

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

2011 ENGINE

Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

SPECIFICATIONS

MATERIAL

MATERIAL SPECIFICATIONS

Item	Specification	Fill Capacity
Motorcraft® Metal Surface Prep ZC-31-A	-	-
Motorcraft® Premium Gold Engine Coolant VC-7-B (US); CVC-7-B (Canada)	WSS-M97B51-A1	(1)
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A	6.6L (7.0 qt.) with filter
Motorcraft® Specialty Orange Engine Coolant VC-3-B (US); CVC-3-B (Canada)	WSS-M97B44-D	(1)
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	-
Motorcraft® Silicone Gasket Remover ZC-30	-	-
Threadlock 262 TA-26	WSK-M2G351-A6	-
(1) Early build vehicle cooling systems are filled with Motorcraft® Premium Gold Engine Coolant. Late build vehicle cooling systems are filled with Motorcraft® Specialty Orange Engine Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.		

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Item	Specification
Engine	
Displacement	5.4L (330 CID)
Number of cylinders	8
Bore	90.2 mm (3.55 in)
Stroke	105.8 mm (4.17 in)
Firing order	1-3-7-2-6-5-4-8
Spark plug	HJFS-24FP-
Minimum oil pressure at idle (engine at normal operating temperature)	172 kPa (25 psi)
Oil pressure at 2,000 rpm (engine at	

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normal operating temperature)	275-517 kPa (40-75 psi)
Compression ratio	9.8: 1
Engine weight (without accessory drive components and with flexplate)	247 kg (545 lb)
Engine weight (without accessory drive components and with flywheel)	260 kg (574 lb)
Cylinder Head and Valve Train	
Combustion chamber volume	48.1-51.1 cc (2.94-3.12 cu in)
Roller follower ratio	-
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	0.020-0.045 mm (0.001-0.002 in)
Valve stem-to-guide clearance - exhaust	0.069-0.094 mm (0.003-0.004 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	55.7 mm (2.19 in)
Valve spring compression pressure	350 N (79 lb) ± 17.5 N (4 lb) @ 42.04 mm (1.66 in)
Valve spring installed height	42.04 mm (1.66 in)
Valve spring installed pressure	350 N (79 lb) ± 17.5 N (4 lb) @ 42.04 mm (1.66 in)
Head gasket surface flatness	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.05 mm (0.002 in) in any 150 mm (6 in) x 150 mm (6 in) area; 0.1 mm (0.004 in) overall
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	-
Hydraulic leak down rate	5-25 seconds ⁽¹⁾
Collapsed lash adjuster gap	0.45-0.85 mm (0.017-0.033 in)

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Camshaft

Theoretical valve lift @ 0 lash - intake	11.1 mm (0.437 in)
Theoretical valve lift @ 0 lash - exhaust	11.0 mm (0.433 in)
Lobe lift - intake	5.520 mm (0.217 in)
Lobe lift - exhaust	5.506 mm (0.217 in)
Allowable lobe lift loss	0.127 mm (0.005 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	0.027-0.190 mm (0.001-0.007 in)

Cylinder Block

Cylinder bore diameter - grade 1	90.200-90.210 mm (3.5512-3.5516 in)
Cylinder bore diameter - grade 2	90.210-90.220 mm (3.5516-3.5520 in)
Cylinder bore diameter - grade 3	0.220-90.230 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)
Head gasket surface flatness	0.03 mm (0.001 in) in any 40 mm (1.5 in) x 40 mm (1.5 in) area; 0.05 mm (0.002 in) in any 150 mm (6 in) x 150 mm (6 in) area; 0.15 mm (0.006 in) overall

Crankshaft

Main bearing journal diameter	67.481-67.505 mm (2.6568-2.6576 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	0.024-0.048 mm (0.0009-0.0019 in)
Connecting rod journal diameter	52.983-53.003 mm (2.0859-2.0867 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)	90.165-90.175 mm (3.5498-3.5502 in)
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Piston diameter - grade 2 (at right angle to pin bore)	90.175-90.185 mm (3.5502-3.5506 in)
Piston diameter - grade 3 (at right angle to pin bore)	90.185-90.195 mm (3.5506-3.5510 in)
Piston-to-cylinder bore clearance (at grade size)	0.025-0.045 mm (0.0010-0.0018 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	1.52-1.55 mm (0.0598-0.0610 in)
Piston ring groove width - intermediate	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - oil control	3.030-3.050 mm (0.1193-0.1201 in)
Piston ring width - top and intermediate	1.47-1.50 mm (0.0578-0.0590 in)
Piston ring-to-groove clearance - top	0.020-0.080 mm (0.0008-0.0031 in)
Piston ring-to-groove clearance - intermediate	0.030-0.070 mm (0.0012-0.0028 in)
Piston pin bore diameter	22.008-22.014 mm (0.8665-0.8667 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	0.005-0.0130 mm (0.0002-0.0005 in)
Connecting rod-to-pin clearance	0.009-0.0235 mm (0.0004-0.0093 in)
Connecting rod pin bore diameter	22.012-22.024 mm (0.8666-0.8671 in)
Connecting rod length (center-to-center)	169.1 mm (6.6575 in)
Connecting rod maximum allowed bend	± 0.038 mm (0.0015 in)
Connecting rod maximum allowed twist ⁽²⁾	± 0.05 mm (0.0020 in)
Connecting rod bearing bore diameter (with assembled liners)	53.027-53.049 mm (2.0877-2.0885 in)
Connecting rod bearing-to-crankshaft clearance	0.026-0.064 mm (0.0010-0.0025 in)
Connecting rod side clearance	0.125-0.475 mm (0.0049-0.0187 in)
<p>(1) The time required for the plunger to leak down 1.6 mm (0.062 in) of travel with 222 N force and leak-down fluid in the lash adjuster.</p> <p>(2) 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.</p>	

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TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
A/C compressor bolts	25	18	-
Accessory drive belt tensioner bolt	25	18	-
Air intake resonator assembly bolt	10	-	89
Air Cleaner (ACL) outlet pipe-to-Throttle Body (TB) adapter bolt	10	-	89
Axle carrier mounting bushing bolts	115	85	-
Camshaft bearing cap bolts ⁽¹⁾	-	-	-
Camshaft phase and sprocket bolts ⁽¹⁾	-	-	-
Camshaft Position (CMP) sensor bolt	10	-	89
Coolant crossover manifold assembly bolts	10	-	89
Coolant pump bolts	25	18	-
Coolant pump pulley bolts	25	18	-
Coolant tube stud bolt	10	-	89
Connecting rod bolts ⁽¹⁾	-	-	-
Crankshaft pulley bolt ⁽¹⁾	-	-	-
Crankshaft main bearing bolts (cross-mounted) ⁽¹⁾	-	-	-
Crankshaft main bearing bolts (vertical) ⁽¹⁾	-	-	-
Crankshaft Position (CKP) sensor bolt	10	-	89
Crankshaft rear seal retainer plate bolts ⁽¹⁾	-	-	-
Cylinder block drain plugs	20	-	177
Cylinder head bolts ⁽¹⁾	-	-	-
Cylinder Head Temperature (CHT) sensor	10	-	89
Drive belt idler pulley bolt	25	18	-
Engine front cover bolts ⁽¹⁾	-	-	-
Engine Oil Pressure (EOP) switch	18	-	159
Engine support insulator-to-cylinder block bolts	63	46	-
Engine support insulator through bolt	350	258	-
Engine support insulator-to-frame bolts	175	129	-
Engine support insulator-to-frame nuts	175	129	-
Engine support insulator-to-frame stud bolt	15	-	133
Evaporative Emission (EVAP) purge valve support bracket bolt	10	-	89
Exhaust manifold heat shield bolts	13	-	115
Exhaust manifold nuts ⁽¹⁾	-	-	-
Exhaust manifold studs	12	-	106
Exhaust manifold-to-Y-pipe nuts	40	30	-
Flexplate bolts ⁽¹⁾	-	-	-

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Flexplate inspection cover bolts	34	25	-
Front frame crossmember bolts	90	66	-
Fuel rail bolts	10	-	89
Ground strap bolt	10	-	89
Hood bolts	12	-	106
Ignition coil	6	-	53
Intake manifold-to-cylinder head bolts ⁽¹⁾	-	-	-
Intake manifold vacuum tube support bracket nut	10	-	89
Knock Sensor (KS) bolts	20	-	177
Oil filter	15	-	133
Oil filter adapter bolts	25	18	-
Oil level indicator tube bolt	10	-	89
Oil pan bolts ⁽¹⁾	-	-	-
Oil drain plug	23	17	-
Oil pump bolts	10	-	89
Oil pump screen and pickup tube bolts	10	-	89
Oil pump screen and pickup tube spacer	25	18	-
Oil pump screen and pickup tube support bracket bolt	25	18	-
PCV fitting bolts	6	-	53
Power steering fluid return tube bolt	23	17	-
Power Steering Pressure (PSP) hose support bracket nut	10	-	89
Power steering pump bolts	25	18	-
Radio ignition interference capacitor nut	25	18	-
Rear seal retainer plate bolts ⁽¹⁾	-	-	-
Skid plate bolts	48	35	-
Spark plug	12	-	106
Starter wiring harness rear support bracket bolt	10	-	89
Steering shaft bolt	30	22	-
Thermostat housing bolts	10	-	89
Timing chain guide bolts	10	-	89
Timing chain hydraulic tensioner bolts	25	18	-
Torque converter-to-flexplate nuts	36	27	-
Transmission fluid cooler tube support bracket nut	10	-	89
Transmission fluid cooler tube rear support bracket bolt	48	35	-
Transmission mount-to-crossmember nuts	103	76	-
Transmission-to-engine bolts	48	35	-
Throttle Body (TB) bolts ⁽¹⁾	-	-	-
Valve cover bolts ⁽¹⁾	-	-	-
Variable Camshaft Timing (VCT) housing bolts	10	-	89
Wiring harness ground strap	10	-	89

(1) Refer to the appropriate procedures in this information.

DESCRIPTION AND OPERATION

ENGINE

NOTE: Refer to the appropriate exploded view graphic under the Assembly procedure in this information.

The 5.4L (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, 90-degree V-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 (ERFS)

Engine 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 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 application.

Engine Code Information Label

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

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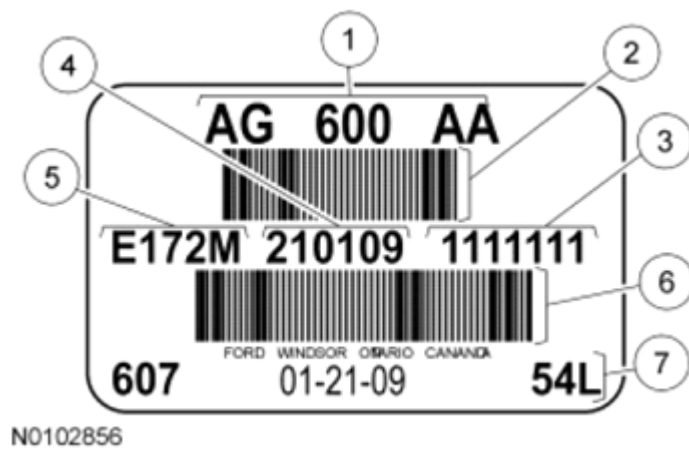


Fig. 1: View Of Engine Code Information Label
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Description
1	Engine part number
2	Bar code
3	Running number
4	Engine build date (DDMMYY)
5	Windsor engine plant
6	Bar code
7	Engine displacement

Engine Cylinder Identification

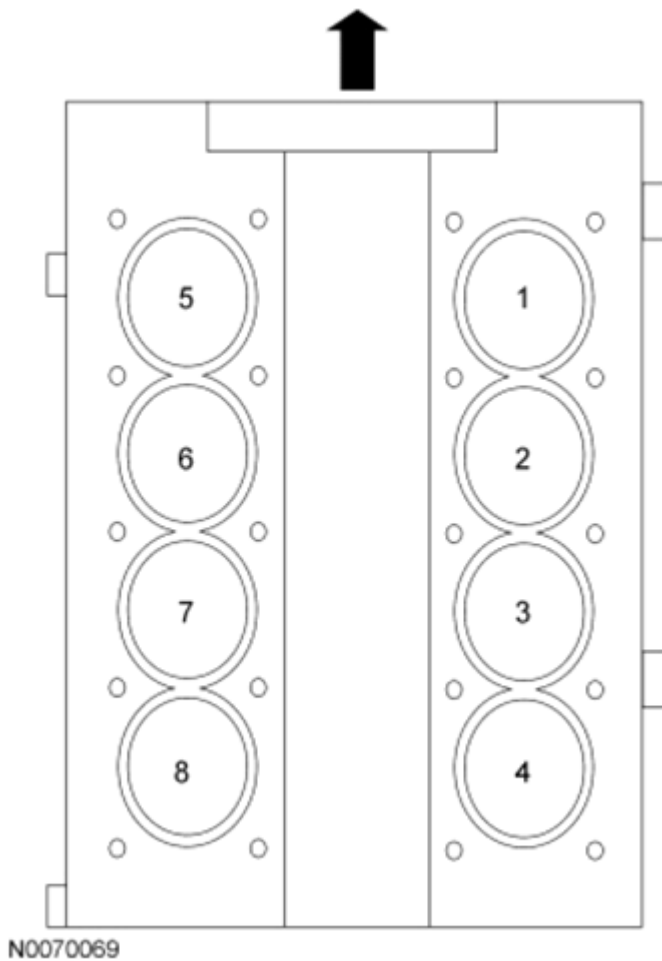


Fig. 2: Engine Cylinder Identification
Courtesy of FORD MOTOR CO.

Exhaust Emission Control System

Operation and necessary maintenance of the exhaust emission control devices used on this engine are covered in the **INTRODUCTION**.

Induction System

The **SFI** system 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.
- supply fuel from the fuel tank with a fuel pump mounted in the fuel tank.

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.

PCV System

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

Lubrication System

The engine lubrication system operates as follows:

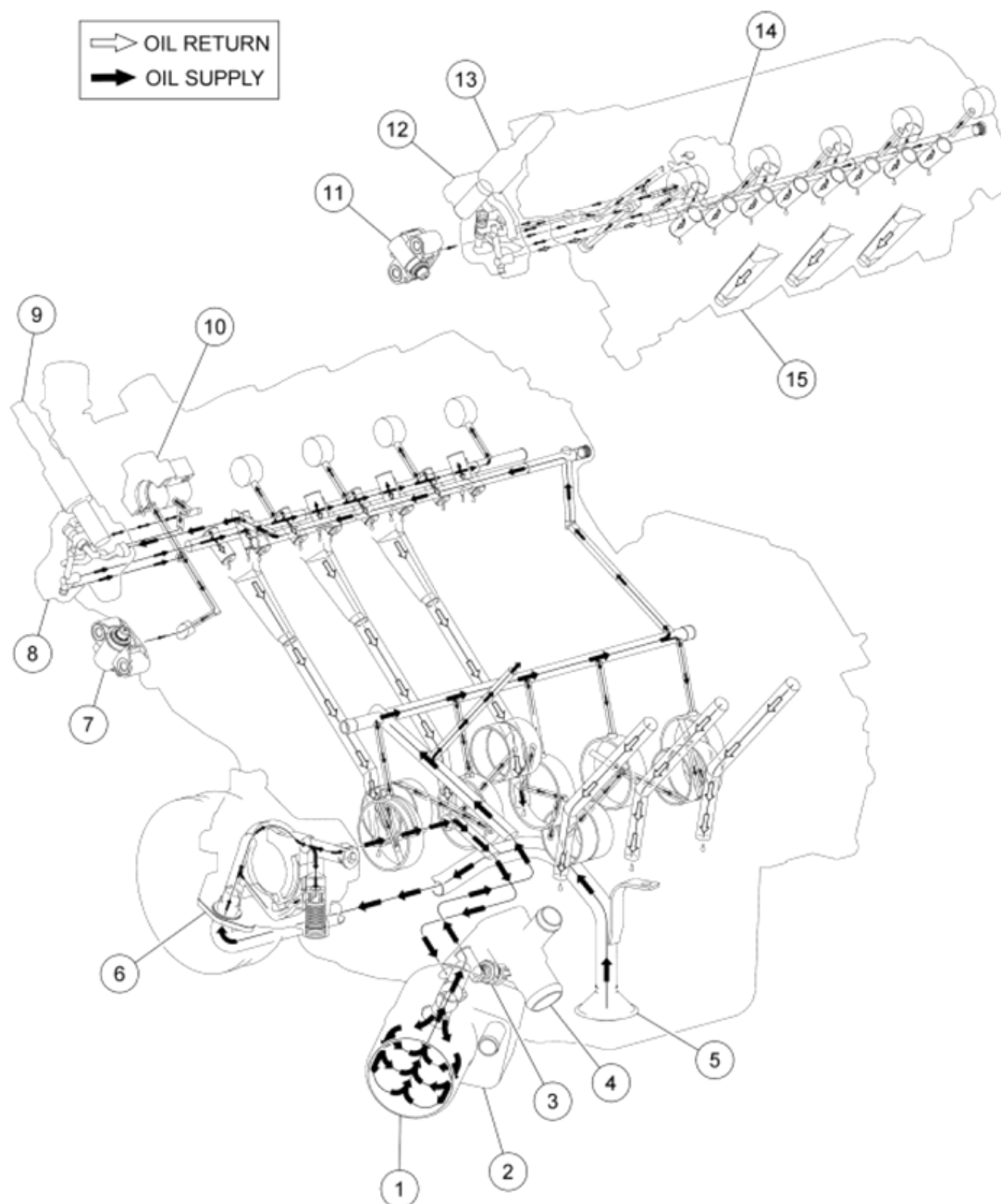
- Oil is drawn into the oil pump through the oil pump screen cover and tube in the sump of the oil pan.
- Oil is pumped through the oil filter on the left front side of the cylinder block.
- Oil enters the main gallery where it is distributed to the crankshaft main journals and to both cylinder heads.
- 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 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 oil pressure feed for the VCT solenoids, VCT housings and camshaft phase and sprockets is not reduced.
- The camshaft lobe and roller followers are lubricated by splash created through valve train operation.

Engine Oil Flow Illustrations

Engine Assembly

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Fig. 3: Engine Oil Flow Diagram
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

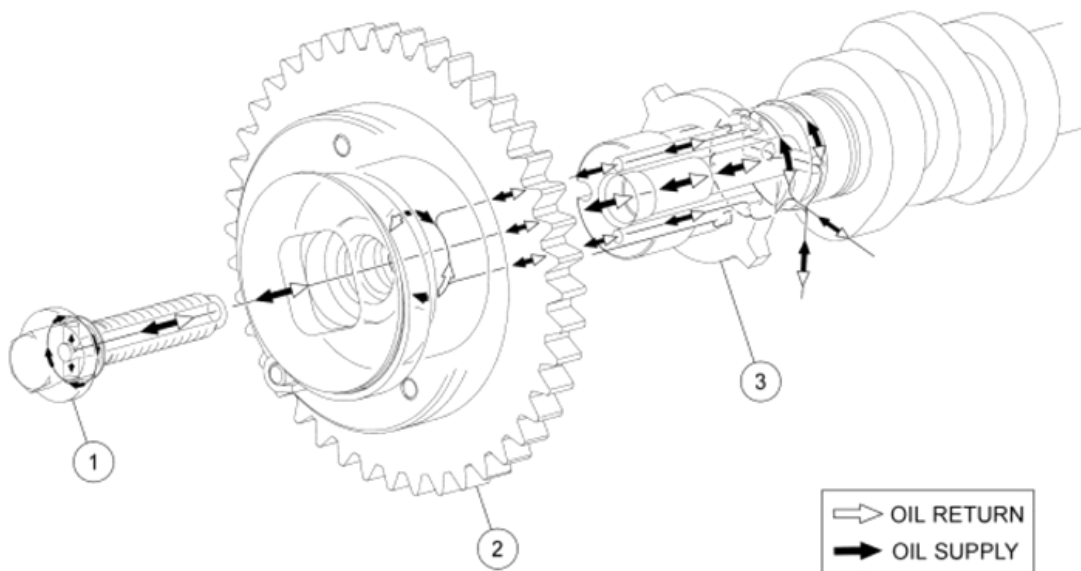
Item	Part Number	Description
1	6731	Oil filter
2	6A642	Oil cooler (if equipped)
3	9278	Engine Oil Pressure (EOP) switch

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4	6881	Oil filter adapter
5	6622	Oil pump screen and pickup tube
6	6600	Oil pump
7	6L266A	Timing chain tensioner - RH
8	6C260	Variable Camshaft Timing (VCT) housing - RH
9	6M280	VCT oil control solenoid assembly - RH
10	-	Front camshaft bearing cap - RH (part of 6049)
11	6L266	Timing chain tensioner - LH
12	6C261	VCT housing - LH
13	6M280	VCT oil control solenoid assembly - LH
14	-	Front camshaft bearing cap - LH (part of 6049)
15	6049	Cylinder head - LH

Camshaft Phaser and Sprocket, Camshaft Phaser and Sprocket Bolt and Camshaft



N0096610

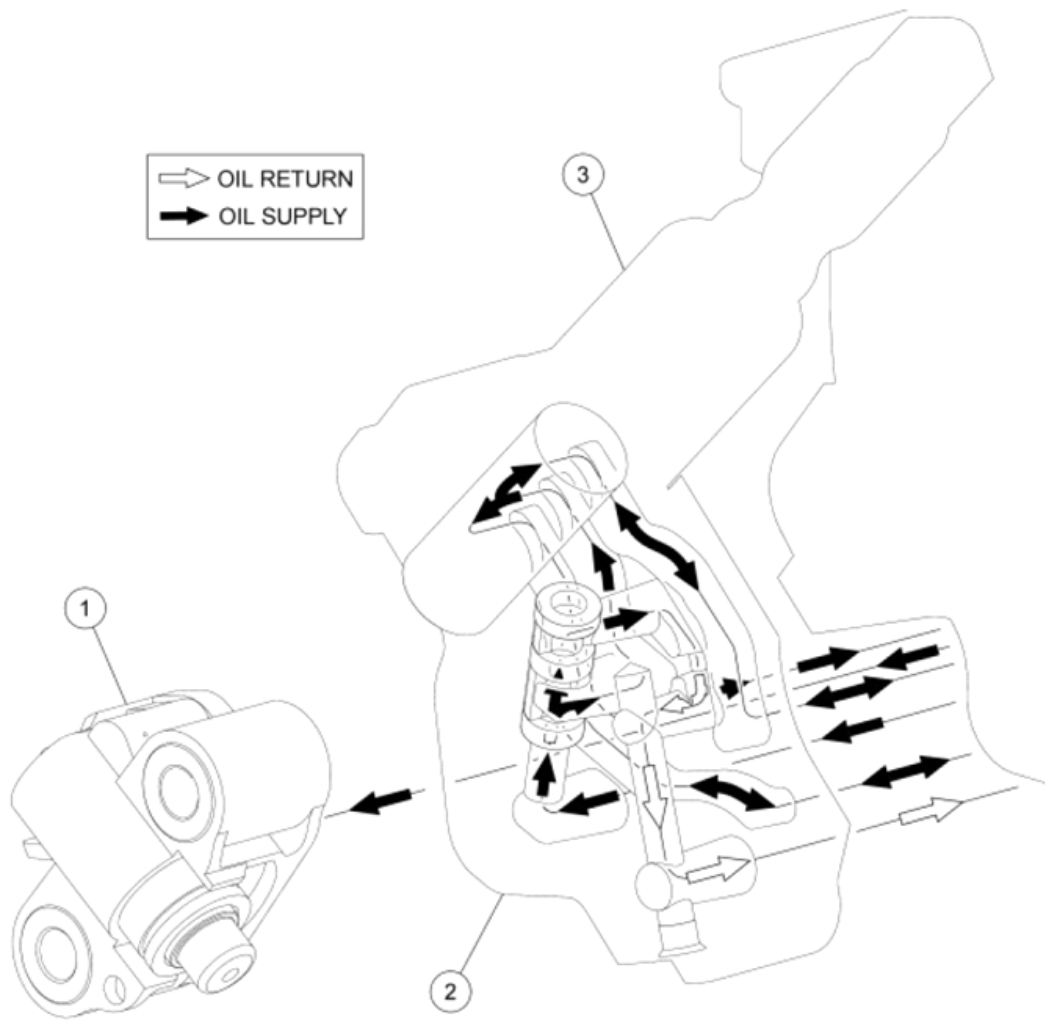
Fig. 4: Camshaft Phaser And Sprocket, Camshaft Phaser And Sprocket Bolt And Camshaft - Oil Flow Diagram

Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6279	Camshaft phase and sprocket bolt
2	-	Camshaft phase and sprocket (part of 6A257)
3	6250	Camshaft

LH Variable Camshaft Timing (VCT) Housing, VCT Solenoid and Timing Chain Tensioner



N0096613

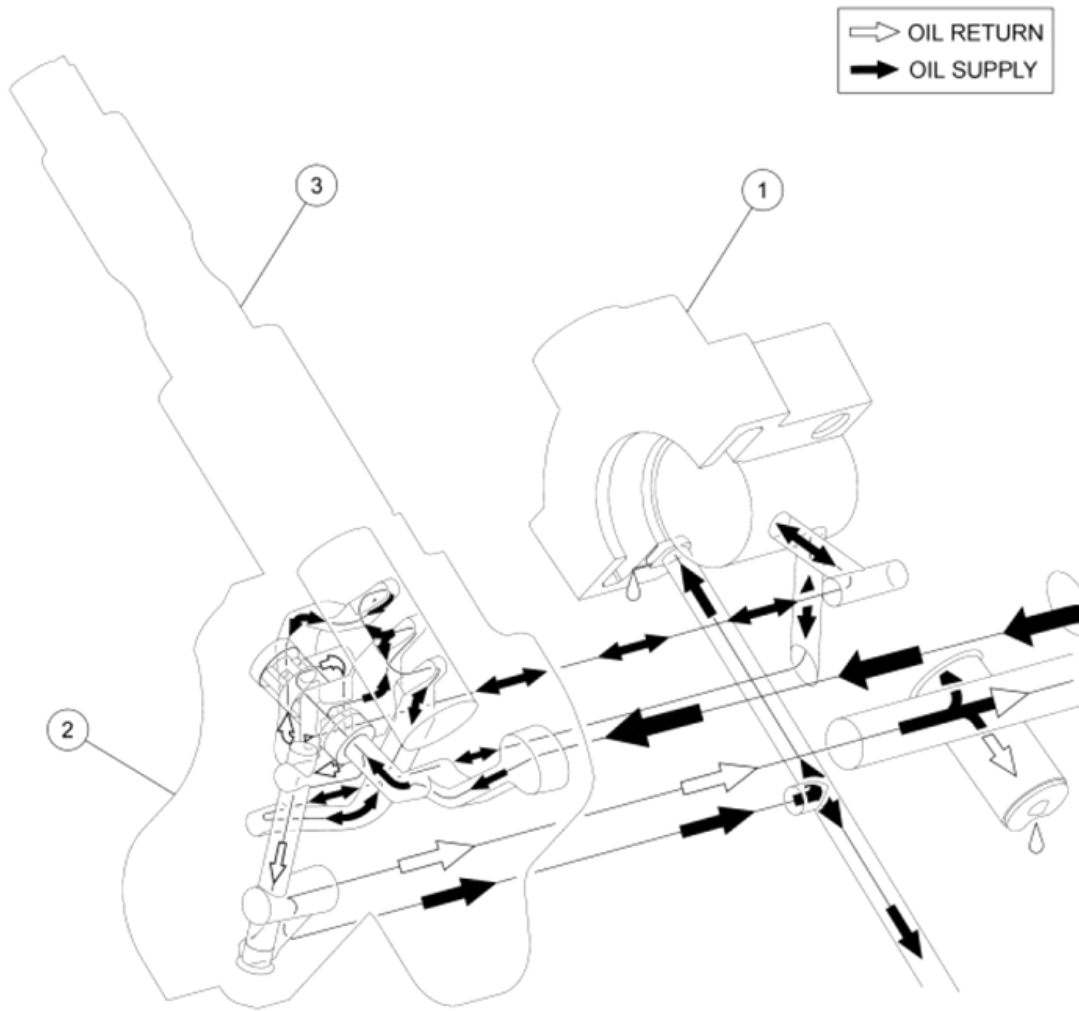
Fig. 5: Locating LH Variable Camshaft Timing (VCT) Housing, VCT Solenoid And Timing Chain Tensioner

Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6L266	Timing chain tensioner - LH
2	6C261	Variable Camshaft Timing (VCT) housing - LH
3	6M280	VCT oil control solenoid assembly - LH

RH Variable Camshaft Timing (VCT) Housing and VCT Solenoid



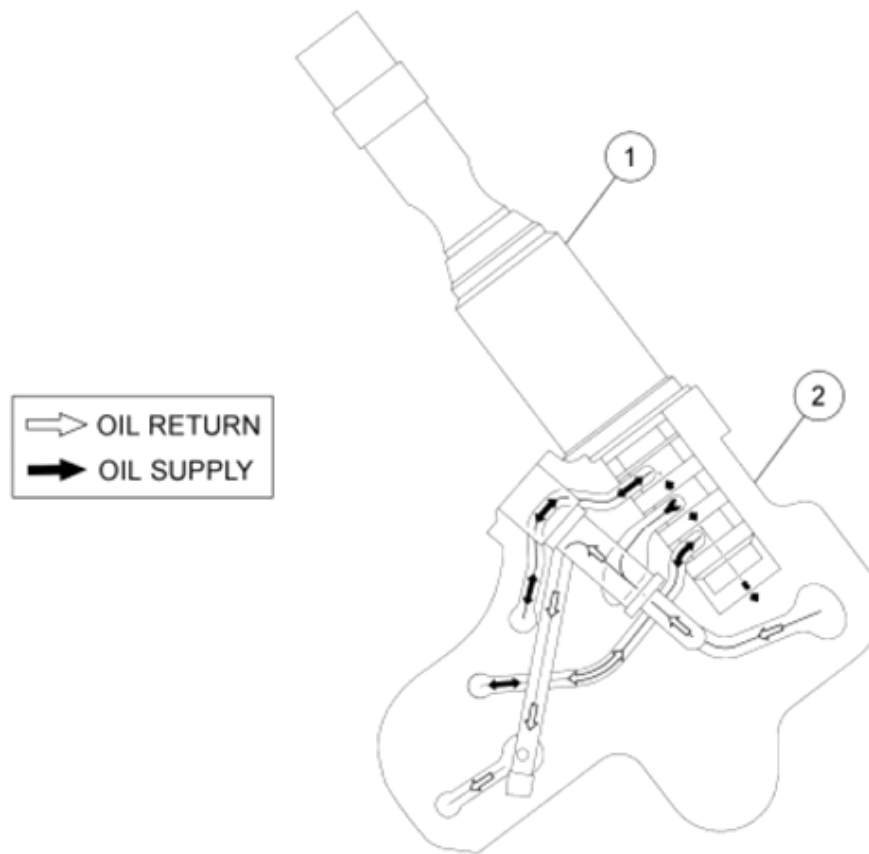
N0096611

Fig. 6: Locating RH Variable Camshaft Timing (VCT) Housing And VCT Solenoid
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	-	Front camshaft bearing cap - RH (part of 6049)
2	6C260	Variable Camshaft Timing (VCT) housing - RH
3	6M280	VCT oil control solenoid assembly - RH

Variable Camshaft Timing (VCT) Housing



N0096612

Fig. 7: View Of Variable Camshaft Timing (VCT) Housing
 Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6M280	Variable Camshaft Timing (VCT) oil control solenoid assembly
2	-	VCT housing

Oil Pump

The lubrication system 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 MECHANICAL SYSTEM - GENERAL INFORMATION** . For driveability concerns, refer to the **INTRODUCTION** .

IN-VEHICLE REPAIR

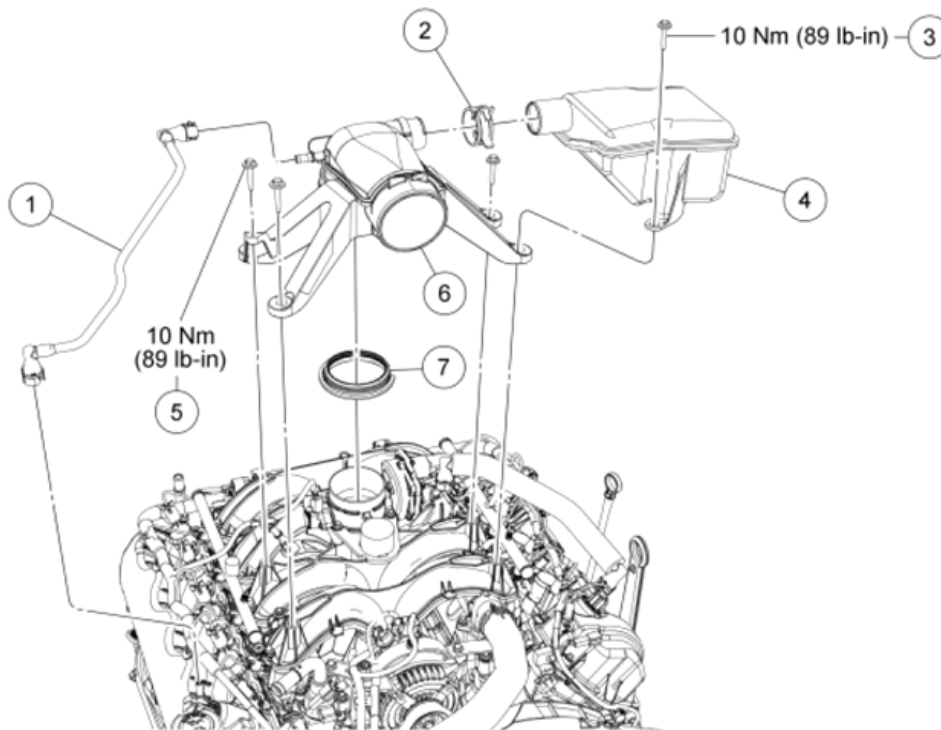
INTAKE MANIFOLD

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® Silicone Gasket Remover ZC-30	-

Air Cleaner (ACL) Outlet Pipe-To-Throttle Body (TB) Adapter and Air Intake Resonator Assembly



N0122759

Fig. 8: Exploded View Of Air Cleaner (ACL) Outlet Pipe-To-Throttle Body (TB) Adapter And Air Intake Resonator Assembly With Torque Specifications

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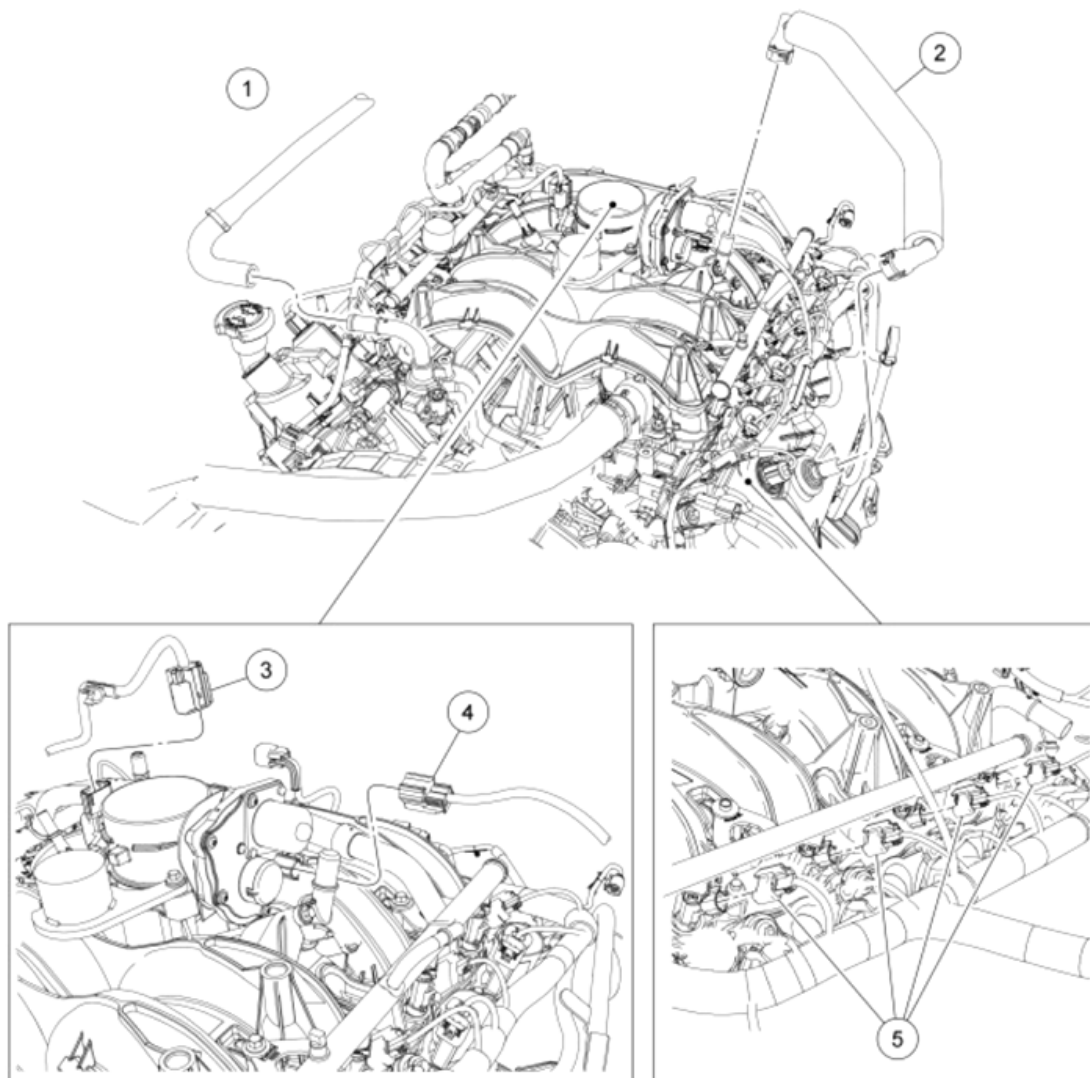
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Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6758	Crankcase ventilation tube
2	-	Throttle Body (TB) adapter-to-air intake resonator assembly clamp (part of 9F763)
3	W505427	Air intake resonator assembly bolt
4	9F763	Air intake resonator assembly
5	W713555	Air Cleaner (ACL) outlet pipe-to-TB adapter bolt (3 required)
6	9A589	ACL outlet pipe-to-TB adapter
7	9628	ACL outlet pipe-to-TB adapter seal

Throttle Body (TB) and Ignition Coil Electrical Connectors



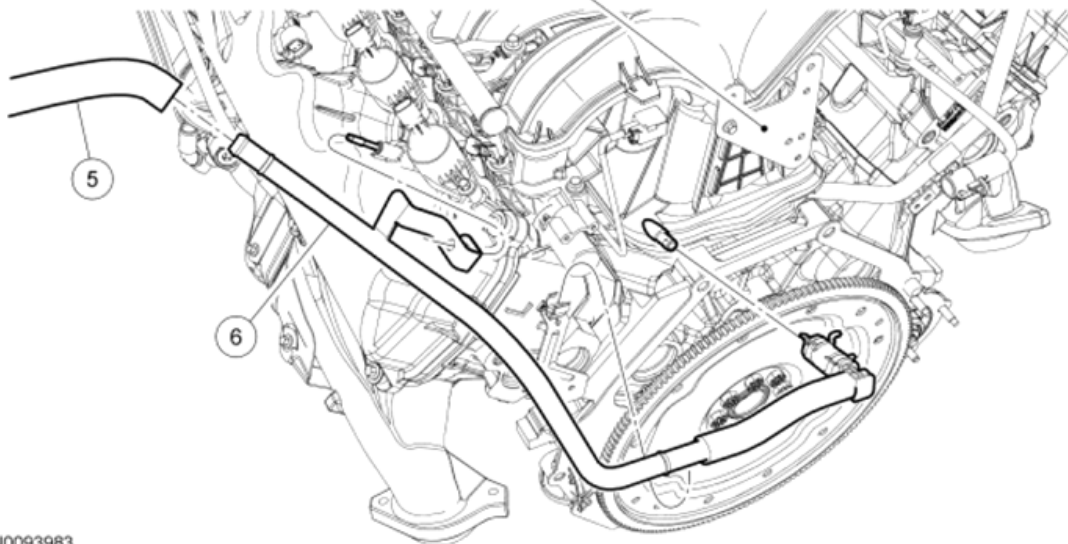
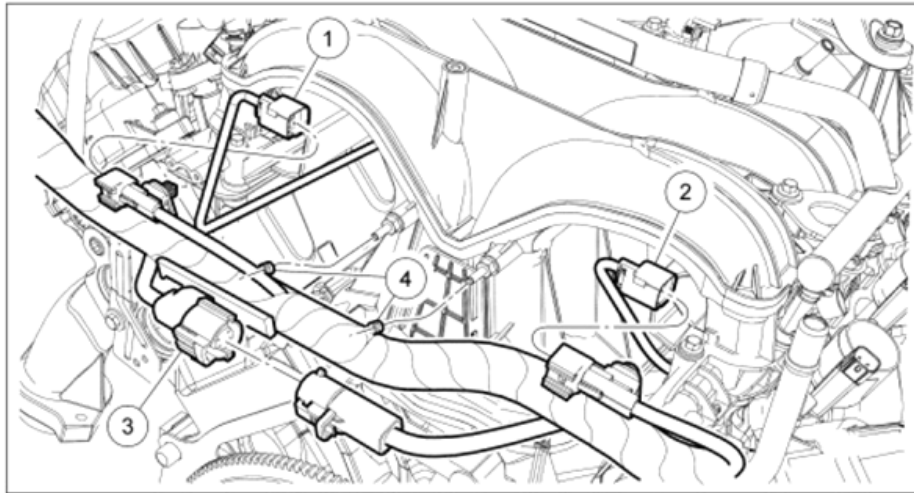
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Fig. 9: Exploded View Of Throttle Body (TB) And Ignition Coil Electrical Connectors
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	18472	Heater coolant hose
2	6A664	PCV tube
3	-	Throttle Position (TP) sensor electrical connector (part of 9D930)
4	-	Electronic Throttle Control (ETC) electrical connector (part of 9D930)
5	-	Fuel injector electrical connectors (part of 9D930) (8 required)

Intake Manifold Vacuum Tube Assembly



N0093983

Fig. 10: Locating Intake Manifold Vacuum Tube Assembly Components
Courtesy of FORD MOTOR CO.

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ITEM DESCRIPTION CHART

Item	Part Number	Description
1	-	LH Knock Sensor (KS) electrical connector (part of 9D930)
2	-	RH KS electrical connector (part of 9D930)
3	-	Cylinder Head Temperature (CHT) electrical connector (part of 9D930)
4	-	Electrical wiring harness retainer (part of 9D930)
5	9C490	Brake booster vacuum hose
6	9A474	Intake manifold vacuum tube assembly

Intake Manifold, Coolant Crossover Manifold Assembly and Gaskets

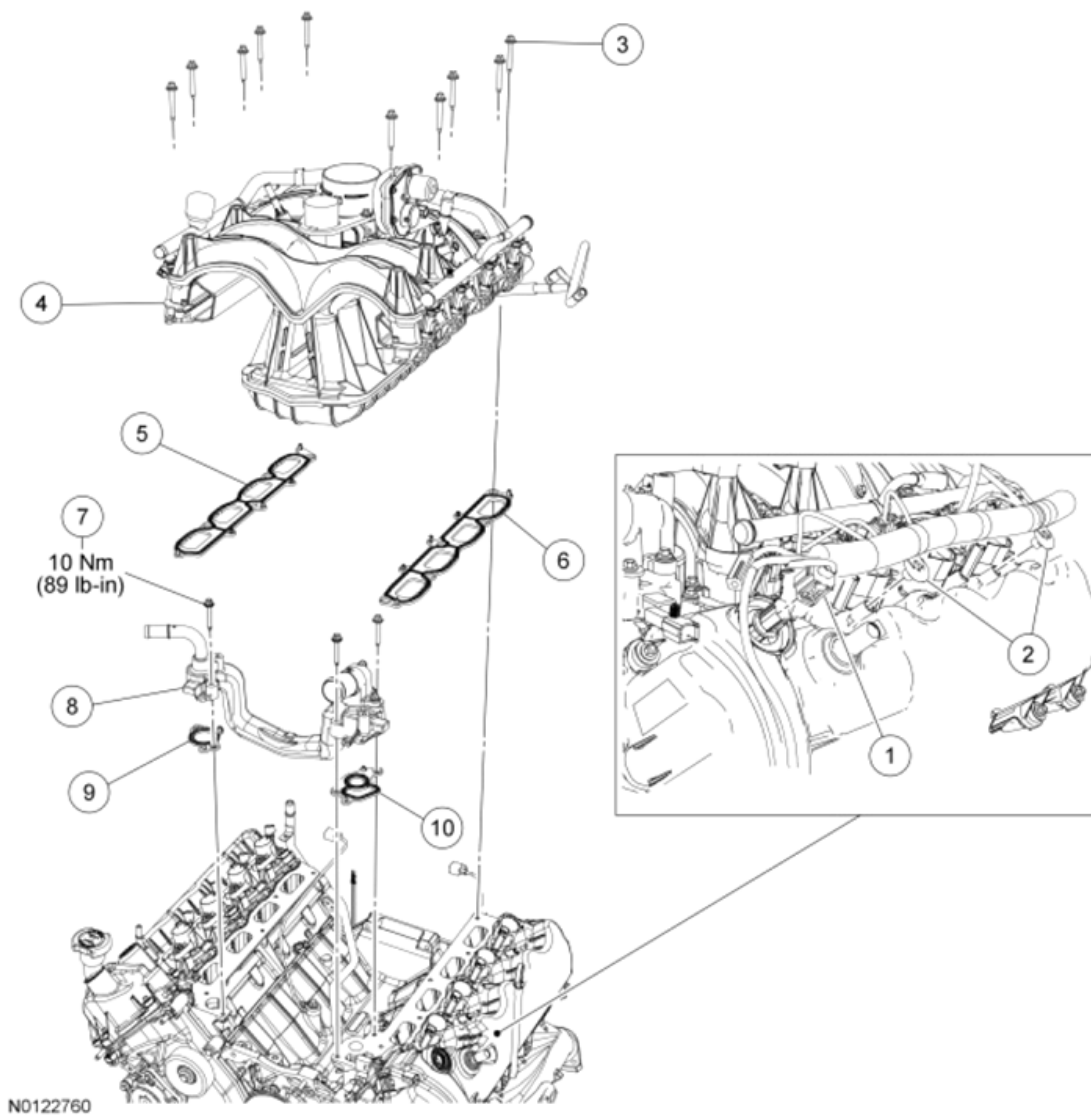


Fig. 11: Exploded View Of Intake Manifold, Coolant Crossover Manifold Assembly And Gaskets With Torque Specifications

Courtesy of FORD MOTOR CO.

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	-	Variable Camshaft Timing (VCT) solenoid electrical connector (part of 9D930)
2	-	Engine wiring harness retainers (part of 9D930) (2 required)
3	W710758	Intake manifold bolt (10 required)
4	9424	Intake manifold
5	9439	RH intake manifold gasket
6	9439	LH intake manifold gasket
7	W503282	Coolant crossover manifold assembly bolt (3 required)
8	8C368	Coolant crossover manifold assembly
9	8C387	RH coolant crossover manifold assembly gasket
10	8C387	LH coolant crossover manifold assembly gasket

Removal

WARNING: Do not smoke, carry lighted tobacco or have an 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 serious personal injury.

WARNING: Before working on or disconnecting any of the fuel tubes or fuel system components, relieve the fuel system pressure to prevent accidental spraying of fuel. Fuel in the fuel system remains under high pressure, even when the engine is not running. Failure to follow this instruction may result in serious personal injury.

1. Drain the cooling system. For additional information, refer to **ENGINE COOLING SYSTEM**.
2. Remove the generator. For additional information, refer to **CHARGING SYSTEM**.
3. Disconnect the quick connect couplings and remove the crankcase ventilation tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
4. Remove the bolt, loosen the clamp and remove the air intake resonator assembly.
5. Remove the 3 bolts and the Throttle Body (TB)-to-Air Cleaner (ACL) outlet tube adapter.
6. Disconnect the quick connect couplings and remove the PCV tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
7. Disconnect the fuel supply tube quick connect coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
8. Disconnect the electrical connector and the Evaporative Emission (EVAP) tube quick connect coupling from the EVAP canister purge valve. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.

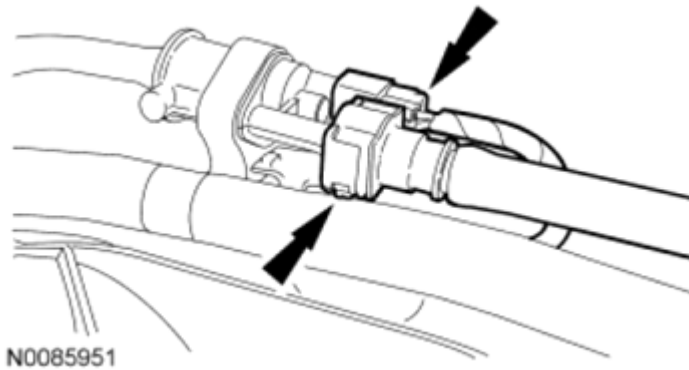


Fig. 12: Locating Evaporative Emission (EVAP) Tube Quick Connect Coupling
Courtesy of FORD MOTOR CO.

9. Disconnect the heater coolant hose from the coolant crossover manifold assembly.
10. Disconnect the 8 fuel injector electrical connectors.
11. Disconnect the Throttle Position (TP) sensor and Electronic Throttle Control (ETC) electrical connectors.
12. Disconnect the 4 LH ignition coil and the LH Variable Camshaft Timing (VCT) solenoid electrical connectors and detach the 2 engine wiring harness retainers from the LH valve cover studs.
13. Disconnect the intake manifold vacuum tube from the brake booster vacuum hose.

NOTE: The intake manifold vacuum tube must be removed with the intake manifold as an assembly.

14. Disconnect the intake manifold vacuum tube from the LH valve cover studbolt and the support bracket at the rear of the LH cylinder head.

15. Remove the 10 intake manifold bolts.

NOTE: 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.

16. **NOTE:** Do not disconnect the upper radiator hose unless servicing the thermostat housing or coolant crossover.

Remove the 3 bolts and position the engine coolant crossover assembly aside.

- Discard the gaskets and clean and inspect the sealing surfaces with metal surface prep. Follow the directions on the packaging.

NOTE: The intake manifold vacuum tube must be positioned under the engine wiring harness and removed with the intake manifold as an assembly.

17. Position the intake forward to gain access to the wiring harness retainers.

18. Disconnect the 2 engine wiring harness retainers from the rear of the intake manifold.
19. Disconnect the Cylinder Head Temperature (CHT) sensor jumper harness electrical connector retainer.

NOTE: 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.

20.

NOTE: The intake manifold vacuum tube must be positioned under the engine wiring harness and removed with the intake manifold as an assembly.

Remove the intake manifold and discard the gaskets.

- Clean and inspect the sealing surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

Installation

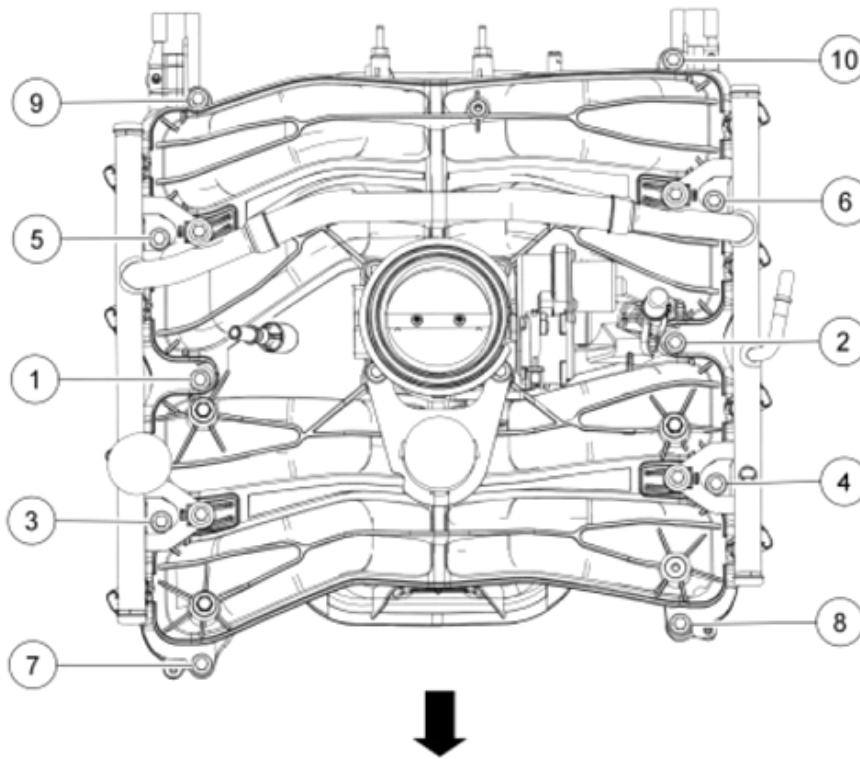
NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

1.

NOTE: The intake manifold vacuum tube must be positioned under the engine wiring harness during installation of the intake manifold.

Using new intake manifold gaskets, position the intake manifold.

2. Position the intake manifold forward and connect the **CHT** sensor jumper harness electrical connector retainer.
3. Connect the 2 engine wiring harness retainers to the rear of the intake manifold and position back the intake manifold assembly.
4. Using new gaskets, position the coolant crossover manifold assembly and install the 3 bolts.
 - Tighten to 10 Nm (89 lb-in).
5. Install the 10 intake manifold bolts and tighten in 2 stages in the sequence shown in the illustration.
 - Stage 1: Tighten to 2 Nm (18 lb-in).
 - Stage 2: Tighten to 10 Nm (89 lb-in).



N0122762

Fig. 13: Identifying Intake Manifold Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

6. Connect the intake manifold vacuum tube to the support bracket and the valve cover stud.
7. Connect the brake booster vacuum hose to the intake manifold vacuum tube and position the clamp.
8. Connect the 4 LH ignition coil and the LH VCT solenoid electrical connectors and attach the 2 engine wiring harness retainers to the LH valve cover studs.
9. Connect the TP sensor and electronic throttle control electrical connectors.
10. Connect the 8 fuel injector electrical connectors.
11. Connect the heater coolant hose to the coolant crossover manifold assembly.
12. Connect the electrical connector and the EVAP tube quick connect coupling to the EVAP canister purge valve. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.

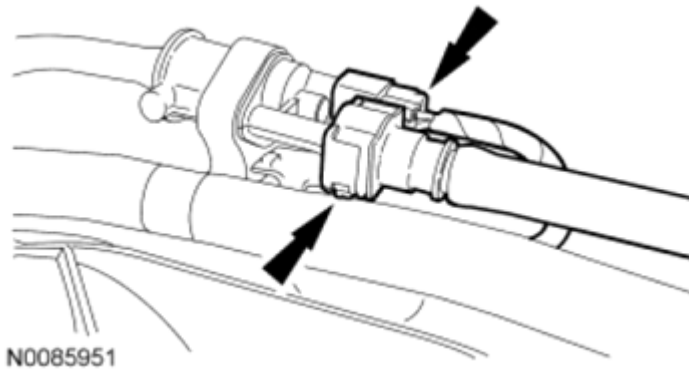


Fig. 14: Locating Evaporative Emission (EVAP) Tube Quick Connect Coupling
Courtesy of FORD MOTOR CO.

13. Connect the fuel supply tube quick connect coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** .
14. Position the PCV tube and connect the quick connect couplings. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** .
15. Position the **TB** -to-**ACL** outlet tube adapter and install the 3 bolts.
 - Tighten the bolt to 10 Nm (89 lb-in).
16. Position the air intake resonator assembly, install the bolt and the clamp.
 - Tighten the bolt to 10 Nm (89 lb-in).
17. Position the crankcase ventilation tube and connect the quick connect couplings. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** .
18. Install the generator. For additional information, refer to **CHARGING SYSTEM** .
19. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING SYSTEM** .

VALVE COVER - LH

PCV Tube, Engine Wiring Harness Retainers and Variable Camshaft Timing (VCT) Solenoid Electrical Connector

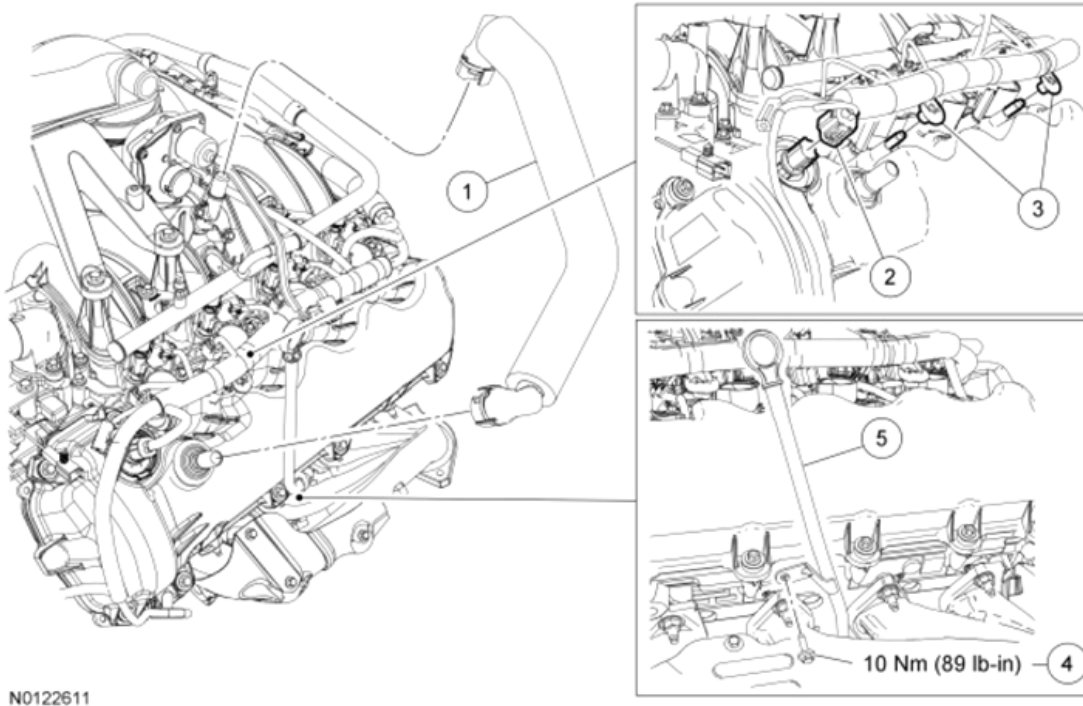
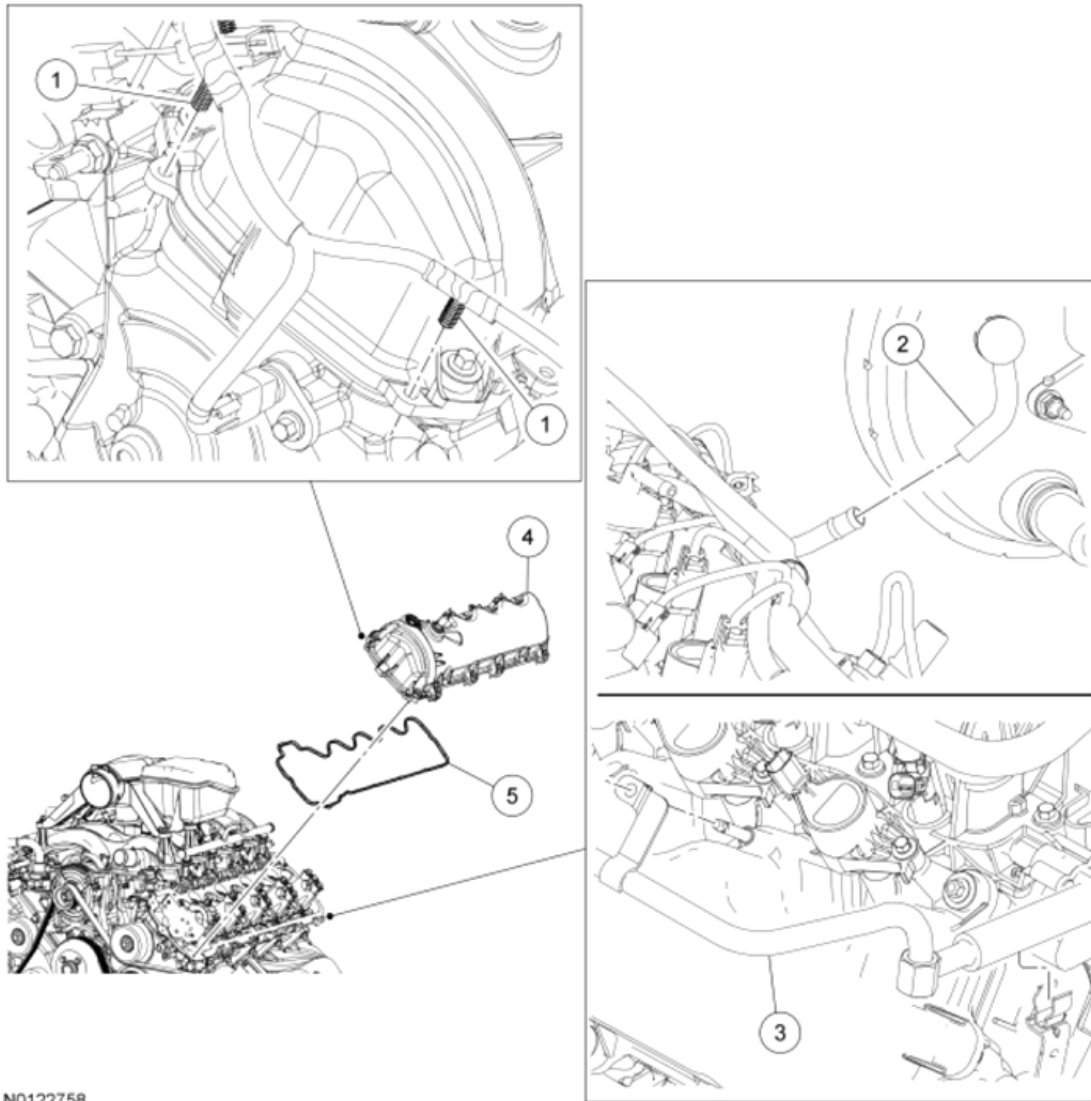


Fig. 15: Exploded View Of PCV Tube, Engine Wiring Harness Retainers And VCT Solenoid Electrical Connector With Torque Specification
 Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6A664	PCV tube
2	-	Variable Camshaft Timing (VCT) solenoid electrical connector (part of 9D930)
3	-	Engine wiring harness retainers (part of 9D930)
4	N605892	Oil level indicator and tube bolt
5	6K873	Oil level indicator and tube

Engine Wiring Harness Retainers, Intake Manifold Vacuum Tube, LH Valve Cover and Gasket



N0122758

Fig. 16: Exploded View Of Engine Wiring Harness Retainers, Intake Manifold Vacuum Tube, LH Valve Cover And Gasket

Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	-	Engine wiring harness retainers (part of 9D930)
2	-	Intake manifold vacuum tube-to-brake booster hose
3	9D446	Intake manifold vacuum tube
4	6A505	LH valve cover
5	6A559	LH valve cover gasket

Removal

1. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR**

DISTRIBUTION SYSTEM & INTAKE AIR FILTERING SYSTEM .

2. Remove the bolt and position the oil level indicator and tube aside.
3. Disconnect the quick connect couplings and remove the PCV tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** .
4. Disconnect the intake manifold vacuum tube hose from the brake booster.
5. Disconnect the intake manifold vacuum tube from the support bracket and the valve cover stud.
6. Disconnect the Variable Camshaft Timing (VCT) solenoid electrical connector.
7. Disconnect the 3 wiring harness retainers from the front of the LH valve cover and the 2 wiring harness retainers from the LH valve cover studs.
8. Remove the 4 LH ignition coils. For additional information, refer to **IGNITION SYSTEM - 5.4L (3V)** .

NOTE: 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.

9.

NOTE: When removing the valve cover, make sure to avoid damaging the Variable Camshaft Timing (VCT) solenoid.

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

Loosen the 10 fasteners and remove the LH valve cover and gasket.

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

Installation

NOTE: If the valve cover is 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. 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.

1.

Apply a bead of silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

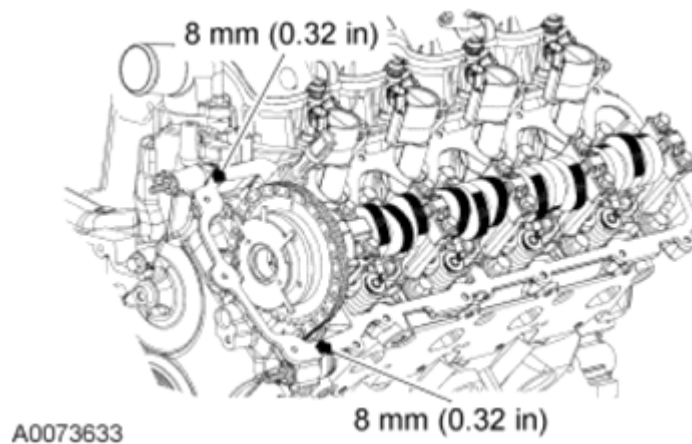
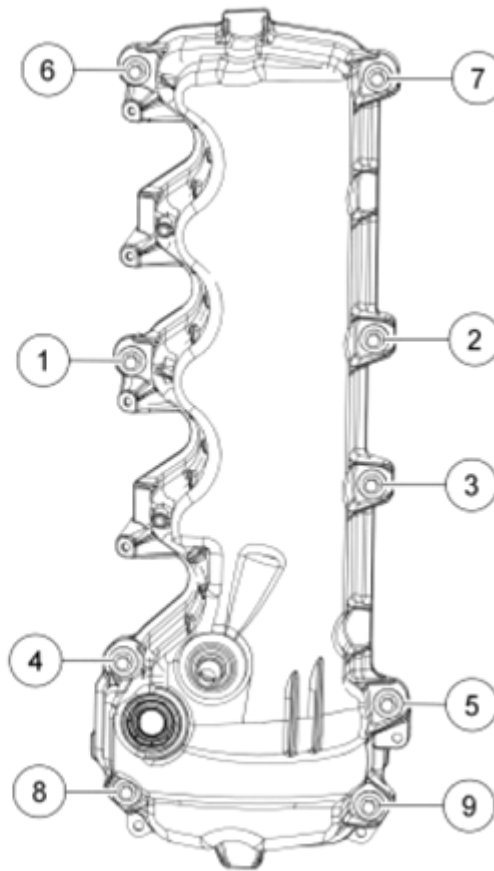


Fig. 17: Locating Silicone Gasket Sealant Area
Courtesy of FORD MOTOR CO.

- NOTE:** When installing the valve cover, make sure to avoid damaging the Variable Camshaft Timing (VCT) solenoid.
- 2.

Position the LH valve cover and new gasket on the cylinder head and tighten the 9 fasteners in the sequence shown in the illustration.

- Tighten to 10 Nm (89 lb-in).



N0122332

Fig. 18: Identifying LH Valve Cover And Gasket On Cylinder Head Fasteners Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Position the intake manifold vacuum tube assembly onto the support bracket and the valve cover stud.
4. Connect the intake manifold vacuum tube hose to the brake booster.
5. Install the 4 LH ignition coils. For additional information, refer to **IGNITION SYSTEM - 5.4L (3V)**.
6. Connect the 3 wiring harness retainers to the front of the RH valve cover and the 2 wiring harness retainers to the RH valve cover studs.
7. Connect the VCT solenoid electrical connector.
8. Position the PCV tube and connect the quick connect couplings. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
9. Position back the oil level indicator and tube and install the bolt.
 - Tighten to 10 Nm (89 lb-in).
10. Install the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION SYSTEM & INTAKE AIR FILTERING SYSTEM**.

VALVE COVER - RH

Material

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-

Engine Wiring Harness Retainers, Variable Camshaft Timing (VCT) Solenoid Electrical Connector, Crankcase Ventilation Tube, RH Valve Cover and Gasket

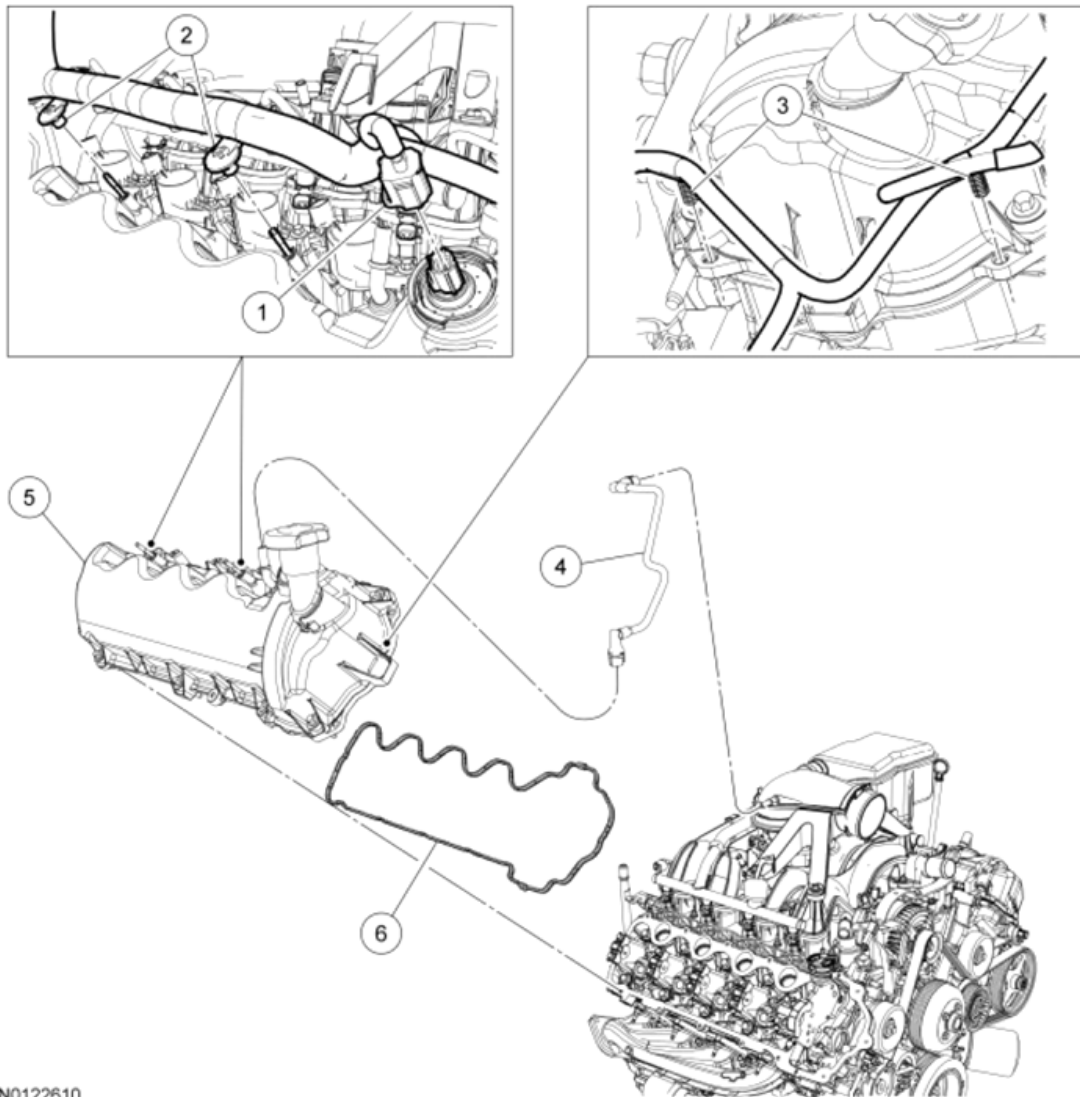


Fig. 19: Exploded View Of Engine Wiring Harness Retainers, VCT Solenoid Electrical Connector, Crankcase Ventilation Tube, RH Valve Cover And Gasket
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

1	-	Variable Camshaft Timing (VCT) solenoid electrical connector (part of 19D930)
2	-	Engine wiring harness retainers (part of 19D930)
3	-	Engine wiring harness retainers (part of 19D930)
4	6758	Crankcase ventilation tube
5	6582	RH valve cover
6	6584	RH valve cover gasket

Removal

Vehicles with auxiliary heat

1. Drain the cooling system. For additional information, refer to **ENGINE COOLING SYSTEM**.
2. Disconnect the 2 auxiliary heat coolant hoses and position the auxiliary heat coolant hoses aside.

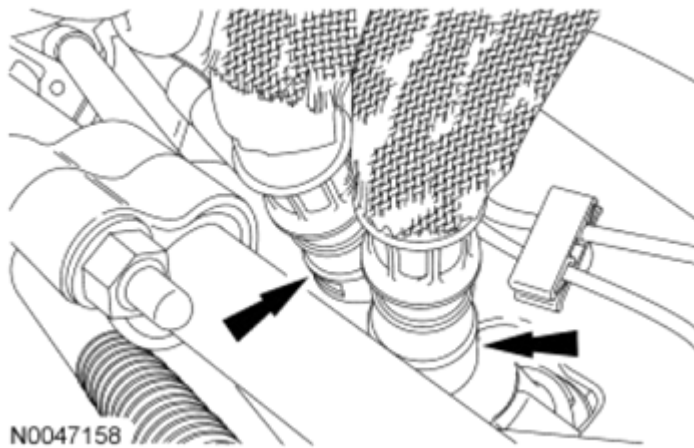


Fig. 20: Locating Auxiliary Heat Coolant Hoses
Courtesy of FORD MOTOR CO.

All vehicles

3. Disconnect the quick connect couplings and remove the crankcase vent tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
4. Disconnect the PCM electrical connector and position aside.

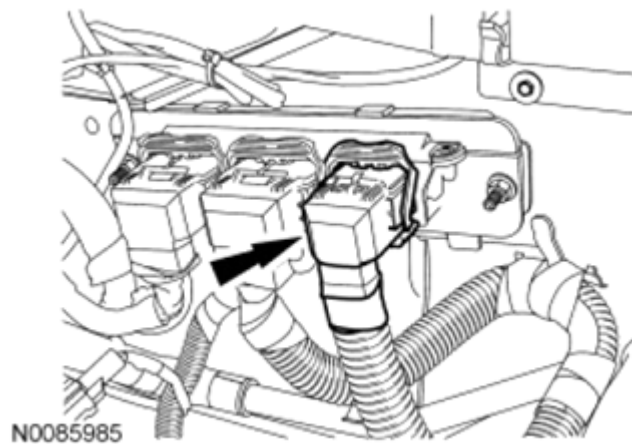


Fig. 21: Locating PCM Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the nut and the ground cable and disconnect the wiring harness retainer.

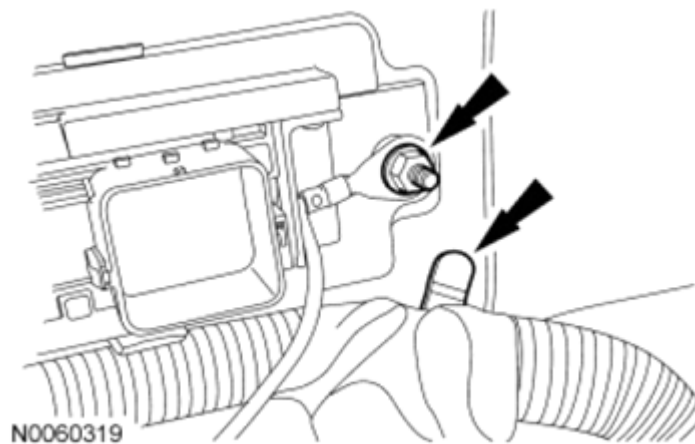


Fig. 22: Locating Wiring Harness Retainer And Nut
Courtesy of FORD MOTOR CO.

6. Disconnect the PCM electrical connector.

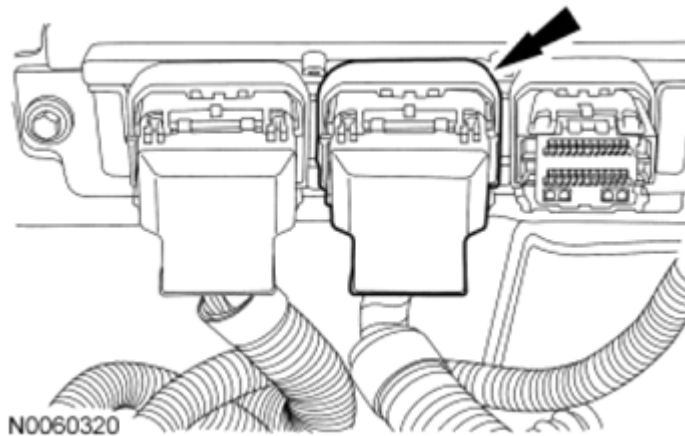


Fig. 23: Locating PCM Electrical Connector
Courtesy of FORD MOTOR CO.

7. Disconnect the 2 electrical connectors and the wiring harness retainer and position the wiring harness aside.

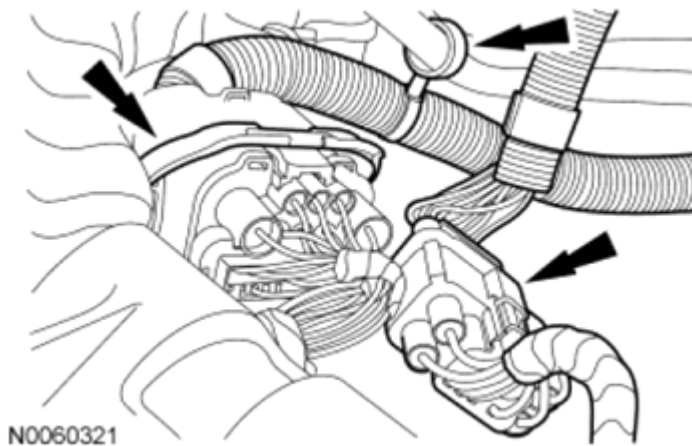


Fig. 24: Locating Electrical Connectors And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

8. Disconnect the RH radio ignition interference capacitor and engine cooling fan clutch electrical connectors.

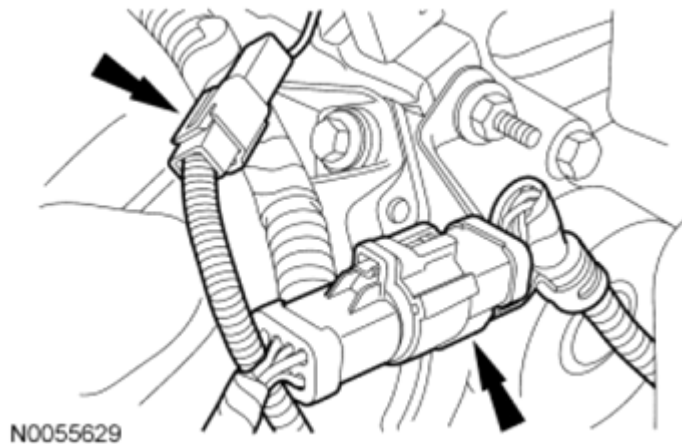


Fig. 25: Locating Engine Cooling Fan Clutch Electrical Connectors
Courtesy of FORD MOTOR CO.

9. Remove the 4 RH ignition coils. For additional information, refer to **IGNITION SYSTEM - 5.4L (3V)**.
10. Disconnect the RH Variable Camshaft Timing (VCT) solenoid electrical connector.
11. Disconnect the 2 engine wiring harness retainers from the RH valve cover studs and position the wiring harness aside.

NOTE: 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.

12.

NOTE: When removing the valve cover, make sure to avoid damaging the Variable Camshaft Timing (VCT) solenoid.

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

Loosen the 9 fasteners and remove the RH valve cover and gasket.

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

Installation

All vehicles

NOTE: If the valve cover is 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. Allow to dry

1.

1. **until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure can cause future oil leakage.**

Apply a bead of silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

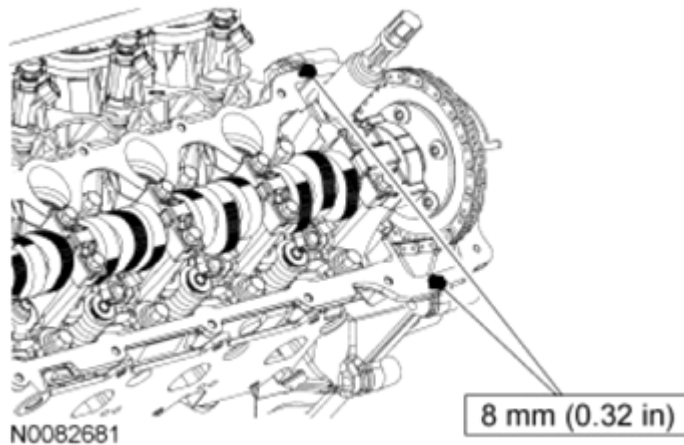
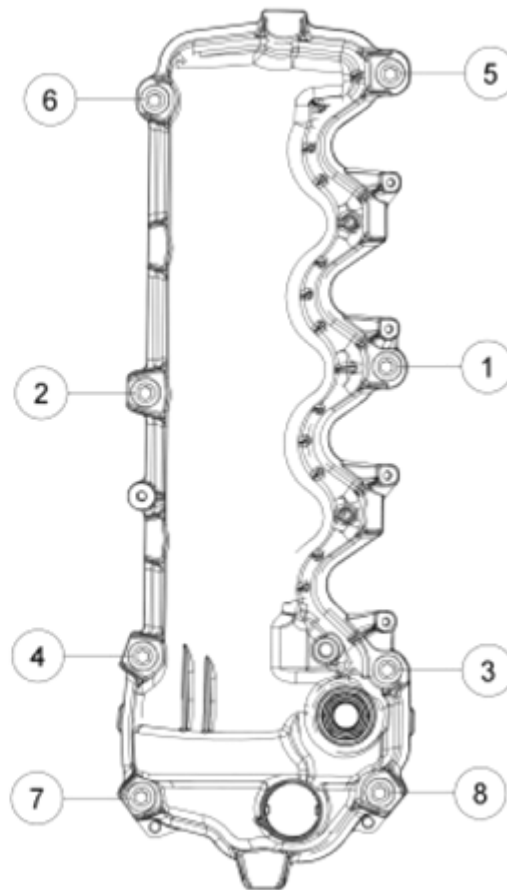


Fig. 26: Locating Silicone Gasket And Sealant Area In Engine Front Cover And Cylinder Head
Courtesy of FORD MOTOR CO.

2. **NOTE: When installing the valve cover, make sure to avoid damaging the Variable Camshaft Timing (VCT) solenoid.**

Position the RH valve cover and new gasket on the cylinder head and tighten the 8 fasteners in the sequence shown in the illustration.

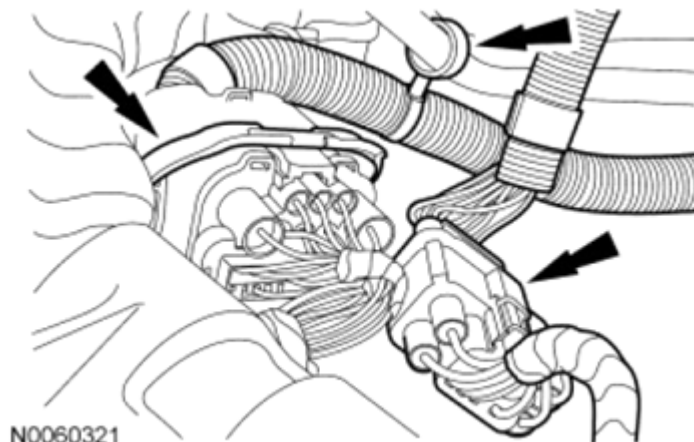
- Tighten to 10 Nm (89 lb-in).



N0122333

Fig. 27: Identifying RH Valve Cover And Gasket On Cylinder Head Fastener Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Install the 4 RH ignition coils. For additional information, refer to **IGNITION SYSTEM - 5.4L (3V)** .
4. Position back the engine wiring harness and connect the 2 electrical connectors and the wiring harness retainer.



N0060321

Fig. 28: Locating Electrical Connectors And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

5. Connect the PCM electrical connector.

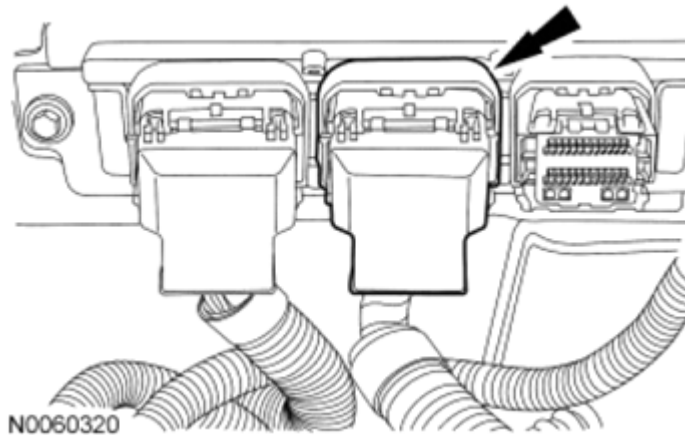


Fig. 29: Locating PCM Electrical Connector
Courtesy of FORD MOTOR CO.

6. Connect the wiring harness retainer and ground cable and install the nut.
- Tighten to 10 Nm (89 lb-in).

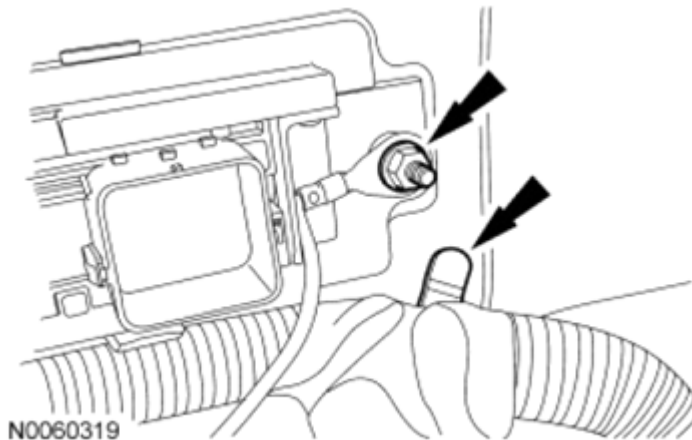


Fig. 30: Locating Wiring Harness Retainer And Nut
Courtesy of FORD MOTOR CO.

7. Connect the PCM electrical connector.

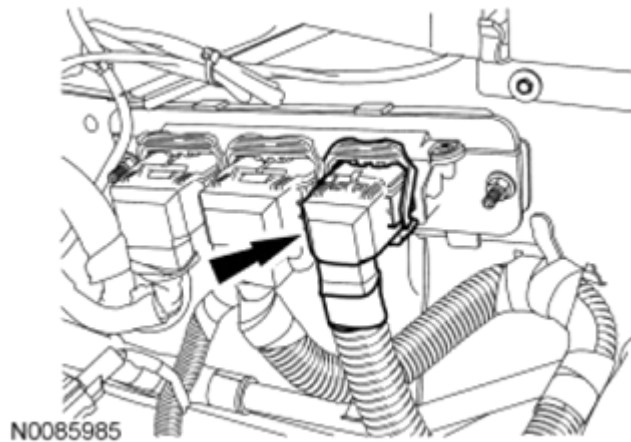


Fig. 31: Locating PCM Electrical Connector
Courtesy of FORD MOTOR CO.

8. Connect the RH radio ignition interference capacitor and engine cooling fan clutch electrical connectors.

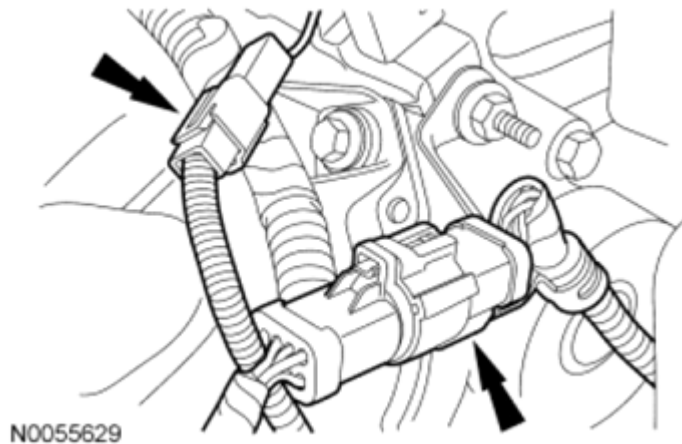


Fig. 32: Locating Engine Cooling Fan Clutch Electrical Connectors
Courtesy of FORD MOTOR CO.

9. Connect the RH VCT solenoid electrical connector.
10. Connect the wiring harness retainers to the valve cover.
11. Position the crankcase vent tube and connect the quick connect couplings. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.

Vehicles with auxiliary heat

12. Connect the 2 auxiliary heat coolant hoses.

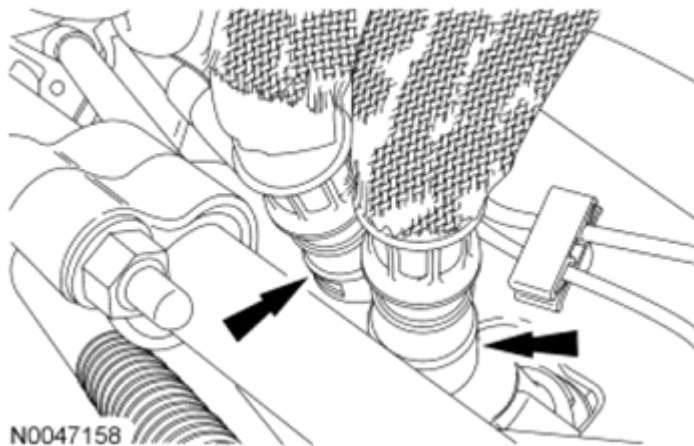


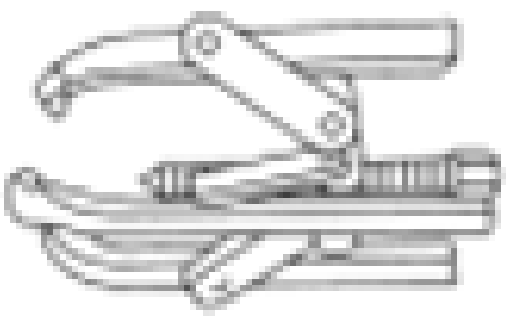
Fig. 33: Locating Auxiliary Heat Coolant Hoses
Courtesy of FORD MOTOR CO.

13. Fill and bleed the coolant system. For additional information, refer to **ENGINE COOLING SYSTEM** .

CRANKSHAFT PULLEY

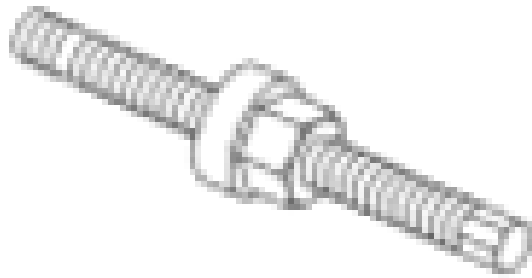
Special Tool(s)

SPECIAL TOOLS CHART

 <p>ST1184-A</p>	<p>3 Jaw Puller 303-D121 or equivalent</p>

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



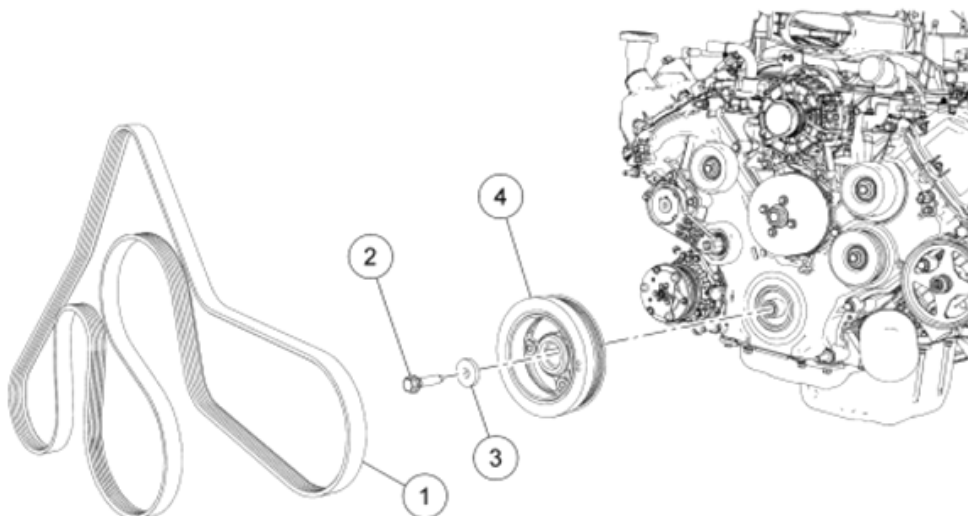
ST1287-A

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

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-



N0006662

Fig. 34: Locating Crankshaft Pulley Components

Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	8620	Accessory drive belt
2	W701512	Crankshaft pulley bolt
3	N806165	Crankshaft pulley bolt washer
4	6316	Crankshaft pulley

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Rotate the tensioner clockwise and remove the accessory drive belt from the crankshaft pulley.

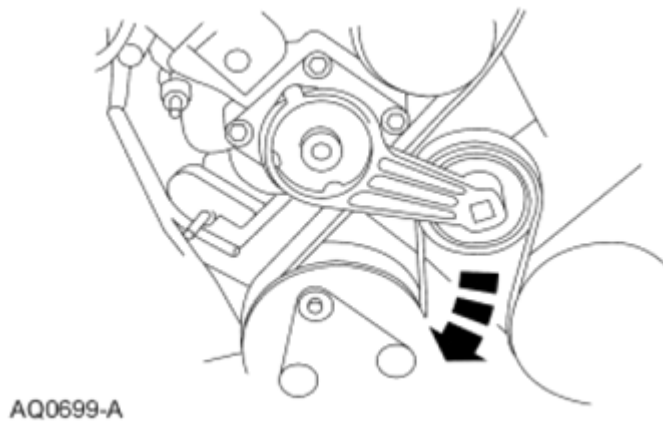


Fig. 35: Rotating Tensioner Clockwise To Drive Belt

Courtesy of FORD MOTOR CO.

3. Remove the crankshaft pulley bolt and washer.
 - Discard the crankshaft pulley bolt.
4. Using the 3 Jaw Puller, remove the crankshaft pulley.



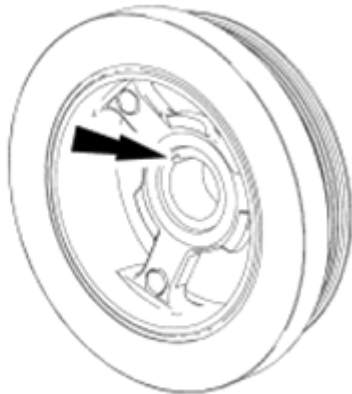
N0010528

Fig. 36: Removing 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.
- 1.

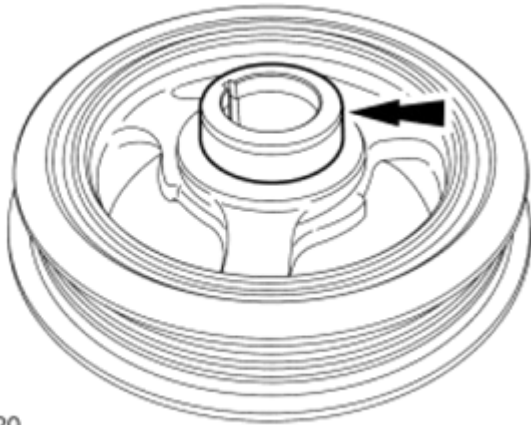
Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.



N0010530

Fig. 37: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

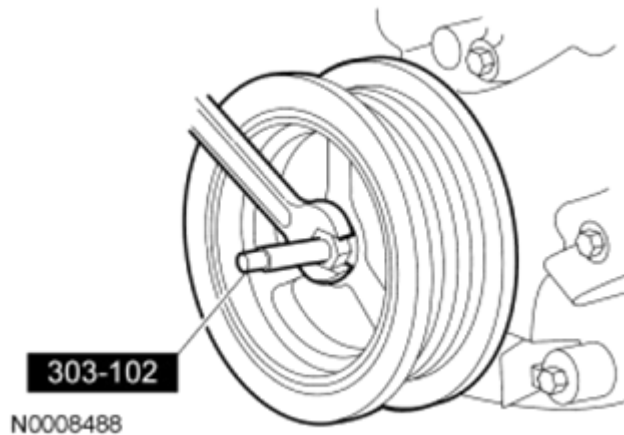
2. Lubricate the crankshaft pulley sealing area with clean engine oil prior to installation.



N0030220

Fig. 38: Locating Crankshaft Pulley Sealing Area
Courtesy of FORD MOTOR CO.

3. Using the Crankshaft Vibration Damper Installer, install the crankshaft pulley.



N0008488

Fig. 39: Installing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

4. Using a new crankshaft pulley bolt, install the bolt and washer and tighten the bolt in 4 stages.
 - Stage 1: Tighten to 90 Nm (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

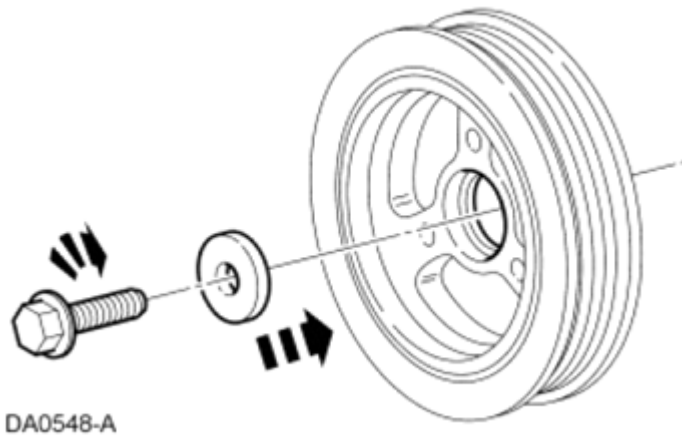


Fig. 40: Installing Crankshaft Pulley Bolt & Washer
Courtesy of FORD MOTOR CO.

5. Rotate the tensioner clockwise and install the accessory drive belt onto the crankshaft pulley.

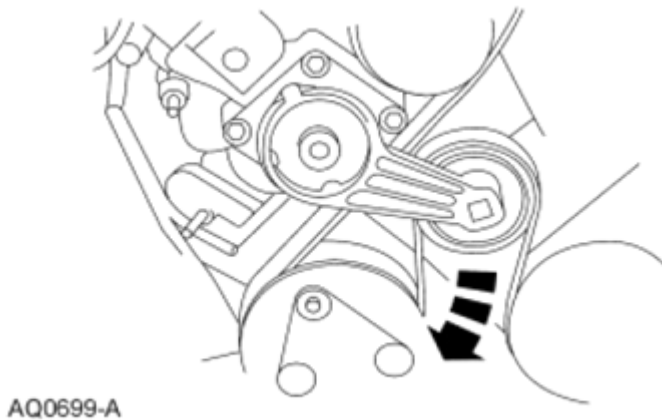


Fig. 41: Rotating Tensioner Clockwise To Drive Belt
Courtesy of FORD MOTOR CO.

CRANKSHAFT FRONT SEAL

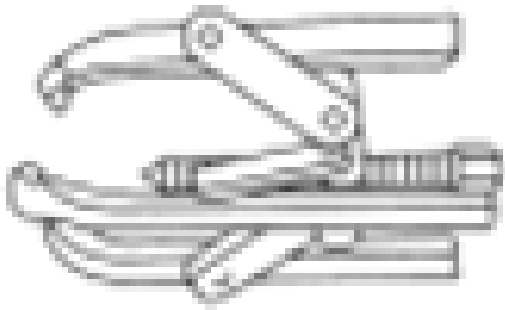
Special Tool(s)

SPECIAL TOOLS CHART

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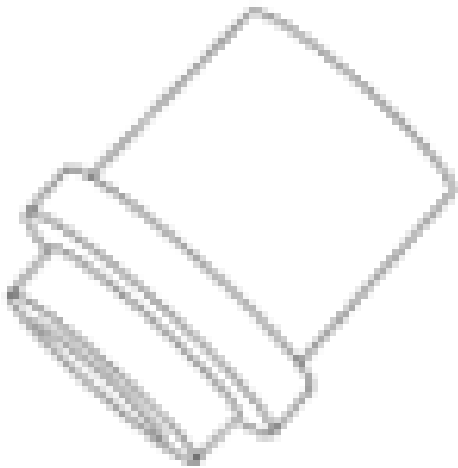
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



3 Jaw Puller 303-D121 or equivalent

ST1184-A



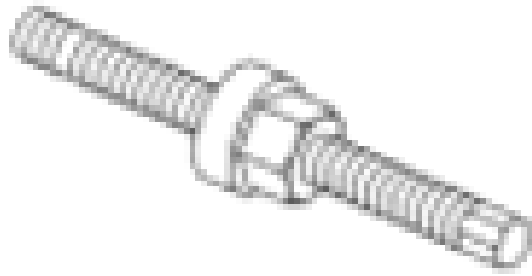
Installer, Crankshaft Front Oil Seal 303-635

ST2197-A

Installer, Crankshaft Vibration Damper 303-102

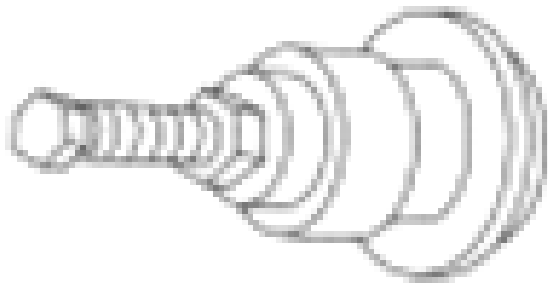
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1287-A

(T74P-6316-B)



ST1328-A

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

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

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

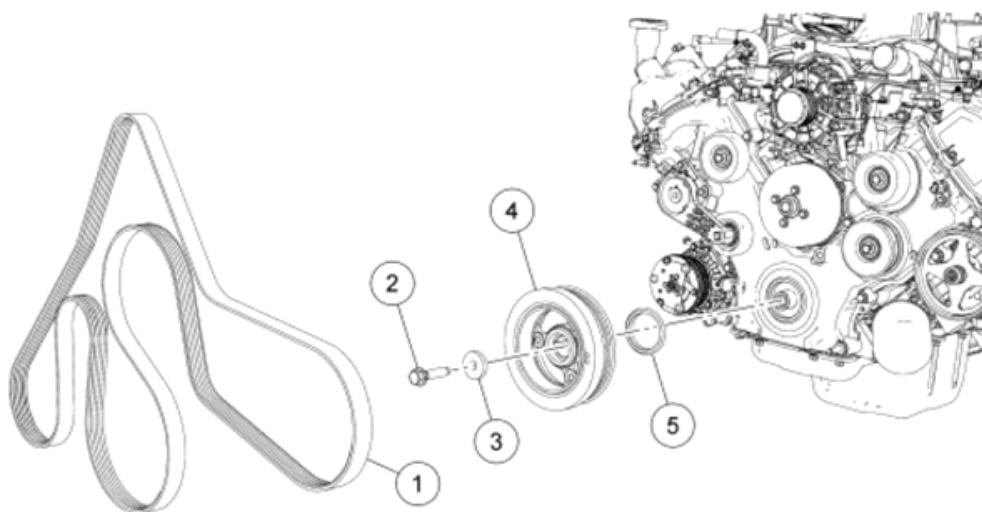


ST1288-A

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-



N0006661

Fig. 42: Locating Crankshaft Front Seal Components

Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	8620	Accessory drive belt
2	W701512	Crankshaft pulley bolt
3	N806165	Crankshaft pulley bolt washer
4	6316	Crankshaft pulley
5	6700	Crankshaft front seal

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Rotate the tensioner clockwise and remove the accessory drive belt from the crankshaft pulley.

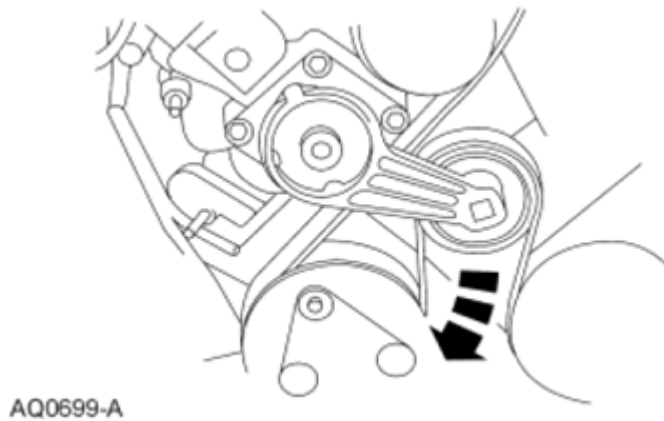


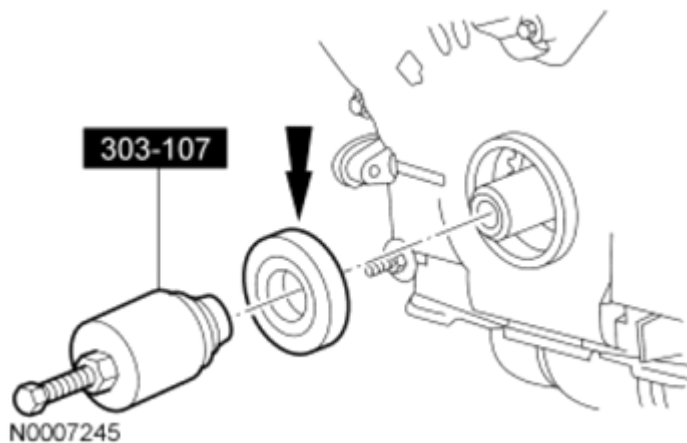
Fig. 43: Rotating Tensioner Clockwise To Drive Belt

Courtesy of FORD MOTOR CO.

3. Remove the crankshaft pulley bolt and washer.
 - Discard the crankshaft pulley bolt.
4. Using the 3 Jaw Puller, remove the crankshaft pulley.

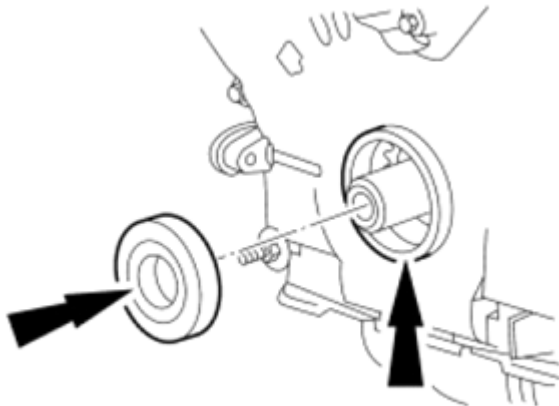


5. Using the Crankshaft Front Oil Seal Remover, remove and discard the crankshaft seal.



Installation

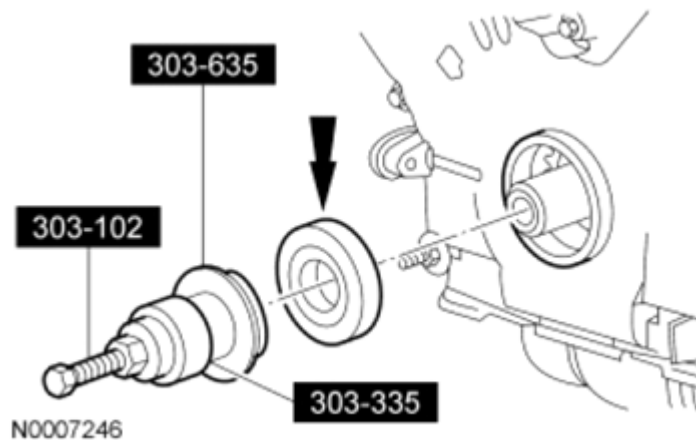
1. Lubricate the engine front cover and the new crankshaft seal inner lip with clean engine oil.



A0029187

Fig. 46: Lubricating Engine Front Cover And Crankshaft Seal Inner Lip With Clean Engine Oil
Courtesy of FORD MOTOR CO.

2. Using the Crankshaft Front Oil Seal Installer, the Crankshaft Vibration Damper Installer and the Front Cover Oil Seal Installer, install the new crankshaft front seal into the engine front cover.



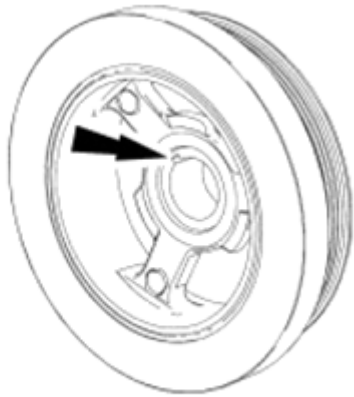
N0007246

Fig. 47: Installing Crankshaft Front Seal Into Engine Front Cover
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.

- 3.

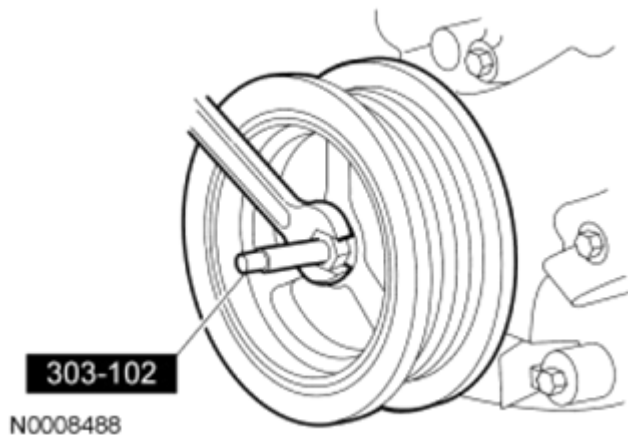
Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.



N0010530

Fig. 48: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

4. Using the Crankshaft Vibration Damper Installer, install the crankshaft pulley.



N0008488

Fig. 49: Installing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

5. Using a new crankshaft pulley bolt, install the bolt and washer and tighten the bolt in 4 stages.
- Stage 1: Tighten to 90 Nm (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

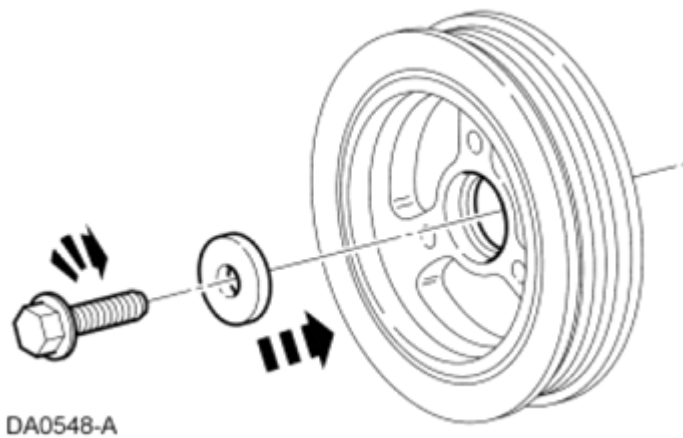


Fig. 50: Installing Crankshaft Pulley Bolt & Washer
Courtesy of FORD MOTOR CO.

6. Rotate the tensioner clockwise and install the accessory drive belt onto the crankshaft pulley.

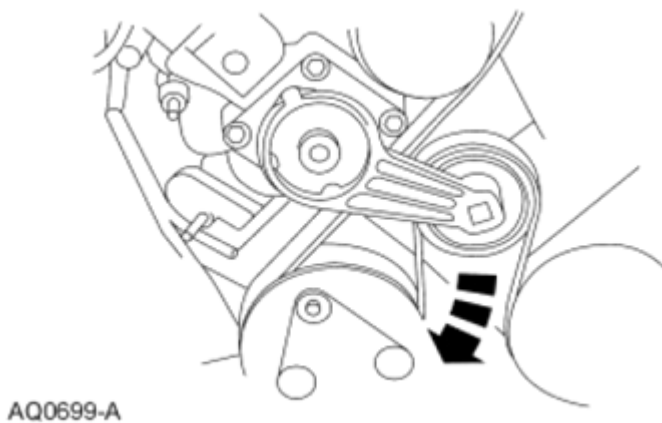


Fig. 51: Rotating Tensioner Clockwise To Drive Belt
Courtesy of FORD MOTOR CO.

