

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

2006 ENGINE

Engine - 3.0L (4V) - Escape & Mariner

SPECIFICATIONS

GENERAL SPECIFICATIONS

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Item	Specification
Lubricants and Sealants	
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Engine	
Displacement	3.0L (4V) (182 CID)
No. cylinders	6
Bore/stroke	89.0 x 79.5 (3.5 x 3.13 in)
Fire order	1-4-2-5-3-6
Oil pressure (Minimum at 1,500 rpm with engine warmed up after 10 minutes of idling)	76 kPa (11 psi)
Oil capacity (includes filter change)	5.7L (6.0 qt)
Spark plug	AGSF-32M Gap = 1.30-1.40 (0.052-0.56 inch)
Cylinder Head and Valve Train	
Cylinder head gasket surface flatness	-
Combustion chamber volume	52 cc (3.17 CI)
Valve arrangement (front to rear)	LH intake I-I-I-I-I-I LH exhaust E-E-E-E-E-E RH intake I-I-I-I-I-I RH exhaust E-E-E-E-E-E
Valve guide bore diameter	6.015-6.044 mm (0.236-0.237 in)
Valve stem diameter - intake	5.975-5.995 mm (0.2350-0.2358 in)
Valve stem diameter - exhaust	5.950-5.970 mm (0.2343-0.2350 in)
Valve stem-to-guide clearance - intake	0.019-0.069 mm (0.0007-0.0027 in)
Valve stem-to-guide clearance - exhaust	0.045-0.094 mm (0.0017-0.037 in)
Valve head diameter - intake	35 mm (1.38 in)
Valve head diameter - exhaust	30 mm (1.18 in)
Valve head diameter (intake) - gauge diameter	33.5 mm (1.3189 in)
Valve head diameter (exhaust) - gauge diameter	28.0 mm (1.10236 in)
Valve face runout	0.05 mm (0.001 in)

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Valve face angle	45.5 degrees
Valve seat width - intake	1.1-1.4 mm (0.043-0.055 in)
Valve seat width - exhaust	1.4-1.7 mm (0.055-0.066 in)
Valve seat runout	0.04 mm (0.001 in)
Valve seat angle	44.75 degrees
Valve spring free length (approx.)	46.6 mm (1.84 in)
Valve spring squareness	2.5%
Valve spring compression pressure (N @ spec, length)	693 N @ 30.09 mm (156 lbs @ 1.18 in)
Valve spring installed height (N @ spec, length)	39.89 mm (1.57 in)
Valve spring installed pressure	240 N @ 39.89 mm (53.95 lbs @ 1.57 in)
Valve spring installed pressure - service limit	10% force loss @ specified height
Roller follower ratio @ max. lift	2.0:1
Hydraulic Lash Adjuster	
Diameter (standard)	16-15.988 mm (0.6290-0.6294 in)
Clearance to bore	0.018-0.069 mm (0.0007-0.0027 in)
Hydraulic leakdown rate	5-25 seconds
Collapsed lash adjuster gap	0.50-1.11 mm (0.019-0.043 in)
Camshaft	
Theoretical valve lift @ 0 lash	9.80 mm (0.388 in)
Lobe lift	4.80 mm (0.189 in)
Allowable lobe lift loss	0.76 mm (0.03 in)
Journal diameter (all)	26.962-26.936 mm (1.061-1.060 in)
Camshaft journal bore inside diameter	27.012-26.987 mm (1.063-1.062 in)
Camshaft journal-to-bearing clearance - standard	0.025-0.076 mm (0.001-0.0029 in)
Camshaft journal-to-bearing clearance - service limit	0.121 mm (0.0047 in)
Runout	-
End play - service limit	0.190 mm (0.00748 in)
Cylinder Block	
Cylinder bore diameter - grade 1	89.000-89.010 mm (3.50393-3.504323 in)
Cylinder bore diameter - grade 2	89.010-89.020 mm (3.504323-3.504717 in)
Cylinder bore diameter - grade 3	89.020-82.030 mm (3.504717-3.50511 in)
Cylinder bore maximum taper	0.020 mm (0.0008 in)
Cylinder bore maximum out-of-round	0.015 mm (0.0005 in)
Cylinder bore maximum out-of-round - service limit	0.020 mm (0.0007 in)
Main bearing bore inside diameter	67.998-68.022 mm (2.677-2.6780 in)
Head gasket surface flatness	-
Crankshaft	

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Main bearing journal diameter	62.968-62.992 mm (2.467-2.479 in)
Main bearing journal maximum taper	0.008 mm (0.0003 in)
Main bearing journal maximum out-of-round	0.006 mm (0.0002 in)
Main bearing journal-to-cylinder block clearance	0.024-0.072 mm (0.0009-0.003 in)
Connecting rod journal diameter	49.969-49.991 mm (1.967-1.968 in)
Connecting rod journal maximum taper	0.008 mm (0.0003 in)
Connecting rod journal maximum out-of-round	0.006 mm (0.0002 in)
Crankshaft maximum end play	0.135-0.255 mm (0.005-0.010 in)
Piston and Connecting Rod	
Piston diameter - coated, grade 1	88.990-89.010 mm (3.5035-3.5043 in)
Piston diameter - coated, grade 2	88.998-89.022 mm (3.5039-3.5048 in)
Piston diameter - coated, grade 3	89.010-89.030 mm (3.5043-3.5051 in)
Piston diameter - uncoated, grade 1	88.970-88.980 mm (3.50275-3.50314 in)
Piston diameter - uncoated, grade 2	88.978-88.992 mm (3.50306-3.50362 in)
Piston diameter - uncoated, grade 3	89.010-89.030 mm (3.50432-3.50511 in)
Piston-to-cylinder bore clearance	0.012 to 0.022 mm (0.0005-0.0009 in)
Piston ring end gap - compression (top, gauge diameter) ⁽¹⁾	0.100-0.250 mm (0.0039-0.0098 in)
Piston ring end gap - compression (bottom, gauge diameter)	0.27-0.42 mm (0.0106-0.0165 in)
Piston ring end gap - oil ring (steel rail, gauge diameter)	0.15-0.65 mm (0.0059-0.0255 in)
Piston ring end gap - compression (top, service limit)	0.50 mm (0.0196 in) max
Piston ring end gap - compression (bottom, service limit)	0.65 mm (0.0255 in) max
Piston ring end gap - oil ring (steel rail, service limit)	0.90 mm (0.0354 in) max
Piston ring groove width - compression (top)	1.230-1.245 mm (0.0484-0.0490 in)
Piston ring groove width - compression (bottom)	1.530-1.545 mm (0.0602-0.0608 in)
Piston ring groove width - oil ring	3.030-3.055 mm (0.1192-0.0120 in)
Piston ring width	-
Piston ring-to-groove clearance	-
Piston pin bore diameter	21.008-21.012 mm (0.8270-0.8272 in)
Piston pin diameter	21.011-21.013 mm (0.8271-0.8273 in)
Piston pin length	60.51-60.08 mm (2.382-2.365 in)
Piston pin-to-piston fit	0.002 to 0.009 mm (0.00007-0.0003 in)
Piston-to-connecting rod clearance	-
Connecting rod-to-pin clearance - standard	0.004-0.02 mm (0.0001-0.0007 in)
Connecting rod-to-pin clearance - service limit	0.035 mm (0.0013 in)
Connecting rod pin bore diameter	21.017-21.031 mm (0.827-0.828 in)
Connecting rod length (center-to-center)	138.06-138.14 mm (5.435-5.38 in)
Connecting rod maximum allowed bend	0.038 mm per 25 (0.0014 per 0.984 in)

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Connecting rod maximum allowed twist	0.050 mm per 25 (0.0019 per 0.984 in)
Connecting rod bearing bore diameter	53.015-53.035 mm (2.0872-2.0879 in)
Connecting rod bearing-to-crankshaft clearance	0.028-0.066 mm (0.001-0.0025 in)
Connecting rod side clearance	0.100-0.30 mm (0.0039-0.0118 in)
(1) Specification 82.4 mm (3.2441 in) diameter gauge	

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	N.m	lb-ft	lb-in
Accessory drive belt tensioner bolt	45	33	-
Accessory drive belt idler pulley bolt	25	18	-
Accelerator cable snow shield screws	10	-	89
Accelerator cable bracket bolts	10	-	89
Air conditioning compressor bolts	25	18	-
Block heater	14	10	-
Camshaft journal cap bolts	10	-	89
Camshaft oil seal retainer bolts	10	-	89
Camshaft position (CMP) sensor bolt	10	-	89
Coolant bypass tube bolts	10	-	89
Coolant pump belt shield nuts	6	-	53
Coolant pump bolts	10	-	89
Crankshaft position (CKP) sensor bolt	10	-	89
Crankshaft damper bolt ⁽¹⁾	-	-	-
Crossbrace bolts	90	66	-
Crossbrace nut	175	129	-
Crankcase cover bolts	10	-	89
Cylinder head bolts ⁽¹⁾	-	-	-
Exhaust gas recirculation (EGR) tube nuts	40	30	-
EGR vacuum regulator stud bolt nut	6	-	53
Engine front cover bolts and studs ⁽¹⁾	-	-	-
Engine lifting eye bolt	112	83	-
Engine support insulator bracket bolt	90	66	-
Engine support insulator bracket nuts	55	41	-
Engine support insulator bolts W500233-S301 (vehicles built through 10/2005)	55	41	-
Engine support insulator bolts W500233-S439 (vehicles built after 10/2005)	48	35	-
Exhaust manifold nuts	20	15	-
Flexplate bolts	80	59	-
Front splash shield bolts	7	-	62
Fuel charging harness nut	6	-	53

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Fuel rail bolts	10	-	89
Ground strap bolt	10	-	89
Halfshaft bracket bolts	48	35	-
Ignition coil-on-plug bolts	6	-	53
Knock sensor (KS) bolt	25	18	-
LH transaxle support insulator through bolt	115	85	-
Lower intake manifold bolts	10	-	89
Oil level indicator and tube stud bolt	10	-	89
Oil pan baffle nuts ⁽¹⁾	-	-	-
Oil pan bolts and studs	25	18	-
Oil pan-to-transaxle bolts	40	30	-
Oil pressure sensor	14	10	-
Oil pump bolts	10	-	89
Oil pump screen and pickup tube bolts and nut ⁽¹⁾	-	-	-
Oil separator bolts	10	-	89
Output shaft speed (OSS) sensor bolt	13	10	-
Power steering pump bolts	25	18	-
Power steering pump pulley nut	49	36	-
Power steering pressure (PSP) tube bracket nut	25	18	-
Power distribution box cable nuts	12	9	-
RH transaxle support insulator through bolt	90	66	-
RH transaxle support insulator bracket nuts and bolt	80	59	-
Rear transaxle support insulator through bolt	113	76	-
RH radio ignition interference capacitor nut	6	-	53
Shifter cable bracket bolts	19	14	-
Spark plugs	15	11	-
Starter motor ground cable bolt	25	18	-
Starter cable positive nut	12	9	-
Transfer case vent tube bolt	14	10	-
Timing chain guide bolts	25	18	-
Timing chain tensioner bolts	25	18	-
Torque converter-to-flexplate nuts	40	30	-
Transaxle-to-engine bolts	40	30	-
Transaxle-to-oil pan bracket bolt	25	18	-
Upper intake manifold bolts	10	-	89
Valve cover bolts and stud bolts	10	-	89
Wiring harness bulkhead connector bolt	10	-	89
Wiring harness shield-to-valve cover stud bolt nuts	6	-	53
Wiring harness bracket-to-valve cover stud bolt nut	10	-	89

(1) Multiple step sequence. Refer to the appropriate procedure.

DESCRIPTION AND OPERATION

ENGINE

The 3.0L (4V) is a V-6 engine has the following features:

- Dual overhead camshafts
- Four valves per cylinder
- Sequential multiport fuel injection (SFI)
- Composite lower intake manifold and composite upper intake manifold
- Aluminum cylinder heads
- Two-piece design aluminum cylinder block
- Electronic ignition system with 6 ignition coils

Identification

For quick identification refer to the safety certification decal.

- The decal is located on the LH front door lock face panel.
- An engine identification label is also attached to the engine.
- The symbol code on the identification tag identifies each engine for determining parts usage; for instance, engine displacement in liters or cubic inch displacement and model year.

Exhaust Emission Control System

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

Induction System

The sequential multiport fuel injection (SFI) provides the fuel/air mixture needed for combustion in the cylinders. The 6 solenoid-operated fuel injectors:

- are mounted between the fuel rail and the intake manifold.
- meter fuel into the air intake stream in accordance with engine demand.
- are positioned so that their tips direct fuel just ahead of the engine intake valves.

Valve Train

The camshafts are mounted in the cylinder heads and act against a roller follower to open and close the valves. A hydraulic lash adjuster is located on one side of the roller follower and the valve tip on the opposite end. The camshafts are driven off the front of each cylinder head by 2 chains (one each side). Both of the chains are driven by sprockets that are located on the crankshaft, just in front of the oil pump.

Positive Crankcase Ventilation System

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

Lubrication System

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the crankshaft, connecting rod bearings and timing chain tensioners. The flow of oil to the valve tappets and valve train is controlled by a restricting orifice located in the head gaskets.

Oil Pump

The lubrication system is designed to provide optimum oil flow to critical components of the engine through its entire operating range.

The heart of the system is a positive displacement internal gear oil pump.

Generically this design is known as a gerotor pump, which operates as follows:

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

Cooling System

The engine cooling system includes the following:

- Radiator
- Dual electric fan assemblies
- Degas bottle (aids in maintaining the correct volume of engine coolant)
- Coolant thermostat
- Coolant hoses

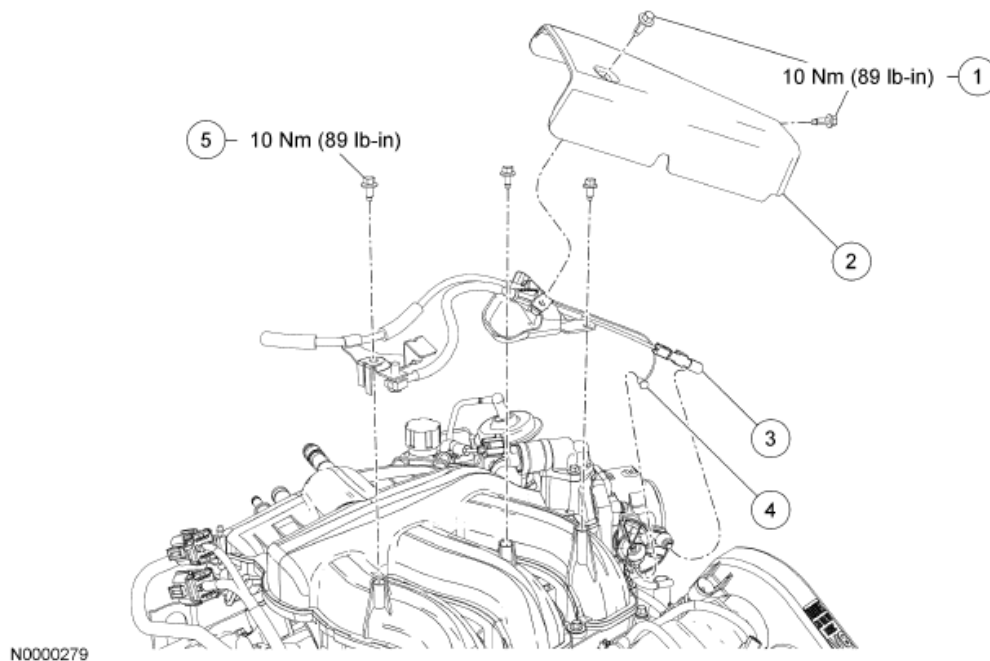
DIAGNOSIS AND TESTING

ENGINE

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

IN-VEHICLE REPAIR

UPPER INTAKE MANIFOLD



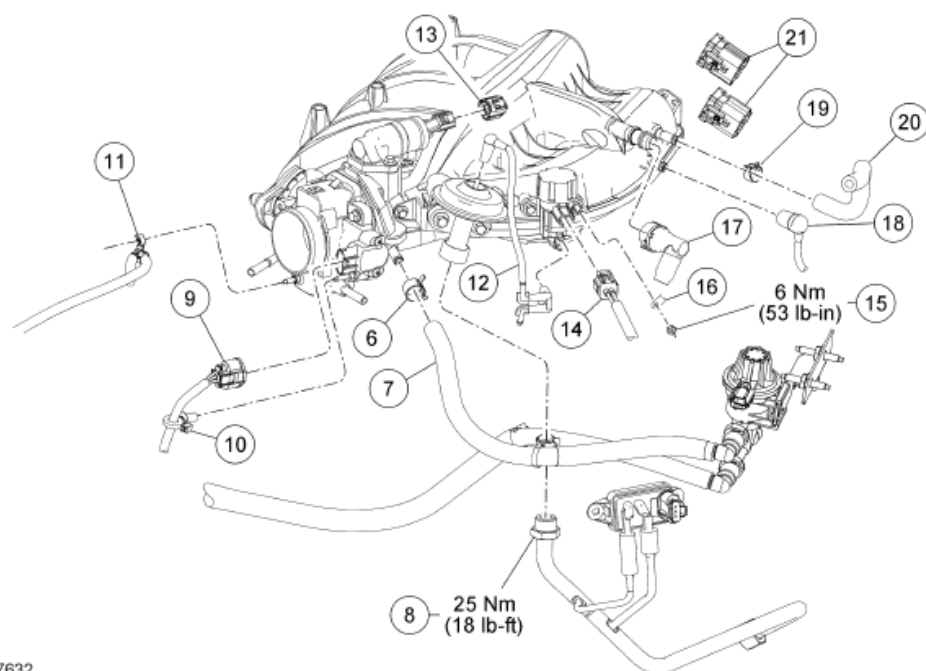
Item	Part Number	Description
1	W702251	Accelerator cable snow shield bolts (2 required)
2	9E776	Accelerator cable snow shield
3	9A825	Speed control cable to throttle body

Item	Part Number	Description
4	9A758	Accelerator cable to throttle body
5	—	Accelerator/speed control cable bracket bolt (3 required)

Fig. 1: Identifying Upper Intake Manifold Components (1 Of 3) (With Torque Specifications)
Courtesy of FORD MOTOR CO.

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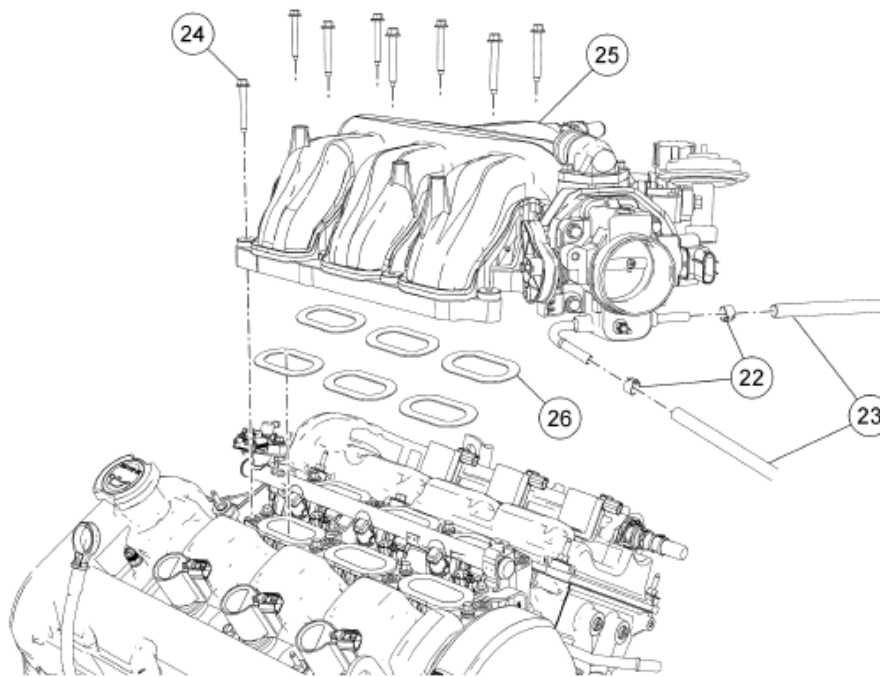


N0037632

Item	Part Number	Description
6	W52593	Clamp
7	9D289	Fuel vapor tube
8	—	Exhaust gas recirculation (EGR) tube fitting (part of 9D477)
9	14A464	Throttle position (TP) sensor electrical connector (part of 9H589)
10	W700497	Wiring retainer (part of 9H589)
11	—	Transaxle vent tube retainer (part of 7034)
12	—	Vacuum tube (part of 9E498)
13	14A464	Idle air control (IAC) valve electrical connector (part of 9H589)
14	14A464	EGR vacuum regulator electrical connector (part of 9H589)

Item	Part Number	Description
15	—	EGR vacuum regulator stud bolt nut
16	—	Wiring retainer (part of 9H589)
17	—	Positive crankcase ventilation (PCV) tube
18	—	Vacuum tube fitting (part of 9E498)
19	392984	Brake booster vacuum hose clamp
20	2C053	Brake booster vacuum hose
21	14A464	Engine control wiring harness electrical connectors (part of 9H589)

Fig. 2: Identifying Upper Intake Manifold Components (2 Of 3) (With Torque Specifications)
Courtesy of FORD MOTOR CO.



Item	Part Number	Description
22	—	Throttle body coolant hose clamps (2 required)
23	—	Throttle body coolant hoses (2 required)
24	9Y450	Upper intake manifold bolt (8 required)
25	9424	Upper intake manifold
26	—	Upper intake manifold gasket (6 required)

Fig. 3: Identifying Upper Intake Manifold Components (3 Of 3)
Courtesy of FORD MOTOR CO.

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Drain the engine cooling system. For additional information, refer to **DRAINING**.
3. Disconnect the battery ground cable. For additional information, refer to **REMOVAL AND INSTALLATION**.
4. Remove the air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION**.
5. Remove the 2 bolts and the accelerator cable snow shield.
6. Disconnect the speed control and accelerator cables from the throttle body.
7. Remove the 3 accelerator/speed control cable bracket bolts and position the cables and brackets aside.
8. Disconnect the exhaust gas recirculation (EGR) tube fitting from the EGR valve.

9. Disconnect the fuel vapor tube from the upper intake manifold.
10. Disconnect the throttle position (TP) sensor electrical connector and detach the wiring retainer.
11. Detach the transaxle vent tube from the throttle body stud bolt.
12. Disconnect the vacuum harness tube fittings from the EGR valve and the EGR vacuum regulator.
13. Disconnect the idle air control (IAC) valve electrical connector.
14. Disconnect the EGR vacuum regulator electrical connector.
15. Remove the nut from the EGR vacuum regulator stud bolt and detach the wiring retainer.
16. Disconnect the positive crankcase ventilation (PCV), brake booster and vacuum harness tubes from the upper intake manifold.
17. Detach the main engine wiring harness electrical connectors from the upper intake manifold.
18. Disconnect the 2 throttle body coolant hoses.
19. Remove the 8 bolts and the upper intake manifold.
 - Remove and discard the gaskets.

Installation

NOTE: **Clean and inspect all sealing surfaces. Install new gaskets.**

1. Position the upper intake manifold and install the bolts.
 - Tighten in the sequence shown to 10 N.m (89 lb-in).

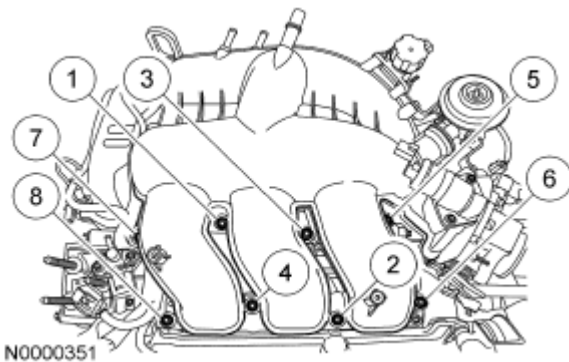


Fig. 4: Identifying Tightening Sequence Of Upper Intake Manifold
Courtesy of FORD MOTOR CO.

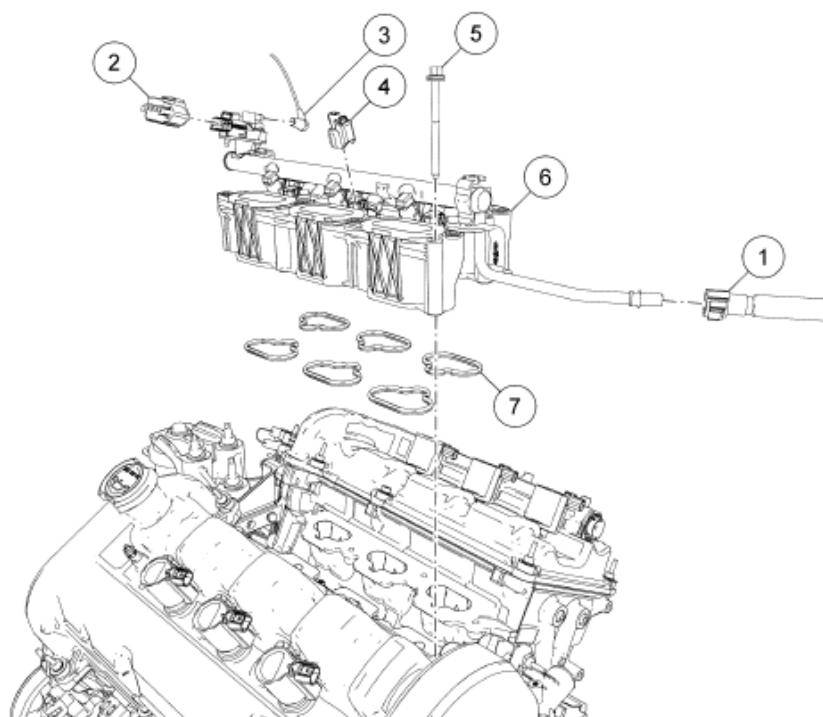
2. Connect the 2 throttle body coolant hoses.
3. Attach the main engine wiring harness electrical connectors to the upper intake manifold.
4. Connect the PCV, brake booster and vacuum harness tubes to the upper intake manifold.
5. Attach the wiring retainer to the EGR vacuum regulator stud bolt and install the nut.
 - Tighten to 6 N.m (53 lb-in).
6. Connect the EGR vacuum regulator electrical connector.
7. Connect the IAC valve electrical connector.

8. Connect the vacuum harness tube fittings to the EGR valve and the EGR vacuum regulator.
9. Attach the transaxle vent tube to the throttle body stud bolt.
10. Connect the TP sensor electrical connector and attach the wiring retainer.
11. Connect the fuel vapor tube to the upper intake manifold.
12. Connect the EGR tube fitting to the EGR valve.
 - Tighten to 40 N.m (30 lb-ft).
13. Position the accelerator/speed control cables and brackets and install the 3 bolts.
 - Tighten to 10 N.m (89 lb-in).
14. Attach the speed control and accelerator cables to the throttle body.
15. Install the accelerator cable snow shield and the 2 bolts.
 - Tighten to 10 N.m (89 lb-in).
16. Install the air cleaner outlet pipe. For additional information, refer to **REMOVAL AND INSTALLATION**.
17. Connect the battery ground cable. For additional information, refer to **REMOVAL AND INSTALLATION**.
18. Fill and bleed the engine cooling system. For additional information, refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING**.

LOWER INTAKE MANIFOLD

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N0000281

Item	Part Number	Description
1	9288	Fuel tube
2	14A464	Fuel rail pressure and temperature sensor electrical connector (part of 9H589)
3	—	Fuel rail pressure and temperature sensor vacuum tube fitting (part of 9E498)
4	14A464	Fuel injector electrical connector (6 required) (part of 9H589)
5	W708187	Lower intake manifold bolt (8 required)
6	9K461	Lower intake manifold
7	9439	Lower intake manifold gasket (6 required)

Fig. 5: Identifying Lower Intake Manifold Components
Courtesy of FORD MOTOR CO.

Removal

WARNING:

Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related component. Highly flammable mixtures are always present and may be ignited, resulting in possible personal injury.

Fuel in the fuel system remains under high pressure even when the

engine is not running. Before repairing or disconnecting any of the fuel system components, the fuel system pressure must be relieved to prevent accidental spraying of fuel, causing personal injury or a fire hazard.

1. Release the fuel system pressure. For additional information refer to **FUEL SYSTEM PRESSURE RELEASE**.
2. Disconnect the battery ground cable. For additional information, refer to **REMOVAL AND INSTALLATION**.
3. Remove the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD**.
4. Disconnect the fuel supply tube quick connect coupling at the fuel rail. For additional information, refer to **QUICK CONNECT COUPLING**.
5. Disconnect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.
6. Disconnect the 6 fuel injector electrical connectors.
7. Remove the 8 lower intake manifold bolts and the lower intake manifold.
 - Remove and discard the gaskets.

Installation

NOTE: Clean and inspect all sealing surfaces. Install new gaskets.

1. Position the lower intake manifold and install the bolts.
 - Tighten in the sequence shown to 10 N.m (89 lb-in).

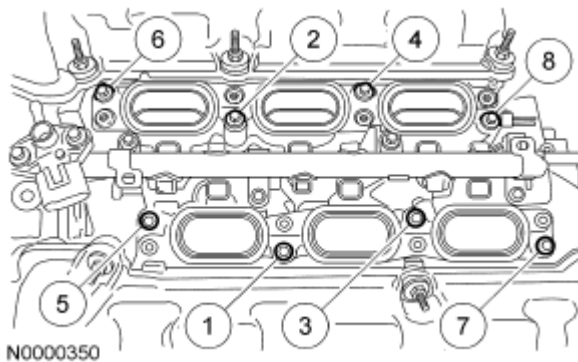
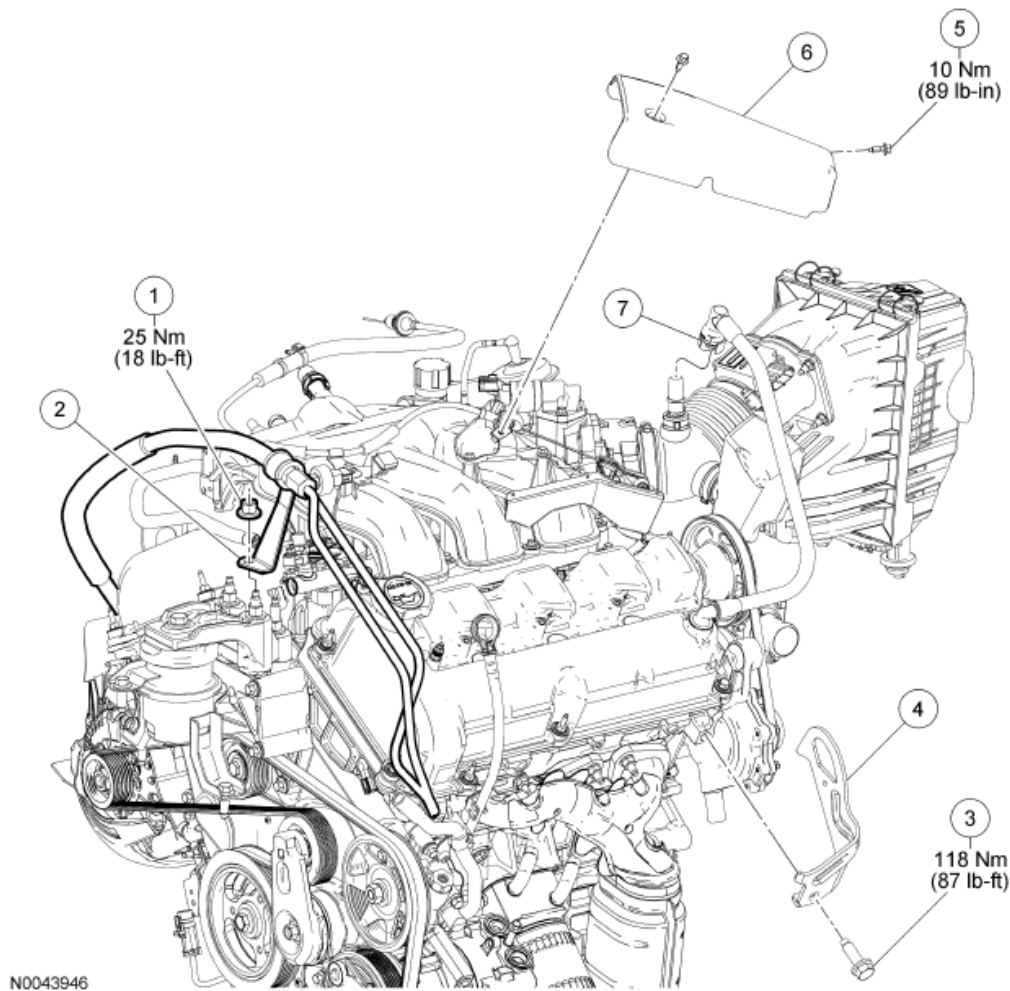


Fig. 6: Identifying Tightening Sequence Of Lower Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

2. Connect the fuel injector electrical connectors.
3. Connect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.
4. Connect the fuel supply tube quick connect coupling at the fuel rail. For additional information, refer to **QUICK CONNECT COUPLING**.
5. Install the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD**.
6. Connect the battery ground cable. For additional information, refer to **REMOVAL AND**

INSTALLATION .**VALVE COVER - LH****MATERIALS**

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A6



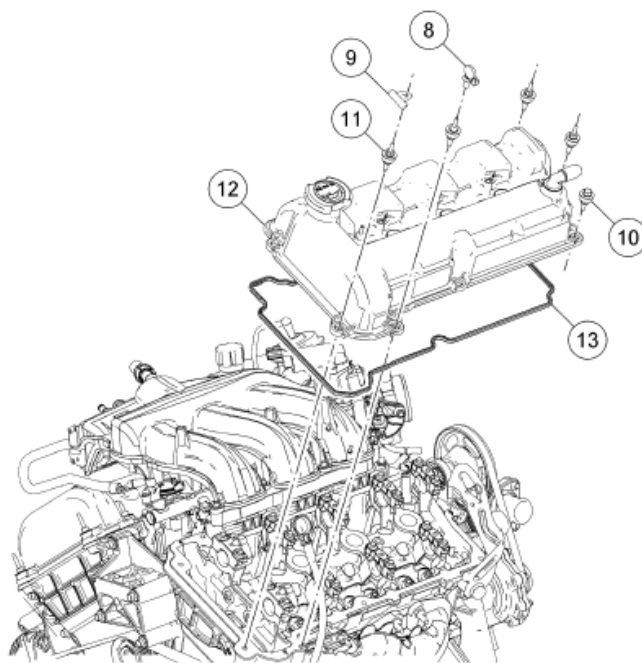
Item	Part Number	Description
1	N621942	Power steering pressure (PSP) tube bracket nut
2	3A719	PSP tube bracket
3	W701627	Engine lift bracket bolt
4	17A084	Engine lift bracket

Item	Part Number	Description
5	W702251	Accelerator cable snow shield bolt (2 required)
6	9E766	Accelerator cable snow shield
7	6853	Crankcase ventilation tube

Fig. 7: Identifying Lower Intake Manifold Components - Early Build (1 Of 2) (With Torque Specifications)
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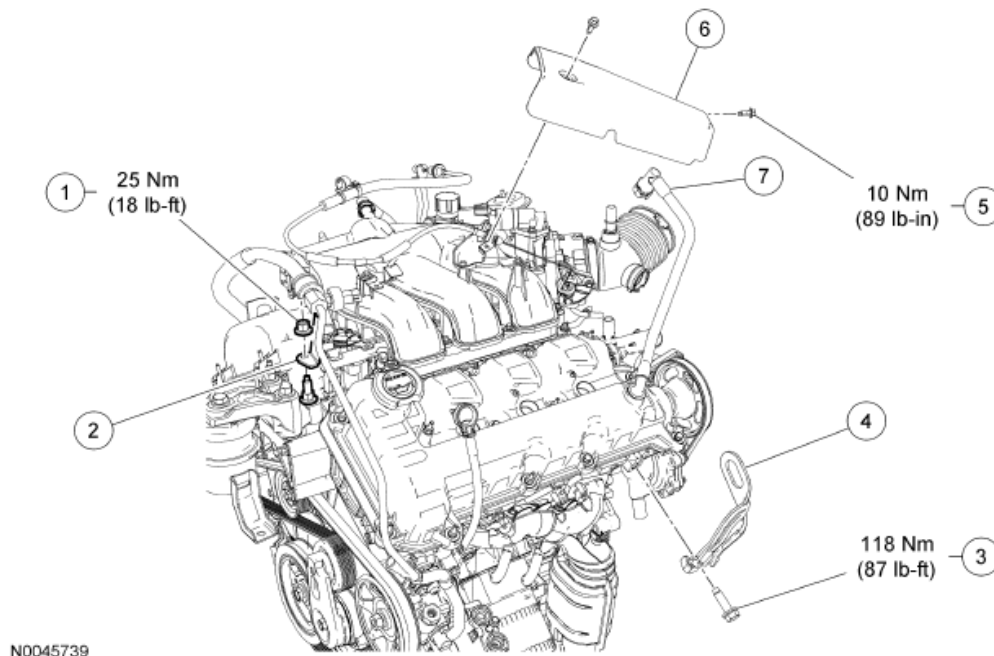
Item	Part Number	Description
8	W700497-S	Wiring retainer (3 required) (part of 9H589)
9	13A506	Wiring retainer (2 required) (part of 9H589)
10	6C519	Valve cover bolt (2 required)

Item	Part Number	Description
11	6C519	Valve cover stud bolt (9 required)
12	6A505	Valve cover
13	6A559	Valve cover gasket

Fig. 8: Identifying Lower Intake Manifold Components - Early Build (2 Of 2)
Courtesy of FORD MOTOR CO.

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Item	Part Number	Description
1	N621942	Power steering pressure (PSP) tube bracket nut
2	3A719	PSP tube bracket
3	W701627	Engine lift bracket bolt
4	17A084	Engine lift bracket

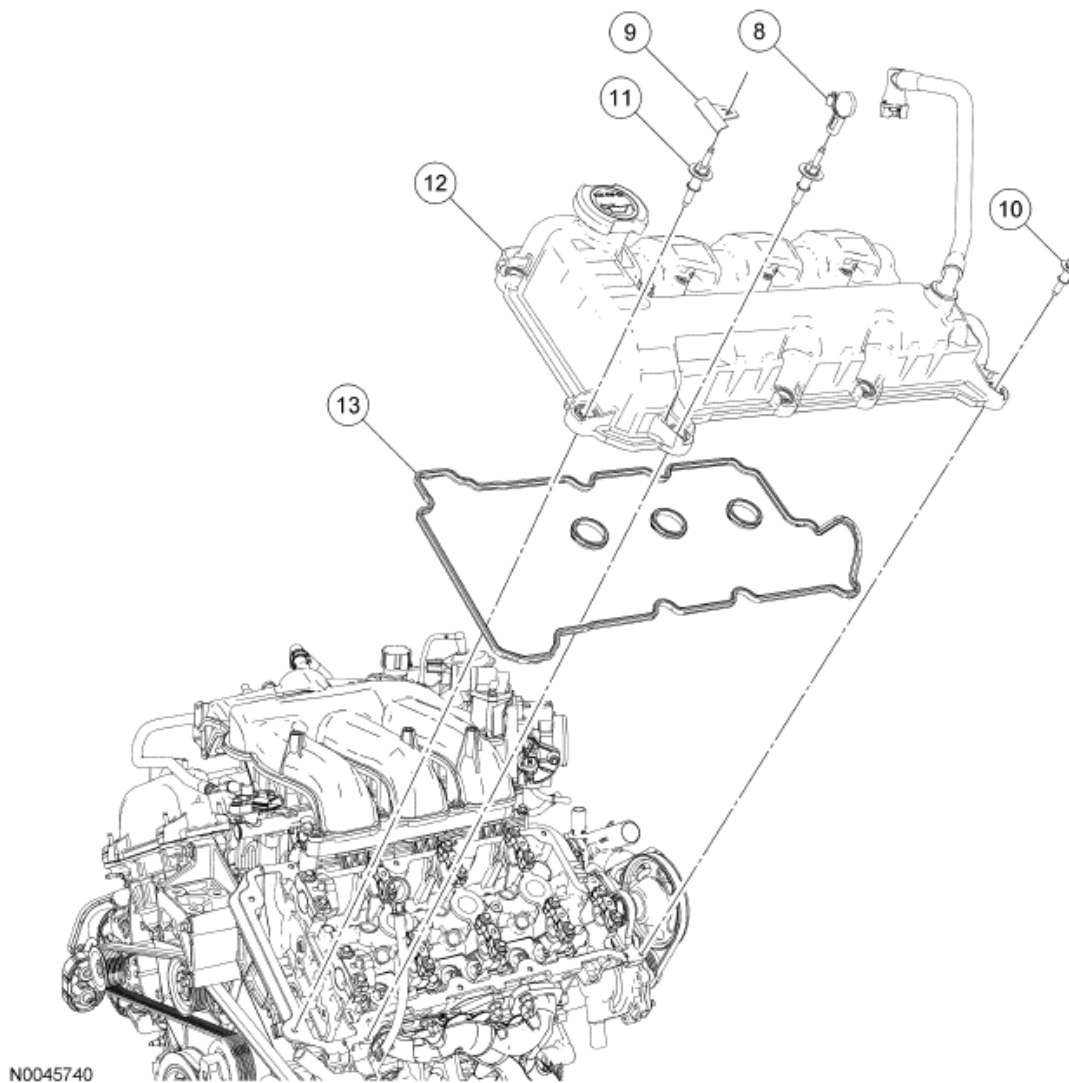
Item	Part Number	Description
5	W7022551	Accelerator cable snow shield bolt (2 required)
6	9E766	Accelerator cable snow shield
7	6853	Crankcase ventilation tube

Fig. 9: Identifying Lower Intake Manifold Components - Late Build (1 Of 2) (With Torque Specifications)

Courtesy of FORD MOTOR CO.

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



Item	Part Number	Description
8	W700497-S	Wiring retainer (3 required) (part of 9H589)
9	13A506	Wiring retainer (2 required) (part of 9H589)
10	6C519	Valve cover bolt (2 required)
11	6C519	Valve cover stud bolt (9 required)
12	6A505	Valve cover
13	6A559	Valve cover gasket

Fig. 10: Identifying Lower Intake Manifold Components - Late Build (2 Of 2)
Courtesy of FORD MOTOR CO.

Removal

CAUTION: During engine repair procedures, cleanliness is extremely important. Any

foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1. Remove the LH ignition coil-on-plugs. For additional information, refer to **REMOVAL AND INSTALLATION**.
2. Remove the power steering pressure (PSP) tube bracket nut and position the PSP tube and bracket aside.
3. If equipped, remove the bolt and the engine lift bracket.
4. Remove the 2 bolts and the accelerator cable snow shield.

CAUTION: Do not disconnect the crankcase ventilation tube from the valve cover or damage to the ventilation tube may occur.

5. Disconnect the crankcase ventilation tube from the air cleaner outlet pipe.
6. Detach the 5 wiring retainers from the valve cover stud bolts.

NOTE: **Inspect the crankcase ventilation tube and valve cover sealing area. If either a new valve cover or crankcase ventilation tube is required, both components must be installed new.**

7. Remove the 2 bolts, 9 stud bolts and the valve cover.
 - Remove and discard the gasket.

Installation

All vehicles

1. Clean the valve cover, cylinder head and front cover sealing surfaces with metal surface cleaner and install a new valve cover gasket.

NOTE: **The valve cover must be installed and the bolts and stud bolts tightened within 4 minutes of sealant application.**

2. Apply a 5 mm (0.19 in) dot of silicone gasket sealant to the front cover-to-cylinder head joints.

Early build vehicles

3. Position the valve cover and install the bolts and stud bolts.
 - Tighten in the sequence shown to 10 N.m (89 lb-in).

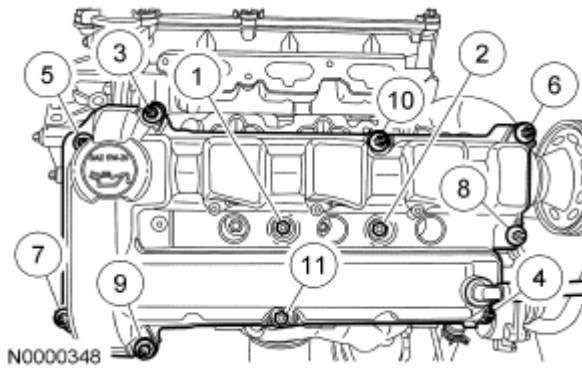


Fig. 11: Identifying Tightening Sequence Of Early Build Bolts
Courtesy of FORD MOTOR CO.

Late build vehicles

4. Position the valve cover and install the bolts and stud bolts.
 - Tighten in the sequence shown to 10 N.m (89 lb-in).

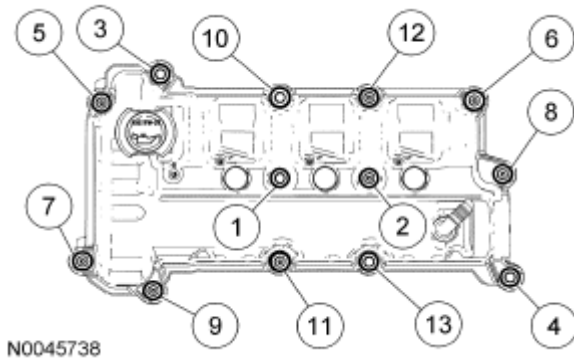


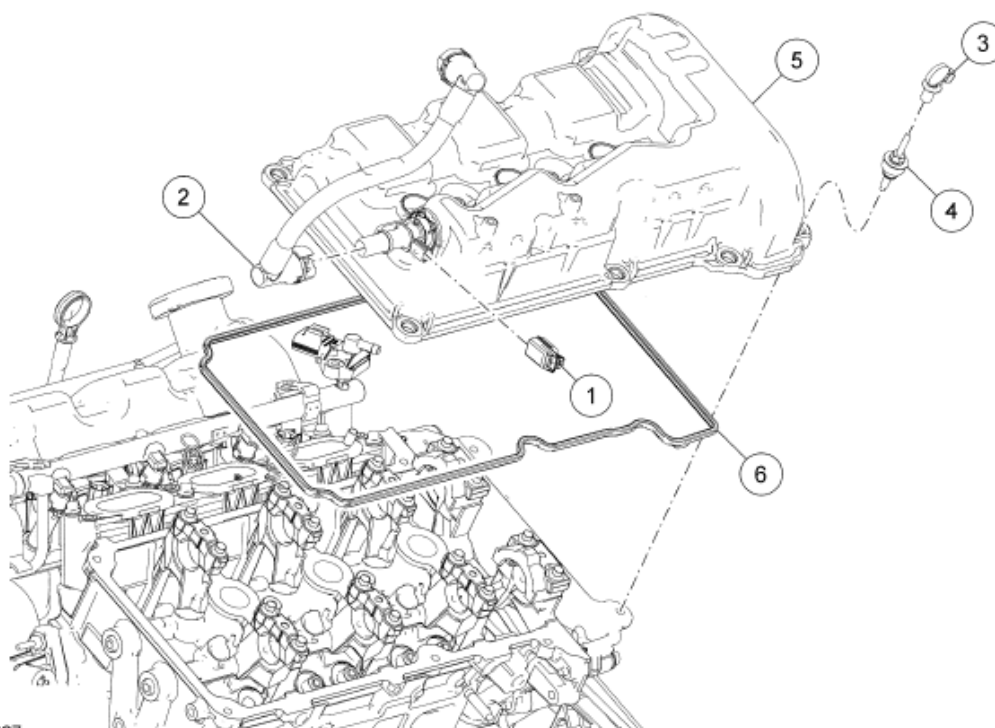
Fig. 12: Identifying Tightening Sequence Of Late Build Bolts
Courtesy of FORD MOTOR CO.

All vehicles

5. Attach the wiring retainers to the valve cover stud bolts.
6. Attach the crankcase ventilation tube to the air cleaner outlet pipe.
7. Install the accelerator cable snow shield and the 2 bolts.
 - Tighten to 10 N.m (89 lb-in).
8. If equipped, install the engine lift bracket and the bolt.
 - Tighten to 118 N.m (87 lb-ft).
9. Position the PSP tube and bracket and install the nut.
 - Tighten to 25 N.m (18 lb-ft).
10. Install the LH ignition coil-on-plugs. For additional information, refer to **REMOVAL AND INSTALLATION**.

VALVE COVER - RH**MATERIALS**

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A6



N0000687

Item	Part Number	Description
1	14A464	Positive crankcase ventilation (PCV) valve electrical connector (part of 12A580)
2	6K817	PCV tube
3	W700497	Wiring retainer (3 required)
4	6C519	Valve cover stud bolt (10 required)
5	6582	Valve cover
6	6584	Valve cover gasket

Fig. 13: Identifying Valve Cover - RH Components
 Courtesy of FORD MOTOR CO.

Removal

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can

cause engine failure.

1. Remove the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD**.
2. Remove the RH ignition coil-on-plugs. For additional information, refer to **REMOVAL AND INSTALLATION**.
3. Disconnect the positive crankcase ventilation (PCV) valve electrical connector.
4. Disconnect the PCV tube from the PCV valve and position it aside.
5. Disconnect the radio ignition interference capacitor electrical connector and detach the 3 wiring retainers from the stud bolts.
6. Remove the nut and the radio ignition interference capacitor.
7. Remove the 2 nuts and position the engine control harness aside.
8. Remove the bolt, 9 stud bolts and the valve cover.
 - Remove and discard the gasket.

Installation

1. Clean the valve cover, cylinder head and front cover sealing surfaces with metal surface cleaner and install a new valve cover gasket.

NOTE: **The valve cover must be installed and the bolts and stud bolts tightened within 4 minutes of sealant application.**

2. Apply a 5 mm (0.19 in) dot of silicone gasket sealant to the front cover-to-cylinder head joints.
3. Position the valve cover and install the stud bolts.
 - Tighten in the sequence shown to 10 N.m (89 lb-in).

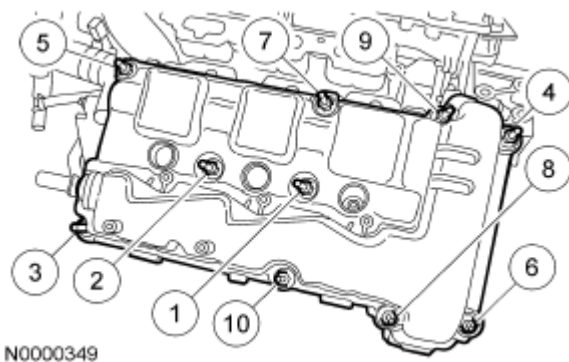
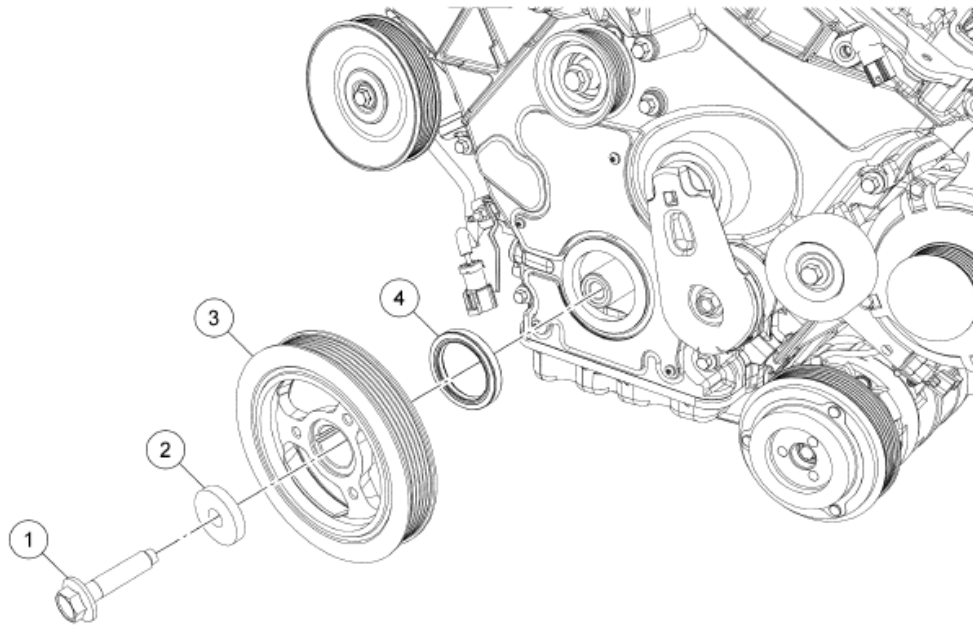


Fig. 14: Identifying Tightening Sequence Of Valve Cover
Courtesy of FORD MOTOR CO.

4. Position the engine control harness and install the nuts.
 - Tighten to 6 N.m (53 lb-in).
5. Install the radio ignition interference capacitor and the nut.
 - Tighten to 6 N.m (53 lb-in).

6. Attach the wiring retainers to the stud bolts and connect the radio ignition interference capacitor electrical connector.
7. Connect the PCV tube to the PCV valve.
8. Connect the PCV valve electrical connector.
9. Install the RH ignition coil-on-plugs. For additional information, refer to **REMOVAL AND INSTALLATION**.
10. Install the upper intake manifold. For additional information, refer to **UPPER INTAKE MANIFOLD**.

LOWER END COMPONENTS - EXPLODED VIEW

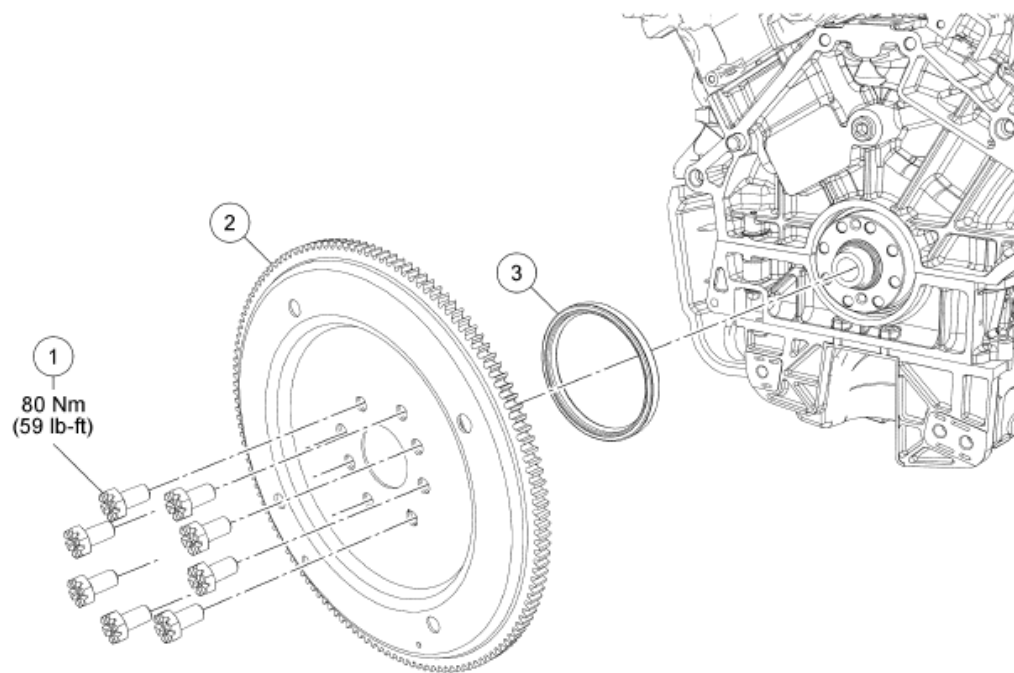


N0062467

Item	Part Number	Description
1	W701512	Crankshaft pulley bolt
2	W701511	Washer

Item	Part Number	Description
3	6316	Crankshaft pulley
4	6700	Crankshaft front seal

Fig. 15: Identifying Crankshaft Pulley & Front Seal Components
Courtesy of FORD MOTOR CO.



Item	Part Number	Description
1	W701559	Flexplate bolt (8 required)
2	6375	Flexplate
3	6701	Crankshaft rear oil seal

Fig. 16: Identifying Flexplate & Rear Seal Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

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

CRANKSHAFT PULLEY

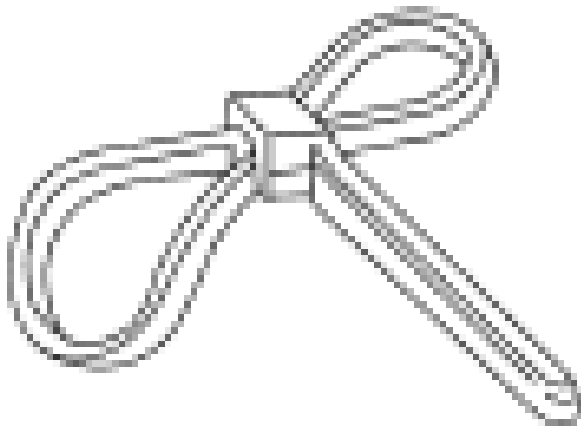
Special Tool(s)

SPECIAL TOOL(S)

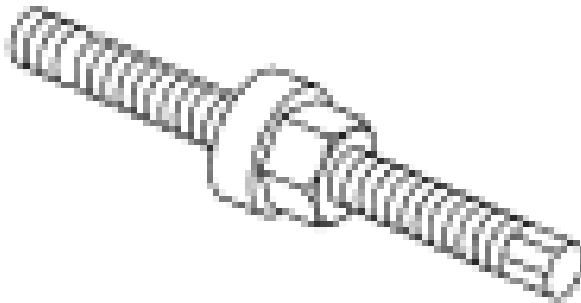
Strap Wrench
303-D055 (D85L-6000-A)

2006 Mercury Mariner

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ST1438-A



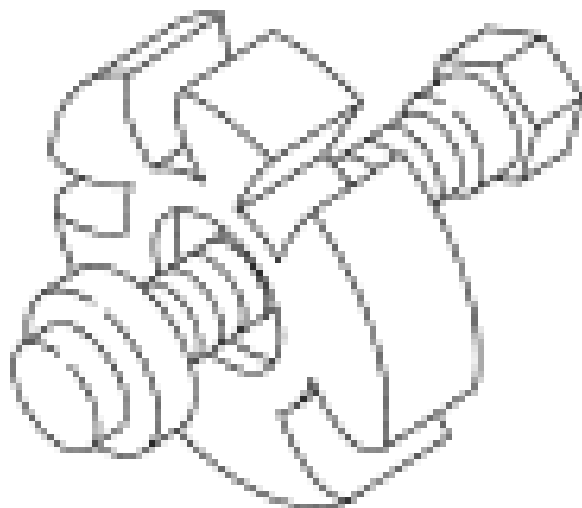
ST1287-A

Replacer, Crankshaft Damper
303-102 (T74P-6316-B)

Remover, Crankshaft Vibration Damper

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1286-A

303-009 (T58P-6316-D)

Materials

MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the accessory drive belt. For additional information, refer to **REMOVAL AND INSTALLATION**.
3. Use the special tool to hold the crankshaft pulley and remove the crankshaft pulley bolt.

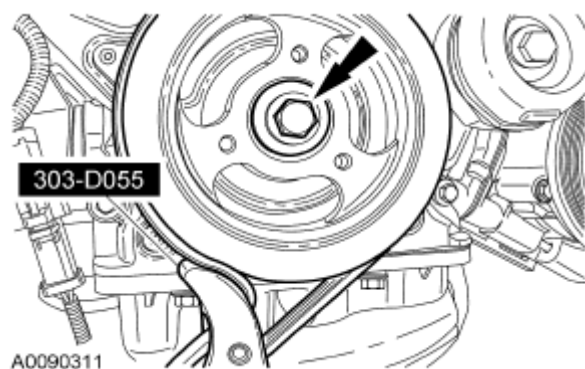


Fig. 17: Locating Special Tool (303-D055) And Crankshaft Pulley Bolt
Courtesy of FORD MOTOR CO.

4. Using the special tool, remove the crankshaft pulley.

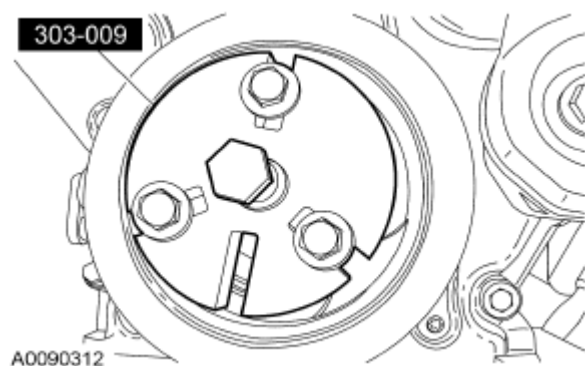


Fig. 18: Removing Crankshaft Pulley Using Special Tool (303-009)
Courtesy of FORD MOTOR CO.

Installation

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

NOTE:

Clean the keyway and slot using metal surface cleaner before applying silicone gasket and sealer.

The crankshaft pulley must be installed and the bolt tightened within 4 minutes of applying the silicone gasket and sealer.

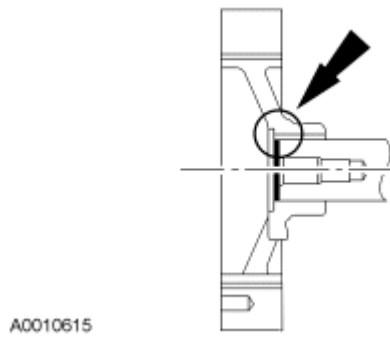


Fig. 19: Applying Silicone Gasket And Sealant
Courtesy of FORD MOTOR CO.

