

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

2007 ENGINE

Engine - 3.9L and 4.2L - Freestar & Monterey

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 Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Thread Sealant with PTFE TA-24	WSK-M2G350-A2
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A

GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Item	Specification
Engine	
Displacement	3.9L
Number of cylinders	6
Bore	96.82 mm (3.81 in)
Stroke	88.0 mm (3.46 in)
Firing order	1-4-2-5-3-6
Oil pressure (hot 2,500 rpm)	275.8-861.8 kPa (40-125 psi)
Oil Capacity	4.73 L (5.0 quarts) total
Compression ratio	9.35:1
Cylinder Head and Valve Train	
Cylinder head gasket surface flatness	0.18 mm (0.007 in)
Combustion chamber volume (cc)	61.5-64.5
Valve arrangement (front to rear)	LH: E, I, E, I, E, I RH: I, E, I, E, I, E
Valve guide bore diameter intake and exhaust	7.015-7.044 mm (0.276-0.277 in)
Valve stem diameter - intake (standard)	6.975-6.995 mm (0.2746-0.2754 in)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Valve stem diameter - exhaust (standard)	6.949-6.970 mm (0.2735-0.2744 in)
Valve stem diameter - intake (oversize)	9.075-9.055 mm (0.3573-0.3565 in)
Valve stem diameter - exhaust (oversize)	9.063-9.043 mm (0.3568-0.3560 in)
Valve stem diameter - intake (oversize)	9.456-9.436 mm (0.3723-0.3715 in)
Valve stem diameter - exhaust (oversize)	9.444-9.424 mm (0.3718-0.3710 in)
Valve stem-to-guide clearance - intake	0.020-0.069 mm (0.0008-0.0027 in)
Valve stem-to-guide clearance - exhaust	0.045-0.095 mm (0.0018-0.0037 in)
Valve head diameter - intake	47.27 mm (1.86 in)
Valve head diameter - exhaust	37.1 mm (1.46 in)
Valve face runout	0.05 mm (0.002 in)
Valve face angle	45.675 degrees
Valve seat width	1.5-2.0 mm (0.06-0.08 in)
Valve seat runout (T.I.R.)	0.076 mm (0.003 in)
Valve seat angle	44.75 degrees
Valve spring free length	50.7 mm
Valve spring squareness	1.2 mm
Valve spring compression pressure (valve open, without damper)	1000 N (224 lb) @ 29.2 mm (1.16 in)
Valve spring compression pressure (valve closed, without damper)	350 N (79 lb) @ 40.7 mm (1.62 in)
Valve spring installed height	40.7 mm (1.62 in)
Valve spring installed pressure	350 N (79 lb) @ 40.7 mm (1.62 in)
Rocker arm ratio	1.73:1
Hydraulic Roller Lifter	
Diameter (Std)	22.195-22.212 mm (0.8738-0.8745 in)
Clearance-to-bore	0.018-0.068 mm (0.0007-0.0027 in)
Service limit	0.127 mm (0.005 in)
Hydraulic leakdown rate	20-100 seconds
Collapsed lash adjuster gap - intake	2.15-4.69 mm (0.089-0.189 in)
Collapsed lash adjuster gap - exhaust	2.15-4.69 mm (0.089-0.189 in)
Camshaft	
Theoretical valve lift @ 0 lash - intake	10.78 mm (0.424 in)
Theoretical valve lift @ 0 lash - exhaust	11.41 mm (0.449 in)
Lobe lift - intake	6.223 mm (0.245 in)
Lobe lift - exhaust	6.575 mm (0.259 in)
Allowable lobe lift loss	0.127 mm (0.005 in)
Journal diameter	52.082-52.108 mm (2.0505-2.0515 in)
Camshaft journal bore inside diameter - intake	47.097 mm (1.8542 in)
Camshaft journal bore inside diameter - exhaust	39.739 mm (1.5645 in)
Camshaft journal-to-bearing clearance	0.025-0.076 mm (0.001-0.003 in)
Camshaft bearing runout	0.127 mm (0.0005 in)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

End play	0.025-0.150 mm (0.001-0.006 in)
Cylinder Block	
Cylinder bore diameter	96.82 mm (3.81 in)
Cylinder bore maximum out-of-round limit	0.025 mm (0.001 in)
Cylinder bore maximum taper	0.050 mm (0.002 in)
Cylinder bore maximum out-of-round service limit	0.127 mm (0.005 in)
Cylinder bore maximum taper service limit	0.254 mm (0.010 in)
Main bearing bore inside diameter	68.905 mm (2.713 in) 68.885 mm (2.712 in)
Camshaft bearing bore inside diameter	-
Head gasket surface flatness	0.008 mm (0.003 in) in 152.0 mm (6.00 in)
Crankshaft	
Main bearing journal diameter (journals 1, 2, 3)	63.978-63.998 mm (2.5188-2.5196 in)
Main bearing journal maximum taper	0.016 mm (0.0006 in) diameter or 0.008 mm (0.0003 in) radius MAX between any 2 measurement points
Main bearing journal maximum out-of-round	0.0008 mm MAX in 45 degrees, 0.016 mm (0.006 in) TOTAL
Main bearing journal-to-cylinder block clearance - desired	0.025-0.035 mm (0.001-0.0014 in)
Main bearing journal-to-cylinder block clearance - allowable	0.013-0.058 mm (0.0005-0.0023 in)
Connecting rod journal diameter	58.682-58.702 mm (2.3103-2.3111 in)
Connecting rod journal maximum taper	0.016 mm (0.0006 in) diameter or mm (0.0003 in) radius MAX between any 2 measurement points
Connecting rod journal maximum out-of-round	0.008 mm (0.0003 in) MAX in 45 degrees, 0.015 mm (0.0006 in) TOTAL
Crankshaft maximum end play	0.010-0.20 mm (0.0004-0.008 in)
Piston^a and Connecting Rod	
Piston diameter - coded red (before coating)	96.795-96.782 mm (3.81082-3.81031 in)
Piston diameter - coded blue (before coating)	96.808-96.795 mm (3.81133-3.81082 in)
Piston diameter - coded yellow (before coating)	96.821-96.808 mm (3.81184-3.81133 in)
Piston-to-cylinder bore clearance (uncoated clearance)	0.018-0.044 mm (0.0007-0.0017 in)
Piston ring end gap - compression (top, in gauge)	0.17-0.33 mm (0.0067-0.0130 in)
Piston ring end gap - compression (bottom, in gauge)	0.3-0.55 mm (0.0118-0.0217 in)
Piston ring end gap - oil ring (steel rail, in gauge)	0.15-0.65 mm (0.0059-0.0256 in)
Piston ring groove width - compression (top)	1.535-1.52 mm (0.0604-0.0598 in)
Piston ring groove width - compression (bottom)	1.54-1.52 mm (0.0606-0.0598 in)
Piston ring groove width - oil	3.05-3.03 mm (0.1200-0.1193 in)
Piston ring width - compression (top)	1.47-1.49 mm (0.0578-0.0587 in)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Piston ring width - compression (bottom)	1.47-1.49 mm (0.0578-0.0587 in)
Piston ring width - oil ring	side seal - snug fit
Piston ring-to-groove clearance - 1st ring	0.030-0.065 mm (0.0012-0.0026 in)
Piston ring-to-groove clearance - 2nd ring	0.030-0.070 mm (0.0012-0.0028 in)
Piston pin bore diameter	23.012-23.012 mm (0.9060-0.9061 in)
Piston pin diameter	23.000-23.003 mm (0.9055-0.9056 in)
Piston pin length	63.55-63.05 mm (2.5096-2.4823 in)
Piston pin-to-piston fit	0.009-0.017 mm (0.0004-0.0007 in)
Connecting rod-to-pin clearance	Press fit 8 kilonewtons (1,800 lb)
Connecting rod pin bore diameter	22.98-22.941 mm (0.9047-0.9032 in)
Connecting rod length (center-to-center)	154.66-154.74 mm (6.08896-6.09211 in)
Connecting rod maximum allowed bend	0.04 per 25 mm (0.0016 per in)
Connecting rod maximum allowed twist	0.05 per 25 mm (0.002 per in)
Connecting rod bearing bore diameter	61.635-61.655 mm (2.4266-2.4274 in)
Connecting rod bearing-to-crankshaft clearance - desired	0.025-0.035 mm (0.001-0.0014 in)
Connecting rod bearing-to-crankshaft clearance - allowable	0.022-0.069 mm (0.00086-0.0027 in)
Connecting rod side clearance - standard	0.11-0.49 mm (0.0047-0.0193 in)
Connecting rod side clearance - service limit	0.49 mm MAX (0.0193 in MAX)
Balance Shaft	
Journal diameter	52.108-52.082 mm (2.0515-2.0505 in)
Bore inside diameter	55.689-55.664 mm (2.192-2.191 in)
Maximum runout	0.025 mm (0.001 in)
End play	0.075-0.200 mm (0.003-0.008 in)

^a When installing new pistons, measure the cylinder bore as described in **ENGINE SYSTEM - GENERAL INFORMATION** . Install the service piston matched to the piston bore diameter above.

GENERAL SPECIFICATIONS**GENERAL SPECIFICATIONS**

Item	Specification
Engine	
Displacement	4.2L
Number of cylinders	6
Bore	96.82 mm (3.81 in)
Stroke	95.0 mm (3.8 in)
Firing order	1-4-2-5-3-6

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Oil pressure (hot 2,500 rpm)	40-125 psi
Oil capacity	5.0 quarts total
Compression ratio	-
Cylinder Head and Valve Train	
Cylinder head gasket surface flatness	0.18 mm (0.007 in)
Combustion chamber volume	61.5-64.5
Valve arrangement (front to rear)	LH: E, I, E, I, E, I RH: I, E, I, E, I, E
Valve guide bore diameter - intake and exhaust	7.015-7.044 mm (0.276-0.277 in)
Valve stem diameter - intake (standard)	6.975-6.995 mm (0.2746-0.2754 in)
Valve stem diameter - exhaust (standard)	6.949-6.970 mm (0.2735-0.2744 in)
Valve stem diameter - oversize (intake)	9.075-9.055 mm (0.3573-0.3565 in)
Valve stem diameter - oversize (exhaust)	9.063-9.043 mm (0.3568-0.3560 in)
Valve stem diameter - oversize (intake)	9.456-9.436 mm (0.3723-0.3715 in)
Valve stem diameter - oversize (exhaust)	9.444-9.424 mm (0.3718-0.3710 in)
Valve stem-to-guide clearance - intake	0.020-0.069 mm (0.0008-0.0027 in)
Valve stem-to-guide clearance - exhaust	0.045-0.095 mm (0.008-0.0037 in)
Valve head diameter - intake	47.27 mm (1.86 in)
Valve head diameter - exhaust	37.1 mm (1.46 in)
Valve face runout	0.05 mm (0.002 in)
Valve face angle	45.675 degrees
Valve seat width	1.5-2.0 mm (0.06-0.08 in)
Valve seat runout (T.I.R.)	0.076 mm (0.003 in)
Valve seat angle	44.75 degrees
Valve spring free length	50.7 mm (1.99 in)
Valve spring squareness	1.2 mm (0.0472 in)
Valve spring compression pressure (valve open, without damper)	1,000 N (224 lb) @ 29.2 mm (1.16 in)
Valve spring compression pressure (valve closed, without damper)	350 N (79 lb) @ 40.7 mm (1.62 in)
Valve spring installed height	40.7 mm (1.62 in)
Valve spring installed pressure	350 N (79 lb) @ 40.7 mm (1.62 in)
Rocker arm ratio	1.73:1
Hydraulic Roller Lifter	
Diameter (standard)	22.195-22.212 mm (0.8738-0.8745 in)
Clearance-to-bore	0.018-0.068 mm (0.0007-0.0027 in)
Service limit	0.127 mm (0.005 in)
Hydraulic leakdown rate	20-100 seconds
Collapsed lash adjuster gap (intake and exhaust)	2.15-4.69 mm (0.089-0.189 in)
Camshaft	
Theoretical valve lift @ 0 lash - intake	10.78 mm (0.4244 in)
Theoretical valve lift @ 0 lash - exhaust	11.41 mm (0.4492 in)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Lobe lift - intake	6.223 mm (0.24 in)
Lobe lift - exhaust	6.575 mm (0.26 in)
Allowable lobe lift loss	0.127 mm (0.005 in)
Journal diameter	52.082-52.108 mm (2.0505-2.0515 in)
Camshaft journal bore inside diameter - intake	47.097 mm (1.8542 in) max. 47.072 mm (1.85 in) min.
Camshaft journal bore inside diameter - exhaust	39.739 mm (1.5645 in) max. 39.714 mm (1.56 in) min.
Camshaft journal-to-bearing clearance	0.025-0.076 mm (0.001-0.003 in)
Camshaft bearing runout	0.127 mm (0.005 in)
End play	0.025-0.150 mm (0.001-0.006 in)
Cylinder Block	
Cylinder bore diameter	96.812 mm (3.81 in)
Cylinder bore maximum out-of-round limit	0.025 mm (0.001 in)
Cylinder bore maximum taper	0.050 mm (0.002 in)
Cylinder bore maximum out-of-round service limit	0.127 mm (0.005 in)
Cylinder bore maximum taper service limit	0.254 mm (0.010 in)
Main bearing bore inside diameter	68.905-68.885 mm (2.713-2.712 in)
Camshaft bearing bore inside diameter - No. 1	55.689-55.664 mm (2.192-2.191 in)
Camshaft bearing bore inside diameter - No. 2 and No. 3	55.308-55.283 mm (2.177-2.176 in)
Camshaft bearing bore inside diameter - No. 4	55.684-55.664 mm (2.192-2.191 in)
Head gasket surface flatness	0.08 mm (0.003 in) in 152.0 mm (6.00 in)
Crankshaft	
Main bearing journal diameter (journals 1, 2, 3)	63.978-63.998 mm (2.5188-2.5196 in)
Main bearing journal maximum taper	0.016 mm (0.0006 in) diameter or 0.008 (0.0003 in) radius MAX between any 2 measurement points
Main bearing journal maximum out-of-round	0.008 mm (0.0003 in) MAX in 45 degrees, 0.016 mm (0.006 in) TOTAL
Main bearing journal-to-cylinder block clearance - desired	0.025-0.035 mm (0.001-0.0014 in)
Main bearing journal-to-cylinder block clearance - allowable	0.013-0.058 mm (0.0005-0.0023 in)
Connecting rod journal diameter	58.682-58.702 mm (2.310-2.311 in)
Connecting rod journal maximum taper	0.016 mm (0.0006 in) diameter or 0.008 mm (0.0003 in) radius between any 2 measurement points
Connecting rod journal maximum out-of-round	0.008 mm (0.0003 in) MAX in 45 degrees, 0.016 mm (0.006 in) Total
Crankshaft maximum end play	0.10-0.20 mm (0.004-0.008 in)
Piston and Connecting Rod	
Piston diameter - coded red (before coating)	96.795-96.782 mm (3.81082-3.81031 in)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Piston diameter - coded blue (before coating)	96.808-96.795 mm (3.81133-3.81082 in)
Piston diameter - coded yellow (before coating)	96.821-96.808 mm (3.81184-3.81133 in)
Piston-to-cylinder bore clearance (uncoated clearance)	0.018-0.044 mm (0.00071-0.00173 in)
Piston ring end gap - compression (top, in gauge)	0.17-0.33 mm (0.0067-0.0130 in)
Piston ring end gap - compression (bottom, in gauge)	0.3-0.55 mm (0.0118-0.0217 in)
Piston ring end gap - oil ring (steel rail, in gauge)	0.15-0.65 mm (0.006-0.026 in)
Piston ring groove width - compression (top)	1.535-1.52 mm (0.0603-0.0598 in)
Piston ring groove width - compression (bottom)	
Piston ring groove width - oil	3.05-3.03 mm (0.12001-0.11929 in)
Piston ring width - compression (top and bottom)	1.460-1.490 mm (0.05748-0.05866 in)
Piston ring width - oil ring	Side seal, snug fit
Piston ring-to-groove clearance - 1st ring	0.030-0.065 mm (0.0012-0.00315 in)
Piston ring-to-groove clearance - 2nd ring	0.030-0.070 mm (0.0012-0.0028 in)
Piston pin bore diameter	23.014-23.018 mm (0.90606-0.90622 in)
Piston pin diameter	23.000-23.003 mm (0.90551-0.90563 in)
Piston pin length	63.55-63.05 mm (2.5096-2.4823 in)
Piston pin-to-piston fit	0.011-0.018 mm (0.00043-0.00071 in)
Connecting rod-to-pin clearance	Press fit 8 kilonewtons (1,800 lb)
Connecting rod pin bore diameter	22.94-22.98 mm (0.90315-0.90472 in)
Connecting rod length (center-to-center)	154.66-154.74 mm (6.08896-6.09211 in)
Connecting rod maximum allowable bend	0.04 per 25 mm (0.0016 per in)
Connecting rod maximum allowable twist	0.059 per 25 mm (0.002 per in)
Connecting rod bearing bore diameter	61.635-61.655 mm (2.4266-2.4274 in)
Connecting rod bearing-to-crankshaft clearance - desired	0.025-0.035 mm (0.001-0.0014 in)
Connecting rod bearing-to-crankshaft clearance - allowable	0.022-0.069 mm (0.00086-0.0027 in)
Connecting rod side clearance (assembled to crank) - standard	0.11-0.49 mm (0.0047-0.01929 in)
Connecting rod side clearance (assembled to crank) - service limit	0.49 mm (0.0193 in) max.
Balance Shaft	
Journal diameter	52.108-52.082 mm (2.0515-2.0505 in)
Bore inside diameter	55.689-55.664 mm (2.192-2.191 in)
Maximum runout	0.025 mm (0.001 in)
End play	0.075-0.200 mm (0.003-0.008 in)

TORQUE SPECIFICATIONS

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

TORQUE SPECIFICATIONS

Description	Nm	lb-ft	lb-in
A/C compressor bracket bolts	47	35	-
A/C compressor manifold and tube assembly bolt	20	15	-
A/C compressor manifold bolt	20	15	-
A/C compressor mounting bracket brace lower bolts	25	18	-
A/C compressor mounting bracket brace upper bolts	47	35	-
Accelerator cable bracket bolt	10	-	89
Accelerator cable bracket nut	10	-	89
Accessory drive belt tensioner bolts	25	18	-
Accessory drive bolt tensioner pulley bracket bolts	25	18	-
Air inlet duct nuts	5	-	44
Auxilliary relay box bolts	10	-	89
B+ wire terminal nut	8	-	71
Balance shaft bolts	11	8	-
Bellhousing bolts	90	66	-
Block heater	2	-	18
Brake calipers	35	26	-
Camshaft position sensor (CMP) bolts	3	-	27
Camshaft synchronizer assembly bolt	25	18	-
Camshaft thrust plate bolts	11	8	-
Catalyst monitor sensor (CMS) electrical connector bracket nut	28	21	-
CMP sensor drive gear bolt	45	33	-
Connecting rod cap bolts ^a	-	-	-
Coolant bypass tube bolt	10	-	89
Coolant pump bolts ^a	-	-	-
Coolant pump extension tube bolt	25	18	-
Coolant pump nuts ^a	-	-	-
Coolant pump outlet tube bolt	10	-	89
Coolant pump pulley bolts	11	8	-
Cowl top panel bolts	6	-	53
Crankshaft main bearing cap bolts ^a	-	-	-
Crankshaft pulley bolt	160	118	-
Cylinder head bolts ^a	-	-	-
Exhaust gas recirculation (EGR) system module bolts	25	18	-
Engine front cover bolts ^a	-	-	-
Engine front cover studs	7	-	62
Engine harness ground bolts	10	-	89
Engine roll restrictor bolts	63	46	-
Engine roll restrictor bracket upper bolt	30	22	-

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Engine roll restrictor bracket lower bolts	90	66	-
Engine wiring harness bracket bolt	25	18	-
EGR tube nuts	40	30	-
Exhaust manifold nuts	25	18	-
Exhaust manifold studs	8	-	71
Flexplate bolts	80	59	-
Flexplate-to-crankshaft bolt	80	59	-
Front subframe bolts	175	129	-
Fuel rail bolts	10	-	89
Generator bolts	25	18	-
Generator brace bolt	47	35	-
Ground cable	10	-	89
Heater shield nuts	10	-	89
Heater tube bolt	10	-	89
Idler pulley bolt	47	35	-
Ignition coil bolts	6	-	53
Inspection cover plate bolt	10	-	89
LH motor mount bolt	90	66	-
LH motor mount-to-subframe nut	90	66	-
Lower engine mount nuts	80	59	-
Lower intake manifold bolts ^a	-	-	-
Oil cooler and tube assembly bolt	35	26	-
Oil cooler mounting bolt	35	26	-
Oil cooler tube bracket bolt	25	18	-
Oil filter housing bolts ^a	-	-	-
Oil level indicator tube and bracket bolt	10	-	89
Oil pan baffle nuts	32	24	-
Oil pan bolts ^a	-	-	-
Oil pan drain plug	26	19	-
Oil pan-to-transaxle mounting bolt	45	33	-
Oil pickup tube and screen bolts	25	18	-
Oil pickup tube and screen nut	32	24	-
Oil pressure sender	27	20	-
Oil pump and filter body-to-engine front cover bolts (large)	25	18	-
Oil pump and filter body-to-engine front cover bolts (small)	10	-	89
Power distribution box bolt	10	-	89
Power steering pump bracket (large) bolts	48	35	-
Power steering pump bracket (small) bolts	25	18	-
Powertrain control module (PCM) bolt	10	-	89
Rear motor mount-to-bracket nut	63	46	-
Rear motor mount-to-subframe nut	90	66	-

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

RH motor mount bracket bolts	48	35	-
RH motor mount-to-bracket bolt	90	66	-
RH motor mount-to-subframe nut	90	66	-
Rocker arm-to-cylinder head bolt(s) ^a	-	-	-
Spark plugs	15	11	-
Stabilizer bar link upper nuts	103	76	-
Steering column bolt	30	22	-
Strut bolts	115	85	-
Synchronizer drive gear bolt	45	33	-
Tappet guide plate bolts	12	9	-
Timing chain tensioner bolts	11	8	-
Torque converter nuts	36	27	-
Transaxle fluid level indicator tube bolt	10	-	89
Transaxle support insulator nut	90	66	-
Upper intake manifold bolts ^a	-	-	-
Valve cover bolts	10	-	89
Valve cover stud bolts	10	-	89

^a Refer to the procedure.

DESCRIPTION AND OPERATION

ENGINE

The 3.9L and 4.2L engines have:

- a V-block with 6 cylinders and splayed crankpins.
- a distributorless ignition system.
- a multiport, sequential fuel injection (SFI) system.
- a variable-length induction system (intake manifold runner control).
- overhead valves.
- hydraulic valve tappets for automatic lash adjustment.
- connecting rod parting faces that are unique with an interference fit.
- an engine dynamic balance shaft.

DIAGNOSTIC TESTS

ENGINE

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

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

IN-VEHICLE SERVICING

UPPER INTAKE MANIFOLD

Special Tools

Illustration	Tool Name	Tool Number
 ST1394-A	Remover, Spark Plug Wire	303-106 (T74P-6666-A)

Material

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

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

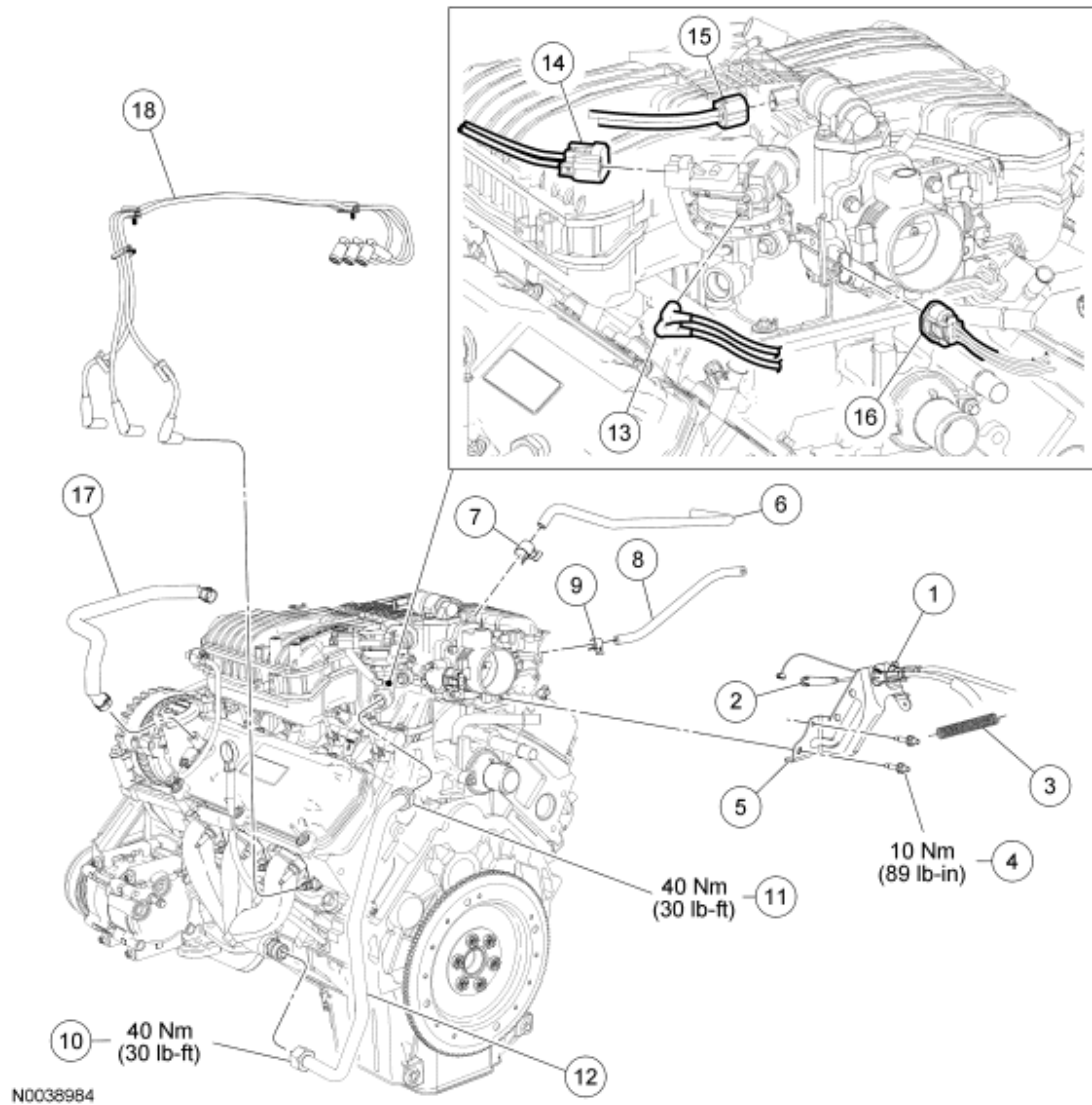


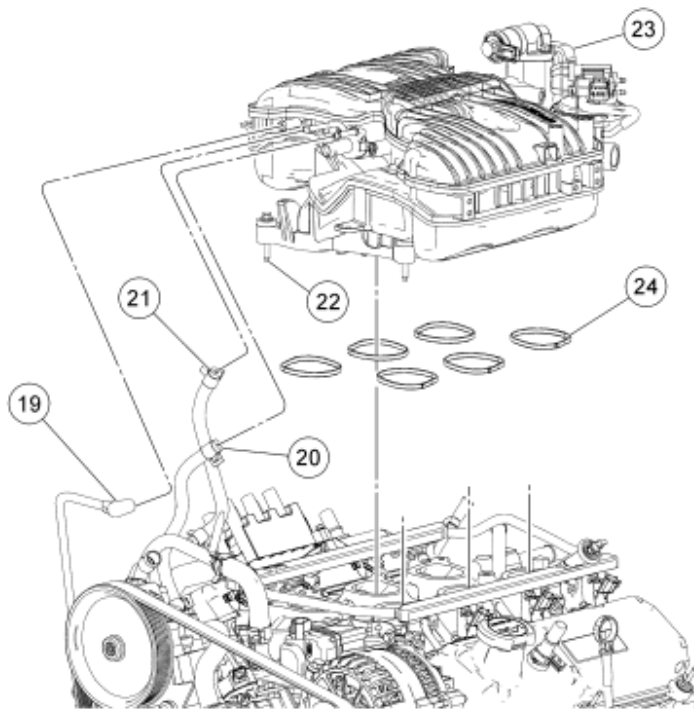
Fig. 1: Exploded View Of Upper Intake Manifold Components & Connectors
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9A758	Accelerator cable
2	9A825	Speed control cable
3	9E894	Spring
4	N802388	Cable bracket stud bolt (2 required)
5	9728	Cable bracket
6	9G271	Evaporative (EVAP) emission return tube
7	-	Clamp (part of 9G271)
8	2A047	Brake booster vacuum hose
9	-	Clamp (part of 2A047)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

10	-	Exhaust gas recirculation (EGR) system module-to-exhaust manifold tube lower fitting (part of 9D477)
11	-	EGR system module-to-exhaust manifold tube upper fitting (part of 9D477)
12	9D477	EGR system module-to-exhaust manifold tube
13	9E498	EGR system module vacuum connector
14	12B637	EGR system module electrical connector
15	12B637	Idle air control (IAC) electrical connector
16	12B637	Throttle position (TP) sensor electrical connector (part of 12B637)
17	6C342	Crankcase vent hose
18	12286	LH spark plug wire assembly (with retainers)



N0039350

Fig. 2: Exploded View Of Upper Intake Manifold
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
19	9E498	Upper intake manifold vacuum tube connector
20	-	Coolant inlet hose (part of 18663)
21	-	Coolant outlet hose (part of 18663)

2007 Mercury Monterey

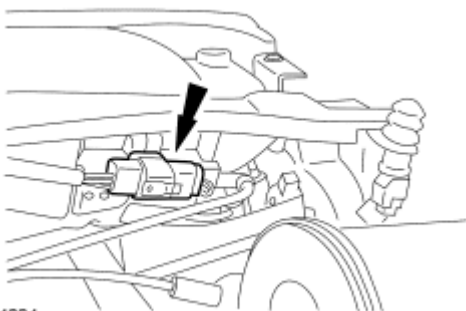
2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

22	-	Upper intake manifold bolt (8 required) (part of 9424)
23	9424	Upper intake manifold
24	9441	Upper intake manifold gasket (6 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.

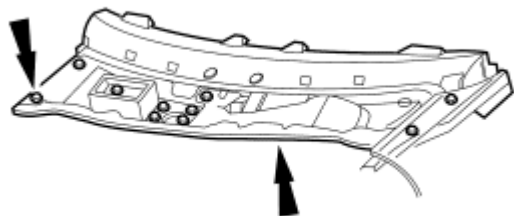
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Drain the cooling system. For additional information, refer to **ENGINE COOLING** article.
4. Remove the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
5. Disconnect the windshield wiper motor electrical connector.



N0024884

Fig. 3: Locating Windshield Wiper Motor Electrical Connector
Courtesy of FORD MOTOR CO.

6. Remove the bolts and the cowl top panel.



N0024885

Fig. 4: Locating Cowl Top Panel Bolts
Courtesy of FORD MOTOR CO.

7. Remove the engine air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
8. Disconnect the accelerator cable from the throttle body.
9. Disconnect the throttle return spring from the accelerator cable bracket.
10. Disconnect the speed control cable from the throttle body.
11. Detach the engine harness retainers from the accelerator cable bracket stud bolt and the throttle position (TP) sensor stud bolt.
12. Remove the 2 cable bracket stud bolts and position aside the cable bracket.
13. Disconnect the evaporative emission (EVAP) return tube from the intake manifold.
14. Disconnect the brake booster vacuum hose from the intake manifold.
15. Disconnect the upper and lower exhaust gas recirculation (EGR) system module tube fittings and remove the tube.
16. Disconnect the EGR system module vacuum connector.
17. Disconnect the EGR system module electrical connector.
18. Disconnect the idle air control (IAC) valve electrical connector.
19. Disconnect the TP sensor electrical connector.
20. Disconnect the crankcase vent hose from the intake manifold.

CAUTION: Spark plug wires must be connected correctly. Mark the spark plug wires before removing them.

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

21. With a twisting motion, use the special tool to pull the LH spark plug wires from the spark plugs and the ignition coil.

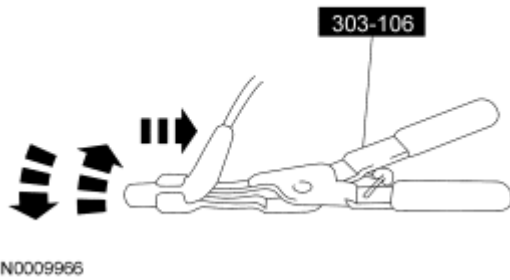


Fig. 5: Pulling Spark Plug Wire Off Spark Plug
Courtesy of FORD MOTOR CO.

22. Remove the LH pin-type retainers and the spark plug wires as an assembly.
23. Disconnect the upper intake manifold vacuum tube connector.
24. Disconnect the coolant inlet hose clamp and the coolant hose from the intake manifold.
25. Disconnect the coolant outlet hose clamp and the coolant hose from the intake manifold.
26. Remove the 8 upper intake manifold bolts.
27. Disconnect the 4 engine harness pin-type retainers.

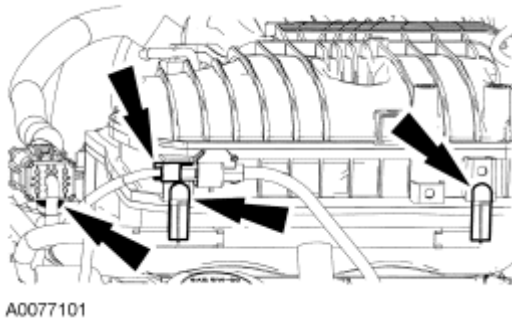


Fig. 6: Locating Engine Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

28. Disconnect the 2 engine harness pin-type retainers.

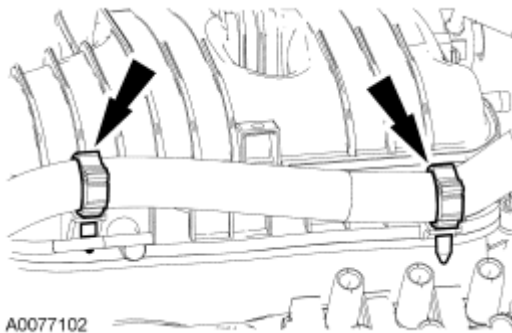


Fig. 7: Locating Engine Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

29. Remove the intake manifold and discard the intake manifold gaskets.

INSTALLATION

1. Install new intake manifold gaskets and position the intake manifold.
2. Install the 8 intake manifold bolts and tighten the upper intake manifold bolts in 2 stages in the sequence shown.
 - Stage 1: Tighten to 6 Nm (53 lb-in).
 - Stage 2: Tighten to 10 Nm (89 lb-in).

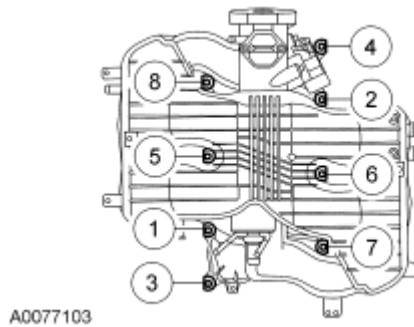


Fig. 8: Identifying Upper Intake Manifold Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Connect the 2 engine harness pin-type retainers.

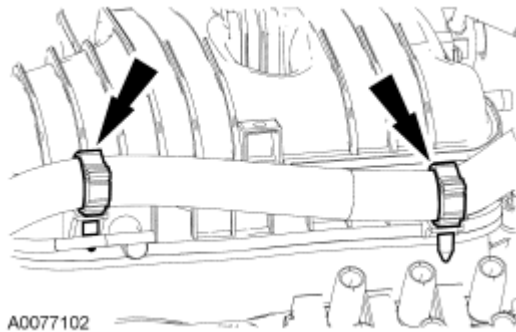


Fig. 9: Locating Engine Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

4. Connect the 4 engine harness pin-type retainers.

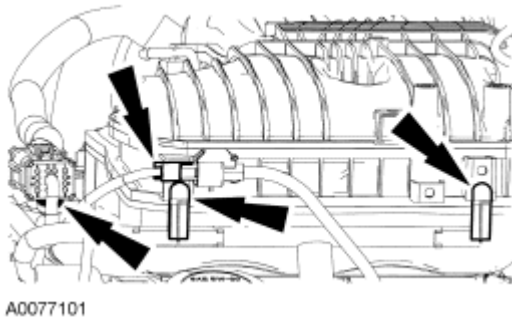


Fig. 10: Locating Engine Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

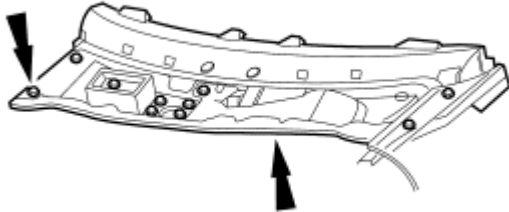
5. Connect the coolant outlet hose to the intake manifold.
6. Connect the coolant inlet hose to the intake manifold.
7. Connect the vacuum tube connector to the upper intake manifold.

CAUTION: Make sure the spark plug boots are positioned so the spark plug wires do not contact the exhaust manifold.

NOTE: Apply dielectric grease to the inside of the spark plug wire boots before attaching to the spark plugs and the ignition coil.

8. Install the spark plug wires and pin-type retainers as an assembly.
9. Connect the crankcase vent hose to the intake manifold.
10. Connect the TP sensor electrical connector.
11. Connect the IAC valve electrical connector.
12. Connect the EGR system module electrical connector.
13. Connect the EGR system module vacuum connector.
14. Position the EGR system module tube and connect the upper and lower module tube fittings.
 - Tighten to 40 Nm (30 lb-ft).
15. Connect the brake booster vacuum hose to the intake manifold.
16. Connect the EVAP return tube to the intake manifold.
17. Position the accelerator cable bracket and install the 2 stud bolts.
 - Tighten to 10 Nm (89 lb-in).
18. Attach the engine harness retainers to the accelerator cable bracket stud bolt and the TP sensor stud bolt.
19. Connect the speed control cable to the throttle body.
20. Connect the throttle return spring to the accelerator cable bracket.
21. Connect the accelerator cable to the throttle body.
22. Install the engine air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
23. Install the cowl top panel and the bolts.

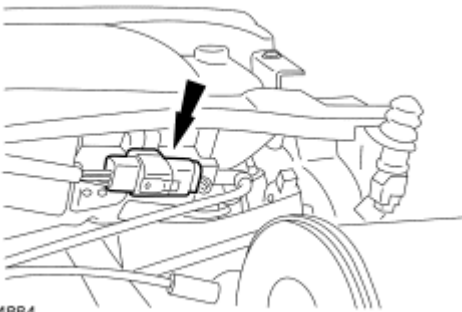
- Tighten to 6 Nm (53 lb-in).



N0024885

Fig. 11: Locating Cowl Top Panel Bolts
Courtesy of FORD MOTOR CO.

24. Connect the windshield wiper motor electrical connector.



N0024884

Fig. 12: Locating Windshield Wiper Motor Electrical Connector
Courtesy of FORD MOTOR CO.

25. Install the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
26. Fill and bleed the cooling system. For additional information, refer to **ENGINE COOLING** article.
27. 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
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Metal Surface Cleaner	WSE-M5B392-A

ZC-21

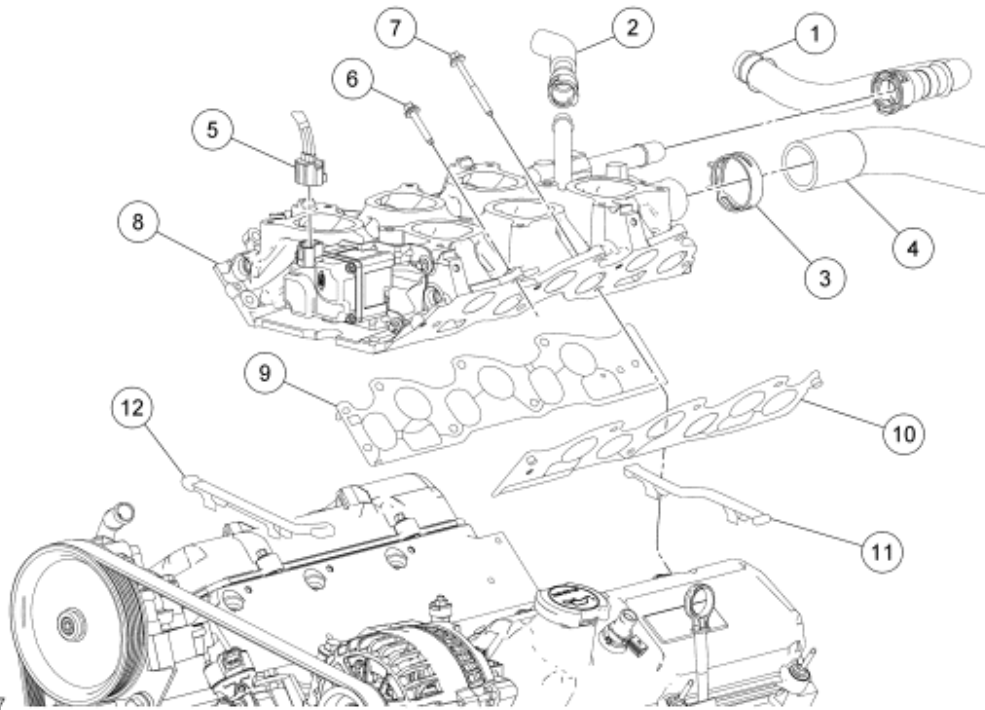


Fig. 13: Exploded View Of Lower Intake Manifold
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	18472	Heater hose
2	18472	Heater hose
3	8287	Upper radiator hose clamp
4	8260	Upper radiator hose
5	12B637	Intake manifold runner control (IMRC) electrical connector
6	W701568	Lower intake manifold bolt (short, 8 required)
7	W701569	Lower intake manifold bolt (long, 6 required)
8	9424	Lower intake manifold
9	9439	RH lower intake manifold gasket
10	9439	LH lower intake manifold gasket
11	9A424	Lower intake manifold rear seal
12	9A425	Lower intake manifold front seal

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 fuel rail. For additional information, refer to **FUEL CHARGING AND CONTROLS** article.
2. Remove the coolant bypass tube. For additional information, refer to **ENGINE COOLING** article.
3. Disconnect the 2 heater hoses from the lower intake manifold.
4. Disconnect the upper radiator hose from the lower intake manifold.
5. Disconnect the intake manifold runner control (IMRC) electrical connector.

NOTE: Mark the location of the 8 short bolts and the 6 long bolts.

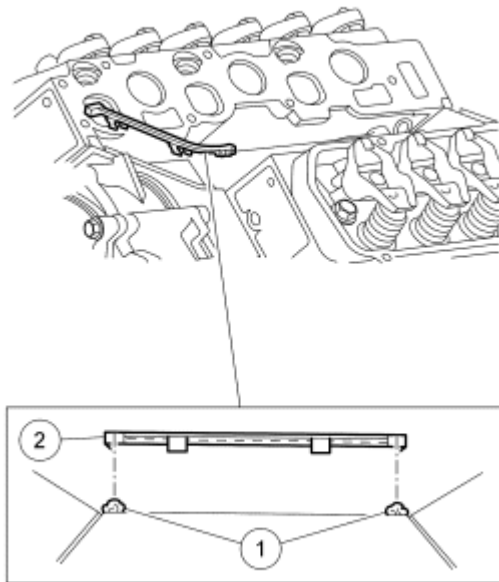
6. Remove the 8 short and the 6 long lower intake manifold bolts.
7. Remove the lower intake manifold.
8. Remove and discard the RH and LH lower intake manifold gaskets.
9. Remove and discard the front and rear lower intake manifold seals.

INSTALLATION

1. Clean all gasket sealing surfaces with metal surface cleaner.

NOTE: Front seal shown, rear seal similar.

2. Install the lower intake manifold front and rear seals.
 1. Apply a bead of silicone gasket and sealer to the intake manifold front and rear seal mounting points as shown.
 2. Install the new lower intake manifold front and rear seals.



N0010643

Fig. 14: Identifying Lower Intake Manifold Front & Rear Seals
Courtesy of FORD MOTOR CO.

3. Install the new intake manifold gaskets.

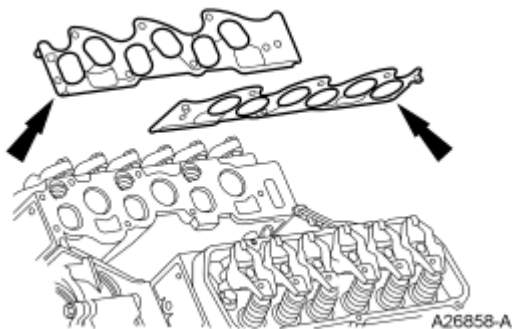
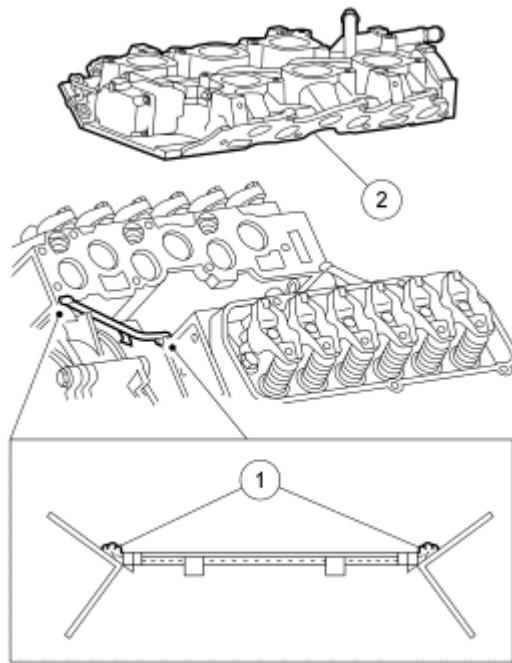


Fig. 15: Identifying Manifold Gaskets
Courtesy of FORD MOTOR CO.

NOTE: **The lower intake manifold must be installed within 4 minutes of applying sealant.**

4. Position the lower intake manifold.
 1. Apply a bead of silicone gasket and sealer to the lower intake manifold mounting points (at the front and rear seal).
 2. Position the lower intake manifold.

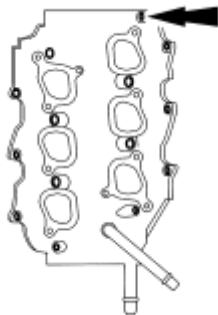


A0084367

Fig. 16: Identifying Lower Intake Manifold
Courtesy of FORD MOTOR CO.

NOTE: Make sure the bolts are installed in the correct locations.

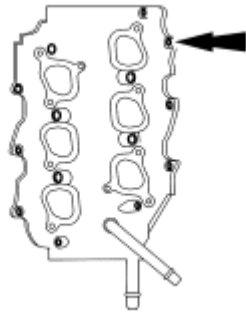
5. Install the 6 long bolts.



A0084368

Fig. 17: Installing Long Bolts
Courtesy of FORD MOTOR CO.

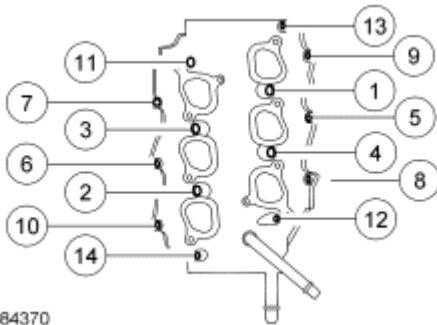
6. Install the 8 short bolts.



A0084369

Fig. 18: Installing Short Bolts
Courtesy of FORD MOTOR CO.

7. Tighten the lower intake manifold bolts in 2 stages in the sequence shown.
 - Stage 1: Tighten to 5 Nm (44 lb-in).
 - Stage 2: Tighten to 10 Nm (89 lb-in).



A0084370

Fig. 19: Identifying Lower Intake Manifold Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

8. Connect the IMRC electrical connector.
9. Connect the upper radiator hose to the lower intake manifold.
10. Connect the 2 heater hoses to the lower intake manifold.
11. Install the fuel rail. For additional information, refer to **FUEL CHARGING AND CONTROLS** article.
12. Install the coolant bypass tube. For additional information, refer to **ENGINE COOLING** article.
13. Drain the engine oil.
 - Tighten to 26 Nm (19 lb-ft).

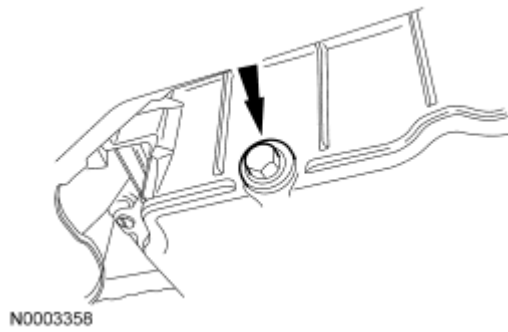


Fig. 20: Identifying Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.

14. Remove and discard the engine oil filter.

NOTE: Lubricate the new engine oil filter seal with clean engine oil prior to installation.

15. Install a new engine oil filter.
 - Tighten one-half turn after the gasket makes contact with oil filter housing.
16. Fill the engine with clean engine oil.

VALVE COVER - LH

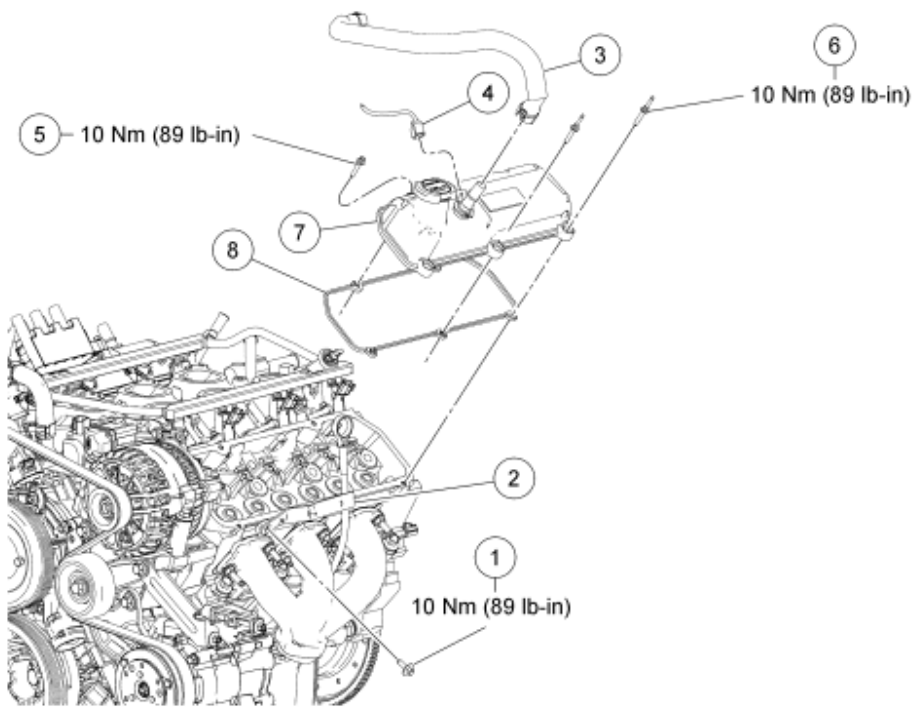


Fig. 21: Exploded View Of Left Valve Cover (With Torque Specifications)
Courtesy of FORD MOTOR CO.

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Item	Part Number	Description
1	W708650	Oil level indicator tube bolt
2	6754	Oil level indicator tube
3	6C342	Crankcase vent hose
4	12B637	Crankcase vent hose electrical connector
5	N807442	Valve cover bolt (3 required)
6	N807443	Valve cover stud bolt (2 required)
7	6582	LH valve cover
8	6584	LH valve cover gasket

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. Remove the 2 nuts and position the auxiliary relay box aside.
 - To install, tighten to 10 Nm (89 lb-in).

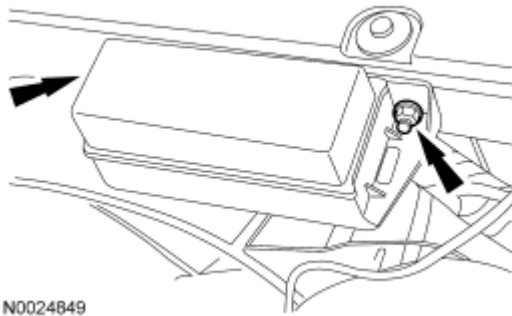


Fig. 22: Locating Auxiliary Relay Box
Courtesy of FORD MOTOR CO.

2. Remove the oil level indicator tube bolt and position aside the oil level indicator tube.
 - To install, tighten to 10 Nm (89 lb-in).
3. Disconnect the crankcase vent hose from the LH valve cover.
4. Disconnect the positive crankcase ventilation (PCV) valve electrical connector.
5. Remove the 3 bolts and the 2 stud bolts from the LH valve cover.
 - To install, tighten to 10 Nm (89 lb-in).
6. Remove the LH valve cover.
7. Remove and discard the LH valve cover gasket.
8. To install, reverse the removal procedure.
 - Install a new gasket in the LH valve cover.

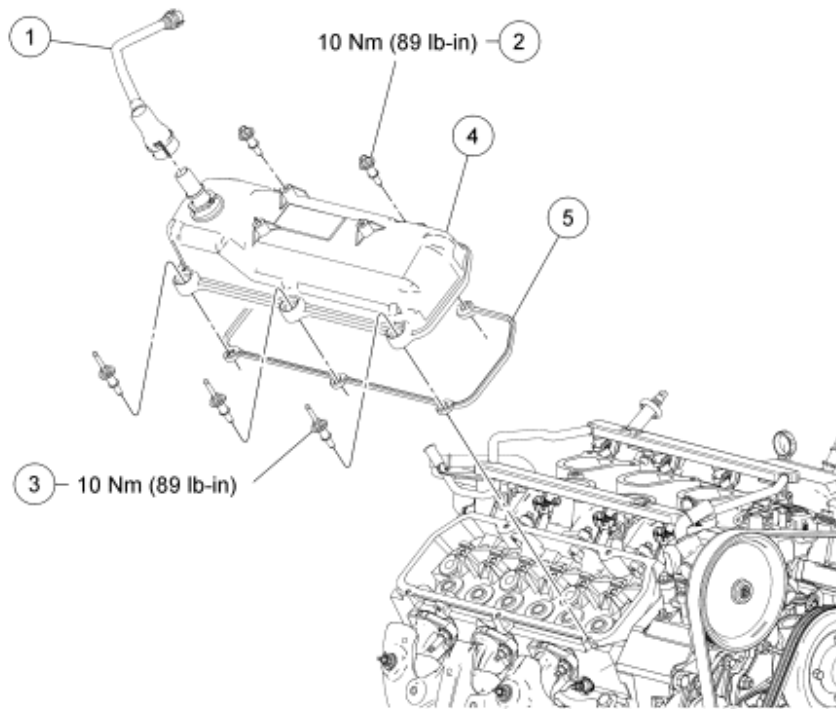
VALVE COVER - RH

Fig. 23: Exploded View Of Right Valve Cover (With Torque Specifications)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6C342	Crankcase vent hose
2	N807442	Valve cover bolt (2 required)
3	N807443	Valve cover stud bolt (3 required)
4	6582	RH valve cover
5	6584	RH valve cover gasket

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. Remove the ignition coil. For additional information, refer to **ENGINE IGNITION** article.
2. Remove the nuts and the fresh air inlet duct.
 - To install, tighten to 5 Nm (44 lb-in).

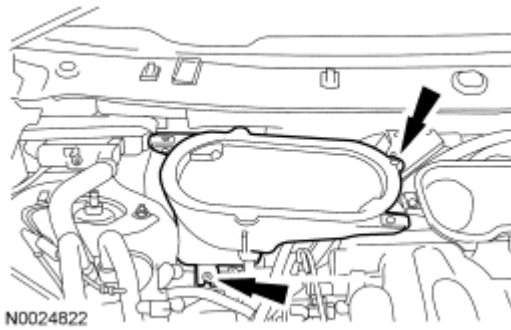


Fig. 24: Locating Fresh Air Inlet Duct Nuts
Courtesy of FORD MOTOR CO.

3. Disconnect the crankcase vent hose.
4. Remove the 2 bolts and the 3 stud bolts from the RH valve cover.
 - To install, tighten to 10 Nm (89 lb-in).
5. Remove the RH valve cover.
6. Remove and discard the RH valve cover gasket.
7. To install, reverse the removal procedure.
 - Install a new gasket in the RH valve cover.

