

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego

2007 ENGINE**Engine - Five Hundred, Freestyle & Montego****SPECIFICATIONS****GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Item	Specification
Lubricants and Sealants	
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 Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Threadlock and Sealer TA-25	WSK-M2G351-A5
Engine	
Displacement	3.0L (4V) (182 CID)
Number of cylinders	6
Bore	89.0 mm (3.50 in)
Stroke	79.5 mm (3.13 in)
Firing 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 ^a	5.7 L (6.0 qts)
Compression ratio	10:1
Cylinder Head and Valve Train	
Cylinder head distortion ^b	-
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)

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Valve stem-to-guide clearance - exhaust	0.046-0.095 mm (0.0018-0.0037 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	0.04 mm (0.001 in)
Valve face angle	45.25-45.75 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	44.5-45.0 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 ± 0.2 mm (1.57 in ± 0.0078 in)
Valve spring installed pressure	240 N ± 12 N @ 39.89 mm (53.95 lbs ± 2.69 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-intake	4.29 mm (0.16 in)
Lobe lift-exhaust	4.68 mm (0.18 in)
Allowable lobe lift loss	0.76 mm (0.003 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	0.028-0.074 mm (0.001-0.0029 in)
Camshaft journal-to-bearing clearance - service limit	0.121 mm (0.0047 in)
Runout	-
End play - service limit	0.025-0.165 mm (0.0009-0.0064 in)
Cylinder Block	
Cylinder bore diameter - grade 1	89.000-89.010 mm (3.5039-3.5043 in)

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Cylinder bore diameter - grade 2	89.011-89.020 mm (3.5043-3.5047) in
Cylinder bore diameter - grade 3	89.021-89.030 mm (3.5047-3.5051) in
Cylinder bore maximum taper	0.020 mm (0.008 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 (2.677-2.678 in)
Head gasket surface flatness	-
Crankshaft	
Main bearing journal diameter	62.968-62.992 mm (2.479-2.480 in)
Main bearing journal maximum taper	0.008 mm (0.0003 in)
Main bearing journal maximum out-of-round	0.006 mm (0.0082 in)
Main bearing journal-to-cylinder block clearance	0.026 mm-0.042 mm (0.0010-0.0016 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 (3.5027-3.5031 in)
Piston diameter - uncoated, grade 2	88.978-88.992 mm (3.5030-3.5036 in)
Piston diameter - uncoated, grade 3	88.990-89.000 mm (3.5035-3.5039 in)
Piston-to-cylinder bore clearance - uncoated	0.018 to 0.042 mm (0.0007-0.0016 in)
Piston ring end gap - compression (top, gauge diameter) ^c	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 max. (0.0196 in)
Piston ring end gap - compression (bottom, service limit)	0.65 mm max. (0.0255 in)
Piston ring end gap - oil ring (steel rail, service limit)	0.90 mm max. (0.0354 in)
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	2.530-2.555 mm (0.0996-0.1005 in)
Piston ring width	-
Piston ring-to-groove clearance	-
Piston pin bore diameter	21.015-21.020 mm (0.8273-0.8275 in)

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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 (0.00007-0.00003 in)
Piston-to-connecting rod clearance	-
Connecting rod-to-pin clearance - standard	0.004-0.0201 mm (0.0001-0.0008 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 (5.435-5.438 in)
Connecting rod maximum allowed bend	0.038 mm (0.0015 in) per 25 mm (0.984 in)
Connecting rod maximum allowed twist	0.050 mm (0.0019 in) per 25 mm (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)

^a With filter change.^b Refer to the procedure for specifications.^c Specification 82.4 mm (3.2441 in) diameter gauge.**TORQUE SPECIFICATIONS****TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
Accessory drive belt tensioner bolt	45	33	-
Air conditioning compressor bolts and nuts	25	18	-
Air conditioning compressor bracket bolts	25	18	-
Battery B+ nut	5	-	44
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 bolts ^a	-	-	-
Crankshaft position (CKP) sensor bolt	10	-	89
Crankshaft damper bolt ^a	-	-	-
Crankcase vent cover bolts	10	-	89
Cylinder head bolts ^a	-	-	-
Driveshaft bolts	25	18	-
Exhaust gas recirculation (EGR) system module bolts	25	18	-
EGR system module tube nuts	40	30	-

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Engine front cover bolts and stud ^a	-	-	-
Engine support insulator nuts	70	52	-
Exhaust manifold heat shield bolts	11	8	-
Exhaust manifold nuts	20	15	-
Exhaust manifold stud	12	9	-
Exhaust manifold-to-catalytic converter bolts	40	30	-
Flexplate bolts	80	59	-
Front transaxle stabilizer mount nut and bolt	40	30	-
Fuel rail bolts	10	-	89
Generator bolts and nuts	48	35	-
Generator-to-engine front cover studs	8	-	71
Generator B+ terminal nut	8	-	71
Ground strap bolts	10	-	89
Ground cable-to-transaxle housing bolt	12	9	-
Halfshaft support bracket bolts	48	35	-
Ignition coil-on-plug bolts	6	-	53
Intermediate shaft-to-steering gear bolt	23	17	-
Knock sensor (KS) bolt	20	15	-
Oil filter adapter bolts ^a	-	-	-
Oil filter	16	12	-
Oil level indicator and tube stud bolt	9	-	80
Oil pan baffle nuts ^a	-	-	-
Oil pan bolts	25	18	-
Oil pan drain plug	26	19	-
Oil pan-to-oil filter adapter bolt	25	18	-
Oil pan-to-transaxle bolts	40	30	-
Oil pressure sender	14	10	-
Oil pump bolts	10	-	89
Oil pump screen and pickup tube bolts	10	-	89
Outer tie-rod end nuts	90	66	-
Power steering fluid reservoir nuts	9	-	80
Power steering fluid reservoir bracket nut	9	-	80
Power steering pump nuts	25	18	-
Power steering pump bracket bolts	25	18	-
Power steering pressure (PSP) tube bracket-to-cylinder head bolts	7	-	62
PSP tube bracket-to-fluid reservoir bracket bolt	7	-	62
PSP tube bracket-to-crossmember bolt	25	18	-
Power steering tube-to-steering gear bolt	25	18	-
Radio ignition interference capacitor bolt	8	-	71
Rear transaxle mount bracket-to-transaxle bolts ^b	55	41	-

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RH engine support insulator bracket bolts	55	41	-
RH valve cover-to power steering fluid reservoir stud bolts	7	-	62
Shifter cable bracket bolts	25	18	-
Spark plugs	15	11	-
Stabilizer bar link nuts	55	41	-
Starter motor ground cable bolt	25	18	-
Starter cable positive nut	12	9	-
Thermostat housing-to-coolant pump bolts	10	-	89
Timing chain guide bolts	25	18	-
Timing chain tensioner bolts	25	18	-
Torque converter-to-flexplate nuts	36	27	-
Transaxle-to-engine bolts	40	30	-
Transaxle roll restrictor cross brace-to-body bolts ^b	55	41	-
Transaxle roll restrictor cross brace-to-roll restrictor bolt ^b	48	35	-
Transaxle roll restrictor bracket-to-roll restrictor bolts ^b	55	41	-
Transaxle roll restrictor-to-transaxle bolts ^b	55	41	-
Upper and lower intake manifold bolts	10	-	89
Valve cover bolts and stud bolts	10	-	89
Wiring harness shield-to-valve cover stud bolt nuts	6	-	53

^a Refer to the procedure.

^b When reinstalling fasteners originally coated with threadlock, clean with a wire brush prior to applying new threadlock. Apply threadlock to the threads of the bolt(s).

DESCRIPTION AND OPERATION

ENGINE

WARNING: The 3.0L Duratec engine is equipped with a composite intake manifold and fabricated exhaust manifolds. The engine should not be supported by these manifolds during repair procedures. Failure to follow these instructions can result in personal injury.

The 3.0L Duratec is a 4-valve-per-cylinder, dual overhead camshaft engine. The engine uses a distributorless ignition system. The cylinder block is a 2-piece design with the upper portion housing the cylinders, and a separate lower cylinder block containing the main bearing caps. Both sections are made of aluminum, with inserts for the bearing areas and caps. An aluminum oil pan bolts to the bottom of the lower cylinder block and to the transaxle to provide greater strength.

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.

DIAGNOSTIC TESTS

ENGINE

Refer to **ENGINE SYSTEM - GENERAL INFORMATION** article for basic mechanical concerns.

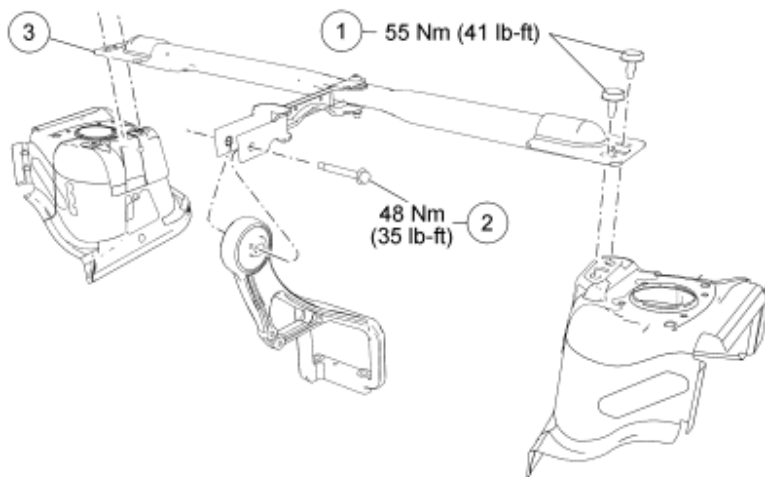
Refer to the **Introduction - Gasoline Engines** article for driveability concerns.

IN-VEHICLE SERVICING

UPPER INTAKE MANIFOLD

Material

Item	Specification
Threadlock and Sealer TA-25	WSK-M2G351-A5



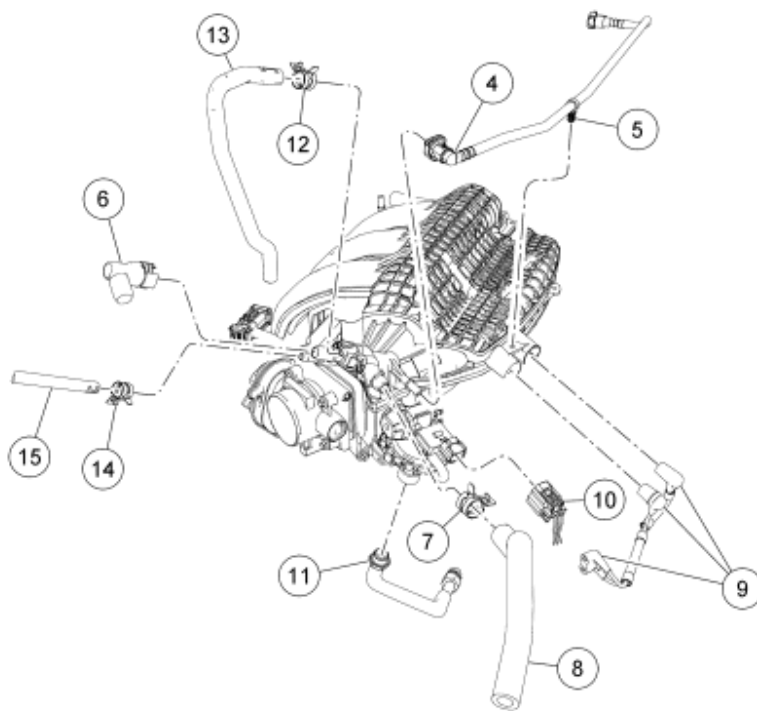
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Fig. 1: Exploded View Of Transaxle Roll Restrictor (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W705985	Transaxle roll restrictor cross brace bolts (4 required)
2	W506525	Transaxle roll restrictor bolt
3	6G053	Transaxle roll restrictor cross brace

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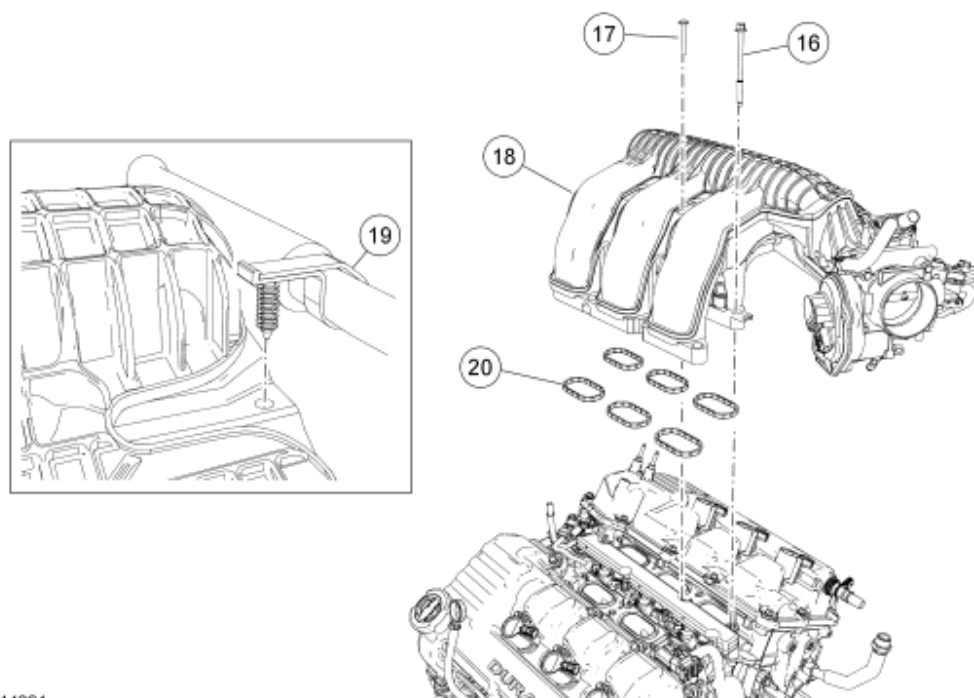
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Fig. 2: Exploded View Of Upper Intake Manifold Fittings, Hoses & Connectors
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
4	9G271	Evaporative emissions (EVAP) canister purge valve tube
5	-	EVAP canister purge valve tube retainer (part of 9G271)
6	6K817	PCV tube
7	-	Brake booster vacuum hose clamp
8	9C482	Brake booster vacuum hose
9	9E498	Vacuum tube fittings (3 required)
10	14A464	Exhaust gas recirculation (EGR) system module electrical connector (part of 12B637)
11	-	EGR system module tube fitting (part of 9D477)
12	8287	Positive crankcase ventilation (PCV) coolant hose clamp
13	18663	PCV coolant hose
14	8287	PCV coolant hose clamp
15	9F814	PCV body coolant hose



N0044321

Fig. 3: Exploded View Of Upper Intake Manifold
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
16	9Y450	Upper intake manifold bolt (8 required)
17	W505978	Upper intake manifold-to-lower intake manifold screw (4 required)
18	9424	Upper intake manifold
19	-	Fuel tube retainer (part of 9G700)
20	310300	Upper intake manifold gasket (6 required)

REMOVAL

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Remove the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
3. Remove the 4 transaxle roll restrictor cross brace bolts.
4. Remove the bolt and the transaxle roll restrictor cross brace.
5. Disconnect the evaporative emissions (EVAP) canister purge valve tube from the upper intake manifold and detach the retainer.
6. Disconnect the positive crankcase ventilation (PCV), brake booster and vacuum harness tubes from the upper intake manifold.

7. Detach the fuel tube retainer from the upper intake manifold.
8. Disconnect the exhaust gas recirculation (EGR) system module electrical connector and vacuum tube.
9. Detach the vacuum tube from the upper intake manifold vacuum tube retainer.
10. Disconnect the EGR system module tube from the EGR system module.
11. Disconnect and plug the 2 PCV coolant hoses.
12. Disconnect the throttle body electrical connector.
13. If equipped, remove and discard the 4 upper-to-lower intake manifold screws.
14. 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 8 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

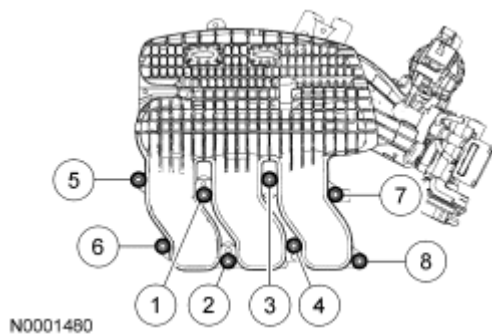


Fig. 4: Upper Intake Manifold Bolt Torque Sequence
Courtesy of FORD MOTOR CO.

2. Connect the throttle body electrical connector.
3. Unplug and connect the 2 PCV coolant hoses.
4. Connect the EGR system module tube to the EGR system module.
 - Tighten to 40 Nm (30 lb-ft).
5. Attach the vacuum tube to the upper intake manifold vacuum tube retainer.
6. Connect the EGR system module electrical connector and vacuum tube.
7. Attach the fuel tube retainer to the upper intake manifold.
8. Connect the PCV, brake booster and vacuum harness tubes to the upper intake manifold.
9. Connect the EVAP canister purge valve tube to the upper intake manifold and attach the retainer.
10. Clean the 4 transaxle roll restrictor cross brace bolts using a wire brush and apply new threadlock to the threads.
11. Position the transaxle roll restrictor cross brace and install the 4 new bolts.

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- Tighten to 55 Nm (41 lb-ft).
- 12. Clean the transaxle roll restrictor cross brace-to-roll restrictor bolt using a wire brush and apply new threadlock to the threads.
- 13. Install a new transaxle roll restrictor cross brace-to-roll restrictor bolt.
 - Tighten to 48 Nm (35 lb-ft).
- 14. Install the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
- 15. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

LOWER INTAKE MANIFOLD

Material

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

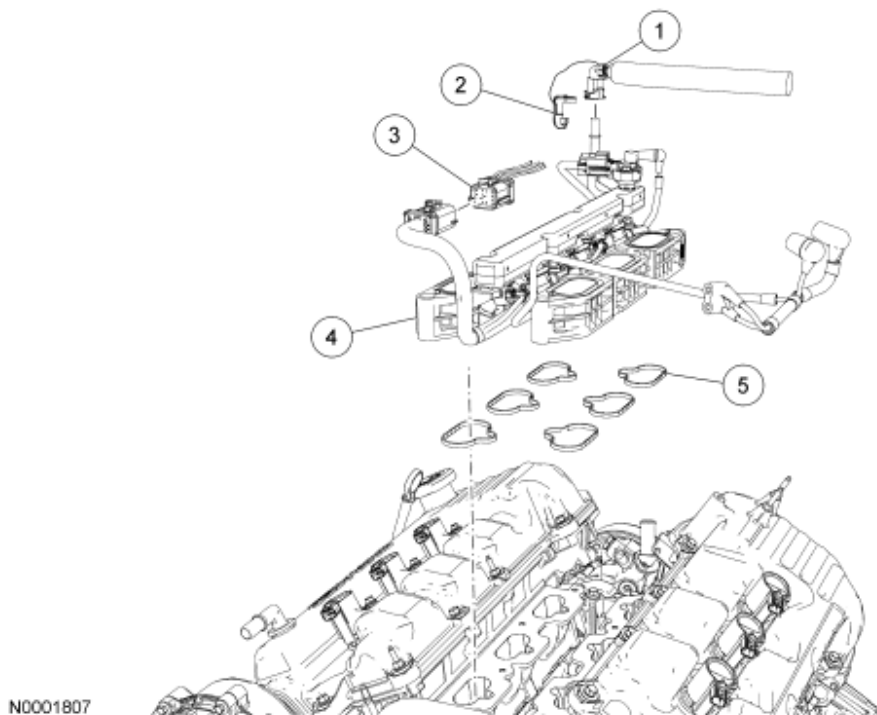


Fig. 5: Exploded View Of Lower Intake Manifold
Courtesy of FORD MOTOR CO.

Item	Part Number	Description

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1	9G700	Fuel tube
2	-	Fuel tube redundant clip (part of 9G700)
3	14A464	Fuel charging wiring harness electrical connector (part of 9H589)
4	9K461	Lower intake manifold
5	9439	Lower intake manifold gasket (6 required)

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.

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

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the upper intake manifold. For additional information, refer to **Upper Intake Manifold**.
4. Disconnect the fuel tube redundant clip.

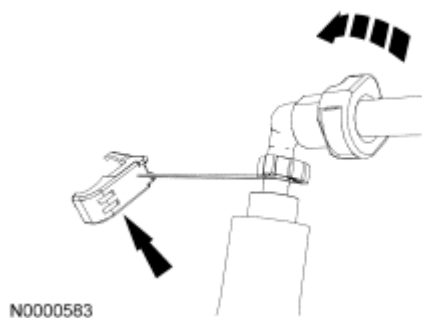


Fig. 6: Fuel Tube Redundant Clip
Courtesy of FORD MOTOR CO.

5. Press the fuel tube quick release coupling button and disconnect the fuel tube from the fuel rail.

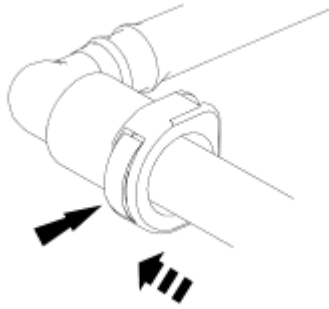


Fig. 7: Locating Fuel Tube Quick Connect Coupling Button
Courtesy of FORD MOTOR CO.

6. Disconnect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.
7. Disconnect the fuel charging wiring harness electrical connector.
8. Remove 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.
2. Connect the fuel charging wiring harness electrical connector.
3. Connect the fuel rail pressure and temperature sensor electrical connector and vacuum tube.

CAUTION: Make sure that the fuel tube coupling clicks into place when installing the tube. To make sure that the fuel tube is fully seated, pull on the tube.

NOTE: Apply clean engine oil to the end of the tube before inserting a tube into the connector.

4. Connect the fuel tube to the fuel rail.

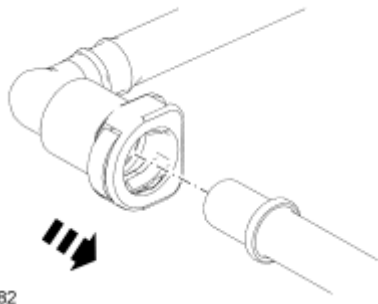


Fig. 8: Installing Quick Connect Coupling Onto Tube
Courtesy of FORD MOTOR CO.

5. Connect the fuel tube redundant clip.

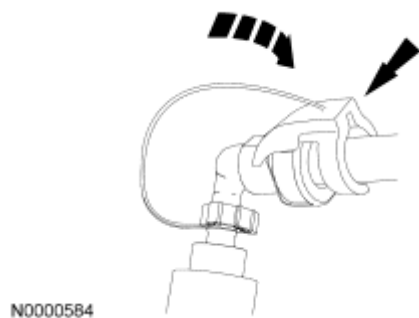


Fig. 9: Fuel Tube Redundant Clip
Courtesy of FORD MOTOR CO.

6. Install the upper intake manifold. For additional information, refer to Upper Intake Manifold.
7. Connect the battery ground cable. For additional information, refer to BATTERY, MOUNTING AND CABLES article.

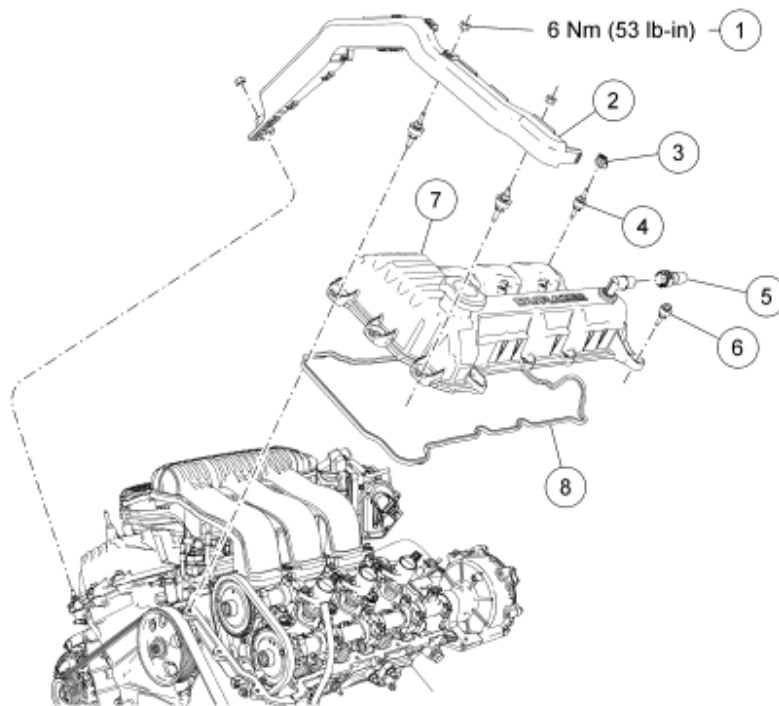
VALVE COVER - LH

Material

Item	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

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Fig. 10: Exploded View Of Left Valve Cover (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Wiring conduit-to-valve cover stud bolt nut (3 required)
2	14A099	Wiring conduit (part of 12B637)
3	-	Wiring retainer (3 required) (part of 9H589)
4	6C519	Valve cover stud bolt (8 required)
5	6578	Crankcase ventilation tube
6	6C519	Valve cover bolt (6 required)
7	6A505	Valve cover
8	6A559	Valve cover gasket

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 **ENGINE IGNITION** article.
2. Disconnect the crankcase ventilation tube from the valve cover.
3. Remove the 3 nuts and position the wiring conduit aside.

4. Detach the 3 wiring retainers from the valve cover stud bolts.
5. Remove the oil level indicator.
6. Remove the 6 bolts, 8 stud bolts and the valve cover.
 - Remove and discard the gasket.

INSTALLATION

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

1. Clean the valve cover, cylinder head and front cover sealing surfaces.

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.

NOTE: Install a new gasket in the valve cover.

3. Position the valve cover and install the 6 bolts and 8 stud bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

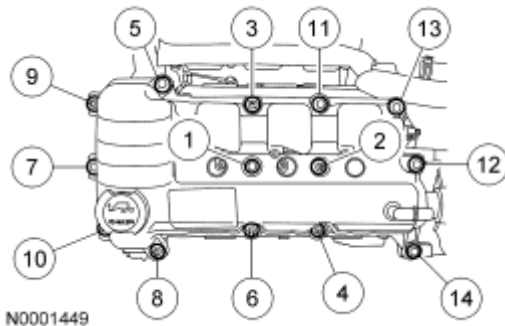


Fig. 11: Identifying Left Valve Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Install the oil level indicator.
5. Attach the wiring retainers to the valve cover stud bolts.
6. Position the wiring conduit and install the 3 nuts.
 - Tighten to 6 Nm (53 lb-in).
7. Attach the crankcase ventilation tube to the valve cover.
8. Install the LH ignition coil-on-plugs. For additional information, refer to **ENGINE IGNITION** article.

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VALVE COVER - RH

Material

Item	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

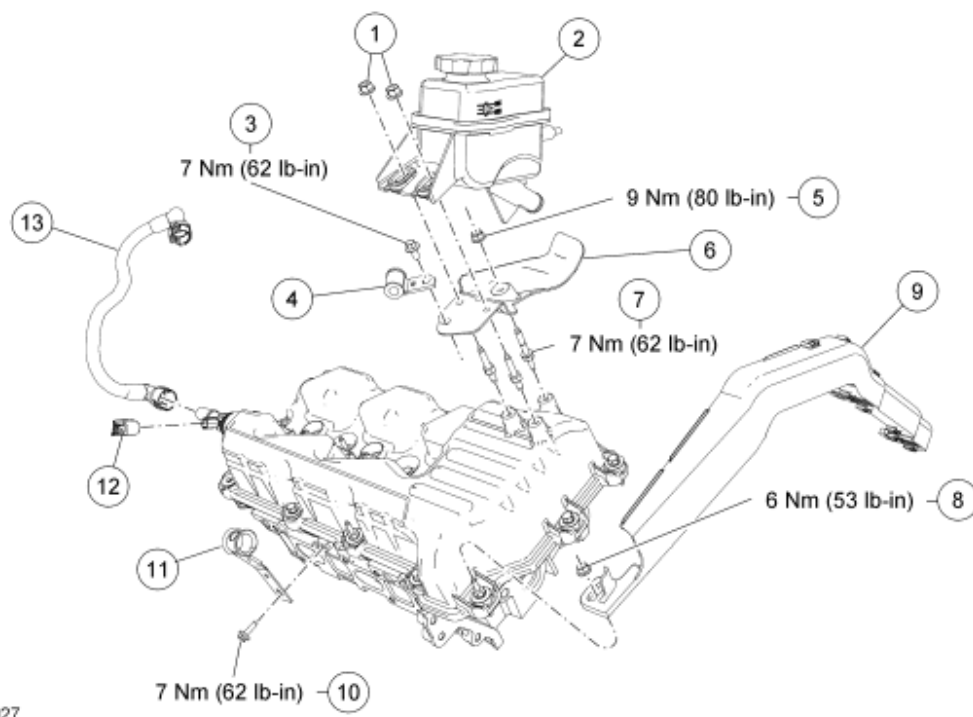


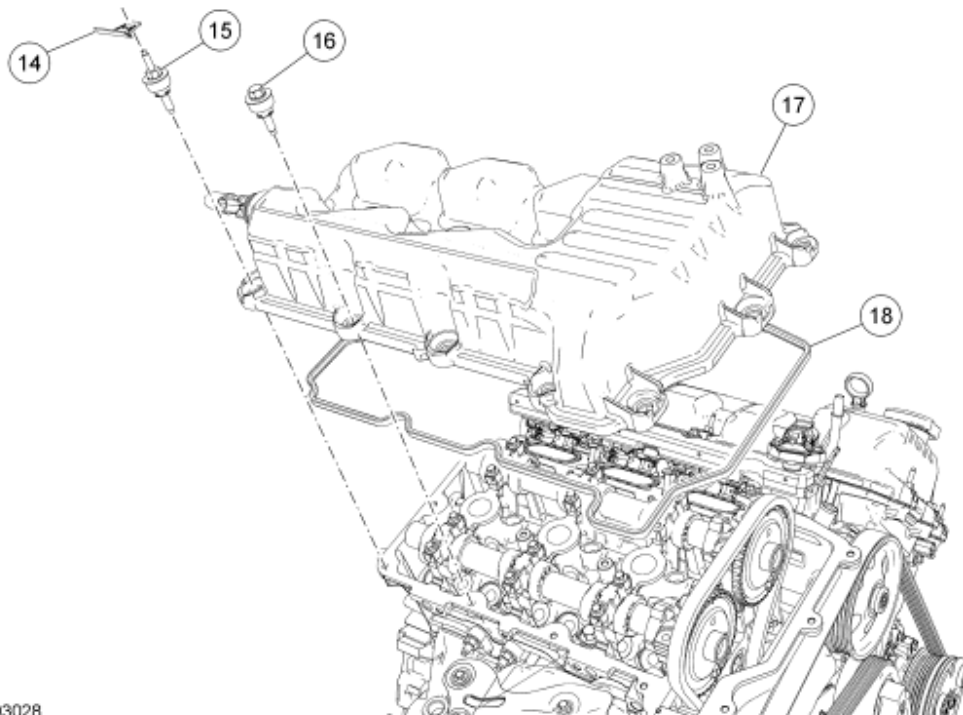
Fig. 12: Exploded View Of Right Valve Cover Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W520111	Power steering reservoir nuts (2 required)
2	3R700	Power steering fluid reservoir
3	W505251	Power steering pressure (PSP) tube retainer bracket bolt
4	-	PSP tube retainer bracket (part of 3F524)
5	W520111	Power steering fluid reservoir bracket nut
6	3490	Power steering fluid reservoir bracket
7	-	Power steering fluid reservoir bracket stud bolt (3 required) (part of 6582)
8	-	Wiring conduit nut (3 required)
9	-	Wiring conduit (part of 12B637)
10	W655891	PSP tube retainer bracket bolt
11	-	PSP tube retainer bracket (part of 3F524)

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12	14A464	Positive crankcase ventilation (PCV) valve electrical connector (part of 12B637)
13	6K817	PCV tube



N0003028

Fig. 13: Exploded View Of Right Valve Cover (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
14	-	Wiring retainer (2 required) (part of 12B637)
15	6C519	Valve cover stud bolt (5 required)
16	6C519	Valve cover bolt (9 required)
17	6582	Valve cover
18	6584	Valve cover gasket

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 ENGINE IGNITION article.

3. If equipped, disconnect the positive crankcase ventilation (PCV) valve electrical connector.
4. Remove the PCV tube.
5. Remove the 2 nuts and position the power steering fluid reservoir aside.
6. Remove the bolt and detach the power steering pressure (PSP) tube bracket from the fluid reservoir bracket.
7. Remove the nut and the power steering fluid reservoir bracket.
8. Remove the 3 power steering fluid reservoir bracket stud bolts from the valve cover.
9. Remove the bolt and detach the PSP tube bracket from the backside of the RH cylinder head.
10. Remove the 3 nuts and detach the wiring conduit from the valve cover stud bolts.
11. Detach the 2 wiring retainers from the valve cover stud bolts.
12. Remove the 9 bolts, 5 stud bolts and the RH valve cover.
 - Remove and discard the gasket.

INSTALLATION

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

1. Clean the valve cover, cylinder head and front cover sealing surfaces.

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.

NOTE: Install a new gasket in the valve cover.

3. Position the valve cover and install the 9 bolts and 5 stud bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

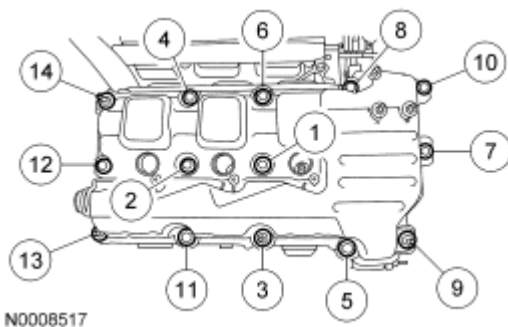
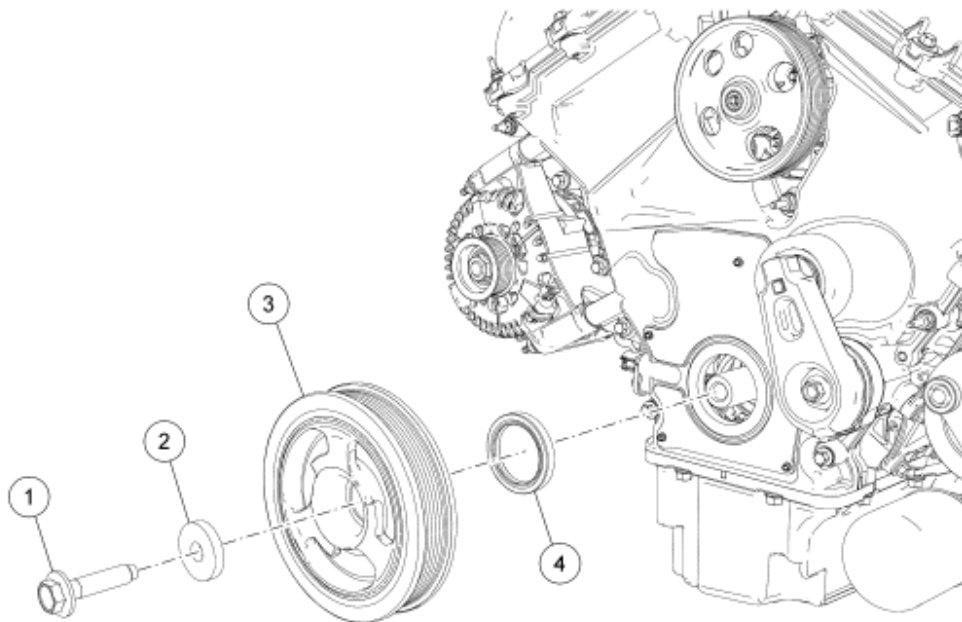


Fig. 14: Identifying Right Valve Cover Bolts Tightening Sequence

Courtesy of FORD MOTOR CO.

4. Attach the 2 wiring retainers to the valve cover stud bolts.
5. Attach the wiring conduit to the valve cover stud bolts and install the 3 nuts.
 - Tighten to 6 Nm (53 lb-in).
6. Position the PSP tube bracket to the backside of the RH cylinder head and install the bolt.
 - Tighten to 7 Nm (62 lb-in).
7. Install the 3 power steering fluid reservoir bracket stud bolts into the valve cover.
 - Tighten to 7 Nm (62 lb-in).
8. Position the power steering fluid reservoir bracket and install the nut.
 - Tighten to 9 Nm (80 lb-in).
9. Position the PSP tube bracket and install the bolt.
 - Tighten to 7 Nm (62 lb-in).
10. Position the power steering fluid reservoir and install the 2 nuts.
 - Tighten to 9 Nm (80 lb-in).
11. Install the PCV tube.
12. If equipped, connect the PCV valve electrical connector.
13. Install the RH ignition coil-on-plugs. For additional information, refer to **ENGINE IGNITION** article.
14. Install the upper intake manifold. For additional information, refer to **Upper Intake Manifold**.

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

N0001812

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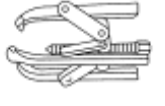
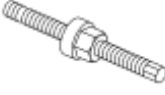
Fig. 15: Exploded View Of Crankshaft Pulley & Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701512-S	Crankshaft pulley bolt
2	W701511-S	Washer
3	6316	Crankshaft pulley
4	6700	Crankshaft front seal

1. For additional information, refer to the following procedures.

CRANKSHAFT PULLEY

Special Tools

Illustration	Tool Name	Tool Number
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A)
 ST1184-A	3 Jaw Puller	303-D121
 ST1287-A	Replacer, Crankshaft Damper	303-102 (T74P-6316-B)
 ST2296-A	Installer, Front Cover Seal	303-335 (T88T-6701-A)

Material

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

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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 AND LIFTING** article.
2. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.
3. Remove the pin-type retainers and the RH fender splash shield.
4. Use the special tool to hold the crankshaft pulley and remove the crankshaft pulley bolt.

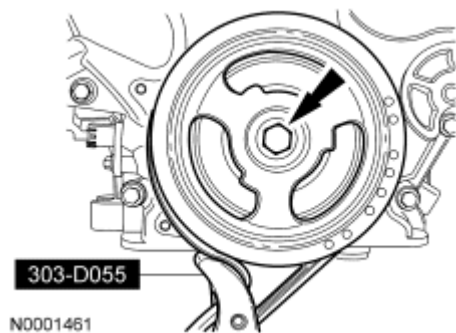


Fig. 16: Identifying Crankshaft Pulley Bolt & Special Tools
Courtesy of FORD MOTOR CO.

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

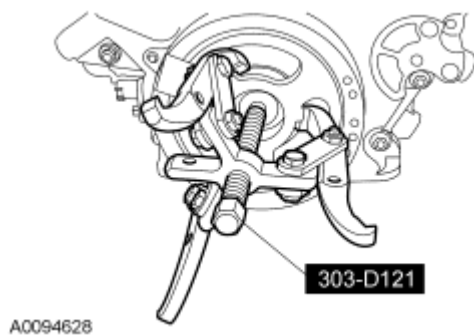


Fig. 17: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

INSTALLATION

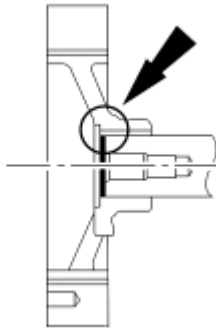
1. Lubricate the front cover and the crankshaft front seal inner lip with clean engine oil.

NOTE: Clean the keyway and slot using metal surface cleaner before applying

silicone gasket and sealer.

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

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

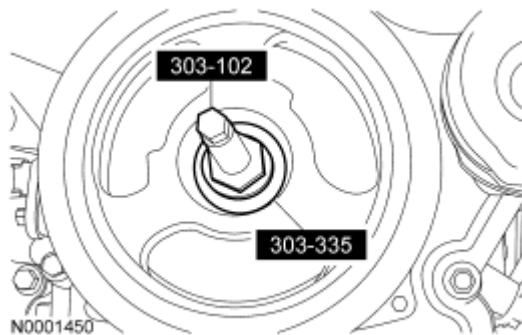


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Fig. 18: Applying Silicone Gasket And Sealant
Courtesy of FORD MOTOR CO.

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

3. Using the special tool, install the crankshaft pulley.



N0001450

Fig. 19: Installing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

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 Nm (89 lb-ft).
 - Stage 2: Loosen one full turn.
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

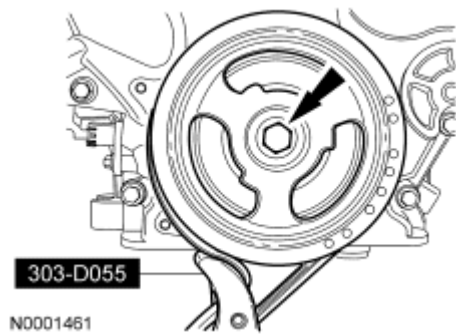


Fig. 20: Identifying Crankshaft Pulley Bolt & Special Tools
Courtesy of FORD MOTOR CO.

5. Position the RH fender splash shield and install the pin-type retainers.
6. Install the accessory drive belt. For additional information, refer to [ACCESSORY DRIVE](#) article.

CRANKSHAFT FRONT SEAL

Special Tools

Illustration	Tool Name	Tool Number
	Replacer, Crankshaft Damper	303-102 (T74P-6316-B)
	Installer, Front Cover Oil Seal	303-335 (T88T-6701-A)
	Remover, Oil Seal	303-409 (T92C-6700-CH)

Material

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	WSS-M2C930-A

(Canada); or equivalent

REMOVAL

1. Remove the crankshaft pulley. For additional information, refer to **Crankshaft Pulley**.

CAUTION: Do not scratch or damage the sealing surfaces when using the special tool to remove the crankshaft front oil seal.

2. Using the special tool, remove the crankshaft front oil seal and discard.

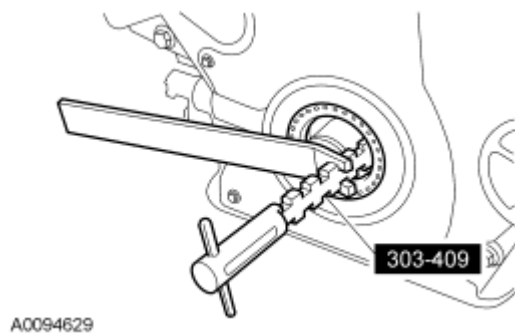


Fig. 21: Removing Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

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 the crankshaft front oil seal.

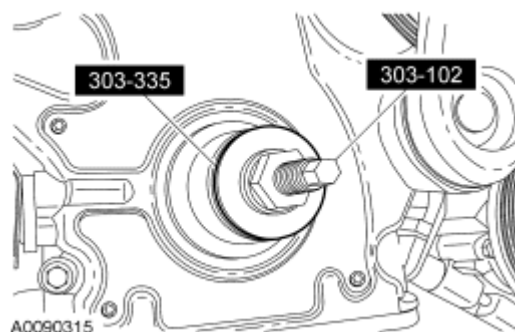
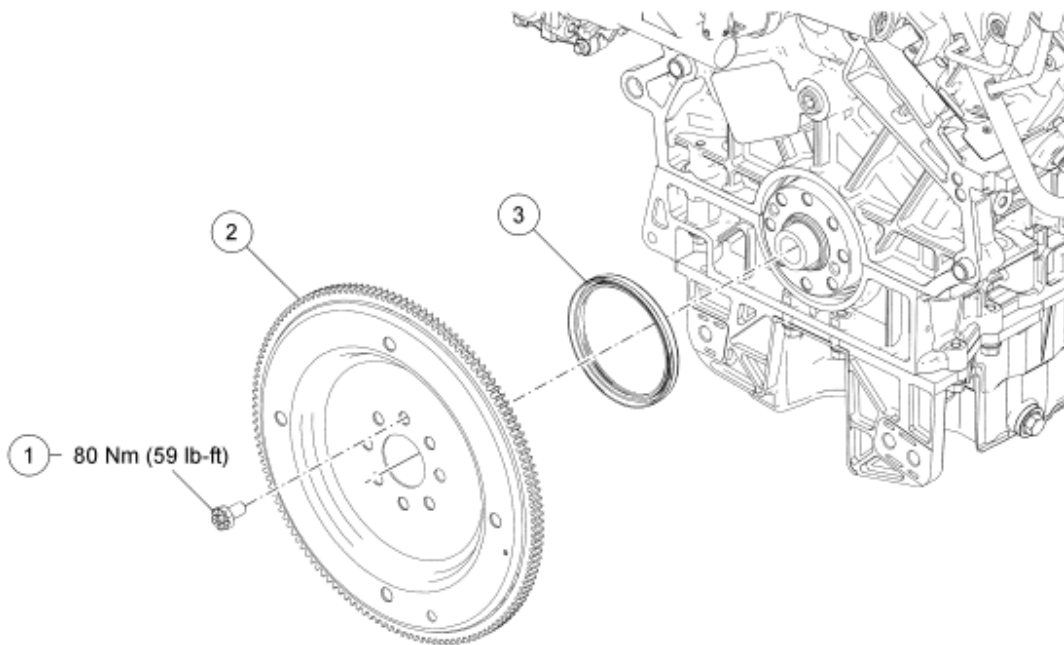


Fig. 22: Installing Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

3. Install the crankshaft pulley. For additional information, refer to **Crankshaft Pulley**.

LOWER END COMPONENTS - EXPLODED VIEW, FLEXPLATE AND CRANKSHAFT REAR SEAL



N0000285

Fig. 23: Exploded View Of Flexplate & Crankshaft Rear Seal (With Torque Specifications)
Courtesy of FORD MOTOR CO.

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

1. For additional information, refer to the following procedures.

FLEXPLATE

REMOVAL AND INSTALLATION

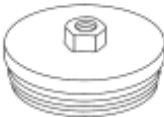
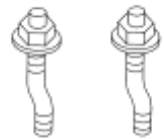
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the transaxle. For additional information, refer to **AUTOMATIC TRANSAXLE/TRANSMISSION - CONTINUOUSLY VARIABLE TRANSMISSION (CVT)** article or **AUTOMATIC TRANSAXLE/TRANSMISSION - 6 SPEED** article.
3. Remove the bolts and the flexplate.
 - To install, tighten to 80 Nm (59 lb-ft).
4. To install, reverse the removal procedure.

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CRANKSHAFT REAR SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST1187-A	Slide Hammer	307-005 (T59L-100-B)
 ST1382-A	Remover, Crankshaft Rear Seal	303-519 (T95P-6701-EH)
 ST1327-A	Installer, Crankshaft Rear Main Oil Seal	303-178 (T82L-6701-A)
 ST1333-A	Installer Bolts, Crankshaft Rear Main Oil Seal	303-384 (T91P-6701-A)

Material

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada): or equivalent	WSS-M2C930-A
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 AND LIFTING** article.
2. Remove the flexplate. For additional information, refer to **Flexplate**.
3. Using the special tools, remove the crankshaft rear oil seal and discard.

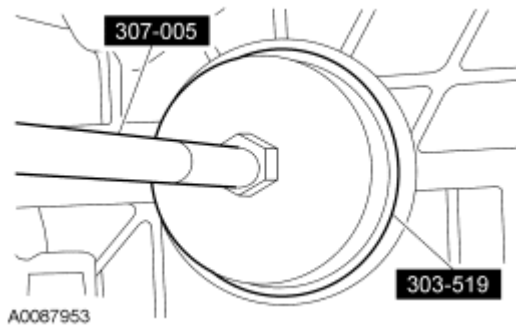


Fig. 24: Removing Rear Crankshaft Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Clean all sealing surfaces with metal surface cleaner.

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

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

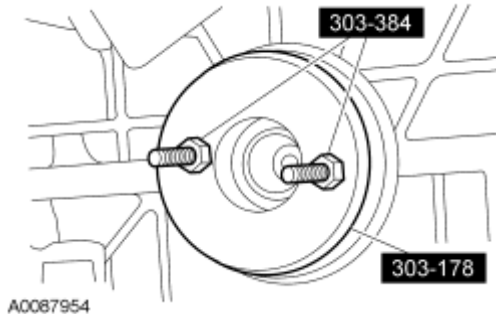


Fig. 25: Installing Crankshaft Rear Oil Seal
Courtesy of FORD MOTOR CO.

ENGINE FRONT COVER

Material

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

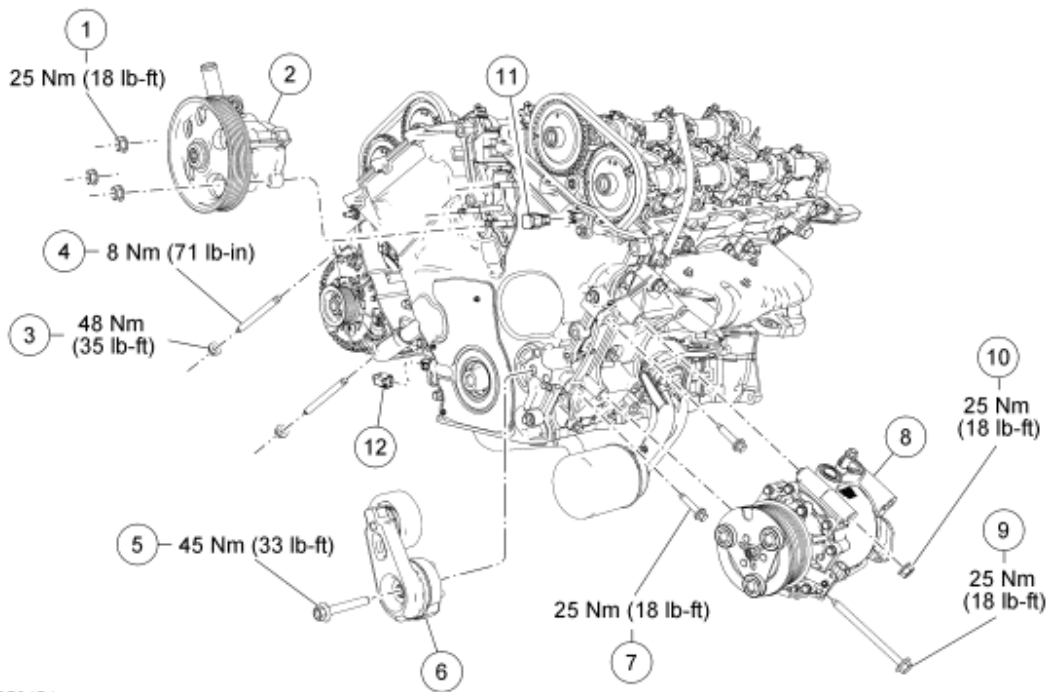
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Motorcraft Metal Surface Prep
ZC-31

Silicone Gasket and Sealant
TA-30

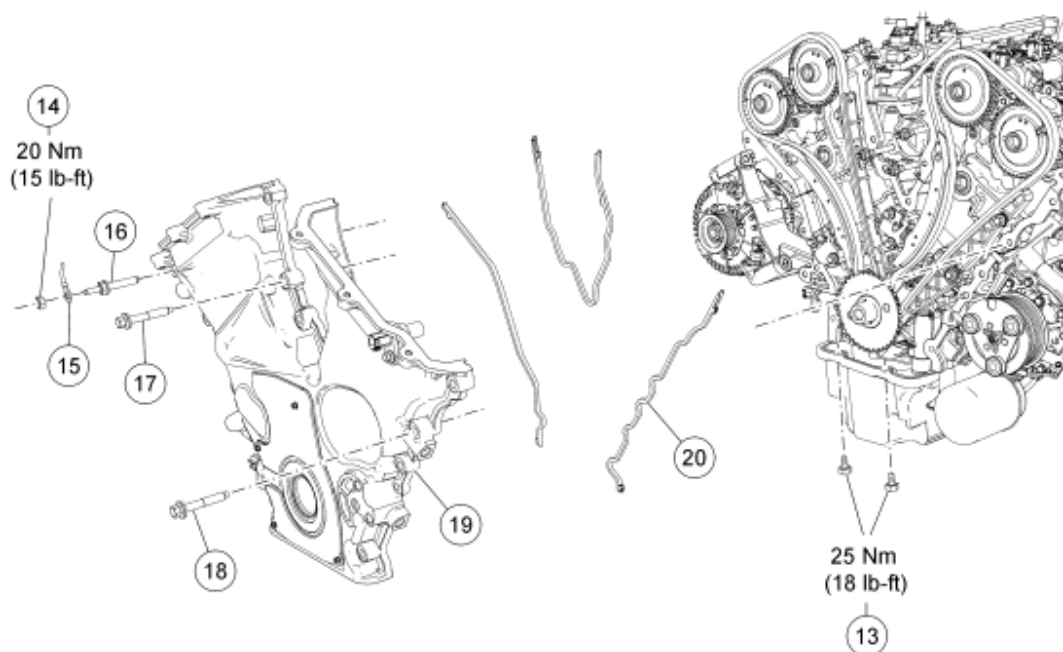
WSE-M4G323-A4



N0050454

Fig. 26: Exploded View Of Accessory Drive Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701582	Power steering pump nut (3 required)
2	3A696	Power steering pump
3	W520414	Generator stud nut (2 required)
4	W709985	Generator stud (2 required)
5	209901	Accessory drive belt tensioner bolt
6	6B209	Accessory drive belt tensioner
7	W701625	A/C compressor bracket bolt (2 required)
8	19D629	A/C compressor
9	W705825	A/C compressor bolt (2 required)
10	W520413	A/C compressor stud nut (2 required)
11	14A464	Camshaft position (CMP) sensor electrical connector (part of 12B637)
12	14A464	Crankshaft position (CKP) sensor electrical connector (part of 12B637)



N0034884

Fig. 27: Exploded View Of Engine Front Cover (With Torque Specifications)

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
13	W709678	Oil pan-to-front cover bolts (2 required)
14	W701525	Engine front cover stud bolt nut
15	-	Ground wire
16	W706213	Engine front cover stud bolt
17	W704961	Engine front cover bolt (8 required)
18	W701525	Engine front cover bolt (7 required)
19	6019	Engine front cover
20	6D081	Engine front cover gasket (3 required)

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 AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the crankshaft front seal. For additional information, refer to **Lower End Components -**

Exploded View, Crankshaft Pulley and Crankshaft Front Seal and Crankshaft Front Seal.

