather tube from the RH valve cover.
9. Loosen the RH valve cover bolts and remove the RH valve cover and the RH valve cover gasket.
 - Discard the gasket.

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

1. Clean the gasket mating surfaces.
 - Clean the valve cover mating surface of the RH cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
 - Clean the RH valve cover gasket groove with soap and water or a suitable solvent.
2. Install a new gasket on the RH valve cover.

NOTE: If the RH valve cover is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface cleaner. Failure to follow this procedure can cause future oil leakage.

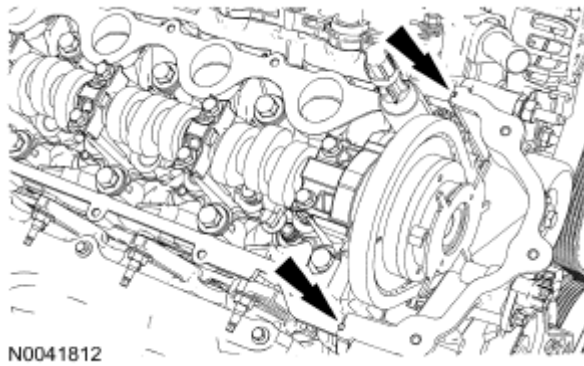


Fig. 8: Identifying Silicone Gasket And Sealant Areas
Courtesy of FORD MOTOR CO.

3. Apply a bead of silicone gasket and sealant in 2 places where the engine front cover meets the RH cylinder head.
4. Position the RH valve cover with a new gasket on the cylinder head and tighten the bolts in the sequence shown.
 - Tighten to 10 N.m (89 lb-in).

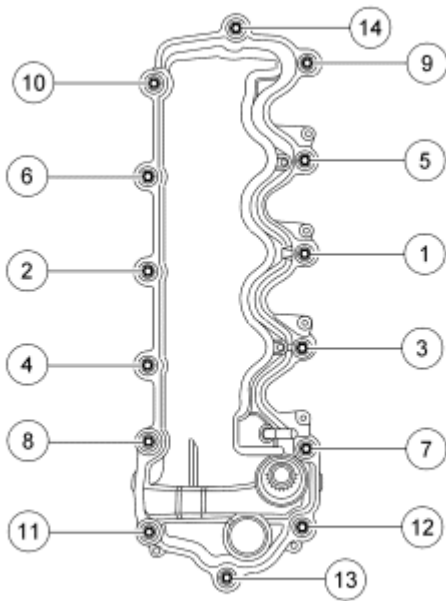
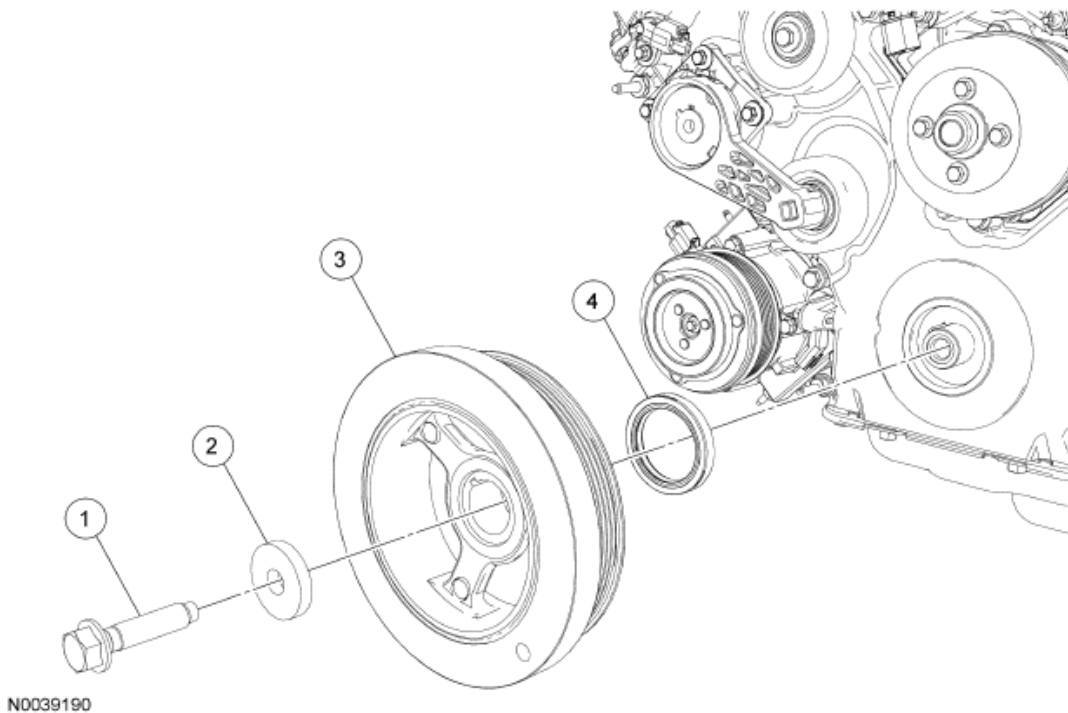


Fig. 9: Identifying Tightening Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

5. Connect the crankcase breather tube to the RH valve cover.
6. Attach the heater hose retainer to the RH valve cover.
7. Attach the wiring harness pin-type retainer to the front of the RH valve cover.

8. Attach the wiring harness retainers to the RH valve cover studs.
9. Connect the RH VCT oil control solenoid electrical connector.
10. Connect the engine wiring harness to the PCM.
 - Position the wiring harness and attach the wiring harness pin-type retainer to the PCM bracket.
 - Connect the in-line electrical connector.
 - Connect the 2 PCM electrical connectors.
11. Install the RH ignition coils. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.
12. Install the air cleaner and the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION & FILTERING**.

LOWER END COMPONENTS - EXPLODED VIEW, CRANKSHAFT PULLEY AND CRANKSHAFT FRONT SEAL



Item	Part Number	Description
1	W701512	Crankshaft pulley bolt
2	N806165	Crankshaft pulley bolt washer
3	6316	Crankshaft pulley
4	6700	Crankshaft front oil seal

Fig. 10: Exploded View Of Crankshaft Pulley And Crankshaft Front Seal
 Courtesy of FORD MOTOR CO.

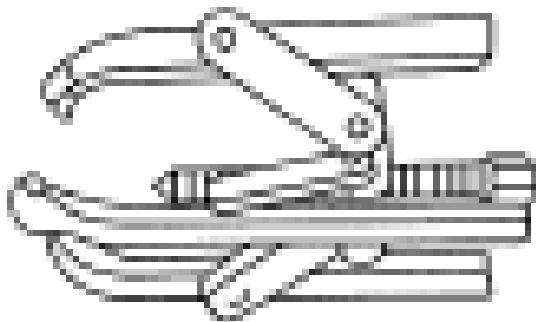
1. For additional information, refer to the appropriate procedure.

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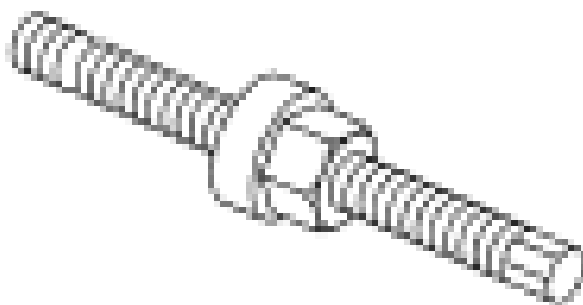
CRANKSHAFT PULLEY

SPECIAL TOOL(S)



3-Jaw Puller
303-D121

ST1184-A



Installer, Crankshaft Vibration Damper
303-102 (T74P-6316-B)

ST1287-A

MATERIAL

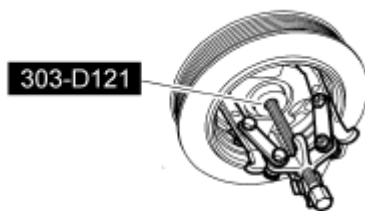
Item	Specification
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Silicone Gasket and Sealant	

TA-30

WSE-M4G323-A4

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the cooling fan shroud. For additional information, refer to **ENGINE COOLING** .
3. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** .
4. Remove and discard the crankshaft pulley bolt and washer.
5. Using the special tool, remove the crankshaft pulley.

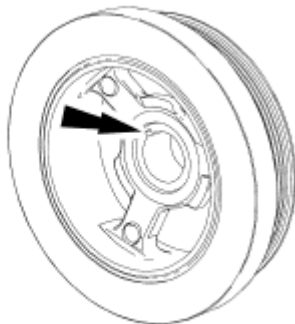


N0010528

Fig. 11: Identifying Special Tool And Crankshaft Pulley
Courtesy of FORD MOTOR CO.

Installation

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface prep and silicone gasket remover. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.



N0010530

Fig. 12: Identifying Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

1. Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.
2. Using the special tool, install the crankshaft pulley.

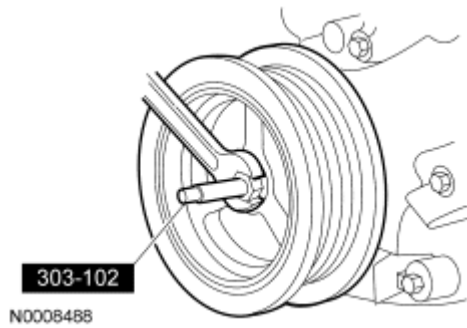


Fig. 13: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

3. Using a new crankshaft pulley bolt, install the bolt and washer and tighten the bolt in 4 stages.
 - Stage 1: Tighten to 90 N.m (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 N.m (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.
4. Install the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** .
5. Install the cooling fan shroud. For additional information, refer to **ENGINE COOLING** .

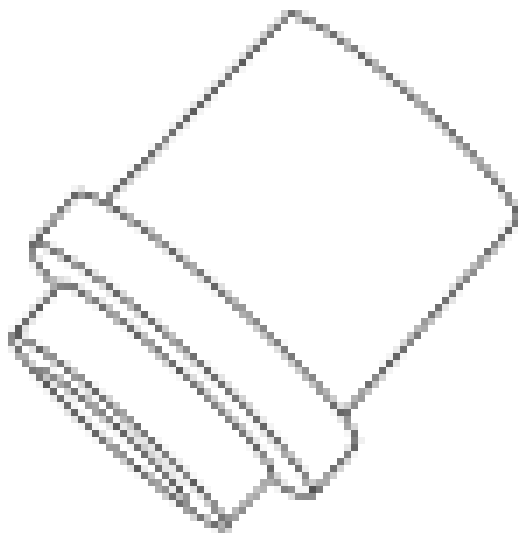
CRANKSHAFT FRONT SEAL

SPECIAL TOOL(S)

ST1288-A	Remover, Crankshaft Front Seal 303-107 (T74P-6700-A)

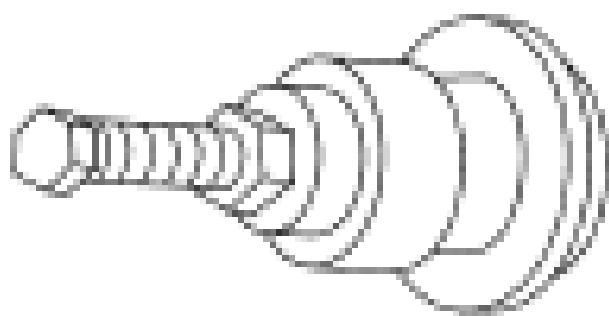
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ST2197-A

Installer, Crankshaft Front Seal
303-635



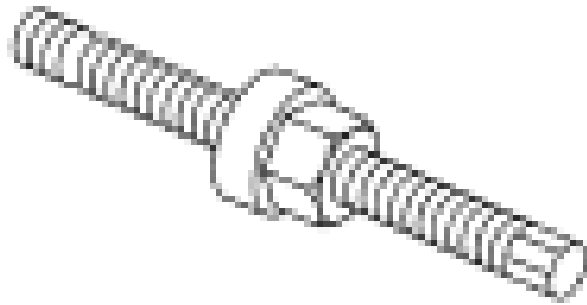
ST1328-A

Installer, Front Cover Seal
303-335 (T88T-6701-A)

Installer, Crankshaft Vibration Damper

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303-102 (T74P-6316-B)

ST1287-A

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A

Removal

1. Remove the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY**.
2. Using the special tool, remove the crankshaft front seal.

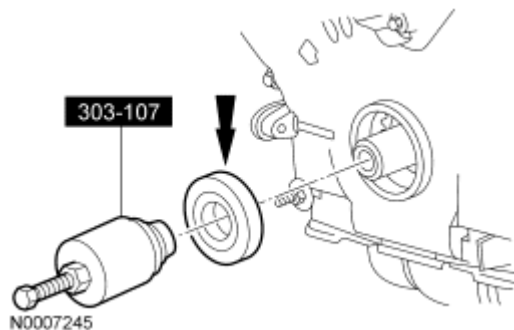


Fig. 14: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

Installation

1. Lubricate the engine front cover and the crankshaft front seal inner lip with clean engine oil.

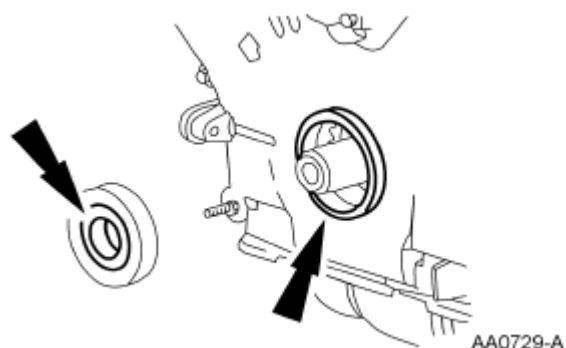


Fig. 15: Locating Engine Front Cover And Crankshaft Front Seal Inner Lip
Courtesy of FORD MOTOR CO.

2. Using the special tools, install the crankshaft front seal.

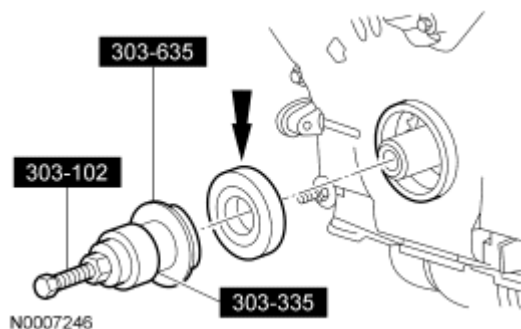
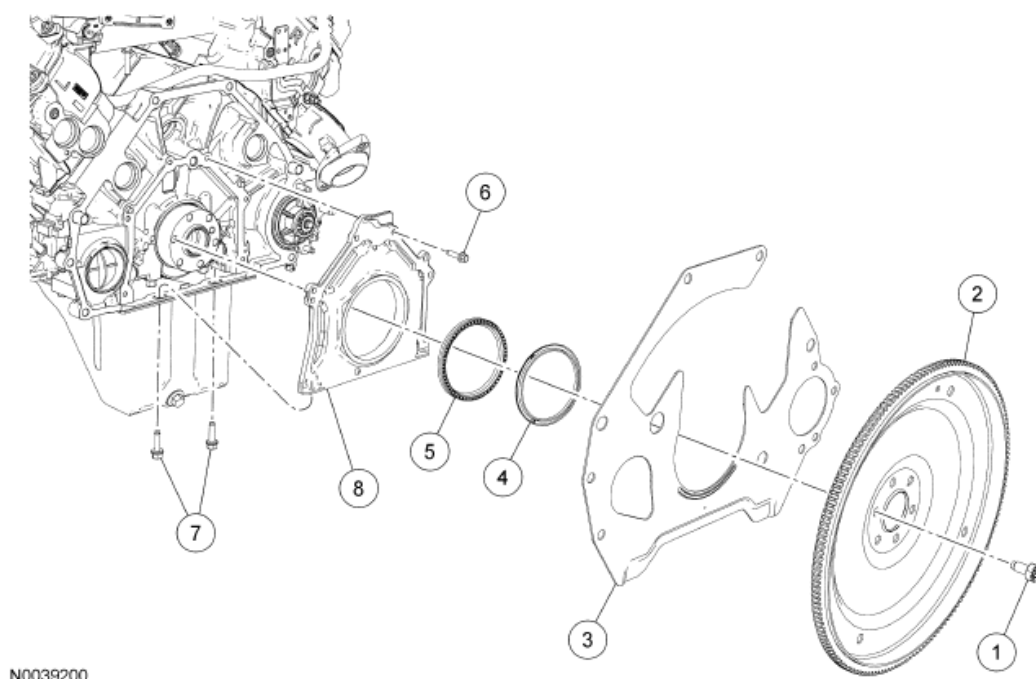


Fig. 16: Installing Crankshaft Front Seal Using Special Tools
Courtesy of FORD MOTOR CO.

3. Install the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY**.

FLEXPLATE OR FLYWHEEL AND CRANKSHAFT REAR SEAL - EXPLODED VIEW



Item	Part Number	Description
1	N806168	Flexplate bolt (6 required)
2	6375	Flexplate
3	6A373	Engine-to-transmission spacer plate
4	6701	Crankshaft oil slinger
5	6310	Crankshaft rear seal
6	N806155	Crankshaft rear seal retainer plate bolt (6 required)

Item	Part Number	Description
7	W701605	Oil pan bolts (2 required)
8	6K318	Crankshaft rear seal retainer plate

Fig. 17: Exploded View Of Flexplate Or Flywheel And Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

1. For additional information, refer to the appropriate procedure.

FLEXPLATE

Removal and Installation

1. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 6R60**.
2. Remove the 6 bolts and the flexplate.
 - To install, tighten to 80 N.m (59 lb-ft) in the sequence shown.

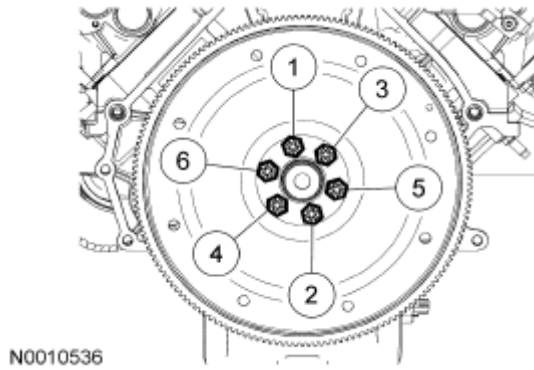


Fig. 18: Locating Flexplate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

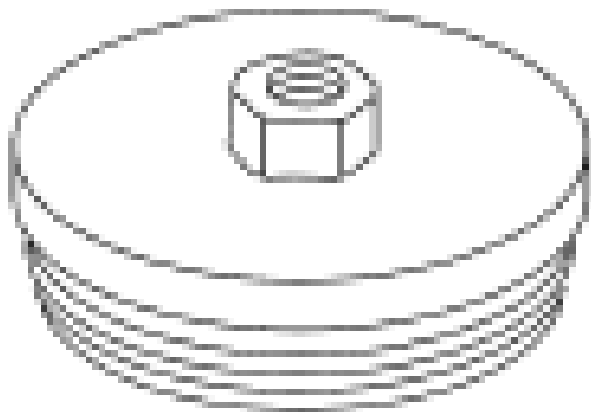
CRANKSHAFT REAR SEAL

SPECIAL TOOL(S)

ST1480-A	Installer, Crankshaft Rear Seal 303-518 (T95P-6701-DH)
	Remover, Crankshaft Rear Seal

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ST1382-A

303-519 (T95P-6701-EH)



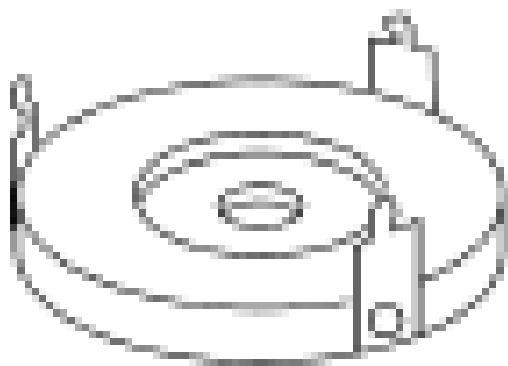
ST1479-A

Installer, Crankshaft Rear Seal
303-516 (T95P-6701-BH)

Remover, Crankshaft Rear Oil Slinger
303-514 (T95P-6701-AH)

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ST1481-A



ST1482-A

Installer, Crankshaft Rear Oil Slinger
303-517 (T95P-6701-CH)

Impact Slide Hammer
100-001 (T50T-100-A)

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ST1185-A

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A

Removal

1. Remove the flexplate. For additional information, refer to **FLEXPLATE**.
2. Remove the engine-to-transmission spacer plate.
3. Using the special tools, remove the crankshaft oil slinger.
 - Discard the crankshaft oil slinger.

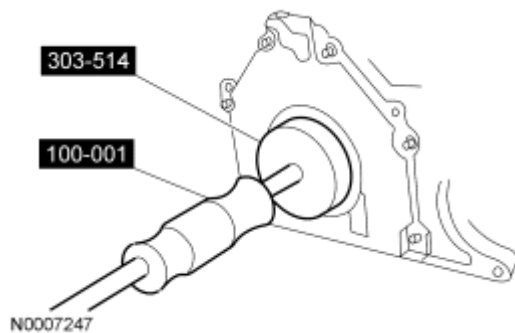


Fig. 19: Removing Crankshaft Rear Oil Seal Slinger
Courtesy of FORD MOTOR CO.

4. Using the special tools, remove the crankshaft rear seal.
 - Discard the crankshaft rear seal.

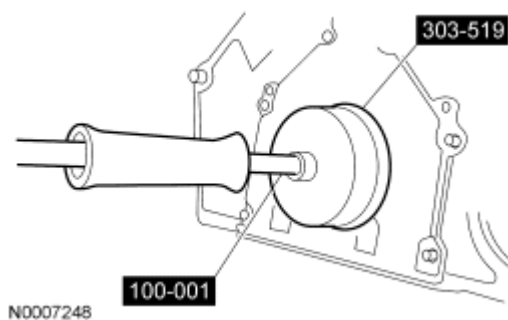


Fig. 20: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

Installation

NOTE: Lubricate the inner lip of the crankshaft rear seal with clean engine oil.

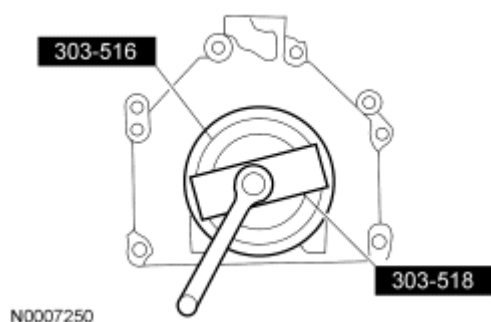


Fig. 21: Using Special Tools To Install New Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

1. Using the special tools, install the crankshaft rear seal.
2. Using the special tools, install the crankshaft rear oil slinger.

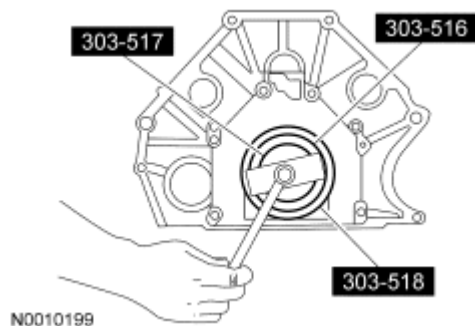


Fig. 22: Installing Crankshaft Rear Oil Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

3. Install the engine-to-transmission spacer plate.

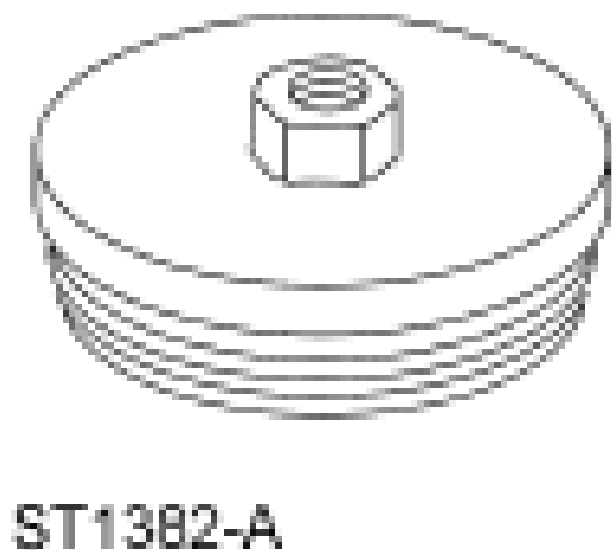
4. Install the flexplate. For additional information, refer to **FLEXPLATE**.

CRANKSHAFT REAR SEAL WITH RETAINER PLATE

SPECIAL TOOL(S)



Installer, Crankshaft Rear Seal
303-518 (T95P-6701-DH)



Remover, Crankshaft Rear Seal
303-519 (T95P-6701-EH)

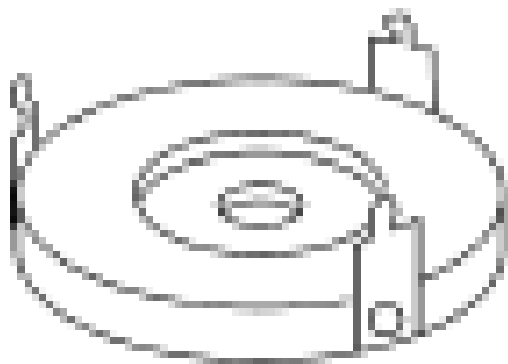
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ST1479-A

Installer, Crankshaft Rear Seal
303-516 (T95P-6701-BH)



ST1481-A

Remover, Crankshaft Rear Oil Slinger
303-514 (T95P-6701-AH)

Installer, Crankshaft Rear Oil Slinger
303-517 (T95P-6701-CH)

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ST1482-A



ST1185-A

Impact Slide Hammer
100-001 (T50T-100-A)

MATERIAL

Item	Specification
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Gasket Maker TA-16	WSK-M2G348-A5
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

Removal

1. Remove the flexplate. For additional information, refer to **FLEXPLATE**.
2. Remove the engine-to-transmission spacer plate.
3. Remove the oil pan. For additional information, refer to **OIL PAN**.
4. Using the special tools, remove the crankshaft oil slinger.
 - Discard the crankshaft oil slinger.

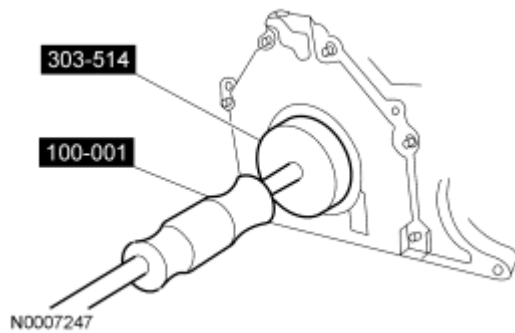


Fig. 23: Removing Crankshaft Rear Oil Seal Slinger
Courtesy of FORD MOTOR CO.

5. Using the special tools, remove the crankshaft rear seal.
 - Discard the crankshaft rear seal.

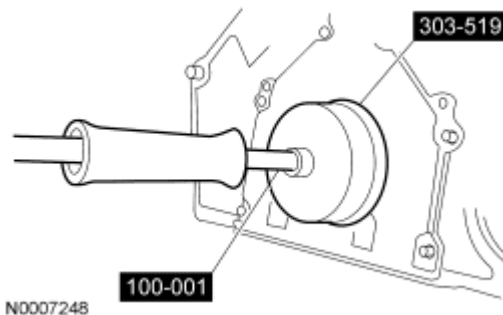


Fig. 24: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

6. Remove the 6 bolts and the crankshaft rear seal retainer plate.

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

NOTE: Clean the sealing surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this

procedure can cause future oil leakage.

1. Clean and inspect the mating surfaces.

NOTE: The crankshaft rear seal retaining plate does not have a sealant groove. Gasket maker must be applied to the crankshaft rear seal retainer plate mating surface on the engine block.

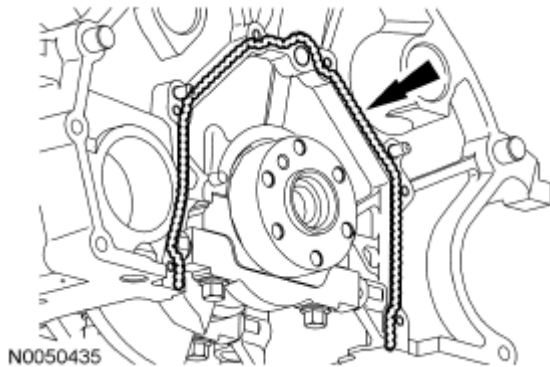


Fig. 25: Locating Crankshaft Rear Seal Retainer Plate Gasket
Courtesy of FORD MOTOR CO.

2. Apply a bead of gasket maker to the crankshaft rear seal retainer plate mating surface on the engine block.
3. Install the crankshaft rear seal retainer plate and the 6 bolts in the sequence shown.
 - Tighten to 10 N.m (89 lb-in).

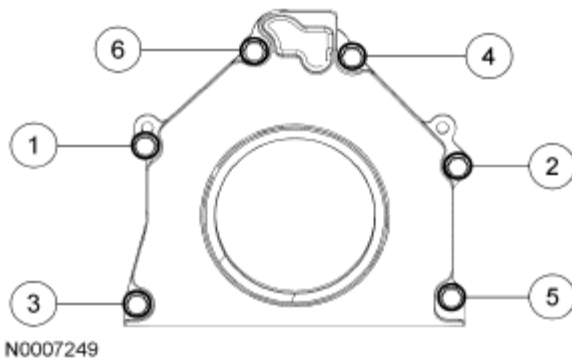


Fig. 26: Identifying Installing Sequence Of Crankshaft Rear Seal Retainer Plate Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the inner lip of the crankshaft rear seal with clean engine oil.

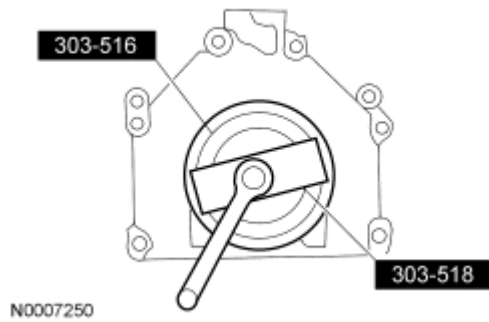


Fig. 27: Using Special Tools To Install New Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

4. Using the special tools, install the crankshaft rear seal.
5. Using the special tools, install the crankshaft rear oil slinger.

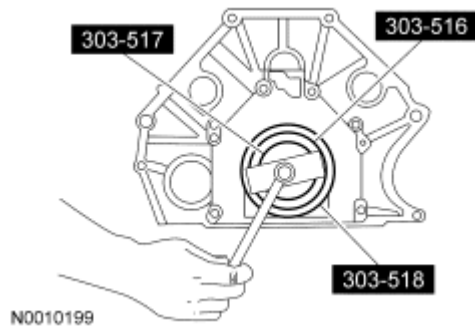


Fig. 28: Installing Crankshaft Rear Oil Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

6. Install the oil pan. For additional information, refer to **OIL PAN**.
7. Install the engine-to-transmission spacer plate.
8. Install the flexplate. For additional information, refer to **FLEXPLATE**.

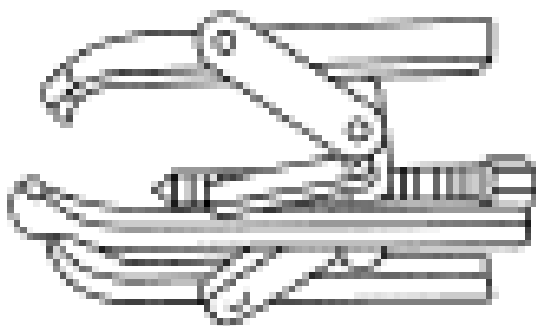
ENGINE FRONT COVER

SPECIAL TOOL(S)

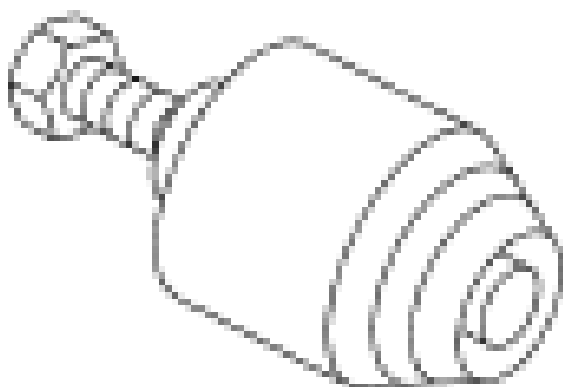
3-Jaw Puller
303-D121

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1184-A



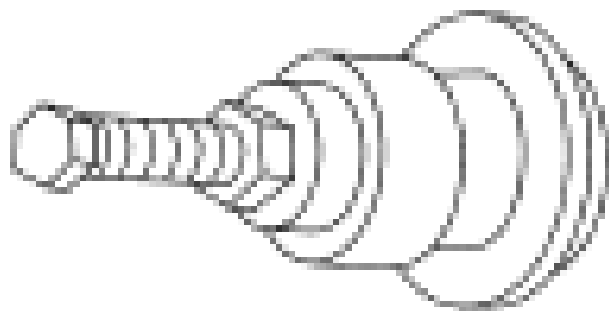
ST1288-A

Remover, Crankshaft Front Seal
303-107 (T74P-6700-A)

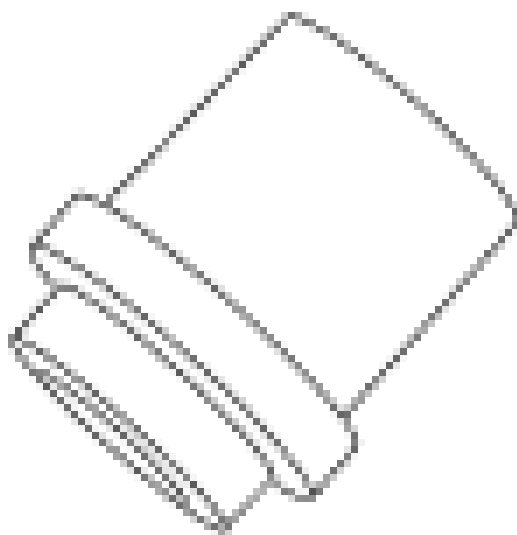
Installer, Crankshaft Front Seal
303-335 (T88T-6701-A)

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1328-A

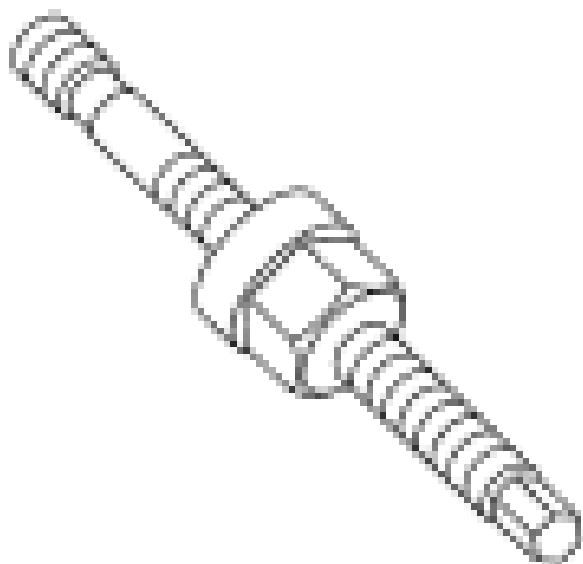


ST2197-A

Installer, Crankshaft Front Seal
303-635

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2428-A

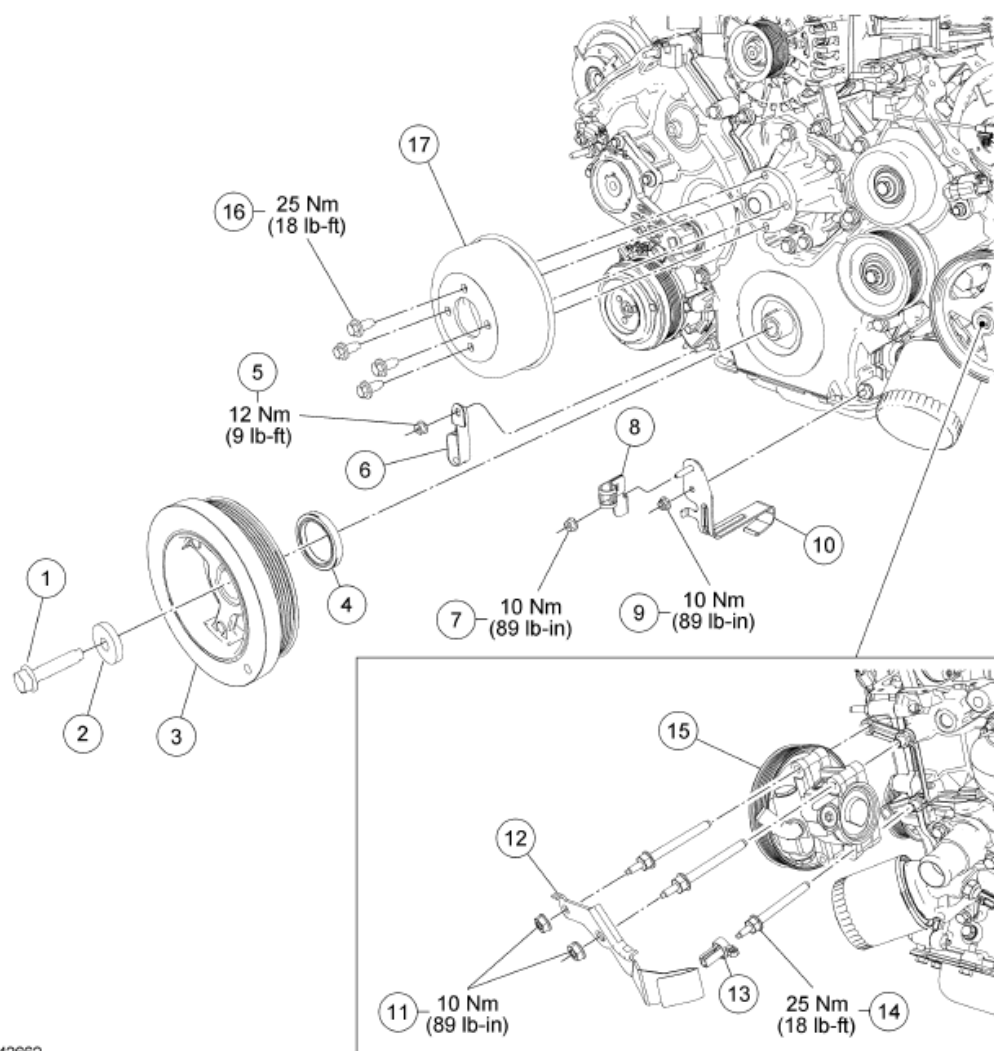
Installer, Crankshaft Vibration Damper
303-102 (T74P-6316-B)

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-

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2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



N0042662

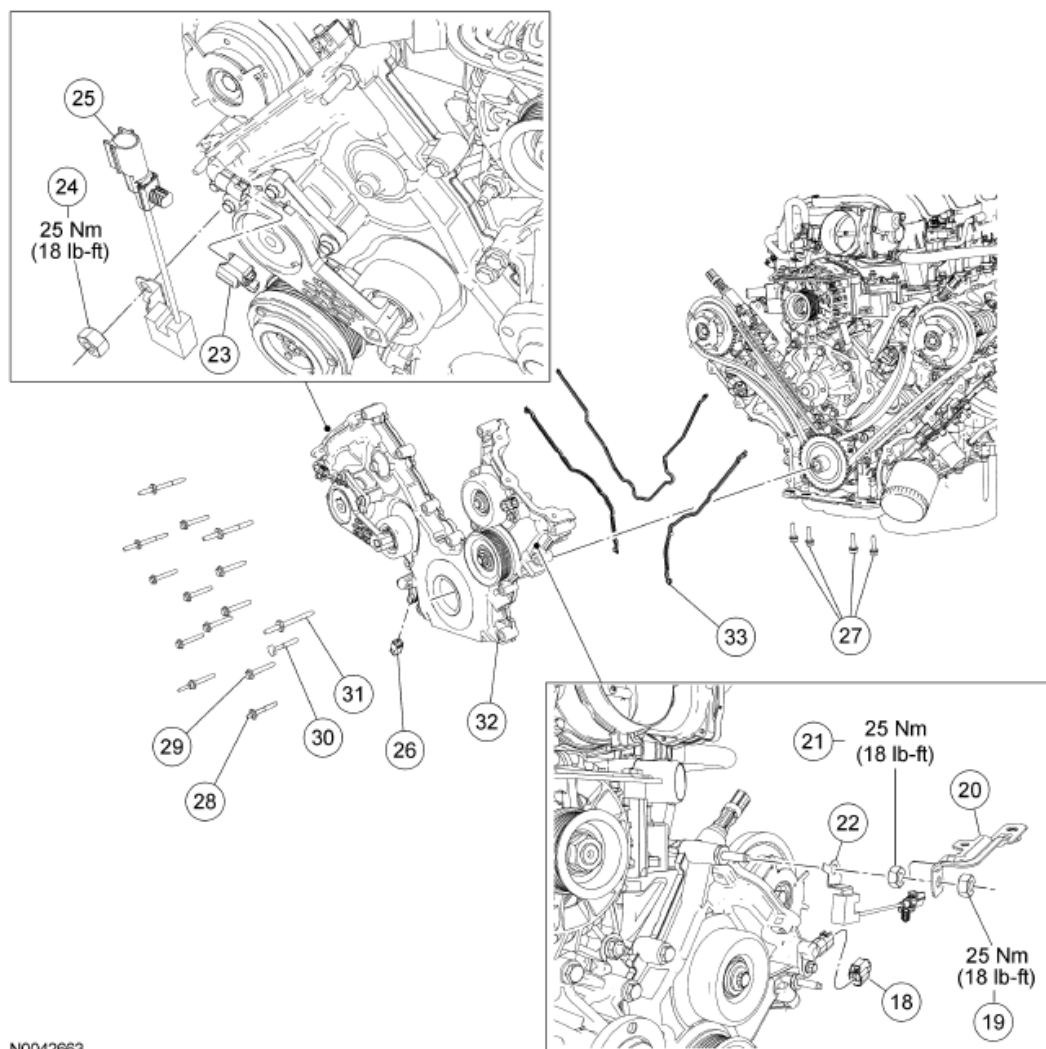
Item	Part Number	Description
1	W701512	Crankshaft pulley bolt
2	N806165	Crankshaft pulley washer
3	8316	Crankshaft pulley
4	6700	Crankshaft front seal
5	7R081	Transmission cooler tube bracket nut
6	BK0001728	Transmission cooler tube bracket (part of 7H420)
7	N805320	Power steering pressure (PSP) hose bracket nut
8	81396	PSP hose bracket (part of 3A719)
9	W520101	Battery cable bracket nut

Item	Part Number	Description
10	10A779	Battery cable bracket (part of 14A280)
11	N805403	Battery cable bracket nuts (2 required)
12	10W652	Battery cable bracket (part of 14A280)
13	14A163	Wiring harness retainer (part of 12B637)
14	W707225	Power steering pump bolts (3 required)
15	3A696	Power steering pump
16	N806282	Coolant pump pulley bolts (4 required)
17	8A528	Coolant pump pulley

Fig. 29: Identifying Engine Front Cover Components (With Torque Specifications) (Items 1-17)
Courtesy of FORD MOTOR CO.

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



N0042663

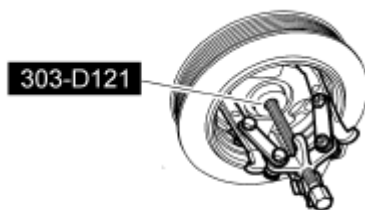
Item	Part Number	Description
18	14A464	LH camshaft position (CMP) sensor electrical connector (part of 12B637)
19	N804758	Cooling fan wiring harness bracket nut
20	14W163	Cooling fan wiring harness bracket
21	N804758	LH radio interference capacitor nut
22	18801	LH radio interference capacitor
23	14A464	RH CMP sensor electrical connector (part of 12B637)
24	N804758	RH radio interference capacitor nut

Item	Part Number	Description
25	18801	RH radio interference capacitor
26	14A464	Crankshaft position (CKP) sensor electrical connector (part of 12B637)
27	W701605	Oil pan-to-engine front cover bolts (4 required)
28	W706508	Engine front cover stud bolt
29	N806177	Engine front cover bolt (8 required)
30	N808294	Engine front cover bolt
31	N806300	Engine front cover stud bolt (5 required)
32	6D080	Engine front cover
33	6D081	Engine front cover gaskets (3 required)

Fig. 30: Identifying Engine Front Cover Components (With Torque Specifications) (Items 18-33)
Courtesy of FORD MOTOR CO.

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the drain plug and drain the engine oil.
 - To install, tighten to 23 N.m (17 lb-ft).
3. Remove the cooling fan shroud. For additional information, refer to **ENGINE COOLING**.
4. Remove the RH side idler pulley. For additional information, refer to **ACCESSORY DRIVE**.
5. Remove the RH valve cover. For additional information, refer to **VALVE COVER - RH**.
6. Remove the LH valve cover. For additional information, refer to **VALVE COVER - LH**.
7. Remove the nut and position the RH radio interference capacitor aside.
8. Disconnect the RH camshaft position (CMP) sensor electrical connector.
9. Remove the nut and the cooling fan wiring harness bracket.
10. Remove the nut and position the LH radio interference capacitor aside.
11. Disconnect the LH CMP sensor electrical connector.
12. Remove the bolts and the coolant pump pulley.
13. Remove the nuts and detach the battery cable bracket from the power steering pump stud bolts.
14. Detach the wiring harness retainer from the power steering pump stud bolt.
15. Remove the stud bolts and position the power steering pump aside.
 - Support the power steering pump with a length of mechanic's wire.
16. Remove the nut and detach the power steering pressure (PSP) hose bracket from the battery cable bracket.
17. Remove the nut and detach the battery cable bracket from the engine front cover.
18. Remove the nut and detach the transmission cooler tube bracket from the engine front cover.
19. Disconnect the crankshaft position (CKP) sensor electrical connector.
20. Remove the crankshaft pulley bolt and washer.
 - Discard the crankshaft pulley bolt.
21. Using the special tool, remove the crankshaft pulley.



N0010528

Fig. 31: Identifying Special Tool And Crankshaft Pulley
Courtesy of FORD MOTOR CO.

22. Using the special tool, remove the crankshaft front seal.

- Discard the crankshaft front seal.

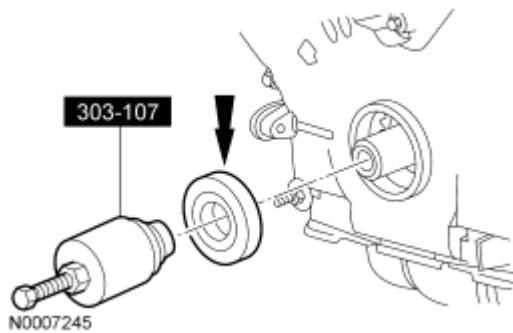
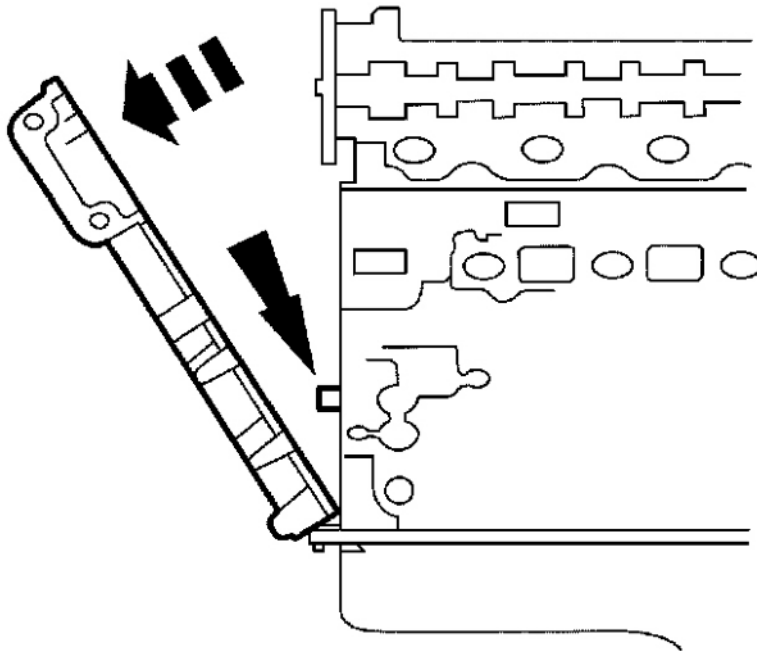


Fig. 32: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

23. Remove the oil pan-to-engine front cover bolts.
24. Remove the engine front cover bolts and stud bolts.
25. Remove the engine front cover from the engine front cover-to-cylinder block dowel.
 - Remove and discard the engine front cover gaskets.



A26122-A

Fig. 33: View Of Engine Front Cover And Cylinder Block Dowel
Courtesy of FORD MOTOR CO.

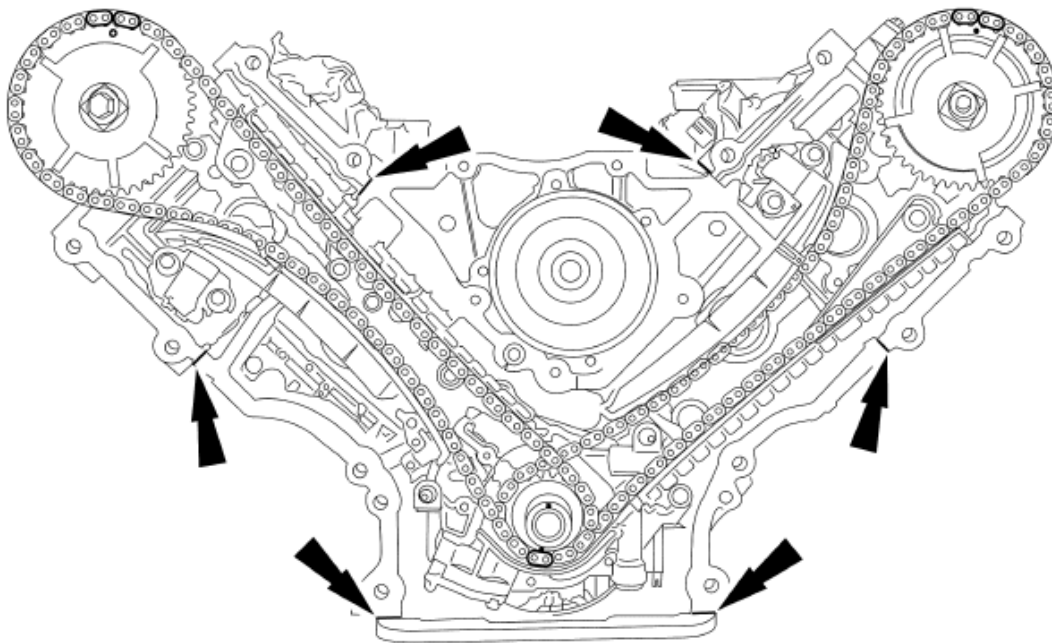
Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

1. Clean the mating surfaces with silicone gasket remover, metal surface prep and a plastic scraping tool. Follow the directions on the packaging.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

NOTE: If the engine front cover is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.



A0080776

Fig. 34: Identifying Silicone Sealant Application Locations
Courtesy of FORD MOTOR CO.

2. Apply a bead of silicone gasket and sealant along the cylinder head-to-cylinder block mating surface and the oil pan-to-cylinder block mating surface at the locations shown.

3. Install new engine front cover gaskets on the engine front cover. Position the engine front cover onto the dowels. Install the fasteners finger tight.

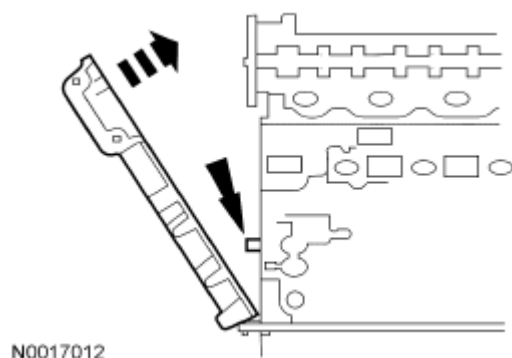
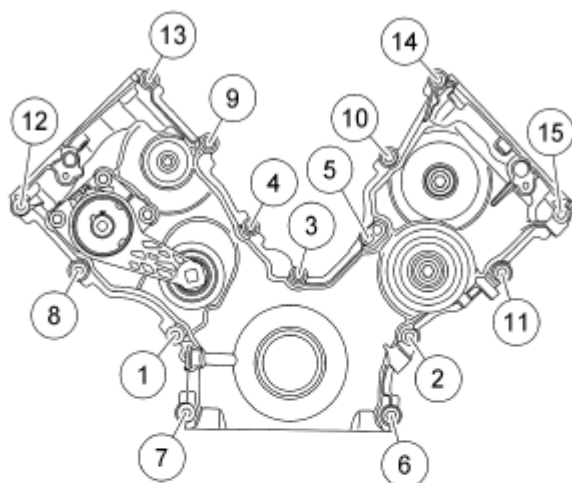


Fig. 35: Installing Engine Front Cover Gasket On Engine Front Cover
Courtesy of FORD MOTOR CO.

4. Tighten the engine front cover fasteners in the sequence shown to 25 N.m (18 lb-ft).

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N0039598

Item	Part Number	Description
1	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
2	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
3	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
4	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
5	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
6	W706508	Stud, Hex Shoulder Pilot, M8 x 1.25 x 50 - M6 x 1 x 10
7	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
8	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
9	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
10	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
11	N808294	Bolt, Hex Head Pilot, M8 x 1.25 x 53
12	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
13	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
14	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
15	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1

Fig. 36: Identifying Engine Front Cover Fasteners Sequence
Courtesy of FORD MOTOR CO.

5. Loosely install the oil pan-to-engine front cover bolts, then tighten the bolts in 2 stages in the sequence shown.
 - Stage 1: Tighten to 20 N.m (15 lb-ft).
 - Stage 2: Tighten an additional 60 degrees.

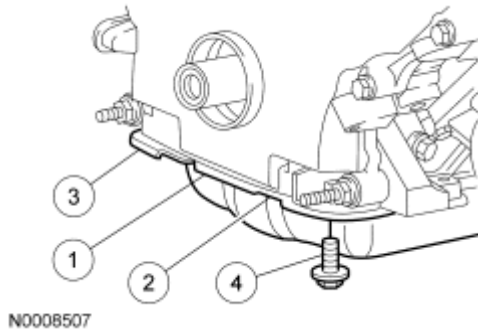


Fig. 37: Identifying Tightening Sequence Of Front Oil Pan Bolts
Courtesy of FORD MOTOR CO.

6. Lubricate the engine front cover and a new crankshaft front seal inner lip with clean engine oil.

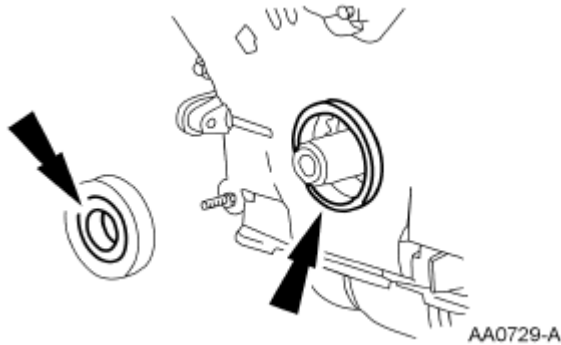


Fig. 38: Locating Engine Front Cover And New Crankshaft Front Seal Inner Lip
Courtesy of FORD MOTOR CO.

7. Using the special tools, install the crankshaft front seal.

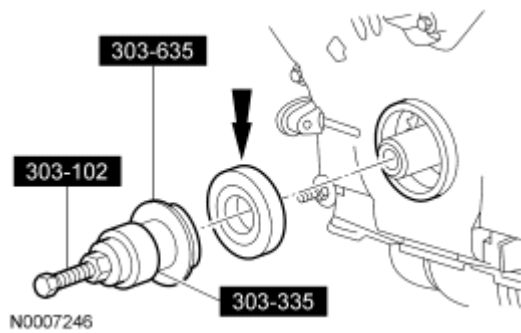


Fig. 39: Installing Crankshaft Front Seal Using Special Tools
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

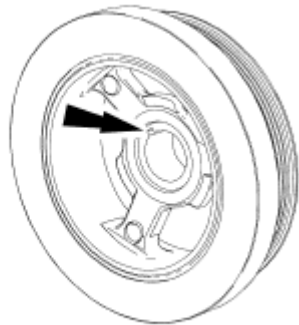


Fig. 40: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

8. Apply silicone gasket sealant to the Woodruff key slot in the crankshaft pulley.
9. Using the special tool, install the crankshaft pulley.

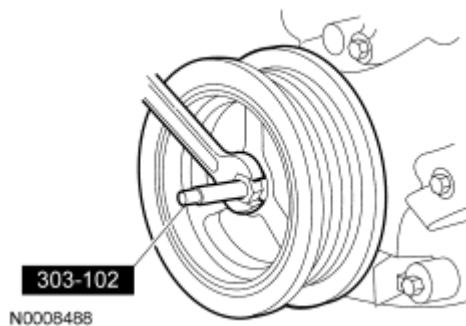


Fig. 41: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

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10. Using a new crankshaft pulley bolt, install the bolt and washer and tighten the bolt in 4 stages.
 - Stage 1: Tighten to 90 N.m (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 N.m (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.
11. Connect the CKP sensor electrical connector.
12. Attach the transmission cooler tube bracket to the engine front cover and install the nut.
 - Tighten to 12 N.m (9 lb-ft).
13. Attach the battery cable bracket to the front cover and install the nut.
 - Tighten to 10 N.m (89 lb-in).
14. Attach the PSP hose bracket to the battery cable bracket and install the nut.
 - Tighten to 10 N.m (89 lb-in).
15. Position the power steering pump and install the stud bolts.
 - Tighten to 25 N.m (18 lb-ft).
16. Attach the wiring harness retainer to the power steering pump stud bolt.
17. Position the battery cable bracket on the power steering pump stud bolts and install the nuts.
 - Tighten to 10 N.m (89 lb-in).
18. Position the coolant pump pulley and install the bolts.
 - Tighten the bolts to 25 N.m (18 lb-ft).
19. Connect the LH CMP sensor electrical connector.
20. Position the LH radio interference capacitor and install the nut.
 - Tighten to 25 N.m (18 lb-ft).
21. Position the cooling fan wiring harness bracket and install the nut.
22. Connect the RH CMP sensor electrical connector.
23. Position the RH radio interference capacitor and install the nut.
 - Tighten to 25 N.m (18 lb-ft).
24. Install the LH valve cover. For additional information, refer to **VALVE COVER - LH**.
25. Install the RH valve cover. For additional information, refer to **VALVE COVER - RH**.
26. Install the RH side idler pulley. For additional information, refer to **ACCESSORY DRIVE**.
27. Install the cooling fan shroud. For additional information, refer to **ENGINE COOLING**.
28. Fill the engine with clean engine oil.

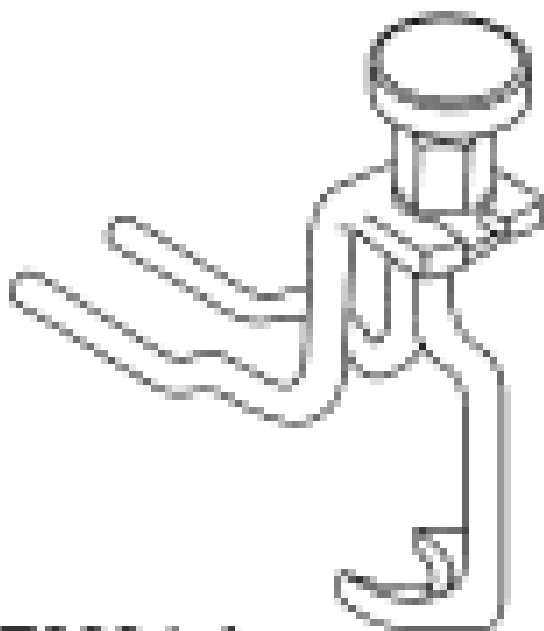
TIMING DRIVE COMPONENTS

SPECIAL TOOL(S)

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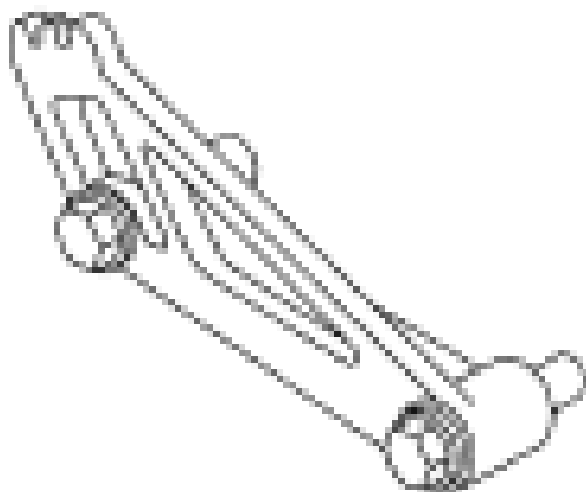
2006 Mercury Mountaineer

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ST2804-A

Compressor, Valve Spring
303-1039



ST2807-A

Locking Tool, Camshaft Phaser Sprocket
303-1046

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A
Hydraulic Chain Tensioner Retaining Clip 1L3Z-6P250-AA	-

Removal

1. Remove the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.
2. Remove the crankshaft sensor ring from the crankshaft.

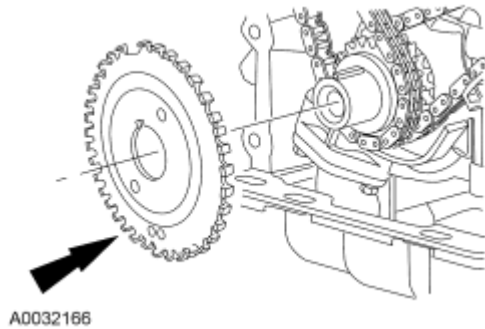


Fig. 42: View Of Crankshaft Sensor Ring At Crankshaft
Courtesy of FORD MOTOR CO.

3. Position the crankshaft keyway at the 12 o'clock position.

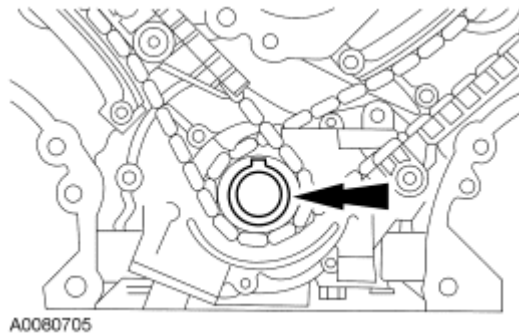


Fig. 43: Positioning Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

NOTE: If the camshaft lobes are not exactly positioned as shown, the crankshaft will require one full additional rotation to 12 o'clock.

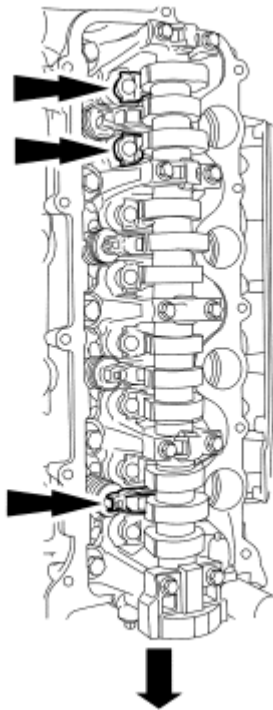


Fig. 44: Identifying Camshaft Lobe Position

Courtesy of FORD MOTOR CO.

4. The No. 1 cylinder must be coming up on the exhaust stroke with the crankshaft keyway at the 12 o'clock position. Verify by noting the position of the 2 intake lobes and the exhaust lobe on the No. 1 cylinder.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



A0083248

Fig. 45: Identifying RH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

5. Remove only the 3 roller followers shown in the illustration from the RH cylinder head.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

NOTE: It may be necessary to push the valve down while compressing the spring.



Fig. 46: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

6. Using the special tool, remove the 3 roller followers designated in the previous step from the RH cylinder head.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

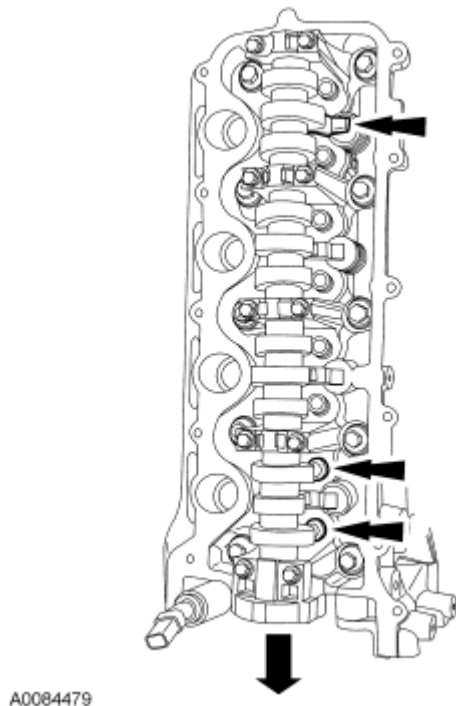


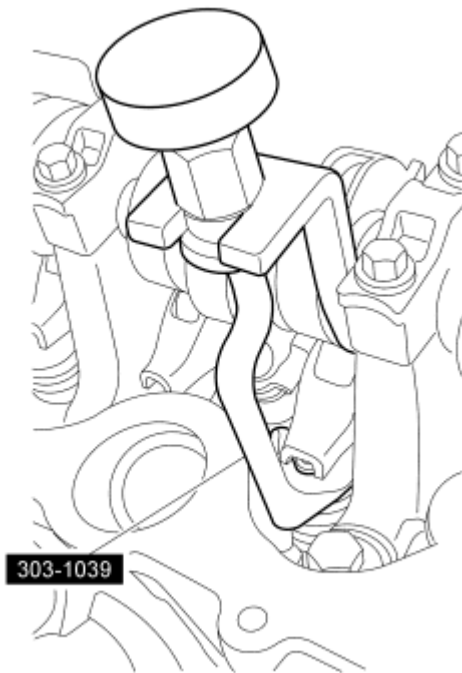
Fig. 47: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

7. Remove only the 3 roller followers shown in the illustration from the LH cylinder head.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may

drop into the cylinder.

NOTE: It may be necessary to push the valve down while compressing the spring.

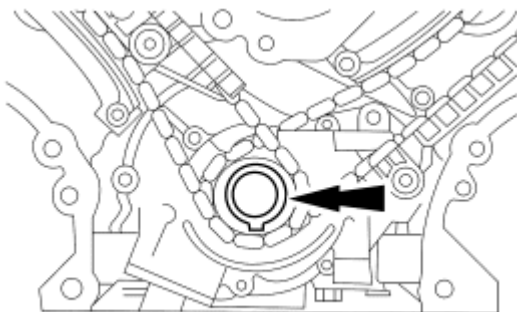


N0010191

Fig. 48: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

8. Using the special tool, remove the 3 roller followers designated in the previous step from the LH cylinder head.

CAUTION: The crankshaft cannot be moved past the 6 o'clock position once set.



N0006305

Fig. 49: Crankshaft Positioned With Keyway At 6 O'clock Position
Courtesy of FORD MOTOR CO.

9. Rotate the crankshaft clockwise and position the crankshaft keyway at the 6 o'clock position.
10. Remove the bolts, the LH timing chain tensioner and tensioner arm.

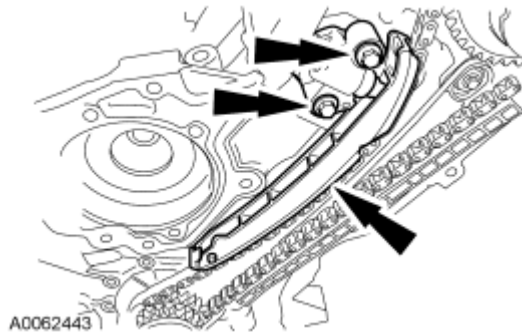


Fig. 50: Identifying LH Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

11. Remove the bolts, the RH timing chain tensioner and tensioner arm.

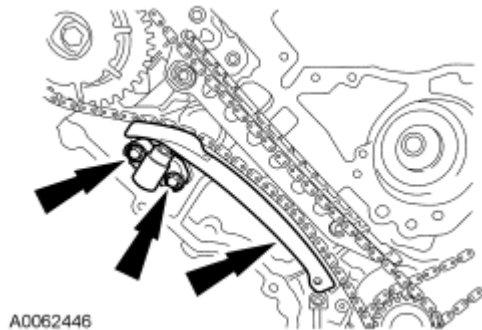


Fig. 51: Identifying RH Timing Chain Tensioner, Tensioner Arm And Bolts
Courtesy of FORD MOTOR CO.

12. Remove the RH and LH timing chains and the crankshaft sprocket.
 - Remove the RH timing chain from the camshaft sprocket.
 - Remove the RH timing chain from the crankshaft sprocket.
 - Remove the LH timing chain from the camshaft sprocket.
 - Remove the LH timing chain and crankshaft sprocket.

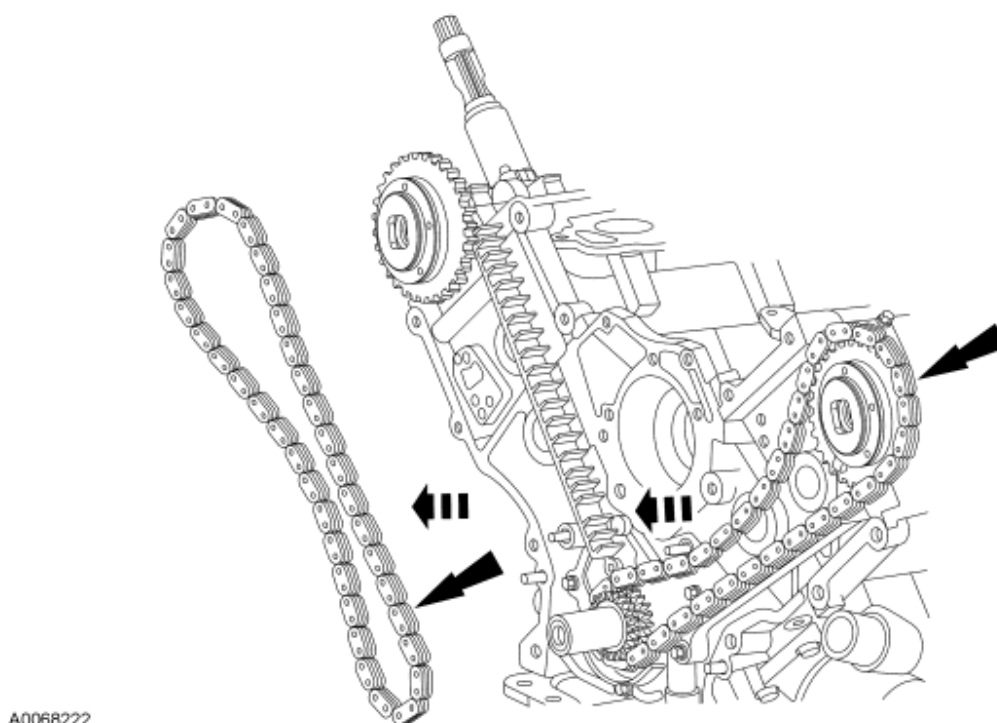


Fig. 52: Identifying RH/LH Timing Chains
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

13. Remove the LH and RH timing chain guides.
 - Remove the bolts.
 - Remove both timing chain guides.

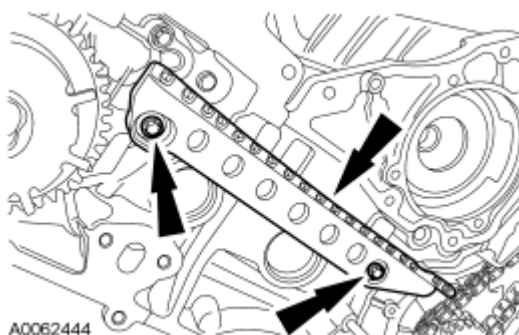


Fig. 53: Identifying Timing Chain Guide And Mounting Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

14. Using the special tool, remove the bolt and the RH camshaft phaser sprocket assembly.
 - Discard the camshaft phaser sprocket bolt.

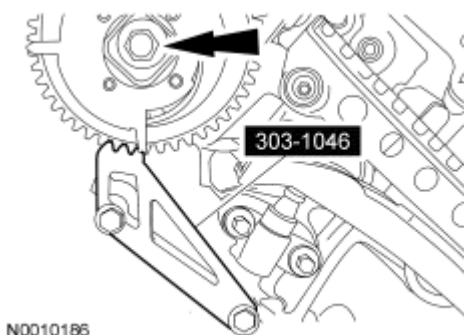


Fig. 54: Identifying VCT Phaser Sprocket Bolt And Holder Tool
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

15. Using the special tool, remove the bolt and the LH camshaft phaser sprocket assembly.
 - Discard the camshaft phaser sprocket bolt.

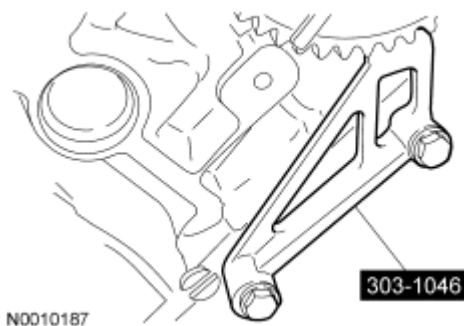
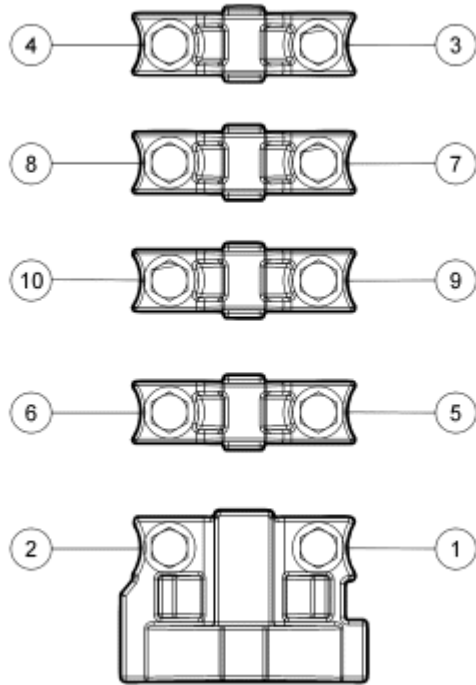


Fig. 55: Identifying Special Sprocket Phaser Tool
Courtesy of FORD MOTOR CO.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from

sideloading.

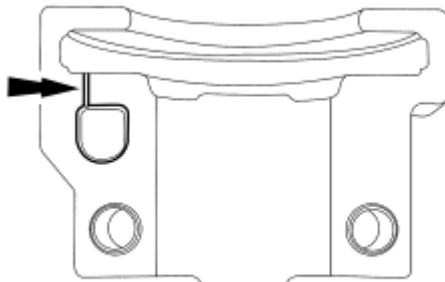
NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.



N0010190

Fig. 56: Identifying Camshaft Bearing Caps Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

16. Remove the bolts in the sequence shown and remove the RH cylinder head front camshaft bearing cap and then the remaining bearing caps.
17. Clean and inspect the RH camshaft bearing caps.
 - The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



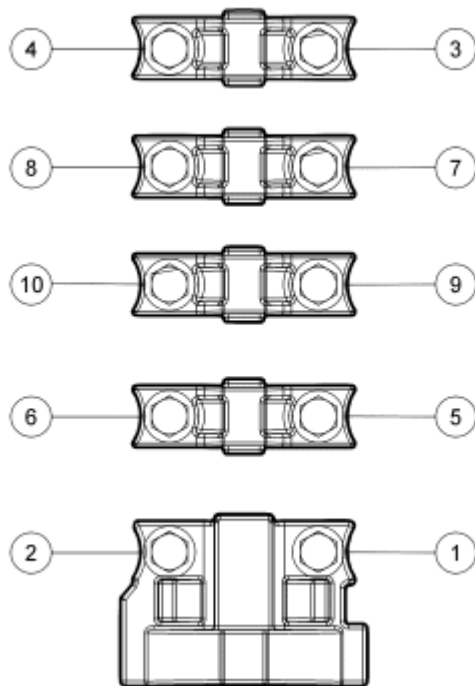
N0010448

Fig. 57: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

18. Remove the RH camshaft.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

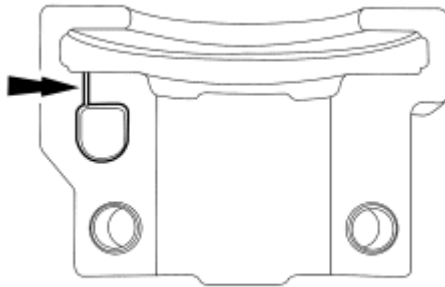
NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.



N0010190

Fig. 58: Identifying Camshaft Bearing Caps Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

19. Remove the bolts in the sequence shown and remove the LH cylinder head front camshaft bearing cap and then the remaining bearing caps.
20. Clean and inspect the LH camshaft bearing caps.
 - The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

Fig. 59: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

21. Remove the LH camshaft.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

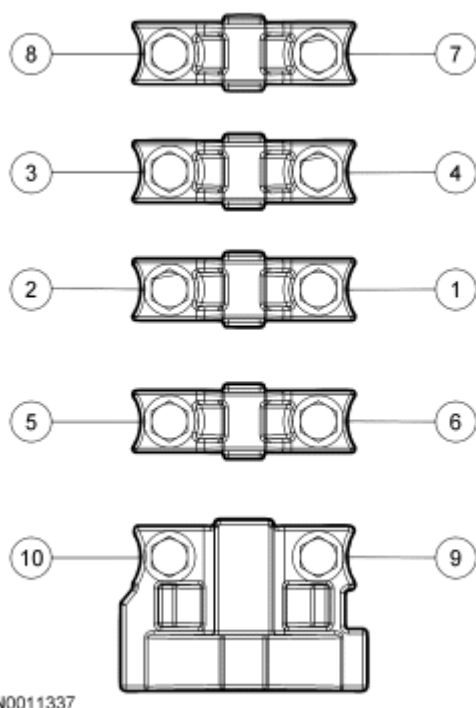
22. Remove all of the remaining roller followers from the cylinder heads.

Installation

1. Install the LH and RH camshafts.
 - Lubricate the camshaft and camshaft journals with clean engine oil prior to installation.

NOTE: **LH shown, RH similar.**

2. Install the LH and RH camshaft bearing caps in their original locations.
 - Lubricate the camshaft bearing caps with clean engine oil.
 - Position the front camshaft bearing cap.
 - Position the remaining camshaft bearing caps.
 - Install the bolts loosely.
 - Tighten to 10 N.m (89 lb-in) in the sequence shown.



N0011337

Fig. 60: Identifying Camshaft Bearing Cap Bolt Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: LH shown, RH similar.

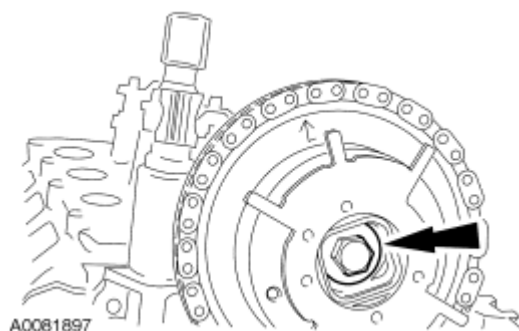


Fig. 61: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

3. Install the camshaft phaser sprockets and new camshaft phaser bolts finger tight.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

NOTE: LH shown, RH similar.

4. Using the special tool, tighten the LH and RH camshaft phaser sprocket bolts in 2 stages.
 - Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

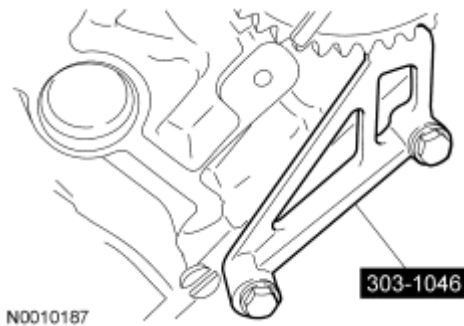


Fig. 62: Identifying Special Sprocket Phaser Tool
Courtesy of FORD MOTOR CO.