LOWER END COMPONENTS - EXPLODED VIEW

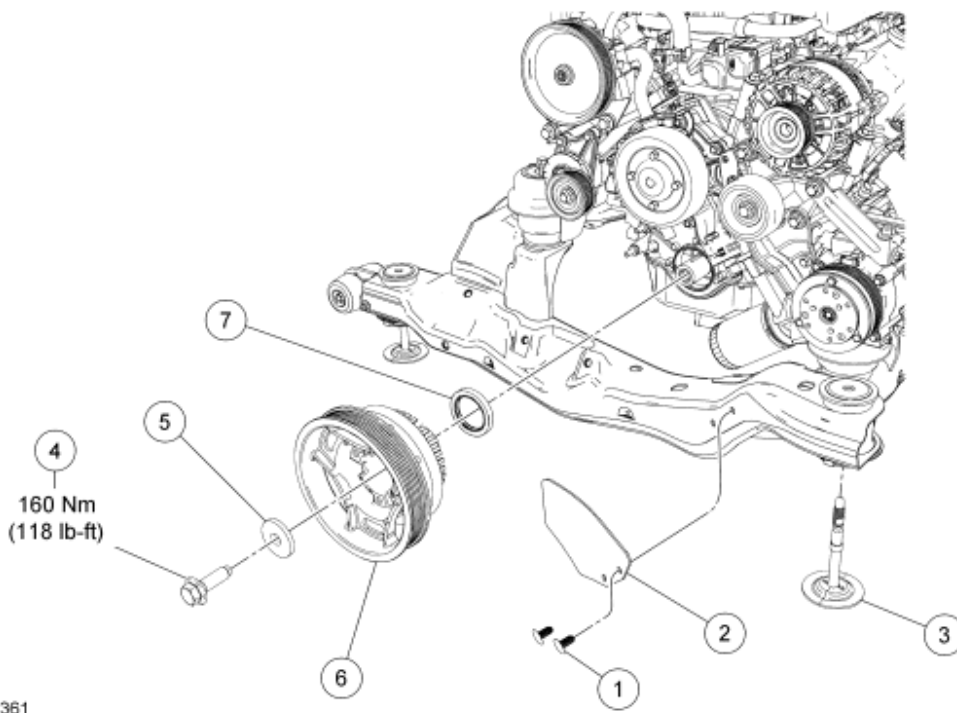


Fig. 25: Exploded View Of Crankshaft Pulley & Front Seal (With Torque Specifications)
Courtesy of FORD MOTOR CO.

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Item	Part Number	Description
1	388930	Pin-type retainer (2 required)
2	16102	Shield
3	N808852	Subframe bolt (2 required)
4	6A340	Crankshaft pulley bolt
5	6378	Crankshaft pulley washer
6	6B321	Crankshaft pulley
7	6700	Crankshaft front seal

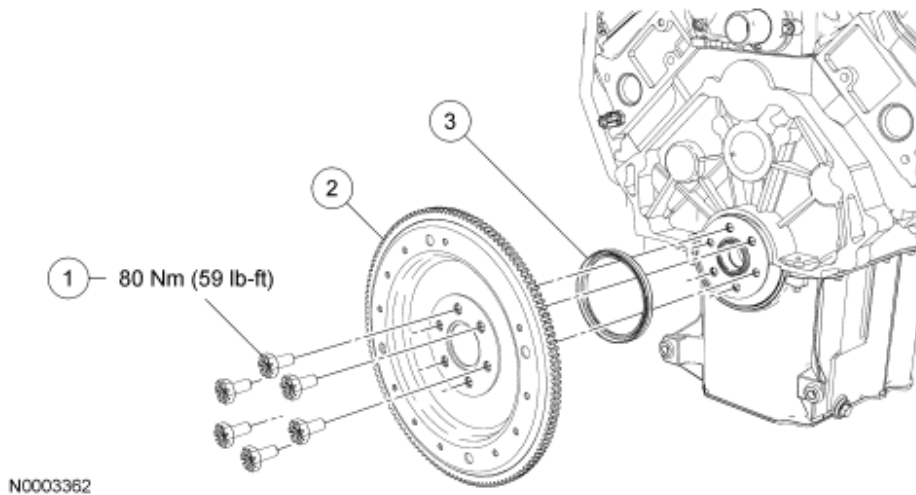


Fig. 26: Exploded View Of Flexplate & Crankshaft Rear Seal (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W707770	Flexplate bolt (6 required)
2	6375	Flexplate
3	6701	Crankshaft rear seal

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

CRANKSHAFT PULLEY

Special Tools

Illustration	Tool Name	Tool Number
ST1286-A	Remover, Crankshaft Vibration Damper	303-009 (T58P-6316-D)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

 ST1378-A	Remover, Crankshaft Vibration Damper	303-176 (T82L-6316-B)
 ST1387-A	Installer, Crankshaft Vibration Damper	303-175 (T82L-6316-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
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

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 accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.
3. Remove the 2 pin-type retainers and the shield.
4. Disconnect the RH front anti-lock brake wheel sensor electrical connector.

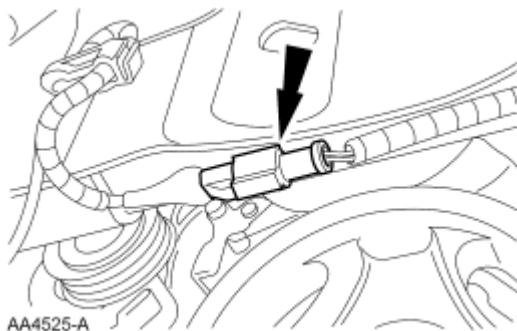


Fig. 27: Right Front Anti-Lock Brake Wheel Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

5. Position a safety stand under the RH side of the subframe.



Fig. 28: Safety Stand Under Right Side Of Subframe
Courtesy of FORD MOTOR CO.

6. Remove the bolts and lower the RH side of the subframe 50.8 mm (2 in).



Fig. 29: Right Subframe Bolts
Courtesy of FORD MOTOR CO.

7. Remove the crankshaft pulley bolt and washer.
8. Using the special tools, remove the crankshaft pulley.

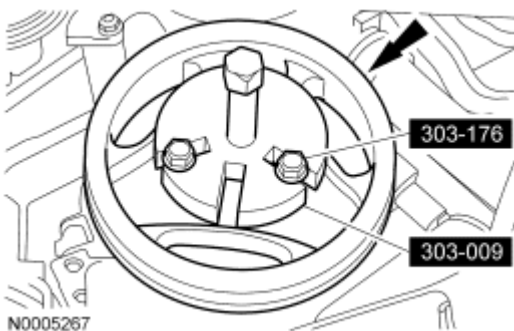


Fig. 30: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

INSTALLATION

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

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

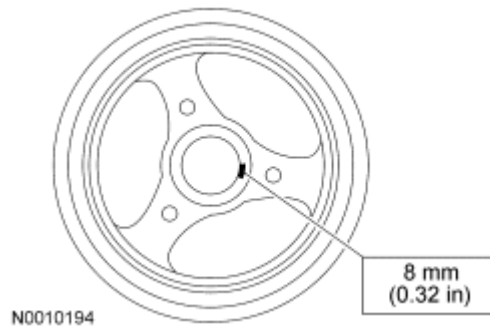


Fig. 31: Applying Silicone Gasket And Sealant To Woodruff Key Slot On Crankshaft Pulley
Courtesy of FORD MOTOR CO.

2. Lubricate the crankshaft pulley sealing surface with clean engine oil.

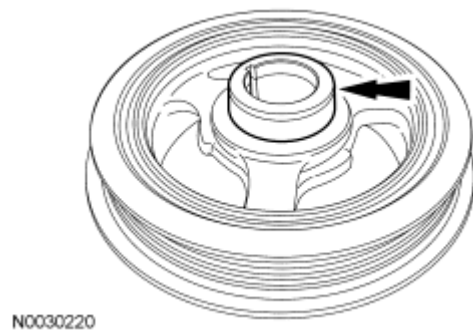


Fig. 32: Lubricating Crankshaft Pulley Sealing Area With Clean Engine Oil
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the crankshaft front seal inner lip with clean engine oil prior to installation.

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

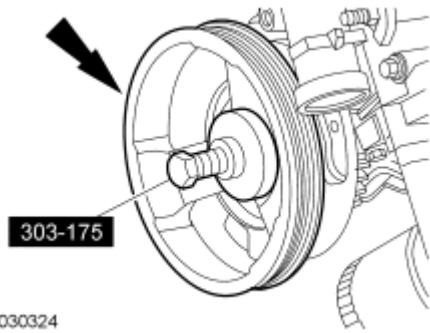


Fig. 33: Installing Crankshaft Pulley Using Special Tool (303--175)
Courtesy of FORD MOTOR CO.

4. Install the crankshaft pulley washer and the bolt.
 - Tighten to 160 Nm (118 lb-ft).
5. Raise the subframe into position, then install the bolts.
 - Tighten to 175 Nm (127 lb-ft).



Fig. 34: Right Subframe Bolts
Courtesy of FORD MOTOR CO.

6. Connect the RH front anti-lock brake wheel sensor electrical connector.

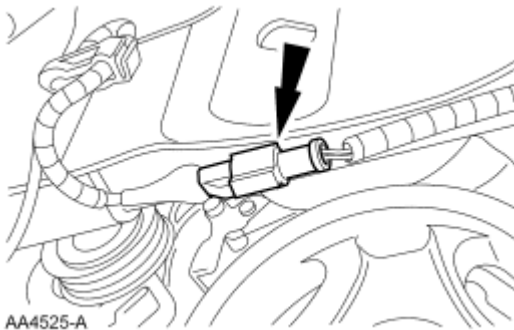


Fig. 35: Right Front Anti-Lock Brake Wheel Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

7. Install the shield and the 2 pin-type retainers.

8. Install the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.

CRANKSHAFT FRONT SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST1385-A	Remover, Oil Seal	303-409 (T92C-6700-CH)
 ST2296-A	Installer, Crankshaft Front Oil Seal	303-335 (T82L-6316-A)
 ST1379-A	Installer, Crankshaft Front Oil Seal	303-474 (T94P-6701-AH)

Material

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

REMOVAL

CAUTION: 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 crankshaft pulley. For additional information, refer to **Crankshaft Pulley**.
3. Using the special tool, remove the front crankshaft seal.

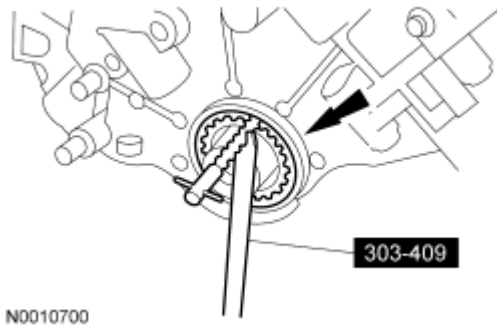


Fig. 36: Removing Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Clean and inspect the mating surface.

NOTE: Lubricate the crankshaft front seal lips with clean engine oil prior to installation.

2. Assemble the special tools, then place the crankshaft front seal onto the special tools.

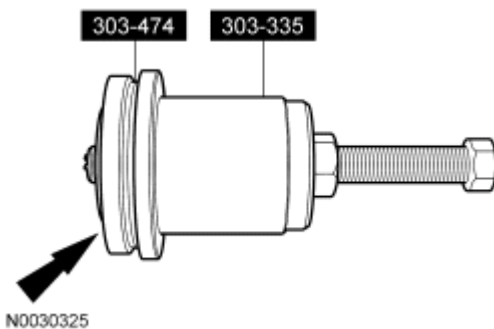


Fig. 37: Identifying Special Tools (303--335) And (303--474)
Courtesy of FORD MOTOR CO.

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

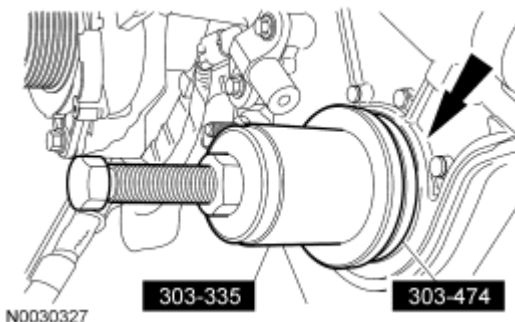


Fig. 38: Installing Crankshaft Front Seal Using Special Tools (303--335) And (303--474)

Courtesy of FORD MOTOR CO.

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

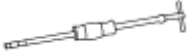
FLEXPLATE

REMOVAL AND INSTALLATION

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

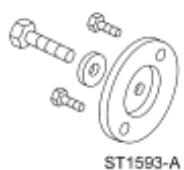
CRANKSHAFT REAR SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST1185-A	Impact Slide Hammer	100-001 (T50T-100-A)
 ST1382-A	Remover, Crankshaft Rear Seal	303-519 (T95P-6701-EH)
 ST1059-A	Replacer, Rear Crankshaft Seal	303-516 (T95P-6701-BH)
 ST1068-A	Spacer, Rear Crank Seal Replacer	303-561 (T96T-6701-B)
	Adapter, Crankshaft Rear Seal (Use only the adapter retaining	303-518 (T95P-6701-DH)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

 T95P-6701-DH ST1060-A	bolts)	
 ST1593-A	Adapter, Crankshaft Rear Seal (Use only the adapter retaining bolts)	303-S560 (T96T-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
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

REMOVAL

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

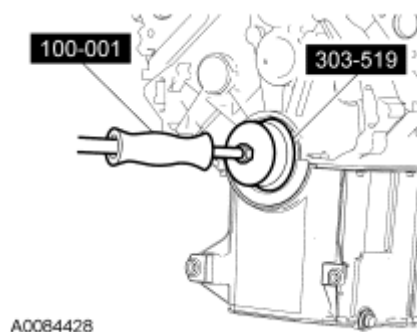


Fig. 39: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Clean and inspect the mating surface.

NOTE: Lubricate the new crankshaft rear seal lips with clean engine oil prior to

installation.

2. Assemble the special tools and crankshaft rear seal.

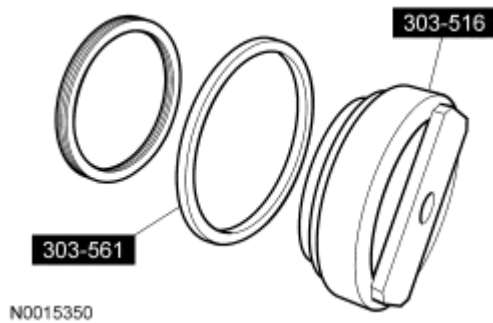


Fig. 40: Identifying Special Tools And Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

3. Install the special tools on the rear of the crankshaft.

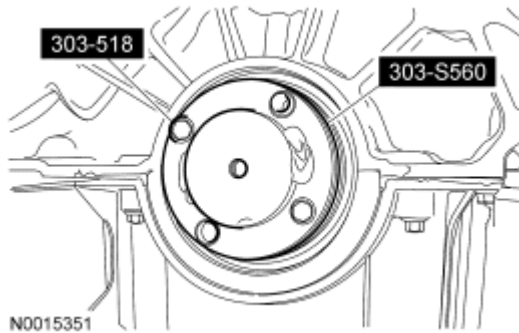


Fig. 41: Installing Special Tools On Rear Of Crankshaft
Courtesy of FORD MOTOR CO.

4. Install the crankshaft rear seal. Tighten the center jack screw until the spacer contacts the engine block.

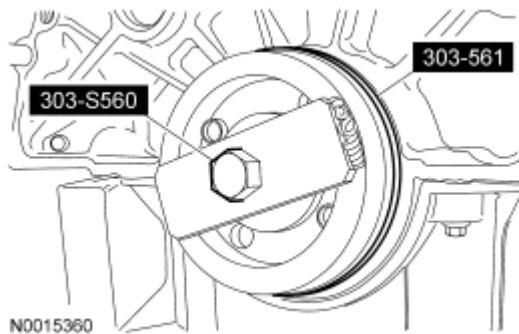


Fig. 42: Installing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

5. Install the flexplate. For additional information, refer to **Flexplate**.

ENGINE FRONT COVER

Special Tools

Illustration	Tool Name	Tool Number
 ST1286-A	Remover, Crankshaft Vibration Damper	303-009 (T58P-6316-D)
 ST1378-A	Remover, Crankshaft Vibration Damper	303-176 (T82L-6316-B)
 ST1387-A	Installer, Crankshaft Vibration Damper	303-175 (T82L-6316-A)
 ST1385-A	Remover, Oil Seal	303-409 (T92C-6700-CH)
 ST2296-A	Installer, Crankshaft Front Oil Seal	303-335 (T82L-6316-A)
 ST1379-A	Installer, Crankshaft Front Oil Seal	303-474 (T94P-6701-AH)

Material

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20	WSS-M2C930-A

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Thread Sealant with PTFE TA-24	WSK-M2G350-A2
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

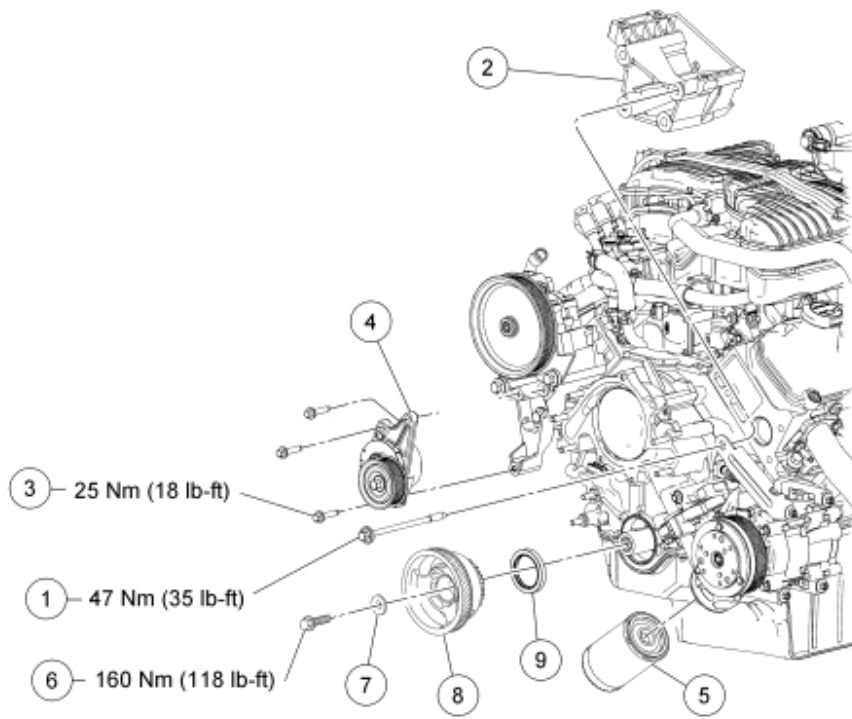


Fig. 43: Exploded View Of Accessory Drive Pulleys, Bracket & Oil Filter (With Torque Specifications)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W707116	Generator brace bolt
2	10039	Generator mounting bracket
3	W701625	Accessory drive belt tensioner bolt (3 required)
4	6B209	Accessory drive belt tensioner
5	6019	Oil filter
6	6A340	Crankshaft pulley bolt
7	6378	Crankshaft pulley washer
8	6B321	Crankshaft pulley
9	6700	Crankshaft front oil seal

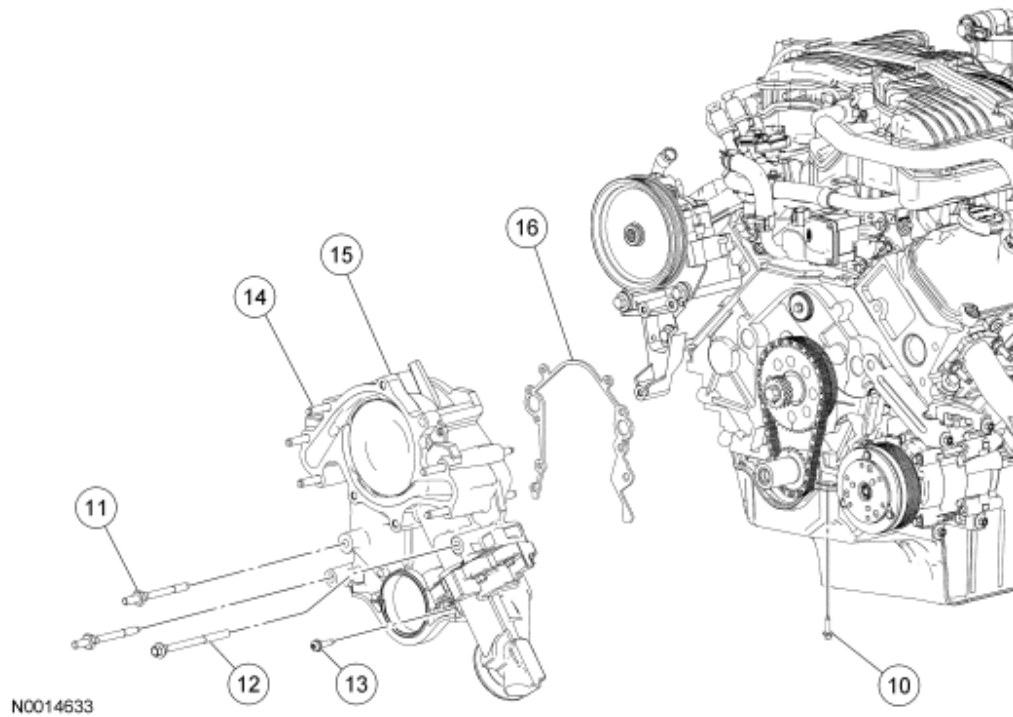


Fig. 44: Exploded View Of Engine Front Cover (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
10	N605892	Oil pan bolt (2 required)
11	N805112	Engine front cover stud bolt (2 required)
12	N804839	Engine front cover bolt
13	W701621	Engine front cover cap screw
14	W708474	Engine front cover stud (5 required)
15	6019	Engine front cover
16	6020	Engine front 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. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the generator. For additional information, refer to **GENERATOR AND REGULATOR** article.
3. Remove the coolant pump. For additional information, refer to **ENGINE COOLING** article.
4. Remove the crankcase position (CKP) sensor. For additional information, refer to **ELECTRONIC**

ENGINE CONTROLS article.

5. Remove the camshaft synchronizer. For additional information, refer to **ELECTRONIC ENGINE CONTROLS** article.
6. Remove the generator brace bolt and the generator mounting bracket.
7. Remove the 3 accessory drive belt tensioner bolts and the tensioner.
8. Remove and discard the oil filter.
9. If equipped, remove the oil cooler. For additional information, refer to **Oil Cooler**.
10. Disconnect the RH front anti-lock brake wheel sensor electrical connector.

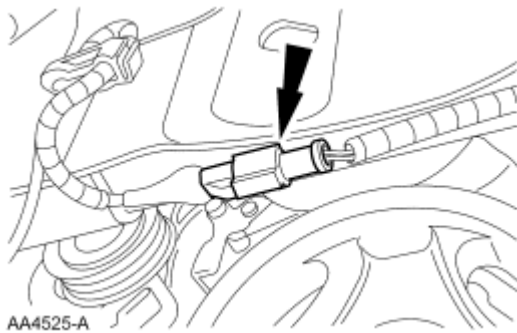


Fig. 45: Right Front Anti-Lock Brake Wheel Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

11. Position a safety stand under the RH side of the subframe.



Fig. 46: Safety Stand Under Right Side Of Subframe
Courtesy of FORD MOTOR CO.

12. Remove the bolts lower the RH side of the subframe 50.8 mm (2 in).



Fig. 47: Right Subframe Bolts
Courtesy of FORD MOTOR CO.

13. Remove the crankshaft pulley bolt and washer.
14. Using the special tools, remove the crankshaft pulley.

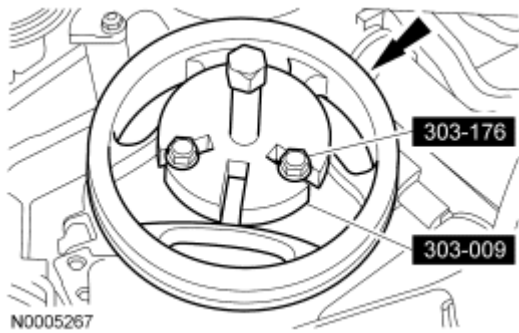


Fig. 48: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

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

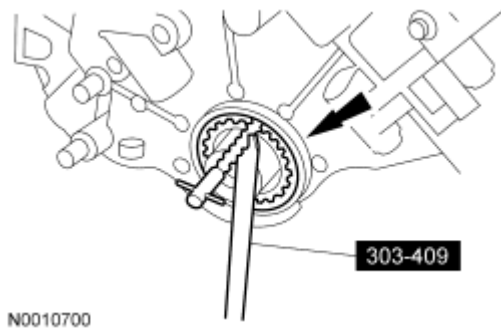


Fig. 49: Removing Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

16. Raise the subframe into position, then install the bolts.



Fig. 50: Right Subframe Bolts
Courtesy of FORD MOTOR CO.

17. Remove the 2 oil pan-to-engine front cover bolts.
18. Disconnect the catalyst monitor sensor electrical connector.

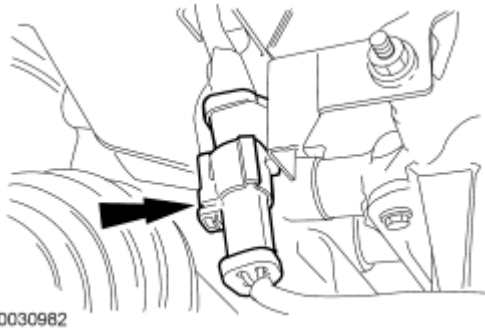


Fig. 51: Locating Catalyst Monitor Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

19. Remove the catalyst monitor sensor electrical connector mounting bracket.

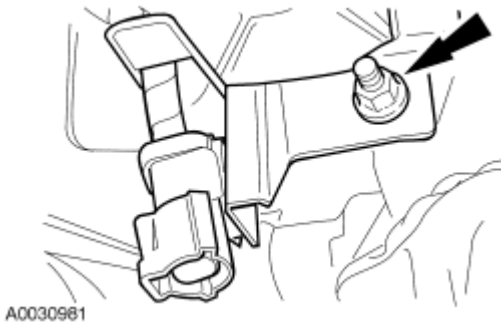


Fig. 52: Locating Catalyst Monitor Sensor Electrical Connector Bracket Nut
Courtesy of FORD MOTOR CO.

20. Remove the 2 engine front cover stud bolts and the engine front cover bolt.

CAUTION: The capscrew is hidden by the oil filter housing. Failure to remove

this retainer will result in damage to the engine front cover.

21. Remove the engine front cover capscrew.

NOTE: Mark the studs so they can be reinstalled in their original location.

22. Loosen the 5 engine front cover studs and remove them with the engine front cover.

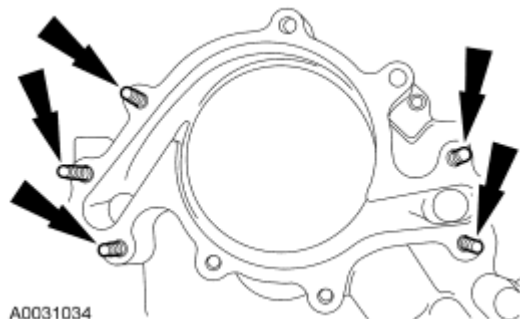


Fig. 53: Locating Studs
Courtesy of FORD MOTOR CO.

23. Remove the engine front cover gasket and discard.

INSTALLATION

CAUTION: In order to prevent foreign material from contaminating the engine block or the engine front cover, it is necessary to seal the coolant and oil passages of both components. Failure to follow these directions will result in engine damage.

CAUTION: Do not use a surface conditioning pad or any other type of fibrous abrasive disc to clean the gasket surfaces. Failure to follow these directions will result in engine damage.

1. Clean and inspect the engine block and front cover as follows:
 - Pack the exposed portion of the oil pan with clean shop towels.
 - Plug the oil and coolant passages.
 - Clean the gasket surfaces.
 - Clean all surfaces requiring gasket sealant with metal surface cleaner.
 - Using compressed air, remove any remaining foreign material from the engine block and front cover.
 - Remove the shop towels from the oil pan.
 - Remove the plugs or seals from the oil and coolant passages.
2. Apply a small amount of silicone gasket and sealer as shown.

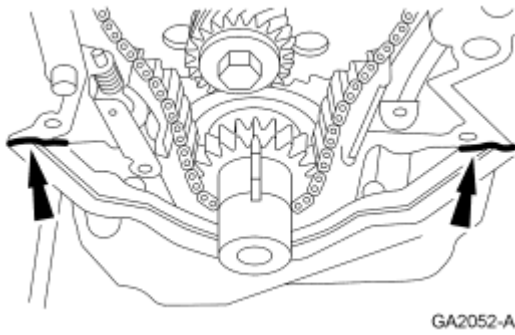


Fig. 54: Applying Silicone Sealer
Courtesy of FORD MOTOR CO.

3. Install the engine front cover gasket and apply a small amount of silicone gasket and sealer as shown.

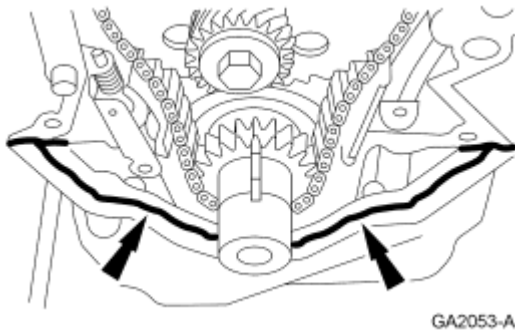
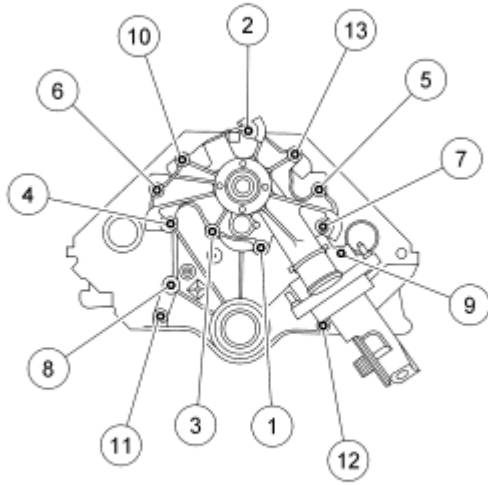


Fig. 55: Applying Silicone Sealer To Pan
Courtesy of FORD MOTOR CO.

CAUTION: The coolant pump and gasket must be installed at this time to correctly tighten all of the engine front cover fasteners in sequence.

NOTE: Use Thread Sealant with PTFE on studs No. 4, 6 and bolt No. 12.

4. Install the engine front cover with the engine front cover studs in their original locations.
 - Tighten the engine front cover studs to 7 Nm (62 lb-in).
 - Using a new gasket, install the coolant pump.
 - Tighten the fasteners in the sequence shown.
 - Tighten bolt No. 12 to 10 Nm (89 lb-in).
 - Tighten all other fasteners to 28 Nm (21 lb-ft).



N0003366

Fig. 56: Identifying Front Cover Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

5. Install the 2 oil pan-to-engine front cover bolts.
 - Tighten to 10 Nm (89 lb-in).
6. Install the catalyst monitor sensor electrical connector bracket and the nut.
 - Tighten to 28 Nm (21 lb-ft).

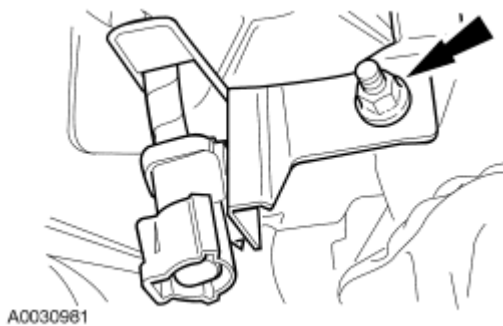


Fig. 57: Locating Catalyst Monitor Sensor Electrical Connector Bracket Nut
Courtesy of FORD MOTOR CO.

7. Connect the catalyst monitor sensor electrical connector.

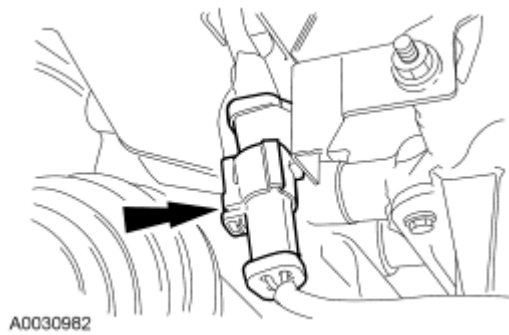


Fig. 58: Locating Catalyst Monitor Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

8. Clean and inspect the engine front cover-to-crankshaft front seal mating surface.

NOTE: Lubricate the new crankshaft front seal lips with clean engine oil prior to installation.

9. Assemble the special tools, then place the crankshaft front seal onto the special tools.

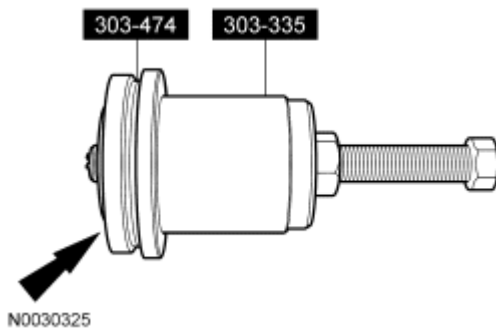


Fig. 59: Identifying Special Tools (303--335) And (303--474)
Courtesy of FORD MOTOR CO.

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

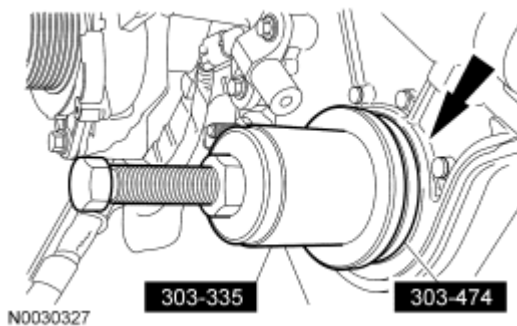


Fig. 60: Installing Crankshaft Front Seal Using Special Tools (303--335) And (303--474)
Courtesy of FORD MOTOR CO.

11. Remove the bolts lower the RH side of the subframe 50.8 mm (2 in).

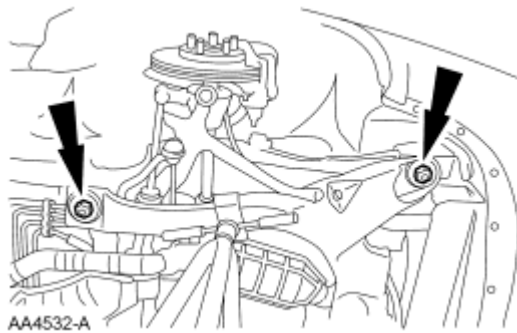


Fig. 61: Right Subframe Bolts
Courtesy of FORD MOTOR CO.

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

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

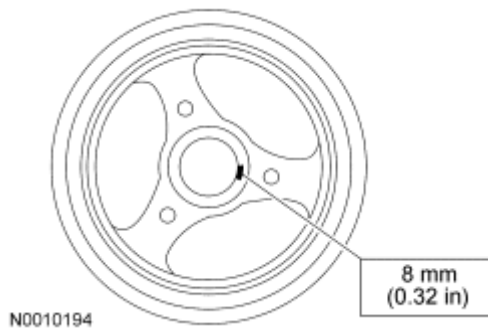


Fig. 62: Applying Silicone Gasket And Sealant To Woodruff Key Slot On Crankshaft Pulley
Courtesy of FORD MOTOR CO.

13. Lubricate the crankshaft pulley sealing surface with clean engine oil.

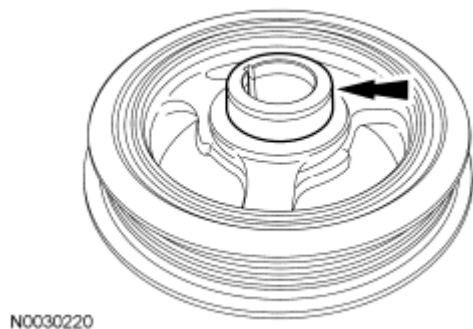


Fig. 63: Lubricating Crankshaft Pulley Sealing Area With Clean Engine Oil
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the crankshaft front seal inner lip with clean engine oil prior to installation.

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

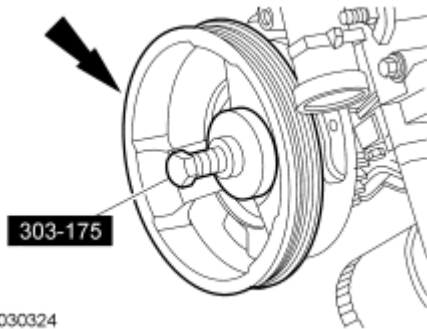


Fig. 64: Installing Crankshaft Pulley Using Special Tool (303--175)
Courtesy of FORD MOTOR CO.

15. Install the crankshaft pulley washer and the bolt.
 - Tighten to 160 Nm (118 lb-ft).
16. Raise the subframe into position, then install the bolts.
 - Tighten to 175 Nm (129 lb-ft).

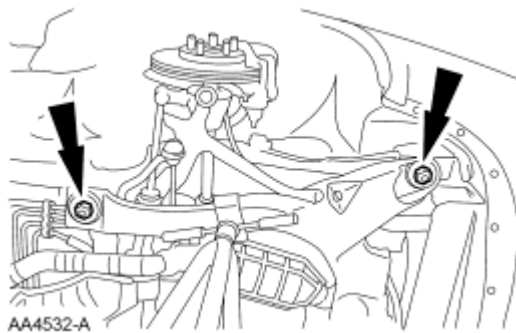


Fig. 65: Right Subframe Bolts
Courtesy of FORD MOTOR CO.

17. Connect the RH front anti-lock brake wheel sensor electrical connector.

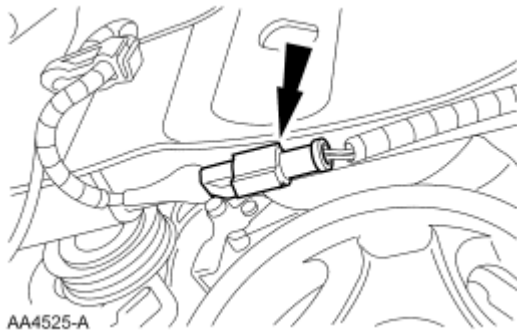


Fig. 66: Right Front Anti-Lock Brake Wheel Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

18. Drain the engine oil.
 - Install the drain plug and tighten to 26 Nm (19 lb-ft).

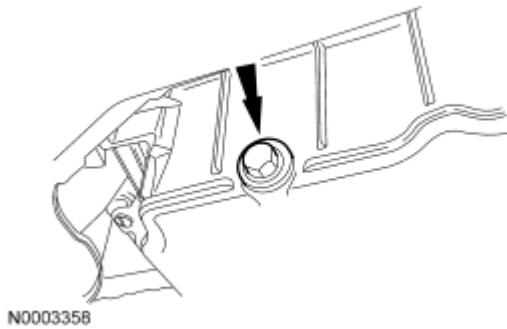


Fig. 67: Identifying Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.

19. If equipped, install the oil cooler. For additional information, refer to [Oil Cooler](#).

NOTE: Lubricate the new engine oil filter seal with clean engine oil prior to installation.

20. Install a new engine oil filter.
 - Tighten one half turn after the gasket makes contact with the oil filter housing.
21. Install the accessory drive belt tensioner and the 3 bolts.
 - Tighten to 25 Nm (18 lb-ft).
22. Install the generator mounting bracket and the generator brace bolt.
 - Tighten to 47 Nm (35 lb-ft).
23. Install the camshaft synchronizer. For additional information, refer to [ELECTRONIC ENGINE CONTROLS](#) article.
24. Install the coolant pump. For additional information, refer to [ENGINE COOLING](#) article.
25. Install the generator. For additional information, refer to [GENERATOR AND REGULATOR](#) article.
26. Fill the engine with clean engine oil.

TIMING DRIVE COMPONENTS

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the engine front cover. For additional information, refer to **Engine Front Cover**.
3. Remove the synchronizer drive gear.
 1. Remove the bolt.
 2. Remove the synchronizer drive gear.

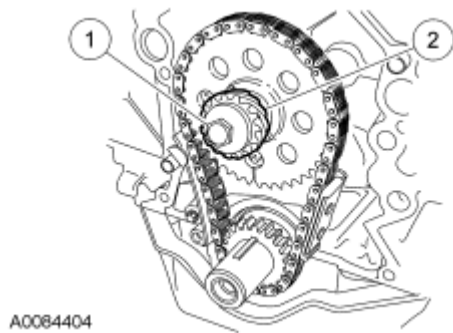


Fig. 68: Identifying Bolt And Camshaft Synchronizer Drive Gear
Courtesy of FORD MOTOR CO.

4. Rotate the crankshaft until the timing marks and keyways align.

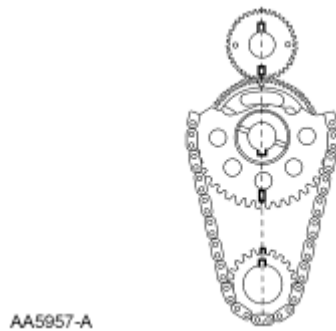
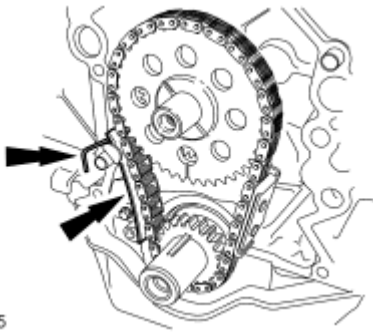


Fig. 69: Aligning Crankshaft Timing Marks And Keyways
Courtesy of FORD MOTOR CO.

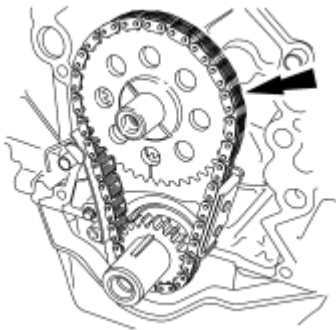
5. Compress and install a retaining pin to hold the timing chain tensioner.



A0084405

Fig. 70: Compressing Timing Chain Tensioner & Installing Retaining Pin
Courtesy of FORD MOTOR CO.

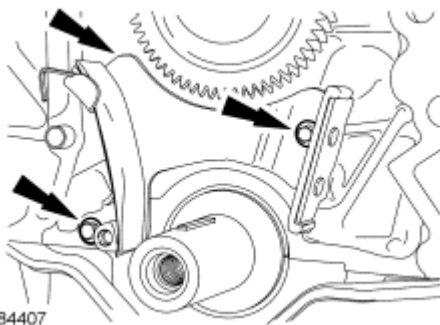
6. Remove the camshaft gear, crankshaft gear and the timing chain as an assembly.



A0084406

Fig. 71: Identifying Timing Chain And Sprockets
Courtesy of FORD MOTOR CO.

7. Remove the bolts and the timing chain tensioner.



A0084407

Fig. 72: Locating Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Install the timing chain tensioner and the bolts.
 - Tighten to 11 Nm (8 lb-ft).

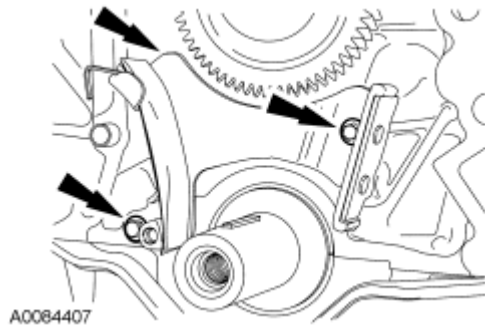


Fig. 73: Locating Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

2. If necessary, retract the tensioner pad retracting mechanism and insert a retaining pin.

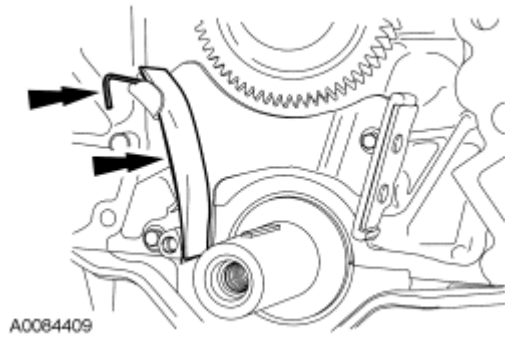


Fig. 74: Compressing Tensioner Pad And Installing Retaining Pin
Courtesy of FORD MOTOR CO.

3. Rotate the crankshaft so the No. 1 piston is at top dead center (TDC) and the key is at the 12 o'clock position.

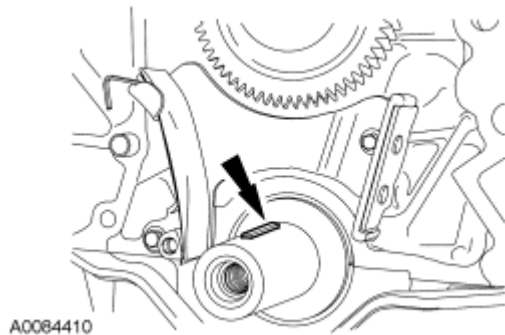
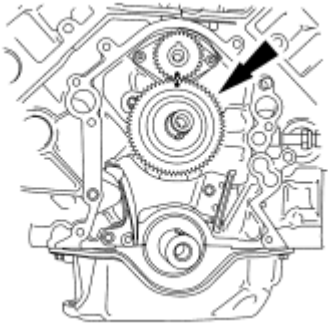


Fig. 75: Locating Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

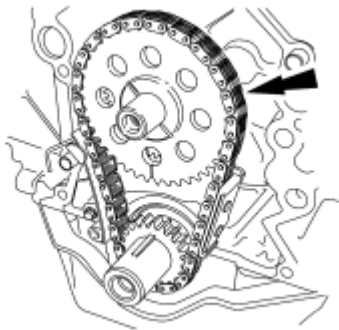
4. Turn the camshaft gear so that the timing mark is on the bottom of the balance shaft.



A0084414

Fig. 76: Locating Camshaft Sprocket Timing Mark
Courtesy of FORD MOTOR CO.

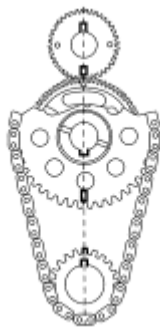
5. Install the timing chain, crankshaft gear and camshaft gear as an assembly.



A0084406

Fig. 77: Identifying Timing Chain & Sprockets
Courtesy of FORD MOTOR CO.

6. Make sure that the timing marks and the keyways are aligned.



AA5957-A

Fig. 78: Aligning Crankshaft Timing Marks & Keyways
Courtesy of FORD MOTOR CO.

7. Remove the retaining pin.

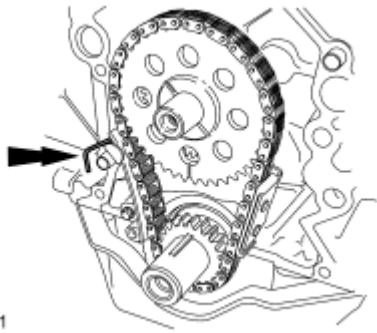


Fig. 79: Locating Retaining Pin
Courtesy of FORD MOTOR CO.

8. Install the synchronizer drive gear and the bolt.
 - Tighten to 45 Nm (33 lb-ft).

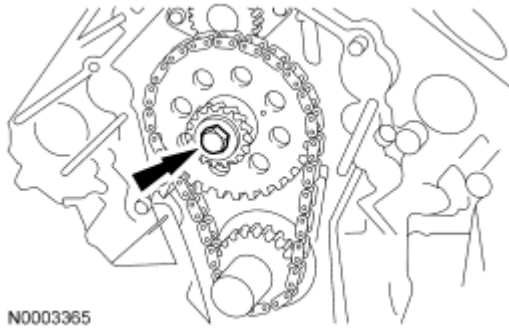


Fig. 80: Locating Camshaft Synchronizer Drive Gear Bolt
Courtesy of FORD MOTOR CO.

9. Install the engine front cover. For additional information, refer to **Engine Front Cover**.

VALVE TRAIN COMPONENTS - EXPLODED VIEW

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

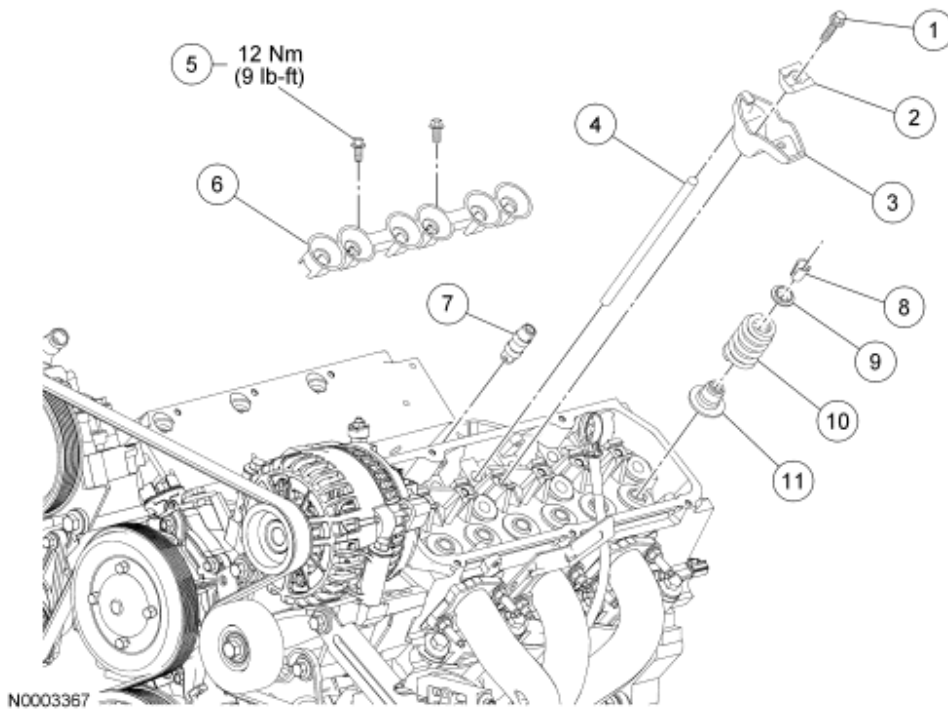


Fig. 81: Exploded View Of Valve Train Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N808305	Rocker arm bolt (12 required)
2	6A528	Rocker arm pivot (12 required)
3	6564	Rocker arm (12 required)
4	6565	Push rod (12 required)
5	-	Tappet guide plate bolt (4 required) (part of 6K564)
6	6K564	Tappet guide plate (2 required)
7	6500	Valve tappet (12 required)
8	6518	Valve spring retainer key (24 required)
9	6514	Valve spring retainer (12 required)
10	6513	Valve spring (12 required)
11	6A517	Valve stem seal

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

ROCKER ARM

Material

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend	

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

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

WSS-M2C930-A

REMOVAL

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

1. Remove the valve cover. For additional information, refer to Valve Cover - LH or Valve Cover - RH.

CAUTION: If the rocker arms are to be reused, they must be installed in their original location. Mark the rocker arm for location before removing.

2. Remove the rocker arm bolts and the rocker arms and pivots.
3. Inspect the rocker arms. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

INSTALLATION

NOTE: Lubricate the rocker arms and pivots with clean engine oil.

1. Install the rocker arms.
 - Position the rocker arms and pivots.
 - Hand start the bolts.
 - Tighten the bolts in 2 stages.
 - Stage 1: Tighten to 5 Nm (44 lb-in).
 - Stage 2: Tighten to 32 Nm (24 lb-ft).
2. Install the valve cover. For additional information, refer to Valve Cover - LH or Valve Cover - RH.

PUSH ROD

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. Remove the rocker arms. For additional information, refer to Valve Train Components - Exploded View and Rocker Arm.

CAUTION: If the push rods are to be reused, they must be installed in their original location. Mark the push rods for location.

2. Remove the push rods.
3. Inspect the push rods. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

NOTE: Lubricate the push rod with clean engine oil.

4. To install, reverse the removal procedure.

VALVE TAPPET

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. Remove the lower intake manifold. For additional information, refer to Lower Intake Manifold.
2. Remove the push rods. For additional information, refer to Valve Train Components - Exploded View and Push Rod.
3. Remove the 4 tappet guide plate bolts and the 2 tappet guide plates.

CAUTION: If the valve tappets are to be reused, they must be installed in their original location. Mark the valve tappets for location before removing.

4. Remove the valve tappets.

5. Inspect the valve tappets. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

NOTE: Lubricate the valve tappets with clean engine oil.

6. To install, reverse the removal procedure.

VALVE SPRING

Special Tools

Illustration	Tool Name	Tool Number
 ST1383-A	Compressor, Valve Spring	303-163 (T81P-6513-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. Rotate the crankshaft until the piston is at the top of its stroke with both the intake and exhaust valves closed prior to removing the rocker arm.
2. Remove the rocker arms. For additional information, refer to **Valve Train Components - Exploded View** and **Rocker Arm**.
3. Remove the spark plugs. For additional information, refer to **ENGINE IGNITION** article.

CAUTION: If a valve drops into the cylinder, remove the cylinder head. For additional information, refer to **Cylinder Head - LH** or **Cylinder Head - RH** in this section.

4. Hold the valve in the cylinder head.
 - Apply a minimum of 689 kPa (100 psi) of compressed air into the cylinder.
5. Using the special tool, compress the valve springs.

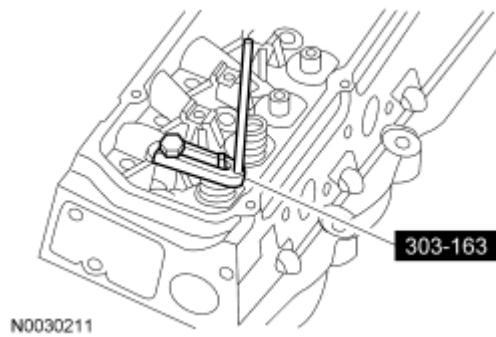


Fig. 82: Compressing Valve Spring Using Special Tool (303--163)
Courtesy of FORD MOTOR CO.

CAUTION: If the components are to be reinstalled, they must be installed in the same position. Mark the components for location.

6. Remove the following:
 1. Valve spring retainer key
 2. Valve spring retainer
 3. Valve spring
 4. Valve stem seal

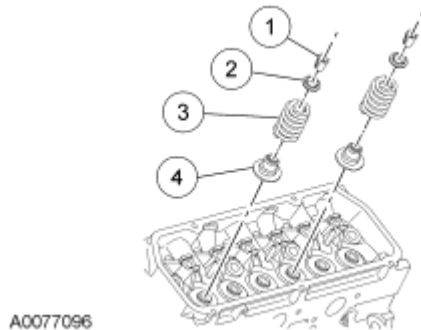


Fig. 83: Identifying Spring Retainer Key, Spring Retainer, Spring & Stem Seal
Courtesy of FORD MOTOR CO.

7. Inspect the components. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

CAUTION: Do not release the compressed air from the cylinder until after the valve spring keys are installed.

8. To install, reverse the removal procedure.

CYLINDER HEAD - LH

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

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	-
Motorcraft Metal Surface Prep ZC-31	-

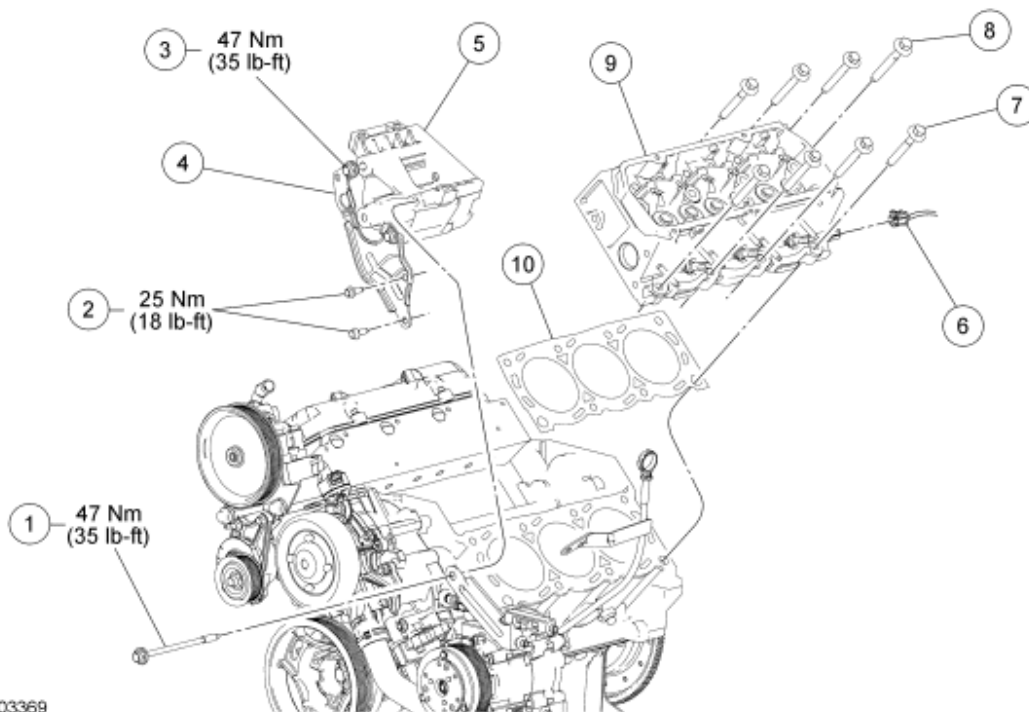


Fig. 84: Exploded View Of Left Cylinder Head (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W707116	Generator brace bolt
2	N605905	A/C compressor mounting bracket brace bolts (2 required)
3	W707116	A/C compressor mounting bracket brace bolt (2 required)
4	19N589	A/C compressor mounting bracket brace
5	10039	Generator mounting bracket
6	12B637	Cylinder head temperature (CHT) sensor electrical connector
7	N811497	Cylinder head bolt (short, 4 required)

8	N811496	Cylinder head bolt (long, 4 required)
9	6050	LH cylinder head
10	6051	LH 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 LH exhaust manifold. For additional information, refer to **Exhaust Manifold - LH**.
4. Remove the push rods from the LH cylinder head. For additional information, refer to **Push Rod**.
5. Remove the generator. For additional information, refer to **GENERATOR AND REGULATOR** article.
6. Remove the accessory drive belt idler pulley. For additional information, refer to **ACCESSORY DRIVE** article.
7. Remove the generator brace bolt.
8. Remove the 2 A/C compressor mounting bracket brace lower bolts.