4. Remove the LH and RH valve covers. For additional information, refer to **Valve Cover - LH** and **Valve Cover - RH**.
5. Remove the bolt and the accessory drive belt tensioner.
6. Remove the 3 power steering pump nuts and position the power steering pump and fluid reservoir aside.
7. Disconnect the crankshaft position (CKP) sensor electrical connector.
8. Disconnect the camshaft position (CMP) sensor electrical connector.
9. Remove the 2 generator-to-engine front cover stud nuts.
10. Remove the 2 generator-to-engine front cover studs.
11. Remove the 3 pin-type retainers and the radiator splash shield.
12. Remove the 2 A/C compressor bolts and the 2 A/C compressor nuts.
 - Support the A/C compressor with mechanic's wire.
13. Remove the 2 A/C compressor bracket-to-engine front cover bolts.
14. Remove the nut and detach the ground wire from the engine front cover stud bolt.
15. Remove the 2 oil pan-to-front cover bolts.

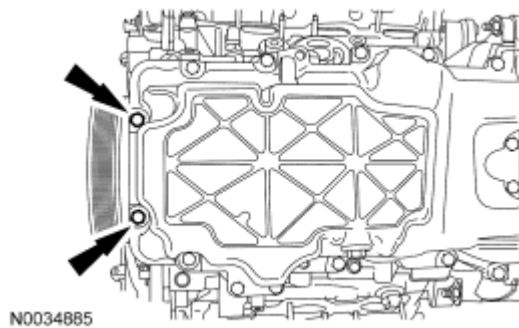


Fig. 28: Locating Oil Pan-To-Front Cover Bolts
Courtesy of FORD MOTOR CO.

16. Remove the 15 bolts, stud bolt 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.

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

1. Use a plastic scraping tool to remove all traces of sealant.
 - Clean all sealing surfaces with silicone gasket remover and metal surface prep.

NOTE: Install 3 new gaskets in the front cover.

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

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.

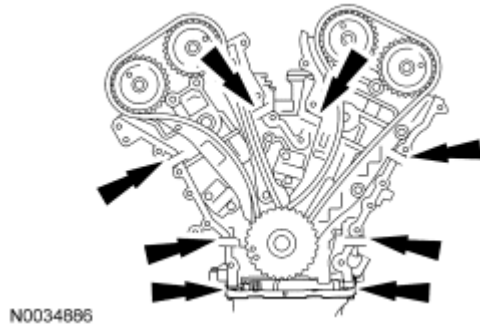


Fig. 29: Identifying Area For Applying Sealant
Courtesy of FORD MOTOR CO.

3. Position the engine front cover and install the 15 bolts and stud bolt.
 - Tighten in the sequence shown to 25 Nm (18 lb-ft).

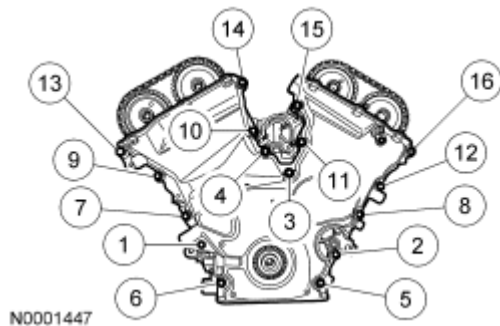


Fig. 30: Identifying Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Install the 2 oil pan-to-front cover bolts.
 - Tighten to 25 Nm (18 lb-ft).

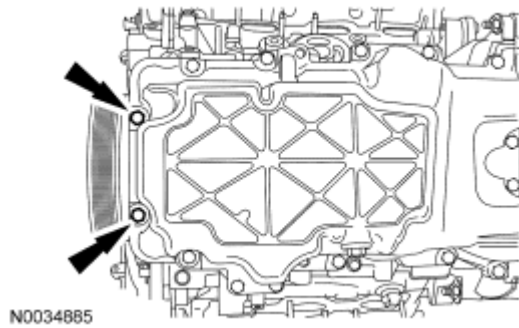


Fig. 31: Locating Oil Pan-To-Front Cover Bolts
Courtesy of FORD MOTOR CO.

5. Remove the oil pan plug and drain the engine oil.
 - Install the plug and tighten to 26 Nm (19 lb-ft).
6. Attach the ground wire to the engine front cover stud bolt and install the nut.
 - Tighten to 20 Nm (15 lb-ft).
7. Install the 2 A/C compressor bracket-to-engine front cover bolts.
 - Tighten to 25 Nm (18 lb-ft).
8. Position the A/C compressor and install the 2 bolts and 2 nuts.
 - Tighten to 25 Nm (18 lb-ft).
9. Position the radiator splash shield and install the 3 pin-type retainers.
10. Install the 2 generator-to-engine front cover studs.
 - Tighten to 8 Nm (71 lb-in).
11. Install the 2 generator-to-engine front cover stud nuts.
 - Tighten to 48 Nm (35 lb-ft).
12. Connect the camshaft position (CMP) sensor electrical connector.
13. Connect the crankshaft position (CKP) sensor electrical connector.
14. Position the power steering pump and fluid reservoir. Install the 3 power steering pump nuts.
 - Tighten to 25 Nm (18 lb-ft).
15. Install the accessory drive belt tensioner and the bolt.
 - Tighten to 45 Nm (33 lb-ft).
16. Install the LH and RH valve covers. For additional information, refer to **Valve Cover - LH** and **Valve Cover - RH**.
17. Install the crankshaft front seal. For additional information, refer to **Lower End Components - Exploded View, Crankshaft Pulley and Crankshaft Front Seal** and **Crankshaft Front Seal**.
18. Fill the engine with clean engine oil.
19. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

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.

CAUTION: 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).

2. Remove the ignition pulse wheel.

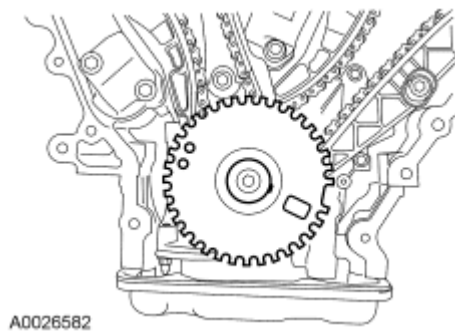


Fig. 32: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

3. Install the damper bolt.

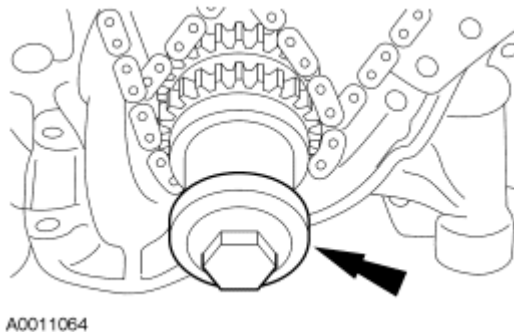


Fig. 33: Identifying Damper Bolt
Courtesy of FORD MOTOR CO.

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 No. 1 cylinder at top dead center (TDC).
 - Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.

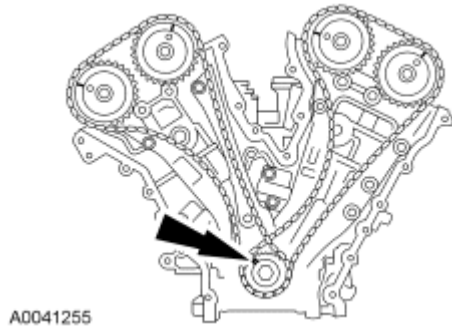


Fig. 34: Identifying Crankshaft Keyway In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

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

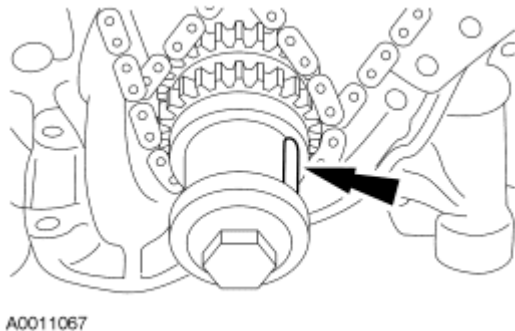


Fig. 35: Identifying Crankshaft Keyway
Courtesy of FORD MOTOR CO.

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

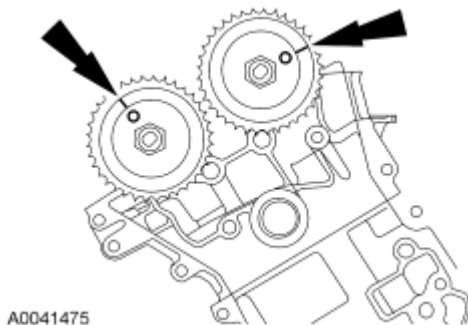


Fig. 36: Locating Camshafts Align Marks
Courtesy of FORD MOTOR CO.

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

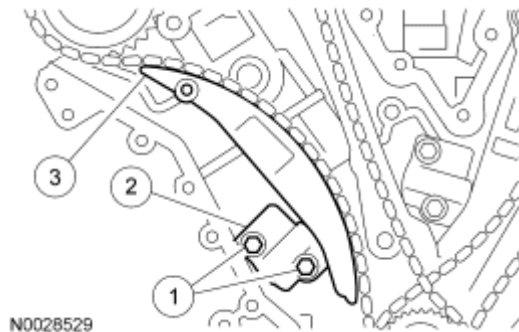


Fig. 37: Identifying RH Timing Chain Tensioner Arm & Bolts
Courtesy of FORD MOTOR CO.

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

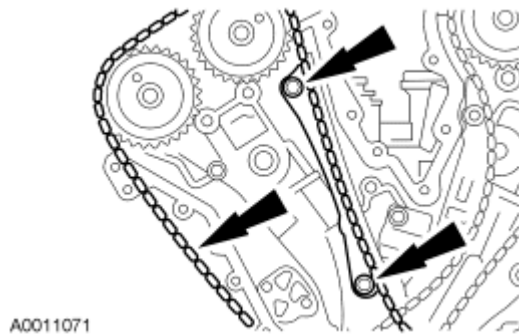
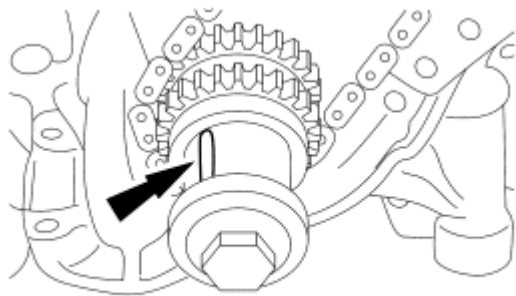


Fig. 38: Locating Timing Chain Guide & Bolts
Courtesy of FORD MOTOR CO.

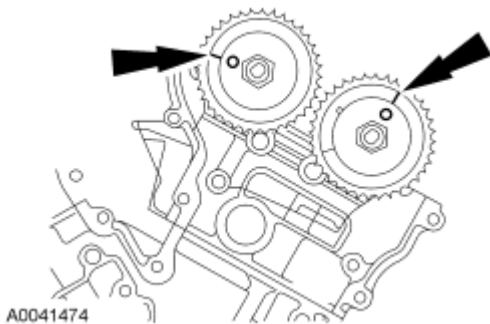
10. Rotate the crankcase clockwise 600 degrees (1-2/3 turns) to position the crankcase keyway in the 11 o'clock position. This will position the LH camshafts in the neutral position.



A0011072

Fig. 39: Positioning Crankcase Key Way In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

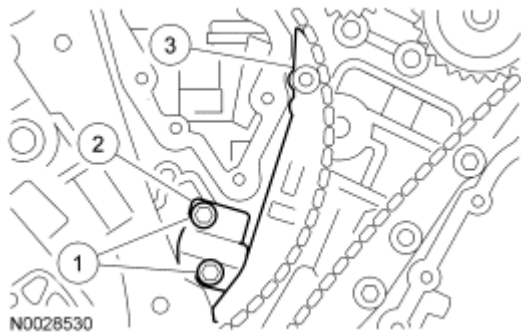
11. Verify the LH camshafts are in the neutral position.



A0041474

Fig. 40: 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. 41: Identifying LH Timing Chain & Tensioner Arm Bolt
Courtesy of FORD MOTOR CO.

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

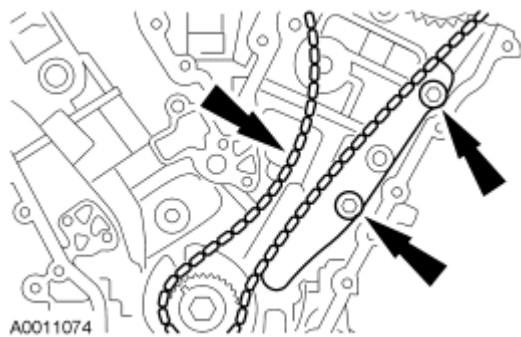


Fig. 42: Locating Timing Chain & Timing Chain Guide
Courtesy of FORD MOTOR CO.

14. Remove the damper bolt and the crankshaft sprocket.

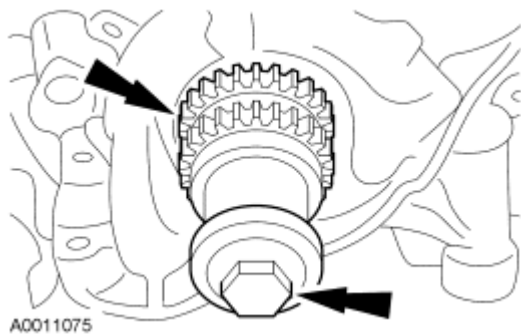


Fig. 43: Locating Damper Bolt & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

INSTALLATION

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

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

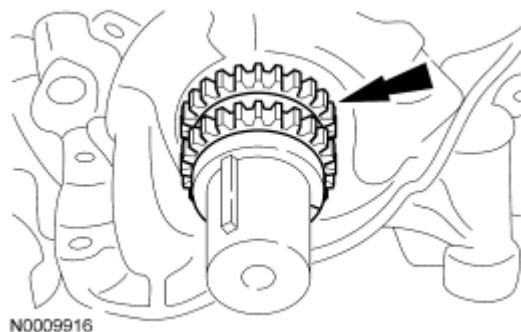


Fig. 44: Locating Crankshaft Sprocket With Timing Marks Out
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

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

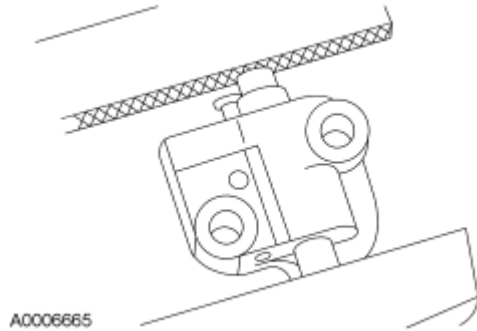


Fig. 45: Identifying Chain Tensioner In Soft-Jawed Vise
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

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

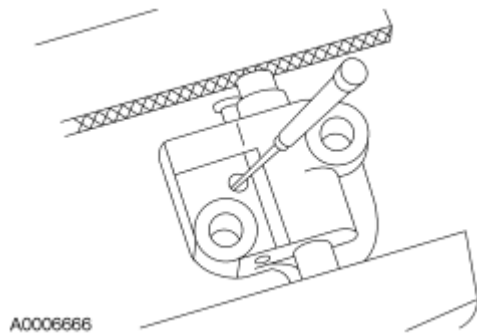


Fig. 46: Holding Chain Tensioner Ratchet Lock Mechanism Away From Ratchet Stem
Courtesy of FORD MOTOR CO.

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.

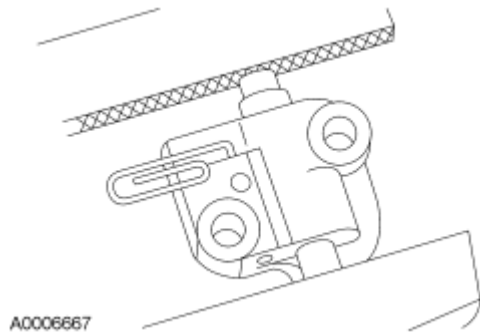


Fig. 47: Retaining Tensioner Piston With 1.5-mm (0.06-in) Wire Or Paper Clip
Courtesy of FORD MOTOR CO.

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.

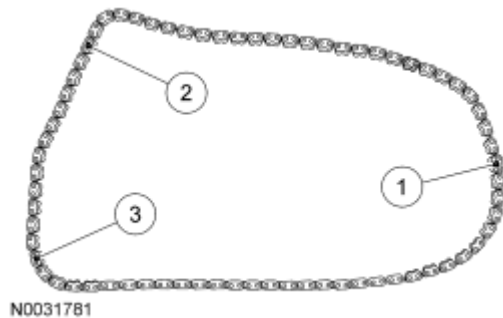


Fig. 48: Locating Crankshaft & Camshaft Timing Marks On LH & RH Timing Chains
Courtesy of FORD MOTOR CO.

7. Verify that the LH camshafts are correctly positioned.

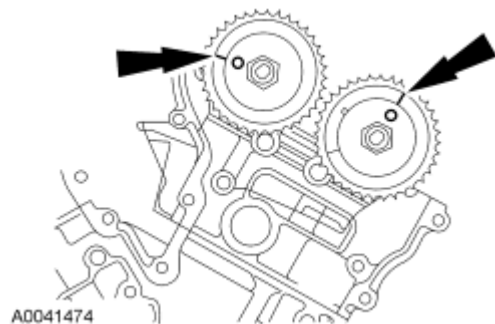


Fig. 49: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

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 Nm (18 lb-ft).

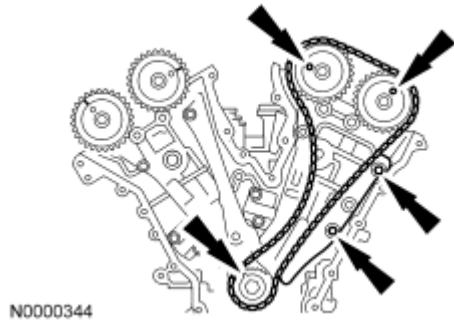


Fig. 50: Aligning Marks On Timing Chain With Marks On Camshaft & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

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

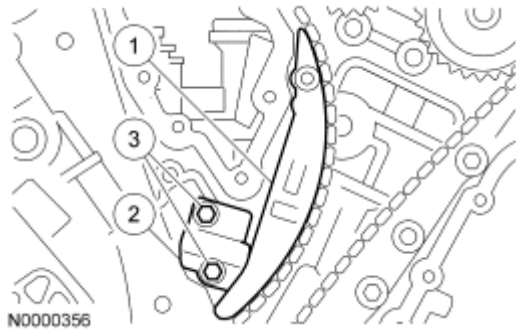


Fig. 51: Identifying Timing Chain Tensioner Arm & Bolts
Courtesy of FORD MOTOR CO.

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

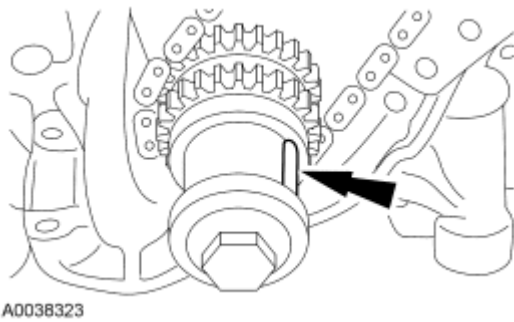


Fig. 52: Locating Crankshaft Keyway
Courtesy of FORD MOTOR CO.

11. Verify that the RH camshafts are correctly positioned.

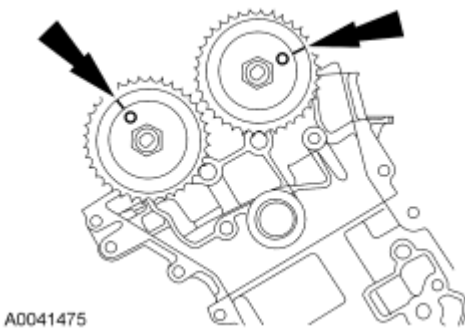


Fig. 53: Locating Camshafts Align Marks
Courtesy of FORD MOTOR CO.

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 Nm (18 lb-ft).

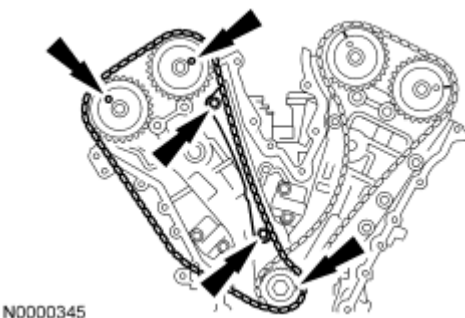


Fig. 54: Aligning Marks On Timing Chain With Marks On Camshaft & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

13. Install the RH timing chain tensioner and tensioner arm.
1. Install the tensioner arm.

2. Position the tensioner.
3. Install the bolts.
4. Tighten to 25 Nm (18 lb-ft).

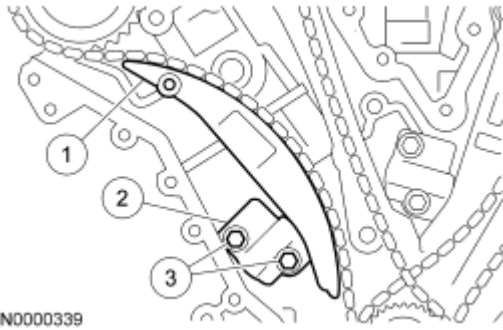
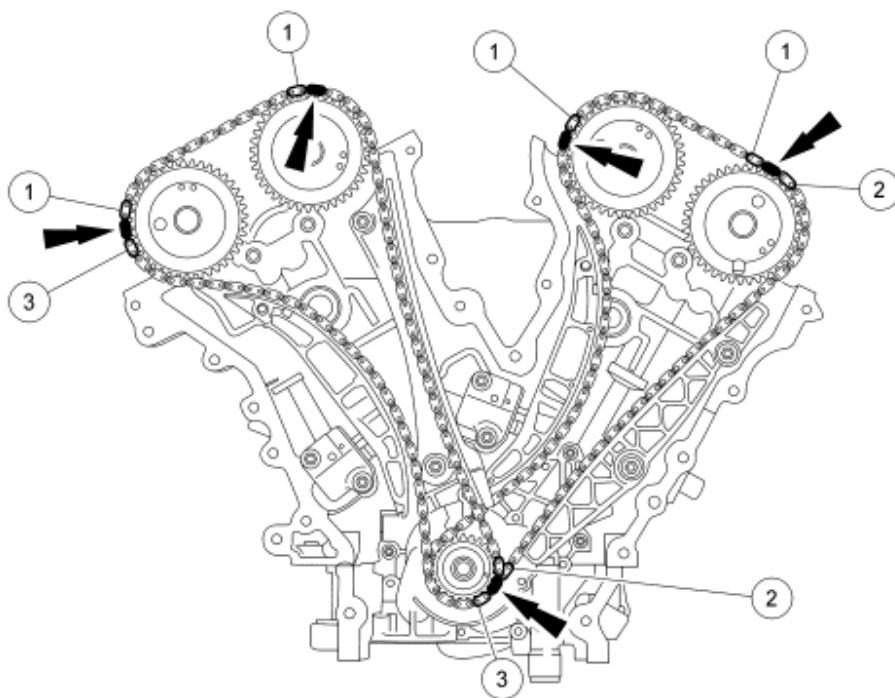


Fig. 55: Identifying Tensioner Arm, Tensioner & Bolts
Courtesy of FORD MOTOR CO.

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.

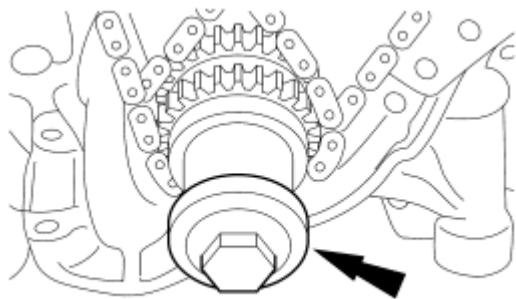
16. Verify the timing with the following steps.
 1. There should be 12 chain links between the camshaft timing marks.
 2. There should be 27 chain links between the camshaft and the crankshaft timing marks.
 3. There should be 30 chain links between the camshaft and the crankshaft timing marks.



N0031782

Fig. 56: Checking Chain Links Timing Marks
Courtesy of FORD MOTOR CO.

17. Remove the crankshaft damper bolt.



A0011064

Fig. 57: 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).

18. Install the ignition pulse wheel.

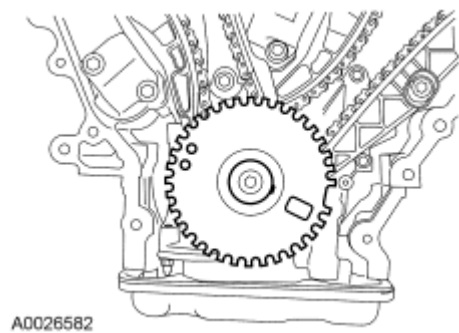


Fig. 58: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

19. Install the LH and RH spark plugs.
 - Tighten to 15 Nm (11 lb-ft).
20. Install the engine front cover. For additional information, refer to **Engine Front Cover**.

VALVE TRAIN COMPONENTS - EXPLODED VIEW

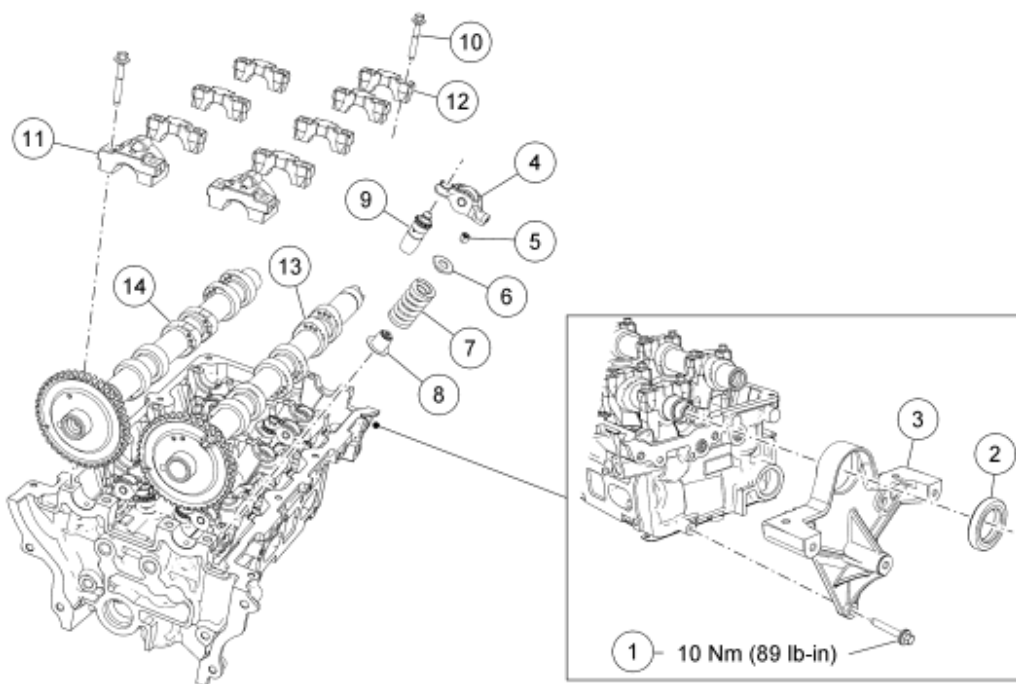


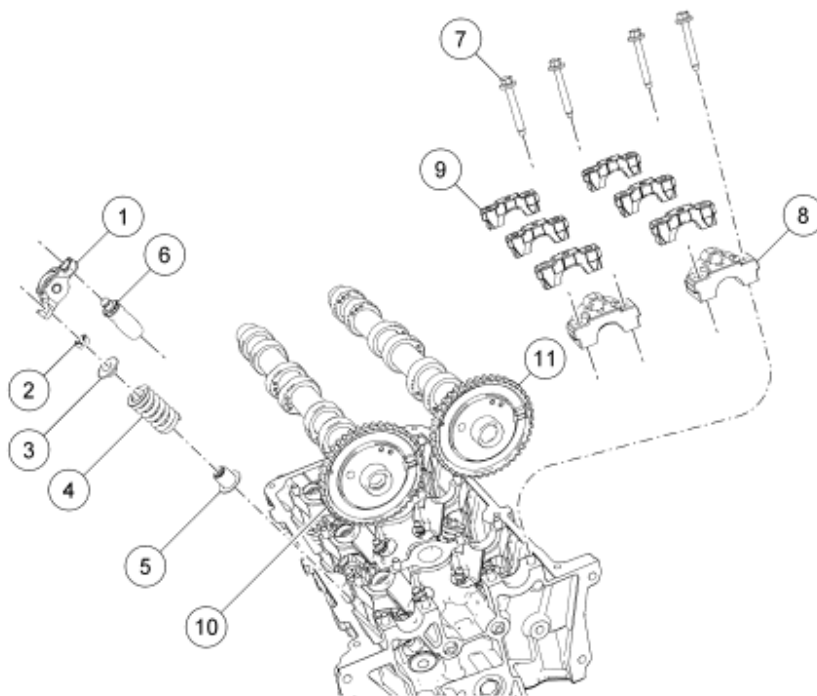
Fig. 59: Exploded View Of Left Valve Train Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W503280	Camshaft oil seal retainer bolt (3 required)
2	6K292	Camshaft oil seal

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego

3	6B294	Camshaft oil seal retainer
4	6529	Roller follower
5	6518	Valve spring retainer key
6	6514	Valve spring retainer
7	6513	Valve spring
8	6A517	Valve stem seal
9	6C501	Hydraulic lash adjuster
10	W705391-S	Camshaft bearing cap bolt (16 required)
11	6B280	Camshaft bearing thrust cap (2 required)
12	6A258	Camshaft bearing cap (7 required)
13	6A269	Exhaust camshaft
14	6A268	Intake camshaft



N0000290

Fig. 60: Exploded View Of Right Valve Train Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

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

2007 Mercury Montego

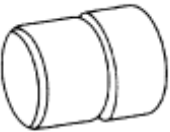
2007 ENGINE Engine - Five Hundred, Freestyle & Montego

7	W705391-S	Camshaft bearing cap bolt (16 required)
8	6B280	Camshaft bearing thrust cap (2 required)
9	6A258	Camshaft bearing cap (6 required)
10	6A267	Exhaust camshaft
11	6A266	Intake camshaft

1. For additional information, refer to the following procedures.

CAMSHAFT - LH

Special Tools

Illustration	Tool Name	Tool Number
 ST2060-A	Protector, Camshaft Oil Seal	303-463 (T94P-6256-AH)
 ST2867-A	Installer, Camshaft Pulley	303-458 (T94P-6312-AH3)
 ST1586-A	Installer, Power Steering Pump Pulley	211-185 (T91P-3A733-A)
 ST1404-A	Installer, Camshaft Oil Seal	303-1139

Material

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

REMOVAL

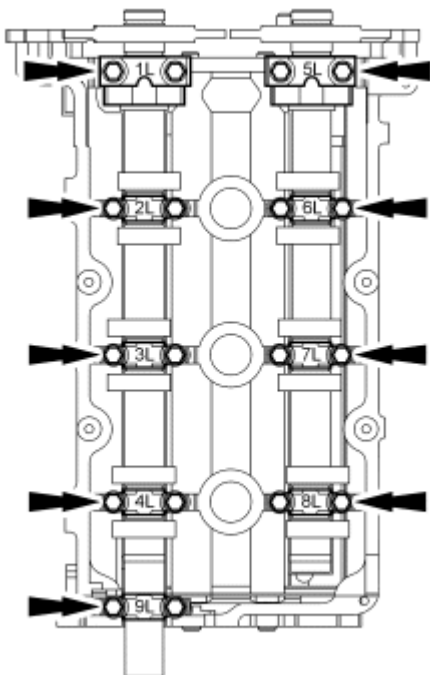
1. Remove the coolant pump. For additional information refer to **ENGINE COOLING** article.
2. Remove the timing drive components. For additional information, refer to **Timing Drive Components**.

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

3. Remove the 3 bolts and the camshaft oil seal retainer.
4. Using a suitable press, remove the camshaft oil seal from the retainer.
 - Discard the camshaft oil seal.

CAUTION: Cylinder head camshaft bearing caps must be assembled in their original positions. Some engines have factory markings on the camshaft bearing caps (as shown in illustration). Engines that do not have the factory markings must be marked for correct position and orientation prior to removal. Failure to install the camshaft bearing caps in their original position may result in severe engine damage.

5. If necessary, mark the camshaft bearing cap position and orientation as shown in the illustration.



N0071869

Fig. 61: Identifying Factory Markings On Left Camshaft Bearing Caps
Courtesy of FORD MOTOR CO.

NOTE: Make sure the camshaft bearing caps are marked as instructed in the previous step.

6. Loosen the LH camshaft bolts evenly in the sequence shown to allow the camshafts to rise from the

cylinder head and remove the camshaft bearing and thrust caps.

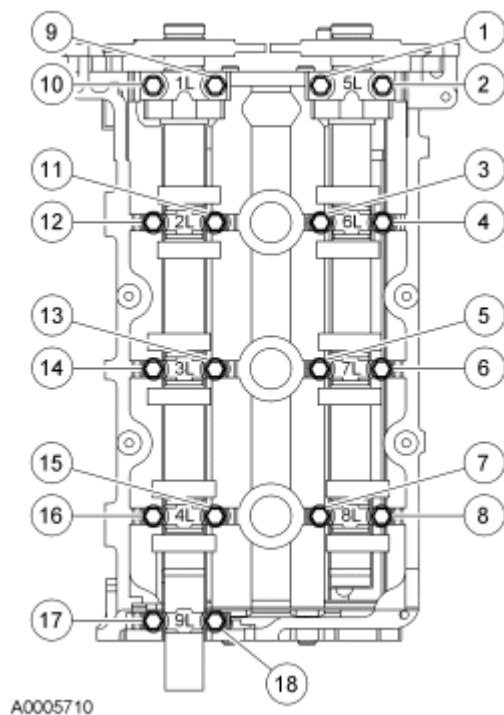


Fig. 62: Identifying Loosening Sequence Of Camshaft Bolts
Courtesy of FORD MOTOR CO.

7. Remove the camshafts from the LH cylinder head.

INSTALLATION

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

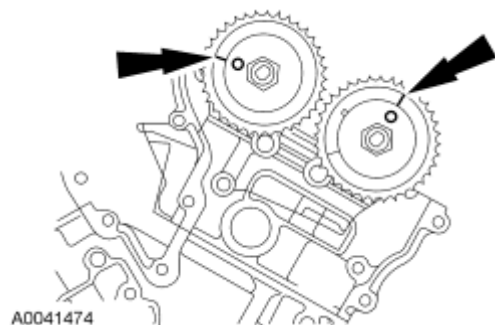


Fig. 63: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

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

damage to the engine may occur.

CAUTION: Do not install the camshaft journal 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.

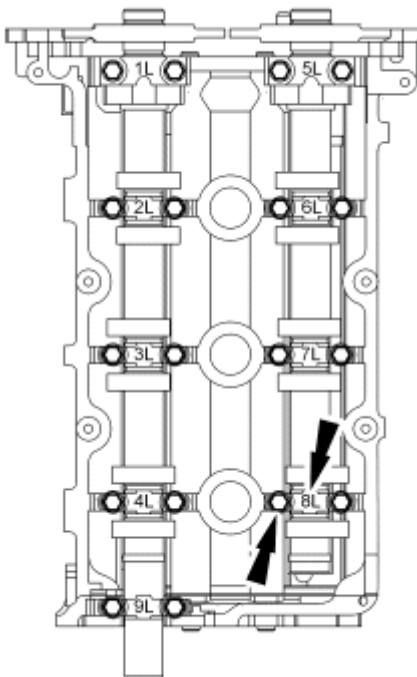


Fig. 64: Identifying Camshaft Bearing Caps Bolts Installing Sequence
Courtesy of FORD MOTOR CO.

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.

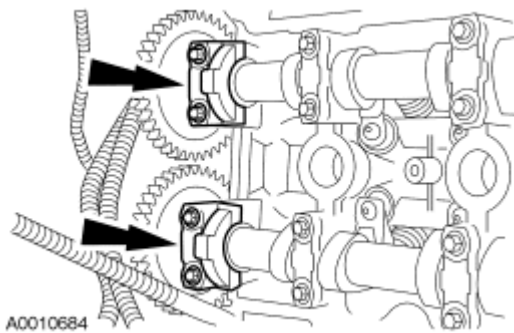


Fig. 65: Locating Camshaft Bearing Thrust Caps
Courtesy of FORD MOTOR CO.

4. Tighten the bolts in the sequence shown to 10 Nm (89 lb-in).

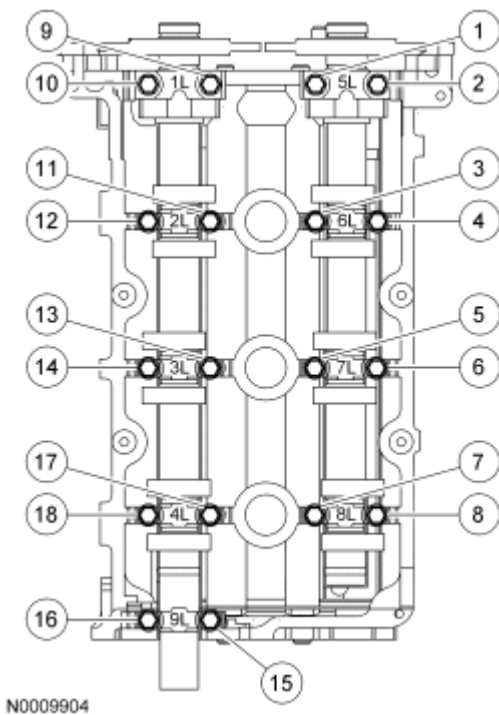


Fig. 66: Identifying Left Camshaft Cap Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

5. Install the camshaft oil seal retainer and the bolts.
 - Tighten to 10 Nm (89 lb-in).

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

6. Position the new camshaft oil seal on the special tool.

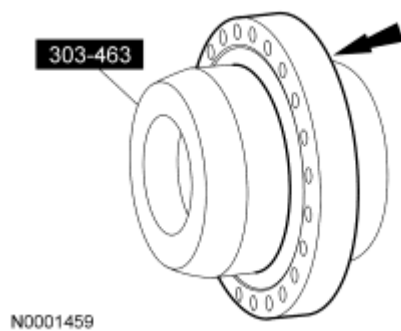


Fig. 67: Locating Camshaft Oil Seal On Special Tool
Courtesy of FORD MOTOR CO.

7. Position the special tool and the camshaft oil seal on the camshaft.

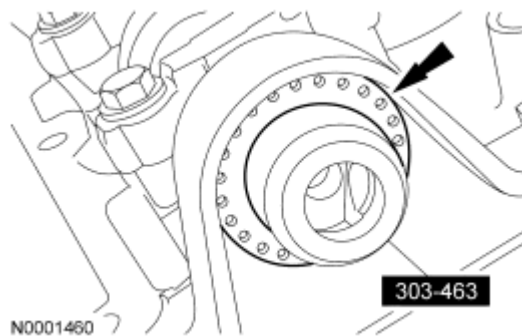


Fig. 68: Positioning Special Tool & Camshaft Oil Seal On Camshaft
Courtesy of FORD MOTOR CO.

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

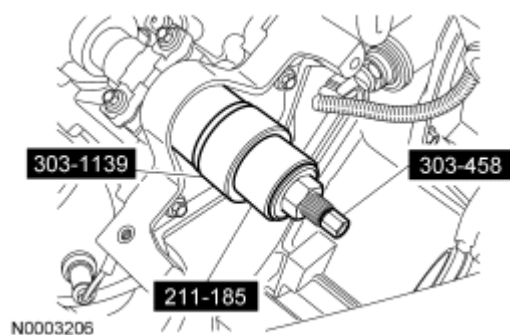


Fig. 69: Installing Camshaft Oil Seal
Courtesy of FORD MOTOR CO.

9. Install the timing drive components. For additional information, refer to **Timing Drive Components**.
10. Install the coolant pump. For additional information, refer to **ENGINE COOLING** article.

CAMSHAFT - RH

Material

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

REMOVAL

1. Remove the timing drive components. For additional information, refer to **Timing Drive Components**.

CAUTION: Cylinder head camshaft bearing caps must be assembled in their original positions. Some engines have factory markings on the camshaft bearing caps (as shown in illustration). Engines that do not have the factory markings must be marked for correct position and orientation prior to removal. Failure to install the camshaft bearing caps in their original position may result in severe engine damage.

2. If necessary, mark the camshaft bearing cap position and orientation as shown in the illustration.

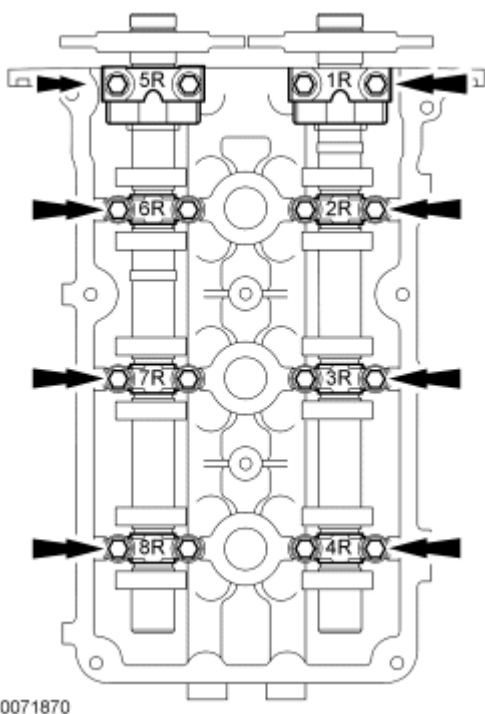
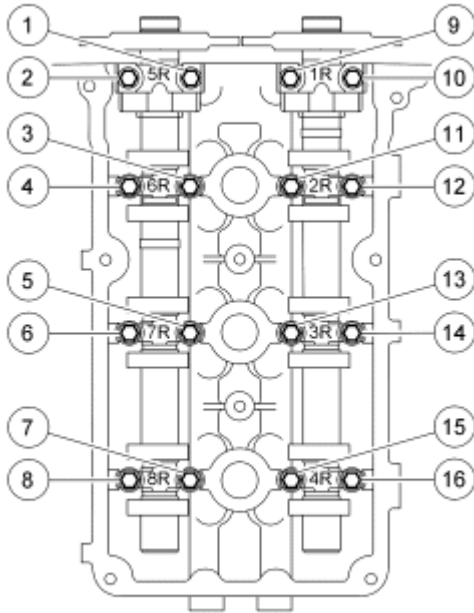


Fig. 70: Identifying Factory Markings On Right Camshaft Bearing Caps
Courtesy of FORD MOTOR CO.

NOTE: Make sure the camshaft bearing caps are marked as instructed in the previous step.

3. Loosen the RH camshaft bolts evenly in the sequence shown to allow the camshafts to rise from the cylinder head and remove the camshaft bearing and thrust caps.



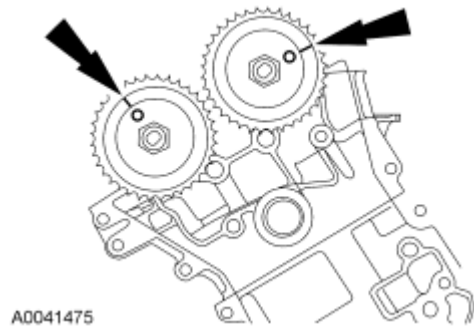
N0008513

Fig. 71: Identifying Right Camshaft Cap Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Remove the camshafts from the RH cylinder heads.

INSTALLATION

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



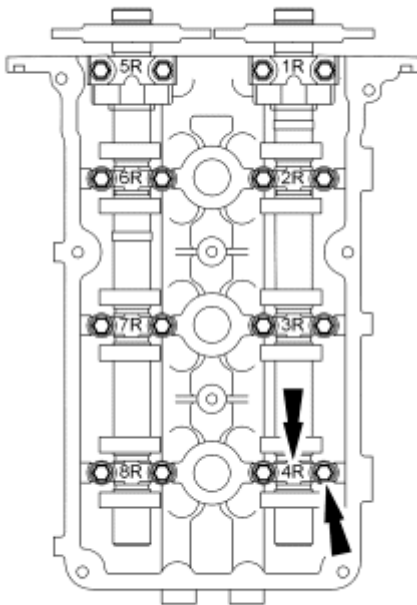
A0041475

Fig. 72: 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.

CAUTION: Do not install the camshaft journal 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.



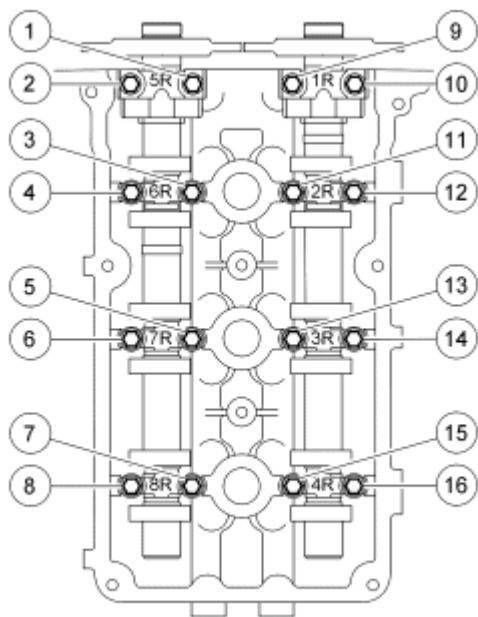
N0008514

Fig. 73: Locating Camshaft Bearing Cap 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.
4. Tighten the bolts in the sequence shown to 10 Nm (89 lb-in).

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N0008513

Fig. 74: Identifying Right Camshaft Cap Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

5. Install the timing drive components. For additional information, refer to [Timing Drive Components](#).

CAMSHAFT ROLLER FOLLOWER

Special Tools

Illustration	Tool Name	Tool Number
 ST1975-A	Compressor, Valve Spring	303-473 (T94P-6565-BH)

Material

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

REMOVAL AND INSTALLATION

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
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 Nm (11 lb-ft).
4. Remove the RH splash shield.
 - To install, tighten to 9 Nm (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.

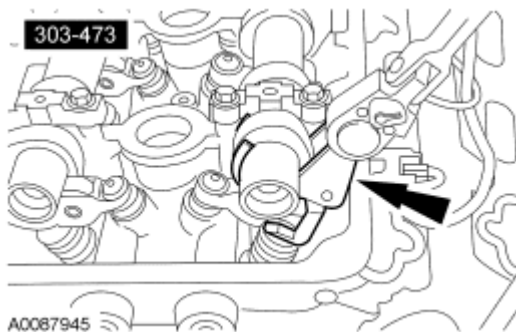


Fig. 75: Removing Roller Followers
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the camshaft followers with clean engine oil.

7. To install, reverse the removal procedure.

HYDRAULIC LASH ADJUSTER

Material

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

REMOVAL AND INSTALLATION

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.

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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

Special Tools

Illustration	Tool Name	Tool Number
 ST1975-A	Compressor, Valve Spring	303-473 (T94P-6565-BH)
 ST1977-A	Installer, Valve Stem Oil Seal	303-470 (T94P-6510-CH)

Material

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

REMOVAL

1. Remove the 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. 76: Identifying Special Tool (303-473)
Courtesy of FORD MOTOR CO.

NOTE: Camshaft removed for clarity.

4. Remove the valve seal.

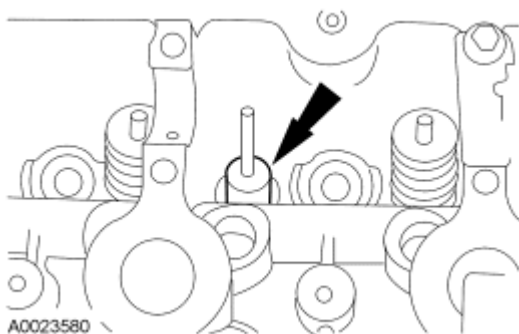


Fig. 77: Removing Valve Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Lubricate the valve guide with clean engine oil.

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

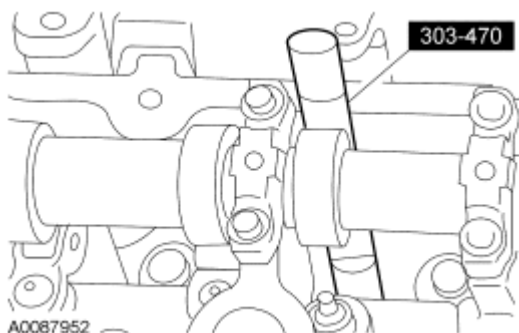


Fig. 78: Installing Valve Seal

Courtesy of FORD MOTOR CO.