2. Apply silicone gasket and sealant to the end of the keyway slot.

NOTE: Lubricate the outside diameter sealing surface with clean engine oil.

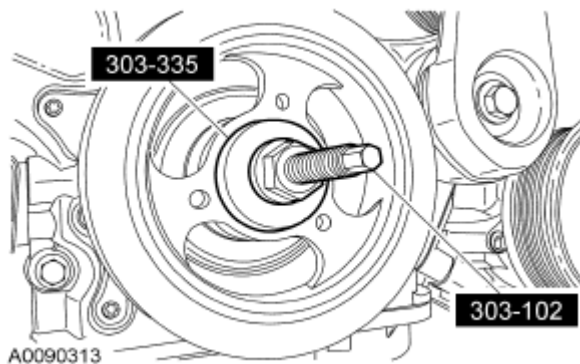


Fig. 20: Installing Crankshaft Pulley Using Special Tools (303-102, 303-335)
Courtesy of FORD MOTOR CO.

3. Using the special tool, install the crankshaft pulley.
4. Install the bolt and washer. Using the special tool to hold the crankshaft pulley, tighten the bolt in 4 stages:
 - Stage 1: Tighten to 120 N.m (89 lb-ft).
 - Stage 2: Loosen one full turn.
 - Stage 3: Tighten to 50 N.m (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

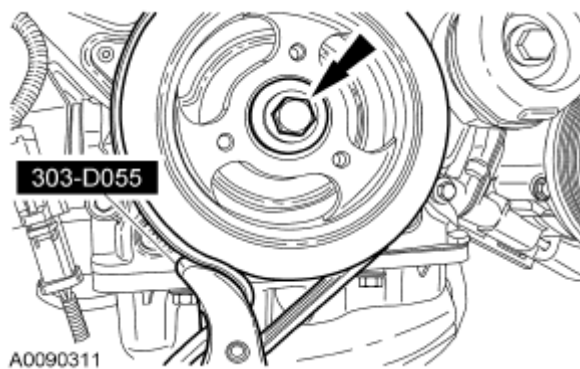
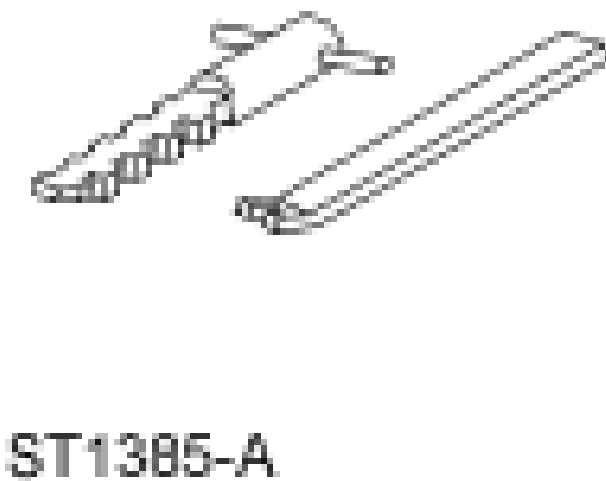


Fig. 21: Identifying Special Tool (303-D055) And Crankshaft Pulley Bolts
Courtesy of FORD MOTOR CO.

CRANKSHAFT FRONT SEAL

Special Tool(s)

SPECIAL TOOL(S)

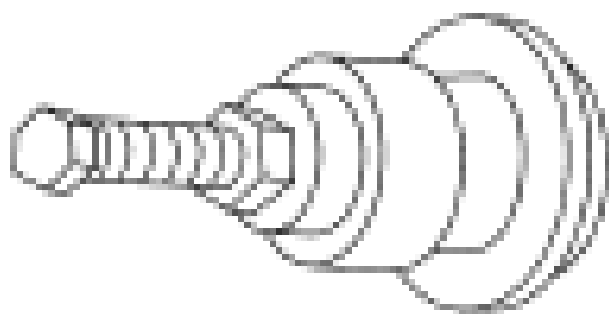


Remover, Oil Seal
303-409 (T92C-6700CH)

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

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ST1328-A

Materials

MATERIALS

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the crankshaft pulley. For additional information, refer to **CRANKSHAFT PULLEY**.
3. Using the special tool, remove and discard the crankshaft front seal.

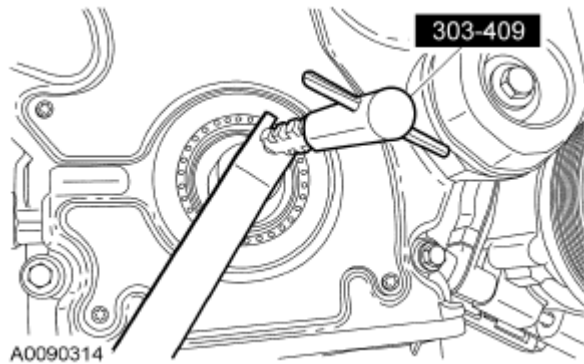


Fig. 22: Removing Crankshaft Front Seal Using Special Tool (303-409)
Courtesy of FORD MOTOR CO.

Installation

NOTE: Clean all sealing surfaces with metal surface cleaner.

1. Apply clean engine oil to the seal lip and seal bore before installing the seal.
2. Using the special tools, install a new crankshaft front seal.

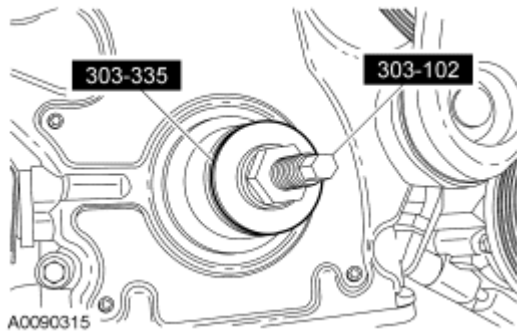


Fig. 23: Installing Crankshaft Seal Using Special Tools (303-335 And 303-102)
Courtesy of FORD MOTOR CO.

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

FLEXPLATE

Removal and Installation

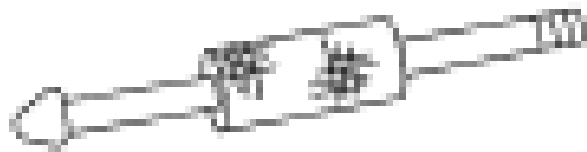
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSAXLE-TRANSMISSION - CD4E** or **AUTOMATIC TRANSAXLE-TRANSMISSION - ELECTRONICALLY CONTROLLED CONTINUOUSLY VARIABLE TRANSMISSION (ECVT)**.
3. Remove the bolts and the flexplate.

- To install, tighten to 80 N.m (59 lb-ft).
4. To install, reverse the removal procedure.

CRANKSHAFT REAR SEAL

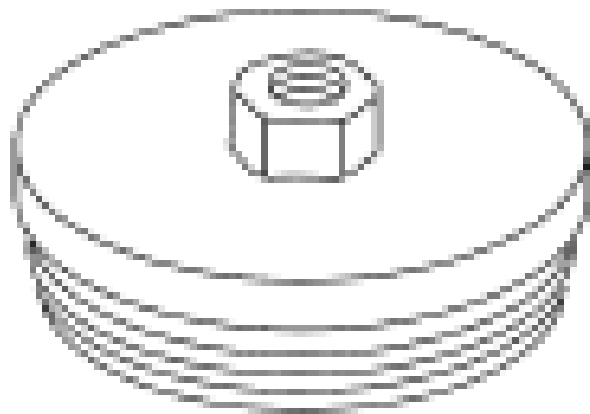
Special Tool(s)

SPECIAL TOOL(S)



ST1187-A

Slide Hammer
307-005 (T59L-100-B)

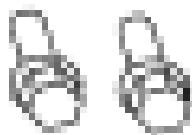
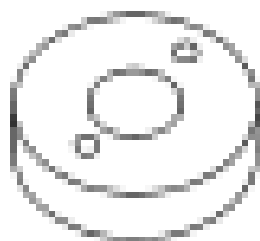


ST1382-A

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

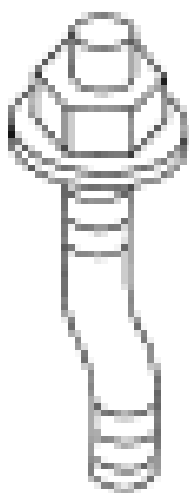
2006 Mercury Mariner

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Installer, Crankshaft Rear Main Oil Seal
303-178 (T82L-6701-A)

ST1327-A



Installer Bolts, Crankshaft Rear Main Oil Seal
303-384 (T91P-6701-A)

ST1333-A

Materials

MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS- M2C930-A
Motorcraft Metal Surface Cleaner ZC-21	WSE- M5B392-A

Removal

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the flexplate. For additional information, refer to **FLEXPLATE**.
3. Using the special tools, remove and discard the crankshaft rear oil seal.

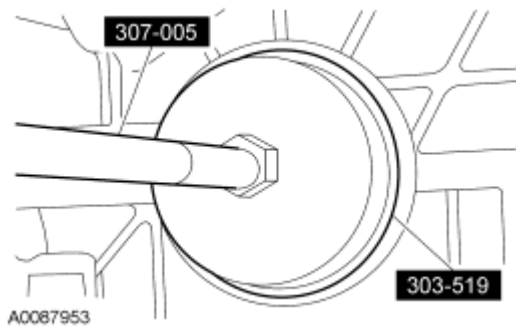


Fig. 24: Identifying Special Tools (307-005 And 303-519)
Courtesy of FORD MOTOR CO.

Installation

NOTE: Clean all sealing surfaces with metal surface cleaner.
Apply clean engine oil to the seal lip and seal bore before installing the seal.

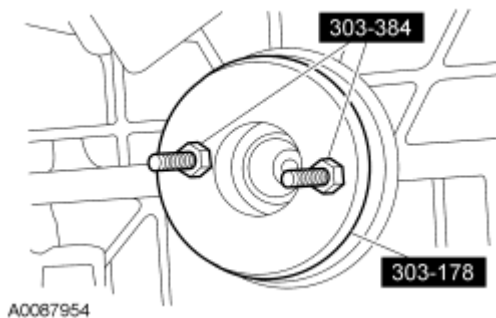


Fig. 25: Identifying Special Tools (303-384 And 303-178)
Courtesy of FORD MOTOR CO.

1. Using the special tools, install the crankshaft rear oil seal.
2. Install the flexplate. For additional information, refer to **FLEXPLATE**.

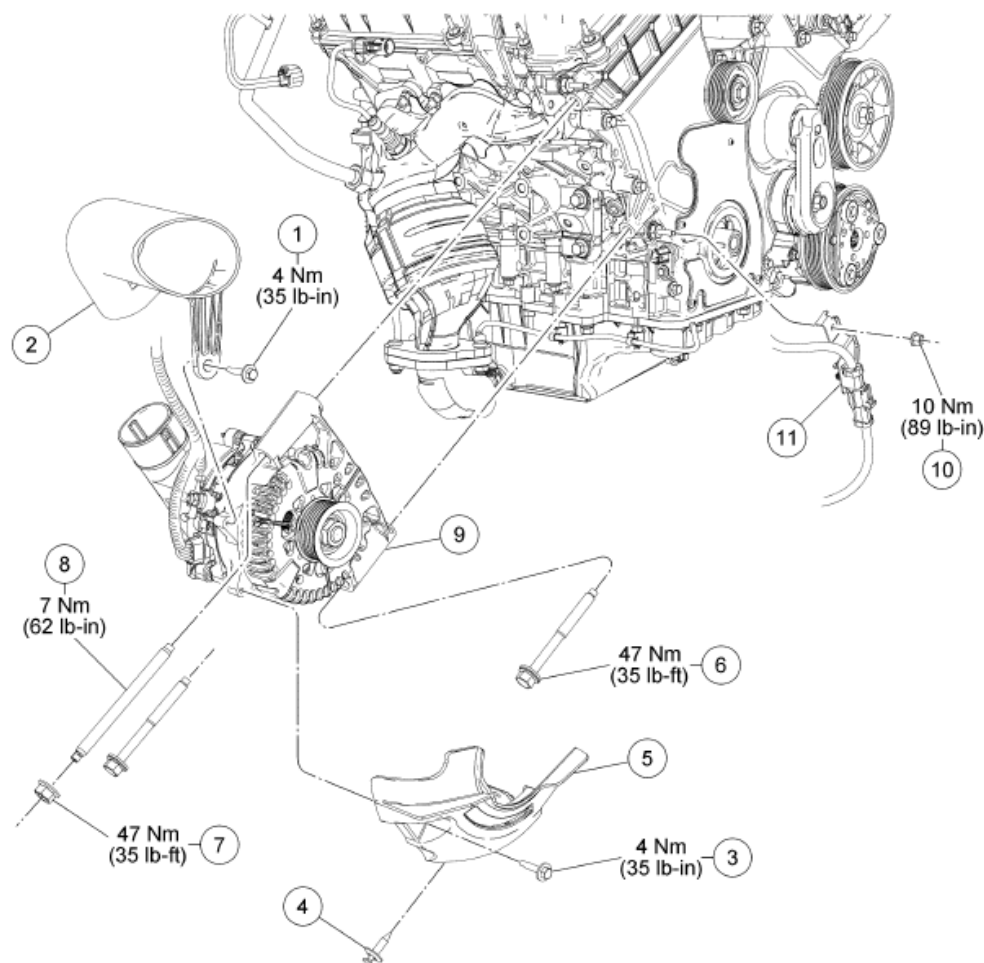
ENGINE FRONT COVER**MATERIALS**

Item	Specification
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2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A6
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

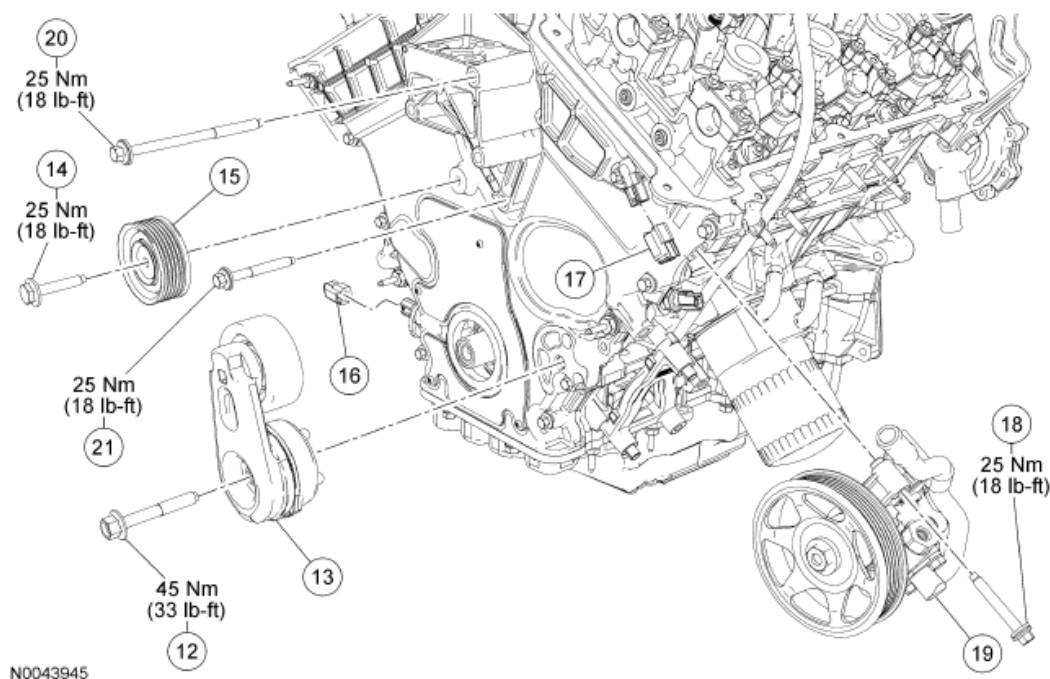


N0043947

Item	Part Number	Description
1	W505415	Generator upper air duct bolt
2	10C392	Generator upper air duct
3	W505415	Generator shield bolt
4	W705848	Pin-type retainer
5	10A389	Generator shield
6	W709986	Generator bolt (2 required)
7	W520414	Generator stud nut

Item	Part Number	Description
8	W710416	Generator stud
9	10300	Generator
10	W701542	Heated oxygen sensor (HO2S) electrical connector bracket nut
11	15A024	HO2S electrical connector bracket

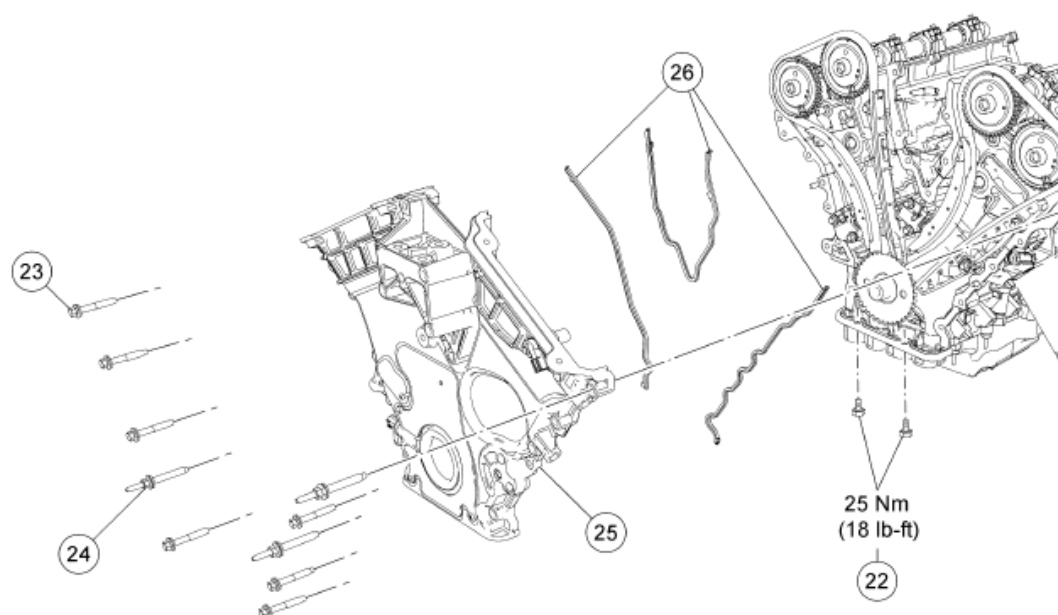
Fig. 26: Identifying Engine Front Cover Components (1 Of 3) (With Torque Specifications)
 Courtesy of FORD MOTOR CO.



Item	Part Number	Description
12	W701625	Accessory drive belt tensioner bolt
13	6B209	Accessory drive belt tensioner
14	—	Accessory drive belt idler pulley bolt (part of 6C348)
15	6C348	Accessory drive belt idler pulley
16	14A464	Crankshaft position (CKP) sensor electrical connector (part of 9H589)

Item	Part Number	Description
17	14A464	Camshaft position (CMP) sensor electrical connector (part of 9H589)
18	W701656	Power steering pump bolt (3 required)
19	3A696	Power steering pump
20	W708221	Engine front cover bolt (3 required)
21	W708222	Engine front cover bolt (3 required)

Fig. 27: Identifying Engine Front Cover Components (2 Of 3) (With Torque Specifications)
 Courtesy of FORD MOTOR CO.



N0043948

Item	Part Number	Description
22	W709678	Oil pan-to-front cover bolts (2 required)
23	W701525	Engine front cover bolt (7 required)
24	W710030	Engine front cover stud bolt (3 required)
25	6019	Engine front cover
26	—	Engine front cover gasket (3 required)

Fig. 28: Identifying Engine Front Cover Components (3 Of 3) (With Torque Specifications)
 Courtesy of FORD MOTOR CO.

Removal

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM PRESSURE RELEASE**.
3. Disconnect the battery ground cable. For additional information, refer to **REMOVAL AND INSTALLATION**.
4. Remove the crankshaft front seal. For additional information, refer to **LOWER END COMPONENTS -**

EXPLODED VIEW and CRANKSHAFT FRONT SEAL.

5. Remove the 5 bolts and the pin-type retainer and the RH lower splash shield.

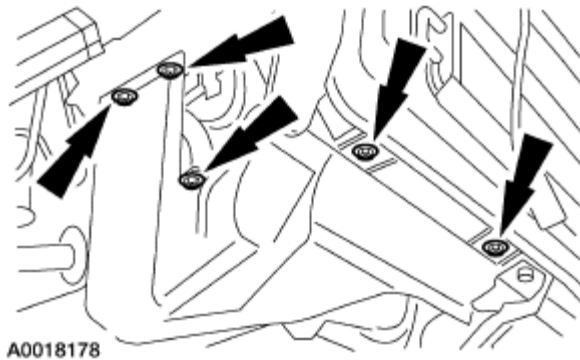


Fig. 29: Locating RH Lower Splash Shield Bolts
Courtesy of FORD MOTOR CO.

6. Remove the generator upper air duct bolt and the air duct.
7. Remove the generator shield pin-type retainer, bolt and the generator shield.
8. Remove the 2 generator bolts.
9. Remove the generator stud nut and stud and position the generator aside.
10. Remove the LH and RH valve covers. For additional information, refer to **VALVE COVER - LH** and **VALVE COVER - RH**.
11. Remove the engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS**.
12. Remove the bolt and the accessory drive belt tensioner.
13. Remove the bolt and the idler pulley.
14. Remove the nut and position the heated oxygen sensor (HO2S) electrical connector bracket aside.
15. Disconnect the crankshaft position (CKP) sensor electrical connector.
16. Disconnect the camshaft position (CMP) sensor electrical connector.

NOTE: The bolt positioned behind the power steering pressure tube will remain in the pump housing.

17. Remove the 3 power steering pump bolts and position the power steering pump aside.
18. If equipped, remove the 3 nuts and position the speed control actuator aside.
19. Remove the 2 oil pan-to-front cover bolts.
20. Remove the 13 bolts, 3 stud bolts and the engine front cover.
 - Remove and discard the gaskets.

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs

or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

Do not damage the oil pan gasket while cleaning the sealant from the lower cylinder block-to-oil pan joint.

1. Use a plastic scraping tool to remove all traces of sealant.
 - Clean all sealing surfaces with metal surface cleaner and install new gaskets.

NOTE: **The engine front cover must be installed and the bolts tightened within 4 minutes of applying sealant.**

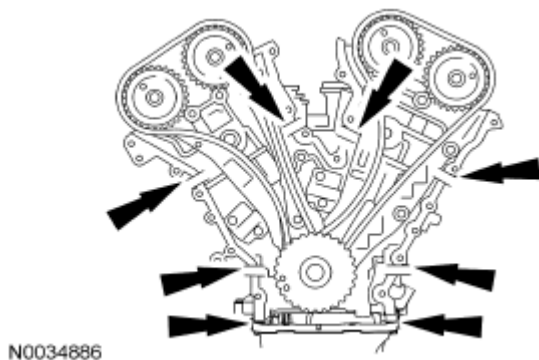
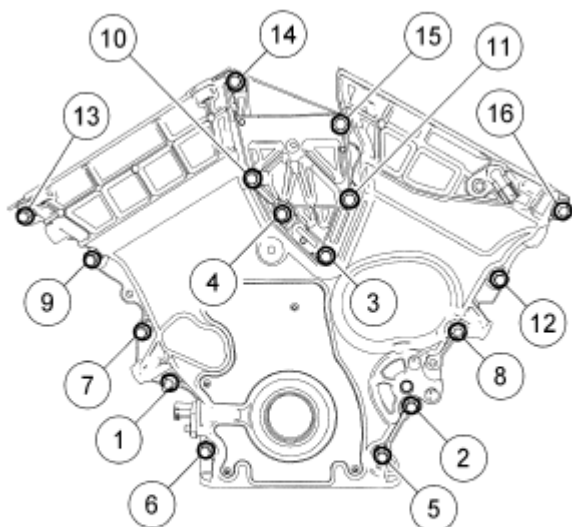


Fig. 30: Identifying Area For Applying Sealant
Courtesy of FORD MOTOR CO.

2. Apply a 6 mm (0.23 in) diameter dot of silicone gasket and sealer to the cylinder block, lower cylinder block, cylinder head and oil pan mating surfaces.

NOTE: **Fasteners 1, 8 and 16 are stud bolts.**

3. Position the engine front cover and install the bolts.
 - Tighten in the sequence shown to 25 N.m (18 lb-ft).



N0000340

Fig. 31: Identifying Tightening Sequence Of Engine Front Cover
 Courtesy of FORD MOTOR CO.

4. Install the 2 oil pan-to-front cover bolts.
 - Tighten to 25 N.m (18 lb-ft).
5. Remove the oil pan plug and drain the engine oil.
 - Install the plug and tighten to 26 N.m (19 lb-ft).
6. Position the power steering pump and install the 3 bolts.
 - Tighten to 25 N.m (18 lb-ft).
7. Connect the CMP electrical connector.
8. Connect the CKP electrical connector.
9. Position the HO2S bracket and install the nut.
 - Tighten to 10 N.m (89 lb-in).
10. Install the idler pulley and the bolt.
 - Tighten to 25 N.m (18 lb-ft).
11. Install the accessory drive belt tensioner and the bolt.
 - To install, tighten to 45 N.m (33 lb-ft).
12. If equipped, install the speed control actuator and 3 nuts.
13. Install the engine support insulator. For additional information, refer to **ENGINE SUPPORT INSULATORS**.
14. Install the LH and RH valve covers. For additional information, refer to **VALVE COVER - LH** and **VALVE COVER - RH**.
15. Position the generator and install the stud.
 - Tighten to 7 N.m (62 lb-in).

16. Install the generator stud nut.
 - Tighten to 47 N.m (35 lb-ft).
17. Install the 2 generator bolts.
 - Tighten to 47 N.m (35 lb-ft).
18. Install the generator shield, bolt and pin-type retainer.
 - Tighten to 4 N.m (35 lb-in).
19. Install the generator upper air duct and the bolt.
 - Tighten to 4 N.m (35 lb-in).
20. Install the RH lower splash shield, 5 bolts and the pin-type retainer.
 - Tighten to 9 N.m (80 lb-in).

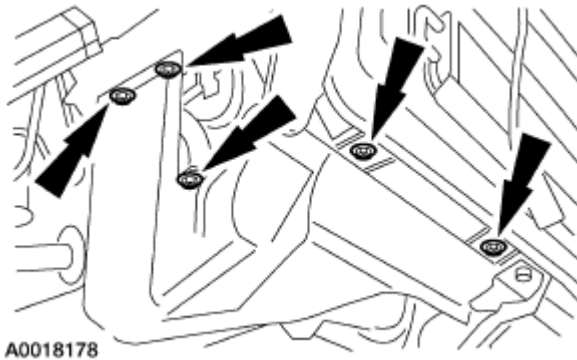


Fig. 32: Locating RH Lower Splash Shield Bolts
Courtesy of FORD MOTOR CO.

21. Install the crankshaft front seal. For additional information, refer to **LOWER END COMPONENTS - EXPLODED VIEW** and **CRANKSHAFT FRONT SEAL**.
22. Fill the engine with clean engine oil.
23. Connect the battery ground cable. For additional information, refer to **REMOVAL AND INSTALLATION**.

TIMING DRIVE COMPONENTS

Removal

CAUTION:

During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

Failure to verify correct timing drive component alignment will result in severe engine damage.

1. Remove the engine front cover. For additional information, refer to **ENGINE FRONT COVER**.

CAUTION: This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped "30" or "30RFF" (orange in color).

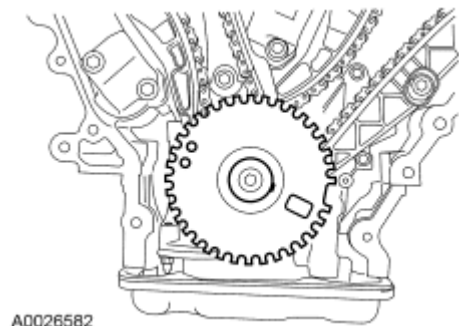


Fig. 33: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

2. Remove the ignition pulse wheel.
3. Install the damper bolt.

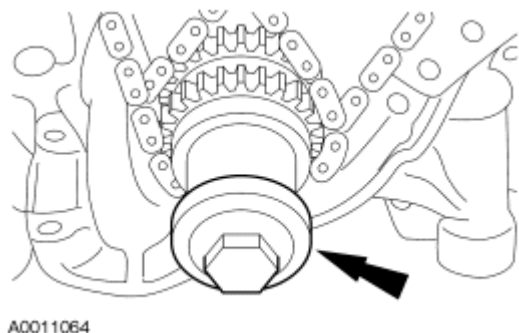


Fig. 34: Identifying Damper Bolt
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

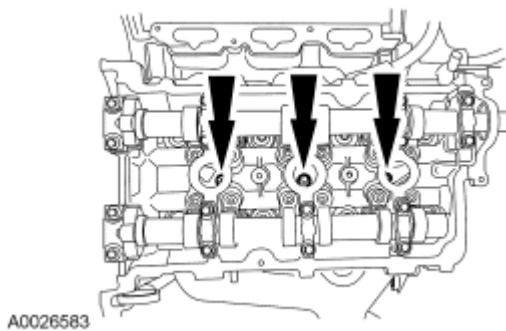


Fig. 35: Locating Spark Plugs
Courtesy of FORD MOTOR CO.

4. Remove the LH and RH spark plugs.
5. Rotate the crankshaft clockwise to position the crankshaft keyway in the 11 o'clock position and position the camshafts in the correct position. This will position the number one cylinder at top dead center (TDC).
 - Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.

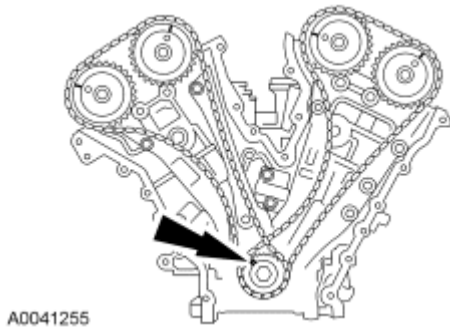


Fig. 36: Identifying Crankshaft Keyway In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

6. Rotate the crankshaft clockwise 120 degrees to the 3 o'clock position to locate the RH camshafts in the neutral position.

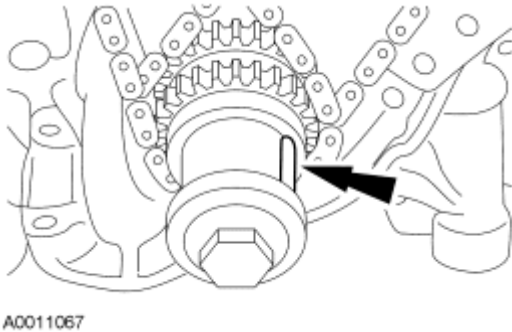


Fig. 37: Identifying Crankshaft Keyway
Courtesy of FORD MOTOR CO.

7. Verify that the RH camshafts are in the neutral position.

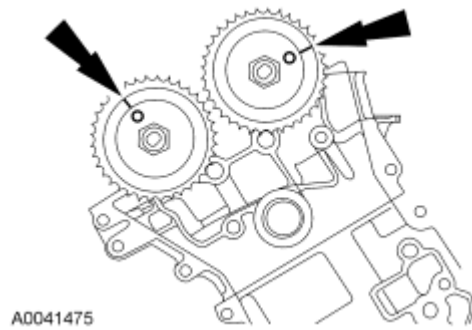


Fig. 38: Locating Camshafts Align Marks
Courtesy of FORD MOTOR CO.

8. Remove the RH timing chain tensioner arm.
 1. Remove the bolts.
 2. Remove the tensioner.
 3. Remove the tensioner arm.

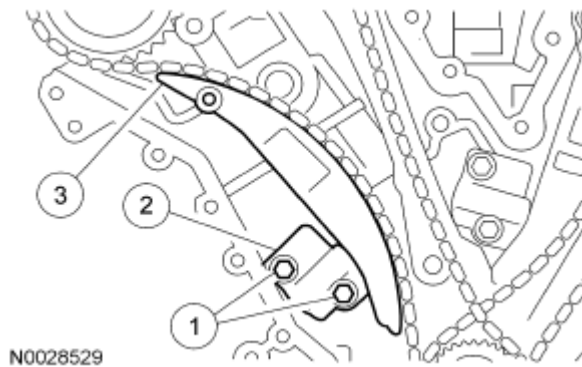


Fig. 39: Identifying RH Timing Chain Tensioner Arm & Bolts
Courtesy of FORD MOTOR CO.

9. Remove the bolts, RH timing chain guide and the timing chain.

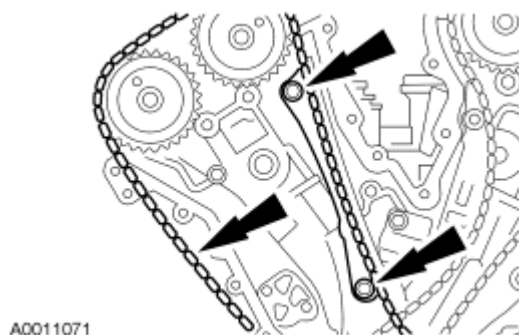
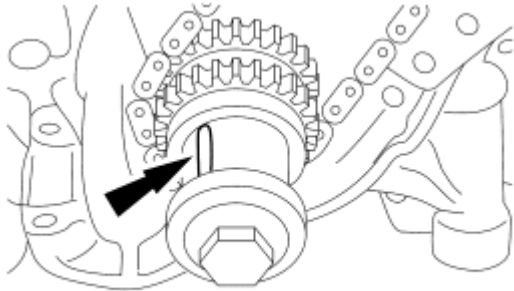


Fig. 40: Locating Timing Chain Guide & Bolts
Courtesy of FORD MOTOR CO.

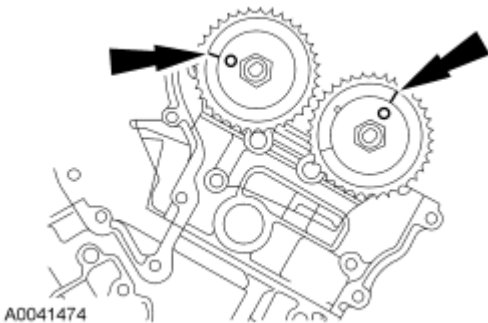
10. Rotate the crankcase clockwise 600 degrees (1-2/3 turns) to position the crankcase keyway in the 11 o'clock position. This will position the LH camshafts in the neutral position.



A0011072

Fig. 41: Positioning Crankcase Key Way In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

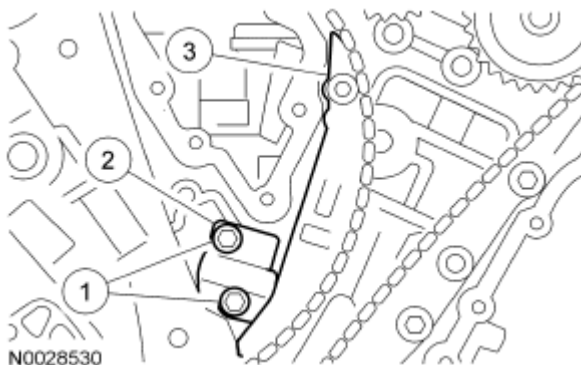
11. Verify the LH camshafts are in the neutral position.



A0041474

Fig. 42: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

12. Remove the LH timing chain and tensioner arm.
 1. Remove the bolts.
 2. Remove the tensioner.
 3. Remove the tensioner arm.



N0028530

Fig. 43: Identifying LH Timing Chain & Tensioner Arm Bolt
Courtesy of FORD MOTOR CO.

13. Remove the LH timing chain and timing chain guide.

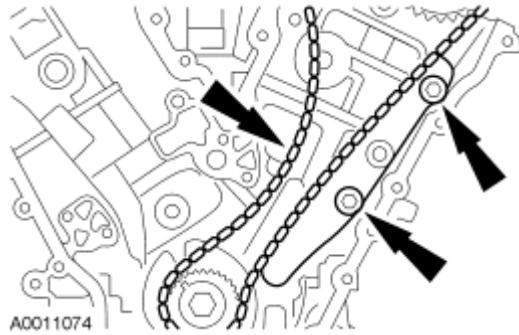


Fig. 44: Locating Timing Chain & Timing Chain Guide
Courtesy of FORD MOTOR CO.

14. Remove the damper bolt and the crankshaft sprockets.

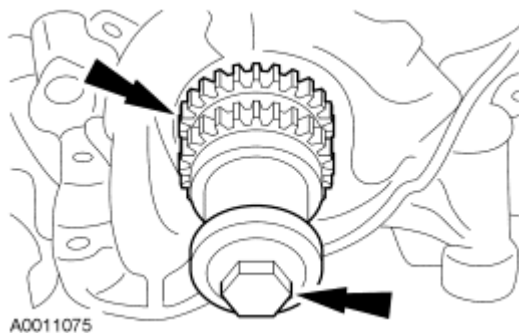


Fig. 45: Locating Damper Bolt & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

Installation

CAUTION: Failure to verify correct timing drive component alignment will result in severe engine damage.

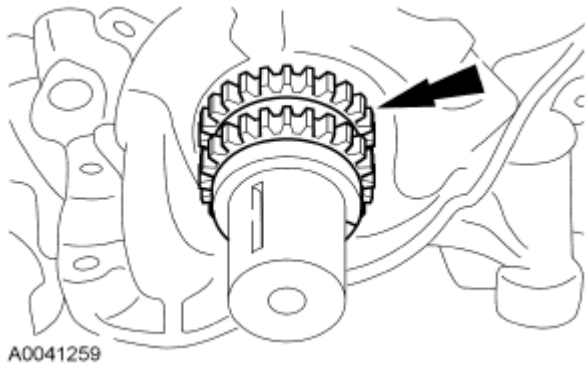


Fig. 46: Locating Crankshaft Sprockets With Timing Marks Out
Courtesy of FORD MOTOR CO.

1. Install the crankshaft sprockets with the timing marks out.

NOTE: LH shown, RH similar.

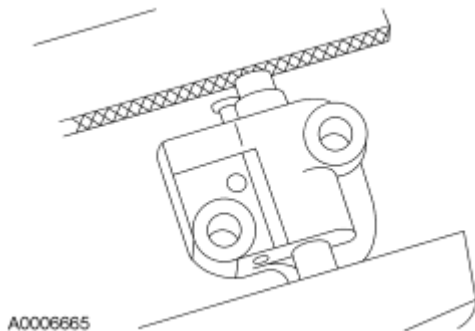


Fig. 47: Identifying Chain Tensioner In Soft-Jawed Vise
Courtesy of FORD MOTOR CO.

2. Position the chain tensioner in a soft-jawed vise.

NOTE: LH shown, RH similar.

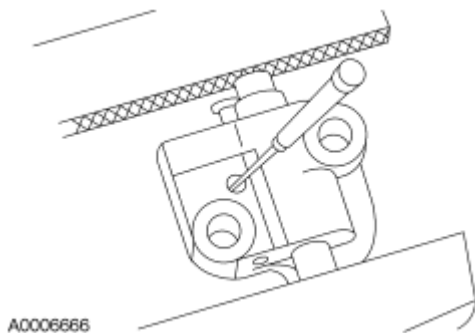


Fig. 48: Holding Chain Tensioner Ratchet Lock Mechanism Away From Ratchet Stem
Courtesy of FORD MOTOR CO.

3. Hold the chain tensioner ratchet lock mechanism away from the ratchet stem with a small pick.

CAUTION: During tensioner compression, do not release the ratchet stem until the tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

4. Slowly compress the timing chain tensioner.
5. Retain the tensioner piston with a 1.5 mm (0.05 in) wire or paper clip.

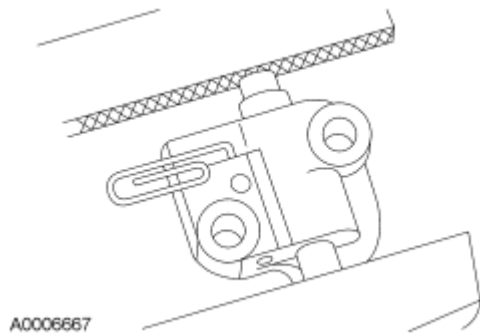


Fig. 49: Retaining Tensioner Piston With 1.5-mm (0.06-in) Wire Or Paper Clip
Courtesy of FORD MOTOR CO.

6. If timing marks in the timing chains are not evident, use a permanent-type marker to mark the crankshaft and camshaft timing marks on the LH and RH timing chains.
 1. Mark any link to use as the crankshaft timing mark.
 2. Starting with the crankshaft timing mark, count 29 links and mark the link.
 3. Continue counting to link 42 and mark the link.

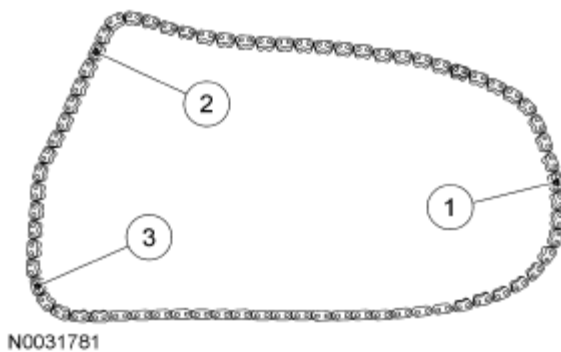


Fig. 50: Locating Crankshaft & Camshaft Timing Marks On LH & RH Timing Chains
Courtesy of FORD MOTOR CO.

7. Verify that the LH camshafts are correctly positioned.

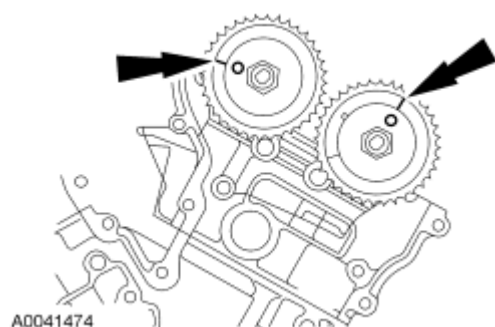


Fig. 51: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

8. Position the LH timing chain and guide and install the bolts.
 - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.
 - Tighten to 25 N.m (18 lb-ft).

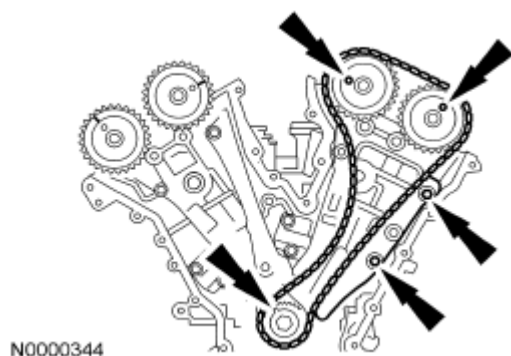


Fig. 52: Locating Align Marks On Timing Chain
Courtesy of FORD MOTOR CO.

9. Install the LH timing chain tensioner arm and the LH timing chain tensioner.
 1. Install the tensioner arm.
 2. Position the tensioner.
 3. Install the bolts.
 - Tighten to 25 N.m (18 lb-ft).

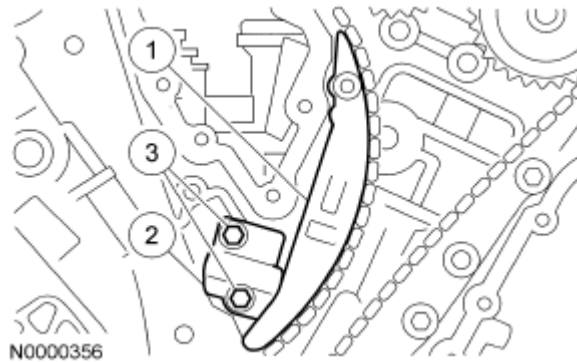


Fig. 53: Identifying LH Timing Chain Tensioner Arm & LH Timing Chain Tensioner
Courtesy of FORD MOTOR CO.

10. Install the crankshaft damper bolt and rotate the crankshaft clockwise 120 degrees until the crankshaft keyway is in the 3 o'clock position.

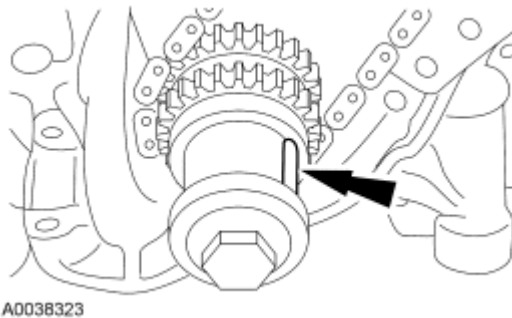


Fig. 54: Locating Crankshaft Keyway
Courtesy of FORD MOTOR CO.

11. Verify that the RH camshafts are correctly positioned.

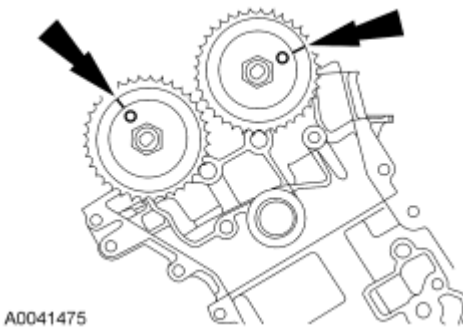


Fig. 55: Locating Camshafts Align Marks
Courtesy of FORD MOTOR CO.

12. Install the RH timing chain and chain guide and install the bolts.
 - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

- Tighten to 25 N.m (18 lb-ft).

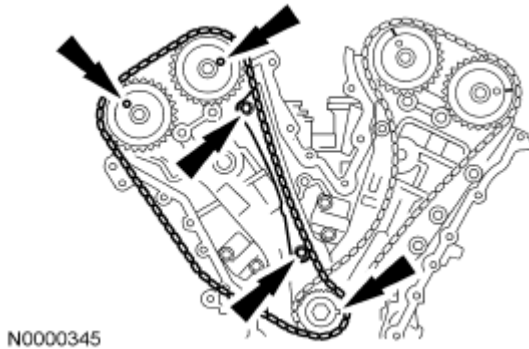


Fig. 56: Locating Align Marks On Timing Chain
Courtesy of FORD MOTOR CO.

13. Install the RH timing chain tensioner and tensioner arm.
 1. Install the tensioner arm.
 2. Position the tensioner.
 3. Install the bolts.
 - Tighten to 25 N.m (18 lb-ft).

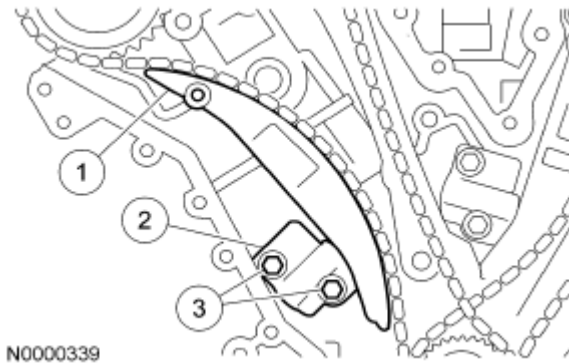


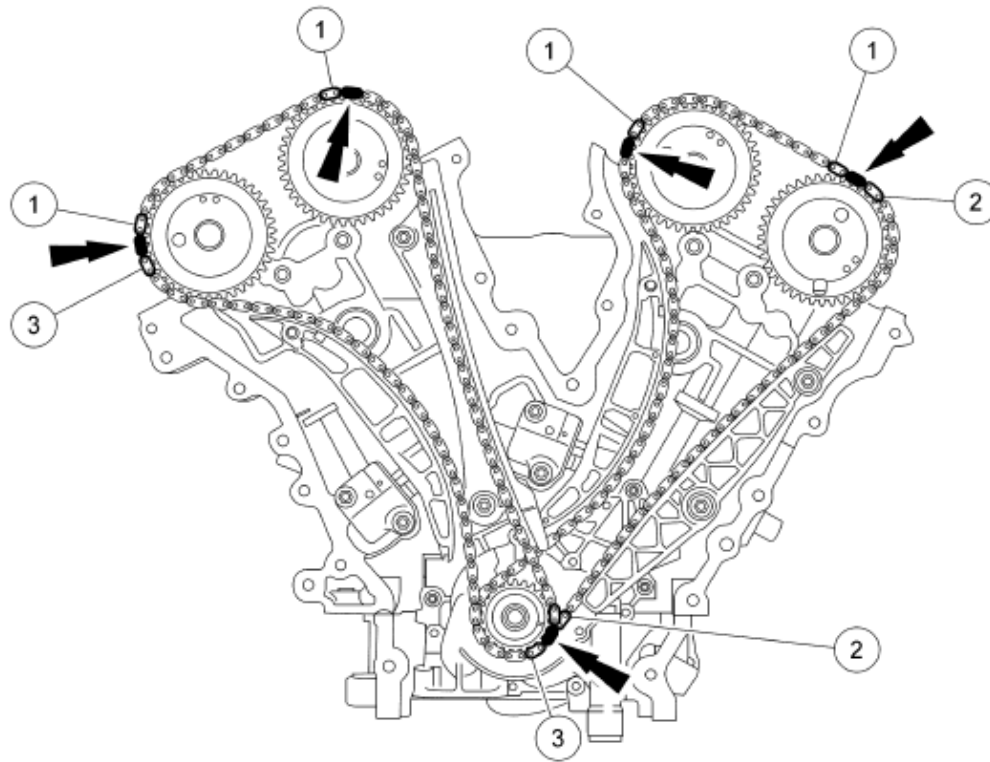
Fig. 57: Identifying RH Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

14. Remove the LH and RH timing chain tensioner piston retaining wires.
15. Rotate the crankshaft counterclockwise 120 degrees to top dead center (TDC).

CAUTION: Failure to verify correct timing drive component alignment will result in severe engine damage.

16. Verify the timing with the following steps.
 1. There should be 12 chain links between the camshaft timing marks.
 2. There should be 27 chain links between the camshaft and the crankshaft timing marks.

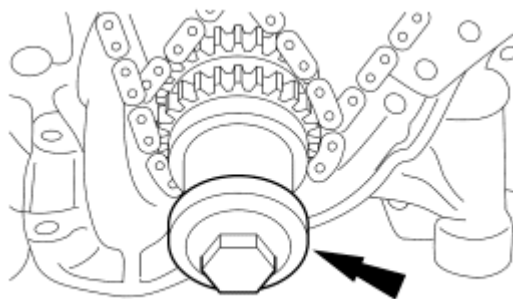
3. There should be 30 chain links between the camshaft and the crankshaft timing marks.



N0031782

Fig. 58: Locating Chain Links Between Camshaft & Crankshaft Timing Marks
Courtesy of FORD MOTOR CO.

17. Remove the crankshaft damper bolt.



A0011064

Fig. 59: Identifying Damper Bolt
Courtesy of FORD MOTOR CO.

CAUTION: This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped "30" or "30RFF" (orange in color).

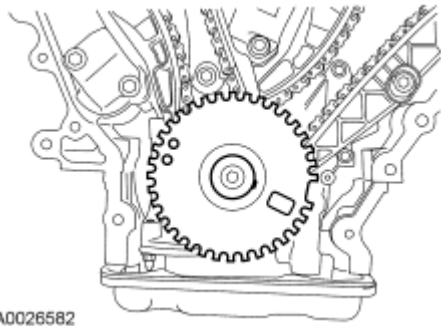


Fig. 60: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

18. Install the ignition pulse wheel.
19. Install the LH and RH spark plugs.
 - Tighten to 15 N.m (11 lb-ft).

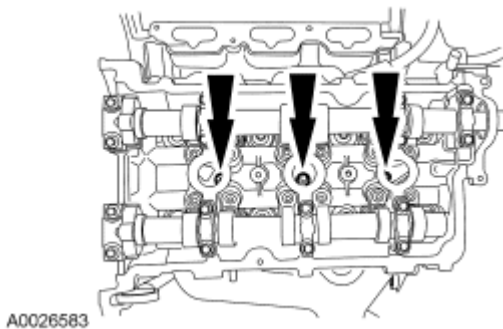


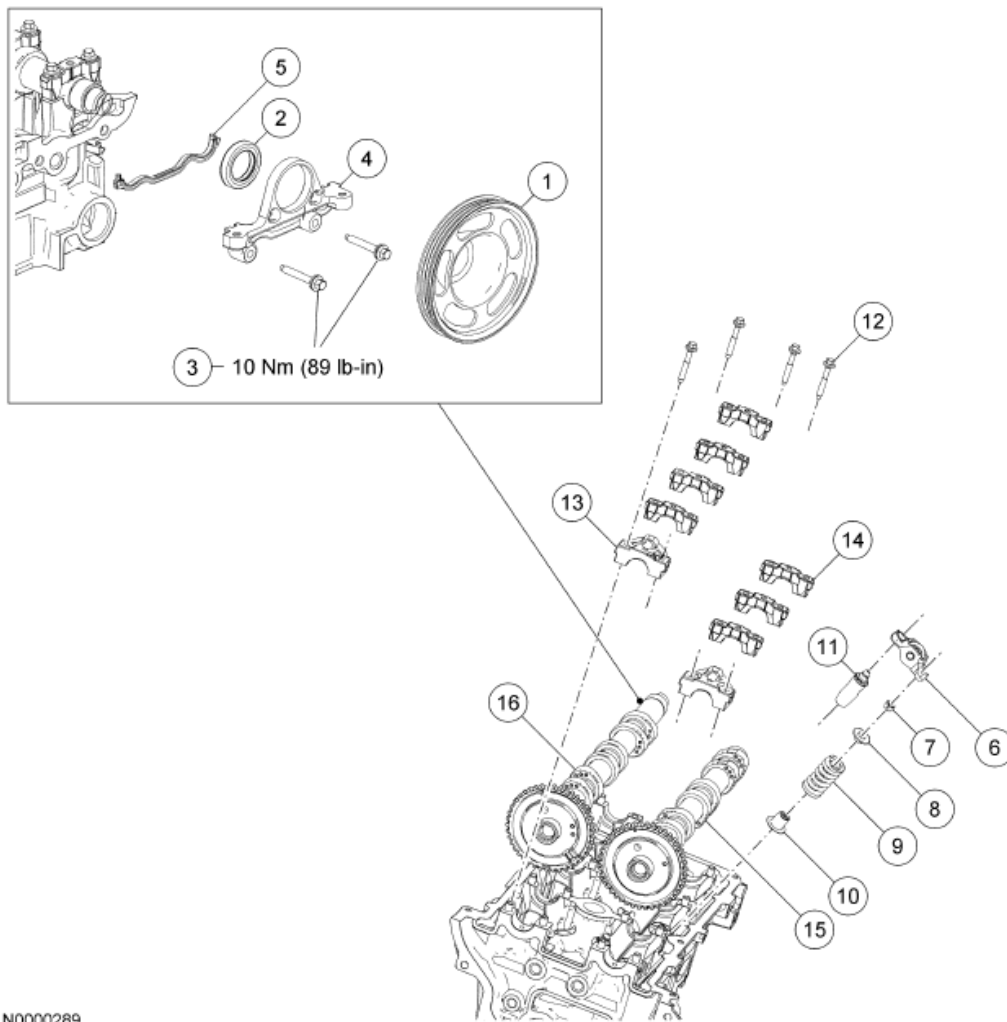
Fig. 61: Locating Spark Plugs
Courtesy of FORD MOTOR CO.

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

VALVE TRAIN COMPONENTS - EXPLODED VIEW

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



N0000289

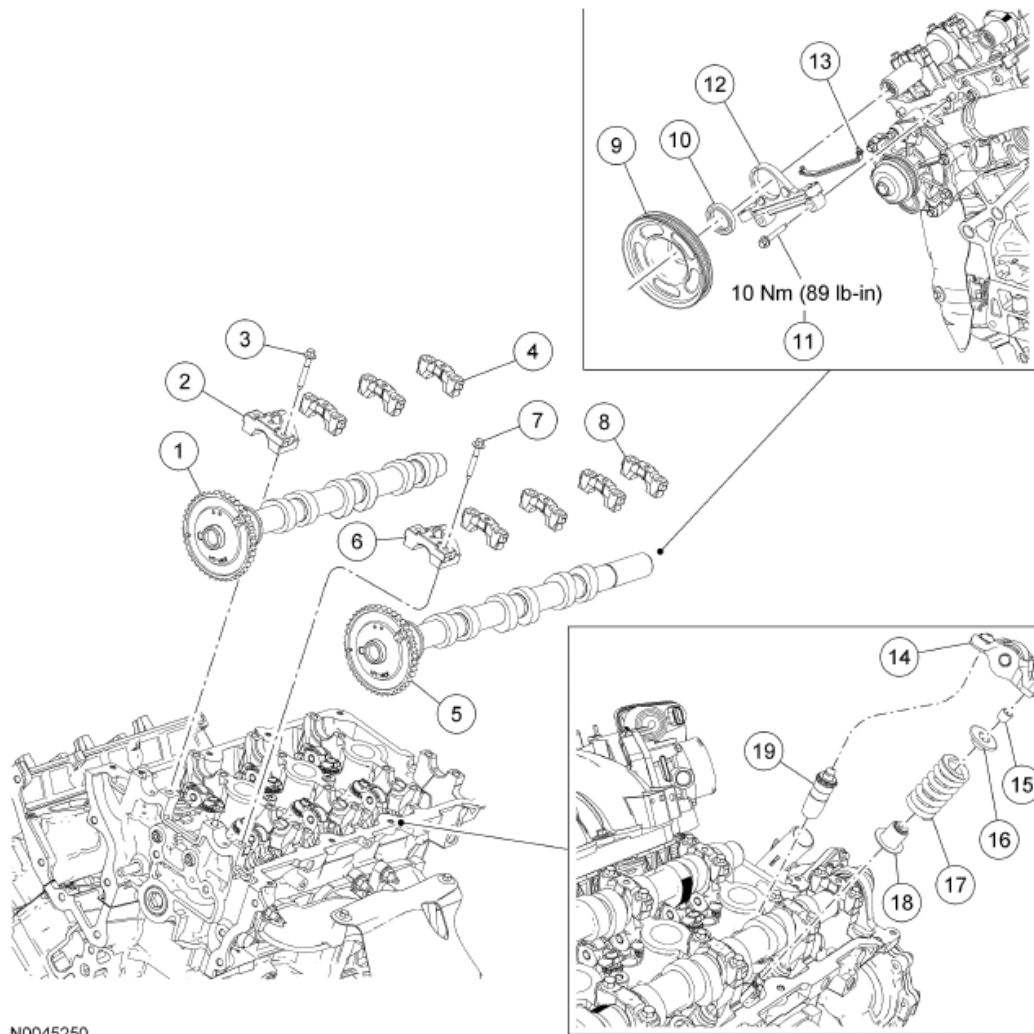
Item	Part Number	Description
1	6A359	Coolant pump drive pulley
2	—	Camshaft oil seal
3	W701242	Camshaft oil seal retainer bolts
4	6B293	Camshaft oil seal retainer
5	6B295	Camshaft oil seal retainer gasket
6	6529	Roller follower (12 required)
7	6518	Valve spring retainer key (24 required)
8	6514	Valve spring retainer (12 required)

Item	Part Number	Description
9	6513	Valve spring (12 required)
10	6A517	Valve stem seal (12 required)
11	6C501	Hydraulic lash adjuster (12 required)
12	W710702	Camshaft bearing cap bolts (16 required)
13	6B280	Camshaft bearing thrust cap (2 required)
14	6B280	Camshaft bearing cap (7 required)
15	6A267	LH exhaust camshaft
16	6A269	LH intake camshaft

Fig. 62: Identifying Valve Train Components - LH Early Build (With Torque Specifications)
 Courtesy of FORD MOTOR CO.

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



N0045250

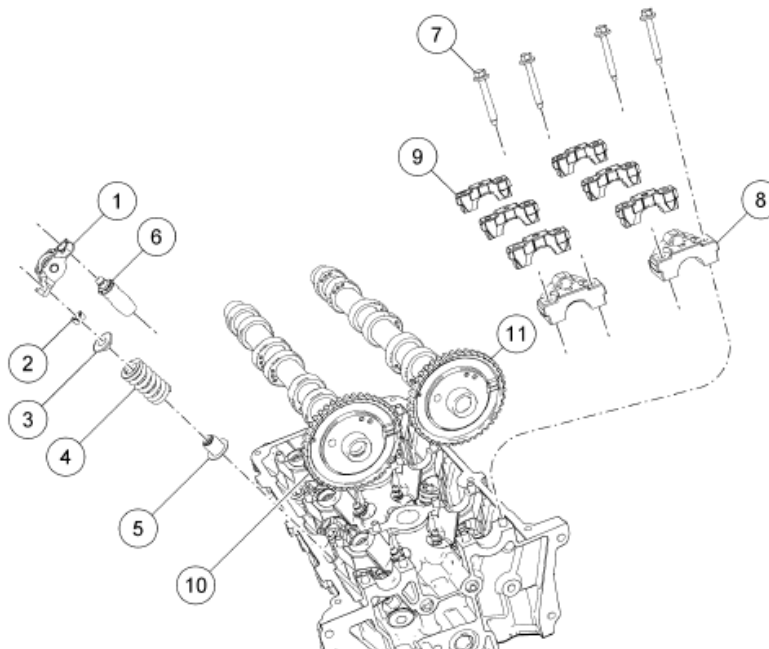
Item	Part Number	Description
1	6A267	LH intake camshaft
2	6B280	Intake camshaft thrust bearing cap
3	W710702	Intake camshaft bearing cap bolt (8 required)
4	6B280	Intake camshaft bearing cap (3 required)
5	6A269	LH exhaust camshaft
6	6B280	Exhaust camshaft thrust bearing cap
7	W710702	Exhaust camshaft bearing cap bolt (10 required)
8	6B280	Exhaust camshaft bearing cap (4 required)
9	6A359	Coolant pump drive pulley
10	—	Camshaft oil seal

Item	Part Number	Description
11	W701242	Camshaft oil seal retainer bolt (2 required)
12	6B293	Camshaft oil seal retainer
13	6B295	Camshaft oil seal retainer gasket
14	6529	Roller follower (12 required)
15	6518	Valve spring retainer key (24 required)
16	6514	Valve spring retainer (12 required)
17	6513	Valve spring (12 required)
18	6A517	Valve stem seal (12 required)
19	6C501	Hydraulic lash adjuster (12 required)

Fig. 63: Identifying Valve Train Components - LH Late Build (With Torque Specifications)
Courtesy of FORD MOTOR CO.

