

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

2009 ENGINE**Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer****SPECIFICATIONS****MATERIAL****MATERIAL**

Item	Specification	Fill Capacity
Motorcraft Metal Surface Prep ZC-31-A	-	-
Motorcraft Premium Gold Engine Coolant with Bittering Agent (bittered in US only) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1	-
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A	4.73L (5 qt) with filter
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	-
Silicone Gasket Remover ZC-30	-	-
Threadlock and Sealer TA-25	WSK-M2G351-A5	-

GENERAL SPECIFICATIONS**GENERAL SPECIFICATIONS**

Item	Specification
Engine	
Displacement	4.0L (244 CID)
Number of cylinders	6
Bore	100.4 mm (3.953 in)
Stroke	84.4 mm (3.32 in)
Firing order	1-4-2-5-3-6
Oil pressure minimum at 2,000 RPM (engine at	

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

normal operating temperature)	103 kPa (15 psi)
Engine weight (without accessory drive components or flexplate)	189 kg (417 lb)
Cylinder Head and Valve Train	
Cylinder head gasket surface flatness	0.08 mm (0.003 in) total
Combustion chamber volume	65.197 ± 2.068-2.018 cc
Valve arrangement (front to rear) - LH	I-E-I-E-I-E
Valve arrangement (front to rear) - RH	E-I-E-I-E-I
Valve guide bore diameter	7.00-7.018 mm (0.276 in)
Valve stem diameter - intake	6.965-6.98 mm (0.274-0.275 in)
Valve stem diameter - exhaust	6.95-6.965 mm (0.27-0.274 in)
Valve stem-to-guide clearance - intake	0.020-0.053 mm (0.001-0.002 in)
Valve stem-to-guide clearance - exhaust	0.035-0.068 mm (0.001-0.003 in)
Valve head diameter - intake	45.9-46.1 mm (1.807-1.815 in)
Valve head diameter - exhaust	38.9-39.1 mm (1.531-1.539 in)
Valve face runout	0.03 mm (0.001 in)
Valve face angle	45 degrees
Valve seat width - intake	1.273-2.121 mm (0.05-0.083 in)
Valve seat width - exhaust	1.556-2.404 mm (0.061-0.095 in)
Valve seat runout	0.059 mm (0.002 in)
Valve seat angle	45 degrees
Valve spring free length	43.1 mm (1.7 in)
Valve spring squareness	± 1.5 degrees
Valve spring compression pressure @ specified height (lb)	275-305 N @ 35.9-36.7 mm (202.84-224.968 lb @ 1.413-1.445 in)
Valve spring installed height	39.86-40.86 mm (1.569-1.609 in)
Valve spring installed pressure	320 N (72 lb)
Roller follower ratio	1.98:1
Camshaft	
Theoretical valve lift @ 0 lash	11.93 mm (0.472 in)
Lobe lift	6.584 mm (0.259 in)
Allowable lobe lift loss	0.127 mm (0.005 in)
Journal diameter	27.935-27.96 mm (1.099-1.101 in)
Camshaft journal bore inside diameter	28.0-28.03 mm (1.102-1.104 in)
Camshaft journal-to-bearing clearance	0.04-0.095 mm (0.002-0.004 in)
Runout	0.05 mm (0.002 in)
End play	0.075-0.185 mm (0.003-0.007 in)
Cylinder Block	
Cylinder bore diameter	100.4 mm (3.953 in)
Cylinder bore maximum taper	0.025 mm (0.001 in)
Cylinder bore maximum out-of-round	0.025 mm (0.001 in)

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

Main bearing bore inside diameter	60.620-60.634 mm (2.387-2.387 in)
Head gasket surface flatness	0.1 mm (0.004 in) overall
Crankshaft	
Main bearing journal diameter	56.980-57.0 mm (2.243-2.244 in)
Main bearing journal maximum taper	0.008 mm (0.0003 in)
Main bearing journal maximum out-of-round	0.008 mm (0.0003 in)
Main bearing journal-to-cylinder block clearance	0.008-0.062 mm (0.0003-0.0024 in)
Connecting rod journal diameter	53.98-54.0 mm (2.125-2.126 in)
Connecting rod journal maximum taper	0.008 mm (0.0003 in)
Connecting rod journal maximum out-of-round	0.008 mm (0.0003 in)
Crankshaft maximum end play	0.05-0.32 mm (0.002-0.0126 in)
Main Bearings	
Clearance to crankshaft	0.021-0.039 mm (0.0008-0.0015 in)
Clearance to crankshaft allowable	0.013-0.048 mm (0.0005-0.002 in)
Bearing wall thickness	1.8-1.806 mm (0.0709-0.0711 in)
Piston and Connecting Rod	
Piston diameter - coded standard	100.360-100.400 mm (3.951-3.9528 in)
Piston diameter - coded 0.5	100.880-100.900 mm (3.971-3.972 in)
Piston diameter - coded 1.0	101.390-101.400 mm (3.991-3.992 in)
Piston-to-cylinder bore clearance	0.030-0.050 mm (0.0012-0.002 in)
Piston ring end gap - top	0.250-0.400 mm (0.009-0.015 in)
Piston ring end gap - bottom	0.40-0.65 mm (0.016-0.028 in)
Piston ring groove width - top	1.23-1.25 mm (0.0484-0.0492 in)
Piston ring groove width - bottom	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - oil ring	3.01-3.03 mm (0.1185-0.1193 in)
Piston ring width - top	1.170-1.190 mm (0.0460-0.0469 in)
Piston ring width - bottom	1.472-1.490 mm (0.0580-0.0587 in)
Piston ring-to-groove clearance - top	0.040-0.075 mm (0.0016-0.0030 in)
Piston ring-to-groove clearance - bottom	0.030-0.065 mm (0.0012-0.0026 in)
Piston pin bore diameter	24.009-24.013 mm (0.9452-0.9453 in)
Piston pin diameter	23.997-24.000 mm (0.9447-0.9448 in)
Piston pin length	71.8-72.3 mm (2.826-2.846 in)
Piston pin-to-piston fit	0.009-0.016 mm (0.0003-0.0006 in)
Connecting rod pin bore diameter	23.958-23.976 mm (0.943-0.944 in)
Connecting rod length (center-to-center)	145.965-146.035 mm (5.747-5.749 in)
Connecting rod maximum allowed bend	0.0125 mm (0.0004 in) per 25.4 mm (1.000 in)
Connecting rod maximum allowed twist	0.038 mm (0.0015 in) per 25.4 mm (1.000 in)
Connecting rod bearing bore diameter	56.82 mm-56.84 mm (2.237 in-2.238 in)
Connecting rod bearing-to-crankshaft clearance	0.022-0.064 mm (0.0008-0.0025 in)
Connecting rod side clearance	0.092-0.318 mm (0.0036-0.0125 in)

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
A/C compressor and power steering pump bracket	42	31	-
A/C line fitting nuts	15	-	133
A/C tube bracket nut	10	-	89
Accessory drive belt tensioner bolt	47	35	-
Balance shaft bolts	29	21	-
Balance shaft chain guide bolts	10	-	89
Balance shaft chain tensioner bolts	29	21	-
Battery cable retainer bracket-to-frame nut	15	-	133
Battery cable-to-engine front cover bracket nut	20	-	177
Battery cable-to-Power Distribution Box (PDB) nut	12	-	106
Camshaft bearing cap bolts	-	-	-
Camshaft sprocket bolt	85	63	-
Cassette-to-cylinder block bolt	19	-	168
Cassette-to-cylinder head bolt, RH	10	-	89
Cassette-to-cylinder head bolt, LH	12	-	106
Connecting rod nuts	-	-	-
Coolant expansion tank bolts	7	-	62
Coolant pump bolts	10	-	89
Coolant pump pulley bolts	25	18	-
Crankshaft pulley bolt	-	-	-
Crossmember bolts	103	76	-
Cylinder block cradle bolts (inside)	-	-	-
Cylinder block cradle bolts (outside)	14	-	124
Cylinder block cradle nuts (outside)	10	-	89
Cylinder block cradle inserts	3	-	27
Cylinder block cradle Torx bolts	10	-	89
Cylinder head bolts	-	-	-
Electrical harness-to-rear of engine bolts	47	35	-
Engine front cover bolts	19	-	168
Engine lifting eye bolts (service)	37	27	-
Engine support insulator bracket bolts	80	59	-
Engine support insulator nuts	90	66	-
Engine support insulator through bolt	103	76	-
Exhaust manifold nuts	22	16	-
Exhaust manifold studs	12	-	106
Exhaust manifold-to-converter nuts	40	30	-
Exhaust manifold-to-EGR system module tube fittings	34	25	-

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

Flexplate bolts	-	-	-
Front axle housing bolts	66	49	-
Front stabilizer bar bracket bolts	55	41	-
Fuel rail bolts	24	18	-
Fuel supply tube bracket-to-valve cover bolt	6	-	53
Fuel supply tube-to-fuel rail bolts	6	-	53
Generator B+ terminal nut	8	-	71
Generator bolts	47	35	-
Generator bracket bolts	42	31	-
Ground strap-to-RH cylinder head bolt	10	-	89
Ground wire nut	9	-	80
Heater hose tube bracket front bolt	34	25	-
Heater hose tube bracket rear bolt	23	17	-
Hood hinge bolts	12	-	106
Hydraulic chain tensioner	44	32	-
Ignition coil bracket bolts	10	-	89
Intake manifold bolts	11	-	97
Jackshaft chain guide bolts	19	-	168
Jackshaft chain tensioner bolts	9	-	80
Jackshaft front sprocket bolt	-	-	-
Jackshaft rear sprocket bolt	-	-	-
Jackshaft thrust plate bolt	11	-	97
Knock Sensor (KS) bolt	20	-	177
Main bearing cap bolts	97	72	-
Oil cooler hose bracket bolt	25	18	-
Oil cooler insert	57	42	-
Oil filter	13	-	115
Oil filter adapter bolt	57	42	-
Oil filter adapter insert	33	24	-
Oil level indicator tube bracket bolt	10	-	89
Oil pan bolts	11	-	97
Oil pan drain plug	26	19	-
Oil pressure switch	13	-	115
Oil pump bolts	19	-	168
Oil pump drive bolt	19	-	168
Oil pump screen cover and tube bolts	10	-	89
Power steering fluid reservoir bolt	7	-	62
Power steering fluid reservoir-to-power steering pump hose bracket bolt	11	-	97
Power steering pressure hose bracket bolt	11	-	97
Power steering pump bolts	25	18	-
Power steering pump pulley bolts	25	18	-
Radiator fan shroud bolts			

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

	7	-	62
Spark plugs	20	-	177
Starter B terminal nut	12	-	106
Starter S terminal nut	6	-	53
Thermostat housing bolts	11	-	97
Transmission cooler tube bracket nut	23	17	-
Transmission-to-cylinder block cradle bolts	47	35	-
Valve cover bolts	10	-	89
Wiring harness-to-front cover bracket nut	20	-	177
Wiring harness-to-RH cylinder head bracket bolt	47	35	-
Wiring harness-to-throttle body bracket nut	9	-	80

DESCRIPTION AND OPERATION

ENGINE

The 4.0L SOHC engine consists of the following:

- Single overhead camshafts
- Sequential Multi-Port Fuel Injection (SFI)
- Distributorless ignition system
- Aluminum cylinder heads
- Cast-iron, 60-degree V cylinder block
- Jackshaft
- Unique engine timing configuration

The 4.0L engine is a 2-valve-per-cylinder, overhead camshaft engine. The engine features a jackshaft located in the cylinder block above the crankshaft and driven by the crankshaft via a sprocket and chain assembly. The jackshaft drives the 2 camshafts via 2 timing chain cassettes, the LH located on the front of the engine and the RH located on the rear of the engine. The oil pump is driven by the crankshaft via a sprocket and chain. The piston assembly is an aluminum piston with a powdered metal connecting rod. The engine uses a distributorless ignition system.

Identification - Always refer to these labels when installation of new parts is necessary, or when checking engine calibrations. The engine parts often differ within a Cubic Inch Displacement (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

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

- engine build date.
- engine plant code.

- engine code.

Exhaust Emission Control System - Operation and necessary maintenance of the exhaust emission control devices used on this engine are covered in the **Introduction - Gasoline Engines** article.

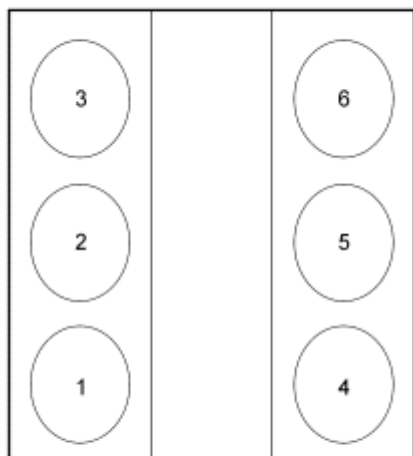
Induction System - The SFI provides the fuel/air mixture needed for combustion in the cylinders. The 6 solenoid-operated fuel injectors:

- are mounted in the cylinder heads.
- meter fuel to the air intake stream in accordance with engine demand.
- are positioned so their tips direct fuel just ahead of the engine intake valves.

PCV System - All engines are equipped with a closed-type PCV system recycling the crankcase vapors to the 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 right front side of the cylinder block.
- Oil enters the main gallery where it is distributed to the crankshaft main journals and to the cylinder head.
- 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.



N0072000

Fig. 1: Engine Cylinder Identification
Courtesy of FORD MOTOR CO.

DIAGNOSTIC TESTS

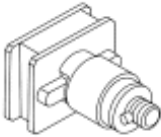
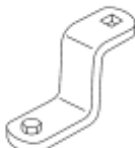
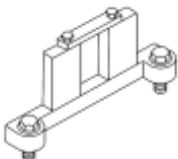
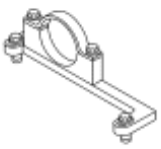
ENGINE

For basic engine mechanical concerns, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
For driveability concerns, refer to the **Introduction - Gasoline Engines** article.

GENERAL PROCEDURES

CAMSHAFT TIMING

Special Tools

Illustration	Tool Name	Tool Number
 ST1776-A	Adapter for 303-564	303-578 (T97T-6256-C)
 ST1779-A	Adapter for 303-577	303-576 (T97T-6256-D)
 ST1780-A	Extension, Torque Wrench	303-575 (T97T-6256-F)
 ST1778-A	Holding Tool, Camshaft	303-577 (T97T-6303-C)
 ST1777-A	Holding Tool, Camshaft Sprocket	303-564 (T97T-6256-B)

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

 ST1781-A	Socket, Camshaft Sprocket Nut	303-565 (T97T-6256-G) or equivalent
 ST1774-A	Tensioner, Timing Chain	303-571 (T97T-6K254-A)
 ST1775-A	Timing Tool, Crankshaft TDC	303-573 (T97T-6303-A)

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

1. Remove the camshaft roller followers. For additional information, refer to **Camshaft Roller Follower**.
2. If necessary, rotate the accessory drive belt tensioner counterclockwise and remove the accessory drive belt.

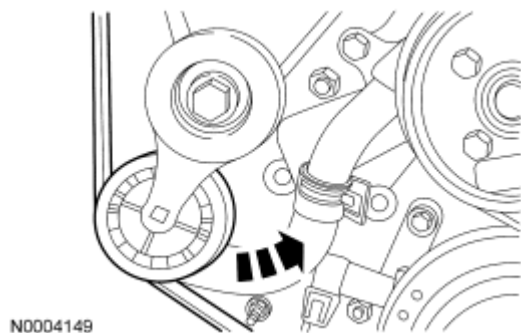


Fig. 2: Rotating Accessory Drive Belt Tensioner Counterclockwise
Courtesy of FORD MOTOR CO.

3. If necessary, remove the bolts and position the generator aside.

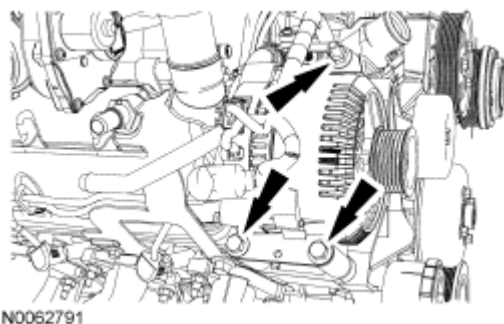


Fig. 3: Locating Generator Bolts
Courtesy of FORD MOTOR CO.

4. If necessary, remove the bolts and position the A/C compressor and power steering pump bracket aside.

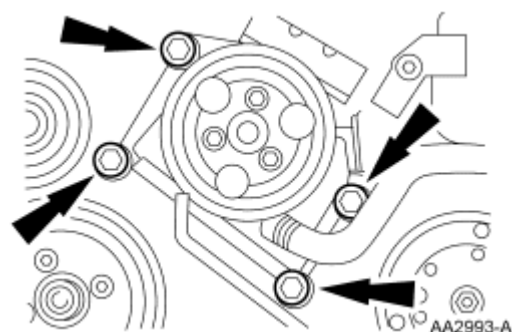


Fig. 4: Locating Power Steering Bracket & Bolts
Courtesy of FORD MOTOR CO.

NOTE: You must re-time the LH and RH camshafts when either camshaft is disturbed.

5. Turn the crankshaft clockwise to position the No. 1 cylinder at top dead center (TDC).
6. Remove the nut and position the wiring harness aside.

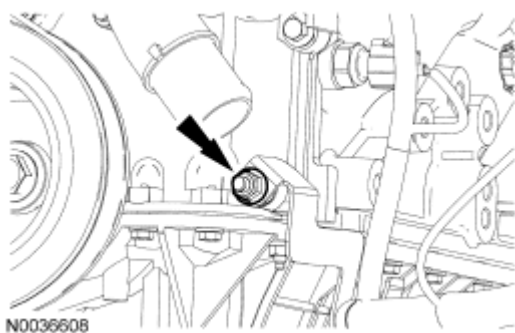


Fig. 5: Locating Wiring Harness Bracket Nut
Courtesy of FORD MOTOR CO.

NOTE: Do not rotate the engine counterclockwise. Rotating the engine counterclockwise will result in incorrect timing of the engine.

NOTE: The special tool must be installed on the damper and should contact the engine block, this positions the engine at TDC.

7. Install the special tool.

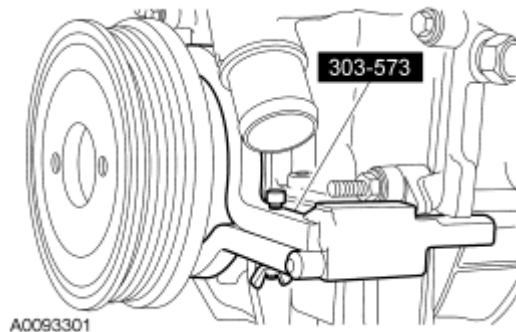


Fig. 6: Identifying Special Tool (303-573)
Courtesy of FORD MOTOR CO.

8. Install the special tools to the RH cylinder head and tighten the 2 top clamp bolts to 10 Nm (89 lb-in).

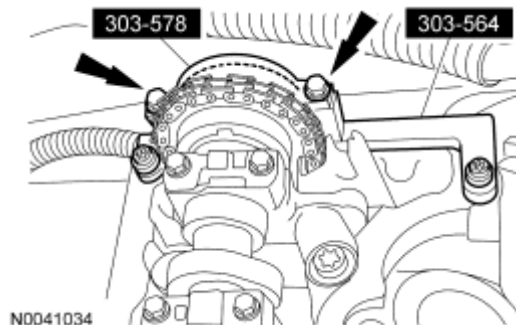


Fig. 7: Locating Clamp Bolts & Special Tools (303-564, 303-578)
Courtesy of FORD MOTOR CO.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

9. Using the special tool with the Camshaft Sprocket Nut Socket 303-565, loosen the RH camshaft sprocket bolt.

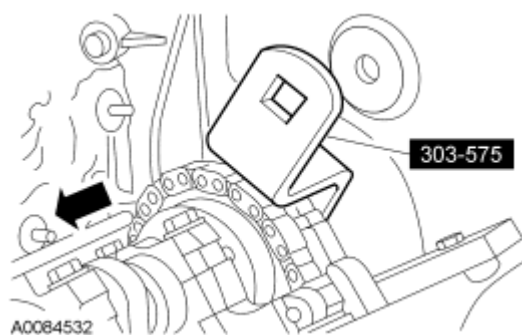


Fig. 8: Identifying Special Tool (303-575)
Courtesy of FORD MOTOR CO.

10. Loosen the top 2 special tool clamp bolts.

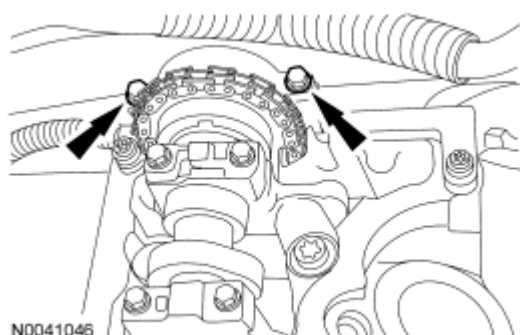


Fig. 9: Locating Clamp Bolts
Courtesy of FORD MOTOR CO.

NOTE: The camshaft timing slots are off-center.

11. Position the camshaft timing slots below the centerline of the camshaft to correctly fit the special tools and install the special tools on the front of the RH cylinder head.

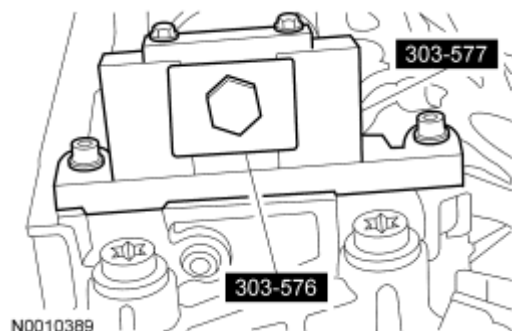


Fig. 10: Identifying Special Tools (303-576, 303-577)
Courtesy of FORD MOTOR CO.

12. Remove the RH hydraulic camshaft tensioner.

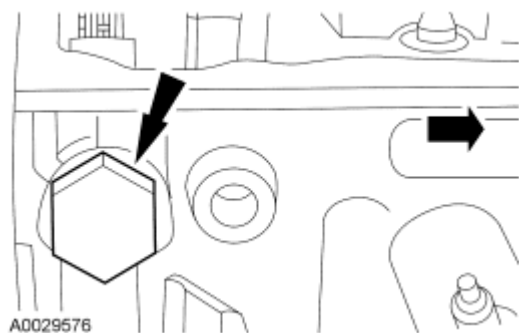


Fig. 11: Locating Hydraulic Camshaft Tensioner Bolt
Courtesy of FORD MOTOR CO.

13. Install the special tool.

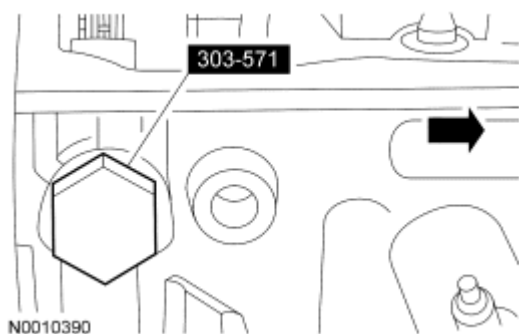


Fig. 12: Identifying Special Tool (303-571)
Courtesy of FORD MOTOR CO.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

14. Tighten the bolts.
 1. Tighten the special tool top 2 clamp bolts to 10 Nm (89 lb-in).
 2. Using the special tool with the Camshaft Sprocket Nut Socket 303-565, tighten the camshaft bolt to 61 Nm (45 lb-ft).

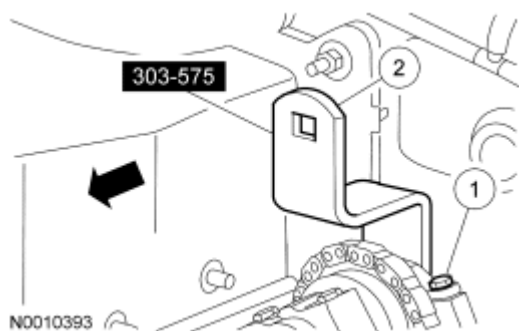


Fig. 13: Identifying Special Tool (303-575) & Clamp Bolt

Courtesy of FORD MOTOR CO.

15. Remove the special tool.

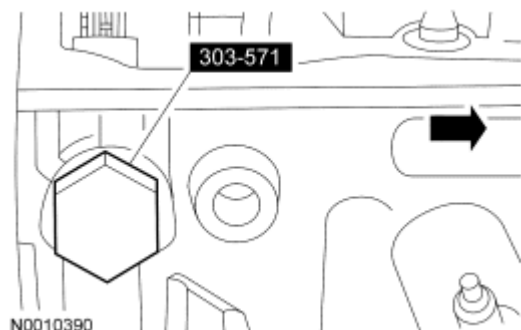


Fig. 14: Identifying Special Tool (303-571)
Courtesy of FORD MOTOR CO.

NOTE: Install a new O-ring seal on the tensioner and lubricate with clean engine oil.

16. Install the RH hydraulic camshaft tensioner.
- Tighten to 44 Nm (32 lb-ft).

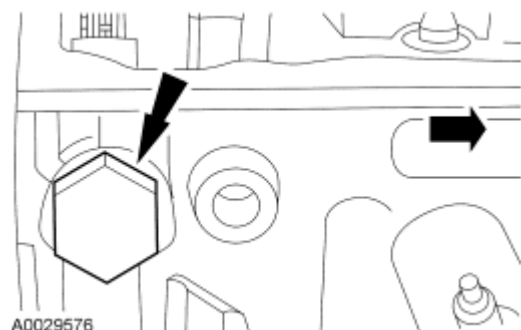


Fig. 15: Locating Hydraulic Camshaft Tensioner Bolt
Courtesy of FORD MOTOR CO.

17. Remove the special tools from the RH cylinder head.
18. Install the special tools on the front of the LH cylinder head and tighten the top 2 clamp bolts to 10 Nm (89 lb-in).

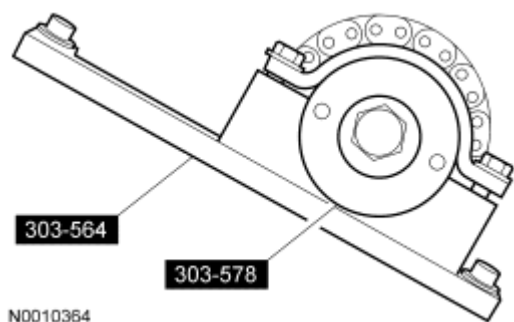


Fig. 16: Identifying Special Holding Tool
Courtesy of FORD MOTOR CO.

19. Loosen the LH camshaft sprocket bolt.

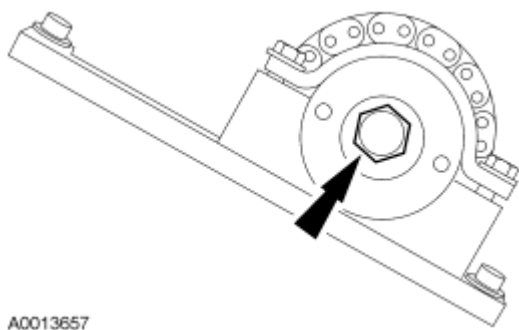


Fig. 17: Locating LH Camshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

20. Loosen the top 2 clamp bolts on the special tool to allow the camshaft sprocket to rotate freely.

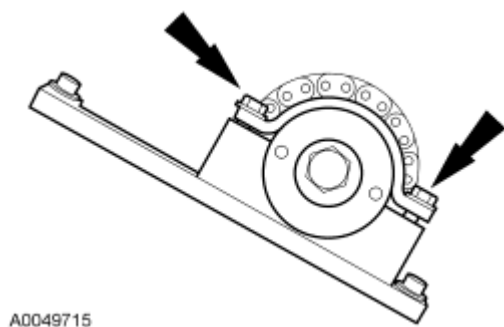


Fig. 18: Locating Clamp Bolts On Special Tool
Courtesy of FORD MOTOR CO.

NOTE: The camshaft timing slots are off-center.

21. Position the camshaft timing slots below the centerline of the camshaft to correctly fit the special tools, and install the special tools on the rear of the LH cylinder head.

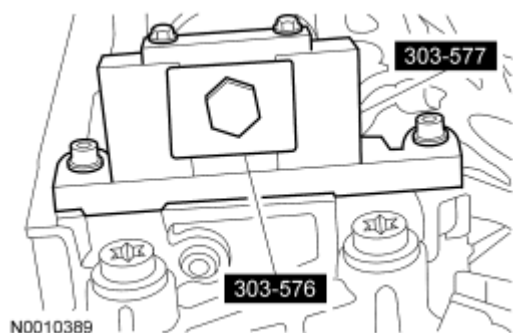


Fig. 19: Identifying Special Tools (303-576, 303-577)
Courtesy of FORD MOTOR CO.

22. Remove the LH hydraulic camshaft tensioner.

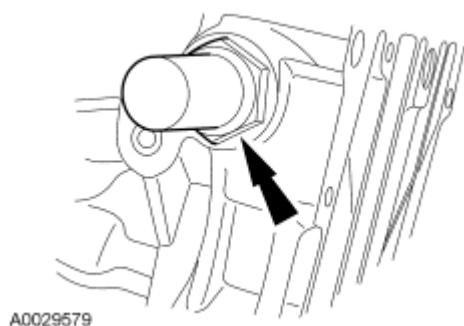


Fig. 20: Locating Camshaft Tensioner
Courtesy of FORD MOTOR CO.

23. Install the special tool.



Fig. 21: Identifying Special Tool (303-571)
Courtesy of FORD MOTOR CO.

24. Tighten the bolts.
1. Tighten the special tool top 2 clamp bolts to 10 Nm (89 lb-in).
 2. Tighten the LH camshaft bolt to 85 Nm (63 lb-ft).

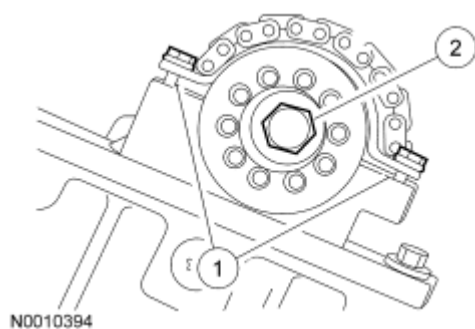


Fig. 22: Identifying Camshaft Bolt & Clamp Bolts
Courtesy of FORD MOTOR CO.

25. Remove the special tool.



Fig. 23: Identifying Special Tool (303-571)
Courtesy of FORD MOTOR CO.

NOTE: Install a new O-ring seal on the tensioner and lubricate with clean engine oil.

26. Install the LH hydraulic camshaft tensioner.
- Tighten to 44 Nm (32 lb-ft).

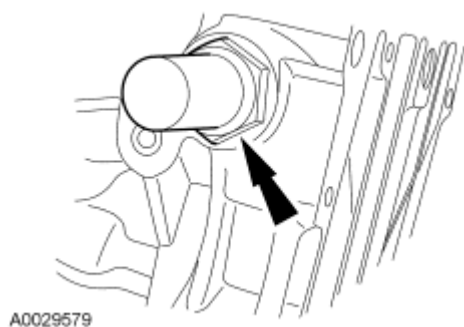


Fig. 24: Locating Camshaft Tensioner
Courtesy of FORD MOTOR CO.

27. Remove the special tools from the LH cylinder head.
28. Remove the special tool.

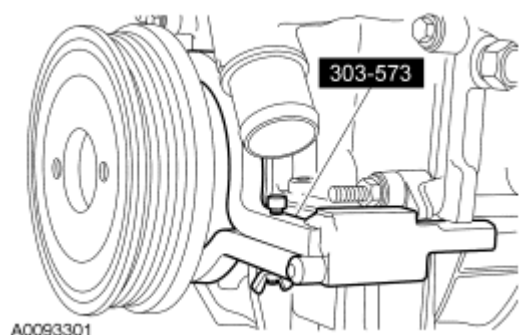


Fig. 25: Identifying Special Tool (303-573)
Courtesy of FORD MOTOR CO.

29. Position the battery cable bracket and install the nut.
 - Tighten to 20 Nm (15 lb-ft).

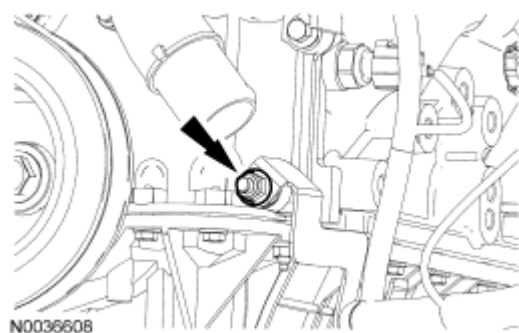


Fig. 26: Locating Wiring Harness Bracket Nut
Courtesy of FORD MOTOR CO.

30. If necessary, position the A/C compressor and power steering pump bracket and install the bolts.
 - Tighten to 42 Nm (31 lb-ft).

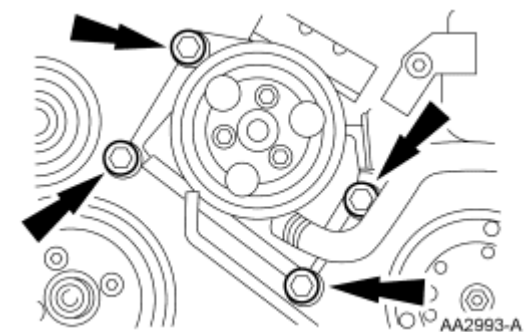


Fig. 27: Locating Power Steering Bracket & Bolts
Courtesy of FORD MOTOR CO.

31. If necessary, position the generator and install the bolts.
- Tighten to 47 Nm (35 lb-ft).

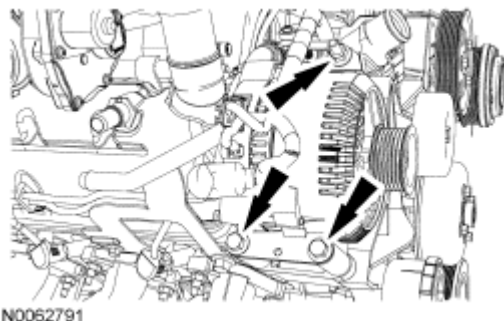


Fig. 28: Locating Generator Bolts
Courtesy of FORD MOTOR CO.

32. If necessary, rotate the accessory drive belt tensioner counterclockwise and install the accessory drive belt.

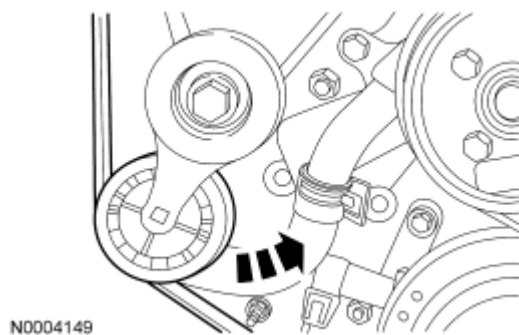


Fig. 29: Rotating Accessory Drive Belt Tensioner Counterclockwise
Courtesy of FORD MOTOR CO.

33. Install the camshaft roller followers. For additional information, refer to **Camshaft Roller Follower**.

IN-VEHICLE SERVICING

INTAKE MANIFOLD

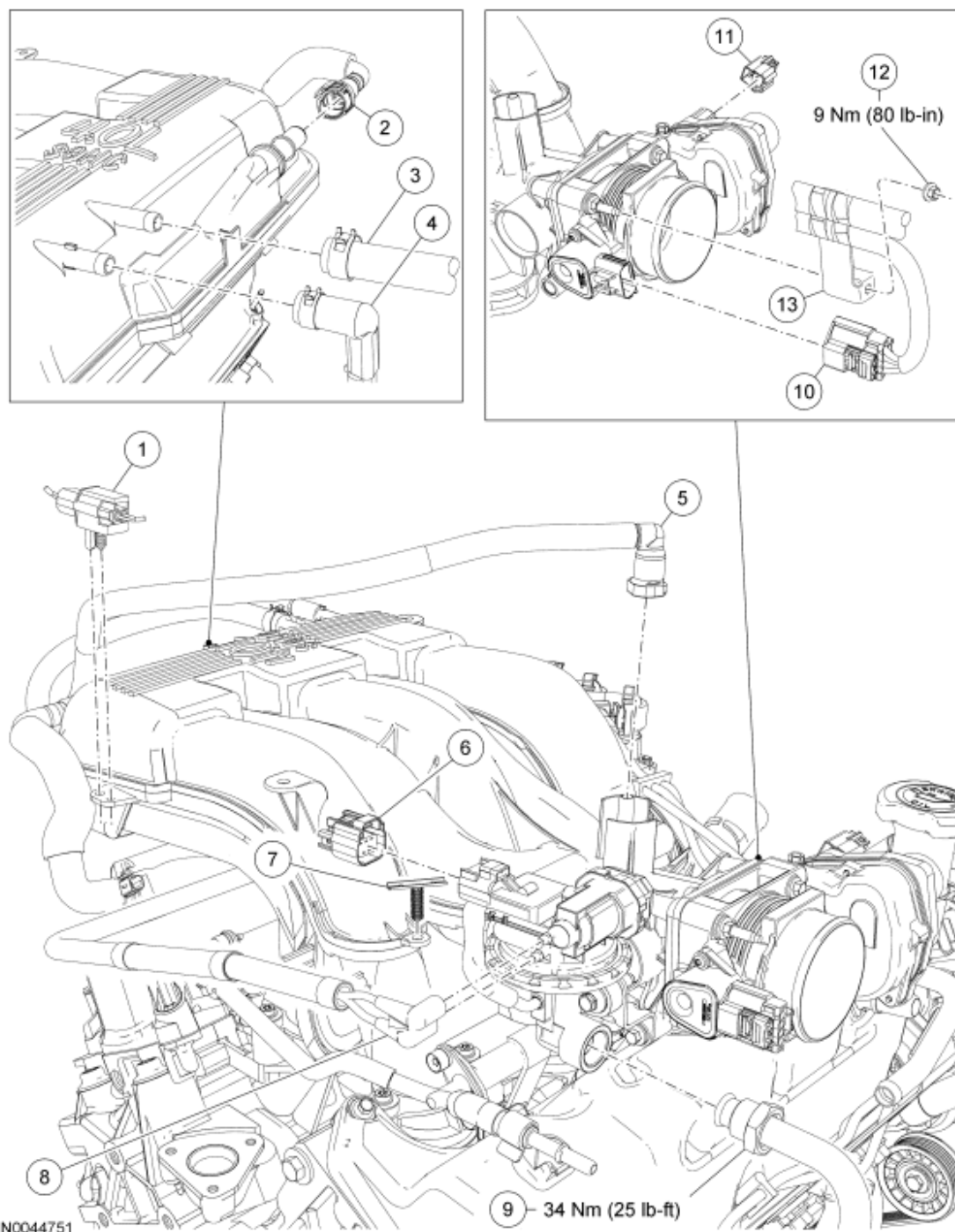


Fig. 30: Intake Manifold Connections With Torque Specifications
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Knock Sensor (KS) electrical connector
2	6K817	PCV tube
3	9C482	Brake booster vacuum supply hose

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

4	9E499	Engine main vacuum harness-to-intake manifold fitting (part of 9E498)
5	9D289	Evaporative Emission (EVAP) tube
6	14A464	EGR system module electrical connector (part of 12B637)
7	-	Wiring harness pin-type retainer (part of 12B637)
8	9E499	EGR system module vacuum fitting (part of 9E498)
9	9J471	EGR tube fitting (part of 9E469)
10	14A464	Throttle Position (TP) sensor electrical connector (part of 12B637)
11	14A464	Electronic Throttle Body (ETB) electrical connector (part of 12B637)
12	-	Wiring harness nut
13	-	Wiring harness bracket

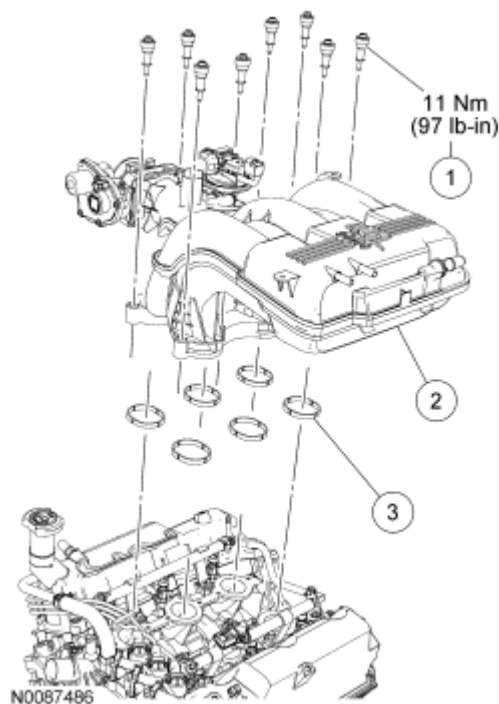


Fig. 31: Intake Manifold With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9K479	Intake manifold bolt (8 required)
2	9424	Intake manifold
3	9461	Intake manifold gasket (6 required)

REMOVAL AND INSTALLATION

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: Do not carry personal electronic devices such as cell phones, pagers or audio equipment 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: Always disconnect the battery ground cable at the battery when working on an evaporative emission (EVAP) system or fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

1. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Detach the Knock Sensor (KS) electrical connector from the intake manifold.
4. Disconnect the PCV tube from the intake manifold.
5. Disconnect the brake booster vacuum hose from the intake manifold.
6. Disconnect the main vacuum harness fitting from the intake manifold.
7. Disconnect the Evaporative Emission (EVAP) tube from the intake manifold.
8. Disconnect the EGR system module electrical connector.
9. Detach the wiring harness retainer.
10. Disconnect the EGR system module vacuum fitting.
11. Loosen the fitting and disconnect the exhaust manifold-to-EGR system module tube from the EGR system module.
 - To install, tighten to 34 Nm (25 lb-ft).
12. Disconnect the Throttle Position (TP) sensor electrical connector.
13. Disconnect the Electronic Throttle Body (ETB) electrical connector.
14. Remove the nut and detach the wiring harness bracket from the ETB.
 - To install, tighten to 9 Nm (80 lb-in).
15. Remove the 8 bolts, the intake manifold and the 6 gaskets.
 - To install, tighten to 11 N.m (97 lb-in).

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools can cause

scratches and gouges which can make leak paths. Use a plastic scraping tool to remove all traces of the old intake manifold gaskets

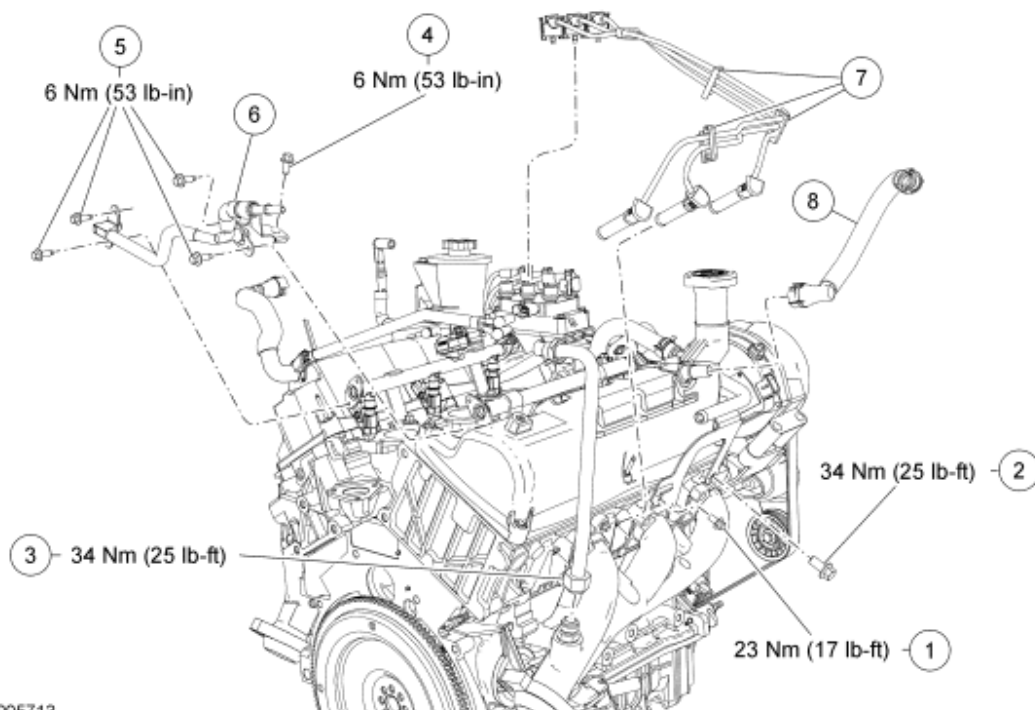
16. Clean the sealing surfaces and inspect the gaskets. Install new gaskets if necessary.

17. To install, reverse the removal procedure.

VALVE COVER - RH

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A



N0005713

Fig. 32: Heater Hose Tube, Spark Plug Wires, Fuel Supply Tube and Crankcase Ventilation Tube With Torque Specifications

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W500023	Heater hose tube bracket rear bolt
2	W500041	Heater hose tube bracket front bolt
3	9E469	EGR system module tube fitting
		Fuel supply tube-to-valve cover bracket

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

4	W500204	bolt
5	W708086	Fuel supply tube bolts (4 required)
6	9E964	Fuel supply tube
7	12297	Spark plug wire retainers
8	6758	Crankcase ventilation tube

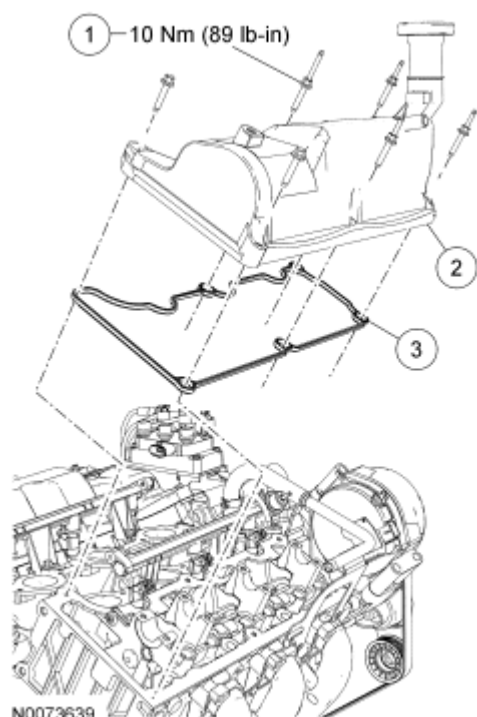


Fig. 33: RH Valve Cover With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6C519	RH valve cover fastener (6 required)
2	6582	RH valve cover
3	6584	RH valve cover gasket

REMOVAL AND INSTALLATION

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: Do not carry personal electronic devices such as cell phones, pagers or audio equipment 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: Always disconnect the battery ground cable at the battery when working on an evaporative emission (EVAP) system or fuel-related component. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in serious personal injury.

1. Disconnect the spring lock coupling from the fuel supply tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the intake manifold. For additional information, refer to **Intake Manifold**.
4. Remove the heater hose tube bracket rear bolt.
 - To install, tighten to 23 Nm (17 lb-ft).
5. Remove the heater hose tube bracket front bolt.
 - To install, tighten to 34 Nm (25 lb-ft).
6. Loosen the exhaust manifold-to-EGR system module tube lower fitting and remove the tube.
 - To install, tighten to 34 Nm (25 lb-ft).

NOTE: Use O-ring seals that are made of special fuel-resistant material. Use of ordinary O-ring seals may cause the fuel system to leak.

7. Remove the fuel supply tube-to-valve cover bracket bolt, the 4 fuel supply tube bolts and the fuel supply tube. Remove and discard the O-ring seals.
 - Install new O-ring seals and lubricate them with clean engine oil.
 - To install, tighten to 6 Nm (53 lb-in).
8. Detach the spark plug wire retainers and position the spark plug wires aside.
9. Remove the crankcase ventilation tube.
10. Remove the 6 bolts and the valve cover.
 - To install, tighten to 10 Nm (89 lb-in).

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

11. Clean and inspect the sealing surfaces and the gasket. Install a new gasket if necessary.
12. To install, reverse the removal procedure.

VALVE COVER - LH

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

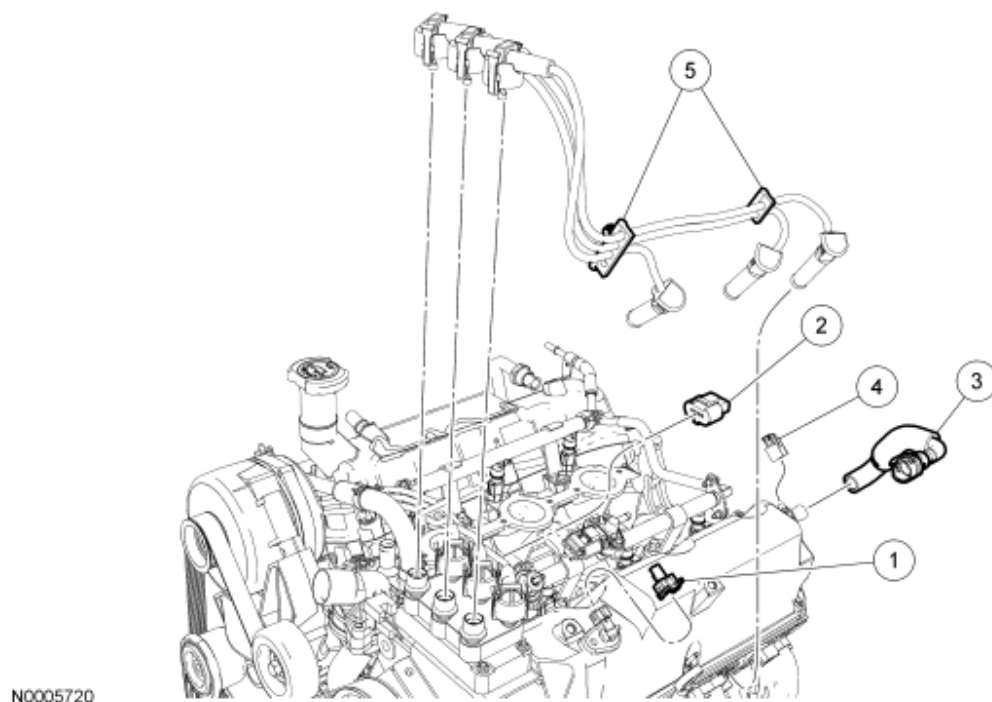
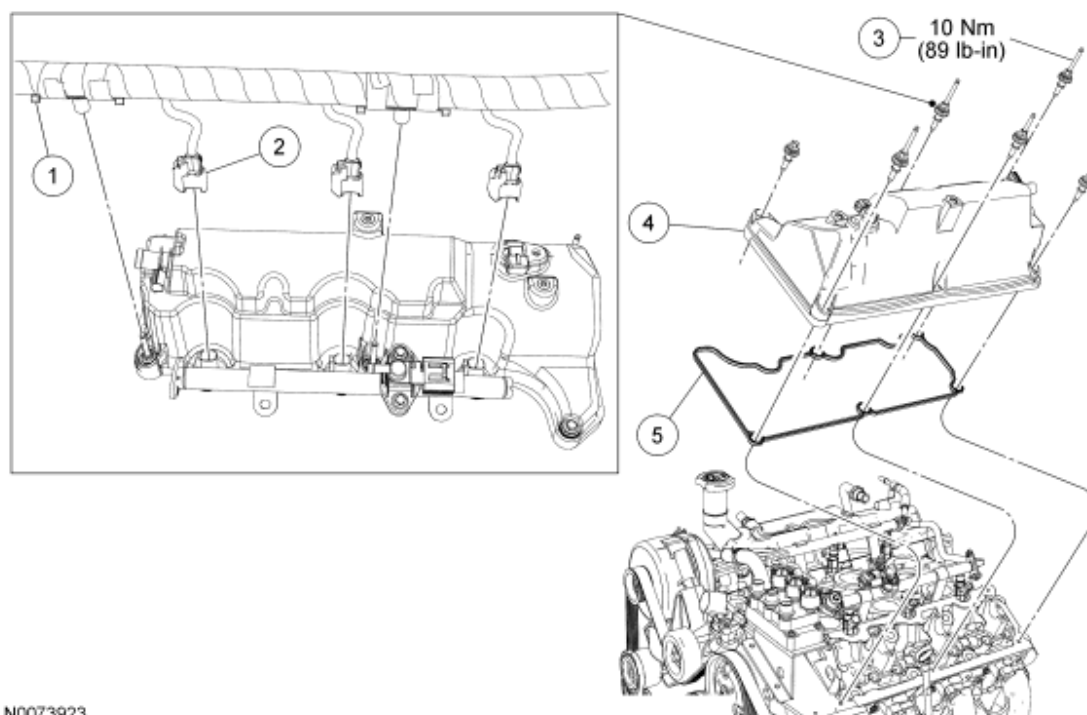


Fig. 34: Ignition and PCV Components, and Camshaft Position (CMP) Sensor
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Camshaft Position (CMP) sensor electrical connector (part of 180101)
2	12B637	Ignition coil electrical connector
3	6K817	PCV valve tube
4	14A464	PCV valve electrical connector (part of 12A580)
5	-	Spark plug wire retainers



N0073923

Fig. 35: LH Valve Cover With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	13A506	Wiring harness retainer (2 required)
2	14A464	Fuel injector electrical connector (3 required)
3	6C519	Valve cover fastener (6 required)
4	6A505	LH valve cover
5	6584	LH valve cover gasket

REMOVAL AND INSTALLATION

1. Remove the intake manifold. For additional information, refer to **Intake Manifold**.
2. Disconnect the Camshaft Position (CMP) sensor electrical connector.
3. Disconnect the ignition coil electrical connector. Detach the wiring harness retainer.
4. Disconnect the 3 fuel injector electrical connectors. Detach the wiring harness retainers.
5. Remove the PCV valve tube.
6. Disconnect the PCV valve electrical connector.
7. Detach the spark plug wire retainers.
8. Remove the 6 bolts and the valve cover.
 - To install, tighten to 10 Nm (89 lb-in).

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

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 the old valve cover gasket.

9. Clean and inspect the sealing surfaces and the gasket. Install a new gasket if necessary.
10. To install, reverse the removal procedure.

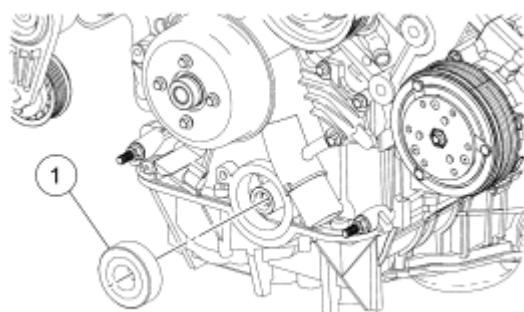
CRANKSHAFT FRONT SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST2439-A	Aligner, Front Cover	303-093 (T74P-6019-A)
 ST2428-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST1288-A	Remover, Crankshaft Front Oil Seal	303-107 (T74P-6700-A)

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A



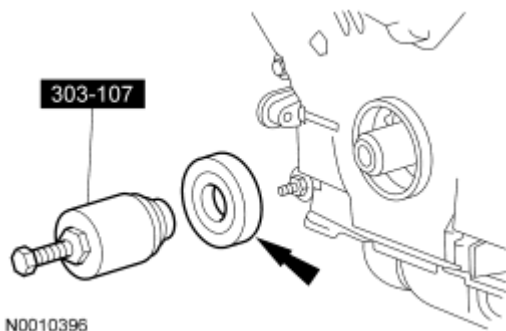
N0005726

Fig. 36: Exploded View Of Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6700	Front crankshaft seal

REMOVAL

1. Remove the crankshaft pulley. For additional information, refer to **Crankshaft Pulley**.
2. Using the Crankshaft Front Oil Seal Remover, remove and discard the crankshaft front seal.



N0010396

Fig. 37: Locating Special Tool And Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Lubricate the new front seal with clean engine oil.

1. Using the Front Cover Aligner and the Crankshaft Vibration Damper Installer, install a new crankshaft front seal.

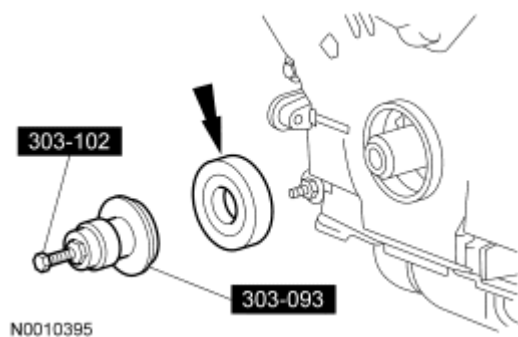
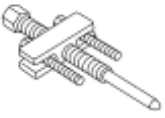


Fig. 38: Identifying Special Tools (303-102, 303-093) & Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

2. Install the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#).

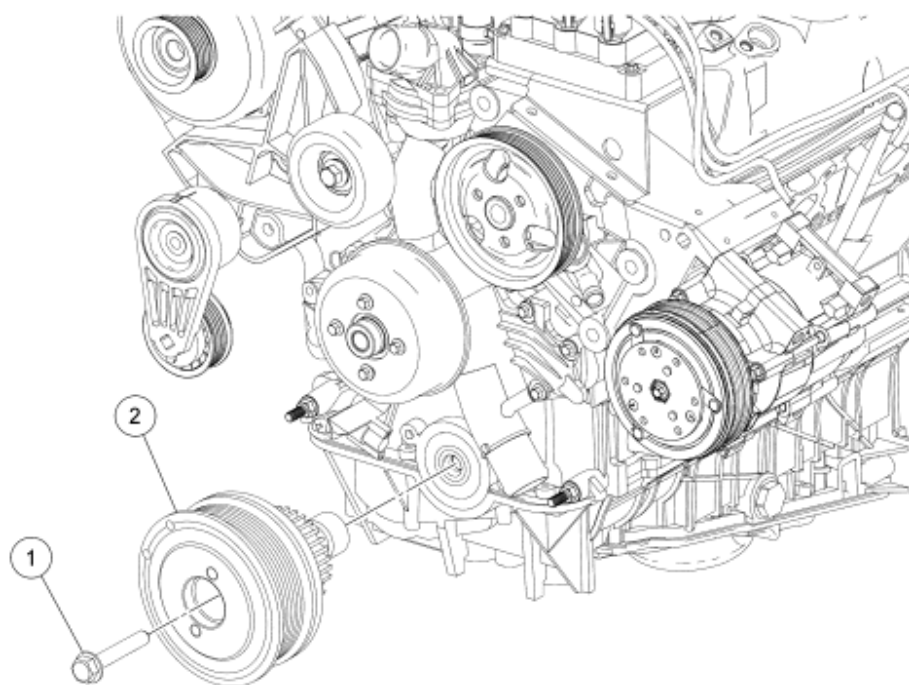
CRANKSHAFT PULLEY

Special Tools

Illustration	Tool Name	Tool Number
 ST2428-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST1784-A	Remover, Crankshaft Vibration Damper	303-101 (T74P-3616-A)
 ST2897-A	Remover, Crankshaft Vibration Damper	303-773
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

General Equipment

8-mm x 1.25 x 100-mm bolts (2 required)



N0005727

Fig. 39: Exploded View Of Crankshaft Pulley
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	E800511	Crankshaft pulley bolt
2	6B321	Crankshaft pulley

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the fan shroud. For additional information, refer to **ENGINE COOLING** article.
3. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.