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



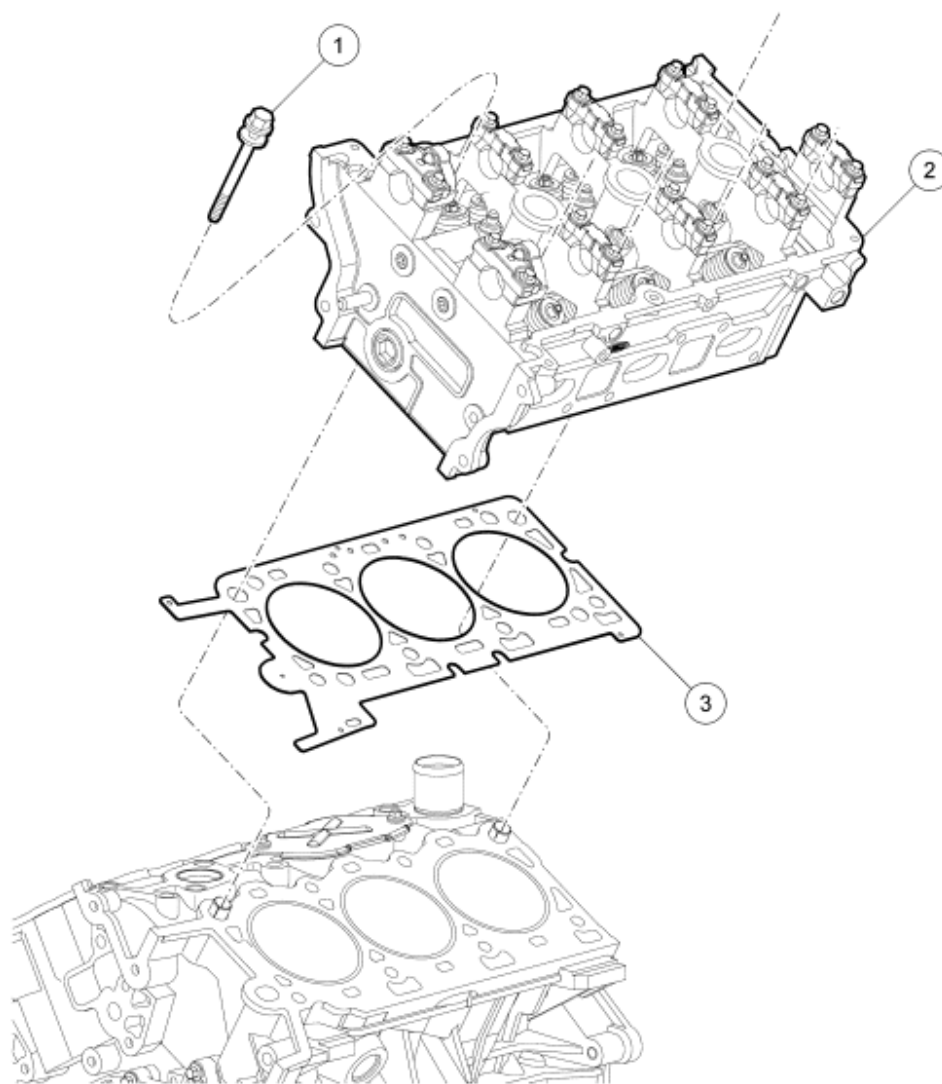
Fig. 79: Identifying Special Tool (303-473)
Courtesy of FORD MOTOR CO.

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

CYLINDER HEAD - LH

Material

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



N0001533

Fig. 80: Exploded View Of Left Cylinder Head
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6065	Cylinder head bolt (8 required)
2	6050	Cylinder head assembly
3	6051	Cylinder head gasket

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 AND LIFTING** article.
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 **ENGINE COOLING** article.
4. Remove the LH camshafts. For additional information, refer to **Camshaft - LH**.
5. Remove the LH exhaust manifold. For additional information, refer to **Exhaust Manifold - LH**.
6. Remove the oil level indicator and tube. For additional information, refer to **Oil Level Indicator and Tube**.

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

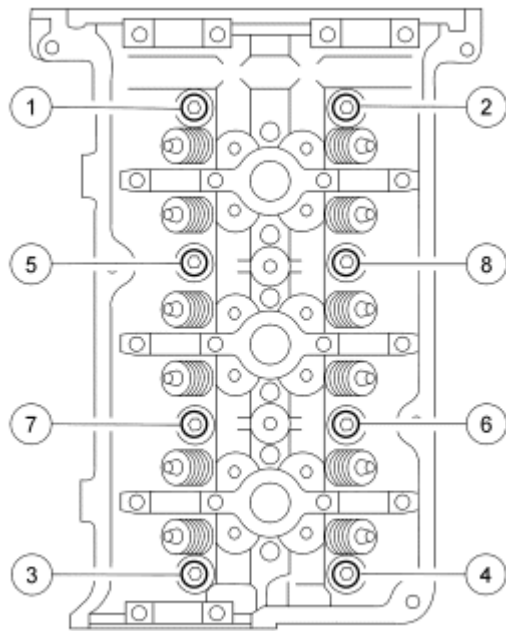
7. Remove the camshaft roller followers.

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

8. Remove the hydraulic lash adjusters.

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

9. Remove the bolts in the sequence shown.



N0001536

Fig. 81: Identifying Loosening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

10. 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.

11. 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 (0.0001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.0001 in).

INSTALLATION

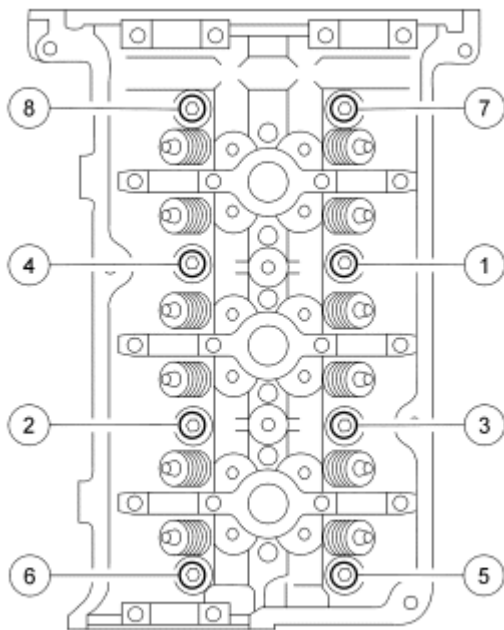
CAUTION: Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths.

1. Use a plastic scraping tool to remove all traces of the head gasket.
 - Clean all surfaces with silicone gasket remover and metal surface prep.
2. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.
3. Position the 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 8 bolts and tighten in 6 stages in the sequence shown.

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



N0001535

Fig. 82: Identifying Tightening Sequence Of Cylinder Head 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.

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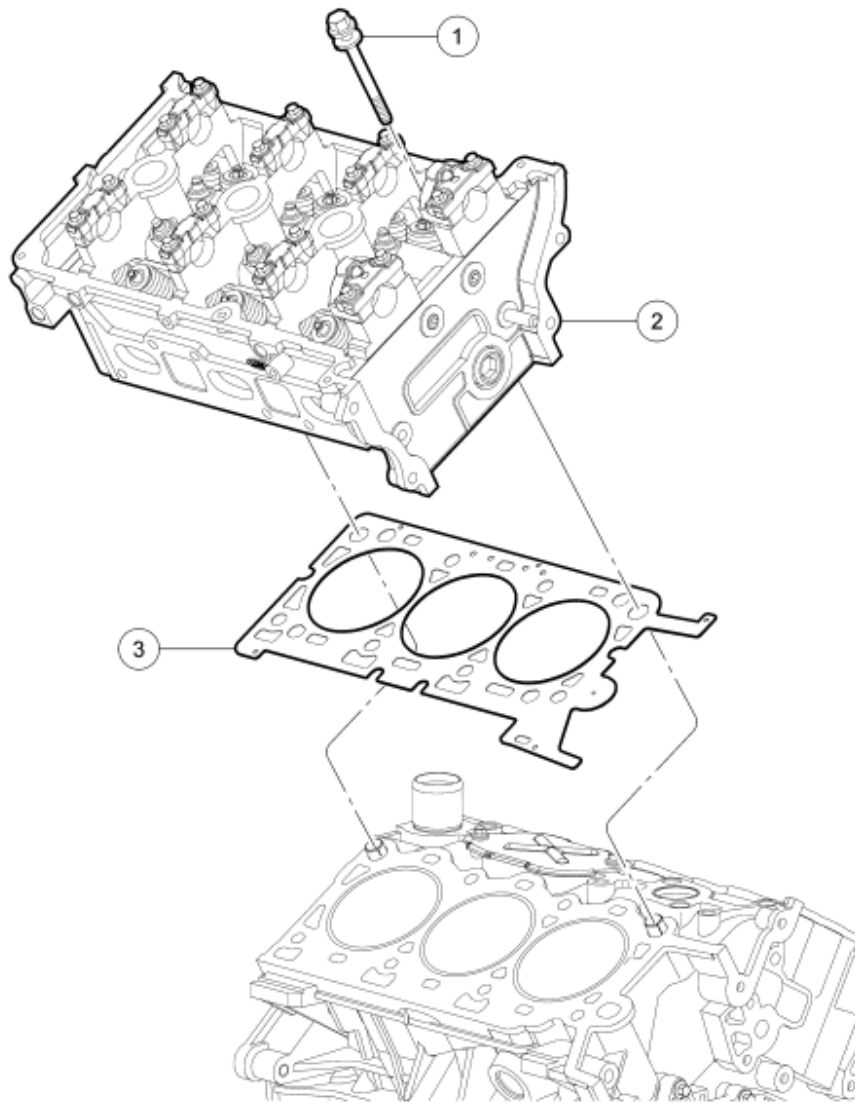
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6. Install the camshaft roller followers.
 - Lubricate the camshaft roller followers with clean engine oil.
7. Install the oil level indicator and tube. For additional information, refer to **Oil Level Indicator and Tube**.
8. Install the LH exhaust manifold. For additional information, refer to **Exhaust Manifold - LH**.
9. Install the coolant bypass tube. For additional information, refer to **ENGINE COOLING** article.
10. Install the lower intake manifold. For additional information, refer to **Lower Intake Manifold**.

CYLINDER HEAD - RH

Material

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



N0001534

Fig. 83: Exploded View Of Right Cylinder Head
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6065	Cylinder head bolt (8 required)
2	6049	Cylinder head assembly
3	6051	Cylinder head gasket

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 AND LIFTING** article.
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 **ENGINE COOLING** article.
4. Remove the RH camshafts. For additional information, refer to **Camshaft - 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.
 - Remove and discard the gasket.
8. Remove the bolt and detach the power steering pressure tube (PSP) bracket.

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

9. Remove the bolts in the sequence shown.

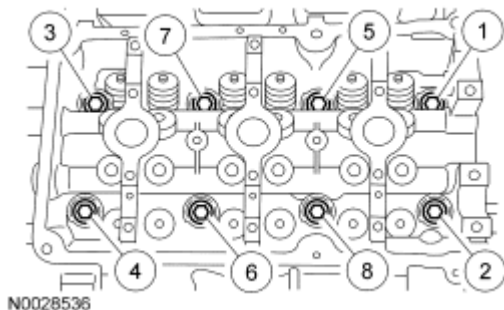


Fig. 84: Identifying Removing Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

10. 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.

11. 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 (0.0001 in) across a 38.1 mm (1.5 in) square area, or scratches more than 0.0254 mm (0.0001 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 gouges which make leak paths.

1. Use a plastic scraping tool to remove all traces of the head gasket.
 - Clean all surfaces with silicone gasket remover and metal surface prep.
2. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.
3. Position the 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 8 bolts and tighten in 6 stages in the sequence shown.
 - Stage 1: Tighten to 40 Nm (30 lb-ft).
 - Stage 2: Tighten 90 degrees.
 - Stage 3: Loosen 1 full turn.
 - Stage 4: Tighten to 40 Nm (30 lb-ft).
 - Stage 5: Tighten 90 degrees.
 - Stage 6: Tighten 90 degrees.

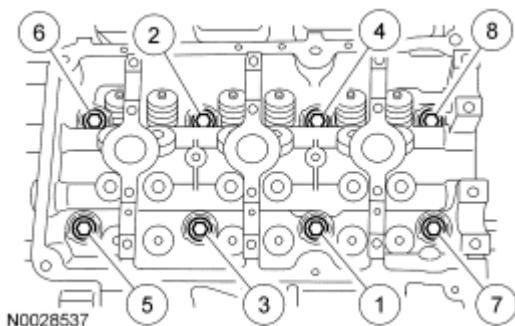


Fig. 85: Identifying Tightening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

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 a new gasket, the RH exhaust manifold and install the 6 nuts.
 - Tighten to 20 Nm (15 lb-ft).

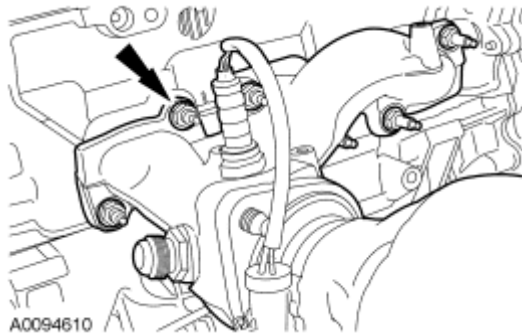


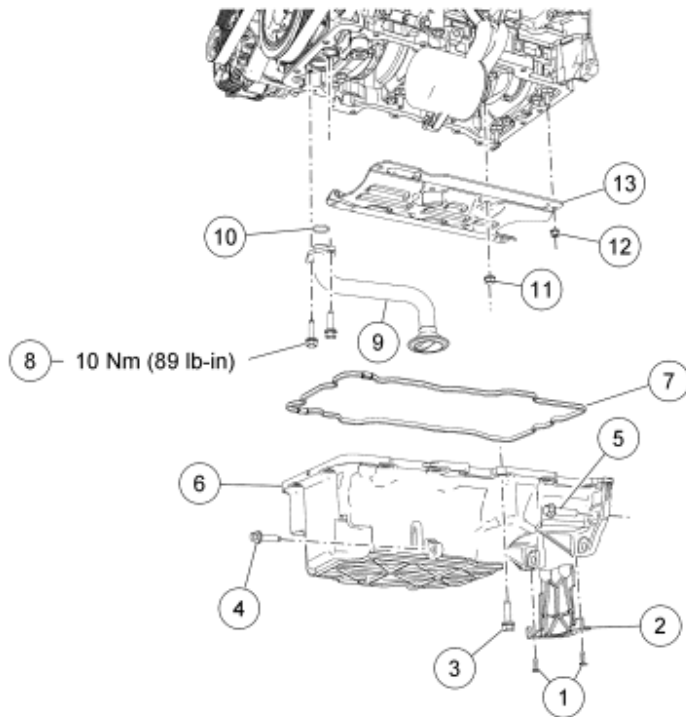
Fig. 86: Locating Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

8. Position the PSP tube bracket and install the bolt.
 - Tighten to 7 Nm (62 lb-in).
9. Install the RH camshafts. For additional information, refer to **Valve Cover - RH**.
10. Install the coolant bypass tube. For additional information, refer to **ENGINE COOLING** article.
11. Install the lower intake manifold. For additional information, refer to **Lower Intake Manifold**.

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

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N0001B11

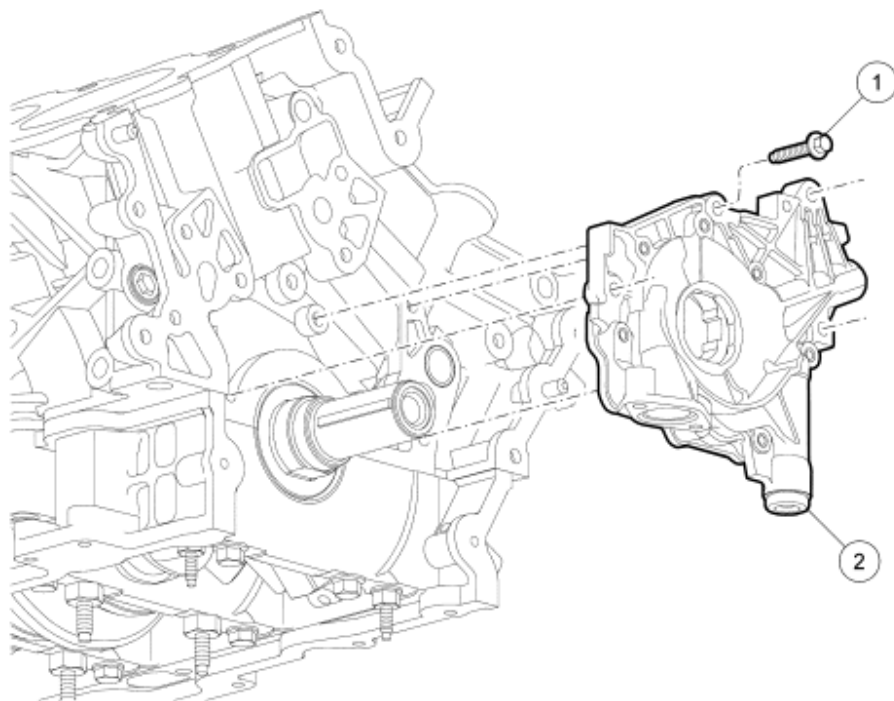
Fig. 87: Exploded View Of Oil Pan, Oil Pump Screen & Pickup Tube, & Oil Pan Baffle (With Torque Specifications)

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N811125	Torque converter lower inspection cover pin-type retainers (2 required)
2	7A828	Torque converter lower inspection cover
3	W709678	Oil pan-to-engine bolt (15 required)
4	W701232	Oil pan-to-oil filter adapter bolt
5	W500121	Oil pan-to-transaxle bolt (2 required)
6	6676	Oil pan
7	6710	Oil pan gasket
8	W709678	Oil pump screen and pickup tube bolt (2 required)
9	6622	Oil pump screen and pickup tube
10	6625	Oil pump screen and pickup tube O-ring seal
11	W701582	Oil pan baffle (M8) nut (4 required)
12	W701542	Oil pan baffle (M6) nut (4 required)
13	6687	Oil pan baffle

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N0000295

Fig. 88: Exploded View Of Oil Pump
Courtesy of FORD MOTOR CO.

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

1. For additional information, refer to the following procedures.

OIL PAN

Material

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Metal Surface 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 AND LIFTING** article.
2. Remove the front catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
3. Remove the 2 bolts and the front catalytic converter bracket.

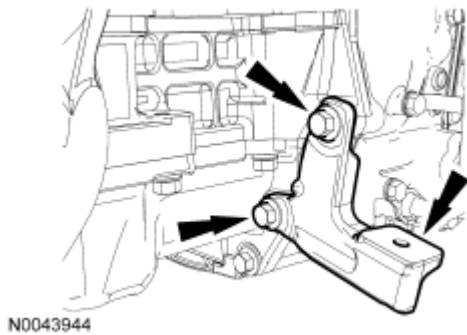


Fig. 89: Locating Front Catalytic Converter Bracket Bolts
Courtesy of FORD MOTOR CO.

4. Drain the engine oil and install the drain plug.
 - Tighten to 26 Nm (19 lb-ft).
5. Remove and discard the oil filter.
6. Remove the torque converter lower inspection cover.
7. Remove the 2 oil pan-to-transaxle bolts.
8. Remove the oil pan-to-oil filter adapter bolt.
9. Remove the 15 bolts and the oil pan.
 - Remove and discard the gasket.

INSTALLATION

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

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

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

2. Apply a 10 mm (0.39 in) diameter dot of silicone sealant to the areas indicated.

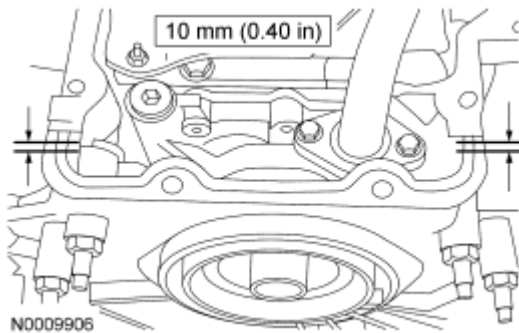


Fig. 90: Applying Silicone Sealant
Courtesy of FORD MOTOR CO.

3. Position the oil pan and a new gasket, and loosely install the bolts and stud bolts.
4. Install the oil pan-to-transaxle bolts.
 - Tighten to 40 Nm (30 lb-ft).
5. Tighten the oil pan-to-engine bolts in the sequence shown to 25 Nm (18 lb-ft).

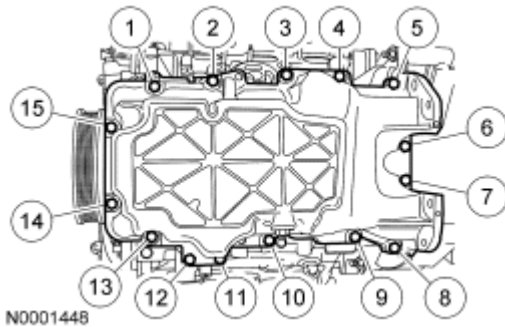


Fig. 91: Identifying Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

6. Install the oil pan-to-oil filter adapter bolt.
 - Tighten to 25 Nm (18 lb-ft).
7. Install a new oil filter.
 - Tighten to 16 Nm (12 lb-ft).
8. Install the front catalytic converter bracket and the 2 bolts.
 - Tighten to 40 Nm (30 lb-ft).

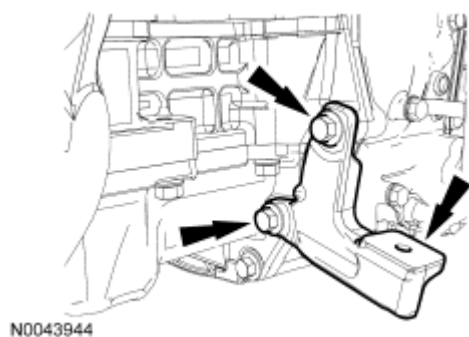


Fig. 92: Locating Front Catalytic Converter Bracket Bolts
Courtesy of FORD MOTOR CO.

9. Install the front catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
10. Fill the engine with clean engine oil.

OIL PUMP SCREEN AND PICKUP TUBE

Material

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

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 AND LIFTING** article.
2. Remove the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan**.
3. Remove the 2 bolts and the oil pump screen and pickup tube.
 - To install, tighten to 10 Nm (89 lb-in).
 - Remove and discard the O-ring seal.

NOTE: Lubricate the new O-ring seal with clean engine oil.

4. To install, reverse the removal procedure.

OIL PAN BAFFLE**REMOVAL AND INSTALLATION**

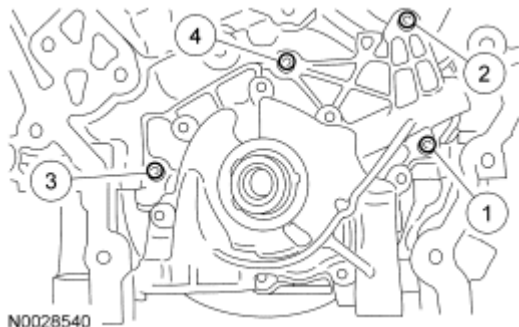
CAUTION: During engine repair procedures, cleanliness is extremely important. Any foreign material, including any material created while cleaning gasket surfaces, that enters the oil passages, coolant passages or the oil pan, can cause engine failure.

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



N0028540

Fig. 93: Identifying Removing Sequence Of Oil Pump Bolts
Courtesy of FORD MOTOR CO.

5. Remove the oil pump.

INSTALLATION

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

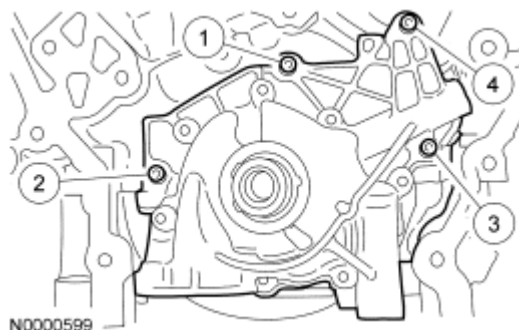


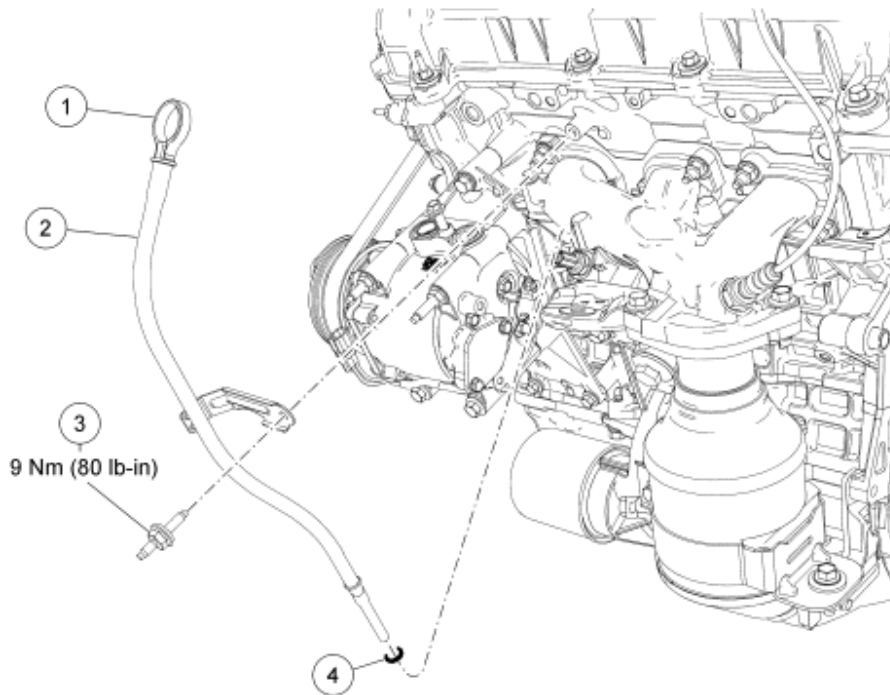
Fig. 94: Identifying Tightening Sequence Of Oil Pump Bolts
Courtesy of FORD MOTOR CO.

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

Material

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



N0001703

Fig. 95: Exploded View Of Oil Level Indicator & Tube (With Torque Specifications)
Courtesy of FORD MOTOR CO.

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

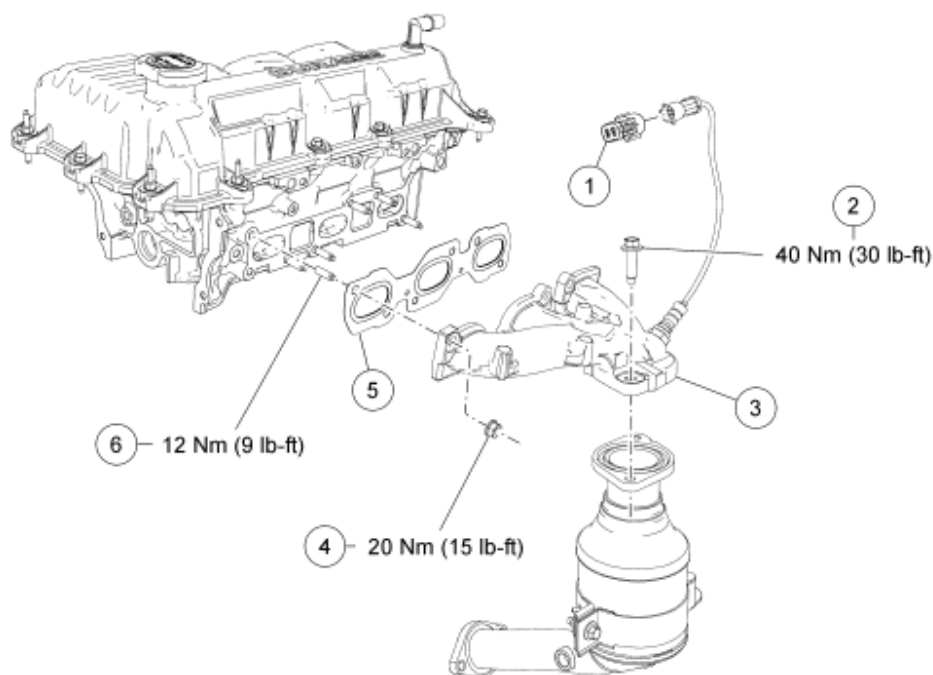
REMOVAL AND INSTALLATION

1. Remove the oil level indicator.
2. Remove the stud bolt and the oil level indicator tube.
 - Remove and discard the O-ring seal.
 - To install, tighten to 9 Nm (80 lb-in).

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

3. To install, reverse the removal procedure.

EXHAUST MANIFOLD - LH



N0045209

Fig. 96: Exploded View Of Left Exhaust Manifold (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Heated oxygen sensor (HO2S) electrical connector (part of 12B637)
2	W709982	LH exhaust manifold-to-catalytic converter bolt (2 required)
3	9431	LH exhaust manifold
4	W701706	LH exhaust manifold nut (6 required)
5	9448	LH exhaust manifold gasket
6	W701732	LH exhaust manifold stud (6 required)

REMOVAL AND INSTALLATION

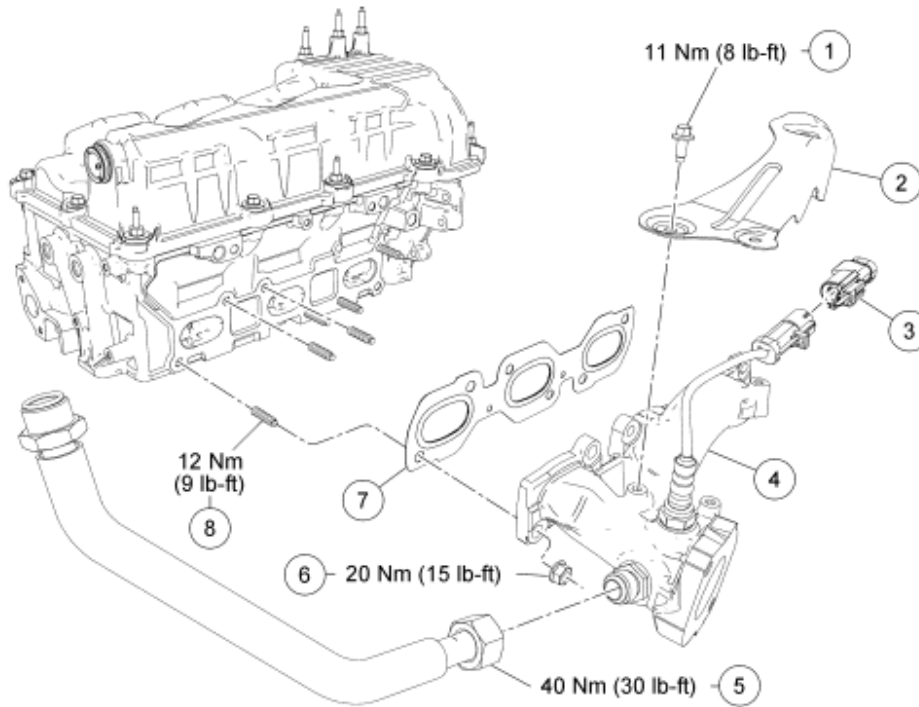
1. Remove the cooling fans. For additional information, refer to **ENGINE COOLING** article.
2. Disconnect the heated oxygen sensor (HO2S) electrical connector.
3. Remove the 2 exhaust manifold-to-catalytic converter bolts.
 - To install, tighten to 40 Nm (30 lb-ft).
4. Remove and discard the 6 exhaust manifold nuts.
 - To install, tighten to 20 Nm (15 lb-ft).
5. Remove the exhaust manifold.
 - Remove and discard the gasket.
6. Remove and discard the 6 exhaust manifold studs.

- To install, tighten to 12 Nm (9 lb-ft).

NOTE: Make sure to install new studs, nuts and gasket.

7. To install, reverse the removal procedure.

EXHAUST MANIFOLD - RH



N0044912

Fig. 97: Exploded View Of Right Exhaust Manifold (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701130	RH exhaust manifold heat shield bolts (2 required)
2	9A462	RH exhaust manifold heat shield
3	14A464	Heated oxygen sensor (HO2S) electrical connector (part of 12B637)
4	9430	RH exhaust manifold
5	-	Exhaust gas recirculation (EGR) system module tube fitting nut (part of 9D477)
6	W701706	RH exhaust manifold nut (6 required)
7	9448	RH exhaust manifold gasket
8	W701732	RH exhaust manifold stud (6 required)

REMOVAL AND INSTALLATION

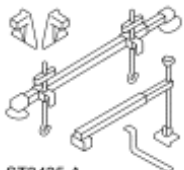
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the RH catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
3. Disconnect the heated oxygen sensor (HO2S) electrical connector.
4. Remove the 3 bolts and the RH exhaust manifold heat shield
 - To install, tighten to 11 Nm (8 lb-ft).
5. Disconnect the exhaust gas recirculation (EGR) system module tube from the exhaust manifold.
 - To install, tighten to 40 Nm (30 lb-ft).
6. Remove and discard the 6 RH exhaust manifold nuts.
 - To install, tighten to 20 Nm (15 lb-ft).
7. Remove and discard the 3 studs closest to the rear of the cylinder head.
 - To install, tighten to 12 Nm (9 lb-ft).
8. Remove the RH exhaust manifold and gasket.
 - Discard the exhaust manifold gasket.
9. Remove and discard the 3 remaining studs.
 - To install, tighten to 12 Nm (9 lb-ft).

NOTE: Make sure to install a new exhaust manifold gasket, studs and nuts.

10. To install, reverse the removal procedure.

ENGINE SUPPORT INSULATORS - LH

Special Tools

Illustration	Tool Name	Tool Number
 ST2425-A	3-Bar Engine Support Kit	303-F072
 ST2463-A	Lifting Brackets, Engine	134-00243 or equivalent

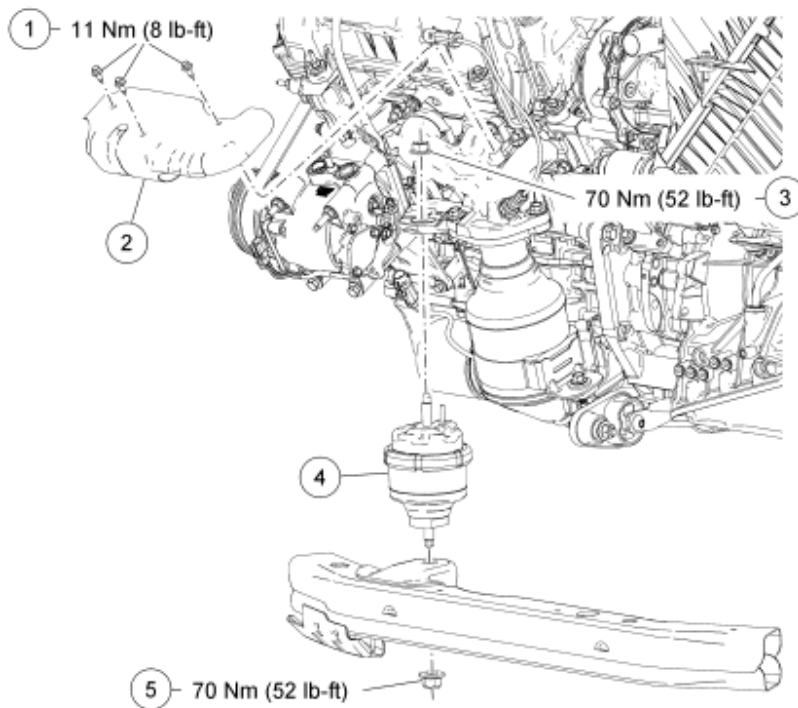


Fig. 98: Exploded View Of Left Engine Support Insulators (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W707130	LH exhaust manifold heat shield bolts (3 required)
2	9A462	LH exhaust manifold heat shield
3	W711311	LH engine support insulator upper nut
4	6038	LH engine support insulator
5	N802978	LH engine support insulator lower nut

REMOVAL AND INSTALLATION

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove and discard the roll restrictor cross brace-to-roll restrictor bolt.
 - To install, tighten to 48 Nm (35 lb-ft).

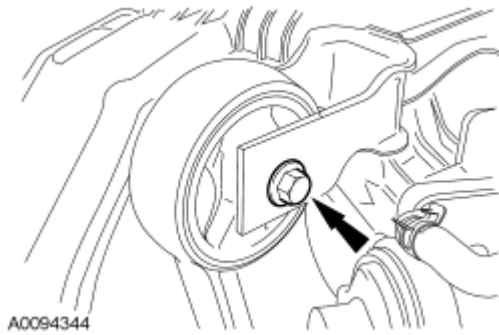


Fig. 99: Locating Upper Roll Restrictor Bolt
Courtesy of FORD MOTOR CO.

3. Remove the front transaxle stabilizer bolt and nut.
 - To install, tighten to 40 Nm (30 lb-ft).

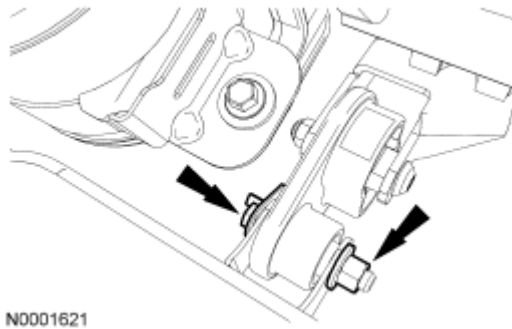


Fig. 100: Locating Front Transaxle Stabilizer Bolt & Nut
Courtesy of FORD MOTOR CO.

4. If equipped, remove the 3 bolts and the LH exhaust manifold heat shield.
 - To install, tighten to 11 Nm (8 lb-ft).
5. Remove the engine support insulator lower nut.
 - To install, tighten to 70 Nm (52 lb-ft).
6. Remove the engine support insulator upper nut.
 - To install, tighten to 70 Nm (52 lb-ft).
7. Mount the special tool to the LH cylinder head.

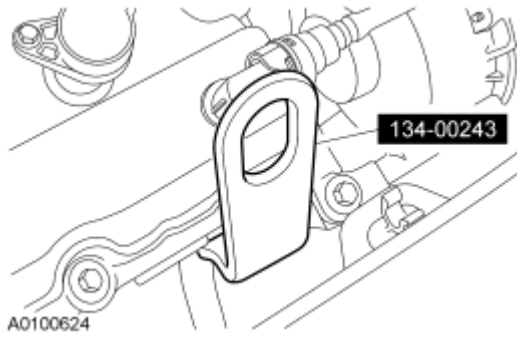


Fig. 101: Special Tool Installed Onto LH Cylinder Head
Courtesy of FORD MOTOR CO.

8. Using the special tools, raise the engine to gain the clearance necessary to remove the insulator.



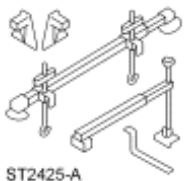
Fig. 102: Identifying Special Tool
Courtesy of FORD MOTOR CO.

CAUTION: Make sure that the engine support insulator locator pins are aligned correctly with the bracket.

9. To install, reverse the removal procedure.

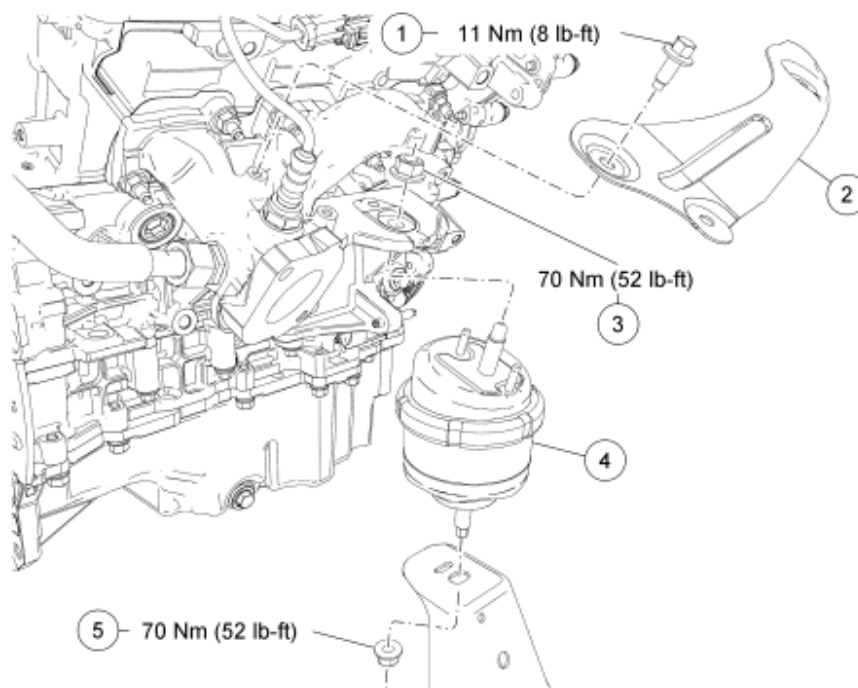
ENGINE SUPPORT INSULATORS - RH

Special Tools

Illustration	Tool Name	Tool Number
 ST2425-A	3-Bar Engine Support Kit	303-F072
	Lifting Brackets, Engine	134-00243 or equivalent

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego



N0001702

Fig. 103: Exploded View Of Right Engine Support Insulators (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W707130	RH exhaust manifold heat shield bolt (3 required)
2	9A462	RH exhaust manifold heat shield
3	W711311	RH engine support insulator upper nut
4	6068	RH engine support insulator
5	W710922	RH engine support insulator lower nut

REMOVAL AND INSTALLATION

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the cowl vent screen. For additional information, refer to **FRONT END BODY PANELS** article.
3. Remove the RH catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.

4. Remove the RH halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
5. Remove and discard the roll restrictor cross brace-to-roll restrictor bolt.
 - To install, tighten to 48 Nm (35 lb-ft).

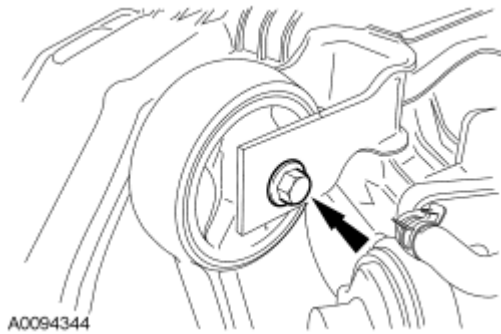


Fig. 104: Locating Upper Roll Restrictor Bolt
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

6. Remove the 4 roll restrictor cross brace bolts.
 - Remove the cross brace.
 - To install, tighten to 55 Nm (41 lb-ft).

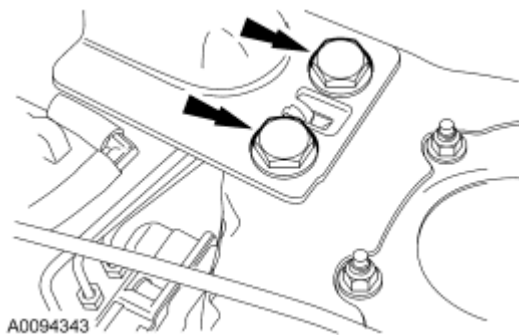


Fig. 105: Identifying Transaxle Roll Restrictor Bar Bolts
Courtesy of FORD MOTOR CO.

7. Remove the 3 bolts and the RH exhaust manifold heat shield.
 - To install, tighten to 11 Nm (8 lb-ft).
8. Remove the engine support insulator lower nut.
 - To install, tighten to 70 Nm (52 lb-ft).
9. Remove the engine support insulator upper nut.
 - To install, tighten to 70 Nm (52 lb-ft).
10. Remove the bolt and detach the power steering pressure (PSP) tube from the RH cylinder head.
 - To install, tighten to 7 Nm (62 lb-in).

11. Mount the special tool to the RH cylinder head.

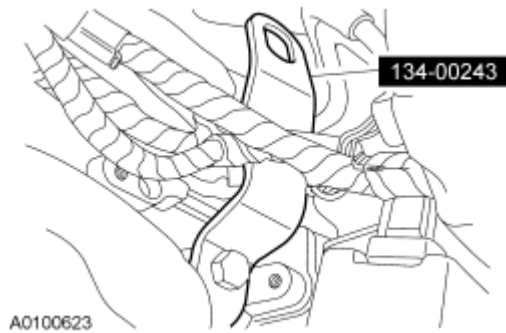


Fig. 106: View Of Special Tool On RH Cylinder Head
Courtesy of FORD MOTOR CO.

12. Using the special tools, raise the engine to gain the clearance necessary to remove the insulator.
 - Remove the engine support insulator.

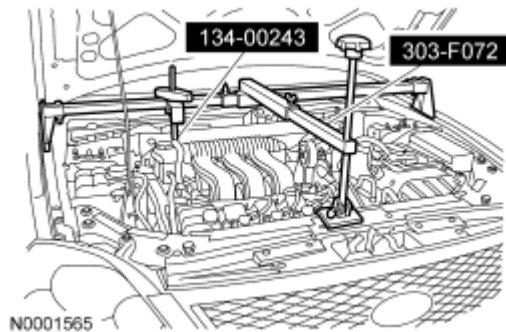


Fig. 107: Identifying Special Tool
Courtesy of FORD MOTOR CO.

CAUTION: Make sure that the engine support insulator locator pin is aligned correctly with the bracket.

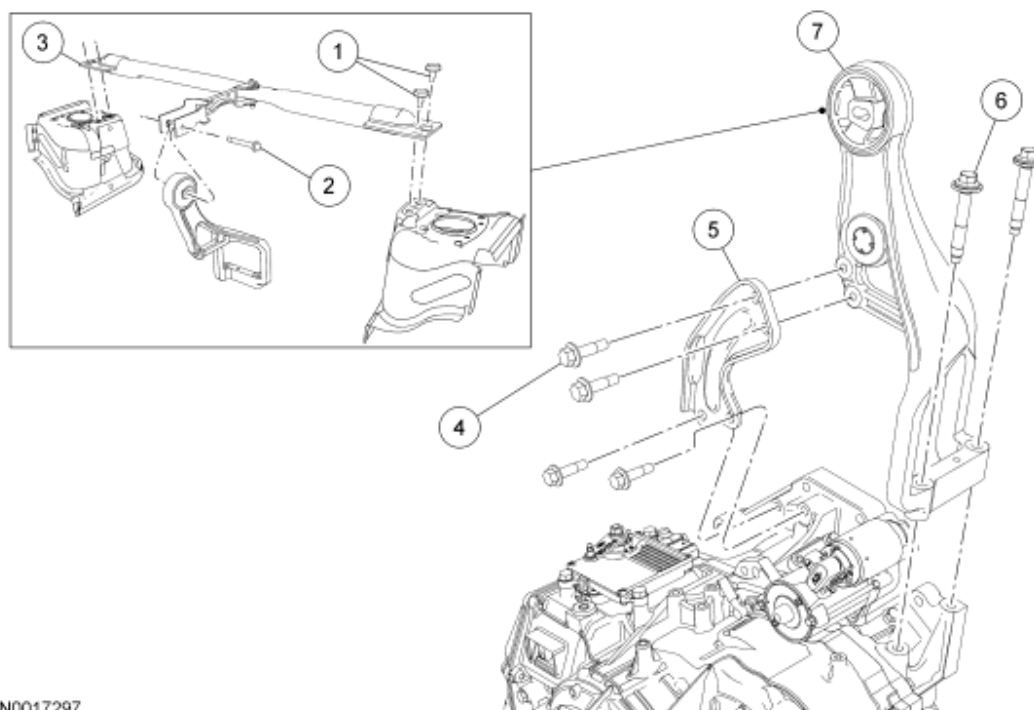
13. To install, reverse the removal procedure.

ENGINE MOUNT - ANTI-ROLL

Material

Item	Specification
Threadlock and Sealer TA-25	WSK-M2G351-A5

NOTE: 6 speed transaxle shown, CVT similar.



N0017297

Fig. 108: Exploded View Of Roll Restrictor
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W705985	Roll restrictor cross brace-to-strut tower bolts (4 required)
2	W506525	Roll restrictor cross brace-to-roll restrictor bolt
3	6G053	Roll restrictor cross brace
4	W711311	Roll restrictor support bracket bolt (4 required)
5	6G087	Roll restrictor support bracket
6	W710524	Roll restrictor bolt (2 required)
7	6F055	Roll restrictor

REMOVAL AND INSTALLATION

1. Remove the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
2. Remove the 4 throttle body bolts and position the throttle body aside.
 - To install, tighten to 10 Nm (89 lb-in).
3. Remove the roll restrictor cross brace-to-roll restrictor bolt.
 - To install, clean the bolt using a wire brush, apply new threadlock to the threads and tighten to 48 Nm (35 lb-ft).

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego

4. Remove the 4 roll restrictor cross brace-to-strut tower bolts and the crossbar.
 - To install, clean the bolts using a wire brush, apply new threadlock to the threads and tighten to 55 Nm (41 lb-ft).
5. Remove the 4 roll restrictor support bracket bolts and the support bracket.
 - To install, clean the bolts using a wire brush, apply new threadlock to the threads and tighten to 55 Nm (41 lb-ft).
6. Detach the wiring retainer from the roll restrictor.
7. Remove the 2 bolts and the roll restrictor.
 - To install, clean the bolt using a wire brush, apply new threadlock to the threads and tighten to 55 Nm (41 lb-ft).
8. To install, reverse the removal procedure.

REMOVAL

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST2463-A	Lifting Brackets, Engine	134-00243 or equivalent
 ST1293-A	Powertrain Lift with Tilting Plate	014-00765
 ST1602-A	Spreader Bar	303-D089 (D93P-6001-A3) or equivalent
 ST2873-A	Engine Lifting Bracket Set	303-1140

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.

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

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
3. Disconnect the negative and positive battery cables. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
4. Recover the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.
5. Remove the air cleaner outlet pipe and air cleaner. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
6. Remove the cowl vent panel. For additional information, refer to **FRONT END BODY PANELS** article.
7. Drain the cooling system. For additional information, refer to **ENGINE COOLING** article.
8. Remove the LH and RH halfshafts. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
9. Remove the exhaust flex pipe and LH catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
10. Remove and discard the roll restrictor cross brace-to-roll restrictor bolt.

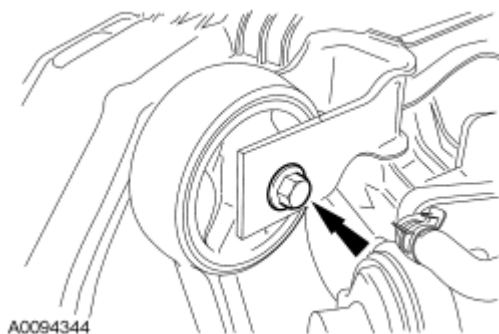


Fig. 109: Locating Upper Roll Restrictor Bolt
Courtesy of FORD MOTOR CO.

11. Remove and discard the 4 roll restrictor cross brace bolts and the cross brace.

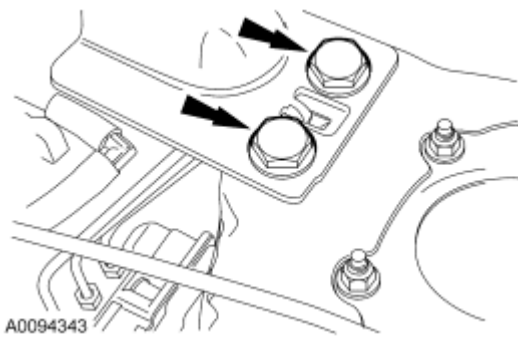


Fig. 110: Identifying Transaxle Roll Restrictor Bar Bolts
Courtesy of FORD MOTOR CO.

12. Remove the bolt and detach the ground strap from the RH fender.

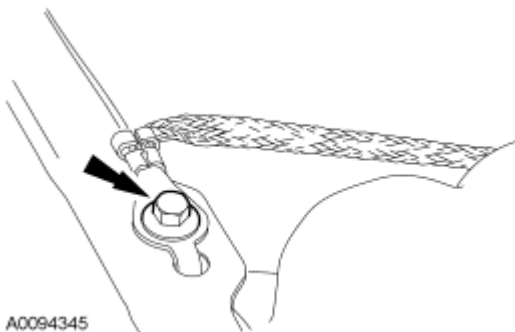


Fig. 111: Locating Ground Strap Bolt
Courtesy of FORD MOTOR CO.

13. Disconnect the redundant clip, press the quick release coupling button and disconnect the fuel tube from the fuel rail.

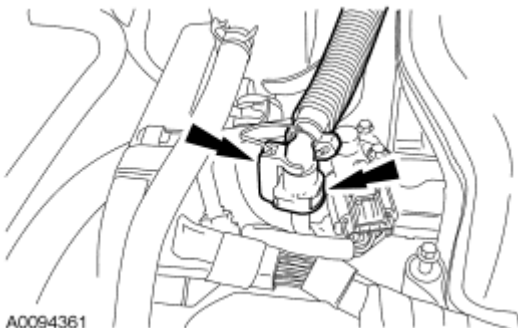


Fig. 112: Fuel Tube Redundant Clip
Courtesy of FORD MOTOR CO.