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



N0000290

Item	Part Number	Description
1	6529	Roller follower (12 required)
2	6518	Valve spring retainer key (24 required)
3	6514	Valve spring retainer (12 required)
4	6513	Valve spring (12 required)
5	6A517	Valve stem seal (12 required)
6	6C501	Hydraulic lash adjuster (12 required)

Item	Part Number	Description
7	W710702	Camshaft bearing cap bolt (16 required)
8	6B280	Camshaft bearing thrust cap (2 required)
9	6B280	Camshaft bearing cap (6 required)
10	6A268	RH exhaust camshaft
11	6A266	RH intake camshaft

Fig. 64: Identifying Valve Train Components - RH
Courtesy of FORD MOTOR CO.

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

CAMSHAFTS - LH

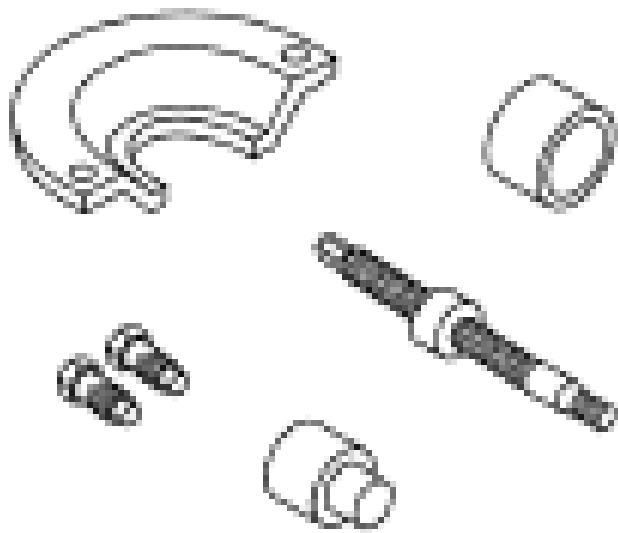
Special Tool(s)

SPECIAL TOOL(S)

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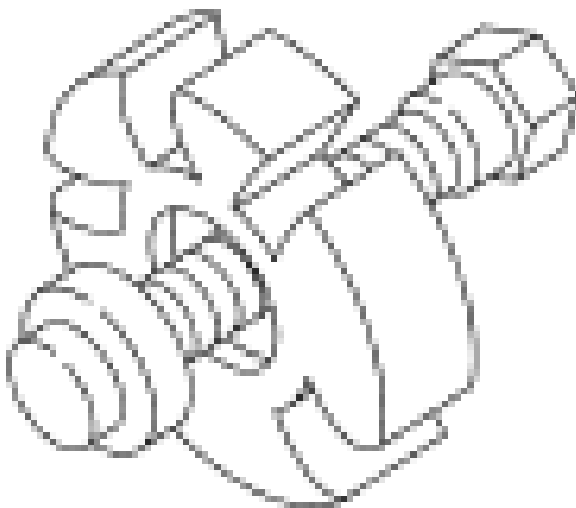
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



Service Set, Water Pump Pulley
303-S455 (T94P-6312-AH)

ST1971-A

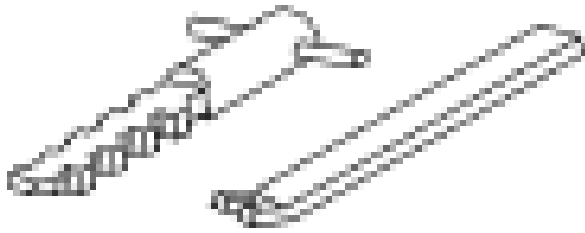


Remover, Crankshaft Vibration Damper
303-009 (T58P-6316-D)

ST1286-A

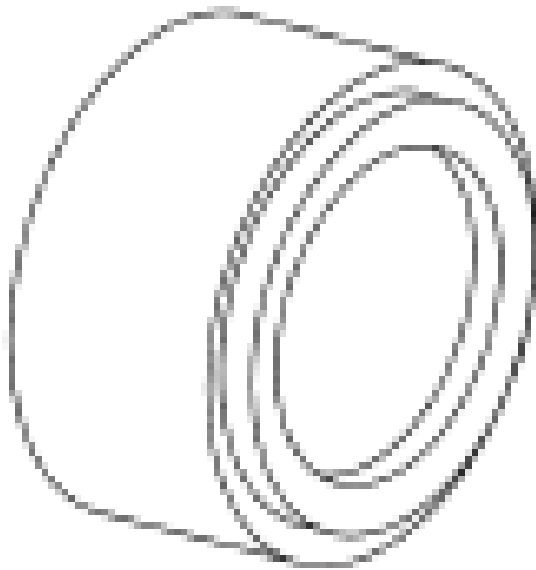
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



Remover, Oil Seal
303-409 (T92C-6700-CH)

ST1385-A



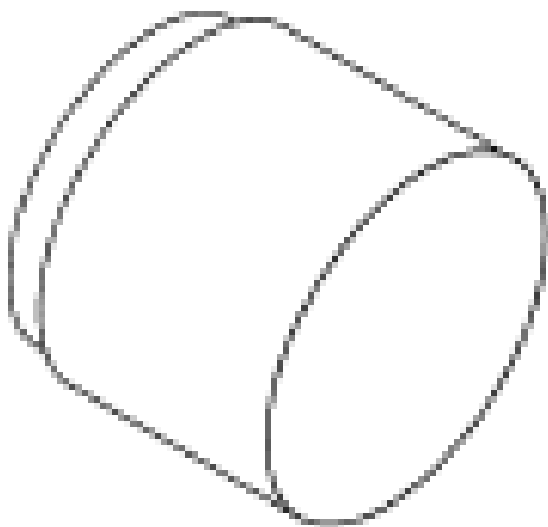
Installer, Camshaft Oil Seal
303-464 (T94P-6256-BH)

ST1970-A

Protector, Camshaft Oil Seal

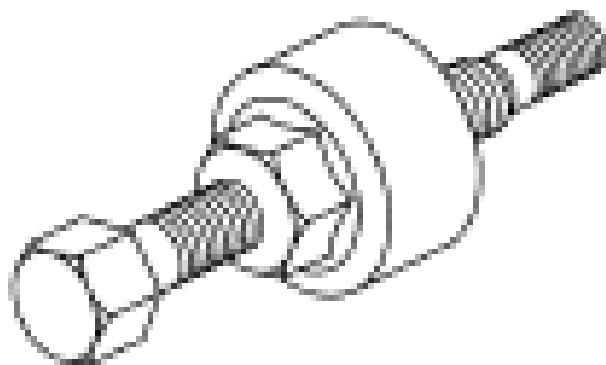
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST2060-A

303-463 (T94P-6256-AH)



ST1586-A

Installer, Power Steering Pump Pulley
211-185 (T91P-3A733-A)

Materials

MATERIALS

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE- M5B392-A
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada	WSS-

Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent

M2C930-A

Removal

NOTE: Early build engines are equipped with the coolant pump drive pulley on the LH intake camshaft, late build engines are equipped with the coolant pump drive pulley on the LH exhaust camshaft.

All engines

1. Remove the coolant pump belt. For additional information refer to **REMOVAL**.
2. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

CAUTION: On early build engines, the OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. On late build engines, the OEM pulley is pressed on flush to the end of the camshaft. Service pulleys on all engines are pressed on flush to the end of the camshaft.

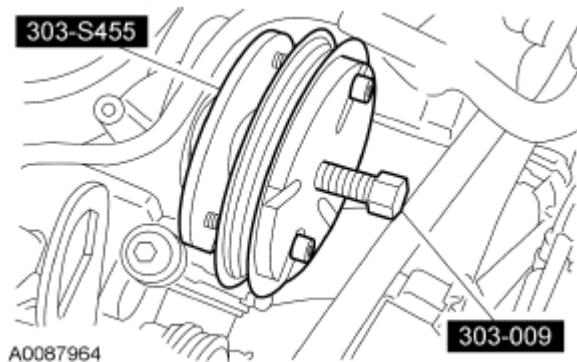


Fig. 65: Removing Coolant Pump Pulley Using Special Tools (303-009, 303-S455)
Courtesy of FORD MOTOR CO.

3. Using the special tools, remove and discard the coolant pump pulley.

CAUTION: To make sure of correct sealing, do not scratch the camshaft.

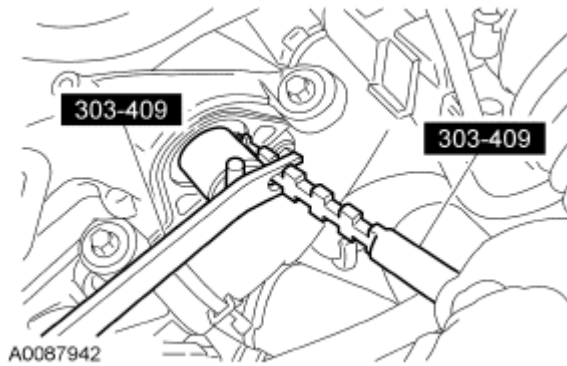


Fig. 66: Removing Camshaft Oil Seal Using Special Tool (303-409)
Courtesy of FORD MOTOR CO.

4. Using the special tools, remove and discard the camshaft oil seal.
5. Remove the 2 bolts and the camshaft oil seal retainer.
 - Discard the press-in-place gasket.

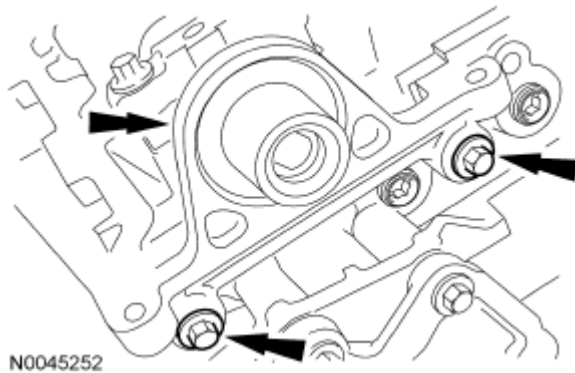


Fig. 67: Locating Camshaft Oil Seal Retainer Bolts
Courtesy of FORD MOTOR CO.

Early build engines

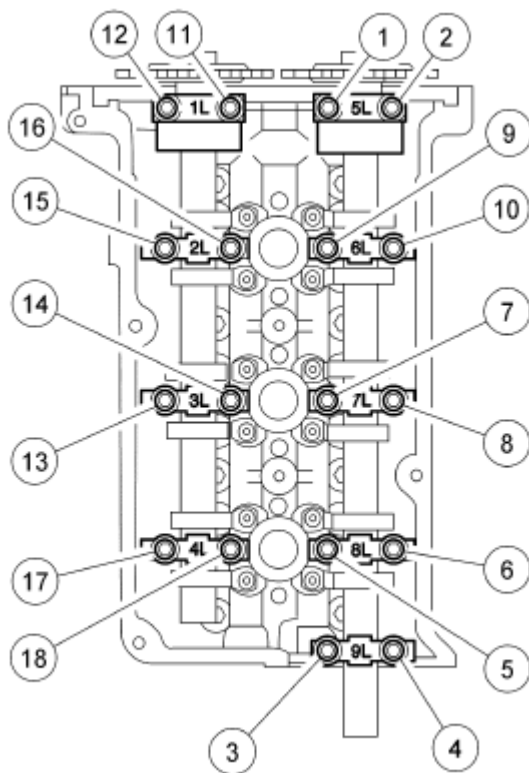
CAUTION:

Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions. If the numbers cannot be seen, mark the camshaft bearing caps prior to removing them.

After loosening all of the camshaft bearing cap bolts, remove the camshaft bearing thrust caps (1L and 5L) first, or damage to the thrust caps may occur.

6. Loosen the bolts evenly in the sequence shown in **Fig. 68**.
 1. Remove the camshaft bearing thrust caps (1L and 5L)
 2. Remove the remaining camshaft bearing caps.

3. Remove the camshafts from the cylinder head.



N0028533

Fig. 68: Identifying Loosening Sequence Of Camshaft Bearing Caps Bolts
Courtesy of FORD MOTOR CO.

Late build engines

CAUTION:

Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions. If the numbers cannot be seen, mark the camshaft bearing caps prior to removing them.

After loosening all of the camshaft bearing cap bolts, remove the camshaft bearing thrust caps (1L and 6L) first, or damage to the thrust caps may occur.

7. Loosen the bolts evenly in the sequence shown in **Fig. 69**.
 1. Remove the camshaft bearing thrust caps (1L and 6L).
 2. Remove the remaining camshaft bearing caps.
 3. Remove the camshafts from the cylinder head.

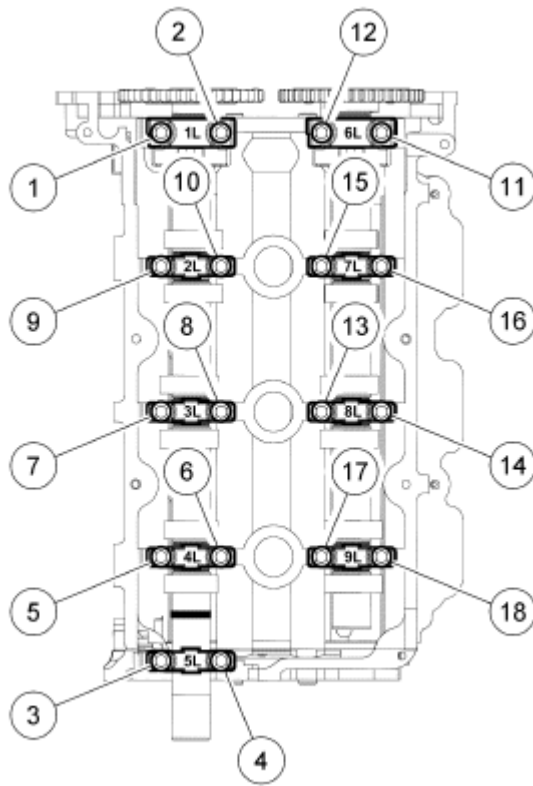


Fig. 69: Identifying Loosening Sequence Of Camshaft Bearing Thrust Caps
Courtesy of FORD MOTOR CO.

Installation

All vehicles

1. Lubricate the camshafts with clean engine oil and carefully position the camshafts into the cylinder head.
 - Align the camshafts as shown.

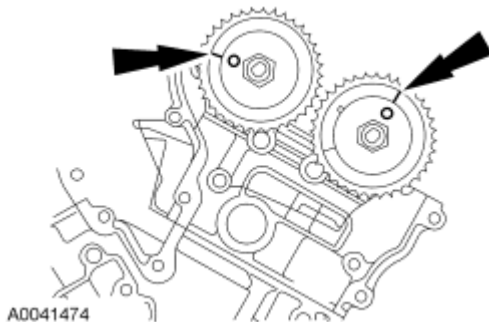


Fig. 70: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

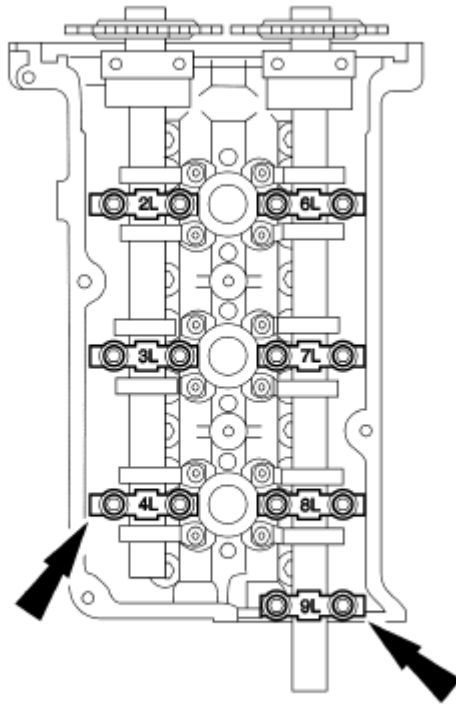
Early build vehicles

CAUTION:

The camshaft caps must be installed in their original positions or damage to the engine may occur.

Do not install the camshaft bearing thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.

2. Lubricate the bearing surfaces of the camshaft bearing caps with clean engine oil and install the bearing caps.
 - Loosely install the bolts.



A0017886

Fig. 71: Locating Camshaft Bearing Caps Bolts
Courtesy of FORD MOTOR CO.

3. Lubricate the bearing surfaces of the camshaft bearing thrust caps with clean engine oil and install the bearing thrust caps.
 - Loosely install the bolts.

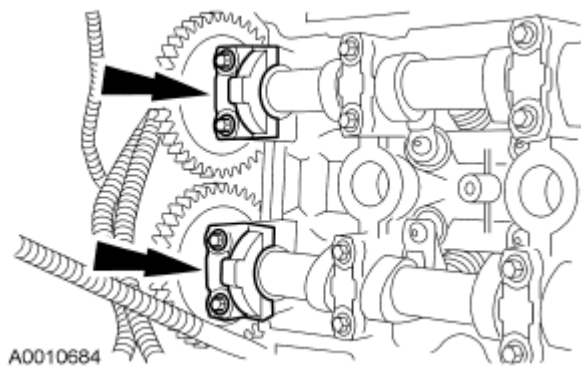


Fig. 72: Locating Camshaft Bearing Thrust Caps
Courtesy of FORD MOTOR CO.

4. Install the bolts.
 - Tighten in the sequence shown to 8 N.m (71 lb-in).

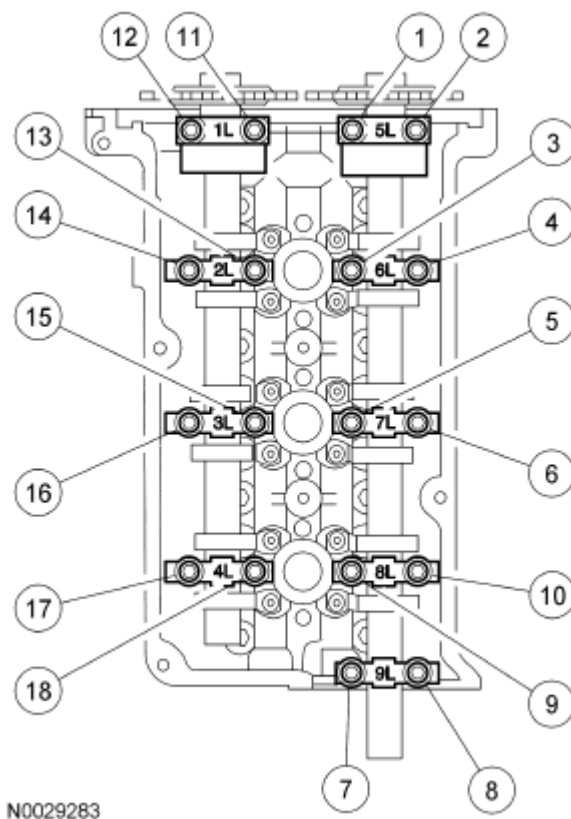


Fig. 73: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

Late build engines

CAUTION: The camshaft caps must be installed in their original positions

or damage to the engine may occur.

Do not install the camshaft bearing thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.

5. Lubricate the bearing surfaces of the camshaft bearing caps with clean engine oil and install the bearing caps.
 - Loosely install the bolts.

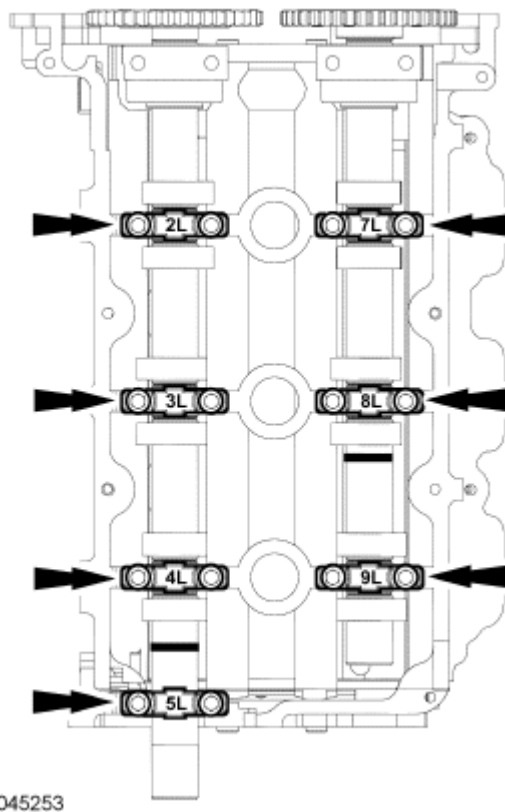


Fig. 74: Identifying Loosening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

6. Lubricate the bearing surfaces of the camshaft bearing thrust caps with clean engine oil and install the bearing thrust caps.
 - Loosely install the bolts.

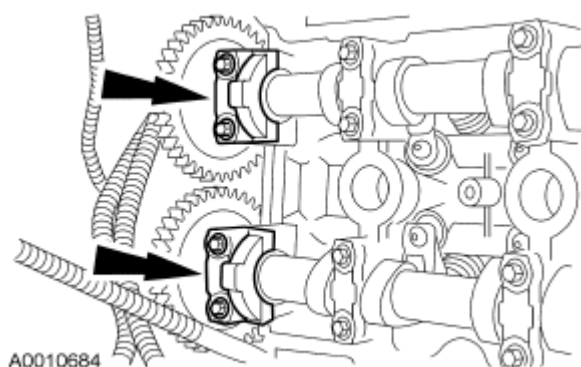


Fig. 75: Locating Camshaft Bearing Thrust Caps
Courtesy of FORD MOTOR CO.

7. Install the bolts.
 - Tighten in the sequence shown to 8 N.m (71 lb-in).

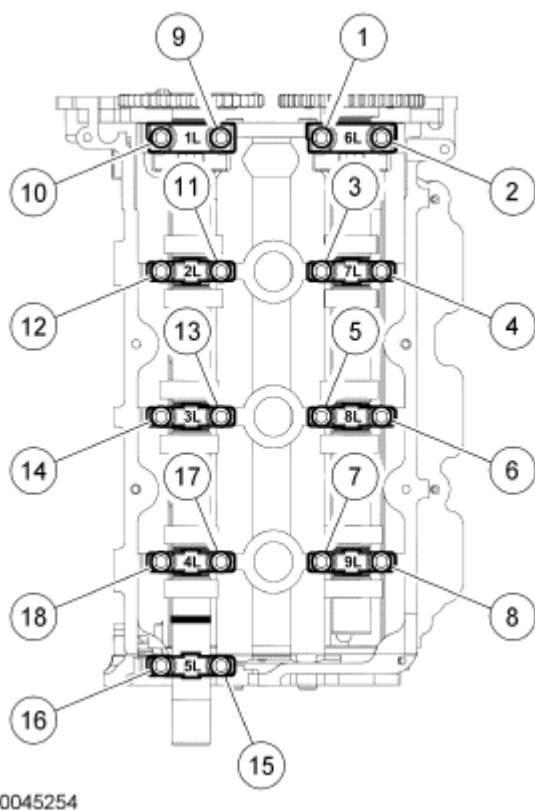


Fig. 76: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

All engines

NOTE: Clean the sealing surfaces with metal surface cleaner before installing a

new press-in-place gasket.

8. Install the camshaft oil seal retainer and the 2 bolts.
 - Tighten to 10 N.m (89 lb-in).

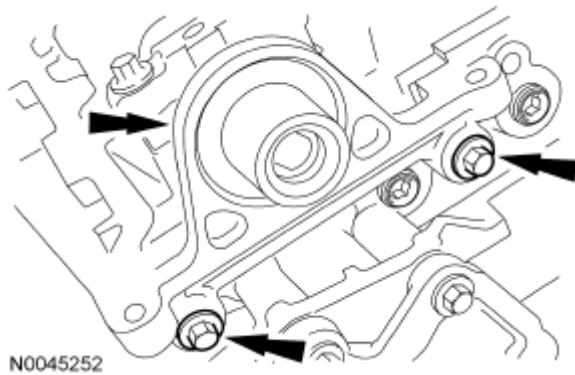


Fig. 77: Locating Camshaft Oil Seal Retainer & Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the camshaft oil seal with clean engine oil.

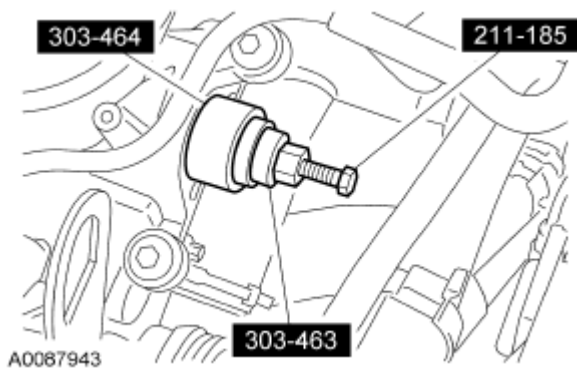


Fig. 78: Installing Camshaft Oil Seal Using Special Tools (303-463, 303-464, 211-185)
Courtesy of FORD MOTOR CO.

9. Using the special tools, install the camshaft oil seal.

CAUTION: On early build engines, the OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. On late build engines, the OEM pulley is pressed on flush to the end of the camshaft. Service pulleys on all engines are pressed on flush to the end of the camshaft.

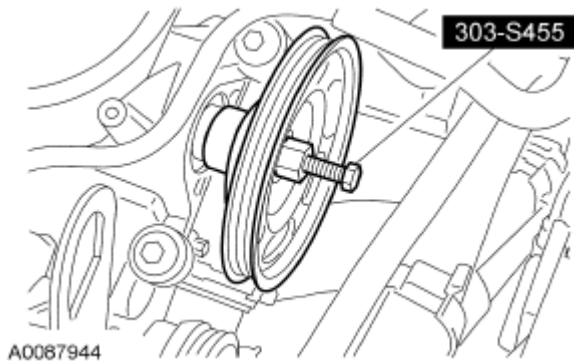


Fig. 79: Installing Coolant Pump Pulley Using Special Tool (303-S455)
Courtesy of FORD MOTOR CO.

10. Using the special tool, install a new service coolant pump pulley.
11. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.
12. Install the coolant pump belt. For additional information refer to **INSTALLATION** .

CAMSHAFTS - RH

Materials

MATERIALS

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

Removal

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

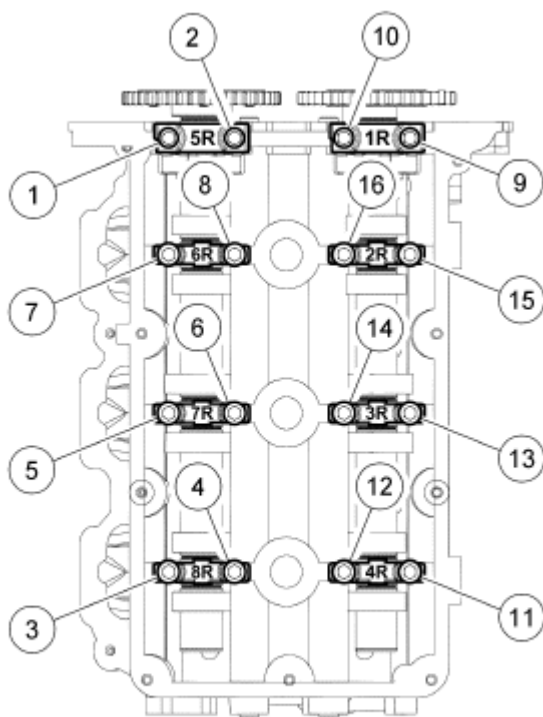
CAUTION:

Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions. If the numbers cannot be seen, mark the camshaft bearing caps prior to removing them.

After loosening all of the camshaft bearing cap bolts, remove the camshaft bearing thrust caps (5R and 1R) first, or damage to the thrust caps may occur.

2. Loosen the bolts evenly in the sequence shown in **Fig. 80**.
 1. Remove the camshaft bearing thrust caps (5R and 1R).
 2. Remove the remaining camshaft bearing caps.

3. Remove the camshafts from the cylinder head.

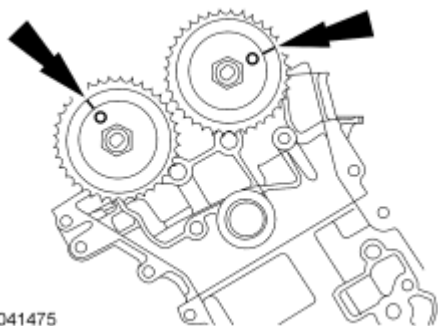


N0045707

Fig. 80: Identifying Loosening Sequence Of Camshaft Bearing Caps
Courtesy of FORD MOTOR CO.

Installation

1. Lubricate the camshafts with clean engine oil and carefully position the camshafts into the cylinder head.
 - Align the camshafts as shown in **Fig. 81**.



A0041475

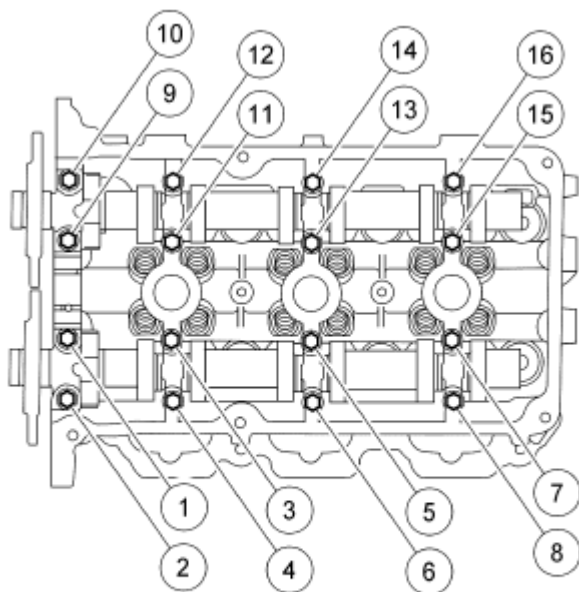
Fig. 81: Locating Camshafts Align Marks
Courtesy of FORD MOTOR CO.

CAUTION: The camshaft caps must be installed in their original positions

or damage to the engine may occur.

Do not install the camshaft bearing thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.

2. Lubricate the bearing surfaces of the camshaft bearing caps with clean engine oil and install the bearing caps.
 - Loosely install the bolts.
3. Lubricate the bearing surfaces of the camshaft bearing thrust caps with clean engine oil and install the bearing thrust caps.
 - Loosely install the bolts.
4. Install the bolts.
 - Tighten in the sequence shown to 10 N.m (89 lb-in).



N0000342

Fig. 82: Identifying Tightening Sequence Of Camshaft Bearing Thrust Caps Bolts
Courtesy of FORD MOTOR CO.

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

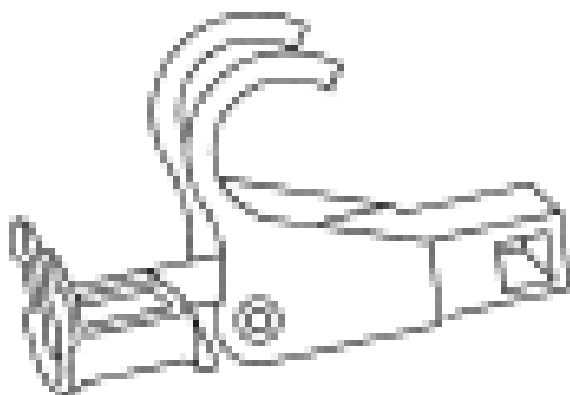
CAMSHAFT ROLLER FOLLOWER

Special Tool(s)

SPECIAL TOOL(S)

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1975-A

Compressor, Valve Spring
303-473 (T94P-6565-BH)

Materials

MATERIALS

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

Removal and Installation

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the LH and RH valve covers. For additional information, refer to **VALVE COVER - LH** and **VALVE COVER - RH**.
3. Remove the 6 spark plugs.
 - To install, tighten to 15 N.m (11 lb-ft).
4. Remove the RH splash shield.
 - To install, tighten to 9 N.m (80 lb-in).
5. Rotate the crankshaft until the camshaft lobe is pointing directly away from the roller follower.
6. Using the special tool, remove the roller followers.

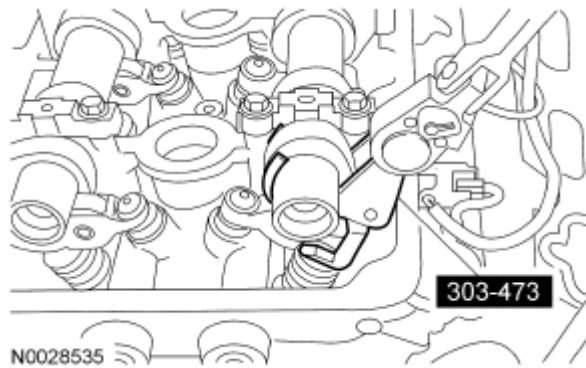


Fig. 83: Removing Roller Using Special Tool (303-473)
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the camshaft followers with clean engine oil.

7. To install, reverse the removal procedure.

HYDRAULIC LASH ADJUSTER

Materials

MATERIALS

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

Removal and Installation

1. Remove the camshaft roller followers. For additional information, refer to **CAMSHAFT ROLLER FOLLOWER**.

NOTE: Mark the positions of the hydraulic lash adjusters to make sure they are assembled in their original positions.

2. Remove the hydraulic lash adjusters.

NOTE: Inspect the hydraulic lash adjusters for scoring marks and uneven wear in the bore. Install new lash adjusters if necessary.

3. To install, reverse the removal procedure.
 - Lubricate the hydraulic lash adjusters with clean engine oil.

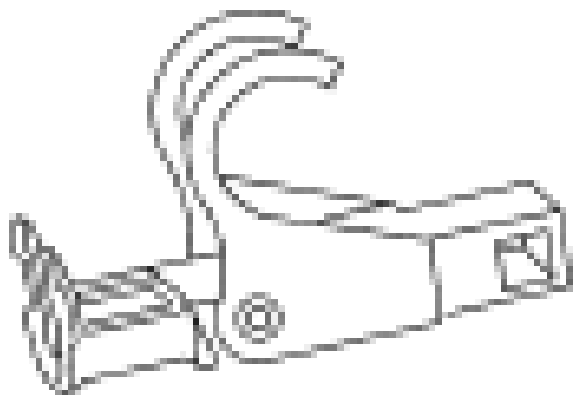
VALVE SPRING, RETAINER, AND SEAL

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

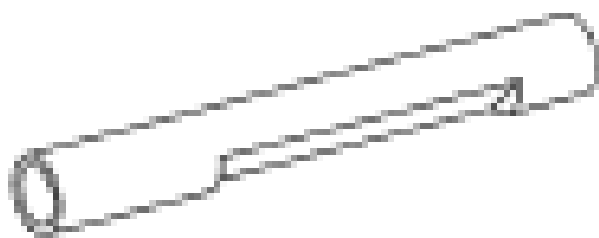
Special Tool(s)

SPECIAL TOOL(S)



ST1975-A

Compressor, Valve Spring
303-473 (T94P-6565-BH)



ST1977-A

Installer, Valve Stem Oil Seal
303-470 (T94P-6510-CH)

Materials

MATERIALS

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

Removal

1. Remove the camshaft roller followers. For additional information, refer to **CAMSHAFT ROLLER FOLLOWER**.

NOTE: If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve(s) to fall into the cylinder. A rubber band, tape or string wrapped around the end of the valve stem will prevent this from happening.

2. Pressurize the cylinder using compressed air.
3. Using the special tool, remove the key, retainer and the valve spring.



Fig. 84: Identifying Special Tool (303-473)
Courtesy of FORD MOTOR CO.

NOTE: Camshaft removed for clarity.

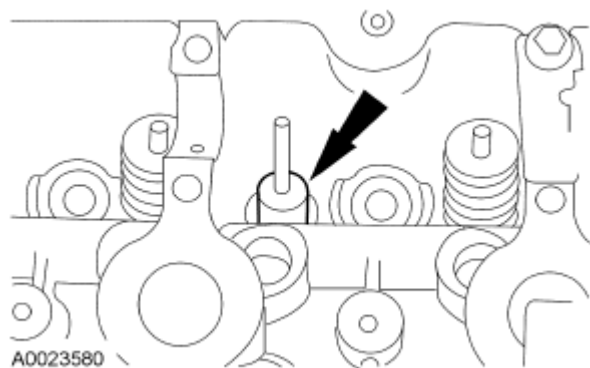


Fig. 85: Locating Valve Seal
Courtesy of FORD MOTOR CO.

4. Remove the valve seal.

Installation

NOTE: Lubricate the valve guide with clean engine oil.

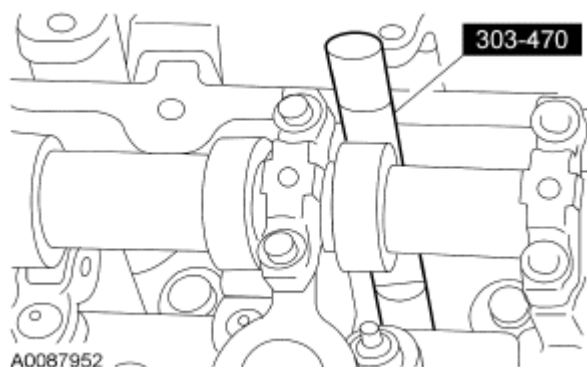


Fig. 86: Identifying Special Tool (303-470)
Courtesy of FORD MOTOR CO.

1. Using the special tool, install the valve seal.
2. Using the special tool, install the valve spring, retainer and key.



Fig. 87: Identifying Special Tool (303-473)
Courtesy of FORD MOTOR CO.

3. Install the camshaft roller followers. For additional information, refer to **CAMSHAFT ROLLER FOLLOWER**.

CYLINDER HEAD - RH

MATERIALS

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can

cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.
3. Remove the coolant bypass tube. For additional information, refer to **REMOVAL AND INSTALLATION**.
4. Remove the RH camshafts. For additional information, refer to **CAMSHAFTS - RH**.

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

5. Remove the camshaft roller followers.

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

6. Remove the hydraulic lash adjusters.
7. Remove the 6 RH exhaust manifold nuts and position the manifold aside.

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

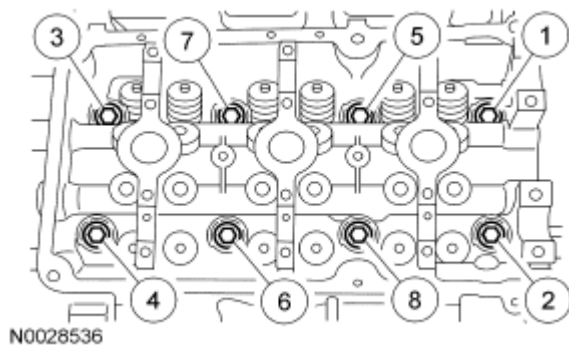


Fig. 88: Identifying Removing Sequence Of Bolts
Courtesy of FORD MOTOR CO.

8. Remove the bolts in the sequence shown in **Fig. 88**.
9. Remove the cylinder head and support the cylinder head on a bench with the head gasket side up.
 - Discard the gasket and the bolts.

NOTE: The straightedge used must be flat within 0.0051 mm (0.0002 in) per foot of tool length.

10. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in).

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gauges which make leak paths.

1. Use a plastic scraping tool to remove all traces of the head gasket.
 - Clean all surfaces with metal surface cleaner.
2. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.
3. Position a new gasket and the cylinder head.

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

4. Install the bolts and tighten in 6 stages in the sequence shown in **Fig. 89**.
 - Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten bolts 90 degrees.
 - Stage 3: Loosen one full turn.
 - Stage 4: Tighten to 40 N.m (30 lb-ft).
 - Stage 5: Tighten 90 degrees.
 - Stage 6: Tighten 90 degrees.

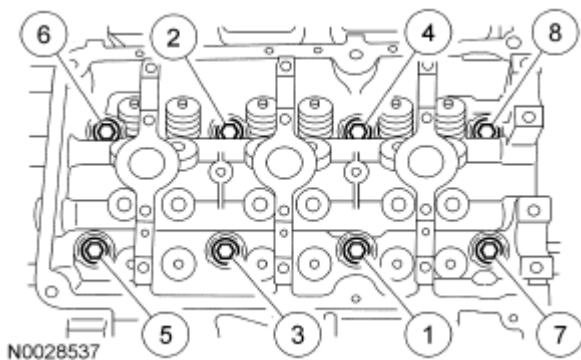


Fig. 89: Identifying Loosening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

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

5. Install the hydraulic lash adjusters.
 - Lubricate the hydraulic lash adjusters with clean engine oil.

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

6. Install the camshaft roller followers.
 - Lubricate the camshaft roller followers with clean engine oil.
7. Position the RH exhaust manifold and install the nuts.
 - Tighten in the sequence shown to 20 N.m (15 lb-ft).

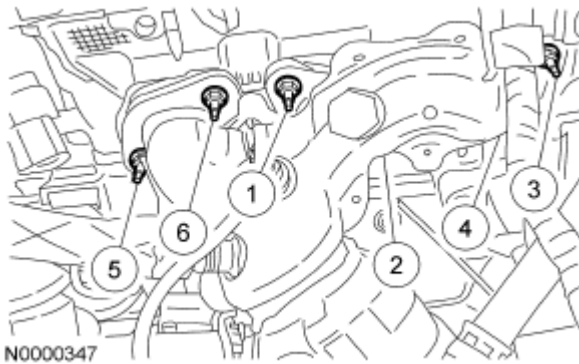


Fig. 90: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

8. Install the RH camshafts. For additional information, refer to VALVE COVER - RH.
9. Install the coolant bypass tube. For additional information, refer to REMOVAL AND INSTALLATION.
10. Install the lower intake manifold. For additional information, refer to LOWER INTAKE MANIFOLD.

CYLINDER HEAD - LH

Materials

MATERIALS

Item	Specification
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A

Removal

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

All engines

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.
3. Remove the coolant bypass tube. For additional information, refer to **REMOVAL AND INSTALLATION**.
4. Remove the LH camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **CAMSHAFTS - LH**.
5. Remove the LH exhaust manifold. For additional information refer to **EXHAUST SYSTEM**.
6. Remove the oil level indicator and tube. For additional information, refer to **OIL LEVEL INDICATOR AND TUBE**.
7. Remove the 3 bolts and position the coolant pump aside.

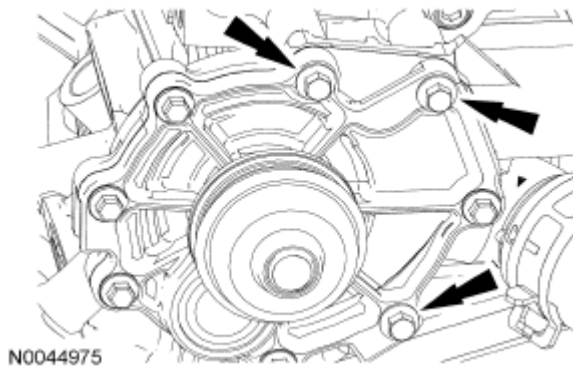


Fig. 91: Locating Coolant Pump Bolts

Courtesy of FORD MOTOR CO.

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

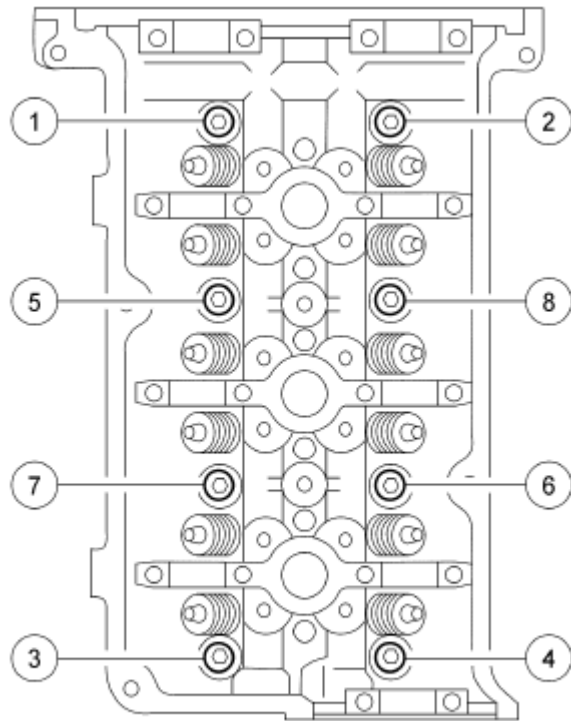
8. Remove the camshaft roller followers.

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

9. Remove the hydraulic lash adjusters.

Early build engines

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



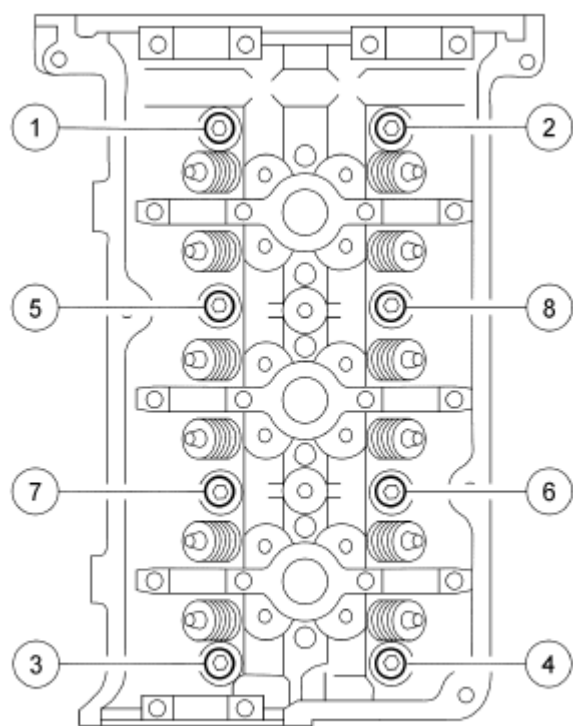
N0028538

Fig. 92: Identifying Removing Sequence Of Bolts - Early Build Engines
Courtesy of FORD MOTOR CO.

10. Remove the bolts in the sequence shown.

Late build engines

NOTE: New cylinder head bolts must be installed. The old bolts are torque-to-yield designed and cannot be reused.



N0001536

Fig. 93: Identifying Removing Sequence Of Bolts - Late Build Engines
Courtesy of FORD MOTOR CO.

11. Remove the bolts in the sequence shown.

All engines

12. Remove the cylinder head and support the cylinder head on a bench with the head gasket side up.
 - Discard the gasket and the bolts.

NOTE: The straightedge used must be flat within 0.0051 mm (0.0002 in) per foot of tool length.

13. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in).

Installation

All engines

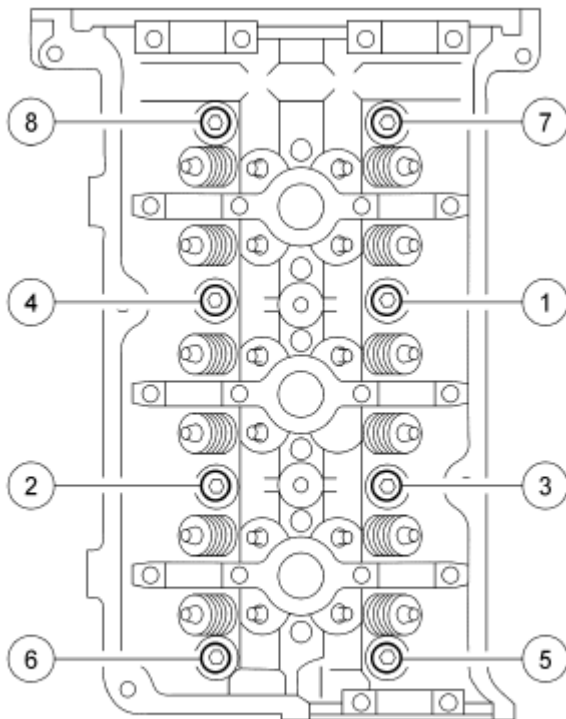
CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

1. Use a plastic scraping tool to remove all traces of the head gasket.
 - Clean all surfaces with metal surface cleaner.
2. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.
3. Position a new gasket and the cylinder head.

Early build engines

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

4. Install the bolts and tighten in 6 stages in the sequence shown in **Fig. 94**.
 - Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten bolts 90 degrees.
 - Stage 3: Loosen one full turn.
 - Stage 4: Tighten to 40 N.m (30 lb-ft).
 - Stage 5: Tighten 90 degrees.
 - Stage 6: Tighten 90 degrees.



N0028539

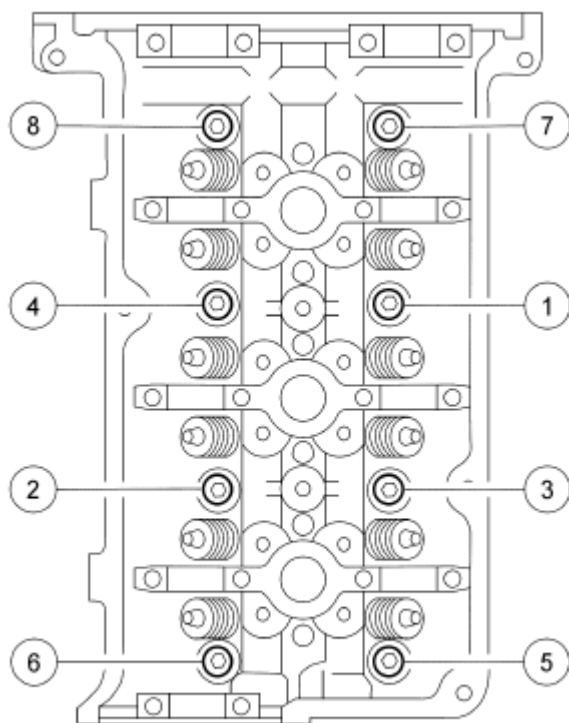
Fig. 94: Identifying Installing Sequence Of Cylinder Head Bolts - Early Build Engines
Courtesy of FORD MOTOR CO.

Late build engines

NOTE: New cylinder head bolts must be installed. The old bolts are torque-to-yield designed and cannot be reused.

5. Install the bolts and tighten in 6 stages in the sequence shown in **Fig. 95**.

- Stage 1: Tighten to 40 N.m (30 lb-ft).
- Stage 2: Tighten 90 degrees.
- Stage 3: Loosen one full turn.
- Stage 4: Tighten to 40 N.m (30 lb-ft).
- Stage 5: Tighten 90 degrees.
- Stage 6: Tighten 90 degrees.



N0001535

Fig. 95: Identifying Installing Sequence Of Cylinder Head Bolts - Late Build Engines
Courtesy of FORD MOTOR CO.

All engines

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

6. Install the hydraulic lash adjusters.

- Lubricate the hydraulic lash adjusters with clean engine oil.

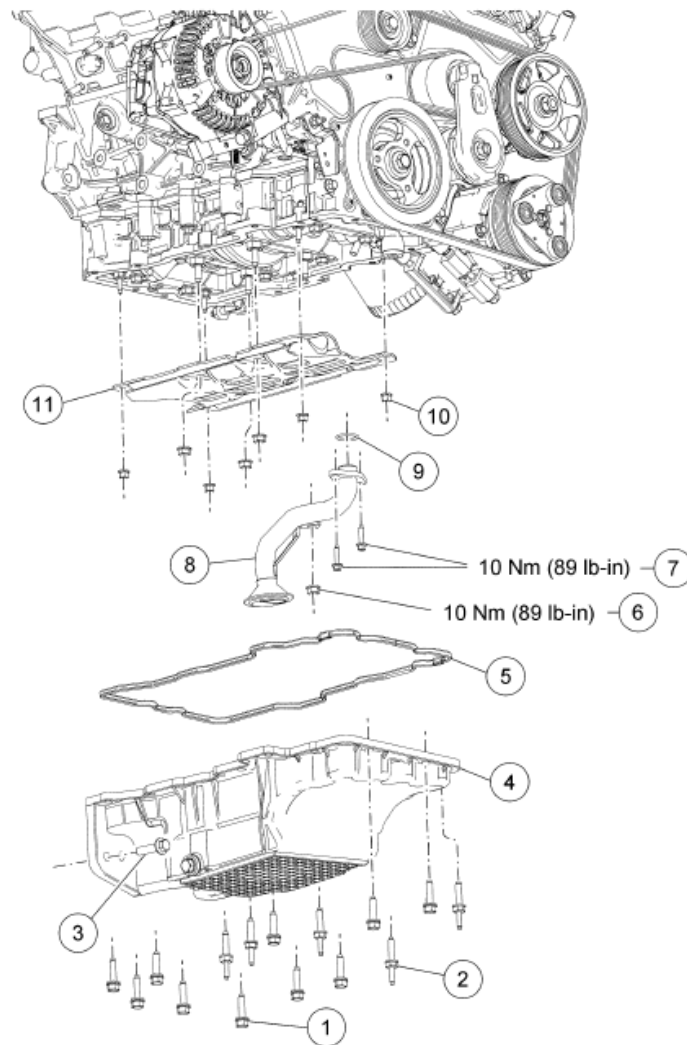
CAUTION: The camshaft roller followers must be installed in their original positions.

7. Install the camshaft roller followers.
 - Lubricate the camshaft roller followers with clean engine oil.
8. Position the coolant pump and install the bolts.
 - Tighten to 10 N.m (89 lb-in).
9. Install the oil level indicator and tube. For additional information refer to **OIL LEVEL INDICATOR AND TUBE**.
10. Install the LH exhaust manifold. For additional information refer to **EXHAUST SYSTEM**.
11. Install the camshafts. For additional information, refer to **VALVE TRAIN COMPONENTS - EXPLODED VIEW** and **CAMSHAFTS - LH**.
12. Install the coolant bypass tube. For additional information, refer to **REMOVAL AND INSTALLATION**.
13. Install the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

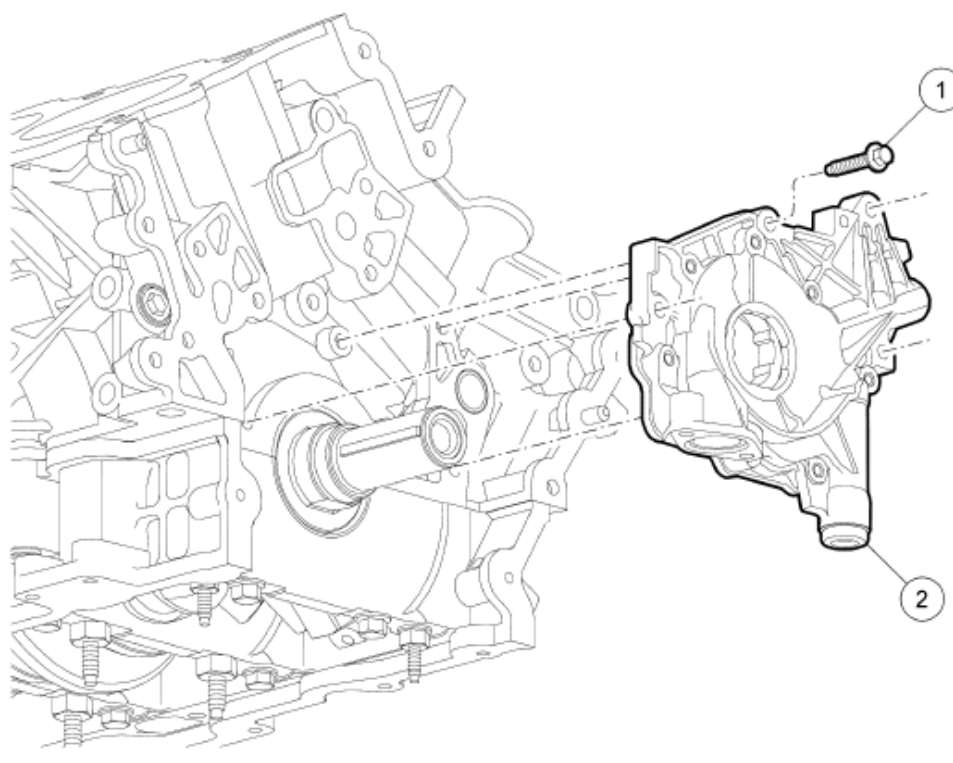


N0031783

Item	Part Number	Description
1	W701605	Oil pan-to-engine bolt (10 required)
2	W701606	Oil pan-to-engine stud bolt (5 required)
3	W500120	Oil pan-to-transaxle bolt (2 required)
4	6675	Oil pan
5	6710	Oil pan gasket

Item	Part Number	Description
6	W701582	Oil pump screen and pickup tube nut
7	W700005	Oil pump screen and pickup tube bolts (2 required)
8	6622	Oil pump screen and pickup tube
9	6625	Oil pump screen and pickup tube O-ring seal
10	W701542	Oil pan baffle nut (7 required)
11	6687	Oil pan baffle

Fig. 96: Identifying Oil Pan, Oil Pump Screen, Pickup Tube & Oil Pan Baffle Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.



Item	Part Number	Description
1	W500300	Oil pump bolt (4 required)
2	6621	Oil pump

Fig. 97: Identifying Oil Pump & Bolts
 Courtesy of FORD MOTOR CO.

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

OIL PAN

Materials

MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A

Removal

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the exhaust flexible pipe. For additional information, refer to **REMOVAL AND INSTALLATION**.
3. Drain the engine oil and install the drain plug.
 - Tighten to 26 Nm (19 lb-ft).
4. Remove and discard the oil filter.
5. Remove the 2 oil pan-to-transaxle bolts.

NOTE: For reference during installation, mark the location of the stud bolts.

6. Remove the 10 bolts, 5 stud bolts and the oil pan.
 - Remove and discard the oil pan gasket.

Installation

CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

1. Use a plastic scraping tool to remove all traces of the oil pan gasket.
 - Clean all sealing surfaces with metal surface cleaner and install a new oil pan gasket.

NOTE: The oil pan must be installed and the bolts tightened within 4 minutes of sealant application.

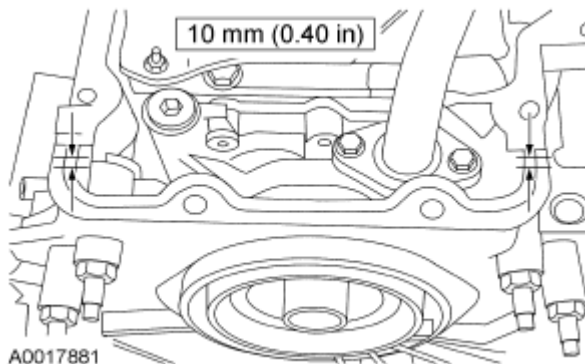


Fig. 98: Identifying Area For Applying Sealant
Courtesy of FORD MOTOR CO.

2. Apply a 10 mm (0.39 in) diameter dot of silicone sealant to the areas indicated.
3. Position the oil pan and loosely install the bolts and stud bolts.
4. Install the oil pan-to-transaxle bolts.
 - Tighten to 40 N.m (30 lb-ft).
5. Tighten the oil pan-to-engine bolts and stud bolts in the sequence shown to 25 N.m (18 lb-ft).

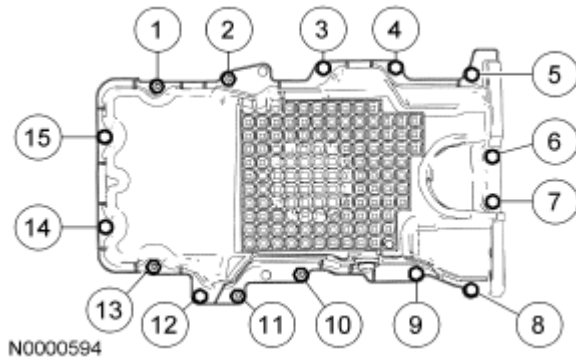


Fig. 99: Identifying Tightening Sequence Of Oil Pan-To-Engine Bolts
Courtesy of FORD MOTOR CO.

6. Install a new oil filter.
 - Tighten to 16 N.m (12 lb-ft).
7. Install the exhaust flexible pipe. For additional information, refer to **REMOVAL AND INSTALLATION**.
8. Fill the engine with clean engine oil.

OIL PUMP SCREEN AND PICKUP TUBE

Materials

MATERIALS

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

Removal

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

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

2. Remove the oil pan. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PAN**.
3. Remove the bolts, nut and the oil pump screen and pickup tube.
 - Remove and discard the O-ring seal.

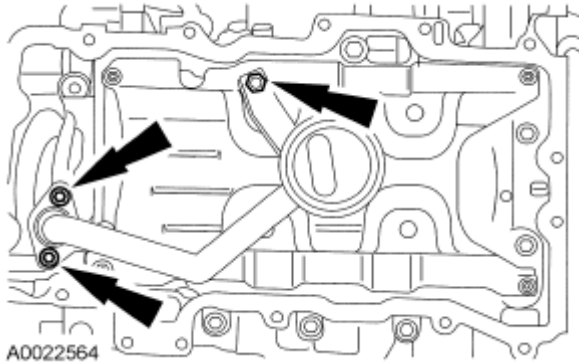


Fig. 100: Locating O-Ring Seal Bolts
Courtesy of FORD MOTOR CO.