ENGINE FRONT COVER

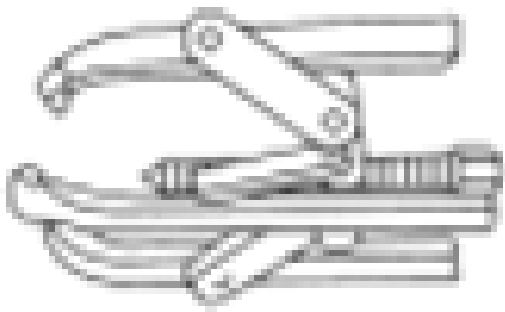
Special Tool(s)

SPECIAL TOOLS CHART

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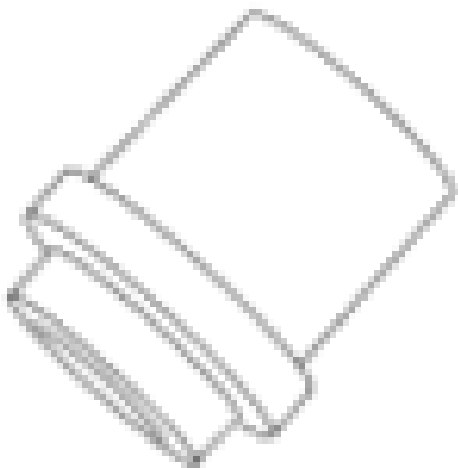
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



3 Jaw Puller 303-D121 or equivalent

ST1184-A

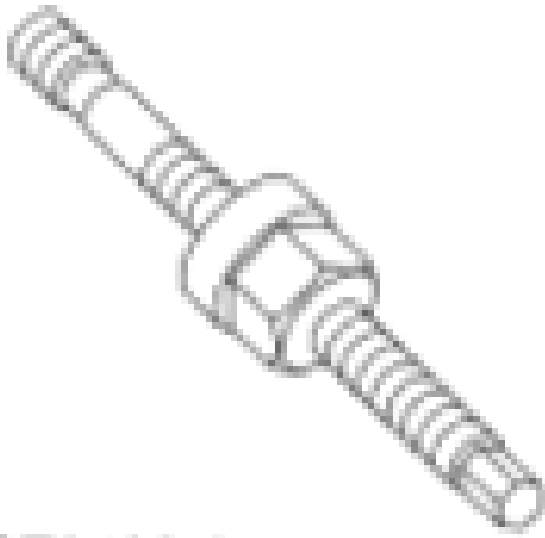


Installer, Crankshaft Front Oil Seal 303-635

ST2197-A

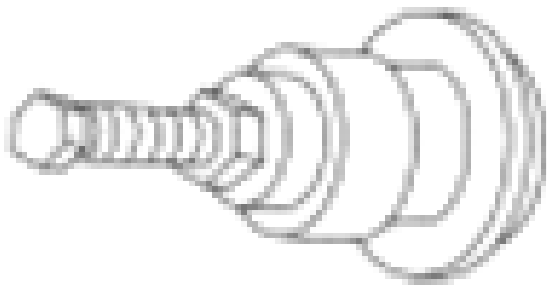
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2428-A

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



ST1328-A

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

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

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1288-A



ST2834-A

Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

	A4
Motorcraft® Silicone Gasket Remover ZC-30	-

Front End Accessory Drive (FEAD), LH and RH Camshaft Position (CMP) Sensors Electrical Connectors

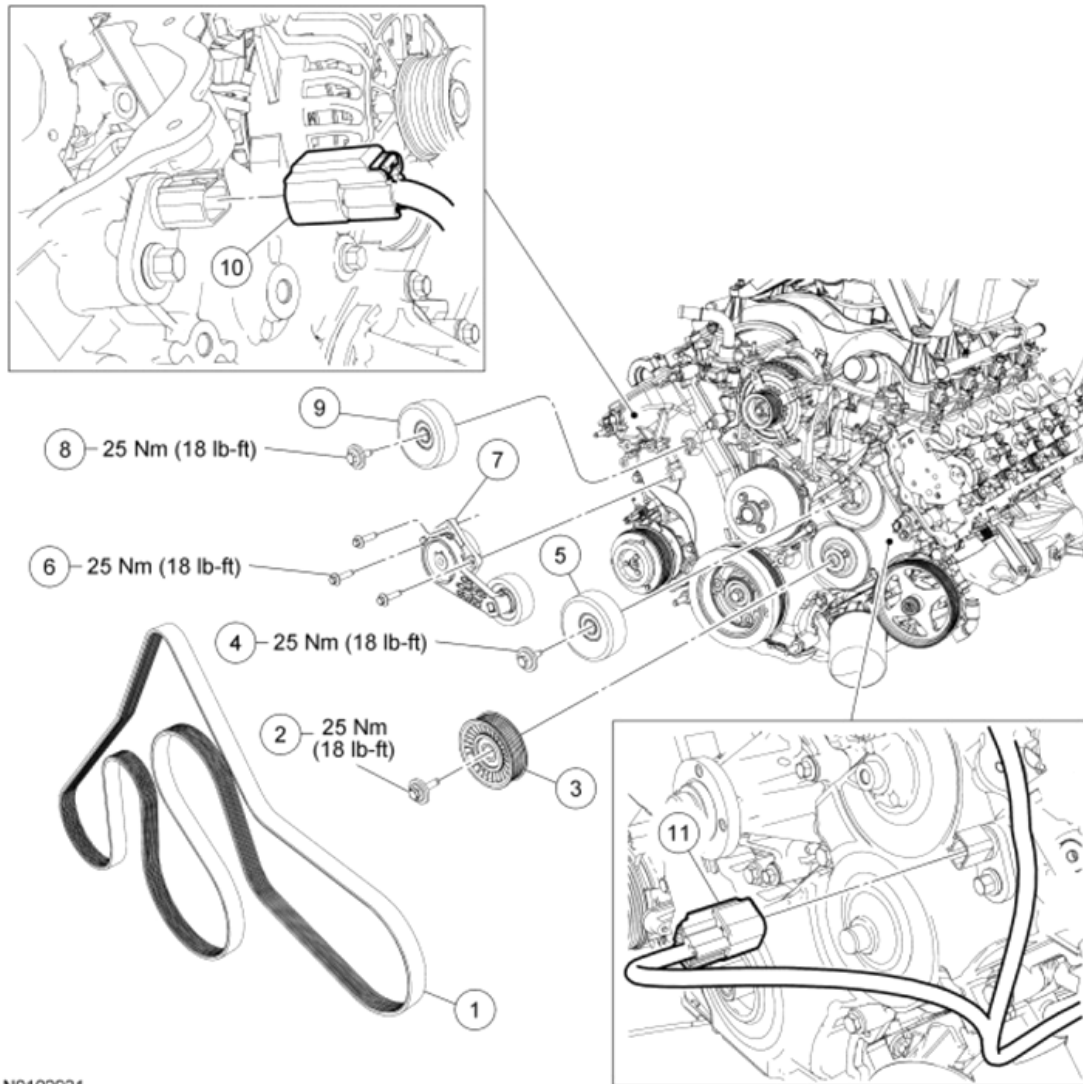


Fig. 52: Exploded View Of FEAD, LH And RH Camshaft Position (CMP) Sensors Electrical Connectors With Torque Specifications
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

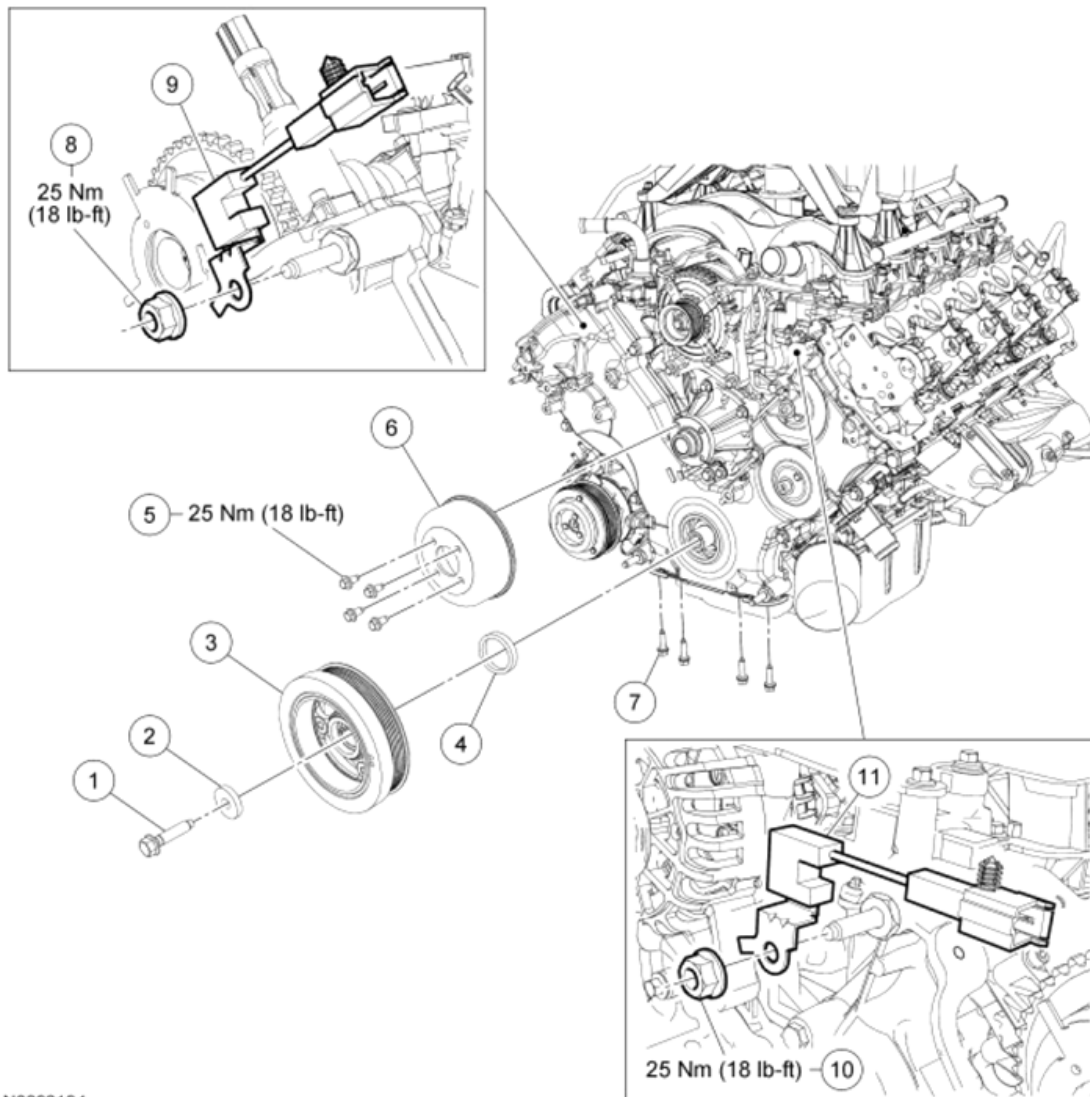
Item	Part Number	Description
1	8620	Accessory drive belt
2	N808102	Accessory drive belt idler pulley bolt
3	6C348	Accessory drive belt idler pulley
4	N808102	Accessory drive belt idler pulley bolt

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2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

5	8678	Accessory drive belt idler pulley
6	N808920	Accessory drive belt tensioner bolt (3 required)
7	6B209	Accessory drive belt tensioner
8	N808102	Accessory drive belt idler pulley bolt
9	8678	Accessory drive belt idler pulley
10	-	RH Camshaft Position (CMP) sensor electrical connector (part of 19D930)
11	-	LH CMP sensor electrical connector (part of 19D930)

Radio Ignition Interference Capacitors, Coolant Pump Pulley, Crankshaft Pulley and Front Oil Pan Bolts



N0092194

Fig. 53: Locating Radio Ignition Interference Capacitors, Coolant Pump Pulley, Crankshaft Pulley And Front Oil Pan Bolts With Torque Specifications

Courtesy of FORD MOTOR CO.

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6A340	Crankshaft pulley bolt
2	6378	Crankshaft pulley bolt washer
3	6312	Crankshaft pulley
4	6700	Crankshaft front seal
5	N806282	Coolant pump pulley bolt (4 required)
6	8A528	Coolant pump pulley
7	W701605	Oil pan bolt (4 required)
8	W500110	RH radio ignition interference capacitor bolt
9	18801	RH radio ignition interference capacitor
10	W500110	LH radio ignition interference capacitor bolt
11	18801	LH radio ignition interference capacitor

Engine Front Cover, Gaskets and Crankshaft Position (CKP) Sensor Electrical Connector

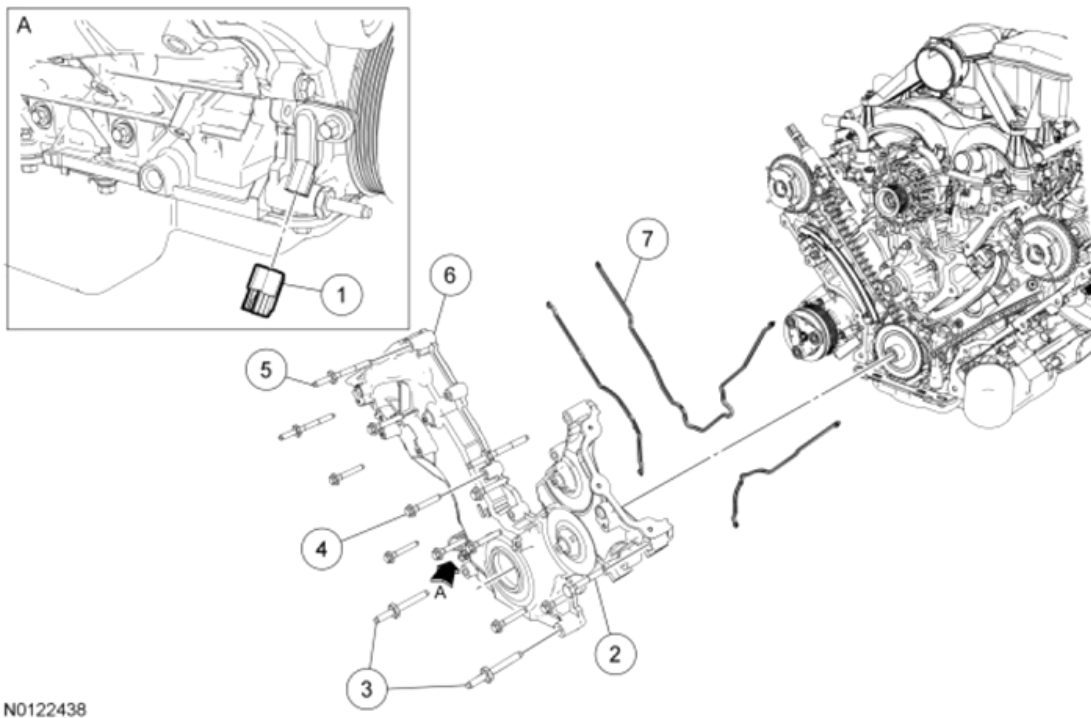


Fig. 54: Exploded View Of Engine Front Cover, Gaskets And Crankshaft Position (CKP) Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	-	Crankshaft Position (CKP) sensor electrical connector (part of 9D930)
2	W706605	Engine front cover bolt

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

3	N808529	Engine front cover studs (2 required)
4	N806177	Engine front cover bolt (9 required)
5	W709573	Engine front cover stud (3 required)
6	6019	Engine front cover
7	6020	Engine front cover gasket (3 required)

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the RH valve cover. For additional information, refer to **VALVE COVER - RH** in this information.
3. Remove the LH valve cover. For additional information, refer to **VALVE COVER - LH** in this information.
4. Loosen the 4 coolant pump pulley bolts.
5. Rotate the tensioner clockwise and remove the accessory drive belt.

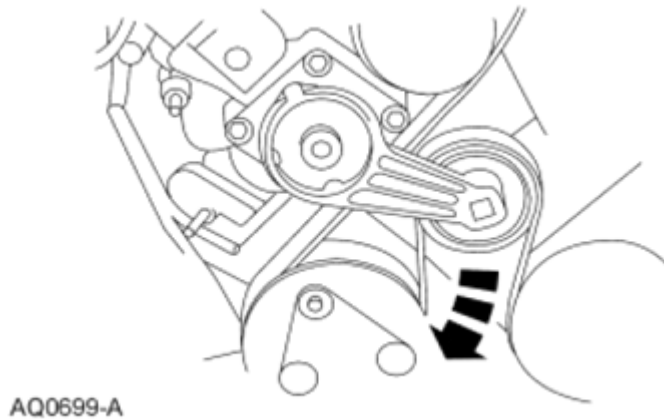


Fig. 55: Rotating Tensioner Clockwise To Drive Belt
Courtesy of FORD MOTOR CO.

6. Remove the 4 bolts and the coolant pump pulley.
7. Drain the engine oil.
8. Remove the bolt and position the starter wiring harness and starter wiring harness rear support bracket aside.

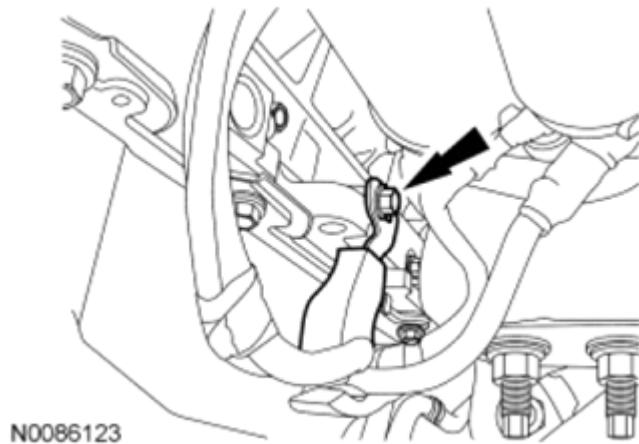


Fig. 56: Locating Starter Wiring Harness Rear Support Bracket And Bolt
Courtesy of FORD MOTOR CO.

9. Remove the nut and position aside the transmission cooler tube support bracket and the starter wiring harness support bracket.

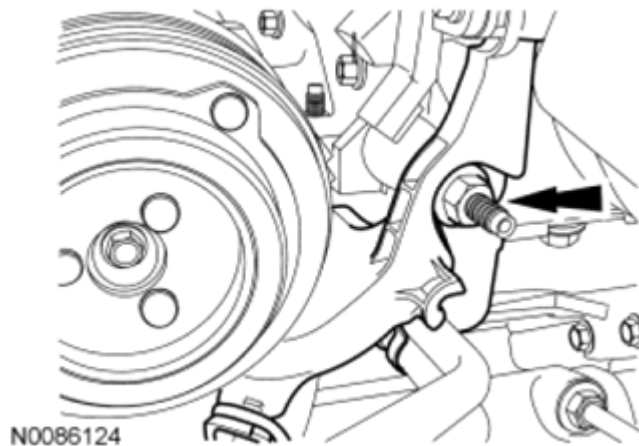


Fig. 57: Locating Transmission Cooler Tube Support Bracket And Nut
Courtesy of FORD MOTOR CO.

10. Disconnect the Crankshaft Position (CKP) sensor electrical connector.
11. Remove the nut and position aside the Power Steering Pressure (PSP) hose support bracket.

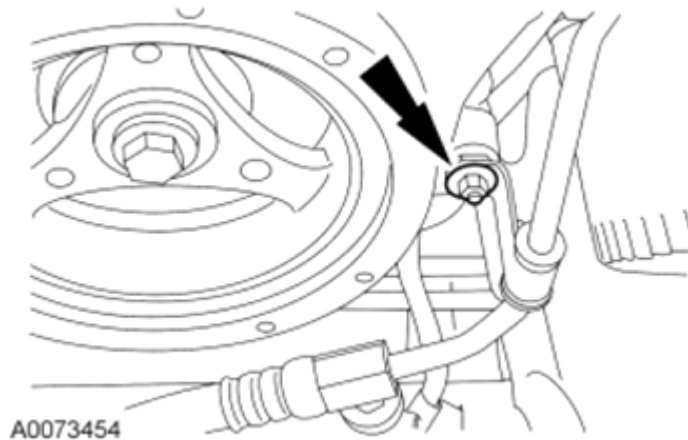


Fig. 58: Locating Power Steering Pressure Tube Support Bracket
Courtesy of FORD MOTOR CO.

12. Remove the crankshaft pulley bolt and washer.
 - Discard the crankshaft pulley bolt.
13. Remove and discard the crankshaft pulley bolt. Using the 3 Jaw Puller, remove the crankshaft pulley.



N0010528

Fig. 59: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

14. Using the Crankshaft Front Oil Seal Remover, remove and discard the crankshaft front seal.

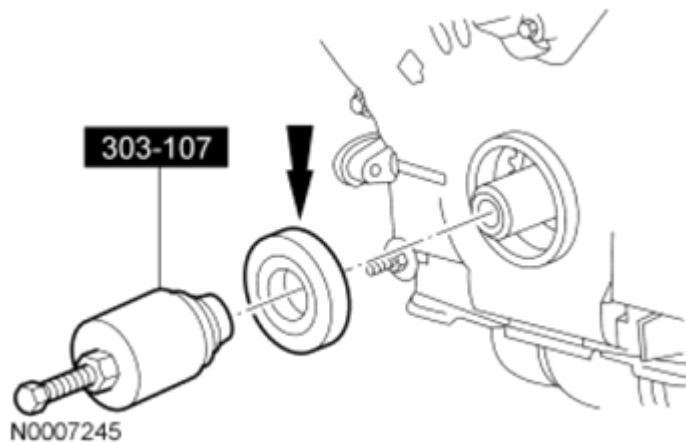


Fig. 60: Removing Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

15. Remove the 3 bolts and the 3 accessory drive idler pulleys.
16. Remove the 3 bolts and the accessory drive belt tensioner.
17. If equipped, remove the 4 bolts and the skid plate.
18. Remove the 4 front oil pan bolts.
19. Disconnect the wiring harness retainer from the power steering pump stud bolt.

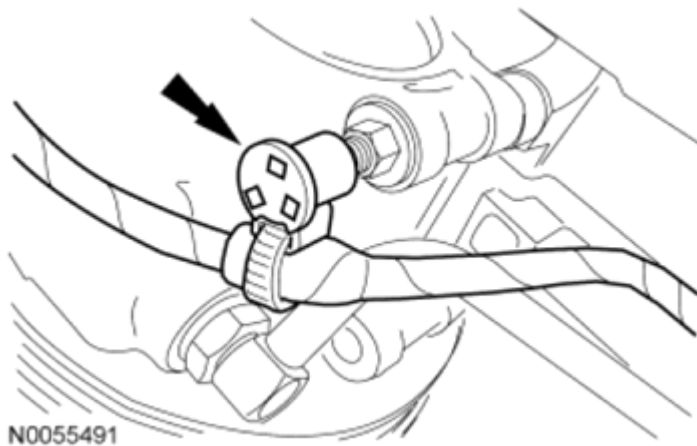


Fig. 61: Locating Engine Wiring Harness And Power Steering Pump Stud Bolt
Courtesy of FORD MOTOR CO.

20. Remove the stud bolt, the 2 bolts, and position aside the power steering pump.



Fig. 62: Locating Power Steering Pump And Bolts
Courtesy of FORD MOTOR CO.

21. Disconnect the RH Camshaft Position (CMP) sensor electrical connector.
22. Remove the nut and position the RH radio ignition interference capacitor aside.
23. Disconnect the LH CMP sensor electrical connector.
24. Remove the nut and position the LH radio ignition interference capacitor aside.
25. Remove the 10 bolts and the 5 studs.

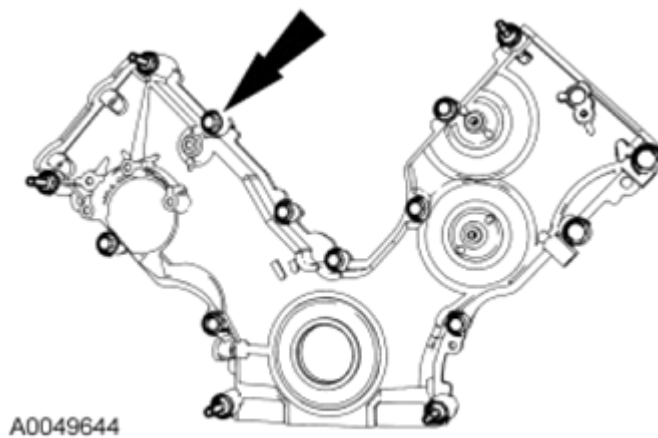


Fig. 63: Locating Front Cover Fasteners
Courtesy of FORD MOTOR CO.

26. Remove the engine front cover from the front cover-to-cylinder block dowel.
 - Remove the engine front cover gaskets.

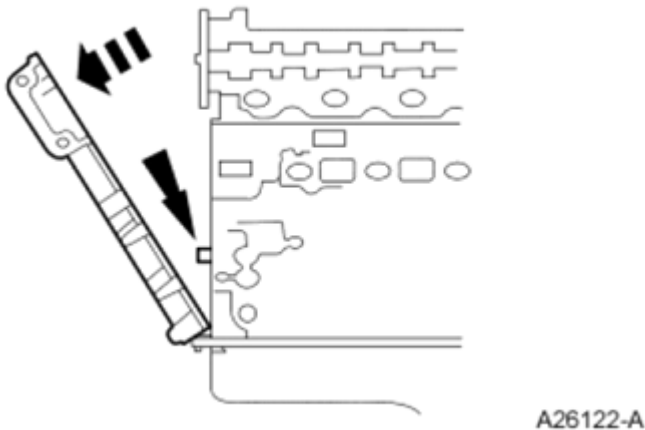


Fig. 64: Removing Engine Front Cover Gaskets
Courtesy of FORD MOTOR CO.

NOTE: 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.

27.

Clean the mating surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

- Inspect the mating surfaces.

Installation

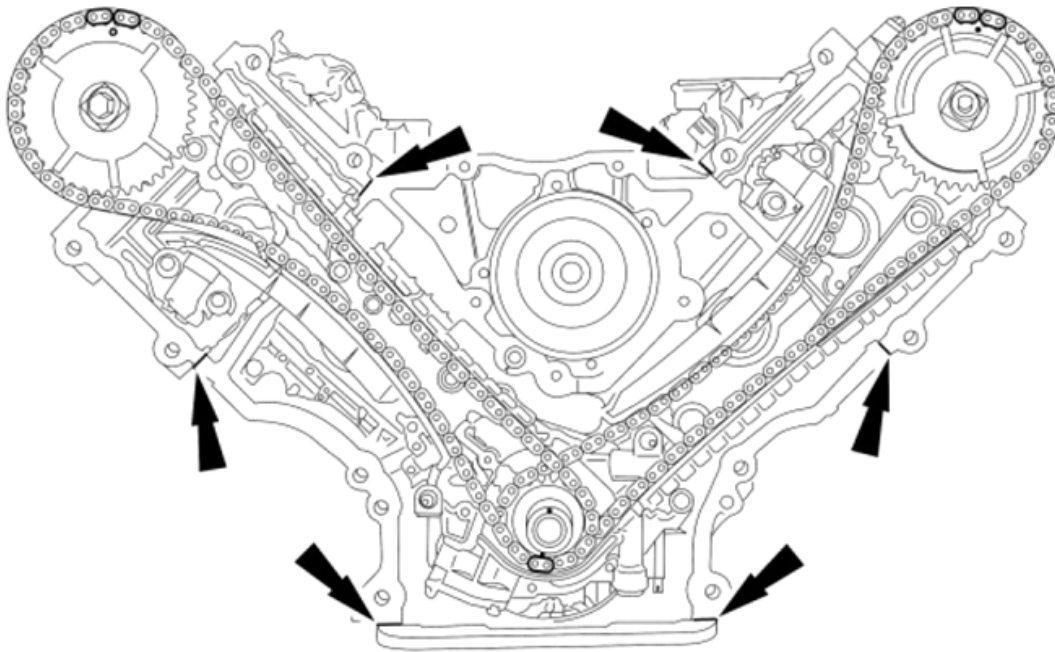
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

1.

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. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. 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.

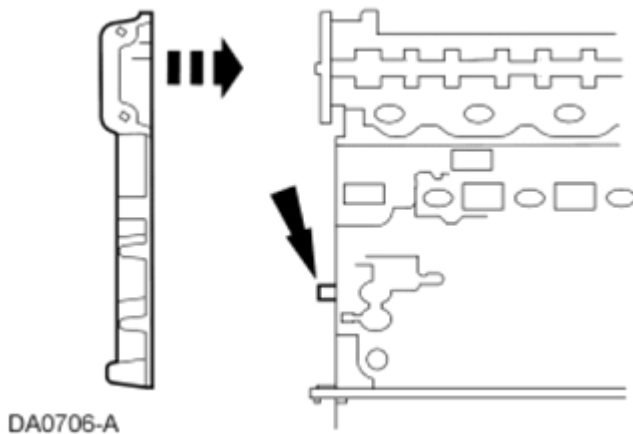
Apply a bead of silicone gasket and sealant along the cylinder head-to-cylinder block surface and the oil pan-to-cylinder block surface, at the locations shown in the illustration.



A0080776

Fig. 65: Locating Silicone Sealant Application Areas
Courtesy of FORD MOTOR CO.

2. Install a new engine front cover gasket on the engine front cover. Position the engine front cover onto the dowels. Install the fasteners finger-tight.



DA0706-A

Fig. 66: Installing Engine Front Cover
Courtesy of FORD MOTOR CO.

3. Tighten the 15 engine front cover fasteners in the sequence shown in the illustration in 2 stages.

Stage 1: Tighten fasteners 1 through 15 to 25 Nm (18 lb-ft).

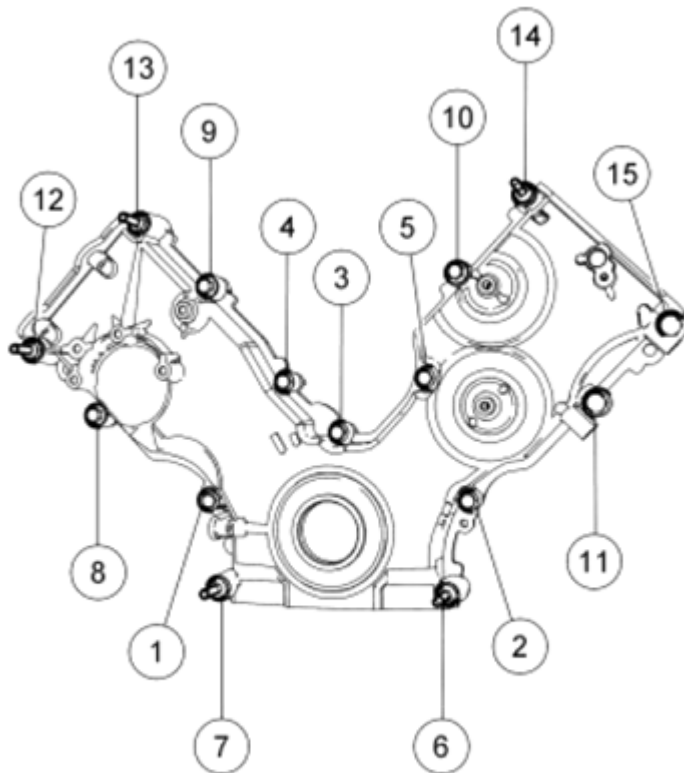
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

Stage 2: Tighten fasteners 6 and 7 to 48 Nm (35 lb-ft).

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
2	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
3	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
4	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
5	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
6	N808529	Stud, Hex Head Pilot, M10 x 1.5 x 1.5 x 103
7	N808529	Stud, Hex Head Pilot, M10 x 1.5 x 1.5 x 103
8	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
9	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
10	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
11	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
12	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
13	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
14	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
15	W706605	Bolt, Hex Head Pilot, M8 x 1.25 x 56



N0010206

Fig. 67: Identifying Engine Front Cover Fastener Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Loosely install the 4 oil pan bolts, then tighten in 2 stages, in the sequence shown in the illustration.
 - Stage 1: Tighten to 20 Nm (177 lb-in).
 - Stage 2: Tighten an additional 60 degrees.

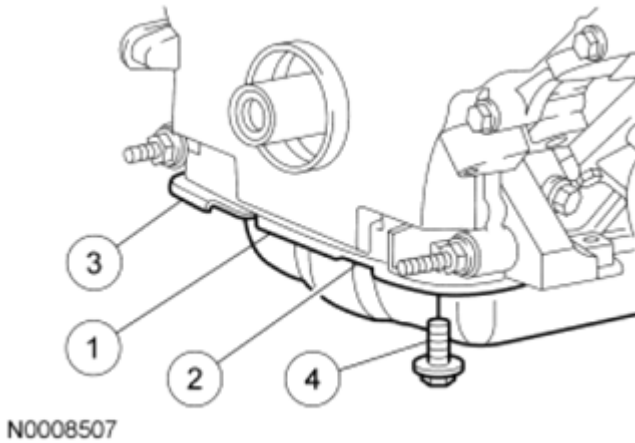


Fig. 68: Identifying Front Oil Pan/Cover Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

5. Connect the **CKP** sensor electrical connector.
6. Position the starter wiring harness support bracket and the transmission cooler tube support bracket and tighten the nut.
 - Tighten to 10 Nm (89 lb-in).

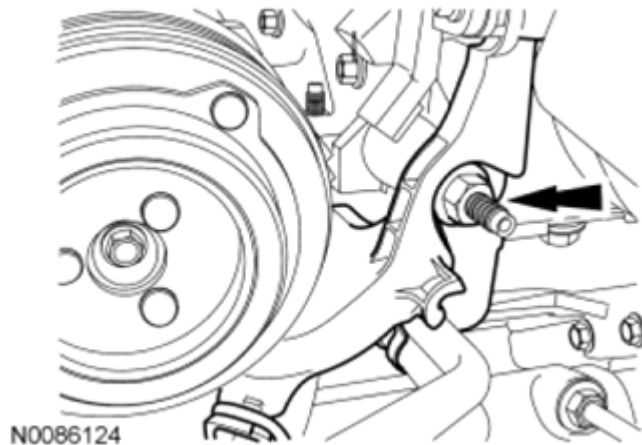


Fig. 69: Locating Transmission Cooler Tube Support Bracket And Nut
Courtesy of FORD MOTOR CO.

7. Position the starter wiring harness and starter wiring harness rear support bracket and install the bolt.

- Tighten to 10 Nm (89 lb-in).

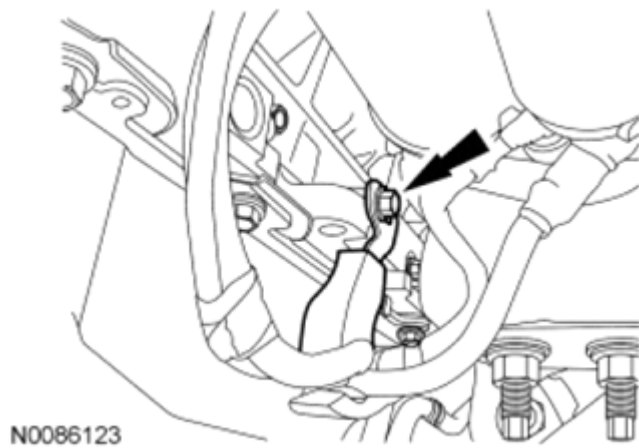


Fig. 70: Locating Starter Wiring Harness Rear Support Bracket And Bolt
Courtesy of FORD MOTOR CO.

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

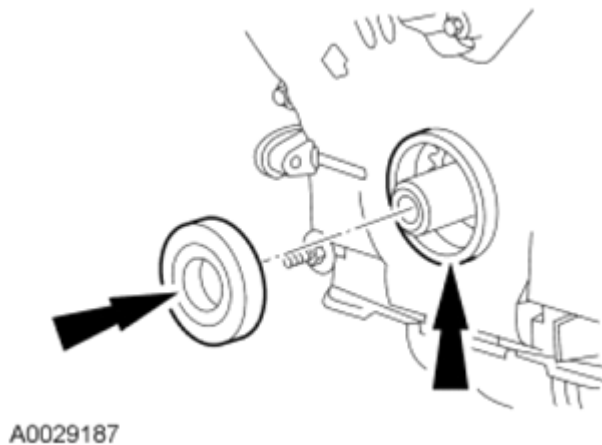


Fig. 71: Locating Engine Front Cover And Crankshaft Seal Inner Lip With Engine Oil
Courtesy of FORD MOTOR CO.

9. Using the Crankshaft Vibration Damper Installer, Front Cover Oil Seal Installer and the Crankshaft Front Oil Seal Installer, install a new crankshaft front seal into the engine front cover.

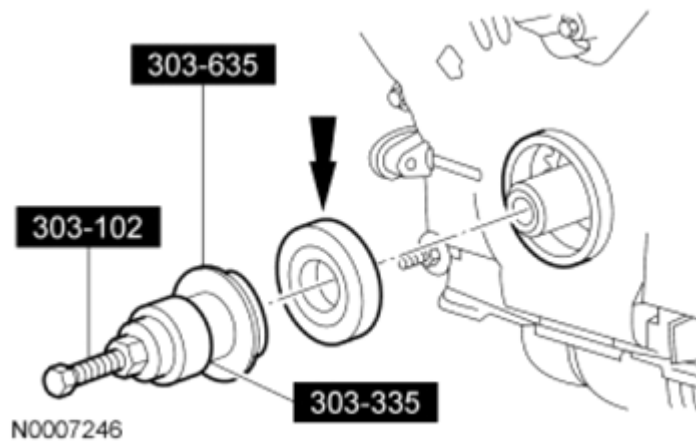


Fig. 72: Installing Crankshaft Front Seal Into Engine Front Cover Using Special Tools
Courtesy of FORD MOTOR CO.

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.

10.

Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.

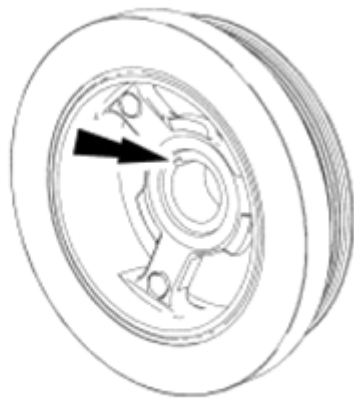


Fig. 73: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

11. Use the Crankshaft Vibration Damper Installer to install the crankshaft pulley.

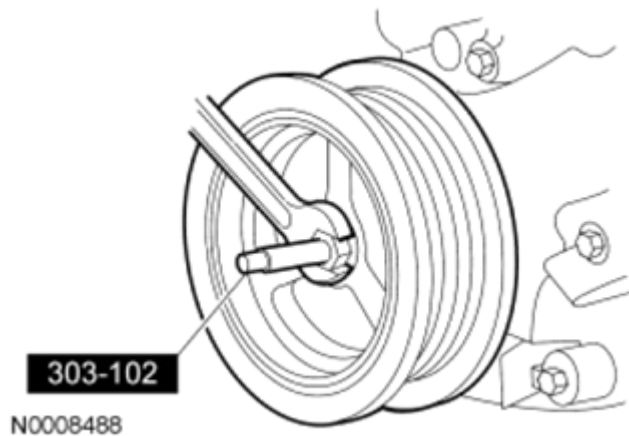


Fig. 74: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

12. Tighten the new crankshaft pulley bolt in 4 stages.
 - Stage 1: Tighten to 90 Nm (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

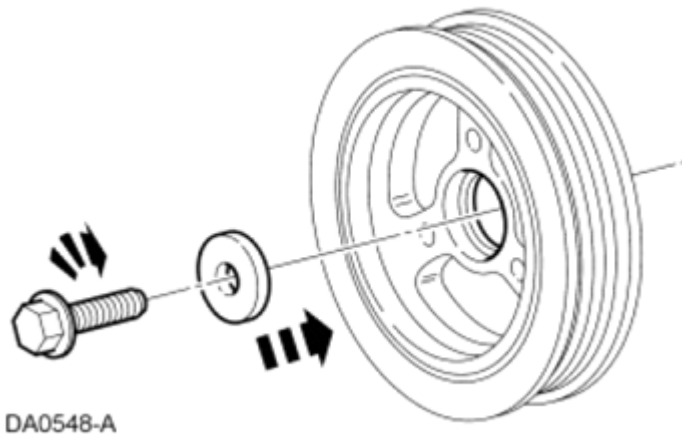


Fig. 75: View Of Crankshaft Pulley Bolt & Washer
Courtesy of FORD MOTOR CO.

13. Install the accessory drive belt tensioner and the 3 bolts.
 - Tighten to 25 Nm (18 lb-ft).
14. Install the 3 accessory drive idler pulleys and the 3 bolts.
 - Tighten to 25 Nm (18 lb-ft).
15. Position the coolant pump pulley and install the 4 bolts finger-tight.
16. If equipped, install the skid plate and the 4 bolts.

- Tighten to 48 Nm (35 lb-ft).
17. Position the power steering pump and install the stud bolt and the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).

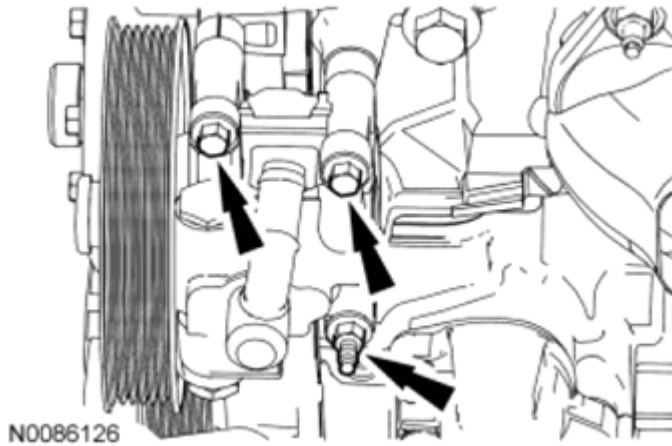


Fig. 76: Locating Power Steering Pump And Bolts
Courtesy of FORD MOTOR CO.

18. Attach the engine wiring harness to the power steering pump stud bolt.

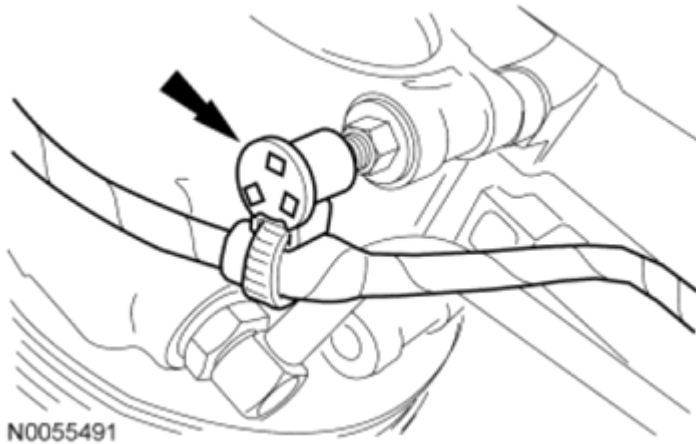


Fig. 77: Locating Engine Wiring Harness And Power Steering Pump Stud Bolt
Courtesy of FORD MOTOR CO.

19. Position the PSP hose support bracket and install the nut.
- Tighten to 10 Nm (89 lb-in).

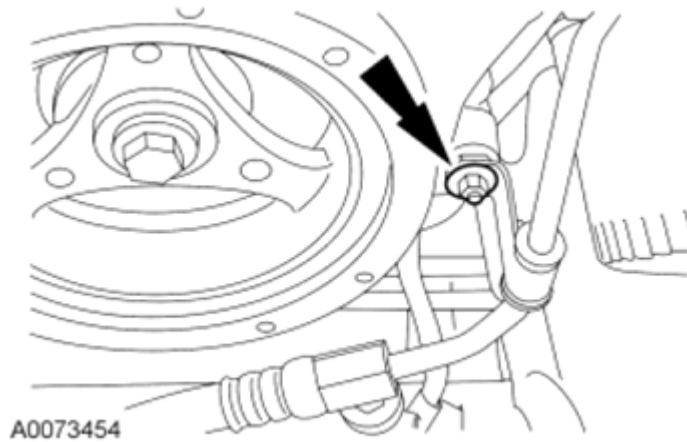


Fig. 78: Locating Power Steering Pressure Tube Support Bracket Nut
Courtesy of FORD MOTOR CO.

20. Connect the RH **CMP** sensor electrical connector.
21. Install the LH radio ignition interference capacitor and the nut.
 - Tighten to 25 Nm (18 lb-ft).
22. Connect the LH **CMP** sensor electrical connector.
23. Install the RH radio ignition interference capacitor and the nut.
 - Tighten to 25 Nm (18 lb-ft).
24. Rotate the tensioner clockwise and install the accessory drive belt.

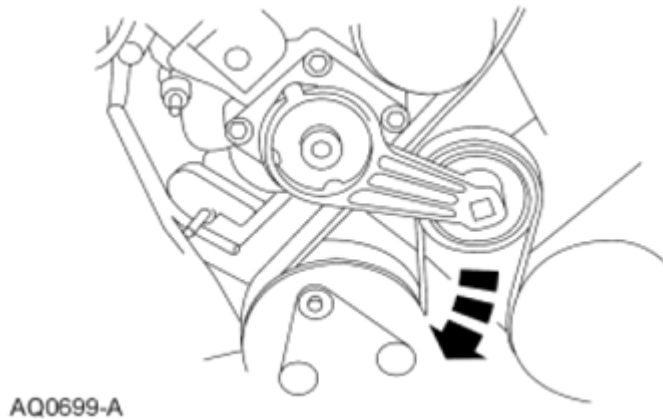


Fig. 79: Rotating Tensioner Clockwise To Drive Belt
Courtesy of FORD MOTOR CO.

25. Tighten the 4 coolant pump pulley bolts.
 - Tighten to 25 Nm (18 lb-ft).
26. Install the LH valve cover. For additional information, refer to **VALVE COVER - LH** in this information.

2011 Ford Expedition

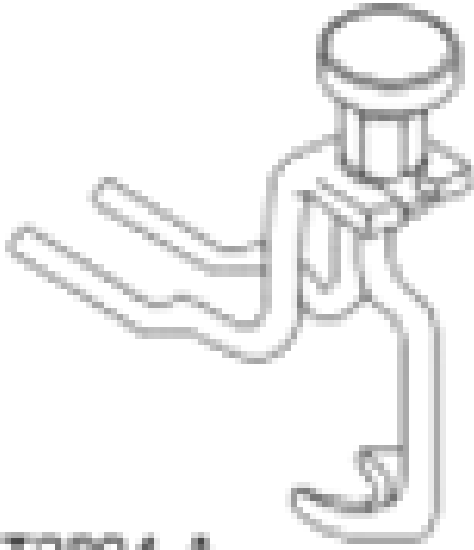
2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

27. Install the RH valve cover. For additional information, refer to **VALVE COVER - RH** in this information.
28. Fill the crankcase with clean engine oil.
29. Using the scan tool, perform the Misfire Monitor Neutral Profile Correction procedure, following the onscreen instructions.

TIMING DRIVE COMPONENTS

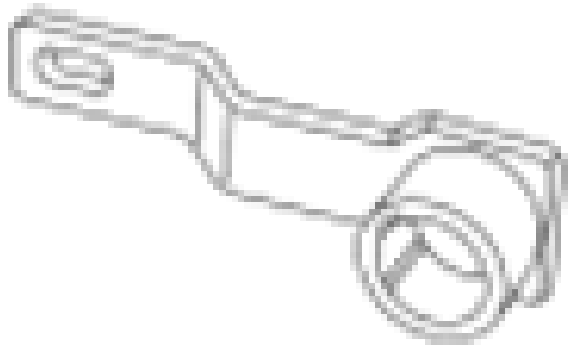
Special Tool(s)

SPECIAL TOOLS CHART

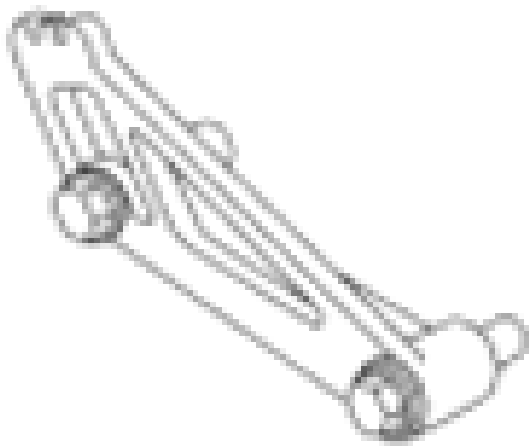
 <p>ST2604-A</p>	<p>Compressor, Valve Spring 303-1039</p>
	<p>Holding Tool, Crankshaft 303-448 (T93P-6303-A)</p>

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1335-A



ST2807-A

Locking Tool, Cam Phaser 303-1046

General Equipment

GENERAL EQUIPMENT CHART

Hydraulic Chain Tensioner Retaining Clip 1L3Z-6P250-AA

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12	WSS-M2C945-A

(Canada)

Removal

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

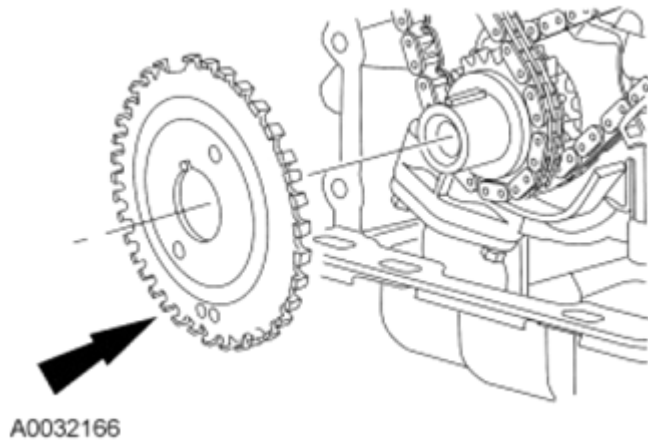


Fig. 80: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

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

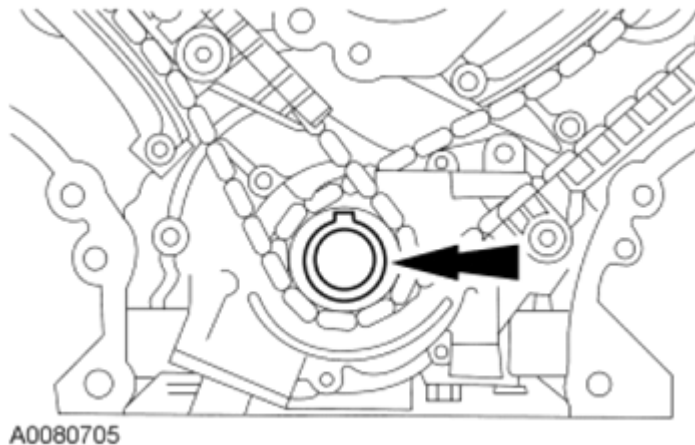


Fig. 81: Positioning Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

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

4.

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.

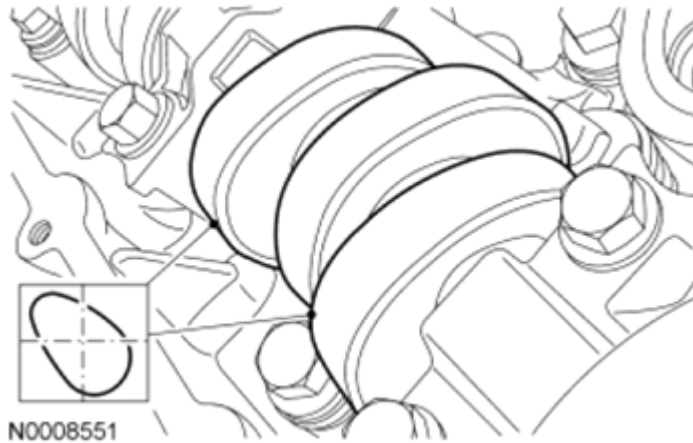
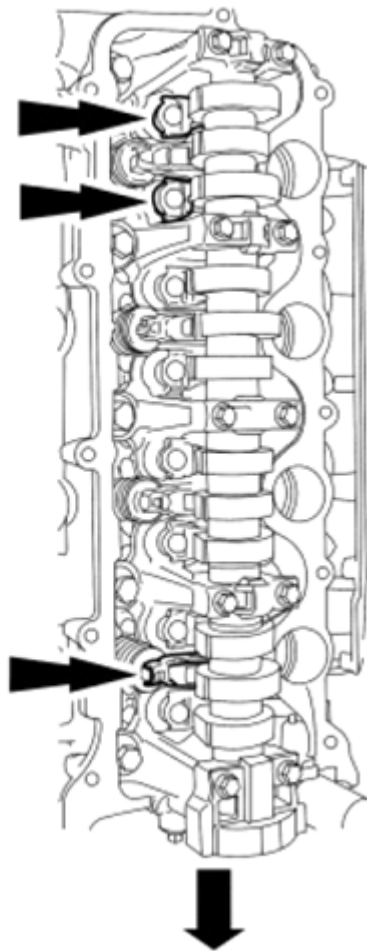


Fig. 82: Identifying Intake Camshaft Lobes And Exhaust Lobe On No. 1 Cylinder
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

5.

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



A0083248

Fig. 83: Locating RH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

6.

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

Using the Valve Spring Compressor, remove the 3 designated camshaft roller followers in the previous step from the RH cylinder head.

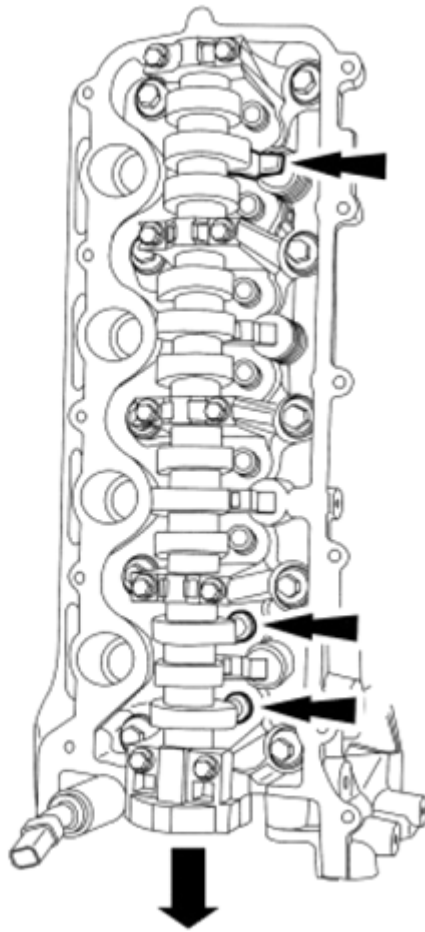


Fig. 84: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

7.

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



A0084479

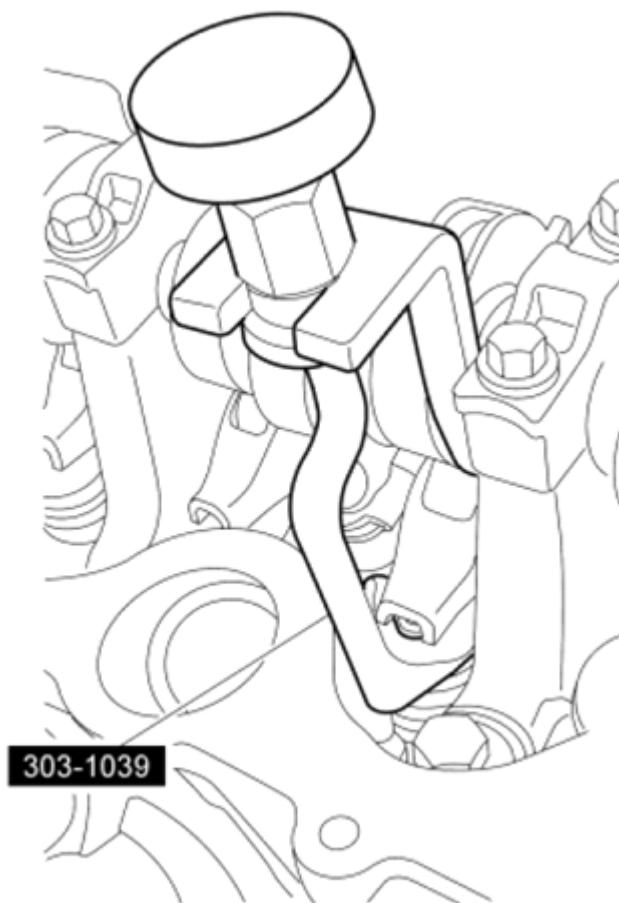
Fig. 85: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

8.

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

Using the Valve Spring Compressor, remove the 3 designated camshaft roller followers in the previous step from the LH cylinder head.



N0010191

Fig. 86: Using Valve Spring Compressor (303-1039) On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

- NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set or engine damage may occur.
- 9.

Rotate the crankshaft clockwise and position the crankshaft keyway at the 6 o'clock position.

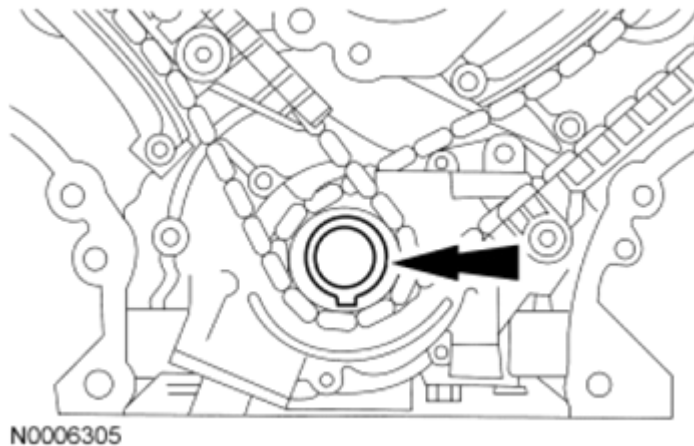


Fig. 87: Locating Crankshaft Keyway
Courtesy of FORD MOTOR CO.

NOTE: If one or both tensioner mounting bolts are loosened or removed, the tensioner-sealing bead must be inspected for seal integrity. If cracks, tears, separation from the tensioner body or permanent compression of the seal bead is observed, install a new tensioner or engine damage may occur.

10.

Remove the 2 bolts, the LH timing chain tensioner and tensioner arm.

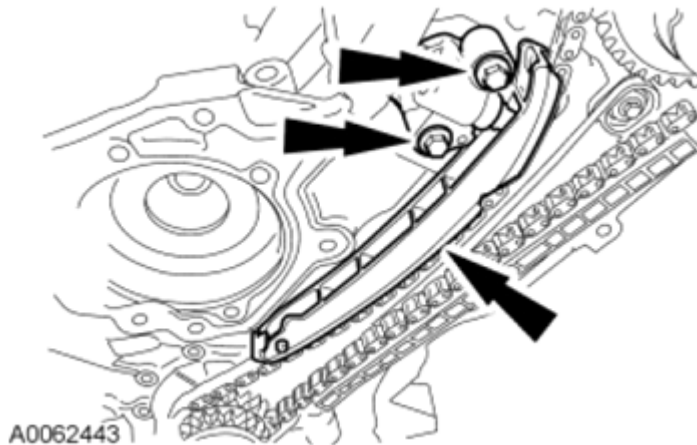


Fig. 88: Locating LH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

NOTE: If one or both tensioner mounting bolts are loosened or removed, the tensioner-sealing bead must be inspected for seal integrity. If cracks, tears, separation from the tensioner body or permanent compression of the seal bead is observed, install a new tensioner or engine damage may occur.

11.

11. occur.

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

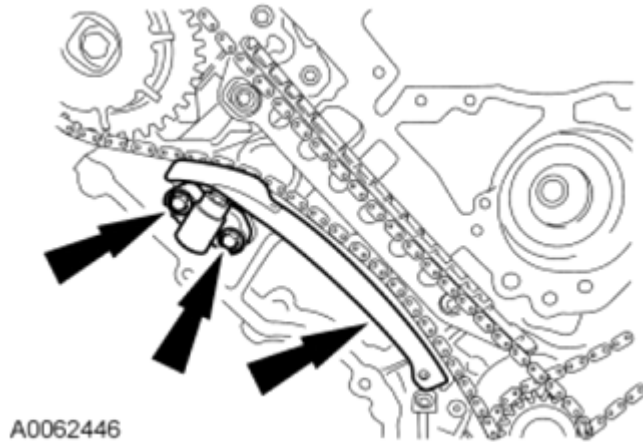


Fig. 89: Locating RH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

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.

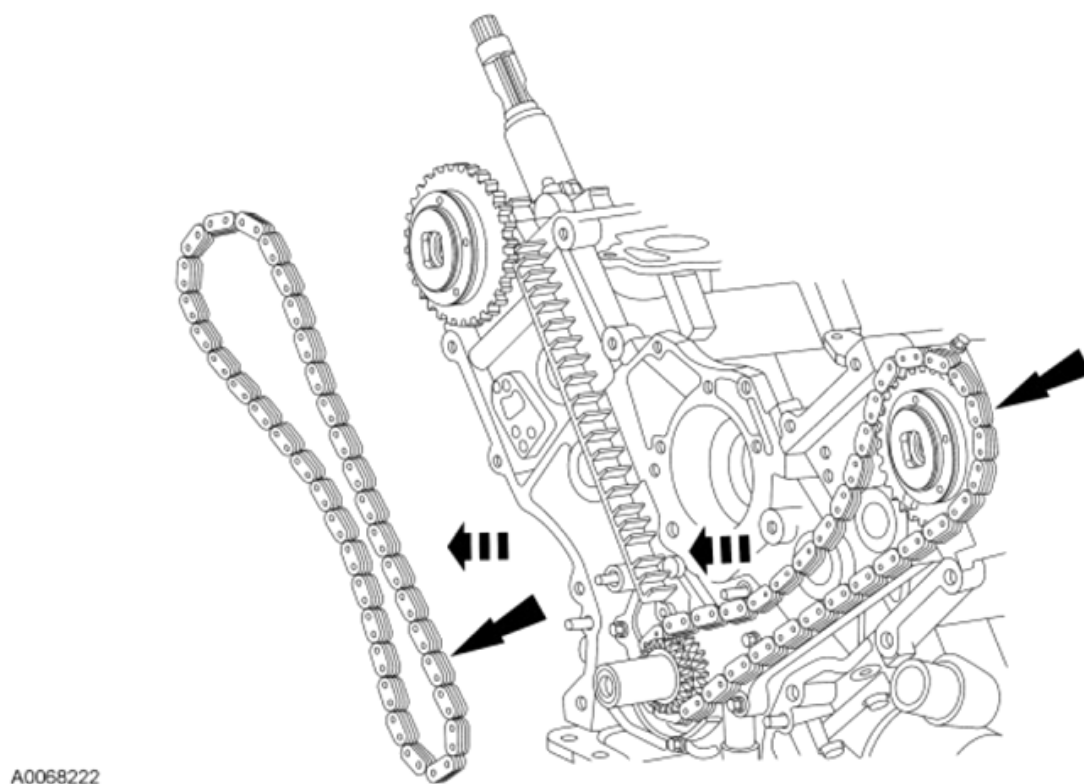


Fig. 90: Locating Timing Chains And Crankshaft Sprocket (RH And LH)
Courtesy of FORD MOTOR CO.

13. **NOTE:** RH shown in the illustration, LH similar.

Remove the LH and RH timing chain guides.

- Remove the 4 bolts.
- Remove both timing chain guides.

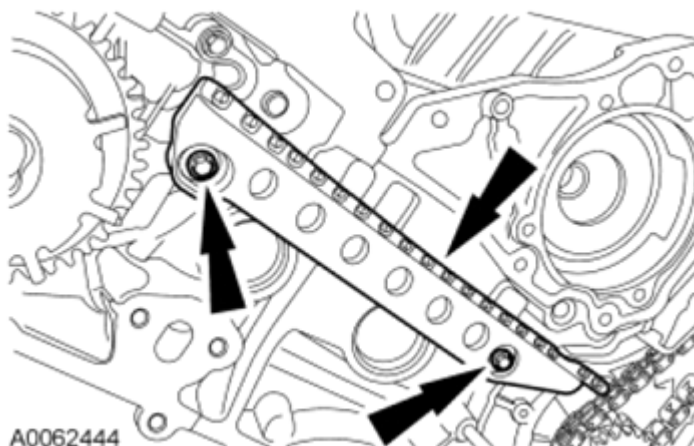


Fig. 91: Locating Timing Chain Guide And Bolts

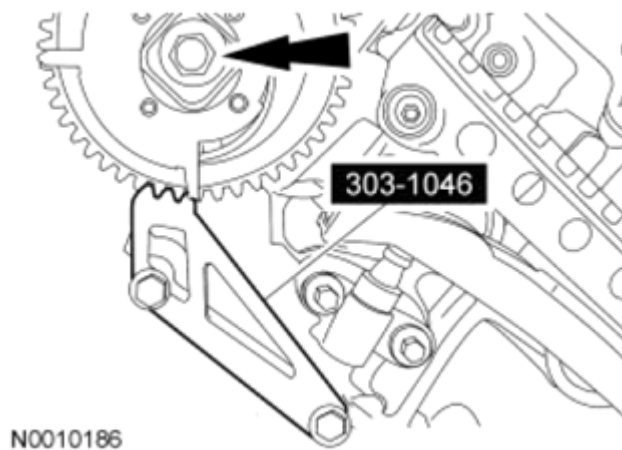
Courtesy of FORD MOTOR CO.

14. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Using the Cam Phaser Locking Tool, remove the bolt and the RH camshaft phase and sprocket assembly.

- Discard the camshaft phase and sprocket bolt.

**Fig. 92: Locating Camshaft Phaser Sprocket Bolt**

Courtesy of FORD MOTOR CO.

15. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Using the Cam Phaser Locking Tool, remove the bolt and the LH camshaft phase and sprocket assembly.

- Discard the camshaft phase and sprocket bolt.

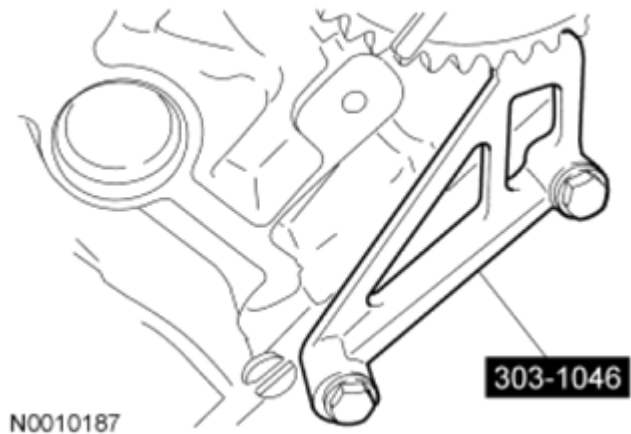
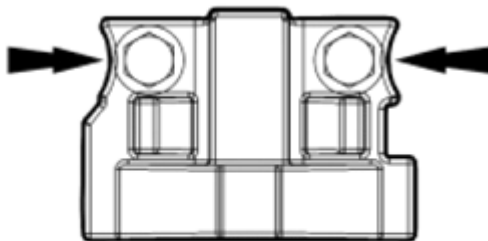


Fig. 93: View Of Cam Phaser Locking Tool
Courtesy of FORD MOTOR CO.

16. **NOTE:** Remove the front thrust camshaft bearing cap straight upward from the bearing towers or the bearing cap may be damaged from side loading.

Remove the 2 bolts and the RH camshaft front bearing cap.

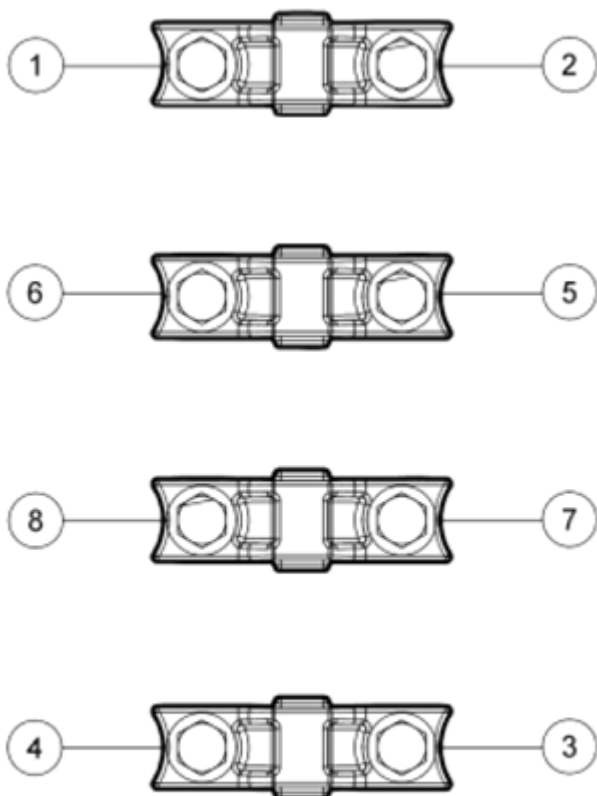


N0070049

Fig. 94: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

17. **NOTE:** The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

Remove the remaining bolts in the sequence shown in the illustration and remove the remaining RH camshaft bearing caps.

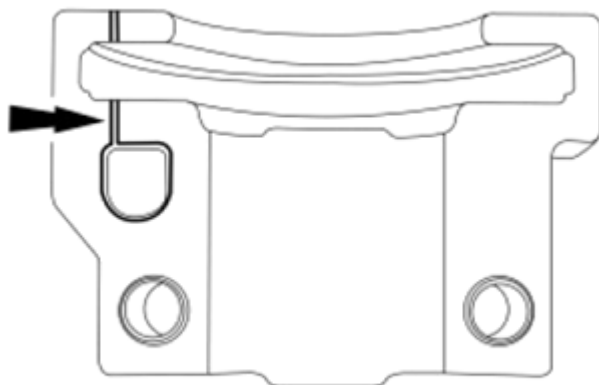


N0091483

Fig. 95: Identifying Camshaft Bearing Caps Bolt Tightening Sequence

Courtesy of FORD MOTOR CO.

18. 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

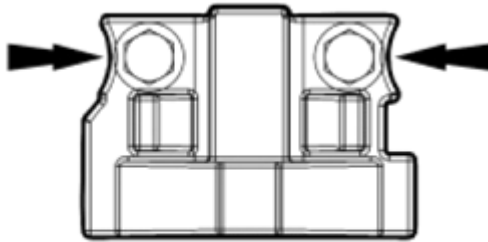
Fig. 96: Locating Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

19. Remove the RH camshaft.

NOTE: Remove the front thrust camshaft bearing cap straight upward from the bearing towers or the bearing cap may be damaged from side loading.

- 20.

Remove the 2 bolts and the RH camshaft front bearing cap.



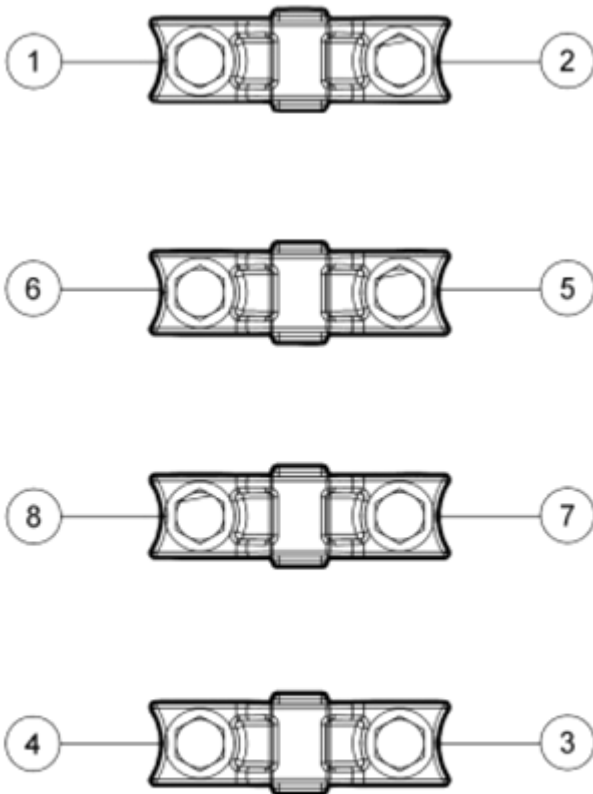
N0070049

Fig. 97: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

- 21.

Remove the remaining bolts in the sequence shown in the illustration and remove the remaining LH camshaft bearing caps.



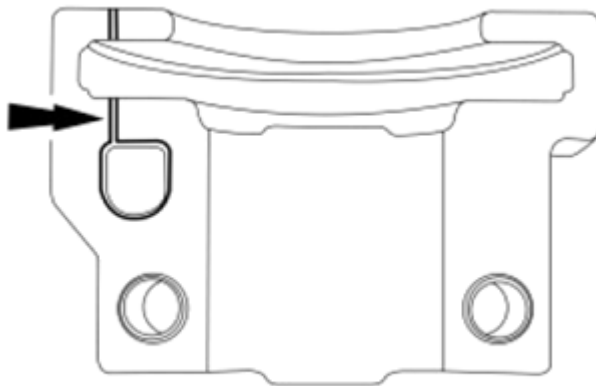
N0091483

Fig. 98: Identifying Camshaft Bearing Caps Bolt Tightening Sequence

Courtesy of FORD MOTOR CO.

22. 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. 99: Locating Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

23. Remove the LH camshaft.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into the original locations. Failure to follow these instructions may result in engine damage.

24.

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

Installation

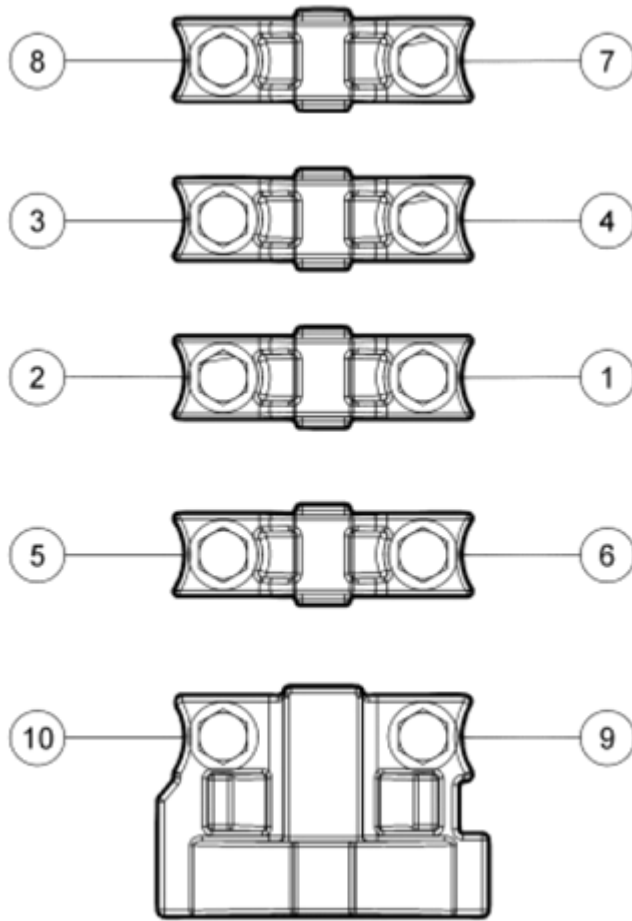
1. Install the LH and RH camshafts.

- Lubricate the camshaft and camshaft journals with clean engine oil prior to installation.

2. **NOTE:** LH shown in the illustration, RH similar.

Install the LH and RH camshaft bearing caps in their original locations.

- Lubricate the camshaft bearing caps with clean engine oil.
- Position the 2 front camshaft bearing caps.
- Position the 8 remaining camshaft bearing caps.
- Install the 20 bolts loosely.
- Tighten to 10 Nm (89 lb-in) in the sequence shown in the illustration.



N0011337

Fig. 100: Identifying Camshaft Bearing Cap Bolt Loosening Sequence
Courtesy of FORD MOTOR CO.

3. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: LH shown in the illustration, RH similar.

Position the camshaft phase and sprockets and install 2 new camshaft phase and sprocket bolts finger-tight.

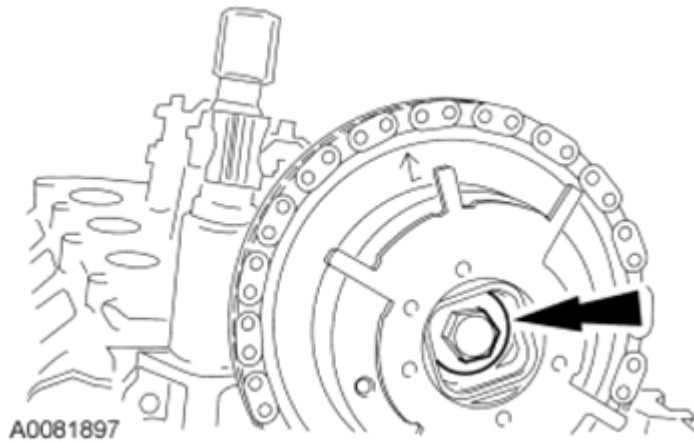


Fig. 101: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

4. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.
- NOTE:** LH shown in the illustration, RH similar.

Using the Cam Phaser Locking Tool, tighten the LH and RH camshaft phase and sprocket bolts in 2 stages.

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

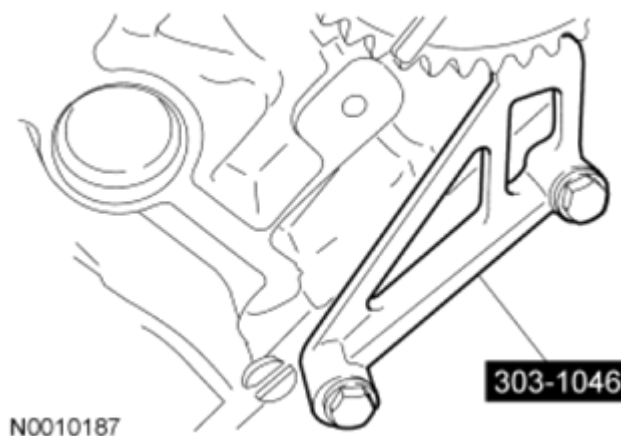


Fig. 102: View Of Cam Phaser Locking Tool
Courtesy of FORD MOTOR CO.

5. Position the crankshaft with the Crankshaft Holding Tool, then remove the tool.

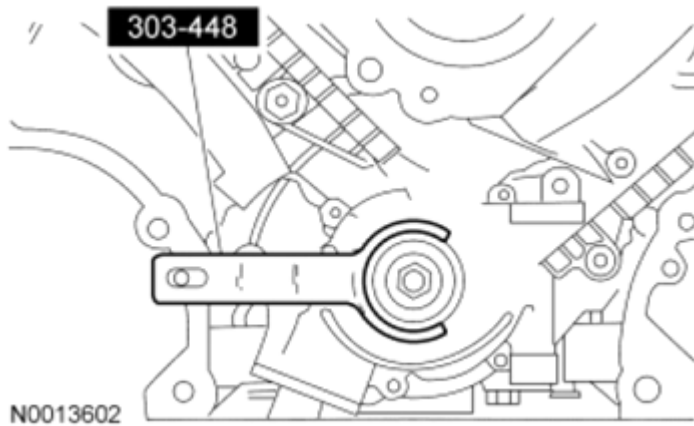


Fig. 103: Positioning Crankshaft
Courtesy of FORD MOTOR CO.

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

NOTE: Prior to installation, inspect the tensioner-sealing bead for seal integrity. If cracks, tears, separation from the tensioner body or permanent compression of the seal bead is observed, install a new tensioner or engine damage may occur.

Compress the tensioner plunger, using a vise.

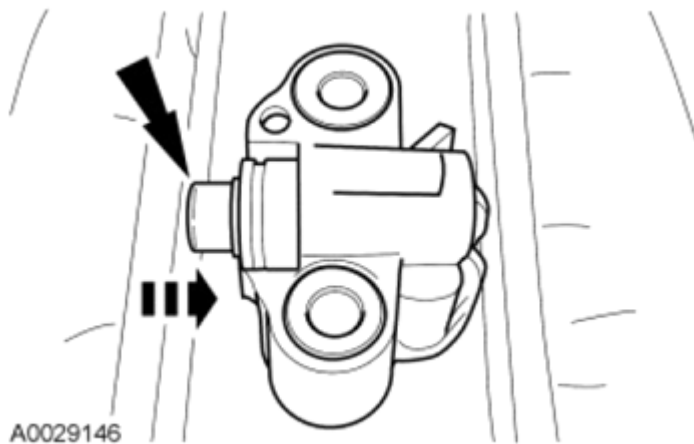


Fig. 104: Compressing Tensioner Plunger Using Vise
Courtesy of FORD MOTOR CO.

7. Install a retaining clip on the tensioner to hold the plunger in during installation.

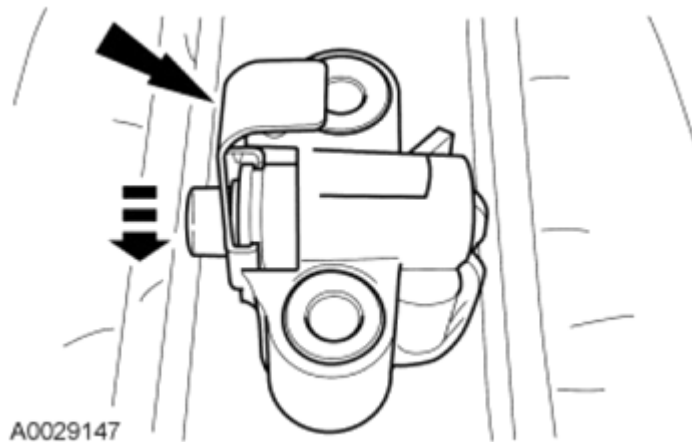


Fig. 105: Installing Retaining Clip On Tensioner
Courtesy of FORD MOTOR CO.

8. Remove the tensioner from the vise.
9. If the copper links are not visible, mark 2 links on one end and 1 link on the other end, and use as timing marks.

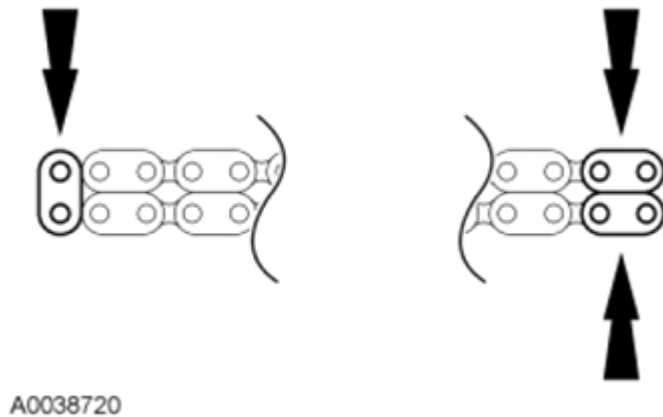


Fig. 106: Locating Copper Link Timing Marks
Courtesy of FORD MOTOR CO.

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

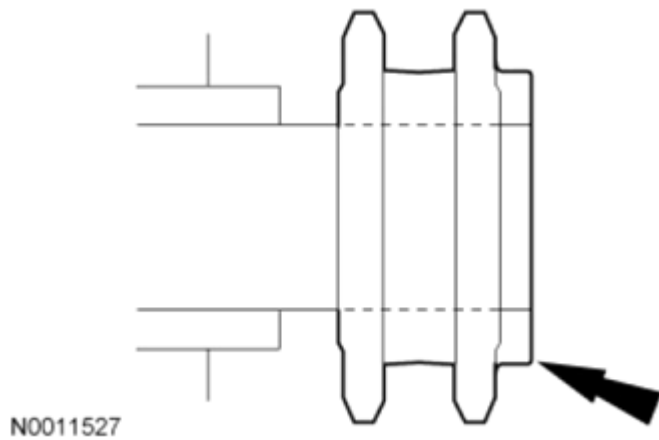


Fig. 107: Installing Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

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

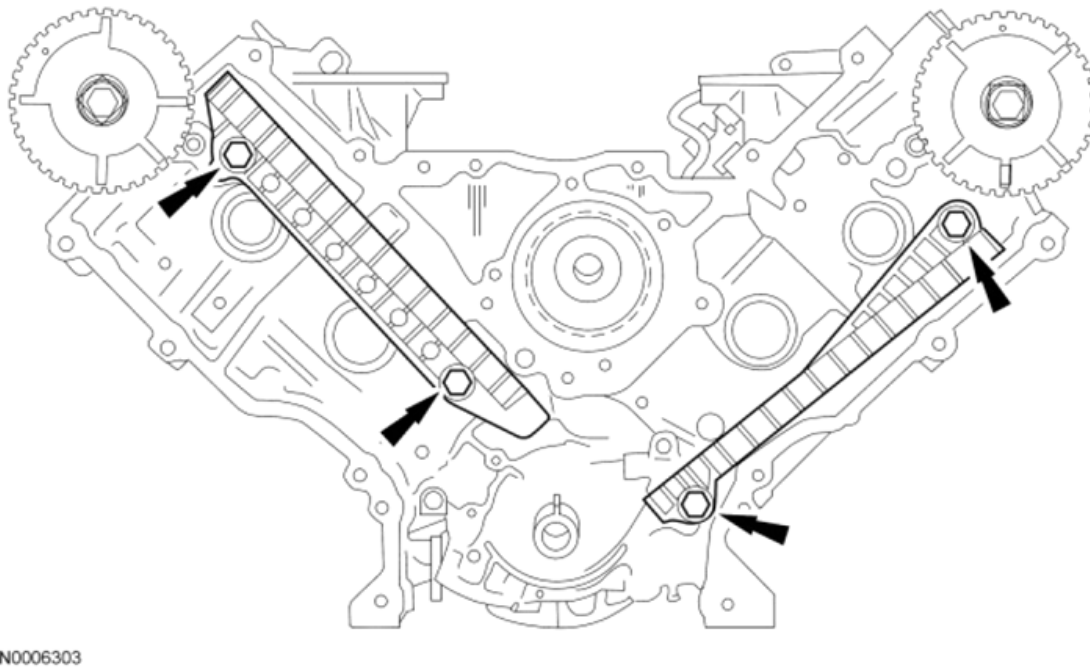


Fig. 108: Locating Timing Chain Guides
Courtesy of FORD MOTOR CO.

12. 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.

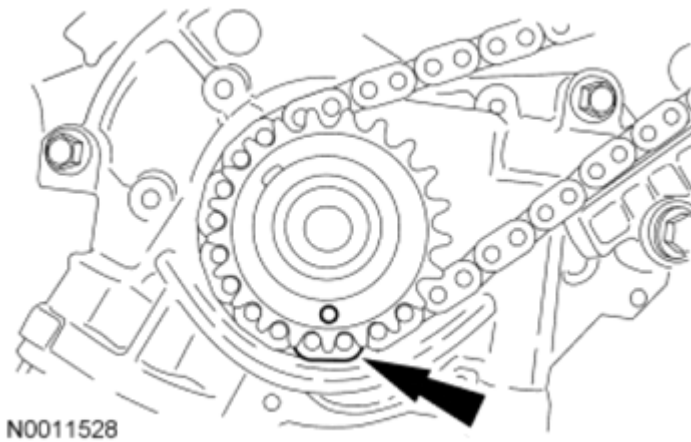


Fig. 109: Aligning Crankshaft Sprocket Timing Mark And Timing Chain Link
Courtesy of FORD MOTOR CO.

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

Position the timing chain on the camshaft phase and sprocket with the timing mark positioned between the 2 copper (marked) chain links.

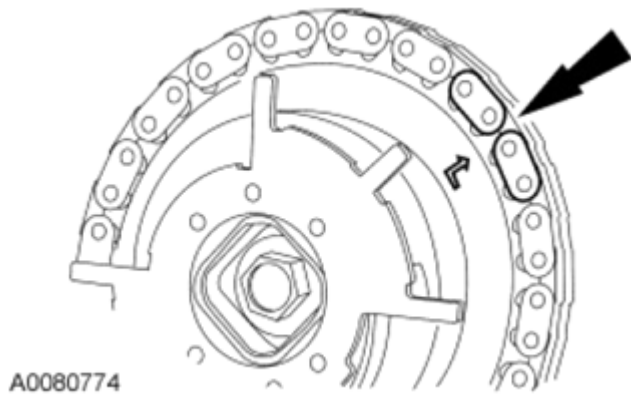


Fig. 110: Locating Timing Mark On Timing Chain
Courtesy of FORD MOTOR CO.

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

Position the LH timing chain tensioner arm on the dowel pin and install the LH timing chain tensioner and the 2 bolts.

- Tighten to 25 Nm (18 lb-ft).

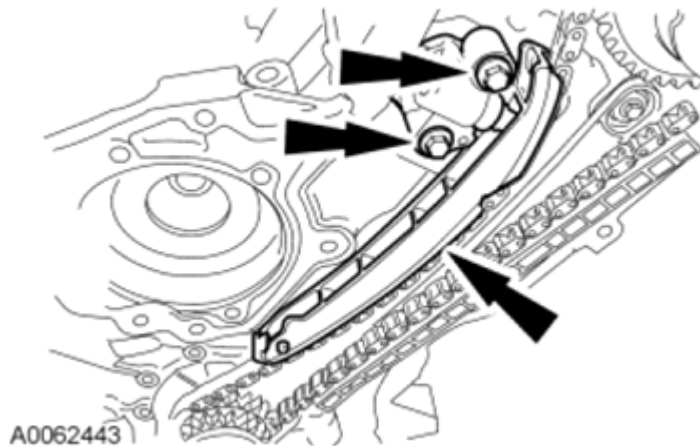


Fig. 111: Locating LH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

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

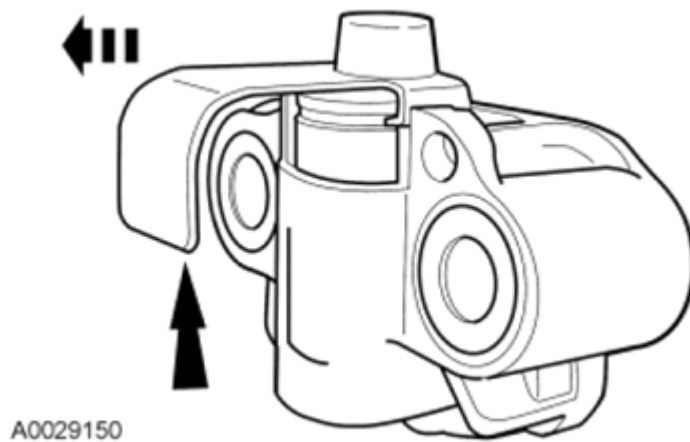


Fig. 112: Removing Retaining Clip From LH Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

16. 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.

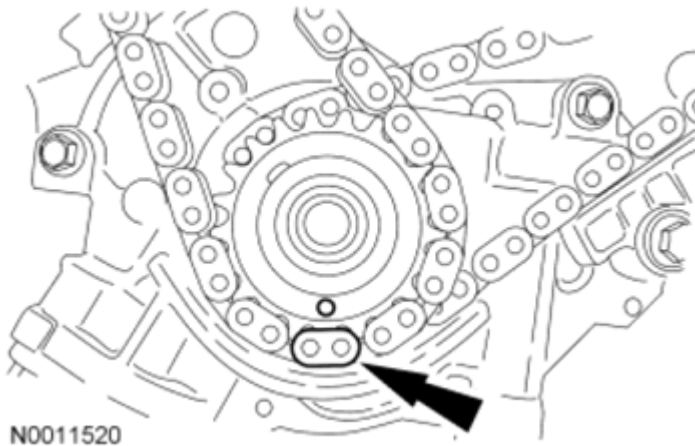


Fig. 113: Aligning (Outer) Sprocket Timing Mark And Chain Link
Courtesy of FORD MOTOR CO.

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

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

Position the RH timing chain on the camshaft phase and sprocket. Make sure the timing mark is positioned between the 2 copper (marked) chain links.

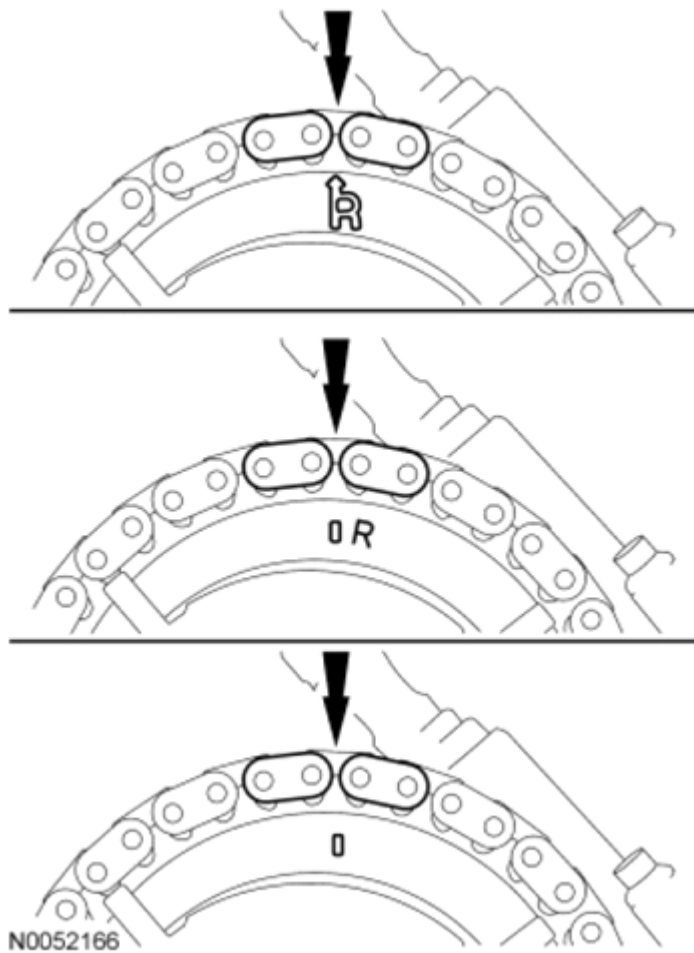


Fig. 114: Locating Timing Mark On Copper Chain Links
Courtesy of FORD MOTOR CO.

18. Position the RH timing chain tensioner arm on the dowel pin and install the RH timing chain tensioner and the 2 bolts.
 - Tighten to 25 Nm (18 lb-ft).

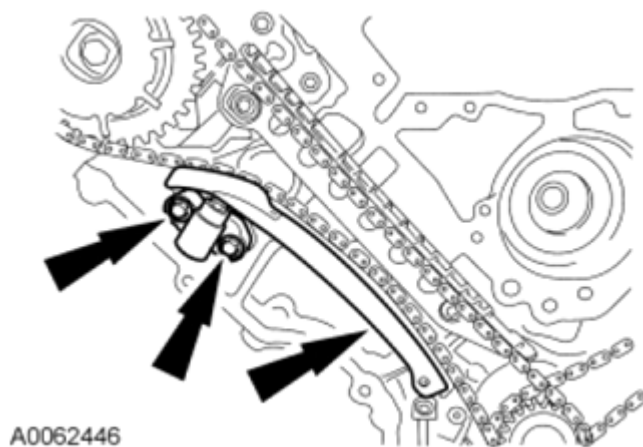


Fig. 115: Locating RH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

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

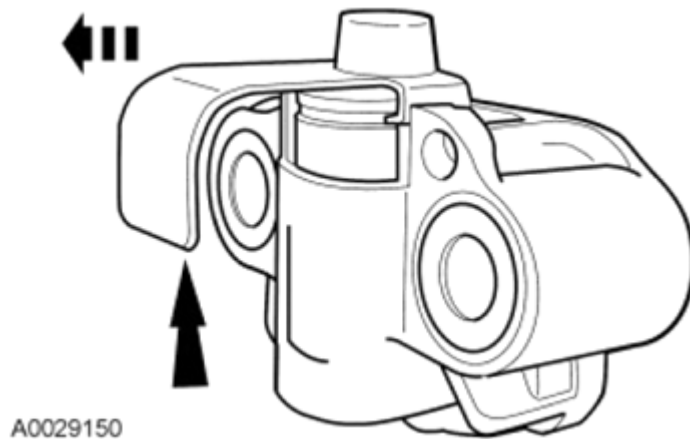
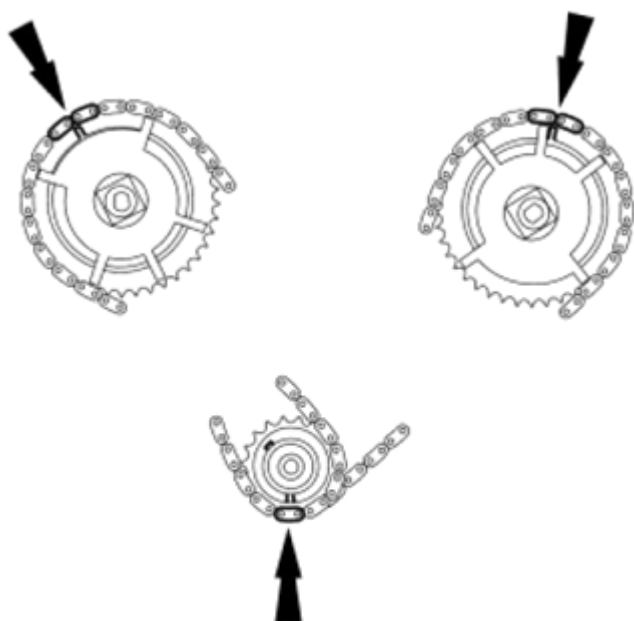


Fig. 116: Removing Retaining Clip From LH Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

20. As a post-check, verify correct alignment of all timing marks.



N0092582

Fig. 117: Locating Timing Chain Mark
Courtesy of FORD MOTOR CO.

21. Install the crankshaft sensor ring on the crankshaft.

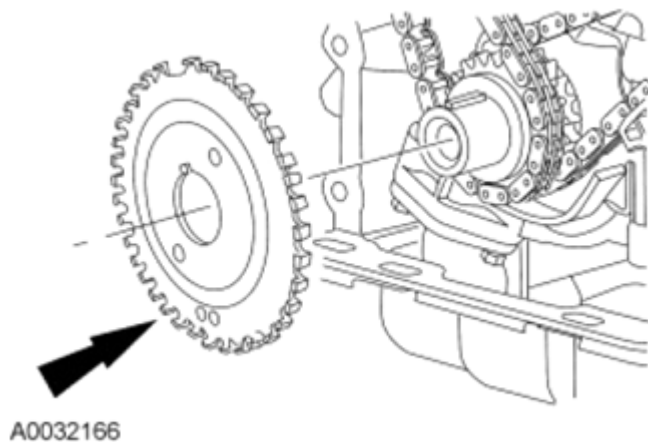


Fig. 118: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

22. **NOTE:** If the components are to be reinstalled, they must be installed into their original locations. Failure to follow this instruction may result in engine damage.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

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

Using the Valve Spring Compressor, install all of the camshaft roller followers.

- Lubricate the camshaft roller followers with clean engine oil prior to installation.



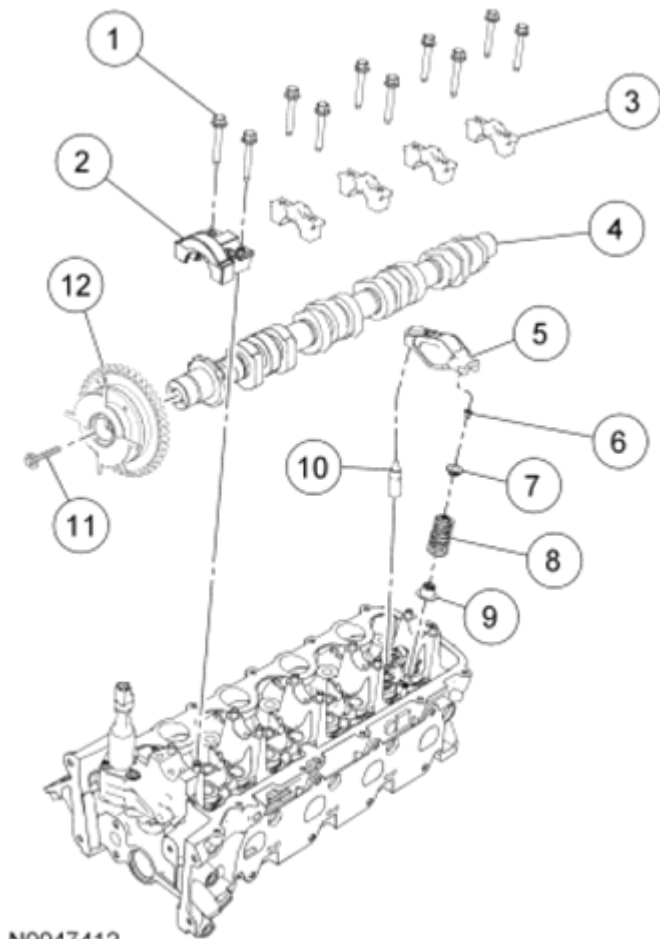
Fig. 119: Using Valve Spring Compressor (303-1039) On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

23. Install the engine front cover. For additional information, refer to ENGINE FRONT COVER in this

information.

VALVE TRAIN COMPONENTS - EXPLODED VIEW

NOTE: LH shown in the illustration, RH similar.



N0047412

Fig. 120: Exploded View Of Valve Train
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	N807834	Camshaft bearing cap bolt (10 required)
2	-	Camshaft front bearing cap (part of 6049)
3	-	Camshaft bearing cap (part of 6049) (4 required)
4	6250	Camshaft
5	6564	Camshaft roller follower (12 required)
6	6518	Valve spring retainer key (24 required)
7	6514	Valve spring retainer (12 required)

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8	6513	Valve spring (12 required)
9	6571	Valve seal (12 required)
10	6C501	Hydraulic lash adjuster (12 required)
11	6279	Camshaft phase and sprocket bolt
12	-	Camshaft phase and sprocket (part of 6A257)

1. For additional information, refer to the appropriate procedures in this information.

CAMSHAFT - LH

Special Tool(s)

SPECIAL TOOLS CHART

 ST2804-A	Compressor, Valve Spring 303-1039
	Locking Tool, Timing Chain 303-1175

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Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

NOTE: 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.

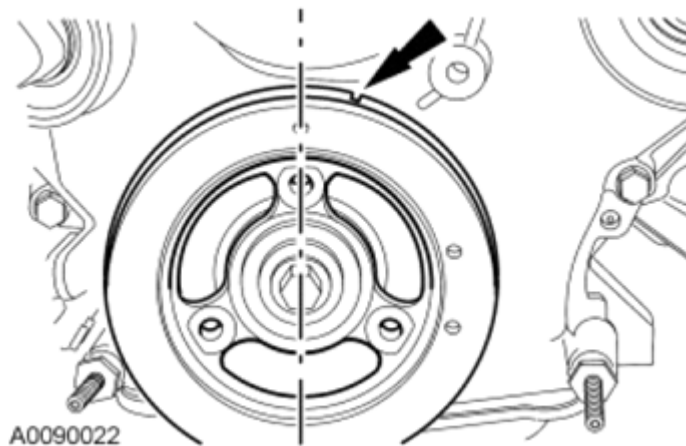


Fig. 121: Positioning Crankshaft Damper Spoke At 12 O'clock Position
Courtesy of FORD MOTOR CO.

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

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

3. **NOTE:** Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Loosen and back off the LH camshaft phase and sprocket bolt one full turn.

4. Disconnect the LH Camshaft Position (CMP) sensor electrical connector.

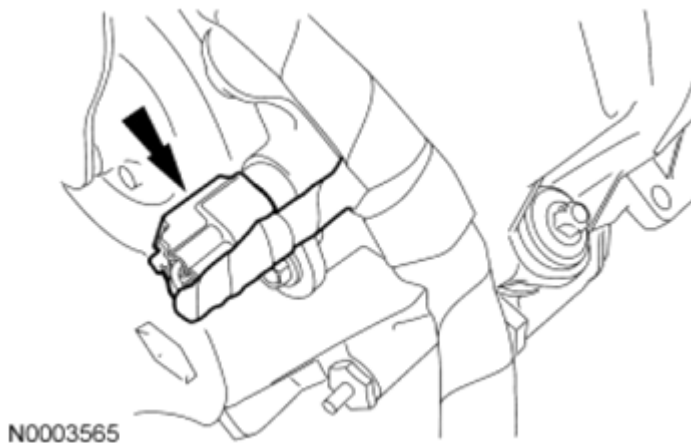


Fig. 122: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the bolt and the LH **CMP** sensor.

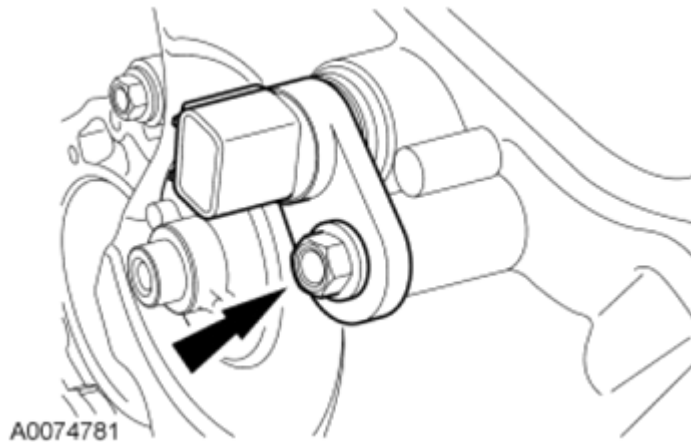


Fig. 123: Locating Bolt And LH CMP Sensor
Courtesy of FORD MOTOR CO.

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

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.

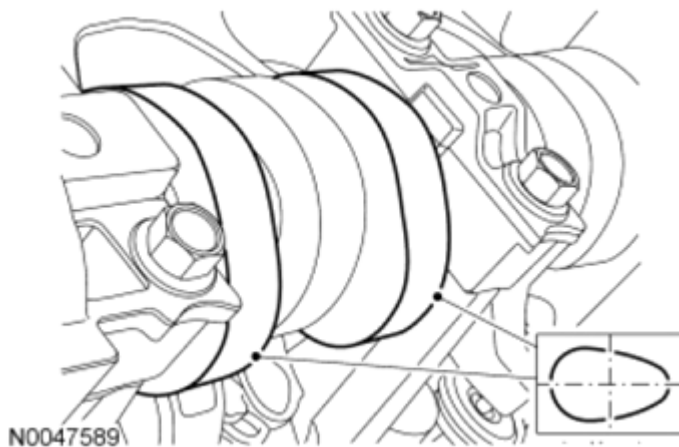
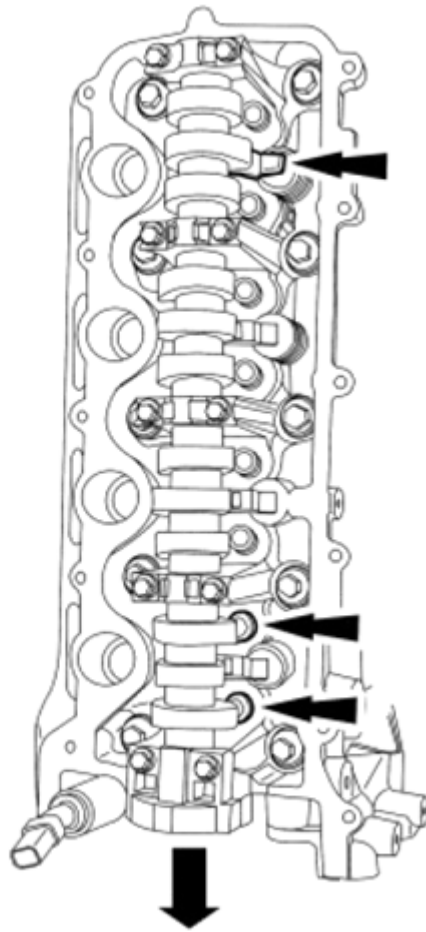


Fig. 124: View Of Camshaft Lobe
Courtesy of FORD MOTOR CO.

7. Remove only the 3 camshaft roller followers shown in the illustration.



A0084479

Fig. 125: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

8. **NOTE:** The camshaft roller followers must be installed in their original locations. Record camshaft roller follower locations. Failure to follow these instructions may result in engine damage.
- NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.
- NOTE:** It may be necessary to push the valve down while compressing the spring.

Using the Valve Spring Compressor, remove only the 3 designated camshaft roller followers from the previous step.



N0010191

Fig. 126: Using Valve Spring Compressor (303-1039) On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

- NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set or engine damage may occur.
- 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.

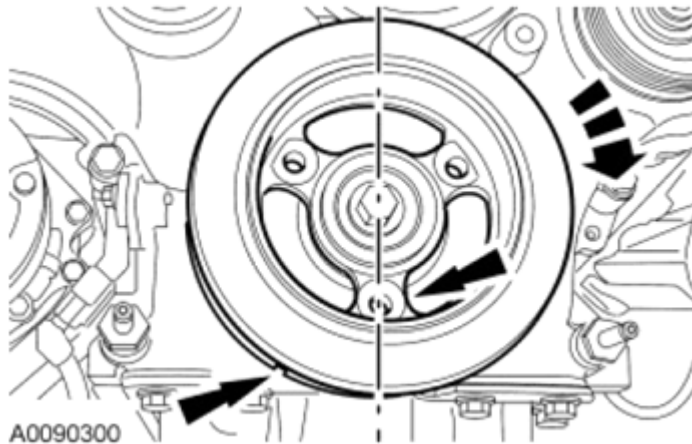


Fig. 127: Positioning Crankshaft Damper Spoke At 6 O'clock Position And Timing Mark Indentation At 7 O'clock Position
Courtesy of FORD MOTOR CO.

10. **NOTE:** Engine is not freewheeling. Camshaft procedure must be followed exactly or damage to valves and pistons will result.
- NOTE:** The Timing Chain Locking Tool must be installed square to the timing chain and the engine block.
- NOTE:** Engine front cover removed for clarity.

Install the Timing Chain Locking Tool in the LH timing chain as shown in the illustration.

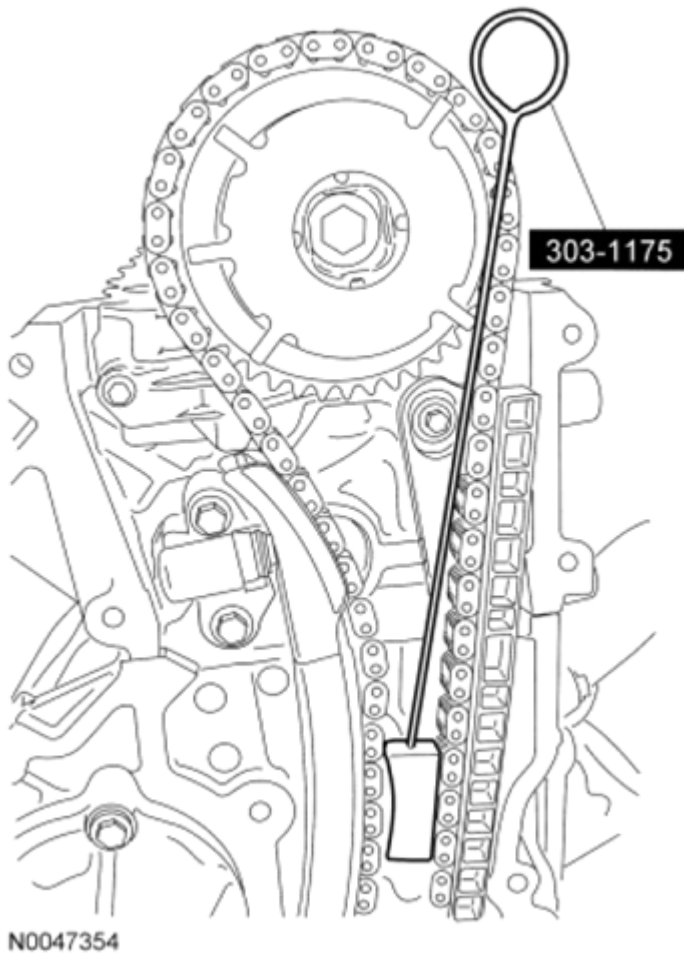


Fig. 128: Using Timing Chain Locking Tool In LH Timing Chain
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

11.

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

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

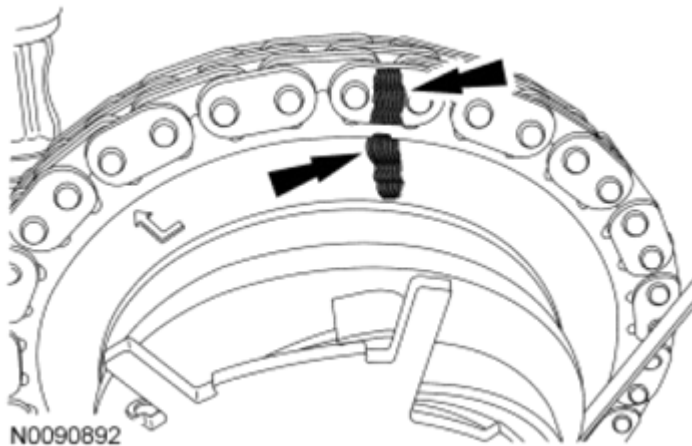
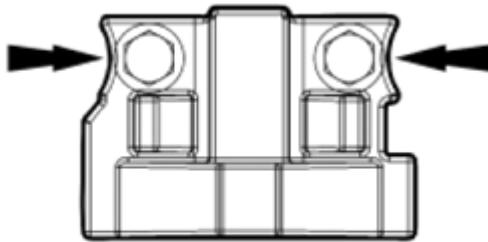


Fig. 129: Locating Timing Chain Scribe Marks
Courtesy of FORD MOTOR CO.

12. **NOTE:** Remove the front thrust camshaft bearing cap straight upward from the bearing towers or the bearing cap may be damaged from side loading.

Remove the 2 bolts and the LH camshaft front bearing cap.

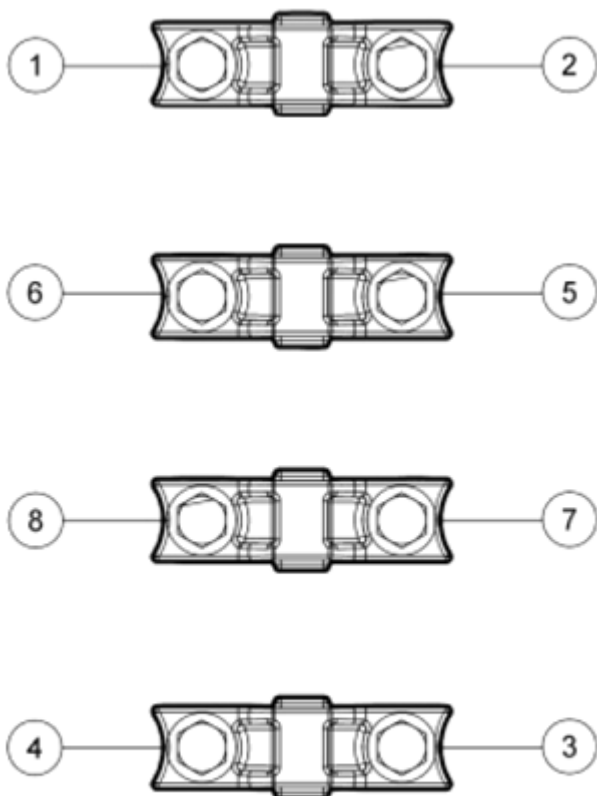


N0070049

Fig. 130: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

13. **NOTE:** The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

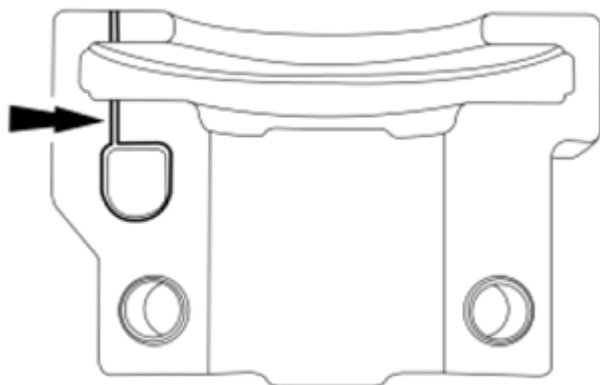
Remove the remaining 8 bolts in the sequence shown in the illustration and remove the 4 camshaft bearing caps.



N0091483

Fig. 131: Identifying Camshaft Bearing Caps Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

14. 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. 132: Locating Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

15. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase and sprocket bolt or damage may occur to the camshaft or camshaft phase and sprocket.
- NOTE:** Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

Remove the bolt and the camshaft phase and sprocket assembly from the camshaft.

- Discard the bolt and washer.

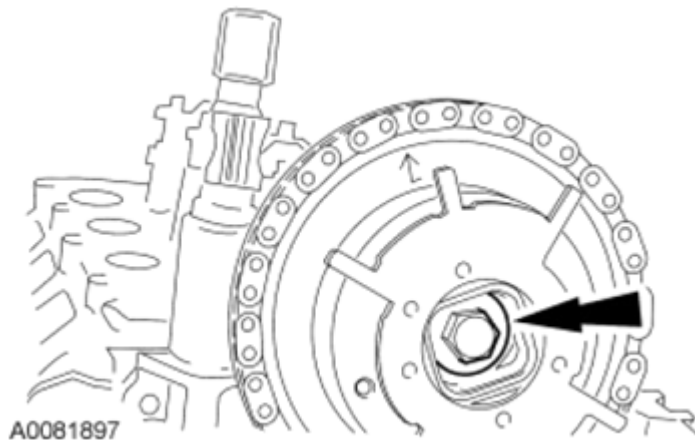


Fig. 133: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

16. Remove the camshaft.
17. Remove and inspect the camshaft phase and sprocket for damage. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .

Installation

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

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

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

2.

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

NOTE: If replacement of the camshaft phase and sprocket is necessary, transfer the scribe mark to the new camshaft phase and sprocket.

Position the camshaft phase and sprocket into the timing chain with the timing chain scribe marks in alignment.

