

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

2009 ENGINE**Engine - 5.4L (4V) - Mustang****SPECIFICATIONS****MATERIAL****Material**

Item	Specification	Fill Capacity
Motorcraft Metal Surface Prep ZC-31-A	-	-
Motorcraft Premium Gold Engine Coolant with Bittering Agent (bittered in US only) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B	6.0L (6.5 qt) with filter
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4	-
Silicone Gasket Remover ZC-30	-	-
Threadlock and Sealer TA-25	WSK-M2G351-A5	-

GENERAL SPECIFICATIONS**GENERAL SPECIFICATIONS**

Item	Specification
Engine	
Displacement	5.4L (330 CID)
Number of cylinders	8
Bore	90.215 mm (3.552 in)
Stroke	105.8 mm (4.23 in)
Firing order	1-3-7-2-6-5-4-8
Oil pressure at 2,000 RPM (engine at normal operating temperature)	276-414 kPa (40-60 psi)
Compression ratio	8.4:1
Engine weight	288 kg (634 lb)
Cylinder Head and Valve Train	
Combustion chamber volume	42.45-45.45 cc (2.59-2.77 cu in)

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Valve stem diameter - intake	7.015-6.995 mm (0.2762-0.2754 in)
Valve stem diameter - exhaust	7.00-6.98 mm (0.2756-0.2748 in)
Valve stem-to-guide clearance - intake	0.057-0.023 mm (0.0022-0.0009 in)
Valve stem-to-guide clearance - exhaust	0.072-0.038 mm (0.0028-0.0015 in)
Valve head diameter - intake	37.13-36.87 mm (1.462-1.4516 in)
Valve head diameter - exhaust	32.13-31.87 mm (1.2650-1.2547 in)
Valve face runout	0.05 mm (0.0019 in)
Valve face angle	45.75-45.25 degrees
Valve seat width - intake	1.4-1.2 mm (0.0551-0.0472 in)
Valve seat width - exhaust	1.6-1.4 mm (0.0630-0.0551 in)
Valve face runout	0.05 mm (0.0019 in)
Valve seat angle	45.00-44.50 degrees
Valve spring free length - intake	54.4 mm (2.1417 in)
Valve spring free length - exhaust	50.9 mm (2.0039 in)
Valve spring perpendicularity - intake	1.2 mm (0.0472 in)
Valve spring perpendicularity - exhaust	1.2 mm (0.0472 in)
Valve spring compression force - intake	815 N @ 31.82 mm (1.2528 in)
Valve spring compression force - exhaust	760 N @ 25.5 mm (1.0827 in)
Valve spring installed height - intake	43.00 mm (1.692 in)
Valve spring installed height - exhaust	39.5 mm (1.555 in)
Valve spring installed force - intake	310 N @ 43.00 mm (1.6929 in)
Valve spring installed force - exhaust	320 N @ 39.5 mm (1.555 in)
Roller follower ratio	1.81:1
Head gasket surface flatness	0.025 mm (0.001 in) in any 25 mm (1 in) x 25 mm (1 in) area; 0.050 mm (0.002 in) in any 150 mm (6 in) x 150 mm (6 in) area; 0.1 mm (0.004 in) overall
Hydraulic Lash Adjuster	
Diameter - intake	12.000-11.989 mm (0.4724-0.4720 in)
Diameter - exhaust	16.000-15.9888 mm (0.6299-0.6295 in)
Clearance-to-bore	0.018-0.069 mm (0.0007-0.0027 in)
Service limit - intake	12.000-11.989 mm (0.4724-0.4720 in)
Service limit - exhaust	16.000-15.9888 mm (0.6299-0.6295 in)
Hydraulic leakdown rate - intake	0.45-3 seconds ^a
Hydraulic leakdown rate - exhaust	0.60-4 seconds ^a
Collapsed lash adjuster gap	0.450-0.850 mm (0.0177-0.0335 in)
Camshaft	
Lobe lift - intake	6.15674 mm (0.242391 in)
Lobe lift - exhaust	6.5958 mm (0.2597 in)
Journal diameter	26.962-26.936 mm (1.0615-1.0605 in)
Journal bore inside diameter	27.012-26.987 mm (1.0635-1.0625 in)

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Journal-to-bearing clearance	0.076-0.025 mm (0.0030-0.0010 in)
Runout	0.09 mm (0.0035 in) (4 places)
End play	0.027-0.190 mm (0.0011-0.0075 in)
Cylinder Block	
Cylinder bore diameter	90.200-90.210 mm (3.5511-3.5515 in)
Cylinder bore maximum taper	0.006 mm (0.0002 in)
Cylinder bore maximum out-of-round	0.020 mm (0.0008 in)
Main bearing bore inside diameter	72.400-72.424 mm (2.850-2.851 in)
Head gasket surface flatness	0.0254 mm (0.001 in) across any 38.1 mm (1.5 in) square
Crankshaft	
Main bearing journal diameter	67.481-67.505 mm (2.6567-2.6577 in)
Main bearing journal maximum taper	0.004 mm (0.0002 in)
Main bearing journal maximum out-of-round	0.0075 mm (0.0003 in) between cross sections
Main bearing journal-to-main bearing clearance	0.048-0.024 mm (0.0019-0.0009 in)
Connecting rod journal diameter	53.003-52.983 mm (2.0867-2.0859 in)
Connecting rod journal maximum taper	0.004 mm (0.0002 in)
Crankshaft maximum end play	0.075-0.377 mm (0.003-0.0148 in)
Piston and Connecting Rod	
Piston diameter	90.180 ± 0.005 mm (3.5504 ± 0.0002 in)
Piston-to-cylinder bore clearance (at grade size)	0.025-0.045 mm (0.0010-0.0018 in)
Piston ring end gap - top	0.13-0.28 mm (0.0051-0.0111 in)
Piston ring end gap - intermediate	0.25-0.40 mm (0.0098-0.0157 in)
Piston ring gap - oil control	0.15-0.65 mm (0.0059-0.0256 in)
Piston ring groove width - top	1.53-1.55 mm (0.0602-0.061 in)
Piston ring groove width - intermediate	1.52-1.54 mm (0.0598-0.0606 in)
Piston ring groove width - oil control	3.030-3.050 mm (0.1193-0.1201 in)
Piston ring width	1.49-1.46 mm (0.0587-0.0575 in)
Piston ring-to-groove clearance - top	0.030-0.050 mm (0.0012-0.0020 in)
Piston ring-to-groove clearance - intermediate	0.030-0.080 mm (0.0012-0.0031 in)
Piston pin bore diameter	22.008-22.014 mm (0.8665-0.8667 in)
Piston pin diameter	22.0005-22.0030 mm (0.8662-0.8663 in)
Piston pin length	61.8 mm (2.433 in)
Piston pin-to-piston fit (clearance)	0.005-0.0135 mm (0.0002-0.0005 in)
Connecting rod-to-pin clearance	0.009-0.0235 mm (0.0004-0.0093 in)
Connecting rod pin bore diameter	22.012-22.024 mm (0.8666-0.8671 in)
Connecting rod length (centerline bore-to-bore)	169.1 mm (6.6575 in)
Connecting rod maximum allowed bend	± 0.038 mm (0.0015 in)
Connecting rod maximum allowed twist	± 0.05 mm (0.0021 in)
Connecting rod bearing bore diameter (with assembled liners)	53.049-53.027 mm (2.0885-2.0877 in)

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Connecting rod bearing-to-crankshaft clearance	0.064-0.026 mm (0.0025-0.001 in)
Connecting rod side clearance (as assembled to crank) - standard play	0.300 ± 0.175 mm (0.0118 ± 0.0069 in)
Connecting rod side clearance (as assembled to crank) - max. play	0.475 mm (0.0187 in)

^a Time required for the plunger to leak down 1.6 mm of travel with 222 N force and leak-down fluid in the lash adjuster.

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
A/C compressor stud bolts	25	18	-
Accessory drive belt idler pulley (smooth and grooved) bolt	25	18	-
Accessory drive belt tensioner bolt	25	18	-
Alternator bolts	50	37	-
Camshaft bearing cap bolts ^a	-	-	-
Camshaft drive sprocket bolts ^a	-	-	-
Camshaft Position (CMP) sensor bolt	10	-	89
Charge Air Cooler (CAC) bolts ^a	-	-	-
CAC coolant tube assembly bolts	10	-	89
Connecting rod cap bolts ^a	-	-	-
Coolant pump bolts	25	18	-
Coolant pump pulley bolt	25	18	-
Coolant tube assembly bolts	10	-	89
Coolant tube bracket nut	9	-	80
Cooling fan assembly bolts	9	-	80
Crankshaft Position (CKP) sensor bolt	10	-	89
Crankshaft pulley bolt ^a	-	-	-
Crankshaft rear seal retainer plate bolts ^a	-	-	-
Cylinder head bolts ^a	-	-	-
EGR system module bolts	25	18	-
EGR tube	40	30	-
Engine block drain plugs	14	-	124
Engine front cover bolts ^a	-	-	-
Engine support insulator bolts	55	41	-
Engine support insulator bracket bolts	63	46	-
Engine support insulator nuts	63	46	-
Exhaust manifold nuts ^a	-	-	-