5. Install the crankshaft sprocket, making sure the flange faces forward.

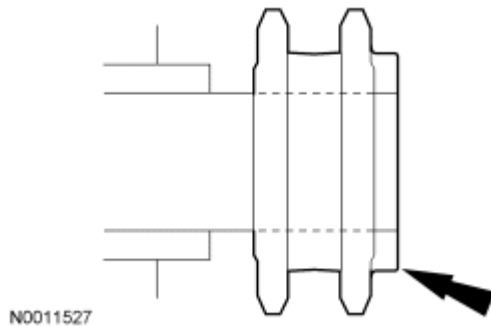


Fig. 63: Identifying Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

6. Rotate the crankshaft to position the crankshaft sprocket timing mark in the 6 o'clock position.

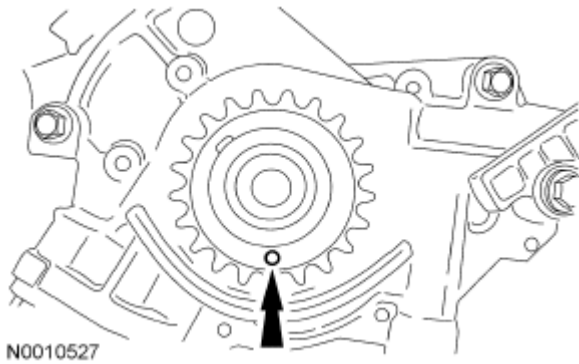


Fig. 64: Locating Crankshaft Sprocket Timing Mark
Courtesy of FORD MOTOR CO.

CAUTION: If one or both tensioner mounting bolts are loosened or removed, the tensioner-sealing bead must be inspected for seal integrity. Any cracks, tears, cuts or separation from the tensioner body, or permanent compression of the seal bead, will require replacement of the tensioner.

7. Inspect the RH and LH timing chain tensioners.
 - Install new tensioners as necessary.

CAUTION: Timing chain procedures must be followed exactly or damage to valves and pistons will result.

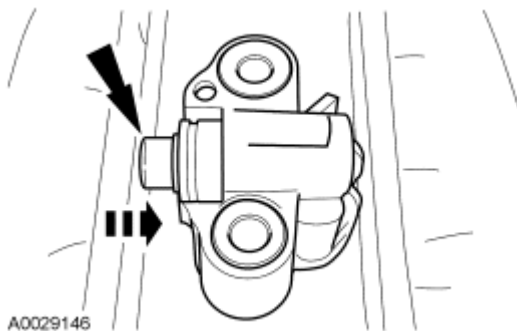


Fig. 65: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

8. Compress the tensioner plunger, using a vise.
9. Install a retaining clip on the tensioner to hold the plunger in during installation.

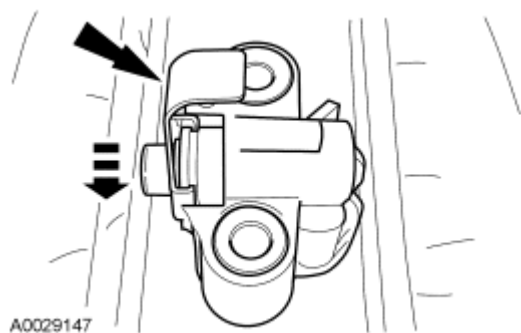


Fig. 66: Identifying Retaining Clip on Tensioner
Courtesy of FORD MOTOR CO.

10. Remove the tensioner from the vise.
11. If the copper links are not visible, mark one link on one end and one link on the other end and use as timing marks.

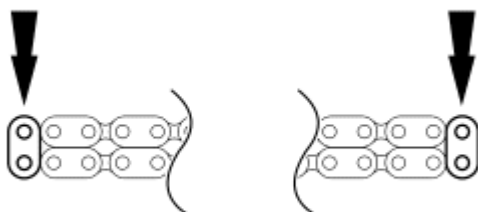
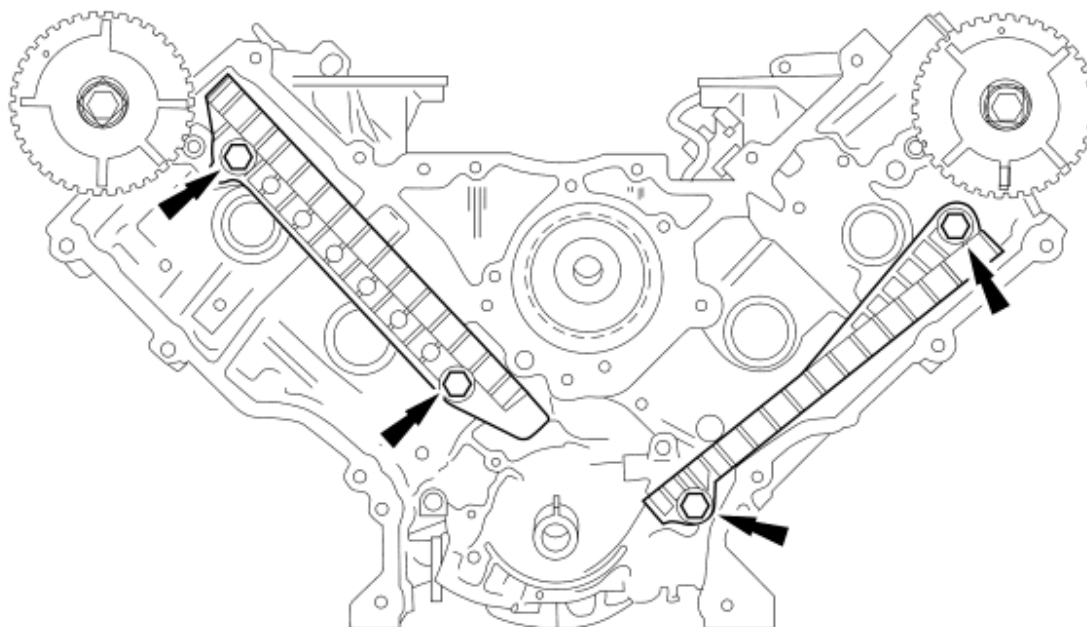


Fig. 67: Identifying Timing Chain Copper Links
Courtesy of FORD MOTOR CO.

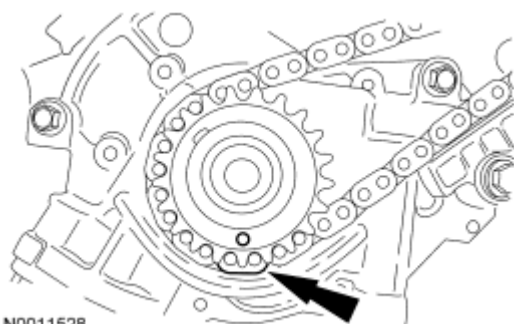
12. Install the 4 bolts and the LH and RH timing chain guides.
 - Tighten to 10 N.m (89 lb-in).



N0006303

Fig. 68: Identifying Timing Chain Guides
Courtesy of FORD MOTOR CO.

13. Position the lower end of the LH (inner) timing chain on the crankshaft sprocket, aligning the timing mark on the outer flange of the crankshaft sprocket with the single copper (marked) link on the chain.



N0011528

Fig. 69: Aligning Crankshaft Sprocket Timing Mark And LH Timing Chain Link
Courtesy of FORD MOTOR CO.

NOTE: Make sure the upper half of the timing chain is below the tensioner arm dowel.

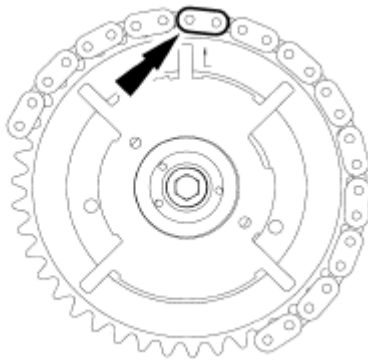


Fig. 70: Locating Aligning Camshaft Sprocket Timing Mark With Copper Link
Courtesy of FORD MOTOR CO.

14. Position the LH timing chain on the camshaft sprocket. Make sure the camshaft sprocket timing mark is aligned with the copper (marked) chain link.

NOTE: The LH timing chain tensioner arm has a bump near the dowel hole for identification.

15. Position the LH timing chain tensioner arm on the dowel pin and install the LH timing chain tensioner and bolts.
 - Tighten to 25 N.m (18 lb-ft).

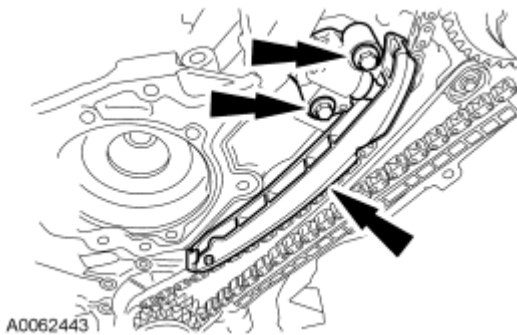


Fig. 71: Identifying LH Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

16. Remove the retaining clip from the LH timing chain tensioner.

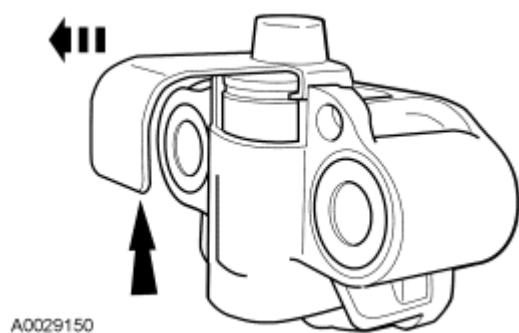


Fig. 72: View Of Retaining Clip And Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

17. Position the lower end of the RH (outer) timing chain on the crankshaft sprocket, aligning the timing mark on the sprocket with the single copper (marked) chain link.

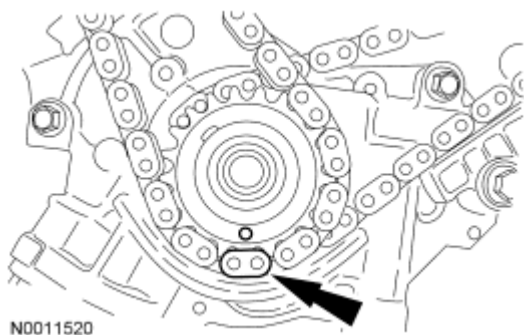


Fig. 73: Aligning Crankshaft Sprocket Timing Mark And RH Timing Chain Link
Courtesy of FORD MOTOR CO.

NOTE: The camshaft phaser and sprocket will be stamped with one of the illustrated timing marks for the RH camshaft.

NOTE: The lower half of the timing chain must be positioned above the tensioner arm dowel.

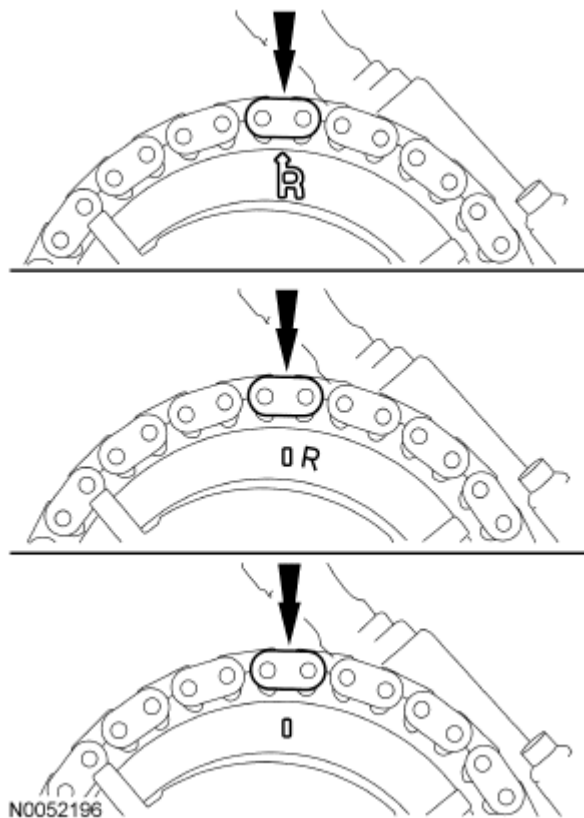


Fig. 74: Locating Camshaft Sprocket Timing Mark Aligned With Copper Chain Link
Courtesy of FORD MOTOR CO.

18. Position the RH timing chain on the camshaft sprocket. Make sure the camshaft sprocket timing mark is aligned with the copper (marked) chain link.
19. Position the RH timing chain tensioner arm on the dowel pin and install the RH timing chain tensioner and bolts.
 - Tighten to 25 N.m (18 lb-ft).

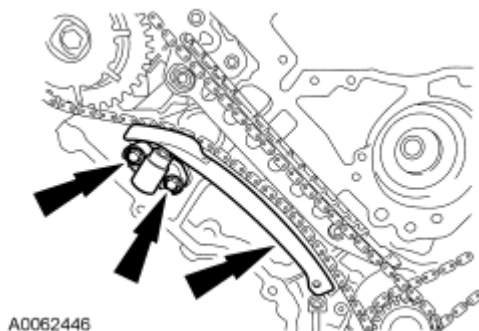


Fig. 75: Identifying RH Timing Chain Tensioner, Tensioner Arm And Bolts
Courtesy of FORD MOTOR CO.

20. Remove the retaining clip from the RH timing chain tensioner.

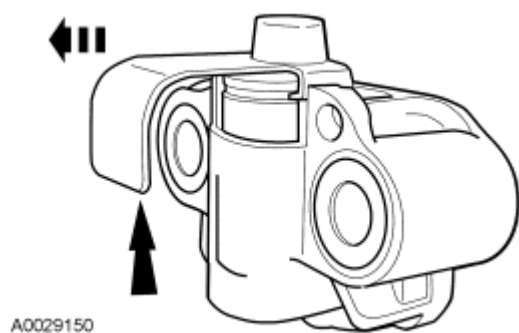


Fig. 76: View Of Retaining Clip And Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

NOTE: The RH and LH camshaft phaser sprockets are similar. Refer to the single timing mark to identify the RH camshaft phaser sprocket and the L timing mark to identify the LH camshaft phaser sprocket.

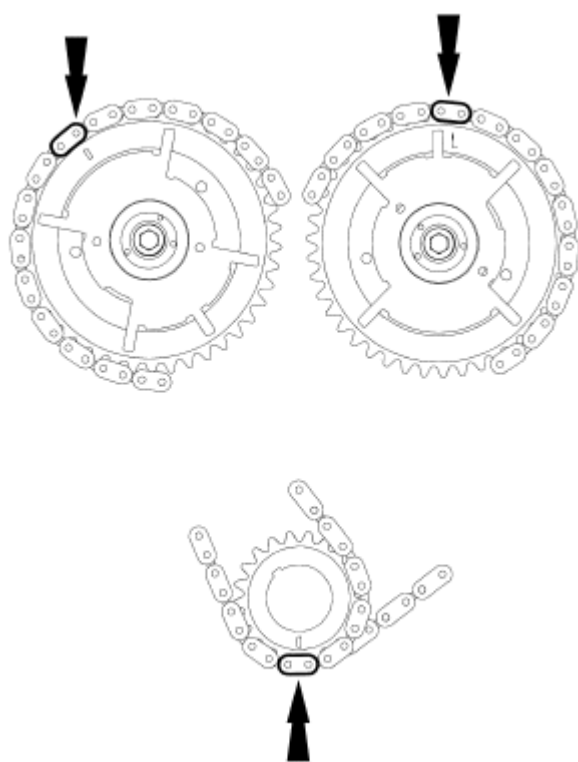


Fig. 77: Locating Aligning Timing Mark On Sprocket With Single Copper Chain Link
Courtesy of FORD MOTOR CO.

21. As a post-check, verify correct alignment of all timing marks. Make sure the timing marks on the sprockets correspond to the above note.
22. Install the crankshaft sensor ring on the crankshaft.

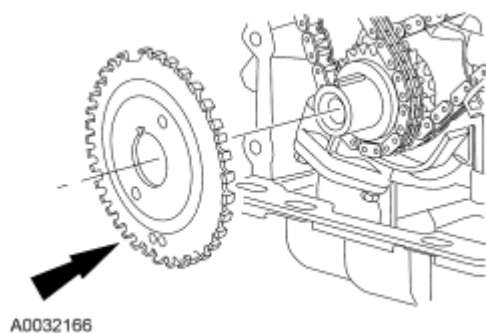


Fig. 78: View Of Crankshaft Sensor Ring At Crankshaft
Courtesy of FORD MOTOR CO.

NOTE: It is necessary to rotate the engine to position the camshaft lobes at base circle to install the roller followers.

23. Using the special tool, install all of the camshaft roller followers.
 - Lubricate the roller followers with clean engine oil prior to installation.

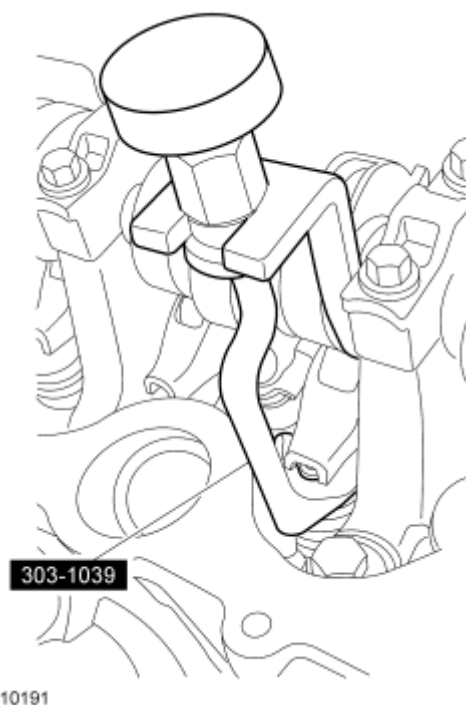


Fig. 79: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

24. Install the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.

VALVE TRAIN COMPONENTS - EXPLODED VIEW

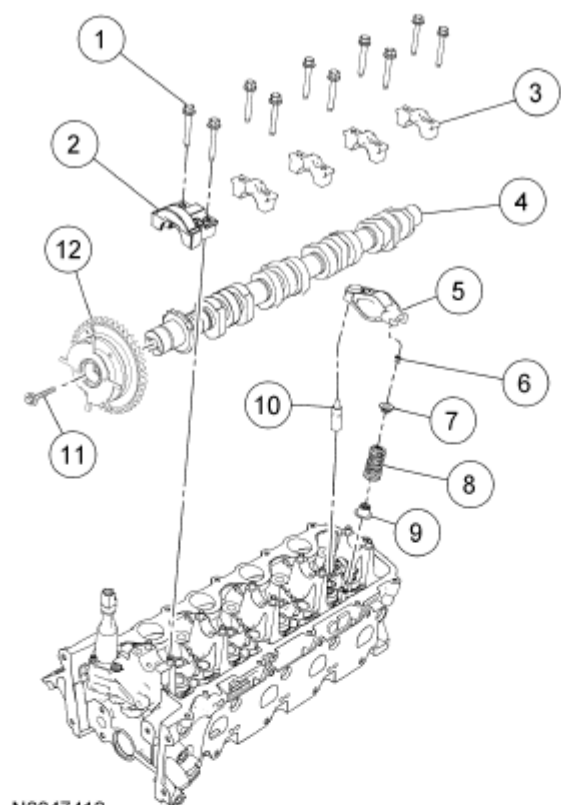
2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

NOTE: LH shown, RH similar.

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



Item	Part Number	Description
1	N807834	Camshaft bearing cap bolt (10 required)
2	6B284	Camshaft front bearing cap
3	6B280	Camshaft bearing cap (4 required)
4	6C255 LH/ 6251 RH	Camshaft
5	6529	Camshaft roller follower (12 required)
6	6518	Valve spring retainer key (24 required)
7	6514	Valve spring retainer (12 required)
8	6513	Valve spring (12 required)
9	6A517	Valve seal (12 required)
10	6C501	Hydraulic lash adjuster (12 required)
11	6279	Camshaft phaser and sprocket bolt
12	6C524	Camshaft phaser and sprocket

Fig. 80: Exploded View Of Valve Train Components

2006 Mercury Mountaineer

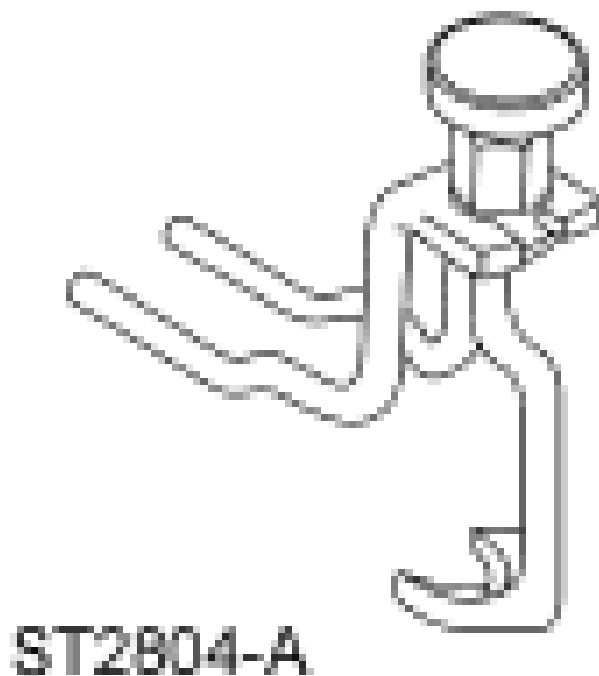
2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

Courtesy of FORD MOTOR CO.

1. For additional information, refer to the appropriate procedure.

CAMSHAFT - LH

SPECIAL TOOL(S)



Compressor, Valve Spring
303-1039

Wedge, Timing Chain
303-1175

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A

Removal

CAUTION: The camshaft procedure must be followed exactly or damage to the valves and pistons will result.

1. Position the crankshaft damper spoke at the 12 o'clock position and the timing mark indentation at the 1 o'clock position.

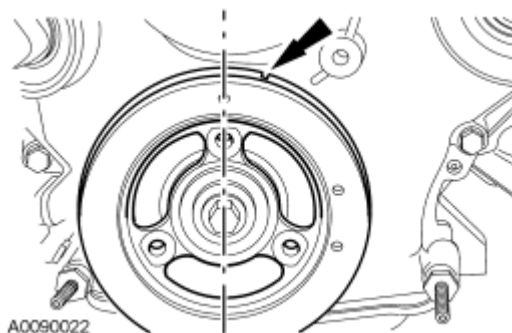


Fig. 81: Locating Crankshaft Damper Spoke Timing Mark

Courtesy of FORD MOTOR CO.

2. Remove the LH valve cover. For additional information, refer to **VALVE COVER - LH**.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

3. Loosen and back off the LH camshaft phaser and sprocket bolt one full turn.
4. Disconnect the LH camshaft position (CMP) sensor electrical connector.

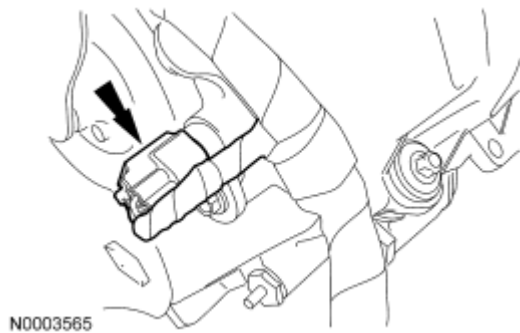


Fig. 82: Identifying LH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the LH CMP sensor and the bolt.

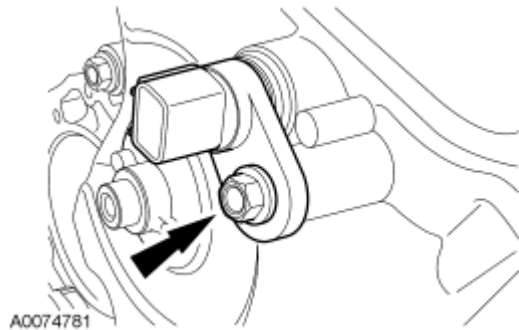


Fig. 83: Locating Bolt And LH CMP Sensor
Courtesy of FORD MOTOR CO.

NOTE: If the camshaft lobes are not exactly positioned as shown, the crankshaft keyway will require one full additional rotation to 12 o'clock.

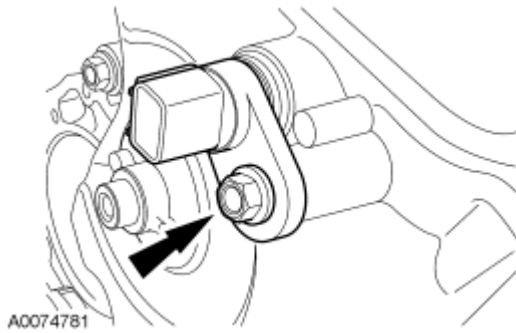


Fig. 84: Locating Bolt And LH CMP Sensor
Courtesy of FORD MOTOR CO.

6. The No. 5 cylinder camshaft lobe must be coming up on the exhaust stroke. Verify by noting the position of the 2 intake camshaft lobes and the exhaust lobe on the No. 5 cylinder.
7. Remove only the 3 camshaft roller followers shown in the illustration.

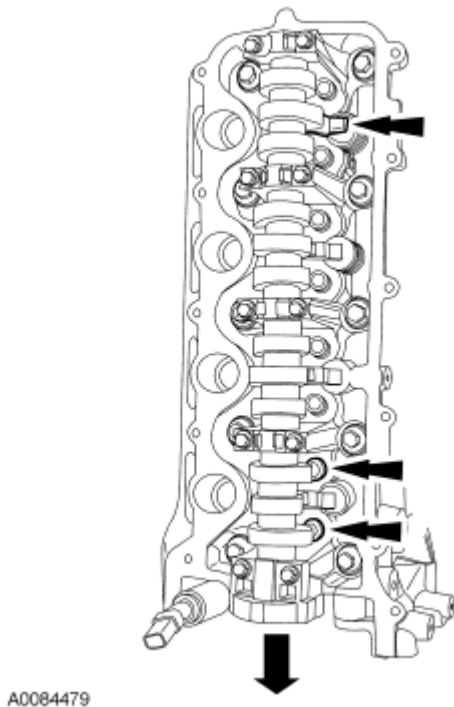


Fig. 85: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

NOTE: The camshaft roller followers must be installed in their original locations. Record camshaft roller follower locations.

NOTE: It may be necessary to push the valve down while compressing the spring.



N0010191

Fig. 86: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

8. Using the special tool, remove only the 3 designated camshaft roller followers from the previous step.

CAUTION: The crankshaft cannot be moved past the 6 o'clock position once set.

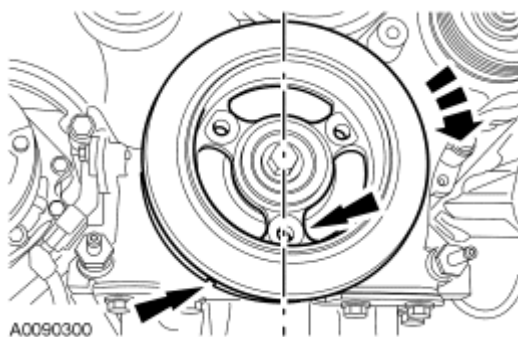


Fig. 87: Positioning Crankshaft Damper Spoke At 6 O'clock Position And Timing Mark Indentation At 7 O'clock Position
Courtesy of FORD MOTOR CO.

9. Rotate the crankshaft clockwise, as viewed from the front, positioning the crankshaft damper spoke at the 6 o'clock position and the timing mark indentation at the 7 o'clock position.

CAUTION: Engine is not freewheeling. Camshaft procedure must be followed exactly or damage to valves and pistons will result.

CAUTION: The Timing Chain Wedge tool must be installed square to the timing chain and the engine block.

NOTE: Engine front cover removed for clarity.

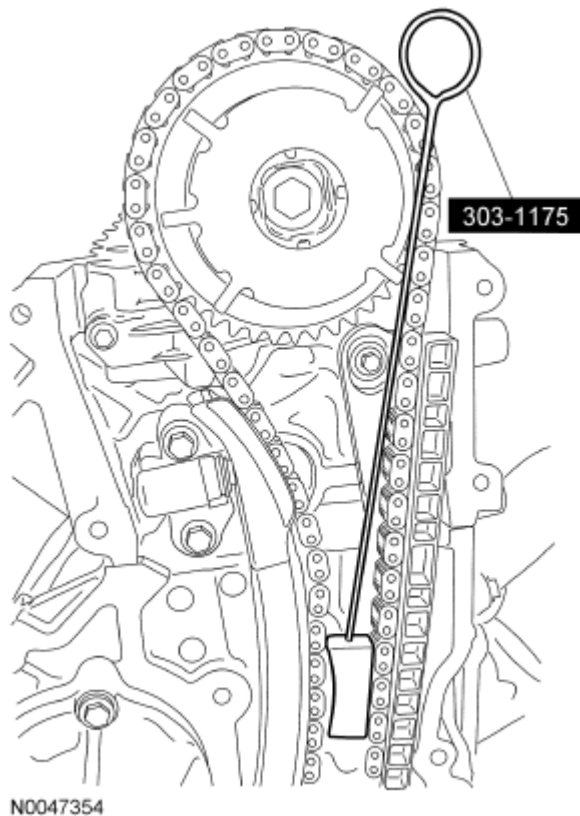


Fig. 88: Installing Special Tool In LH Timing Chain
Courtesy of FORD MOTOR CO.

10. Install the special tool in the LH timing chain as shown.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to TIMING DRIVE COMPONENTS.

CAUTION: The timing chain must be installed in its original position onto the camshaft phaser and sprocket using the scribed marks, or damage to valves and pistons will result.

NOTE: RH shown, LH similar.

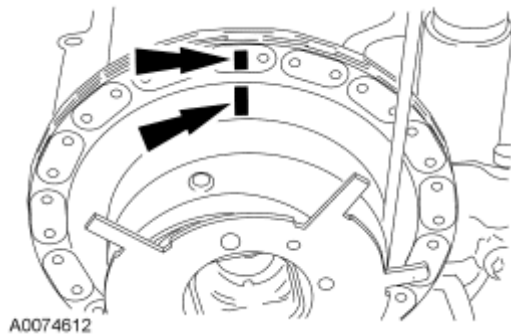


Fig. 89: Identifying Scribe Marks Of Camshaft Phaser And Chain
Courtesy of FORD MOTOR CO.

11. Scribe a location mark on the timing chain and the camshaft phaser and sprocket assembly.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.

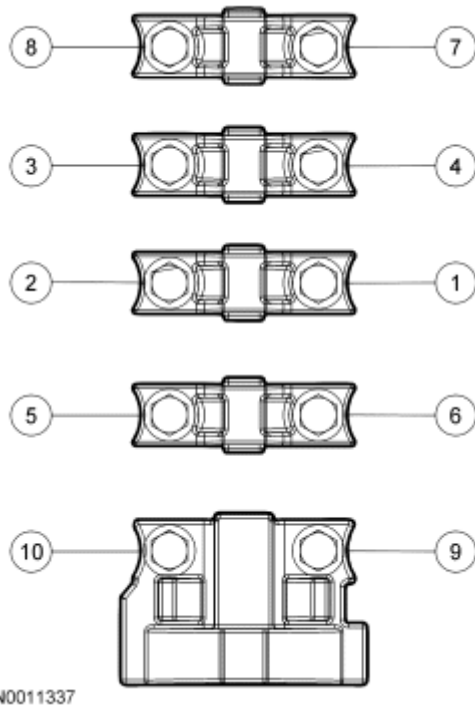
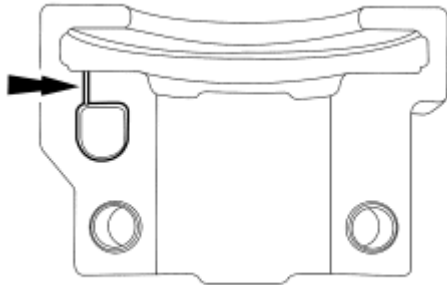


Fig. 90: Identifying Camshaft Bearing Cap Bolt Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

12. Remove the bolts in the sequence shown and remove the front camshaft bearing cap and then the remaining bearing caps.
13. Clean and inspect the LH camshaft bearing caps.
 - The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

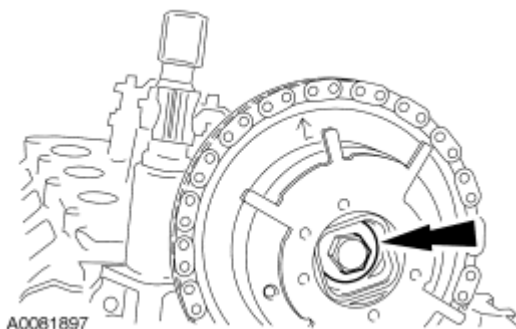
Fig. 91: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser and sprocket bolt or damage may occur to the camshaft or camshaft phaser and sprocket.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to **TIMING DRIVE COMPONENTS**.

14. Remove the bolt and withdraw the camshaft from the camshaft phaser and sprocket assembly, leaving the camshaft phaser and sprocket assembly in place.
 - Discard the bolt and washer.



A0081897

Fig. 92: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

15. Inspect the camshaft phaser and sprocket for damage. For additional information, refer to **CAMSHAFT PHASER AND SPROCKET**.

Installation

1. Lubricate the camshaft and camshaft journals with clean engine oil.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to **TIMING DRIVE COMPONENTS**.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Do not allow the camshaft roller followers to move out of position when installing the camshaft.

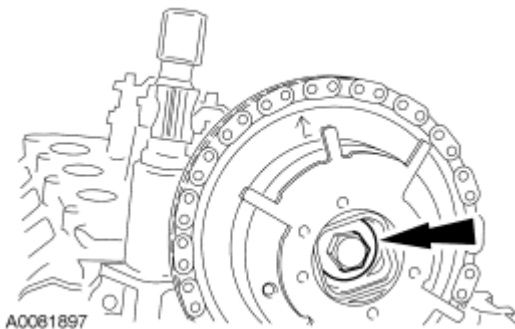


Fig. 93: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

2. Install the camshaft into the camshaft phaser and sprocket assembly and onto the head. Install a new camshaft phaser and sprocket bolt finger-tight.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to **TIMING DRIVE COMPONENTS**.

CAUTION: The timing chain must be installed in its original position onto the camshaft phaser and sprocket using the scribed marks, or damage to valves and pistons will result.

NOTE: RH shown, LH similar.

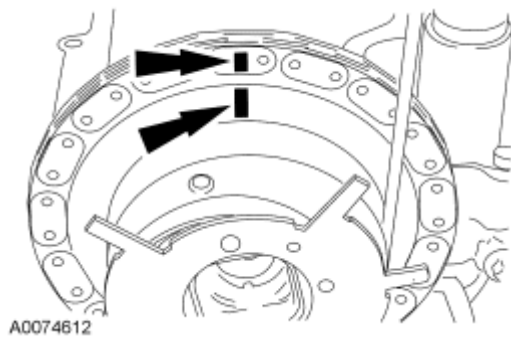
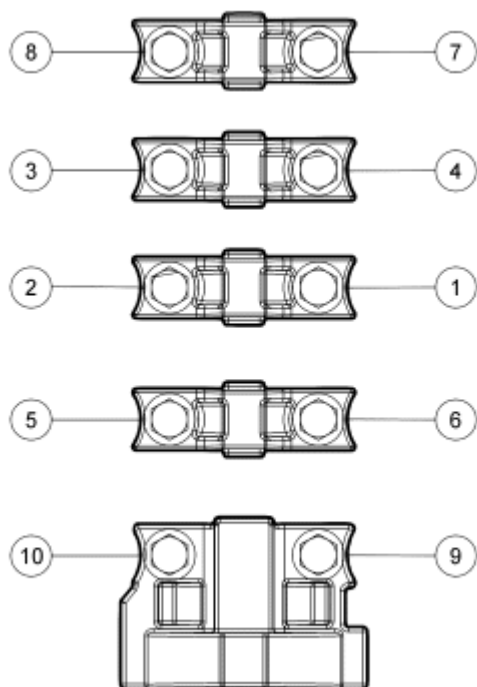


Fig. 94: Identifying Scribe Marks Of Camshaft Phaser And Chain
Courtesy of FORD MOTOR CO.

3. Verify the camshaft phaser and sprocket and timing chain scribe marks are still in alignment.

CAUTION: Do not allow the camshaft roller followers to move out of position when installing the camshaft.

4. Install the camshaft bearing caps in their original locations.
 - Lubricate the camshaft bearing caps with clean engine oil.
 - Position the front camshaft bearing cap.
 - Position the remaining camshaft bearing caps.
 - Install the bolts loosely.
5. Tighten the bolts in the sequence shown.
 - Tighten to 10 N.m (89 lb-in).



N0011337

Fig. 95: Identifying Camshaft Bearing Cap Bolt Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Engine front cover removed for clarity.

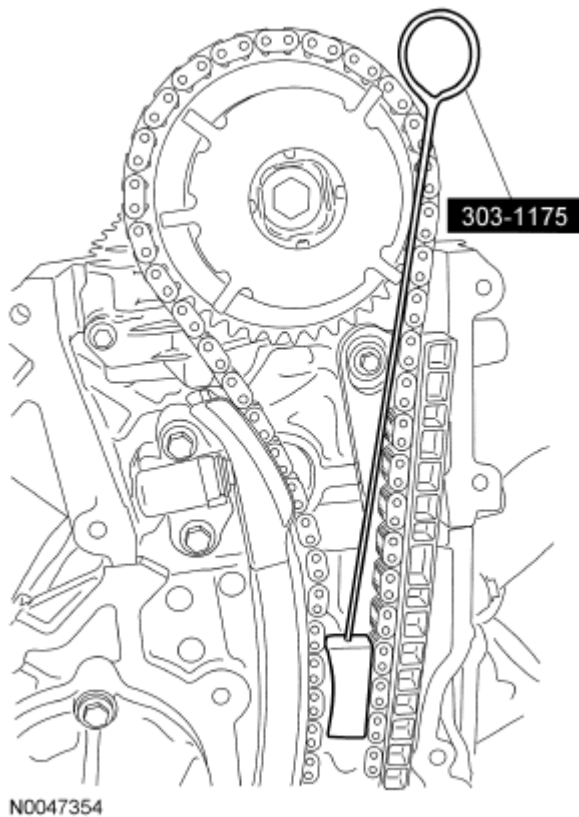


Fig. 96: Identifying Special Tools
Courtesy of FORD MOTOR CO.

6. Remove the special tools.
7. Rotate the crankshaft a half turn counterclockwise and position the crankshaft damper spoke at the 12 o'clock position and the timing mark indentation at the 1 o'clock position.

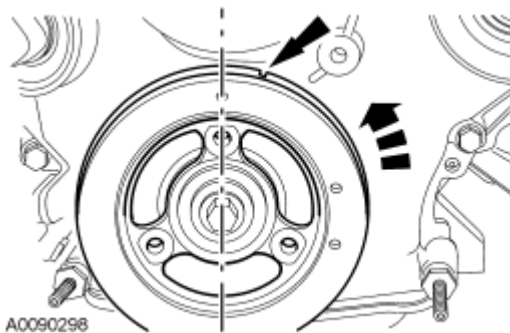


Fig. 97: Positioning Crankshaft Damper Spoke At 12 O'clock Position And Timing Mark Indentation At 1 O'clock Position
Courtesy of FORD MOTOR CO.

8. Verify correct camshaft position by noting the position of the No. 5 cylinder intake and exhaust camshaft lobes.

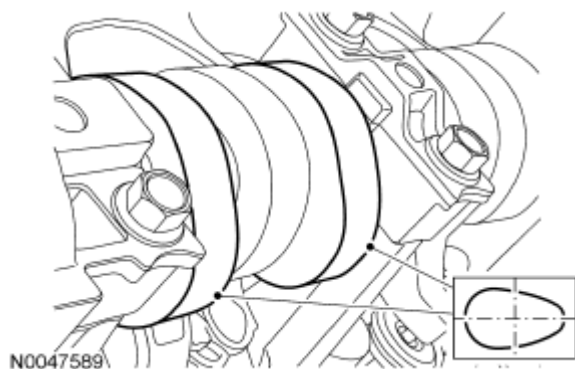


Fig. 98: Identifying Intake And Exhaust Camshaft Lobes Position
Courtesy of FORD MOTOR CO.

9. Using the special tool, install the 3 originally removed camshaft roller followers.



Fig. 99: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

10. Install the CMP sensor and the bolt.

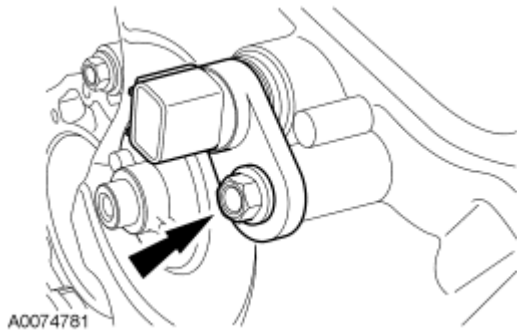


Fig. 100: Locating Bolt And LH CMP Sensor
Courtesy of FORD MOTOR CO.

11. Connect the CMP electrical connector.

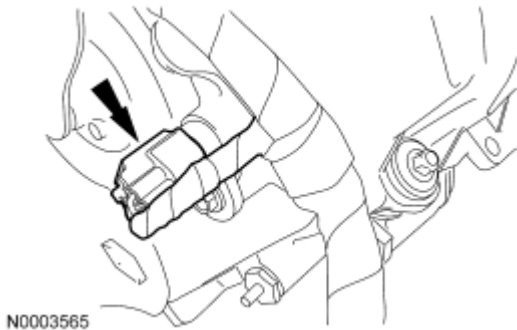


Fig. 101: Identifying LH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

CAUTION: Only use hand tools to install the camshaft phaser and sprocket assembly or damage may occur to the camshaft or camshaft phaser and sprocket.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

12. Tighten the camshaft phaser and sprocket bolt in 2 stages:
- Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

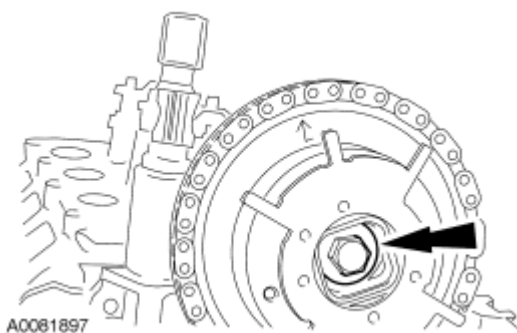
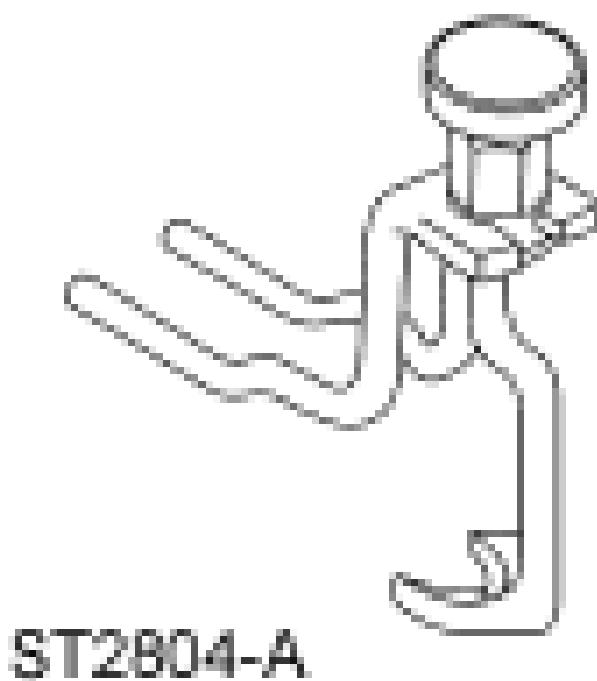


Fig. 102: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

13. Install the LH valve cover. For additional information, refer to VALVE COVER - LH.

CAMSHAFT - RH

SPECIAL TOOL(S)



Compressor, Valve Spring
303-1039

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



Wedge, Timing Chain
303-1175

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A

Removal

CAUTION: The camshaft procedure must be followed exactly or damage to the valves and pistons will result.

1. Position the crankshaft damper spoke at the 12 o'clock position and the timing mark indentation at the 1 o'clock position.

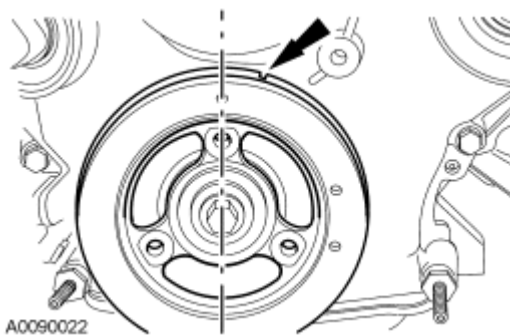


Fig. 103: Locating Crankshaft Damper Spoke Timing Mark

Courtesy of FORD MOTOR CO.

2. Remove the RH valve cover. For additional information, refer to **VALVE COVER - RH**.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

3. Loosen and backoff the RH camshaft phaser and sprocket bolt one full turn.
4. Disconnect the RH camshaft position (CMP) sensor electrical connector.

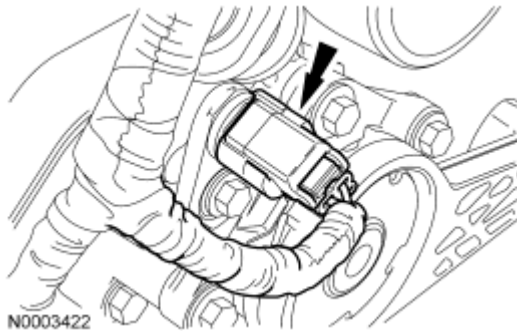


Fig. 104: Identifying RH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the bolt and the RH CMP sensor.

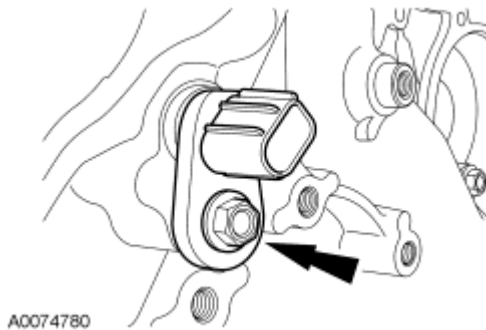


Fig. 105: Locating Camshaft (CMP) Sensor Bolt
Courtesy of FORD MOTOR CO.

NOTE: If the camshaft lobes are not exactly positioned as shown, the crankshaft will require one full additional rotation to 12 o'clock.

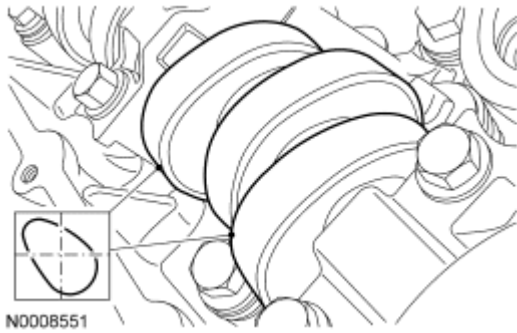


Fig. 106: Identifying Camshaft Lobe Position
Courtesy of FORD MOTOR CO.

6. The No. 1 cylinder camshaft exhaust lobe must be coming up on the exhaust stroke. Verify by noting the position of the 2 intake camshaft lobes and the exhaust lobe on the No. 1 cylinder.
7. Remove only the 3 camshaft roller followers shown in the illustration.

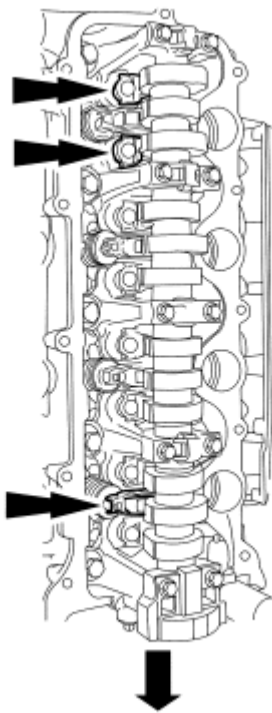


Fig. 107: Identifying RH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

NOTE: The camshaft roller followers must be installed in their original locations. Record camshaft roller follower locations.

NOTE: It may be necessary to push the valve down while compressing the spring.



Fig. 108: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

8. Using the special tool, remove only the 3 designated camshaft roller followers from the previous step.

CAUTION: The crankshaft cannot be moved past the 6 o'clock position once set.

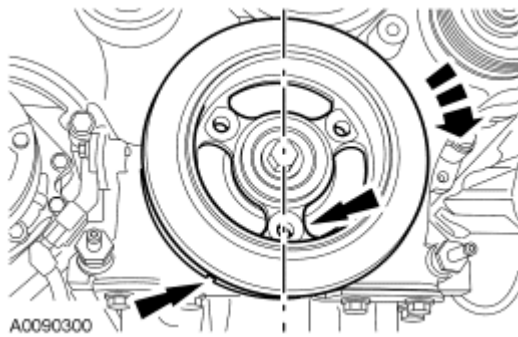


Fig. 109: Positioning Crankshaft Damper Spoke At 6 O'clock Position And Timing Mark Indentation At 7 O'clock Position
Courtesy of FORD MOTOR CO.

9. Rotate the crankshaft clockwise, as viewed from the front, positioning the crankshaft damper spoke at the 6 o'clock position and the timing mark indentation at the 7 o'clock position.

CAUTION: Engine is not freewheeling. Camshaft procedure must be followed exactly or damage to valves and pistons will result.

CAUTION: The Timing Chain Wedge tool must be installed square to the timing chain and the engine block.

NOTE: Engine front cover removed for clarity.

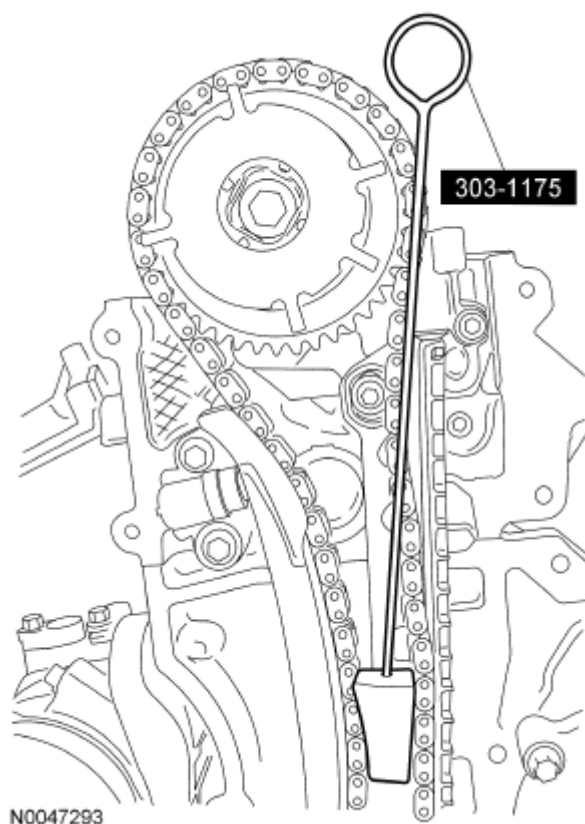


Fig. 110: Identifying Special Tool
Courtesy of FORD MOTOR CO.

10. Install the special tool in the RH timing chain as shown.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to TIMING DRIVE COMPONENTS.

CAUTION: The timing chain must be installed in its original position onto the camshaft phaser and sprocket using the scribed marks, or damage to valves and pistons will result.

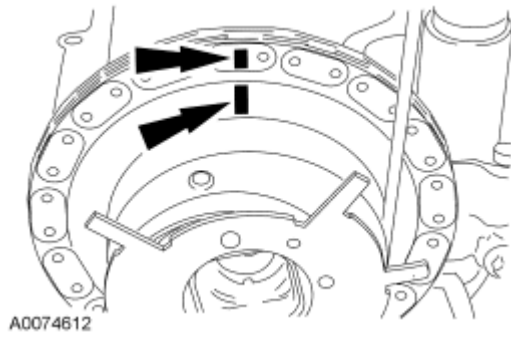


Fig. 111: Identifying Scribe Marks Of Camshaft Phaser And Chain
Courtesy of FORD MOTOR CO.

11. Scribe a location mark on the timing chain and the camshaft phaser and sprocket assembly.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.

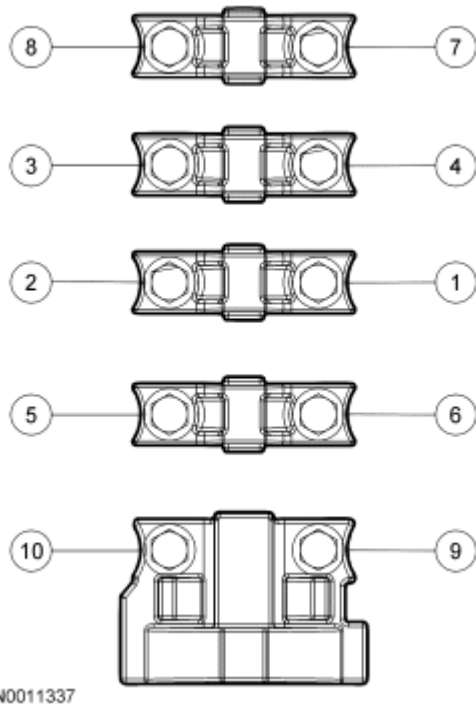


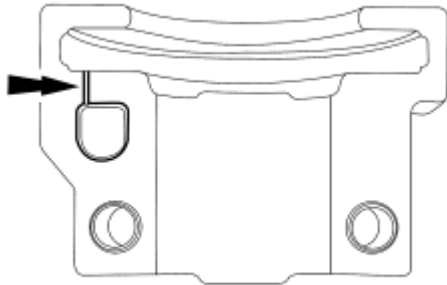
Fig. 112: Identifying Camshaft Bearing Cap Bolt Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

12. Remove the bolts in the sequence shown and remove the front camshaft bearing cap and then the

remaining bearing caps.

13. Clean and inspect the RH camshaft bearing caps.

- The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

Fig. 113: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

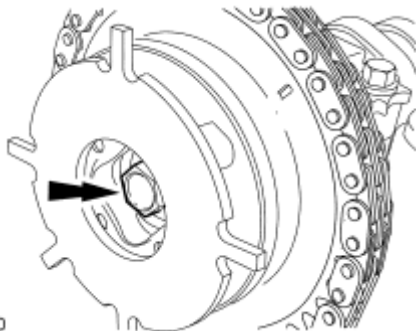
CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser and sprocket bolt or damage may occur to the camshaft or camshaft phaser and sprocket.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to **TIMING DRIVE COMPONENTS**.

14. Remove the bolt and withdraw the camshaft from the camshaft phaser and sprocket assembly, leaving the camshaft phaser and sprocket assembly in place.

- Discard the bolt and washer.



N0008550

Fig. 114: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

15. Inspect the camshaft phaser and sprocket for damage. For additional information, refer to **CAMSHAFT PHASER AND SPROCKET**.

Installation

1. Lubricate the camshaft and camshaft journals with clean engine oil.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to **TIMING DRIVE COMPONENTS**.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Do not allow the camshaft roller followers to move out of position when installing the camshaft.

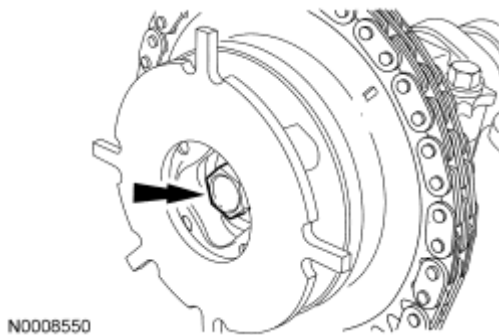


Fig. 115: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

2. Install the camshaft into the camshaft phaser and sprocket assembly and onto the head. Install a new camshaft phaser and sprocket bolt finger-tight.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to **TIMING DRIVE COMPONENTS**.

CAUTION: The timing chain must be installed in its original position onto the camshaft phaser and sprocket using the scribed marks, or damage to valves and pistons will result.

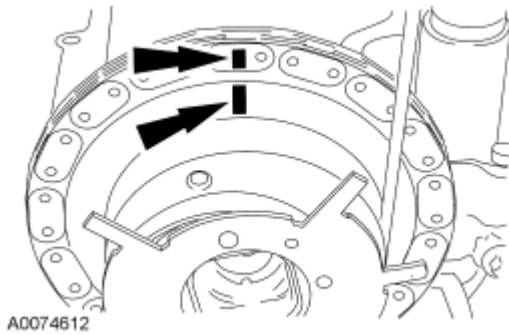
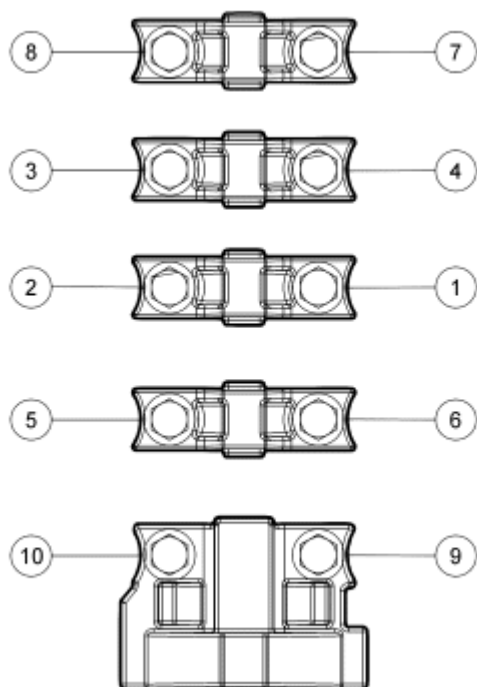


Fig. 116: Identifying Scribe Marks Of Camshaft Phaser And Chain
Courtesy of FORD MOTOR CO.

3. Verify the camshaft phaser and sprocket and timing chain scribe marks are still in alignment.

CAUTION: Do not allow the camshaft roller followers to move out of position when installing the camshaft.

4. Install the camshaft bearing caps in their original locations.
 - Lubricate the camshaft bearing caps with clean engine oil.
 - Position the front camshaft bearing cap.
 - Position the remaining camshaft bearing caps.
 - Install the bolts loosely.
5. Tighten the bolts in the sequence shown.
 - Tighten to 10 N.m (89 lb-in).



N0011337

Fig. 117: Identifying Camshaft Bearing Cap Bolt Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Engine front cover removed for clarity.

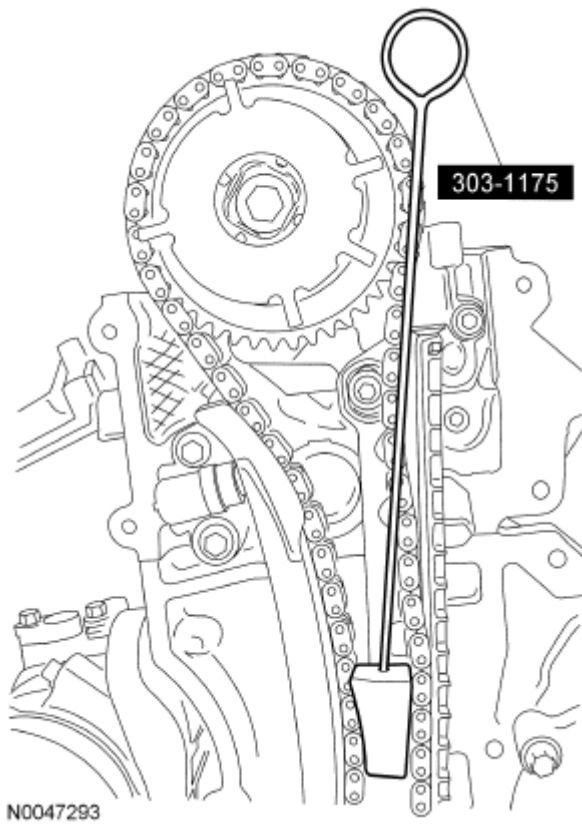


Fig. 118: Identifying Special Tool
Courtesy of FORD MOTOR CO.

6. Remove the special tool.
7. Rotate the crankshaft a half turn counterclockwise and position the crankshaft damper spoke at the 12 o'clock position and the timing mark indentation at the 1 o'clock position.

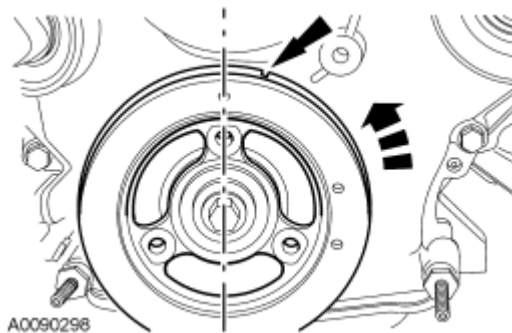


Fig. 119: Positioning Crankshaft Damper Spoke At 12 O'clock Position And Timing Mark Indentation At 1 O'clock Position
Courtesy of FORD MOTOR CO.

8. Verify correct camshaft position by noting the position of the No. 1 cylinder intake and exhaust camshaft lobes.



Fig. 120: Identifying Camshaft Lobe Position
Courtesy of FORD MOTOR CO.

9. Using the special tool, install the 3 originally removed camshaft roller followers.



Fig. 121: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

10. Install the CMP sensor and the bolt.
- Tighten to 10 N.m (89 lb-in).

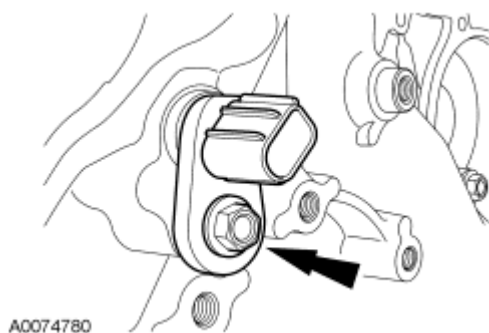


Fig. 122: Locating Camshaft (CMP) Sensor Bolt
Courtesy of FORD MOTOR CO.

11. Connect the CMP electrical connector.

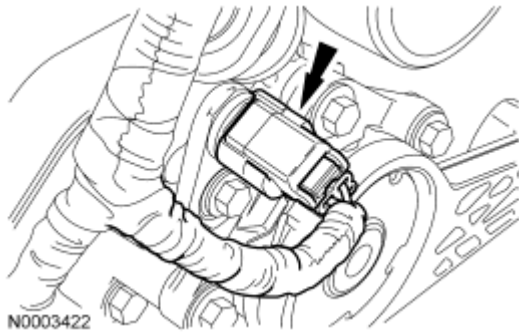


Fig. 123: Identifying RH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

CAUTION: Only use hand tools to install the camshaft phaser and sprocket assembly or damage may occur to the camshaft or camshaft phaser and sprocket.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

12. Tighten the new camshaft phaser and sprocket bolt in 2 stages:

- Stage 1: Tighten to 40 N.m (30 lb-ft).
- Stage 2: Tighten an additional 90 degrees.

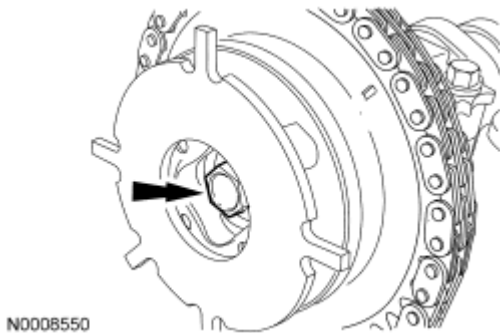


Fig. 124: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

13. Install the RH valve cover. For additional information, refer to **VALVE COVER - RH.**

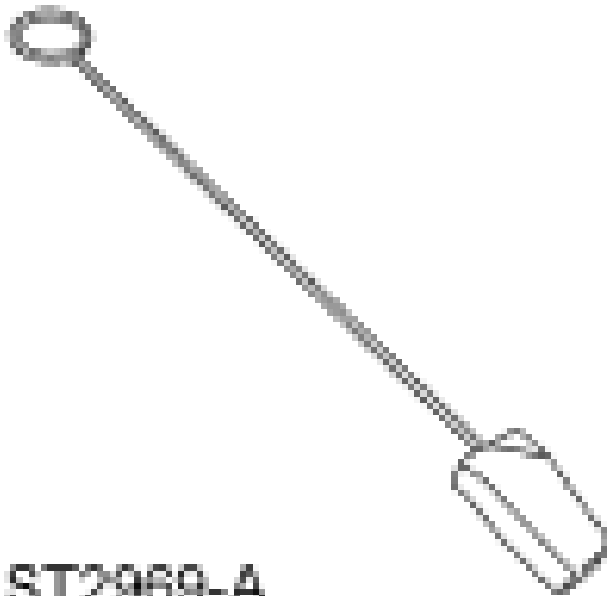
CAMSHAFT PHASER AND SPROCKET

SPECIAL TOOL(S)

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2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



Wedge, Timing Chain
303-1175

Removal

1. If servicing the RH camshaft phaser and sprocket, remove the RH camshaft. For additional information, refer to **CAMSHAFT - RH**.
2. If servicing the LH camshaft phaser and sprocket, remove the LH camshaft. For additional information, refer to **CAMSHAFT - LH**.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Do not remove the Timing Chain Wedge tool at any time during assembly. If the special tool is removed or out of placement, the engine front cover must be removed and the engine must be retimed. For additional information, refer to **TIMING DRIVE COMPONENTS**.

3. Remove the camshaft phaser and sprocket from the timing chain.
4. Inspect the front of the camshaft phaser and sprocket for missing or damaged roll pins.
 - If the roll pins are missing or damaged, a new camshaft phaser and sprocket must be installed.

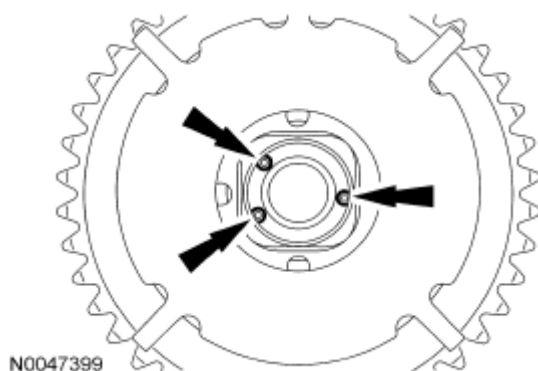


Fig. 125: Locating Camshaft Phaser Bolts
Courtesy of FORD MOTOR CO.

5. Inspect the rear of the camshaft phaser and sprocket for a deformed or damaged location pin.
 - If the location pin is deformed or damaged a new camshaft phaser and sprocket must be installed.

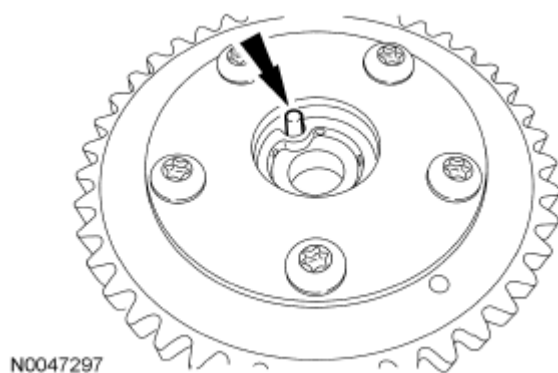
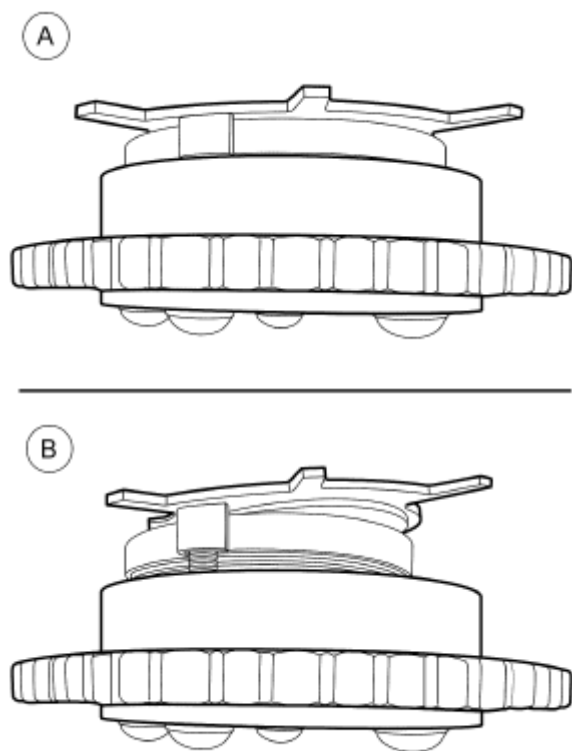


Fig. 126: Locating Roll Pin Location
Courtesy of FORD MOTOR CO.

6. Visually inspect the camshaft phaser and sprocket for squareness (A). If the trigger wheel or spring is deformed or damaged (B), install a new camshaft phaser and sprocket.



N0047574

Fig. 127: Identifying Camshaft Phaser And Sprocket For Squareness
Courtesy of FORD MOTOR CO.

Installation

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

1. If installing a new camshaft phaser and sprocket, transfer the original scribe mark to the new camshaft phaser and sprocket.

CAUTION: The timing chain must be installed in its original position onto the camshaft phaser and sprocket using the scribed marks, or damage to valves and pistons will result.

CAUTION: Damage to the camshaft phaser and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

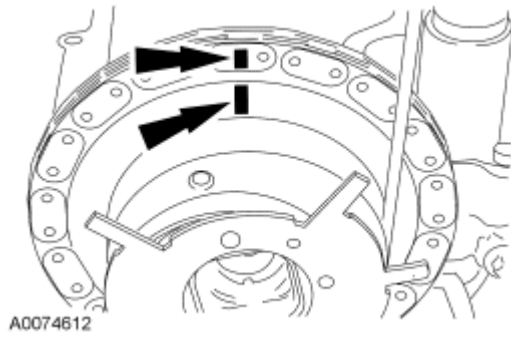


Fig. 128: Identifying Scribe Marks Of Camshaft Phaser And Chain
 Courtesy of FORD MOTOR CO.

2. Align the scribe marks and position the camshaft phaser and sprocket into the timing chain.
3. If servicing the RH camshaft phaser and sprocket, install the RH camshaft. For additional information, refer to **CAMSHAFT - RH**.
4. If servicing the LH camshaft phaser and sprocket, install the LH camshaft. For additional information, refer to **CAMSHAFT - LH**.

CAMSHAFT ROLLER FOLLOWER

SPECIAL TOOL(S)

ST2804-A	Compressor, Valve Spring 303-1039
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MATERIAL

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

Removal

1. Depending on the roller follower being serviced, remove the LH or RH valve cover. For additional information, refer to **VALVE COVER - LH** or **VALVE COVER - RH**.
2. Rotate the crankshaft until the piston for the valve being serviced is at the top of its stroke with the intake valve and the exhaust valves closed.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



Fig. 129: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

3. Using the special tool, compress the valve spring and remove the camshaft roller follower.
4. Repeat the previous 2 steps for each roller follower being serviced.
5. Inspect the roller follower. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.

Installation

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

NOTE: Lubricate the roller follower with clean engine oil.

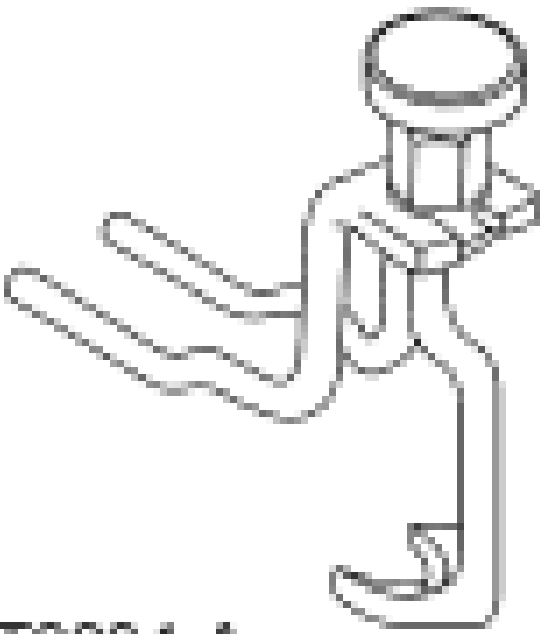


Fig. 130: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

1. Using the special tool, compress the valve spring and install the camshaft roller follower.
2. Repeat the previous step for each roller follower being serviced.
3. Depending on the valve being serviced, install the LH or RH valve cover. For additional information, refer to VALVE COVER - LH or VALVE COVER - RH.

VALVE SPRINGS

SPECIAL TOOL(S)

 ST2804-A	Compressor, Valve Spring 303-1039
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Removal

1. Depending on the valve spring being serviced, remove the LH or RH valve cover. For additional

information, refer to **VALVE COVER - LH** or **VALVE COVER - RH**.

2. Remove the spark plug. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.
3. Rotate the crankshaft until the piston for the valve spring being serviced is at the top of its stroke with the intake valve and the exhaust valves closed.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



Fig. 131: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

4. Using the special tool, compress the valve spring and remove the camshaft roller follower.
5. Use compressed air in the cylinder to hold both valves in position.
 - Apply a minimum of 965 kPa (140 psi) of compressed air into the cylinder.

CAUTION: If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve to fall into the cylinder. If air pressure must be removed, support the valve prior to removal.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



Fig. 132: Compressing Valve Spring With Special Tool
Courtesy of FORD MOTOR CO.

6. Using the special tool, compress the valve spring and remove the valve spring retainer keys.
7. Remove the valve spring retainer and the valve spring.
8. Inspect the valve spring. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.

Installation

1. Using the special tool, install the valve spring, the valve spring retainer and the valve spring retainer keys.



Fig. 133: Compressing Valve Spring With Special Tool
Courtesy of FORD MOTOR CO.

2. Relieve the air pressure from the cylinder.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



Fig. 134: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

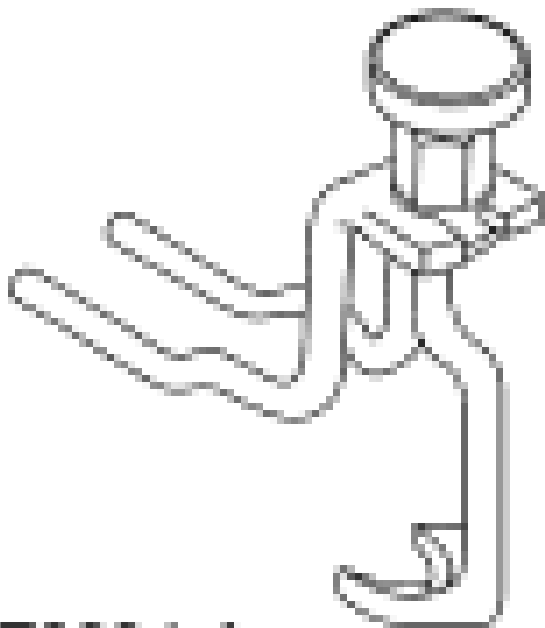
3. Using the special tool, compress the valve spring and install the camshaft roller follower.
4. Install the spark plug. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.
5. Depending on the valve spring being serviced, install the LH or RH valve cover. For additional information, refer to **VALVE COVER - LH** or **VALVE COVER - RH**.

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

VALVE SEALS

SPECIAL TOOL(S)



ST2804-A

Compressor, Valve Spring
303-1039



ST1332-A

Installer, Valve Stem Oil Seal
303-383 (T91P-6571-A)

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or	WSS-

equivalent

M2C930-A

Removal

1. Depending on the valve seal being serviced, remove the LH or RH valve cover. For additional information, refer to **VALVE COVER - LH** or **VALVE COVER - RH**.
2. Remove the spark plug. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.
3. Rotate the crankshaft until the piston for the valve seal being serviced is at the top of its stroke with the intake valve and the exhaust valves closed.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



Fig. 135: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

4. Using the special tool, compress the valve spring and remove the camshaft roller follower.
5. Use compressed air in the cylinder to hold both valves in position.
 - Apply a minimum of 965 kPa (140 psi) of compressed air into the cylinder.

CAUTION: If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve to fall into the cylinder. If air pressure must be removed, support the valve prior to removal.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



Fig. 136: Compressing Valve Spring With Special Tool
Courtesy of FORD MOTOR CO.

6. Using the special tool, compress the valve spring and remove the valve spring retainer keys.
7. Remove the valve spring retainer, the valve spring and the valve seal.
 - Discard the valve seal.
8. Inspect the components. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.

Installation

NOTE: Lubricate the valve seal and valve stem with clean engine oil prior to installation.

1. Position a new valve seal onto the valve stem.
2. Using the special tool, install the new valve seal.

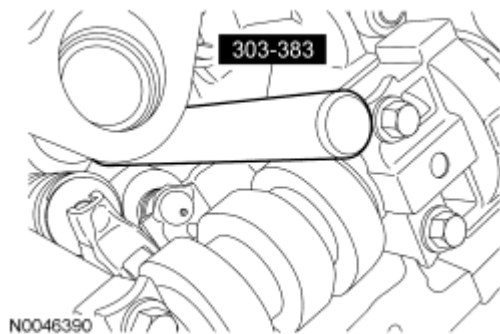


Fig. 137: Installing Valve Seal Using Special Tool
Courtesy of FORD MOTOR CO.

3. Using the special tool, install the valve spring, the valve spring retainer and the valve spring retainer keys.



Fig. 138: Compressing Valve Spring With Special Tool
Courtesy of FORD MOTOR CO.

4. Relieve the air pressure from the cylinder.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



Fig. 139: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

5. Using the special tool, compress the valve spring and install the camshaft roller follower.
6. Install the spark plug. For additional information, refer to **ENGINE IGNITION - 4.6L (3V)**.
7. Depending on the valve seal being serviced, install the LH or RH valve cover. For additional information, refer to **VALVE COVER - LH** or **VALVE COVER - RH**.

HYDRAULIC LASH ADJUSTER

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A

Removal and Installation

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

1. Remove the camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW, CAMSHAFT - LH** and **CAMSHAFT - RH**.
2. Remove the remaining roller followers from the cylinder head being serviced.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

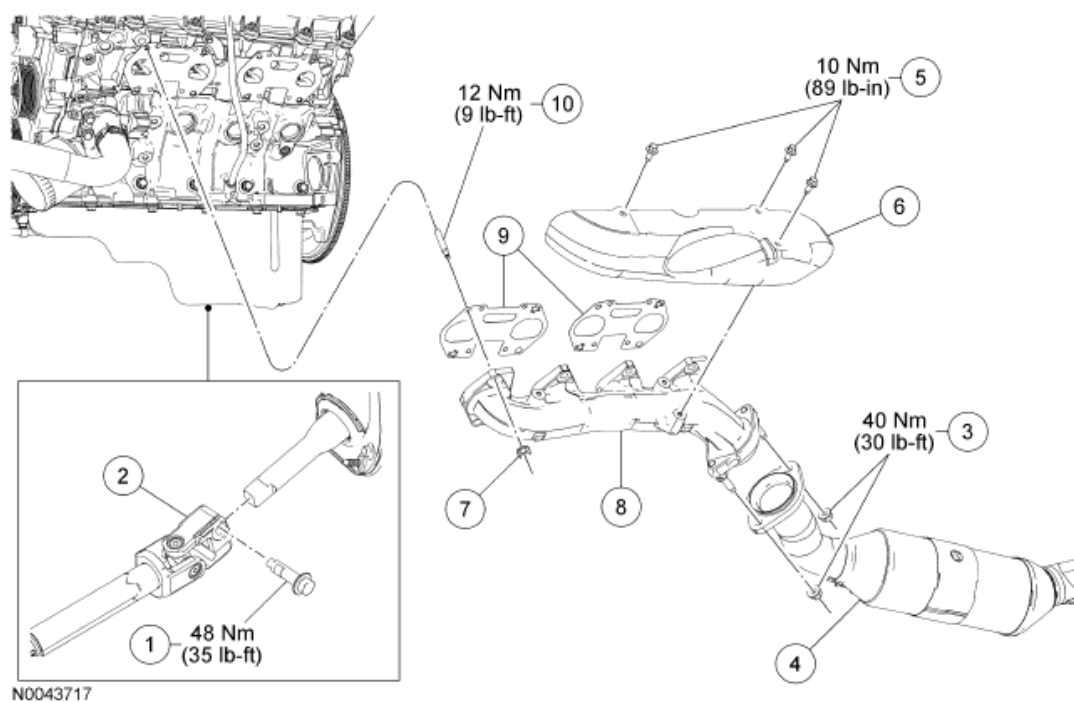
3. Remove the hydraulic lash adjusters that are being serviced.
4. Inspect the hydraulic lash adjusters. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.