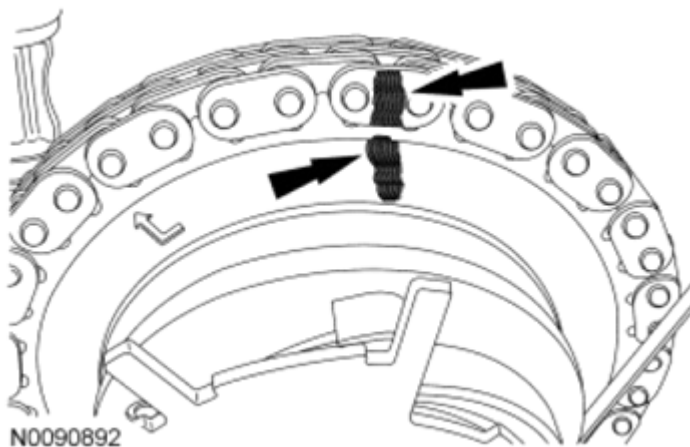


Fig. 134: Locating Timing Chain Scribe Marks
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

3.

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

NOTE: Only use hand tools to install the camshaft phase and sprocket bolt or damage may occur to the camshaft or camshaft phase and sprocket.

Install the camshaft phase and sprocket assembly onto the camshaft and install a new camshaft phase and sprocket bolt finger-tight.

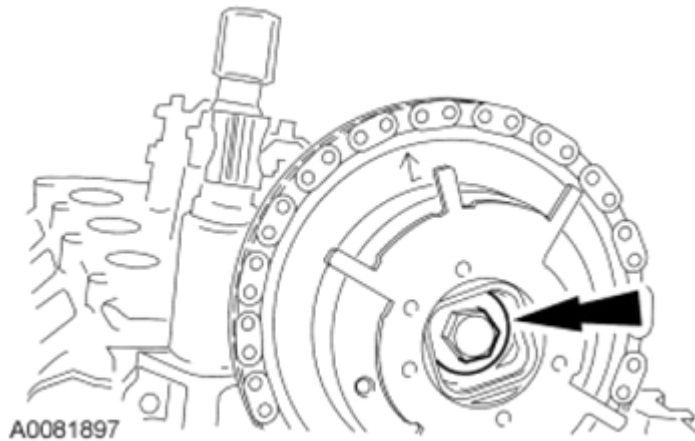


Fig. 135: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

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

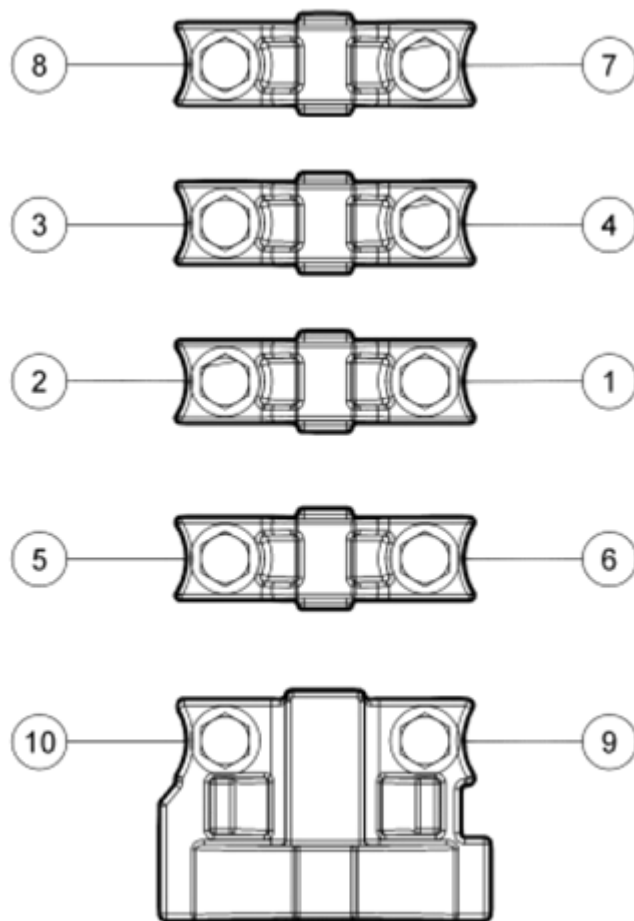
4.

Install the 5 camshaft bearing caps in their original locations.

- Lubricate the camshaft bearing caps with clean engine oil.
- Position the 2 front camshaft bearing cap.
- Position the remaining 8 camshaft bearing caps.
- Install the 10 bolts loosely.

5. Tighten the bolts in the sequence shown in the illustration.

- Tighten to 10 Nm (89 lb-in).



N0011337

Fig. 136: Identifying Camshaft Bearing Cap Bolt Loosening Sequence
Courtesy of FORD MOTOR CO.

6. **NOTE:** Engine front cover removed for clarity.

Remove the Timing Chain Locking Tool.

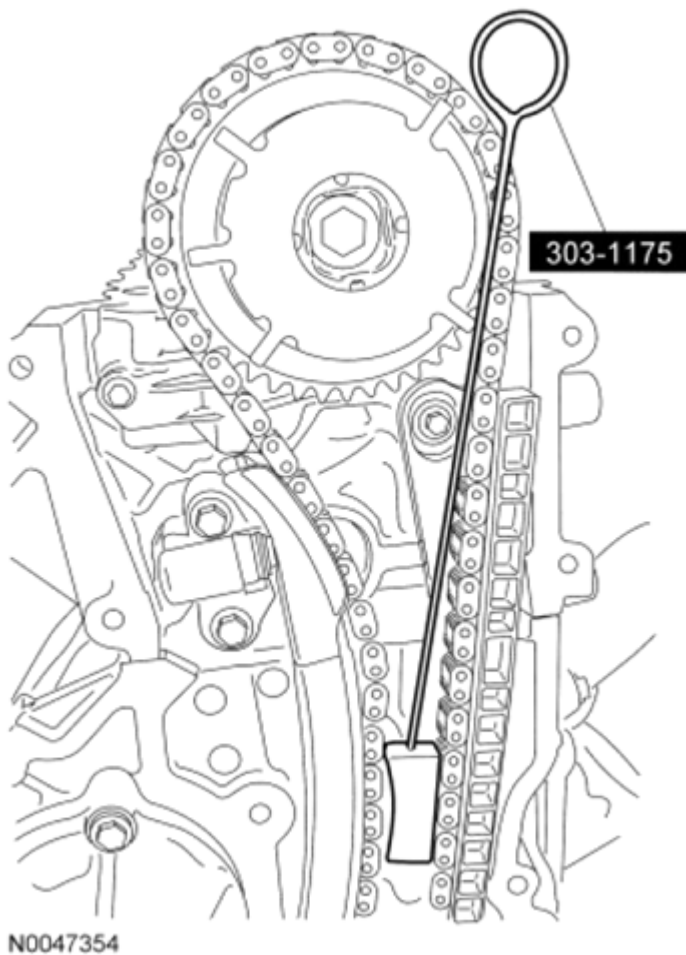


Fig. 137: Using Timing Chain Locking Tool In LH Timing Chain
Courtesy of FORD MOTOR CO.

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.

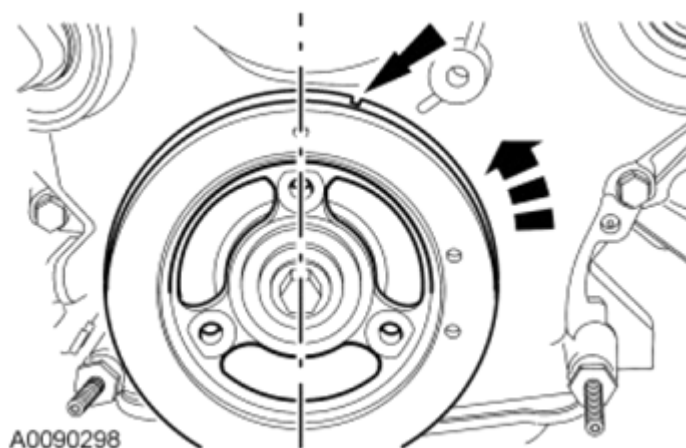


Fig. 138: Positioning Crankshaft Damper Spoke At 12 O'Clock Position And Timing Mark Indentation At 1 O'Clock Position
Courtesy of FORD MOTOR CO.

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

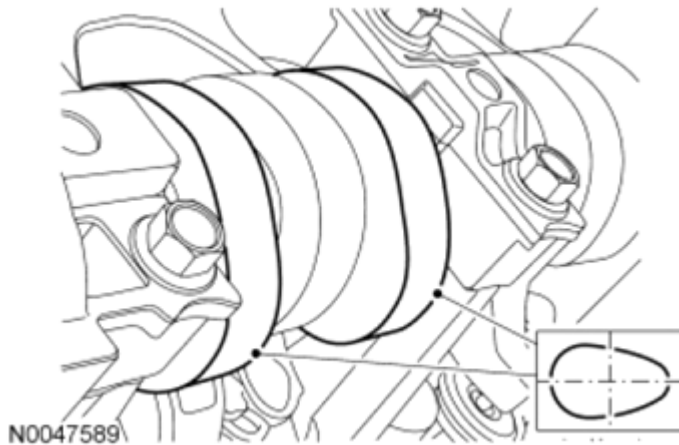
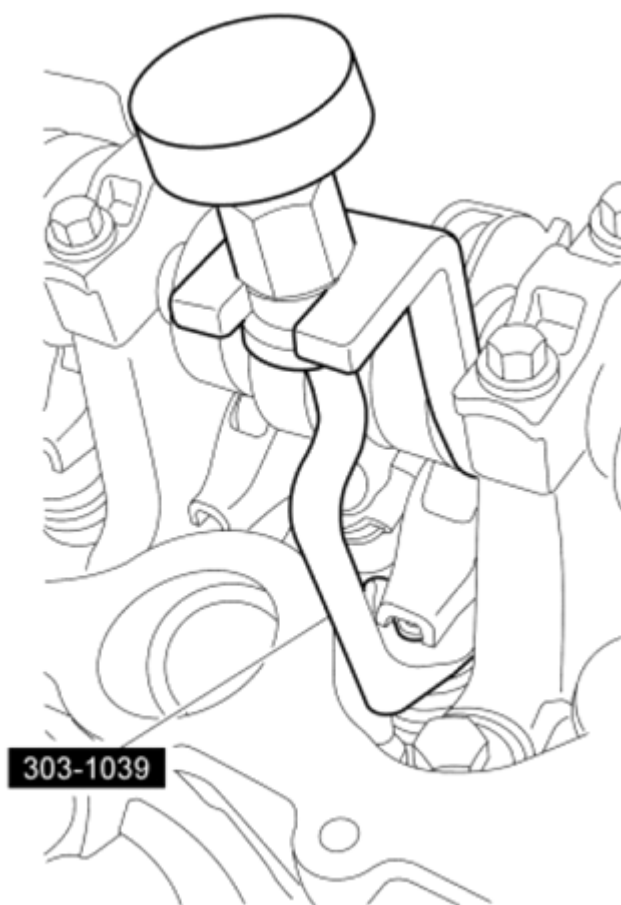


Fig. 139: View Of Camshaft Lobe
Courtesy of FORD MOTOR CO.

- NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.
- 9.

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

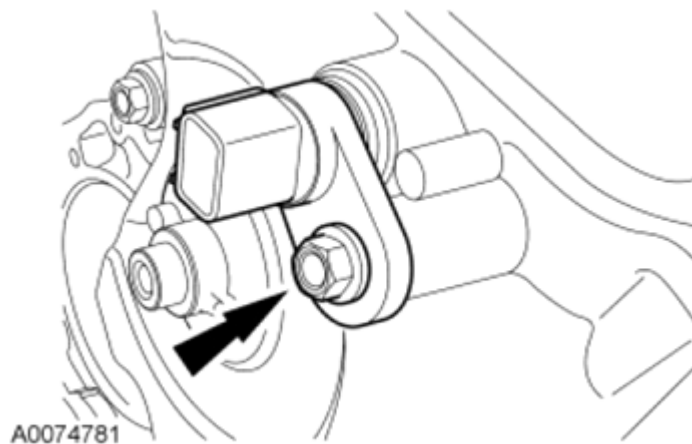
Using the Valve Spring Compressor, install the 3 originally removed camshaft roller followers.



N0010191

Fig. 140: Using Valve Spring Compressor (303-1039) On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

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



A0074781

Fig. 141: Locating Bolt And LH CMP Sensor
Courtesy of FORD MOTOR CO.

11. Connect the **CMP** electrical connector.

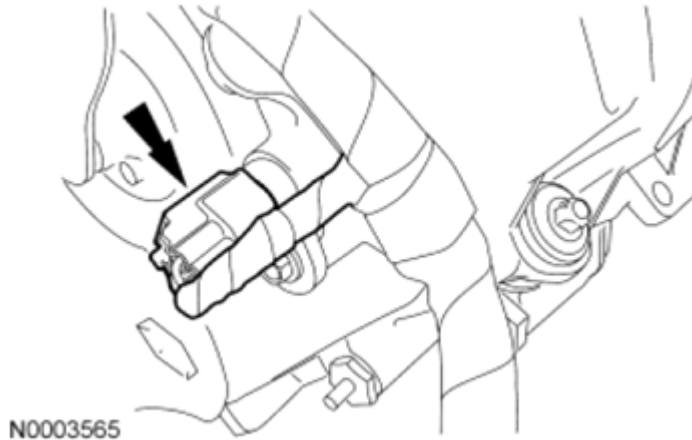


Fig. 142: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

12. **NOTE:** Only use hand tools to install the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

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

Tighten the camshaft phase and sprocket bolt in 2 stages:

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

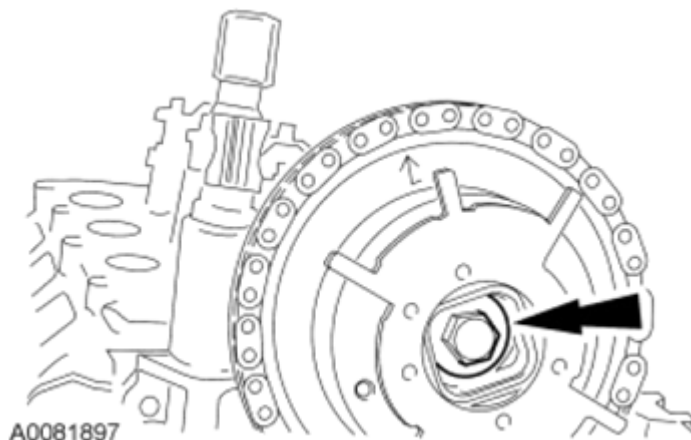


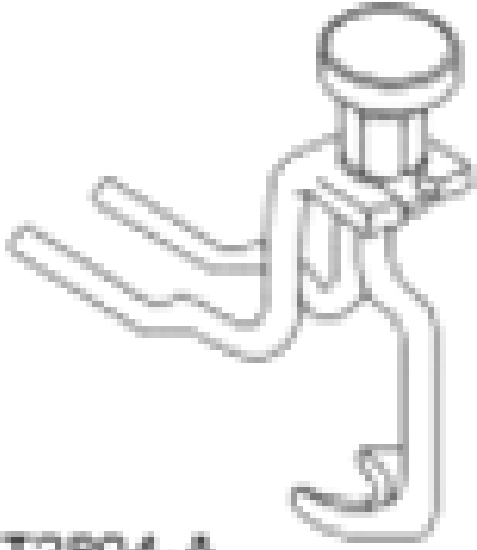
Fig. 143: Locating Camshaft Phaser And Sprocket Assembly Bolt
 Courtesy of FORD MOTOR CO.

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

CAMSHAFT - RH

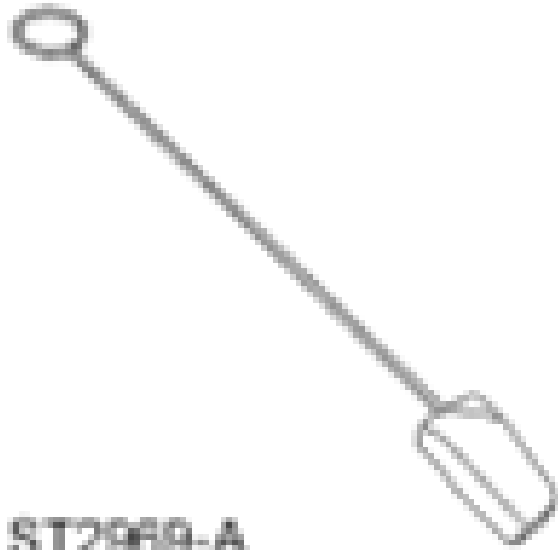
Special Tool(s)

SPECIAL TOOLS CHART

 <p>ST2804-A</p>	<p>Compressor, Valve Spring 303-1039</p>
	<p>Locking Tool, Timing Chain 303-1175</p>

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

NOTE: 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.

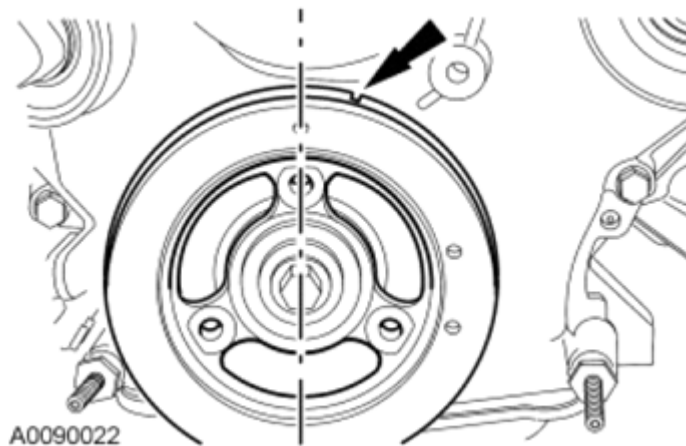


Fig. 144: Positioning Crankshaft Damper Spoke At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

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

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

3. **NOTE:** Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Loosen and back off the RH camshaft phase and sprocket bolt one full turn.

4. Disconnect the RH Camshaft Position (CMP) sensor electrical connector.

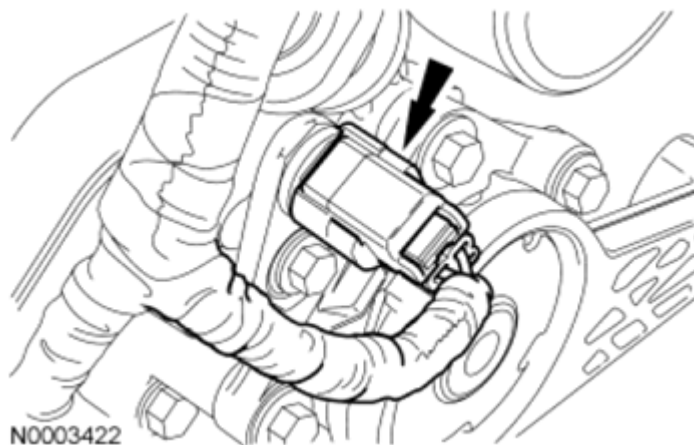


Fig. 145: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the bolt and the RH **CMP** sensor.

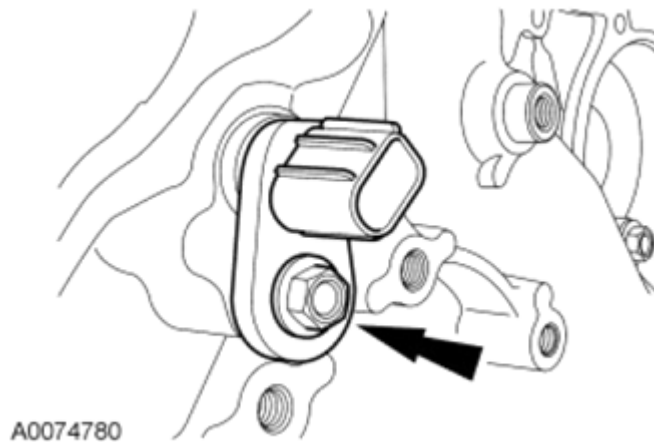


Fig. 146: Locating Bolt And RH CMP Sensor
Courtesy of FORD MOTOR CO.

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

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.

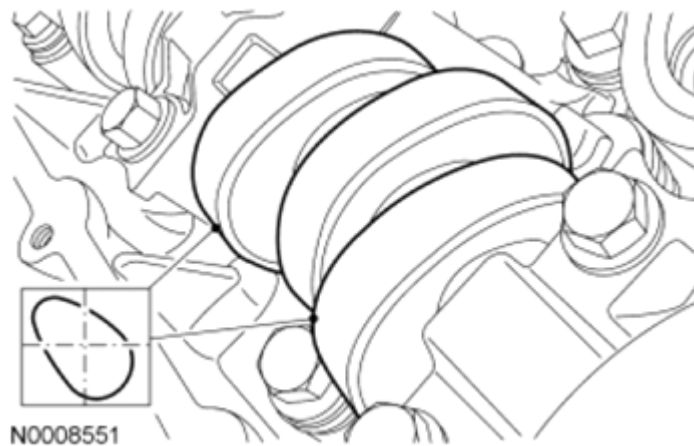
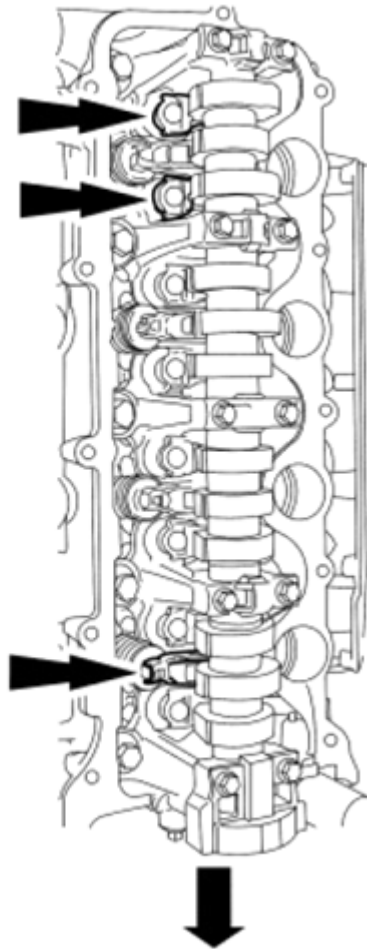


Fig. 147: Locating Intake Camshaft Lobes And Exhaust Lobe On No. 1 Cylinder
Courtesy of FORD MOTOR CO.

7. Remove only the 3 camshaft roller followers shown in the illustration.



A0083248

Fig. 148: Locating Cylinder Head Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

8. **NOTE:** The camshaft roller followers must be installed in their original locations. Record camshaft roller follower locations. Failure to follow these instructions may result in engine damage.
- NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.
- NOTE:** It may be necessary to push the valve down while compressing the spring.

Using the Valve Spring Compressor, remove only the 3 designated camshaft roller followers from the previous step.



Fig. 149: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

9. **NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set or engine damage may occur.

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.

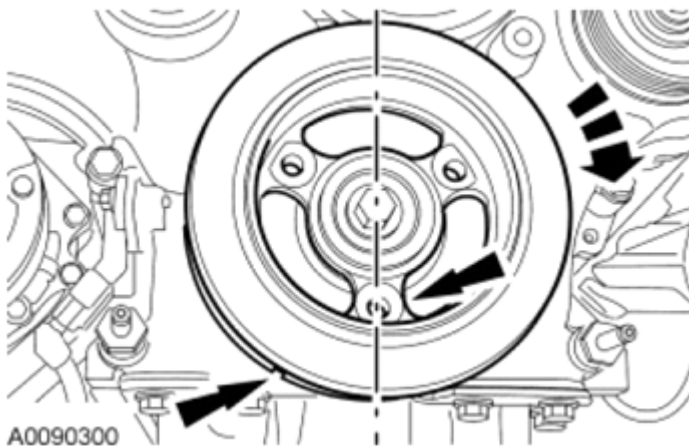


Fig. 150: Positioning Crankshaft Damper Spoke At 6 O'clock Position And Timing Mark Indentation At 7 O'clock Position
Courtesy of FORD MOTOR CO.

10. **NOTE:** Engine is not freewheeling. Camshaft procedure must be followed exactly or damage to valves and pistons will result.
- NOTE:** The Timing Chain Locking Tool must be installed square to the timing chain and the engine block.

NOTE: Engine front cover removed for clarity.

Install the Timing Chain Locking Tool in the RH timing chain as shown in the illustration.

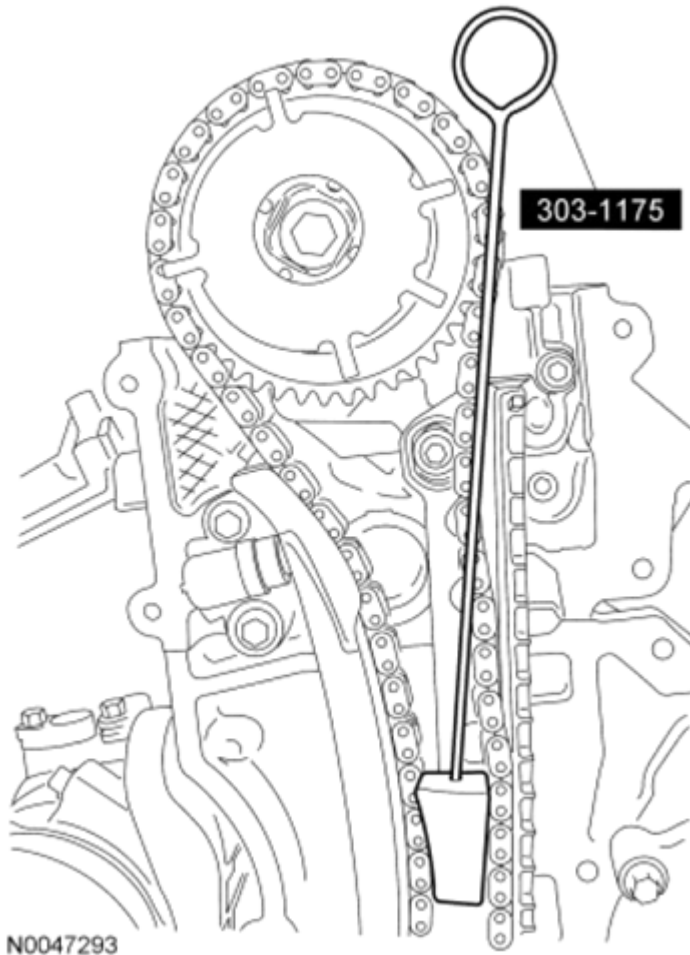


Fig. 151: Using Timing Chain Locking Tool In RH Timing Chain
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

11.

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

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

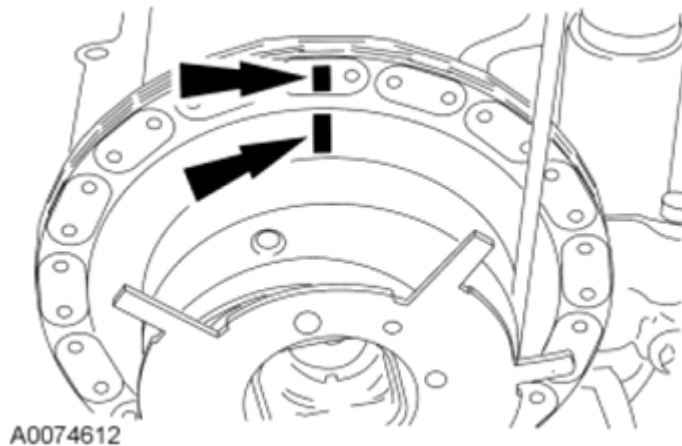
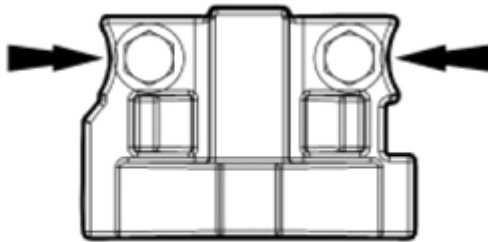


Fig. 152: Locating Scribe Marks Of Camshaft Phaser And Sprocket (RH)
Courtesy of FORD MOTOR CO.

12. **NOTE:** Remove the front thrust camshaft bearing cap straight upward from the bearing towers or the bearing cap may be damaged from side loading.

Remove the 2 bolts and the front camshaft bearing cap.

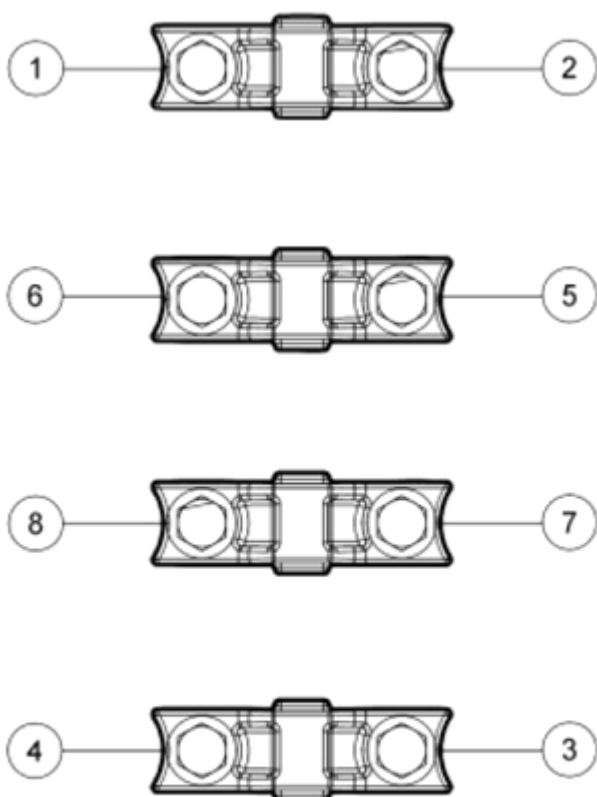


N0070049

Fig. 153: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

13. **NOTE:** The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

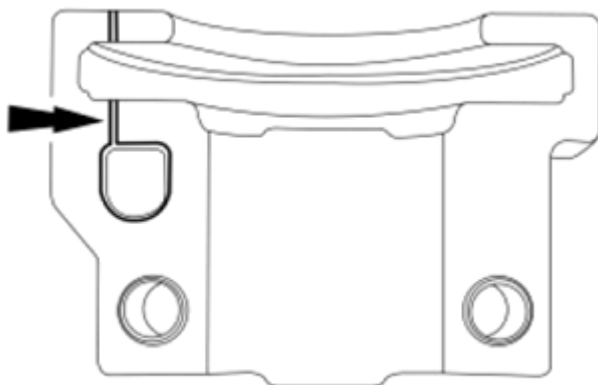
Remove the remaining bolts in the sequence shown in the illustration and remove the remaining camshaft bearing caps.



N0091483

Fig. 154: Identifying Camshaft Bearing Caps Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

14. 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. 155: Locating Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

15. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase and sprocket bolt or damage may occur to the camshaft or camshaft phase and sprocket.
- NOTE:** Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

Remove the bolt and the camshaft phase and sprocket assembly from the camshaft.

- Discard the bolt and washer.

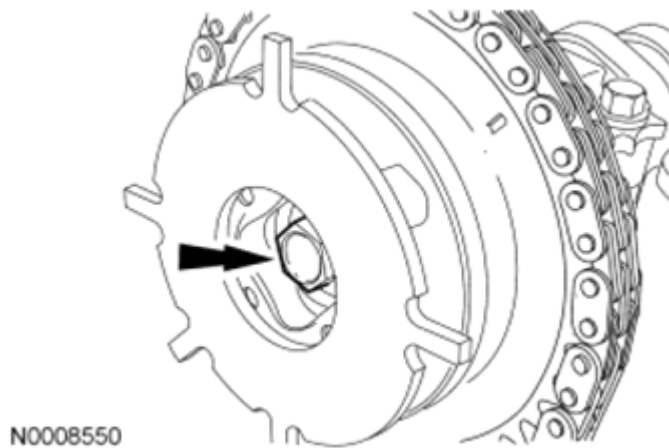


Fig. 156: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

16. Remove the camshaft.
17. Remove and inspect the camshaft phase and sprocket for damage. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .

Installation

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

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

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

2.

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

NOTE: If replacement of the camshaft phase and sprocket is necessary, transfer the scribe mark to the new camshaft phase and sprocket.

Position the camshaft phase and sprocket into the timing chain with the timing chain scribe marks in alignment.

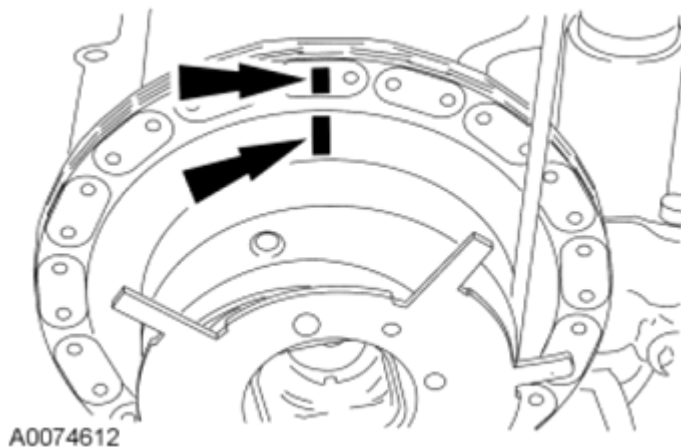


Fig. 157: Locating Scribe Marks Of Camshaft Phaser And Sprocket (RH)
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

3.

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

NOTE: Only use hand tools to install the camshaft phase and sprocket bolt or damage may occur to the camshaft or camshaft phase and sprocket.

Install the camshaft phase and sprocket assembly onto the camshaft and install a new camshaft phase and sprocket bolt finger-tight.

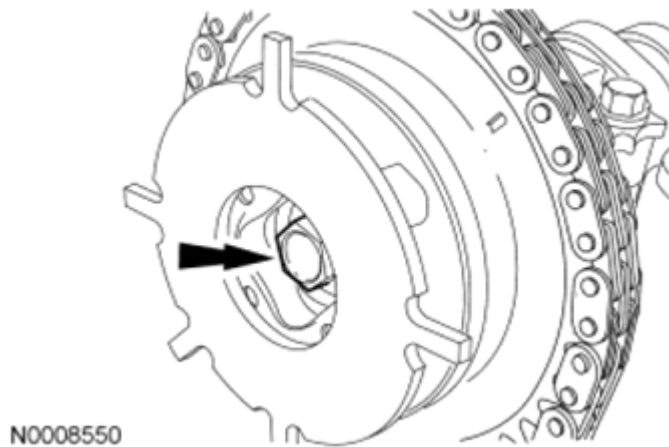


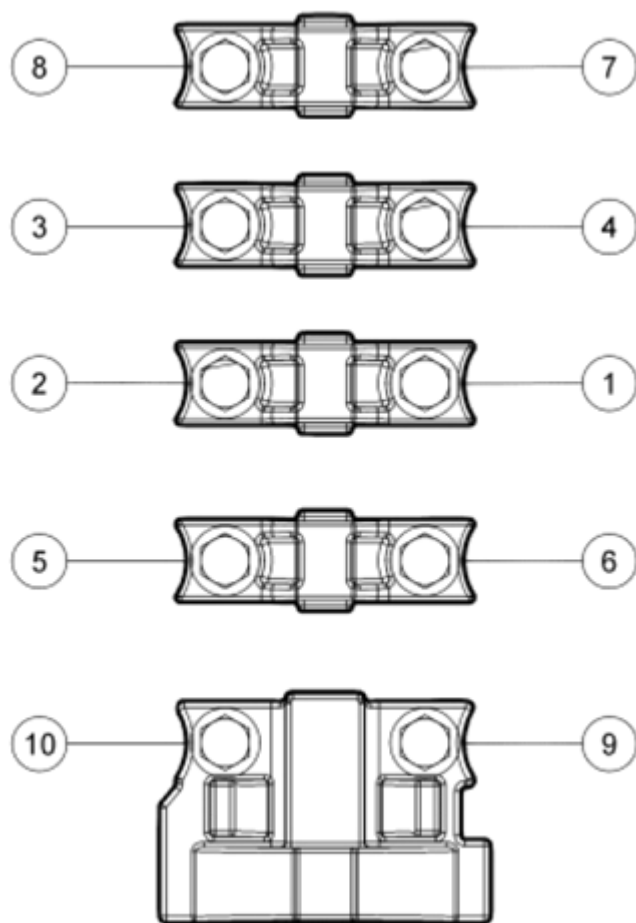
Fig. 158: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

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

4.

Install the 5 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 10 bolts loosely.
5. Tighten the 10 bolts in the sequence shown in the illustration.
- Tighten to 10 Nm (89 lb-in).



N0011337

Fig. 159: Identifying Camshaft Bearing Cap Bolt Loosening Sequence
Courtesy of FORD MOTOR CO.

6. **NOTE:** Engine front cover removed for clarity.

Remove the Timing Chain Locking Tool.

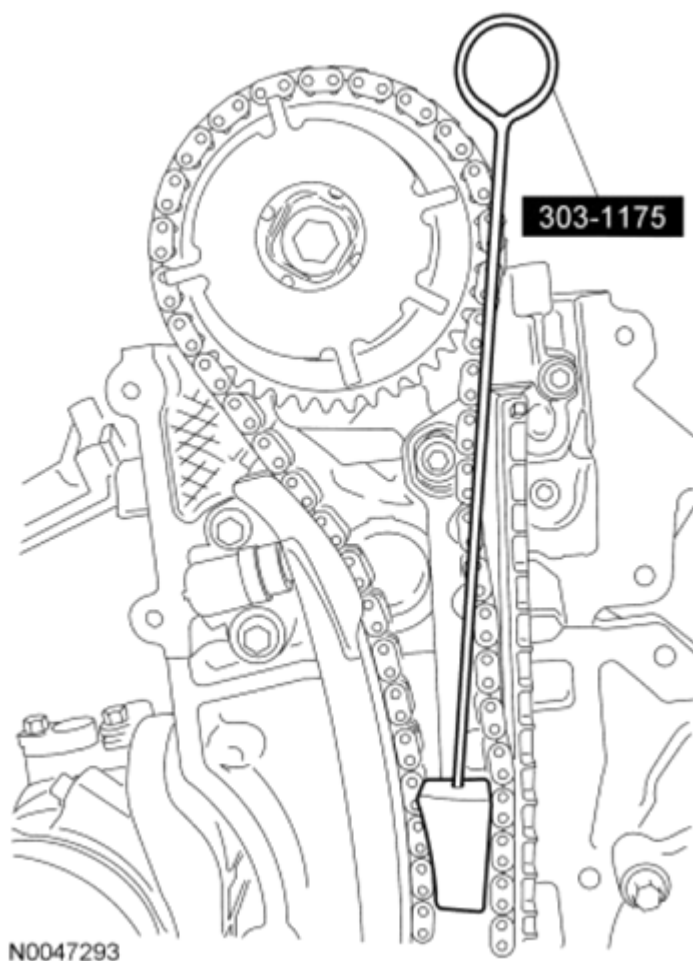


Fig. 160: Using Timing Chain Locking Tool In RH Timing Chain
Courtesy of FORD MOTOR CO.

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.

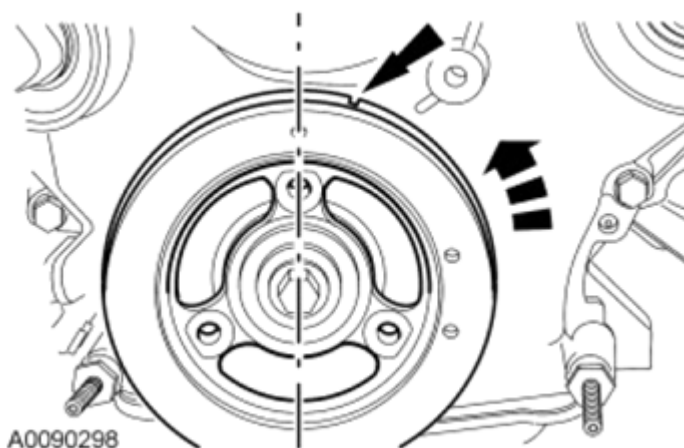


Fig. 161: Positioning Crankshaft Damper Spoke At 12 O'clock Position And Timing Mark Indentation At 1 O'clock Position
Courtesy of FORD MOTOR CO.

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

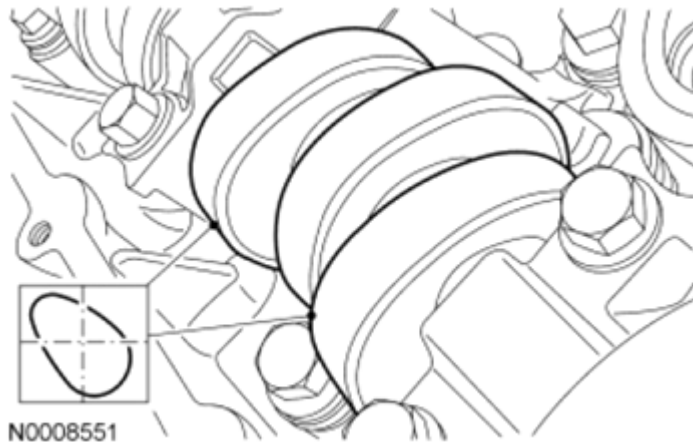


Fig. 162: View Of Intake Camshaft Lobes And Exhaust Lobe On No. 1 Cylinder
Courtesy of FORD MOTOR CO.

- NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.
- 9.

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

Using the Valve Spring Compressor, install the 3 originally removed camshaft roller followers.



Fig. 163: View Of Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

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

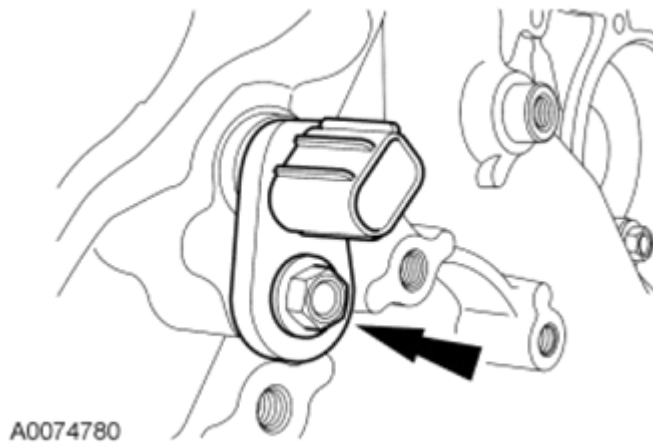


Fig. 164: Locating Bolt And RH CMP Sensor
Courtesy of FORD MOTOR CO.

11. Connect the **CMP** electrical connector.

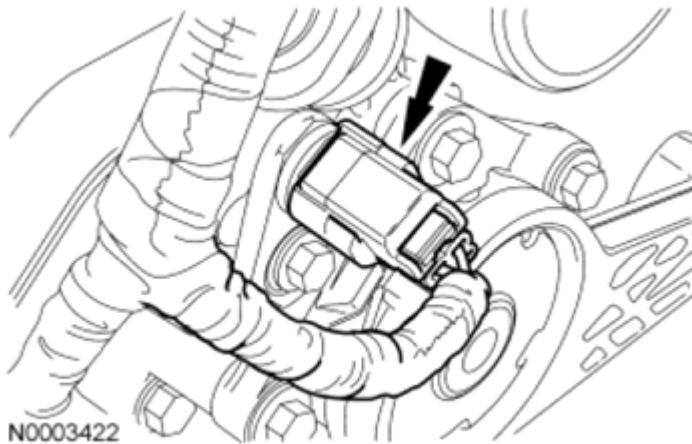


Fig. 165: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

12. **NOTE:** Only use hand tools to install the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.
- NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

Tighten the new camshaft phase and sprocket bolt in 2 stages:

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

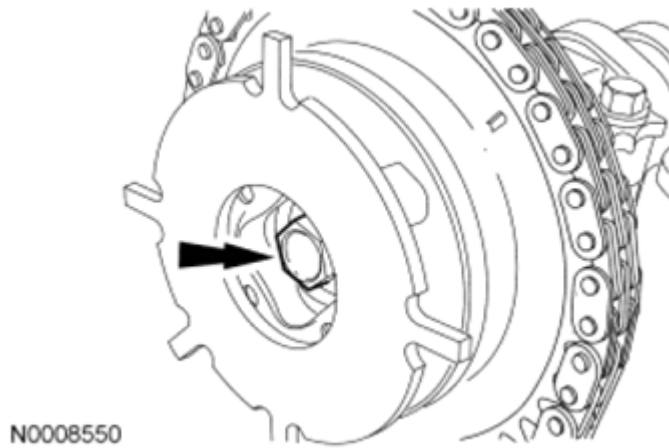


Fig. 166: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

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

CAMSHAFT PHASER AND SPROCKET - LH

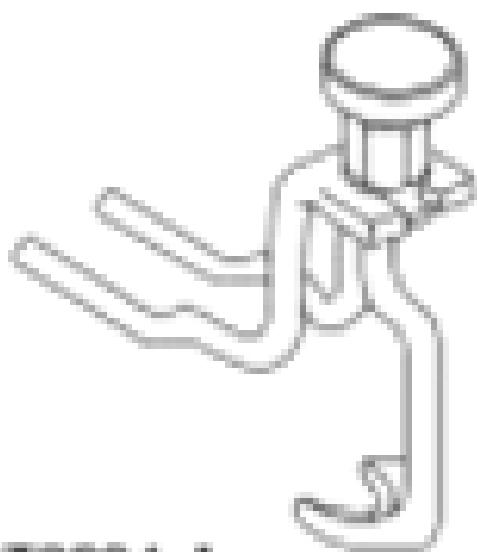
Special Tool(s)

SPECIAL TOOLS CHART

	Compressor, Valve Spring 303-1039
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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2804-A



ST2959-A

Locking Tool, Timing Chain 303-1175

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE	WSS-

5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)

M2C945-A

Removal

NOTE: 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.

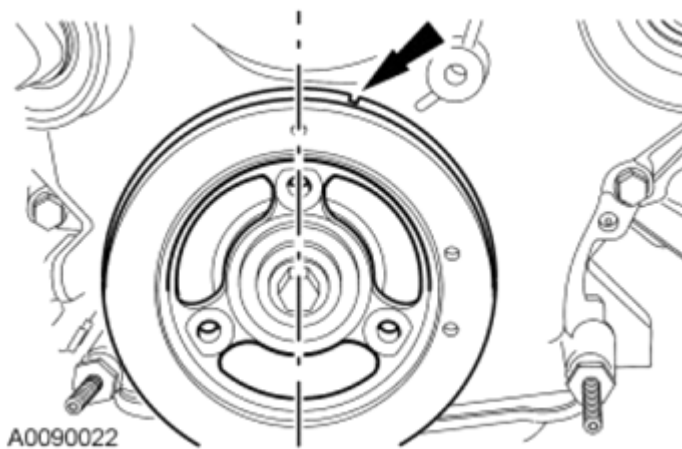


Fig. 167: Positioning Crankshaft Damper Spoke At 12 O'clock Position
Courtesy of FORD MOTOR CO.

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

3. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Loosen and back off the LH camshaft phase and sprocket bolt one full turn.

4. Disconnect the LH Camshaft Position (CMP) sensor electrical connector.

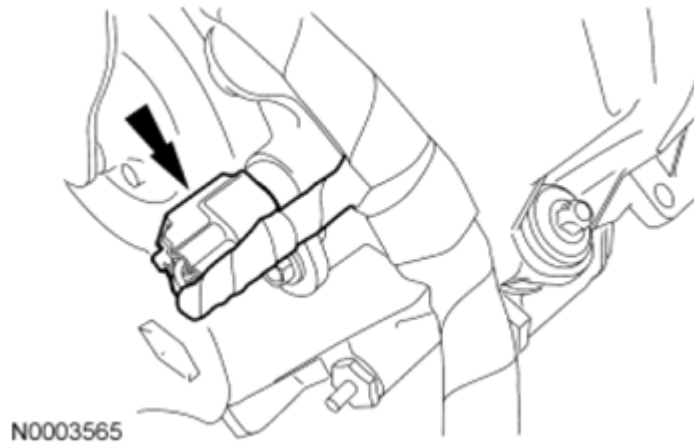


Fig. 168: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the bolt and the LH CMP sensor.

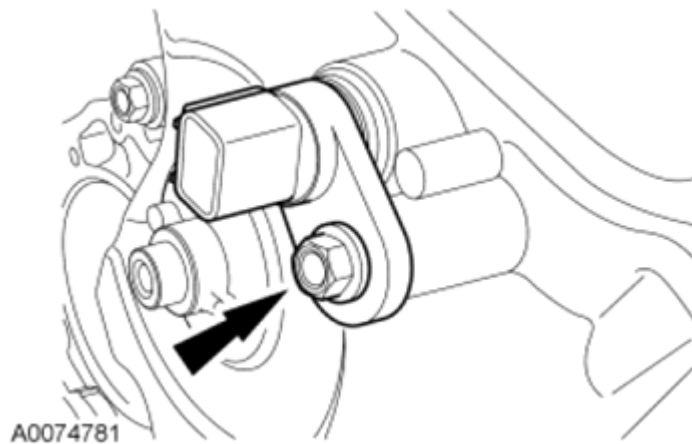


Fig. 169: Locating Bolt And LH CMP Sensor
Courtesy of FORD MOTOR CO.

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

- 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.

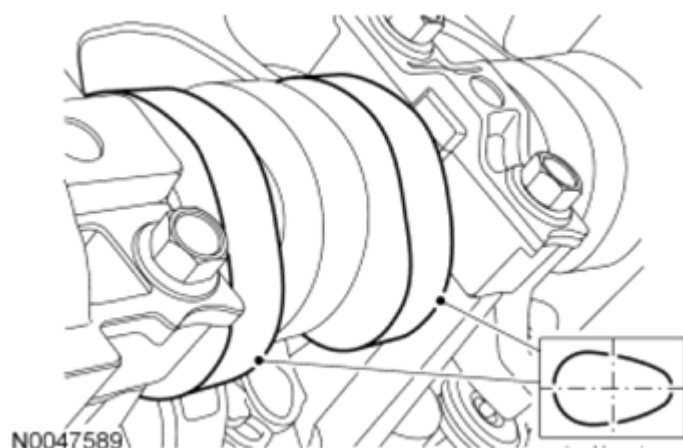


Fig. 170: View Of Camshaft Lobe
Courtesy of FORD MOTOR CO.

7. Remove only the 3 camshaft roller followers shown in the illustration.

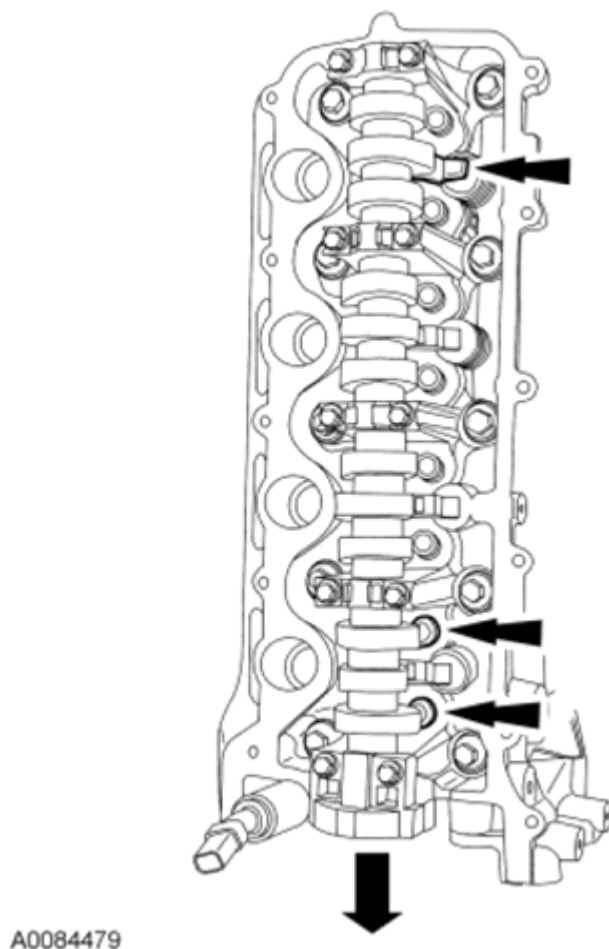


Fig. 171: Locating Cylinder Head Camshaft Roller Followers

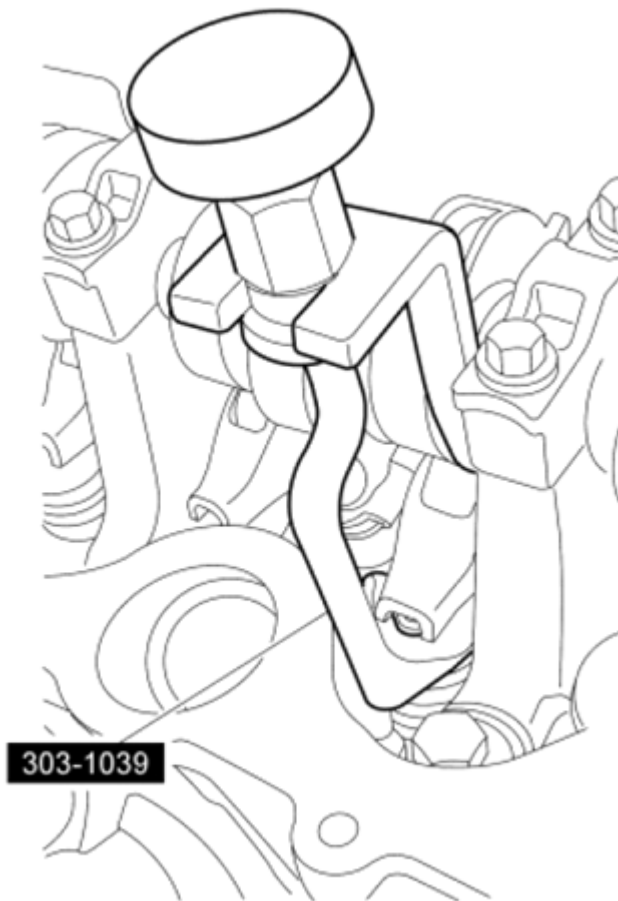
Courtesy of FORD MOTOR CO.

- NOTE:** The camshaft roller followers must be installed in their original locations. Record camshaft roller follower locations. Failure to follow these instructions may result in engine damage.
- 8.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

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

Using the Valve Spring Compressor, remove only the 3 designated camshaft roller followers from the previous step.



N0010191

Fig. 172: Using Valve Spring Compressor (303-1039) On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

9. **NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set or engine damage may occur.

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.

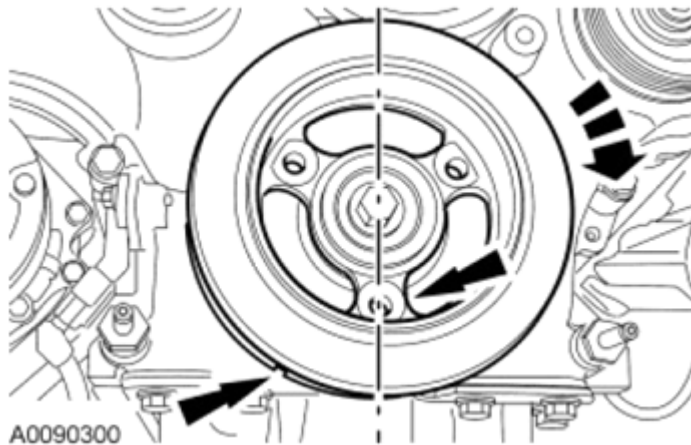
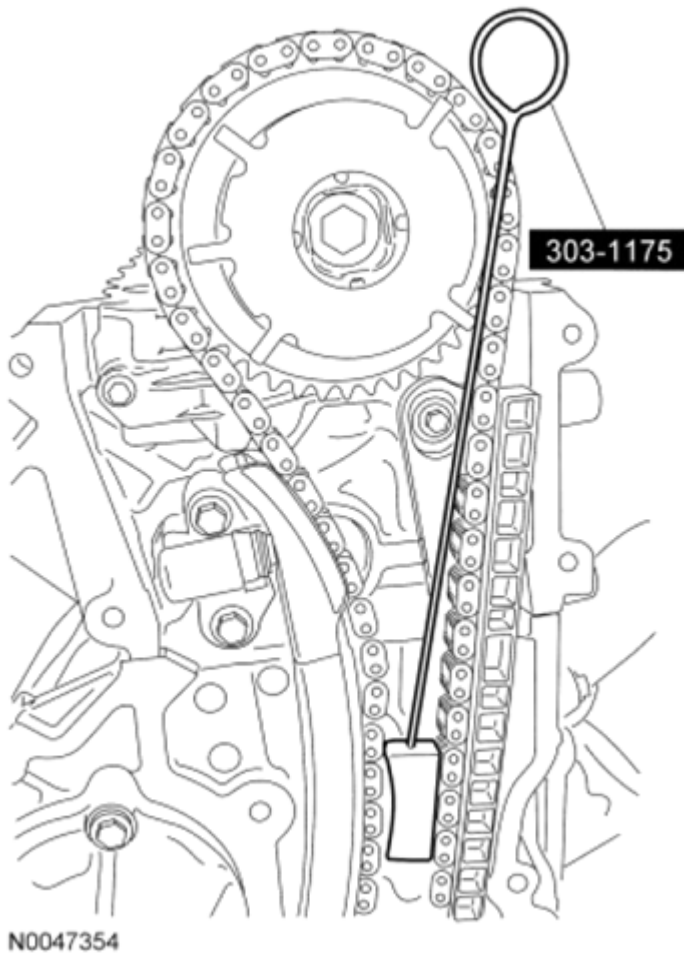


Fig. 173: Positioning Crankshaft Damper Spoke At 6 O'Clock Position And Timing Mark Indentation At 7 O'Clock Position
Courtesy of FORD MOTOR CO.

10. **NOTE:** Engine is not freewheeling. Camshaft procedure must be followed exactly or damage to valves and pistons will result.
- NOTE:** The Timing Chain Locking Tool must be installed square to the timing chain and the engine block or damage may result.
- NOTE:** Engine front cover removed for clarity.

Install the Timing Chain Locking Tool in the LH timing chain as shown in the illustration.



N0047354

Fig. 174: Using Timing Chain Locking Tool In LH Timing Chain
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

11.

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

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

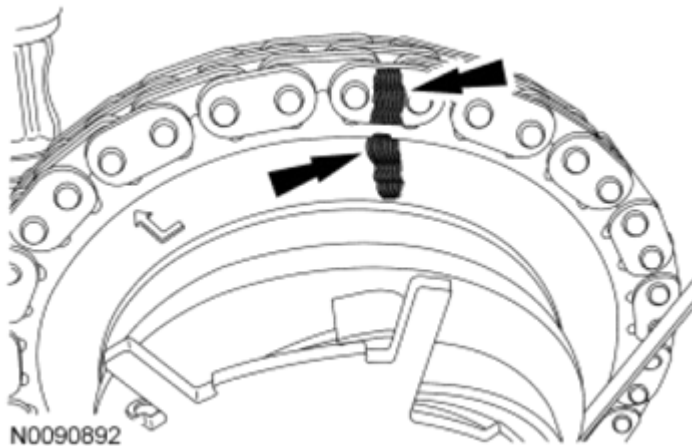


Fig. 175: Locating Timing Chain Scribe Marks

Courtesy of FORD MOTOR CO.

12.

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

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

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

Remove the bolt and the camshaft phase and sprocket assembly from the camshaft.

- Discard the bolt and washer.

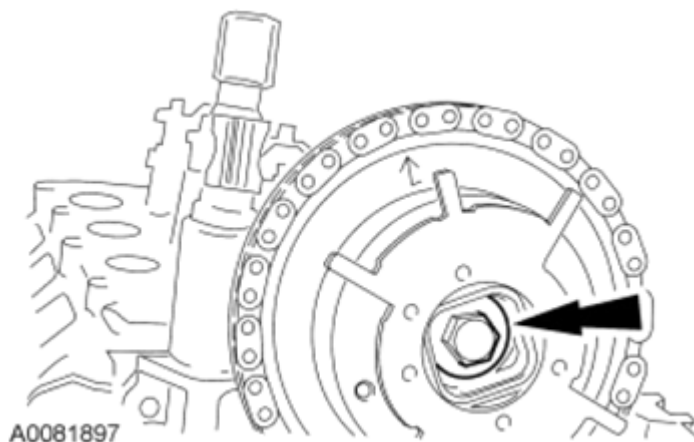


Fig. 176: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

13. Remove the camshaft phase and sprocket assembly from the timing chain and inspect for damage. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

Installation

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

1.

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

NOTE: If replacement of the camshaft phase and sprocket is necessary, transfer the scribe mark to the new camshaft phase and sprocket.

Position the camshaft phase and sprocket into the timing chain with the timing chain scribe marks in alignment.

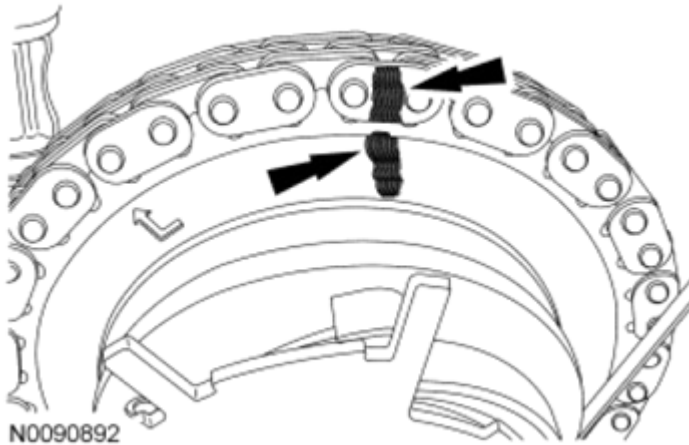


Fig. 177: Locating Timing Chain Scribe Marks
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

2.

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

NOTE: Only use hand tools to install the camshaft phase and sprocket bolt or damage may occur to the camshaft or camshaft phase and sprocket.

Install the camshaft phase and sprocket assembly onto the camshaft and install a new camshaft phase and sprocket bolt finger-tight.

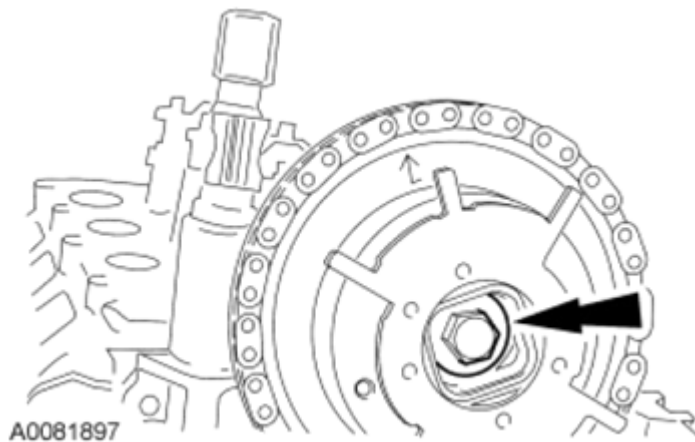


Fig. 178: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

3. **NOTE:** Engine front cover removed for clarity.

Remove the Timing Chain Locking Tool.

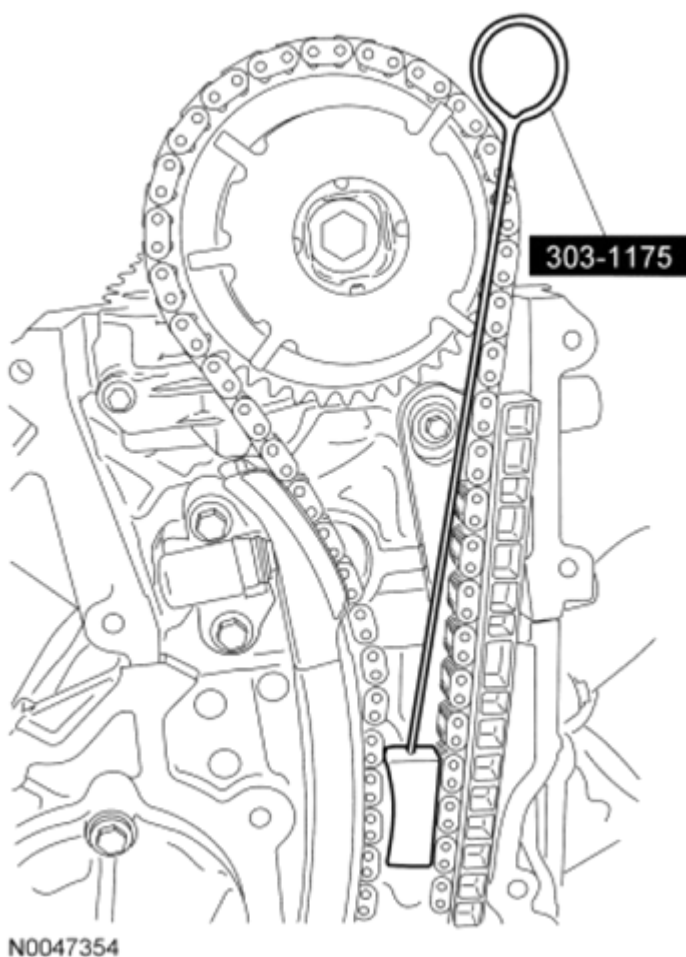


Fig. 179: Using Timing Chain Locking Tool In LH Timing Chain
Courtesy of FORD MOTOR CO.

4. 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.

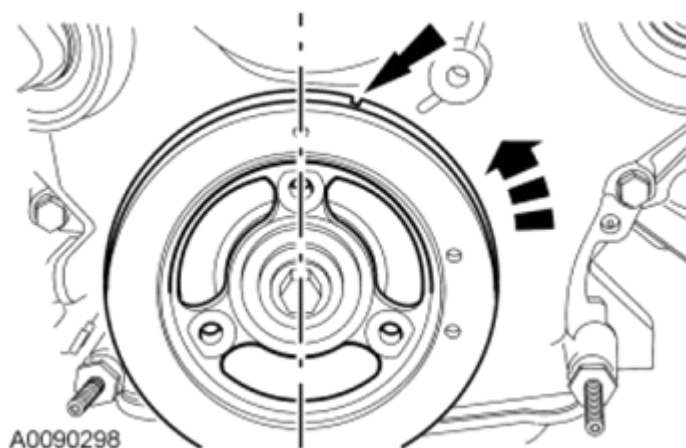


Fig. 180: Positioning Crankshaft Damper Spoke At 12 O'clock Position And Timing Mark Indentation At 1 O'clock Position
Courtesy of FORD MOTOR CO.

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

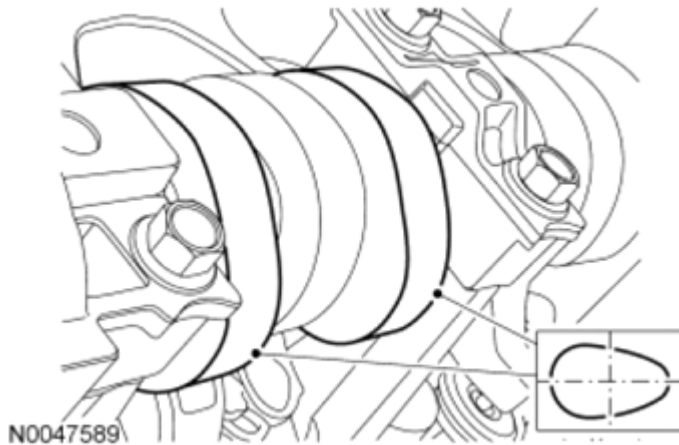
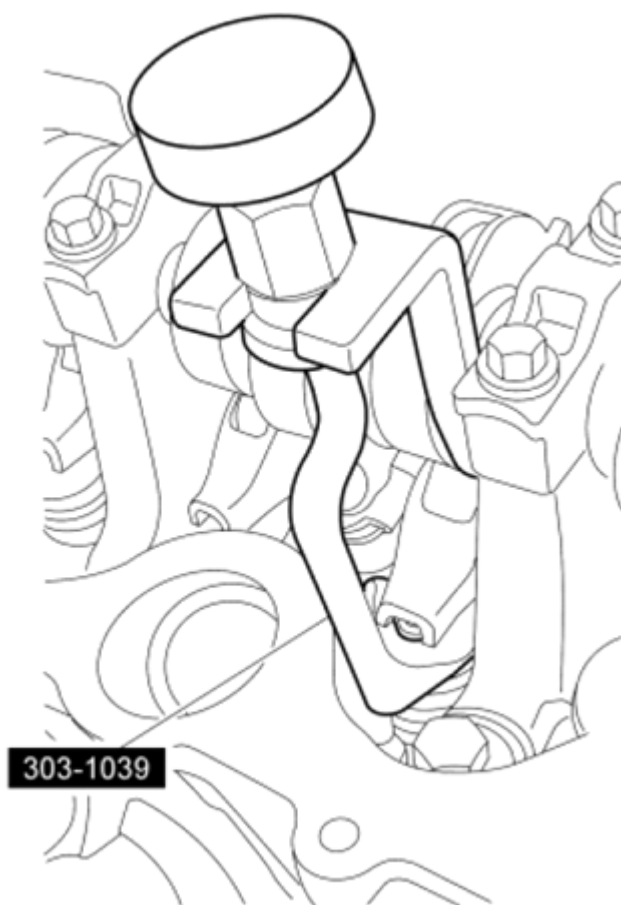


Fig. 181: View Of Camshaft Lobe
Courtesy of FORD MOTOR CO.

- NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.
- 6.

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

Using the Valve Spring Compressor, install the 3 originally removed camshaft roller followers.



N0010191

Fig. 182: Using Valve Spring Compressor (303-1039) On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

7. **NOTE:** Lubricate the O-ring seal with clean engine oil prior to installation.

Install the **CMP** sensor and the bolt.

- Tighten to 10 Nm (89 lb-in).

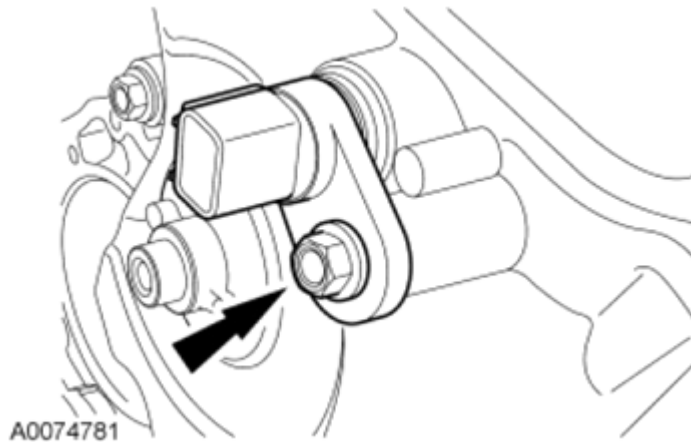


Fig. 183: Locating Bolt And LH CMP Sensor
Courtesy of FORD MOTOR CO.

8. Connect the **CMP** electrical connector.

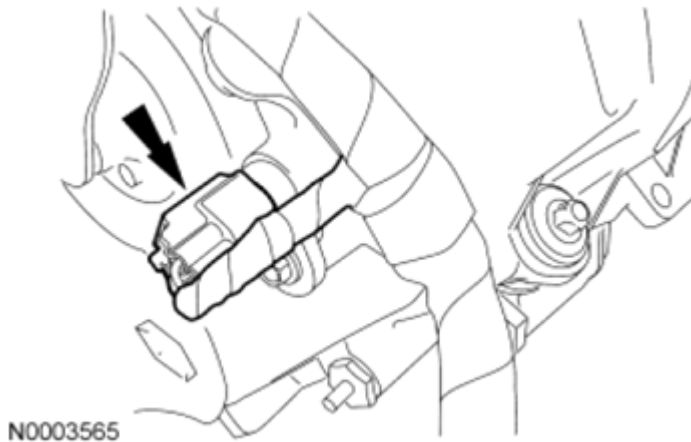


Fig. 184: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

9. **NOTE:** Only use hand tools to install the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

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

Tighten the camshaft phase and sprocket bolt in 2 stages:

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

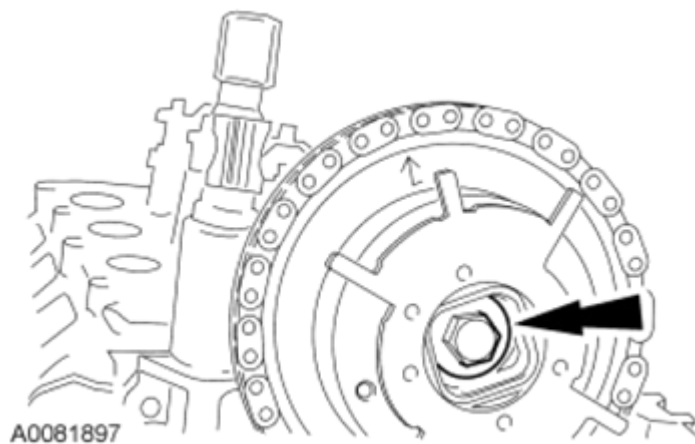


Fig. 185: Locating Camshaft Phaser And Sprocket Assembly Bolt
 Courtesy of FORD MOTOR CO.

10. Install the LH valve cover. For additional information, refer to **VALVE COVER - LH** in this information.

CAMSHAFT PHASER AND SPROCKET - RH

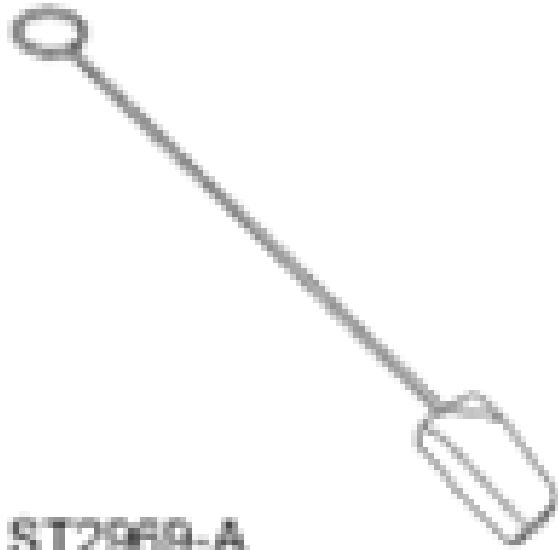
Special Tool(s)

SPECIAL TOOLS CHART

<p>ST2804-A</p> <p>A technical line drawing of a special tool, ST2804-A. It features a long, curved handle with a hook at the end and a cylindrical head with a flat top.</p>	<p>Compressor, Valve Spring 303-1039</p>

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



Locking Tool, Timing Chain 303-1175

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

NOTE: This 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.

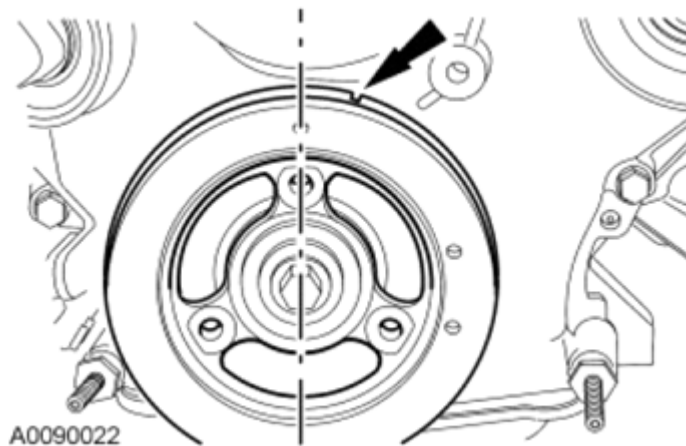


Fig. 186: Positioning Crankshaft Damper Spoke At 12 O'clock Position
Courtesy of FORD MOTOR CO.

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

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

3. **NOTE:** Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Loosen and back off the RH camshaft phase and sprocket bolt one full turn.

4. Disconnect the RH Camshaft Position (CMP) sensor electrical connector.

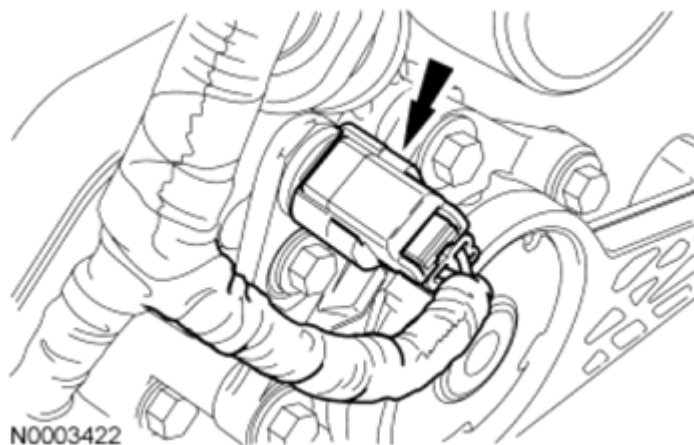


Fig. 187: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the bolt and the RH **CMP** sensor.

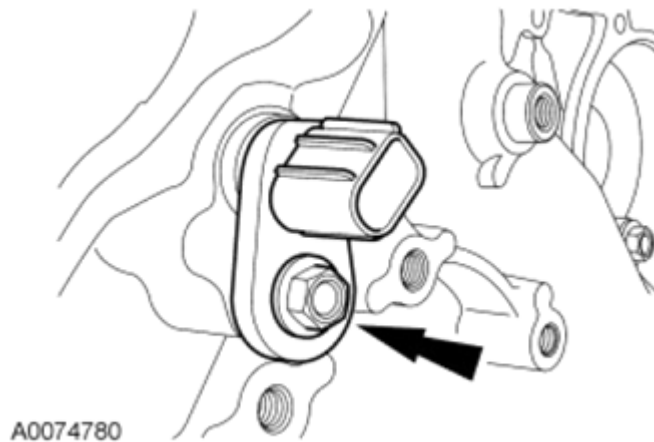


Fig. 188: Locating Bolt And RH CMP Sensor
Courtesy of FORD MOTOR CO.

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

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.

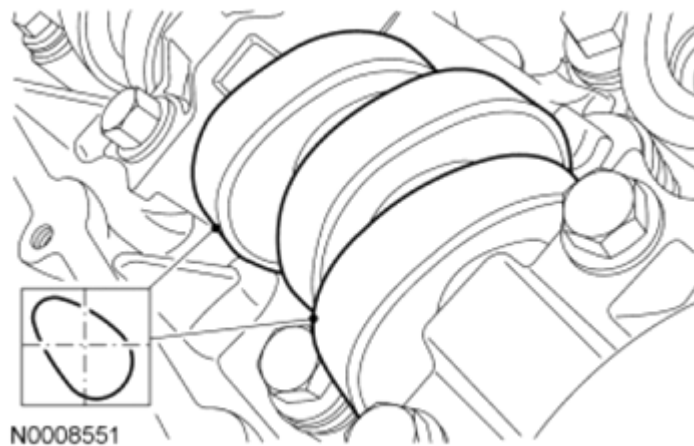
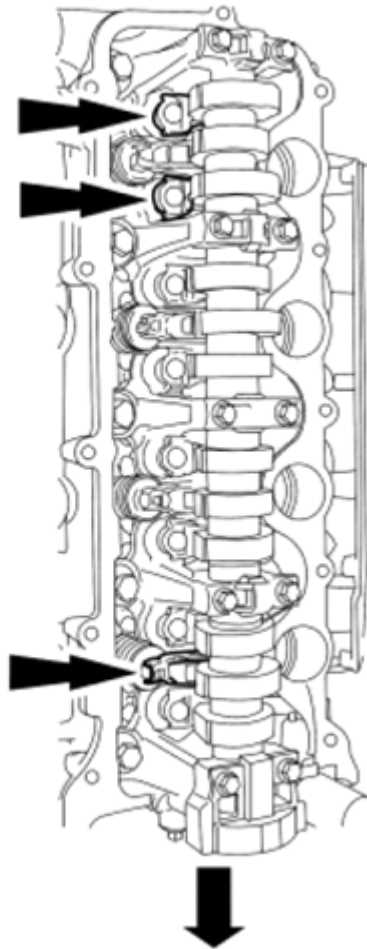


Fig. 189: Locating Intake Camshaft Lobes And Exhaust Lobe On No. 1 Cylinder
Courtesy of FORD MOTOR CO.

7. Remove only the 3 camshaft roller followers shown in the illustration.



A0083248

Fig. 190: Locating Cylinder Head Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

8. **NOTE:** The camshaft roller followers must be installed in their original locations. Record camshaft roller follower locations. Failure to follow these instructions may result in engine damage.
- NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.
- NOTE:** It may be necessary to push the valve down while compressing the spring.

Using the Valve Spring Compressor, remove only the 3 designated camshaft roller followers from the previous step.



Fig. 191: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

9. **NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set or engine damage may occur.

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.

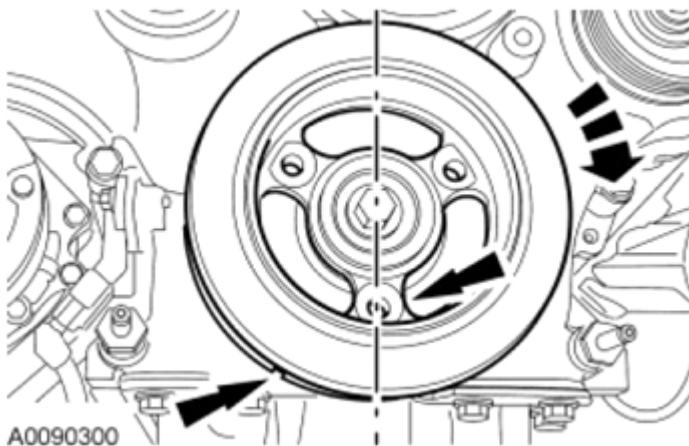


Fig. 192: Positioning Crankshaft Damper Spoke At 6 O'clock Position And Timing Mark Indentation At 7 O'clock Position
Courtesy of FORD MOTOR CO.

10. **NOTE:** Engine is not freewheeling. Camshaft procedure must be followed exactly or damage to valves and pistons will result.
- NOTE:** The Timing Chain Locking Tool must be installed square to the timing chain and the engine block.

NOTE: Engine front cover removed for clarity.

Install the Timing Chain Locking Tool in the RH timing chain as shown in the illustration.

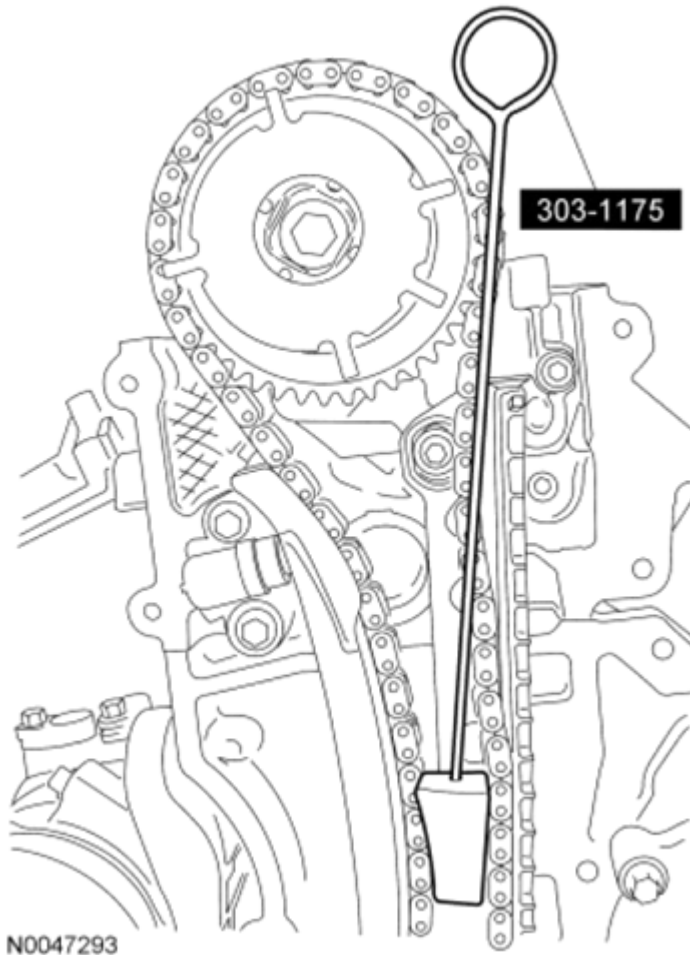


Fig. 193: Using Timing Chain Locking Tool In RH Timing Chain
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

11.

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

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

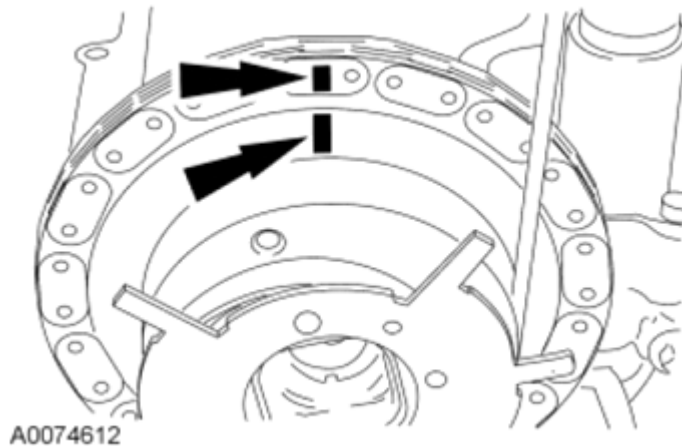


Fig. 194: Locating Scribe Marks Of Camshaft Phaser And Sprocket (RH)
Courtesy of FORD MOTOR CO.

12. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase and sprocket bolt or damage may occur to the camshaft or camshaft phase and sprocket.
- NOTE:** Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

Remove the bolt and remove the camshaft phase and sprocket assembly from camshaft.

- Discard the bolt and washer.

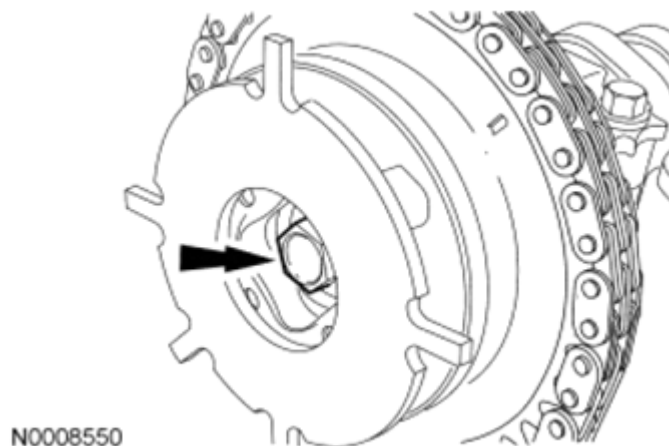


Fig. 195: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

13. Remove the camshaft phase and sprocket assembly from the timing chain and inspect for damage. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

Installation

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

1.

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

NOTE: If replacement of the camshaft phase and sprocket is necessary, transfer the scribe mark to the new camshaft phase and sprocket.

Position the camshaft phase and sprocket into the timing chain with the timing chain scribe marks in alignment.

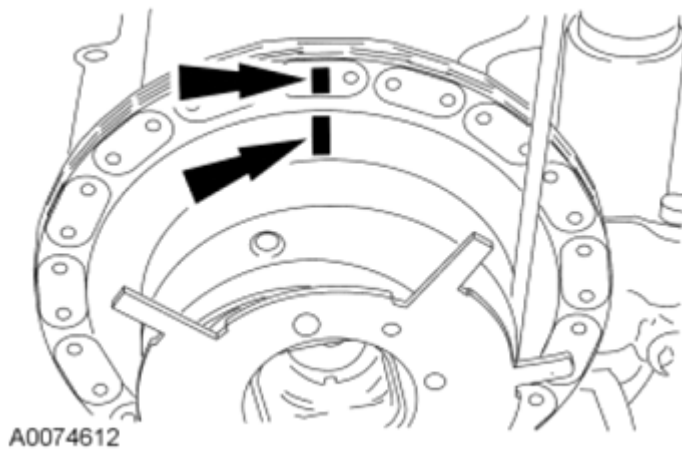


Fig. 196: Locating Scribe Marks Of Camshaft Phaser And Sprocket (RH)
Courtesy of FORD MOTOR CO.

NOTE: Do not remove the Timing Chain Locking Tool at any time during assembly. If the Timing Chain Locking 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** in this information.

2.

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

NOTE: Only use hand tools to install the camshaft phase and sprocket bolt or damage may occur to the camshaft or camshaft phase and sprocket.

Install the camshaft phase and sprocket assembly onto the camshaft and install a new camshaft phase and sprocket bolt finger-tight.

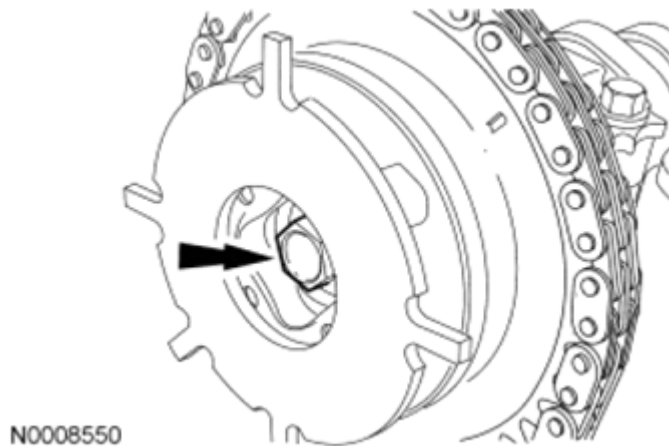


Fig. 197: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

3. **NOTE:** Engine front cover removed for clarity.

Remove the Timing Chain Locking Tool.

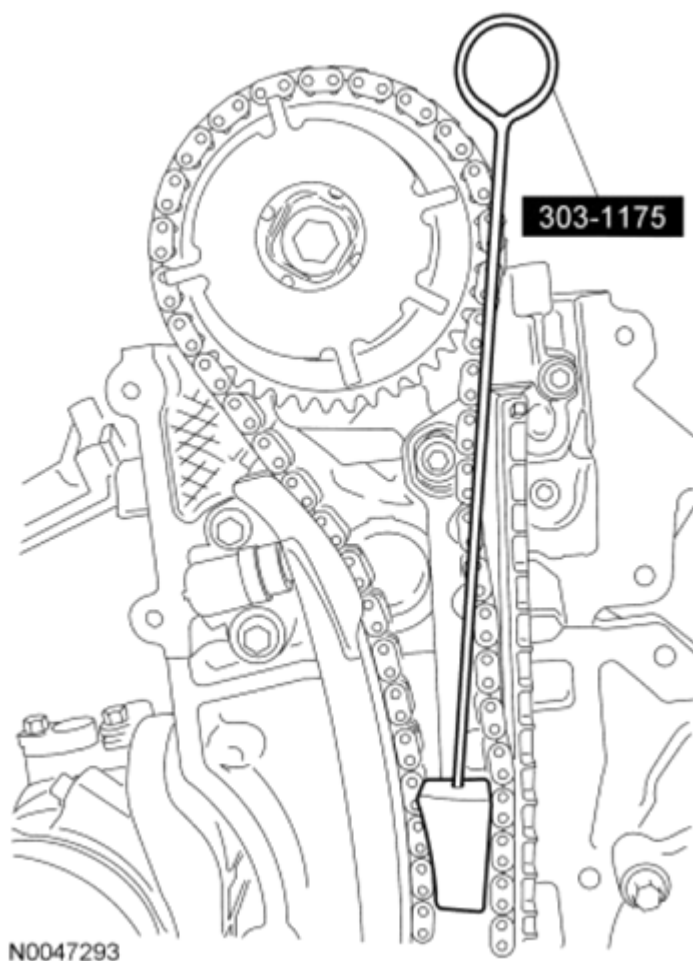


Fig. 198: Identifying Timing Chain Locking Tool In RH Timing Chain
Courtesy of FORD MOTOR CO.

4. 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.

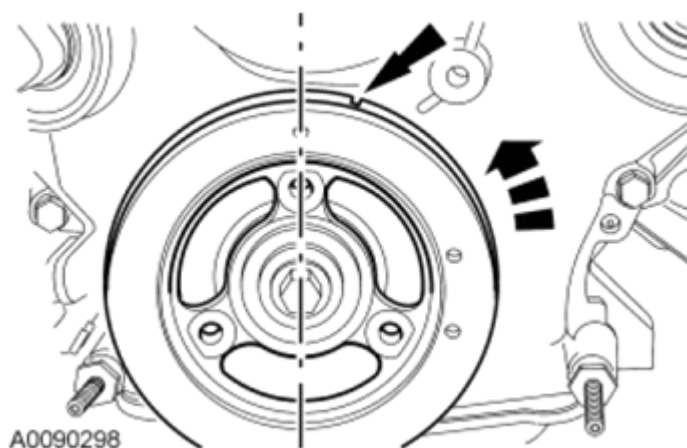


Fig. 199: Using Crankshaft Damper Spoke At 12 O'Clock Position And Timing Mark Indentation At 1 O'Clock Position

Courtesy of FORD MOTOR CO.

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

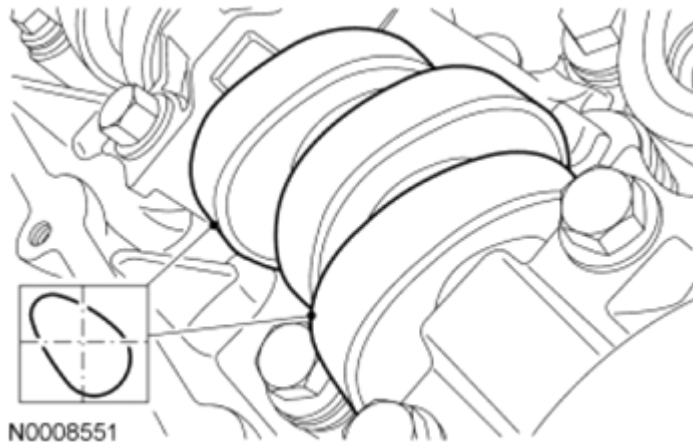


Fig. 200: Locating Intake Camshaft Lobes And Exhaust Lobe On No. 1 Cylinder

Courtesy of FORD MOTOR CO.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

6.

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

Using the Valve Spring Compressor, install the 3 originally removed camshaft roller followers.



Fig. 201: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

7. **NOTE:** Lubricate the O-ring seal with clean engine oil prior to installation.

Install the **CMP** sensor and the bolt.

- Tighten to 10 Nm (89 lb-in).

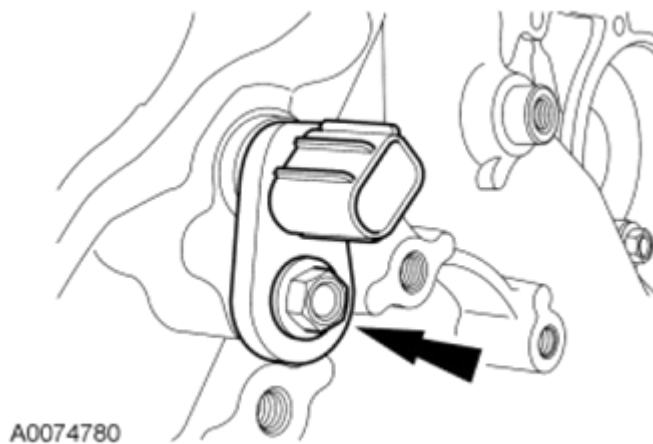


Fig. 202: Locating Bolt And RH CMP Sensor
Courtesy of FORD MOTOR CO.

8. Connect the **CMP** electrical connector.

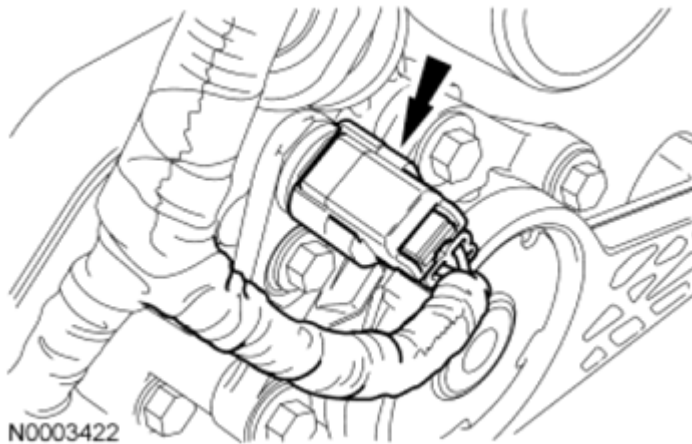


Fig. 203: Locating CMP Electrical Connector
Courtesy of FORD MOTOR CO.

9. **NOTE:** Only use hand tools to install the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

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

Tighten the new camshaft phase and sprocket bolt in 2 stages:

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

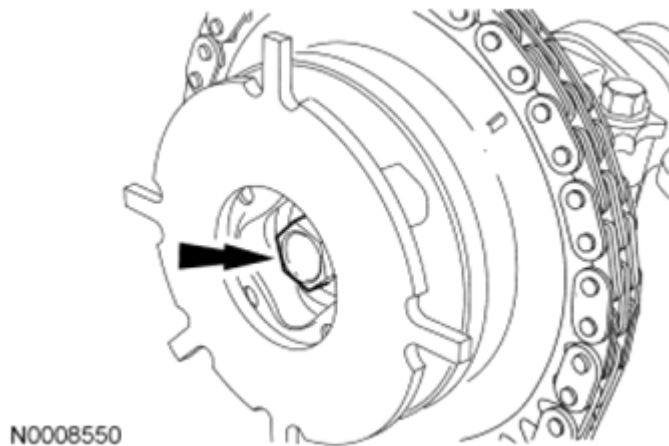


Fig. 204: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

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

VARIABLE CAMSHAFT TIMING (VCT) HOUSING

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-

Removal

All Variable Camshaft Timing (VCT) housings

1. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** in this information.

RH VCT housing

2. Remove the 2 bolts and the RH Variable Camshaft Timing (VCT) housing.

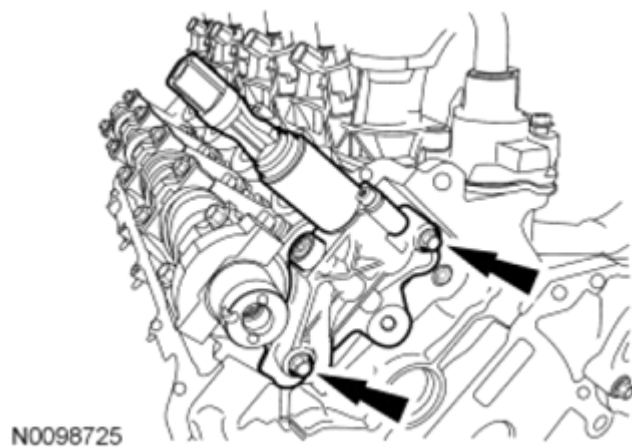


Fig. 205: Locating VCT Housing RH And Bolts
Courtesy of FORD MOTOR CO.

LH VCT housing

3. Remove the 2 bolts and the LH VCT housing.

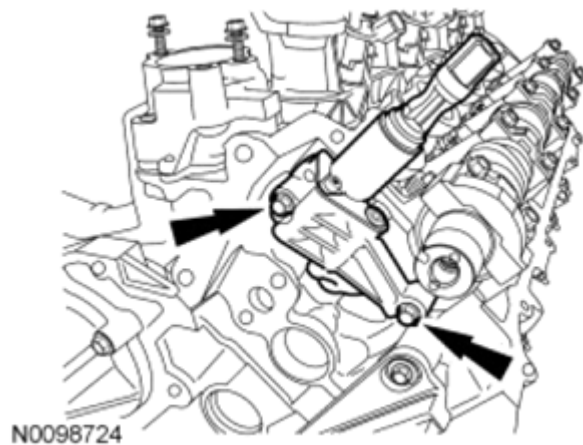
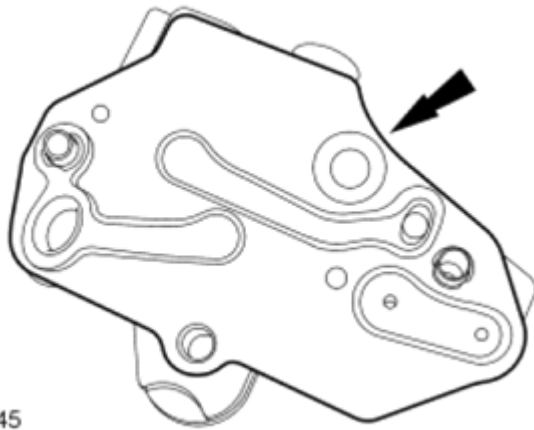


Fig. 206: Locating LH VCT Housing Bolts
Courtesy of FORD MOTOR CO.

All VCT housings

4. Remove and discard the VCT housing gasket.



N0096845

Fig. 207: Locating VCT Housing Gasket
Courtesy of FORD MOTOR CO.

NOTE: 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.

5.

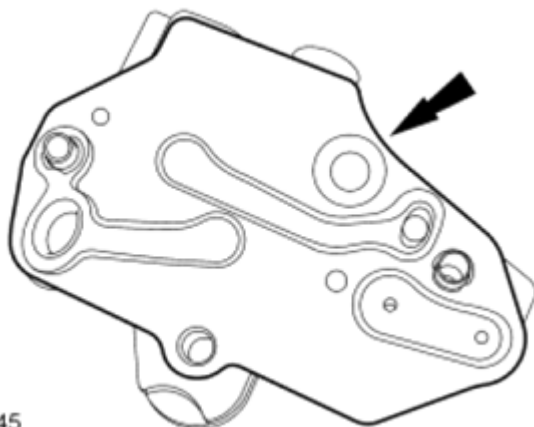
Clean and inspect the cylinder head sealing surfaces with metal surface prep. Follow the directions on the packaging.

6. Clean and inspect the VCT housing. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

Installation

All VCT housing

1. Install a new gasket onto the VCT housing.



N0096845

Fig. 208: Locating VCT Housing Gasket
Courtesy of FORD MOTOR CO.

RH VCT housing

2. Position the RH VCT housing and install the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

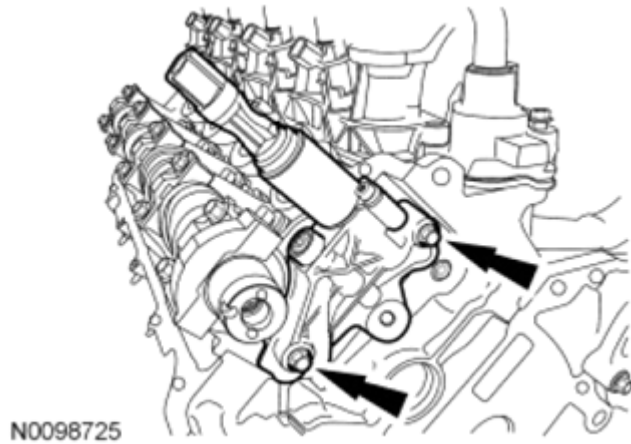


Fig. 209: Locating VCT Housing RH And Bolts
Courtesy of FORD MOTOR CO.

LH VCT housing

3. Position the LH VCT housing and install the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

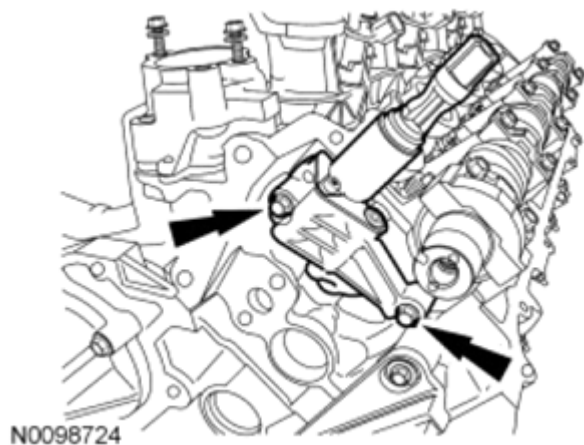


Fig. 210: Locating LH VCT Housing Bolts
Courtesy of FORD MOTOR CO.

All VCT housings

2011 Ford Expedition

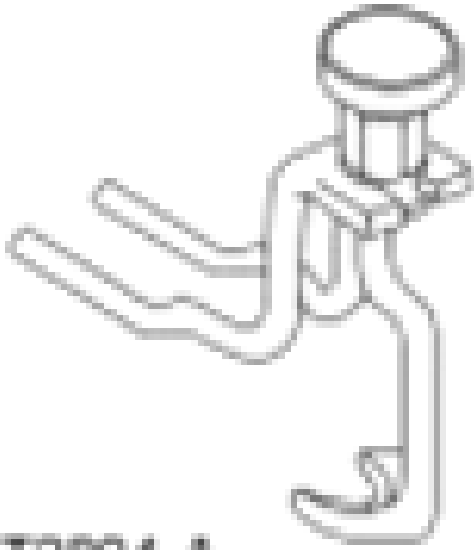
2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

4. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** in this information.

CAMSHAFT ROLLER FOLLOWER

Special Tool(s)

SPECIAL TOOLS CHART

 ST2804-A	Compressor, Valve Spring 303-1039
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Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

LH cylinder head camshaft roller followers

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

RH cylinder head camshaft roller followers

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

information.

All camshaft roller followers

3. 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.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

4. **NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

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

Using the Valve Spring Compressor, compress the valve spring and remove the camshaft roller follower.



Fig. 211: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

5. Repeat the previous 2 steps for each camshaft roller follower being serviced.
6. Inspect the camshaft roller follower. For additional information, refer to ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION.

Installation

All camshaft roller followers

- 1.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Failure to follow these instructions may result in engine damage.

1.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

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

NOTE: Lubricate the camshaft roller followers with clean engine oil prior to installation.

Using the Valve Spring Compressor, compress the valve spring and install the camshaft roller follower.



Fig. 212: Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

2. Repeat the previous step for each camshaft roller follower being serviced.

LH cylinder head camshaft roller followers

3. Install the LH valve cover. For additional information, refer to VALVE COVER - LH in this information.

RH cylinder head camshaft roller followers

4. Install the RH valve cover. For additional information, refer to VALVE COVER - RH in this information.

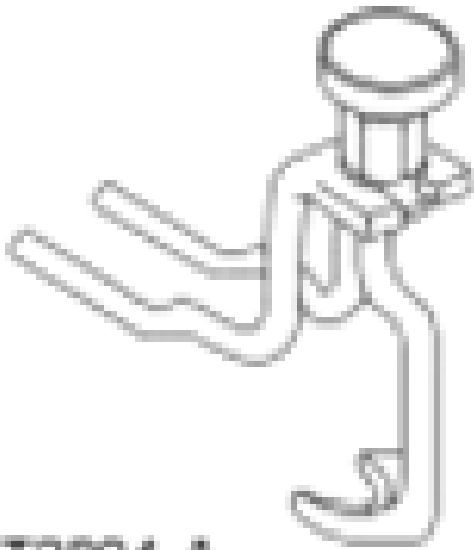
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

VALVE SPRINGS

Special Tool(s)

SPECIAL TOOLS CHART

 ST2804-A	Compressor, Valve Spring 303-1039
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Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

RH cylinder head valve springs

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

LH cylinder head valve springs

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

All valve springs

3. Remove the spark plug for the cylinder being serviced. For additional information, refer to **IGNITION SYSTEM - 5.4L (3V)**.
4. 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.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

5.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to **CYLINDER HEAD** in this information.

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

Using the Valve Spring Compressor, compress the valve spring and remove the camshaft roller follower.



Fig. 213: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

6. Use compressed air in the cylinder being serviced to hold both valves in position.
 - Apply a minimum of 965 kPa (140 psi) of compressed air into the cylinder.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

7.

NOTE: 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. If a valve drops into the cylinder, remove the cylinder head. For additional information, refer to CYLINDER HEAD in this information.

Using the Valve Spring Compressor, compress the valve spring and remove the valve spring retainer keys.



Fig. 214: Removing Valve Spring Retainer Keys
Courtesy of FORD MOTOR CO.

8. Remove the valve spring retainer and the valve spring.
9. Inspect the valve spring. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

Installation

All valve springs

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Failure to follow these instructions may result in engine damage.

- 1.

Using the Valve Spring Compressor, install the valve spring, the valve spring retainer and the valve spring retainer keys.



Fig. 215: Installing Valve Spring Retainer Keys
Courtesy of FORD MOTOR CO.

2. Relieve the air pressure from the cylinder.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Failure to follow this instruction may result in engine damage.

- 3.

NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.

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

NOTE: Lubricate the camshaft roller followers with clean engine oil prior to installation.

Using the Valve Spring Compressor, compress the valve spring and install the camshaft roller follower.



Fig. 216: Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

4. Install the spark plug. For additional information, refer to **IGNITION SYSTEM - 5.4L (3V)** .

LH cylinder head valve springs

5. Install the LH valve cover. For additional information, refer to **VALVE COVER - LH** in this information.

RH cylinder head valve springs

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

VALVE SEALS

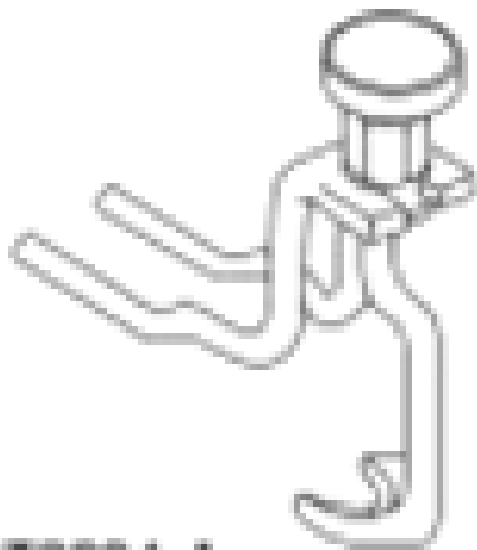
Special Tool(s)

SPECIAL TOOLS CHART

	Compressor, Valve Spring 303-1039
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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2804-A



ST1332-A

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

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

RH cylinder head valve seals

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

LH cylinder head valve seals

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

All valve seals

3. Remove the spark plug for the cylinder being serviced. For additional information, refer to **IGNITION SYSTEM - 5.4L (3V)**.
4. 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.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

5. **NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to **CYLINDER HEAD** in this information.

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

Using the Valve Spring Compressor, compress the valve spring and remove the camshaft roller follower.



Fig. 217: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

6. Use compressed air in the cylinder being serviced to hold the valves in position.
 - Apply a minimum of 965 kPa (140 psi) of compressed air into the cylinder.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

7.

NOTE: 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. If a valve drops into the cylinder, remove the cylinder head. For additional information, refer to CYLINDER HEAD in this information.

Using the Valve Spring Compressor, compress the valve spring and remove the valve spring retainer keys.



Fig. 218: Removing Valve Spring Retainer Keys
Courtesy of FORD MOTOR CO.

8. Remove the valve spring retainer, the valve spring and the valve seal.
 - Discard the valve seal.
9. Inspect the components. For additional information, refer to ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION.

Installation

All valve seals

- 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 Valve Stem Oil Seal Installer, install the new valve seal.

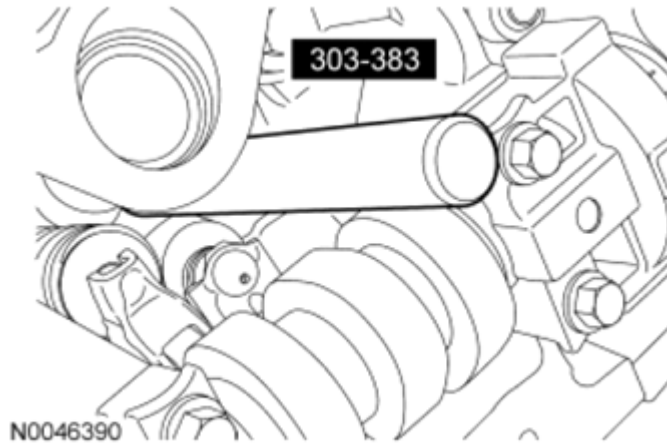


Fig. 219: Installing Valve Seal Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Failure to follow this instruction may result in engine damage.

- 3.

Using the Valve Spring Compressor, install the valve spring, the valve spring retainer and the valve spring retainer keys.



Fig. 220: Installing Valve Spring Retainer Keys
Courtesy of FORD MOTOR CO.

4. Relieve the air pressure from the cylinder.

5. **NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Failure to follow this instruction may result in engine damage.
- NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed. For additional information, refer to CYLINDER HEAD in this information.
- NOTE:** It may be necessary to push the valve down while compressing the spring.
- NOTE:** Lubricate the camshaft roller followers with clean engine oil prior to installation.

Using the Valve Spring Compressor, compress the valve spring and install the camshaft roller follower.



Fig. 221: Installing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

6. Install the spark plug. For additional information, refer to IGNITION SYSTEM - 5.4L (3V) .

LH cylinder head valve seals

7. Install the LH valve cover. For additional information, refer to VALVE COVER - LH in this information.

RH cylinder head valve seals

8. Install the RH valve cover. For additional information, refer to VALVE COVER - RH in this information.

HYDRAULIC LASH ADJUSTER

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal and Installation

RH cylinder head hydraulic lash adjusters

1. Remove the RH camshaft. For additional information, refer to **CAMSHAFT - RH** in this information.

LH cylinder head hydraulic lash adjusters

2. Remove the LH camshaft. For additional information, refer to **CAMSHAFT - LH** in this information.

All hydraulic lash adjusters

3. Remove the camshaft roller follower from the hydraulic lash adjuster being serviced.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

4.

Remove the hydraulic lash adjuster that is being serviced.

5. Inspect the hydraulic lash adjuster. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

NOTE: Lubricate the hydraulic lash adjuster with clean engine oil prior to installation.

6.