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Exhaust manifold studs	12	-	106
Flywheel ^a	-	-	-
Fuel rail bolts	10	-	89
Generator B+ wire terminal nut	8	-	71
Generator bolts and stud bolt	50	37	-
Ground wire-to-LH cylinder head bolt	10	-	89
Ground wire-to-RH engine support insulator nut	25	18	-
Hood bolts	12	-	106
Ignition coil-on-plug cover bolts	10	-	89
Intake Air Temperature 2 (IAT2) sensor	15	-	133
Intake manifold assembly bolts ^a	-	-	-
Intake manifold wiring harness bracket bolts	10	-	89
Intermediate steering shaft bolt	47	35	-
Lower intake manifold cover bolts ^a	-	-	-
Main bearing cap bolts ^a	-	-	-
Main bearing cap side bolts ^a	-	-	-
Oil cooler bolts ^a	-	-	-
Oil filter ^a	-	-	-
Oil filter adapter bolts ^a	-	-	-
Oil level indicator tube bolt	10	-	89
Oil pan bolts ^a	-	-	-
Oil pan drain plug	26	19	-
Oil pan stud bolt wire harness bracket retainer nut	10	-	89
Oil pan-to-engine front cover bolts	25	15	-
Oil pan-to-engine front cover stud bolt	25	18	-
Oil pump bolts ^a	-	-	-
Oil pump screen and pickup tube (large bolts)	25	18	-
Oil pump screen and pickup tube (small bolts)	10	-	89
Power Distribution Box (PDB) connector bolt	6	-	53
Power Steering Pressure (PSP) tube fitting	65	48	-
Power steering pump bolts	25	18	-
Power steering reservoir bracket bolts	25	18	-
Power steering tube bracket bolt	10	-	89
Power steering tube bracket nut	10	-	89
Radio interference capacitor nuts	10	-	89
Spark plugs	18	-	159
Starter B+ terminal nut	12	-	106
Starter bolts ^a	-	-	-
Starter S-terminal nut	5	-	44

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Steering column dash boot nuts	9	-	80
Strut tower cross brace nuts	35	26	-
Subframe bolts	115	85	-
Subframe cross brace nut	48	35	-
Subframe nuts	115	85	-
Supercharger (SC) bolts ^a	-	-	-
SC drive belt heavy load idler (closest to centerline of engine) bolt	48	35	-
SC drive belt idler (smooth and grooved) bolts	25	18	-
SC drive belt tensioner bolt	48	35	-
Thermostat housing nuts	25	18	-
Throttle Body (TB) and spacer bolts	10	-	89
Timing chain guide bolts	10	-	89
Timing chain tensioner bolts (primary)	25	18	-
Timing chain tensioner bolts (secondary)	10	-	89
Valve cover bolts ^a	-	-	-
Windage tray nuts ^a	-	-	-

^a Refer to the procedure.

DESCRIPTION AND OPERATION

ENGINE

The 5.4L (330 CID) is a V-8 engine with the following features:

- Dual overhead camshafts
- Four valves per cylinder
- Sequential Multi-Port Fuel Injection (SFI)
- Aluminum cylinder heads
- Cast iron, 90-degree V-cylinder block
- Individually chain-driven camshafts with a hydraulic timing chain tensioner on each timing chain
- Electronic ignition system with 8 ignition coils
- Supercharger (SC)
- Charge Air Cooler (CAC)

Identification

For quick identification, refer to the safety certification decal.

- The decal is located on the LH front door lock face panel.
- Find the engine code (letter or number) on the decal, then refer to the Engine Identification Chart to

determine engine type and size. Refer to **IDENTIFICATION CODES** .

- The symbol code on the identification tag identifies each engine for determining parts usage; for example, engine displacement in liters or cubic inch displacement and model year.

Engine Code Information

The engine code information label is located on the engine front cover. The label contains, among other information:

- the engine calibration number.
- the engine build date.
- the engine plant code.
- the engine code.

Emission Calibration Label

NOTE: **The engine codes and the calibration numbers must be used when making inquiries or ordering parts.**

The emission calibration number label is located on the LH side door or LH door post pillar. It identifies:

- the engine calibration number.
- the engine code number.
- the revision level.

These numbers are used to determine if parts are unique to specific engines.

Supercharger (SC)

NOTE: **Some Mustang Shelby GT500 vehicles may exhibit a SC belt squeal during 1st to 2nd gear shift under hard acceleration. This is due to the transmission being shifted faster than the SC drive belt system can respond. This is a normal characteristic of this vehicle under this driving condition.**

The SC is a positive displacement pump. Its purpose is to supply an excess volume of intake air to the engine by increasing air pressure and density in the intake manifold. The SC is matched to the engine by its displacement and belt ratio, and can provide excess airflow at any engine speed.

NOTE: **The SC is repaired only as an assembly. Disassembly of the SC unit may void the warranty.**

NOTE: **The SC is not a bolt-on option. It is part of an integrated engine system. Many components of the supercharged engine are not interchangeable with similar parts from a non-supercharged engine.**

The SC contains two 3-lobed rotors. The helical shape and specialized porting provide a smooth discharge flow and low level of noise during operation. The rotors are supported by ball bearings in front and needle bearings at the rear. The drive gears are pressed into place, therefore the SC is installed new as a unit, and is not repairable.

The SC system is a blow-through type with the fuel injected directly into the intake ports. The SC is belt driven off the crankshaft through an idler pulley. The throttle body controls the amount of intake air to the SC through the intake plenum. Air from the SC is routed through the CAC, then to the intake manifold. The resulting denser air charge in the combustion chamber provides for a higher power output of the engine over a non-supercharged engine of the same displacement.

NOTE: **It is not possible to increase manifold pressure or engine power output by altering the bypass valve or the actuator.**

At partial-throttle opening or when vacuum is present in the intake system, a vacuum controlled bypass valve reroutes some discharged air from the SC back through the intake plenum. This prevents the SC from cavitating, causing reduced performance, increased temperatures and poor economy.

The SC has a self-contained oiling system that does not require a fluid change for the life of the vehicle.

Induction System

The SFI provides the fuel/air mixture needed for combustion in the cylinders. The 8 solenoid-operated fuel injectors:

- are mounted in the fuel injection supply manifold and the intake manifold above the cylinder heads.
- meter fuel into the air intake stream in accordance with engine demand.
- are positioned so that their tips direct fuel just ahead of the engine intake valves.
- are connected in series with the fuel pressure regulator.
- supply fuel from the fuel tank by a fuel pump mounted in the fuel tank.

A constant fuel pressure drop is maintained across the fuel injectors by the fuel pressure regulator. The fuel pressure regulator:

- is positioned upstream from the fuel injectors on the fuel injection supply manifold.

Crankshaft

The crankshaft is supported on the bottom of the cylinder block by 5 crankshaft main bearings.

Camshafts

The camshafts:

- are arranged in pairs, one each (intake and exhaust) on each cylinder head.
- are synchronized through a secondary timing chain.

- depress the roller followers to actuate the valves.

Valve Train

The valves are actuated by a direct acting hydraulic lash adjuster and roller follower. The direct acting hydraulic lash adjusters and roller followers:

- provide hydraulic lash adjustment.
- ride on the camshaft lobes.

Engine Lubrication System

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the:

- crankshaft main bearings.
- crankshaft thrust main bearing.
- connecting rod bearings.
- oil galleries.

All other parts are lubricated by splash of the oil.

Oil Pump

The lubrication system of the 5.4L (4V) engine is designed to provide optimum oil flow to critical components of the engine through its entire operating range. The heart of the system is a positive displacement internal gear oil pump using top seal rotors.

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

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

Engine Cylinder Identification

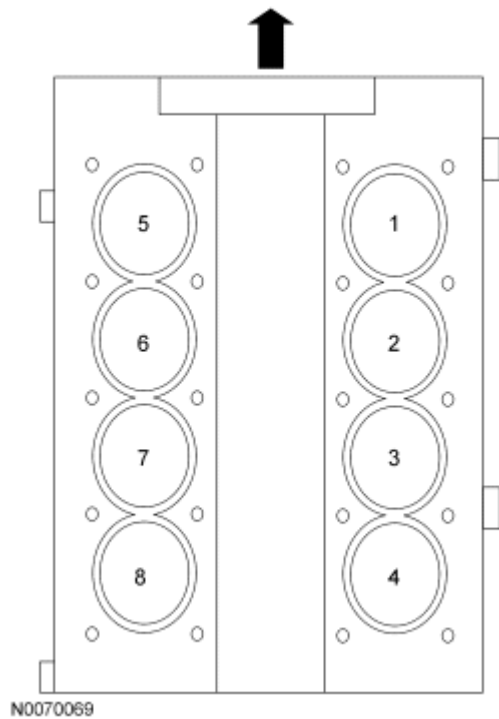


Fig. 1: Engine Cylinder Identification
Courtesy of FORD MOTOR CO.