NOTE: Lubricate each of the hydraulic lash adjusters with clean engine oil prior to installation.

5. To install, reverse the removal procedure.

EXHAUST MANIFOLD - LH

Removal



Item	Part Number	Description
1	W710570	Intermediate steering shaft pinch bolt
2	3C662	Intermediate steering shaft
3	W705443	Dual converter Y-pipe flange nuts (4 required)
4	5F250	Dual converter Y-pipe
5	W707130	LH exhaust manifold heat shield bolts (3 required)
6	9Y427	LH exhaust manifold heat shield
7	W701706	LH exhaust manifold nuts (8 required)
8	9431	LH exhaust manifold
9	9Y431	LH exhaust manifold gaskets (2 required)
10	W707747	LH exhaust manifold stud (8 required)

Fig. 140: Identifying Exhaust Manifold - LH Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Detach the evaporative emission (EVAP) canister purge valve from the bracket and position the valve aside.

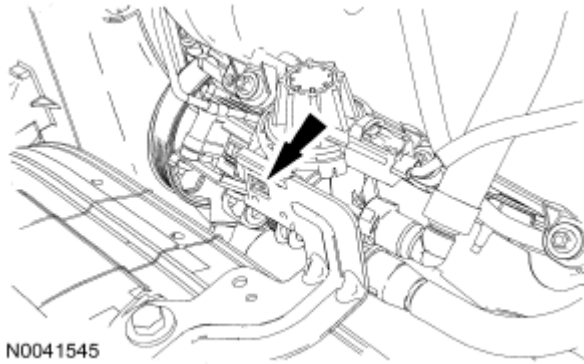


Fig. 141: Locating EVAP Canister Purge Valve To Bracket
Courtesy of FORD MOTOR CO.

CAUTION: Do not allow the lower steering column shaft to rotate while it is disconnected from the gear or the clockspring can be damaged. If there is evidence that the lower steering column shaft has rotated, the clockspring must be removed and recentered. For additional information, refer to SUPPLEMENTAL RESTRAINT SYSTEM .

3. Remove the intermediate steering shaft pinch bolt and disconnect the intermediate steering shaft from the lower steering column shaft.
4. Remove the 4 nuts and disconnect the dual converter Y-pipe from the exhaust manifolds.
5. Remove the nuts and position the wiring harness bracket aside.

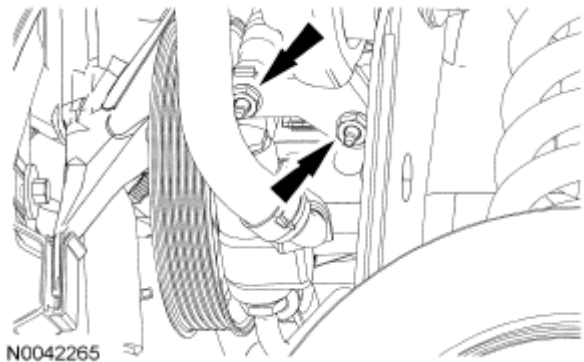


Fig. 142: Locating Wiring Harness Bracket Nuts
Courtesy of FORD MOTOR CO.

6. Remove the bolts and the LH exhaust manifold heat shield.
7. Remove and discard the pushpin.

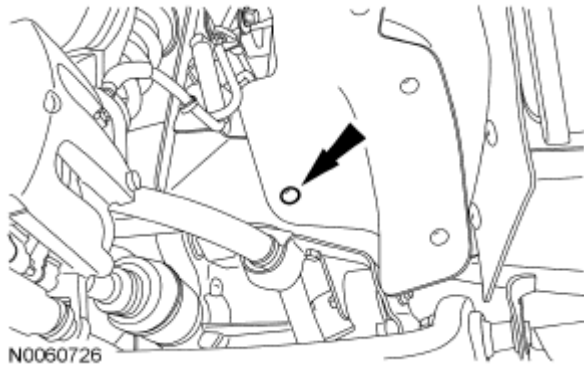


Fig. 143: Locating Pushpin
Courtesy of FORD MOTOR CO.

8. Remove the 8 nuts, the LH exhaust manifold and the gaskets.
 - Deflect the inner fender splash shield and remove the manifold between the splash shield and the frame rail.
 - Discard the nuts and the gaskets.

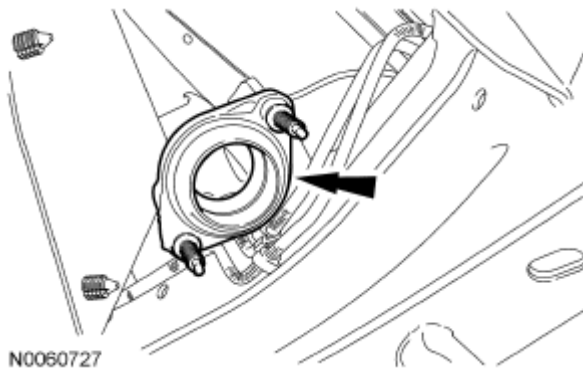


Fig. 144: Locating Exhaust Manifold And Gaskets
Courtesy of FORD MOTOR CO.

9. Remove and discard the 8 LH exhaust manifold studs.

Installation

1. Inspect the LH exhaust manifold gasket mating surfaces for flatness. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
2. Install 8 new LH exhaust manifold studs.
 - Tighten to 12 N.m (9 lb-ft).
3. Position the new gaskets, the LH exhaust manifold and install new nuts finger-tight.
 - Deflect the inner fender splash shield and install the exhaust manifold between the splash shield and the frame rail.

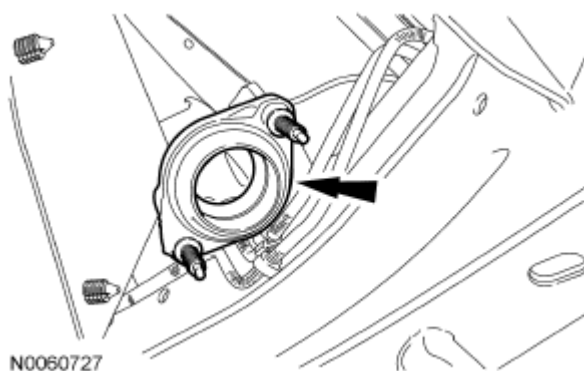


Fig. 145: Locating Exhaust Manifold And Gaskets
Courtesy of FORD MOTOR CO.

4. Tighten the exhaust manifold nuts in the sequence shown.
 - Tighten to 25 N.m (18 lb-ft).

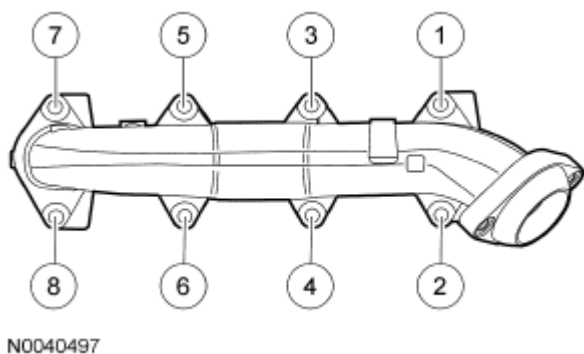


Fig. 146: Identifying Tightening Sequence Of Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

5. Position the inner fender splash shield and install a new pushpin.

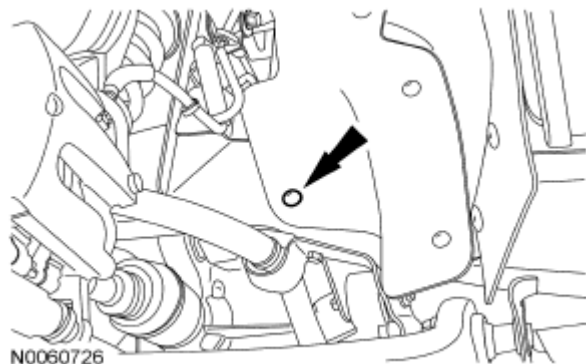


Fig. 147: Locating Pushpin
Courtesy of FORD MOTOR CO.

6. Install the heat shield and the bolts.
 - Tighten to 10 N.m (89 lb-in).
7. Position the wiring harness bracket and install the nuts.
 - Tighten to 10 N.m (89 lb-in).

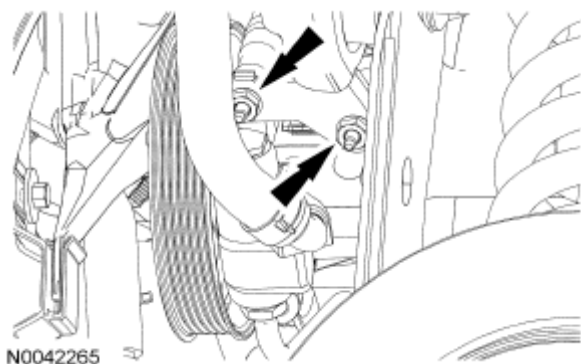


Fig. 148: Locating Wiring Harness Bracket Nuts
Courtesy of FORD MOTOR CO.

8. Connect the dual converter Y-pipe to the exhaust manifolds and install the 4 nuts.
 - Tighten to 40 N.m (30 lb-ft).
9. Connect the intermediate steering shaft to the lower steering column shaft and install the pinch bolt.
 - Tighten to 48 N.m (35 lb-ft).
10. Attach the EVAP canister purge valve to the bracket.

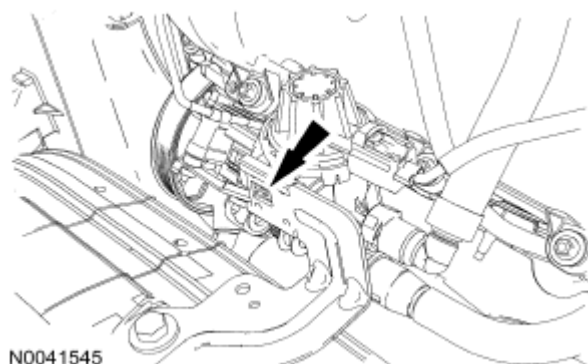


Fig. 149: Locating EVAP Canister Purge Valve To Bracket
Courtesy of FORD MOTOR CO.

EXHAUST MANIFOLD - RH

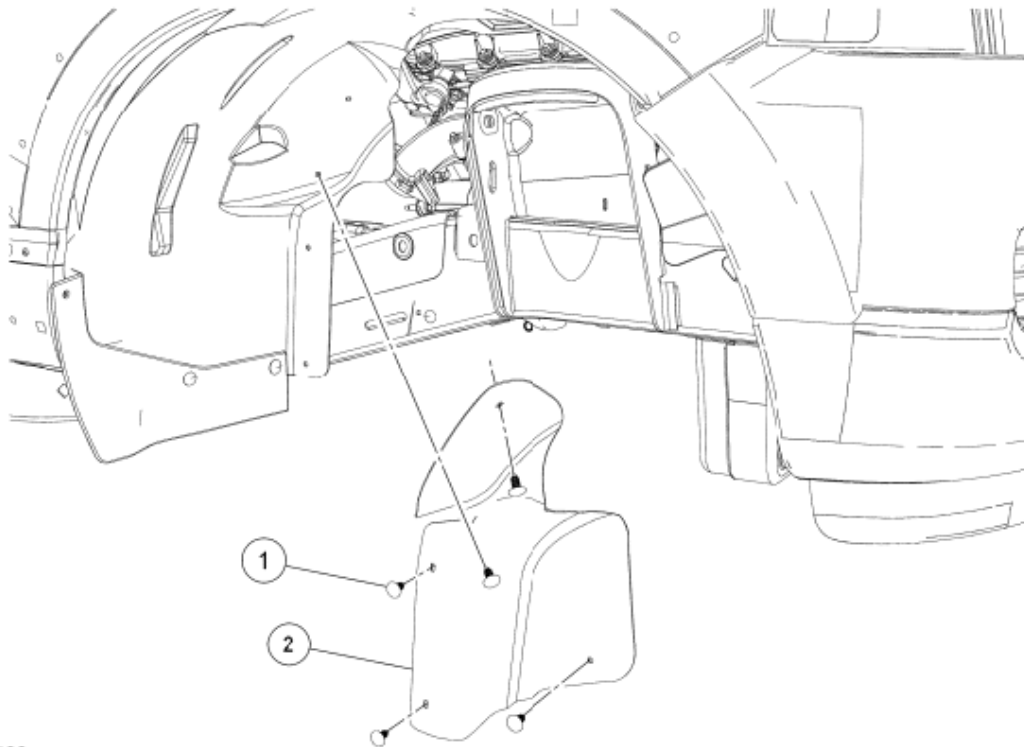
Removal

All Vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.

Vehicles With Auxiliary Climate Control

2. Drain the cooling system. For additional information, refer to **ENGINE COOLING**.
3. Detach the heater core hose assembly retainer from the RH valve cover.
4. Remove the RH front fender splash shield.



N0074139

Fig. 150: Identifying Splash Shield Pushpin And Splash Shield (RH)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	388577	RH splash shield pushpin (5 required)
2	16034	RH splash shield

5. Disconnect the 2 heater hoses and position aside.
6. Remove the auxiliary line bracket nut.
7. Remove the auxiliary line bracket.

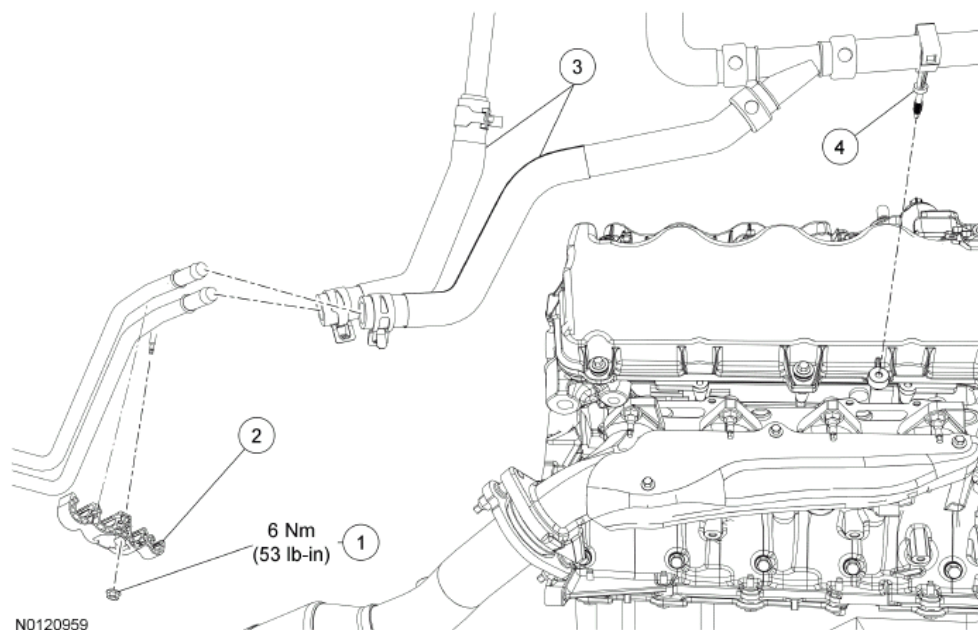


Fig. 151: Identifying Auxiliary Line Bracket Nut, Bracket, Heater Core Hose & Retainer - Vehicles With Auxiliary Climate Control (With Torque Specifications)
 Courtesy of FORD MOTOR CO.

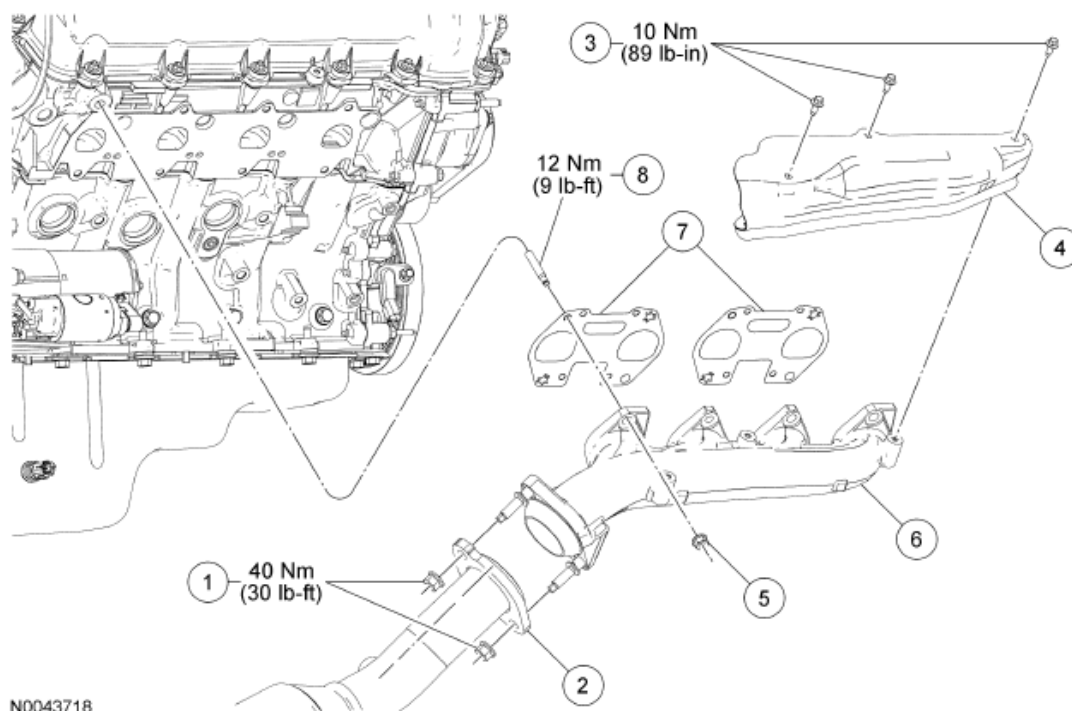
Item	Part Number	Description
1	W520512	Auxiliary line bracket nut
2	18N332	Auxiliary line bracket
3	18K470	Heater core hose assembly
4	-	Heater core hose assembly retainer

All Vehicles

- Remove the 4 nuts and disconnect the dual converter Y-pipe from the exhaust manifolds.

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



Item	Part Number	Description
1	W705443	Dual converter Y-pipe flange nuts (4 required)
2	5F250	Dual converter Y-pipe
3	W707130	RH exhaust manifold heat shield bolts (3 required)
4	9A462	RH exhaust manifold heat shield
5	W701706	RH exhaust manifold nuts (8 required)
6	9430	RH exhaust manifold
7	9Y431	RH exhaust manifold gaskets (2 required)
8	W707747	RH exhaust manifold stud (8 required)

Fig. 152: Identifying Exhaust Manifold - RH Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

9. Remove the 3 bolts and the RH exhaust manifold heat shield.
10. Remove the 5 pushpins and the splash shield.

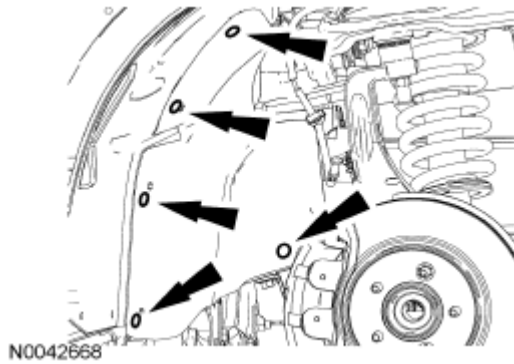


Fig. 153: Locating Pushpins
Courtesy of FORD MOTOR CO.

11. Remove the 8 nuts, the RH exhaust manifold and the 2 gaskets.
 - Discard the nuts and the gaskets.
12. Remove and discard the 8 RH exhaust manifold studs.

Installation

All Vehicles

1. Inspect the exhaust manifold gasket mating surfaces for flatness. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
2. Install 8 new RH exhaust manifold studs.
 - Tighten to 12 N.m (9 lb-ft).
3. Position the 2 new gaskets, the RH exhaust manifold and install new nuts finger-tight.
4. Tighten the nuts in the sequence shown in illustration.
 - Tighten to 25 N.m (18 lb-ft).

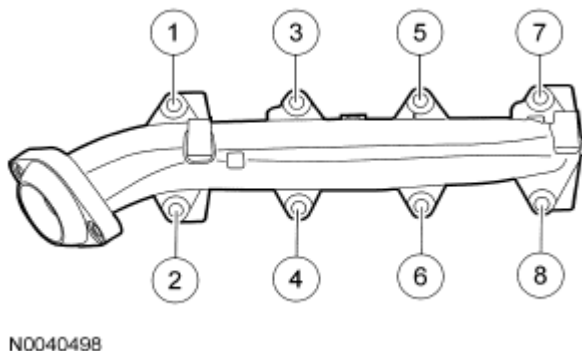


Fig. 154: Identifying Tightening Sequence Of Exhaust Manifold-To-Catalytic Converter Nuts
Courtesy of FORD MOTOR CO.

5. Position the splash shield and install the 5 pushpins.

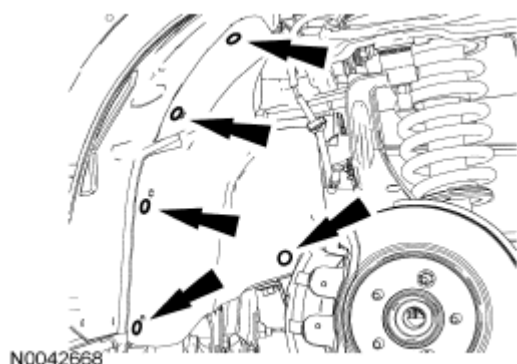


Fig. 155: Locating Pushpins

Courtesy of FORD MOTOR CO.

6. Position the heat shield and install the 3 bolts.
 - Tighten to 10 N.m (89 lb-in).
7. Connect the dual converter Y-pipe to the exhaust manifolds and install the 4 nuts.
 - Tighten to 40 N.m (30 lb-ft).

Vehicles With Auxiliary Climate Control

8. Install the auxiliary line bracket.
9. Install the auxiliary line bracket nut.
 - Tighten to 6 N.m (53 lb-in).
10. Position and connect the 2 heater hoses.
11. Install the RH front fender splash shield.
12. Attach the heater core hose assembly retainer to the RH valve cover.
13. Fill the cooling system. For additional information, refer to **ENGINE COOLING** .

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



Item	Part Number	Description
6	N605904	Oil pump screen and pickup tube support bracket bolt
7	6622	Oil pump screen and pickup tube
8	6625	Oil pump screen and pickup tube O-ring seal
9	N806183	Oil pump bolts (3 required)
10	6621	Oil pump

1. For additional information, refer to the appropriate procedure.

MATERIAL

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Remove the front axle, if equipped. For additional information, refer to **FRONT DRIVE AXLE/DIFFERENTIAL - DANA 30** .
3. Remove the stabilizer bar. For additional information, refer to **FRONT SUSPENSION - REAR WHEEL DRIVE (RWD)** .
4. Remove the drain plug and drain the engine oil. Install the drain plug when finished.
 - Tighten to 23 N.m (17 lb-ft).
5. Remove the nut and position the power steering pressure (PSP) hose bracket aside.

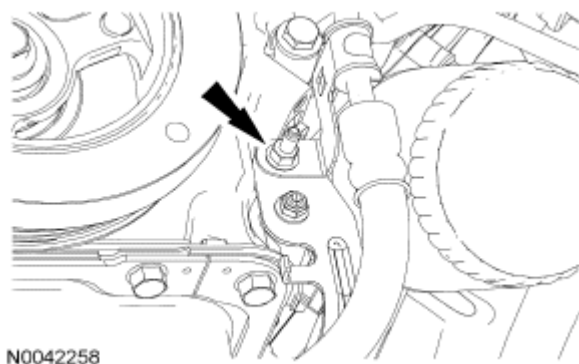


Fig. 157: Locating Power Steering Pressure (PSP) Hose Bracket Nut
Courtesy of FORD MOTOR CO.

6. Remove the nut and position the battery cable bracket aside.

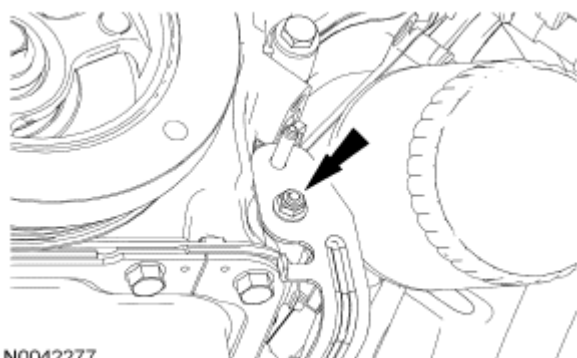


Fig. 158: Locating Battery Cable Bracket Nut
Courtesy of FORD MOTOR CO.

7. Disconnect the oil temperature sensor electrical connector.
8. Detach the wiring harness retainers from the RH side oil pan bolts.

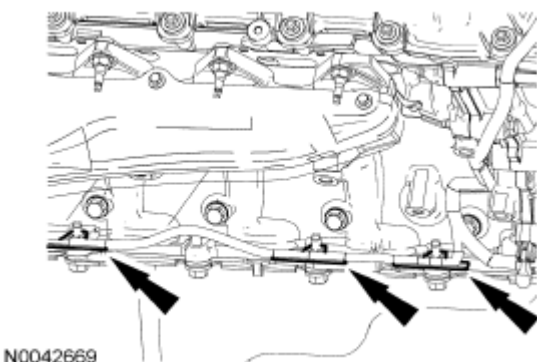


Fig. 159: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

9. Remove the bolts and the oil drain splash shield.

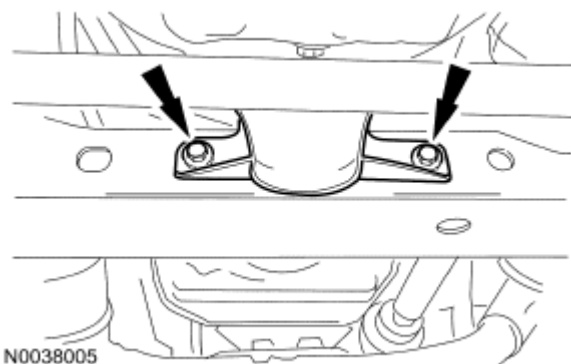


Fig. 160: Locating Oil Drain Splash Shield Bolts
Courtesy of FORD MOTOR CO.

10. If equipped with a block heater, detach the block heater wiring harness retainer from the LH side oil pan bolt.

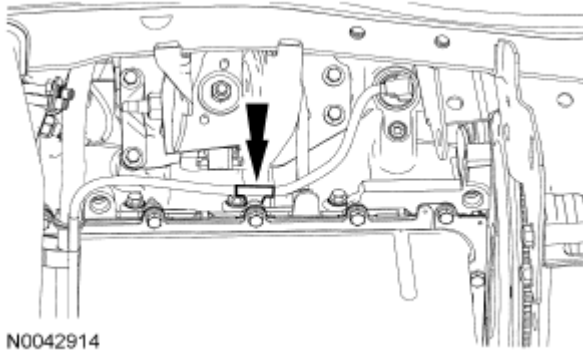


Fig. 161: Locating Block Heater Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

11. Remove the bolts, the oil pan and the gasket.
 - Discard the gasket.

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These may cause scratches and gouges resulting in leak paths. Use a plastic scraper to clean the sealing surfaces. Failure to follow these directions can cause future oil leaks.

1. Clean and inspect the sealing surfaces with silicone gasket remover, metal surface prep, and a plastic scraper. Follow the directions on the packaging.

NOTE: If the oil pan and gasket are not secured within 4 minutes of sealer application, the sealant must be removed and the sealing surfaces cleaned with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

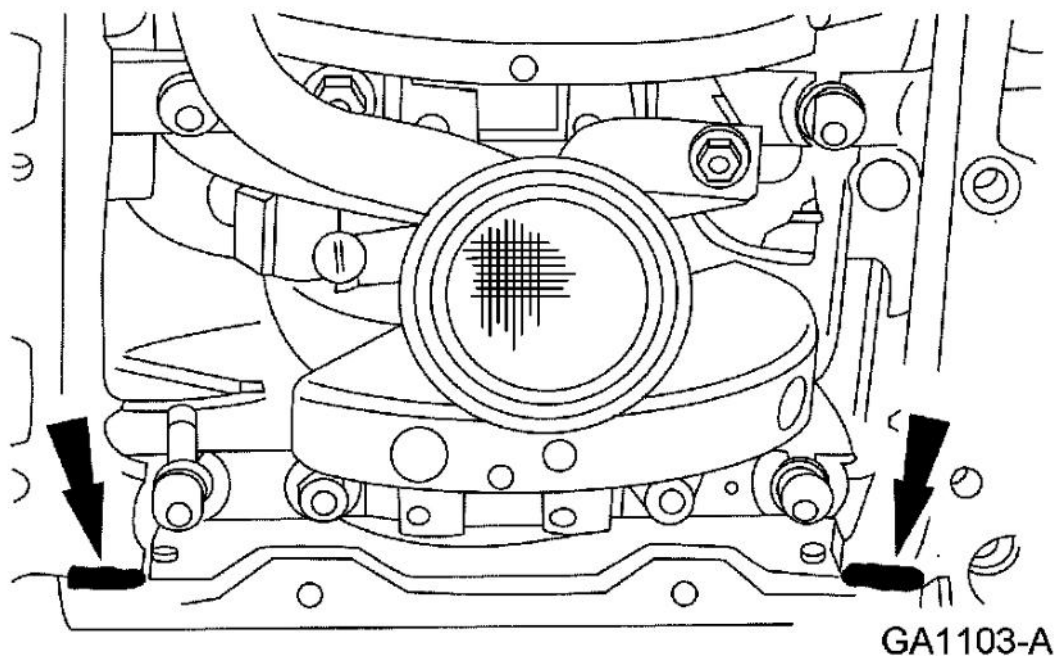
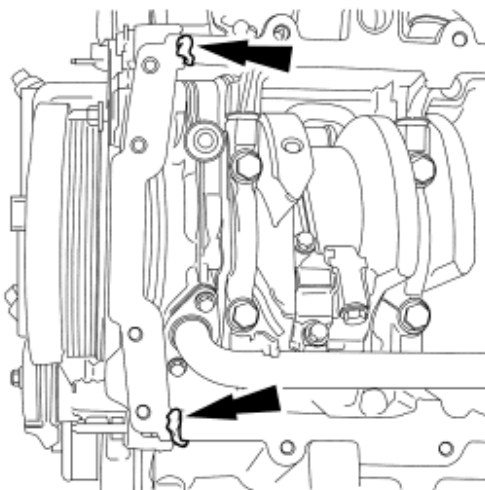


Fig. 162: Area For Applying Bead Of Silicone Gasket And Sealant
Courtesy of FORD MOTOR CO.

2. Apply silicone gasket and sealant in 2 places as shown.

NOTE: If the oil pan and gasket are not secured within 4 minutes of sealer application, the sealant must be removed and the sealing surfaces cleaned with silicone gasket remover and metal surface prep. Follow the directions on the packaging.



A0045427

Fig. 163: Applying Silicone Gasket And Sealant At Engine Front Cover-To-Cylinder Block Sealing Surface
 Courtesy of FORD MOTOR CO.

3. Apply silicone gasket and sealant in 2 places as shown.
4. Position a new oil pan gasket and the oil pan and install the bolts finger-tight.
5. Tighten the bolt in 3 stages in the sequence shown.
 - Stage 1: Tighten to 2 N.m (18 lb-in).
 - Stage 2: Tighten to 20 N.m (15 lb-ft).
 - Stage 3: Tighten an additional 60 degrees.

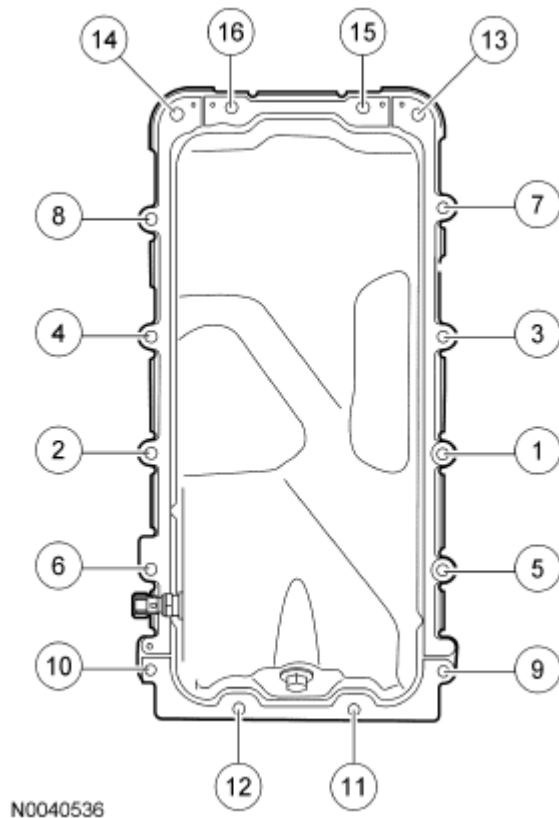


Fig. 164: Identifying Tightening Sequence Of Bolts
 Courtesy of FORD MOTOR CO.

6. If equipped with a block heater, attach the block heater wiring harness retainer to the LH oil pan bolt.

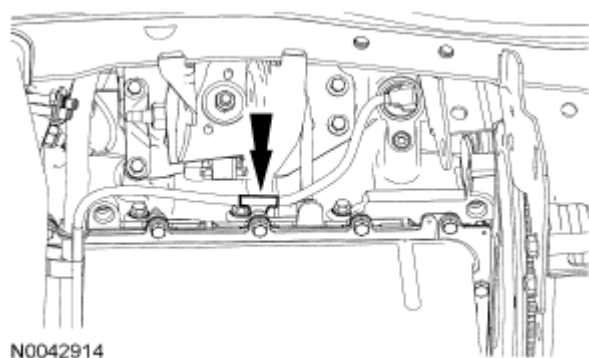


Fig. 165: Locating Block Heater Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

7. Position the oil drain splash shield and install the bolts.
 - Tighten to 12 N.m (9 lb-ft).

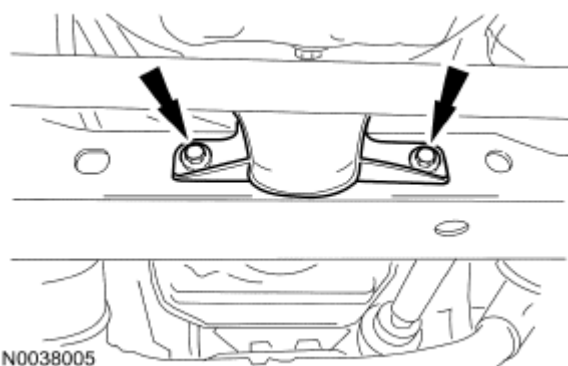


Fig. 166: Locating Oil Drain Splash Shield Bolts
Courtesy of FORD MOTOR CO.

8. Attach the wiring harness retainers to the RH oil pan bolts.

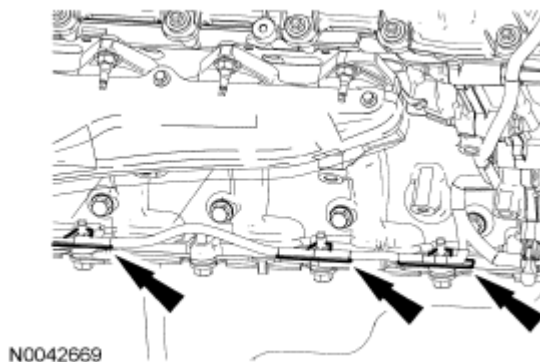


Fig. 167: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

9. Connect the oil temperature sensor electrical connector.
10. Attach the battery cable bracket and install the nut.
 - Tighten to 10 N.m (89 lb-in).

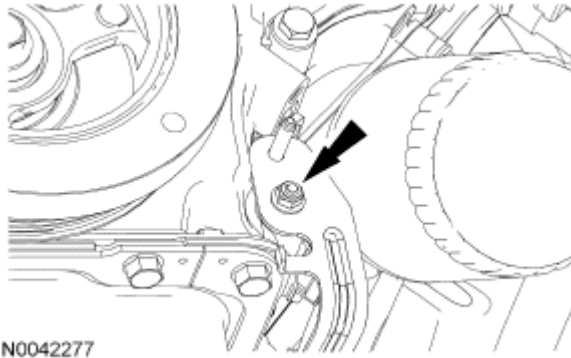


Fig. 168: Locating Battery Cable Bracket Nut
Courtesy of FORD MOTOR CO.

11. Attach the PSP hose bracket and install the nut.
 - Tighten to 10 N.m (89 lb-in).

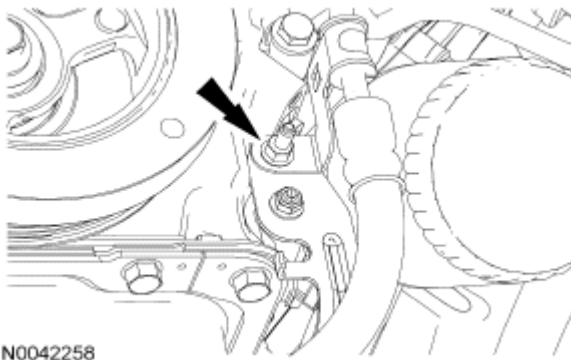


Fig. 169: Locating PSP Hose Bracket Nut
Courtesy of FORD MOTOR CO.

12. Install the stabilizer bar. For additional information, refer to **FRONT SUSPENSION - REAR WHEEL DRIVE (RWD)**.
13. Install the front axle, if equipped. For additional information, refer to **FRONT DRIVE AXLE/DIFFERENTIAL - DANA 30**.
14. Fill the engine with clean engine oil.

OIL PUMP SCREEN AND PICKUP TUBE

MATERIAL

Item	Specification

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US);
Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or
equivalent

WSS-
M2C930-A

Removal

1. Remove the oil pan. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PAN**.
2. Remove the bolts and the oil pump screen and pickup tube.

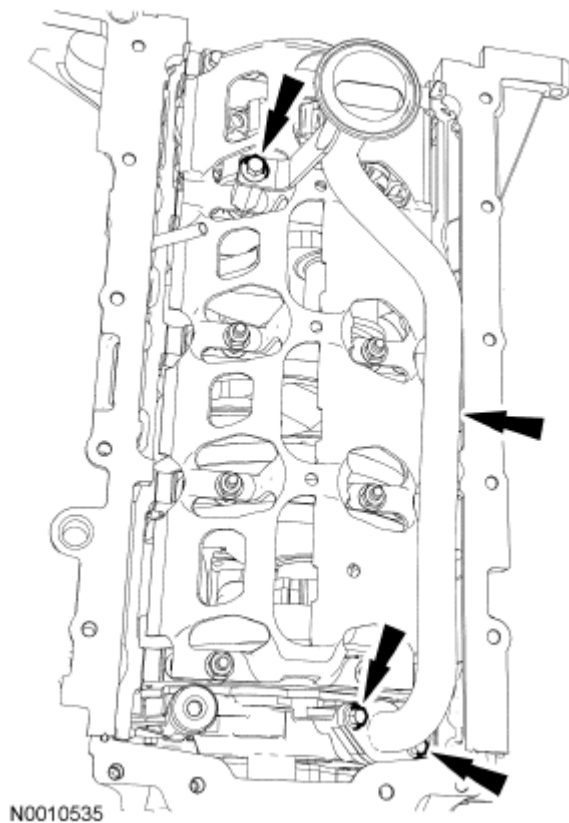


Fig. 170: Locating Oil Pump Screen And Pickup Tube And Bolt
Courtesy of FORD MOTOR CO.

Installation

CAUTION: Make sure the O-ring is in place and not damaged. A missing or damaged O-ring can cause foam in the lubrication system, low oil pressure and severe engine damage.

NOTE: Clean and inspect the mating surfaces and install a new O-ring. Lubricate the O-ring with clean engine oil prior to installation.

1. Position the oil pump screen and pickup tube and install the bolts.

- Tighten the oil pump screen and pickup tube-to-oil pump bolts to 10 N.m (89 lb-in).
- Tighten the oil pump screen and pickup tube-to-spacer bolt to 25 N.m (18 lb-ft).

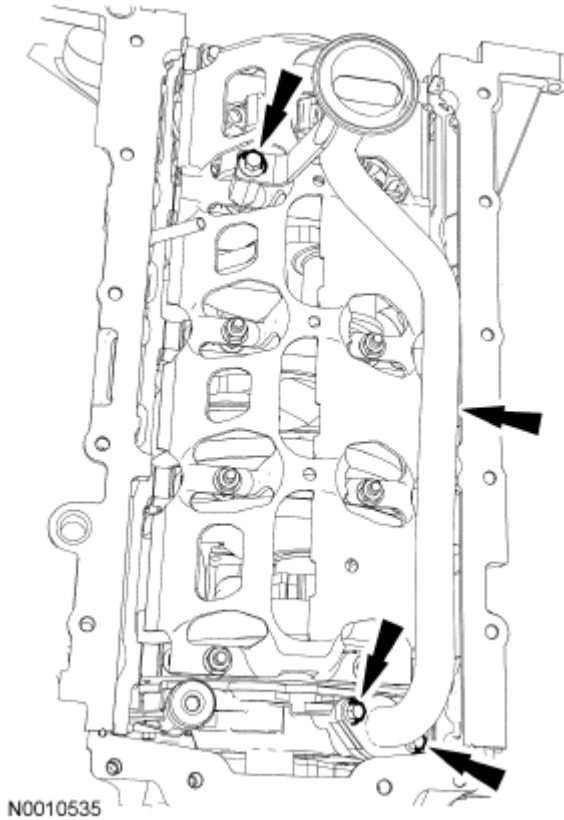


Fig. 171: Locating Oil Pump Screen And Pickup Tube And Bolt
Courtesy of FORD MOTOR CO.

2. Install the oil pan. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PAN**.

OIL PUMP

MATERIAL

Item	Specification
Motorcraft Metal Surface Prep ZC-31	-
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

Removal

1. Remove the oil pan. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PAN**.

2. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.
3. Remove the bolts and the oil pump screen and pickup tube.

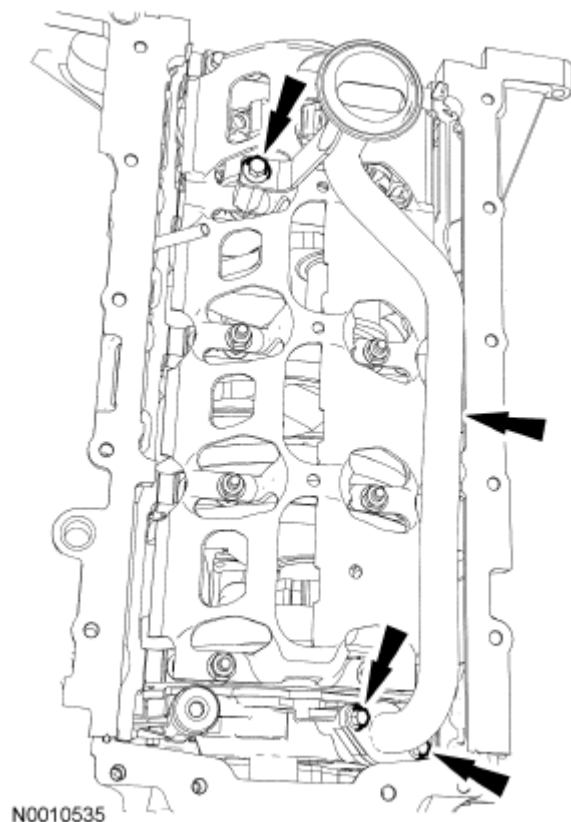


Fig. 172: Locating Oil Pump Screen And Pickup Tube And Spacer Bolt
Courtesy of FORD MOTOR CO.

4. Remove the 3 bolts and the oil pump.



Fig. 173: Locating Oil Pump Bolts
Courtesy of FORD MOTOR CO.

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

1. Clean the sealing surfaces with metal surface prep. Follow the directions on the packaging. Inspect the mating surfaces.
2. Position the oil pump and install the bolts.
 - Tighten to 10 N.m (89 lb-in).

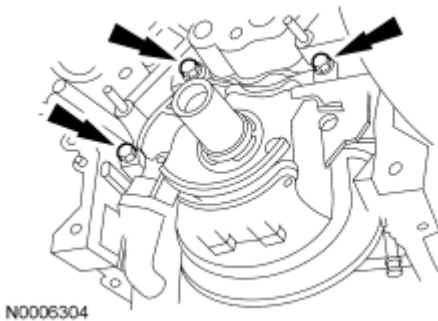


Fig. 174: Locating Oil Pump Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Make sure the O-ring is in place and not damaged. A missing or damaged O-ring can cause foam in the lubrication system, low oil pressure and severe engine damage.

NOTE: Clean and inspect the mating surfaces and install a new O-ring. Lubricate the O-ring with clean engine oil prior to installation.

3. Position the oil pump screen and pickup tube and install the bolts.
 - Tighten the oil pump screen and pickup tube-to-oil pump bolts to 10 N.m (89 lb-in).
 - Tighten the oil pump screen and pickup tube-to-spacer bolt to 25 N.m (18 lb-ft).

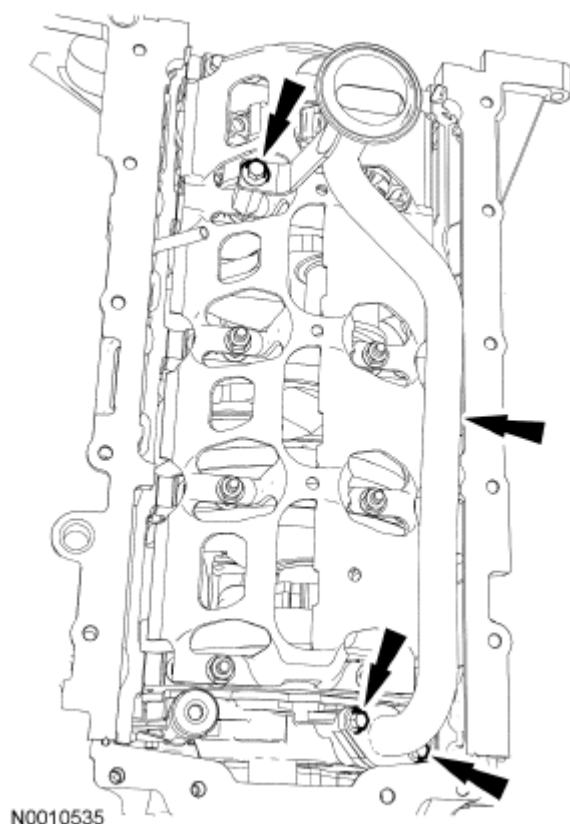


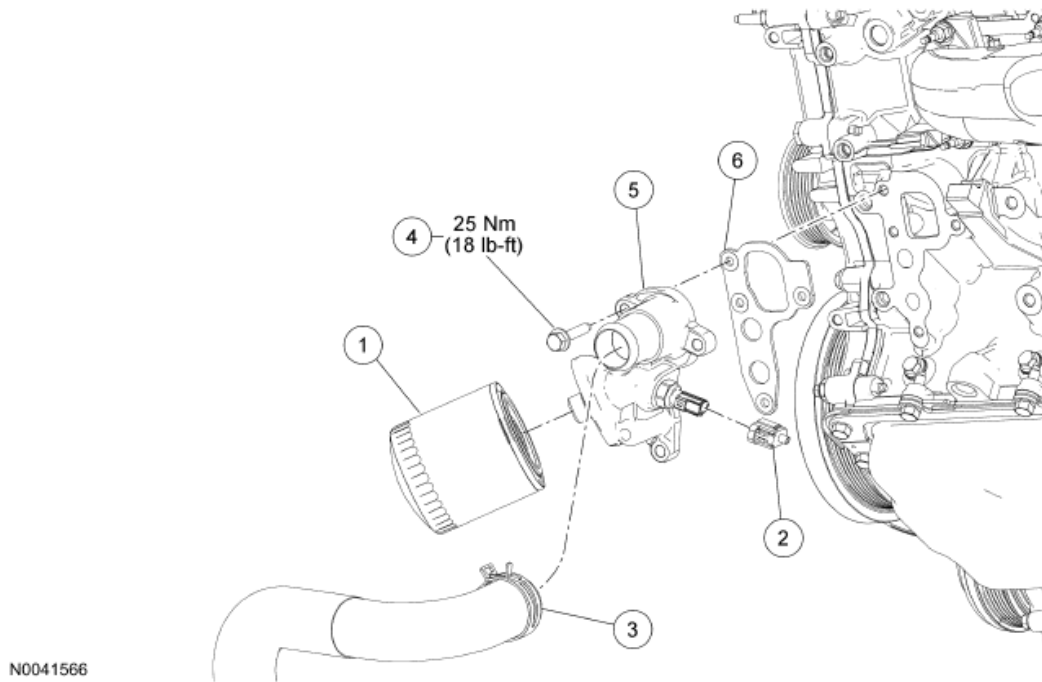
Fig. 175: Locating Oil Pump Screen And Pickup Tube And Spacer Bolt
Courtesy of FORD MOTOR CO.

4. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.
5. Install the oil pan. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PAN**.

OIL FILTER ADAPTER

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-



Item	Part Number	Description
1	6714	Oil filter
2	14A464	Engine oil pressure switch electrical connector (part of 12B637)

Item	Part Number	Description
3	8B273	Lower radiator hose
4	W705128	Oil filter adapter bolts (4 required)
5	6881	Oil filter adapter
6	6A636	Oil filter adapter gasket

Fig. 176: Identifying Oil Filter Adapter Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING**.
3. Drain the engine oil.
 - Install the drain plug and tighten to 23 N.m (17 lb-ft).
4. Disconnect the engine oil pressure switch electrical connector.
5. Disconnect the lower radiator hose and position it aside.
6. Remove and discard the engine oil filter.
 - To install, lubricate the oil filter gasket with clean engine oil and tighten until the seal makes contact.
 - Using an oil filter strap wrench, tighten the filter an additional 270 degrees.
7. Remove the 4 bolts and the oil filter adapter.
 - To install, tighten to 25 N.m (18 lb-ft).

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

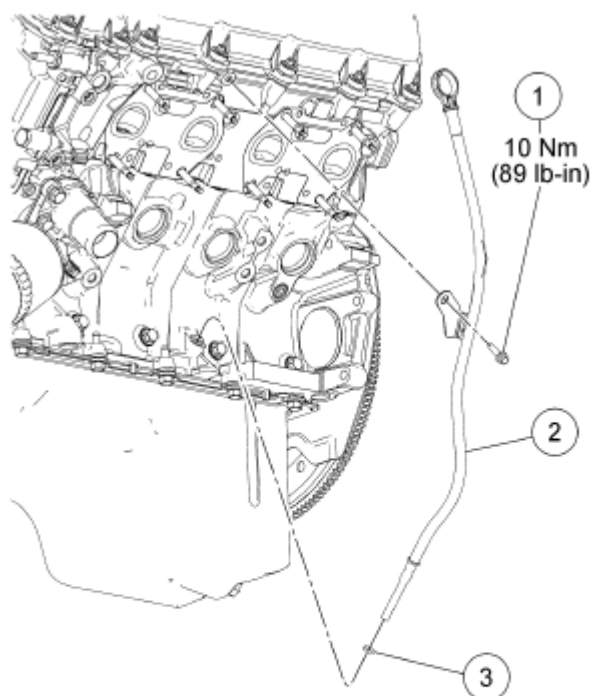
CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These may cause scratches and gouges resulting in leak paths. Use a plastic scraper to clean the sealing surfaces.

8. Remove and discard the oil filter adapter gasket.
 - Clean the sealing surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
 - Inspect the mating surfaces.
9. To install, reverse the removal procedure.
 - Fill the engine with clean engine oil.
10. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING** .

OIL LEVEL INDICATOR AND TUBE

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A



Item	Part Number	Description
1	N806155	Oil level indicator and tube bolt
2	6754	Oil level indicator and tube
3	—	O-ring seal (part of 6754)

Fig. 177: Identifying Oil Level Indicator And Tube Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Removal and Installation

1. Remove the LH exhaust manifold. For additional information, refer to **EXHAUST MANIFOLD - LH**.
2. Remove the oil level indicator and tube bolt.
 - To install, tighten to 10 N.m (89 lb-in).
3. Remove the oil level indicator and tube from the cylinder block.
4. Remove and discard the O-ring seal.

NOTE: Install a new oil level indicator tube O-ring seal and lubricate it with clean engine oil prior to installation.

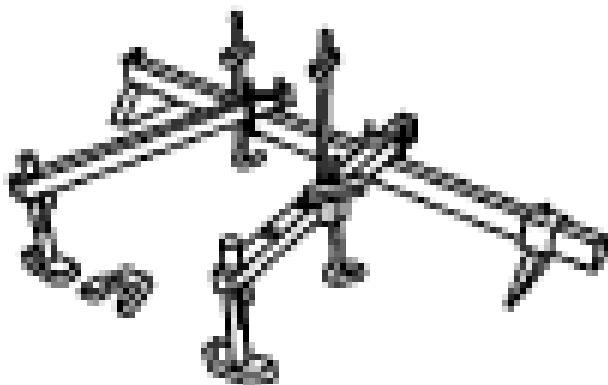
5. To install, reverse the removal procedure.

ENGINE SUPPORT INSULATORS

SPECIAL TOOL(S)

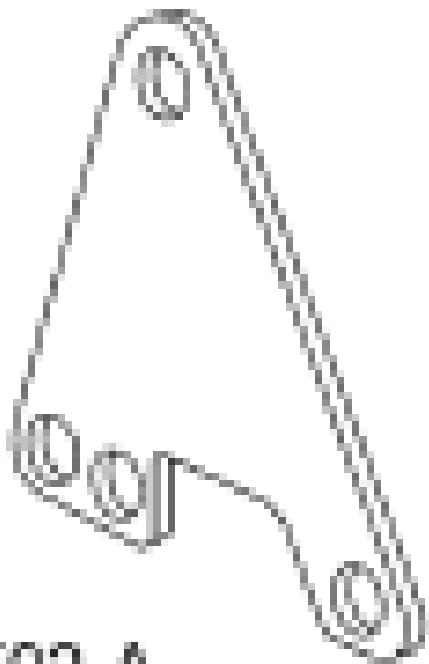
2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



3-Bar Engine Support
303-F070

ST2176-A

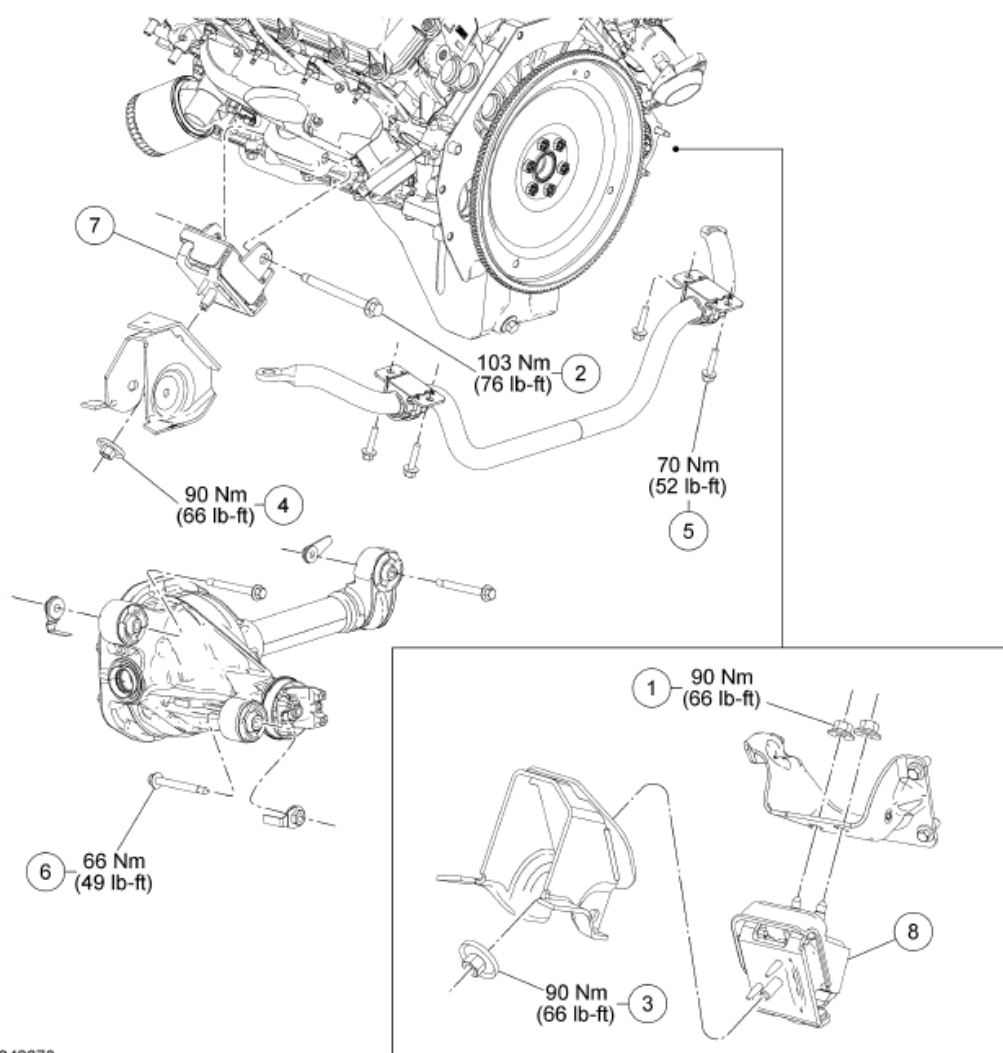


Engine Support Bracket
303-639

ST2592-A

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



N0042670

Item	Part Number	Description
1	N807479	RH engine support insulator nut (2 required)
2	W708103	LH engine support insulator through bolt
3	N802330	RH engine support insulator nut
4	N802330	LH engine support insulator nut

Item	Part Number	Description
5	W707472	Stabilizer bar bracket bolt (4 required)
6	W506549	Front axle bolt (3 required) (if equipped)
7	6B032	LH engine support insulator
8	6038	RH engine support insulator

Fig. 178: Identifying Engine Support Insulators Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Removal and Installation

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.

2. Remove the engine cooling fan. For additional information, refer to **ENGINE COOLING** .
3. Remove the throttle body (TB). For additional information, refer to **FUEL CHARGING & CONTROLS - 4.6L (3V)** .
4. Remove the alternator. For additional information, refer to **GENERATOR AND REGULATOR** .
5. Disconnect the positive crankcase ventilation (PCV) valve hose.

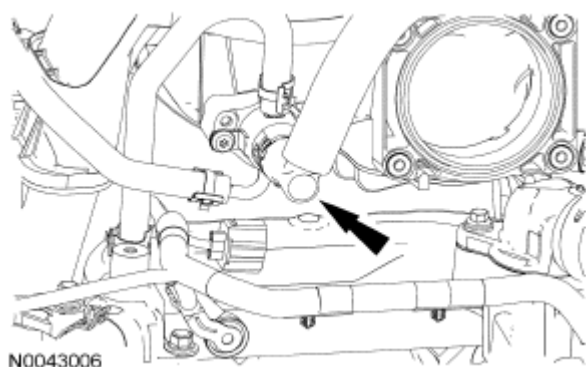


Fig. 179: Locating Positive Crankcase Ventilation (PCV) Valve Hose
Courtesy of FORD MOTOR CO.

6. Remove the bolts and position the heated PCV fitting aside.

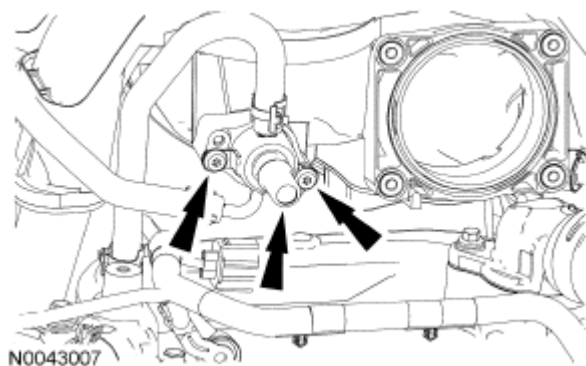


Fig. 180: Locating Heated PCV Fitting Bolts
Courtesy of FORD MOTOR CO.

7. Disconnect the evaporative emission (EVAP) hose.

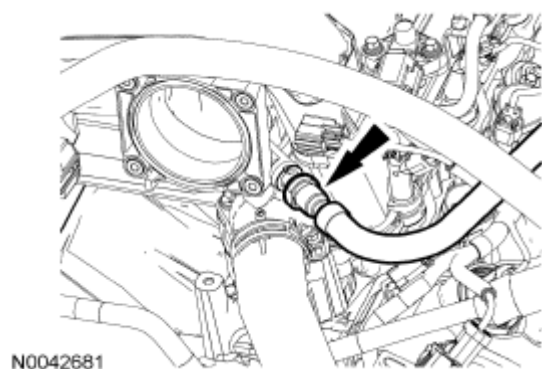


Fig. 181: Locating Evaporative Emission (EVAP) Hose
Courtesy of FORD MOTOR CO.

8. Remove the 5 pushpins and the splash shield.

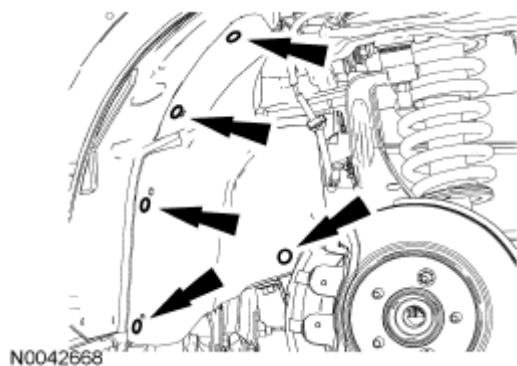


Fig. 182: Locating Pushpins And Splash Shield
Courtesy of FORD MOTOR CO.

9. Remove the RH engine support insulator upper nuts.
 - To install, tighten to 90 N.m (66 lb-ft).
10. Remove the LH engine support insulator through bolt.
 - To install, tighten to 103 N.m (76 lb-ft).
11. Install the special tools and raise the engine approximately 70 mm (2.75 in).

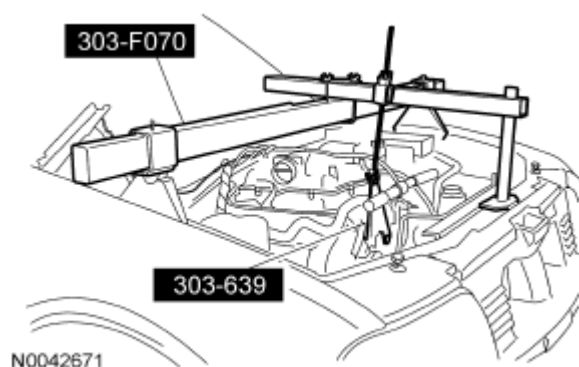


Fig. 183: Identifying Special Tools
Courtesy of FORD MOTOR CO.

RH side

12. Remove the RH engine support insulator lower nut.
 - To install, tighten to 90 N.m (66 lb-ft).
13. Remove the RH engine support insulator.

Four wheel drive (4WD) vehicles

14. Remove the bolts and allow the stabilizer bar to hang freely.
 - To install, tighten to 70 N.m (52 lb-ft).

WARNING: Secure the axle to the jack with a safety strap. Failure to follow these instructions may result in personal injury.

15. Support the axle housing with a suitable jack stand.
16. Disconnect the vent hose from the differential housing vent tube.

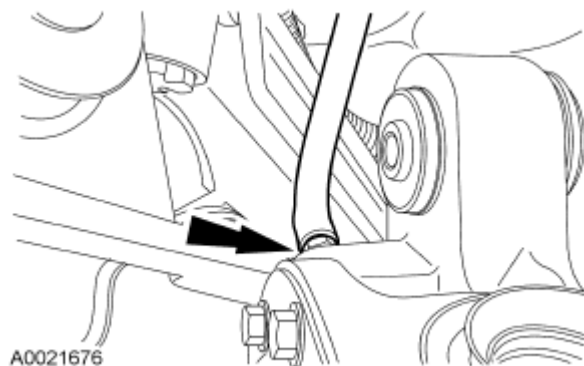


Fig. 184: Locating Vent Hose From Differential Housing Vent Tube
Courtesy of FORD MOTOR CO.

CAUTION: Any time bolts, washers, spacers or nuts are loosened in the differential support for any reason, install new components to prevent damage.

17. Remove and discard the 3 bolts and 3 flag nuts.
 - To install, tighten to 66 N.m (49 lb-ft).
18. Lower the differential housing approximately 25 mm (1 in).

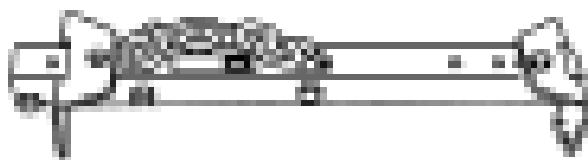
LH side

19. Remove the LH engine support insulator nut.
 - To install, tighten to 90 N.m (66 lb-ft).
20. Remove the engine support insulator.
21. To install, reverse the removal procedure.
 - If equipped, install new differential housing bolts and flag nuts.

REMOVAL

ENGINE

SPECIAL TOOL(S)



ST1377-A

Modular Engine Lift Bracket
303-F047 (014-00073) or equivalent

WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

WARNING: Fuel in the fuel system remains under high pressure even when the engine is not running. Before repairing or disconnecting any of the fuel system components, the fuel system pressure must be relieved to prevent

accidental spraying of fuel, causing a fire hazard. Failure to follow these instructions may result in personal injury.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Disconnect the windshield washer hose.

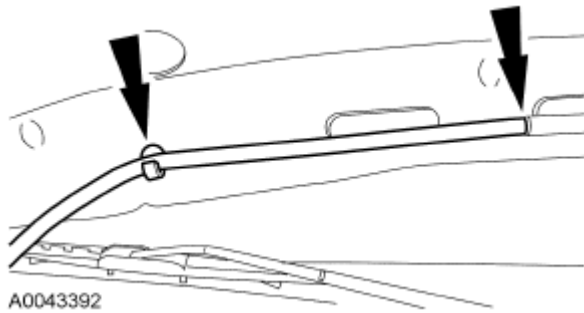


Fig. 185: Locating Windshield Washer Hose And Retainer
Courtesy of FORD MOTOR CO.

NOTE: Index-mark the hood hinge location to aid in hood installation.

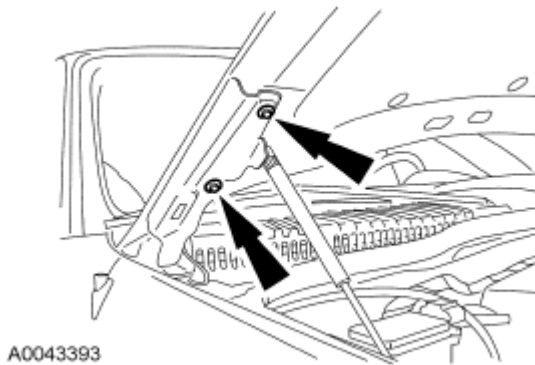


Fig. 186: Locating Hood Hinge Bolts
Courtesy of FORD MOTOR CO.

3. Remove the 4 bolts and the hood.
4. Remove the intake manifold. For additional information, refer to **INTAKE MANIFOLD**.
5. Open the cover, remove the nuts and disconnect the wiring harness terminals.

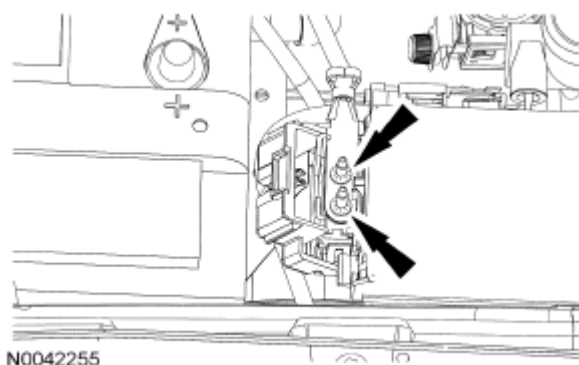


Fig. 187: Locating Wiring Harness Terminals Nuts
Courtesy of FORD MOTOR CO.

6. Remove the cooling fan. For additional information, refer to **ENGINE COOLING** .
7. Drain the cooling system. For additional information, refer to **ENGINE COOLING** .
8. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.

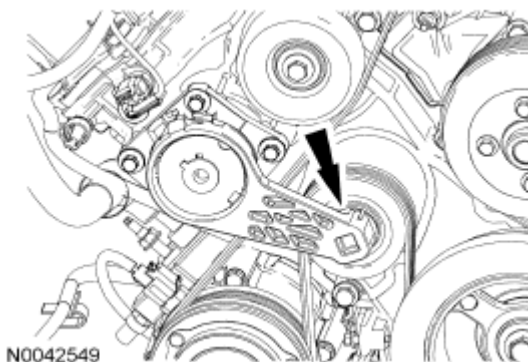


Fig. 188: Locating Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

9. Disconnect the electrical connector.

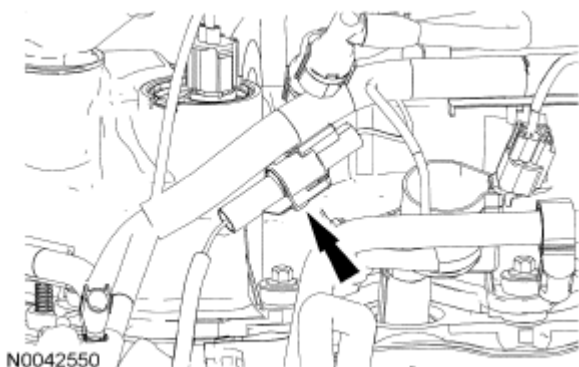


Fig. 189: Locating Electrical Connector
Courtesy of FORD MOTOR CO.

10. Disconnect the heated PCV fitting coolant hose.

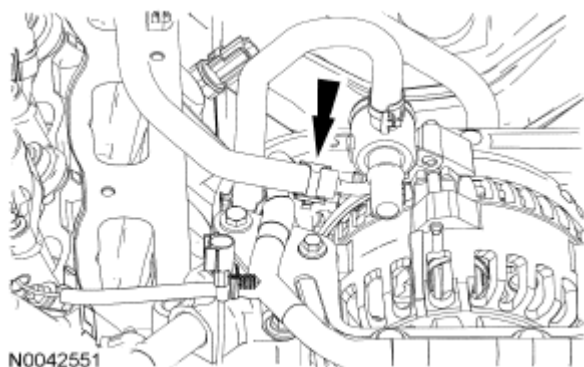


Fig. 190: Locating Heated PCV Fitting Coolant Hose
Courtesy of FORD MOTOR CO.

11. Detach the wiring harness retainer from the cooling fan wiring harness bracket.

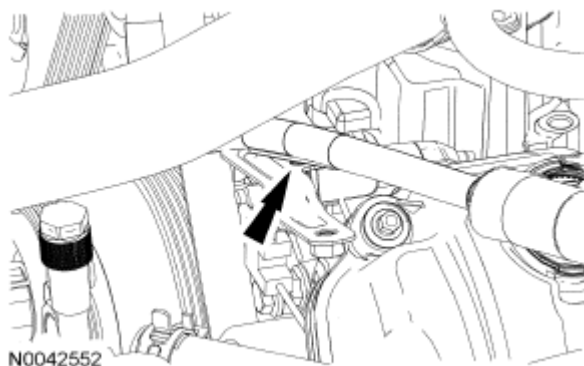


Fig. 191: Locating Wiring Harness Retainer From Cooling Fan Wiring Harness Bracket
Courtesy of FORD MOTOR CO.

12. Loosen the nuts.

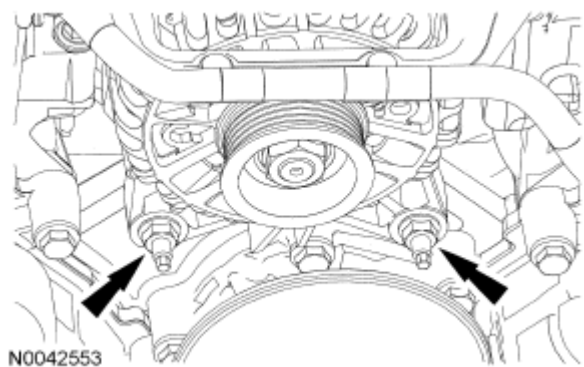


Fig. 192: Locating Nuts
Courtesy of FORD MOTOR CO.

13. Remove the bolts and the alternator, the alternator bracket and the wiring harness as an assembly.

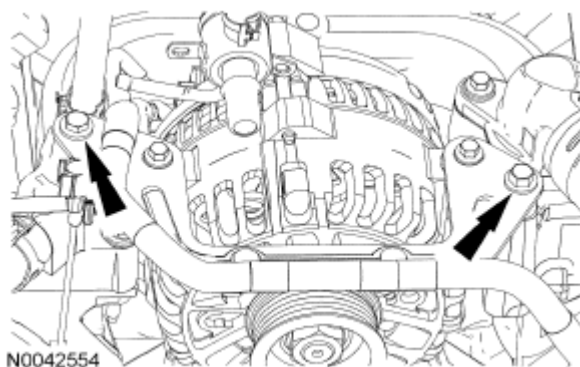


Fig. 193: Locating Alternator Bracket Bolt
Courtesy of FORD MOTOR CO.

14. Disconnect the heater hose.

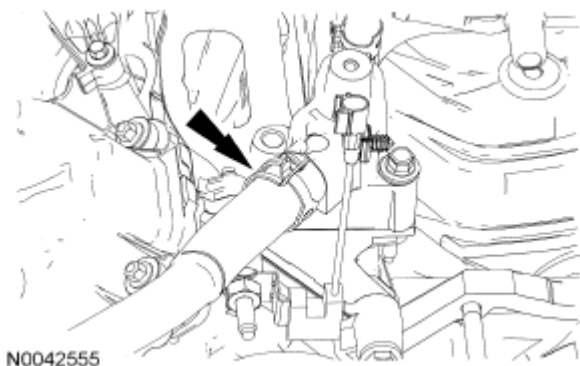


Fig. 194: Locating Heater Hose
Courtesy of FORD MOTOR CO.

15. Remove the upper radiator hose.

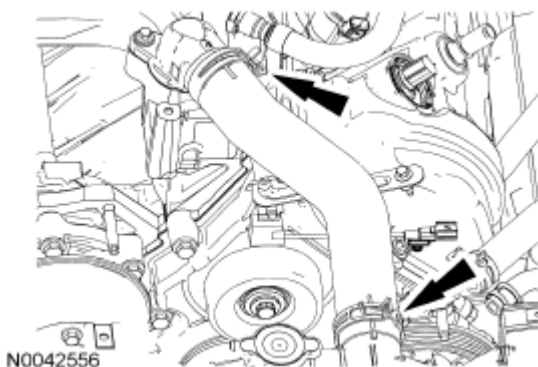


Fig. 195: Locating Upper Radiator Hose Clamps
Courtesy of FORD MOTOR CO.

16. Remove the bolts, the coolant crossover manifold, the gaskets, the heated PCV fitting and the heated PCV fitting coolant hose as an assembly.
- Discard the gaskets.

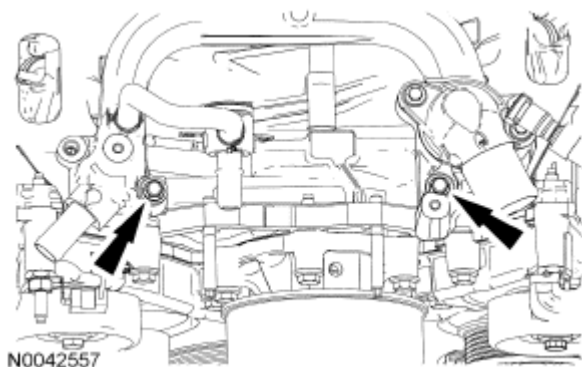


Fig. 196: Locating Bolts
Courtesy of FORD MOTOR CO.

17. Disconnect the evaporative emission (EVAP) canister purge valve electrical connector.

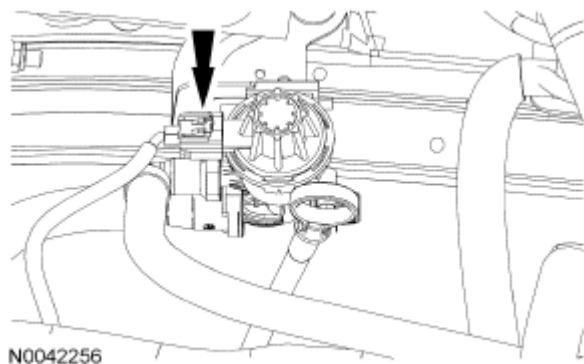


Fig. 197: Locating Evaporative Emission (EVAP) Canister Purge Valve Electrical Connector
Courtesy of FORD MOTOR CO.

18. Detach the heater hose retainer from the RH valve cover.

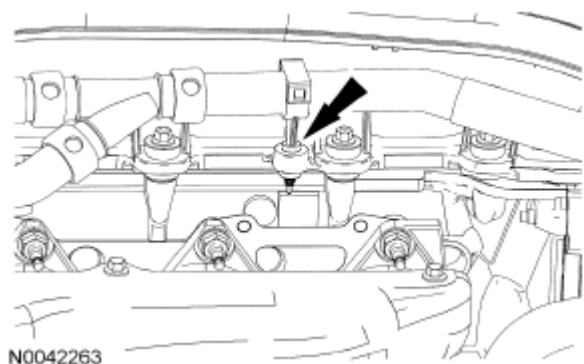


Fig. 198: Locating Heater Hose Retainer
Courtesy of FORD MOTOR CO.

19. Disconnect the in-line electrical connector and the 2 powertrain control module (PCM) electrical connectors, and detach the wiring harness pin-type retainer.

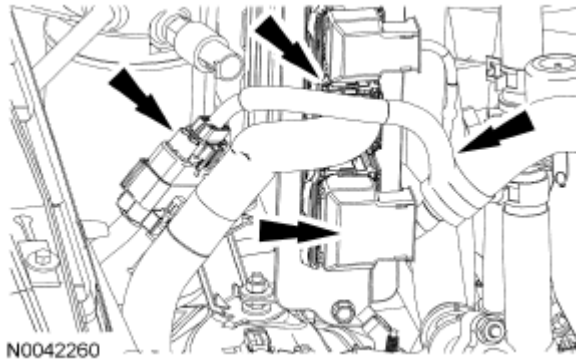


Fig. 199: Locating In-Line Electrical Connector And Powertrain Control Module (PCM) Electrical Connectors And Wiring Harness Pin-Type Retainer
Courtesy of FORD MOTOR CO.

20. Disconnect the heater hose.

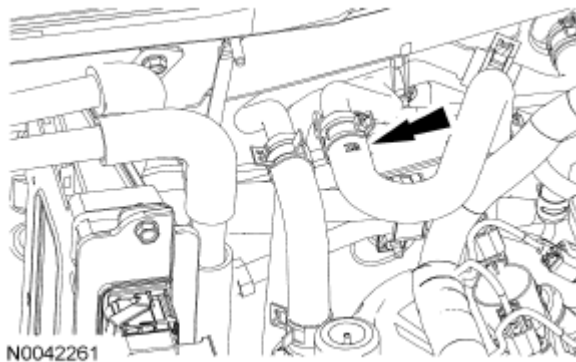


Fig. 200: Locating Heater Hose
Courtesy of FORD MOTOR CO.

21. Remove the nut and disconnect the ground wire.

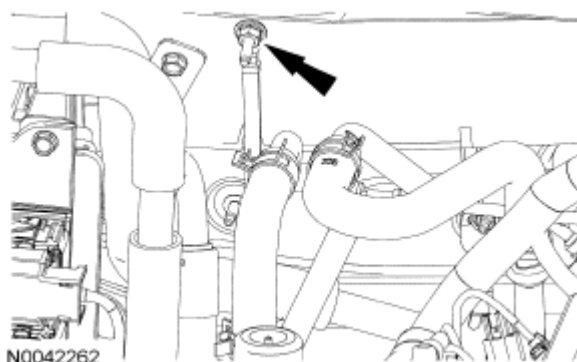


Fig. 201: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

22. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 6R60**.
23. Remove the 3 screws, the 3 pushpins and the inner fender splash shield.