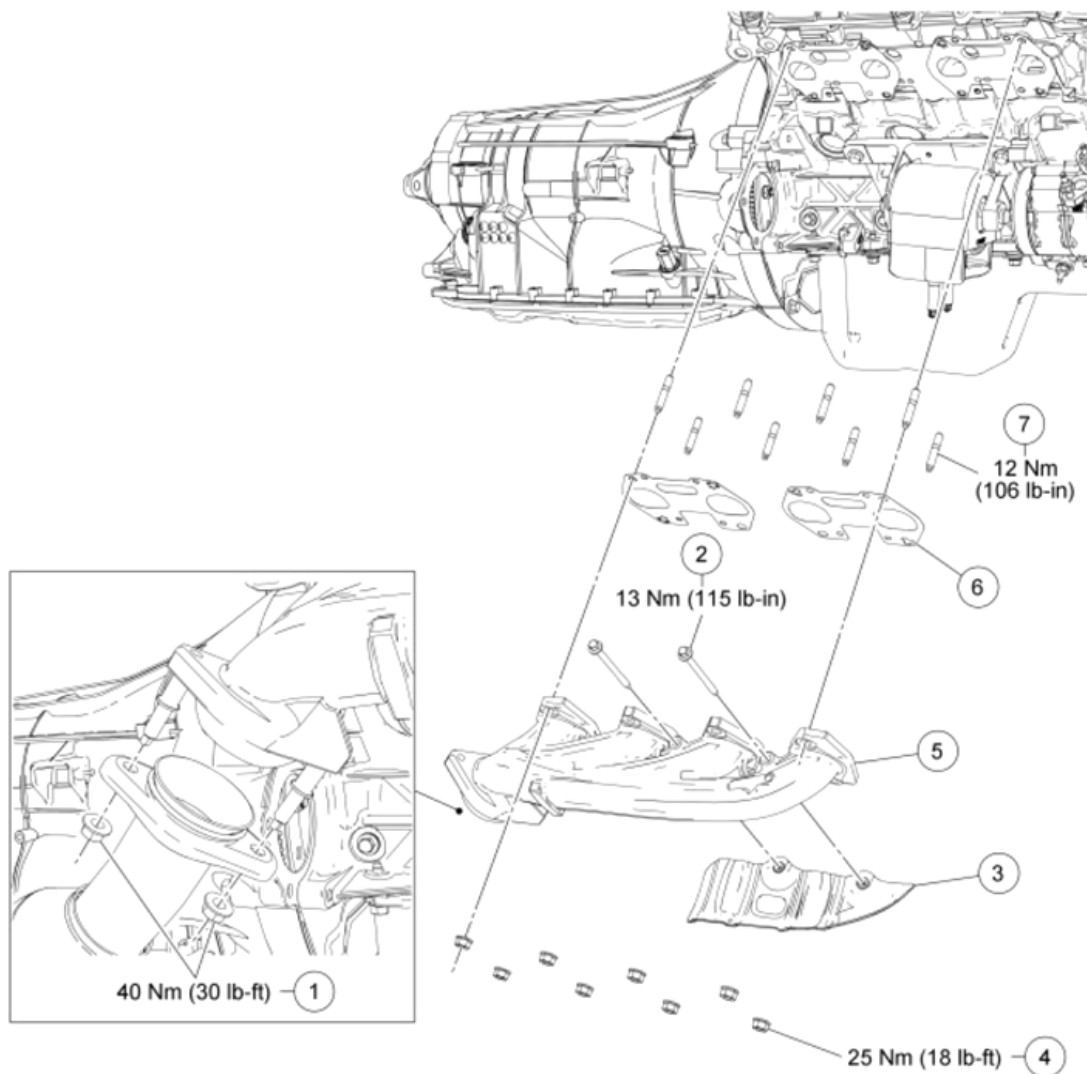
To install, reverse the removal procedure.

EXHAUST MANIFOLD - RH

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-



N0122609

Fig. 222: Exploded View Of Exhaust Manifold With Torque Specification (RH)
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	W520514	Exhaust Y-pipe flange nuts (2 required)
2	W711460	Exhaust manifold heat shield bolt (2 required)
3	9A462	Exhaust manifold heat shield
4	W701706	Exhaust manifold nut (8 required)
5	9430	Exhaust manifold
6	9448	Exhaust manifold gasket (2 required)
7	W707747	Exhaust manifold stud (8 required)

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the RH inner fenderwell. For additional information, refer to **BODY PANEL SYSTEM - FRONT END BODY PANELS**.
3. Remove the RH engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS**.
4. Remove the 2 bolts and the exhaust manifold heat shield.
5. Remove the 8 exhaust manifold nuts, the 8 studs and the exhaust manifold.
 - Discard the exhaust manifold nuts and studs.

NOTE: 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.

6.

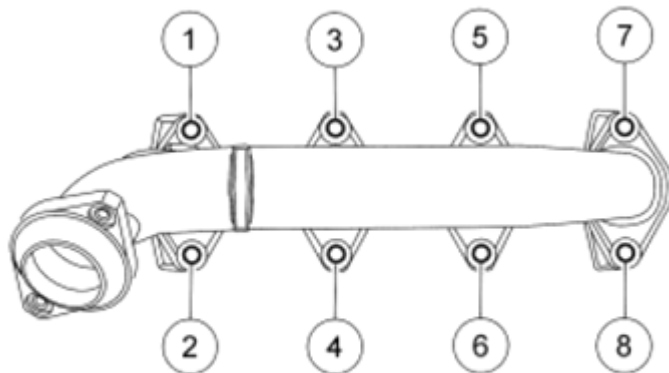
NOTE: Clean the sealing surfaces with metal surface prep. Follow the directions on the packaging.

Remove and discard the 2 exhaust manifold gaskets. Clean the sealing surfaces with metal surface prep.

7. Inspect the exhaust manifold. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

Installation

1. Using 2 new exhaust manifold gaskets and 8 new studs, position the 2 gaskets and exhaust manifold and install the 8 studs.
 - Tighten to 12 Nm (106 lb-in).
2. Using 8 new exhaust manifold nuts, install the 8 nuts.
 - Tighten to 25 Nm (18 lb-ft) in the sequence shown in the illustration.



N0008433

Fig. 223: Identifying Exhaust Manifold Nuts Tightening Sequence

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

Courtesy of FORD MOTOR CO.

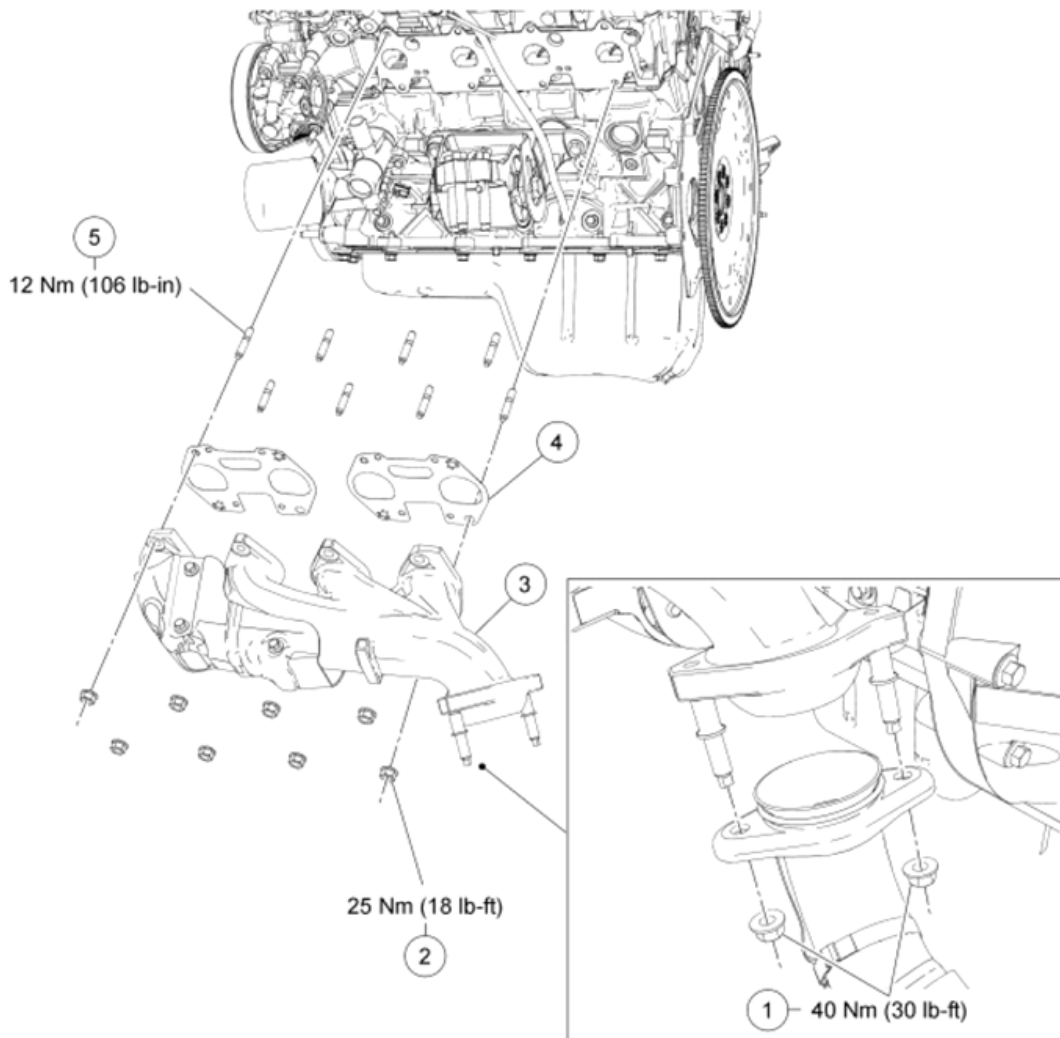
3. Position the exhaust manifold heat shield and install the 2 bolts.
 - Tighten to 13 Nm (115 lb-in).
4. Install the RH engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS**.
5. Install the RH inner fenderwell. For additional information, refer to **BODY PANEL SYSTEM - FRONT END BODY PANELS**.

EXHAUST MANIFOLD - LH

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-



N0102614

Fig. 224: Exploded View Of Exhaust Manifold With Torque Specification (LH)
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	W520514	Exhaust Y-pipe flange nuts (2 required)
2	W701706	Exhaust manifold nut (8 required)
3	9431	Exhaust manifold assembly
4	9Y431	Exhaust manifold gasket (2 required)
5	W707747	Exhaust manifold stud (8 required)

Removal

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION SYSTEM & INTAKE AIR FILTERING SYSTEM**.
3. Remove the degas bottle. For additional information, refer to **ENGINE COOLING SYSTEM**.

NOTE: Do not allow the steering column shaft to rotate while the intermediate shaft is disconnected or damage to the clockspring can result. If there is evidence that the shaft has rotated, the clockspring must be removed and re-centered. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM**.

4.

Remove the bolt and disconnect the steering shaft and position aside.

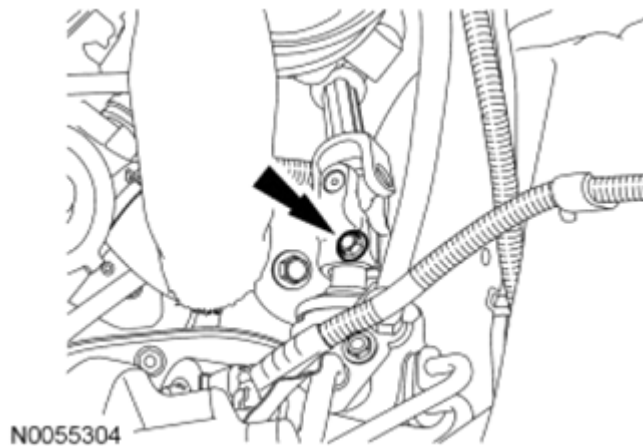


Fig. 225: Locating Steering Shaft And Bolt
Courtesy of FORD MOTOR CO.

5. Remove the 4 (2 LH and 2 RH) exhaust manifold-to-catalytic converter nuts.

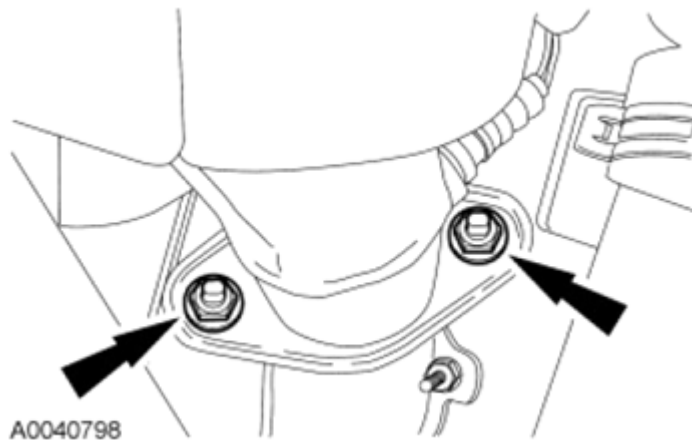


Fig. 226: Locating Exhaust Manifold-To-Catalytic Converter Nuts

Courtesy of FORD MOTOR CO.

Four-Wheel Drive (4WD) vehicles

6. Remove the front driveshaft. For additional information, refer to **DRIVESHAFT** .

All vehicles

7. Remove the 8 exhaust manifold nuts, the 8 studs and the exhaust manifold.
 - Discard the exhaust manifold nuts and studs.

NOTE: 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.

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

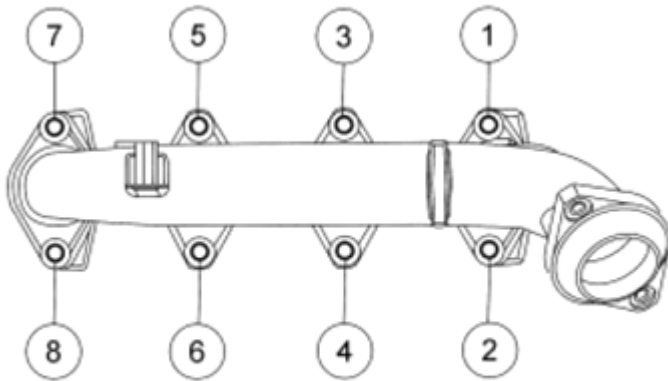
Remove and discard the 2 exhaust manifold gaskets. Clean the sealing surfaces with metal surface prep.

9. Inspect the exhaust manifold. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .

Installation

All vehicles

1. Using 2 new exhaust manifold gaskets and 8 new studs, position the 2 gaskets and exhaust manifold and install the 8 studs.
 - Tighten to 12 Nm (106 lb-in).
2. Using new exhaust manifold nuts, install the 8 nuts.
 - Tighten to 25 Nm (18 lb-ft) in the sequence shown in the illustration.



N0010196

Fig. 227: Identifying Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

4WD vehicles

3. Install the front driveshaft. For additional information, refer to **DRIVESHAFT**.

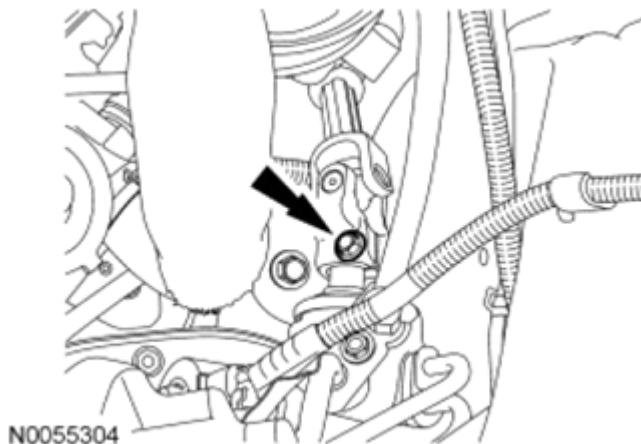
All vehicles

NOTE: Do not allow the steering column shaft to rotate while the intermediate shaft is disconnected or damage to the clockspring can result. If there is evidence that the shaft has rotated, the clockspring must be removed and re-centered. For additional information, refer to **SUPPLEMENTAL RESTRAINT SYSTEM**.

- 4.

Connect the steering shaft and install the bolt.

- To install, tighten to 30 Nm (22 lb-ft).



N0055304

Fig. 228: Locating Steering Shaft And Bolt

Courtesy of FORD MOTOR CO.

5. Install the 4 exhaust manifold-to-catalytic converter nuts.

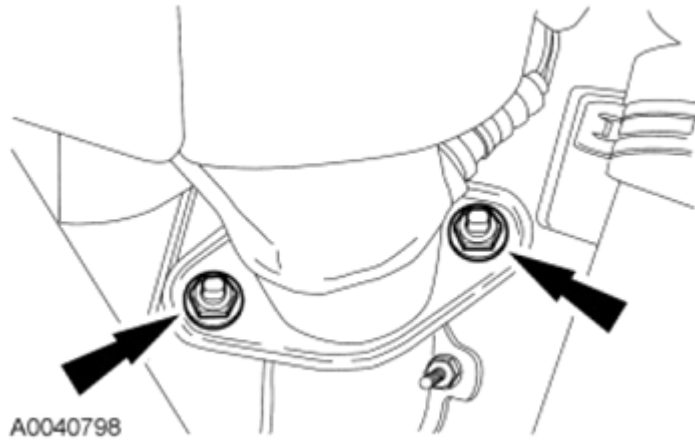


Fig. 229: Locating Exhaust Manifold-To-Catalytic Converter Nuts
Courtesy of FORD MOTOR CO.

6. Install the degas bottle. For additional information, refer to **ENGINE COOLING SYSTEM** .
7. Install the ACL outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION SYSTEM & INTAKE AIR FILTERING SYSTEM** .

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

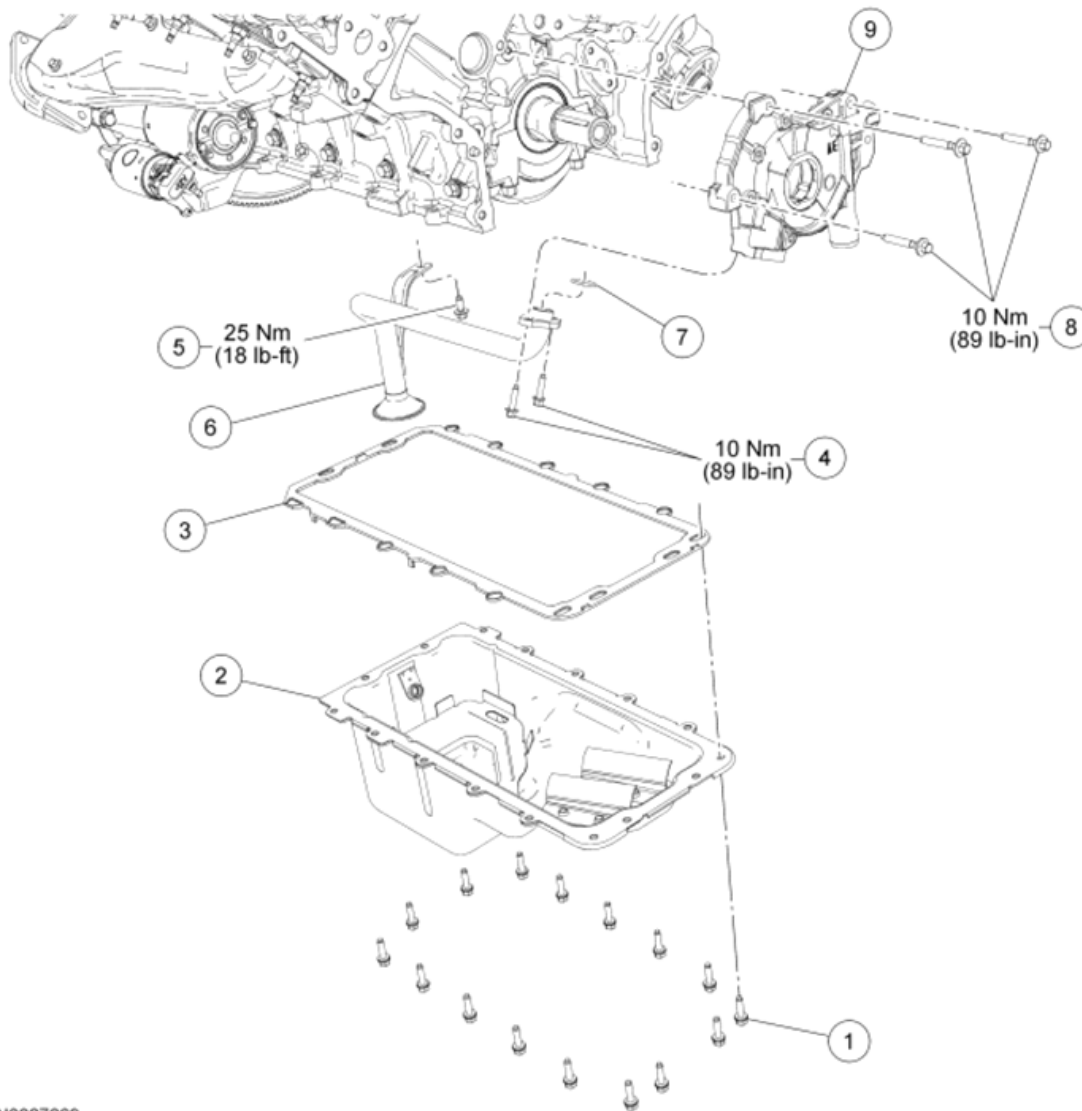


Fig. 230: Exploded View Of Engine Lubrication With Torque Specification
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	W701605	Oil pan bolt (16 required)
2	6675	Oil pan
3	6710	Oil pan gasket
4	N806155	Oil pump screen and pickup tube-to-oil pump bolts (2 required)
5	N605904	Oil pump screen and pickup tube support bracket bolt
6	6622	Oil pump screen and pickup tube
7	6625	Oil pump screen and pickup tube O-ring seal
8	N806183	Oil pump bolts (3 required)

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

9 | 6621 | Oil pump

1. For additional information, refer to the appropriate procedures in this information.

OIL PAN

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-

Removal

All vehicles

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

Four-Wheel Drive (4WD) vehicles

2. If equipped, remove the 10 bolts and the 2 skid plates.

All vehicles

3. Remove the oil drain plug and drain the engine oil. Install the drain plug when finished.
 - Tighten to 23 Nm (17 lb-ft).

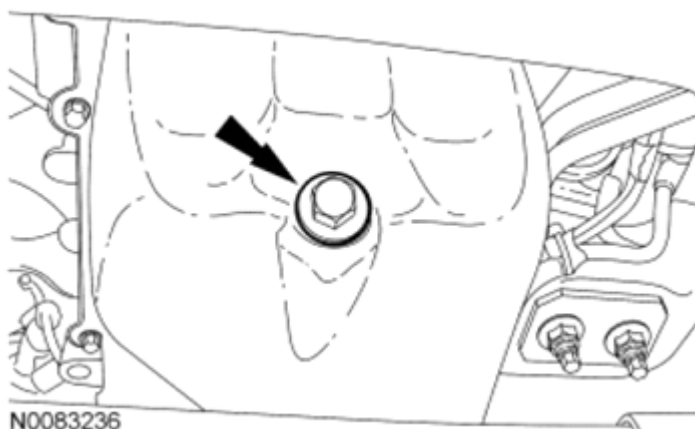


Fig. 231: Locating Drain Plug
Courtesy of FORD MOTOR CO.

4. Remove the 4 nuts, the 4 bolts and the crossmember.

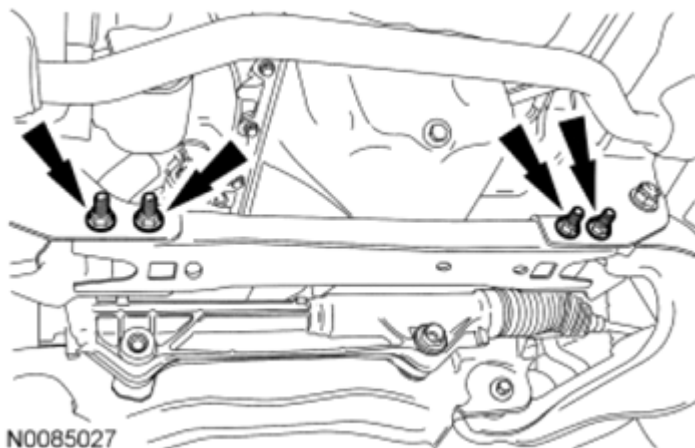


Fig. 232: Locating Crossmember Nuts And Bolts
Courtesy of FORD MOTOR CO.

4WD vehicles

5. Position a suitable hydraulic jack under the front axle. Securely strap the jack to the axle.



Fig. 233: Positioning Suitable Hydraulic Jack Under Front Axle
Courtesy of FORD MOTOR CO.

NOTE: Rotate the steering column so the pinch bolt for the steering column coupling allows clearance for the isolator bolt.

6.

Remove the upper front axle carrier mounting bushing bolt.

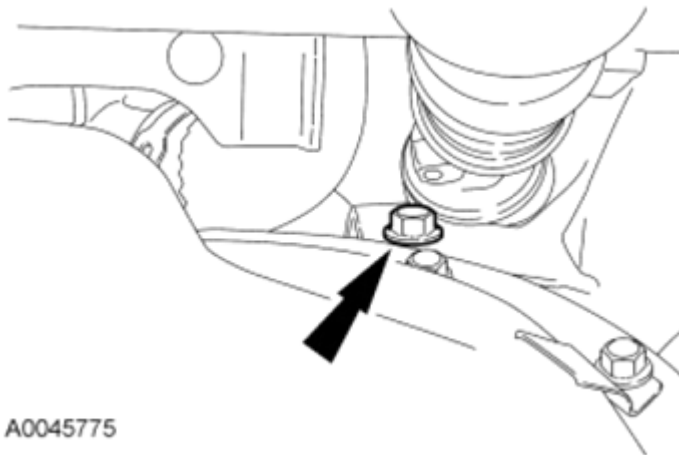


Fig. 234: Locating Upper Front Axle Carrier Mounting Bushing Bolt
Courtesy of FORD MOTOR CO.

7. Remove the axle shaft housing carrier bushing bolt.

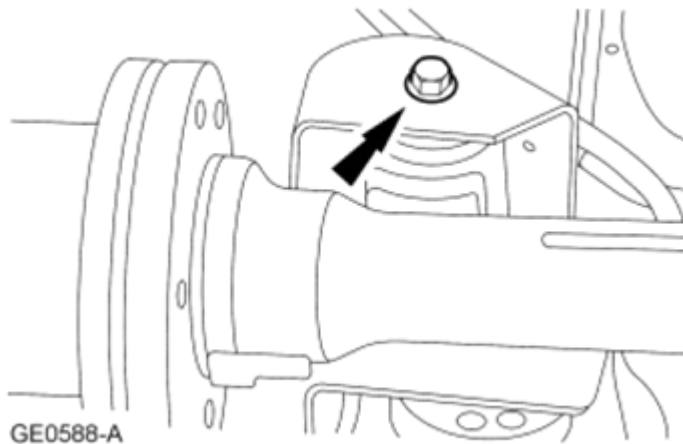


Fig. 235: Locating Axle Shaft Housing Carrier Bushing Bolt
Courtesy of FORD MOTOR CO.

8. Remove the lower front axle carrier mounting bushing bolt.

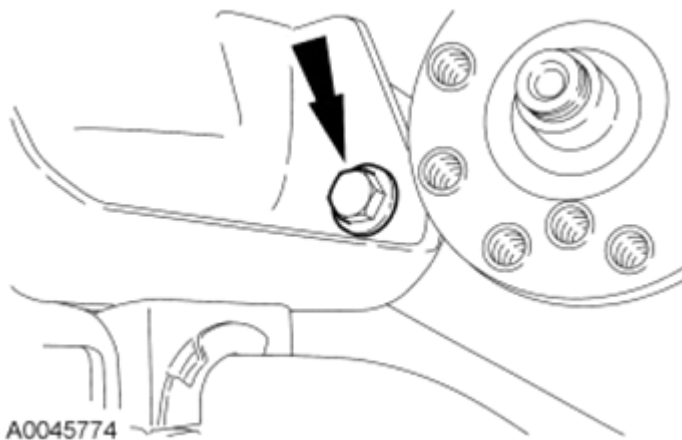


Fig. 236: Locating Lower Front Axle Carrier Mounting Bushing Bolt
Courtesy of FORD MOTOR CO.

- NOTE:** Use care when lowering the front axle housing, or the vacuum lines to the axle solenoid may become disconnected or damaged.
- 9.

Lower the axle to allow clearance for the oil pan to be removed.

All vehicles

10. Remove the starter wiring harness rear support bracket bolt.

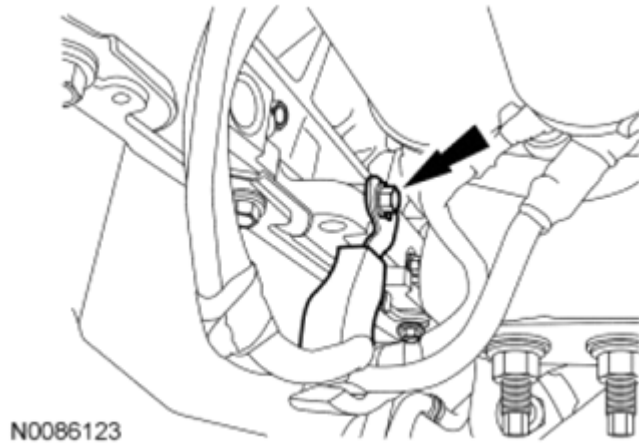


Fig. 237: Locating Starter Wiring Harness Rear Support Bracket And Bolt
Courtesy of FORD MOTOR CO.

11. Remove the nut and position the starter wiring harness and the transmission fluid cooler tubes aside.

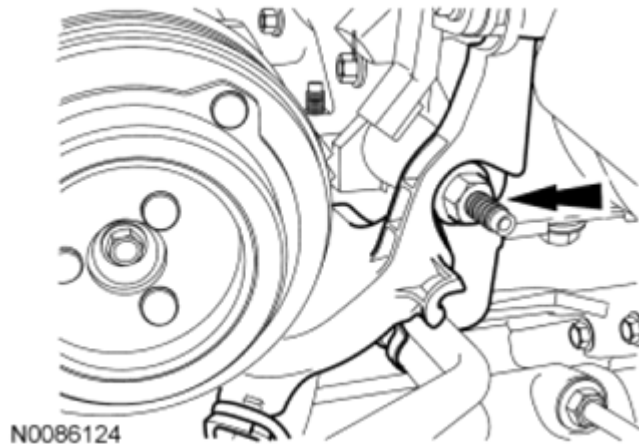


Fig. 238: Locating Transmission Cooler Tube Support Bracket And Nut
Courtesy of FORD MOTOR CO.

12. Detach the oil pressure switch wiring harness from the oil pan bolt.

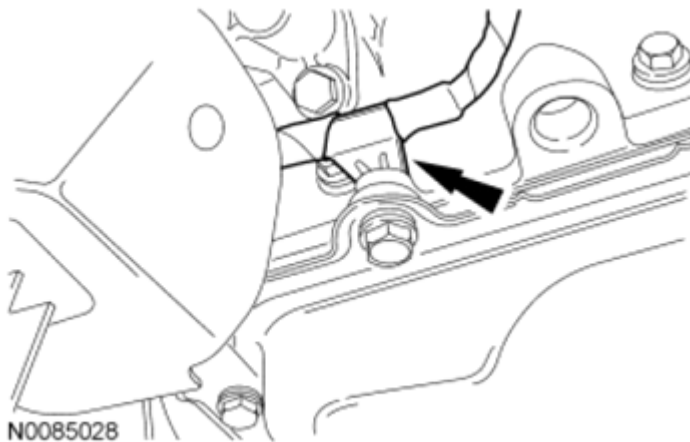


Fig. 239: Locating Oil Pan Bolt
Courtesy of FORD MOTOR CO.

13. Remove the 16 bolts, the oil pan and the gasket.
 - Discard the gasket.

NOTE: 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.

14.

Inspect the oil pan. Clean the gasket mating surfaces of the oil pan and engine block with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

Installation

All vehicles

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. 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.

1.

Apply silicone gasket and sealant at the crankshaft rear seal retainer plate-to-cylinder block sealing surface.

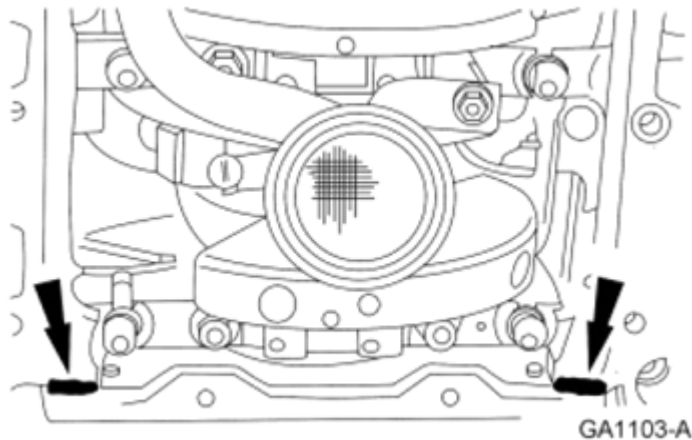
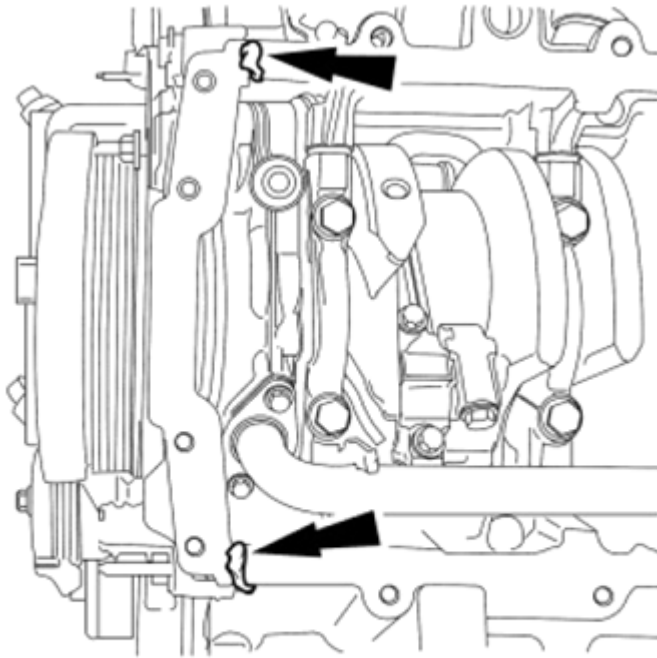


Fig. 240: Locating Area For Applying Bead Of Silicone Gasket And Sealant
Courtesy of FORD MOTOR CO.

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. 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.

2.

Apply silicone gasket and sealant at the engine front cover-to-cylinder block sealing surface.



N0032191

Fig. 241: Locating Silicone Gasket And Sealant Application Points
Courtesy of FORD MOTOR CO.

3. Position a new gasket and the oil pan and install the 16 bolts.
 - Tighten the bolts in the sequence shown in the illustration in 3 stages.
 - Stage 1: Tighten to 2 Nm (18 lb-in).
 - Stage 2: Tighten to 20 Nm (177 lb-in).
 - Stage 3: Tighten an additional 60 degrees.

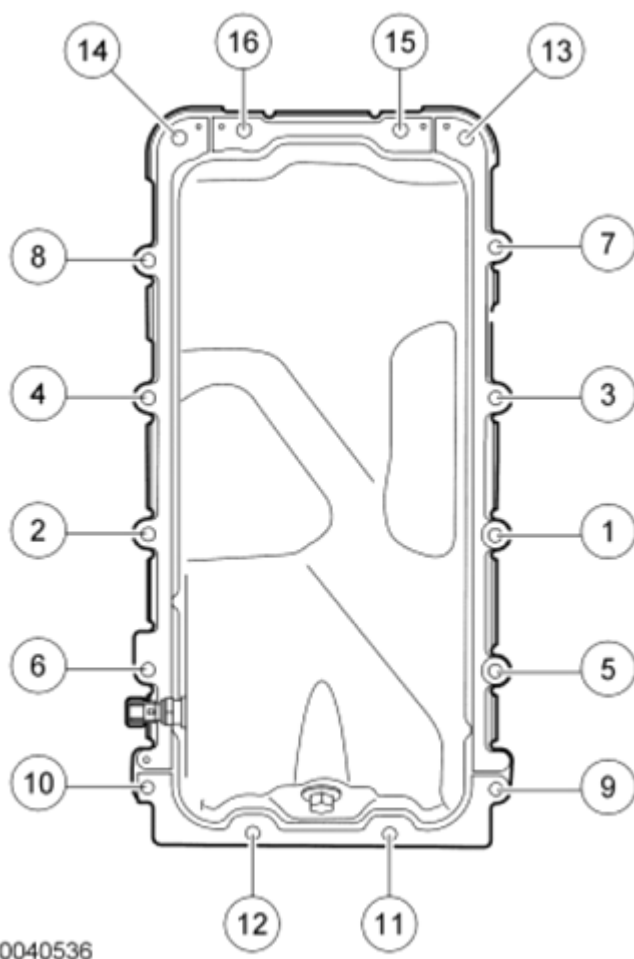


Fig. 242: Identifying Gasket And Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Attach the oil pressure switch wiring harness to the oil pan bolt.

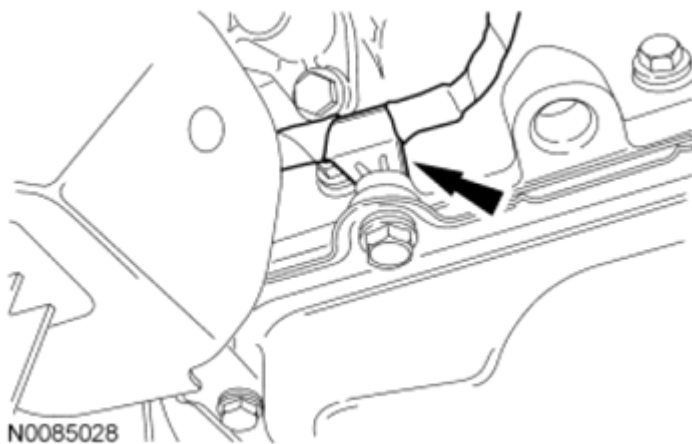


Fig. 243: Locating Oil Pan Bolt

Courtesy of FORD MOTOR CO.

5. Position the transmission fluid cooler tube support bracket, the starter wiring harness support bracket and install the nut.
 - Tighten to 10 Nm (89 lb-in).

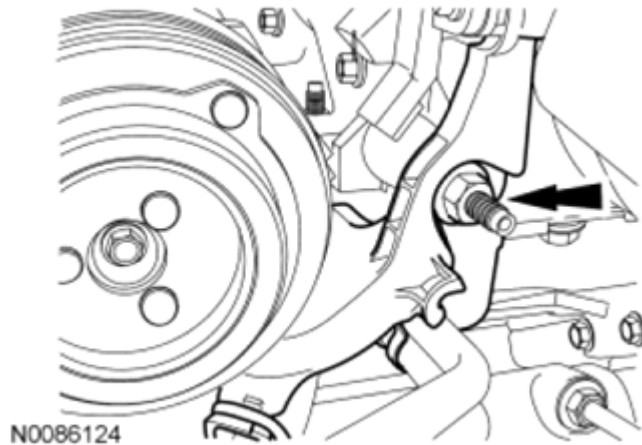


Fig. 244: Locating Transmission Cooler Tube Support Bracket And Nut
Courtesy of FORD MOTOR CO.

6. Position the starter wiring harness and install the starter wiring harness rear support bracket bolt.
 - Tighten to 10 Nm (89 lb-in).

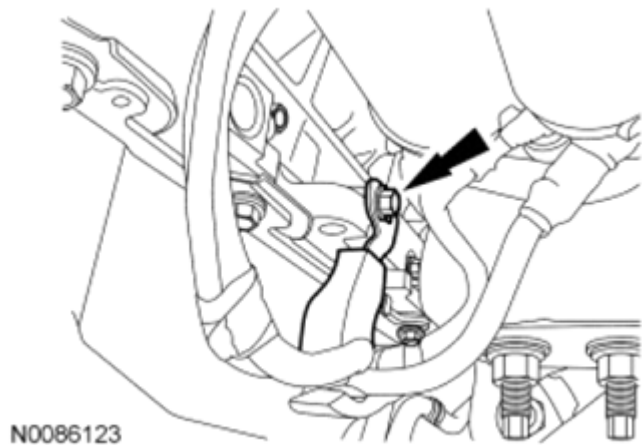


Fig. 245: Locating Starter Wiring Harness Rear Support Bracket And Bolt
Courtesy of FORD MOTOR CO.

7. Install the transmission fluid cooling tubes rear support bracket bolt.
 - Tighten to 48 Nm (35 lb-ft).

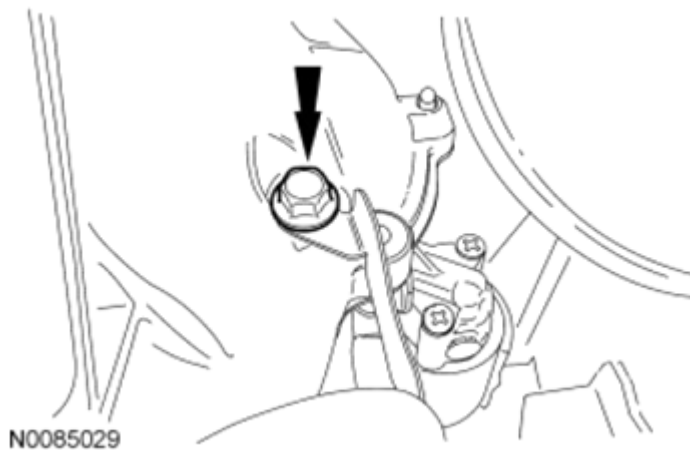


Fig. 246: Locating Transmission Fluid Cooling Tubes Rear Support Bracket Bolt
Courtesy of FORD MOTOR CO.

4WD vehicles

8. **NOTE:** Use care when positioning the front axle housing, or the vacuum lines to the axle solenoid may become disconnected or damaged.

Raise the front axle carrier into position.

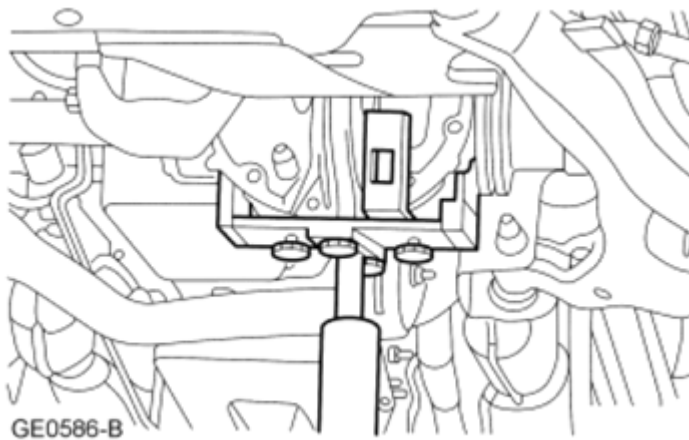


Fig. 247: Positioning Suitable Hydraulic Jack Under Front Axle
Courtesy of FORD MOTOR CO.

9. Install the lower front axle carrier mounting bushing bolt.
- Tighten to 115 Nm (85 lb-ft).

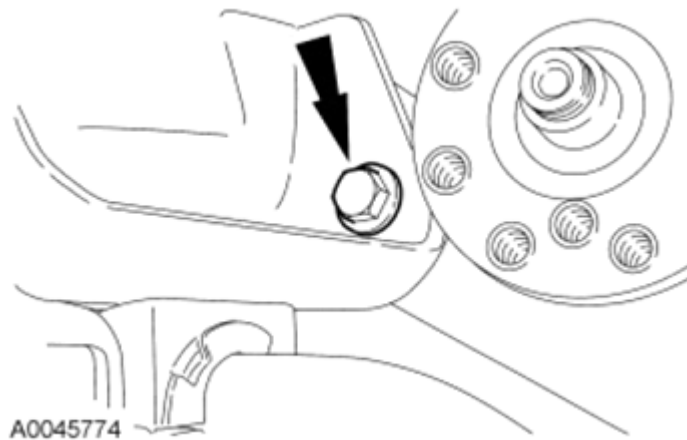


Fig. 248: Locating Lower Front Axle Carrier Mounting Bushing Bolt
Courtesy of FORD MOTOR CO.

10. Install the axle shaft housing carrier bushing bolt.
 - Tighten to 115 Nm (85 lb-ft).

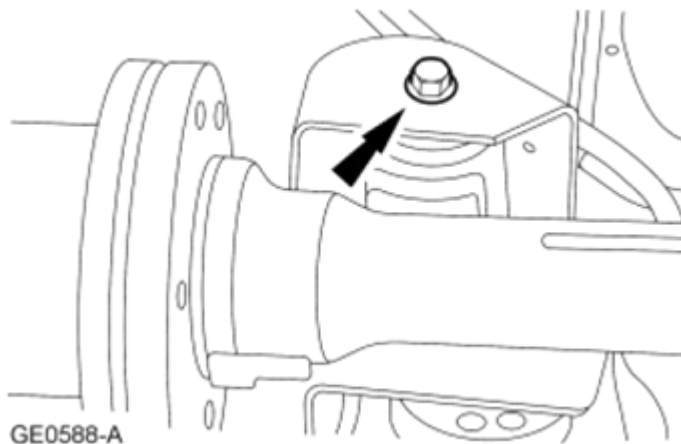


Fig. 249: Locating Axle Shaft Housing Carrier Bushing Bolt
Courtesy of FORD MOTOR CO.

11. Install the upper front axle carrier mounting bushing bolt.
 - Tighten to 115 Nm (85 lb-ft).

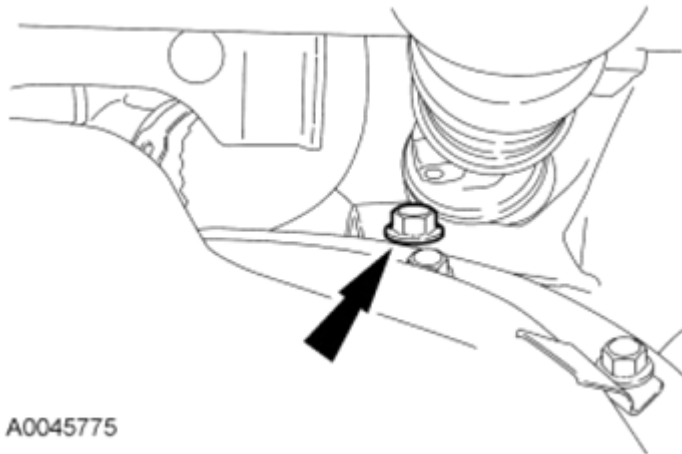


Fig. 250: Locating Upper Front Axle Carrier Mounting Bushing Bolt
Courtesy of FORD MOTOR CO.

All vehicles

12. Position the crossmember and install the 4 bolts and the 4 nuts.
 - Tighten to 90 Nm (66 lb-ft).

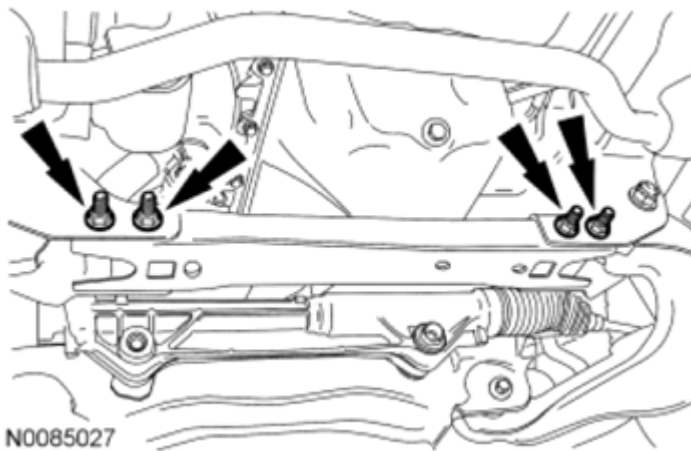


Fig. 251: Locating Crossmember Nuts And Bolts
Courtesy of FORD MOTOR CO.

4WD vehicles

13. If equipped, install the 2 skid plates and the 10 bolts.
 - Tighten to 48 Nm (35 lb-ft).

All vehicles

14. Fill the engine with clean engine oil.

OIL PUMP

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

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

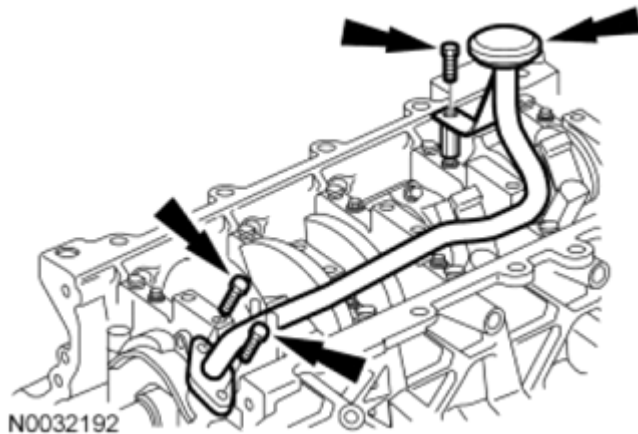


Fig. 252: Removing Oil Pump Screen And Pickup Tube Bolts
Courtesy of FORD MOTOR CO.

4. Remove the 3 bolts and the oil pump.



Fig. 253: Locating Oil Pump And Bolts
Courtesy of FORD MOTOR CO.

Installation

- NOTE:** 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 3 bolts.
 - Tighten to 10 Nm (89 lb-in).

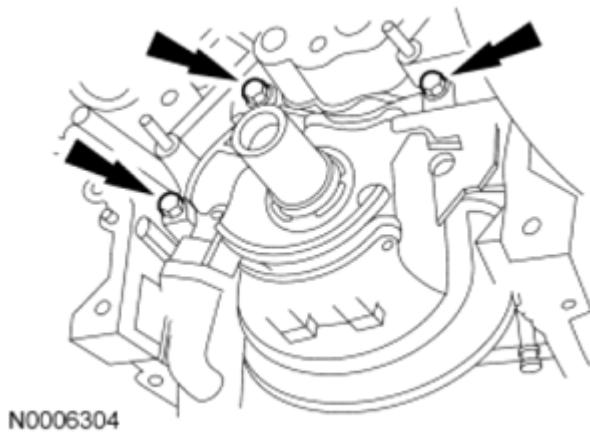


Fig. 254: Locating Oil Pump And Bolts
Courtesy of FORD MOTOR CO.

- 3.

NOTE: 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.

3.

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

Position the oil pump screen and pickup tube and install the 3 bolts.

- Tighten the 2 oil pump screen and pickup tube-to-oil pump bolts to 10 Nm (89 lb-in).
- Tighten the oil pump screen and pickup tube-to-spacer bolt to 25 Nm (18 lb-ft).

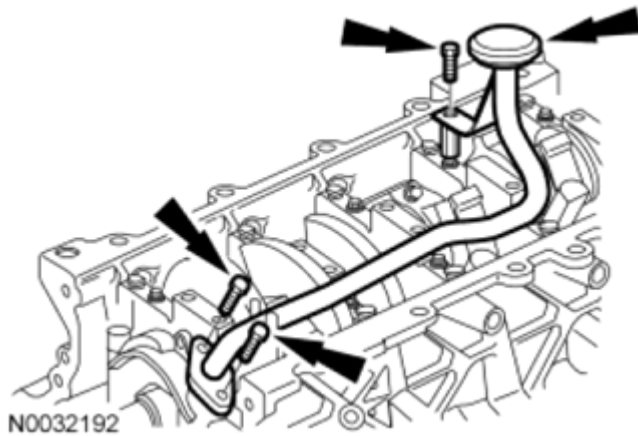


Fig. 255: Removing Oil Pump Screen And Pickup Tube Bolts

Courtesy of FORD MOTOR CO.

4. Install the oil pan. For additional information, refer to **OIL PAN** in this information.
5. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS** in this information.

OIL PUMP SCREEN AND PICKUP TUBE

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

1. Remove the oil pan. For additional information, refer to **OIL PAN** in this information.

2. Remove the 3 bolts and the oil pump screen and pickup tube.

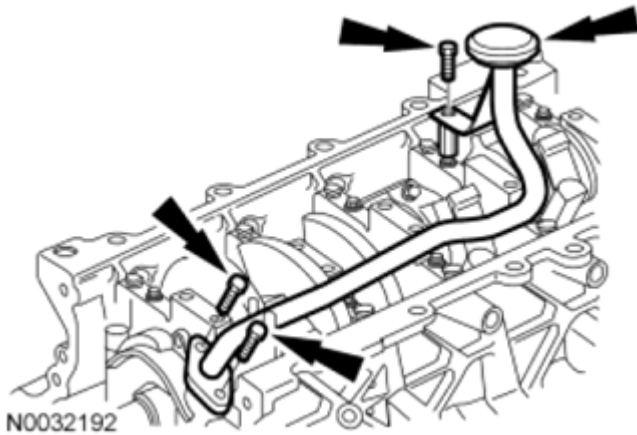


Fig. 256: Removing Oil Pump Screen And Pickup Tube Bolts
Courtesy of FORD MOTOR CO.

Installation

NOTE: 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.

1.

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

Position the oil pump screen and pickup tube and install the 3 bolts.

- Tighten the 2 oil pump screen and pickup tube-to-oil pump bolts to 10 Nm (89 lb-in).
- Tighten the oil pump screen and pickup tube-to-spacer bolt to 25 Nm (18 lb-ft).

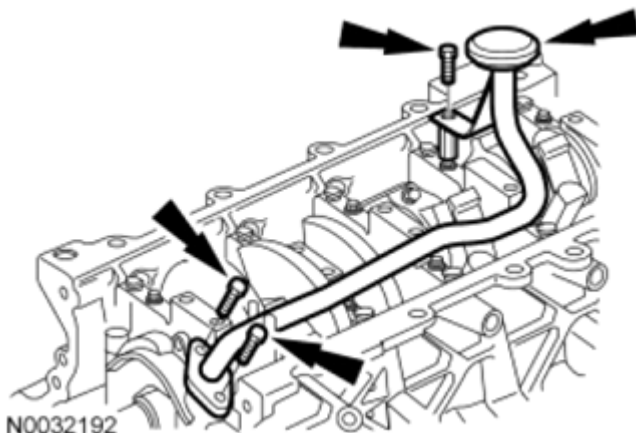


Fig. 257: Removing Oil Pump Screen And Pickup Tube Bolts
Courtesy of FORD MOTOR CO.

2. Install the oil pan. For additional information, refer to **OIL PAN** in this information.

OIL FILTER ADAPTER

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Motorcraft® Silicone Gasket Remover ZC-30	-

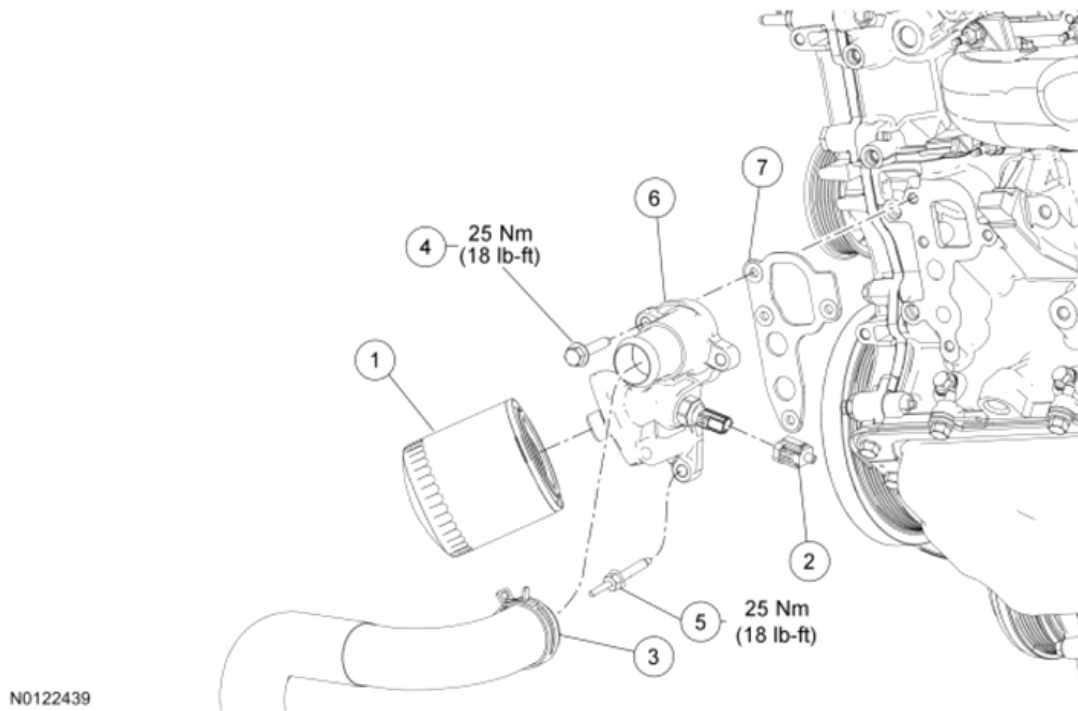


Fig. 258: Exploded View Of Oil Filter Adapter With Torque Specification
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6731	Oil filter
2	14A464	Engine oil pressure switch electrical connector (part of 9D930)

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

3	8286	Lower radiator hose
4	W705128	Oil filter adapter bolt (3 required)
5	W714716	Oil filter adapter stud bolt
6	6881	Oil filter adapter
7	6840	Oil filter adapter gasket

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 SYSTEM**.
3. Drain the engine oil.
 - Install the drain plug and tighten to 23 Nm (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 3 bolts, studbolt and the oil filter adapter.
 - To install, tighten to 25 Nm (18 lb-ft).

NOTE: 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 SYSTEM**.

ENGINE OIL PRESSURE (EOP) SWITCH

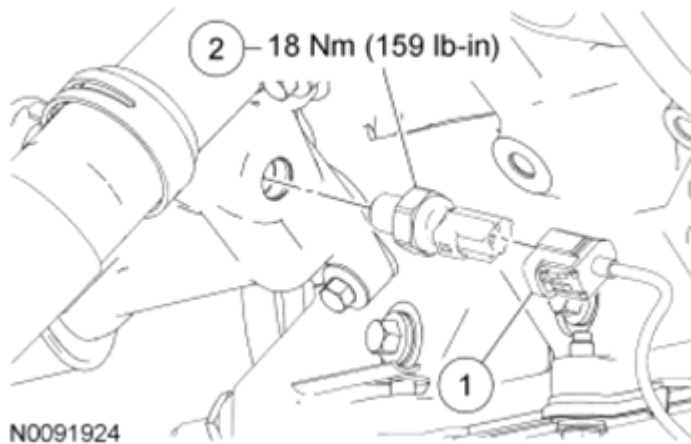


Fig. 259: Locating Engine Oil Pressure (EOP) Switch With Torque Specification
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	-	Engine Oil Pressure (EOP) switch electrical connector (part 9D930)
2	9278	EOP switch

Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Disconnect the Engine Oil Pressure (EOP) switch electrical connector.
3. Remove the **EOP** switch.
 - To install, tighten to 18 Nm (159 lb-in).
4. To install, reverse the removal procedure.

OIL LEVEL INDICATOR AND TUBE

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

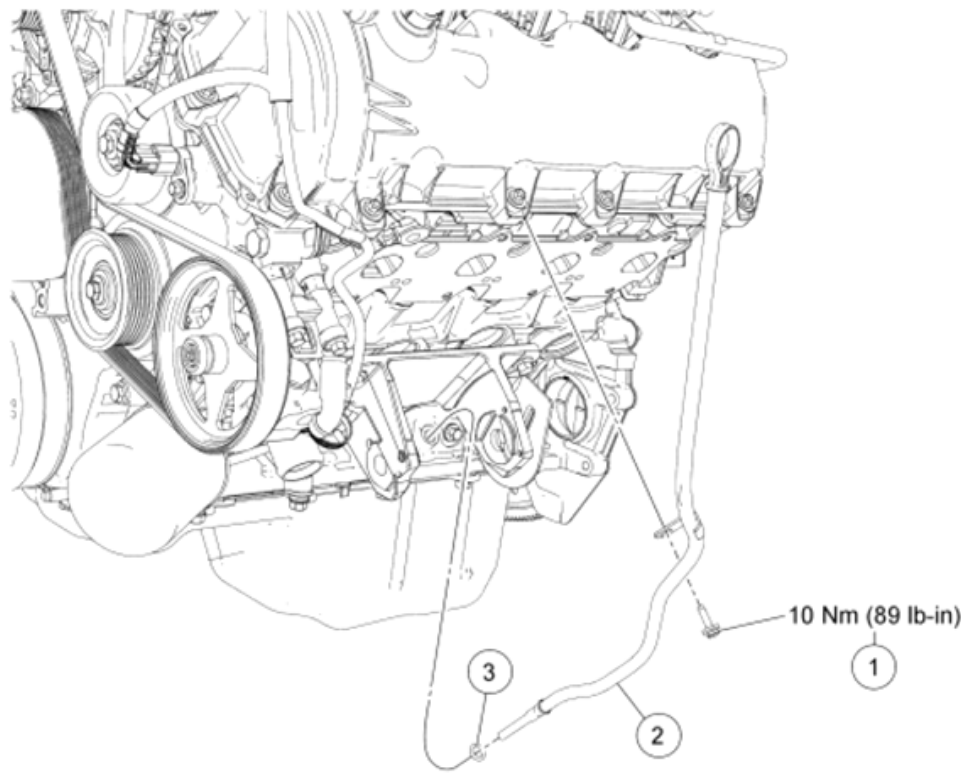


Fig. 260: Exploded View Of Oil Level Indicator And Tube Bolt With Torque Specifications
 Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	N605892	Oil level indicator and tube bolt
2	6K873	Oil level indicator and tube
3	-	Oil level indicator tube O-ring seal

Removal and Installation

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

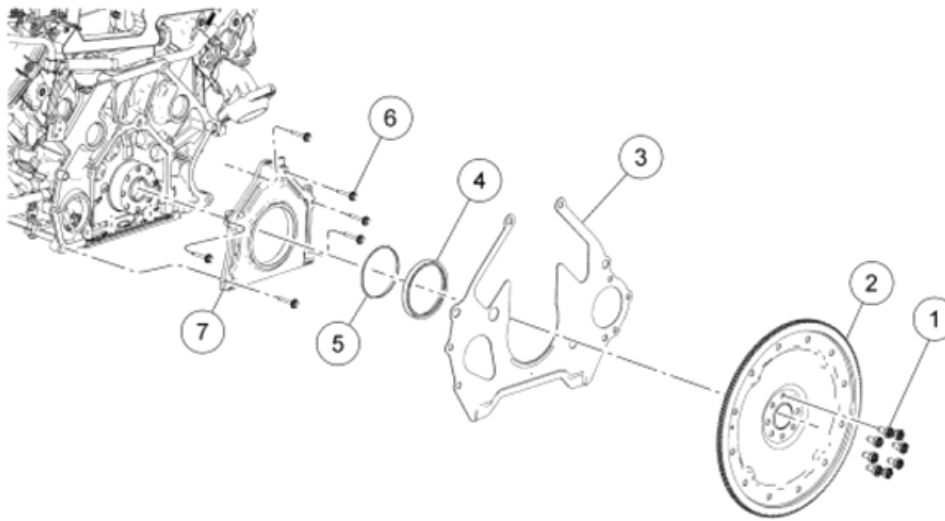
NOTE: Lubricate the new oil level indicator tube O-ring seal with clean engine oil prior to installation.

4.

To install, reverse the removal procedure.

- Install a new O-ring seal.

FLEXPLATE OR FLYWHEEL AND CRANKSHAFT REAR SEAL - EXPLODED VIEW



N0052372

Fig. 261: Exploded View Of Flexplate Or Flywheel And Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

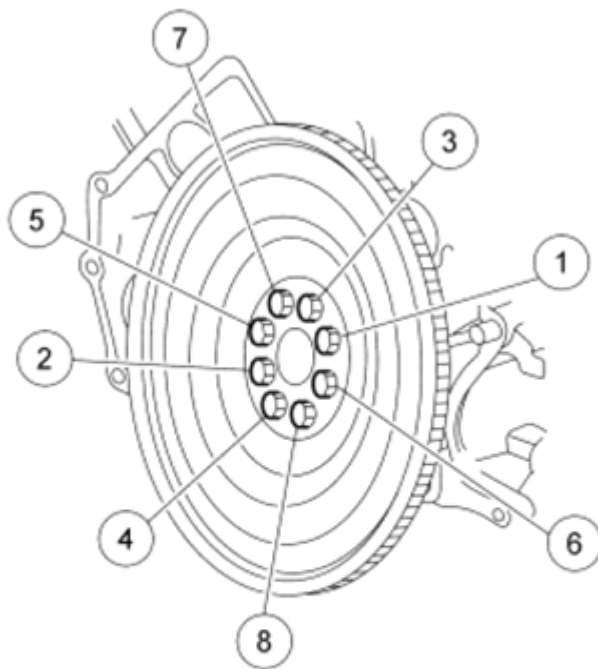
Item	Part Number	Description
1	N806168	Flexplate bolt (8 required)
2	6375	Flexplate
3	6A373	Rear cover plate
4	6310	Crankshaft oil slinger
5	6701	Crankshaft rear seal
6	N806155	Crankshaft rear seal retainer plate bolt (6 required)
7	6K318	Crankshaft rear seal retainer plate

1. For additional information, refer to the appropriate procedures in this information.

FLEXPLATE

Removal and Installation

1. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSMISSION - 6R80**.
2. Remove the 8 bolts and the flexplate.
 - To install, tighten to 80 Nm (59 lb-ft) in the sequence shown in the illustration.



N0010329

Fig. 262: Identifying Flexplate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. To install, reverse the removal procedure.

CRANKSHAFT REAR SEAL

Special Tool(s)

SPECIAL TOOLS CHART

	Installer, Crankshaft Rear Oil Seal 303-516 (T95P-6701-BH)
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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1479-A



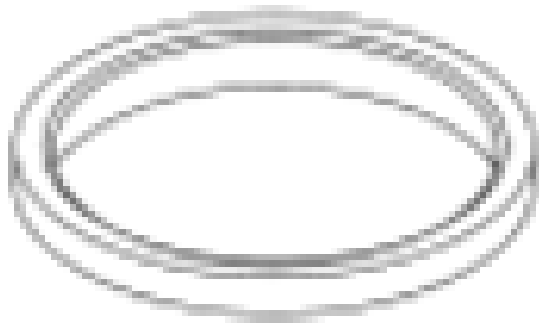
ST1480-A

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

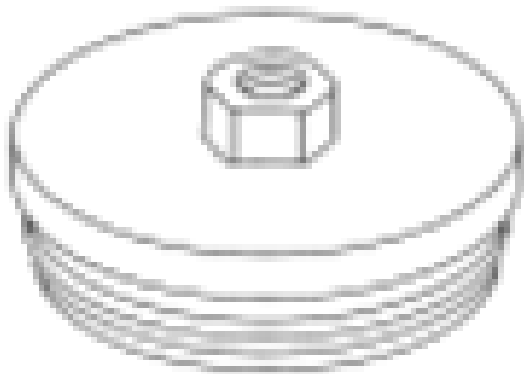
Installer, Crankshaft Rear Oil Slinger
303-517 (T95P-6701-CH)

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1482-A



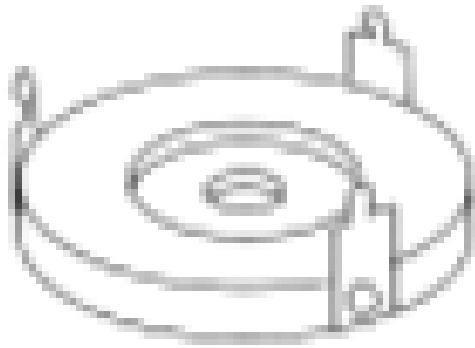
ST1382-A

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

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

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1481-A



ST1185-A

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

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Removal

1. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSMISSION -**

6R80 .

2. Remove the 8 bolts and the flexplate.
3. Using the Slide Hammer and the Crankshaft Rear Oil Slinger Remover, remove and discard the crankshaft oil slinger.

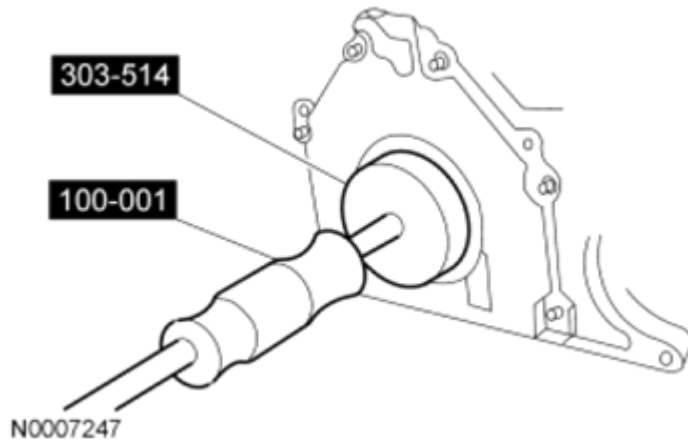


Fig. 263: Removing Crankshaft Rear Oil Seal Slinger Using Special Tools
 Courtesy of FORD MOTOR CO.

4. Using the Slide Hammer and the Crankshaft Rear Oil Seal Remover, remove and discard the crankshaft rear seal.

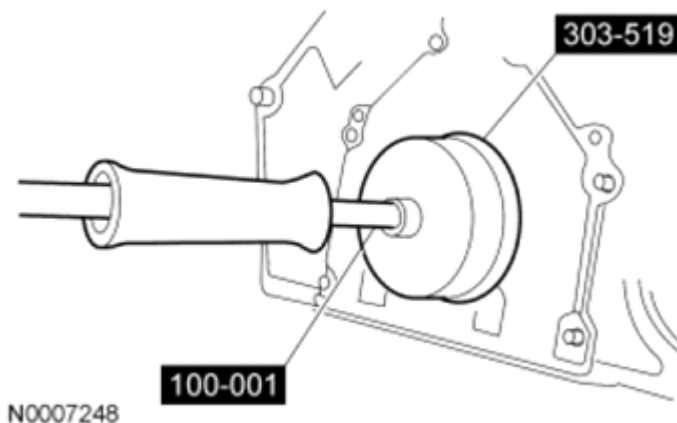


Fig. 264: Removing Crankshaft Rear Seal Using Special Tools
 Courtesy of FORD MOTOR CO.

Installation

NOTE: Lubricate the crankshaft rear seal with clean engine oil prior to installation.

- 1.

Using the Crankshaft Rear Oil Seal Installers, install a new crankshaft rear seal.

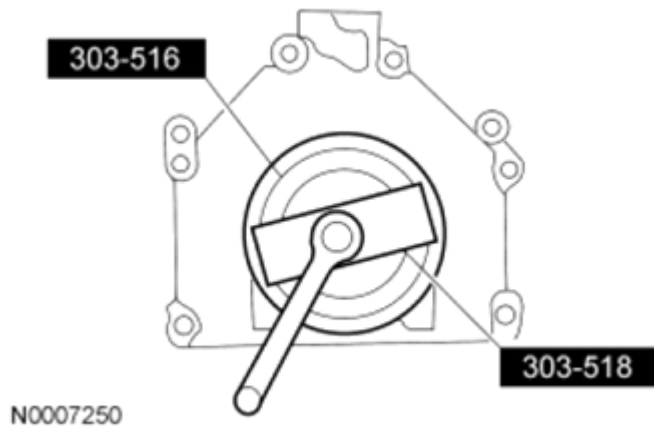


Fig. 265: Installing Crankshaft Rear Oil Seal Using Special Tools
Courtesy of FORD MOTOR CO.

2. **NOTE:** Lubricate the crankshaft oil slinger with clean engine oil prior to installation.

Using the Crankshaft Rear Oil Seal Installers and the Crankshaft Rear Oil Slinger Installer, install a new crankshaft oil slinger.

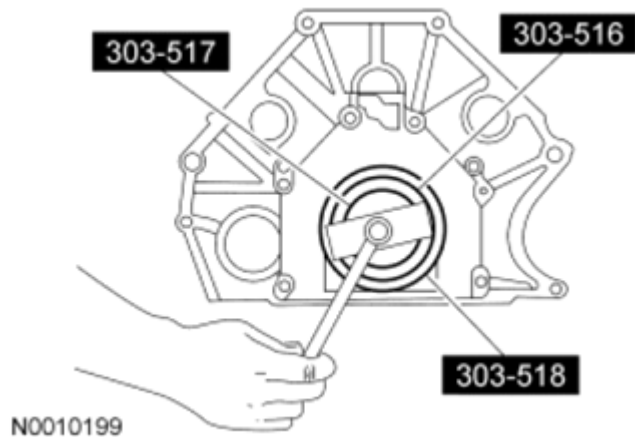
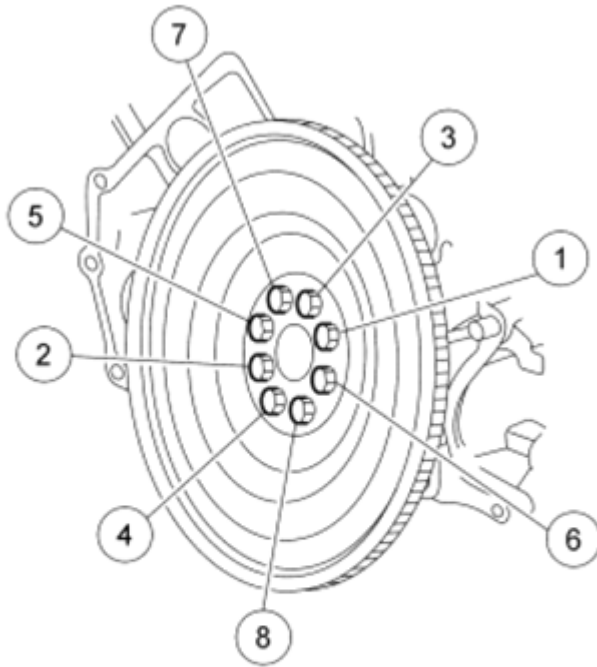


Fig. 266: Installing Crankshaft Rear Oil Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

3. Install the flexplate and tighten the 8 bolts in the sequence shown in the illustration.
- Tighten to 80 Nm (59 lb-ft).



N0010329

Fig. 267: Identifying Flexplate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Install the transmission. For additional information, refer to **AUTOMATIC TRANSMISSION - 6R80**.

CRANKSHAFT REAR SEAL WITH RETAINER PLATE

Special Tool(s)

SPECIAL TOOLS CHART

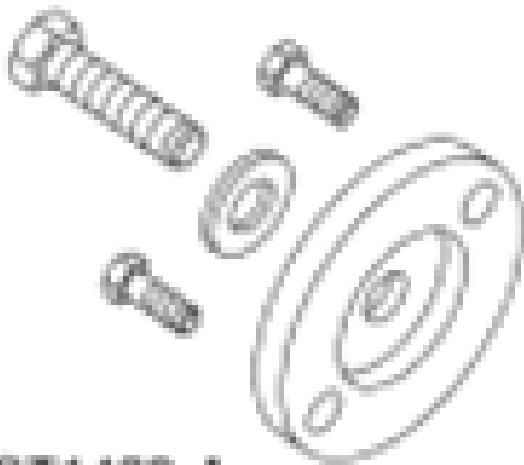
	Installer, Crankshaft Rear Oil Seal 303-516 (T95P-6701-BH)
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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1479-A



ST1480-A

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

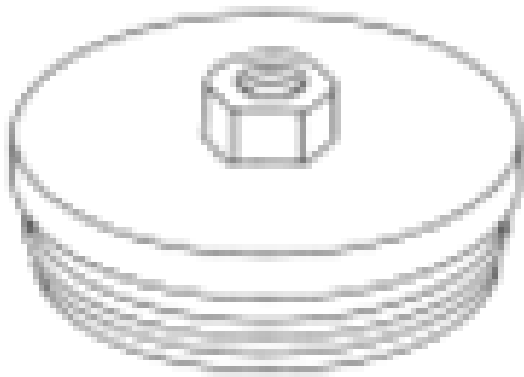
Installer, Crankshaft Rear Oil Slinger
303-517 (T95P-6701-CH)

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1482-A



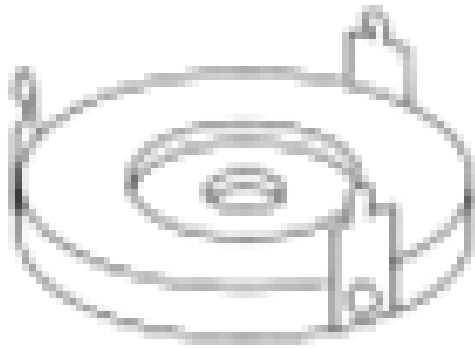
ST1382-A

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

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

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1481-A



ST1185-A

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

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

Motorcraft® Silicone Gasket Remover
ZC-30

-

Removal

1. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSMISSION - 6R80**.
2. Remove the oil pan. For additional information, refer to **OIL PAN** in this information.
3. Remove the rear engine cover.
4. Using the Slide Hammer and the Crankshaft Rear Oil Slinger Remover, remove and discard the crankshaft oil slinger.

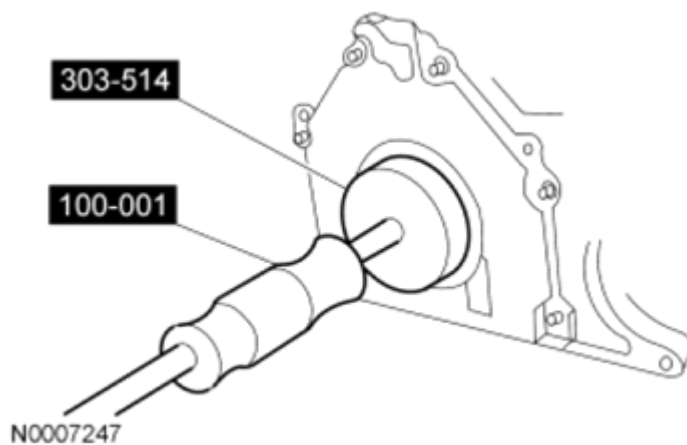


Fig. 268: Removing Crankshaft Rear Oil Seal Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

5. Using the Slide Hammer and the Crankshaft Rear Oil Seal Remover, remove and discard the crankshaft rear seal.

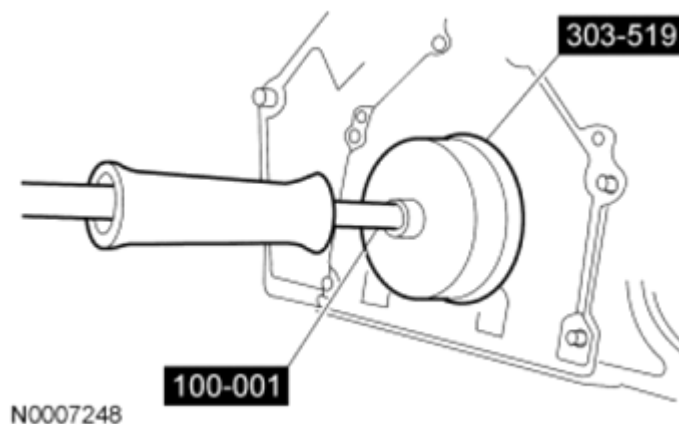


Fig. 269: Removing Crankshaft Rear Seal Using Special Tools
Courtesy of FORD MOTOR CO.

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

Installation

1. **NOTE:** 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.

Clean and inspect the mating surface.

2. **NOTE:** If the rear crankshaft seal retaining plate is 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. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure may cause future oil leaks.

- NOTE:** The silicone must be applied on the groove along the retainer plate.

Apply a 4.06 mm (0.16 in) bead of silicone gasket and sealant around the crankshaft rear seal retainer plate sealing surface.

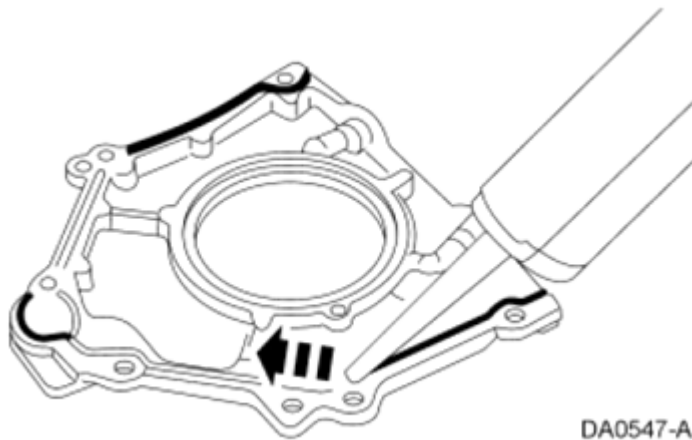


Fig. 270: Locating Sealant Application Areas
Courtesy of FORD MOTOR CO.

3. Install the crankshaft rear seal retainer plate and the 6 bolts in the sequence shown in the illustration.
 - Tighten to 10 Nm (89 lb-in).

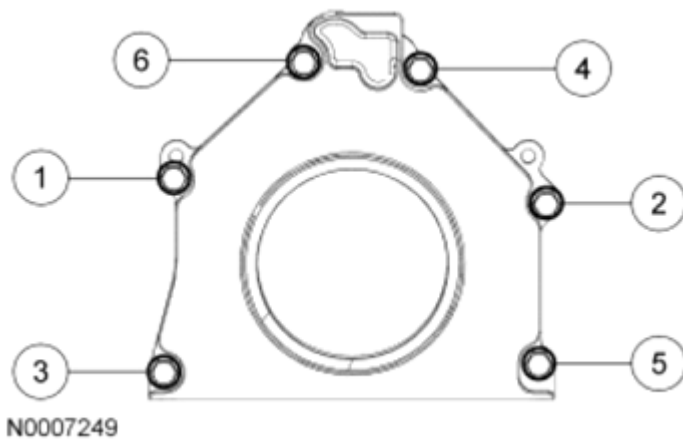


Fig. 271: Identifying Retainer Plate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

- NOTE:** Lubricate the crankshaft rear seal with clean engine oil prior to installation.
- 4.

Using the Crankshaft Rear Oil Seal Installers, install a new crankshaft rear seal.

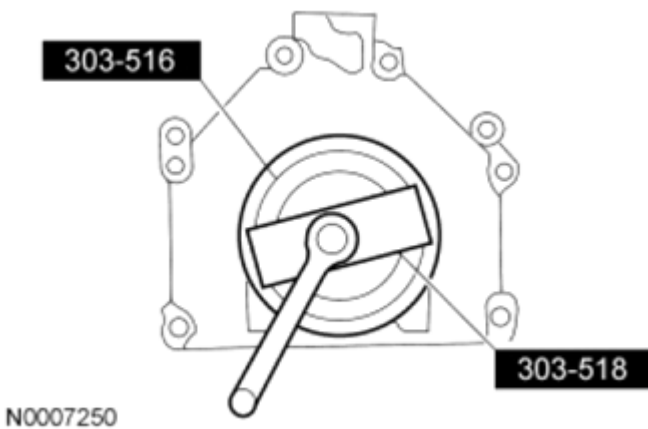


Fig. 272: Installing Crankshaft Rear Oil Seal Using Special Tools
Courtesy of FORD MOTOR CO.

- NOTE:** Lubricate the crankshaft oil slinger with clean engine oil prior to installation.
- 5.

Using the Crankshaft Rear Oil Seal Installers and the Crankshaft Rear Oil Slinger Installer, install a new crankshaft oil slinger.

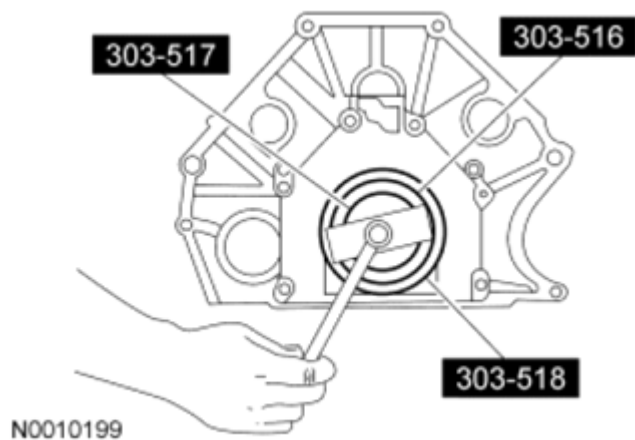


Fig. 273: Installing Crankshaft Rear Oil Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

6. Install the rear engine cover.
7. Install the flexplate and tighten the 8 bolts in the sequence shown in the illustration.
 - Tighten to 80 Nm (59 lb-ft).

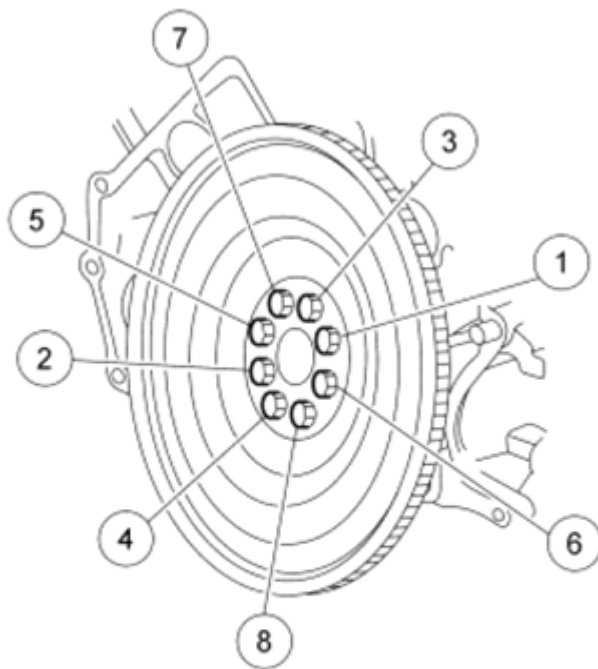



Fig. 274: Identifying Flexplate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

8. Install the oil pan. For additional information, refer to **OIL PAN** in this information.
9. Install the transmission. For additional information, refer to **AUTOMATIC TRANSMISSION - 6R80** .

ENGINE SUPPORT INSULATORS

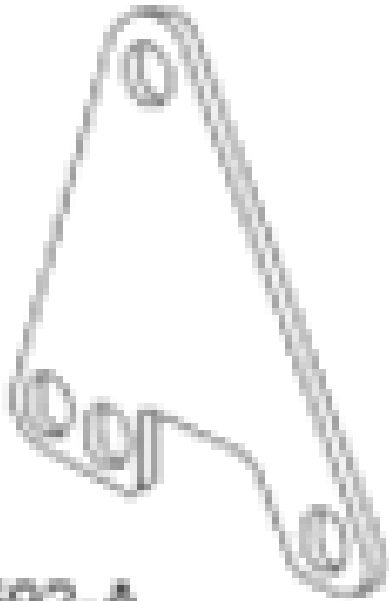
Special Tool(s)

SPECIAL TOOLS CHART

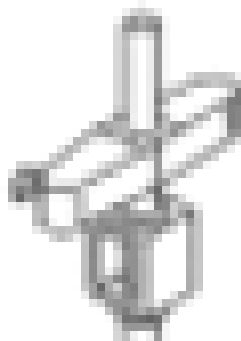
 <p>ST2176-B</p>	<p>Support Bar, Engine 303-F070</p>
	<p>Support Bracket, Engine 303-639</p>

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2592-A



Support Hook
303-F071

2011 Ford Expedition

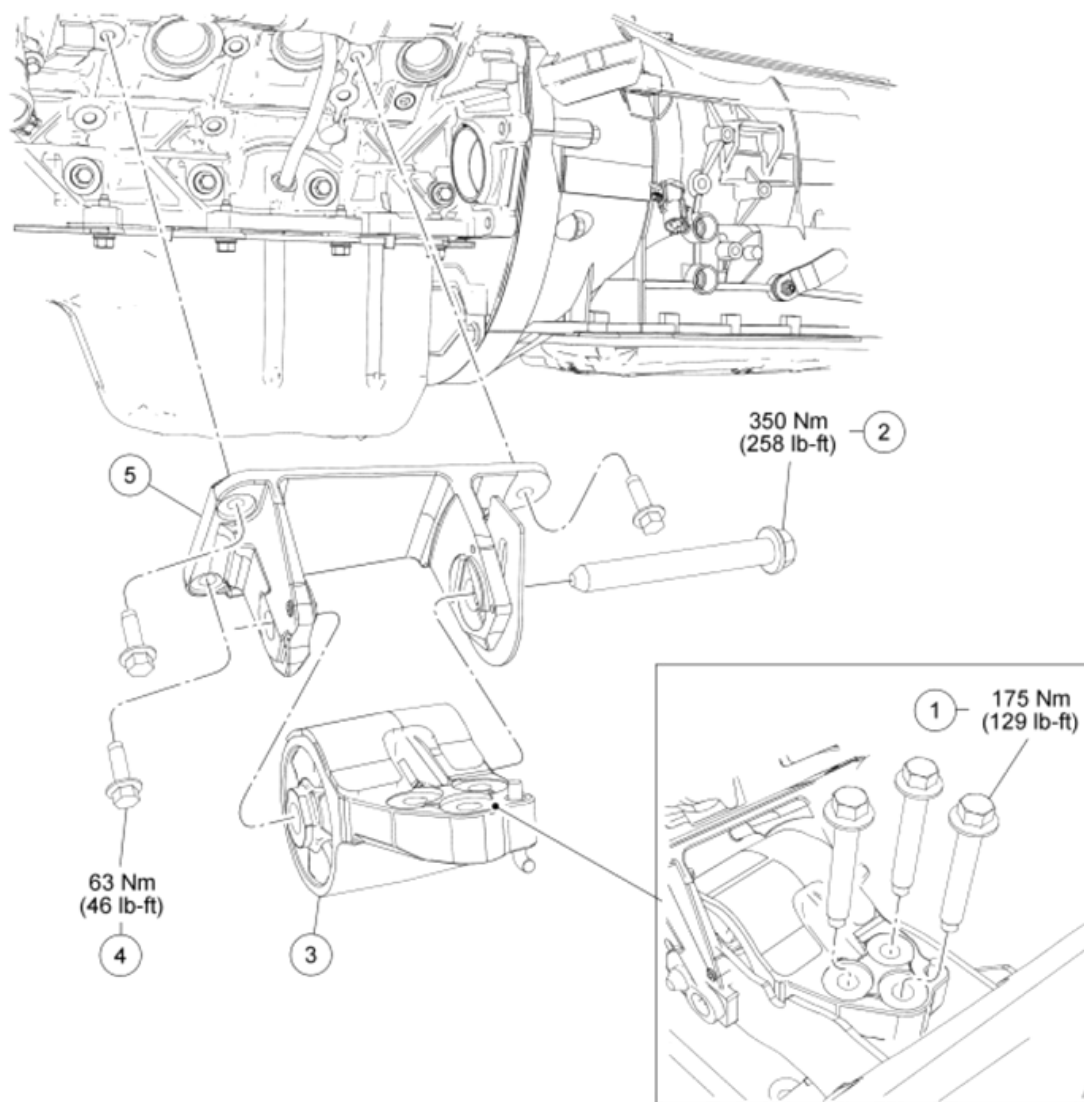
2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

Material

MATERIAL SPECIFICATIONS

Item	Specification
Threadlock 262 TA-26	WSK-M2G351-A6

LH Engine Support Insulator



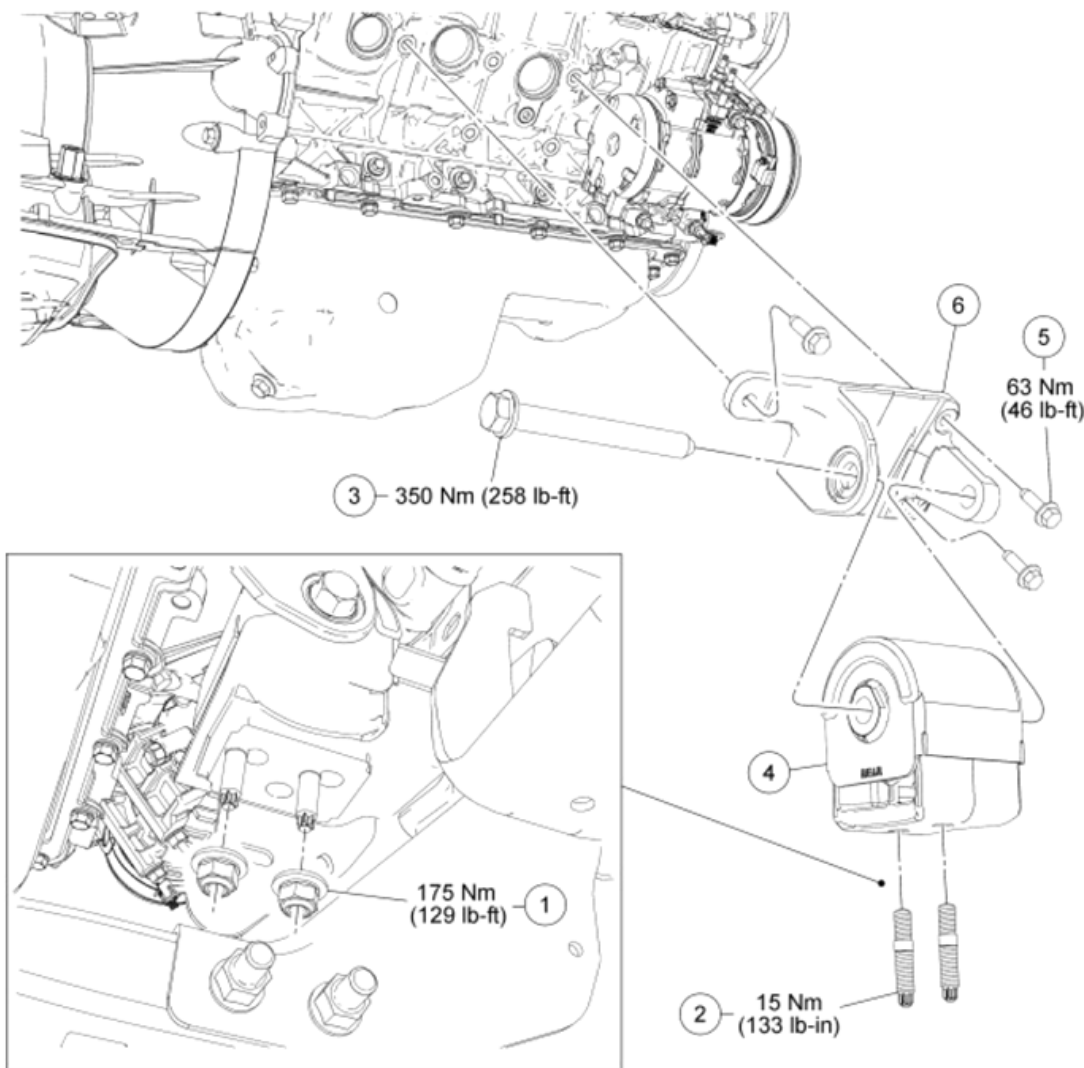
N0055142

Fig. 275: Exploded View Of Engine Support Insulator Components With Torque Specification (LH)
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	W712805	LH engine support insulator-to-frame bolt (3 required)
2	W711142	LH engine support insulator through bolt
3	6B032	LH engine support insulator
4	W711141	LH engine support insulator-to-cylinder block bracket bolt (3 required)
5	6061	LH engine support insulator-to-cylinder block bracket

RH Engine Support Insulator



N0091926

Fig. 276: Exploded View Of Engine Support Insulator Components With Torque Specification (RH)
 Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

Item	Part Number	Description
1	W707251	RH engine support insulator-to-frame nut (2 required)
2	W711144	RH engine support insulator-to-frame stud bolt (2 required)
3	W711142	RH engine support insulator through bolt
4	6H028	RH engine support insulator
5	W711141	RH engine support insulator-to-cylinder block bracket bolt (3 required)
6	-	RH engine support insulator-to-cylinder block bracket

Removal

All engine support insulators

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, BATTERY MOUNTING SYSTEM & BATTERY CABLES**.
3. Remove the Throttle Body (TB). For additional information, refer to **FUEL SYSTEM & ENGINE CONTROLS - 5.4L (3V)**.
4. Remove the cooling fan. For additional information, refer to **ENGINE COOLING SYSTEM**.
5. Remove the generator. For additional information, refer to **CHARGING SYSTEM**.
6. Remove the starter. For additional information, refer to **STARTING SYSTEM**.
7. If servicing the engine support insulators on a Four-Wheel Drive (4WD) vehicle, remove the front driveshaft. For additional information, refer to **DRIVESHAFT**.
8. Install the Engine Support Bar, Support Hook and Engine Support Bracket.

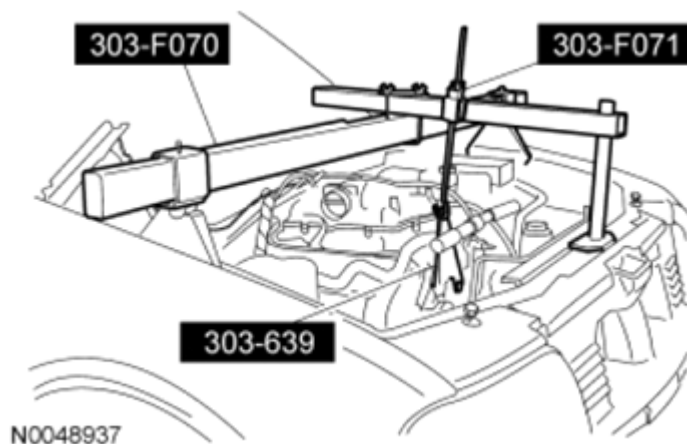


Fig. 277: Installing Engine Support Bar
Courtesy of FORD MOTOR CO.

9. Remove the 4 (2 RH and 2 LH) Y-pipe flange nuts.

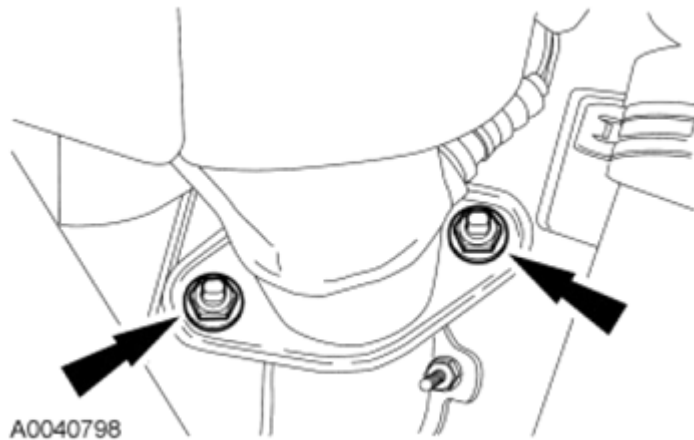


Fig. 278: Locating Exhaust Manifold-To-Catalytic Converter Nuts
Courtesy of FORD MOTOR CO.

10. **NOTE:** Only use hand tools when removing the transmission mount-to-crossmember nuts or damage to the transmission mount can occur.

Loosen the 2 transmission mount-to-crossmember nuts.

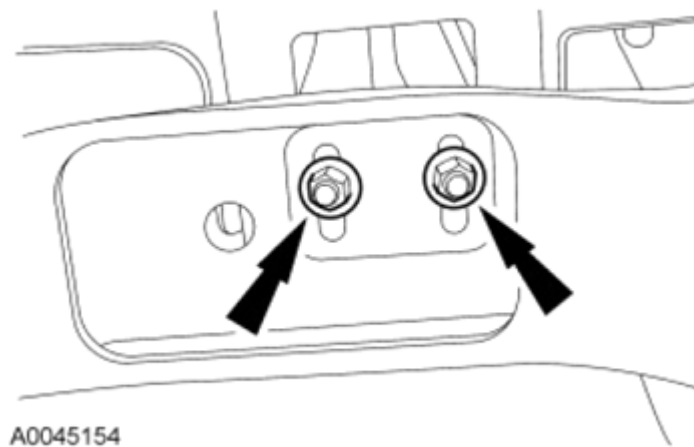


Fig. 279: Locating Transmission Mount-To-Crossmember Nuts
Courtesy of FORD MOTOR CO.

RH engine support insulator

11. **NOTE:** Only use hand tools when loosening the engine support insulator through bolts or damage to the engine support insulator-to-cylinder block bracket can occur.

Loosen the LH engine support insulator through bolt.

NOTE: Only use hand tools when removing the engine support insulator through bolts or damage to the engine support insulator-to-cylinder block bracket can occur.

12.

Remove the RH engine support insulator through bolt.

NOTE: Only use hand tools when removing the engine support insulator nuts or damage to the engine support insulator can occur.

13.

NOTE: If during nut removal the stud bolt is extracted from the engine support insulator, separate the nut from the stud bolt prior to stud bolt installation.

Remove the 2 RH engine support insulator nuts.

NOTE: Only use hand tools when removing the engine support insulator stud bolts or damage to the engine support insulator can occur.

14.

Remove the 2 RH engine support insulator stud bolts.

15. Using the Engine Support Bar, Support Hook and Engine Support Bracket, raise the engine.

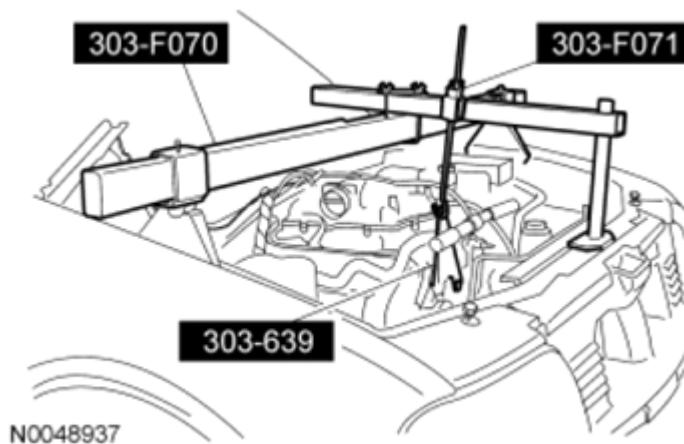


Fig. 280: Installing Engine Support Bar
Courtesy of FORD MOTOR CO.

16. Remove the 3 bolts and the RH engine support insulator-to-cylinder block bracket.

17. Remove the RH engine support insulator.

LH engine support insulator

NOTE: Only use hand tools when loosening the engine support insulator through bolts or damage to the engine support insulator-to-cylinder block bracket

18.

18. **can occur.**

Loosen the RH engine support insulator through bolt.

NOTE: Only use hand tools when removing the engine support insulator through bolts or damage to the engine support insulator-to-cylinder block bracket can occur.

- 19.

Remove the LH engine support insulator through bolt.

20. Using the Engine Support Bar, Support Hook and Engine Support Bracket, raise the engine.

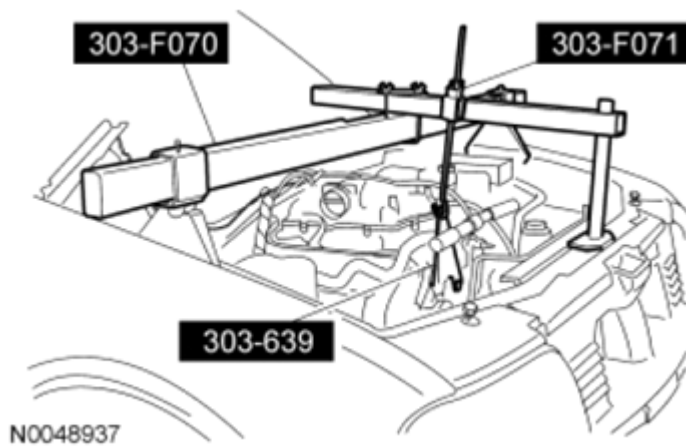


Fig. 281: Installing Engine Support Bar
Courtesy of FORD MOTOR CO.

NOTE: Only use hand tools when removing the engine support insulator-to-frame bolts or damage to the engine support insulator-to-frame nut plate can occur.

- 21.

Remove the 3 engine support insulator-to-frame bolts.

- Discard the 3 bolts.

22. Remove the 3 bolts and the LH engine support insulator-to-cylinder block bracket.
23. Remove the LH engine support insulator.
24. Inspect the engine support insulator-to-frame nut plate for thread damage. If the nut plate is damaged, bend 2 tabs back and remove the nut plate. Replace the nut plate with service part No. 56190 and bend the 2 tabs back to the original position.

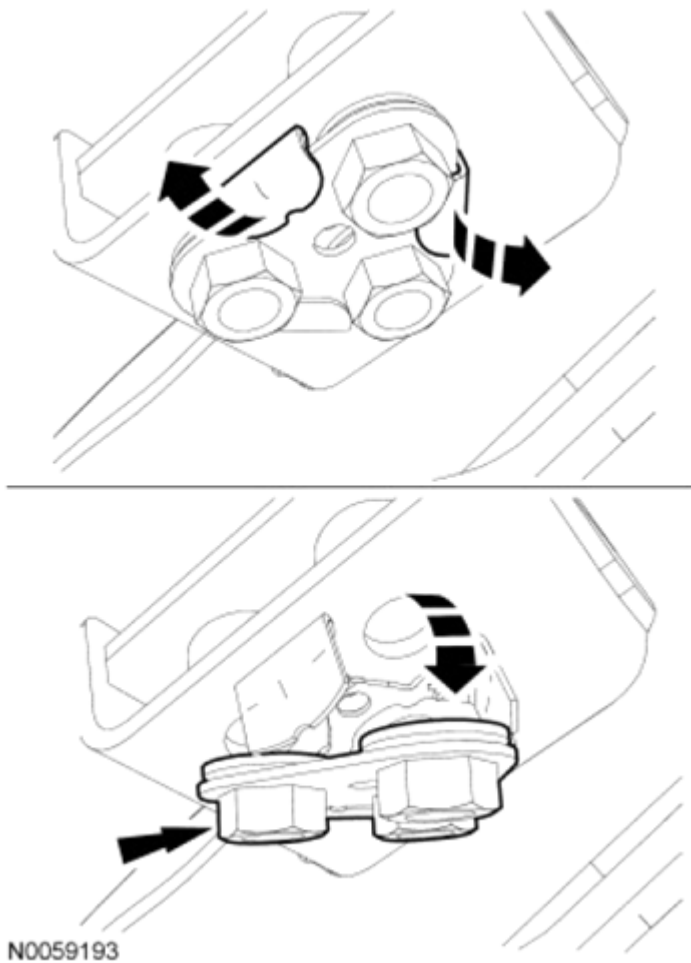


Fig. 282: Removing Engine Support Insulator-To-Cylinder Block Bracket And Bolts LH
Courtesy of FORD MOTOR CO.

Installation

RH engine support insulator

1. Clean the engine support insulator-to-cylinder block and engine support insulator-to-frame mating surfaces of any dirt or foreign material prior to installation.

NOTE: Only use hand tools when installing the engine support insulator stud bolts or damage to the engine support insulator can occur.

2.

Position the RH engine support insulator into the vehicle and install the 2 stud bolts.

- Tighten to 15 Nm (133 lb-in).

3. Position the RH engine support insulator-to-cylinder block bracket and install the 3 bolts.

- Tighten to 63 Nm (46 lb-ft).

4. **NOTE:** Only use hand tools when installing the RH engine support insulator nuts

4. **or damage to the engine support insulator can occur.**

Install the 2 RH engine support insulator nuts.

- Tighten to 175 Nm (129 lb-ft).

LH engine support insulator

5. Clean the engine support insulator-to-cylinder block and engine support insulator-to-frame mating surfaces of any dirt or foreign material prior to installation.
6. Position the LH engine support insulator and hand start the 3 new engine support insulator-to-frame bolts.
 - Tighten to 175 Nm (129 lb-ft).
7. Position the LH engine support insulator-to-cylinder block bracket and install the 3 bolts.
 - Tighten to 63 Nm (46 lb-ft).

All engine support insulator

8. Using the Engine Support Bar, Support Hook and Engine Support Bracket, lower the engine into position.

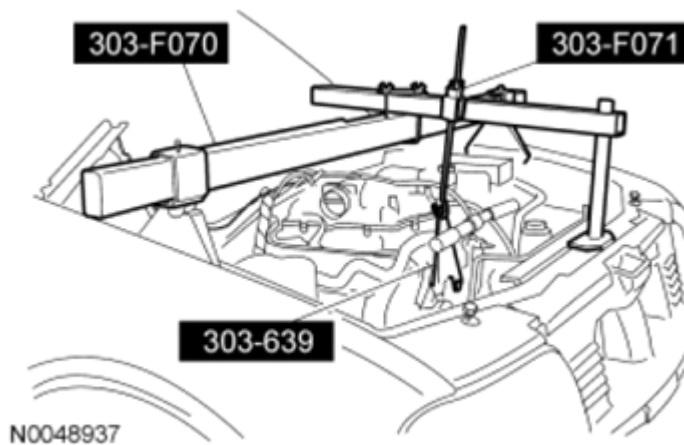


Fig. 283: Installing Engine Support Bar
Courtesy of FORD MOTOR CO.

NOTE: Only use hand tools when installing the engine support insulator through bolt or damage to the engine support insulator-to-cylinder block bracket can occur.

- 9.

Install the LH and RH engine support insulator bolts.

- Apply threadlock to the bolt threads prior to installation.
- Tighten to 350 Nm (258 lb-ft).

10. **NOTE:** Only use hand tools when installing the transmission mount-to-

10. **crossmember nuts or damage to the transmission mount can occur.**

Install the transmission mount-to-crossmember nuts.

- Tighten to 103 Nm (76 lb-ft).

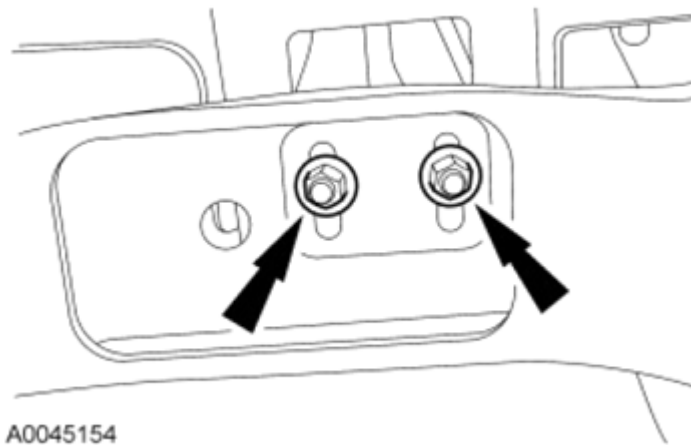


Fig. 284: Locating Transmission Mount-To-Crossmember Nuts
Courtesy of FORD MOTOR CO.

11. Position the Y-pipe and install the 4 (2 RH and 2 LH) nuts.

- Tighten to 40 Nm (30 lb-ft).

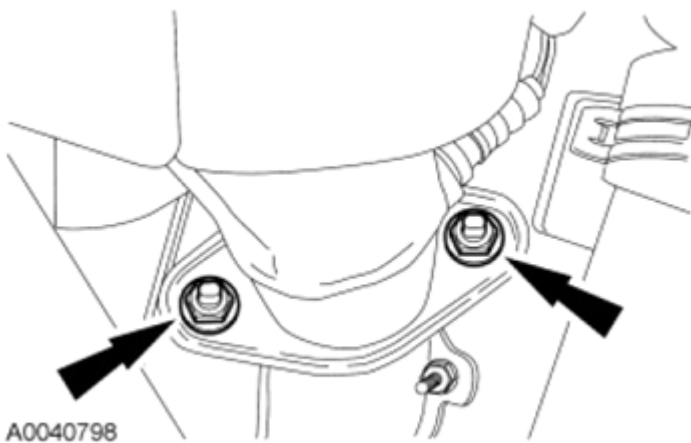


Fig. 285: Locating Exhaust Manifold-To-Catalytic Converter Nuts
Courtesy of FORD MOTOR CO.

12. Remove the Engine Support Bar, Support Hook and Engine Support Bracket.

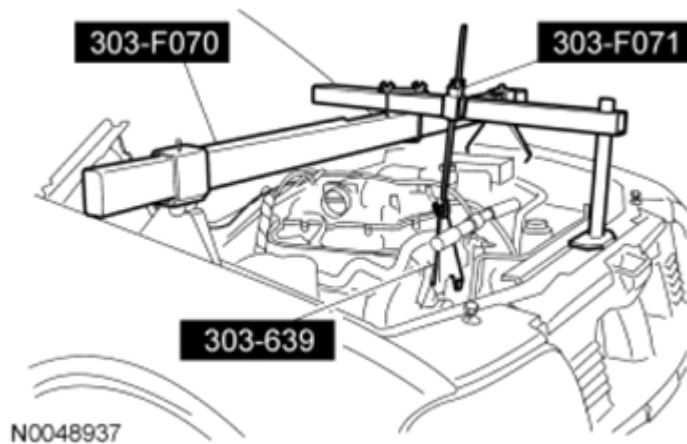


Fig. 286: Installing Engine Support Bar
Courtesy of FORD MOTOR CO.

13. Install the starter. For additional information, refer to **STARTING SYSTEM** .
14. If servicing the engine support insulator on a **4WD** vehicle, install the front driveshaft. For additional information, refer to **DRIVESHAFT** .
15. Install the generator. For additional information, refer to **CHARGING SYSTEM** .
16. Install the cooling fan. For additional information, refer to **ENGINE COOLING SYSTEM** .
17. Install the **TB** . For additional information, refer to **FUEL SYSTEM & ENGINE CONTROLS - 5.4L (3V)** .
18. Connect the battery ground cable. For additional information, refer to **BATTERY, BATTERY MOUNTING SYSTEM & BATTERY CABLES** .

REMOVAL

ENGINE

Special Tool(s)

SPECIAL TOOLS CHART

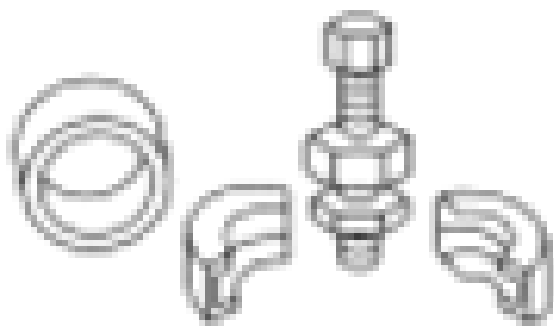
	Lifting Bracket, Engine 303-F047 (014-00073) or equivalent
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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1377-A



ST1290-B

Remover, Power Steering Pump Pulley
211-016 (T69L-10300-B)

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. **NOTE:** Index-mark the hood hinge location to aid in hood installation.

Remove the 4 bolts and the hood.

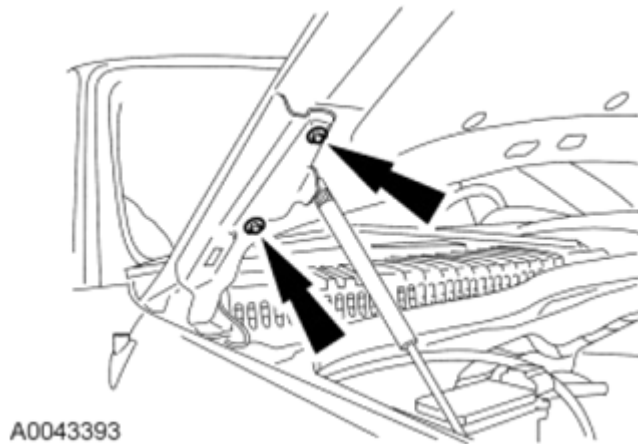


Fig. 287: Locating Hood Bolts And Hood Supports
Courtesy of FORD MOTOR CO.

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

3.

Remove the intake manifold. For additional information, refer to **INTAKE MANIFOLD** in this information.

4. Remove the accessory drive belt.
5. Remove the cooling module. For additional information, refer to **ENGINE COOLING SYSTEM** .
6. Position the Power Distribution Box (PDB) and wiring harness forward.
7. Remove the starter. For additional information, refer to **STARTING SYSTEM** .
8. Remove the 2 bolts and the flexplate inspection cover.