NOTE: This bolt is torque-to-yield and cannot be reused.

4. Using the Strap Wrench to hold the crankshaft pulley, remove the bolt.

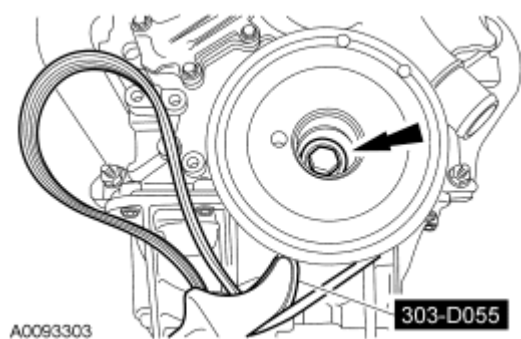


Fig. 40: Holding Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: If the pulley bolt is not installed, the tool will bottom out before the pulley is off.

5. Install the crankshaft pulley bolt 2 to 3 turns. Using the 2 Crankshaft Vibration Damper Removers and the two 8-mm bolts, remove the crankshaft pulley.
 - Discard the crankshaft pulley bolt.

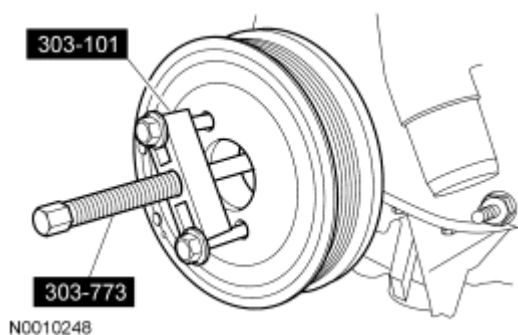


Fig. 41: Identifying Special Tool (303-773, 303-101)
Courtesy of FORD MOTOR CO.

INSTALLATION

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



Fig. 42: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

2. Using the Strap Wrench to hold the crankshaft pulley, install a new crankshaft pulley bolt. Tighten the bolt in 2 stages.
 - Stage 1: Tighten to 45 Nm (33 lb-ft).
 - Stage 2: Tighten an additional 85 degrees.

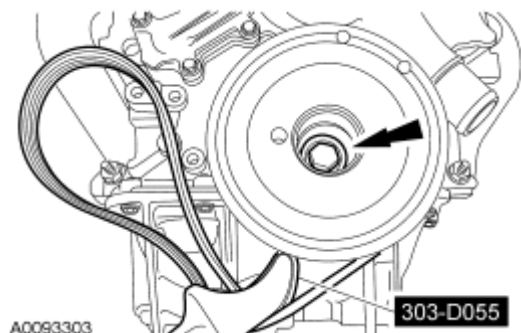
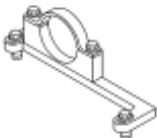


Fig. 43: Holding Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

3. Install the accessory drive belt. For additional information, refer to [ACCESSORY DRIVE](#) article.
4. Install the fan shroud. For additional information, refer to [ENGINE COOLING](#) article.

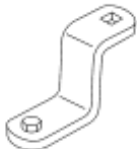
CYLINDER HEAD

Special Tools

Illustration	Tool Name	Tool Number
 ST1776-A	Adapter for 303-564	303-578 (T97T-6256-A) or equivalent
 ST1777-A	Holding Tool, Camshaft Sprocket	303-564 (T97T-6256-B) or equivalent
 ST1394-A	Remover, Spark Plug Wire	303-106 (T74P-6666-A)

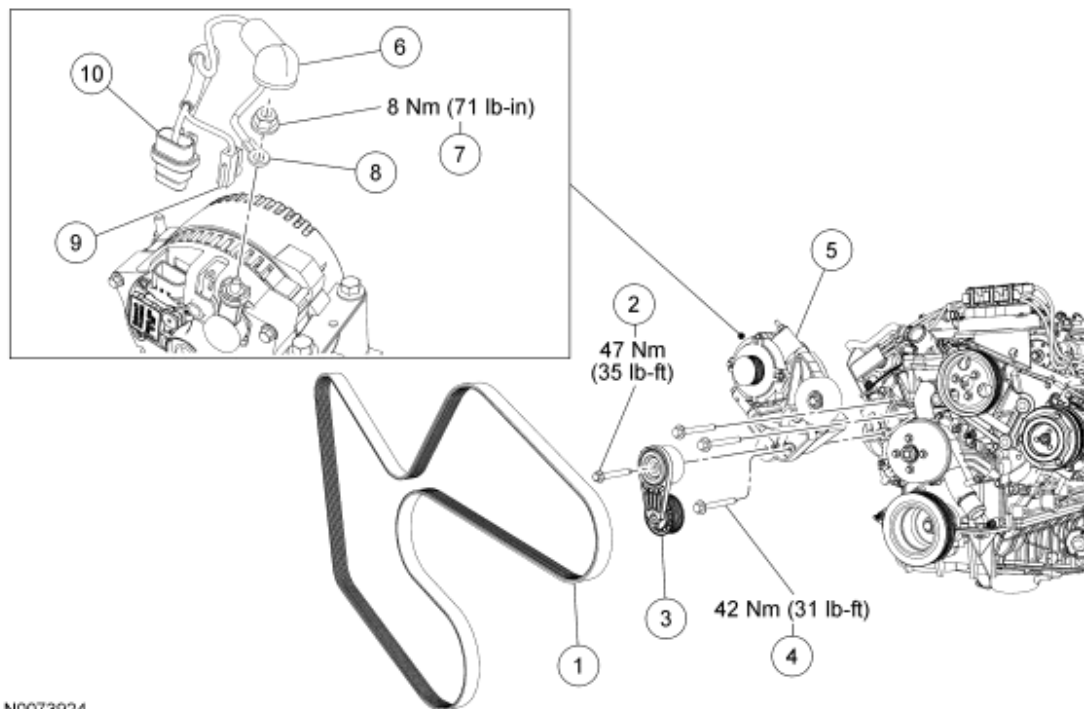
2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

 ST1781-A	Socket, Camshaft Sprocket Nut	303-565 (T97T-6256-G) or equivalent
 ST1780-A	Torque Wrench Extension	303-575 (T97T-6256-F) or equivalent

Material

Item	Specification
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A



N0073924

Fig. 44: Accessory Drive Belt, Tensioner and Generator Bracket With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	8620	Accessory drive belt
2	W500325	Accessory drive belt tensioner bolt
3	6B209	Accessory drive belt tensioner

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

4	N807938	Generator bracket bolt (3 required)
5	10239	Generator bracket
6	14A240	Generator B+ terminal cover (part of 12A280)
7	-	Generator B+ terminal nut
8	-	Generator B+ terminal
9	14489	Generator electrical connector (part of 14A280)
10	14489	Generator electrical connector (part of 14A280)

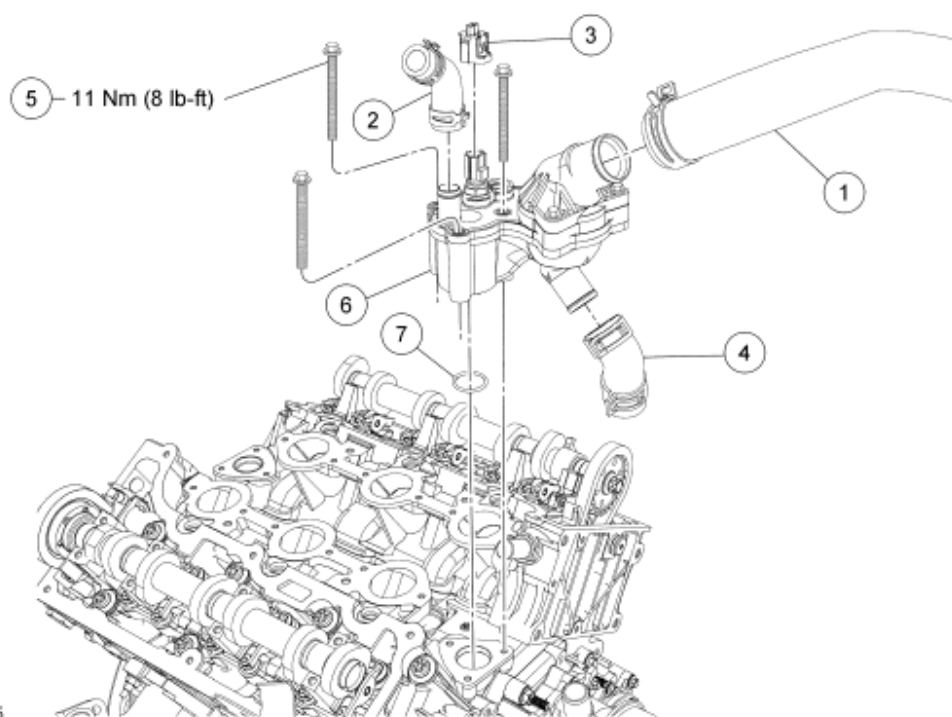


Fig. 45: Thermostat Housing With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	8B274	Upper radiator hose
2	18472	Heater hose
3	14A464	Engine coolant temperature (ECT) sensor electrical connector (part of 12B637)
4	8548	Bypass hose
5	W702527	Thermostat housing bolt (3 required)
6	9K478	Thermostat housing
7	8255	O-ring seal

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

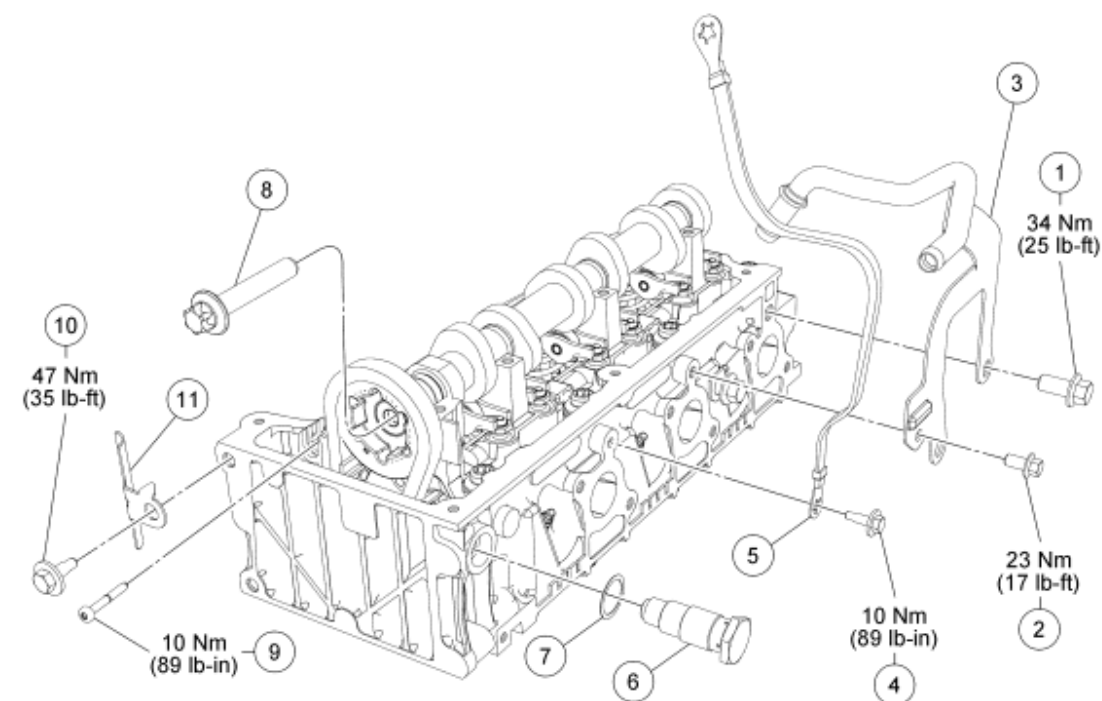
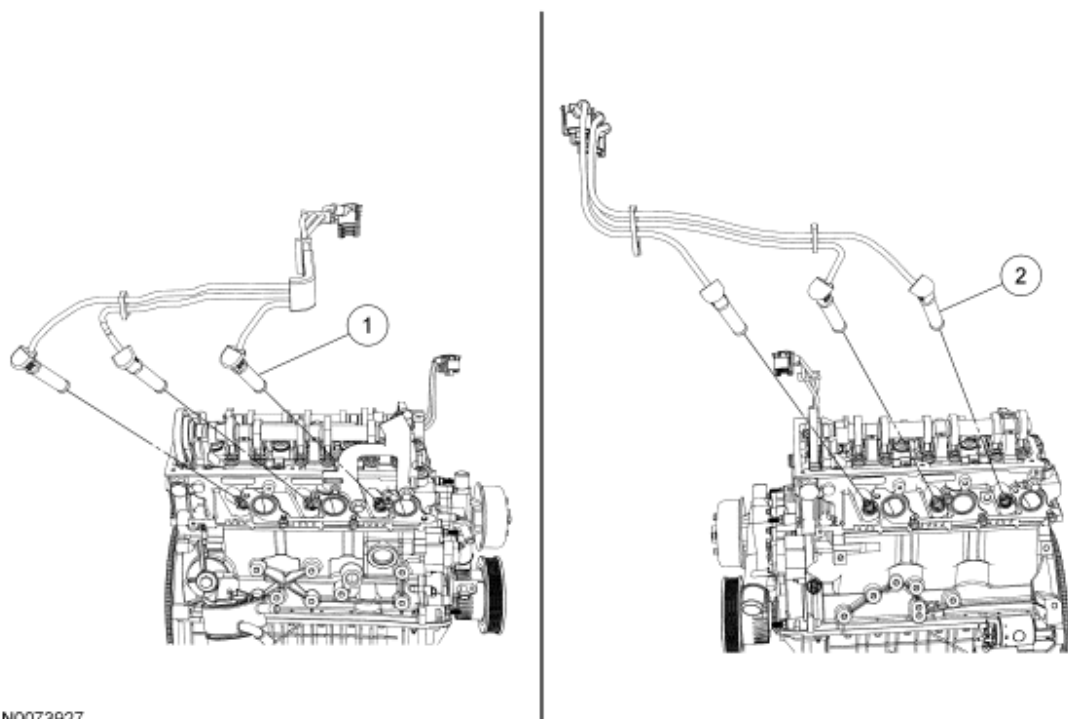


Fig. 46: RH Cylinder Head Attachments With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W500041	Heater tube assembly front bolt
2	W500022	Heater tube assembly rear bolt
3	18696	Heater tube assembly
4	W505421	Engine ground strap bolt
5	19A095	Engine ground strap
6	6K254	RH hydraulic timing chain tensioner
7	-	RH hydraulic timing chain tensioner O-ring seal
8	6M276	RH camshaft sprocket bolt
9	6U000	RH timing cassette-to-cylinder head bolt
10	W505430	Wiring harness retainer bolt
11	14C508	Wiring harness retainer (part of 12B637)

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



N0073927

Fig. 47: Spark Plug Wires
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	12280	RH spark plug wire (3 required)
2	12281	LH spark plug wire (3 required)

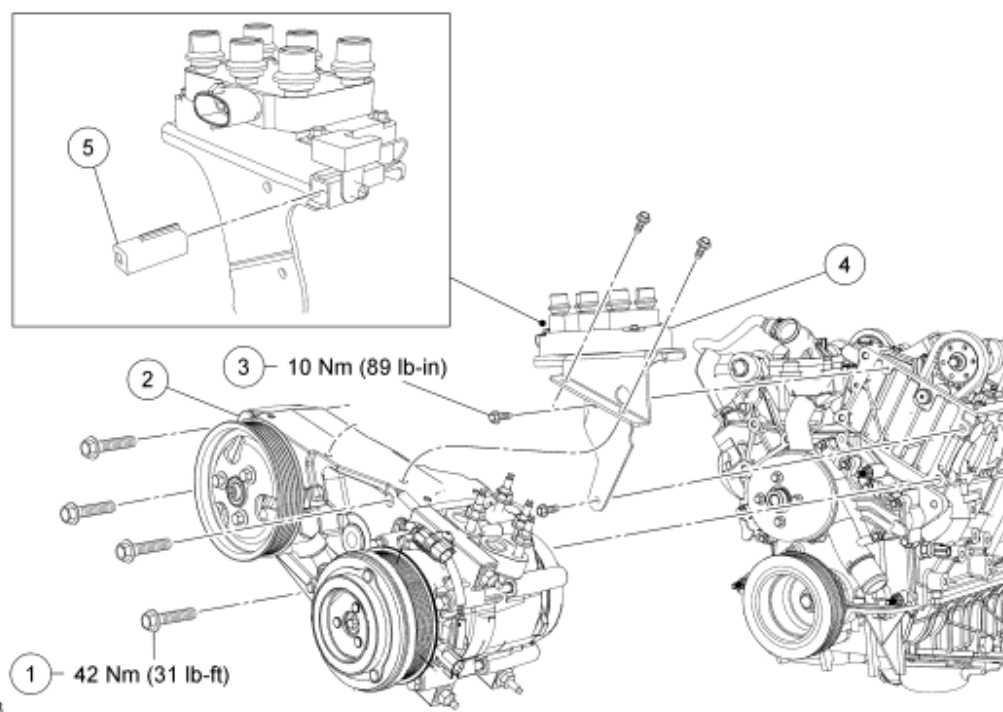


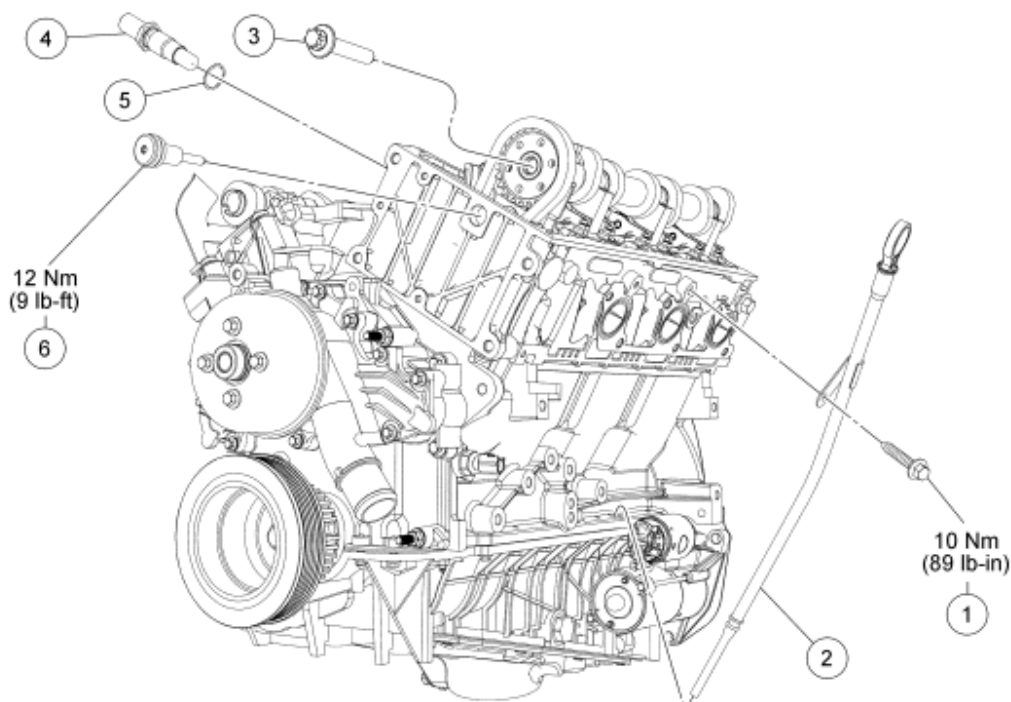
Fig. 48: Power Steering Pump and A/C Compressor Bracket and Ignition Coil With Torque Specifications

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N807938	A/C compressor and power steering pump bracket bolt (4 required)
2	19E708	A/C compressor and power steering pump bracket
3	-	Ignition coil and bracket assembly bolt (4 required)
4	12A310	Ignition coil and bracket assembly
5	14A464	Radio ignition interference capacitor electrical connector (part of 12B637)

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



N0073929

Fig. 49: LH Cylinder Head Attachments With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Oil level indicator tube assembly bolt
2	6754	Oil level indicator tube assembly
3	6M276	LH camshaft sprocket bolt
4	6K254	LH hydraulic timing chain tensioner
5	-	LH hydraulic timing chain tensioner O-ring seal
6	6U001	LH timing cassette-to-cylinder head bolt

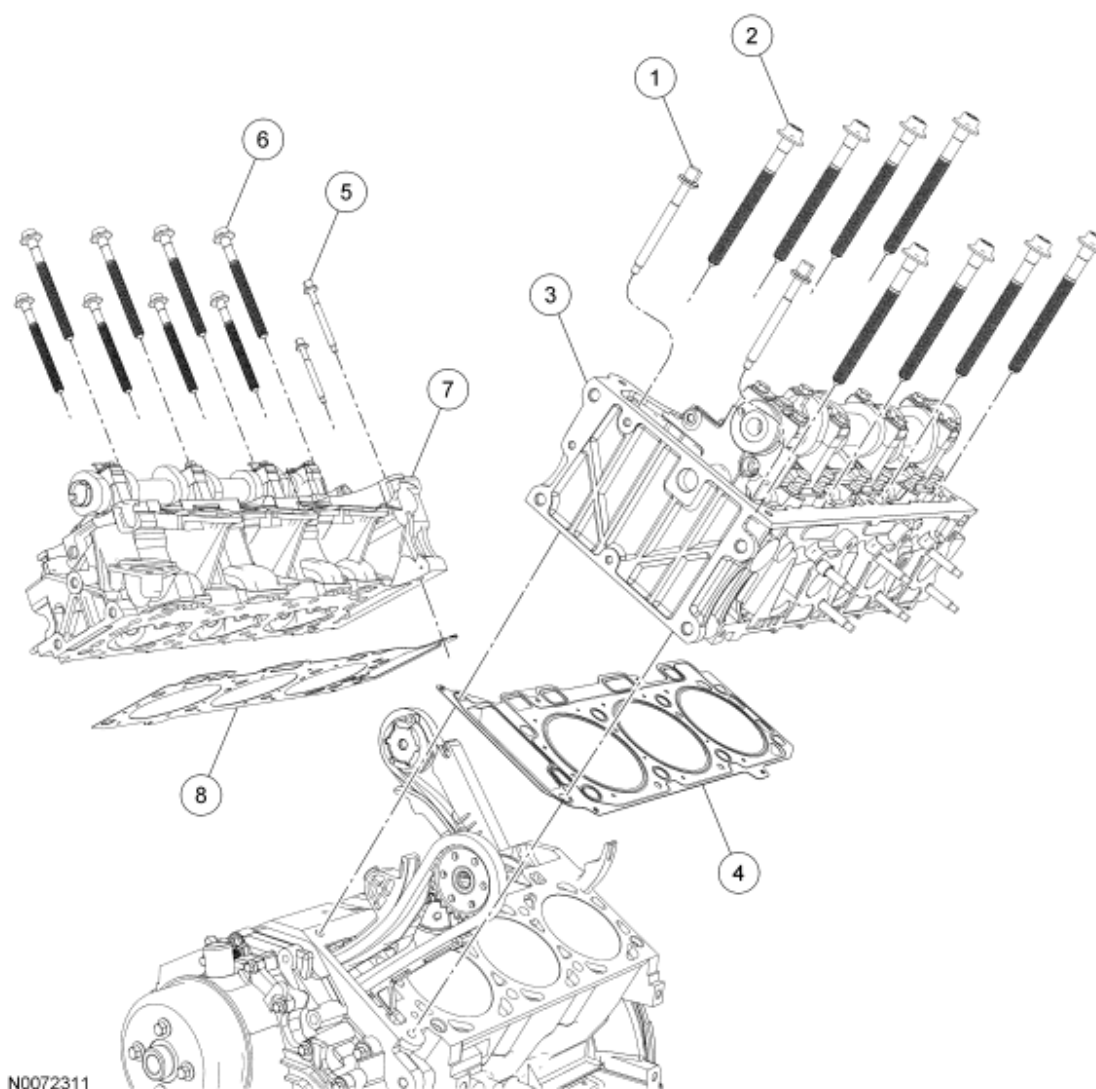


Fig. 50: Cylinder Heads
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6065	LH cylinder head bolt (M8) (2 required)
2	6065	LH cylinder head bolt (M12) (8 required)
3	6M099	LH cylinder head
4	6083	LH cylinder head gasket
5	6065	RH cylinder head bolt (M8) (2 required)
6	6065	RH cylinder head bolt (M12) (8 required)
7	6049	RH cylinder head
8	6051	RH cylinder head gasket

REMOVAL

Both sides

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING** article.
3. Remove the roller followers. For additional information, refer to **Camshaft Roller Follower**.
4. Rotate the accessory drive belt tensioner counterclockwise and remove the drive belt.

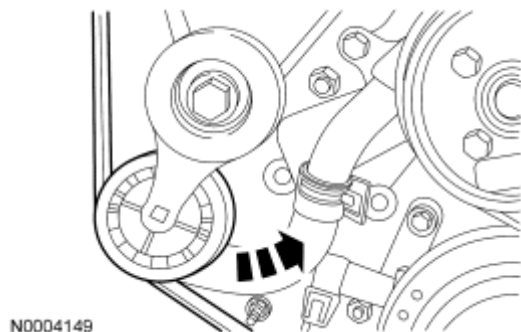


Fig. 51: Rotating Accessory Drive Belt Tensioner Counterclockwise
Courtesy of FORD MOTOR CO.

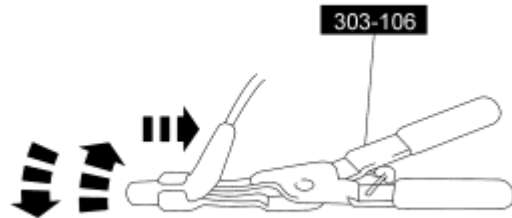
RH side

5. Remove the bolts and position the heater hose tube bracket aside.
6. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
7. Disconnect the generator electrical connections.
8. Remove the bolt and the accessory drive belt tensioner.
9. Remove the generator mounting bracket assembly.
10. Disconnect the heater hose from the thermostat housing.
11. Disconnect the engine coolant temperature (ECT) sensor electrical connector.
12. Disconnect the upper radiator hose from the thermostat housing.
13. Position the bypass hose clamp aside.
14. Remove the bolts and the thermostat housing.
15. Remove the bolt and position the engine wiring harness aside.
16. Remove the engine ground strap.

NOTE: It is important to twist the spark plug wire boot while pulling upward to avoid damage to the spark plug wire.

NOTE: Spark plug wires must be connected to the correct spark plug. Mark the spark plug wires for installation reference.

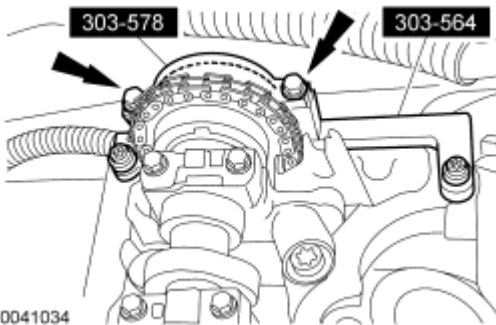
17. With a twisting motion, use the special tool to pull the spark plug wires from the RH spark plugs.



N0009966

Fig. 52: Pulling Spark Plug Wire Off Spark Plug
Courtesy of FORD MOTOR CO.

18. Remove the RH exhaust manifold. For additional information, refer to Exhaust Manifold - RH.
19. Remove the RH hydraulic timing chain tensioner.
20. Install the special tools.
 - Tighten to 10 Nm (89 lb-in).



N0041034

Fig. 53: Locating Clamp Bolts & Special Tools (303-564, 303-578)
Courtesy of FORD MOTOR CO.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

21. Using the special tool with the Camshaft Sprocket Nut Socket 303-565, remove the RH camshaft bolt.

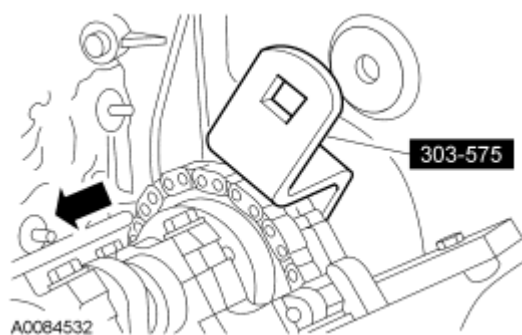


Fig. 54: Identifying Special Tool (303-575)
Courtesy of FORD MOTOR CO.

22. Remove the RH side cassette-to-cylinder head bolt.

NOTE: Remove the camshaft sprocket from the timing chain to gain clearance to remove the cylinder head. Leaving the sprocket in place can damage the cassette and prevent the cylinder head from being removed.

NOTE: Hold the timing chain and cassette with a rubber band to aid in removal and to prevent the timing chain from falling into the cylinder block.

23. Remove the RH camshaft sprocket from the timing chain. Install a rubber band around the cassette and the timing chain.

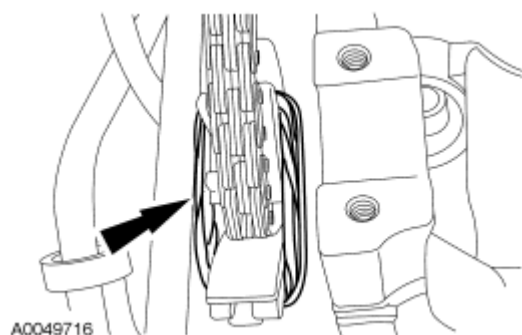


Fig. 55: Locating RH Camshaft Sprocket
Courtesy of FORD MOTOR CO.

LH side

24. Disconnect the radio ignition interference capacitor electrical connector.
25. Remove the ignition coil and bracket assembly-to-A/C compressor and power steering pump bracket bolts.
26. Remove the bolts and position the A/C compressor and power steering pump bracket aside.
27. Remove the ignition coil and bracket assembly-to-cylinder head bolts and the ignition coil and bracket assembly.

28. Remove the bolt and the oil level indicator tube.
29. Remove the LH exhaust manifold. For additional information, refer to **Exhaust Manifold - LH**.
30. Remove the LH hydraulic timing chain tensioner.
31. Install the special tools.
 - Tighten the top clamp bolts to 10 Nm (89 lb-in).

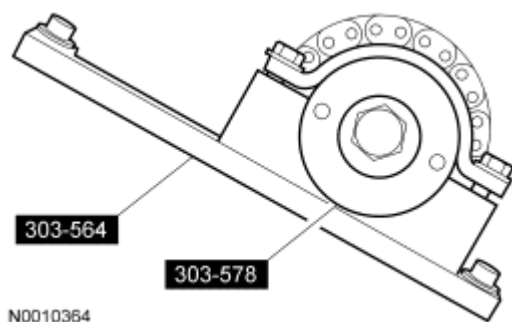


Fig. 56: Identifying Special Holding Tool
Courtesy of FORD MOTOR CO.

32. Remove the LH side camshaft sprocket bolt.
33. Remove the LH timing cassette-to-cylinder head bolt.

NOTE: Remove the camshaft sprocket from the timing chain to gain clearance to remove the cylinder head. Leaving the sprocket in place can damage the cassette and prevent the cylinder head from being removed.

NOTE: Hold the timing chain and cassette with a rubber band to aid in removal and to prevent the timing chain from falling into the cylinder block.

34. Remove the LH camshaft sprocket from the timing chain. Install a rubber band around the cassette and the timing chain.

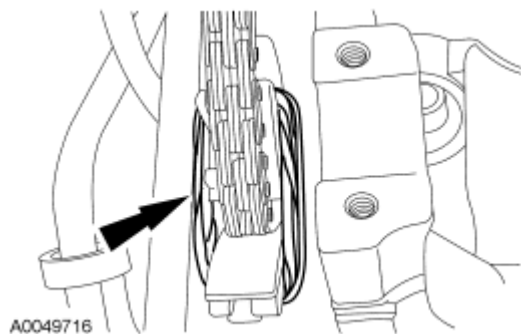


Fig. 57: Locating RH Camshaft Sprocket
Courtesy of FORD MOTOR CO.

Both sides

- NOTE:** To avoid damage to the timing chain cassette, an assistant will be required to help lift the cylinder head from the vehicle.
- NOTE:** On the RH side, when lifting the cylinder head, be careful to avoid contacting the A/C tube or the A/C tube can be damaged.
- NOTE:** New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

35. Remove the cylinder heads.

- Remove the cylinder head bolts in the sequence shown. Discard all bolts.
- Remove and discard the head gasket.

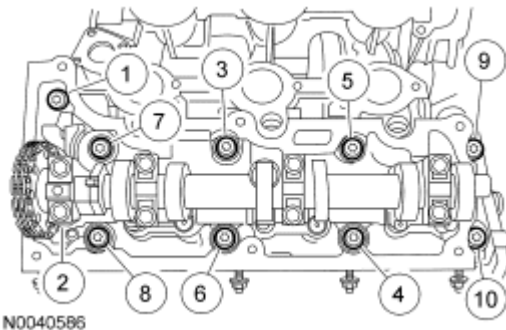


Fig. 58: Identifying Cylinder Head Bolts Tightening Sequence

Courtesy of FORD MOTOR CO.

- NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean 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.

36. Clean and inspect the mating surfaces.

37. Inspect the cylinder head and the cylinder block for flatness. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.**INSTALLATION****Both sides**

1. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.
2. Position the cylinder head gasket on the block.

RH side

NOTE: To avoid damage to the timing chain cassette, an assistant will be required to help position the cylinder head in the vehicle.

NOTE: On the RH side, when lifting the cylinder head, be careful to avoid contacting the A/C tube or the A/C tube can be damaged.

NOTE: New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

3. Install the cylinder head. Install 8 new 12-mm bolts and tighten in the sequence shown in 2 stages.
 - Stage 1: Tighten to 12 Nm (9 lb-ft).
 - Stage 2: Tighten to 25 Nm (18 lb-ft).

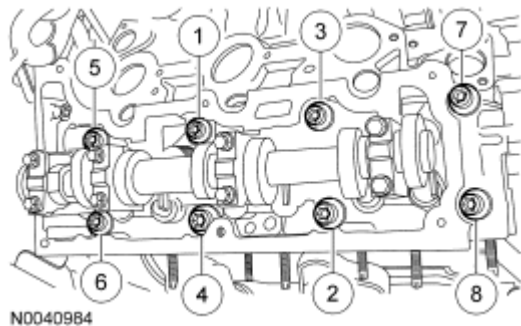


Fig. 59: Identifying Tightening Sequence Of 12-MM Bolts
Courtesy of FORD MOTOR CO.

4. Install 2 new 8-mm bolts.
 - Tighten to 32 Nm (24 lb-ft).

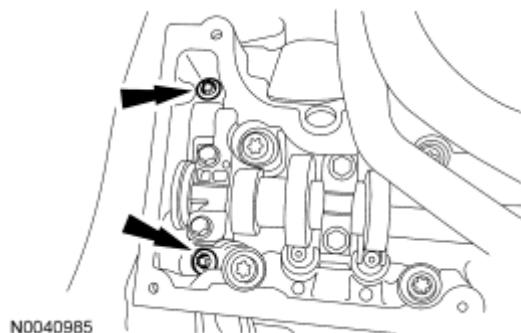


Fig. 60: Locating 8-Mm Bolts
Courtesy of FORD MOTOR CO.

5. Tighten the eight 12-mm bolts in the sequence shown in 2 stages.
 - Stage 1: Tighten 90 degrees.

- Stage 2: Tighten an additional 90 degrees.

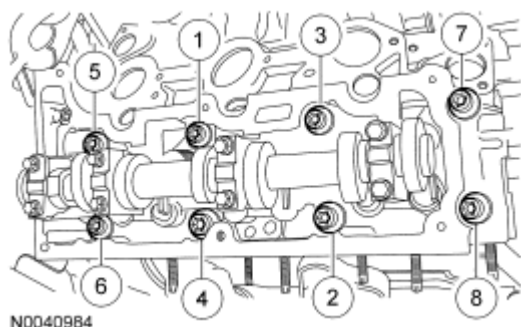


Fig. 61: Identifying Tightening Sequence Of 12-MM Bolts
Courtesy of FORD MOTOR CO.

NOTE: The camshaft gear must turn freely on the camshaft. **DO NOT** tighten the bolt at this time. Tightening the bolt can result in incorrect engine timing.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

- Remove the rubber band. Install the camshaft sprocket and bolt.
- Install the RH timing cassette-to-cylinder head bolt.
 - Tighten to 10 Nm (89 lb-in).
- Install the RH exhaust manifold. For additional information, refer to **Exhaust Manifold - RH**.

NOTE: Apply silicone brake caliper grease and dielectric compound to the inside of the spark plug boots.

- Connect the spark plug wires to the RH spark plugs.
- Install the engine ground strap and the bolt.
 - Tighten to 10 Nm (89 lb-in).
- Position the engine wiring harness and install the bolt.
 - Tighten to 47 Nm (35 lb-ft).

NOTE: Inspect the O-ring seal. Install a new O-ring seal if necessary.

- Install the thermostat housing and the bolts.
 - Tighten to 11 Nm (8 lb-ft).
- Position the coolant bypass hose clamp.
- Install the upper radiator hose to the thermostat housing.
- Connect the engine coolant temperature (ECT) sensor electrical connector.
- Connect the heater hose to the thermostat housing.

LH side

NOTE: To avoid damage to the timing chain cassette, an assistant will be required to help position the cylinder head in the vehicle.

NOTE: New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

17. Install the cylinder head. Install 8 new 12-mm bolts and tighten in the sequence shown in 2 stages.
 - Stage 1: Tighten to 12 Nm (9 lb-ft).
 - Stage 2: Tighten to 25 Nm (18 lb-ft).

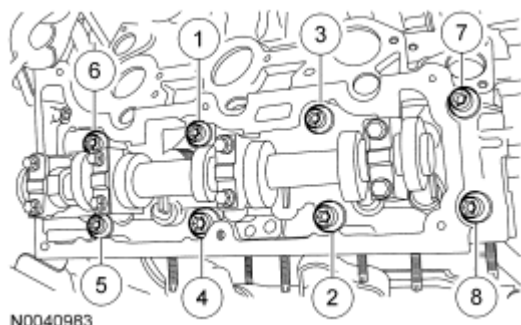


Fig. 62: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

18. Install 2 new 8-mm bolts.
 - Tighten to 32 Nm (24 lb-ft).

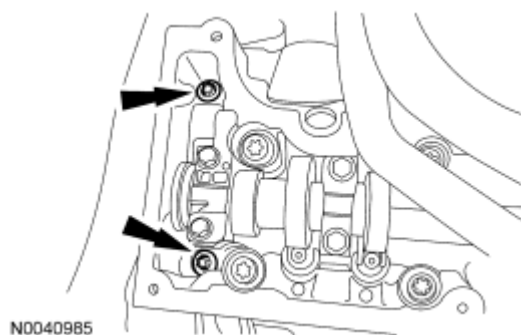


Fig. 63: Locating 8-Mm Bolts
Courtesy of FORD MOTOR CO.

19. Tighten the eight 12-mm bolts in the sequence shown in 2 stages.
 - Stage 1: Tighten 90 degrees.
 - Stage 2: Tighten an additional 90 degrees.

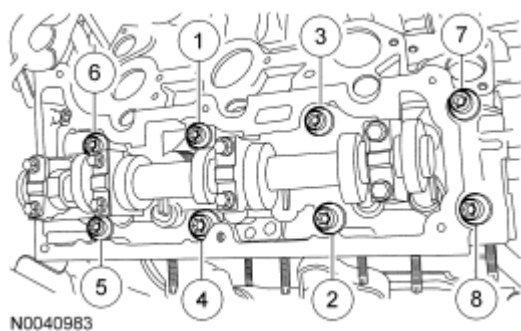


Fig. 64: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: The camshaft gear must turn freely on the camshaft. DO NOT tighten the bolt at this time. Tightening the bolt can result in incorrect engine timing.

20. Remove the rubber band. Install the camshaft sprocket and bolt.
21. Install the LH timing cassette-to-cylinder head bolt.
 - Tighten to 12 Nm (9 lb-ft).
22. Install the LH exhaust manifold. For additional information, refer to Exhaust Manifold - LH.

NOTE: Apply silicone brake caliper grease and dielectric compound to the inside of the spark plug boots.

23. Connect the spark plug wires to the LH spark plugs.
24. Install the oil level indicator tube and the bolt.
 - Tighten to 10 Nm (89 lb-in).

Both sides

25. Time the camshafts. For additional information, refer to Camshaft Timing.

RH side

26. Install the generator mounting bracket assembly and the bolts.
 - Tighten to 42 Nm (31 lb-ft).
27. Position the accessory drive belt tensioner and install the bolt.
 - Tighten to 47 Nm (35 lb-ft).
28. Connect the generator electrical connections.
 - Tighten to 8 Nm (71 lb-in).
29. Connect the battery ground cable. For additional information, refer to BATTERY, MOUNTING AND CABLES article.
30. Position the heater hose tube bracket and install the bolts.

- Tighten the rear bolt to 23 Nm (17 lb-ft).
- Tighten the front bolt to 34 Nm (25 lb-ft).

LH side

31. Position the ignition coil and bracket assembly and install the bracket-to-cylinder head bolts.
 - Tighten to 10 Nm (89 lb-in).
32. Position the A/C compressor and power steering pump bracket and install the bolts.
 - Tighten to 42 Nm (31 lb-ft).
33. Install the ignition coil bracket-to-A/C compressor and power steering pump bracket bolts.
 - Tighten to 10 Nm (89 lb-in).
34. Connect the radio ignition interference capacitor electrical connector.

Both sides

35. Rotate the accessory drive belt tensioner counterclockwise and install the accessory drive belt.

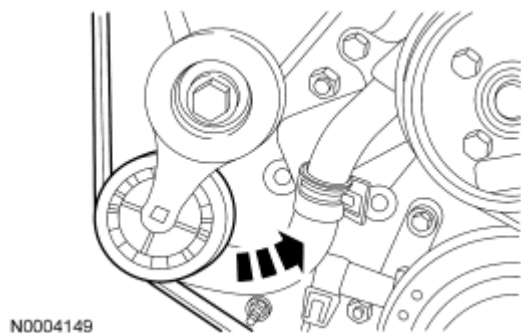


Fig. 65: Rotating Accessory Drive Belt Tensioner Counterclockwise
Courtesy of FORD MOTOR CO.

36. Fill and bleed the engine cooling system. For additional information, refer to ENGINE COOLING article.

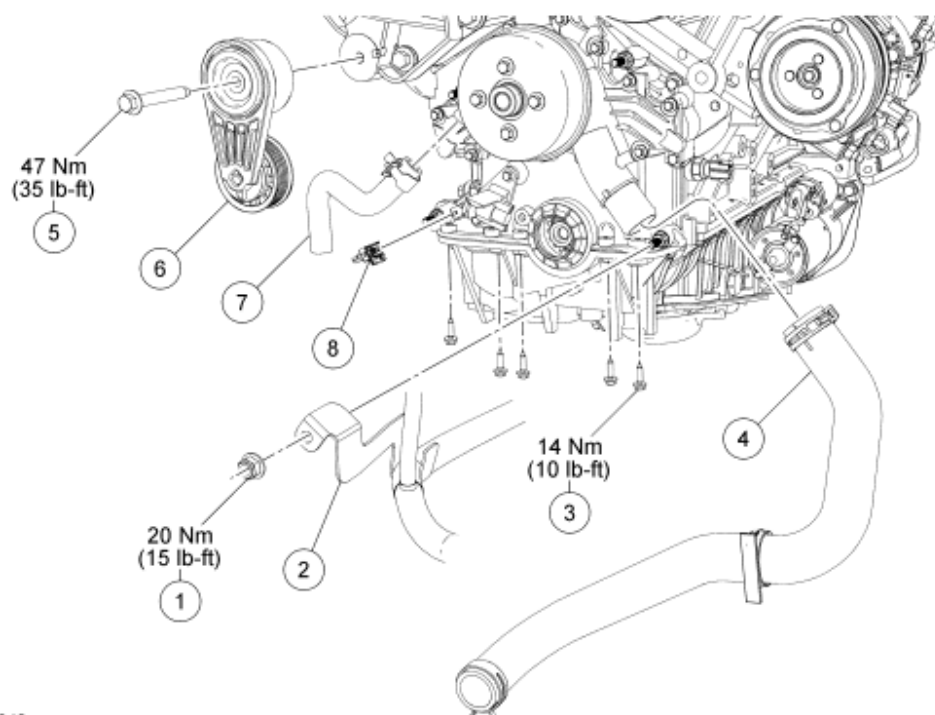
ENGINE FRONT COVER

Material

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

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



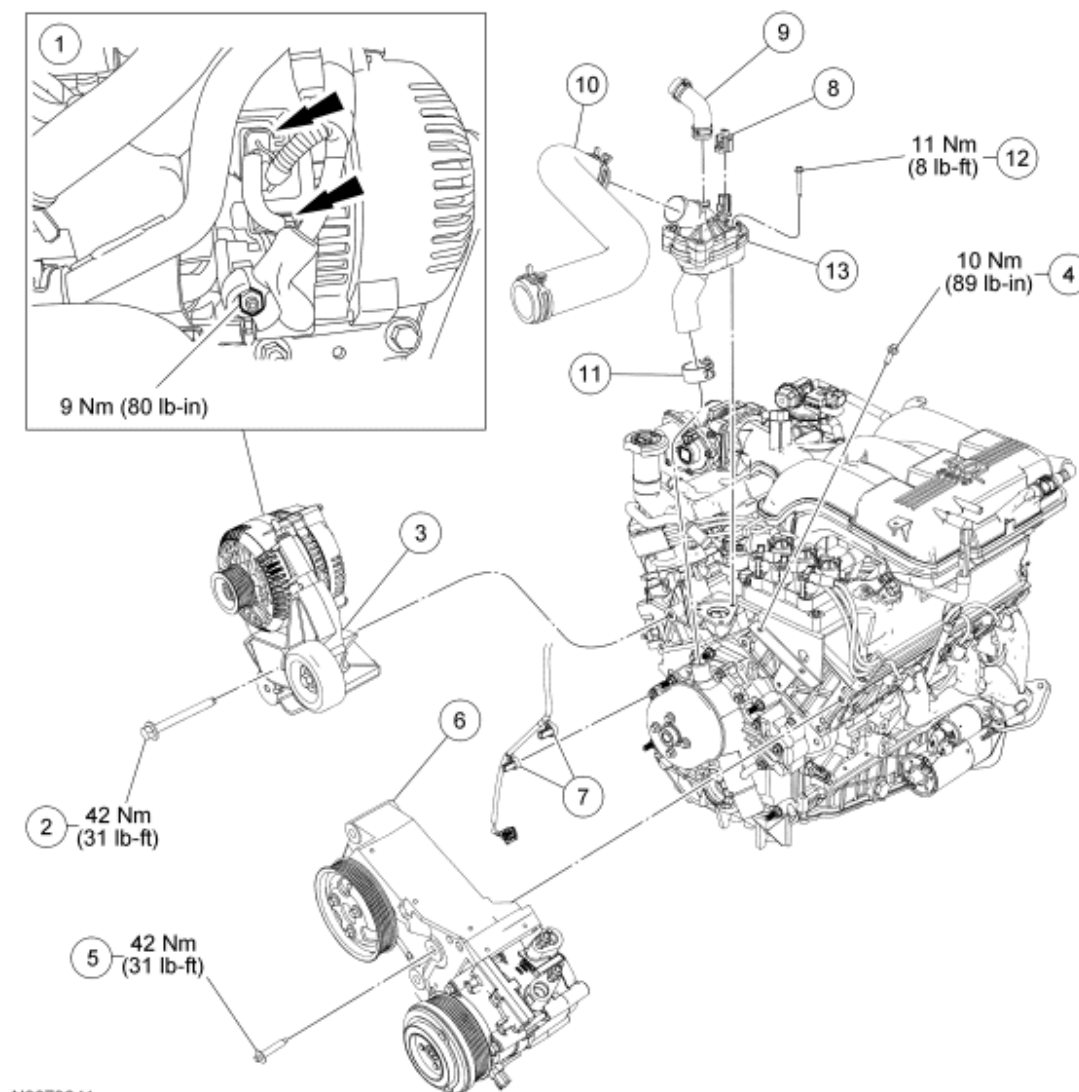
N0073640

Fig. 66: Lower End Components With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W520102	Wiring harness bracket nut
2	10A779	Wiring harness bracket (part of 14A280)
3	W503275	Cylinder block cradle-to-front cover bolt (5 required)
4	8260	Lower radiator hose
5	-	Accessory drive belt tensioner bolt
6	6B209	Accessory drive belt tensioner
7	-	Heater hose
8	14A464	Crankshaft position (CKP) sensor electrical connector

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



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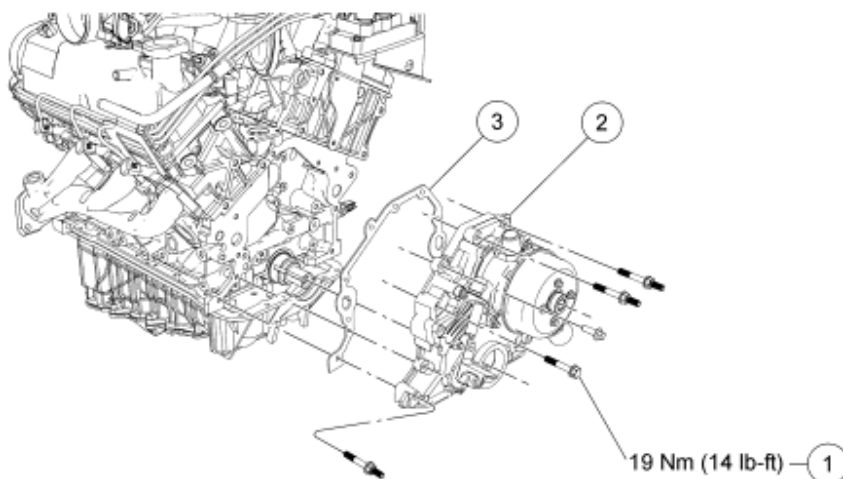
Fig. 67: Accessory Drive Brackets With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Generator wiring connections
2	-	Generator bracket bolt (3 required)
3	-	Generator bracket
4	-	Ignition coil bracket-to-LH accessory drive bracket bolt
5	-	LH accessory drive bracket bolt (4 required)
6	-	LH accessory drive bracket
7	-	Wiring harness routing clips
8	-	Engine coolant temperature (ECT) sensor

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

		electrical connector
9	18472	Heater hose
10	8260	Upper radiator hose
11	-	Bypass hose clamp
12	-	Thermostat housing bolt (3 required)
13	-	Thermostat housing



N0073642

Fig. 68: Engine Front Cover With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Engine front cover bolt (10 required)
2	-	Engine front cover
3	-	Gasket

REMOVAL

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Drain the cooling system. For additional information, refer to **ENGINE COOLING** article.
3. Remove the crankshaft front seal. For additional information, refer to **Crankshaft Front Seal**.
4. Remove the nut and detach the wiring harness bracket from the front cover.
5. Remove the 5 oil pan-to-front cover bolts.
6. Disconnect the lower radiator hose.
7. Remove the bolt and the drive belt tensioner.
8. Disconnect the heater hose from the coolant pump.
9. Disconnect the crankshaft position (CKP) sensor electrical connector.
10. Disconnect the generator electrical connectors and the wiring harness retainer.
11. Remove the 3 generator bracket bolts and the generator bracket.

12. Remove the coil bracket-to-LH accessory drive bracket bolt.
13. Remove the 4 bolts and the LH accessory drive bracket.
14. Remove and discard the CKP sensor wiring harness retainers.
15. Disconnect the engine coolant temperature (ECT) sensor electrical connector.
16. Disconnect the upper radiator hose from the thermostat housing.
17. Disconnect the heater hose from the thermostat housing.

NOTE: The bypass hose will be removed with the thermostat housing.

18. Release the bypass hose clamp from the coolant pump end.
19. Remove the 3 bolts and the thermostat housing.

NOTE: Note the positions of the stud bolts for installation reference.

20. Remove the 10 bolts, the engine front cover and the gasket. Discard the gasket.

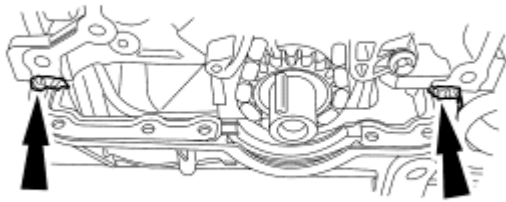
INSTALLATION

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

1. Clean and inspect the gasket mating surfaces. Use silicone gasket remover and metal surface prep and a plastic scraping tool. Follow the directions on the packaging.
2. Position the front cover gasket.

CAUTION: 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.

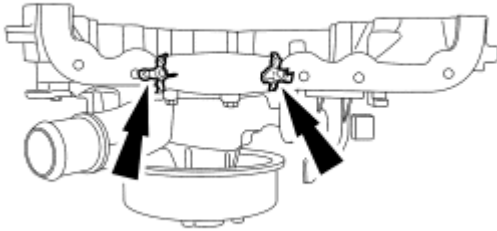
3. Apply silicone gasket and sealant to the oil pan and engine block mating surfaces.



A0029570

Fig. 69: Locating Engine Block Mating Surfaces Sealant Areas
Courtesy of FORD MOTOR CO.

4. Apply silicone gasket and sealant to the front cover in 2 places.



A0029571

Fig. 70: Locating Silicone Gasket And Sealant Areas
Courtesy of FORD MOTOR CO.

NOTE: Make sure the stud bolts are installed in their original positions.

5. Position the engine front cover and install the 10 bolts.
 - Tighten to 19 Nm (14 lb-ft).

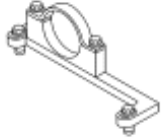
NOTE: Make sure the coolant bypass hose is attached to the coolant pump.

6. Position the thermostat housing and install the 3 bolts.
 - Tighten to 11 Nm (8 lb-ft).
7. Position the bypass hose clamp.
8. Connect the upper radiator hose to the thermostat housing.
9. Connect the heater hose to the thermostat housing.
10. Connect the ECT sensor electrical connector.
11. Install new wiring harness retainers and position the CKP sensor wiring.
12. Connect the CKP sensor electrical connector.
13. Position the LH accessory drive bracket and install the 4 bolts.

- Tighten to 42 Nm (31 lb-ft).
- 14. Install the ignition coil bracket-to-LH accessory drive bracket bolt.
 - Tighten to 10 Nm (89 lb-in).
- 15. Position the generator bracket and install the 3 bolts.
 - Tighten to 42 Nm (31 lb-ft).
- 16. Connect the generator electrical connectors and the wiring harness retainer.
 - Tighten to 9 Nm (80 lb-in).
- 17. Connect the heater hose to the coolant pump.
- 18. Position the accessory drive belt tensioner and install the bolt.
 - Tighten to 47 Nm (35 lb-ft).
- 19. Connect the lower radiator hose.
- 20. Install the 5 cylinder block cradle-to-front cover bolts.
 - Tighten to 14 Nm (10 lb-ft).
- 21. Position the wiring harness bracket and install the nut.
 - Tighten to 20 Nm (15 lb-ft).
- 22. Install the crankshaft front seal. For additional information, refer to **Crankshaft Front Seal**.
- 23. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
- 24. Fill the engine cooling system For additional information, refer to **ENGINE COOLING** article.

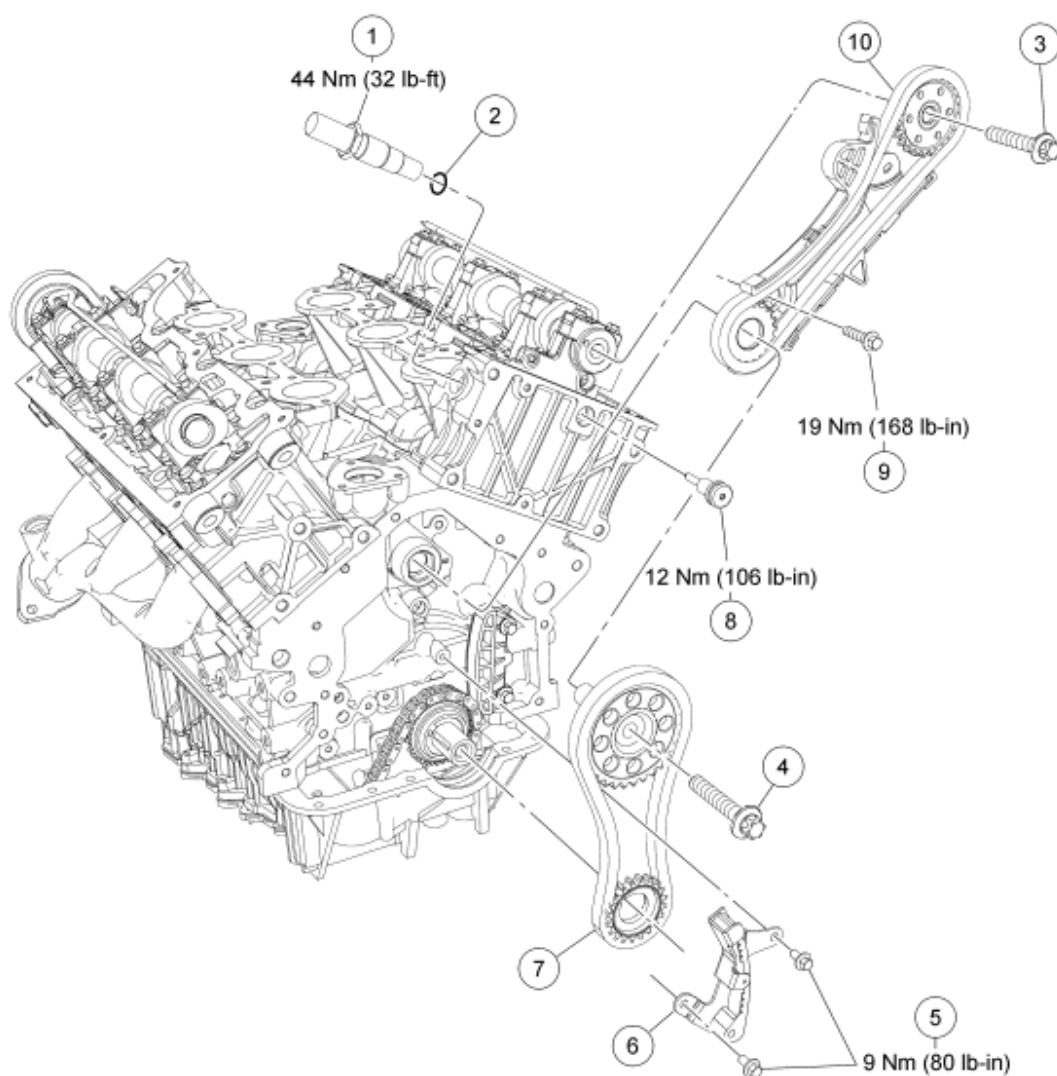
CAMSHAFT DRIVE CASSETTE - LH

Special Tools

Illustration	Tool Name	Tool Number
 ST1776-A	Adapter for 303-564	303-578 (T97T-6256-A)
 ST1777-A	Holding Tool, Camshaft Sprocket	303-564 (T97T-6256)
 ST2694-A	Holding Tool, Crankshaft	303-674

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



N0087541

Fig. 71: Camshaft Drive Cassette Components - LH With Torque Specifications
Courtesy of FORD MOTOR CO.