Installation

1. Install a new O-ring seal on the oil pump screen and pickup tube.
 - Lubricate the O-ring seal with clean engine oil.
2. Install the oil pump screen and pickup tube.
 1. Position the oil pump screen and pickup tube.
 2. Install the bolts and tighten to 10 N.m (89 lb-in).
 3. Install the nut and tighten in 2 stages.
 - Stage 1: Tighten to 5 N.m (44 lb-in).
 - Stage 2: Tighten 45 degrees.

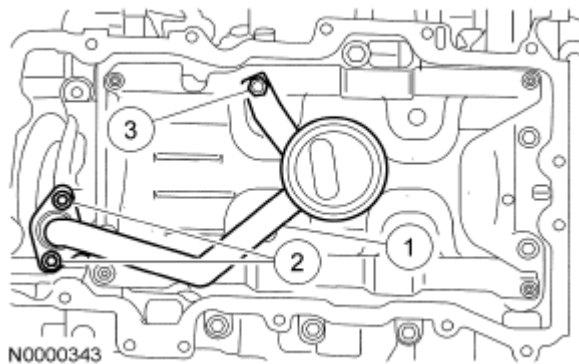


Fig. 101: Identifying Oil Pump Screen, Pickup Tube & Bolts
Courtesy of FORD MOTOR CO.

3. Install the oil pan. For additional information, refer to **OIL PAN**.

OIL PAN BAFFLE**Removal and Installation**

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the oil pump screen and pickup tube. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PUMP SCREEN AND PICKUP TUBE**.
3. Remove the 7 nuts and the oil pan baffle.
 - To install tighten the oil pan baffle nuts in 2 stages.
 - Stage 1: Tighten to 5 Nm (44 lb-in).
 - Stage 2: Tighten an additional 45 degrees.
4. To install, reverse the removal procedure.

OIL PUMP**Removal**

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING**.
2. Remove the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.
3. Remove the oil pump screen and pickup tube. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PUMP SCREEN AND PICKUP TUBE**.
4. Remove the bolts in the sequence shown in **Fig. 102**.

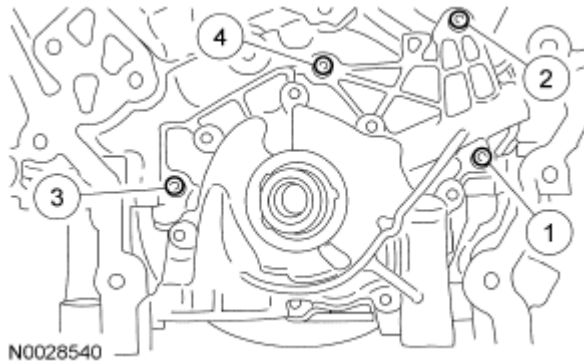


Fig. 102: Identifying Removing Sequence Of Bolts
Courtesy of FORD MOTOR CO.

Installation

1. Position the oil pump and install the bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

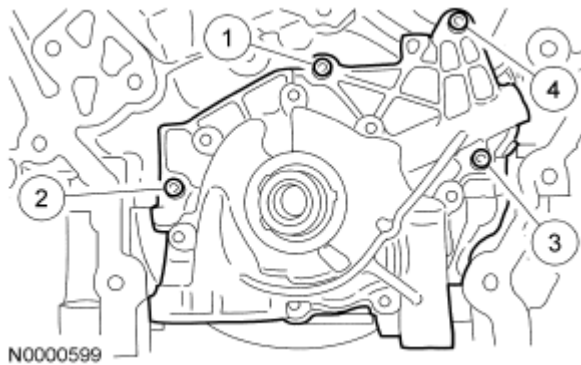


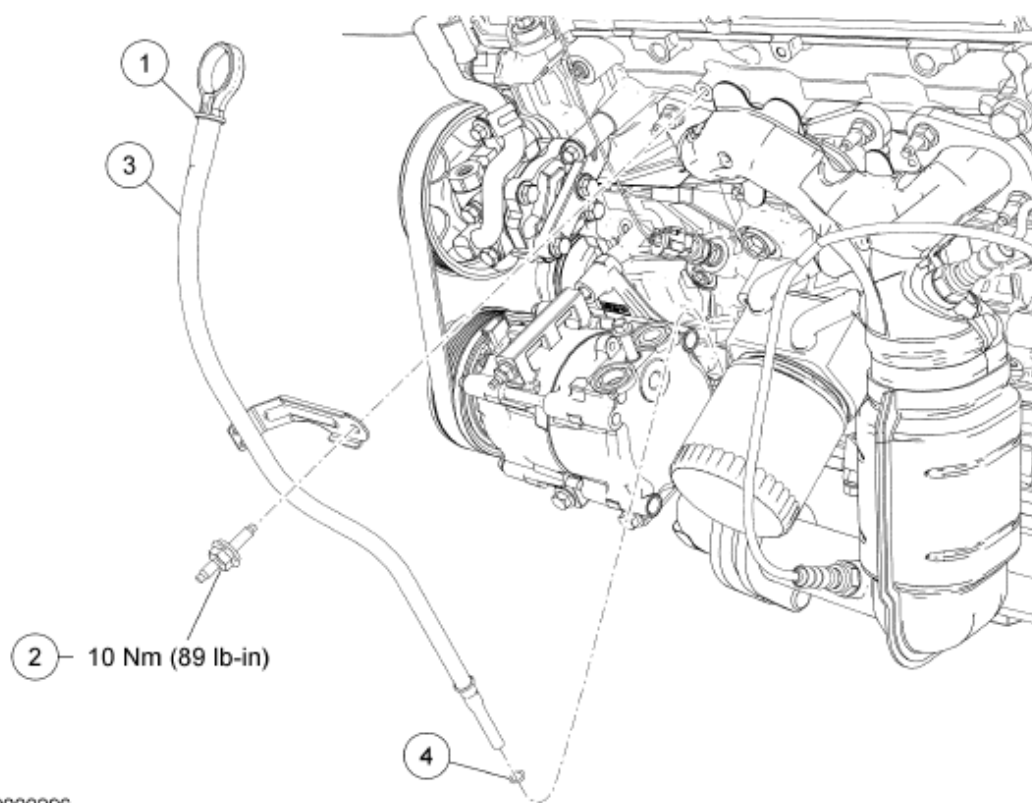
Fig. 103: Identifying Tightening Sequence Of Oil Pump Bolts
Courtesy of FORD MOTOR CO.

2. Install the oil pump screen and pickup tube. For additional information, refer to **ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW** and **OIL PUMP SCREEN AND PICKUP TUBE**.
3. Install the timing drive components. For additional information, refer to **TIMING DRIVE COMPONENTS**.

OIL LEVEL INDICATOR AND TUBE

MATERIALS

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



Item	Part Number	Description
1	6750	Oil level indicator
2	W701822	Oil level indicator tube bolt
3	6754	Oil level indicator tube
4	110282	Oil level indicator O-ring seal

Fig. 104: Identifying Oil Level Indicator & Tube Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Removal and Installation

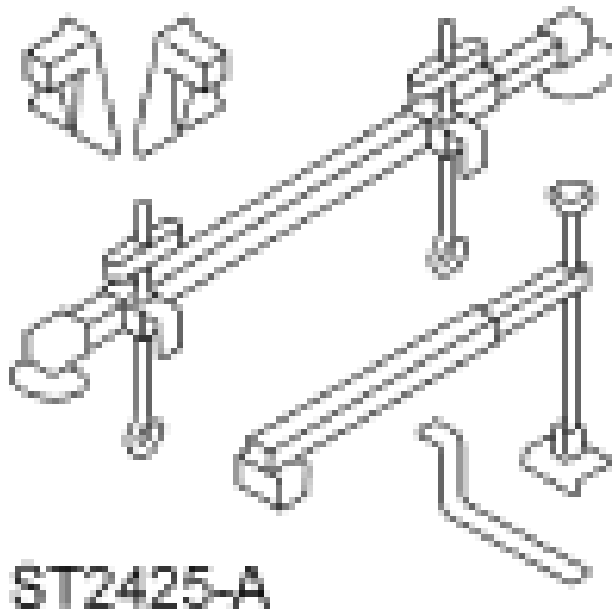
1. Detach the upper radiator hose pin-type retainer from the radiator core support and position the hose aside.
2. Remove the 4 upper radiator support bracket bolts and the 2 brackets.
 - To install, tighten to 10 N.m (89 lb-in).
3. Remove the oil level indicator.
4. Remove the stud bolt and then remove the oil level indicator tube by guiding it between the radiator core support and the cooling fan.
 - Remove and discard the O-ring seal.
 - To install, tighten to 10 N.m (89 lb-in).

NOTE:

Install a new O-ring seal and lubricate with clean engine oil.

Installation of the oil level indicator may require the assistance of a second technician to align the tube with the orifice.

5. To install, reverse the removal procedure.

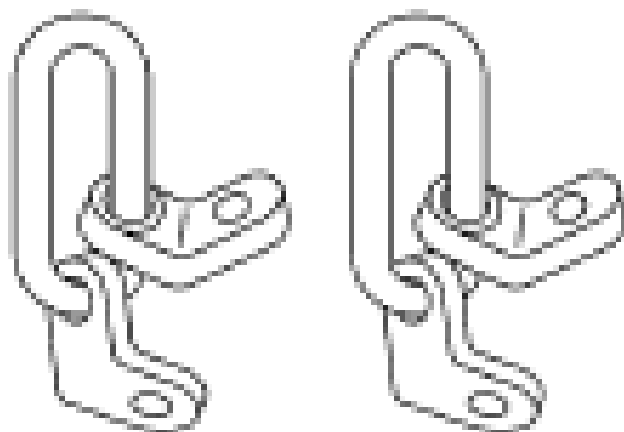
ENGINE SUPPORT INSULATORS**SPECIAL TOOL(S)**

3-Bar Engine Support Kit
303-F072

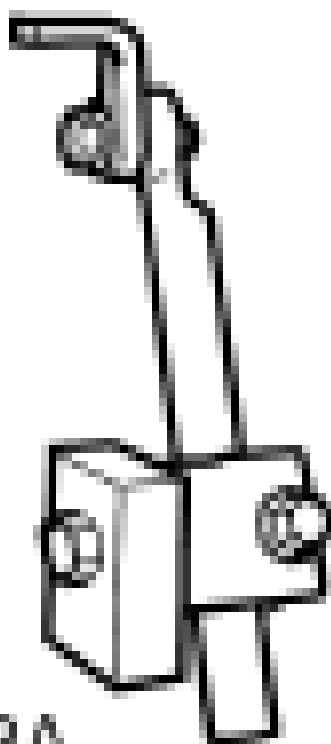
Lifting Brackets, Engine
303-050 (T70P-6000)

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

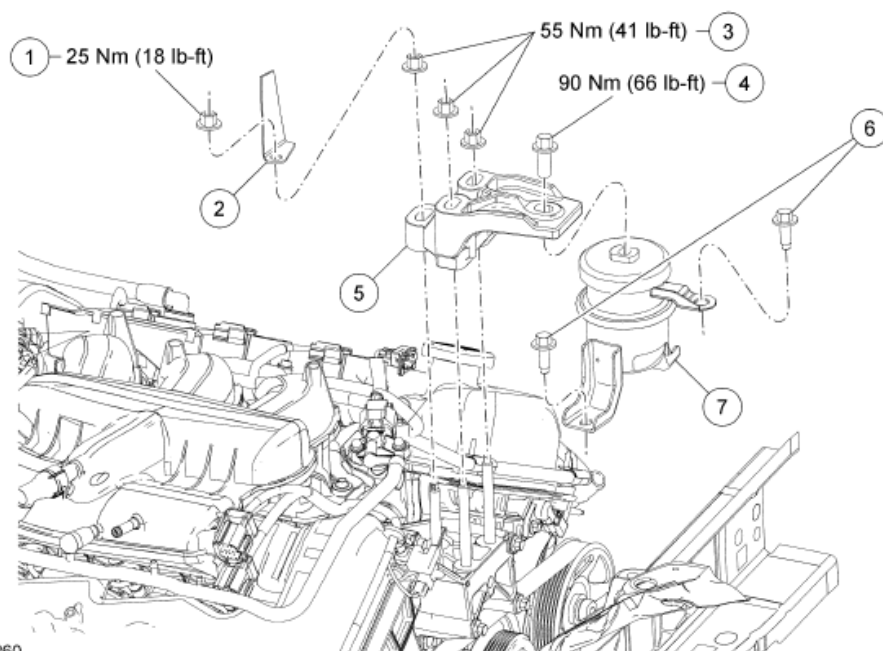


ST1595-A



ST2743A

Universal Adapter Brackets
014-0001



Item	Part Number	Description
1	N621942-S	Power steering pressure (PSP) tube bracket nut
2	—	PSP tube bracket (part of 3A719)
3	N621942-S	Engine support insulator bracket nuts (3 required)
4	W709667-S	Engine support insulator bracket bolt
5	—	Engine support insulator bracket
6	W500233-S301	Engine support insulator bolts (3 required) (vehicles built through 10/2005)
6	W500233-S439	Engine support insulator bolts (3 required) (vehicles built after 10/2005)

Item	Part Number	Description
7	6068	Engine support insulator

Fig. 105: Identifying Engine Support Insulator Components (With Torque Specifications)
 Courtesy of FORD MOTOR CO.

Removal and Installation

1. Remove the lower intake manifold. For additional information, refer to **LOWER INTAKE MANIFOLD**.
2. Remove the engine support insulator bracket bolt.
 - To install, tighten to 90 N.m (66 lb-ft).
3. Install the special tools.
 1. Position the 2 universal adapter brackets on top of the cylinder block.
 2. Install 2 M8 x 1.25 x 36 mm (1.41 in) bolts and tighten to 10 N.m (89 lb-in).

3. Position the universal lifting bracket onto the 2 universal adapter brackets.
4. Fasten the universal lifting bracket to the 2 universal adapter brackets with a suitable nut and bolt.

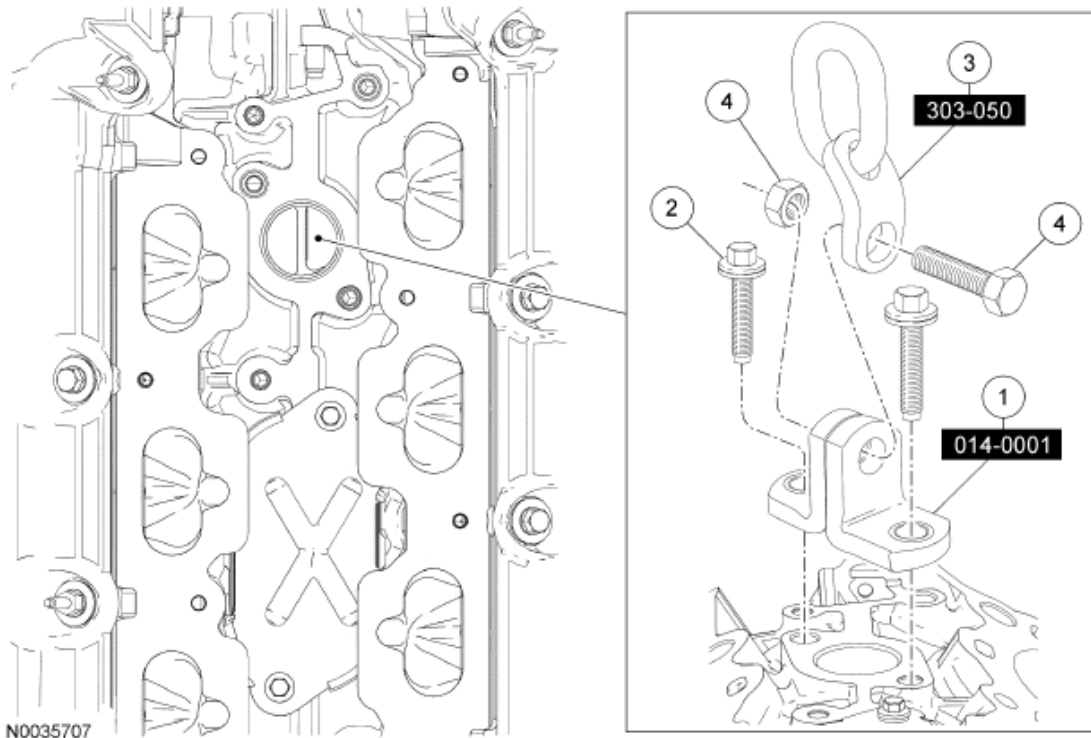
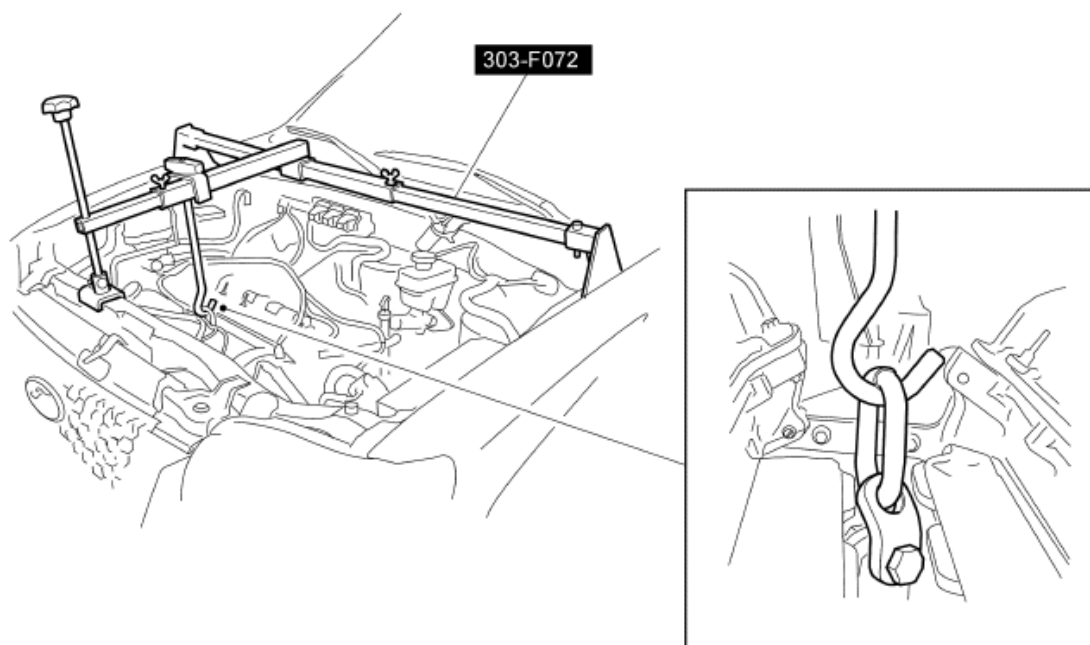


Fig. 106: Installing Special Tools (303-050 And 014-0001)
Courtesy of FORD MOTOR CO.

4. Using the special tools, lift the engine 12 mm (0.47 in).



N0035706

Fig. 107: Lifting Engine Using Special Tool (303-F072)
Courtesy of FORD MOTOR CO.

5. Remove the nut and position the PSP tube bracket aside.
 - To install, tighten to 25 N.m (18 lb-ft).
6. Remove the 3 nuts and the engine support insulator bracket.
 - To install, tighten to 55 N.m (41 lb-ft).
7. Remove the 3 bolts and the engine support insulator.
 - To install, tighten to 55 N.m (41 lb-ft) (vehicles built through 10/2005).
 - To install, tighten to 48 N.m (35 lb-ft) (vehicles built after 10/2005).
8. To install, reverse the removal procedure.

REMOVAL

ENGINE

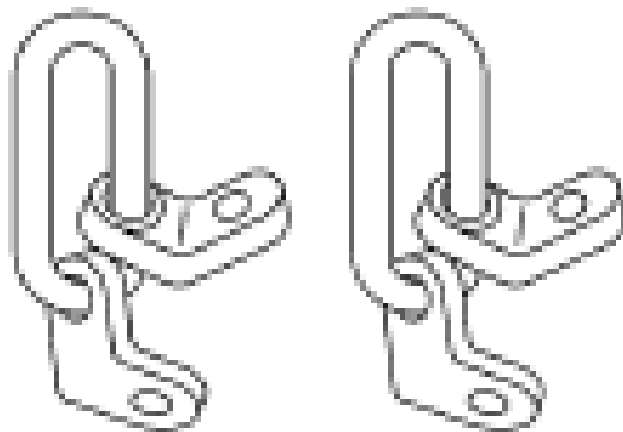
Special Tool(s)

SPECIAL TOOL(S)

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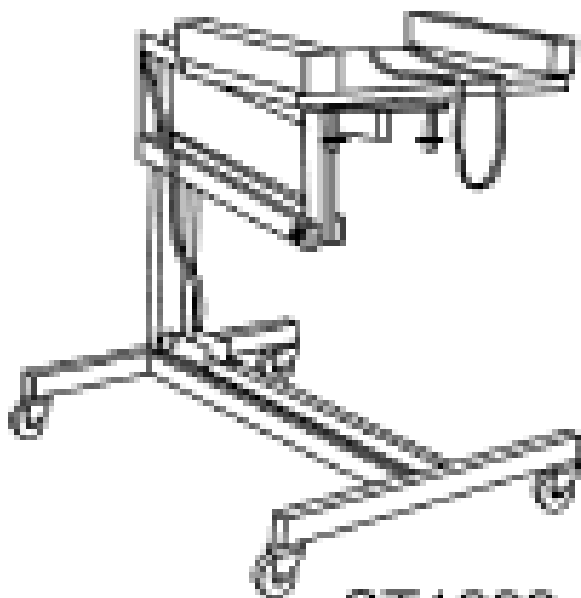
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1595-A

Lifting Brackets, Engine
303-050 (T70P-6000)

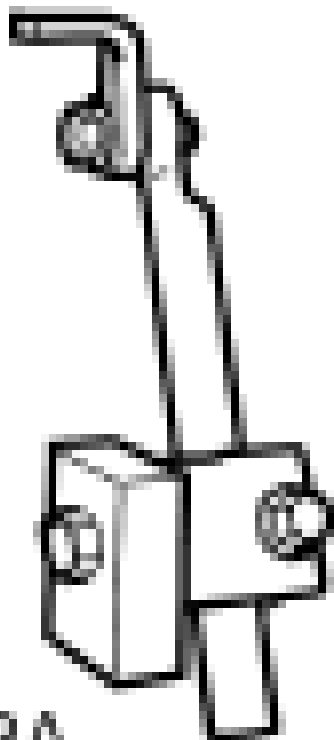


ST1293-A

Powertrain Lift with Tilting Plate
014-00765

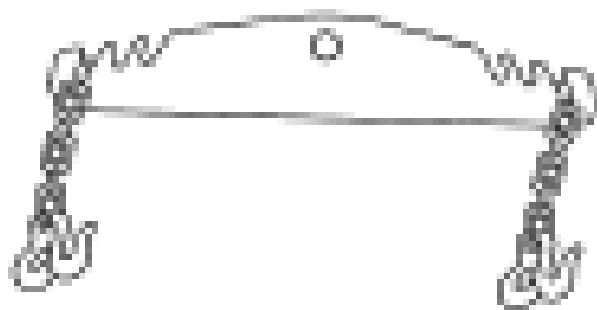
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST2743A

Universal Adapter Brackets
014-0001



ST1602-A

Spreader Bar
303-D089 (D93P-6001-A3) or Equivalent

Removal

NOTE: For additional information, refer to the exploded views under ASSEMBLY.

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING & LIFTING** .
2. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM PRESSURE RELEASE** .
3. Remove the battery tray. For additional information, refer to **REMOVAL AND INSTALLATION** .
4. Remove the air cleaner outlet pipe and . For additional information, refer to **REMOVAL AND INSTALLATION - AIR CLEANER OUTLET PIPE** and **REMOVAL AND INSTALLATION - AIR CLEANER** .
5. Disconnect the power steering pressure (PSP) switch electrical connector.
 - Remove the nut and detach the ground wire and PSP hose bracket.

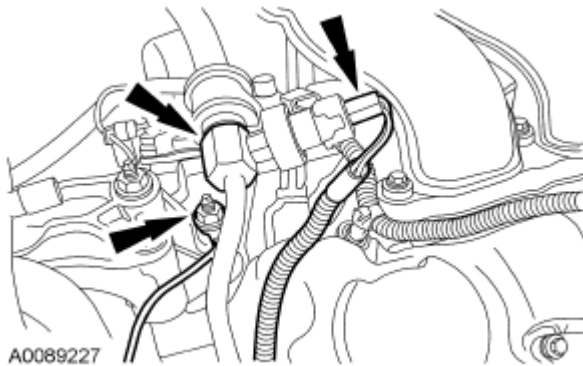


Fig. 108: Locating Ground Wire & PSP Hose Bracket
Courtesy of FORD MOTOR CO.

6. Remove the lower radiator air deflectors.

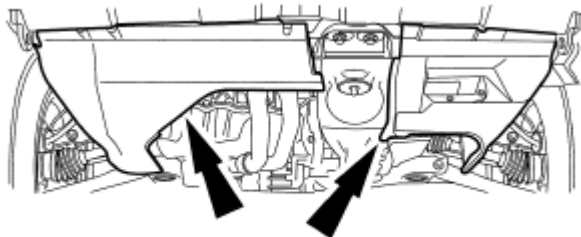


Fig. 109: Locating Lower Radiator Air Deflectors
Courtesy of FORD MOTOR CO.

7. Remove the exhaust system flexpipe. For additional information, refer to **REMOVAL AND INSTALLATION** .
8. Remove the generator. For additional information, refer to **REMOVAL AND INSTALLATION** .
9. Remove the accessory drive belt from the remaining pulleys and the engine.

10. Remove the LH half shaft. For additional information, refer to **REMOVAL** .
11. Drain the engine coolant. For additional information, refer to **DRAINING** .
12. Drain the engine oil and install the drain plug.
 - Tighten to 26 N.m (19 lb-ft).

All wheel drive (AWD) vehicles

CAUTION: Do not reuse the CV joint bolts and washers. Install new bolts and washers or damage to the vehicle may occur.

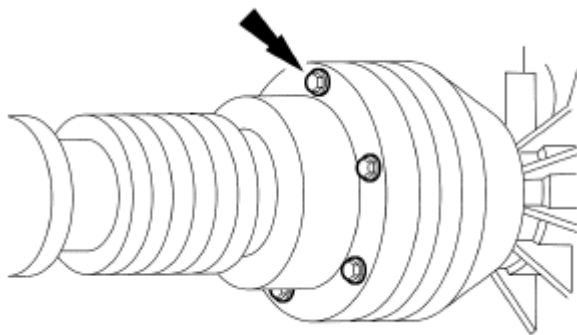


Fig. 110: Locating Driveshaft-To-Power Take Off Bolts & Washers
Courtesy of FORD MOTOR CO.

13. Remove and discard the 6 front driveshaft-to-power take off bolts and washers.

CAUTION: Do not reuse the bolts and straps for the center U-joint. Install new bolts and straps or damage to the vehicle may occur.

NOTE: There is a difference in the length of the head of the replacement yoke strap bolts from the production bolts. The longer head pinion bolts can be used in either location.

14. Remove the front driveshaft.
 1. Index-mark the front driveshaft to the center bearing.
 2. Remove and discard the bolts and straps.

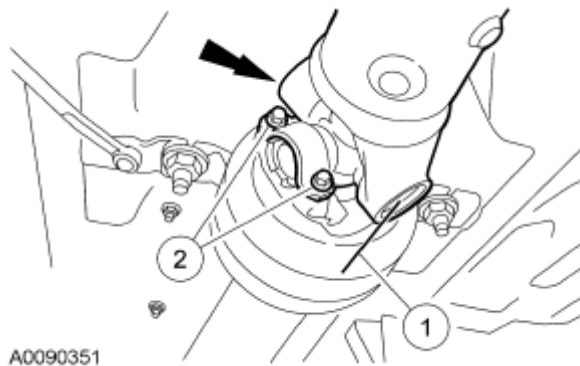


Fig. 111: Locating Bolts & Straps
Courtesy of FORD MOTOR CO.

All vehicles

15. Disconnect the A/C clutch electrical connector.

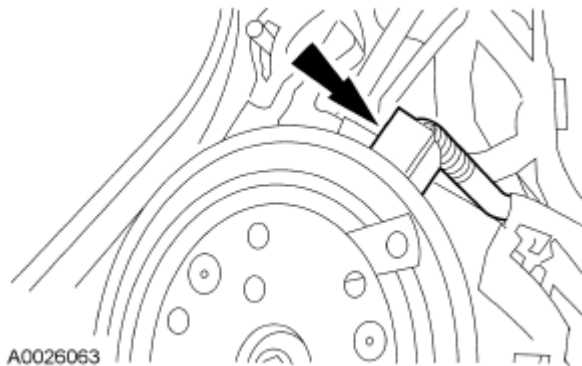


Fig. 112: Locating A/C Clutch Electrical Connector
Courtesy of FORD MOTOR CO.

16. Remove the bolts and position the A/C compressor aside.

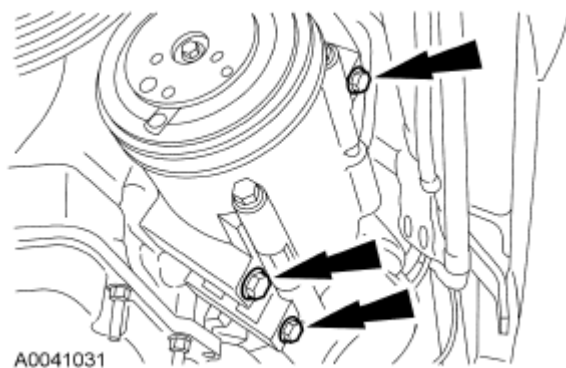


Fig. 113: Locating A/C Compressor Bolts
Courtesy of FORD MOTOR CO.

17. Remove the nut and the power steering pump pulley.

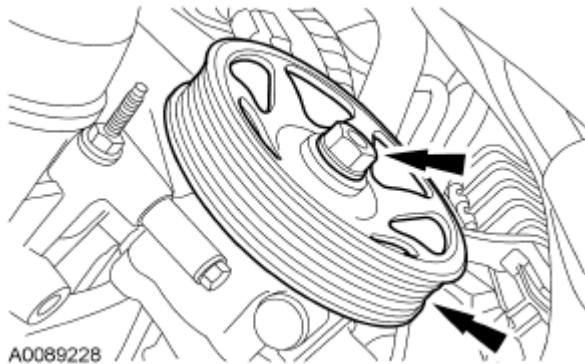


Fig. 114: Locating Nut And Power Steering Pump Pulley
Courtesy of FORD MOTOR CO.

NOTE: The bolt positioned behind the power steering pressure (PSP) tube will remain in the pump housing.

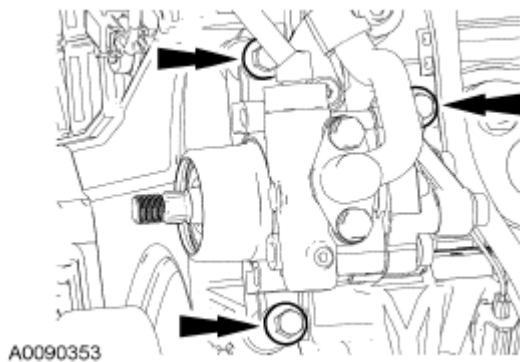
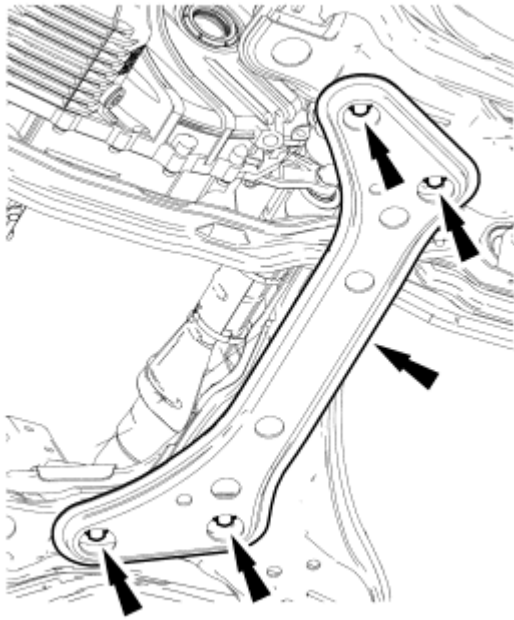


Fig. 115: Locating Power Steering Pump Bolts
Courtesy of FORD MOTOR CO.

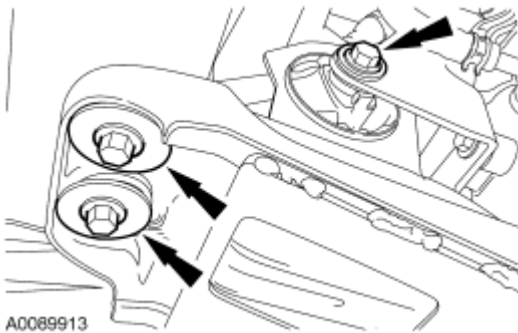
18. Remove the power steering pump bolts and position the pump aside.
19. Remove the 4 bolts and the lateral support crossmember.



A0087403

Fig. 116: Identifying Lateral Support Crossmember And Bolts
Courtesy of FORD MOTOR CO.

20. Remove the front roll restrictor bolt and the 2 bolts for the engine support crossmember.



A0089913

Fig. 117: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember
Courtesy of FORD MOTOR CO.

21. Remove the rear nut and the engine support crossmember.
- Discard the nut.

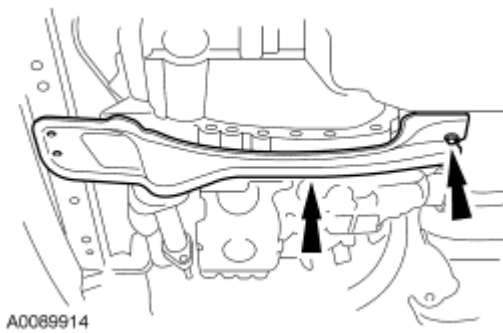


Fig. 118: Identifying Cross Brace And Rear Nut
Courtesy of FORD MOTOR CO.

22. Disconnect the 2 transmission cooler tubes.

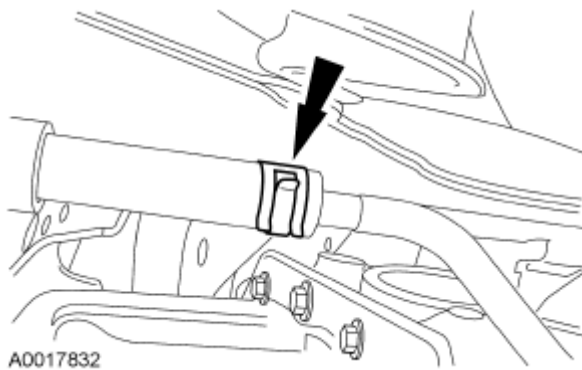


Fig. 119: Locating Transmission Cooler Tubes
Courtesy of FORD MOTOR CO.

23. Disconnect the exhaust gas recirculation (EGR) tube fitting from the converter.

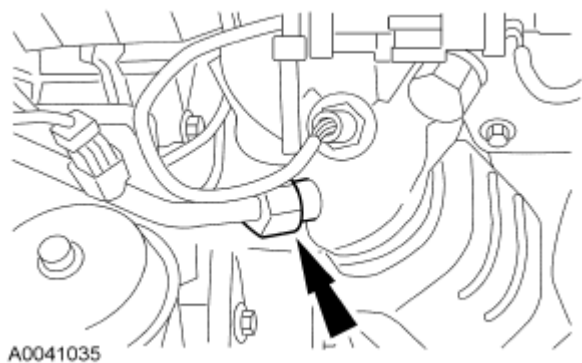


Fig. 120: Locating Exhaust Gas Recirculation (EGR) Tube Fitting
Courtesy of FORD MOTOR CO.

24. Remove the bolts and the accelerator cable snow shield.

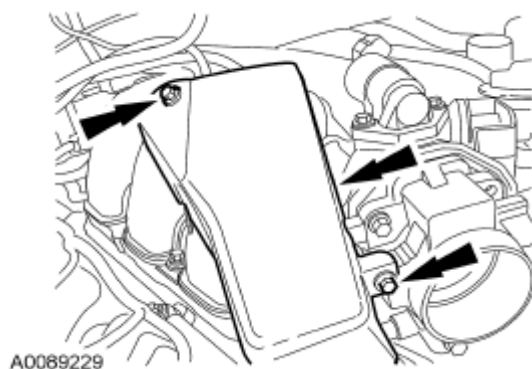


Fig. 121: Locating Accelerator Cable Snow Shield Bolts
Courtesy of FORD MOTOR CO.

25. Disconnect the accelerator cable and the speed control actuator cable and remove the cable bracket bolts.

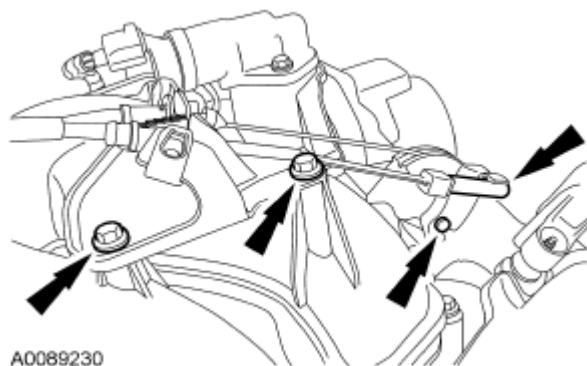


Fig. 122: Locating Cable Bracket Bolts (1 Of 2)
Courtesy of FORD MOTOR CO.

26. Remove the bolt and position the cables and brackets aside.

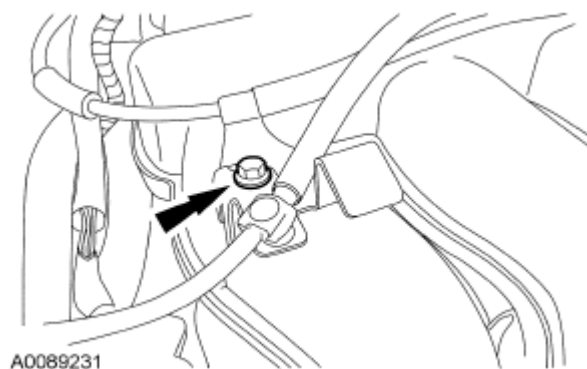


Fig. 123: Locating Cable Bracket Bolts (2 Of 2)
Courtesy of FORD MOTOR CO.

27. Disconnect the hoses.

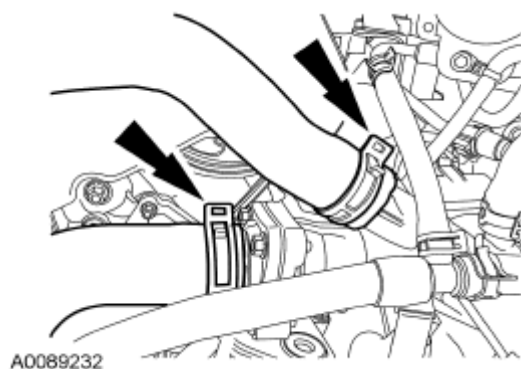


Fig. 124: Locating Hoses
Courtesy of FORD MOTOR CO.

28. Disconnect the heater hoses and the throttle body coolant hose.

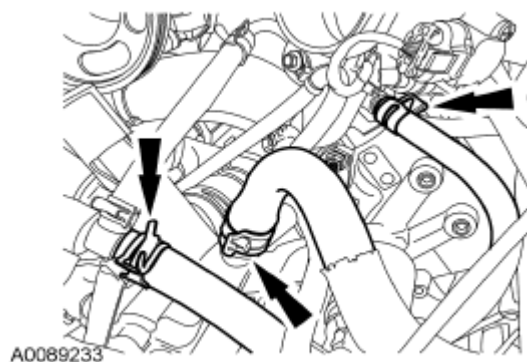


Fig. 125: Locating Heater Hoses & Throttle Body Coolant Hose
Courtesy of FORD MOTOR CO.

29. Disconnect the fuel supply tube quick connect coupling. For additional information, refer to **QUICK CONNECT COUPLING**.
30. Detach the wiring harness pin-type retainer from the gearshift cable bracket.

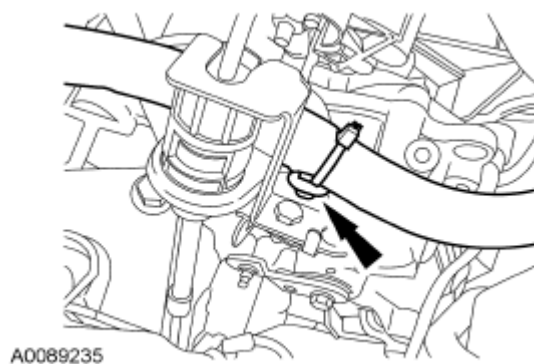


Fig. 126: Locating Pin-Type Retainer From Gearshift Cable Bracket
Courtesy of FORD MOTOR CO.

31. Disconnect the gearshift cable from the transaxle.

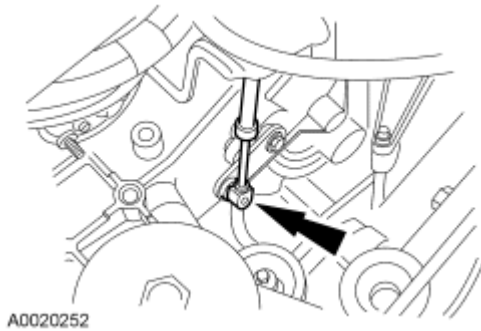


Fig. 127: Locating Shift Cable End At Manual Lever
Courtesy of FORD MOTOR CO.

32. Remove the bolts and position the gearshift cable and bracket aside.

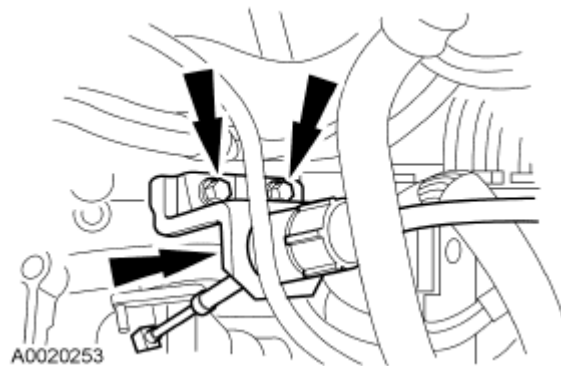


Fig. 128: Locating Gearshift Cable & Bracket
Courtesy of FORD MOTOR CO.

33. Disconnect the differential pressure feedback EGR sensor electrical connector and detach the pin-type retainer.

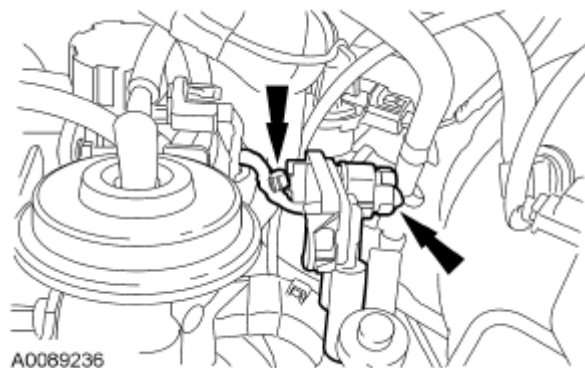


Fig. 129: Locating EGR Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

34. Disconnect the EGR tube fitting and remove the EGR tube and the differential pressure feedback EGR sensor as an assembly.

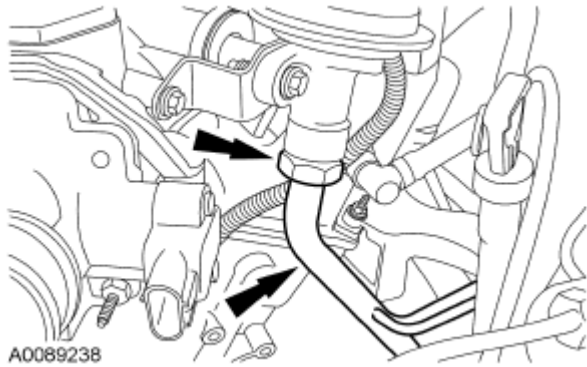


Fig. 130: Locating EGR Tube Fitting
Courtesy of FORD MOTOR CO.

35. Disconnect the evaporative emissions canister purge valve vacuum tube from the intake manifold.
- Detach the vacuum tube retainer from the transmission fill tube.

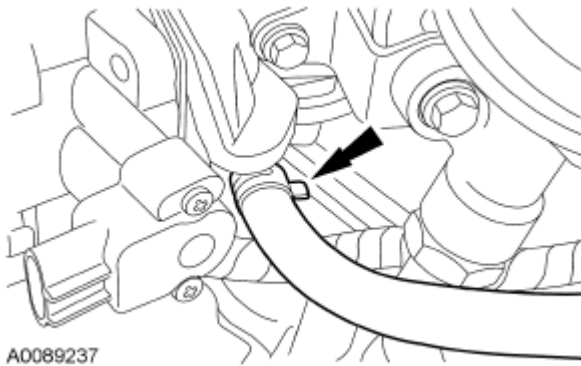


Fig. 131: Locating Vacuum Tube Retainer
Courtesy of FORD MOTOR CO.

36. Disconnect the brake booster vacuum tube and the vacuum reservoir tube.

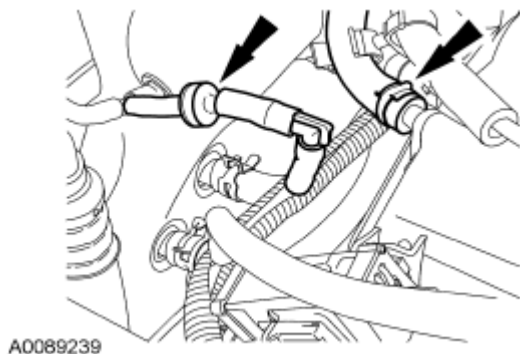


Fig. 132: Locating Brake Booster Vacuum Tube & Vacuum Reservoir Tube
Courtesy of FORD MOTOR CO.

37. Disconnect the manifold absolute pressure (MAP) sensor vacuum tube and electrical connector.

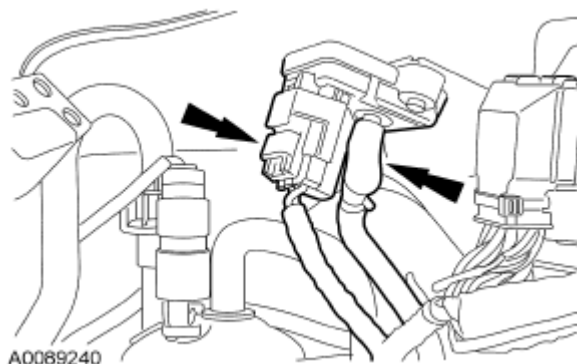


Fig. 133: Locating Manifold Absolute Pressure (MAP) Sensor Vacuum Tube & Electrical Connector
Courtesy of FORD MOTOR CO.

38. Disconnect the powertrain control module (PCM) electrical connectors and remove the nut.
- Position the wiring aside.

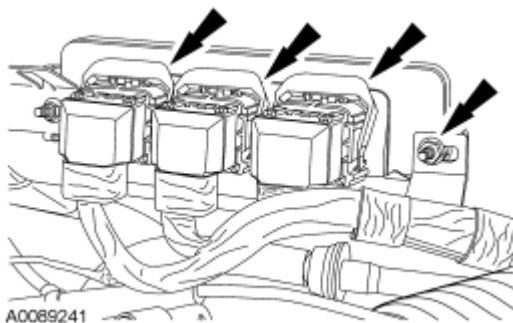


Fig. 134: Locating Powertrain Control Module (PCM) Electrical Connectors
Courtesy of FORD MOTOR CO.

39. Remove the bolt and detach the ground wire.

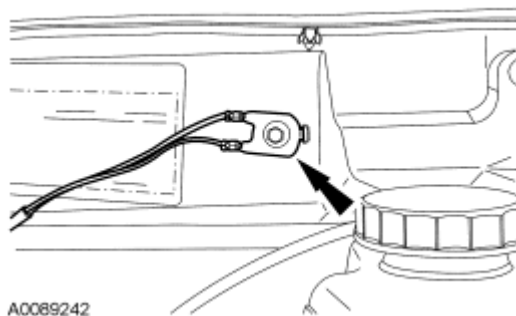


Fig. 135: Locating Ground Wire & Bolt
Courtesy of FORD MOTOR CO.

40. Remove the power distribution box cover.

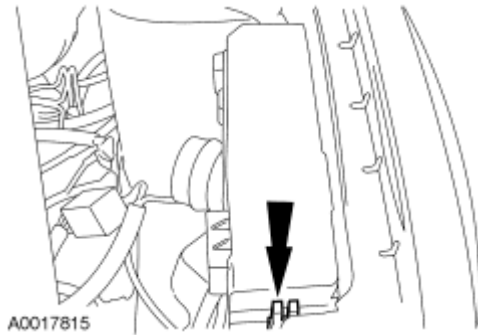


Fig. 136: Locating Power Distribution Box Cover
Courtesy of FORD MOTOR CO.

41. Remove the nuts and disconnect the cables.

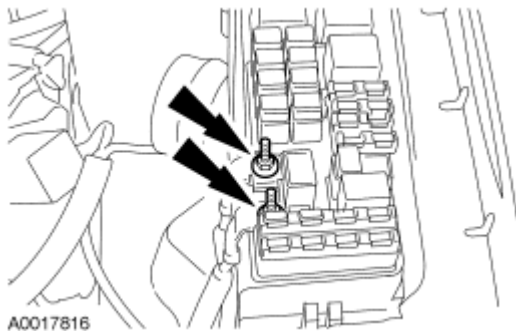


Fig. 137: Locating Cables & Nuts
Courtesy of FORD MOTOR CO.

42. Disconnect the electrical connector from the power distribution box.

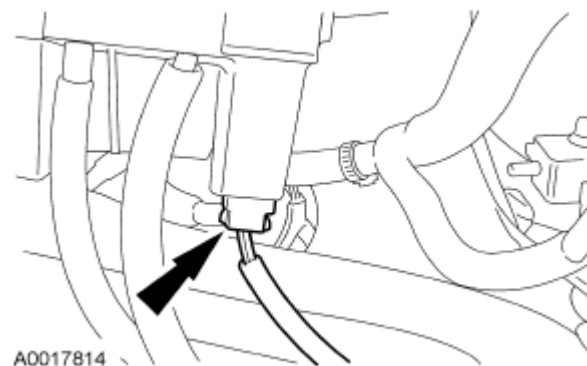


Fig. 138: Locating Electrical Connector From Power Distribution Box
Courtesy of FORD MOTOR CO.

43. Remove the bolts and disconnect the ground strap and the electrical connector.

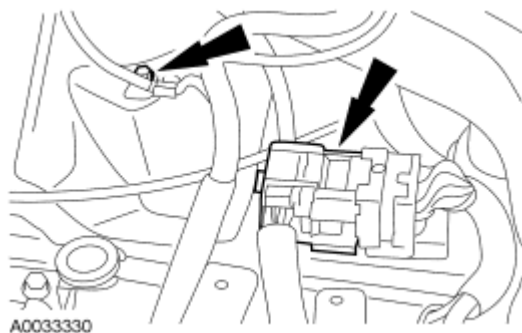


Fig. 139: Locating Ground Strap & Electrical Connector
Courtesy of FORD MOTOR CO.

44. Detach the wiring harness retainers from the battery tray bracket and position the wiring harness aside.

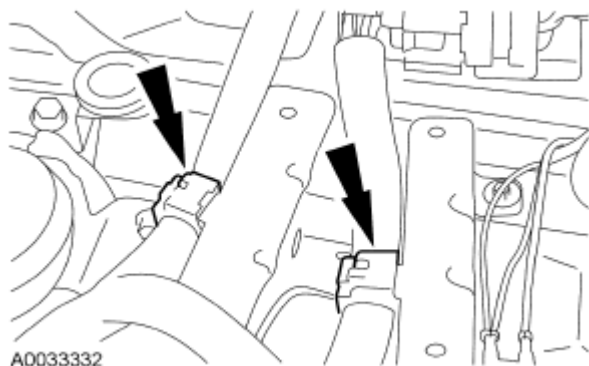


Fig. 140: Locating Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

45. If equipped, disconnect the engine block heater electrical connector.

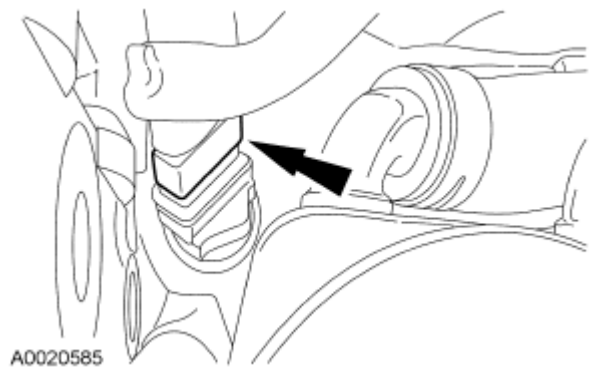


Fig. 141: Locating Engine Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

46. Detach the heated oxygen sensor (HO2S) wiring retainer from the radiator center support.

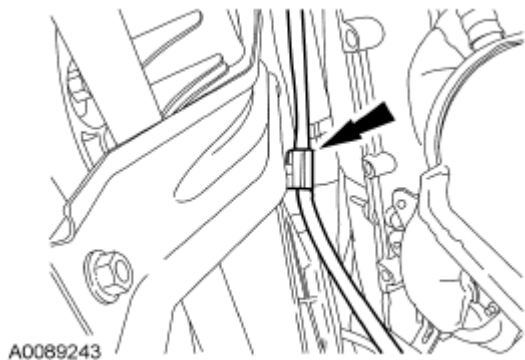


Fig. 142: Locating Heated Oxygen Sensor (HO2S) Wiring Retainer
Courtesy of FORD MOTOR CO.

47. Disconnect the output shaft speed (OSS) sensor electrical connector and remove the bolt and the OSS sensor.

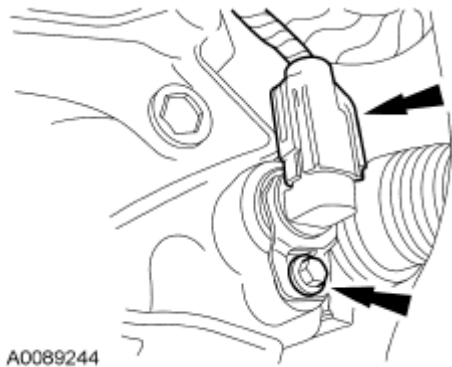


Fig. 143: Locating Output Shaft Speed (OSS) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

48. Remove the torque converter inspection cover.



Fig. 144: Locating Torque Converter Inspection Cover

Courtesy of FORD MOTOR CO.

49. Remove the 4 torque converter nuts.

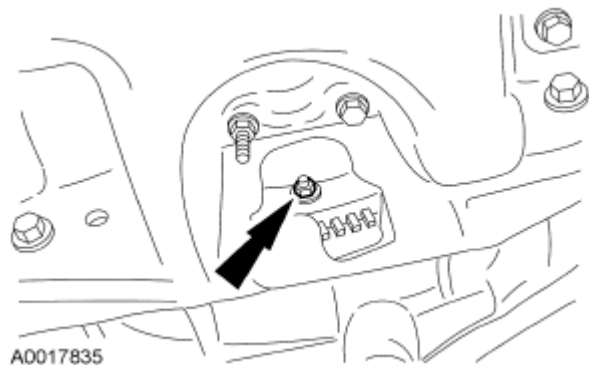


Fig. 145: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

50. Remove the 2 oil pan-to-transaxle bolts.



Fig. 146: Locating Oil Pan-To-Transaxle Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not allow the engine oil pan to rest on the powertrain lift.

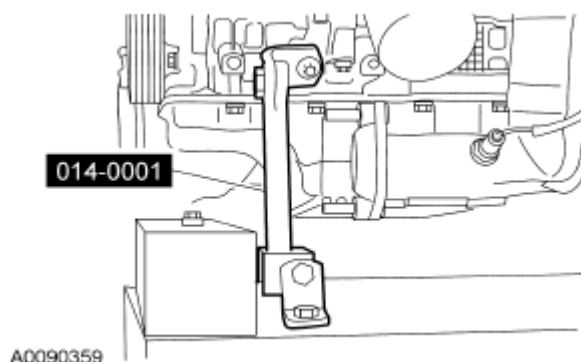


Fig. 147: Securing Engine & Transaxle To Powertrain Lift Using Special Tool (014-0001)
Courtesy of FORD MOTOR CO.

NOTE: The next 5 steps must be carried out with the vehicle raised and the universal powertrain lift in position.

51. Using the special tools, secure the engine and transaxle to the powertrain lift.
52. Remove the RH transaxle support insulator bolt.

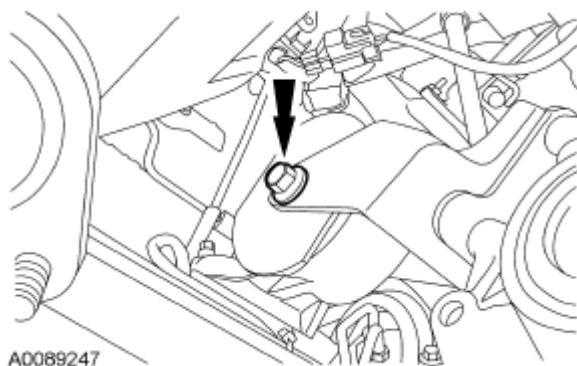


Fig. 148: Locating RH Transaxle Support Insulator Bolt
Courtesy of FORD MOTOR CO.

53. Remove the bolt, nuts and the RH transaxle support insulator.

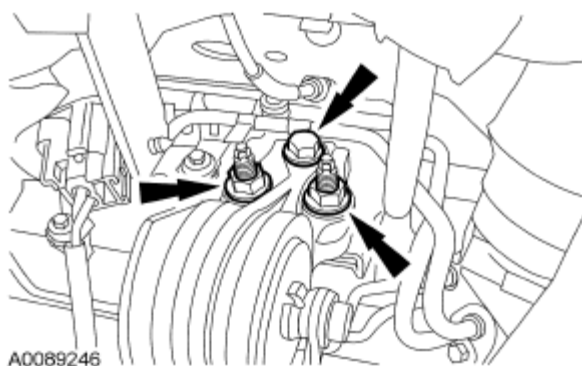


Fig. 149: Locating RH Transaxle Support Insulator Nut & Bolts
Courtesy of FORD MOTOR CO.

54. Remove the rear transaxle support bolt.

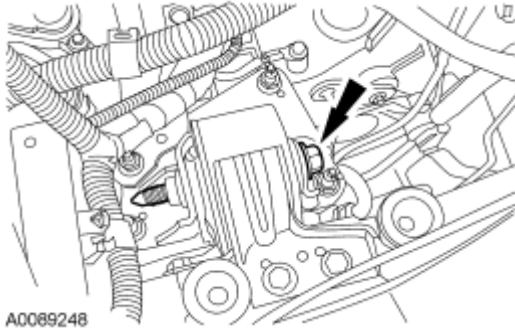


Fig. 150: Locating Transaxle Mount Bolt
Courtesy of FORD MOTOR CO.

55. Remove the front engine support bolts and nut.

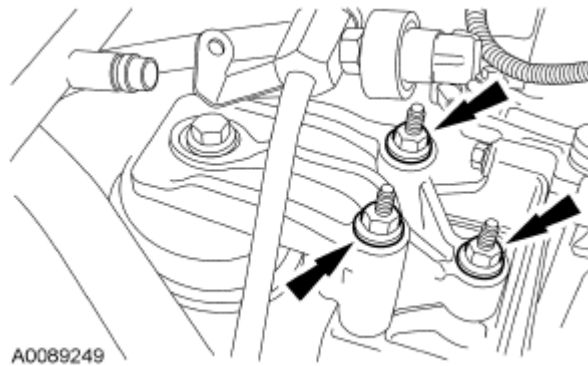


Fig. 151: Locating Front Engine Support Bolts & Nut
Courtesy of FORD MOTOR CO.

56. Remove the powertrain from the vehicle.
57. Disconnect the heated oxygen and catalyst monitor sensor electrical connectors and detach the pin-type retainers from the transaxle support bracket.

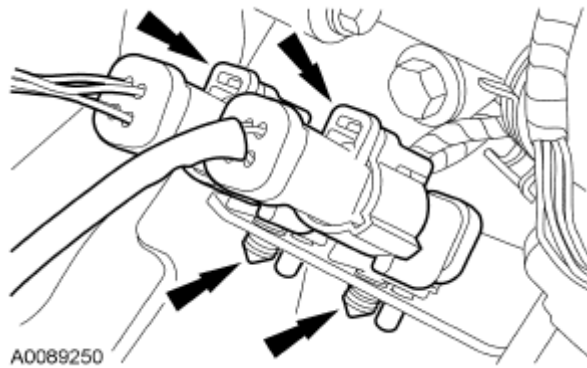


Fig. 152: Locating Heated Oxygen & Catalyst Monitor Sensor Electrical Connectors
Courtesy of FORD MOTOR CO.