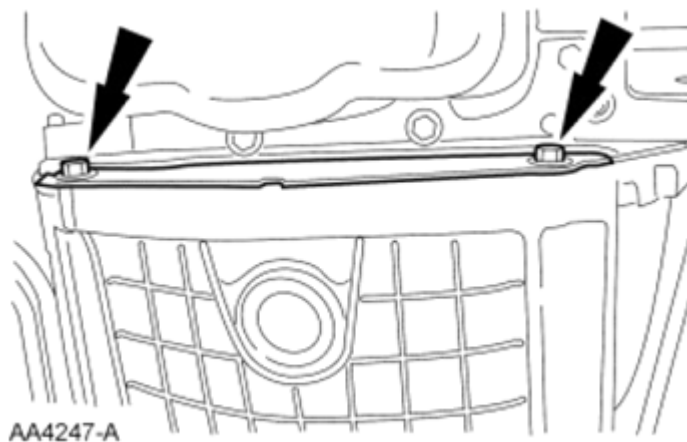


Fig. 288: Locating Flexplate Inspection Cover Bolts
Courtesy of FORD MOTOR CO.

9. Remove the cylinder block opening cover.

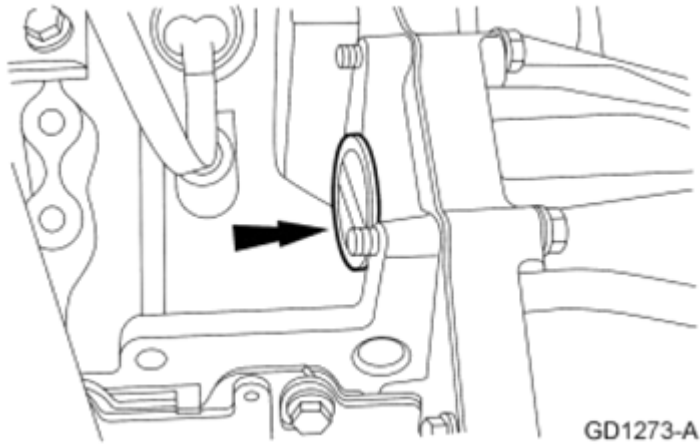


Fig. 289: Locating Cylinder Block Opening Cover
Courtesy of FORD MOTOR CO.

10. Remove the 4 torque converter-to-flexplate nuts.
- Discard the nuts.



Fig. 290: Locating Torque Converter-To-Flexplate Nuts
Courtesy of FORD MOTOR CO.

11. **NOTE:** The upper 2 transmission-to-engine bolts will be removed later.

Remove the lower 5 transmission-to-engine bolts.

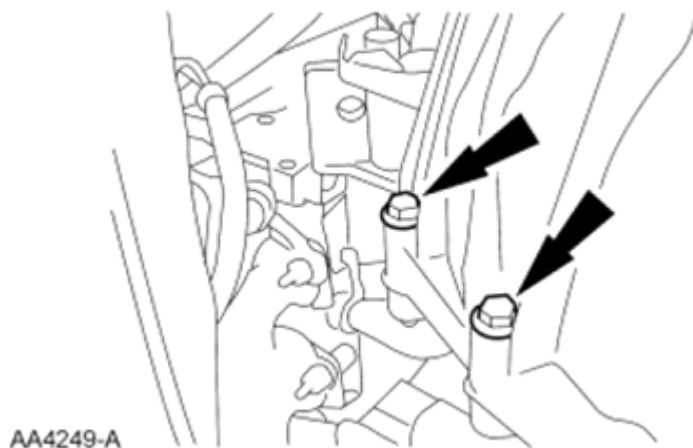


Fig. 291: Locating Lower Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

12. Remove the drain plug and drain the engine oil. Install the drain plug when finished.
 - Tighten to 23 Nm (17 lb-ft).

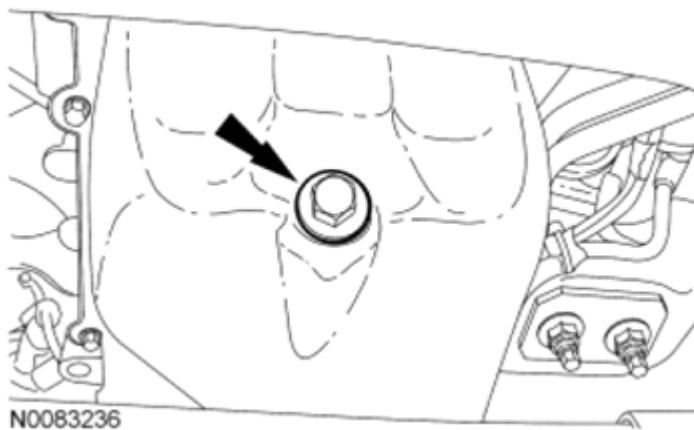


Fig. 292: Locating Drain Plug
Courtesy of FORD MOTOR CO.

13. Disconnect the A/C compressor electrical connector and the wiring harness retainer.

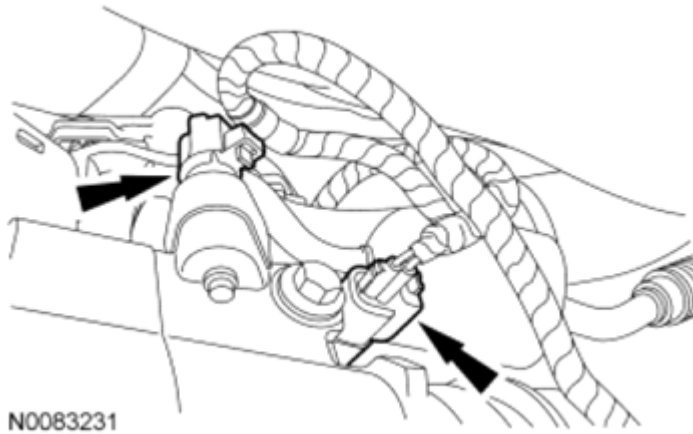


Fig. 293: Locating A/C Compressor Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

14. Disconnect the Crankshaft Position (CKP) sensor electrical connector.

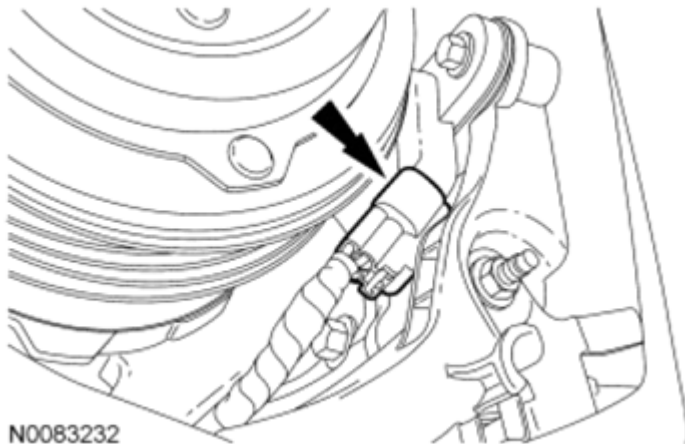


Fig. 294: Locating Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

15. Remove the bolts and position the A/C compressor aside.

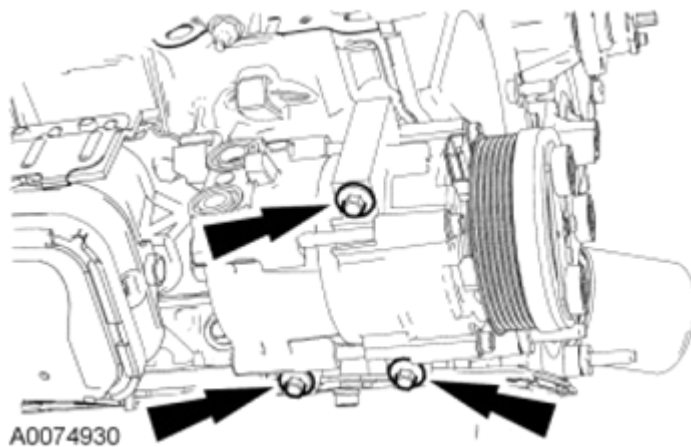


Fig. 295: Locating Bolts And A/C Compressor
Courtesy of FORD MOTOR CO.

16. Remove the bolt and position aside the starter wiring harness and rear support bracket.

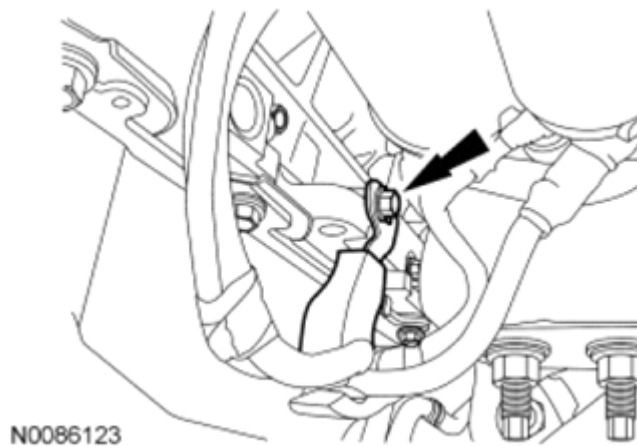


Fig. 296: Locating Starter Wiring Harness Rear Support Bracket And Bolt
Courtesy of FORD MOTOR CO.

17. If equipped, disconnect the block heater electrical connector.

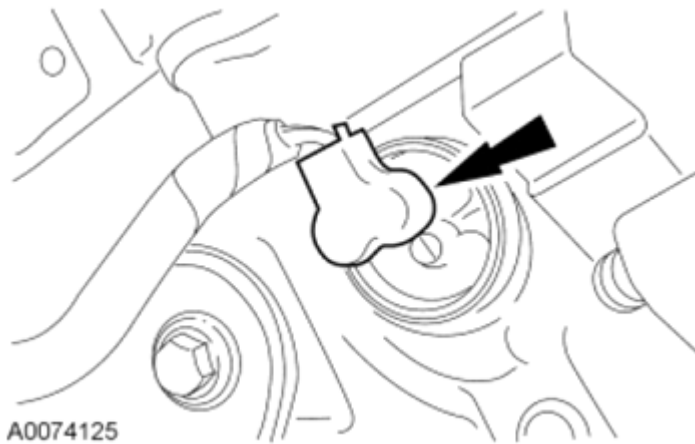


Fig. 297: Locating Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

18. Disconnect the Engine Oil Pressure (EOP) switch electrical connector and detach the wiring harness retainers from the oil pan bolt, the power steering pump stud bolt and the engine block.



Fig. 298: Locating Engine Oil Pressure (EOP) Switch Electrical Connector And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

19. Remove the 4 exhaust Y-pipe flange nuts.

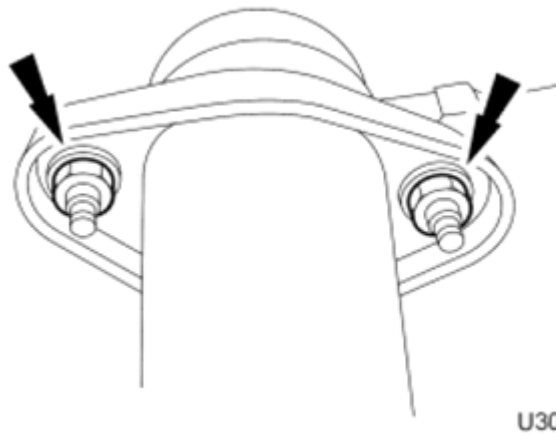


Fig. 299: Identifying Exhaust Manifold Flange Nuts
Courtesy of FORD MOTOR CO.

20. **NOTE:** Only use hand tools when removing the engine support insulator nuts or the engine support insulator may be damaged.

NOTE: If during nut removal the stud bolt is extracted from the engine support insulator, separate the nut from the stud bolt prior to stud bolt installation.

Remove the 2 RH engine support insulator nuts.

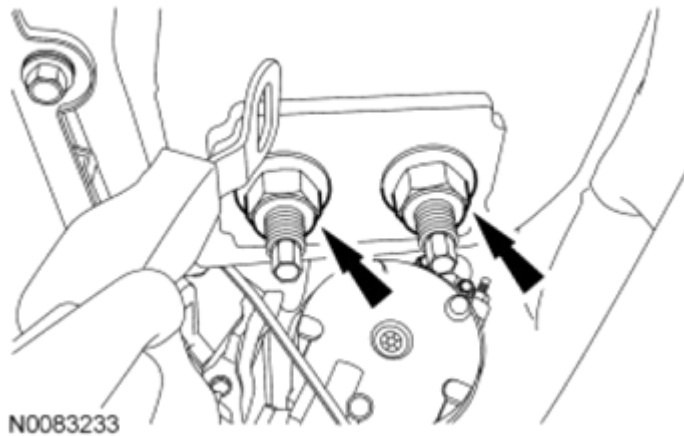


Fig. 300: Locating RH Engine Support Insulator Nuts
Courtesy of FORD MOTOR CO.

21. **NOTE:** Only use hand tools when loosening the engine support insulator through bolt or the engine support insulator may be damaged.

Remove the LH engine support insulator bolt.

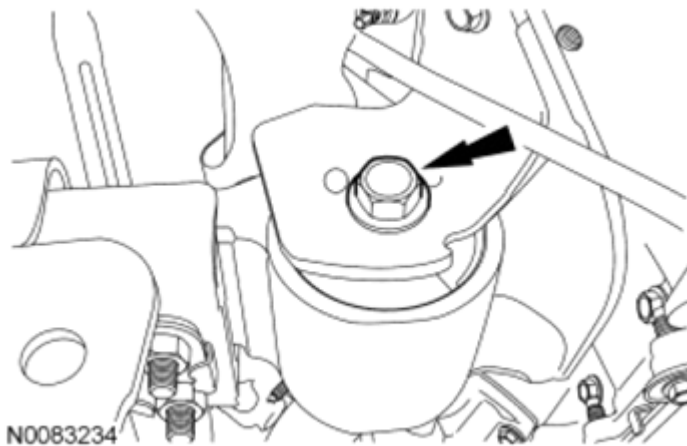


Fig. 301: Locating LH Engine Support Insulator Bolt
Courtesy of FORD MOTOR CO.

22. Loosen the 2 transmission mount nuts.

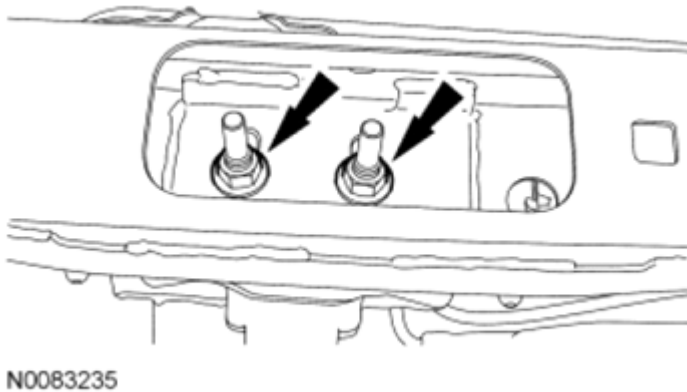


Fig. 302: Locating Transmission Mount Nuts
Courtesy of FORD MOTOR CO.

23. Remove the nut and position aside the transmission cooler tube support bracket and the starter wiring harness support bracket.

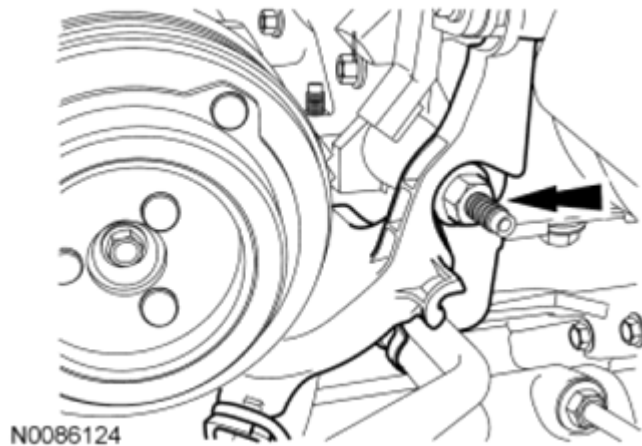


Fig. 303: Locating Transmission Cooler Tube Support Bracket And Nut
Courtesy of FORD MOTOR CO.

24. Remove the Power Steering Pressure (PSP) tube support bracket nut.

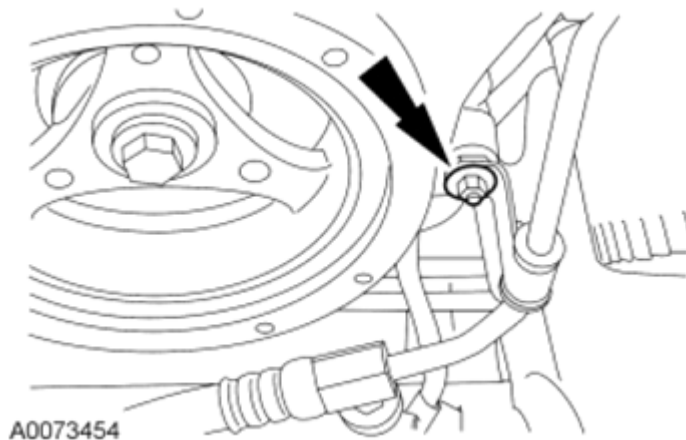


Fig. 304: Locating Power Steering Pressure Tube Support Bracket
Courtesy of FORD MOTOR CO.

NOTE: While servicing the power steering system, care should be taken to prevent the entry of foreign material or failure of the power steering components may result.

- 25.

Remove the bolt and detach the power steering fluid tubes from the steering gear.

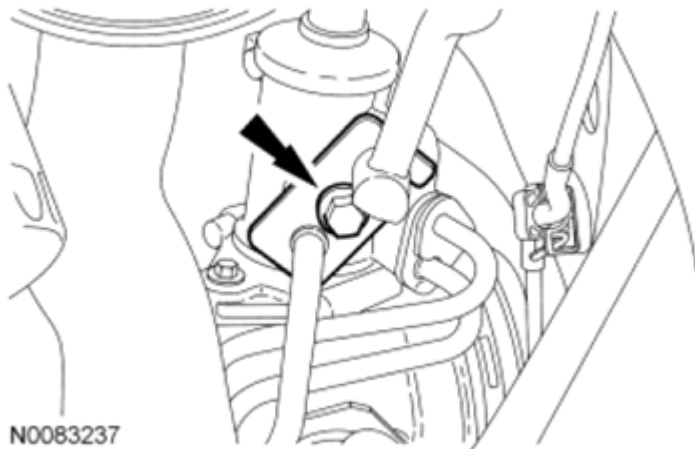


Fig. 305: Locating Power Steering Fluid Tubes And Bolt
Courtesy of FORD MOTOR CO.

NOTE: Do not install a power steering pump pulley that has been removed and installed twice or pulley failure and/or pump damage may occur. Inspect the pulley for paint marks in the web area near the hub. If there are 2 paint marks, discard the pulley and install a new one. If there is one paint mark or no paint marks, use a paint pencil to mark the web area of the pulley near the hub.

26.

Using the Power Steering Pump Pulley Remover, remove the power steering pump pulley.

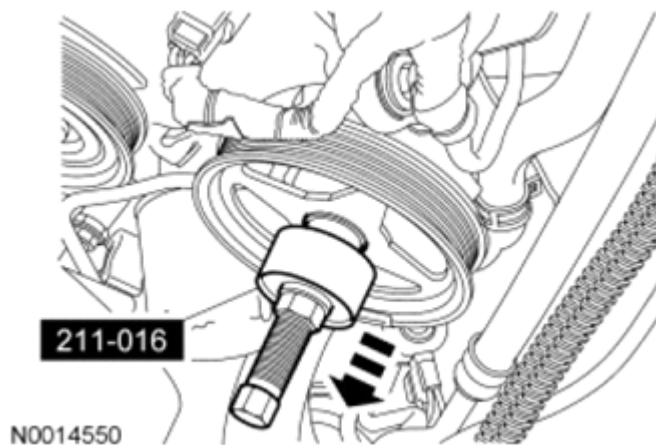


Fig. 306: Removing Power Steering Pump Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

27. Remove the 2 bolts, 1 stud bolt and position aside the power steering pump and reservoir as an assembly.



Fig. 307: Locating Power Steering Pump And Bolts
Courtesy of FORD MOTOR CO.

28. Disconnect electrical connector and detach the connector and wiring harness retainers.

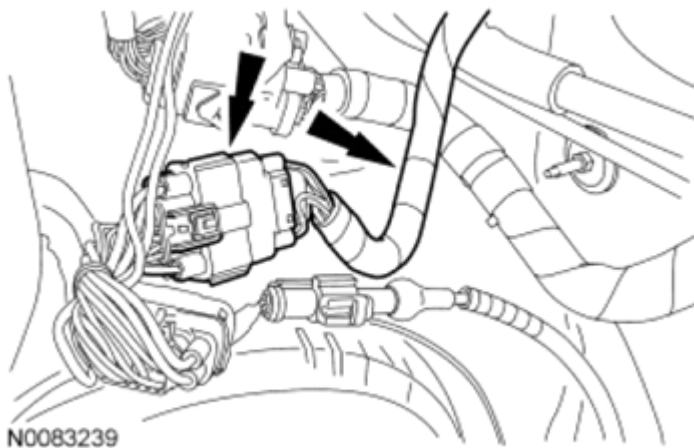


Fig. 308: Locating Engine Harness Electrical Connector
Courtesy of FORD MOTOR CO.

29. Disconnect the PCM electrical connector and the engine wiring harness retainer and position the engine wiring harness aside.

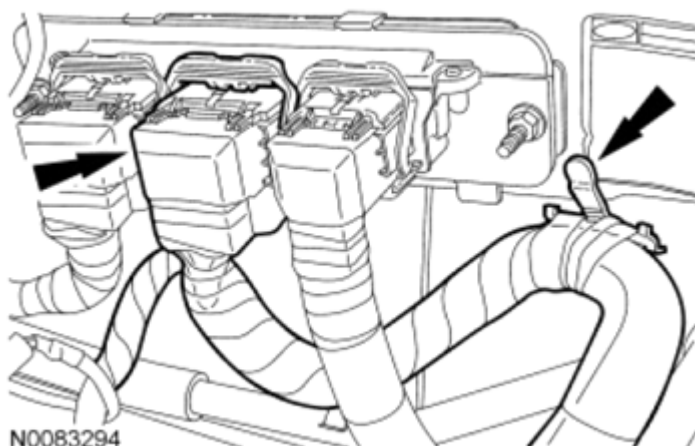


Fig. 309: Locating PCM Electrical Connector
Courtesy of FORD MOTOR CO.

30. Remove the ground strap bolt.

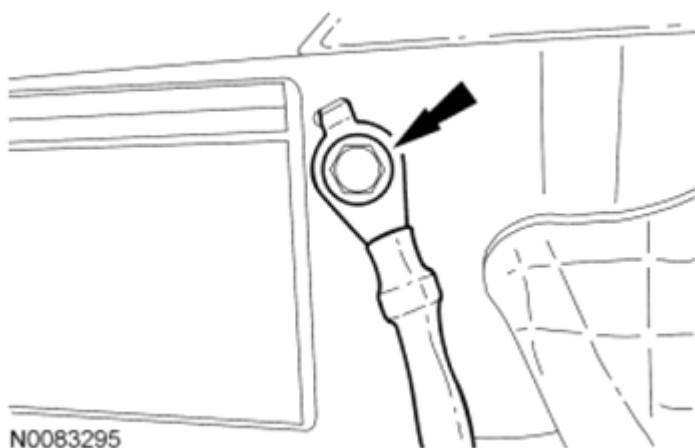


Fig. 310: Locating Ground Strap And Bolt
Courtesy of FORD MOTOR CO.

31. Disconnect the RH Knock Sensor (KS) electrical connector and the heater coolant hose.



Fig. 311: Locating KS Electrical Connector RH
Courtesy of FORD MOTOR CO.

32. Disconnect the LH KS electrical connector.

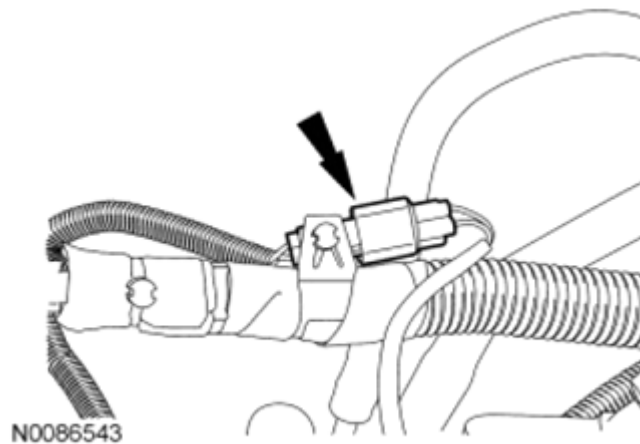


Fig. 312: Locating KS Electrical Connector LH
Courtesy of FORD MOTOR CO.

33. Disconnect the Cylinder Head Temperature (CHT) electrical connector.

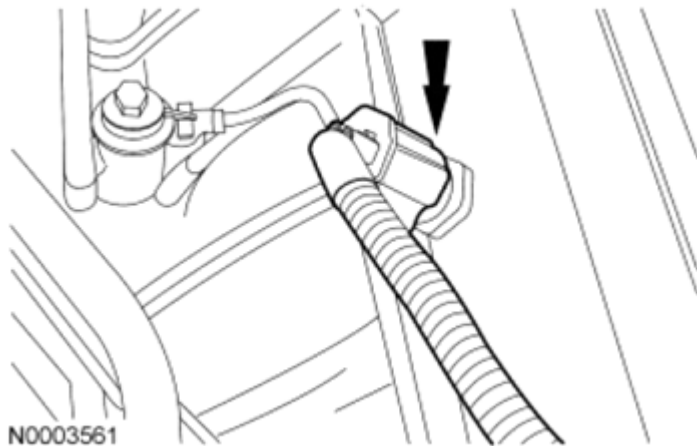


Fig. 313: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

34. Disconnect the RH Camshaft Position (CMP) sensor electrical connector and the 2 wiring harness retainers.

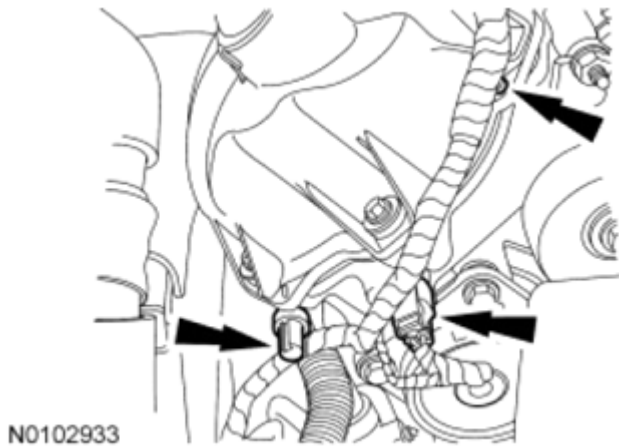


Fig. 314: Locating RH Camshaft Position (CMP) Sensor Electrical Connector And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

35. Disconnect the RH Variable Camshaft Timing (VCT) solenoid and the RH radio ignition interference capacitor electrical connectors.

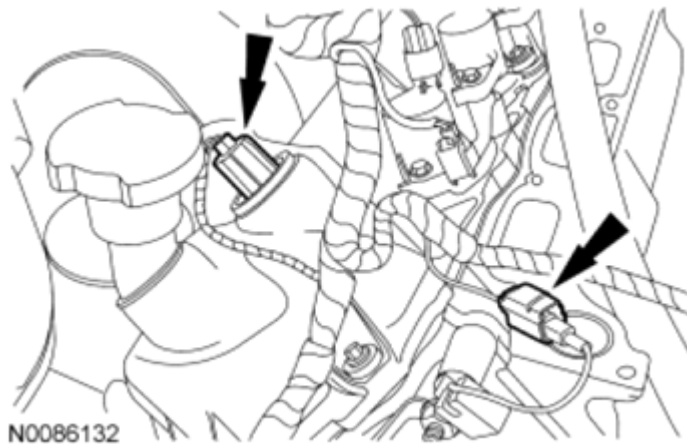


Fig. 315: Locating Radio Ignition Interference Capacitor Electrical Connectors RH
Courtesy of FORD MOTOR CO.

36. Disconnect the 4 RH ignition coil electrical connectors and the 2 engine wiring harness retainers from the RH valve cover studs.

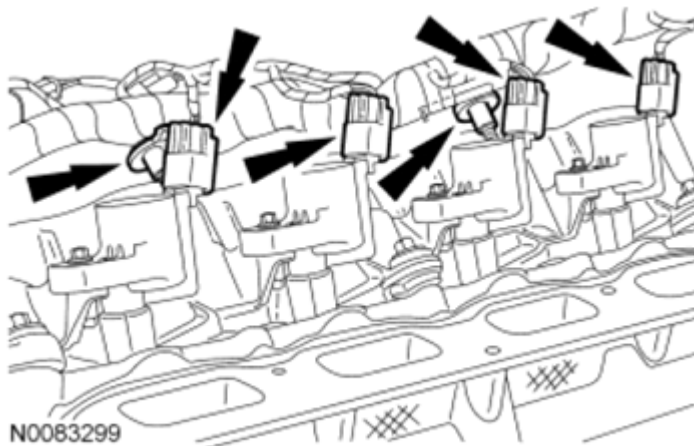


Fig. 316: Locating Ignition Coil Electrical Connectors And Engine Wiring Harness Retainers (RH)
Courtesy of FORD MOTOR CO.

37. Disconnect the LH CMP sensor, radio interference capacitor and VCT solenoid electrical connectors and detach the radio interference capacitor electrical connector retainer and the 2 wiring harness retainers.

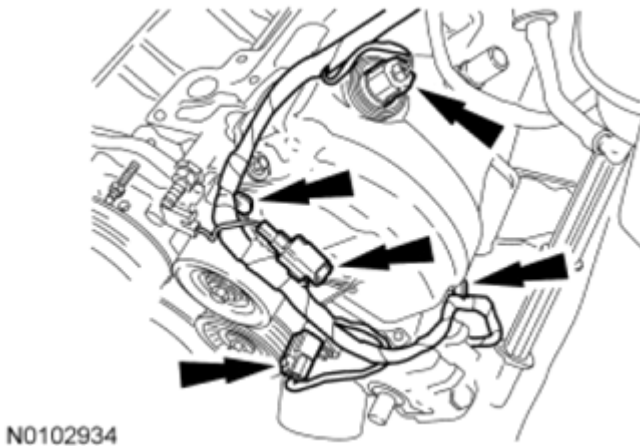


Fig. 317: Locating VCT Solenoid Electrical Connectors And Radio Interference Capacitor Electrical Connector Retainer And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

38. Disconnect the transmission wiring harness retainer from the intake manifold vacuum tube support bracket.

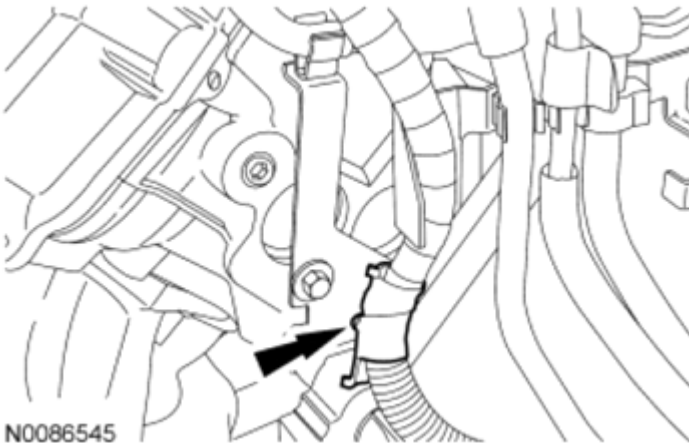


Fig. 318: Locating Transmission Wiring Harness Retainer And Intake Manifold Vacuum Tube Support Bracket
Courtesy of FORD MOTOR CO.

39. Position the engine wiring harness aside.
40. Support the transmission.

NOTE: On 4WD vehicles, it may be necessary to reposition the transfer case vent hose to access the bolts.

- 41.

Remove the upper 2 transmission-to-engine bolts.

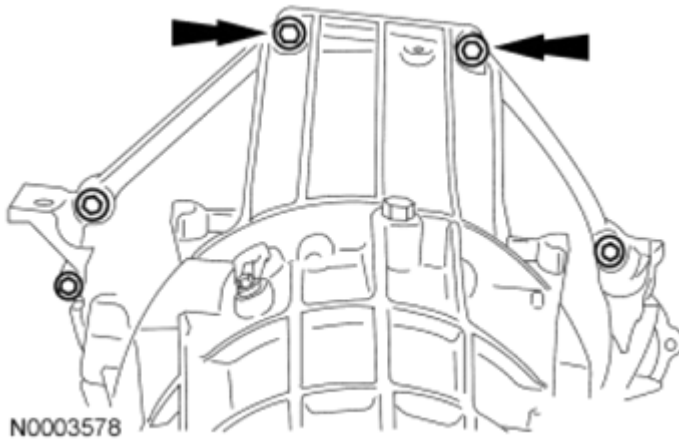


Fig. 319: Locating Upper Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

42. Install the Engine Lifting Bracket.

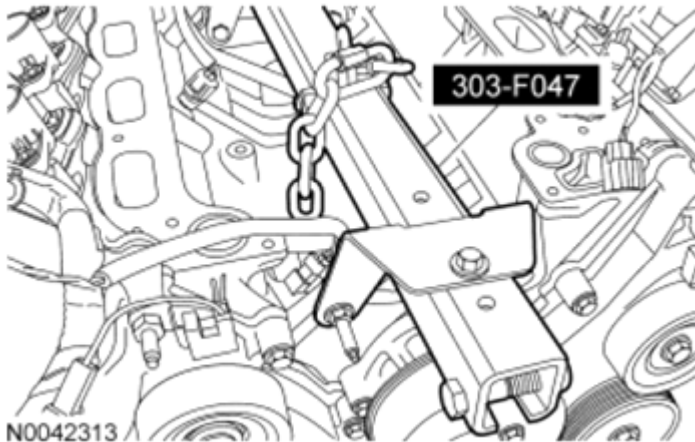


Fig. 320: Installing Engine Lift Bracket
Courtesy of FORD MOTOR CO.

43. Using a suitable floor crane, remove the engine assembly from the vehicle.

CYLINDER HEAD

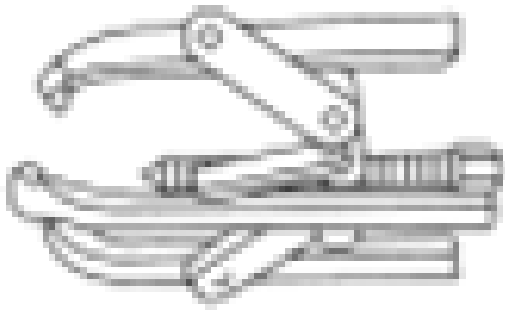
Special Tool(s)

SPECIAL TOOLS CHART

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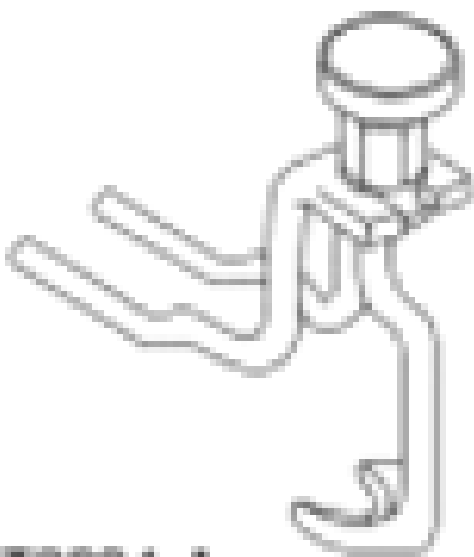
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



3 Jaw Puller
303-D121 or equivalent

ST1184-A



Compressor, Valve Spring
303-1039

ST2804-A

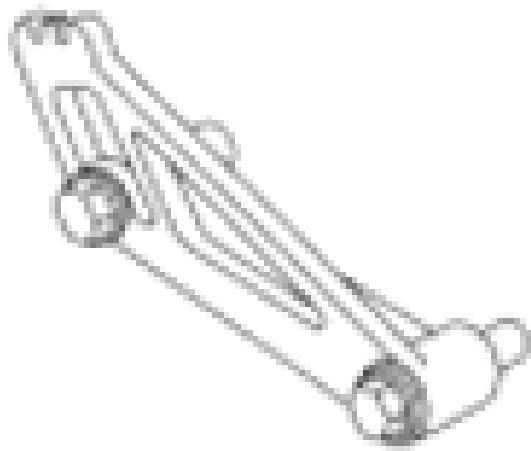
Lifting Bracket, Engine
303-F047 (014-00073) or equivalent

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1377-A



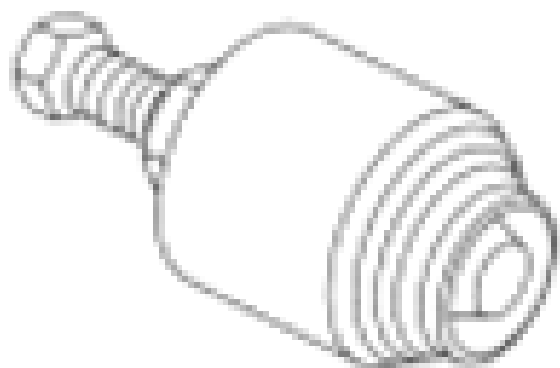
ST2807-A

Locking Tool, Cam Phaser
303-1046

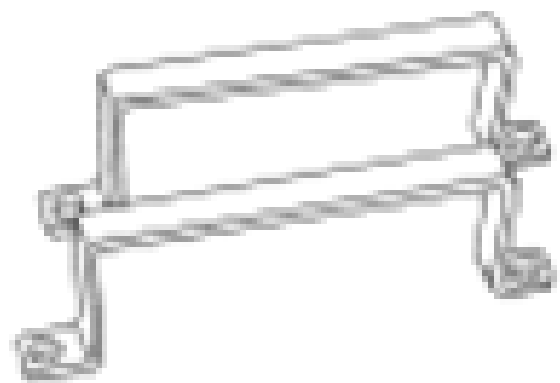
Remover, Crankshaft Front Oil Seal
303-107 (T74P-6700-A)

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1730-A



ST1668-A

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

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® Silicone Gasket Remover ZC-30	-

All cylinder heads

1. Remove the engine. For additional information, refer to **ENGINE** in this information.

NOTE: Do not use the oil pan to support the engine or oil pan and oil pan gasket damage may occur.

- 2.

Lower and support the engine assembly on wood blocks.

3. Remove the Engine Lifting Bracket.

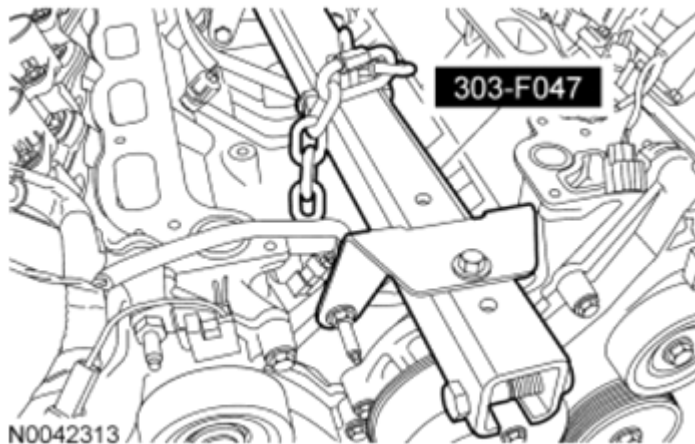


Fig. 321: Using Engine Lift Bracket
Courtesy of FORD MOTOR CO.

4. Install the engine onto an engine stand.
5. If equipped with cylinder block drain plugs, remove the 3 bolts and the RH engine support insulator.

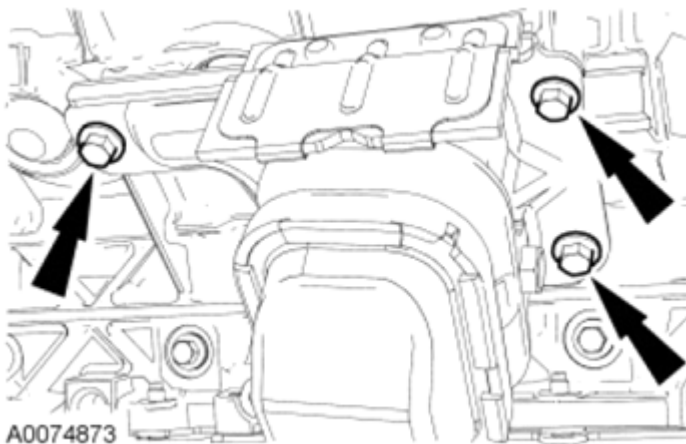


Fig. 322: Locating RH Engine Support Insulator Bolts
Courtesy of FORD MOTOR CO.

6. **NOTE:** LH shown in the illustration, RH similar.

If equipped, remove the cylinder block drain plugs and drain the coolant into a suitable container.

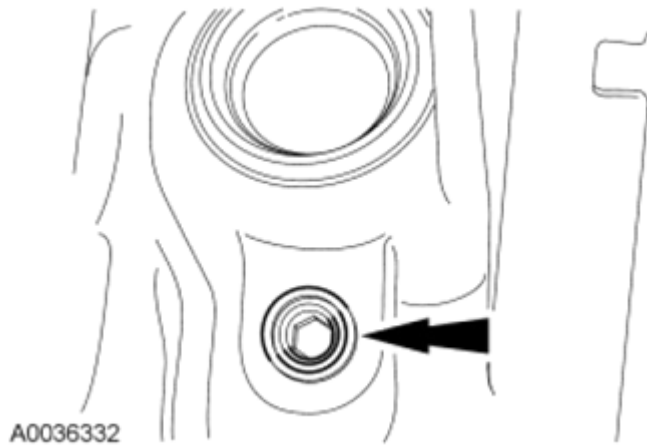


Fig. 323: Locating Cylinder Block Drain Plugs
Courtesy of FORD MOTOR CO.

7. **NOTE:** LH shown in the illustration, RH similar.

If equipped, install the cylinder block drain plugs.

- Tighten to 20 Nm (177 lb-in).

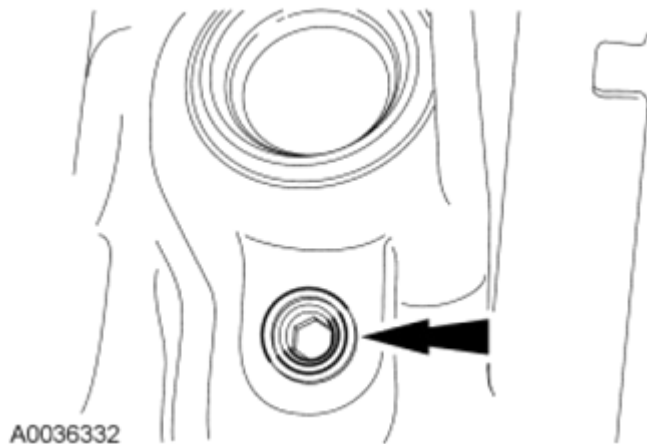


Fig. 324: Locating Cylinder Block Drain Plugs
Courtesy of FORD MOTOR CO.

8. Remove the nut and the RH radio interference capacitor.

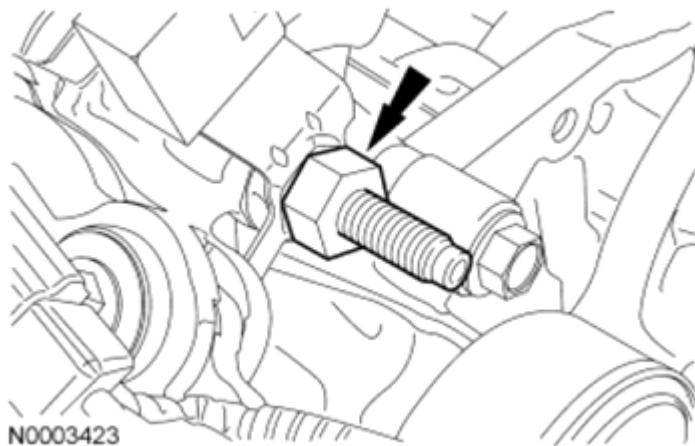


Fig. 325: Removing RH Radio Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

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

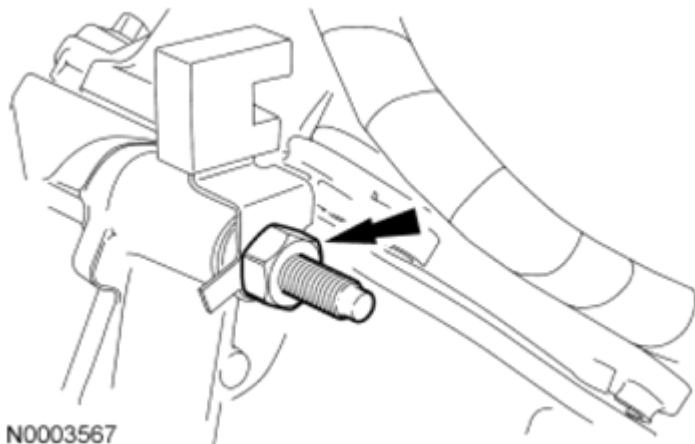


Fig. 326: Locating LH Radio Ignition Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

10. Remove the bolt and the intake manifold vacuum tube support bracket.

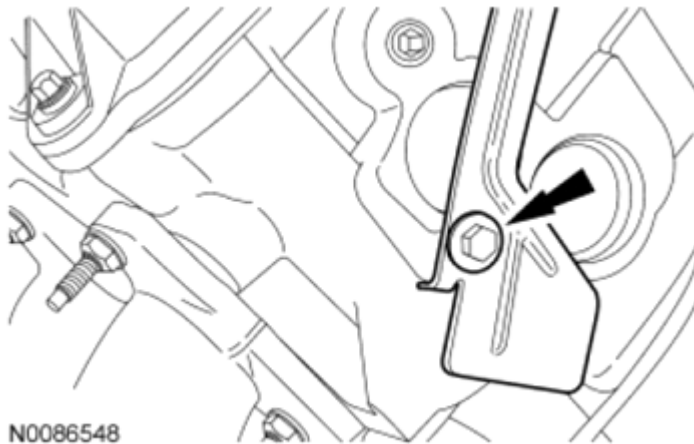


Fig. 327: Locating Bolt And Intake Manifold Vacuum Tube Support Bracket
Courtesy of FORD MOTOR CO.

11. **NOTE:** LH shown in the illustration, RH similar.

Remove the 8 bolts and the 8 ignition coils.

- Remove the ignition coil using a twisting motion while pulling up on the ignition coil.

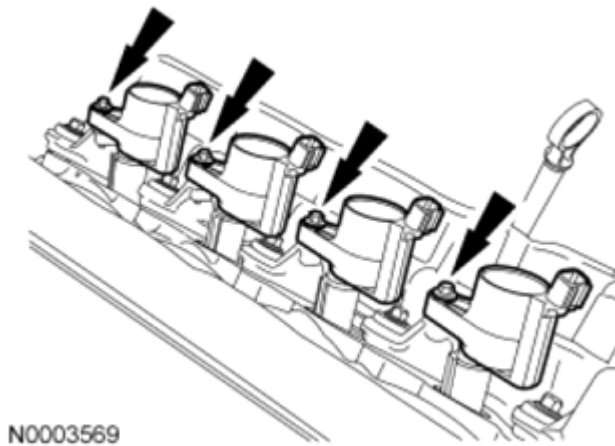


Fig. 328: Locating Ignition Coils Bolts
Courtesy of FORD MOTOR CO.

12. Remove the bolt and the oil level indicator tube.
- Discard the O-ring seal.

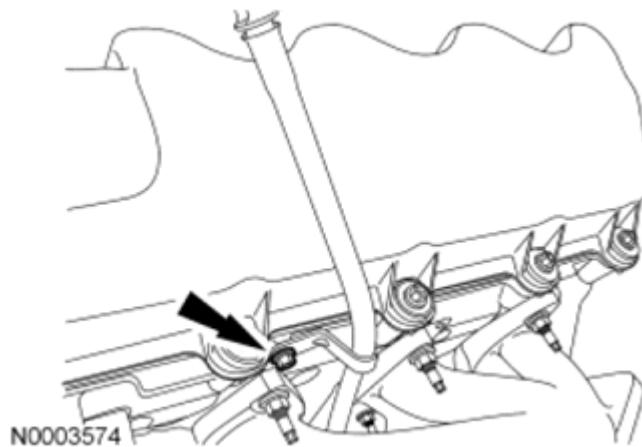


Fig. 329: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

NOTE: 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.

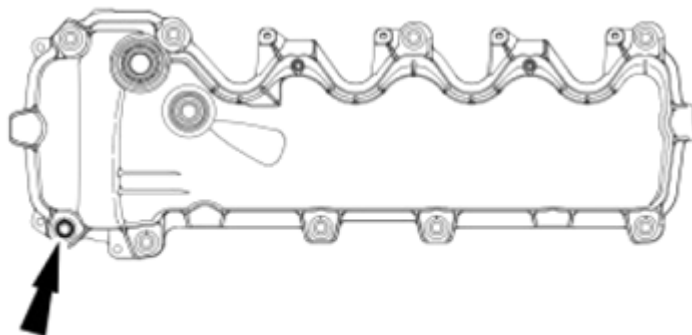
13.

NOTE: Remove the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

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

Loosen the 9 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.



N0122607

Fig. 330: Locating Valve Cover Gasket Bolt
Courtesy of FORD MOTOR CO.

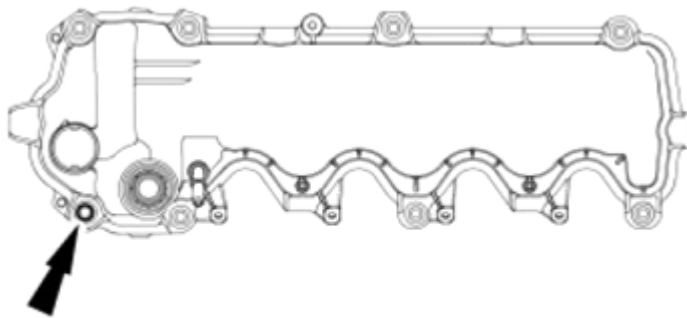
14. **NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

NOTE: Remove the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

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

Loosen the 8 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.



N0122608

Fig. 331: Locating RH Valve Cover And Bolts
Courtesy of FORD MOTOR CO.

15. Remove the 7 bolts, the coolant pump pulley and the 3 accessory drive belt idler pulleys.

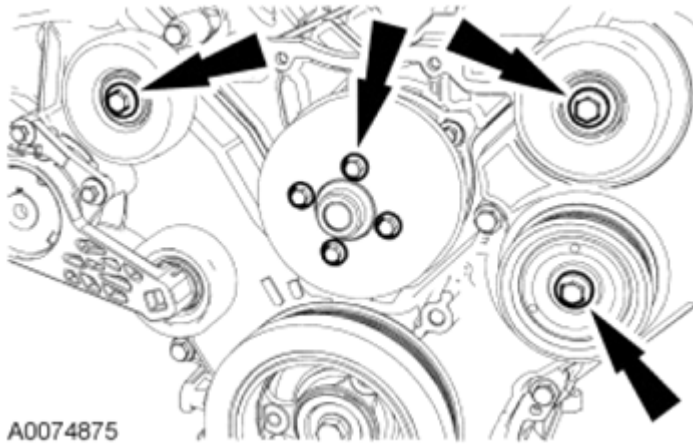


Fig. 332: Locating Coolant Pump Pulley And Accessory Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

16. Remove the 3 bolts and the accessory drive belt tensioner.

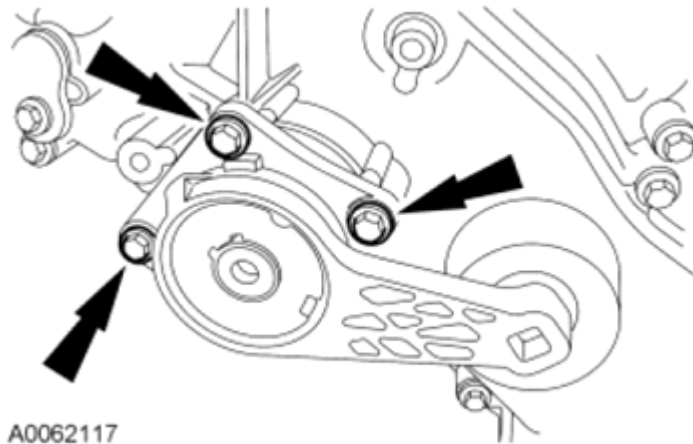


Fig. 333: Locating Accessory Drive Belt Tensioner Bolts
Courtesy of FORD MOTOR CO.

17. Remove and discard the crankshaft pulley bolt. Using the 3 Jaw Puller, remove the crankshaft pulley.



N0010528

Fig. 334: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

18. Using the Crankshaft Front Oil Seal Remover, remove and discard the crankshaft seal.

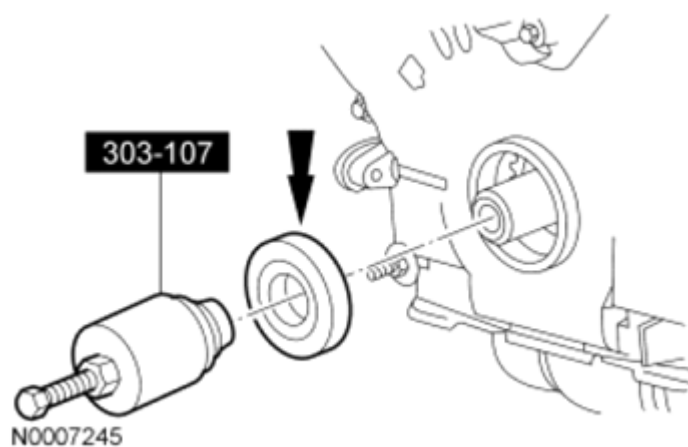
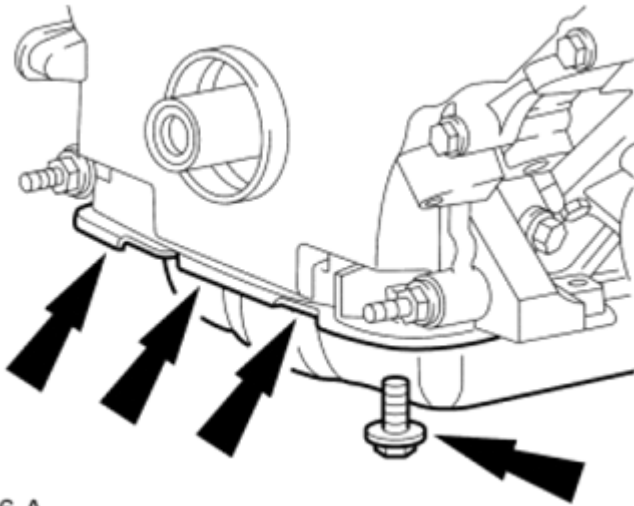


Fig. 335: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

19. Remove the front 4 oil pan bolts.

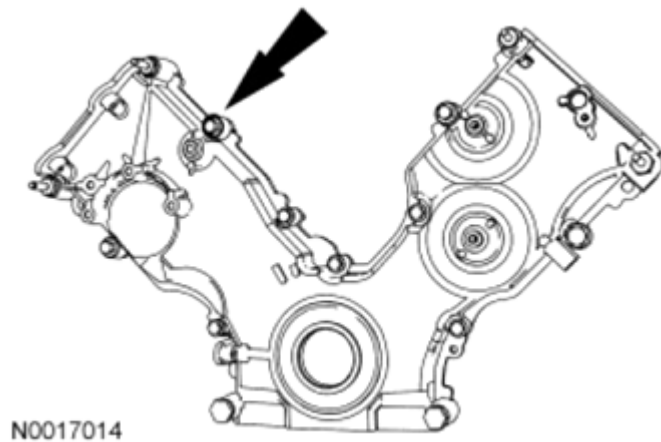


AA4226-A

Fig. 336: Locating Front Oil Pan Bolts
Courtesy of FORD MOTOR CO.

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

Remove the 15 engine front cover fasteners.



N0017014

Fig. 337: Removing Engine Front Cover Fasteners
Courtesy of FORD MOTOR CO.

21. Remove the engine front cover from the cylinder block.

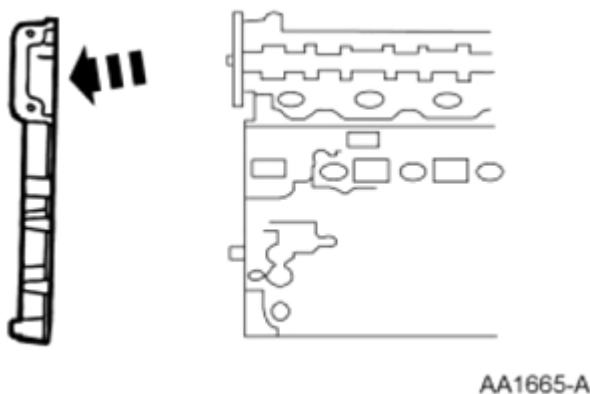


Fig. 338: Removing Engine Front Cover From Cylinder Block
Courtesy of FORD MOTOR CO.

22. Remove the crankshaft sensor ring from the crankshaft.

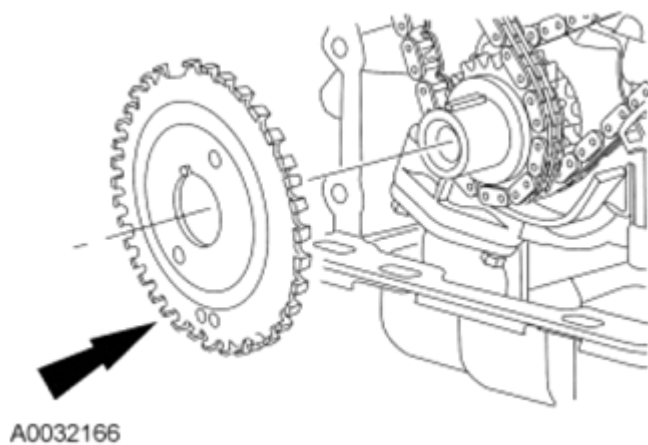


Fig. 339: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

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

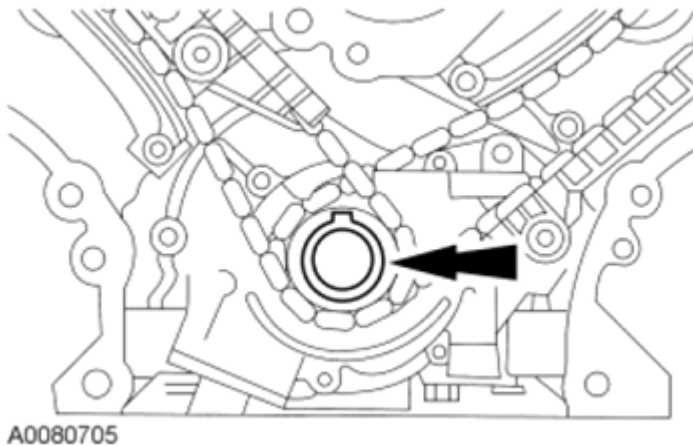


Fig. 340: Positioning Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

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

24.

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.

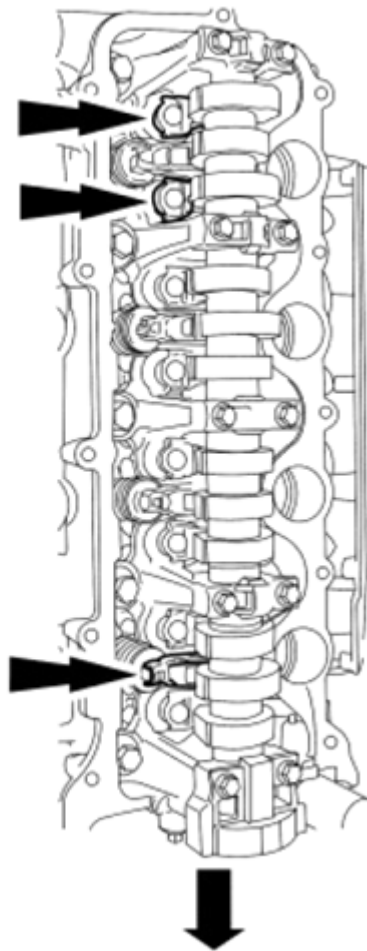


Fig. 341: View Of Intake Camshaft Lobes And Exhaust Lobe On No. 1 Cylinder
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

25.

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



A0083248

Fig. 342: Cylinder Head Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

26.

NOTE: Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder. If the valve drops into the cylinder, the cylinder head must be removed.

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

Using the Valve Spring Compressor, remove the 3 roller followers designated in the previous step from the RH cylinder head.

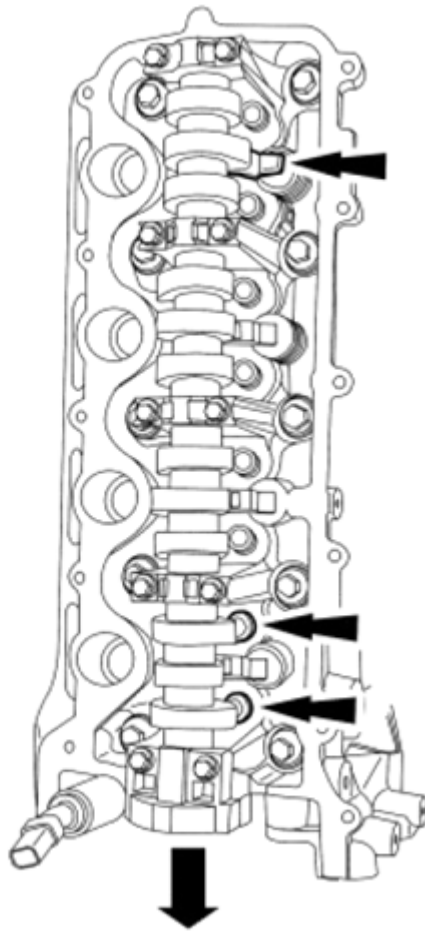


Fig. 343: Removing Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

27.

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

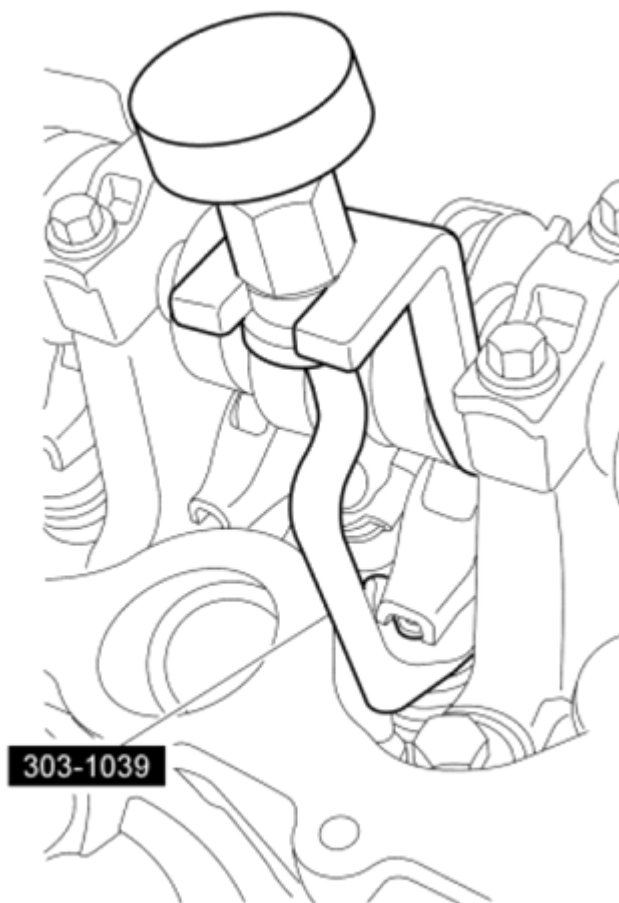


A0084479

Fig. 344: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

28. **NOTE:** Do not allow the valve keepers to fall off the valve or the valve may drop into the cylinder. If the valve drops into the cylinder, the cylinder head must be removed.
- NOTE:** It may be necessary to push the valve down while compressing the spring.

Using the Valve Spring Compressor, remove the 3 roller followers designated in the previous step from the LH cylinder head.



N0010191

Fig. 345: Using Valve Spring Compressor On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

29. **NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set.
Failure to follow these instructions may result in engine damage.

Rotate the crankshaft clockwise and position the crankshaft keyway at the 6 o'clock position.

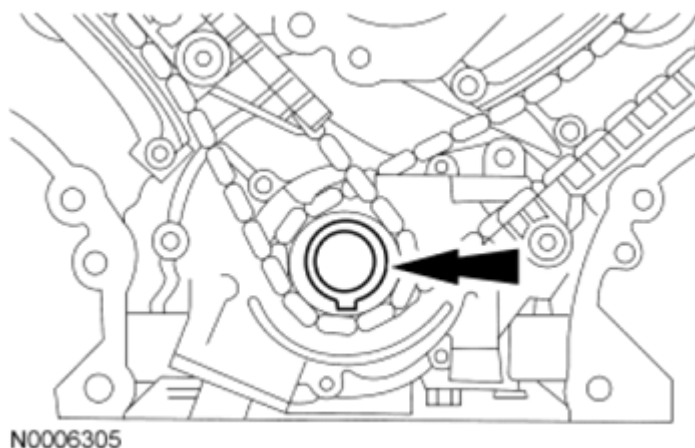


Fig. 346: Locating Crankshaft Keyway
Courtesy of FORD MOTOR CO.

30. Remove the 2 bolts, the LH timing chain tensioner and tensioner arm.

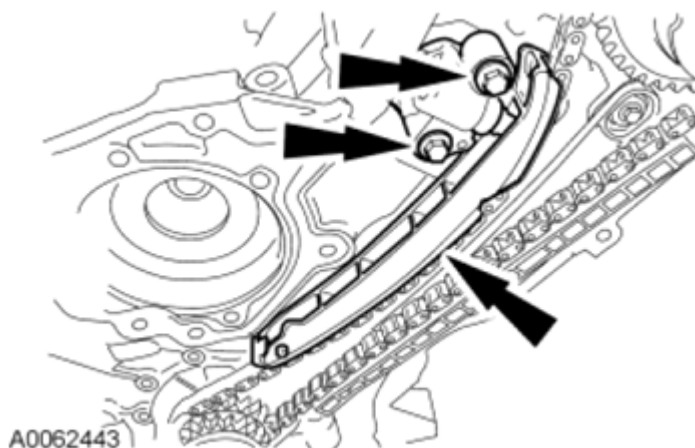


Fig. 347: Locating LH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

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

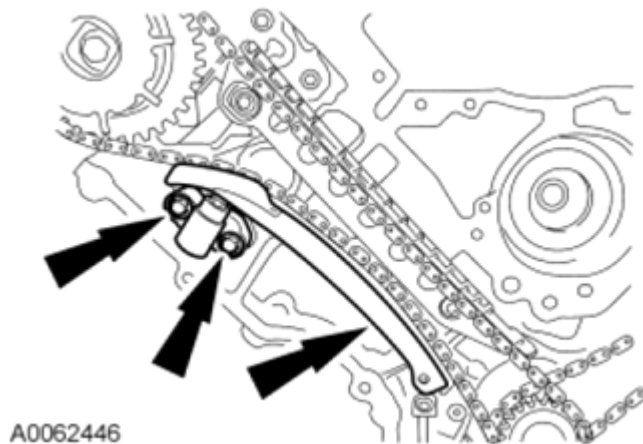


Fig. 348: Locating RH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

32. 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.

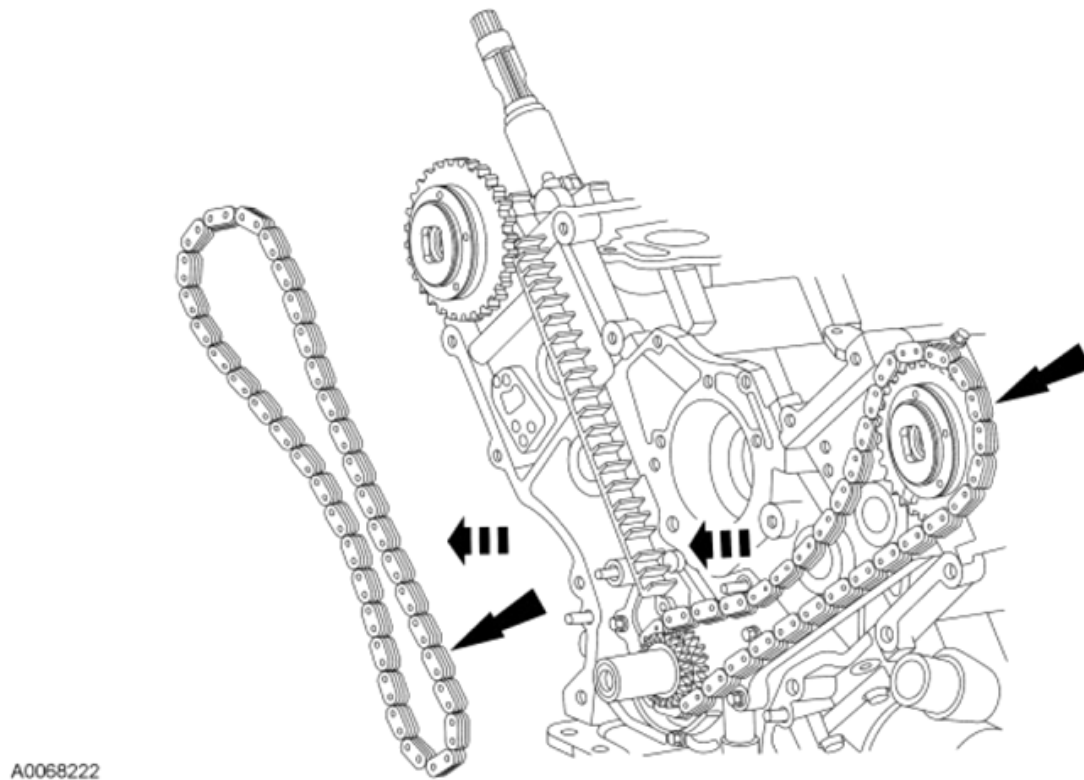


Fig. 349: Locating Timing Chains And Crankshaft Sprocket (RH And LH)

Courtesy of FORD MOTOR CO.

33. **NOTE:** RH shown in the illustration, LH similar.

Remove the LH and RH timing chain guides.

- Remove the 4 bolts.
- Remove both timing chain guides.

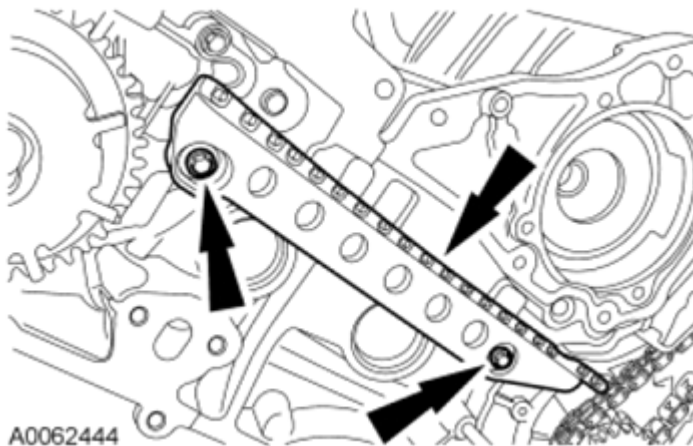


Fig. 350: Locating Timing Chain Guide And Mounting Bolts
Courtesy of FORD MOTOR CO.

LH cylinder head

34. **NOTE:** Damage to the camshaft phase sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase sprocket assembly or damage may occur to the camshaft or camshaft phase unit.
- NOTE:** Damage to the camshaft phase sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

Using the Cam Phaser Locking Tool, remove the bolt and the LH camshaft phase sprocket assembly.

- Discard the camshaft phase sprocket bolt.

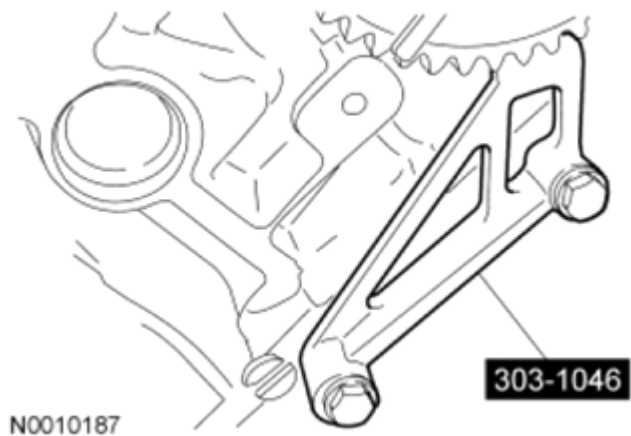


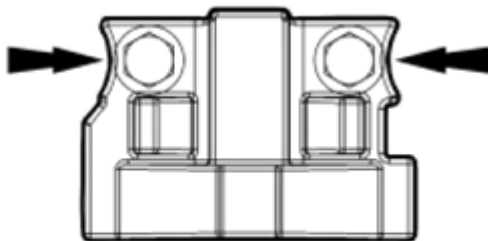
Fig. 351: Identifying Cam Phaser Locking Tool
Courtesy of FORD MOTOR CO.

35. Inspect the camshaft phase sprocket. For additional information, refer to ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION.

NOTE: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from side loading.

36.

Remove the 2 bolts and the LH cylinder head camshaft front bearing cap.



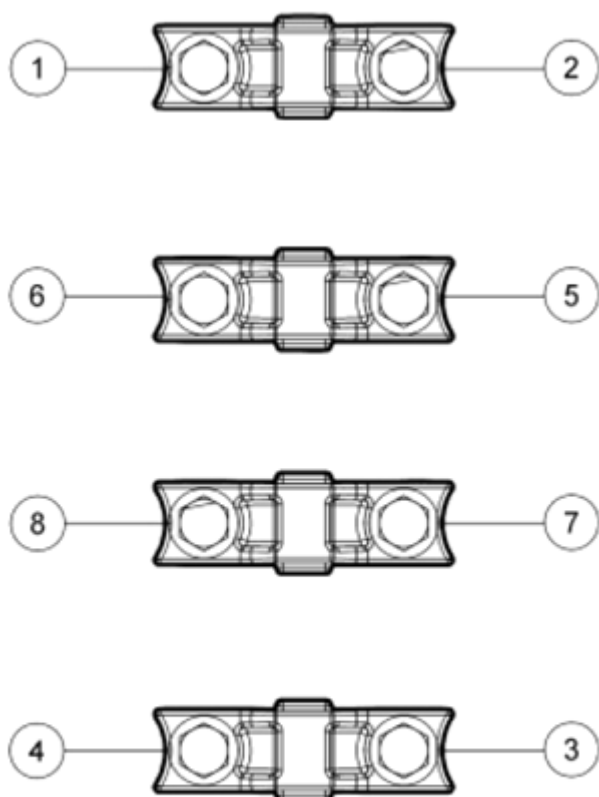
N0070049

Fig. 352: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

37.

Remove the remaining 8 bolts in the sequence shown in the illustration and remove the LH cylinder head camshaft bearing caps.



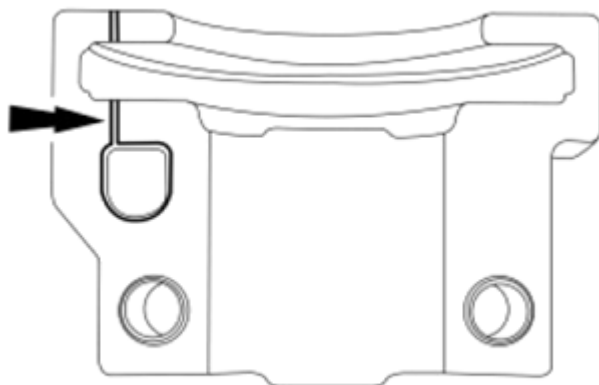
N0091483

Fig. 353: Identifying Camshaft Bearing Caps Bolts Tightening Sequence

Courtesy of FORD MOTOR CO.

38. 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. 354: Identifying Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

39. Remove the LH camshaft.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

40.

Remove all of the remaining camshaft roller followers from the cylinder head.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

41.

Remove the hydraulic lash adjusters from the LH cylinder head.

42. Install the Cylinder Head Remover/Installer on the LH cylinder head.

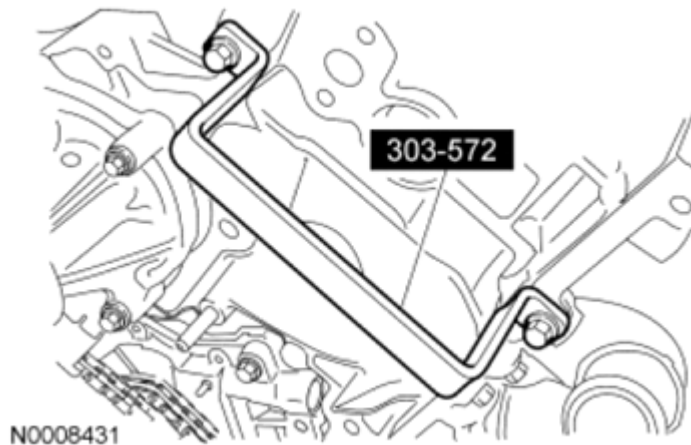


Fig. 355: Installing Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

43. Remove the 8 nuts and the LH exhaust manifold.

- Discard the 8 nuts.
- Discard the 2 gasket.
- Inspect the exhaust manifold. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .

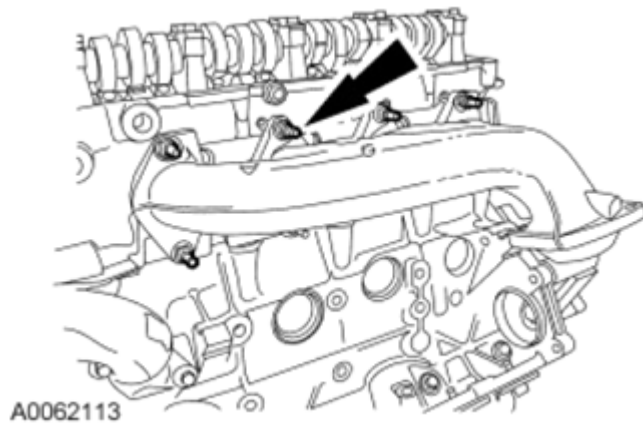


Fig. 356: Locating Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

44. Remove and discard the 8 LH exhaust manifold-to-cylinder head studs.

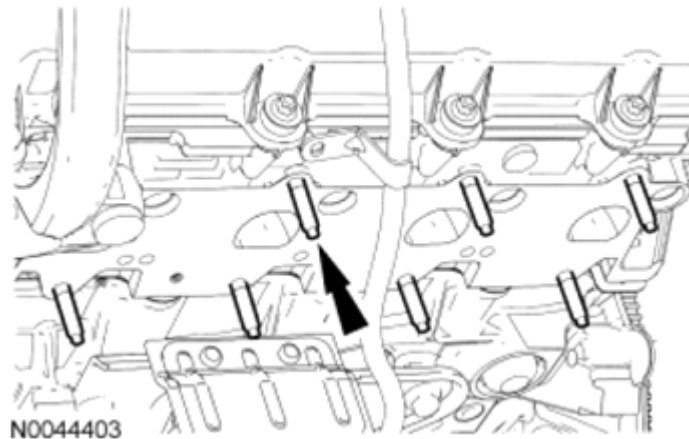


Fig. 357: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

RH cylinder head

45. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase unit.
- NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

Using the Cam Phaser Locking Tool, remove the bolt and the RH camshaft phase and sprocket assembly.

- Discard the camshaft phase sprocket bolt.

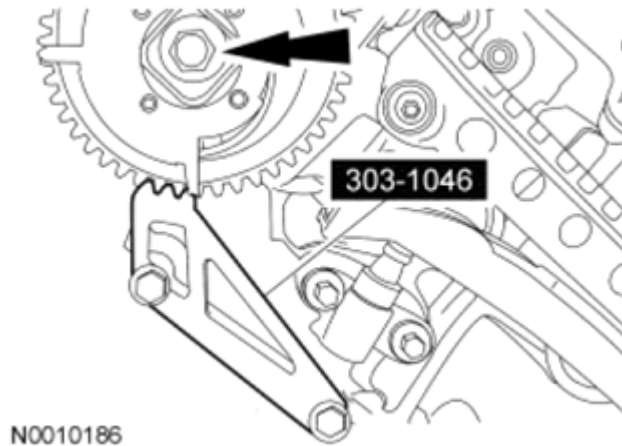


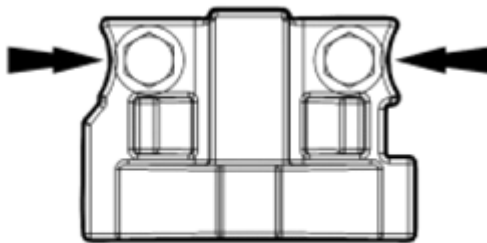
Fig. 358: Locating Camshaft Phaser Sprocket Bolt
Courtesy of FORD MOTOR CO.

46. Inspect the camshaft phase sprocket. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

NOTE: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from side loading.

- 47.

Remove the 2 bolts and the RH cylinder head camshaft front bearing cap.



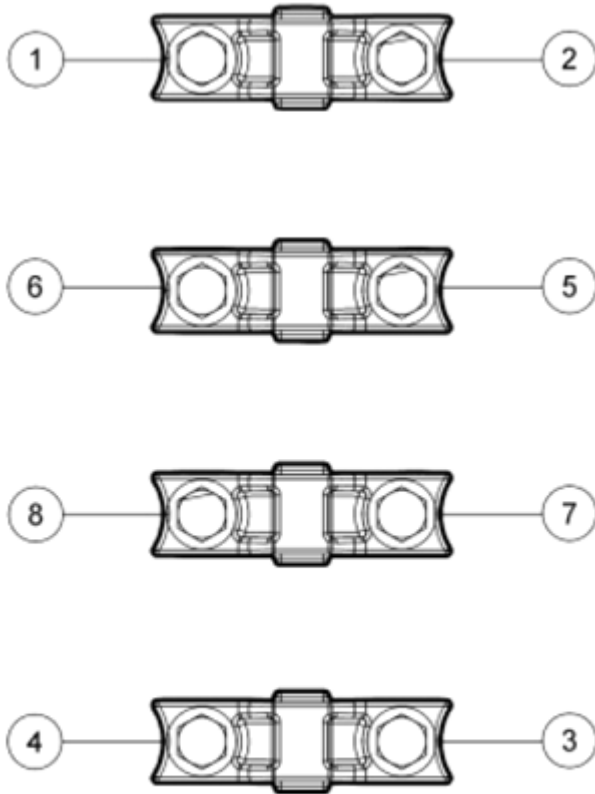
N0070049

Fig. 359: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

- 48.

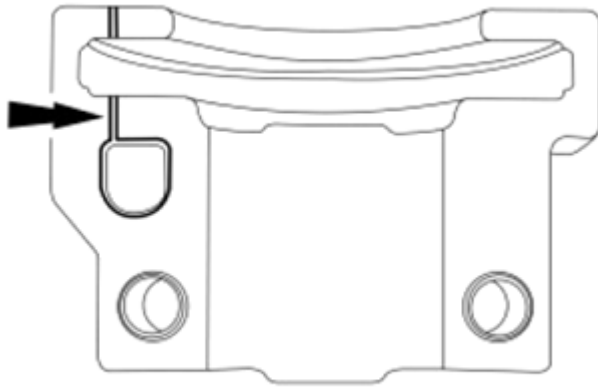
Remove the remaining 8 bolts in the sequence shown in the illustration and remove the RH cylinder head camshaft bearing caps.



N0091483

Fig. 360: Identifying Camshaft Bearing Caps Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

49. 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. 361: Locating Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

50. Remove the RH camshaft.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

51.

Remove all of the remaining camshaft roller followers from the cylinder head.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

52.

Remove the hydraulic lash adjusters from the RH cylinder head.

53. Install the Cylinder Head Remover/Installer on the RH cylinder head.

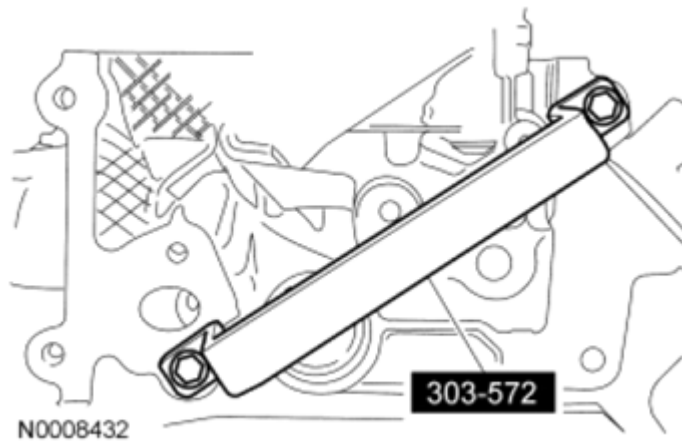


Fig. 362: Installing Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

54. Remove the 8 nuts and the RH exhaust manifold.
- Discard the 8 nuts.
 - Discard the 2 gaskets.
 - Inspect the exhaust manifold. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .

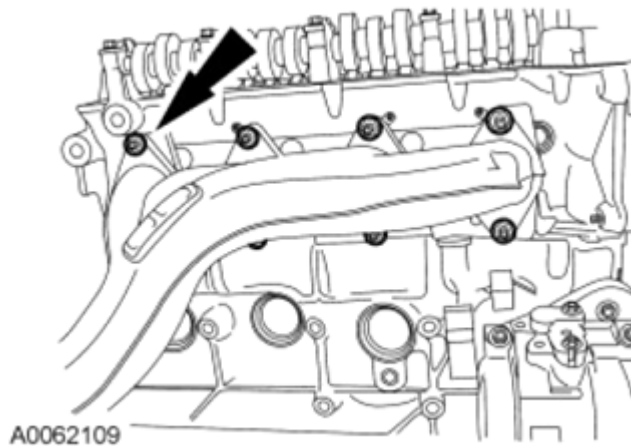


Fig. 363: Locating RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

55. Remove and discard the 8 RH exhaust manifold-to-cylinder head studs.

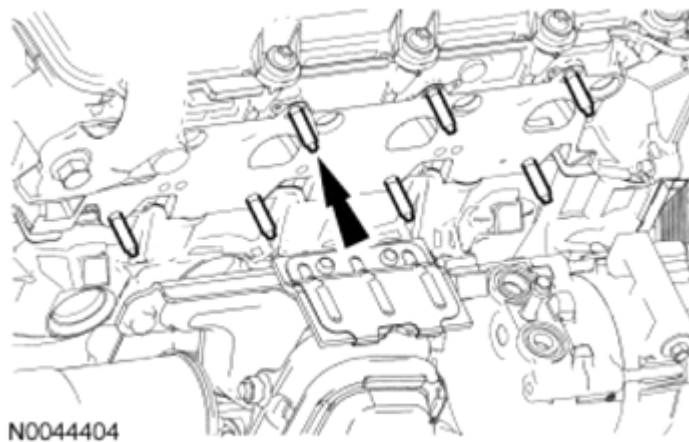


Fig. 364: Locating Exhaust Manifold-To-Cylinder Head Studs (RH)
Courtesy of FORD MOTOR CO.

56. Remove the nut and the ground strap.

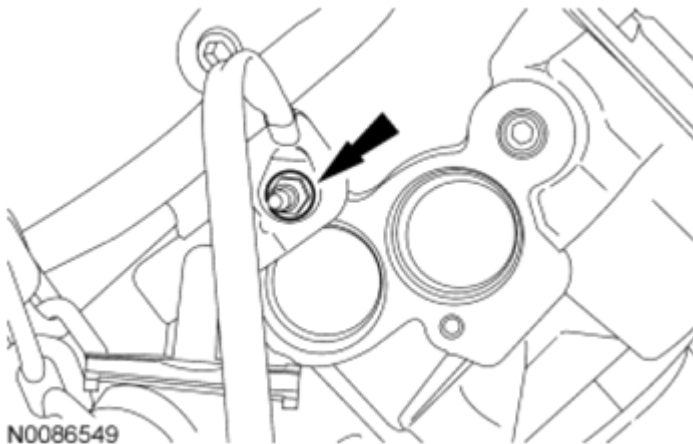


Fig. 365: Locating Nut And Ground Strap
Courtesy of FORD MOTOR CO.

57. Remove the stud bolt and the coolant tube.
- Discard the O-ring seals.

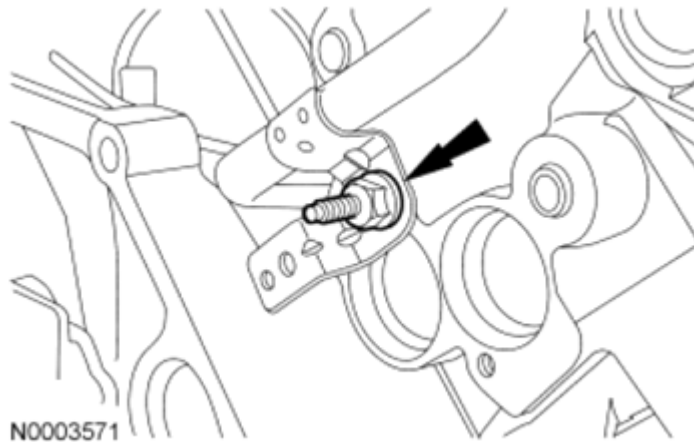


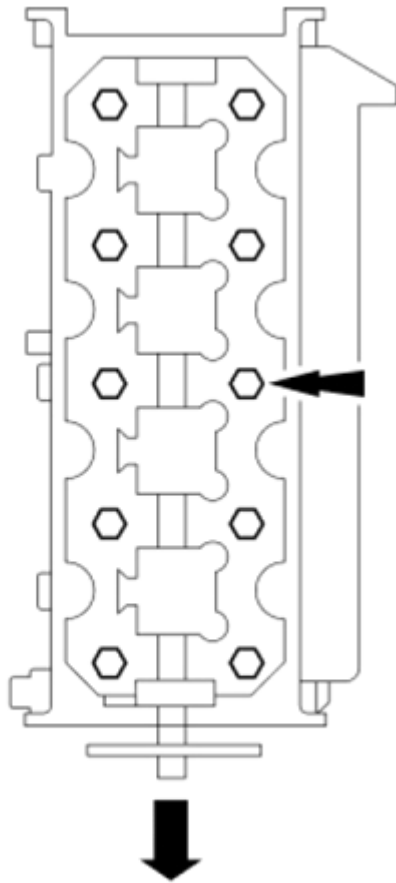
Fig. 366: Removing Coolant Tube Stud Bolt
Courtesy of FORD MOTOR CO.

All cylinder heads

- 58.
- NOTE:** The cylinder head must be cool before removing it from the engine. Cylinder head warpage may result if a warm or hot cylinder head is removed.
- NOTE:** Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.
- NOTE:** 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.
- NOTE:** Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface, or the cylinder head may be damaged.
- NOTE:** The cylinder head bolts must be discarded and new bolts must be installed. They are a tighten-to-yield design and cannot be reused.
- NOTE:** RH shown in the illustration, LH similar.

Remove the 20 bolts and the cylinder heads.

- Discard the cylinder head gaskets.
- Discard the cylinder head bolts.



N0067889

Fig. 367: Locating Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

NOTE: 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.

59.

NOTE: Observe all warnings or notices 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.

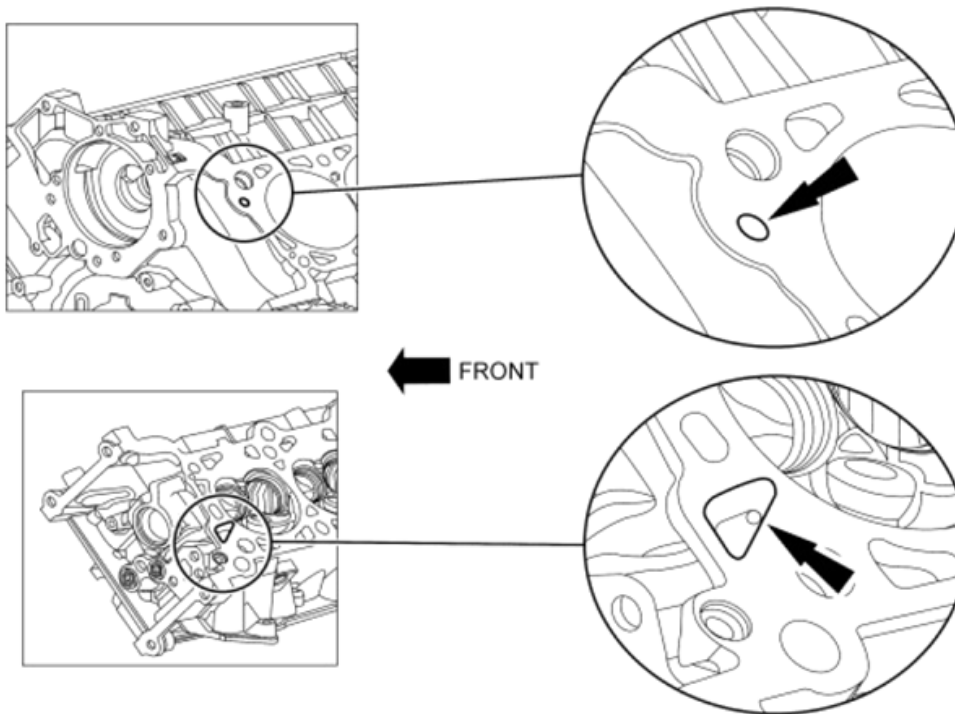
Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block in the following sequence.

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.

60. **NOTE:** LH shown in the illustration, RH similar.

Support the cylinder heads on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion, paying particular attention to the oil pressure feed area. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.



A0079634

Fig. 368: Locating Oil Pressure Feed Area
Courtesy of FORD MOTOR CO.

DISASSEMBLY

ENGINE

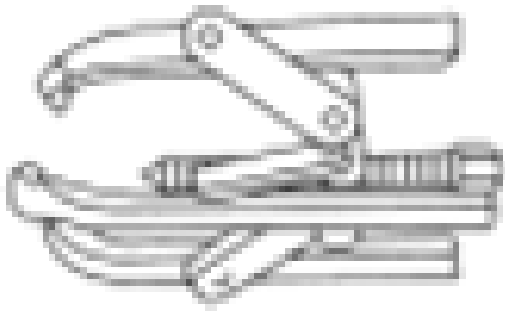
Special Tool(s)

SPECIAL TOOLS CHART

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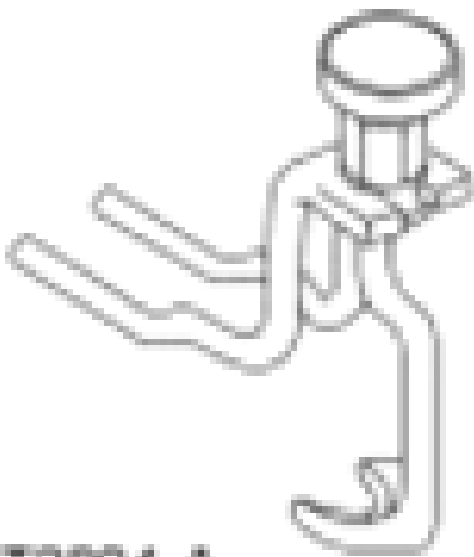
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



3 Jaw Puller
303-D121

ST1184-A

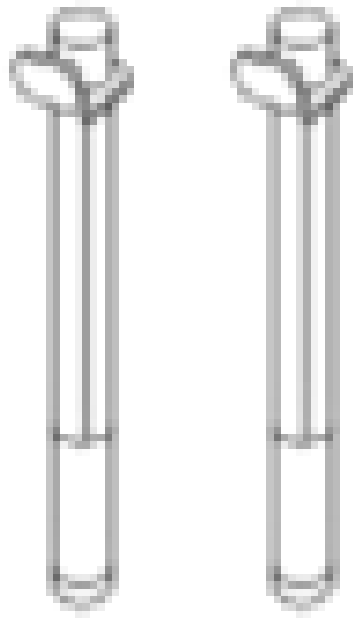


Compressor, Valve Spring
303-1039

ST2804-A

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1337-A

Installer, Connecting Rod
303-442 (T93P-6136-A)



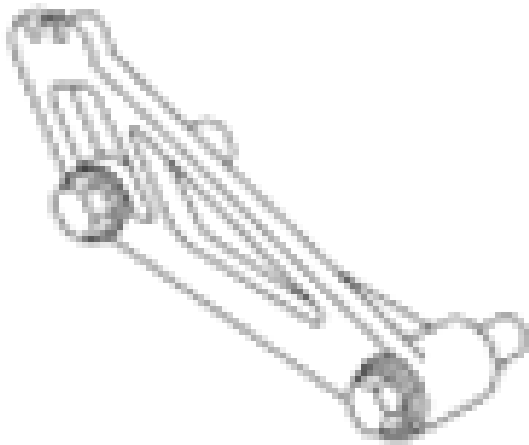
ST1377-A

Lifting Bracket, Engine
303-F047 (014-00073) or equivalent

Locking Tool, Cam Phaser

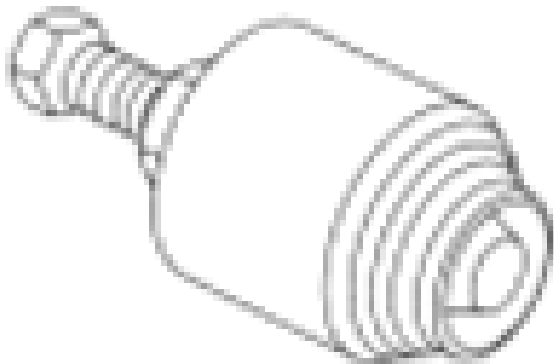
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2807-A

303-1046



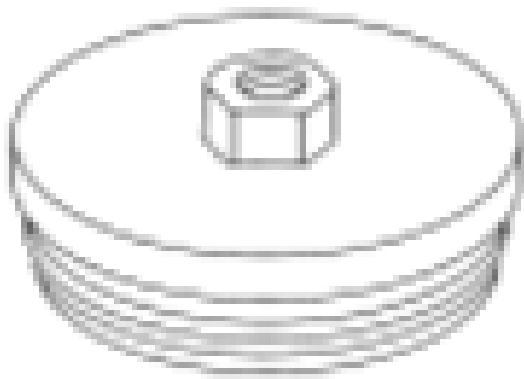
ST1730-A

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

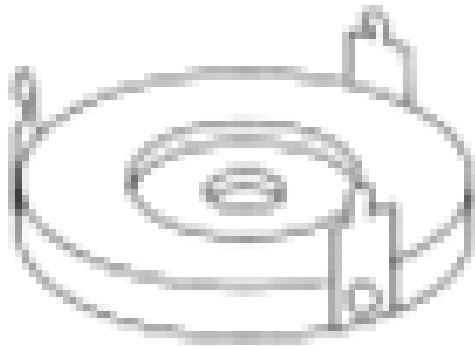
Remover, Crankshaft Rear Oil Seal
303-519 (T95P-6701-DH)

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1382-A



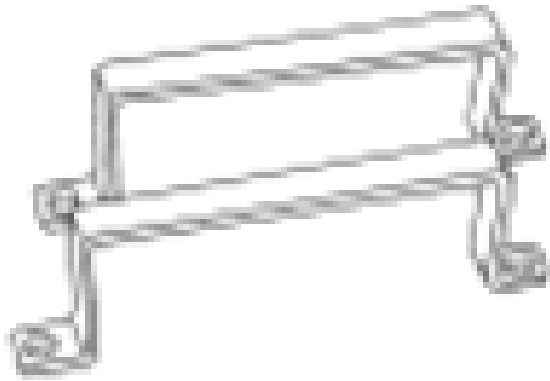
ST1481-A

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

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

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1668-A



ST1185-A

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

Material

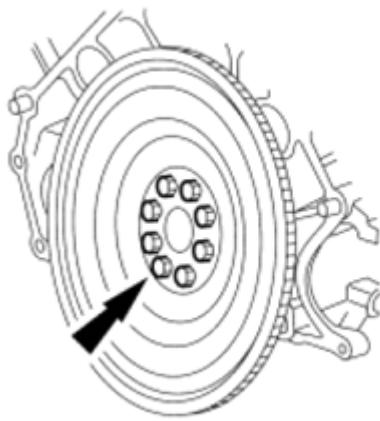
MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® Silicone Gasket Remover ZC-30	-

NOTE: Remove the cylinder heads before removing the crankshaft. Failure to do so may result in engine damage.

- NOTE:** 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, may cause engine failure.
- NOTE:** The flexplate or flywheel, crankshaft rear seal and the crankshaft rear oil slinger must be removed before mounting the engine on the engine stand.
- NOTE:** For additional information, refer to the appropriate exploded view graphic under the **Assembly** procedure in this information.

1. Remove the 8 bolts and the flexplate.



A26551-A

Fig. 369: Locating Flexplate Bolts
Courtesy of FORD MOTOR CO.

2. Using the Slide Hammer and the Crankshaft Rear Oil Slinger Remover, remove and discard the crankshaft oil slinger.

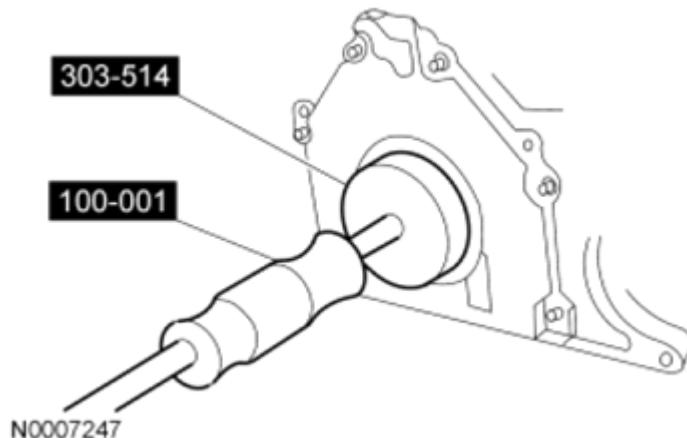


Fig. 370: Removing Crankshaft Rear Oil Seal Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

3. Using the Slide Hammer and the Crankshaft Rear Oil Seal Remover, remove and discard the crankshaft rear seal.

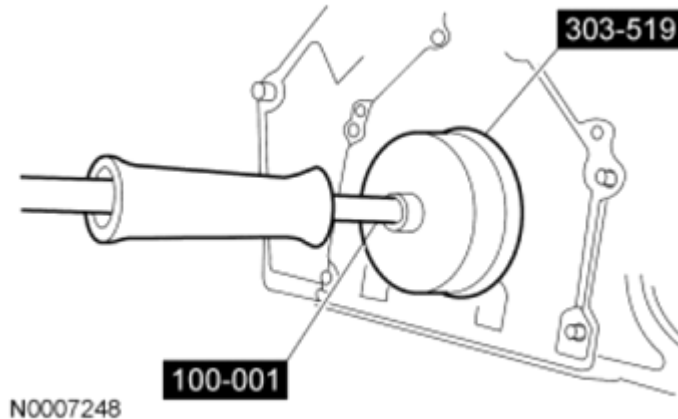


Fig. 371: Removing Crankshaft Rear Seal Using Special Tools
Courtesy of FORD MOTOR CO.

4. Remove the 8 bolts and the crankshaft rear seal retainer plate.

NOTE: 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.

Clean and inspect the sealing surfaces.

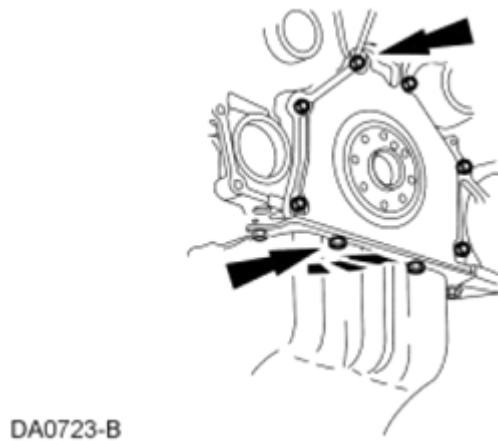


Fig. 372: Locating Bolts And Crankshaft Rear Seal Retainer Plate
Courtesy of FORD MOTOR CO.

5. Mount the engine on an engine stand.
6. Remove the Engine Lifting Bracket.

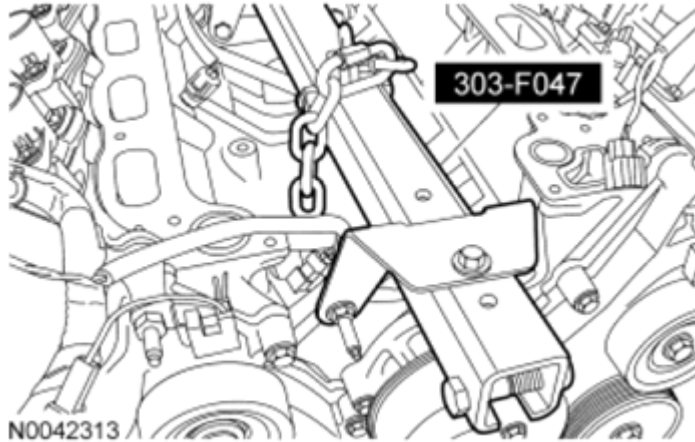


Fig. 373: Removing Engine Lift Bracket
Courtesy of FORD MOTOR CO.

7. Remove the 3 bolts and the RH engine support insulator.

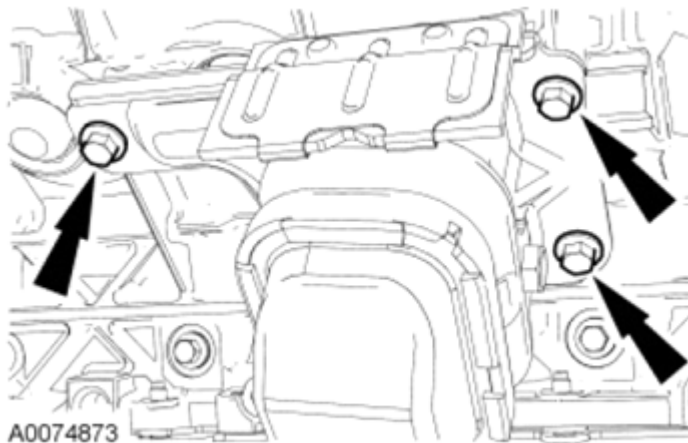


Fig. 374: Locating RH Engine Support Insulator Bolts
Courtesy of FORD MOTOR CO.

8. **NOTE:** LH shown in the illustration, RH similar.

If equipped, remove the cylinder block drain plugs and drain the coolant into a suitable container.

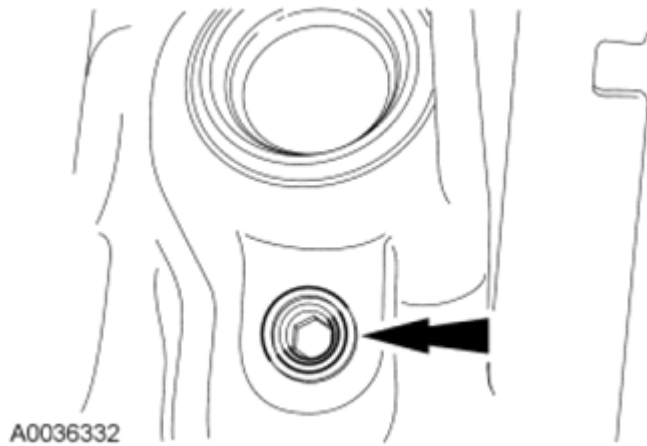


Fig. 375: Locating Cylinder Block Drain Plugs
Courtesy of FORD MOTOR CO.

9. **NOTE:** LH shown in the illustration, RH similar.

If equipped, install the cylinder block drain plugs.

- Tighten to 20 Nm (177 lb-in).

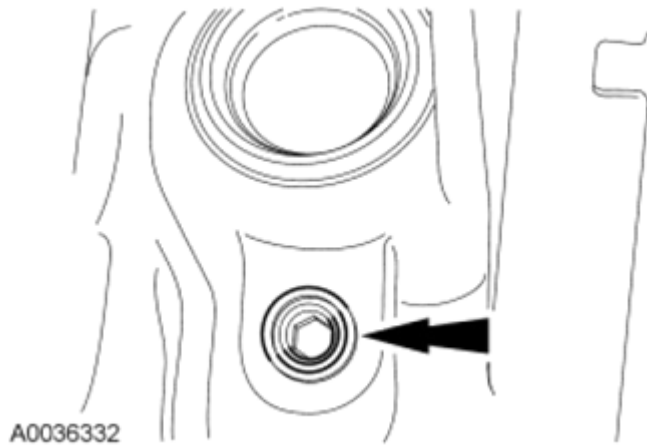


Fig. 376: Locating Cylinder Block Drain Plugs
Courtesy of FORD MOTOR CO.

10. Remove the nut and the RH radio interference capacitor.

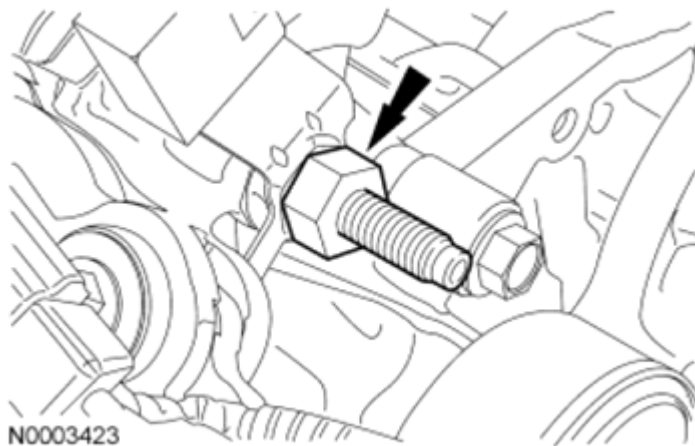


Fig. 377: Removing RH Radio Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

11. Remove the nut and the LH radio ignition interference capacitor.

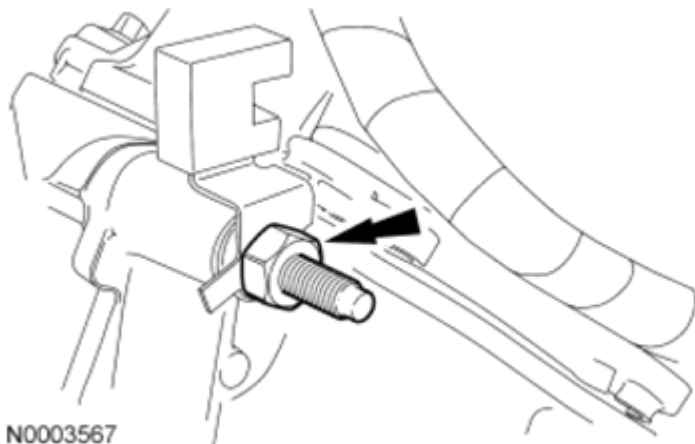


Fig. 378: Locating LH Radio Ignition Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

12. Remove the bolt and the intake manifold vacuum tube support bracket.

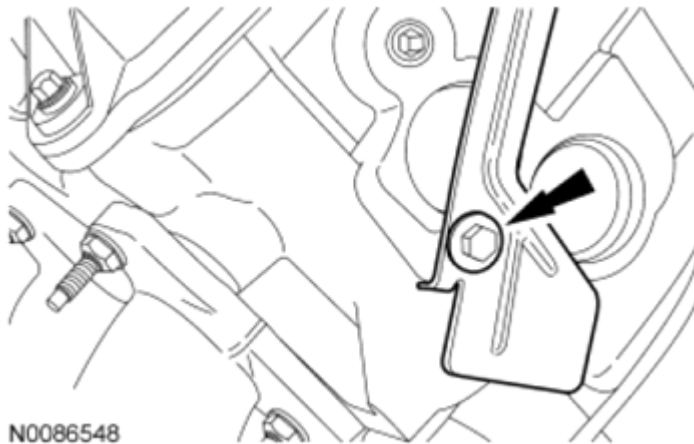


Fig. 379: Locating Bolt And Intake Manifold Vacuum Tube Support Bracket
Courtesy of FORD MOTOR CO.

13. **NOTE:** LH shown in the illustration, RH similar.

Remove the 8 bolts and the 8 ignition coils.

- Remove the ignition coil using a twisting motion while pulling up on the ignition coil.

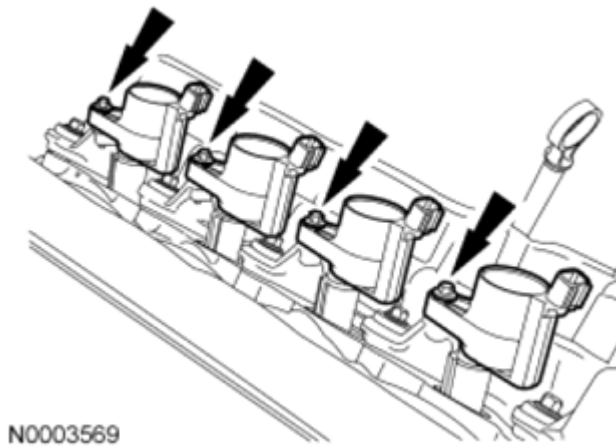


Fig. 380: Locating Ignition Coils Bolts
Courtesy of FORD MOTOR CO.

14. Remove the 2 bolts and both of the Knock Sensor (KS).

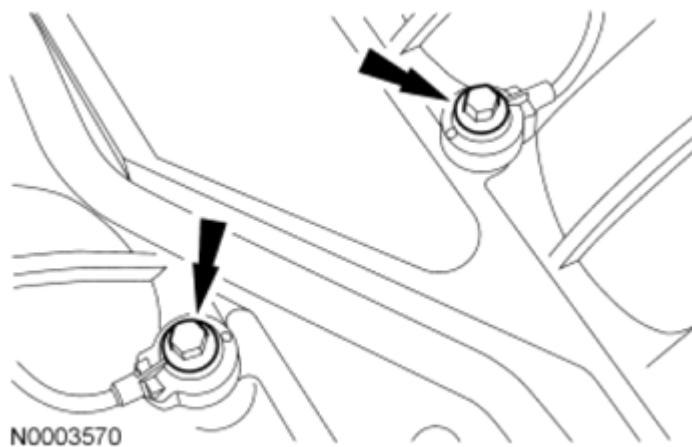


Fig. 381: Locating Knock Sensors Bolts
Courtesy of FORD MOTOR CO.

15. Remove the stud bolt and the coolant tube.
 - Discard the O-ring seal.

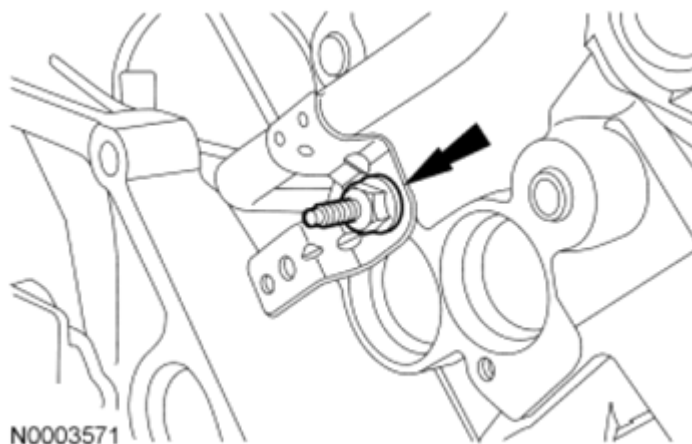


Fig. 382: Locating Coolant Tube Stud Bolt
Courtesy of FORD MOTOR CO.