NOTE: Clearance between the engine and vehicle frame is limited.

9. Remove the A/C compressor mounting bracket brace, 2 upper bolts and generator mounting bracket from the engine as an assembly.
10. Remove the 4 bolts and the engine roll restrictor bracket.

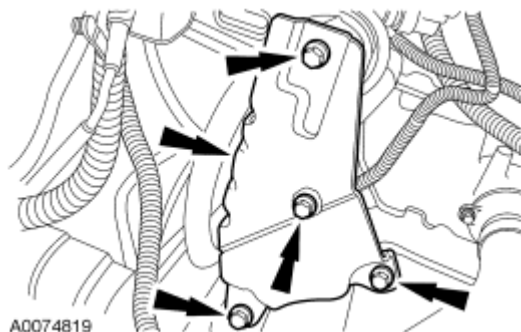


Fig. 85: Locating Engine Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

11. Disconnect the cylinder head temperature (CHT) sensor electrical connector.
12. Disconnect the knock sensor (KS) sensor electrical connector.
13. Remove the lower exhaust manifold studs to access the LH cylinder head bolts.

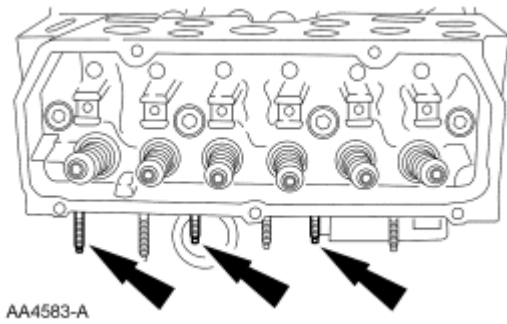


Fig. 86: Lower Exhaust Manifold Studs
 Courtesy of FORD MOTOR CO.

14. Remove and discard the 4 short LH cylinder head bolts.
15. Remove and discard the 4 long LH cylinder head bolts.
16. Remove the LH cylinder head.
 - Remove and discard the cylinder head gasket.

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

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

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

17. 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.
18. Inspect the cylinder head for distortion. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

INSTALLATION

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

2. Install the new cylinder head gasket and the LH cylinder head.

CAUTION: Always use new bolts.

NOTE: Lubricate the bolts with clean engine oil prior to installation.

3. Install the new bolts. Make sure the bolts are installed in the correct locations.
 1. Install the 4 new long bolts.
 2. Install the 4 new short bolts.

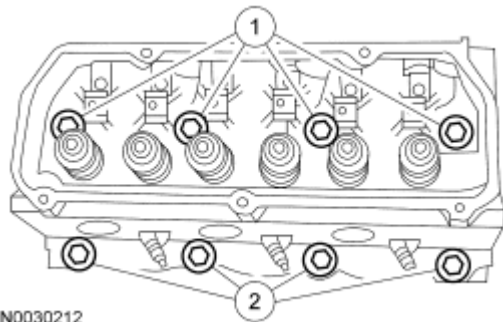


Fig. 87: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

4. Tighten the bolts in the sequence shown in 3 stages.
 - Stage 1: Tighten to 20 Nm (15 lb-ft).
 - Stage 2: Tighten to 40 Nm (30 lb-ft).
 - Stage 3: Tighten to 50 Nm (37 lb-ft).

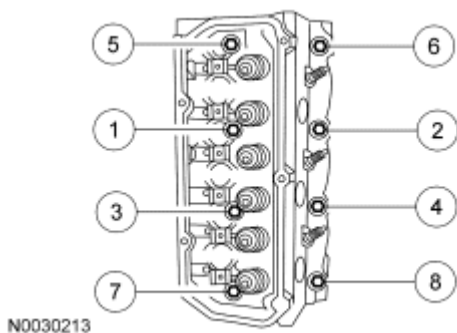


Fig. 88: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Each bolt must be loosened and the final tightening carried out prior to working on the next bolt in the sequence. Do not loosen all of the bolts at one time.

5. Carry out the following final tightening process on each bolt in the sequence shown.

- Long bolts:
 - Loosen and back out 3 turns.
 - Tighten to 40 Nm (30 lb-ft).
 - Tighten an additional 180 degrees.
 - Go to the next bolt in sequence.
- Short bolts:
 - Loosen and back out 3 turns.
 - Tighten to 25 Nm (18 lb-ft).
 - Tighten an additional 180 degrees.
 - Go to the next bolt in sequence.

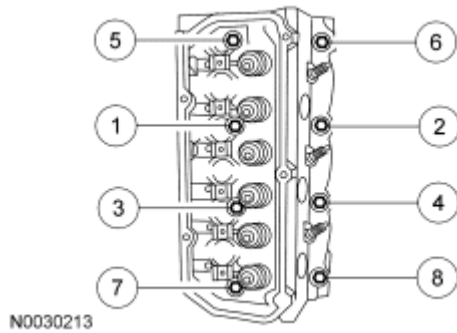


Fig. 89: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

6. Install the LH exhaust manifold lower studs.

- Tighten to 8 Nm (71 lb-in).

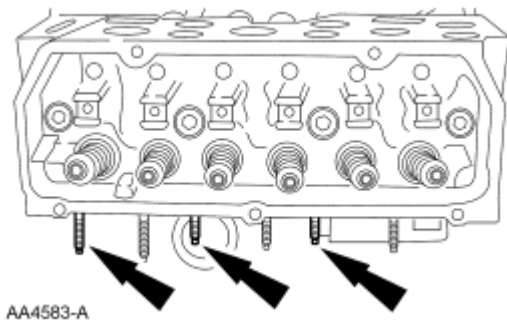


Fig. 90: Lower Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

7. Connect the KS electrical connector.
8. Connect the CHT sensor electrical connector.
9. Position the engine roll restrictor bracket and install the 4 bolts.

- Tighten the 2 upper bolts to 63 Nm (46 lb-ft).
- Tighten the 2 lower bolts to 90 Nm (66 lb-ft).

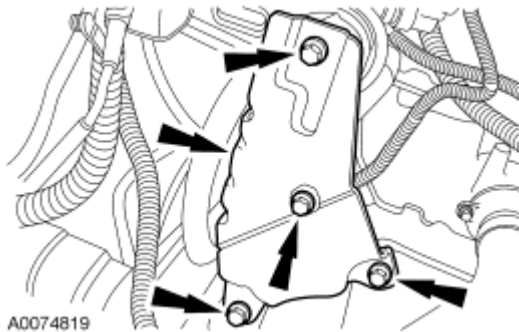


Fig. 91: Locating Engine Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

10. Install the A/C compressor mounting bracket brace, 2 upper bolts and generator mounting bracket to the engine as an assembly.
 - Tighten to 47 Nm (35 lb-ft).
11. Install the 2 A/C compressor mounting bracket brace lower bolts.
 - Tighten to 25 Nm (18 lb-ft).
12. Install the generator brace bolt.
 - Tighten to 47 Nm (35 lb-ft).
13. Install the accessory drive belt idler pulley. For additional information, refer to **ACCESSORY DRIVE** article.
14. Install the generator. For additional information, refer to **GENERATOR AND REGULATOR** article.
15. Install the push rods from the LH cylinder head. For additional information, refer to **Push Rod**.
16. Install the lower intake manifold. For additional information, refer to **Lower Intake Manifold**.
17. Install the LH exhaust manifold. For additional information, refer to **Exhaust Manifold - LH**.
18. Drain the engine oil.
 - Install the drain plug and tighten to 26 Nm (19 lb-ft).

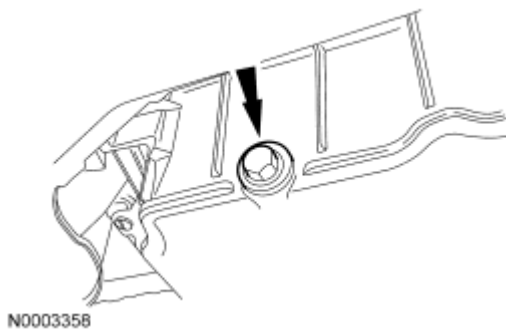


Fig. 92: Identifying Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.

19. Remove and discard the engine oil filter.

NOTE: Lubricate the new engine oil filter seal with clean engine oil prior to installation.

20. Install a new engine oil filter.

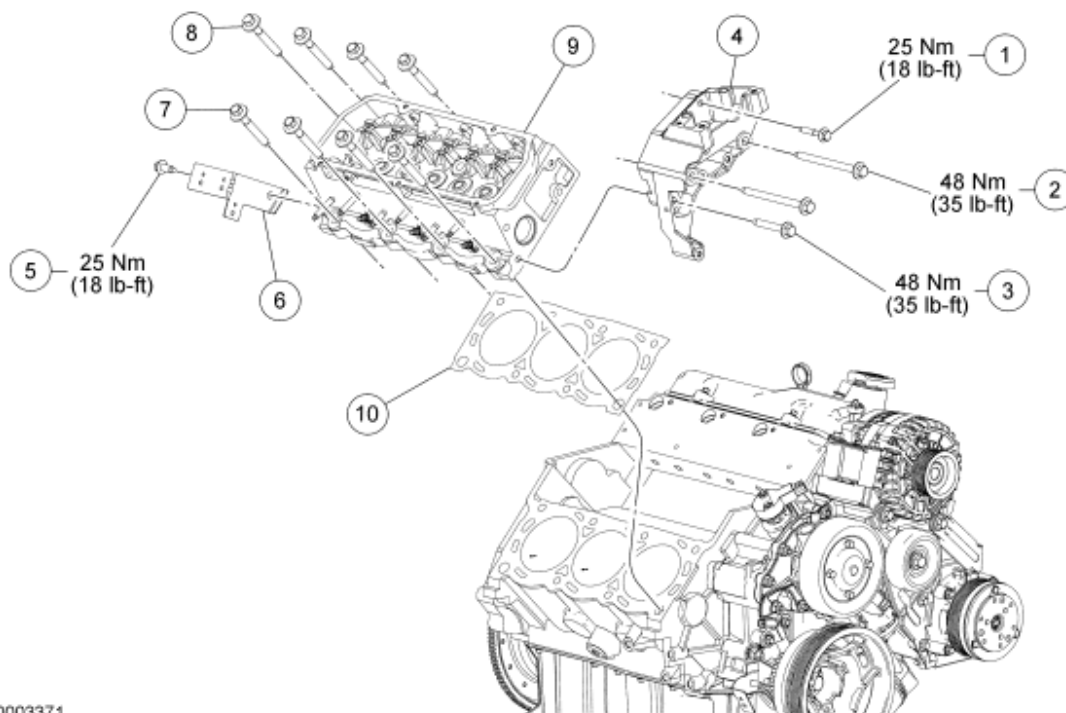
- Tighten the engine oil filter one half turn after the gasket makes contact with the oil filter housing.

21. Fill the engine with clean engine oil.

CYLINDER HEAD - 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
Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-



N0003371

Fig. 93: Exploded View Of Right Cylinder Head (With Torque Specifications)
Courtesy of FORD MOTOR CO.

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Item	Part Number	Description
1	W705430	Power steering mounting bracket bolt
2	W705428	Power steering mounting bracket bolt (2 required)
3	W705429	Power steering mounting bracket bolt
4	3C631	Power steering mounting bracket
5	W705430	Engine wiring harness bracket bolt
6	12B637	Engine wiring harness bracket
7	N811497	Cylinder head bolt (short, 4 required)
8	N811496	Cylinder head bolt (long, 4 required)
9	6050	RH cylinder head
10	6051	RH 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 RH exhaust manifold. For additional information, refer to **Exhaust Manifold - RH**.
4. Remove the push rods from the RH cylinder head. For additional information, refer to **Push Rod**.
5. Remove the 2 coolant pump outlet tube bolts and position the tube aside.

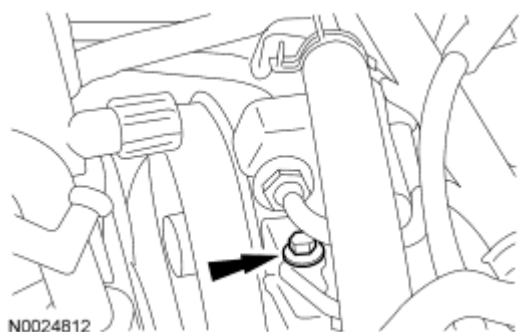


Fig. 94: Locating Coolant Pump Outlet Tube Bolt
Courtesy of FORD MOTOR CO.

6. Remove the accessory drive belt tensioner. For additional information, refer to **ACCESSORY DRIVE** article.

NOTE: The bolt that is positioned under the power steering pressure tube fitting

will remain with the pump.

7. Remove the 4 bolts and position the power steering pump aside.

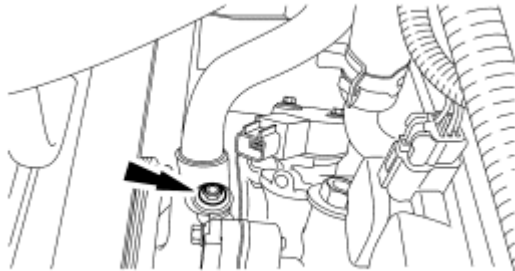


Fig. 95: Locating Power Steering Pump Bolt
Courtesy of FORD MOTOR CO.

8. Remove the 4 power steering mounting bracket bolts and the bracket.
9. Remove the engine wiring harness bracket bolt and position aside the wiring harness bracket.
10. Remove the lower exhaust manifold studs to access the cylinder head bolts.

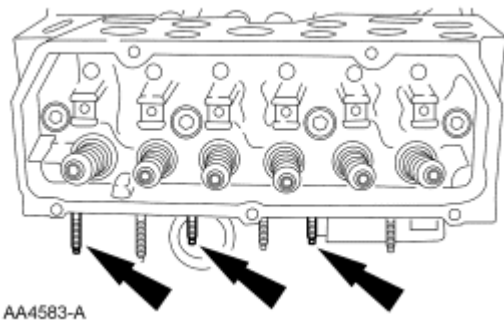


Fig. 96: Lower Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

11. Remove and discard the 4 short RH cylinder head bolts.
12. Remove and discard the 4 long RH cylinder head bolts.
13. Remove the RH cylinder head.
 - Remove and discard the cylinder head gasket.

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

CAUTION: Observe all warnings or cautions and follow all application directions

contained on the packaging of the silicone gasket remover and the metal surface prep.

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

14. 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.
15. Inspect the cylinder head for distortion. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

INSTALLATION

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

CAUTION: Always use new bolts.

NOTE: Lubricate the bolts with clean engine oil prior to installation.

3. Install the new bolts. Make sure the bolts are installed in the correct locations.
 1. Install the 4 new long bolts.
 2. Install the 4 new short bolts.

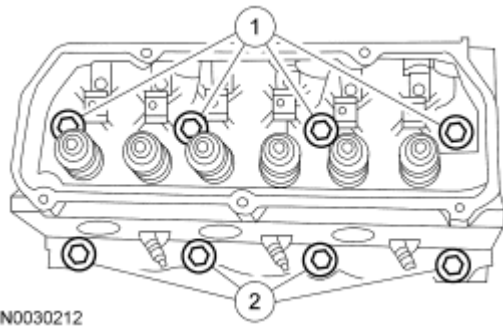


Fig. 97: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

4. Tighten the bolts in the sequence shown in 3 stages.

- Stage 1: Tighten to 20 Nm (15 lb-ft).
- Stage 2: Tighten to 40 Nm (30 lb-ft).
- Stage 3: Tighten to 50 Nm (37 lb-ft).

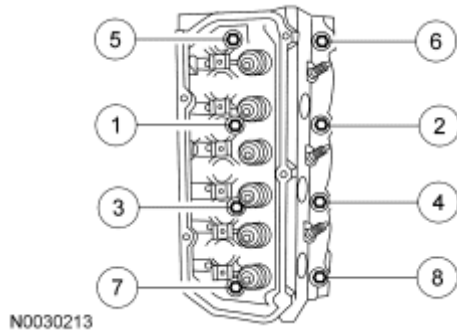


Fig. 98: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Each bolt must be loosened and the final tightening carried out prior to working on the next bolt in the sequence. Do not loosen all of the bolts at one time.

5. Carry out the following final tightening process on each bolt in the sequence shown.

- Long bolts:
 - Loosen and back out 3 turns.
 - Tighten to 40 Nm (30 lb-ft).
 - Tighten an additional 180 degrees.
 - Go to the next bolt in sequence.
- Short bolts:
 - Loosen and back out 3 turns.
 - Tighten to 25 Nm (18 lb-ft).
 - Tighten an additional 180 degrees.
 - Go to the next bolt in sequence.

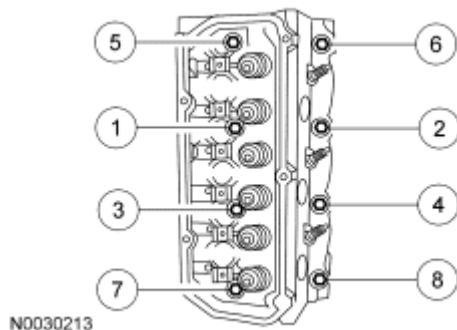


Fig. 99: Identifying Cylinder Head Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

6. Install the RH exhaust manifold lower studs.
 - Tighten to 8 Nm (71 lb-in).

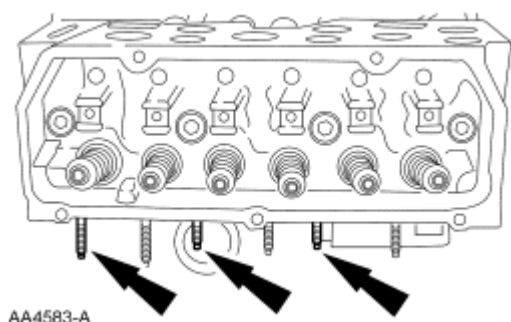


Fig. 100: Lower Exhaust Manifold Studs
 Courtesy of FORD MOTOR CO.

7. Position the engine wiring harness bracket and install the bolt.
 - Tighten to 25 Nm (18 lb-ft).
8. Position the power steering mounting bracket and install the bolt.
 - Tighten to 48 Nm (35 lb-ft).
9. Install the 2 power steering mounting bracket bolts.
 - Tighten to 48 Nm (35 lb-ft).
10. Install the power steering mounting bracket bolt.
 - Tighten to 25 Nm (18 lb-ft).
11. Position the power steering pump and install the 4 bolts.
 - Tighten to 25 Nm (18 lb-ft).
12. Install the accessory drive belt tensioner. For additional information, refer to **ACCESSORY DRIVE** article.
13. Install the coolant pump outlet tube and the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).
14. Install the lower intake manifold. For additional information, refer to **Lower Intake Manifold**.
15. Install the push rods in the RH cylinder head. For additional information, refer to **Push Rod**.
16. Install the RH exhaust manifold. For additional information, refer to **Exhaust Manifold - RH**.
17. Drain the engine oil.
 - Install the drain plug and tighten to 26 Nm (19 lb-ft).

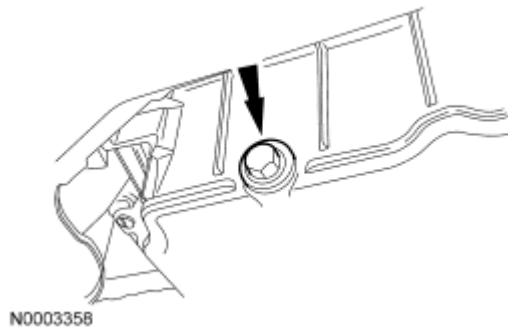


Fig. 101: Identifying Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.

18. Remove and discard the engine oil filter.

NOTE: Lubricate the new engine oil filter seal with clean engine oil prior to installation.

19. Install a new engine oil filter.
 - Tighten one half turn after gasket makes contact with oil filter housing.
20. Fill the engine with clean engine oil.

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

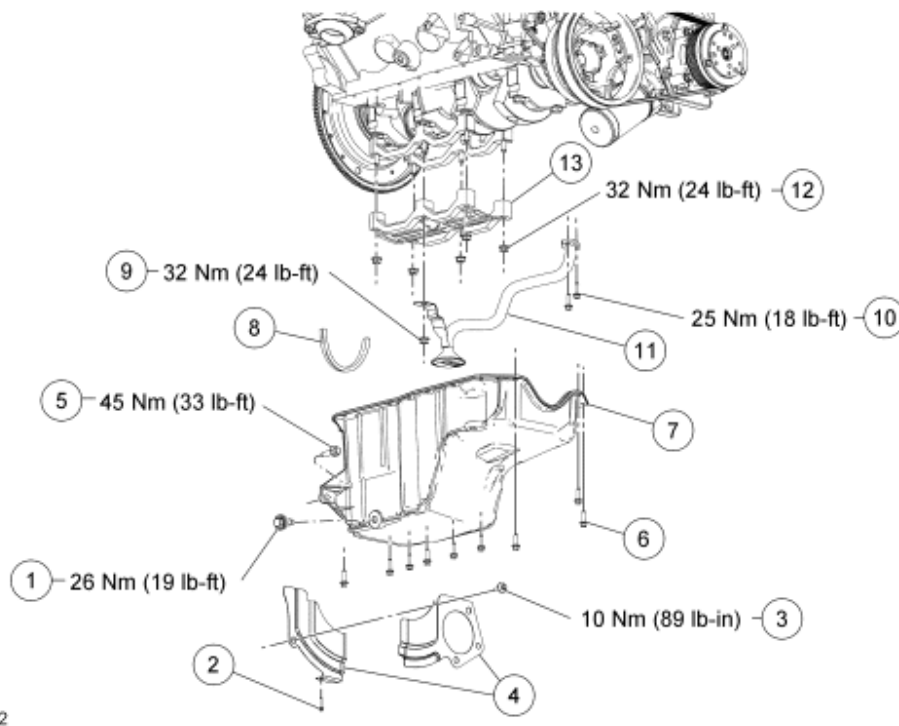


Fig. 102: Exploded View Of Engine Lubrication Components (With Torque Specifications)
Courtesy of FORD MOTOR CO.

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Item	Part Number	Description
1	-	Drain plug and gasket (part of 6675)
2	-	Inspection cover pin-type retainer
3	N602728	Inspection cover bolt
4	7986	Inspection cover
5	N606087	Oil pan-to-transaxle bolt (3 required)
6	N605892	Oil pan bolt (17 required)
7	6675	Oil pan
8	6723	Oil pan rear seal
9	W707494	Oil screen and pickup tube nut
10	N801689	Oil screen and pickup tube bolt
11	6622	Oil screen and pickup tube
12	W707494	Oil pan baffle nut (5 required)
13	6A835	Oil pan baffle

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
Motorcraft Metal Surface Cleaner ZC-21	WSE-M5B392-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

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.

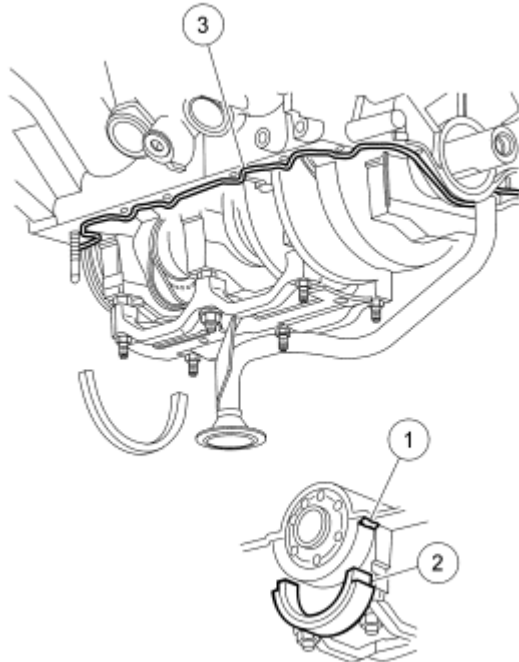
1. Remove the starter. For additional information, refer to **STARTING SYSTEM** article.
2. Remove the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
3. Remove the drain plug and gasket and allow the engine oil to drain.
4. Remove the inspection cover pin-type retainer, bolt and the inspection cover.
5. Remove the 3 oil pan-to-transaxle bolts.
6. Remove the 17 oil pan bolts and the oil pan.

7. Remove the oil pan rear seal and discard.
8. Clean the oil pan mating surfaces with metal surface cleaner.

INSTALLATION

NOTE: **If the oil pan is not installed within 4 minutes, remove the sealer and reapply.**

1. Clean and apply sealant to the oil pan sealing areas shown and install the oil pan rear seal.
 1. Apply silicone gasket and sealer to the rear main bearing cap.
 2. Install the rear oil pan seal.
 3. Apply a bead of silicone gasket and sealer to the oil pan mating surface.



A0084427

Fig. 103: Applying Silicone Gasket And Sealant To Oil Pan Sealing Areas Shown & Installing Oil Pan Rear Seal

Courtesy of FORD MOTOR CO.

2. Install the oil pan and start the bolts.
 - Tighten to 10 Nm (89 lb-in) in the sequence shown.

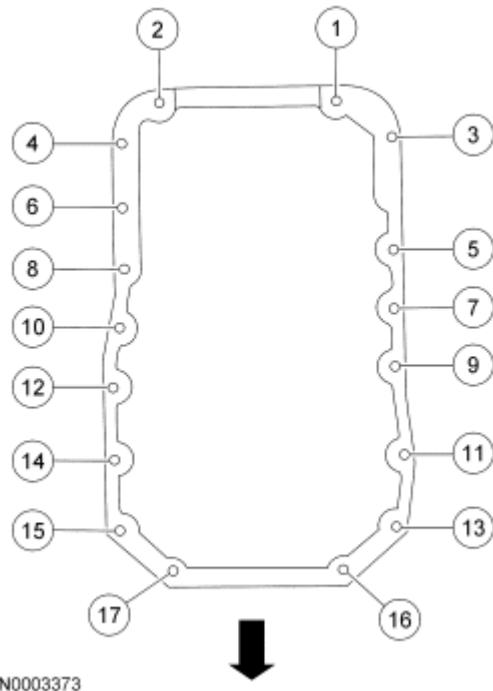


Fig. 104: Identifying Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Install the 3 oil pan-to-transaxle bolts.
 - Tighten to 45 Nm (33 lb-ft).
4. Install the inspection cover, bolt and the pin-type retainer.
5. Install the oil pan drain plug and gasket.
 - Tighten to 26 Nm (19 lb-ft).
6. Install the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
7. Install the starter. For additional information, refer to **STARTING SYSTEM** article.
8. Refill the engine with clean engine oil.

OIL PUMP SCREEN AND PICKUP TUBE

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 **Oil Pan**.

3. Remove the oil screen and pickup tube nut.
 - To install, tighten to 32 Nm (24 lb-ft).
4. Remove the 2 oil screen and pickup tube bolts and the oil screen and pickup tube.
 - To install, tighten to 25 Nm (18 lb-ft).
5. 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 pan. For additional information, refer to **Oil Pan**.
3. Remove the oil pump screen and pickup tube nut.
 - To install, tighten to 32 Nm (24 lb-ft).
4. Remove the 2 pump oil screen and pickup tube bolts and the oil pump screen and pickup tube.
 - To install, tighten to 25 Nm (18 lb-ft).
5. Remove the 5 oil pan baffle nuts and the oil pan baffle.
 - To install, tighten to 32 Nm (24 lb-ft).
6. To install, reverse the removal procedure.

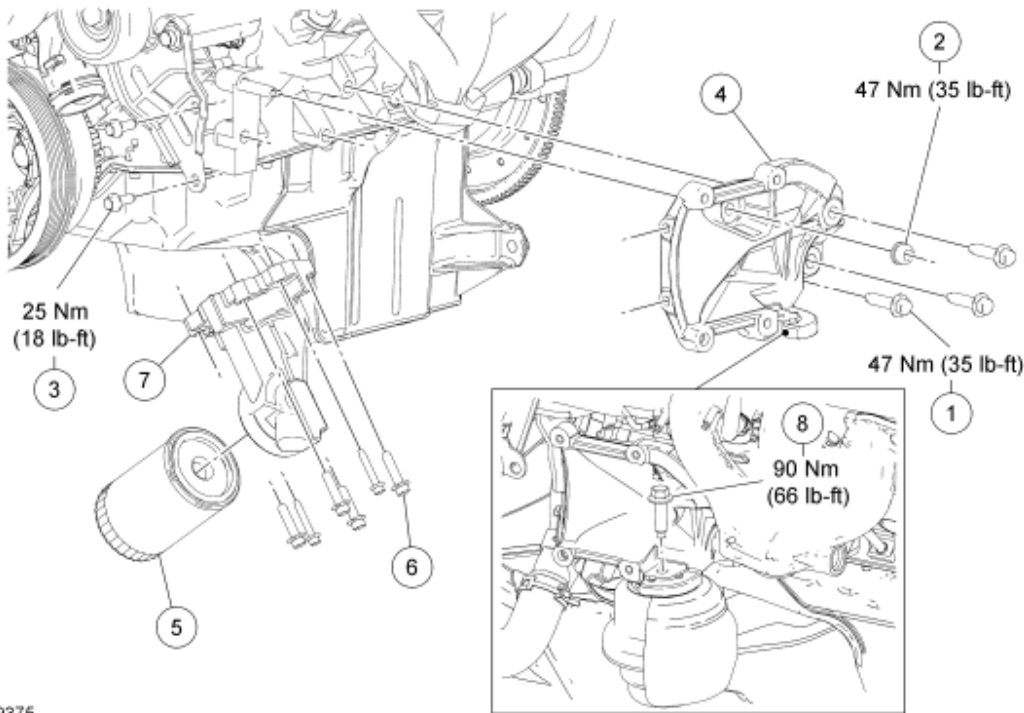
OIL PUMP

Special Tools

Illustration	Tool Name	Tool Number
	Engine Lift Bracket Set	303-D095 (D94L-6001-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



N0029375

Fig. 105: Exploded View Of Oil Pump (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N605921	A/C compressor bracket bolt (3 required)
2	N802001	A/C compressor bracket nut
3	N605905	A/C compressor bracket brace bolt (2 required)
4	19D624	A/C compressor bracket
5	6731	Oil filter
6	6019	Oil filter housing bolt (6 required)
7	6019	Oil filter housing
8	W500643	LH motor mount bolt

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 A/C compressor. For additional information, refer to **CLIMATE CONTROL** article.
3. Remove the drain plug and drain the engine oil.

4. Remove the LH motor mount bolt.
5. Install the special tool to the exhaust manifold.

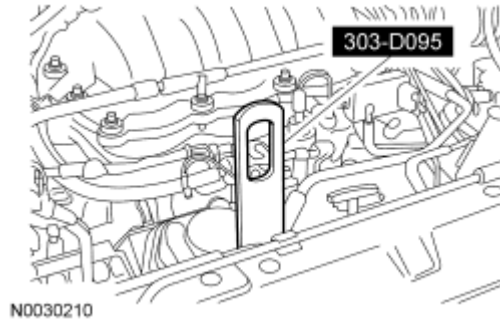


Fig. 106: Identifying Special Tool (303--D095)
Courtesy of FORD MOTOR CO.

6. Attach the engine lifting equipment and raise the engine.

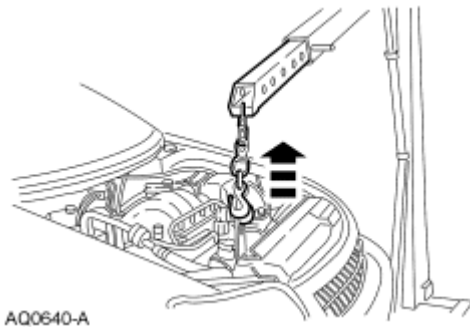


Fig. 107: Lifting Engine
Courtesy of FORD MOTOR CO.

7. Remove the 3 A/C compressor bracket bolts.
8. Remove the A/C compressor bracket nut.
9. Remove the 2 A/C compressor bracket brace lower bolts and the A/C compressor bracket.
10. Lower the engine and remove the engine lifting equipment.
11. Remove and discard the engine oil filter.
12. If equipped, remove the oil cooler. For additional information, refer to **Oil Cooler**.
13. Remove the 6 oil filter housing bolts and the oil filter housing.

CAUTION: Do not reuse the liquid injection seal. A new service seal must be installed.

14. Remove and discard the liquid injection seal.

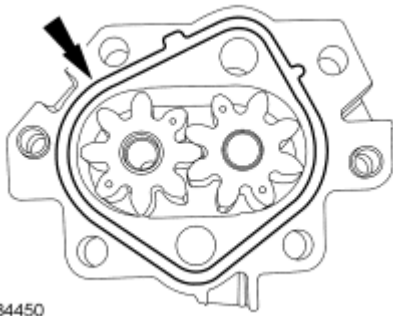


Fig. 108: Locating Liquid Injection Seal
Courtesy of FORD MOTOR CO.

15. Remove and inspect the oil pump drive gear, driven gear and cover. Install new components if necessary.

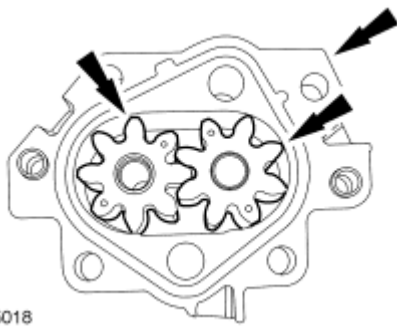


Fig. 109: Locating Oil Pump Drive Gear, Driven Gear And Cover
Courtesy of FORD MOTOR CO.

16. Inspect the face of the oil pump for flatness.

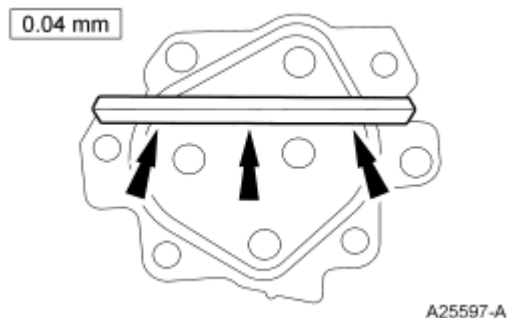


Fig. 110: Inspecting Face Of Oil Pump
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Install a new service seal on the oil pump cover.

NOTE: Lubricate parts with clean engine oil before assembly.

2. Install the oil pump drive gear, driven gear and cover.

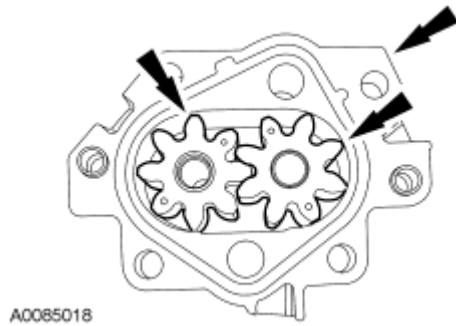


Fig. 111: Locating Oil Pump Drive Gear, Driven Gear And Cover
Courtesy of FORD MOTOR CO.

3. Install the oil filter housing and the 6 bolts and tighten the oil filter housing bolts as shown.
 1. Tighten to 10 Nm (89 lb-in).
 2. Tighten to 25 Nm (18 lb-ft).

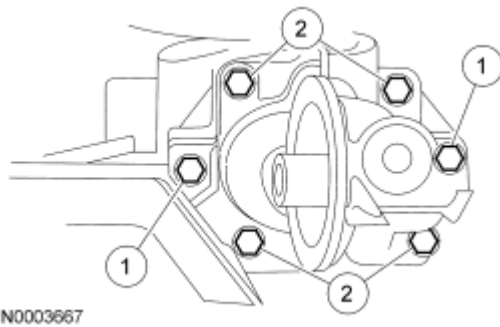


Fig. 112: Identifying Oil Filter Housing Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. If equipped, install the oil cooler. For additional information, refer to [Oil Cooler](#).

NOTE: Lubricate the new engine oil filter seal with clean engine oil prior to installation.

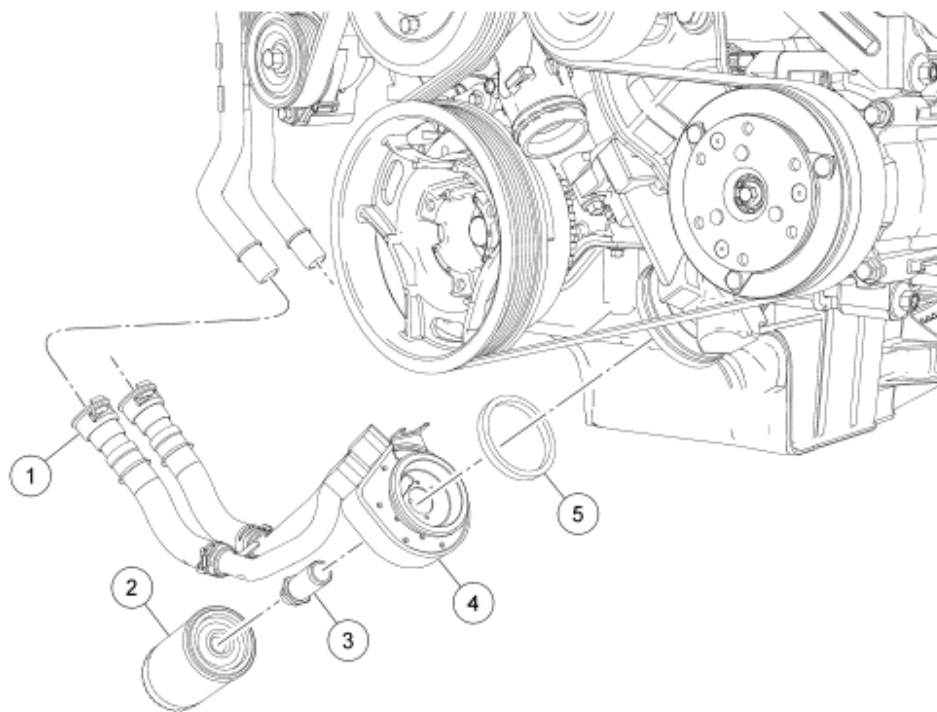
5. Install a new engine oil filter.
 - Tighten one half turn after gasket makes contact with oil filter housing.
6. Attach the engine lifting equipment and raise the engine.
7. Install the A/C compressor bracket and the 2 A/C compressor bracket brace lower bolts.
 - Tighten to 25 Nm (18 lb-ft).
8. Install the A/C compressor bracket nut.
 - Tighten to 47 Nm (35 lb-ft).
9. Install the 3 A/C compressor bracket bolts.

- Tighten to 47 Nm (35 lb-ft).
- 10. Lower the engine and remove the lifting equipment.
- 11. Install the LH motor mount bolt.
 - Tighten to 90 Nm (66 lb-ft).
- 12. Install the oil pan drain plug.
 - Tighten to 26 Nm (19 lb-ft).
- 13. Install the A/C compressor. For additional information, refer to **CLIMATE CONTROL** article.
- 14. Fill the engine with clean engine oil.

OIL COOLER

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



N0008704

Fig. 113: Exploded View Of Oil Cooler
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6K834	Quick disconnect oil cooler coolant tube (2 required)

2	6714	Oil filter
3	-	Oil cooler mounting bolt (part of 6A642)
4	6A642	Oil cooler and tube assembly
5	-	Oil cooler seal (part of 6A642)

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. Drain the cooling system. For additional information, refer to **ENGINE COOLING** article.
3. Disconnect the 2 quick disconnect oil cooler coolant tubes.

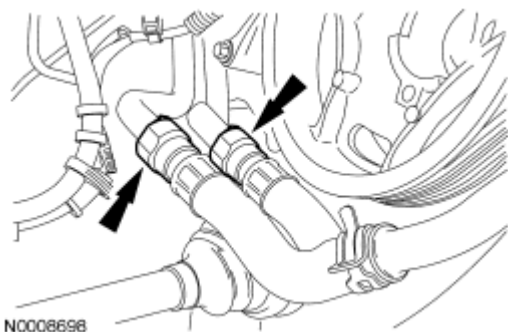


Fig. 114: Locating Quick Disconnect Oil Cooler Coolant Tubes
Courtesy of FORD MOTOR CO.

4. Remove the oil filter and discard.
5. Remove the oil cooler mounting bolt.



Fig. 115: Locating Oil Cooler Mounting Bolt
Courtesy of FORD MOTOR CO.

CAUTION: If metal or aluminum foreign material is present in the oil cooler, mechanical concerns exist. To diagnose mechanical concerns, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

6. Remove and inspect the oil cooler and tube assembly.

INSTALLATION

1. Install the oil cooler and tube assembly and the mounting bolt.
 - Tighten to 35 Nm (26 lb-ft).



Fig. 116: Locating Oil Cooler Mounting Bolt
Courtesy of FORD MOTOR CO.

2. Install the new oil filter.
 - Lubricate the oil filter seal with clean engine oil prior to installation.
 - Tighten the oil filter 1/2 turn after the gasket makes contact with sealing surface.
3. Connect the 2 quick disconnect oil cooler coolant tubes.

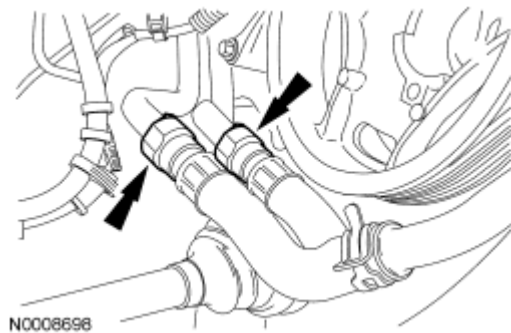


Fig. 117: Locating Quick Disconnect Oil Cooler Coolant Tubes
Courtesy of FORD MOTOR CO.

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

OIL LEVEL INDICATOR AND TUBE

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

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

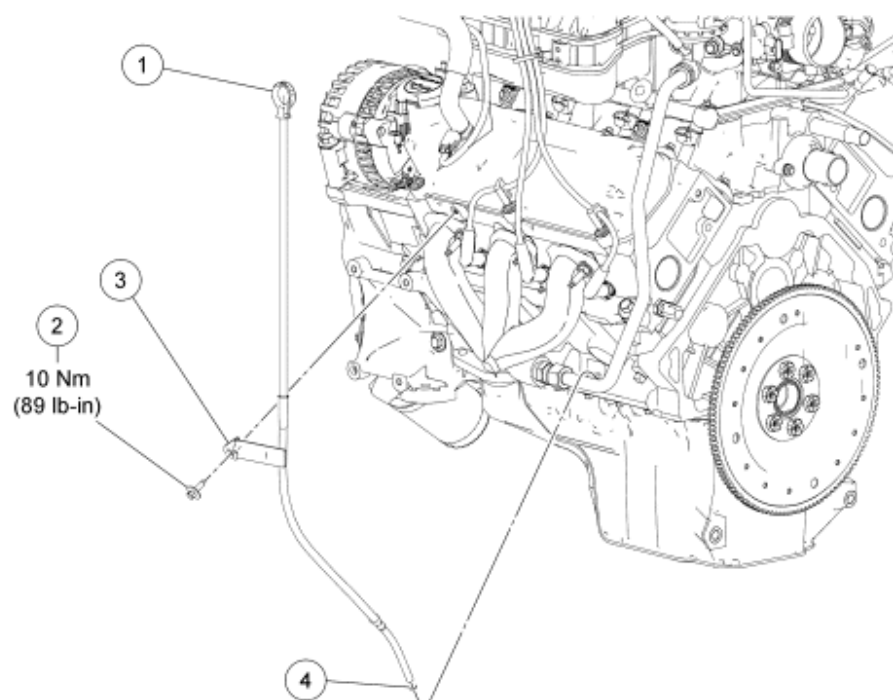


Fig. 118: Exploded View Of Oil Level Indicator & Tube (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6750	Oil level indicator
2	W708650	Oil level indicator tube bolt
3	6754	Oil level indicator tube
4	6754-B	Oil level indicator tube O-ring seal

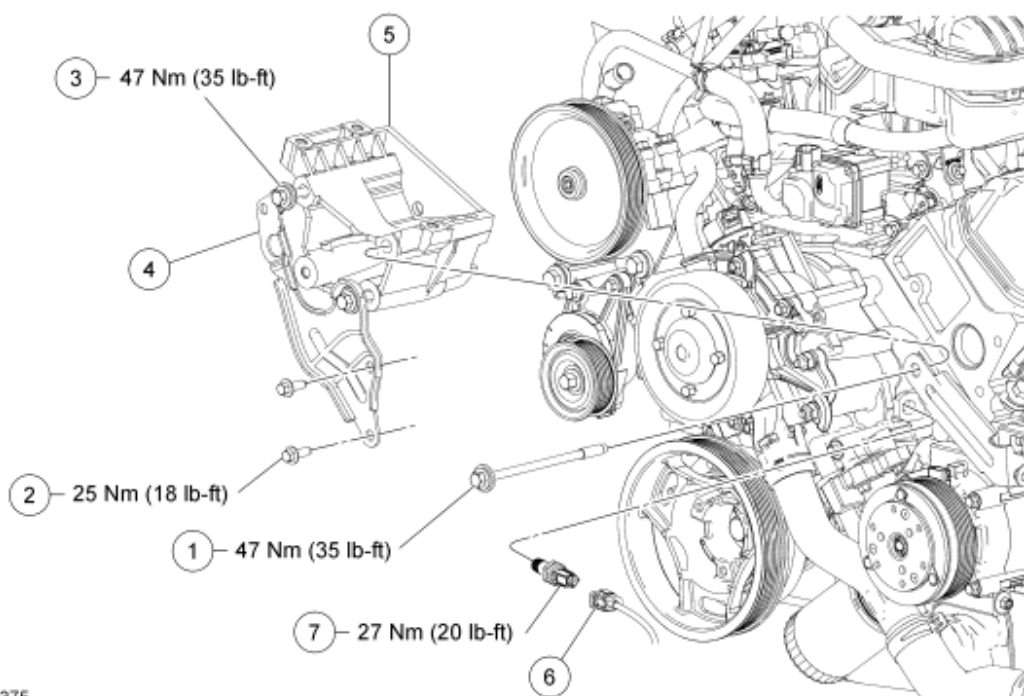
REMOVAL AND INSTALLATION

1. Remove the radiator and cooling fan assembly. For additional information, refer to **ENGINE COOLING** article.
2. Remove the oil level indicator.
3. Remove the oil level indicator tube bolt.
 - To install, tighten to 10 Nm (89 lb-in).
4. Remove the oil level indicator tube from the engine block.

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

5. Remove and discard the oil indicator tube O-ring seal.
6. To install, reverse the removal procedure.

OIL PRESSURE SENDER



N0003375

Fig. 119: Exploded View Of Oil Pressure Sender (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W707116	Generator brace bolt
2	N605905	A/C compressor mounting bracket brace bolt (2 required)
3	W707116	A/C compressor mounting bracket brace long bolt (2 required)
4	19N589	A/C compressor mounting bracket brace
5	10039	Generator mounting bracket
6	12B637	Oil pressure sender electrical connector
7	9278	Oil pressure sender

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. Remove the generator. For additional information, refer to **GENERATOR AND REGULATOR** article.
2. Remove the accessory drive belt idler pulley. For additional information, refer to **ACCESSORY DRIVE** article.
3. Remove the generator brace bolt.
 - To install, tighten to 47 Nm (35 lb-ft).
4. Remove the 2 A/C compressor mounting bracket brace bolts.
 - To install, tighten to 25 Nm (18 lb-ft).

NOTE: Clearance between the engine and vehicle frame is limited.

5. Remove the A/C compressor mounting bracket brace, 2 long bolts and generator mounting bracket from the engine as an assembly.
 - To install, tighten to 47 Nm (35 lb-ft).
6. Disconnect the oil pressure sender electrical connector.
7. Remove the oil pressure sender.
 - To install, tighten to 27 Nm (20 lb-ft).
8. To install, reverse the removal procedure.

EXHAUST MANIFOLD - RH

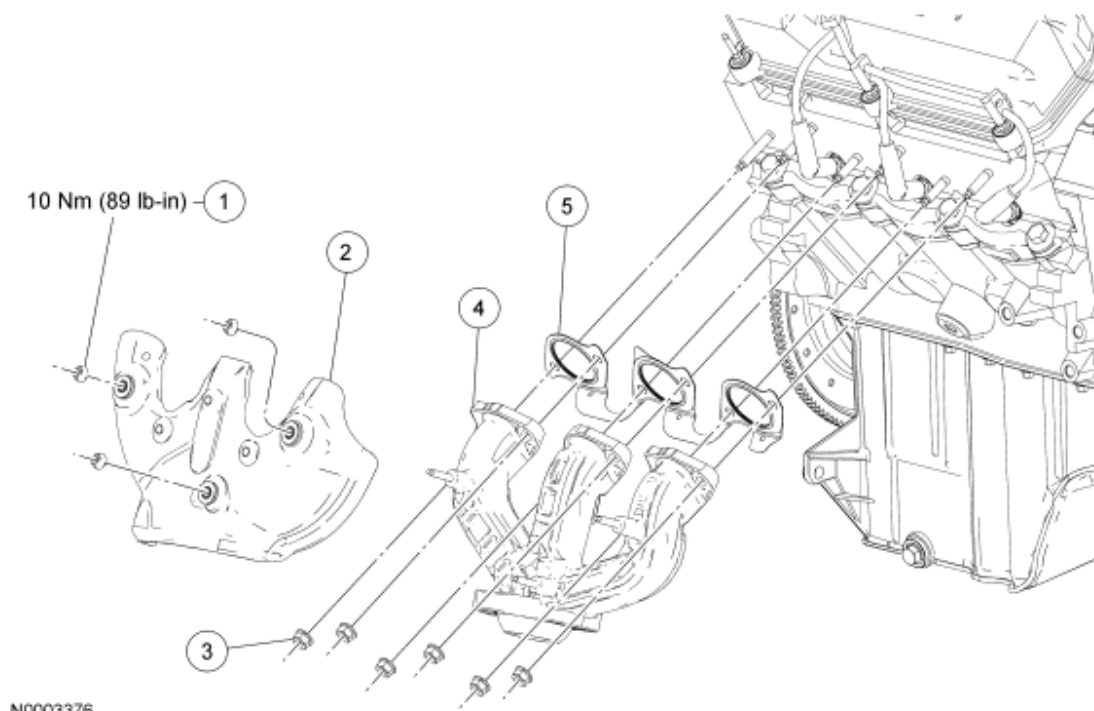


Fig. 120: Exploded View Of Right Exhaust Manifold (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W520101	Heat shield nuts (3 required)
2	9N454	Heat shield
3	W701706	Exhaust manifold nut (6 required)
4	9430	RH exhaust manifold
5	9448	RH exhaust manifold gasket

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
3. Remove the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
4. Disconnect the windshield wiper motor electrical connector.

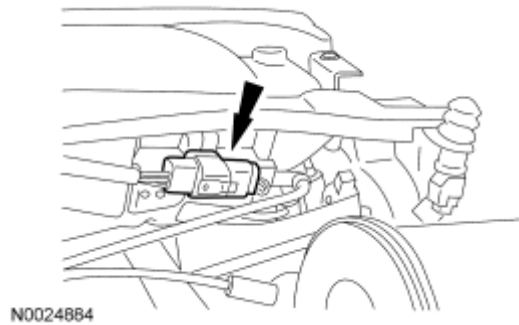


Fig. 121: Locating Windshield Wiper Motor Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the bolts and the cowl top panel.

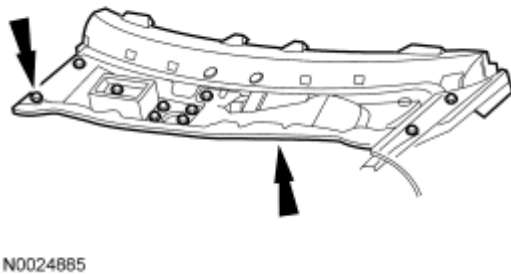
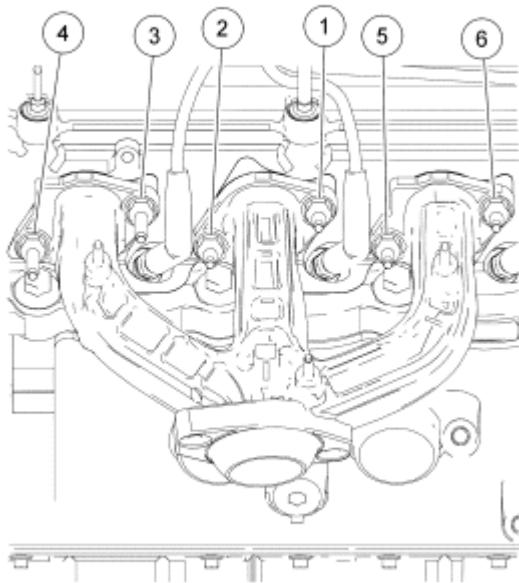


Fig. 122: Locating Cowl Top Panel Bolts
Courtesy of FORD MOTOR CO.

6. Remove the 3 heat shield nuts and the RH heat shield.
7. Remove the 6 exhaust manifold nuts and the RH exhaust manifold.
8. Remove and discard the RH exhaust manifold gasket.

INSTALLATION

1. Install a new RH exhaust manifold gasket.
2. Install the RH exhaust manifold and the 6 nuts.
 - Tighten to 25 Nm (18 lb-ft) in the sequence shown.

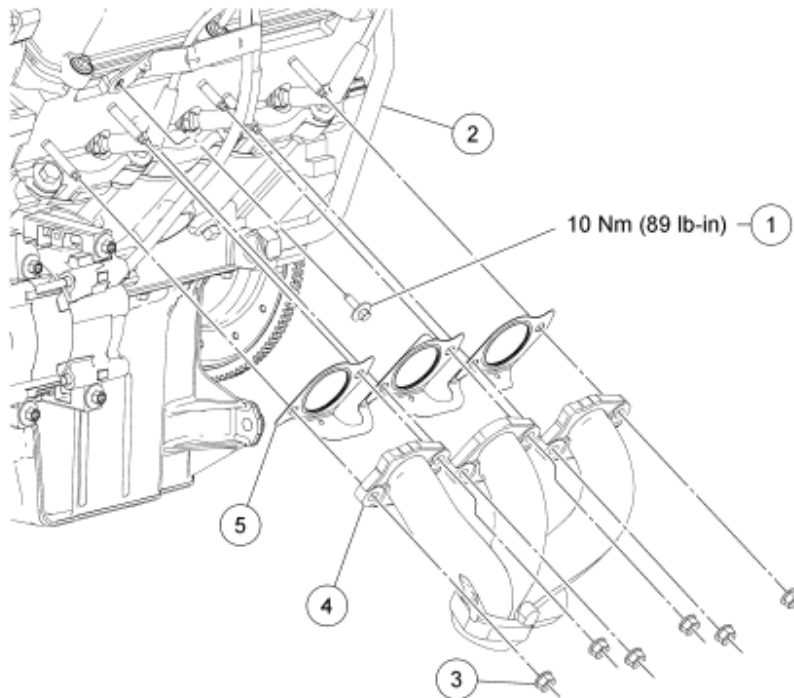


N0003377

Fig. 123: Identifying Right Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Install the RH heat shield and the 3 nuts.
 - Tighten to 10 Nm (89 lb-in).
4. Install the cowl top panel and bolts.
 - Tighten to 6 Nm (53 lb-in).
5. Connect the windshield wiper motor electrical connector.
6. Install the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
7. Install the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.