58. Disconnect the transmission range (TR) sensor electrical connector.

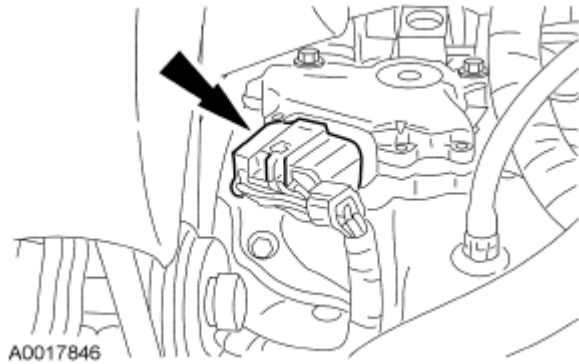


Fig. 153: Locating Transmission Range (TR) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

59. Disconnect the transaxle wiring harness electronic control switch electrical connector.

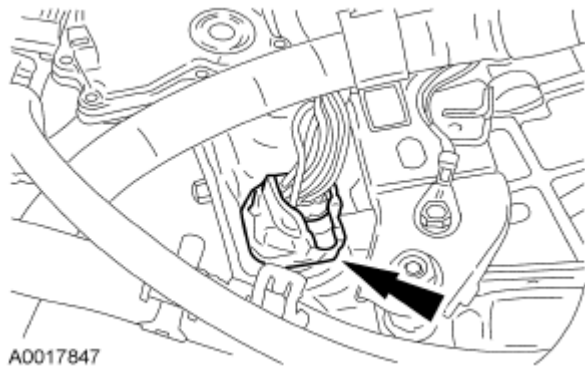


Fig. 154: Locating Transaxle Wiring Harness Electronic Control Switch Electrical Connector
Courtesy of FORD MOTOR CO.

60. Detach the transaxle control harness from the brackets.

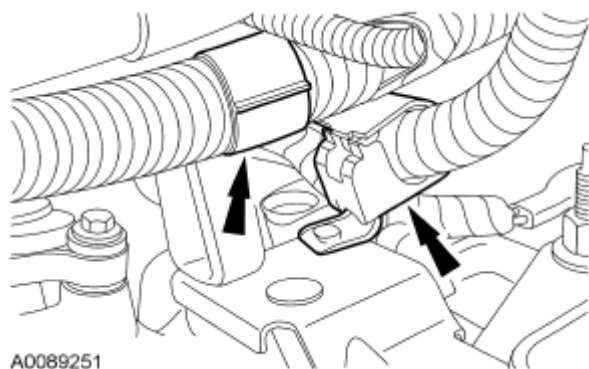


Fig. 155: Locating Transaxle Control Harness From Brackets
Courtesy of FORD MOTOR CO.

61. Disconnect the turbine speed sensor (TSS) electrical connector.

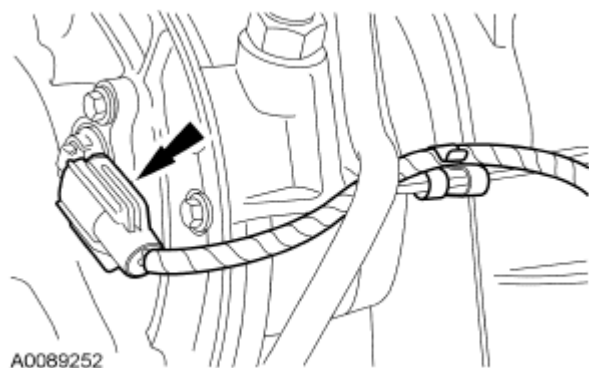


Fig. 156: Locating Turbine Speed Sensor (TSS) Electrical Connector
Courtesy of FORD MOTOR CO.

AWD vehicles

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

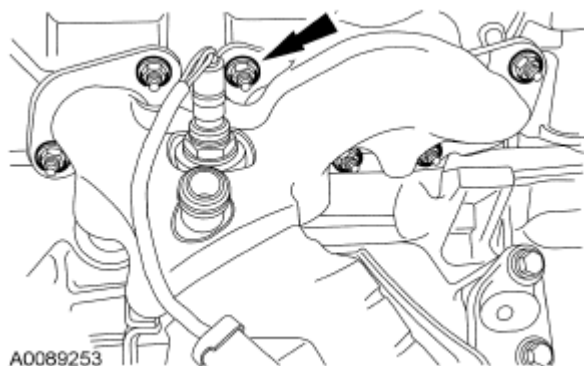


Fig. 157: Locating Nuts & Gasket

Courtesy of FORD MOTOR CO.

63. Remove and discard the 6 RH exhaust manifold studs.

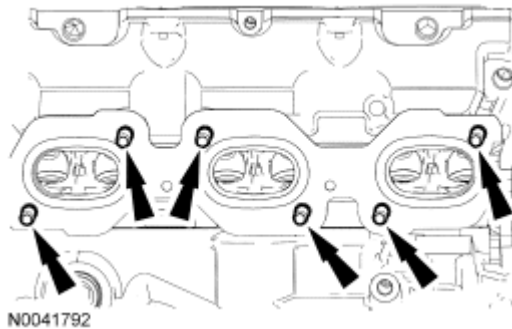


Fig. 158: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

64. Remove the bolts and the halfshaft support bracket.

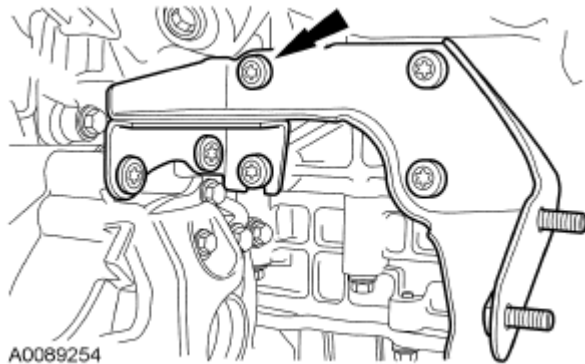


Fig. 159: Locating Halfshaft Support Bracket & Bolt
Courtesy of FORD MOTOR CO.

65. Remove the bolt, detach the pin-type retainer and position the power take off vent tube aside.

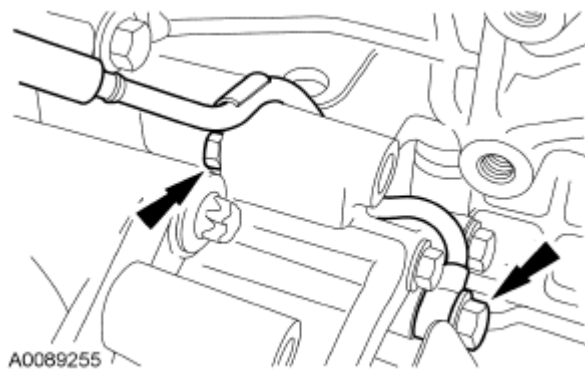


Fig. 160: Locating Pin-Type Retainer & Bolts

Courtesy of FORD MOTOR CO.

All vehicles

66. Remove the 7 remaining transaxle-to-engine bolts.

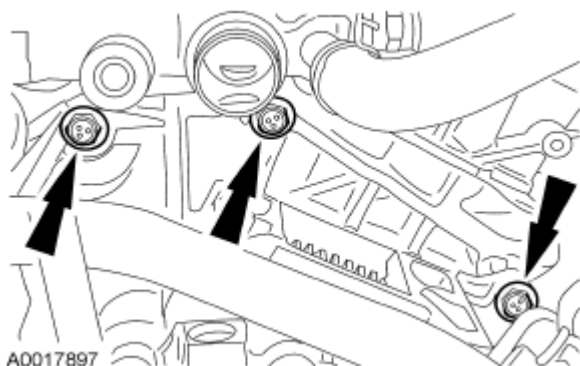


Fig. 161: Locating Transaxle-To-Engine Bolts
Courtesy of FORD MOTOR CO.

NOTE: Once the engine is supported by the engine crane, remove the engine-to-lift table support brackets.

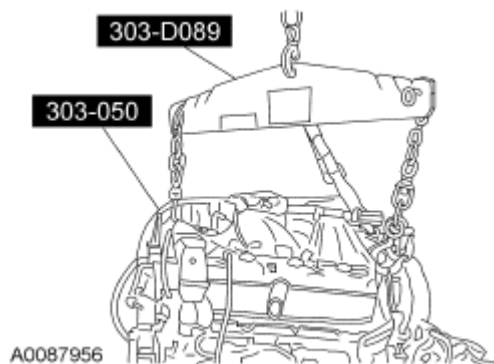


Fig. 162: Removing Engine From Universal Powertrain Lift Using Special Tools (303-050, 303-D089)
Courtesy of FORD MOTOR CO.

67. Using the special tools, remove the engine from the universal powertrain lift.

DISASSEMBLY

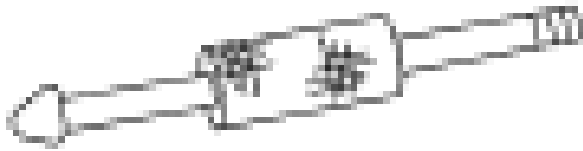
ENGINE

SPECIAL TOOL(S)

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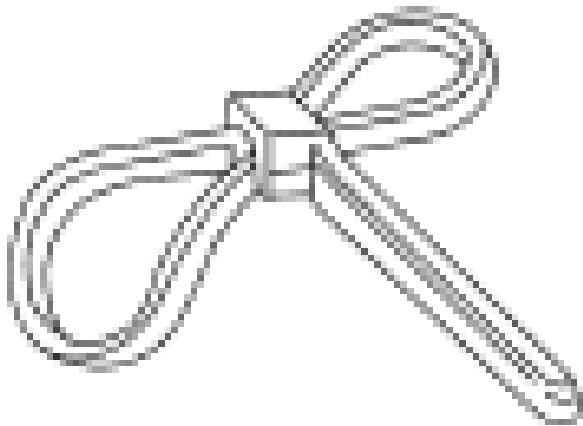
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



Slide Hammer
307-005 (T59L-100-B)

ST1187-A



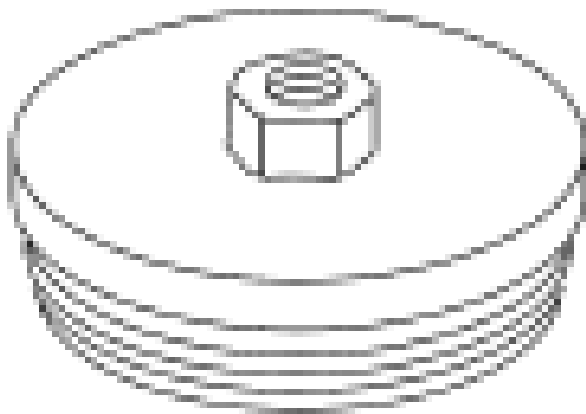
Strap Wrench
303-D055 (D85L-6000-A)

ST1438-A

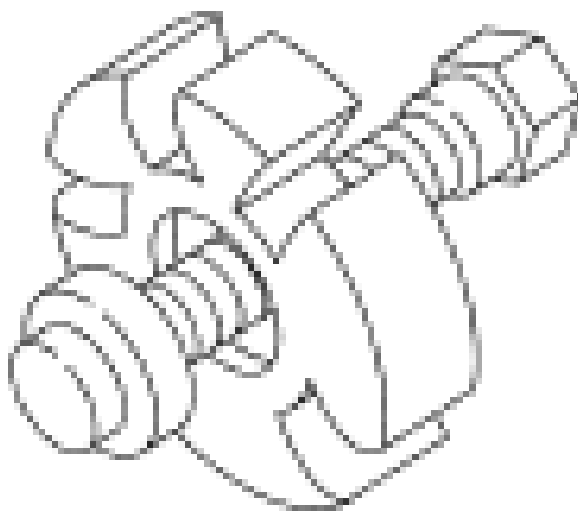
Remover, Crankshaft Rear Oil Seal
303-519 (T95P-6701-EH)

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1382-A



ST1286-A

Remover, Crankshaft Vibration Damper
303-009 (T58P-6316-D)

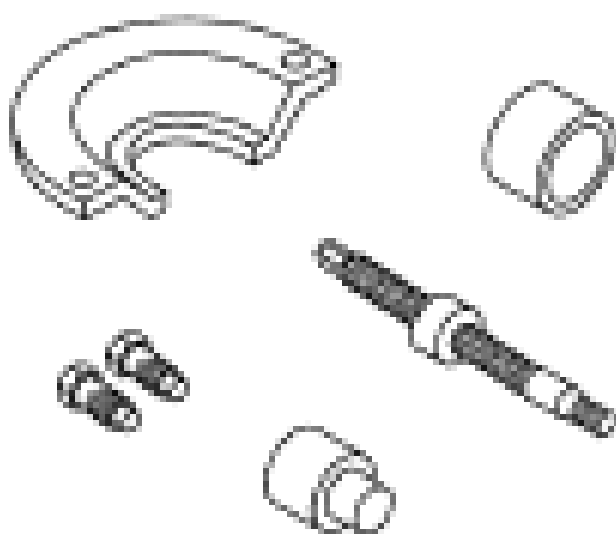
Remover, Oil Seal
303-409 (T92C-6700CH)

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1385-A



ST1971-A

Service Set, Water Pump Pulley
303-S455 (T94P-6312-AH)

CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

NOTE: For additional information, refer to the exploded view under ASSEMBLY. Early build vehicles are equipped with the coolant pump drive pulley on

the LH intake camshaft, late build vehicles are equipped with the coolant pump drive pulley on the LH exhaust camshaft.

All vehicles

1. Remove the bolts and the flexplate.

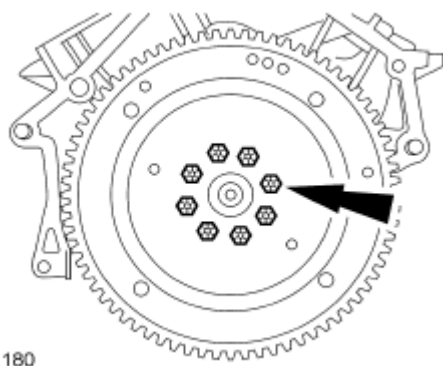


Fig. 163: Locating Bolts & Flexplate
Courtesy of FORD MOTOR CO.

2. Using the special tools, remove and discard the crankshaft rear oil seal.

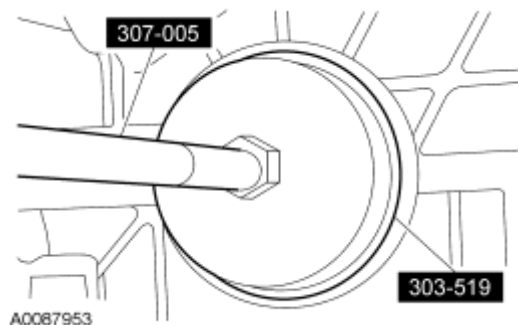


Fig. 164: Identifying Special Tools (307-005 And 303-519)
Courtesy of FORD MOTOR CO.

3. Mount the engine on a suitable stand.
4. Detach the engine control sensor wiring connectors from the upper intake manifold.

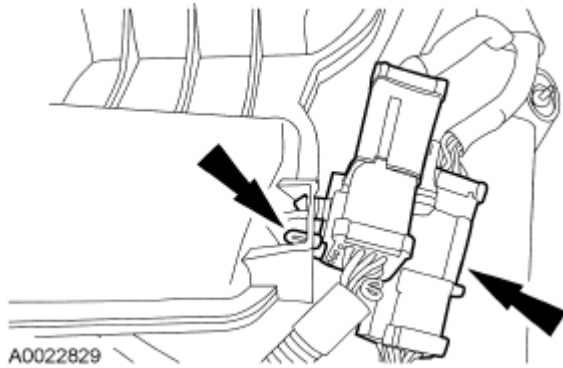


Fig. 165: Locating Engine Control Sensor Wiring Connectors
Courtesy of FORD MOTOR CO.

5. Detach the wiring retainer, remove the nut and the heated oxygen sensor (HO2S) electrical connector bracket.

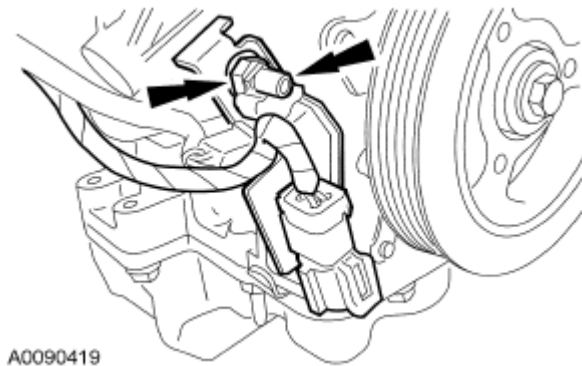


Fig. 166: Locating Heated Oxygen Sensor (HO2S) Electrical Connector Bracket
Courtesy of FORD MOTOR CO.

6. Disconnect the exhaust gas recirculation (EGR) vacuum regulator electrical connector and remove the nut. Detach the wiring harness retainer.

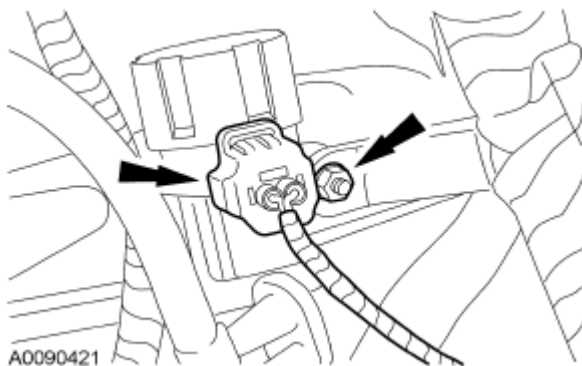


Fig. 167: Locating Exhaust Gas Recirculation (EGR) Vacuum Regulator Electrical Connector
Courtesy of FORD MOTOR CO.

7. Disconnect the knock sensor (KS) electrical connector.



Fig. 168: Locating Knock Sensor (KS) Electrical Connector
Courtesy of FORD MOTOR CO.

8. Remove the nuts and the engine control wire harness.

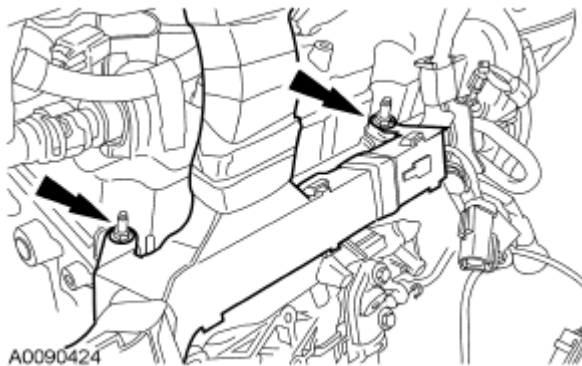


Fig. 169: Locating Nuts
Courtesy of FORD MOTOR CO.

9. Disconnect the idle air control (IAC) valve and the throttle position (TP) sensor electrical connectors, and detach the wiring retainer.

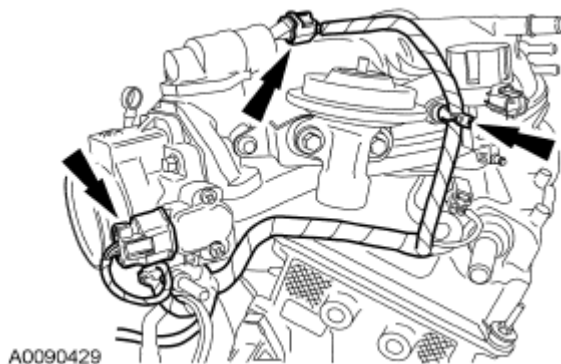


Fig. 170: Locating Idle Air Control (IAC) Valve

Courtesy of FORD MOTOR CO.

10. Remove the positive crankcase ventilation (PCV) tube.

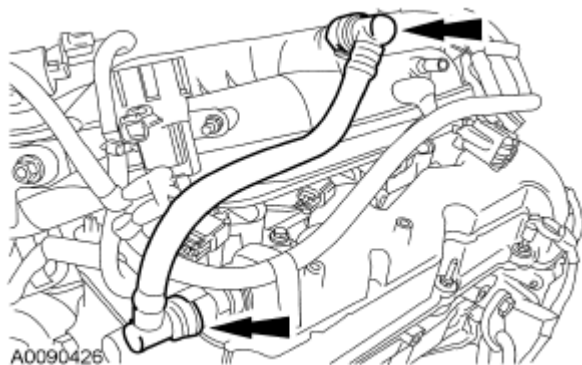


Fig. 171: Locating Positive Crankcase Ventilation (PCV) Tube
Courtesy of FORD MOTOR CO.

11. Disconnect the vacuum tube fittings from the EGR valve, EGR vacuum regulator and the intake manifold.

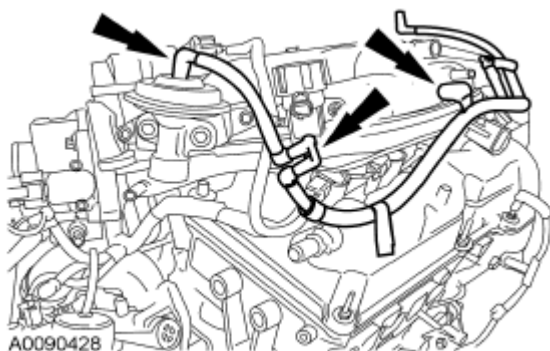


Fig. 172: Locating Vacuum Tube Fittings From EGR Valve
Courtesy of FORD MOTOR CO.

12. Disconnect the throttle body coolant hose.

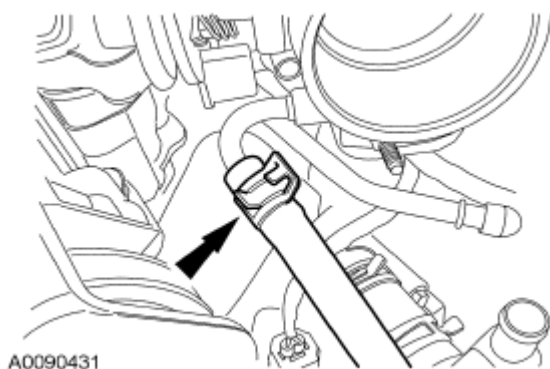


Fig. 173: Locating Throttle Body Coolant Hose
Courtesy of FORD MOTOR CO.

13. Remove the bolts and upper intake manifold.
 - Discard the gaskets.

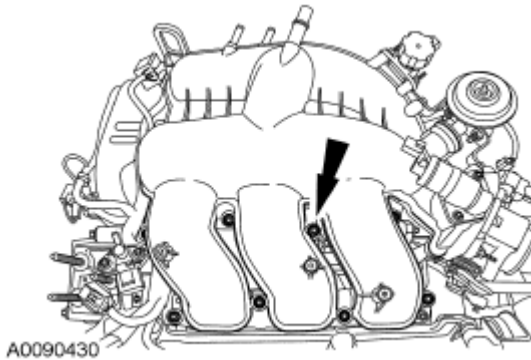


Fig. 174: Locating Upper Intake Manifold Bolt
Courtesy of FORD MOTOR CO.

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

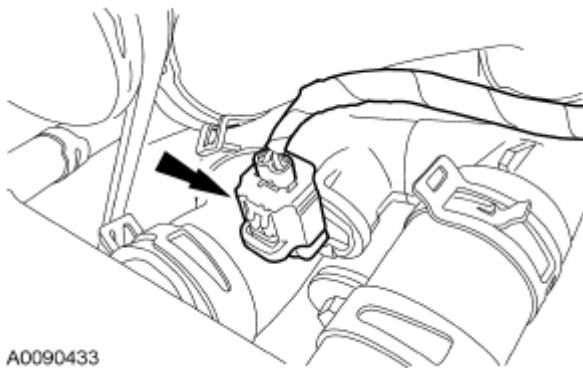


Fig. 175: Locating Engine Coolant Temperature (ECT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

15. Disconnect the RH coil-on-plug electrical connectors and detach the wiring retainer.

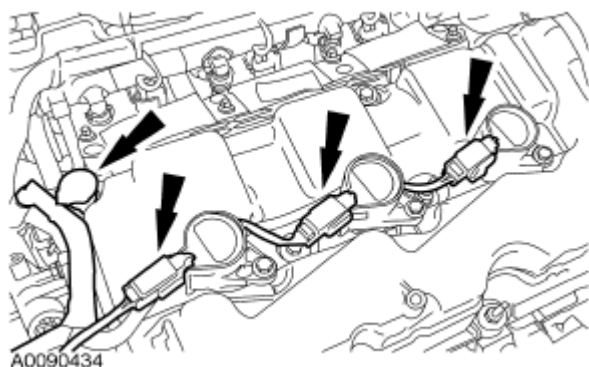


Fig. 176: Locating RH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

16. Disconnect the radio interference capacitor electrical connector and detach the wiring retainers.

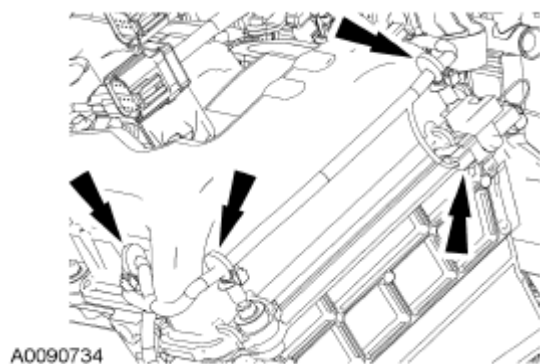


Fig. 177: Locating Radio Interference Capacitor Electrical Connector
Courtesy of FORD MOTOR CO.

17. Disconnect the LH coil-on-plug electrical connectors and detach the wiring retainers.

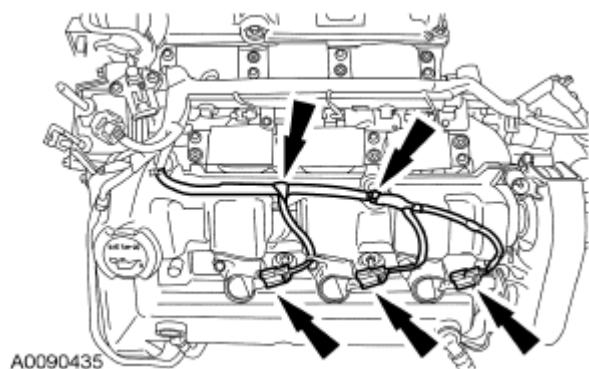


Fig. 178: Locating LH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

18. Disconnect the camshaft position sensor (CMP) and oil pressure sensor electrical connectors and detach

the wiring retainers.

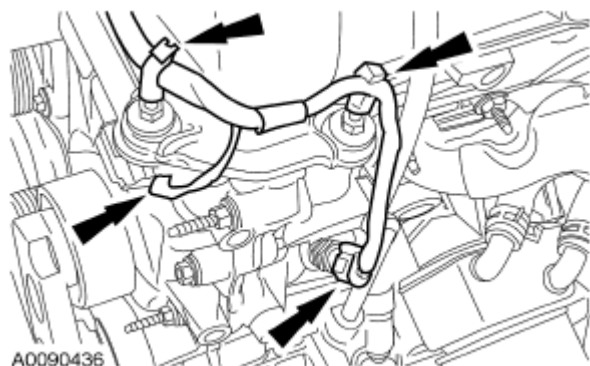


Fig. 179: Locating Camshaft Position Sensor (CMP) Connectors
Courtesy of FORD MOTOR CO.

19. Disconnect the crankshaft position (CKP) sensor electrical connector and detach the wiring retainers.

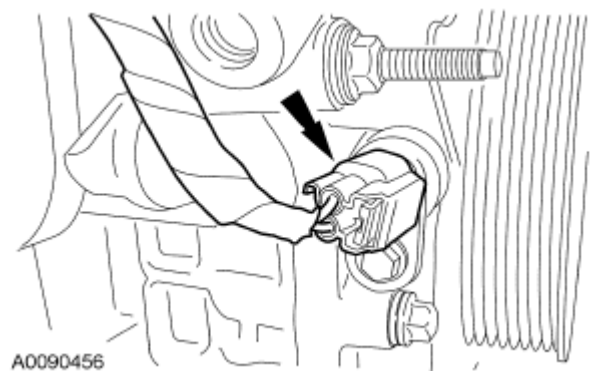


Fig. 180: Locating Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

20. Disconnect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.
 - Remove the engine vacuum harness.

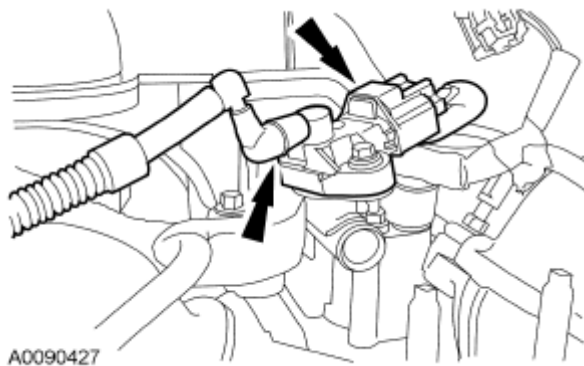


Fig. 181: Locating Temperature Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

21. Disconnect the fuel injector electrical connectors and remove the fuel charging wiring harness.

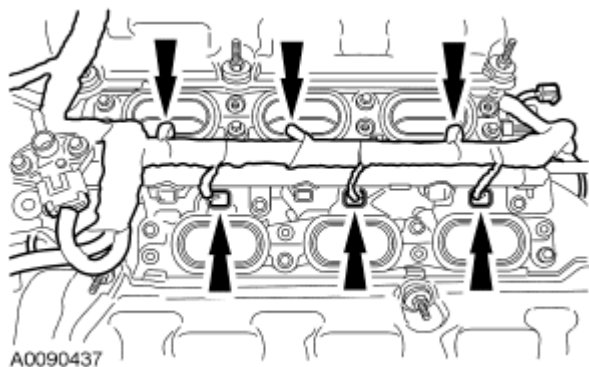


Fig. 182: Locating Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

22. Remove the bolts and the lower intake manifold.
- Discard the gaskets.

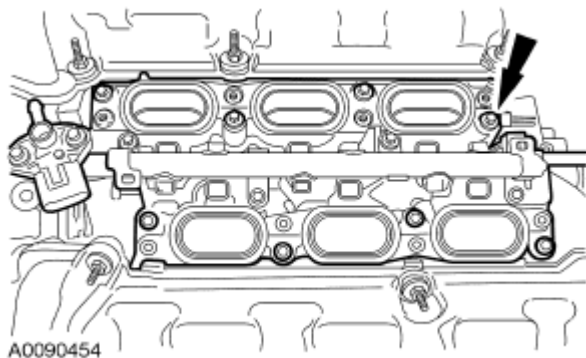


Fig. 183: Locating Lower Intake Manifold Bolt
Courtesy of FORD MOTOR CO.

CAUTION: When removing the coil-on-plugs, a slight twisting motion will break the seal and ease removal.

NOTE: LH shown, RH similar.

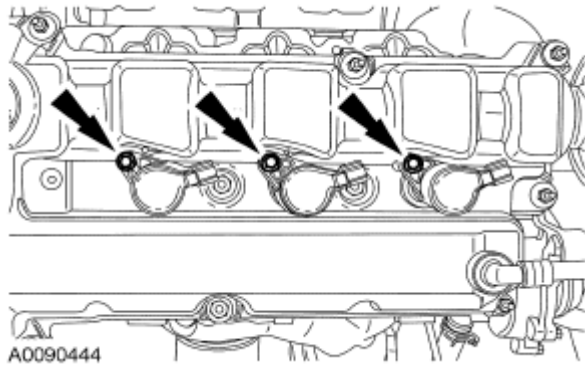


Fig. 184: Locating Coil-On-Plugs Bolts
Courtesy of FORD MOTOR CO.

23. Remove the bolts and the 6 coil-on-plugs.
24. Remove the nut and the radio interference capacitor.

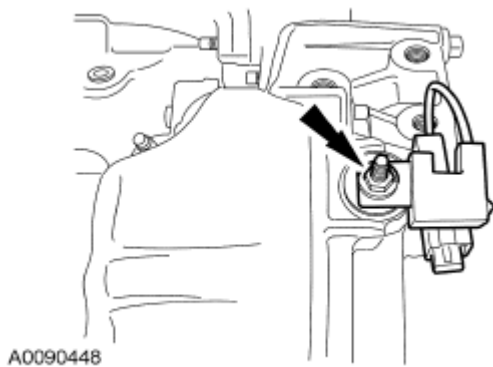


Fig. 185: Locating Radio Interference Capacitor Nut
Courtesy of FORD MOTOR CO.

25. Remove the bolts and the RH valve cover.
 - Discard the gasket.

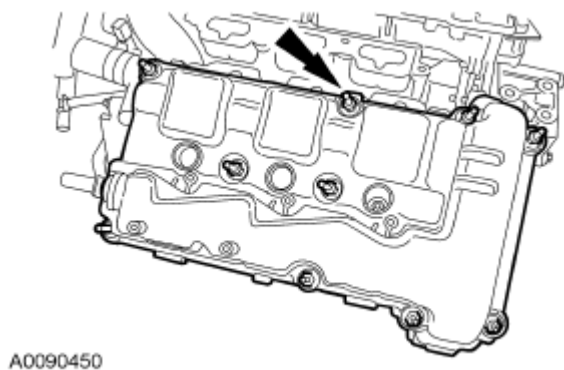


Fig. 186: Locating RH Valve Cover Bolts
Courtesy of FORD MOTOR CO.

26. If equipped, remove the bolt and the engine lift bracket.

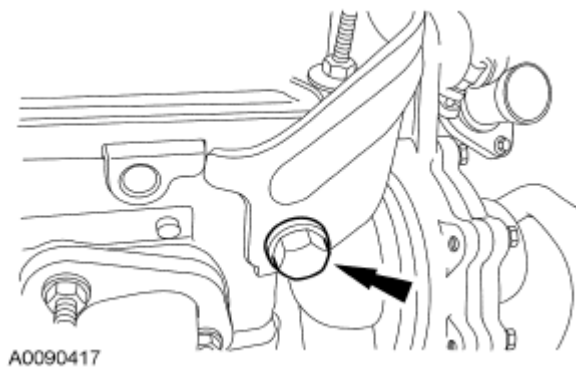


Fig. 187: Locating Engine Lift Bracket Bolts
Courtesy of FORD MOTOR CO.

Early build vehicles

27. Remove the bolts and the LH valve cover.
- Discard the gasket.

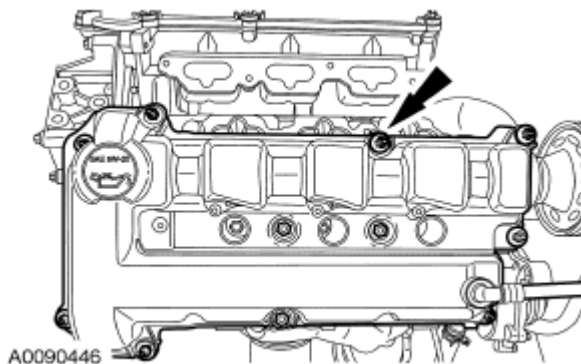


Fig. 188: Locating LH Valve Cover Bolts
Courtesy of FORD MOTOR CO.

Late build vehicles

28. Remove the bolts and the LH valve cover.
- Discard the gasket.

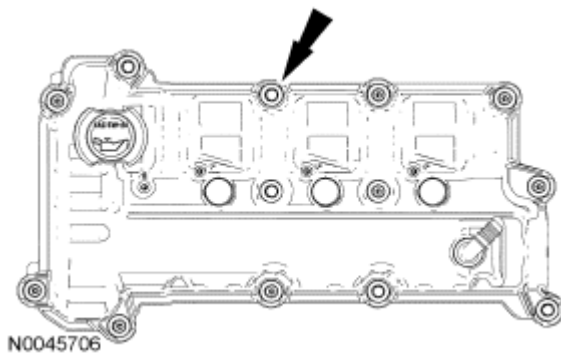


Fig. 189: Locating LH Valve Cover Bolts
Courtesy of FORD MOTOR CO.

4x2 vehicles

29. Remove the nuts, the RH exhaust manifold and the gasket.
 - Discard the gasket and nuts.

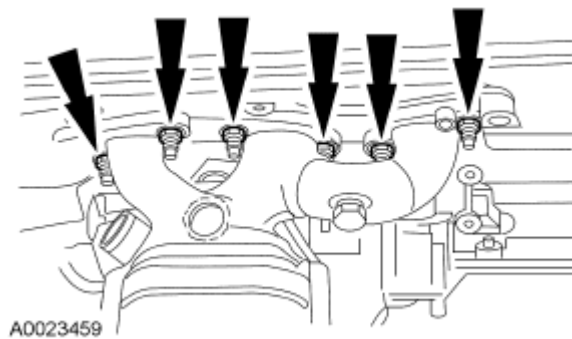


Fig. 190: Locating Gasket & Nuts
Courtesy of FORD MOTOR CO.

30. Remove and discard the 6 RH exhaust manifold studs.

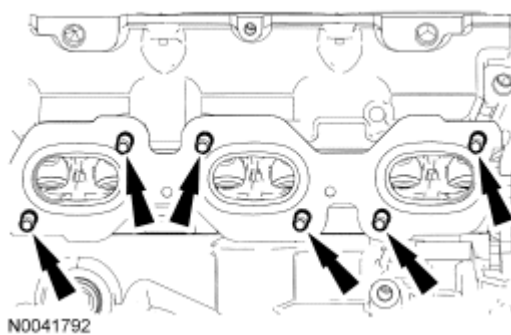


Fig. 191: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

31. Remove the bolts and the halfshaft support bracket.

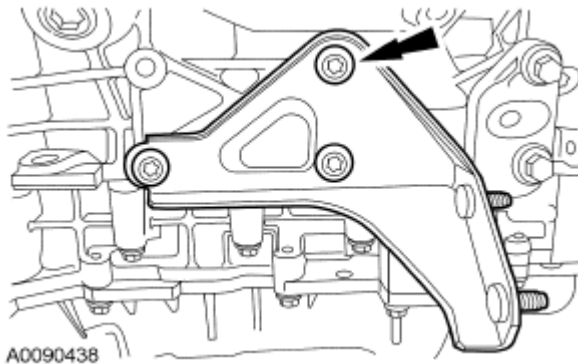


Fig. 192: Locating Halfshaft Support Bracket Bolts
Courtesy of FORD MOTOR CO.

All vehicles

32. Remove the nuts, the LH exhaust manifold and the gasket.
- Discard the gasket and nuts.

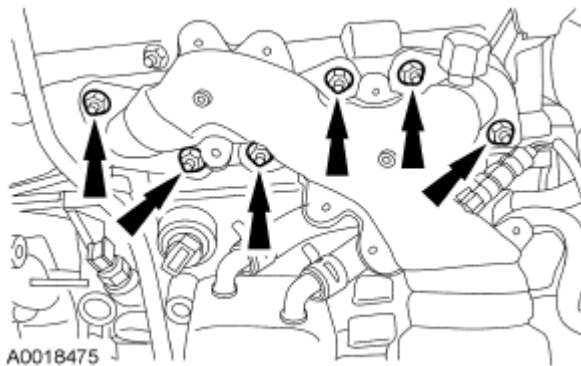


Fig. 193: Locating LH Exhaust Manifold & Gasket
Courtesy of FORD MOTOR CO.

33. Remove and discard the 6 LH exhaust manifold studs.

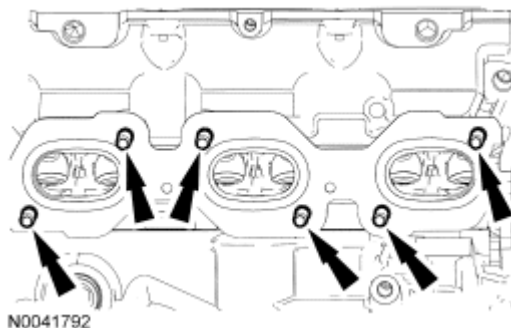
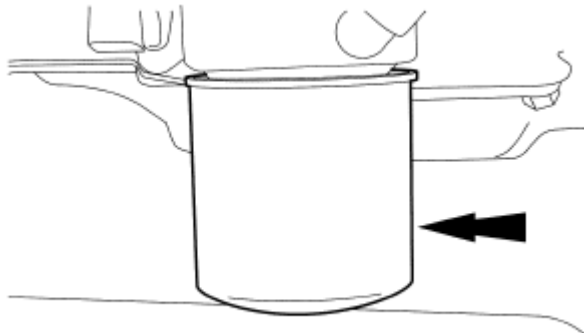


Fig. 194: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

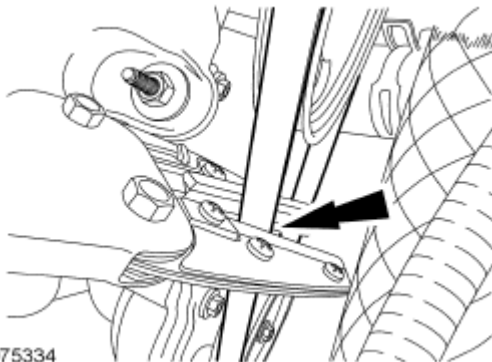
34. Remove and discard the oil filter.



A0018485

Fig. 195: Locating Oil Filter
Courtesy of FORD MOTOR CO.

35. Cut and remove the coolant pump belt.



A0075334

Fig. 196: Locating Coolant Pump Belt
Courtesy of FORD MOTOR CO.

36. Disconnect the hoses.

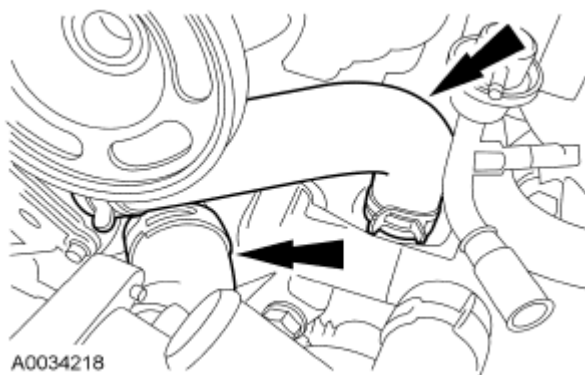


Fig. 197: Locating Hoses
Courtesy of FORD MOTOR CO.

37. Remove the 3 bolts and the coolant pump.

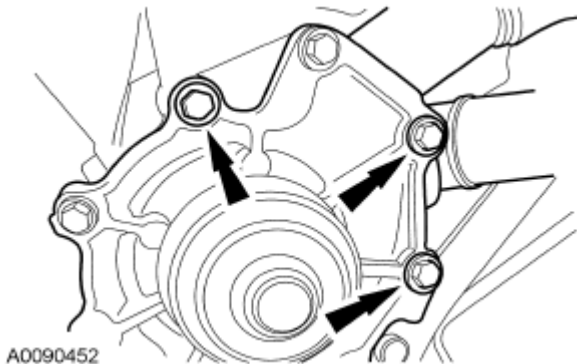


Fig. 198: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

38. Disconnect the hoses and remove the coolant tube.

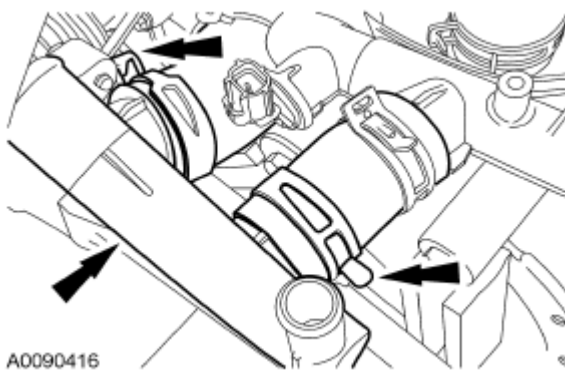


Fig. 199: Locating Coolant Tube
Courtesy of FORD MOTOR CO.

39. Remove the nut, bolt and the coolant bypass tube.

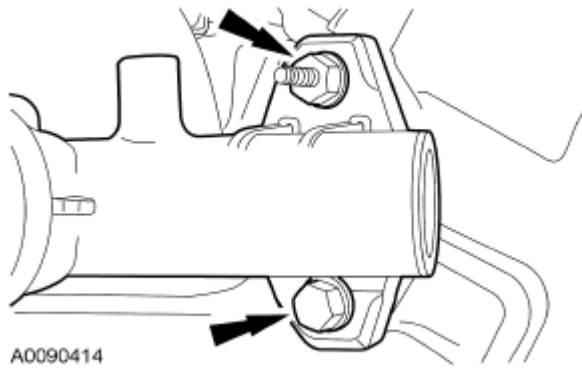


Fig. 200: Locating Coolant Bypass Tube Bolts
Courtesy of FORD MOTOR CO.

40. Remove the stud bolt and the oil level indicator and tube.
 - Remove and discard the O-ring seal.

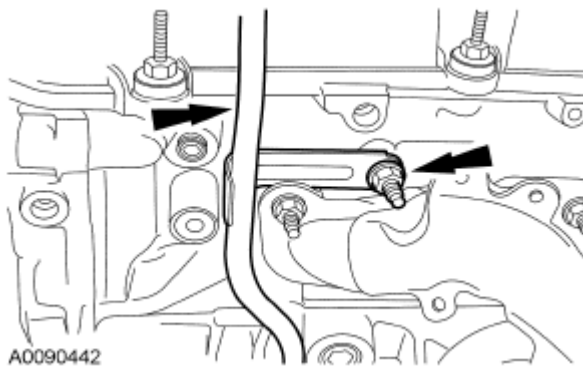


Fig. 201: Locating O-Ring Seal & Stud Bolts
Courtesy of FORD MOTOR CO.

41. Remove the bolts, studs and the oil pan.
 - Discard the gasket.

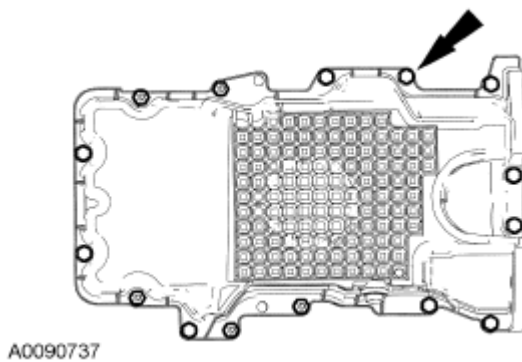


Fig. 202: Locating Studs & Oil Pan Gasket
Courtesy of FORD MOTOR CO.

42. Remove the bolts, nut and the oil pump screen and pickup tube.

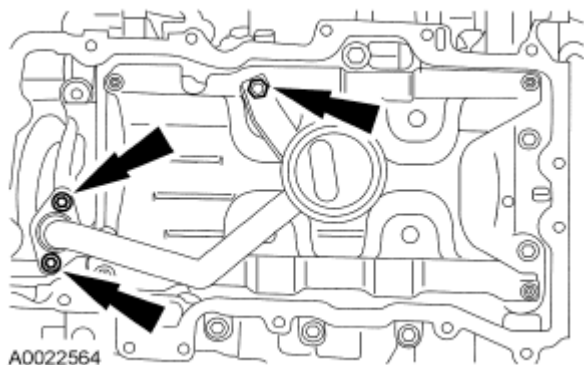


Fig. 203: Locating Oil Pump Screen & Pickup Tube Bolts
Courtesy of FORD MOTOR CO.

43. Remove and discard the O-ring seal.

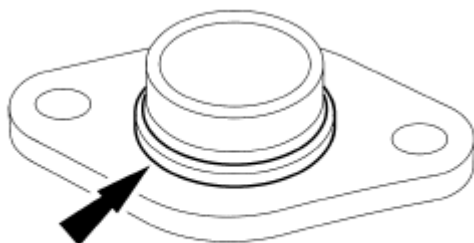


Fig. 204: Locating O-Ring Seal
Courtesy of FORD MOTOR CO.

44. Remove the nuts and the oil pan baffle.

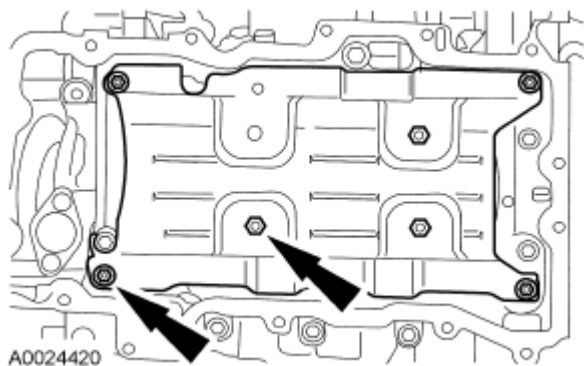


Fig. 205: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

45. Remove the oil pressure sender and, if equipped, the block heater.

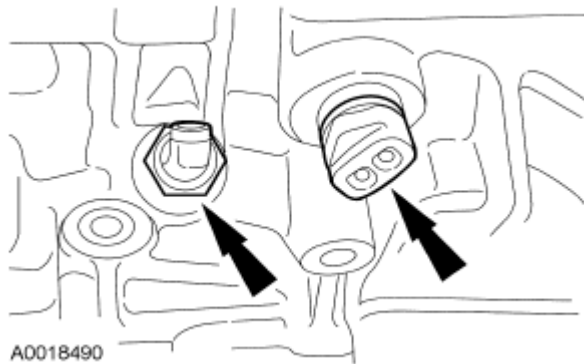


Fig. 206: Locating Oil Pressure Sender
Courtesy of FORD MOTOR CO.

46. Remove the bolt and the KS.

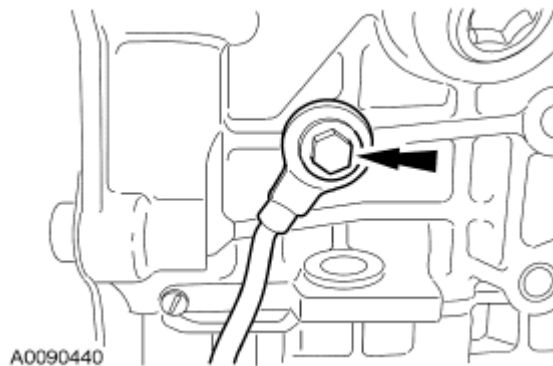


Fig. 207: Locating Bolts
Courtesy of FORD MOTOR CO.

47. Use the special tool to hold the crankshaft damper and remove the bolt.

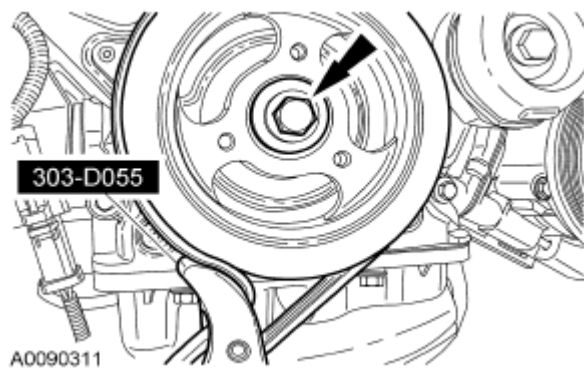


Fig. 208: Identifying Special Tool (303-D055) And Crankshaft Pulley Bolts
Courtesy of FORD MOTOR CO.

48. Using the special tool, remove the crankshaft damper.

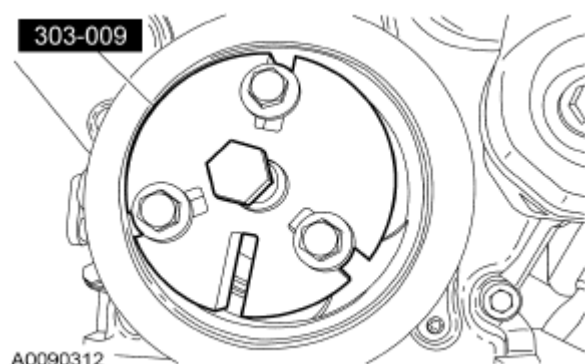


Fig. 209: Removing Crankshaft Pulley Using Special Tool (303-009)
Courtesy of FORD MOTOR CO.

49. Remove and discard the crankshaft front seal from the front cover.

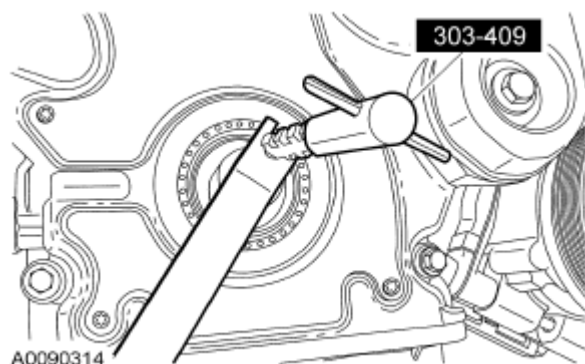


Fig. 210: Removing Crankshaft Front Seal From Front Cover Using Special Tool (303-409)
Courtesy of FORD MOTOR CO.

50. Remove the bolt and the idler pulley.

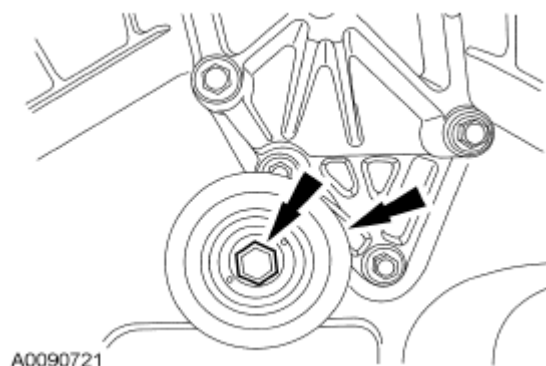


Fig. 211: Removing Idler Pulley Bolt
Courtesy of FORD MOTOR CO.

51. Remove the bolt and the belt tensioner.

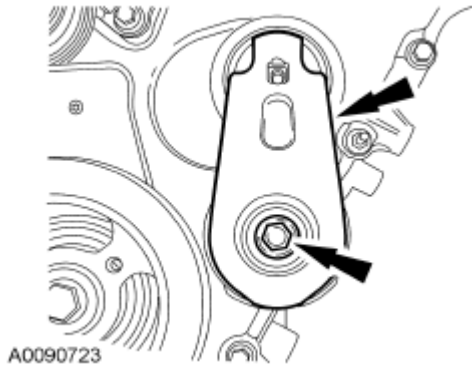


Fig. 212: Locating Bolt & Belt Tensioner
Courtesy of FORD MOTOR CO.

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

52. Remove the bolts, studs and the front cover.
- Discard the gaskets.

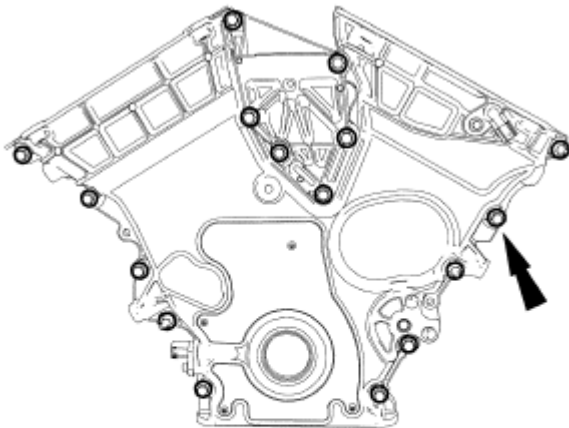


Fig. 213: Locating Front Cover Bolts
Courtesy of FORD MOTOR CO.

CAUTION: This pulse wheel is used in several different engines. Install the pulse

wheel with the keyway in the slot stamped "30" or "30RFF" (orange in color).

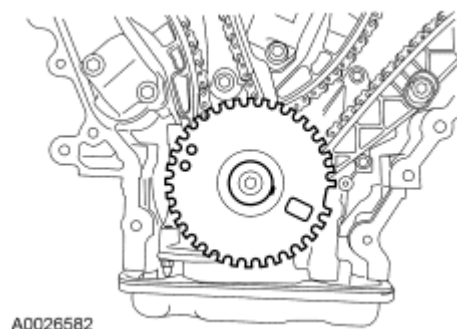


Fig. 214: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

53. Remove the ignition pulse wheel.
54. Install the damper bolt.

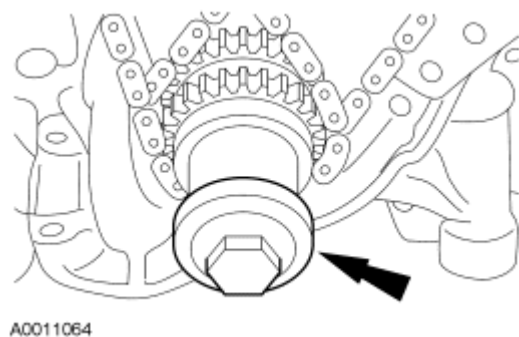


Fig. 215: Identifying Damper Bolt
Courtesy of FORD MOTOR CO.

CAUTION: Only use hand tools when removing or installing the spark plugs, damage can occur to the cylinder head or spark plug.

NOTE: LH shown, RH similar.

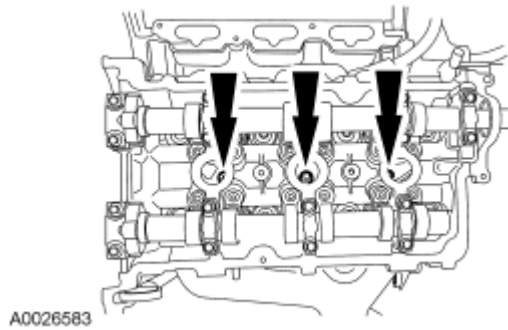


Fig. 216: Locating Spark Plugs
Courtesy of FORD MOTOR CO.

55. Remove the LH and RH spark plugs.
56. Rotate the crankshaft clockwise to position the crankshaft keyway in the 11 o'clock position and position the camshafts in the correct position. This will position the number one cylinder at top dead center (TDC).
 - Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.

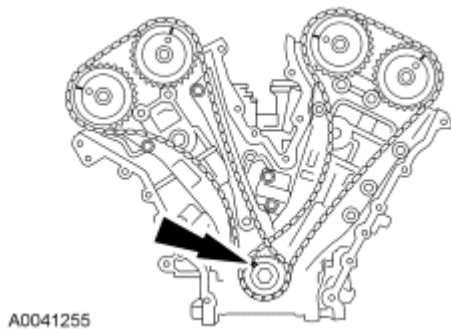


Fig. 217: Identifying Crankshaft Keyway In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

57. Rotate the crankshaft clockwise 120 degrees to the 3 o'clock position to position the RH camshafts in the neutral position.

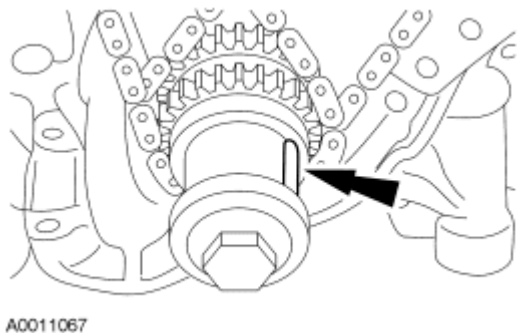


Fig. 218: Identifying Crankshaft Keyway

Courtesy of FORD MOTOR CO.

58. Verify that the RH camshafts are in the neutral position.

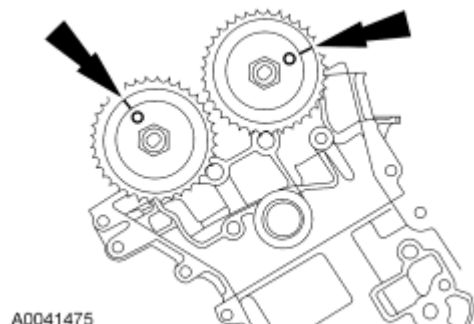


Fig. 219: Locating Camshafts Align Marks
Courtesy of FORD MOTOR CO.

59. Remove the RH timing chain tensioner arm.
1. Remove the bolts.
 2. Remove the tensioner.
 3. Remove the tensioner arm.

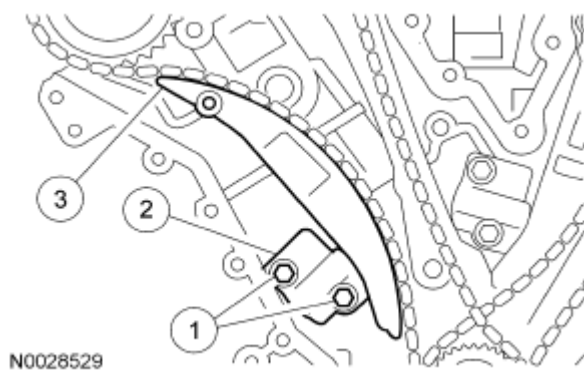


Fig. 220: Identifying RH Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

60. Remove the bolts, RH timing chain guide and the timing chain.

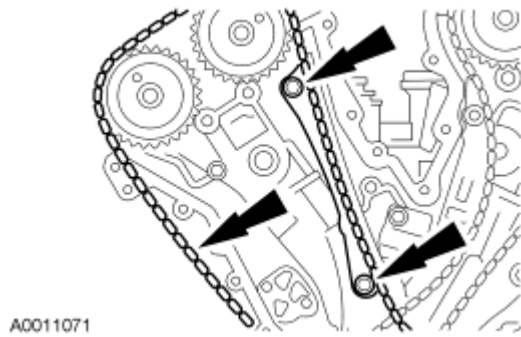


Fig. 221: Locating Timing Chain Guide & Bolts
Courtesy of FORD MOTOR CO.