DIAGNOSTIC TESTS

ENGINE

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

IN-VEHICLE SERVICING

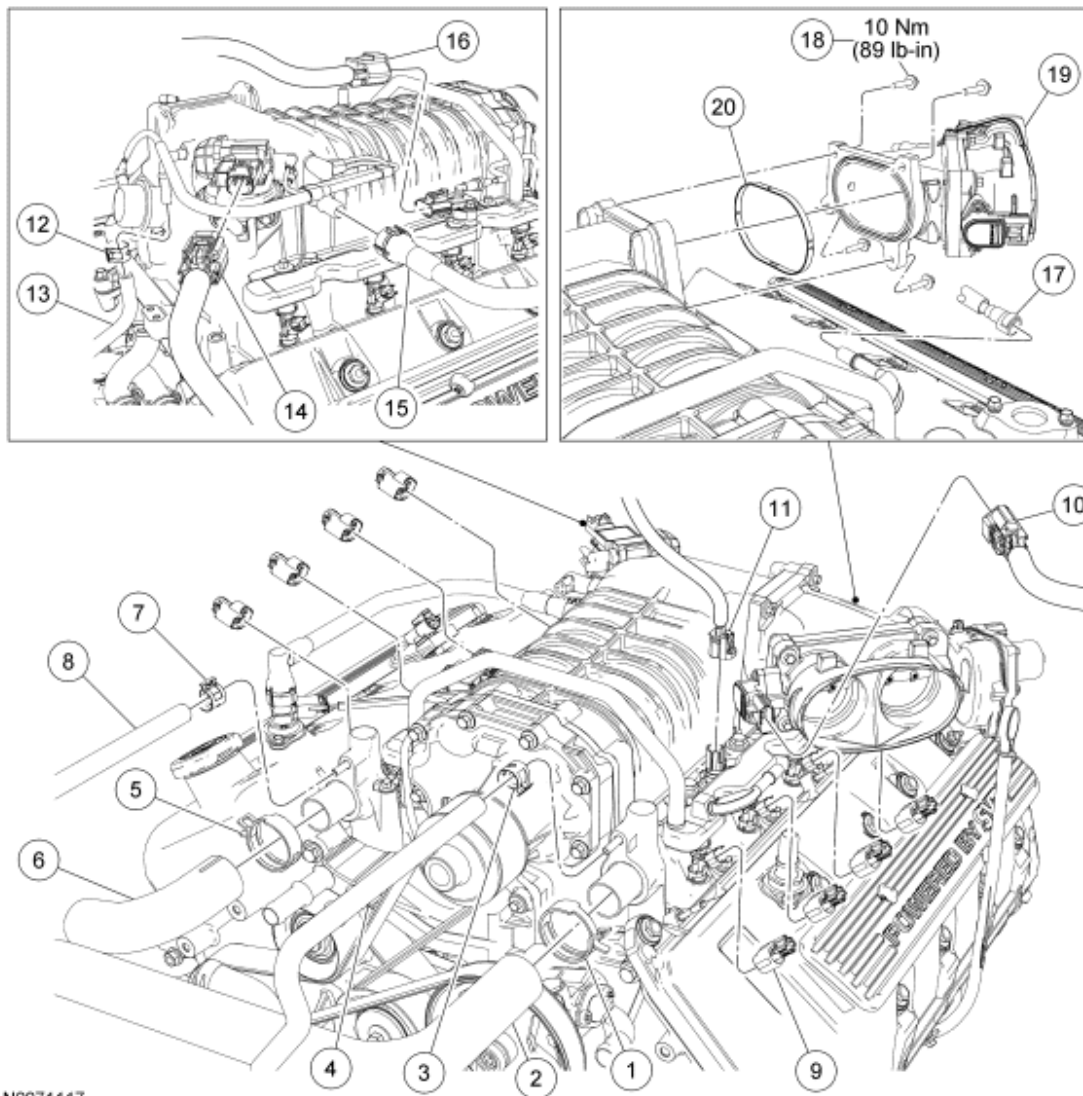
INTAKE MANIFOLD

Material

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

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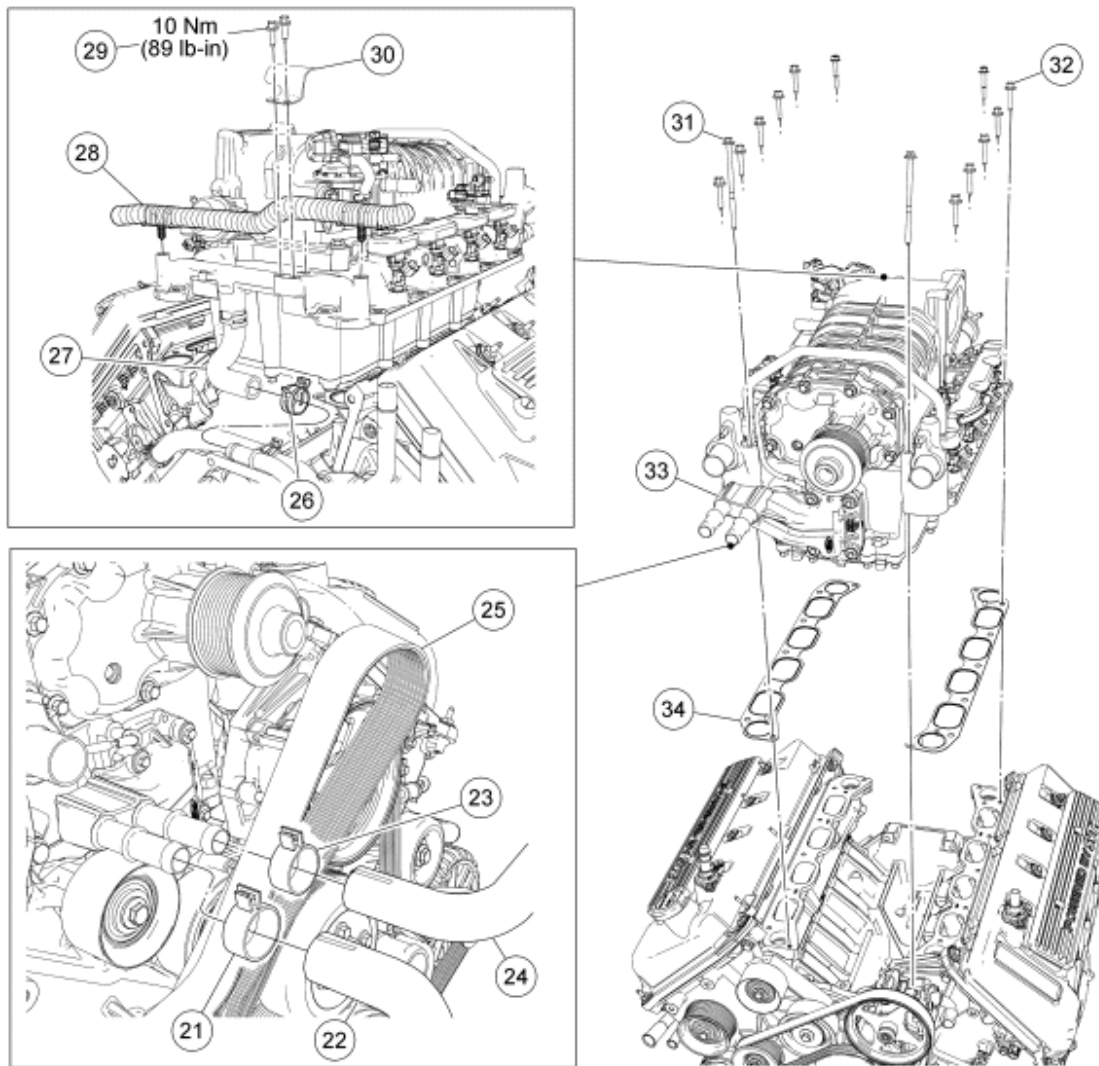
Fig. 2: Exploded View Of Intake Manifold With Torque Specification (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	15161	Upper radiator hose clamp
2	8A586	Upper radiator hose
3	W527352	Coolant vent hose clamp
4	8276	Coolant vent hose
5	15161	Upper radiator hose clamp
6	8A586	Upper radiator hose
7	W527352	Coolant vent hose clamp
8	8276	Coolant vent hose
9	14A464	Fuel injector electrical connector (8 required) (part of 12B637)
10	14A464	Throttle Position (TP) sensor electrical connector (part of 12B637)

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11	14A464	Intake Air Temperature 2 (IAT2) sensor electrical connector (part of 12B637)
12	W527352	Supercharger (SC) bubbler hose clamp (part of 6C324)
13	6C324	SC bubbler hose
14	14A464	EGR system module electrical connector (part of 12B637)
15	6K817	Crankcase ventilation tube
16	14A464	Fuel rail pressure and temperature sensor electrical connector (part of 12B637)
17	9J280	Fuel supply tube
18	N806154	Throttle Body (TB) spacer bolt (4 required)
19	9E822	TB and spacer assembly
20	9L437	TB spacer gasket



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Fig. 3: Exploded View Of Intake Manifold With Torque Specification (2 Of 2)

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Courtesy of FORD MOTOR CO.

Item	Part Number	Description
21	W527362	Charge Air Cooler (CAC) hose clamp
22	8D030	CAC hose
23	W527362	CAC hose clamp
24	8D031	CAC hose
25	8620	SC drive belt
26	8287	Heater hose clamp
27	18C553	Heater hose
28	-	Wiring harness pin-type retainer (2 required) (part of 12B637)
29	-	Wiring harness retainer bolt (2 required)
30	14K060	Wiring harness retainer
31	W705654	Intake manifold bolt (2 required)
32	W704682	Intake manifold bolt (12 required)
33	9H487	Intake manifold
34	9439	Intake manifold gasket (2 required)

REMOVAL

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

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

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

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
2. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING**.
3. Drain the Supercharger (SC) cooling system. For additional information, refer to **SUPERCHARGER COOLING**.
4. Remove the 4 nuts and the strut tower cross brace.