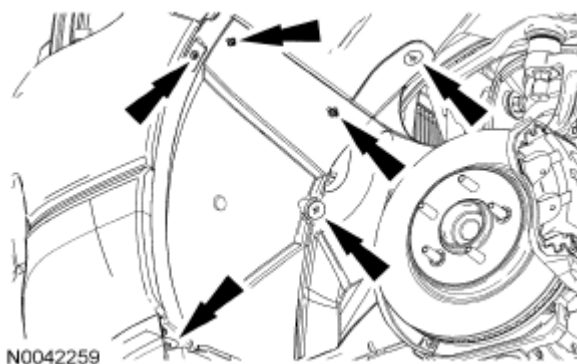


Fig. 202: Locating Screws, Pushpins And Inner Fender Splash Shield
Courtesy of FORD MOTOR CO.

24. Remove the nut and detach the power steering pressure hose bracket.

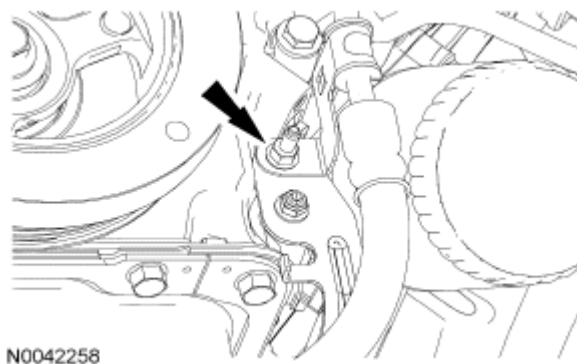


Fig. 203: Locating Power Steering Pressure Hose Bracket Nut
Courtesy of FORD MOTOR CO.

25. Remove the nut and detach the wiring harness bracket.

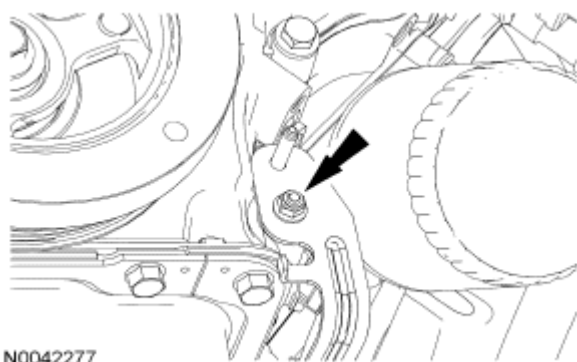


Fig. 204: Locating Wiring Harness Bracket Nut
Courtesy of FORD MOTOR CO.

26. Remove the nuts and detach the wiring harness bracket.

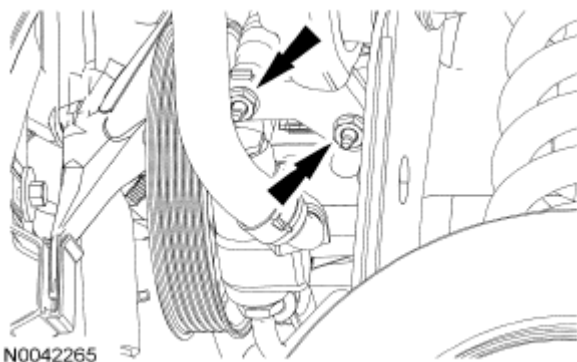


Fig. 205: Locating Wiring Harness Bracket Nut
Courtesy of FORD MOTOR CO.

27. Detach the wiring harness retainer from the power steering pump stud bolt.

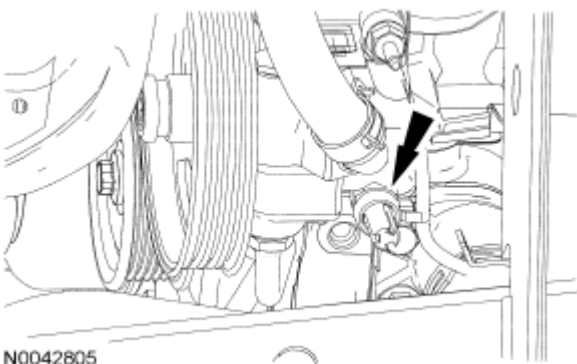


Fig. 206: Locating Power Steering Pump Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

28. Remove the stud bolts and position the power steering pump aside.

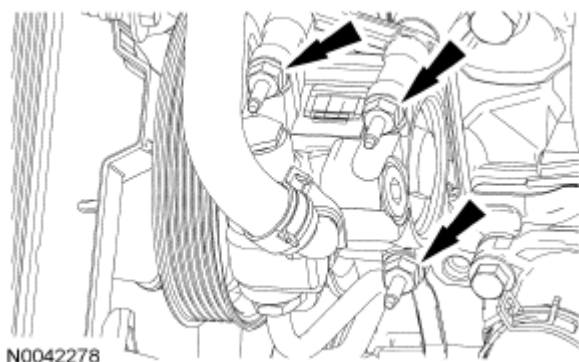


Fig. 207: Locating Stud Bolts
Courtesy of FORD MOTOR CO.

29. Disconnect the lower radiator hose from the oil filter adapter.

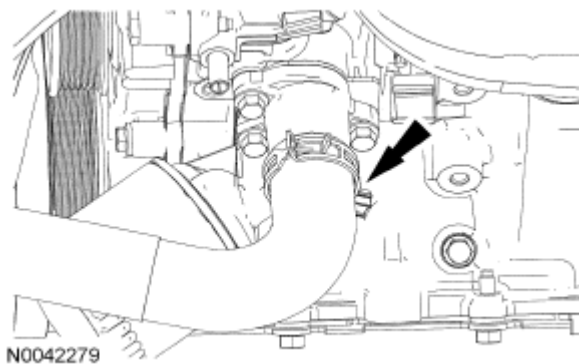


Fig. 208: Locating Radiator Hose Clamp
Courtesy of FORD MOTOR CO.

30. Disconnect the A/C clutch electrical connector and detach the wiring harness retainer. Remove the nut and detach the A/C hose bracket.

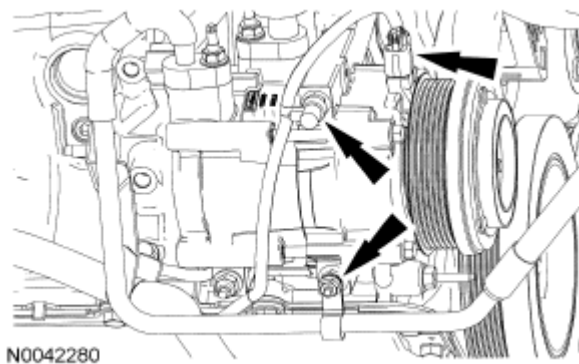
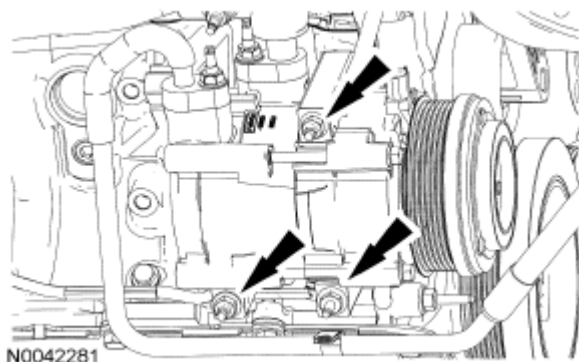


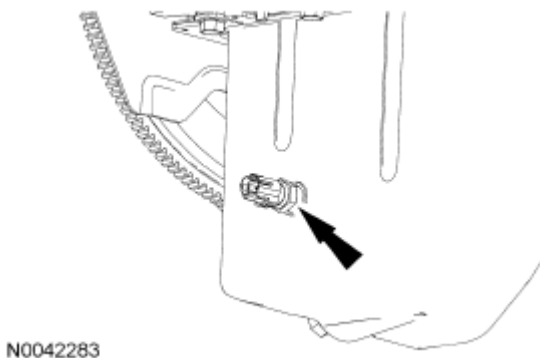
Fig. 209: Locating A/C Clutch Electrical Connector, Wiring Harness Retainer, Nut And A/C Hose

Bracket**Courtesy of FORD MOTOR CO.**

31. Remove the 2 nuts, the stud bolt and position the A/C compressor aside.

**Fig. 210: Locating A/C Compressor Stud Bolt And Nut****Courtesy of FORD MOTOR CO.**

32. Remove the oil drain plug and drain the engine oil. Install the drain plug when finished.
- Tighten to 23 N.m (17 lb-ft).
33. Remove the oil temperature sensor.

**Fig. 211: Locating Oil Temperature Sensor****Courtesy of FORD MOTOR CO.**

34. Remove the bolt and detach the wiring harness bracket from the RH engine support insulator bracket.

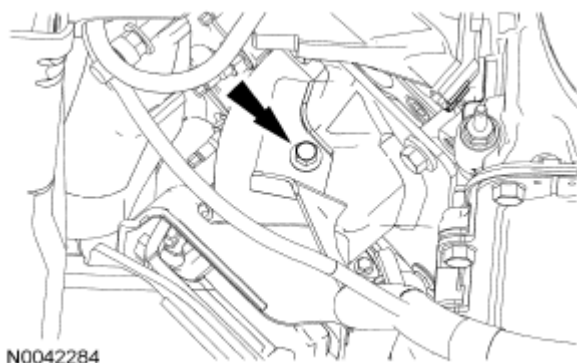


Fig. 212: Locating Wiring Harness Bracket Bolt
Courtesy of FORD MOTOR CO.

35. Remove the pushpins and the RH splash shield.

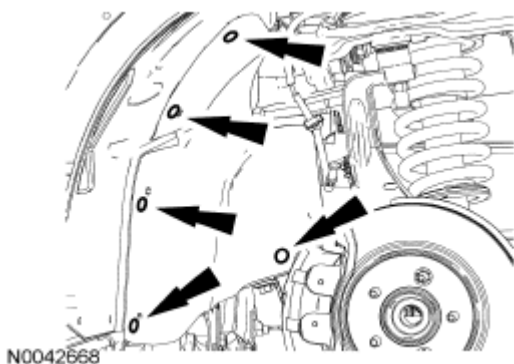


Fig. 213: Locating Pushpins
Courtesy of FORD MOTOR CO.

36. Remove the RH engine support insulator nuts.

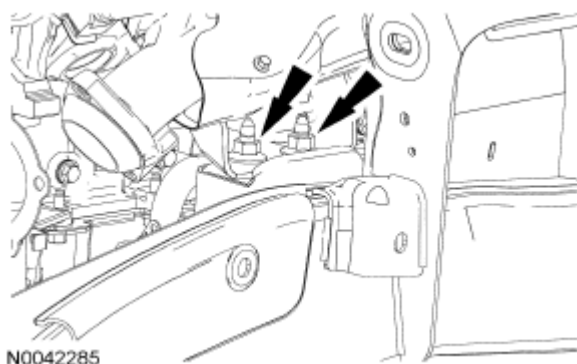


Fig. 214: Locating RH Engine Support Insulator Nuts
Courtesy of FORD MOTOR CO.

37. If equipped, disconnect the block heater electrical connector and detach the wiring harness retainers.

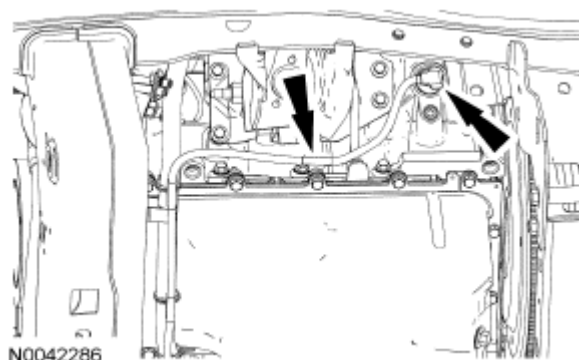


Fig. 215: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

38. Remove the LH engine support insulator through bolt.

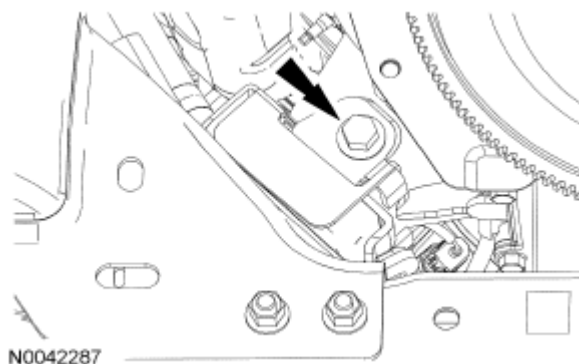


Fig. 216: Locating LH Engine Support Insulator Bolt
Courtesy of FORD MOTOR CO.

39. Install the special tool.

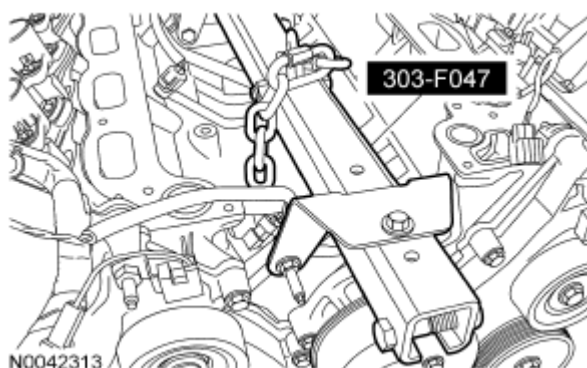


Fig. 217: Identifying Special Tool
Courtesy of FORD MOTOR CO.

40. Attach a suitable floor crane to the special tool installed in the previous step and remove the engine from

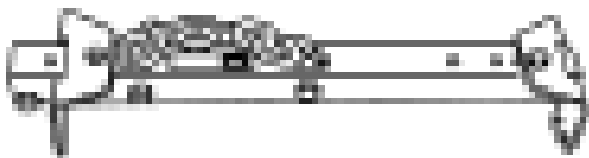
2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

the vehicle.

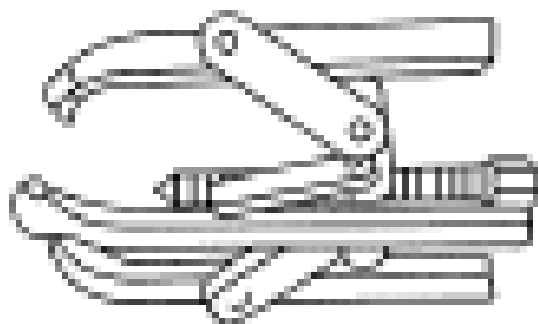
CYLINDER HEAD

SPECIAL TOOL(S)



Modular Engine Lift Bracket
303-F047 (014-00073) or equivalent

ST1377-A



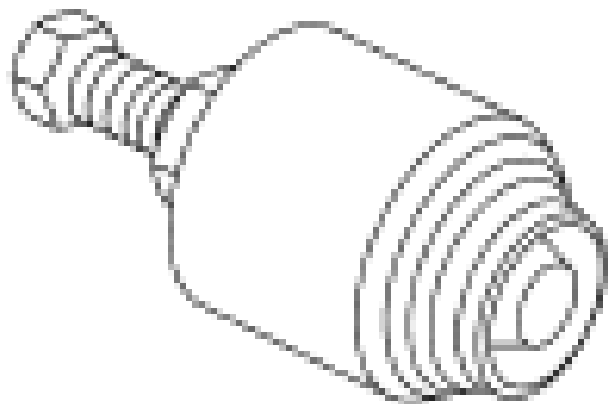
3-Jaw Puller
303-D121

ST1184-A

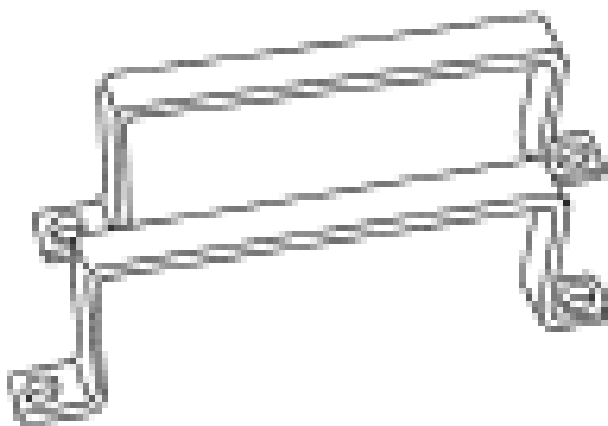
Remover, Crankshaft Front Seal
303-107 (T74P-6700-A)

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1730-A



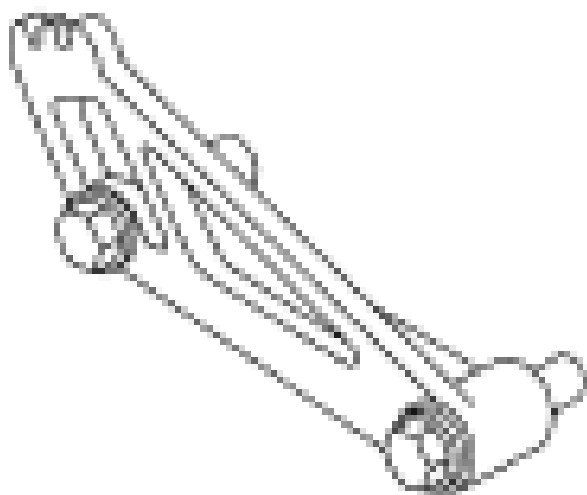
ST1668-A

Remover/Installer, Cylinder Head
303-572 (T97T-6000-A)

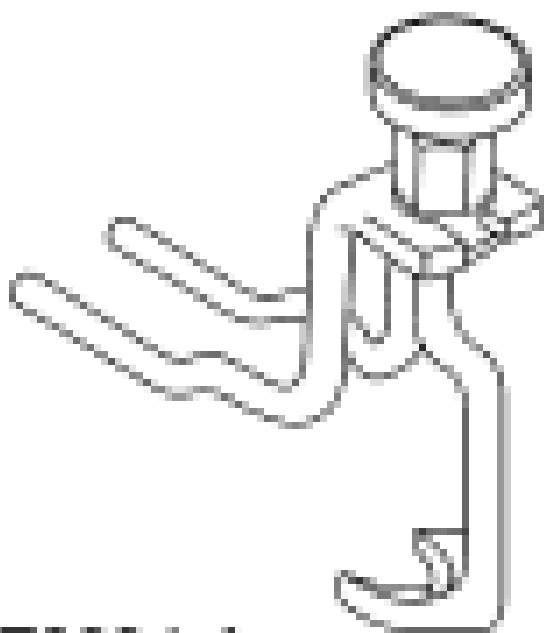
Locking Tool, Camshaft Phaser Sprocket
303-1046

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2807-A



ST2804-A

Compressor, Valve Spring
303-1039

MATERIAL

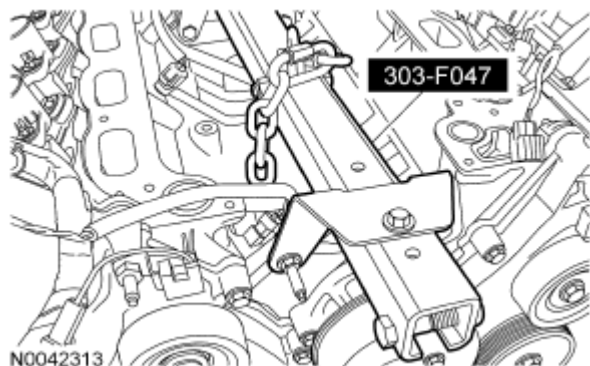
Item	Specification
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover	

ZC-30

-

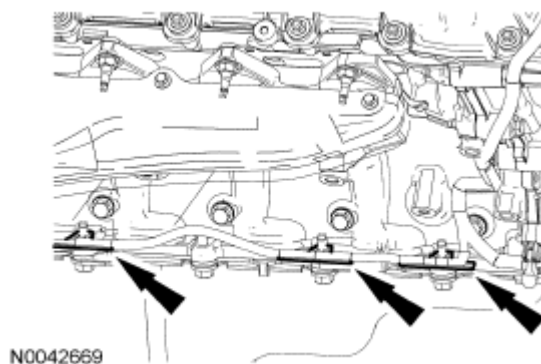
All cylinder heads

1. Remove the engine. For additional information, refer to **ENGINE**.
2. Mount the engine on a suitable work stand.
3. Remove the special tool.

**Fig. 218: Identifying Special Tool**

Courtesy of FORD MOTOR CO.

4. Detach the wiring harness retainers from the RH oil pan bolts.

**Fig. 219: Locating Oil Pan Wiring Harness Retainers**

Courtesy of FORD MOTOR CO.

5. Disconnect the crankshaft position sensor electrical connector and detach the wiring harness retainer.

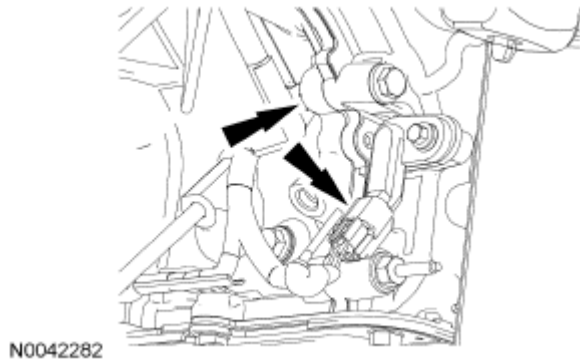


Fig. 220: Locating Crankshaft Position Sensor Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

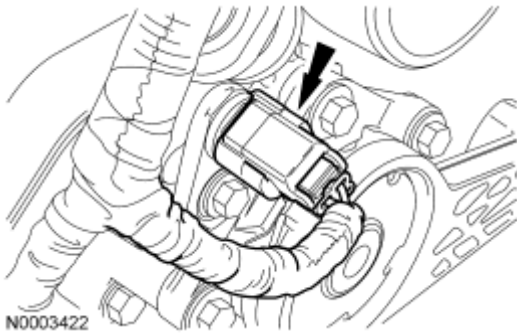


Fig. 221: Identifying RH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

6. Disconnect the RH and LH camshaft position (CMP) sensor electrical connectors.

NOTE: RH shown, LH similar.

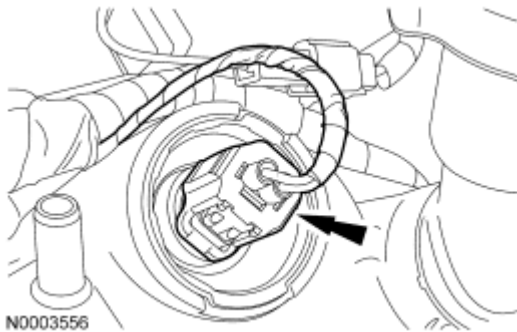


Fig. 222: Locating Camshaft Timing (VCT) Solenoid Electrical Connectors
Courtesy of FORD MOTOR CO.

7. Disconnect the RH and LH variable camshaft timing (VCT) solenoid electrical connectors.

8. Detach the wiring harness retainers.

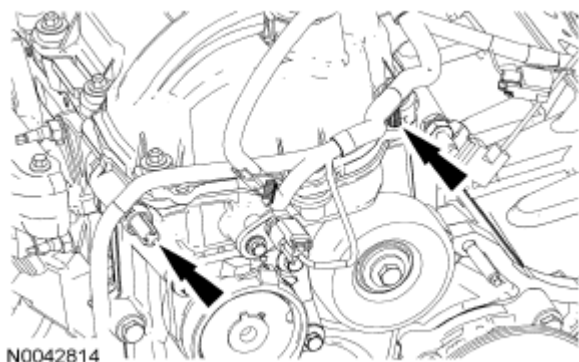


Fig. 223: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

9. Remove the nut and the RH radio ignition interference capacitor.

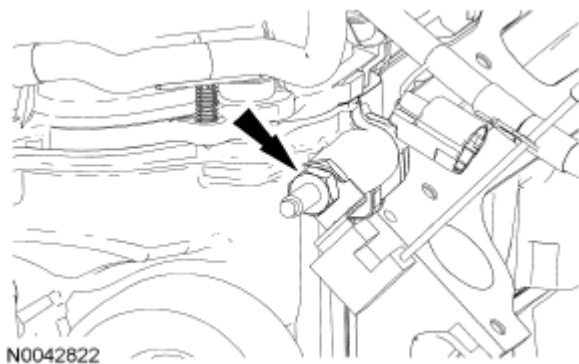


Fig. 224: Locating Radio Ignition Interference Capacitor Nut
Courtesy of FORD MOTOR CO.

10. Disconnect the oil pressure sensor electrical connector.

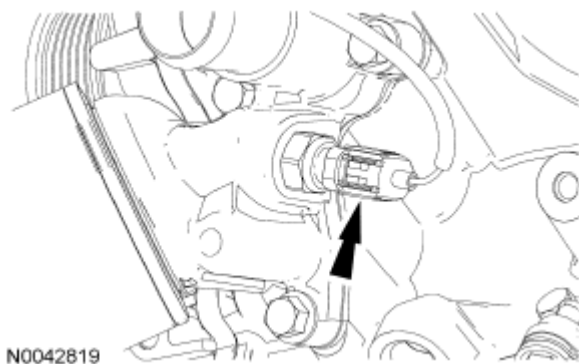


Fig. 225: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

11. Disconnect the LH CMP sensor electrical connector and detach the wiring harness retainers.

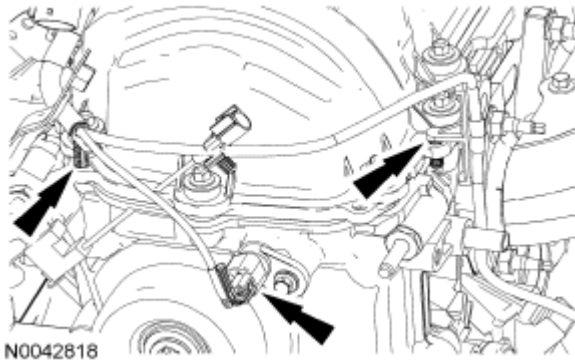


Fig. 226: Locating CMP Sensor Electrical Connector And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

12. Remove the nut and the cooling fan wiring harness bracket.

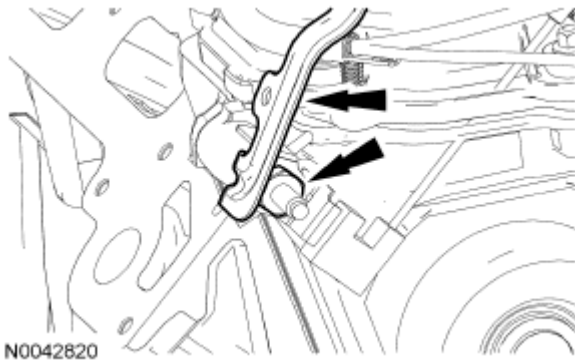


Fig. 227: Locating Cooling Fan Wiring Harness Bracket And Nut
Courtesy of FORD MOTOR CO.

13. Remove the nut and detach the LH radio interference capacitor.

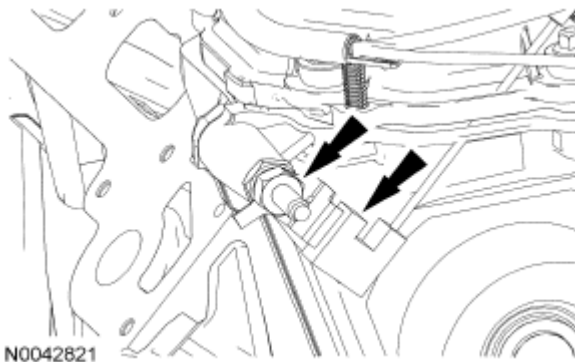


Fig. 228: Locating Radio Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

14. Detach the wiring harness retainers from the LH valve cover studs.

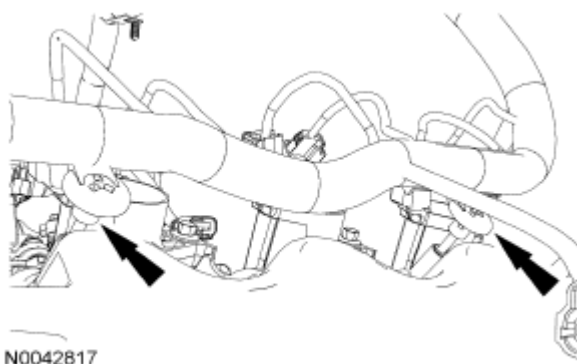


Fig. 229: Locating Valve Cover Studs
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

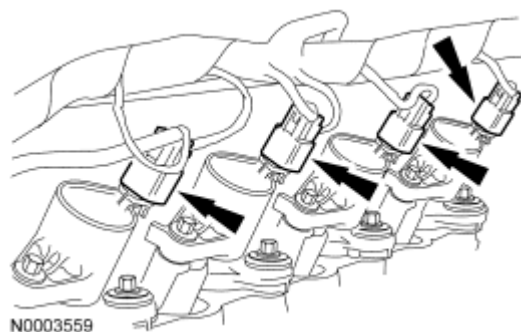


Fig. 230: Locating Ignition Coil Electrical Connectors
Courtesy of FORD MOTOR CO.

15. Disconnect the 4 RH and 4 LH ignition coil electrical connectors.
16. Detach the wiring harness retainers from the RH valve cover studs.

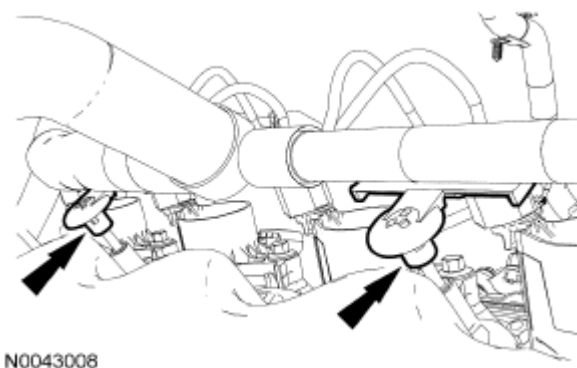


Fig. 231: Locating Valve Cover Studs
Courtesy of FORD MOTOR CO.

17. Disconnect the cylinder head temperature (CHT) sensor electrical connector.

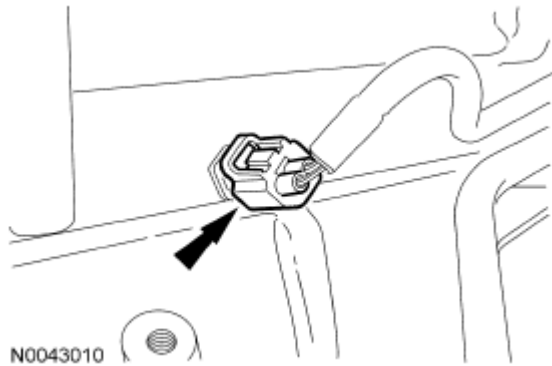


Fig. 232: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

18. Detach the electrical connector retainers and remove the engine wiring harness.

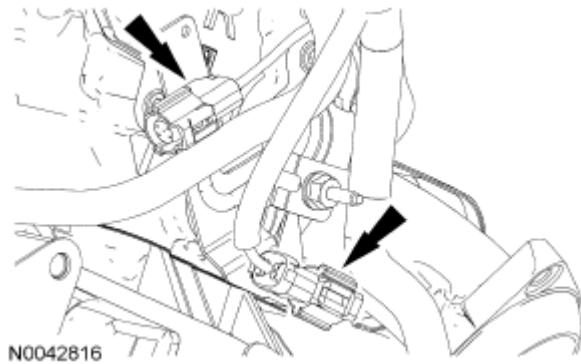


Fig. 233: Locating Electrical Connector Retainers And Engine Wiring Harness
Courtesy of FORD MOTOR CO.

CAUTION: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube.

19. Remove the breather tube from the RH valve cover.
- Disconnect the quick connect fittings.
 - Push the connector toward the valve cover to release pressure.
 - Push the release tab clockwise.
 - Disconnect the quick connect fitting.

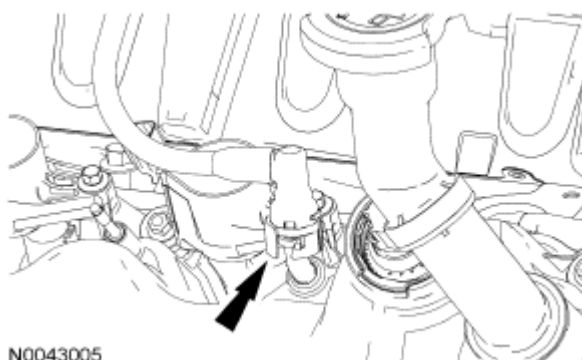


Fig. 234: Locating Quick Connect Fitting
Courtesy of FORD MOTOR CO.

CAUTION: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube.

20. Remove the positive crankcase ventilation (PCV) tube from the LH valve cover.
 - Disconnect the quick connect fittings.
 - Push the connector toward the valve cover to release pressure.
 - Push the release tab clockwise.
 - Disconnect the quick connect fitting.

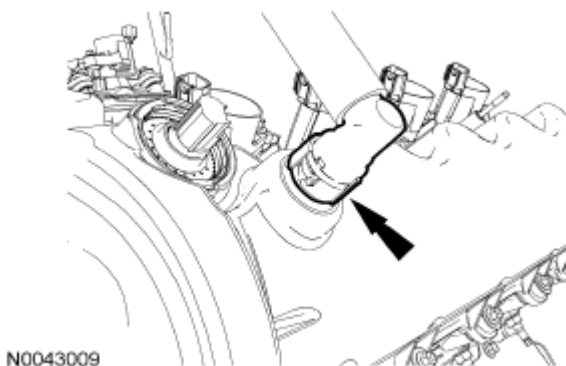


Fig. 235: Locating Quick Connect Fitting
Courtesy of FORD MOTOR CO.

21. Remove and discard the oil filter.

NOTE: LH shown, RH similar.

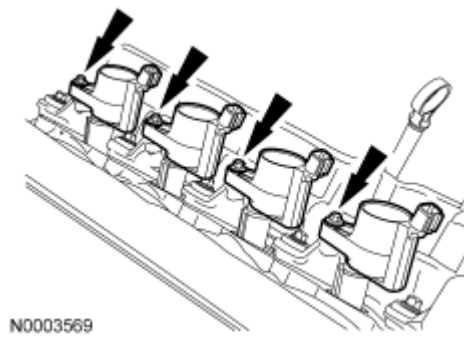


Fig. 236: Identifying Ignition Coils And Bolts
Courtesy of FORD MOTOR CO.

22. Remove the 8 bolts and the 8 ignition coils.
23. Remove the bolt and position the oil level indicator aside.



Fig. 237: Locating Bolt
Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

CAUTION: When removing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

NOTE: The bolts are part of the valve cover and should not be removed.

24. Loosen the 15 bolts and remove the LH valve cover.
 - Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
 - Inspect the valve cover gasket. If the gasket is damaged, remove and discard the gasket. Clean the valve cover gasket groove with soap and water or a suitable solvent.

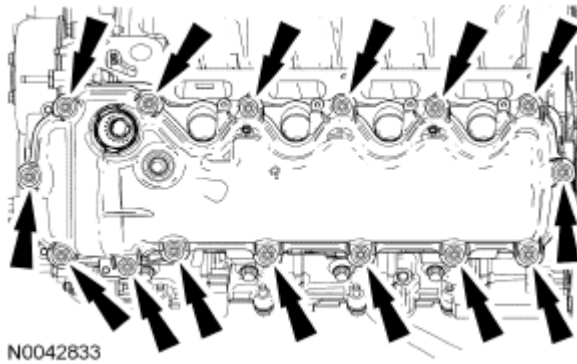


Fig. 238: Locating Valve Cover Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

CAUTION: When removing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

NOTE: The bolts are part of the valve cover and should not be removed.

25. Loosen the 14 bolts and remove the RH valve cover.

- Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the valve cover gasket. If the gasket is damaged, remove and discard the gasket. Clean the valve cover gasket groove with soap and water or a suitable solvent.

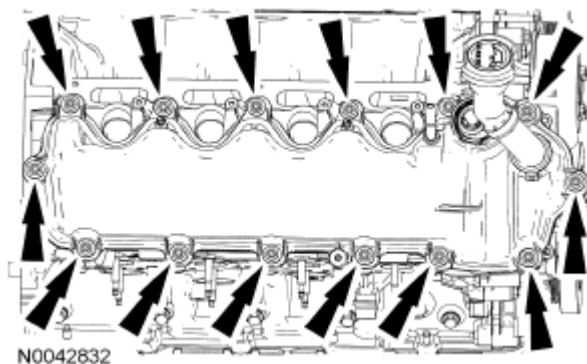


Fig. 239: Locating Valve Cover Bolts
Courtesy of FORD MOTOR CO.

26. Remove the 5 bolts, the coolant pump pulley and the RH side accessory drive belt idler pulley.

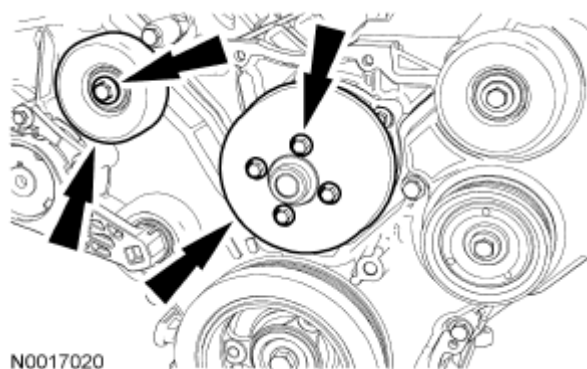


Fig. 240: Locating Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

27. Remove and discard the crankshaft pulley bolt. Using the special tool, remove the crankshaft pulley.

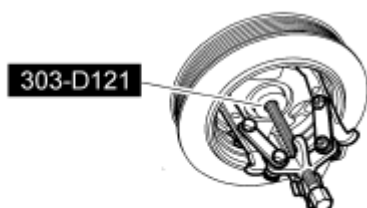


Fig. 241: Identifying Special Tool And Crankshaft Pulley
Courtesy of FORD MOTOR CO.

28. Using the special tool, remove the crankshaft seal.

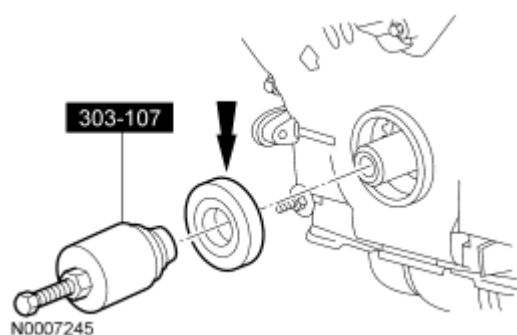
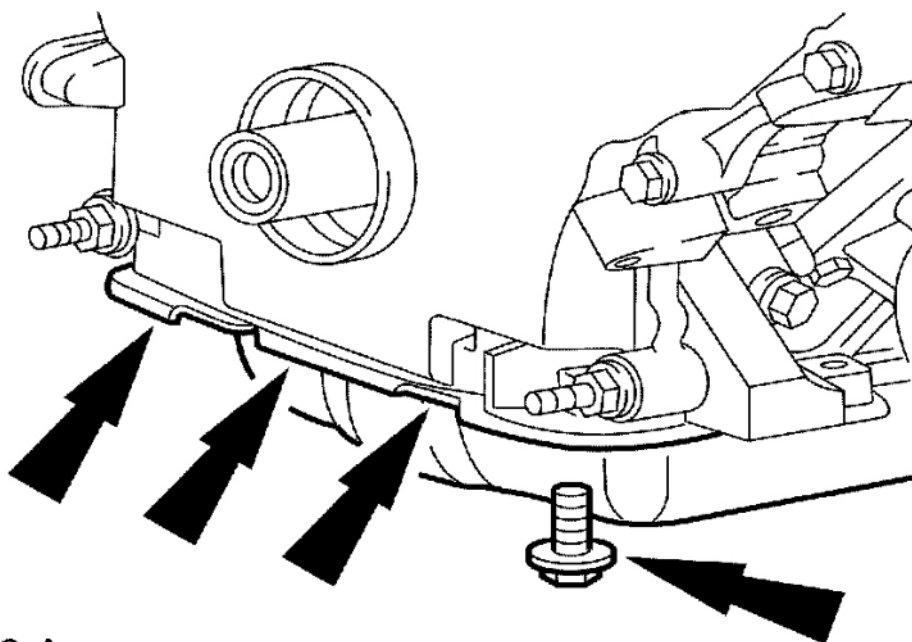


Fig. 242: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

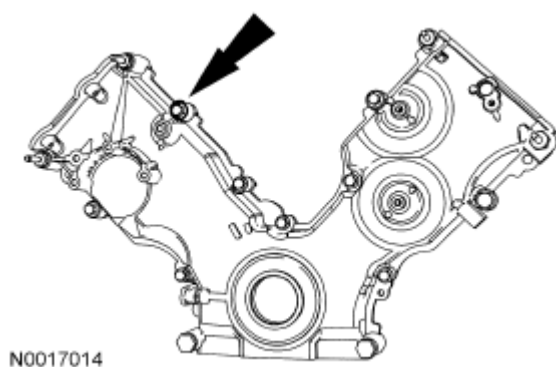
29. Remove the 4 oil pan-to-engine front cover bolts.



AA4226-A

Fig. 243: Locating Oil Pan Bolts-To-Front Cover
Courtesy of FORD MOTOR CO.

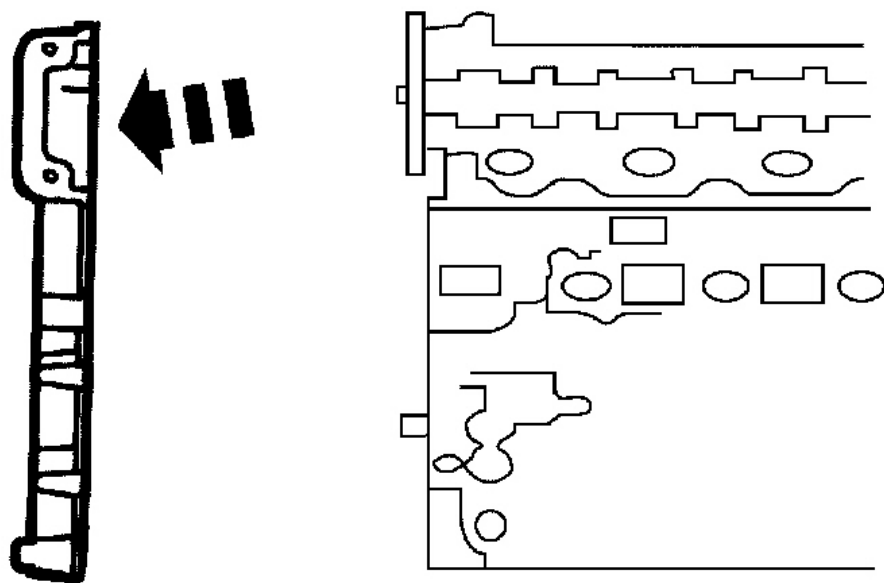
NOTE: Correct fastener location is essential for the assembly procedure. Record fastener location.



N0017014

Fig. 244: Locating Engine Front Cover Fasteners
Courtesy of FORD MOTOR CO.

30. Remove the engine front cover fasteners.
31. Remove the engine front cover from the cylinder block.



AA1665-A

Fig. 245: Locating Engine Front Cover
Courtesy of FORD MOTOR CO.

32. Remove the crankshaft sensor ring from the crankshaft.

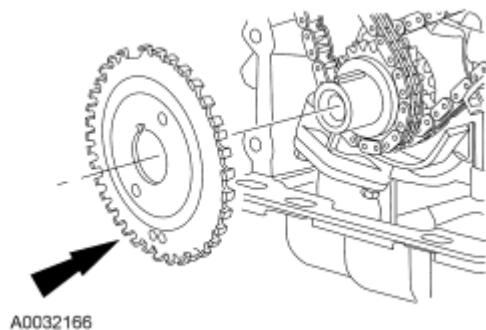


Fig. 246: View Of Crankshaft Sensor Ring At Crankshaft
Courtesy of FORD MOTOR CO.

33. Position the crankshaft keyway at the 12 o'clock position.

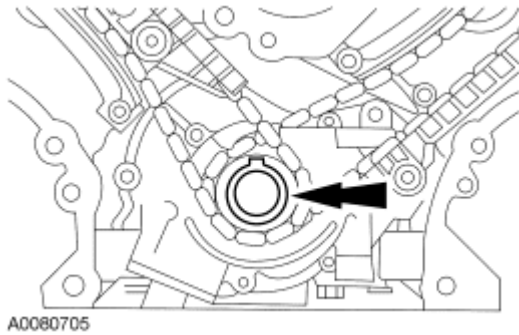


Fig. 247: Positioning Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

NOTE: If the camshaft lobes are not exactly positioned as shown, the crankshaft will require one full additional rotation to the 12 o'clock position.

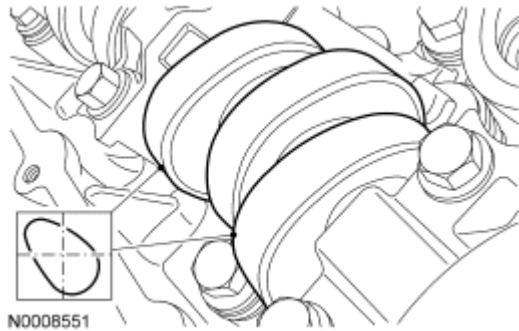
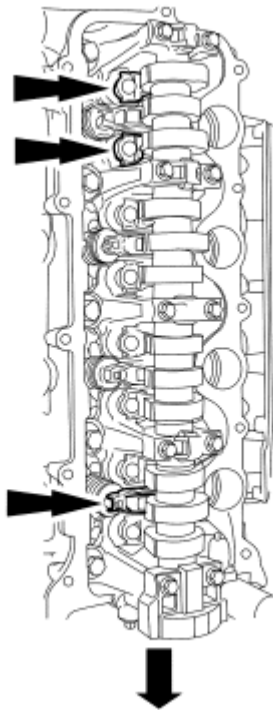


Fig. 248: Identifying Camshaft Lobe Position
Courtesy of FORD MOTOR CO.

34. The No. 1 cylinder camshaft exhaust lobe must be coming up on the exhaust stroke. Verify by noting the position of the 2 intake lobes and the exhaust lobe on the No. 1 cylinder.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



A0083248

Fig. 249: Identifying RH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

35. Remove only the 3 roller followers shown in the illustration from the RH cylinder head.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

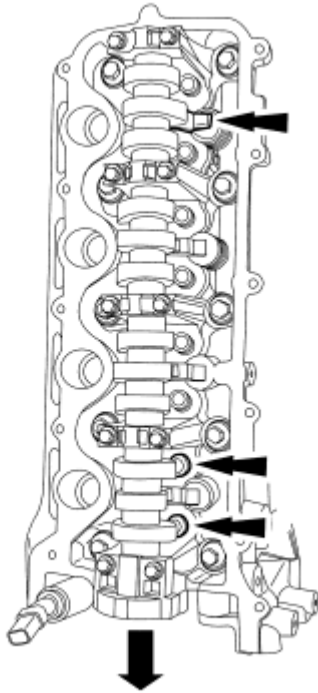
NOTE: It may be necessary to push the valve down while compressing the spring.



Fig. 250: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

36. Using the special tool, remove the 3 roller followers designated in the previous step from the RH cylinder head.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



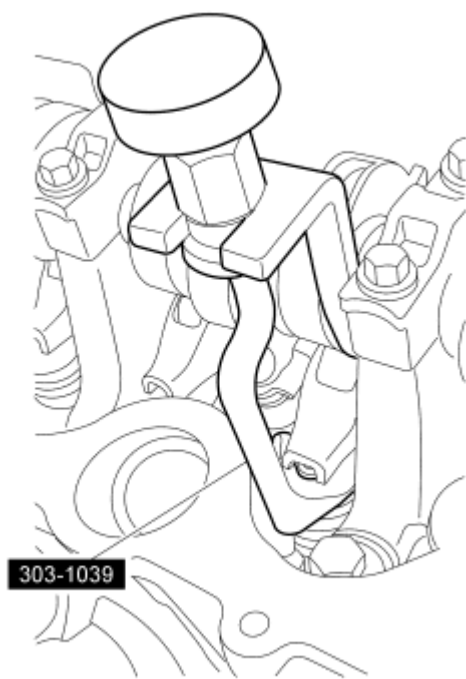
A0084479

Fig. 251: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

37. Remove only the 3 roller followers shown in the illustration from the LH cylinder head.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

NOTE: It may be necessary to push the valve down while compressing the spring.

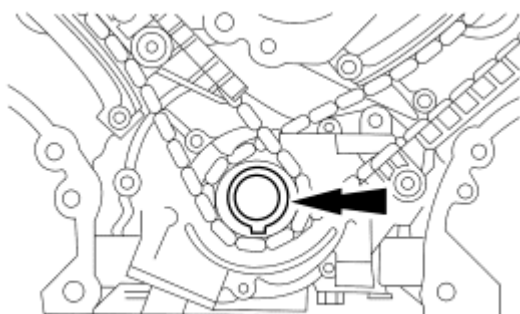


N0010191

Fig. 252: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

38. Using the special tool, remove the 3 roller followers designated in the previous step from the LH cylinder head.

CAUTION: The crankshaft cannot be moved past the 6 o'clock position once set.



N0006305

Fig. 253: Crankshaft Positioned With Keyway At 6 O'clock Position
Courtesy of FORD MOTOR CO.

39. Rotate the crankshaft clockwise and position the crankshaft keyway at the 6 o'clock position.
40. Remove the 2 bolts, the LH timing chain tensioner and tensioner arm.

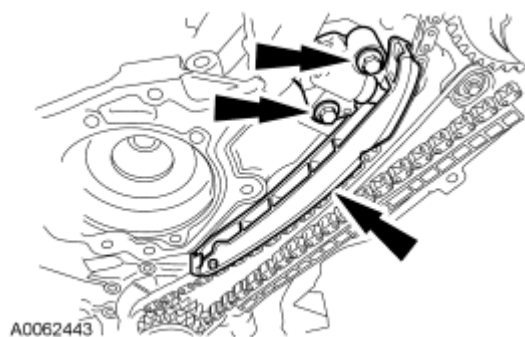


Fig. 254: Identifying LH Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

41. Remove the 2 bolts, the RH timing chain tensioner and tensioner arm.

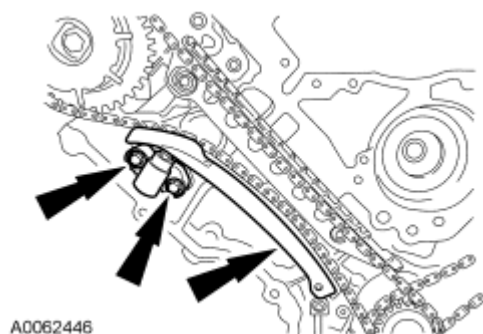


Fig. 255: Identifying RH Timing Chain Tensioner, Tensioner Arm And Bolts
Courtesy of FORD MOTOR CO.

42. Remove the RH and LH timing chains and the crankshaft sprocket.
- Remove the RH timing chain from the camshaft sprocket.
 - Remove the RH timing chain from the crankshaft sprocket.
 - Remove the LH timing chain from the camshaft sprocket.
 - Remove the LH timing chain and crankshaft sprocket.

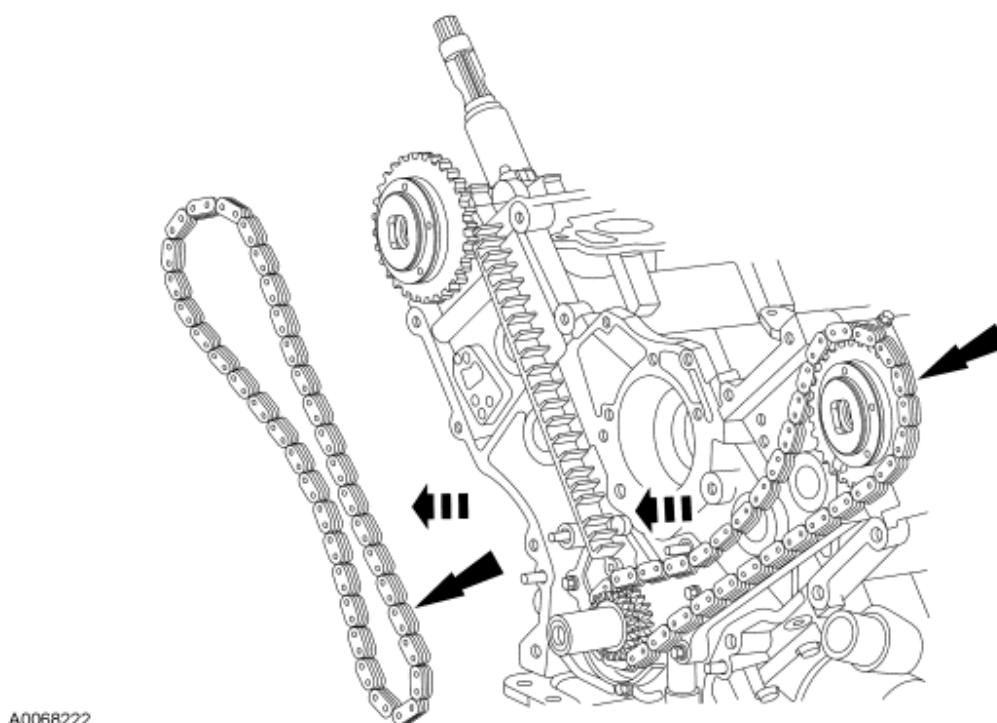


Fig. 256: Identifying RH/LH Timing Chains
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

43. Remove the LH and RH timing chain guides.
- Remove the 2 bolts.
 - Remove both timing chain guides.

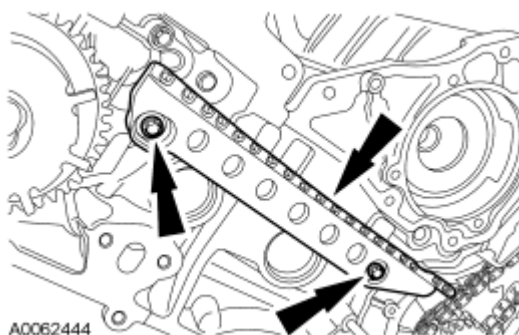


Fig. 257: Identifying Timing Chain Guide And Mounting Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

44. Using the special tool, remove the bolt and the RH camshaft phaser sprocket assembly.
- Discard the camshaft phaser sprocket bolt.

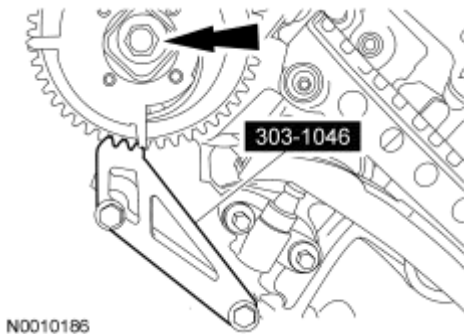


Fig. 258: Identifying VCT Phaser Sprocket Bolt And Holder Tool
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

45. Using the special tool, remove the bolt and the LH camshaft phaser sprocket assembly.
- Discard the camshaft phaser sprocket bolt.

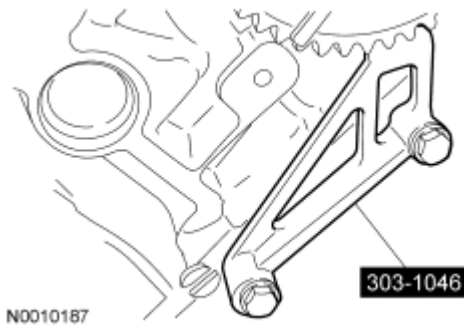


Fig. 259: Identifying Special Sprocket Phaser Tool
Courtesy of FORD MOTOR CO.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.

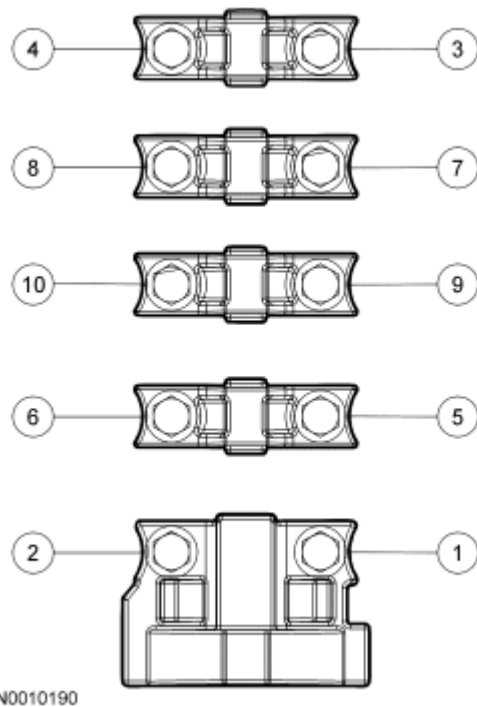
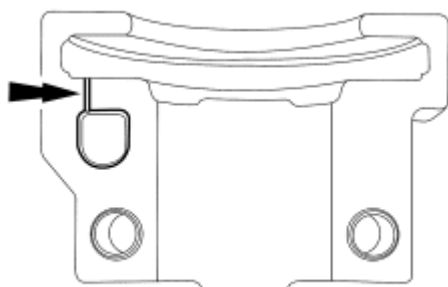


Fig. 260: Identifying Camshaft Bearing Caps Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

46. Remove the bolts in the sequence shown. Remove the RH cylinder head front camshaft bearing cap, then the remaining bearing caps.
47. Clean and inspect the RH camshaft bearing caps.

- The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



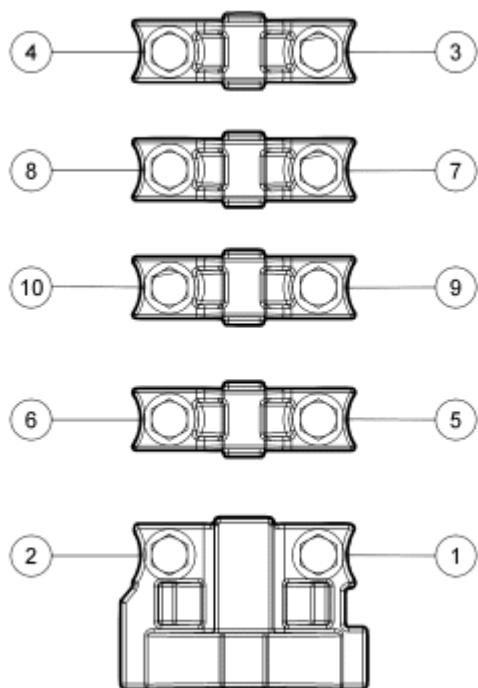
N0010448

Fig. 261: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

48. Remove the RH camshaft.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.

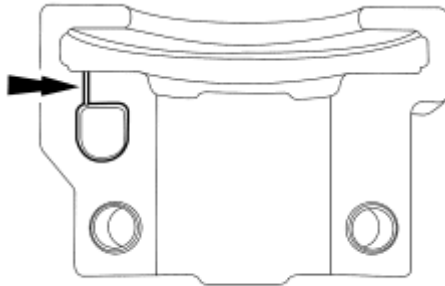


N0010190

Fig. 262: Identifying Camshaft Bearing Caps Loosening/Tightening Sequence

Courtesy of FORD MOTOR CO.

49. Remove the bolts in the sequence shown. Remove the LH cylinder head front camshaft bearing cap, then the remaining bearing caps.
50. Clean and inspect the LH camshaft bearing caps.
 - The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

Fig. 263: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

51. Remove the LH camshaft.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

52. Remove all of the remaining roller followers from the cylinder heads.

LH cylinder head

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

53. Remove the hydraulic lash adjusters from the LH cylinder head.
54. Install the special tool onto the LH cylinder head.

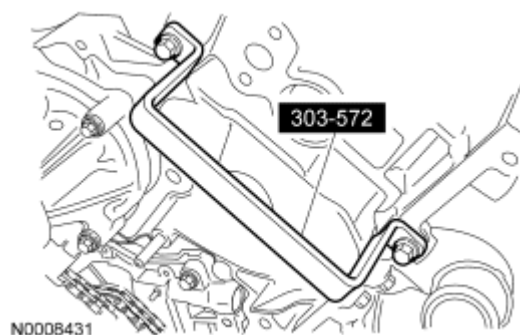


Fig. 264: Identifying Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

55. Remove the bolts and the LH exhaust manifold heat shield.

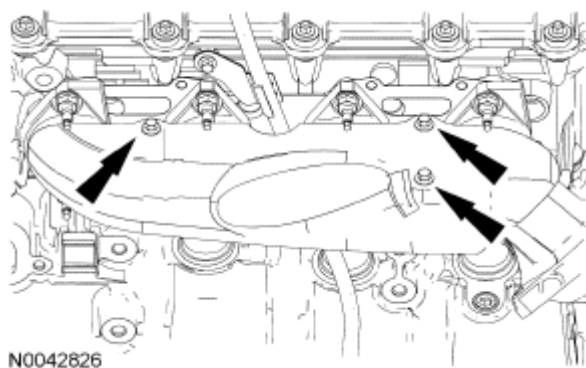


Fig. 265: Locating LH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

56. Remove the nuts, the LH exhaust manifold and the gaskets.
- Discard the nuts and the gaskets.

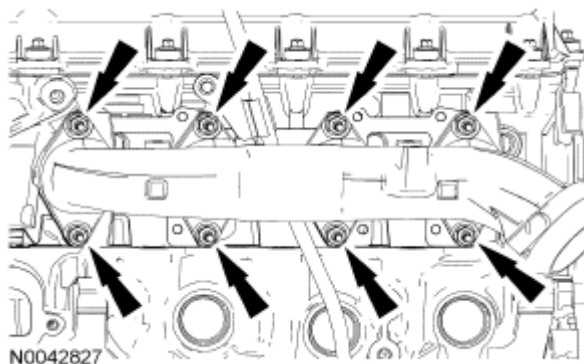


Fig. 266: Locating LH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

57. Remove and discard the 8 LH exhaust manifold studs.

RH cylinder head

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

58. Remove the hydraulic lash adjusters from the RH cylinder heads.
59. Install the special tool onto the RH cylinder head.

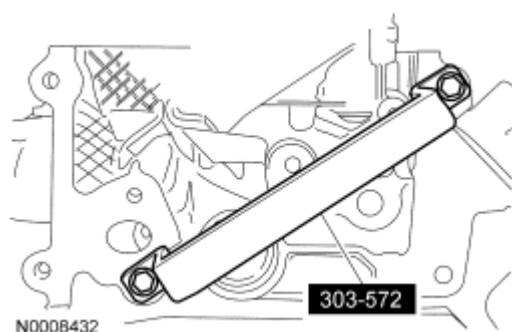


Fig. 267: Identifying Special Tool On Cylinder Head
Courtesy of FORD MOTOR CO.

60. Remove the bolts and the RH exhaust manifold heat shield.

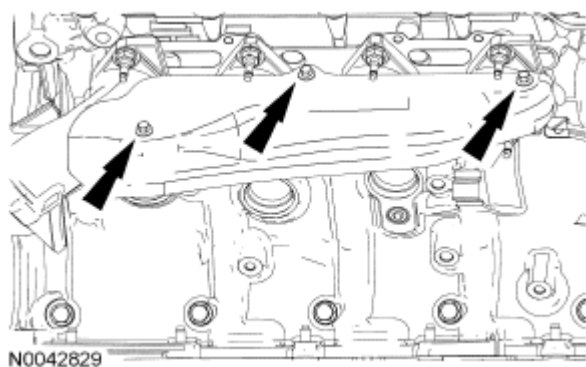


Fig. 268: Identifying RH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

61. Remove the nuts, the RH exhaust manifold and the gaskets.
 - Discard the nuts and the gaskets.

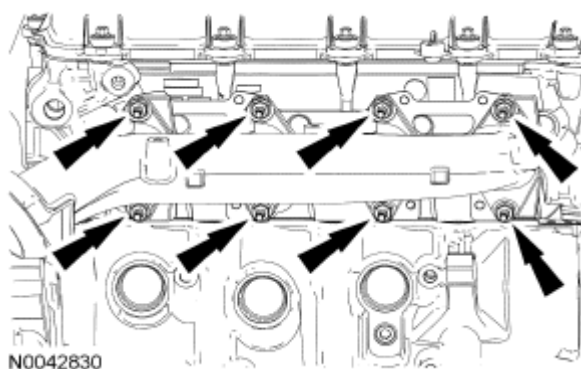


Fig. 269: Locating RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

62. Remove and discard the 8 RH exhaust manifold studs.
63. Remove the nut and the ground strap.

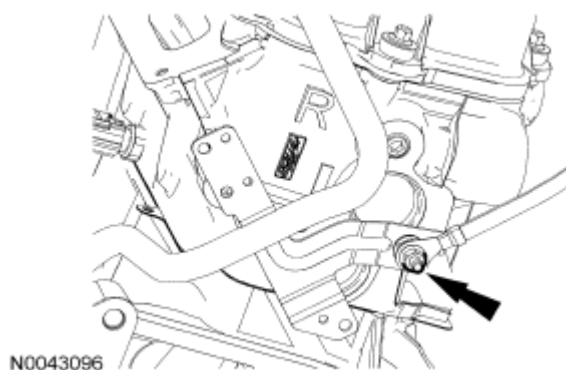


Fig. 270: Locating Ground Strap Nut
Courtesy of FORD MOTOR CO.

64. Remove the stud bolt and the heater supply tube and hoses as an assembly.
 - Discard the O-ring seals.

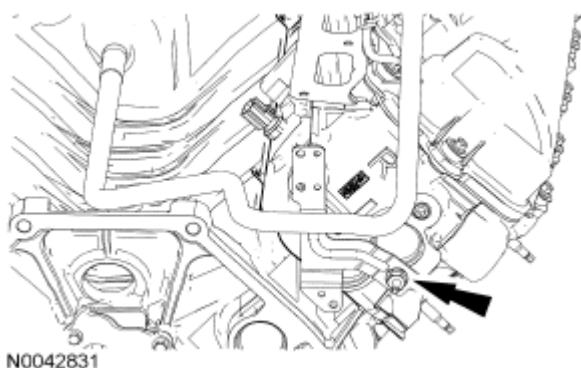


Fig. 271: Locating Heater Supply Tube Stud Bolt
Courtesy of FORD MOTOR CO.

All cylinder heads

CAUTION: The cylinder head must be cool before removing it from the engine. Cylinder head warpage can result if a warm or hot cylinder head is removed.

CAUTION: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.

CAUTION: The cylinder head bolts must be discarded and new bolts must be installed. They are tighten-to-yield designed and cannot be reused.

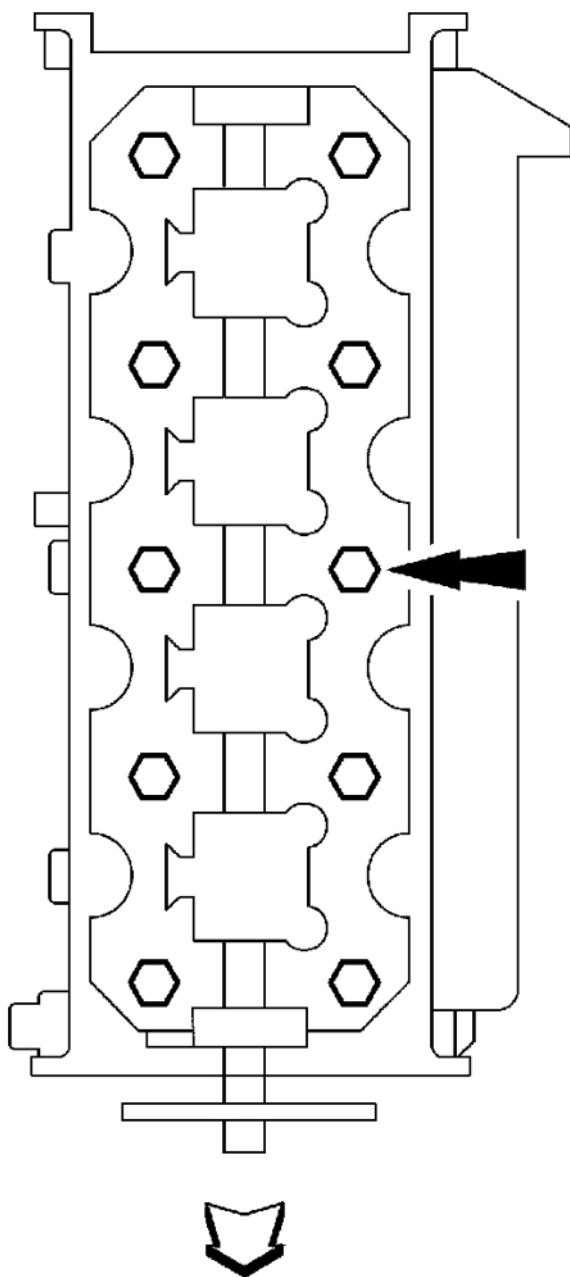
CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

CAUTION: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.

NOTE: RH shown, LH similar.

65. Remove the 20 bolts and the cylinder heads.

- Discard the cylinder head gaskets.
- Discard the cylinder head bolts.



A26253-A

Fig. 272: Locating Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or

other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

CAUTION: Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

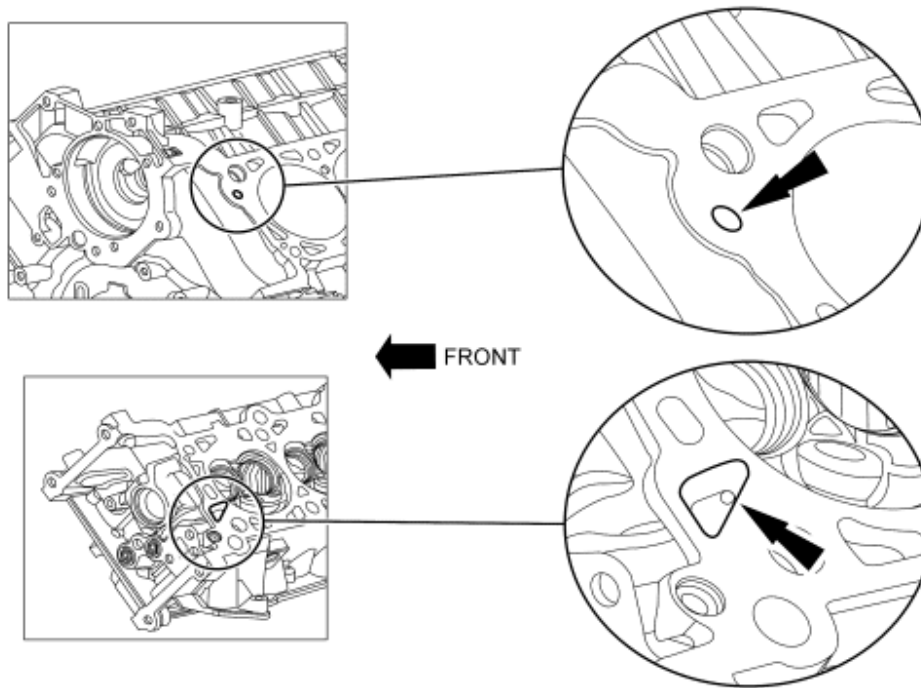
NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

66. Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block.
1. Remove any large deposits of silicone or gasket material with a plastic scraper.
 2. Apply silicone gasket remover, following package directions and allow to set for several minutes.
 3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
 4. Apply metal surface prep, following package directions, to remove any remaining traces of oil or coolant and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

NOTE: Make sure all cylinder head surfaces are clear of any gasket material, RTV, oil and coolant. The cylinder head surface must be clean and dry before running a flatness check.

NOTE: Use a straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot length. For example, if the straightedge is 61 cm (24 in) long, the machined edge must be flat within 0.010 mm (0.0004 in) from end to end.

NOTE: LH shown, RH similar.



A0079634

Fig. 273: Identifying Cylinder Head/Cylinder Block Oil Pressure Feed Areas
Courtesy of FORD MOTOR CO.

67. Support the cylinder heads on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge, paying particular attention to the oil pressure feed area. The cylinder heads must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches longer than 0.0254 mm (0.001 in).

DISASSEMBLY

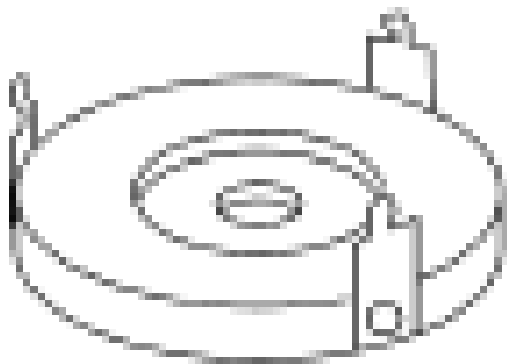
ENGINE

SPECIAL TOOL(S)

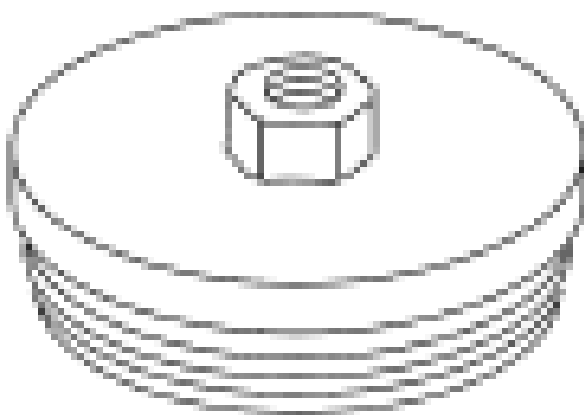
Remover, Crankshaft Rear Slinger
303-514 (T95P-6701-AH)

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1481-A



ST1382-A

Remover, Crankshaft Rear Seal
303-519 (T95P-6701-EH)

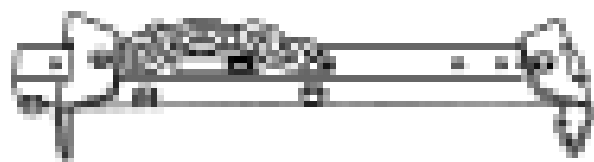
Slide Hammer
100-001 (T50T-100-A)

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1185-A



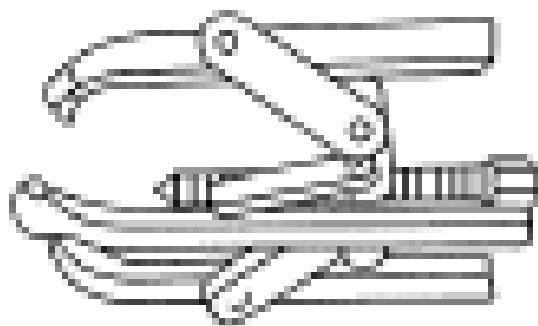
ST1377-A

Modular Engine Lift Bracket
303-F047 (014-00073)

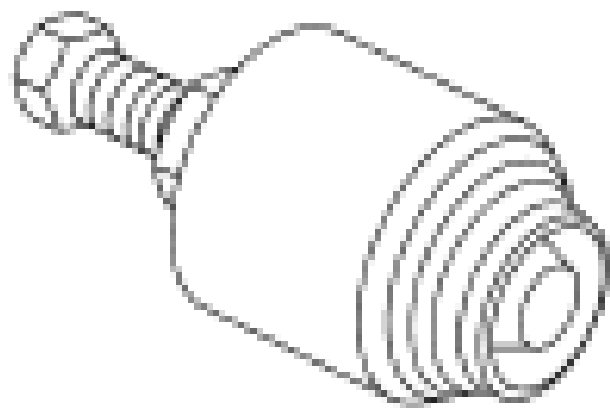
3-Jaw Puller
303-D121

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1184-A



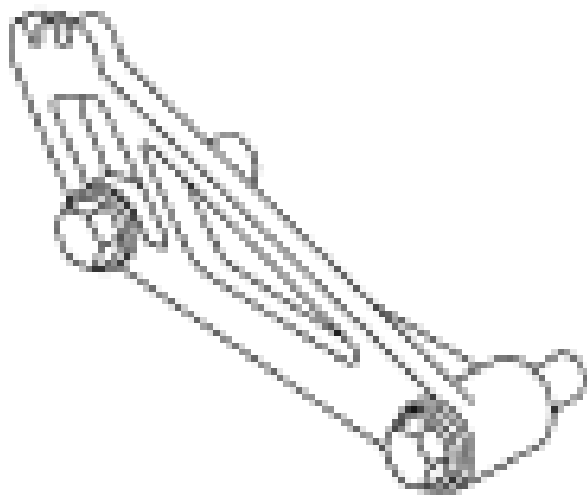
ST1730-A

Remover, Crankshaft Front Seal
303-107 (T74P-6700-A)

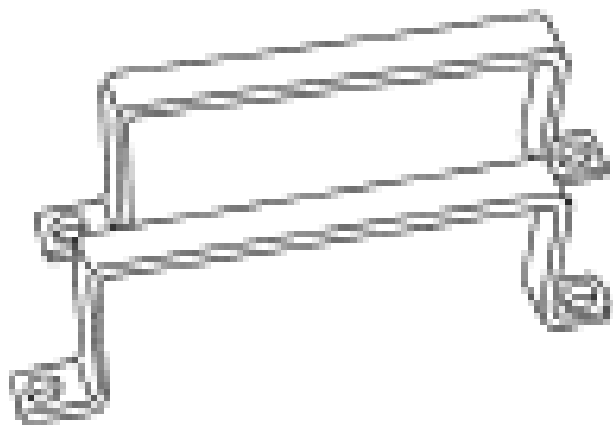
Locking Tool, Camshaft Phaser Sprocket
303-1046

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2807-A

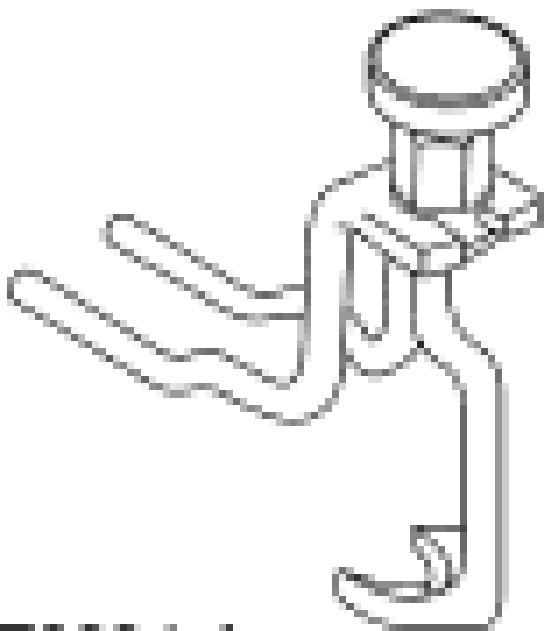


ST1668-A

Remover/Installer, Cylinder Head
303-572 (T97T-6000-A)

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



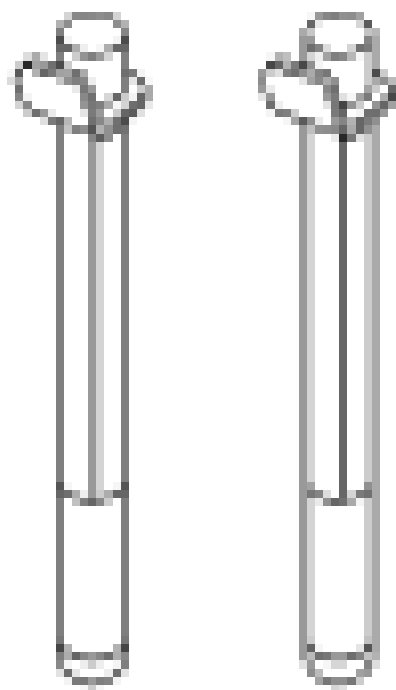
ST2804-A

Compressor, Valve Spring
303-1039

Installer, Connecting Rod
303-442 (T93P-6136-A)

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1337-A

MATERIAL

Item	Specification
Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-

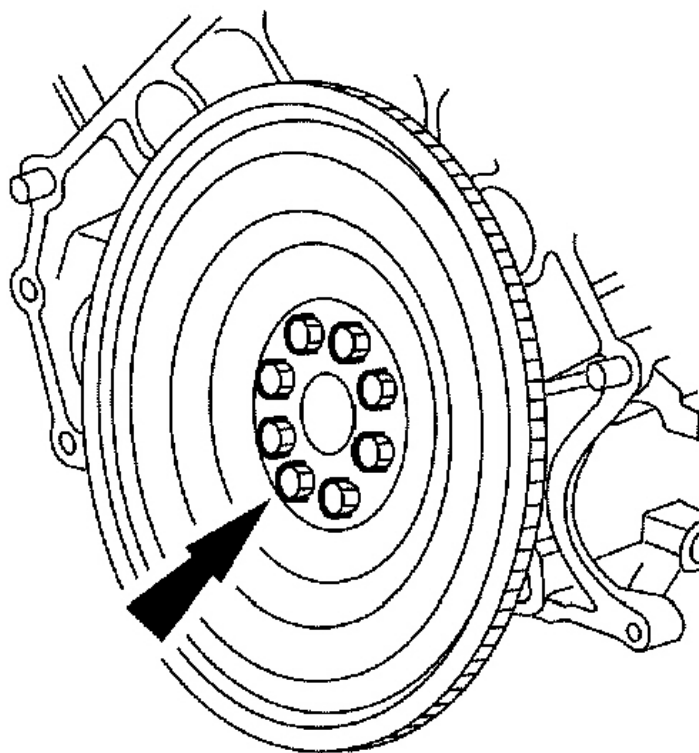
CAUTION: Remove the cylinder heads before removing the crankshaft. Failure to do so can result in engine damage.