EXHAUST MANIFOLD - LH



N0003378

Fig. 124: Exploded View Of Left Exhaust Manifold (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W708650	Oil level indicator tube bolt
2	9D477	Exhaust gas recirculation (EGR) tube-to-exhaust manifold nut
3	W701706	Exhaust manifold nut (6 required)
4	9430	LH exhaust manifold
5	9448	LH exhaust manifold gasket

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
3. Remove the oil level indicator tube bolt.
4. Disconnect the EGR tube.
 - Loosen the nut.
 - Separate the EGR tube from the exhaust manifold.

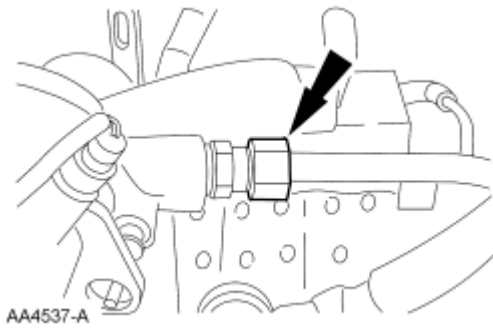


Fig. 125: EGR Tube At Exhaust Manifold
Courtesy of FORD MOTOR CO.

5. Remove the 6 exhaust manifold nuts and the LH exhaust manifold.
6. Remove and discard the LH exhaust manifold gasket.

INSTALLATION

1. Install a new LH exhaust manifold gasket.
2. Install the LH exhaust manifold and the 6 nuts.
 - Tighten to 25 Nm (18 lb-ft) in the sequence shown.

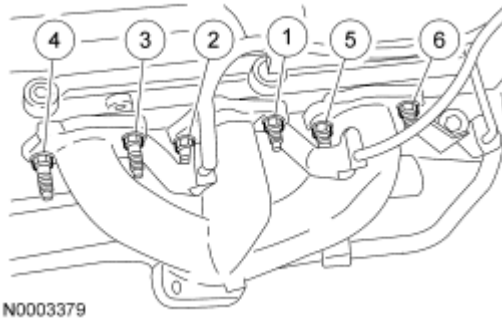


Fig. 126: Identifying Left Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Connect the EGR tube to the exhaust manifold.
 - Tighten to 40 Nm (30 lb-ft).

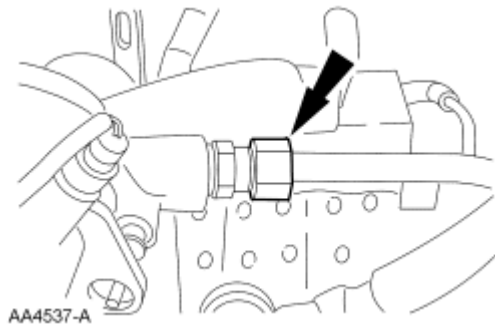
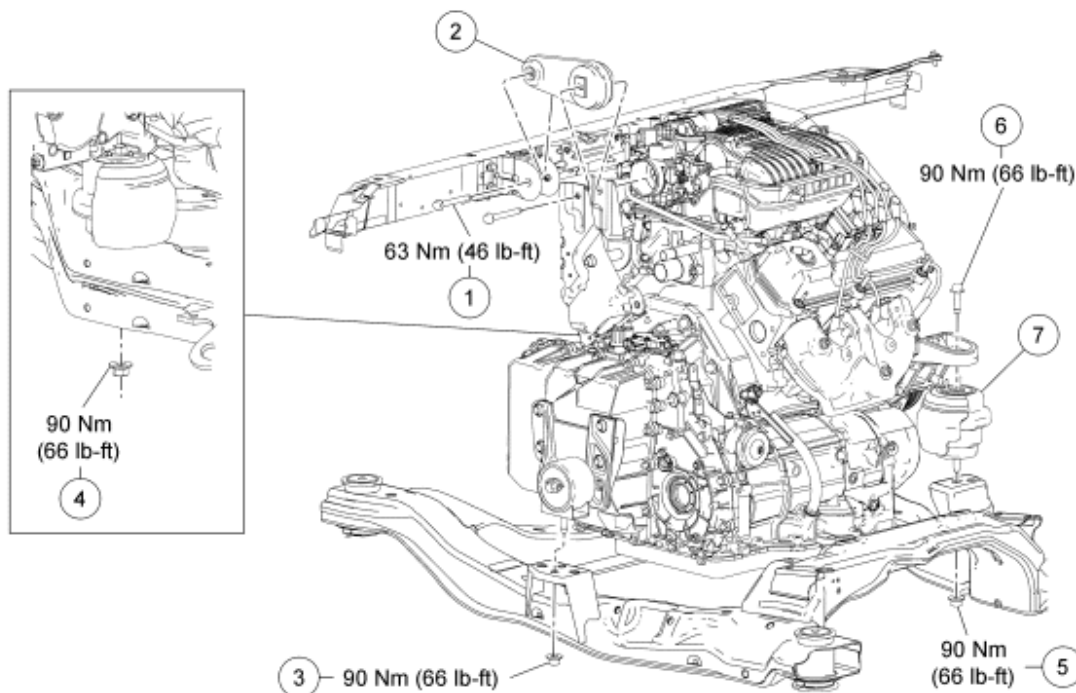


Fig. 127: EGR Tube At Exhaust Manifold
Courtesy of FORD MOTOR CO.

4. Install the oil level indicator tube bolt.
 - Tighten to 10 Nm (89 lb-in).
5. Install the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.

ENGINE MOUNTS - EXPLODED VIEW



N0030214

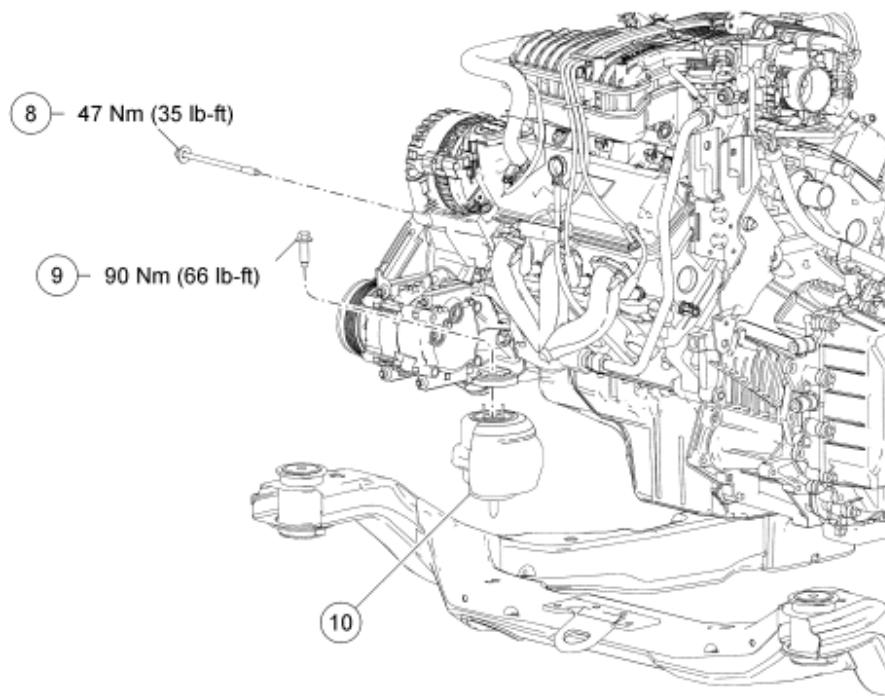
Fig. 128: Exploded View Of Transaxle & Engine Mounts (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W560727	Engine roll restrictor bolt (2 required)
2	6F050	Engine roll restrictor
3	W705605	Transaxle support insulator nut

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

4	W705605	LH engine mount nut
5	W705605	RH engine mount nut
6	W500643	RH engine mount bolt
7	6068	RH engine mount



N0036045

Fig. 129: Exploded View Of Left Engine Mount (With Torque Specifications)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
8	W707116	Generator brace bolt
9	W500643	LH engine mount bolt
10	6038	LH engine mount

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

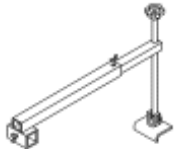
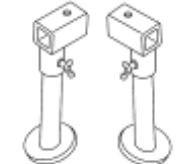
ENGINE MOUNT - RH

Special Tools

Illustration	Tool Name	Tool Number
 ST2363-A	Support Bar, Engine	303-290A

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

 ST2379-A	Adapter for 303-290A (Support Leg)	303-290A-03A
 ST2514-A	Adapter for 303-290A (Spreader Bar)	303-290A-10
 ST2541-A	Adapter for 303-290A (Strut)	303-290A-09
 ST2375-A	Lifting Bracket Set, Engine	303-D095 (D94L-6001A) or equivalent

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 hood.
3. Remove the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
4. Disconnect the windshield wiper motor electrical connector.

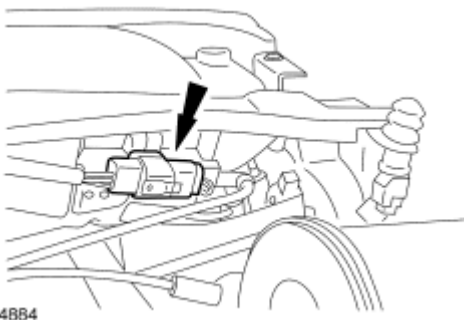
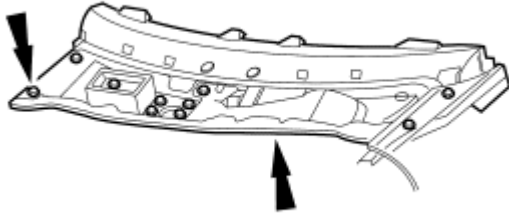


Fig. 130: Locating Windshield Wiper Motor Electrical Connector
Courtesy of FORD MOTOR CO.

5. Remove the bolts and the cowl top panel.

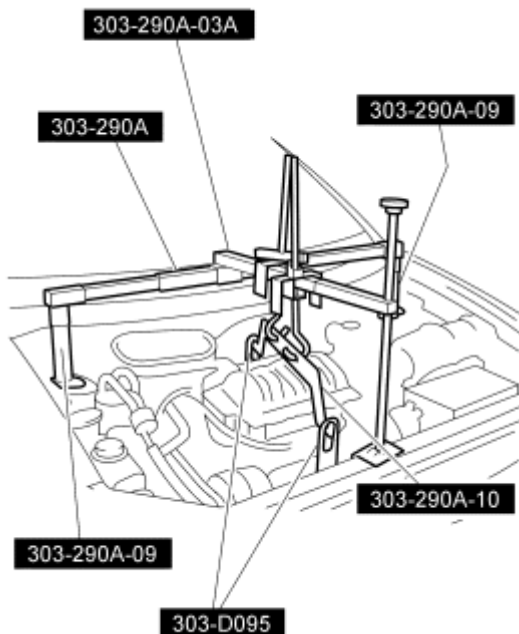
- To install, tighten to 6 Nm (53 lb-in).



N0024885

Fig. 131: Locating Cowl Top Panel Bolts
Courtesy of FORD MOTOR CO.

- Remove the 2 engine roll restrictor bolts and the engine roll restrictor.
 - To install, tighten to 63 Nm (46 lb-ft).
- Remove the transaxle support insulator nut.
 - To install, tighten to 90 Nm (66 lb-ft).
- Remove the LH engine mount nut.
 - To install, tighten to 90 Nm (66 lb-ft).
- Remove the RH engine mount nut.
 - To install, tighten to 90 Nm (66 lb-ft).
- Using the special tools, raise the engine.



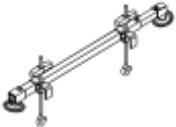
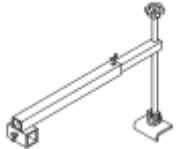
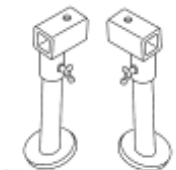
N0008694

Fig. 132: Raising Engine

Courtesy of FORD MOTOR CO.

11. Remove the RH engine mount bolt.
 - To install, tighten to 90 Nm (66 lb-ft).
12. Remove the RH engine mount.
13. To install, reverse the removal procedure.

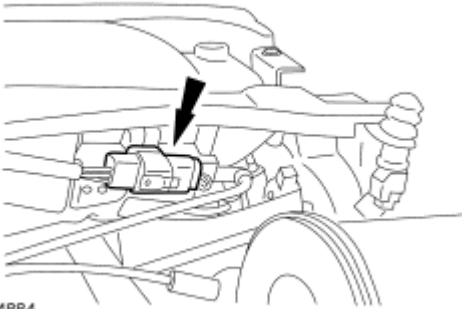
ENGINE MOUNT - LH**Special Tools**

Illustration	Tool Name	Tool Number
 ST2363-A	Support Bar, Engine	303-290A
 ST2379-A	Adapter for 303-290A (Support Leg)	303-290A-03A
 ST2514-A	Adapter for 303-290A (Spreader Bar)	303-290A-10
 ST2541-A	Adapter for 303-290A (Strut)	303-290A-09
 ST2375-A	Lifting Bracket Set, Engine	303-D095 (D94L-6001A) or equivalent

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 hood.

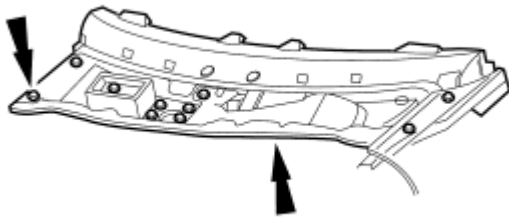
3. Remove the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
4. Disconnect the windshield wiper motor electrical connector.



N0024884

Fig. 133: Locating Windshield Wiper Motor Electrical Connector
Courtesy of FORD MOTOR CO.

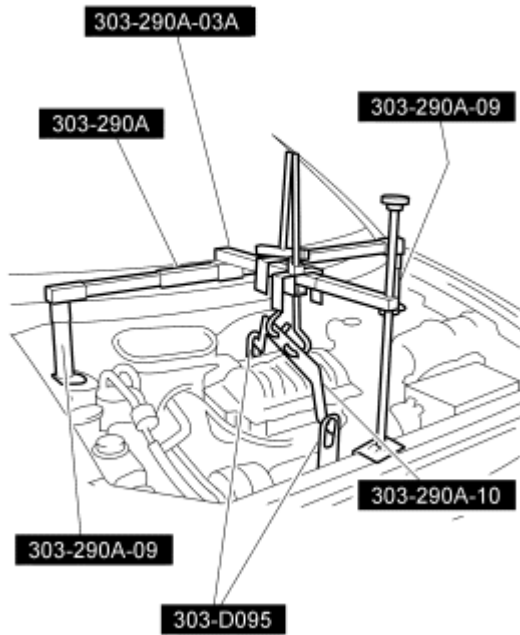
5. Remove the bolts and the cowl top panel.
 - To install, tighten to 6 Nm (53 lb-in).



N0024885

Fig. 134: Locating Cowl Top Panel Bolts
Courtesy of FORD MOTOR CO.

6. Remove the 2 engine roll restrictor bolts and the engine roll restrictor.
 - To install, tighten to 63 Nm (46 lb-ft).
7. Remove the transaxle support insulator nut.
 - To install, tighten to 90 Nm (66 lb-ft).
8. Remove the LH engine mount nut.
 - To install, tighten to 90 Nm (66 lb-ft).
9. Remove the RH engine mount nut.
 - To install, tighten to 90 Nm (66 lb-ft).
10. Using the special tools, raise the engine.



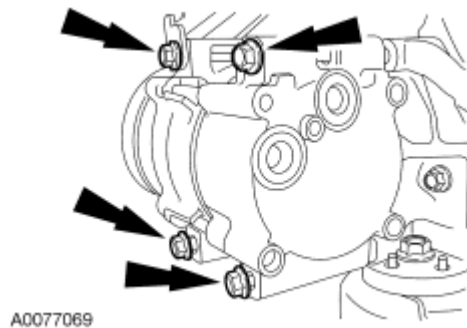
N0008694

Fig. 135: Raising Engine
Courtesy of FORD MOTOR CO.

11. Remove the generator brace bolt.
 - To install, tighten to 47 Nm (35 lb-ft).

NOTE: The A/C compressor must be repositioned to access the LH engine mount bolt.

12. Loosen the A/C compressor mounting bolts 25.4 mm (1 in), then slide the A/C compressor toward the front of the vehicle.
 - To install, tighten to 25 Nm (18 lb-ft).



A0077069

Fig. 136: Locating A/C Compressor Bolts
Courtesy of FORD MOTOR CO.

13. Remove the LH engine mount bolt.
 - To install, tighten to 90 Nm (66 lb-ft).
14. Remove the LH engine mount.
15. To install, reverse the removal procedure.

REMOVAL

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
	Powertrain Lift	014-00765
	Lifting Bracket Set, Engine	303-D095 (D94L-6001-A) or equivalent

REMOVAL

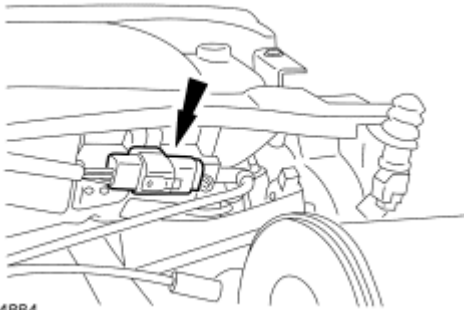
WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel-related components. Highly flammable mixtures are always present and may be ignited. Failure to follow these instructions may result in personal injury.

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. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
3. Disconnect the battery ground and positive cables. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
4. Recover the air conditioning system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.
5. Remove the engine air cleaner and engine air cleaner outlet pipe. For additional information, refer to

INTAKE AIR DISTRIBUTION AND FILTERING article.

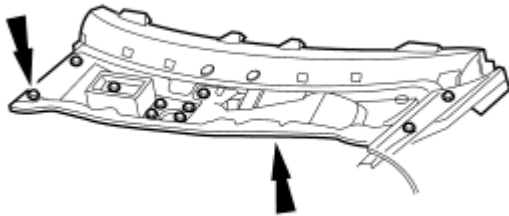
6. Disconnect the fuel rail spring lock coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
7. Remove the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
8. Disconnect the windshield wiper motor electrical connector.



N0024884

Fig. 137: Locating Windshield Wiper Motor Electrical Connector
Courtesy of FORD MOTOR CO.

9. Remove the bolts and the cowl top panel.



N0024885

Fig. 138: Locating Cowl Top Panel Bolts
Courtesy of FORD MOTOR CO.

10. Drain the cooling system. For additional information, refer to **ENGINE COOLING** article.
11. If equipped, disconnect the 2 lower oil cooler coolant tube quick connect fittings.

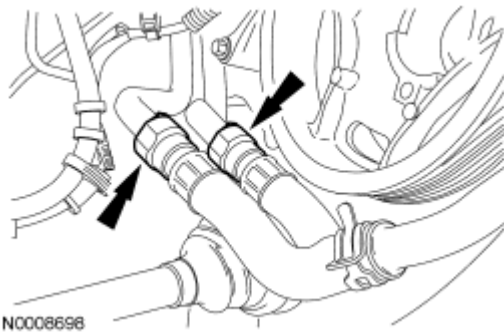


Fig. 139: Locating Quick Disconnect Oil Cooler Coolant Tubes
Courtesy of FORD MOTOR CO.

12. If equipped, disconnect the 2 upper oil cooler coolant tube quick connect fittings.
 - Remove the bolt and the coolant tubes.

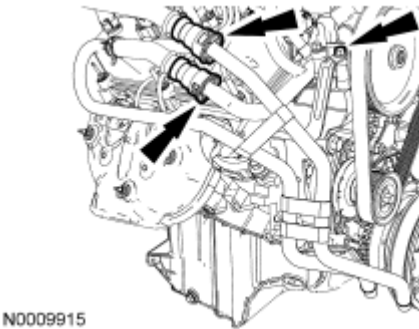


Fig. 140: Locating Oil Cooler Coolant Tubes
Courtesy of FORD MOTOR CO.

13. Remove the power steering pump. For additional information, refer to **POWER STEERING** article.
14. Remove the starter. For additional information, refer to **STARTING SYSTEM** article.
15. Remove the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
16. Remove the drain plug and drain the engine oil.
 - Install the drain plug and tighten to 26 Nm (19 lb-ft).

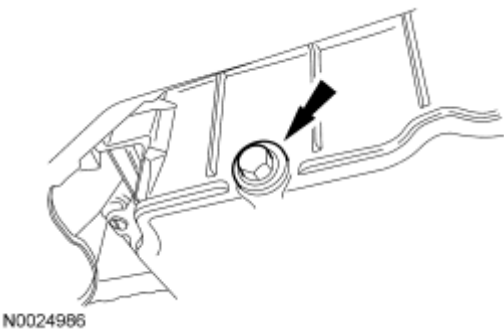


Fig. 141: Locating Engine Oil Drain Plug
Courtesy of FORD MOTOR CO.

17. Disconnect the accelerator cable end and the speed control actuator cable end. Remove the throttle return spring.

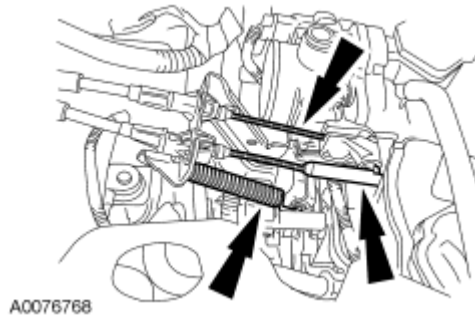


Fig. 142: Locating Accelerator Cable, Speed Control Actuator Cable & Throttle Return Spring
Courtesy of FORD MOTOR CO.

18. Position the accelerator cable bracket aside.
- Disconnect the engine wiring harness retainer.
 - Remove the stud bolts and position aside the accelerator cable bracket.

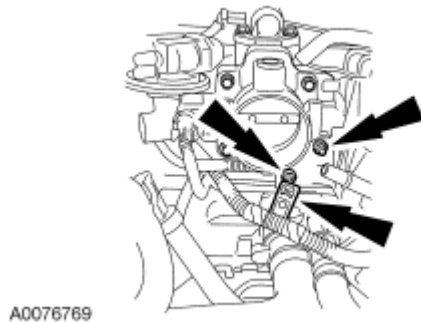


Fig. 143: Locating Accelerator Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

19. Disconnect the upper radiator and heater hoses.

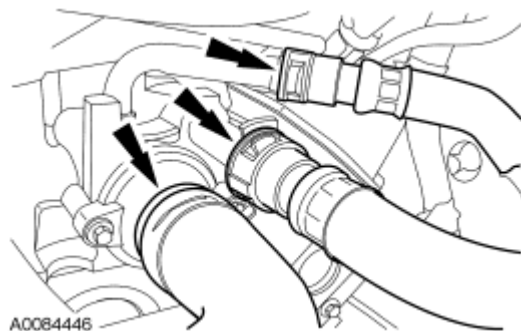


Fig. 144: Locating Upper Radiator Hose & Heater Hoses
Courtesy of FORD MOTOR CO.

20. Remove the power distribution box cover.

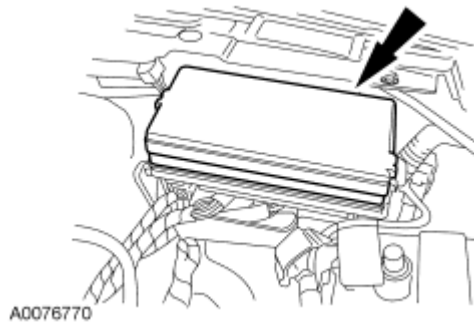


Fig. 145: Locating Power Distribution Box Cover
Courtesy of FORD MOTOR CO.

21. Disconnect the B+ terminal from the power distribution box.

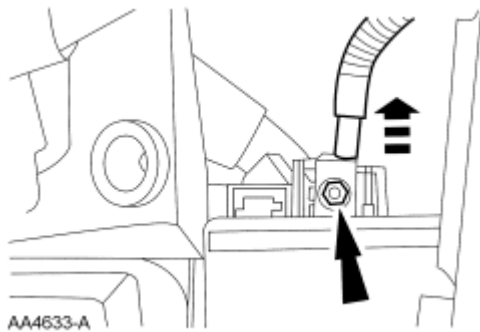


Fig. 146: Locating Power Distribution Box B+ Terminal
Courtesy of FORD MOTOR CO.

22. Remove the 68-pin electrical connector from the power distribution box.
1. Separate the power distribution box from the bracket.
 2. Loosen the bolt.
 3. Disconnect the 68-pin connector.

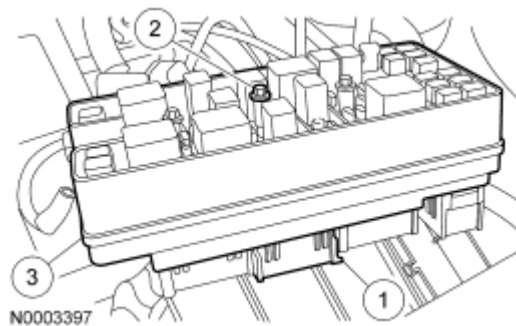


Fig. 147: Identifying 68-Pin Connector And Power Distribution Box
Courtesy of FORD MOTOR CO.

23. Release the engine wiring harness retainer.

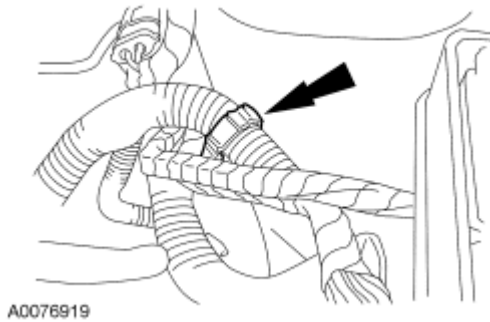


Fig. 148: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

24. Release the engine wiring harness retainer.

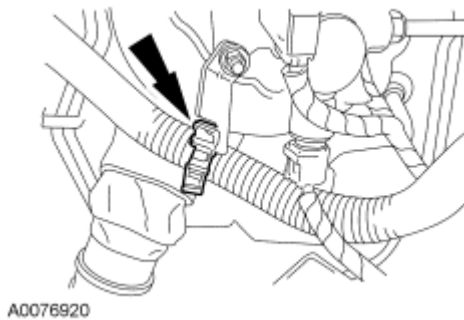


Fig. 149: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

25. Disconnect the 16-pin electrical connector.

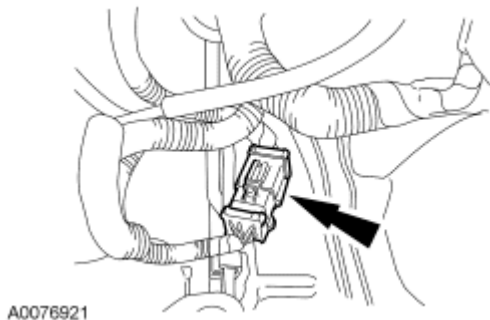


Fig. 150: Locating 16-Pin Electrical Connector
Courtesy of FORD MOTOR CO.

26. Disconnect the shift cable.

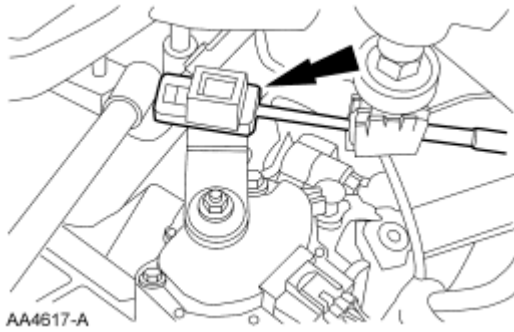


Fig. 151: Shift Cable At Transmission
Courtesy of FORD MOTOR CO.

27. Disconnect the cable from the bracket, then position the shift cable aside.

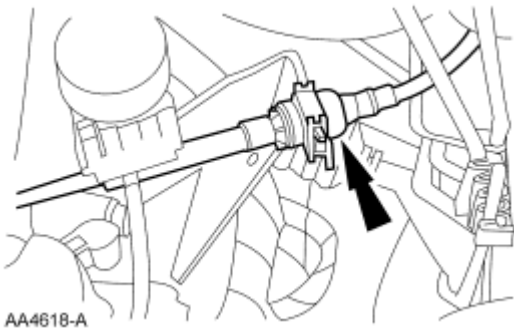


Fig. 152: Shift Cable At Bracket
Courtesy of FORD MOTOR CO.

28. Disconnect the evaporative (EVAP) return tube.

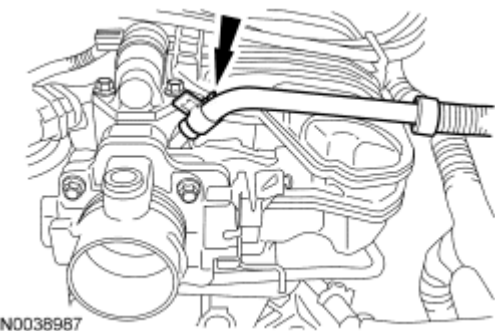
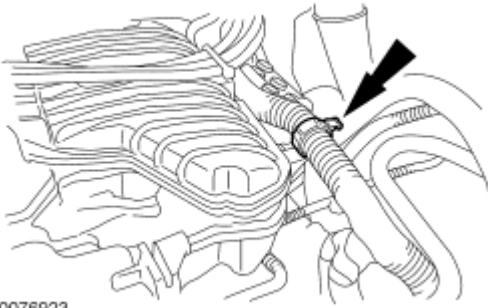


Fig. 153: Locating Evaporative Return Tube
Courtesy of FORD MOTOR CO.

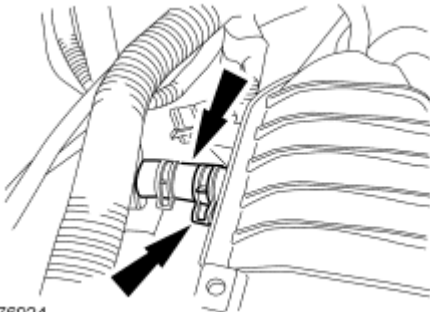
29. Release the engine wiring harness retainer.



A0076923

Fig. 154: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

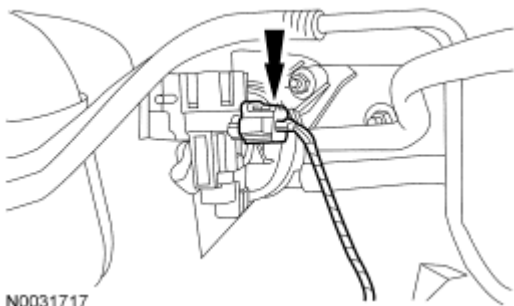
30. Reposition the clamp and disconnect the brake booster vacuum hose.



A0076924

Fig. 155: Locating Brake Booster Vacuum Hose
Courtesy of FORD MOTOR CO.

31. Disconnect the EVAP canister purge valve electrical connector.



N0031717

Fig. 156: Locating EVAP Canister Purge Valve Electrical Connector
Courtesy of FORD MOTOR CO.

32. Remove the engine wire harness pin-type retainer.

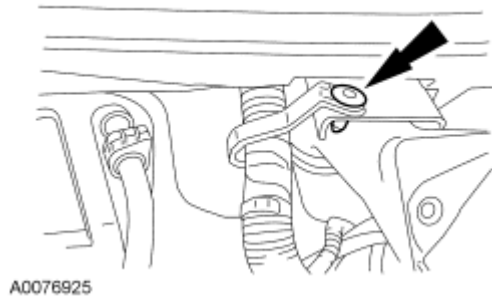


Fig. 157: Locating Engine Wiring Harness Pin-Type Retainer
Courtesy of FORD MOTOR CO.

33. Remove the bolt from the engine wire harness ground.

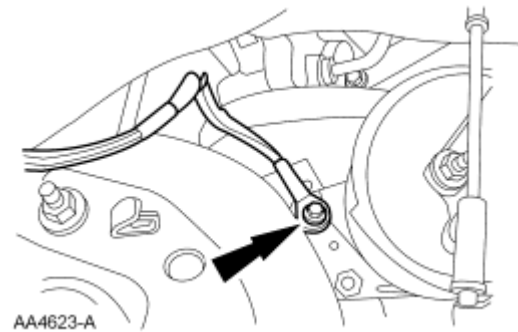


Fig. 158: Engine Wire Harness Ground Bolt
Courtesy of FORD MOTOR CO.

34. Loosen the bolt and disconnect the powertrain control module (PCM).

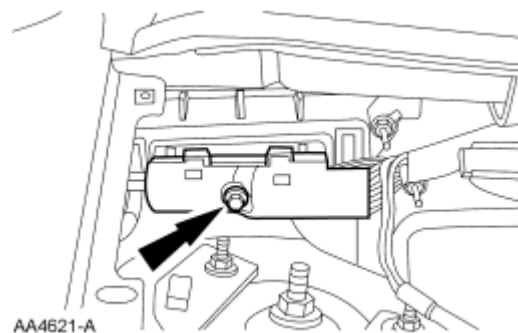
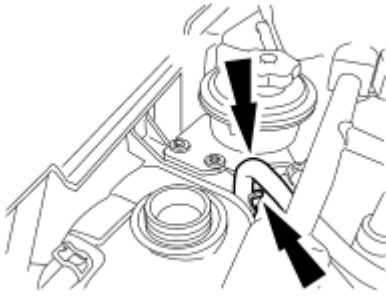


Fig. 159: Powertrain Control Module (PCM) Connector Bolt
Courtesy of FORD MOTOR CO.

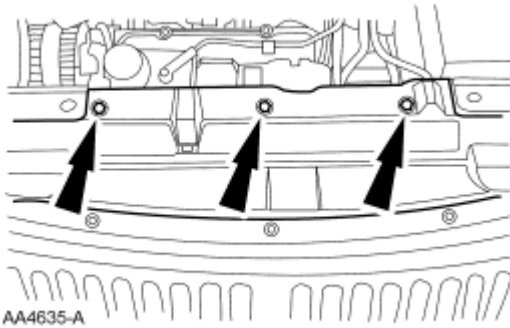
35. Reposition the clamp and disconnect the degas bottle hose.



A0076926

Fig. 160: Locating Degas Bottle Hose
Courtesy of FORD MOTOR CO.

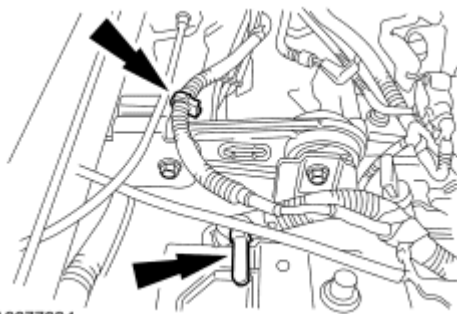
36. Remove the 3 retainers and the upper radiator sight shield.



AA4635-A

Fig. 161: Upper Radiator Sight Shield Retainers
Courtesy of FORD MOTOR CO.

37. Release the 2 engine wiring harness retainers.



A0077024

Fig. 162: Locating Engine Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

38. Remove the engine roll restrictor.
- Remove the 2 bolts.
 - Remove the engine roll restrictor.

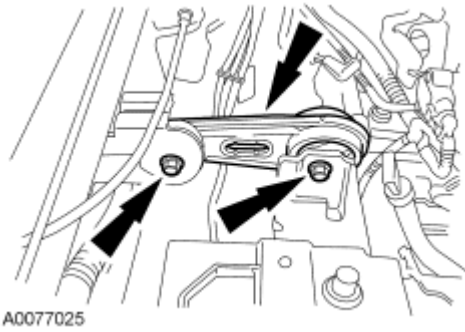


Fig. 163: Locating Engine Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

39. Remove the bolt from the ground cable.

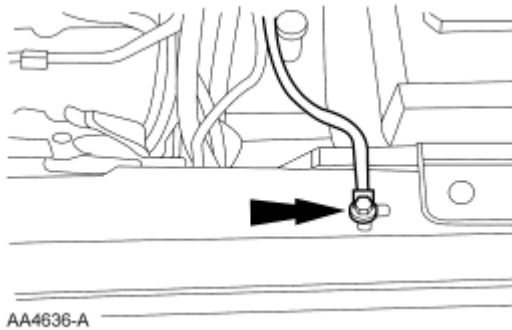


Fig. 164: Ground Cable Bolt
Courtesy of FORD MOTOR CO.

40. Remove the bolt from the ground cable.

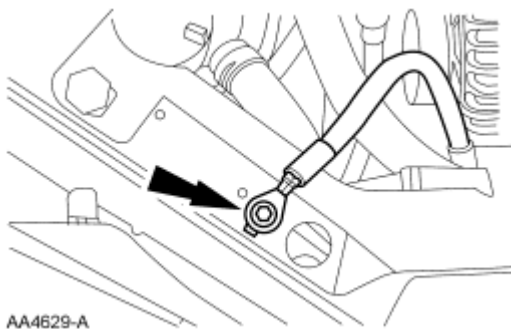


Fig. 165: Ground Cable Bolt
Courtesy of FORD MOTOR CO.

41. Disconnect the heater hose.

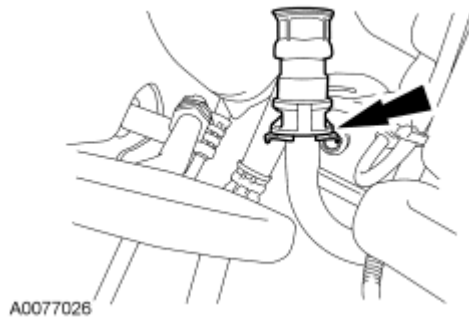


Fig. 166: Locating Heater Hose
Courtesy of FORD MOTOR CO.

42. Disconnect the A/C electrical connector.

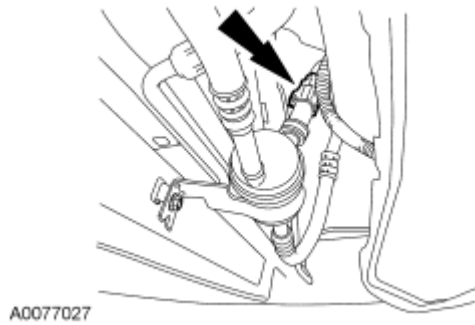


Fig. 167: Locating A/C Electrical Connector
Courtesy of FORD MOTOR CO.

43. Remove the bolt and position the A/C compressor manifold aside.

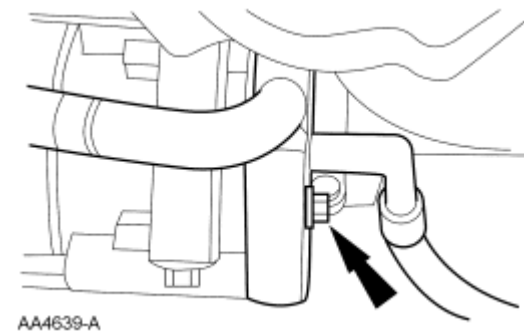
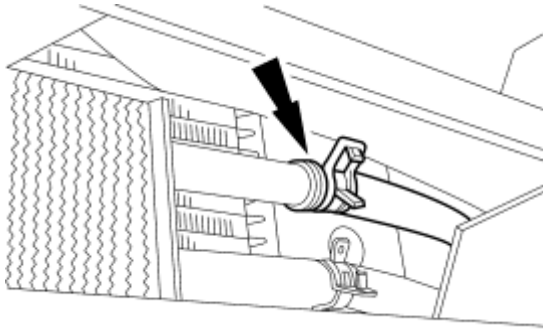


Fig. 168: A/C Compressor Manifold Bolt
Courtesy of FORD MOTOR CO.

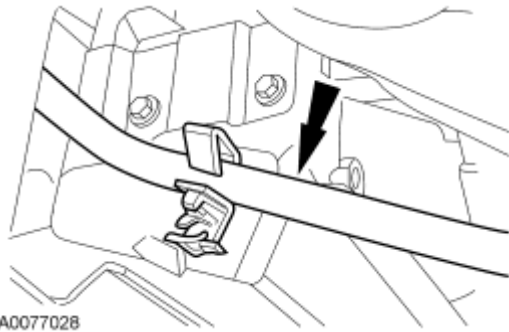
44. Reposition the clamp and disconnect the power steering cooler hose.



AA4642-A

Fig. 169: Power Steering Cooler Hose
Courtesy of FORD MOTOR CO.

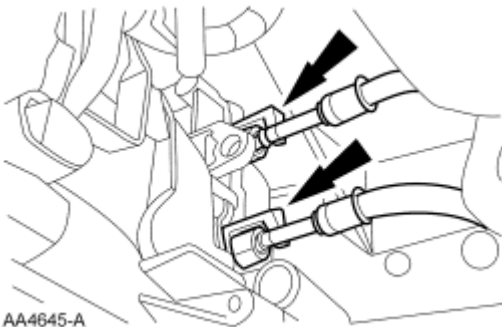
45. Remove the power steering cooler hose from the retaining clip.



A0077028

Fig. 170: Locating Power Steering Cooling Hose
Courtesy of FORD MOTOR CO.

46. Disconnect the transaxle cooler tubes.
- Remove the clips.
 - Disconnect the oil cooler tubes.



AA4645-A

Fig. 171: Transaxle Cooler Tubes & Clips
Courtesy of FORD MOTOR CO.

47. Disconnect the steering column.
- Remove the bolt.

- Slide the joint upward.

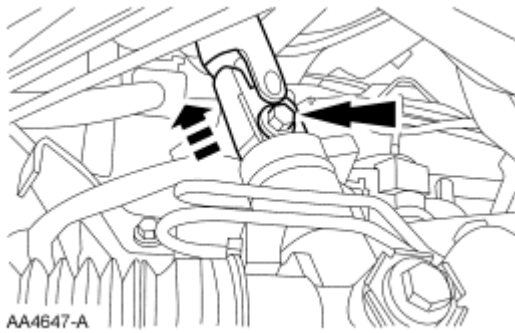


Fig. 172: Steering Column Shaft Pinch Bolt
Courtesy of FORD MOTOR CO.

48. Disconnect the lower radiator hose.
- Reposition the clamp.

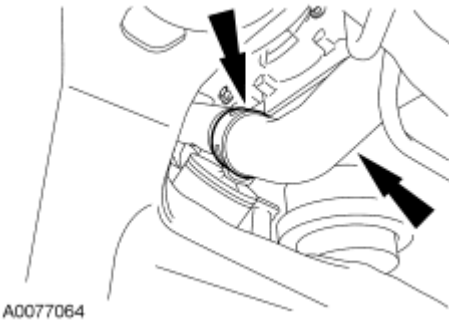


Fig. 173: Locating Lower Radiator Hose
Courtesy of FORD MOTOR CO.

49. Remove the oil pan-to-transaxle bolts.

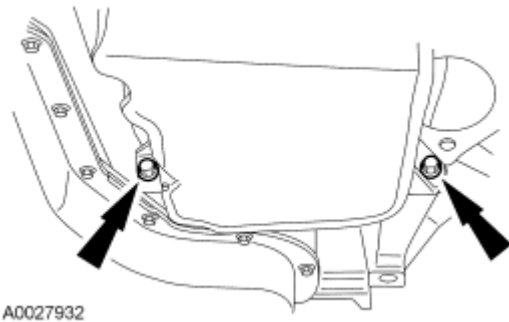


Fig. 174: Locating Oil Pan-To-Transaxle Bolts
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

50. Remove the RH and LH lower engine mount nuts.



Fig. 175: Locating Lower Engine Mount Nuts
Courtesy of FORD MOTOR CO.

51. Remove the inspection cover.
- Remove the bolt.
 - Remove the cover.

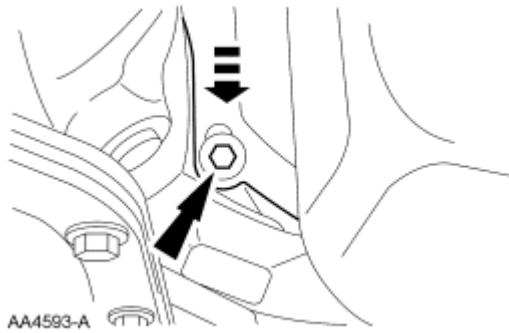


Fig. 176: Inspection Cover Bolt
Courtesy of FORD MOTOR CO.

52. Remove the 4 torque converter nuts.

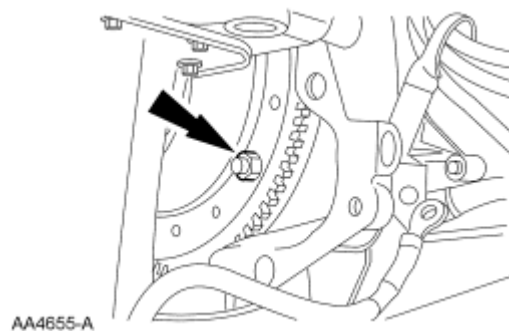


Fig. 177: Torque Converter Nut
Courtesy of FORD MOTOR CO.

53. Remove the RH and LH wiring harness retainers.

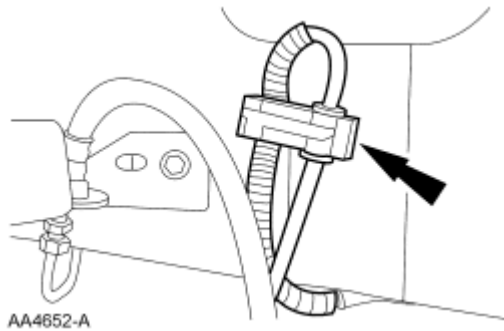


Fig. 178: Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

54. Remove the nuts and the RH and LH ABS electrical connectors.

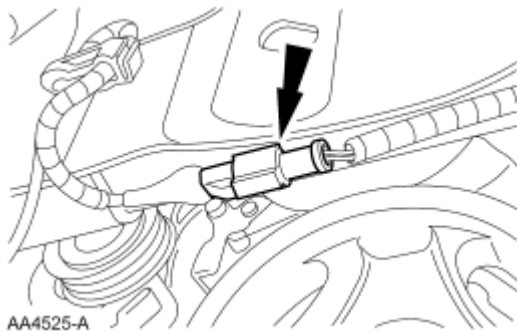


Fig. 179: Right Front Anti-Lock Brake Wheel Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

CAUTION: When removing the disc brake caliper, never allow it to hang from the brake hose. Provide a suitable support.

55. Remove the 4 bolts, then position the RH and LH brake calipers aside.

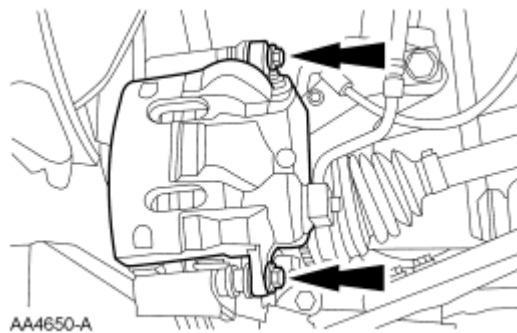


Fig. 180: Brake Caliper Bolts
Courtesy of FORD MOTOR CO.

56. Remove the nuts and disconnect the RH and LH front stabilizer links.

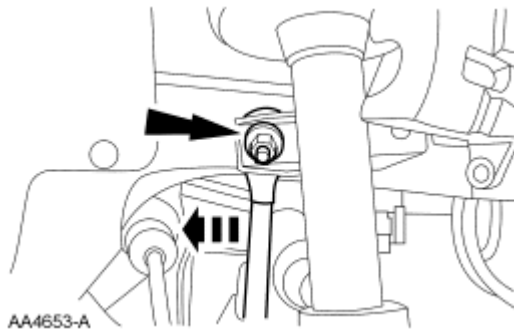


Fig. 181: Front Stabilizer Link & Nut
Courtesy of FORD MOTOR CO.

57. Remove the RH and LH strut bolts.

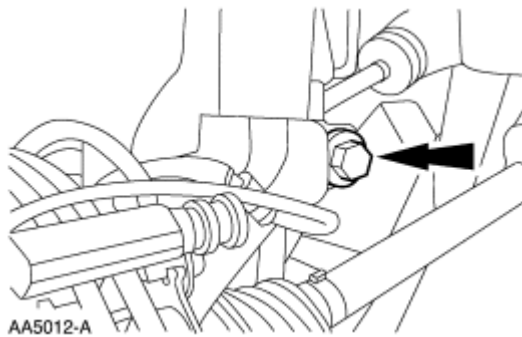


Fig. 182: Strut Bolt
Courtesy of FORD MOTOR CO.

58. Position the special tool under the subframe assembly.

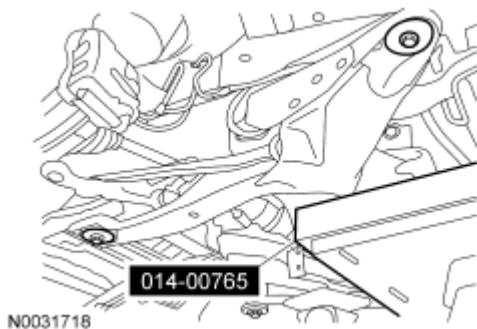


Fig. 183: Positioning Special Tool (014--00765)
Courtesy of FORD MOTOR CO.

59. Remove the 4 bolts.

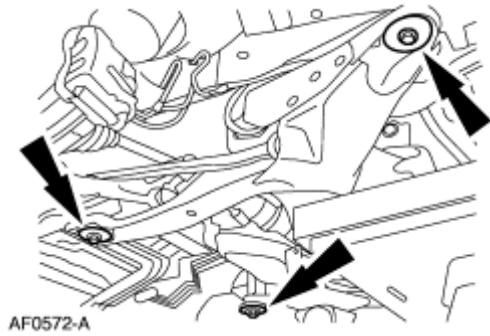


Fig. 184: Subframe Bolts
Courtesy of FORD MOTOR CO.

60. Lower the engine, transaxle and subframe assembly.
61. Remove the generator brace bolt.

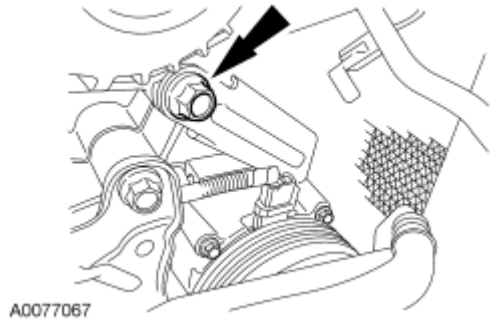


Fig. 185: Locating Generator Brace Bolt
Courtesy of FORD MOTOR CO.

62. Disconnect the A/C compressor electrical connector.

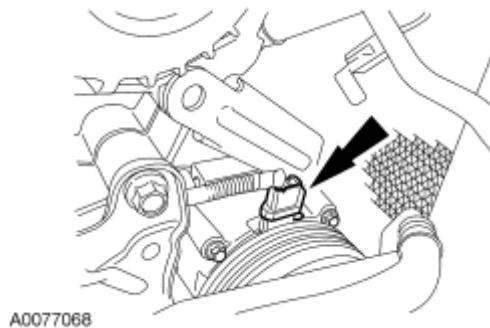


Fig. 186: Locating A/C Compressor Electrical Connector
Courtesy of FORD MOTOR CO.

63. Remove the 4 bolts and the A/C compressor.

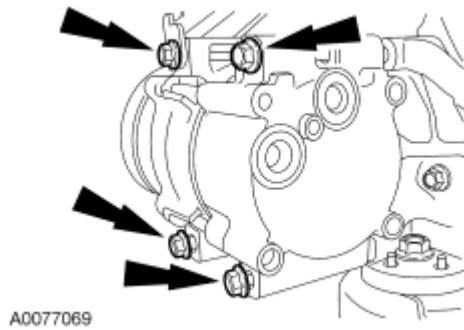


Fig. 187: Locating A/C Compressor Bolts
Courtesy of FORD MOTOR CO.

64. Release the engine wiring harness retainer.

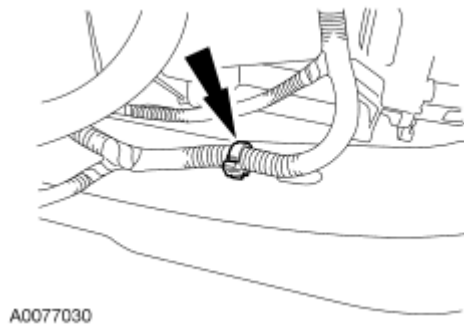


Fig. 188: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

65. Detach the electrical connector from the subframe.

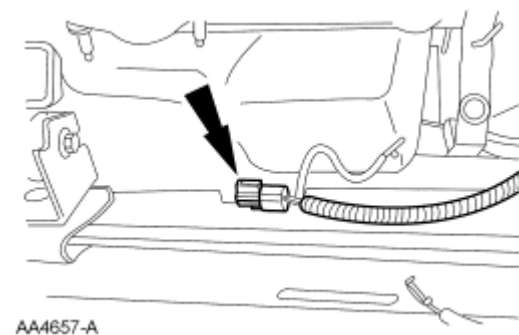


Fig. 189: Electrical Connector At Subframe
Courtesy of FORD MOTOR CO.

66. Release the engine wiring harness retainers.

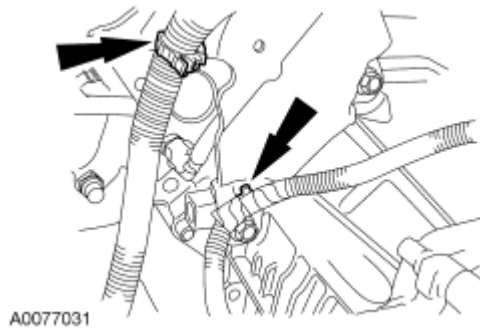


Fig. 190: Locating Engine Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

67. Remove the engine roll restrictor bracket.
- Remove the bolts.
 - Remove the engine roll restrictor bracket.

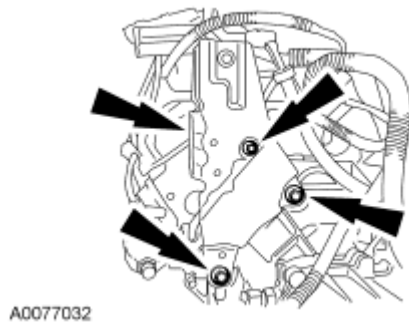


Fig. 191: Locating Engine Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

68. Remove the engine wiring harness pin-type retainer.

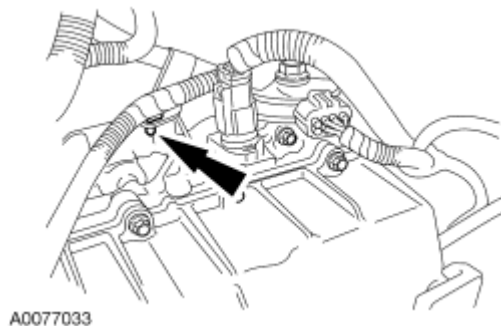


Fig. 192: Locating Engine Wiring Harness Pin-Type Retainer
Courtesy of FORD MOTOR CO.

69. Disconnect the transaxle electrical connectors.

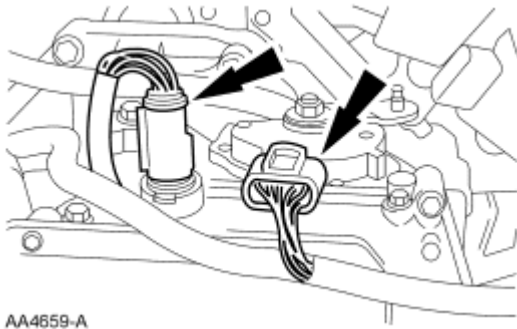


Fig. 193: Transaxle Electrical Connectors
Courtesy of FORD MOTOR CO.

70. Disconnect the turbine shaft speed (TSS) sensor connector.

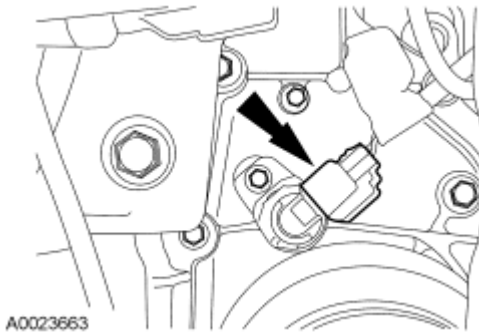


Fig. 194: Turbine Shaft Speed (TSS) Sensor Connector
Courtesy of FORD MOTOR CO.

71. Remove the pin-type harness retainer.

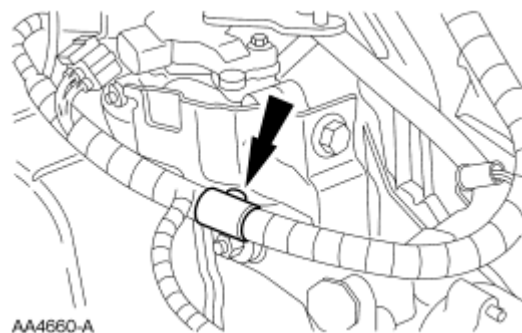


Fig. 195: Pin-Type Harness Retainer
Courtesy of FORD MOTOR CO.