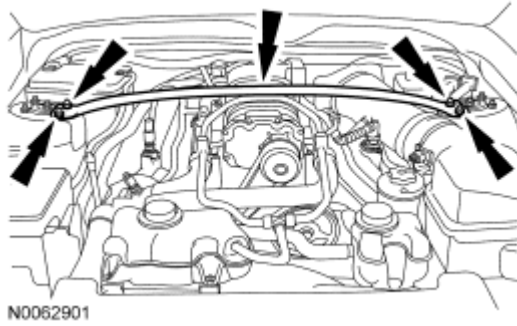
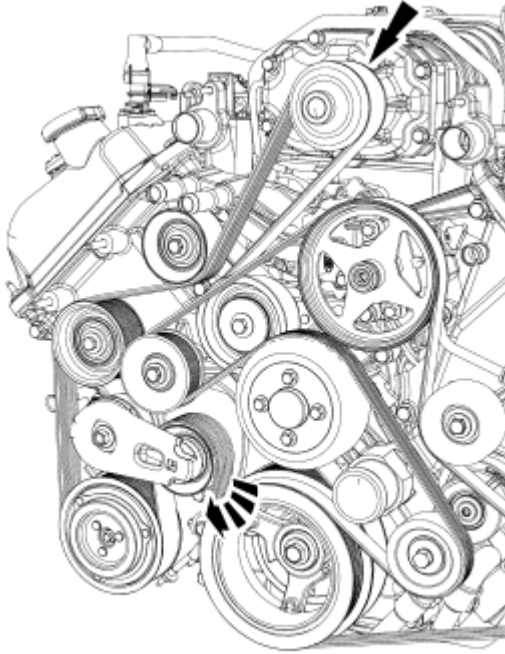


Fig. 4: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

5. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
6. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
7. Remove the EGR tube. For additional information, refer to **ENGINE EMISSION CONTROL**.
8. Disconnect the Throttle Position (TP) sensor electrical connector.
9. Remove the 4 bolts and position the Throttle Body (TB) and spacer assembly aside.
10. Disconnect the Intake Air Temperature 2 (IAT2) sensor electrical connector.
11. Disconnect the fuel supply tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
12. Disconnect the 4 LH fuel injector electrical connectors.
13. Remove the 2 bolts and the wiring harness retainer from the rear of the intake manifold.
14. Detach the 2 wiring harness pin-type retainers from the rear of the intake manifold.
15. Disconnect the fuel rail pressure and temperature sensor electrical connector.
16. Disconnect the 4 RH fuel injector electrical connectors.
17. Disconnect the EGR system module electrical connector.
18. Disconnect the crankcase ventilation tube from the RH side of the SC.
19. Disconnect the SC bubbler hose from the rear of the SC.
20. Rotate the SC drive belt tensioner clockwise and remove the drive belt from the SC drive pulley.



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Fig. 5: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC
Courtesy of FORD MOTOR CO.

21. Disconnect the 2 upper radiator hoses and the 2 coolant vent hoses from the intake manifold.
22. Disconnect the 2 coolant hoses from the Charge Air Cooler (CAC).
23. Disconnect the heater hose located below the rear of the intake manifold.
24. Remove the 14 bolts and the intake manifold assembly.
 - Discard the gaskets.

INSTALLATION

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

1. Using new intake manifold gaskets, position the intake manifold.
2. Install the 14 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

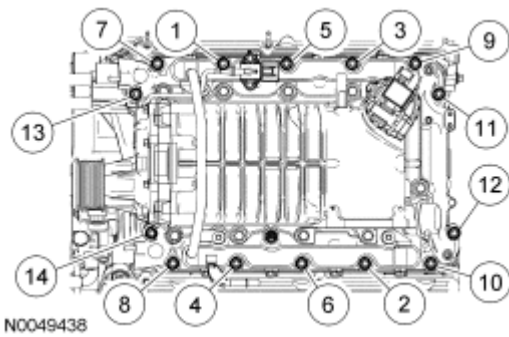


Fig. 6: Identifying Intake Manifold Gasket Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Connect the heater hose located below the rear of the intake manifold.
4. Connect the 2 coolant hoses to the CAC.
5. Connect the 2 upper radiator hoses and the 2 coolant vent hoses to the intake manifold.
6. Rotate the SC drive belt tensioner clockwise and install the drive belt onto the SC drive pulley.

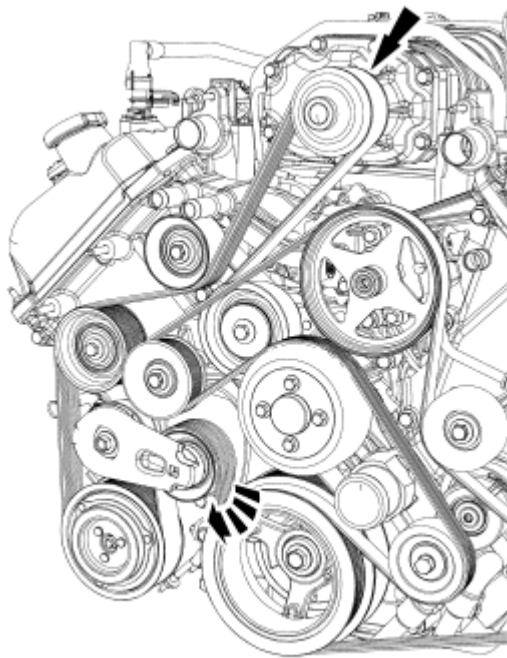


Fig. 7: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC
Courtesy of FORD MOTOR CO.

7. Connect the SC bubbler hose to the rear of the SC.
8. Connect the crankcase ventilation tube to the RH side of the SC.
9. Connect the EGR system module electrical connector.
10. Connect the 4 RH fuel injector electrical connectors.

11. Connect the fuel rail pressure and temperature sensor electrical connector.
12. Attach the 2 wiring harness pin-type retainers to the rear of the intake manifold.
13. Install the wiring harness retainer and the 2 bolts onto the rear of the intake manifold.
14. Connect the 4 LH fuel injector electrical connectors.
15. Connect the fuel supply tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** .
16. Connect the IAT2 sensor electrical connector.
17. Install the TB and spacer assembly and the 4 bolts.
 - Tighten to 10 Nm (89 lb-in).
18. Connect the TP sensor electrical connector.
19. Install the EGR tube. For additional information, refer to **ENGINE EMISSION CONTROL** .
20. Install the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** .
21. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .
22. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).

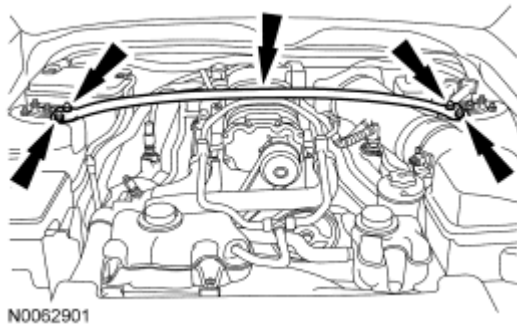


Fig. 8: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

23. Fill and bleed the SC cooling system. For additional information, refer to **SUPERCHARGER COOLING** .
24. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING** .

VALVE COVER - RH

Material

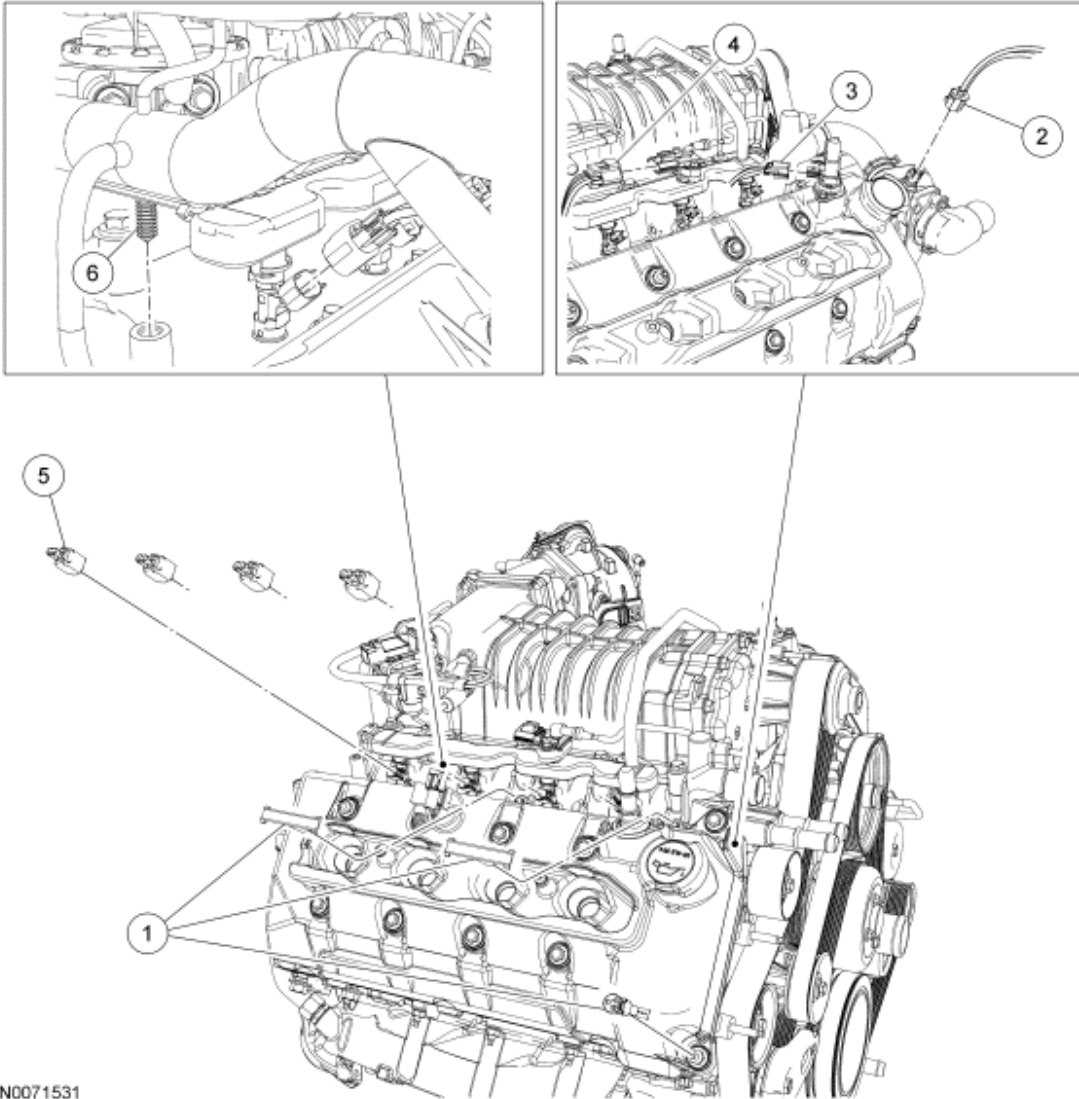
Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