16. Remove the 3 bolts and the LH engine support insulator-to-cylinder block bracket.

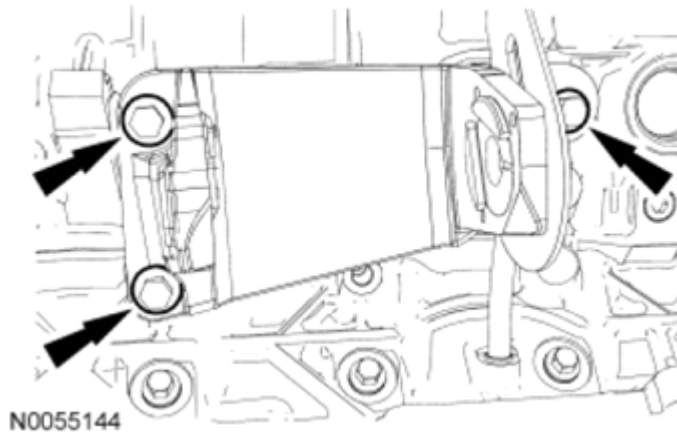


Fig. 383: Locating Bolts And Engine Support Insulator-To-Cylinder Block Bracket LH
Courtesy of FORD MOTOR CO.

17. Remove the bolt and the oil level indicator tube.
 - Discard the O-ring seal.

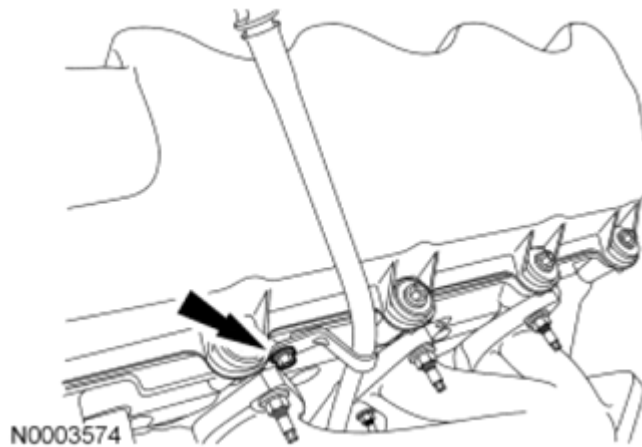


Fig. 384: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

18.

NOTE: 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.

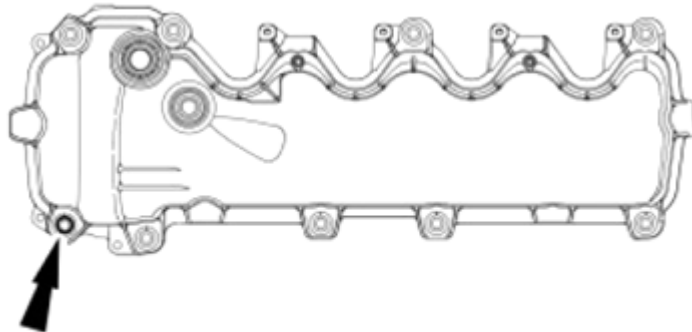
NOTE: Remove the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

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

Loosen the 9 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.



N0122607

Fig. 385: Locating Valve Cover Gasket Bolt
Courtesy of FORD MOTOR CO.

NOTE: 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.

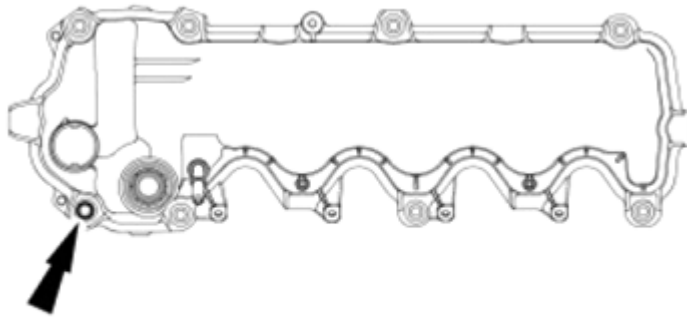
19.

NOTE: Remove the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

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

Loosen the 8 bolts and remove the RH valve cover.

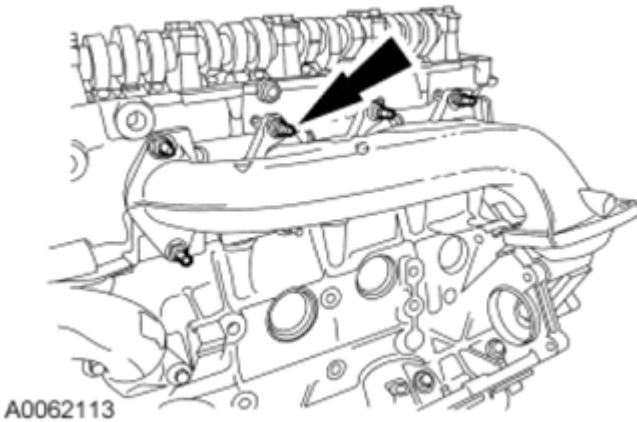
- Clean the valve cover mating surface of the cylinder head with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the valve cover gasket. If the gasket is damaged, remove and discard the gasket. Clean the valve cover gasket groove with soap and water or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



N0122608

Fig. 386: Locating RH Valve Cover And Bolts
Courtesy of FORD MOTOR CO.

20. Remove the 8 nuts, the 8 studs and the LH exhaust manifold.
- Discard the gaskets, nuts and studs.
 - Inspect the exhaust manifold. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .



A0062113

Fig. 387: Locating LH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

21. Remove the 8 nuts, the 8 studs and the RH exhaust manifold.
- Discard the gaskets, nuts and studs.
 - Inspect the exhaust manifold. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .

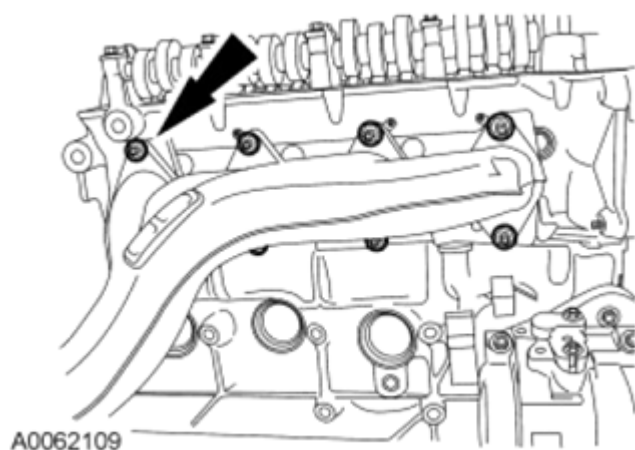


Fig. 388: Locating RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

22. Remove and discard the oil filter. Remove the 3 bolts, the studbolt and the oil filter adapter.

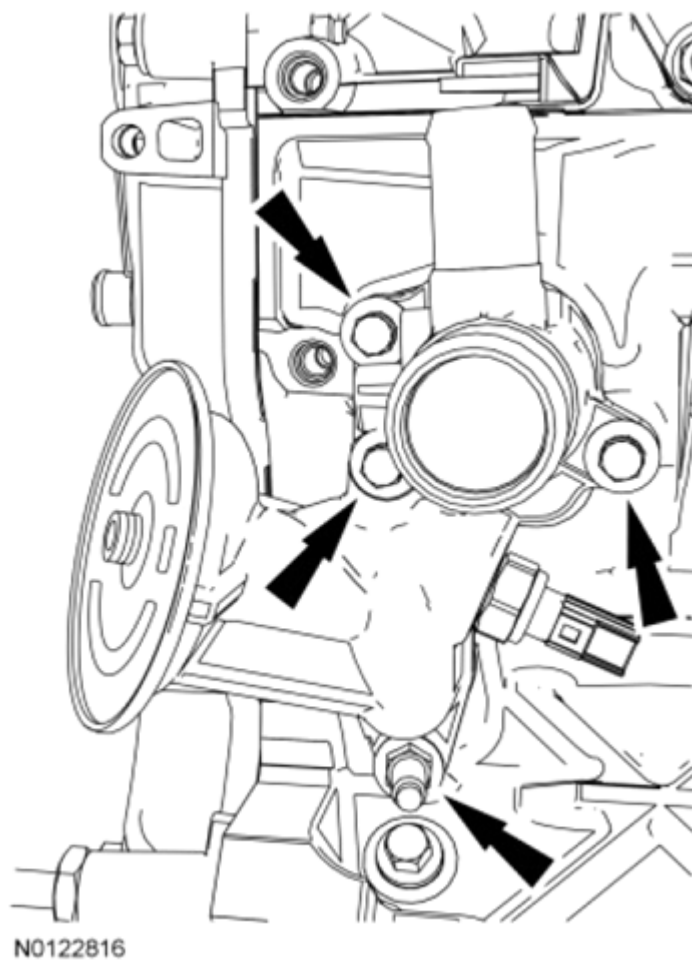
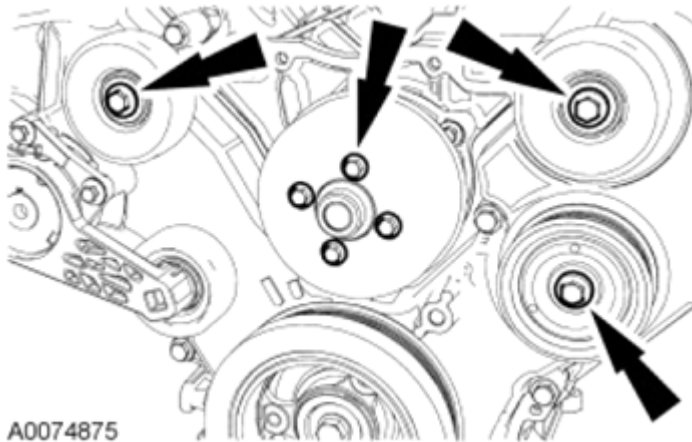


Fig. 389: Locating Oil Filter Bolts

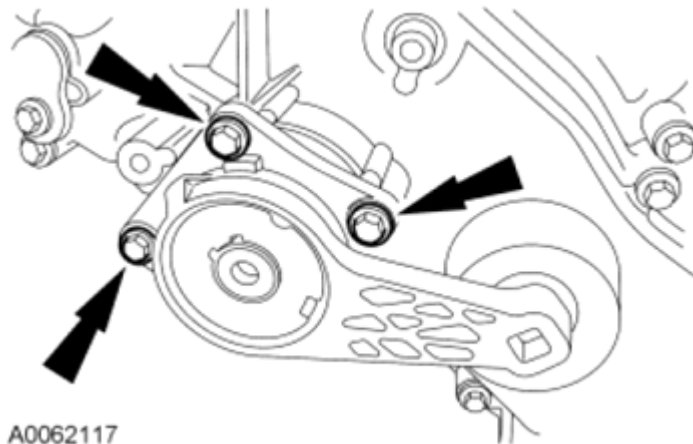
Courtesy of FORD MOTOR CO.

23. Remove the 7 bolts, coolant pump pulley and the 3 accessory drive belt idler pulleys.

**Fig. 390: Locating Coolant Pump Pulley And Accessory Drive Belt Idler Pulley Bolts**

Courtesy of FORD MOTOR CO.

24. Remove the 3 bolts and the accessory drive belt tensioner.

**Fig. 391: Removing Accessory Drive Belt Tensioner Bolts**

Courtesy of FORD MOTOR CO.

25. Remove the 4 bolts.

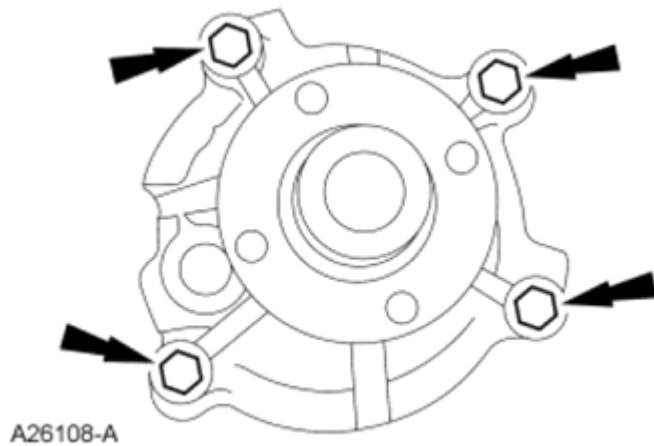


Fig. 392: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

26. Remove the coolant pump from the cylinder block.
- Discard the O-ring seal.

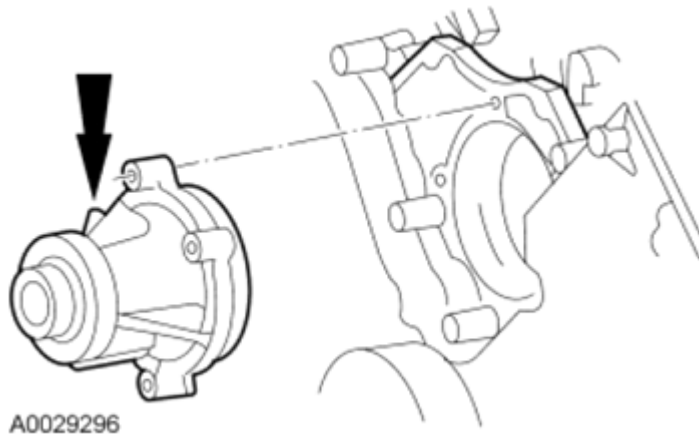


Fig. 393: Removing Coolant Pump
Courtesy of FORD MOTOR CO.

27. Remove and discard the crankshaft pulley bolt. Using the 3 Jaw Puller, remove the crankshaft pulley.



N0010528

Fig. 394: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

28. Using the Crankshaft Front Oil Seal Remover, remove and discard the crankshaft seal.

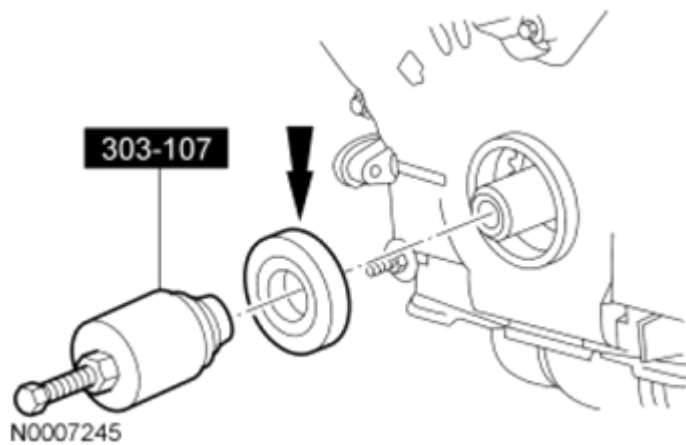


Fig. 395: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

29. Remove the 16 bolts, oil pan and oil pan gasket.

NOTE: 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.

Clean and inspect the sealing surfaces.

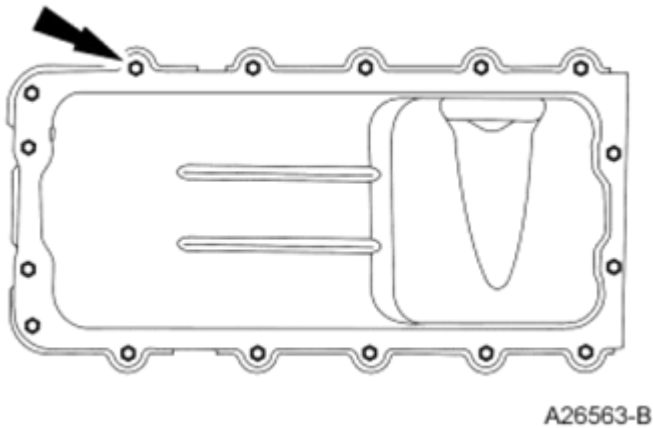


Fig. 396: Locating Oil Pan Gasket And Bolts
Courtesy of FORD MOTOR CO.

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

Remove the 10 bolts and the 5 studs.

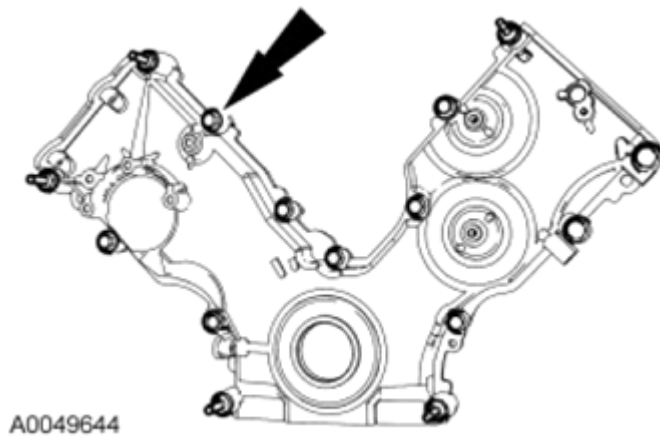


Fig. 397: Locating Front Cover Fasteners
Courtesy of FORD MOTOR CO.

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

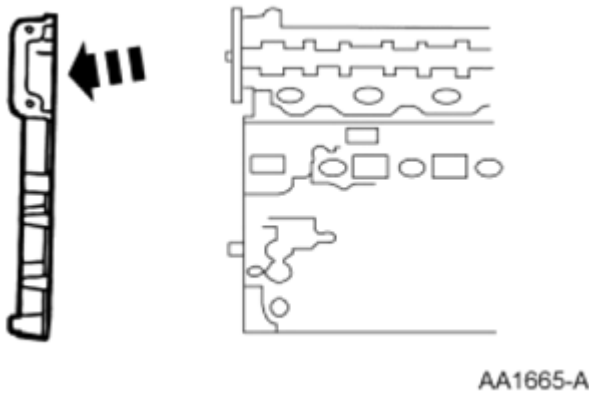


Fig. 398: Removing Engine Front Cover From Cylinder Block
Courtesy of FORD MOTOR CO.

32. Remove the crankshaft sensor ring from the crankshaft.

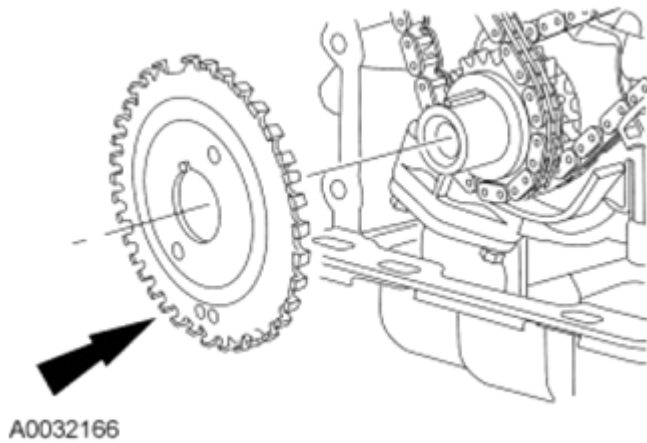


Fig. 399: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

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

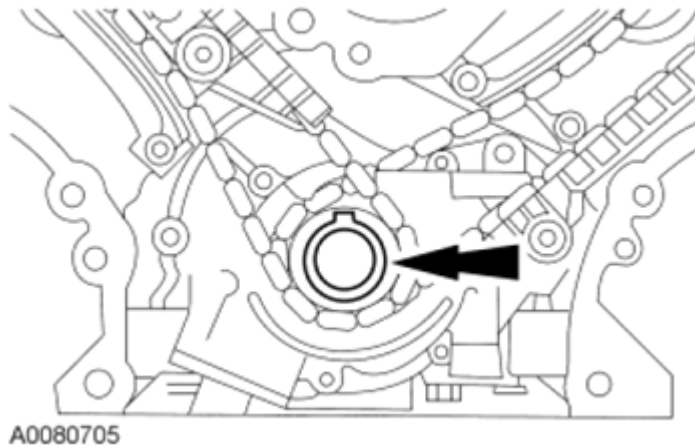


Fig. 400: Positioning Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

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

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 camshaft lobes and the exhaust lobe on the No. 1 cylinder.

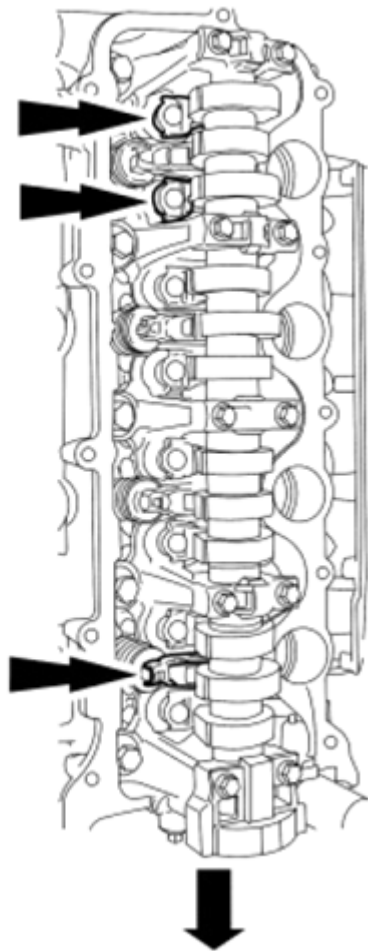


Fig. 401: View Of Intake Camshaft Lobes And Exhaust Lobe On No. 1 Cylinder
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

35.

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



A0083248

Fig. 402: Locating RH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

36. **NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed.

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

Using the Valve Spring Compressor, remove the 3 camshaft roller followers designated in the previous step from the RH cylinder head.



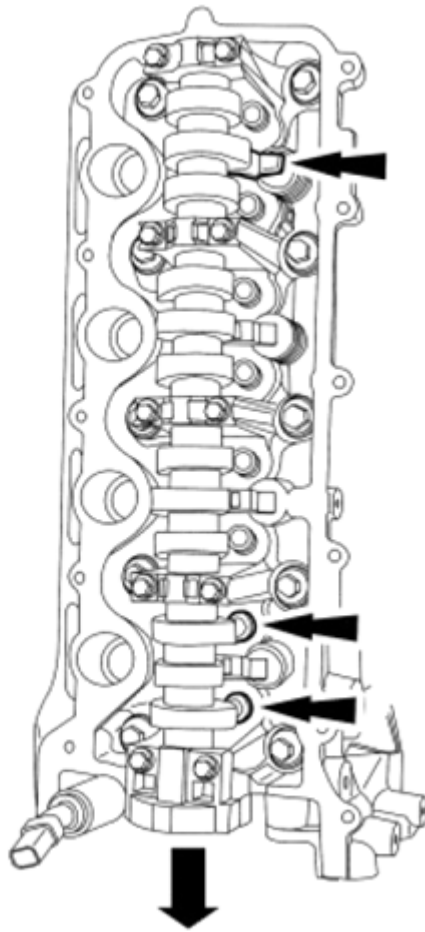
Fig. 403: Removing Camshaft Roller Followers

Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

37.

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



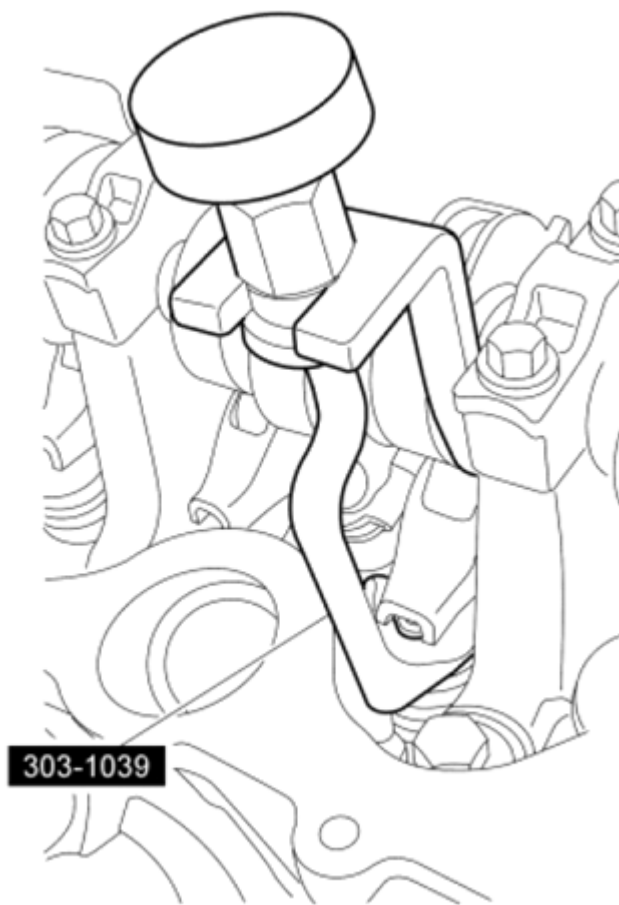
A0084479

Fig. 404: Locating LH Cylinder Head Camshaft Roller Followers And Bolts
Courtesy of FORD MOTOR CO.

38. **NOTE:** Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed.

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

Using the Valve Spring Compressor, remove the 3 camshaft roller followers designated in the previous step from the LH cylinder head.



N0010191

Fig. 405: Removing Valve Spring Compressor On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

39. **NOTE:** The crankshaft cannot be moved past the 6 o'clock position once set or engine damage may occur.

Rotate the crankshaft clockwise and position the crankshaft keyway at the 6 o'clock position.

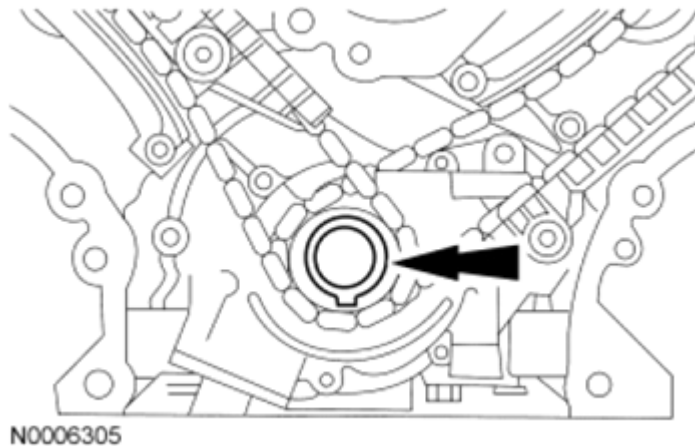


Fig. 406: Locating Crankshaft Keyway
Courtesy of FORD MOTOR CO.

NOTE: If one or both tensioner mounting bolts are loosened or removed, the tensioner-sealing bead must be inspected for seal integrity. If cracks, tears, separation from the tensioner body or permanent compression of the seal bead is observed, install a new tensioner or engine damage may occur.

40.

Remove the 2 bolts, the LH timing chain tensioner and tensioner arm.

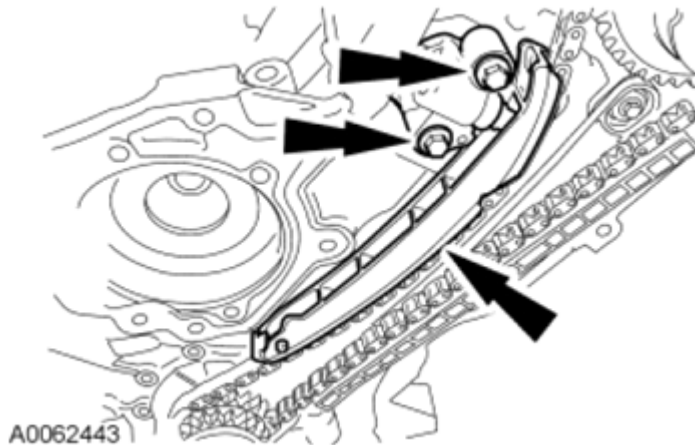


Fig. 407: Locating LH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

NOTE: If one or both tensioner mounting bolts are loosened or removed, the tensioner-sealing bead must be inspected for seal integrity. If cracks, tears, separation from the tensioner body or permanent compression of the seal bead is observed, install a new tensioner or engine damage may occur.

41.

41.

occur.

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

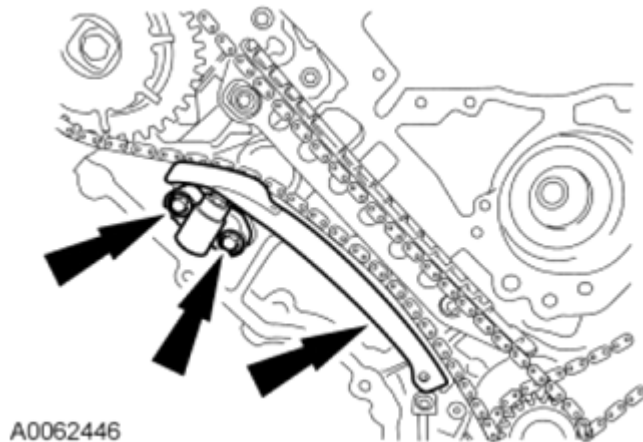


Fig. 408: Locating RH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

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.

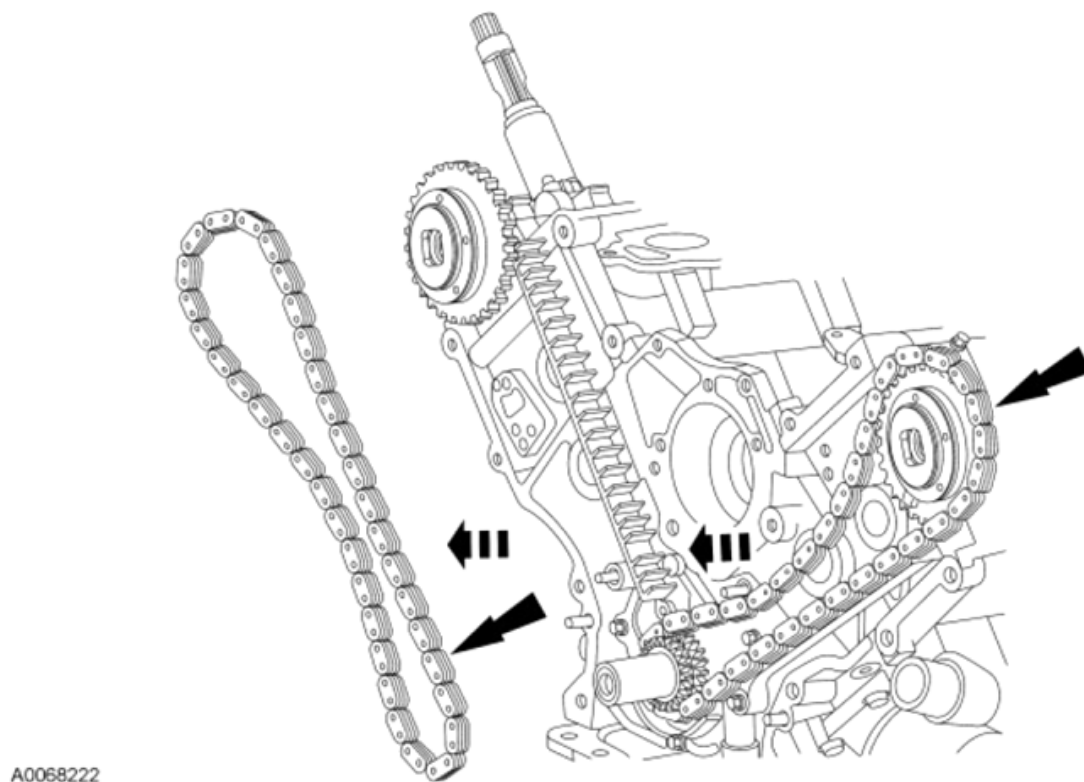


Fig. 409: Locating Timing Chains And Crankshaft Sprocket (RH And LH)
Courtesy of FORD MOTOR CO.

43. **NOTE:** RH shown in the illustration, LH similar.

Remove the LH and RH timing chain guides.

- Remove the 4 bolts.
- Remove both timing chain guides.

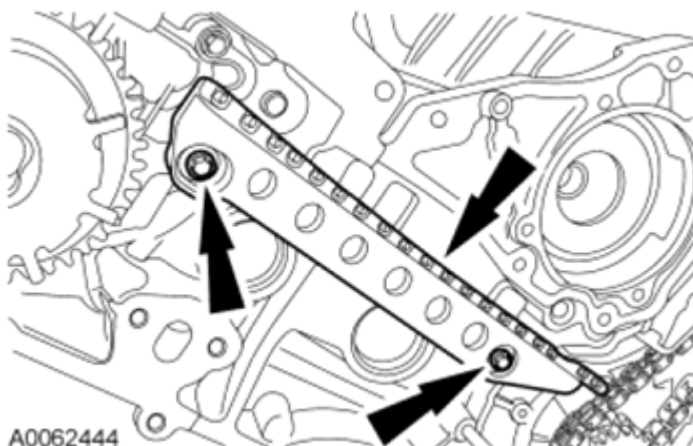


Fig. 410: Locating Timing Chain Guide And Bolts
Courtesy of FORD MOTOR CO.

44. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Using the Cam Phaser Locking Tool, remove the bolt and the RH camshaft phase and sprocket assembly.

- Discard the camshaft phase and sprocket bolt.

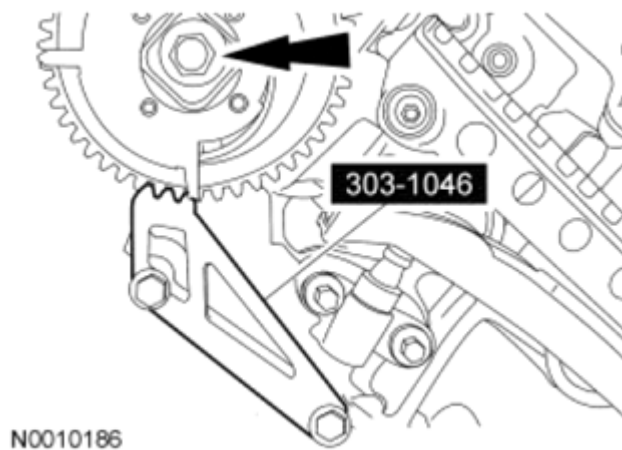


Fig. 411: Locating Camshaft Phaser Sprocket Bolt
Courtesy of FORD MOTOR CO.

45. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.

Using the Cam Phaser Locking Tool, remove the bolt and the LH camshaft phase and sprocket assembly.

- Discard the camshaft phase and sprocket bolt.

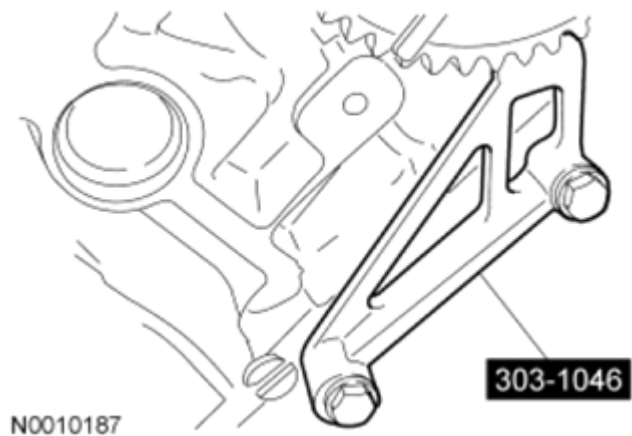


Fig. 412: Identifying Cam Phaser Locking Tool
Courtesy of FORD MOTOR CO.

46. Install the Cylinder Head Remover/Installer onto the LH cylinder head.

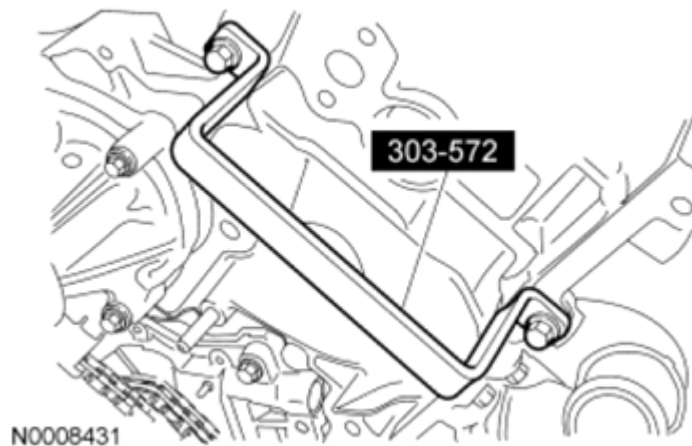


Fig. 413: Installing Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

47. Install the Cylinder Head Remover/Installer onto the RH cylinder head.

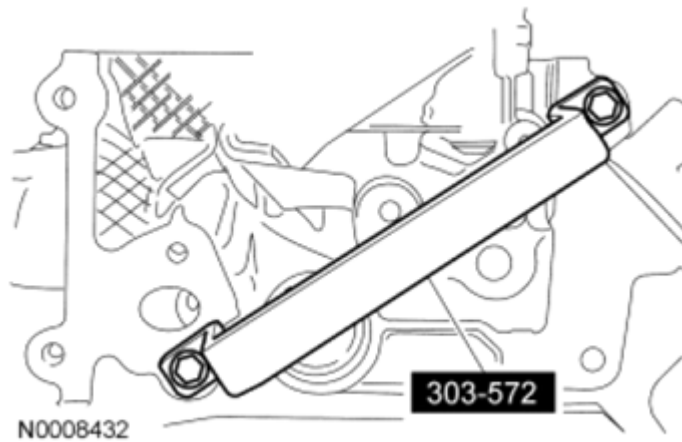
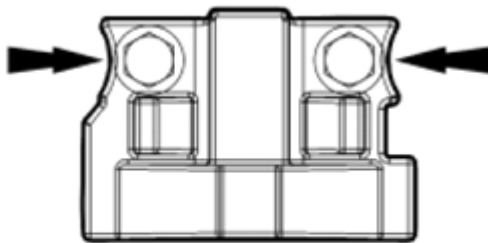


Fig. 414: Installing Special Tool Onto Cylinder Head
Courtesy of FORD MOTOR CO.

48. **NOTE:** Remove the front thrust camshaft bearing cap straight upward from the bearing towers or the bearing cap may be damaged from side loading.

Remove the 2 bolts and the RH cylinder head camshaft front bearing cap.

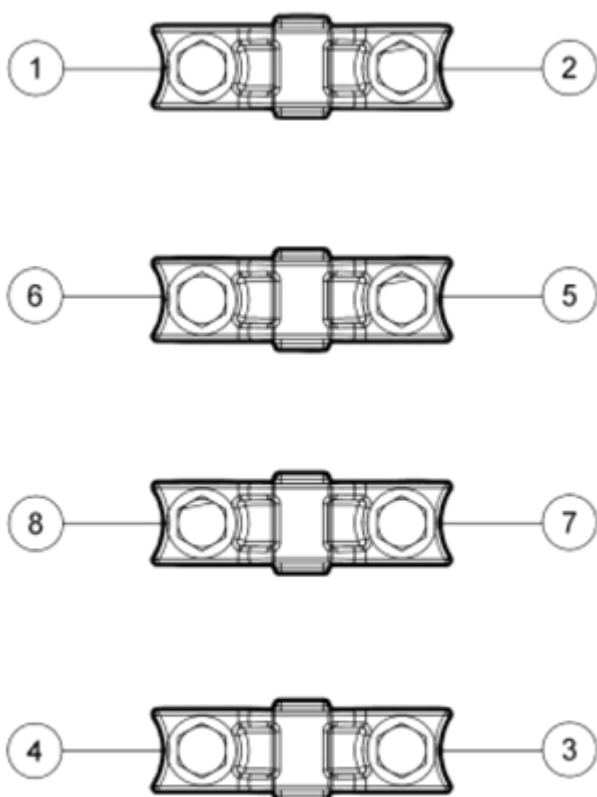


N0070049

Fig. 415: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

49. **NOTE:** The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

Remove the remaining 8 bolts in the sequence shown in the illustration and remove the RH cylinder head camshaft bearing caps.



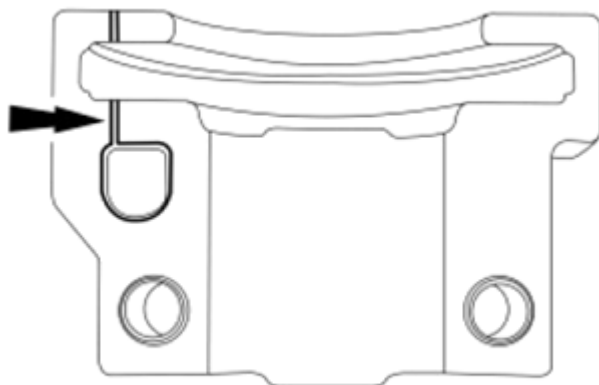
N0091483

Fig. 416: Identifying Camshaft Bearing Caps Bolts In Tightening Sequence

Courtesy of FORD MOTOR CO.

50. 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. 417: Locating Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

51. Remove the RH camshaft.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

52.

Remove the remaining camshaft roller followers from the RH cylinder head.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

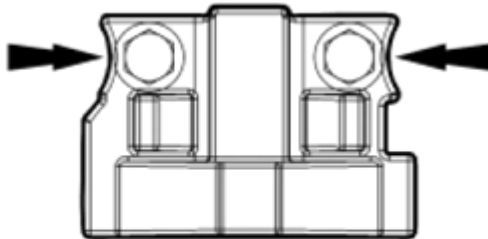
53.

Remove the hydraulic lash adjusters from the RH cylinder head.

NOTE: Remove the front thrust camshaft bearing cap straight upward from the bearing towers or the bearing cap may be damaged from side loading.

54.

Remove the 2 bolts and the LH cylinder head camshaft front bearing cap.



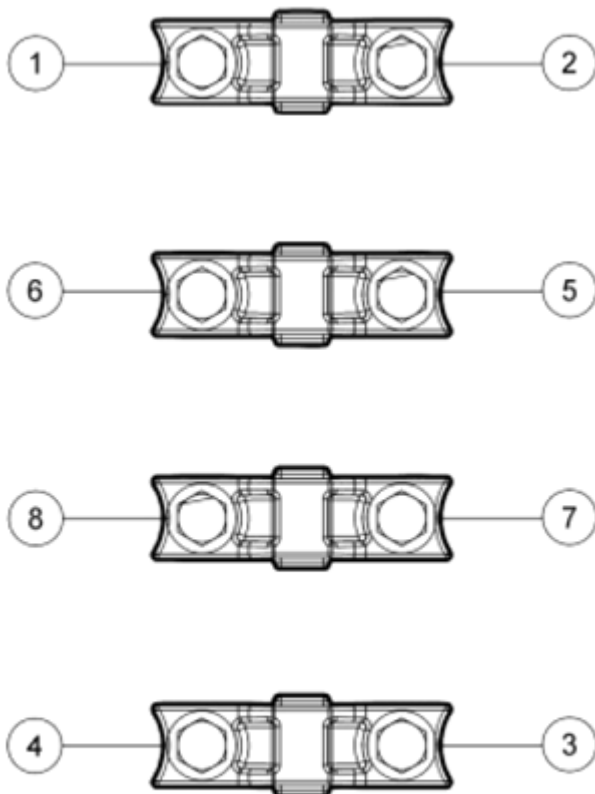
N0070049

Fig. 418: Locating Camshaft Front Bearing Cap And Bolts
Courtesy of FORD MOTOR CO.

NOTE: The camshaft bearing caps must be installed in their original locations. Record camshaft bearing cap locations. Failure to follow these instructions may result in engine damage.

55.

Remove the remaining 8 bolts in the sequence shown in the illustration and remove the LH cylinder head camshaft bearing caps.

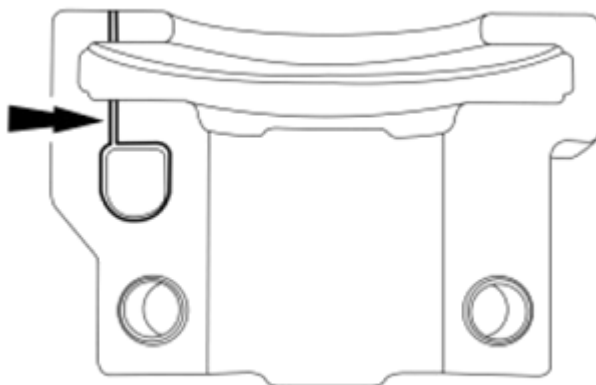


N0091483

Fig. 419: Identifying Camshaft Bearing Caps Bolts In Tightening Sequence

Courtesy of FORD MOTOR CO.

56. 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. 420: Locating Camshaft Front Thrust Bearing Cap Oil Metering Groove
Courtesy of FORD MOTOR CO.

57. Remove the LH camshaft.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into the original locations. Failure to follow these instructions may result in engine damage.

58.

Remove the remaining camshaft roller followers from the LH cylinder head.

NOTE: If the components are to be reinstalled, they must be installed in the same positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.

59.

Remove the hydraulic lash adjusters from the LH cylinder head.

NOTE: The cylinder head must be cool before removing it from the engine. Cylinder head warpage may result if a warm or hot cylinder head is removed.

60.

NOTE: Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine. Failure to follow this procedure may cause engine damage.

NOTE: The cylinder head bolts must be discarded and new bolts must be installed. They are a tighten-to-yield design and cannot be reused.

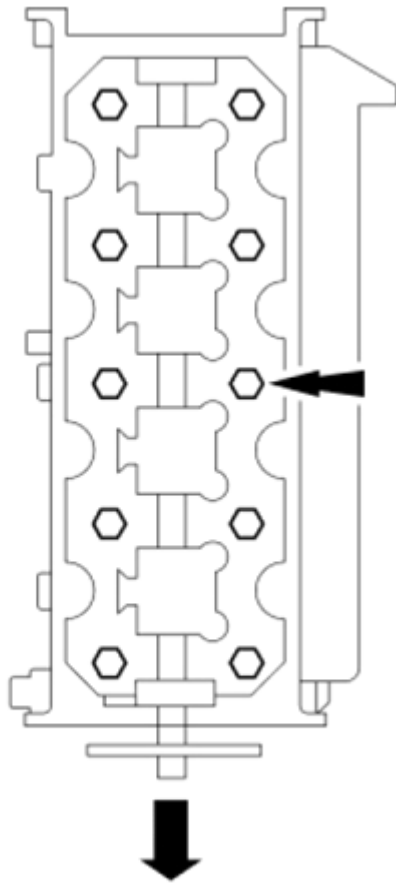
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges, which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

NOTE: Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface. Failure to follow this procedure may cause engine damage.

NOTE: RH shown in the illustration, LH similar.

Remove the bolts and the cylinder head.

- Discard the cylinder head gasket.
- Discard the cylinder head bolts.



N0067889

Fig. 421: Locating Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

NOTE: 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.

61.

NOTE: Observe all warnings or notices and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep. Failure to follow this procedure may cause engine damage.

NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

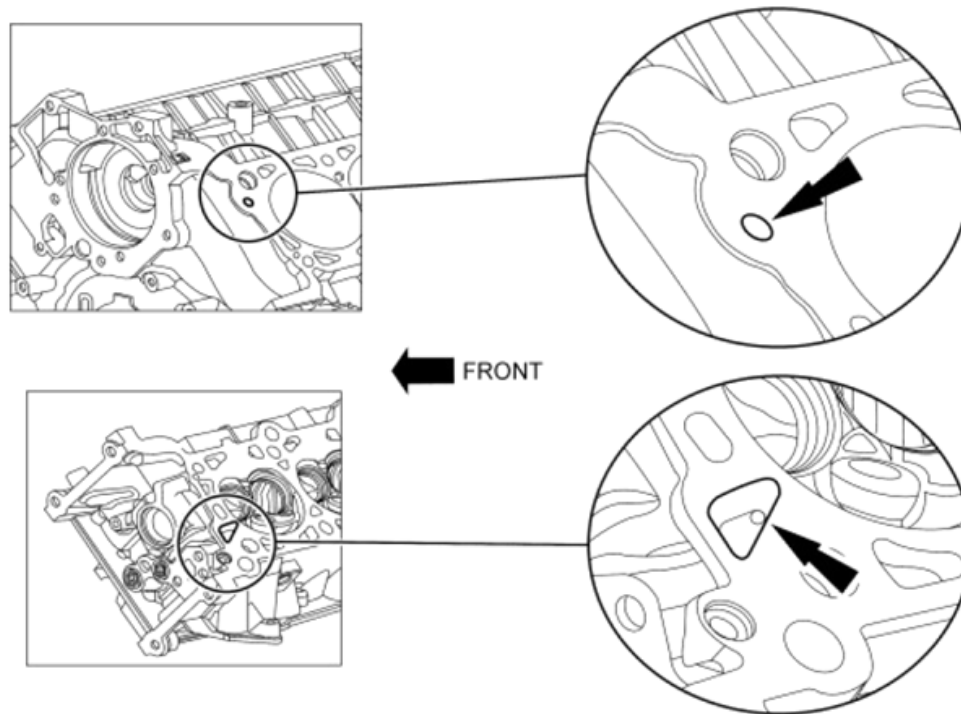
Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block in the following sequence.

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.

62. **NOTE:** LH shown in the illustration, RH similar.

Support the cylinder heads on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion, paying particular attention to the oil pressure feed area. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.



A0079634

Fig. 422: Identifying Oil Pressure Feed Area
Courtesy of FORD MOTOR CO.

63. Remove the 3 bolts, the oil pump screen and pickup tube and the spacer.

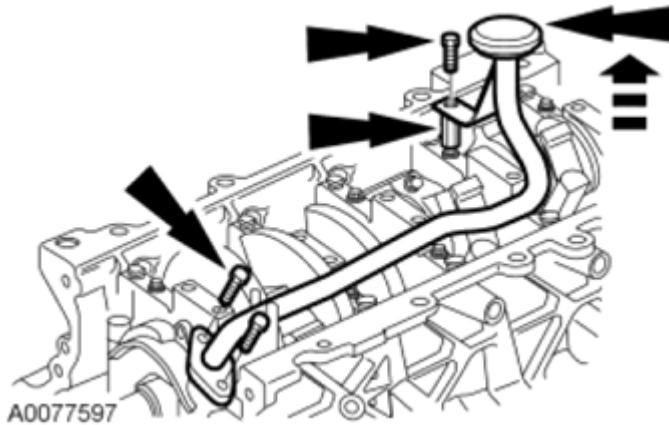


Fig. 423: Locating Bolts And Oil Pump Screen
Courtesy of FORD MOTOR CO.

64. Remove the 3 bolts and the oil pump.



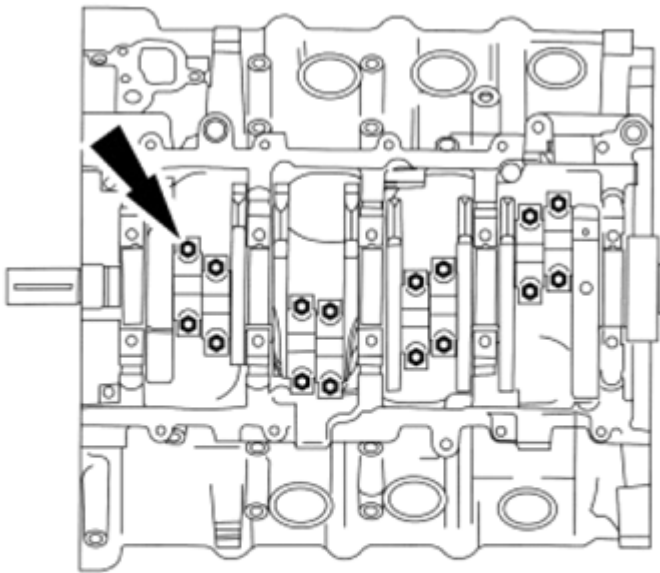
Fig. 424: Locating Oil Pump And Bolts
Courtesy of FORD MOTOR CO.

65. 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.

NOTE: 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. Failure to follow these instructions may result in engine damage.

- 66.

Remove the 16 bolts and the 8 connecting rod caps. Discard the bolts.



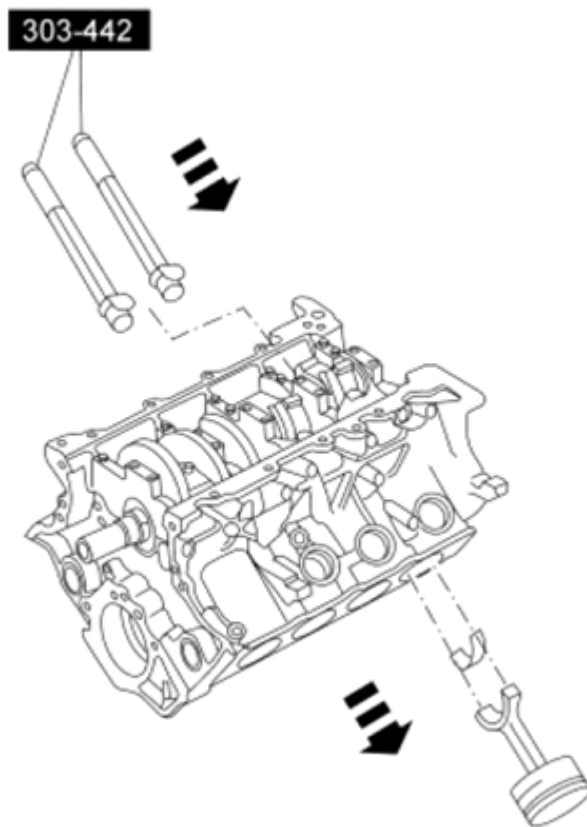
DA0578-A

Fig. 425: Locating Bolts And Connecting Rod Caps
Courtesy of FORD MOTOR CO.

NOTE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod. Failure to follow these instructions may result in engine damage.

67.

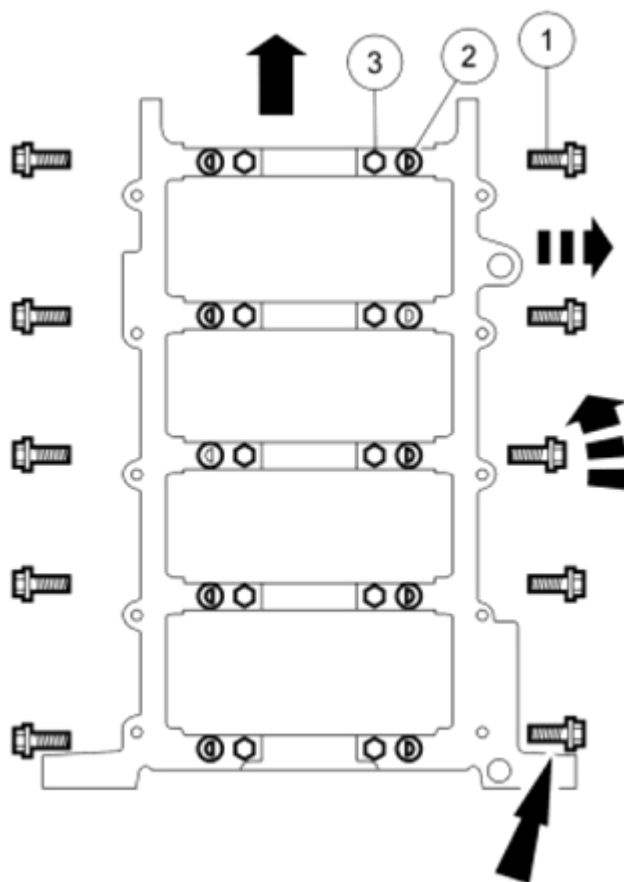
Use the Connecting Rod Installer to push the piston through the top of the cylinder block.



N0010189

Fig. 426: Pushing Piston Through Top Of Cylinder Block
 Courtesy of FORD MOTOR CO.

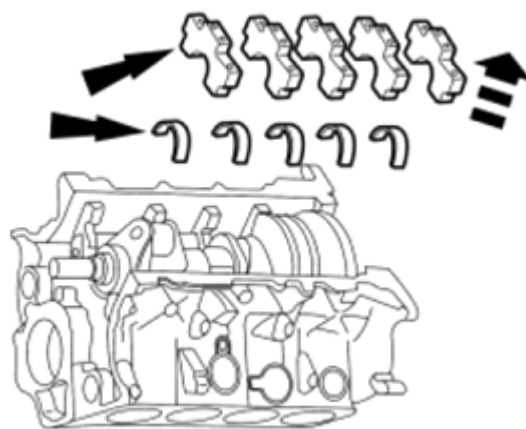
68. Disassemble the 8 pistons. For additional information, refer to **PISTON** in this information.
69. Remove the fasteners.
 1. Remove and discard the 10 cross-mounted main cap bolts.
 2. Remove the 10 dowels.
 3. Remove and discard the 10 main bearing cap bolts.



N0010188

Fig. 427: Removing Main Bearing Cap Bolts
Courtesy of FORD MOTOR CO.

70. Remove the main bearing caps, the lower crankshaft main bearings and the lower thrust washer.



DA0518-B

Fig. 428: Locating Main Bearing Caps
Courtesy of FORD MOTOR CO.

71. Remove the crankshaft, the upper crankshaft main bearings and the upper thrust washers from the cylinder block.

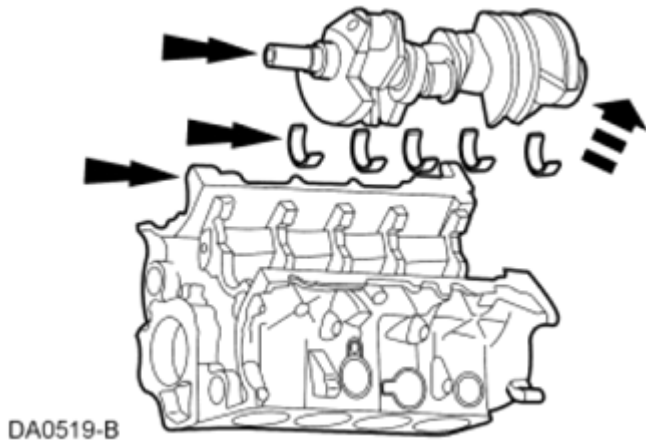


Fig. 429: Locating Crankshaft, Upper Crankshaft Main Bearings And Upper Thrust Washers From Cylinder Block

Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

CYLINDER HEAD

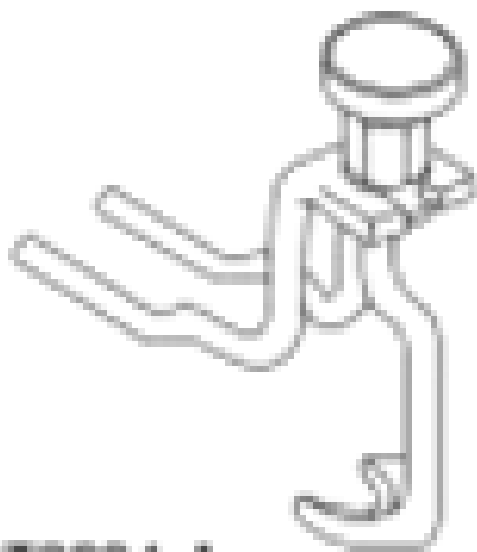
Special Tool(s)

SPECIAL TOOLS CHART

	Compressor, Valve Spring 303-1039
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2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2804-A



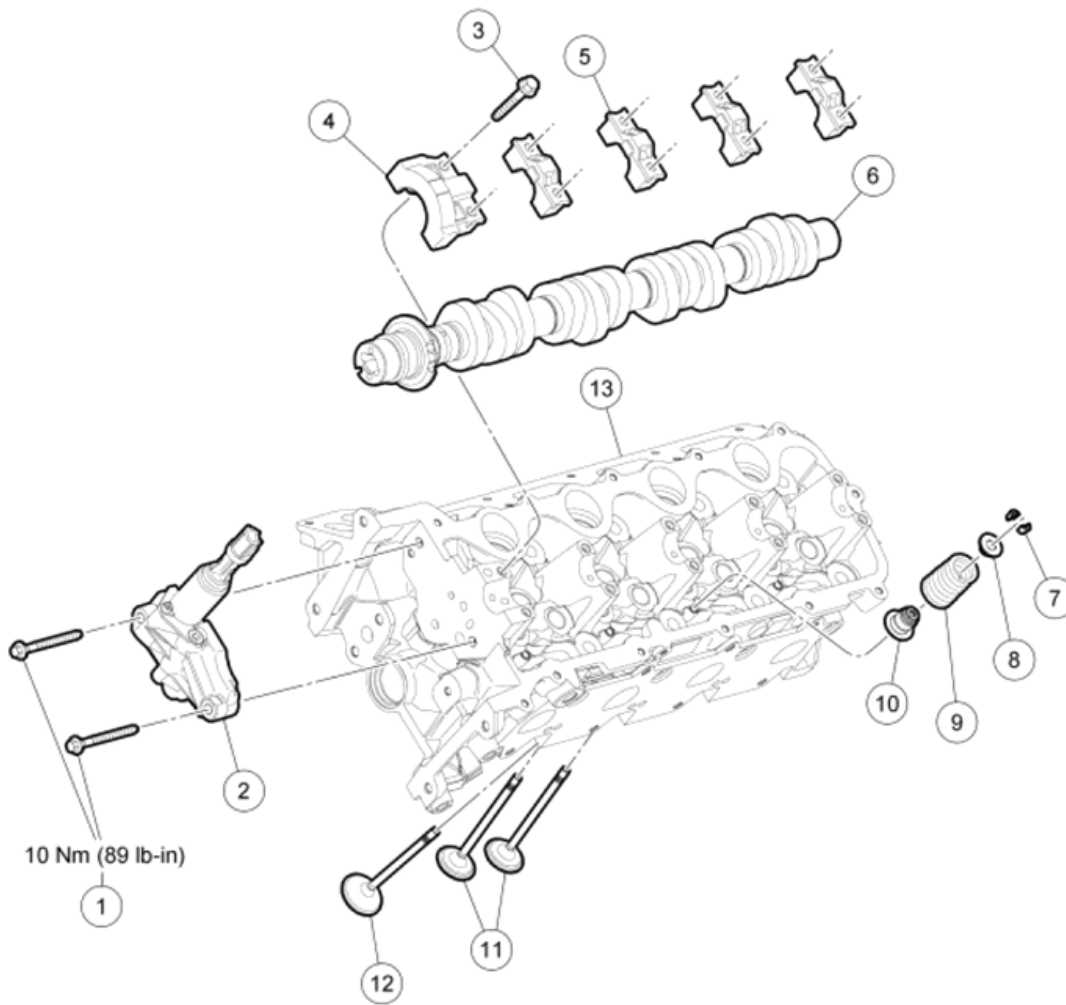
ST1332-A

Installer, Valve Stem Oil Seal
303-383 (T91T-6571-A)

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A



N0010131

Fig. 430: Exploded View Of Cylinder Head
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	W701520	Variable Camshaft Timing (VCT) housing assembly bolts (2 required)
2	6C261	VCT housing assembly - LH
3	N807834	Camshaft bearing cap bolt (10 required)
4	-	Camshaft front bearing cap (part of 6049)
5	-	Camshaft bearing cap (part of 6049) (4 required)
6	6250	Camshaft
7	6518	Valve spring retainer key (24 required)
8	6514	Valve spring retainer (12 required)
9	6513	Valve spring (12 required)
10	6571	Valve seal (12 required)

11	6507	Intake valves (8 required)
12	6505	Exhaust valve (4 required)
13	6049	Cylinder head

Disassembly

1. Remove the 2 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.
3. 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 10 bolts finger-tight.
4. Using the Valve Spring Compressor, compress the valve spring and remove the valve spring retainer keys.



Fig. 431: Removing Valve Spring Retainer Keys
 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 MECHANICAL SYSTEM - GENERAL INFORMATION**.

NOTE: Remove the front thrust camshaft bearing cap straight upward from the bearing towers, or the bearing cap may be damaged from side loading.

9.

Remove the 10 bolts, 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 MECHANICAL SYSTEM - GENERAL INFORMATION**.

Assembly

1. Lubricate the camshaft and camshaft journals with clean engine oil and install the camshaft.
2. 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 10 bolts finger-tight.
3. **NOTE:** **Lubricate the valve stem with clean engine oil prior to installation.**

Install the valve into the cylinder head.

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

Position a new valve seal onto the valve stem.

5. Using the Valve Stem Oil Seal Installer, install the new valve seal.

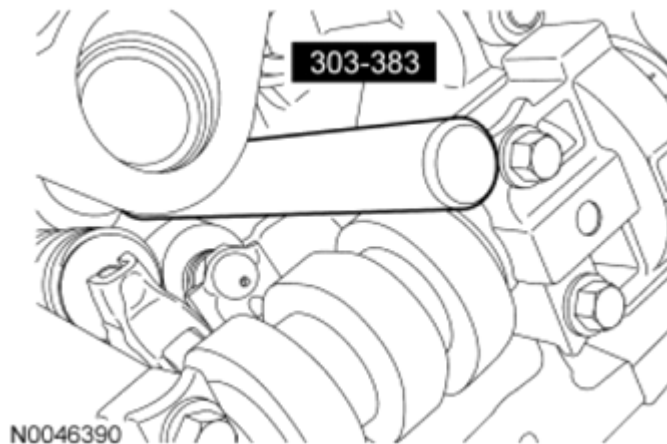


Fig. 432: Installing Valve Seal Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed into their original locations. Failure to follow these instructions may result in engine damage.

6.

Using the Valve Spring Compressor, install the valve spring, the valve spring retainer and the valve spring retainer keys.



Fig. 433: Removing Valve Spring Retainer Keys
Courtesy of FORD MOTOR CO.

7. Repeat the previous 2 steps for each valve.
8. Remove the 8 bolts, the front camshaft bearing cap and then the remaining bearing caps.
9. Remove the camshaft.
10. Install a new gasket, the VCT housing and the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

PISTON

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

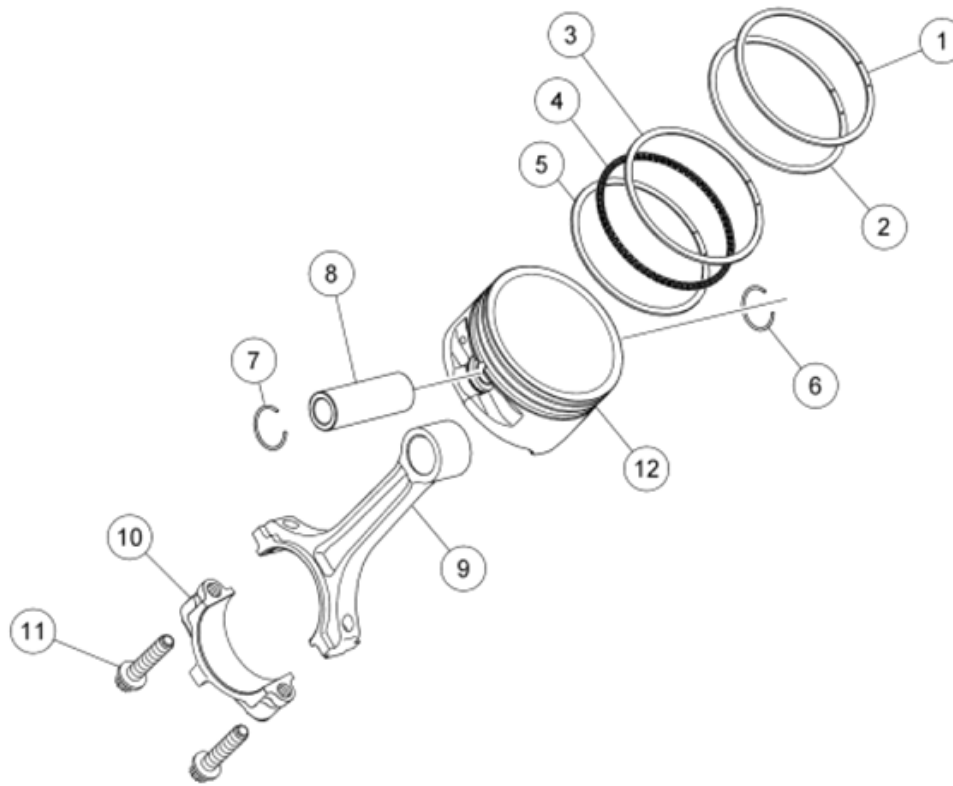


Fig. 434: Exploded View Of Piston
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

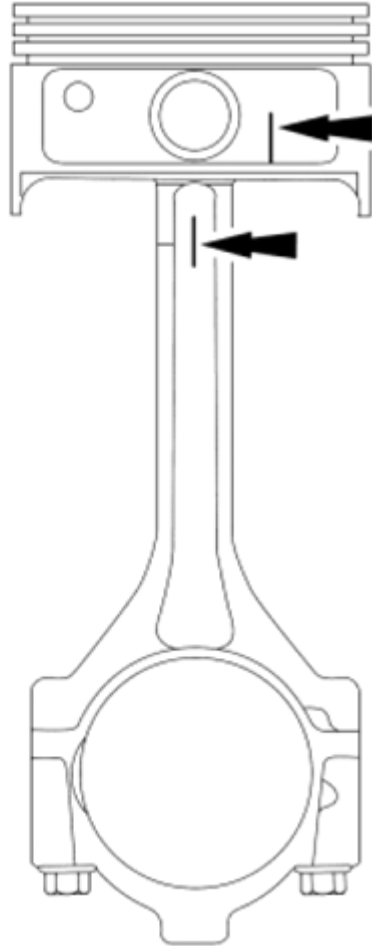
Item	Part Number	Description
1	6150	Piston compression upper ring
2	6152	Piston compression lower ring
3	6159	Piston oil control upper segment ring
4	6161	Piston oil control spacer
5	6159	Piston oil control lower segment ring
6	6140	Piston pin retainer
7	6140	Piston pin retainer
8	6135	Piston pin
9	6200	Connecting rod
10	-	Connecting rod bearing cap (part of 6200)
11	6414	Connecting rod bearing cap bolt (2 required)
12	6110	Piston

Disassembly

WARNING: Since the retainer ring has a tendency to spring out, cover the end of the pin bore with a hand or shop rag when removing the ring. Wear eye

protection. Failure to follow these instructions may result in serious personal injury.

1. Remove the piston rings from the piston.
 - Discard the piston rings.
2. Mark the piston and connecting rod on the same side for assembly reference.



N0088658

Fig. 435: Locating Mark On Piston And Connecting Rod
Courtesy of FORD MOTOR CO.

3. Remove the 2 piston pin retainers and the piston pin.
4. Separate the piston from the connecting rod.
5. Clean and inspect the piston and connecting rod. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION**.

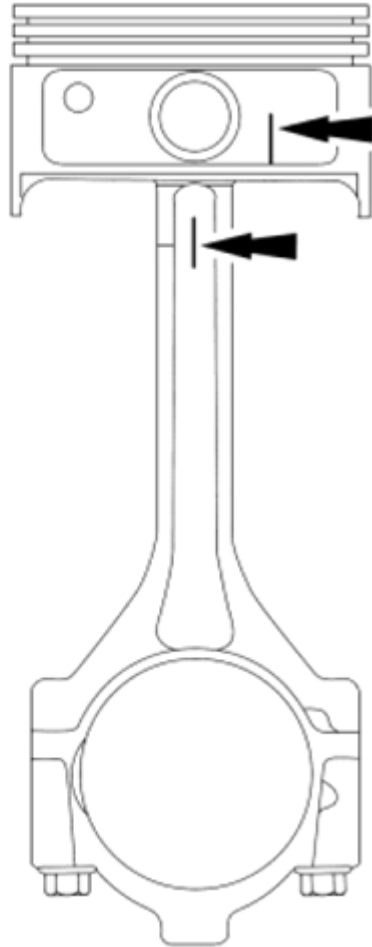
Assembly

1. **NOTE:** The connecting rod must be installed into the piston with the marks made

during disassembly on the same side. If a new piston or connecting rod is being installed, it can be installed in either direction.

1.

Position the connecting rod in the piston.



N0088658

Fig. 436: Locating Mark On Piston And Connecting Rod
Courtesy of FORD MOTOR CO.

2. Lubricate the piston pin and pin bore with clean engine oil.
3. Install the piston pin in the piston and connecting rod assembly.
4. Install the 2 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.

INTAKE MANIFOLD ASSEMBLY

Material

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A

Evaporative Emission (EVAP) Purge Valve, Fuel Rail and Fuel Injectors

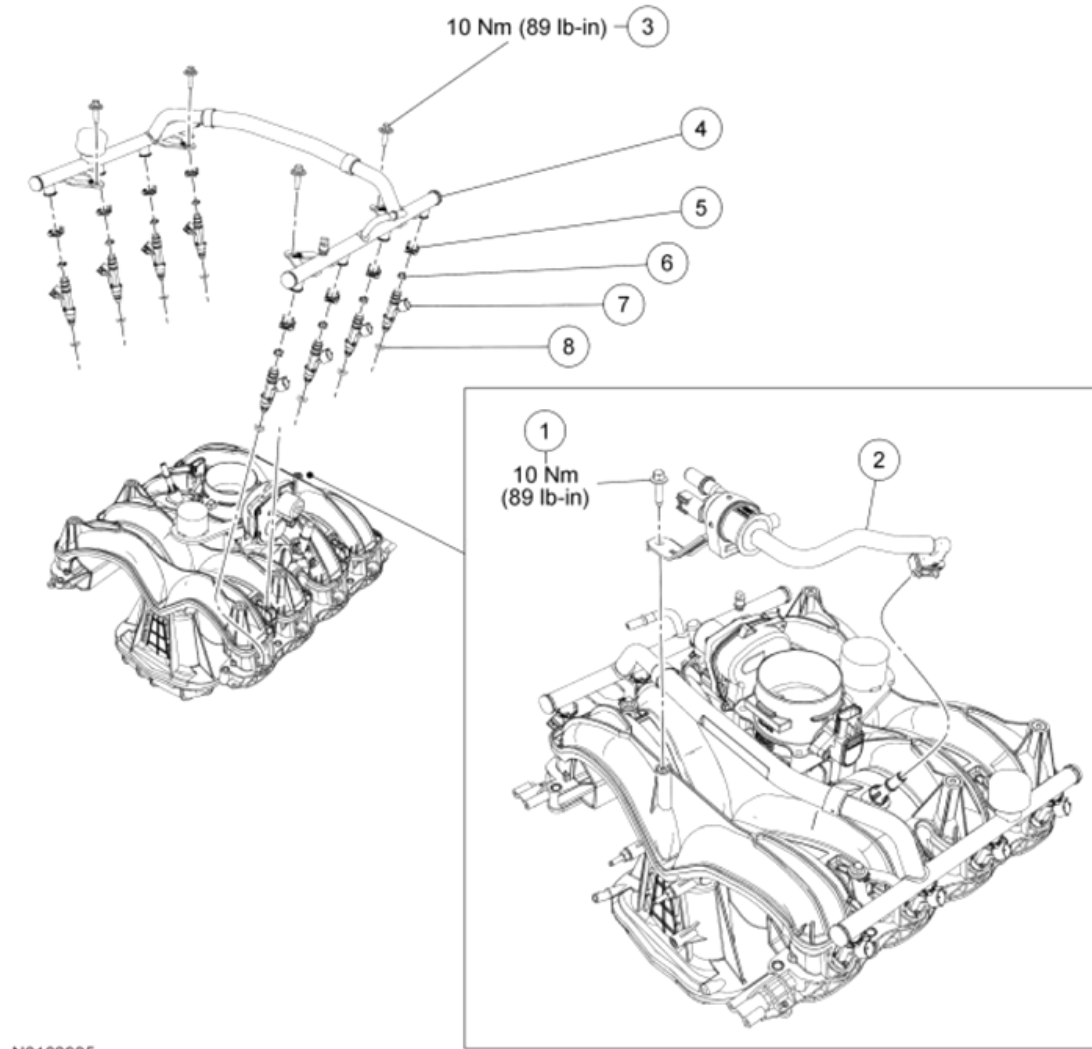


Fig. 437: Exploded View Of Evaporative Emission (EVAP) Purge Valve, Fuel Rail And Fuel Injectors With Torque Specifications
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	W506023	Evaporative Emission (EVAP) purge valve support bracket bolt
2	9C915	EVAP purge valve and tube assembly

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3	W708650	Fuel rail bolt (4 required)
4	9F792	Fuel rail
5	9C995	Fuel injector-to-fuel rail locking clip (8 required)
6	9229	Fuel injector-to-fuel rail O-ring seal (8 required)
7	9F593	Fuel injector (8 required)
8	9229	Fuel injector-to-intake manifold O-ring seal (8 required)

Intake Manifold Vacuum Tube, Throttle Body (TB) and Intake Manifold

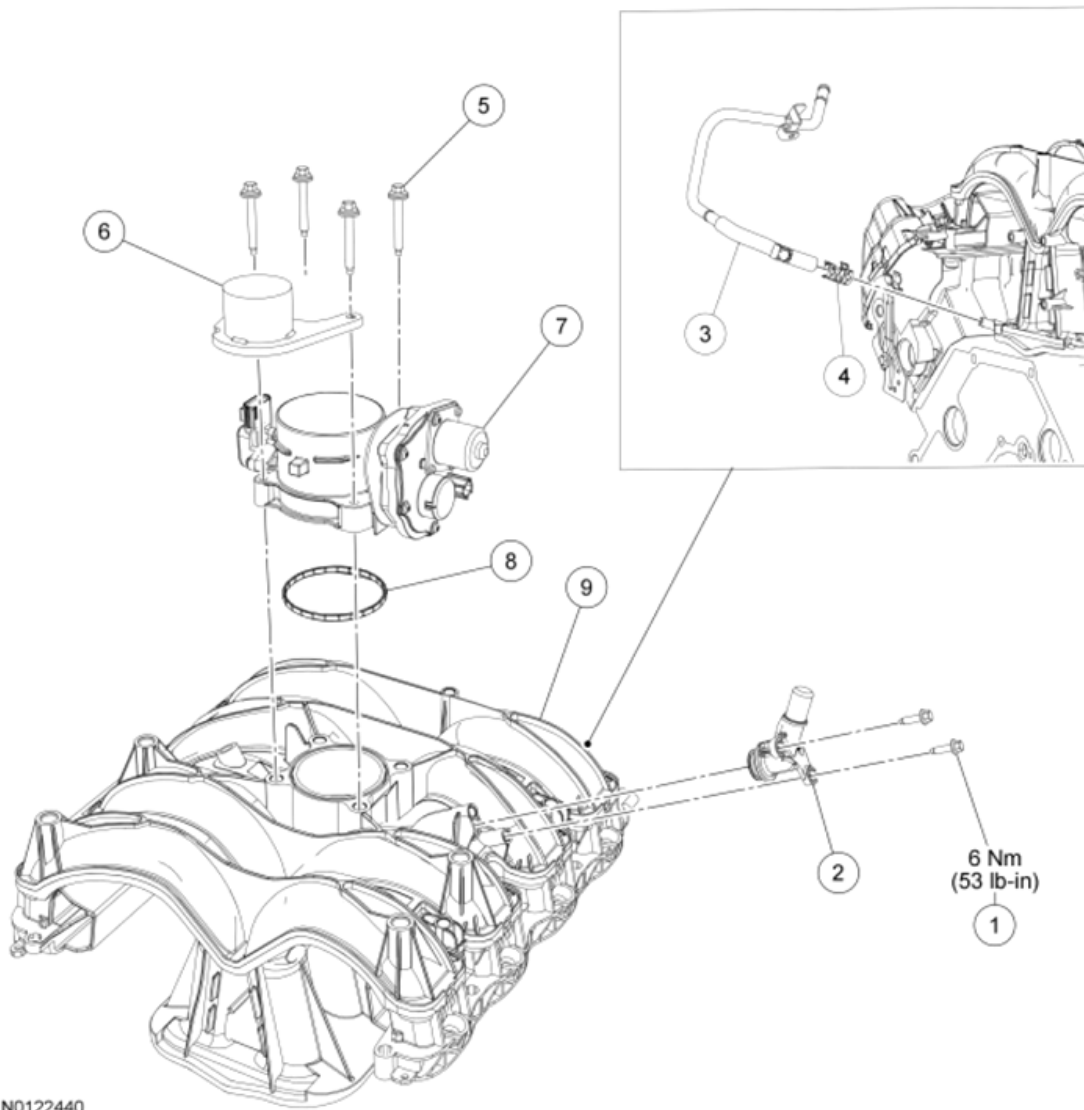


Fig. 438: Exploded View Of Intake Manifold Vacuum Tube, Throttle Body (TB) And Intake Manifold With Torque Specifications
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

Item	Part Number	Description
1	W500204	PCV fitting bolt (2 required)
2	9F695	PCV fitting
3	9A474	Intake manifold vacuum tube assembly
4	W704840	Intake manifold vacuum tube assembly clamp
5	W503282	Throttle Body (TB) bolt (4 required)
6	9J444	Vibration damper
7	9E926	TB assembly
8	9E936	TB seal
9	9424	Intake manifold

Disassembly

1. Remove the bolt and disconnect the quick connect coupling and remove the Evaporative Emission (EVAP) purge valve assembly.
2. Remove the 4 bolts and the fuel rail.
3. Remove the 8 fuel injector-to-fuel rail locking clips and separate the 8 fuel injectors from the fuel rail.
 - Discard the 2 O-ring seals from each fuel injector.
4. Remove the vacuum tube assembly from the intake manifold.
5. Remove the 2 bolts and the PCV fitting.
6. Remove the 4 bolts, the vibration damper and the Throttle Body (TB).

Assembly

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

- 1.

NOTE: Lubricate the O-ring seal with clean engine oil prior to installation.

Install the PCV fitting and the 2 bolts.

- Tighten to 6 Nm (53 lb-in).
2. Install the vacuum tube assembly onto the intake manifold and position the clamp.
 3. Install the **TB**, vibration damper and tighten the 4 bolts in 2 stages.
 - Stage 1: Tighten to 9 Nm (80 lb-in).
 - Stage 2: Tighten an additional 90 degrees.

4. **NOTE:** Lubricate the new O-ring seals with clean engine oil prior to installation.

Install 16 new O-ring seals on each of the fuel injectors.

2011 Ford Expedition

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5. Assemble the 8 fuel injectors onto the fuel rail and install the 8 locking clips.
6. Install the fuel rail and fuel injector as an assembly onto the intake manifold.
7. Install the 4 fuel rail bolts.
 - Tighten to 10 Nm (89 lb-in).
8. Position the Evaporative Emission (EVAP) purge valve assembly and connect the quick connect coupling and install the bolt.
 - Tighten to 10 Nm (89 lb-in).

ASSEMBLY

ENGINE

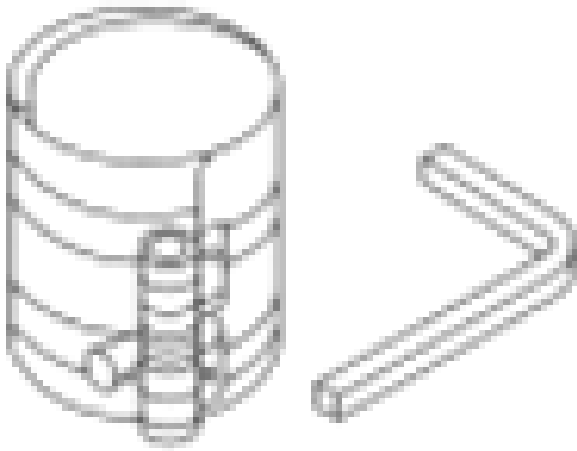
Special Tool(s)

SPECIAL TOOLS CHART

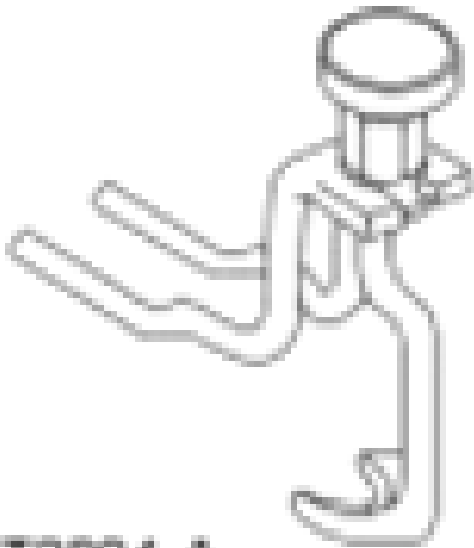
 ST2806-A	Alignment Pins, Cylinder Head 303-1040 (SR-015486)
	Compressor, Piston Ring 303-D032 (D81L-6002-C) or equivalent

2011 Ford Expedition

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ST1376-A

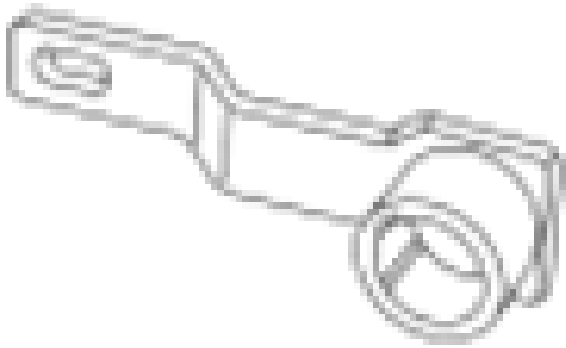


ST2804-A

Compressor, Valve Spring
303-1039

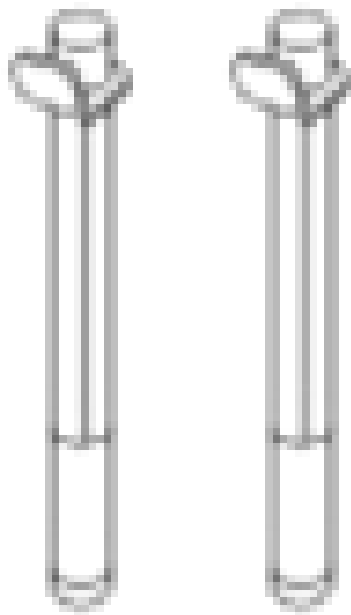
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1335-A

Holding Tool, Crankshaft
303-448 (T93P-6303-A)

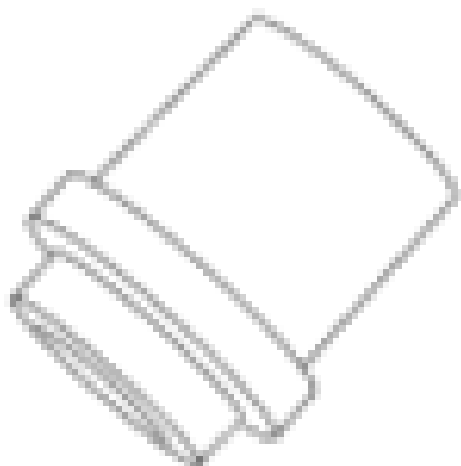


ST1337-A

Installer, Connecting Rod
303-442 (T93P-6136-A)

2011 Ford Expedition

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ST2197-A

Installer, Crankshaft Front Oil Seal
303-635



ST1479-A

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

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

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ST1480-A



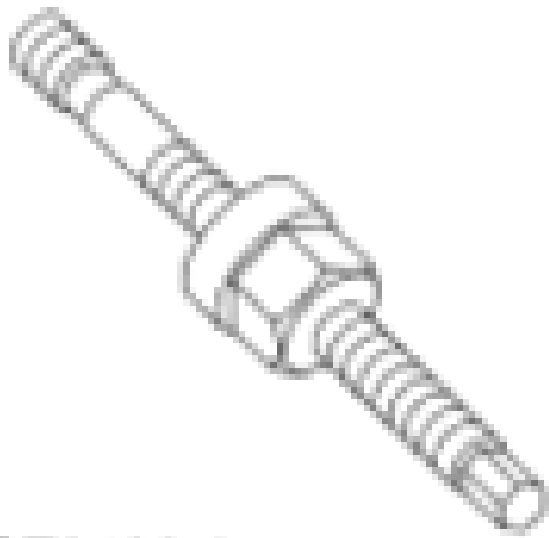
ST1482-A

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

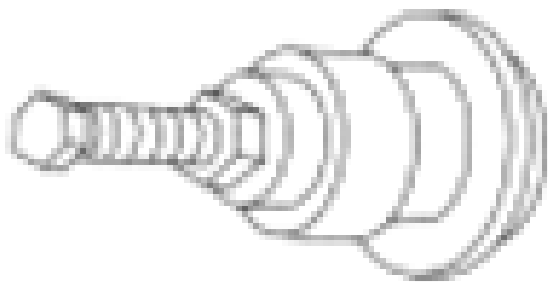
Installer, Crankshaft Vibration Damper
303-102 (T74P-6316-B)

2011 Ford Expedition

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ST2428-A



ST1328-A

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

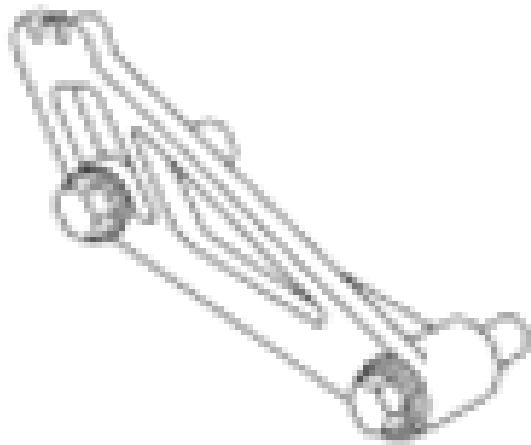
Lifting Bracket, Engine
303-F047 (014-00073) or equivalent

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1377-A



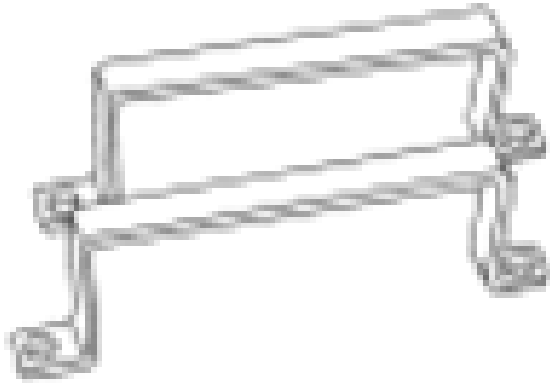
ST2807-A

Locking Tool, Cam Phaser
303-1046

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

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1668-A

General Equipment

GENERAL EQUIPMENT CHART

Hydraulic Chain Tensioner Retaining Clip 1L3Z-6P250-AA

Material

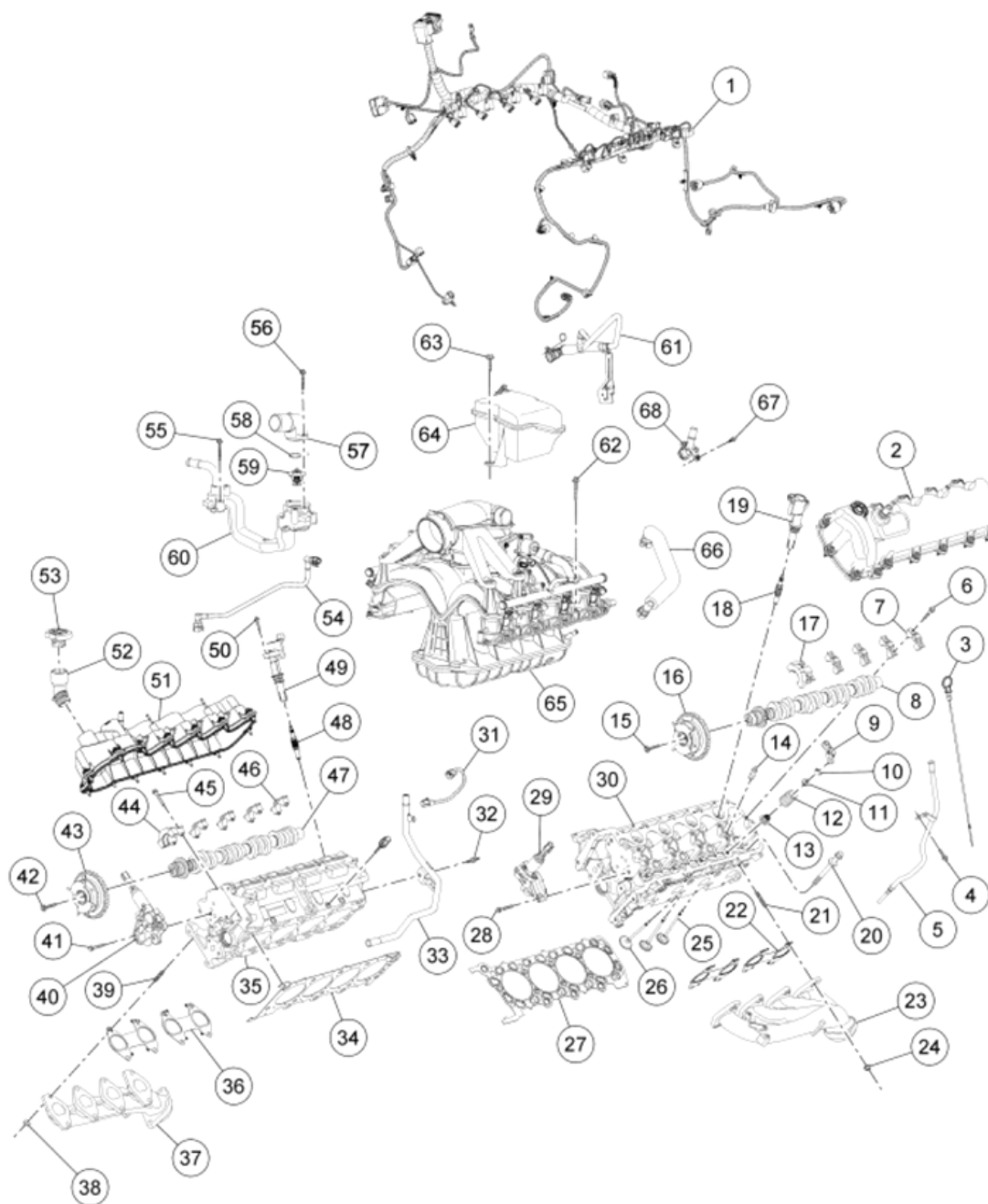
MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® Premium Gold Engine Coolant VC-7-B (US); CVC-7-B (Canada)	WSS-M97B51-A1
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Motorcraft® Specialty Orange Engine Coolant VC-3-B (US); CVC-3-B (Canada)	WSS-M97B44-D
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-

Engine - Upper End

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



N0103022

Fig. 439: Exploded View Of Engine - Upper End
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	9D930	Engine wiring harness
2	6582	Valve cover - LH
3	6750	Oil level indicator

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

4	N605892	Oil level indicator tube bolt
5	6754	Oil level indicator tube
6	N807834	Camshaft bearing cap bolt (10 required)
7	-	Camshaft bearing cap (part of 6049) (4 required)
8	6250	Camshaft - LH
9	6564	Roller follower (24 required)
10	6518	Valve spring retainer key (48 required)
11	6514	Valve spring retainer (24 required)
12	6513	Valve spring (24 required)
13	6571	Valve stem seal (24 required)
14	6C501	Hydraulic lash adjuster (24 required)
15	6279	Camshaft phase and sprocket bolt
16	-	Camshaft phase and sprocket (part of 6A257)
17	-	Camshaft bearing cap (part of 6049)
18	HJFS-24FP-	Spark plug (4 required)
19	12029	Ignition coil (4 required)
20	6065	Cylinder head bolt (20 required)
21	W703902	Exhaust manifold stud (8 required)
22	9448	Exhaust manifold gasket (2 required)
23	9431	Exhaust manifold - LH
24	W701706	Exhaust manifold nut (8 required)
25	6507	Intake valve (16 required)
26	6505	Exhaust valve (8 required)
27	6051	Cylinder head gasket - LH
28	W701520	Variable Camshaft Timing (VCT) oil control solenoid assembly bolt (2 required)
29	6C261	VCT oil control solenoid assembly - LH
30	6049	Cylinder head - LH
31	14A411	Cylinder Head Temperature (CHT) sensor jumper harness
32	W701571	Heater outlet tube stud bolt
33	18663	Heater outlet tube
34	6051	Cylinder head gasket - RH
35	6049	Cylinder head - RH
36	9448	Exhaust manifold gasket (2 required)
37	9430	Exhaust manifold - RH
38	W701706	Exhaust manifold nut (8 required)
39	W707747	Exhaust manifold stud (8 required)
40	6C260	VCT oil control solenoid assembly - RH
41	W701520	VCT oil control solenoid assembly bolt (2 required)
42	6279	Camshaft phase and sprocket bolt
43	-	Camshaft phase and sprocket (part of 6A257)

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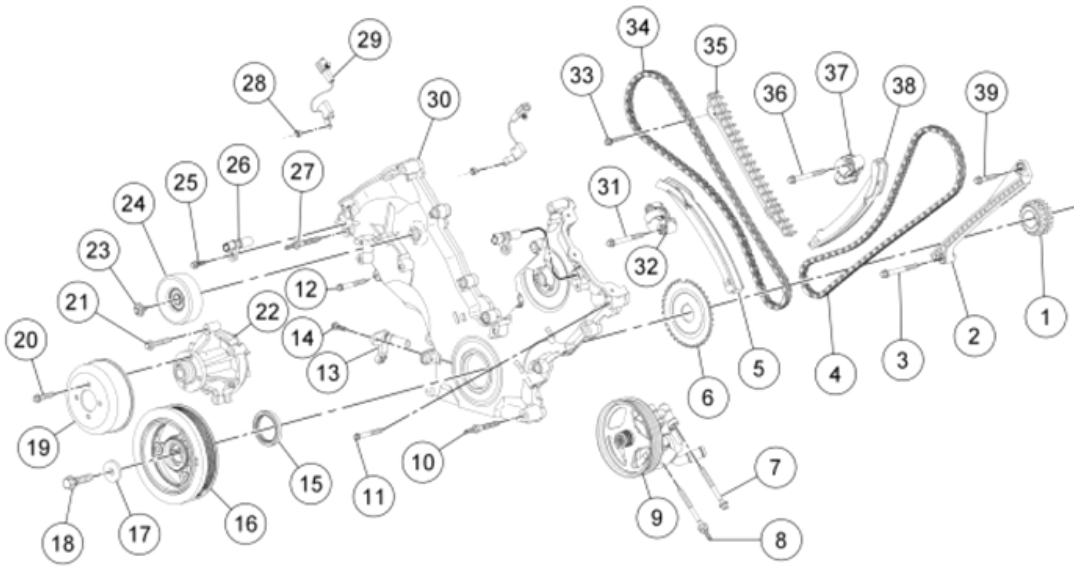
2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

44	-	Camshaft bearing cap (part of 6049)
45	N807834	Camshaft bearing cap bolt (10 required)
46	-	Camshaft bearing cap (part of 6049) (4 required)
47	6250	Camshaft - RH
48	HJFS-24FP-	Spark plug (4 required)
49	12029	Ignition coil (4 required)
50	W711062	Ignition coil bolt (8 required)
51	6582	Valve cover - RH
52	6763	Oil fill adapter
53	6766	Oil fill adapter cap
54	6758	Crankcase ventilation tube
55	W503282	Engine coolant crossover manifold assembly bolt (3 required)
56	W503279	Thermostat housing bolt (2 required)
57	8592	Thermostat housing
58	N806807	Thermostat O-ring seal
59	8255	Thermostat
60	8C368	Engine coolant crossover manifold assembly
61	9A474	Intake manifold vacuum harness and support bracket assembly
62	W710758	Intake manifold bolt (10 required)
63	W505427	Air intake resonator assembly bolt
64	9F763	Air intake resonator assembly
65	9424	Intake manifold assembly
66	6A664	PCV tube
67	W500204	PCV fitting bolt (2 required)
68	9F695	PCV fitting

Engine - Front End

2011 Ford Expedition

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N0122436

Fig. 440: Exploded View Of Engine - Front End
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	6306	Crankshaft sprocket
2	6K297	Timing chain guide - LH
3	N605892	Timing chain guide lower bolt - LH
4	6268	Timing chain - LH
5	6K255	Tensioner arm - RH
6	12A227	Ignition pulse wheel
7	W706447	Power steering pump bolt (2 required)
8	W715069	Power steering pump stud bolt
9	3A696	Power steering pump assembly
10	N808529	Engine front cover stud bolt (2 required)
11	W706605	Engine front cover bolt
12	N806177	Engine front cover bolt (9 required)
13	6C315	Crankshaft Position (CKP) sensor
14	N806155	CKP sensor bolt
15	6700	Crankshaft front seal
16	6312	Crankshaft pulley
17	N806165	Crankshaft pulley washer
18	6A340	Crankshaft pulley bolt
19	8509	Coolant pump pulley
20	N806282	Coolant pump pulley bolt (4 required)

2011 Ford Expedition

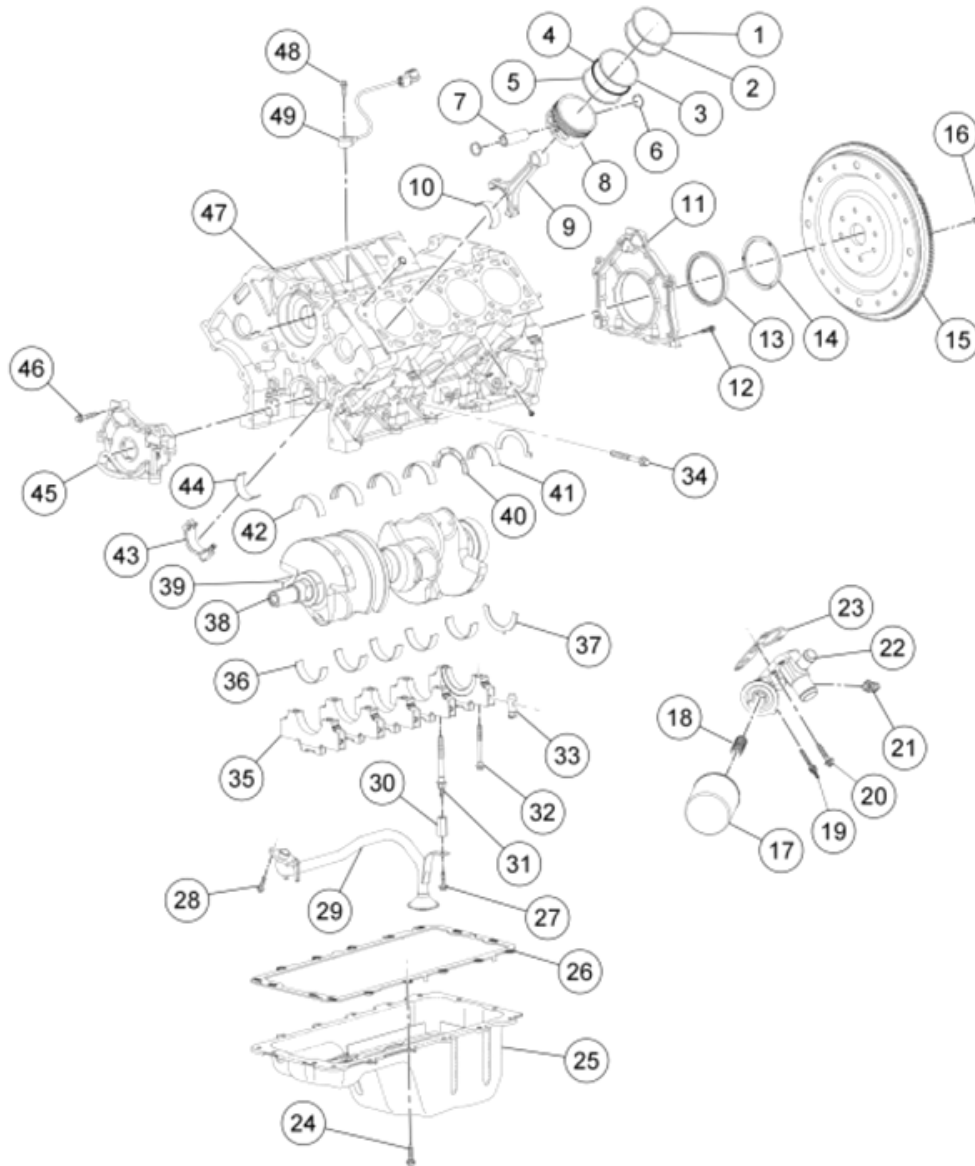
2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L

21	N808794	Coolant pump bolt (4 required)
22	8501	Coolant pump
23	N808102	Accessory drive belt idler pulley bolt
24	8678	Accessory drive belt idler pulley
25	N806155	Camshaft Position (CMP) sensor bolt (2 required)
26	6B288	CMP sensor (2 required)
27	W709573	Engine front cover stud bolt (3 required)
28	W500110	Radio ignition interference capacitor bolt (2 required)
29	18801	Radio ignition interference capacitor (2 required)
30	6019	Engine front cover
31	N606543	Timing chain tensioner bolt - RH (2 required)
32	6L266	Timing chain tensioner - RH
33	W503282	Timing chain guide bolt - RH (2 required)
34	6268	Timing chain - RH
35	6L266	Timing chain guide - RH
36	N606543	Timing chain tensioner bolt - LH (2 required)
37	6M269	Timing chain tensioner - LH
38	6M274	Tensioner arm - LH
39	N605892	Timing chain guide upper bolt - LH

Engine - Lower End

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



N0122437

Fig. 441: Exploded View Of Engine - Lower End
Courtesy of FORD MOTOR CO.

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	-	Upper compression ring (part of 6148) (8 required)
2	-	Lower compression ring (part of 6148) (8 required)
3	-	Outer oil control ring (part of 6148) (8 required)
4	-	Inner oil control ring (part of 6148) (8 required)
5	-	Outer oil control ring (part of 6148) (8 required)
6	6140	Piston pin retainer (16 required)
7	6135	Piston pin (8 required)

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8	6108	Piston (8 required)
9	6200	Connecting rod assembly (8 required)
10	6211	Connecting rod bearing (8 required)
11	6K301	Crankshaft rear seal retainer plate
12	N806155	Crankshaft rear seal retainer plate bolt (6 required)
13	6701	Crankshaft rear seal
14	6310	Crankshaft oil slinger
15	6375	Flexplate
16	6379	Flexplate bolt (8 required)
17	6731	Oil filter
18	6890	Oil filter threaded adapter
19	W714716	Oil filter adapter stud bolt
20	N806156	Oil filter adapter bolt (3 required)
21	9278	Engine Oil Pressure (EOP) switch
22	6881	Oil filter adapter
23	6840	Oil filter adapter gasket
24	W701605	Oil pan bolt (16 required)
25	6675	Oil pan
26	6710	Oil pan gasket
27	N605904	Oil pump screen and pickup tube bolt
28	N806155	Oil pump screen and pickup tube bolt (2 required)
29	6622	Oil pump screen and pickup tube
30	N806180	Oil pump screen and pickup tube spacer
31	6345	Crankshaft main bearing cap stud
32	6345	Crankshaft main bearing cap bolt (9 required)
33	6A346	Crankshaft main bearing dowel (10 required)
34	6345	Crankshaft main bearing cap bolt (10 required)
35	-	Crankshaft main bearing cap (part of 6010) (5 required)
36	-	Crankshaft bearing - lower (part of 6D309) (5 required)
37	-	Crankshaft thrust washer - lower (part of 6A355)
38	6303	Crankshaft
39	N806201	Crankshaft key
40	-	Crankshaft thrust washer - upper (part of 6A355) (2 required)
41	-	Crankshaft bearing - upper (part of 6D309) (4 required)
42	-	Crankshaft bearing - upper (part of 6D309)
43	-	Connecting rod cap part of 6200 (8 required)
44	6211	Connecting rod bearing (8 required)
45	6600	Oil pump
46	N806183	Oil pump bolt (3 required)
47	6010	Cylinder block
48	W500225	Knock Sensor (KS) bolt (2 required)

12A699

KS (2 required)

NOTE: Early build vehicle cooling systems are filled with Motorcraft® Premium Gold Engine Coolant. Late build vehicle cooling systems are filled with Motorcraft® Specialty Orange Engine Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

1. Record the main bearing code found on the front of the engine block.

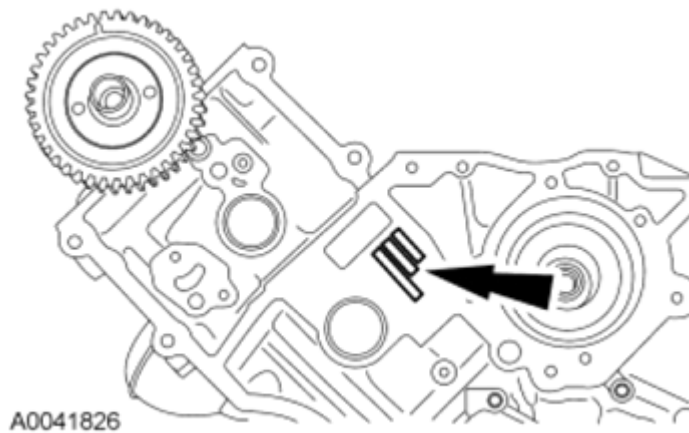


Fig. 442: Locating Main Bearing Code Found On Front Of Engine Block
Courtesy of FORD MOTOR CO.

2. Record the main bearing code found on the back of the crankshaft.

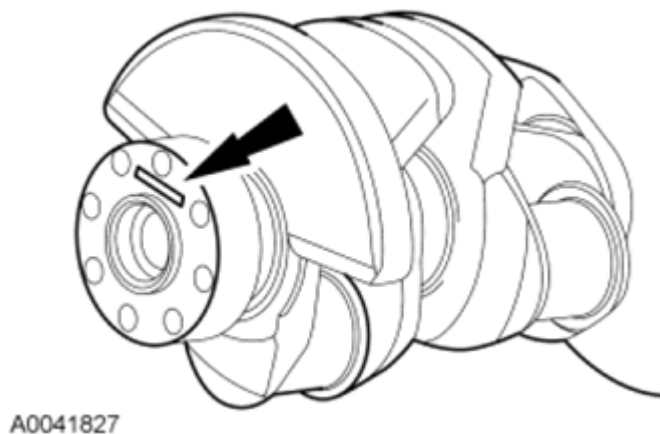


Fig. 443: Locating Main Bearing Code Found On Back Of Crankshaft
Courtesy of FORD MOTOR CO.

3. Using the data recorded earlier and the Bearing Select Fit Chart, Standard Bearings, determine the required bearing grade for each main bearing.

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- Read the first letter of the engine block main bearing code and the first letter of the crankshaft main bearing code.
- Read down the column below the engine block main bearing code letter, and across the row next to the crankshaft main bearing code letter, until the 2 intersect. This is the required bearing grade for the No. 1 crankshaft main bearing.
- As an example, if the engine block code letter is F and the crankshaft code letter is D, the correct bearing grade for this main bearing is a 2.
- Repeat this process for the remaining 4 main bearings.

MAXIMUM CRANKSHAFT DIA

MINIMUM BLOCK DIA

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
	72.400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424
X	67.504	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
W	67.503	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
V	67.502	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
U	67.501	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2
T	67.500	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
S	67.499	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
R	67.498	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Q	67.497	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3
P	67.496	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
O	67.495	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
N	67.494	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
M	67.493	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3
L	67.492	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3
K	67.491	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
J	67.490	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
I	67.489	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
H	67.488	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
G	67.487	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3
F	67.486	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
E	67.485	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
D	67.484	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
C	67.483	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
B	67.482	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
A	67.481	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

A0031544

Fig. 444: Bearing Select Fit Chart (Standard Bearings)

Courtesy of FORD MOTOR CO.

- If oversize bearings are being used, use the procedure in the previous step and the Bearing Select Fit Chart, Oversize Bearings to determine the required bearing grade for each main bearing.

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		MINIMUM BLOCK DIA																								
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	
		72.400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424
MAXIMUM CRANKSHAFT DIA	X 67.254	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	W 67.253	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	V 67.252	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2
	U 67.251	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2
	T 67.250	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2
	S 67.249	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2
	R 67.248	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2
	Q 67.247	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	3
	P 67.246	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3
	O 67.245	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
	N 67.244	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3
	M 67.243	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3
	L 67.242	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3
	K 67.241	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3
	J 67.240	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3
	I 67.239	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3
	H 67.238	2	2	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3
	G 67.237	2	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3
	F 67.236	2	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	E 67.235	2	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	D 67.234	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	C 67.233	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	B 67.232	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	A 67.231	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

A0041840

Fig. 445: Bearing Select Fit Chart (Oversize Bearings)

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.

5.

Install the crankshaft upper main bearings into the cylinder block and lubricate them with clean engine oil.

NOTE: The upper thrust washers are shown in the illustration for location purposes only. Do not install the upper thrust washers until the crankshaft is installed. Refer to the following 2 steps.

6.

Install the crankshaft onto the upper crankshaft main bearings.

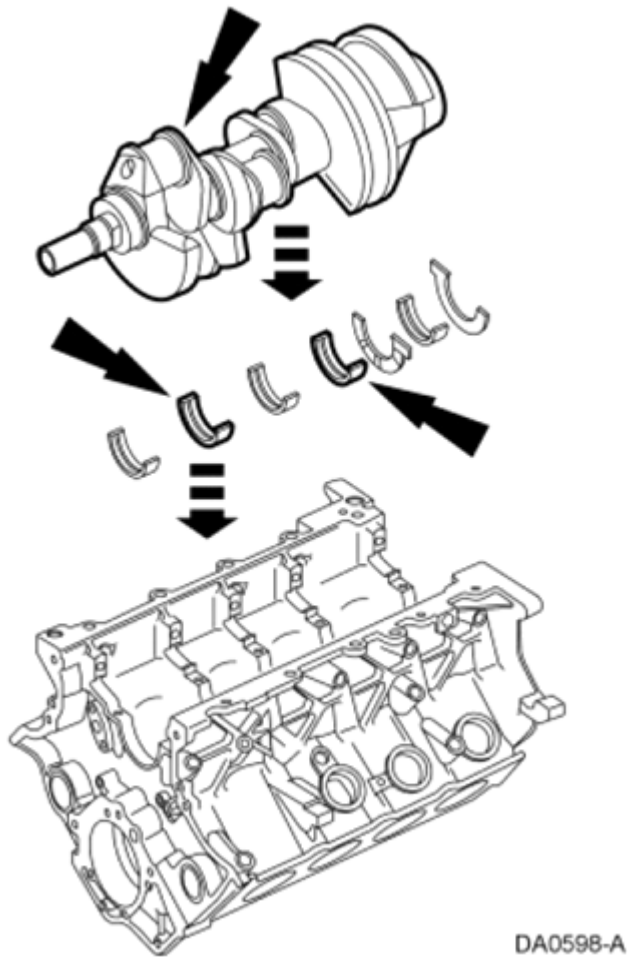
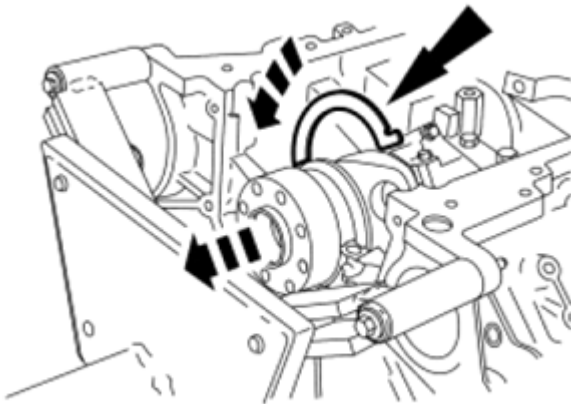


Fig. 446: Locating Crankshaft On Upper Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

NOTE: The oil groove on the thrust washer must face toward the front of the engine (against the crankshaft thrust surface).