72. Disconnect the electrical connectors.

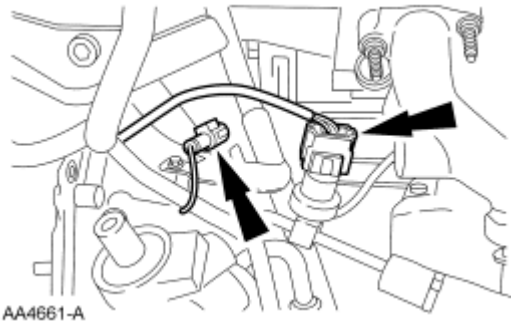


Fig. 196: Electrical Connectors
Courtesy of FORD MOTOR CO.

73. Detach the 2 electrical connectors from the wiring harness bracket.

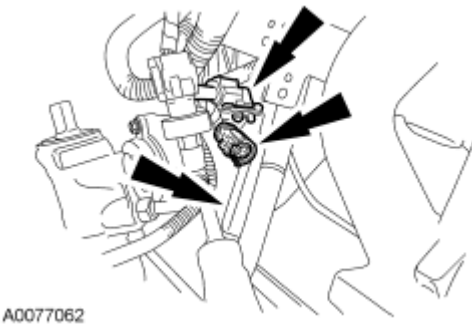


Fig. 197: Electrical Connectors At Bracket
Courtesy of FORD MOTOR CO.

74. Detach the electrical connector from the subframe.

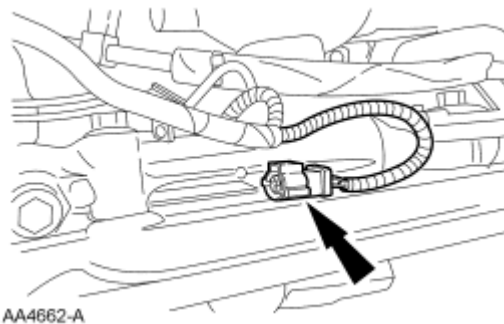


Fig. 198: Electrical Connectors At Subframe
Courtesy of FORD MOTOR CO.

75. Remove the bolt and the transaxle fluid level indicator and tube.

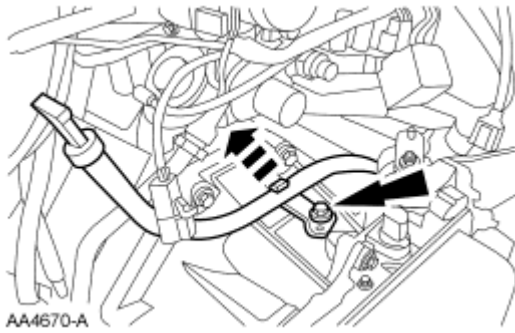


Fig. 199: Transaxle Fluid Level Indicator Tube & Bolt
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

76. Install the special tools.

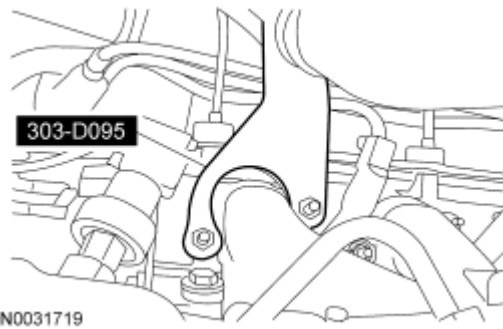


Fig. 200: Identifying Special Tool (303--D095)
Courtesy of FORD MOTOR CO.

77. Install the engine lifting equipment.

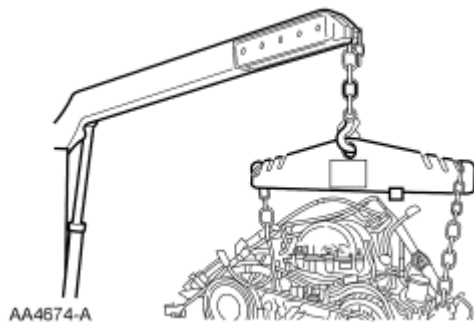


Fig. 201: Engine Lifting Equipment
Courtesy of FORD MOTOR CO.

78. Remove the 4 bellhousing bolts.

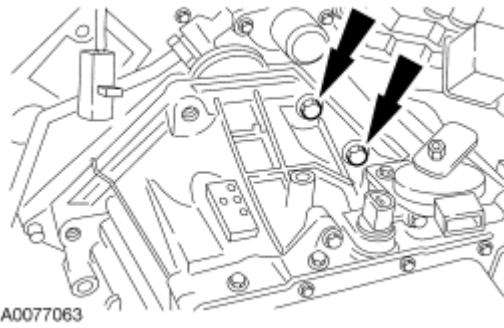


Fig. 202: Locating Bellhousing Bolts
Courtesy of FORD MOTOR CO.

79. Remove the bolt and the LH engine mount.

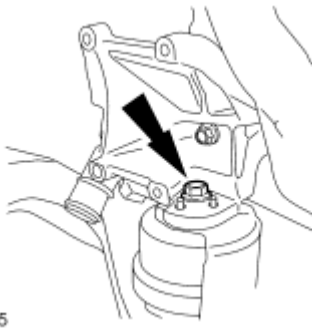


Fig. 203: Locating LH Engine Mount Bolt
Courtesy of FORD MOTOR CO.

80. Remove the bolt and the RH engine mount.

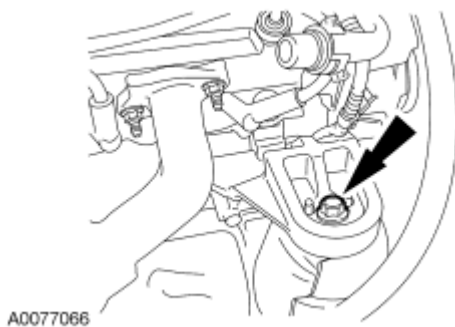


Fig. 204: Locating RH Engine Mount Bolt
Courtesy of FORD MOTOR CO.

81. Remove the oil pan-to-transaxle bolt.

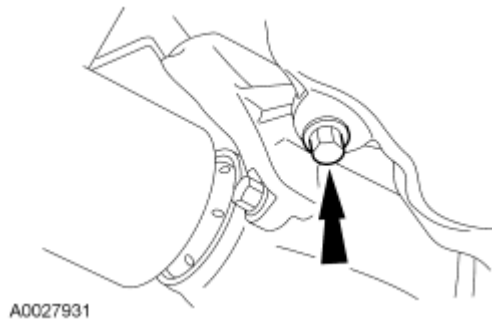


Fig. 205: Locating Oil Pan-To-Transaxle Bolt
Courtesy of FORD MOTOR CO.

82. Remove the 2 engine mount bracket-to-transaxle bolts.

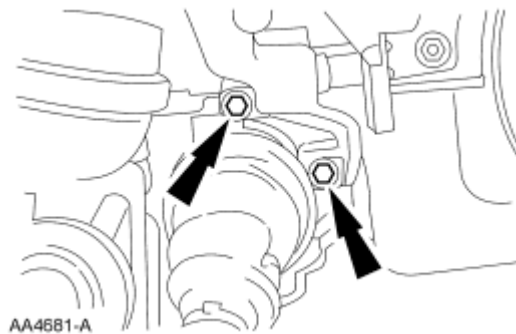


Fig. 206: Engine Mount Bracket-To-Transaxle Bolts
Courtesy of FORD MOTOR CO.

83. Using the engine lifting equipment, separate and lift the engine from the subframe and transaxle assembly.

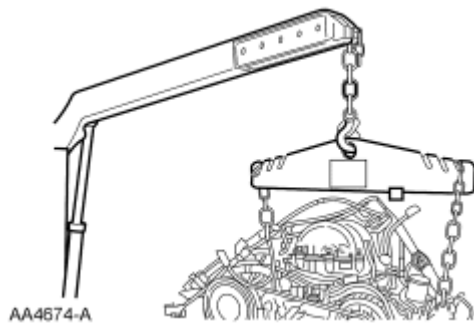


Fig. 207: Engine Lifting Equipment
Courtesy of FORD MOTOR CO.

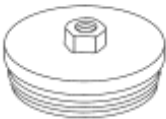
DISASSEMBLY

ENGINE

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Special Tools

Illustration	Tool Name	Tool Number
 ST1185-A	Impact Slide Hammer	100-001 (T50T-100-A)
 ST1382-A	Remover, Crankshaft Rear Seal	303-519 (T95P-6701-EH)
 ST1286-A	Remover, Crankshaft Vibration Damper	303-009 (T58P-6316-D)
 ST1385-A	Remover, Oil Seal	303-409 (T92C-6700-CH)
 ST1378-A	Remover, Crankshaft Vibration Damper	303-176 (T82L-6316-B)

Material

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

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 views in Engine Assembly.

1. Remove the 6 bolts and the flywheel.

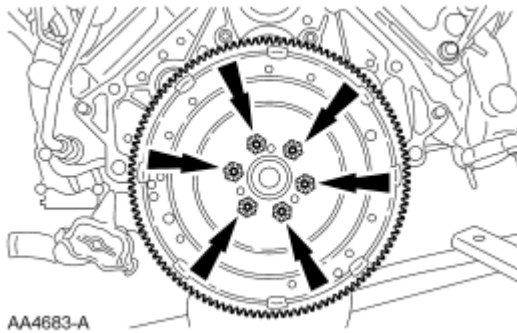


Fig. 208: Flexplate Bolts
Courtesy of FORD MOTOR CO.

2. Using the special tools, remove the crankshaft rear seal.

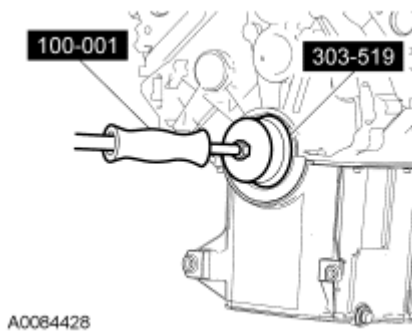


Fig. 209: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

3. Mount the engine on a suitable stand.
4. Remove the 4 bolts and the coolant pump pulley.

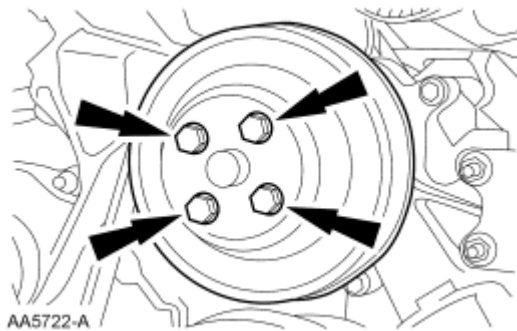


Fig. 210: Identifying Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

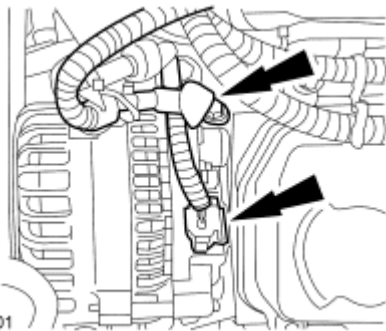
5. Remove the accessory drive belt idler pulley.



A0077105

Fig. 211: Locating Accessory Drive Belt Idler Pulley
Courtesy of FORD MOTOR CO.

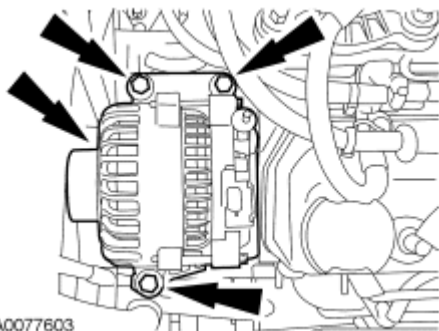
6. Disconnect the generator.
 - Remove the B+ wire terminal.
 - Disconnect the generator electrical connector.



A0077601

Fig. 212: Locating Generator Electrical Connector
Courtesy of FORD MOTOR CO.

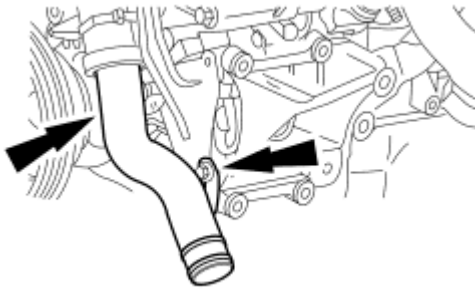
7. Remove the 3 bolts and the generator.



A0077603

Fig. 213: Locating Generator Bolts
Courtesy of FORD MOTOR CO.

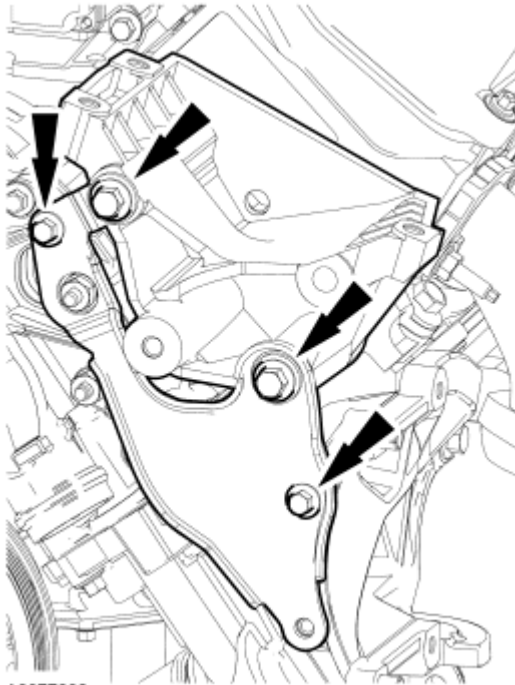
8. Remove the bolt and the coolant pump extension tube and bracket.



A0077606

Fig. 214: Locating Coolant Pump Extension Tube And Bracket Bolt
Courtesy of FORD MOTOR CO.

9. Remove the 4 bolts and the A/C compressor mounting bracket brace and generator mounting bracket as an assembly.



A0077608

Fig. 215: Locating A/C Compressor Mounting Bracket Bolts
Courtesy of FORD MOTOR CO.

10. Remove the 4 bolts and the A/C compressor bracket.

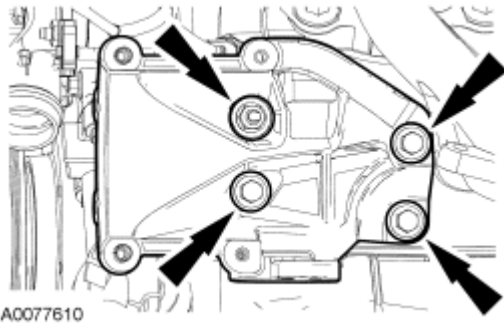


Fig. 216: Locating A/C Compressor Bracket Bolts
Courtesy of FORD MOTOR CO.

NOTE: Remove and discard the coolant pump outlet tube O-ring.

11. Remove the coolant pump outlet tube.
 - Disconnect the 3 coolant hoses.
 - Reposition the clamps.
 - Remove the 2 bolts and the coolant pump outlet tube.

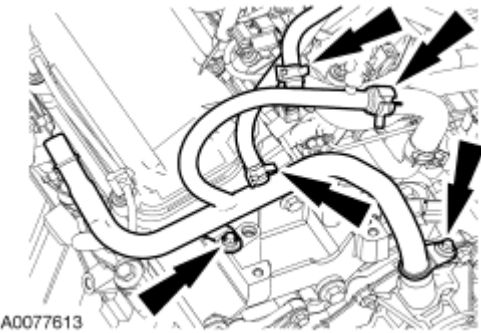


Fig. 217: Locating Coolant Pump Outlet Tube Bolts
Courtesy of FORD MOTOR CO.

12. Remove the 3 bolts and the accessory drive belt tensioner.

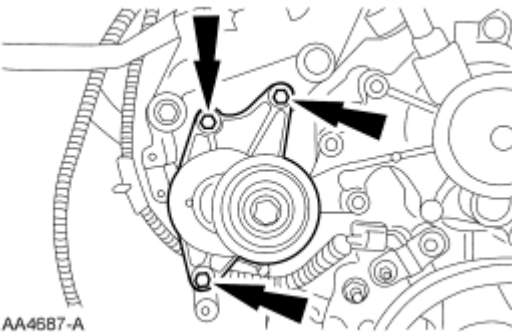


Fig. 218: Accessory Drive Belt Tensioner Bolts
Courtesy of FORD MOTOR CO.

13. Remove the 4 bolts and the power steering pump bracket.

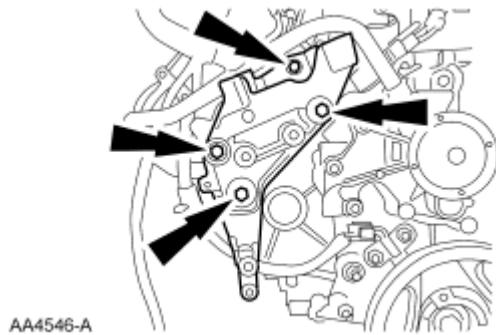


Fig. 219: Power Steering Pump Bracket Bolts
Courtesy of FORD MOTOR CO.

14. Disconnect the crankshaft position (CKP) sensor electrical connector.

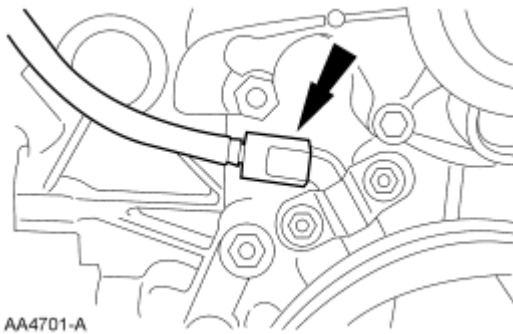


Fig. 220: Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

15. Remove the catalyst monitor sensor electrical connector mounting bracket.

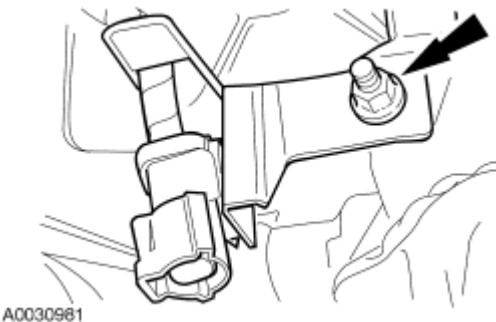


Fig. 221: Locating Catalyst Monitor Sensor Electrical Connector Bracket Nut
Courtesy of FORD MOTOR CO.

16. Remove the 4 bolts and the RH engine mount bracket.

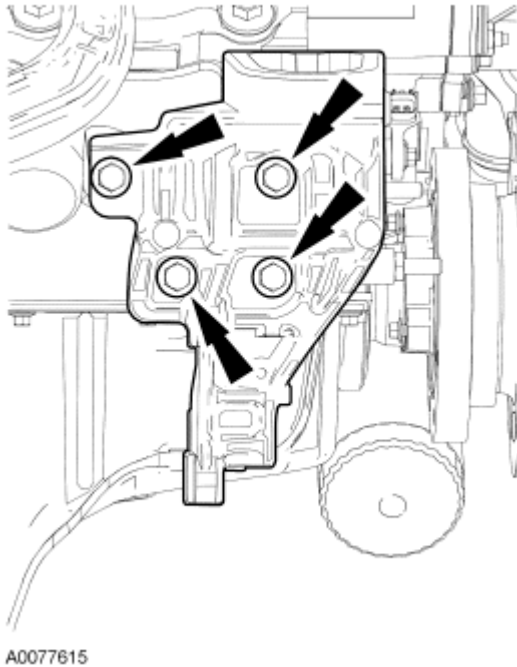


Fig. 222: Locating RH Engine Mount Bracket Bolts
Courtesy of FORD MOTOR CO.

17. Disconnect the oil pressure sensor electrical connector and remove the engine harness pin-type retainer.

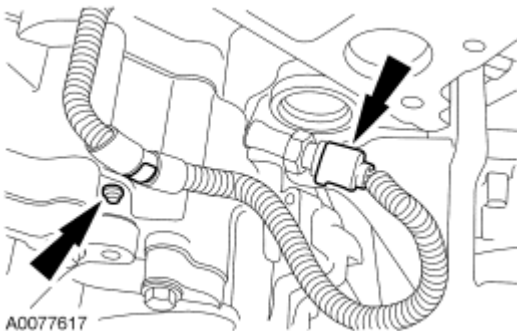


Fig. 223: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

18. Disconnect the camshaft position (CMP) sensor electrical connector.

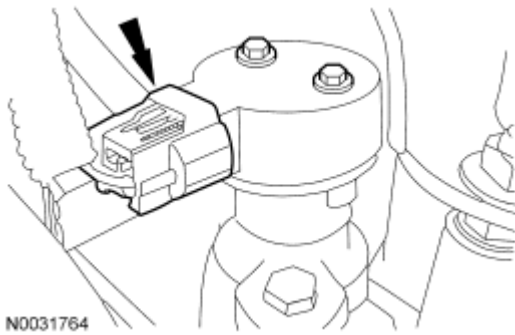


Fig. 224: Locating Camshaft Position Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

19. Disconnect the intake manifold runner control (IMRC) electrical connector.

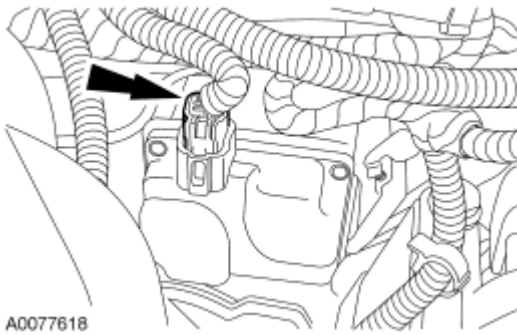


Fig. 225: Locating Intake Manifold Runner Control Electrical Connector
Courtesy of FORD MOTOR CO.

20. Disconnect the crankcase vent hose valve electrical connector and quick-connect the crankcase vent hose.

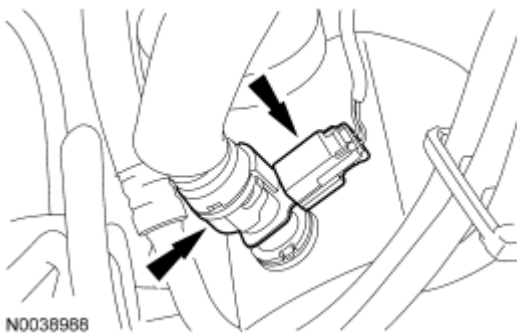


Fig. 226: Locating Crankcase Vent Hose Valve Electrical Connector
Courtesy of FORD MOTOR CO.

21. Disconnect the quick connect crankcase vent hose from the intake manifold and remove.

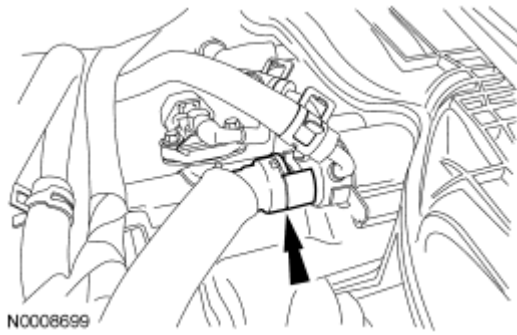


Fig. 227: Locating Quick Connect Crankcase Vent Hose
Courtesy of FORD MOTOR CO.

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

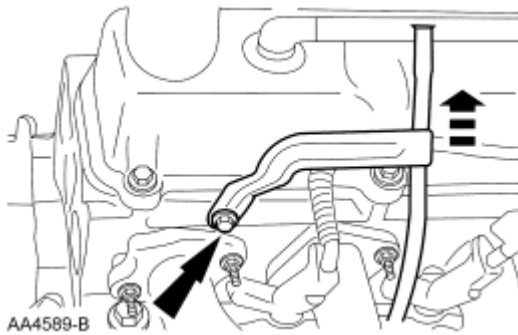


Fig. 228: Oil Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

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

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

23. Disconnect and remove the spark plug wires and retainers as an assembly.

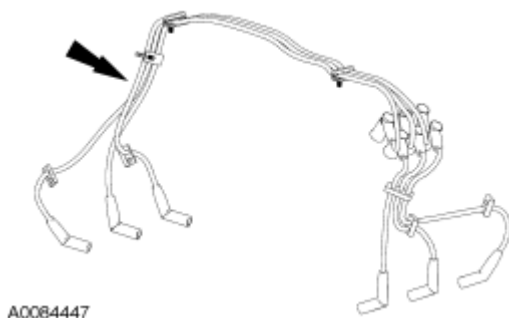


Fig. 229: Locating Spark Plug Wires & Retainers

Courtesy of FORD MOTOR CO.

24. Remove the 4 engine harness pin-type retainers.

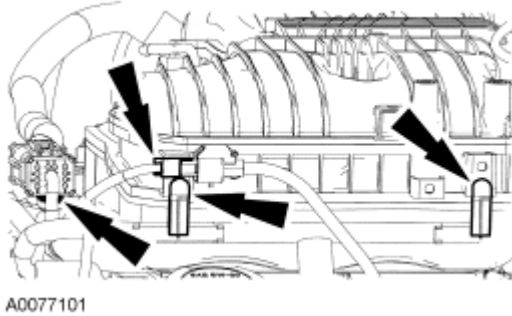


Fig. 230: Locating Engine Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

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

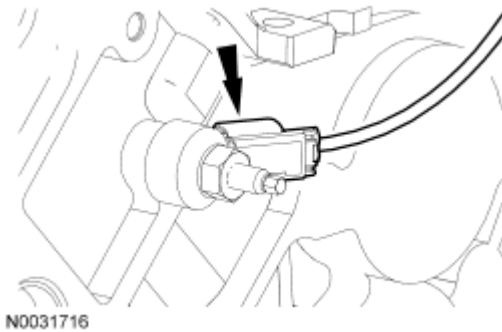


Fig. 231: Locating Knock Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

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

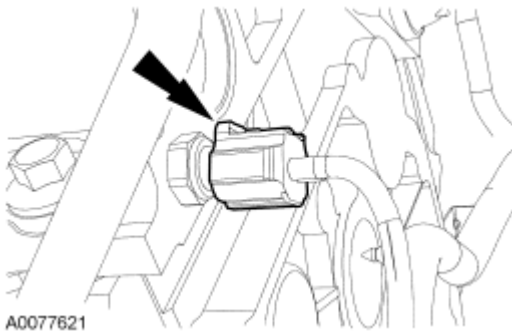


Fig. 232: Locating Cylinder Head Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

27. Disconnect the following.

1. Idle air control (IAC) electrical connector
2. Throttle position (TP) sensor electrical connector
3. Exhaust gas recirculation (EGR) system module electrical connector
4. EGR system module vacuum connector
5. EGR system module-to-exhaust manifold tube upper fitting

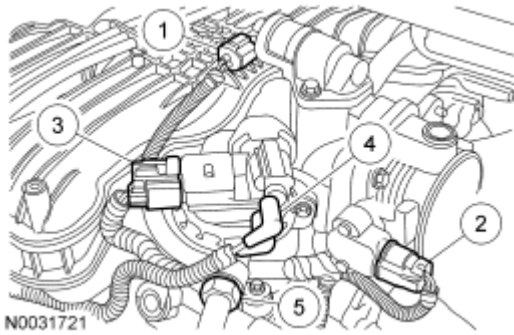


Fig. 233: Identifying EGR System Module Vacuum Connector & Throttle Position Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

28. Detach the wire retainer from the TP sensor stud bolt.

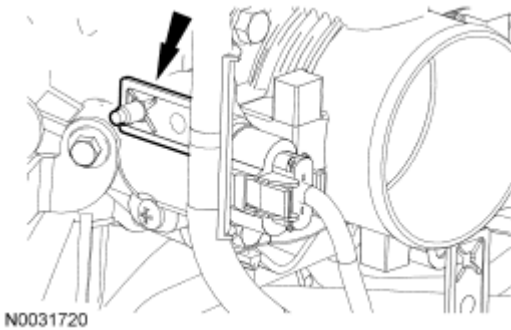


Fig. 234: Locating Wire Retainer

Courtesy of FORD MOTOR CO.

29. Loosen the nut and remove the EGR system module-to-exhaust manifold tube.

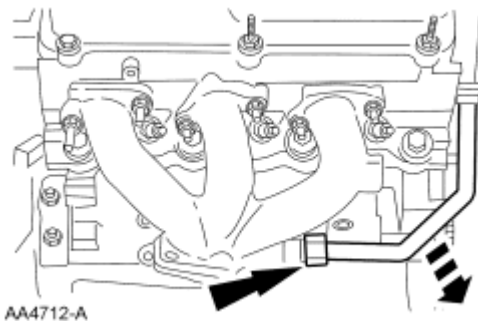


Fig. 235: EGR System Module-To-Exhaust Manifold Tube
Courtesy of FORD MOTOR CO.

30. Disconnect the ignition coil electrical connector and remove the engine harness pin-type retainer.

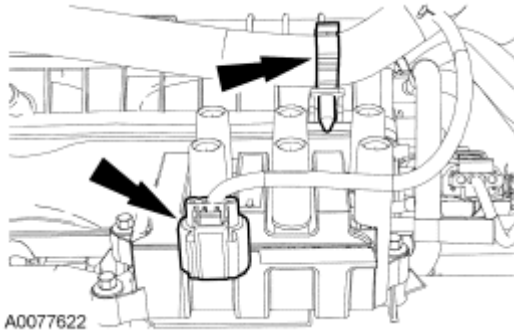


Fig. 236: Locating Ignition Coil Electrical Connector
Courtesy of FORD MOTOR CO.

31. Remove the 3 bolts and the ignition coil.

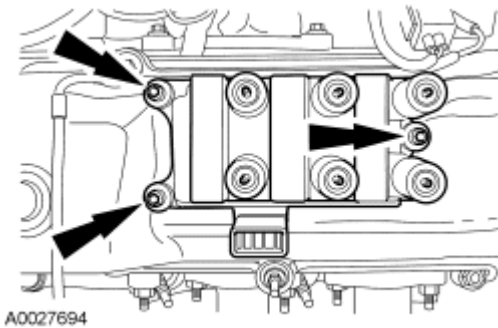


Fig. 237: Locating Ignition Coil Bolts
Courtesy of FORD MOTOR CO.

32. Disconnect the vacuum harness connection and remove the vacuum harness from the engine.

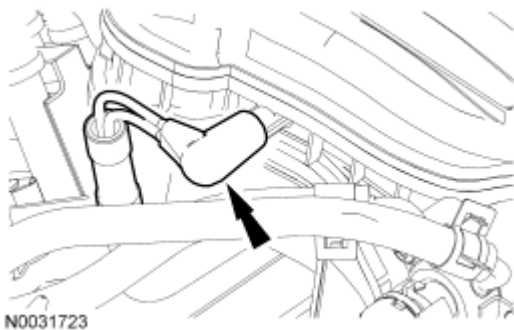


Fig. 238: Locating Vacuum Harness
Courtesy of FORD MOTOR CO.

33. Disconnect the engine harness-to-fuel charging harness electrical connector and remove the engine harness from the engine.

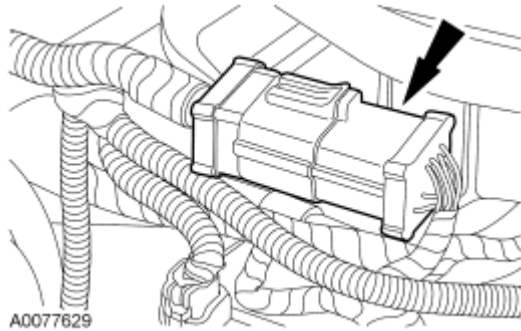


Fig. 239: Locating Engine Harness-To-Fuel Charging Harness Electrical Connector
Courtesy of FORD MOTOR CO.

34. Remove the upper intake manifold and discard the gaskets.

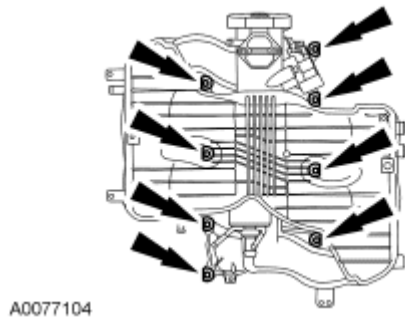


Fig. 240: Locating Upper Intake Manifold
Courtesy of FORD MOTOR CO.

35. Remove the bolts and the fuel rail, fuel injectors and fuel charging harness as an assembly.

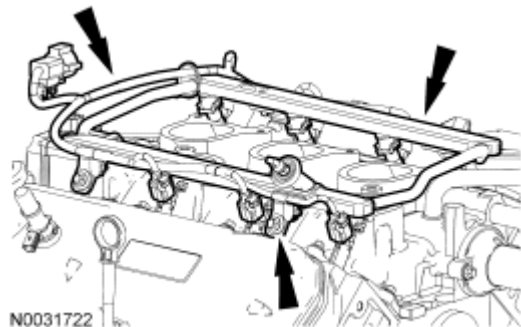
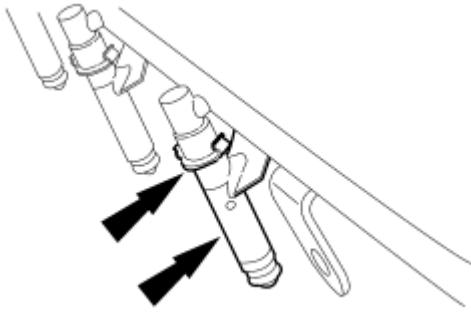


Fig. 241: Locating Fuel Rail, Fuel Injectors And Fuel Charging Harness
Courtesy of FORD MOTOR CO.

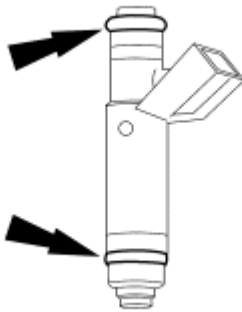
36. Remove the fuel injector clips and fuel injectors.



AV1417-A

Fig. 242: Fuel Injectors & Clips
Courtesy of FORD MOTOR CO.

37. Remove and discard the fuel injector O-rings.

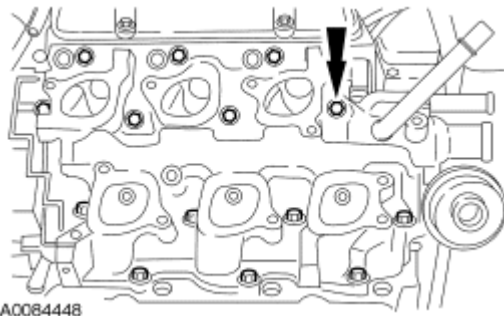


AV1418-B

Fig. 243: Fuel Injector O-Rings
Courtesy of FORD MOTOR CO.

NOTE: Record the location of the 6 long bolts and the 8 short bolts.

38. Remove the bolts and the lower intake manifold assembly.



A0084448

Fig. 244: Locating Lower Intake Manifold Assembly Bolts
Courtesy of FORD MOTOR CO.

39. Remove and discard the lower intake manifold sealing components.



Item	Part Number	Description
1	9439	RH intake manifold gasket
2	9439	LH intake manifold gasket
3	9A424	Intake manifold rear end seal (part of 9439)
4	9A425	Intake manifold front end seal (part of 9439)

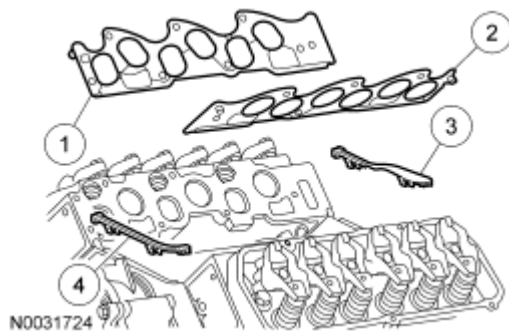
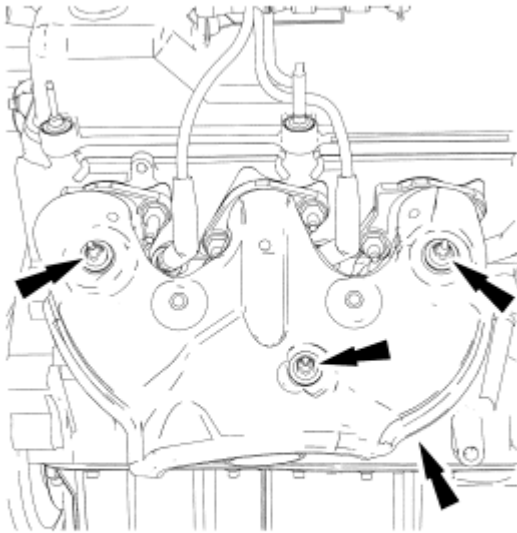


Fig. 245: Lower Intake Manifold Gaskets
Courtesy of FORD MOTOR CO.

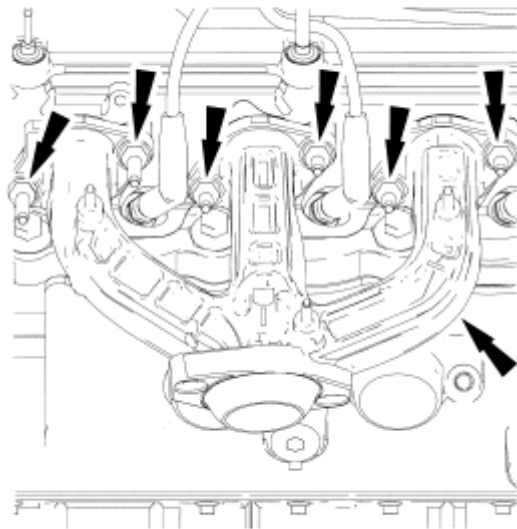
40. Remove the 3 nuts and the heat shield.



A0085039

Fig. 246: Locating Heat Shield Nuts
Courtesy of FORD MOTOR CO.

41. Remove the 6 nuts and the RH exhaust manifold.



A0085046

Fig. 247: Locating RH Exhaust Manifold Nuts

Courtesy of FORD MOTOR CO.

42. Remove the 6 nuts and the LH exhaust manifold.

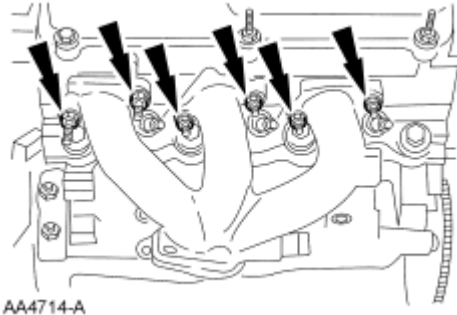


Fig. 248: Locating LH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

43. Clean and inspect the exhaust manifolds. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
44. Remove the LH valve cover.
 1. Remove the 3 bolts.
 2. Remove the 2 stud bolts.
 3. Remove the LH valve cover.

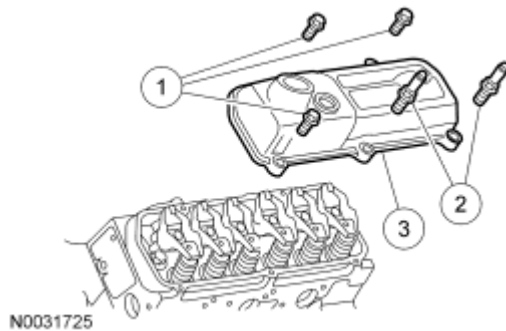


Fig. 249: Identifying LH Valve Cover
Courtesy of FORD MOTOR CO.

45. Remove the RH valve cover.
 1. Remove the 3 stud bolts.
 2. Remove the 2 bolts.
 3. Remove the RH valve cover.

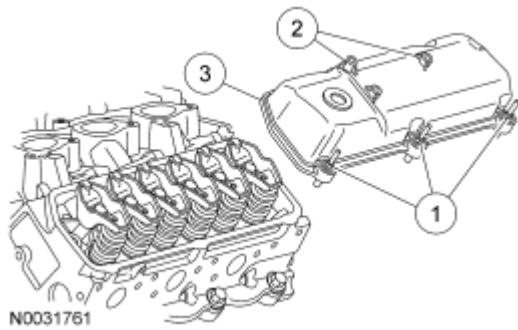


Fig. 250: Identifying RH Valve Cover
Courtesy of FORD MOTOR CO.

CAUTION: If the components are to be reinstalled, they must be installed into the same position. Mark the components for location.

NOTE: If the rocker arms are to be reinstalled, they must be installed into their original locations. Mark the rocker arms for location.

46. Remove the rocker arms.
1. Remove the bolts.
 2. Remove the rocker arms and pivots.

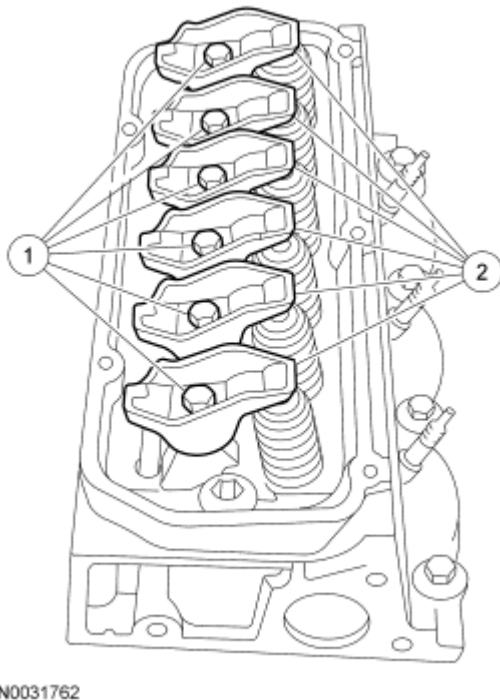
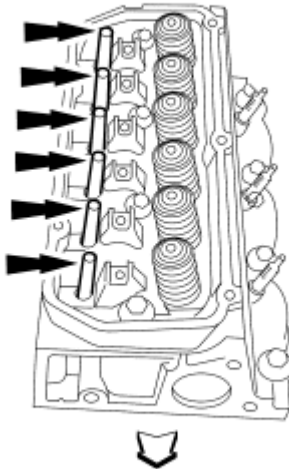


Fig. 251: Identifying Rocker Arms And Pivots
Courtesy of FORD MOTOR CO.

NOTE: If the push rods are to be reinstalled, they must be installed into their original locations. Mark the push rods for location.

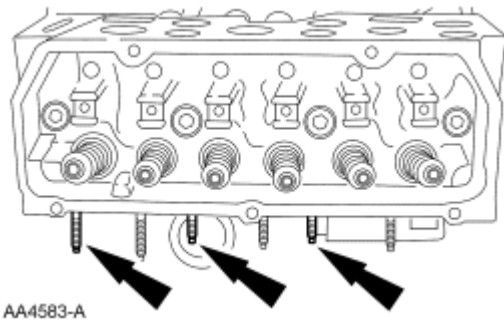
47. Remove the 12 push rods.



A25443-A

Fig. 252: Pushrods
Courtesy of FORD MOTOR CO.

48. Remove the lower 3 exhaust manifold studs from both cylinder heads.



AA4583-A

Fig. 253: Lower Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

NOTE: Record the location of long and short bolts.

49. Remove and discard all the cylinder head bolts.

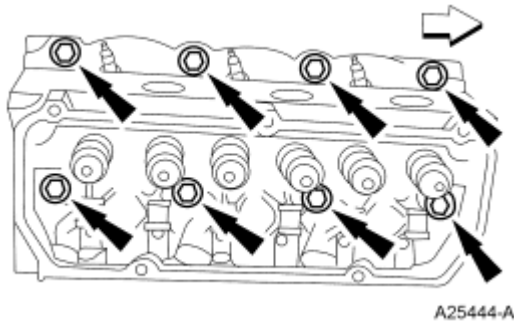


Fig. 254: Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

50. Remove the RH and LH cylinder heads and the gaskets. Discard the gasket.

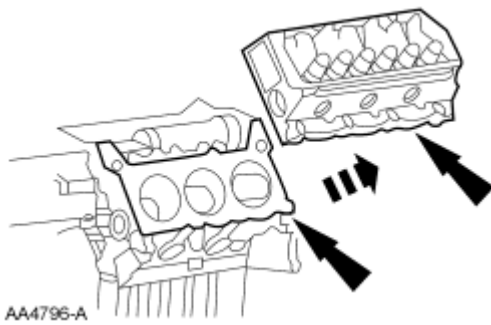


Fig. 255: Cylinder Head & Gasket
Courtesy of FORD MOTOR CO.

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

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

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

51. Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder heads 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.
52. Inspect the cylinder heads for distortion. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
 53. Remove and discard the engine oil filter.

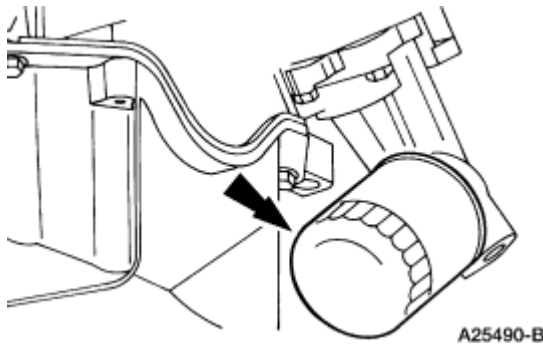


Fig. 256: Engine Oil Filter
Courtesy of FORD MOTOR CO.

CAUTION: A new oil cooler must be installed or severe damage to the engine can occur.

54. If equipped, remove the oil cooler and tube assembly bolt.
 - Discard the oil cooler and tube assembly.



Fig. 257: Locating Oil Cooler/Tube Assembly & Bolt
Courtesy of FORD MOTOR CO.

55. Remove the oil pressure sensor.

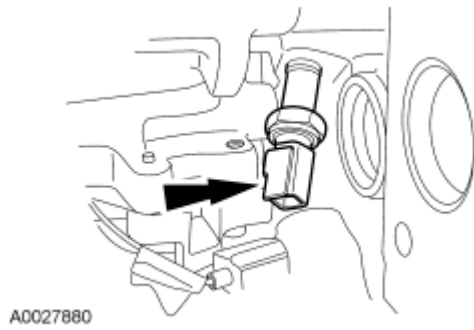


Fig. 258: Locating Oil Pressure Sensor
Courtesy of FORD MOTOR CO.

NOTE: Discard the oil pan rear seal.

56. Remove the 17 bolts and the oil pan.

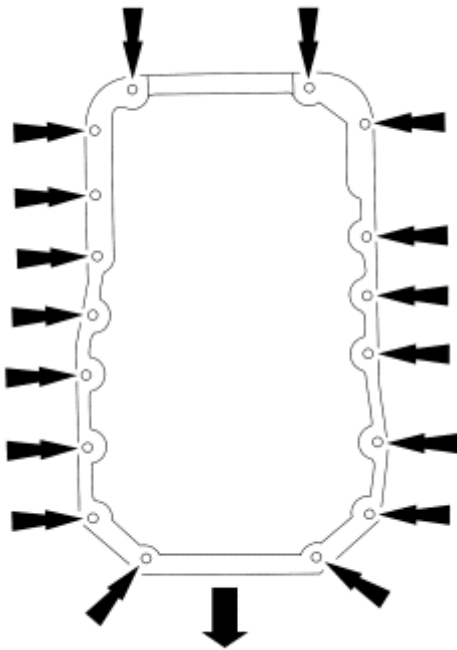
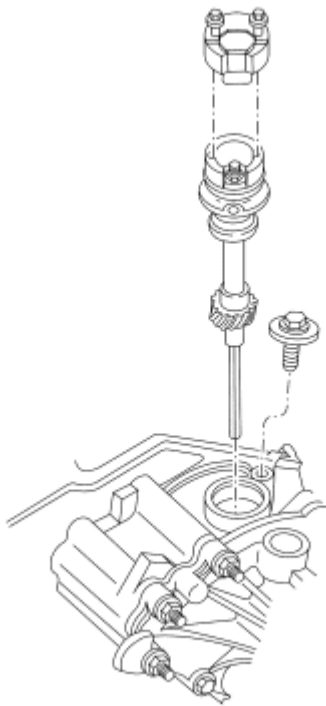


Fig. 259: Locating Oil Pan Bolts
Courtesy of FORD MOTOR CO.

NOTE: In some cases the oil pump intermediate shaft may not come out with the synchronizer assembly. If so, retrieve the intermediate shaft before proceeding.

57. Remove the bolt and the camshaft synchronizer assembly.



DA0633-B

Fig. 260: Camshaft Synchronizer Assembly & Bolt
Courtesy of FORD MOTOR CO.

58. Using the special tool, remove the crankshaft damper and pulley assembly.

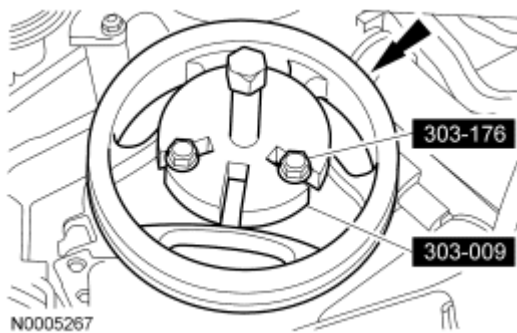


Fig. 261: Removing Crankshaft Pulley
Courtesy of FORD MOTOR CO.

59. Using the special tool, remove the crankshaft front seal. Discard the seal.

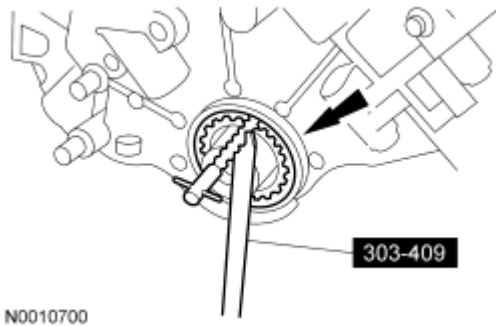


Fig. 262: Removing Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

60. Remove the coolant pump.
 - Remove the 4 nuts, 4 bolts and the stud bolt.
 - Remove the coolant pump.
 - Discard the coolant pump housing gasket.

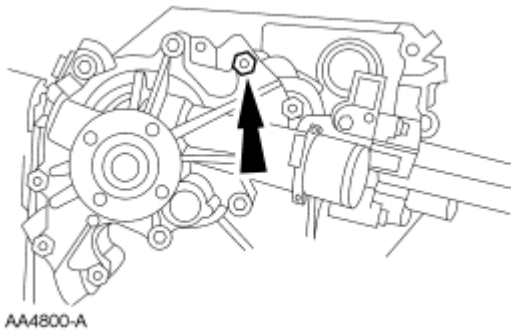
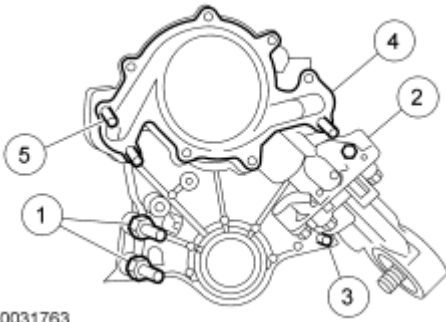


Fig. 263: Coolant Pump
Courtesy of FORD MOTOR CO.

61. Remove the engine front cover and oil pump assembly and the engine front cover gasket.
 1. Remove the 2 stud bolts.
 2. Remove the bolt.

CAUTION: The capscrew is hidden; make sure to remove it or the engine front cover will be damaged.

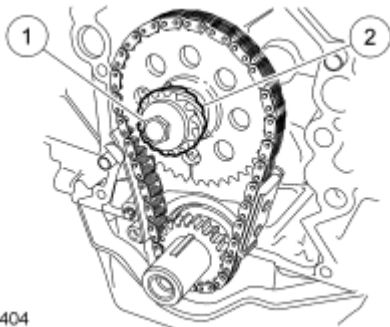
3. Remove the capscrew.
4. Slide the engine front cover and engine front cover gasket from the dowels. Discard the engine front cover gasket.
5. Remove the 4 studs.



N0031763

Fig. 264: Identifying Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.

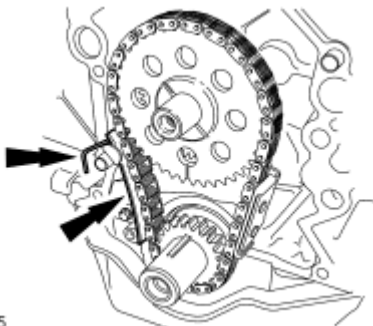
62. Remove the camshaft synchronizer drive gear.
 1. Remove the bolt.
 2. Remove the camshaft synchronizer drive gear.



A0084404

Fig. 265: Camshaft Synchronizer Drive Gear & Bolt
Courtesy of FORD MOTOR CO.

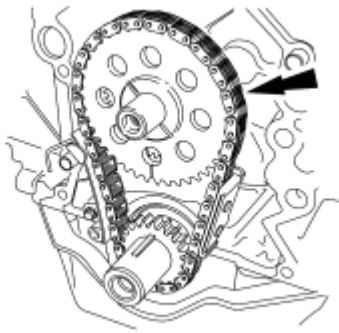
63. Compress and install a retaining pin to hold the timing chain tensioner.



A0084405

Fig. 266: Compressing Timing Chain Tensioner And Installing Retaining Pin
Courtesy of FORD MOTOR CO.

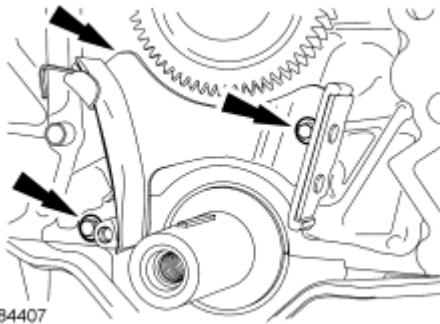
64. Remove the camshaft gear, the crankshaft gear and the timing chain as an assembly.



A0084406

Fig. 267: Identifying Timing Chain And Sprockets
Courtesy of FORD MOTOR CO.

65. Remove the bolts and the timing chain tensioner.

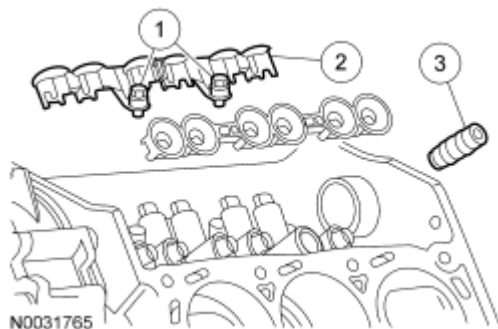


A0084407

Fig. 268: Locating Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

NOTE: If the valve tappets are to be reinstalled, they must be installed into their original locations. Mark the valve tappets for installation.

66. Remove the 12 valve tappets.
1. Remove the 2 bolts.
 2. Remove the tappet guide plate and retainer.
 3. Remove the 12 valve tappets.



N0031765

Fig. 269: Identifying Valve Tappets

Courtesy of FORD MOTOR CO.

67. Remove the engine balance shaft drive gear and camshaft key.

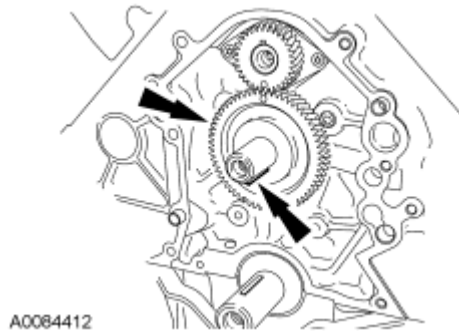


Fig. 270: Locating Engine Balance Shaft Drive Gear & Camshaft Key
Courtesy of FORD MOTOR CO.

68. Remove the engine dynamic balance shaft.
- Remove the 2 bolts.
 - Remove the balance shaft driven gear, thrust plate and engine dynamic balance shaft as an assembly.

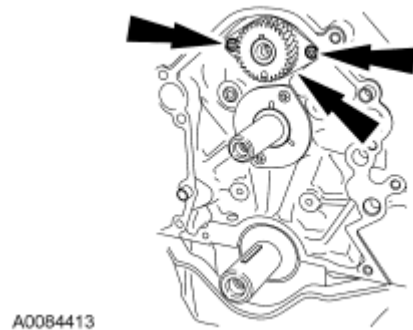


Fig. 271: Balance Shaft Driven Gear, Thrust Plate & Bolts
Courtesy of FORD MOTOR CO.

69. Remove the camshaft.
1. Remove the 2 bolts.
 2. Remove the camshaft thrust plate.
 3. Remove the spacer.
 4. Remove the camshaft.

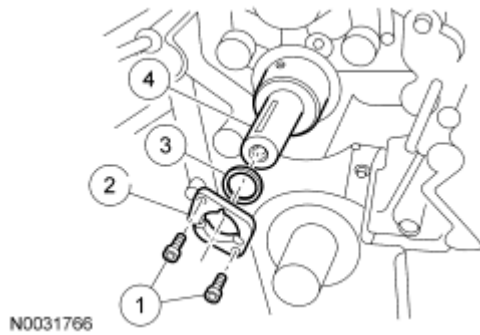


Fig. 272: Camshaft, Spacer, Thrust Plate & Bolts
Courtesy of FORD MOTOR CO.