Silicone Gasket Remover
ZC-30

-



N0071531

Fig. 9: Exploded View Of RH Valve Cover (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	-	Wiring harness retainers (3 required) (part of 12B637)
2	14A464	Engine Coolant Temperature (ECT) sensor electrical connector (part of 12B637)
3	14A464	PCV valve electrical connector (part of 12B637)
4	14A464	Fuel rail pressure and temperature sensor electrical connector (part of 12B637)
5	14A464	RH fuel injector electrical connector (4 required) (part of 12B637)

6 - Wiring harness retainer (part of 12B637)

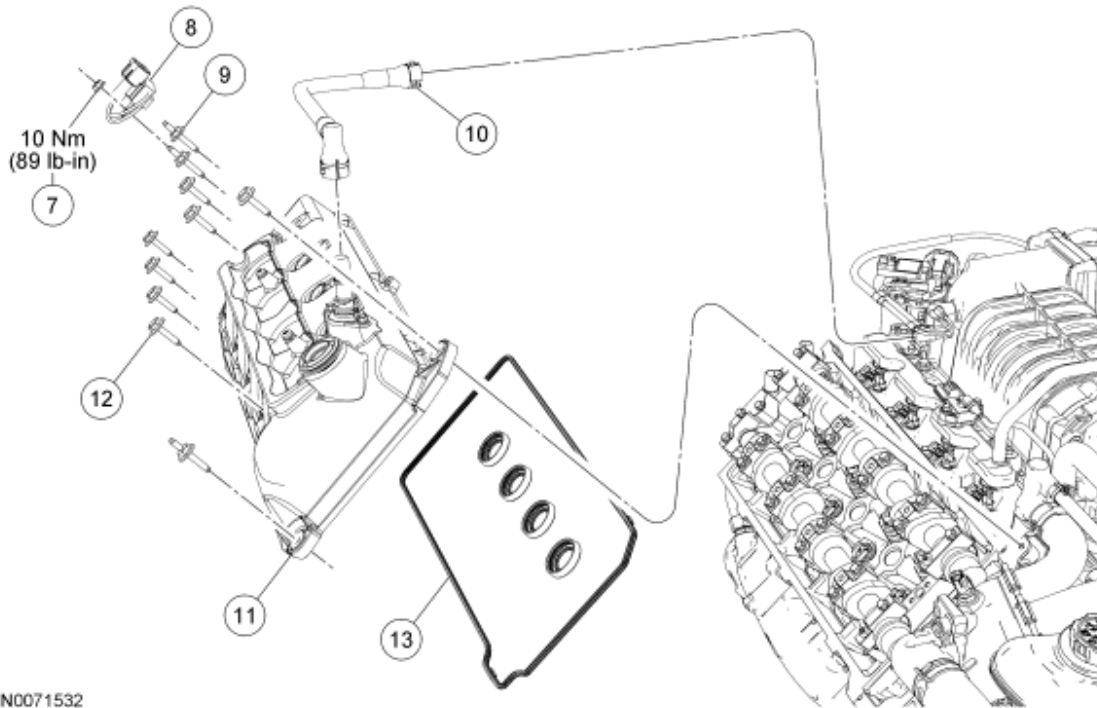


Fig. 10: Exploded View Of RH Valve Cover With Torque Specification (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
7	W520111	RH radio interference capacitor nut
8	18801	RH radio interference capacitor
9	W708442	RH valve cover stud bolt (3 required)
10	64817	Crankcase ventilation hose
11	6582	RH valve cover assembly
12	W708441	RH valve cover bolt (7 required)
13	6584	RH valve cover gasket

REMOVAL

1. Remove the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
2. Remove the 4 nuts and the strut tower cross brace.

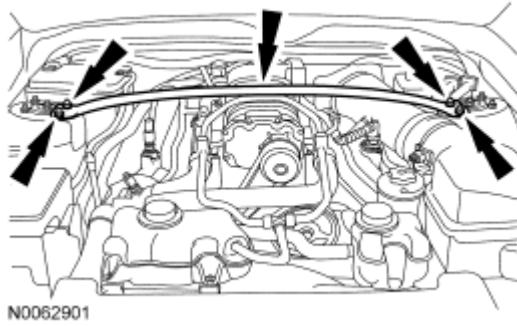


Fig. 11: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

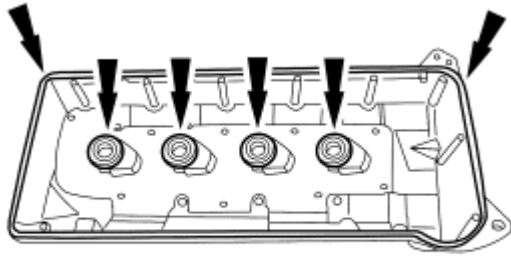
3. Remove the RH ignition coils. For additional information, refer to **ENGINE IGNITION - 5.4L (4V)** .
4. Remove the crankcase ventilation tube.
5. Disconnect the PCV valve electrical connector.
6. Remove the nut and the RH radio interference capacitor.
7. Disconnect the 4 RH fuel injector electrical connectors.
8. Disconnect the fuel rail pressure and temperature sensor electrical connector.
9. Disconnect the Engine Coolant Temperature (ECT) sensor electrical connector.
10. Detach the 3 wiring harness retainers from the RH valve cover studs.
11. Detach the wiring harness pin-type retainer from the rear of the intake manifold.
12. Remove the 7 bolts, 3 stud bolts and RH valve cover.
 - Remove and discard the gaskets.

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

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

INSTALLATION

1. Install new gaskets. Make sure the gaskets are correctly seated on the valve cover.

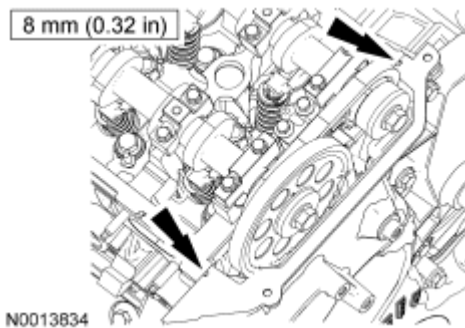


A0056221

Fig. 12: Locating Gaskets On Valve Cover
Courtesy of FORD MOTOR CO.

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

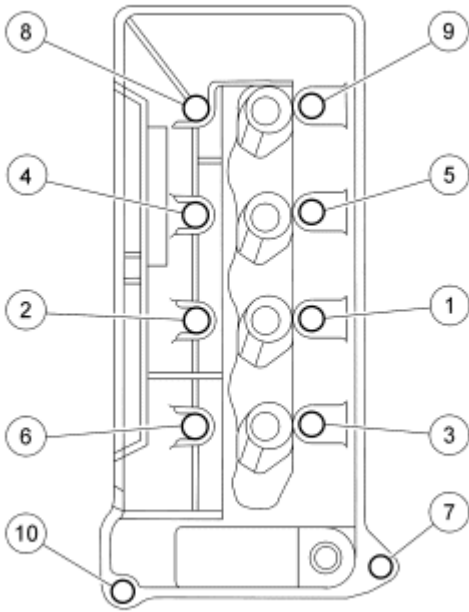
2. Apply a bead of silicone gasket and sealant in 2 places where the engine front cover meets the cylinder head.



N0013834

Fig. 13: Applying Bead Of Silicone Gasket & Sealant In 2 Places Where Engine Front Cover Meets Cylinder Head
Courtesy of FORD MOTOR CO.

3. Install the RH valve cover, the 7 bolts and 3 stud bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).



A0100283

Fig. 14: Identifying RH Valve Cover, Bolts & Stud Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Attach the wiring harness pin-type retainer to the rear of the intake manifold.
5. Attach the 3 wiring harness retainers to the RH valve cover studs.
6. Connect the ECT sensor electrical connector.
7. Connect the fuel rail pressure and temperature sensor electrical connector.
8. Connect the 4 RH fuel injector electrical connectors.
9. Install the RH radio interference capacitor and the nut.
 - Tighten to 10 Nm (89 lb-in).
10. Connect the PCV valve electrical connector.
11. Install the crankcase ventilation tube.
12. Install the RH ignition coils. For additional information, refer to **ENGINE IGNITION - 5.4L (4V)**.
13. Install the 4 nuts and the strut tower cross brace.
 - Tighten to 35 Nm (26 lb-ft).