14. Detach the fuel tube clip from the upper intake manifold.

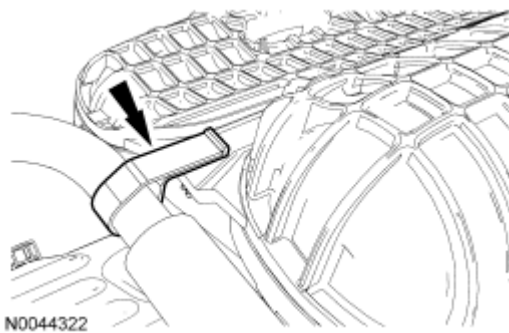


Fig. 113: Locating Fuel Tube Retainer
Courtesy of FORD MOTOR CO.

15. Disconnect the vapor tube from the purge valve.

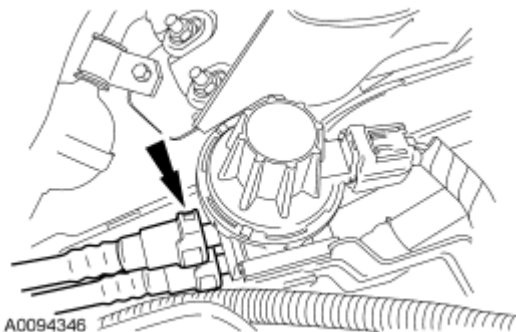


Fig. 114: Locating Vapor Tube
Courtesy of FORD MOTOR CO.

16. Disconnect the 2 powertrain control module (PCM) electrical connectors and detach the wiring conduit.

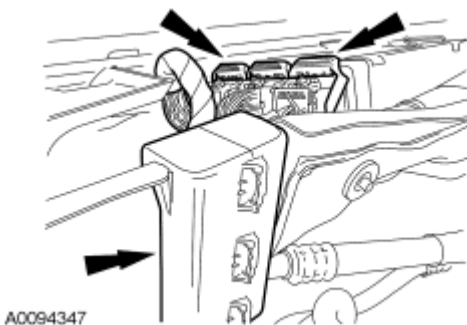


Fig. 115: Locating Powertrain Control Module Electrical Connectors & Wiring Conduit
Courtesy of FORD MOTOR CO.

17. Disconnect the power steering reservoir hose and detach the retainer.

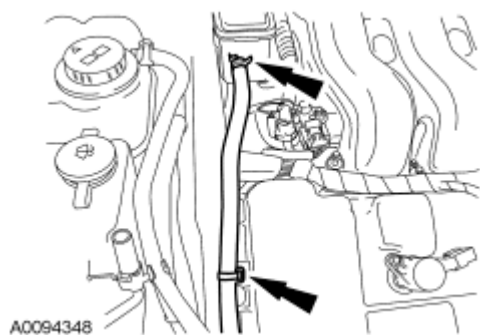


Fig. 116: Locating Power Steering Reservoir Hose & Retainer
Courtesy of FORD MOTOR CO.

18. Remove the bolt and detach the ground wire from the LH fender.

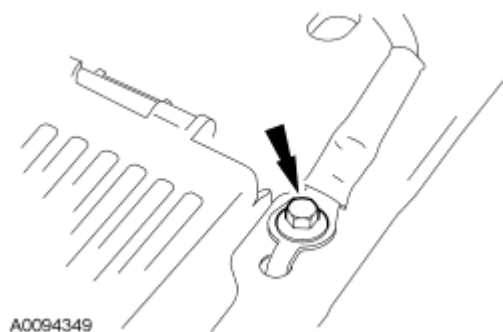


Fig. 117: Locating Ground Wire Bolt
Courtesy of FORD MOTOR CO.

19. Remove the nut and detach the B+ terminal from the battery cable.

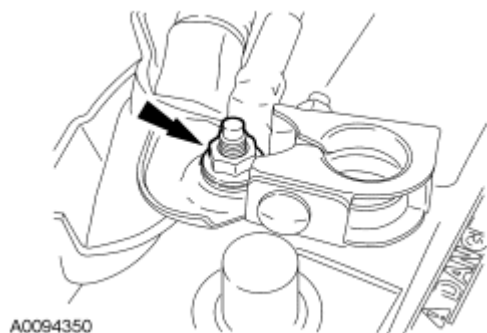


Fig. 118: Locating Battery Cable Nut
Courtesy of FORD MOTOR CO.

Vehicles with CVT transaxle

20. Detach the transmission vent tube from the coolant hose.



Fig. 119: Transmission Vent Tube & Coolant Hose
Courtesy of FORD MOTOR CO.

21. Disconnect the shift cable.

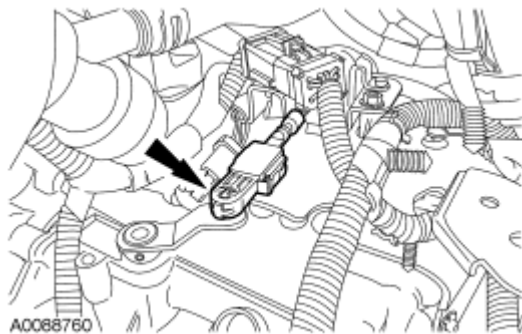


Fig. 120: Locating Shift Cable End
Courtesy of FORD MOTOR CO.

22. Disconnect the 16-pin electrical connector and detach the wiring retainers.
- Detach the electrical connector from the shift cable bracket.

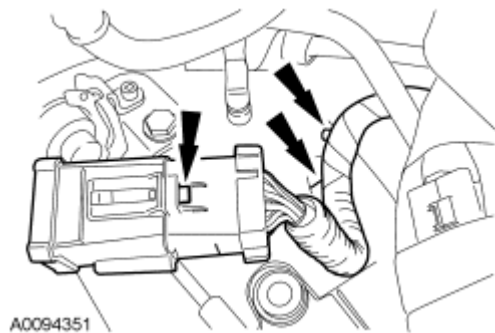


Fig. 121: Locating 16-Pin Electrical Connector & Wiring Retainers
Courtesy of FORD MOTOR CO.

23. Remove the 2 bolts and position the shift cable aside.

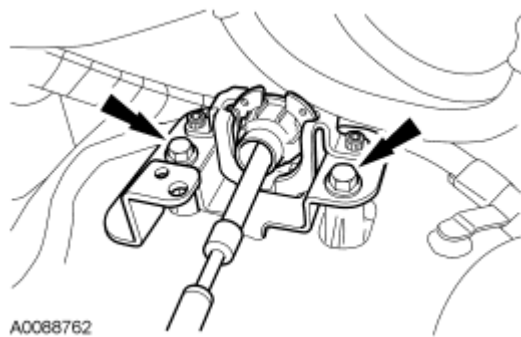


Fig. 122: Locating Shift Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

Vehicles with 6-speed transaxle

24. Detach the transmission vent tube from the coolant hose.



Fig. 123: Transmission Vent Tube & Coolant Hose
Courtesy of FORD MOTOR CO.

25. Disconnect the shift cable.



Fig. 124: Locating Shift Cable End
Courtesy of FORD MOTOR CO.

26. Disconnect the 16-pin electrical connector and detach the wiring retainer.
- Disconnect the electrical connector from the shift cable bracket.

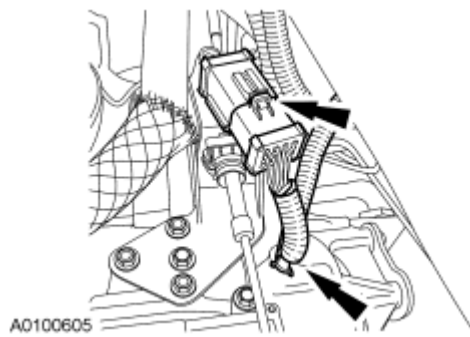


Fig. 125: Locating 16-Pin Electrical Connector & Wiring Retainer
Courtesy of FORD MOTOR CO.

27. Remove the 3 shift cable bracket bolts and position the cable and bracket aside.

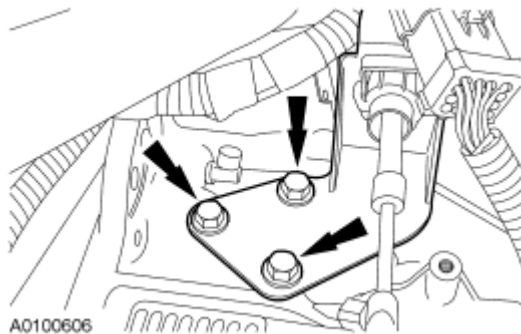


Fig. 126: Locating Shift Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

All vehicles

28. Disconnect the heater hose and the positive crankcase ventilation (PCV) coolant hose.

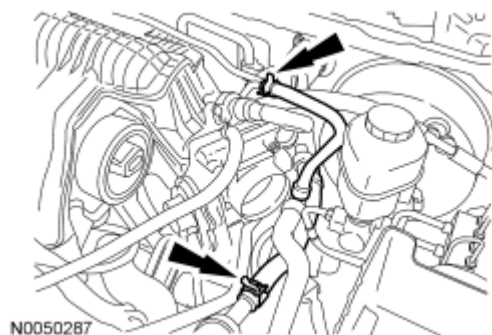


Fig. 127: Heater Hose & Positive Crankcase Ventilation (PCV) Coolant Hose
Courtesy of FORD MOTOR CO.

29. Disconnect the brake booster vacuum hose from the upper intake manifold.

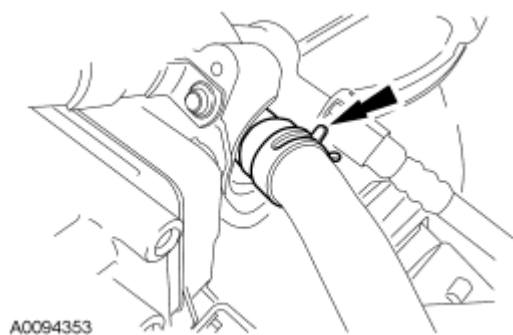


Fig. 128: Locating Brake Booster Vacuum Hose
Courtesy of FORD MOTOR CO.

30. Disconnect the coolant hoses from the thermostat housing.

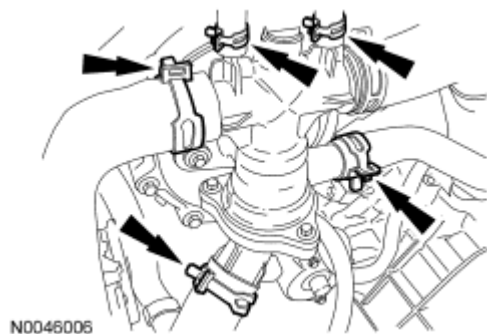


Fig. 129: Locating Coolant Hoses At Thermostat Housing
Courtesy of FORD MOTOR CO.

31. Detach the coolant tube retainers.

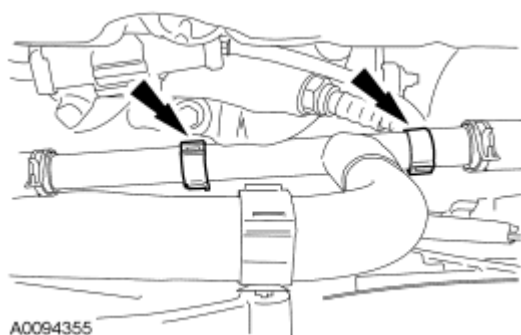


Fig. 130: Locating Coolant Tube Retainers
Courtesy of FORD MOTOR CO.

32. Disconnect the 10-pin electrical connector and detach the wiring retainers.

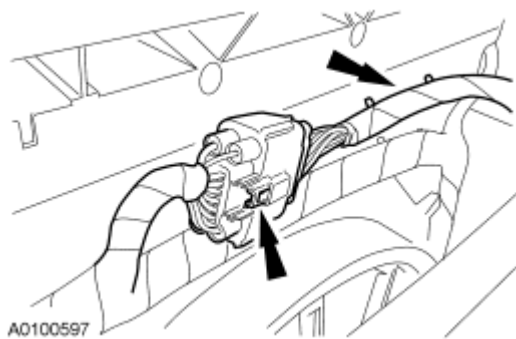


Fig. 131: Locating 10-Pin Electrical Connector & Wiring Retainer
Courtesy of FORD MOTOR CO.

33. Disconnect the A/C high-pressure switch electrical connector.

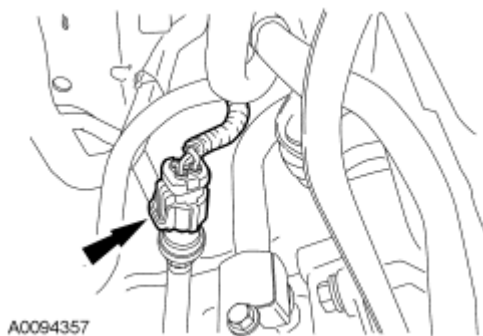


Fig. 132: Locating A/C High-Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

34. Remove the bolt and disconnect the A/C compressor manifold tube assembly.

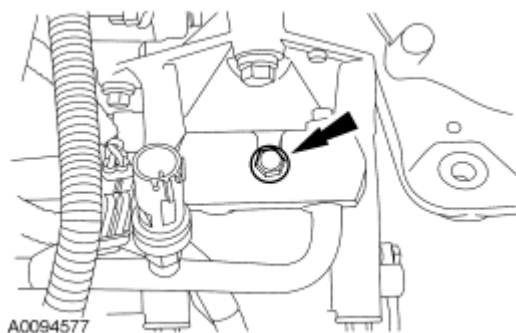


Fig. 133: Locating A/C Compressor Manifold Tube Assembly Bolt
Courtesy of FORD MOTOR CO.

35. Remove the nut and position the A/C tubes aside.

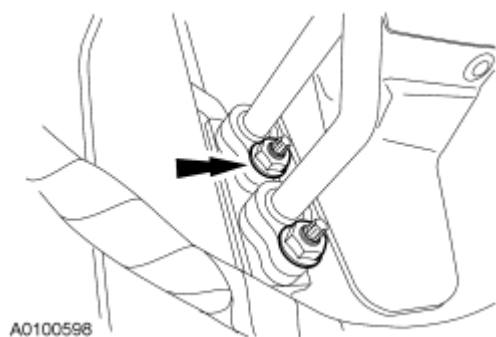


Fig. 134: Locating A/C Tubes Nut
Courtesy of FORD MOTOR CO.

36. Disconnect the transmission cooler hoses.

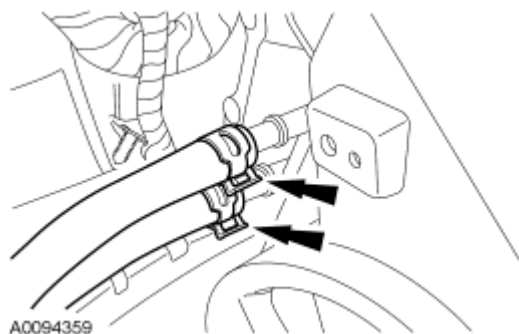


Fig. 135: Locating Transmission Cooler Hoses
Courtesy of FORD MOTOR CO.

37. Disconnect the power steering cooler hose.

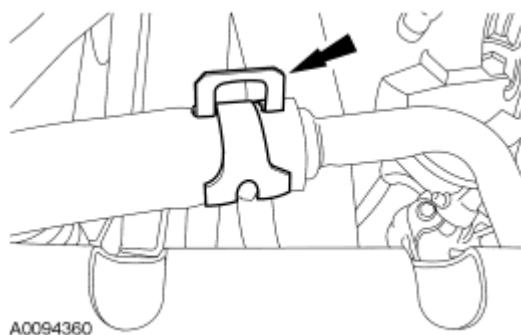


Fig. 136: Locating Power Steering Cooler Hose
Courtesy of FORD MOTOR CO.

38. Remove the engine oil pan drain plug and drain the engine oil.
- Install the plug and tighten to 26 Nm (19 lb-ft).

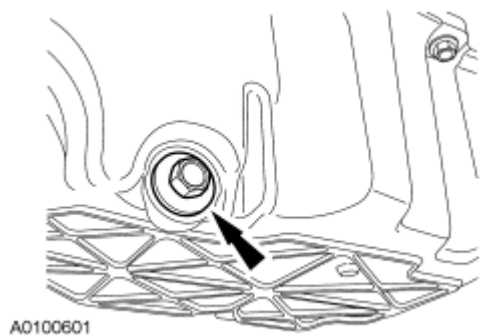


Fig. 137: Locating Engine Oil Pan Drain Plug
Courtesy of FORD MOTOR CO.

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

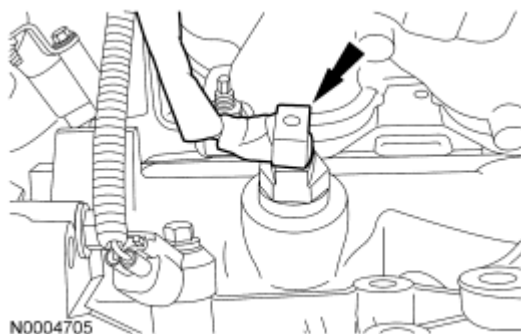


Fig. 138: Locating Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

40. Remove the 2 pin-type retainers and the torque converter lower access plug.

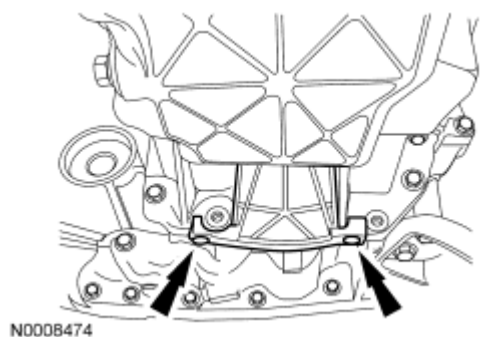


Fig. 139: Locating Torque Converter Lower Access Plug
Courtesy of FORD MOTOR CO.

41. Remove and discard the 4 torque converter nuts.



Fig. 140: Locating Torque Converter Nut
Courtesy of FORD MOTOR CO.

42. Remove the 3 engine-to-transaxle bolts and the LH catalytic converter bracket.

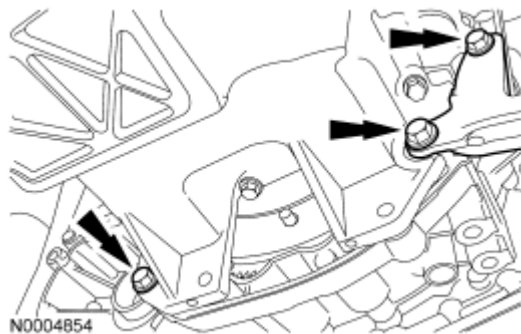


Fig. 141: Locating Transaxle-To-Engine Bolts
Courtesy of FORD MOTOR CO.

43. If equipped, remove the 2 driveshaft support bracket bolts.

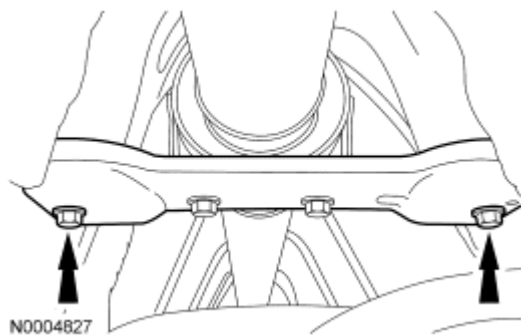
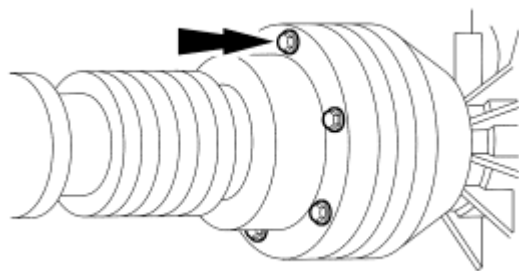


Fig. 142: Identifying Driveshaft Cross Brace Mounting Bolts
Courtesy of FORD MOTOR CO.

44. If equipped, remove the bolts and disconnect the driveshaft.
- Position the driveshaft aside.



A0052598

Fig. 143: Front Driveshaft-To-Transfer Case Bolts
Courtesy of FORD MOTOR CO.

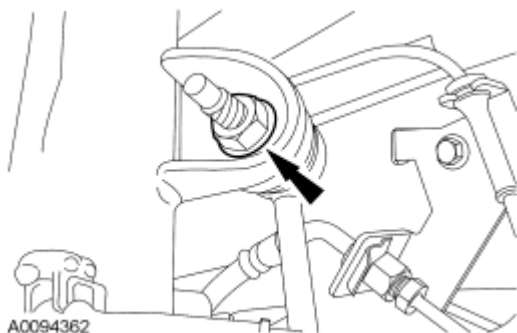
45. Using the special tool, lower the powertrain and subframe from the vehicle.



A0100603

Fig. 144: Supporting Powertrain & Subframe Using Special Tool
Courtesy of FORD MOTOR CO.

46. Remove the nuts and separate the stabilizer bar links from the struts.



A0094362

Fig. 145: Identifying Stabilizer Bar Link Nuts
Courtesy of FORD MOTOR CO.

47. Remove the nuts and separate the outer tie rods from the wheel knuckles.
- Discard the nuts.

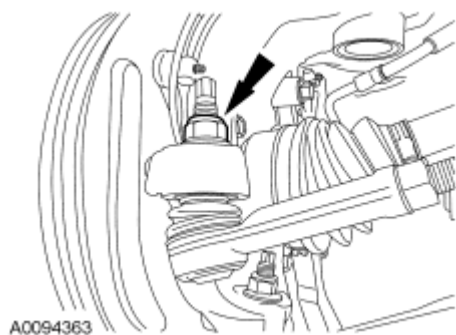


Fig. 146: Locating Outer Tie Rod Nut
Courtesy of FORD MOTOR CO.

48. Remove and discard the steering column intermediate shaft bolt.
- Detach the intermediate shaft from the steering gear.

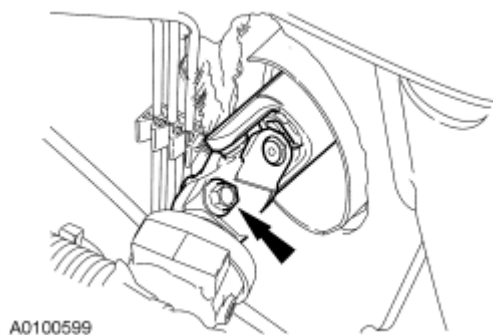


Fig. 147: Locating Steering Column Intermediate Shaft Bolt
Courtesy of FORD MOTOR CO.

49. Using the special tool, support the powertrain and the subframe.



Fig. 148: Supporting Powertrain & Subframe Using Special Tool
Courtesy of FORD MOTOR CO.

50. Remove the 6 bolts and the 2 rear subframe brackets.

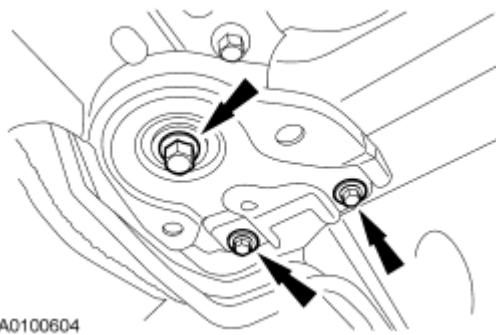


Fig. 149: Locating Rear Subframe Bracket Bolts
Courtesy of FORD MOTOR CO.

51. Remove the 2 forward subframe bolts and washers.

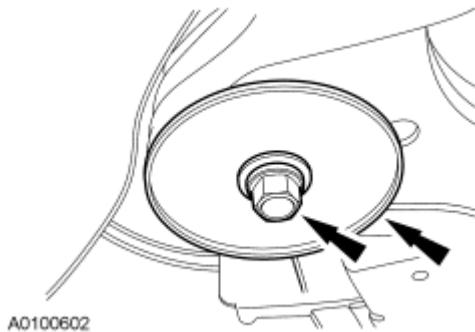


Fig. 150: Locating Subframe Bolts & Washers
Courtesy of FORD MOTOR CO.

52. Remove the power steering pressure (PSP) tube bracket bolt and disconnect the PSP switch electrical connector.

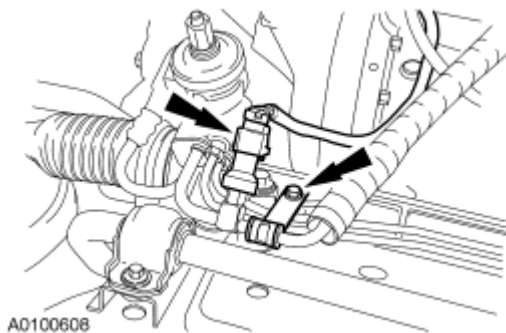


Fig. 151: Locating Power Steering Pressure Tube Bracket Bolt & PSP Switch Electrical Connector
Courtesy of FORD MOTOR CO.

53. Remove the bolt and disconnect the power steering fluid tubes.

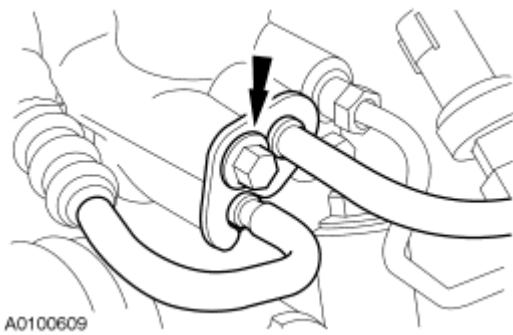


Fig. 152: Locating Power Steering Fluid Tubes & Bolt
Courtesy of FORD MOTOR CO.

54. Disconnect the RH catalyst monitor sensor electrical connector and detach the pin-type retainers from the subframe.

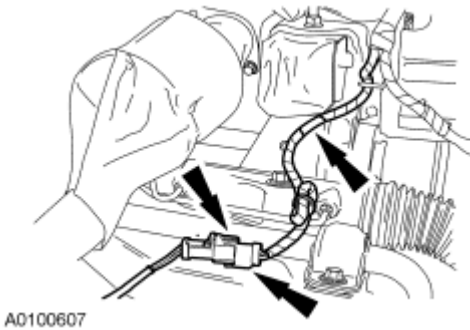


Fig. 153: Locating Pin-Type Retainers & Catalyst Monitor Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

Vehicles with CVT transaxle

55. Disconnect the transaxle bulkhead electrical connector.

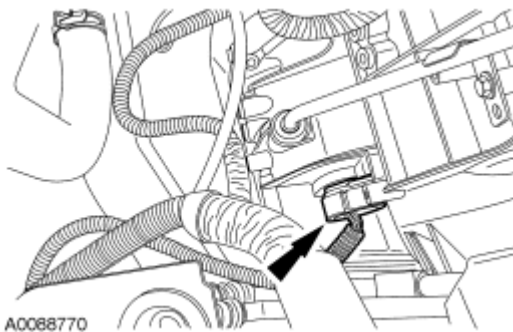


Fig. 154: Locating Transaxle Bulkhead Electrical Connector
Courtesy of FORD MOTOR CO.

56. Detach the wiring harness retainer from the transaxle.

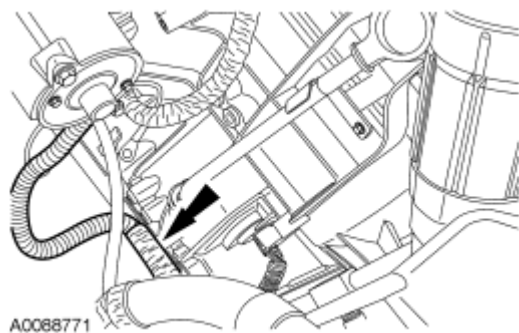


Fig. 155: Locating Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

57. Detach the wiring harness retainers from the transaxle.



Fig. 156: Locating Wire Harness Retainers At Transaxle
Courtesy of FORD MOTOR CO.

58. Detach the lower wiring harness retainers from the transaxle.

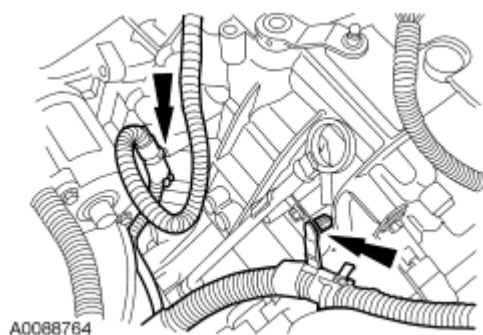


Fig. 157: Locating Lower Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

59. Remove the 4 bolts and the roll restrictor bracket.

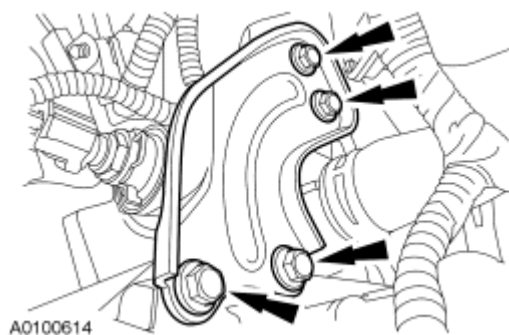


Fig. 158: Locating Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

60. Detach the wiring harness from the roll restrictor.

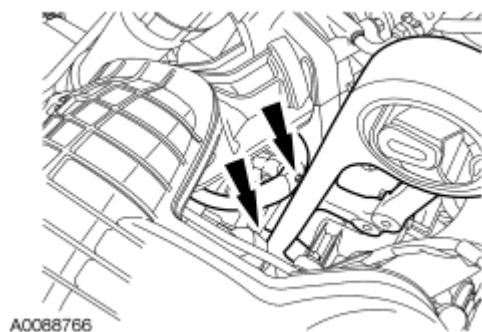


Fig. 159: Locating Wiring Harness At Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

61. Remove the 2 bolts and the roll restrictor.

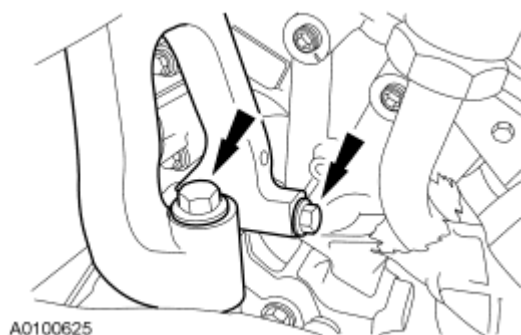


Fig. 160: Locating Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

62. Remove the starter motor electrical connector cover.

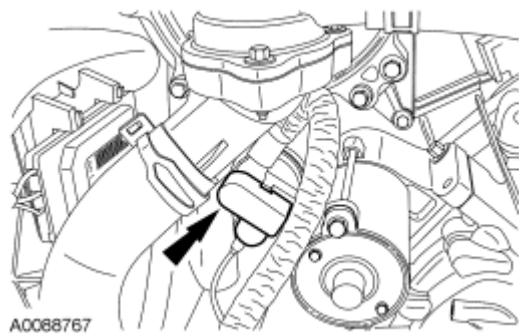


Fig. 161: Identifying Starter Motor Electrical Connector Cover
Courtesy of FORD MOTOR CO.

63. Remove the nuts and disconnect the starter motor wiring.

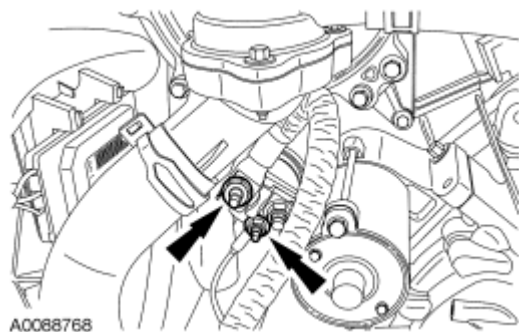


Fig. 162: Identifying Starter Motor Electrical Connectors
Courtesy of FORD MOTOR CO.

64. Remove the 2 bolts and the starter motor.

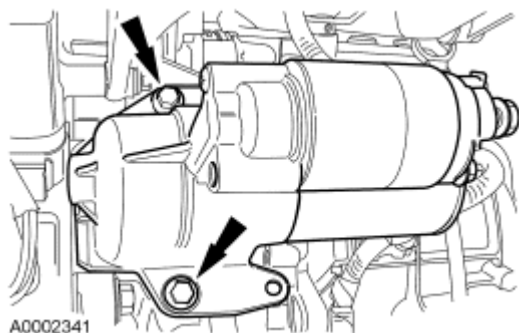


Fig. 163: Identifying Starter Motor Mounting Bolts
Courtesy of FORD MOTOR CO.

65. Remove the bolt and disconnect the ground cable.

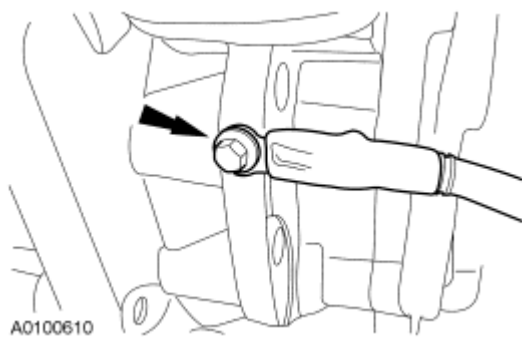


Fig. 164: Locating Ground Wire
Courtesy of FORD MOTOR CO.

Vehicles with 6-speed transaxle

66. Disconnect the wire harness from the transmission control unit (TCU).

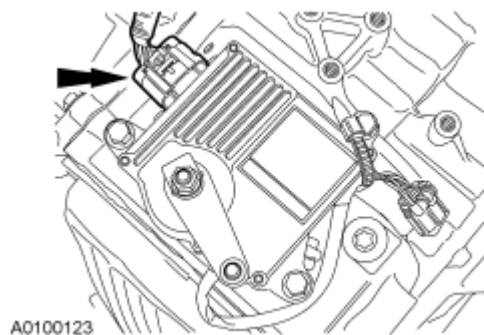


Fig. 165: Identifying Transmission Control Module Electrical Connector
Courtesy of FORD MOTOR CO.

67. Remove the 4 bolts and the roll restrictor bracket.

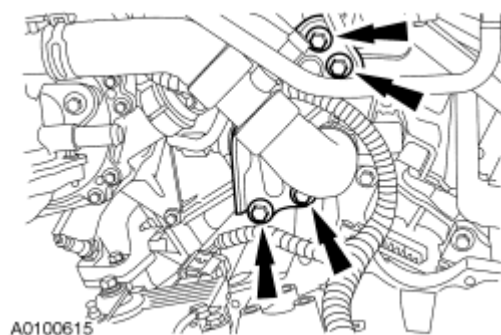


Fig. 166: Locating Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

68. Remove the 2 bolts and the roll restrictor.

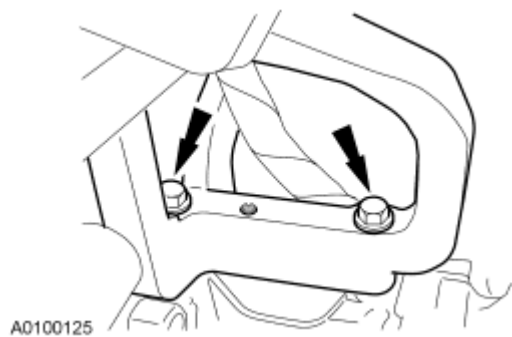


Fig. 167: Locating Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

69. Remove the starter motor electrical connector cover.

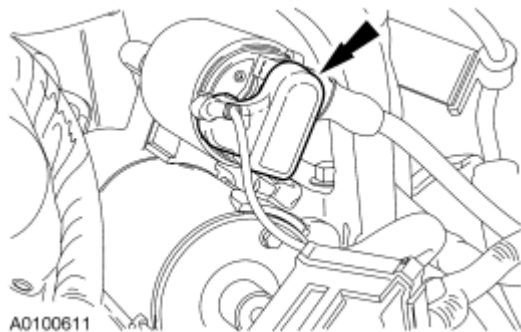


Fig. 168: Locating Starter Motor Electrical Connector Cover
Courtesy of FORD MOTOR CO.

70. Remove the nuts and disconnect the starter motor wiring.

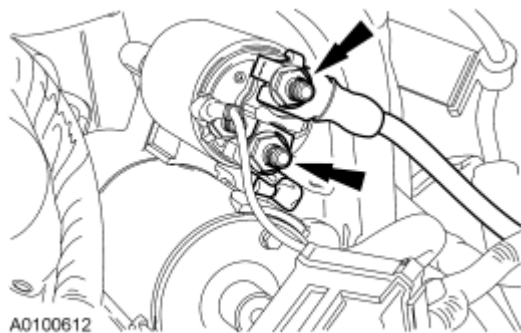


Fig. 169: Locating Starter Motor Wiring Nuts
Courtesy of FORD MOTOR CO.

71. Remove the 2 bolts and the starter motor.

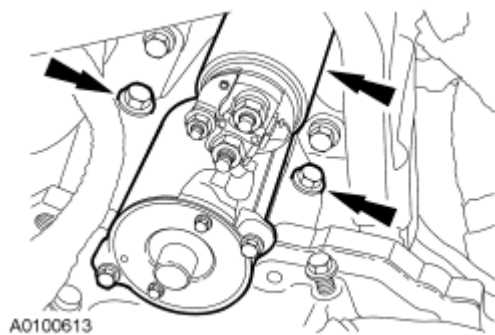


Fig. 170: Locating Starter Motor Bolts
Courtesy of FORD MOTOR CO.

72. Remove the bolt and disconnect the ground cable.

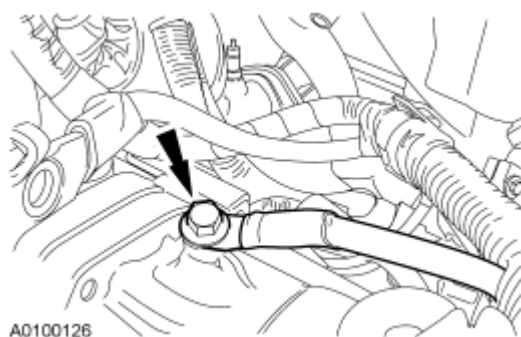


Fig. 171: Locating Ground Cable Bolt
Courtesy of FORD MOTOR CO.

All vehicles

73. Install the special tool to the RH cylinder head.

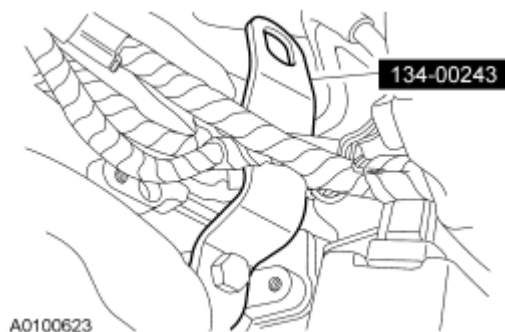


Fig. 172: View Of Special Tool On RH Cylinder Head
Courtesy of FORD MOTOR CO.

74. Install the special tool to the LH cylinder head.

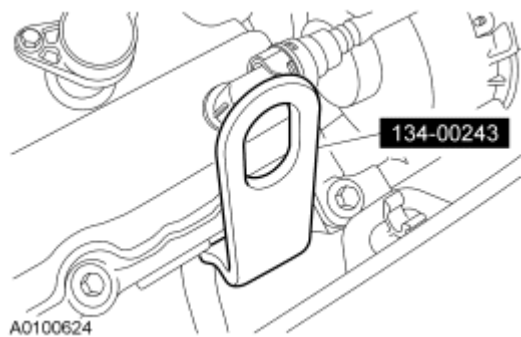


Fig. 173: Special Tool Installed Onto LH Cylinder Head
Courtesy of FORD MOTOR CO.

NOTE: When installing the lower half of the lifting bracket it will be easier to loosely install the upper bolt first then install the lower bolt.

75. Install the lower half of the special tool.

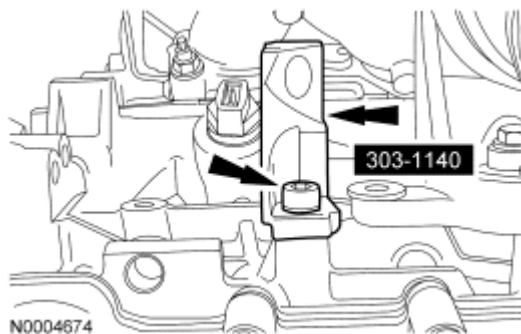


Fig. 174: Identifying Lower Half Of Lifting Hook
Courtesy of FORD MOTOR CO.

76. Install the upper half of the special tool.



Fig. 175: Identifying Upper Half Of Lifting Hook
Courtesy of FORD MOTOR CO.

77. Using the special tools and a suitable engine crane, support the powertrain.

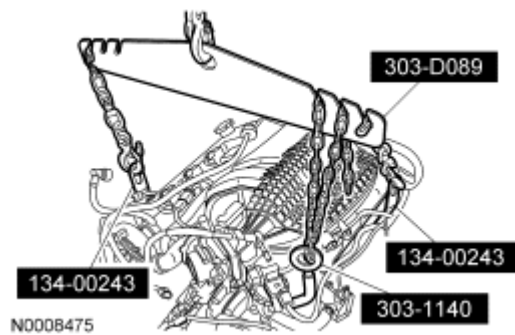


Fig. 176: Supporting Powertrain Using Special Tool
Courtesy of FORD MOTOR CO.

78. Remove the front transaxle stabilizer bolt.

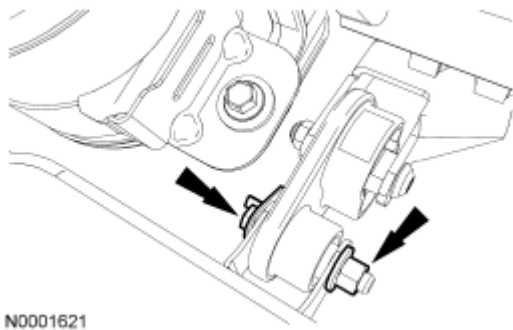


Fig. 177: Locating Front Transaxle Stabilizer Bolt & Nut
Courtesy of FORD MOTOR CO.

79. Remove the 3 bolts and the RH exhaust manifold heat shield.

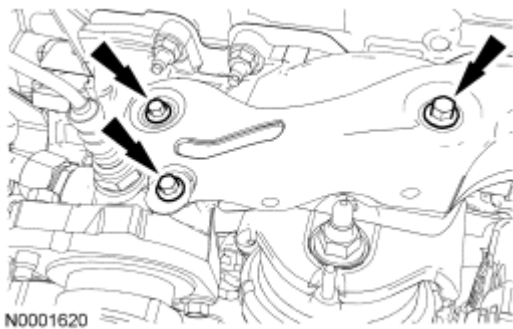


Fig. 178: Locating RH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

80. Remove the RH engine insulator upper nut.

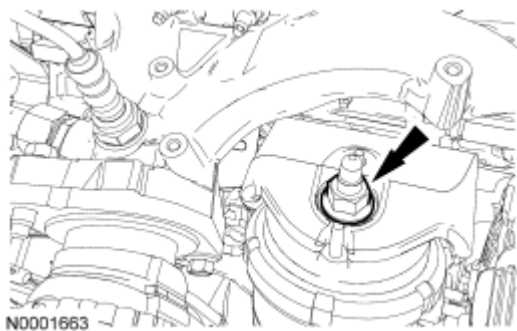


Fig. 179: Locating RH Engine Insulator Upper Nut
Courtesy of FORD MOTOR CO.

81. Remove the LH engine insulator upper nut.

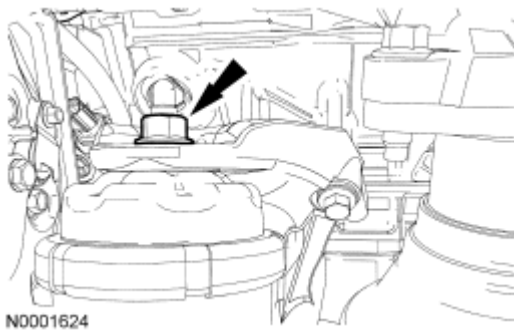


Fig. 180: Locating LH Engine Insulator Upper Nut
Courtesy of FORD MOTOR CO.

82. If equipped, remove the upper power transfer unit (PTU) bracket bolts and the bracket.

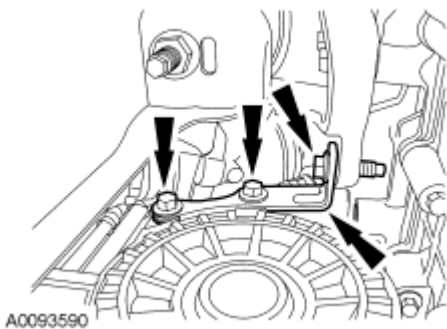


Fig. 181: Identifying Upper PTU Bracket Bolts & Bracket
Courtesy of FORD MOTOR CO.

Vehicles with CVT transaxle

83. Remove the 4 front transaxle insulator bracket bolts.

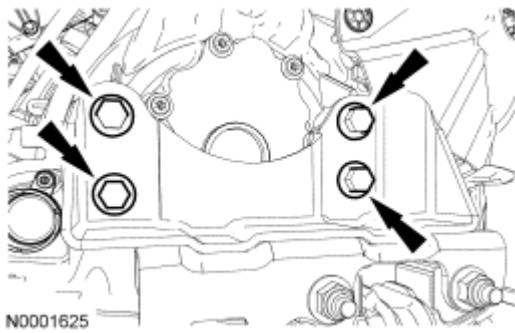


Fig. 182: Locating Transaxle Mount Bolts
Courtesy of FORD MOTOR CO.

Vehicles with 6-speed transaxle

84. Remove the 3 front transaxle insulator bracket bolts.

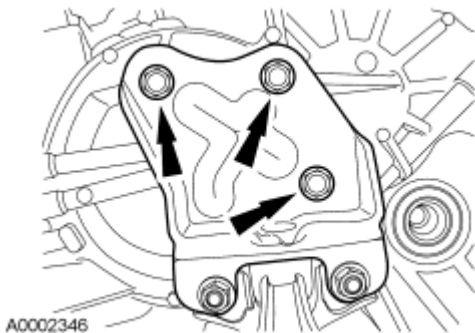


Fig. 183: Identifying Upper Transaxle Mount Retaining Bolts
Courtesy of FORD MOTOR CO.

All vehicles

85. Using the special tools and a suitable engine crane, lift the powertrain off of the subframe.

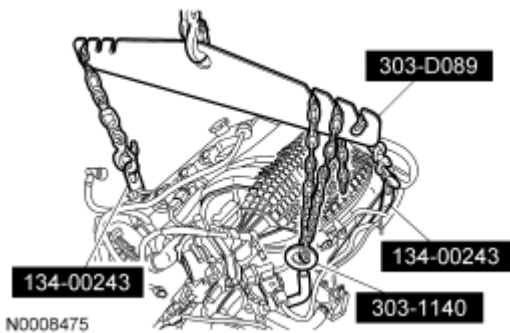


Fig. 184: Supporting Powertrain Using Special Tool
Courtesy of FORD MOTOR CO.

86. Lower the powertrain and support the transaxle using blocks of wood.

87. Position the knock sensor (KS) heat shield aside.

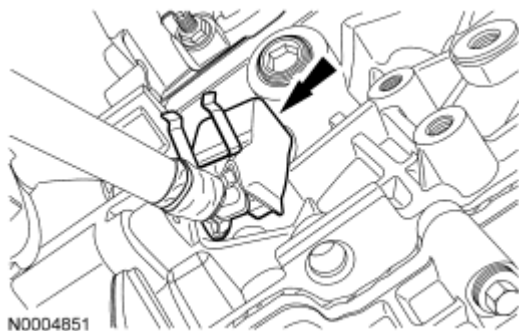


Fig. 185: Identifying Knock Sensor Heat Shield
Courtesy of FORD MOTOR CO.

88. Disconnect the electrical connector and then remove the bolt and the KS.

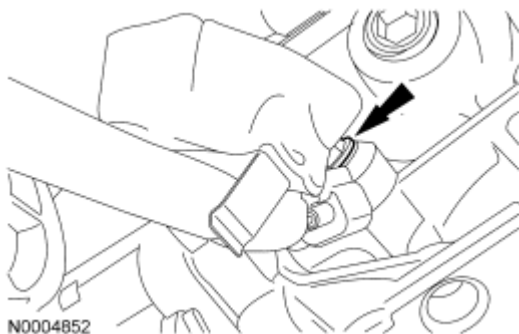


Fig. 186: Locating Knock Sensor
Courtesy of FORD MOTOR CO.

89. Remove the engine-to-transaxle bolt.

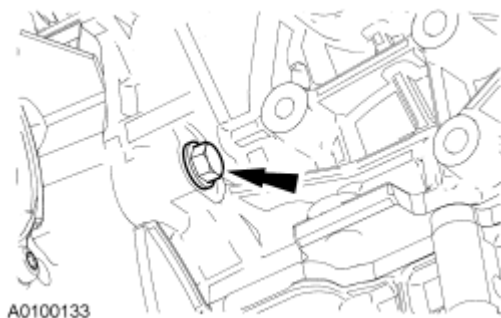


Fig. 187: Locating Transaxle-To-Engine Bolt
Courtesy of FORD MOTOR CO.

Vehicles with CVT transaxle

90. Remove the 4 remaining transaxle-to-engine bolts.
 - Separate the engine from the transaxle.

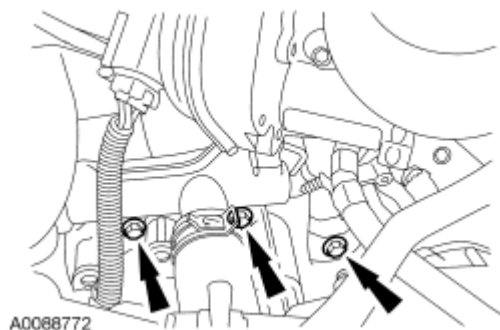


Fig. 188: Identifying Transaxle-To-Engine Bolts
Courtesy of FORD MOTOR CO.

Vehicles with 6-speed transaxle

91. Remove the 4 remaining transaxle-to-engine bolts.
 - Separate the engine from the transaxle.

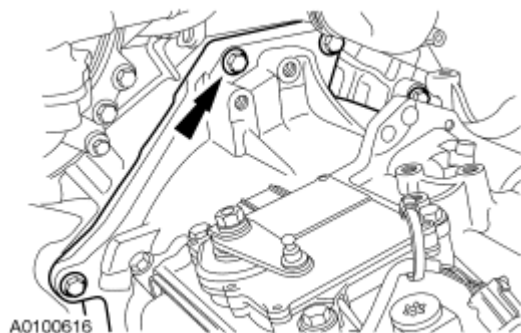


Fig. 189: Locating Transaxle-To-Engine Bolts
Courtesy of FORD MOTOR CO.

DISASSEMBLY

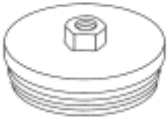
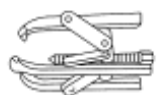
ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1187-A	Slide Hammer	307-005 (T59L-100-B)

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego

 ST1382-A	Remover, Crankshaft Rear Oil Seal	303-519 (T95P-6701-EH)
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A)
 ST1385-A	Remover, Oil Seal	303-409 (T92C-6700CH)
 ST1184-A	3-Jaw Puller	303-D121

Material

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

All vehicles

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 Engine Assembly.

1. Remove the 8 bolts and the flexplate.

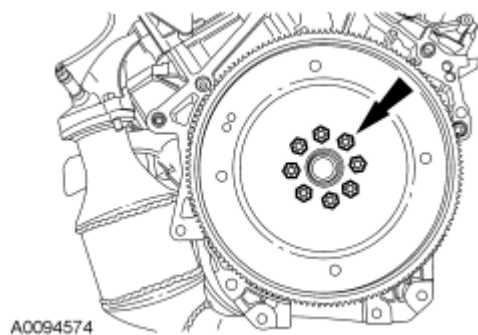


Fig. 190: Locating Flexplate Bolts
Courtesy of FORD MOTOR CO.

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

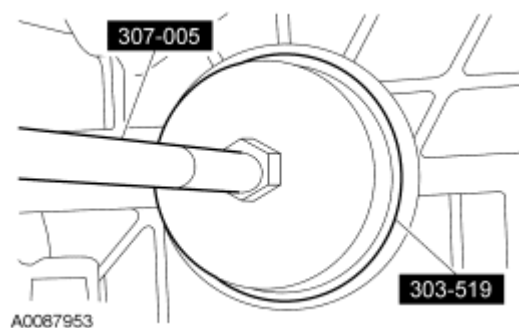


Fig. 191: Removing Rear Crankshaft Seal
Courtesy of FORD MOTOR CO.