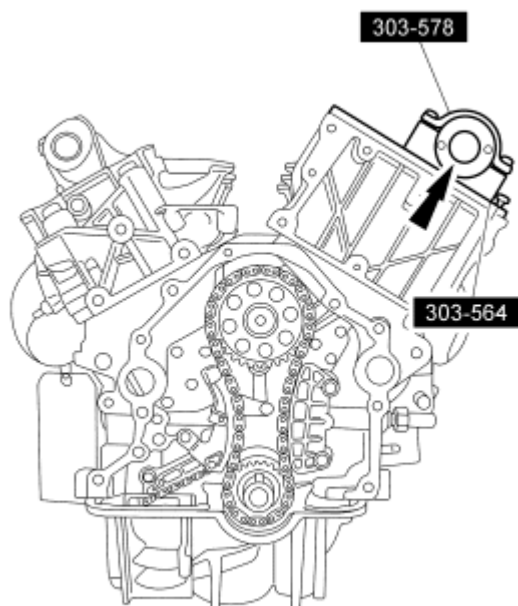
Item	Part Number	Description
1	6K254	Hydraulic chain tensioner
2	-	Hydraulic chain tensioner washer
3	6M276	Camshaft sprocket bolt
4	6M276	Jackshaft sprocket bolt
5	W500011	Primary chain tensioner bolts (2 required)
6	6M271	Primary chain tensioner
7	-	Primary chain and sprocket assembly
8	6U001	LH cassette upper bolt
9	W500110	LH cassette lower bolt
10	6M289	LH cassette

REMOVAL

1. Remove the valve covers. For additional information, refer to Valve Cover - RH and Valve Cover - LH.
2. Remove the fuel rail. For additional information, refer to FUEL CHARGING AND CONTROLS - 4.0L SOHC article.
3. Remove the engine front cover. For additional information, refer to Engine Front Cover.
4. Remove the thermostat housing. For additional information, refer to ENGINE COOLING article.
5. Remove all of the roller followers. For additional information, refer to Camshaft Roller Follower.

NOTE: **The LH and RH camshafts must be retimed when either camshaft is disturbed.**

6. Turn the crankshaft clockwise to position the No. 1 cylinder at Top Dead Center (TDC).
7. Remove the LH hydraulic chain tensioner.
 - Discard the washer.
8. Remove the LH camshaft sprocket bolt.
 - Install the Camshaft Sprocket Holding Tool and the Adapter for 303-564 and tighten the bolts to 10 Nm (89 lb-in).
 - Remove the LH camshaft sprocket bolt.



A0083332

Fig. 72: Identifying Special Tool (303-578, 303-564) & Camshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

9. Using the Crankshaft Holding Tool to prevent the crankshaft from turning, remove the jackshaft sprocket

bolt.

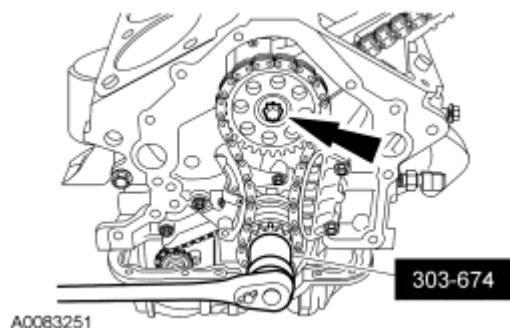


Fig. 73: Identifying Special Tool (303-674) & Jackshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

10. Remove the 2 bolts and the primary chain tensioner.
11. Remove the primary chain and sprockets as an assembly.

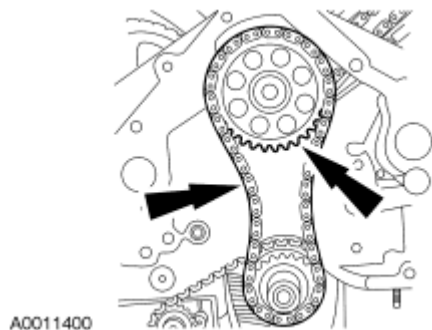


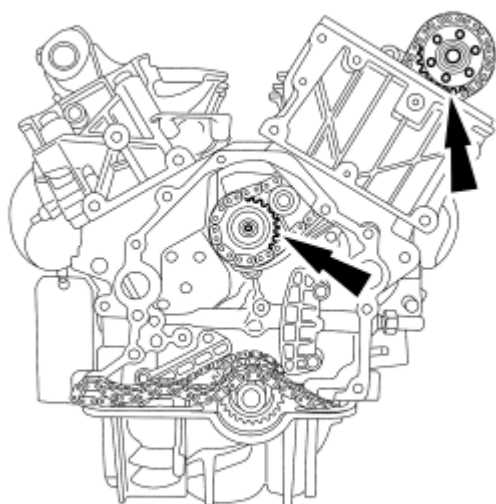
Fig. 74: Locating Jackshaft Chain And Sprockets
Courtesy of FORD MOTOR CO.

12. Remove the LH cassette upper bolt.
13. Remove the LH cassette lower bolt and the LH cassette.

INSTALLATION

NOTE: The camshaft chain sprockets must be oriented correctly.

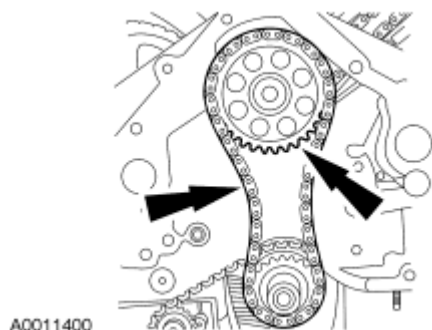
1. Position the LH cassette.



A0029678

Fig. 75: Locating Camshaft Chain Sprockets
Courtesy of FORD MOTOR CO.

2. Install the LH cassette lower bolt.
 - Tighten to 19 Nm (168 lb-in).
3. Install the LH cassette upper bolt.
 - Tighten to 12 Nm (106 lb-in).
4. Install the jackshaft chain and sprockets as an assembly.



A0011400

Fig. 76: Locating Jackshaft Chain And Sprockets
Courtesy of FORD MOTOR CO.

5. Install the jackshaft chain tensioner and the 2 bolts.
 - Tighten to 9 Nm (80 lb-in).
6. Using the Crankshaft Holding Tool to prevent the crankshaft from turning, tighten the jackshaft sprocket

bolt in 2 stages.

- Stage 1: Tighten to 45 Nm (33 lb-ft).
- Stage 2: Tighten an additional 90 degrees.

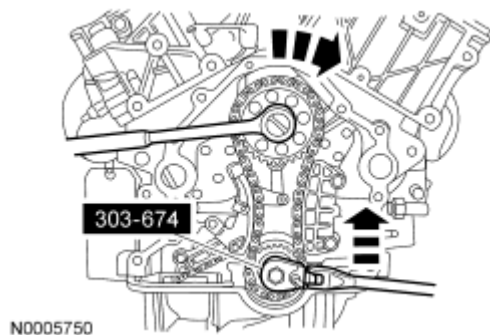


Fig. 77: Tightening Jackshaft Sprocket Bolt In 2 Stages Using Special Tool
Courtesy of FORD MOTOR CO.

7. Loosely install the camshaft sprocket bolt.
8. Install the engine front cover. For additional information, refer to **Engine Front Cover**.

NOTE: The LH and RH camshafts must be retimed when either camshaft is disturbed.

NOTE: Install the LH hydraulic chain tensioner during camshaft timing.

9. Re-time the LH and RH camshafts. For additional information, refer to **Camshaft Timing**.
10. Install the camshaft roller followers. For additional information, refer to **Camshaft Roller Follower**.
11. Install the fuel rail. For additional information, refer to **FUEL CHARGING AND CONTROLS - 4.0L SOHC** article.
12. Install the valve covers. For additional information, refer to **Valve Cover - RH** and **Valve Cover - LH**.
13. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING** article.

TIMING DRIVE COMPONENTS - CAMSHAFT DRIVE CASSETTE, RH

NOTE: For Timing Drive Components - Camshaft Drive Cassette, RH service information, see **ENGINE** under **DISASSEMBLY**.

HYDRAULIC TIMING CHAIN TENSIONER - LH

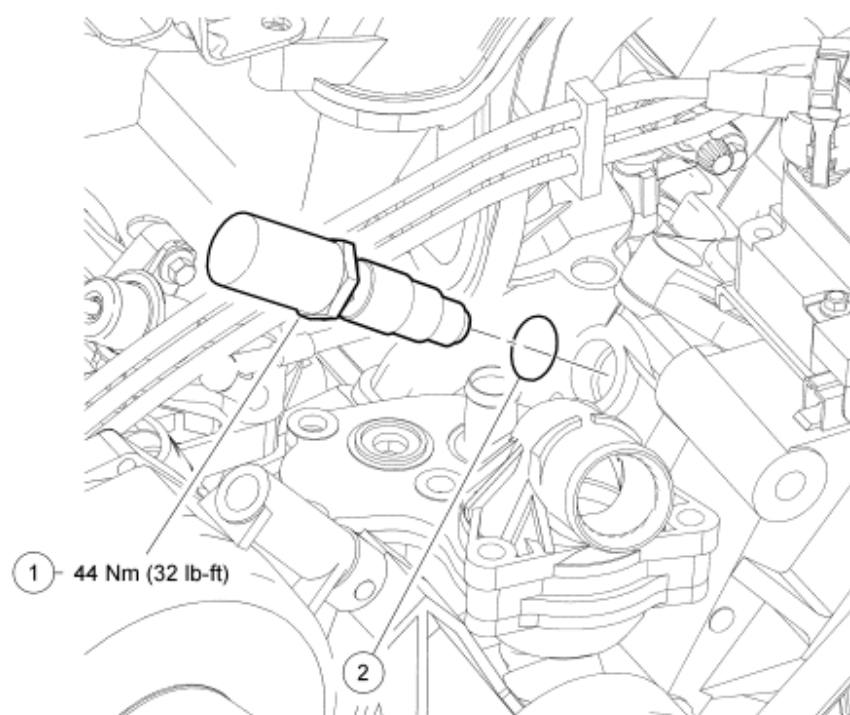


Fig. 78: Exploded View Of Hydraulic Timing Chain Tensioner With Torque Specification - LH
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6K524	LH hydraulic chain tensioner
2	-	LH hydraulic chain tensioner washer

REMOVAL AND INSTALLATION

1. Remove the hydraulic chain tensioner.
 - To install, tighten to 44 Nm (32 lb-ft).
2. Remove and discard the washer.
3. To install, reverse the removal procedure.
 - Install a new hydraulic chain tensioner washer.

HYDRAULIC TIMING CHAIN TENSIONER - RH

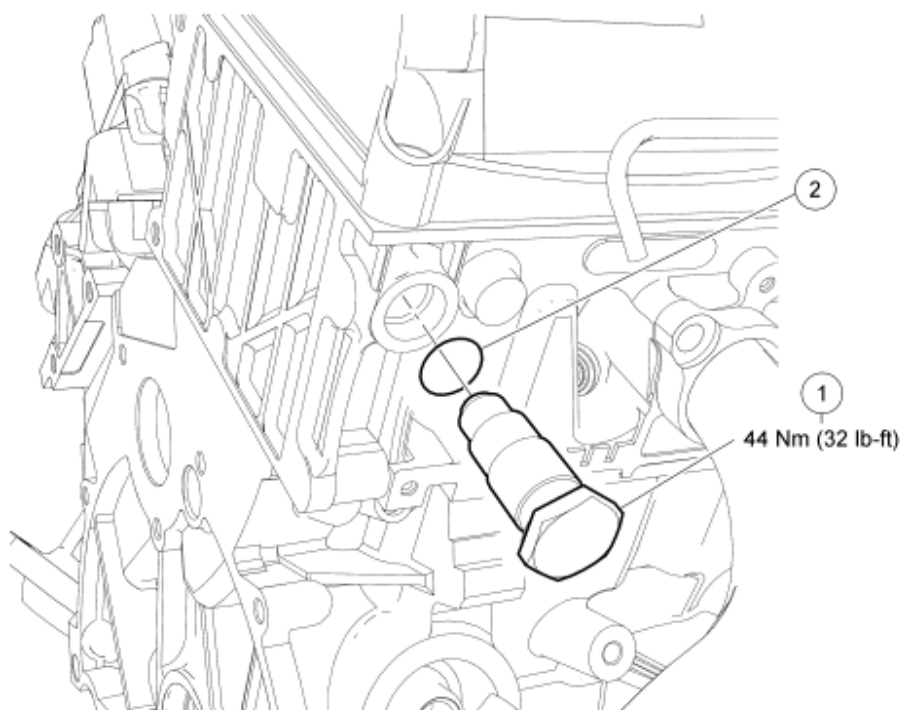


Fig. 79: Exploded View Of Hydraulic Timing Chain Tensioner With Torque Specification - RH
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6K254	RH hydraulic chain tensioner
2	-	RH hydraulic chain tensioner washer

REMOVAL AND INSTALLATION

1. Remove the hydraulic chain tensioner.
 - To install, tighten to 44 Nm (32 lb-ft).
2. Remove and discard the washer.
3. To install, reverse the removal procedure.
 - Install a new hydraulic chain tensioner washer.

VALVE TRAIN COMPONENTS - EXPLODED VIEW

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

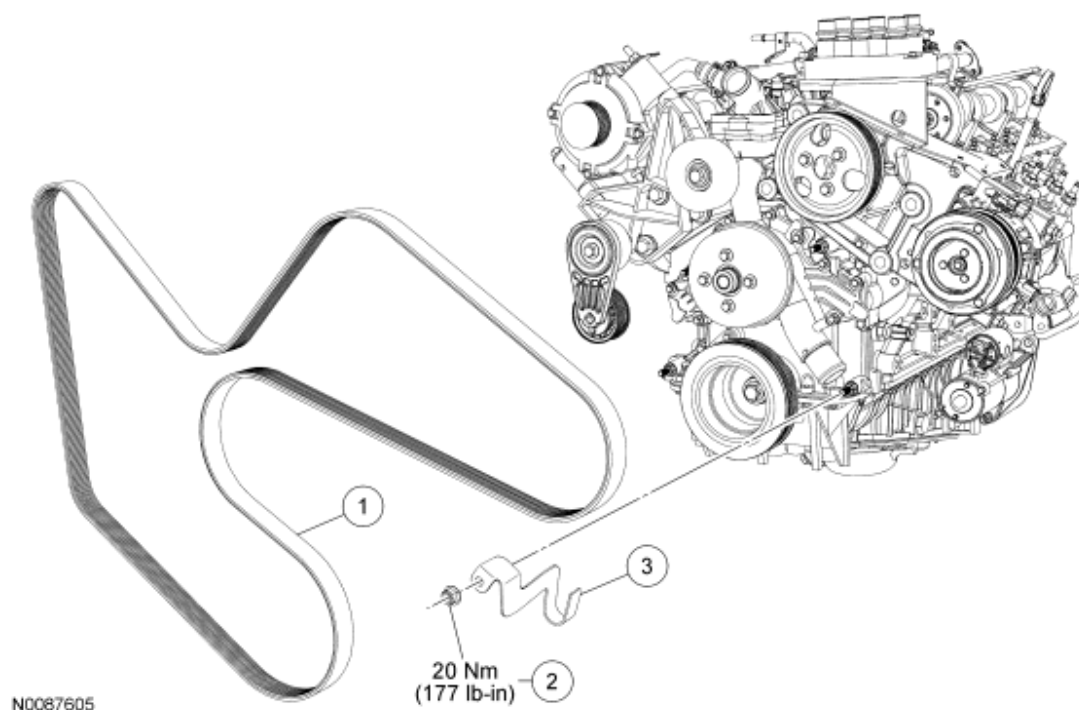
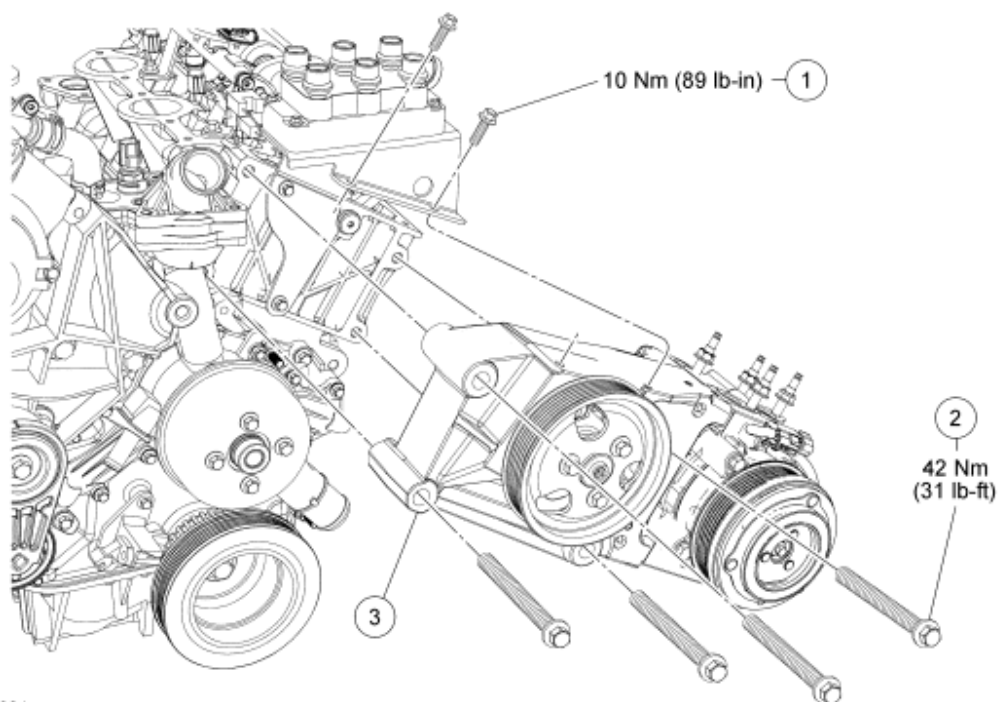


Fig. 80: Accessory Drive Belt and Wiring Harness Bracket With Torque Specification
Courtesy of FORD MOTOR CO.

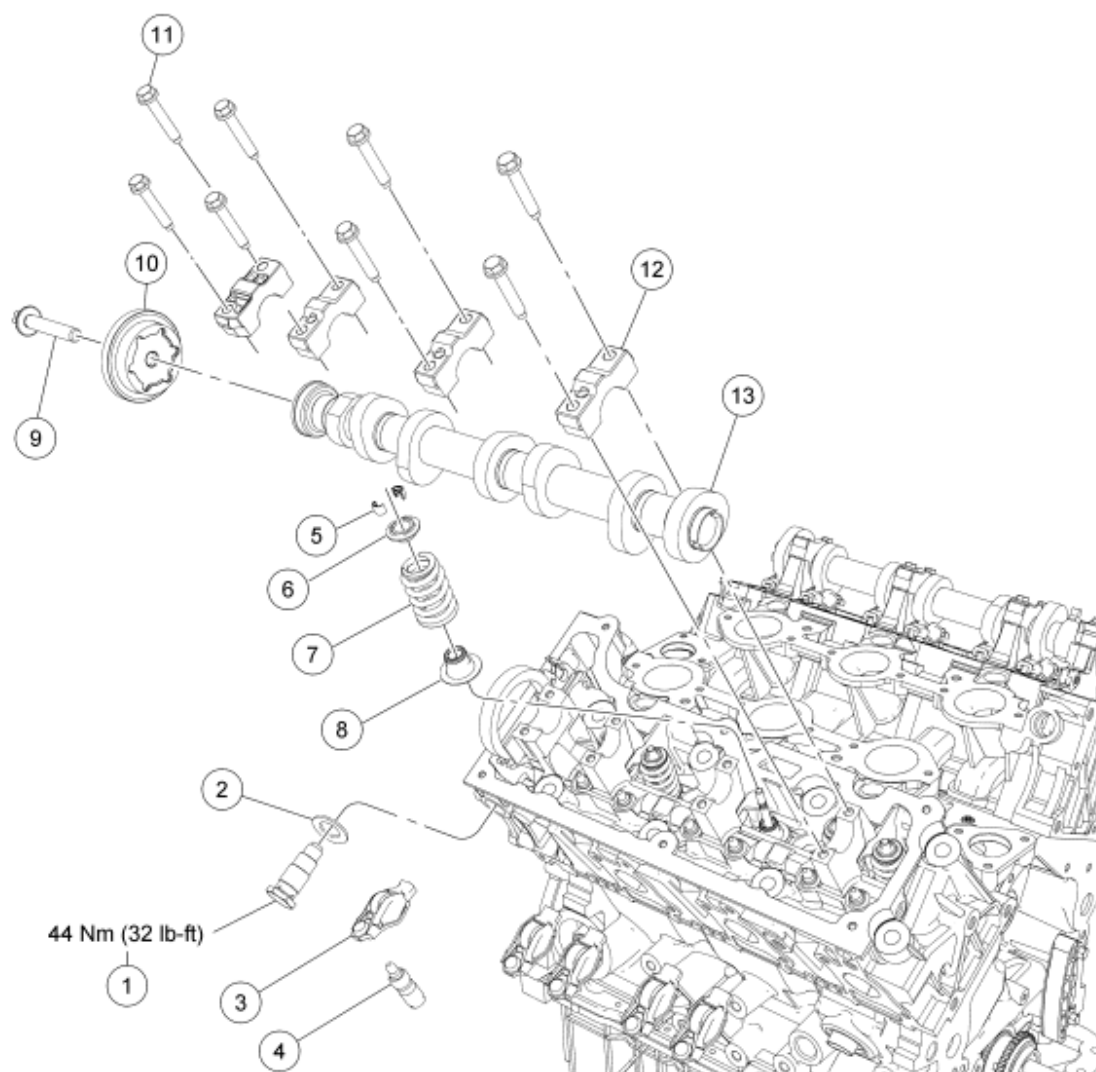
Item	Part Number	Description
1	8620	Accessory drive belt
2	W520102	Wiring harness bracket nut
3	10A779	Wiring harness bracket (part of 14A280)



N0073931

Fig. 81: A/C Compressor and Power Steering Pump Bracket With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Ignition coil bracket-to-A/C compressor and power steering pump bracket bolt (2 required)
2	N807938	A/C compressor and power steering pump bracket bolt (4 required)
3	19E708	A/C compressor and power steering pump bracket



N0085217

Fig. 82: Valve Train Components - RH With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6K254	RH hydraulic chain tensioner
2	-	RH hydraulic chain tensioner washer
3	6529	Camshaft roller follower (6 required)
4	6C501	Hydraulic lash adjuster
5	6518	Valve spring retainer key (12 required)
6	6A536	Valve spring retainer (6 required)
7	6513	Valve spring (6 required)
8	6571	Valve seal (6 required)
9	6M276	RH camshaft sprocket bolt
10	6256	RH camshaft sprocket

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

11	W702341	Camshaft bearing cap bolt (8 required)
12	6A258	Camshaft bearing cap (4 required)
13	6250	RH camshaft

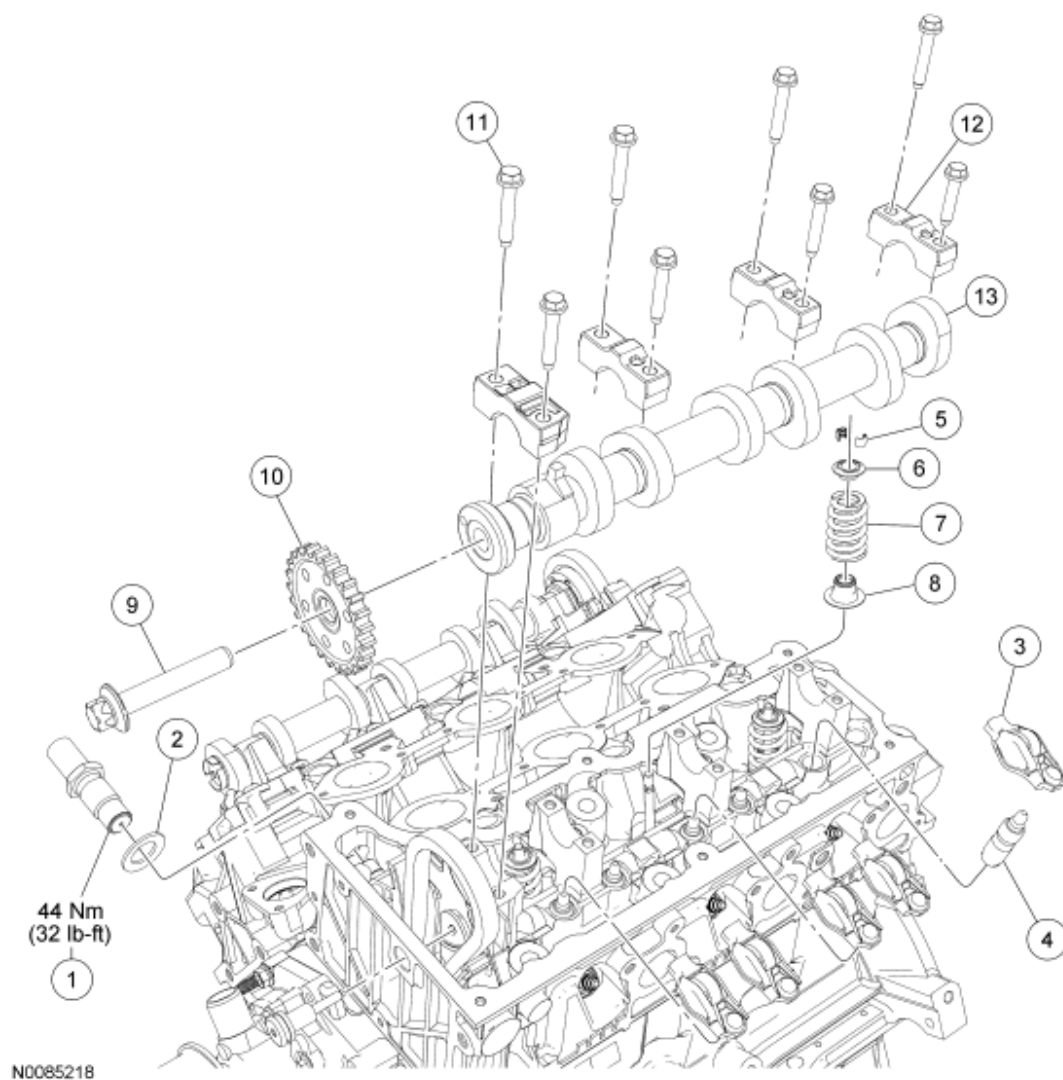


Fig. 83: Valve Train Components - LH With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6K254	LH hydraulic chain tensioner
2	-	LH hydraulic chain tensioner washer
3	6529	Camshaft roller follower (6 required)
4	6C501	Hydraulic lash adjuster
5	6518	Valve spring retainer key (12 required)
6	6A536	Valve spring retainer (6 required)

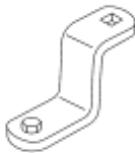
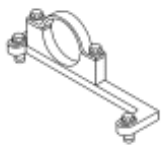
2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

7	6513	Valve spring (6 required)
8	6571	Valve seal (6 required)
9	6M276	LH camshaft sprocket bolt
10	6M267	LH camshaft sprocket
11	W702341	Camshaft bearing cap bolt (8 required)
12	6A258	Camshaft bearing cap (4 required)
13	6A274	LH camshaft

CAMSHAFTS

Special Tools

Illustration	Tool Name	Tool Number
 ST1776-A	Adapter for 303-564	303-578 (T97T-6256-A) or equivalent
 ST1780-A	Extension, Torque Wrench	303-575 (T97T-6256-F) or equivalent
 ST1777-A	Holding Tool, Camshaft Sprocket	303-564 (T97T-6256-B) or equivalent
 ST1781-A	Socket, Camshaft Sprocket Nut	303-565 (T97T-6256-G)
 ST1775-A	Timing Tool, Crankshaft TDC	303-573 (T97T-6303-A) or equivalent

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil	

XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent

WSS-M2C929-A

REMOVAL

Both sides

1. Remove the camshaft roller followers. For additional information, refer to Camshaft Roller Follower.
2. Remove the nut and position the wiring harness bracket aside.

NOTE: Carry out the RH and LH camshaft timing procedure when either camshaft is serviced.

3. Rotate the crankshaft clockwise to position the No. 1 cylinder at Top Dead Center (TDC).

NOTE: Do not rotate the engine counterclockwise. Rotating the engine counterclockwise will result in damage to the damper crankshaft sensor speed wheel and incorrect timing of the engine.

NOTE: The Crankshaft TDC Timing Tool must be installed on the damper and should contact the engine block. This positions the piston at TDC.

4. Install the Crankshaft TDC Timing Tool.

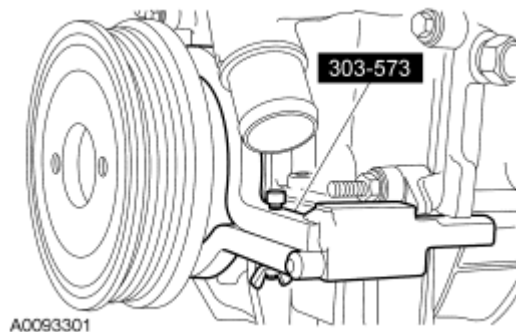


Fig. 84: Identifying Special Tool (303-573)
Courtesy of FORD MOTOR CO.

RH side

5. Remove the RH hydraulic timing chain tensioner.
 - Discard the washer.
6. Install the Camshaft Sprocket Holding Tool and the Adapter for 303-564 on the rear of the RH cylinder head and tighten the top 2 clamp bolts to 10 Nm (89 lb-in).

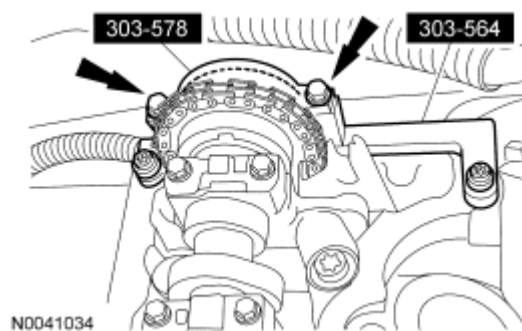


Fig. 85: Locating Clamp Bolts & Special Tools (303-564, 303-578)
Courtesy of FORD MOTOR CO.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

7. Using the Torque Wrench Extension and the Camshaft Sprocket Nut Socket, loosen the camshaft sprocket bolt.

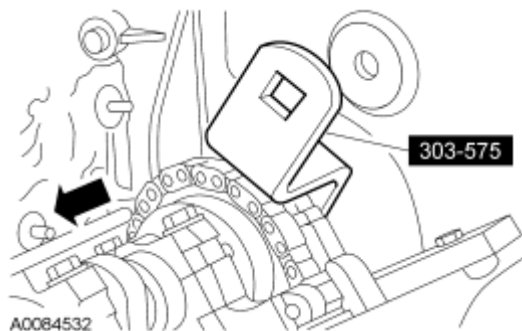


Fig. 86: Identifying Special Tool (303-575)
Courtesy of FORD MOTOR CO.

8. Remove the bolt and position the camshaft sprocket aside.

LH side

9. Remove the LH hydraulic timing chain tensioner.
 - Discard the washer.
10. Rotate the accessory drive belt tensioner counterclockwise and detach the accessory drive belt from the A/C compressor and power steering pump pulleys.

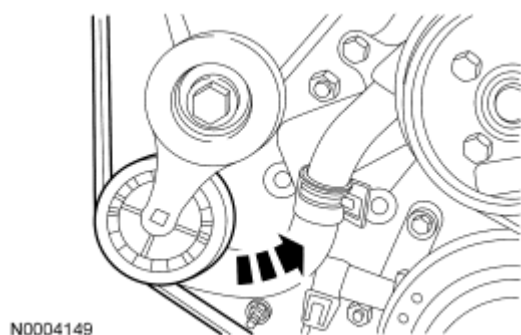


Fig. 87: Rotating Accessory Drive Belt Tensioner Counterclockwise
Courtesy of FORD MOTOR CO.

11. Remove the bolts and position the A/C compressor and power steering pump bracket aside.
12. Install the Camshaft Sprocket Holding Tool and the Adapter for 303-564 on the front of the LH camshaft and tighten the 2 top clamp bolts to 10 Nm (89 lb-in).

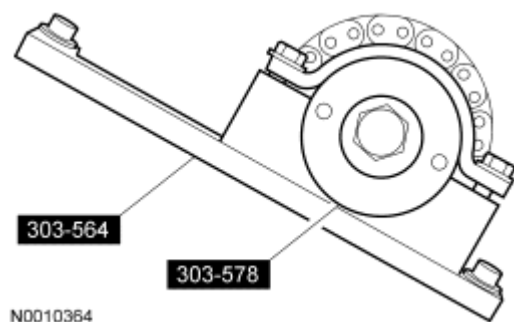


Fig. 88: Identifying Special Holding Tool
Courtesy of FORD MOTOR CO.

13. Remove the bolt and position the camshaft sprocket aside.

Both sides

NOTE: Mark the position of the camshaft bearing caps so they can be installed in their original positions.

14. Remove the 8 bolts for each set of camshaft bearing caps in the sequence shown and remove the camshaft bearing caps.

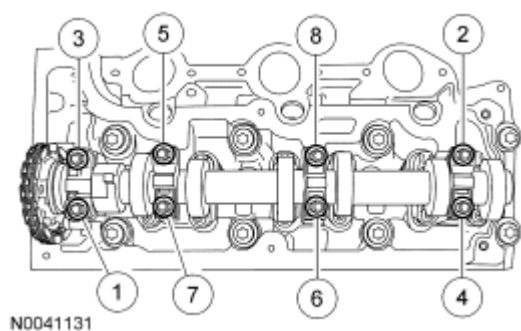


Fig. 89: Identifying Camshaft Bearing Cap Bolts Removal Sequence
Courtesy of FORD MOTOR CO.

15. Remove the camshaft.

INSTALLATION

NOTE: Lubricate the camshaft journal bearing surfaces on the cylinder head, the camshaft journals and the camshaft bearing caps with clean engine oil.

Both sides

1. Install the camshaft.

NOTE: The camshaft bearing caps must be installed in their original positions.

NOTE: After installing the bolts, check the camshaft for free rotation.

2. Position the camshaft bearing caps and the 8 bolts for each set of camshaft bearing caps.
 - Tighten the bolts in the sequence shown in 2 stages.
 - Stage 1: Tighten to 6 Nm (53 lb-in).
 - Stage 2: Tighten to 16 Nm (142 lb-in).

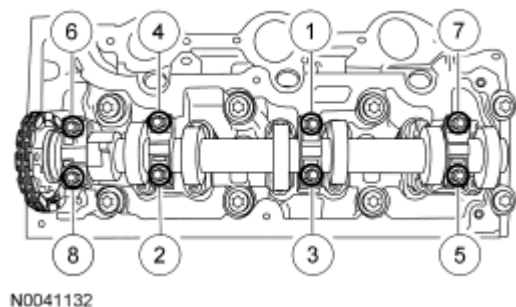


Fig. 90: Identifying Camshaft Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

RH side

NOTE: The camshaft gear must turn freely on the camshaft. DO NOT tighten the bolt at this time. Tightening the bolt may result in incorrect engine timing.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

3. Install the camshaft sprocket and loosely install the bolt.

LH side

NOTE: The camshaft gear must turn freely on the camshaft. DO NOT tighten the bolt at this time. Tightening the bolt may result in incorrect engine timing.

4. Install the camshaft sprocket and loosely install the bolt.

Both sides

5. Time the camshafts. For additional information, refer to Camshaft Timing.

CAMSHAFT ROLLER FOLLOWER

Special Tools

Illustration	Tool Name	Tool Number
 ST1330-A	Compressor, Valve Spring	303-581 (T97T-6565-A)

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

REMOVAL AND INSTALLATION

1. Remove the LH and RH valve covers. For additional information, refer to Valve Cover - RH and Valve Cover - LH.
2. Remove the fuel rail. For additional information, refer to FUEL CHARGING AND CONTROLS - 4.0L SOHC article.

3. Remove the cooling fan. For additional information, refer to **ENGINE COOLING** article.
4. Rotate the crankshaft until the camshaft for the cylinder being serviced is at base circle.

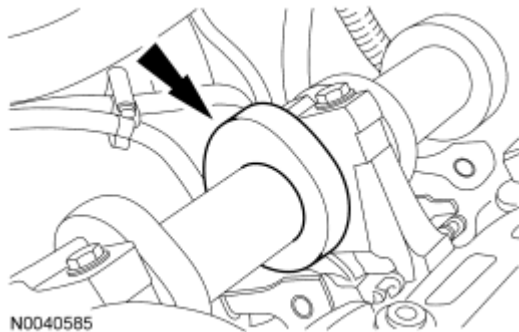


Fig. 91: Locating Crankshaft Lobe
Courtesy of FORD MOTOR CO.

NOTE: Mark each camshaft roller follower to make sure it is returned to its original position.

5. Using the Valve Spring Compressor, remove the camshaft roller followers.

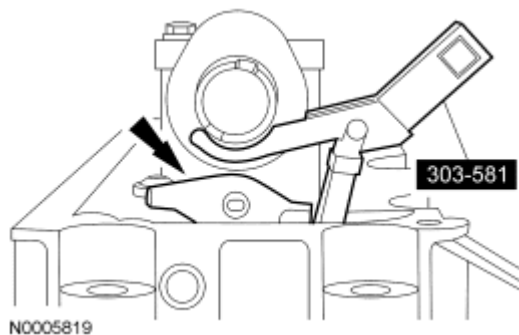


Fig. 92: Locating Camshaft Roller Followers And Special Tools
Courtesy of FORD MOTOR CO.

NOTE: The camshaft roller followers must be installed in their original positions.

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

6. To install, reverse the removal procedure.

VALVE SPRINGS

Special Tools

Illustration	Tool Name	Tool Number

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



ST1330-A

Compressor, Valve Spring

303-581 (T97T-6565-A)

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

REMOVAL AND INSTALLATION

1. Remove the camshaft roller followers. For additional information, refer to Camshaft Roller Follower.
2. Position the piston of the cylinder being serviced at Top Dead Center (TDC).

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.

3. Hold the valves in the cylinder head.
 - Remove the spark plug of the cylinder being serviced.
 - Use a suitable tool to apply air pressure to the cylinder.
4. Using the Valve Spring Compressor, remove the valve spring retainer keys, the valve spring retainers and the valve springs.

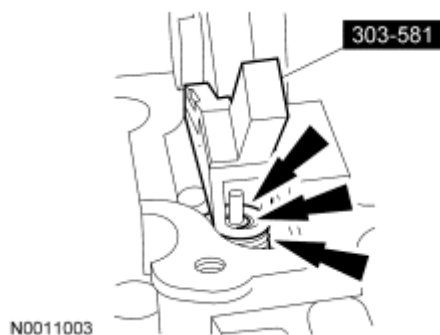


Fig. 93: Removing Valve Spring Retainer Keys, Valve Spring Retainers & Valve Springs Using Special Tool (303-581)

Courtesy of FORD MOTOR CO.

NOTE: Lubricate the valve springs, the retainers and the retainer keys with clean engine oil.

- To install, reverse the removal procedure.

VALVE SEALS

Special Tools

Illustration	Tool Name	Tool Number
 ST1824-A	Installer, Valve Stem Seal	303-370 (T90T-6571-A)

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

REMOVAL

- Remove the valve springs. For additional information, refer to Valve Springs.
- Remove the valve seals.

INSTALLATION

NOTE: Lubricate the valve seals with clean engine oil.

- Using the Valve Stem Seal Installer, install the valve seal.

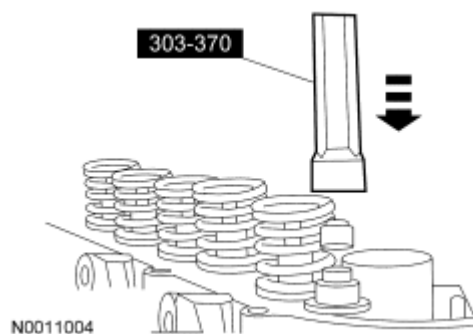


Fig. 94: Installing Valve Seal Using Special Tool (303-370)
Courtesy of FORD MOTOR CO.

- Install the valve springs. For additional information, refer to Valve Springs.

HYDRAULIC LASH ADJUSTER**Material**

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

REMOVAL AND INSTALLATION

1. Remove the camshaft roller followers. For additional information, refer to **Camshaft Roller Follower**.

NOTE: Mark each hydraulic lash adjuster to make sure it is returned to its original position.

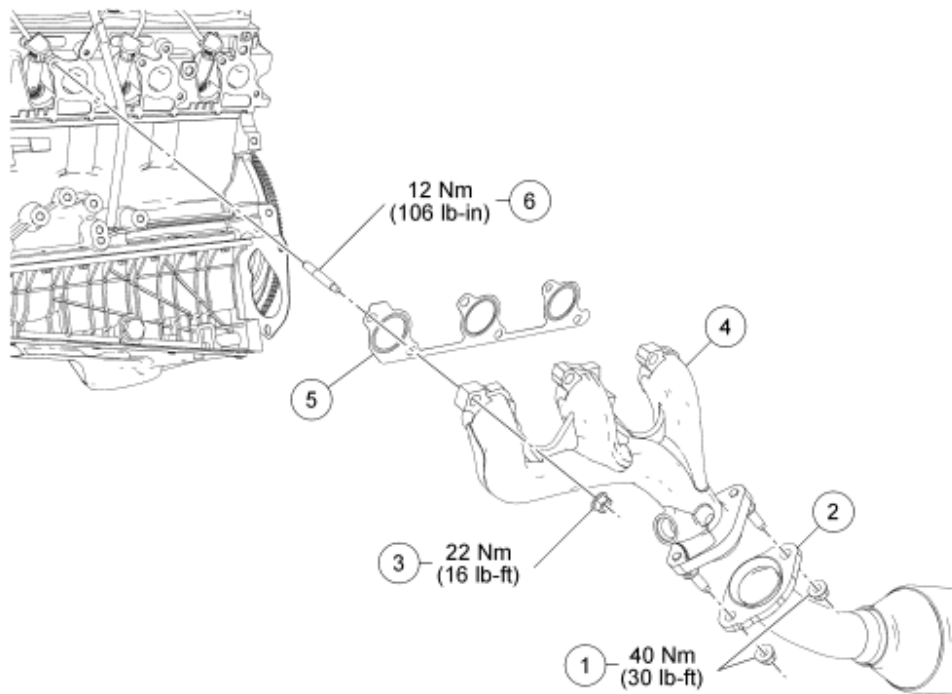
2. Remove the hydraulic lash adjusters.

NOTE: The hydraulic lash adjusters must be installed in their original positions.

NOTE: Lubricate the hydraulic lash adjusters with clean engine oil.

3. To install, reverse the removal procedure.

EXHAUST MANIFOLD - LH



N0087582

Fig. 95: Exhaust Manifold Components - LH With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701706	Exhaust manifold-to-dual converter Y-pipe nuts (4 required)
2	5F250	Dual converter Y-pipe
3	W701706	LH exhaust manifold nut (6 required)
4	9431	LH exhaust manifold
5	9448	LH exhaust manifold gasket
6	W705495	LH exhaust manifold stud (6 required)

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the 4 exhaust manifold-to-dual converter Y-pipe nuts and position the dual converter Y-pipe aside.
 - Discard the nuts.
3. Remove the 6 nuts, the LH exhaust manifold and the gasket.
 - Discard the nuts and the gasket.
4. Remove and discard the 6 LH exhaust manifold studs.

INSTALLATION

1. Inspect the LH exhaust manifold gasket surfaces for flatness. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
2. Install 6 new LH exhaust manifold studs.
 - Tighten to 12 Nm (106 lb-in).
3. Position a new gasket, the LH exhaust manifold and install 6 new nuts.
 - Tighten to 22 Nm (16 lb-ft).
4. Position the dual converter Y-pipe and install 4 new nuts.
 - Tighten to 40 Nm (30 lb-ft).

EXHAUST MANIFOLD - RH

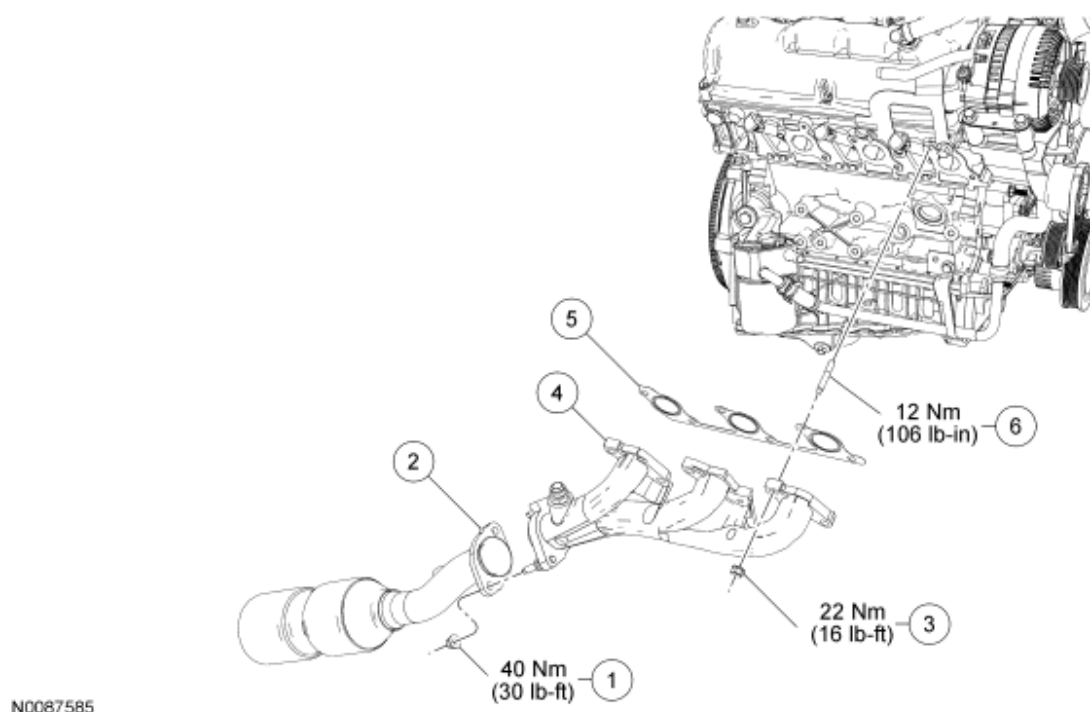


Fig. 96: Exhaust Manifold Components - RH With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701706	Exhaust manifold-to-dual converter Y-pipe nut (4 required)
2	5F250	Dual converter Y-pipe
3	W701706	RH exhaust manifold nut (6 required)
4	9430	RH exhaust manifold
5	9448	RH exhaust manifold gasket
6	W705495	RH exhaust manifold stud (6 required)

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the EGR tube. For additional information, refer to **ENGINE EMISSION CONTROL** article.
3. Remove the 4 exhaust manifold-to-dual converter Y-pipe nuts and position the dual converter Y-pipe aside.
 - Discard the nuts.
4. Remove the 6 nuts, the RH exhaust manifold and the gasket.
 - Discard the nuts and the gasket.
5. Remove and discard the 6 RH exhaust manifold studs.

INSTALLATION

1. Inspect the RH exhaust manifold gasket surfaces for flatness. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
2. Install 6 new RH exhaust manifold studs.
 - Tighten to 12 Nm (106 lb-in).
3. Position a new gasket, the RH exhaust manifold and install 6 new nuts.
 - Tighten to 22 Nm (16 lb-ft).
4. Position the dual converter Y-pipe and install 4 new nuts.
 - Tighten to 40 Nm (30 lb-ft).
5. Install the EGR tube. For additional information, refer to **ENGINE EMISSION CONTROL** article.

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

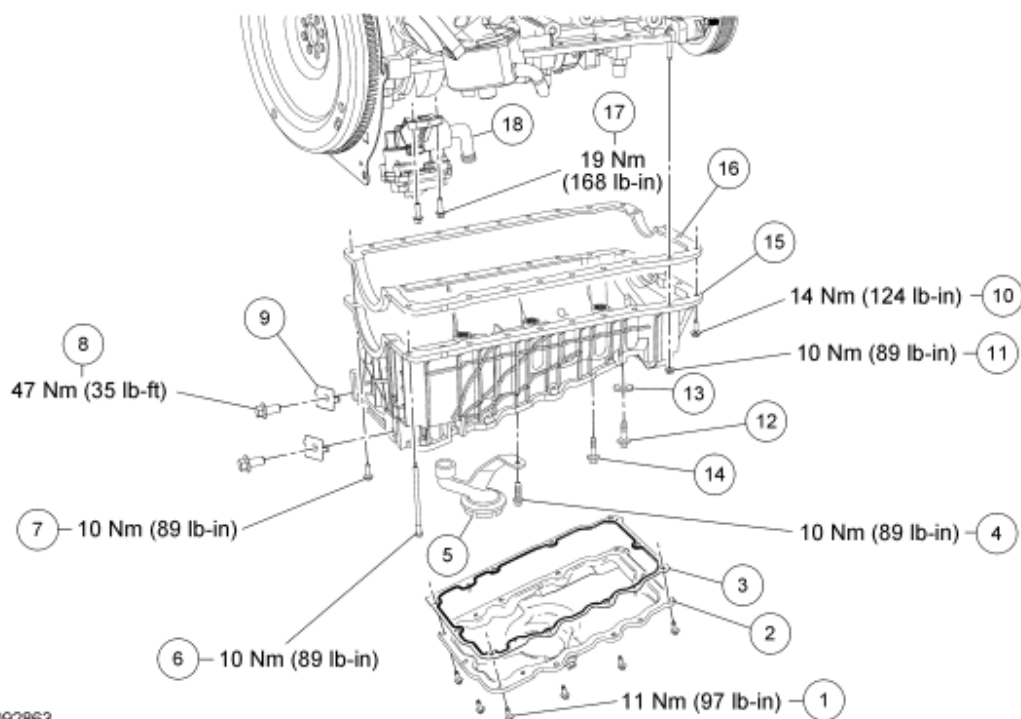


Fig. 97: Engine Lubrication Components - Exploded View With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	E802185	Oil pan bolt (10 required)
2	6675	Oil pan
3	6710-A	Oil pan gasket
4	W500214	Oil pump screen and pickup tube bolt
5	6617	Oil pump screen and pickup tube
6	E804588	Cylinder block cradle Torx bolt
7	W709198-S437	Cylinder block cradle Torx bolt
8	E802185	Bell housing-to-cylinder block cradle bolt (2 required)
9	6C629	Bell housing-to-cylinder block cradle spacer (2 required)
10	W503275	Cylinder block cradle bolt (outside) (20 required)
11	E822125	Cylinder block cradle nut (2 required)
12	W702323	Cylinder block cradle bolt (inside) (2 required)
13	6734	Washer (2 required)
14	W702323	Cylinder block cradle bolt (inside) (6 required)
15	6F092	Cylinder block cradle

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

16	6710	Cylinder block cradle gasket
17	W708582	Oil pump bolt (2 required)
18	6600	Oil pump

OIL PAN

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

REMOVAL AND INSTALLATION

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the drain plug and drain the engine oil.
 - To install, tighten to 26 Nm (19 lb-ft).
3. Remove the 10 bolts, the oil pan and the gasket. Discard the gasket.
 - To install, tighten to 11 Nm (97 lb-in).

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 the old oil pan gasket.

4. Clean and inspect the sealing surfaces.
5. To install, reverse the removal procedure.
6. Fill the engine with clean engine oil.

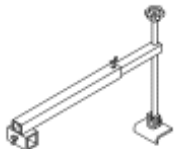
CYLINDER BLOCK CRADLE

Special Tools

Illustration	Tool Name	Tool Number
 ST2378-A	Adapter for 303-290A	303-290-01

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

 ST2379-A	Adapter for 303-290A	303-290A-03A
 ST1595-A	Lifting Bracket, Engine	303-050 (T70P-6000)
 ST2363-A	Support Bar, Engine	303-290A

Material

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

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

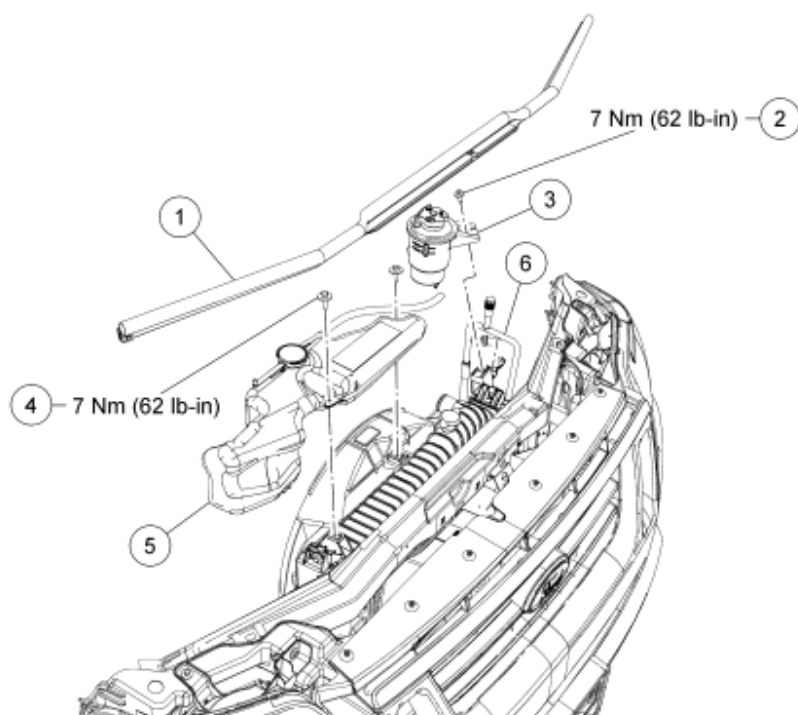
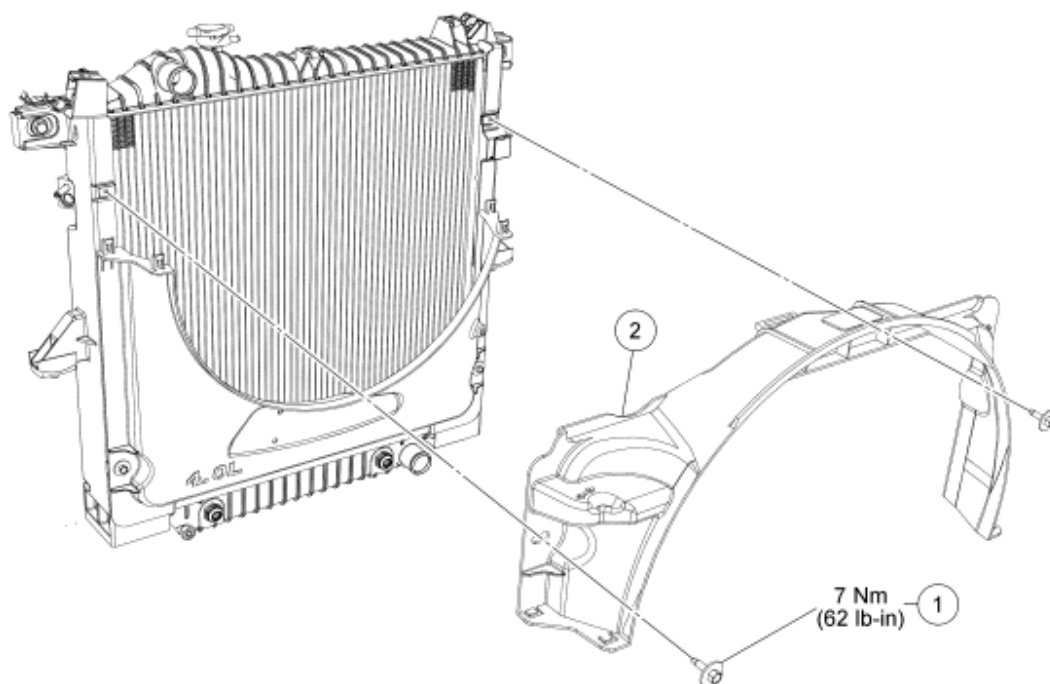


Fig. 98: Front End Components With Torque Specifications
Courtesy of FORD MOTOR CO.