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: The flexplate, the spacer plate, the crankshaft rear seal, the crankshaft rear oil slinger and the rear seal retainer plate must be removed before mounting the engine on the engine stand.

NOTE: For additional information, refer to the exploded view under the ASSEMBLY procedure.

1. Remove the 6 bolts and the flexplate.



A26925-A

Fig. 274: Locating Flexplate Bolts
Courtesy of FORD MOTOR CO.

2. Remove the spacer plate.

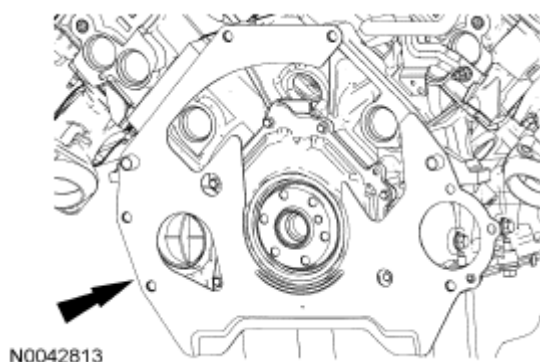


Fig. 275: Locating Spacer Plate
Courtesy of FORD MOTOR CO.

- Using the special tools, remove the crankshaft rear oil slinger.

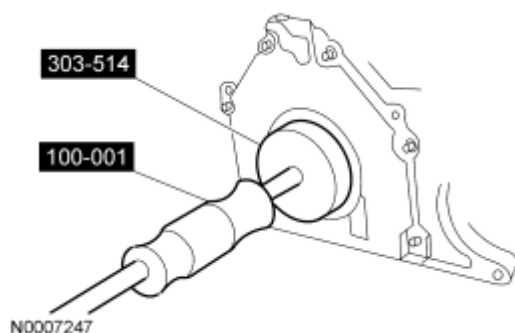


Fig. 276: Removing Crankshaft Rear Oil Seal Slinger
Courtesy of FORD MOTOR CO.

- Using the special tools, remove the crankshaft rear seal.

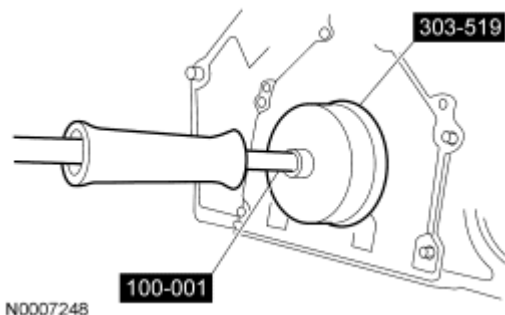
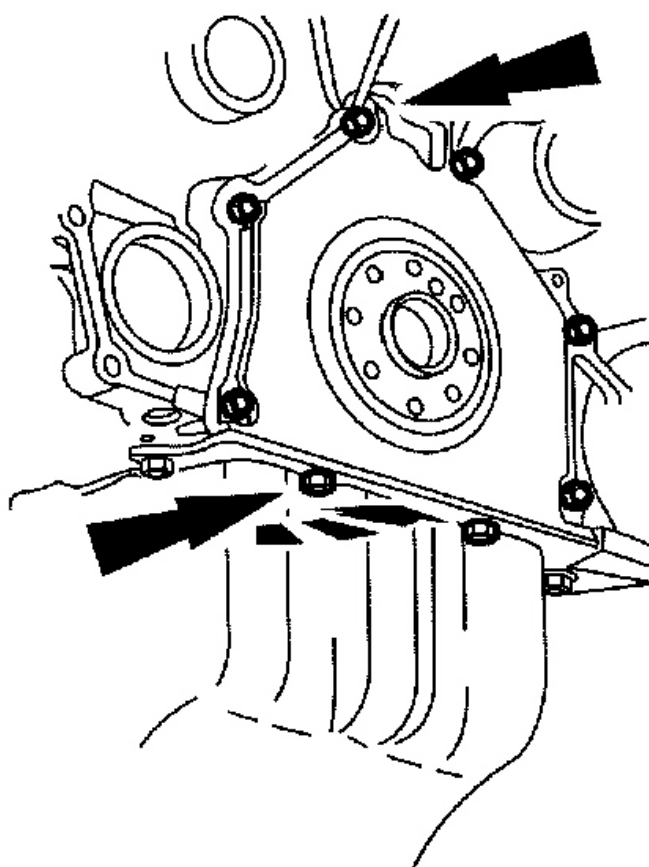


Fig. 277: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

- Remove the 8 bolts and the crankshaft rear seal retainer plate.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs

or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.



DA0723-B

Fig. 278: Identifying Bolts And Crankshaft Rear Seal Retainer Plate
Courtesy of FORD MOTOR CO.

- Clean and inspect the sealing surfaces.
6. Mount the engine on a suitable work stand.
 7. Remove the special tool.

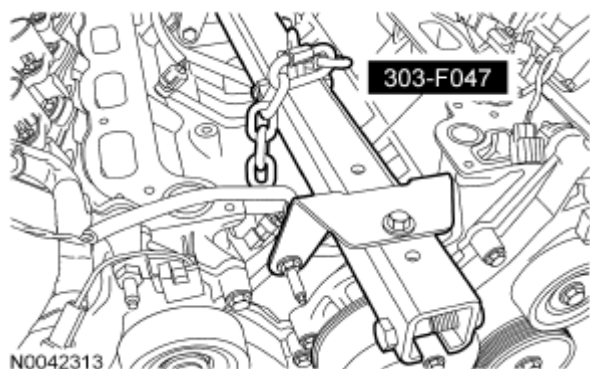


Fig. 279: Identifying Special Tool
Courtesy of FORD MOTOR CO.

8. Detach the wiring harness retainers from the RH oil pan bolts.

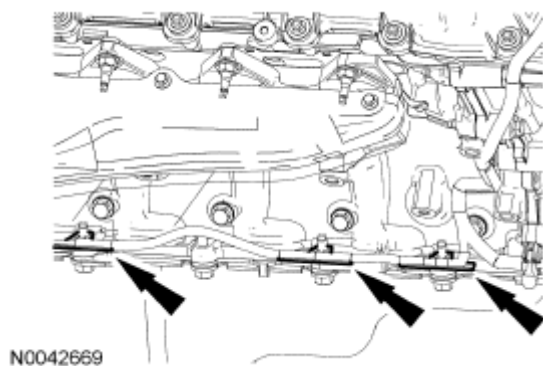


Fig. 280: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

9. Disconnect the crankshaft position sensor electrical connector and detach the wiring harness retainer.



Fig. 281: Locating Crankshaft Position Sensor Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

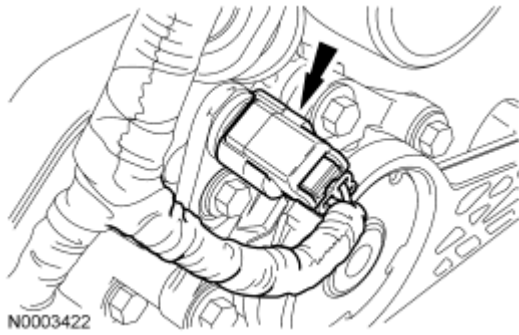


Fig. 282: Identifying RH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

10. Disconnect the RH and LH camshaft position (CMP) sensor electrical connectors.

NOTE: RH shown, LH similar.

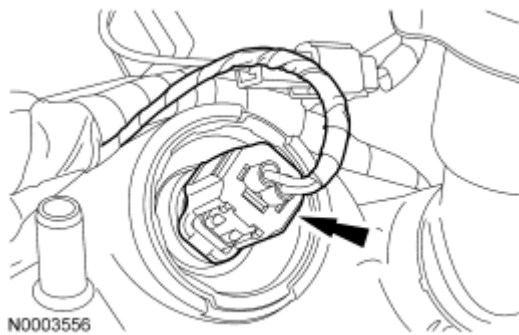


Fig. 283: Locating Camshaft Timing (VCT) Solenoid Electrical Connectors
Courtesy of FORD MOTOR CO.

11. Disconnect the RH and LH variable camshaft timing (VCT) solenoid electrical connectors.
12. Detach the wiring harness retainers.

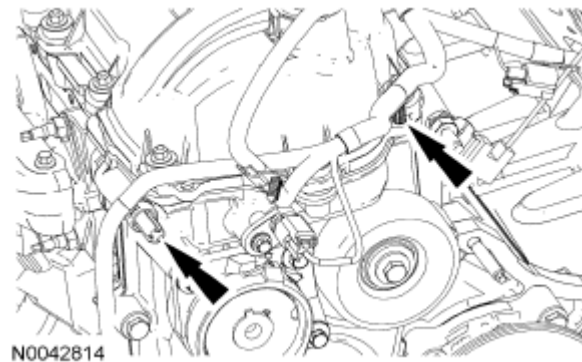


Fig. 284: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

13. Remove the nut and the RH radio ignition interference capacitor.

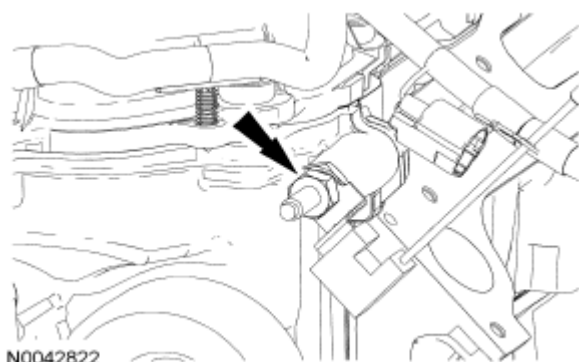


Fig. 285: Locating RH Radio Ignition Interference Capacitor Nut
Courtesy of FORD MOTOR CO.

14. Disconnect the oil pressure sensor electrical connector.

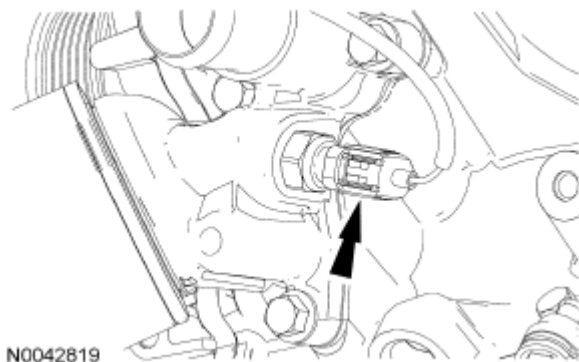


Fig. 286: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

15. Disconnect the LH CMP sensor electrical connector and detach the wiring harness retainers.

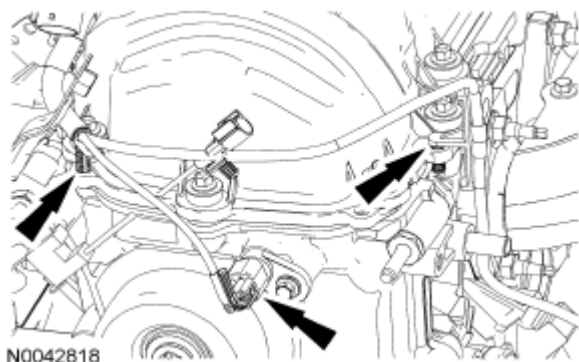


Fig. 287: Locating LH CMP Sensor Electrical Connector And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

16. Remove the nut and the cooling fan wiring harness bracket.

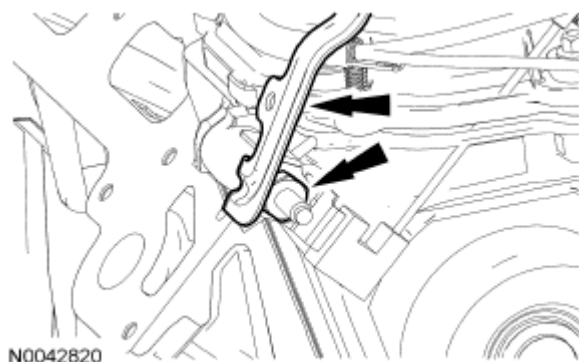


Fig. 288: Locating Cooling Fan Wiring Harness Bracket Nut
Courtesy of FORD MOTOR CO.

17. Remove the nut and detach the LH radio interference capacitor.

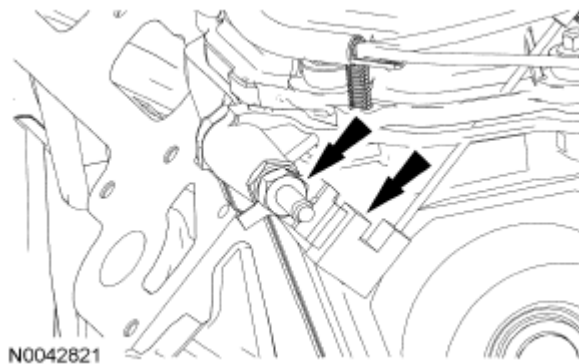


Fig. 289: Locating LH Radio Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

18. Detach the from the LH valve cover studs.

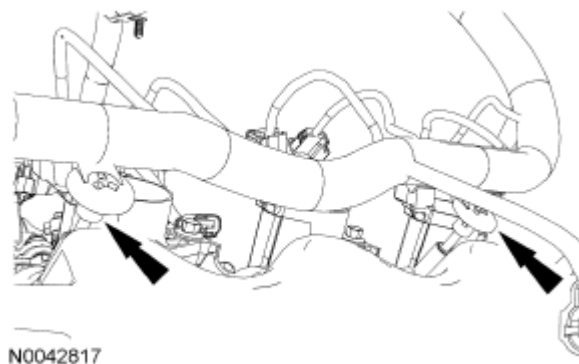


Fig. 290: Locating LH Valve Cover Studs
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

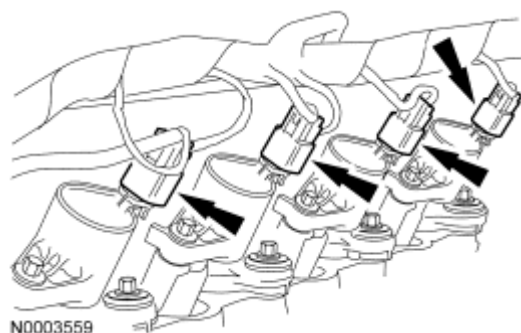


Fig. 291: Locating Ignition Coil Electrical Connectors
Courtesy of FORD MOTOR CO.

19. Disconnect the 4 RH and 4 LH ignition coil electrical connectors.
20. Detach the wiring harness retainers from the RH valve cover studs.

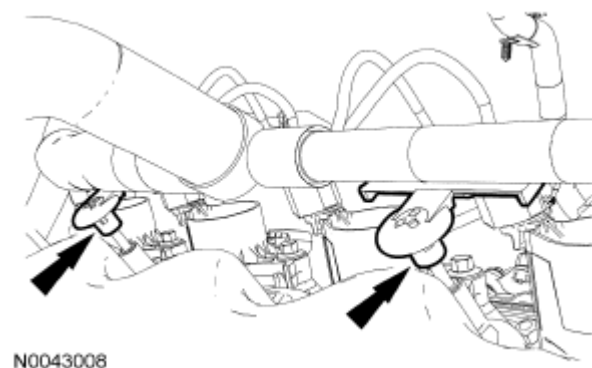


Fig. 292: Locating RH Valve Cover Studs
Courtesy of FORD MOTOR CO.

21. Disconnect the cylinder head temperature (CHT) sensor electrical connector.

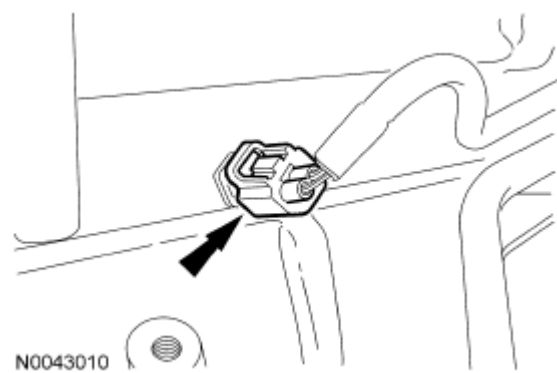


Fig. 293: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

22. Remove the nut and the ground strap.

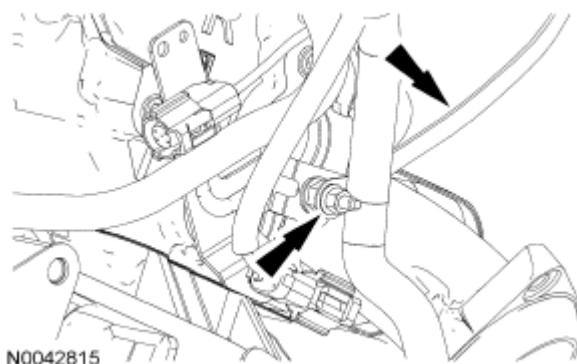


Fig. 294: Locating Nut And Ground Strap
Courtesy of FORD MOTOR CO.

23. Detach the electrical connector retainers and remove the engine wiring harness.

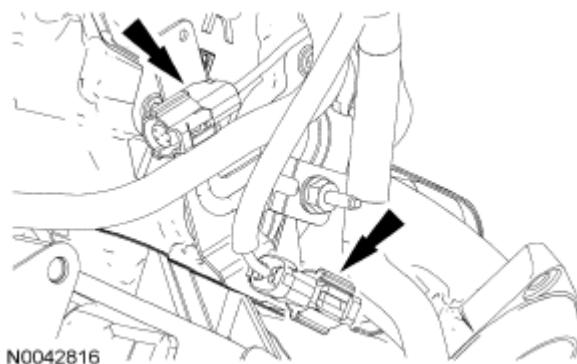


Fig. 295: Locating Electrical Connector Retainers And Engine Wiring Harness
Courtesy of FORD MOTOR CO.

24. Remove the stud bolt and the heater supply tube and hoses as an assembly.
- Discard the O-ring seals.

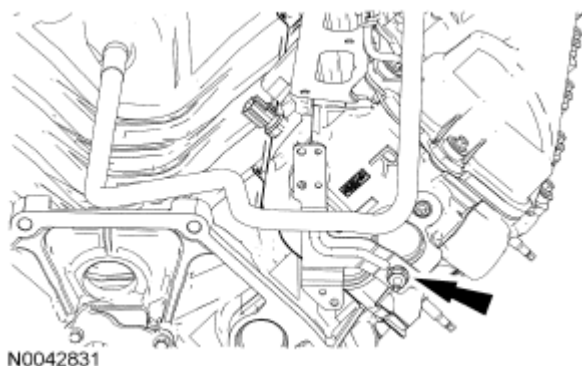


Fig. 296: Locating Heater Supply Tube Stud Bolt

Courtesy of FORD MOTOR CO.

CAUTION: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube.

25. Remove the breather tube from the RH valve cover.

- Disconnect the quick connect fittings.
 - Push the connector toward the valve cover to release pressure.
 - Push the release tab clockwise.
 - Disconnect the quick connect fitting.

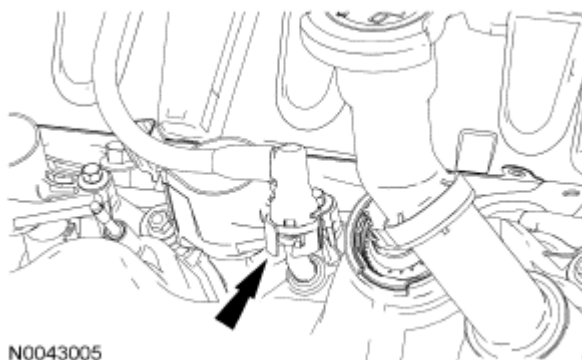


Fig. 297: Locating Breather Tube Connector Retaining Clip
Courtesy of FORD MOTOR CO.

CAUTION: When reusing liquid or vapor tube connectors, make sure to use compressed air to remove any foreign material from the connector retaining clip area before separating from the tube.

26. Remove the positive crankcase ventilation (PCV) tube from the LH valve cover.

- Disconnect the quick connect fittings.
 - Push the connector toward the valve cover to release pressure.
 - Push the release tab clockwise.
 - Disconnect the quick connect fitting.

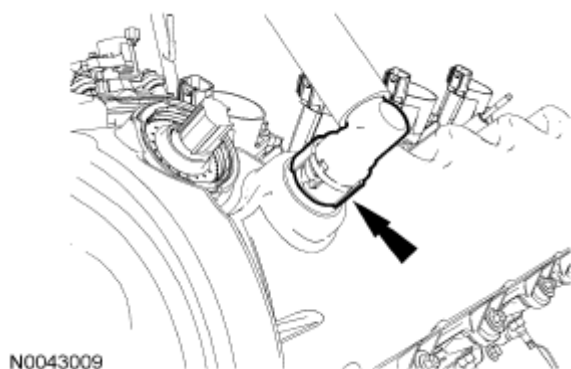


Fig. 298: Locating Positive Crankcase Ventilation (PCV) Tube Connector Retaining Clip
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

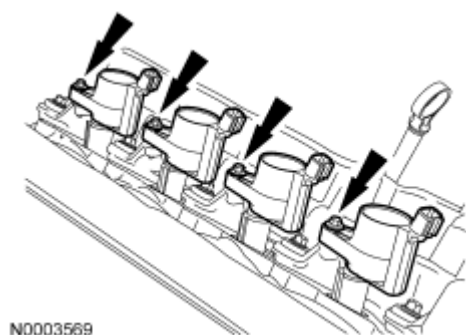


Fig. 299: Identifying Ignition Coils And Bolts
Courtesy of FORD MOTOR CO.

27. Remove the 8 bolts and the 8 ignition coils.
28. Remove the bolts and the LH engine support insulator bracket.

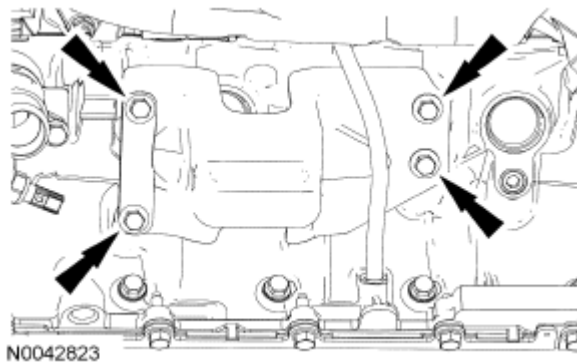


Fig. 300: Locating LH Engine Support Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

29. Remove and discard the oil filter. Remove the bolts and the oil filter adapter.

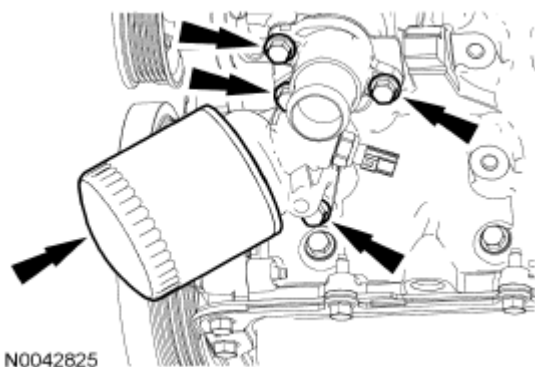


Fig. 301: Locating Bolts And Oil Filter Adapter
Courtesy of FORD MOTOR CO.

30. Remove the bolts and the LH exhaust manifold heat shield.

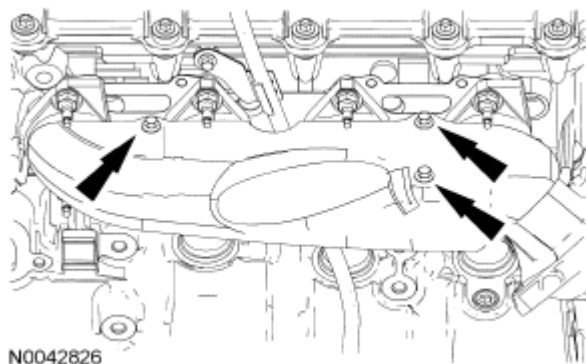


Fig. 302: Locating LH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

31. Remove the nuts, the LH exhaust manifold and the gaskets.
- Discard the nuts and the gaskets.

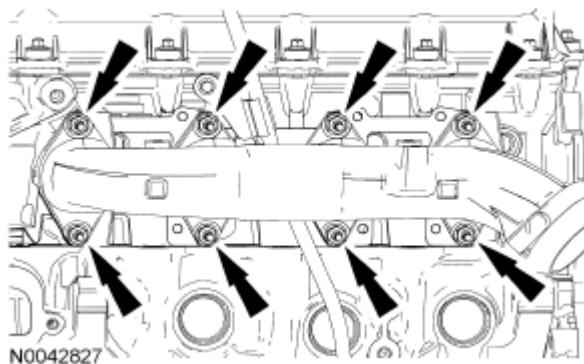


Fig. 303: Locating LH Exhaust Manifold Nuts

Courtesy of FORD MOTOR CO.

32. Remove and discard the 8 LH exhaust manifold studs.
33. Remove the bolt and the oil level indicator tube.

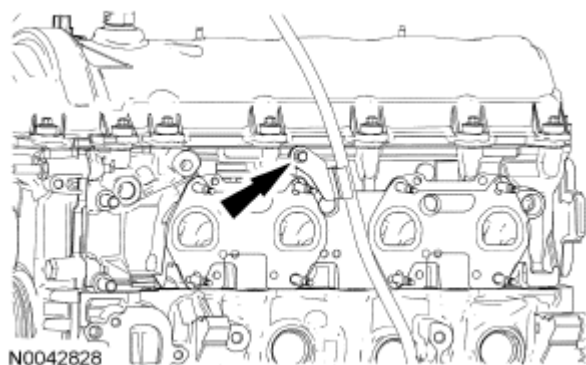


Fig. 304: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

34. Remove the bolts and the RH engine support insulator bracket.

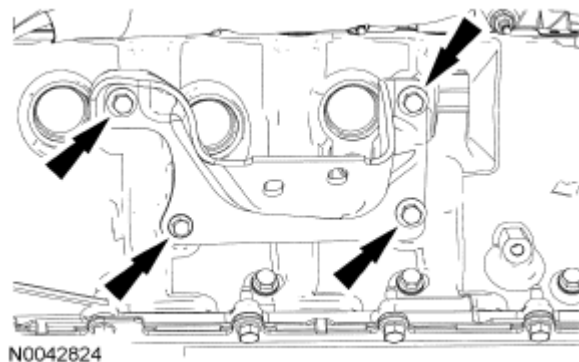


Fig. 305: Locating RH Engine Support Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

35. Remove the bolts and the RH exhaust manifold heat shield.

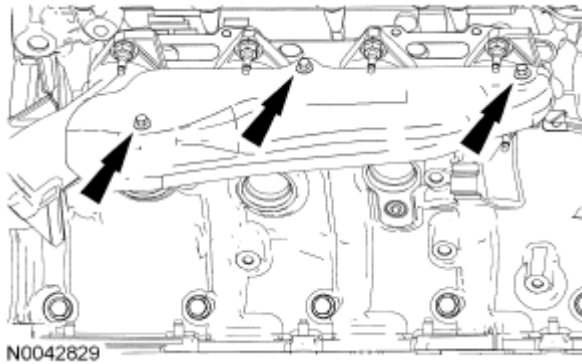


Fig. 306: Locating RH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

36. Remove the nuts, the RH exhaust manifold and the gaskets.
- Discard the nuts and the gaskets.

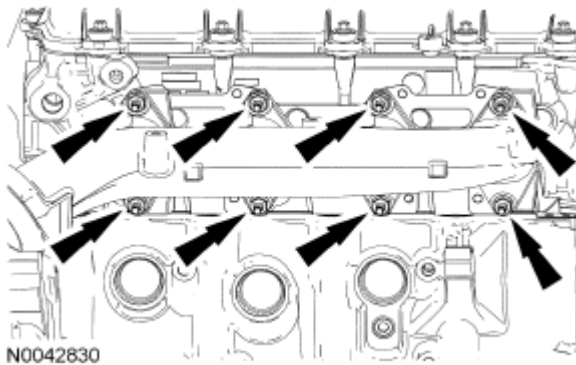


Fig. 307: Locating RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

37. Remove and discard the 8 RH exhaust manifold studs.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

CAUTION: When removing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

NOTE: The bolts are part of the valve cover and should not be removed.

38. Loosen the 14 bolts and remove the RH valve cover.
- Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal

surface prep. Follow the directions on the packaging.

- Inspect the valve cover gasket. If the gasket is damaged, remove and discard the gasket. Clean the valve cover gasket groove with soap and water or a suitable solvent.

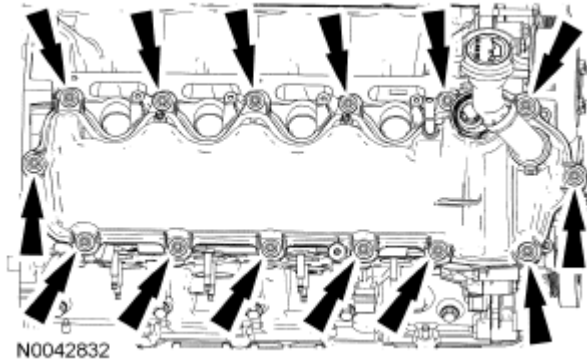


Fig. 308: Locating RH Valve Cover Bolts

Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

CAUTION: When removing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

NOTE: The bolts are part of the valve cover and should not be removed.

39. Loosen the 15 bolts and remove the LH valve cover.

- Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the valve cover gasket. If the gasket is damaged, remove and discard the gasket. Clean the valve cover gasket groove with soap and water or a suitable solvent.

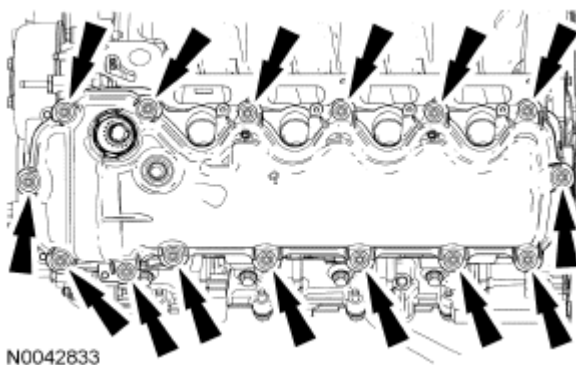


Fig. 309: Locating LH Valve Cover Bolts
Courtesy of FORD MOTOR CO.

40. Remove the bolt and the RH CMP sensor.

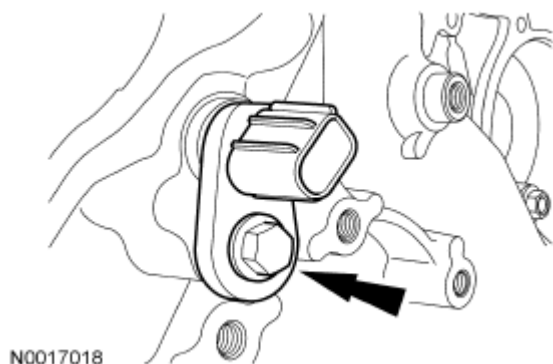


Fig. 310: Locating RH CMP Sensor Bolt
Courtesy of FORD MOTOR CO.

41. Remove the bolt and the LH CMP sensor.

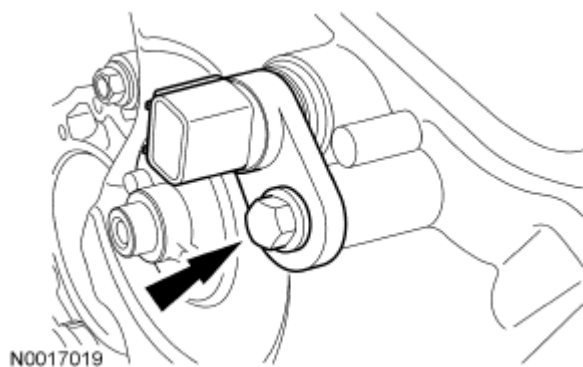


Fig. 311: Locating LH CMP Sensor Bolt
Courtesy of FORD MOTOR CO.

42. Remove the bolt and the CKP sensor.

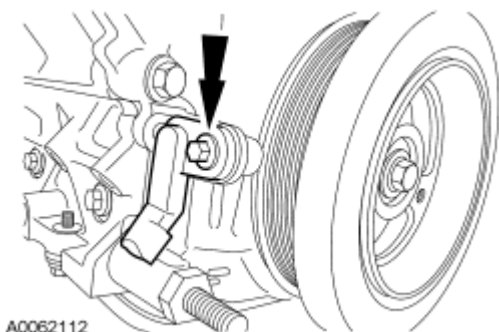


Fig. 312: Locating Crankshaft Position (CKP) Sensor Bolt
Courtesy of FORD MOTOR CO.

43. Remove the 7 bolts, the coolant pump pulley and the 3 accessory drive belt idler pulleys.

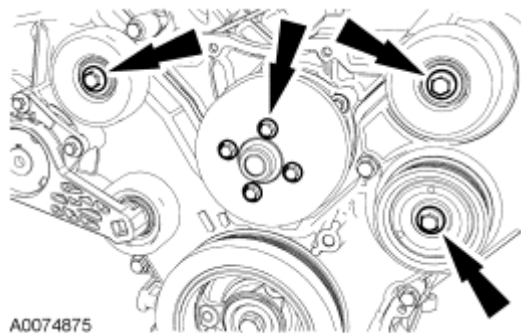


Fig. 313: Locating Coolant Pump Pulley And Accessory Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

44. Remove the 3 bolts and the accessory drive belt tensioner.

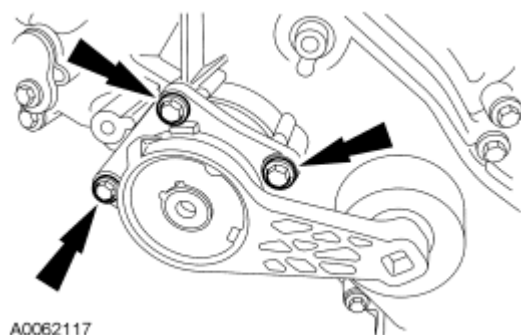


Fig. 314: Identifying Accessory Drive Belt Tensioner Bolts
Courtesy of FORD MOTOR CO.

45. Remove the 4 coolant pump bolts.

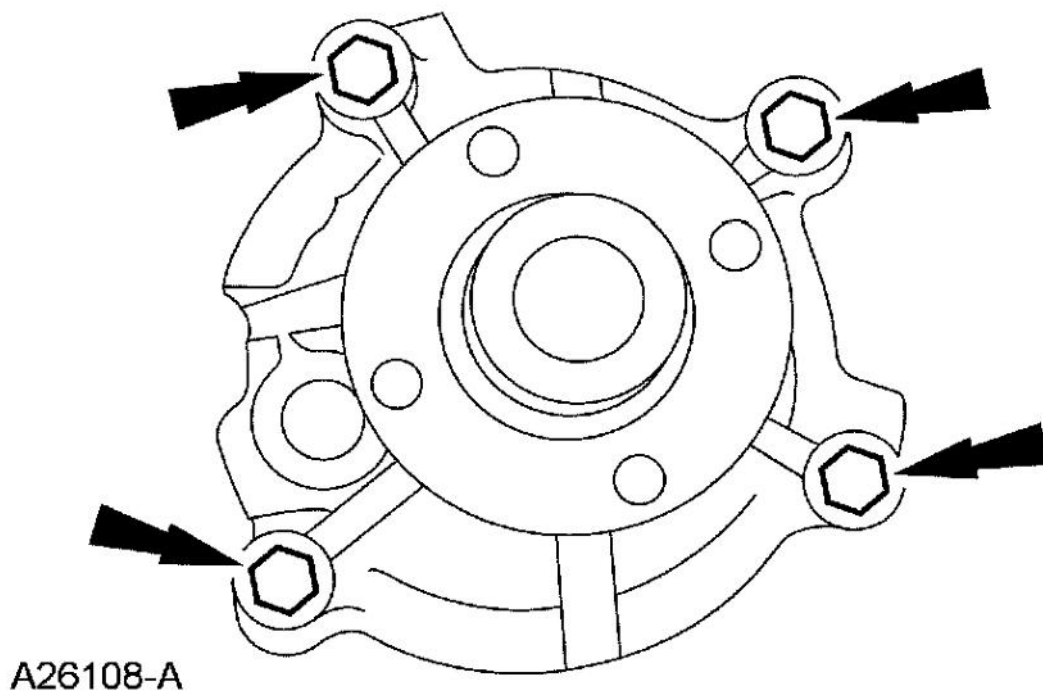


Fig. 315: Identifying Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

46. Remove the coolant pump from the cylinder block.
- Discard the O-ring seal.

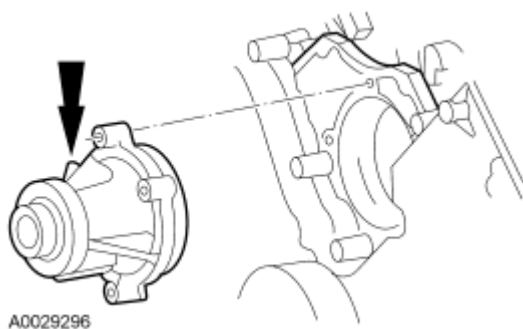


Fig. 316: Identifying Coolant Pump
Courtesy of FORD MOTOR CO.

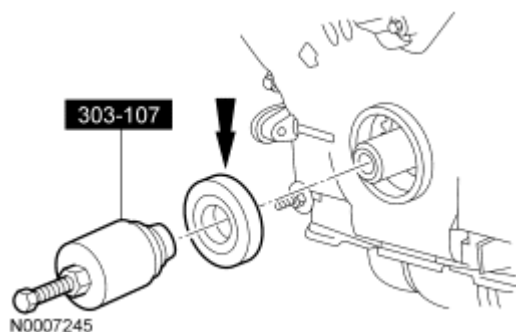
47. Remove and discard the crankshaft pulley bolt. Using the special tool, remove the crankshaft pulley.



N0010528

Fig. 317: Identifying Special Tool
Courtesy of FORD MOTOR CO.

48. Using the special tool, remove the crankshaft front oil seal.

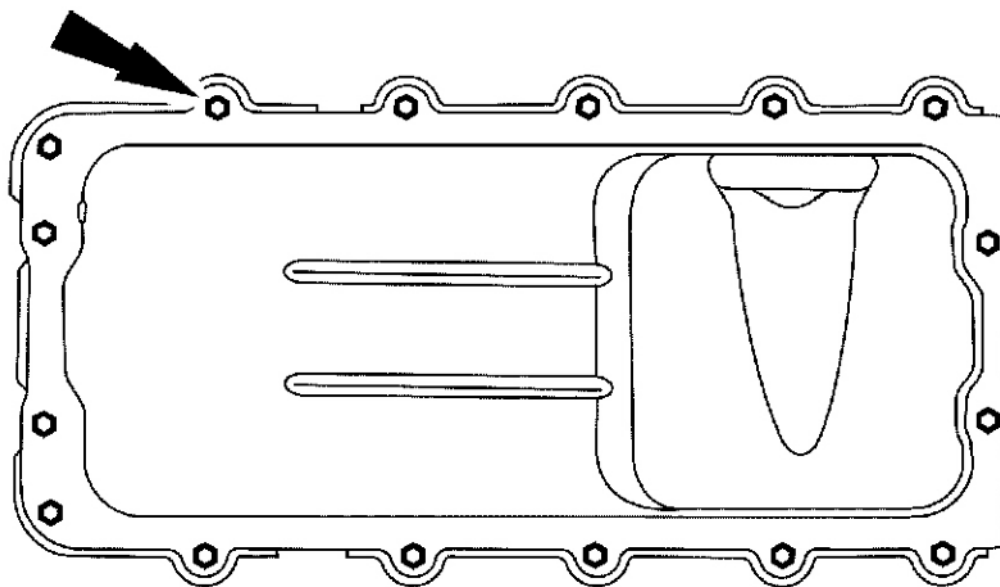


N0007245

Fig. 318: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

49. Remove the bolts, oil pan and oil pan gasket.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.



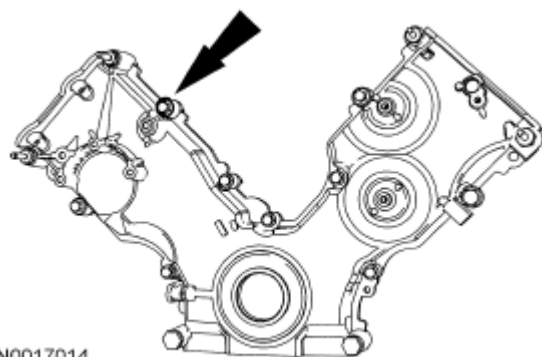
A26563-B

Fig. 319: Identifying Oil Pan Bolts

Courtesy of FORD MOTOR CO.

- Clean and inspect the sealing surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

NOTE: Correct fastener location is essential for the assembly procedure. Record fastener location.



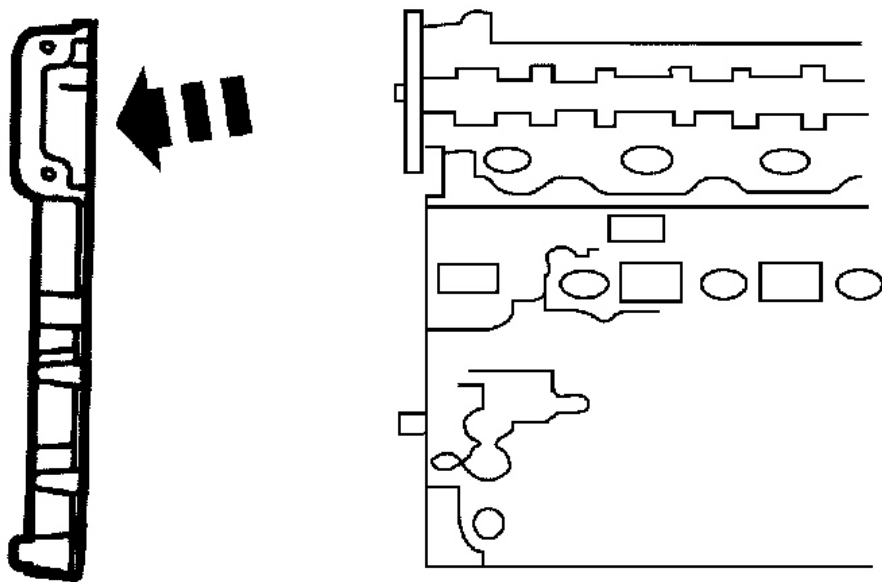
N0017014

Fig. 320: Locating Engine Front Cover Fasteners

Courtesy of FORD MOTOR CO.

50. Remove the engine front cover fasteners.

51. Remove the engine front cover from the cylinder block.



AA1665-A

Fig. 321: Locating Engine Front Cover
Courtesy of FORD MOTOR CO.

52. Remove the crankshaft sensor ring from the crankshaft.

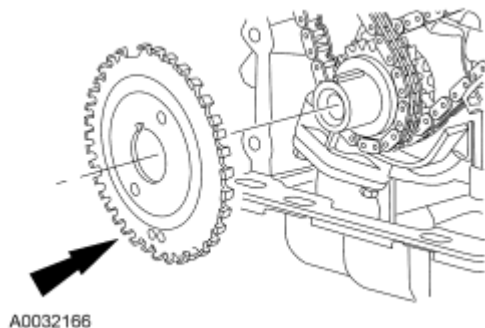


Fig. 322: View Of Crankshaft Sensor Ring At Crankshaft
Courtesy of FORD MOTOR CO.

53. Position the crankshaft keyway at the 12 o'clock position.

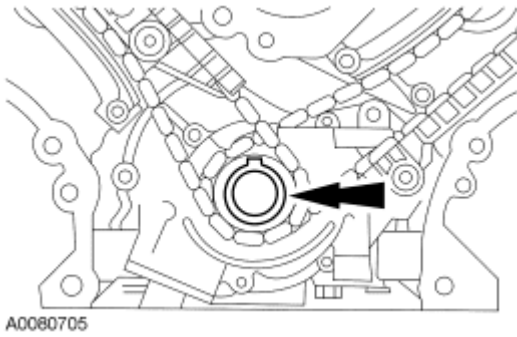


Fig. 323: Positioning Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

NOTE: If the camshaft lobes are not exactly positioned as shown, the crankshaft will require one full additional rotation to the 12 o'clock position.

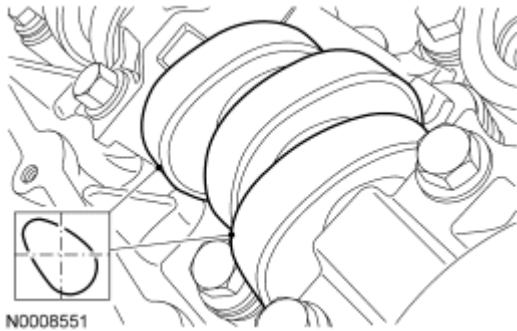
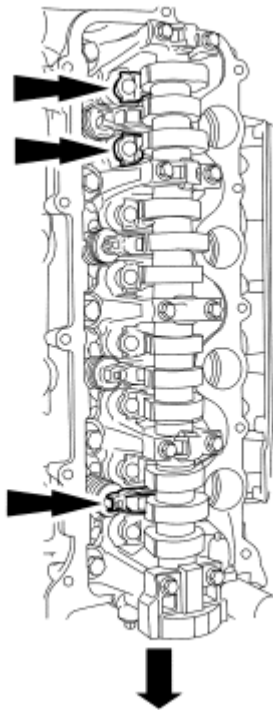


Fig. 324: Identifying Camshaft Lobe Position
Courtesy of FORD MOTOR CO.

54. The No. 1 cylinder camshaft exhaust lobe must be coming up on the exhaust stroke. Verify by noting the position of the 2 intake lobes and the exhaust lobe on the No. 1 cylinder.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



A0083248

Fig. 325: Identifying RH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

55. Remove only the 3 roller followers shown in the illustration from the RH cylinder head.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

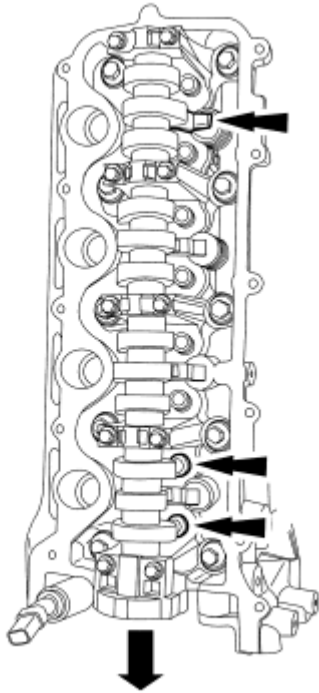
NOTE: It may be necessary to push the valve down while compressing the spring.



Fig. 326: Identifying Special Tool For Removing/Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

56. Using the special tool, remove the 3 roller followers designated in the previous step from the RH cylinder head.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.



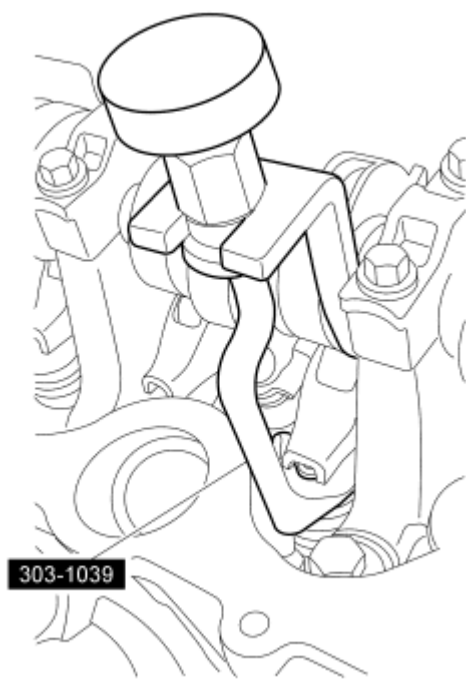
A0084479

Fig. 327: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

57. Remove only the 3 roller followers shown in the illustration from the LH cylinder head.

CAUTION: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder.

NOTE: It may be necessary to push the valve down while compressing the spring.

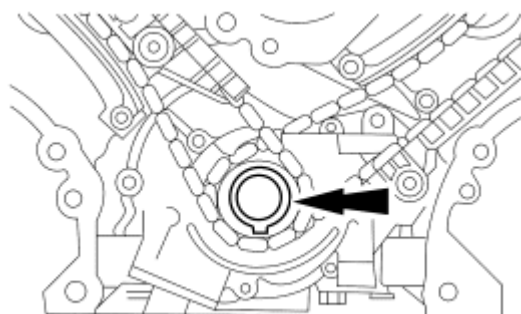


N0010191

Fig. 328: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

58. Using the special tool, remove the 3 roller followers designated in the previous step from the LH cylinder head.

CAUTION: The crankshaft cannot be moved past the 6 o'clock position once set.



N0006305

Fig. 329: Crankshaft Positioned With Keyway At 6 O'clock Position
Courtesy of FORD MOTOR CO.

59. Rotate the crankshaft clockwise and position the crankshaft keyway at the 6 o'clock position.
60. Remove the 2 bolts, the LH timing chain tensioner and tensioner arm.

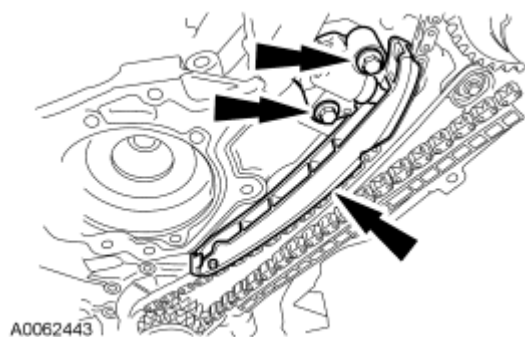


Fig. 330: Identifying LH Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

61. Remove the 2 bolts, the RH timing chain tensioner and tensioner arm.

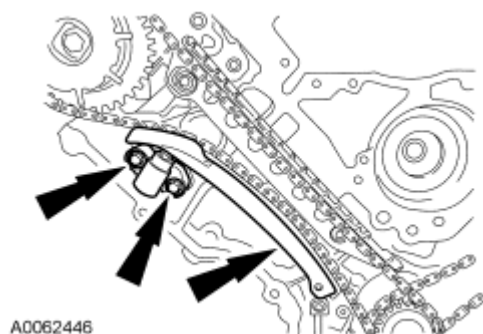


Fig. 331: Identifying RH Timing Chain Tensioner, Tensioner Arm And Bolts
Courtesy of FORD MOTOR CO.

62. Remove the RH and LH timing chains and the crankshaft sprocket.
- Remove the RH timing chain from the camshaft sprocket.
 - Remove the RH timing chain from the crankshaft sprocket.
 - Remove the LH timing chain from the camshaft sprocket.
 - Remove the LH timing chain and crankshaft sprocket.

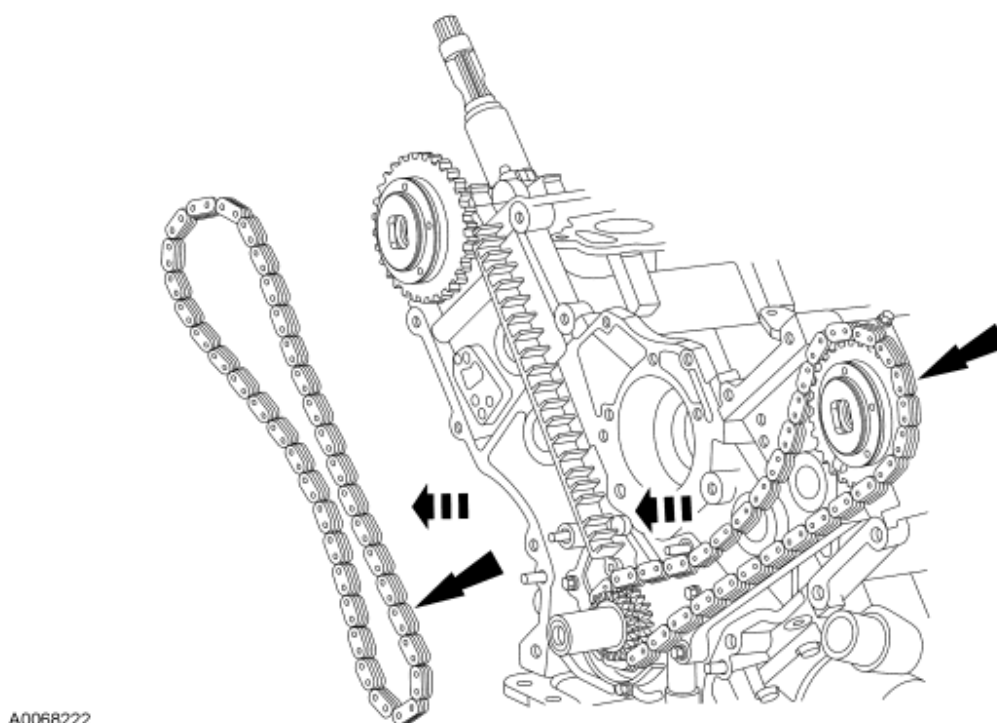


Fig. 332: Identifying RH/LH Timing Chains
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

63. Remove the LH and RH timing chain guides.

- Remove the 2 bolts.
- Remove both timing chain guides.

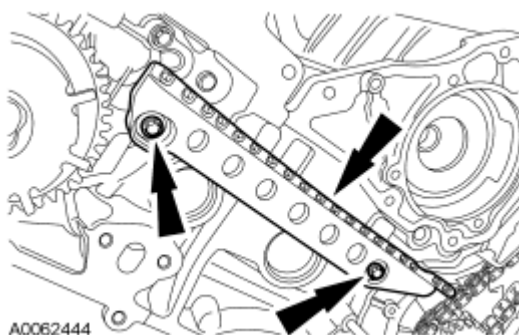


Fig. 333: Identifying Timing Chain Guide And Mounting Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

64. Using the special tool, remove the bolt and the RH camshaft phaser sprocket assembly.
- Discard the camshaft phaser sprocket bolt.

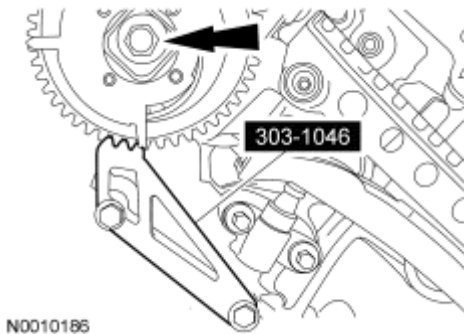


Fig. 334: Identifying VCT Phaser Sprocket Bolt And Holder Tool
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

65. Using the special tool, remove the bolt and the LH camshaft phaser sprocket assembly.
- Discard the camshaft phaser sprocket bolt.

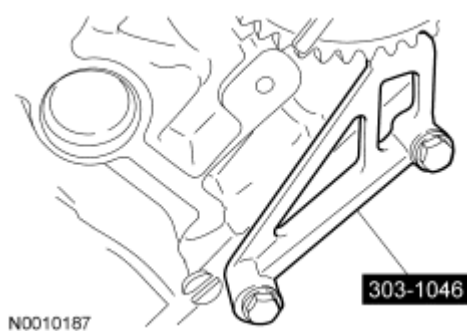


Fig. 335: Identifying Special Sprocket Phaser Tool
Courtesy of FORD MOTOR CO.

66. Install the special tool onto the LH cylinder head.

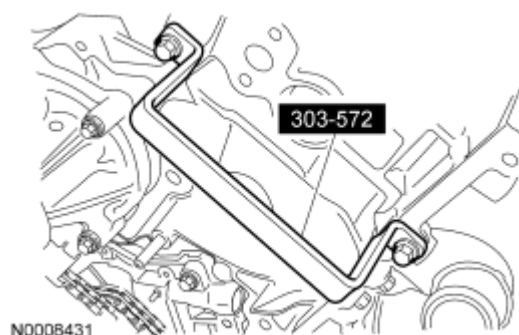


Fig. 336: Identifying Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

67. Install the special tool onto the RH cylinder head.

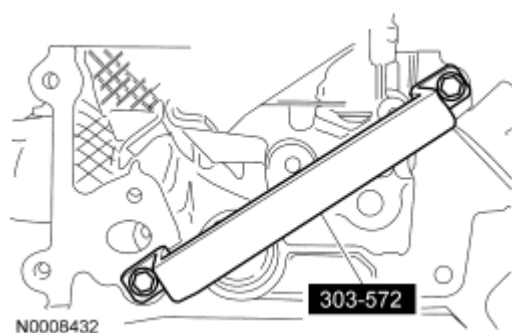
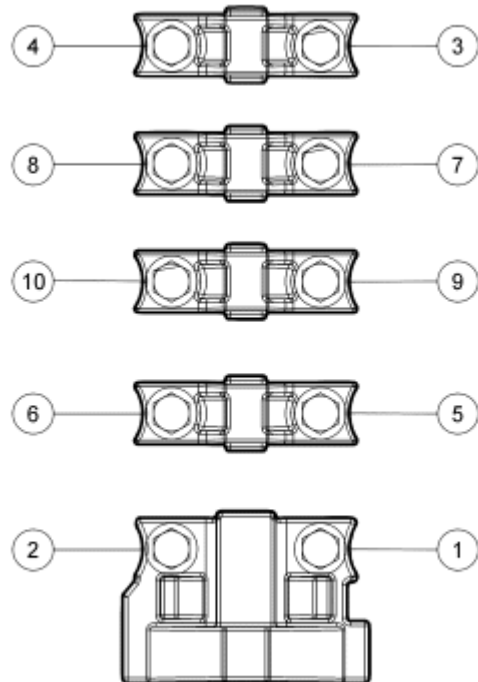


Fig. 337: Identifying Special Tool On Cylinder Head
Courtesy of FORD MOTOR CO.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

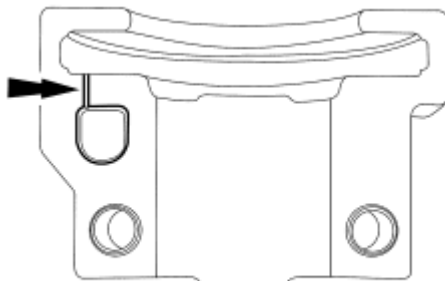
NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.



N0010190

Fig. 338: Identifying Camshaft Bearing Caps Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

68. Remove the bolts in the sequence shown. Remove the RH cylinder head front camshaft bearing cap, then the remaining bearing caps.
69. Clean and inspect the RH camshaft bearing caps.
 - The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

Fig. 339: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

70. Remove the RH camshaft.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

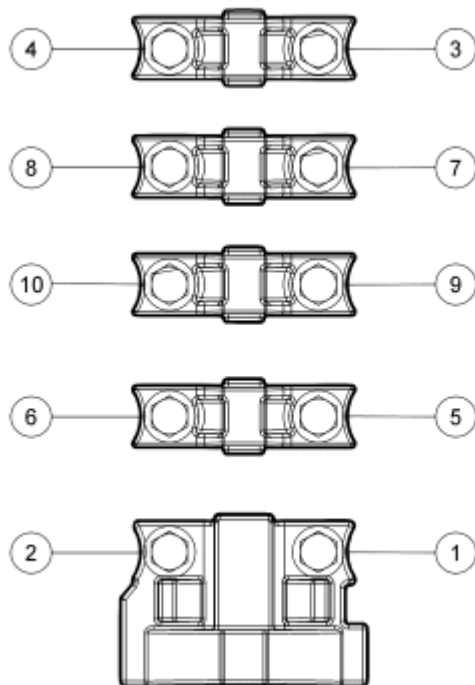
71. Remove the remaining roller followers from the RH cylinder head.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

72. Remove the hydraulic lash adjusters from the RH cylinder head.

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations.

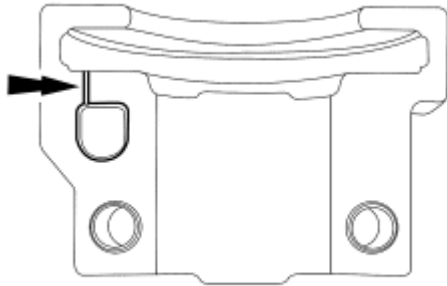


N0010190

Fig. 340: Identifying Camshaft Bearing Caps Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

73. Remove the bolts in the sequence shown. Remove the LH cylinder head front camshaft bearing cap, then the remaining bearing caps.
74. Clean and inspect the LH camshaft bearing caps.

- The camshaft front thrust bearing cap contains an oil metering groove. Make sure the groove is free of foreign material.



N0010448

Fig. 341: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

75. Remove the LH camshaft.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

76. Remove the remaining roller followers from the LH cylinder head.

CAUTION: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations.

77. Remove the hydraulic lash adjusters from the LH cylinder head.

CAUTION: The cylinder head must be cool before removing it from the engine. Cylinder head warpage can result if a warm or hot cylinder head is removed.

CAUTION: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.

CAUTION: The cylinder head bolts must be discarded and new bolts must be installed. They are tighten-to-yield designed and cannot be reused.

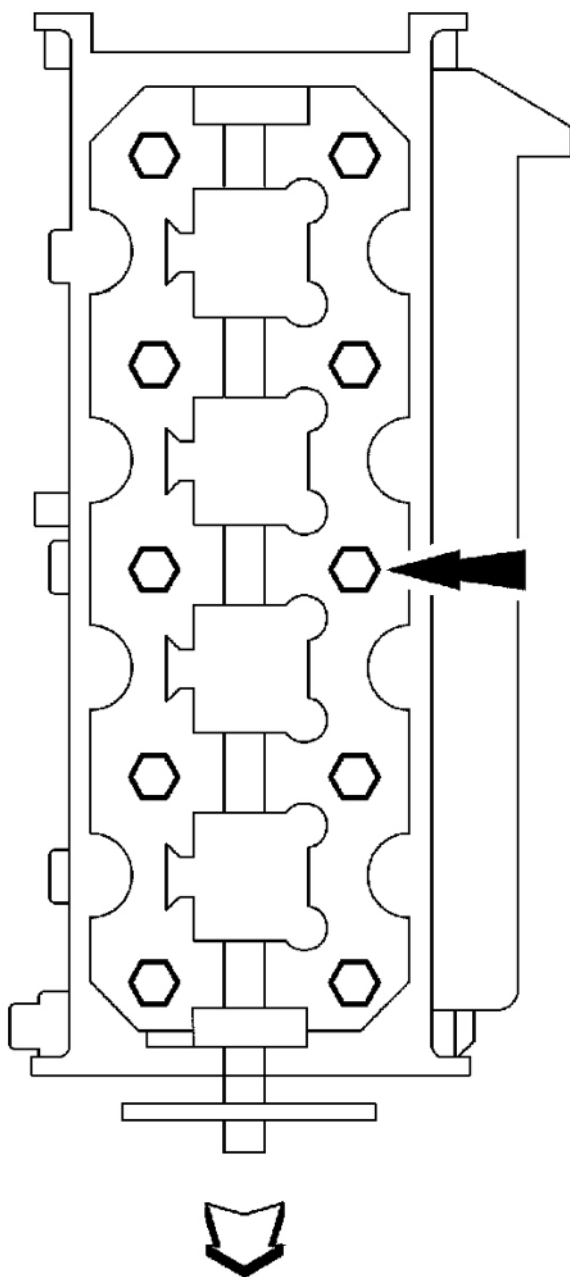
CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

CAUTION: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.

NOTE: RH shown, LH similar.

78. Remove the 20 bolts and the cylinder heads.

- Discard the cylinder head gaskets.
- Discard the cylinder head bolts.



A26253-A

Fig. 342: Locating Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or

other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.

CAUTION: Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

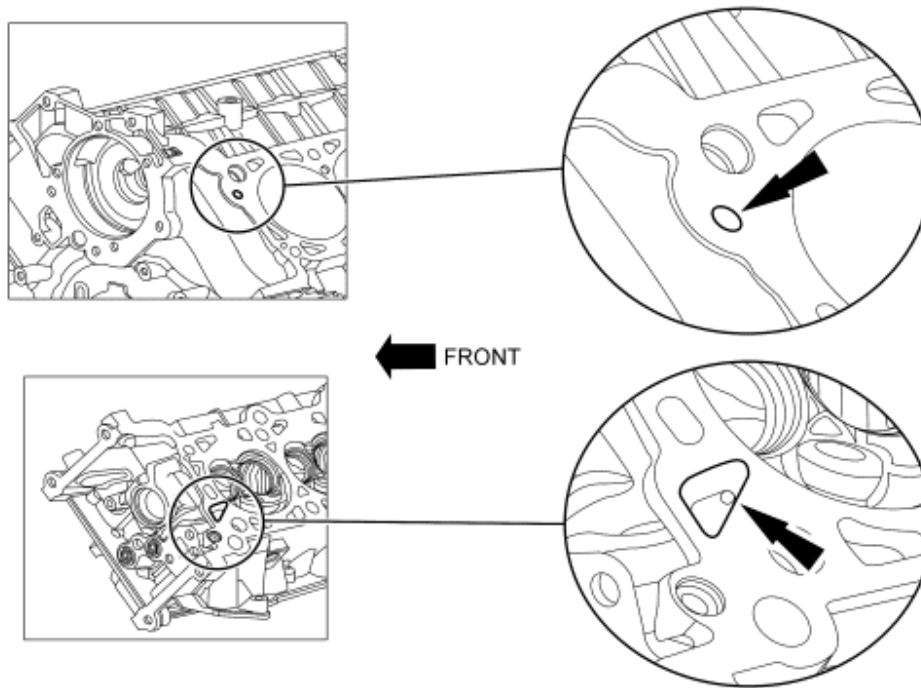
NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

79. Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block.
1. Remove any large deposits of silicone or gasket material with a plastic scraper.
 2. Apply silicone gasket remover, following package directions and allow to set for several minutes.
 3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
 4. Apply metal surface prep, following package directions, to remove any remaining traces of oil or coolant and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

NOTE: Make sure all cylinder head surfaces are clear of any gasket material, RTV, oil and coolant. The cylinder head surface must be clean and dry before running a flatness check.

NOTE: Use a straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot length. For example, if the straightedge is 61 cm (24 in) long, the machined edge must be flat within 0.010 mm (0.0004 in) from end to end.

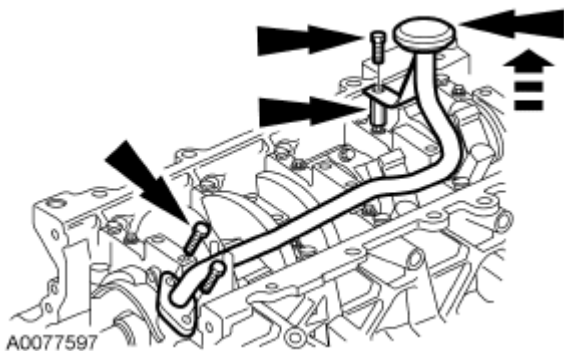
NOTE: LH shown, RH similar.



A0079634

Fig. 343: Identifying Cylinder Head/Cylinder Block Oil Pressure Feed Areas
Courtesy of FORD MOTOR CO.

80. Support the cylinder heads on a bench with the head gasket side up. Inspect all areas of the deck face with a straightedge, paying particular attention to the oil pressure feed area. The cylinder heads must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches longer than 0.0254 mm (0.001 in).
81. Remove the bolts, the oil pump screen and pickup tube and the spacer.



A0077597

Fig. 344: Removing Bolts, Oil Pump Screen, Pickup Tube And Spacer
Courtesy of FORD MOTOR CO.

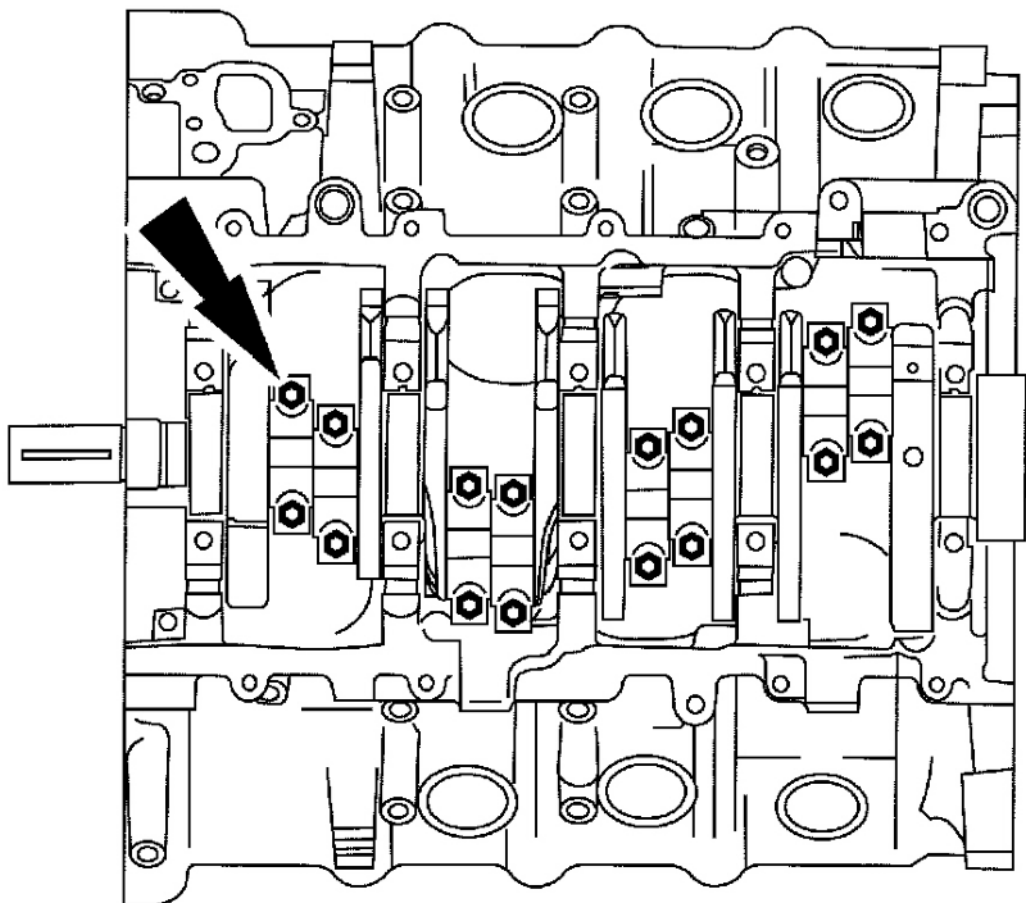
82. Remove the 3 bolts and the oil pump.



Fig. 345: Locating Oil Pump Bolts
Courtesy of FORD MOTOR CO.

83. Before removing the pistons, inspect the top of the cylinder bores. If necessary, remove the ridge or carbon deposits from each cylinder using an abrasive pad or equivalent, following the manufacturer instructions.

CAUTION: Verify that the connecting rods and rod caps have orientation numbers cast into them. If not, number the connecting rods and rod caps for correct orientation.

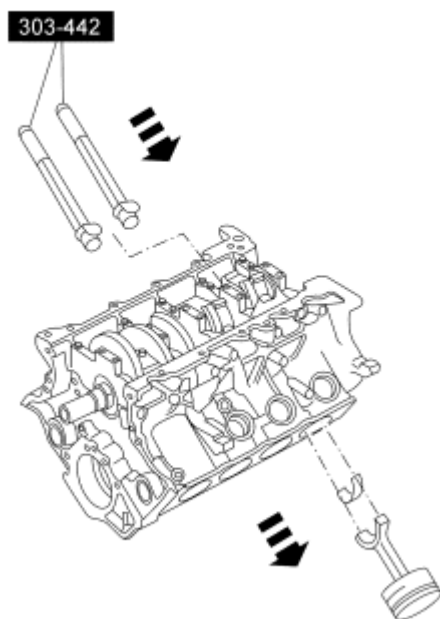


DA0578-A

Fig. 346: Identifying Bolts And Connecting Rod Caps
Courtesy of FORD MOTOR CO.

84. Remove the bolts and the connecting rod caps. Discard the bolts.

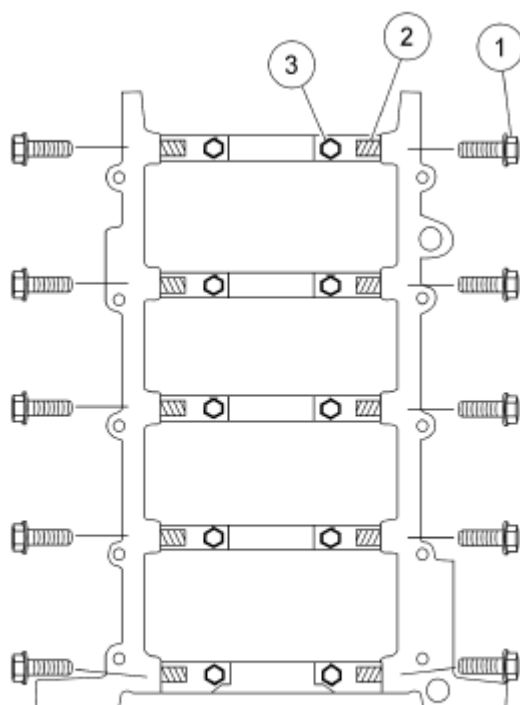
CAUTION: Do not scratch the cylinder walls or crankshaft journals with the connecting rod.



N0010189

Fig. 347: Pushing Piston Through Top Of Cylinder Block
Courtesy of FORD MOTOR CO.

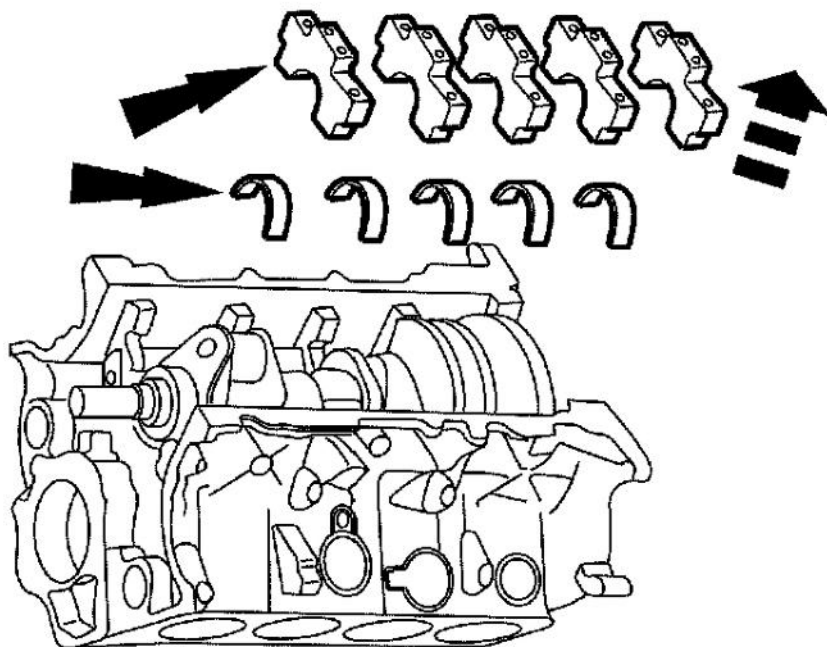
85. Use the special tool to push the piston through the top of the cylinder block.
86. Disassemble the 8 pistons. For additional information, refer to **PISTON**.
87. Remove the fasteners.
 1. Remove and discard the cross-mounted main cap bolts.
 2. Loosen the jack screws.
 3. Remove and discard the main bearing cap bolts and the stud bolt.



N0015130

Fig. 348: Identifying Main Cap Bolts, Jack Screws And Main Bearing Cap Bolts
Courtesy of FORD MOTOR CO.

88. Remove the 5 main bearing caps, the lower crankshaft main bearings and the lower thrust washer.



DA0518-B

Fig. 349: Identifying Main Bearing Caps
Courtesy of FORD MOTOR CO.