70. Remove the bearing covers.
 1. Remove the engine dynamic balance shaft bearing cover.
 2. Remove the camshaft bearing cover.

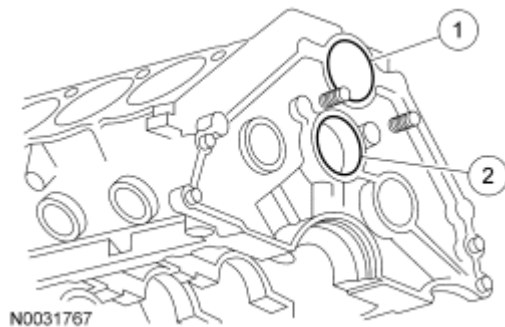


Fig. 273: Identifying Engine Dynamic Balance Shaft Bearing Cover & Camshaft Bearing Cover
Courtesy of FORD MOTOR CO.

71. Remove the oil pump screen cover and tube.
 - Remove the nut.
 - Remove the 2 bolts.

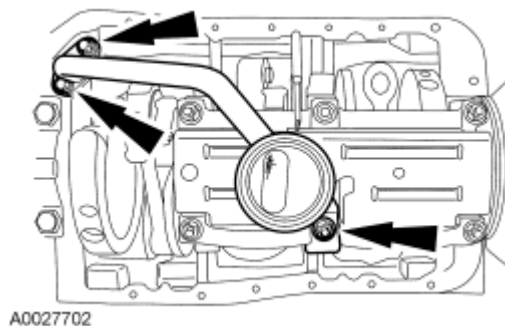


Fig. 274: Locating Oil Pump Screen Cover Bolts & Nuts
Courtesy of FORD MOTOR CO.

72. Remove the 5 nuts and the oil pan baffle.

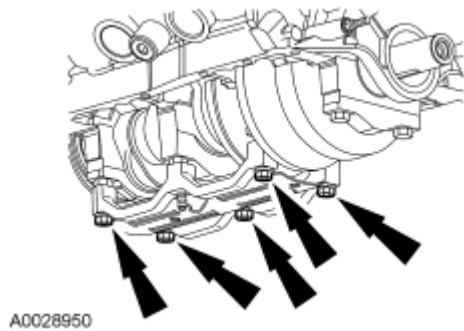


Fig. 275: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

73. If necessary, remove the ridge at the top of the cylinder.

CAUTION: The connecting rods and bearings are matched to the crankshaft journals. Make sure the components are marked and installed in the correct location.

CAUTION: Each connecting rod and connecting rod cap are matched sets. They will fit together only one way. Mark them before removing.

CAUTION: Do not damage the connecting rod and the connecting rod cap fractured joint face surface or engine damage can occur.

74. Remove the piston.

1. Make sure the piston being removed is at the bottom of the cylinder bore.
2. Remove the 2 bolts.
3. Remove the connecting rod cap and the lower connecting rod bearing.

CAUTION: Do not damage the cylinder wall when removing the piston.

4. Push the piston and the connecting rod out of the cylinder.

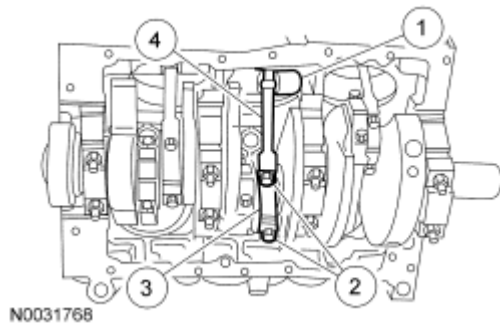


Fig. 276: Removing Piston
Courtesy of FORD MOTOR CO.

75. Repeat the piston removal steps for the remaining pistons.

CAUTION: The crankshaft main bearings and the main bearing caps are matched to the crankshaft journals. Make sure the components are marked for position.

NOTE: The crankshaft main bearing located at the main bearing cap is the thrust bearing.

76. Remove the 4 main bearing caps and lower crankshaft main bearings.
1. Remove the 2 stud bolts.
 2. Remove the main bearing cap and lower crankshaft main bearing.

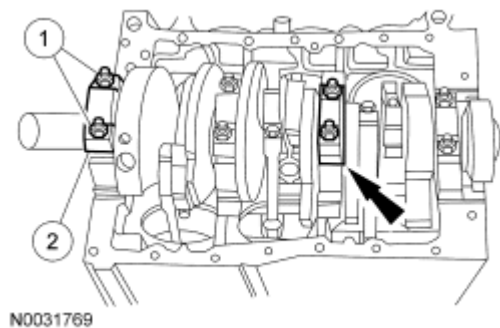


Fig. 277: Main Bearing Cap & Bolts
Courtesy of FORD MOTOR CO.

77. Repeat the main bearing cap and the lower bearing removal steps for the remaining main bearing caps and the lower crankshaft main bearings.

CAUTION: The crankshaft journals must be protected from damage when the crankshaft is removed.

78. Remove the crankshaft.

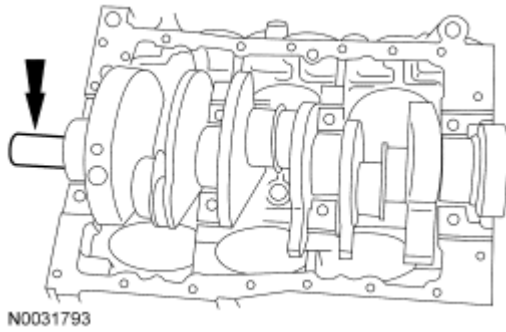


Fig. 278: Locating Crankshaft
Courtesy of FORD MOTOR CO.

NOTE: For ease in reassembly, record the location of the crankshaft upper thrust bearing.

79. Remove the upper 4 crankshaft main bearings and the crankshaft upper thrust bearing.

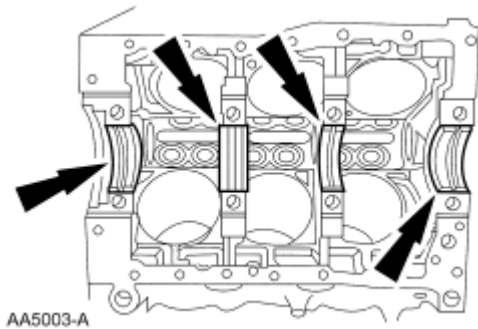


Fig. 279: Identifying Crankshaft Upper Main Bearings And Upper Thrust Main Bearing
Courtesy of FORD MOTOR CO.

80. Remove the 4 camshaft bearings.

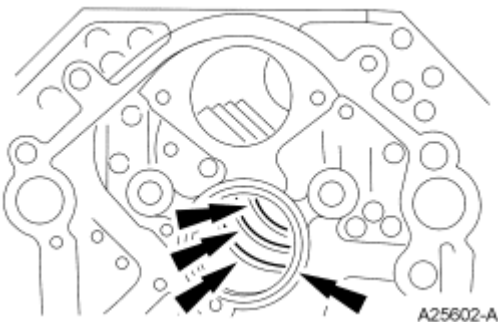


Fig. 280: Identifying Camshaft Bearings
Courtesy of FORD MOTOR CO.

81. Remove the 2 engine dynamic balance shaft bearings.

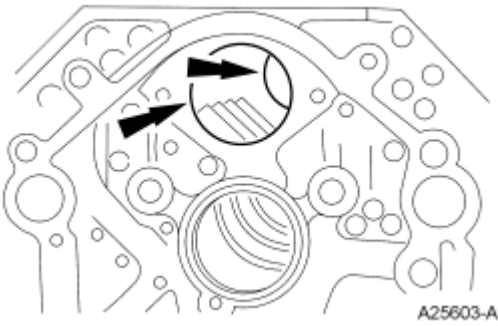


Fig. 281: Identifying Engine Dynamic Balance Shaft Bearings
Courtesy of FORD MOTOR CO.

82. If equipped, remove the engine block heater.

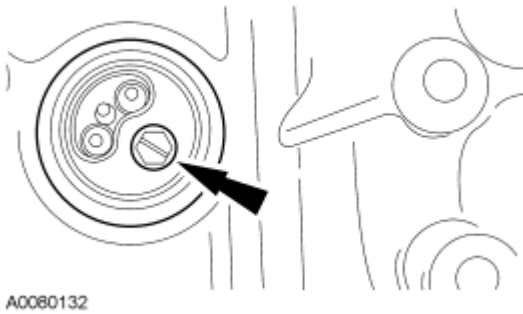


Fig. 282: Locating Engine Block Heater
Courtesy of FORD MOTOR CO.

NOTE: For cleaning purposes, the plugs should be removed.

83. If necessary, remove the following:

1. Cylinder block dowels
2. Oil gallery plugs
3. Coolant jacket plugs

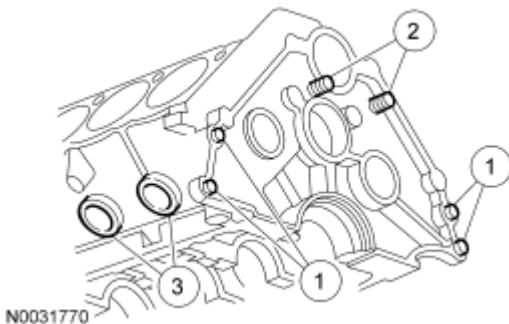


Fig. 283: Identifying Cylinder Block Dowels, Oil Gallery Plugs & Coolant Jacket Plugs
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

CYLINDER HEAD

Special Tools

Illustration	Tool Name	Tool Number
	Compressor, Valve Spring	303-163 (T81P-6513-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

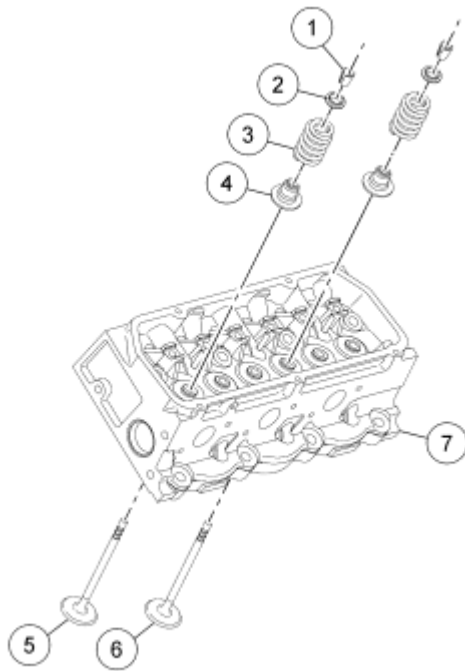


Fig. 284: Exploded View Of Cylinder Head Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6518	Valve spring retainer key (12 required)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

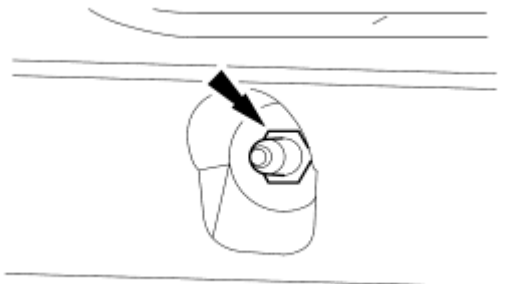
2	6514	Valve spring retainer (6 required)
3	6513	Valve spring (6 required)
4	6A517	Valve stem seal (6 required)
5	6505	Intake valve (3 required)
6	6507	Exhaust valve (3 required)
7	6049	Cylinder head

DISASSEMBLY AND ASSEMBLY

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

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

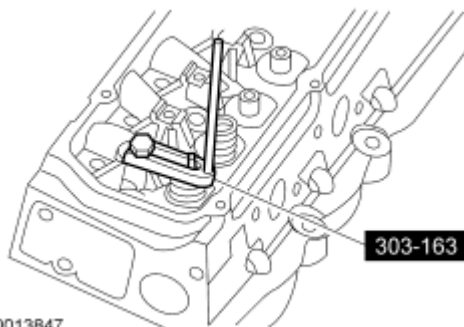
1. Remove the spark plugs.
 - To install, tighten to 15 Nm (11 lb-ft).



N0003368

Fig. 285: Locating Spark Plug
Courtesy of FORD MOTOR CO.

2. Using the special tool, compress the valve springs.



N0013847

Fig. 286: Compressing Valve Springs
Courtesy of FORD MOTOR CO.

3. Remove the following:
 1. Valve spring retainer key
 2. Valve spring retainers
 3. Valve springs
 4. Valve stem seal/seats
 5. Intake valves
 6. Exhaust valves

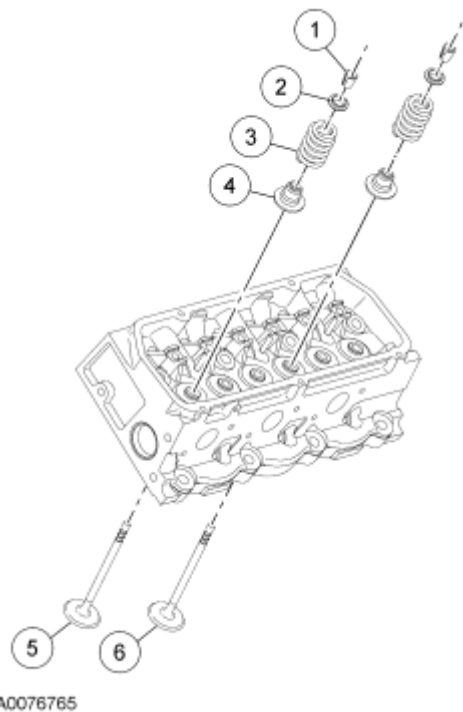


Fig. 287: Identifying Valve Spring Retainers, Valve Springs And Valves
 Courtesy of FORD MOTOR CO.

4. Inspect the components, if necessary. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

CAUTION: Lubricate the parts with clean engine oil before installing.

5. To assemble, reverse the disassembly procedure.

PISTON

Special Tools

Illustration	Tool Name	Tool Number

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey



ST1336-A

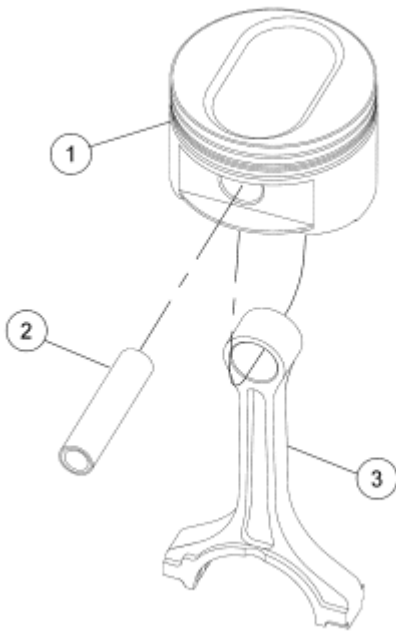
Pin Remover/Replacer

303-S024 (T68P-6135-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

NOTE: 4.2L shown, 3.9L similar.



A0076767

Fig. 288: Exploded View Of Piston Rod & Pin
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6108	Piston
2	6135	Piston pin
3	6200	Connecting rod

DISASSEMBLY

1. Using the special tool, press the piston pin out from the connecting rod and piston assembly.

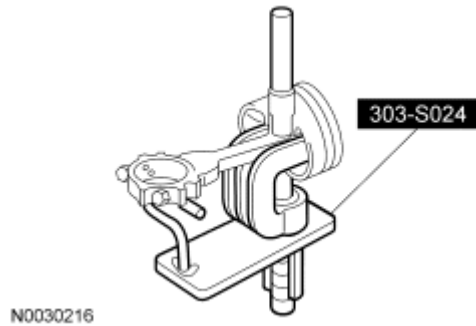


Fig. 289: Pressing Piston Pin From Connecting Rod Using Special Tool (303--S024)
Courtesy of FORD MOTOR CO.

2. Remove the connecting rod from the piston.

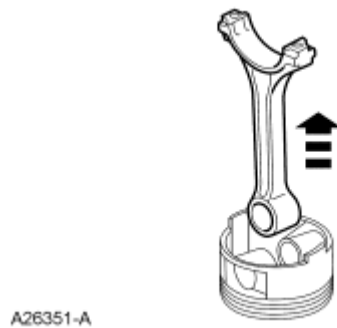


Fig. 290: Removing Connecting Rod From Piston
Courtesy of FORD MOTOR CO.

3. Clean and inspect the connecting rod and piston. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

ASSEMBLY

1. Lubricate the piston pin and piston pin bore with clean engine oil.

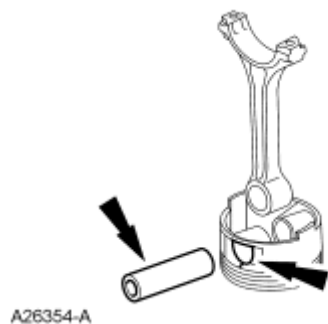


Fig. 291: Lubricating Piston Pin And Pin Bore

Courtesy of FORD MOTOR CO.

NOTE: The connecting rod can be installed in either direction.

- Position the piston pin in the bore aligned with the connecting rod bore.

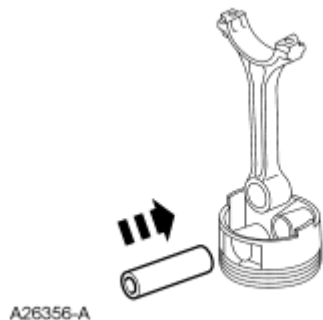


Fig. 292: Positioning Piston Pin In Bore
Courtesy of FORD MOTOR CO.

- Using the special tool, press the piston pin into the piston and rod assembly.

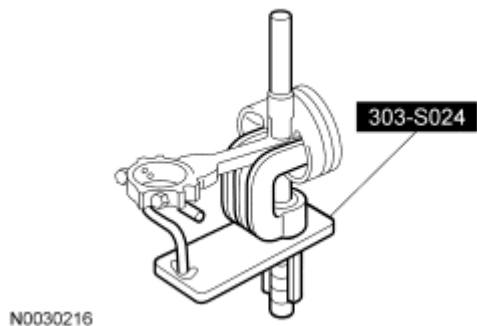


Fig. 293: Pressing Piston Pin Into Connecting Rod Using Special Tool (303--S024)
Courtesy of FORD MOTOR CO.

ASSEMBLY

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
ST1381-A	Service Set, Camshaft	303-017 (T65L-6250-A)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

 ST2296-A	Installer, Crankshaft Front Oil Seal	303-335 (T82L-6316-A)
 ST1379-A	Installer, Crankshaft Front Oil Seal	303-474 (T94P-6701-AH)
 ST1387-A	Installer, Crankshaft Vibration Damper	303-175 (T82L-6316-A)
T95P-6701-BH  ST1059-A	Replacer, Rear Crankshaft Seal	303-516 (T95P-6701-BH)
T96T-6701-B  ST1068-A	Spacer, Rear Crank Seal Replacer	303-561 (T96T-6701-B)
T95P-6701-DH  ST1060-A	Adapter, Crankshaft Rear Seal (Use only the adapter retaining bolts)	303-518 (T95P-6701-DH)
 ST1593-A	Adapter, Crankshaft Rear Seal (Use only the adapter and the center jack screw)	303-S560 (T96T-6701-A)
 ST2375-A	Engine Lifting Brackets	303-D095 (D94L-6001-A)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey



ST2362-A

Synchronizer Alignment Gauge

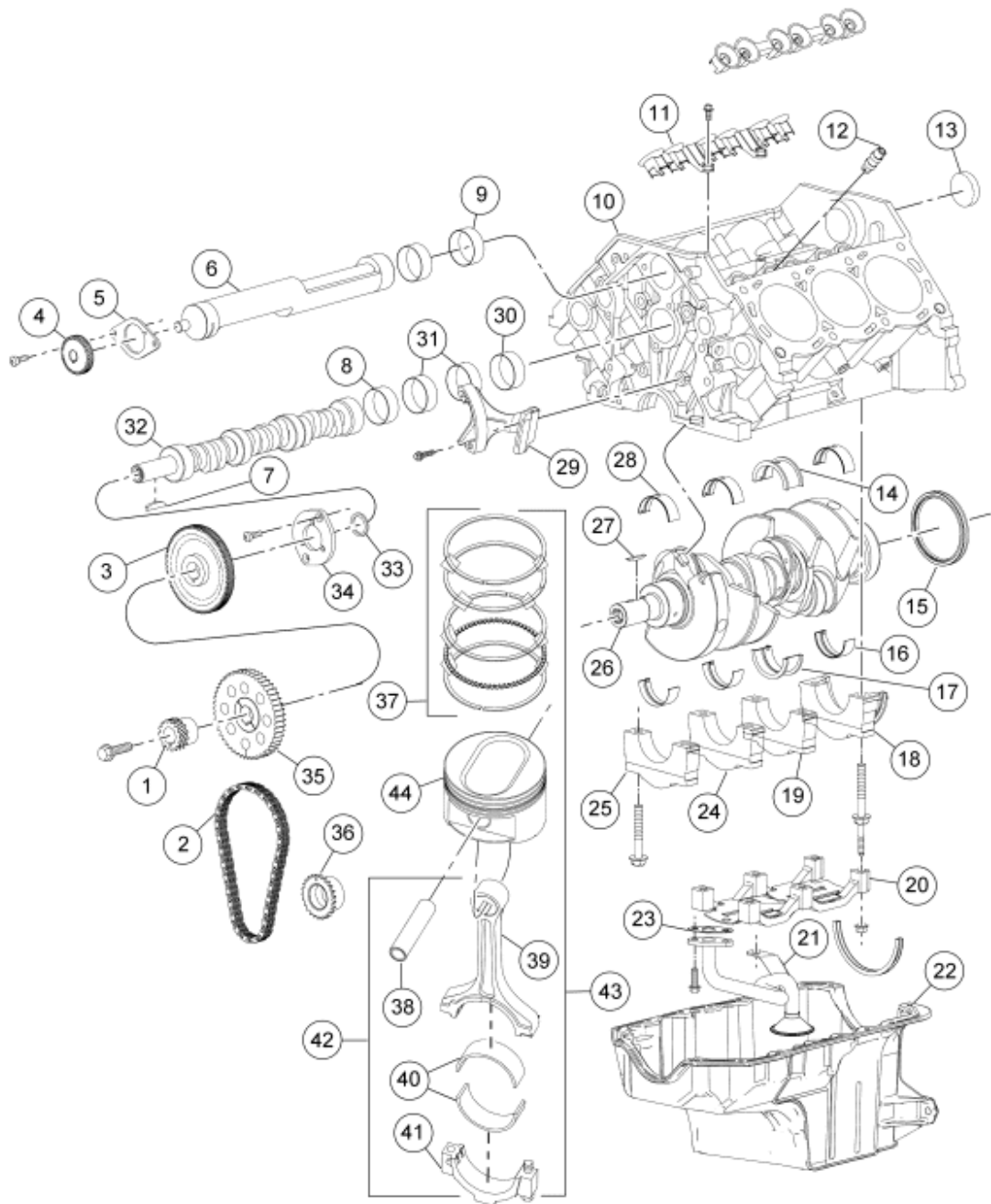
303-630

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
Silicone Gasket and Sealant TA 30	WSE-M4G323-A4
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Thread Sealant with PTFE TA-24	WSK-M2G350-A2

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey



N0005243

Fig. 294: Exploded View Of Engine - Lower Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6255	Camshaft synchronizer drive gear
2	6268	Timing chain
3	6A303	Engine balance shaft drive gear

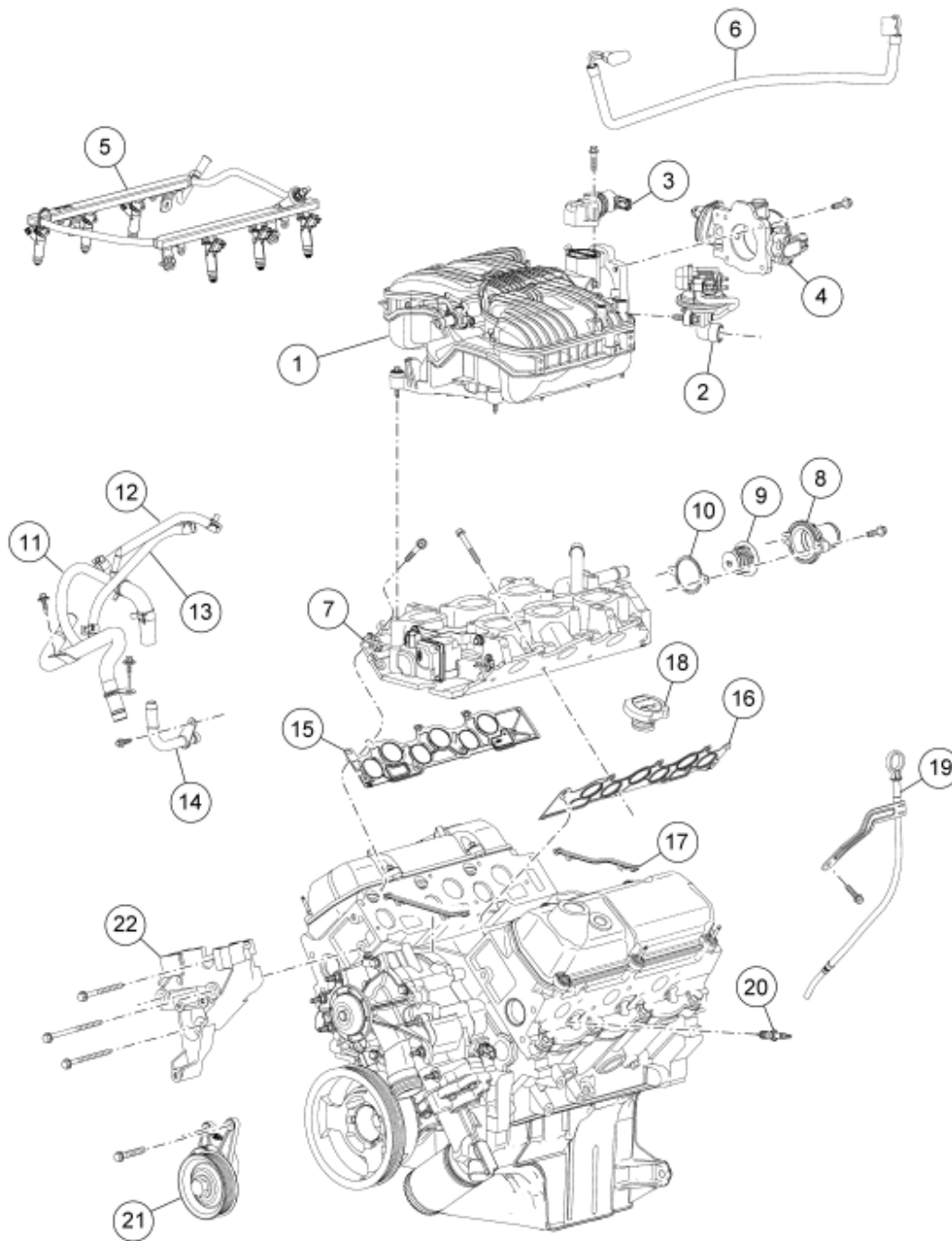
2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

4	6A304	Engine balance shaft driven gear
5	6C341	Balance shaft thrust plate
6	6A311	Engine dynamic balance shaft
7	W705934	Woodruff key
8	6261	Camshaft bearing
9	6A333	Balance shaft bearing (2 required)
10	6010	Cylinder block
11	6K564	Tappet guide plate and retainer
12	6500	Valve tappet
13	376958	Balance shaft cover plug
14	6337	Crankshaft thrust main bearing
15	6701	Crankshaft rear oil seal
16	6A338	Crankshaft main bearing (lower)
17	6A339	Crankshaft thrust main bearing
18	6325	Rear main bearing cap
19	6327	Main bearing cap
20	6687	Oil pan baffle
21	6622	Oil pump screen cover and tube
22	6675	Oil pan
23	6625	Oil pump inlet tube gasket
24	6334	Main bearing cap
25	6329	Main bearing cap
26	6303	Crankshaft
27	388907	Woodruff key
28	6333	Crankshaft main bearing (upper)
29	6284	Timing chain vibration damper
30	6263	Camshaft rear bearing
31	6262	Camshaft center bearing
32	6250	Camshaft
33	6265	Camshaft gear spacer
34	6269	Camshaft thrust plate
35	6256	Camshaft gear
36	6303	Crankshaft gear
37	6148	Piston rings
38	6135	Piston pin
39	6200	Connecting rod
40	6211	Connecting rod bearing
41	6210	Connecting rod cap
42	6200	Connecting rod assembly
43	6100	Piston and connecting rod assembly
44	6108	Piston

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey



N0031802

Fig. 295: Exploded View Of Engine - Upper Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9424	Upper intake manifold assembly
2	9Y456	Exhaust gas recirculation (EGR) system module

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

3	9F715	Idle speed control valve assembly
4	9E926	Throttle body assembly
5	9F797	Fuel supply manifold assembly
6	9E498	Engine vacuum tube harness assembly
7	9J447	Lower intake manifold assembly
8	8594	Thermostat housing
9	8575	Thermostat
10	8255	Coolant outlet gasket
11	18663	Coolant pump outlet tube
12	-	Coolant inlet hose (part of 18663)
13	-	Coolant outlet hose (part of 18663)
14	8548	Coolant bypass tube assembly
15	9439	Lower intake manifold gasket, RH
16	9439	Lower intake manifold gasket, LH
17	9A424	Lower intake manifold gasket seal (2 required)
18	6766	Oil fill cap
19	6754	Oil level indicator tube
20	12405	Spark plug (6 required)
21	6B209	Drive belt tensioner
22	3C631	Power steering pump bracket

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

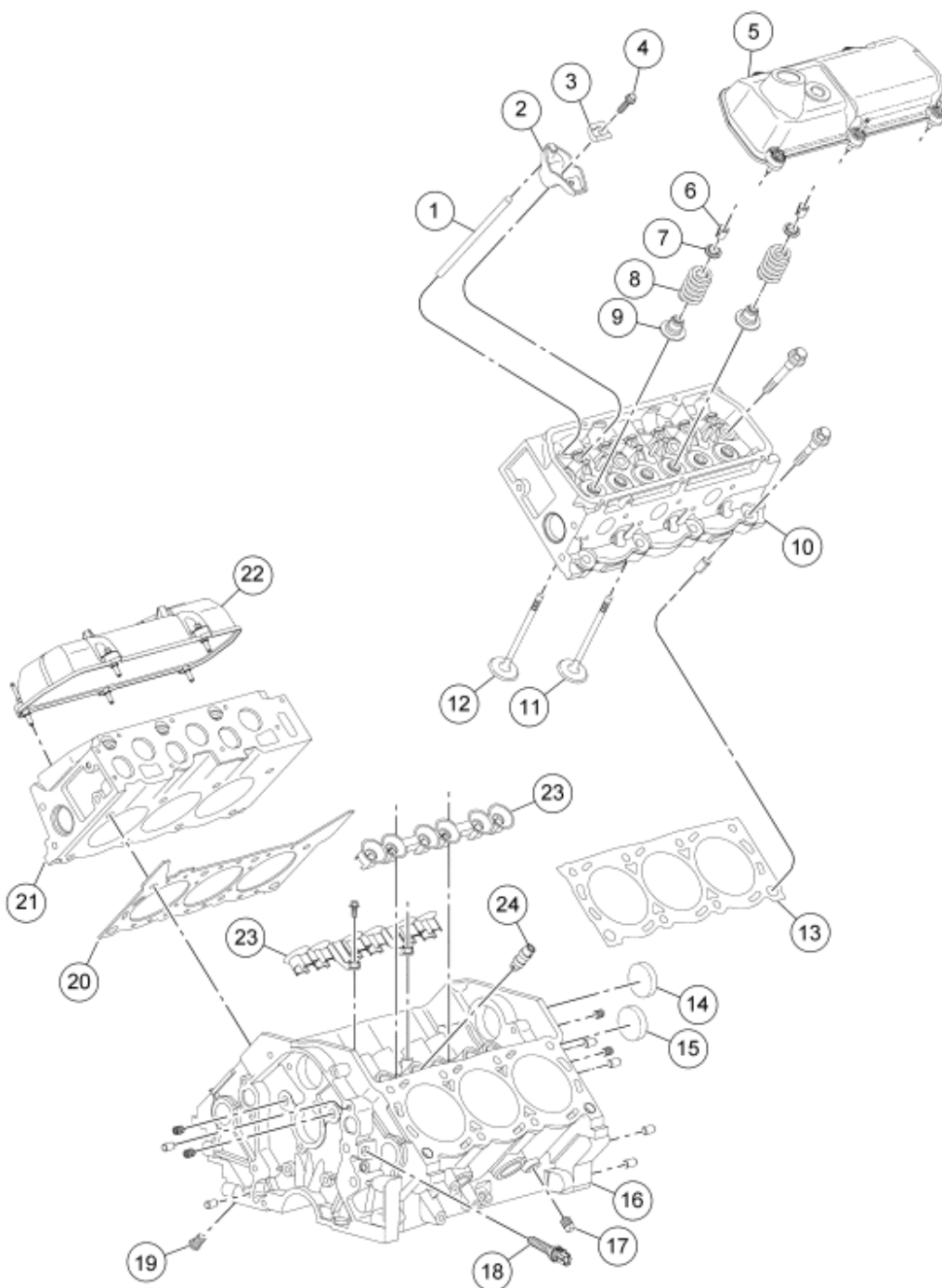


Item	Part Number	Description
1	6B288	Camshaft position (CMP) sensor
2	8507	Coolant pump housing gasket
3	12A362	Camshaft synchronizer
4	6A618	Oil pump intermediate shaft
5	6020	Engine front cover gasket
6	6010	Cylinder block
7	6019	Engine front cover
8	-	Oil cooler seal (part of 6A642)
9	6A642	Oil cooler and tube assembly
10	-	Oil cooler mounting bolt (part of 6A642)

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

11	6714	Oil bypass filter
12	6C315	Crankshaft position (CKP) sensor
13	8501	Coolant pump
14	6B321	Crankshaft damper and pulley assembly
15	6K375	Flywheel



N0036712

Fig. 297: Exploded View Of Cylinder Heads

2007 Mercury Monterey

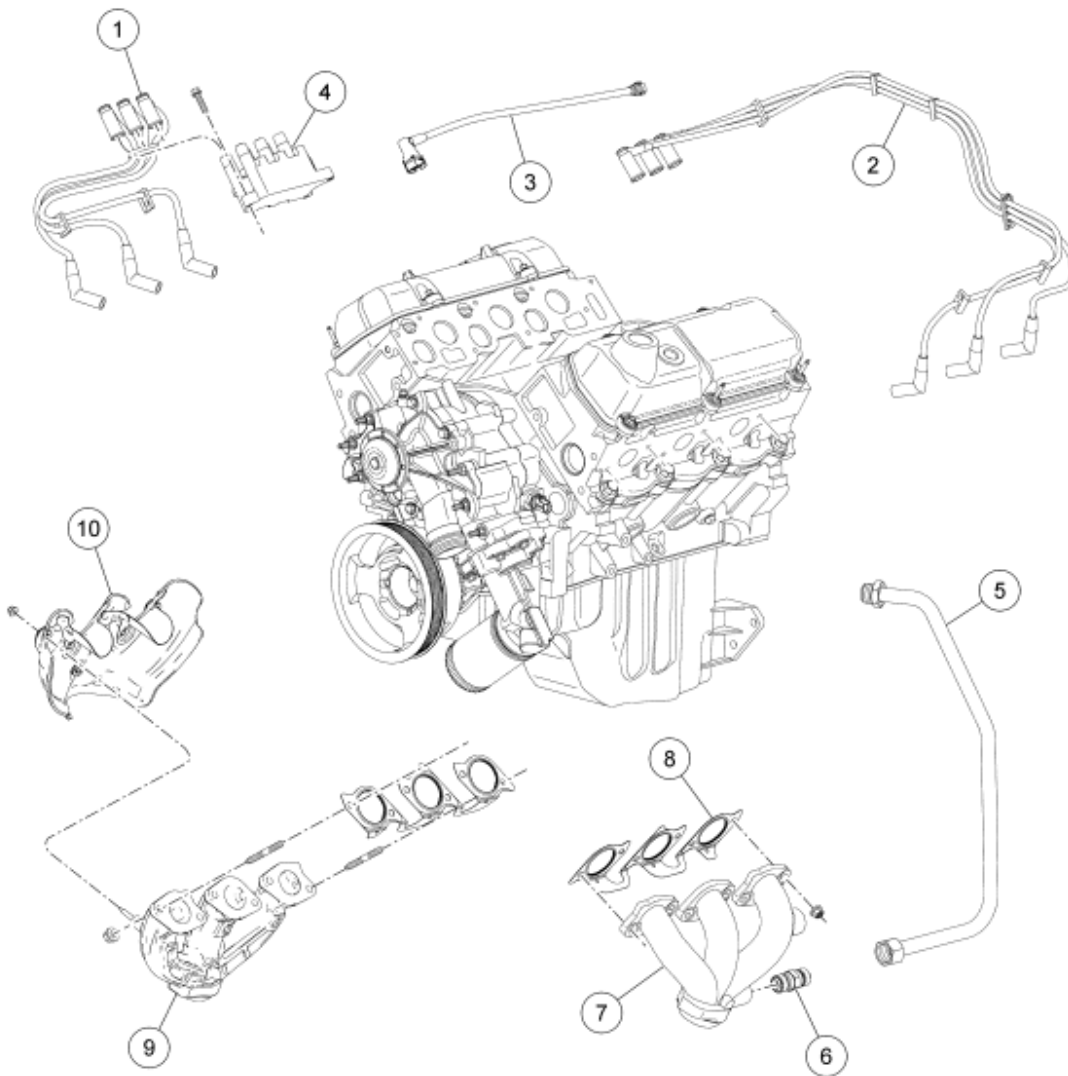
2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6565	Push rod (12 required)
2	6564	Rocker arm (12 required)
3	6A528	Rocker arm pivot (12 required)
4	N808305	Rocker arm bolt
5	6A505	Valve cover, LH
6	6518	Valve spring key (24 required)
7	6514	Valve spring retainer (12 required)
8	6513	Valve spring (12 required)
9	6A517	Valve seal/seat (12 required)
10	6049	Cylinder head, LH
11	6507	Exhaust valve
12	6505	Intake valve
13	6083	Cylinder head gasket, LH
14	376958	Camshaft rear bearing cover
15	6A335	Balance shaft cover plug
16	6010	Cylinder block
17	87744	Engine block plug
18	9278	Oil pressure sender switch
19	6C057	Engine block plug
20	6051	Cylinder head gasket, RH
21	6050	Cylinder head, RH
22	6582	Valve cover, RH
23	6K564	Tappet guide plate and retainer
24	6500	Valve tappet

2007 Mercury Monterey

2007 ENGINE Engine - 3.9L and 4.2L - Freestar & Monterey



N0038991

Fig. 298: Exploded View Of Engine - External Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	12280	Spark plug wire set, RH
2	12281	Spark plug wire set, LH
3	6C342	Crankcase vent hose
4	12029	Ignition coil
5	9D477	EGR system module-to-exhaust manifold tube
6	N806991	EGR system module-to-exhaust manifold tube connector
7	9431	Exhaust manifold, LH
8	9448	Exhaust manifold gasket (2 required)

9	9430	Exhaust manifold, RH
10	9N454	Heat shield

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: The moving components must be lubricated with clean engine oil before assembly.

CAUTION: The components with oil holes must be correctly aligned with the oil feed holes.

1. If necessary, install the following:
 1. Cylinder block dowels
 2. Oil gallery plugs
 3. Coolant jacket plugs

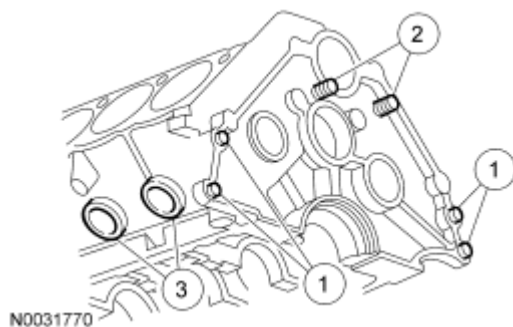


Fig. 299: Identifying Cylinder Block Dowels, Oil Gallery Plugs And Coolant Jacket Plugs
Courtesy of FORD MOTOR CO.

2. Using the Camshaft Service Set, install the 2 engine dynamic balance shaft bearings.

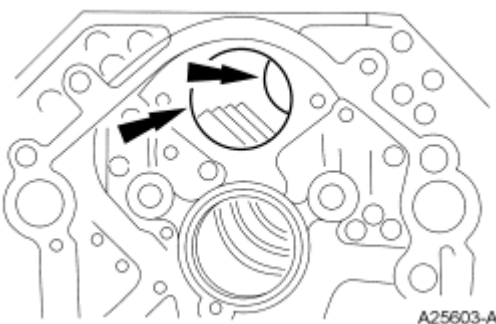


Fig. 300: Identifying Engine Dynamic Balance Shaft Bearings

Courtesy of FORD MOTOR CO.

3. Using the Camshaft Service Set, install the 4 camshaft bearings.

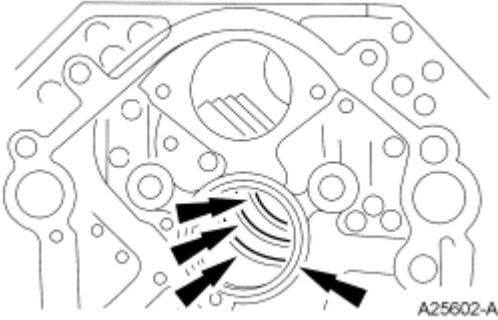


Fig. 301: Identifying Camshaft Bearings
Courtesy of FORD MOTOR CO.

4. Install the following:
 1. Engine dynamic balance shaft bearing cover
 2. Camshaft bearing cover

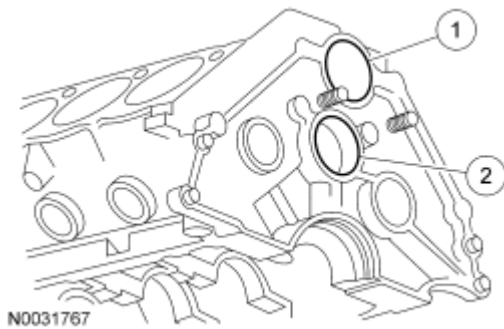


Fig. 302: Identifying Engine Dynamic Balance Shaft Bearing Cover & Camshaft Bearing Cover
Courtesy of FORD MOTOR CO.

5. If equipped, install the block heater.
 - Tighten to 2 Nm (18 lb-in).

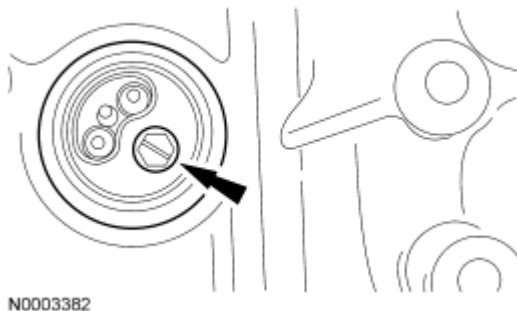


Fig. 303: Locating Block Heater
Courtesy of FORD MOTOR CO.

CAUTION: Make sure the components are installed in the correct locations.

NOTE: Lubricate the crankshaft main bearings with clean engine oil prior to installation.

6. Install the 4 crankshaft upper main bearings and the crankshaft upper thrust main bearing.

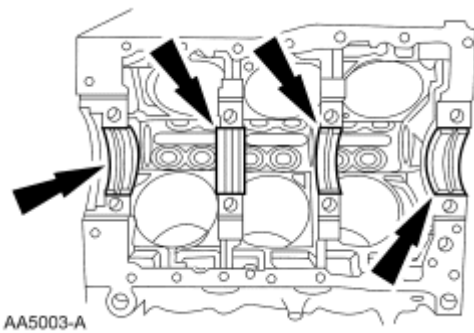


Fig. 304: Identifying Crankshaft Upper Main Bearings & Upper Thrust Main Bearing
Courtesy of FORD MOTOR CO.

CAUTION: The crankshaft journals must be protected from damage when installing the crankshaft.

7. Position the crankshaft.

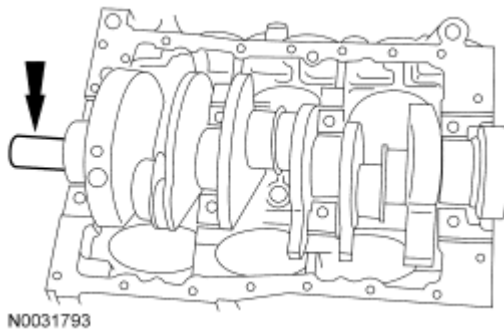
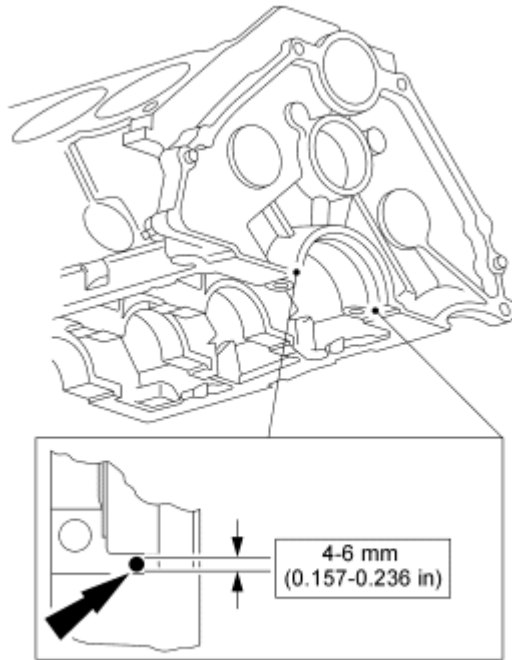


Fig. 305: Locating Crankshaft
Courtesy of FORD MOTOR CO.

CAUTION: The main bearings are precision selective fit. Inspect the bearing clearance. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

NOTE: If the rear main bearing cap is not installed within 4 minutes, remove the sealant and reapply.

8. Clean the rear main bearing cap sealing area with metal surface cleaner. Apply silicone gasket and sealant to the rear main bearing cap-to-cylinder block parting line.

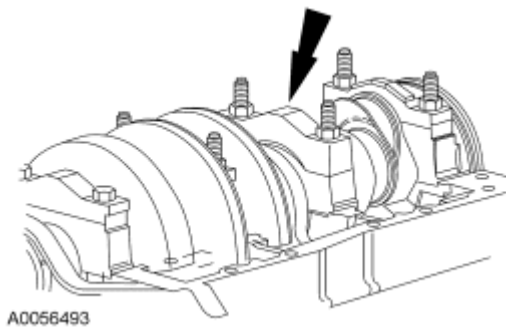


AA6042-A

Fig. 306: Applying Silicone Gasket And Sealant To Rear Main Bearing Cap-To-Cylinder Block Parting Line

Courtesy of FORD MOTOR CO.

9. Install the main bearing caps. Tighten the bolts in 2 stages.
 - Stage 1: Tighten to 55 N.m (41 lb-ft).
 - Stage 2: Rotate an additional 90 degrees.

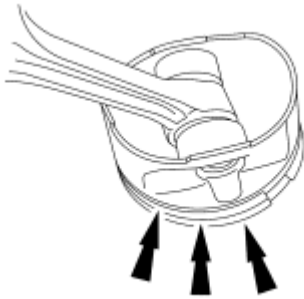


A0056493

Fig. 307: Locating Main Bearing Caps

Courtesy of FORD MOTOR CO.

10. Using a piston ring compressor, compress the piston rings.



A25530-A

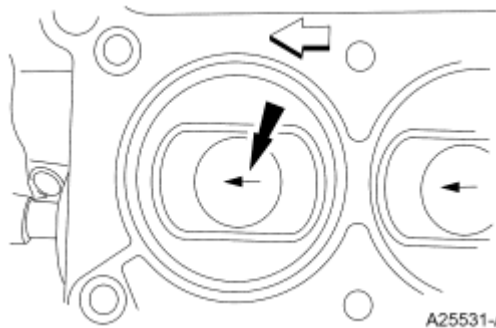
Fig. 308: Compressing Piston Rings
Courtesy of FORD MOTOR CO.

CAUTION: Inspect the piston clearance. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

CAUTION: Do not damage the cylinder wall with the sharp edges of the connecting rod.

NOTE: 4.2L shown, 3.9L similar.

11. Install the piston with the arrow on the piston face pointing toward the front of the engine.



A25531-A

Fig. 309: Installing Piston
Courtesy of FORD MOTOR CO.

CAUTION: Inspect the connecting rod bearing clearance. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

CAUTION: The connecting rod cap will fit only one way.

12. Position the lower connecting rod bearing and the connecting rod cap on the connecting rod and the crankshaft journal.

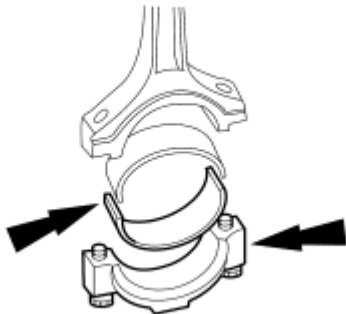


Fig. 310: Positioning Lower Connecting Rod Bearing And Connecting Rod Cap
Courtesy of FORD MOTOR CO.

13. Tighten the 2 connecting rod cap bolts in 3 stages.
 - Stage 1: Tighten to 25 N.m (18 lb-ft).
 - Stage 2: Tighten to 45 N.m (33 lb-ft).
 - Stage 3: Tighten an additional 105 degrees.

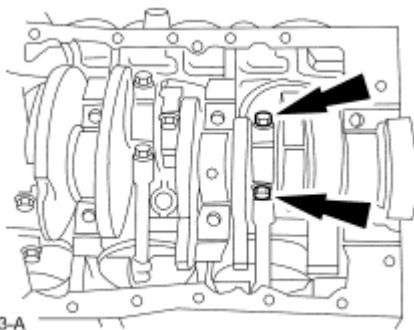


Fig. 311: Tightening Connecting Rod Cap Bolts
Courtesy of FORD MOTOR CO.

14. Install the remaining pistons and the connecting rods.
15. Install the oil pan baffle and the 5 retaining nuts.
 - Tighten to 32 Nm (24 lb-ft).

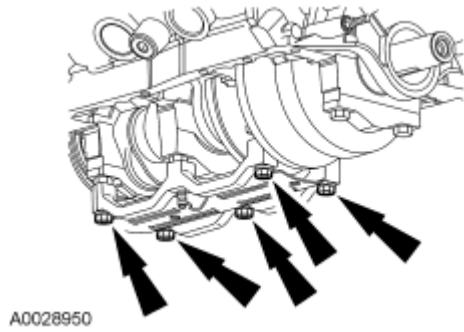


Fig. 312: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

16. Using a new gasket, install the oil pump screen cover and tube.
 1. Tighten to 25 Nm (18 lb-ft).
 2. Tighten to 32 Nm (24 lb-ft).

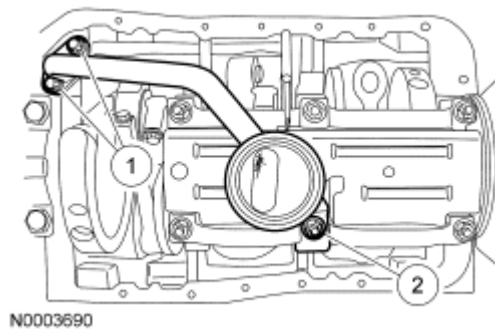


Fig. 313: Installing Oil Pump Screen Cover And Tube
Courtesy of FORD MOTOR CO.

CAUTION: Do not damage the camshaft lobes when installing the camshaft.

17. Install the camshaft, camshaft spacer and camshaft key.

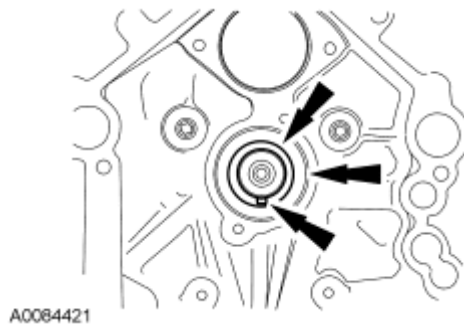


Fig. 314: Locating Camshaft, Camshaft Spacer And Camshaft Key
Courtesy of FORD MOTOR CO.

18. Install the camshaft thrust plate and 2 bolts.
 - Tighten to 11 Nm (8 lb-ft).

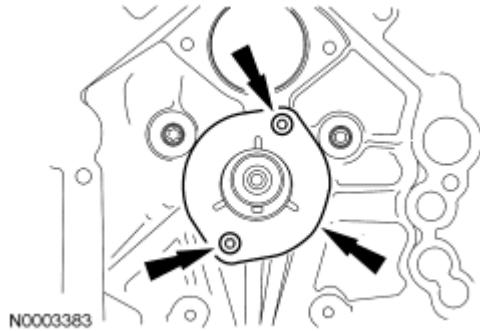


Fig. 315: Locating Camshaft Thrust Plate Bolts
Courtesy of FORD MOTOR CO.

19. Install the engine dynamic balance shaft assembly and 2 bolts.
 - Tighten to 11 Nm (8 lb-ft).

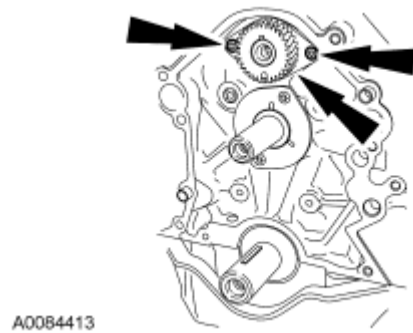


Fig. 316: Balance Shaft Driven Gear, Thrust Plate & Bolts
Courtesy of FORD MOTOR CO.

NOTE: If correctly aligned, the engine dynamic balance shaft keyway will be at 12 o'clock and the camshaft keyway will be at 6 o'clock on the camshaft.

20. Install the engine balance shaft drive gear so that the timing mark lines up with the timing mark on the engine balance shaft driven gear.

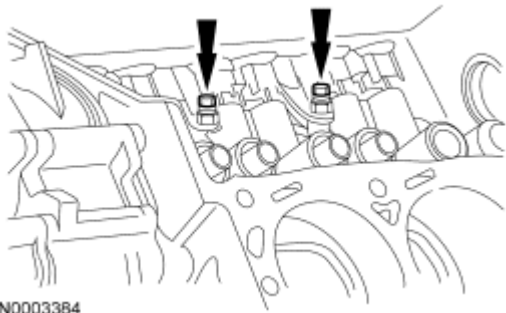


A0084424

Fig. 317: Installing Engine Balance Shaft Drive Gear
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the valve tappets with clean engine oil prior to installing. If reusing the valve tappets, make sure to install them in their original locations.

21. Install the 12 valve tappets.
- Install the valve tappets.
 - Install the tappet guide plates and retainers.
 - Install the bolts and tighten to 12 Nm (9 lb-ft).



N0003384

Fig. 318: Locating Valve Tappet Guide Plate & Retainer Bolt
Courtesy of FORD MOTOR CO.

22. Install the timing chain tensioner and bolts.
- Position the timing chain tensioner.
 - Install the bolts and tighten to 11 Nm (8 lb-ft).

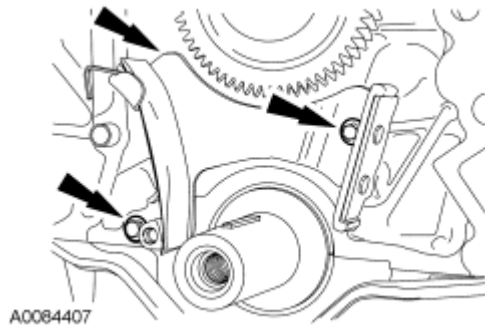


Fig. 319: Locating Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

23. If necessary, compress the tensioner pad and install a retaining pin.

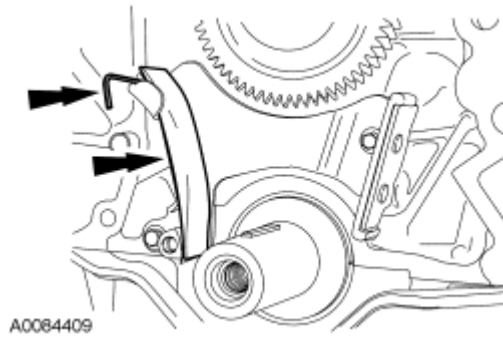


Fig. 320: Compressing Tensioner Pad And Installing Retaining Pin
Courtesy of FORD MOTOR CO.