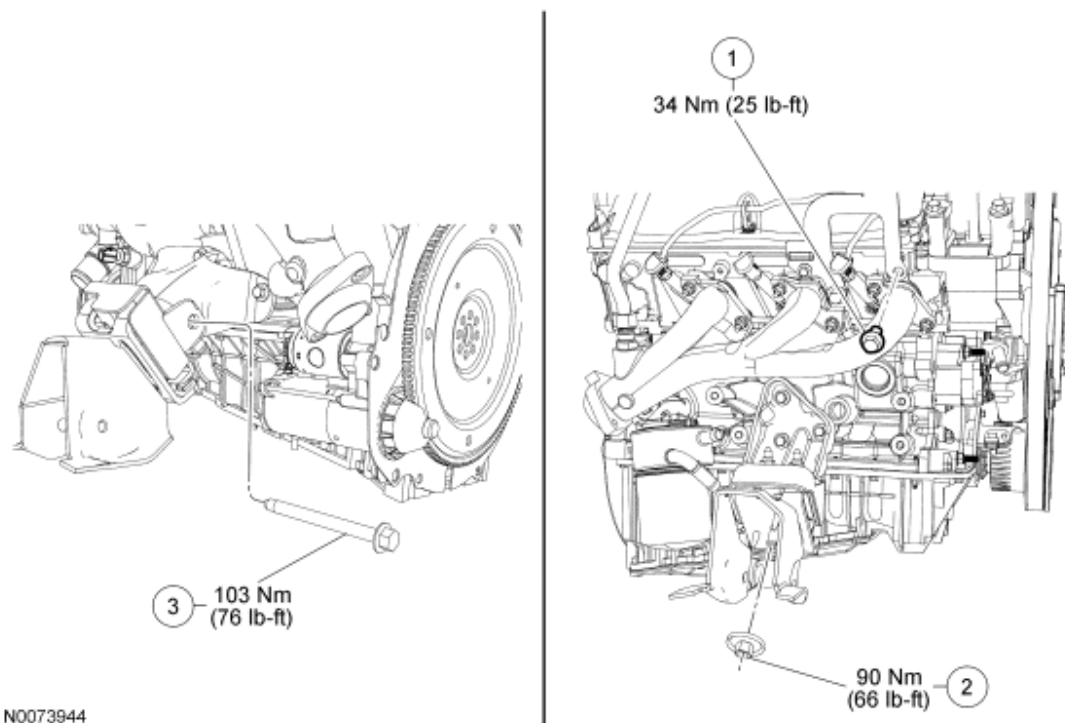
Item	Part Number	Description
1	16C824	Weatherstrip
2	W503924	Power steering fluid reservoir bolt
3	3R700	Power steering fluid reservoir
4	W709027	Coolant expansion tank bolt (2 required)
5	8C045	Coolant expansion tank
6	19972	A/C tube



N0073943

Fig. 99: Upper Cooling Fan Shroud With Torque Specification
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W713417	Upper cooling fan shroud bolt (2 required)
2	8K618	Upper cooling fan shroud

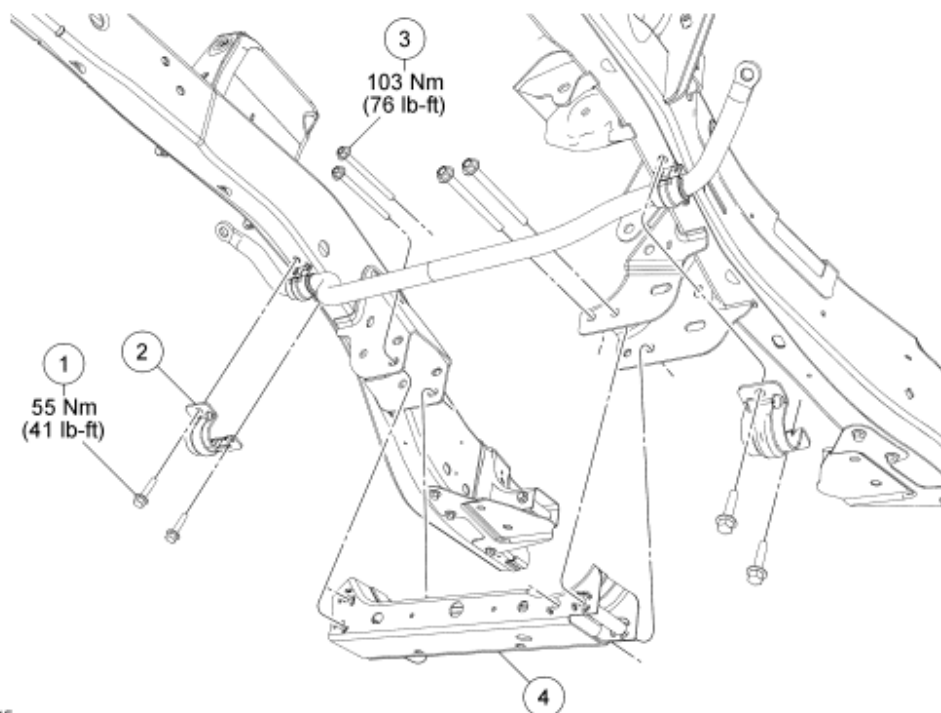


N0073944

Fig. 100: Engine Support Insulator Bolt and Nut and Heater Tube Bracket Bolt With Torque Specifications

Courtesy of FORD MOTOR CO.

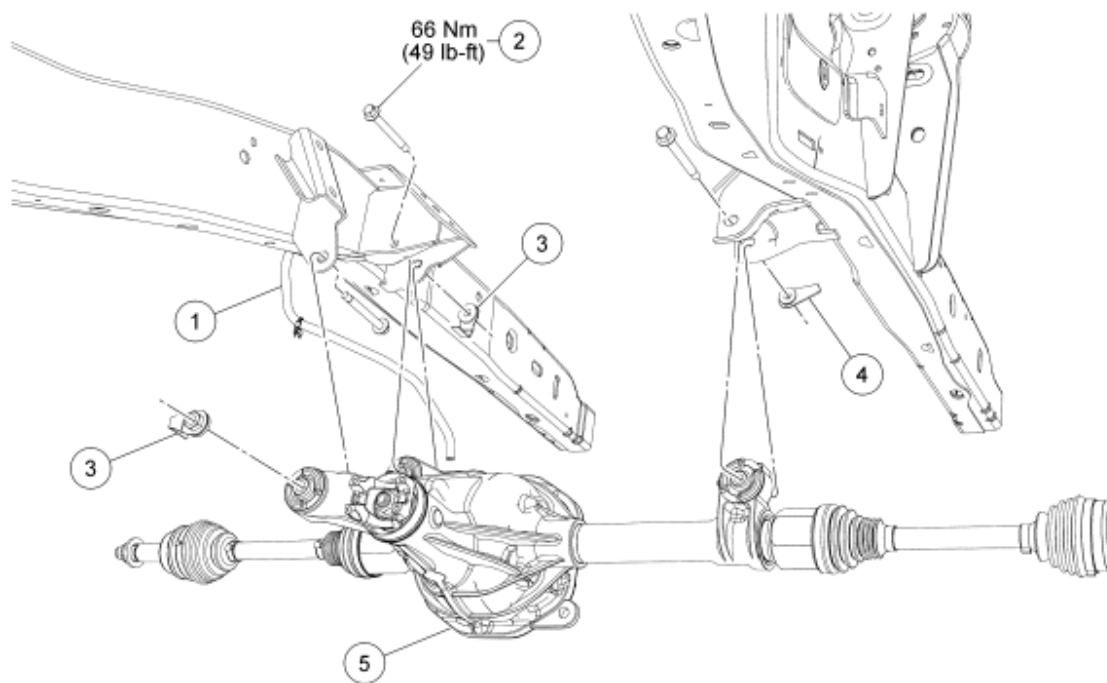
Item	Part Number	Description
1	W500041	Heater tube bracket front bolt
2	N802330	RH engine support insulator nut
3	W708103	LH engine support insulator through bolt



N0073945

Fig. 101: Stabilizer Bar and Crossmember With Torque Specifications
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W707472	Stabilizer bar bracket bolt (4 required)
2	3B353	Stabilizer bar bracket (2 required)
3	5D120	Crossmember bolt (4 required)
4	5E138	Crossmember



N0073946

Fig. 102: Front Axle - Four-Wheel Drive (4WD) Vehicles With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	3B476	Differential housing vent hose
2	W506549	Differential housing bolt (3 required)
3	W706348	Differential housing flag nuts (2 required)
4	W708348	Differential housing flag nut
5	3002	Differential housing

REMOVAL

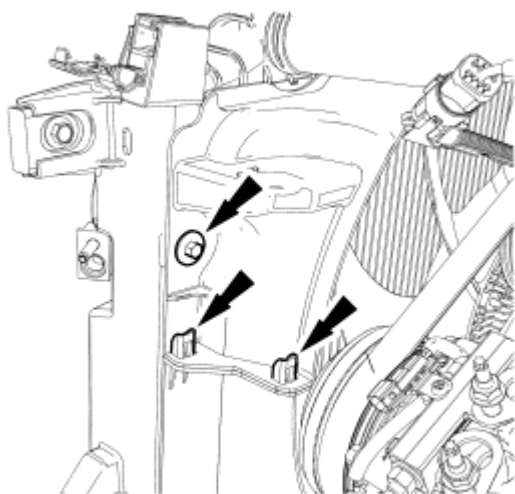
All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the Air Cleaner (ACL) outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
4. Remove the starter. For additional information, refer to **STARTING SYSTEM** article.
5. Remove the oil pump screen and pickup tube. For additional information, refer to **Oil Pump Screen and Pickup Tube**.
6. Remove the weatherstrip.

7. Remove the bolt and position the power steering fluid reservoir aside.

NOTE: Allow the engine to cool before removing the coolant expansion tank. The radiator draws coolant from the coolant expansion tank as the engine cools. If the coolant expansion tank is removed before the engine cools, the radiator will draw air into the system, resulting in possible engine damage.

8. Disconnect the coolant overflow hose. Remove the 2 bolts and the coolant expansion tank.
9. Remove the 2 bolts, unclip the clips and remove the upper fan shroud.



N0036752

Fig. 103: Locating Upper Fan Shroud Bolts And Clips
Courtesy of FORD MOTOR CO.

10. Remove the heater tube bracket front bolt.
11. Install the Engine Lifting Bracket using the previously removed bolt.
 - Tighten to 23 Nm (17 lb-ft).

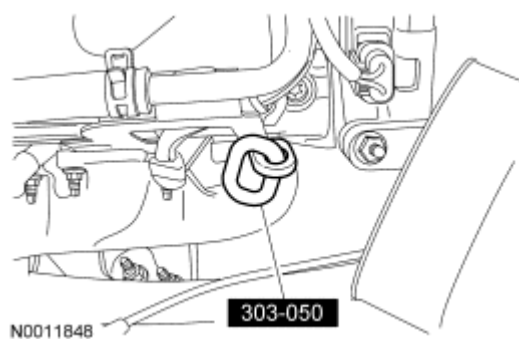


Fig. 104: Identifying Special Tool (303-050)
Courtesy of FORD MOTOR CO.

NOTE: This is not a typical setup. Only the right side of the engine will be raised.

12. Install the Engine Support Bar and the 2 Adapters for 303-290A.

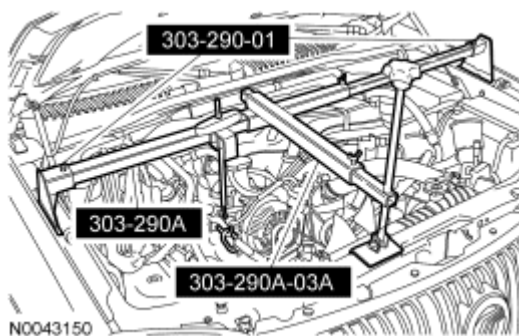


Fig. 105: Identifying Special Tools (303-290A, 303-290-01, 303-290A-03A)
Courtesy of FORD MOTOR CO.

All-Wheel Drive (AWD) vehicles

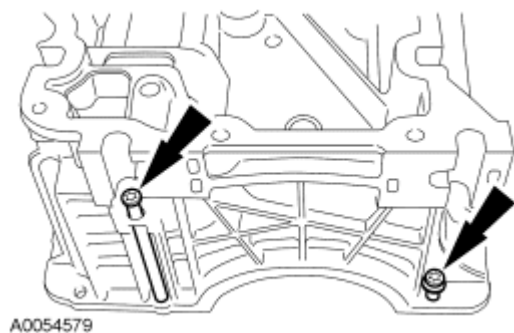
13. Remove the 4 bolts and the 2 stabilizer bar brackets.
14. Remove the 4 bolts and the crossmember.

All vehicles

15. Remove the RH engine support insulator nut.
16. Remove the LH engine support insulator through bolt.
17. Remove the 2 transmission-to-cylinder block cradle bolts.

NOTE: Cylinder block cradle is shown removed for clarity. Note the location of the 2 Torx head bolts at the rear of the cylinder block cradle.

18. Remove the 2 cylinder block cradle rear bolts.

**Fig. 106: Locating Rear Cylinder Block Cradle Bolts**

Courtesy of FORD MOTOR CO.

19. Remove the 20 bolts and 2 nuts along the outside of the cylinder block cradle.

NOTE: Note the location of the 2 silver-colored bolts that have washer seals. They must be installed in the same position with new washer seals.

20. Remove the 8 cylinder block cradle inner bolts and the 2 washer seals.

- Discard the washer seals.

21. Raise the engine.

AWD vehicles

WARNING: Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

22. Support the front axle with a suitable jack.
23. Disconnect the vent hose from the differential housing vent tube.

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

24. Remove and discard the 3 axle housing bolts and 3 flag nuts. Lower the axle.

All vehicles

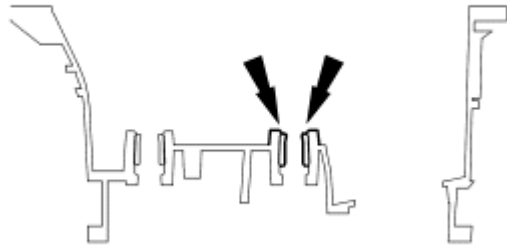
25. Remove the cylinder block cradle.

INSTALLATION

All vehicles

NOTE: Failure to back off the set screws may result in damage to the cylinder block cradle.

1. Back the set screws off until they are below the cylinder block cradle boss.



A0060498

Fig. 107: Locating Cylinder Block Cradle Boss
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 the old cylinder block cradle gasket and sealant.

NOTE: Gasket material as well as silicone sealant may be present in the cavities in the main bearing cap. This material must be removed completely prior to assembly.

2. Clean the gasket mating surfaces, making sure all the sealant is removed from the cavities on the rear main bearing cap. To clean the sealing area, use a plastic scraping tool, silicone gasket remover and metal surface prep. Follow the directions on the packaging.



A0082981

Fig. 108: Locating Sealant Position On Rear Main Bearing Cap
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket

remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure may cause future oil leakage.

3. Apply silicone in the 6 places shown.

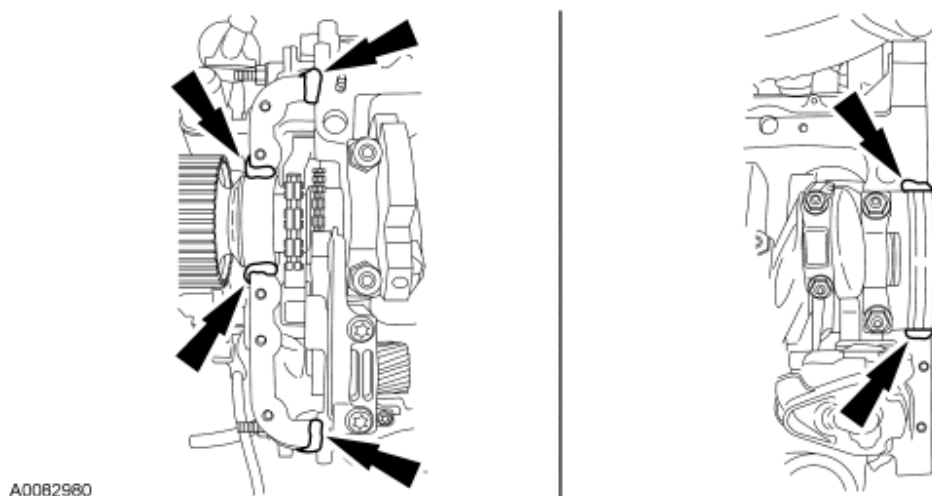


Fig. 109: Locating Silicone Applying Area
Courtesy of FORD MOTOR CO.

4. Position a new gasket and the cylinder block cradle. Install the outer 20 bolts and 2 nuts finger-tight.
5. Install the 2 cylinder block cradle rear Torx bolts finger-tight.
6. Install the 2 transmission-to-cylinder block cradle bolts.
 - Tighten to 47 Nm (35 lb-ft).
7. Tighten the outer 20 bolts and 2 nuts.
 - Tighten the nuts to 10 Nm (89 lb-in).
 - Tighten the bolts to 14 Nm (124 lb-in).
8. Tighten the 2 cylinder block cradle rear Torx bolts.
 - Tighten to 10 Nm (89 lb-in).
9. Tighten the 8 inserts.
 - Tighten to 3 Nm (27 lb-in).

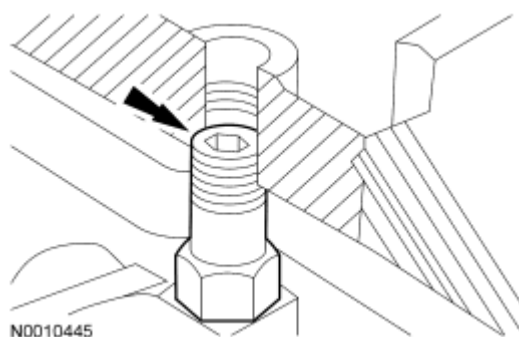


Fig. 110: Locating Cylinder Block Cradle Rear Torx Bolts
Courtesy of FORD MOTOR CO.

10. Install the 2 silver-colored bolts and new washer seals finger-tight.

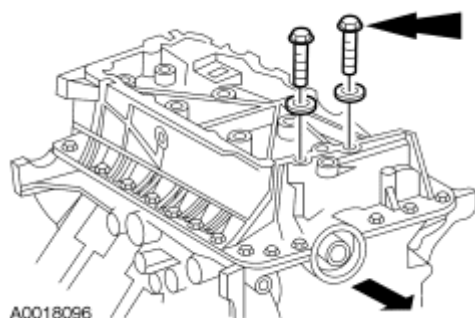


Fig. 111: Locating Silver-Colored Bolts And New Washer Seals
Courtesy of FORD MOTOR CO.

11. Install the 6 remaining inner bolts finger-tight.
12. Tighten the 8 inner bolts in the sequence shown in 2 stages.
 - Stage 1: Tighten to 15 Nm (133 lb-ft).
 - Stage 2: Tighten to 34 Nm (25 lb-ft).

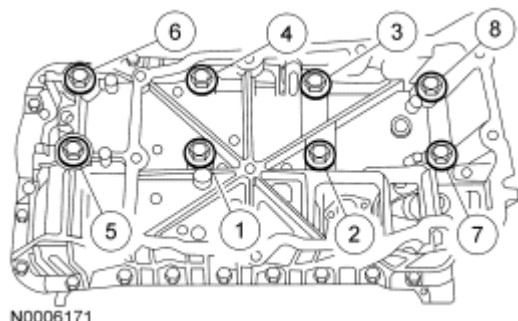


Fig. 112: Identifying Cylinder Block Cradle Inner Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

AWD vehicles

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

13. Raise the axle into position and install 3 new bolts and nuts.
 - Tighten to 66 Nm (49 lb-ft).
14. Connect the vent hose to the differential housing vent tube.

All vehicles

15. Lower the engine and remove the Engine Support Bar and the Adapters for 303-290A.

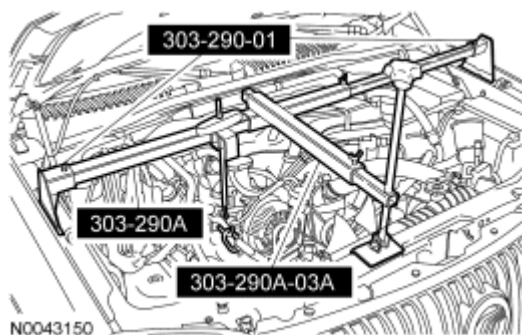


Fig. 113: Identifying Special Tools (303-290A, 303-290-01, 303-290A-03A)
Courtesy of FORD MOTOR CO.

16. Install the LH engine support insulator through bolt and nut.
- Tighten to 103 Nm (76 lb-ft).
17. Install the RH engine support insulator nut.
- Tighten to 90 Nm (66 lb-ft).

AWD vehicles

18. Position the crossmember and install the 4 bolts.
- Tighten to 103 Nm (76 lb-ft).
19. Position the 2 stabilizer bar brackets and install the 4 bolts.
- Tighten to 55 Nm (41 lb-ft).

All vehicles

20. Install the oil pump screen and pickup tube. For additional information, refer to **Oil Pump Screen and Pickup Tube**.
21. Install the starter. For additional information, refer to **STARTING SYSTEM** article.
22. Remove the Engine Lifting Bracket.

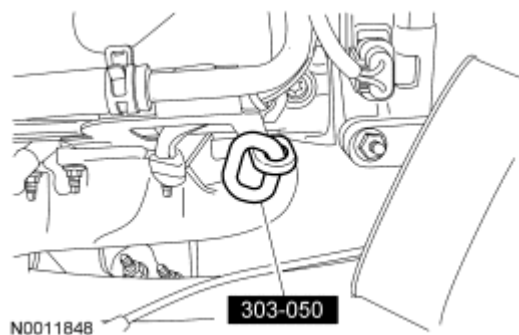
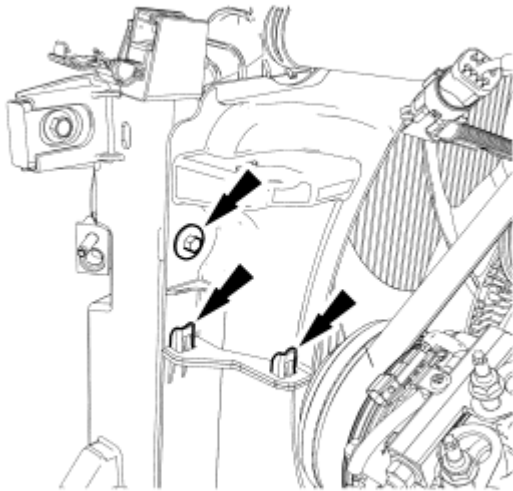


Fig. 114: Identifying Special Tool (303-050)

Courtesy of FORD MOTOR CO.

23. Install the heater tube bracket front bolt.
 - Tighten to 34 Nm (25 lb-ft).
24. Position the upper fan shroud and install the 2 bolts.
 - Tighten to 7 Nm (62 lb-in).



N0036752

Fig. 115: Locating Upper Fan Shroud Bolts And Clips
Courtesy of FORD MOTOR CO.

25. Position the coolant expansion tank, install the 2 bolts and connect the coolant overflow hose.
 - Tighten to 7 Nm (62 lb-in).
26. Position the power steering fluid reservoir and install the bolt.
 - Tighten to 7 Nm (62 lb-in).
27. Install the weatherstrip.
28. Install the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
29. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

OIL PUMP

Material

Item	Specification
------	---------------

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil
XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent

WSS-M2C929-A

1. Remove the cylinder block cradle. For additional information, refer to **Cylinder Block Cradle**.
2. Remove the 2 bolts and the oil pump.
 - To install, tighten to 19 Nm (168 lb-in).
3. To install, reverse the removal procedure.
 - Lubricate the oil pump with clean engine oil.

OIL PUMP SCREEN AND PICKUP TUBE

REMOVAL AND INSTALLATION

1. Remove the oil pan. For additional information, refer to **Oil Pan**.
2. Remove the bolt and the oil pump screen and pickup tube.
 - To install, tighten to 10 N.m (89 lb-in).
3. To install, reverse the removal procedure.

OIL COOLER

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

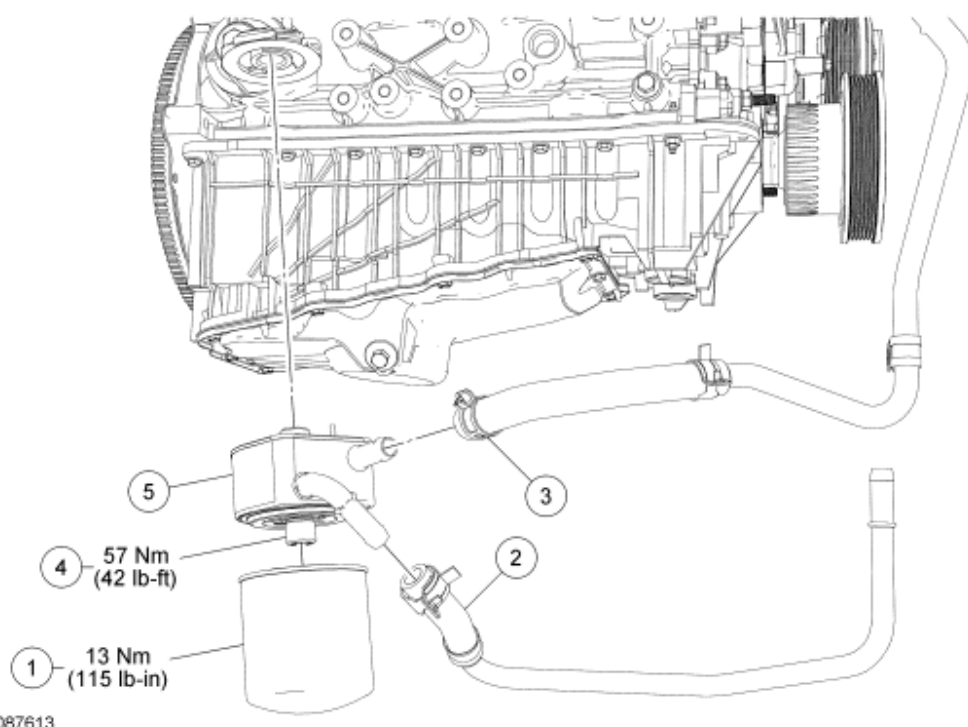


Fig. 116: Oil Cooler Components With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6714	Oil filter
2	6N867	Oil cooler inlet hose
3	84947	Heater hose
4	-	Oil cooler threaded insert (part of 6A642)
5	6A642	Oil cooler

REMOVAL AND INSTALLATION

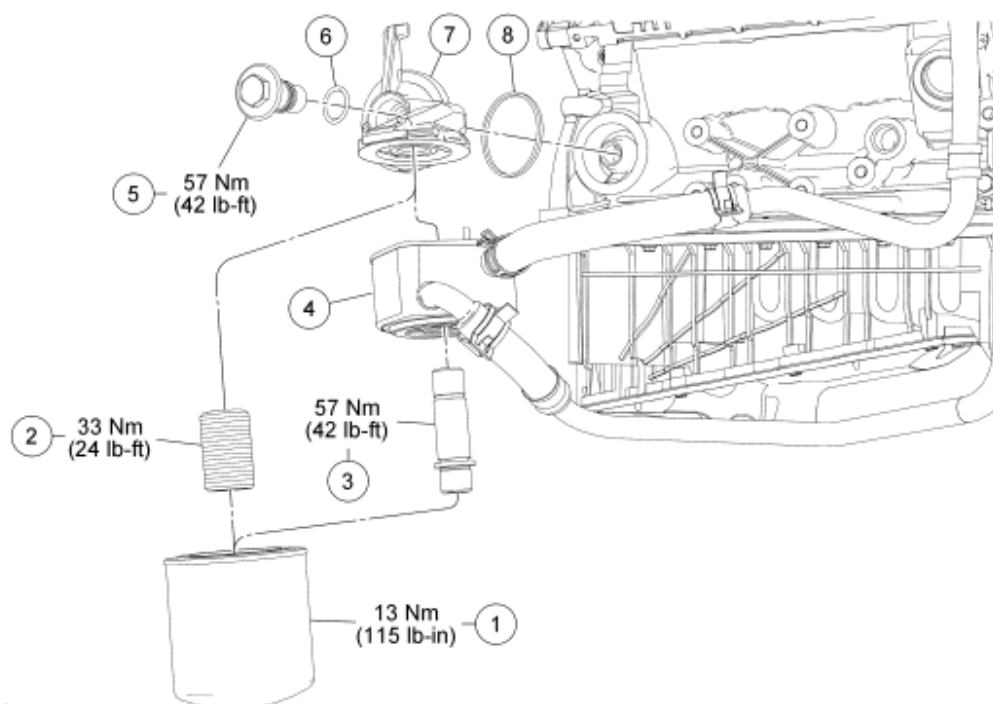
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Drain the cooling system. For additional information, refer to **ENGINE COOLING** article.
3. Remove and discard the oil filter.
 - To install, tighten to 13 Nm (115 lb-ft).
4. Disconnect the oil cooler inlet hose from the oil cooler.
5. Disconnect the heater hose from the oil cooler.
6. Loosen the threaded insert and remove the oil cooler.
 - To install, tighten to 57 Nm (42 lb-ft).
7. To install, reverse the removal procedure.
 - Install a new oil filter.

- Check the engine oil and fill as necessary.

OIL FILTER ADAPTER

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A



N0087614

Fig. 117: Oil Filter Adapter Components With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6714	Oil filter
2	6890	Oil filter adapter threaded insert (vehicles without an oil cooler)
3	-	Oil cooler threaded insert (part of 6A642) (oil cooler equipped vehicles only)
4	6A642	Oil cooler (oil cooler equipped vehicles only)
5	6895	Oil filter adapter bolt
6	E853188	Oil filter adapter bolt O-ring seal

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

7	6884	Oil filter adapter
8	6L621	Oil filter adapter gasket

REMOVAL AND INSTALLATION

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the RH exhaust manifold. For additional information, refer to **Exhaust Manifold - RH**.
3. Remove and discard the oil filter.
 - To install, tighten to 13 Nm (115 lb-in).

Vehicles equipped with an oil cooler

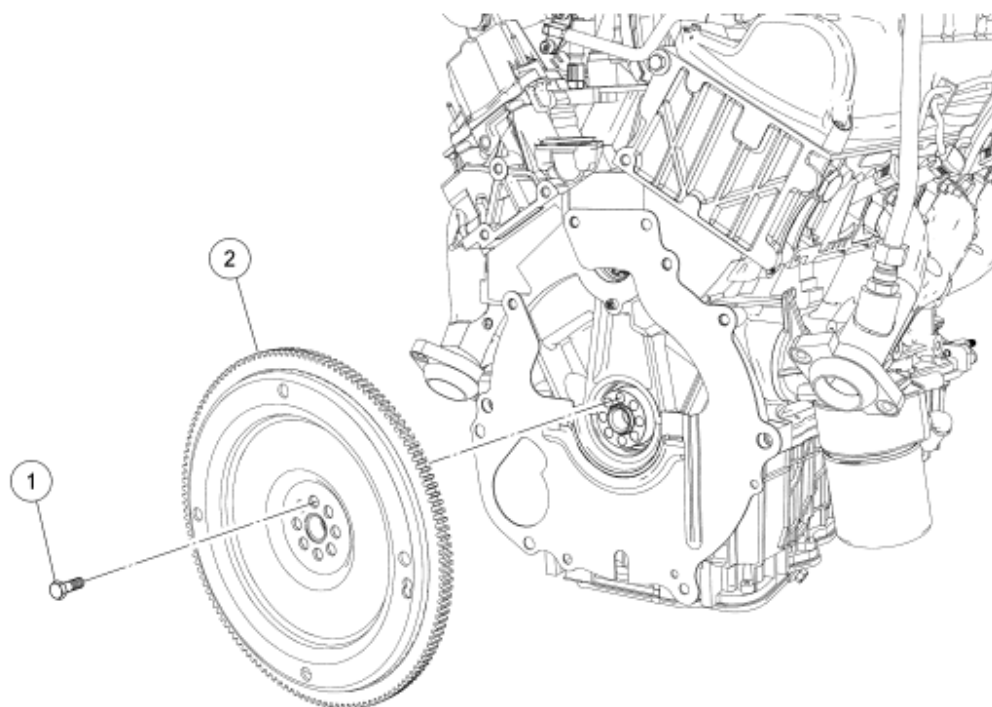
NOTE: The oil cooler threaded insert is part of the oil cooler and is not removed.

4. Loosen the oil cooler threaded insert and position the oil cooler aside.
 - To install, tighten to 57 Nm (42 lb-ft).

All vehicles

5. Remove the bolt and the oil filter adapter.
 - To install, tighten to 57 Nm (42 lb-ft).
6. To install, reverse the removal procedure.
 - Install a new oil filter.
 - Check the engine oil and fill as necessary.

FLEXPLATE



N0036792

Fig. 118: Exploded View Of Flexplate
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6379	Flexplate bolt (8 required)
2	6375	Flexplate

REMOVAL

1. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 5R55S** article.
2. Remove the 8 bolts and the flexplate.

INSTALLATION

NOTE: Special bolts are used for flexplate installation. Do not use standard bolts.

1. Install the flexplate. Tighten the 8 bolts in 3 stages in the sequence shown.
 - Stage 1: Tighten to 13 Nm (115 lb-in).
 - Stage 2: Tighten to 50 Nm (37 lb-ft).
 - Stage 3: Tighten an additional 90 degrees.

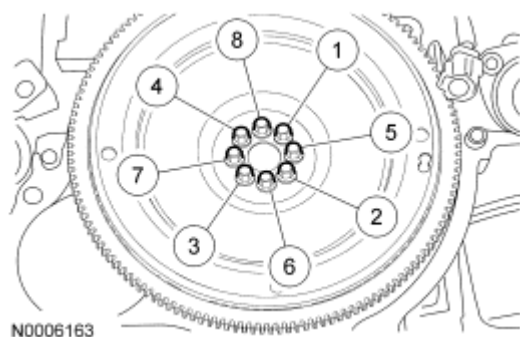
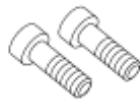


Fig. 119: Identifying Flexplate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

2. Install the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 5R55S** article.

CRANKSHAFT REAR SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST307B-A	Adapter for 303-579	303-527 (T95T-6701-A3)
 ST2132-A	Installer, Crankshaft Rear Oil Seal	303-579 (T97T-6701-A)
 ST1385-A	Remover, Oil Seal	303-409 (T92C-6700-CH)
 ST3077-A	Screws, Crankshaft Rear Oil Seal	303-528 (T95T-6701-A4)

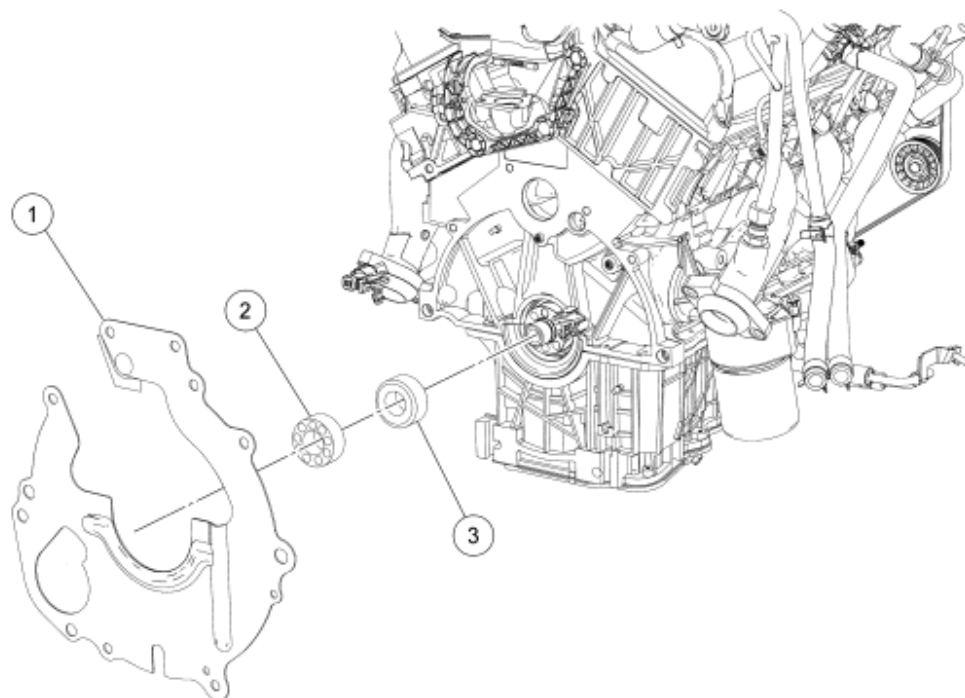
Material

Item	Specification
Motorcraft Metal Surface Prep	

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

ZC-31-A	-
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A



N0005875

Fig. 120: Exploded View Of Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6A373	Spacer plate
2	6434	Flexplate-to-crankshaft spacer
3	6701	Crankshaft rear seal

REMOVAL

1. Remove the flexplate. For additional information, refer to **Flexplate**.
2. Remove the spacer plate.
3. Remove the flexplate-to-crankshaft spacer.

NOTE: The original crankshaft rear seal does not have a metal speedy sleeve. Replacement rear crankshaft seals come with a speedy sleeve. If present, this sleeve must be removed before attempting to remove the seal.

4. If necessary, remove the speedy sleeve using 2 screwdrivers or small pry bars.

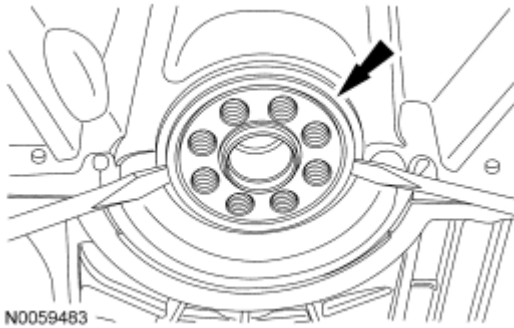


Fig. 121: Locating Speedy Sleeve
Courtesy of FORD MOTOR CO.

NOTE: Avoid scratching or damaging the crankshaft rear seal running surface during removal of the crankshaft rear seal. Scratches or other damage to the crankshaft may cause oil leaks.

5. Using the Oil Seal Remover, remove the crankshaft rear seal.

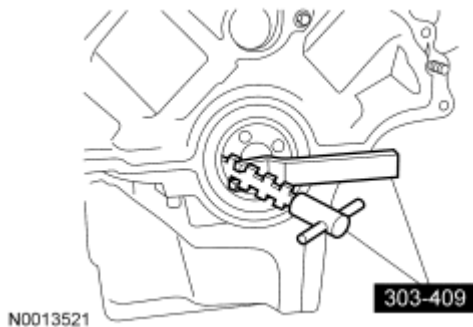


Fig. 122: Removing Crankshaft Rear Seal Using Special Tool (303-409)
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: The new replacement crankshaft rear seal comes with a speedy sleeve. The speedy sleeve must be installed with the crankshaft rear seal.

NOTE: Be sure the crankshaft rear sealing surface is clean and free of any rust or corrosion. To clean the crankshaft rear seal surface area, use extra-fine emery cloth or extra-fine 0000 steel wool with metal surface prep.

1. Lubricate the crankshaft rear oil seal with clean engine oil.
2. Install the Adapter for 303-579 and the Crankshaft Rear Oil Seal Screws.

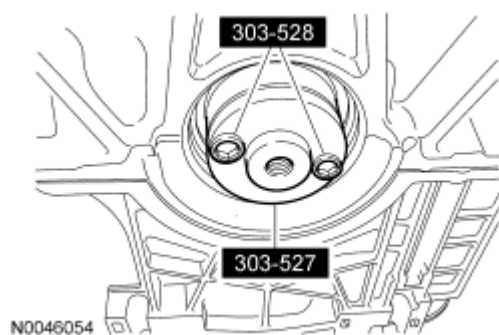


Fig. 123: Identifying Special Tool (303-527, 303-528)
Courtesy of FORD MOTOR CO.

3. Position the crankshaft rear seal with speedy sleeve on the Adapter for 303-579 and the Crankshaft Rear Oil Seal Screws.

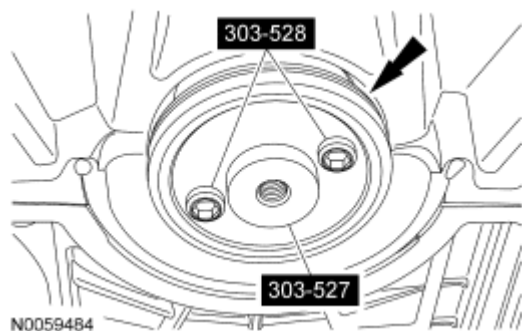


Fig. 124: Identifying Crankshaft Rear Seal, Special Tool (303-527, 303-528)
Courtesy of FORD MOTOR CO.

4. Using the Crankshaft Rear Oil Seal Installer, install the crankshaft rear seal with speedy sleeve.

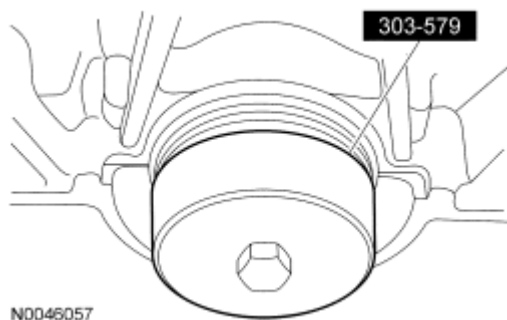


Fig. 125: Installing Crankshaft Rear Oil Seal Using Special Tool
Courtesy of FORD MOTOR CO.

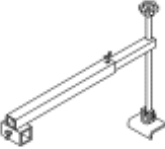
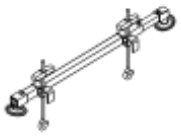
5. Install the flexplate-to-crankshaft spacer.
6. Install the spacer plate.
7. Install the flexplate. For additional information, refer to **Flexplate**.

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

ENGINE SUPPORT INSULATORS

Special Tools

Illustration	Tool Name	Tool Number
 ST2378-A	Adapter for 303-290A	303-290-01
 ST2379-A	Adapter for 303-290A	303-290A-03A
 ST1595-A	Lifting Bracket, Engine	303-050 (T70P-6000)
 ST2363-A	Support Bar, Engine	303-290A

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

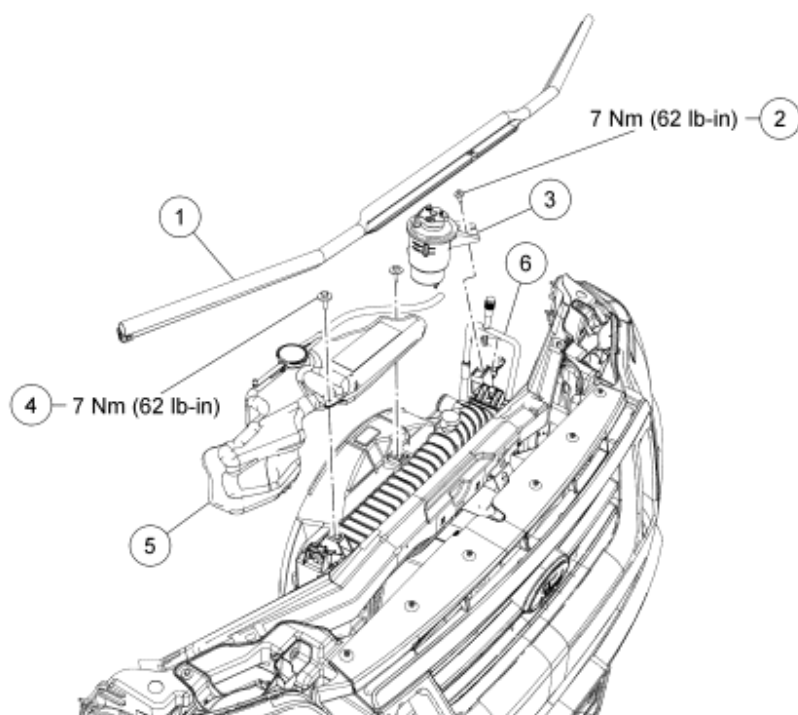
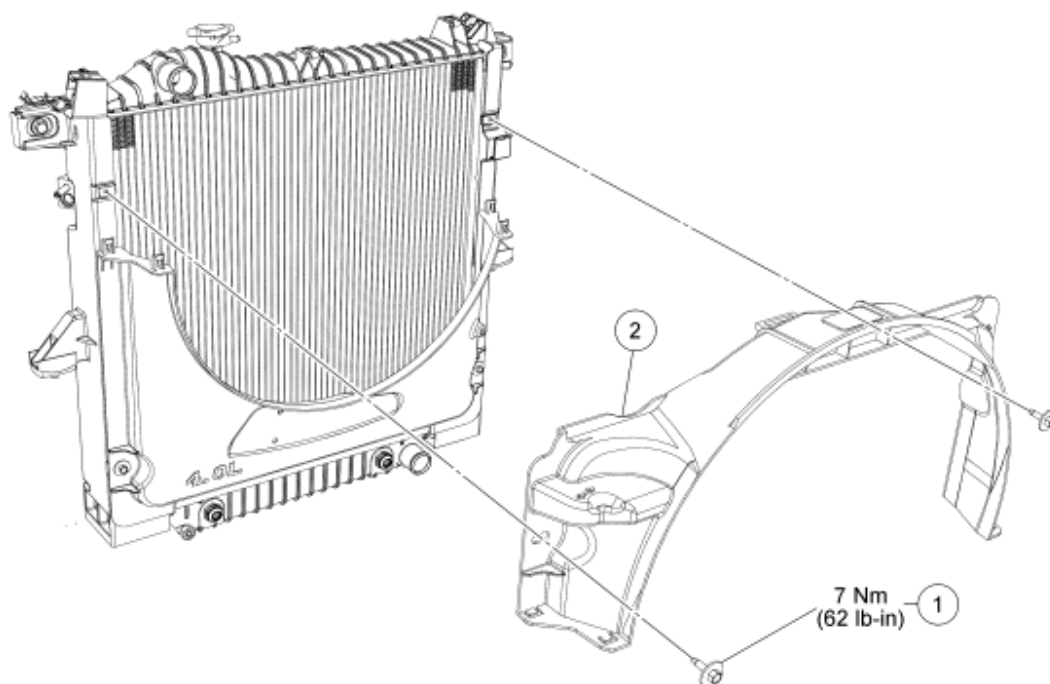


Fig. 126: Front End Components With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	16C824	Weatherstrip
2	W503924	Power steering fluid reservoir bolt
3	3R700	Power steering fluid reservoir
4	W709027	Coolant expansion tank bolt (2 required)
5	8C045	Coolant expansion tank
6	19972	A/C tube

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



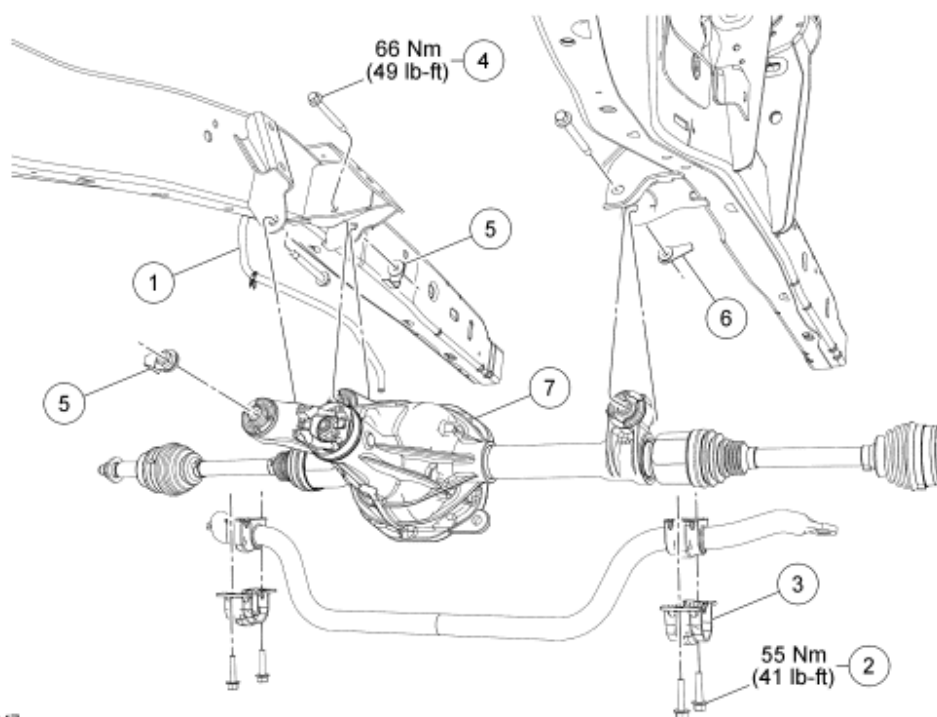
N0073943

Fig. 127: Upper Cooling Fan Shroud With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W713417	Upper cooling fan shroud bolt (2 required)
2	8K618	Upper cooling fan shroud

2009 Mercury Mountaineer

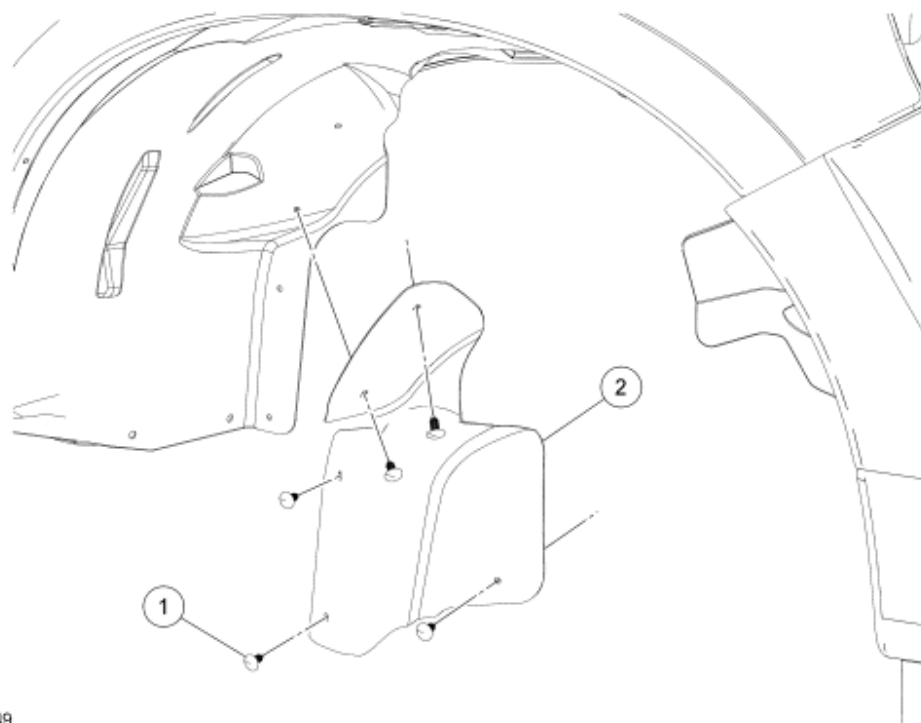
2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



N0073947

Fig. 128: Front Axle - Four-Wheel Drive (4WD) Vehicles With Torque Specifications
Courtesy of FORD MOTOR CO.

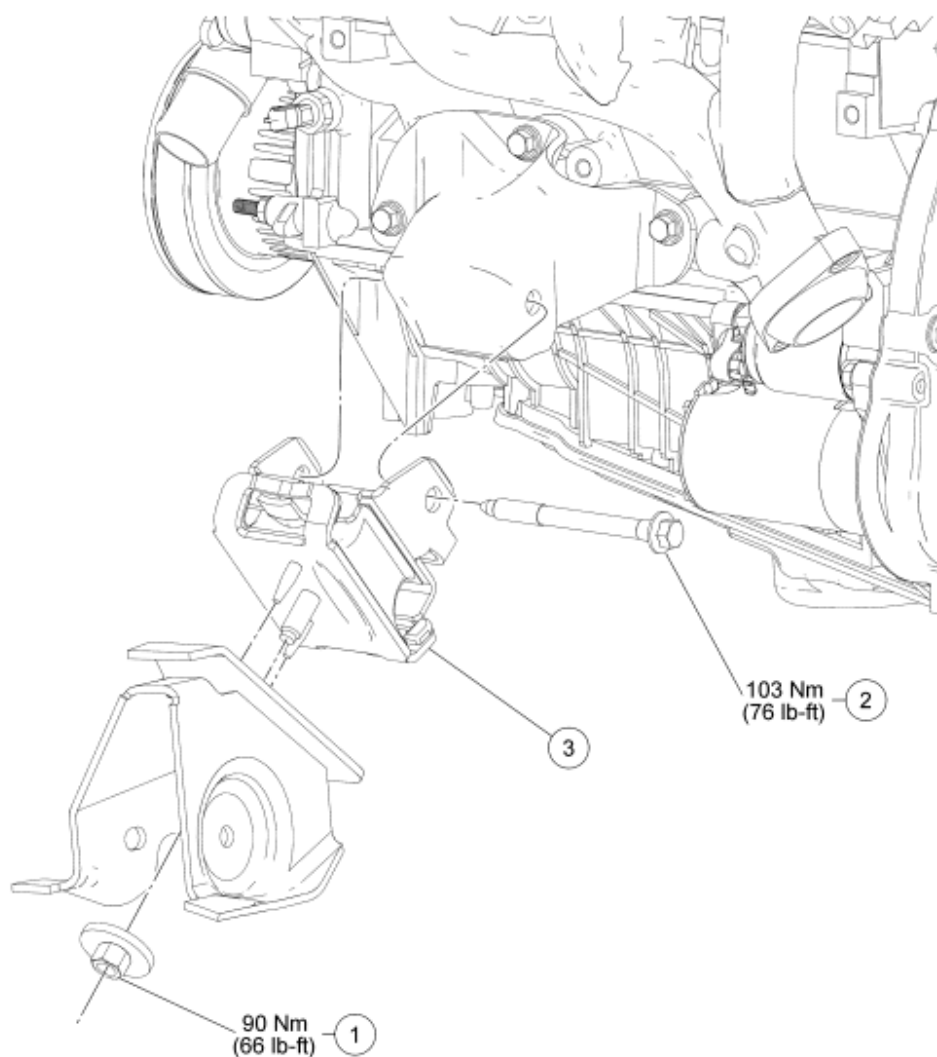
Item	Part Number	Description
1	3B476	Differential housing vent hose
2	W707472	Stabilizer bar bracket bolt (4 required)
3	3B353	Stabilizer bar bracket (2 required)
4	W506549	Differential housing bolt (3 required)
5	W706348	Differential housing flag nuts (2 required)
6	W708348	Differential housing flag nut
7	3010	Differential housing



N0073949

Fig. 129: RH Inner Fender Splash Shield
Courtesy of FORD MOTOR CO.

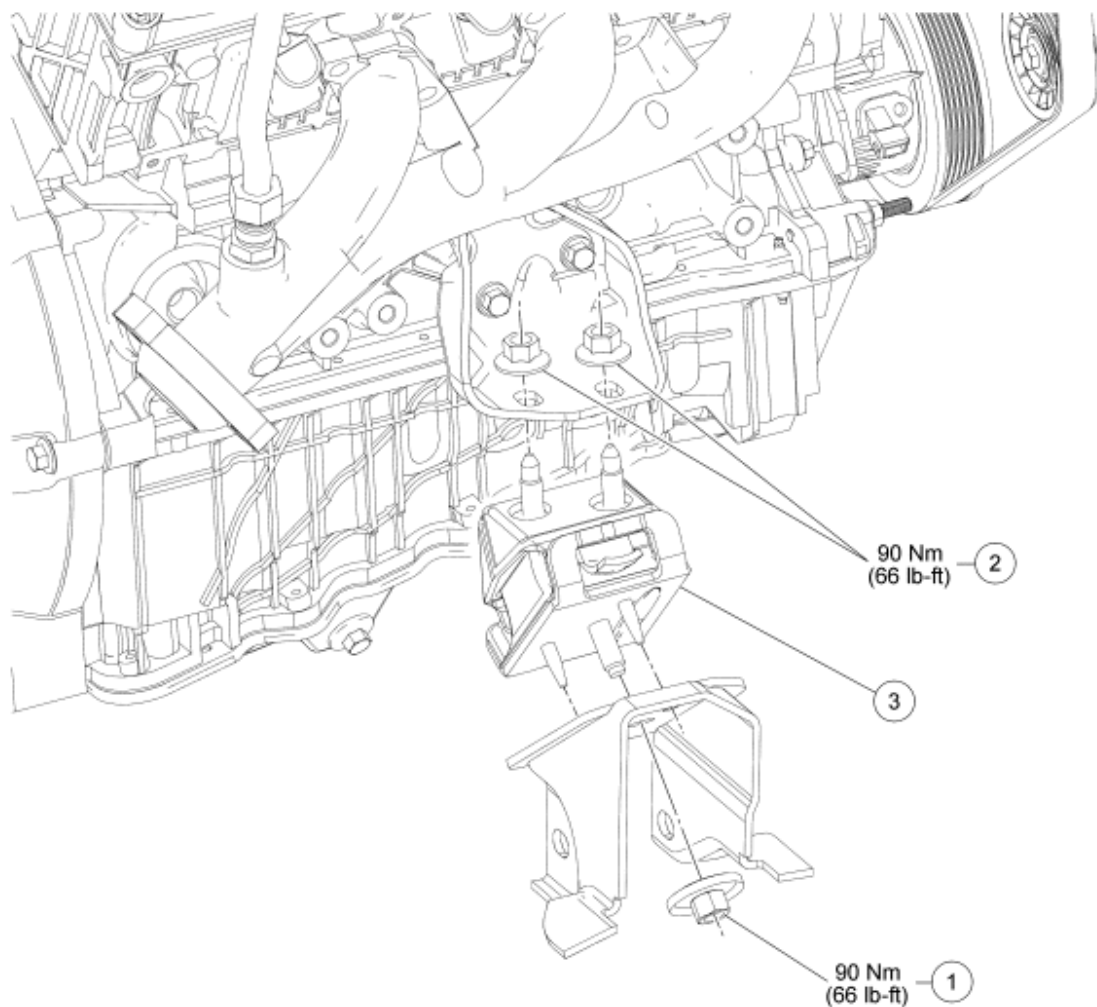
Item	Part Number	Description
1	388577	Inner fender splash shield push pin (5 required)
2	16034	Inner fender splash shield



N0074080

Fig. 130: Engine Support Insulator - LH With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N802330	LH engine support insulator nut
2	W705694	LH engine support insulator through bolt
3	6038B	LH engine support insulator



N0074081

Fig. 131: Engine Support Insulator - RH With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N802330	RH engine support insulator lower nut
2	N802653	RH engine support insulator upper nuts (2 required)
3	6038A	RH engine support insulator

REMOVAL AND INSTALLATION

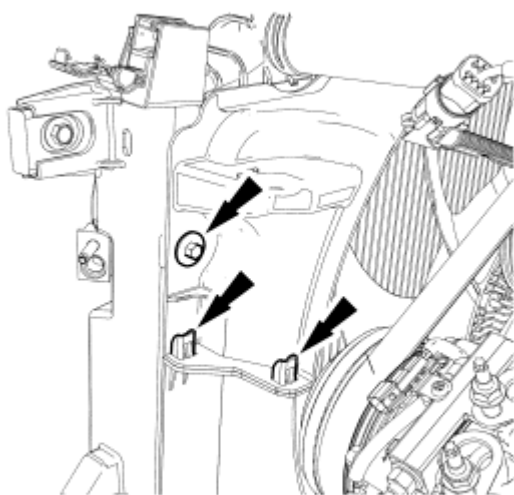
All vehicles

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

2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the weatherstrip.
4. Remove the bolt and position the power steering fluid reservoir aside.
 - To install, tighten to 7 Nm (62 lb-in).