89. Remove the crankshaft, the upper crankshaft main bearings and the upper thrust washers from the cylinder block.

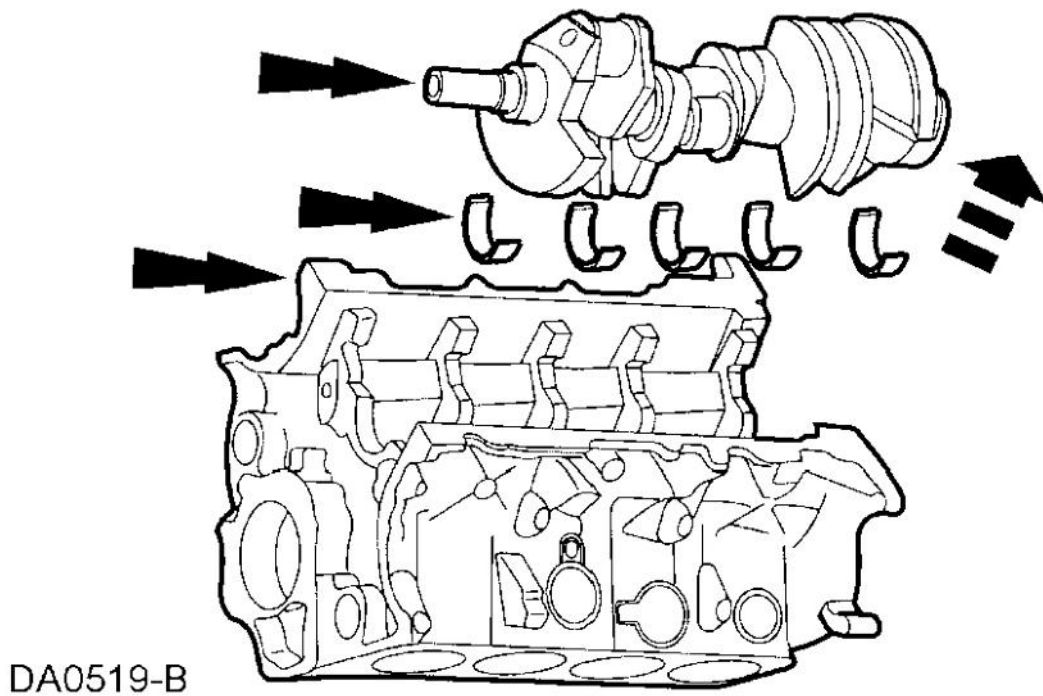


Fig. 350: Identifying Crankshaft And Main Bearings
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

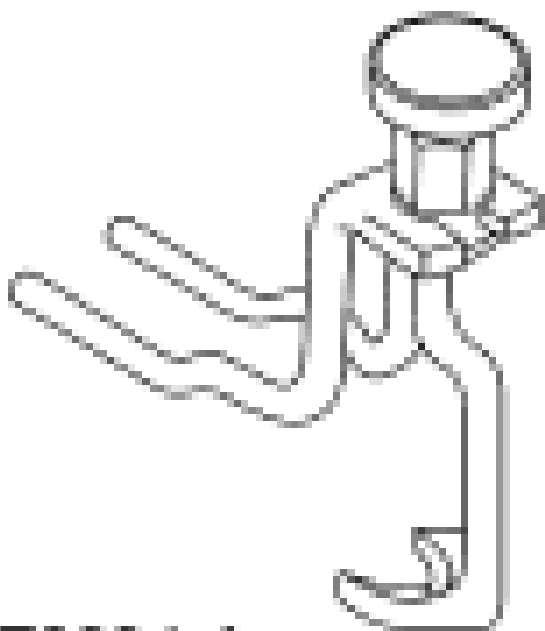
CYLINDER HEAD

SPECIAL TOOL(S)

	Compressor, Valve Spring 303-1039
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2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2804-A



ST1332-A

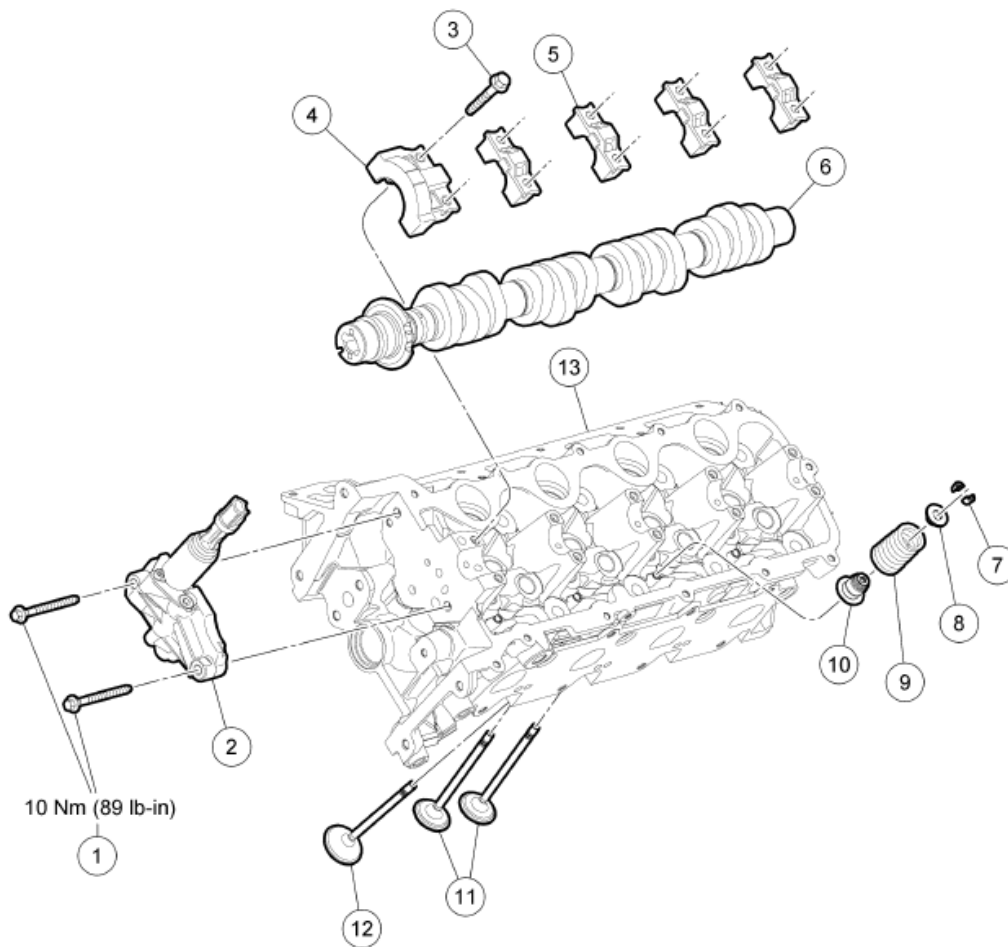
Installer, Valve Stem Oil Seal
303-383 (T91T-6571-A)

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



N0010131

Item	Part Number	Description
1	W701520	Variable camshaft timing (VCT) housing assembly bolts (2 required)
2	6C261 LH/ 6C260 RH	VCT housing assembly
3	N807834	Camshaft bearing cap bolt (10 required)
4	6B284	Camshaft front bearing cap
5	6B280	Camshaft bearing cap (4 required)

Item	Part Number	Description
6	6C255 LH/ 6251 RH	Camshaft
7	6518	Valve spring retainer key (24 required)
8	6514	Valve spring retainer (12 required)
9	6513	Valve spring (12 required)
10	6A517	Valve seal (12 required)
11	6507	Intake valves (8 required)
12	6505	Exhaust valve (4 required)
13	6050 LH/ 6049 RH	Cylinder head

Fig. 351: Identifying Cylinder Head Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Disassembly

1. Remove the bolts and the variable camshaft timing (VCT) housing.
 - Discard the gasket.

2. Lubricate the camshaft and camshaft journals with clean engine oil and install the camshaft.

NOTE: **The camshaft must be installed in the head to use the special tool necessary to compress the valve springs.**

NOTE: **Lubricate the camshaft bearing caps with clean engine oil.**

3. Install the camshaft bearing caps in their original locations.
 - Position the front camshaft bearing cap.
 - Position the remaining camshaft bearing caps.
 - Install the bolts finger-tight.
4. Using the special tool, compress the valve spring and remove the valve spring retainer keys.



Fig. 352: Compressing Valve Spring With Special Tool
Courtesy of FORD MOTOR CO.

5. Remove the valve spring retainer, the valve spring and the valve seal.
 - Discard the valve seal.
6. Remove the valve from the cylinder head.
7. Repeat the previous 3 steps for each valve.
8. Inspect the components. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

CAUTION: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from sideloading.

9. Remove the bolts and the front camshaft bearing cap and then the remaining bearing caps.
10. Remove the camshaft.
11. Check the cylinder head for distortion. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

Assembly

1. Lubricate the camshaft and camshaft journals with clean engine oil and install the camshaft.

NOTE: Lubricate the camshaft bearing caps with clean engine oil.

2. Install the camshaft bearing caps in their original locations.
 - Position the front camshaft bearing cap.
 - Position the remaining camshaft bearing caps.
 - Install the bolts finger-tight.

NOTE: Lubricate the valve stem with clean engine oil prior to installation.

3. Install the valve into the cylinder head.

NOTE: Lubricate the valve seal and valve stem with clean engine oil prior to installation.

4. Position a new valve seal onto the valve stem.
5. Using the special tool, install the new valve seal.

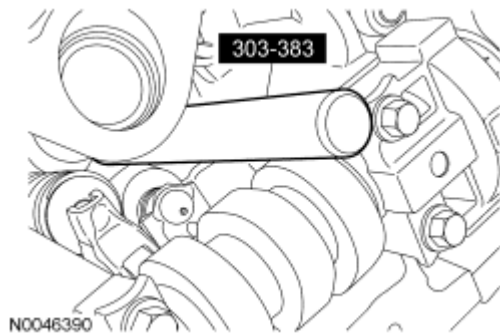


Fig. 353: Installing Valve Seal Using Special Tool
Courtesy of FORD MOTOR CO.

6. Using the special tool, install the valve spring, the valve spring retainer and the valve spring retainer keys.



Fig. 354: Compressing Valve Spring With Special Tool

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

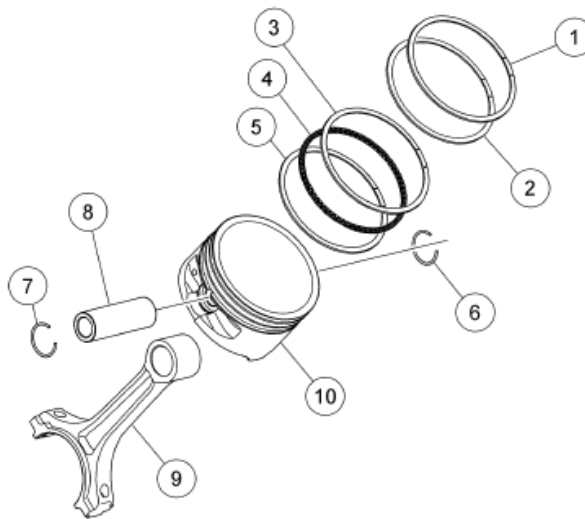
Courtesy of FORD MOTOR CO.

7. Repeat the previous 2 steps for each valve.
8. Remove the bolts and the front camshaft bearing cap and then the remaining bearing caps.
9. Remove the camshaft.
10. Install a new gasket, the variable camshaft timing (VCT) housing and the bolts.
 - Tighten to 10 N.m (89 lb-in).

PISTON

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A



N0010114

Item	Part Number	Description
1	6150	Piston compression ring, upper
2	6152	Piston compression ring, lower
3	6159	Piston oil control segment ring, upper
4	6161	Piston oil control spacer

Item	Part Number	Description
5	6159	Piston oil control segment ring, lower
6	6140	Piston pin retainer
7	6140	Piston pin retainer
8	6135	Piston pin
9	6200	Connecting rod
10	6110	Piston

Fig. 355: Identifying Piston Components
Courtesy of FORD MOTOR CO.

Disassembly

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2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

1. Remove the piston rings from the piston.
 - Discard the piston rings.
2. Remove the piston pin retainers and the piston pin.
3. Separate the piston from the connecting rod.
4. Clean and inspect the piston and connecting rod. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION** .

Assembly

NOTE: **The connecting rod must be installed into the piston with identification markings toward the front.**

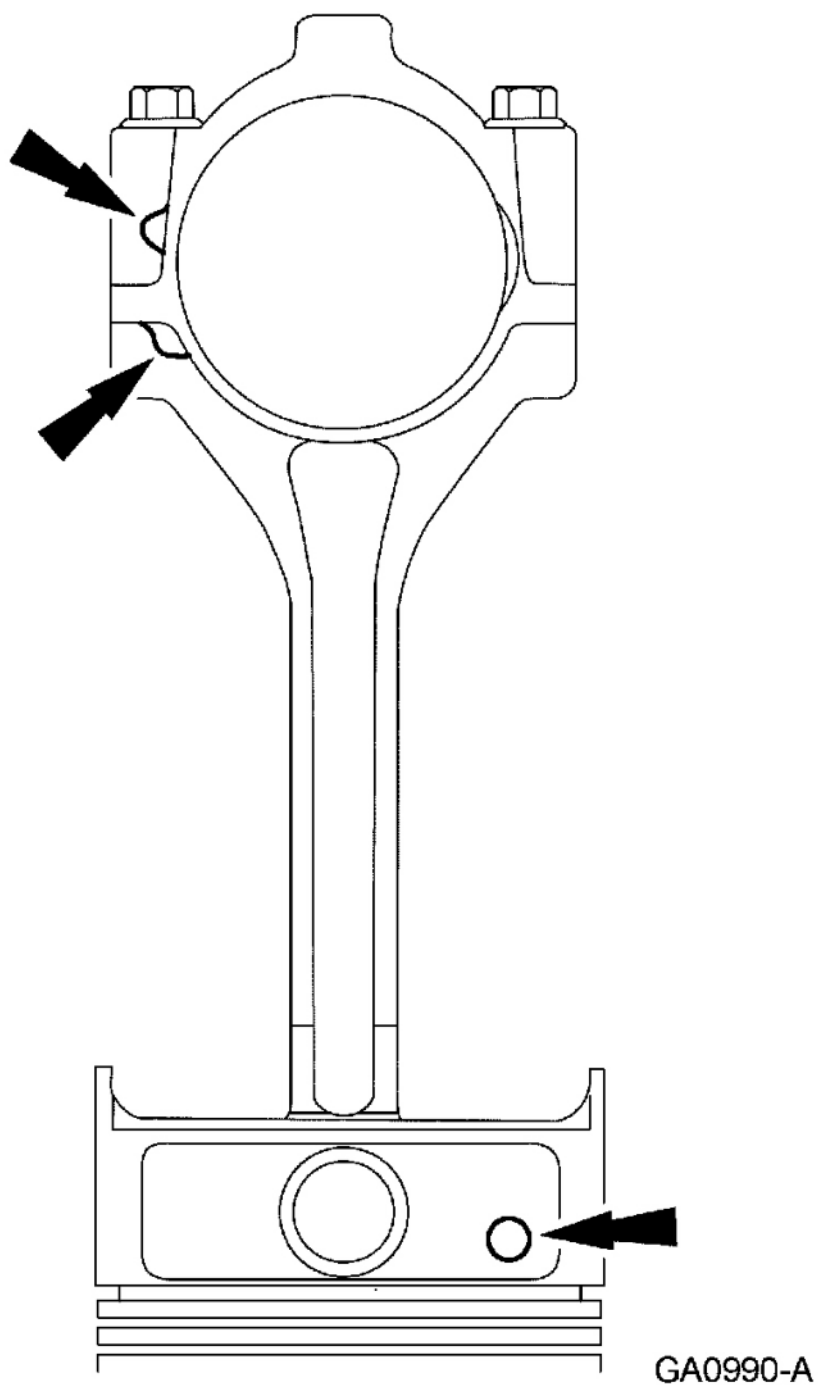


Fig. 356: Locating Connecting Rod & Piston Identification Marks
Courtesy of FORD MOTOR CO.

1. Position the connecting rod in the piston.
2. Lubricate the piston pin and pin bore with clean engine oil.

2006 Mercury Mountaineer

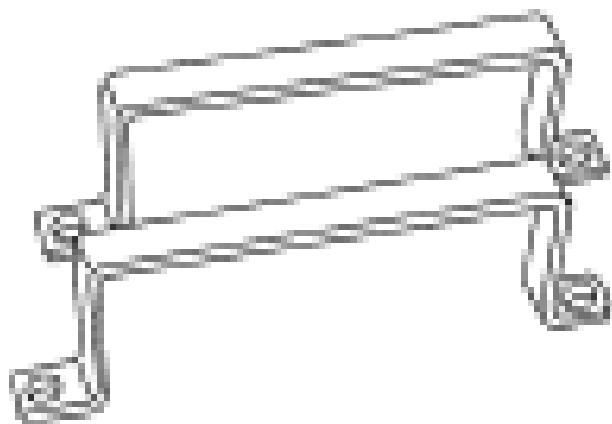
2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

3. Install the piston pin in the piston and connecting rod assembly.
4. Install the piston pin retaining clips in the piston.
5. Lubricate the piston and the new piston rings with clean engine oil.
6. Install the piston rings onto the piston.

ASSEMBLY

ENGINE

SPECIAL TOOL(S)



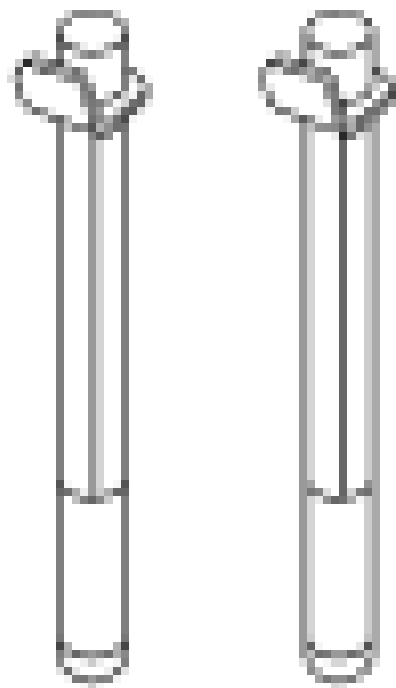
ST1668-A

Remover/Installer, Cylinder Head
303-572 (T97T-6000-A)

Installer, Connecting Rod
303-442 (T93P-6136-A)

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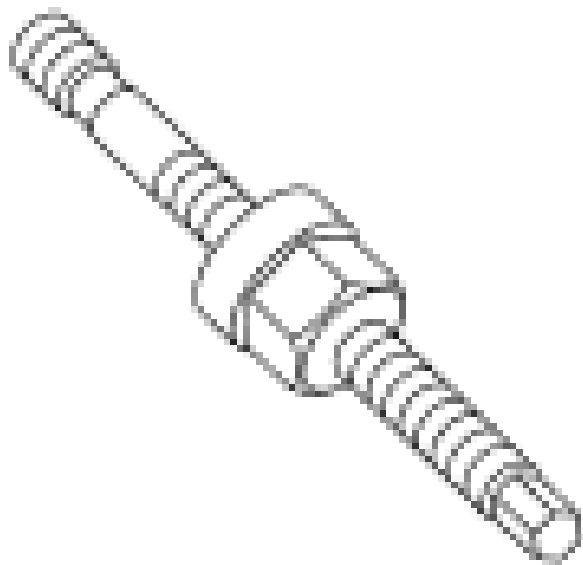
ST1337-A



Compressor, Valve Spring
303-1039

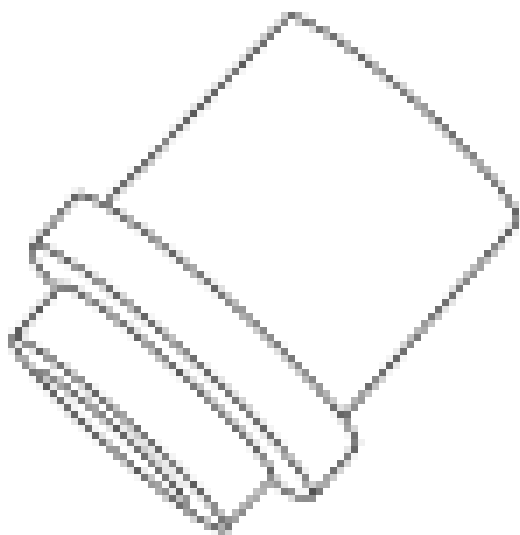
2006 Mercury Mountaineer

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ST2428-A

Installer, Crankshaft Vibration Damper
303-102 (T74P-6316-B)

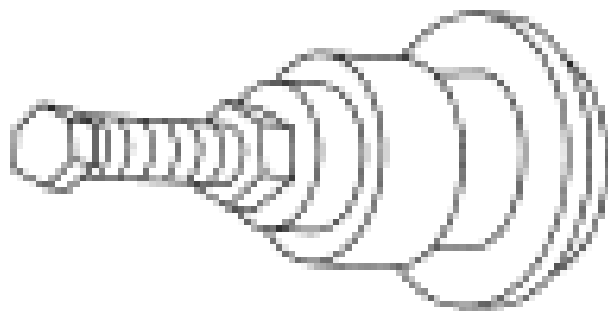


ST2197-A

Installer, Crankshaft Front Seal
303-635

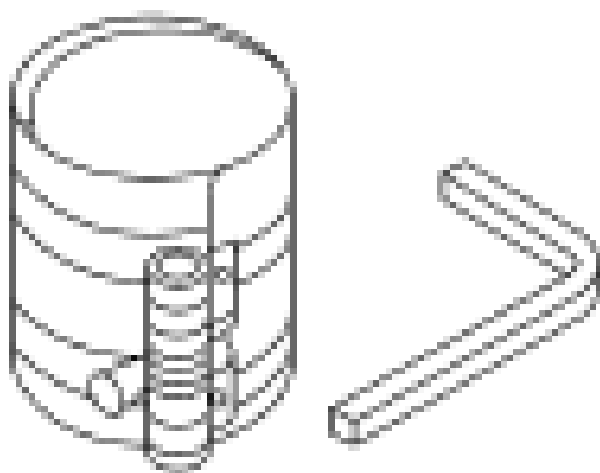
2006 Mercury Mountaineer

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Installer, Front Cover Seal
303-335 (T88T-6701-A)

ST1328-A



Compressor, Piston Ring
303-D032 (D81L-6002-C) or equivalent

ST1376-A

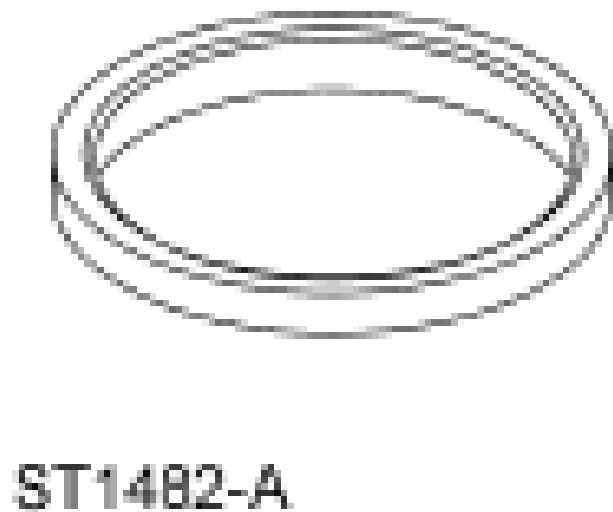
Installer, Crankshaft Rear Seal

2006 Mercury Mountaineer

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303-518 (T95P-6701-DH)



Installer, Crankshaft Oil Slinger
303-517 (T95P-6701-CH)

Installer, Crankshaft Rear Seal
303-516 (T95P-6701-EH)

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ST1479-A



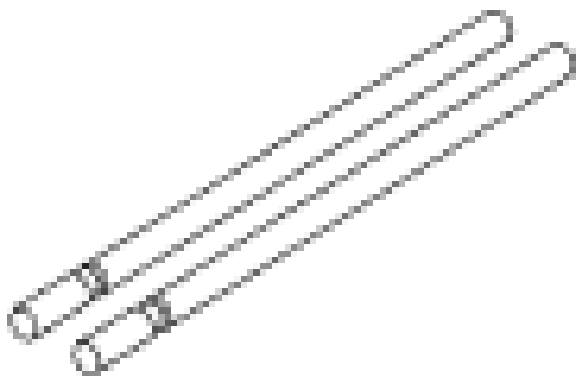
ST1185-A

Impact Slide Hammer
100-001 (T50T-100-A)

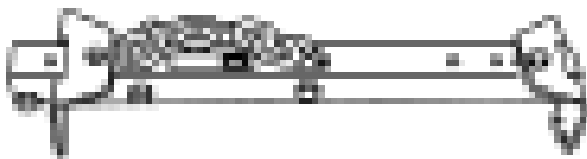
Alignment Pins, Cylinder Head
303-1040 (SR-015486)

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ST2806-A



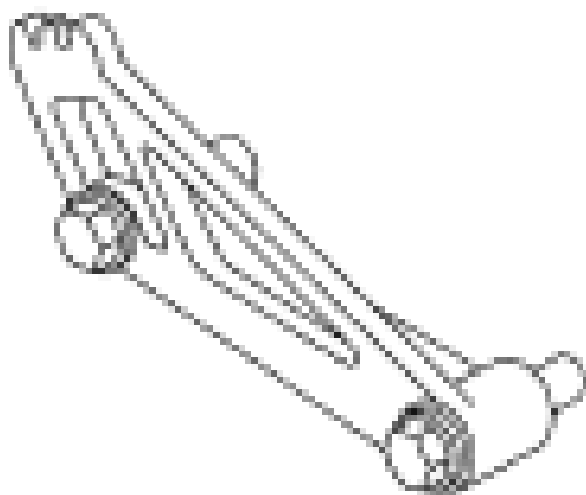
ST1377-A

Modular Engine Lift Bracket
303-F047 (014-00073) or equivalent

Locking Tool, Camshaft Phaser Sprocket
303-1046

2006 Mercury Mountaineer

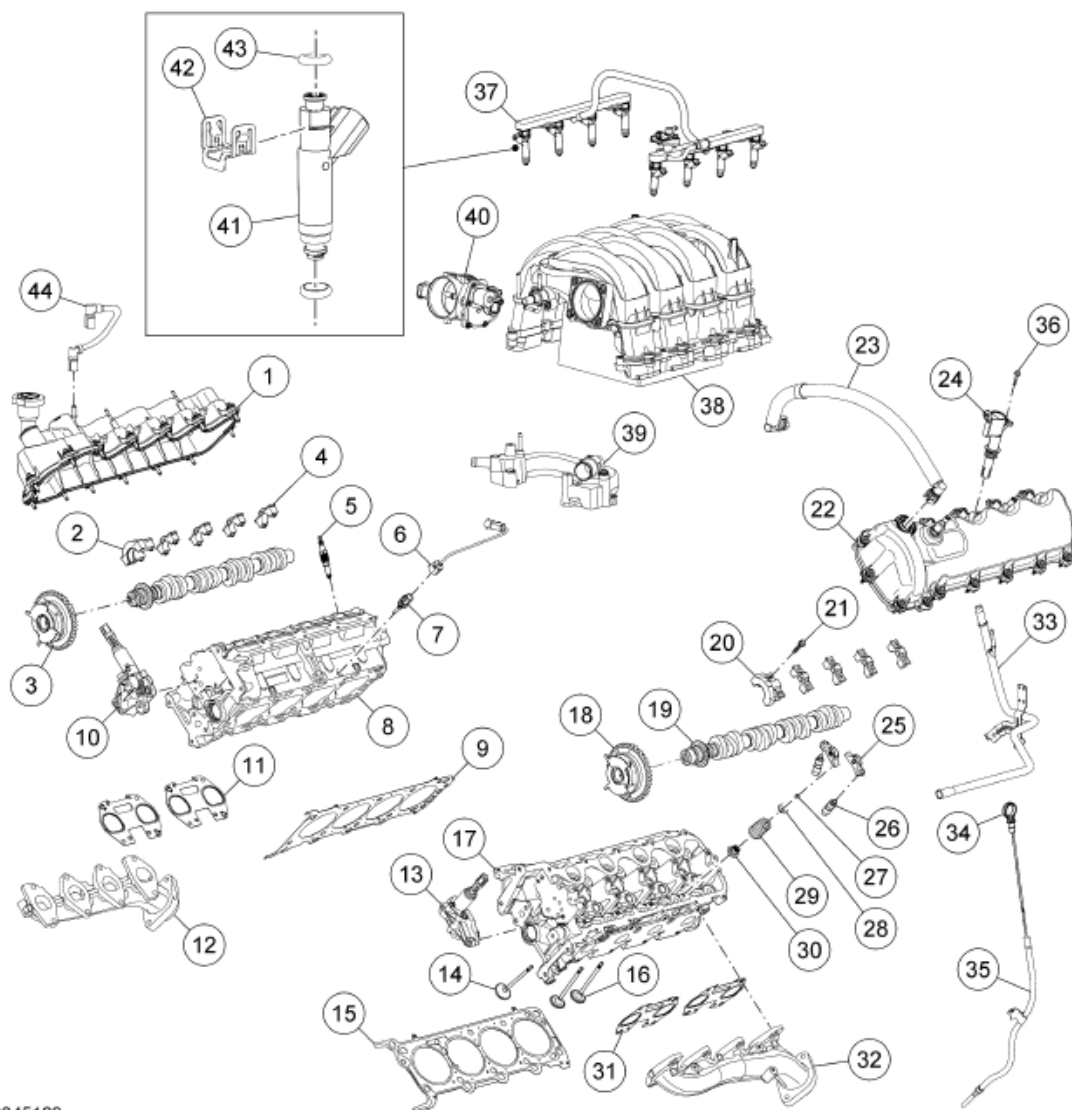
2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2807-A

MATERIAL

Item	Specification
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Silicone Gasket and Sealant TA-30 or equivalent	WSE-M4G323-A4
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or equivalent (yellow color)	WSS-M97B51-A1
Hydraulic Chain Tensioner Retaining Clip 1L3Z-6P250-AA	-



N0045182

Fig. 357: Identifying Engine Components - Upper End
 Courtesy of FORD MOTOR CO.

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

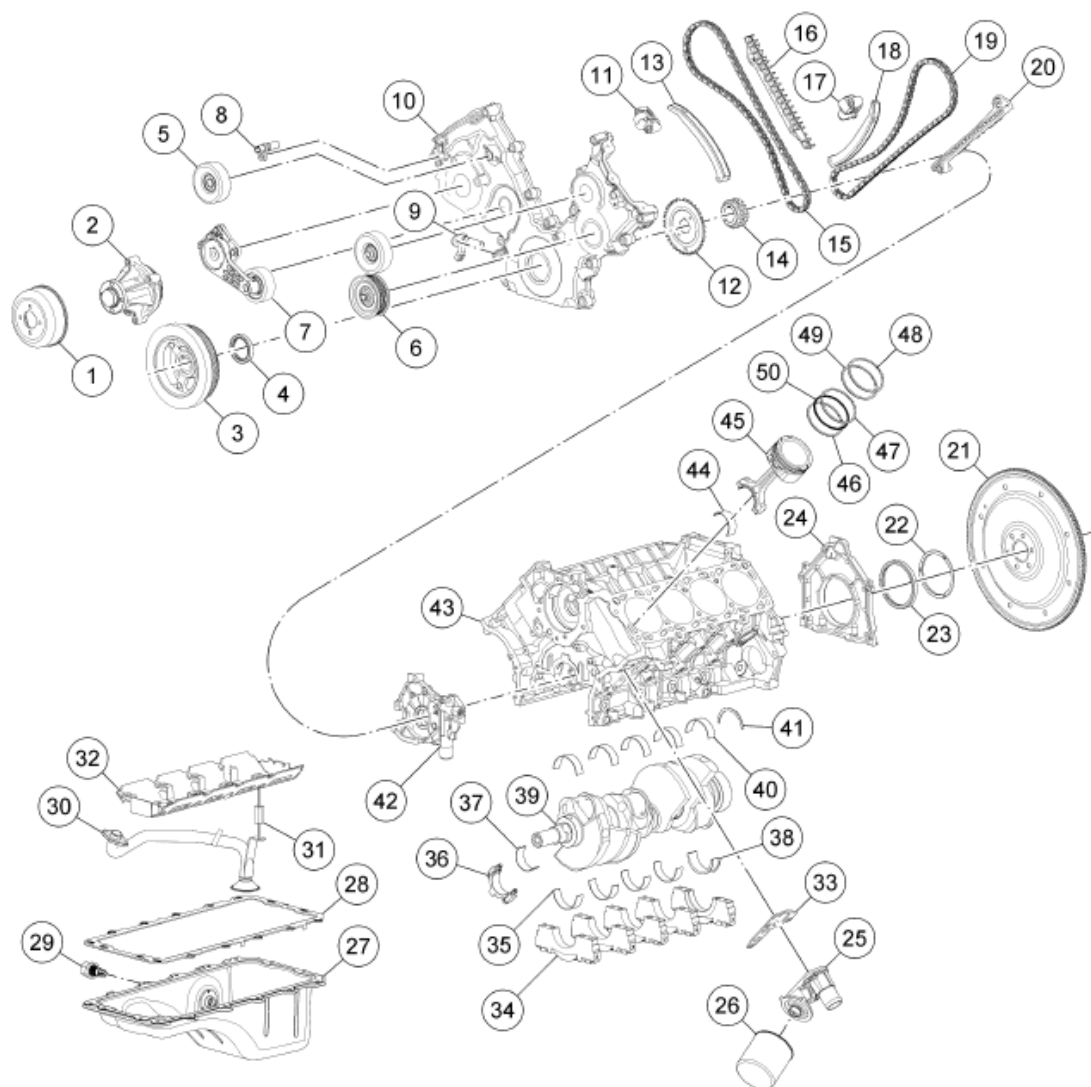
Item	Part Number	Description
1	6582	RH valve cover
2	6B284	RH camshaft thrust bearing cap
3	6C524	RH camshaft phaser sprocket
4	6B280	Camshaft bearing cap (8 required)
5	12405	Spark plug (8 required)
6	14B102	Cylinder head temperature (CHT) sensor jumper harness
7	6G004	CHT sensor
8	6049	RH cylinder head
9	6051	RH cylinder head gasket
10	6C261	RH variable camshaft timing (VCT) oil control solenoid assembly
11	9Y431	Exhaust manifold gaskets (2 required)
12	9430	Exhaust manifold — RH
13	6C261	LH VCT oil control solenoid assembly
14	6505	Exhaust valve (8 required)
15	6083	LH cylinder head gasket
16	6507	Intake valve (16 required)
17	6050	LH cylinder head
18	6C524	LH camshaft phaser sprocket
19	6C255	LH camshaft
20	6B284	LH camshaft thrust bearing cap
21	N807834	Camshaft bearing cap bolt (20 required)

Item	Part Number	Description
22	6A505	LH valve cover
23	6K817	Positive crankcase ventilation (PCV) tube
24	12A366	Ignition coil (8 required)
25	6529	Roller follower (24 required)
26	6C501	Hydraulic lash adjuster (24 required)
27	6518	Valve spring retainer key (48 required)
28	6514	Valve spring retainer (24 required)
29	6513	Valve spring (24 required)
30	6A517	Valve stem seal (24 required)
31	9Y431	Exhaust manifold gaskets (2 required)
32	9431	LH exhaust manifold
33	18B402	Coolant tube
34	6750	Oil level indicator
35	6K873	Oil level indicator tube
36	W706175	Ignition coil bolt (8 required)
37	9F792	Fuel rail assembly
38	9424	Intake manifold assembly
39	8C369	Engine coolant crossover
40	9F991	Electronic throttle body
41	9F860	Fuel injector (8 required)
42	9C995	Fuel injector clip (8 required)
43	9F798	O-ring seal (16 required)
44	6758	PCV breather hose

Fig. 358: Item Description Of Engine Components - Upper End
Courtesy of FORD MOTOR CO.

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



N0043036

Fig. 359: Identifying Engine Components - Lower End
Courtesy of FORD MOTOR CO.

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

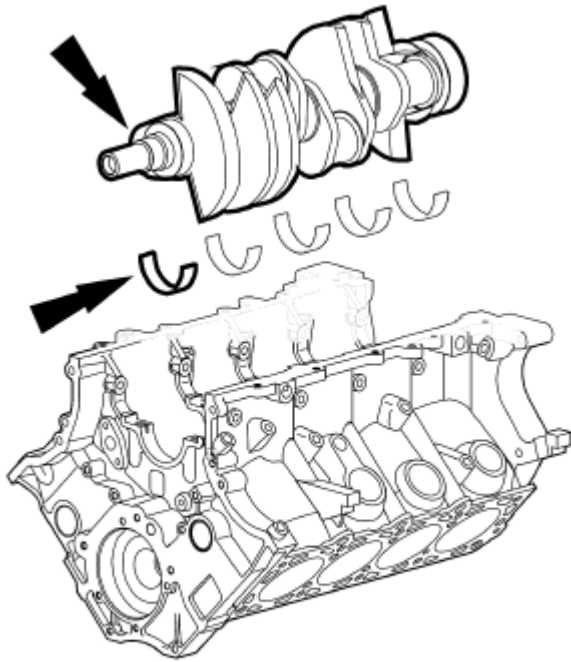
Item	Part Number	Description
1	8A528	Coolant pump pulley
2	8501	Coolant pump
3	6316	Crankshaft pulley
4	6700	Crankshaft front seal
5	19A216	Accessory drive belt idler pulley (2 required)
6	6C348	Accessory drive belt idler pulley
7	6B209	Accessory drive belt tensioner
8	6B288	Camshaft position (CMP) sensor (2 required)
9	6C315	Crankshaft position (CKP) sensor
10	6C086	Engine front cover
11	6L266	RH timing chain tensioner
12	12A227	Ignition pulse wheel
13	6K255	RH tensioner arm
14	6306	Crankshaft sprocket
15	6268	RH timing chain
16	6M256	RH timing chain guide
17	6M269	LH timing chain tensioner
18	6M274	LH tensioner arm
19	6268	LH timing chain
20	6B274	LH timing chain guide
21	6375	Flexplate
22	6701	Crankshaft oil slinger
23	6310	Crankshaft rear seal
24	6K318	Crankshaft rear seal retainer plate
25	6881	Oil filter adapter
26	6714	Oil filter
27	6675	Oil pan
28	6710	Oil pan gasket
29	12A648	Engine oil temperature sensor

Item	Part Number	Description
30	6622	Oil pump screen and pickup tube
31	N806180	Oil pump screen and pickup tube spacer
32	6687	Windage tray
33	6A636	Oil filter adapter gasket
34	6325	Crankshaft main bearing cap (5 required)
35	6A338	Lower crankshaft bearing (4 required)
36	6210	Connecting rod cap (8 required)
37	6211	Connecting rod lower bearing (8 required)
38	6K302	Lower crankshaft thrust washer
39	6303	Crankshaft
40	6333	Upper crankshaft bearing (5 required)
41	6A341	Upper crankshaft thrust washer
42	6621	Oil pump
43	6010	Cylinder block
44	6211	Connecting rod upper bearing (8 required)
45	6110	Piston (8 required)
46	6159	Outer oil control ring (8 required)
47	6159	Outer oil control ring (8 required)
48	6150	Upper compression ring (8 required)
49	6152	Lower compression ring (8 required)
50	6161	Inner oil control ring (8 required)

Fig. 360: Item Description Of Engine Components - Lower End
Courtesy of FORD MOTOR CO.

NOTE: Before assembling the cylinder block, all sealing surfaces must be free of chips, dirt, paint and foreign material. Also, make sure the coolant and oil passages are clear.

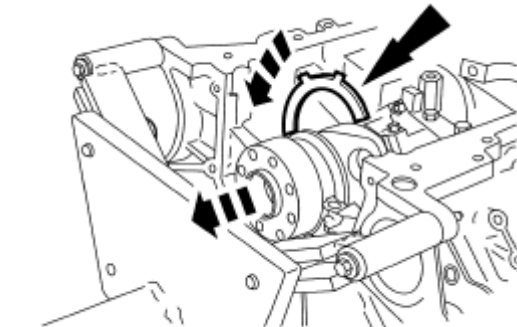
1. Install the crankshaft main bearings.
 - Install the crankshaft upper main bearings into the cylinder block.
 - Install the crankshaft lower main bearings into the bearing caps.
 - Make sure all oil passages are aligned.
 - Lubricate all main bearings with clean engine oil.
2. Lubricate the crankshaft bearing journals with clean engine oil. Install the crankshaft onto the upper crankshaft main bearings.



A0054093

Fig. 361: Locating Crankshaft And Upper Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

NOTE: The oil groove on the thrust washer must face toward the rear of the engine (against the crankshaft thrust surface).



A0054094

Fig. 362: Installing Crankshaft Upper Thrust Washer
Courtesy of FORD MOTOR CO.

NOTE: Rotate the jackscrews into the main bearing caps enough to provide clearance to the cylinder block prior to installing the bearing caps

3. Push the crankshaft rearward and install the rear crankshaft upper thrust washer at the back of the No. 5 main boss.

4. Install the thrust washer on the rear (No. 5) main bearing cap and install the rear (No. 5) main bearing cap.

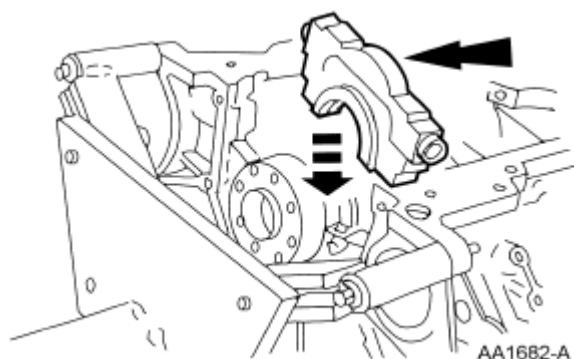


Fig. 363: Installing Thrust Washer On Rear (No. 5) Main Bearing Cap And Installing Rear (No. 5) Main Bearing Cap
Courtesy of FORD MOTOR CO.

5. Install the crankshaft lower main bearings into the main bearing caps and lubricate them with clean engine oil. Locate the main bearing cap on the cylinder block and, keeping the cap as square as possible, alternately draw the cap down evenly using the cap fasteners.
6. Push the crankshaft forward to seat the crankshaft thrust washer. Hold the crankshaft in the forward position.

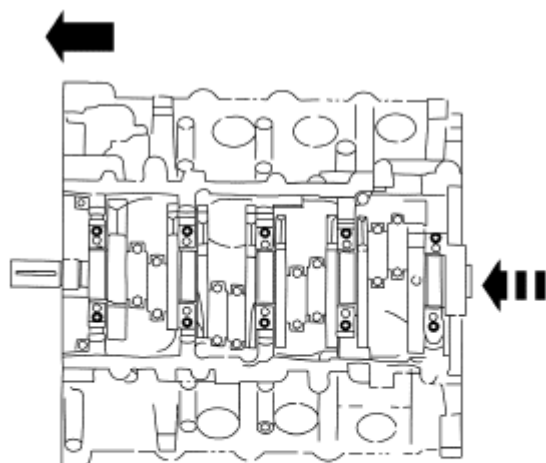
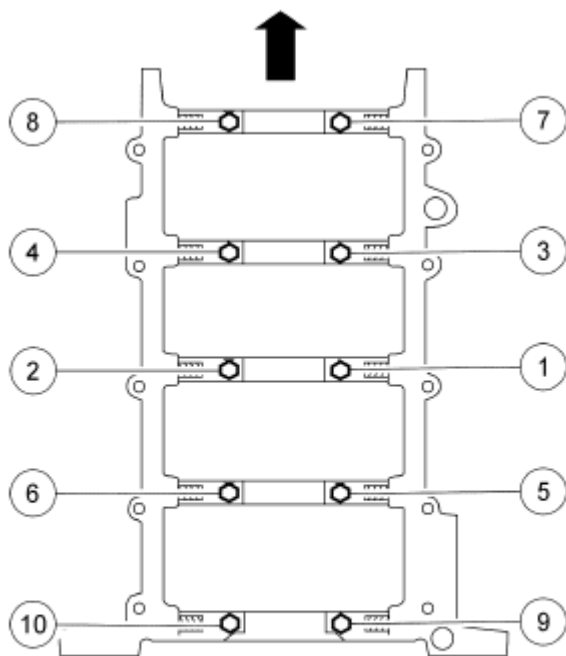


Fig. 364: Pushing Crankshaft Forward To Seat Crankshaft Thrust Washer
Courtesy of FORD MOTOR CO.

7. Tighten the vertical main bearing cap fasteners in the sequence shown, in 2 stages.

- Stage 1: Tighten to 40 N.m (30 lb-ft).
- Stage 2: Tighten an additional 90 degrees.

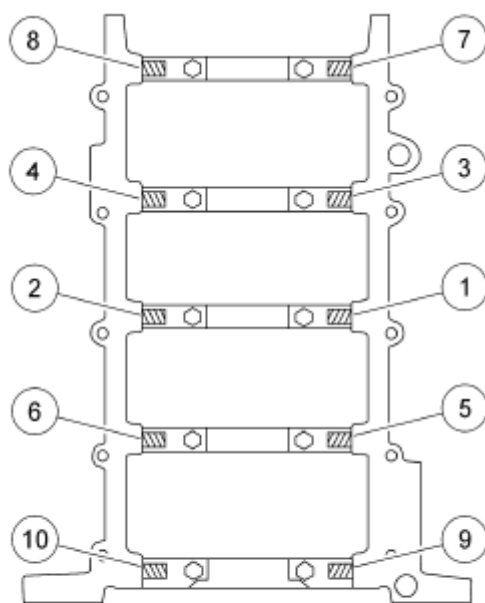


N0013765

Fig. 365: Identifying Rear Main Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

8. Tighten the jack screws against the cylinder block in the sequence shown in 2 stages.

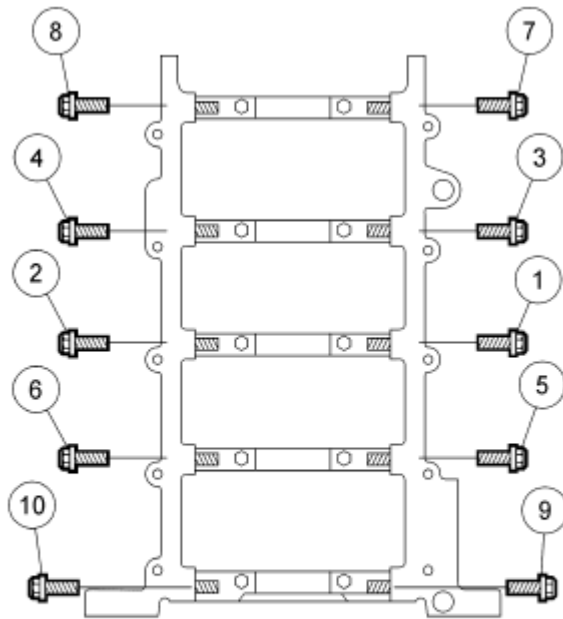
- Stage 1: Tighten to 5 N.m (44 lb-in).
- Stage 2: Tighten to 10 N.m (89 lb-in).



N0015132

Fig. 366: Identifying Jack Screws Tightening Sequence
Courtesy of FORD MOTOR CO.

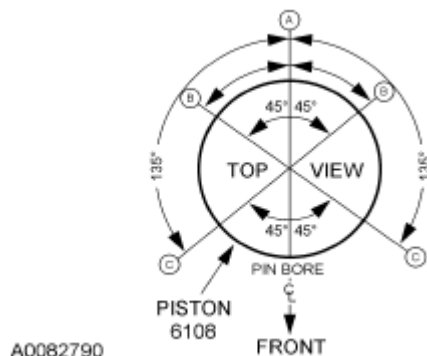
9. Install the side bolts and tighten them in the sequence shown.
 - Tighten to 21 N.m (15 lb-ft).



N0015131

Fig. 367: Identifying Side Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

10. Check the crankshaft end play. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
11. Check that crankshaft torque-to-turn does not exceed 6 N.m (53 lb-in).
12. Check the piston-to-cylinder block and piston ring clearances. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
13. Assemble the pistons. For additional information, refer to **PISTON**.
14. Make sure the ring gaps (oil spacer-A, oil ring-B, compression ring-C) are correctly spaced around the circumference of the piston.



A0082790

Fig. 368: Identifying Piston Ring Gaps Position
Courtesy of FORD MOTOR CO.

CAUTION: Do not scratch the cylinder walls or crankshaft journals with the connecting rod.

NOTE: The following piston installation steps are for all 8 connecting rods, rod bearings and pistons. Only one connecting rod, rod bearing and piston is shown.

15. Use the special tools to install the connecting rod with the upper connecting rod bearing in place.
- Lubricate the piston and ring with clean engine oil.
 - Lubricate the rod bearings with clean engine oil.

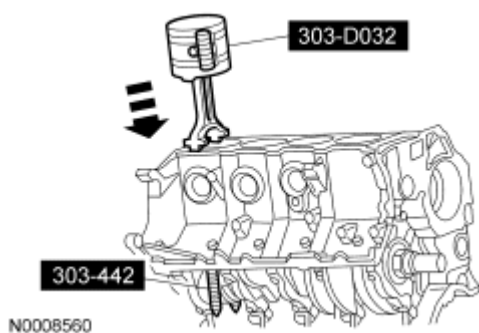


Fig. 369: Using Special Tools To Install Piston And Connecting Rod Assembly
Courtesy of FORD MOTOR CO.

CAUTION: Do not scratch the cylinder walls or crankshaft journals with the connecting rod.

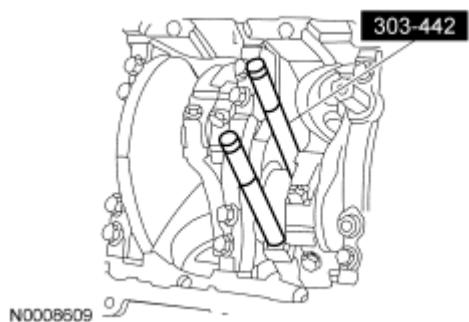


Fig. 370: Identifying Special Tool (303-442)
Courtesy of FORD MOTOR CO.

16. Once the connecting rod is seated on the crankshaft journal, remove the special tools.

CAUTION: The rod cap installation must keep the same orientation as marked during disassembly.

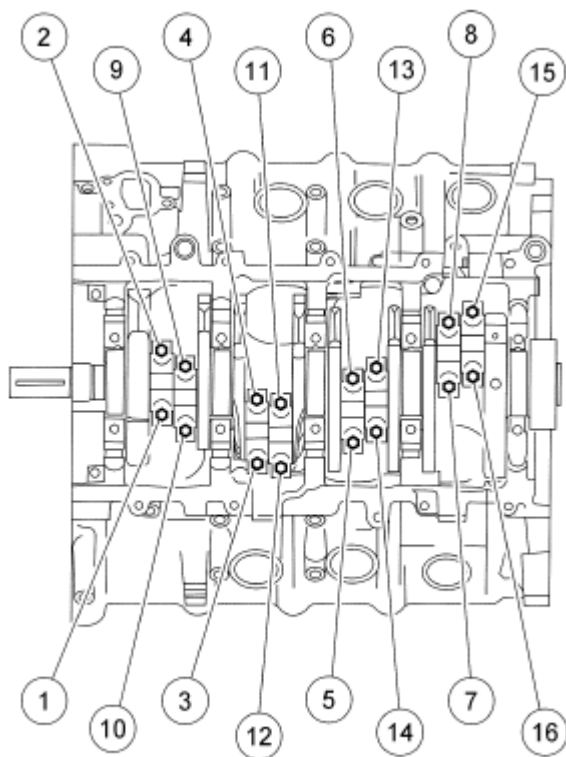
NOTE: The connecting rod caps are of the "cracked" design and must mate with the connecting rod ends. Excessive bearing clearance will result if not mated correctly.

17. Position the lower bearing and connecting rod and install the new bolts loosely.

NOTE: Main bearing caps shown removed for clarity.

18. Tighten the bolts in 2 stages, in the sequence shown.

- Stage 1: Tighten to 43 N.m (32 lb-ft).
- Stage 2: Tighten an additional 105 degrees.



N0043038

Fig. 371: Identifying Main Bearing Caps Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

19. Position the oil pump and install the 3 bolts.

- Tighten to 10 N.m (89 lb-in).

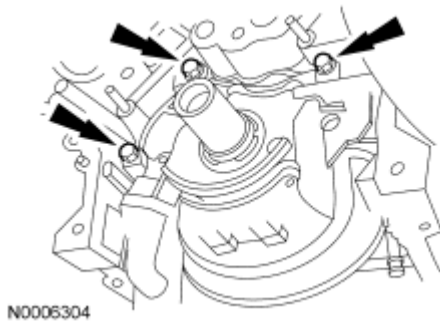


Fig. 372: Locating Oil Pump Bolts
Courtesy of FORD MOTOR CO.

20. Install the pickup tube spacer.
- Tighten to 25 N.m (18 lb-ft).

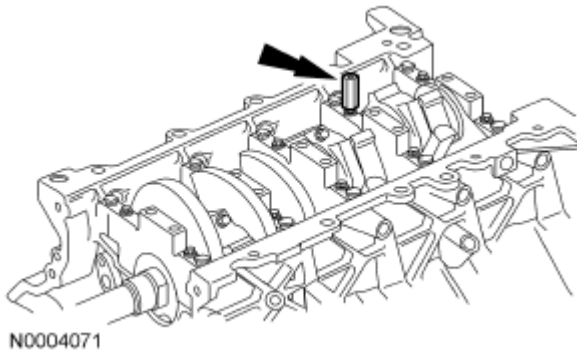


Fig. 373: Locating Pickup Tube Spacer
Courtesy of FORD MOTOR CO.

CAUTION: Make sure the O-ring is in place and not damaged. A missing or damaged O-ring can cause foam in the lubrication system, low oil pressure and severe engine damage.

NOTE: Clean and inspect the mating surfaces and install a new O-ring. Lubricate the O-ring with clean engine oil.

21. Position the oil pump screen and pickup tube and install the bolts.
1. Tighten to 25 N.m (18 lb-ft).
 2. Tighten to 10 N.m (89 lb-in).

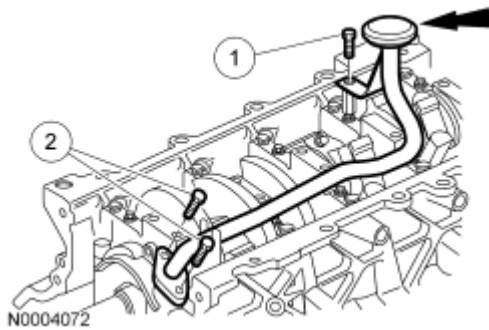


Fig. 374: Locating Oil Pump Screen And Pickup Tube
Courtesy of FORD MOTOR CO.

CAUTION: Make sure all coolant residue and foreign material are cleaned from the block surface and cylinder bore.

CAUTION: The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry.

CAUTION: The cylinder head bolts must be discarded and new bolts installed. They are tighten-to-yield designed and cannot be reused.

NOTE: Do not turn the crankshaft until instructed to do so.

NOTE: LH shown, RH similar.

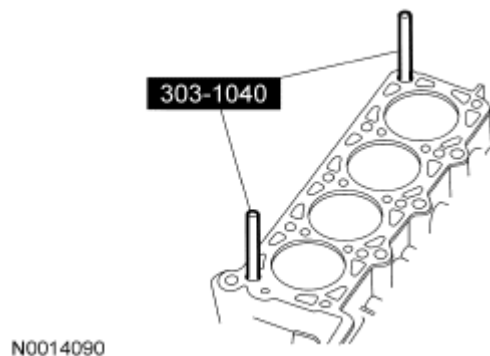


Fig. 375: Identifying Special Tools
Courtesy of FORD MOTOR CO.

22. Using the special tools, position the cylinder head gaskets and cylinder heads over the dowels and install the 20 cylinder head bolts loosely.
23. Tighten the LH cylinder head bolts in 3 stages, in the sequence shown.
 - Stage 1: Tighten to 40 N.m (30 lb-ft).

- Stage 2: Tighten an additional 90 degrees.
- Stage 3: Tighten an additional 90 degrees.

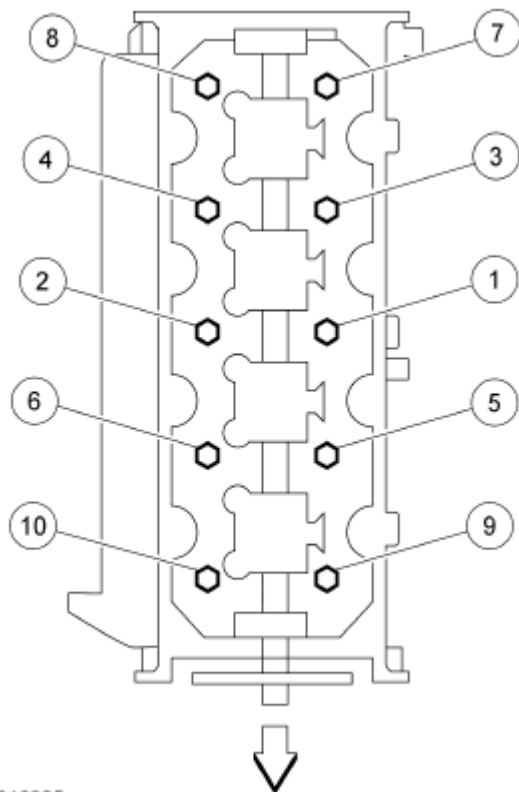


Fig. 376: Identifying LH Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

24. Tighten the RH cylinder head bolts in 3 stages, in the sequence shown.
- Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.
 - Stage 3: Tighten an additional 90 degrees.

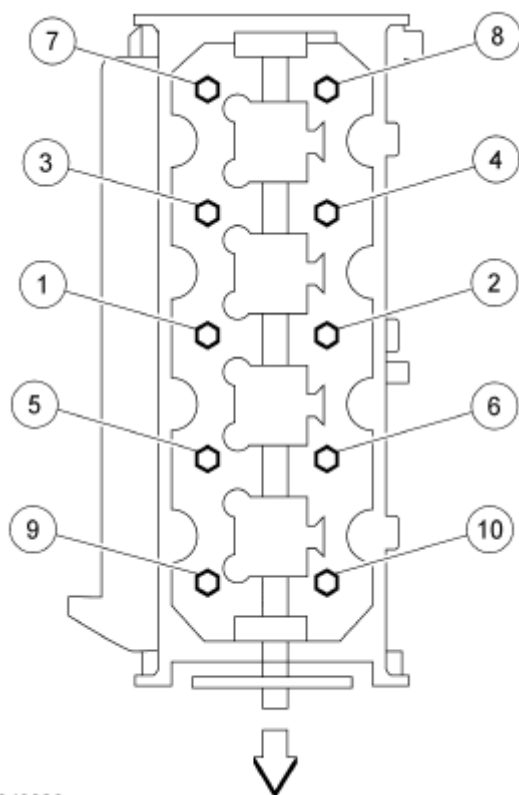


Fig. 377: Identifying RH Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

25. Remove the special tool from the LH cylinder head.

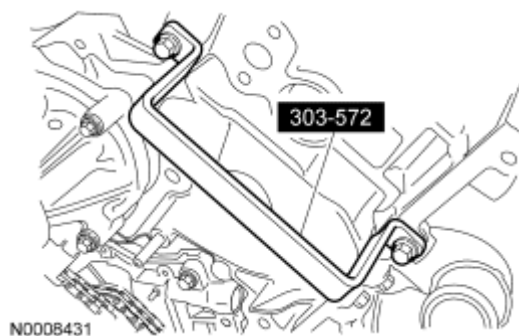


Fig. 378: Identifying Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

26. Remove the special tool from the RH cylinder head.

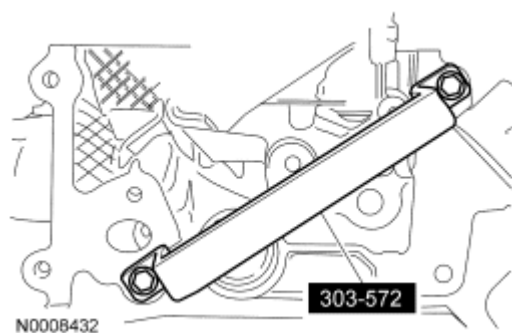


Fig. 379: Identifying Special Tool On Cylinder Head
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the hydraulic lash adjusters with clean engine oil prior to installation.

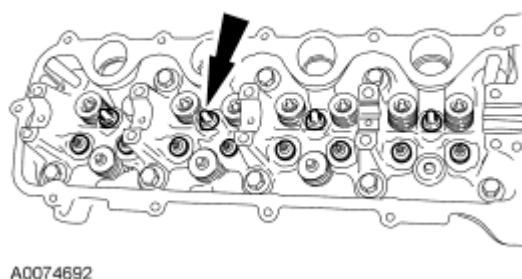


Fig. 380: Identifying Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

27. Install the hydraulic lash adjusters into the RH and LH cylinder heads.

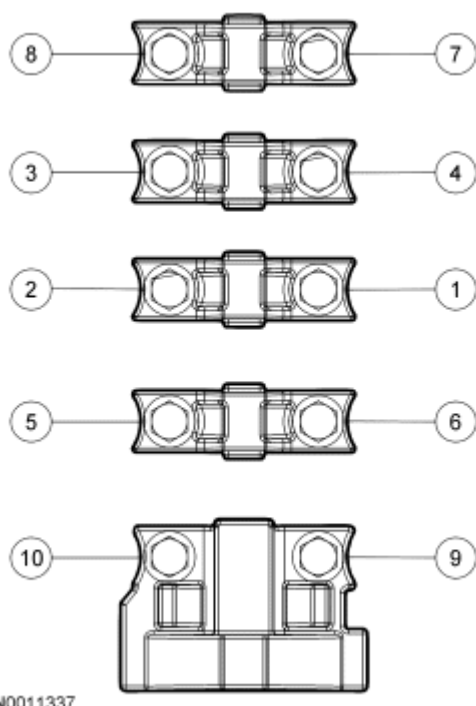
NOTE: Lubricate the camshaft and camshaft journals with clean engine oil prior to installation.

28. Install the LH and RH camshafts.

NOTE: LH shown, RH similar.

NOTE: Lubricate the camshaft bearing caps with clean engine oil.

29. Install the LH and RH camshaft bearing caps in their original locations.
- Position the front camshaft bearing cap.
 - Position the remaining camshaft bearing caps.
 - Install the bolts loosely.
 - Tighten to 10 N.m (89 lb-in) in the sequence shown.



N0011337

Fig. 381: Identifying Camshaft Bearing Cap Bolt Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: LH shown, RH similar.

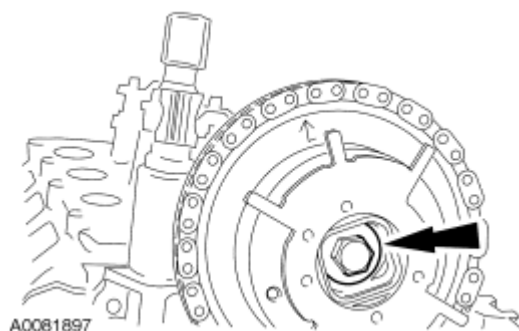


Fig. 382: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

30. Position the camshaft phaser sprockets and install new camshaft phaser bolts finger tight.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: LH shown, RH similar.

31. Using the special tool, tighten the LH and RH camshaft phaser sprocket bolts in 2 stages.
- Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

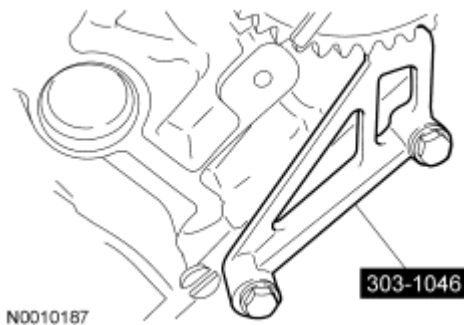


Fig. 383: Identifying Special Sprocket Phaser Tool
Courtesy of FORD MOTOR CO.

32. Install the crankshaft sprocket, making sure the flange faces forward.

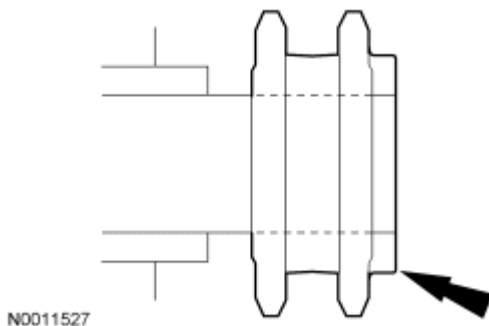


Fig. 384: Identifying Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

33. Rotate the crankshaft to position the crankshaft sprocket timing mark in the 6 o'clock position.

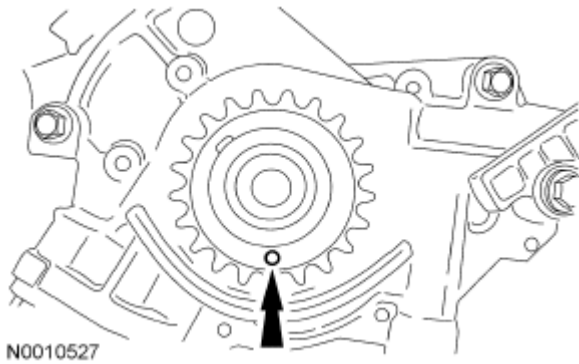


Fig. 385: Locating Crankshaft Sprocket Timing Mark In 6 O'clock Position
Courtesy of FORD MOTOR CO.

34. Rotate the camshaft sprockets to position the RH camshaft sprocket timing mark in the 11 o'clock position and the LH camshaft sprocket timing mark in the 12 o'clock position.

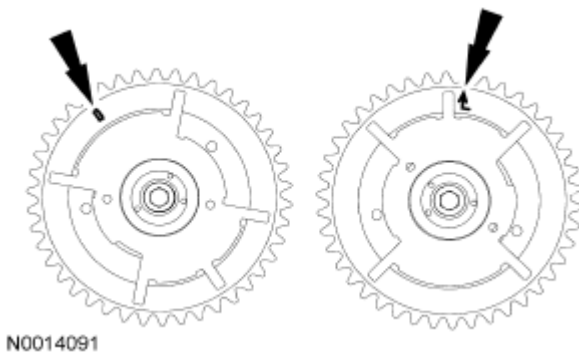


Fig. 386: Locating Camshaft Sprocket Timing Mark
Courtesy of FORD MOTOR CO.

CAUTION: If one or both tensioner mounting bolts are loosened or removed, the tensioner-sealing bead must be inspected for seal integrity. Any cracks, tears, cuts or separation from the tensioner body, or permanent compression of the seal bead, will require replacement of the tensioner.

35. Inspect the RH and LH timing chain tensioners.
- Install new tensioners as necessary.

CAUTION: Timing chain procedures must be followed exactly or damage to valves and pistons will result.

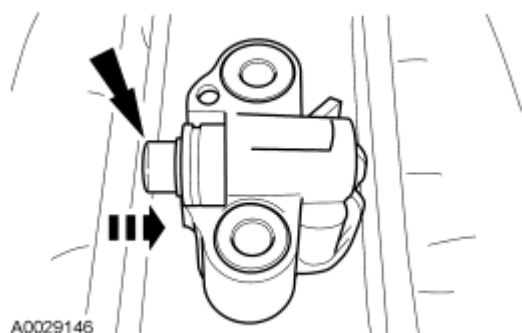


Fig. 387: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

36. Compress the tensioner plunger, using a vise.
37. Install a retaining clip on the tensioner to hold the plunger in during installation.

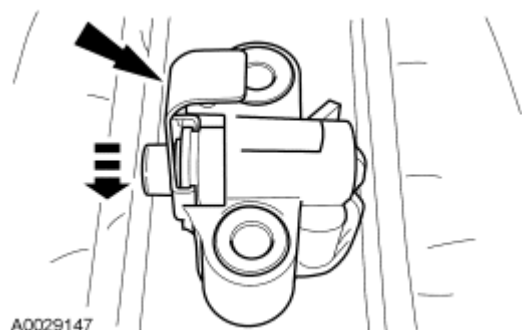


Fig. 388: Identifying Retaining Clip on Tensioner
Courtesy of FORD MOTOR CO.

38. Remove the tensioner from the vise.
39. If the copper links are not visible, mark one link on one end and one link on the other end and use as timing marks.

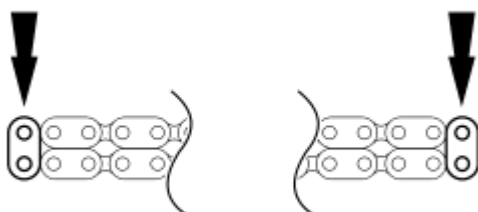
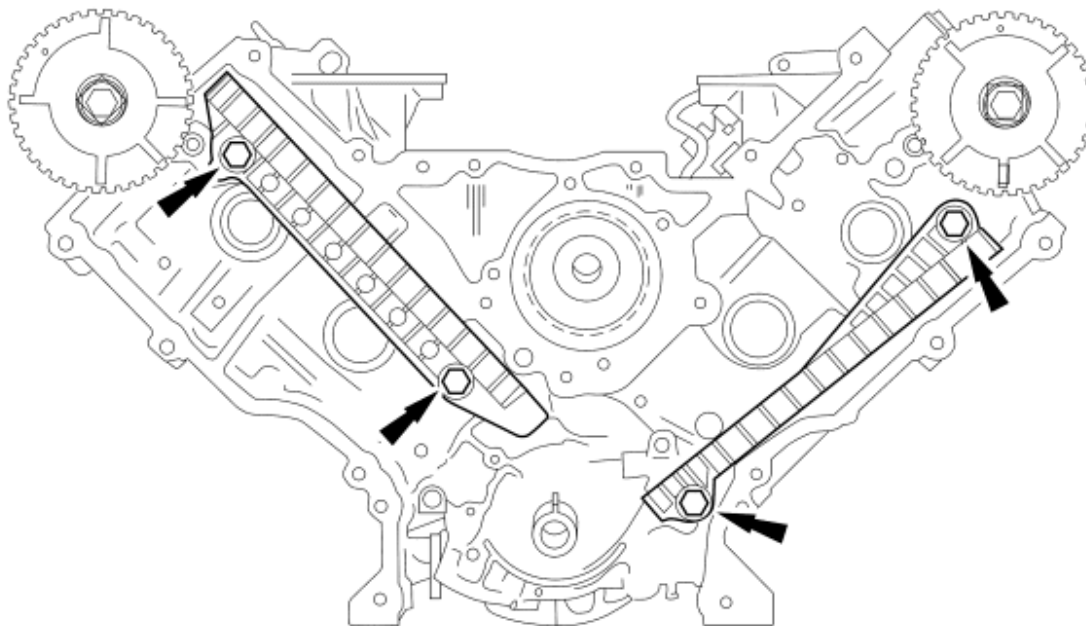


Fig. 389: Identifying Timing Chain Copper Links
Courtesy of FORD MOTOR CO.

40. Install the 4 bolts and the LH and RH timing chain guides.

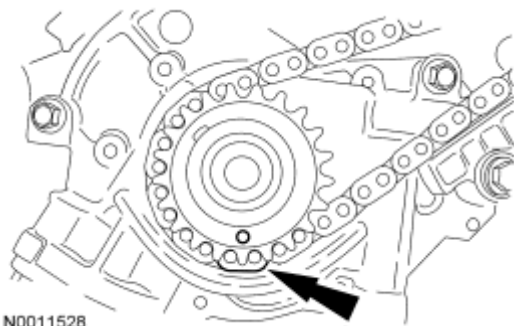
- Tighten to 10 N.m (89 lb-in).



N0006303

Fig. 390: Identifying Timing Chain Guides
Courtesy of FORD MOTOR CO.

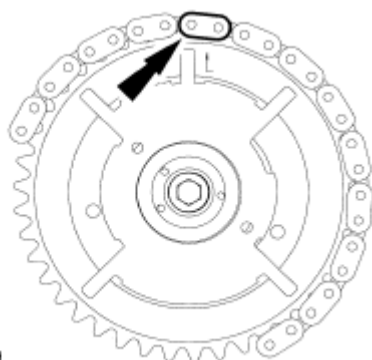
41. Position the lower end of the LH (inner) timing chain on the crankshaft sprocket, aligning the timing mark on the outer flange of the crankshaft sprocket with the single copper (marked) link on the chain.



N0011528

Fig. 391: Aligning Crankshaft Sprocket Timing Mark And LH Timing Chain Link
Courtesy of FORD MOTOR CO.

NOTE: Make sure the upper half of the timing chain is below the tensioner arm dowel.



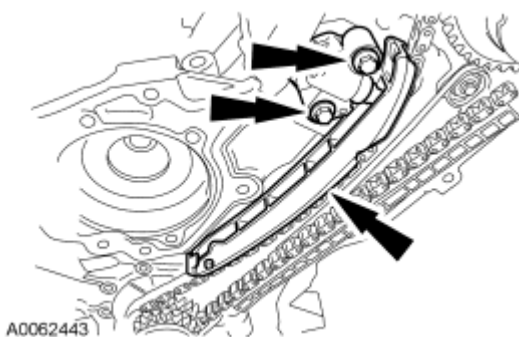
N0010529

Fig. 392: Locating Copper Link
Courtesy of FORD MOTOR CO.

42. Position the LH timing chain on the camshaft sprocket. Make sure the camshaft sprocket timing mark is aligned with the copper (marked) chain link.

NOTE: The LH timing chain tensioner arm has a bump near the dowel hole for identification.

43. Position the LH timing chain tensioner arm on the dowel pin and install the LH timing chain tensioner and 2 bolts.
 - Tighten to 25 N.m (18 lb-ft).



A0062443

Fig. 393: Identifying LH Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

44. Remove the retaining clip from the LH timing chain tensioner.

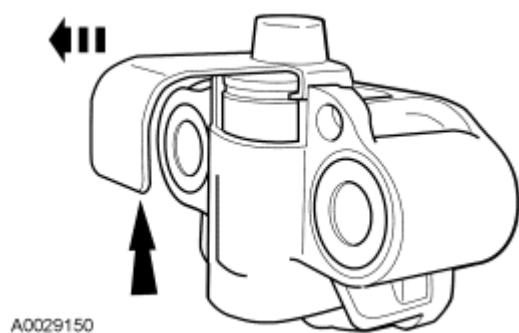


Fig. 394: View Of Retaining Clip And Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

45. Position the lower end of the RH (outer) timing chain on the crankshaft sprocket, aligning the timing mark on the sprocket with the single copper (marked) chain link.

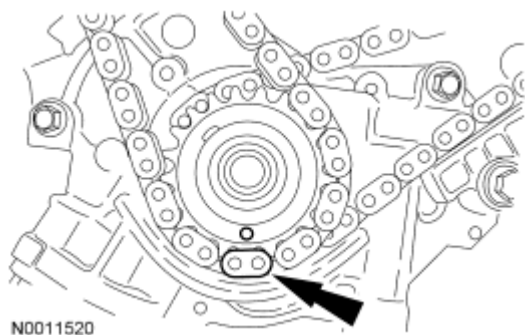


Fig. 395: Aligning Crankshaft Sprocket Timing Mark And RH Timing Chain Link
Courtesy of FORD MOTOR CO.

NOTE: The lower half of the timing chain must be positioned above the tensioner arm dowel.

NOTE: The camshaft phaser and sprocket will be stamped with one of the illustrated timing marks for the RH camshaft.

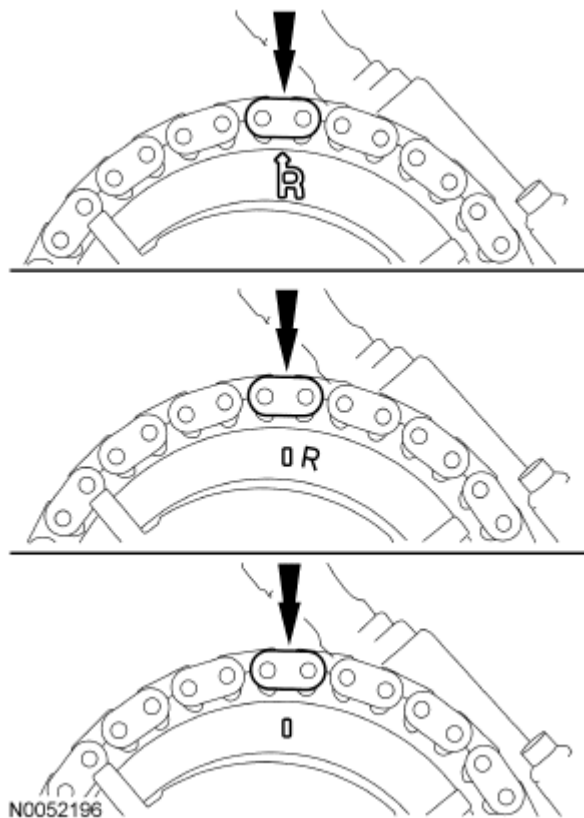


Fig. 396: Locating Timing Chain Copper Link
Courtesy of FORD MOTOR CO.

46. Position the RH timing chain on the camshaft sprocket. Make sure the camshaft sprocket timing mark is aligned with the copper (marked) chain link.
47. Position the RH timing chain tensioner arm on the dowel pin and install the RH timing chain tensioner and 2 bolts.
 - Tighten to 25 N.m (18 lb-ft).

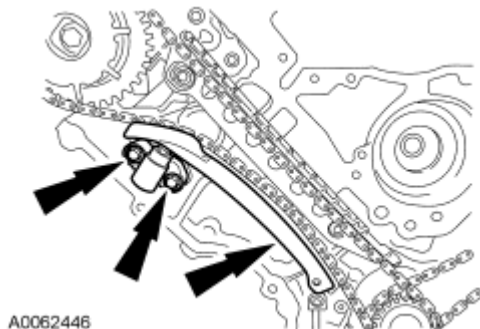


Fig. 397: Identifying RH Timing Chain Tensioner, Tensioner Arm And Bolts
Courtesy of FORD MOTOR CO.

48. Remove the retaining clip from the RH timing chain tensioner.

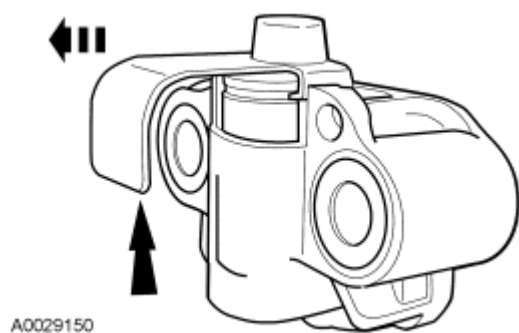


Fig. 398: View Of Retaining Clip And Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

NOTE: The RH and LH camshaft phaser sprockets are similar. Refer to the single timing mark to identify the RH camshaft phaser sprocket and the L timing mark to identify the LH camshaft phaser sprocket.

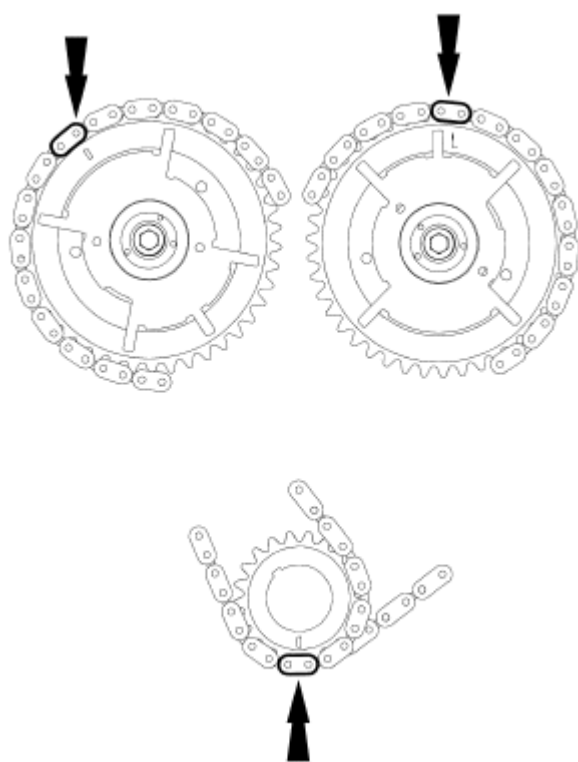


Fig. 399: Locating Timing Marks
Courtesy of FORD MOTOR CO.

49. As a post-check, verify correct alignment of all timing marks. Make sure the timing marks on the sprockets correspond to the above note.
50. Install the crankshaft sensor ring on the crankshaft.

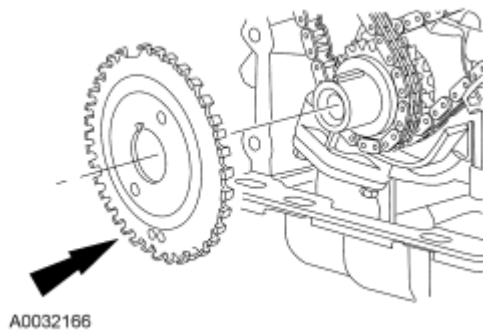


Fig. 400: View Of Crankshaft Sensor Ring At Crankshaft
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the roller followers with clean engine oil prior to installation.



Fig. 401: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

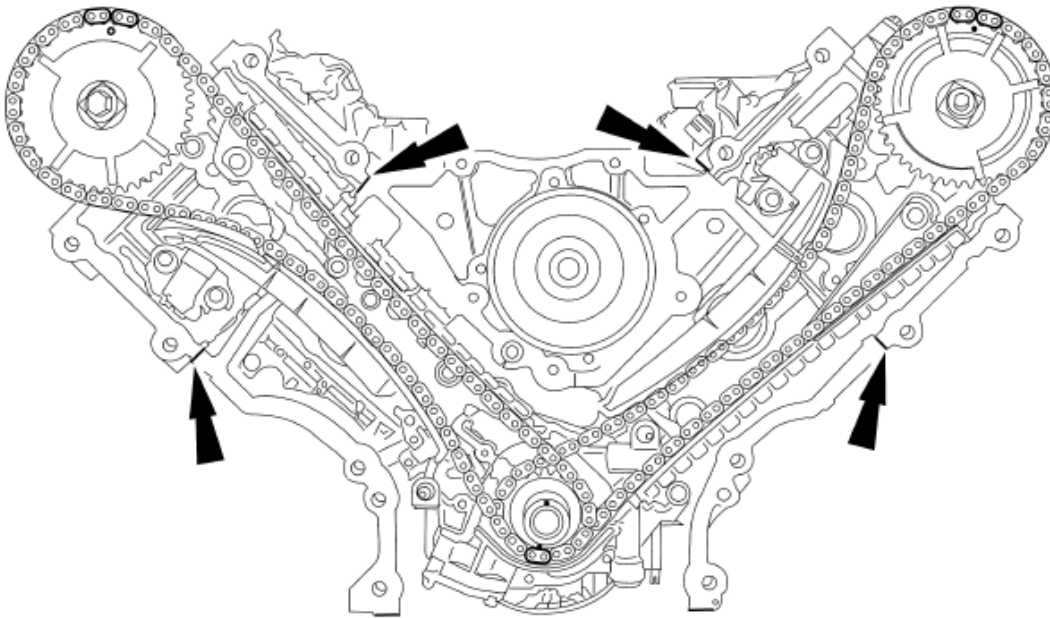
51. Using the special tool, install all of the camshaft roller followers.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

NOTE: If the engine front cover is not secured within 4 minutes, the sealant must

be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

NOTE: Make sure that the engine front cover gasket is in place on the engine front cover before installation.