3. Mount the engine on a suitable stand.

Freestyle only

4. If equipped, remove the 3 retainers and the A/C compressor pulley shield.

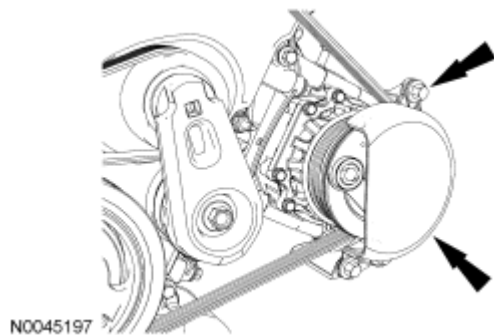


Fig. 192: Locating A/C Compressor Pulley Shield Retainers
Courtesy of FORD MOTOR CO.

All vehicles

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

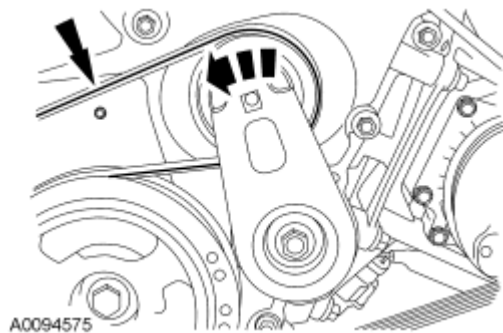


Fig. 193: Rotating Tensioner Counterclockwise
Courtesy of FORD MOTOR CO.

6. Disconnect the A/C compressor electrical connector.

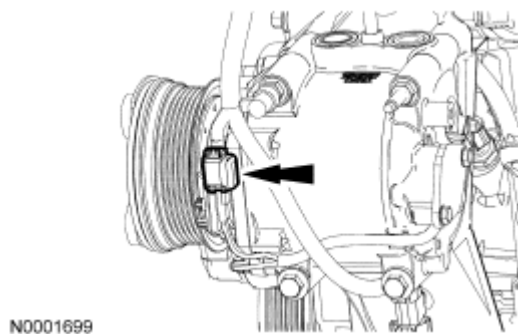


Fig. 194: Locating A/C Compressor Electrical Connector
Courtesy of FORD MOTOR CO.

7. Disconnect the LH catalyst monitor sensor electrical connector and detach the wiring retainer.

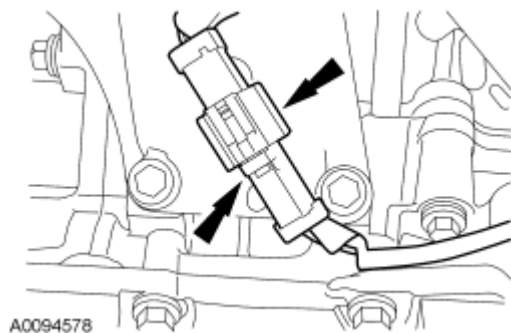


Fig. 195: Locating Catalyst Monitor Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

Freestyle only

8. If equipped, remove the 2 nuts, the bolt and the A/C compressor shield.

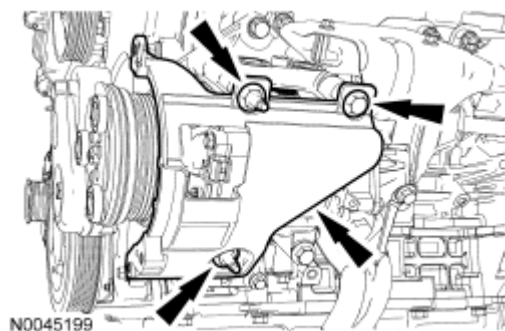


Fig. 196: Locating A/C Compressor Shield Nuts & Bolt
Courtesy of FORD MOTOR CO.

9. If equipped, remove the bolt and the A/C compressor.

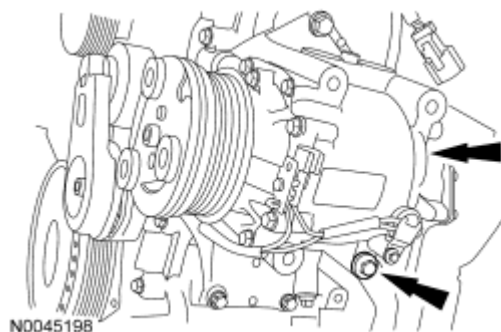


Fig. 197: Locating A/C Compressor Bolt
Courtesy of FORD MOTOR CO.

All vehicles

10. Remove the 2 bolts, 2 nuts and the A/C compressor.

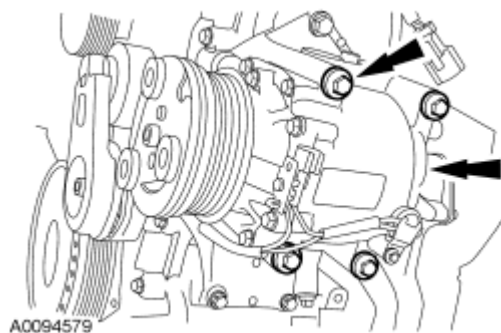


Fig. 198: Locating A/C Compressor Bolts & Nuts
Courtesy of FORD MOTOR CO.

11. Remove the 5 bolts and the A/C compressor bracket.

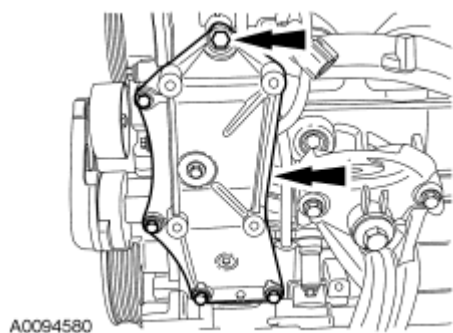


Fig. 199: Locating A/C Compressor Bracket Bolts
Courtesy of FORD MOTOR CO.

12. Disconnect the LH heated oxygen sensor (HO2S) electrical connector and detach the wiring retainer.

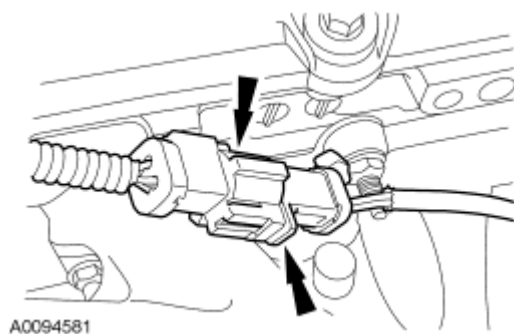


Fig. 200: Locating Heated Oxygen Sensor (HO2S) Electrical Connector & Wiring Retainer
Courtesy of FORD MOTOR CO.

13. Disconnect the oil pressure sensor electrical connector.

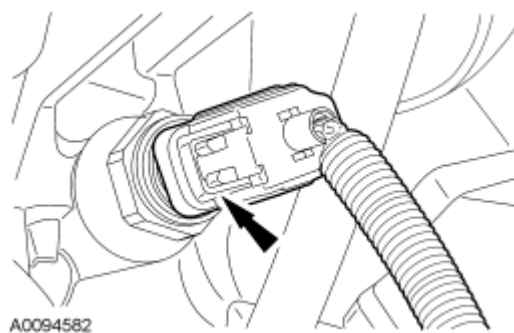


Fig. 201: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

14. Remove the 2 nuts, disconnect the camshaft position sensor (CMP) and detach the retainers.

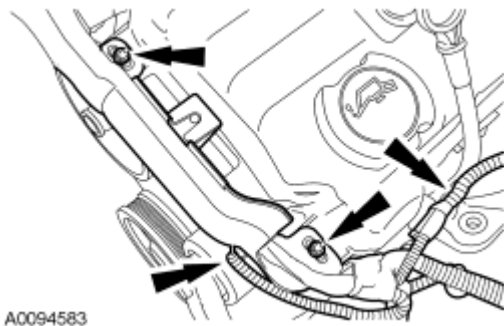


Fig. 202: Locating Camshaft Position Sensor (CMP) Electrical Connector
Courtesy of FORD MOTOR CO.

15. Loosen the fittings and remove the exhaust gas recirculation (EGR) system module tube.

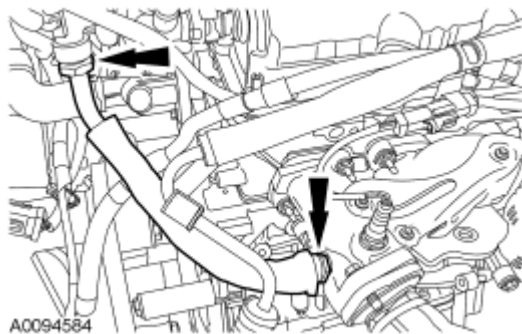


Fig. 203: Locating Exhaust Gas Recirculation (EGR) System Module Tube
Courtesy of FORD MOTOR CO.

16. Disconnect the EGR system module electrical connector.

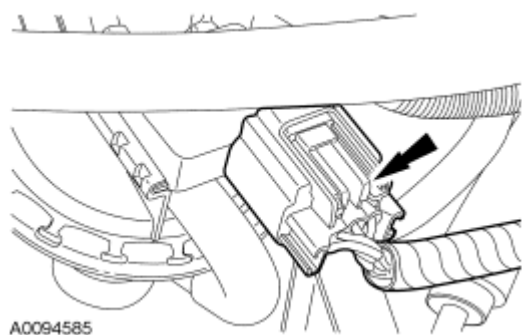


Fig. 204: Locating Exhaust Gas Recirculation (EGR) System Module Electrical Connector
Courtesy of FORD MOTOR CO.

17. Disconnect the throttle body electrical connector.

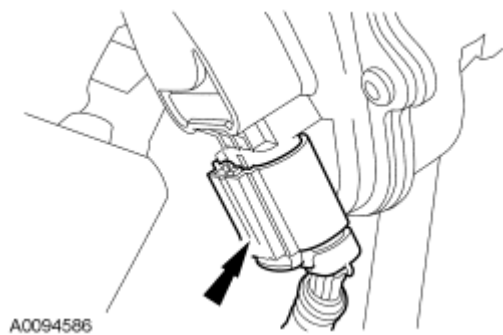


Fig. 205: Locating Throttle Body Electrical Connector
Courtesy of FORD MOTOR CO.

18. Disconnect and remove the positive crankcase ventilation (PCV) tube.

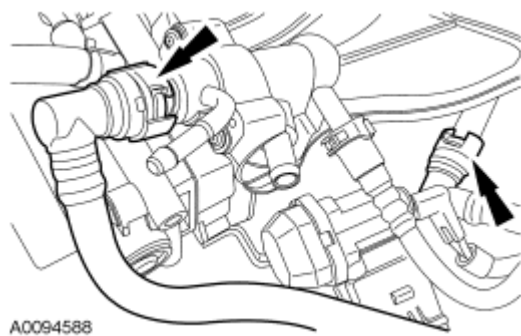


Fig. 206: Locating Positive Crankcase Ventilation (PCV) Tube
Courtesy of FORD MOTOR CO.

19. Disconnect the fuel rail pressure and temperature sensor vacuum tube and electrical connector.

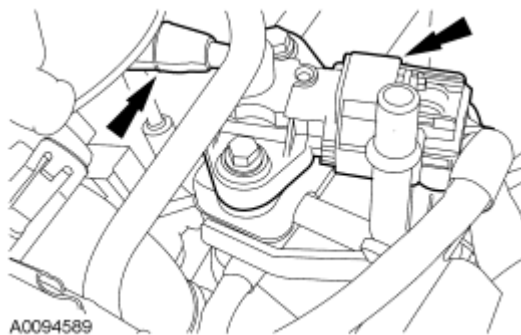


Fig. 207: Locating Fuel Rail Pressure, Temperature Sensor Vacuum Tube & Electrical Connector
Courtesy of FORD MOTOR CO.

20. Disconnect the fuel charging wiring harness electrical connector.

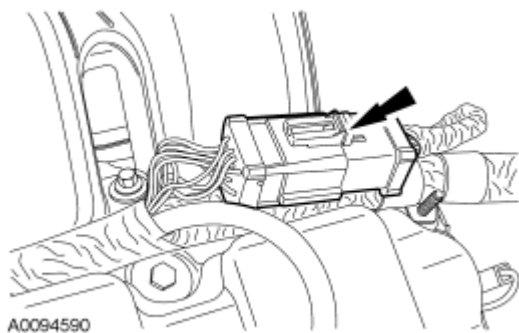


Fig. 208: Locating Fuel Charging Wiring Harness Electrical Connector
Courtesy of FORD MOTOR CO.

21. Disconnect the RH HO2S and detach the retainer.

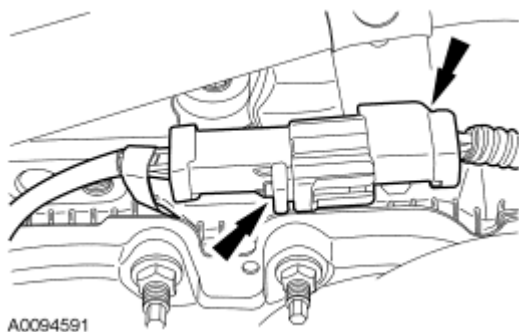


Fig. 209: Locating HO2S Connector & Retainer
Courtesy of FORD MOTOR CO.

22. Remove the bolt and detach the power steering tube bracket.

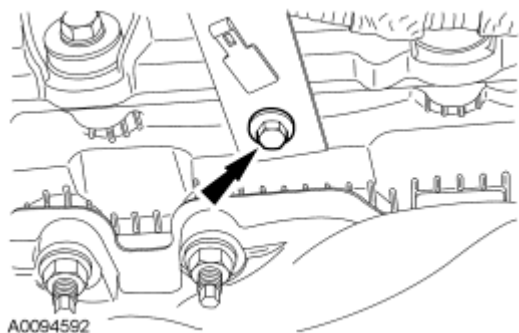


Fig. 210: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

23. Remove the bolt and detach the power steering tube bracket.

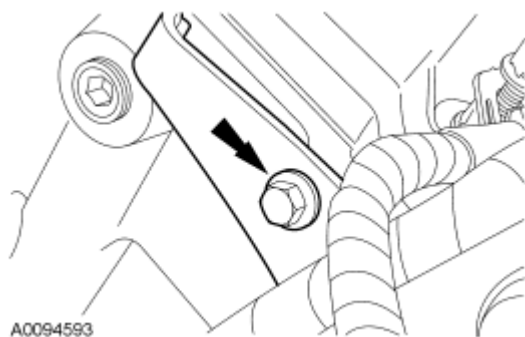


Fig. 211: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

24. Remove the 2 nuts and detach the power steering fluid reservoir.

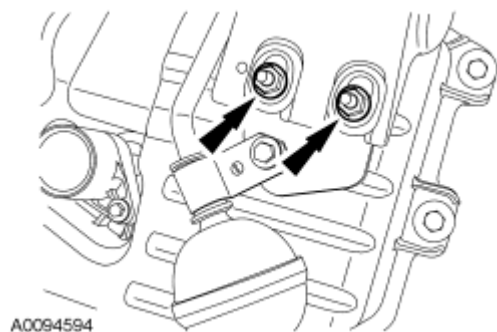


Fig. 212: Locating Power Steering Fluid Reservoir Nuts
Courtesy of FORD MOTOR CO.

25. Remove the power steering fluid reservoir bracket nut.

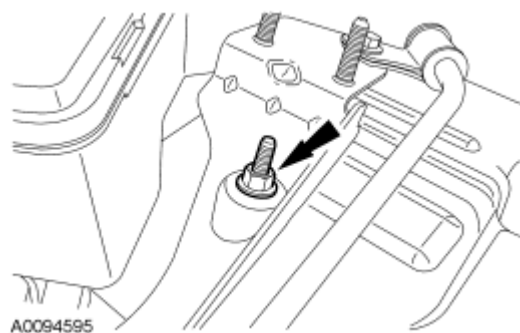


Fig. 213: Locating Power Steering Fluid Reservoir Bracket Nut
Courtesy of FORD MOTOR CO.

26. Remove the 3 nuts and the power steering pump, reservoir and tubes.

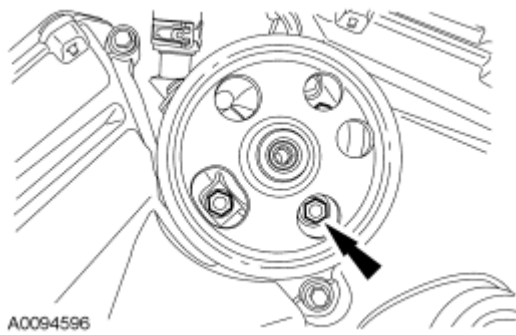


Fig. 214: Locating Power Steering Pump Nuts
Courtesy of FORD MOTOR CO.

27. Remove the 8 bolts and the upper and lower intake manifold.
- Remove and discard the gaskets.

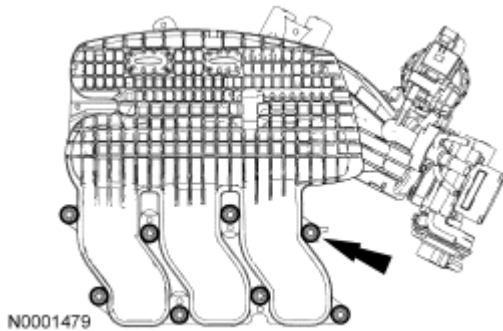


Fig. 215: Locating Upper & Lower Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

28. Remove the nut and position the wiring conduit aside.



Fig. 216: Locating Wiring Conduit Nut
Courtesy of FORD MOTOR CO.

29. Disconnect the RH ignition coil electrical connectors and detach the wiring retainers.

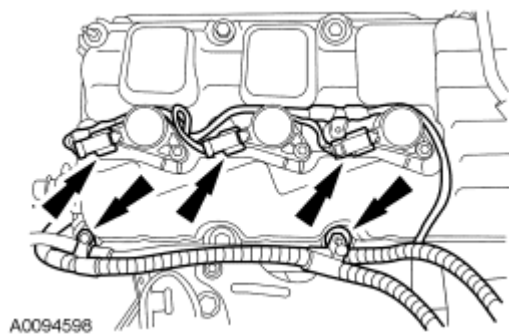


Fig. 217: Locating Ignition Coil Electrical Connectors & Wiring Retainers
Courtesy of FORD MOTOR CO.

30. Remove the nut and disconnect the generator wiring.
- Detach the wiring retainer.

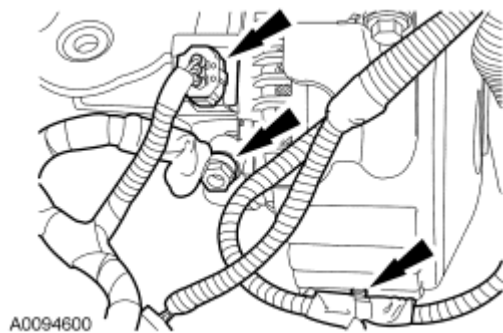


Fig. 218: Locating Generator Wiring Nut
Courtesy of FORD MOTOR CO.

31. Remove the nut and detach the ground wire.

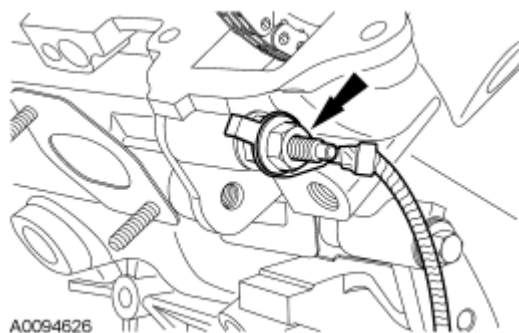


Fig. 219: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

32. Disconnect the crankshaft position sensor (CKP) electrical connector and detach the wiring retainer.

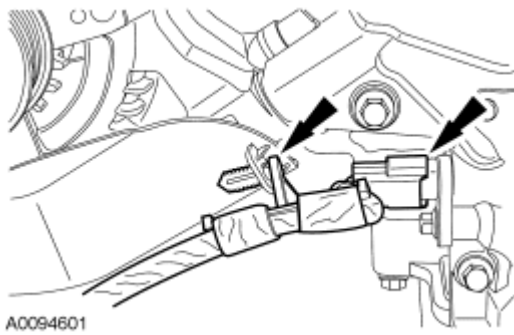


Fig. 220: Locating Crankshaft Position Sensor (CKP) Electrical Connector & Wiring Retainers
Courtesy of FORD MOTOR CO.

33. Disconnect the LH ignition coil electrical connectors and detach the wiring retainers.

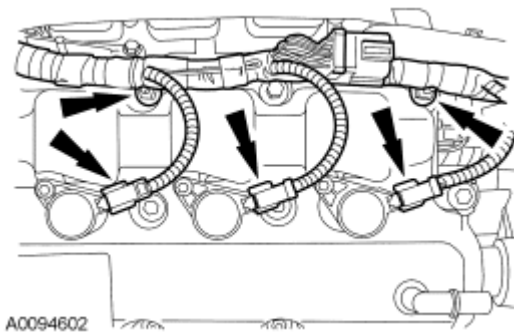


Fig. 221: Locating Ignition Coil Electrical Connectors & Wiring Retainers
Courtesy of FORD MOTOR CO.

34. Disconnect the engine coolant temperature (ECT) sensor and the radio interference capacitor electrical connectors.

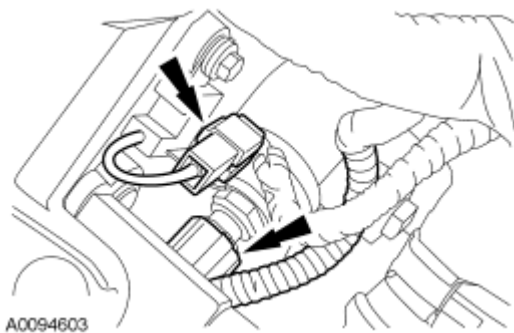


Fig. 222: Locating Engine Coolant Temperature Sensor & Radio Interference Capacitor Connectors
Courtesy of FORD MOTOR CO.

35. Disconnect the bypass and the coolant pump hoses.

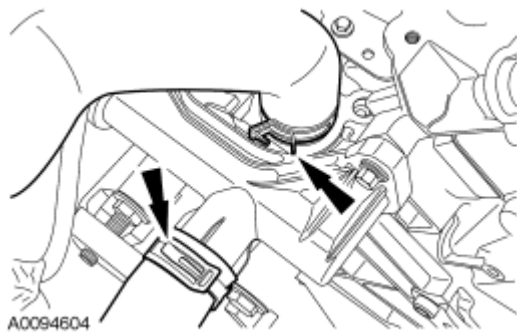


Fig. 223: Locating Bypass & Coolant Pump Hoses
Courtesy of FORD MOTOR CO.

36. Remove the engine wiring harness.
37. Remove the stud bolt and the oil level indicator tube.
 - Remove and discard the O-ring seal.

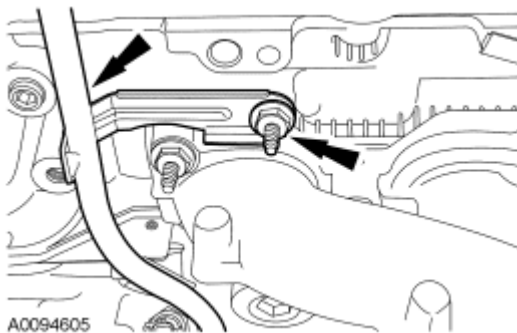


Fig. 224: Locating Oil Level Indicator Tube & Stud Bolt
Courtesy of FORD MOTOR CO.

38. Remove and discard the oil filter.

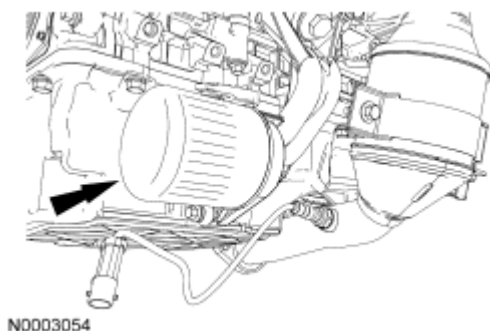


Fig. 225: Locating Oil Filter
Courtesy of FORD MOTOR CO.

39. Remove the 4 bolts and the oil filter adapter.
 - Remove and discard the O-ring seal from the M22 bolt.

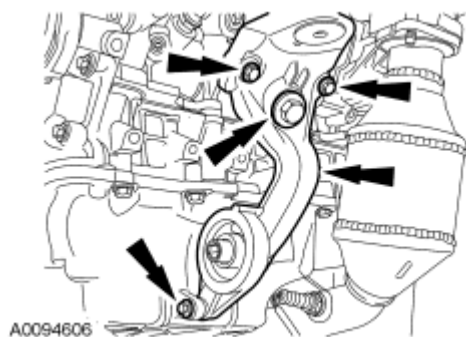


Fig. 226: Locating Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

40. Remove the 2 nuts, bolt and the generator.

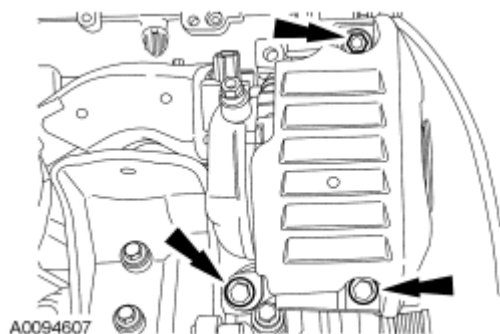


Fig. 227: Locating Generator Nuts & Bolt
Courtesy of FORD MOTOR CO.

41. Remove the 4 bolts and the RH engine insulator bracket.

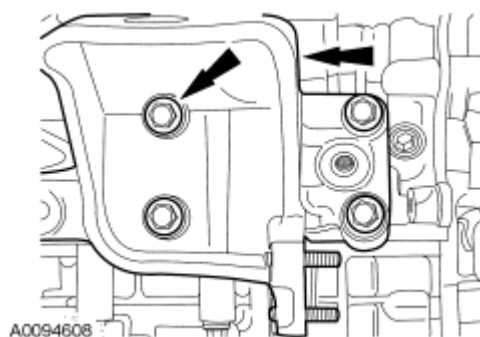


Fig. 228: Locating Engine Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

42. Remove and discard the 6 RH exhaust manifold nuts.

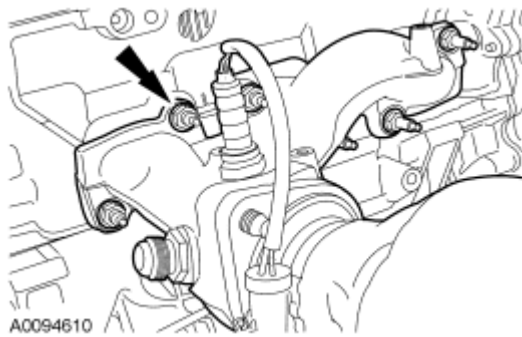


Fig. 229: Locating Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

43. Remove the RH exhaust manifold.
 - Remove and discard the gasket.
44. Remove and discard the 6 RH exhaust manifold studs.

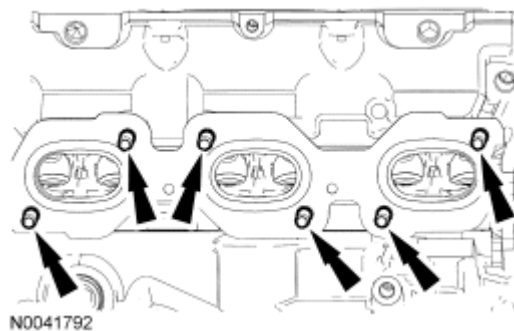


Fig. 230: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

45. Remove and discard the 6 LH exhaust manifold nuts.

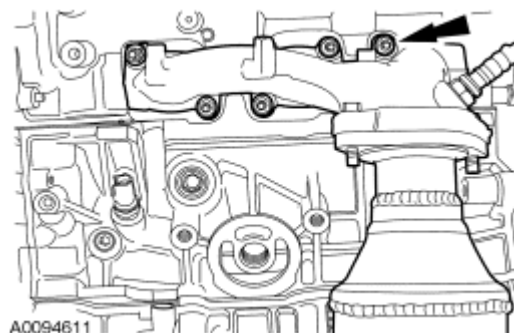


Fig. 231: Locating Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

46. Remove the LH exhaust manifold.
 - Remove and discard the gasket.

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

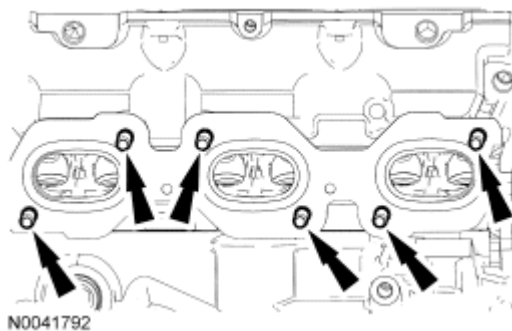


Fig. 232: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

48. Remove the 6 bolts and the RH and LH ignition coils.

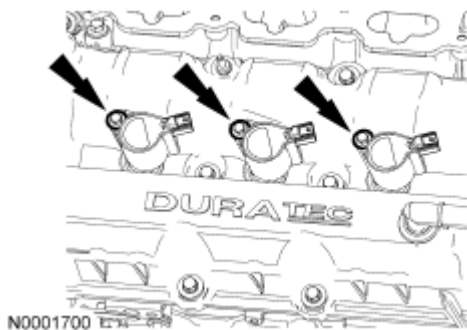


Fig. 233: Locating Ignition Coils
Courtesy of FORD MOTOR CO.

49. Remove the 6 bolts, 8 stud bolts and the LH valve cover.
- Remove and discard the gasket.

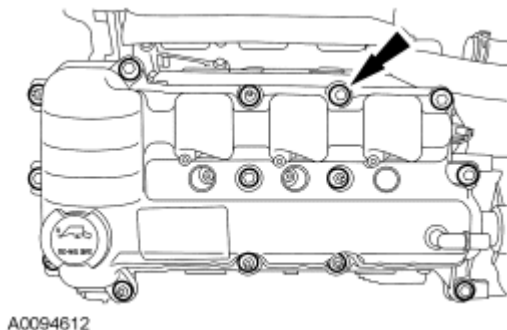


Fig. 234: Locating LH Valve Cover Bolt
Courtesy of FORD MOTOR CO.

50. Remove the 9 bolts, 5 stud bolts and the RH valve cover.

- Remove and discard the gasket.

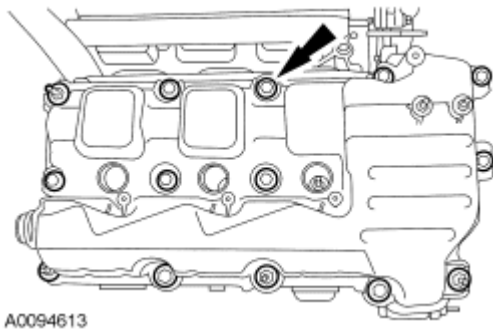


Fig. 235: Locating RH Valve Cover Bolt
Courtesy of FORD MOTOR CO.

51. Remove the 2 bolts and the thermostat housing.
- Remove and discard the O-ring seal.

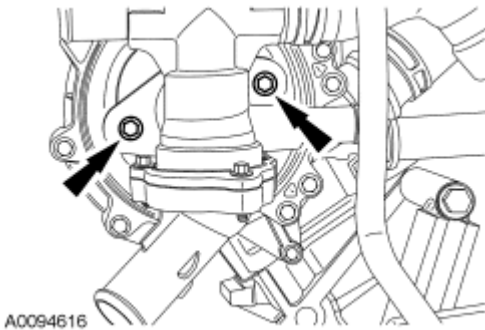


Fig. 236: Locating Thermostat Housing Bolts
Courtesy of FORD MOTOR CO.

52. Remove the 4 bolts and the coolant pump.

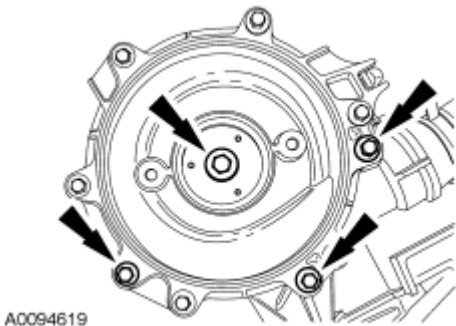


Fig. 237: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

53. Remove the 2 bolts and the coolant bypass tube.

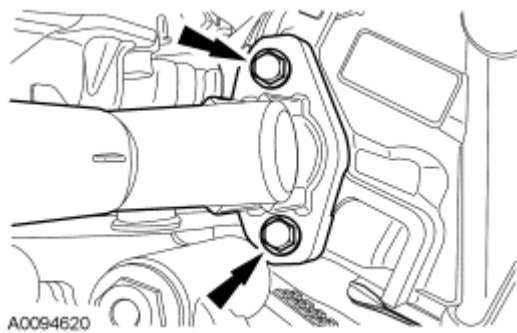


Fig. 238: Locating Coolant Bypass Tube Bolts
Courtesy of FORD MOTOR CO.

54. Remove the bolt and the radio interference capacitor.



Fig. 239: Locating Radio Interference Capacitor Bolt
Courtesy of FORD MOTOR CO.

55. Remove the 15 bolts and the oil pan.
- Remove and discard the gasket.

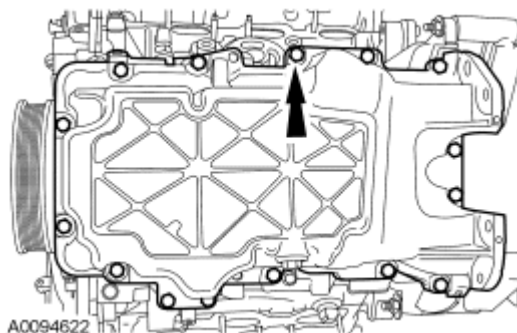


Fig. 240: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

56. Remove the 2 bolts and the oil pump screen and pickup tube.
- Remove and discard the O-ring seal.

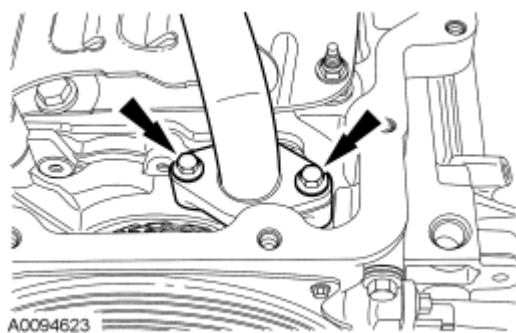


Fig. 241: Locating Oil Pump Screen & Pickup Tube Bolts
Courtesy of FORD MOTOR CO.

57. Remove the 8 nuts and the oil pan baffle.

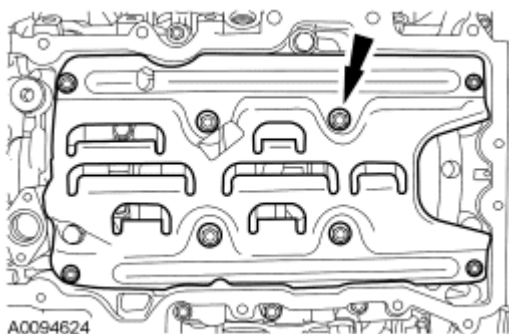


Fig. 242: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

58. Remove the oil pressure sender.

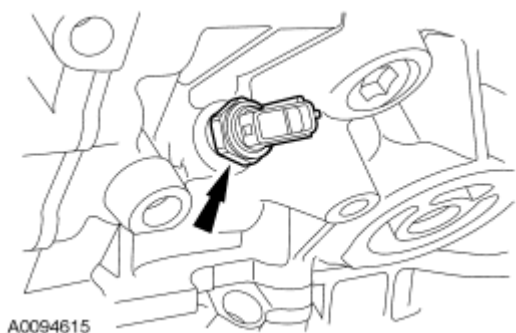


Fig. 243: Locating Oil Pressure Sender
Courtesy of FORD MOTOR CO.

59. If equipped, remove the block heater.

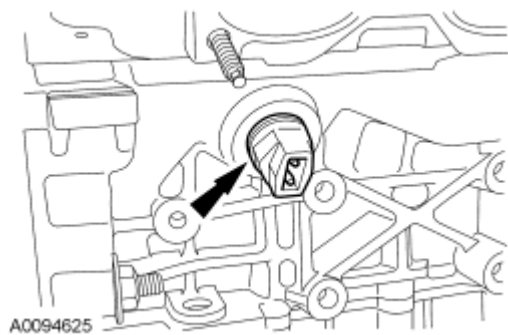


Fig. 244: Locating Block Heater
Courtesy of FORD MOTOR CO.

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

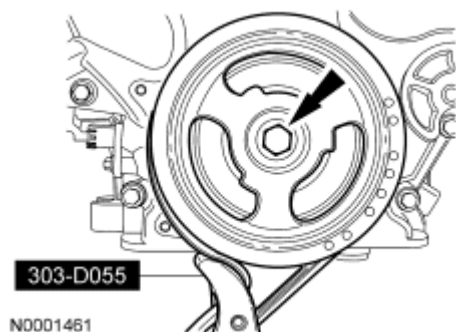


Fig. 245: Identifying Crankshaft Pulley Bolt & Special Tools
Courtesy of FORD MOTOR CO.

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

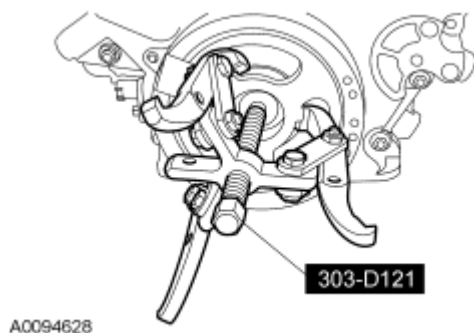
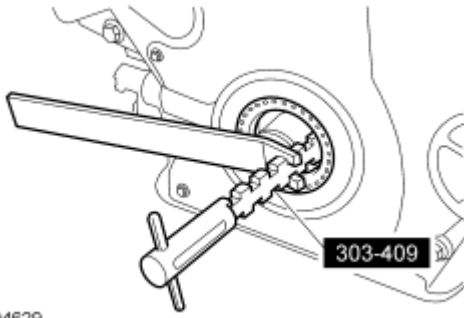


Fig. 246: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

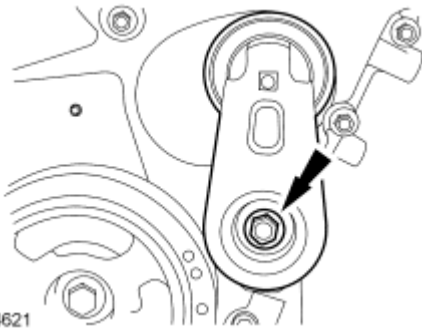
62. Using the special tool, remove and discard the crankshaft front seal from the engine front cover.



A0094629

Fig. 247: Removing Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

63. Remove the bolt and the belt tensioner.

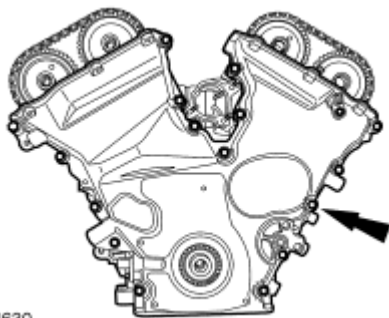


A0094621

Fig. 248: Locating Belt Tensioner Bolt
Courtesy of FORD MOTOR CO.

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

64. Remove the stud bolt, 14 bolts and the front cover.
- Remove and discard the gaskets.



A0094630

Fig. 249: Locating Front Cover Bolts & Stud 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 "30 RFF" only (orange in color).

65. Remove the ignition pulse wheel.

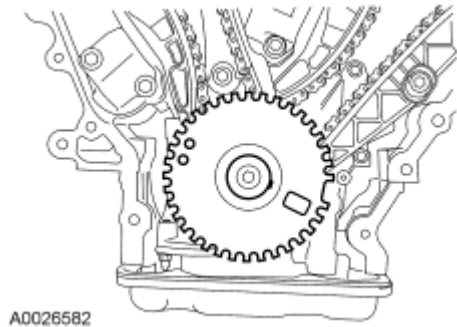


Fig. 250: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

66. Install the damper bolt.

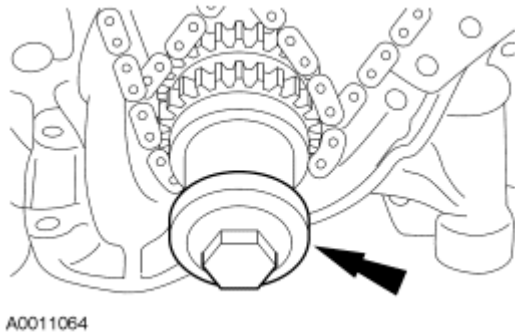


Fig. 251: Identifying Damper Bolt
Courtesy of FORD MOTOR CO.

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.

67. Remove the LH and RH spark plugs.

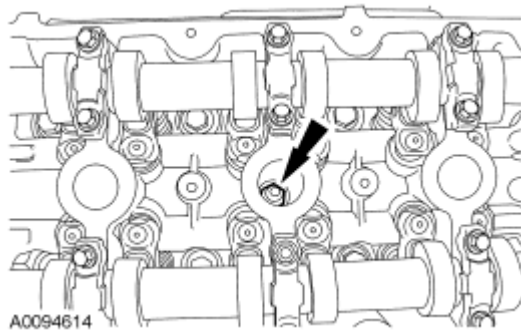


Fig. 252: Locating Spark Plugs
Courtesy of FORD MOTOR CO.

68. 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 No. 1 cylinder at top dead center (TDC).
- Verify that the camshafts are correctly located. If not, rotate the crankshaft one additional turn and recheck.

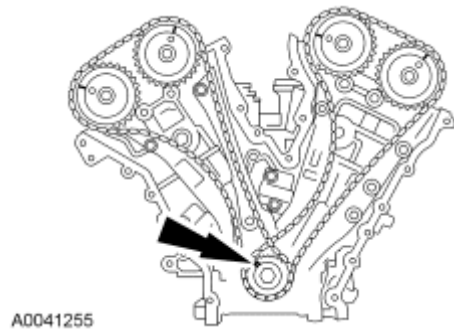


Fig. 253: Identifying Crankshaft Keyway In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

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

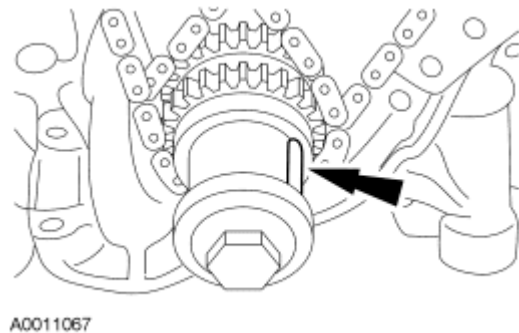


Fig. 254: Identifying Crankshaft Keyway
Courtesy of FORD MOTOR CO.

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

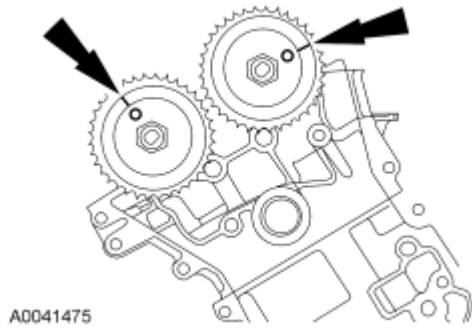


Fig. 255: Locating Camshafts Align Marks
Courtesy of FORD MOTOR CO.

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

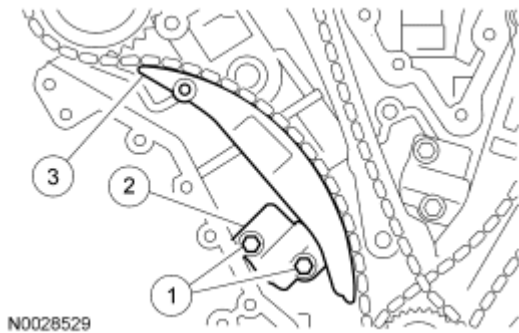


Fig. 256: Identifying RH Timing Chain Tensioner Arm & Bolts
Courtesy of FORD MOTOR CO.

72. Remove the 2 bolts, RH timing chain guide and the timing chain.

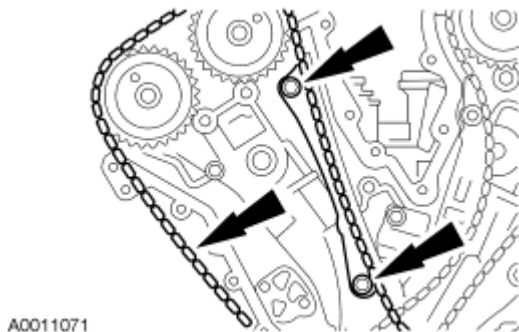
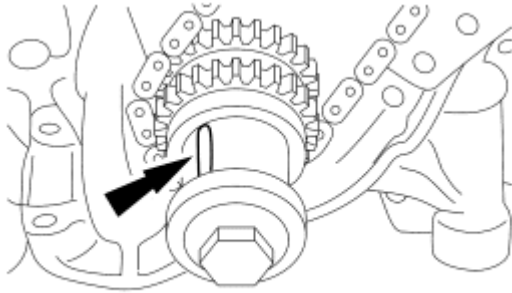


Fig. 257: Locating Timing Chain Guide & Bolts
Courtesy of FORD MOTOR CO.

73. Rotate the crankcase clockwise 600 degrees (1-2/3 turns) to position the crankcase keyway in the 11

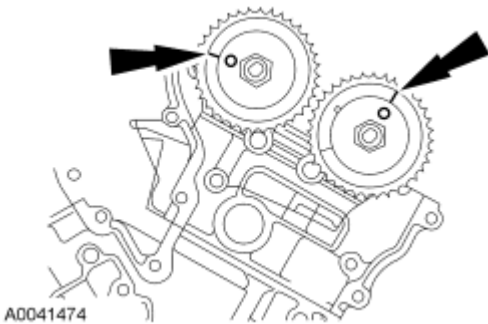
o'clock position. This will position the LH camshafts in the neutral position.



A0011072

Fig. 258: Positioning Crankcase Key Way In 11 O'Clock Position
Courtesy of FORD MOTOR CO.

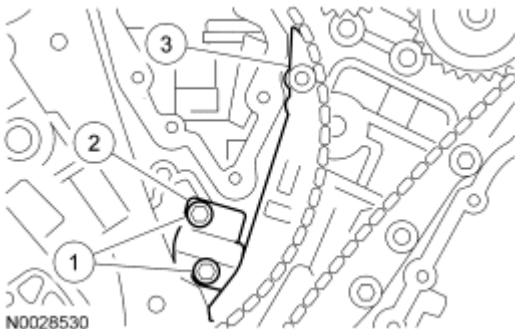
74. Verify the LH camshafts are in the neutral position.



A0041474

Fig. 259: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

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



N0028530

Fig. 260: Identifying LH Timing Chain & Tensioner Arm Bolt
Courtesy of FORD MOTOR CO.

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

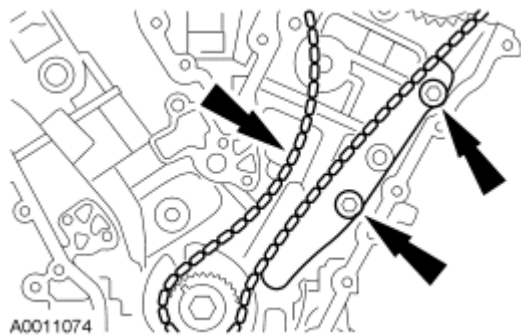


Fig. 261: Locating Timing Chain & Timing Chain Guide
Courtesy of FORD MOTOR CO.

77. Remove the damper bolt and the crankshaft sprockets.

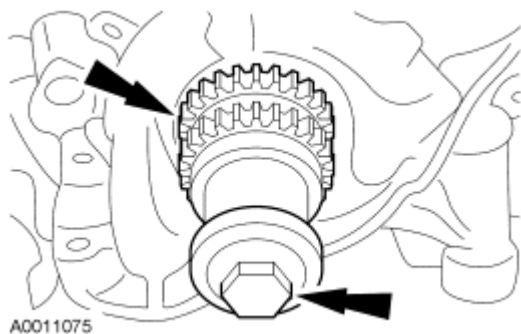


Fig. 262: Locating Damper Bolt & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

78. Remove the 3 bolts and camshaft oil seal retainer.
- Remove and discard the press-in-place gasket.

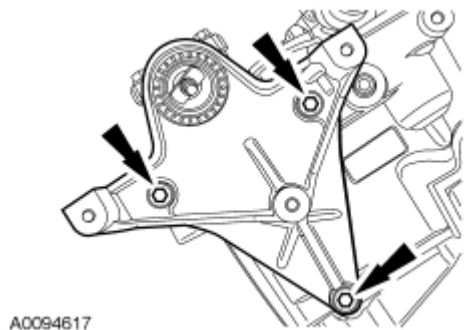


Fig. 263: Locating Camshaft Oil Seal Retainer Bolts
Courtesy of FORD MOTOR CO.

79. Using a suitable press, remove the camshaft oil seal.

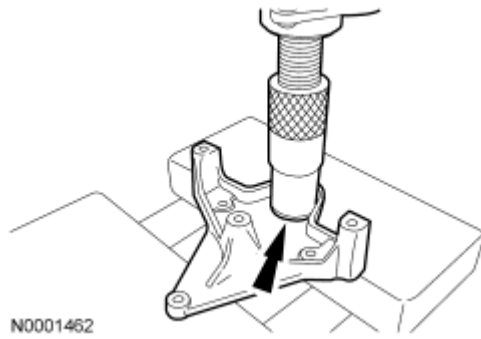


Fig. 264: Removing Camshaft Oil Seal
Courtesy of FORD MOTOR CO.

CAUTION: Cylinder head camshaft bearing caps must be assembled in their original positions. Some engines have factory markings on the camshaft bearing caps (as shown in illustration). Engines that do not have the factory markings must be marked for correct position and orientation prior to removal. Failure to install the camshaft bearing caps in their original position may result in severe engine damage.

80. If necessary, mark the camshaft bearing cap position and orientation as shown in the illustration.

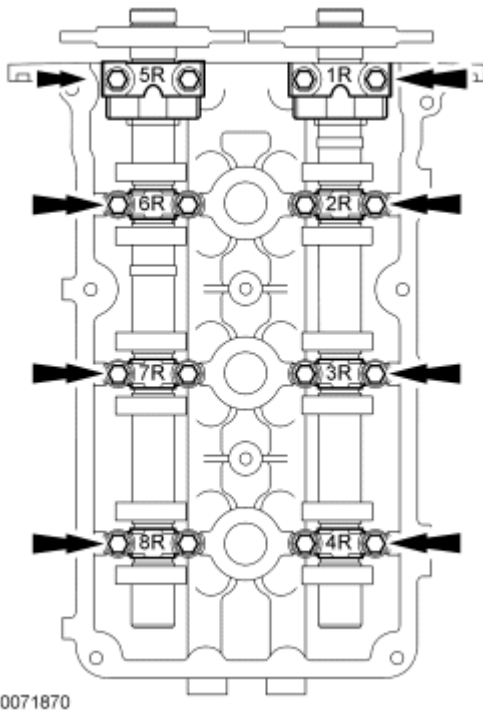


Fig. 265: Identifying Factory Markings On Right Camshaft Bearing Caps
Courtesy of FORD MOTOR CO.

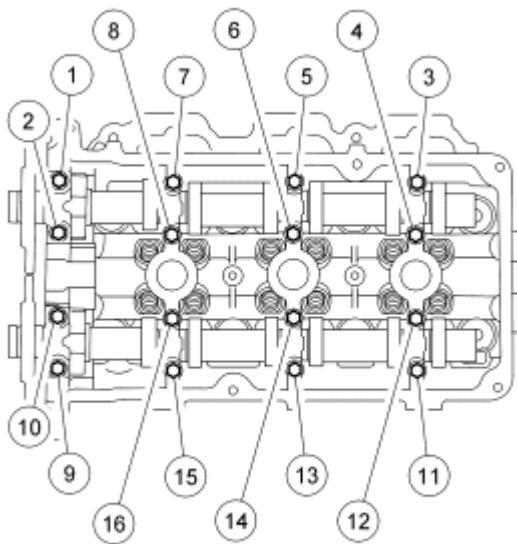
NOTE: Make sure the camshaft bearing caps are marked as instructed in the

previous step.