61. Rotate the crankcase clockwise 600 degrees (1-2/3 turns) to position the crankcase key way in the 11 o'clock position. This will position the LH camshafts in the neutral position.

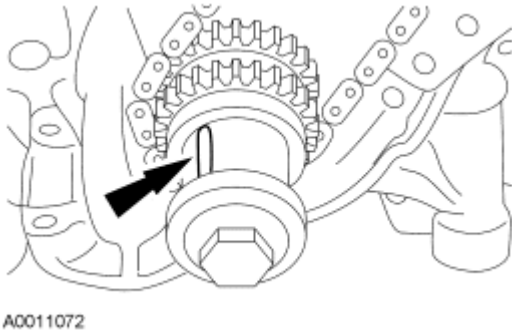


Fig. 222: Positioning Crankcase Key Way In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

62. Verify the LH camshafts are in the neutral position.

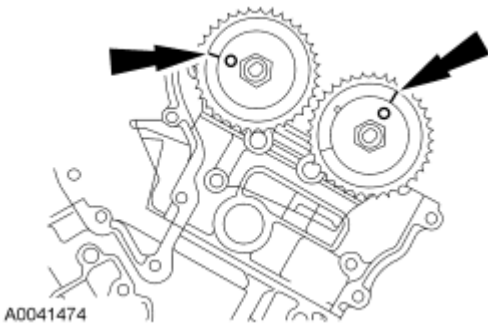


Fig. 223: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

63. Remove the LH timing chain and tensioner arm.
1. Remove the bolts.
 2. Remove the tensioner.

3. Remove the tensioner arm.

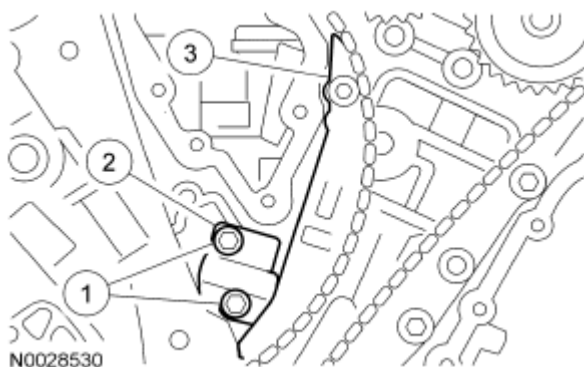


Fig. 224: Locating LH Timing Chain & Tensioner Arm
Courtesy of FORD MOTOR CO.

64. Remove the LH timing chain and timing chain guide.

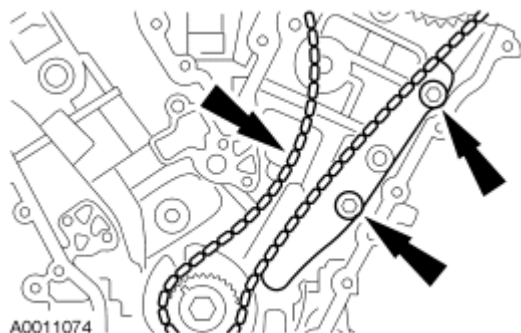


Fig. 225: Locating Timing Chain & Timing Chain Guide
Courtesy of FORD MOTOR CO.

65. Remove the damper bolt and the crankshaft sprockets.

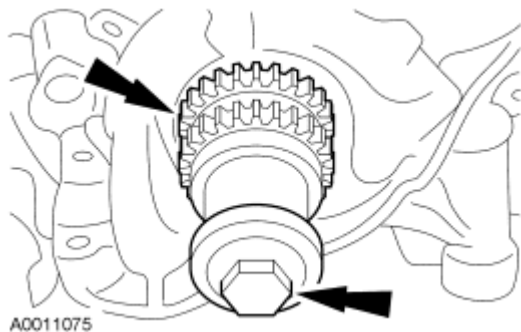


Fig. 226: Locating Damper Bolt & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

CAUTION: On early build engines, the OEM pulley is pressed on 4.74 mm (0.18

in) past flush of the end of the camshaft. On late build engines, the OEM pulley is pressed on flush to the end of the camshaft. Service pulleys on all engines are pressed on flush to the end of the camshaft.

NOTE: Early build shown, late build similar.

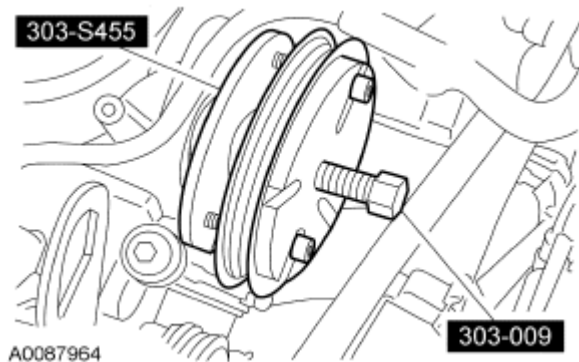


Fig. 227: Removing Coolant Pump Drive Pulley Using Special Tools (303-009, 303-S455)
Courtesy of FORD MOTOR CO.

66. Using the special tools, remove the coolant pump drive pulley and discard.

CAUTION: To make sure of correct sealing, do not scratch the camshaft.

NOTE: Early build shown, late build similar.

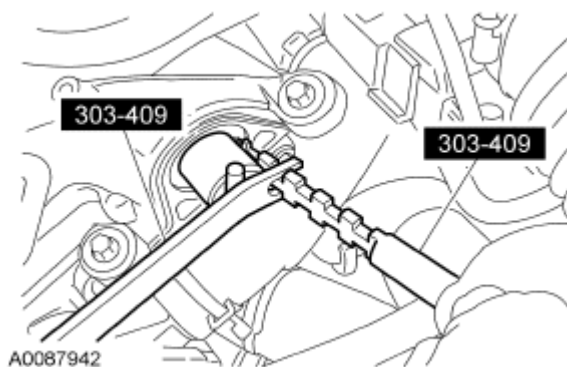


Fig. 228: Removing Camshaft Oil Seal Using Special Tool (303-409)
Courtesy of FORD MOTOR CO.

67. Using the special tools, remove the camshaft oil seal and discard.

NOTE: Early build shown, late build similar.

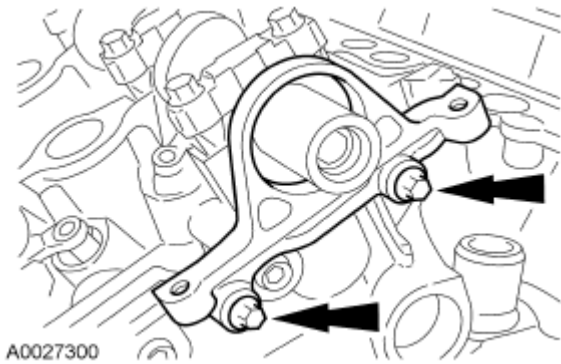


Fig. 229: Locating Camshaft Oil Seal Retainer Bolts
Courtesy of FORD MOTOR CO.

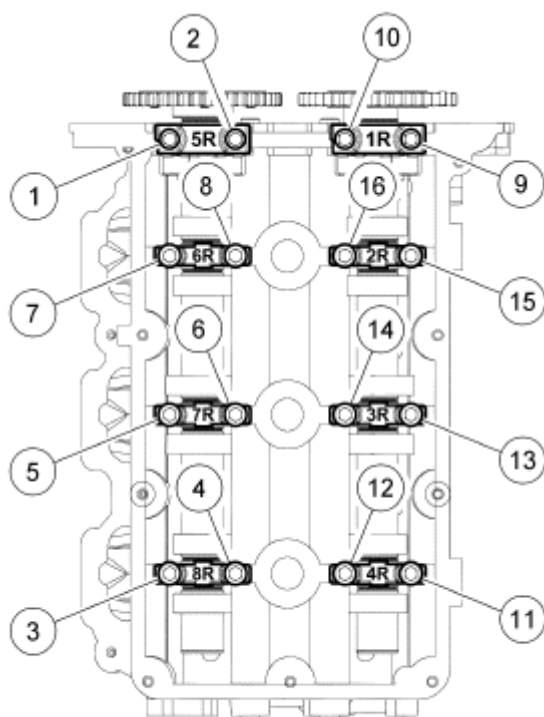
68. Remove the intake camshaft oil seal retainer and discard the press-in-place gasket.

CAUTION:

Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions. If the numbers cannot be seen, mark the camshaft bearing caps prior to removing them.

After loosening all of the camshaft bearing cap bolts, remove the camshaft bearing thrust caps (5R and 1R) first, or damage to the thrust caps may occur.

69. Loosen the bolts evenly in the sequence shown in **Fig. 230**.
1. Remove the camshaft bearing thrust caps (5R and 1R).
 2. Remove the remaining camshaft bearing caps.
 3. Remove the camshafts from the cylinder head.



N0045707

Fig. 230: Identifying Loosening Sequence Of Camshaft Bearing Bolts
 Courtesy of FORD MOTOR CO.

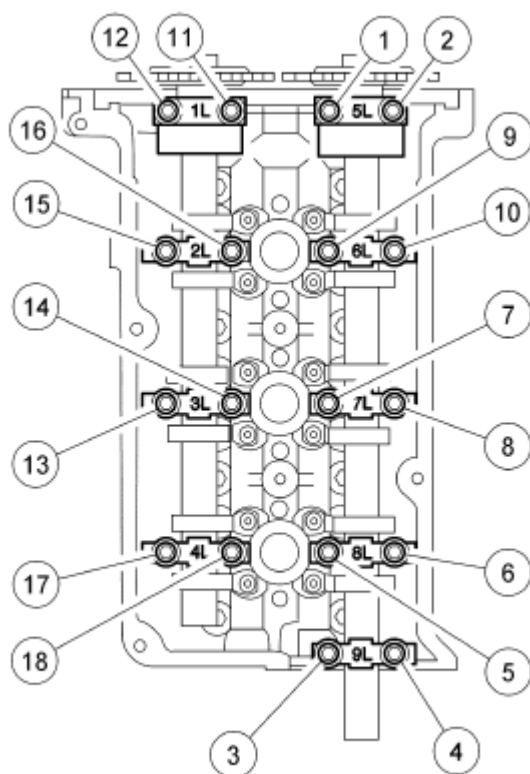
Early build vehicles

CAUTION:

Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions. If the numbers cannot be seen, mark the camshaft bearing caps prior to removing them.

After loosening all of the camshaft bearing cap bolts, remove the camshaft bearing thrust caps (1L and 5L) first, or damage to the thrust caps may occur.

70. Loosen the bolts evenly in the sequence shown in **Fig. 231**.
 1. Remove the camshaft bearing thrust caps (1L and 5L).
 2. Remove the remaining camshaft bearing caps.
 3. Remove the camshafts from the cylinder head.



N0028533

Fig. 231: Identifying Loosening Sequence Of Camshaft Bearing Bolts - Early Build Vehicles
 Courtesy of FORD MOTOR CO.

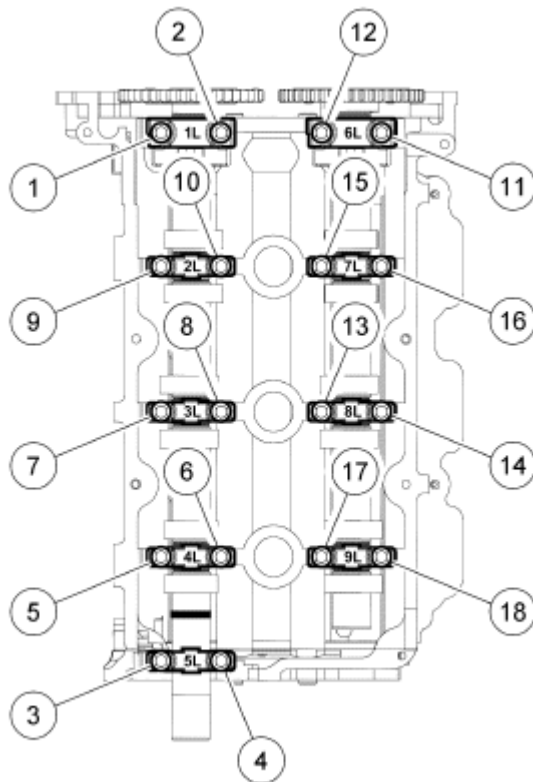
Late build vehicles

CAUTION:

Cylinder head camshaft bearing caps are numbered to verify that they are assembled in their original positions. If the numbers cannot be seen, mark the camshaft bearing caps prior to removing them.

After loosening all of the camshaft bearing cap bolts, remove the camshaft bearing thrust caps (1L and 6L) first, or damage to the thrust caps may occur.

71. Loosen the bolts evenly in the sequence shown in **Fig. 232**.
 1. Remove the camshaft bearing thrust caps (1L and 6L).
 2. Remove the remaining camshaft bearing caps.
 3. Remove the camshafts from the cylinder head.



N0045251

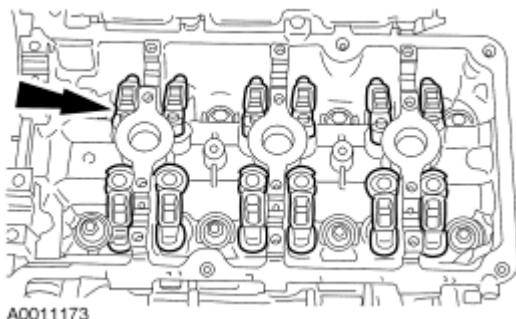
Fig. 232: Identifying Loosening Sequence Of Camshaft Bearing Bolts - Late Build Vehicles
Courtesy of FORD MOTOR CO.

All vehicles

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

NOTE: RH shown, LH similar.

72. Remove the LH and RH camshaft roller followers.
 - Mark the location of the roller followers, using a permanent-type marker.



A0011173

Fig. 233: Locating Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

73. Loosen the bolts in the indicated sequence and remove the LH and RH cylinder heads.
 - Discard the bolts and the gaskets.

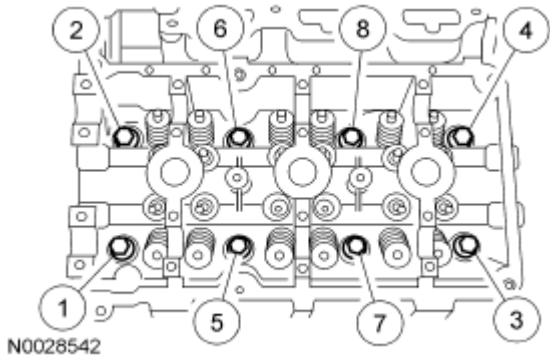


Fig. 234: Identifying Loosening Sequence Of LH & RH Cylinder Bolts
Courtesy of FORD MOTOR CO.

74. Support the cylinder head on a bench with the head gasket side up.

NOTE: The straightedge used must be flat within 0.0051 mm (0.0002 in) per foot of tool length.

75. Inspect all areas of the deck face with a straightedge and feeler gauge. The cylinder head must not have depressions deeper than 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.001 in).
76. Remove the bolts and the oil separator cover.
 - Discard the gasket.

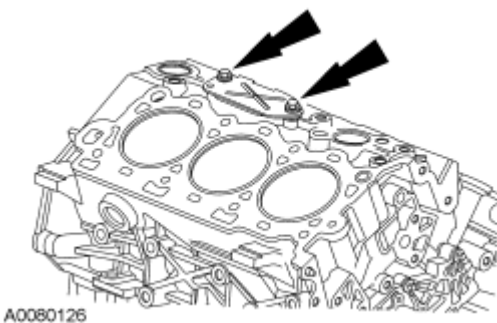


Fig. 235: Locating Oil Separator Cover Bolts
Courtesy of FORD MOTOR CO.

77. Remove the crankshaft key.

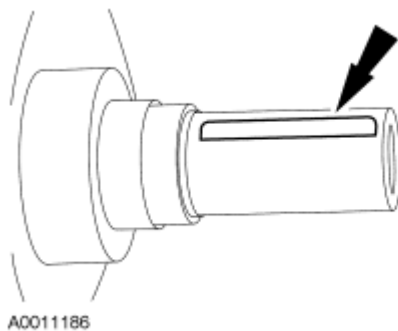
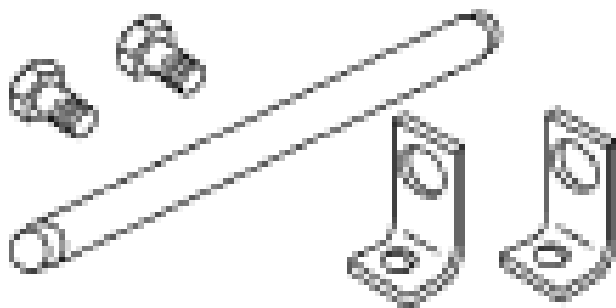


Fig. 236: Locating Crankshaft Key
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

CYLINDER HEAD

SPECIAL TOOL(S)



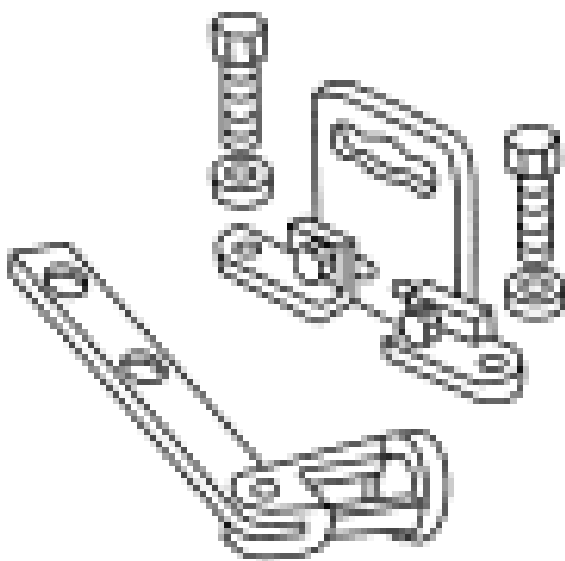
ST1981-A

Compressor, Valve Spring
303-300 (T87C-6565-A)

Compressor, Valve Spring

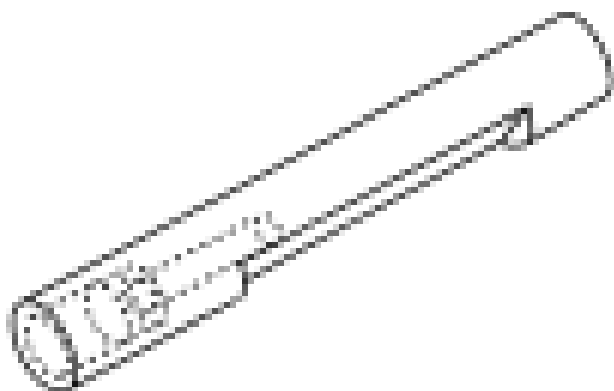
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1907-A

303-350 (T89P-6565-A)



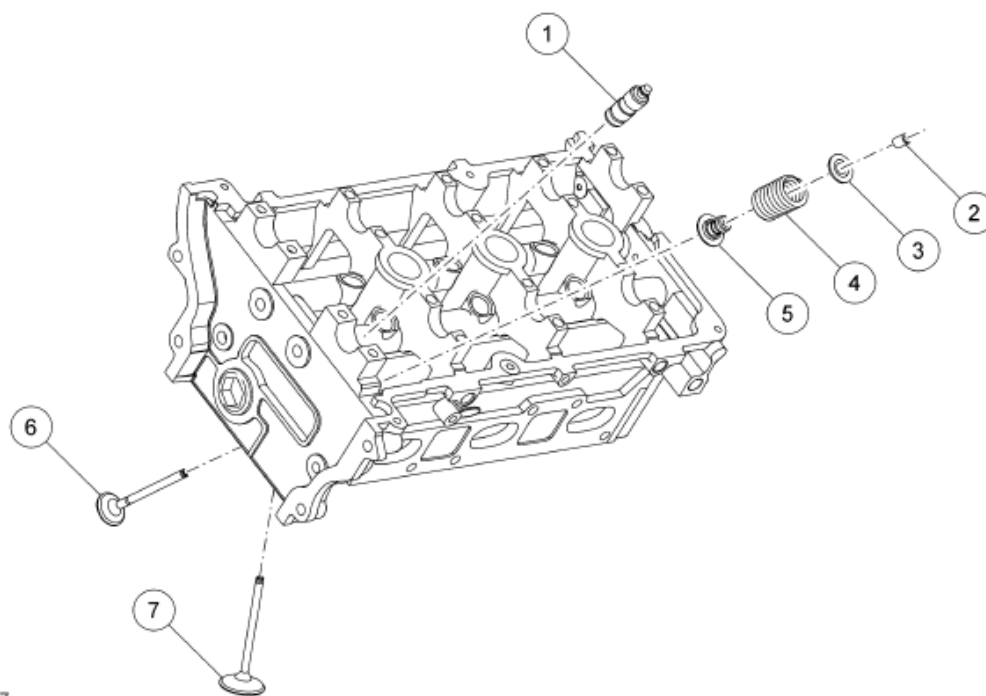
ST1906-A

Installer, Valve Stem Oil Seal
303-470 (T94P-6510-CH)

MATERIALS

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A

NOTE: Early build shown, late build similar.



A0090907

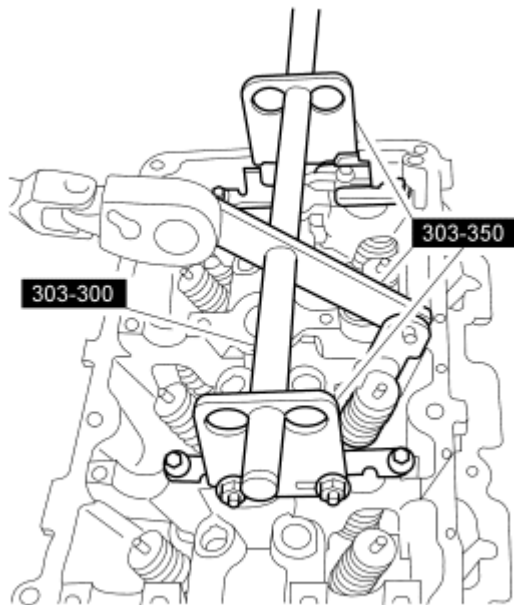
Item	Part Number	Description
1	6C501	Hydraulic lash adjuster (12 required)
2	6518	Valve spring retainer key (12 required)
3	6514	Valve spring retainer (12 required)
4	6513	Valve spring (12 required)
5	6A517	Valve stem seal (12 required)
6	6505	Intake valve
7	6507	Exhaust valve

Fig. 237: Identifying Cylinder Head Components
Courtesy of FORD MOTOR CO.

Disassembly

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

1. Remove the hydraulic lash adjusters.
2. Using the special tool, remove the keys, retainer and spring.



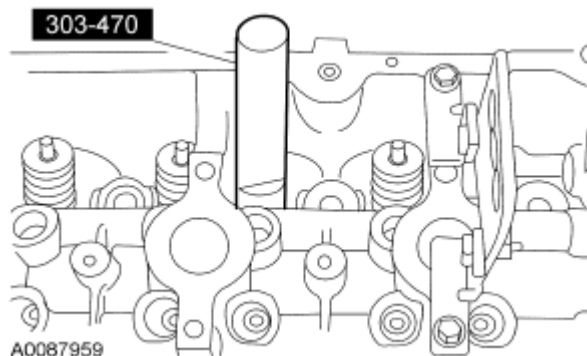
A0087958

Fig. 238: Identifying Special Tools (303-300 And 303-350)
Courtesy of FORD MOTOR CO.

3. Remove the valve from the cylinder head.
4. Remove the valve stem seal.

Assembly

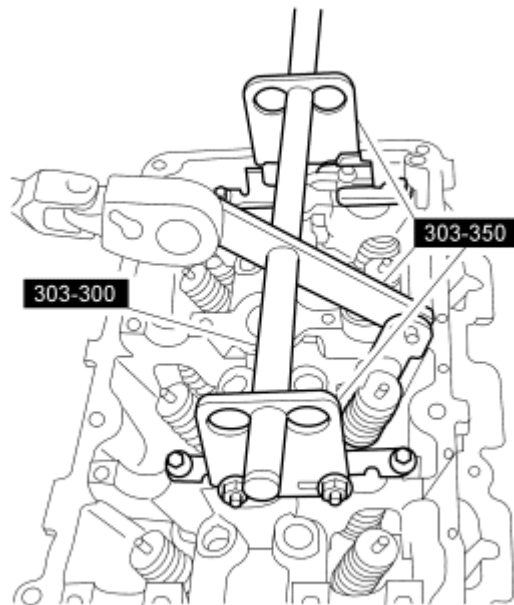
1. Using the special tool, install the valve stem seal.



A0087959

Fig. 239: Installing Valve Stem Seal Using Special Tool (303-470)
Courtesy of FORD MOTOR CO.

2. Install the valve.
3. Using the special tool, install the valve spring, retainer and key.



A0087958

Fig. 240: Identifying Special Tools (303-300 And 303-350)
 Courtesy of FORD MOTOR CO.

4. Install the hydraulic lash adjusters.
 - Lubricate the hydraulic lash adjusters with clean engine oil.

ASSEMBLY

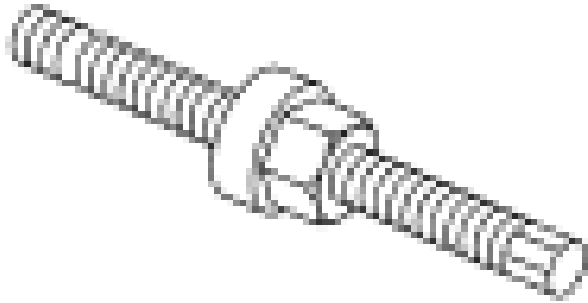
ENGINE

SPECIAL TOOL(S)

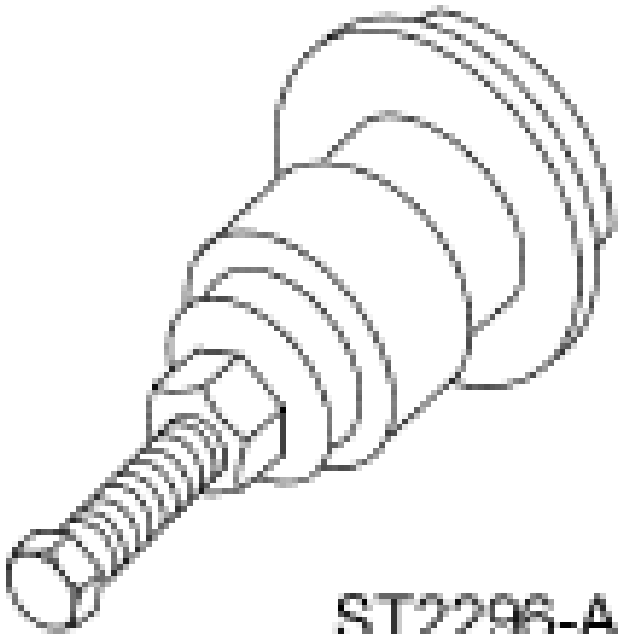
Installer, Crankshaft Vibration Damper
 303-102 (T74P-6316-B)

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1287-A



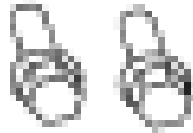
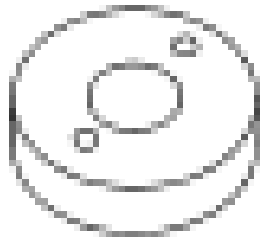
ST2298-A

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

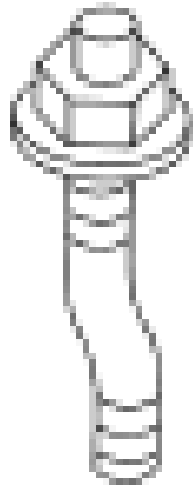
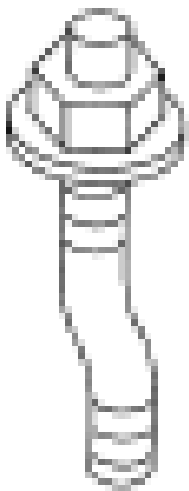
Installer, Crankshaft Rear Main Oil Seal
303-178 (T82L-6701-A)

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1327-A



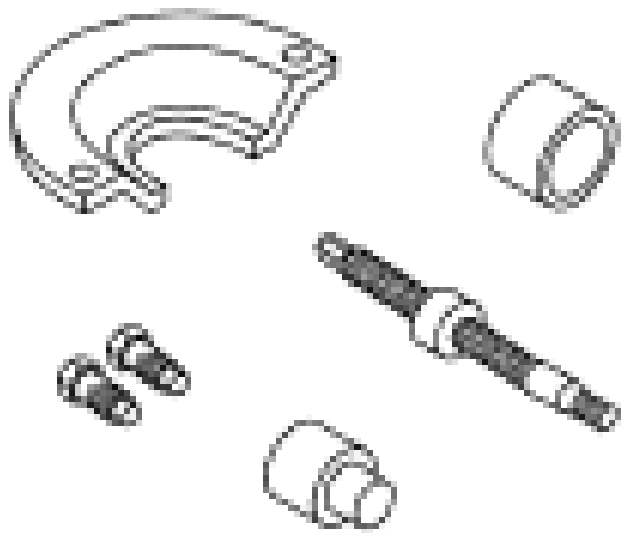
ST1333-A

Installer Bolts, Crankshaft Rear Main Oil Seal
303-384 (T91P-6701-A)

Service Set, Water Pump Pulley

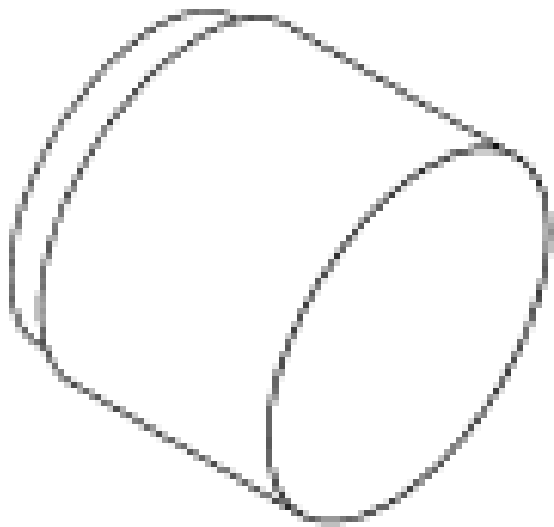
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1971-A

303-S455 (T94P-6312-AH)

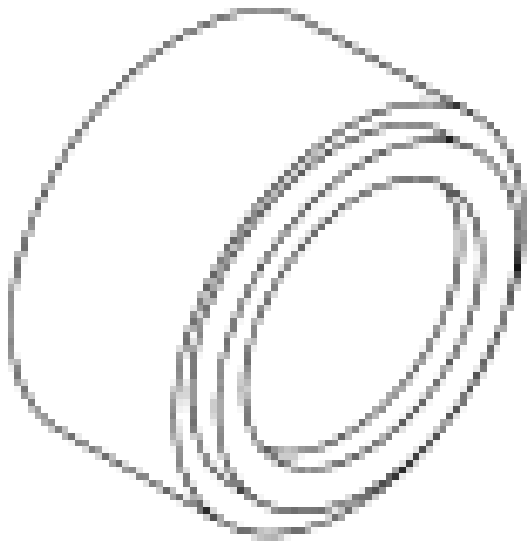


ST2060-A

Protector, Camshaft Oil Seal
303-463 (T91P-6256-AH)

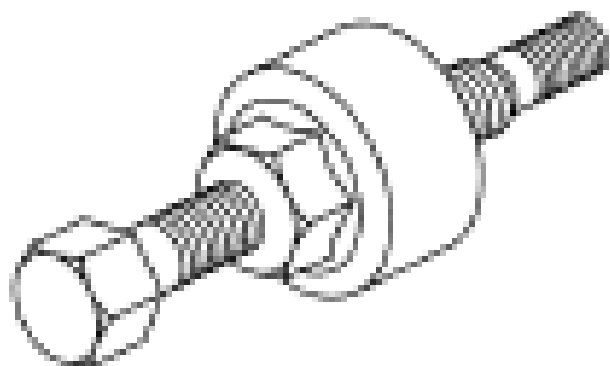
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1979-A

Installer, Camshaft Oil Seal
303-464 (T94P-6256-BH)

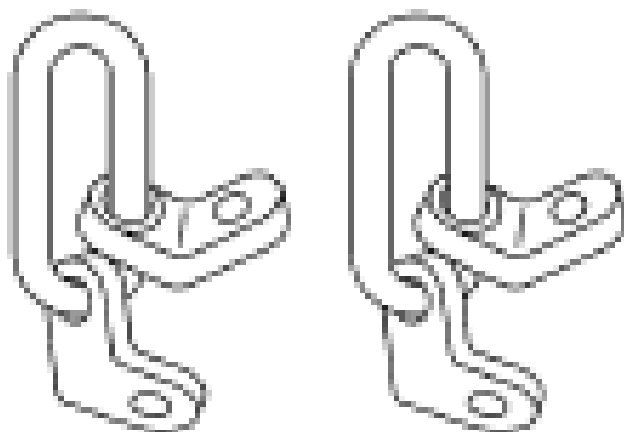


ST1586-A

Installer, Power Steering Pump Pulley
211-185 (T91P-3A733-A)

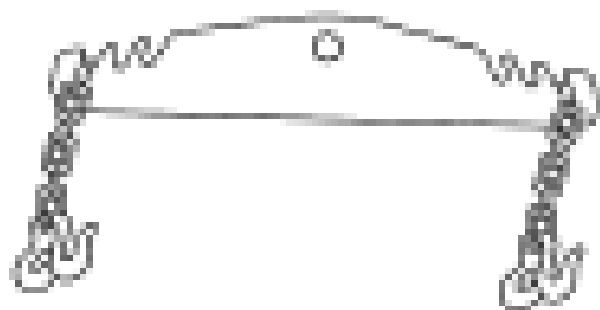
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ST1595-A

Lifting Brackets, Engine
303-050 (T70P-6000)



ST1602-A

Spreader Bar
303-D089 (D93P-6001-A3) or equivalent

MATERIALS

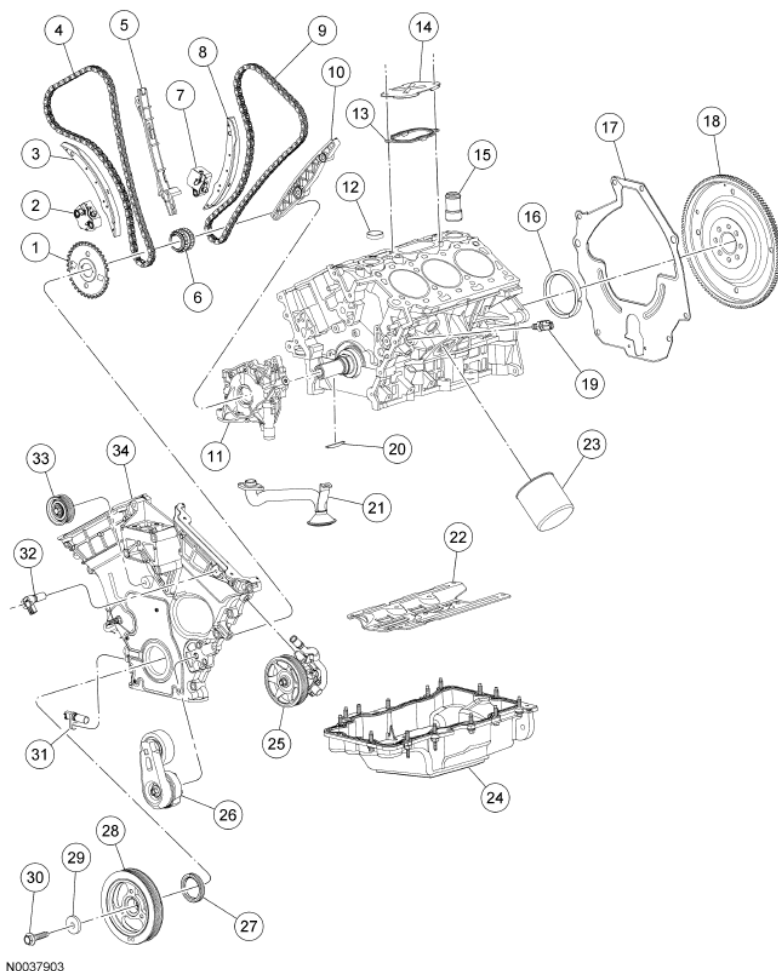
Item	Specification
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (in Canada Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12) or equivalent	WSS-M2C930-A

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Silicone Gasket and Sealant
TA-30

WSE-M4G323-
A4

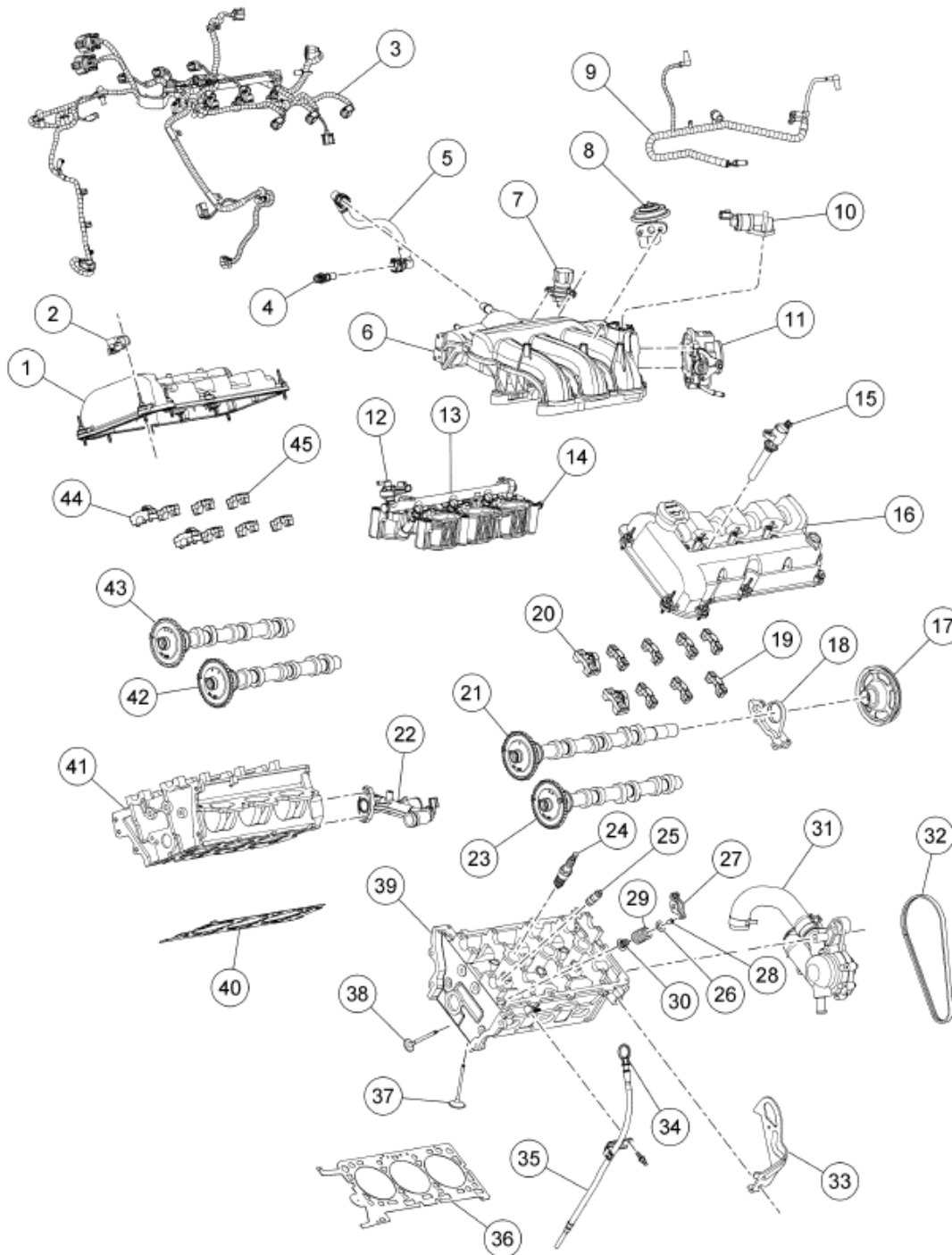


Item	Part Number	Description
1	12A227	Ignition pulse wheel
2	6L266	RH timing chain tensioner
3	6K255	RH timing chain tensioner arm
4	6268	RH timing chain
5	6M256	RH timing chain guide
6	6306	Crankshaft sprocket
7	6L266	LH timing chain tensioner
8	6K255	LH timing chain tensioner arm
9	6268	LH timing chain
10	6B297	LH timing chain guide
11	6621	Oil pump
12	W701923	Cup plug
13	6B752	Oil separator gasket
14	—	Cover
15	8A505	Water inlet tube
16	6701	Crankshaft rear oil seal
17	—	Spacer plate
18	6375	Flexplate
19	—	Oil pressure sender

Item	Part Number	Description
20	W705934	Woodruff key
21	6622	Oil pickup tube and screen
22	6687	Oil pan baffle
23	6714	Oil filter
24	6675	Oil pan
25	3A674	Power steering pump and pulley
26	6B209	Accessory drive belt tensioner
27	6700	Crankshaft front seal
28	6316	Crankshaft vibration damper
29	W701511	Crankshaft vibration damper washer
30	W701512	Crankshaft vibration damper bolt
31	6B288	Crankshaft position (CKP) sensor
32	6C315	Camshaft position (CMP) sensor
33	—	Accessory drive belt idler pulley
34	6019	Front cover

Fig. 241: Identifying Engine Components (1 Of 2)

Courtesy of FORD MOTOR CO.



N0031824

Fig. 242: Identifying Engine Components (2 Of 2)
 Courtesy of FORD MOTOR CO.

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

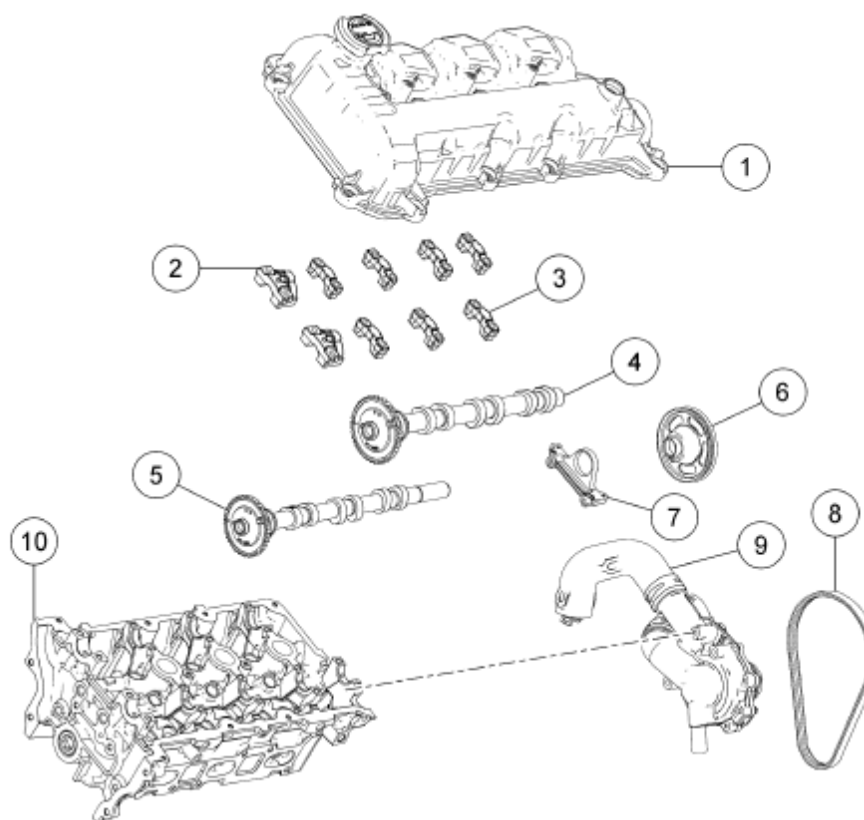
Item	Part Number	Description
1	6582	RH valve cover
2	18801	Radio ignition interference capacitor
3	12B637	Engine control sensor and fuel charging wiring harness
4	—	Positive crankcase ventilation (PCV) valve
5	—	PCV tube
6	9424	Upper intake manifold
7	9J472	Exhaust gas recirculation (EGR) vacuum regulator
8	9D460	EGR valve
9	9E498	Vacuum harness
10	9F715	Idle air control (IAC) valve
11	9E926	Throttle body
12	4682	Fuel rail pressure and temperature sensor
13	9F792	Fuel rail
14	9J477	Lower intake manifold
15	12A366	Coil-on-plug (6 req'd)
16	6A505	LH valve cover (Early build)
17	6A359	Coolant pump drive pulley (Early build)
18	6B293	Rear seal retainer (Early build)
19	6B280	Camshaft bearing cap (Early build)
20	6B280	Camshaft thrust bearing cap (Early build)
21	6A267	LH intake camshaft (Early build)

Item	Part Number	Description
22	8548	Coolant bypass tube
23	6A269	LH exhaust camshaft (Early build)
24	12405	Spark plug
25	6C501	Hydraulic lash adjuster
26	6514	Valve spring retainer
27	6529	Camshaft follower
28	6518	Valve spring retainer key
29	6513	Valve spring
30	6A517	Valve stem seal
31	8501	Coolant pump (Early build)
32	8K543	Coolant pump belt (Early build)
33	—	LH engine lifting eye
34	—	Oil level indicator
35	6754	Oil level indicator tube
36	6083	LH cylinder head gasket
37	6507	Intake valve
38	6505	Exhaust valve
39	6049	LH cylinder head (Early build)
40	6051	RH cylinder head gasket
41	6050	RH cylinder head
42	6A266	RH intake camshaft
43	6A268	RH exhaust camshaft
44	6B280	Camshaft bearing cap
45	6A258	Camshaft journal cap

Fig. 243: Identifying Engine Component Description Table
Courtesy of FORD MOTOR CO.

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



Item	Part Number	Description
1	6A505	LH valve cover (Late build)
2	6B280	Camshaft thrust bearing cap (Late build)
3	6B280	Camshaft bearing cap (Late build)
4	6A267	LH intake camshaft (Late build)
5	6A269	LH exhaust camshaft (Late build)
6	6A359	Coolant pump drive pulley (Late build)
7	6B293	Rear seal retainer (Late build)
8	8K543	Coolant pump drive belt (Late build)
9	8501	Coolant pump (Late build)
10	6049	LH cylinder head (Late build)

Fig. 244: Identifying Engine Components

Courtesy of FORD MOTOR CO.

CAUTION: During engine repair procedures, cleanliness is extremely important.

Any foreign material, including any material created while cleaning gasket surfaces that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

If the oil pan was removed during engine disassembly, it must be installed after the engine and transaxle are assembled and the transaxle-to-engine bolts are installed. Failure to follow this assembly sequence can result in engine oil leaks.

NOTE: Early build vehicles are equipped with the coolant pump drive pulley on the LH intake camshaft, late build vehicles are equipped with the coolant pump drive pulley on the LH exhaust camshaft.

All vehicles

1. If removed, install the crankshaft key into the keyway on the crankshaft.

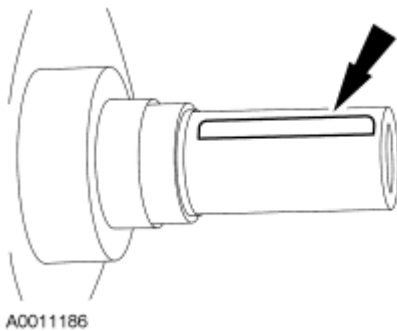


Fig. 245: Locating Crankshaft Key
Courtesy of FORD MOTOR CO.

2. Install the crankcase cover, a new gasket and the bolts.
 - Tighten to 10 N.m (89 lb-in).

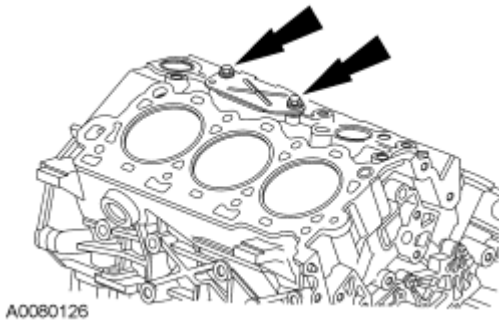


Fig. 246: Locating Oil Separator Cover Bolts
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

3. Position the new LH and RH cylinder heads and gaskets. Install new bolts and tighten in the sequence shown in 6 stages.
 - Stage 1: Tighten to 40 N.m (30 lb-ft).
 - Stage 2: Tighten to 90 N.m (66 lb-ft).
 - Stage 3: Loosen one full turn.
 - Stage 4: Tighten to 40 N.m (30 lb-ft).
 - Stage 5: Tighten 90 degrees.
 - Stage 6: Tighten 90 degrees.

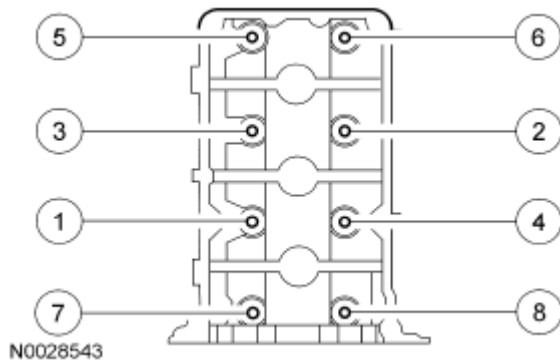


Fig. 247: Identifying Tightening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

4. Install the crankshaft damper bolt and rotate the crankshaft keyway to the 11 o'clock position to locate top dead center (TDC).

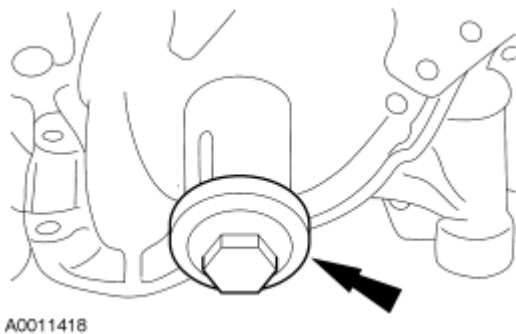


Fig. 248: Locating Crankshaft Damper Bolt
Courtesy of FORD MOTOR CO.

5. Apply clean engine oil to the LH and RH camshaft roller followers.

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

NOTE: RH shown, LH similar.

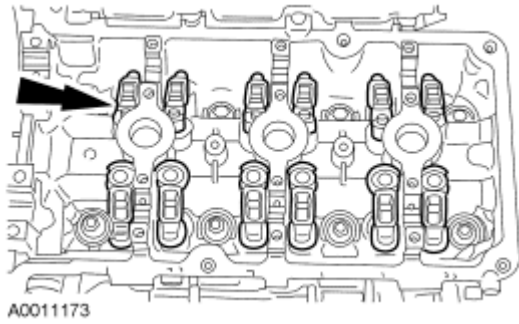


Fig. 249: Locating Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

6. Install the LH and RH camshaft roller followers.
7. Apply clean engine oil to the LH and RH camshafts.
8. Install the LH and RH camshafts.
 - Locate the camshafts as shown.

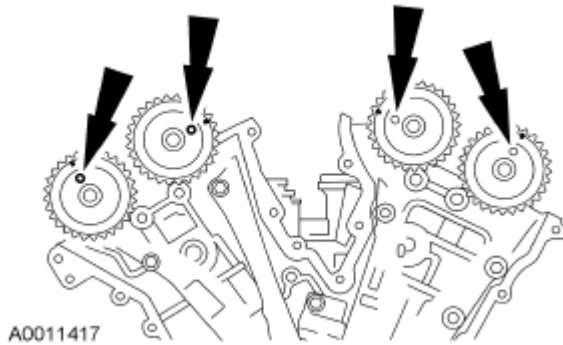


Fig. 250: Locating Camshafts Matching Marks
Courtesy of FORD MOTOR CO.

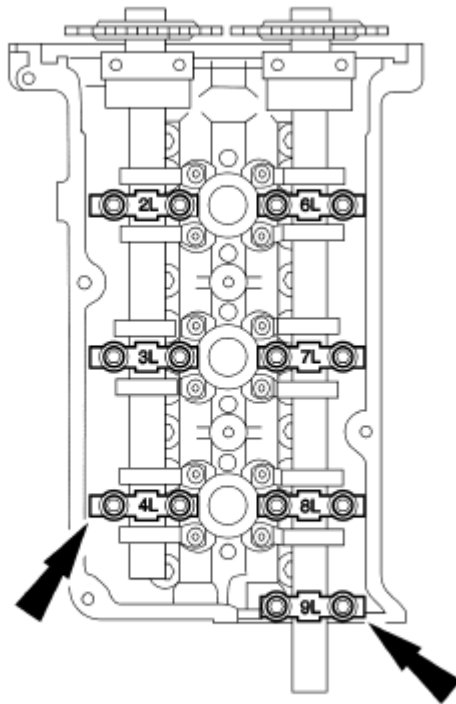
Early build vehicles

CAUTION:

The camshaft caps must be installed in their original positions or damage to the engine may occur.

Do not install the camshaft bearing thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.

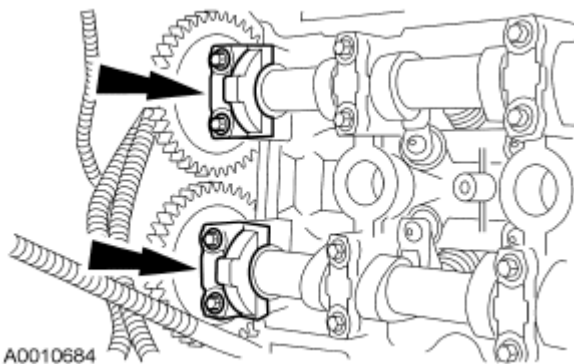
9. Lubricate the bearing surfaces of the LH camshaft bearing caps with clean engine oil and install the bearing caps.
 - Loosely install the bolts.



A0017886

Fig. 251: Identifying Camshaft Bearing Cap Bolts
Courtesy of FORD MOTOR CO.

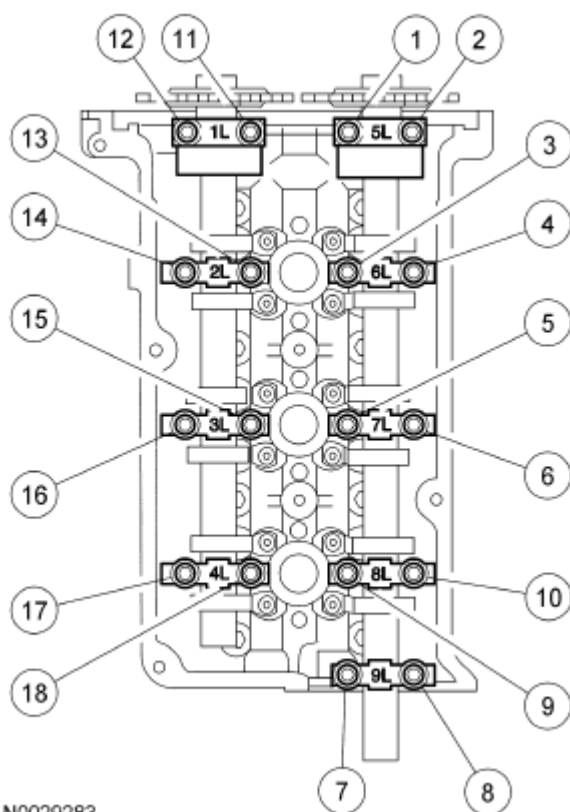
10. Lubricate the bearing surfaces of the LH camshaft bearing thrust caps with clean engine oil and install the bearing thrust caps.
 - Loosely install the bolts.



A0010684

Fig. 252: Locating Camshaft Bearing Thrust Caps
Courtesy of FORD MOTOR CO.

11. Install the bolts.
 - Tighten in the sequence shown to 8 N.m (71 lb-in).



N0029283

Fig. 253: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

Late build vehicles

CAUTION:

The camshaft caps must be installed in their original positions or damage to the engine may occur.

Do not install the camshaft bearing thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.

12. Lubricate the bearing surfaces of the LH camshaft bearing caps with clean engine oil and install the bearing caps.
 - Loosely install the bolts.

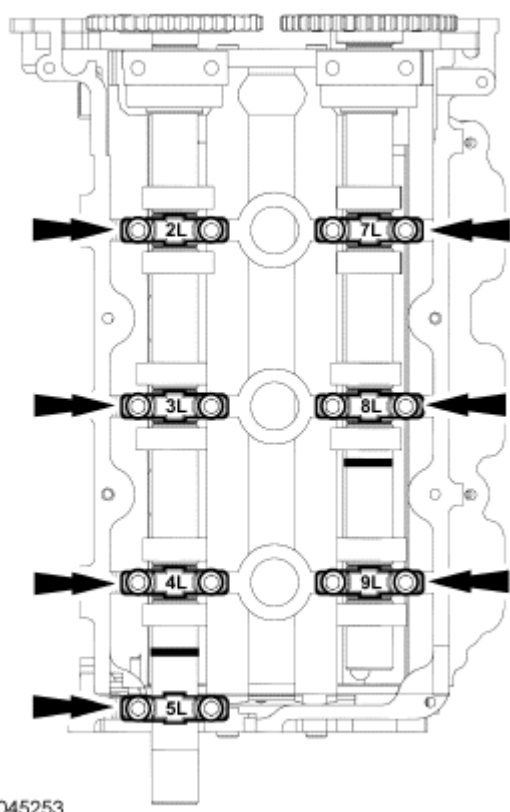


Fig. 254: Locating Camshaft Bearing Caps Installing Sequence
Courtesy of FORD MOTOR CO.

13. Lubricate the bearing surfaces of the LH camshaft bearing thrust caps with clean engine oil and install the bearing thrust caps.
 - Loosely install the bolts.

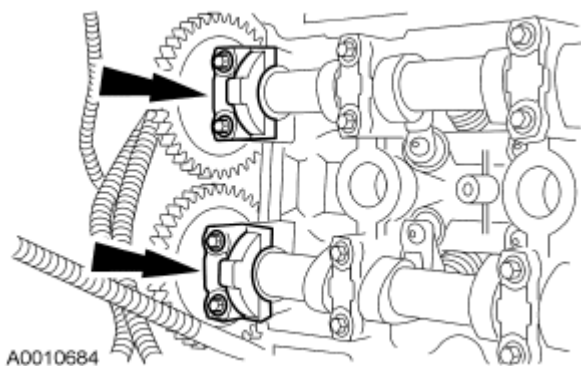
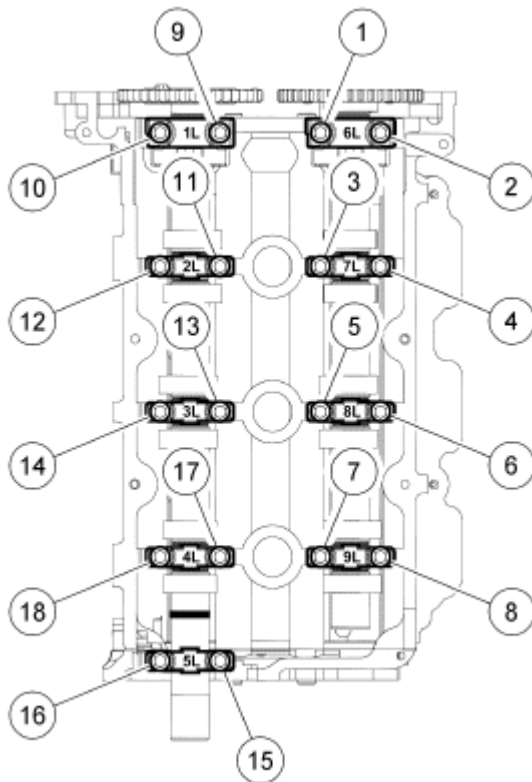


Fig. 255: Locating Camshaft Bearing Thrust Caps
Courtesy of FORD MOTOR CO.

14. Install the bolts.
 - Tighten in the sequence shown to 8 N.m (71 lb-in).



N0045254

Fig. 256: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

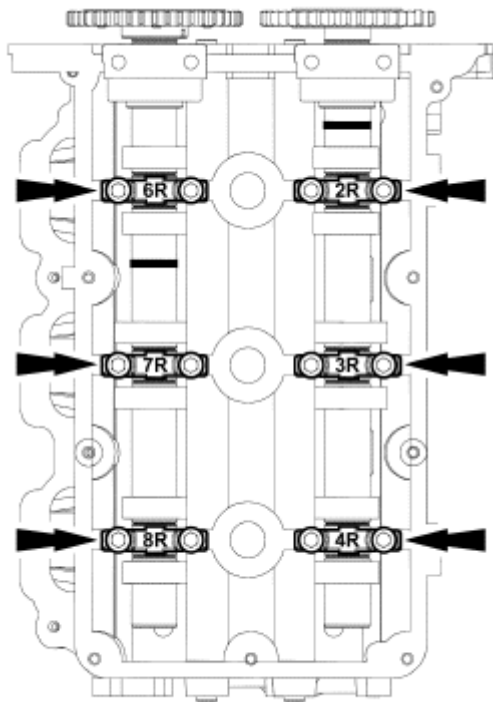
All vehicles

CAUTION:

The camshaft caps must be installed in their original positions or damage to the engine may occur.

Do not install the camshaft bearing thrust caps until all of the camshaft bearing caps have been installed, or damage to the thrust caps may occur.