N0010501

Fig. 402: Identifying Area For Applying Bead Of Silicone Gasket
Courtesy of FORD MOTOR CO.

52. Apply a bead of silicone gasket and sealant along the cylinder head-to-cylinder block surface at the locations shown.
53. Install a new engine front cover gasket on the engine front cover. Position the engine front cover onto the dowels. Install the 15 fasteners finger-tight.

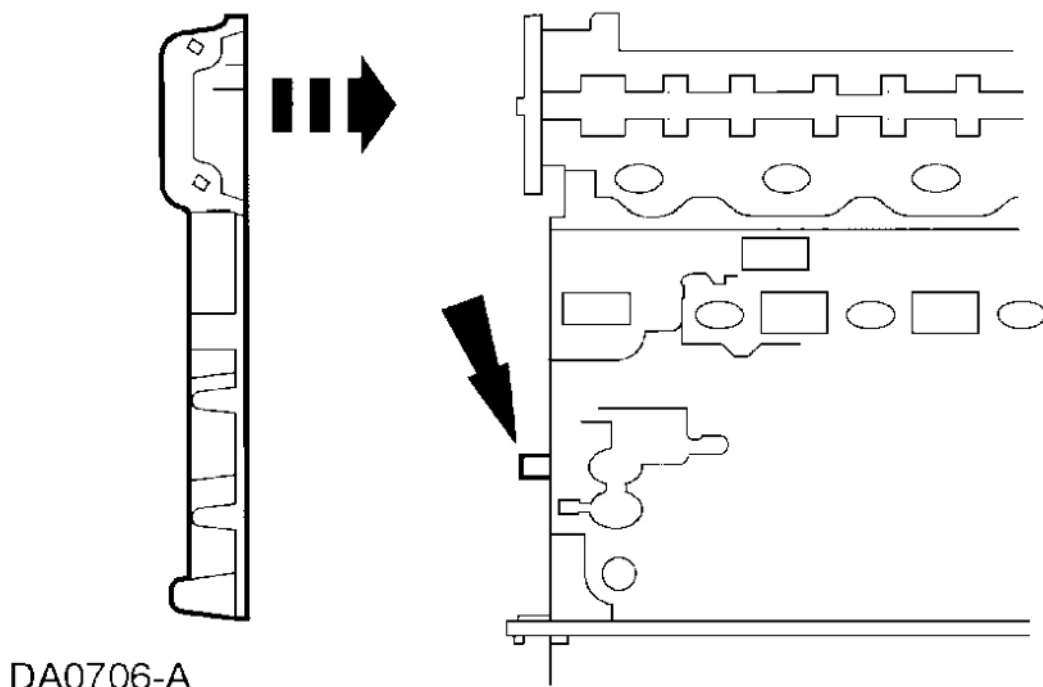
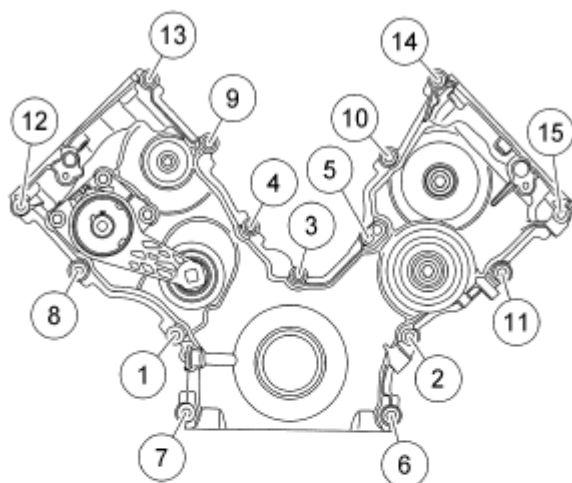


Fig. 403: Identifying Engine Front Cover And Alignment Dowels
Courtesy of FORD MOTOR CO.

54. Tighten the engine front cover fasteners in the sequence shown to 25 N.m (18 lb-ft).

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer

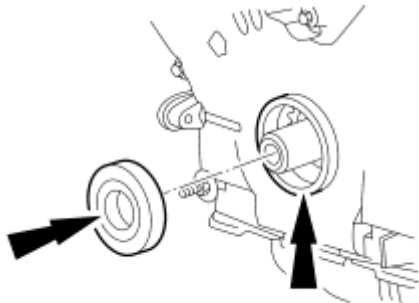


N0039598

Item	Part Number	Description
1	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
2	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
3	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
4	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
5	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
6	W706508	Stud, Hex Shoulder Pilot, M8 x 1.25 x 50 - M6 x 1 x 10
7	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
8	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
9	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
10	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
11	N808294	Bolt, Hex Head Pilot, M8 x 1.25 x 53
12	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
13	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
14	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
15	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1

Fig. 404: Identifying Engine Front Cover Fasteners In Sequence
Courtesy of FORD MOTOR CO.

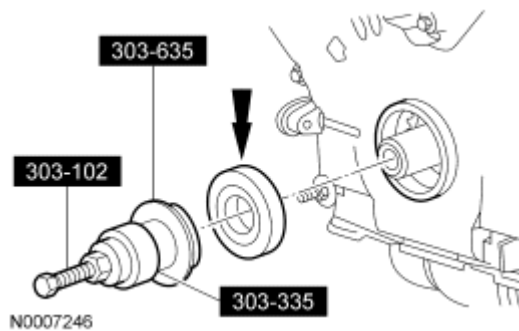
55. Lubricate the engine front cover and the crankshaft front oil seal inner lip with clean engine oil.



A0029187

Fig. 405: Locating Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

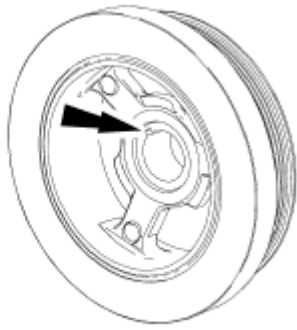
56. Using the special tools, install the crankshaft front oil seal into the engine front cover.



N0007246

Fig. 406: Installing Crankshaft Front Seal Using Special Tools
Courtesy of FORD MOTOR CO.

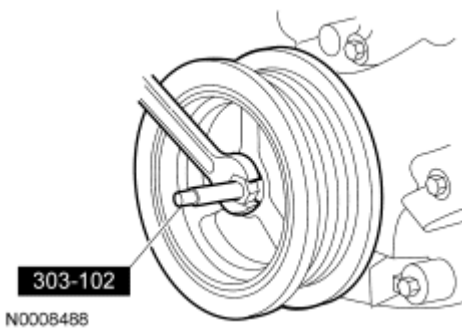
NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface prep and silicone gasket remover. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.



N0010530

Fig. 407: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

57. Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.
58. Using the special tool, install the crankshaft pulley.



N0008488

Fig. 408: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

59. Using a new crankshaft pulley bolt, install the bolt and washer and tighten the bolt in 4 stages.
 - Stage 1: Tighten to 90 N.m (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 N.m (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

CAUTION: Do not rotate the coolant pump housing once the coolant pump has been positioned in the cylinder block. Damage to the O-ring seal will occur.

NOTE: Lubricate the new O-ring seal using clean engine coolant and install the O-ring seal onto the coolant pump.

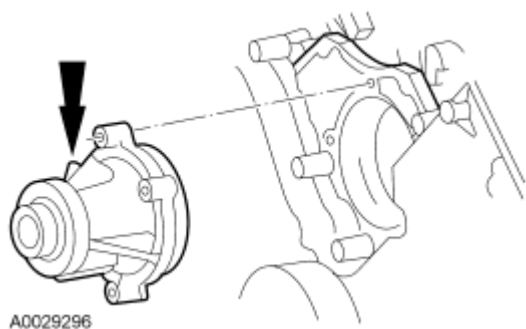


Fig. 409: Identifying Coolant Pump
Courtesy of FORD MOTOR CO.

60. Position the coolant pump and install the 4 bolts loosely.
61. Tighten the 4 coolant pump bolts.
 - Tighten to 25 N.m (18 lb-ft).

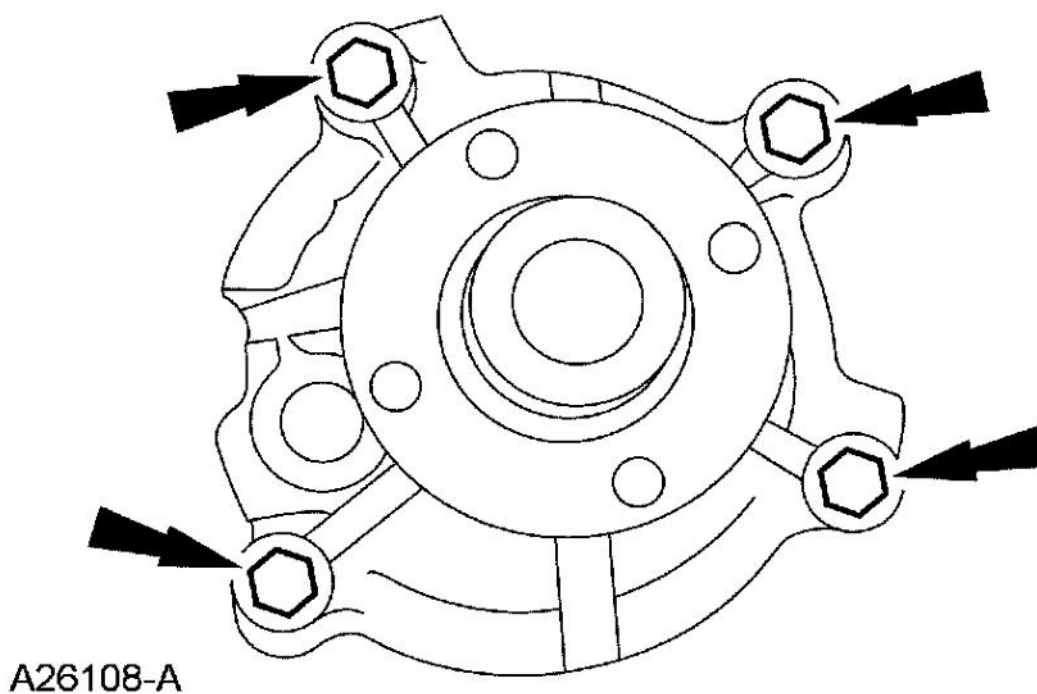


Fig. 410: Identifying Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

62. Position the accessory drive belt tensioner and install the 3 bolts.
 - Tighten to 25 N.m (18 lb-ft).

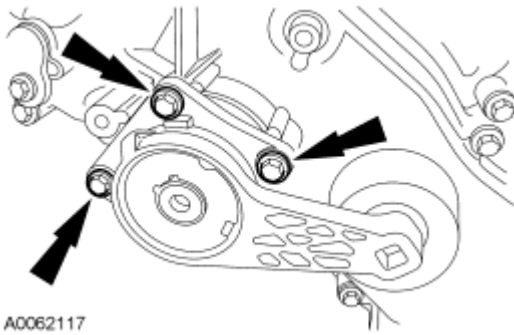


Fig. 411: Identifying Accessory Drive Belt Tensioner Bolts
Courtesy of FORD MOTOR CO.

63. Install the 3 accessory drive belt idler pulleys, the coolant pump pulley and the 7 bolts.
- Tighten to 25 N.m (18 lb-ft).

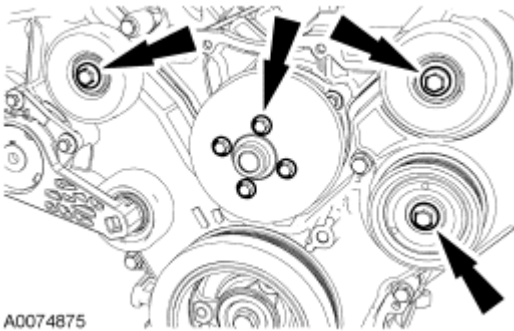


Fig. 412: Locating Coolant Pump Pulley And Accessory Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

64. Install the crankshaft position (CKP) sensor and the bolt.
- Tighten to 10 N.m (89 lb-in).

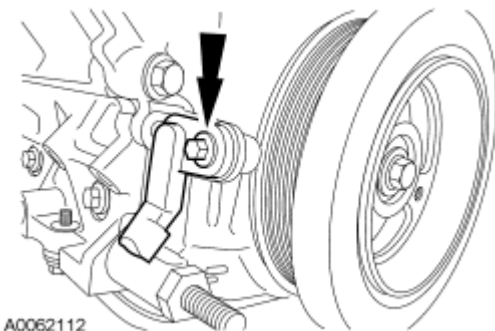


Fig. 413: Locating Crankshaft Position (CKP) Sensor Bolt
Courtesy of FORD MOTOR CO.

65. Install the LH camshaft position (CMP) sensor and the bolt.
- Tighten to 10 N.m (89 lb-in).

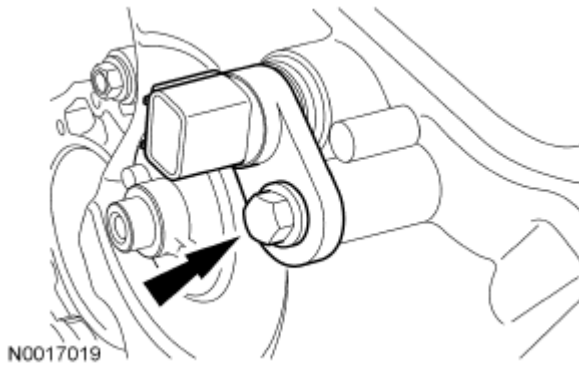


Fig. 414: Locating LH Camshaft Position (CMP) Sensor And Bolt
Courtesy of FORD MOTOR CO.

66. Install the RH CMP sensor and the bolt.
- Tighten to 10 N.m (89 lb-in).

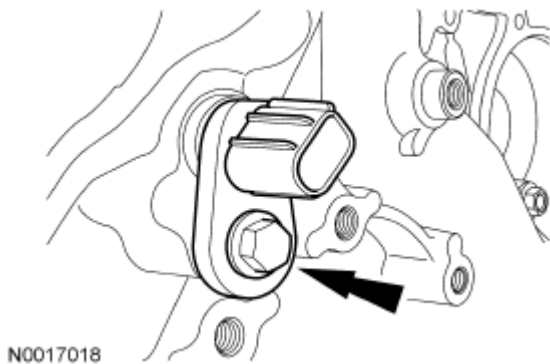


Fig. 415: Locating RH CMP Sensor And Bolt
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

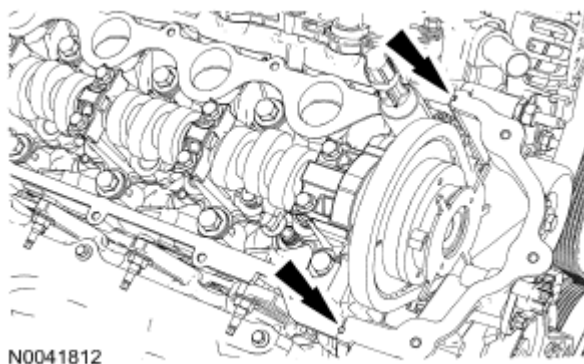
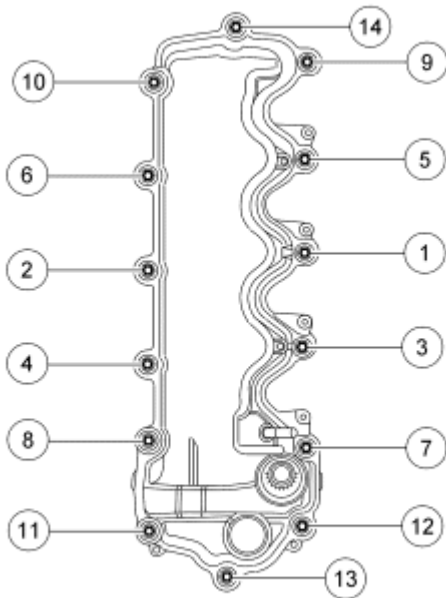


Fig. 416: Locating Silicone Gasket And Sealant Area
Courtesy of FORD MOTOR CO.

67. Apply silicone gasket and sealant in 2 places where the engine front cover meets the RH cylinder head.

CAUTION: When installing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

68. Position the RH valve cover and gasket on the cylinder head and tighten the 14 bolts in the sequence shown.
- Tighten to 10 N.m (89 lb-in).



N0006317

Fig. 417: Identifying Tightening Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

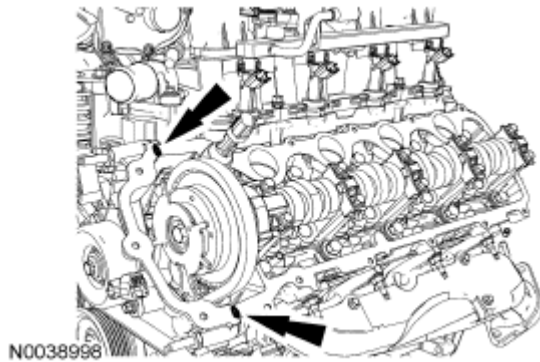


Fig. 418: Locating Silicone Gasket And Sealant Area
Courtesy of FORD MOTOR CO.

69. Apply silicone gasket and sealant in 2 places where the engine front cover meets the LH cylinder head.

CAUTION: When installing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

70. Position the LH valve cover and gasket on the cylinder head and tighten the 15 bolts in the sequence shown.
- Tighten to 10 N.m (89 lb-in).

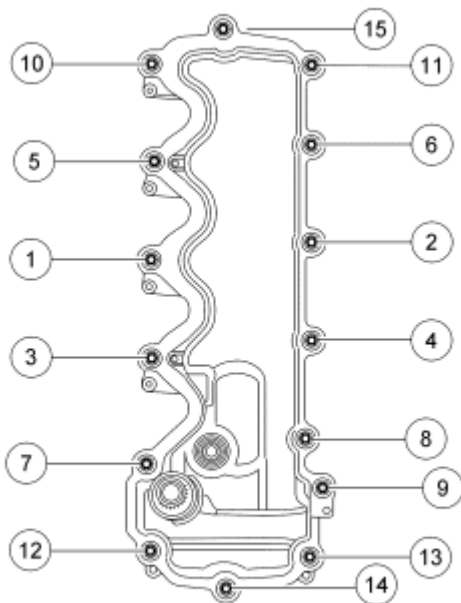
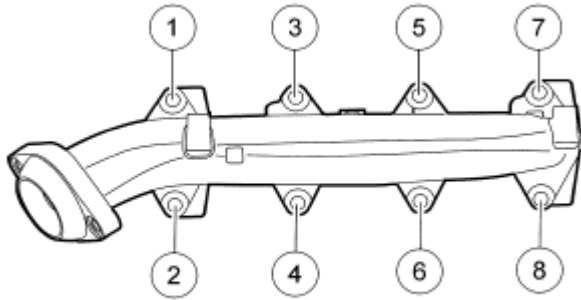


Fig. 419: Identifying Tighten Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

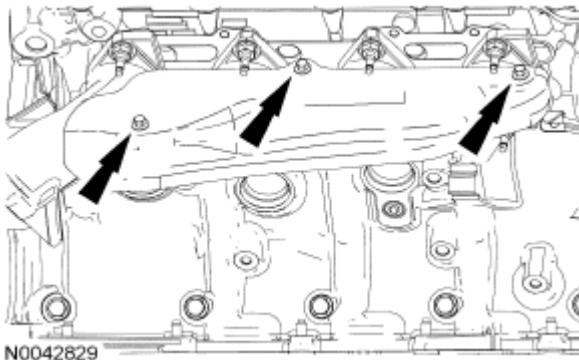
71. Inspect the RH exhaust manifold for flatness. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
72. Install 8 new RH exhaust manifold studs.
 - Tighten to 12 N.m (9 lb-ft).
73. Position new gaskets, the RH exhaust manifold and tighten the 8 new nuts in the sequence shown.
 - Tighten to 25 N.m (18 lb-ft).



N0040498

Fig. 420: Identifying Removing Sequence Exhaust Manifold-To-Catalytic Converter Nuts
Courtesy of FORD MOTOR CO.

74. Position the RH heat shield and install the bolts
 - Tighten to 10 N.m (89 lb-in).



N0042829

Fig. 421: Identifying Tightening Sequence Of RH Heat Shield Bolts
Courtesy of FORD MOTOR CO.

75. Position the RH engine support insulator bracket and install the bolts.
 - Tighten to 72 N.m (53 lb-ft).

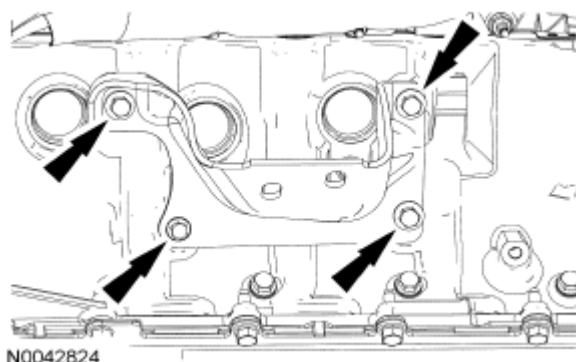


Fig. 422: Locating Engine Support Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

76. Position the oil level indicator tube and install the bolt.
- Install a new O-ring seal and lubricate the O-ring seal with clean engine oil prior to installation.
 - Tighten to 10 N.m (89 lb-in).

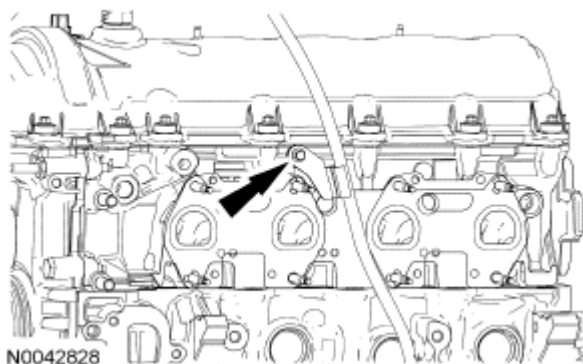
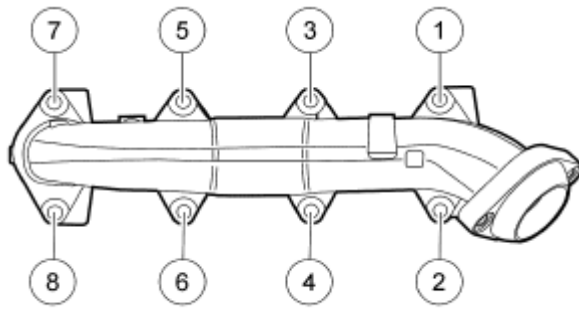


Fig. 423: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

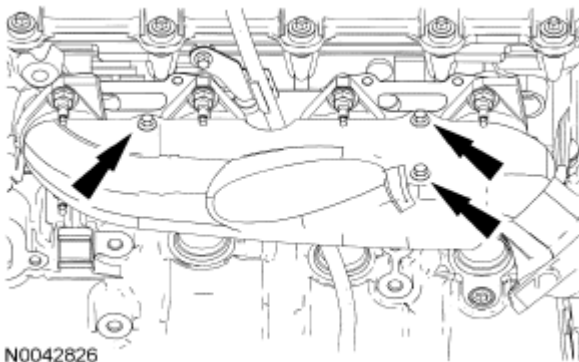
77. Inspect the LH exhaust manifold for flatness. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
78. Install 8 new LH exhaust manifold studs.
- Tighten to 12 N.m (9 lb-ft).
79. Position new gaskets, the LH exhaust manifold and tighten the 8 new nuts in the sequence shown.
- Tighten to 25 N.m (18 lb-ft).



N0040497

Fig. 424: Locating Tightening Sequence Of Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

80. Position the LH exhaust manifold heat shield and install the bolts.
- Tighten to 10 N.m (89 lb-in).



N0042826

Fig. 425: Locating LH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These may cause scratches and gouges resulting in leak paths. Use a plastic scraper to clean the sealing surfaces.

81. Clean the oil filter adapter sealing surfaces using silicone gasket remover, metal surface prep and a plastic scraping tool. Follow the directions on the packaging.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

NOTE: Clean and inspect the mating surfaces and install new gaskets.

82. Position the oil filter adapter and install the bolts.

- Tighten to 25 N.m (18 lb-ft).

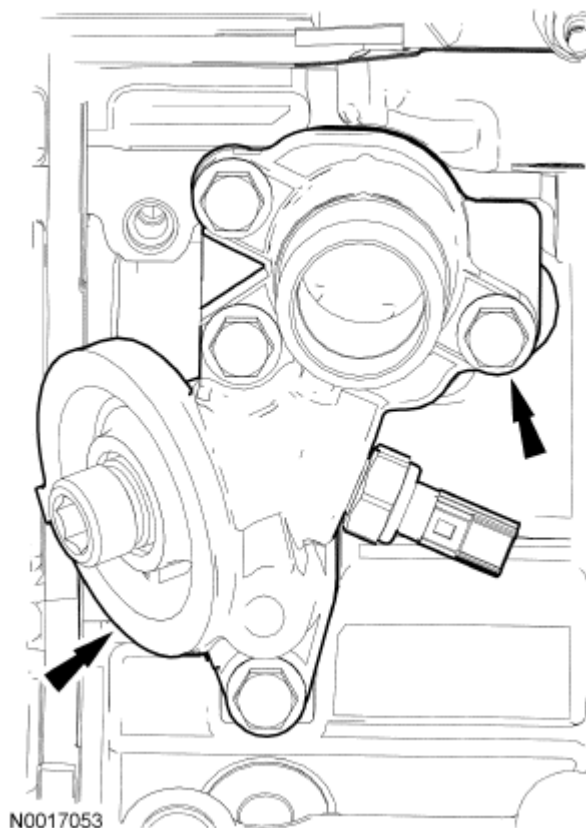


Fig. 426: Locating Oil Filter Adapter And Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the oil filter gasket with clean engine oil

83. Install a new oil filter.

- Tighten the oil filter until the gasket makes contact, then use an oil filter strap wrench to tighten the filter an additional 270 degrees.

84. Position the LH engine support insulator bracket and install the bolts.

- Tighten to 72 N.m (53 lb-ft).

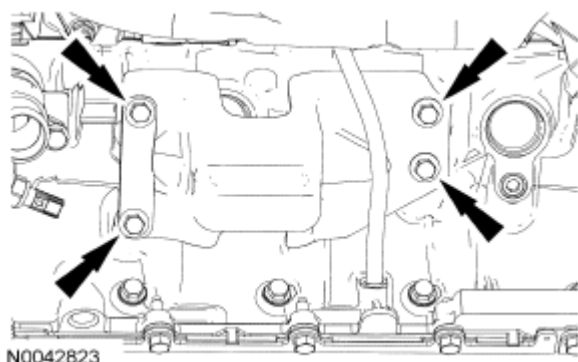


Fig. 427: Locating Engine Support Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

85. Install the 8 ignition coils and the 8 bolts.
- Tighten to 6 N.m (53 lb-in).

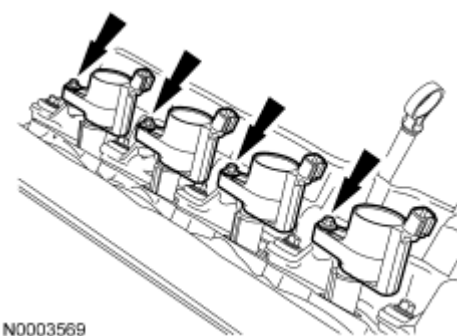


Fig. 428: Identifying Ignition Coils And Bolts
Courtesy of FORD MOTOR CO.

86. Connect the positive crankcase ventilation (PCV) hose to the LH valve cover.

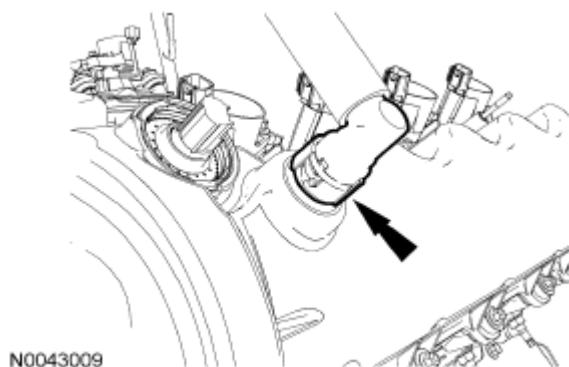
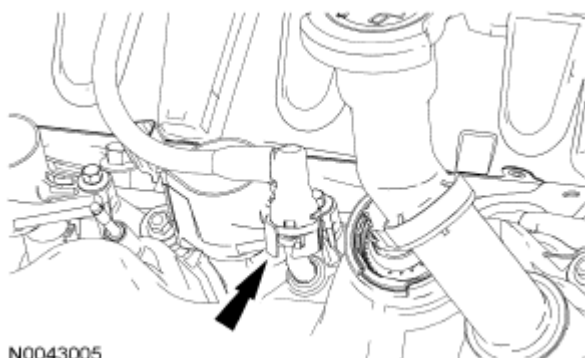


Fig. 429: Locating Positive Crankcase Ventilation (PCV) Hose
Courtesy of FORD MOTOR CO.

87. Connect the breather tube to the RH valve cover.

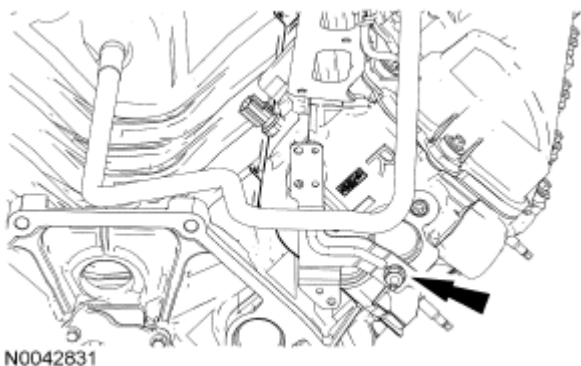


N0043005

Fig. 430: Locating Breather Tube Valve Cover
Courtesy of FORD MOTOR CO.

NOTE: Install new O-ring seals and lubricate the O-ring seals with clean engine coolant.

88. Position the heater supply tube and the hoses as an assembly and install the stud bolt.
- Tighten to 10 N.m (89 lb-in).



N0042631

Fig. 431: Locating Heater Supply Tube Stud Bolt
Courtesy of FORD MOTOR CO.

89. Position the engine wiring harness and attach the electrical connectors to the heater supply tube bracket.

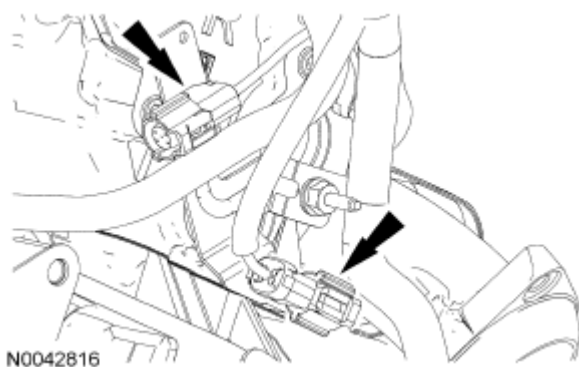


Fig. 432: Locating Engine Wiring Harness Electrical Connectors
Courtesy of FORD MOTOR CO.

90. Position the ground strap and install the nut.
- Tighten to 10 N.m (89 lb-in).

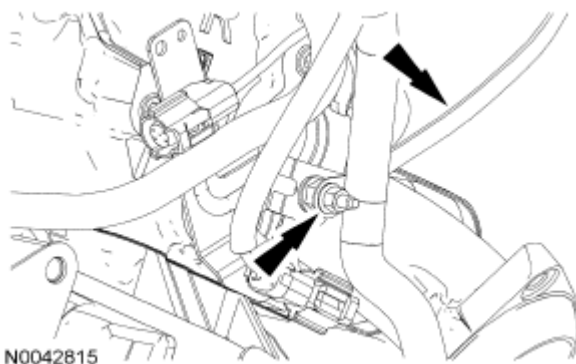


Fig. 433: Locating Ground Strap Nut
Courtesy of FORD MOTOR CO.

91. Connect the cylinder head temperature (CHT) sensor electrical connector.

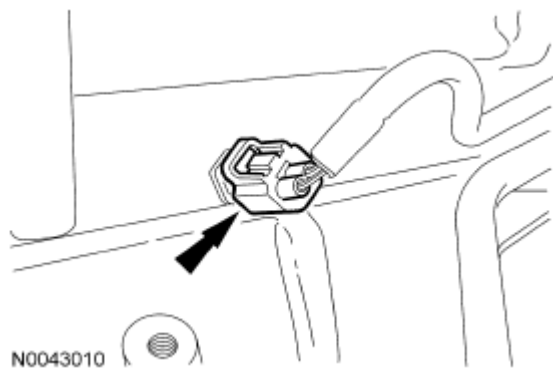
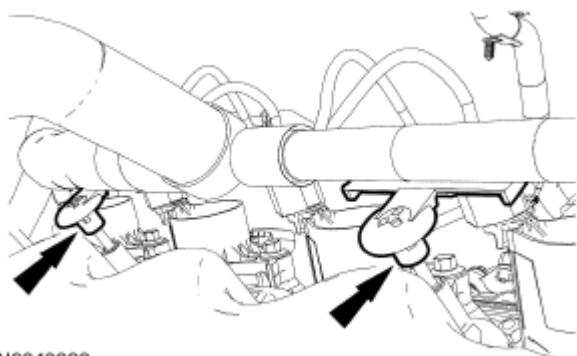


Fig. 434: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

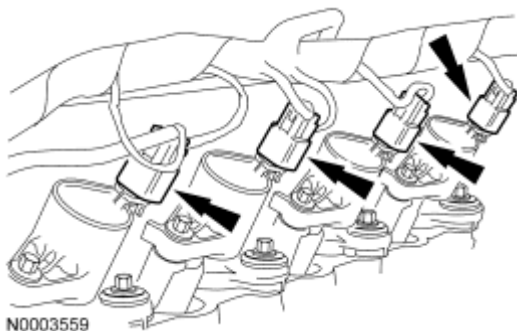
92. Attach the wiring harness retainers to the RH valve cover studs.



N0043008

Fig. 435: Locating RH Valve Cover Studs
Courtesy of FORD MOTOR CO.

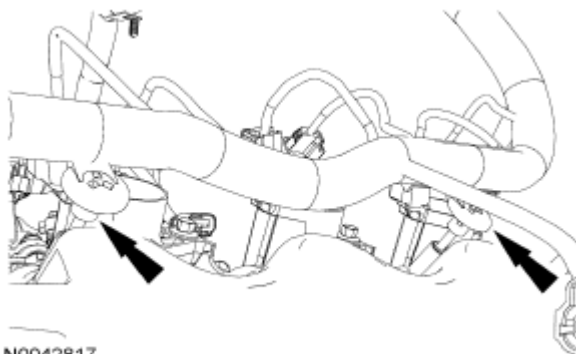
NOTE: RH shown, LH similar.



N0003559

Fig. 436: Locating Ignition Coil Electrical Connectors
Courtesy of FORD MOTOR CO.

93. Connect the RH and LH ignition coil electrical connectors.
94. Attach the wiring harness retainers to the LH valve cover studs.



N0042817

Fig. 437: Locating Valve Cover Studs
Courtesy of FORD MOTOR CO.

95. Position the LH radio interference capacitor and install the nut.

- Tighten to 25 N.m (18 lb-ft).

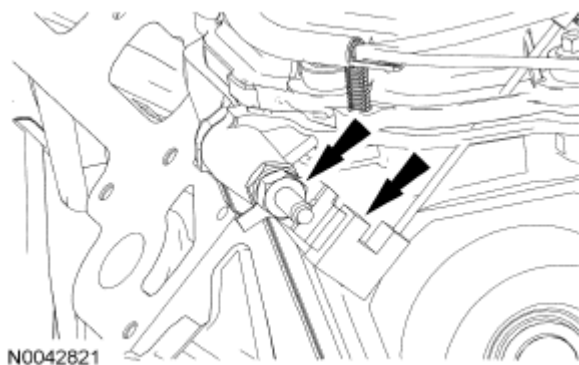


Fig. 438: Locating Radio Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

96. Position the cooling fan wiring harness and install the nut.

- Tighten to 25 N.m (18 lb-ft).

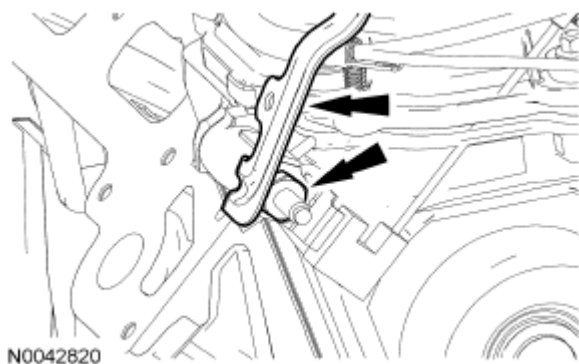


Fig. 439: Locating Cooling Fan Wiring Harness And Nut
Courtesy of FORD MOTOR CO.

97. Connect the LH camshaft position sensor and attach the wiring harness retainers.

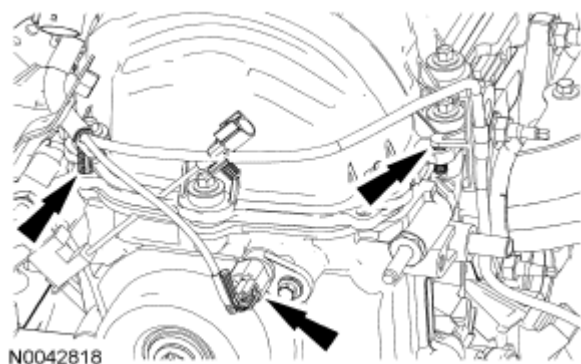


Fig. 440: Locating LH Camshaft Position Sensor And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

98. Connect the oil pressure sensor electrical connector.

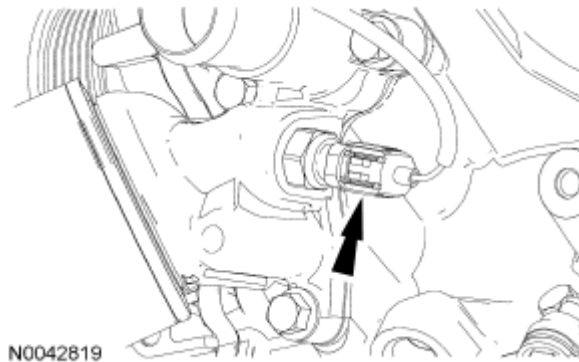


Fig. 441: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

99. Position the RH radio interference capacitor and install the nut.
- Tighten to 25 N.m (18 lb-ft).

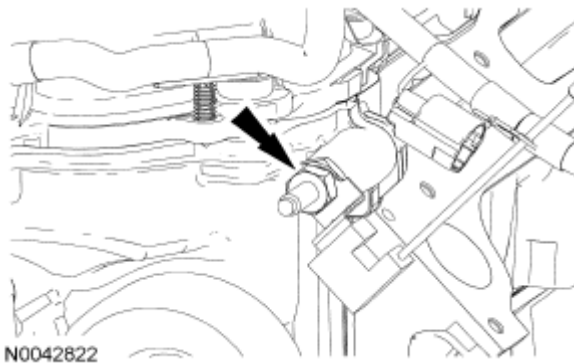


Fig. 442: Locating RH Radio Interference Capacitor Nut
Courtesy of FORD MOTOR CO.

100. Attach the wiring harness retainers.

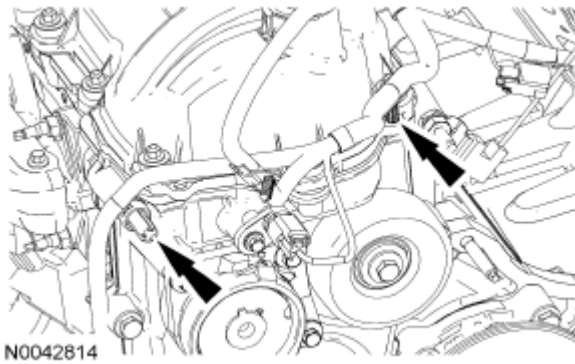


Fig. 443: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

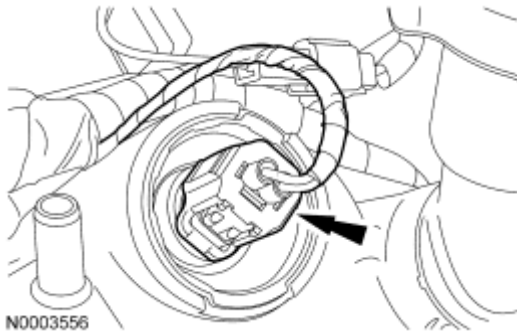


Fig. 444: Locating Camshaft Timing (VCT) Solenoid Electrical Connectors
Courtesy of FORD MOTOR CO.

101. Connect the RH and LH variable camshaft timing (VCT) solenoid electrical connectors.

NOTE: RH shown, LH similar.

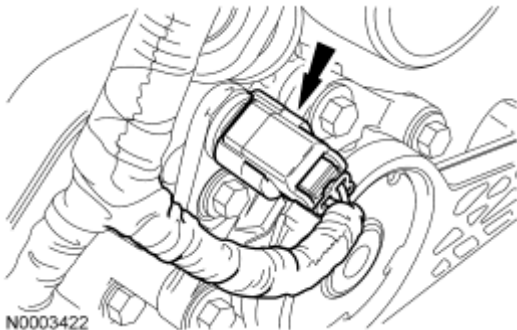


Fig. 445: Identifying RH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

102. Disconnect the RH and LH camshaft position (CMP) sensor electrical connectors.

103. Connect the crankshaft position sensor electrical connector and attach the wiring harness retainer.

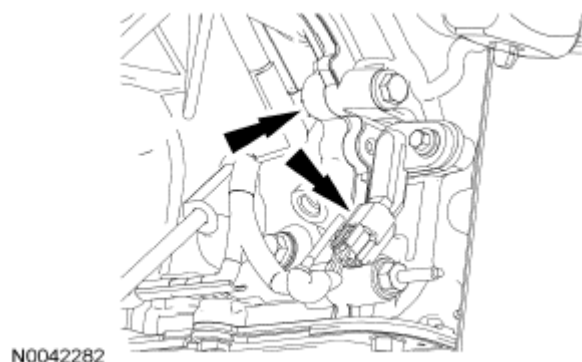


Fig. 446: Locating Crankshaft Position Sensor Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

104. Attach the wiring harness retainers to the RH oil pan bolts.

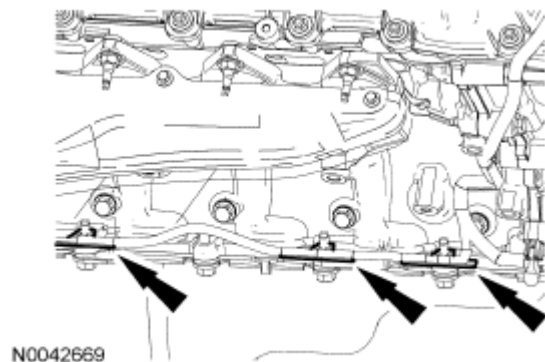


Fig. 447: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

105. Install the special tool.

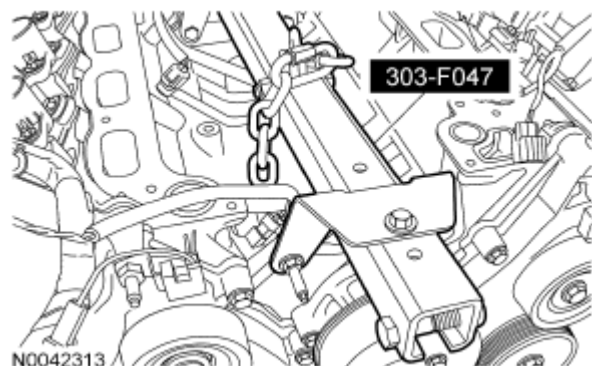


Fig. 448: Identifying Special Tool
Courtesy of FORD MOTOR CO.

106. Using a suitable floor crane, remove the engine from the engine stand.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the aluminum retainer plate. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

107. Inspect the crankshaft rear seal retainer plate. Clean the mating surface for the rear seal retainer plate with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

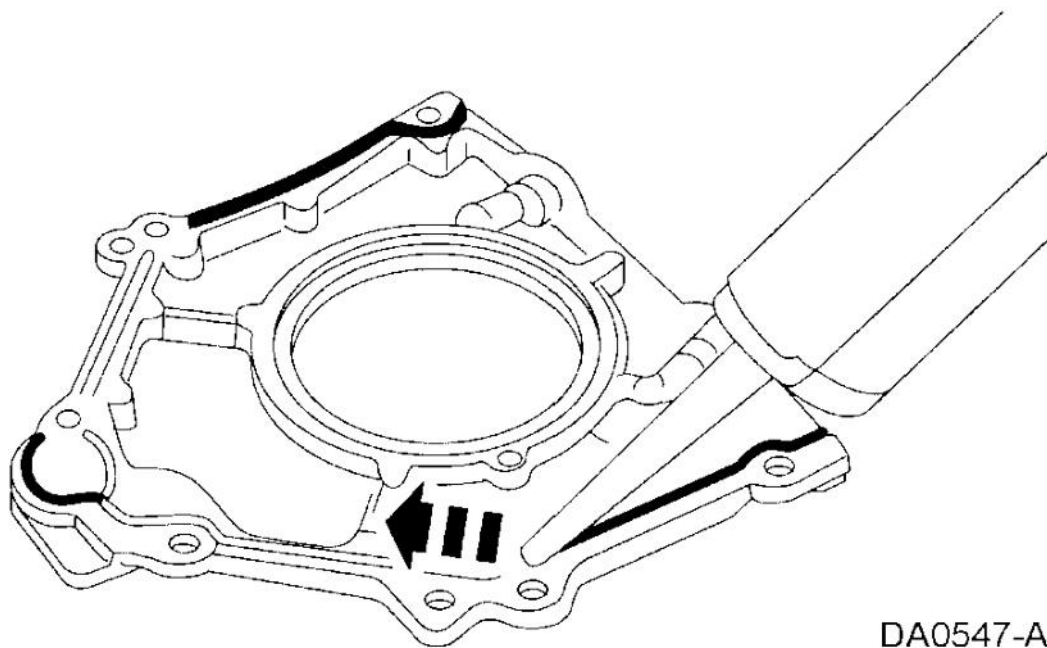
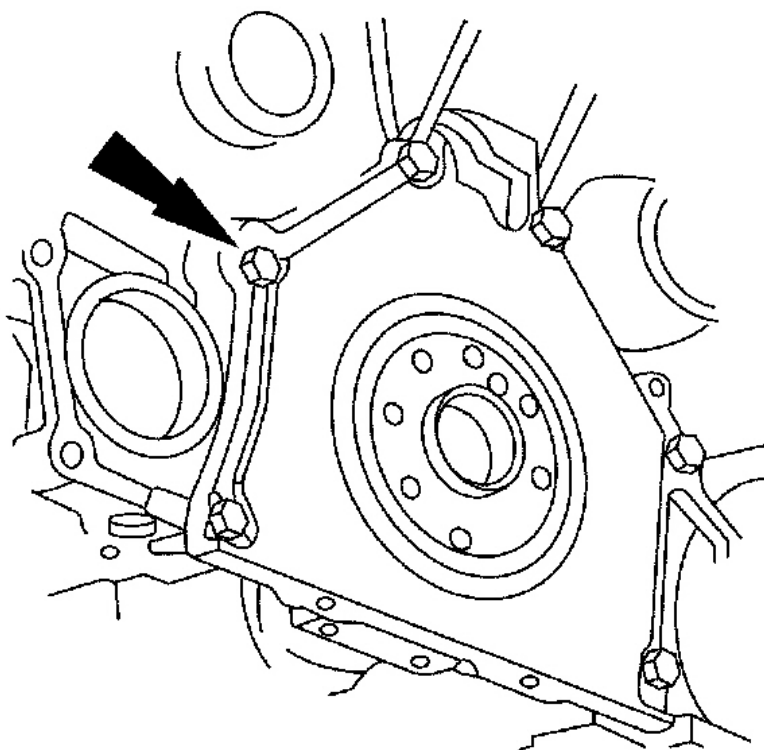


Fig. 449: Applying Bead Of Silicone Gasket And Sealant Around Crankshaft Rear Seal Retainer Plate Sealing Surface
Courtesy of FORD MOTOR CO.

108. Apply a 4 mm (0.16 in) bead of silicone gasket and sealant around the crankshaft rear seal retainer sealing surface.

109. Install the crankshaft rear seal retainer plate and loosely install the 6 bolts.



GA2605-A

Fig. 450: Identifying Crankshaft Rear Oil Seal Retainer
Courtesy of FORD MOTOR CO.

110. Tighten the 6 bolts in the sequence shown.
- Tighten to 10 N.m (89 lb-in).

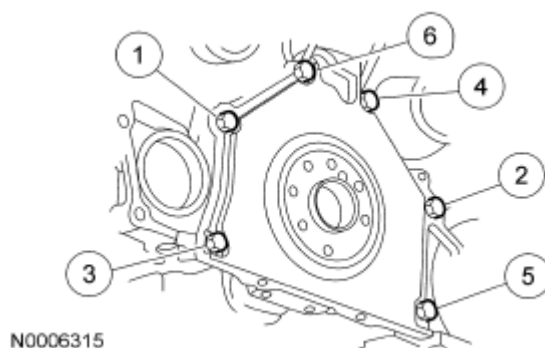


Fig. 451: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or

other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

111. Inspect the oil pan. Clean the mating surface for the oil pan with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

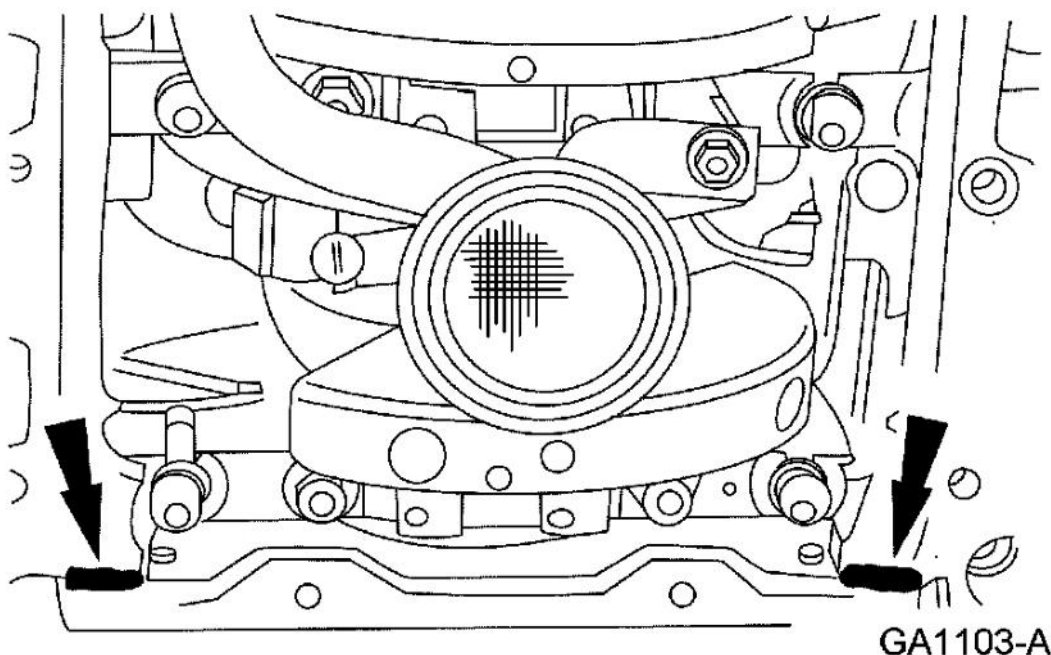
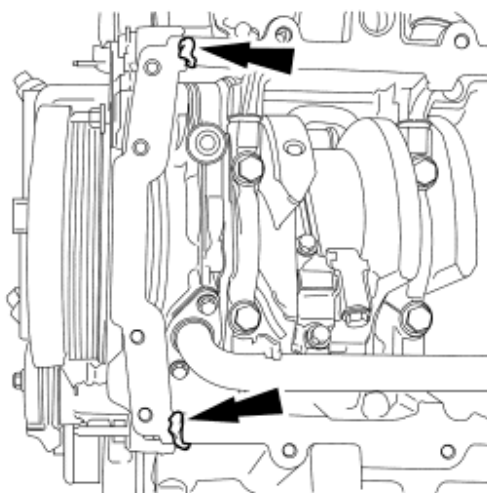


Fig. 452: Area For Applying Bead Of Silicone Gasket And Sealant
Courtesy of FORD MOTOR CO.

112. Apply silicone gasket and sealant at the crankshaft rear seal retainer plate-to-cylinder block sealing surface.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.



A0045427

Fig. 453: Applying Silicone Gasket And Sealant At Engine Front Cover-To-Cylinder Block Sealing Surface

Courtesy of FORD MOTOR CO.

113. Apply silicone gasket and sealant at the engine front cover-to-cylinder block sealing surface.
114. Install the oil pan gasket and the oil pan and loosely install the 16 bolts.

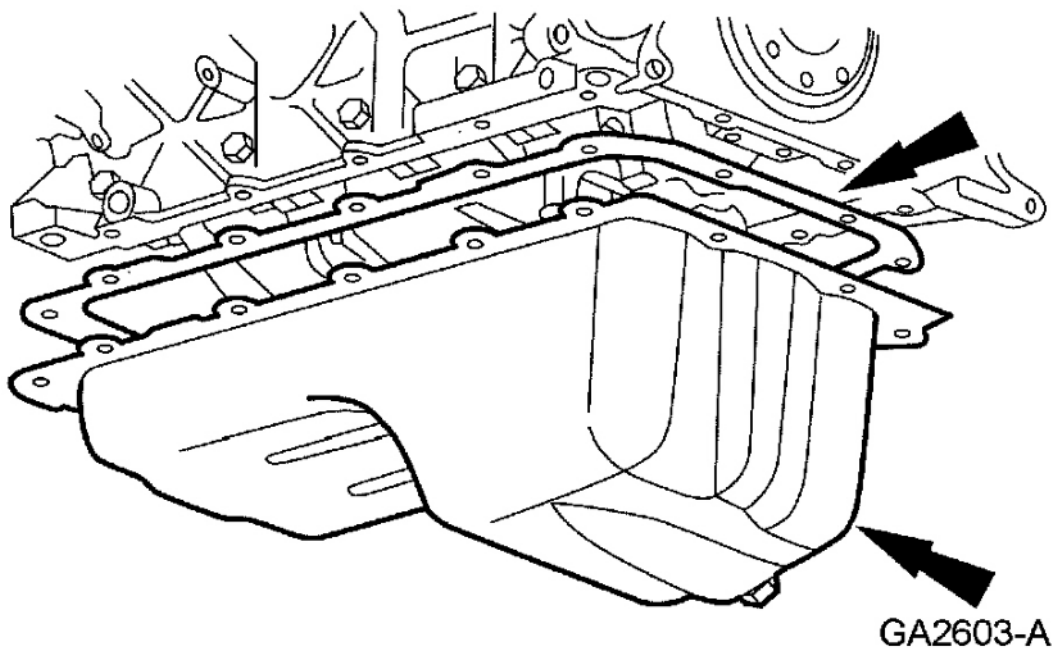


Fig. 454: Identifying Oil Pan And Gasket
Courtesy of FORD MOTOR CO.

115. Tighten the 16 bolts in 3 stages, in the sequence shown.

- Stage 1: Tighten to 2 N.m (18 lb-in).
- Stage 2: Tighten to 20 N.m (15 lb-ft).
- Stage 3: Tighten an additional 60 degrees.

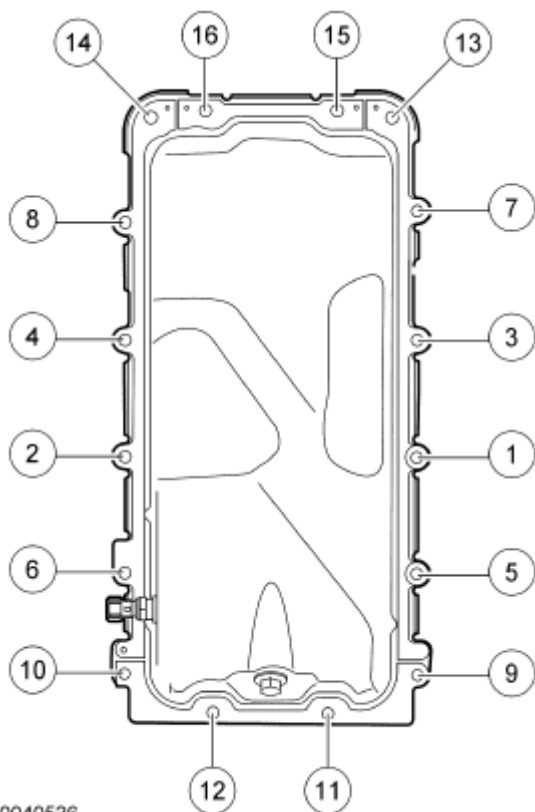


Fig. 455: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the inner lip of the crankshaft rear seal with clean engine oil.

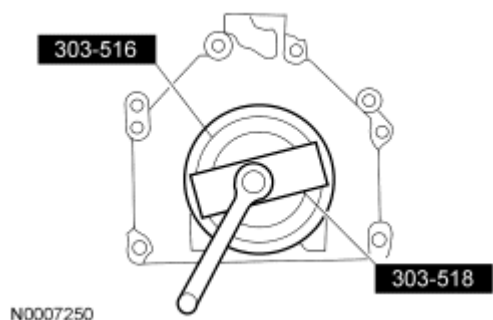


Fig. 456: Using Special Tools To Install New Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

116. Using the special tools, install a new crankshaft rear seal.
117. Using the special tools, install the crankshaft rear oil slinger.

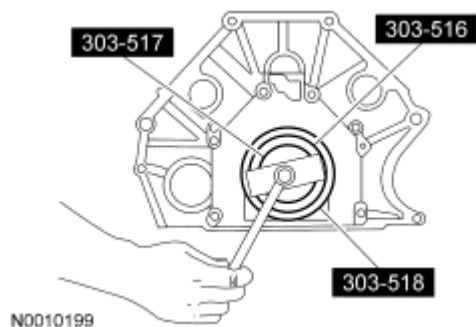


Fig. 457: Installing Crankshaft Rear Oil Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

118. Install the spacer plate.

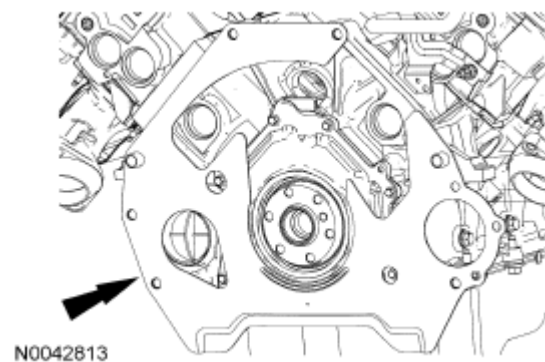


Fig. 458: Locating Spacer Plate
Courtesy of FORD MOTOR CO.

119. Position the flexplate and install the bolts in the sequence shown.
 - Tighten to 80 N.m (59 lb-ft).

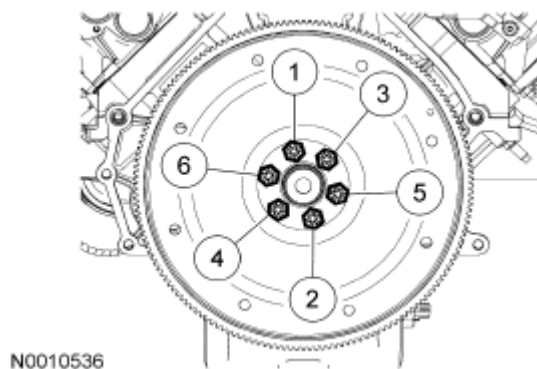


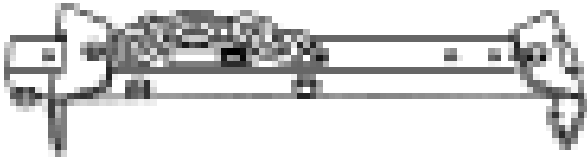
Fig. 459: Identifying Flexplate Bolts Tightening Sequence

Courtesy of FORD MOTOR CO.

INSTALLATION

ENGINE

SPECIAL TOOL(S)

 ST1377-A	Modular Engine Lift Bracket 303-F047 (014-00073) or equivalent
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MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A

1. Position the engine in the vehicle and remove the floor crane.
2. Remove the special tool.

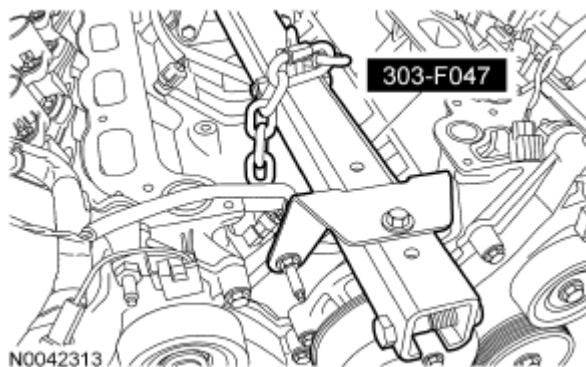


Fig. 460: Identifying Special Tool
Courtesy of FORD MOTOR CO.

3. Install the LH engine support insulator through-bolt.
 - Tighten to 103 N.m (76 lb-ft).

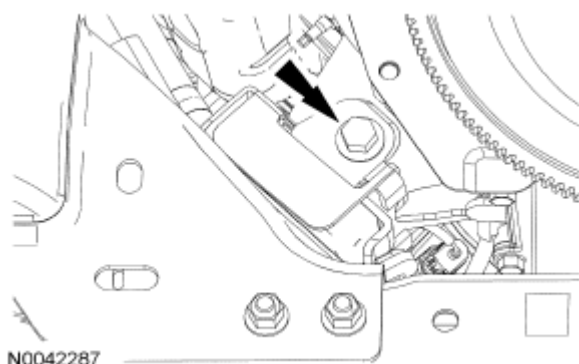


Fig. 461: Locating LH Engine Support Insulator Through-Bolt
Courtesy of FORD MOTOR CO.

4. If equipped, attach the block heater wiring harness retainers and connect the block heater electrical connector.

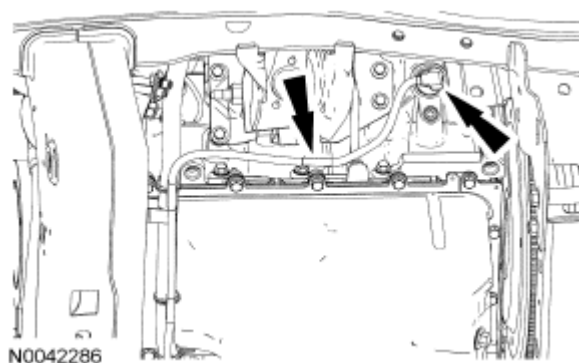


Fig. 462: Locating Block Heater Wiring Harness Retainers And Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

5. Install the RH engine support insulator nuts.
 - Tighten to 90 N.m (66 lb-ft).

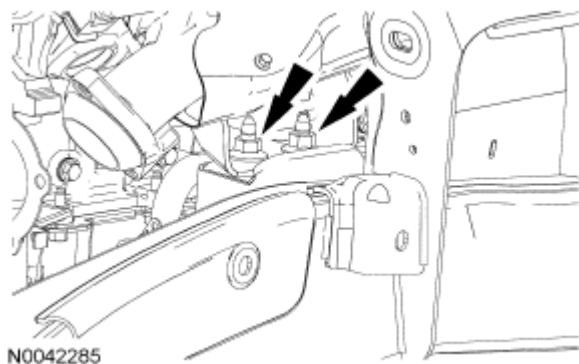


Fig. 463: Locating RH Engine Support Insulator Nuts
Courtesy of FORD MOTOR CO.

6. Position the RH splash shield and install the pushpins.

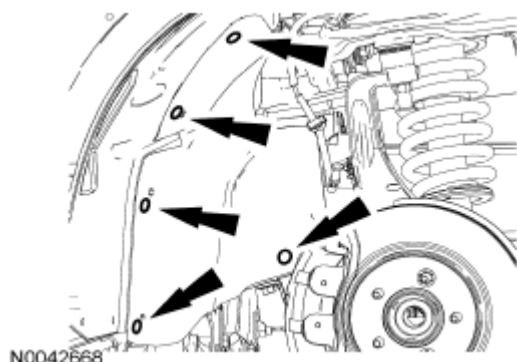


Fig. 464: Locating RH Splash Shield Pushpins
Courtesy of FORD MOTOR CO.

7. Position the battery cable bracket on the RH engine support insulator bracket and install the bolt.
- Tighten to 15 N.m (11 lb-ft).

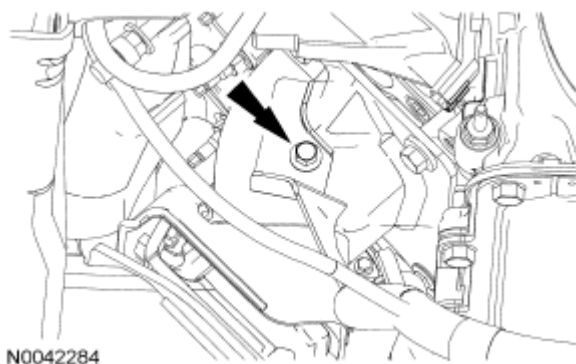


Fig. 465: Locating RH Engine Support Insulator Bracket Bolt
Courtesy of FORD MOTOR CO.

8. Install the oil temperature sensor.
- Tighten to 15 N.m (11 lb-ft).

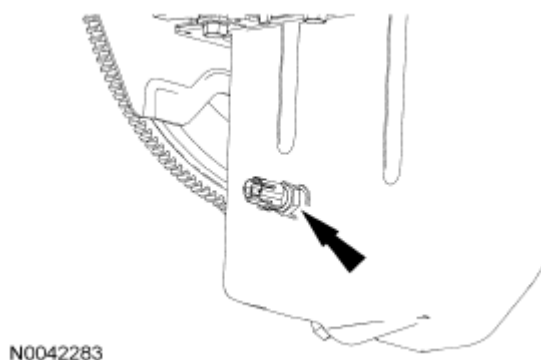


Fig. 466: Locating Oil Temperature Sensor
Courtesy of FORD MOTOR CO.

9. Position the A/C compressor and install the 2 nuts and the stud bolt.
 - Tighten to 25 N.m (18 lb-ft).

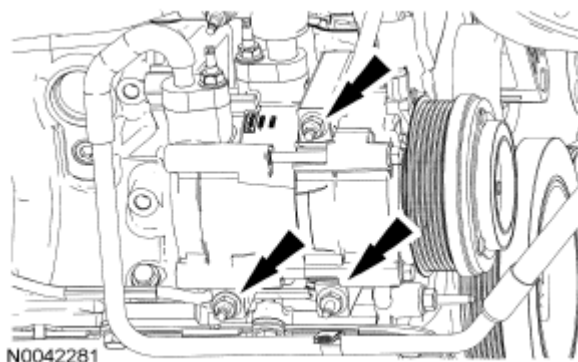


Fig. 467: Locating A/C Compressor Nuts
Courtesy of FORD MOTOR CO.

10. Position the A/C hose bracket and install the nut. Attach the wiring harness retainer and connect the A/C clutch electrical connector.
 - Tighten to 20 N.m (15 lb-ft).

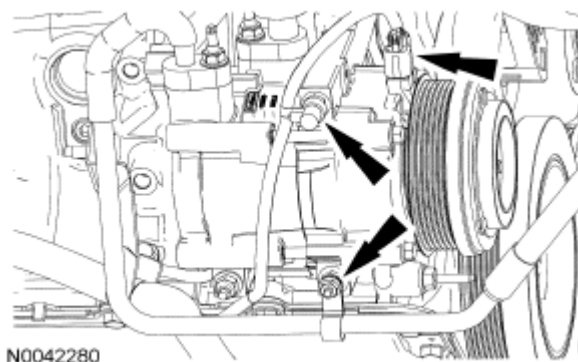


Fig. 468: Locating A/C Hose Bracket And A/C Clutch Electrical Connector
Courtesy of FORD MOTOR CO.

11. Connect the lower radiator hose to the oil filter adapter.

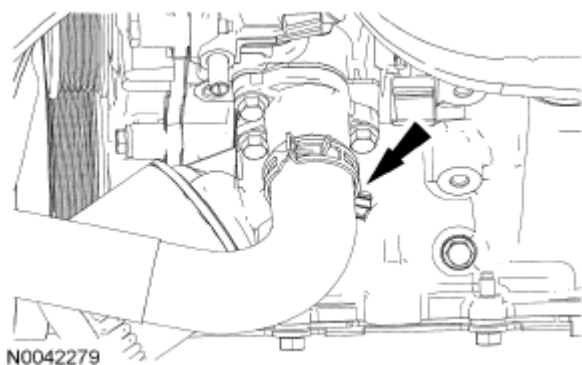


Fig. 469: Locating Lower Radiator Hose Clamp
Courtesy of FORD MOTOR CO.

12. Position the power steering pump and install the stud bolts.
 - Tighten to 25 N.m (18 lb-ft).

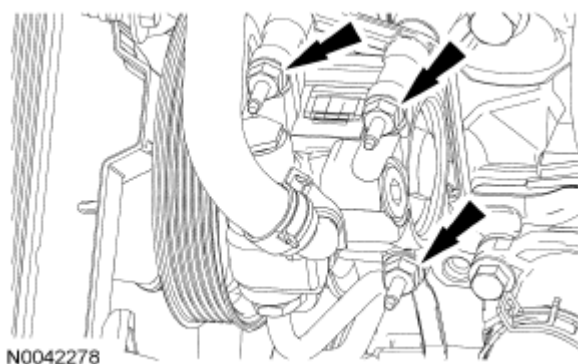


Fig. 470: Locating Power Steering Pump Stud Bolts
Courtesy of FORD MOTOR CO.

13. Attach the wiring harness retainer to the power steering pump stud bolt.

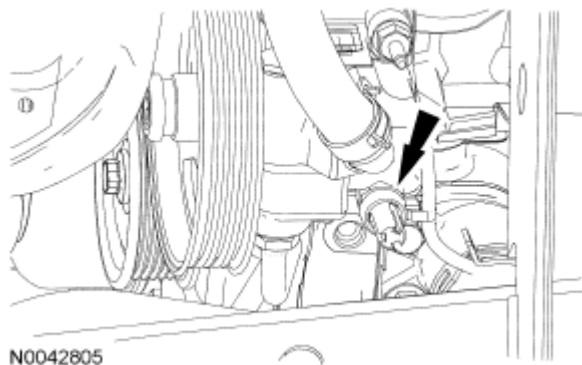


Fig. 471: Locating Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

14. Position the wiring harness bracket and install the nuts.

- Tighten to 10 N.m (89 lb-in).

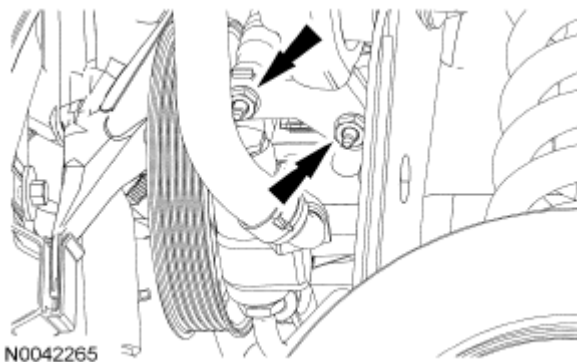


Fig. 472: Locating Wiring Harness Bracket Nuts
Courtesy of FORD MOTOR CO.

15. Position the wiring harness bracket and install the nut.

- Tighten to 10 N.m (89 lb-in).

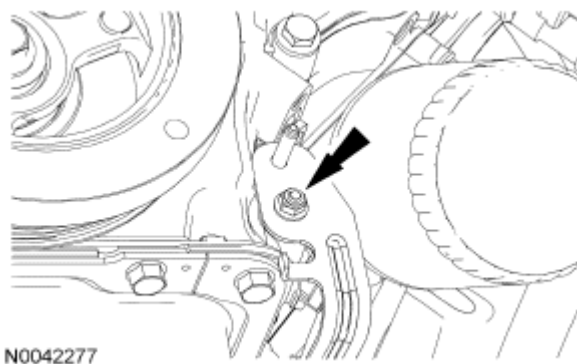


Fig. 473: Locating Wiring Harness Bracket Nut
Courtesy of FORD MOTOR CO.

16. Position the power steering pressure hose bracket and install the nut.

- Tighten to 10 N.m (89 lb-in).

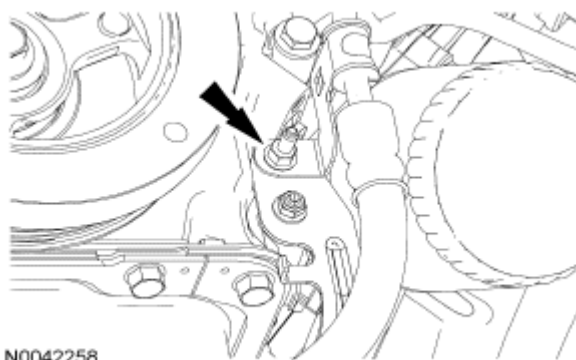


Fig. 474: Locating Power Steering Pressure Hose Bracket Nut
Courtesy of FORD MOTOR CO.

17. Position the inner fender splash shield and install the 3 pushpins and 3 screws.

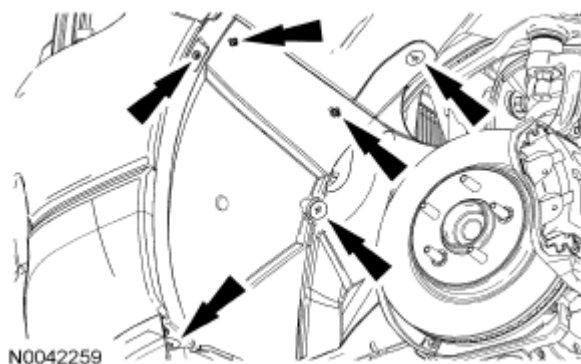


Fig. 475: Locating Inner Fender Splash Shield Pushpins And Screws
Courtesy of FORD MOTOR CO.

18. Install the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 6R60** .
19. Position the ground wire and install the nut.
- Tighten to 12 N.m (9 lb-ft).

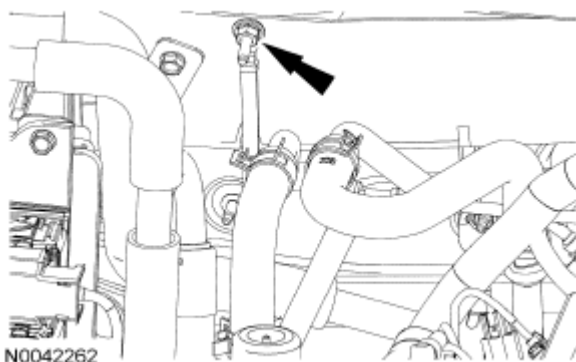


Fig. 476: Locating Ground Wire And Nut

Courtesy of FORD MOTOR CO.

20. Connect the heater hose.

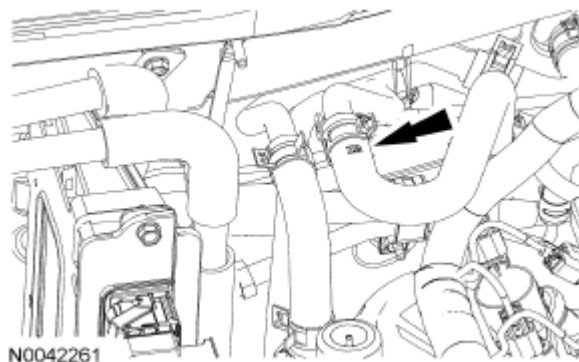


Fig. 477: Locating Heater Hose
Courtesy of FORD MOTOR CO.

21. Attach the wiring harness pin-type retainer, and connect the 2 powertrain control module (PCM) electrical connectors and the in-line electrical connector.

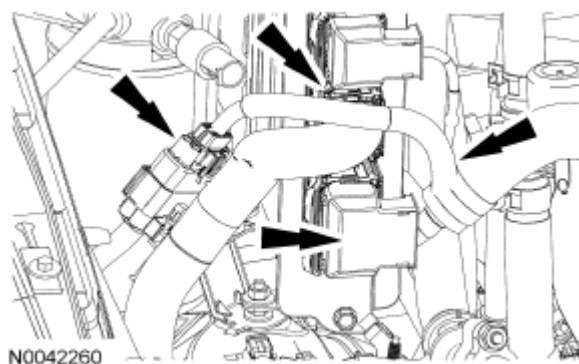


Fig. 478: Locating Wiring Harness Pin-Type Retainer, Powertrain Control Module (PCM) Electrical Connectors And In-Line Electrical Connector
Courtesy of FORD MOTOR CO.

22. Attach the heater hose retainer to the RH valve cover.

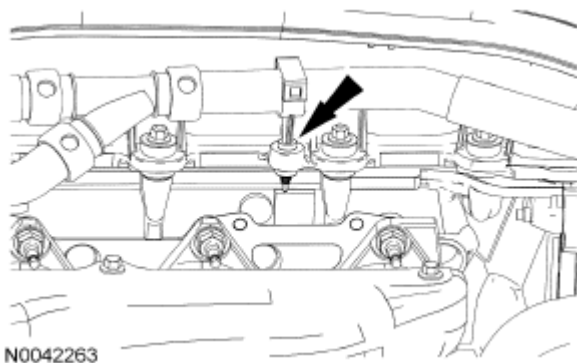


Fig. 479: Locating Heater Hose Retainer
Courtesy of FORD MOTOR CO.

23. Connect the evaporative emission (EVAP) canister purge valve electrical connector.

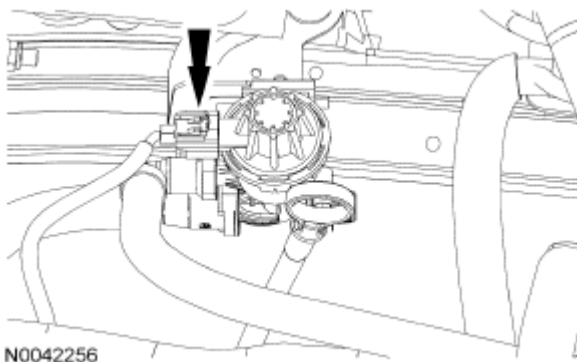


Fig. 480: Locating Evaporative Emission (EVAP) Canister Purge Valve Electrical Connector
Courtesy of FORD MOTOR CO.

24. Position new gaskets, the coolant crossover, the heated positive crankcase ventilation (PCV) fitting and the heated PCV fitting hose as an assembly and install the bolts.
- Tighten to 10 N.m (89 lb-in).

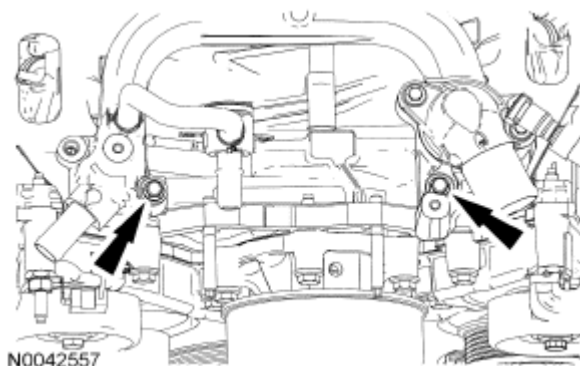


Fig. 481: Locating PCV Fitting Hose Assembly Bolts
Courtesy of FORD MOTOR CO.