NOTE: RH shown, LH similar.

NOTE: The camshaft caps have alignment dowels.

81. Loosen the LH and RH camshaft cap bolts in the indicated sequence and remove the camshaft caps.
- Tap the caps lightly with a soft-faced mallet to loosen the camshaft caps.



N0028541

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

82. Remove the LH and RH camshafts.

CAUTION: The camshaft roller followers must be installed in their original positions or damage to the engine may occur.

NOTE: RH shown, LH similar.

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

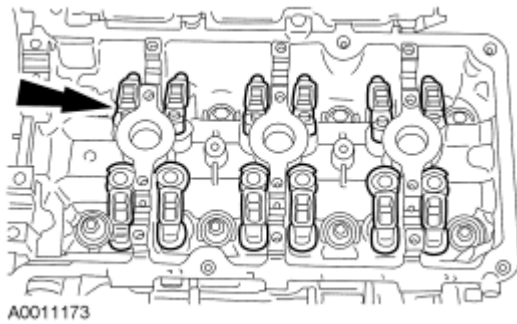


Fig. 267: Locating Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

84. Loosen the bolts in the indicated sequence and remove the LH and RH cylinder heads.
 - Remove and discard the gaskets and the bolts.

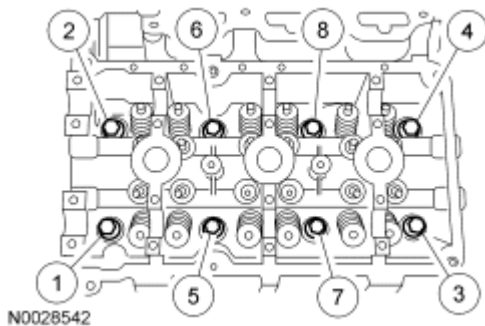


Fig. 268: Identifying Loosening Sequence Of Cylinder Heads Bolts
Courtesy of FORD MOTOR CO.

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

NOTE: Observe all warnings or cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

85. Clean the cylinder head-to-cylinder block mating surface of both the cylinder head and the cylinder block.
 1. Remove any large deposits of silicone or gasket material with a plastic scraper.
 2. Apply silicone gasket remover, following package directions, and allow to set for several minutes.

3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
 4. Apply metal surface prep, following package directions, to remove any traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.
86. 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.**

87. 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).
88. Remove the 3 bolts and the power steering pump bracket.



Fig. 269: Locating Power Steering Pump Bracket Bolts
Courtesy of FORD MOTOR CO.

89. Remove the 2 bolts and the oil separator cover.
- Remove and discard the gasket.

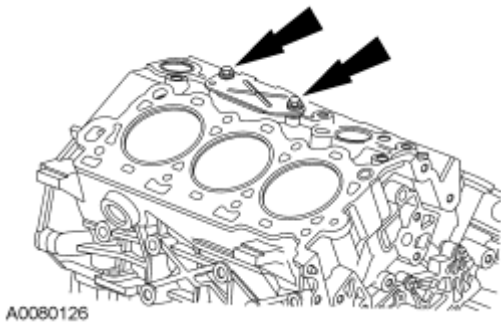


Fig. 270: Locating Oil Separator Cover Bolts
Courtesy of FORD MOTOR CO.

90. Remove the crankshaft key.

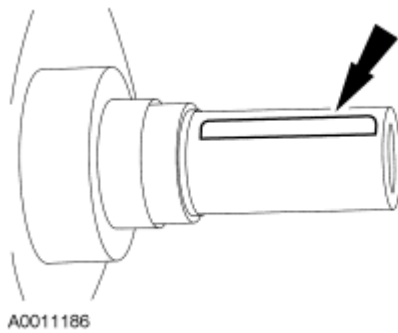


Fig. 271: Locating Crankshaft Key
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

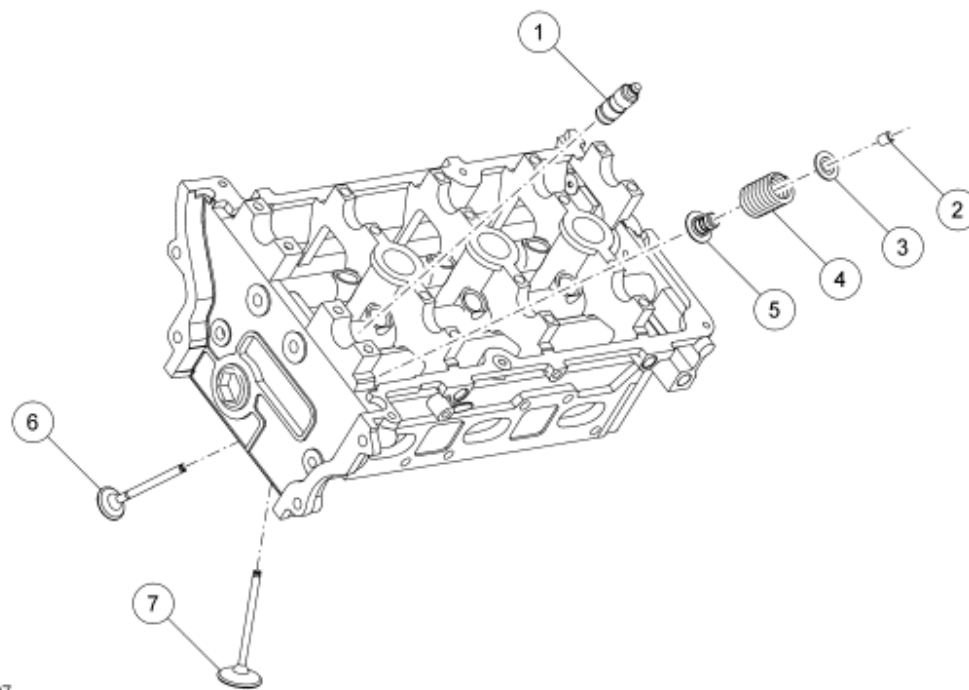
CYLINDER HEAD

Special Tools

Illustration	Tool Name	Tool Number
ST1981-A	Compressor, Valve Spring	303-300 (T87C-6565-A)
ST1907-A	Compressor, Valve Spring	303-350 (T89P-6565-A)
ST1906-A	Installer, Valve Stem Oil Seal	303-470 (T94P-6510-CH)

Material

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



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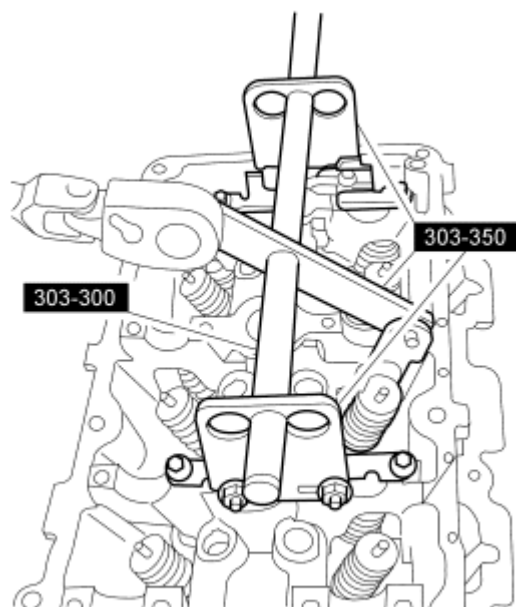
Fig. 272: Exploded View Of Cylinder Head Components
Courtesy of FORD MOTOR CO.

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

DISASSEMBLY

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

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



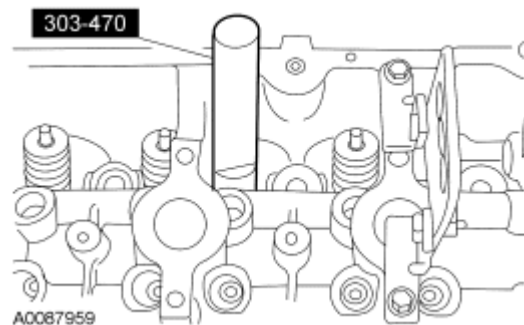
A0087958

Fig. 273: Identifying Special Tools (303-300 & 303-350)
Courtesy of FORD MOTOR CO.

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

ASSEMBLY

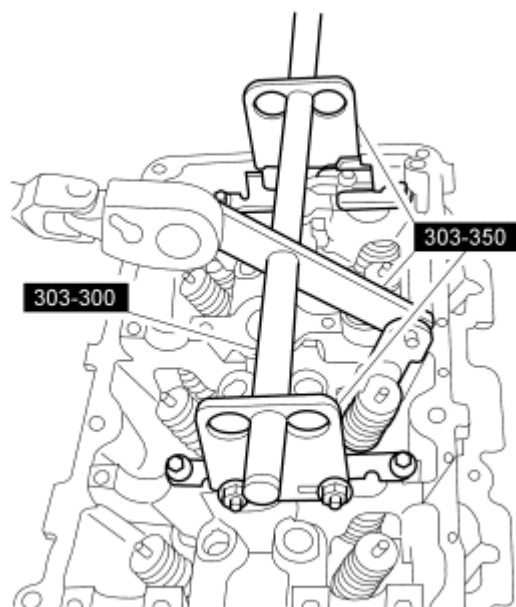
1. Using the special tool, install the valve stem seal.



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Fig. 274: Installing Valve Stem Seal
Courtesy of FORD MOTOR CO.

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



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Fig. 275: Identifying Special Tools (303-300 & 303-350)
 Courtesy of FORD MOTOR CO.

4. Install the hydraulic lash adjusters.

PISTON

Material

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

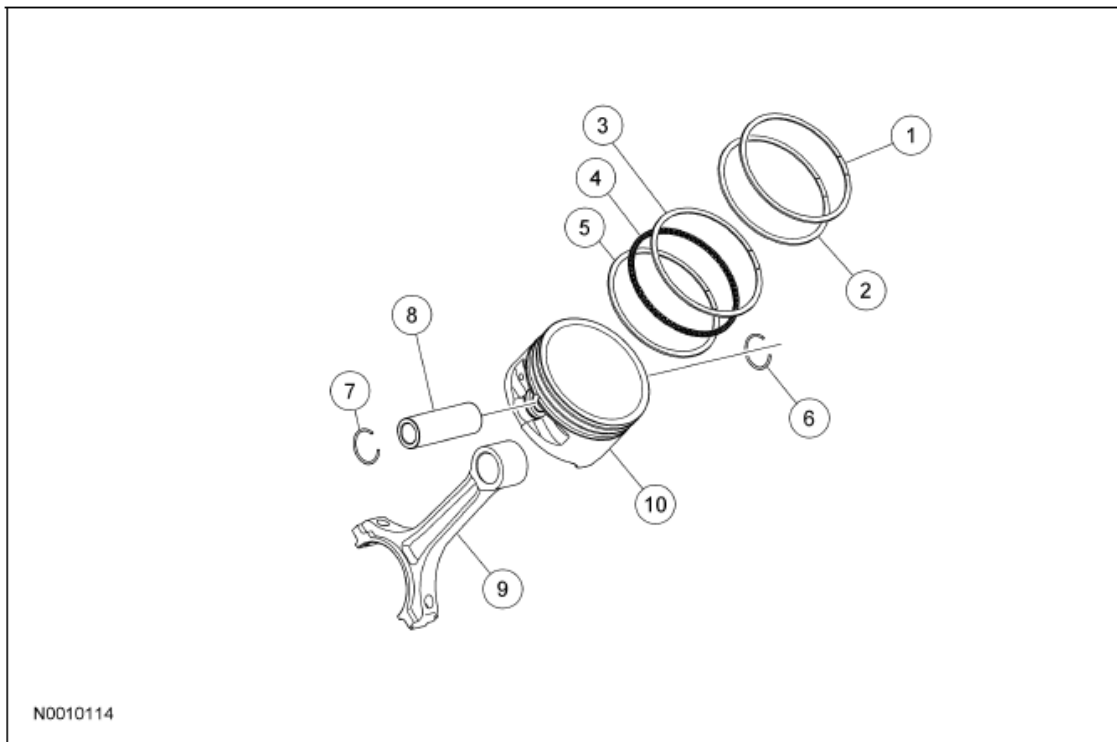


Fig. 276: Exploded View Of Engine Piston Assembly
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6150	Piston compression upper ring
2	6152	Piston compression lower ring
3	6159	Piston oil control upper segment ring
4	6161	Piston oil control spacer
5	6159	Piston oil control lower segment ring
6	6140	Piston pin retainer
7	6140	Piston pin retainer
8	6135	Piston pin
9	6200	Connecting rod
10	6110	Piston

Disassembly

1. Remove the piston rings from the piston.
 - Discard the piston rings.
2. Remove the 2 piston pin retainers and the piston pin.

NOTE: If the piston and connecting rod are to be reinstalled, they must be assembled in the same orientation. Mark the piston orientation to the connecting rod for reassembly.

3. Separate the piston from the connecting rod.
4. Clean and inspect the piston and connecting rod. For additional information, refer to **SPECIFICATIONS**.

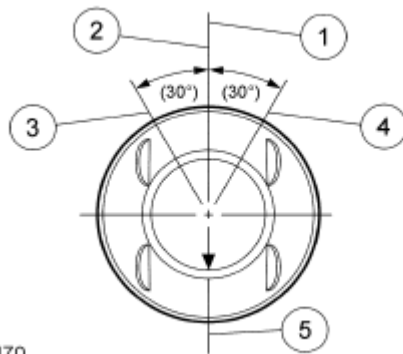
Assembly

1. Align the piston-to-connecting rod orientation marks and position the connecting rod in the piston.
2. Lubricate the piston pin and pin bore with clean engine oil.
3. Install the piston pin in the piston and connecting rod assembly.
4. Install the piston pin retaining clips in the piston.
5. Lubricate the piston and the new piston rings with clean engine oil.

NOTE: The piston compression lower ring should be installed with the "O" mark on the ring face pointing up toward the top of the piston.

NOTE: When installing the piston oil control spacer, orient the gap such that the cut ends are pointed toward the top of the piston.

6. Install the piston rings onto the piston as shown in the figure below.
 1. Center line of the piston parallel to the wrist pin bore
 2. Upper compression ring gap location
 3. Upper oil control segment ring gap location
 4. Lower oil control segment ring gap location
 5. Expander ring and lower compression ring gap location



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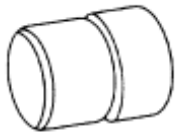
Fig. 277: Exploded View Of Piston Ring Position
Courtesy of FORD MOTOR CO.

ASSEMBLY**ENGINE**

2007 Mercury Montego

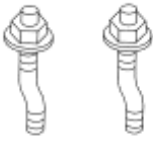
2007 ENGINE Engine - Five Hundred, Freestyle & Montego

Special Tools

Illustration	Tool Name	Tool Number
 ST1287-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST2296-A	Installer, Front Cover Oil Seal	303-335 (T88T-6701-A)
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A)
 ST1586-A	Installer, Power Steering Pump Pulley	211-185 (T91P-3A733-A)
 ST2060-A	Protector, Camshaft Oil Seal	303-463 (T94P-6256-AH)
 ST2867-A	Installer, Camshaft Pulley	303-458 (T94P-6312-AH3)
 ST1404-A	Installer, Camshaft Oil Seal	303-1139
 ST1327-A	Installer, Crankshaft Rear Main Oil Seal	303-178 (T82L-6701-A)

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego

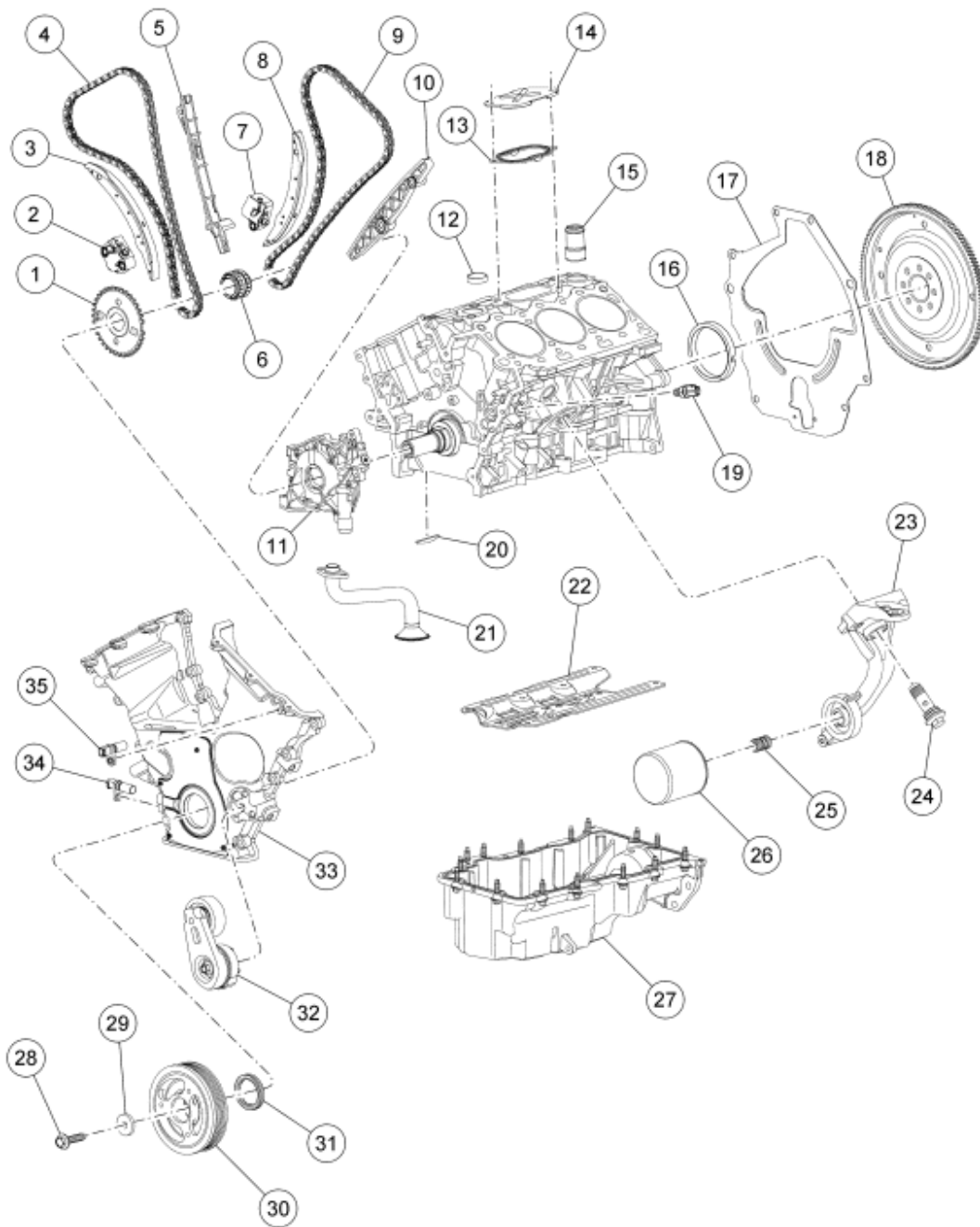
 ST1333-A	Installer Bolts, Crankshaft Rear Main Oil Seal	303-384 (T91P-6701-A)
 ST2463-A	Lifting Brackets, Engine	134-00243 or equivalent
 ST1602-A	Spreader Bar	303-D089 (D93P-6001-A3) or equivalent

Material

Item	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
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 Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego



N0040023

Fig. 278: Exploded View Of Engine Block Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	12A227	Ignition pulse wheel
2	6L266	RH timing chain tensioner
3	6K255	RH timing chain tensioner arm

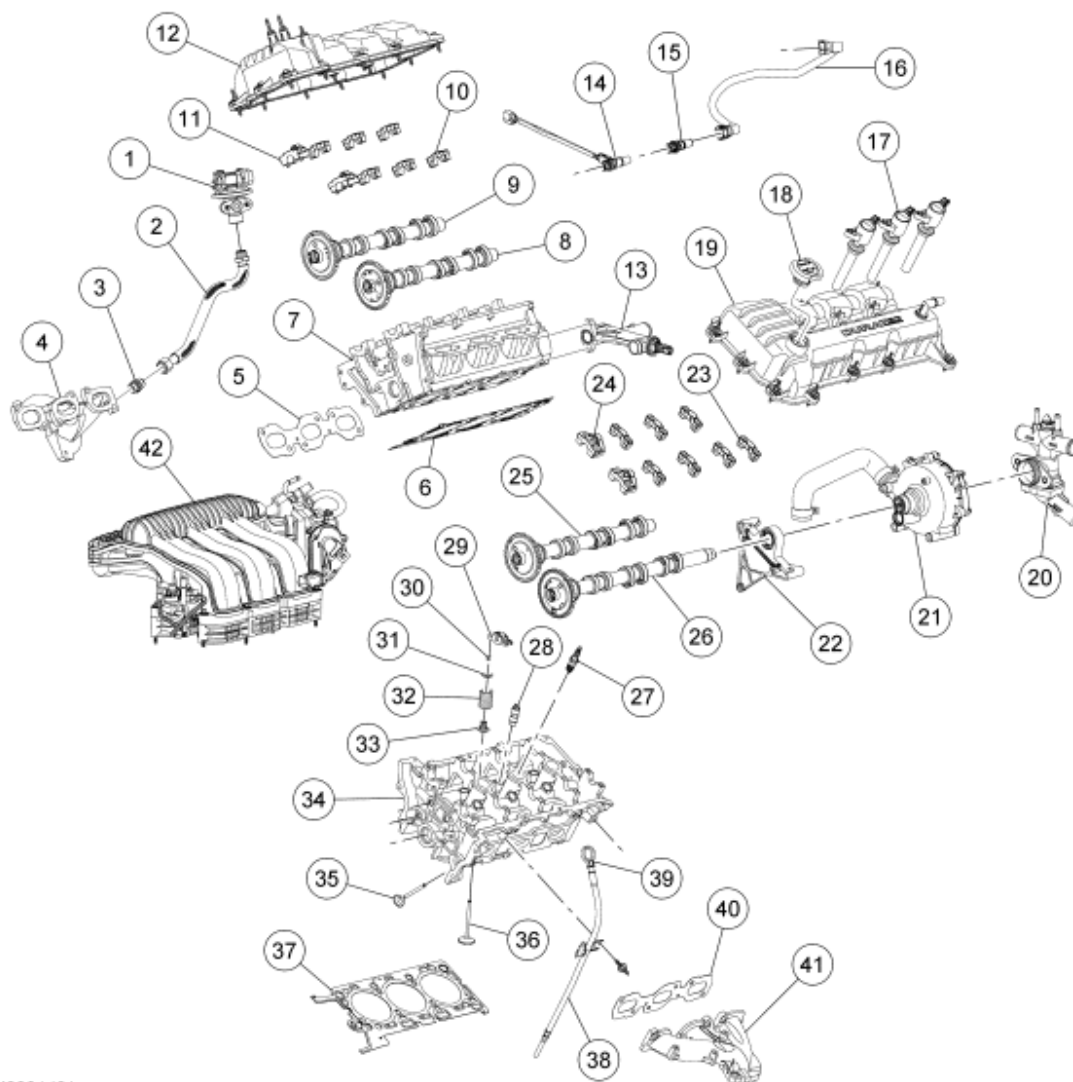
2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego

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	6889	Oil separator cover
15	8A505	Water inlet tube
16	6701	Crankshaft rear oil seal
17	-	Spacer plate
18	6375	Flexplate
19	9278	Oil pressure sender
20	W705934	Woodruff key
21	6622	Oil pickup tube and screen
22	6687	Oil pan baffle
23	6881	Oil filter adapter
24	6894	Oil filter adapter bolt
25	6890	Oil filter adapter insert
26	6714	Oil filter
27	6675	Oil pan
28	W701512	Crankshaft vibration damper bolt
29	W701511	Crankshaft vibration damper washer
30	6316	Crankshaft vibration damper
31	6700	Crankshaft front seal
32	6B209	Accessory drive belt tensioner
33	6019	Front cover
34	6B288	Crankshaft position (CKP) sensor
35	6C315	Camshaft position (CMP) sensor

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N0001481

Fig. 279: Exploded View Of Engine Heads, Intake & Exhaust Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9D475	Exhaust gas recirculation (EGR) system module
2	9D477	EGR module tube
3	9F485	RH exhaust manifold insert
4	9431	RH exhaust manifold
5	9448	RH exhaust manifold gasket
6	6051	RH cylinder head gasket
7	6050	RH cylinder head
8	6A266	RH exhaust camshaft
9	6A268	RH intake camshaft

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10	6A258	Camshaft journal cap
11	6B280	Camshaft bearing cap
12	6582	RH valve cover
13	8548	Coolant bypass tube
14	9769	Positive crankcase ventilation (PCV) valve (heated)
15	6A666	PCV valve (non-heated)
16	6K817	PCV tube
17	12A366	Coil-on-plug (6 required)
18	6766	Oil fill cap
19	6A405	LH valve cover
20	8A586	Thermostat housing
21	8501	Coolant pump
22	6B293	Camshaft oil seal retainer
23	6A258	Camshaft journal cap
24	6B280	Camshaft bearing cap
25	6A267	LH intake camshaft
26	6A269	LH exhaust camshaft
27	12405	Spark plug
28	6C501	Hydraulic lash adjuster
29	6529	Camshaft roller follower
30	6514	Valve spring retainer
31	6518	Valve spring retainer key
32	6513	Valve spring
33	6A517	Valve stem seal
34	6049	LH cylinder head
35	6507	Exhaust valve
36	6505	Intake valve
37	6083	LH cylinder head gasket
38	6754	Oil level indicator tube
39	6750	Oil level indicator
40	9448	LH exhaust manifold gasket
41	9431	LH exhaust manifold
42	9424/9J477	Upper/lower intake manifold

All vehicles

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

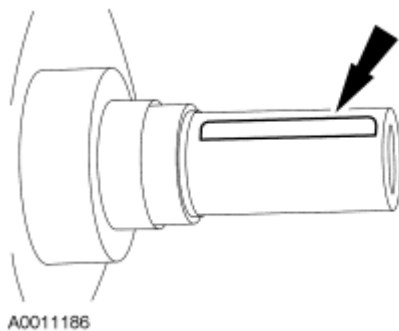


Fig. 280: Locating Crankshaft Key
Courtesy of FORD MOTOR CO.

2. Install the oil separator cover, a new gasket and the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

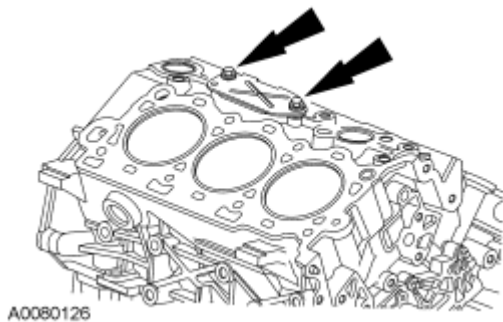


Fig. 281: Locating Oil Separator Cover Bolts
Courtesy of FORD MOTOR CO.

3. Install the power steering pump bracket and the 3 bolts.
 - Tighten to 25 Nm (18 lb-ft).

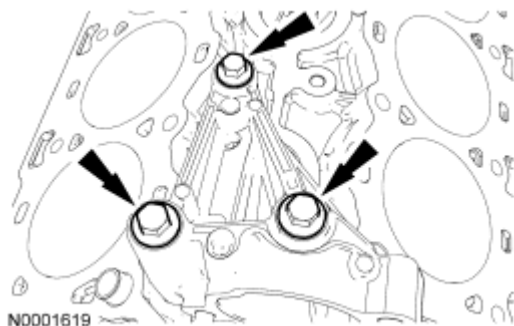


Fig. 282: Locating Power Steering Pump Bracket Bolts
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

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

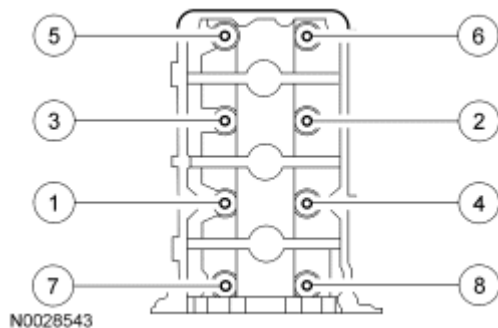


Fig. 283: Identifying Cylinder Heads Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

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

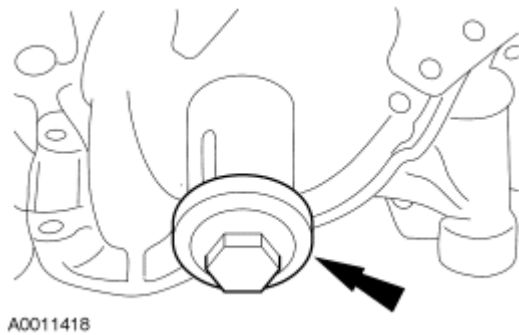


Fig. 284: Locating Crankshaft Damper Bolt
Courtesy of FORD MOTOR CO.

6. 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.

7. Install the LH and RH camshaft roller followers.

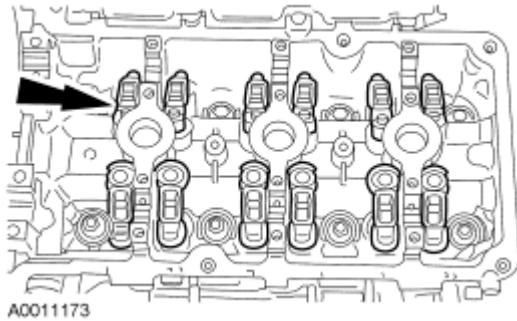


Fig. 285: Locating Camshaft Roller Followers
Courtesy of FORD MOTOR CO.

8. Apply clean engine oil to the LH and RH camshafts.
9. Install the LH and RH camshafts.
 - Locate the camshafts as shown.

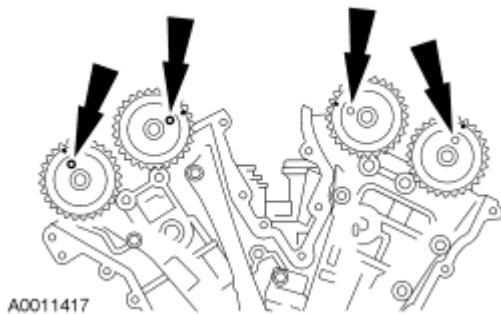


Fig. 286: Locating Camshafts Matching Marks
Courtesy of FORD MOTOR CO.

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

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

10. Lubricate the camshaft journal caps with clean engine oil. Position the LH camshaft caps and install the bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

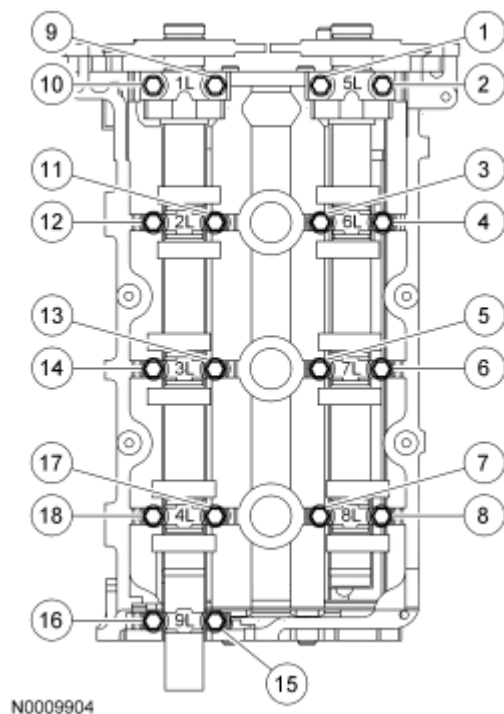
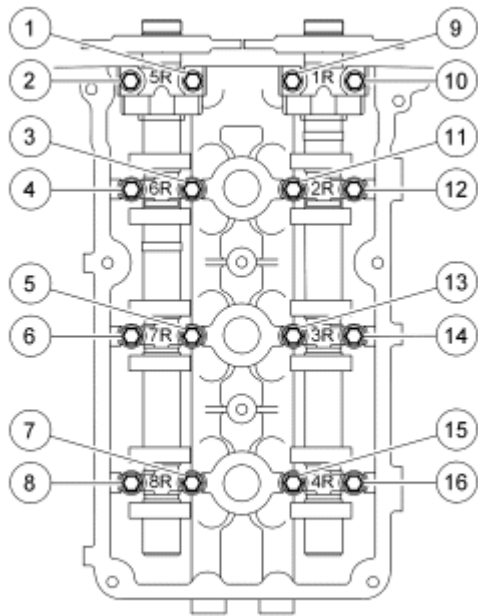


Fig. 287: Identifying Left Camshaft Cap Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

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

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

11. Position the RH camshaft caps and install the bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

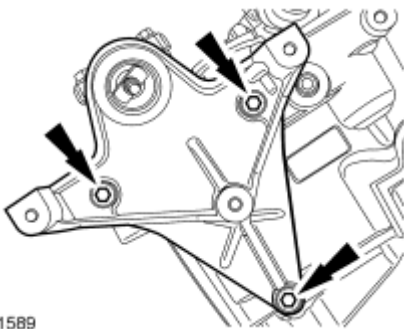


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Fig. 288: Identifying Right Camshaft Cap Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Clean the sealing surface with metal surface prep before installing a new press-in-place gasket.

12. Install the camshaft oil seal retainer and the 3 bolts.
 - Tighten to 10 Nm (89 lb-in).



N0001589

Fig. 289: Locating Camshaft Oil Seal Retainer Bolts
Courtesy of FORD MOTOR CO.

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

13. Position the new camshaft oil seal on the special tool.

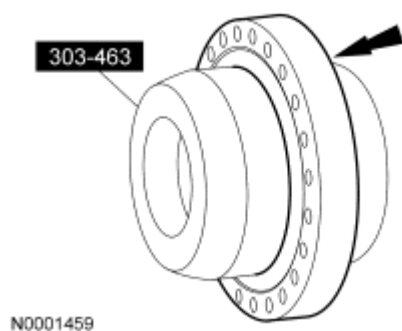


Fig. 290: Locating Camshaft Oil Seal On Special Tool
Courtesy of FORD MOTOR CO.

14. Position the special tool and the camshaft oil seal on the camshaft.

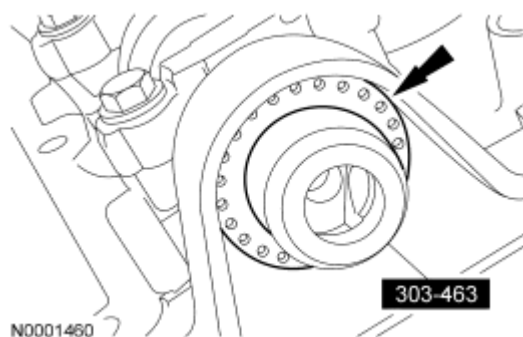


Fig. 291: Positioning Special Tool & Camshaft Oil Seal On Camshaft
Courtesy of FORD MOTOR CO.

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

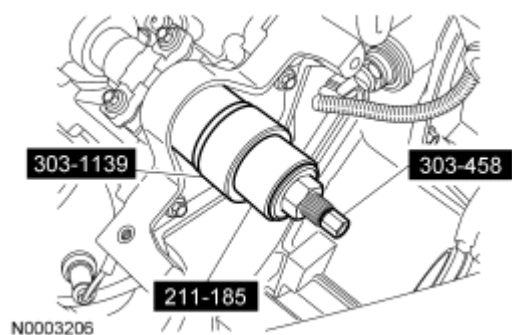


Fig. 292: Installing Camshaft Oil Seal
Courtesy of FORD MOTOR CO.

16. Remove the crankshaft damper bolt.

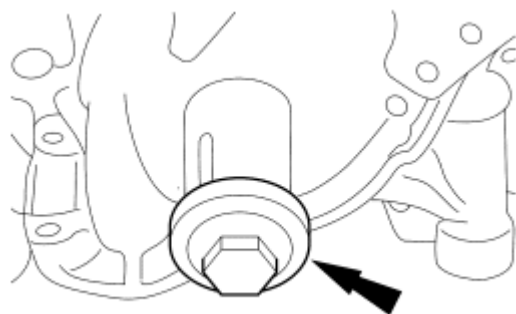


Fig. 293: Locating Crankshaft Damper Bolt
Courtesy of FORD MOTOR CO.

17. Install the crankshaft sprocket with the timing marks facing outward.

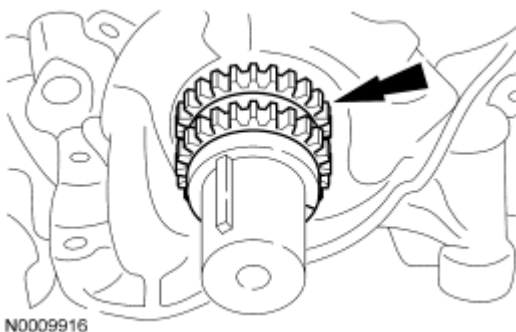


Fig. 294: Locating Crankshaft Sprocket With Timing Marks Out
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

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

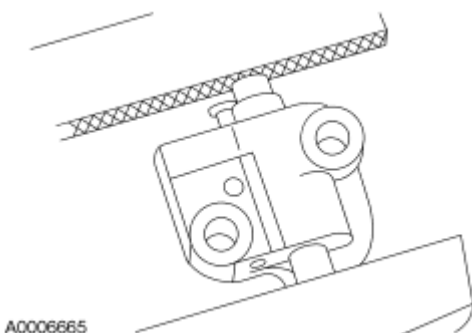


Fig. 295: Identifying Chain Tensioner In Soft-Jawed Vise
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

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

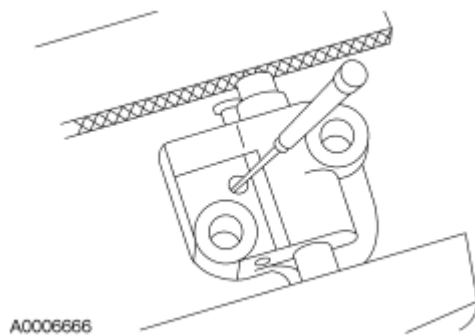


Fig. 296: Holding Chain Tensioner Ratchet Lock Mechanism Away From Ratchet Stem
Courtesy of FORD MOTOR CO.

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.

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

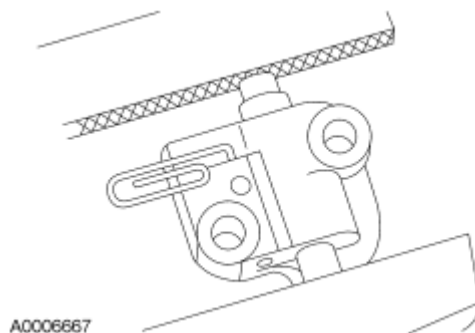


Fig. 297: Retaining Tensioner Piston With 1.5-mm (0.06-in) Wire Or Paper Clip
Courtesy of FORD MOTOR CO.

22. 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.

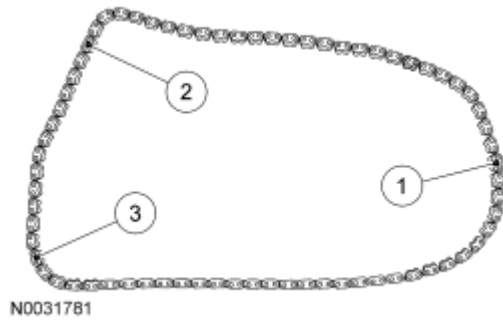


Fig. 298: Locating Crankshaft & Camshaft Timing Marks On LH & RH Timing Chains
Courtesy of FORD MOTOR CO.

23. Verify that the LH camshafts are correctly positioned.

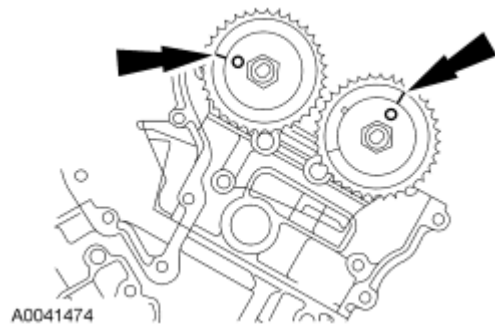


Fig. 299: Locating Camshafts Aligning Marks
Courtesy of FORD MOTOR CO.

24. Position the LH timing chain and guide and install the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).
 - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

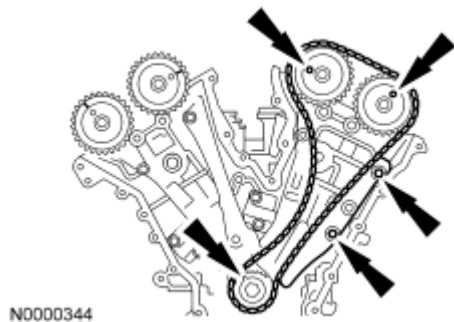


Fig. 300: Aligning Marks On Timing Chain With Marks On Camshaft & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

25. 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 2 bolts.
4. Tighten to 25 Nm (18 lb-ft).

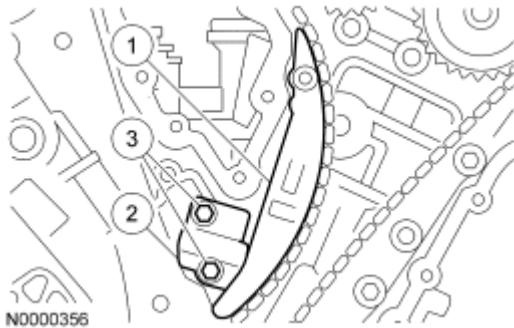


Fig. 301: Identifying Timing Chain Tensioner Arm & Bolts
Courtesy of FORD MOTOR CO.

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

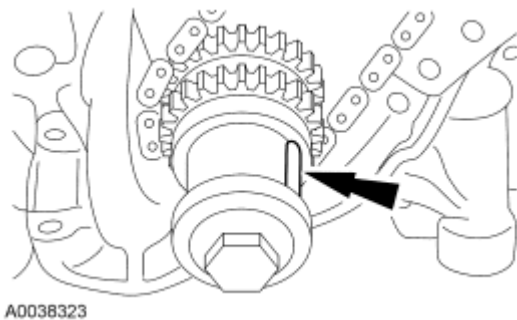


Fig. 302: Locating Crankshaft Keyway
Courtesy of FORD MOTOR CO.

27. Verify that the RH camshafts are correctly positioned.

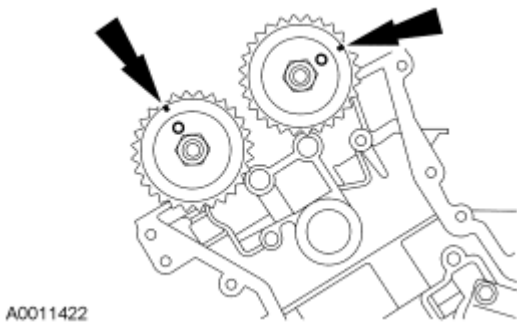


Fig. 303: Aligning Marks RH Camshafts
Courtesy of FORD MOTOR CO.

28. Install the RH timing chain and chain guide and install the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).
 - Align the marks on the timing chain with the marks on the camshaft and crankshaft sprockets.

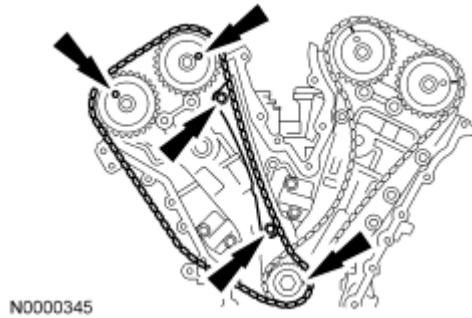


Fig. 304: Aligning Marks On Timing Chain With Marks On Camshaft & Crankshaft Sprockets
Courtesy of FORD MOTOR CO.

29. Install the RH timing chain tensioner and tensioner arm.
1. Install the tensioner arm.
 2. Position the tensioner.
 3. Install the 2 bolts.
 4. Tighten to 25 Nm (18 lb-ft).

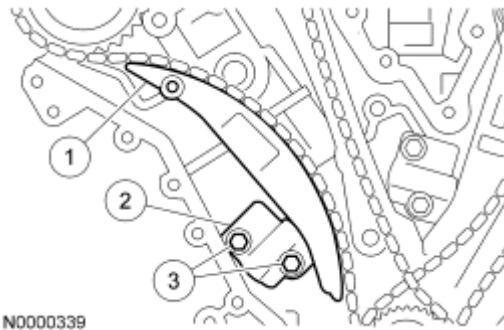


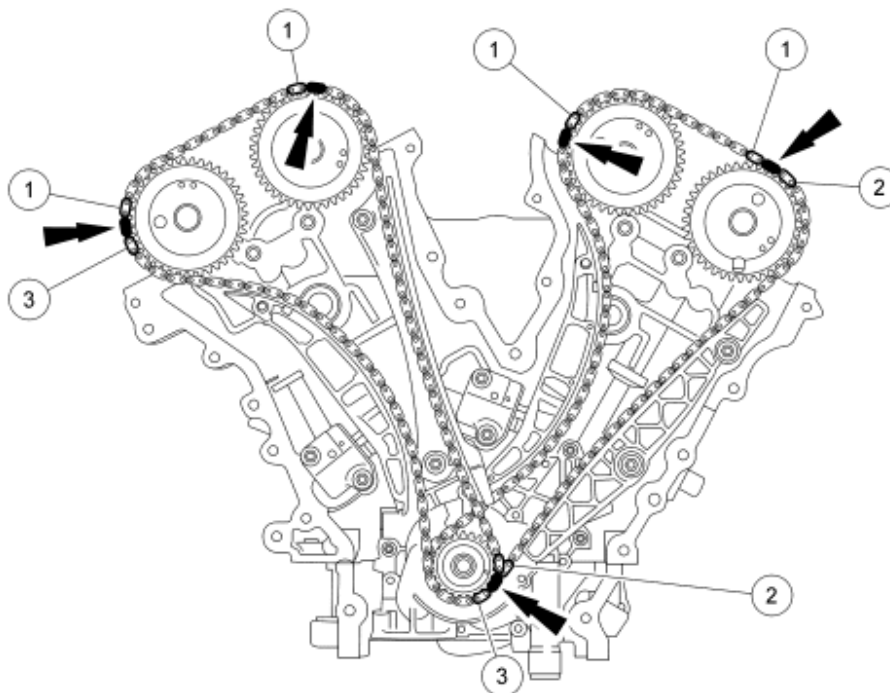
Fig. 305: Identifying Tensioner Arm, Tensioner & Bolts
Courtesy of FORD MOTOR CO.

30. Remove the LH and RH timing chain tensioner piston retaining wires.
31. 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.

32. Verify the timing with the following steps.
1. There should be 12 chain links between the camshaft timing marks.

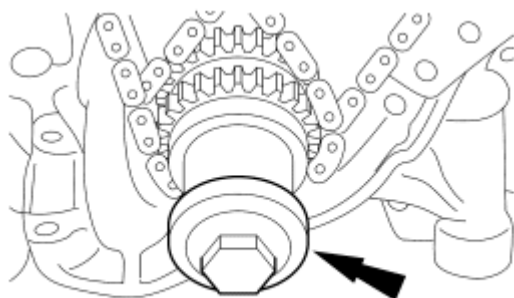
2. There should be 27 chain links between the camshaft and the crankshaft timing marks.
3. There should be 30 chain links between the camshaft and the crankshaft timing marks.



N0031782

Fig. 306: Checking Chain Links Timing Marks
Courtesy of FORD MOTOR CO.

33. Remove the crankshaft damper bolt.



A0011064

Fig. 307: 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).

34. Install the ignition pulse wheel.

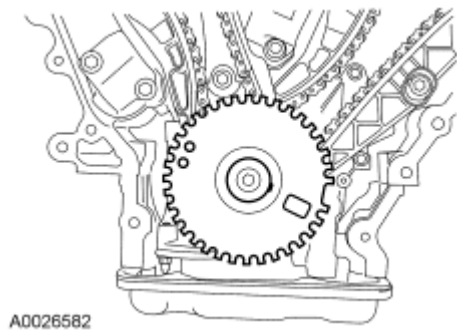


Fig. 308: Identifying Ignition Pulse Wheel
Courtesy of FORD MOTOR CO.

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

35. Install the LH and RH spark plugs.
- Tighten to 15 Nm (11 lb-ft).

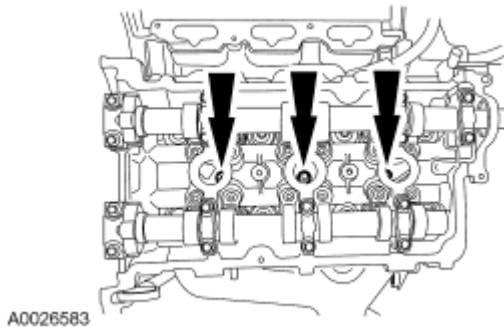


Fig. 309: Locating Spark Plugs
Courtesy of FORD MOTOR CO.

36. Install 3 new gaskets in the engine front cover.

NOTE: Clean the sealing surfaces with silicone gasket remover and metal surface prep before applying gasket and sealant.

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

37. 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.

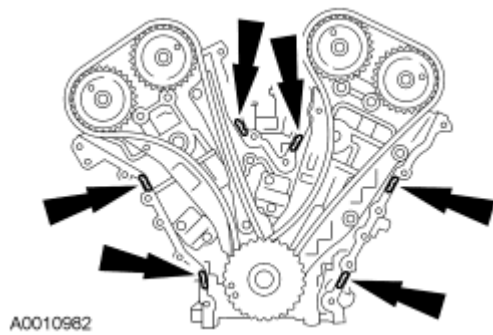


Fig. 310: Applying Sealant To Cylinder Block
Courtesy of FORD MOTOR CO.

38. Position the engine front cover. Install the 14 bolts and the stud bolt.
- Tighten in the sequence shown to 25 Nm (18 lb-ft).

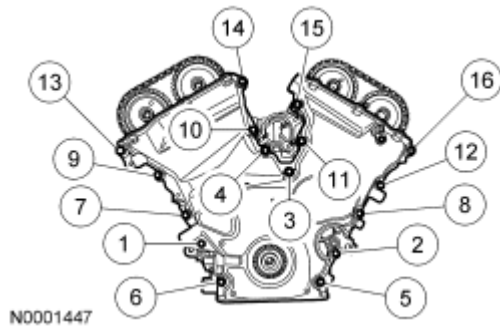


Fig. 311: Identifying Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

39. Install the belt tensioner and the bolt.
- Tighten to 45 Nm (33 lb-ft).

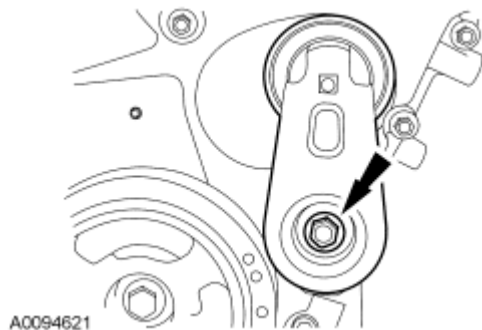


Fig. 312: Locating Belt Tensioner Bolt
Courtesy of FORD MOTOR CO.

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

40. Using the special tool, install a new crankshaft front seal.

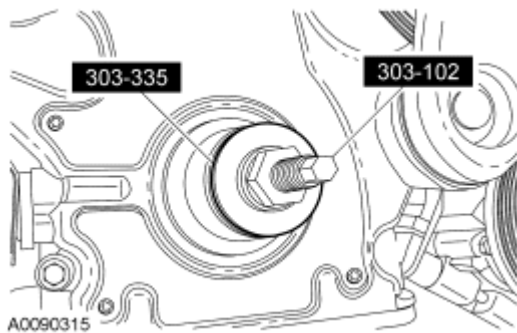


Fig. 313: Installing Crankshaft Front Oil Seal
Courtesy of FORD MOTOR CO.

NOTE: Clean the keyway and slot using metal surface cleaner before applying silicone gasket and sealant.