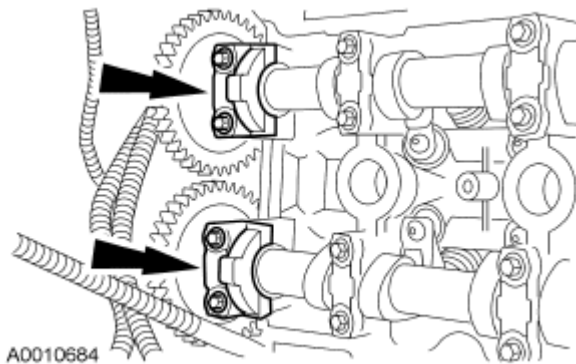
15. Lubricate the bearing surfaces of the RH camshaft bearing caps with clean engine oil and install the bearing caps.
 - Loosely install the bolts.



N0045737

Fig. 257: Locating Camshaft Bearing Caps Installing Sequence
Courtesy of FORD MOTOR CO.

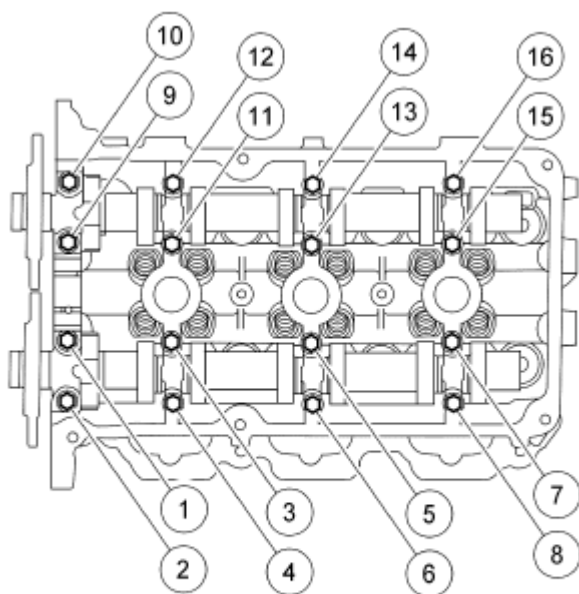
16. Lubricate the bearing surfaces of the RH camshaft bearing thrust caps with clean engine oil and install the bearing thrust caps.
 - Loosely install the bolts.



A0010684

Fig. 258: Locating Camshaft Bearing Thrust Caps
Courtesy of FORD MOTOR CO.

17. Install the bolts.
 - Tighten in the sequence shown to 8 N.m (71 lb-in).



N0000342

Fig. 259: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

NOTE: Clean the sealing surface with metal surface cleaner before installing a new press-in-place gasket.
Early build shown, late build similar.

18. Install the camshaft oil seal retainer and the bolts.
 - Tighten to 10 N.m (89 lb-in).

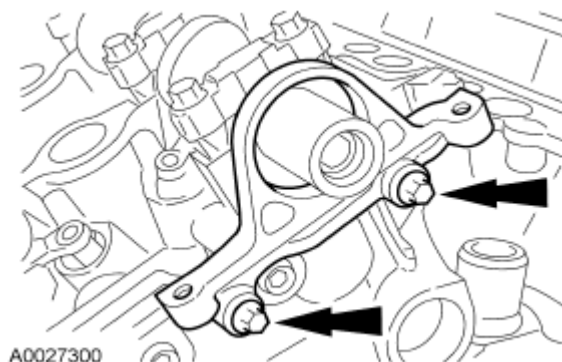


Fig. 260: Locating Camshaft Oil Seal Retainer Bolts
Courtesy of FORD MOTOR CO.

NOTE: Apply clean engine oil to the seal lip and seal bore before installing the seal.

Early build shown, late build similar.

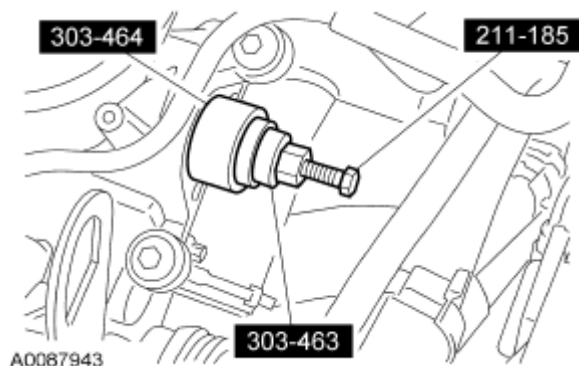


Fig. 261: Installing Camshaft Oil Seal Using Special Tools (303-463, 303-464, 211-185)
Courtesy of FORD MOTOR CO.

19. Using the special tools, install a new camshaft oil seal.

CAUTION: On early build engines, the OEM pulley is pressed on 4.74 mm (0.18 in) past flush of the end of the camshaft. On late build engines, the OEM pulley is pressed on flush to the end of the camshaft. Service pulleys on all engines are pressed on flush to the end of the camshaft.

NOTE: Early build shown, late build similar.

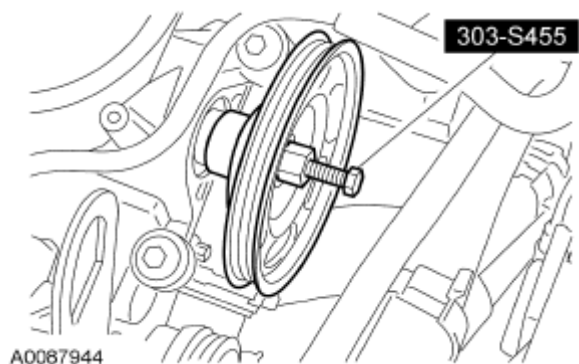
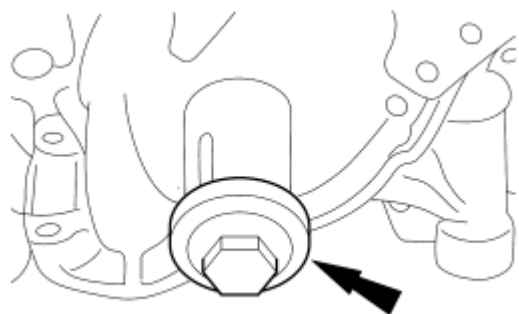


Fig. 262: Installing Coolant Pump Drive Pulley Using Special Tool (303-S455)
Courtesy of FORD MOTOR CO.

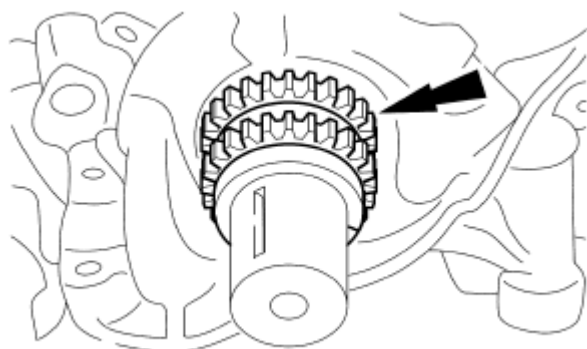
20. Using the special tool, install a new service coolant pump drive pulley.
21. Remove the crankshaft damper bolt.



A0011418

Fig. 263: Locating Crankshaft Damper Bolt
Courtesy of FORD MOTOR CO.

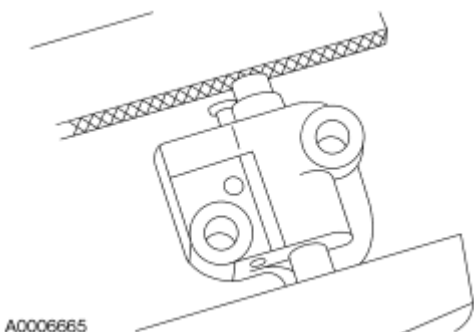
22. Install the crankshaft sprockets with the timing marks out.



A0041259

Fig. 264: Locating Crankshaft Sprockets With Timing Marks Out
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.



A0006665

Fig. 265: Identifying Chain Tensioner In Soft-Jawed Vise
Courtesy of FORD MOTOR CO.

23. Position the chain tensioner in a soft-jawed vise.

NOTE: LH shown, RH similar.

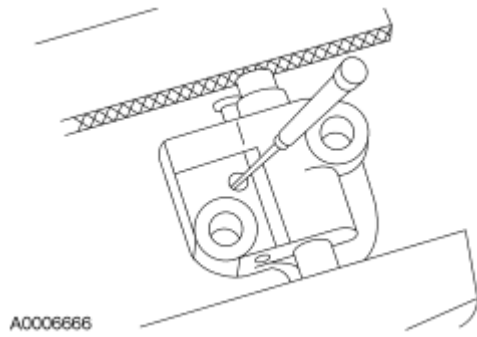


Fig. 266: Holding Chain Tensioner Ratchet Lock Mechanism Away From Ratchet Stem
Courtesy of FORD MOTOR CO.

24. Hold the chain tensioner ratchet lock mechanism away from the ratchet stem with a small pick.

CAUTION: During tensioner compression, do not release the ratchet stem until the tensioner piston is fully bottomed in its bore or damage to the ratchet stem will result.

25. Slowly compress the timing chain tensioner.
26. Retain the tensioner piston with a 1.5 mm (0.06 in) wire or paper clip.

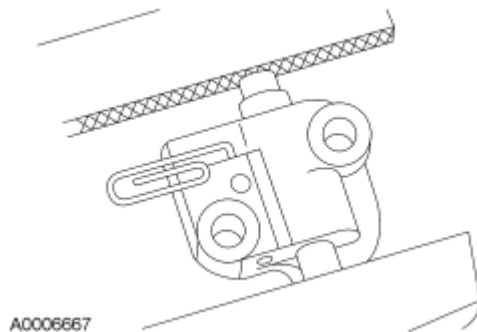


Fig. 267: Retaining Tensioner Piston With 1.5-mm (0.06-in) Wire Or Paper Clip
Courtesy of FORD MOTOR CO.

27. If timing marks in the timing chains are not evident, use a permanent-type marker to mark the crankshaft and camshaft timing marks on the LH and RH timing chains.
 1. Mark any link to use as the crankshaft timing mark.
 2. Starting with the crankshaft timing mark, count 29 links and mark the link.
 3. Continue counting to link 42 and mark the link.

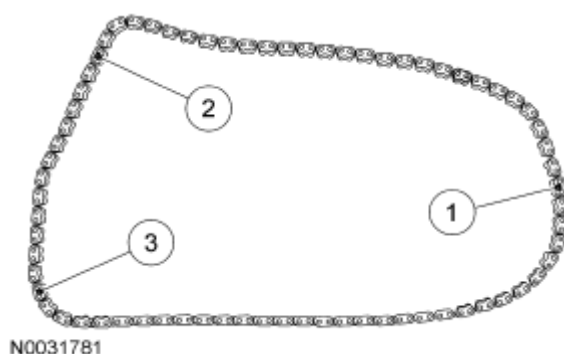


Fig. 268: Locating Crankshaft Timing Mark
Courtesy of FORD MOTOR CO.

28. Position the LH timing chain and guide and install the bolts.

- Tighten to 25 N.m (18 lb-ft).
- Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

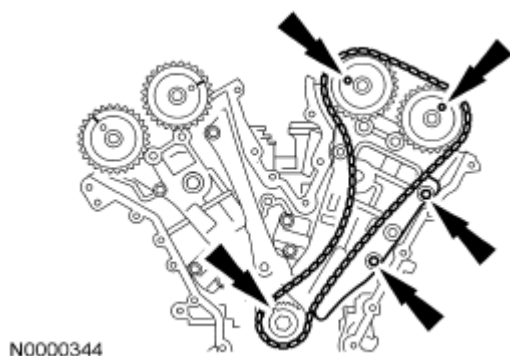


Fig. 269: Locating Aligning Marks On Timing Chain
Courtesy of FORD MOTOR CO.

29. Install the LH timing chain tensioner arm and the LH timing chain tensioner.

1. Install the tensioner arm.
2. Position the tensioner.
3. Install the bolts.
 - Tighten to 25 N.m (18 lb-ft).

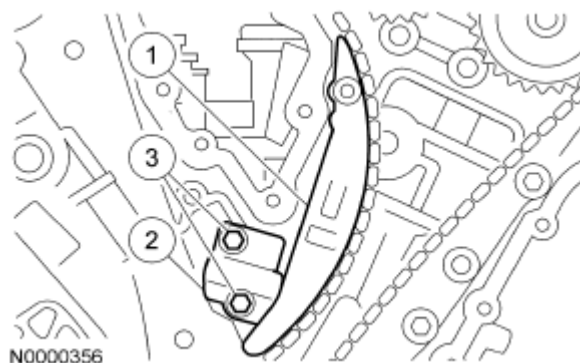


Fig. 270: Identifying Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

30. Install the crankshaft damper bolt and rotate the crankshaft clockwise 120 degrees until the crankshaft keyway is in the 3 o'clock position.

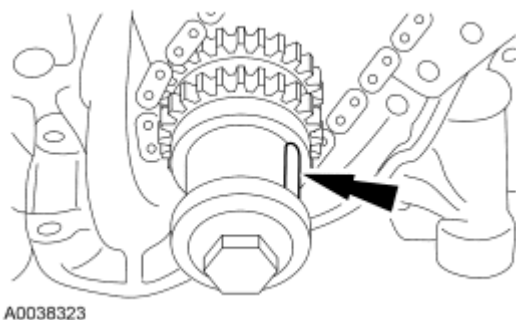


Fig. 271: Locating Crankshaft Keyway
Courtesy of FORD MOTOR CO.

31. Verify that the RH camshafts are correctly positioned.

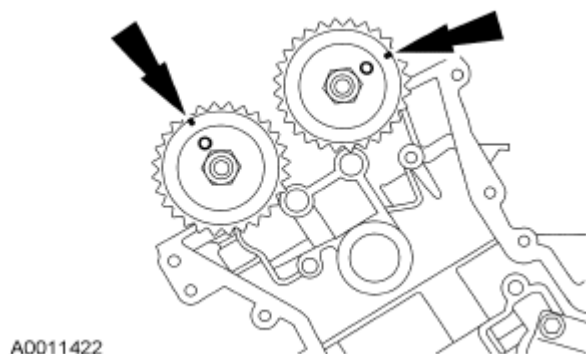


Fig. 272: Locating Camshafts Position
Courtesy of FORD MOTOR CO.

32. Install the RH timing chain and chain guide and install the bolts.

- Tighten to 25 N.m (18 lb-ft).
- Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

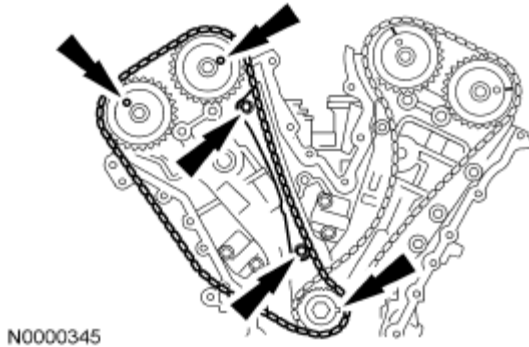


Fig. 273: Locating Aligning Marks On Timing Chain
Courtesy of FORD MOTOR CO.

33. Install the RH timing chain tensioner and tensioner arm.
 1. Install the tensioner arm.
 2. Position the tensioner.
 3. Install the bolts.
 - Tighten to 25 N.m (18 lb-ft).

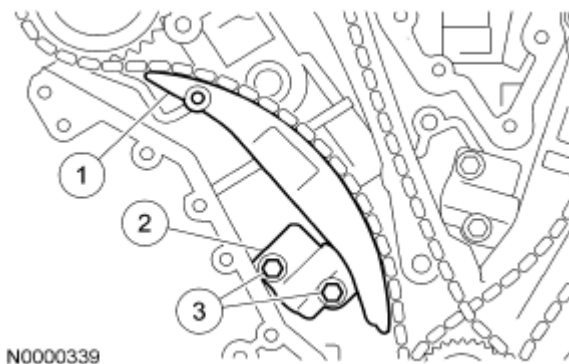


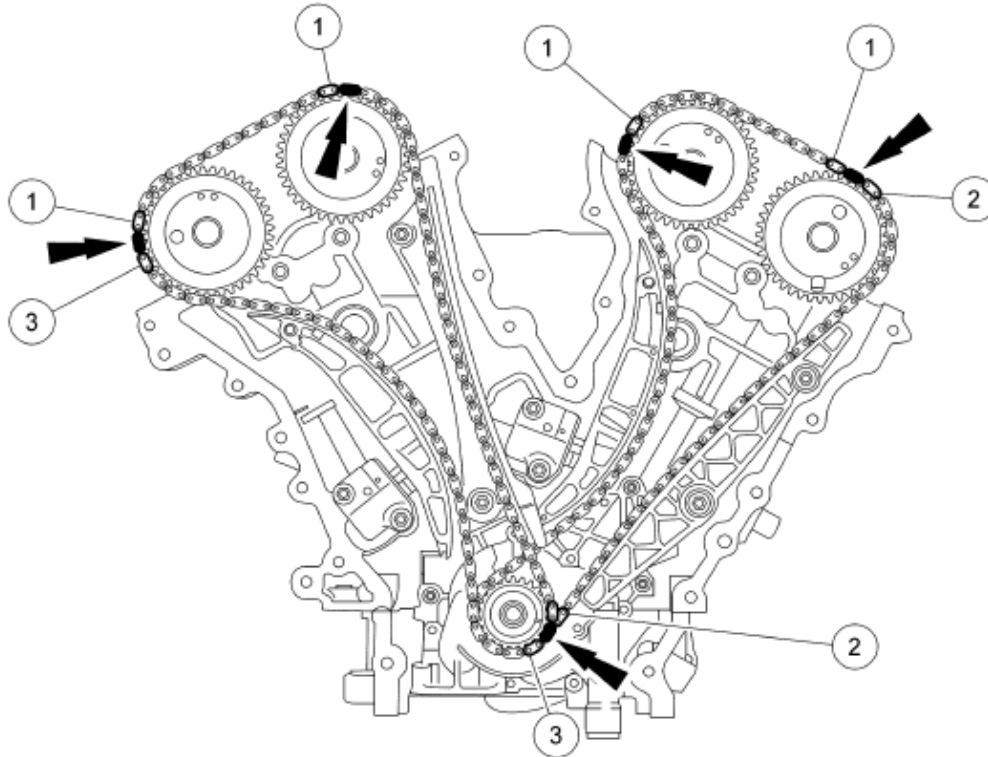
Fig. 274: Identifying Timing Chain Tensioner & Tensioner Arm
Courtesy of FORD MOTOR CO.

34. Remove the LH and RH timing chain tensioner piston retaining wires.
35. Rotate the crankshaft counterclockwise 120 degrees to top dead center (TDC).

CAUTION: Failure to verify correct timing drive component alignment will result in severe engine damage.

36. Verify the timing with the following steps.
 1. There should be 12 chain links between the camshaft timing marks.

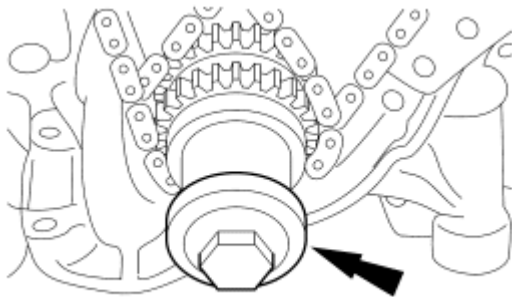
2. There should be 27 chain links between the camshaft and the crankshaft timing marks.
3. There should be 30 chain links between the camshaft and the crankshaft timing marks.



N0031782

Fig. 275: Locating Camshaft & Crankshaft Timing Marks
Courtesy of FORD MOTOR CO.

37. Remove the crankshaft damper bolt.



A0011064

Fig. 276: Identifying Damper Bolt
Courtesy of FORD MOTOR CO.

CAUTION: This pulse wheel is used in several different engines. Install the pulse wheel with the keyway in the slot stamped "30" or "30RFF" only (orange in color).

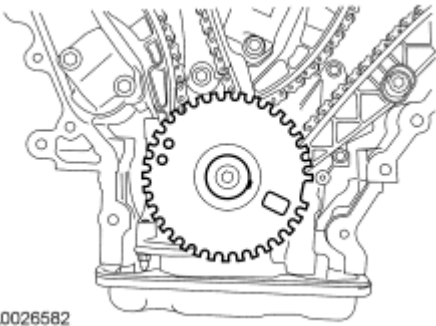


Fig. 277: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

38. Install the ignition pulse wheel.
39. Install 3 new gaskets in the front cover.

NOTE:

Clean and degrease the sealing surfaces with metal surface cleaner before applying gasket and sealant.

The front cover must be installed and the bolts tightened within 4 minutes of sealant application.

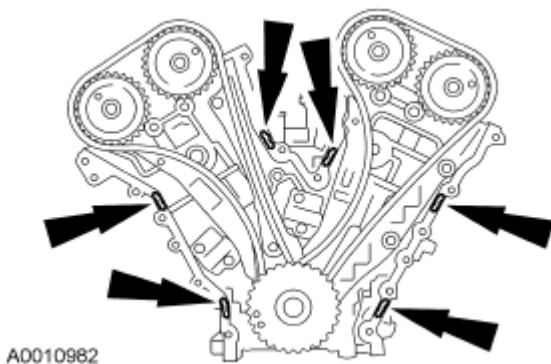


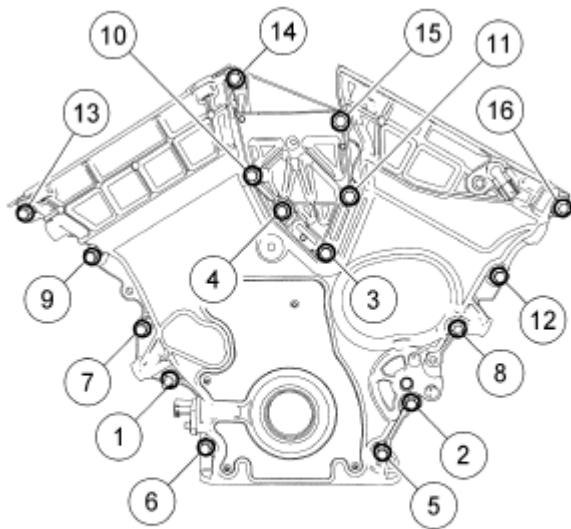
Fig. 278: Locating Dot Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

40. Apply a 6 mm (0.24 in) dot of silicone gasket and sealant to the cylinder block to lower cylinder block and cylinder head mating surfaces.

NOTE:

Fasteners 1, 8, 13 and 16 are stud bolts.

41. Position the front cover and install the bolts and stud bolts.
 - Tighten in the sequence shown to 25 N.m (18 lb-ft).



N0000340

Fig. 279: Identifying Tightening Sequence Of Bolts
Courtesy of FORD MOTOR CO.

42. Install the belt tensioner and the bolt.
 - Tighten to 45 N.m (33 lb-ft).

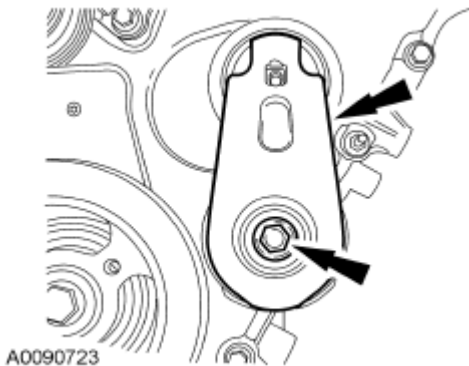


Fig. 280: Locating Belt Tensioner & Bolt
Courtesy of FORD MOTOR CO.

43. Install the idler pulley and the bolt.
 - Tighten to 25 N.m (18 lb-ft).

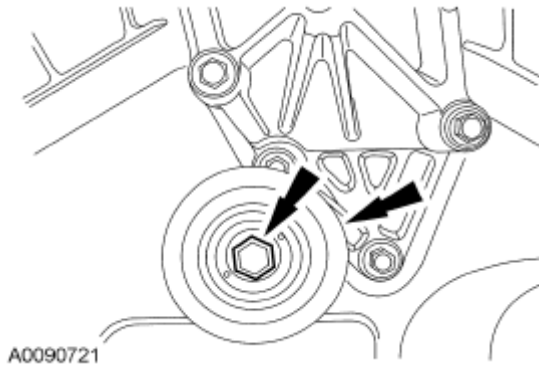


Fig. 281: Locating Idler Pulley & Bolt
Courtesy of FORD MOTOR CO.

NOTE: Apply clean engine oil to the seal lip and seal bore before installing the seal.

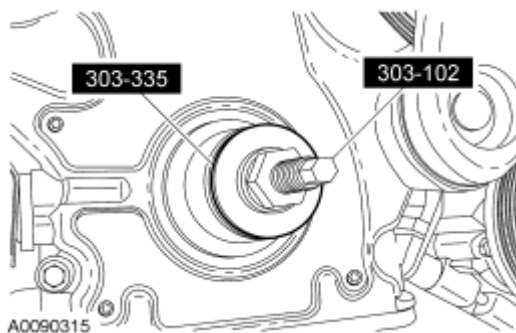


Fig. 282: Installing Crankshaft Seal Using Special Tools (303-335 And 303-102)
Courtesy of FORD MOTOR CO.

44. Using the special tools, install the crankshaft front oil seal.

NOTE:

- Clean the keyway and slot using metal surface cleaner before applying silicone gasket and sealant.**
- Sealing surfaces must be free of dirt and oil.**
- The crankshaft damper must be installed and the bolt tightened within four minutes of sealant application.**

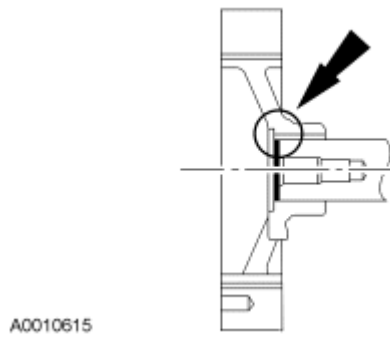


Fig. 283: Applying Silicone Gasket And Sealant
Courtesy of FORD MOTOR CO.

45. Apply silicone gasket and sealant to the end of the crankshaft damper keyway slot.

NOTE: Lubricate the outside diameter sealing surface with clean engine oil.

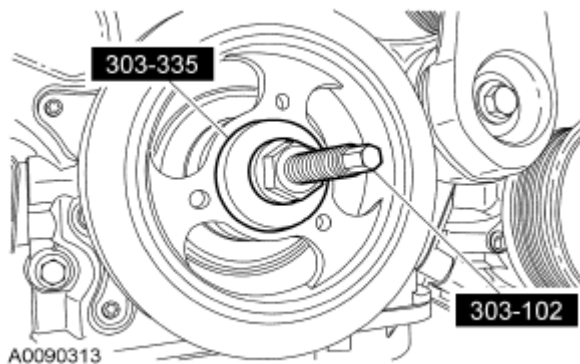


Fig. 284: Installing Crankshaft Vibration Damper Using Special Tools (303-102, 303-335)
Courtesy of FORD MOTOR CO.

46. Using the special tool, install the crankshaft vibration damper.
47. Install the crankshaft vibration damper washer and tighten the bolt in 4 stages.
 - Stage 1: Tighten to 120 N.m (89 lb-ft).
 - Stage 2: Loosen one full turn (360 degrees).
 - Stage 3: Tighten to 50 N.m (37 lb-ft).
 - Stage 4: Tighten to 90 N.m (66 lb-ft).

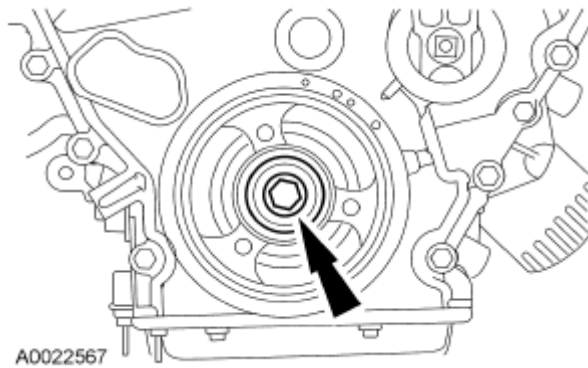


Fig. 285: Locating Crankshaft Vibration Damper Washer & Bolt
Courtesy of FORD MOTOR CO.

48. Install the knock sensor (KS) and the bolt.
- Tighten to 25 N.m (18 lb-ft).

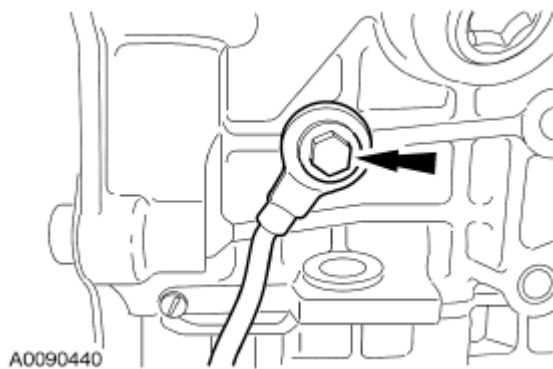


Fig. 286: Locating Knock Sensor (KS) & Bolt
Courtesy of FORD MOTOR CO.

49. Install the oil pressure sender and, if equipped, the block heater.
- Tighten to 14 N.m (10 lb-ft).

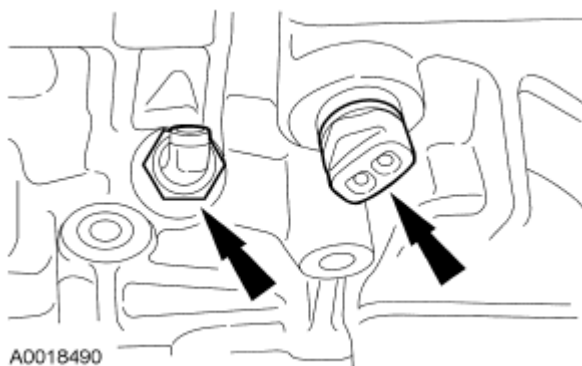


Fig. 287: Locating Oil Pressure Sender
Courtesy of FORD MOTOR CO.

50. Position the oil pan baffle. Install the nuts and tighten in 2 stages.

- Stage 1: Tighten to 5 N.m (44 lb-in).
- Stage 2: Tighten 45 degrees.

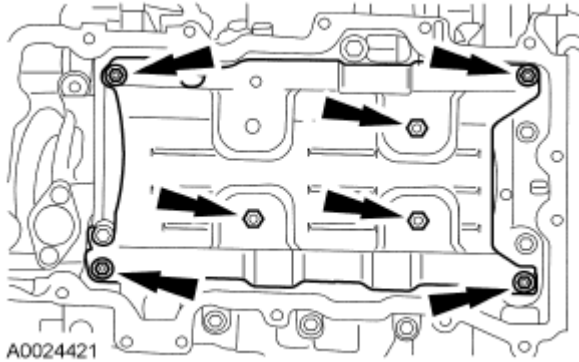


Fig. 288: Locating Oil Pan Baffle And Nuts
Courtesy of FORD MOTOR CO.

51. Install a new O-ring seal on the oil pump screen and pickup tube. Lubricate with clean engine oil.

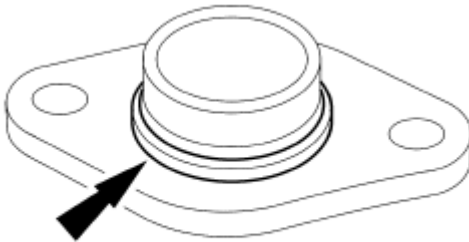


Fig. 289: Locating O-Ring Seal
Courtesy of FORD MOTOR CO.

52. Install the oil pump screen and pickup tube.

1. Position the oil pump screen and pickup tube.
2. Install the bolts.
3. Install the nut and tighten in 2 stages.
 - Stage 1: Tighten to 5 N.m (44 lb-in).
 - Stage 2: Tighten 45 degrees.

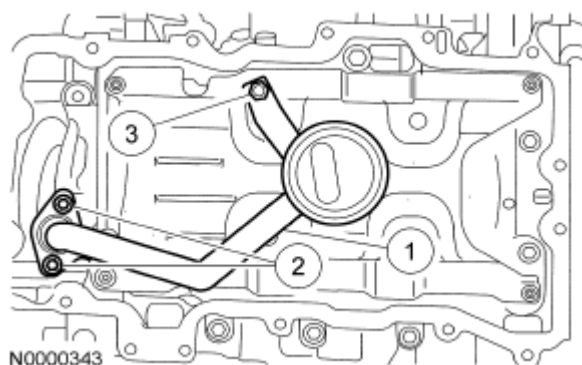


Fig. 290: Installing Oil Pump Screen & Pickup Tube
Courtesy of FORD MOTOR CO.

53. Install a new O-ring on the oil level indicator tube. Apply clean engine oil to the O-ring.

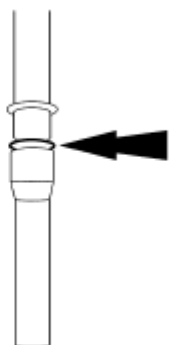


Fig. 291: Locating O-Ring On Oil Level Indicator Tube
Courtesy of FORD MOTOR CO.

54. Position the oil level indicator and tube and install the stud bolt.
- Tighten to 10 N.m (89 lb-in).

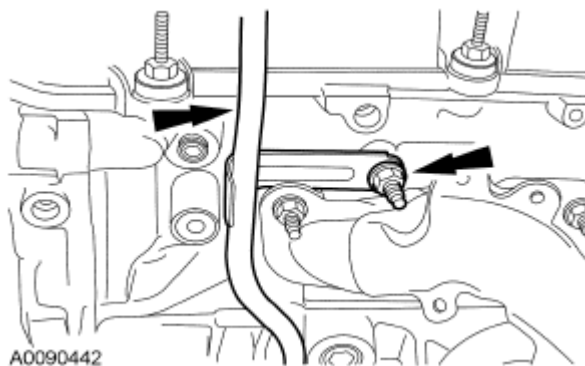


Fig. 292: Locating Stud Bolt
Courtesy of FORD MOTOR CO.

55. Install the bypass tube and the nut and bolt.

- Tighten to 10 N.m (89 lb-in).

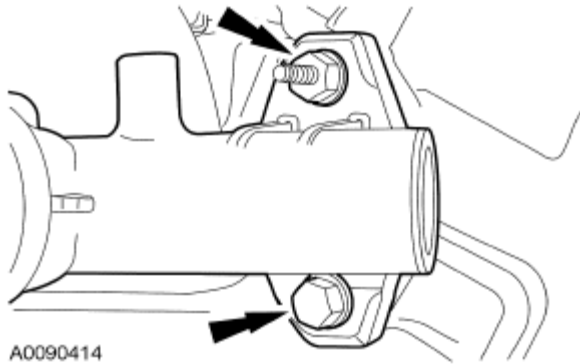


Fig. 293: Locating Bypass Tube, Nut & Bolt
Courtesy of FORD MOTOR CO.

56. Position the coolant tube and connect the hoses.

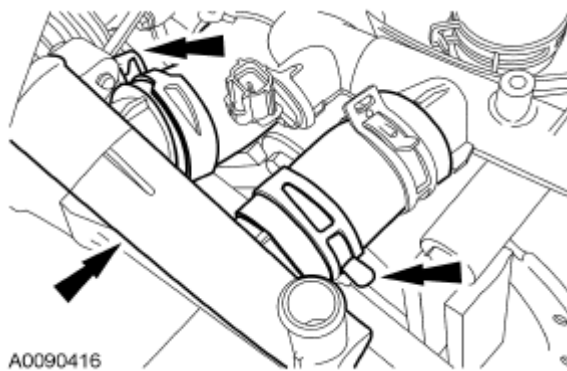


Fig. 294: Locating Coolant Tube & Connect Hoses
Courtesy of FORD MOTOR CO.

57. Install the coolant pump and the bolts.

- Tighten to 10 N.m (89 lb-in).

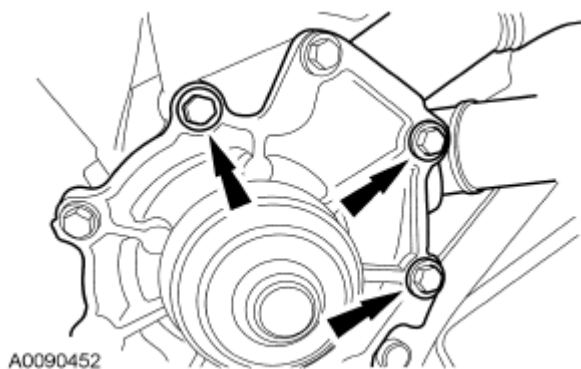


Fig. 295: Locating Coolant Pump & Bolts
Courtesy of FORD MOTOR CO.

58. Connect the hoses.

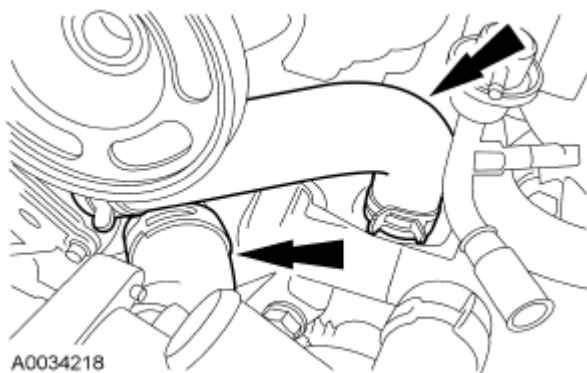


Fig. 296: Locating Hoses
Courtesy of FORD MOTOR CO.

59. Install the coolant pump belt on the coolant pump pulley and position it on the camshaft pulley.

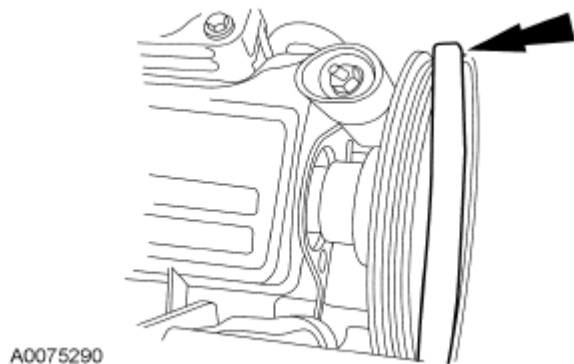


Fig. 297: Locating Coolant Pump Belt
Courtesy of FORD MOTOR CO.

60. Lubricate the O-ring seal and install the oil filter.

- Tighten the oil filter 3/4 of a turn after the filter gasket makes contact with the oil filter adapter.

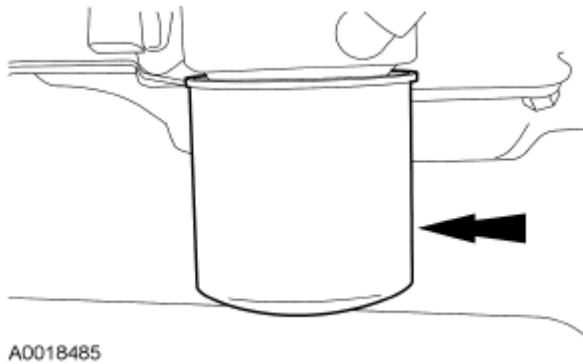


Fig. 298: Locating Oil Filter
Courtesy of FORD MOTOR CO.

4x2 vehicles

61. Install the halfshaft support bracket and the bolts.
 - Tighten to 48 N.m (35 lb-ft).

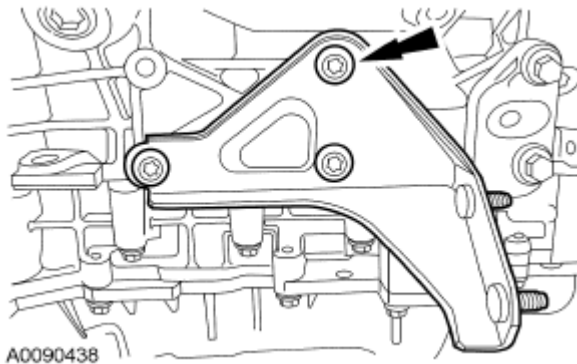


Fig. 299: Locating Halfshaft Support Bracket & Bolts
Courtesy of FORD MOTOR CO.

62. Install 6 new RH exhaust manifold studs.
 - Tighten to 12 N.m (9 lb-ft).

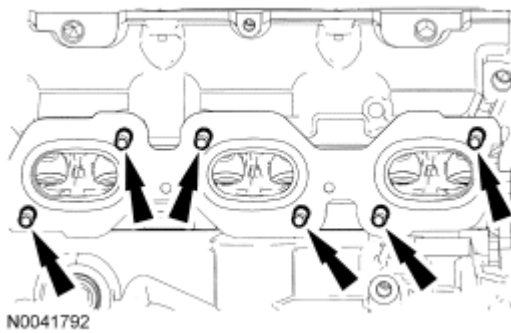


Fig. 300: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

63. Install a new gasket and the RH exhaust manifold and new nuts.
- Tighten in the sequence shown to 20 N.m (15 lb-ft).

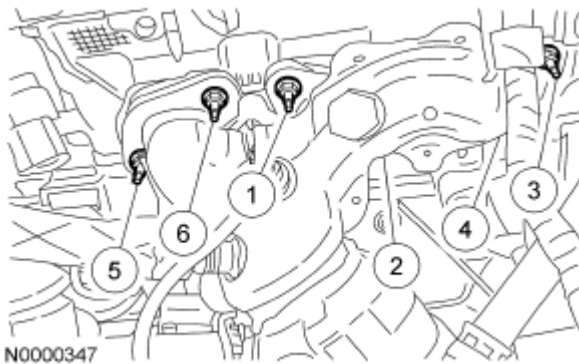


Fig. 301: Identifying Tightening Sequence Of Exhaust Manifold
Courtesy of FORD MOTOR CO.

All vehicles

64. Install 6 new LH exhaust manifold studs.
- Tighten to 12 N.m (9 lb-ft).

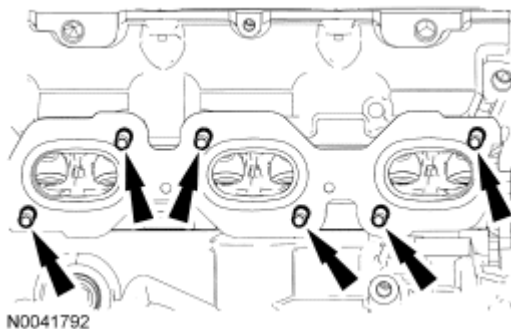


Fig. 302: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

65. Install a new gasket and the LH exhaust manifold and new nuts.
- Tighten in the sequence shown to 20 N.m (15 lb-ft).

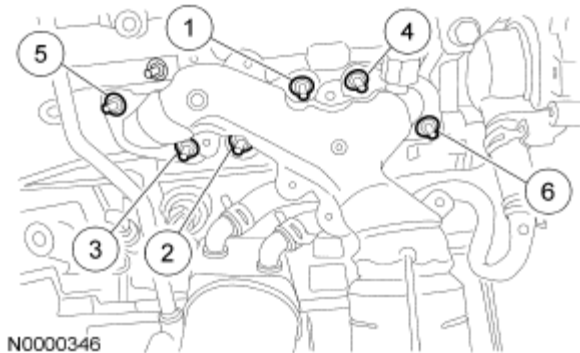


Fig. 303: Identifying Tightening Sequence Of Exhaust Manifold Nut
Courtesy of FORD MOTOR CO.

CAUTION: Do not use any screwdrivers, pliers or other metal objects that could cause damage to the belt or camshaft pulley while installing the belt.

66. Rotate the crankshaft clockwise to seat the water pump belt on the camshaft pulley.

CAUTION: Only use hand tools when removing or installing the spark plugs, damage can occur to the cylinder head or spark plug.

67. Install the LH and RH spark plugs.
- Tighten to 15 N.m (11 lb-ft).

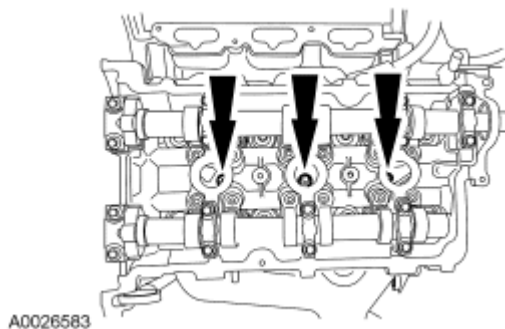


Fig. 304: Locating Spark Plugs
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

The valve cover must be installed and the bolts and studs tightened within 4 minutes of sealant application.

Clean cylinder head and front cover surface using metal surface cleaner before applying silicone gasket and sealant.

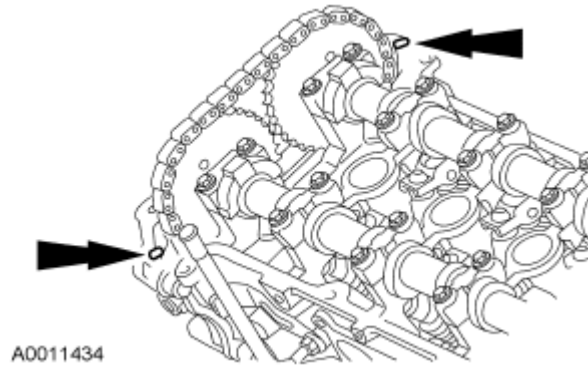


Fig. 305: Applying Dot Of Silicone Gasket And Sealant At Cylinder Block
Courtesy of FORD MOTOR CO.

68. Apply an 8 mm (0.31 in) dot of silicone gasket and sealant at the cylinder block to front cover mating surface of the LH and RH valve covers.

Early build vehicles

NOTE: Install a new valve cover gasket.

69. Position the LH valve cover and install the bolts and stud bolts.
 - Tighten in the sequence shown to 10 N.m (89 lb-in).

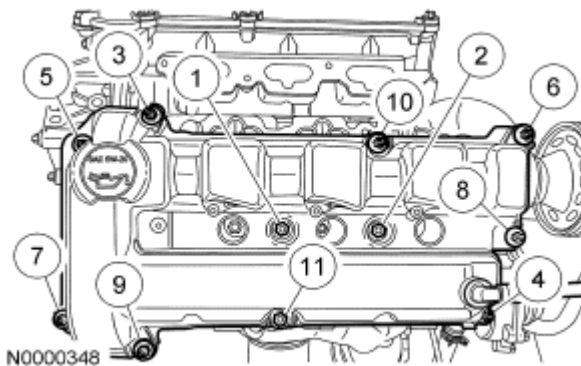


Fig. 306: Identifying Tightening Sequence Of Valve Cover Bolts & Studs - Early Build Vehicles
Courtesy of FORD MOTOR CO.

Late build vehicles

NOTE: Install a new valve cover gasket.

70. Position the LH valve cover and install the bolts and stud bolts.

- Tighten in the sequence shown to 10 N.m (89 lb-in).

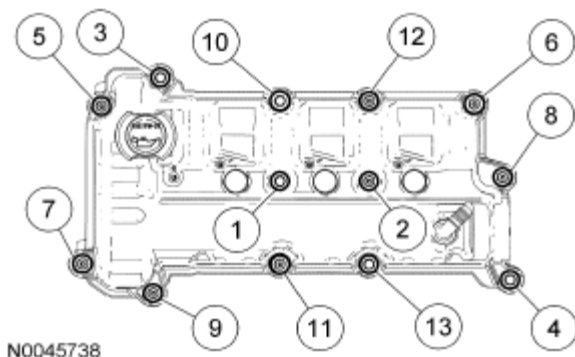


Fig. 307: Identifying Tightening Sequence Of Valve Cover Bolts & Studs - Late Build Vehicles

Courtesy of FORD MOTOR CO.

All vehicles

71. If equipped, install the engine lift bracket and the bolt.

- Tighten to 100 N.m (74 lb-ft).

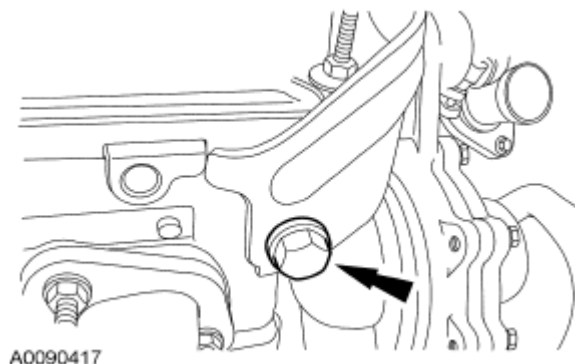


Fig. 308: Locating Lift Bracket & Bolt

Courtesy of FORD MOTOR CO.

NOTE: Install a new valve cover gasket.

72. Position the RH valve cover and install the bolts and stud bolts.

- Tighten in the sequence shown to 10 N.m (89 lb-in).

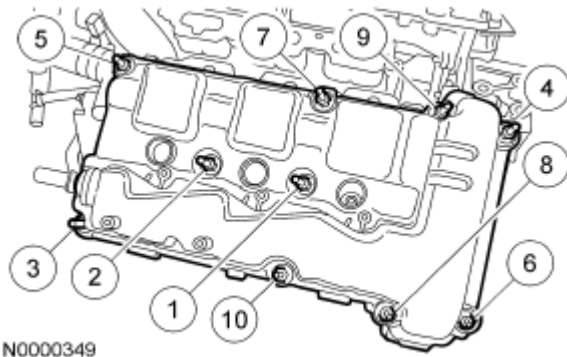


Fig. 309: Identifying Tightening Sequence Of Valve Cover Bolts & Studs
Courtesy of FORD MOTOR CO.

73. Install the radio interference capacitor and the nut.
- Tighten to 6 N.m (53 lb-in).

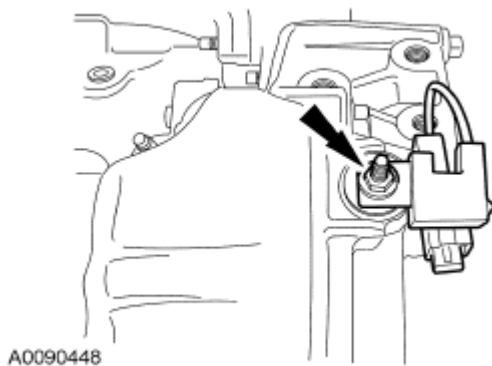


Fig. 310: Identifying Tightening Sequence Of Capacitor & Nut
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.
Apply a light film of silicone brake caliper grease and dielectric compound to the interior of the spark plug boot prior to installation.

74. Install the 6 coil-on-plugs and the bolts.
- Tighten to 6 N.m (53 lb-in).

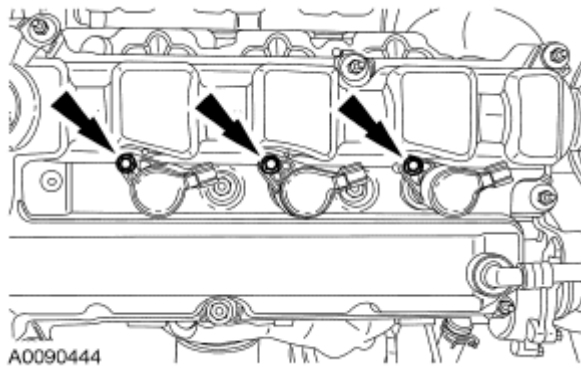


Fig. 311: Locating Coil-On-Plugs & Bolts
Courtesy of FORD MOTOR CO.

75. Install new gaskets in the lower intake manifold.

NOTE: Install new gaskets.

76. Install the lower intake manifold and the bolts.

- Tighten in the sequence shown to 10 N.m (89 lb-in).

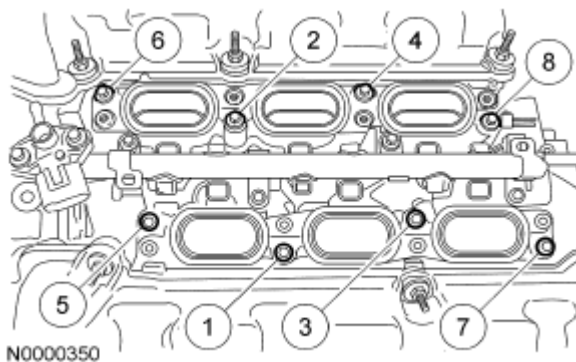


Fig. 312: Identifying Tightening Sequence Of Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

77. Position the fuel charging wiring harness and connect the fuel injector electrical connectors.

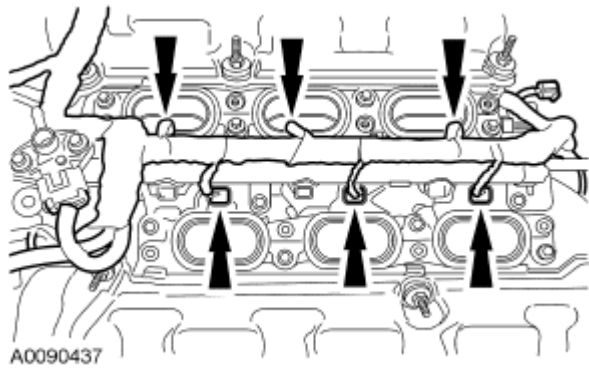


Fig. 313: Locating Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

78. Connect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.

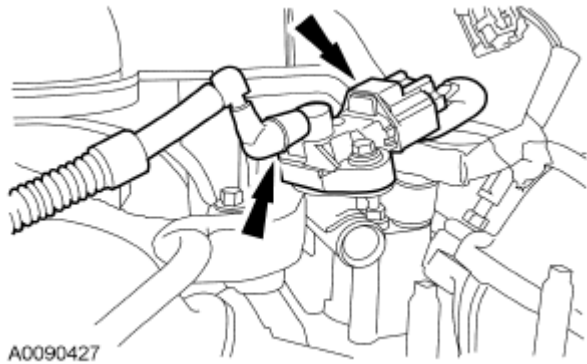


Fig. 314: Locating Fuel Rail Pressure & Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

79. Connect the crankshaft position (CKP) sensor electrical connector and attach the wiring retainers.

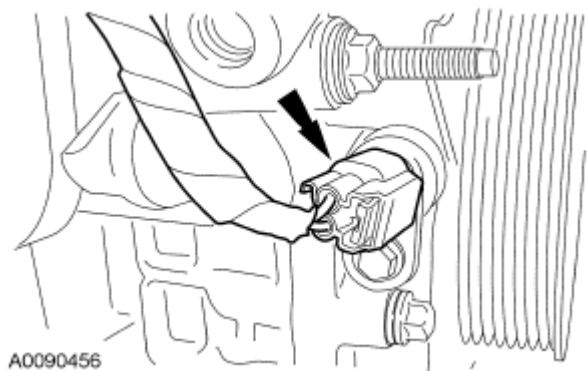


Fig. 315: Locating Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

80. Connect the camshaft position sensor (CMP) and oil pressure sensor electrical connectors and attach the

wiring retainers.

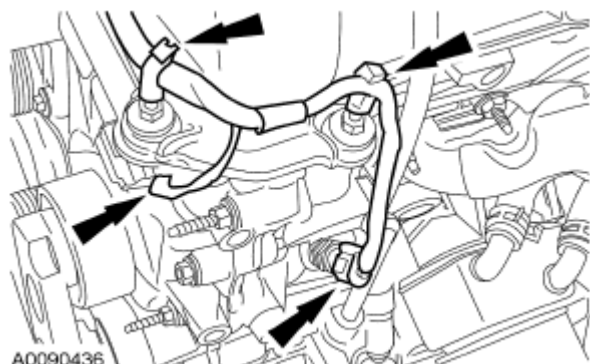


Fig. 316: Locating Camshaft Position Sensor (CMP)
Courtesy of FORD MOTOR CO.

81. Connect the LH coil-on-plug electrical connectors and attach the wiring retainers.

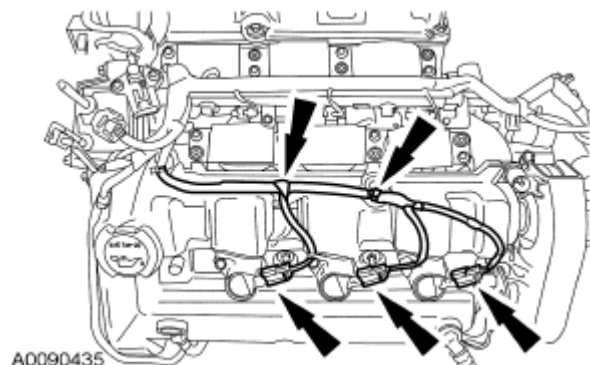


Fig. 317: Locating Coil-On-Plug Electrical Connectors & Wiring Retainers
Courtesy of FORD MOTOR CO.

82. Connect the radio interference capacitor electrical connector and attach the wiring retainers.

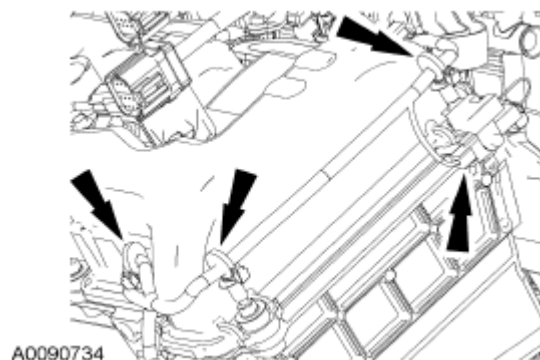


Fig. 318: Locating Radio Interference Capacitor Electrical Connector
Courtesy of FORD MOTOR CO.

83. Connect the RH coil-on-plug electrical connectors and attach the wiring retainer.

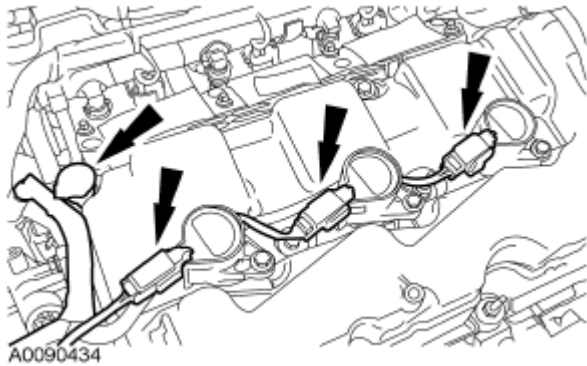


Fig. 319: Locating Coil-On-Plug Electrical Connectors & Wiring Retainers
Courtesy of FORD MOTOR CO.

84. Connect the engine coolant temperature (ECT) sensor electrical connector.

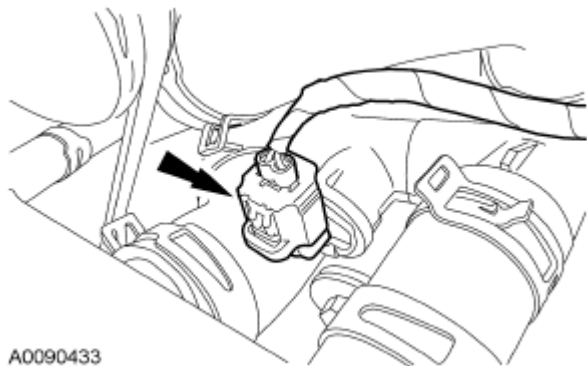


Fig. 320: Locating Engine Coolant Temperature (ECT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: **Install new gaskets.**

85. Install the upper intake manifold and the bolts.
- Tighten in the sequence shown to 10 Nm (89 lb-in).

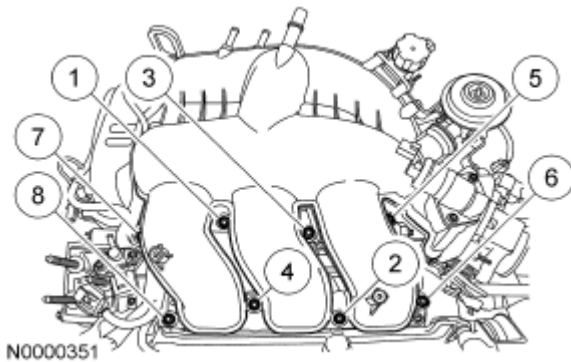


Fig. 321: Identifying Tightening Sequence Of Upper Intake Manifold And Bolts
Courtesy of FORD MOTOR CO.

86. Connect the throttle body coolant hose.

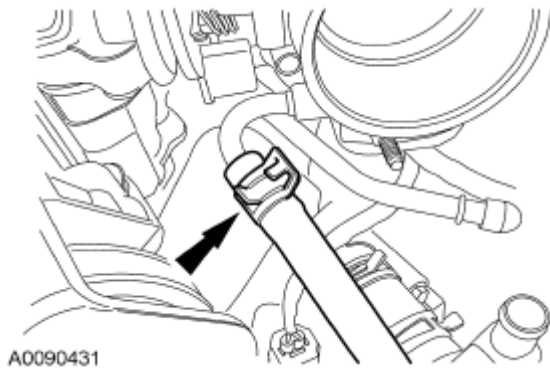


Fig. 322: Locating Throttle Body Coolant Hose
Courtesy of FORD MOTOR CO.

87. Connect the vacuum tube fittings to the EGR valve, EGR vacuum regulator and the intake manifold.

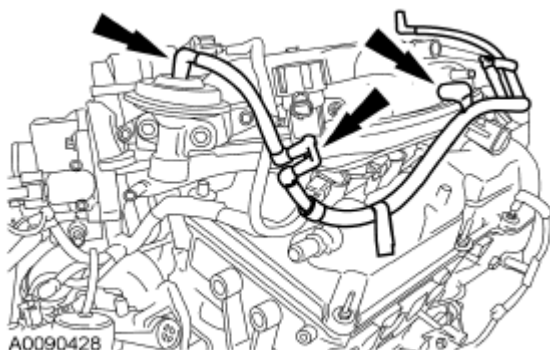


Fig. 323: Locating EGR Valve & EGR Vacuum Regulator
Courtesy of FORD MOTOR CO.