24. Rotate the crankshaft so the No. 1 piston is at top dead center (TDC) and the keyway is at the 12 o'clock position.

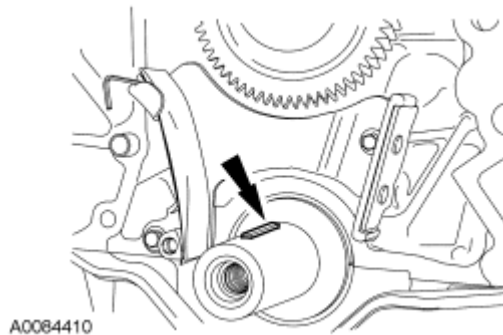
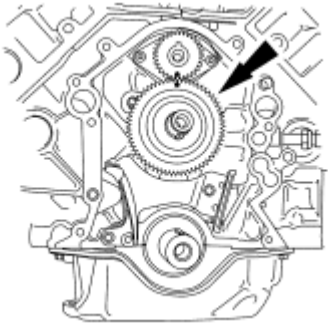


Fig. 321: Locating Crankshaft Keyway At 12 O'Clock Position
Courtesy of FORD MOTOR CO.

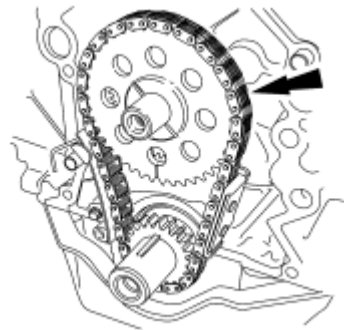
25. Turn the camshaft sprocket so that the keyway is on the bottom of the camshaft.



A0084414

Fig. 322: Locating Camshaft Sprocket Timing Mark
Courtesy of FORD MOTOR CO.

26. Install the timing chain, the camshaft sprocket and the crankshaft sprocket as an assembly.



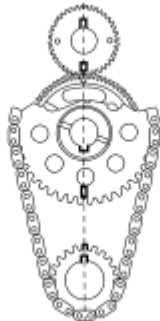
A0084406

Fig. 323: Identifying Timing Chain & Sprockets
Courtesy of FORD MOTOR CO.

CAUTION: All timing marks must be aligned with the No. 1 cylinder set on TDC of the compression stroke or the synchronizer assembly will not be installed correctly.

NOTE: The crankshaft must not be turned until the camshaft synchronizer is installed.

27. Make sure the timing marks and the keyways are aligned.



AA5957-A

Fig. 324: Aligning Crankshaft Timing Marks & Keyways
Courtesy of FORD MOTOR CO.

28. Remove the retaining pin.

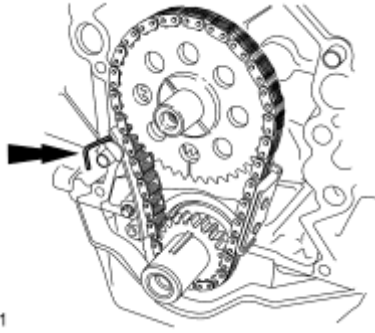


Fig. 325: Locating Retaining Pin
Courtesy of FORD MOTOR CO.

29. Install the synchronizer drive gear and the bolt.
- Tighten to 45 Nm (33 lb-ft).

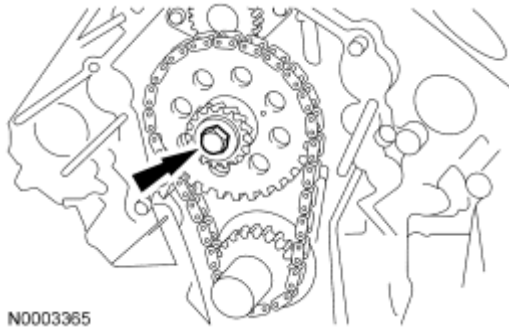


Fig. 326: Locating Camshaft Synchronizer Drive Gear Bolt
Courtesy of FORD MOTOR CO.

NOTE: Use Thread Sealant with PTFE on studs No. 4 and 6 and bolt No. 12.

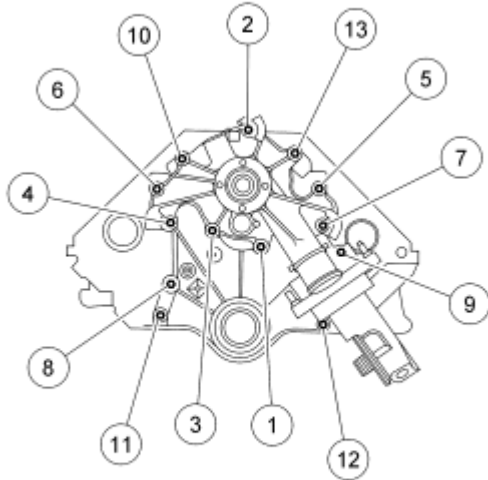
30. Install the engine front cover studs in their original locations.
- Tighten the 4 engine front cover studs to 7 Nm (62 lb-in).

CAUTION: The coolant pump and gasket must be installed at this time to correctly tighten all of the engine front cover fasteners in sequence.

NOTE: Clean and inspect the mating surfaces.

31. Using a new gasket, install the engine front cover.

- Using a new gasket, install the coolant pump.
- Tighten the fasteners in the sequence shown.
 - Tighten capscrew No. 12 to 10 Nm (89 lb-in).
 - Tighten all other fasteners to 28 Nm (21 lb-ft).

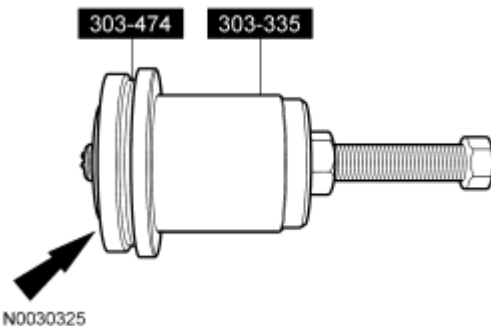


N0003366

Fig. 327: Identifying Front Cover Bolt Tightening Sequence
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the new crankshaft front seal lips with clean engine oil prior to installation.

32. Assemble the special tools, then place the crankshaft front seal onto the special tools.



N0030325

Fig. 328: Identifying Special Tools (303--335) And (303--474)
Courtesy of FORD MOTOR CO.

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

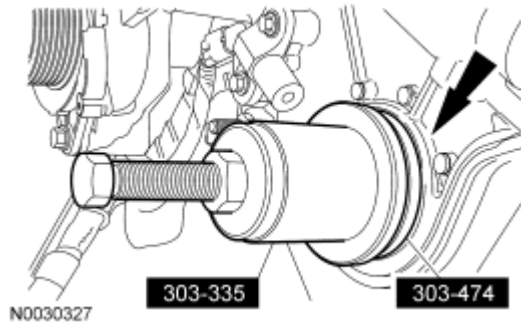


Fig. 329: Installing Crankshaft Front Seal Using Special Tools (303--335) And (303--474)
Courtesy of FORD MOTOR CO.

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

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

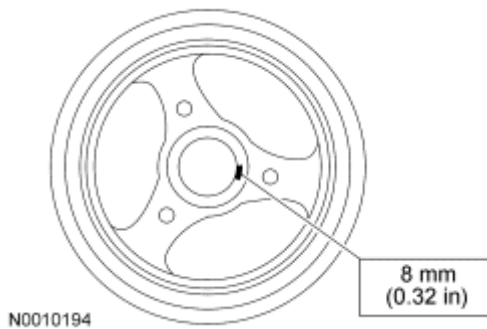


Fig. 330: Applying Silicone Gasket And Sealant To Woodruff Key Slot On Crankshaft Pulley
Courtesy of FORD MOTOR CO.

35. Lubricate the crankshaft pulley sealing surface with clean engine oil.

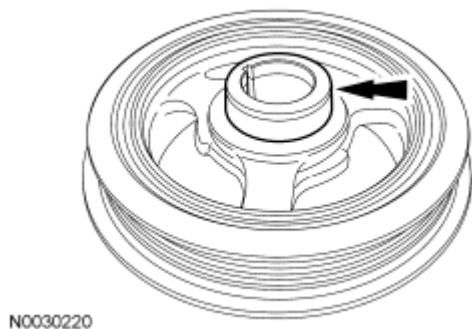


Fig. 331: Lubricating Crankshaft Pulley Sealing Area With Clean Engine Oil
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the crankshaft front seal inner lip with clean engine oil prior to installation.

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

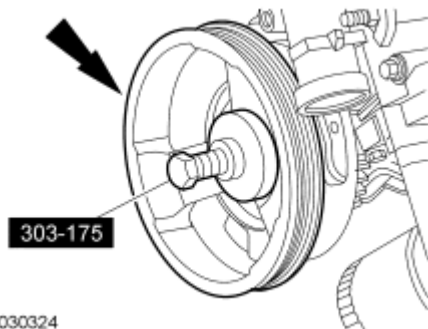


Fig. 332: Installing Crankshaft Pulley Using Special Tool (303--175)
Courtesy of FORD MOTOR CO.

37. Install the crankshaft pulley washer and the bolt.
- Tighten to 160 Nm (118 lb-ft).

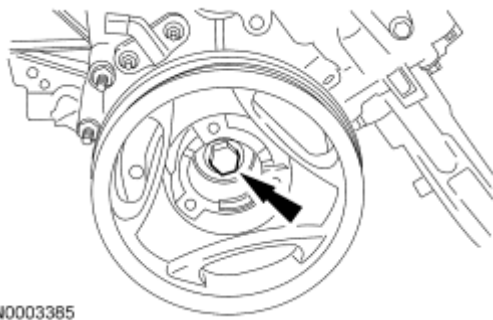
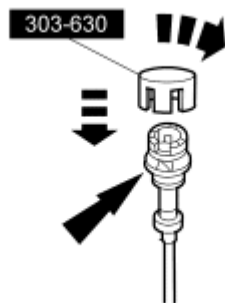


Fig. 333: Locating Crankshaft Pulley Washer Bolt
Courtesy of FORD MOTOR CO.

CAUTION: After installation, do not loosen the synchronizer bolt and rotate the synchronizer assembly. The synchronizer assembly is not adjustable. Do not loosen the synchronizer bolt after the alignment tool has been removed in order to align the CMP electrical connector for any reason. If the electrical connector is not in the correct position, the synchronizer assembly must be removed, the alignment tool and the assembly reinstalled if the engine has not been rotated from top dead center TDC of the compression stroke on the No. 1 cylinder.

CAUTION: A synchronizer alignment gauge must be used during the installation of the synchronizer assembly. Failure to follow this procedure will result in the fuel system being out of time with the engine, possibly causing engine damage.

38. Install the special tool on the camshaft synchronizer by rotating the tool until it engages the notch in the camshaft synchronizer housing.



N0015116

Fig. 334: Installing Special Tool On Camshaft Synchronizer
Courtesy of FORD MOTOR CO.

NOTE: Always coat the synchronizer drive gear with clean engine oil prior to installation.

NOTE: During installation, the arrow on the special tool will rotate clockwise as the gears engage.

39. Install the camshaft synchronizer housing assembly so the arrow on the synchronizer alignment tool is 54 degrees from the centerline of the engine.

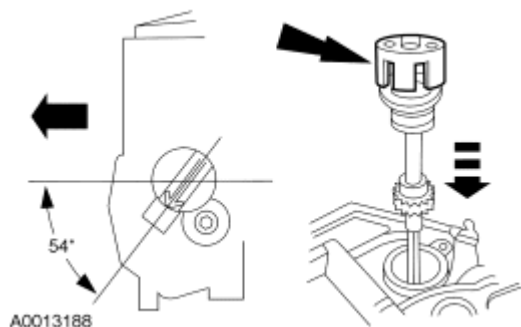


Fig. 335: Installing Camshaft Synchronizer Housing Assembly So Arrow On Synchronizer Alignment Tool Is 54 Degrees From Centerline Of The Engine
Courtesy of FORD MOTOR CO.

40. Install the camshaft synchronizer retaining bolt.
 - Tighten to 25 Nm (18 lb-ft).

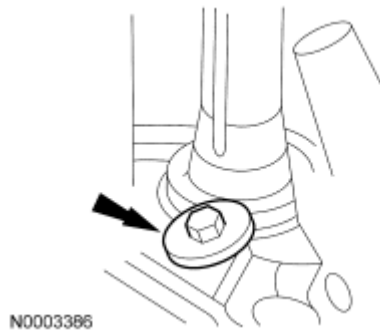


Fig. 336: Locating Camshaft Synchronizer Retaining Bolt
Courtesy of FORD MOTOR CO.

41. Install the CMP sensor and the 2 bolts.
 - Tighten to 3 Nm (27 lb-in).

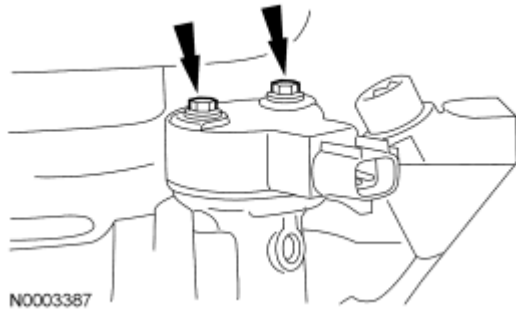
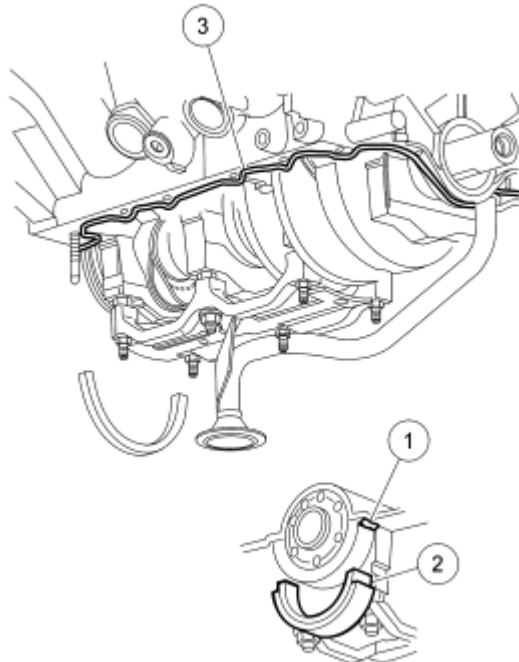


Fig. 337: Locating CMP Sensor Bolts
Courtesy of FORD MOTOR CO.

NOTE: If the oil pan is not installed within 4 minutes, remove the sealant and reapply.

42. Clean and apply the sealant to the oil pan sealing areas shown and install the oil pan rear seal.
 1. Apply silicone gasket and sealant to the rear main bearing cap.
 2. Install the oil pan rear seal.
 3. Clean the oil pan mating surfaces with metal surface cleaner and apply silicone gasket and sealant to the oil pan mating surfaces.



A0084427

Fig. 338: Applying Silicone Gasket And Sealant To Oil Pan Sealing Areas Shown And Installing Oil Pan Rear Seal

Courtesy of FORD MOTOR CO.

43. Install the oil pan and 17 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

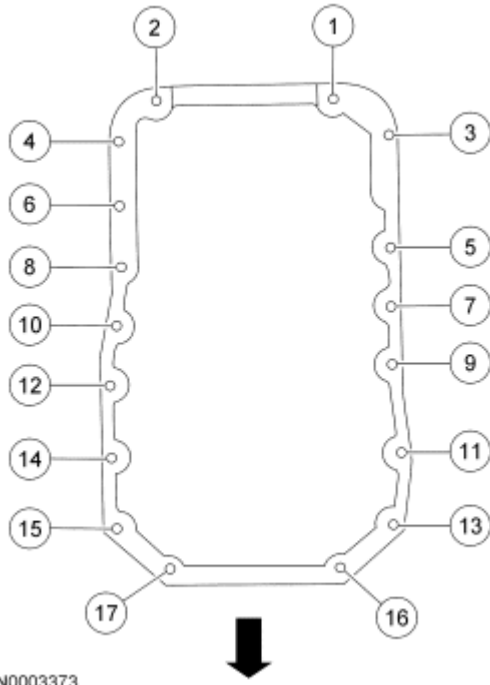


Fig. 339: Identifying Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

44. Install the oil pressure sender.
 - Tighten to 27 Nm (20 lb-ft).

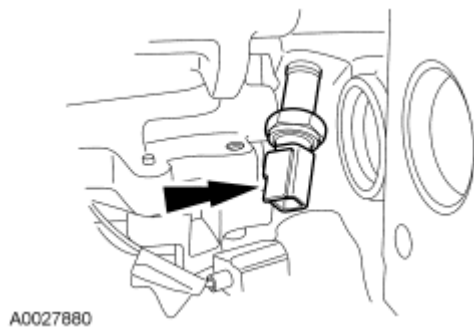


Fig. 340: Locating Oil Pressure Sensor
Courtesy of FORD MOTOR CO.

CAUTION: A new oil cooler must be installed or severe damage to the engine can occur.

45. If equipped, install a new oil cooler and tube assembly and bolt.
 - Tighten to 35 Nm (26 lb-ft).



Fig. 341: Locating Oil Cooler And Tube Assembly And Bolt
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the new engine oil filter seal with clean engine oil prior to installation.

46. Install a new engine oil filter.
- Tighten one half turn after the gasket makes contact with the oil filter housing.

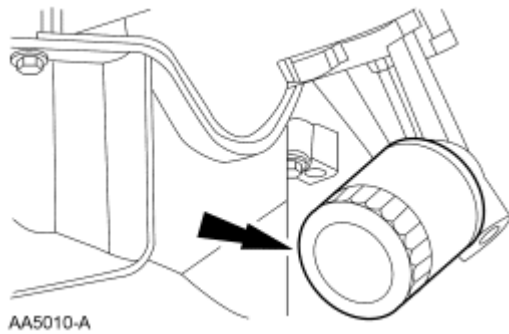


Fig. 342: Engine Oil Filter
Courtesy of FORD MOTOR CO.

NOTE: Install the new cylinder head gaskets with the small hole to the front of the engine.

47. Using new gaskets, install the RH and the LH cylinder heads.

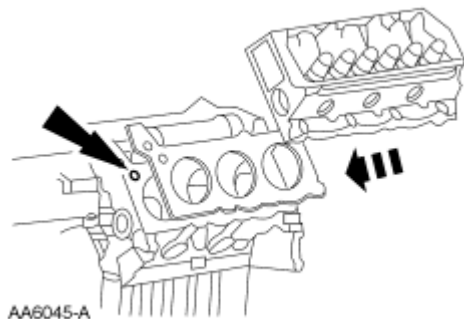


Fig. 343: Cylinder Head & Gasket
Courtesy of FORD MOTOR CO.

CAUTION: Always use new bolts.

NOTE: Lubricate the bolts with clean engine oil prior to installation.

48. Install the new bolts. Make sure the bolts are installed in the correct locations.
 1. Install the new long bolts.
 2. Install the new short bolts.

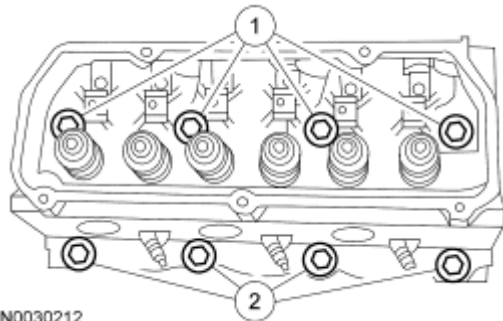


Fig. 344: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

49. Tighten the bolts in the sequence shown in 3 stages.
 - Stage 1: Tighten to 20 Nm (15 lb-ft).
 - Stage 2: Tighten to 40 Nm (30 lb-ft).
 - Stage 3: Tighten to 50 Nm (37 lb-ft).

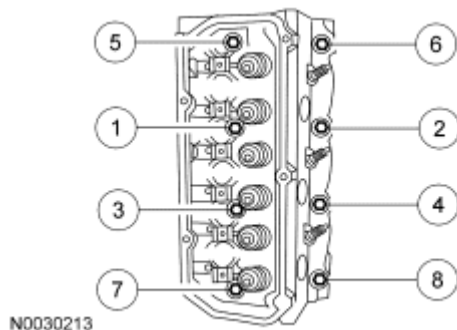


Fig. 345: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

CAUTION: Each bolt must be loosened and the final tightening carried out prior to working on the next bolt in the sequence. Do not loosen all of the

bolts at one time.

50. Carry out the following final tightening process on each bolt in the sequence shown.

- Long bolts:
 - Loosen and back out 3 turns.
 - Tighten to 45 Nm (33 lb-ft).
 - Tighten an additional 180 degrees.
 - Continue on to the next bolt in sequence.
- Short bolts:
 - Loosen and back out 3 turns.
 - Tighten to 25 Nm (18 lb-ft).
 - Tighten an additional 180 degrees.
 - Continue on to the next bolt in sequence.

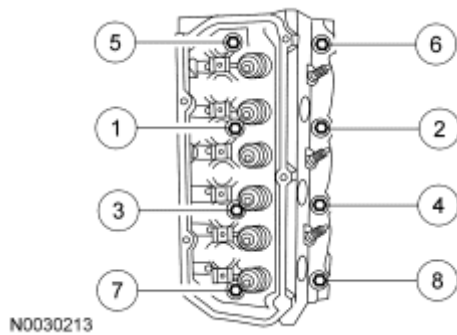


Fig. 346: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

51. Install the 3 lower exhaust manifold studs on both cylinder heads.

- Tighten to 8 Nm (71 lb-in).

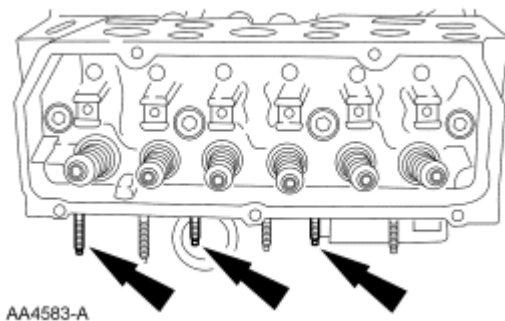
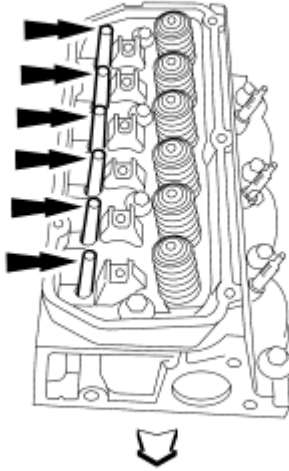


Fig. 347: Lower Exhaust Manifold Studs
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the push rods with clean engine oil prior to installation. If

reusing the push rods, make sure to install them in their original locations.

52. Install the 12 push rods.



A25443-A

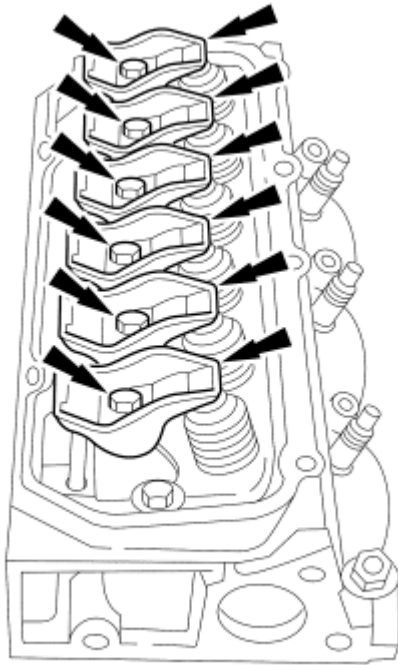
Fig. 348: Pushrods

Courtesy of FORD MOTOR CO.

NOTE: If reusing the rocker arms, make sure to install them in their original locations.

53. Install the 12 rocker arms.

- Position the rocker arms and pivots.
- Hand-start the 12 bolts.
- Tighten the 12 bolts in 2 stages.
 - Stage 1: Tighten to 5 Nm (44 lb-in).
 - Stage 2: Tighten to 32 Nm (24 lb-ft).



AA4735-A

Fig. 349: Bolts, Rocker Arm Pivots & Rocker Arms
Courtesy of FORD MOTOR CO.

NOTE: Install new gaskets in the valve covers.

NOTE: RH shown, LH similar.

54. Install the valve covers.
1. Position the valve covers.
 2. Install the bolts and tighten to 10 Nm (89 lb-in).
 3. Install the stud bolts and tighten to 10 Nm (89 lb-in).

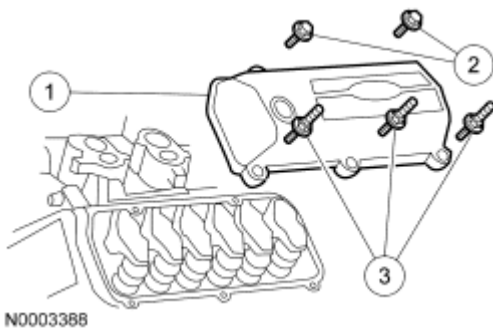
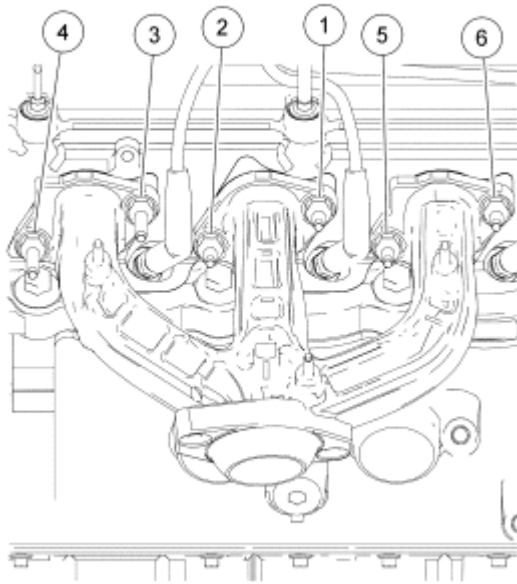


Fig. 350: Identifying Valve Cover
Courtesy of FORD MOTOR CO.

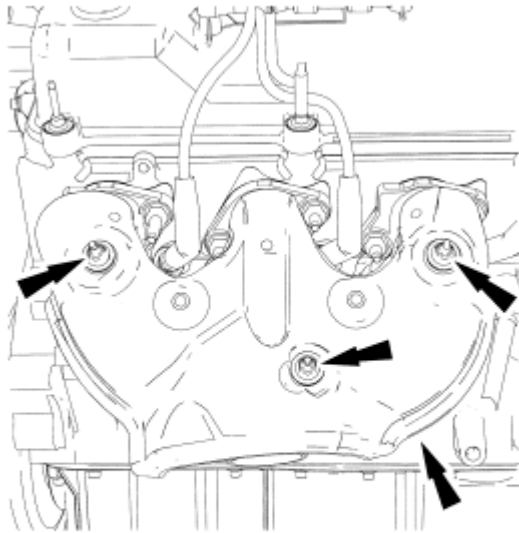
55. Using a new gasket, install the RH exhaust manifold. Loosely install the 6 RH nuts.
56. Tighten the 6 nuts in the sequence shown.
 - Tighten to 25 Nm (18 lb-ft).



N0003389

Fig. 351: Identifying Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

57. Install the heat shield and the 3 nuts.
 - Tighten to 10 Nm (89 lb-in).



A0085039

Fig. 352: Locating Heat Shield Nuts
Courtesy of FORD MOTOR CO.

58. Using a new gasket, install the LH exhaust manifold. Loosely install the 6 nuts.



AA4714-A

Fig. 353: Locating LH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

59. Tighten the nuts in the sequence shown.
- Tighten to 25 Nm (18 lb-ft).

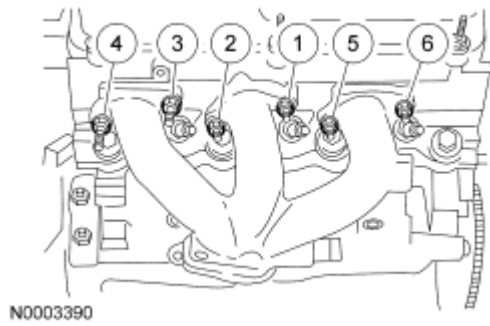


Fig. 354: Identifying Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

60. Refer to the illustration for intake manifold sealing components.

Item	Part Number	Description
1	9439	RH intake manifold gasket
2	9439	LH intake manifold gasket
3	9A424	Intake manifold rear end seal (part of 9439)
4	9A425	Intake manifold front end seal (part of 9439)

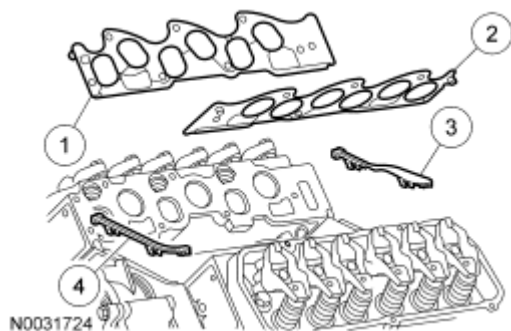
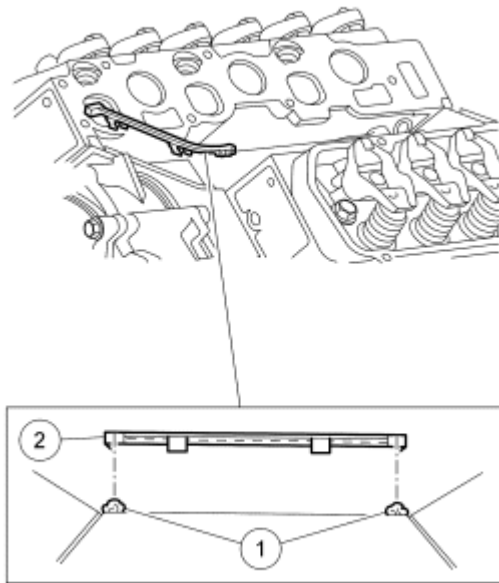


Fig. 355: Lower Intake Manifold Gaskets
Courtesy of FORD MOTOR CO.

61. Install the lower intake manifold front and rear end seals.

1. Apply a bead of silicone gasket and sealant to the intake manifold front and rear end seal mounting points as indicated.

2. Install the lower intake manifold front and rear end seals.



N0010643

Fig. 356: Identifying Lower Intake Manifold Front & Rear Seals
Courtesy of FORD MOTOR CO.

62. Position the intake manifold gaskets.

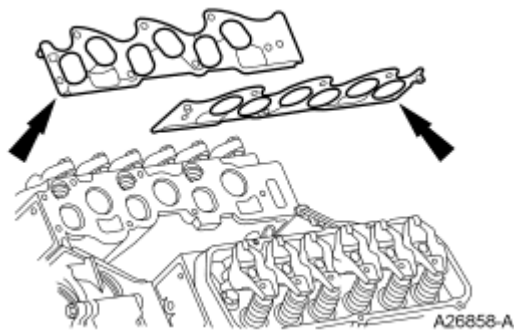
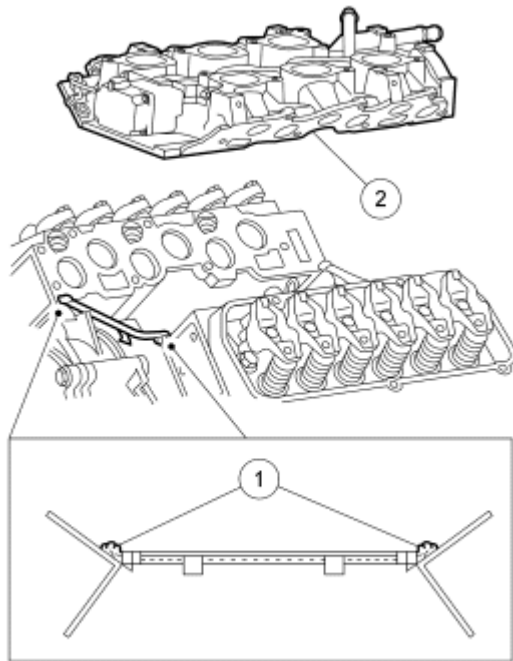


Fig. 357: Identifying Manifold Gaskets
Courtesy of FORD MOTOR CO.

NOTE: The lower intake manifold must be installed within 4 minutes of applying the sealant.

63. Position the lower intake manifold.
 1. Apply a bead of silicone gasket and sealant to the lower intake manifold mounting at the points indicated.

2. Position the lower intake manifold.

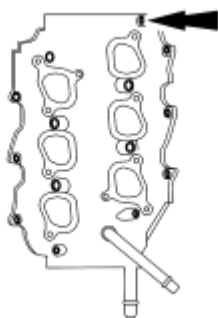


A0084367

Fig. 358: Identifying Lower Intake Manifold
Courtesy of FORD MOTOR CO.

NOTE: Make sure the bolts are installed in the correct locations.

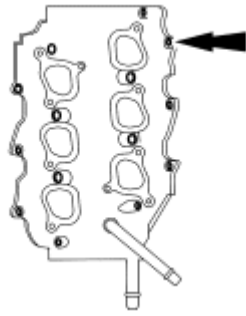
64. Install the 6 long bolts.



A0084368

Fig. 359: Installing Long Bolts
Courtesy of FORD MOTOR CO.

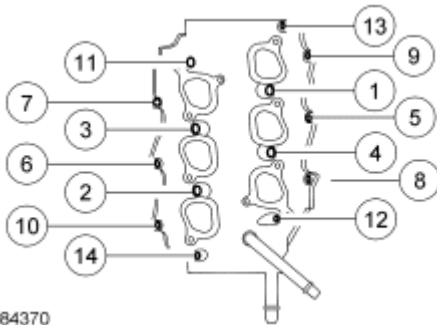
65. Install the 8 short bolts.



A0084369

Fig. 360: Installing Short Bolts
Courtesy of FORD MOTOR CO.

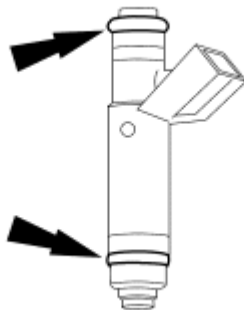
66. Tighten the lower intake manifold bolts in 2 stages in the sequence shown.
- Stage 1: Tighten to 5 N.m (44 lb-in).
 - Stage 2: Tighten to 10 N.m (89 lb-in).



A0084370

Fig. 361: Identifying Lower Intake Manifold Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

67. Install new O-ring seals on the fuel injectors.

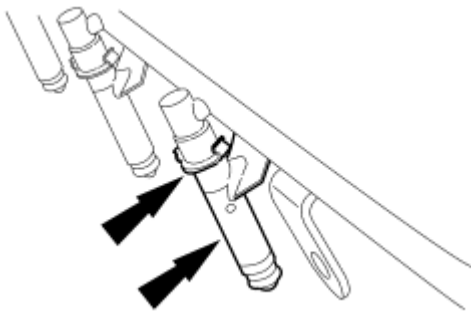


AV1418-B

Fig. 362: Fuel Injector O-Rings
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the O-ring seals with clean engine oil to aid installation.

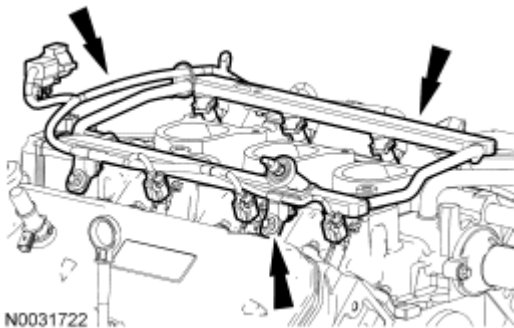
68. Install the fuel injectors and retaining clips on the fuel supply manifold.



AV1417-A

Fig. 363: Fuel Injectors & Clips
Courtesy of FORD MOTOR CO.

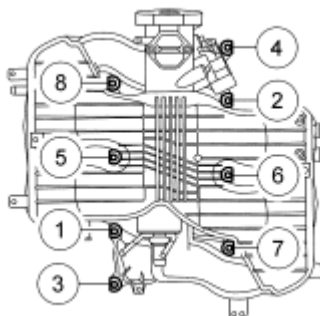
69. Install the fuel rail, fuel injectors and fuel charging harness as an assembly and install the bolts.
- Tighten to 10 Nm (89 lb-in).



N0031722

Fig. 364: Locating Fuel Rail, Fuel Injectors & Fuel Charging Harness
Courtesy of FORD MOTOR CO.

70. Using new gaskets, install the upper intake manifold and 8 bolts.
- Tighten the 8 upper intake manifold bolts in 2 stages in the sequence shown.
 - Stage 1: Tighten to 6 Nm (53 lb-in).
 - Stage 2: Tighten to 10 Nm (89 lb-in).



A0077103

Fig. 365: Identifying Upper Intake Manifold Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

71. Position the engine harness onto the engine and connect the engine harness-to-fuel charging harness electrical connector.

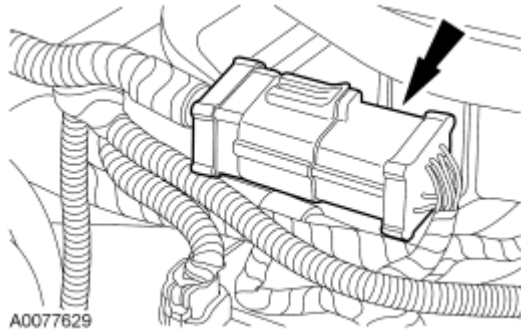


Fig. 366: Locating Engine Harness-To-Fuel Charging Harness Electrical Connector
Courtesy of FORD MOTOR CO.

72. Position the vacuum harness onto the engine and connect the vacuum harness connection.

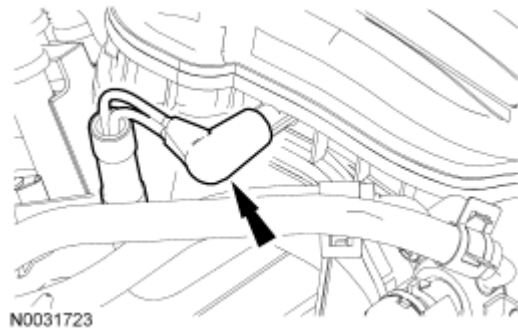


Fig. 367: Locating Vacuum Harness
Courtesy of FORD MOTOR CO.

73. Install the ignition coil and 3 bolts.
 - Tighten to 6 Nm (53 lb-in).

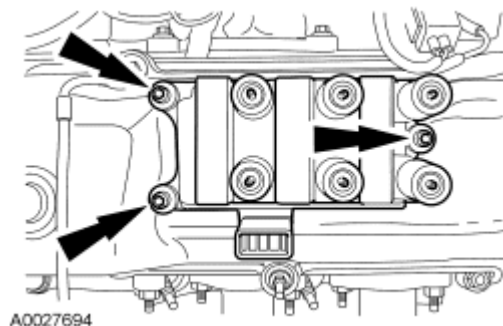


Fig. 368: Locating Ignition Coil Bolts

Courtesy of FORD MOTOR CO.

74. Install the engine harness pin-type retainer and connect the ignition coil electrical connector.

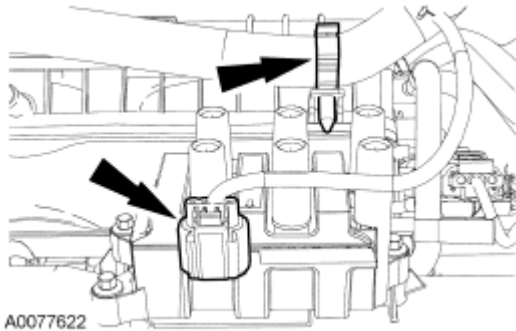


Fig. 369: Locating Ignition Coil Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: Do not tighten the EGR system module-to-manifold tube lower fitting.

75. Install the EGR system module-to-manifold tube.

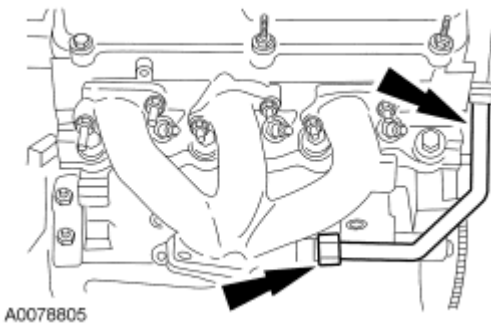


Fig. 370: Locating EGR System Module-To-Manifold Tube
Courtesy of FORD MOTOR CO.

76. Attach the wire retainer to the throttle position (TP) sensor stud bolt.

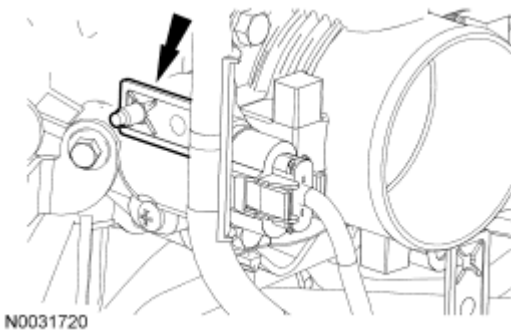


Fig. 371: Locating Wire Retainer

Courtesy of FORD MOTOR CO.

77. Connect the following:

1. Idle air control (IAC) electrical connector
2. TP sensor electrical connector
3. Exhaust gas recirculation (EGR) system module electrical connector
4. EGR system module vacuum connector
5. EGR system module-to-exhaust manifold tube upper fitting and tighten to 40 Nm (30 lb-ft)

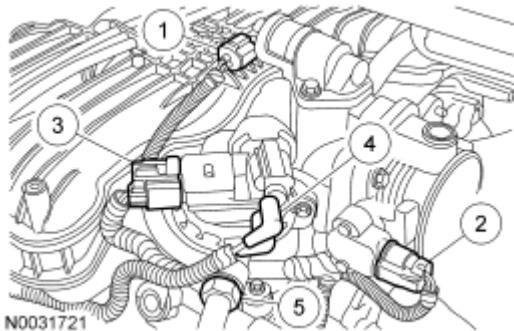


Fig. 372: Identifying EGR System Module Vacuum Connector & Throttle Position Sensor Electrical Connector

Courtesy of FORD MOTOR CO.

78. Tighten the EGR system module-to-manifold tube lower fitting.

- Tighten to 40 Nm (30 lb-ft).

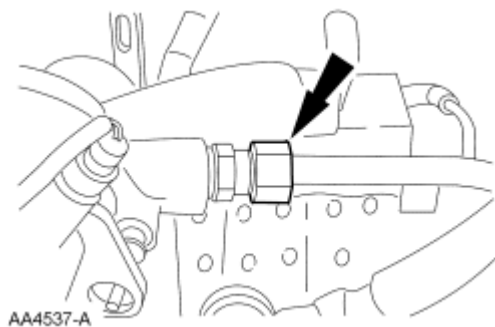


Fig. 373: EGR Tube At Exhaust Manifold

Courtesy of FORD MOTOR CO.

79. Connect the cylinder head temperature (CHT) sensor electrical connector.

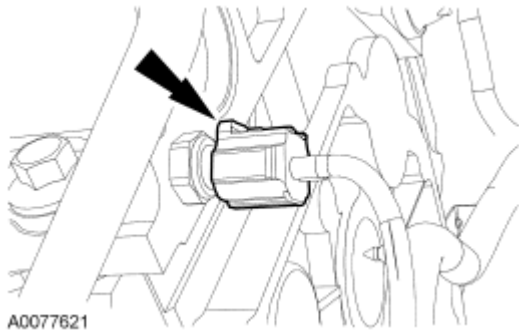


Fig. 374: Locating Cylinder Head Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

80. Connect the knock sensor (KS) electrical connector.

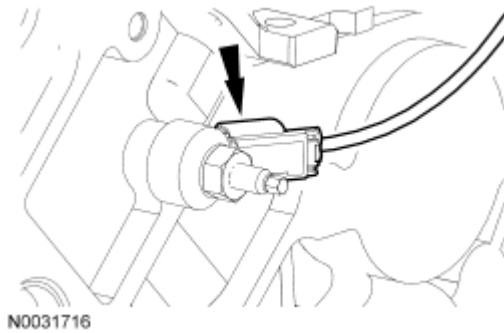


Fig. 375: Locating Knock Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

81. Install the 4 engine harness pin-type retainers.

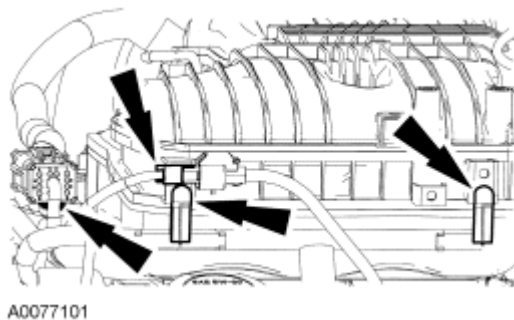
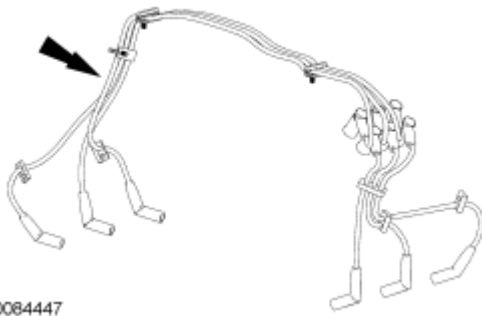


Fig. 376: Locating Engine Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

NOTE: Apply dielectric grease to the inside of the spark plug wire boots before attaching to the spark plugs and the ignition coil.

82. Install and connect the spark plug wires and retainers as an assembly.



A0084447

Fig. 377: Locating Spark Plug Wires & Retainers
Courtesy of FORD MOTOR CO.

NOTE: Install a new oil level indicator tube O-ring seal.

83. Install the oil level indicator tube and the retaining nut.
- Tighten to 10 Nm (89 lb-in).

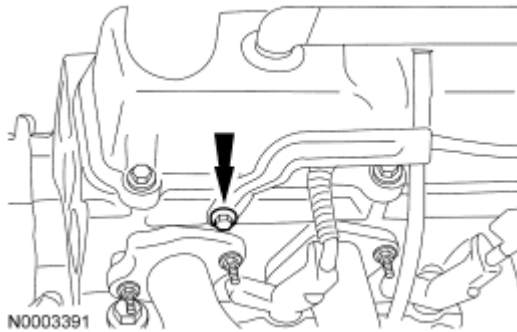


Fig. 378: Oil Level Indicator Tube & Nut
Courtesy of FORD MOTOR CO.

84. Connect the quick disconnect crankcase vent hose to the intake manifold.

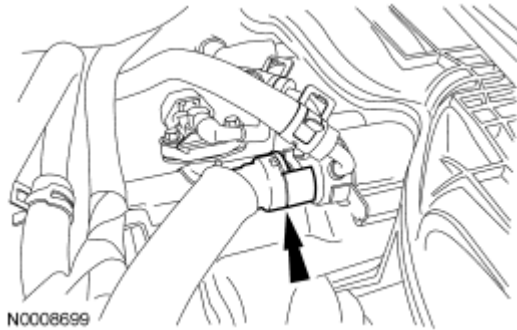


Fig. 379: Locating Quick Connect Crankcase Vent Hose
Courtesy of FORD MOTOR CO.

85. Connect the quick disconnect crankcase vent hose and connect the crankcase vent hose valve electrical

connector.

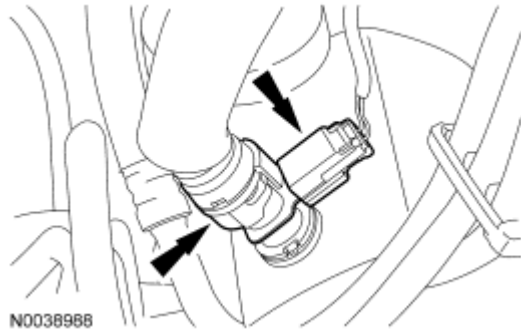


Fig. 380: Locating Crankcase Vent Hose Valve Electrical Connector
Courtesy of FORD MOTOR CO.

86. Connect the intake manifold runner control (IMRC) electrical connector.

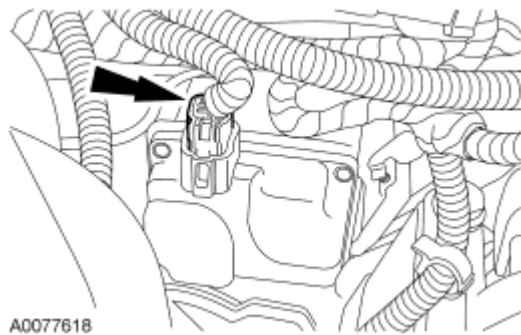


Fig. 381: Locating Intake Manifold Runner Control Electrical Connector
Courtesy of FORD MOTOR CO.

87. Connect the CMP sensor electrical connector.

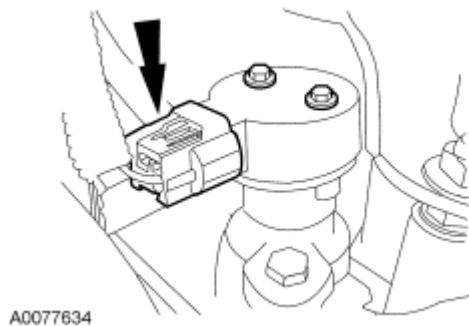


Fig. 382: Locating CMP Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

88. Connect the oil pressure sensor electrical connector and install the engine harness pin-type retainer.

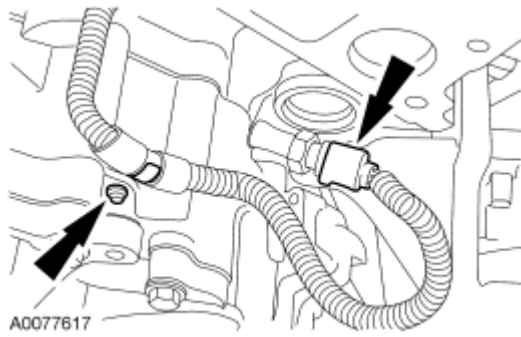


Fig. 383: Locating Oil Pressure Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

89. Install the RH engine mount bracket and 4 bolts.
- Tighten to 48 Nm (35 lb-ft).

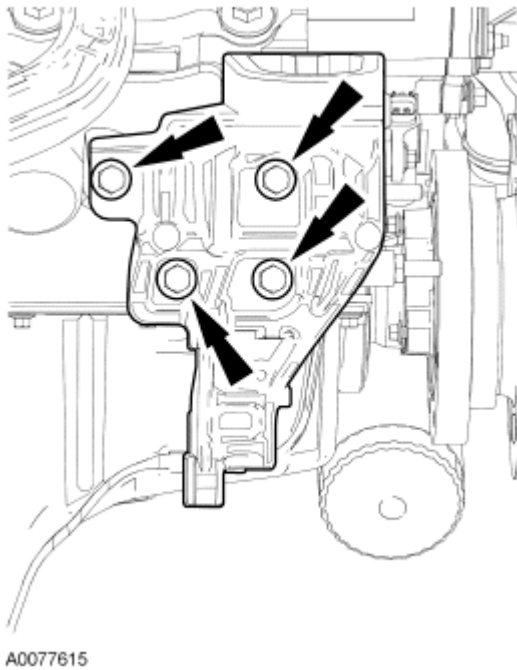


Fig. 384: Locating RH Engine Mount Bracket Bolts
Courtesy of FORD MOTOR CO.

90. Install the catalyst monitor sensor electrical connector bracket.
- Tighten to 28 Nm (21 lb-ft).

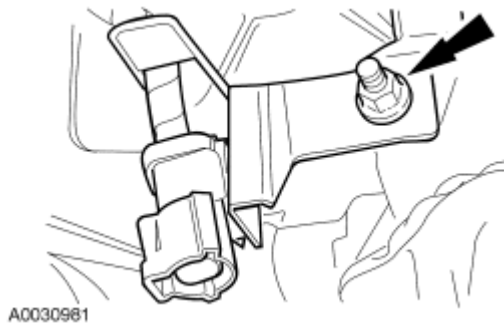


Fig. 385: Locating Catalyst Monitor Sensor Electrical Connector Bracket Nut
Courtesy of FORD MOTOR CO.

91. Connect the CKP sensor electrical connectors.

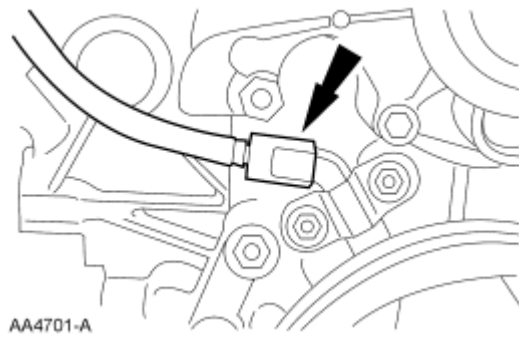


Fig. 386: Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

92. Install the power steering pump bracket and 4 mounting bolts.
 1. Tighten to 25 Nm (18 lb-ft).
 2. Tighten to 48 Nm (35 lb-ft).

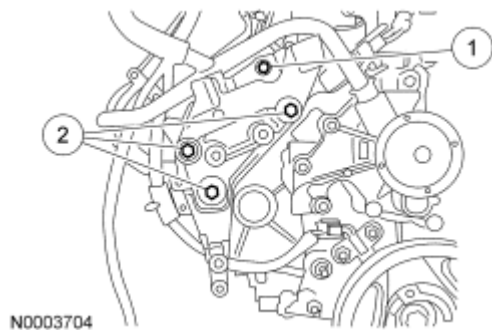


Fig. 387: Identifying Power Steering Pump Bracket & Mounting Bolts
Courtesy of FORD MOTOR CO.

93. Install the accessory drive belt tensioner and 3 bolts.
 - Tighten to 25 Nm (18 lb-ft).

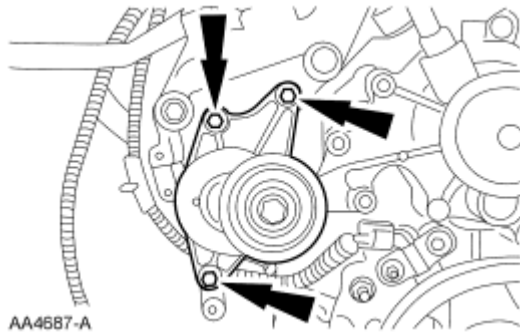


Fig. 388: Accessory Drive Belt Tensioner Bolts
Courtesy of FORD MOTOR CO.

NOTE: Install a new coolant pump outlet tube O-ring seal and lubricate with clean engine coolant.

94. Install the coolant pump outlet tube.
 - Install the 2 bolts and tighten to 10 Nm (89 lb-in).
 - Connect the 3 coolant hoses.
 - Reposition the clamps.

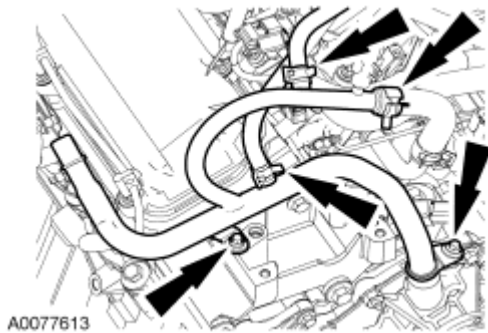


Fig. 389: Locating Coolant Pump Outlet Tube Bolts
Courtesy of FORD MOTOR CO.

95. Install the A/C compressor bracket and 4 bolts.
 - Tighten to 47 Nm (35 lb-ft).

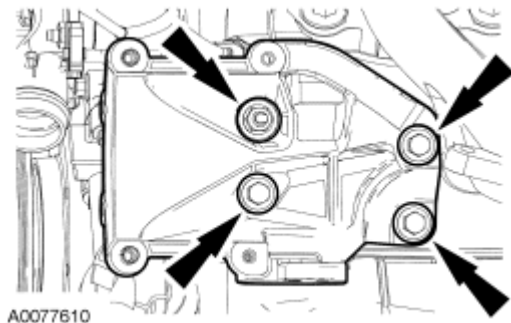


Fig. 390: Locating A/C Compressor Bracket Bolts
Courtesy of FORD MOTOR CO.

96. Install the A/C compressor mounting bracket brace and generator mounting bracket as an assembly and install the 4 bolts.
 1. Tighten to 25 Nm (18 lb-ft).
 2. Tighten to 47 Nm (35 lb-ft).

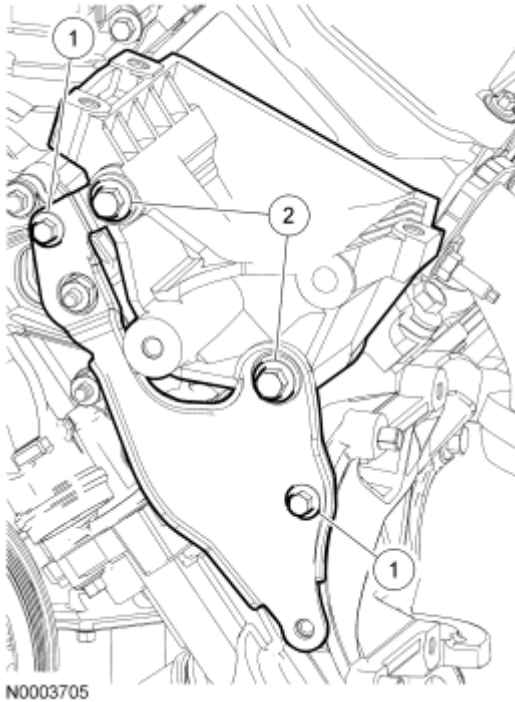


Fig. 391: Installing A/C Compressor Mounting Bracket Brace And Generator Mounting Bracket
Courtesy of FORD MOTOR CO.