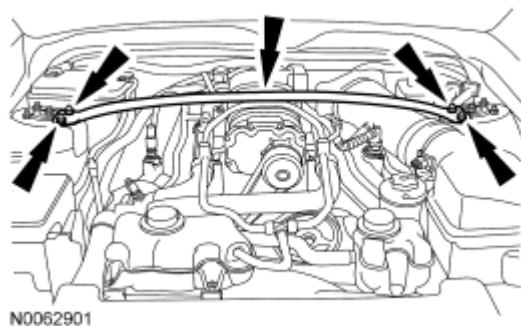


Fig. 15: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

14. Install the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES** .

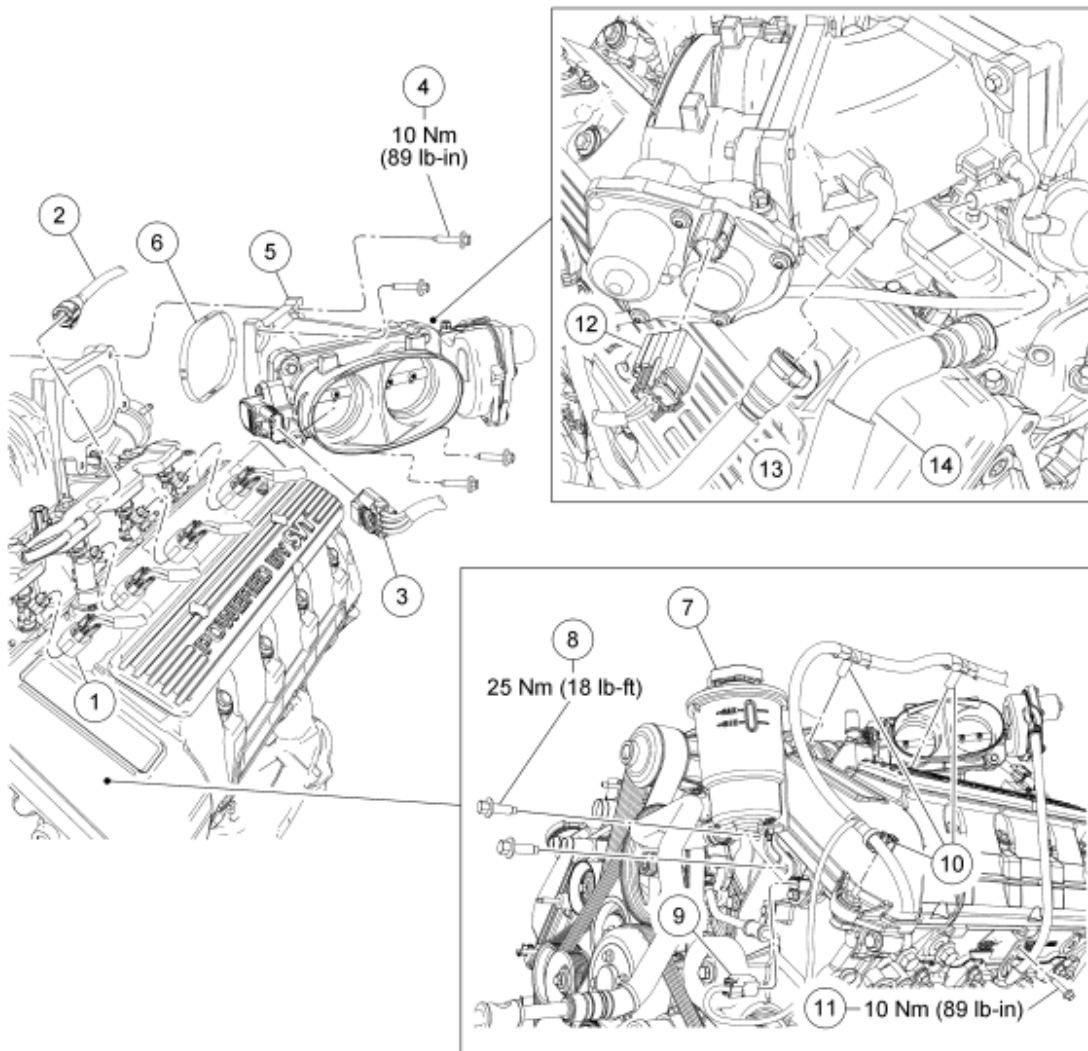
VALVE COVER - LH

Material

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

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang



N0071766

Fig. 16: Exploded View Of LH Valve Cover With Torque Specifications (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	LH fuel injector electrical connector (4 required) (part of 12B637)
2	9J280	Fuel supply tube
3	14A464	Throttle Position (TP) sensor electrical connector (part of 12B637)
4	N806154	Throttle Body (TB) spacer bolt (4 required)
5	9E822	TB and spacer
6	9L437	TB spacer gasket
7	3R700	Power steering reservoir
8	W500223	Power steering reservoir bolt (2 required)
9	14A464	Camshaft Position (CMP) sensor electrical connector (part of 12B637)
10	-	Wiring harness retainers (3 required) (part of 12B637)
11	-	Camshaft Position (CMP) sensor electrical connector (part of 12B637)

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11	N806155	Oil level indicator tube bolt
12	14A464	Electronic throttle control electrical connector (part of 12B637)
13	9G271	Evaporative Emission (EVAP) hose
14	2B432	Brake booster vacuum hose

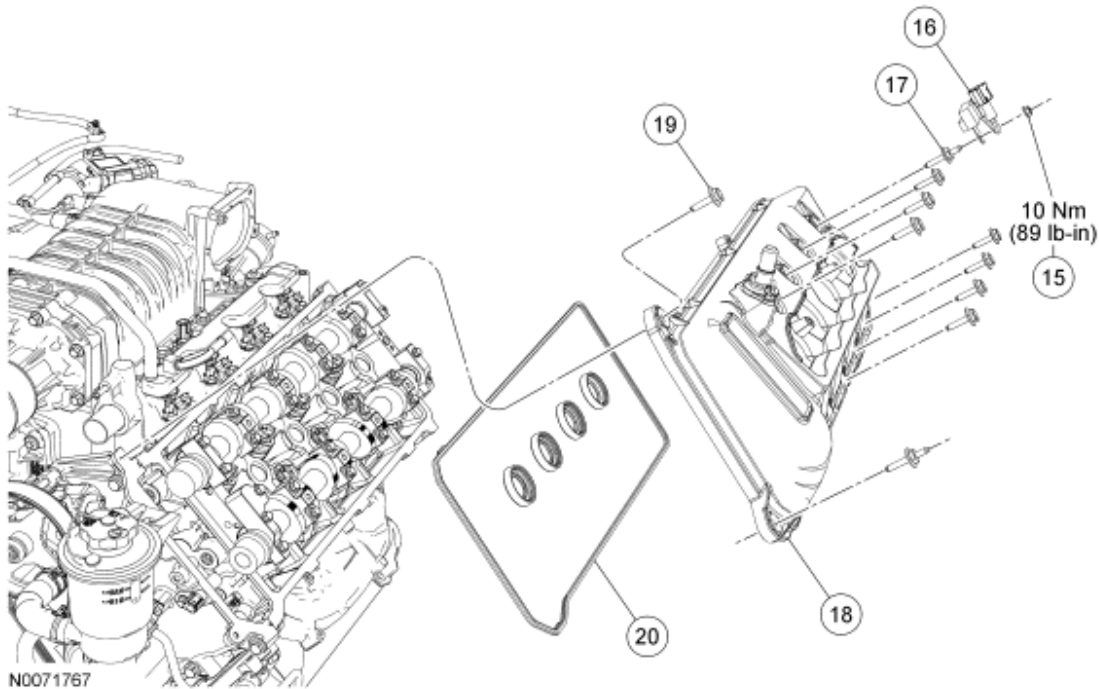


Fig. 17: Exploded View Of LH Valve Cover With Torque Specification (2 Of 2)

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
15	W520111	LH radio interference capacitor nut
16	18801	LH radio interference capacitor
17	W708442	LH valve cover stud bolt (2 required)
18	6A505	LH valve cover
19	W708441	LH valve cover bolt (8 required)
20	6584	LH valve cover gasket

REMOVAL

1. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
3. Remove the 4 nuts and the strut tower cross brace.