NOTE: The crankshaft damper must be installed and the bolt tightened within 4 minutes of sealant application.

41. Apply silicone gasket and sealant to the end of the crankshaft damper keyway slot.

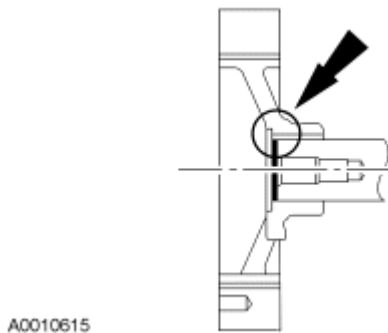


Fig. 314: Applying Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

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

42. Using the special tools, install the crankshaft pulley.

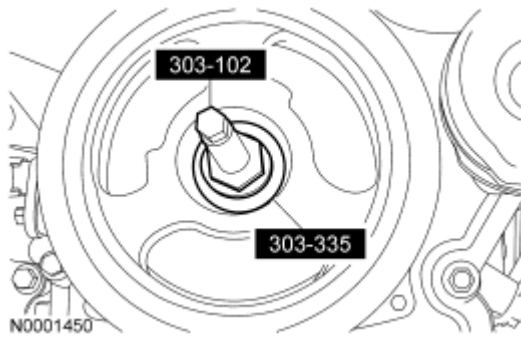


Fig. 315: Installing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

43. Using the special tool to hold the crankshaft pulley, install the bolt and washer and tighten in 4 stages.
- Stage 1: Tighten to 120 Nm (89 lb-ft).
 - Stage 2: Loosen one full turn (360 degrees).
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten to 90 Nm (66 lb-ft).

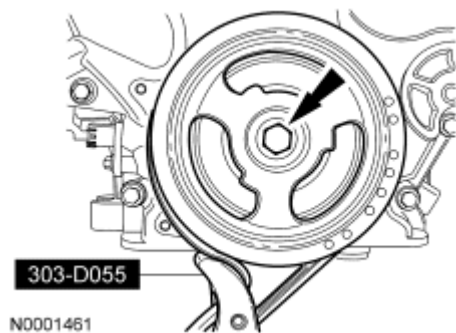


Fig. 316: Identifying Crankshaft Pulley Bolt & Special Tools
Courtesy of FORD MOTOR CO.

44. If equipped, install the block heater.
- Tighten to 14 Nm (10 lb-ft).

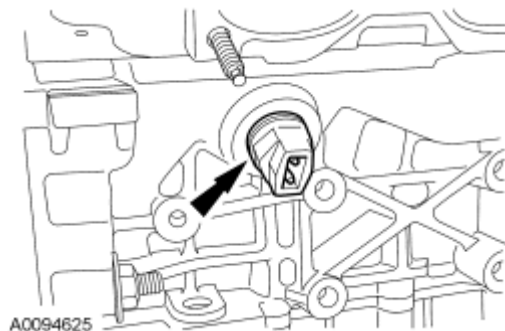


Fig. 317: Locating Block Heater
Courtesy of FORD MOTOR CO.

45. Install the oil pressure sender.
- Tighten to 14 Nm (10 lb-ft).

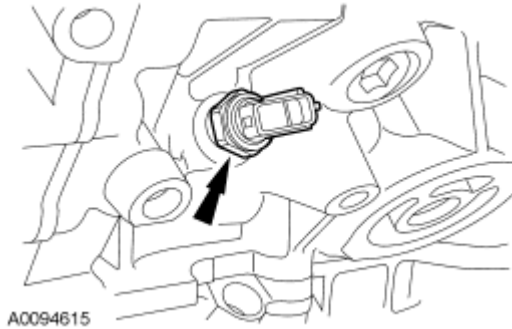


Fig. 318: Locating Oil Pressure Sender
Courtesy of FORD MOTOR CO.

46. Install the oil pan baffle and the 8 nuts.
- Tighten the M8 nuts to 15 Nm (11 lb-ft) and then rotate 45 degrees.
 - Tighten the M6 nuts to 5 Nm (44 lb-in) and then rotate 45 degrees.

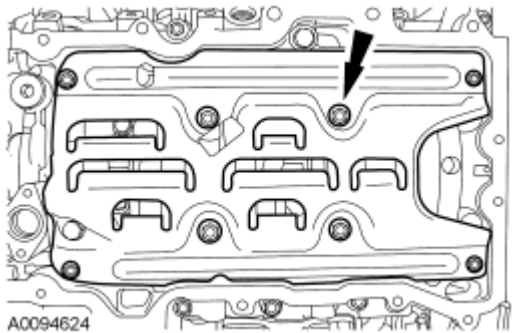


Fig. 319: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the new oil pump screen and pickup tube O-ring seal with clean engine oil.

47. Position the oil pump screen and pickup tube and install the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

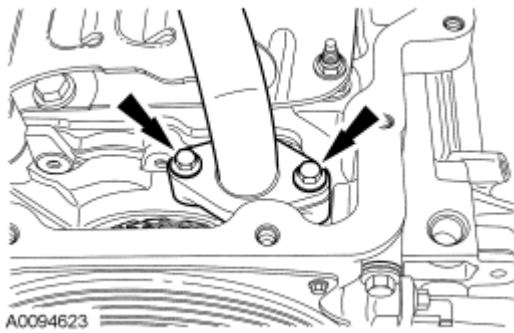


Fig. 320: Locating Oil Pump Screen & Pickup Tube Bolts
Courtesy of FORD MOTOR CO.

48. Install the radio interference capacitor and the bolt.
- Tighten to 8 Nm (71 lb-in).



Fig. 321: Locating Radio Interference Capacitor Bolt
Courtesy of FORD MOTOR CO.

49. Install the coolant bypass tube and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

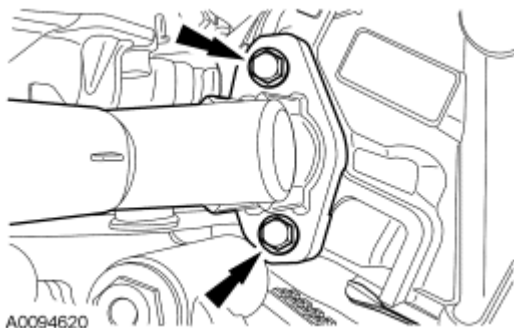


Fig. 322: Locating Coolant Bypass Tube Bolts
Courtesy of FORD MOTOR CO.

50. Install the coolant pump and the 4 bolts. Tighten in 4 stages:
- Stage 1: Tighten the coolant pump center bolt to 4 Nm (35 lb-in).

- Stage 2: Loosely install the 3 coolant pump outer bolts.
- Stage 3: Tighten the coolant pump center bolt to 25 Nm (18 lb-ft).
- Stage 4: Tighten the 3 coolant pump outer bolts to 10 Nm (89 lb-in).

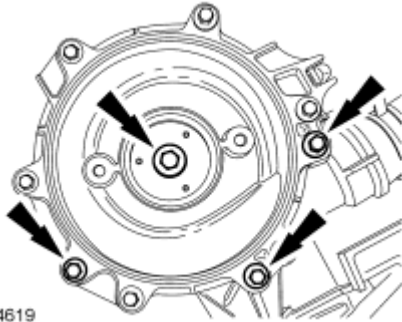


Fig. 323: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

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

51. Install the thermostat housing and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

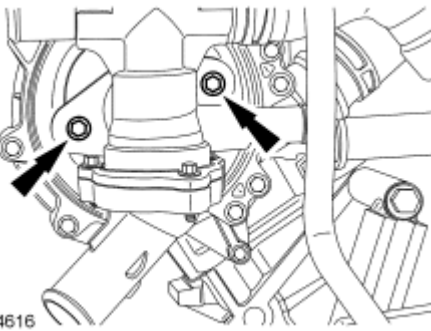


Fig. 324: Locating Thermostat Housing Bolts
Courtesy of FORD MOTOR CO.

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

52. Clean the LH and RH valve cover sealing surfaces.

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

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

NOTE: Install a new gasket in the valve cover.

54. Position the RH valve cover. Install the 9 bolts and 5 stud bolts.
- Tighten in the sequence shown to 10 Nm (89 lb-in).

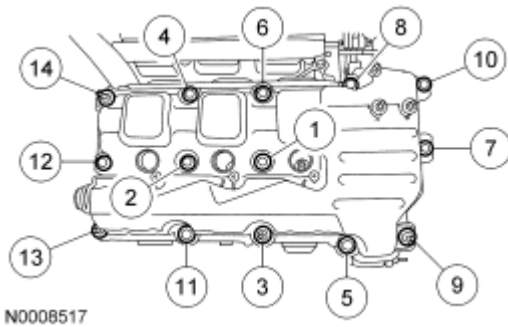


Fig. 325: Identifying Right Valve Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

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

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

NOTE: Install a new gasket in the valve cover.

56. Position the LH valve cover. Install the 6 bolts and 8 stud bolts.
- Tighten in the sequence shown to 10 Nm (89 lb-in).

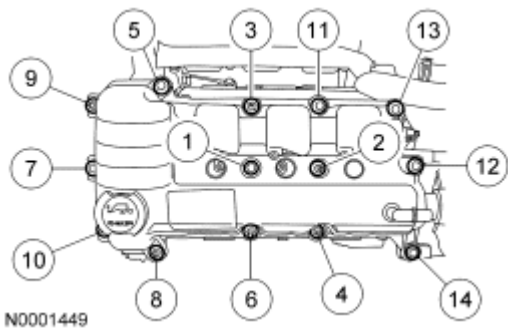


Fig. 326: Identifying Left Valve Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

57. Install the RH and LH ignition coils and the 6 bolts.
- Tighten to 6 Nm (53 lb-in).

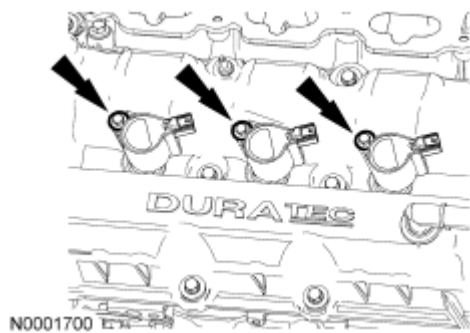


Fig. 327: Locating Ignition Coils
Courtesy of FORD MOTOR CO.

58. Install 6 new LH exhaust manifold studs.
 - Tighten to 12 Nm (9 lb-ft).

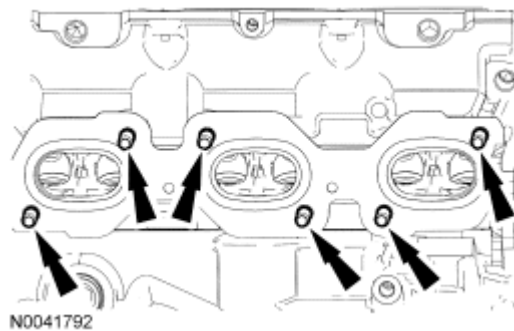


Fig. 328: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

59. Position a new gasket and the LH exhaust manifold and converter. Install the 6 new nuts.
 - Tighten to 20 Nm (15 lb-ft).

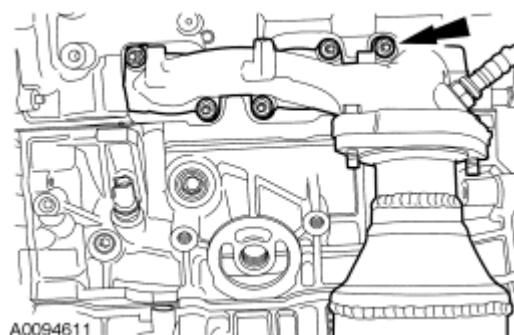


Fig. 329: Locating Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

60. Install 6 new RH exhaust manifold studs.
 - Tighten to 12 Nm (9 lb-ft).

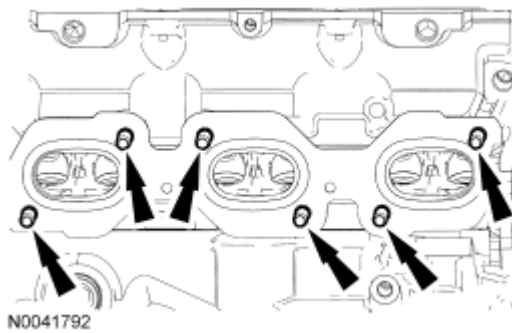


Fig. 330: Locating Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

61. Position a new gasket and the RH exhaust manifold and converter. Install the 6 new nuts.
- Tighten to 20 Nm (15 lb-ft).

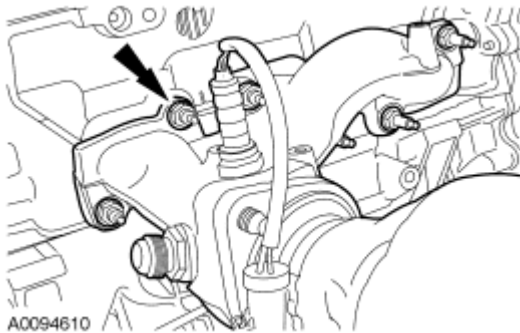


Fig. 331: Locating Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

62. Install the RH engine insulator bracket and the 4 bolts.
- Tighten to 55 Nm (41 lb-ft).

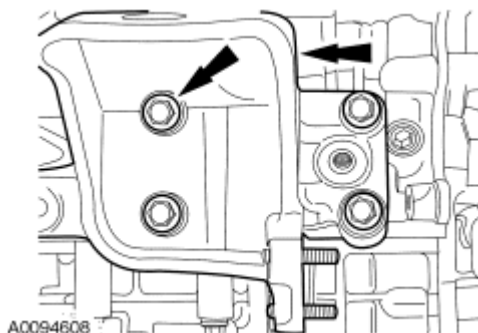


Fig. 332: Locating Engine Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

63. Install the generator, nuts and the bolt.
- Tighten to 48 Nm (35 lb-ft).

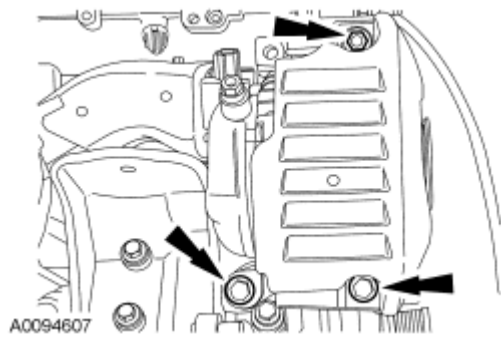


Fig. 333: Locating Generator Nuts & Bolt
Courtesy of FORD MOTOR CO.

NOTE: Install a new O-ring seal on the M22 bolt and lubricate with clean engine oil.

64. Position the oil filter adapter and loosely install the bolts. Tighten in 3 stages:
 - Stage 1: Tighten the M22 bolt to 25 Nm (18 lb-ft).
 - Stage 2: Tighten the M8 bolt to 25 Nm (18 lb-ft).
 - Stage 3: Tighten the M22 bolt to 155 Nm (111 lb-ft).

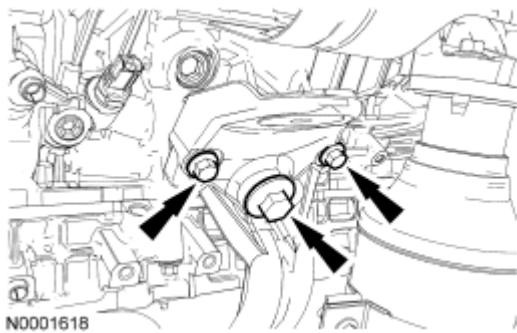


Fig. 334: Locating Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

65. Install a new oil filter.
 - Tighten to 16 Nm (12 lb-ft).

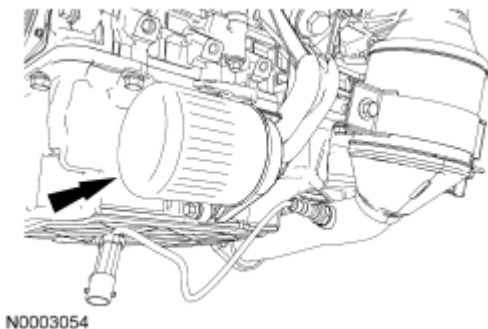
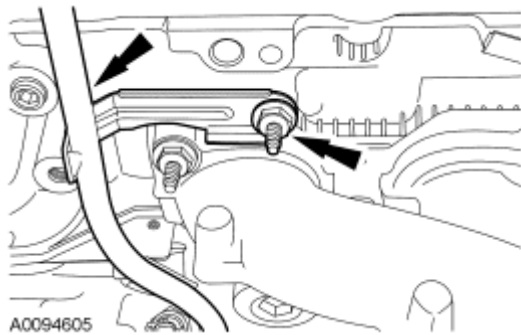


Fig. 335: Locating Oil Filter

Courtesy of FORD MOTOR CO.

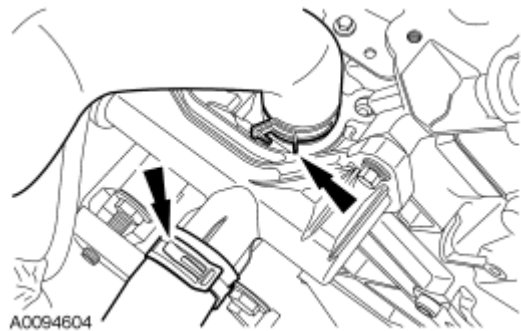
NOTE: Install a new O-ring seal on the oil level indicator tube and lubricate with clean engine oil.

66. Install the oil level indicator tube and the stud bolt.
- Tighten to 9 Nm (80 lb-in).

**Fig. 336: Locating Oil Level Indicator Tube & Stud Bolt**

Courtesy of FORD MOTOR CO.

67. Position the engine wiring harness.
68. Connect the bypass and the coolant pump hoses.

**Fig. 337: Locating Bypass & Coolant Pump Hoses**

Courtesy of FORD MOTOR CO.

69. Connect the engine coolant temperature (ECT) sensor and the radio interference capacitor electrical connectors.

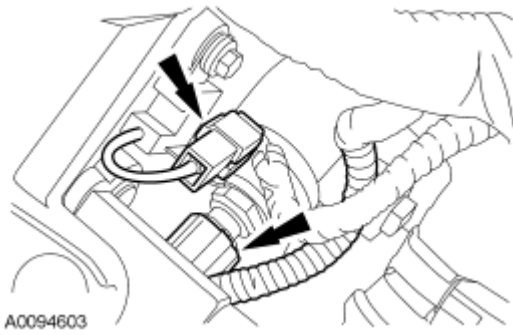


Fig. 338: Locating Engine Coolant Temperature Sensor & Radio Interference Capacitor Connectors
Courtesy of FORD MOTOR CO.

70. Connect the LH ignition coil electrical connectors and attach the wiring retainers.

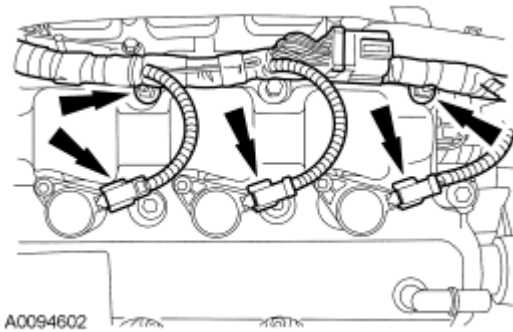


Fig. 339: Locating Ignition Coil Electrical Connectors & Wiring Retainers
Courtesy of FORD MOTOR CO.

71. Connect the crankshaft position sensor (CKP) electrical connector and attach the wiring retainer.

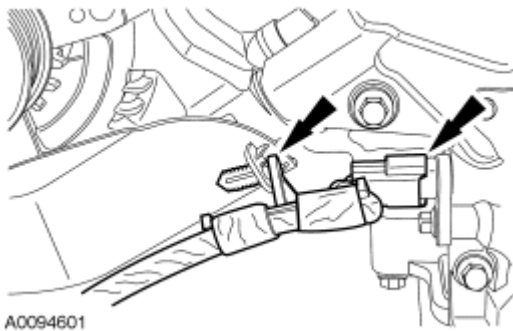


Fig. 340: Locating Crankshaft Position Sensor (CKP) Electrical Connector & Wiring Retainers
Courtesy of FORD MOTOR CO.

72. Attach the ground wire and install the nut.
- Tighten to 20 Nm (15 lb-ft).

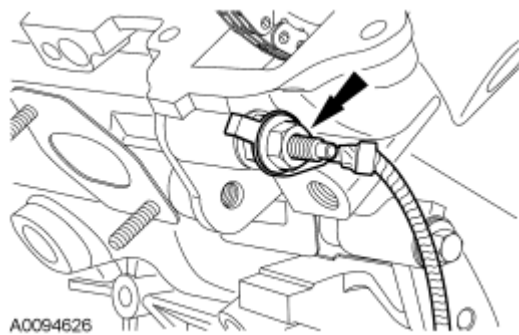


Fig. 341: Locating Ground Wire Nut
Courtesy of FORD MOTOR CO.

73. Connect the generator wiring and install the nut.
 - Attach the wiring retainer.
 - Tighten to 8 Nm (71 lb-in).

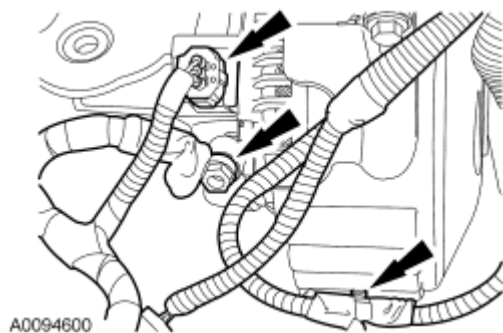


Fig. 342: Locating Generator Wiring Nut
Courtesy of FORD MOTOR CO.

74. Connect the RH ignition coil electrical connectors and attach the wiring retainers.

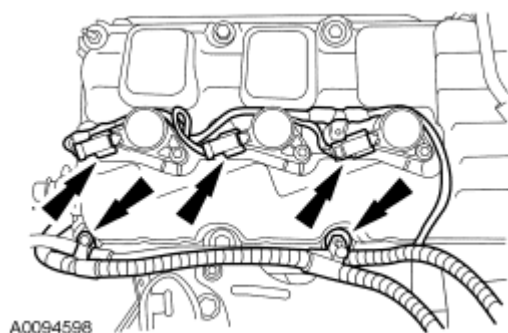


Fig. 343: Locating Ignition Coil Electrical Connectors & Wiring Retainers
Courtesy of FORD MOTOR CO.

75. Position the wiring conduit on the valve cover studs and install the nut.
 - Tighten to 6 Nm (53 lb-in).

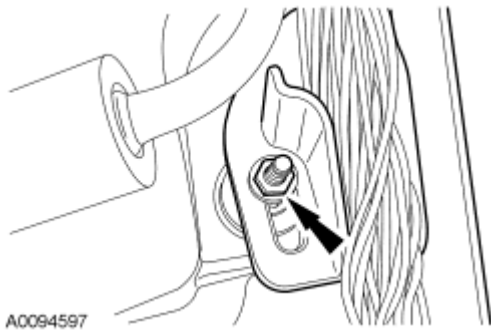


Fig. 344: Locating Wiring Conduit Nut
Courtesy of FORD MOTOR CO.

NOTE: Clean the sealing surfaces with metal surface prep before installing the upper and lower intake manifold.

76. Position the new gaskets and the upper and lower intake manifold. Install the bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

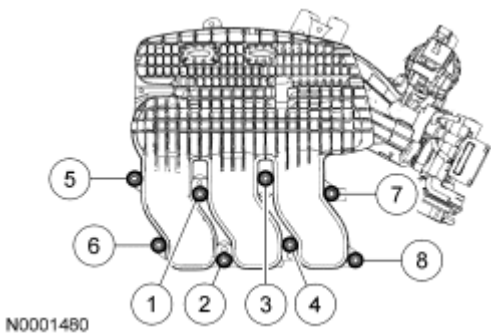


Fig. 345: Upper Intake Manifold Bolt Torque Sequence
Courtesy of FORD MOTOR CO.

77. Position the power steering pump, reservoir bracket and tubes. Install the 3 nuts.
 - Tighten to 25 Nm (18 lb-ft).

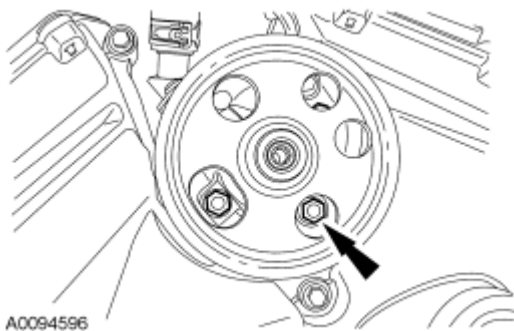


Fig. 346: Locating Power Steering Pump Nuts
Courtesy of FORD MOTOR CO.

78. Install the power steering fluid reservoir bracket nut.

- Tighten to 9 Nm (80 lb-in).

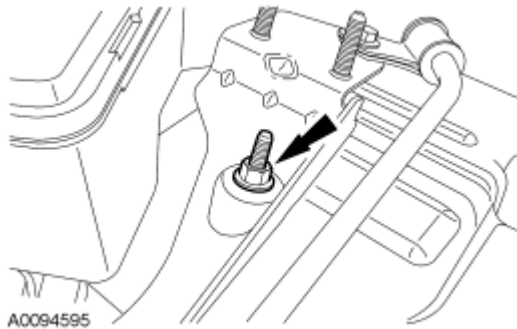


Fig. 347: Locating Power Steering Fluid Reservoir Bracket Nut
Courtesy of FORD MOTOR CO.

79. Position the power steering fluid reservoir and install the 2 nuts.

- Tighten to 9 Nm (80 lb-in).

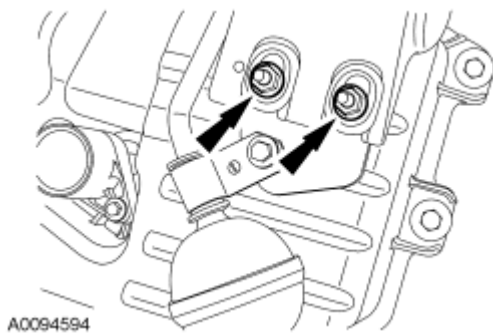


Fig. 348: Locating Power Steering Fluid Reservoir Nuts
Courtesy of FORD MOTOR CO.

80. Position the power steering tube bracket and install the bolt.

- Tighten to 7 Nm (62 lb-in).

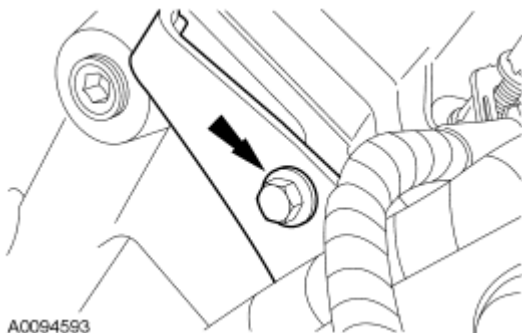


Fig. 349: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

81. Position the power steering tube bracket and install the bolt.
- Tighten to 7 Nm (62 lb-in).

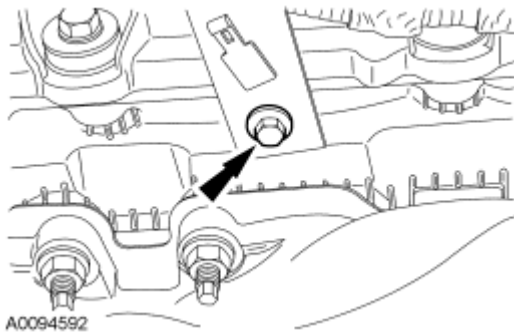


Fig. 350: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

82. Connect the RH HO2S and attach the retainer.

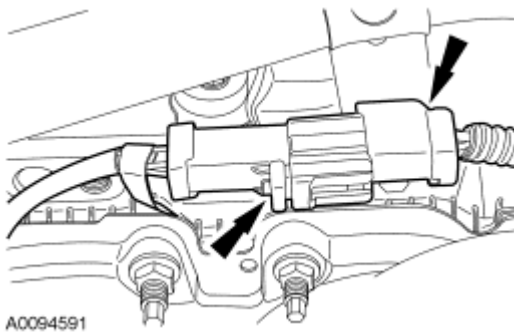


Fig. 351: Locating HO2S Connector & Retainer
Courtesy of FORD MOTOR CO.

83. Connect the fuel charging wiring harness electrical connector.

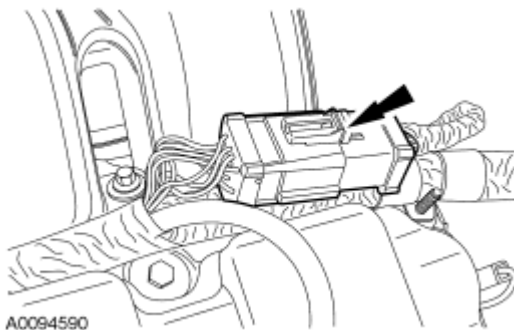


Fig. 352: Locating Fuel Charging Wiring Harness Electrical Connector
Courtesy of FORD MOTOR CO.

84. Connect the fuel rail pressure and temperature sensor vacuum tube and electrical connector.

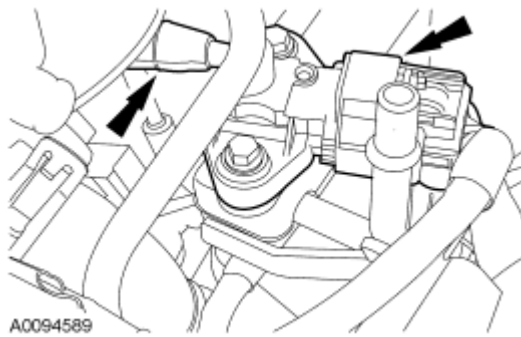


Fig. 353: Locating Fuel Rail Pressure, Temperature Sensor Vacuum Tube & Electrical Connector
Courtesy of FORD MOTOR CO.

85. Install and connect the positive crankcase ventilation (PCV) tube.

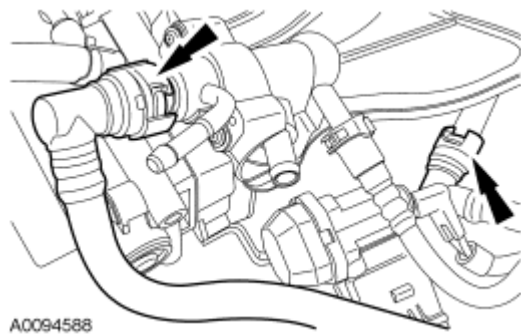


Fig. 354: Locating Positive Crankcase Ventilation (PCV) Tube
Courtesy of FORD MOTOR CO.

86. Connect the throttle body electrical connector.

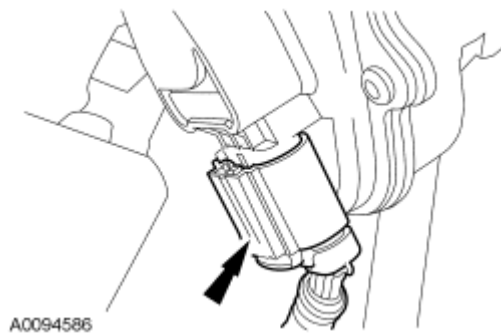


Fig. 355: Locating Throttle Body Electrical Connector
Courtesy of FORD MOTOR CO.

87. Connect the exhaust gas recirculation (EGR) system module electrical connector.

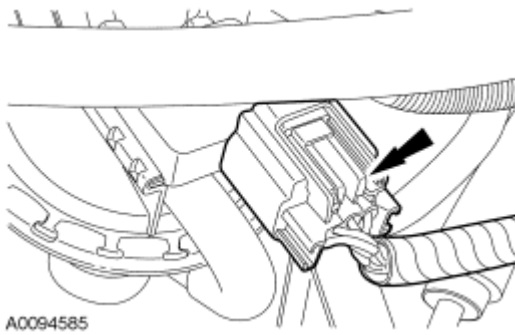


Fig. 356: Locating Exhaust Gas Recirculation (EGR) System Module Electrical Connector
Courtesy of FORD MOTOR CO.

88. Position the EGR system module tube.
- Tighten to 40 Nm (30 lb-ft).

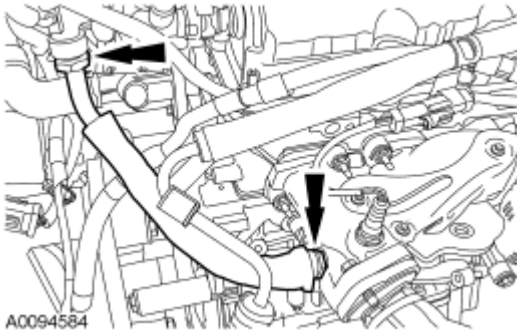


Fig. 357: Locating Exhaust Gas Recirculation (EGR) System Module Tube
Courtesy of FORD MOTOR CO.

89. Connect the camshaft position sensor (CMP) electrical connector, attach the wiring retainers and install the 2 wiring conduit nuts.
- Tighten to 6 Nm (53 lb-in).

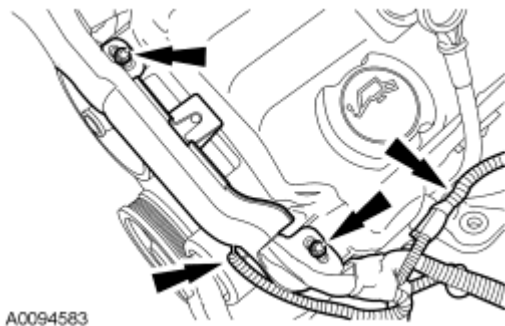


Fig. 358: Locating Camshaft Position Sensor (CMP) Electrical Connector
Courtesy of FORD MOTOR CO.

90. Connect the oil pressure sensor electrical connector.

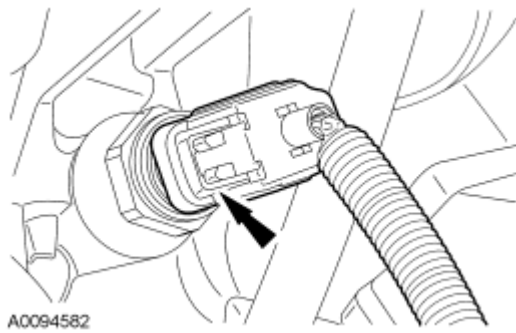


Fig. 359: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

91. Connect the LH heated oxygen sensor (HO2S) electrical connector and attach the wiring retainer.

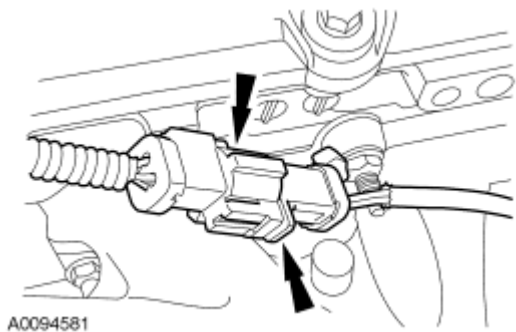


Fig. 360: Locating Heated Oxygen Sensor (HO2S) Electrical Connector & Wiring Retainer
Courtesy of FORD MOTOR CO.

92. Install the A/C compressor bracket and the 5 bolts.
- Tighten to 25 Nm (18 lb-ft).

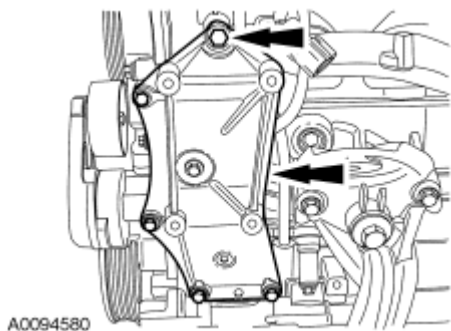


Fig. 361: Locating A/C Compressor Bracket Bolts
Courtesy of FORD MOTOR CO.

93. Install the A/C compressor, 2 nuts and 2 bolts.
- Tighten to 25 Nm (18 lb-ft).

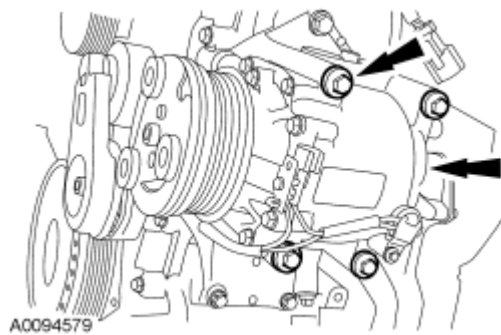


Fig. 362: A/C Compressor Nuts & Bolts
Courtesy of FORD MOTOR CO.

Freestyle only

94. If equipped, install the A/C compressor and the bolt.
- Tighten to 25 Nm (18 lb-ft).

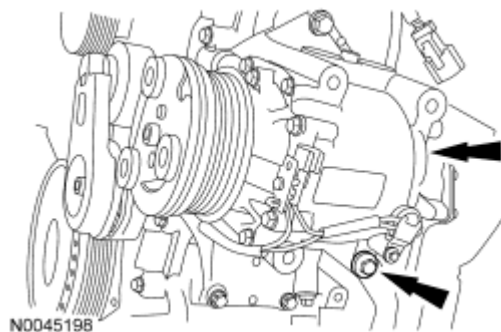


Fig. 363: Locating A/C Compressor Bolt
Courtesy of FORD MOTOR CO.

95. If equipped, install the A/C compressor shield, 2 nuts and the bolt.
- Tighten to 25 Nm (18 lb-ft).

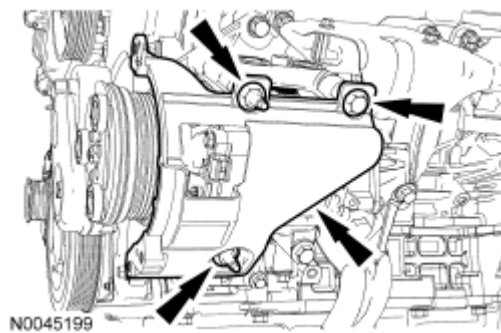


Fig. 364: Locating A/C Compressor Shield Nuts & Bolt
Courtesy of FORD MOTOR CO.

All vehicles

96. Connect the LH catalyst monitor sensor electrical connector and attach the wiring retainer.

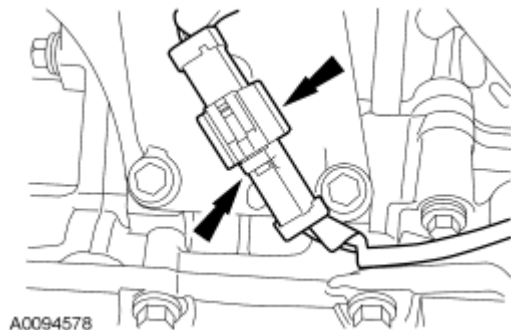


Fig. 365: Locating Catalyst Monitor Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

97. Connect the A/C compressor electrical connector.

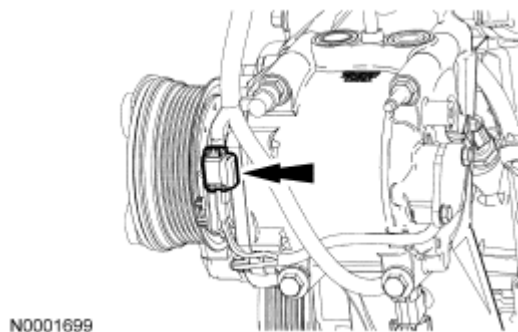


Fig. 366: Locating A/C Compressor Electrical Connector
Courtesy of FORD MOTOR CO.

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

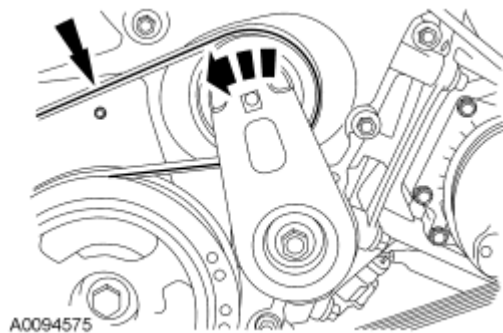


Fig. 367: Rotating Tensioner Counterclockwise
Courtesy of FORD MOTOR CO.

Freestyle only

99. If equipped, install the A/C compressor pulley shield and the 3 retainers.

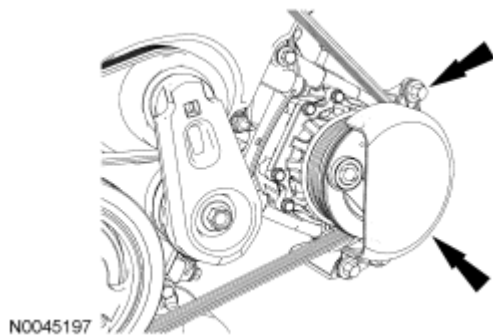


Fig. 368: Locating A/C Compressor Pulley Shield Retainers
Courtesy of FORD MOTOR CO.

All vehicles

100. Install the special tool to the RH cylinder head.

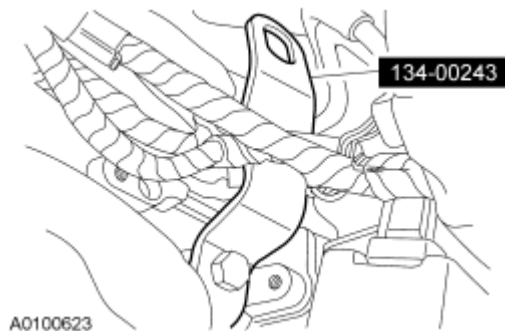


Fig. 369: View Of Special Tool On RH Cylinder Head
Courtesy of FORD MOTOR CO.

101. Install the special tool to the LH cylinder head.

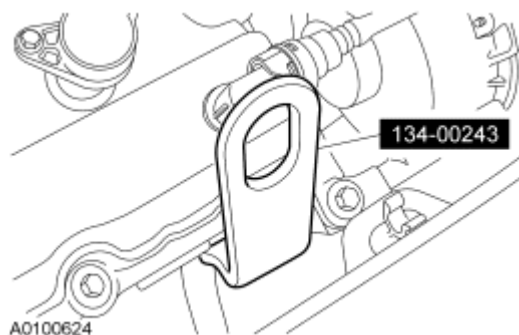


Fig. 370: Special Tool Installed Onto LH Cylinder Head
Courtesy of FORD MOTOR CO.

NOTE: When installing the lower half of the lifting bracket it will be easier to loosely install the upper bolt first then install the lower bolt.

102. Install the lower half of the special tool.

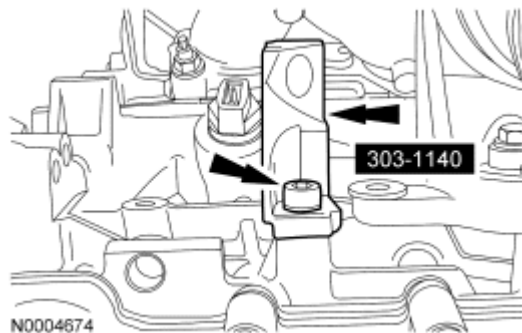


Fig. 371: Identifying Lower Half Of Lifting Hook
Courtesy of FORD MOTOR CO.

103. Install the upper half of the special tool.



Fig. 372: Identifying Upper Half Of Lifting Hook
Courtesy of FORD MOTOR CO.

104. Using the special tools and a suitable engine crane, remove the engine from the engine stand.

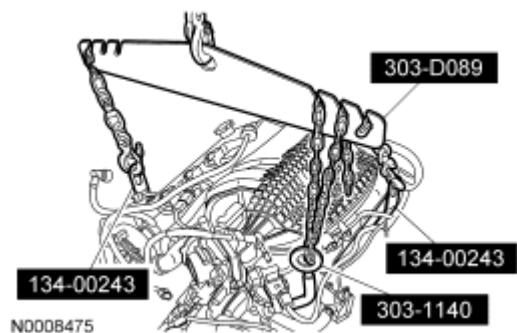


Fig. 373: Supporting Powertrain Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the seal lips with clean engine oil before installing.

105. Using the special tools, install the crankshaft rear oil seal.

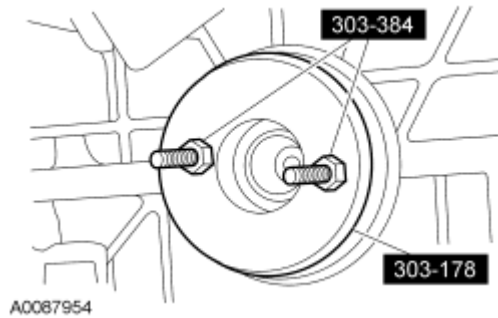


Fig. 374: Installing Crankshaft Rear Oil Seal
Courtesy of FORD MOTOR CO.

106. Install the flexplate and the 8 bolts.

- Tighten to 80 Nm (59 lb-ft).

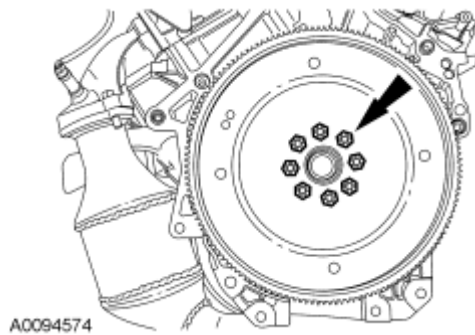


Fig. 375: Locating Flexplate Bolts
Courtesy of FORD MOTOR CO.

INSTALLATION

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST2463-A	Lifting Brackets, Engine	134-00243 or equivalent

2007 Mercury Montego

2007 ENGINE Engine - Five Hundred, Freestyle & Montego

 ST1293-A	Powertrain Lift with Tilting Plate	014-00765
 ST1602-A	Spreader Bar	303-D089 (D93P-6001-A3) or equivalent
 ST2873-A	Engine Lifting Bracket Set	303-1140

Material

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Threadlock and Sealer TA-25	WSK-M2G351-A5

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.

All vehicles

1. Using the special tools and a suitable engine crane, align the engine with the transaxle.

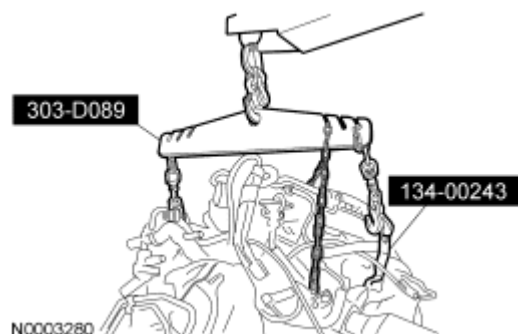


Fig. 376: Aligning Engine With Transaxle
Courtesy of FORD MOTOR CO.

Vehicles with 6-speed transaxle

2. Install the 4 transaxle-to-engine bolts.
 - Tighten to 40 Nm (30 lb-ft).

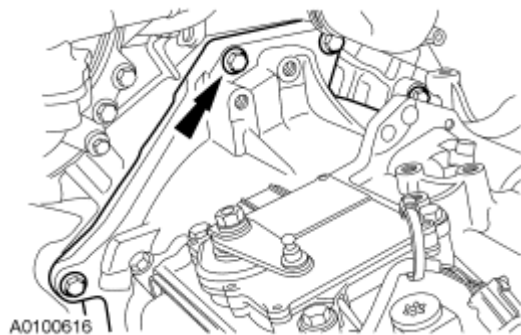


Fig. 377: Locating Transaxle-To-Engine Bolts
Courtesy of FORD MOTOR CO.

Vehicles with CVT transaxle

3. Install the 3 transaxle-to-engine bolts.
 - Tighten to 40 Nm (30 lb-ft).

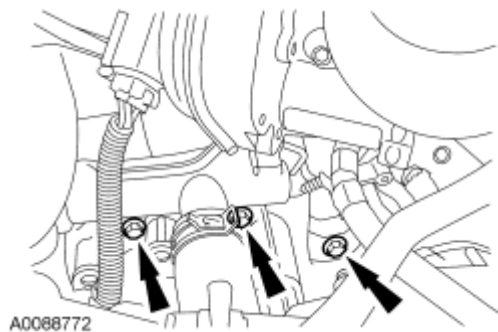


Fig. 378: Identifying Transaxle-To-Engine Bolts
Courtesy of FORD MOTOR CO.

All vehicles

4. Install the engine-to-transaxle bolt.
 - Tighten to 40 Nm (30 lb-ft).

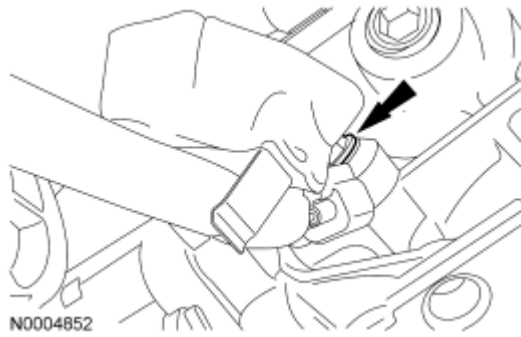


Fig. 379: Locating Knock Sensor
Courtesy of FORD MOTOR CO.

5. Position the knock sensor (KS), install the bolt and connect the electrical connector.
 - Tighten to 20 Nm (15 lb-ft).

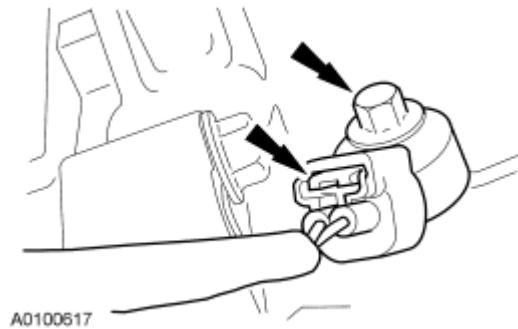


Fig. 380: Locating Knock Sensor (KS) Electrical Connector & Bolt
Courtesy of FORD MOTOR CO.

6. Attach the heat shield to the KS.

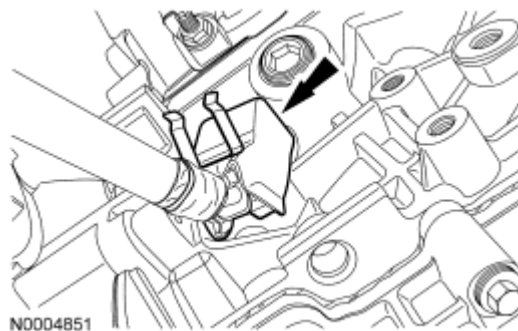


Fig. 381: Identifying Knock Sensor Heat Shield
Courtesy of FORD MOTOR CO.

NOTE: A third lift chain should be used to allow for level lifting of the engine.

7. Using the special tools and a suitable engine crane, position the powertrain on the subframe.

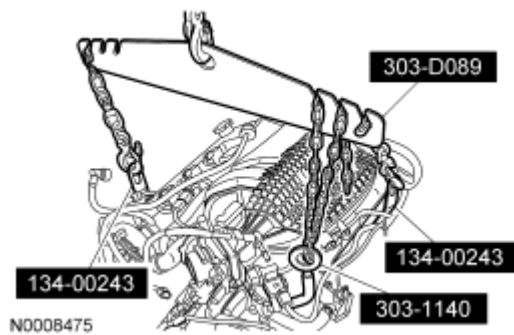


Fig. 382: Supporting Powertrain Using Special Tool
Courtesy of FORD MOTOR CO.

8. Install the LH engine insulator upper nut.
 - Tighten to 70 Nm (62 lb-ft).

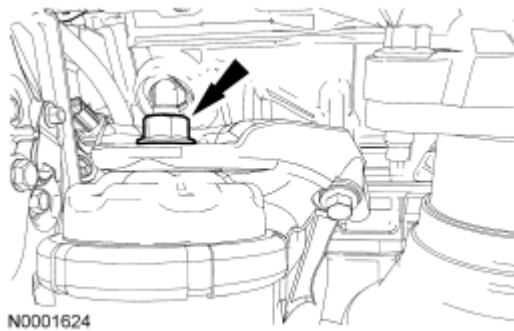


Fig. 383: Locating LH Engine Insulator Upper Nut
Courtesy of FORD MOTOR CO.