25. Install the upper radiator hose.

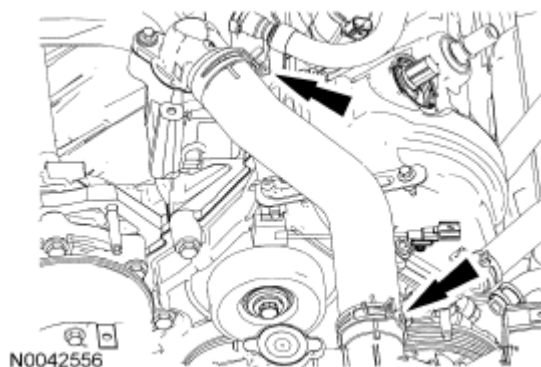


Fig. 482: Locating Upper Radiator Hose Clamps
Courtesy of FORD MOTOR CO.

26. Connect the heater hose.

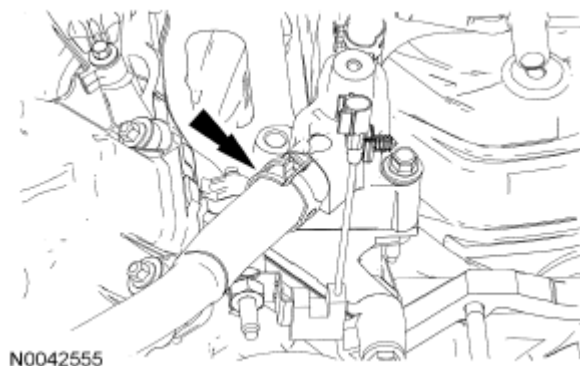


Fig. 483: Locating Heater Hose Clamp
Courtesy of FORD MOTOR CO.

27. Position the alternator, alternator bracket and the wiring harness as an assembly and install the bolts.
- Tighten to 10 N.m (89 lb-in).

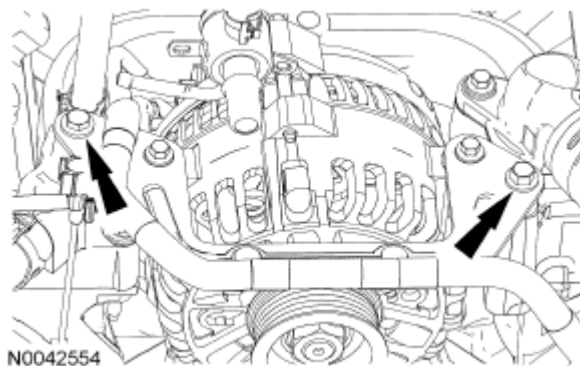


Fig. 484: Locating Alternator Bracket And Wiring Harness Bolts

Courtesy of FORD MOTOR CO.

28. Tighten the nuts
- Tighten to 25 N.m (18 lb-ft).

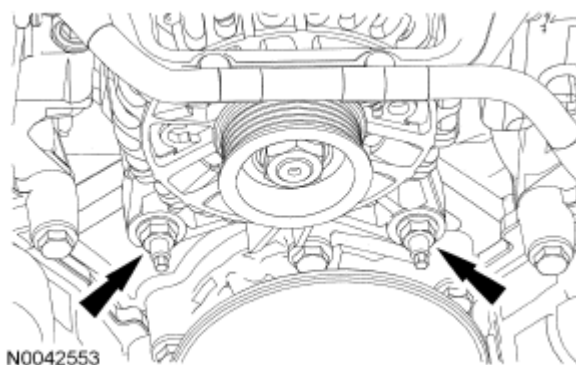


Fig. 485: Locating Nut
Courtesy of FORD MOTOR CO.

29. Attach the wiring harness retainer to the cooling fan wiring harness bracket.

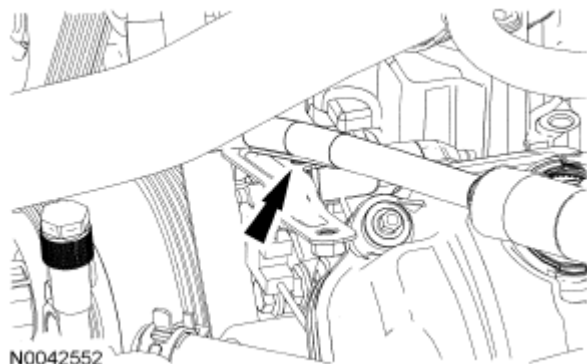


Fig. 486: Locating Cooling Fan Wiring Harness Bracket
Courtesy of FORD MOTOR CO.

30. Connect the heated PCV fitting coolant hose.

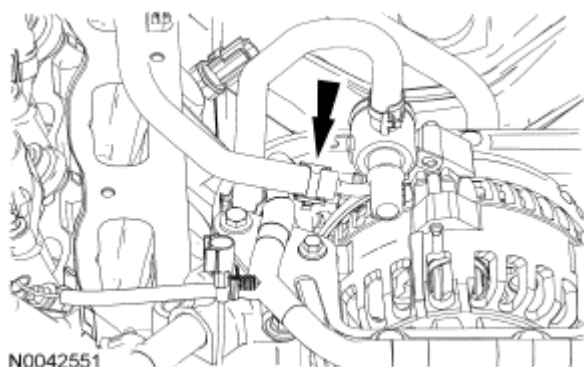


Fig. 487: Locating Heated PCV Fitting Coolant Hose
Courtesy of FORD MOTOR CO.

31. Connect the electrical connector.



Fig. 488: Locating Electrical Connector
Courtesy of FORD MOTOR CO.

32. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt.

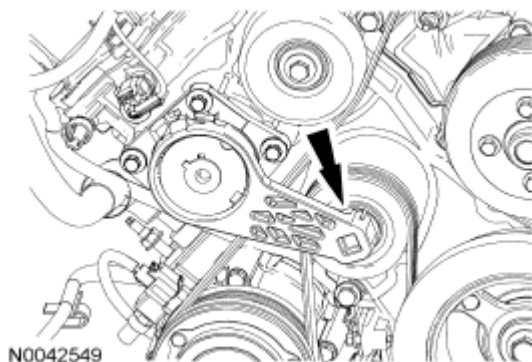


Fig. 489: Locating Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

33. Install the cooling fan. For additional information, refer to **ENGINE COOLING** .

34. Connect the wiring harness terminals, install the nuts and close the cover.
- Tighten to 12 N.m (9 lb-ft).

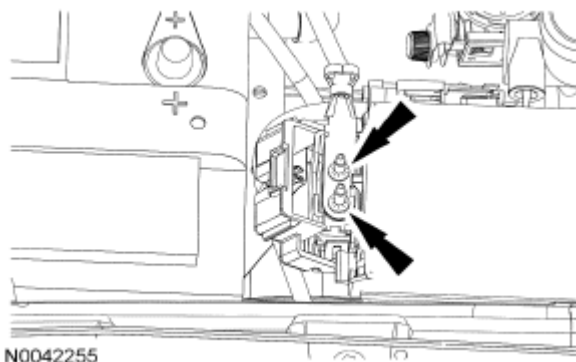


Fig. 490: Locating Wiring Harness Terminals Nuts
Courtesy of FORD MOTOR CO.

35. Install the intake manifold. For additional information, refer to **INTAKE MANIFOLD**.
36. Position the hood and install the 4 bolts.
- Tighten to 12 N.m (9 lb-ft).

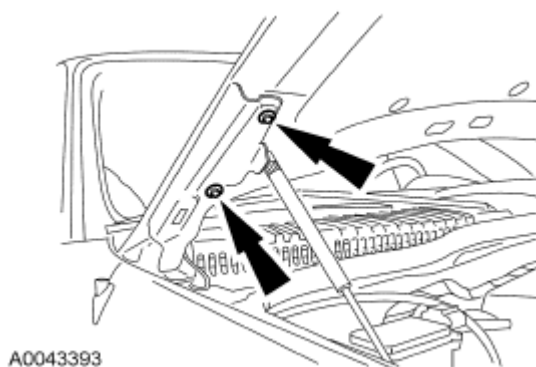


Fig. 491: Locating Hood Hinge Bolts
Courtesy of FORD MOTOR CO.

37. Connect the windshield washer hose.

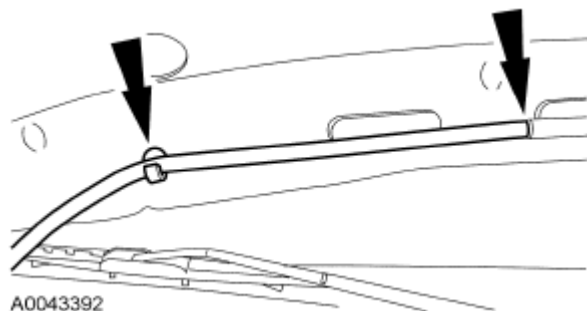
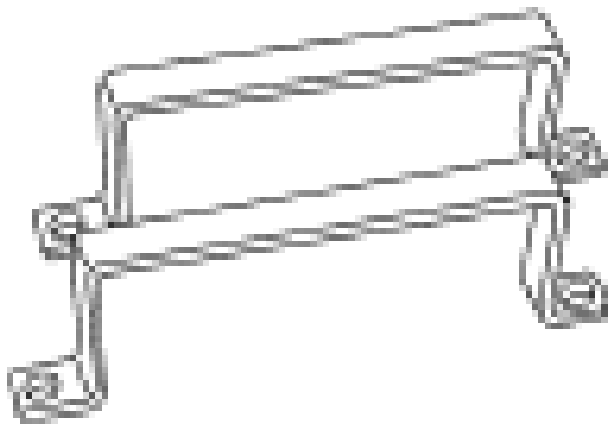


Fig. 492: Locating Windshield Washer Hose And Retainer
 Courtesy of FORD MOTOR CO.

38. Fill the engine with clean engine oil.
39. Fill and bleed the cooling system. For additional information, refer to **ENGINE COOLING** .
40. Carry out the fluid level check for the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 6R60** .

CYLINDER HEAD

SPECIAL TOOL(S)



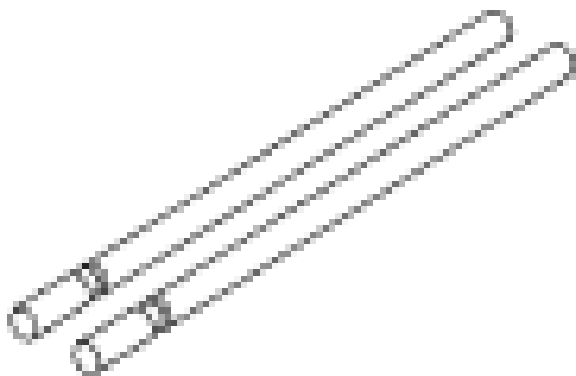
ST1068-A

Remover/Installer, Cylinder Head
 303-572 (T97T-6000-A)

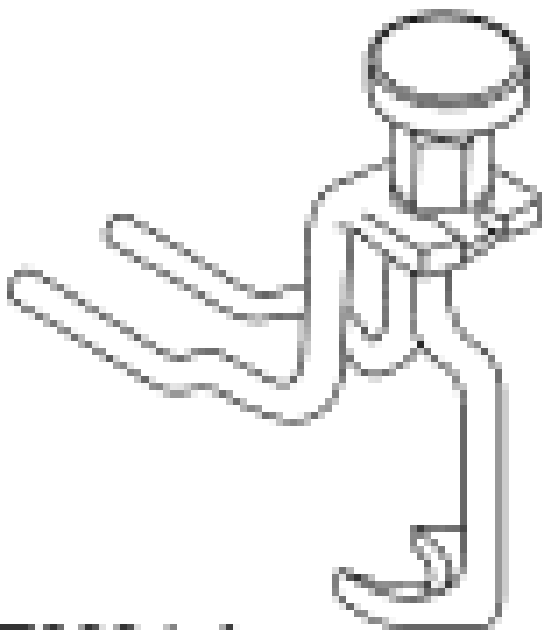
Alignment Pins, Cylinder Head
 303-1040 (SR-015486)

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2806-A

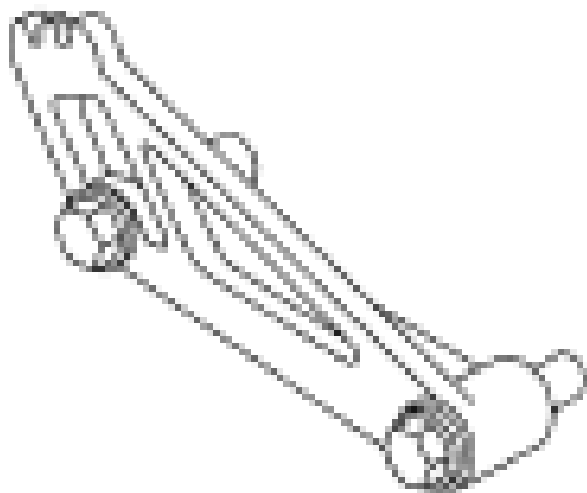


ST2804-A

Compressor, Valve Spring
303-1039

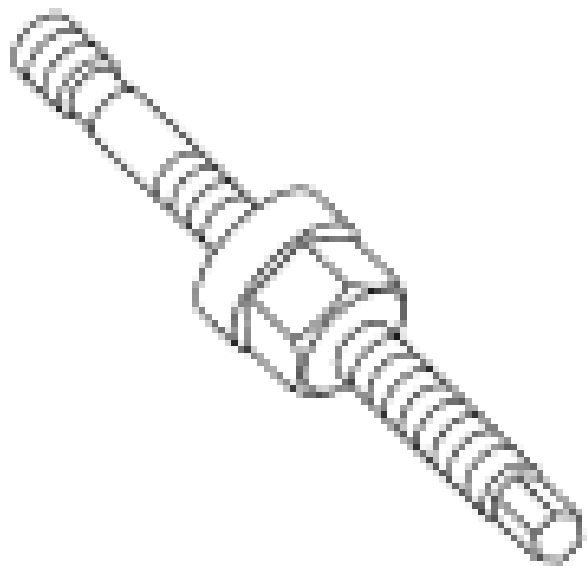
2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2807-A

Locking Tool, Camshaft Phaser Sprocket
303-1046

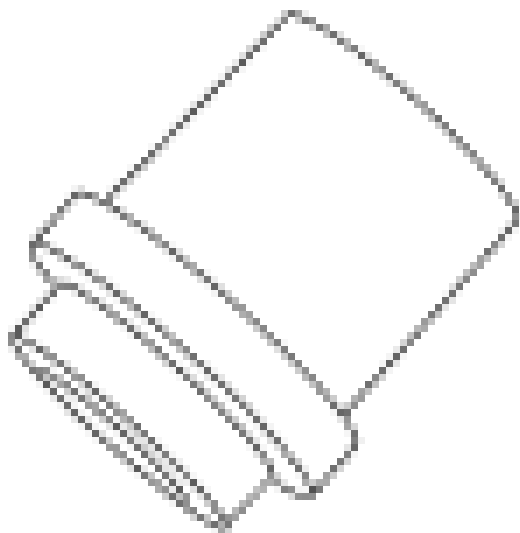


ST2428-A

Installer, Crankshaft Vibration Damper
303-102 (T74P-6316-B)

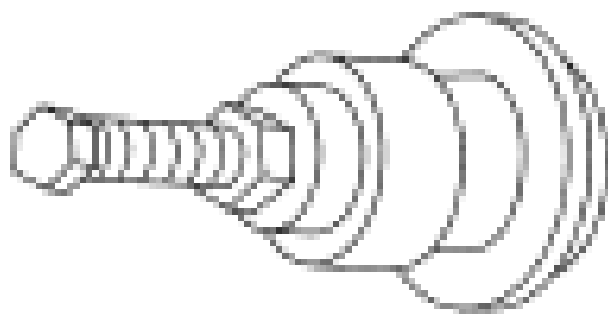
2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST2197-A

Installer, Crankshaft Front Seal
303-635



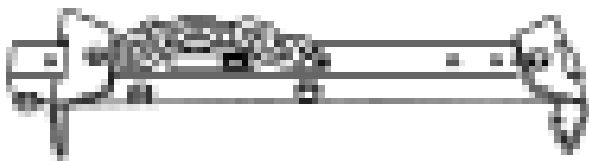
ST1328-A

Installer, Front Cover Seal
303-335 (T88T-6701-A)

Modular Engine Lift Bracket
303-F047 (014-00073) or equivalent

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



ST1377-A

MATERIAL

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A
Motorcraft Premium Gold Engine Coolant VC-7-A (in California, Oregon and New Mexico VC-7-B, in Canada CVC-7-A) or equivalent (yellow color)	WSS-M97B51-A1
Silicone Gasket and Sealant TA-30 or equivalent	WSE-M4G323-A4
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Hydraulic Chain Tensioner Retaining Clip 1L3Z-6P250-AA	-

All cylinder heads

CAUTION: Make sure all coolant residue and foreign material are cleaned from the block surface and cylinder bore.

CAUTION: The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry.

CAUTION: The cylinder head bolts must be discarded and new bolts installed. They are tighten-to-yield designed and cannot be reused.

NOTE: Do not turn the crankshaft until instructed to do so.

NOTE: LH shown, RH similar.

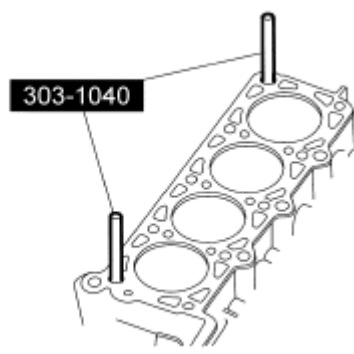


Fig. 493: Identifying Special Tools
Courtesy of FORD MOTOR CO.

1. Using the special tools, position the cylinder head gaskets and cylinder heads over the dowels and install the cylinder head bolts loosely.

LH cylinder head

2. Tighten the LH cylinder head bolts in 3 stages, in the sequence shown.
 - Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.
 - Stage 3: Tighten an additional 90 degrees.

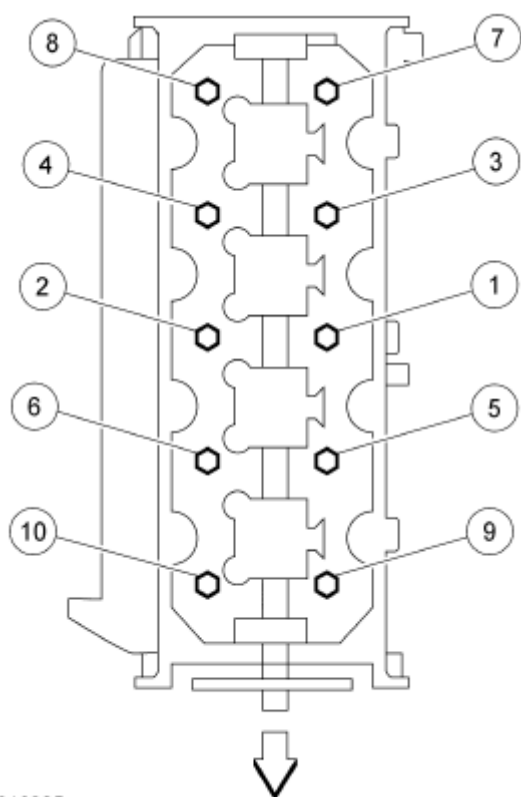


Fig. 494: Identifying Tightening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

3. Remove the special tool from the LH cylinder head.

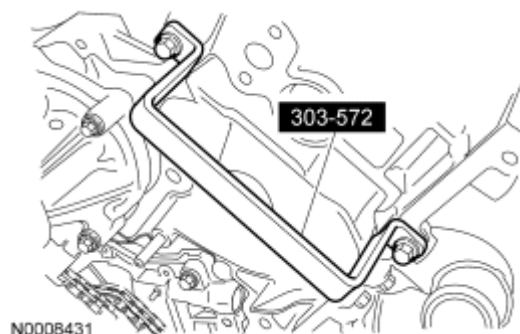
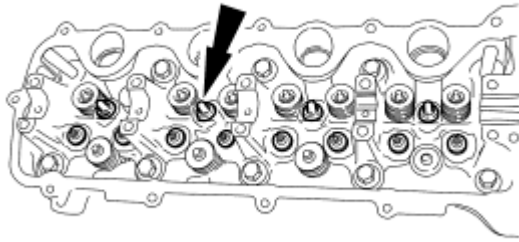


Fig. 495: Identifying Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the hydraulic lash adjusters with clean engine oil prior to installation.

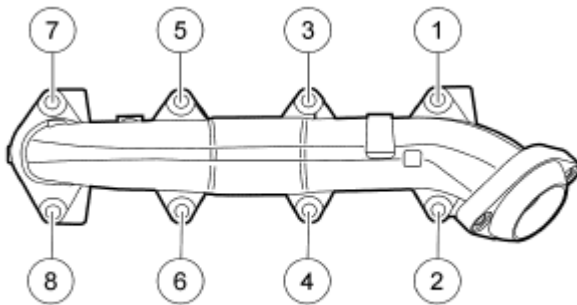
NOTE: The hydraulic lash adjusters must be installed in their original locations.



A0074692

Fig. 496: Identifying Hydraulic Lash Adjusters
 Courtesy of FORD MOTOR CO.

4. Install the hydraulic lash adjusters into the LH cylinder head.
5. Remove the oil level indicator tube, install a new O-ring seal, and lubricate the O-ring seal with clean engine oil. Position the oil level indicator tube loosely in the engine block before installing the LH exhaust manifold.
6. Inspect the LH exhaust manifold gasket mating surfaces for flatness. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
7. Install 8 new LH exhaust manifold studs.
 - Tighten to 12 N.m (9 lb-ft).
8. Position new gaskets, the LH exhaust manifold and tighten the 8 new nuts in the sequence shown.
 - Tighten to 25 N.m (18 lb-ft).



N0040497

Fig. 497: Identifying Tightening Sequence Of LH Exhaust Manifold Bolts
 Courtesy of FORD MOTOR CO.

9. Position the LH exhaust manifold heat shield and install the bolts.
 - Tighten to 10 N.m (89 lb-in).

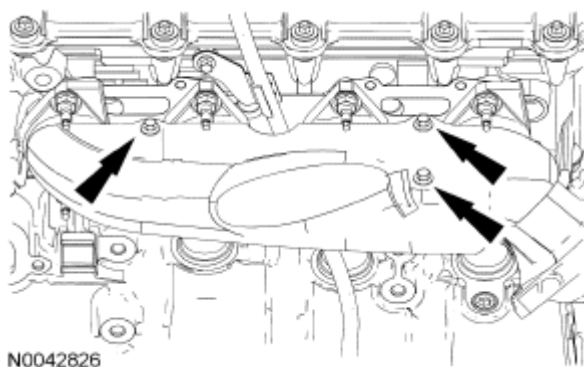


Fig. 498: Locating LH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

RH cylinder head

10. Tighten the RH cylinder head bolts in 3 stages, in the sequence shown.

- Stage 1: Tighten to 40 N.m (30 lb-ft).
- Stage 2: Tighten an additional 90 degrees.
- Stage 3: Tighten an additional 90 degrees.

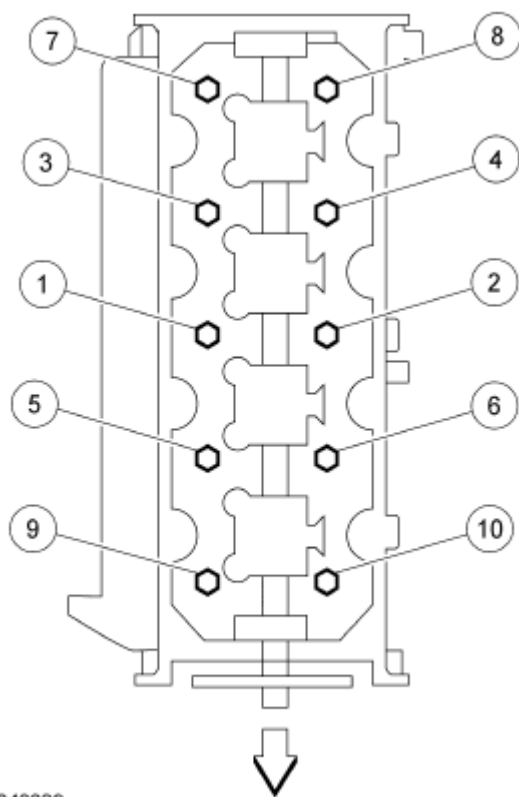


Fig. 499: Identifying Tightening Sequence Of Bolts RH Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

11. Remove the special tool from the RH cylinder head.

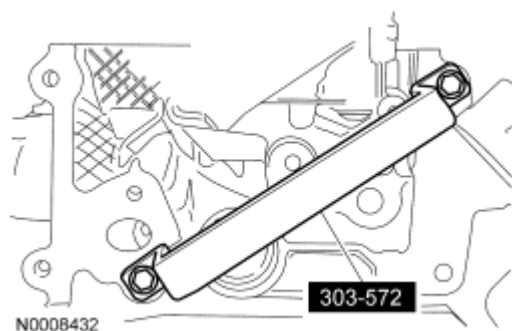


Fig. 500: Identifying Special Tool On Cylinder Head
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the hydraulic lash adjusters with clean engine oil prior to installation.

NOTE: The hydraulic lash adjusters must be installed in their original locations.

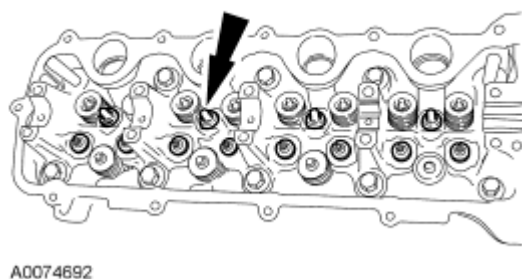
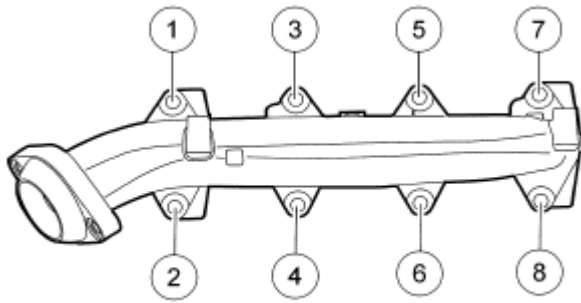


Fig. 501: Identifying Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

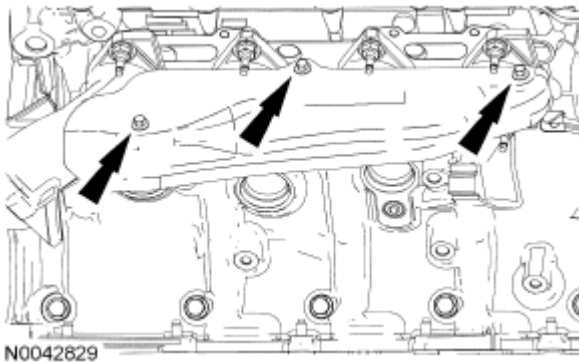
12. Install the hydraulic lash adjusters into the RH cylinder head.
13. Inspect the RH exhaust manifold gasket mating surfaces for flatness. For additional information, refer to **ENGINE SYSTEM-GENERAL INFORMATION**.
14. Install 8 new RH exhaust manifold studs.
 - Tighten to 12 N.m (9 lb-ft).
15. Position new gaskets, the RH exhaust manifold and tighten the 8 new nuts in the sequence shown.
 - Tighten to 25 N.m (18 lb-ft).



N0040498

Fig. 502: Identifying Tightening Sequence Of RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

16. Position the RH heat shield and install the bolts.
- Tighten to 10 N.m (89 lb-in).



N0042829

Fig. 503: Identifying Heat Shield Bolts
Courtesy of FORD MOTOR CO.

NOTE: Install new O-ring seals and lubricate the O-ring seals with clean engine coolant.

17. Position the heater supply tube and the hoses as an assembly and install the stud bolt.
- Tighten to 10 N.m (89 lb-in).

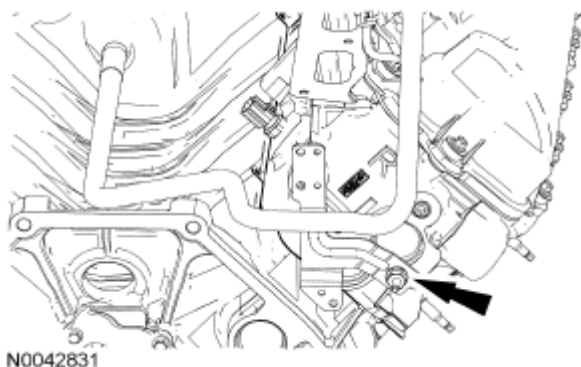


Fig. 504: Locating Heater Supply Tube Stud Bolt
Courtesy of FORD MOTOR CO.

18. Position the ground strap and install the nut.
 - Tighten to 10 N.m (89 lb-in).

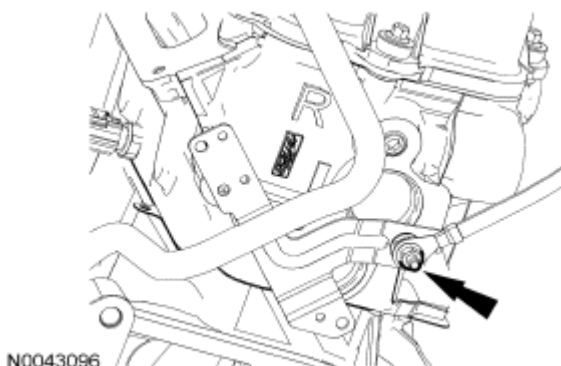


Fig. 505: Locating Ground Strap Nut
Courtesy of FORD MOTOR CO.

All cylinder heads

NOTE: Lubricate the camshaft and camshaft journals with clean engine oil prior to installation.

19. Install the LH and RH camshafts.

NOTE: LH shown, RH similar.

NOTE: Lubricate the camshaft bearing caps with clean engine oil.

20. Install the LH and RH camshaft bearing caps in their original locations.
 - Position the front camshaft bearing cap.
 - Position the remaining camshaft bearing caps.

- Install the bolts loosely.
- Tighten to 10 N.m (89 lb-in) in the sequence shown.

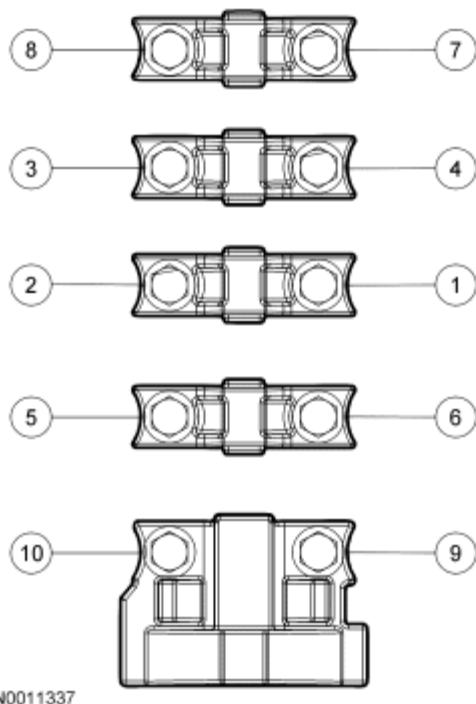


Fig. 506: Identifying Camshaft Bearing Cap Bolt Loosening/Tightening Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: The RH and LH camshaft phaser sprockets are similar. Refer to the single timing mark to identify the RH camshaft phaser sprocket and the L timing mark to identify the LH camshaft phaser sprocket.

NOTE: LH shown, RH similar.

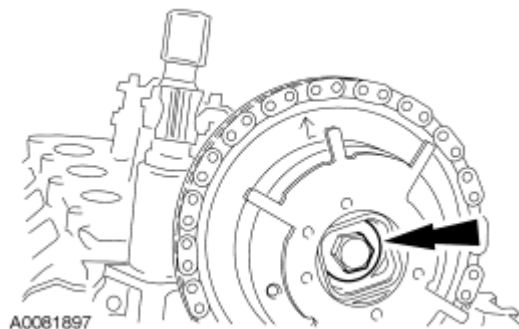


Fig. 507: Identifying Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

21. Install the camshaft phaser sprockets and new camshaft phaser bolts finger tight.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

CAUTION: Only use hand tools to remove the camshaft phaser sprocket assembly or damage may occur to the camshaft or camshaft phaser unit.

CAUTION: Damage to the camshaft phaser sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: LH shown, RH similar.

22. Using the special tool, tighten the LH and RH camshaft phaser sprocket bolts in 2 stages.
- Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

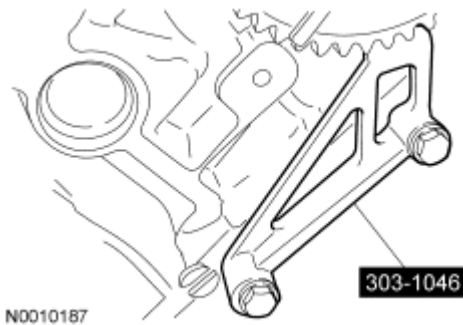


Fig. 508: Identifying Special Sprocket Phaser Tool
Courtesy of FORD MOTOR CO.

23. Install the crankshaft sprocket, making sure the flange faces forward.

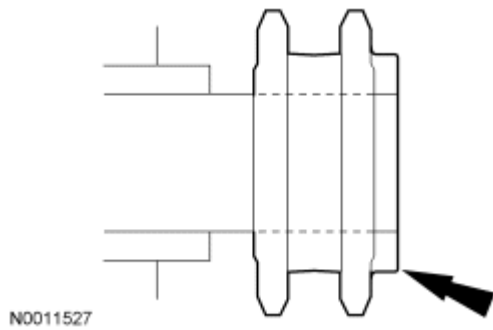


Fig. 509: Identifying Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

24. Rotate the crankshaft to position the crankshaft sprocket timing mark in the 6 o'clock position.

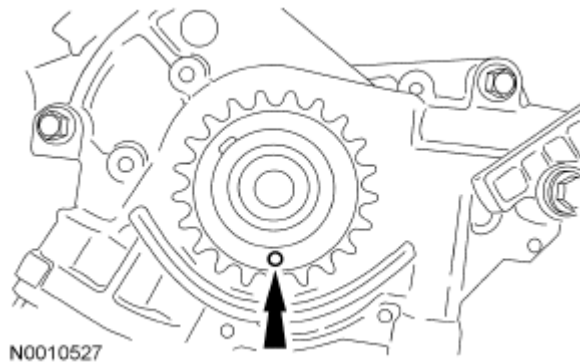


Fig. 510: Locating Crankshaft Sprocket Timing Mark In 6 O'clock Position
Courtesy of FORD MOTOR CO.

25. Rotate the camshaft sprockets to position the RH camshaft sprocket timing mark in the 11 o'clock position and the LH camshaft sprocket timing mark in the 12 o'clock position.

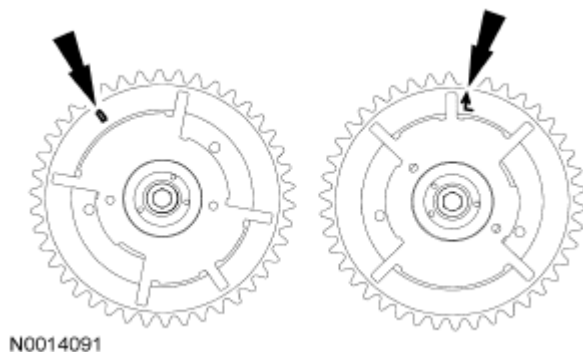


Fig. 511: Locating Camshaft Sprockets Timing Mark
Courtesy of FORD MOTOR CO.

CAUTION: If one or both tensioner mounting bolts are loosened or removed, the tensioner-sealing bead must be inspected for seal integrity. Any

cracks, tears, cuts or separation from the tensioner body, or permanent compression of the seal bead, will require replacement of the tensioner.

26. Inspect the RH and LH timing chain tensioners.
- Install new tensioners, as necessary.

CAUTION: Timing chain procedures must be followed exactly or damage to valves and pistons will result.

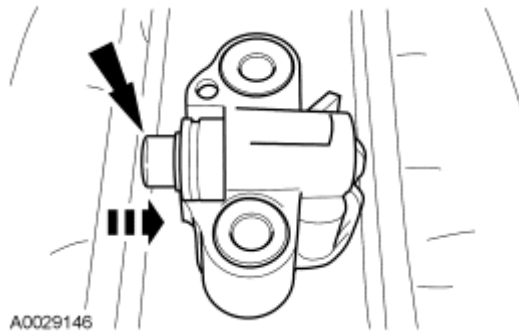


Fig. 512: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

27. Compress the tensioner plunger, using a vise.
28. Install a retaining clip on the tensioner to hold the plunger in during installation.

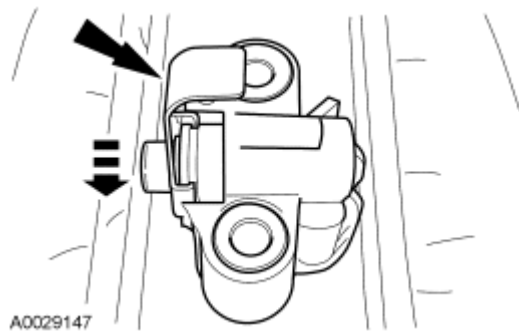
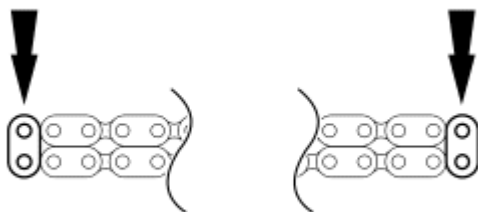


Fig. 513: Identifying Retaining Clip on Tensioner
Courtesy of FORD MOTOR CO.

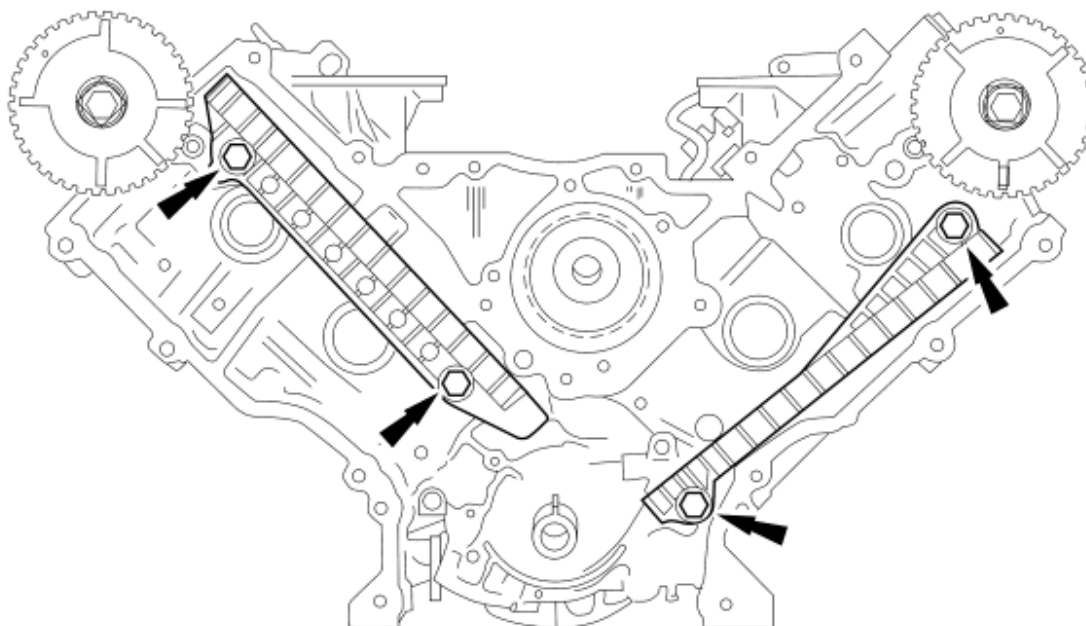
29. Remove the tensioner from the vise.
30. If the copper links are not visible, mark one link on one end and one link on the other end and use as timing marks.



A0038719

Fig. 514: Identifying Timing Chain Copper Links
Courtesy of FORD MOTOR CO.

31. Install the 4 bolts and the LH and RH timing chain guides.
- Tighten to 10 N.m (89 lb-in).



N0006303

Fig. 515: Identifying Timing Chain Guides
Courtesy of FORD MOTOR CO.

32. Position the lower end of the LH (inner) timing chain on the crankshaft sprocket, aligning the timing mark on the outer flange of the crankshaft sprocket with the single copper (marked) link on the chain.

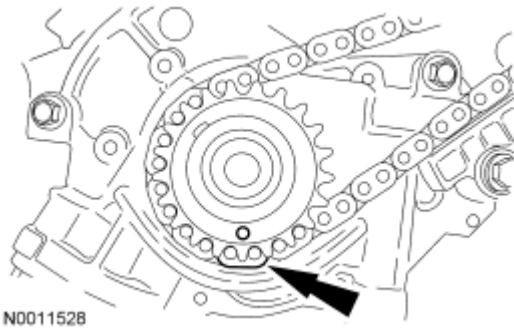


Fig. 516: Aligning Crankshaft Sprocket Timing Mark And LH Timing Chain Link
Courtesy of FORD MOTOR CO.

NOTE: Make sure the upper half of the timing chain is below the tensioner arm dowel.

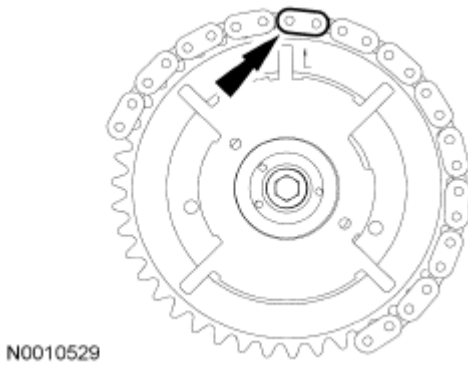


Fig. 517: Locating Camshaft Sprocket Timing Mark With Copper Link
Courtesy of FORD MOTOR CO.

33. Position the LH timing chain on the camshaft sprocket. Make sure the camshaft sprocket timing mark is aligned with the copper (marked) chain link.

NOTE: The LH timing chain tensioner arm has a bump near the dowel hole for identification.

34. Position the LH timing chain tensioner arm on the dowel pin and install the LH timing chain tensioner and 2 bolts.
- Tighten to 25 N.m (18 lb-ft).

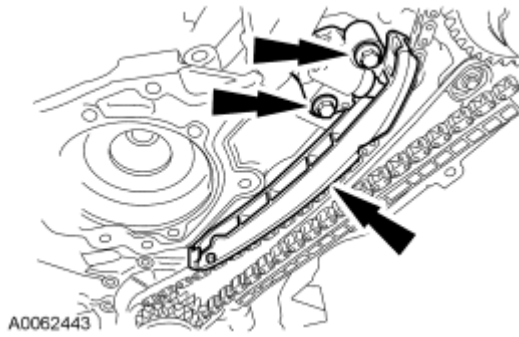


Fig. 518: Identifying LH Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

35. Remove the retaining clip from the LH timing chain tensioner.

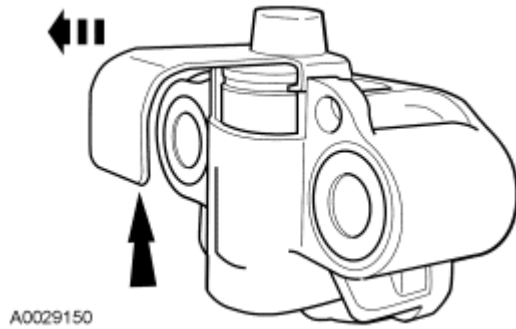


Fig. 519: View Of Retaining Clip And Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

36. Position the lower end of the RH (outer) timing chain on the crankshaft sprocket, aligning the timing mark on the sprocket with the single copper (marked) chain link.

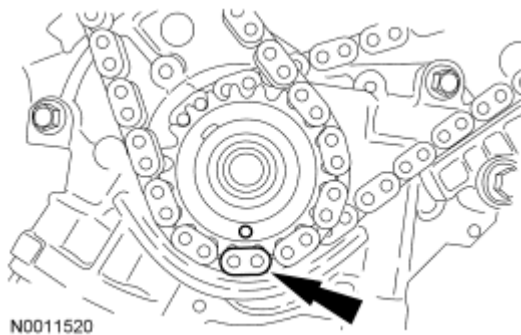


Fig. 520: Aligning Crankshaft Sprocket Timing Mark And RH Timing Chain Link
Courtesy of FORD MOTOR CO.

NOTE: The lower half of the timing chain must be positioned above the tensioner arm dowel.

NOTE: The camshaft phaser and sprocket will be stamped with one of the illustrated timing marks for the RH camshaft.

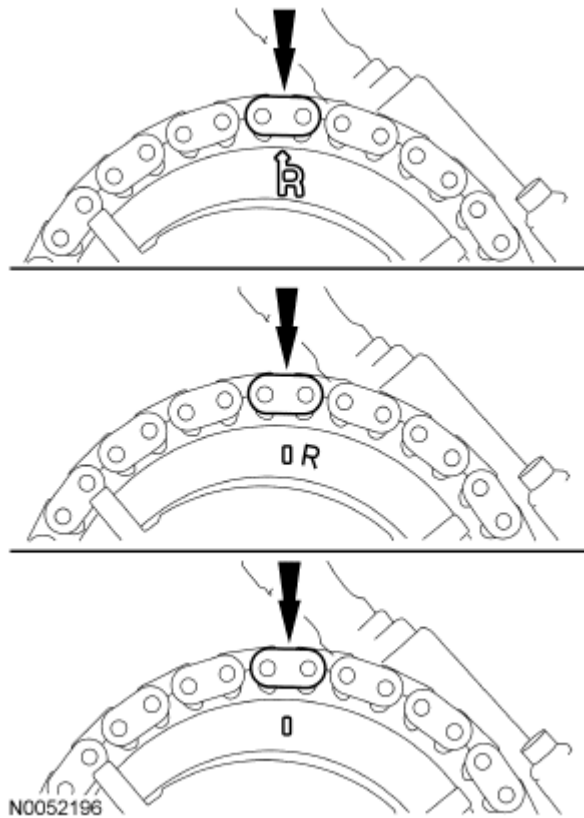


Fig. 521: Locating Camshaft Sprocket Timing Mark Is Aligned With Copper Chain Link
Courtesy of FORD MOTOR CO.

37. Position the RH timing chain on the camshaft sprocket. Make sure the camshaft sprocket timing mark is aligned with the copper (marked) chain link.
38. Position the RH timing chain tensioner arm on the dowel pin and install the RH timing chain tensioner and 2 bolts.
 - Tighten to 25 N.m (18 lb-ft).

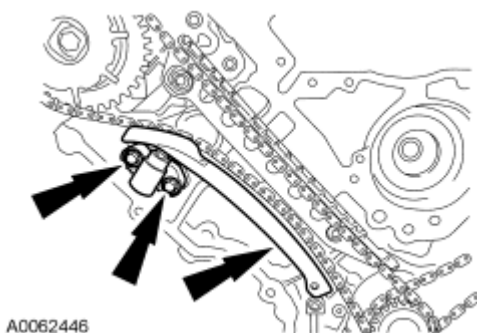


Fig. 522: Identifying RH Timing Chain Tensioner, Tensioner Arm And Bolts

Courtesy of FORD MOTOR CO.

39. Remove the retaining clip from the RH timing chain tensioner.

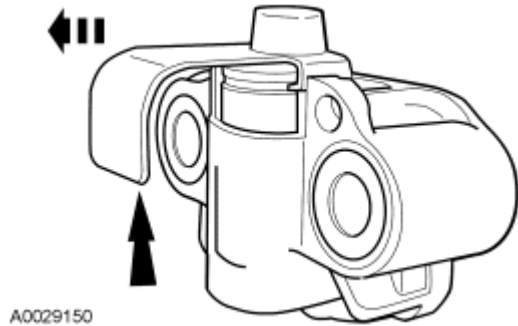


Fig. 523: View Of Retaining Clip And Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

NOTE: The RH and LH camshaft phaser sprockets are similar. Refer to the single timing mark to identify the RH camshaft phaser sprocket and the L timing mark to identify the LH camshaft phaser sprocket.

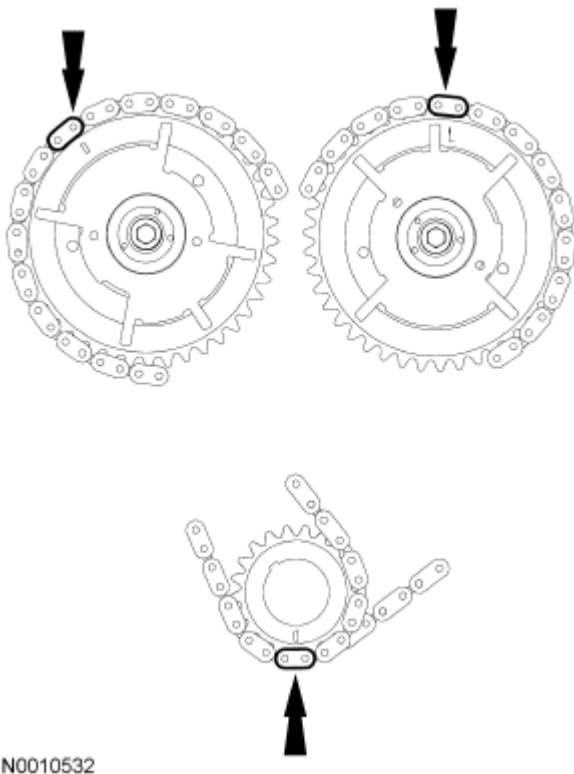


Fig. 524: Identifying Chains And Sprockets Timing Marks
Courtesy of FORD MOTOR CO.

40. As a post-check, verify correct alignment of all timing marks. Make sure the timing marks on the

sprockets correspond to the above note.

41. Install the crankshaft sensor ring on the crankshaft.

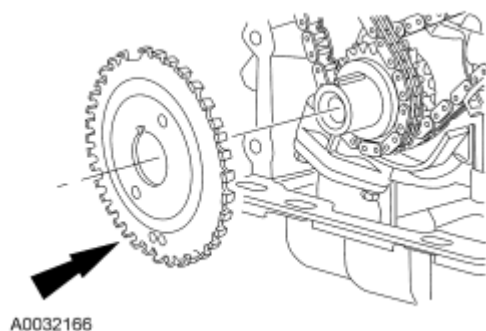


Fig. 525: View Of Crankshaft Sensor Ring At Crankshaft
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the roller followers with clean engine oil prior to installation.

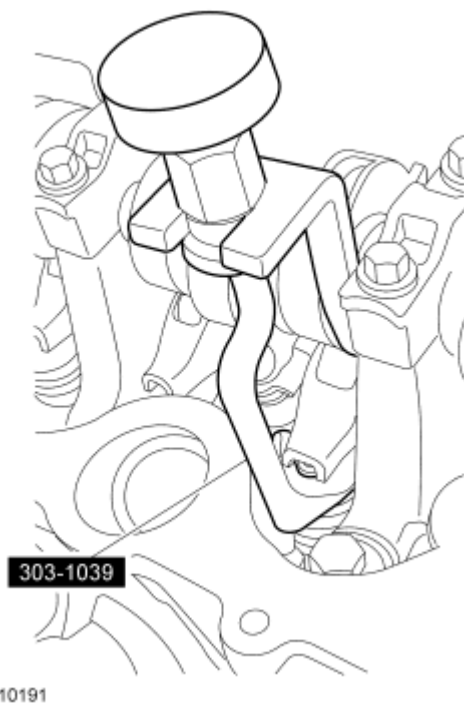


Fig. 526: Compressing Spring Using Special Tool
Courtesy of FORD MOTOR CO.

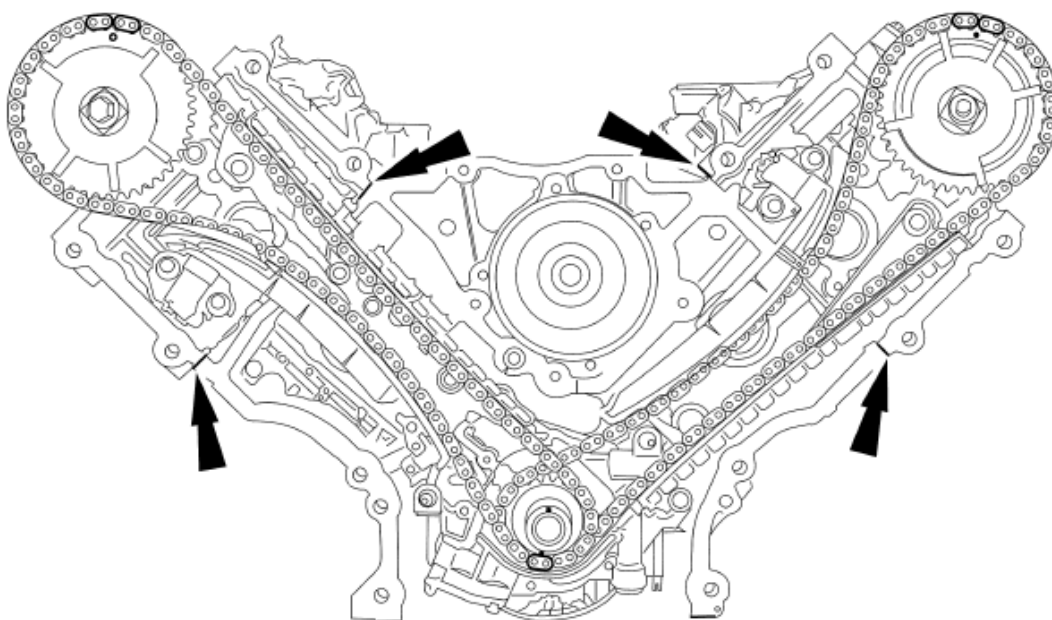
42. Using the special tool, install all of the camshaft roller followers.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic

scraping tool to remove all traces of old sealant.

NOTE: If the engine front cover is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

NOTE: Make sure that the engine front cover gasket is in place on the engine front cover before installation.



N0010501

Fig. 527: Identifying Area For Applying Sealant
Courtesy of FORD MOTOR CO.

43. Apply a bead of silicone gasket and sealant along the cylinder head-to-cylinder block surface at the locations shown.
44. Install a new engine front cover gasket on the engine front cover. Position the engine front cover onto the dowels. Install the 15 fasteners finger-tight.

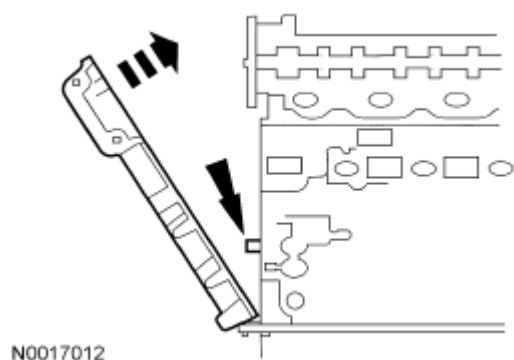
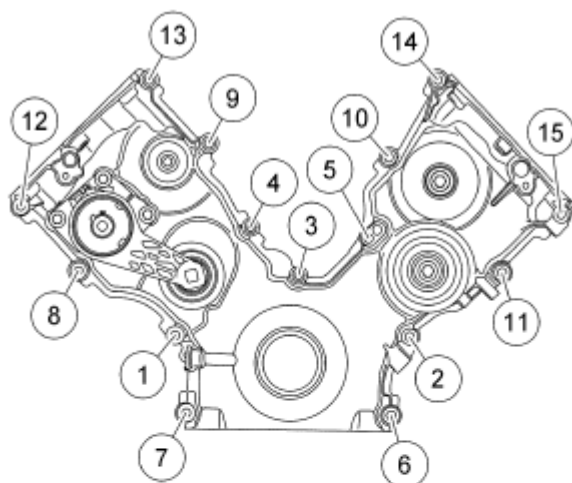


Fig. 528: Installing Engine Front Cover Gasket On Engine Front Cover
Courtesy of FORD MOTOR CO.

45. Tighten the engine front cover fasteners in the sequence shown to 25 N.m (18 lb-ft).

2006 Mercury Mountaineer

2006 ENGINE Engine - 4.6L (3V) - Explorer & Mountaineer



N0039598

Item	Part Number	Description
1	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
2	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
3	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
4	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
5	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
6	W706508	Stud, Hex Shoulder Pilot, M8 x 1.25 x 50 - M6 x 1 x 10
7	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
8	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
9	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
10	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 53
11	N808294	Bolt, Hex Head Pilot, M8 x 1.25 x 53
12	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
13	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
14	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1
15	N806300	Stud, Hex Shoulder Pilot, M8 x 1.25 x 1.25 x 91.1

Fig. 529: Identifying Tightening Sequence Of Engine Front Cover Fasteners
Courtesy of FORD MOTOR CO.

46. Loosely install the 4 bolts, then tighten the bolts in 2 stages, in the sequence shown.
- Stage 1: Tighten to 20 N.m (15 lb-ft).
 - Stage 2: Tighten an additional 60 degrees.

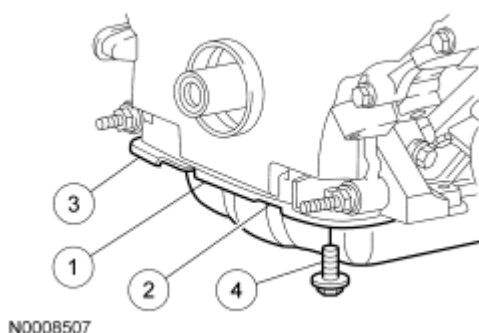


Fig. 530: Identifying Tightening Sequence Of Front Oil Pan Bolts
Courtesy of FORD MOTOR CO.

47. Lubricate the engine front cover and the crankshaft seal inner lip with clean engine oil.

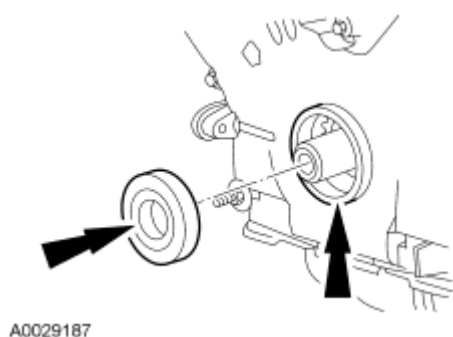


Fig. 531: Locating Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

48. Using the special tools, install the crankshaft front oil seal into the engine front cover.

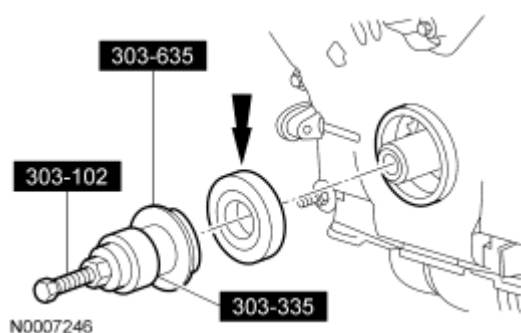
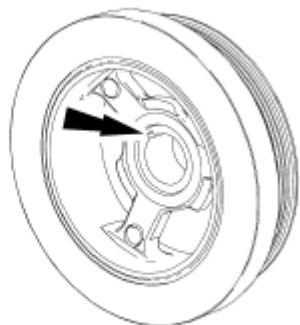


Fig. 532: Installing Crankshaft Front Seal Using Special Tools
Courtesy of FORD MOTOR CO.

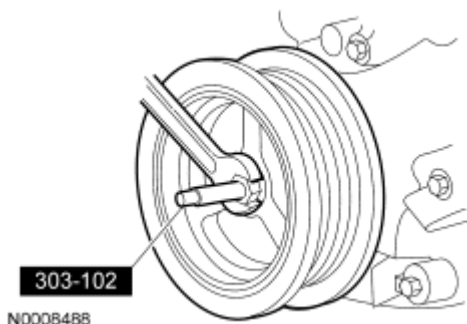
NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface prep and silicone gasket remover. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.



N0010530

Fig. 533: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

49. Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.
50. Using the special tool, install the crankshaft pulley.



N0008488

Fig. 534: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

51. Using a new crankshaft pulley bolt, install the bolt and washer and tighten the bolt in 4 stages.
 - Stage 1: Tighten to 90 N.m (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 N.m (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.
52. Install the RH side accessory drive belt idler pulley, the coolant pump pulley and the 5 bolts.
 - Tighten to 25 N.m (18 lb-ft).

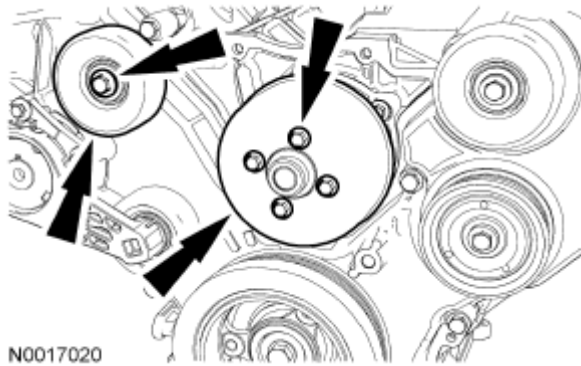


Fig. 535: Locating RH Side Accessory Drive Belt Idler Pulley, Coolant Pump Pulley And Bolts

Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

53. Clean the valve cover mating surface with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

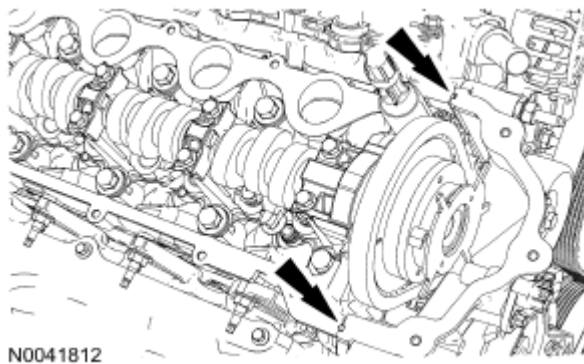


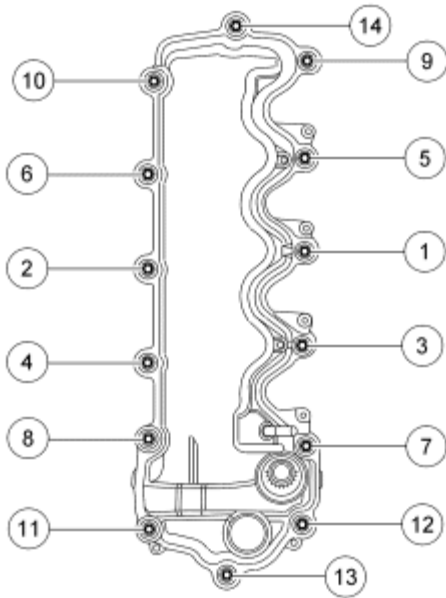
Fig. 536: Identifying Area For Applying Sealant

Courtesy of FORD MOTOR CO.

54. Apply silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

CAUTION: When installing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

55. Position the RH valve cover and gasket on the cylinder head and tighten the bolts in the sequence shown.
- Tighten to 10 N.m (89 lb-in).



N0006317

Fig. 537: Identifying Tightening Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

56. Clean the valve cover mating surface with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

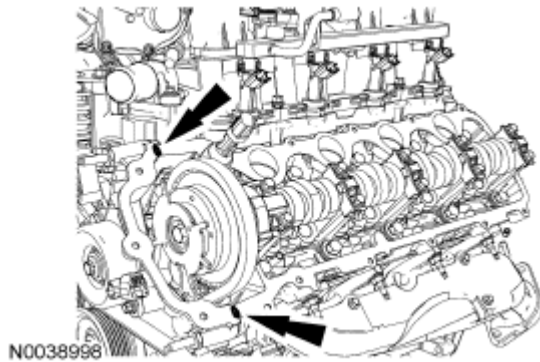
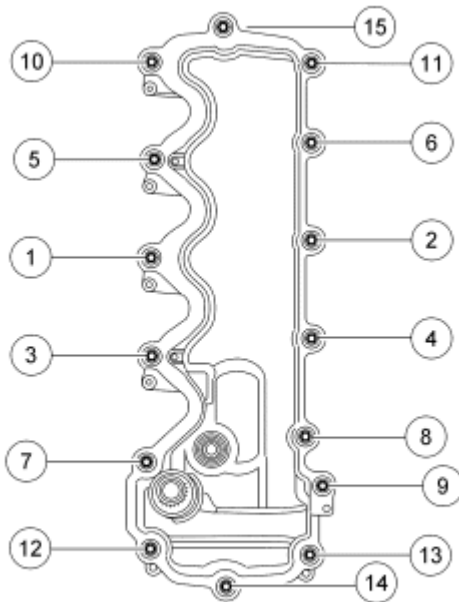


Fig. 538: Identifying Area For Applying Sealant
Courtesy of FORD MOTOR CO.

57. Apply silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

CAUTION: When installing the valve cover, make sure to avoid damaging the variable camshaft timing (VCT) solenoid.

58. Position the LH valve cover and gasket on the cylinder head and tighten the bolts in the sequence shown.
- Tighten to 10 N.m (89 lb-in).



N0006318

Fig. 539: Identifying Tighten Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

59. Position the oil level indicator tube and install the bolt.

- Tighten to 10 N.m (89 lb-in).



Fig. 540: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

60. Install the 8 ignition coils and the 8 bolts.
 - Tighten to 6 N.m (53 lb-in).

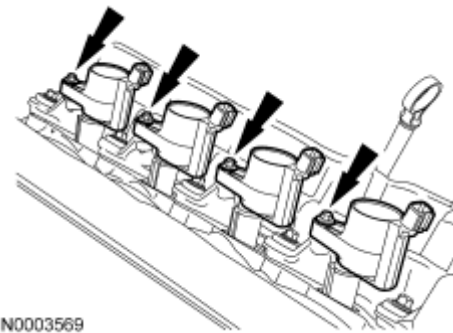


Fig. 541: Identifying Ignition Coils And Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the oil filter gasket with clean engine oil.

61. Install a new oil filter.
 - Tighten the oil filter until the gasket makes contact, then use an oil filter strap wrench to tighten the filter an additional 270 degrees.
62. Connect the positive crankcase ventilation (PCV) hose to the LH valve cover.

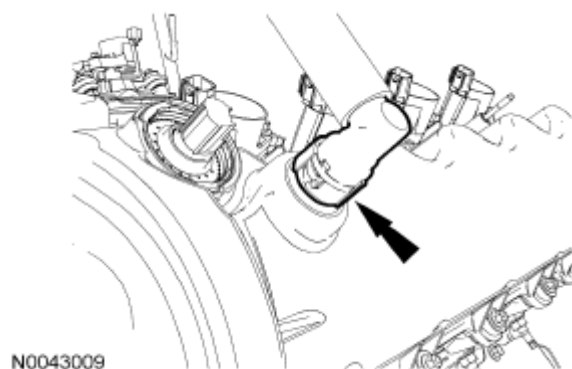


Fig. 542: Locating Positive Crankcase Ventilation (PCV) Hose To LH Valve Cover
Courtesy of FORD MOTOR CO.

63. Connect the breather tube to the RH valve cover.

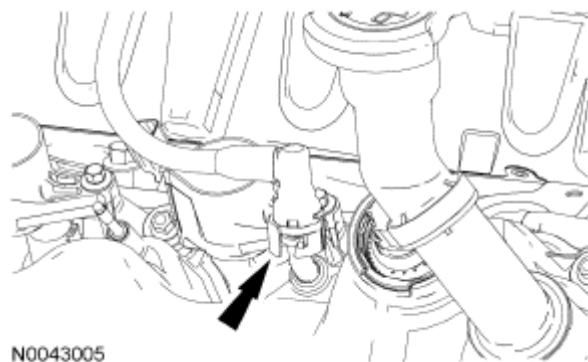


Fig. 543: Locating Breather Tube RH Valve Cover
Courtesy of FORD MOTOR CO.

64. Position the engine wiring harness and attach the electrical connectors to the heater supply tube bracket.

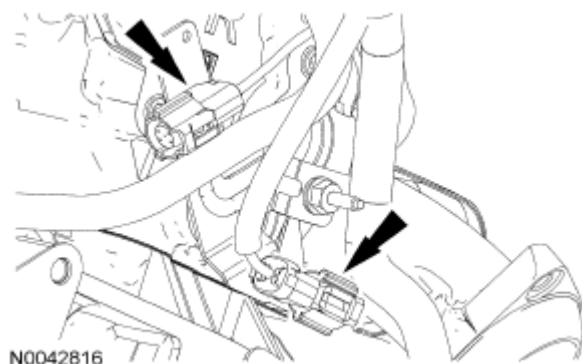


Fig. 544: Locating Electrical Connectors
Courtesy of FORD MOTOR CO.

65. Connect the cylinder head temperature (CHT) sensor electrical connector.

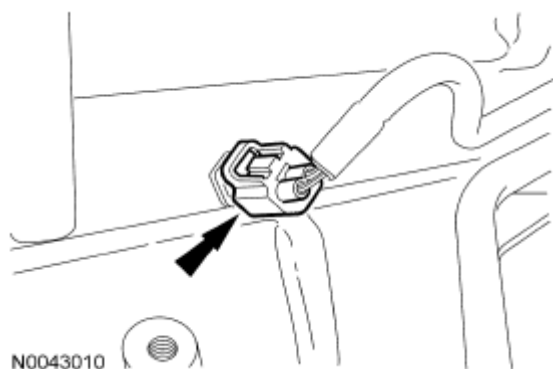


Fig. 545: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

66. Attach the wiring harness retainers to the RH valve cover studs.

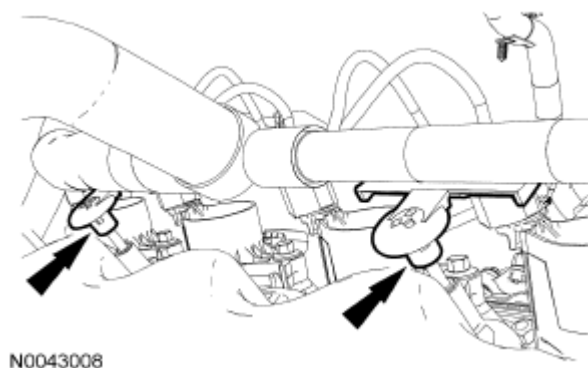


Fig. 546: Locating RH Valve Cover Studs
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

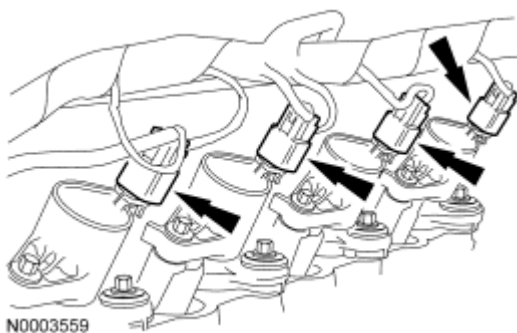


Fig. 547: Locating Ignition Coil Electrical Connectors
Courtesy of FORD MOTOR CO.

67. Connect the RH and LH ignition coil electrical connectors.
68. Attach the wiring harness retainers to the LH valve cover studs.

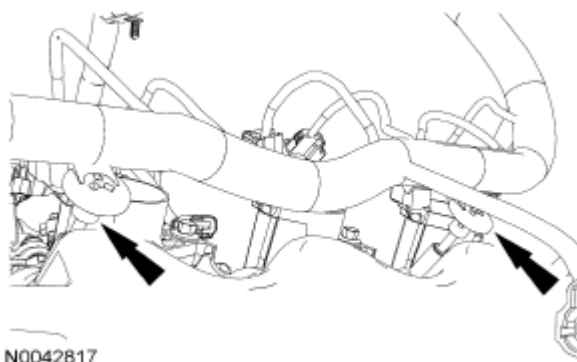


Fig. 548: Locating LH Valve Cover Studs
Courtesy of FORD MOTOR CO.

69. Position the LH radio interference capacitor and install the nut.
- Tighten to 25 N.m (18 lb-ft).

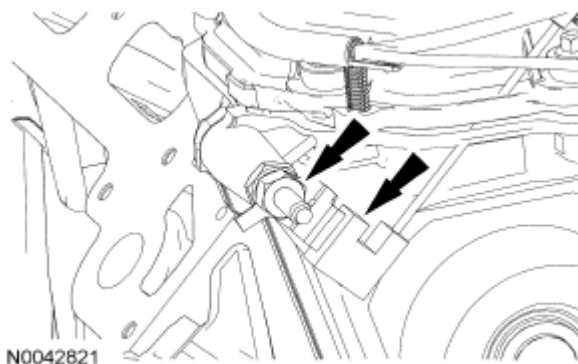


Fig. 549: Locating LH Radio Interference Capacitor And Nuts
Courtesy of FORD MOTOR CO.

70. Position the cooling fan wiring harness and install the nut.
- Tighten to 25 N.m (18 lb-ft).

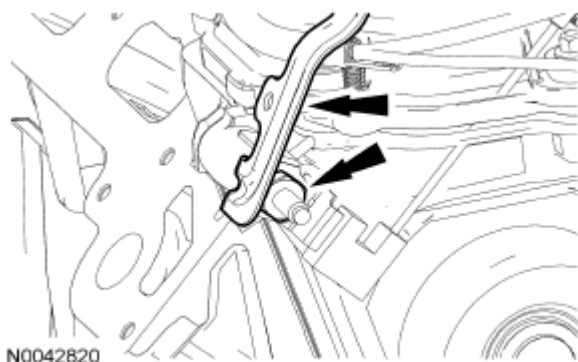


Fig. 550: Locating Cooling Fan Wiring Harness And Nut
Courtesy of FORD MOTOR CO.

71. Connect the LH camshaft position sensor and attach the wiring harness retainers.

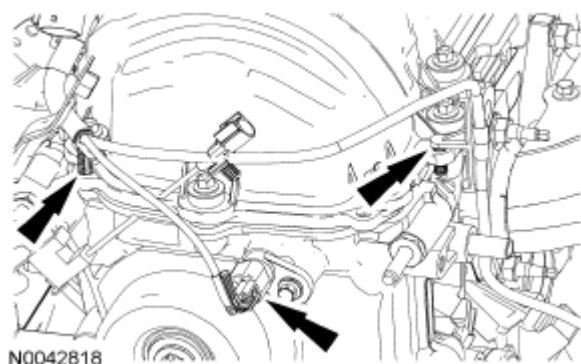


Fig. 551: Locating LH Camshaft Position Sensor And Attach Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

72. Connect the oil pressure sensor electrical connector.

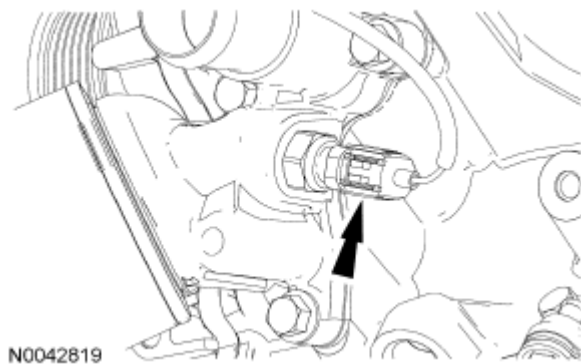


Fig. 552: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

73. Position the RH radio interference capacitor and install the nut.
- Tighten to 25 N.m (18 lb-ft).

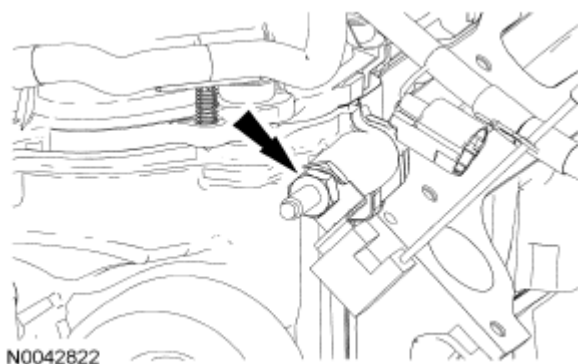


Fig. 553: Locating RH Radio Interference Capacitor Nut

Courtesy of FORD MOTOR CO.

74. Attach the wiring harness retainers.

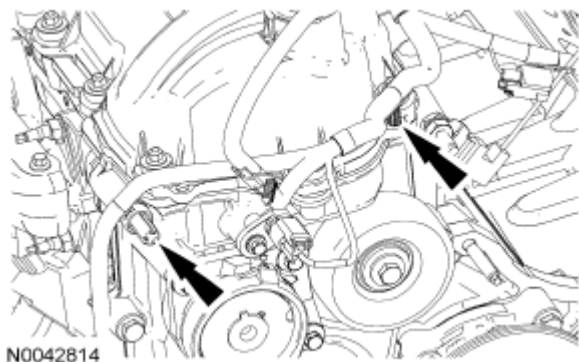


Fig. 554: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

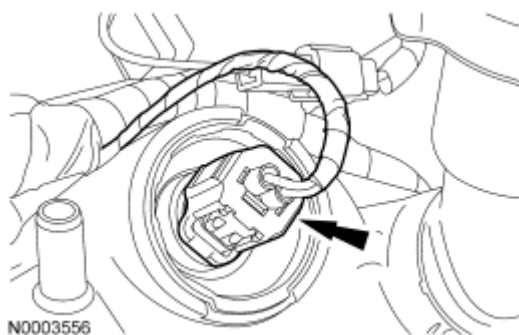


Fig. 555: Locating Camshaft Timing (VCT) Solenoid Electrical Connectors
Courtesy of FORD MOTOR CO.

75. Connect the RH and LH variable camshaft timing (VCT) solenoid electrical connectors.

NOTE: RH shown, LH similar.

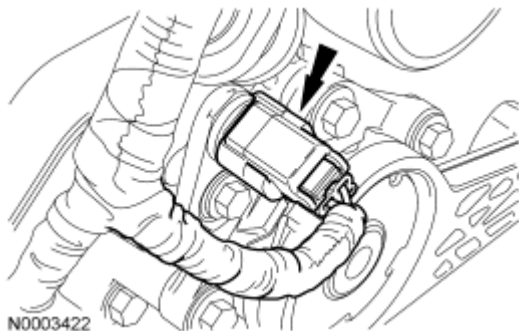


Fig. 556: Identifying RH CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

76. Disconnect the RH and LH camshaft position (CMP) sensor electrical connectors.
77. Connect the crankshaft position sensor electrical connector and attach the wiring harness retainer.

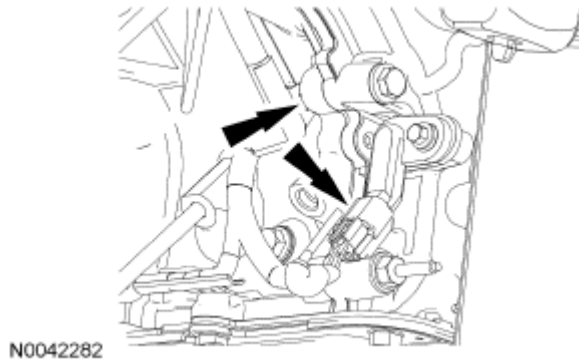


Fig. 557: Locating Crankshaft Position Sensor Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

78. Attach the wiring harness retainers to the RH oil pan bolts.

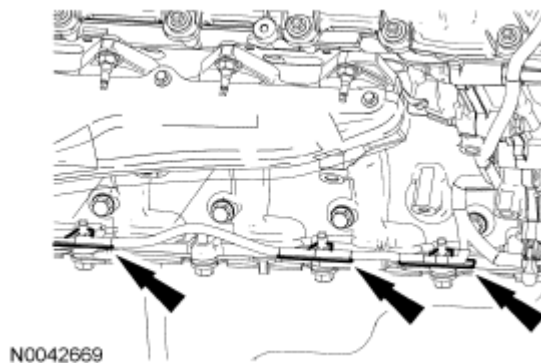


Fig. 558: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

79. Install the special tool.

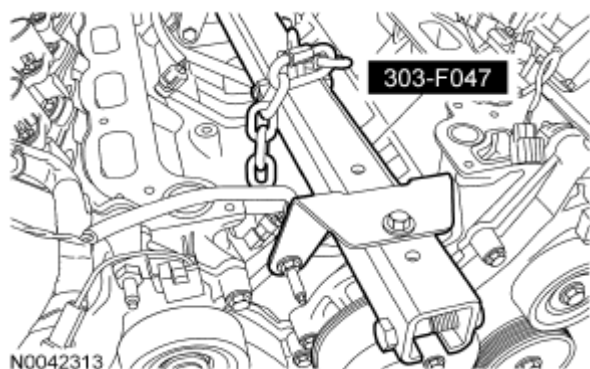


Fig. 559: Identifying Special Tool
Courtesy of FORD MOTOR CO.

80. Using a suitable floor crane, remove the engine from the engine stand.
81. Install the engine. For additional information, refer to **ENGINE**.