NOTE: Allow the engine to cool before removing the coolant expansion tank. The radiator draws coolant from the coolant expansion tank as the engine cools. If the coolant expansion tank is removed before the engine cools, the radiator will draw air into the system, resulting in possible engine damage.

5. Disconnect the coolant overflow hose. Remove the 2 bolts and the coolant expansion tank.
 - To install, tighten to 7 Nm (62 lb-in).
6. Remove the 2 bolts, unclip the clips and remove the upper fan shroud.
 - To install, tighten to 7 Nm (62 lb-in).



N0036752

Fig. 132: Locating Upper Fan Shroud Bolts And Clips
Courtesy of FORD MOTOR CO.

7. Remove the bolt and install the Engine Lifting Bracket.
 - Tighten to 42 Nm (31 lb-ft).

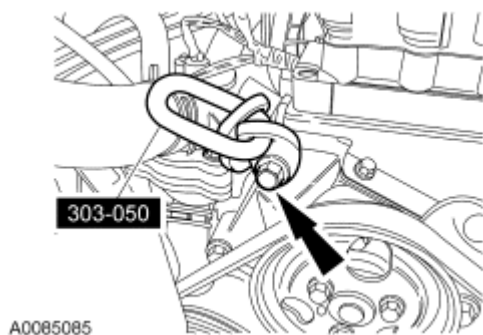


Fig. 133: Locating Front End Accessory Drive (FEAD) Bracket Bolt
Courtesy of FORD MOTOR CO.

8. Install the Engine Support Bar and the 2 Adapters for 303-290A.

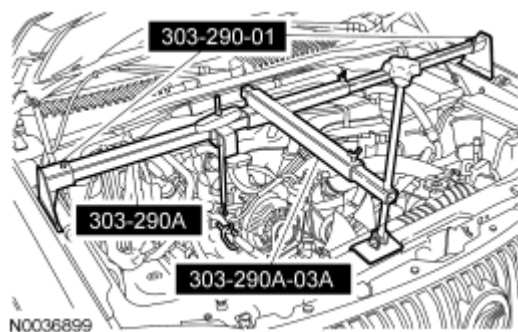


Fig. 134: Identifying Special Tools (303-290A, 303-290-01, 303-290A-03A)
Courtesy of FORD MOTOR CO.

9. Remove the LH engine support insulator through bolt.
 - To install, tighten to 103 Nm (76 lb-ft).
10. Remove the 5 pushpins and the RH inner fender splash shield.
11. Remove the 3 RH engine support insulator nuts.
 - To install, tighten to 90 Nm (66 lb-ft).
12. Raise the engine approximately 60 mm (2.36 in).
13. Remove the RH engine support insulator.

All-Wheel Drive (AWD) vehicles

14. Remove the 4 bolts and the 2 stabilizer bar brackets. Allow the stabilizer bar to hang freely.
 - To install, tighten to 55 Nm (41 lb-ft).

WARNING: Secure the assembly to the jack. Avoid any obstructions while lowering and raising the jack. Contact with obstructions may cause the assembly to fall off the jack, which may result in serious personal injury.

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

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

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

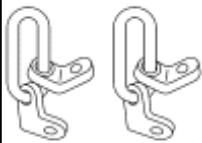
All vehicles

18. Remove the nut and the LH engine support insulator.
 - To install, tighten to 90 Nm (66 lb-ft).
19. To install, reverse the removal procedure.

REMOVAL

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1595-A	Lifting Bracket, Engine	303-050 (T70P-6000)
 ST2673-A	Spreader Bar	303-D701 or equivalent

REMOVAL

NOTE: If the fuel rail is used as a leverage device, it can be damaged. Care must be taken when working around the fuel rail.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the fuel supply tube spring lock coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
3. Disconnect the battery cables. For additional information, refer to **BATTERY, MOUNTING AND**

CABLES article.

4. Remove the nut and disconnect the ground wire.

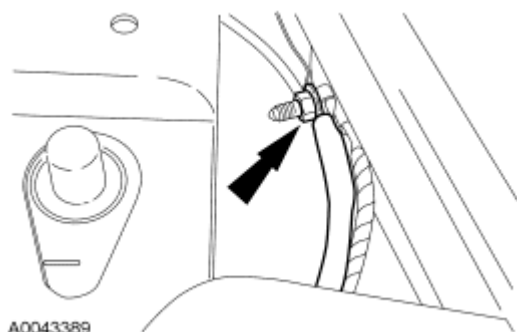


Fig. 135: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

5. Disconnect the electrical connector and detach the wiring harness retainers.

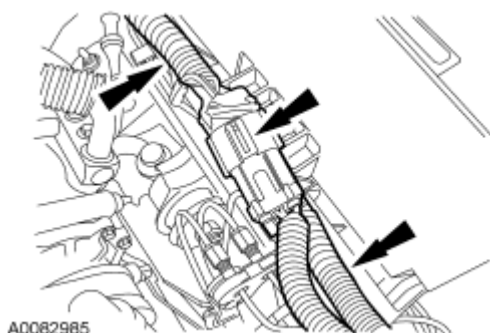


Fig. 136: Locating Electrical Connector And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

6. Lift the cover, remove the 2 nuts and disconnect the battery cable connector.
 - Lay the wiring harness on top of the engine.

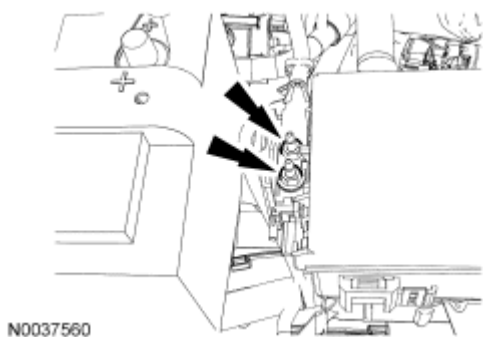


Fig. 137: Locating Battery Cable Connectors Nuts
Courtesy of FORD MOTOR CO.

7. Recover the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.
8. Drain the cooling system. For additional information, refer to **ENGINE COOLING** article.
9. Remove the cooling fan. For additional information, refer to **ENGINE COOLING** article.
10. Remove the Air Cleaner (ACL) and the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
11. Disconnect the windshield washer hose.

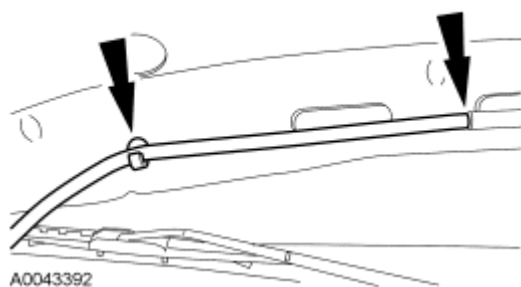


Fig. 138: Locating Windshield Washer Hose And Retainer
Courtesy of FORD MOTOR CO.

NOTE: Mark the hinge locations for installation reference.

12. Remove the 4 bolts and the hood.

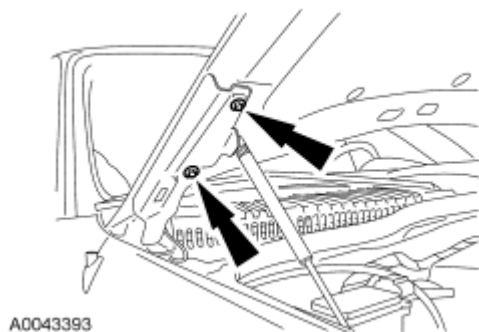
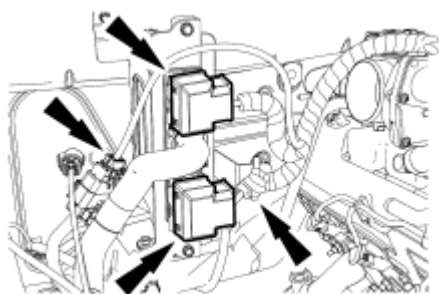


Fig. 139: Locating Hood Hinge Bolts
Courtesy of FORD MOTOR CO.

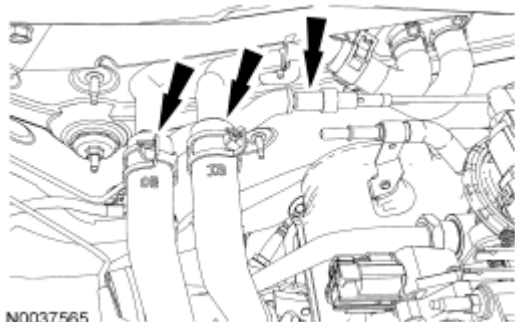
13. Disconnect the wiring harness electrical connector and the engine wiring harness-to-PCM electrical connectors. Detach the wiring harness retainer.



N0039896

Fig. 140: Locating Powertrain Control Module Electrical Connectors, Wiring Harness Electrical Connector & Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

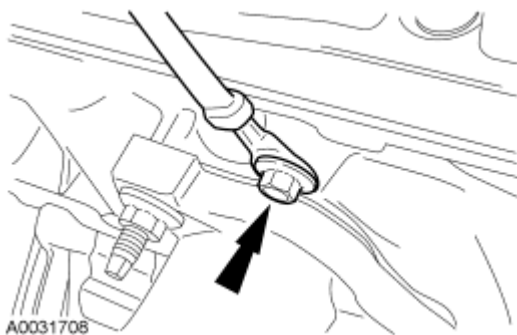
14. Disconnect the heater hoses and the vacuum hose.
 - Disconnect the heater control valve vacuum hose.



N0037565

Fig. 141: Locating Heater Control Valve Vacuum Hoses
Courtesy of FORD MOTOR CO.

15. Remove the bolt and position the ground wire aside.



A0031708

Fig. 142: Locating Ground Wire Bolt
Courtesy of FORD MOTOR CO.

16. Disconnect the Evaporative Emission (EVAP) hose.

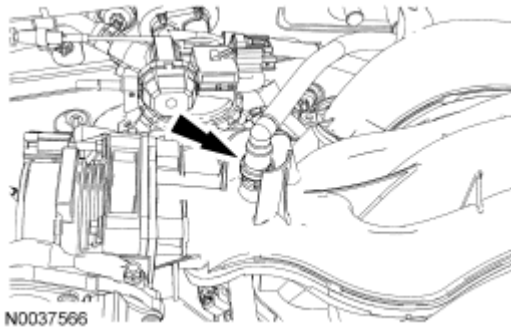


Fig. 143: Locating EVAP Hose
Courtesy of FORD MOTOR CO.

17. Remove the upper radiator hose.

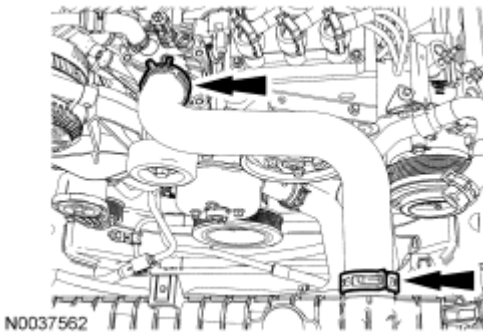


Fig. 144: Locating Upper Radiator Hose Clamps
Courtesy of FORD MOTOR CO.

18. Loosen the 3 power steering pump pulley bolts.

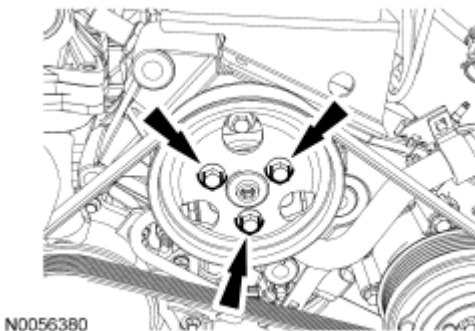


Fig. 145: Identifying Power Steering Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

19. Rotate the accessory drive belt tensioner counterclockwise and remove the accessory drive belt.

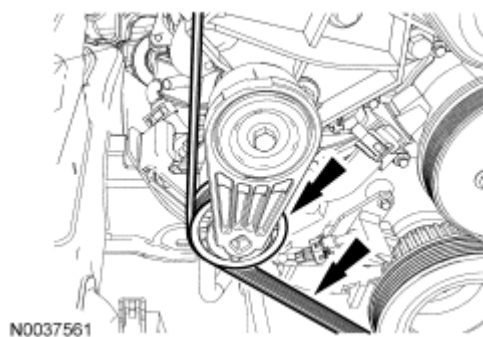


Fig. 146: Identifying Accessory Drive Belt Tensioner And Accessory Drive Belt
Courtesy of FORD MOTOR CO.

20. Remove the 3 bolts and the power steering pump pulley.



Fig. 147: Locating Power Steering Pump Pulley And Bolts
Courtesy of FORD MOTOR CO.

21. Disconnect the lower radiator hose from the coolant pump.

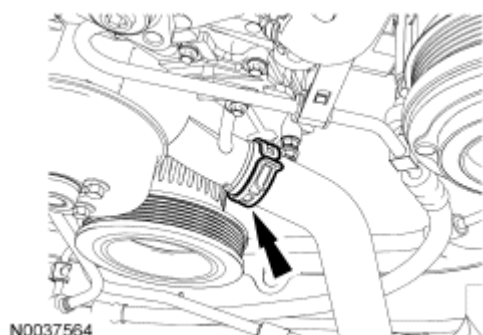


Fig. 148: Locating Lower Radiator Hose Clamp
Courtesy of FORD MOTOR CO.

22. Disconnect the Power Steering Pressure (PSP) switch electrical connector.

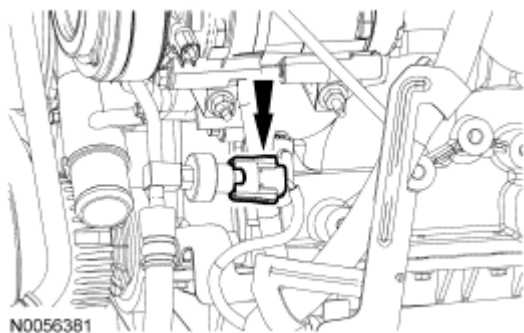


Fig. 149: Locating Power Steering Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: A/C compressor removed from art for clarity.

23. Remove the PSP hose and the 2 power steering reservoir-to-power steering pump supply hose bracket bolts.

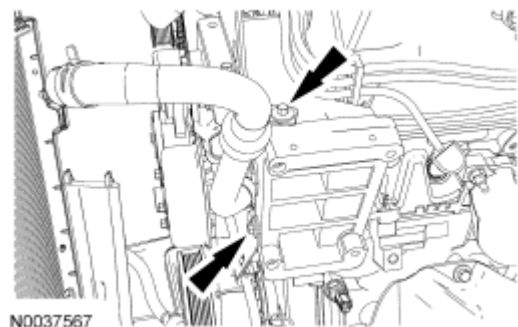


Fig. 150: Locating Power Steering Reservoir-To-Power Steering Pump Hoses Bolts
Courtesy of FORD MOTOR CO.

24. Remove the 3 bolts and position the power steering pump aside.

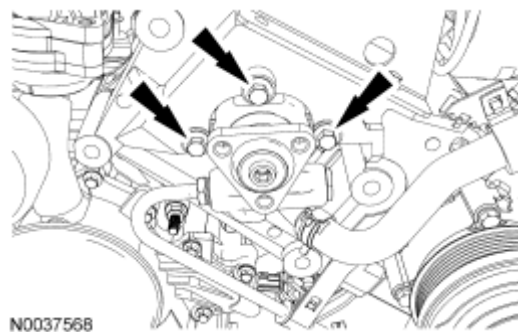


Fig. 151: Locating Power Steering Pump Bolts
Courtesy of FORD MOTOR CO.

25. Disconnect the brake booster vacuum hose.

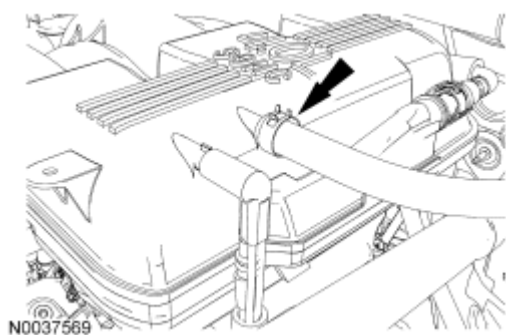


Fig. 152: Locating Brake Booster Vacuum Hose Clamp
Courtesy of FORD MOTOR CO.

26. Disconnect the EVAP canister purge valve electrical connector. Disconnect and remove the EVAP hose.

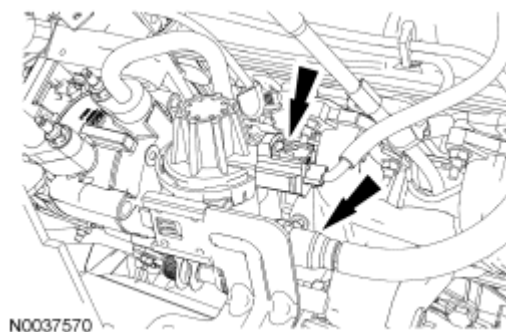


Fig. 153: Locating EVAP Canister Purge Valve Electrical Connector And EVAP Hose
Courtesy of FORD MOTOR CO.

27. Remove the 2 nuts and detach the A/C tubes.

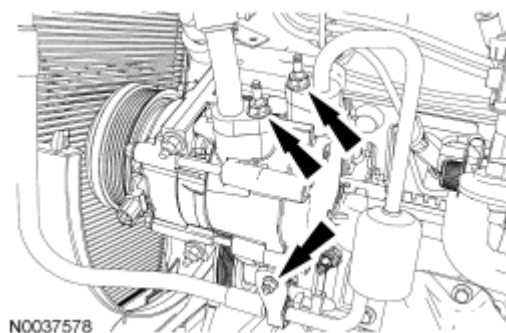


Fig. 154: Locating A/C Tube Bracket Nut And A/C Fitting Nuts
Courtesy of FORD MOTOR CO.

28. Disconnect the A/C high pressure switch, remove the nut, open the retaining clip and remove the A/C tube.

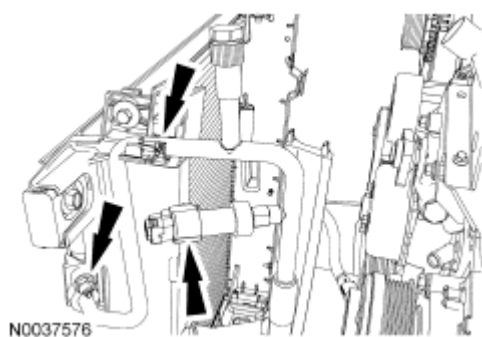


Fig. 155: Locating A/C High Pressure Switch, Retaining Clip And A/C Tube
Courtesy of FORD MOTOR CO.

29. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 5R55S** article.
30. Remove the terminal cover. Remove the 2 nuts, detach the wires and remove the starter.

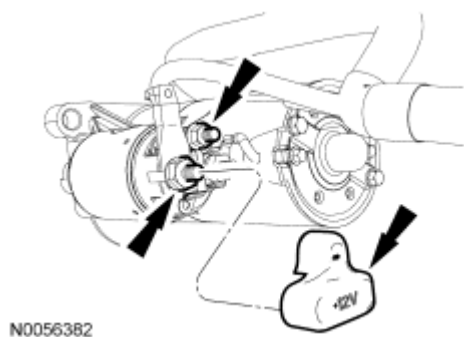


Fig. 156: Locating Terminal Cover And Nuts
Courtesy of FORD MOTOR CO.

31. Remove the oil filter.

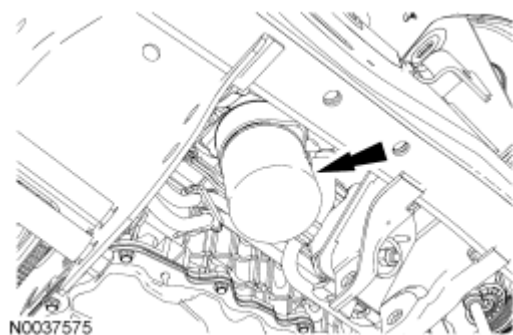


Fig. 157: Locating Oil Filter
Courtesy of FORD MOTOR CO.

32. Remove the nut and detach the transmission cooler tube bracket.
 - Support the transmission cooler tubes with mechanic's wire.

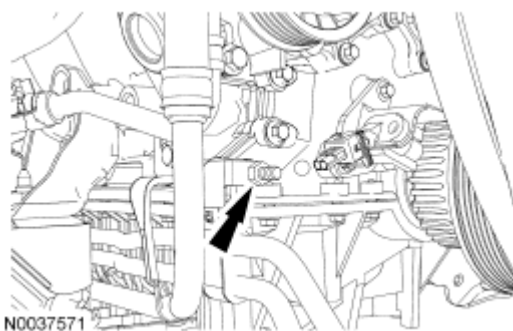


Fig. 158: Locating Transmission Cooler Tubes Nut
Courtesy of FORD MOTOR CO.

33. Remove the nut and detach the battery cable harness bracket from the frame rail.

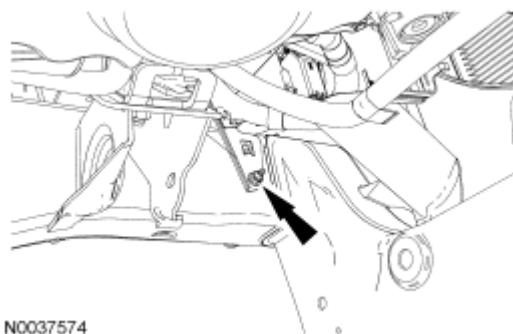


Fig. 159: Locating Battery Cable Harness Bracket Nut
Courtesy of FORD MOTOR CO.

34. Remove the LH engine support insulator through bolt.

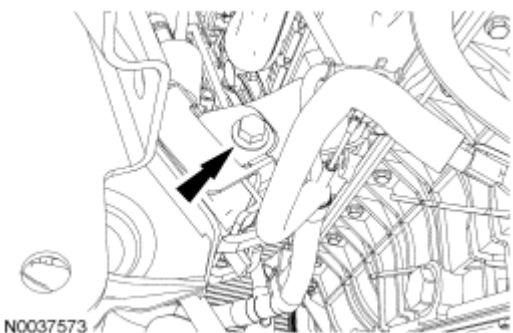


Fig. 160: Locating LH Engine Support Insulator Through Bolt
Courtesy of FORD MOTOR CO.

35. Remove the 2 RH engine support insulator nuts.



Fig. 161: Locating RH Engine Support Insulator Nuts
Courtesy of FORD MOTOR CO.

36. If equipped, disconnect the block heater electrical connector and wiring harness retainer.

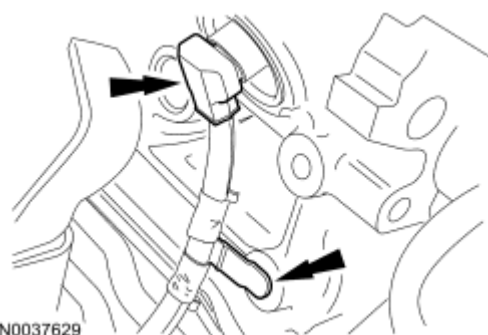


Fig. 162: Locating Block Heater Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

37. Remove the heater tube bracket bolt.

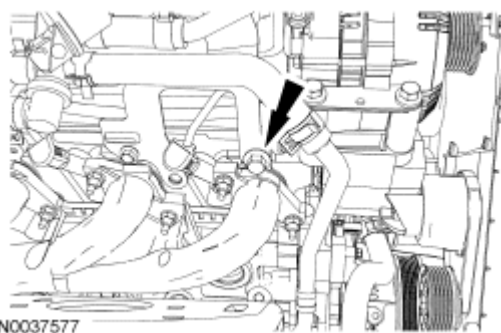


Fig. 163: Locating Heater Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

38. Install the Engine Lifting Bracket on the RH side of the engine.
- Tighten to 37 Nm (27 lb-ft).

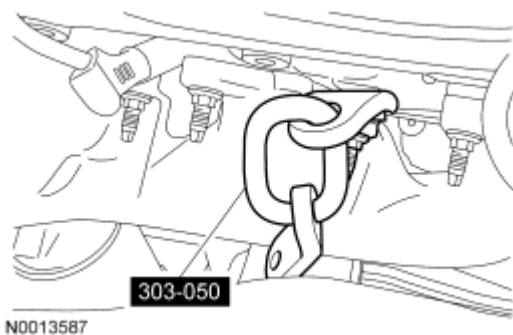


Fig. 164: Installing Special Tool (303-050) On RH Side Of Engine
Courtesy of FORD MOTOR CO.

39. Install the Engine Lifting Bracket on the LH side of the engine.

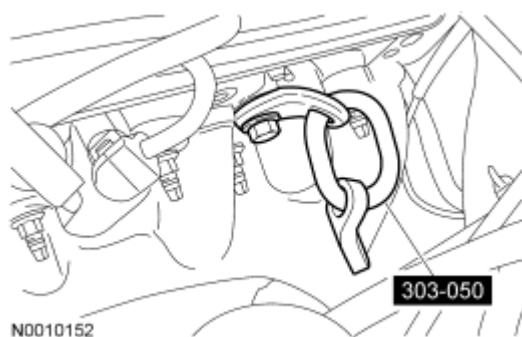


Fig. 165: Identifying Special Tool (303-050)
Courtesy of FORD MOTOR CO.

40. Attach the Spreader Bar and using a suitable floor crane, remove the engine.

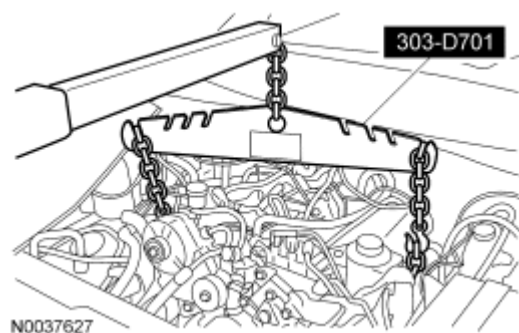


Fig. 166: Removing Engine Using Special Tool (303-D701) & A Suitable Floor Crane
Courtesy of FORD MOTOR CO.

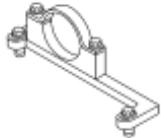
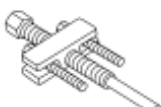
DISASSEMBLY

ENGINE

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

Special Tools

Illustration	Tool Name	Tool Number
 ST1776-A	Adapter for 303-564	303-578 (T97T-6256-A)
 ST1330-A	Compressor, Valve Spring	303-581 (T97T-6565-A)
 ST2741A	Crankshaft Socket	303-674
 ST1777-A	Holding Tool, Camshaft Sprocket	303-564 (T97T-6256-B)
 ST1831-A	Lifting Eyes	303-050 (D81L-6001-D) or equivalent
 ST1286-A	Remover, Crankshaft Front Oil Seal	303-107 (T74P-6700-A)
 ST1764-A	Remover, Crankshaft Vibration Damper	303-101 (T74P-3616-A)
	Remover, Crankshaft Vibration Damper	303-773

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

 ST2897-A		
 ST1394-A	Remover, Spark Plug Wire	303-106 (T74P-6666-A)
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

General Equipment

8 mm x 1.25 x 100 mm bolts (2 required)

- NOTE:** Remove the cylinder heads before removing the crankshaft. Failure to do so may result in engine damage.
- NOTE:** If the fuel rail is used as a leverage device, it may be damaged. Care must be taken when working around the fuel rail.
- NOTE:** During the repair or replacement of fuel-related components, cap, tape or otherwise appropriately protect all liquid and vapor fuel openings to prevent the ingress of dirt or foreign material. Remove all caps, tape and other protective materials prior to installation.
- NOTE:** For additional information, refer to the exploded views under Engine.

1. Remove the bolts and the flexplate.

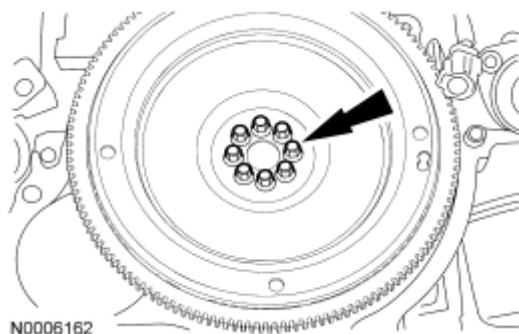


Fig. 167: Locating Flexplate Bolts
Courtesy of FORD MOTOR CO.

2. Remove the spacer plate and the flexplate spacer.

NOTE: The crankshaft rear seal may have a metal speedy sleeve. This sleeve must be removed before attempting to remove the seal.

3. If necessary, remove the speedy sleeve using 2 screwdrivers or small pry bars.

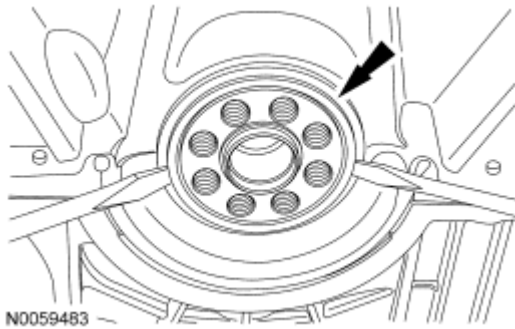


Fig. 168: Locating Speedy Sleeve
Courtesy of FORD MOTOR CO.

4. Install the engine on a suitable stand. Remove the engine lifting equipment and the special tools.
5. Remove the bolt.

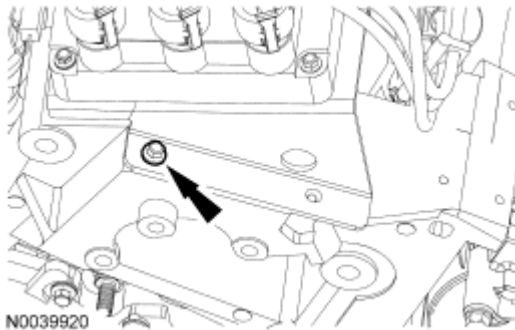


Fig. 169: Identifying Bolt
Courtesy of FORD MOTOR CO.

6. Disconnect the A/C compressor electrical connector and wire harness retainer.

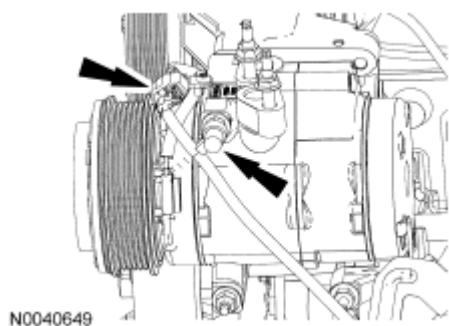


Fig. 170: Identifying A/C Compressor Electrical Connector And Wire Harness Retainer
Courtesy of FORD MOTOR CO.

7. Remove the bolts and the accessory bracket.

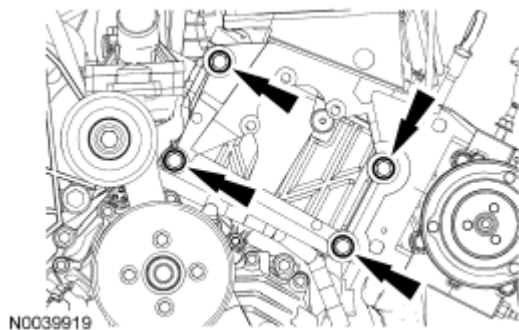


Fig. 171: Locating Accessory Bracket Bolts
Courtesy of FORD MOTOR CO.

8. Disconnect the generator electrical connectors and wiring harness retainer.



Fig. 172: Identifying Generator Electrical Connectors And Wire Harness Retainer
Courtesy of FORD MOTOR CO.

9. Remove the generator mounting bracket.
 1. Remove the bolt and the drive belt tensioner.
 2. Remove the generator mounting bracket bolts.

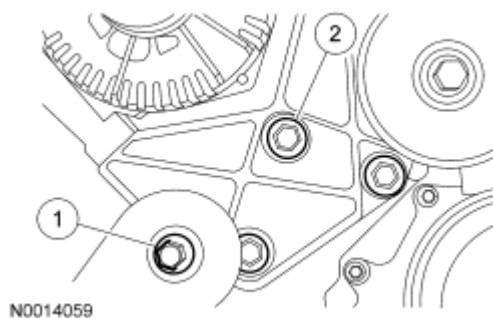


Fig. 173: Locating Generator Mounting Bracket Bolts
Courtesy of FORD MOTOR CO.

10. Disconnect the heater hose from the thermostat housing.

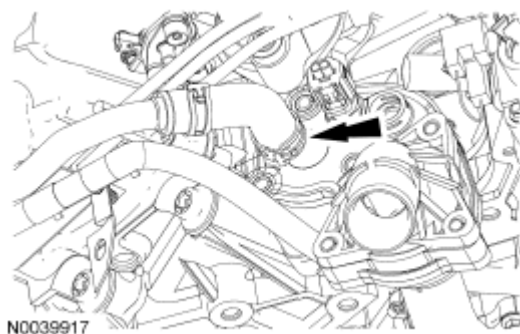


Fig. 174: Locating Heater Hose Clamp
Courtesy of FORD MOTOR CO.

11. Disconnect the hose from the oil cooler.

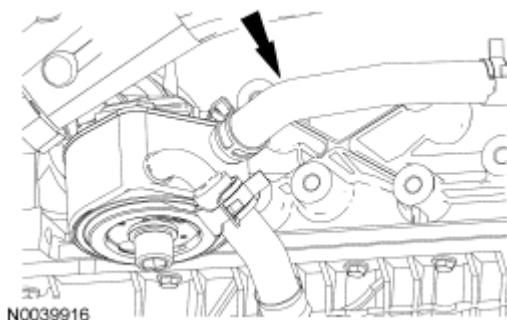


Fig. 175: Locating Oil Cooler Hose
Courtesy of FORD MOTOR CO.

12. Remove the bolt, the heater hose tube bracket and the hoses as an assembly.

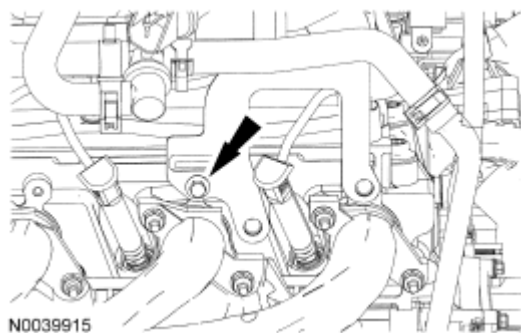


Fig. 176: Locating Heater Hose Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

NOTE: It is important to twist the spark plug wire boots while pulling upward to avoid possible damage to the spark plug wires.

NOTE: Spark plug wires must be connected to the correct ignition coil terminal. Mark spark plug wire locations before removing them.

13. Using the special tool, disconnect the spark plug wires from the spark plugs.

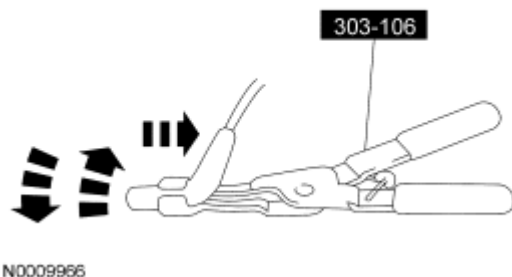


Fig. 177: Pulling Spark Plug Wire Off Spark Plug
Courtesy of FORD MOTOR CO.

14. Detach the RH spark plug wire retainers.

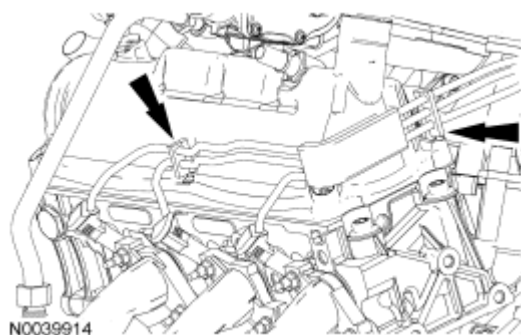


Fig. 178: Locating RH Spark Plug Wire Retainers

Courtesy of FORD MOTOR CO.

15. Detach the LH spark plug wire retainers.

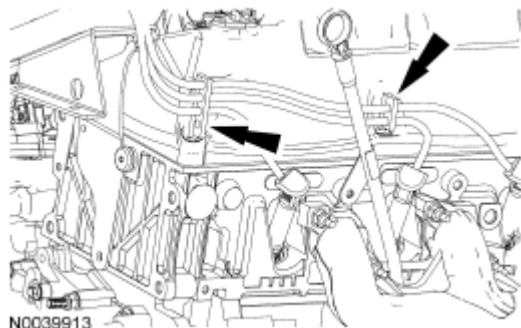


Fig. 179: Locating LH Spark Plug Wire Retainers
Courtesy of FORD MOTOR CO.

NOTE: RH spark plug wires shown removed for clarity.

16. Disconnect the coil and the radio interference capacitor electrical connectors and detach the wiring harness retainer.

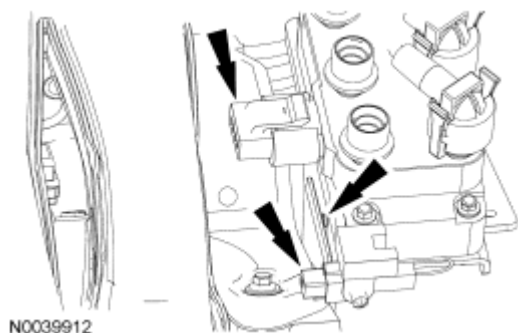


Fig. 180: Identifying Wiring Harness Retainer, Coil And Radio Interference Capacitor Electrical Connectors
Courtesy of FORD MOTOR CO.

17. Remove the bolts. Remove the coil, bracket and spark plug wires as an assembly.

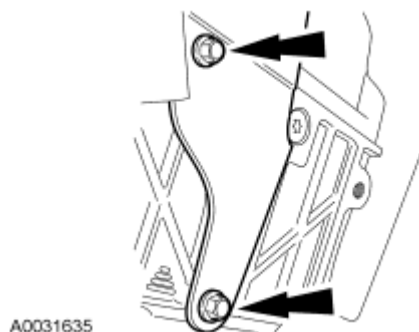


Fig. 181: Locating Coil Bracket Bolts
Courtesy of FORD MOTOR CO.

18. Remove the oil cooler hose bracket bolt, if equipped. Disconnect the oil cooler or heater hose.

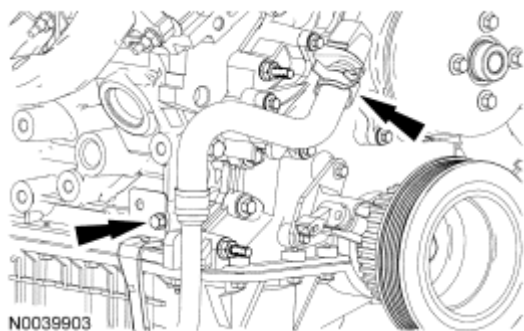


Fig. 182: Locating Oil Cooler Hose Bracket Bolt And Heater Hose Clamp
Courtesy of FORD MOTOR CO.

19. If equipped, remove the oil cooler and hose.

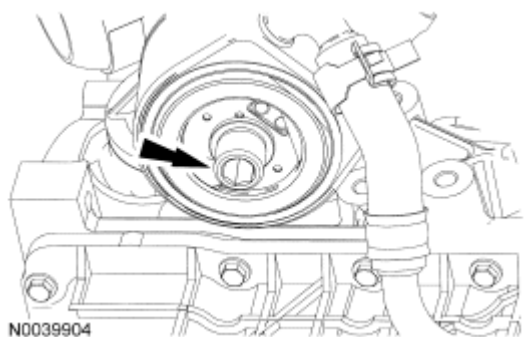


Fig. 183: Locating Oil Cooler And Hose
Courtesy of FORD MOTOR CO.

20. Disconnect the vacuum and PCV hoses from the intake manifold.

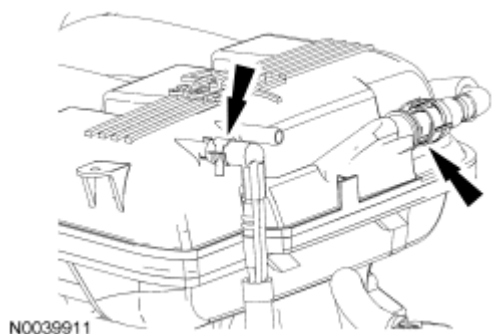


Fig. 184: Identifying Vacuum And Positive Crankcase Ventilation Hoses
Courtesy of FORD MOTOR CO.

21. Disconnect the knock sensor (KS) electrical connector.
- Detach the wiring harness pin-type retainer.

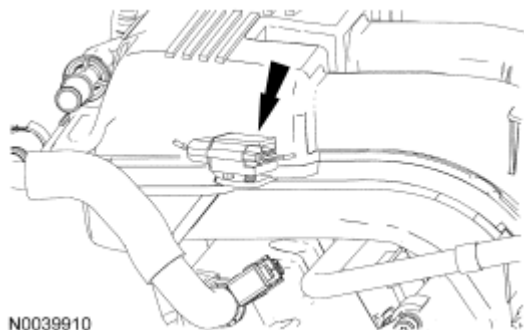


Fig. 185: Locating Knock Sensor (KS) Electrical Connector
Courtesy of FORD MOTOR CO.

22. Disconnect the EGR system module vacuum hose and electrical connector. Detach the wiring harness pin-type retainer.

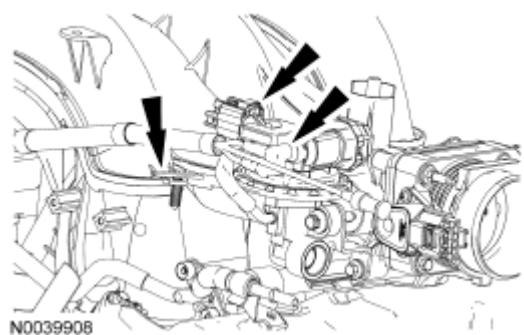


Fig. 186: Identifying Exhaust Gas Recirculation (EGR) System Module Vacuum Hose & Wiring Harness Pin-Type Retainer
Courtesy of FORD MOTOR CO.

23. Disconnect the electronic throttle body (TB) and throttle position (TP) sensor electrical connectors. Remove the nut and detach the wiring harness bracket.

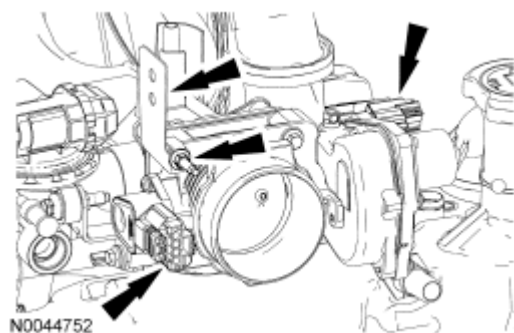


Fig. 187: Identifying Electronic Throttle Body (TB), Throttle Position (TP) Sensor Electrical

Connectors & Wiring Harness Bracket
Courtesy of FORD MOTOR CO.

24. Remove the exhaust manifold-to-EGR system module tube.

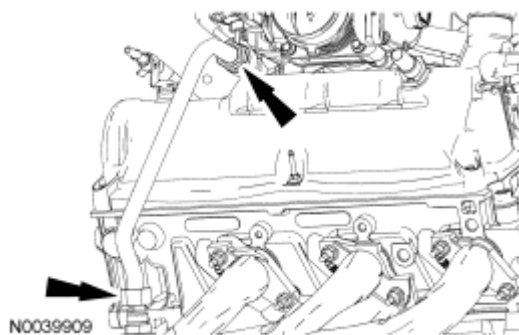


Fig. 188: Identifying Exhaust Manifold-To-EGR System Module Tube
Courtesy of FORD MOTOR CO.

25. Remove the bolts and the intake manifold and gaskets.

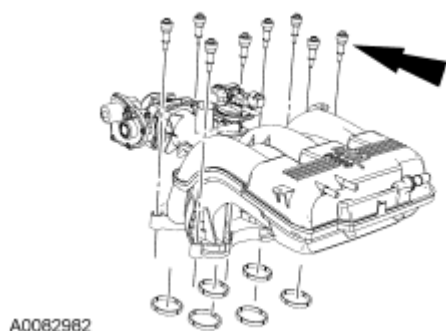


Fig. 189: Locating Gaskets, Intake Manifold And Bolts
Courtesy of FORD MOTOR CO.

26. Disconnect the 6 fuel injector electrical connectors and detach the wiring harness retainers.

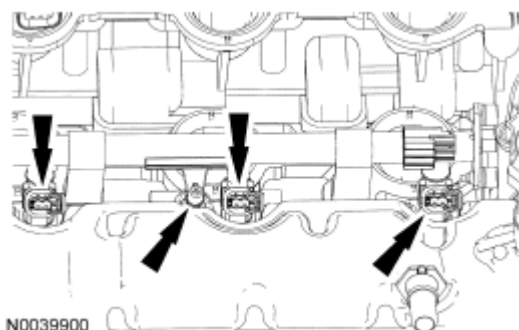


Fig. 190: Locating Fuel Injector Electrical Connectors And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

27. Disconnect the crankshaft position (CKP) sensor electrical connector and the wiring anchors. Discard the wiring anchors.

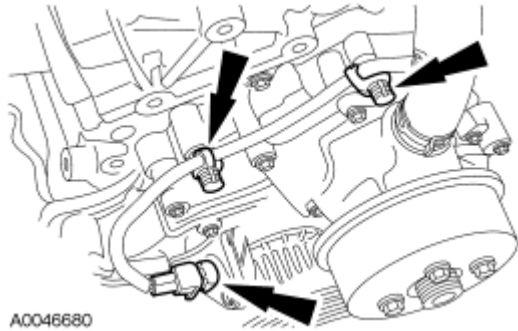


Fig. 191: Locating Crankshaft Position Sensor Electrical Connectors And Wiring Anchors
Courtesy of FORD MOTOR CO.

28. Disconnect the fuel rail pressure and temperature sensor and the camshaft position (CMP) sensor electrical connectors.

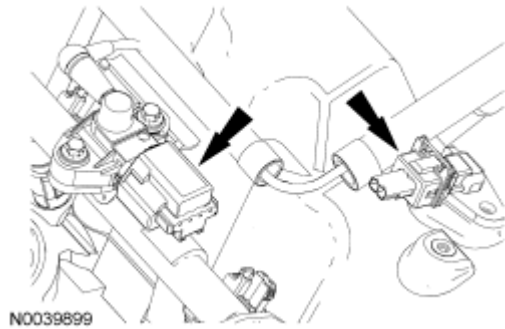


Fig. 192: Locating Fuel Rail Pressure & Temperature Sensor And Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

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

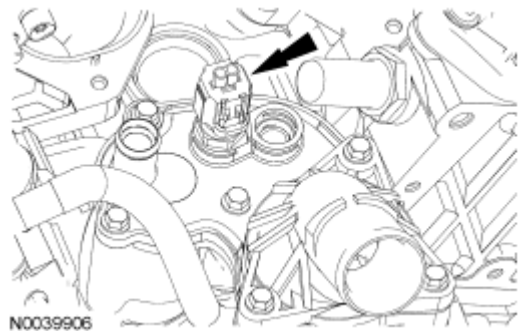


Fig. 193: Locating Engine Coolant Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

30. Remove the engine wiring harness retainer bolt and remove the engine wiring harness.

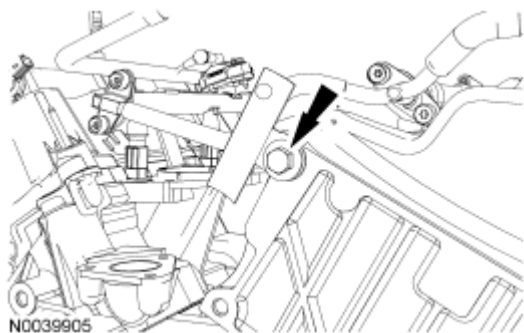


Fig. 194: Identifying Engine Wiring Harness Retainer Bolt
Courtesy of FORD MOTOR CO.

31. Disconnect the fuel pressure and temperature sensor vacuum hose fitting.
- Remove the vacuum harness.

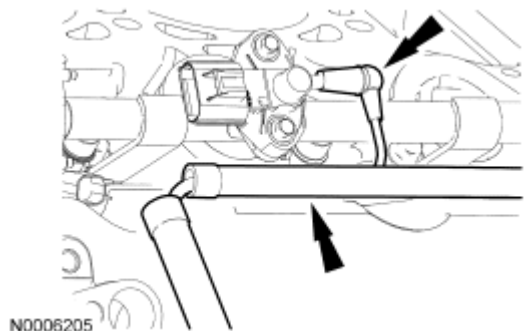


Fig. 195: Identifying Fuel Pressure And Temperature Sensor Vacuum Hose Fitting
Courtesy of FORD MOTOR CO.

32. Disconnect the oil pressure switch electrical connector, remove the nut and detach the battery cable and harness bracket.

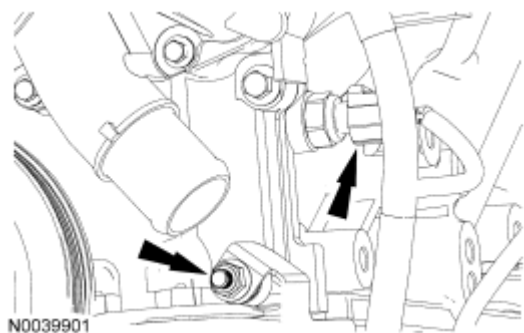


Fig. 196: Locating Oil Pressure Switch Electrical Connector And Nut
Courtesy of FORD MOTOR CO.

33. Detach the retainers and remove the battery cable and harness.

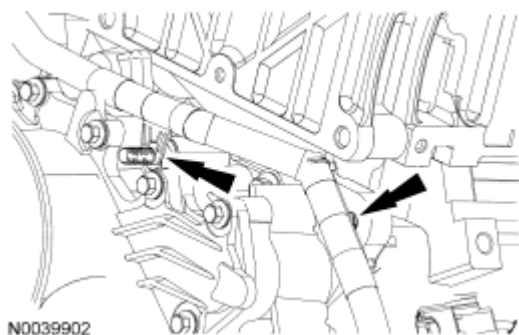


Fig. 197: Locating Battery Cable And Retainers
Courtesy of FORD MOTOR CO.

34. Remove the oil pressure switch.

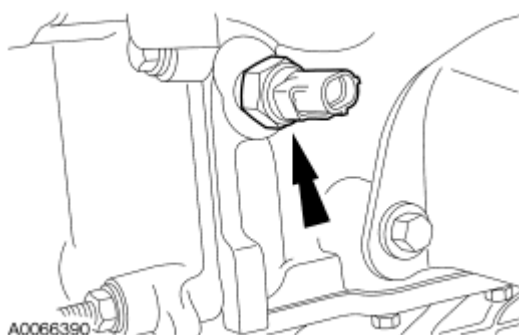


Fig. 198: Identifying Oil Pressure Switch
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

35. Remove the RH and the LH insulator bolts and brackets.

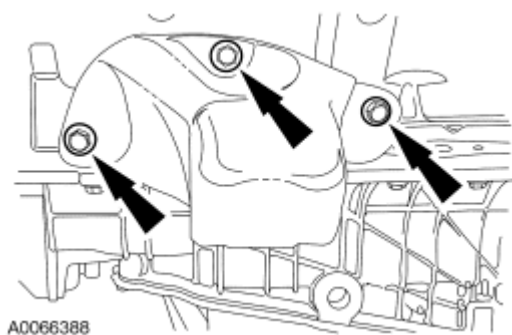


Fig. 199: Locating Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

36. Remove the fuel supply tube bolt.

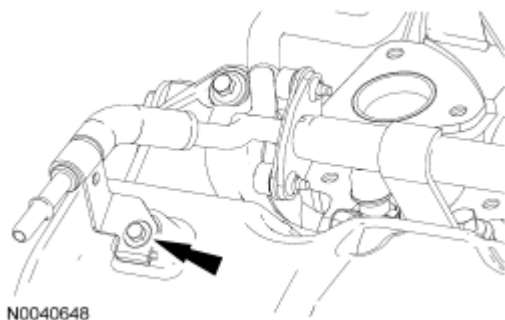


Fig. 200: Locating Fuel Supply Tube Bolt
Courtesy of FORD MOTOR CO.

37. Remove the bolts and the fuel rail.

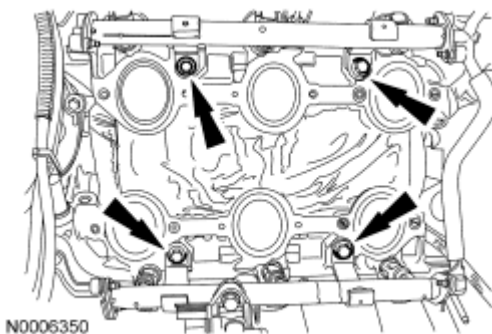


Fig. 201: Locating Fuel Rail & Bolts
Courtesy of FORD MOTOR CO.

38. Remove the fuel injectors.
- Remove and discard the O-ring seals.

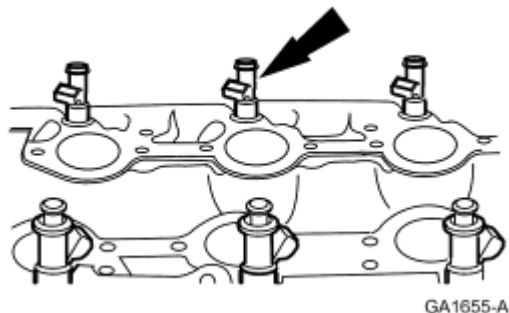
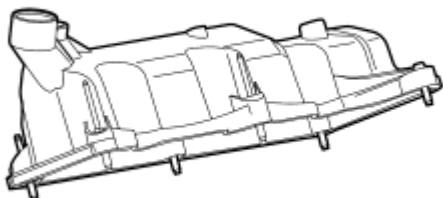


Fig. 202: Identifying O-Ring Seals
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

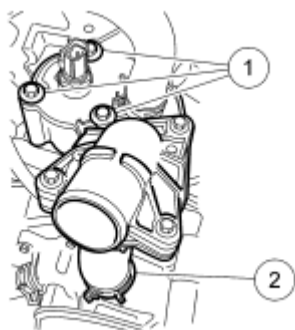
39. Loosen the bolts and remove the valve covers.



A0030006

Fig. 203: Locating Valve Covers & Gasket
Courtesy of FORD MOTOR CO.

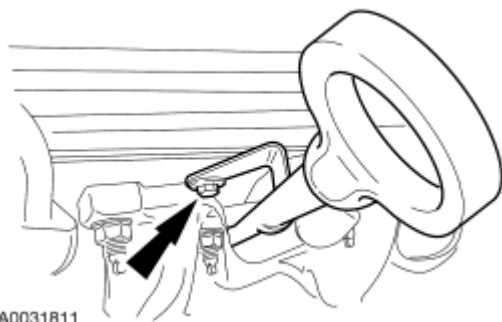
40. Remove the thermostat housing.
1. Remove the bolts.
 2. Release the bypass hose clamp and remove the thermostat housing.



N0014060

Fig. 204: Identifying Bypass Hose Clamp & Housing
Courtesy of FORD MOTOR CO.

41. Remove the bolt and the oil level indicator tube.



A0031811

Fig. 205: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

42. Remove the bolt and the KS.

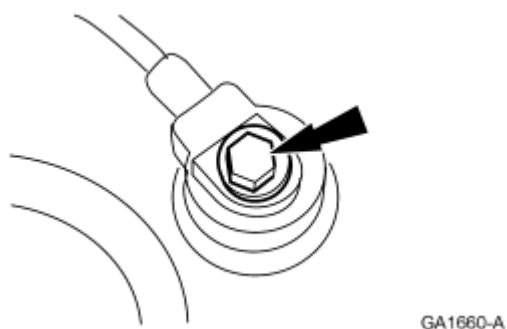


Fig. 206: Locating Knock Sensor (KS) Bolt
Courtesy of FORD MOTOR CO.

43. Remove the nuts and the RH exhaust manifold and gasket.
- Discard the nuts and the gasket.

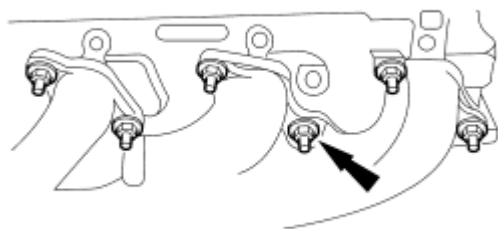


Fig. 207: Locating RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

44. Remove and discard the 6 RH exhaust manifold studs.
45. Remove the nuts and the LH exhaust manifold and gasket.
- Discard the nuts and the gasket.

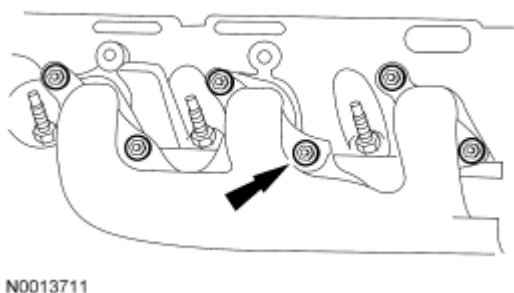


Fig. 208: Locating LH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

46. Remove and discard the 6 LH exhaust manifold studs.
47. Using the special tool to hold the crankshaft pulley, remove the bolt.

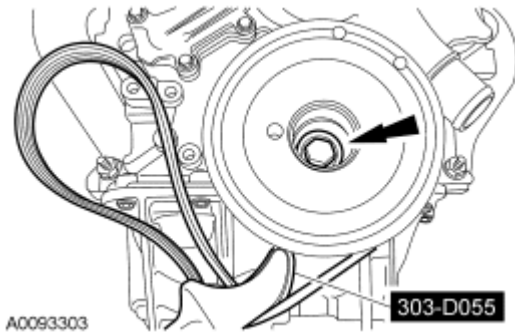


Fig. 209: Holding Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: If the pulley bolt is not installed, the tool will bottom out before the pulley is off.

48. Install the crankshaft pulley bolt 2 to 3 turns. Using the special tools and the two 8-mm bolts, remove the crankshaft pulley.
 - Discard the crankshaft pulley bolt.