88. Install the positive crankcase ventilation (PCV) tube.

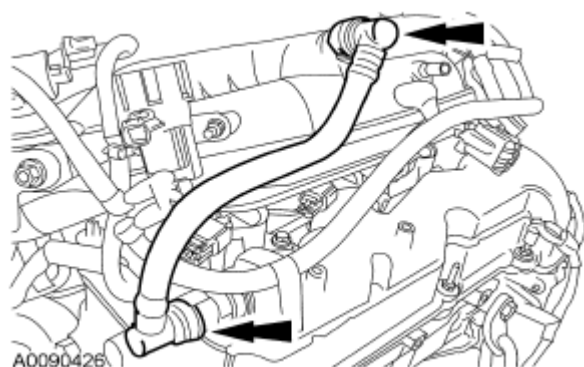


Fig. 324: Locating Positive Crankcase Ventilation (PCV) Tube
Courtesy of FORD MOTOR CO.

89. Connect the idle air control (IAC) valve and the throttle position (TP) sensor electrical connectors and attach the wiring retainer.

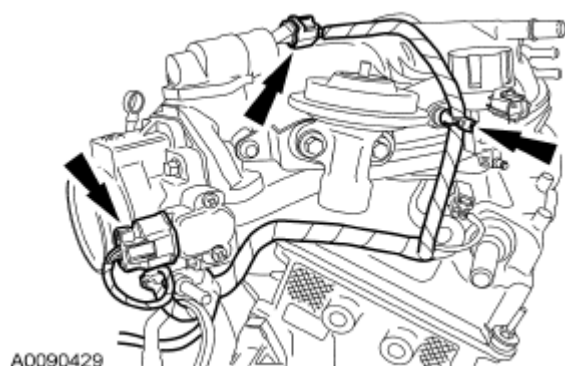


Fig. 325: Locating Idle Air Control (IAC) Valve
Courtesy of FORD MOTOR CO.

90. Position the engine control wiring harness and install the nuts.
- Tighten to 6 N.m (53 lb-in).

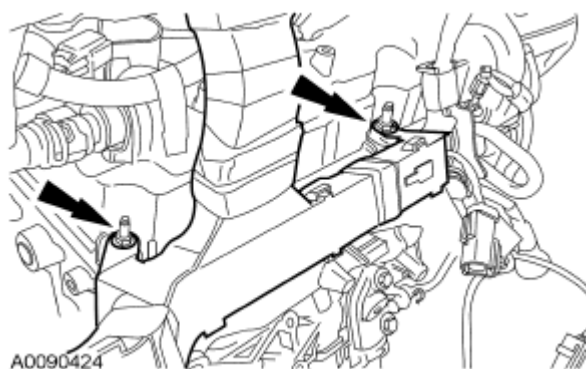


Fig. 326: Locating Engine Control Wiring Harness & Nuts
Courtesy of FORD MOTOR CO.

91. Connect the KS electrical connector.



Fig. 327: Locating KS Electrical Connector
Courtesy of FORD MOTOR CO.

92. Connect the exhaust gas recirculation (EGR) vacuum regulator electrical connector. Attach the wiring harness retainer and install the nut.
- Tighten to 10 N.m (89 lb-in).

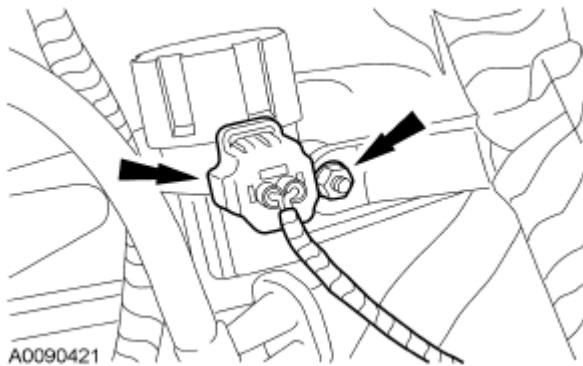


Fig. 328: Locating Exhaust Gas Recirculation (EGR)
Courtesy of FORD MOTOR CO.

93. Position the heated oxygen sensor (HO2S) electrical connector bracket. Install the nut and attach the wiring retainer.
- Tighten to 10 N.m (89 lb-in).

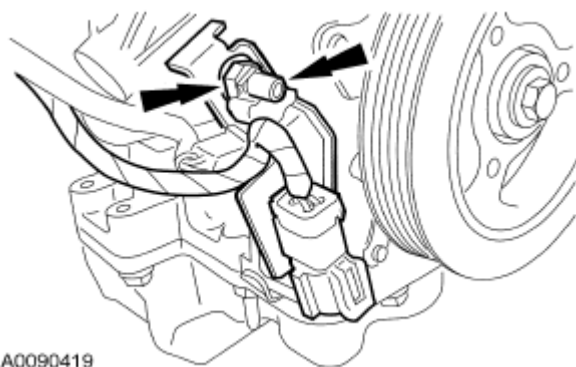


Fig. 329: Locating Heated Oxygen Sensor (HO2S) Electrical Connector
Courtesy of FORD MOTOR CO.

94. Attach the engine control sensor wiring connectors to the upper intake manifold.

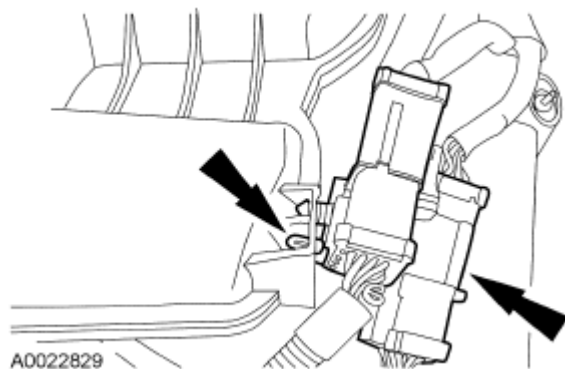


Fig. 330: Locating Engine Control Sensor Wiring Connectors
Courtesy of FORD MOTOR CO.

95. Using the special tools, remove the engine from the engine stand.

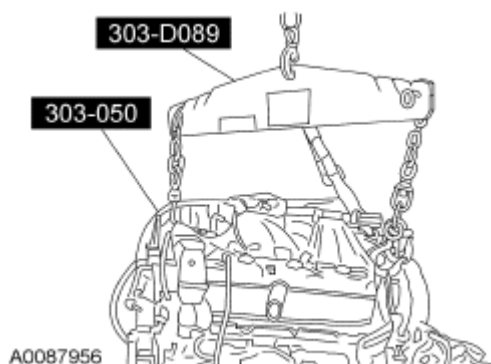


Fig. 331: Removing Engine From Engine Stand Using Special Tools (303-050, 303-D089)
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the seal lips and seal bore with clean engine oil before installing.

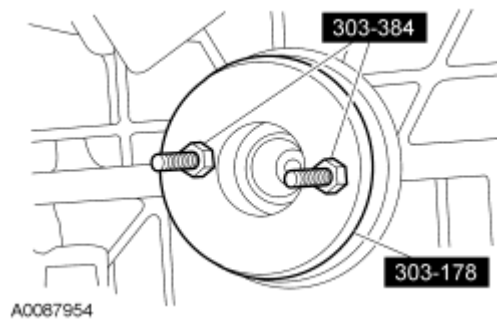


Fig. 332: Identifying Special Tools (303-384 And 303-178)
Courtesy of FORD MOTOR CO.

96. Using the special tools, install the crankshaft rear oil seal.
97. Position the flexplate and install the bolts.
 - Tighten to 80 N.m (59 lb-ft).

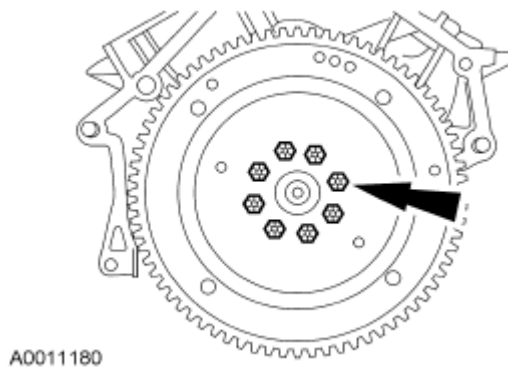


Fig. 333: Locating Flexplate & Bolts
Courtesy of FORD MOTOR CO.

INSTALLATION

ENGINE

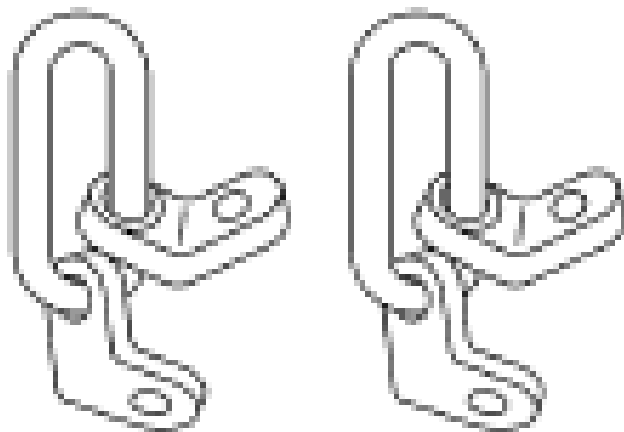
Special Tool(s)

SPECIAL TOOL(S)

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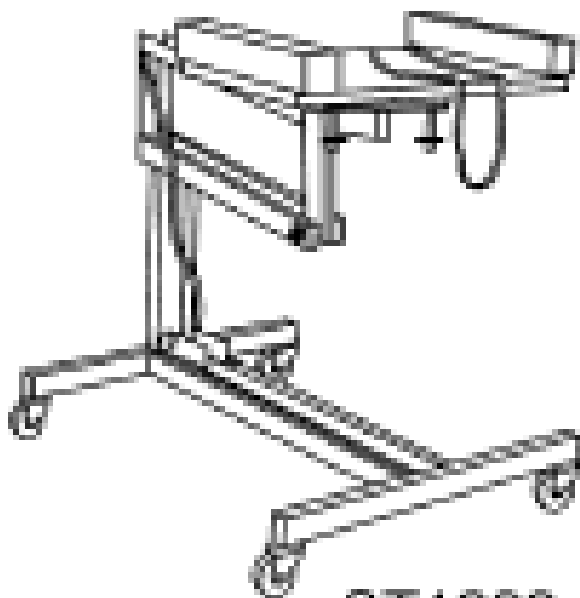
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



ST1595-A

Lifting Bracket, Engine
303-050 (T70P-6000)

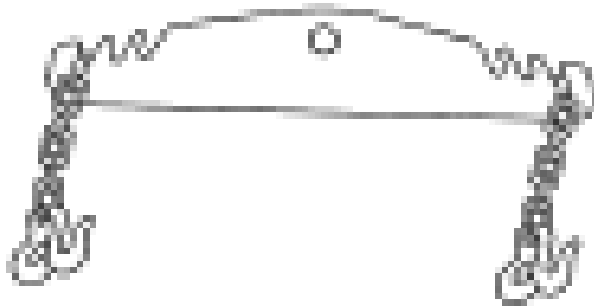


ST1293-A

Powertrain Lift with Tilting Plate
014-00765

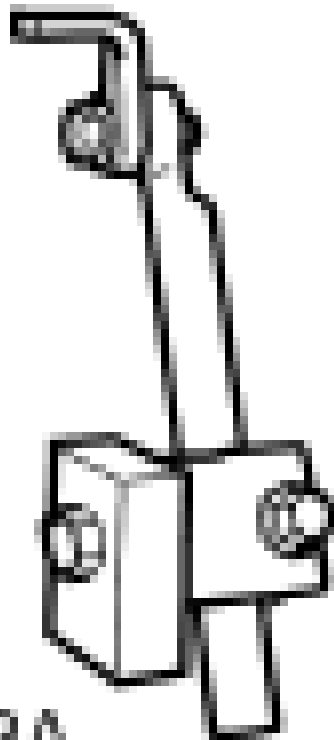
2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner



Spreader Bar
303-D089 (D93P-6001-A3) or equivalent

ST1602-A



Universal Adapter Brackets
014-0001

ST2743A

Materials

MATERIALS

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

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

Installation

CAUTION: If the oil pan was removed during engine disassembly, it must be installed after the engine and transaxle are assembled and the transaxle-to-engine bolts are installed. Failure to follow this assembly sequence can result in engine oil leaks.

All vehicles

1. Using the special tools, align the engine with the transaxle.

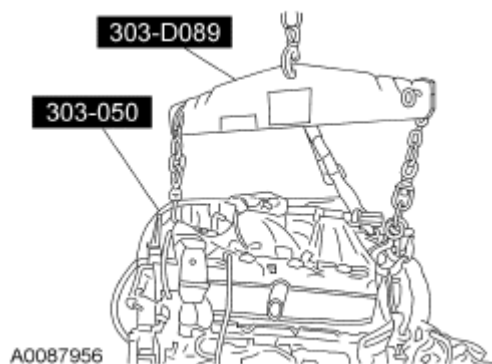


Fig. 334: Aligning Engine With Transaxle Using Special Tools (303-050, 303-D089)
Courtesy of FORD MOTOR CO.

2. Install the 7 transaxle bolts.
 - Tighten to 40 N.m (30 lb-ft).

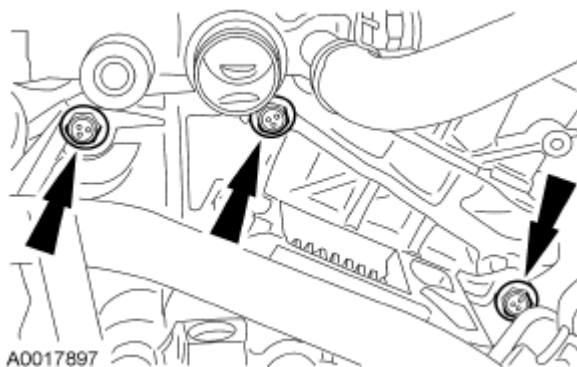


Fig. 335: Locating Transaxle Bolts
Courtesy of FORD MOTOR CO.

3. Using the special tools, secure the engine to the powertrain lift.

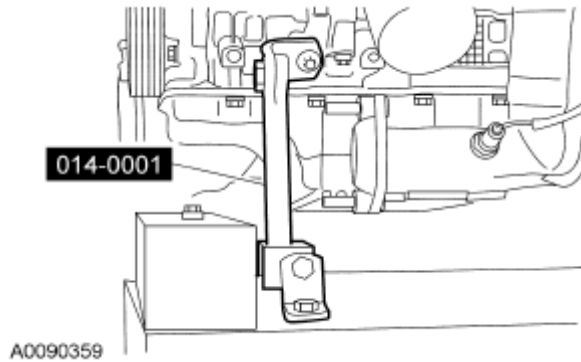


Fig. 336: Securing Engine To Powertrain Lift Using Special Tool (014-0001)
Courtesy of FORD MOTOR CO.

All wheel drive (AWD) vehicles

4. Position the power take off, attach the pin-type retainer and install the bolt.
 - Tighten to 14 N.m (10 lb-ft).

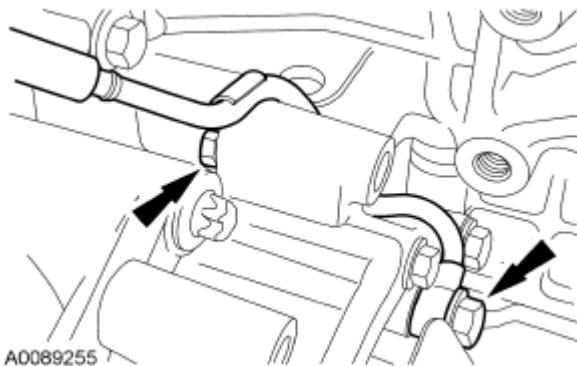


Fig. 337: Locating Pin-Type Retainer & Bolt
Courtesy of FORD MOTOR CO.

5. Install the half shaft support bracket and the bolts.
 - Tighten to 48 N.m (35 lb-ft).

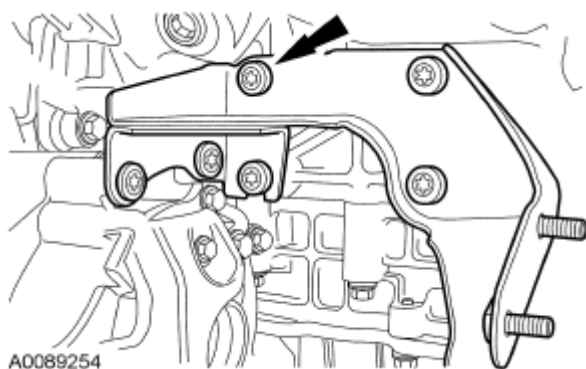


Fig. 338: Locating Half Shaft Support Bracket & Bolts
Courtesy of FORD MOTOR CO.

6. Install 6 new RH exhaust manifold studs.
 - Tighten to 12 N.m (9 lb-ft).

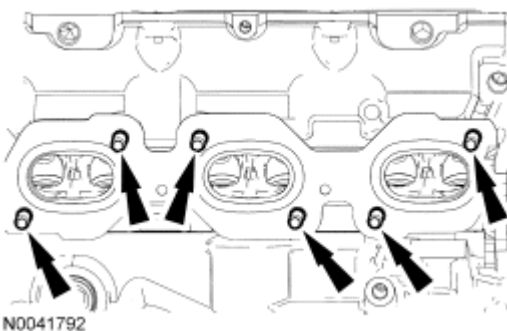


Fig. 339: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

7. Install a new gasket and the RH exhaust manifold and new nuts.
 - Tighten in the sequence shown to 20 N.m (15 lb-ft).

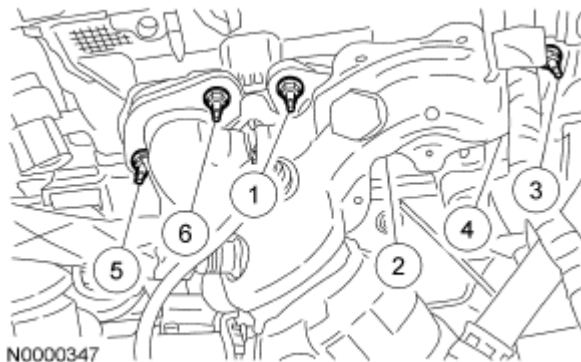


Fig. 340: Identifying Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

All vehicles

8. Connect the turbine speed sensor (TSS) electrical connector.

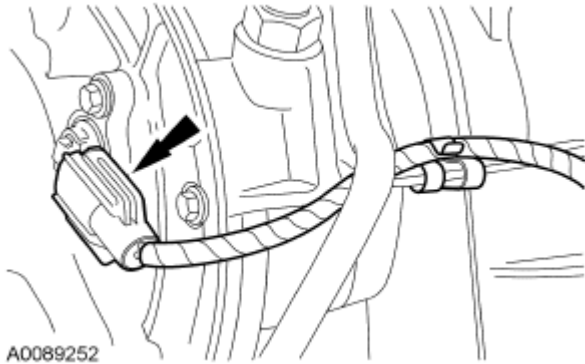


Fig. 341: Locating Turbine Speed Sensor (TSS) Electrical Connector
Courtesy of FORD MOTOR CO.

9. Attach the transaxle control harness to the brackets.

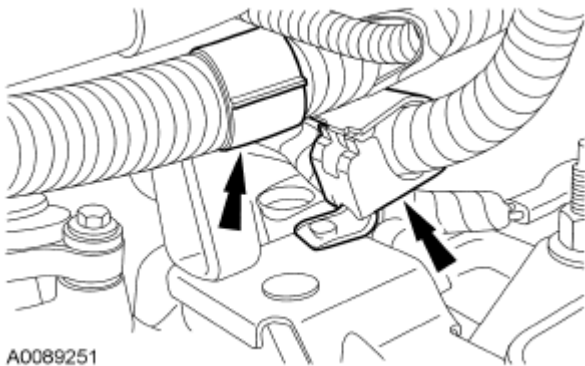


Fig. 342: Locating Transaxle Control Harness
Courtesy of FORD MOTOR CO.

10. Connect the transaxle wiring harness electronic control switch electrical connector.

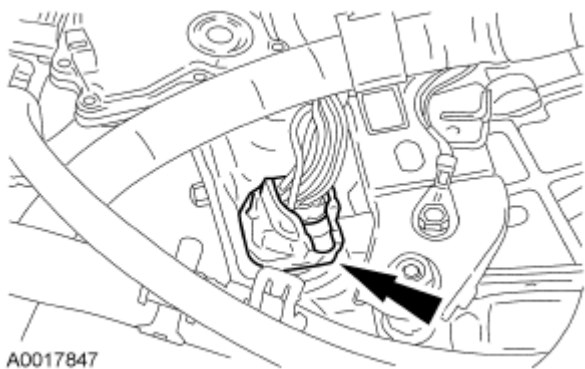


Fig. 343: Locating Transaxle Wiring Harness Electronic Control Switch Electrical Connector
Courtesy of FORD MOTOR CO.

11. Connect the transmission range (TR) sensor electrical connector.

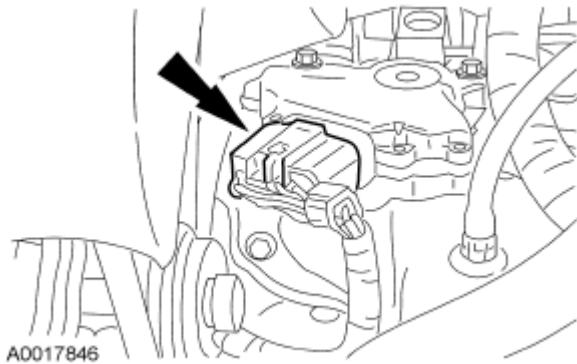


Fig. 344: Locating Transmission Range (TR) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

12. Attach the pin-type retainers to the transaxle support bracket and connect the heated oxygen sensor (HO2S) and catalyst monitor sensor electrical connectors.

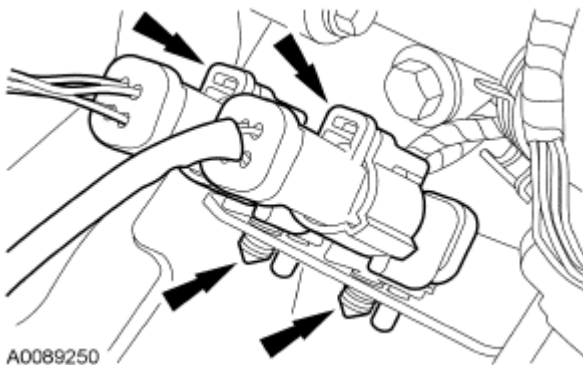


Fig. 345: Locating Pin-Type Retainers
Courtesy of FORD MOTOR CO.

13. Position the powertrain into the vehicle.

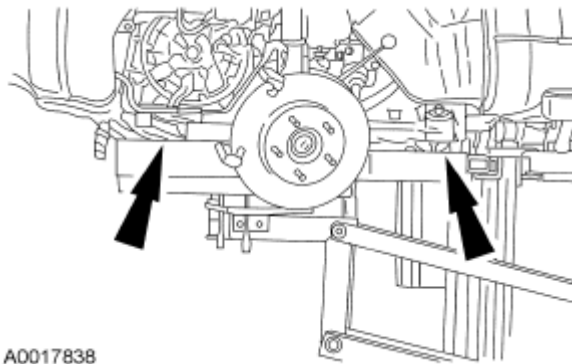


Fig. 346: Locating Powertrain Into Vehicle
Courtesy of FORD MOTOR CO.

14. Install the front engine support nuts.
 - Tighten to 55 N.m (41 lb-ft).

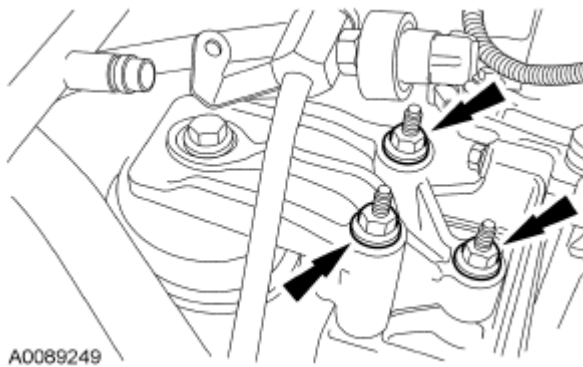


Fig. 347: Locating Front Engine Support Nuts
Courtesy of FORD MOTOR CO.

15. Install the rear transaxle support bolt.
 - Tighten to 103 N.m (76 lb-ft).

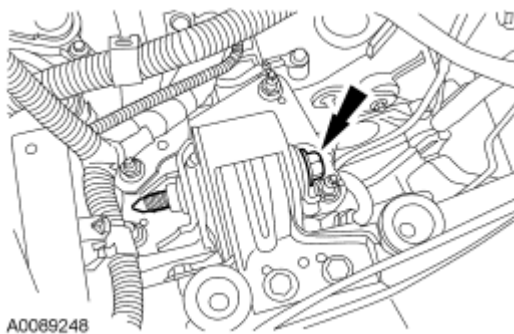


Fig. 348: Locating Transaxle Mount Bolt
Courtesy of FORD MOTOR CO.

16. Position the RH transaxle support insulator and install the bolt and nuts.
- Tighten to 80 N.m (59 lb-ft).

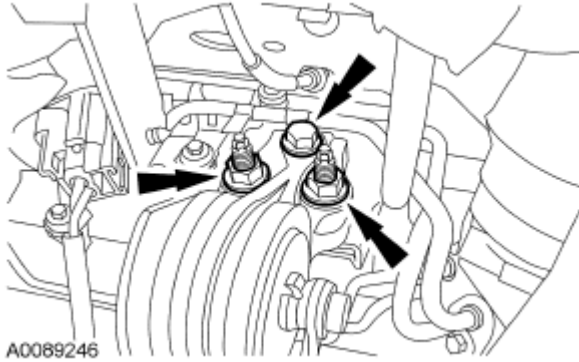


Fig. 349: Locating Transaxle Support Insulator Bolt & Nuts
Courtesy of FORD MOTOR CO.

17. Install the RH transaxle support insulator bolt.
- Tighten to 115 N.m (85 lb-ft).

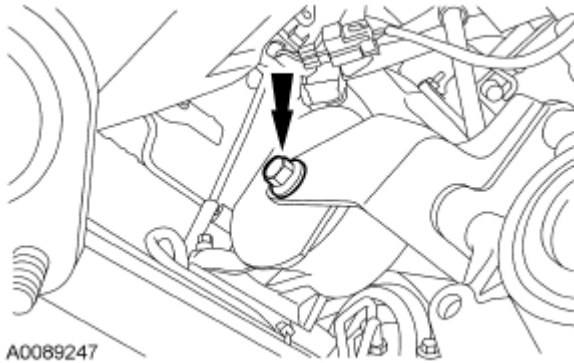


Fig. 350: Locating Transaxle Support Insulator Bolt
Courtesy of FORD MOTOR CO.

NOTE:

**Clean and degrease all sealing surfaces with metal surface cleaner.
The oil pan must be installed and the bolts tightened within 4 minutes
of the sealant application.**

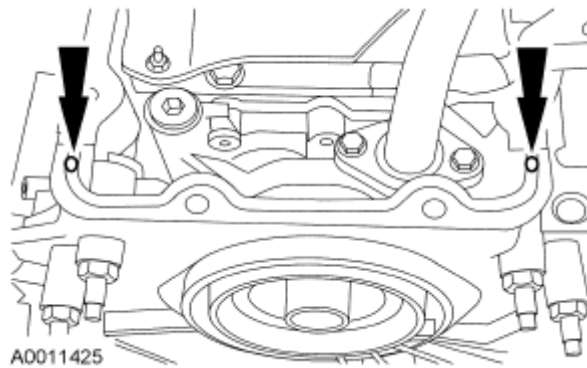


Fig. 351: Locating Dot Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

18. Apply a 10 mm (0.39 in) dot of silicone gasket and sealant to the front cover-to-cylinder block sealing surface.

NOTE: Install a new oil pan gasket.

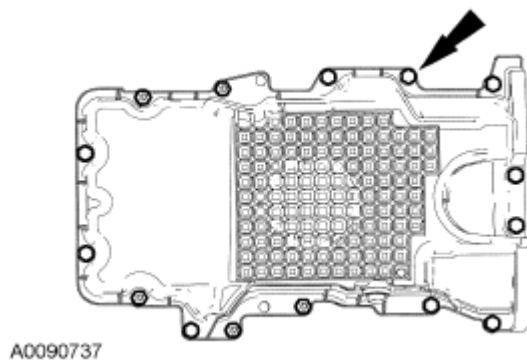


Fig. 352: Locating Oil Pan Gasket Bolts & Stud Bolts
Courtesy of FORD MOTOR CO.

19. Position the oil pan and gasket and loosely install the bolts and stud bolts.
20. Install the 2 oil pan-to-transaxle bolts.
 - Tighten to 40 N.m (30 lb-ft).



Fig. 353: Locating Oil Pan-To-Transaxle Bolts
Courtesy of FORD MOTOR CO.

21. Tighten the oil pan bolts in the sequence shown to 25 N.m (18 lb-ft).

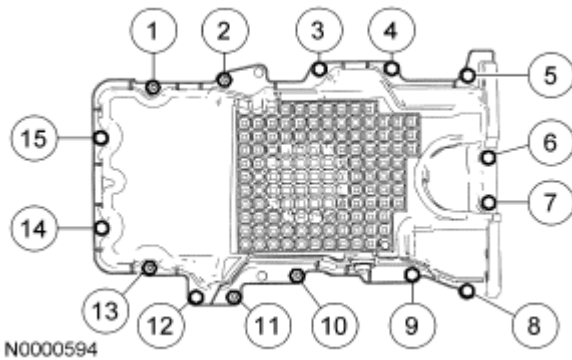


Fig. 354: Identifying Tightening Sequence Of Oil Pan Bolts
Courtesy of FORD MOTOR CO.

22. Install the 4 torque converter nuts.
- Tighten to 40 N.m (30 lb-ft).

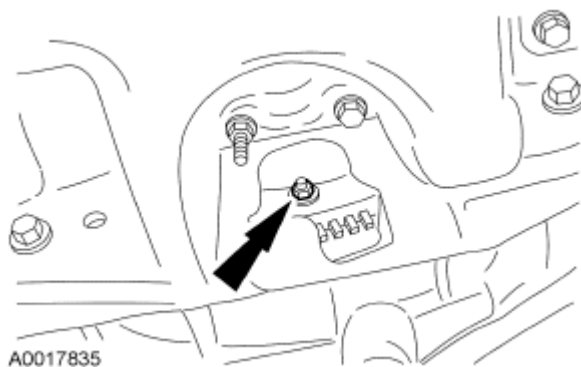


Fig. 355: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

23. Install the torque converter inspection cover.



Fig. 356: Locating Torque Converter Inspection Cover
Courtesy of FORD MOTOR CO.

24. Install the output shaft speed (OSS) sensor and the bolt and connect the electrical connector.
- Tighten to 13 N.m (10 lb-ft).

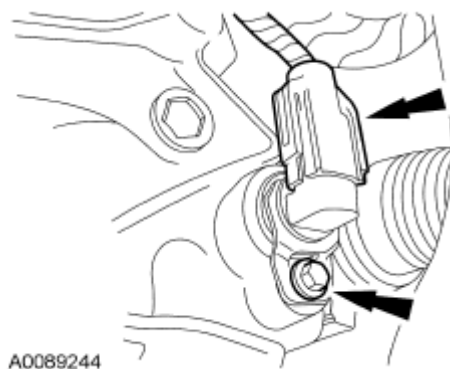


Fig. 357: Locating Output Shaft Speed (OSS) Sensor
Courtesy of FORD MOTOR CO.

25. Attach the HO2S wiring retainer to the radiator center support.

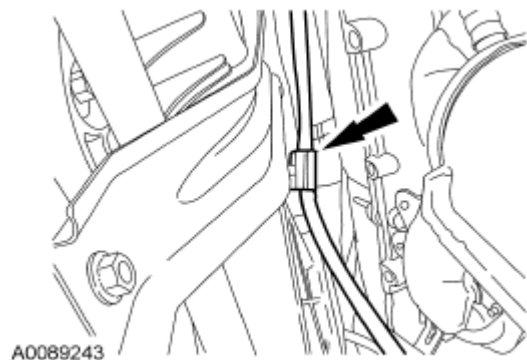


Fig. 358: Locating HO2S Wiring Retainer

Courtesy of FORD MOTOR CO.

26. If equipped, connect the engine block heater electrical connector.

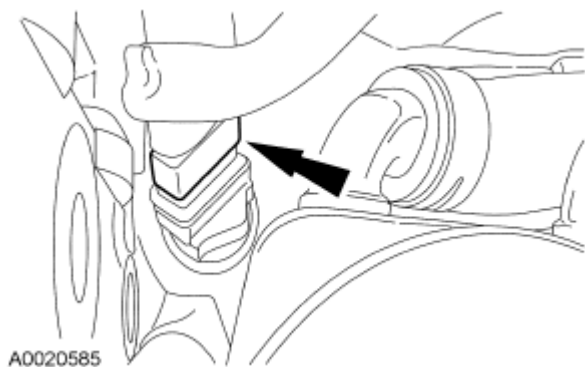


Fig. 359: Locating Engine Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

27. Attach the wiring harness retainers from the battery tray bracket.

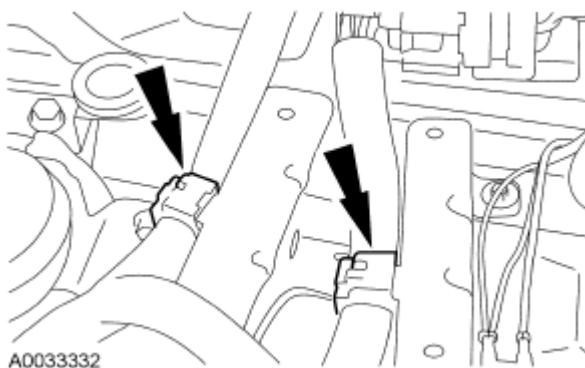


Fig. 360: Locating Battery Tray Bracket
Courtesy of FORD MOTOR CO.

28. Position the ground strap and the electrical connector and install the bolts.
- Tighten to 10 N.m (89 lb-in).

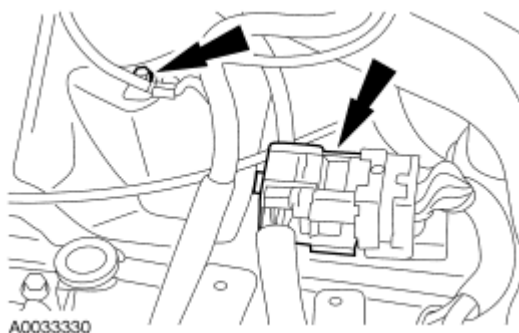


Fig. 361: Locating Ground Strap & Electrical Connector
Courtesy of FORD MOTOR CO.

29. Install the cables and the nuts.
- Tighten to 12 N.m (9 lb-ft).

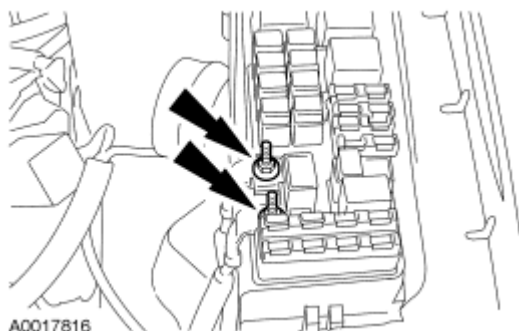


Fig. 362: Locating Cables & Nuts
Courtesy of FORD MOTOR CO.

30. Install the power distribution box cover.

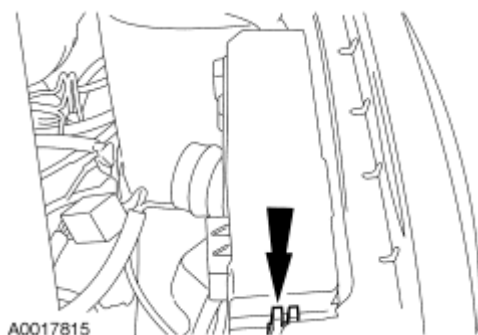


Fig. 363: Locating Power Distribution Box Cover
Courtesy of FORD MOTOR CO.

31. Attach the ground wire and install the bolt.
- Tighten to 10 N.m (89 lb-in).

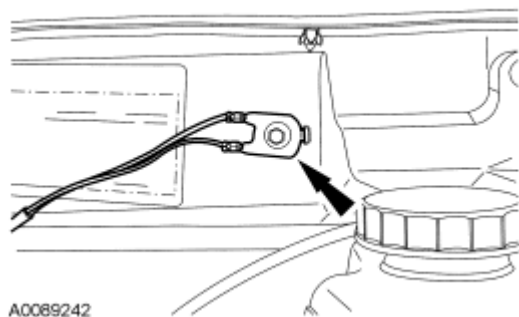


Fig. 364: Locating Ground Wire & Bolt
Courtesy of FORD MOTOR CO.

32. Position the wiring and install the nut. Connect the powertrain control module (PCM) electrical connectors.
- Tighten to 8 N.m (71 lb-in).

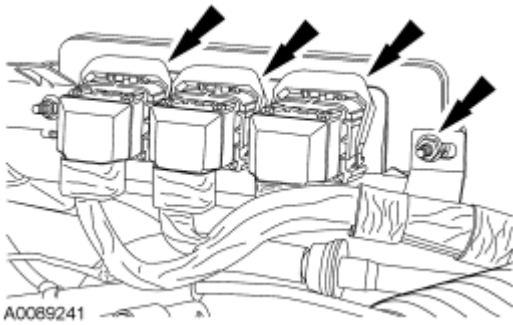


Fig. 365: Locating Powertrain Control Module (PCM) Electrical Connectors
Courtesy of FORD MOTOR CO.

33. Connect the manifold absolute pressure (MAP) sensor electrical connector and vacuum tube.

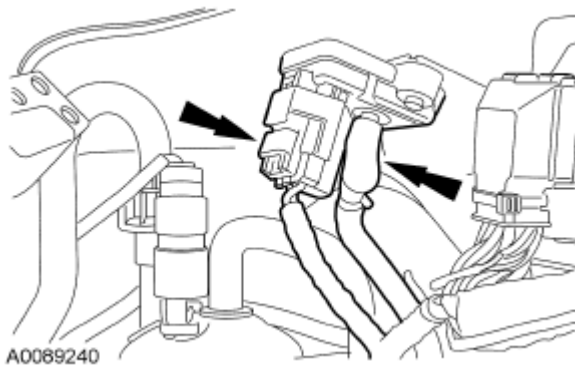


Fig. 366: Locating Manifold Absolute Pressure (MAP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

34. Connect the brake booster vacuum tube and the vacuum reservoir tube.

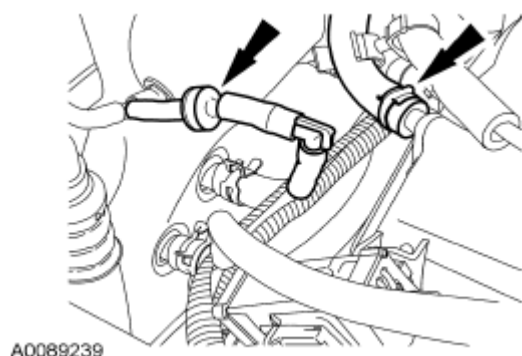


Fig. 367: Locating Brake Booster Vacuum Tube Vacuum Reservoir Tube
Courtesy of FORD MOTOR CO.

35. Connect the evaporative emissions purge valve vacuum tube to the intake manifold.
- Attach the vacuum tube retainer to the transmission fill tube.

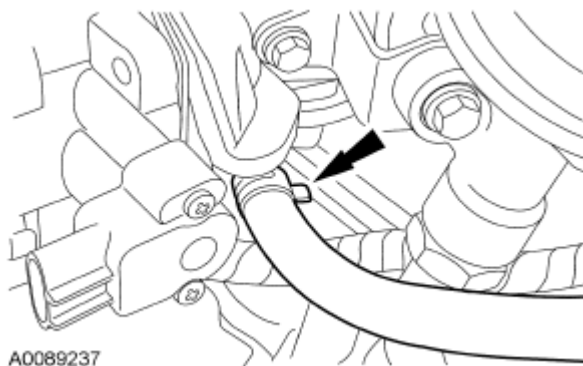


Fig. 368: Locating Vacuum Tube Retainer
Courtesy of FORD MOTOR CO.

36. Position the exhaust gas recirculation (EGR) tube and loosely install the fittings.
- Tighten the EGR tube-to-EGR valve fitting to 40 N.m (30 lb-ft).

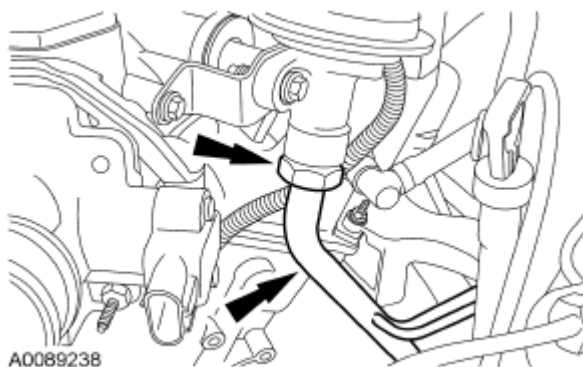


Fig. 369: Locating Exhaust Gas Recirculation (EGR) Tube
Courtesy of FORD MOTOR CO.

37. Connect the differential pressure feedback EGR sensor electrical connector and attach the pin-type retainer.

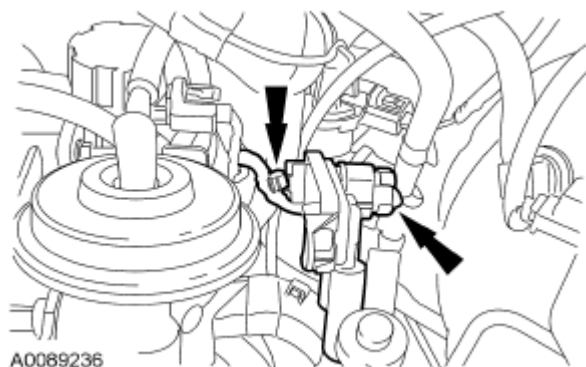


Fig. 370: Locating EGR Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

38. Position the gearshift cable bracket and install the bolts.
- Tighten to 19 N.m (14 lb-ft).

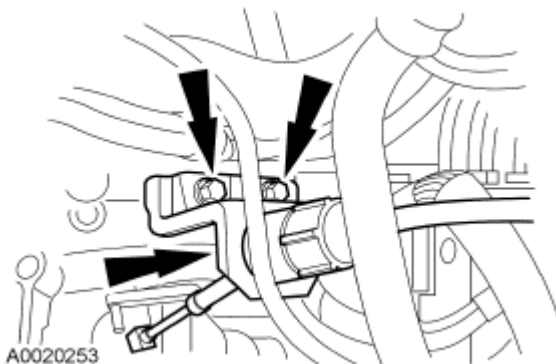


Fig. 371: Locating Gearshift Cable Bracket Bolt
Courtesy of FORD MOTOR CO.

39. Attach the wiring harness pin-type retainer to the gearshift cable bracket.

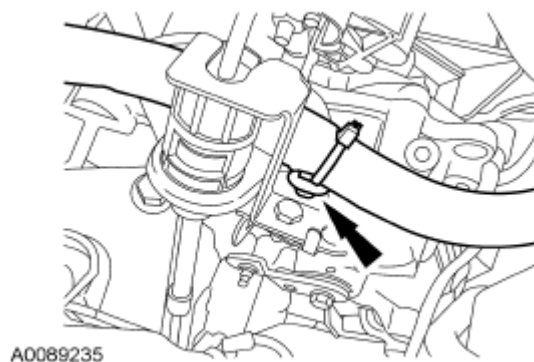
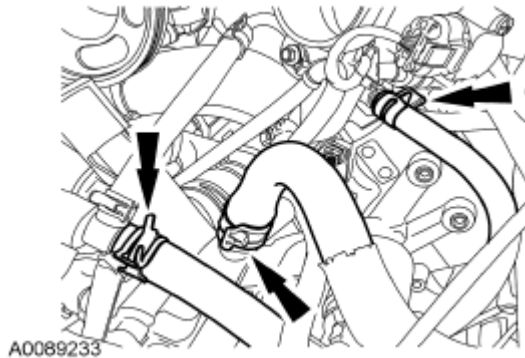


Fig. 372: Locating Pin-Type Retainer

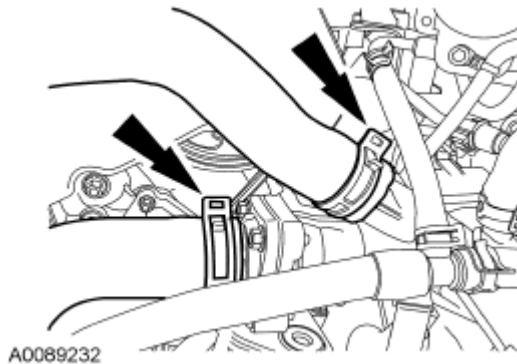
Courtesy of FORD MOTOR CO.

40. Connect the fuel supply tube quick connect coupling at the fuel rail. For additional information, refer to **QUICK CONNECT COUPLING**.
41. Connect the heater hoses and the throttle body coolant hose.

**Fig. 373: Locating Heater Hoses & Throttle Body Coolant Hose**

Courtesy of FORD MOTOR CO.

42. Connect the hoses.

**Fig. 374: Locating Hoses**

Courtesy of FORD MOTOR CO.

43. Position the accelerator and speed control cables and bracket. Install the nut.
 - Tighten to 10 N.m (89 lb-in).

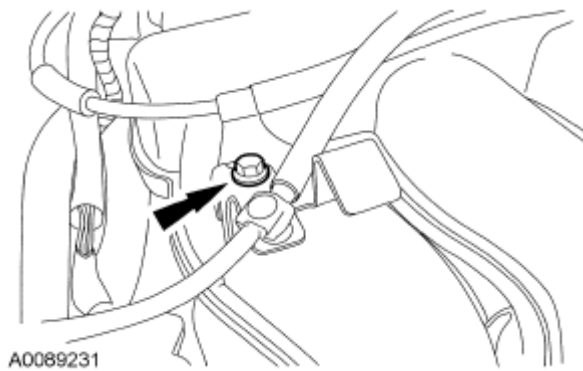


Fig. 375: Locating Accelerator & Speed Control Cables Nut
Courtesy of FORD MOTOR CO.

44. Position the bracket and install the bolts.
- Tighten to 10 N.m (89 lb-in).
 - Connect the accelerator cable and the speed control actuator cable.

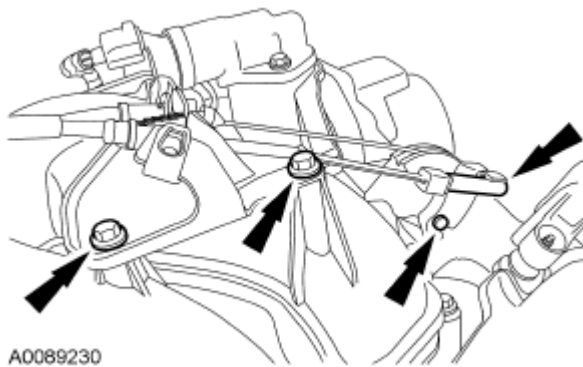


Fig. 376: Locating Bolts
Courtesy of FORD MOTOR CO.

45. Position the accelerator cable snow shield and install the bolts.
- Tighten to 10 N.m (89 lb-in).

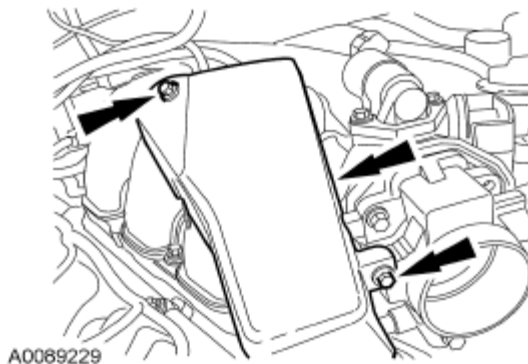


Fig. 377: Locating Accelerator Cable Snow Shield Bolt
Courtesy of FORD MOTOR CO.

46. Tighten the EGR tube-to-RH catalytic converter fitting to 40 N.m (30 lb-ft).

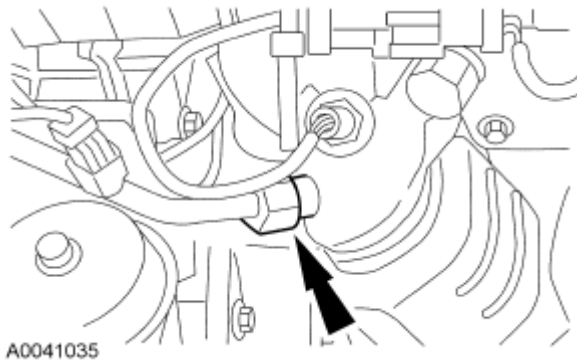


Fig. 378: Locating EGR Tube-To-RH Catalytic Converter Fitting
Courtesy of FORD MOTOR CO.

47. Connect the 2 transmission cooler tubes.

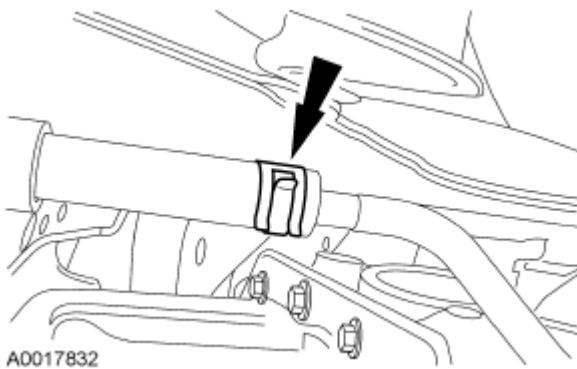


Fig. 379: Locating Transmission Cooler Tubes
Courtesy of FORD MOTOR CO.

48. Install the crossbrace and the new nut.
- Tighten to 175 N.m (129 lb-ft).

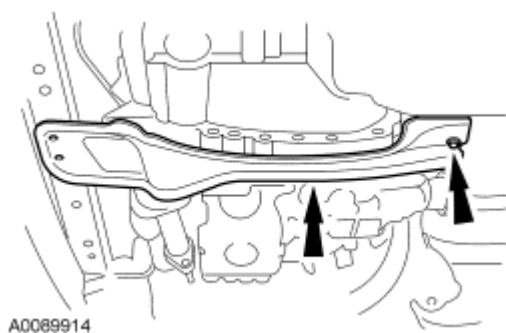


Fig. 380: Identifying Cross Brace And Rear Nut
 Courtesy of FORD MOTOR CO.

49. Install the bolt for the transaxle mount and install the 2 bolts for the crossbrace.
- Tighten the transaxle mount bolt to 115 N.m (85 lb-ft).
 - Tighten the crossbrace bolts to 90 N.m (66 lb-ft).

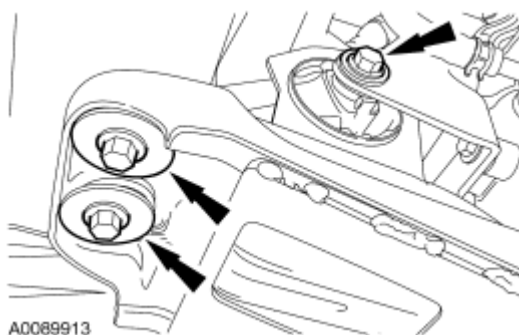
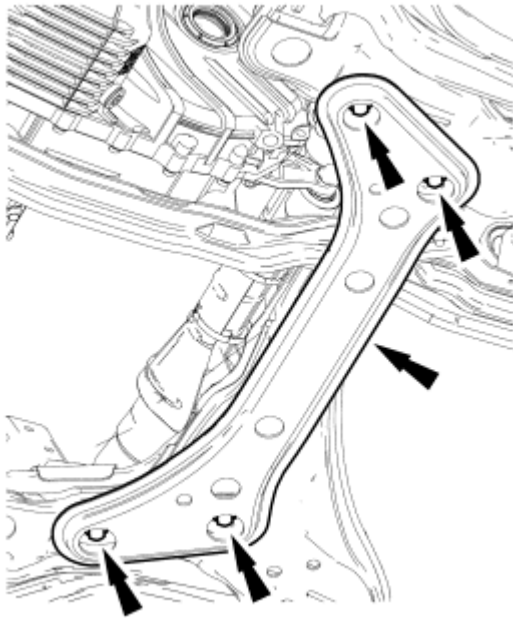


Fig. 381: Identifying Front Roll Restrictor Bolt & Bolts For Engine Support Crossmember
 Courtesy of FORD MOTOR CO.

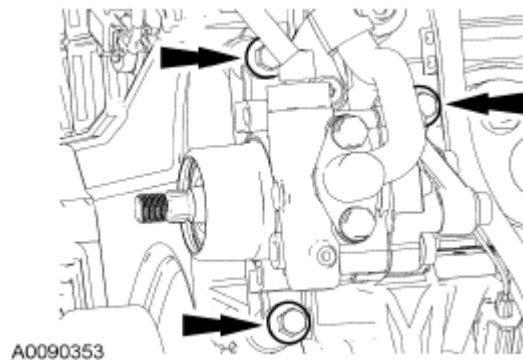
50. Install the lateral support crossmember and the 4 bolts.
- Tighten to 115 N.m (85 lb-ft).



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Fig. 382: Identifying Lateral Support Crossmember And Bolts
Courtesy of FORD MOTOR CO.

51. Position the power steering pump and install the bolts.
- Tighten to 25 N.m (18 lb-ft).



A0090353

Fig. 383: Locating Power Steering Pump Bolts
Courtesy of FORD MOTOR CO.

52. Install the power steering pump pulley and the nut.
- Tighten to 49 N.m (36 lb-ft).

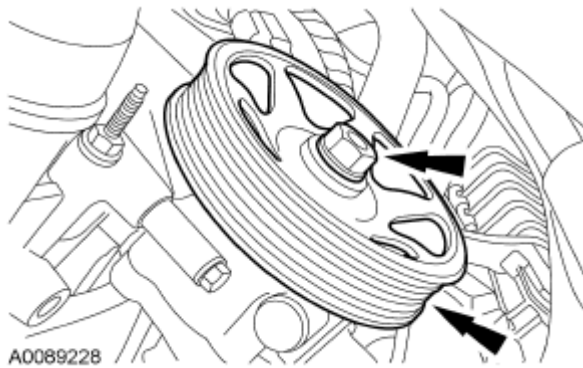


Fig. 384: Locating Power Steering Pump Pulley & Nut
Courtesy of FORD MOTOR CO.

53. Install the A/C compressor and the bolts.
- Tighten to 25 N.m (18 lb-ft).

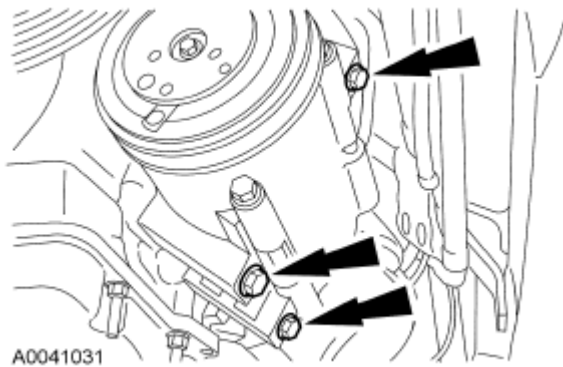


Fig. 385: Locating A/C Compressor & Bolts
Courtesy of FORD MOTOR CO.

54. Connect the A/C clutch field coil electrical connector.

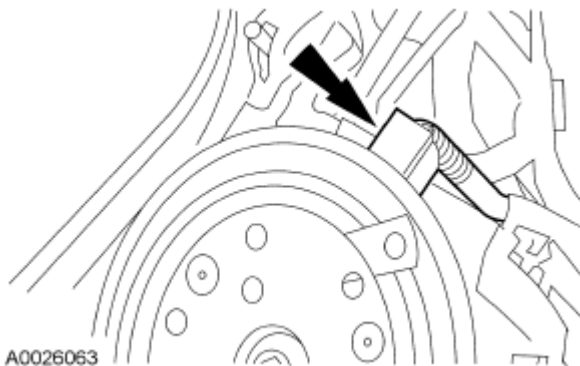


Fig. 386: Locating A/C Clutch Field Coil Electrical Connector
Courtesy of FORD MOTOR CO.

AWD vehicles

CAUTION: Do not reuse the bolts and straps for the center U-joint. Install new bolts and straps or damage to the vehicle may occur.

NOTE: There is a difference in the length of the head of the replacement yoke strap bolts from the production bolts. The longer head pinion bolts can be used in either location.

55. Install the driveshaft.

1. Align the driveshaft with the index marks.
2. Install the new straps and bolts.
 - Tighten to 23 N.m (17 lb-ft).

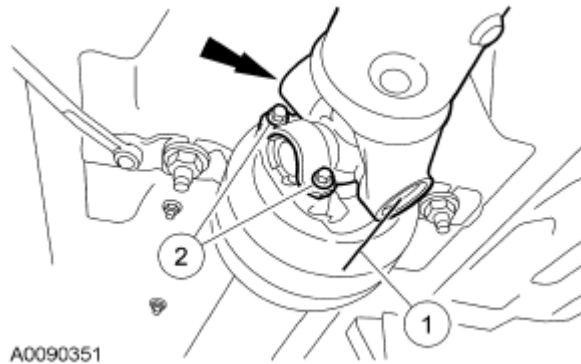


Fig. 387: Locating Straps & Bolts
Courtesy of FORD MOTOR CO.

CAUTION: Do not reuse the CV joint bolts and washers. Install new bolts and washers or damage to the vehicle may occur.

56. Install the 6 front driveshaft-to-power take off bolts and washers.

- Tighten to 37 N.m (27 lb-ft).

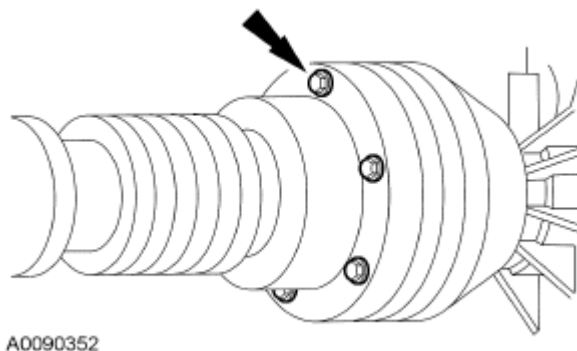
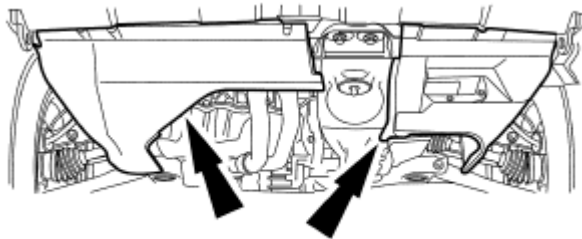


Fig. 388: Locating Driveshaft Bolt
Courtesy of FORD MOTOR CO.

All vehicles

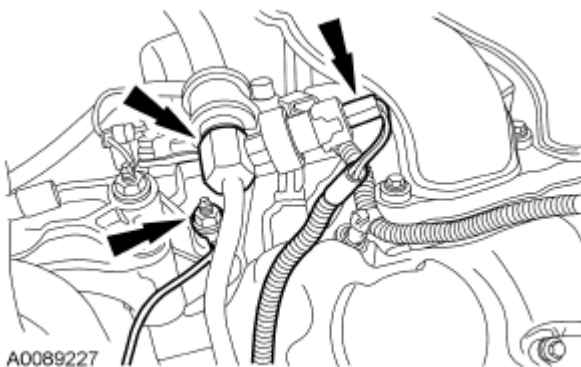
57. Install the LH halfshaft. For additional information, refer to **INSTALLATION** .
58. Position the accessory drive belt on all pulleys except the generator pulley.
59. Install the generator. For additional information, refer to **REMOVAL AND INSTALLATION** .
60. Install the exhaust system flexpipe. For additional information, refer to **REMOVAL AND INSTALLATION** .
61. Install the lower radiator air deflectors.



A0019937

Fig. 389: Locating Lower Radiator Air Deflectors
Courtesy of FORD MOTOR CO.

62. Position the power steering hose bracket and install the nut.
 - Tighten to 25 N.m (18 lb-ft).
 - Connect the power steering pressure (PSP) switch electrical connector.



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Fig. 390: Locating Power Steering Pressure (PSP) Switch Electrical Connector
Courtesy of FORD MOTOR CO.

63. Install the air cleaner outlet pipe and air cleaner. For additional information, refer to **REMOVAL AND INSTALLATION - AIR CLEANER OUTLET PIPE** and **REMOVAL AND INSTALLATION - AIR CLEANER** .

2006 Mercury Mariner

2006 ENGINE Engine - 3.0L (4V) - Escape & Mariner

64. Install the battery tray. For additional information, refer to **REMOVAL AND INSTALLATION** .
65. Fill and bleed the cooling system. For additional information refer to **COOLING SYSTEM DRAINING, FILLING AND BLEEDING** .
66. Fill the engine with clean engine oil.