97. Install the coolant extension tube and bracket and bolt.
 - Tighten to 25 Nm (18 lb-ft).

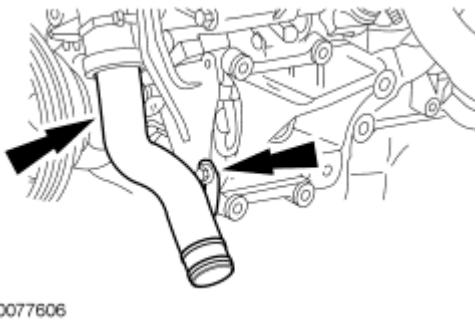


Fig. 392: Locating Coolant Pump Extension Tube & Bracket Bolt
Courtesy of FORD MOTOR CO.

98. Install the generator and 3 bolts.
- Tighten to 25 Nm (18 lb-ft).

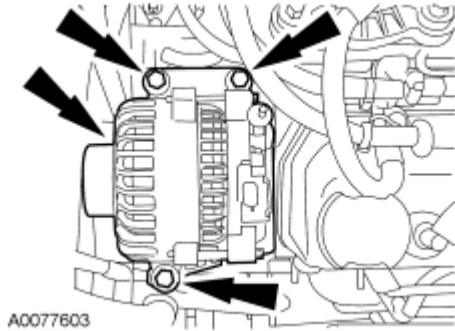


Fig. 393: Locating Generator Bolts
Courtesy of FORD MOTOR CO.

99. Connect the generator.
- Install the B+ wire terminal and nut and tighten to 8 Nm (71 lb-in).
 - Connect the generator electrical connector.

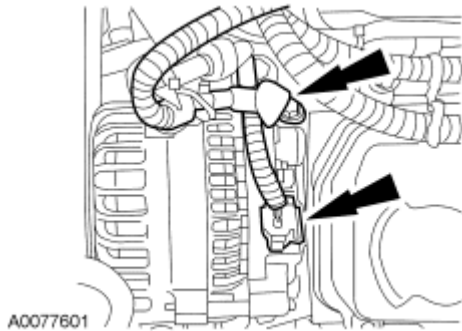


Fig. 394: Locating Generator Electrical Connector
Courtesy of FORD MOTOR CO.

100. Install the accessory drive idler pulley and bolt.
- Tighten to 47 Nm (35 lb-ft).

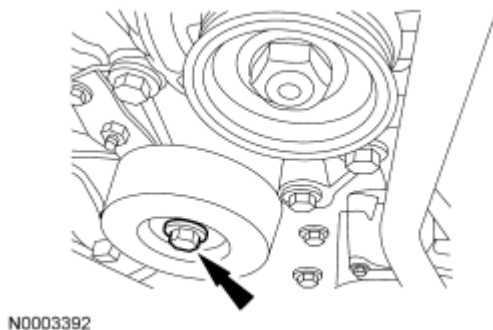


Fig. 395: Locating Accessory Drive Idler Pulley Bolt
Courtesy of FORD MOTOR CO.

101. Install the coolant pump pulley and 4 bolts.
- Tighten to 11 Nm (8 lb-ft).

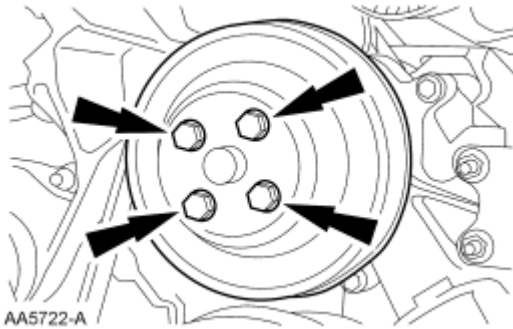


Fig. 396: Identifying Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

102. Install the special tools.

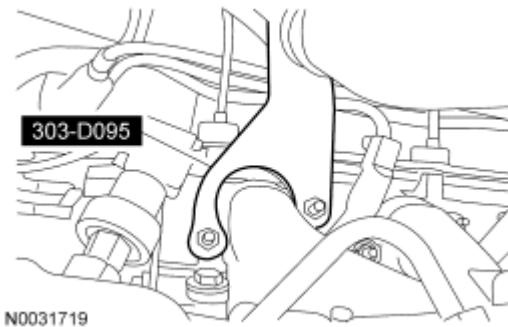


Fig. 397: Identifying Special Tool (303--D095)
Courtesy of FORD MOTOR CO.

103. Install the engine lifting equipment.

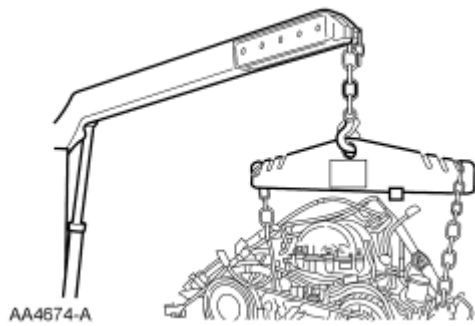


Fig. 398: Engine Lifting Equipment
Courtesy of FORD MOTOR CO.

104. Remove the engine from the stand.

NOTE: Lubricate the crankshaft rear seal lips with clean engine oil prior to installation.

105. Assemble the special tools and the crankshaft rear seal.

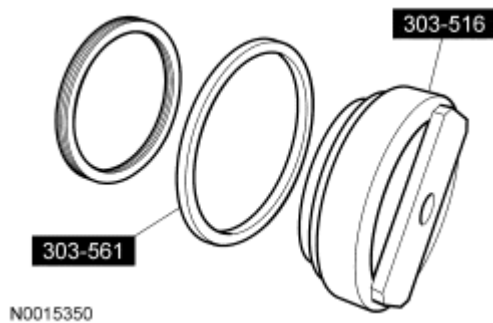


Fig. 399: Identifying Special Tools And Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

106. Install the special tools on the rear of the crankshaft.

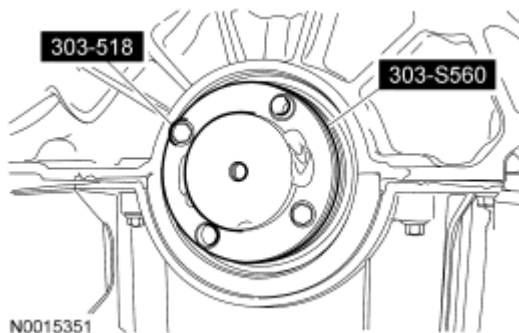


Fig. 400: Installing Special Tools On Rear Of Crankshaft
Courtesy of FORD MOTOR CO.

107. Install the crankshaft rear seal. Tighten the center jack screw until the spacer contacts the engine block.

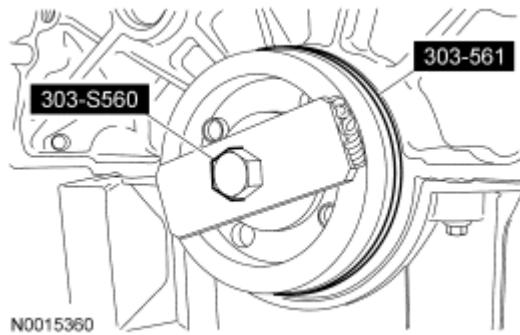


Fig. 401: Installing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

108. Install the flywheel and 6 bolts.

- Tighten to 80 Nm (59 lb-ft).

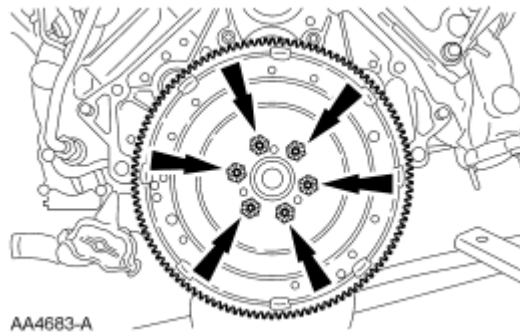


Fig. 402: Flexplate Bolts
Courtesy of FORD MOTOR CO.

INSTALLATION

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
	Powertrain Lift	014-00765

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

INSTALLATION

1. Position the engine onto the transaxle and subframe assembly.
2. Install the 2 engine mount bracket-to-transaxle bolts.
 - Tighten to 63 Nm (46 lb-ft).

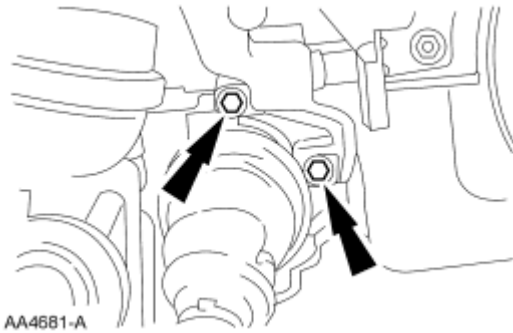


Fig. 403: Engine Mount Bracket-To-Transaxle Bolts
Courtesy of FORD MOTOR CO.

3. Install the oil pan-to-transaxle bolt.
 - Tighten to 45 Nm (33 lb-ft).

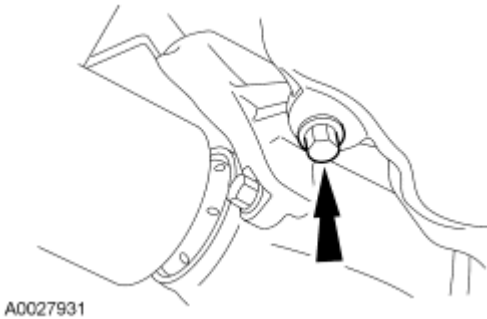


Fig. 404: Locating Oil Pan-To-Transaxle Bolt
Courtesy of FORD MOTOR CO.

4. Install the RH engine mount and bolt.
 - Tighten to 90 Nm (66 lb-ft).

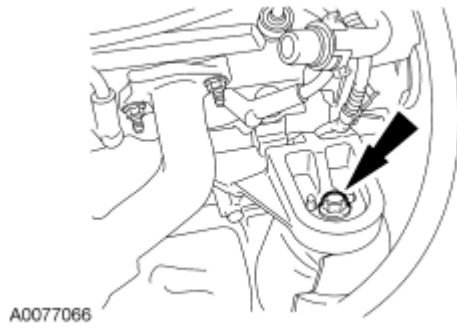


Fig. 405: Locating RH Engine Mount Bolt
Courtesy of FORD MOTOR CO.

5. Install the LH engine mount and bolt.
 - Tighten to 90 Nm (66 lb-ft).

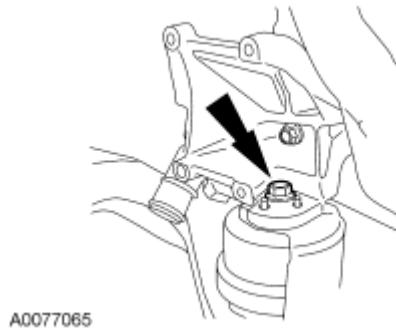


Fig. 406: Locating LH Engine Mount Bolt
Courtesy of FORD MOTOR CO.

6. Install the 4 bellhousing bolts.
 - Tighten to 90 Nm (66 lb-ft).

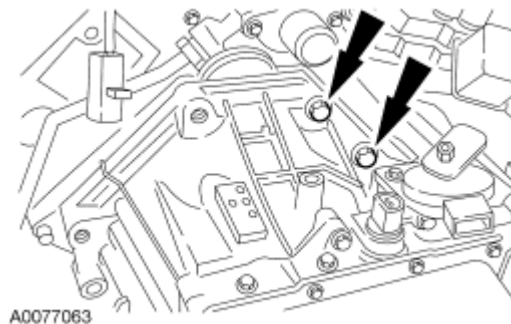


Fig. 407: Locating Bellhousing Bolts
Courtesy of FORD MOTOR CO.

7. Install the transaxle fluid level indicator and tube and bolt.
 - Tighten to 10 Nm (89 lb-in).

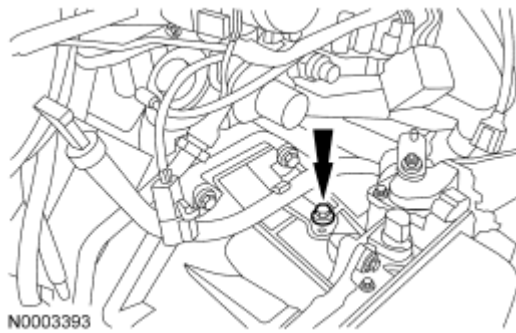


Fig. 408: Locating Transaxle Fluid Level Indicator Tube Bolt
Courtesy of FORD MOTOR CO.

8. Attach the electrical connector to the subframe.

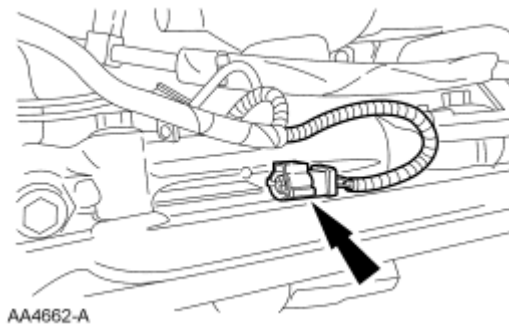


Fig. 409: Electrical Connectors At Subframe
Courtesy of FORD MOTOR CO.

9. Attach the 2 electrical connectors to the wiring harness bracket.

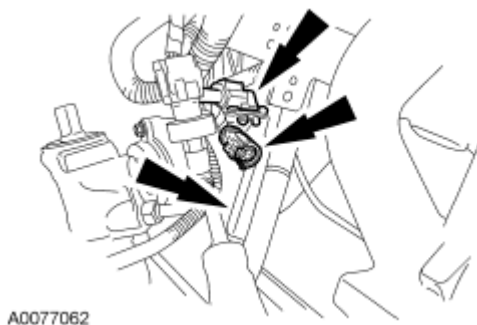


Fig. 410: Electrical Connectors At Bracket
Courtesy of FORD MOTOR CO.

10. Connect the electrical connectors.

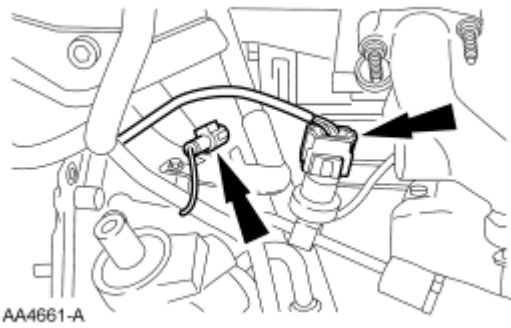


Fig. 411: Electrical Connectors
Courtesy of FORD MOTOR CO.

11. Install the wiring harness pin-type retainer.

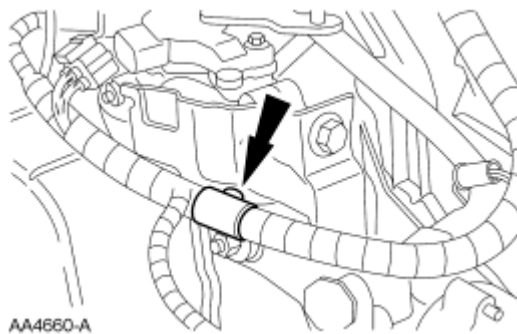


Fig. 412: Pin-Type Harness Retainer
Courtesy of FORD MOTOR CO.

12. Connect the turbine shaft speed (TSS) sensor.

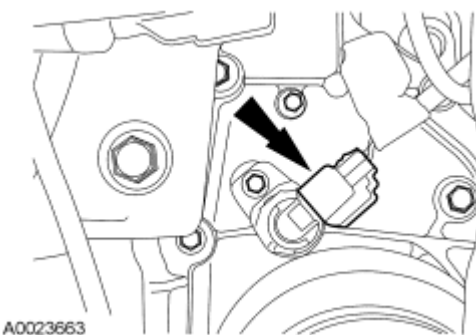


Fig. 413: Turbine Shaft Speed (TSS) Sensor Connector
Courtesy of FORD MOTOR CO.

13. Connect the transaxle electrical connectors.

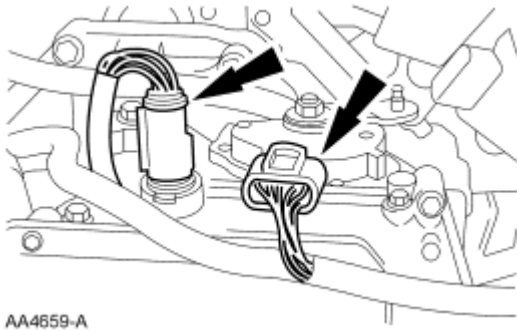


Fig. 414: Transaxle Electrical Connectors
Courtesy of FORD MOTOR CO.

14. Install the wiring harness pin-type retainer.

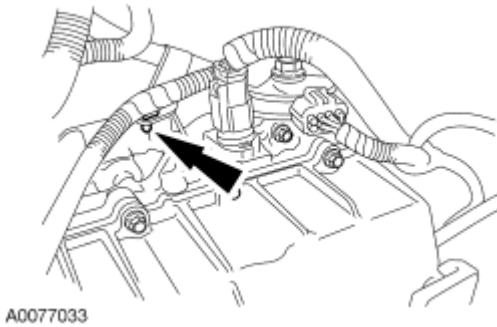


Fig. 415: Locating Engine Wiring Harness Pin-Type Retainer
Courtesy of FORD MOTOR CO.

15. Position the engine roll restrictor bracket and install the 3 bolts.
- Tighten the upper bolt to 30 Nm (22 lb-ft).
 - Tighten the 2 lower bolts to 90 Nm (66 lb-ft).

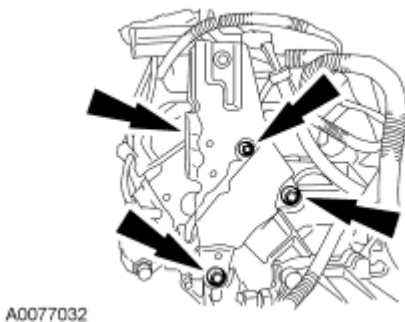


Fig. 416: Locating Engine Roll Restrictor Bracket Bolts
Courtesy of FORD MOTOR CO.

16. Install the engine wiring harness into the retainers.

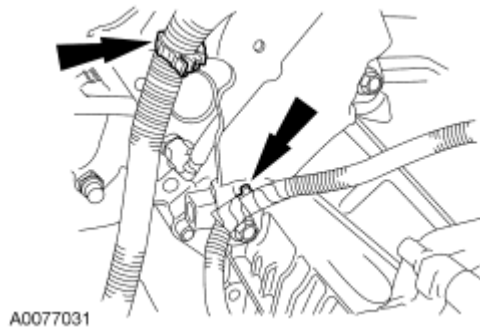


Fig. 417: Locating Engine Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

17. Attach the electrical connector to the subframe.

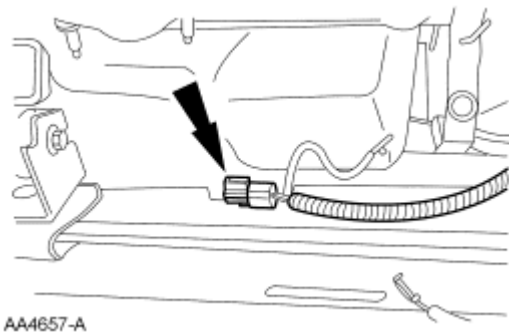


Fig. 418: Electrical Connector At Subframe
Courtesy of FORD MOTOR CO.

18. Install the engine wiring harness into the retainer.

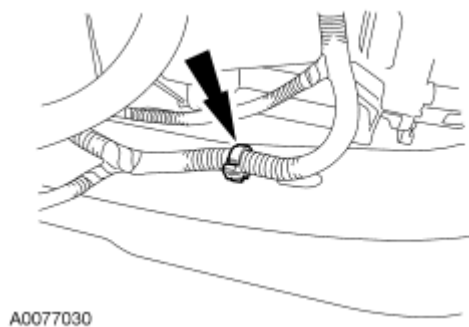


Fig. 419: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

19. Position the A/C compressor and install the 4 bolts.
- Tighten to 25 Nm (18 lb-ft).

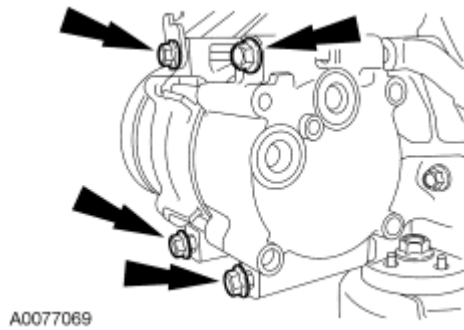


Fig. 420: Locating A/C Compressor Bolts
Courtesy of FORD MOTOR CO.

20. Connect the A/C compressor electrical connector.

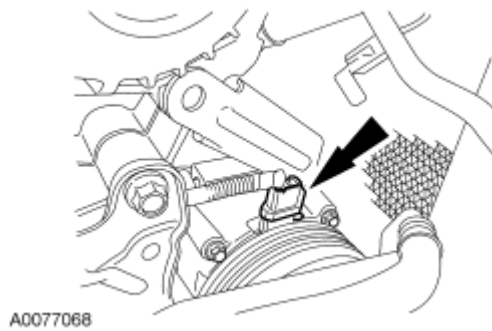


Fig. 421: Locating A/C Compressor Electrical Connector
Courtesy of FORD MOTOR CO.

21. Install the generator brace bolt.
- Tighten to 47 Nm (35 lb-ft).

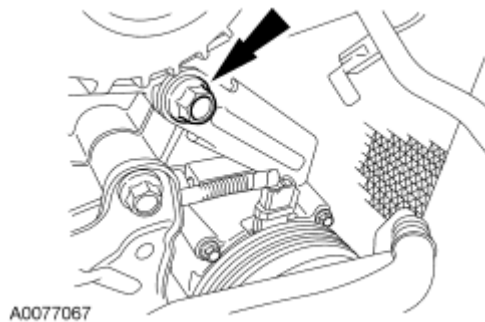


Fig. 422: Locating Generator Brace Bolt
Courtesy of FORD MOTOR CO.

22. Using a 19 mm (0.74 in) dowel, check the front subframe alignment.
- The dowel should slide directly through the front subframe and body without tilting.

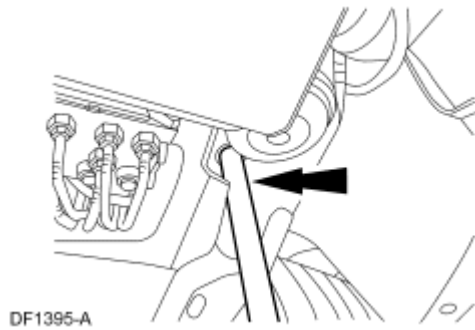


Fig. 423: Dowel
Courtesy of FORD MOTOR CO.

23. Using the powertrain lift, raise the engine, transaxle and subframe assembly in the vehicle.

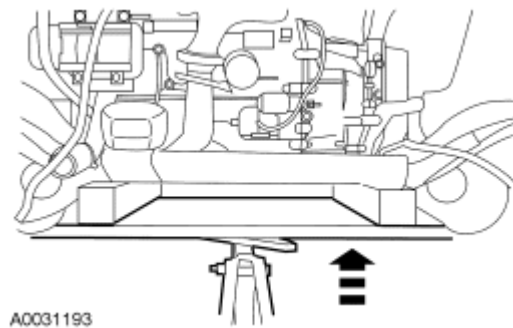


Fig. 424: Raising Engine, Transaxle & Subframe Assembly
Courtesy of FORD MOTOR CO.

24. Install the 4 subframe bolts (3 shown).
- Tighten to 175 Nm (129 lb-ft).

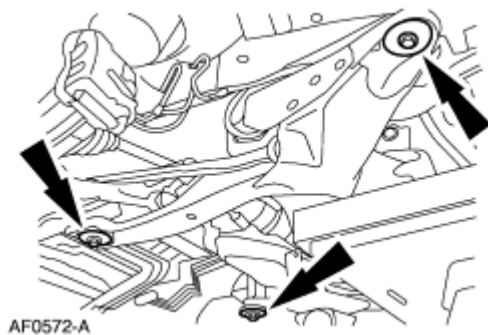


Fig. 425: Subframe Bolts
Courtesy of FORD MOTOR CO.

25. Install the RH and LH strut bolts.
- Tighten to 115 Nm (85 lb-ft).

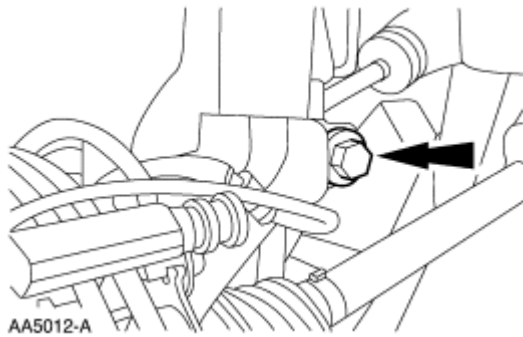


Fig. 426: Strut Bolt
Courtesy of FORD MOTOR CO.

26. Connect the upper RH and LH front stabilizer links and install the nuts.
- Tighten to 103 Nm (76 lb-ft).

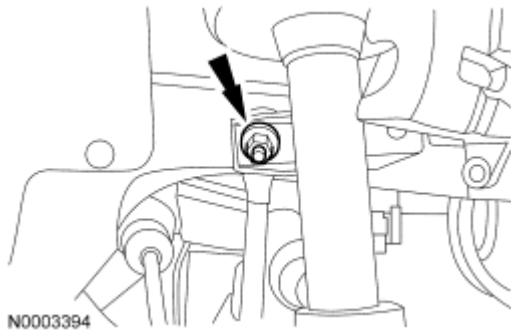


Fig. 427: Locating Front Stabilizer Link Nut
Courtesy of FORD MOTOR CO.

27. Connect the RH and LH anti-lock brake sensor (ABS) electrical connectors.

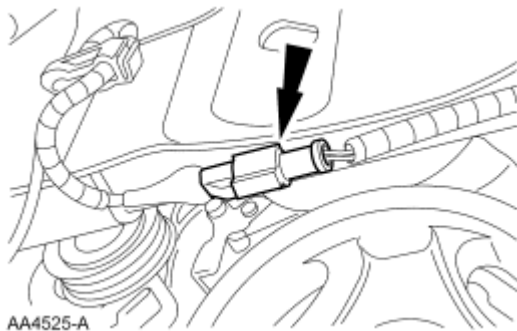


Fig. 428: Right Front Anti-Lock Brake Wheel Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

28. Install the RH and LH ABS sensor wiring harness retainers.

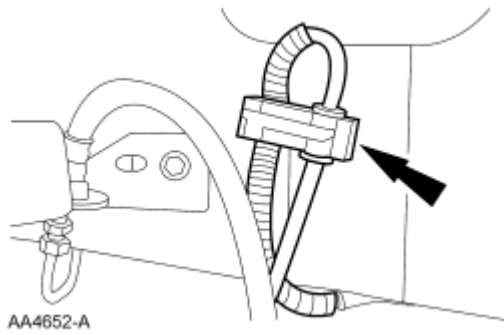


Fig. 429: Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

29. Install the RH and LH brake calipers and install the 4 bolts.
 - Tighten to 35 Nm (26 lb-ft).

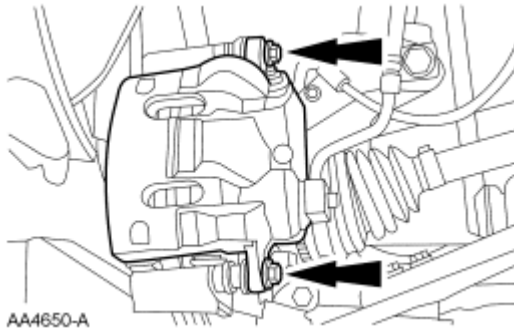


Fig. 430: Brake Caliper Bolts
Courtesy of FORD MOTOR CO.

30. Install the 4 torque converter nuts.
 - Tighten to 36 Nm (27 lb-ft).

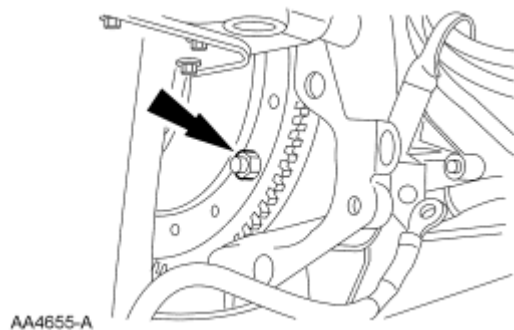


Fig. 431: Torque Converter Nut
Courtesy of FORD MOTOR CO.

31. Install the inspection cover bolt.
 - Tighten to 10 Nm (89 lb-in).

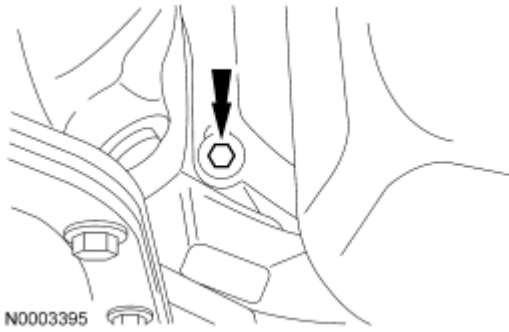


Fig. 432: Locating Inspection Cover Bolt
Courtesy of FORD MOTOR CO.

32. Install the 2 oil pan-to-transaxle bolts.
- Tighten to 45 Nm (33 lb-ft).

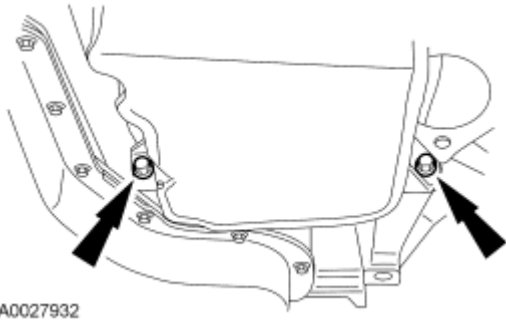


Fig. 433: Locating Oil Pan-To-Transaxle Bolts
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

33. Install the RH and LH lower engine mount nuts.
- Tighten to 80 Nm (59 lb-ft).

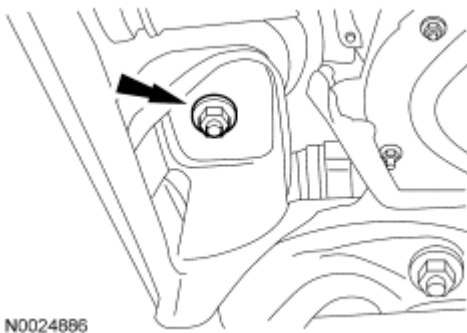


Fig. 434: Locating Lower Engine Mount Nuts
Courtesy of FORD MOTOR CO.

34. Connect the lower radiator hose.
- Position the clamp.

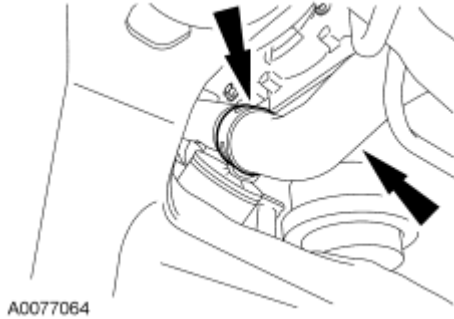


Fig. 435: Locating Lower Radiator Hose
Courtesy of FORD MOTOR CO.

35. Connect the steering column.
- Slide the joint downward.
 - Install the bolt and tighten to 30 Nm (22 lb-ft).

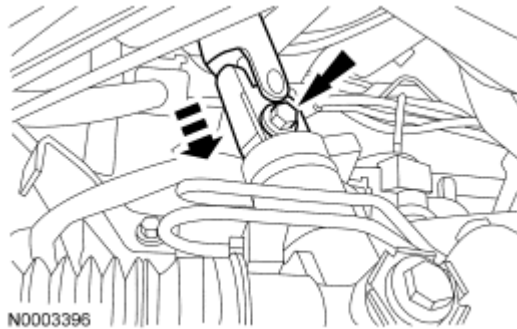


Fig. 436: Steering Column Bolt
Courtesy of FORD MOTOR CO.

36. Install the transaxle cooler tubes.
- Connect the tubes.
 - Install the clips.

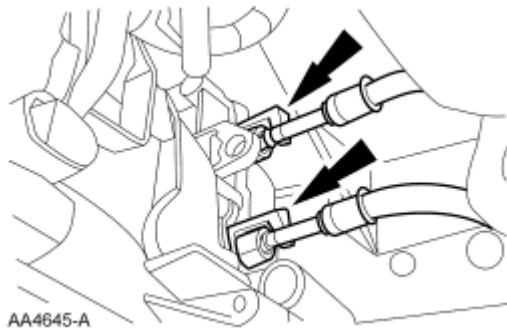


Fig. 437: Transaxle Cooler Tubes & Clips
Courtesy of FORD MOTOR CO.

37. Install the power steering cooling hose into the retaining clip.

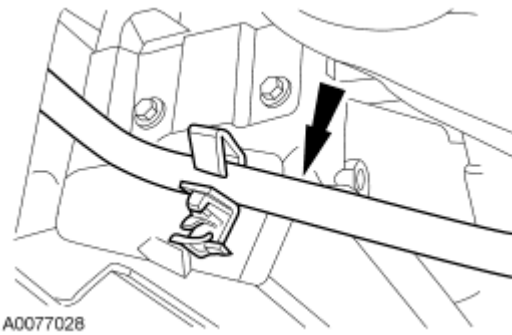


Fig. 438: Locating Power Steering Cooling Hose
Courtesy of FORD MOTOR CO.

38. Connect the power steering oil cooler hose.
- Position the clamp.

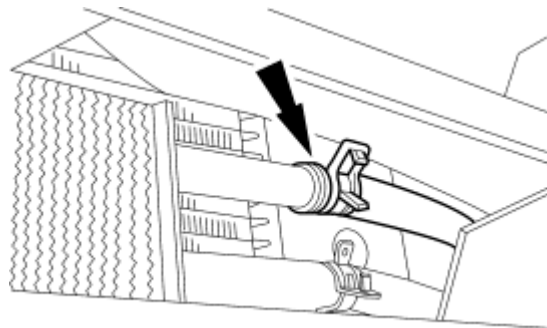


Fig. 439: Power Steering Cooler Hose
Courtesy of FORD MOTOR CO.

39. Position the A/C compressor manifold and install the bolt.
- Tighten to 20 Nm (15 lb-ft).

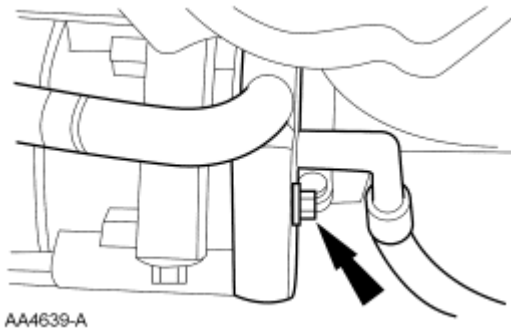


Fig. 440: A/C Compressor Manifold Bolt
Courtesy of FORD MOTOR CO.

40. Connect the A/C electrical connector.

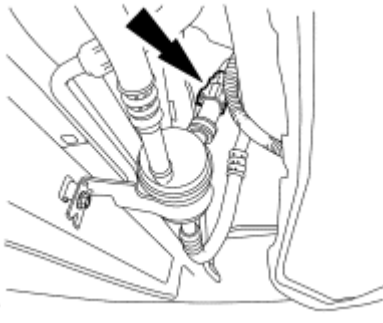


Fig. 441: Locating A/C Electrical Connector
Courtesy of FORD MOTOR CO.

41. Connect the heater hose.

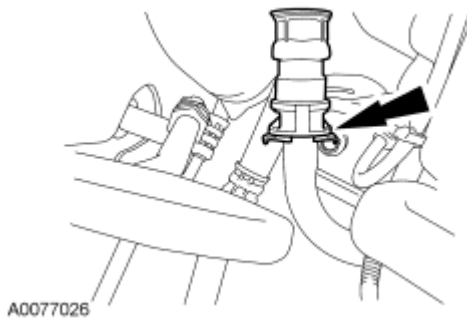


Fig. 442: Locating Heater Hose
Courtesy of FORD MOTOR CO.

42. Install the ground cable.
- Tighten to 10 Nm (89 lb-in).

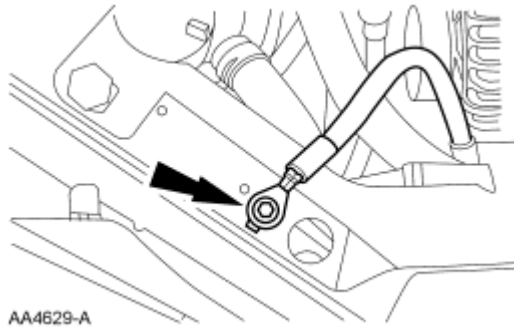


Fig. 443: Ground Cable Bolt
Courtesy of FORD MOTOR CO.

43. Install the ground cable.
- Tighten to 10 Nm (89 lb-in).

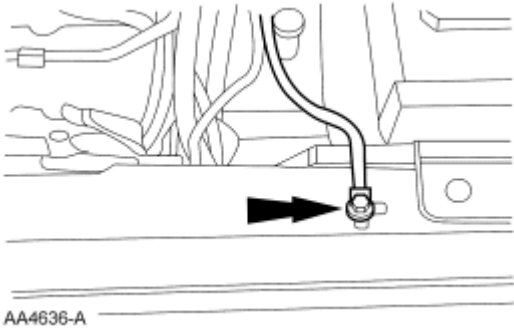


Fig. 444: Ground Cable Bolt
Courtesy of FORD MOTOR CO.

44. Position the engine roll restrictor and install the 2 bolts.
- Tighten to 63 Nm (46 lb-ft).

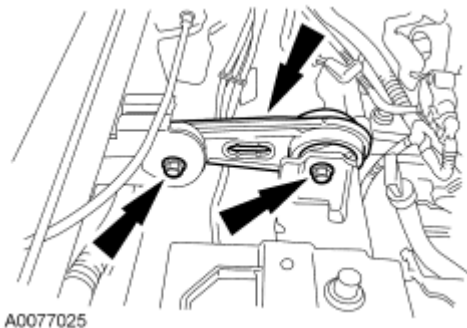


Fig. 445: Locating Engine Roll Restrictor Bolts
Courtesy of FORD MOTOR CO.

45. Install the 2 engine harness retainers.

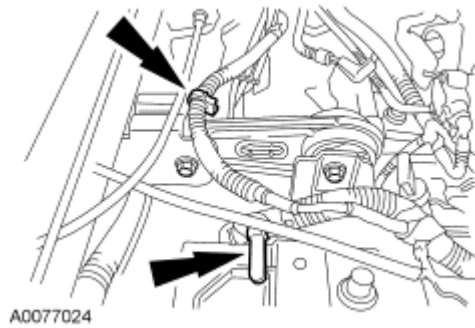


Fig. 446: Locating Engine Wiring Harness Retainers
Courtesy of FORD MOTOR CO.

46. Install the sight shield.
- Install the 3 pin-type retainers.

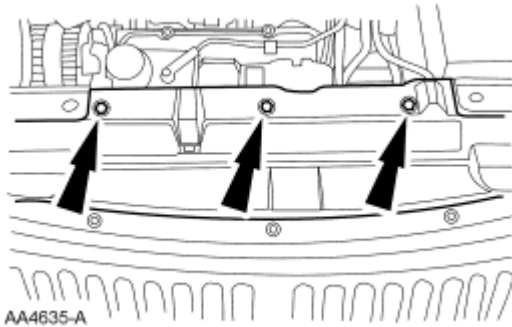


Fig. 447: Upper Radiator Sight Shield Retainers
Courtesy of FORD MOTOR CO.

47. Connect the degas bottle hose.
- Position the clamp.

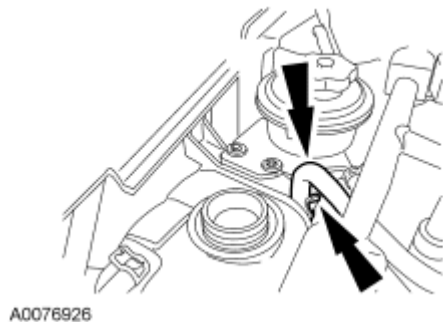


Fig. 448: Locating Degas Bottle Hose
Courtesy of FORD MOTOR CO.

48. Connect the PCM and tighten the bolt.
- Tighten to 10 Nm (89 lb-in).

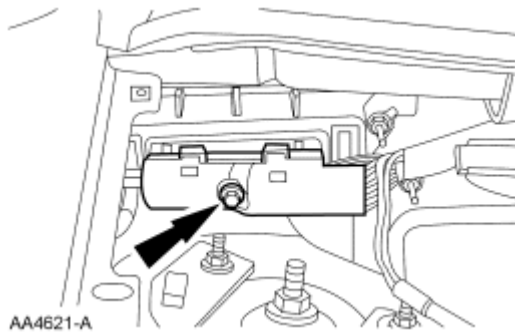


Fig. 449: Powertrain Control Module (PCM) Connector Bolt
Courtesy of FORD MOTOR CO.

49. Position the engine wire harness ground and install the bolt.
- Tighten to 10 Nm (89 lb-in).

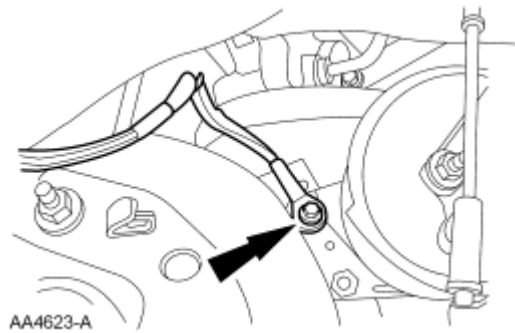


Fig. 450: Engine Wire Harness Ground Bolt
Courtesy of FORD MOTOR CO.

50. Install the engine wiring harness pin-type retainer.

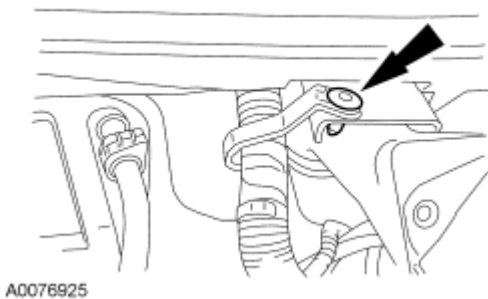


Fig. 451: Locating Engine Wiring Harness Pin-Type Retainer
Courtesy of FORD MOTOR CO.

51. Connect the evaporative emissions (EVAP) canister purge valve electrical connector.

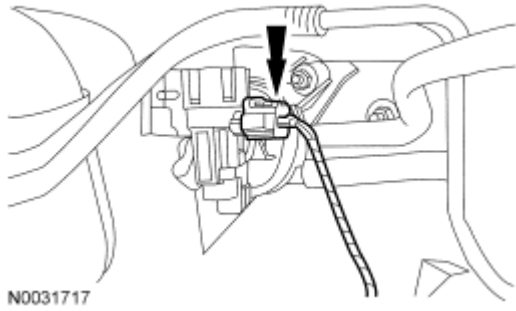


Fig. 452: Locating EVAP Canister Purge Valve Electrical Connector
Courtesy of FORD MOTOR CO.

52. Connect the brake booster vacuum hose.
- Position the clamp.

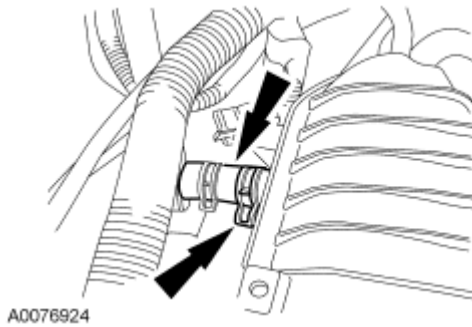


Fig. 453: Locating Brake Booster Vacuum Hose
Courtesy of FORD MOTOR CO.

53. Install the engine wiring harness into the retainer.

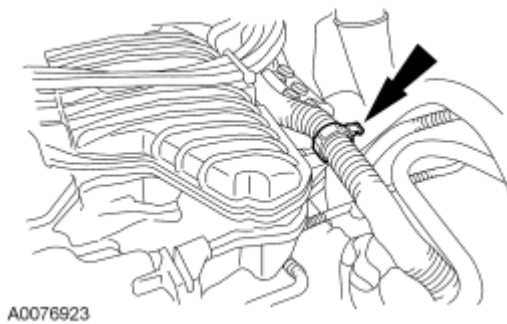


Fig. 454: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

54. Connect the EVAP return tube.

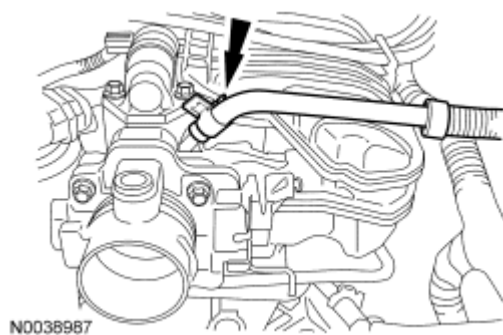


Fig. 455: Locating Evaporative Return Tube
Courtesy of FORD MOTOR CO.

55. Install the shift cable in the shift cable bracket.

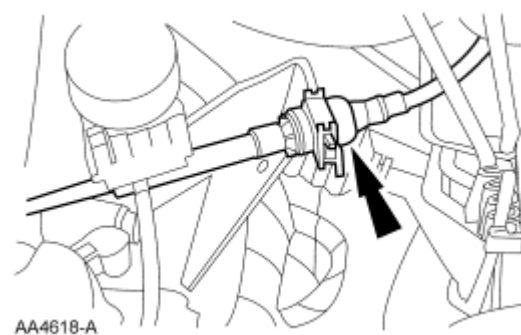


Fig. 456: Shift Cable At Bracket
Courtesy of FORD MOTOR CO.

56. Connect the shift cable.

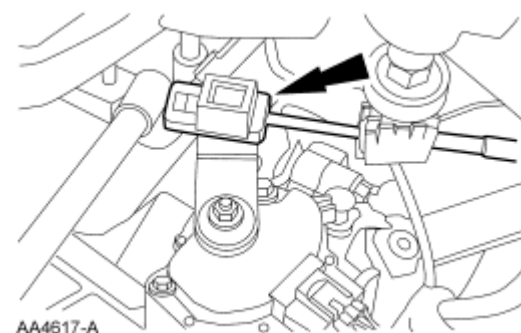


Fig. 457: Shift Cable At Transmission
Courtesy of FORD MOTOR CO.

57. Connect the 16-pin electrical connector.

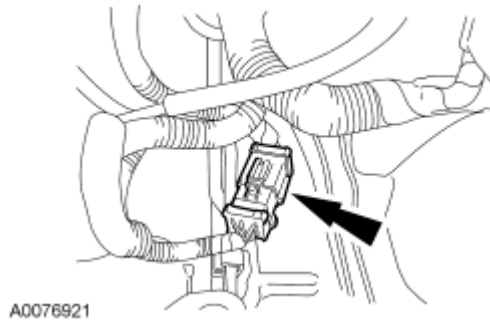


Fig. 458: Locating 16-Pin Electrical Connector
Courtesy of FORD MOTOR CO.

58. Install the engine wiring harness into the retainer.

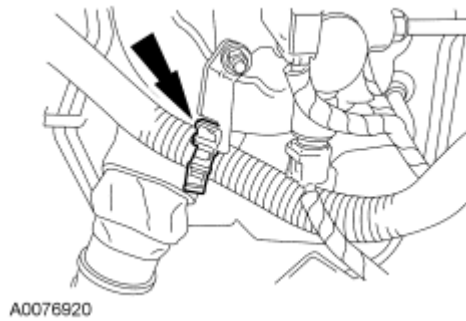


Fig. 459: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

59. Install the engine wiring harness into the retainer.

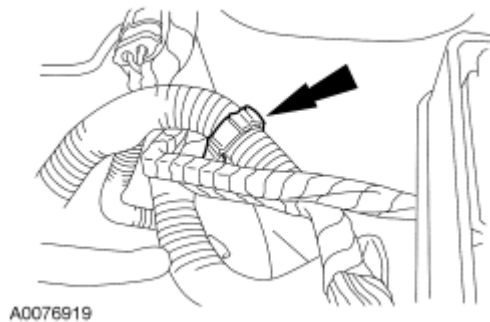


Fig. 460: Locating Engine Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

60. Install the 68-pin connector into the power distribution box.
1. Connect the 68-pin connector to the power distribution box.
 2. Install the bolt and tighten to 10 Nm (89 lb-in).
 3. Attach the power distribution box to the bracket.

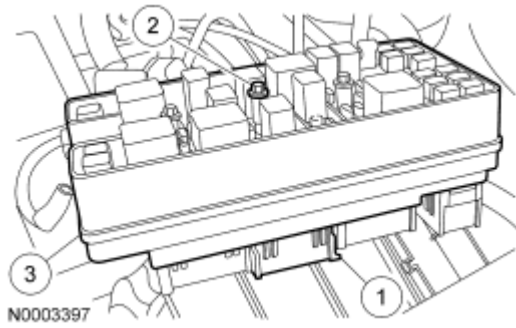


Fig. 461: Identifying Power Distribution Box 68-Pin Connector
Courtesy of FORD MOTOR CO.

61. Connect the B+ terminal to the power distribution box.
 - Tighten to 10 Nm (89 lb-in).

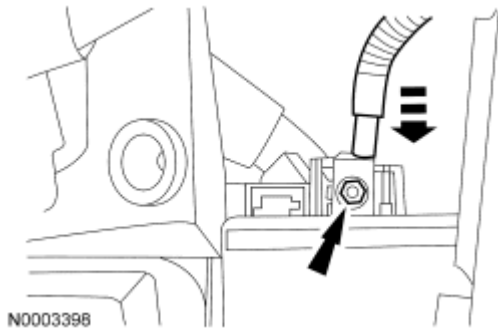


Fig. 462: Power Distribution Box B+ Terminal
Courtesy of FORD MOTOR CO.

62. Install the power distribution box cover.

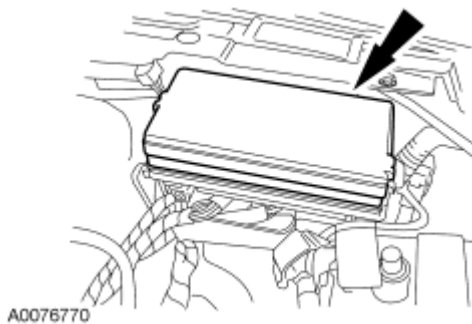


Fig. 463: Locating Power Distribution Box Cover
Courtesy of FORD MOTOR CO.

63. Connect the upper radiator hose and heater hoses.

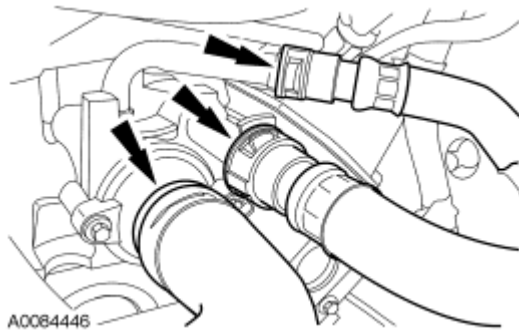


Fig. 464: Locating Upper Radiator Hose & Heater Hoses
Courtesy of FORD MOTOR CO.

64. Install the accelerator bracket.
- Position the bracket.
 - Install the stud bolts and tighten to 10 Nm (89 lb-in).
 - Attach the engine wiring harness retainer.

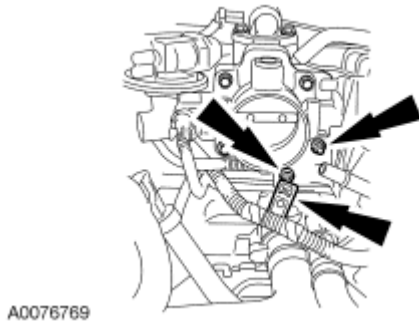


Fig. 465: Locating Accelerator Cable Bracket Bolts
Courtesy of FORD MOTOR CO.

65. Connect the accelerator cable end and the speed control actuator cable end. Install the throttle return spring.

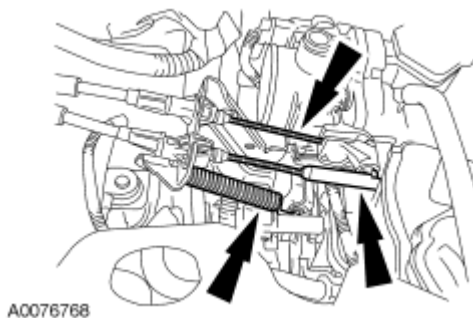


Fig. 466: Locating Accelerator Cable, Speed Control Actuator Cable & Throttle Return Spring
Courtesy of FORD MOTOR CO.

66. Install the dual converter Y-pipe. For additional information, refer to **EXHAUST SYSTEM** article.
67. Install the starter. For additional information, refer to **STARTING SYSTEM** article.
68. Install the power steering pump. For additional information, refer to **POWER STEERING** article.
69. If equipped, install the oil cooler coolant tubes and the bolt.
 - Tighten to 25 Nm (18 lb-ft).
 - Connect the 2 upper quick connect fittings.

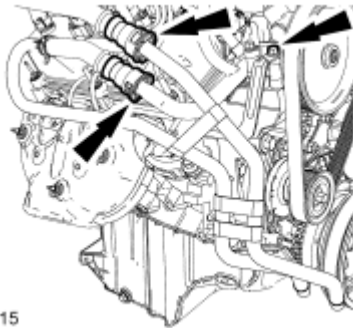


Fig. 467: Locating Oil Cooler Coolant Tubes
Courtesy of FORD MOTOR CO.

70. If equipped, connect the 2 lower oil cooler coolant tube quick connect fittings.

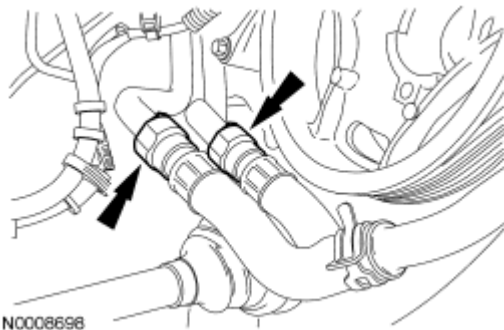
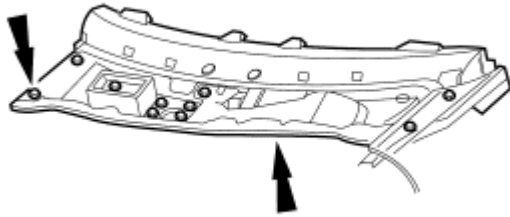


Fig. 468: Locating Quick Disconnect Oil Cooler Coolant Tubes
Courtesy of FORD MOTOR CO.

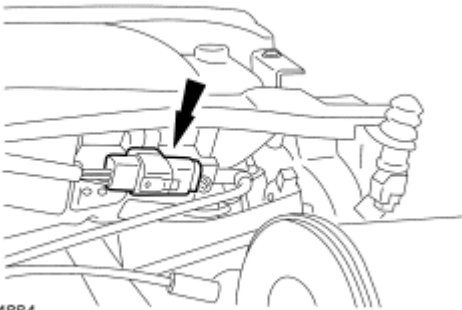
71. Connect the fuel supply manifold spring lock coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
72. Install the engine air cleaner and engine air cleaner outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
73. Install the cowl top panel and bolts.
 - Tighten to 6 Nm (53 lb-in).



N0024885

Fig. 469: Locating Cowl Top Panel Bolts
Courtesy of FORD MOTOR CO.

74. Connect the windshield wiper motor electrical connector.



N0024884

Fig. 470: Locating Windshield Wiper Motor Electrical Connector
Courtesy of FORD MOTOR CO.

75. Install the cowl panel grille. For additional information, refer to **FRONT END BODY PANELS** article.
76. Connect the battery ground and positive cables. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
77. Fill the engine with clean engine oil.
78. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING** article.
79. Fill the power steering system. For additional information, refer to **STEERING SYSTEM - GENERAL INFORMATION** article.
80. Recharge the air conditioning system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.