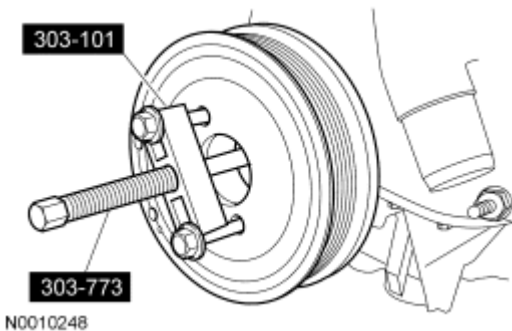


Fig. 210: Identifying Special Tool (303-773, 303-101)
Courtesy of FORD MOTOR CO.

49. Remove the bolts and the coolant pump pulley.

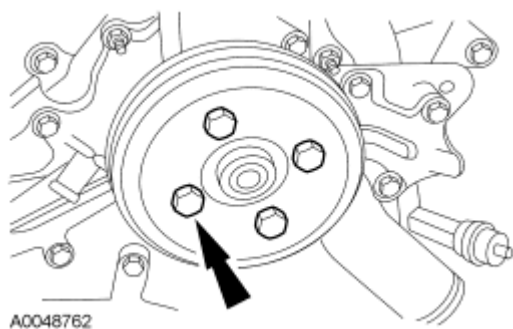


Fig. 211: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

50. Remove the bolts and the coolant pump.

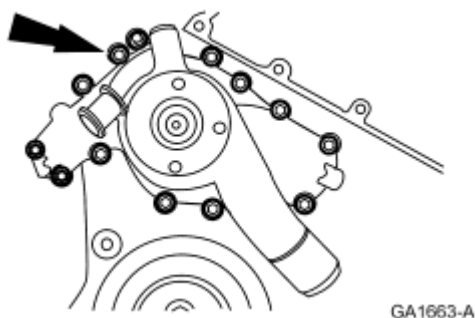


Fig. 212: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

51. Rotate the crankshaft until the cam lobe of the cylinder being serviced is in the up position.

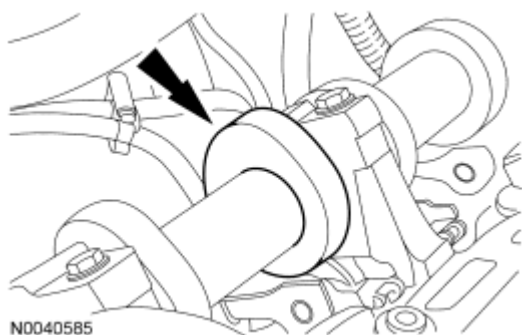


Fig. 213: Locating Crankshaft Lobe
Courtesy of FORD MOTOR CO.

NOTE: Mark each camshaft roller follower to make sure it is installed in its original position during reassembly.

52. Using the special tool, remove the camshaft roller followers.

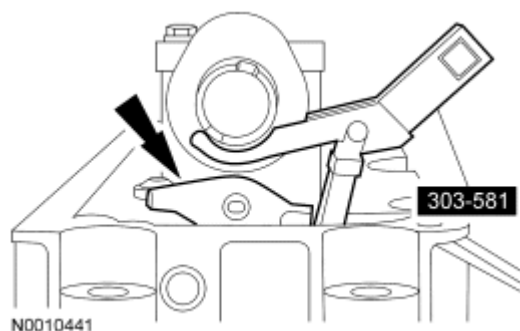


Fig. 214: Removing Camshaft Roller Followers Using Special Tool (303-581)
Courtesy of FORD MOTOR CO.

53. Remove the RH hydraulic chain tensioner.

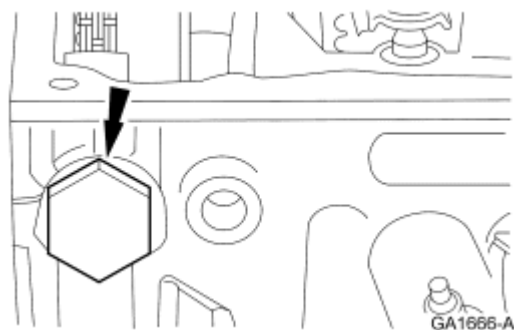


Fig. 215: Locating RH Hydraulic Chain Tensioner
Courtesy of FORD MOTOR CO.

54. Install the special tools on the RH cylinder head and tighten the top 2 clamp bolts.
- Tighten to 10 Nm (89 lb-in).

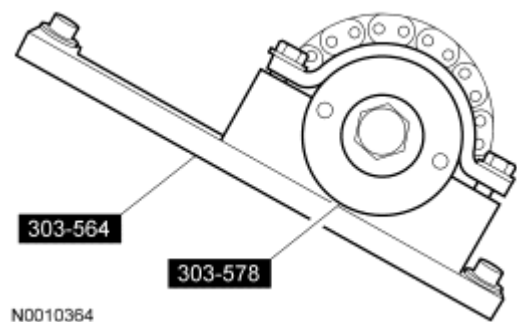
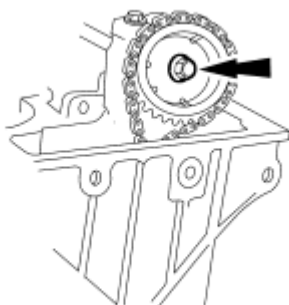


Fig. 216: Identifying Special Holding Tool
Courtesy of FORD MOTOR CO.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

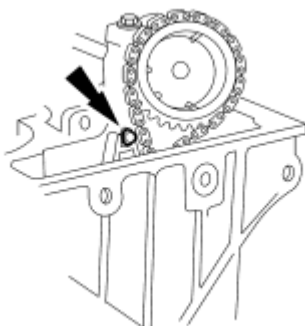
55. Remove the RH camshaft sprocket bolt.



GA1667-A

Fig. 217: Locating RH Camshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

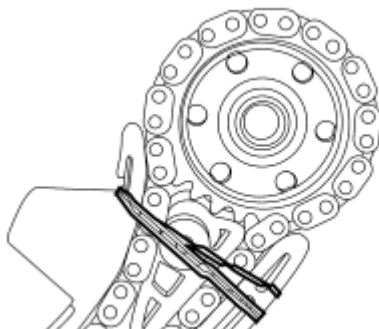
56. Remove the bolt.



GA3228-A

Fig. 218: Locating RH Chain Guide Bolt
Courtesy of FORD MOTOR CO.

57. Remove the camshaft sprocket from the camshaft and install a rubber band on the cassette to hold the chain and camshaft sprocket in place.



GA1724-A

Fig. 219: Identifying Camshaft Sprocket From Camshaft
Courtesy of FORD MOTOR CO.

58. Remove the LH hydraulic chain tensioner.

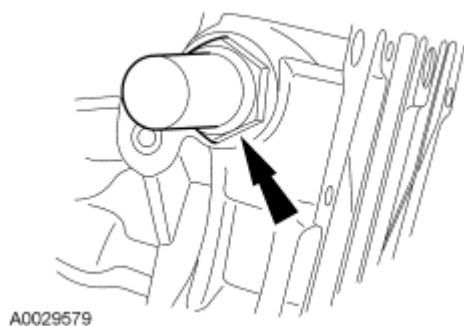


Fig. 220: Locating Camshaft Tensioner
Courtesy of FORD MOTOR CO.

59. Install the special tools on the LH cylinder head.

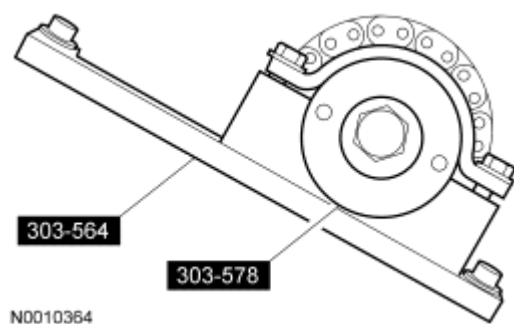


Fig. 221: Identifying Special Holding Tool
Courtesy of FORD MOTOR CO.

60. Remove the LH camshaft sprocket bolt.

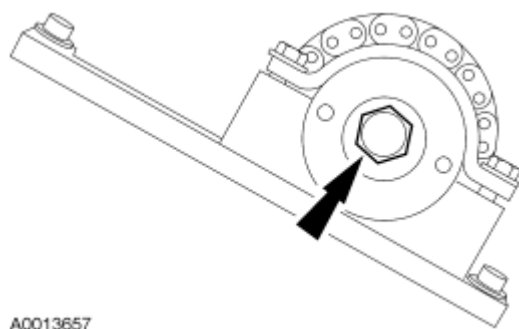
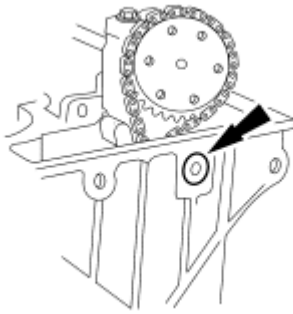


Fig. 222: Locating LH Camshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

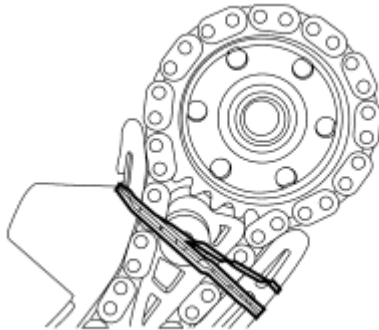
61. Remove the bolt.



GA1670-A

Fig. 223: Locating Chain Guide Bolt
Courtesy of FORD MOTOR CO.

62. Remove the camshaft sprocket from the camshaft and install a rubber band on the cassette to hold the chain and camshaft sprocket in place.

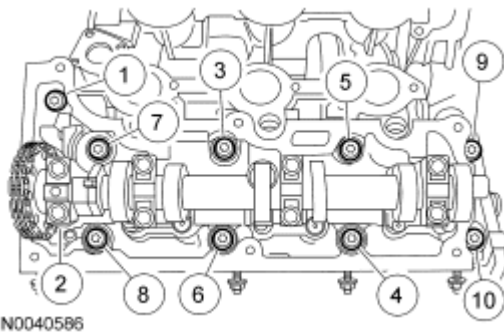


GA1724-A

Fig. 224: Identifying Camshaft Sprocket From Camshaft
Courtesy of FORD MOTOR CO.

NOTE: New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

63. Remove the bolts in the sequence shown and remove the cylinder heads.
 - Discard the gaskets and the bolts.



N0040586

Fig. 225: Identifying 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 the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the cylinder head gasket.

64. Clean and inspect the cylinder head sealing surfaces. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
65. Using the special tool, remove the crankshaft front oil seal.

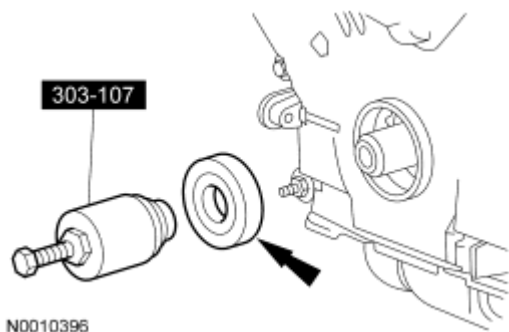


Fig. 226: Locating Special Tool And Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

66. Remove the 5 cylinder block cradle-to-engine front cover bolts.
67. Remove the bolts and the engine front cover.

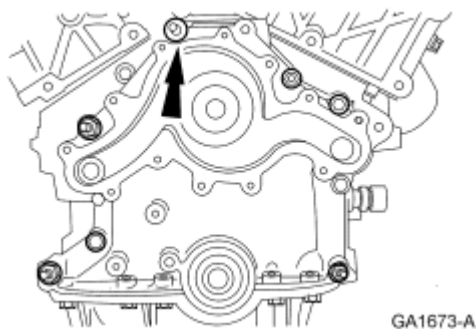


Fig. 227: Locating Front Cover & Fasteners
Courtesy of FORD MOTOR CO.

68. Remove the bolts and the oil pan.

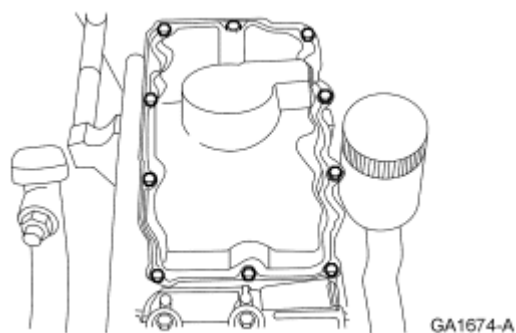


Fig. 228: Identifying Oil Pan & Bolts
Courtesy of FORD MOTOR CO.

69. Remove the bolt and the oil pump screen cover and tube.

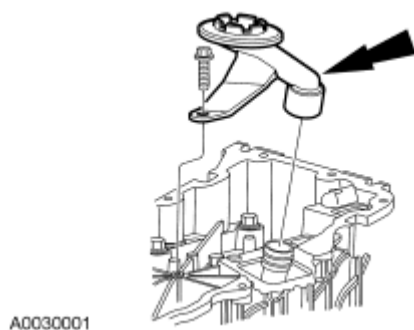


Fig. 229: Locating Oil Pump Screen Cover And Bolt
Courtesy of FORD MOTOR CO.

NOTE: Note the location of the 2 silver-colored bolts with the washer seals. These bolts must be installed in the same position from which they were removed with new washer seals.

70. Remove the cylinder block cradle inner bolts. Remove and discard the 2 washer seals.

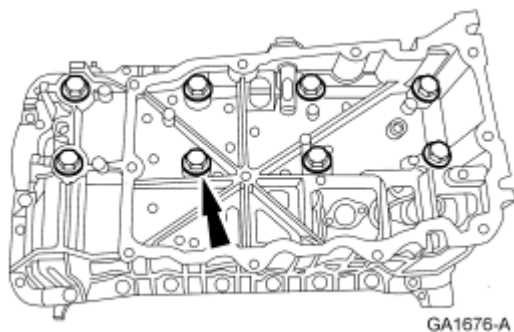


Fig. 230: Locating Inner Cylinder Block Cradle Bolts
Courtesy of FORD MOTOR CO.

71. Remove the cylinder block cradle Torx bolts.

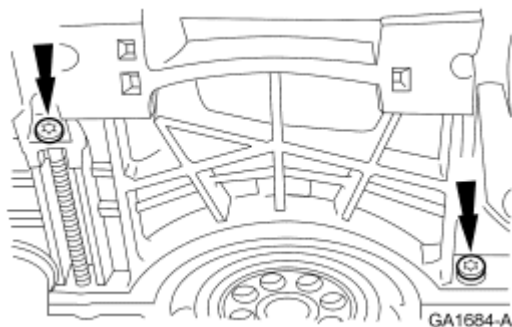


Fig. 231: Locating Rear Cylinder Block Cradle Bolts
Courtesy of FORD MOTOR CO.

72. Remove the 15 bolts and the 2 nuts. Remove the cylinder block cradle.

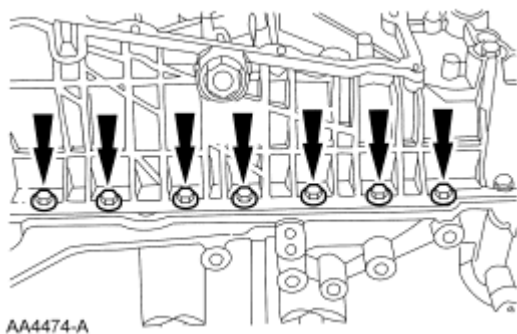
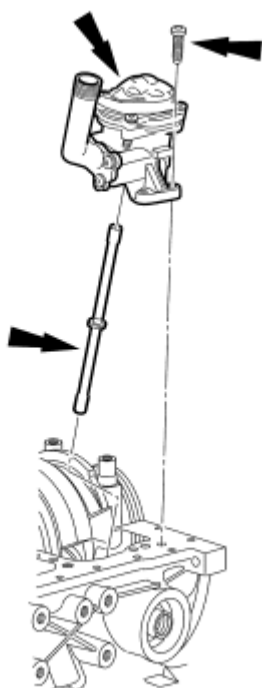


Fig. 232: Locating Cylinder Block Cradle Bolts & Nuts
Courtesy of FORD MOTOR CO.

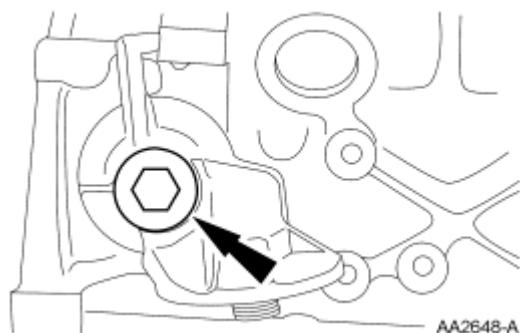
73. Remove the oil pump pickup tube, the oil pump and the oil pump intermediate shaft.



N0013589

Fig. 233: Locating Oil Pump Intermediate Shaft, Oil Pump And Bolt
Courtesy of FORD MOTOR CO.

74. Remove the oil filter adapter.



AA2648-A

Fig. 234: Locating Oil Filter Adapter
Courtesy of FORD MOTOR CO.

75. Inspect and install new O-ring seals, if necessary.

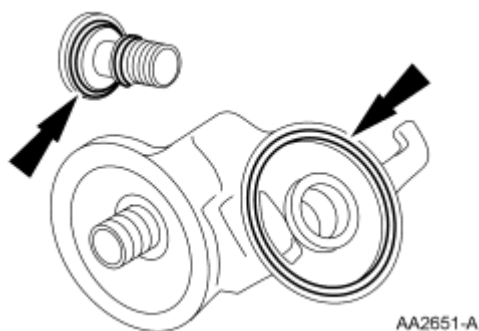


Fig. 235: Locating O-Ring Seals
Courtesy of FORD MOTOR CO.

76. Remove the jackshaft rear plug.

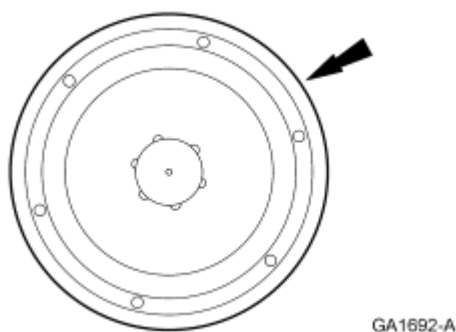


Fig. 236: Locating Jackshaft Rear Plug
Courtesy of FORD MOTOR CO.

77. Using the special tool, hold the crankshaft.

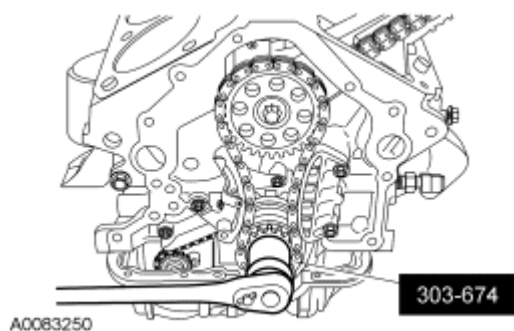


Fig. 237: Holding Crankshaft Using Special Tool (303-674)
Courtesy of FORD MOTOR CO.

78. Remove the jackshaft sprocket rear bolt.

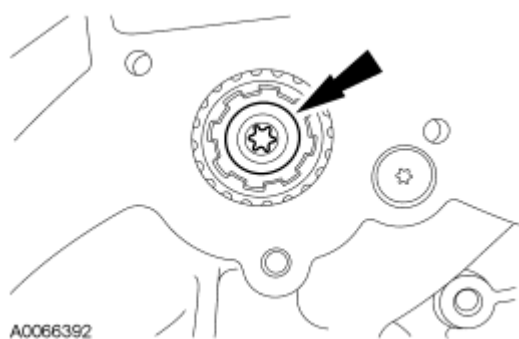


Fig. 238: Locating Rear Jackshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

79. Remove the RH cassette bolt.

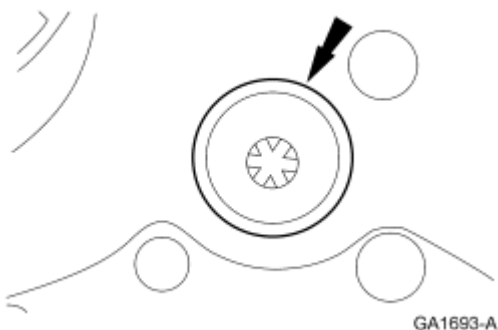


Fig. 239: Locating RH Camshaft Drive Cassette Bolt & Spacer
Courtesy of FORD MOTOR CO.

80. Remove the RH cassette.

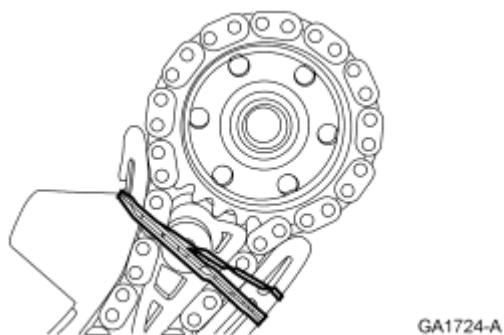


Fig. 240: Identifying Camshaft Sprocket From Camshaft
Courtesy of FORD MOTOR CO.

81. Remove the oil pump bolt and retainer and then remove the oil pump drive.

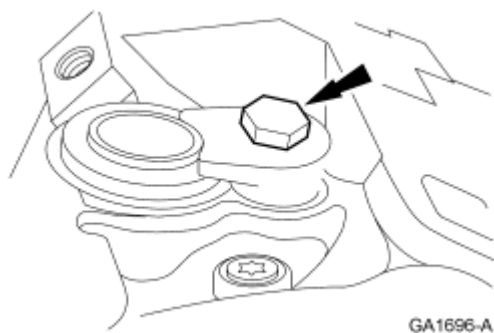


Fig. 241: Locating Oil Pump Drive
Courtesy of FORD MOTOR CO.

82. Using the special tool to hold the crankshaft, loosen the front sprocket retaining bolt.

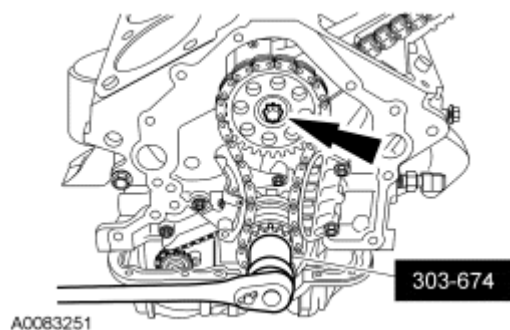


Fig. 242: Identifying Special Tool (303-674) & Jackshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

83. Remove the bolts and the chain tensioner.

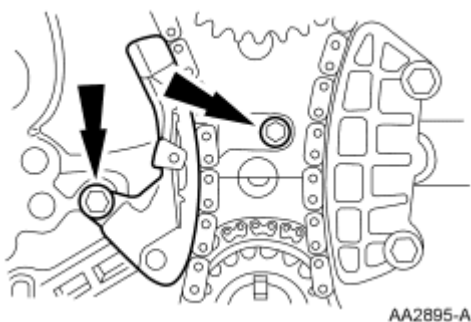


Fig. 243: Locating Chain Tensioner & Bolts
Courtesy of FORD MOTOR CO.

84. Remove the chain guide.



Fig. 244: Locating Chain Guide & Bolts
Courtesy of FORD MOTOR CO.

85. Remove the bolt.

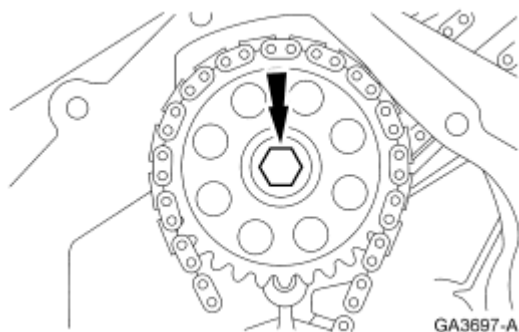


Fig. 245: Locating Jackshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

86. Remove the jackshaft and crankshaft sprockets and the chain.
- Remove the crankshaft key.

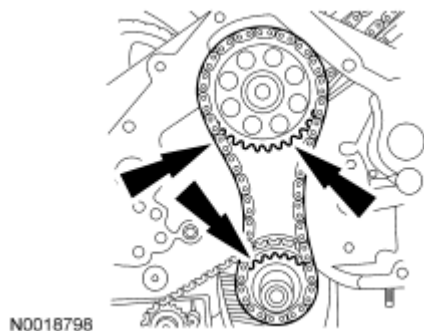


Fig. 246: Identifying Jackshaft, Crankshaft Sprockets And Chain
Courtesy of FORD MOTOR CO.

87. Remove the bolt and the front cassette.

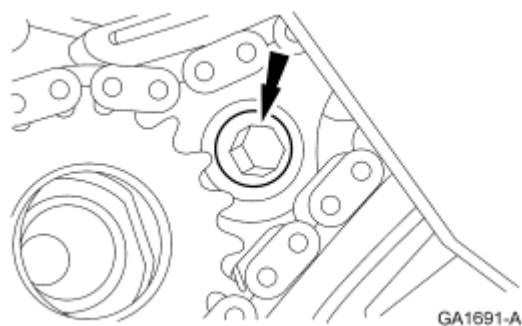


Fig. 247: Locating Front Cassette & Bolt
Courtesy of FORD MOTOR CO.

88. Remove the jackshaft thrust plate.

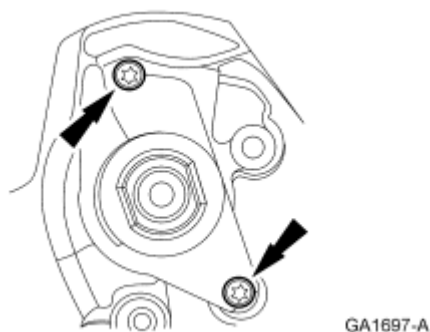


Fig. 248: Locating Jackshaft Thrust Plate & Bolts
Courtesy of FORD MOTOR CO.

89. Remove the jackshaft.

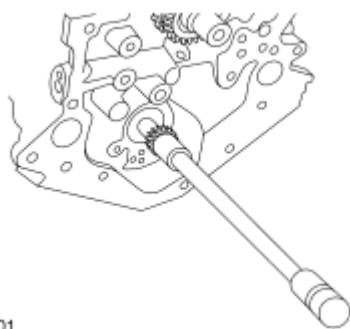


Fig. 249: Identifying Jackshaft
Courtesy of FORD MOTOR CO.

90. Remove the balance shaft tensioner.
1. Install a pin in the balance shaft tensioner.
 2. Remove the bolts.
 3. Remove the balance shaft tensioner.

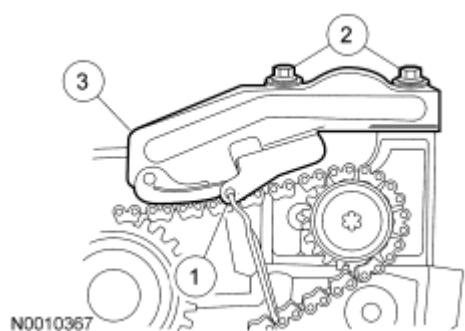


Fig. 250: Identifying Balance Shaft Tensioner, Bolts And Pin
Courtesy of FORD MOTOR CO.

91. Remove the 2 bolts and the balance shaft chain guide.

NOTE: DO NOT remove the balance shaft sprocket bolt.

92. Remove the balance shaft chain and crankshaft sprocket.

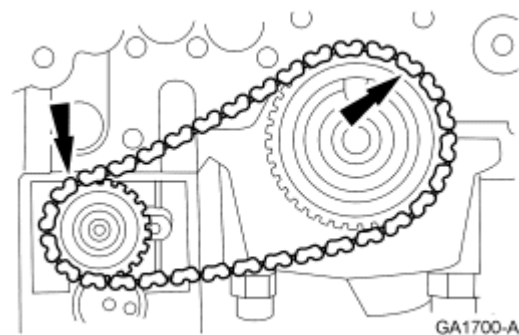


Fig. 251: Identifying Balance Shaft Chain & Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

93. Remove the balance shaft.
 1. Remove the bolts.
 2. Remove the balance shaft.

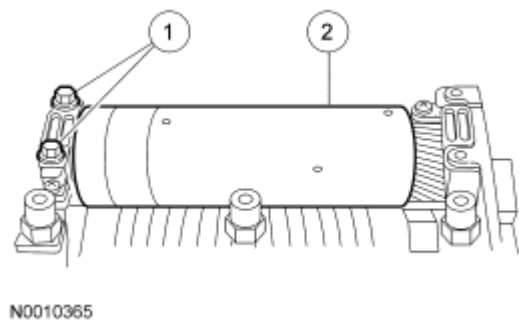


Fig. 252: Identifying Balance Shaft

Courtesy of FORD MOTOR CO.

94. 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's instructions.

NOTE: Clearly mark the connecting rods and rod caps in numerical order for correct reassembly.

95. Remove the connecting rod caps.
1. Remove the connecting rod cap.
 2. Remove the connecting rod nuts.

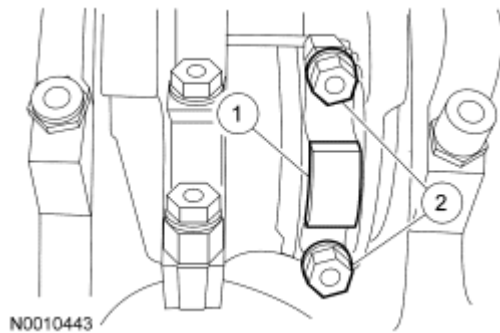


Fig. 253: Identifying Connecting Rod Nuts And Cap
Courtesy of FORD MOTOR CO.

96. Install rubber hose pieces on the bolts to protect the crankshaft and remove the pistons.

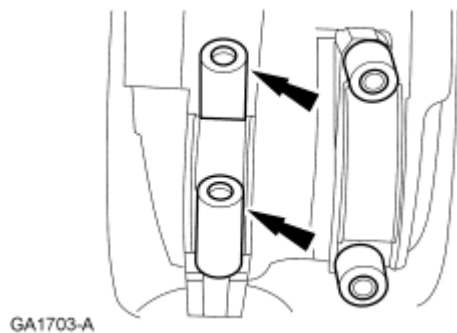


Fig. 254: Locating Rubber Hose Pieces On Connecting Rod Bolts
Courtesy of FORD MOTOR CO.

97. Remove the connecting rod bearings.

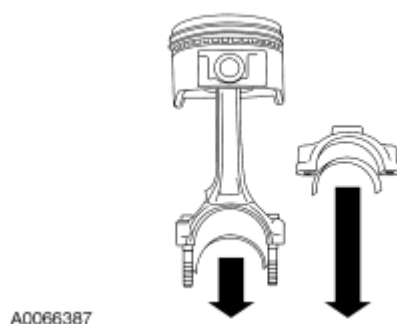


Fig. 255: Locating Connecting Rod Bearings
Courtesy of FORD MOTOR CO.

98. Remove the piston rings.

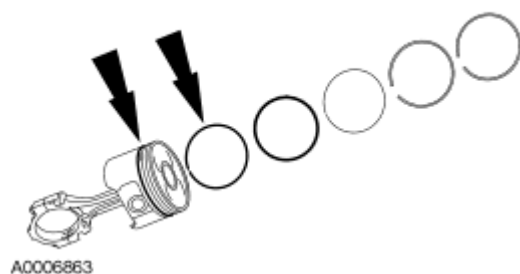


Fig. 256: Locating Piston Rings
Courtesy of FORD MOTOR CO.

99. Clean and inspect the pistons. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

NOTE: Remove the cylinder heads before removing the crankshaft. Failure to do so can result in engine damage.

100. Remove the bolts.

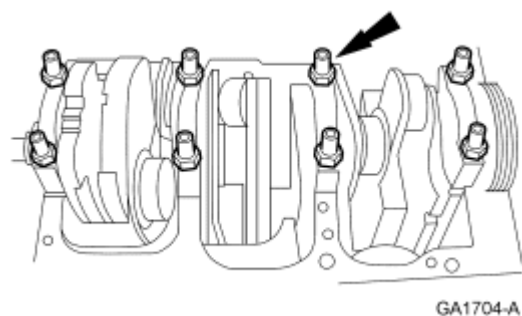


Fig. 257: Locating Crankshaft Main Bearing Cap Bolts

Courtesy of FORD MOTOR CO.

NOTE: Number (or mark) the crankshaft bearing caps before removing them.

101. Remove the crankshaft main bearing caps.

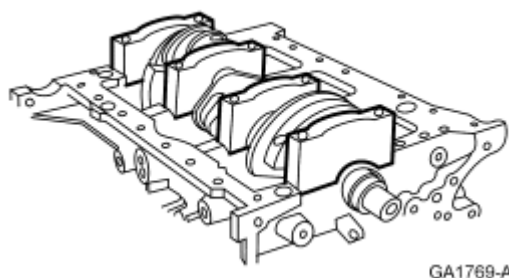


Fig. 258: Locating Crankshaft Main Bearing Caps
Courtesy of FORD MOTOR CO.

102. Remove the crankshaft rear oil seal from the crankshaft.

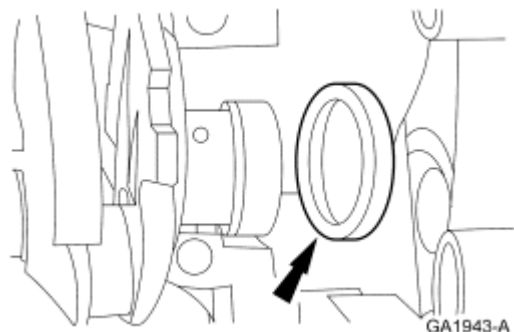


Fig. 259: Identifying Crankshaft Rear Oil Seal
Courtesy of FORD MOTOR CO.

103. Remove the crankshaft.

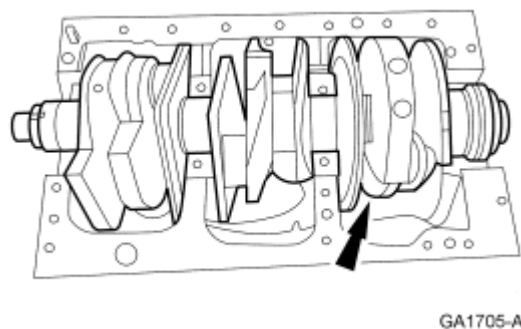


Fig. 260: Locating Crankshaft Main Bearings

Courtesy of FORD MOTOR CO.

104. Remove the crankshaft main bearings and the thrust bearing.

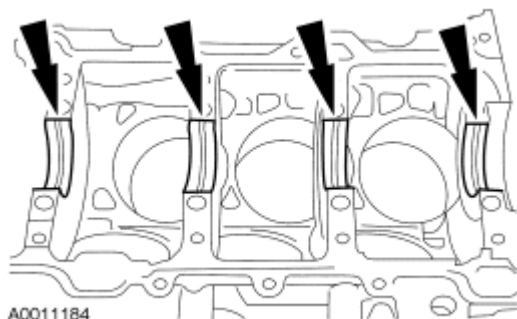


Fig. 261: Locating Crankshaft Main Bearings And Thrust Bearing
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

CYLINDER HEAD

Special Tools

Illustration	Tool Name	Tool Number
	Compressor, Valve Spring	303-581 (T97T-6565-A)
	Installer, Valve Stem Oil Seal	303-370 (T90T-6571-A)

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

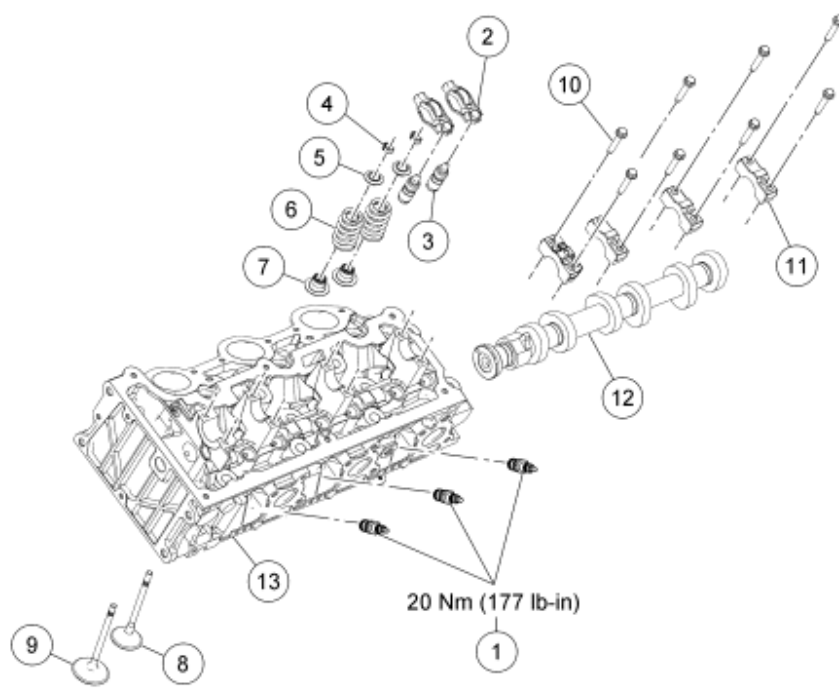


Fig. 262: Cylinder Head Components With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	12405	Spark plugs
2	6529	Camshaft roller follower
3	6C501	Hydraulic lash adjuster
4	6518	Valve spring retainer key (12 required)
5	6A536	Valve spring retainer
6	6513	Valve spring (6 required)
7	6571	Valve seal (6 required)
8	6505	Exhaust valve
9	6507	Intake valve
10	W702341	Camshaft bearing cap mounting bolt (8 required)
11	6A258	Camshaft bearing cap (4 required)
12	6A274	LH camshaft
13	6050	Cylinder head

DISASSEMBLY

1. Remove the spark plugs.

NOTE: Mark each hydraulic lash adjuster to make sure it is installed in its original

position.

2. Remove the hydraulic lash adjusters.



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Fig. 263: Locating Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

NOTE: Keep the valves, valve springs, retainers and retainer keys in order so they can be installed in their original positions.

3. Using the Valve Spring Compressor, remove the valve spring retainer keys, the valve spring and the retainer. Remove the valve.
 - Repeat the procedure until all of the valves are removed.

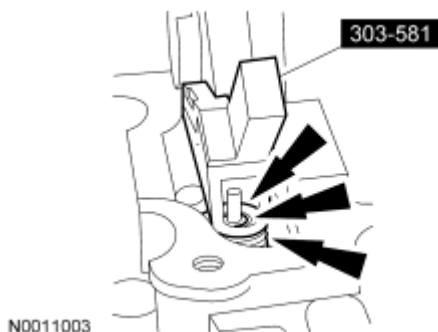


Fig. 264: Removing Valve Spring Retainer Keys, Valve Spring Retainers & Valve Springs Using Special Tool (303-581)
Courtesy of FORD MOTOR CO.

4. Remove and discard the valve seals.

NOTE: Mark the position of the camshaft bearing caps so they can be installed in their original positions.

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

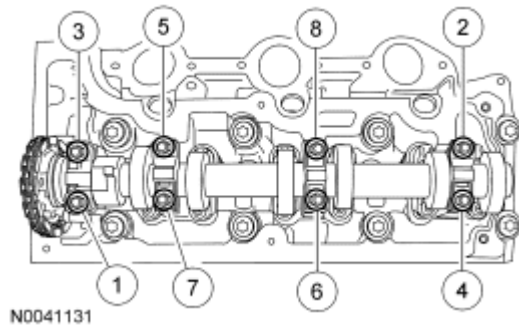


Fig. 265: Identifying Camshaft Bearing Cap Bolts Removal Sequence
Courtesy of FORD MOTOR CO.

6. Remove the camshaft.

ASSEMBLY

NOTE: Lubricate all parts with clean engine oil prior to assembly.

NOTE: Install the camshaft roller followers only after the cylinder head is installed in the vehicle and the timing procedure has been carried out.

1. Inspect the cylinder head. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.
2. Position the camshaft.

NOTE: The camshaft bearing caps must be installed in their original positions.

NOTE: After installing the bolts, check the camshaft for free rotation.

3. Position the 4 camshaft bearing caps and the 8 bolts. Tighten the bolts in the sequence shown in 2 stages.
 - Stage 1: Tighten to 6 Nm (53 lb-in).
 - Stage 2: Tighten to 16 Nm (142 lb-in).

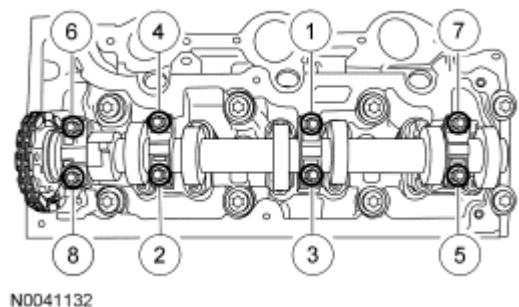


Fig. 266: Identifying Camshaft Bearing Cap Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Valves must be installed in the position from which they were removed.

4. Install the valve.
5. Using the Valve Stem Oil Seal Installer, install new valve stem seals.

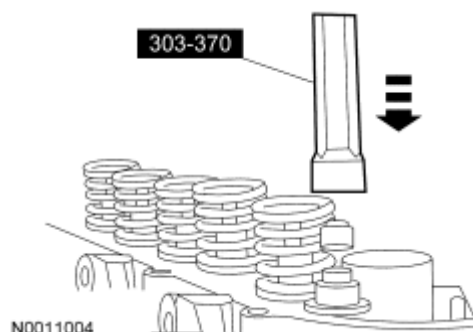


Fig. 267: Installing Valve Seal Using Special Tool (303-370)
Courtesy of FORD MOTOR CO.

NOTE: The valve springs, retainers and retainer keys must be installed in the positions from which they were removed.

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

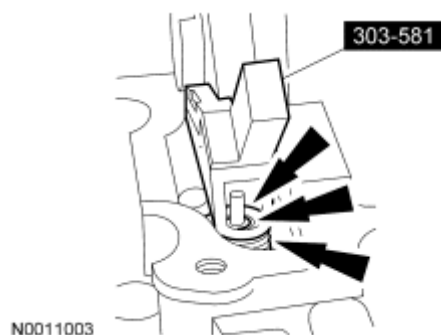
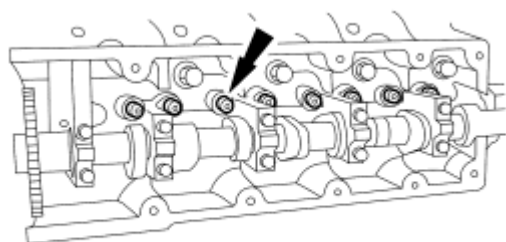


Fig. 268: Removing Valve Spring Retainer Keys, Valve Spring Retainers & Valve Springs Using Special Tool (303-581)
Courtesy of FORD MOTOR CO.

NOTE: Install the hydraulic lash adjusters in the same positions from which they were removed.

7. Install the hydraulic lash adjusters.



A26324-A

Fig. 269: Locating Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

8. Install the spark plugs.
 - Tighten to 20 Nm (177 lb-in).

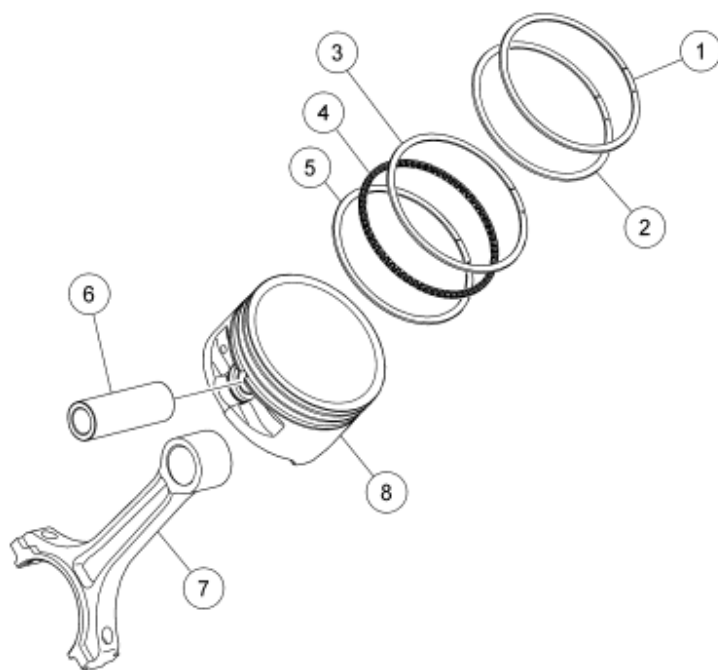
PISTON

Special Tools

Illustration	Tool Name	Tool Number
 ST1336-A	Service Set, Piston Pin	303-S024 (T68P-6135-A)

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A



N0006375

Fig. 270: Exploded View Of Piston Components
Courtesy of FORD MOTOR CO.

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	6135	Piston pin
7	6200	Connecting rod
8	6110	Piston

DISASSEMBLY

NOTE: The connecting rod bolts and nuts cannot be reused.

NOTE: Mark the position of the parts, so they can be installed in their original positions.

1. Remove the connecting rod bearings from the connecting rod and cap.
2. Remove the piston rings from the piston.
3. Using the Piston Pin Service Set, press the piston pin out of the connecting rod and piston assembly.

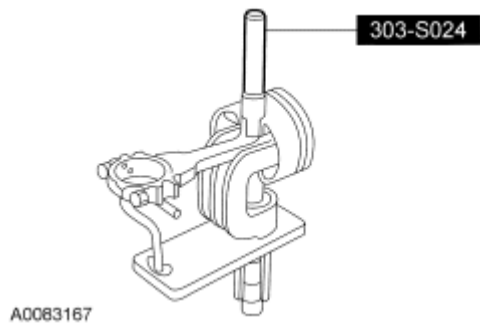


Fig. 271: Pressing Piston Pin Out Of Connecting Rod & Piston Assembly Using Special Tool (303-S024)

Courtesy of FORD MOTOR CO.

ASSEMBLY

NOTE: Lubricate all parts with clean engine oil.

NOTE: Install the piston in the connecting rod with the cylinder number side of the rod and the indentation notch in the piston on the same side.

NOTE: The oil hole in the connecting rod must face the RH side of the cylinder block and the arrow on the piston must face the front of the engine block.

NOTE: If the piston pin is removed from the piston, a new piston and piston pin must be used. Do not reuse the piston or the piston pin.

1. Gradually heat the pin bore side of the connecting rod to approximately 232°C-316°C (467°F-626°F) and immediately install the piston pin.
2. Using the Piston Pin Service Set, press the piston pin into the piston and connecting rod assembly.

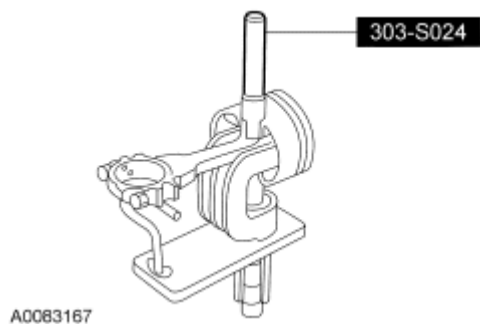


Fig. 272: Pressing Piston Pin Out Of Connecting Rod & Piston Assembly Using Special Tool (303-S024)

Courtesy of FORD MOTOR CO.

3. Install the piston rings.

4. Make sure the ring gaps (oil spacer-A, oil ring-B, compression ring-C) are correctly spaced around the circumference of the piston.

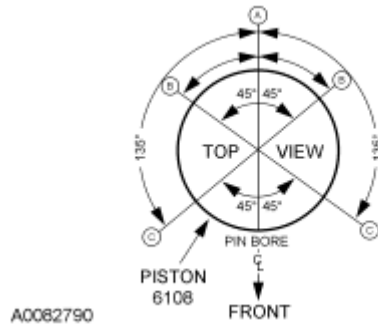


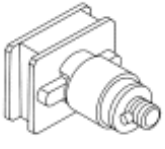
Fig. 273: Identifying Piston Ring Gaps Positioning
Courtesy of FORD MOTOR CO.

5. Install the connecting rod bearings in the connecting rod and cap.

ASSEMBLY

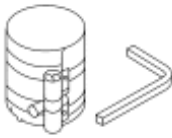
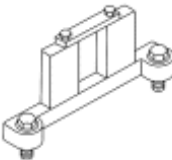
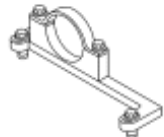
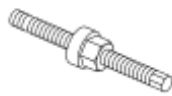
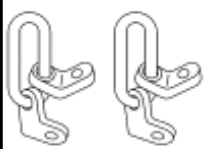
ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1776-A	Adapter for 303-564	303-578 (T97T-6256-A)
 ST1779-A	Adapter for 303-577	303-576 (T97T-6256-D)
 ST3078-A	Adapter for 303-579	303-527 (T95T-6701-A3)
 ST2439-A	Aligner, Front Cover	303-093 (T74P-6019-A)

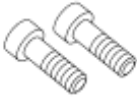
2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

 ST1380-A	Compressor, Piston Ring	303-D032 (D81L-6002-C)
 ST1330-A	Compressor, Valve Spring	303-581 (T97T-6565-A)
 ST2741A	Crankshaft Socket	303-674
 ST1778-A	Holding Tool, Camshaft	303-577 (T97T-6256-C)
 ST1777-A	Holding Tool, Camshaft Sprocket	303-564 (T97T-6256-B)
 ST2132-A	Installer, Crankshaft Rear Oil Seal	303-579 (T97T-6701-A)
 ST1287-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST1595-A	Lifting Bracket, Engine	303-050 (T70P-6000)

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

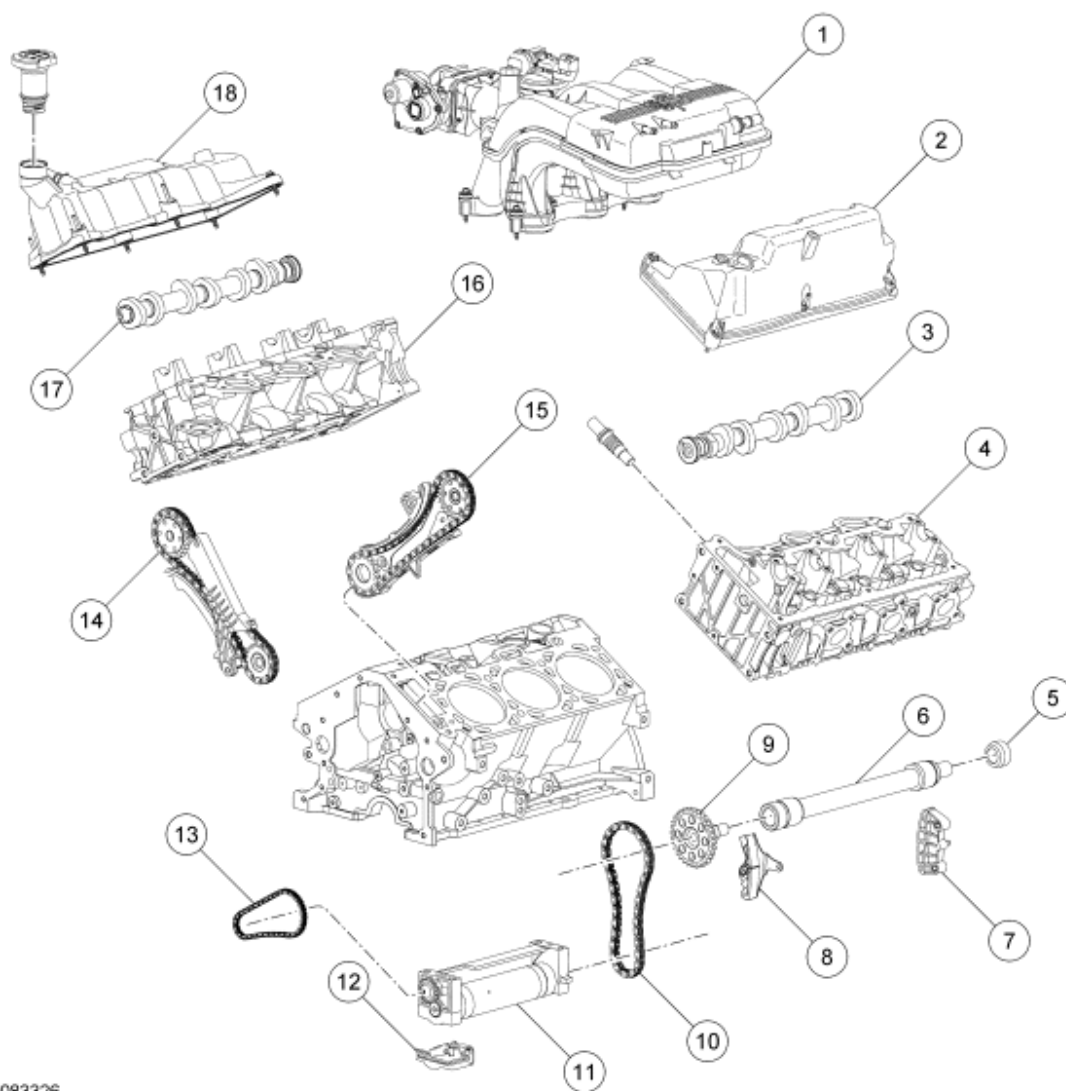
 ST3077-A	Screws, Crankshaft Rear Oil Seal	303-528 (T95T-6701-A4)
 ST2573-A	Spreader Bar	303-D701 or equivalent
 ST1438-A	Strap Wrench	303-D055 (85L-6000-A) or equivalent
 ST1774-A	Tensioner, Timing Chain	303-571 (T97T-6K254-A)
 ST1775-A	Timing Tool, Crankshaft TDC	303-573 (T97T-6303-A)

Material

Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12 (Canada); or equivalent	WSS-M2C929-A
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer



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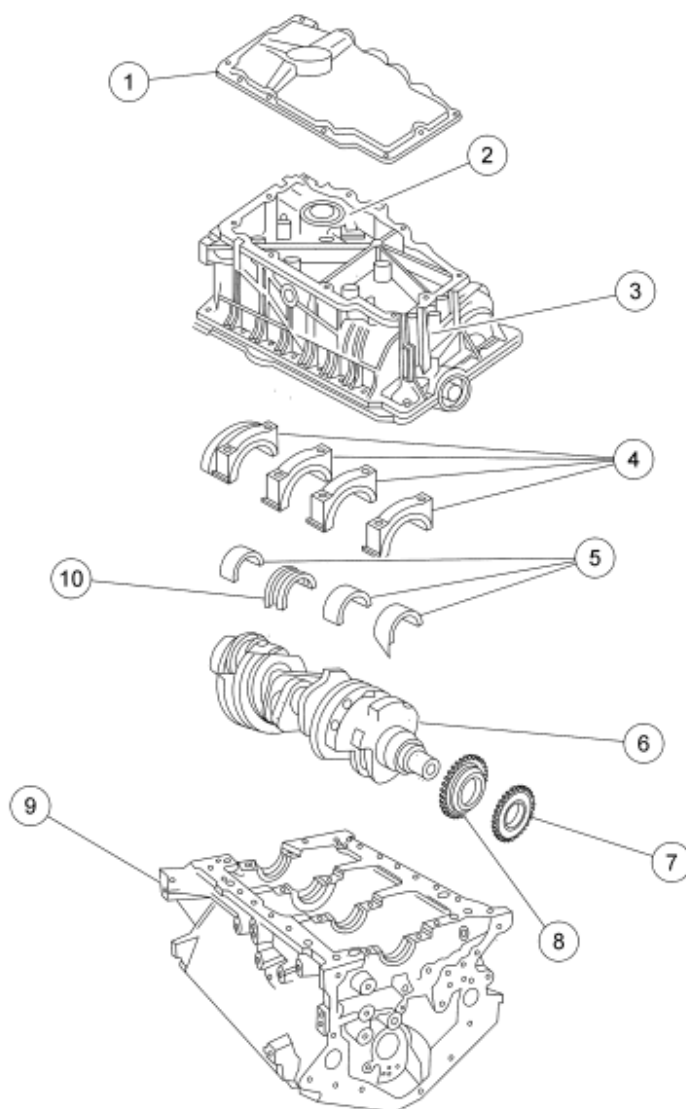
Fig. 274: Upper End - 4.0L SOHC Engine
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9K479	Intake manifold
2	6A505	Valve cover, LH
3	6A274	Camshaft, LH
4	6050	Cylinder head, LH
5	6M296	Spacer
6	6M262	Jackshaft
7	6M272	Jackshaft chain guide
8	6M271	Jackshaft chain tensioner
9	6M264	Jackshaft sprocket
10	6M270	Jackshaft chain assembly

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

11	6A311	Balance shaft
12	6K355	Balance shaft chain tensioner
13	6A364	Balance shaft chain
14	6M289	LH cassette
15	6M290	RH cassette
16	6049	Cylinder head, RH
17	6250	Camshaft, RH
18	6582	Valve cover, RH



N0041840

Fig. 275: Lower End - 4.0L SOHC Engine
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6675	Oil pan

2009 Mercury Mountaineer

2009 ENGINE Engine - 4.0L SOHC - Explorer, Explorer Sport Trac & Mountaineer

2	6617	Tube assembly oil pickup
3	6F092	Cylinder block cradle
4	-	Crankshaft main bearing caps
5	6A338	Crankshaft lower main bearings
6	6303	Crankshaft
7	6306	Jackshaft sprocket
8	6K350	Balance shaft sprocket
9	6010	Cylinder block
10	6A339	Crankshaft lower thrust main bearing

NOTE: If used as a leverage device, the fuel rail may be damaged. Care must be taken when working around the fuel rail.

NOTE: During engine assembly it may be necessary to check the bearing clearances and crankshaft end play. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

NOTE: Before engine assembly, use silicone gasket remover and metal surface prep and a suitable plastic or wooden scraper to clean the sealing surfaces. Follow the directions on the packaging. All sealing surfaces must be clean. Make sure coolant and oil passages are clear.

1. Install the crankshaft main bearings and the thrust bearing.
 - Lubricate the crankshaft main bearings with clean engine oil.

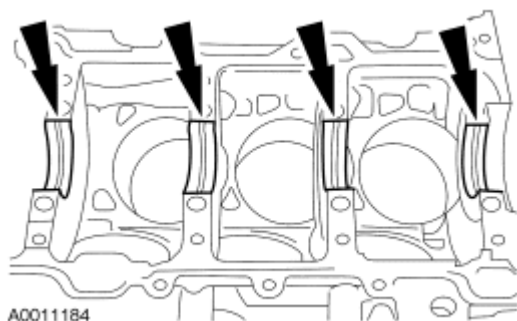
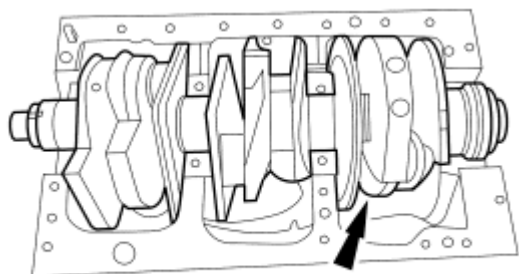


Fig. 276: Locating Crankshaft Main Bearings And Thrust Bearing
Courtesy of FORD MOTOR CO.