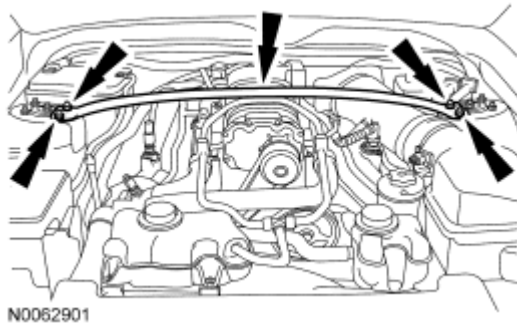


Fig. 18: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

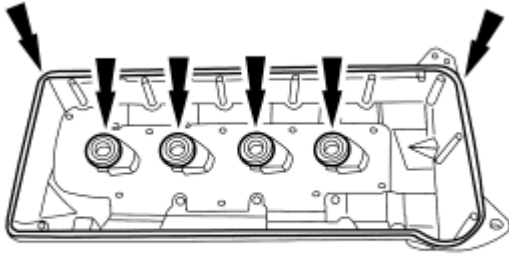
4. Remove the power brake booster. For additional information, refer to **POWER BRAKE ACTUATION**.
5. Remove the Air Cleaner (ACL) assembly and ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
6. Remove the LH ignition coils. For additional information, refer to **ENGINE IGNITION - 5.4L (4V)**.
7. Disconnect the Throttle Position (TP) sensor electrical connector.
8. Disconnect the electronic throttle control electrical connector.
9. Disconnect the brake booster vacuum hose from the Throttle Body (TB) spacer.
10. Disconnect the Evaporative Emission (EVAP) hose from the TB spacer.
11. Remove the 4 bolts and the TB and spacer assembly.
 - Discard the gasket.
12. Disconnect the 4 LH fuel injector electrical connectors.
13. Disconnect the fuel supply tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
14. Remove the nut and the LH radio interference capacitor.
15. Disconnect the Camshaft Position (CMP) sensor electrical connector.
16. Remove the 2 power steering reservoir bracket bolts and position the reservoir aside.
17. Detach the 3 wiring harness retainers from the LH valve cover studs.
18. Remove the bolt and position the oil level indicator tube aside.
19. Remove the 8 bolts, 2 stud bolts and LH valve cover.
 - Remove and discard the gaskets.

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

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

INSTALLATION

1. Install new gaskets. Make sure the gaskets are correctly seated on the valve cover.



A0056221

Fig. 19: Locating Gaskets On Valve Cover
Courtesy of FORD MOTOR CO.

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

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

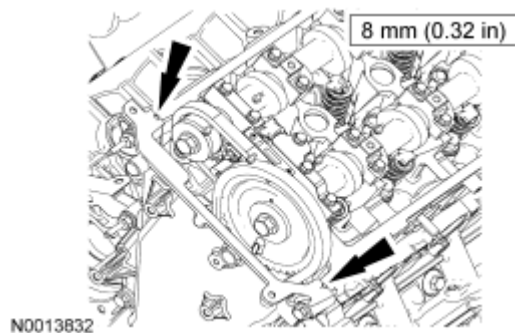
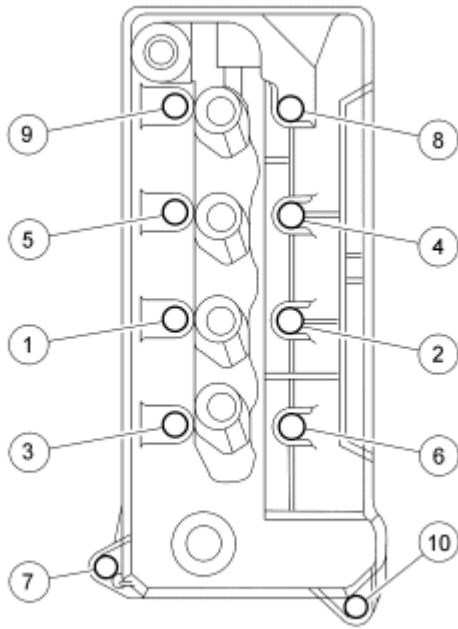


Fig. 20: Applying Bead Of Silicone Gasket & Sealant In 2 Places Where Engine Front Cover Meets Cylinder Head
Courtesy of FORD MOTOR CO.

3. Install the RH valve cover, the 8 bolts and 2 stud bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).



A0100284

Fig. 21: Identifying RH Valve Cover, Bolts & Stud Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Position the oil level indicator tube and install the bolt.
 - Tighten to 10 Nm (89 lb-in).
5. Attach the 3 wiring harness retainers to the LH valve cover studs.
6. Position the power steering reservoir and install the 2 power steering reservoir bracket bolts.
 - Tighten to 25 Nm (18 lb-ft).
7. Connect the CMP sensor electrical connector.
8. Install the LH radio interference capacitor and nut.
 - Tighten to 10 Nm (89 lb-in).
9. Connect the fuel supply tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
10. Connect the 4 LH fuel injector electrical connectors.
11. Using a new gasket, install the TB and spacer assembly and the 4 bolts.
 - Tighten to 10 Nm (89 lb-in).
12. Connect the EVAP hose to the TB spacer.
13. Connect the brake booster vacuum hose to the TB spacer.
14. Connect the electronic throttle control electrical connector.
15. Connect the TP sensor electrical connector.
16. Install the LH ignition coils. For additional information, refer to **ENGINE IGNITION - 5.4L (4V)**.
17. Install the ACL assembly and ACL outlet pipe. For additional information, refer to **INTAKE AIR**

DISTRIBUTION AND FILTERING

18. Install the power brake booster. For additional information, refer to **POWER BRAKE ACTUATION**.
19. Install the 4 nuts and the strut tower cross brace.
 - Tighten to 35 Nm (26 lb-ft).

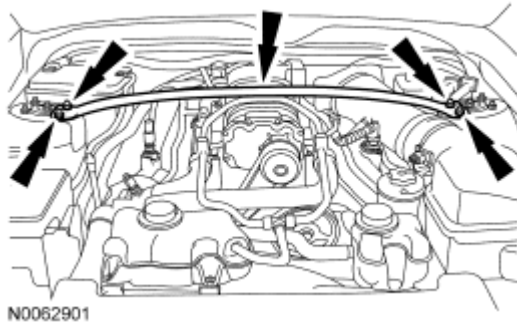


Fig. 22: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

20. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.

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

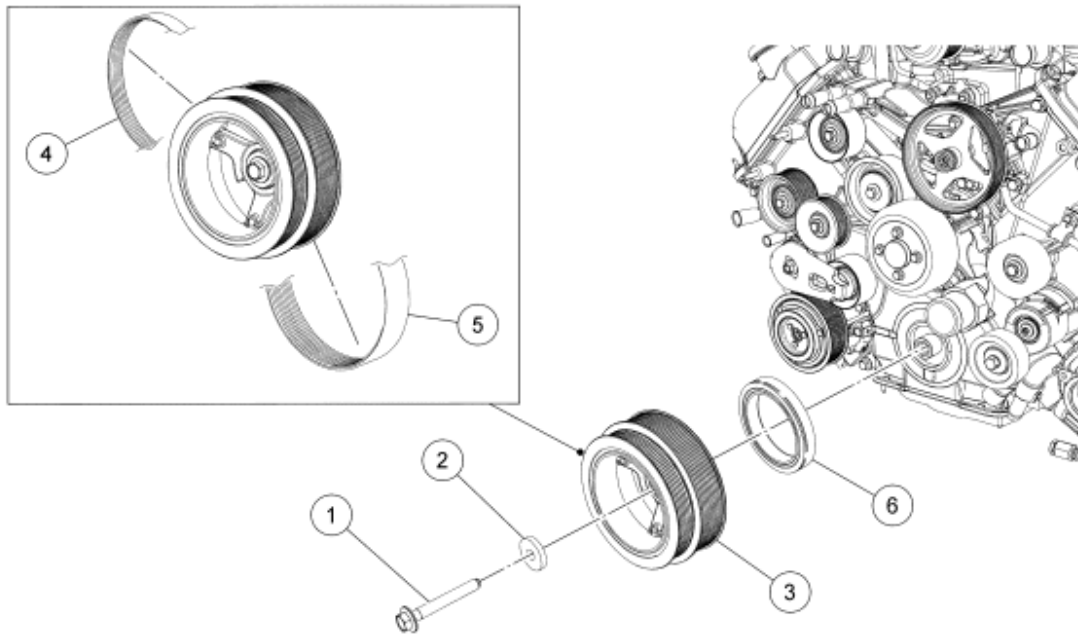


Fig. 23: Exploded View Of Crankshaft Pulley & Crankshaft Front Seal - Lower End Components
Courtesy of FORD MOTOR CO.

2009 Ford Mustang GT

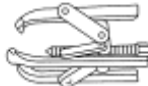
2009 ENGINE Engine - 5.4L (4V) - Mustang

Item	Part Number	Description
1	6A340	Crankshaft pulley bolt
2	N806165	Crankshaft pulley washer
3	6316	Crankshaft pulley
4	8620	Accessory drive belt
5	8620	Supercharger (SC) drive belt
6	6700	Crankshaft front seal

1. For additional information, refer to the procedures.

CRANKSHAFT PULLEY

Special Tools

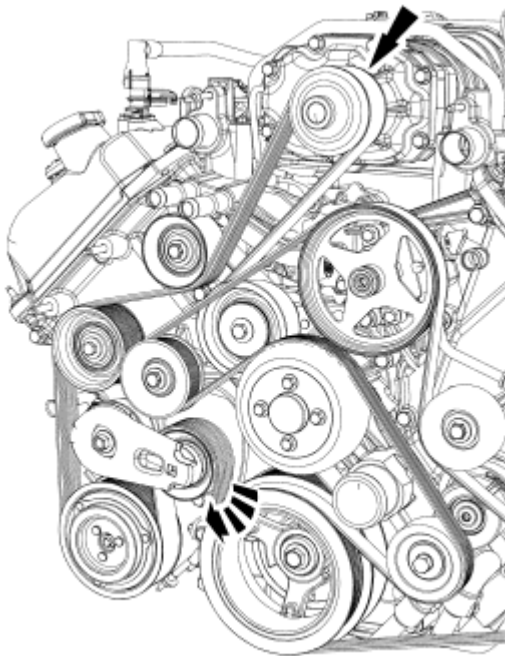
Illustration	Tool Name	Tool Number
 ST1184-A	3-Jaw Puller	303-D121 or equivalent
 ST1287-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

Material

Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the cooling fan assembly. For additional information, refer to **ENGINE COOLING**.
3. Rotate the Supercharger (SC) drive belt tensioner clockwise and remove the drive belt from the SC drive pulley.