9. Install the RH engine insulator upper nut.
 - Tighten to 70 Nm (62 lb-ft).

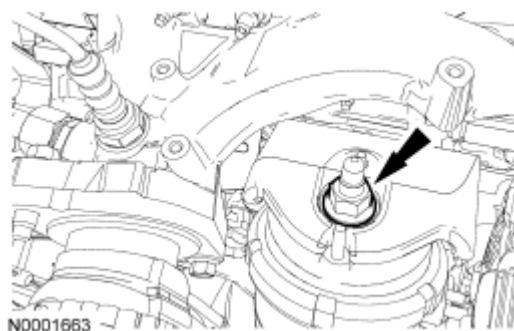


Fig. 384: Locating RH Engine Insulator Upper Nut
Courtesy of FORD MOTOR CO.

10. Position the RH exhaust manifold heat shield and install the 3 bolts.
 - Tighten to 11 Nm (8 lb-ft).

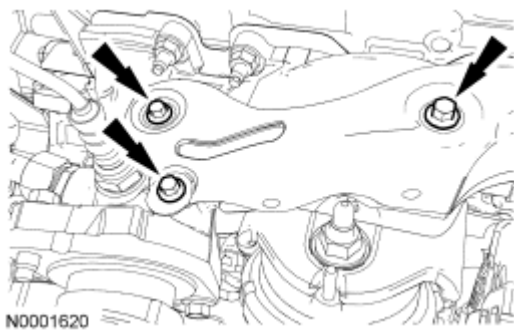


Fig. 385: Locating RH Exhaust Manifold Heat Shield Bolts
Courtesy of FORD MOTOR CO.

11. Install the front transaxle stabilizer bolt.
 - Tighten to 40 Nm (30 lb-ft).

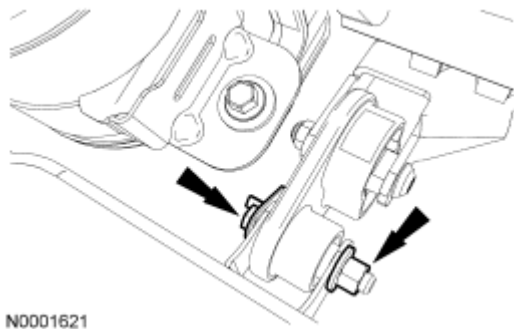


Fig. 386: Locating Front Transaxle Stabilizer Bolt & Nut
Courtesy of FORD MOTOR CO.

12. If equipped, install the upper power transfer unit (PTU) bracket and the bolts.
 - Tighten to 55 Nm (41 lb-ft).

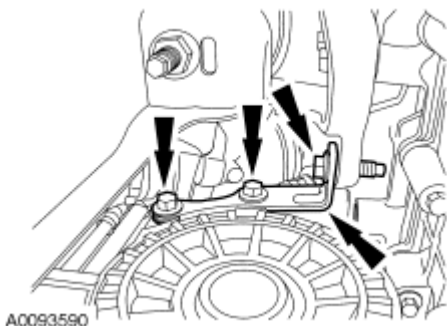


Fig. 387: Identifying Upper PTU Bracket Bolts & Bracket
Courtesy of FORD MOTOR CO.

Vehicles with 6-speed transaxle

13. Clean the 3 rear transaxle insulator bracket bolts using a wire brush and apply new threadlock to the threads.
14. Install the 3 rear transaxle insulator bracket bolts.
 - Tighten to 55 Nm (41 lb-ft).

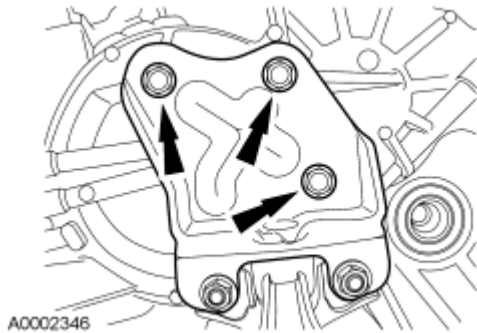


Fig. 388: Identifying Upper Transaxle Mount Retaining Bolts
Courtesy of FORD MOTOR CO.

15. Position the ground cable and install the bolt.
 - Tighten to 12 Nm (9 lb-ft).

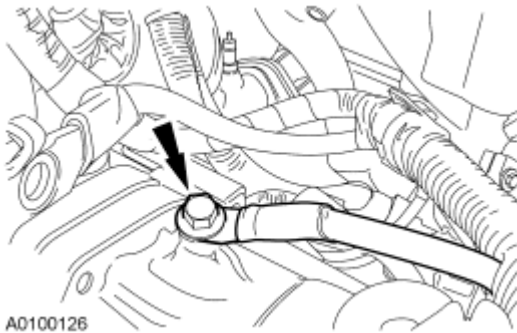


Fig. 389: Locating Ground Cable Bolt
Courtesy of FORD MOTOR CO.

16. Position the starter motor and install the 2 bolts.
 - Tighten to 25 Nm (18 lb-ft).

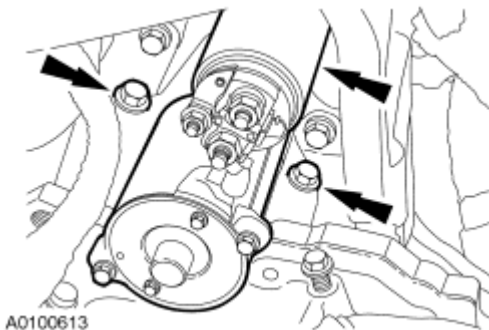


Fig. 390: Locating Starter Motor Bolts
Courtesy of FORD MOTOR CO.

17. Position the starter motor wiring and install the nuts.
 - Tighten the larger nut to 12 Nm (9 lb-ft).
 - Tighten the smaller nut to 9 Nm (80 lb-in).

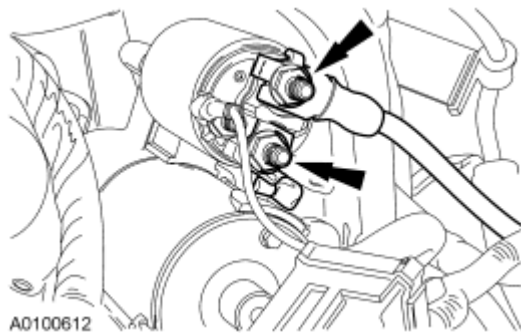


Fig. 391: Locating Starter Motor Wiring Nuts
Courtesy of FORD MOTOR CO.

18. Install the starter motor terminal cover.

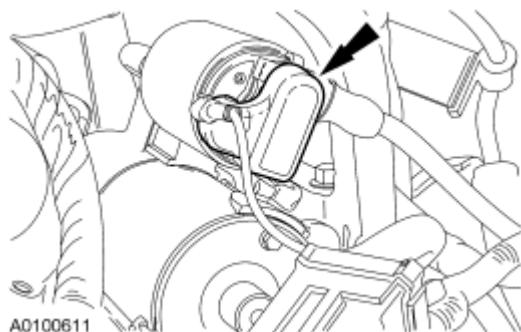


Fig. 392: Locating Starter Motor Electrical Connector Cover
Courtesy of FORD MOTOR CO.

19. Clean the 2 roll restrictor bolts using a wire brush and apply new threadlock to the threads.
20. Position the roll restrictor and install the 2 bolts.
 - Tighten to 55 Nm (41 lb-ft).

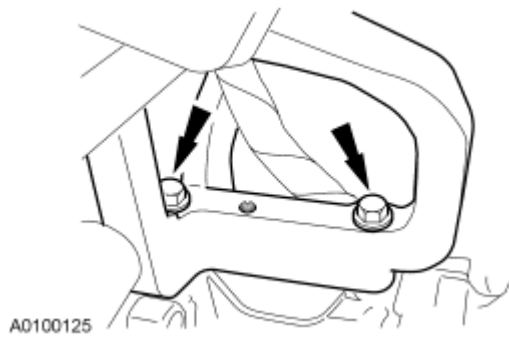


Fig. 393: Locating Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

21. Clean the 4 roll restrictor bracket bolts using a wire brush and apply new threadlock to the threads.
22. Position the roll restrictor bracket and install the 4 bolts.
 - Tighten to 55 Nm (41 lb-ft).

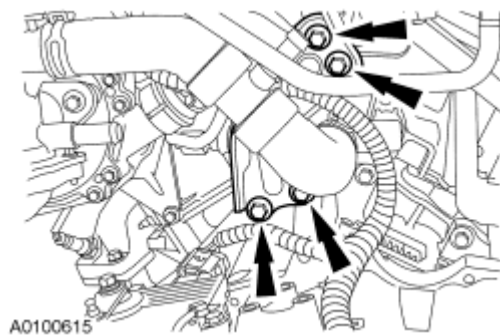


Fig. 394: Locating Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

23. Connect the transmission control unit (TCU) wire harness.

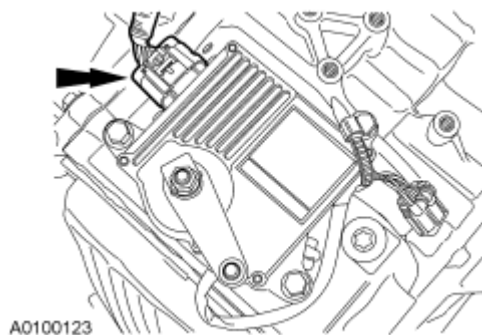


Fig. 395: Identifying Transmission Control Module Electrical Connector
Courtesy of FORD MOTOR CO.

Vehicles with CVT transaxle

24. Clean the 4 rear transaxle insulator bolts using a wire brush and apply new threadlock to the threads.
25. Install the 4 rear transaxle insulator bracket bolts.
 - Tighten to 55 Nm (41 lb-ft).

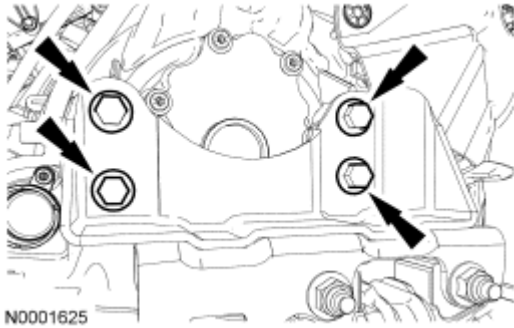


Fig. 396: Locating Transaxle Mount Bolts
Courtesy of FORD MOTOR CO.

26. Position the ground cable and install the bolt.
 - Tighten to 12 Nm (9 lb-ft).

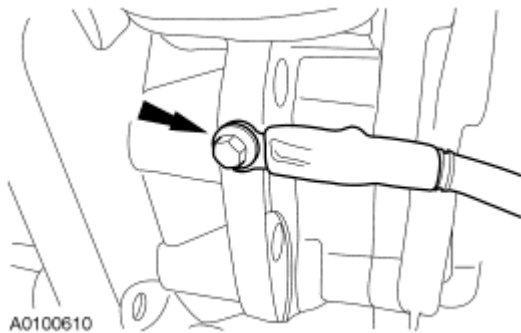


Fig. 397: Locating Ground Wire
Courtesy of FORD MOTOR CO.

27. Position the starter motor and install the 2 bolts.
 - Tighten to 25 Nm (18 lb-ft).

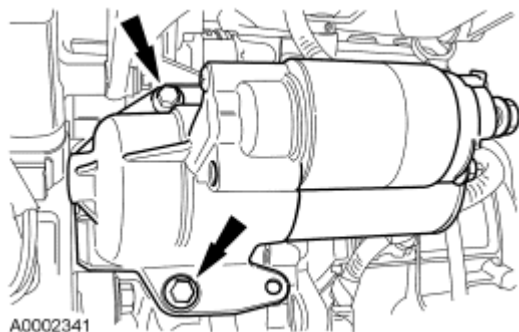


Fig. 398: Identifying Starter Motor Mounting Bolts
Courtesy of FORD MOTOR CO.

28. Position the starter motor wiring and install the nuts.
- Tighten the larger nut to 12 Nm (9 lb-ft).
 - Tighten the smaller nut to 9 Nm (80 lb-in).

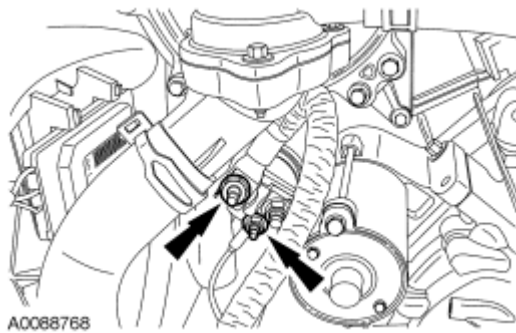


Fig. 399: Identifying Starter Motor Electrical Connectors
Courtesy of FORD MOTOR CO.

29. Install the starter motor terminal cover.

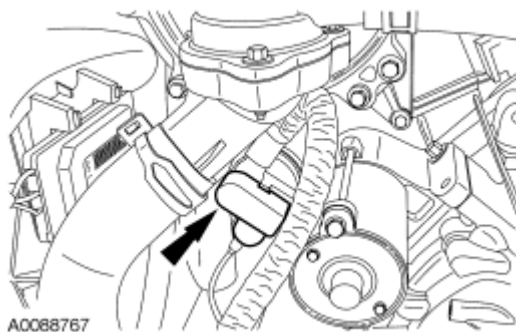


Fig. 400: Identifying Electrical Cover For Starter Motor Electrical Connectors
Courtesy of FORD MOTOR CO.

30. Clean the 2 roll restrictor bolts using a wire brush and apply new threadlock to the threads.
31. Position the roll restrictor and install the 2 bolts.
- Tighten to 55 Nm (41 lb-ft).

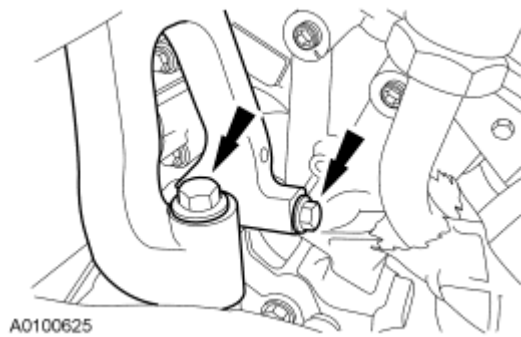


Fig. 401: Locating Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

32. Attach the wiring harness to the roll restrictor.

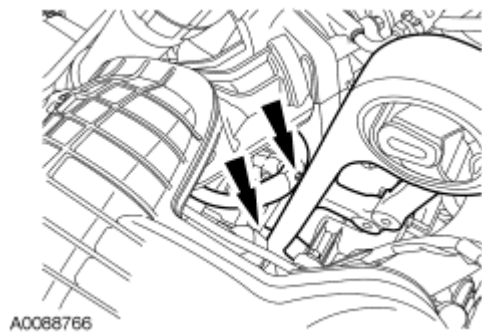


Fig. 402: Locating Wiring Harness At Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

33. Clean the 4 roll restrictor bracket bolts using a wire brush and apply new threadlock to the threads.
34. Position the roll restrictor bracket and install the 4 bolts.
- Tighten to 55 Nm (41 lb-ft).

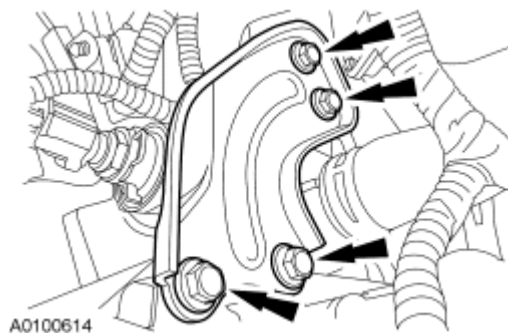


Fig. 403: Locating Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

35. Attach the lower wiring harness retainers to the transaxle.

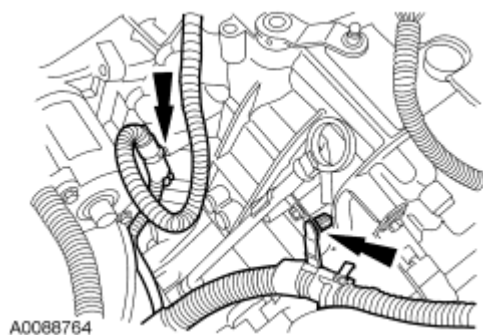


Fig. 404: Locating Lower Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

36. Attach the wiring harness retainers to the transaxle.

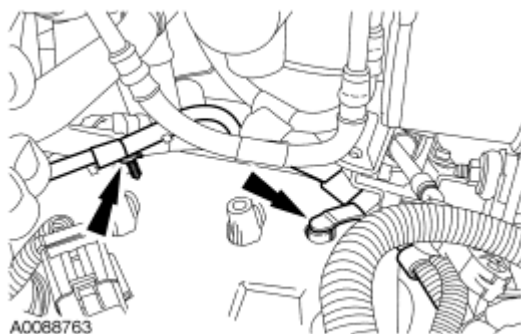


Fig. 405: Locating Wire Harness Retainers At Transaxle
Courtesy of FORD MOTOR CO.

37. Attach the wiring harness retainer to the transaxle.

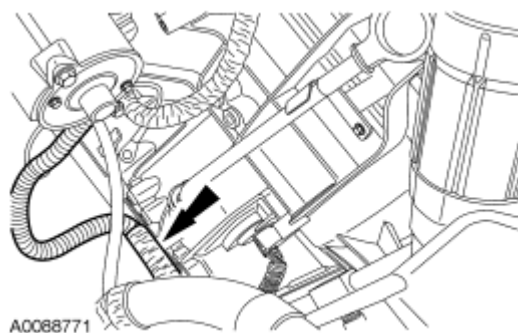


Fig. 406: Locating Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

38. Connect the transaxle bulkhead electrical connector.

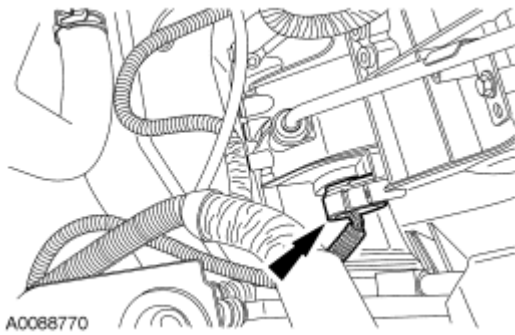


Fig. 407: Locating Transaxle Bulkhead Electrical Connector
Courtesy of FORD MOTOR CO.

All vehicles

39. Attach the pin-type retainers to the subframe and connect the RH catalyst monitor sensor electrical connector.

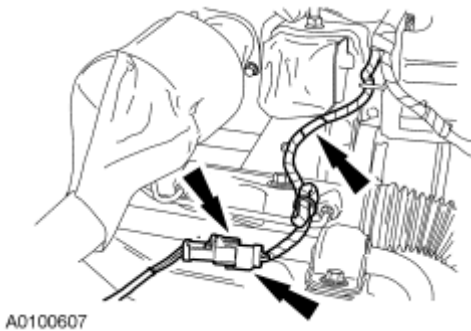


Fig. 408: Locating Pin-Type Retainers & Catalyst Monitor Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

40. Connect the power steering fluid tubes and install the bolt.
- Tighten to 25 Nm (18 lb-ft).

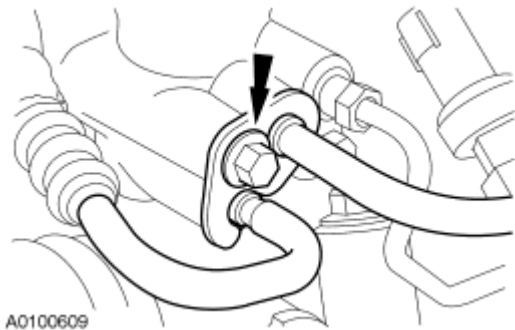


Fig. 409: Locating Power Steering Fluid Tubes & Bolt
Courtesy of FORD MOTOR CO.

41. Install the power steering pressure (PSP) tube bracket bolt and connect the PSP switch electrical

connector.

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

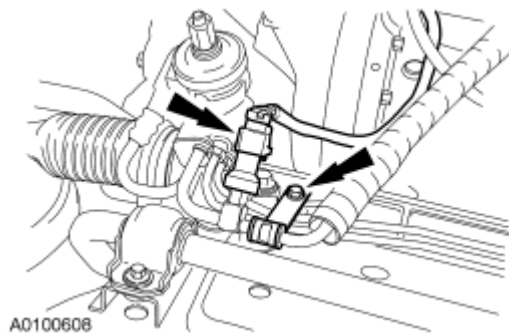


Fig. 410: Locating Power Steering Pressure Tube Bracket Bolt & PSP Switch Electrical Connector
Courtesy of FORD MOTOR CO.

42. Using the special tool, position the powertrain and subframe in the vehicle.



Fig. 411: Supporting Powertrain & Subframe Using Special Tool
Courtesy of FORD MOTOR CO.

43. Install the 2 forward subframe bolts and washers.
- Tighten to 200 Nm (148 lb-ft).

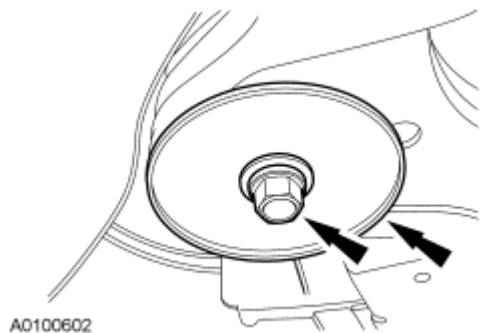
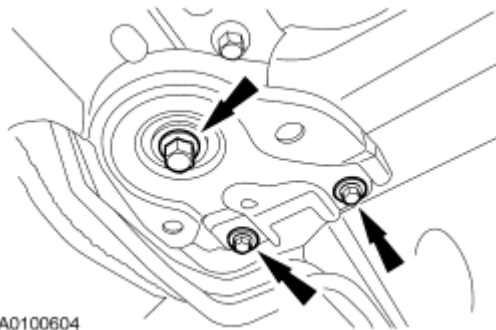


Fig. 412: Locating Subframe Bolts & Washers
Courtesy of FORD MOTOR CO.

44. Position the rear subframe brackets and install the 6 bolts.

- Tighten the 2 larger bolts to 150 Nm (111 lb-ft).
- Tighten the 4 smaller bolts to 55 Nm (41 lb-ft).

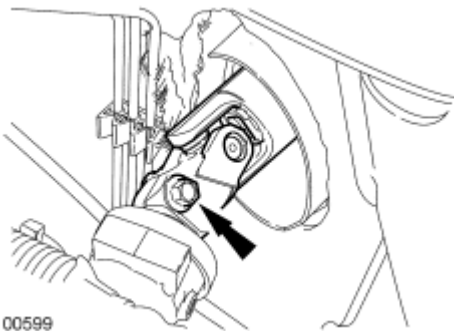


A0100604

Fig. 413: Locating Rear Subframe Bracket Bolts
Courtesy of FORD MOTOR CO.

45. Attach the steering column intermediate shaft and install a new bolt.

- Tighten to 23 Nm (17 lb-ft).

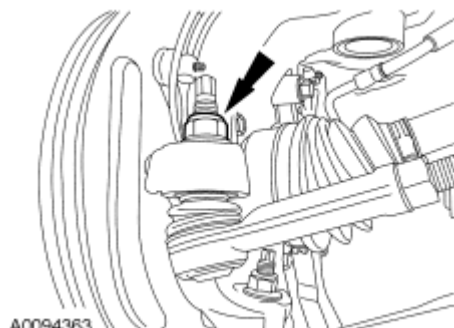


A0100599

Fig. 414: Locating Steering Column Intermediate Shaft Bolt
Courtesy of FORD MOTOR CO.

46. Attach the outer tie rods to the wheel knuckles and install new nuts.

- Tighten to 115 Nm (85 lb-ft).



A0094363

Fig. 415: Locating Outer Tie Rod Nut
Courtesy of FORD MOTOR CO.

47. Attach the stabilizer bar links to the struts and install new nuts.
- Tighten to 55 Nm (41 lb-ft).

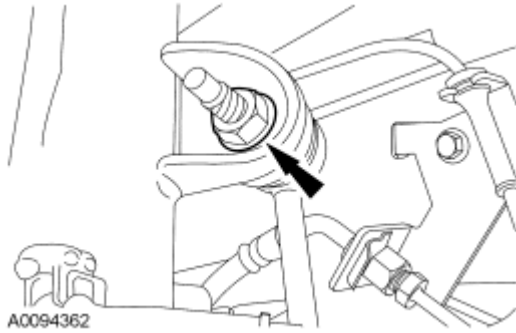


Fig. 416: Identifying Stabilizer Bar Link Nuts
Courtesy of FORD MOTOR CO.

48. If equipped, connect the driveshaft and install the bolts.
- Tighten to 25 Nm (18 lb-ft).

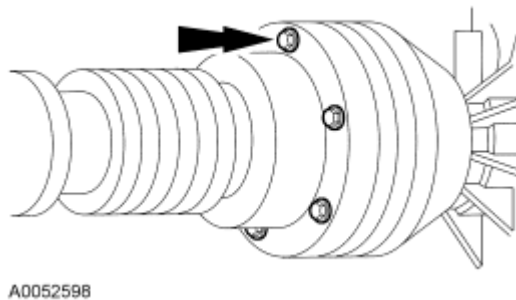


Fig. 417: Front Driveshaft-To-Transfer Case Bolts
Courtesy of FORD MOTOR CO.

49. If equipped, position the driveshaft support bracket and install the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).

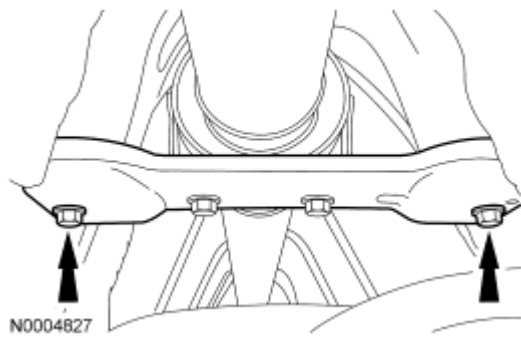


Fig. 418: Identifying Driveshaft Cross Brace Mounting Bolts
 Courtesy of FORD MOTOR CO.

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

50. Apply a 10 mm (0.39 in) diameter dot of silicone sealant to the areas indicated.

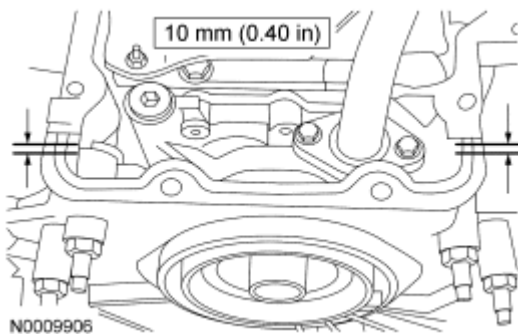


Fig. 419: Applying Silicone Sealant
 Courtesy of FORD MOTOR CO.

51. Position the oil pan and a new gasket. Loosely install the 15 bolts.

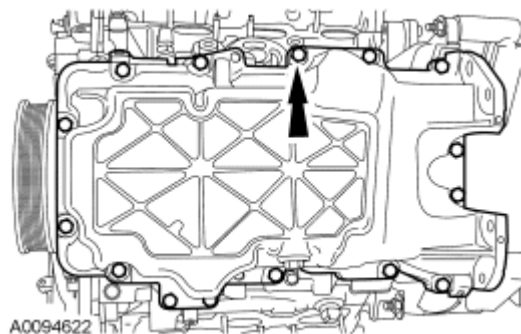


Fig. 420: Locating Oil Pan Bolts
 Courtesy of FORD MOTOR CO.

52. Position the LH catalytic converter bracket and install the 3 engine-to-transaxle bolts.

- Tighten to 40 Nm (30 lb-ft).

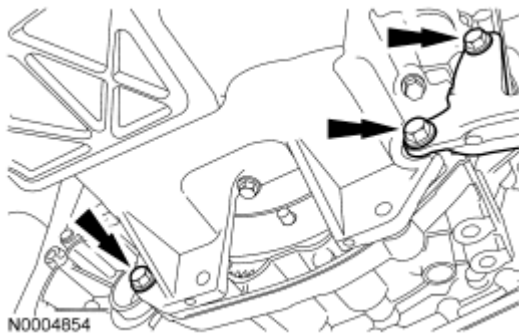


Fig. 421: Locating Transaxle-To-Engine Bolts
Courtesy of FORD MOTOR CO.

53. Tighten the 15 oil pan bolts in the sequence shown to 25 Nm (18 lb-ft).

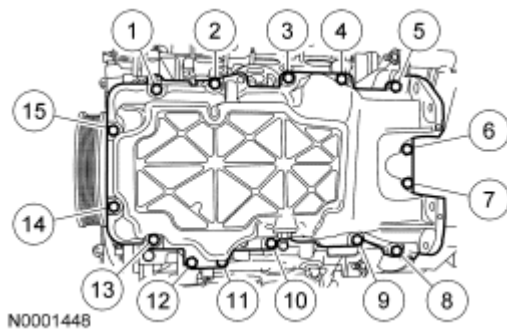


Fig. 422: Identifying Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

54. Install the oil pan-to-oil filter adapter bolt.
 - Tighten to 25 Nm (18 lb-ft).

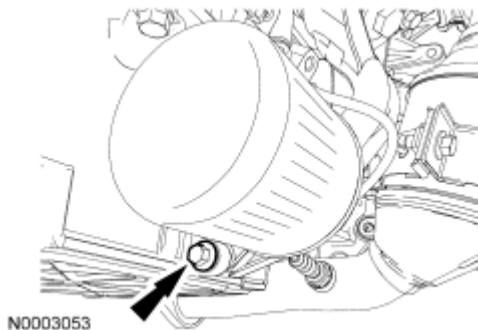


Fig. 423: Locating Oil Pan-To-Oil Filter Adapter Bolt
Courtesy of FORD MOTOR CO.

55. Install the 4 new torque converter nuts.

- Tighten to 36 Nm (27 lb-ft).



Fig. 424: Locating Torque Converter Nut
Courtesy of FORD MOTOR CO.

56. Position the lower torque converter access plug and install the pin-type retainers.

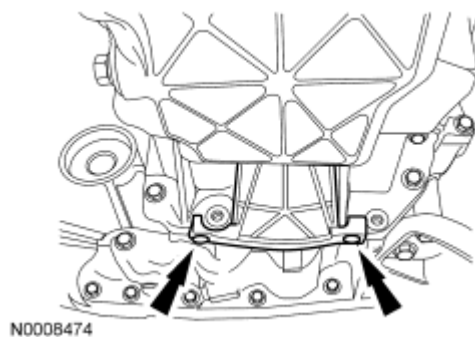


Fig. 425: Locating Torque Converter Lower Access Plug
Courtesy of FORD MOTOR CO.

57. If equipped, connect the block heater electrical connector and attach the wiring retainers.

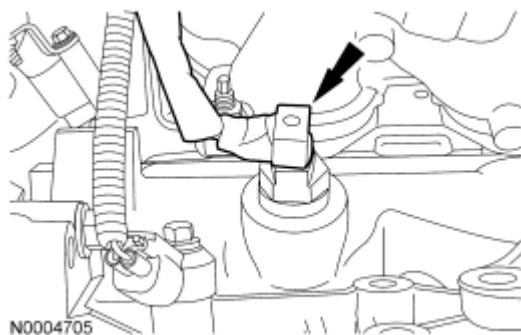


Fig. 426: Locating Block Heater Electrical Connector
Courtesy of FORD MOTOR CO.

58. Connect the power steering cooler hose.

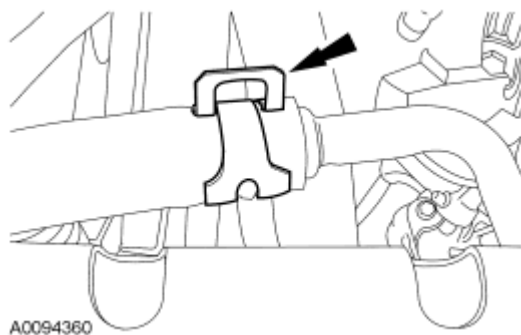


Fig. 427: Locating Power Steering Cooler Hose
Courtesy of FORD MOTOR CO.

59. Connect the transmission cooler hoses.

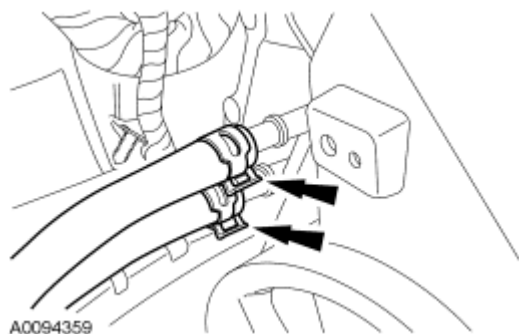


Fig. 428: Locating Transmission Cooler Hoses
Courtesy of FORD MOTOR CO.

60. Position the A/C tube and install the nut.
- Tighten to 8 Nm (71 lb-in).

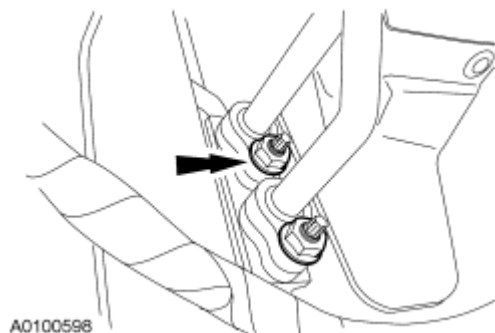


Fig. 429: Locating A/C Tubes Nut
Courtesy of FORD MOTOR CO.

61. Position the A/C manifold assembly tubes and install the bolt.
- Tighten to 20 Nm (15 lb-ft).

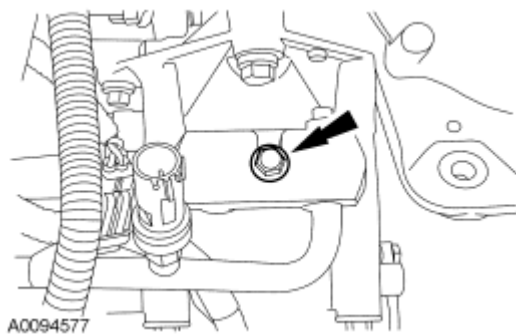


Fig. 430: Locating A/C Compressor Manifold Tube Assembly Bolt
Courtesy of FORD MOTOR CO.

62. Connect the A/C high-pressure switch electrical connector.

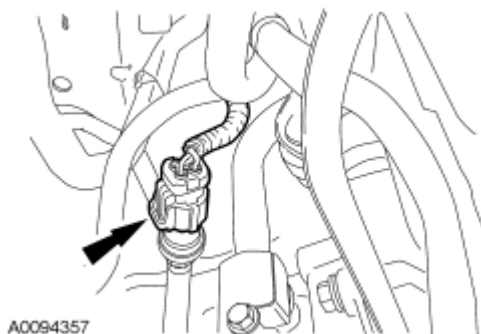


Fig. 431: Locating A/C High-Pressure Switch Electrical Connector
Courtesy of FORD MOTOR CO.

63. Connect the 10-pin electrical connector and attach the wiring retainers.

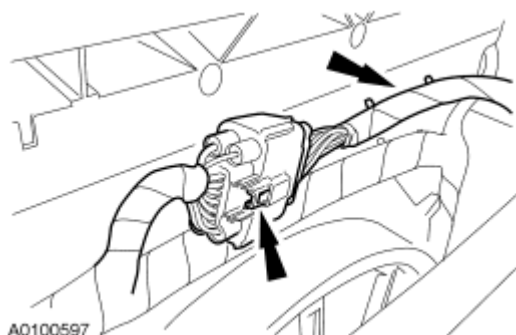


Fig. 432: Locating 10-Pin Electrical Connector & Wiring Retainer
Courtesy of FORD MOTOR CO.

64. Position the coolant tube and secure the tube in the clips.

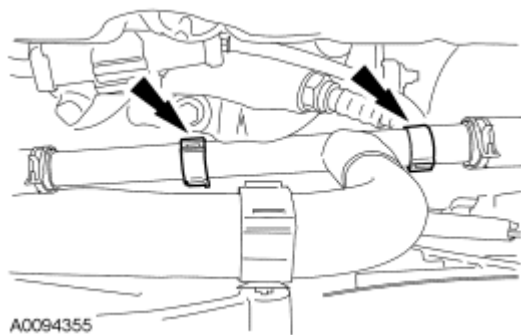


Fig. 433: Locating Coolant Tube Retainers
Courtesy of FORD MOTOR CO.

65. Connect the coolant hoses to the thermostat housing.

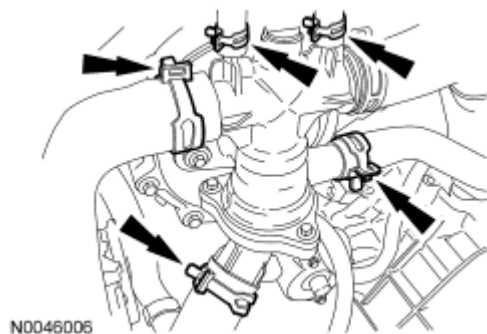


Fig. 434: Locating Coolant Hoses At Thermostat Housing
Courtesy of FORD MOTOR CO.

66. Connect the brake booster vacuum hose to the upper intake manifold.

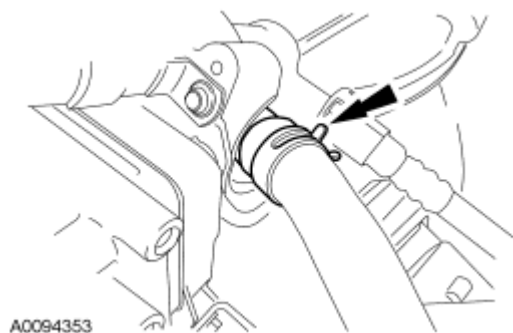


Fig. 435: Locating Brake Booster Vacuum Hose
Courtesy of FORD MOTOR CO.

67. Connect the heater hose and the positive crankcase ventilation (PCV) coolant hose.

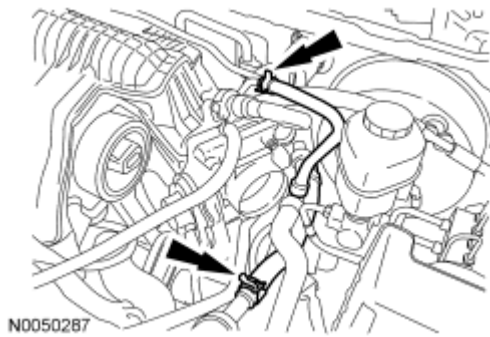


Fig. 436: Heater Hose & Positive Crankcase Ventilation (PCV) Coolant Hose
Courtesy of FORD MOTOR CO.

Vehicles with 6-speed transaxle

68. Position the shift cable bracket and install the 3 bolts.
- Tighten to 25 Nm (18 lb-ft).

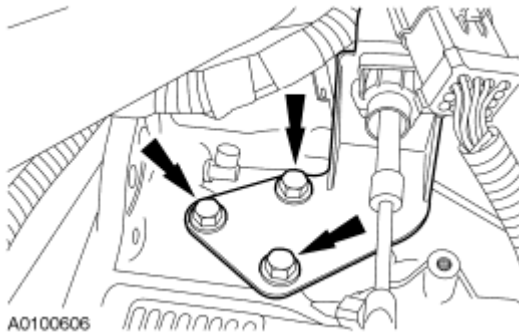


Fig. 437: Locating Shift Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

69. Connect the 16-pin electrical connector and attach the wiring retainer.
- Connect the electrical connector to the shift cable bracket.

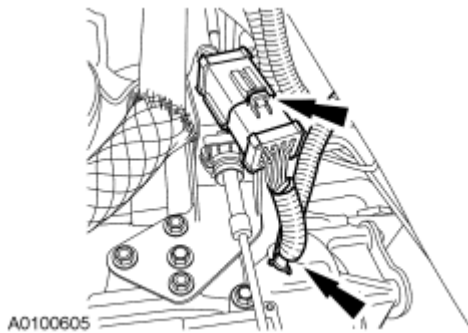


Fig. 438: Locating 16-Pin Electrical Connector & Wiring Retainer
Courtesy of FORD MOTOR CO.

70. Connect the shift cable.

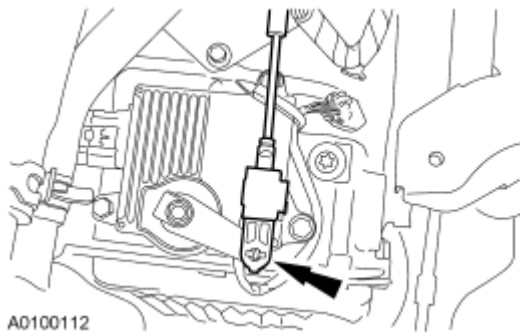


Fig. 439: Locating Shift Cable End
Courtesy of FORD MOTOR CO.

71. Attach the transmission vent tube to the coolant hose.



Fig. 440: Transmission Vent Tube & Coolant Hose
Courtesy of FORD MOTOR CO.

Vehicles with CVT transaxle

72. Position the shift cable bracket and install the 2 bolts.

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

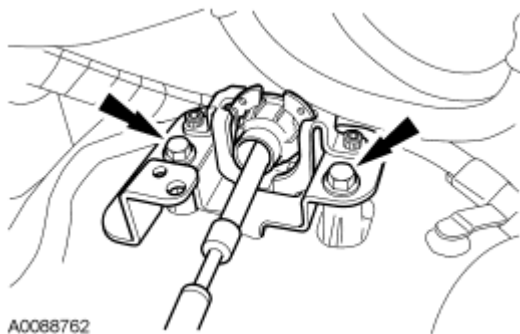


Fig. 441: Locating Shift Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

73. Connect the 16-pin electrical connector and attach the wiring retainers.
- Attach the electrical connector to the shift cable bracket.

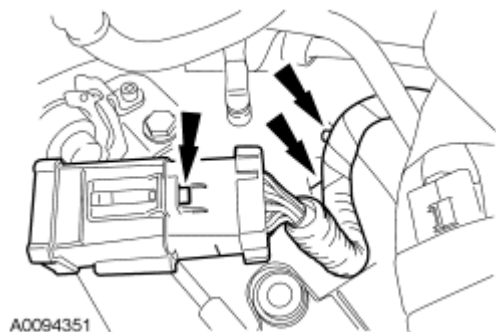


Fig. 442: Locating 16-Pin Electrical Connector & Wiring Retainers
Courtesy of FORD MOTOR CO.

74. Connect the shift cable.

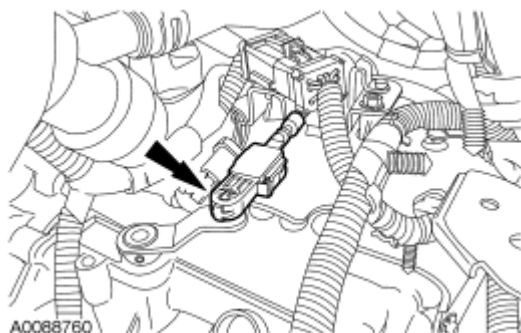


Fig. 443: Locating Shift Cable End
Courtesy of FORD MOTOR CO.

75. Attach the transmission vent tube to the coolant hose.

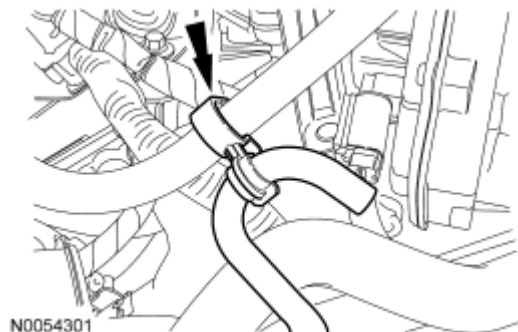


Fig. 444: Transmission Vent Tube & Coolant Hose
Courtesy of FORD MOTOR CO.

All vehicles

76. Attach the B+ terminal to the battery cable and install the nut.
- Tighten to 5 Nm (44 lb-in).

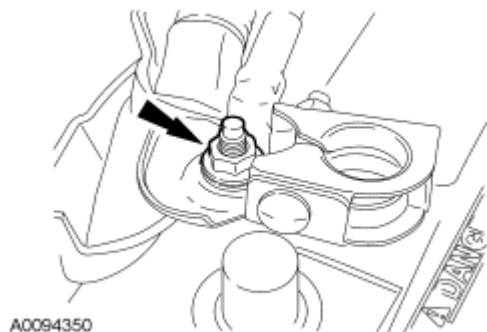


Fig. 445: Locating Battery Cable Nut
Courtesy of FORD MOTOR CO.

77. Position the ground wire on the LH fender and install the bolt.
- Tighten to 10 Nm (89 lb-in).

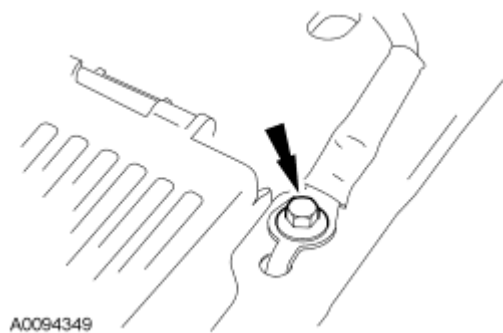


Fig. 446: Locating Ground Wire Bolt
Courtesy of FORD MOTOR CO.

78. Connect the power steering reservoir hose and attach the retainer.

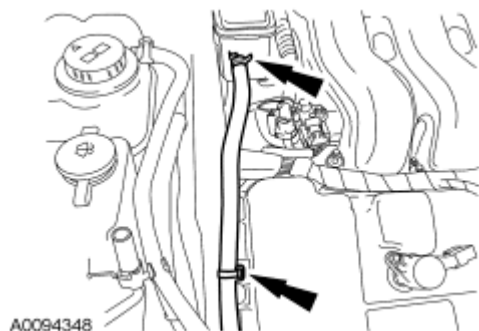


Fig. 447: Locating Power Steering Reservoir Hose & Retainer
Courtesy of FORD MOTOR CO.

79. Connect the 2 powertrain control module (PCM) electrical connectors and attach the wiring conduit.

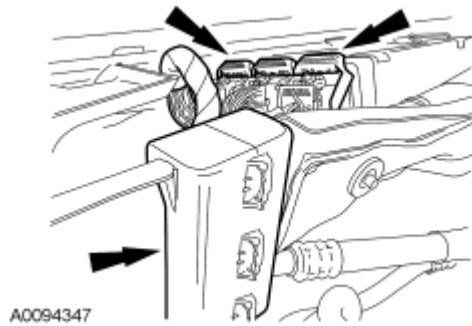


Fig. 448: Locating Powertrain Control Module Electrical Connectors & Wiring Conduit
Courtesy of FORD MOTOR CO.

80. Connect the vapor tube to the purge valve.

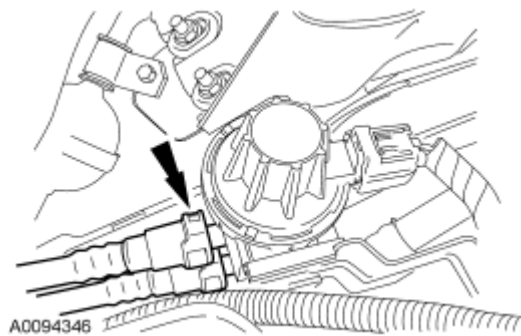


Fig. 449: Locating Vapor Tube
Courtesy of FORD MOTOR CO.

CAUTION: Make sure that the fuel tube coupling clicks into place when installing the tube. To make sure that the fuel tube is fully seated, pull on the tube.

NOTE: Apply clean engine oil to the end of the tube before inserting a tube into the connector.

81. Connect the fuel tube to the fuel rail.
- Connect the fuel tube redundant clip.

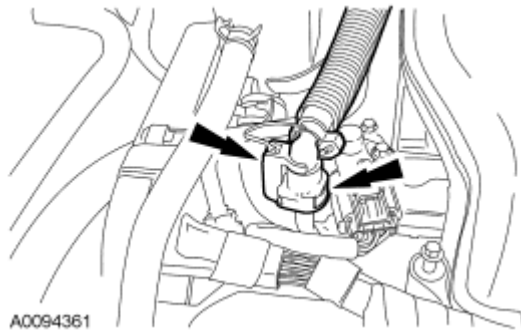


Fig. 450: Fuel Tube Redundant Clip
Courtesy of FORD MOTOR CO.

82. Attach the fuel tube retainer to the upper intake manifold.

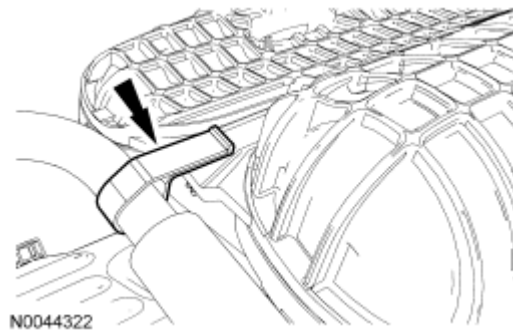


Fig. 451: Locating Fuel Tube Retainer
Courtesy of FORD MOTOR CO.

83. Position the ground strap on the RH fender and install the bolt.
- Tighten to 10 Nm (89 lb-in).

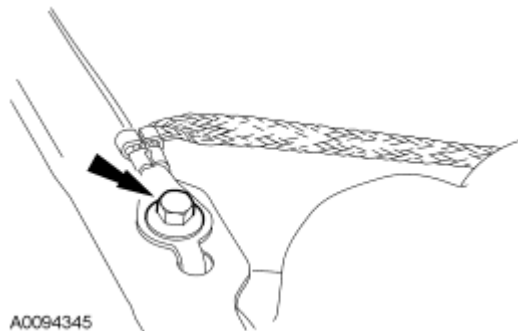


Fig. 452: Locating Ground Strap Bolt
Courtesy of FORD MOTOR CO.

84. Clean the 4 roll restrictor cross brace bolts using a wire brush and apply new threadlock to the threads.
85. Position the roll restrictor cross brace and install the 4 new bolts.
- Tighten to 55 Nm (41 lb-ft).

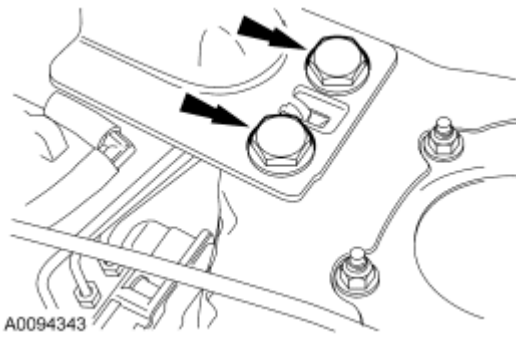


Fig. 453: Identifying Transaxle Roll Restrictor Bar Bolts
Courtesy of FORD MOTOR CO.

86. Clean the roll restrictor cross brace-to-roll restrictor bolt using a wire brush and apply new threadlock to the threads.
87. Install a new roll restrictor cross brace-to-roll restrictor bolt.
 - Tighten to 48 Nm (35 lb-ft).

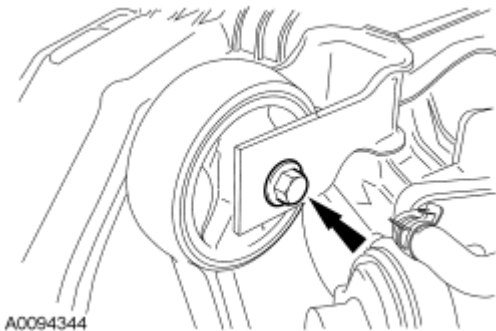


Fig. 454: Locating Upper Roll Restrictor Bolt
Courtesy of FORD MOTOR CO.

88. Install the LH and RH halfshafts. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
89. Install the exhaust flex pipe and the LH catalytic converter. For additional information, refer to **EXHAUST SYSTEM** article.
90. Install the cowl vent panel. For additional information, refer to **FRONT END BODY PANELS** article.
91. Install the air cleaner outlet pipe and air cleaner. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
92. Fill the engine with clean engine oil.
93. Connect the negative and positive battery cables. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
94. Evacuate and recharge the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.
95. Fill the power steering system. For additional information, refer to **STEERING SYSTEM - GENERAL INFORMATION** article.

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