2. Install the lower main bearings in the bearing caps.

NOTE: The crankshaft main bearings are precision selective fit. Inspect the bearing clearance. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

3. Install the crankshaft.

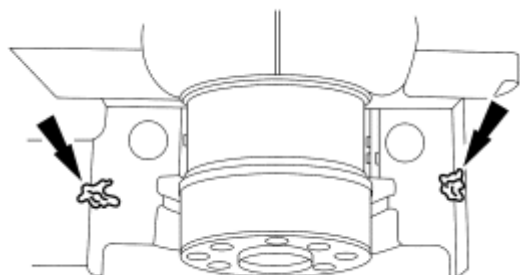


GA1705-A

Fig. 277: Locating Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

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

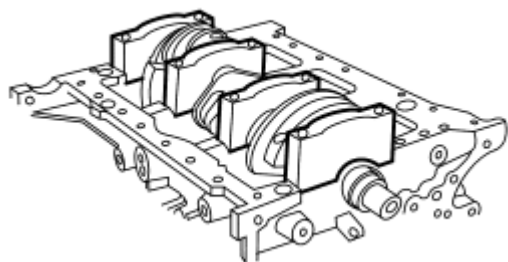
4. Apply silicone gasket and sealant to the rear main bearing cap to cylinder block parting line.



GA1707-A

Fig. 278: Apply Silicone Gasket & Sealant To Rear Main Bearing Cap
Courtesy of FORD MOTOR CO.

5. Install the 4 main bearing caps in the same position from which they were removed.



GA1769-A

Fig. 279: Locating Crankshaft Main Bearing Caps
Courtesy of FORD MOTOR CO.

6. Tighten the 8 bolts.
 - Tighten to 97 Nm (72 lb-ft).

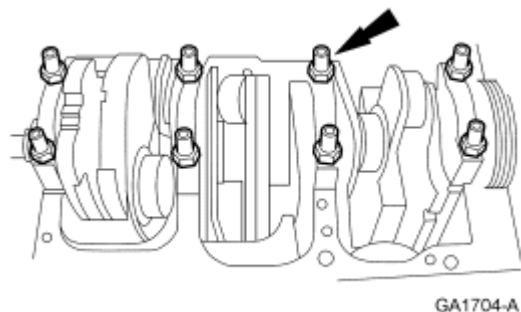


Fig. 280: Locating Crankshaft Main Bearing Cap Bolts
Courtesy of FORD MOTOR CO.

7. Check the piston to cylinder bore and ring clearance. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

NOTE: Lubricate the piston rings with clean engine oil.

8. Install the piston rings.
9. Make sure the ring gaps (oil spacer-A, oil ring-B, compression ring-C) are correctly spaced around the circumference of the piston.

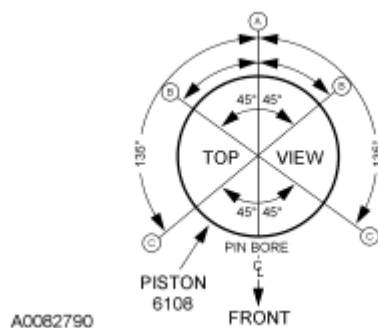
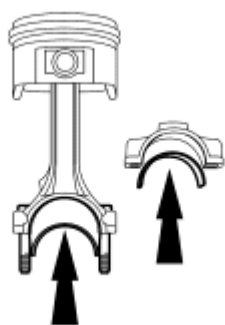


Fig. 281: Identifying Piston Ring Gaps Positioning
Courtesy of FORD MOTOR CO.

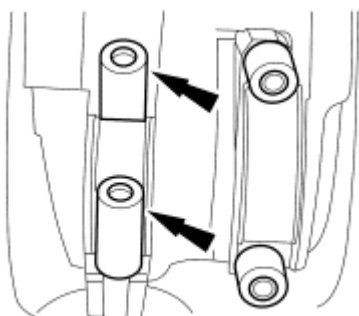
10. Install the connecting rod bearings.



A0067508

Fig. 282: Locating Connecting Rod Bearings
Courtesy of FORD MOTOR CO.

11. Install rubber hose pieces on the connecting rod bolts to protect the crankshaft.

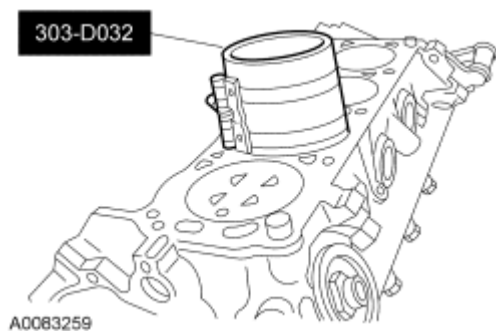


GA1703-A

Fig. 283: Locating Rubber Hose Pieces On Connecting Rod Bolts
Courtesy of FORD MOTOR CO.

NOTE: Position the piston with the indentation arrow toward the front of the cylinder block.

12. Using the Piston Ring Compressor, install the pistons.
 - Rotate the crankshaft as necessary.



A0083259

Fig. 284: Installing Piston Using Special Tool (303-D032)
Courtesy of FORD MOTOR CO.

NOTE: The old nuts and bolts are used for checking clearances. New nuts and bolts must be used for reassembly.

13. Check the clearance of each connecting rod bearing. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
14. Rotate the crankshaft until the piston is at the bottom of its stroke.

NOTE: For cylinders 1, 2 and 3, remove the connecting rod nut at the oil split hole side first. For cylinders 4, 5 and 6, remove the opposite nut first.

15. Loosen the first nut until the face is approximately 2 mm (0.08 in) over the end of the bolt.

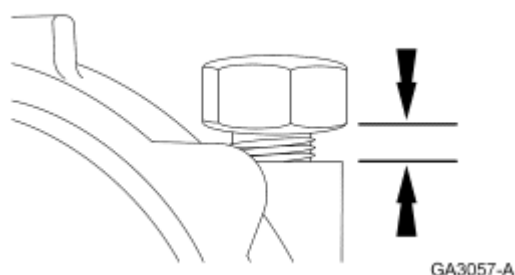


Fig. 285: Locating Connecting Rod Nut
Courtesy of FORD MOTOR CO.

16. Tap on the nut until the bolt can be removed by hand.

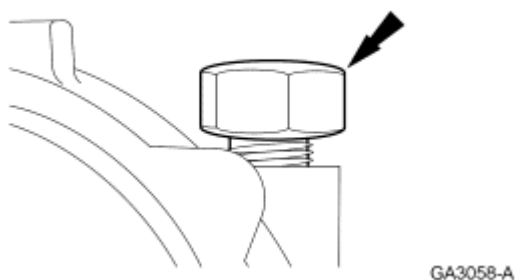


Fig. 286: Locating Opposite Bolt
Courtesy of FORD MOTOR CO.

17. Repeat the previous 2 steps for the opposite bolt.
18. Install the 2 new bolts, making certain that the bolt head is parallel to the sideward face of the connecting rod.

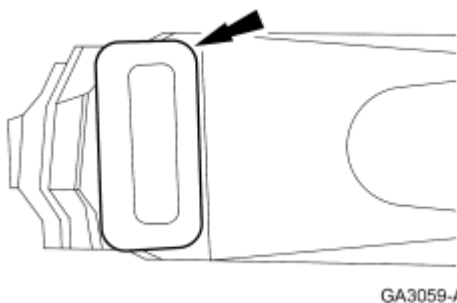


Fig. 287: Locating Connecting Rod Cap
Courtesy of FORD MOTOR CO.

19. Install the connecting rod cap in the original position.
20. Install and tighten the 2 connecting rod nuts finger-tight.

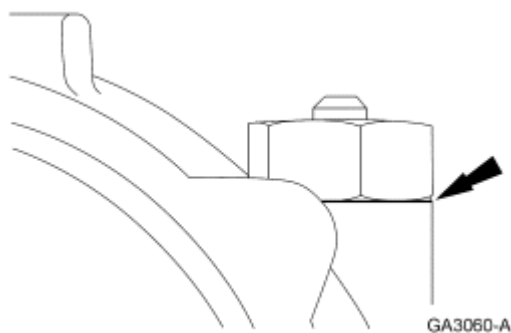
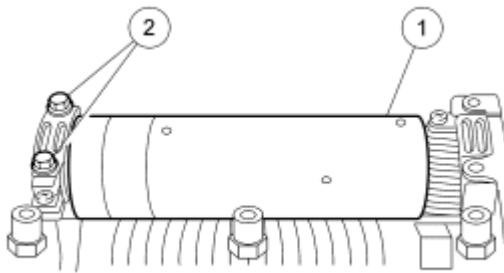


Fig. 288: Tightening Connecting Rod Nuts
Courtesy of FORD MOTOR CO.

21. Tighten the 2 connecting rod nuts in 2 stages.
 - Stage 1: Tighten to 20 Nm (177 lb-in).
 - Stage 2: Tighten an additional 90 degrees.
22. Repeat the previous 4 steps for the remaining connecting rods.
23. Rotate the crankshaft until the No. 1 piston is at Top Dead Center (TDC).
24. Install the balance shaft.
 1. Install the balance shaft assembly.
 2. Install the 2 bolts.
 - Tighten to 29 Nm (21 lb-ft).

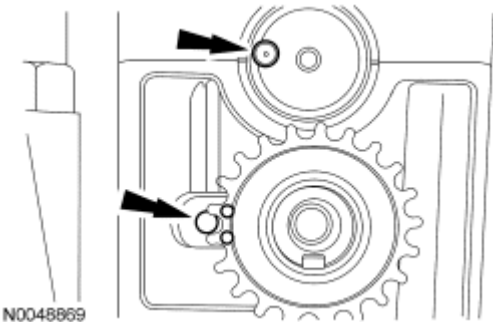


N0010444

Fig. 289: Identifying Balance Shaft Assembly And Bolts
Courtesy of FORD MOTOR CO.

NOTE: Due to the gear ratio between the reversal shaft and the balance shaft, up to 7 complete turns of the balance shaft may be required to find the correct position.

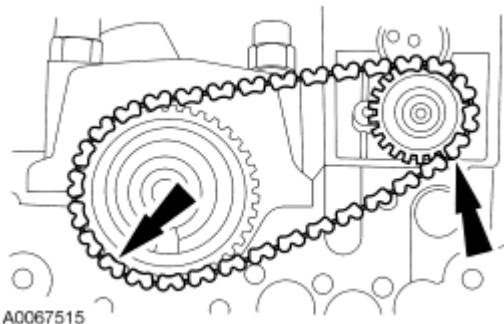
25. Align the timing marks.
- Install a 4 mm (0.16 in) pin to hold the shaft in place.



N0048869

Fig. 290: Locating Timing Marks
Courtesy of FORD MOTOR CO.

26. Install the balance shaft chain and crankshaft sprocket.



A0067515

Fig. 291: Locating Balance Shaft Chain And Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

27. Install the balance shaft tensioner and chain guide.
1. Install the balance shaft tensioner.
 2. Install the 2 bolts and tighten to 29 Nm (21 lb-ft).
 3. Position the balance shaft chain guide, install the 2 bolts and tighten to 10 Nm (89 lb-in).
 - Remove the pins from the tensioner and the sprocket.
 - Install the crankshaft key.

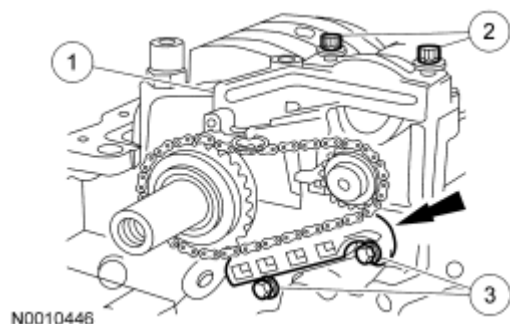


Fig. 292: Locating Balance Shaft Tensioner, Bolts And Balance Shaft Chain Guide
Courtesy of FORD MOTOR CO.

28. Install the oil pump intermediate shaft, the oil pump and the bolt.
- Tighten to 19 Nm (168 lb-in).

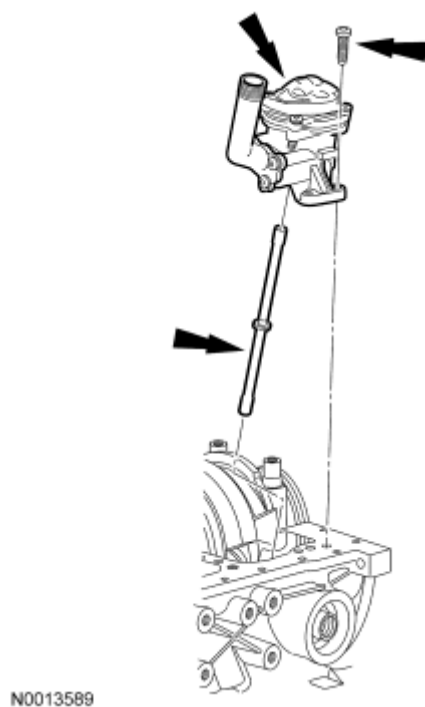


Fig. 293: Locating Oil Pump Intermediate Shaft, Oil Pump And Bolt
Courtesy of FORD MOTOR CO.

29. Install the jackshaft.

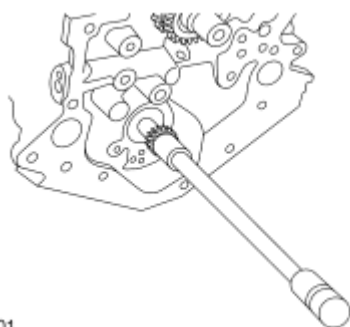


Fig. 294: Identifying Jackshaft
Courtesy of FORD MOTOR CO.

30. Install the jackshaft thrust plate and the 2 bolts.
- Tighten to 11 Nm (97 lb-in).

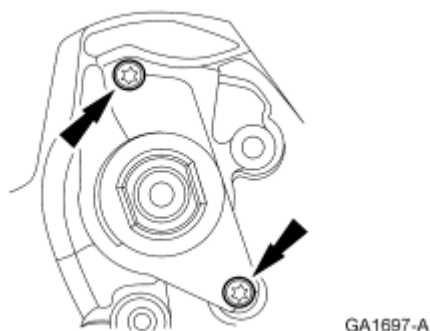


Fig. 295: Locating Jackshaft Thrust Plate & Bolts
Courtesy of FORD MOTOR CO.

31. Install the front cassette and the bolt.
- Tighten to 19 Nm (168 lb-in).

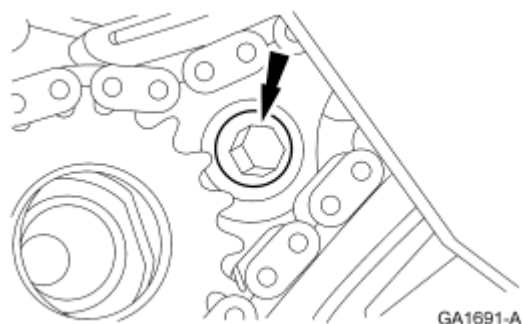


Fig. 296: Locating Front Cassette & Bolt
Courtesy of FORD MOTOR CO.

32. Position the jackshaft, the crankshaft sprockets and the chain.

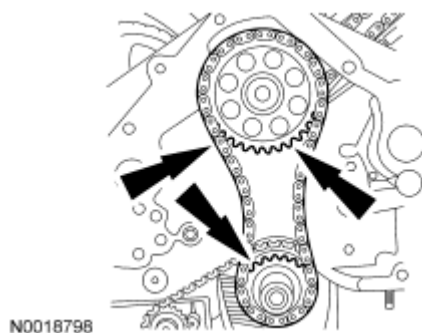


Fig. 297: Identifying Jackshaft, Crankshaft Sprockets And Chain
Courtesy of FORD MOTOR CO.

33. Install the chain guide and the 2 bolts.
- Tighten to 19 Nm (168 lb-in).



Fig. 298: Locating Chain Guide & Bolts
Courtesy of FORD MOTOR CO.

34. Install the jackshaft chain tensioner and the 2 bolts.
- Tighten to 9 Nm (80 lb-in).

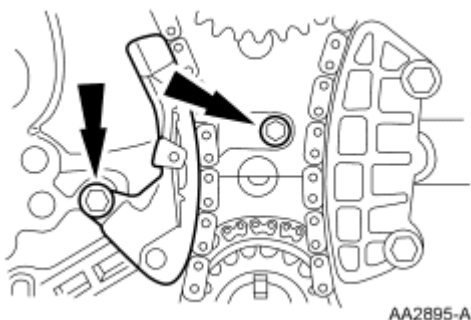


Fig. 299: Locating Chain Tensioner & Bolts
Courtesy of FORD MOTOR CO.

35. Using the Crankshaft Socket, hold the crankshaft.

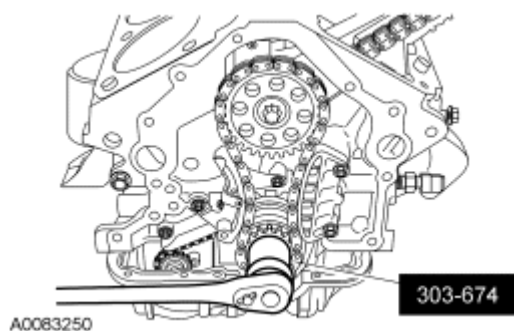


Fig. 300: Holding Crankshaft Using Special Tool (303-674)
Courtesy of FORD MOTOR CO.

36. Install the jackshaft front bolt and tighten in 2 stages.
- Stage 1: Tighten to 45 Nm (33 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

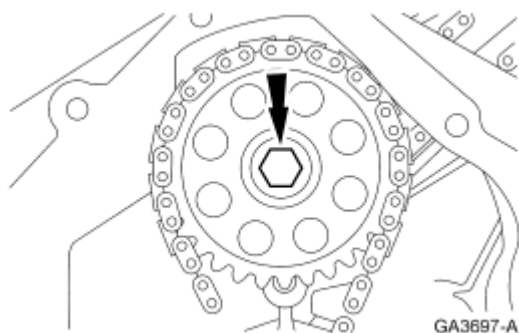


Fig. 301: Locating Jackshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

37. Install the oil pump drive and the bolt.
- Tighten to 19 Nm (168 lb-in).

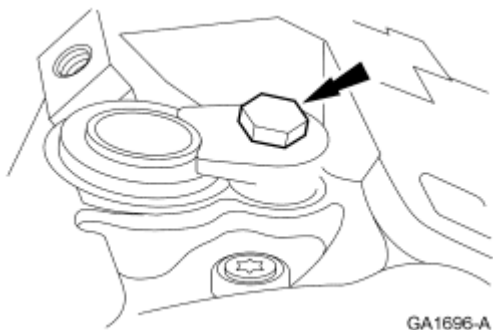


Fig. 302: Locating Oil Pump Drive
Courtesy of FORD MOTOR CO.

38. Install the RH cassette and sprocket to the jackshaft.
- Install, but do not tighten the bolt at this time.

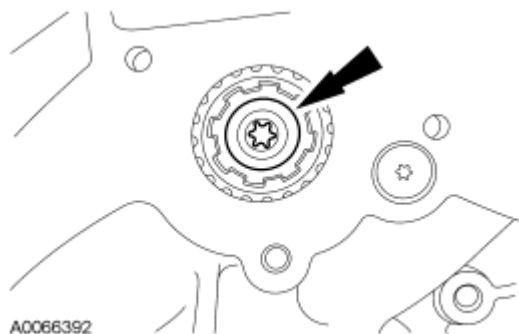


Fig. 303: Locating Rear Jackshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

39. Install the RH camshaft bolt.
- Tighten to 19 Nm (168 lb-in).

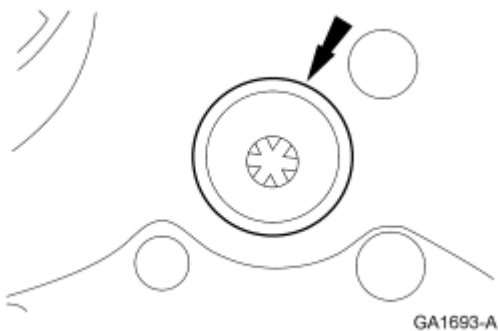


Fig. 304: Locating RH Camshaft Drive Cassette Bolt & Spacer
Courtesy of FORD MOTOR CO.

40. Using the Crankshaft Socket, hold the crankshaft.

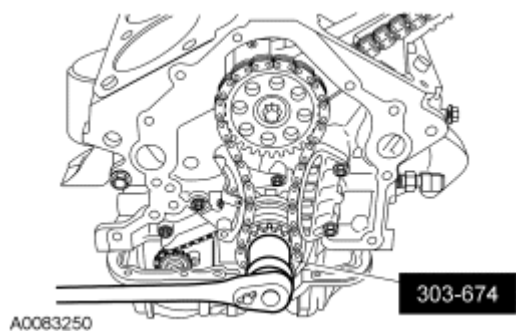


Fig. 305: Holding Crankshaft Using Special Tool (303-674)
Courtesy of FORD MOTOR CO.

41. Tighten the rear jackshaft bolt in 2 stages.
- Stage 1: Tighten to 20 Nm (177 lb-in).
 - Stage 2: Tighten an additional 90 degrees.

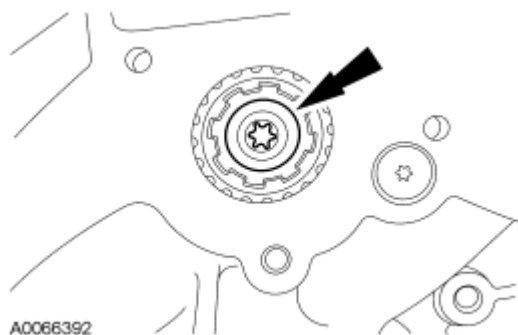


Fig. 306: Locating Rear Jackshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

42. Install the rear jackshaft plug.

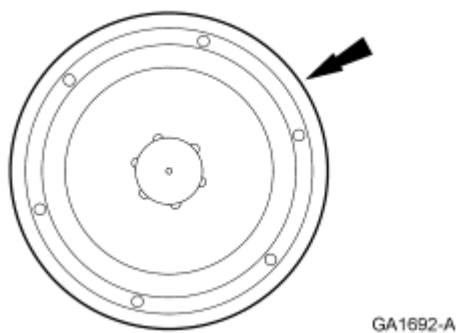


Fig. 307: Locating Jackshaft Rear Plug
Courtesy of FORD MOTOR CO.

43. Position the front cover gasket, the front cover and loosely install the 10 bolts.

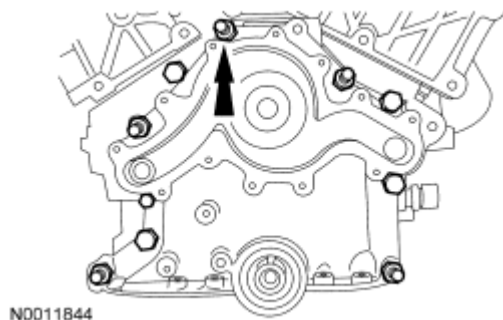


Fig. 308: Locating Front Cover Stud Bolts
Courtesy of FORD MOTOR CO.

44. Install the Front Cover Aligner and tighten the 10 front cover bolts.
 - Tighten to 19 Nm (168 lb-in).

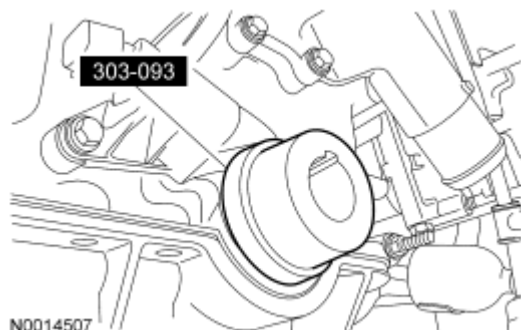


Fig. 309: Identifying Special Tool (303-093)
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the seal lip with clean engine oil.

45. Using the Front Cover Aligner and the Crankshaft Vibration Damper Installer, install the crankshaft front oil seal.

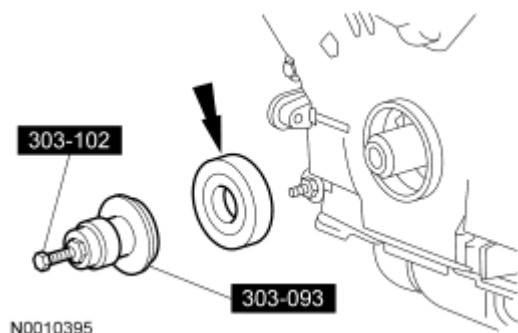


Fig. 310: Identifying Special Tools (303-102, 303-093) & Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

NOTE: The cylinder block cradle inserts must be loosened completely or damage to the cylinder block cradle or oil leaks can result.

46. Loosen the 8 cylinder block cradle inserts.

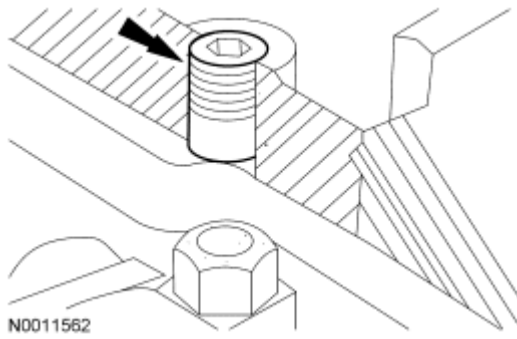


Fig. 311: Locating Cylinder Block Cradle Boss Screw
Courtesy of FORD MOTOR CO.

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

47. Apply silicone gasket and sealant to the front cover in 4 places.

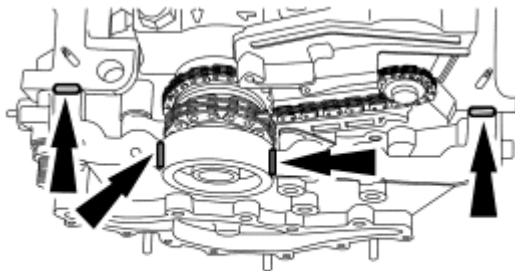


Fig. 312: Applying Silicone Gasket & Sealant To Front Cover
Courtesy of FORD MOTOR CO.

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

48. Apply silicone gasket and sealant to the rear main bearing cap as shown.
- Position the cylinder block cradle gasket.

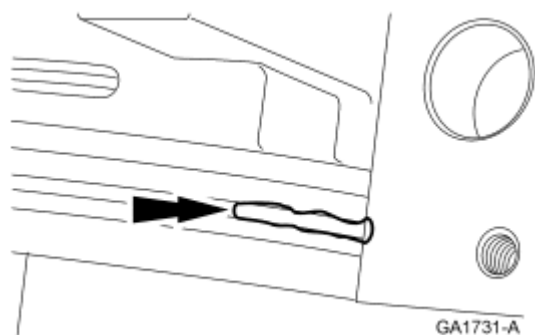


Fig. 313: Silicone Gasket & Sealant To Rear Main Bearing Cap
Courtesy of FORD MOTOR CO.

49. Position the cylinder block cradle and gasket assembly.

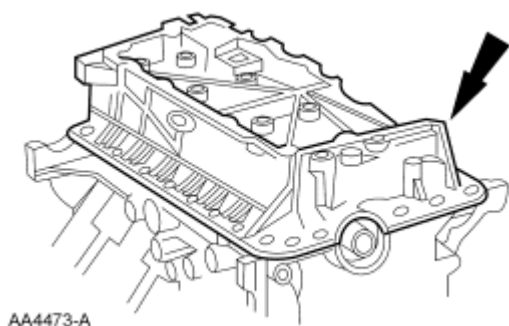


Fig. 314: Locating Cylinder Block Cradle & Gasket Assembly
Courtesy of FORD MOTOR CO.

50. Install and finger-tighten the 20 bolts and 2 nuts.

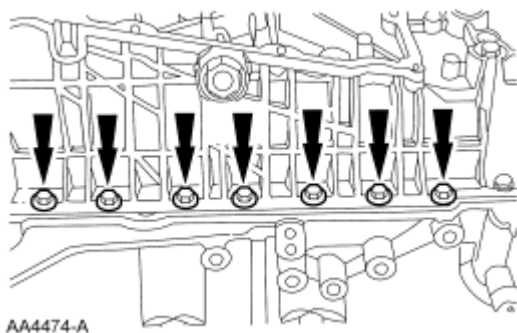


Fig. 315: Locating Cylinder Block Cradle Bolts & Nuts
Courtesy of FORD MOTOR CO.

51. Install and finger-tighten the 2 Torx bolts.

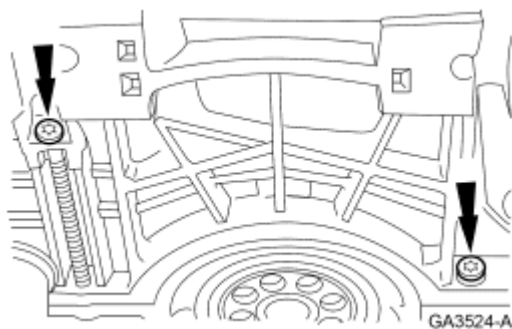


Fig. 316: Locating Rear Cylinder Block Cradle Bolts

Courtesy of FORD MOTOR CO.

NOTE: The cylinder block cradle to the cylinder block alignment must be within a maximum mismatch of 0.25 mm (0.01 in) cylinder block cradle under flush or 0.05 mm (0.00196 in) cylinder block cradle protrusion.

52. Using a straightedge, align the transmission face of the cylinder block cradle with the rear face of the cylinder block.

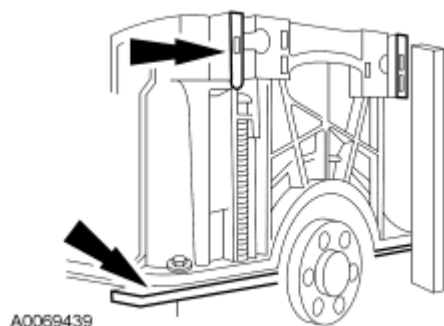


Fig. 317: Locating Transmission Face Of Cylinder Block Cradle With Rear Face Of Cylinder Block

Courtesy of FORD MOTOR CO.

53. Tighten the 20 bolts and the 2 nuts.
 - Tighten the nuts to 10 Nm (89 lb-in).
 - Tighten the bolts to 14 Nm (124 lb-in).

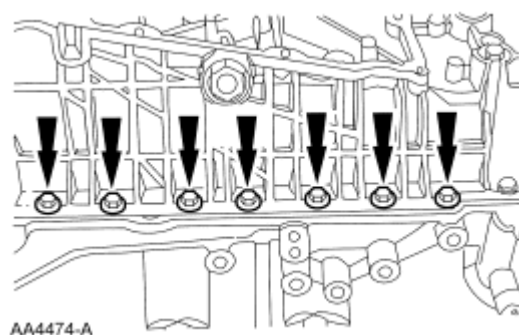


Fig. 318: Locating Cylinder Block Cradle Bolts & Nuts
Courtesy of FORD MOTOR CO.

54. Tighten the Torx bolts.
- Tighten to 10 Nm (89 lb-in).

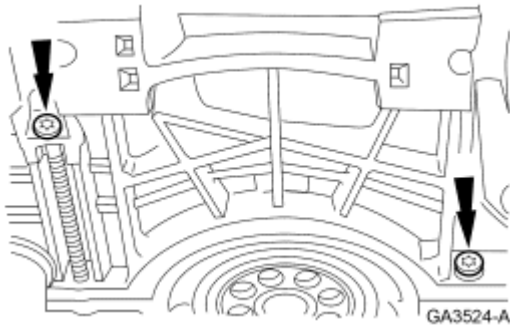


Fig. 319: Locating Rear Cylinder Block Cradle Bolts
Courtesy of FORD MOTOR CO.

55. Tighten the 8 inserts.
- Tighten to 3 Nm (27 lb-in).

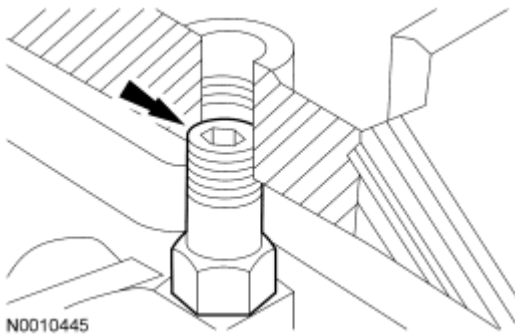


Fig. 320: Locating Cylinder Block Cradle Rear Torx Bolts
Courtesy of FORD MOTOR CO.

56. Install new seals on the 2 silver bolts and position them in the cylinder block cradle.

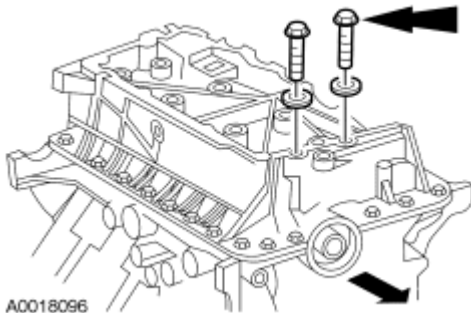


Fig. 321: Locating Silver-Colored Bolts And New Washer Seals
Courtesy of FORD MOTOR CO.

57. Position the 6 remaining bolts.

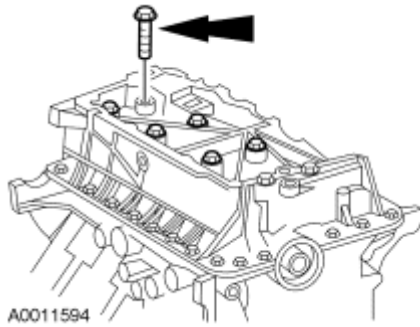


Fig. 322: Locating Lower Block Cradle Bolts
Courtesy of FORD MOTOR CO.

58. Tighten the 8 cylinder block cradle inner bolts in the sequence shown in 2 stages.
- Stage 1: Tighten to 15 Nm (133 lb-ft).
 - Stage 2: Tighten to 34 Nm (25 lb-ft).

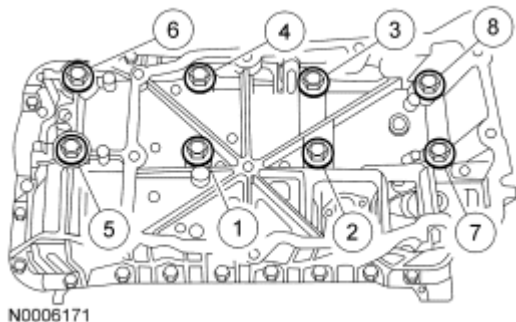


Fig. 323: Identifying Cylinder Block Cradle Inner Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: The cylinder block cradle to the cylinder block alignment must be within a maximum mismatch of 0.25 mm (0.01 in) cylinder block cradle under flush or 0.05 mm (0.00196 in) cylinder block cradle protrusion.

59. Measure the step between the rear face of the cylinder block and the transmission face of the cylinder block cradle.
- Cradles that exceed protrusion specification must be removed and the appropriate assembly steps repeated.
 - Cradles that exceed the under flush specification may be repaired by installing shims (next step).

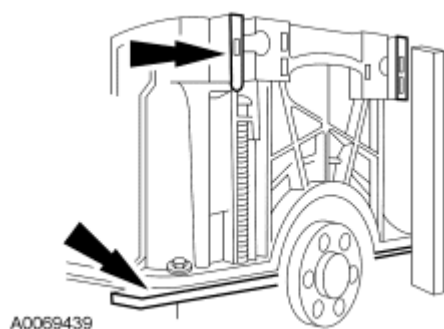


Fig. 324: Locating Transmission Face Of Cylinder Block Cradle With Rear Face Of Cylinder Block
Courtesy of FORD MOTOR CO.

60. Repair all assemblies that exceed under flush specification by installing shims on one or both sides of the cylinder block cradle.



Fig. 325: Locating Shims On Both Sides Of Cylinder Block Cradle
Courtesy of FORD MOTOR CO.

61. Install the oil pump screen cover and tube and the bolt.
- Tighten to 10 Nm (89 lb-in).

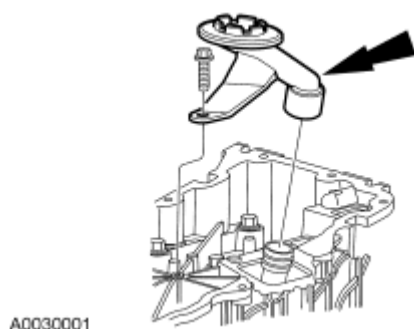


Fig. 326: Locating Oil Pump Screen Cover And Bolt
Courtesy of FORD MOTOR CO.

62. Install the gasket, the oil pan and the 10 bolts.
- Tighten to 11 Nm (97 lb-in).

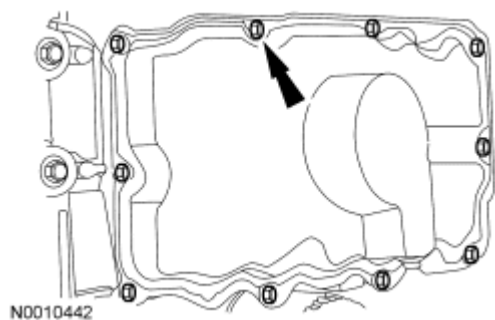


Fig. 327: Locating Gasket, Oil Pan And Bolts
Courtesy of FORD MOTOR CO.

63. Install the oil filter adapter and the bolt.
 - Tighten to 57 Nm (42 lb-ft).

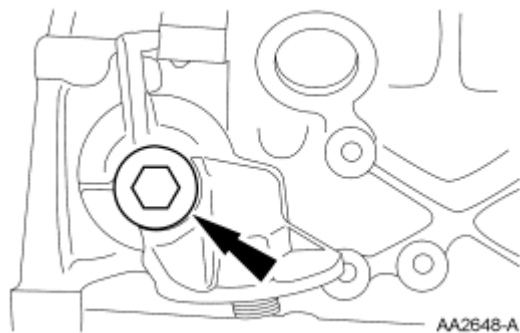


Fig. 328: Locating Oil Filter Adapter
Courtesy of FORD MOTOR CO.

64. Install the coolant pump and the 12 bolts.
 - Tighten to 10 Nm (89 lb-in).

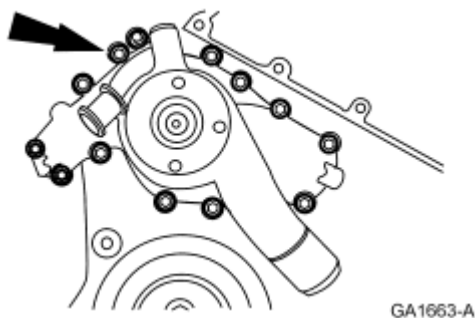


Fig. 329: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

65. Install the cylinder head gaskets.

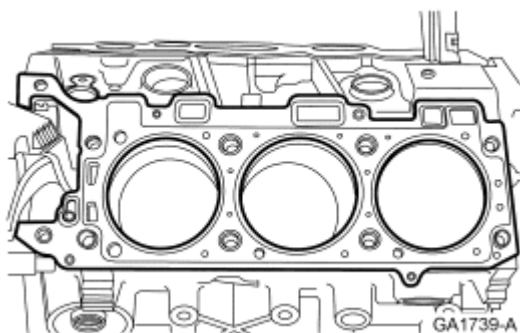


Fig. 330: Identifying Cylinder Head Gaskets
Courtesy of FORD MOTOR CO.

NOTE: New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

66. Install the LH cylinder head and tighten the 8 new 12-mm bolts in the sequence shown in 2 stages.
- Stage 1: Tighten to 12 Nm (106 lb-in).
 - Stage 2: Tighten to 25 Nm (18 lb-ft).

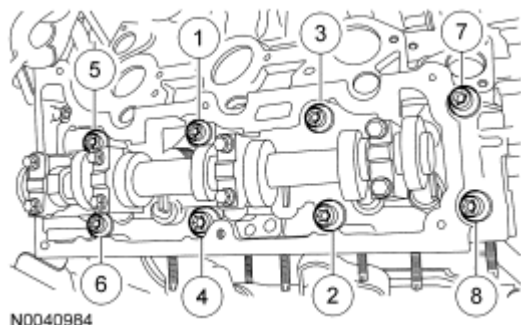


Fig. 331: Identifying Tightening Sequence Of 12-MM Bolts
Courtesy of FORD MOTOR CO.

67. Install 2 new 8-mm bolts.
- Tighten to 32 Nm (24 lb-ft).

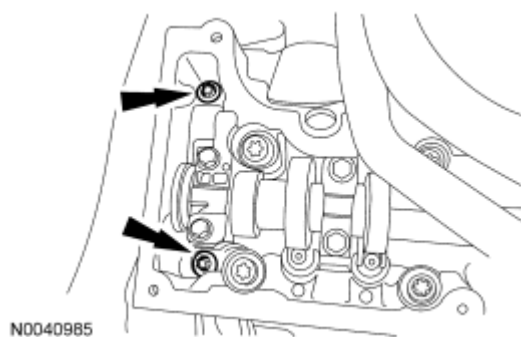


Fig. 332: Locating 8-Mm Bolts
Courtesy of FORD MOTOR CO.

68. Tighten the 8 new 12-mm bolts in the sequence shown in 2 stages.
- Stage 1: Rotate 90 degrees.
 - Stage 2: Rotate an additional 90 degrees.

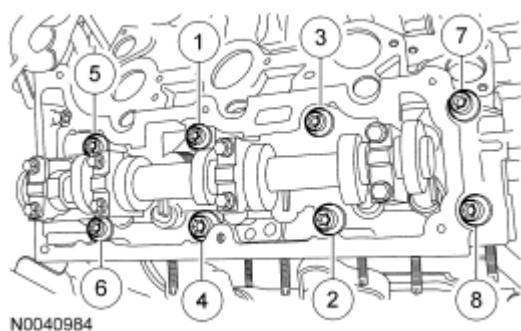


Fig. 333: Identifying Tightening Sequence Of 12-MM Bolts
Courtesy of FORD MOTOR CO.

NOTE: New cylinder head bolts must be installed. They are a torque-to-yield design and cannot be reused.

69. Install the RH cylinder head. Install 8 new 12-mm bolts and tighten in the sequence shown in 2 stages.
- Stage 1: Tighten to 12 Nm (106 lb-in).
 - Stage 2: Tighten to 25 Nm (18 lb-ft).

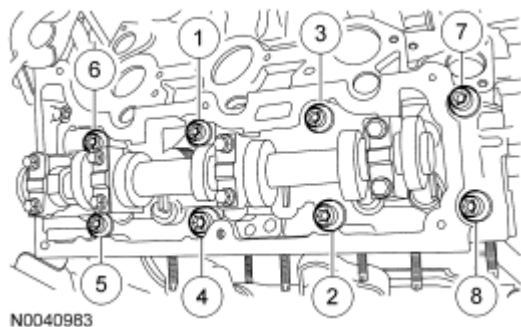


Fig. 334: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

70. Install 2 new 8-mm bolts.
 - Tighten to 32 Nm (24 lb-ft).

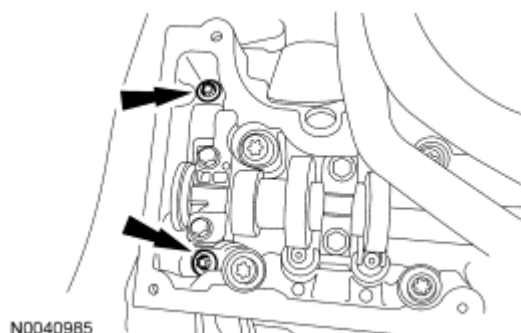


Fig. 335: Locating 8-Mm Bolts
Courtesy of FORD MOTOR CO.

71. Tighten the 8 new 12-mm bolts in the sequence shown in 2 stages.
 - Stage 1: Rotate 90 degrees.
 - Stage 2: Rotate an additional 90 degrees.

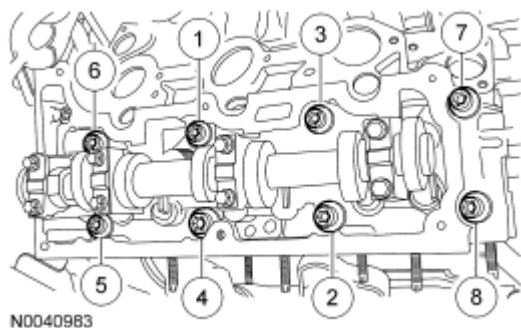


Fig. 336: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

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



Fig. 337: Installing Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: A new bolt must be used each time it is removed.

73. Using the Strap Wrench, tighten the bolt in 2 stages.
- Stage 1: Tighten to 50 Nm (37 lb-ft).
 - Stage 2: Rotate an additional 90 degrees.

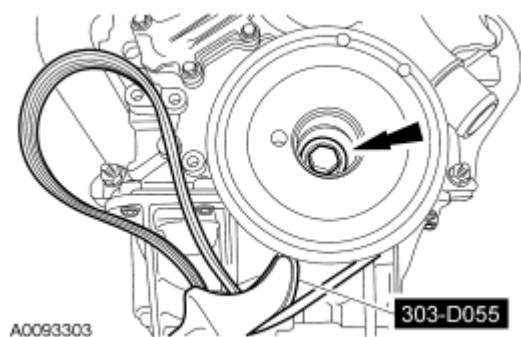


Fig. 338: Holding Crankshaft Pulley Using Special Tool
Courtesy of FORD MOTOR CO.

74. Install the coolant pump pulley and the 4 bolts.
- Tighten to 25 Nm (18 lb-ft).

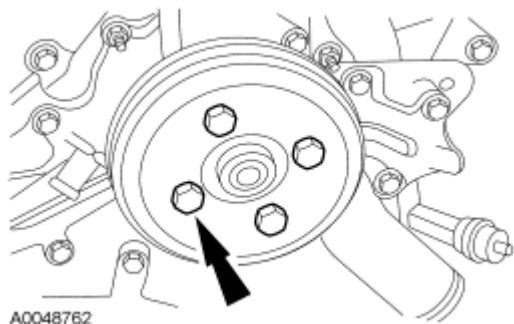
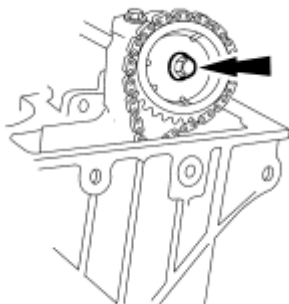


Fig. 339: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

NOTE: The camshaft sprocket must turn freely on the camshaft. DO NOT tighten the bolt.

75. Loosely install the RH camshaft sprocket bolt.

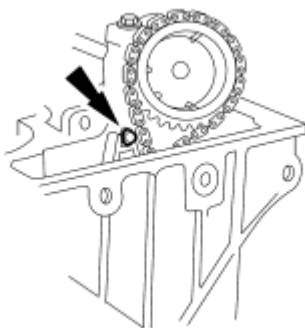


GA1667-A

Fig. 340: Locating RH Camshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

76. Install the bolt.

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

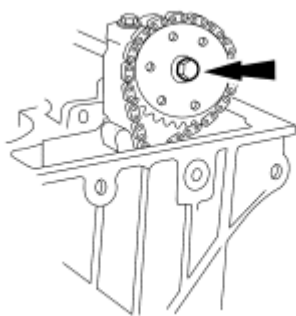


GA3228-A

Fig. 341: Locating RH Chain Guide Bolt
Courtesy of FORD MOTOR CO.

NOTE: The camshaft sprocket must turn freely on the camshaft. DO NOT tighten the bolt.

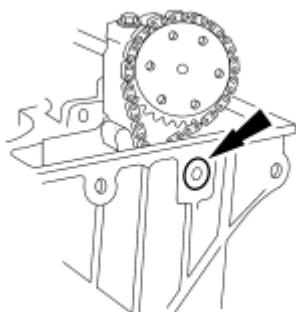
77. Loosely install the LH camshaft sprocket bolt.



GA1669-A

Fig. 342: Locating Camshaft Sprocket Bolt
Courtesy of FORD MOTOR CO.

78. Install the bolt.
- Tighten to 12 Nm (106 lb-in).



GA1670-A

Fig. 343: Locating Chain Guide Bolt
Courtesy of FORD MOTOR CO.

79. Turn the crankshaft one revolution clockwise.

NOTE: Do not rotate the engine counterclockwise. Rotating the engine counterclockwise will result in incorrect timing of the engine.

NOTE: The Crankshaft TDC Timing Tool must be installed on the damper and should contact the engine block. This positions the engine at Top Dead Center (TDC).

80. Install the Crankshaft TDC Timing Tool.

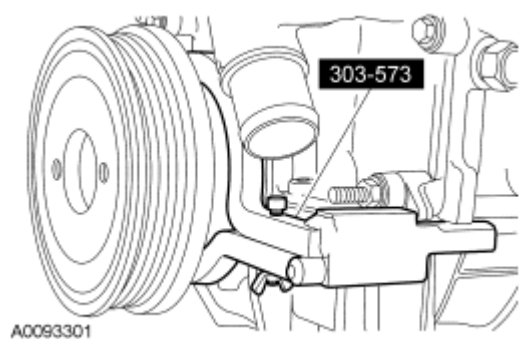


Fig. 344: Identifying Special Tool (303-573)
Courtesy of FORD MOTOR CO.

NOTE: Camshaft timing slots are off-center.

NOTE: Position the camshaft timing slots below centerline of camshaft.

81. Install the Camshaft Holding Tool and the Adapter for 303-577 on the front of the RH cylinder head.

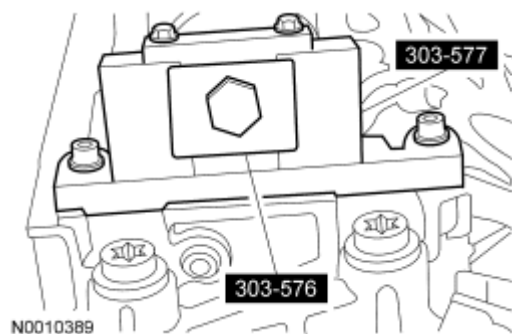


Fig. 345: Identifying Special Tools (303-576, 303-577)
Courtesy of FORD MOTOR CO.

NOTE: Leave the top 2 Camshaft Sprocket Holding Tool clamp bolts loose.

82. Install the Camshaft Sprocket Holding Tool and the Adapter for 303-564 on the rear of the RH cylinder head.

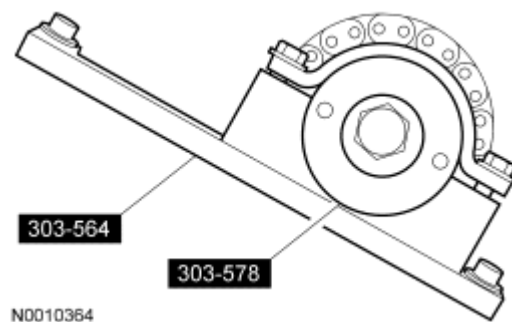


Fig. 346: Identifying Special Holding Tool
Courtesy of FORD MOTOR CO.

83. Install the Timing Chain Tensioner.

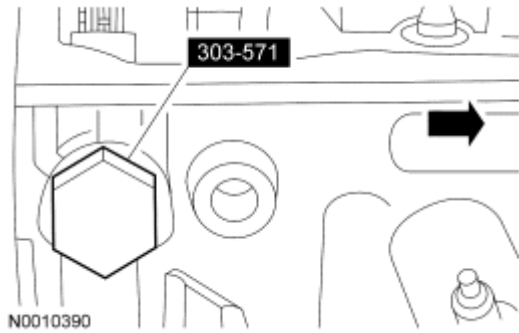


Fig. 347: Identifying Special Tool (303-571)
Courtesy of FORD MOTOR CO.

NOTE: The RH camshaft sprocket bolt is a LH-threaded bolt. Turning the bolt in the wrong direction can damage the bolt.

84. Tighten the bolts.
1. Tighten the Camshaft Sprocket Holding Tool top 2 clamp bolts to 10 Nm (89 lb-in).
 2. Tighten the camshaft bolt to 85 Nm (63 lb-ft).

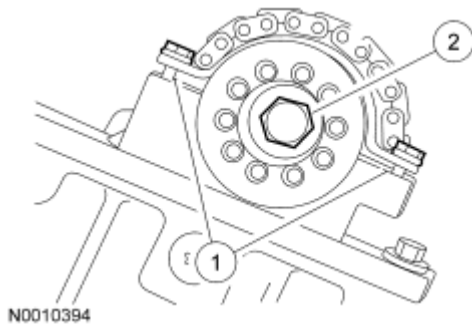


Fig. 348: Identifying Camshaft Bolt & Clamp Bolts
Courtesy of FORD MOTOR CO.

85. Remove the Timing Chain Tensioner and install the RH camshaft tensioner.
- Tighten to 44 Nm (32 lb-ft).



Fig. 349: Locating RH Hydraulic Chain Tensioner
Courtesy of FORD MOTOR CO.

NOTE: Do not tighten the Camshaft Sprocket Holding Tool top 2 clamp bolts. The camshaft sprocket must rotate freely.

86. Install the Camshaft Sprocket Holding Tool and the Adapter for 303-564 on the front of the LH cylinder head.

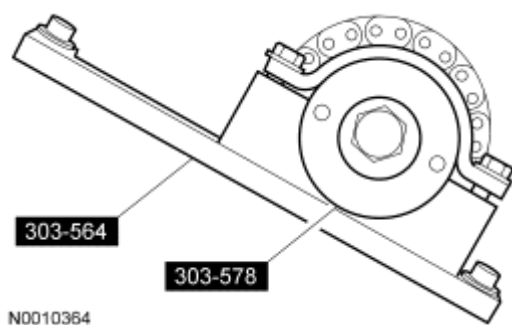


Fig. 350: Identifying Special Holding Tool
Courtesy of FORD MOTOR CO.

NOTE: Camshaft timing slots are off-center.

NOTE: Position the camshaft timing slots below centerline of camshaft.

87. Install the Camshaft Holding Tool and the Adapter for 303-577 on the front of the LH cylinder head.

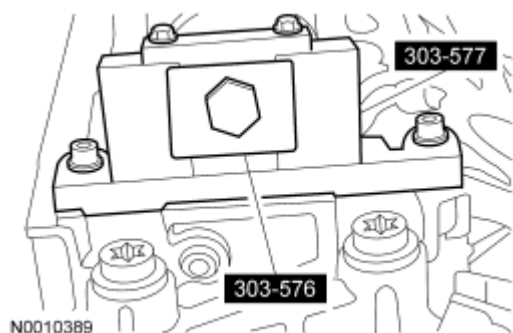


Fig. 351: Identifying Special Tools (303-576, 303-577)
Courtesy of FORD MOTOR CO.

88. Install the Timing Chain Tensioner.



Fig. 352: Identifying Special Tool (303-571)
Courtesy of FORD MOTOR CO.

89. Tighten the bolts.

1. Tighten the Camshaft Sprocket Holding Tool top 2 clamp bolts to 10 Nm (89 lb-in).
2. Tighten the camshaft bolt to 85 Nm (63 lb-ft).

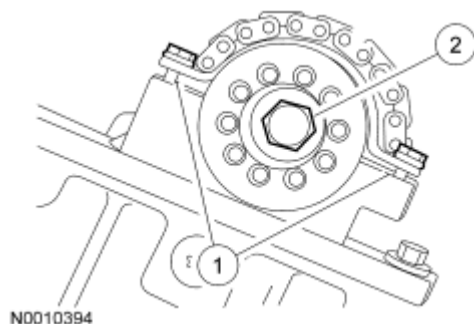


Fig. 353: Identifying Camshaft Bolt & Clamp Bolts
Courtesy of FORD MOTOR CO.

90. Install the LH camshaft tensioner.

- Tighten to 44 Nm (32 lb-ft).

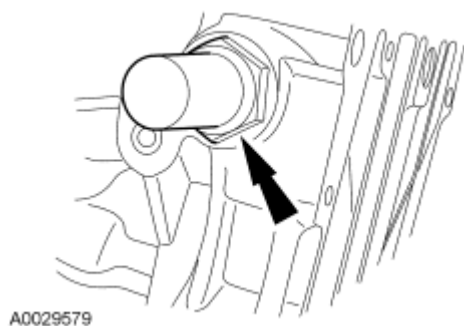


Fig. 354: Locating Camshaft Tensioner
Courtesy of FORD MOTOR CO.

91. Rotate the crankshaft until the cam lobe is in the up position.

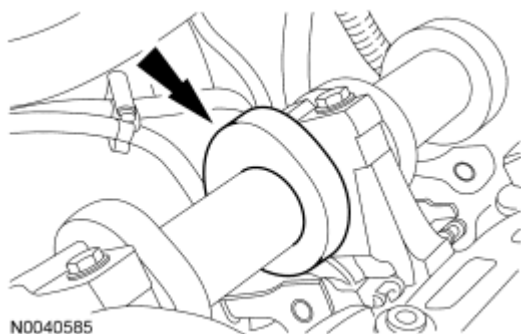


Fig. 355: Locating Crankshaft Lobe
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the parts with clean engine oil.

92. Using the Valve Spring Compressor, install the roller followers in their original positions.

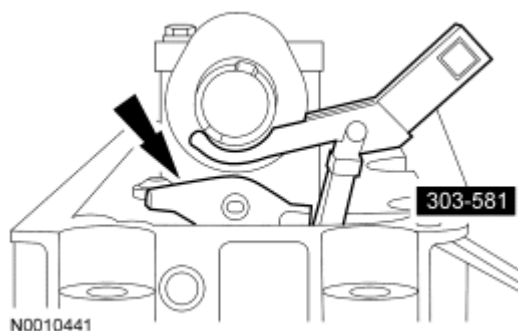
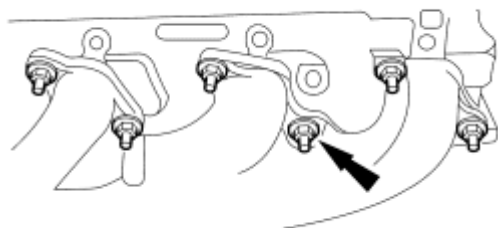


Fig. 356: Removing Camshaft Roller Followers Using Special Tool (303-581)
Courtesy of FORD MOTOR CO.