7.

Push the crankshaft rearward and install the rear crankshaft upper thrust washer at the back of the No. 5 main boss.

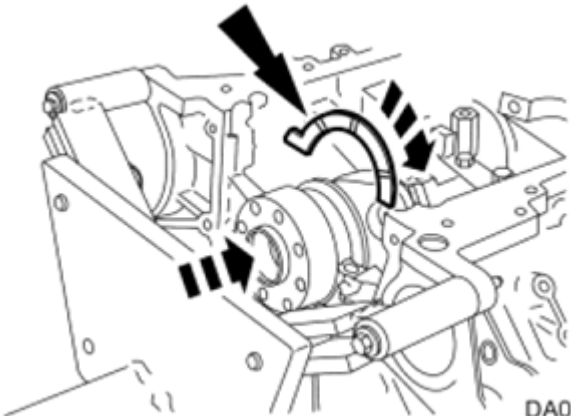


DA0596-A

Fig. 447: Installing Rear Crankshaft Upper Thrust Washer
Courtesy of FORD MOTOR CO.

8. **NOTE:** The oil groove on the thrust washer must face toward the front of the engine (against the crankshaft surface).

Push the crankshaft forward and install the front crankshaft upper thrust washer at the front of the No. 5 main boss.



DA0595-B

Fig. 448: Installing Front Crankshaft Upper Thrust Washer
Courtesy of FORD MOTOR CO.

9. **NOTE:** To aid in assembly, apply petroleum jelly to the back of the crankshaft thrust washer.

- NOTE:** The oil groove on the thrust washer must face toward the rear of the engine (crankshaft surface).

Install the lower crankshaft thrust washer to the back side of the No. 5 main bearing cap, with oil grooves

facing the crankshaft surface.

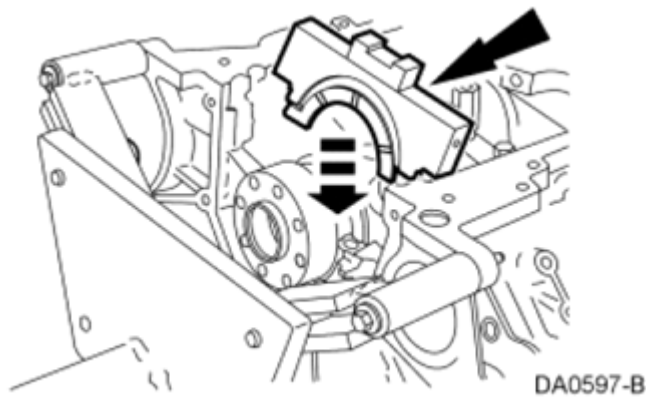


Fig. 449: Installing Lower Crankshaft Thrust Washer To Back Side
Courtesy of FORD MOTOR CO.

10. 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.
11. Install the 10 dowel pins so the flat sides face the crankshaft.

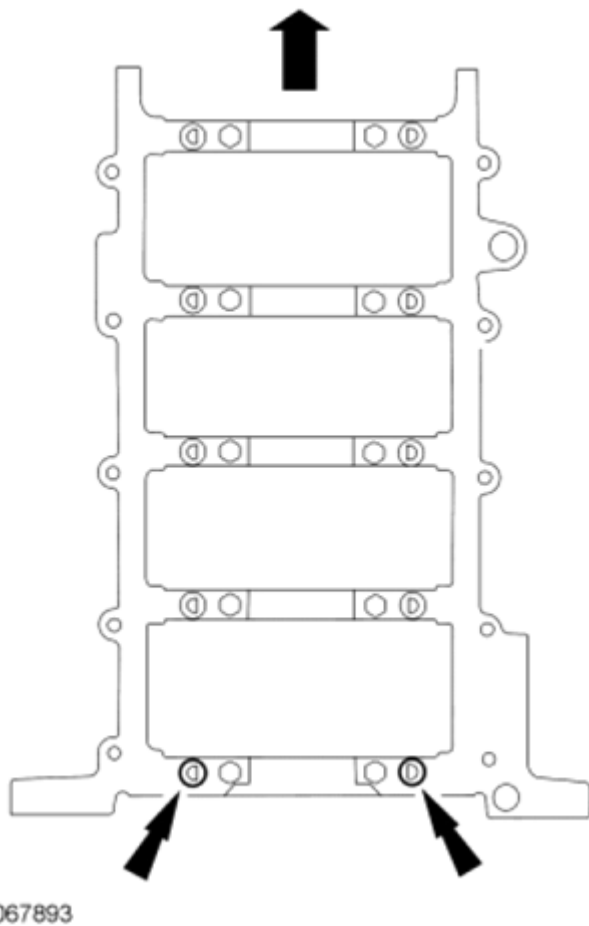
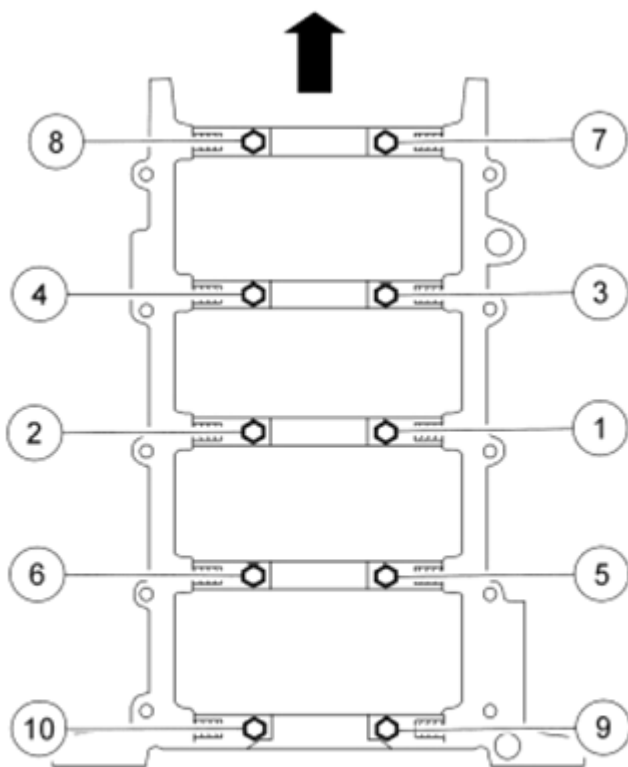


Fig. 450: Installing Crankshaft Lower Main Bearings
Courtesy of FORD MOTOR CO.

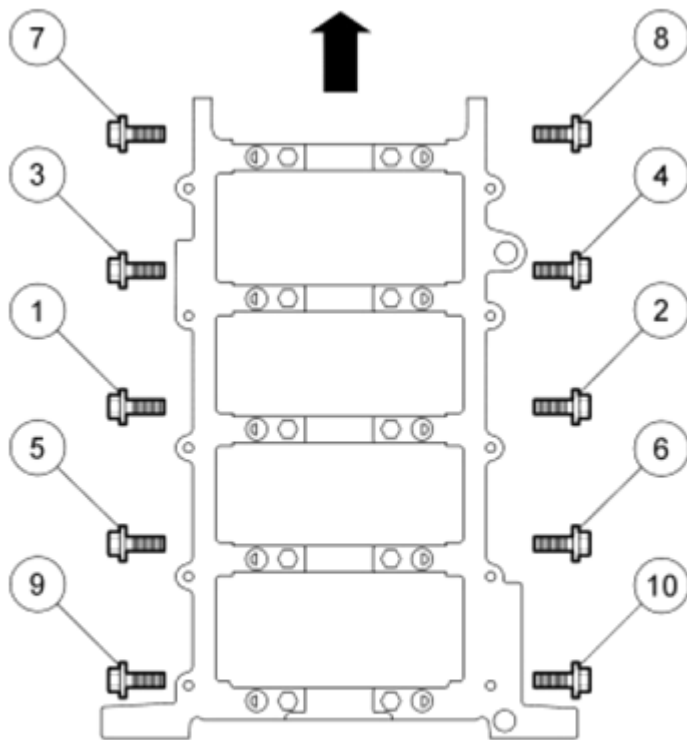
12. Install the 10 vertical main bearing cap fasteners and tighten in 2 stages, in the sequence shown in the illustration.
 - Stage 1: Tighten to 40 Nm (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.



N0010200

Fig. 451: Identifying Vertical Main Bearing Cap Fasteners In Tightening Sequence
 Courtesy of FORD MOTOR CO.

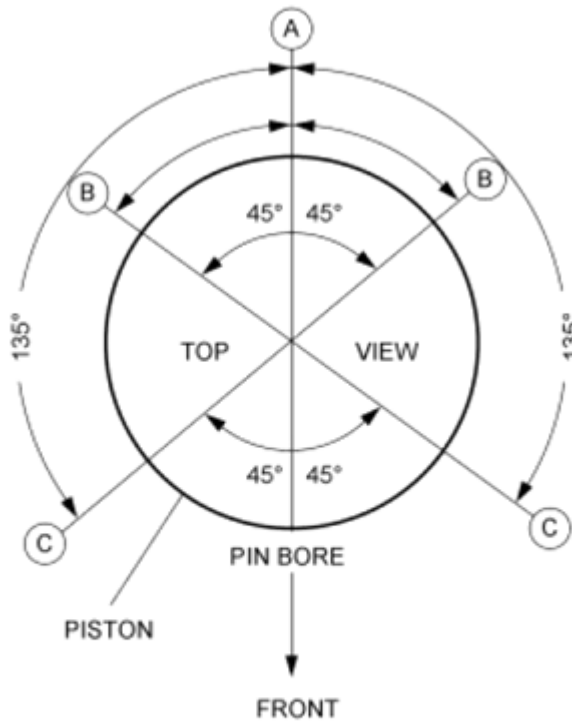
13. Install the 10 side bolts and tighten them in 2 stages, in the sequence shown in the illustration.
 - Stage 1: Tighten to 30 Nm (22 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.



N0010201

Fig. 452: Identifying Side Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

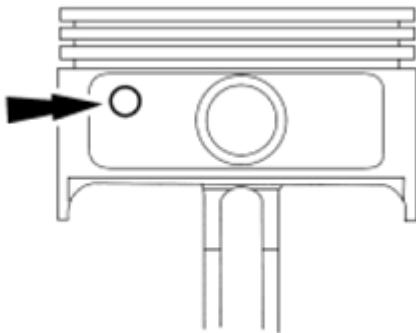
14. Assemble the 8 pistons. For additional information, refer to **PISTON** in this information.
15. Make sure the ring gaps (oil spacer - A, oil ring - B, compression ring - C) are correctly spaced around the circumference of the piston.



N0029312

Fig. 453: Identifying Ring Gap Locations
Courtesy of FORD MOTOR CO.

16. Make sure the dimple in the piston faces the front of the engine.



N0088510

Fig. 454: Locating Dimple In Piston Faces
Courtesy of FORD MOTOR CO.

NOTE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod or engine damage may occur.

- 17.

NOTE: The following piston installation steps are for all 8 connecting rods, connecting rod bearings and pistons. Only one connecting rod, connecting rod bearing and piston is shown in the illustration.

Using the Piston Ring Compressor and the Connecting Rod Installer, 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.

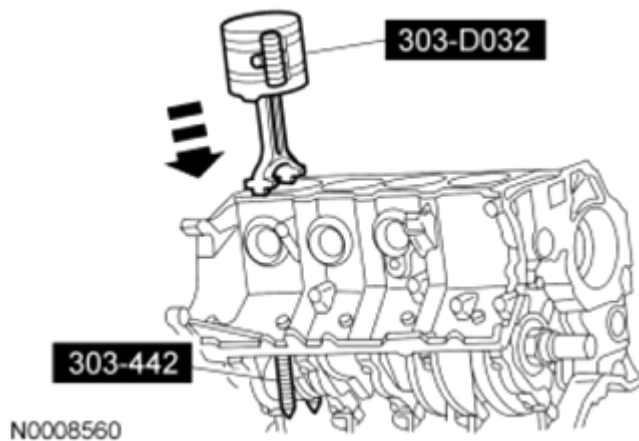


Fig. 455: Lubricating Rod Bearings
Courtesy of FORD MOTOR CO.

18. **NOTE:** Do not scratch the cylinder walls or crankshaft journals with the connecting rod or engine damage may occur.

Once the connecting rod is seated on the crankshaft journal, remove the Connecting Rod Installer.

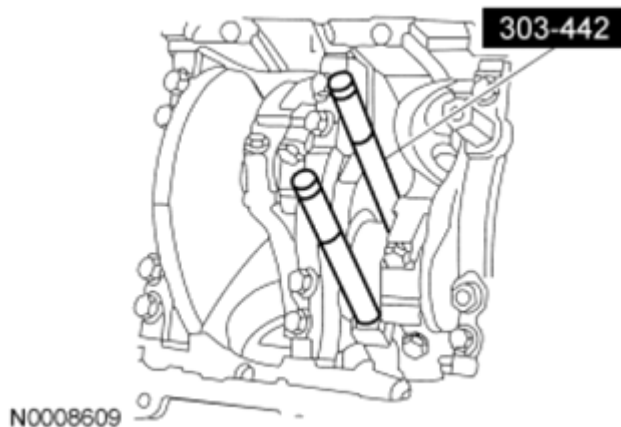


Fig. 456: Removing Connecting Rod Installer

Courtesy of FORD MOTOR CO.

19. **NOTE:** The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.

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.

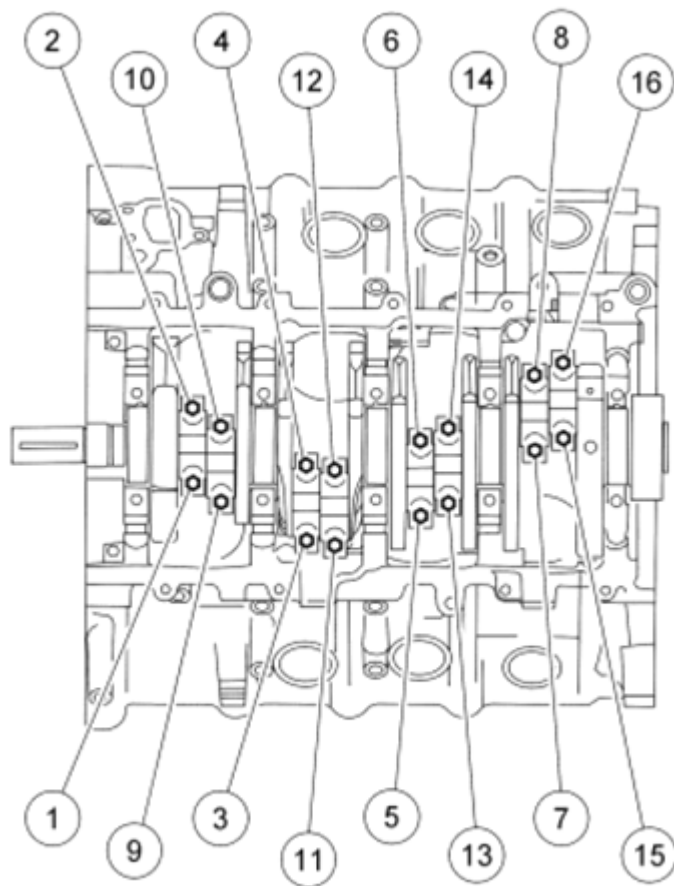
Position the lower bearing and connecting rod, and install the 16 new bolts loosely.

20. Check the piston-to-cylinder block and piston ring clearances. For additional information, refer to **ENGINE MECHANICAL SYSTEM - GENERAL INFORMATION** .

21. **NOTE:** Main bearing caps are removed for clarity.

Tighten the 16 bolts in 2 stages, in the sequence shown in the illustration.

- Stage 1: Tighten to 43 Nm (32 lb-ft).
- Stage 2: Tighten an additional 105 degrees.



N0008562

Fig. 457: Identifying Connecting Rod Bearing Caps Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

22. Position the oil pump and install the 3 bolts.
 - Tighten to 10 Nm (89 lb-in).



N0006304

Fig. 458: Locating Oil Pump And Bolts
Courtesy of FORD MOTOR CO.

23. Install the oil pump screen and pickup tube spacer.
- Tighten to 25 Nm (18 lb-ft).

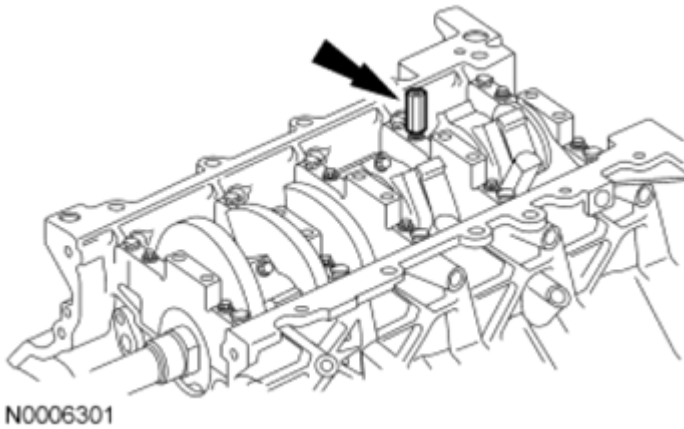


Fig. 459: Installing Oil Pump Screen And Pickup Tube Spacer
Courtesy of FORD MOTOR CO.

- NOTE:** 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.
- 24.

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

Position the oil pump screen and pickup tube and install the 3 bolts.

- Tighten the 2 oil pump screen and pickup tube-to-oil pump bolts to 10 Nm (89 lb-in).
- Tighten the oil pump screen and pickup tube-to-spacer bolt to 25 Nm (18 lb-ft).

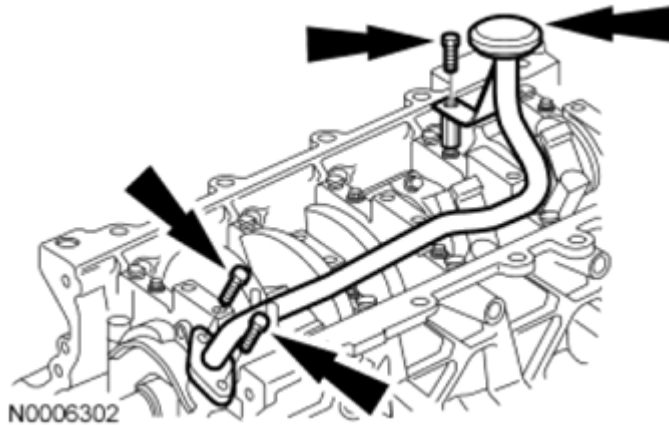


Fig. 460: Locating Oil Pump Screen And Pickup Tube And Bolts
Courtesy of FORD MOTOR CO.

25. Position the crankshaft with the Crankshaft Holding Tool, then remove the tool.

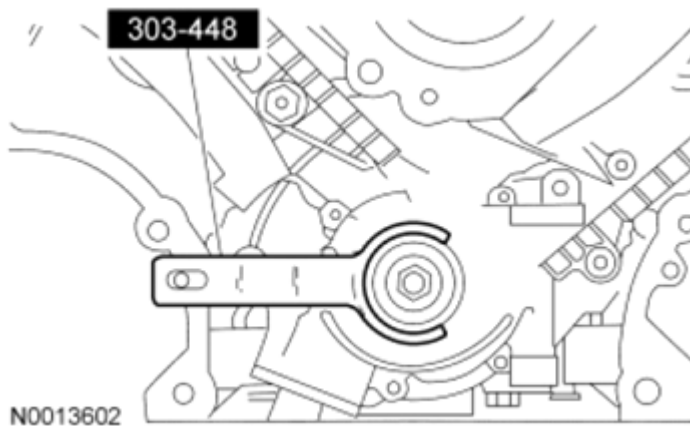


Fig. 461: Positioning Crankshaft
Courtesy of FORD MOTOR CO.

26. **NOTE:** Make sure all coolant residue and foreign material are cleaned from the block surface and cylinder bore.
- NOTE:** The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry or engine damage may occur.
- NOTE:** The cylinder head bolts must be discarded and new bolts installed. They are a tighten-to-yield design and cannot be reused.
- NOTE:** Do not turn the crankshaft until instructed to do so.

NOTE: LH shown in the illustration, RH similar.

Using the Cylinder Head Alignment Pins, position the cylinder head gaskets and cylinder heads over the dowels and install the 20 cylinder head bolts loosely.

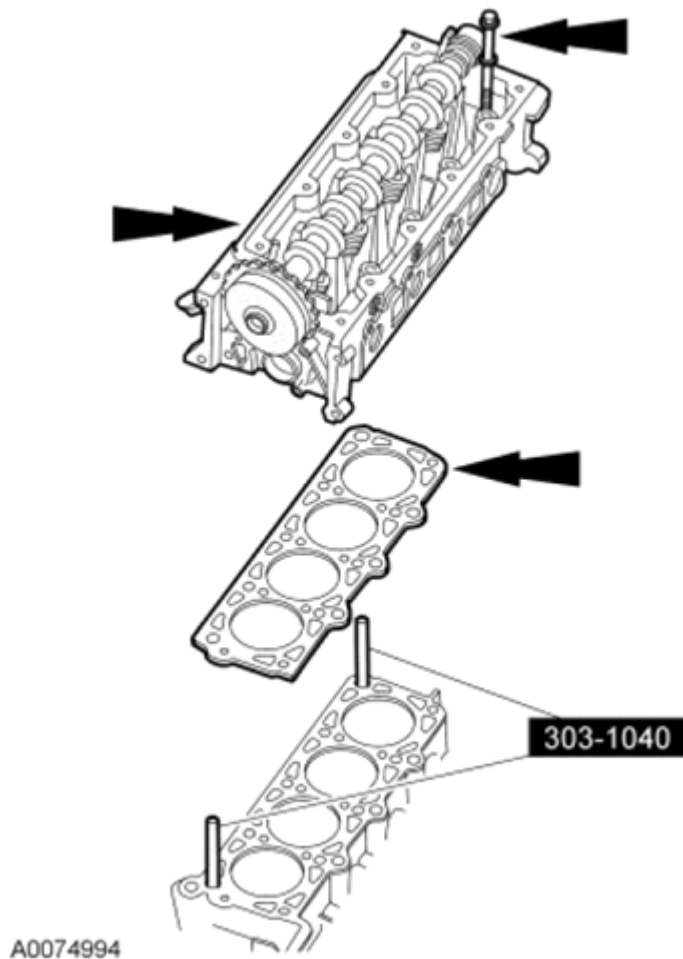
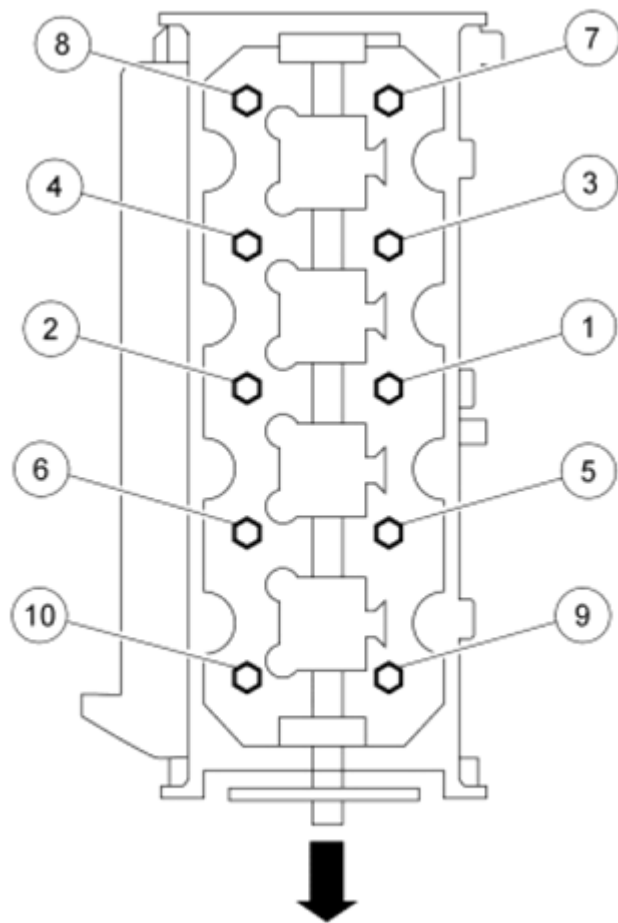


Fig. 462: Locating Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

27. **NOTE:** RH shown in the illustration, LH similar.

Tighten the 20 bolts in 3 stages, in the sequence shown in the illustration.

- Stage 1: Tighten to 40 Nm (30 lb-ft).
- Stage 2: Tighten an additional 90 degrees.
- Stage 3: Tighten an additional 90 degrees.



N0067890

Fig. 463: Identifying Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

28. Remove the Cylinder Head Remover/Installer from the LH cylinder head.

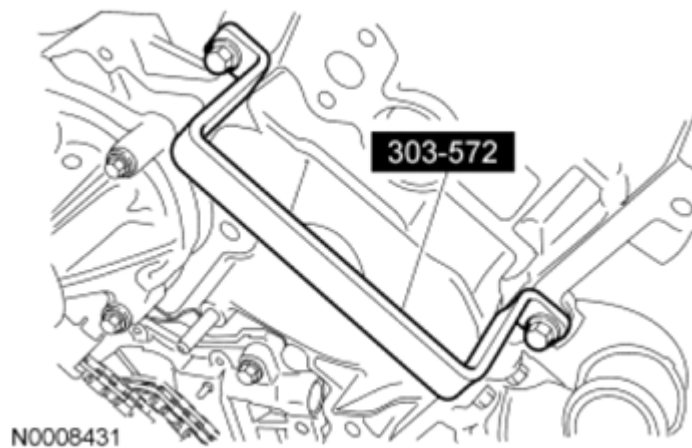


Fig. 464: Removing Special Tool From Cylinder Head

Courtesy of FORD MOTOR CO.

29. Remove the Cylinder Head Remover/Installer from the RH cylinder head.

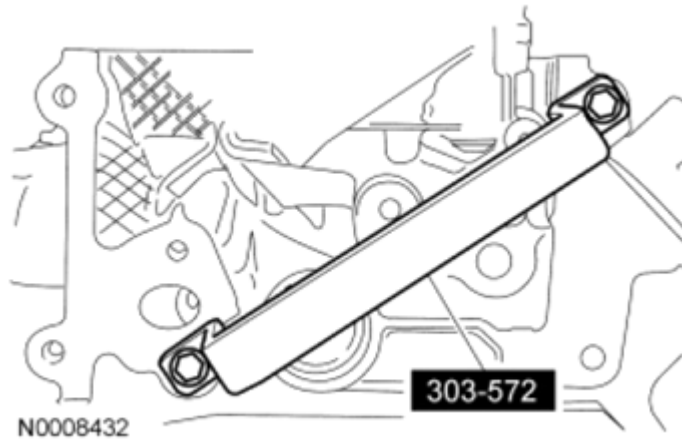


Fig. 465: View Of Remover/Installer Tool
Courtesy of FORD MOTOR CO.

30. Install the 24 hydraulic lash adjusters into the RH and LH cylinder heads.
- Lubricate the hydraulic lash adjusters with clean engine oil prior to installation.

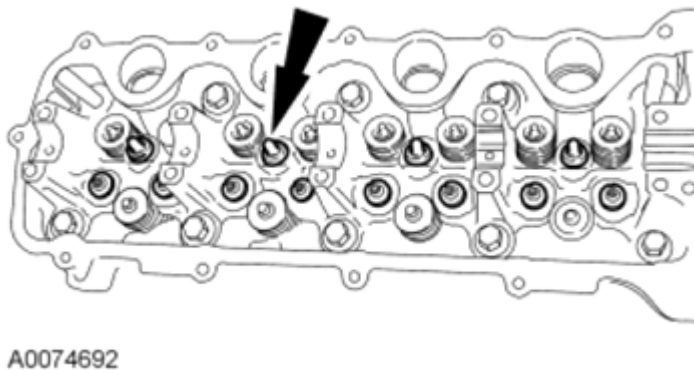


Fig. 466: Locating Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

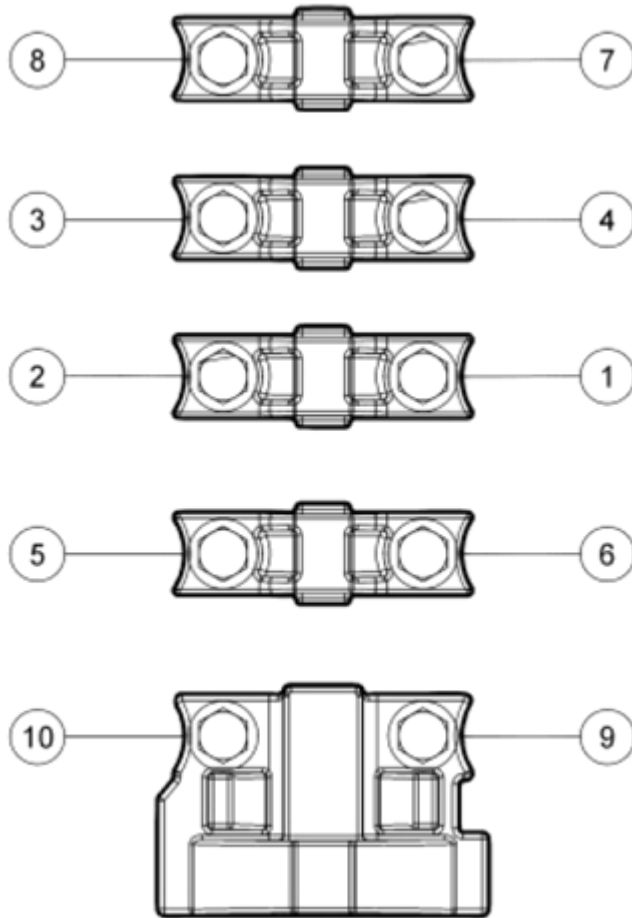
31. Install the LH and RH camshafts.
- Lubricate the camshaft and camshaft journals with clean engine oil prior to installation.

32. **NOTE:** **LH shown in the illustration, RH similar.**

Install the 5 LH and 5 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 20 bolts loosely.
- Tighten to 10 Nm (89 lb-in) in the sequence shown in the illustration.



N0011337

Fig. 467: Identifying Camshaft Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

33. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

NOTE: LH shown in the illustration, RH similar.

Install the camshaft phase and sprockets and new camshaft phase and sprocket bolts finger-tight.

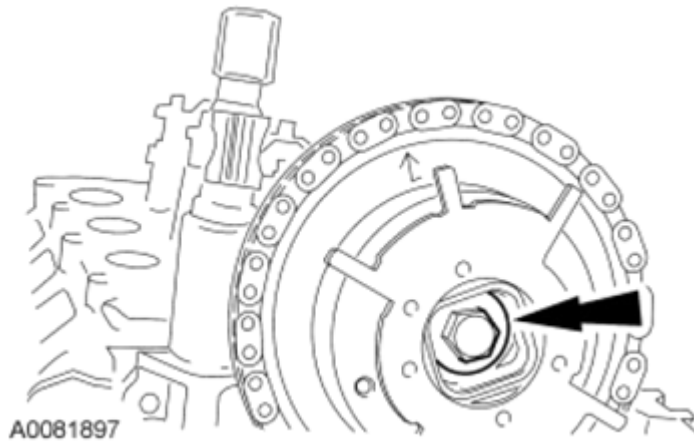


Fig. 468: Locating Camshaft Phaser And Sprocket Bolts
Courtesy of FORD MOTOR CO.

34. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase and sprocket.
- NOTE:** LH shown in the illustration, RH similar.

Using the Cam Phaser Locking Tool, tighten the LH and RH camshaft phase and sprocket bolts in 2 stages.

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

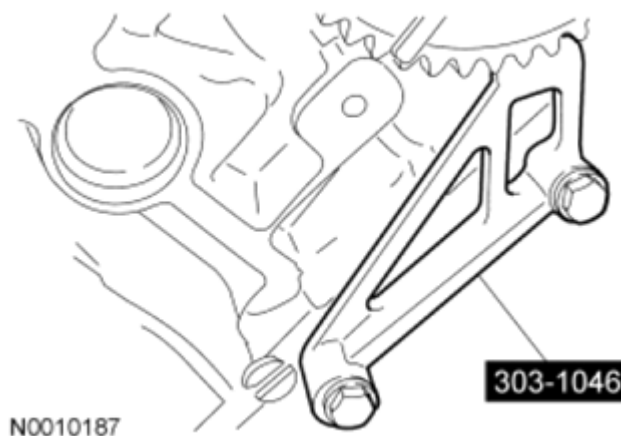


Fig. 469: Identifying Cam Phaser Locking Tool
Courtesy of FORD MOTOR CO.

35. **NOTE:** Timing chain procedures must be followed exactly or damage to valves and pistons may result.

NOTE: Prior to installation, inspect the tensioner-sealing bead for seal integrity. If cracks, tears, separation from the tensioner body or permanent compression of the seal bead is observed, install a new tensioner or engine damage may occur.

Compress the tensioner plunger, using a vise.

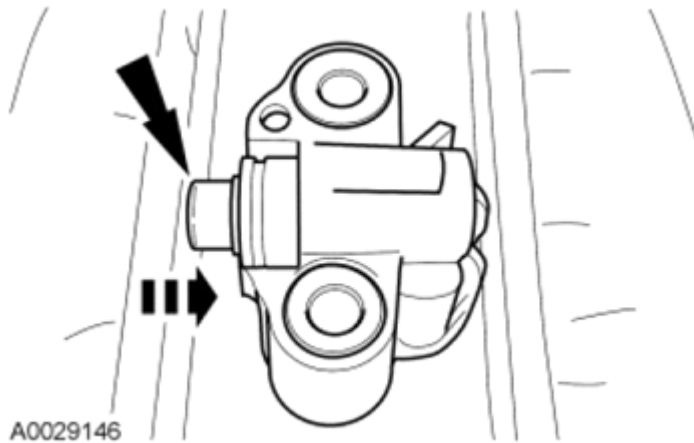


Fig. 470: Compressing Tensioner Plunger Using Vise
Courtesy of FORD MOTOR CO.

36. Install the Hydraulic Chain Tensioner Retaining Clip on the tensioner to hold the plunger in during installation.

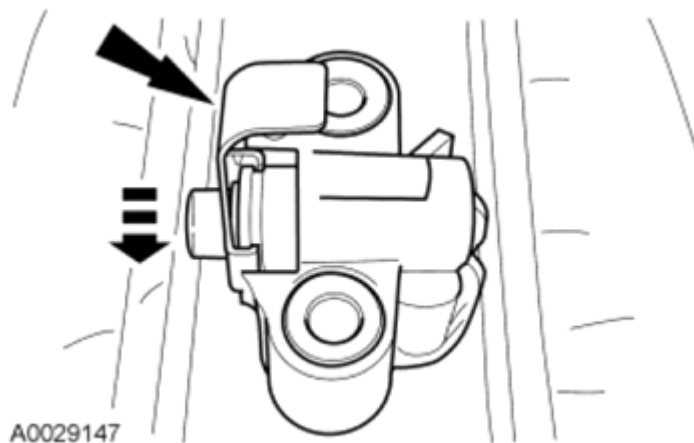
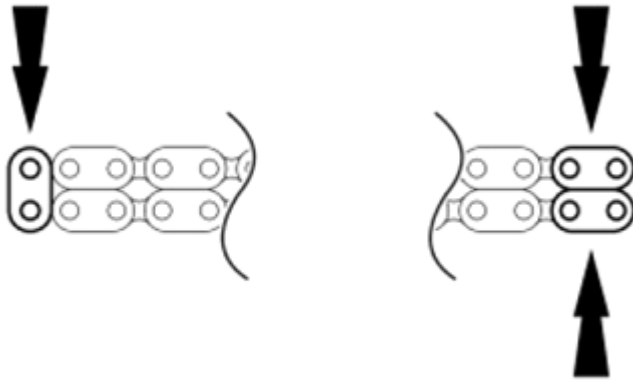


Fig. 471: Installing Retaining Clip On Tensioner
Courtesy of FORD MOTOR CO.

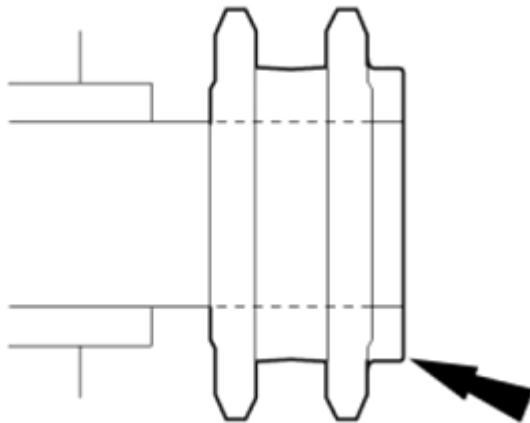
37. Remove the tensioner from the vise.
38. If the copper links are not visible, mark 2 links on one end and 1 link on the other end, and use as timing marks.



A0038720

Fig. 472: Locating Copper Link Timing Marks
Courtesy of FORD MOTOR CO.

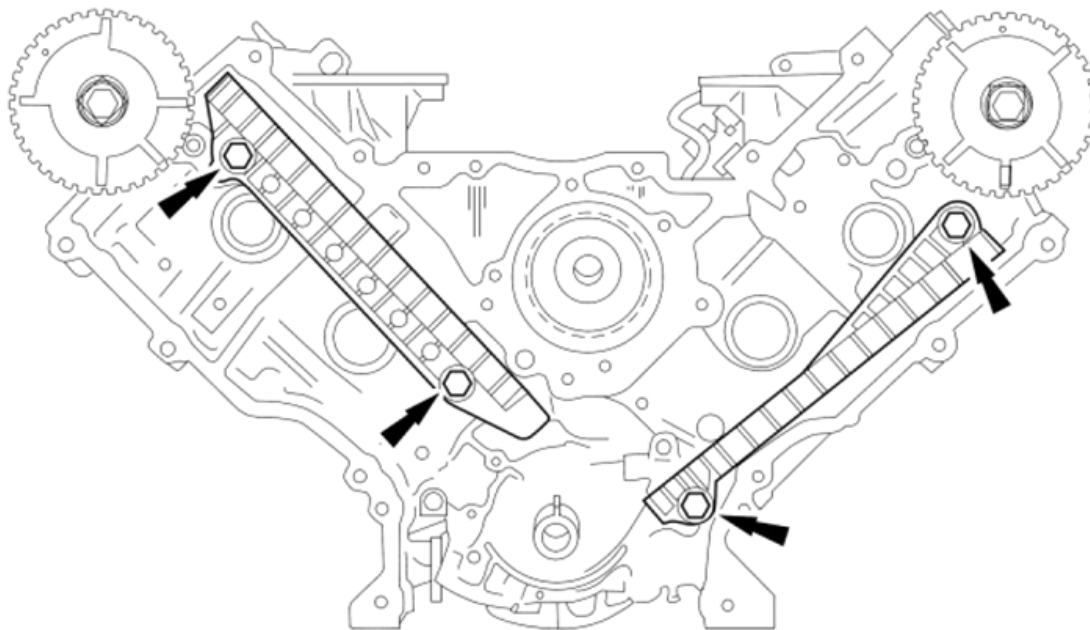
39. Install the crankshaft sprocket, making sure the flange faces forward.



N0011527

Fig. 473: Installing Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

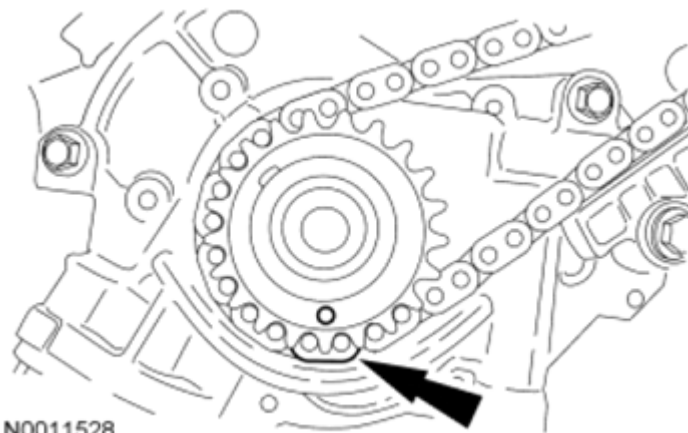
40. Position the LH and RH timing chain guides and install the 4 bolts.
 - Tighten to 10 Nm (89 lb-in).



N0006303

Fig. 474: Locating 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. 475: Aligning Crankshaft Sprocket Timing Mark And Timing Chain Link
Courtesy of FORD MOTOR CO.

- NOTE:** Make sure the upper half of the timing chain is below the tensioner arm dowel.
- 42.

Position the timing chain on the camshaft phase and sprocket with the timing mark positioned between the 2 copper (marked) chain links.

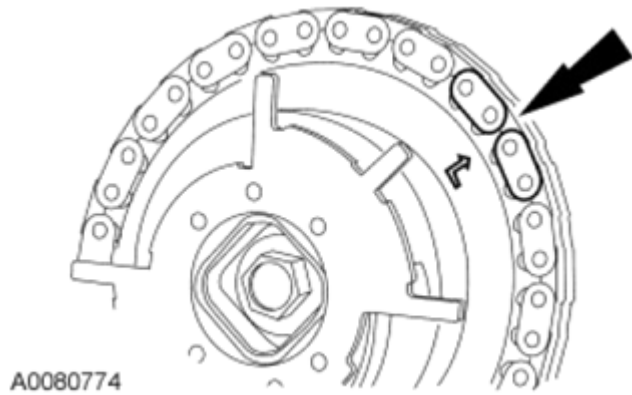


Fig. 476: Locating Timing Mark On Timing Chain
Courtesy of FORD MOTOR CO.

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

Position the LH timing chain tensioner arm on the dowel pin and install the LH timing chain tensioner and 2 bolts.

- Tighten to 25 Nm (18 lb-ft).

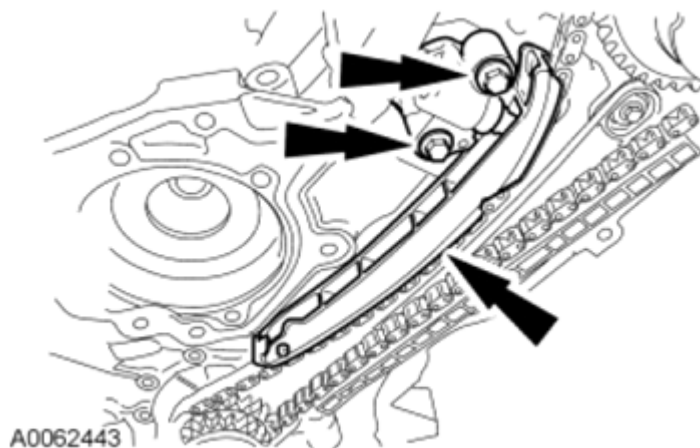


Fig. 477: Locating LH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

44. Remove the Hydraulic Chain Tensioner Retaining Clip from the LH timing chain tensioner.

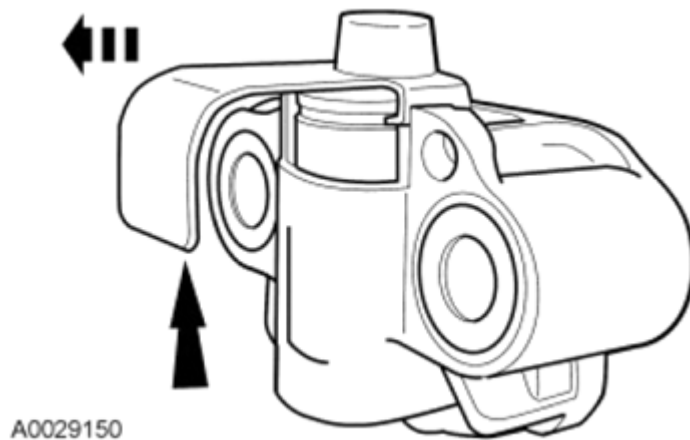


Fig. 478: Removing Retaining Clip From LH Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

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.

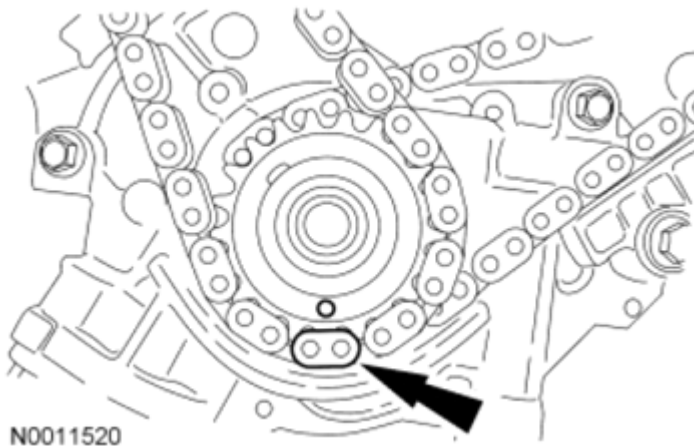


Fig. 479: Aligning (Outer) Sprocket Timing Mark And Chain Link
Courtesy of FORD MOTOR CO.

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

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

Position the RH timing chain on the camshaft phase and sprocket. Make sure the timing mark is positioned between the 2 copper (marked) chain links.

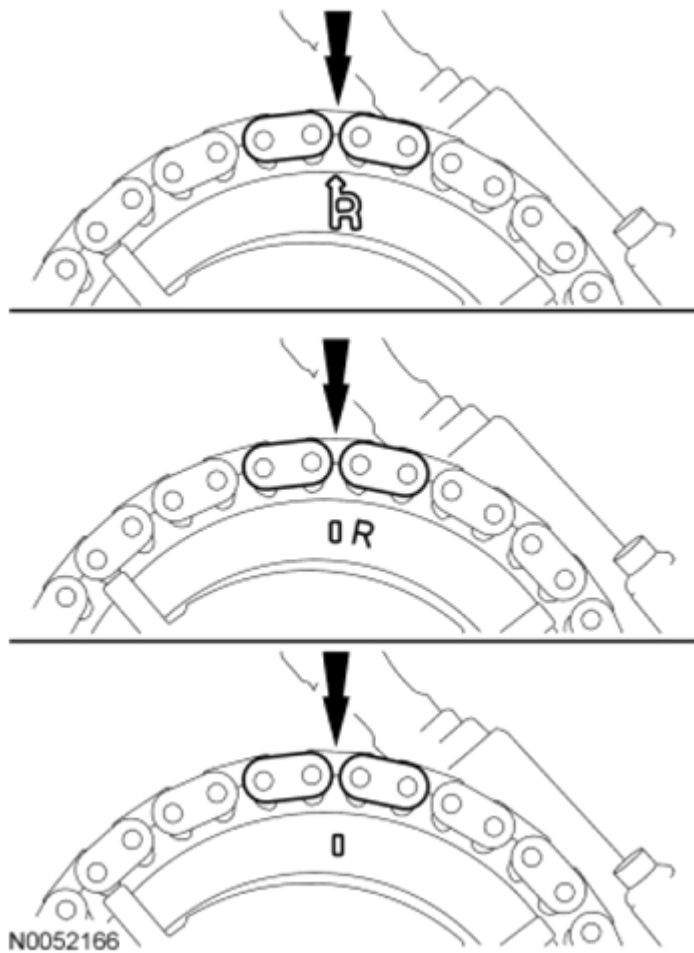


Fig. 480: Locating Timing Mark On Copper Chain Links
 Courtesy of FORD MOTOR CO.

47. Position the RH timing chain tensioner arm on the dowel pin and install the RH timing chain tensioner and the 2 bolts.
 - Tighten to 25 Nm (18 lb-ft).

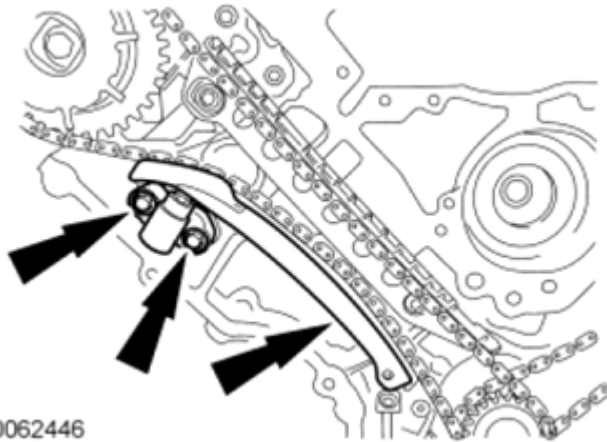


Fig. 481: Locating RH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

48. Remove the Hydraulic Chain Tensioner Retaining Clip from the RH timing chain tensioner.

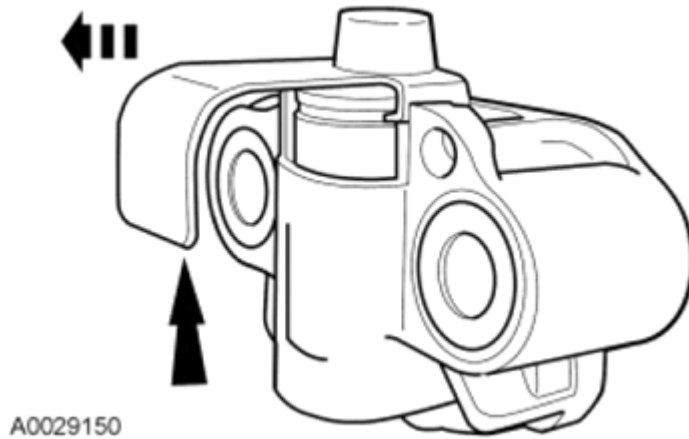
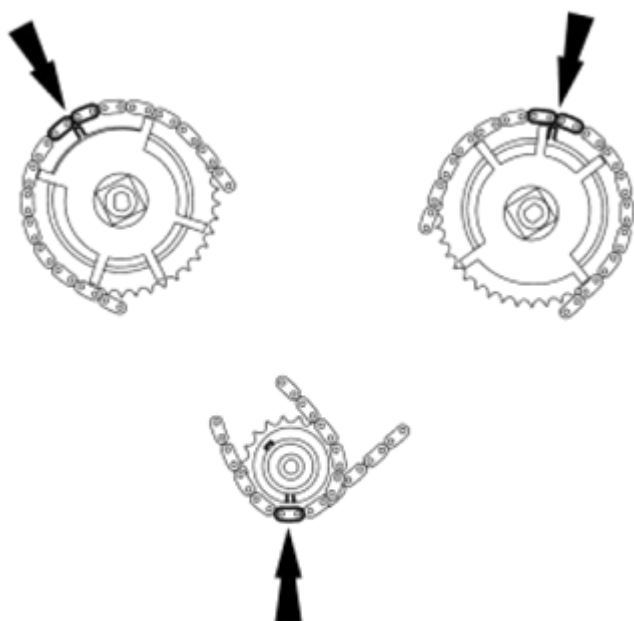


Fig. 482: Removing Retaining Clip From LH Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

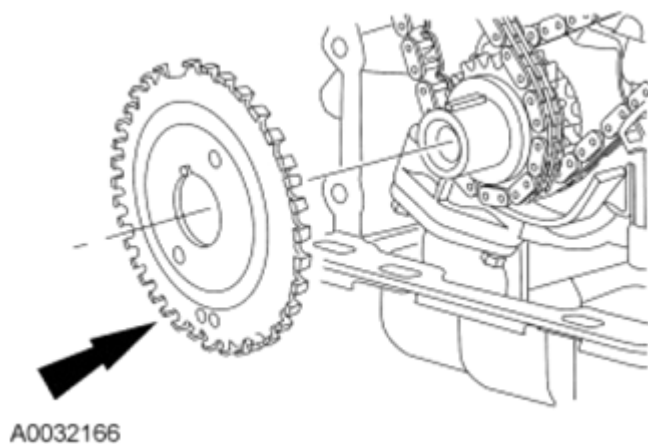
49. As a post-check, verify correct alignment of all timing marks.



N0092582

Fig. 483: Locating Timing Chain Mark Location
Courtesy of FORD MOTOR CO.

50. Install the crankshaft sensor ring on the crankshaft.



A0032166

Fig. 484: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

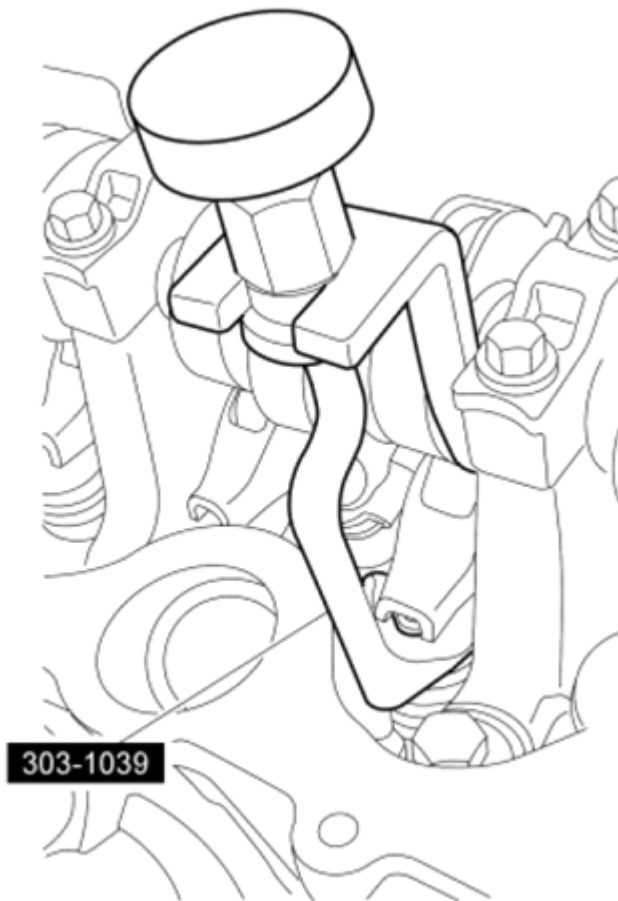
NOTE: Do not allow the valve keepers to fall off of the valve or the valve may drop into the cylinder. If a valve drops into the cylinder, the cylinder head must be removed.

51.

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

Using the Valve Spring Compressor, install all of the camshaft roller followers.

- Lubricate the camshaft roller followers with clean engine oil prior to installation.



N0010191

Fig. 485: View Of Valve Spring Compressor On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

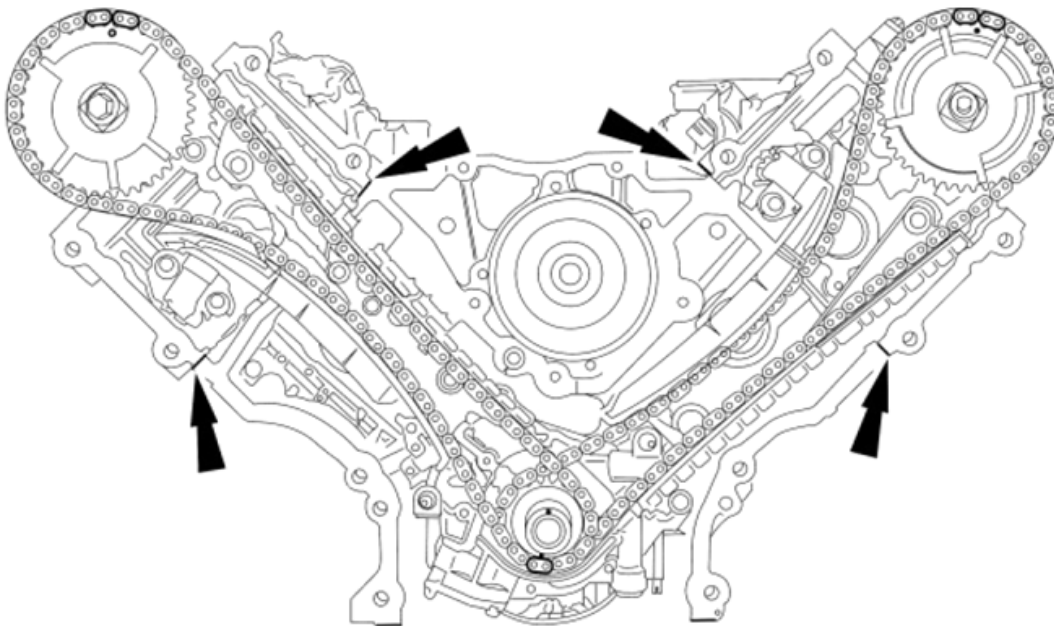
NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

52.

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. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure may cause future oil leakage.

NOTE: Make sure that the engine front cover gasket is in place on the engine front cover before installation.

Apply a bead of silicone gasket and sealant along the cylinder head-to-cylinder block surface at the locations shown in the illustration.



N0010501

Fig. 486: Locating Engine Front Cover Onto Dowels
Courtesy of FORD MOTOR CO.

53. Install a new engine front cover gasket on the engine front cover. Position the engine front cover onto the dowels. Install the fasteners finger-tight.

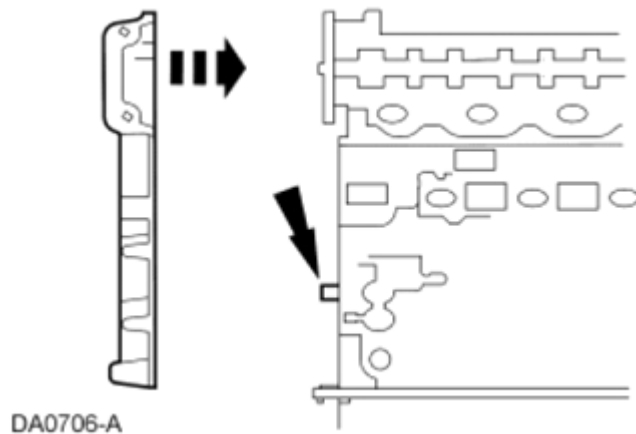


Fig. 487: Installing Engine Front Cover
Courtesy of FORD MOTOR CO.

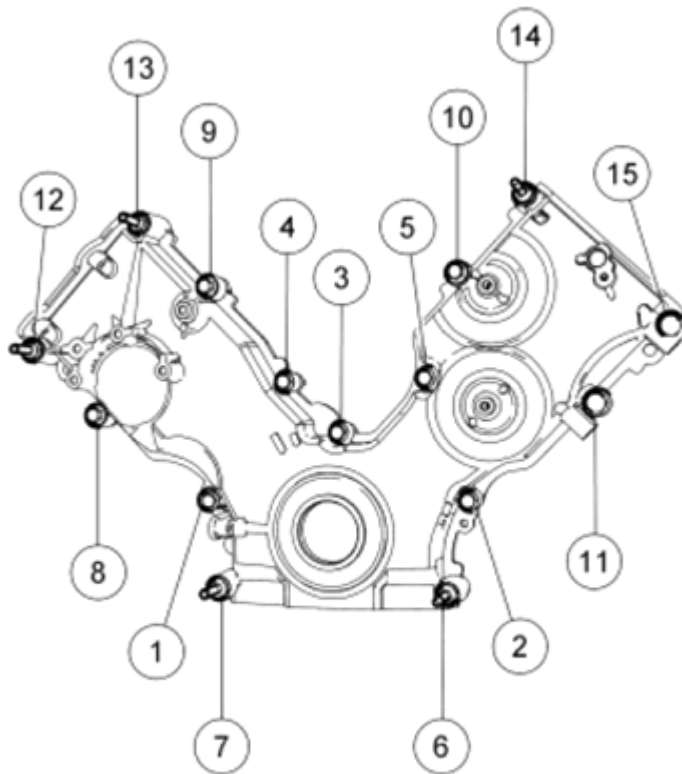
54. Tighten the 15 engine front cover fasteners in the sequence shown in the illustration in 2 stages.

Stage 1: Tighten fasteners 1 through 15 to 25 Nm (18 lb-ft).

Stage 2: Tighten fasteners 6 and 7 to 48 Nm (35 lb-ft).

ITEM DESCRIPTION CHART

Item	Part Number	Description
1	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
2	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
3	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
4	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
5	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
6	N808529	Stud, Hex Head Pilot, M10 x 1.5 x 1.5 x 103
7	N808529	Stud, Hex Head Pilot, M10 x 1.5 x 1.5 x 103
8	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
9	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
10	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
11	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
12	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
13	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
14	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
15	W706605	Bolt, Hex Head Pilot, M8 x 1.25 x 56



N0010206

Fig. 488: Identifying Engine Front Cover Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

55. **NOTE:** 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.

Using a new O-ring seal, position the coolant pump and install the bolts loosely.

- Lubricate the new O-ring seal using clean engine coolant and install the O-ring seal onto the coolant pump. Use the same type of coolant that was drained from the system.

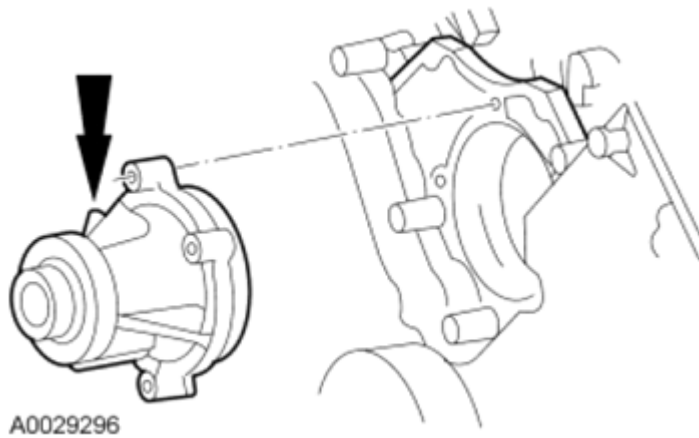


Fig. 489: Locating Coolant Pump
Courtesy of FORD MOTOR CO.

56. Tighten the 4 coolant pump bolts.
- Tighten to 25 Nm (18 lb-ft).

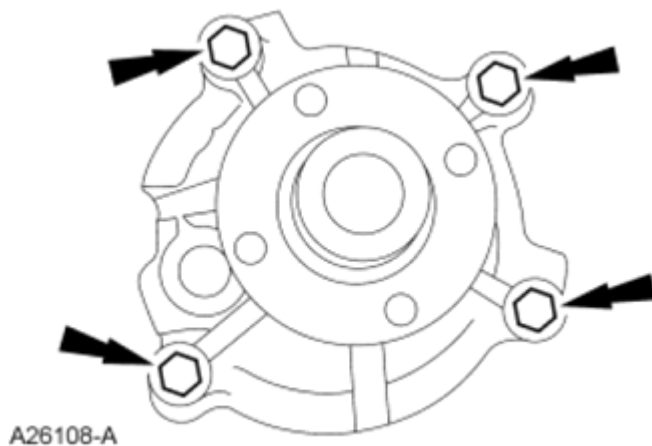
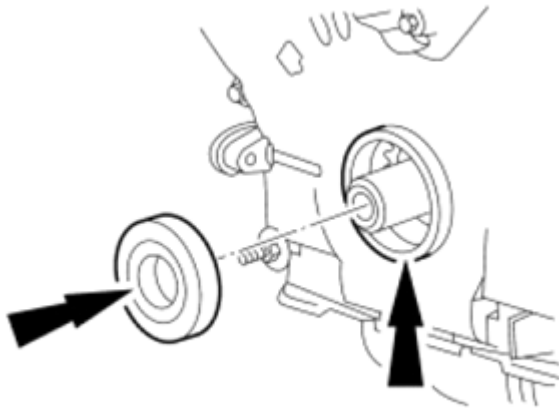


Fig. 490: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

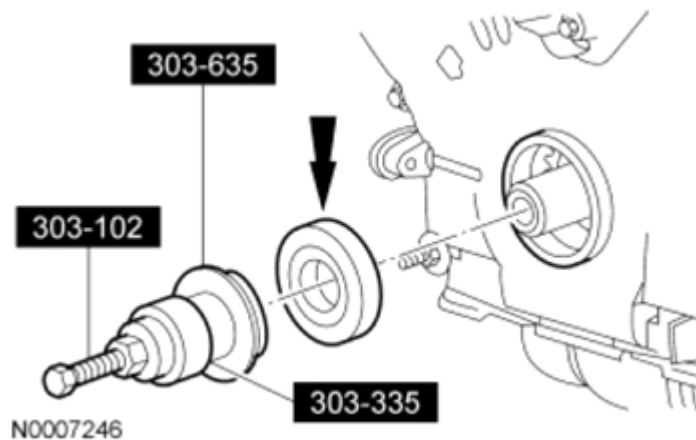
57. Lubricate the engine front cover and the crankshaft seal inner lip with clean engine oil.



A0029187

Fig. 491: Lubricating Engine Front Cover And Crankshaft Seal Inner Lip With Clean Engine Oil
Courtesy of FORD MOTOR CO.

58. Using the Crankshaft Vibration Damper Installer, Front Cover Oil Seal Installer and Crankshaft Front Oil Seal Installer, install a new crankshaft front seal.



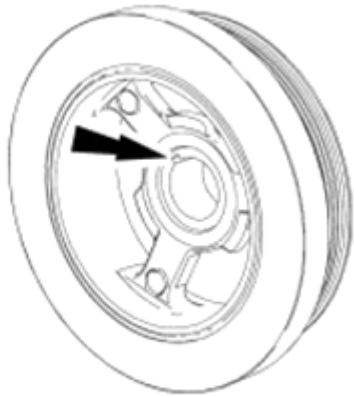
N0007246

Fig. 492: Installing Crankshaft Front Seal Into Engine Front Cover 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.

- 59.

Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.



N0010530

Fig. 493: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

60. Using the Crankshaft Vibration Damper Installer, install the crankshaft pulley.

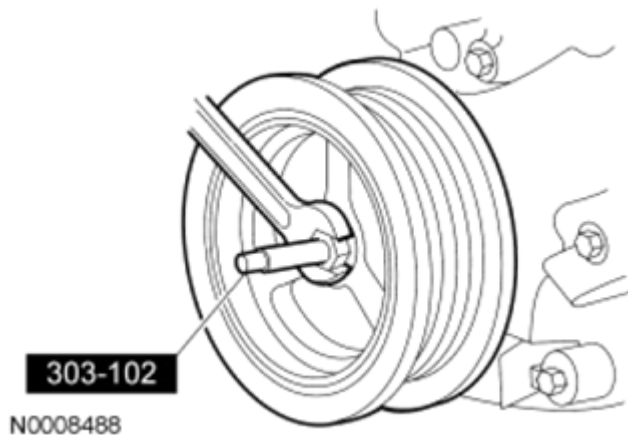


Fig. 494: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

61. Tighten the new crankshaft pulley bolt in 4 stages.
- Stage 1: Tighten to 90 Nm (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

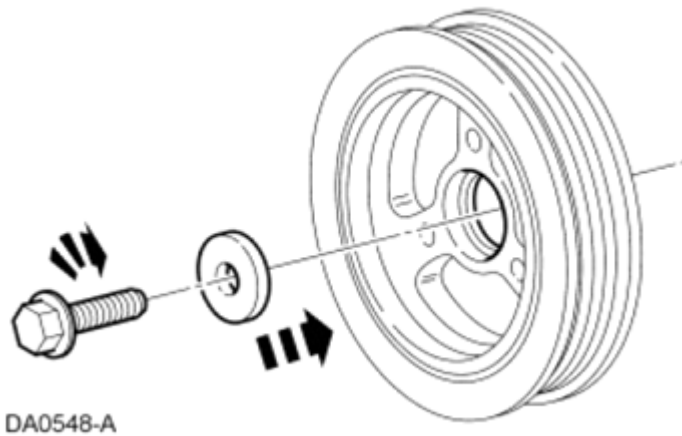


Fig. 495: Installing Crankshaft Pulley Bolt & Washer
Courtesy of FORD MOTOR CO.

62. Position the accessory drive belt tensioner and install the 3 bolts.
- Tighten to 25 Nm (18 lb-ft).

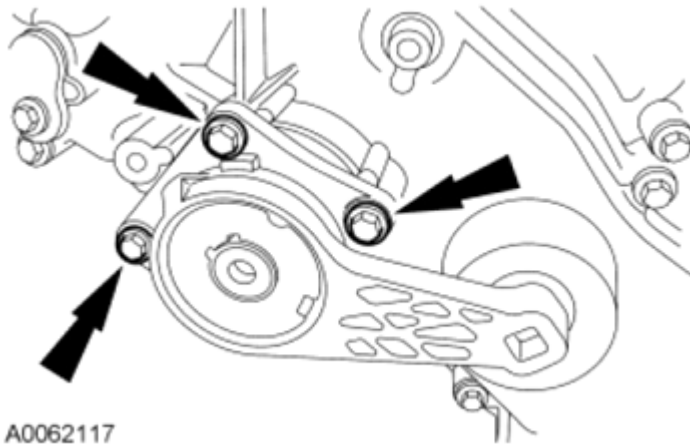


Fig. 496: Locating Accessory Drive Belt Tensioner Bolts
Courtesy of FORD MOTOR CO.

63. Install the 3 accessory drive belt idler pulleys, the coolant pump pulley and the 7 bolts.
- Tighten to 25 Nm (18 lb-ft).

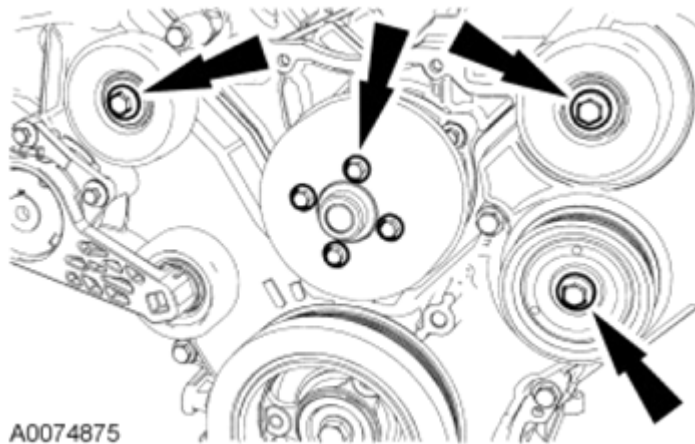


Fig. 497: Locating Coolant Pump Pulley And Accessory Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

NOTE: 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.

64.

NOTE: Clean and inspect the mating surfaces, and install a new gasket.

Position the oil filter adapter and install the 3 bolts and the studbolt.

- Tighten to 25 Nm (18 lb-ft).

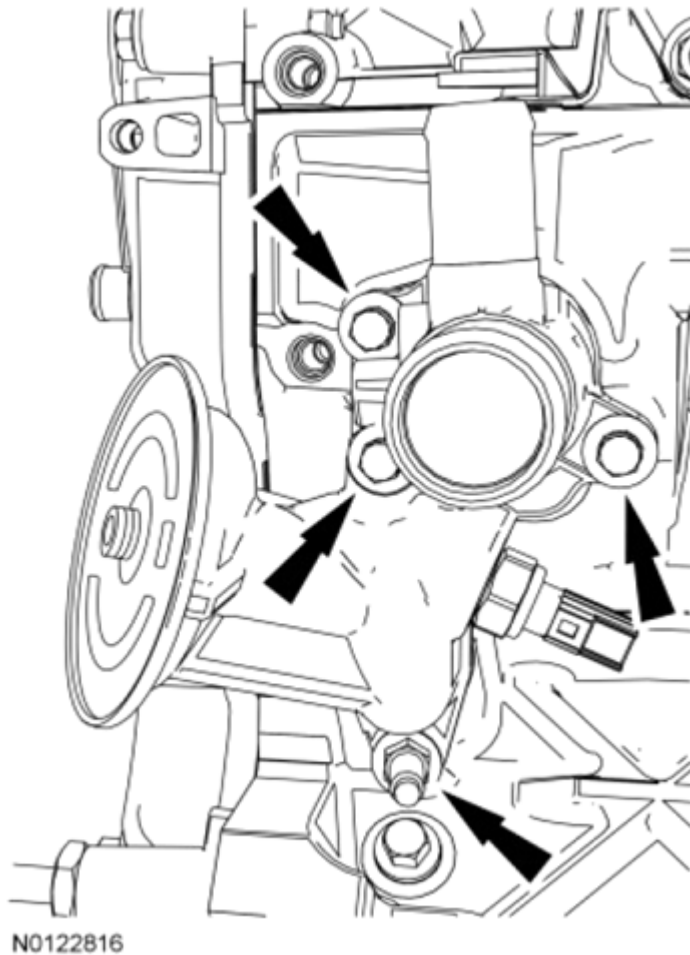


Fig. 498: Locating Oil Filter Bolts
Courtesy of FORD MOTOR CO.

65. **NOTE:** Lubricate the oil filter gasket with clean engine oil.

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.

66. **NOTE:** LH shown in the illustration, RH similar.

Install 16 new exhaust manifold studs.

- Tighten to 12 Nm (106 lb-in).

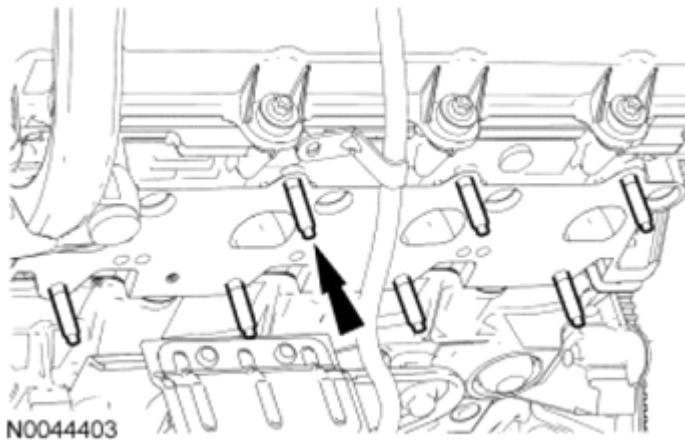


Fig. 499: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

67. Position a new gasket, the LH exhaust manifold and tighten the 8 nuts in the sequence shown in the illustration.
- Tighten to 25 Nm (18 lb-ft).

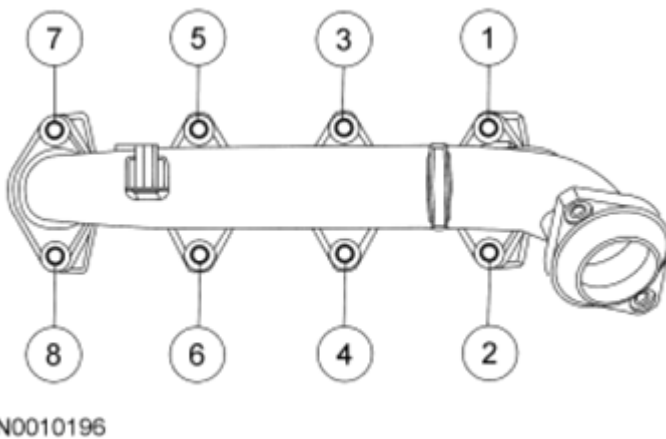
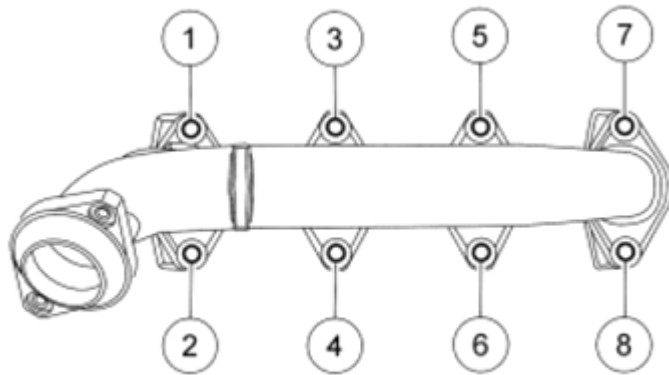


Fig. 500: Identifying Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

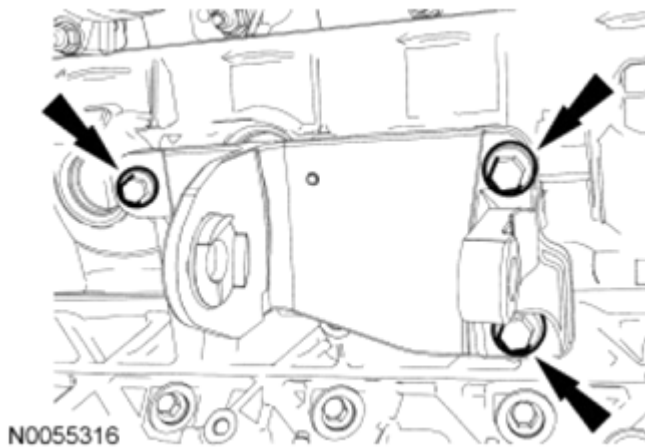
68. Position a new gasket, the RH exhaust manifold and tighten the 8 nuts in the sequence shown in the illustration.
- Tighten to 25 Nm (18 lb-ft).



N0008433

Fig. 501: Identifying Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

69. Position the RH engine support insulator-to-cylinder block bracket and install the 3 bolts.
- Tighten to 63 Nm (46 lb-ft).



N0055316

Fig. 502: Locating Engine Support Insulator-To-Cylinder Block Bracket And Bolts
Courtesy of FORD MOTOR CO.

NOTE: 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.

70.

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 with silicone gasket remover and metal surface prep.

71.

Follow the directions on the packaging. 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.

71.

Apply silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

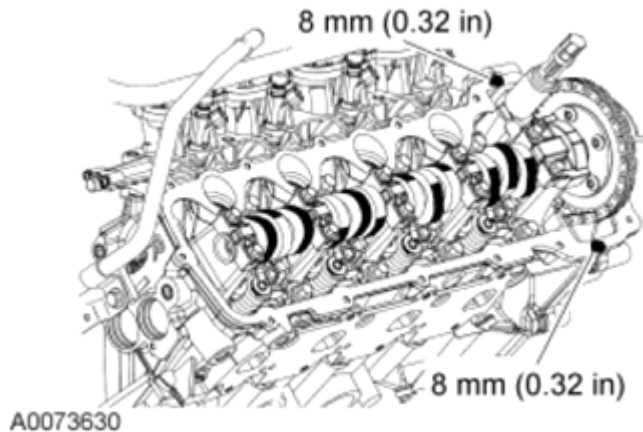


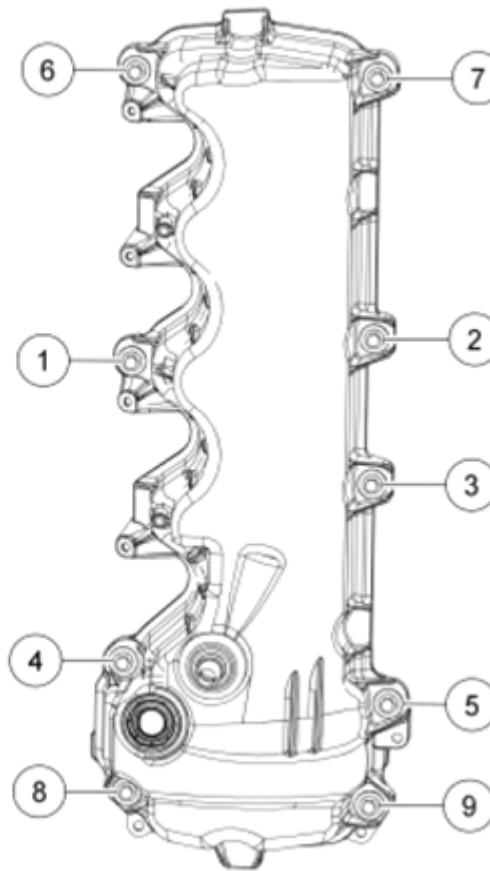
Fig. 503: Locating Silicone Gasket Application Points
Courtesy of FORD MOTOR CO.

NOTE: When installing the valve cover, make sure to avoid damaging the Variable Camshaft Timing (VCT) solenoid.

72.

Position the RH valve cover and gasket on the cylinder head and tighten the 8 bolts in the sequence shown in the illustration.

- Tighten to 10 Nm (89 lb-in).



N0122332

Fig. 504: Identifying RH Valve Cover And Gasket On Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: 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.

73.

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 with silicone gasket remover and metal surface prep. Follow the directions on the packaging. 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.

74.

Apply silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

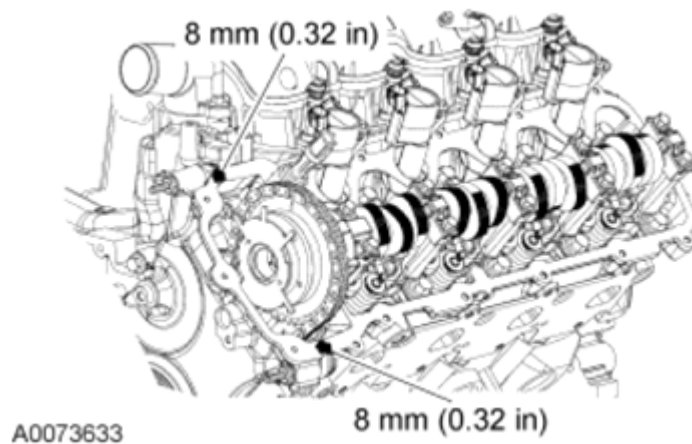
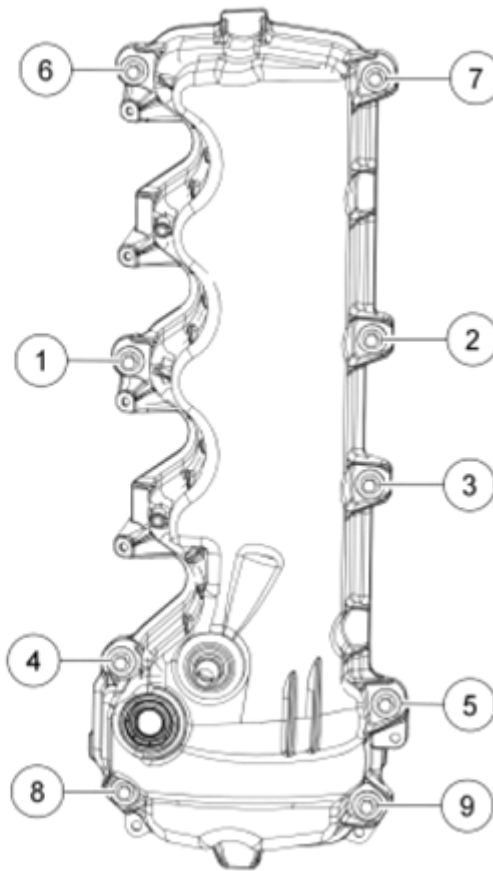


Fig. 505: Locating Silicone Gasket Application Points
Courtesy of FORD MOTOR CO.

75. **NOTE:** When installing the valve cover, make sure to avoid damaging the Variable Camshaft Timing (VCT) solenoid.

Position the LH valve cover and gasket on the cylinder head and tighten the 9 bolts in the sequence shown in the illustration.

- Tighten to 10 Nm (89 lb-in).



N0122332

Fig. 506: Identifying RH Valve Cover And Gasket On Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

76. Install the oil level indicator tube and the bolt.
- Install a new O-ring seal and lubricate the O-ring seal with clean engine oil prior to installation.
 - Tighten to 10 Nm (89 lb-in).

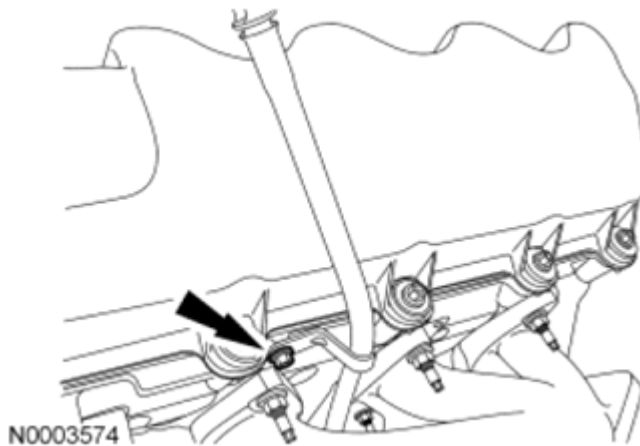


Fig. 507: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

77. Position the LH engine support insulator-to-cylinder block bracket and install the 3 bolts.
- Tighten to 63 Nm (46 lb-ft).

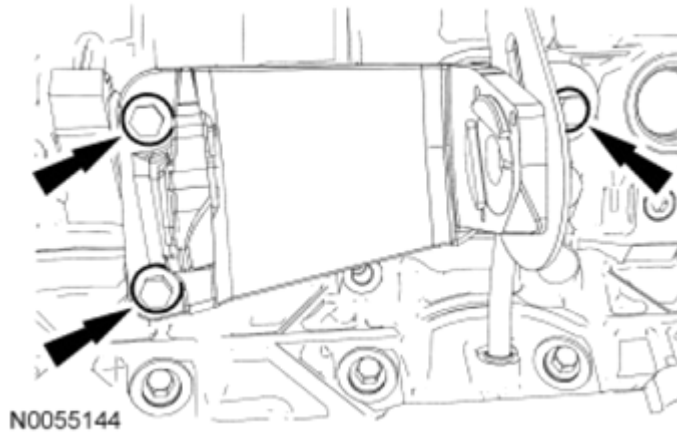


Fig. 508: Locating Bolts And Engine Support Insulator-To-Cylinder Block Bracket LH
Courtesy of FORD MOTOR CO.

78. **NOTE:** Do not reuse the O-ring seals.

NOTE: Lubricate the O-ring seals with clean engine coolant prior to installation. Use the same type of coolant that was drained from the system.

Slide the coolant tube forward with the new O-ring seals into the cylinder block.

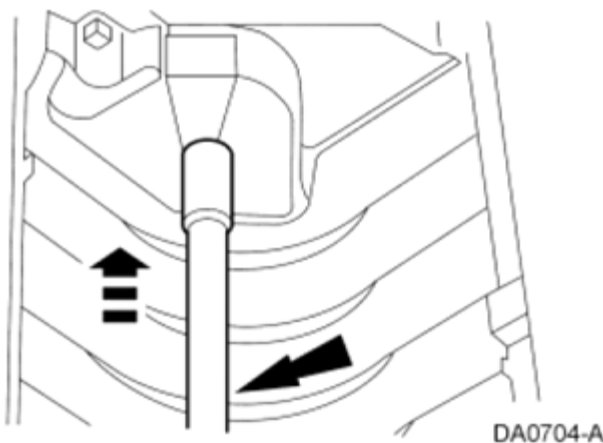


Fig. 509: Sliding Coolant Tube With O-Ring Seals Into Cylinder Block
Courtesy of FORD MOTOR CO.

79. Install the coolant tube stud bolt.
- Tighten to 10 Nm (89 lb-in).

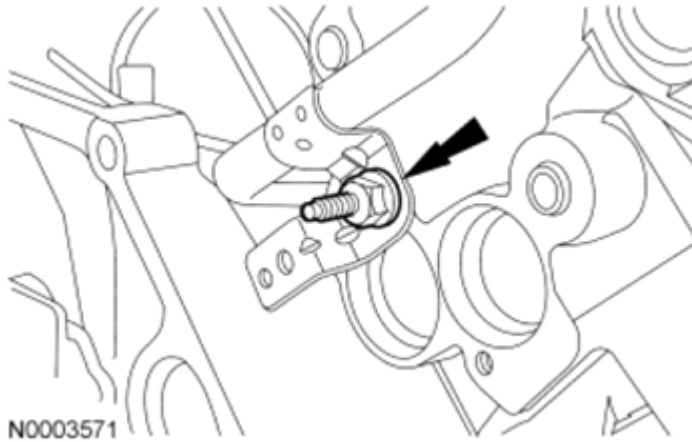


Fig. 510: Locating Coolant Tube Stud Bolt
Courtesy of FORD MOTOR CO.

80. Install the 2 Knock Sensor (KS) and the 2 bolts.
- Tighten to 20 Nm (177 lb-in).

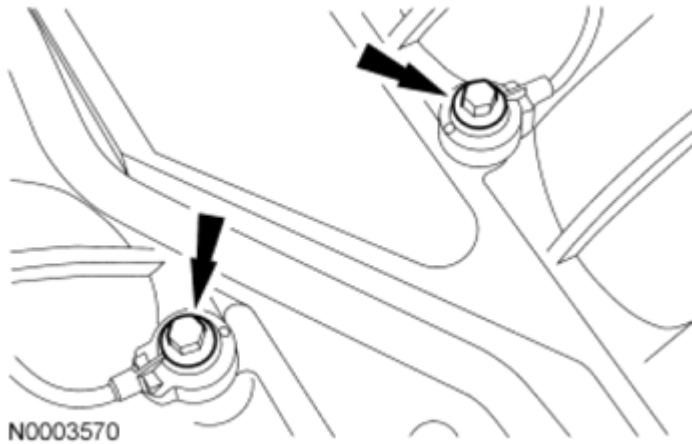


Fig. 511: Locating Knock Sensors (KS) Bolts
Courtesy of FORD MOTOR CO.

81. **NOTE:** LH shown in the illustration, RH similar.

Install the 8 ignition coils and the 8 bolts.

- Verify that the ignition coil spring is correctly located inside the ignition coil boot and that there is no damage to the tip of the boot.
- Apply a light coat of dielectric compound to the inside of the ignition coil boots prior to

installation.

- Tighten to 6 Nm (53 lb-in).

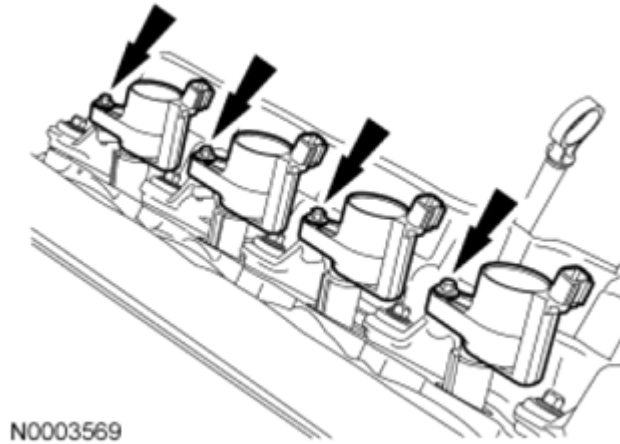


Fig. 512: Locating Ignition Coils Bolts
Courtesy of FORD MOTOR CO.

82. Position the intake manifold vacuum tube support bracket and install the bolt.
- Tighten to 10 Nm (89 lb-in).

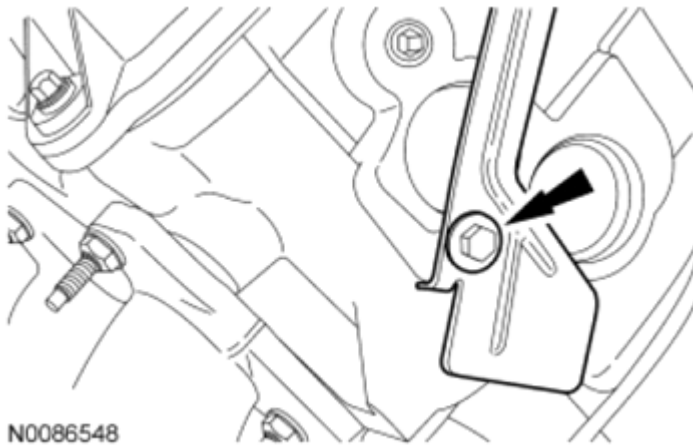


Fig. 513: Locating Bolt And Intake Manifold Vacuum Tube Support Bracket
Courtesy of FORD MOTOR CO.

83. Install the LH radio ignition interference capacitor and the nut.
- Tighten to 25 Nm (18 lb-ft).

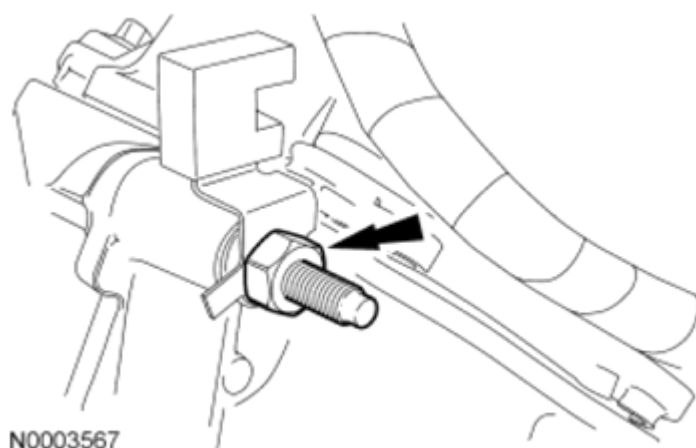


Fig. 514: Locating LH Radio Ignition Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

84. Install the RH radio ignition interference capacitor and the nut.
- Tighten to 25 Nm (18 lb-ft).

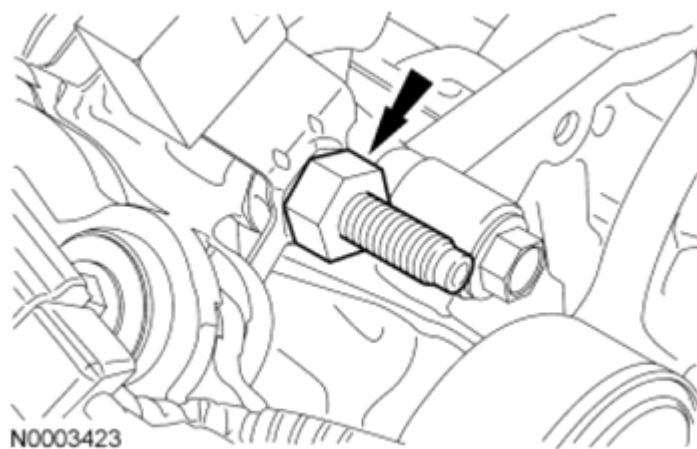


Fig. 515: Locating RH Radio Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

85. Install the Engine Lifting Bracket.

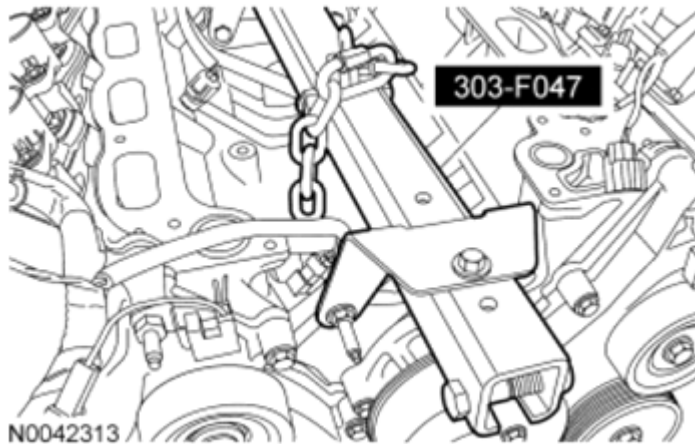


Fig. 516: Installing Engine Lift Bracket
Courtesy of FORD MOTOR CO.

86. Using a floor crane, remove the engine from the engine stand.

NOTE: 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. Failure to follow this procedure can cause future oil leakage.

87.

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. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure may cause future oil leakage.

88.

Apply a 4 mm (0.16 in) bead of silicone gasket and sealant around the crankshaft rear seal retainer sealing surface.

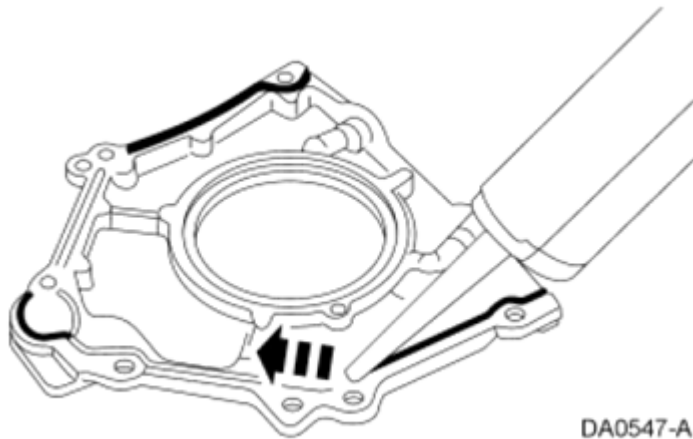


Fig. 517: Locating Sealant Application Areas
Courtesy of FORD MOTOR CO.

89. Install the crankshaft rear seal retainer plate and loosely install the 6 bolts.

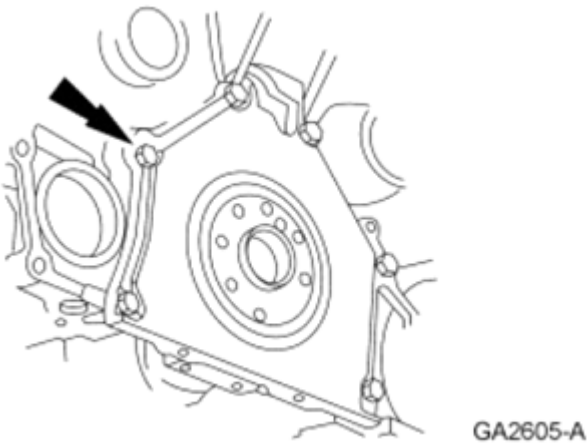


Fig. 518: Locating Crankshaft Rear Seal Retainer Plate And Bolts
Courtesy of FORD MOTOR CO.

90. Tighten the bolts in the sequence shown in the illustration.
- Tighten to 10 Nm (89 lb-in).

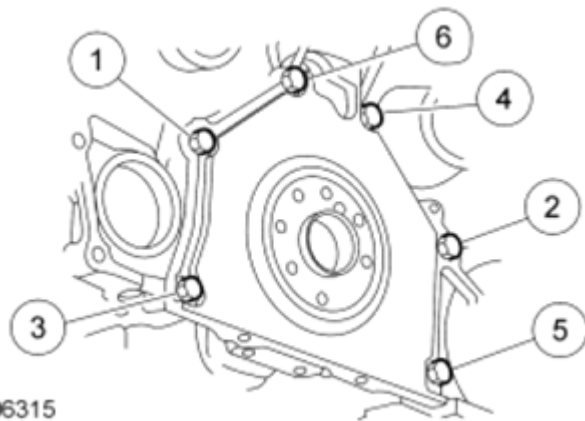


Fig. 519: Identifying Crankshaft Rear Seal Retainer Plate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: 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.

91.

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. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure may cause future oil leakage.

92.

Apply silicone gasket and sealant at the crankshaft rear seal retainer plate-to-cylinder block sealing surface.

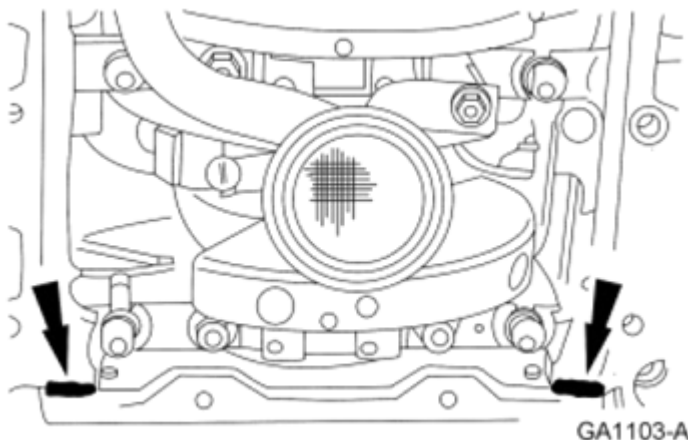
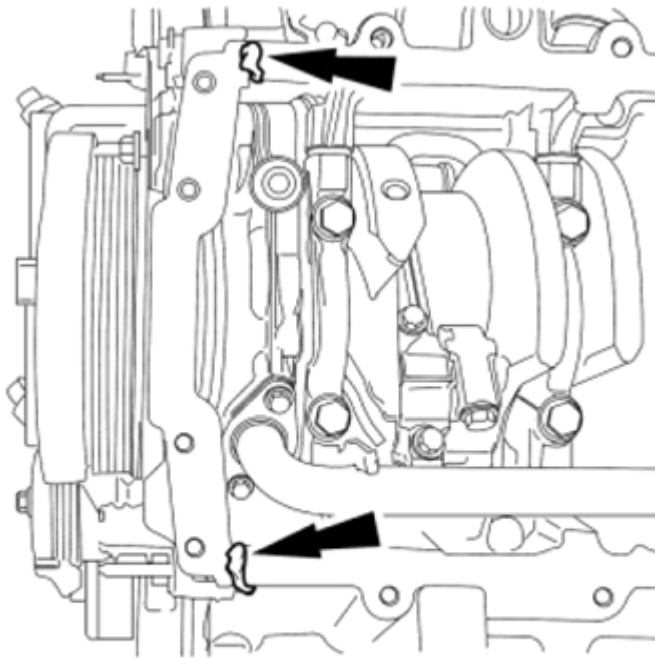


Fig. 520: Locating Areas For Applying Bead Of Silicone Gasket And Sealant
Courtesy of FORD MOTOR CO.

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. Allow to dry until there is no sign of wetness, or 4 minutes, whichever is longer. Failure to follow this procedure may cause future oil leakage.

93.

Apply silicone gasket and sealant at the engine front cover-to-cylinder block sealing surface.



N0032191

Fig. 521: Locating Silicone Gasket And Sealant Application Points
Courtesy of FORD MOTOR CO.

94. Install the oil pan gasket and the oil pan and loosely install the 16 bolts.

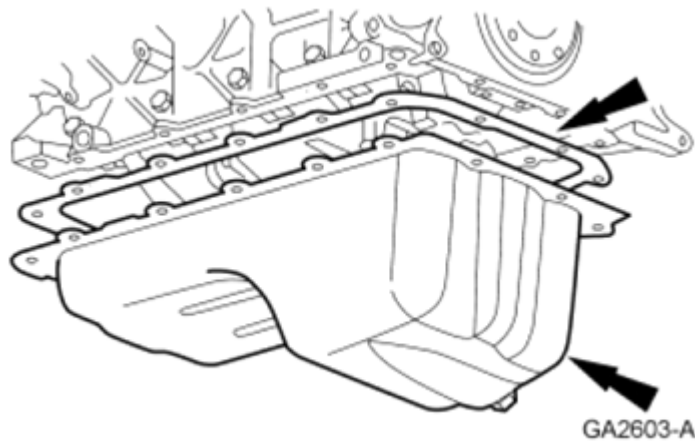
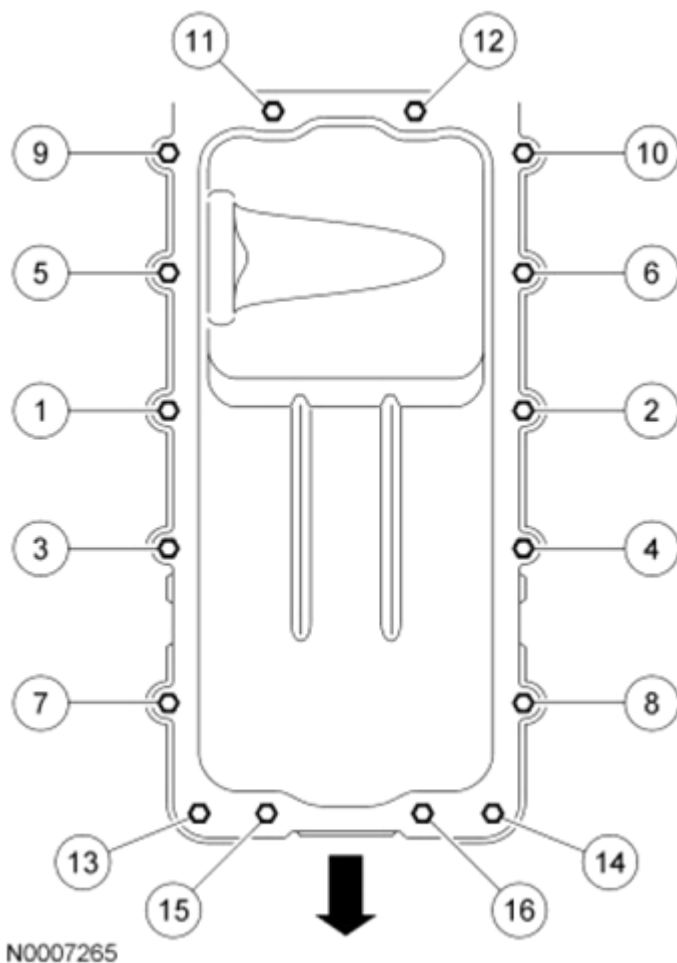


Fig. 522: Locating Oil Pan Gasket And Oil Pan Bolts
Courtesy of FORD MOTOR CO.

95. Tighten the 16 bolts in 3 stages, in the sequence shown in the illustration.
- Stage 1: Tighten to 2 Nm (18 lb-in).
 - Stage 2: Tighten to 20 Nm (177 lb-in).
 - Stage 3: Tighten an additional 60 degrees.



N0007265

Fig. 523: Identifying Oil Pan Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

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

Using the 2 Crankshaft Rear Oil Seal Installers, install a new crankshaft rear seal.

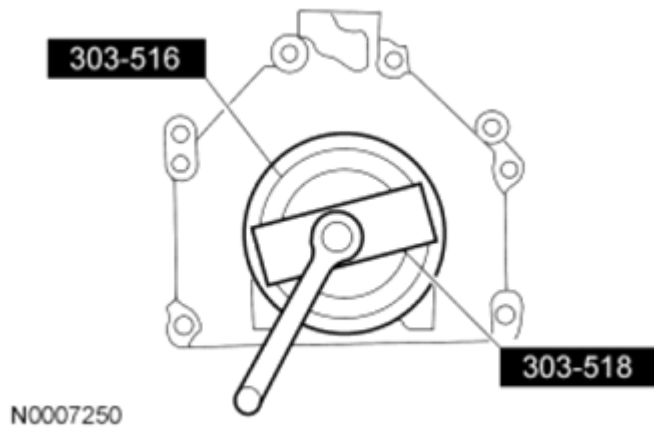


Fig. 524: Installing Crankshaft Rear Oil Seal Using Special Tools
Courtesy of FORD MOTOR CO.

97. Using the 2 Crankshaft Rear Oil Seal Installers and the Crankshaft Rear Oil Slinger Installer, install the crankshaft rear oil slinger.

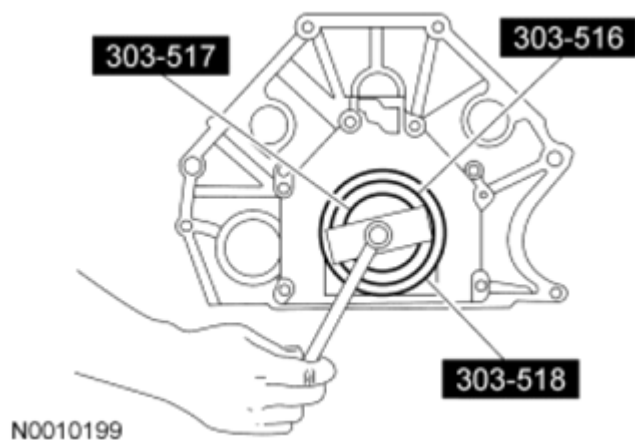


Fig. 525: Installing Crankshaft Rear Oil Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

98. Install the spacer plate.

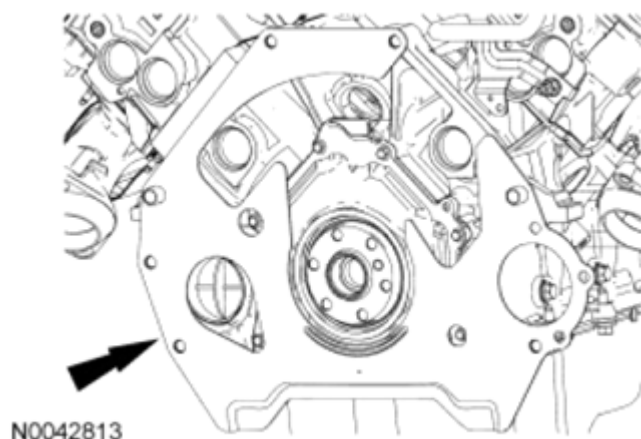
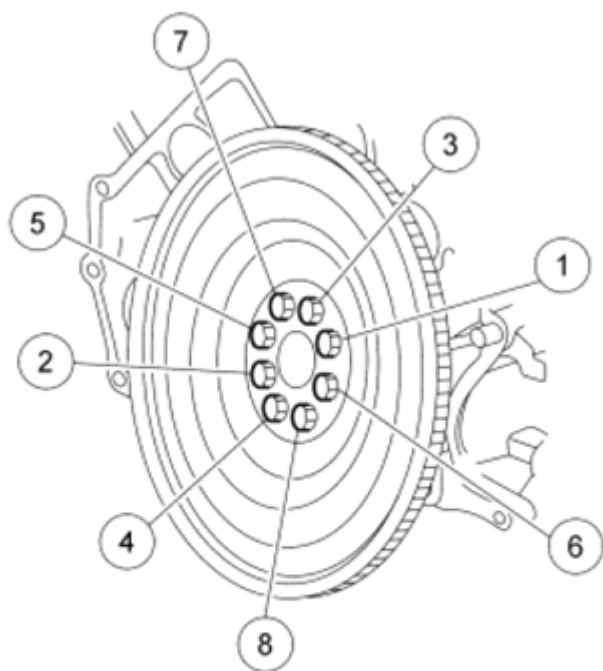


Fig. 526: Locating Spacer Plate
Courtesy of FORD MOTOR CO.

99. Install the flexplate and the 8 bolts in the sequence shown in the illustration.
- Tighten to 80 Nm (59 lb-ft).



N0010329

Fig. 527: Identifying Flexplate Bolts Tightening Sequence

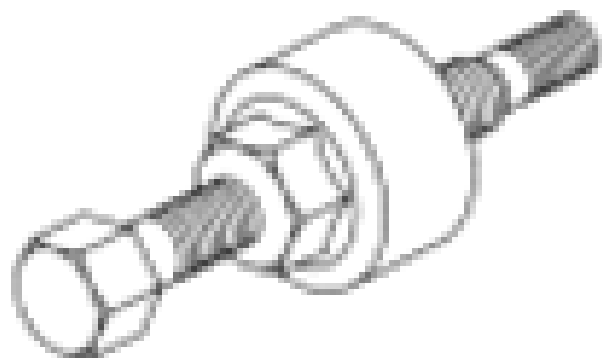
Courtesy of FORD MOTOR CO.

INSTALLATION

ENGINE

Special Tool(s)

SPECIAL TOOLS CHART



ST1586-A

Installer, Power Steering Pump Pulley
211-185 (T91P-3A733-A)



ST1377-A

Lifting Bracket, Engine
303-F047 (014-00073) or equivalent

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2834-A

Vehicle Communication Module (VCM) and Integrated Diagnostic System (IDS) software with appropriate hardware, or equivalent scan tool

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Threadlock 262 TA-26	WSK-M2G351-A6

1. Using a suitable floor crane, position the engine assembly into the vehicle.

NOTE: Only use hand tools when tightening the engine support insulator through bolt or the engine support insulator may be damaged.

- 2.

Apply threadlock to the bolt threads and install the LH engine support insulator bolt.

- Tighten to 350 Nm (258 lb-ft).

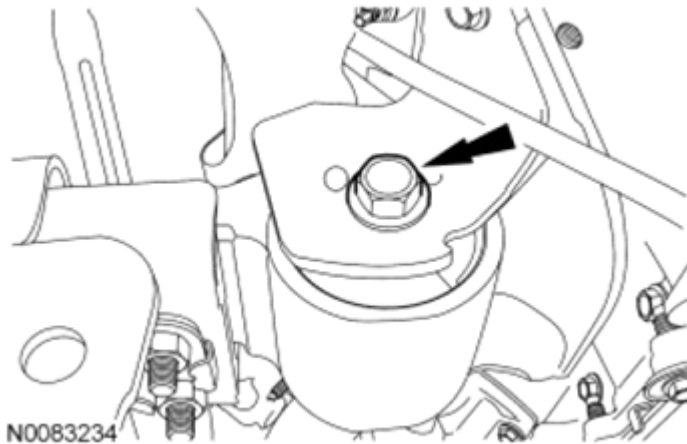


Fig. 528: Locating Engine Support Insulator Bolt
Courtesy of FORD MOTOR CO.

3. **NOTE:** Only use hand tools when tightening the engine support insulator nuts or the engine support insulator may be damaged.

NOTE: Make sure the RH engine support insulator mating surfaces and the washer mating surface are free of foreign material and corrosion before installation. Install a new washer.

Apply threadlock to the stud threads and install the RH engine support insulator washer and nuts.

- Tighten to 250 Nm (184 lb-ft).

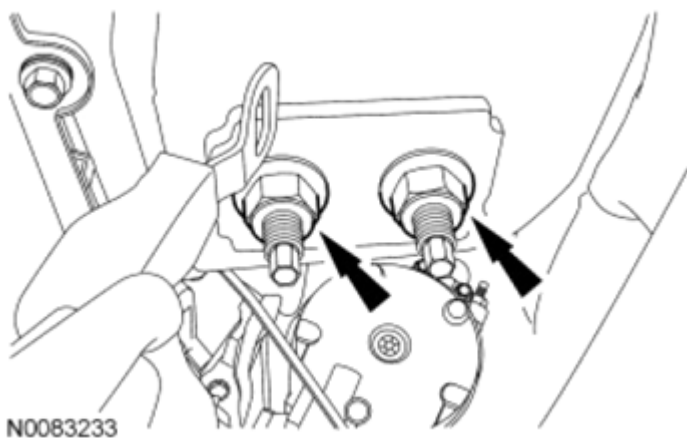


Fig. 529: Locating RH Engine Support Insulator Nuts
Courtesy of FORD MOTOR CO.

4. Remove the Engine Lifting Bracket.

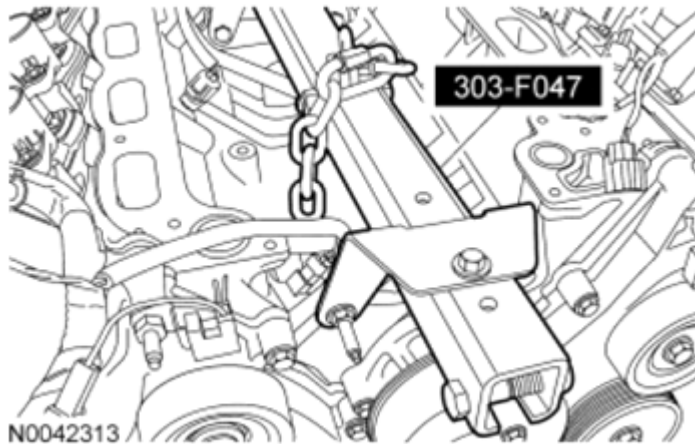


Fig. 530: Removing Engine Lift Bracket
Courtesy of FORD MOTOR CO.

5. **NOTE:** The upper 2 transmission-to-engine bolts will be installed later.

Install the lower 5 transmission-to-engine bolts.

- Tighten to 48 Nm (35 lb-ft).

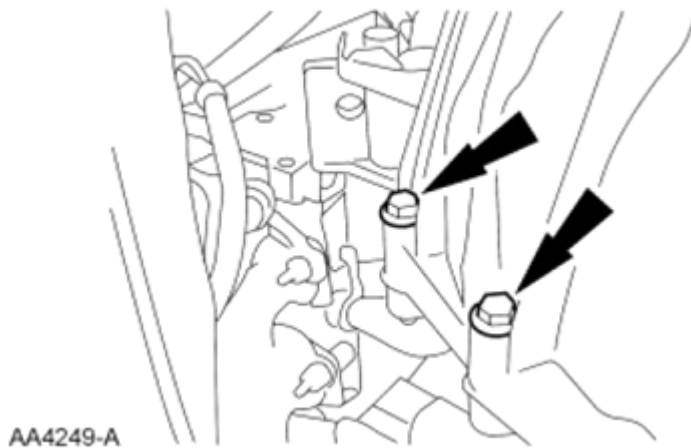
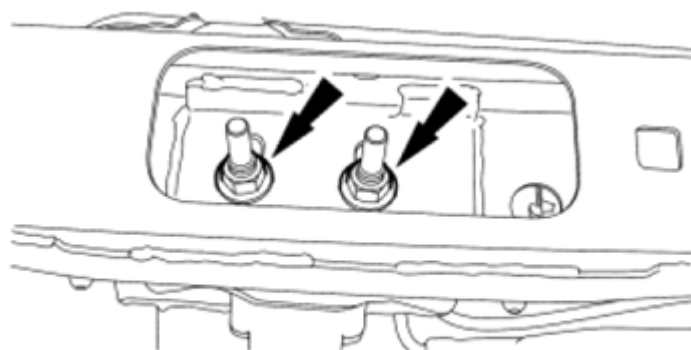


Fig. 531: Locating Lower Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

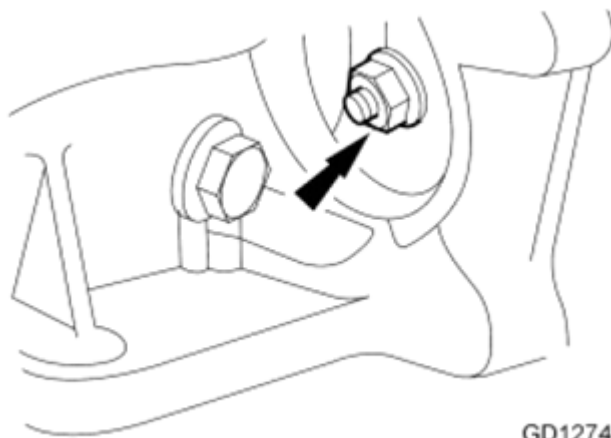
6. Tighten the 2 transmission mount nuts.
- Tighten to 103 Nm (76 lb-ft).



N0083235

Fig. 532: Locating Transmission Mount Nuts
Courtesy of FORD MOTOR CO.

7. Install 4 new torque converter-to-flexplate nuts.
 - Tighten to 36 Nm (27 lb-ft).



GD1274-A

Fig. 533: Locating Torque Converter-To-Flexplate Nuts
Courtesy of FORD MOTOR CO.

8. Install the cylinder block opening cover.

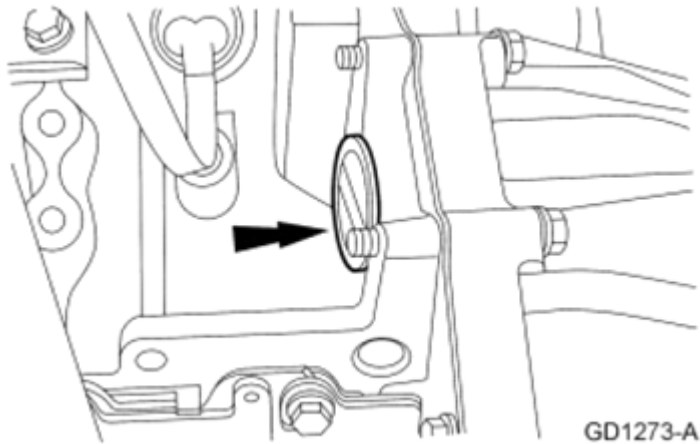


Fig. 534: Locating Cylinder Block Opening Cover
Courtesy of FORD MOTOR CO.

9. Install the flexplate inspection cover and the 2 bolts.
 - Tighten to 34 Nm (25 lb-ft).

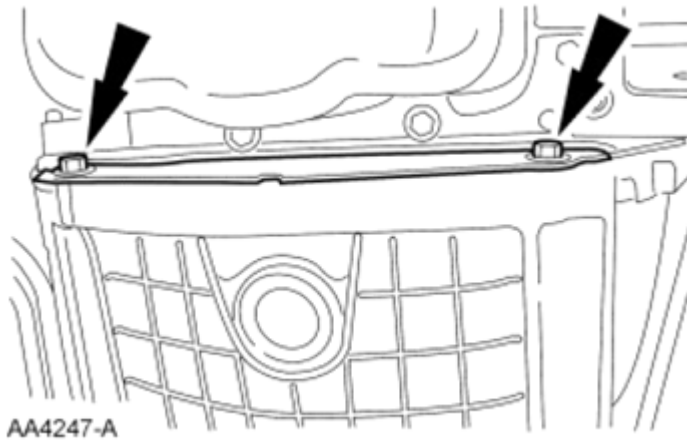


Fig. 535: Locating Flexplate Inspection Cover Bolts
Courtesy of FORD MOTOR CO.

10. Position the A/C compressor and install the 3 bolts.
 - Tighten to 25 Nm (18 lb-ft).

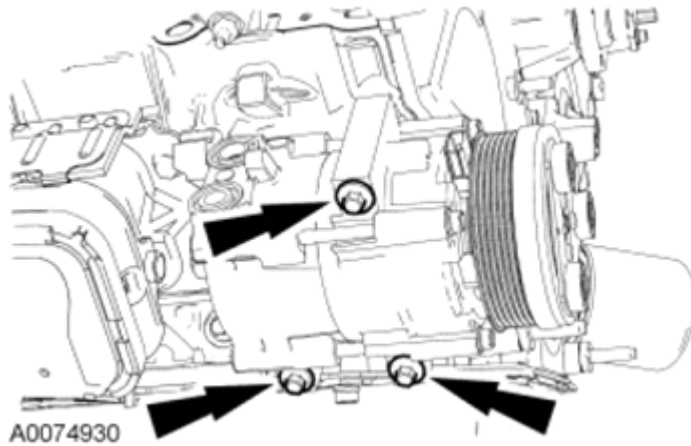


Fig. 536: Locating Bolts And A/C Compressor
Courtesy of FORD MOTOR CO.

11. Position the transmission cooler tube support bracket, the starter wiring harness support bracket and install the nut.
 - Tighten to 10 Nm (89 lb-in).

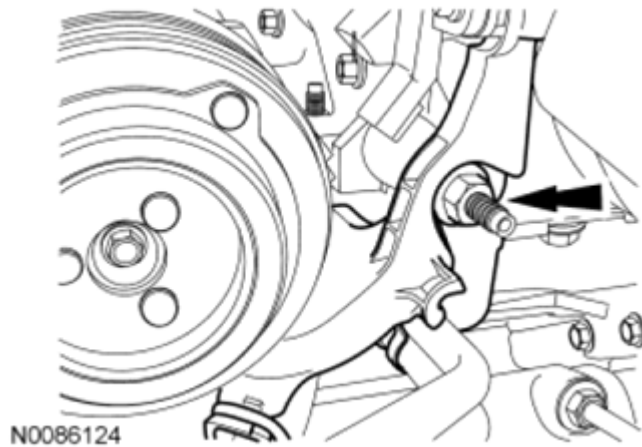


Fig. 537: Locating Transmission Cooler Tube Support Bracket And Nut
Courtesy of FORD MOTOR CO.

12. Position the starter wiring harness and rear support bracket and install the bolt.
 - Tighten to 10 Nm (89 lb-in).

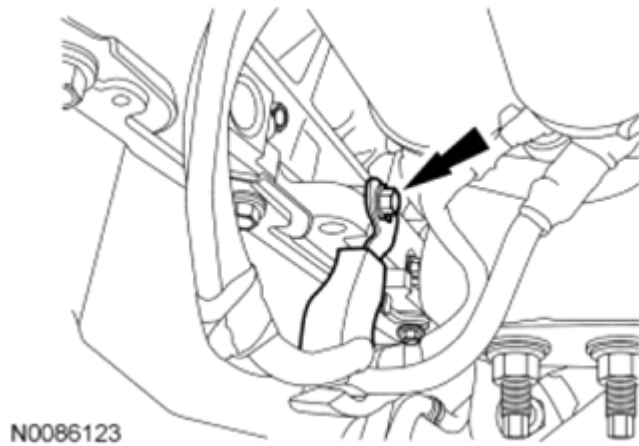


Fig. 538: Locating Starter Wiring Harness Rear Support Bracket And Bolt
Courtesy of FORD MOTOR CO.

13. Install the starter. For additional information, refer to **STARTING SYSTEM** .
14. If equipped, connect the block heater electrical connector.

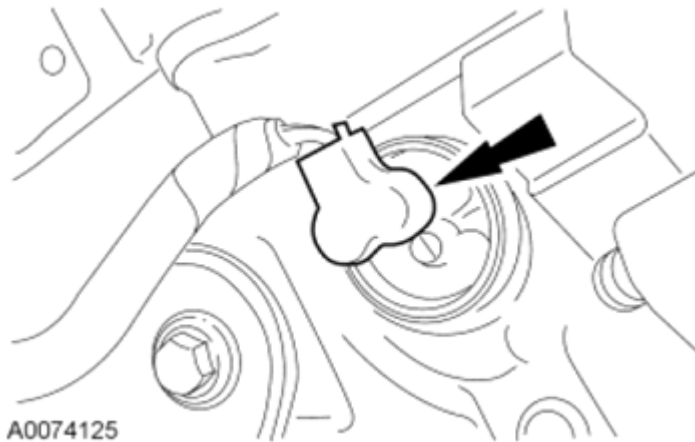


Fig. 539: Locating Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

15. Install the 4 exhaust Y-pipe flange nuts (2 RH and 2 LH).
 - Tighten to 40 Nm (30 lb-ft).

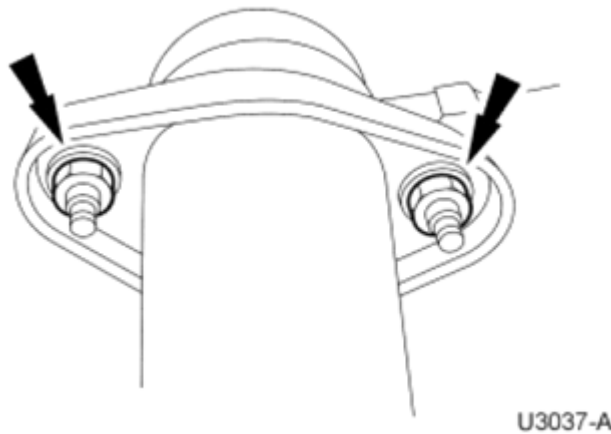


Fig. 540: Locating Exhaust Y-Pipe Flange Nuts
Courtesy of FORD MOTOR CO.

16. **NOTE:** On Four-Wheel Drive (4WD) vehicles, reposition the transfer case vent hose.

Position the fuel and Evaporative Emission (EVAP) tube support bracket and install the upper 2 transmission-to-engine bolts.

- Tighten to 48 Nm (35 lb-ft).

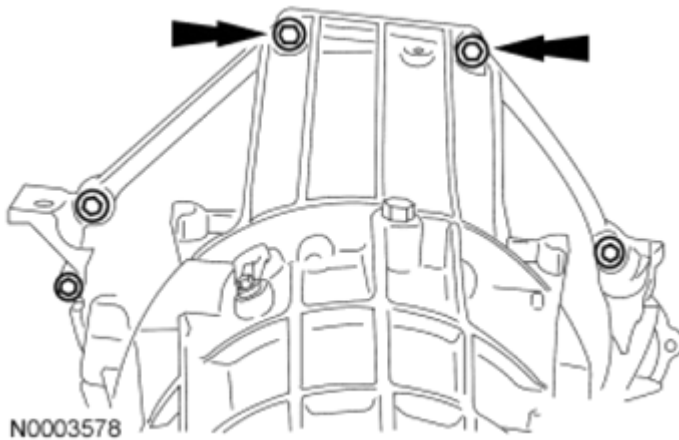


Fig. 541: Locating Upper Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

17. Position the engine wiring harness onto the engine.
18. Connect the transmission wiring harness retainer to the intake manifold vacuum tube support bracket.

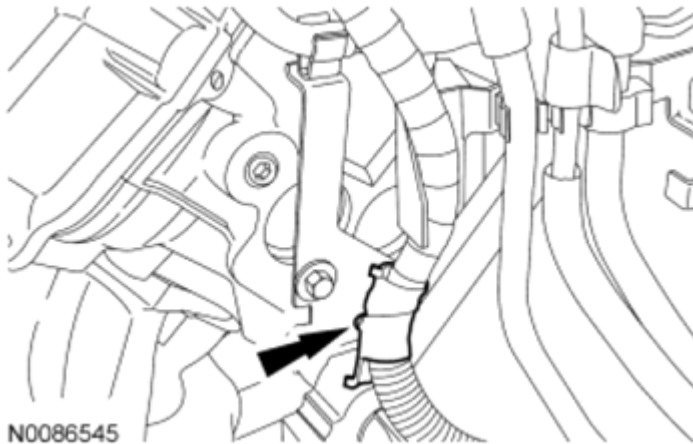


Fig. 542: Locating Transmission Wiring Harness Retainer And Intake Manifold Vacuum Tube Support Bracket
Courtesy of FORD MOTOR CO.

19. Connect the LH Camshaft Position (CMP) sensor, radio interference capacitor and Variable Camshaft Timing (VCT) solenoid electrical connectors, the radio interference capacitor electrical connector retainer and the 2 wiring harness retainers.

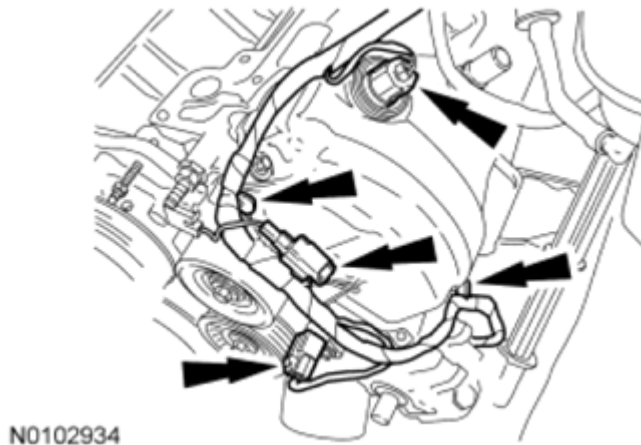


Fig. 543: Locating VCT Solenoid Electrical Connectors And Radio Interference Capacitor Electrical Connector Retainer And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

20. Connect the Cylinder Head Temperature (CHT) electrical connector.

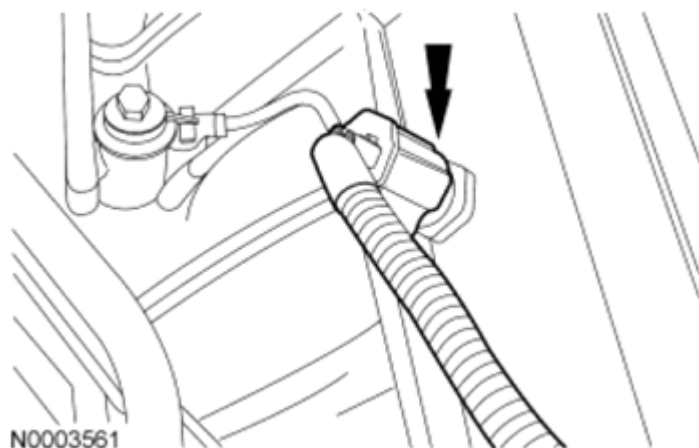


Fig. 544: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

21. Connect the LH Knock Sensor (KS) electrical connector.

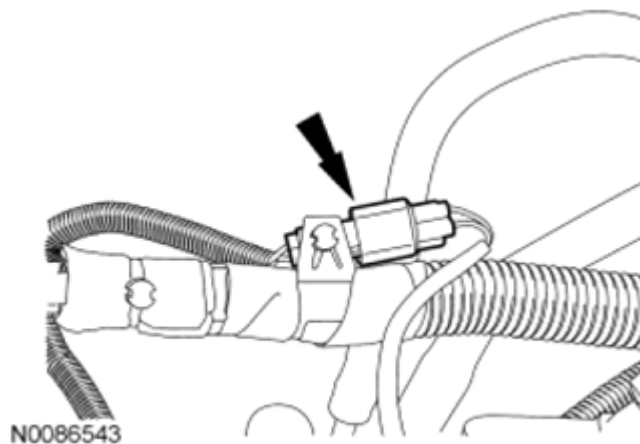


Fig. 545: Locating KS Electrical Connector LH
Courtesy of FORD MOTOR CO.

22. Connect the RH KS electrical connector and the heater coolant hose.

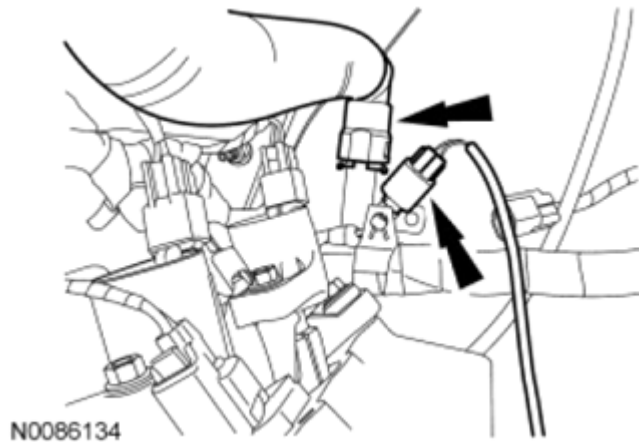


Fig. 546: Locating KS Electrical Connector RH
Courtesy of FORD MOTOR CO.

23. Connect the 4 RH ignition coil electrical connectors and the 2 engine wiring harness retainers to the RH valve cover studs.

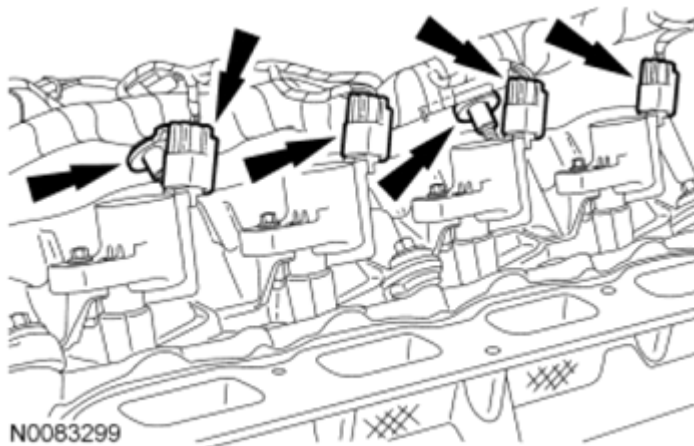


Fig. 547: Locating Ignition Coil Electrical Connectors And Engine Wiring Harness Retainers (RH)
Courtesy of FORD MOTOR CO.

24. Connect the RH VCT solenoid and the RH radio ignition interference capacitor electrical connectors.

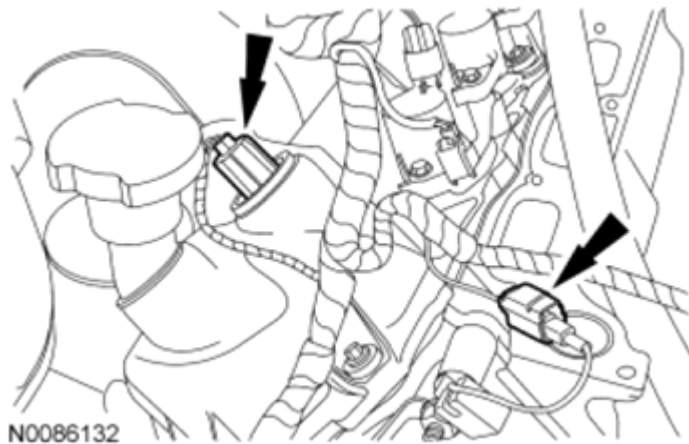


Fig. 548: Locating Radio Ignition Interference Capacitor Electrical Connectors RH
Courtesy of FORD MOTOR CO.

25. Connect the RH CMP sensor electrical connector and the 2 wiring harness retainers.

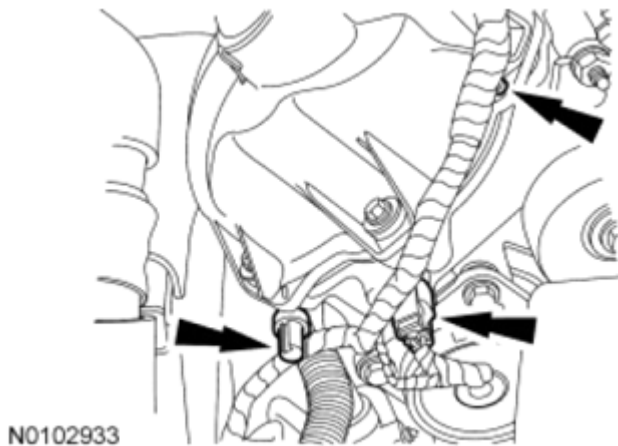


Fig. 549: Connecting RH CMP Sensor Electrical Connector And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

26. Position the ground strap and install the bolt.
- Tighten to 10 Nm (89 lb-in).

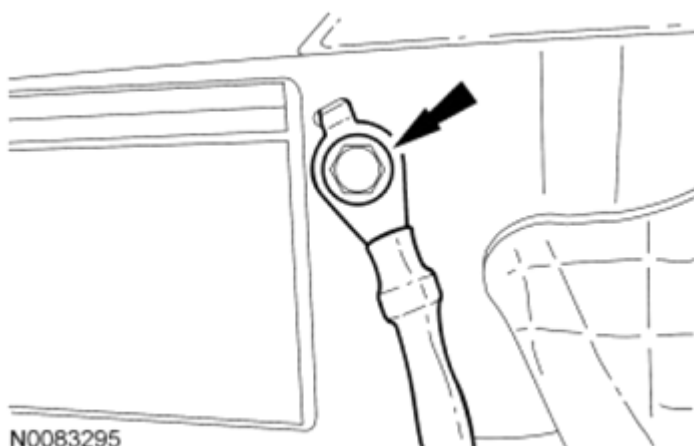


Fig. 550: Locating Ground Strap And Bolt
Courtesy of FORD MOTOR CO.

27. Connect the PCM electrical connector and the engine wiring harness retainer.

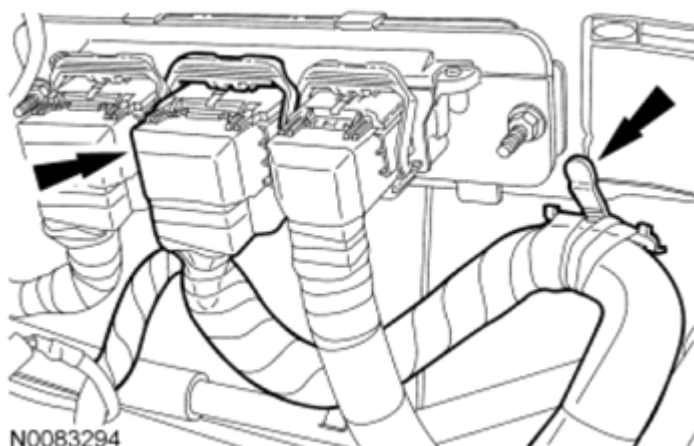


Fig. 551: Locating PCM Electrical Connector
Courtesy of FORD MOTOR CO.

28. Connect the engine harness electrical connector and wiring harness retainer.

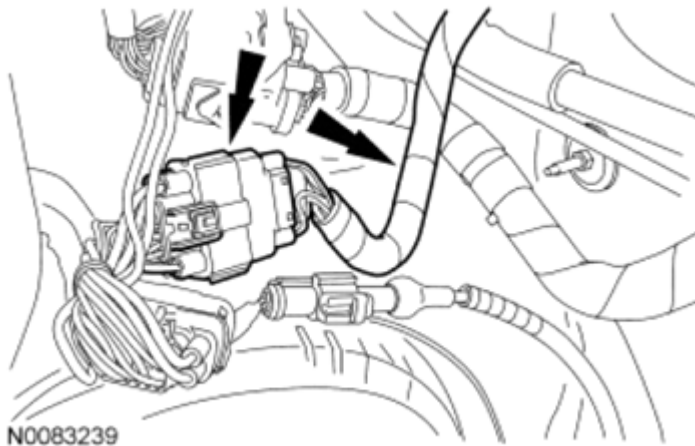


Fig. 552: Locating Engine Harness Electrical Connector
Courtesy of FORD MOTOR CO.

29. Position the power steering pump and reservoir assembly and install the 2 bolts and the stud bolt.
- Tighten to 25 Nm (18 lb-ft).

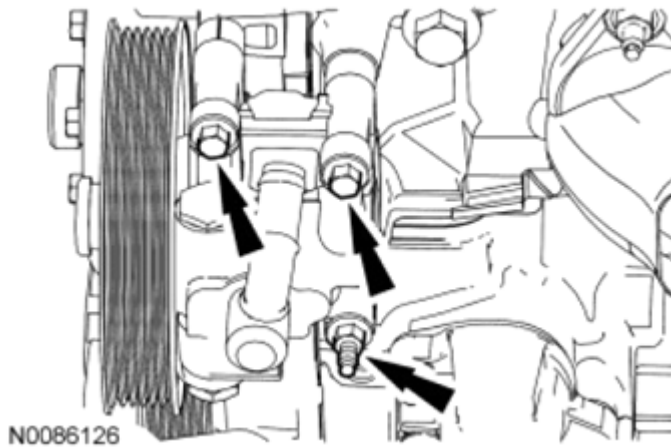


Fig. 553: Locating Power Steering Pump And Bolts
Courtesy of FORD MOTOR CO.

30. Using the Power Steering Pump Pulley Installer, install the power steering pump pulley.

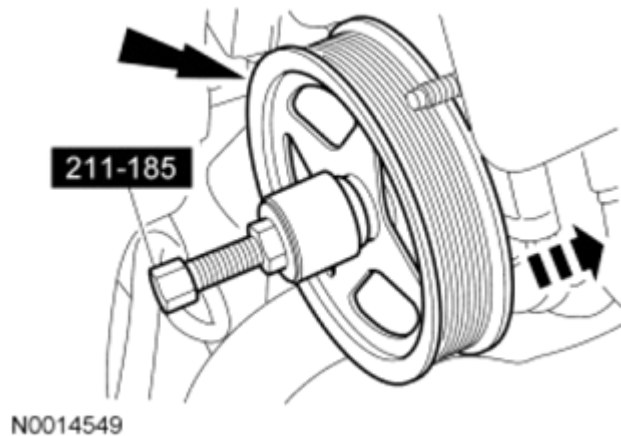


Fig. 554: Installing Power Steering Pump Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

31. Position the Power Steering Pressure (PSP) hose support bracket and install the nut.
 - Tighten to 10 Nm (89 lb-in).

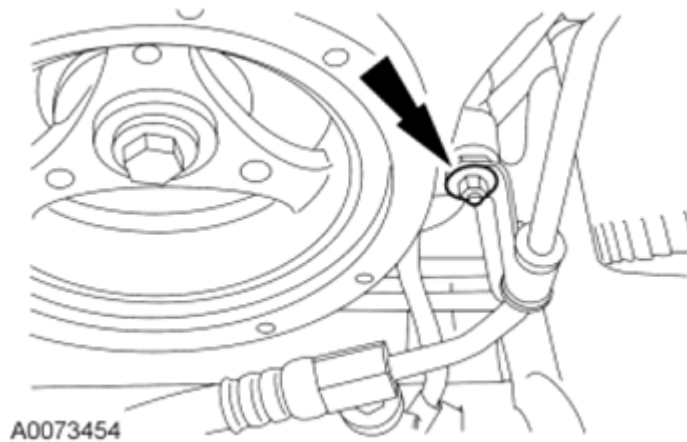


Fig. 555: Locating Power Steering Pressure Tube Support Bracket And Bolt
Courtesy of FORD MOTOR CO.

NOTE: While servicing the power steering system, care should be taken to prevent the entry of foreign material or failure of the power steering components may result.

32.

Position the power steering fluid tubes and install the bolt.

- Tighten to 23 Nm (17 lb-ft).

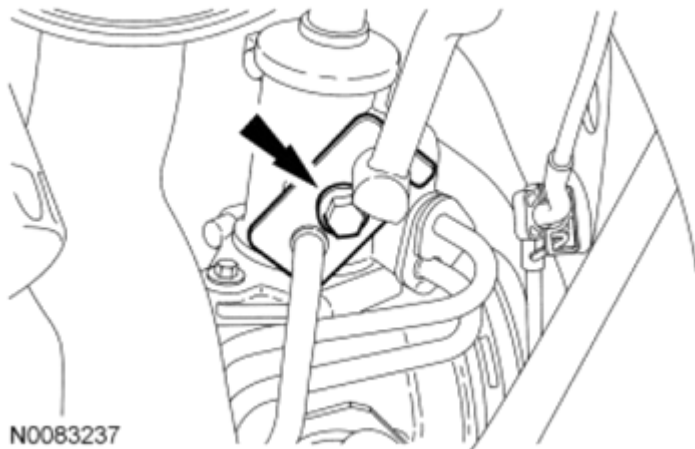


Fig. 556: Locating Power Steering Fluid Tubes And Bolt
Courtesy of FORD MOTOR CO.

33. Connect the A/C compressor electrical connector and the wiring harness retainer.

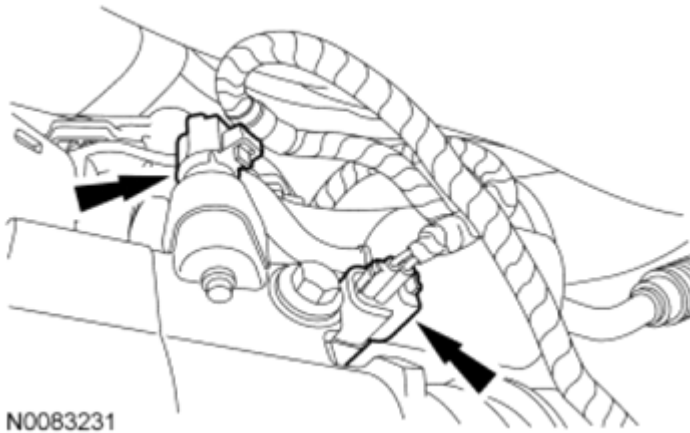


Fig. 557: Locating A/C Compressor Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

34. Connect the Engine Oil Pressure (EOP) switch electrical connector and the wiring harness retainers to the oil pan bolt, the power steering pump stud bolt and the engine block.

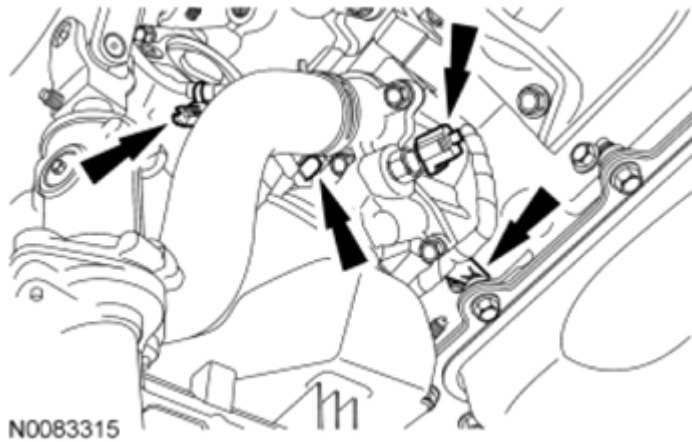


Fig. 558: Locating Engine Oil Pressure (EOP) Switch Electrical Connector And Wiring Harness Retainers

Courtesy of FORD MOTOR CO.

35. Connect the Crankshaft Position (CKP) sensor electrical connector.

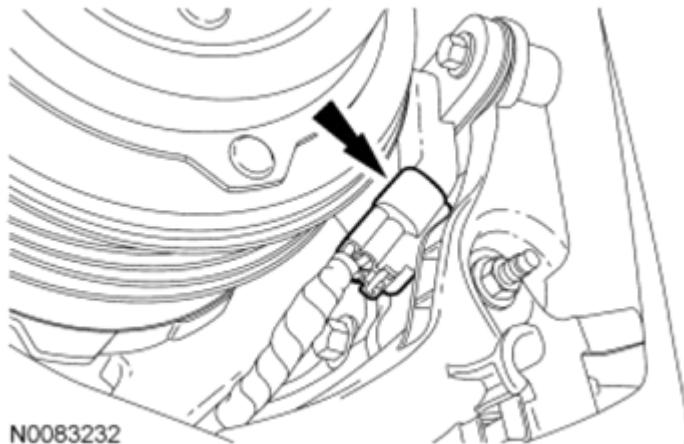


Fig. 559: Locating Crankshaft Position (CKP) Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

36. Position the accessory drive belt onto the accessory drive pulleys.
37. Position the Power Distribution Box (PDB) and wiring harness onto the engine.
38. Install the cooling module. For additional information, refer to **ENGINE COOLING SYSTEM**.

NOTE: If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

- 39.

Install the intake manifold. For additional information, refer to **INTAKE MANIFOLD** in this

information.

40. **NOTE:** **Align the index marks made during hood removal.**

Position the hood and install the 4 bolts.

- Tighten to 12 Nm (106 lb-in).

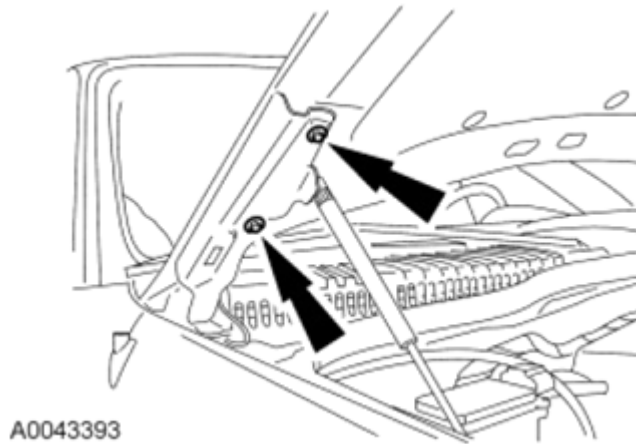


Fig. 560: Positioning Hood Bolts And Hood Supports
Courtesy of FORD MOTOR CO.

41. Fill the crankcase with clean engine oil.
42. Evacuate and charge the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** .
43. Fill and bleed the power steering system. For additional information, refer to **STEERING SYSTEM - HYDRAULIC POWER ASSIST STEERING (HPAS)** .
44. If the engine was disassembled, use the scan tool to perform the Misfire Monitor Neutral Profile Correction procedure following the on-screen instructions.

CYLINDER HEAD

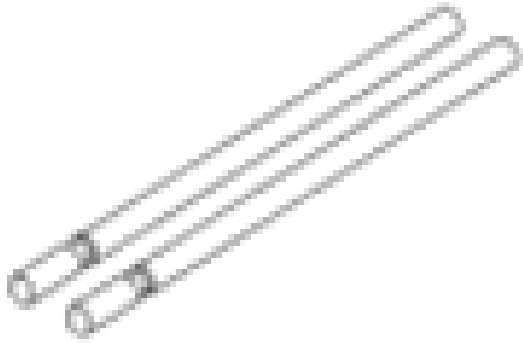
Special Tool(s)

SPECIAL TOOLS CHART

Alignment Pins, Cylinder Head

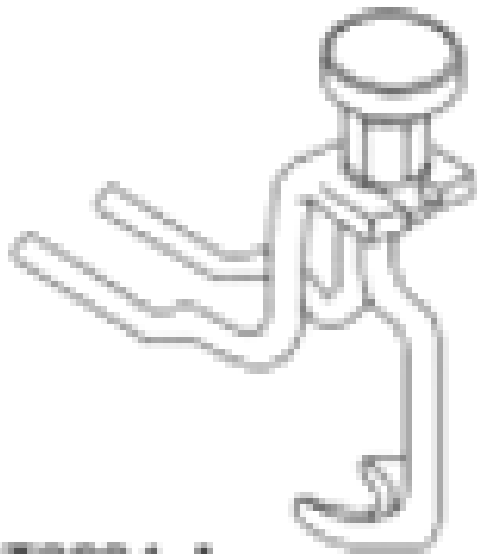
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2806-A

303-1040 (SR-015486)



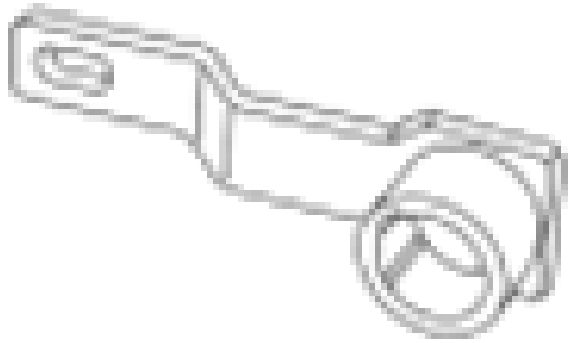
ST2804-A

Compressor, Valve Spring
303-1039

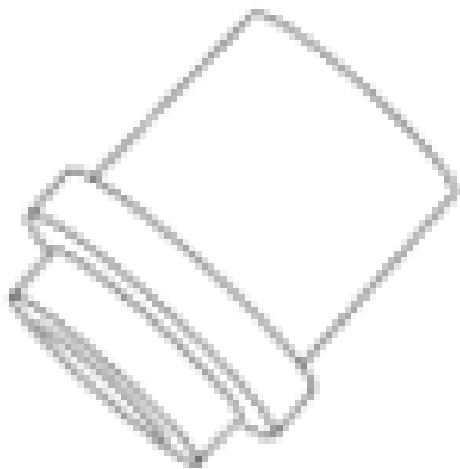
Holding Tool, Crankshaft
303-448 (T93P-6303-A)

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1335-A



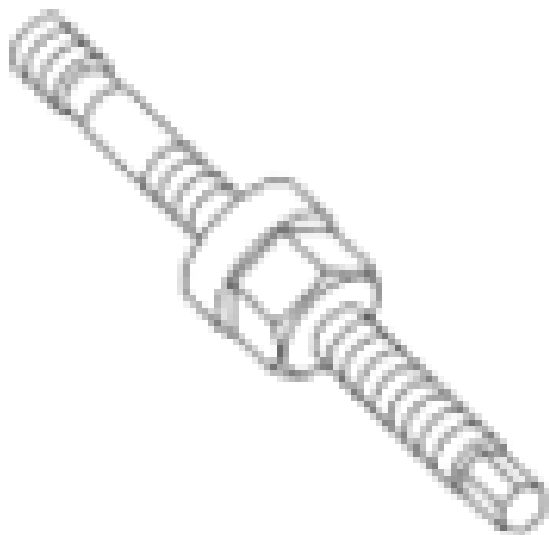
ST2197-A

Installer, Crankshaft Front Oil Seal
303-635

Installer, Crankshaft Vibration Damper

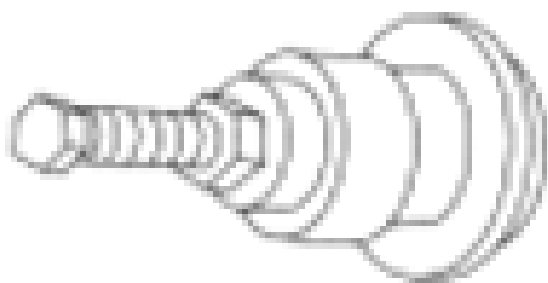
2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST2428-A

303-102 (T74P-6316-B)



ST1328-A

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

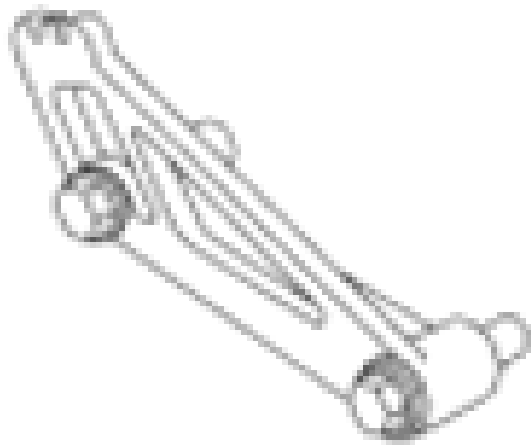
Lifting Bracket, Engine
303-F047 (014-00073) or equivalent

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1377-A



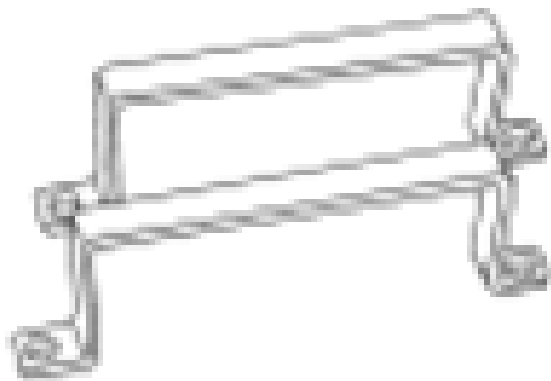
ST2807-A

Locking Tool, Cam Phaser Sprocket
303-1046

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

2011 Ford Expedition

2011 ENGINE Engine Mechanical - 5.4L (3V) - Expedition, Expedition EL, Navigator & Navigator L



ST1668-A

General Equipment

GENERAL EQUIPMENT CHART

Hydraulic Chain Tensioner Retaining Clip - 1L3Z-6P250-AA

Material

MATERIAL SPECIFICATIONS

Item	Specification
Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® Premium Gold Engine Coolant VC-7-B (US); CVC-7-B (Canada)	WSS-M97B51-A1
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil (Canada) XO-5W20-QSP (US); CXO-5W20-LSP12 (Canada)	WSS-M2C945-A
Motorcraft® Specialty Orange Engine Coolant VC-3-B (US); CVC-3-B (Canada)	WSS-M97B44-D
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft® Silicone Gasket Remover ZC-30	-
Threadlock 262 TA-26	WSK-M2G351-A6

All cylinder heads

1. **NOTE:** Make sure all coolant residue and foreign material are cleaned from the block surface and cylinder bore. Failure to follow this instruction may result in engine damage.
- NOTE:** The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry.
- NOTE:** The cylinder head bolts must be discarded and new bolts installed. They are a tighten-to-yield design and cannot be reused.
- NOTE:** Do not turn the crankshaft until instructed to do so.
- NOTE:** LH shown in the illustration, RH similar.

Using the Cylinder Head Alignment Pins, position the cylinder head gaskets and cylinder heads over the dowels and install the 20 cylinder head bolts loosely.

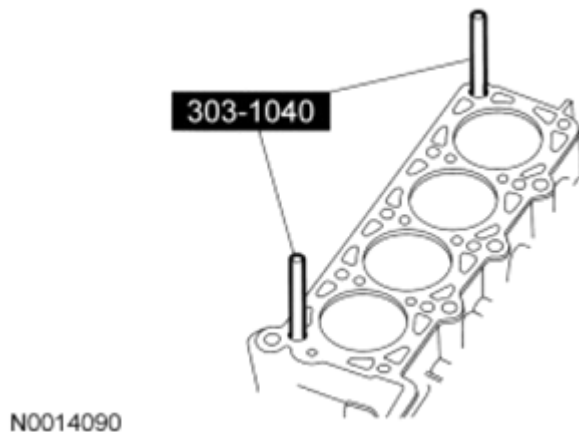
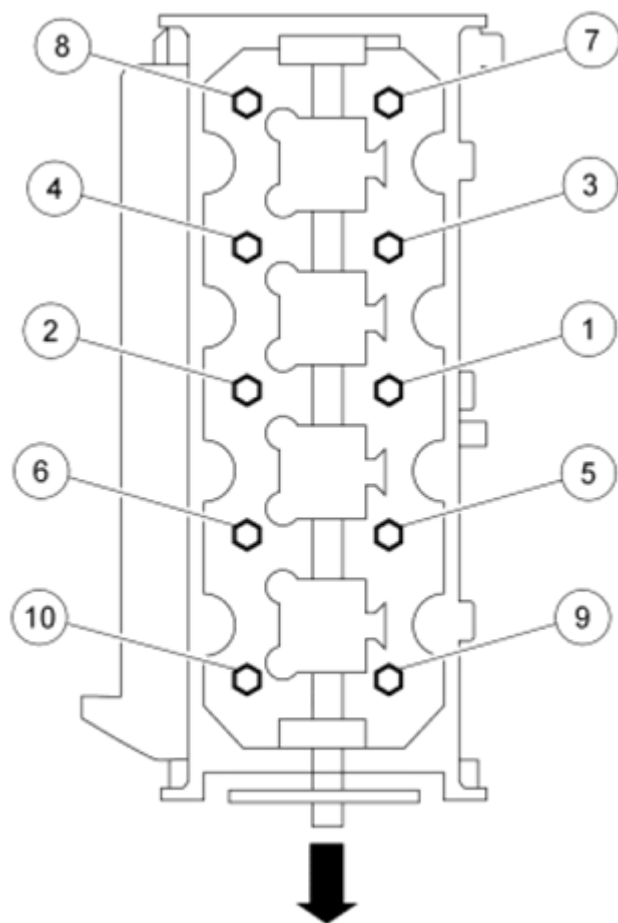


Fig. 561: Positioning Cylinder Head Gaskets And Cylinder Heads Over Dowels
Courtesy of FORD MOTOR CO.

2. Tighten the 20 bolts in 3 stages, in the sequence shown in the illustration.

RH shown in the illustration, LH similar.

- Stage 1: Tighten to 40 Nm (30 lb-ft).
- Stage 2: Tighten an additional 90 degrees.
- Stage 3: Tighten an additional 90 degrees.



N0067890

Fig. 562: Identifying Cylinder Head Gaskets Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

LH cylinder head

3. Remove the Cylinder Head Remover/Installer from the LH cylinder head.

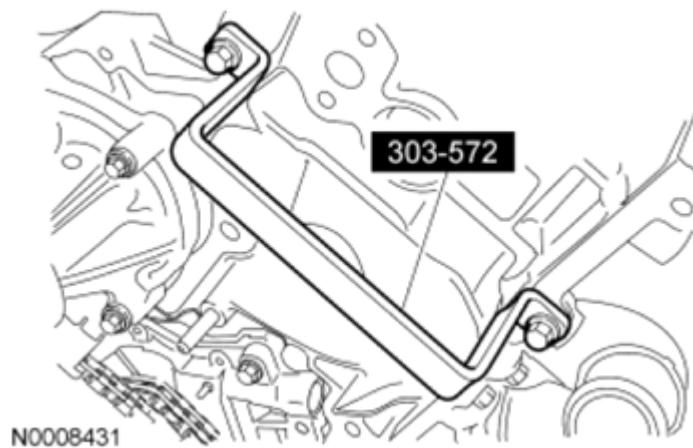


Fig. 563: Removing Special Tool From Cylinder Head
Courtesy of FORD MOTOR CO.

4. **NOTE:** The hydraulic lash adjusters must be installed in their original locations.

Install the hydraulic lash adjusters into the LH cylinder head.

- Lubricate the hydraulic lash adjusters with clean engine oil prior to installation.

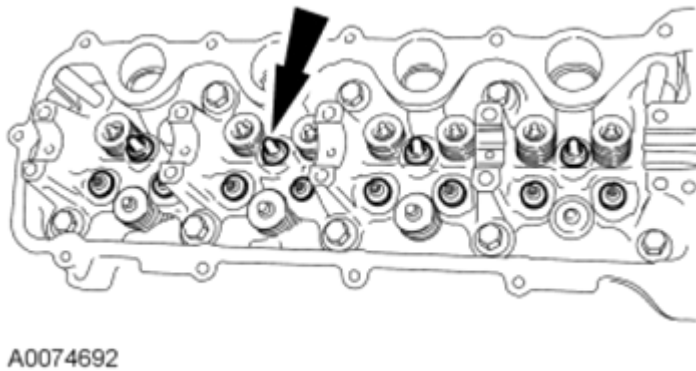


Fig. 564: Locating Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

5. Install 8 new LH exhaust manifold-to-cylinder head studs.
- Tighten to 12 Nm (106 lb-in).

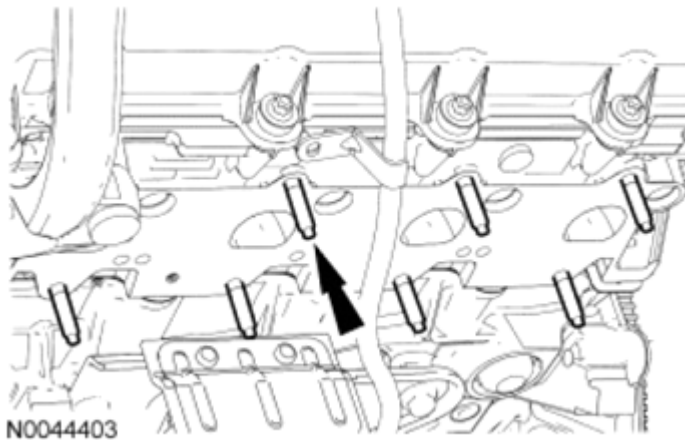


Fig. 565: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

6. Position new gaskets, the LH exhaust manifold and tighten 8 new nuts in the sequence shown in the illustration.
 - Tighten to 25 Nm (18 lb-ft).

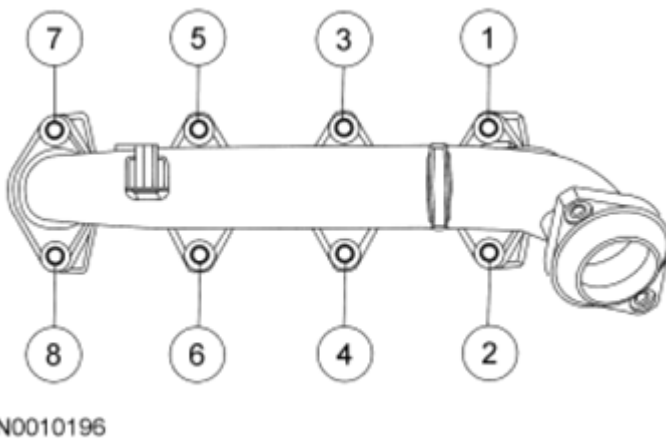


Fig. 566: Identifying Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

RH cylinder head

7. Remove the Cylinder Head Remover/Installer from the RH cylinder head.

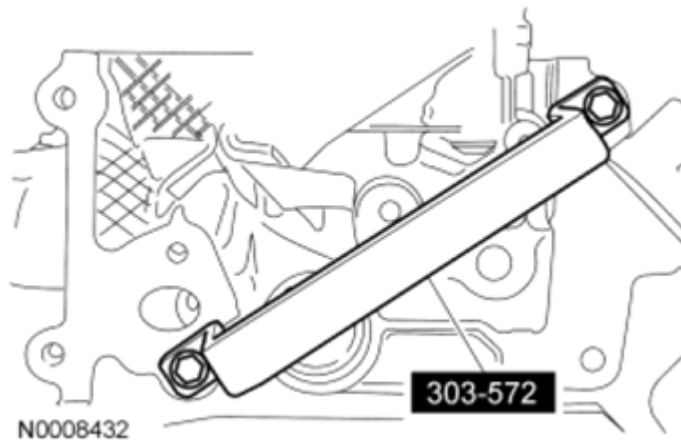


Fig. 567: Removing Special Tool From Cylinder Head
Courtesy of FORD MOTOR CO.

8. **NOTE:** The hydraulic lash adjusters must be installed in their original locations.

Install the hydraulic lash adjusters into the RH cylinder head.

- Lubricate the hydraulic lash adjusters with clean engine oil prior to installation.

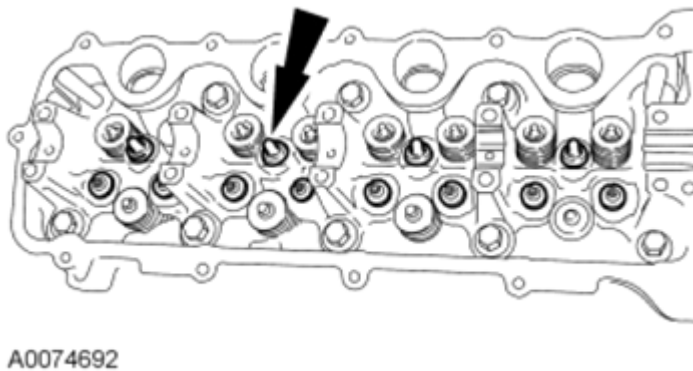


Fig. 568: Locating Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

9. Install 8 new RH exhaust manifold-to-cylinder head studs.
- Tighten to 12 Nm (106 lb-in).

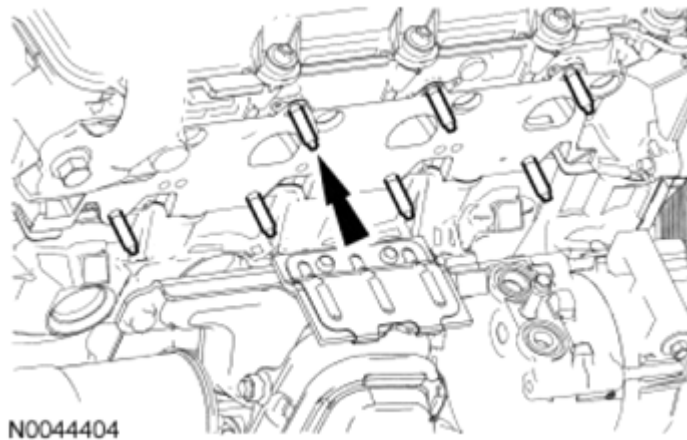


Fig. 569: Locating Exhaust Manifold-To-Cylinder Head Studs (RH)
Courtesy of FORD MOTOR CO.

10. Position 2 new gaskets, the RH exhaust manifold and tighten the 8 new nuts in the sequence shown in the illustration.
 - Tighten to 25 Nm (18 lb-ft).

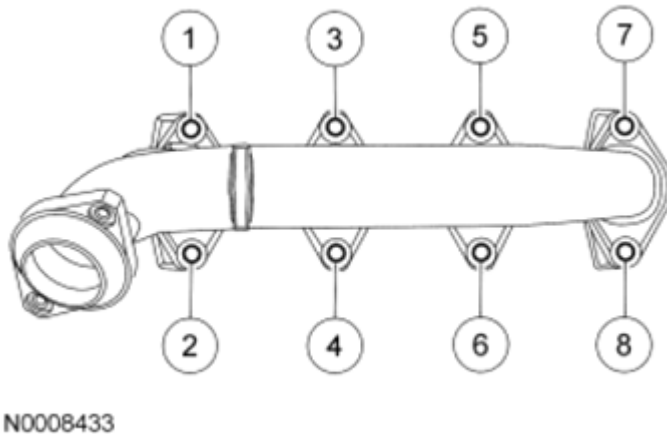


Fig. 570: Identifying Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Early build vehicle cooling systems are filled with Motorcraft® Premium Gold Engine Coolant. Late build vehicle cooling systems are filled with Motorcraft® Specialty Orange Engine Coolant. Do not mix coolant types. Mixing coolant types degrades the corrosion protection of the coolant. Failure to follow these instructions may damage the engine or cooling system.

11.

NOTE: Install 2 new O-ring seals and lubricate the O-ring seals with clean engine coolant. Use the same type of coolant that was drained from the system.

Install the coolant tube and the stud bolt.

- Tighten to 10 Nm (89 lb-in).

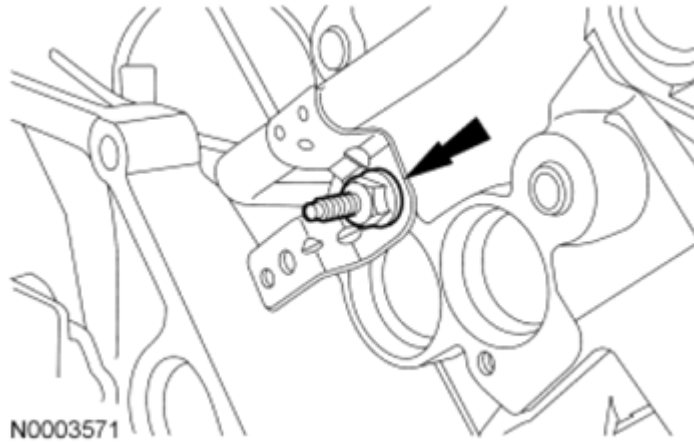


Fig. 571: Locating Coolant Tube Stud Bolt
Courtesy of FORD MOTOR CO.

12. Position the ground strap and install the nut.

- Tighten to 10 Nm (89 lb-in).

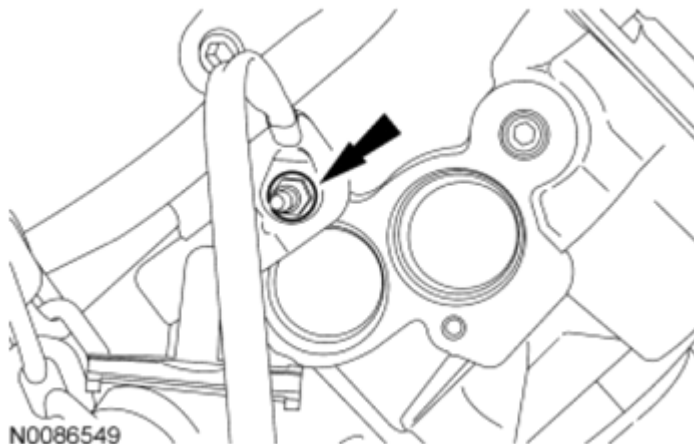


Fig. 572: Locating Nut And Ground Strap
Courtesy of FORD MOTOR CO.

All cylinder heads

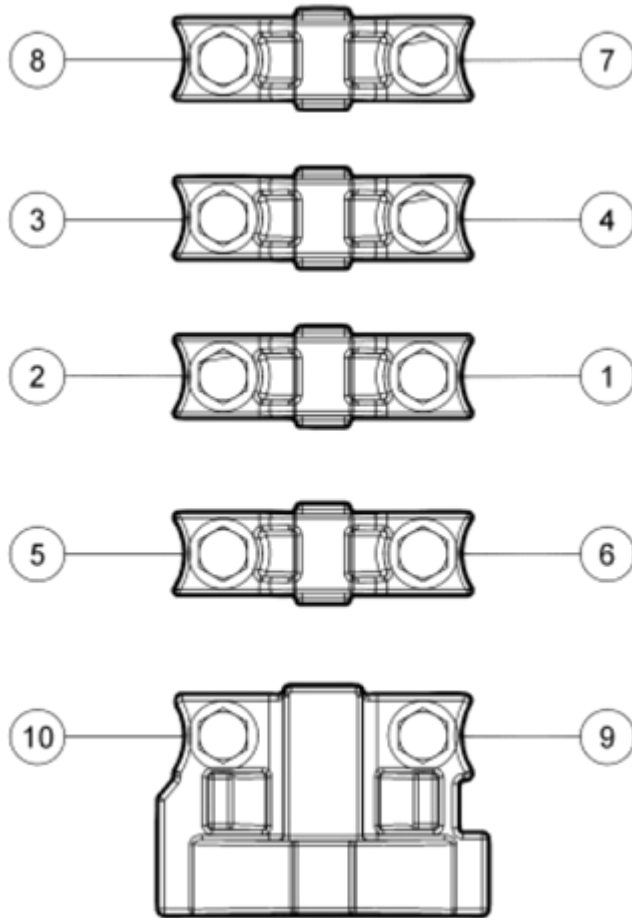
13. Install the LH and RH camshafts.

- Lubricate the camshaft and camshaft journals with clean engine oil prior to installation.

14. **NOTE:** LH shown in the illustration, RH similar.

Install the LH and RH camshaft bearing caps in their original locations.

- Lubricate the camshaft bearing caps with clean engine oil.
- Position the 2 front camshaft bearing caps.
- Position the remaining 8 camshaft bearing caps.
- Install the 20 bolts loosely.
- Tighten to 10 Nm (89 lb-in) in the sequence shown in the illustration.



N0011337

Fig. 573: Identifying Camshaft Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

15. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.

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

NOTE: LH shown in the illustration, RH similar.

Install the camshaft phase and sprockets and new camshaft phase and sprocket bolts finger-tight.

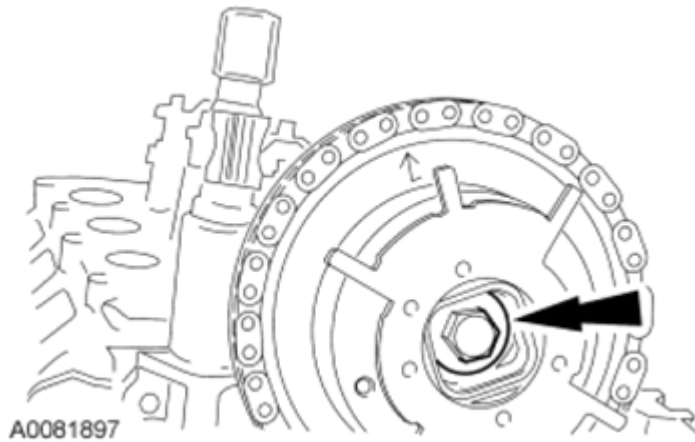


Fig. 574: Locating Camshaft Phaser And Sprocket Assembly Bolt
Courtesy of FORD MOTOR CO.

16. **NOTE:** Damage to the camshaft phase and sprocket assembly will occur if mishandled or used as a lifting or leveraging device.
- NOTE:** Only use hand tools to remove the camshaft phase and sprocket assembly or damage may occur to the camshaft or camshaft phase unit.
- NOTE:** LH shown in the illustration, RH similar.

Using the Cam Phaser Sprocket Locking Tool, tighten the LH and RH camshaft phase and sprocket bolts in 2 stages.

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

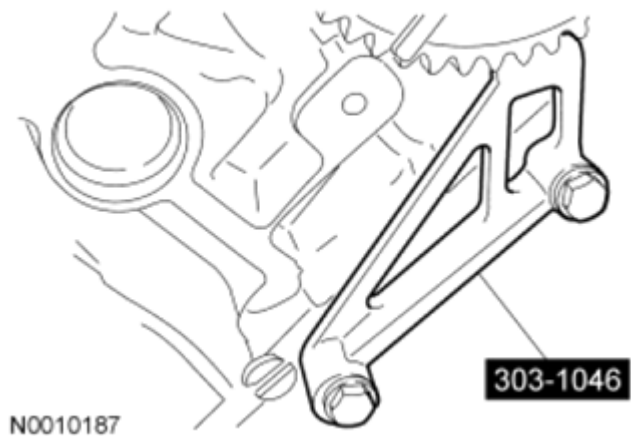


Fig. 575: Identifying Cam Phaser Locking Tool
Courtesy of FORD MOTOR CO.

NOTE: 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 or engine damage may occur.

17.

Inspect the RH and LH timing chain tensioners.

- Install new tensioners, as necessary.

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

18.

Compress the tensioner plunger, using a vise.

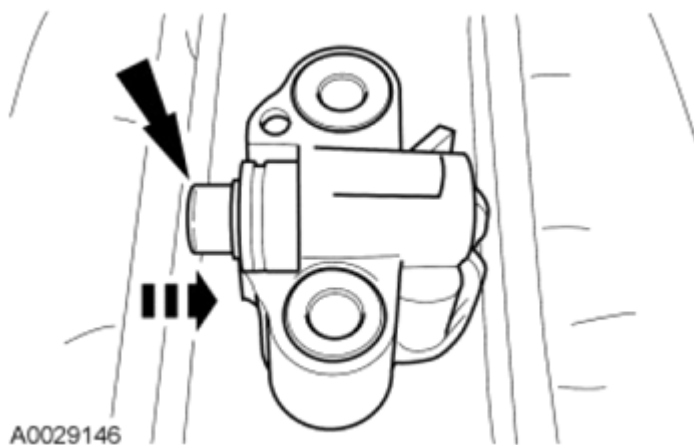


Fig. 576: Compressing Tensioner Plunger Using Vise
Courtesy of FORD MOTOR CO.

19. Install a Hydraulic Chain Tensioner Retaining Clip on the tensioner to hold the plunger in during installation.

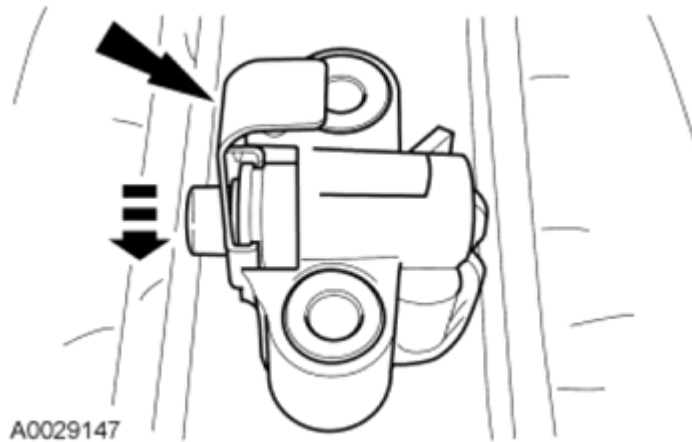


Fig. 577: Installing Retaining Clip On Tensioner
Courtesy of FORD MOTOR CO.

20. Remove the tensioner from the vise.
21. If the copper links are not visible, mark 2 links on one end and 1 link on the other end, and use as timing marks.

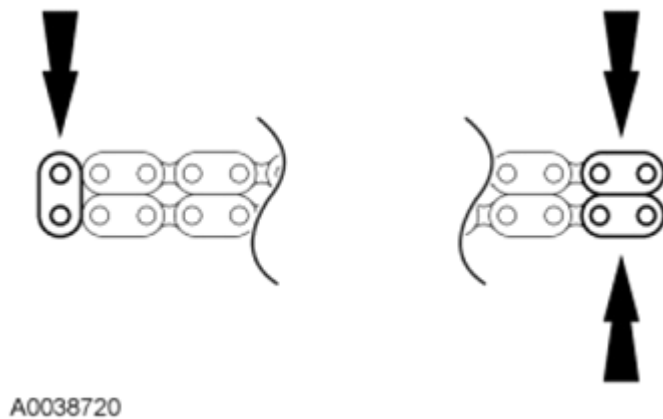


Fig. 578: Identifying Copper Link Timing Marks
Courtesy of FORD MOTOR CO.

22. Position the crankshaft with the Crankshaft Holding Tool, then remove the tool.

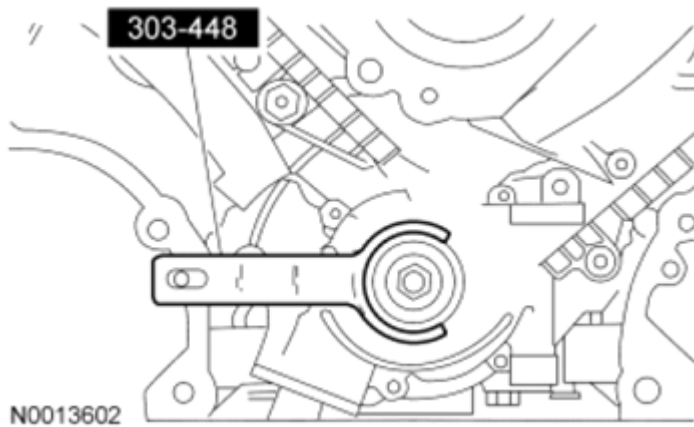


Fig. 579: Positioning Crankshaft
Courtesy of FORD MOTOR CO.

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

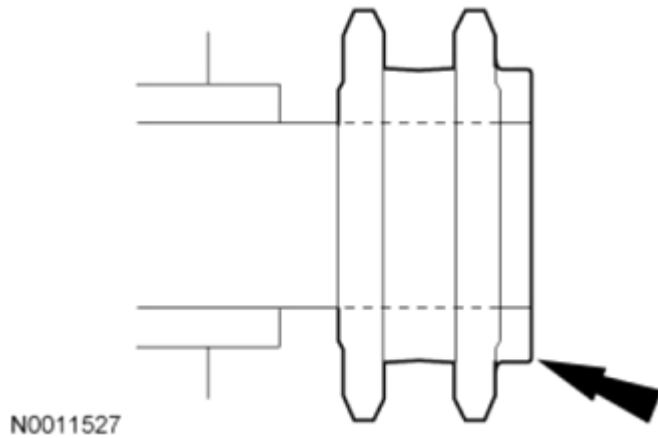
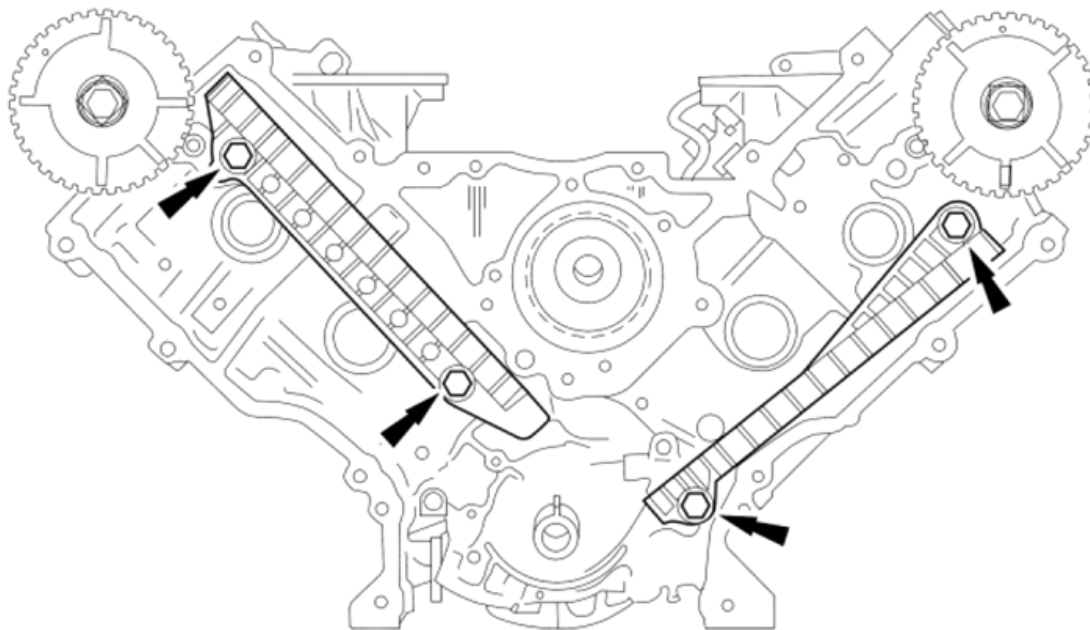


Fig. 580: Installing Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

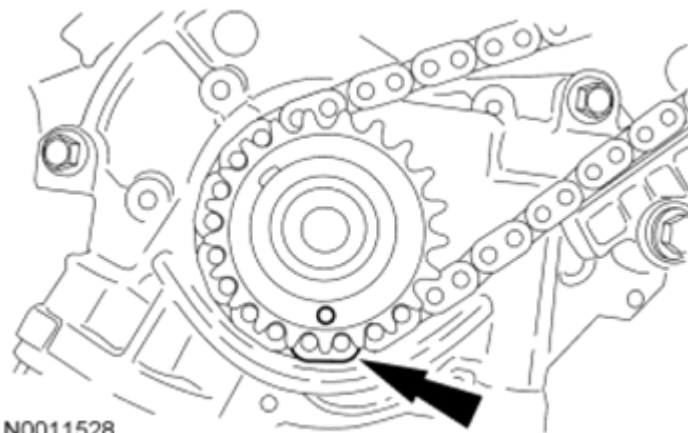
24. Position the LH and RH timing chain guides and install the 4 bolts.
- Tighten to 10 Nm (89 lb-in).



N0006303

Fig. 581: Locating Timing Chain Guides
Courtesy of FORD MOTOR CO.

25. 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. 582: Aligning Crankshaft Sprocket Timing Mark And Timing Chain Link
Courtesy of FORD MOTOR CO.

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

- 26.

Position the timing chain on the camshaft phase and sprocket with the camshaft phase and sprocket timing mark positioned between the 2 copper (marked) chain links.

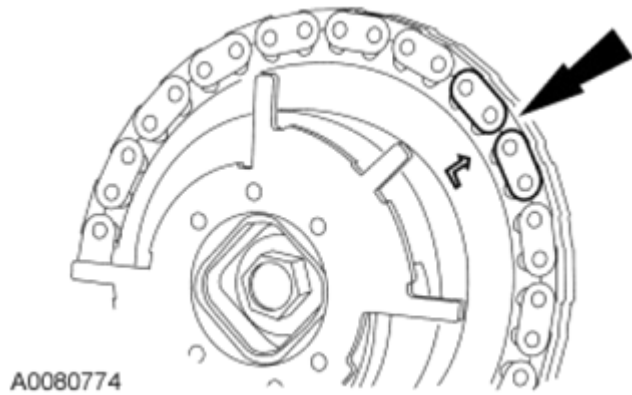


Fig. 583: Locating Timing Mark On Timing Chain
Courtesy of FORD MOTOR CO.

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

Position the LH timing chain tensioner arm on the dowel pin and install the LH timing chain tensioner and the 2 bolts.

- Tighten to 25 Nm (18 lb-ft).

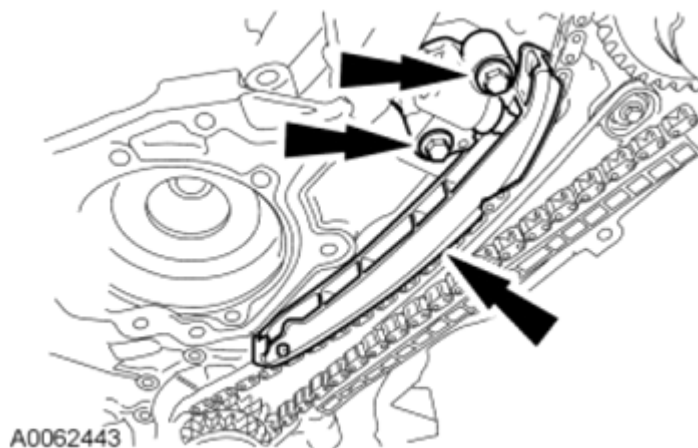


Fig. 584: Locating LH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

28. Remove the Hydraulic Chain Tensioner Retaining Clip from the LH timing chain tensioner.

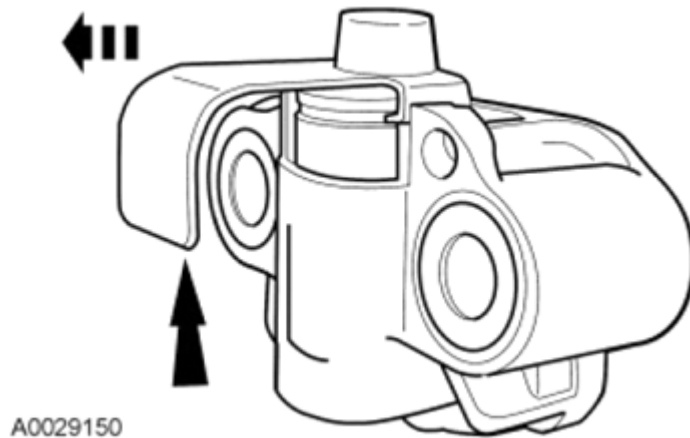


Fig. 585: Removing Retaining Clip From LH Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

29. 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.

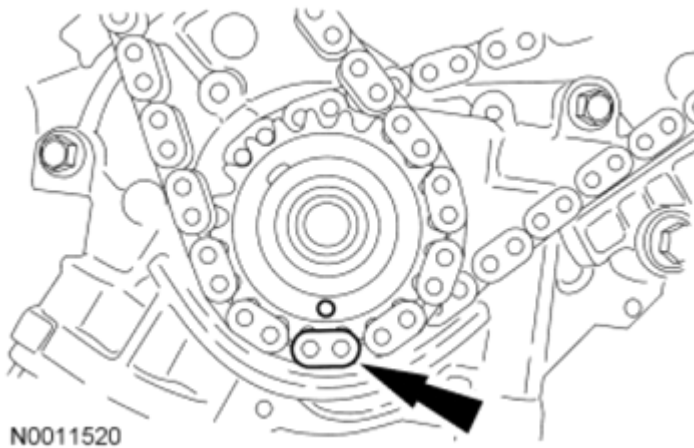


Fig. 586: Aligning (Outer) Sprocket Timing Mark And Chain Link
Courtesy of FORD MOTOR CO.

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

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

Position the RH timing chain on the camshaft sprocket. Make sure the camshaft sprocket timing mark is positioned between the 2 copper (marked) chain links.

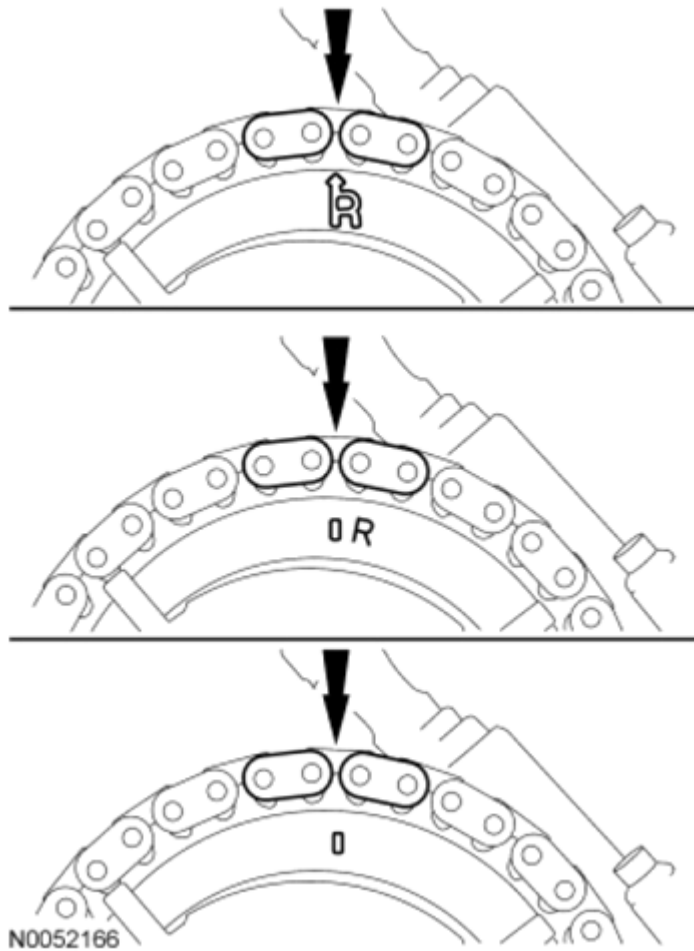


Fig. 587: Locating Timing Mark On Copper Chain Links
Courtesy of FORD MOTOR CO.

31. Position the RH timing chain tensioner arm on the dowel pin and install the RH timing chain tensioner and the 2 bolts.
 - Tighten to 25 Nm (18 lb-ft).

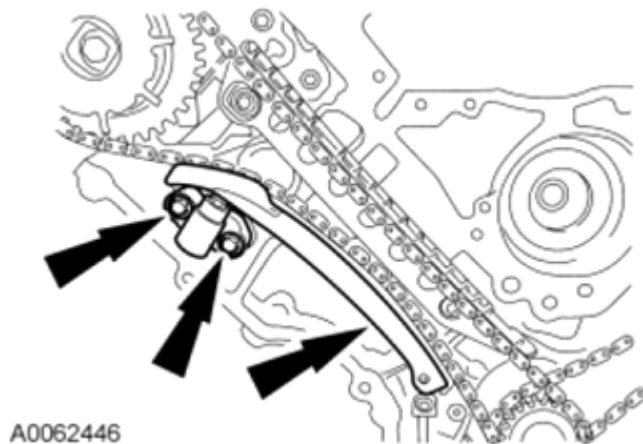


Fig. 588: Locating RH Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

32. Remove the Hydraulic Chain Tensioner Retaining Clip from the RH timing chain tensioner.

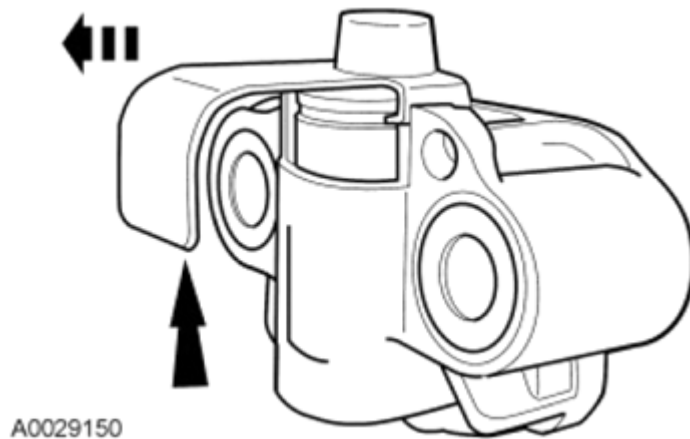
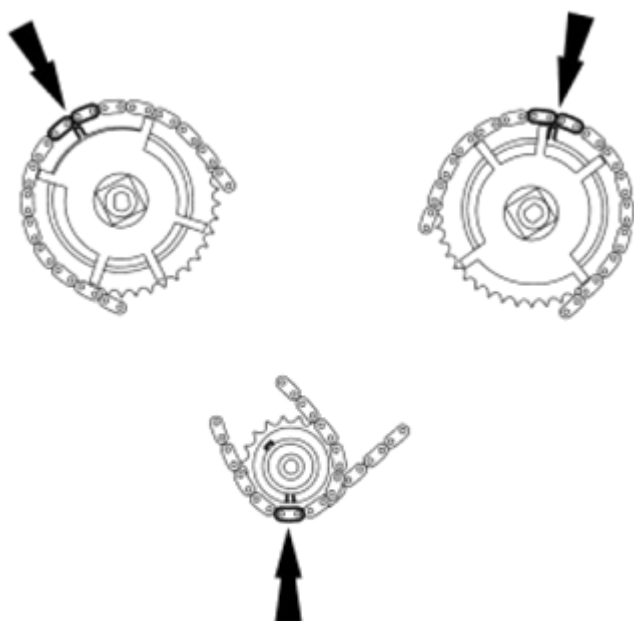


Fig. 589: Removing Retaining Clip From LH Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

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

- 33.

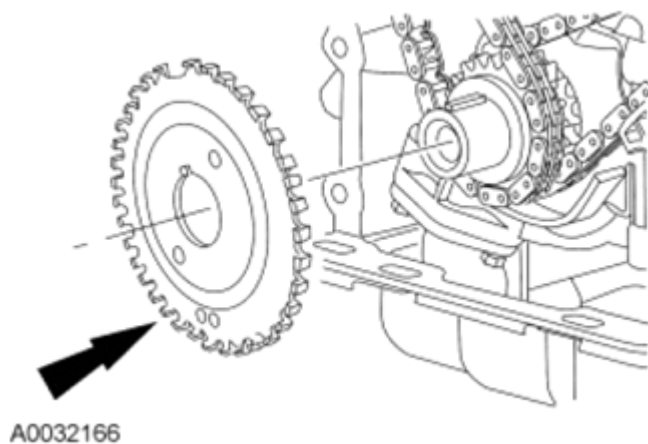
As a post-check, verify correct alignment of all timing marks.



N0092582

Fig. 590: Locating Timing Chain Mark Location
Courtesy of FORD MOTOR CO.

34. Install the crankshaft sensor ring on the crankshaft.



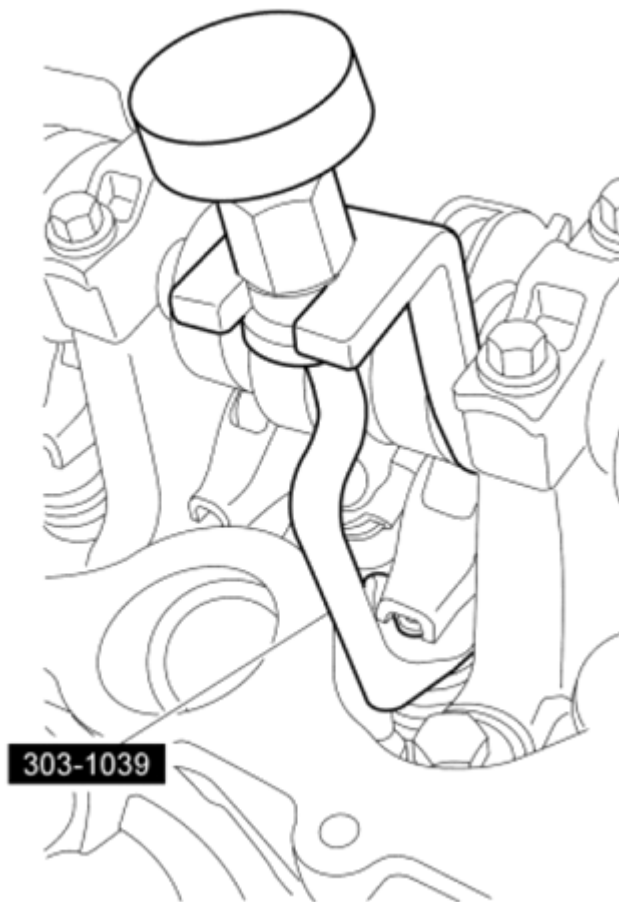
A0032166

Fig. 591: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

35. **NOTE:** If the components are to be reinstalled, they must be installed in the same positions. Failure to follow these instructions may result in engine damage.

NOTE: Lubricate the roller followers with clean engine oil prior to installation.

Using the Valve Spring Compressor, install all of the camshaft roller followers.



N0010191

Fig. 592: Installing Valve Spring Compressor On Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

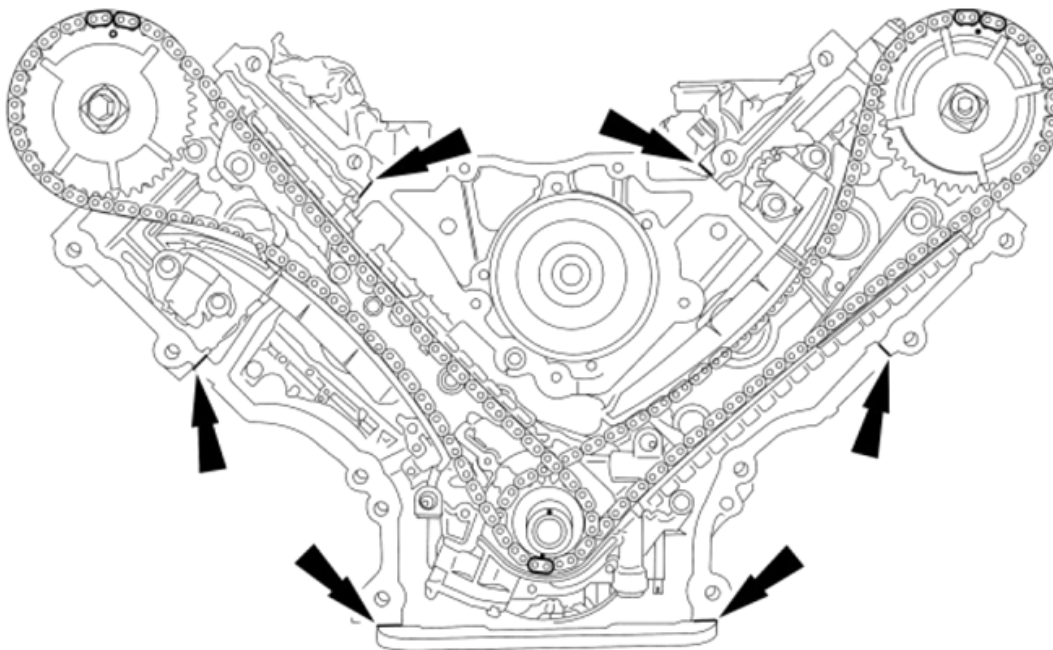
36. **NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

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.

Apply a bead of silicone gasket and sealant along the cylinder head-to-cylinder block surface at the locations shown in the illustration.



A0080776

Fig. 593: Locating Silicone Sealant Application Areas
Courtesy of FORD MOTOR CO.

37. Install 3 new engine front cover gaskets on the engine front cover. Position the engine front cover onto the dowels. Install the 15 fasteners finger-tight.

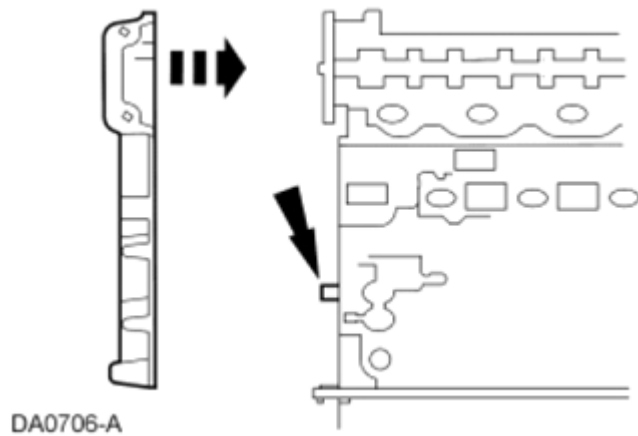


Fig. 594: Installing Engine Front Cover
Courtesy of FORD MOTOR CO.

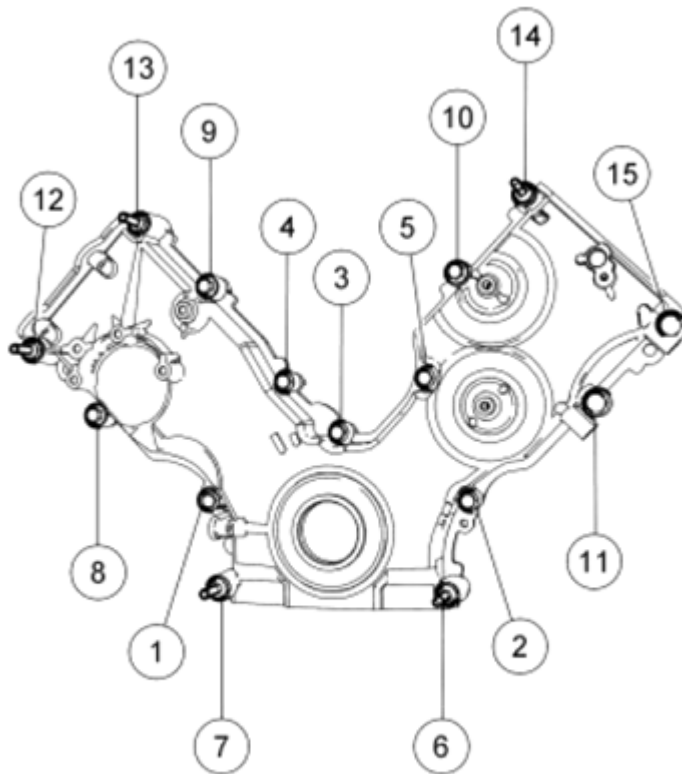
38. Tighten the 15 engine front cover fasteners in the sequence shown in the illustration in 2 stages.

Stage 1: Tighten fasteners 1 through 15 to 25 Nm (18 lb-ft).

Stage 2: Tighten fasteners 6 and 7 to 48 Nm (35 lb-ft).

ITEM DESCRIPTION CHART

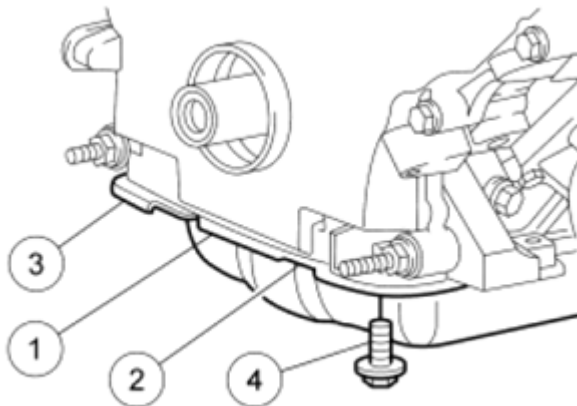
Item	Part Number	Description
1	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
2	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
3	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
4	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
5	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
6	N808529	Stud, Hex Head Pilot, M10 x 1.5 x 1.5 x 103
7	N808529	Stud, Hex Head Pilot, M10 x 1.5 x 1.5 x 103
8	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
9	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
10	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
11	N806177	Bolt, Hex Flange Head Pilot, M8 x 1.25 x 50
12	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
13	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
14	W709573	Stud and Washer, Hex Head Pilot, M8 x 1.25 x 1.25 x 94
15	W706605	Bolt, Hex Head Pilot, M8 x 1.25 x 56



N0010206

Fig. 595: Identifying Engine Front Cover Fasteners Tightening Sequence
Courtesy of FORD MOTOR CO.

39. Loosely install the 4 bolts, then tighten the bolts in 2 stages, in the sequence shown in the illustration.
- Stage 1: Tighten to 20 Nm (177 lb-in).
 - Stage 2: Tighten an additional 60 degrees.



N0008507

Fig. 596: Identifying Front Oil Pan/Cover Bolts Tightening Sequence

Courtesy of FORD MOTOR CO.

40. **NOTE:** 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.

Clean the valve cover mating surface with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

41. **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.

Apply silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

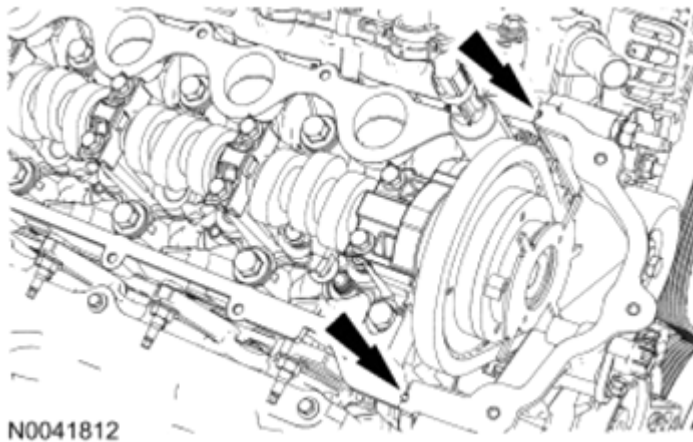
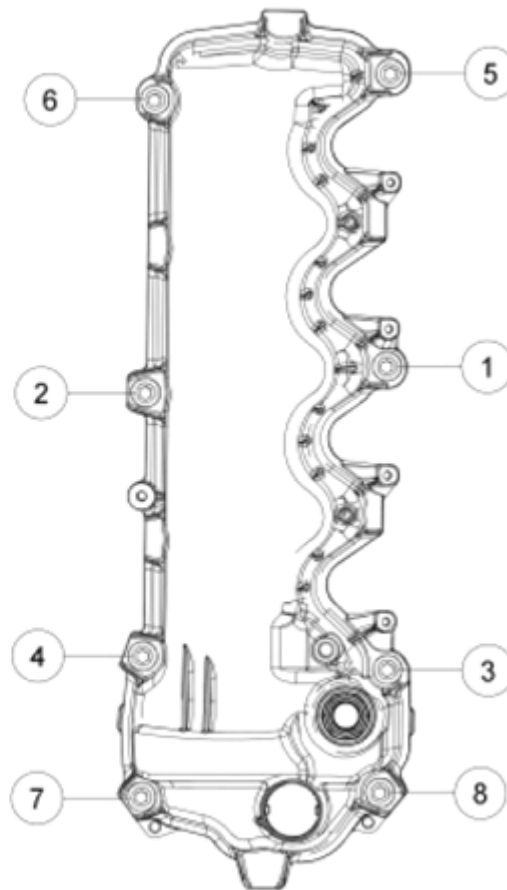


Fig. 597: Locating Silicone Gasket And Sealant Applying Area
Courtesy of FORD MOTOR CO.

42. **NOTE:** Install the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

Position the RH valve cover and new gasket on the cylinder head and tighten the 8 fasteners in the sequence shown in the illustration.

- Tighten to 10 Nm (89 lb-in).



N0122333

Fig. 598: Identifying RH Valve Cover And Gasket On Cylinder Head Fasteners Tightening Sequence

Courtesy of FORD MOTOR CO.

NOTE: 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.

43.

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.

44.

Apply silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.

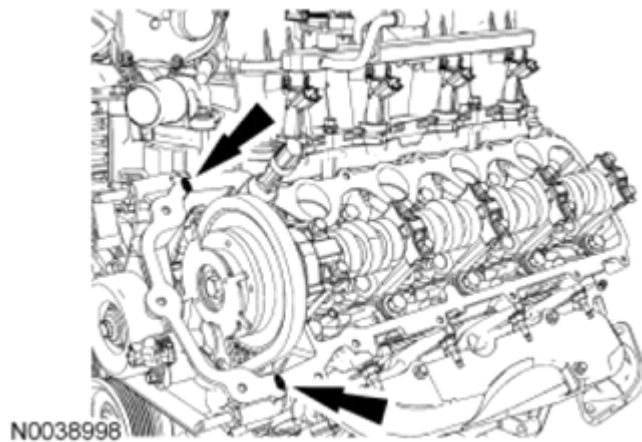
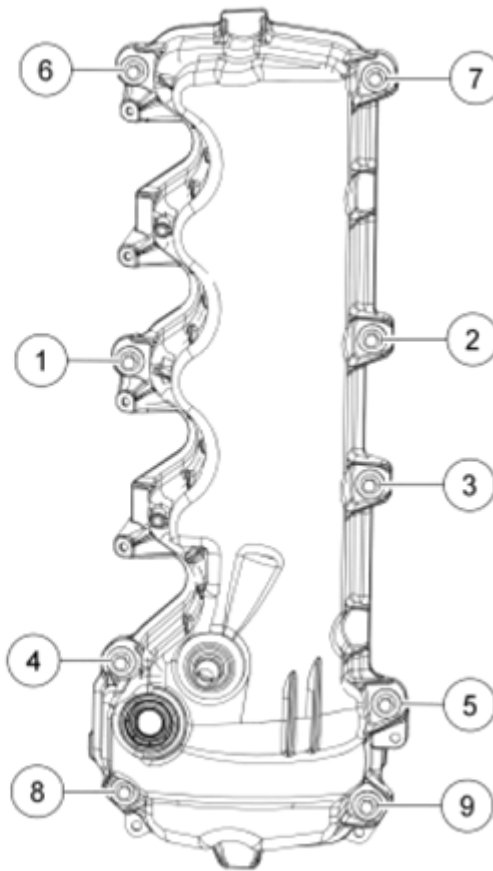


Fig. 599: Locating Silicone Gasket And Sealant Applying Area
Courtesy of FORD MOTOR CO.

45. **NOTE:** Install the valve cover carefully, or the Variable Camshaft Timing (VCT) solenoid may be damaged.

Position the LH valve cover and new gasket on the cylinder head and tighten the 9 fasteners in the sequence shown in the illustration.

- Tighten to 10 Nm (89 lb-in).



N0122332

Fig. 600: Identifying RH Valve Cover And Gasket On Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

46. 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 Nm (89 lb-in).

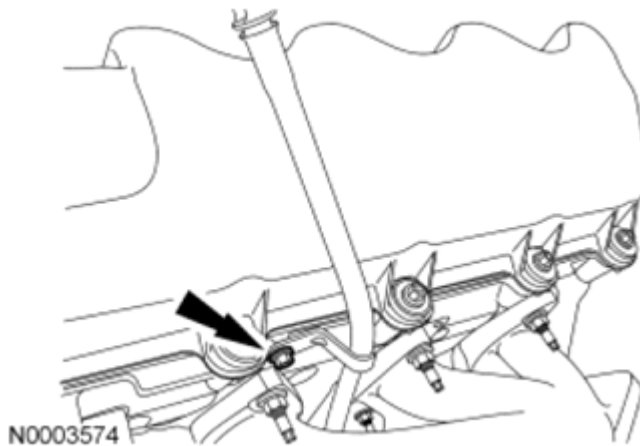


Fig. 601: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

47. **NOTE:** Clean the engine support insulator-to-cylinder block mating surfaces of any dirt or foreign material prior to installation.

If equipped with cylinder block drain plugs, position the RH engine support insulator and install the 3 bolts.

- Apply threadlock 262 to the bolt threads prior to installation.
- Tighten to 63 Nm (46 lb-ft).

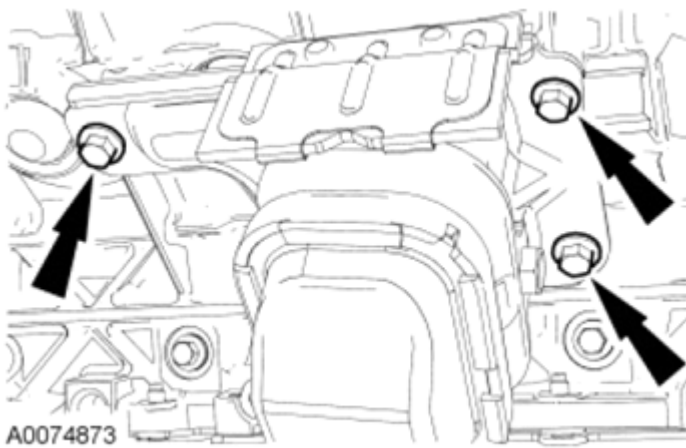


Fig. 602: Locating RH Engine Support Insulator Bolts
Courtesy of FORD MOTOR CO.

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

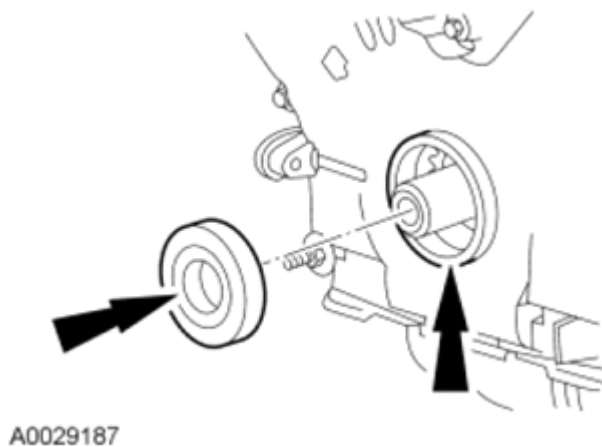


Fig. 603: Lubricating Engine Front Cover And Crankshaft Seal Inner Lip With Clean Engine Oil
Courtesy of FORD MOTOR CO.

49. Using the Crankshaft Front Oil Seal Installer, the Crankshaft Vibration Damper Installer and the Front Cover Oil Seal Installer, install the new crankshaft front seal into the engine front cover.

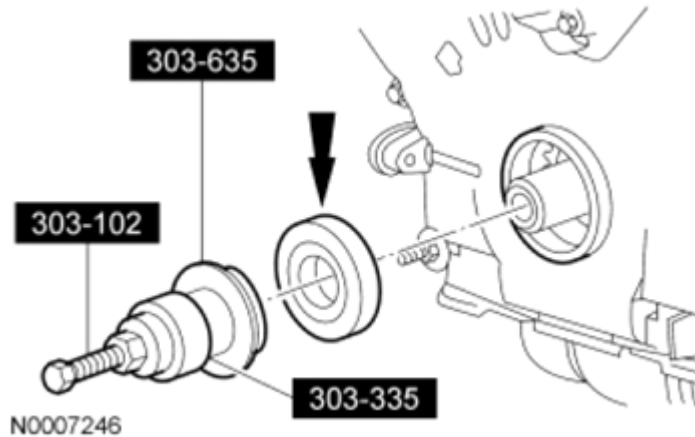
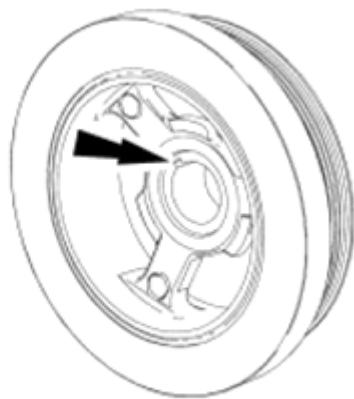


Fig. 604: Installing Crankshaft Front Seal Into Engine Front Cover Using Special Tools
Courtesy of FORD MOTOR CO.

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.

50.

Apply silicone gasket and sealant to the Woodruff key slot in the crankshaft pulley.



N0010530

Fig. 605: Locating Woodruff Key Slot In Crankshaft Pulley
Courtesy of FORD MOTOR CO.

51. Using the Crankshaft Vibration Damper Installer, install the crankshaft pulley.

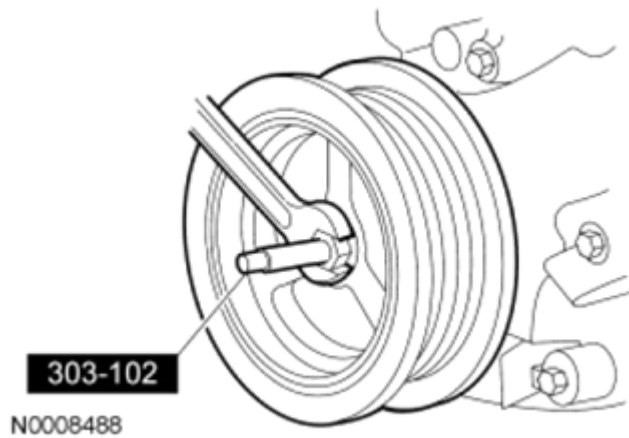


Fig. 606: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

52. Using a new crankshaft pulley bolt, install the bolt and washer and tighten the bolt in 4 stages.
- Stage 1: Tighten to 90 Nm (66 lb-ft).
 - Stage 2: Loosen 360 degrees.
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

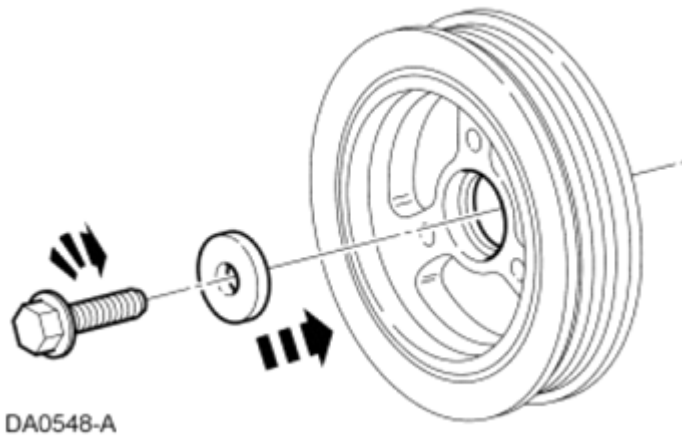


Fig. 607: Installing Crankshaft Pulley Bolt & Washer
Courtesy of FORD MOTOR CO.

53. Position the accessory drive belt tensioner and install the 3 bolts.
- Tighten to 25 Nm (18 lb-ft).

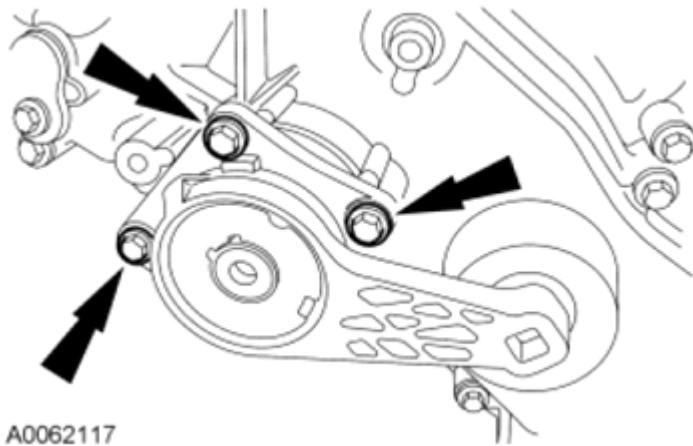


Fig. 608: Locating Accessory Drive Belt Tensioner Bolts
Courtesy of FORD MOTOR CO.

54. Install the 3 accessory drive belt idler pulleys, the coolant pump pulley and the 7 bolts.
- Tighten to 25 Nm (18 lb-ft).

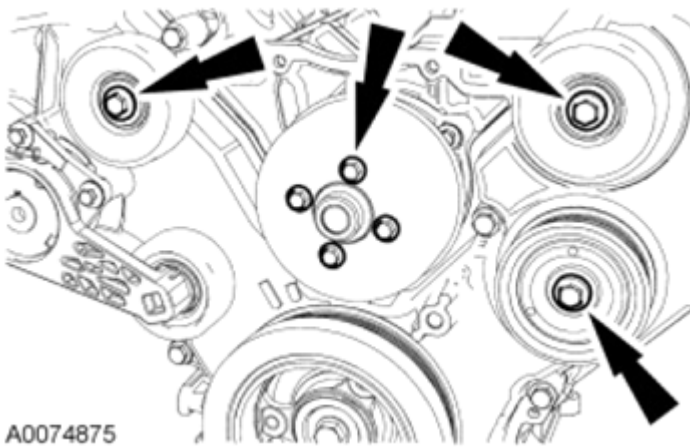


Fig. 609: Locating Coolant Pump Pulley And Accessory Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

55. **NOTE:** LH shown in the illustration, RH similar.

Install the 8 ignition coils and the 8 bolts.

- Verify that the ignition coil spring is correctly located inside the ignition coil boot and that there is no damage to the tip of the boot.
- Apply a light coat of dielectric compound to the inside of the ignition coil boots prior to installation.
- Tighten to 6 Nm (53 lb-in).

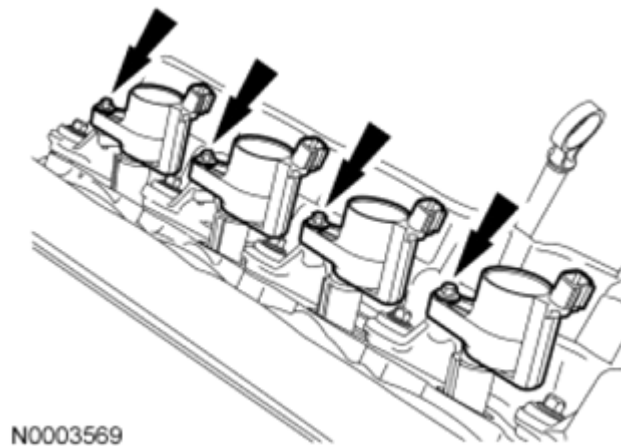


Fig. 610: Locating Ignition Coils Bolts
Courtesy of FORD MOTOR CO.

56. Position the intake manifold vacuum tube support bracket and install the bolt.
- Tighten to 10 Nm (89 lb-in).

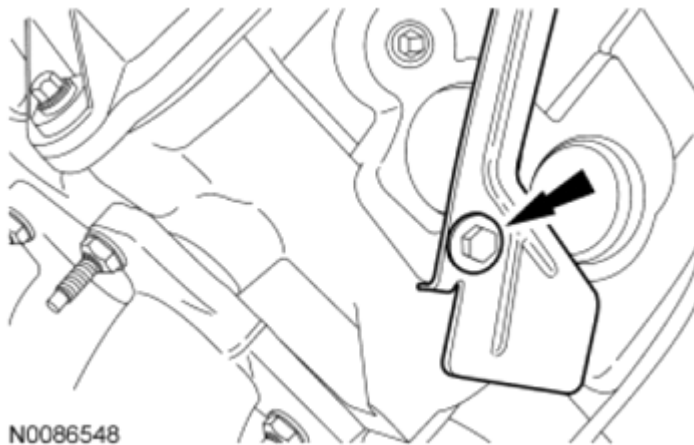


Fig. 611: Locating Bolt And Intake Manifold Vacuum Tube Support Bracket
Courtesy of FORD MOTOR CO.

57. Install the LH radio ignition interference capacitor and the nut.
- Tighten to 25 Nm (18 lb-ft).

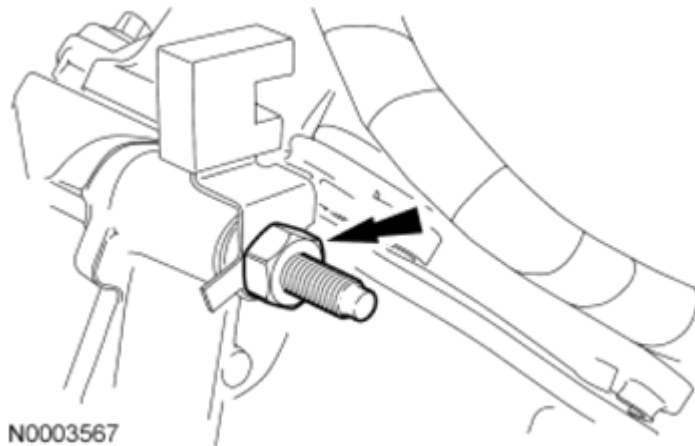


Fig. 612: Locating LH Radio Ignition Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

58. Install the RH radio ignition interference capacitor and the nut.
 - Tighten to 25 Nm (18 lb-ft).

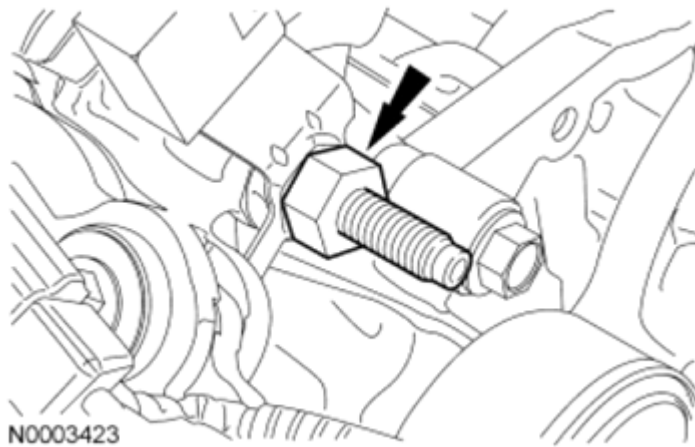


Fig. 613: Installing RH Radio Interference Capacitor And Nut
Courtesy of FORD MOTOR CO.

59. Using a floor crane, remove the engine from the engine stand.

NOTE: Do not use the oil pan to support the engine or oil pan and oil pan gasket damage may occur.

60.

Lower and support the engine assembly on wood blocks.

61. Install the Engine Lifting Bracket.

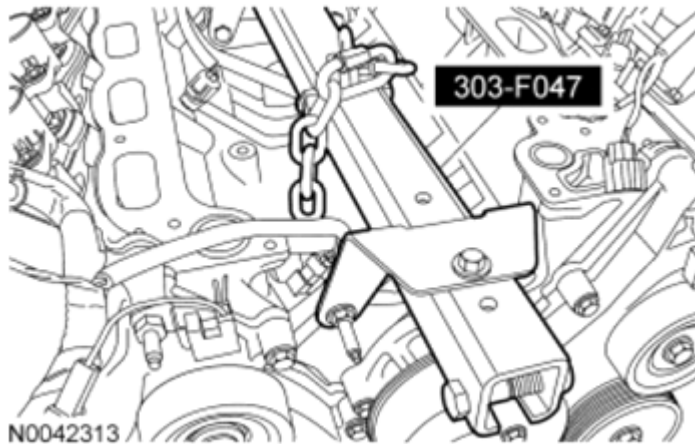


Fig. 614: Installing Modular Engine Bracket
Courtesy of FORD MOTOR CO.

62. Install the engine. For additional information, refer to **ENGINE** in this information.