93. Inspect the RH and LH exhaust manifold gasket mating surfaces for flatness. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

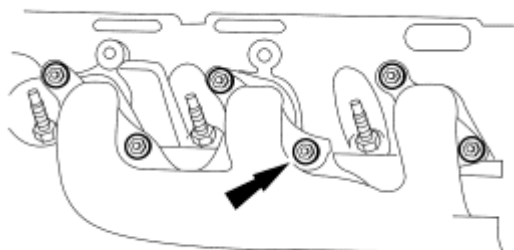
94. Install 6 new RH exhaust manifold studs.
 - Tighten to 12 Nm (106 lb-in).
95. Install a new gasket, the RH exhaust manifold and the 6 new nuts.
 - Tighten to 22 Nm (16 lb-ft).



N0013712

Fig. 357: Locating RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

96. Install 6 new LH exhaust manifold studs.
 - Tighten to 12 Nm (106 lb-in).
97. Install a new gasket, the LH exhaust manifold and the 6 new nuts.
 - Tighten to 22 Nm (16 lb-ft).

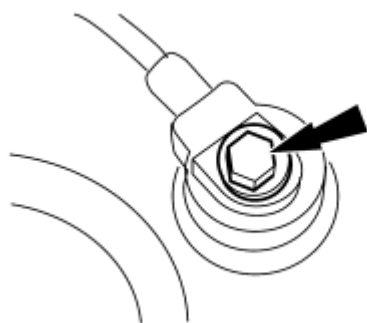


N0013711

Fig. 358: Locating LH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

NOTE: Prior to installation, use metal surface prep to clean mating surfaces.
Follow the directions on the packaging.

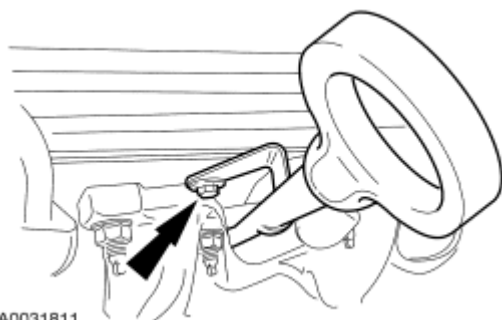
98. Install the Knock Sensor (KS) and the bolt.
 - Tighten to 20 Nm (177 lb-in).



GA1660-A

Fig. 359: Locating Knock Sensor (KS) Bolt
Courtesy of FORD MOTOR CO.

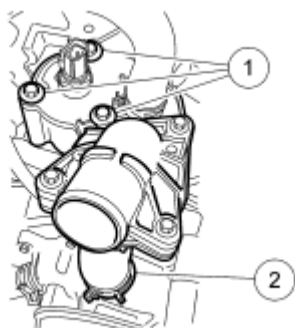
99. Install the oil level indicator tube and the bolt.
 - Tighten to 10 Nm (89 lb-in).



A0031811

Fig. 360: Locating Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

100. Position the thermostat housing and bypass hose on the coolant pump.
 1. Install the 3 bolts.
 - Tighten to 11 Nm (97 lb-in).
 2. Position the bypass hose clamp.

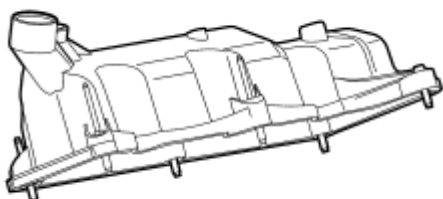


N0014060

Fig. 361: Identifying Bypass Hose Clamp & Housing
Courtesy of FORD MOTOR CO.

NOTE: RH valve cover shown, LH similar.

101. Install the valve covers and tighten the 12 bolts.
- Tighten to 10 Nm (89 lb-in).

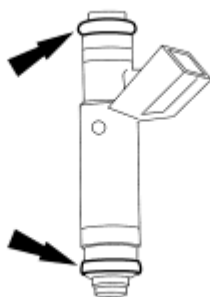


A0030006

Fig. 362: Locating Valve Covers & Gasket
Courtesy of FORD MOTOR CO.

NOTE: Use O-ring seals that are made of special fuel-resistant material. Use of ordinary O-rings seals may cause the fuel system to leak. Do not reuse the O-ring seals.

102. Install new O-ring seals on each of the fuel injectors.



AV1418-A

Fig. 363: Identifying Fuel Injector O-Ring Seals
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the fuel injector O-ring seals with clean engine oil.

103. Install the fuel injectors.

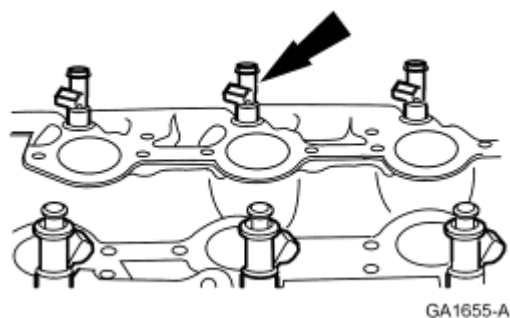


Fig. 364: Identifying O-Ring Seals
Courtesy of FORD MOTOR CO.

104. Install the fuel rail and the 4 bolts.
- Tighten to 24 Nm (18 lb-ft).

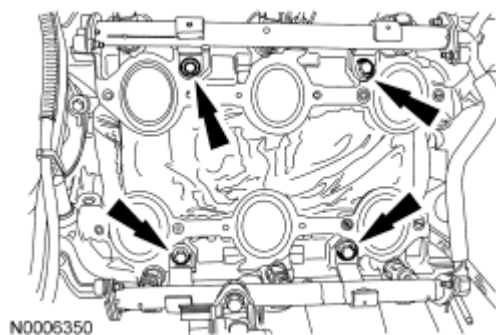


Fig. 365: Locating Fuel Rail & Bolts
Courtesy of FORD MOTOR CO.

105. Position the fuel supply tube and install the bolt.
- Tighten to 6 Nm (53 lb-in).

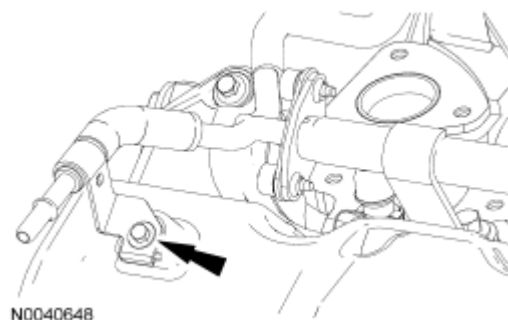


Fig. 366: Locating Fuel Supply Tube Bolt
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

106. Install the LH and RH insulator brackets and the 6 bolts.

- Tighten to 80 Nm (59 lb-ft).

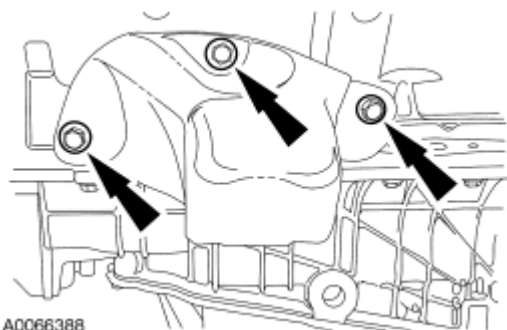


Fig. 367: Locating Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

107. Install the oil pressure switch.

- Tighten to 13 Nm (115 lb-in).

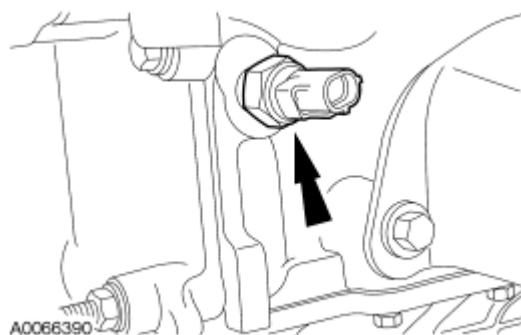


Fig. 368: Identifying Oil Pressure Switch
Courtesy of FORD MOTOR CO.

108. Position the battery cable and harness and attach the retainers.

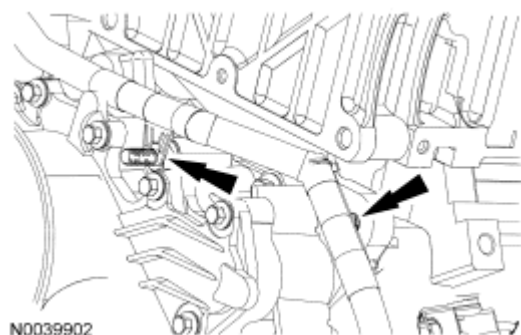


Fig. 369: Locating Battery Cable And Retainers
Courtesy of FORD MOTOR CO.

109. Connect the oil pressure switch electrical connector. Position the battery cable and harness bracket and install the nut.
- Tighten to 20 Nm (177 lb-in).

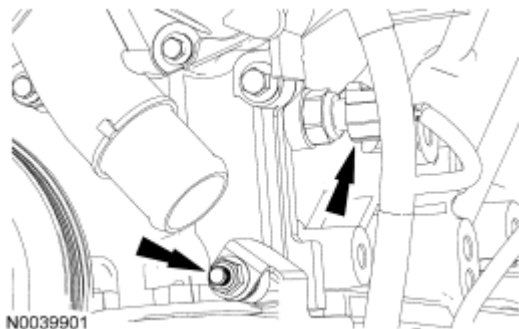


Fig. 370: Locating Oil Pressure Switch Electrical Connector And Nut
Courtesy of FORD MOTOR CO.

110. Position the vacuum harness on the engine and connect the fuel pressure and temperature sensor vacuum hose fittings.

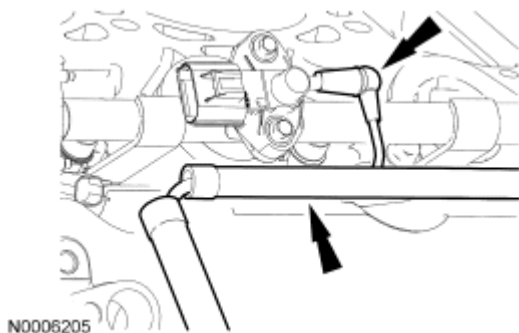


Fig. 371: Identifying Fuel Pressure And Temperature Sensor Vacuum Hose Fitting
Courtesy of FORD MOTOR CO.

111. Position the engine wiring harness on the engine.
112. Position the engine wiring harness retainer and install the bolt.
- Tighten to 47 Nm (35 lb-ft).

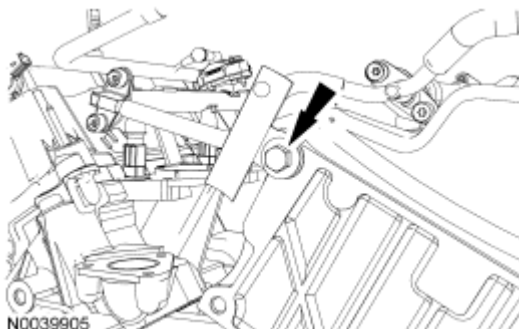


Fig. 372: Identifying Engine Wiring Harness Retainer Bolt
Courtesy of FORD MOTOR CO.

113. Connect the Engine Coolant Temperature (ECT) sensor electrical connector.

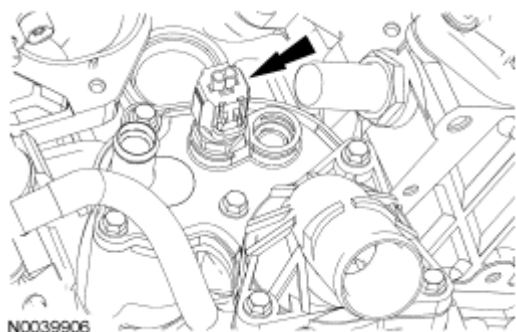


Fig. 373: Locating Engine Coolant Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

114. Connect the fuel rail pressure and temperature sensor and the Camshaft Position (CMP) sensor electrical connector.

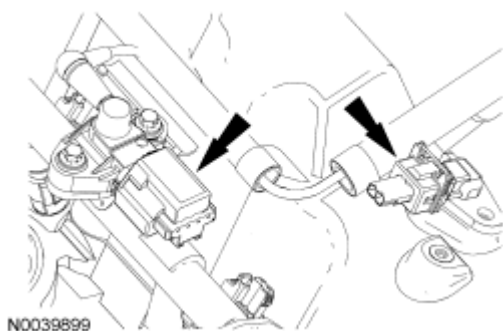


Fig. 374: Locating Fuel Rail Pressure & Temperature Sensor And Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

115. Connect the Crankshaft Position (CKP) sensor electrical connectors and new wiring anchors.

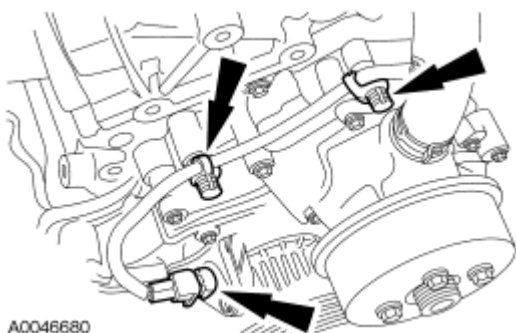


Fig. 375: Locating Crankshaft Position Sensor Electrical Connectors And Wiring Anchors

Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

116. Connect the 6 fuel injector electrical connectors and attach the wiring harness retainers.

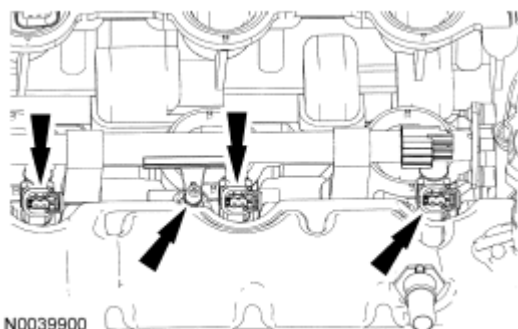


Fig. 376: Locating Fuel Injector Electrical Connectors And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

117. Install the gaskets, the intake manifold and the 8 bolts.
- Tighten to 11 Nm (97 lb-in).

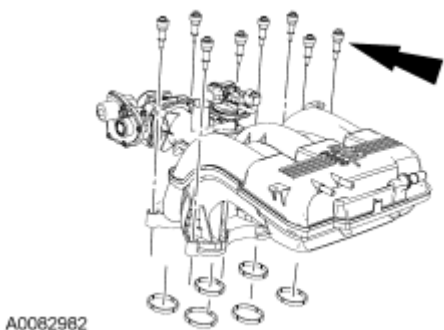


Fig. 377: Locating Gaskets, Intake Manifold And Bolts
Courtesy of FORD MOTOR CO.

118. Install the exhaust manifold-to-EGR system module tube.
- Tighten to 34 Nm (25 lb-ft).

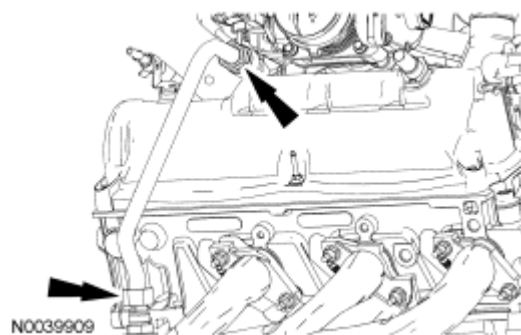


Fig. 378: Identifying Exhaust Manifold-To-EGR System Module Tube
Courtesy of FORD MOTOR CO.

119. Connect the Electronic Throttle Body (ETB) and Throttle Position (TP) sensor electrical connectors. Attach the wiring harness bracket and install the nut.
- Tighten to 9 Nm (80 lb-in).

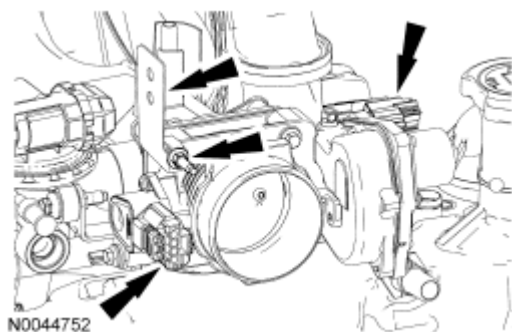


Fig. 379: Identifying Electronic Throttle Body (TB), Throttle Position (TP) Sensor Electrical Connectors & Wiring Harness Bracket
Courtesy of FORD MOTOR CO.

120. Connect the EGR system module vacuum hose and electrical connector. Attach the wiring harness pin-type retainer.

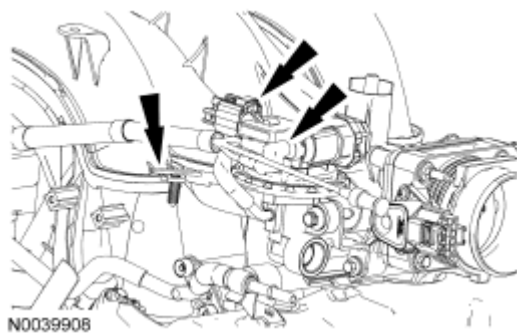


Fig. 380: Identifying Exhaust Gas Recirculation (EGR) System Module Vacuum Hose & Wiring Harness Pin-Type Retainer
Courtesy of FORD MOTOR CO.

121. Attach the wiring harness pin-type retainer and connect the KS electrical connector.

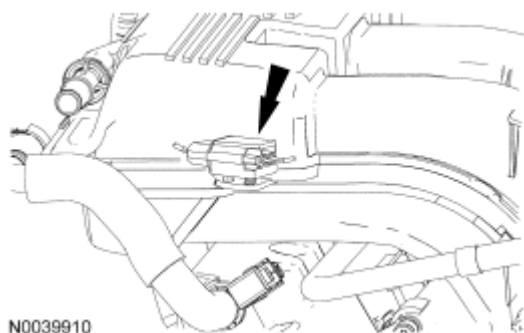


Fig. 381: Locating Knock Sensor (KS) Electrical Connector
Courtesy of FORD MOTOR CO.

122. Connect the vacuum and PCV hoses to the intake manifold.

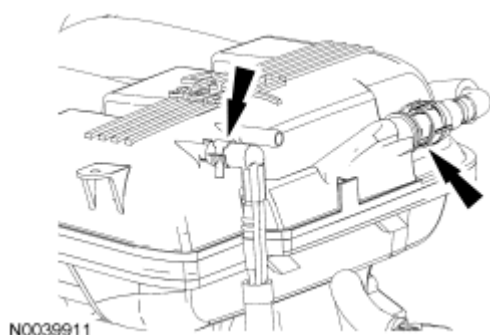


Fig. 382: Identifying Vacuum And Positive Crankcase Ventilation Hoses
Courtesy of FORD MOTOR CO.

123. Install the oil cooler and hose.
- Tighten to 57 Nm (42 lb-ft).

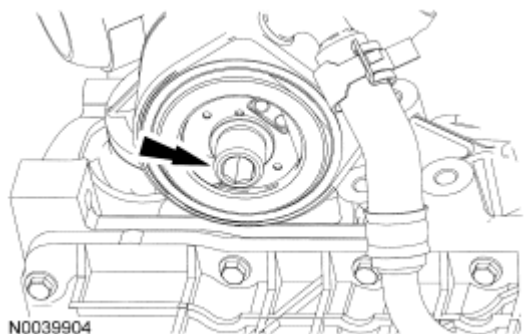


Fig. 383: Locating Oil Cooler And Hose
Courtesy of FORD MOTOR CO.

124. Connect the oil cooler hose. Position the oil cooler hose bracket and install the bolt.

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

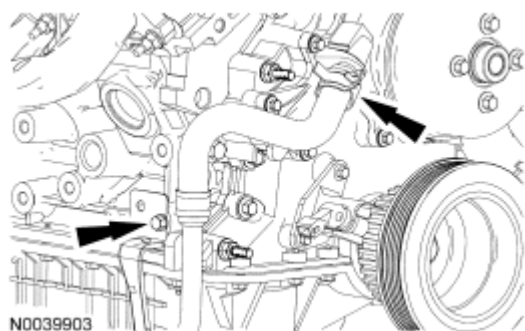


Fig. 384: Locating Oil Cooler Hose Bracket Bolt And Heater Hose Clamp
Courtesy of FORD MOTOR CO.

125. Position the ignition coil, bracket and spark plug wires as an assembly and install the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

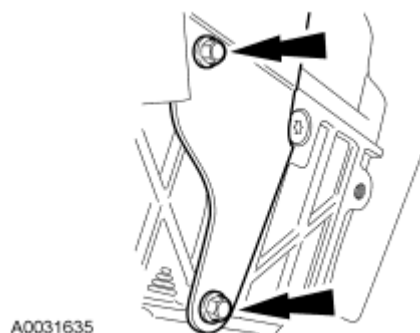


Fig. 385: Locating Coil Bracket Bolts
Courtesy of FORD MOTOR CO.

NOTE: RH spark plug wires removed for clarity.

126. Attach the wiring harness retainer and connect the coil and radio interference capacitor electrical connectors.

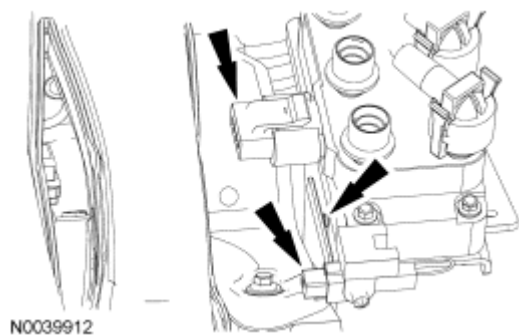


Fig. 386: Identifying Wiring Harness Retainer, Coil And Radio Interference Capacitor Electrical

Connectors

Courtesy of FORD MOTOR CO.

NOTE: Make sure to orient the spark plug boots so the spark plug wires do not contact the exhaust manifold or the spark plug wires may be damaged.

NOTE: Apply silicone dielectric compound to the inside of the spark plug boots.

127. Attach the LH spark plug wire retainers and connect the LH spark plug wires to the spark plugs.

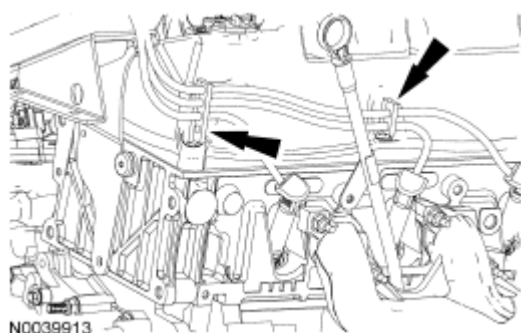


Fig. 387: Locating LH Spark Plug Wire Retainers

Courtesy of FORD MOTOR CO.

NOTE: Make sure to orient the spark plug boots so the spark plug wires do not contact the exhaust manifold or the spark plug wires may be damaged.

NOTE: Apply silicone dielectric compound to the inside of the spark plug boots.

128. Attach the RH spark plug wire retainers and connect the RH spark plug wires to the spark plugs.

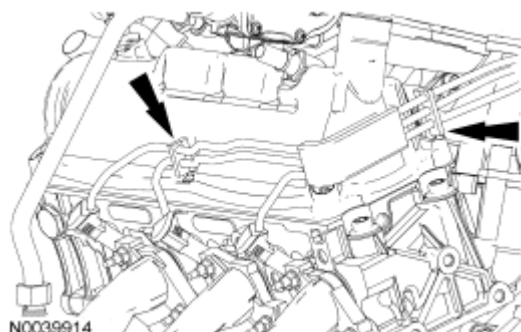


Fig. 388: Locating RH Spark Plug Wire Retainers

Courtesy of FORD MOTOR CO.

129. Position the heater hose tube bracket and the hoses as an assembly and install the bolt.
- Tighten to 23 Nm (17 lb-ft).

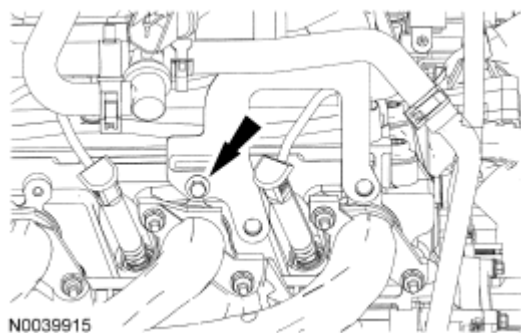


Fig. 389: Locating Heater Hose Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

130. Connect the hose to the oil cooler.

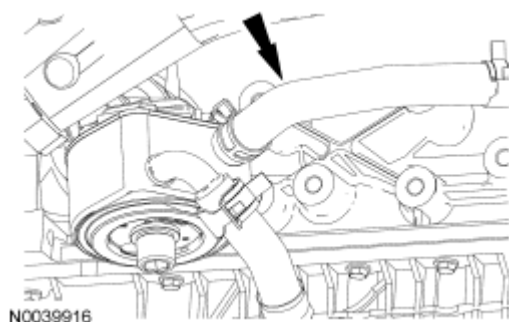


Fig. 390: Locating Oil Cooler Hose
Courtesy of FORD MOTOR CO.

131. Connect the heater hose to the thermostat housing.

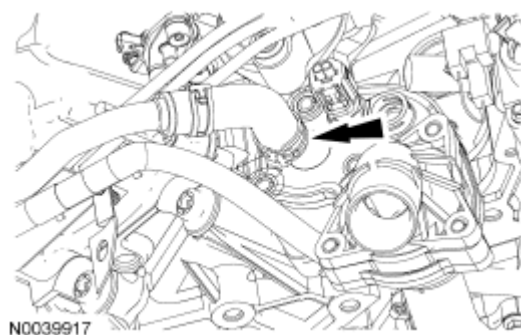


Fig. 391: Locating Heater Hose Clamp
Courtesy of FORD MOTOR CO.

132. Install the generator mounting bracket.
1. Install the 3 generator mounting bracket bolts.
 - Tighten to 42 Nm (31 lb-ft).
 2. Install the drive belt tensioner and bolt.

- Tighten to 47 Nm (35 lb-ft).

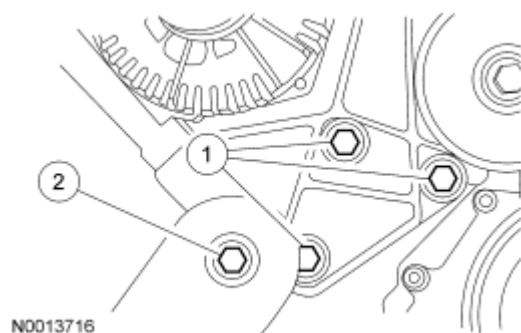


Fig. 392: Locating Generator Mounting Bracket Bolts
Courtesy of FORD MOTOR CO.

133. Connect the generator electrical connections and the wiring harness retainer.

- Tighten to 9 Nm (80 lb-in).



Fig. 393: Identifying Generator Electrical Connectors And Wire Harness Retainer
Courtesy of FORD MOTOR CO.

134. Install the accessory bracket and the 4 bolts.

- Tighten to 42 Nm (31 lb-ft).

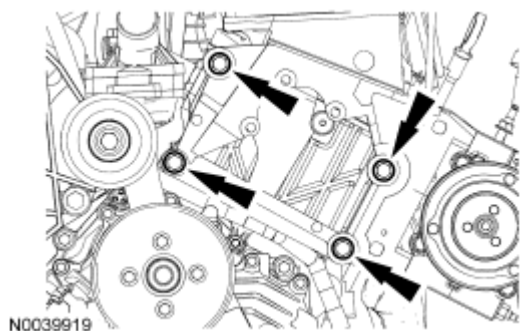


Fig. 394: Locating Accessory Bracket Bolts
Courtesy of FORD MOTOR CO.

135. Connect the A/C compressor electrical connector and wire harness retainer.

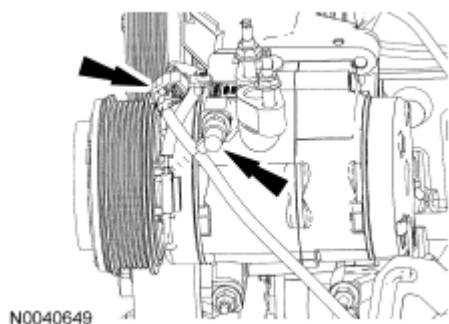


Fig. 395: Identifying A/C Compressor Electrical Connector And Wire Harness Retainer
Courtesy of FORD MOTOR CO.

136. Install the bolt.
- Tighten to 10 Nm (89 lb-in).

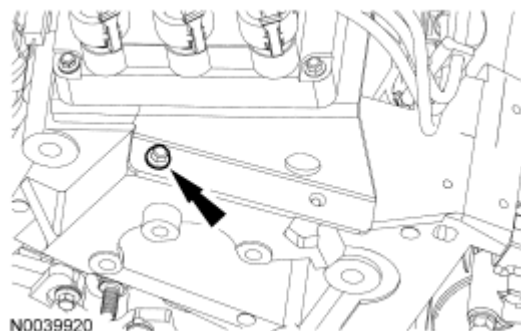


Fig. 396: Identifying Bolt
Courtesy of FORD MOTOR CO.

137. Install the right side Engine Lifting Bracket.

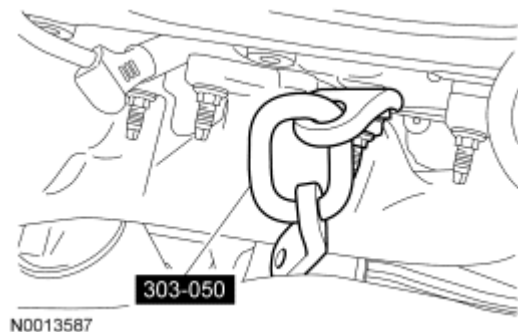


Fig. 397: Installing Special Tool (303-050) On RH Side Of Engine
Courtesy of FORD MOTOR CO.

138. Install the left side Engine Lifting Bracket.

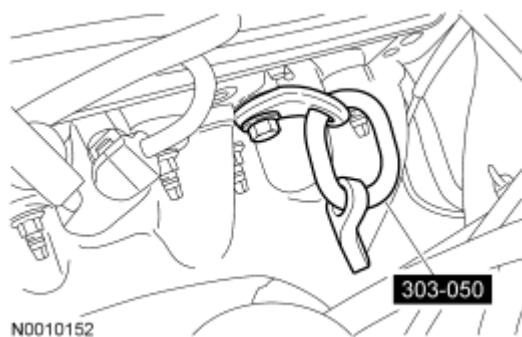


Fig. 398: Identifying Special Tool (303-050)
Courtesy of FORD MOTOR CO.

139. Using the Spreader Bar and a floor crane, remove the engine from the engine stand.

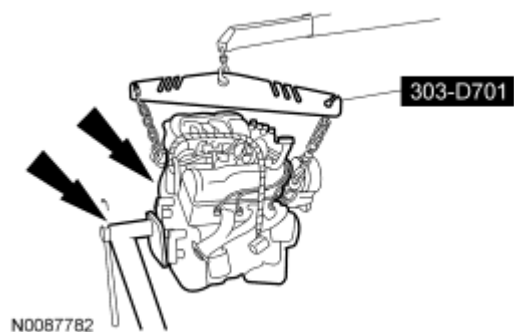


Fig. 399: Identifying Special Tool (303-D701)
Courtesy of FORD MOTOR CO.

NOTE: The new replacement crankshaft rear seal comes with a speedy sleeve. The speedy sleeve must be installed with the crankshaft rear seal.

NOTE: Be sure that the crankshaft rear sealing surface is clean and free of any rust or corrosion. To clean the crankshaft rear sealing surface, use an extra-fine emery cloth or an extra-fine steel wool with metal surface prep.

140. Lubricate the crankshaft rear oil seal with engine oil.
141. Install the Adapter for 303-579 and the Crankshaft Rear Oil Seal Screws.

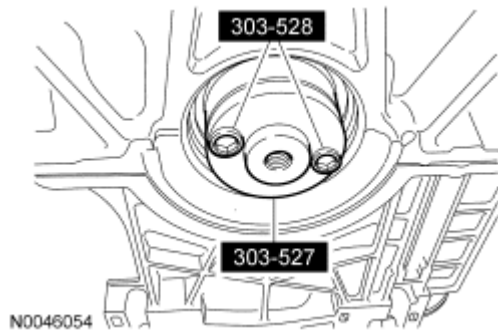


Fig. 400: Identifying Special Tool (303-527, 303-528)
Courtesy of FORD MOTOR CO.

142. Position the crankshaft rear seal with speedy sleeve on the Adapter for 303-579 and the Crankshaft Rear Oil Seal Screws.

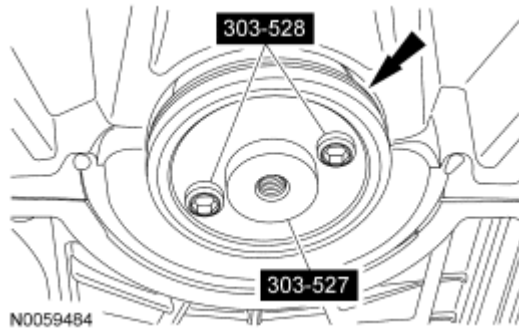


Fig. 401: Identifying Crankshaft Rear Seal, Special Tool (303-527, 303-528)
Courtesy of FORD MOTOR CO.

143. Using the Crankshaft Rear Oil Seal Installer, install the crankshaft rear oil seal with speedy sleeve.

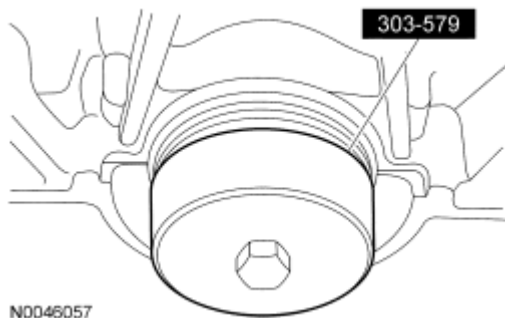


Fig. 402: Installing Crankshaft Rear Oil Seal Using Special Tool
Courtesy of FORD MOTOR CO.

144. Install the spacer plate.
145. Install the flexplate-to-crankshaft spacer.

NOTE: Special bolts are used for flexplate installation. Do not use standard bolts.

146. Install the flexplate.

- Tighten the 8 bolts in the sequence shown in 3 stages.
- Stage 1: Tighten to 13 Nm (115 lb-in).
- Stage 2: Tighten to 50 Nm (37 lb-ft).
- Stage 3: Tighten an additional 90 degrees.

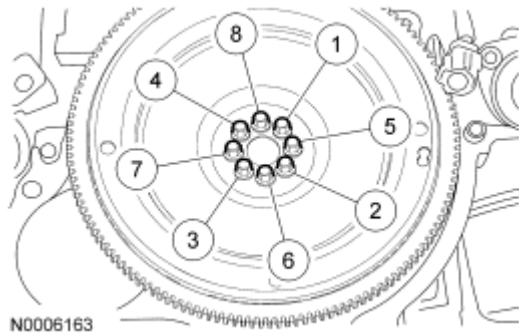
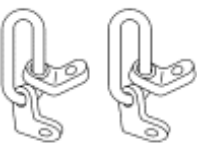


Fig. 403: Identifying Flexplate Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

INSTALLATION

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1595-A	Engine Lifting Bracket	303-050 (T70P-6000)
 ST2673-A	Spreader Bar	303-D701 or equivalent

Material

Item	Specification
Motorcraft SAE 5W-30 Premium Synthetic Blend Motor Oil XO-5W30-QSP (US); Motorcraft SAE 5W-30 Super Premium Motor Oil CXO-5W30-LSP12	WSS-M2C929-A

(Canada); or equivalent

INSTALLATION

NOTE: If used as a leverage device, the fuel rail can be damaged. Care must be taken when working around the fuel rail.

1. Position the engine in the vehicle and remove the floor crane and the Spreader Bar.

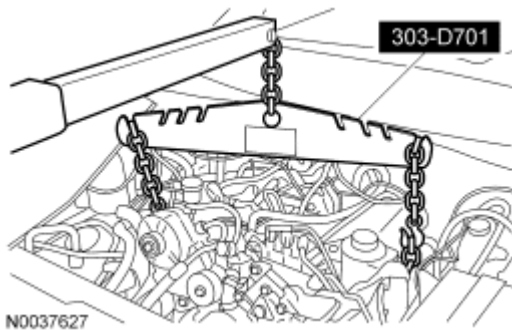


Fig. 404: Removing Engine Using Special Tool (303-D701) & A Suitable Floor Crane
Courtesy of FORD MOTOR CO.

2. Install the 2 RH engine support insulator nuts.
 - Tighten to 90 Nm (66 lb-ft).



Fig. 405: Locating RH Engine Support Insulator Nuts
Courtesy of FORD MOTOR CO.

3. Remove the Engine Lifting Bracket from the RH side of the engine.

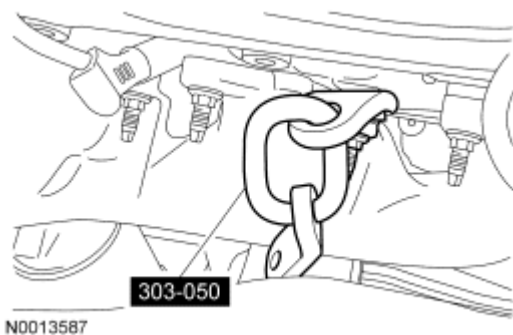


Fig. 406: Installing Special Tool (303-050) On RH Side Of Engine
Courtesy of FORD MOTOR CO.

4. Install the heater tube bracket front bolt.
 - Tighten to 34 Nm (25 lb-ft).

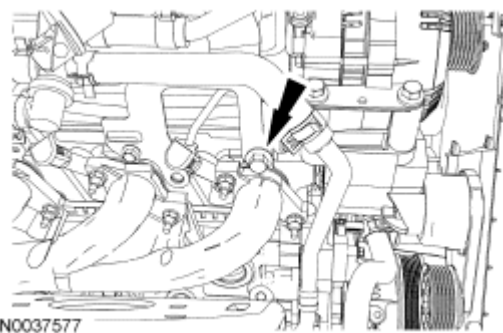


Fig. 407: Locating Heater Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

5. If equipped, connect the block heater electrical connector and the wiring harness retainer.

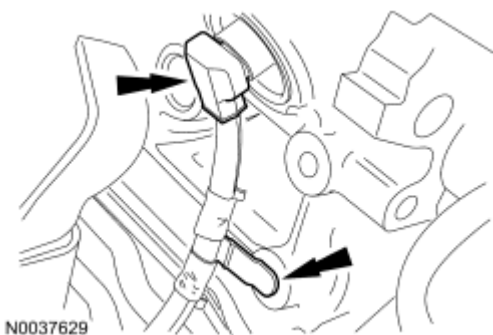


Fig. 408: Locating Block Heater Electrical Connector And Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

6. Remove the Engine Lifting Bracket from the LH side of the engine.

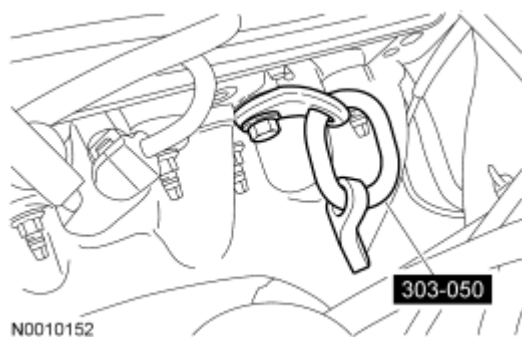


Fig. 409: Identifying Special Tool (303-050)
Courtesy of FORD MOTOR CO.

7. Install the LH engine support insulator through bolt.
 - Tighten to 103 Nm (76 lb-ft).

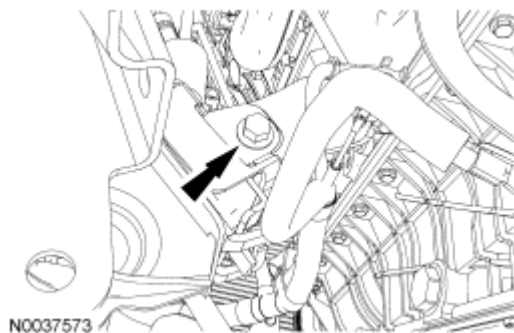


Fig. 410: Locating LH Engine Support Insulator Through Bolt
Courtesy of FORD MOTOR CO.

8. Position the battery cable harness bracket and install the nut.
 - Tighten to 15 Nm (133 lb-in).

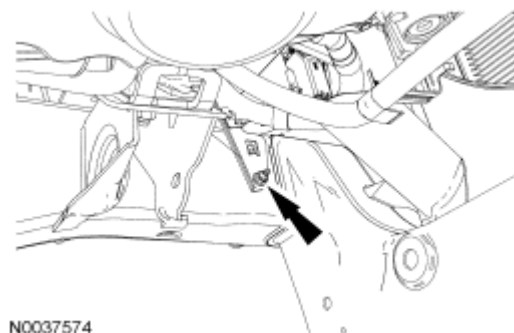


Fig. 411: Locating Battery Cable Harness Bracket Nut
Courtesy of FORD MOTOR CO.

9. Position the transmission cooler tubes and install the nut.
 - Tighten to 23 Nm (17 lb-ft).

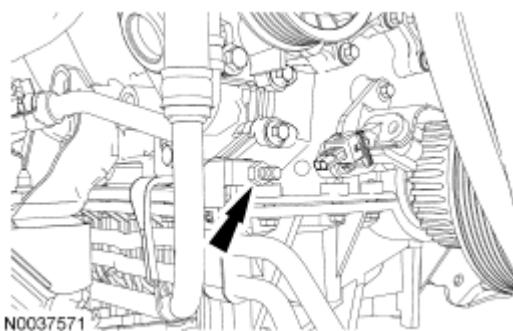


Fig. 412: Locating Transmission Cooler Tubes Nut
Courtesy of FORD MOTOR CO.

10. Install the oil filter.
 - Tighten to 13 Nm (115 lb-in).

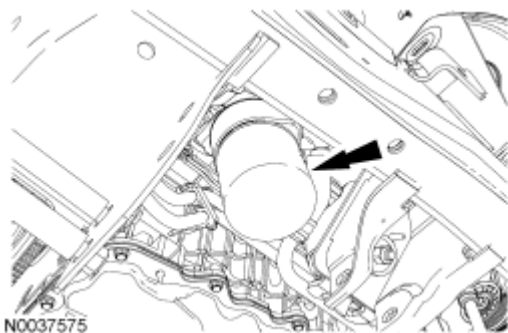


Fig. 413: Locating Oil Filter
Courtesy of FORD MOTOR CO.

11. Install the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 5R55S** article.
12. Attach the starter wiring and install the nuts. Install the terminal cover.
 1. Tighten the S-terminal nut to 6 Nm (53 lb-in).
 2. Tighten the B-terminal nut to 12 Nm (106 lb-in).

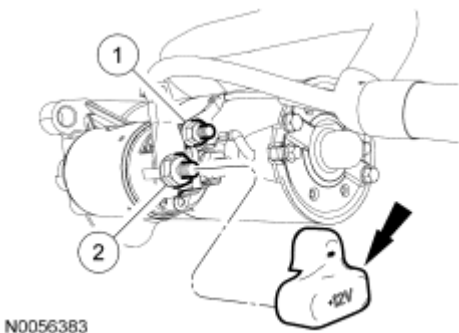


Fig. 414: Locating Starter Wiring Nuts And Terminal Cover
Courtesy of FORD MOTOR CO.

13. Install a new gasket and a new O-ring seal. Position the A/C tube, install the nut, close the latch and connect the A/C high pressure cutoff switch electrical connector.
 - Tighten to 15 Nm (133 lb-in).

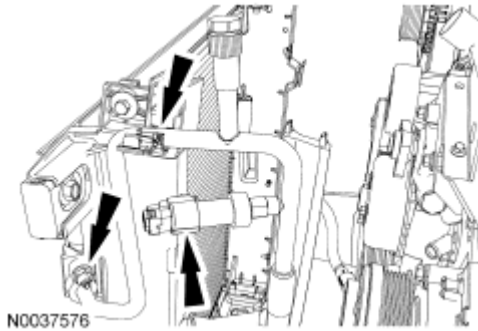


Fig. 415: Locating A/C High Pressure Switch, Retaining Clip And A/C Tube
Courtesy of FORD MOTOR CO.

14. Install new gaskets and new O-ring seal. Position the A/C tubes and install the 3 nuts.
 - Tighten the 2 A/C fitting nuts to 15 Nm (133 lb-in).
 - Tighten the A/C tube bracket nut to 10 Nm (89 lb-in).

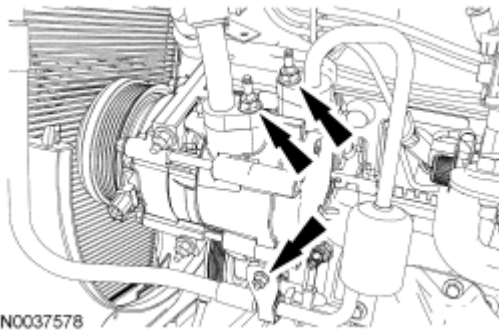


Fig. 416: Locating A/C Tube Bracket Nut And A/C Fitting Nuts
Courtesy of FORD MOTOR CO.

15. Position the Evaporative Emission (EVAP) hose and connect it to the EVAP canister purge valve. Connect the EVAP canister purge valve electrical connector.

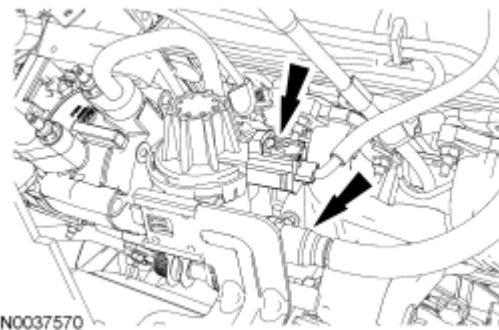


Fig. 417: Locating EVAP Canister Purge Valve Electrical Connector And EVAP Hose
Courtesy of FORD MOTOR CO.

16. Connect the brake booster vacuum hose.

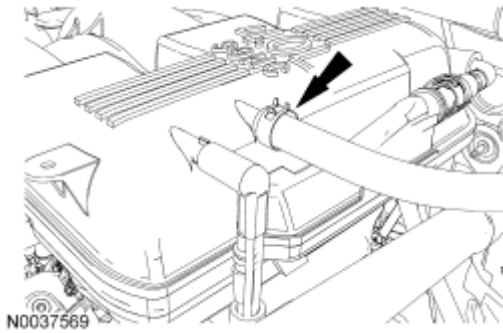


Fig. 418: Locating Brake Booster Vacuum Hose Clamp
Courtesy of FORD MOTOR CO.

17. Position the power steering pump and install the 3 bolts.
- Tighten to 25 Nm (18 lb-ft).

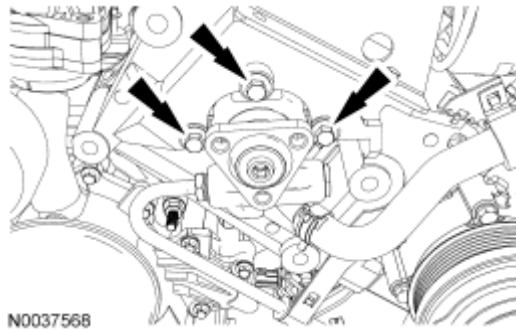


Fig. 419: Locating Power Steering Pump Bolts
Courtesy of FORD MOTOR CO.

NOTE: A/C compressor removed from art for clarity.

18. Position the Power Steering Pressure (PSP) hose and the power steering reservoir-to-power steering pump hoses and install the 2 bolts.
- Tighten to 11 Nm (97 lb-in).

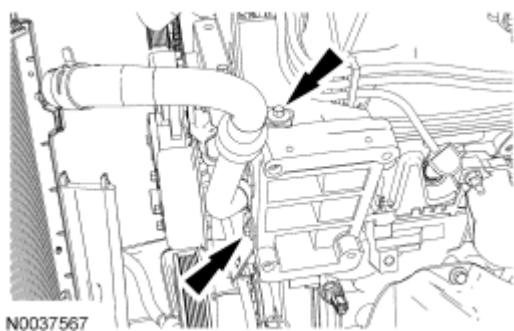


Fig. 420: Locating Power Steering Reservoir-To-Power Steering Pump Hoses Bolts
Courtesy of FORD MOTOR CO.

19. Connect the PSP switch electrical connector.

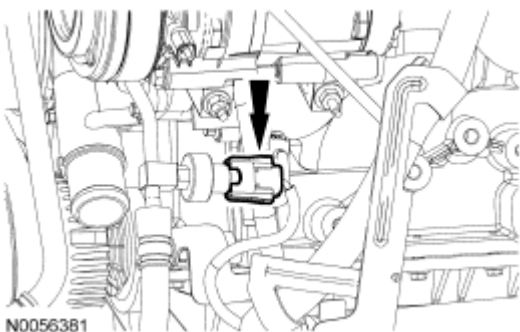


Fig. 421: Locating Power Steering Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

20. Connect the lower radiator hose to the coolant pump.

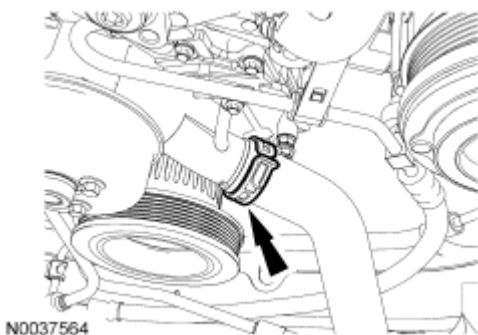


Fig. 422: Locating Lower Radiator Hose Clamp
Courtesy of FORD MOTOR CO.

21. Position the power steering pump pulley and install the 3 bolts finger-tight.



Fig. 423: Locating Power Steering Pump Pulley And Bolts
Courtesy of FORD MOTOR CO.

22. Rotate the accessory drive belt counterclockwise and install the accessory drive belt.

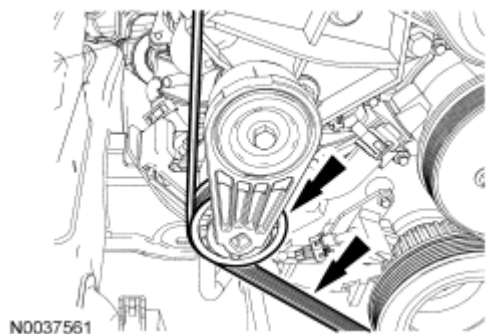


Fig. 424: Identifying Accessory Drive Belt Tensioner And Accessory Drive Belt
Courtesy of FORD MOTOR CO.

23. Tighten the 3 power steering pump pulley bolts.
- Tighten to 25 Nm (18 lb-ft).

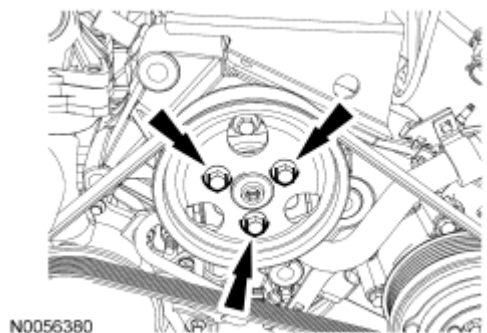


Fig. 425: Identifying Power Steering Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

24. Install the upper radiator hose.

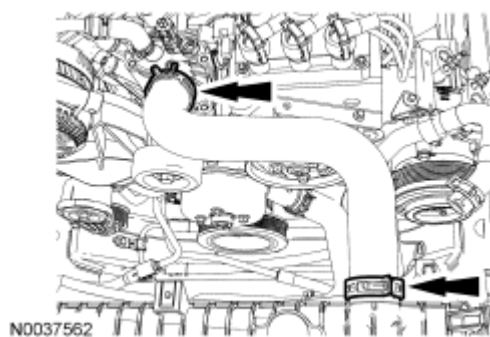


Fig. 426: Locating Upper Radiator Hose Clamps
Courtesy of FORD MOTOR CO.

25. Connect the EVAP hose.

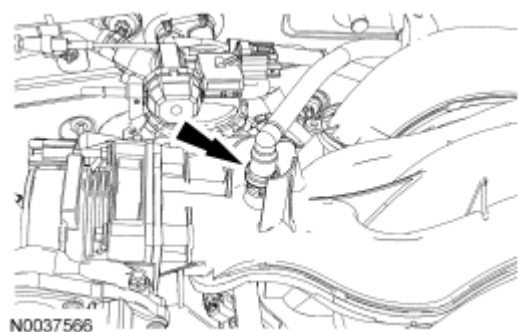


Fig. 427: Locating EVAP Hose
Courtesy of FORD MOTOR CO.

26. Position the ground wire and install the bolt.
- Tighten to 10 Nm (89 lb-in).

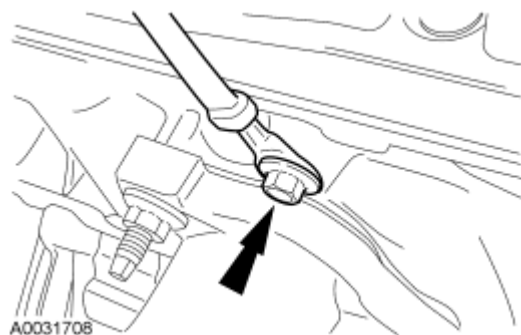


Fig. 428: Locating Ground Wire Bolt
Courtesy of FORD MOTOR CO.

27. Connect the heater hoses and the vacuum hose.
- Connect the heater control valve vacuum hose.

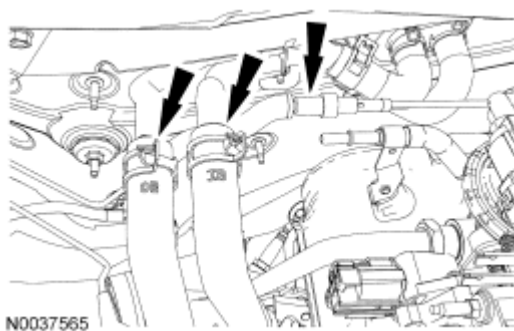


Fig. 429: Locating Heater Control Valve Vacuum Hoses
Courtesy of FORD MOTOR CO.

28. Connect the engine wiring harness-to-PCM electrical connectors and the wiring harness electrical connector. Attach the wiring harness retainer.

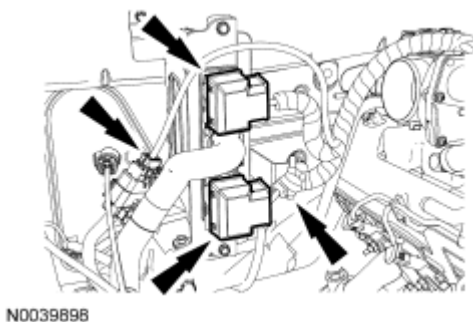


Fig. 430: Locating Powertrain Control Module Electrical Connectors, Wiring Harness Electrical Connector & Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

29. Position the hood and install the 4 bolts.
- Tighten to 12 Nm (106 lb-in).

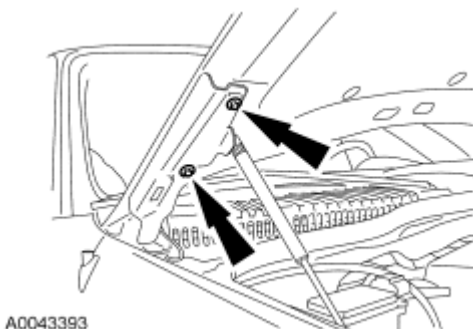


Fig. 431: Locating Hood Hinge Bolts
Courtesy of FORD MOTOR CO.

30. Connect the windshield washer hose.

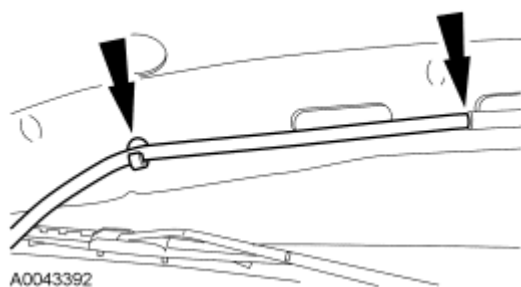


Fig. 432: Locating Windshield Washer Hose And Retainer
Courtesy of FORD MOTOR CO.

31. Install the Air Cleaner (ACL) and the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
32. Install the cooling fan. For additional information, refer to **ENGINE COOLING** article.
33. Connect the battery cable connectors and install the 2 nuts. Close the cover.
 - Tighten to 12 Nm (106 lb-in).

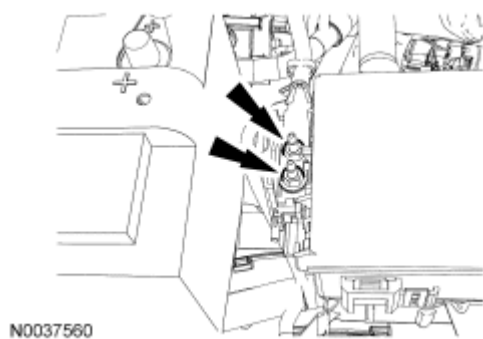


Fig. 433: Locating Battery Cable Connectors Nuts
Courtesy of FORD MOTOR CO.

34. Connect the electrical connector and attach the wiring harness retainers.

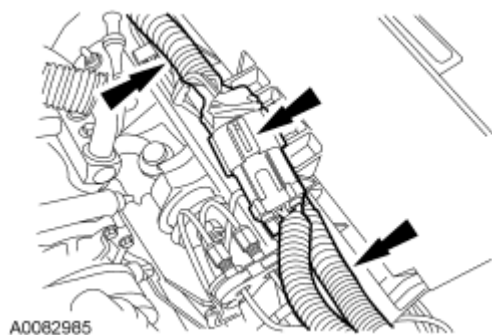


Fig. 434: Locating Electrical Connector And Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

35. Position the ground wire and install the nut.
- Tighten to 9 Nm (80 lb-in).

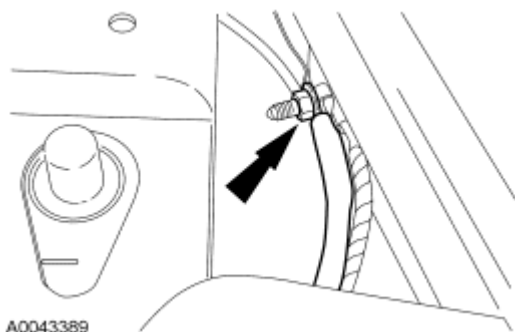


Fig. 435: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

36. Connect the battery cables. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
37. Connect the fuel supply tube spring lock coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
38. Fill the engine with clean engine oil.
39. Fill the cooling system. For additional information, refer to **ENGINE COOLING** article.
40. Recharge the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.
41. Start the engine and check for leaks. Stop the engine and check all fluid levels.
42. Carry out the fluid level check for the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - 5R55S** article.