N0071530

Fig. 24: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC
Courtesy of FORD MOTOR CO.

4. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt from the power steering pump pulley.

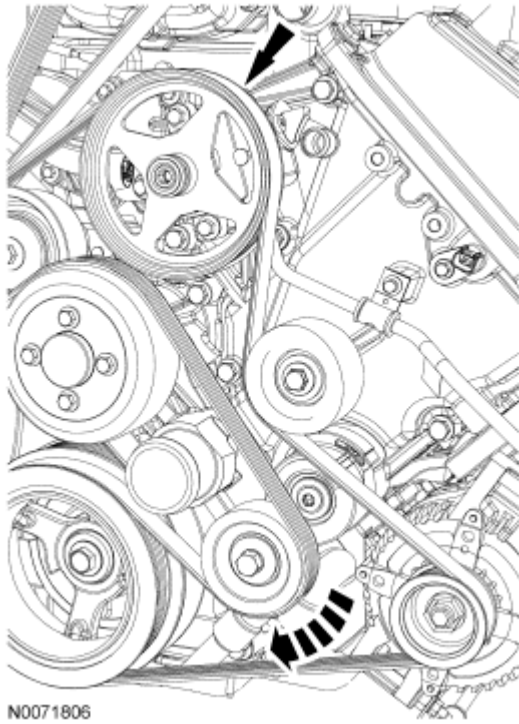


Fig. 25: Rotating Accessory Drive Belt Tensioner Clockwise & Removing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

5. Position the accessory drive belt and SC drive belt away from the crankshaft pulley.
6. Using the Strap Wrench, remove the crankshaft pulley bolt and the washer.
 - Discard the bolt.

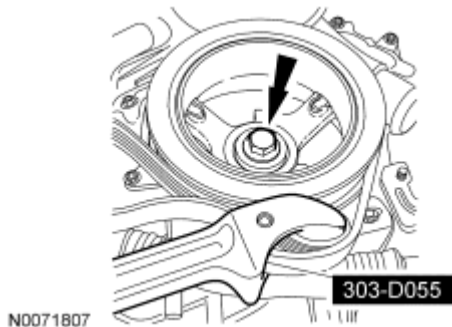


Fig. 26: Removing Crankshaft Pulley Bolt & Washer Using Strap Wrench
Courtesy of FORD MOTOR CO.

7. Using the 3-Jaw Puller, remove the crankshaft pulley.

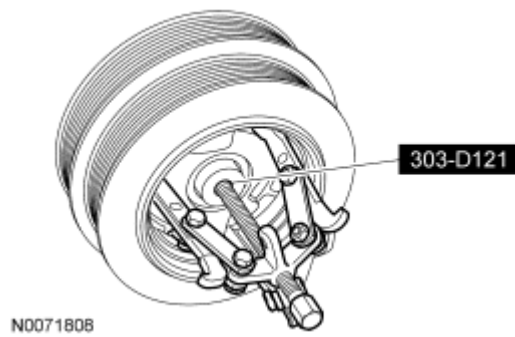


Fig. 27: Removing Crankshaft Pulley Using 3-Jaw Puller
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

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

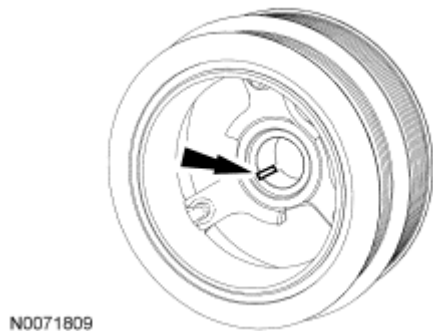


Fig. 28: Applying Silicone Gasket & Sealant To Woodruff Key Slot On Crankshaft Pulley
Courtesy of FORD MOTOR CO.

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

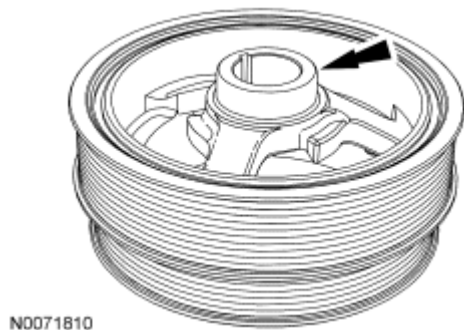


Fig. 29: Lubricating Crankshaft Pulley Sealing Surface With Clean Engine Oil Prior To

Installation**Courtesy of FORD MOTOR CO.**

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

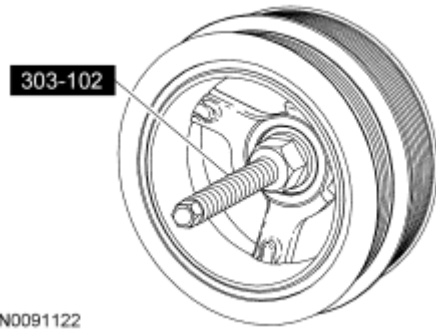


Fig. 30: Installing Crankshaft Pulley Using Crankshaft Vibration Damper Installer
Courtesy of FORD MOTOR CO.

4. Using the Strap Wrench, install a new crankshaft pulley bolt and the original washer, tighten the bolt in 4 stages:
 - Stage 1: Tighten to 120 Nm (88 lb-ft).
 - Stage 2: Loosen one full turn.
 - Stage 3: Tighten to 50 Nm (37 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.

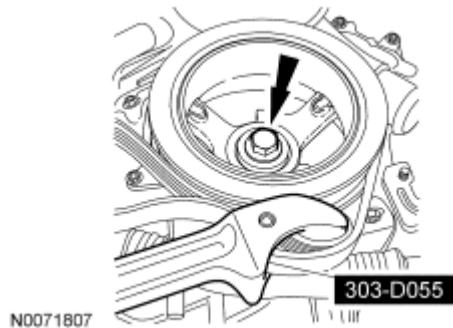


Fig. 31: Removing Crankshaft Pulley Bolt & Washer Using Strap Wrench
Courtesy of FORD MOTOR CO.

5. Position the accessory drive belt and SC drive belt onto the crankshaft pulley.
6. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt onto the power steering pump pulley.

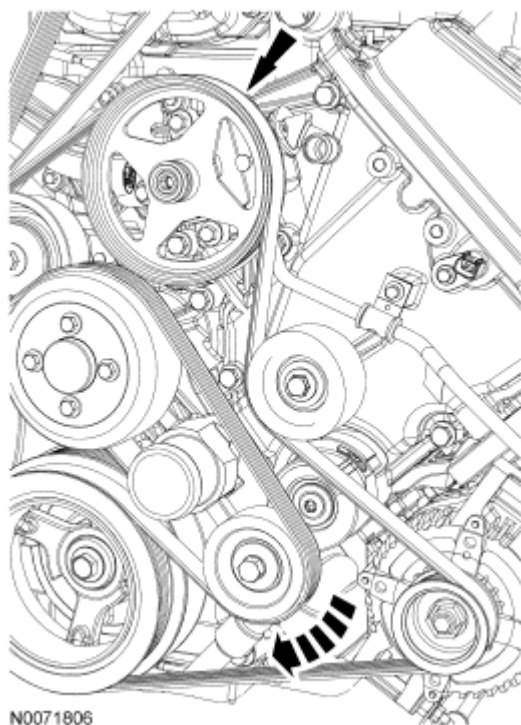


Fig. 32: Rotating Accessory Drive Belt Tensioner Clockwise & Removing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

7. Rotate the SC drive belt tensioner clockwise and install the drive belt onto the SC drive pulley.

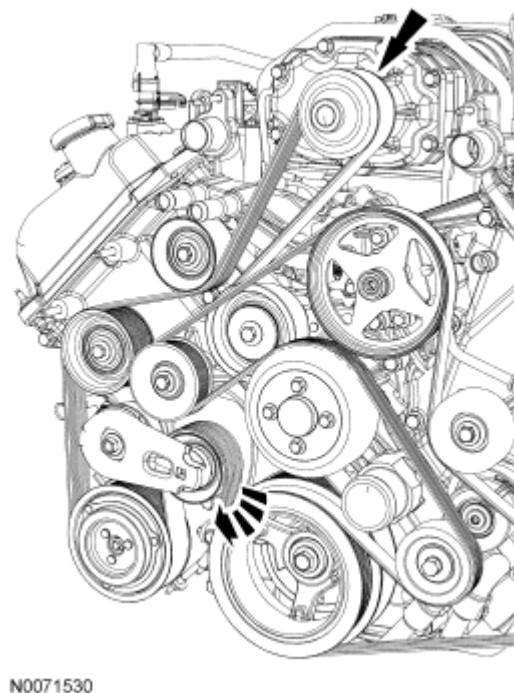


Fig. 33: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC

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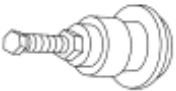
2009 ENGINE Engine - 5.4L (4V) - Mustang

Courtesy of FORD MOTOR CO.

8. Install the cooling fan assembly. For additional information, refer to **ENGINE COOLING**.

CRANKSHAFT FRONT SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST2197-A	Installer, Crankshaft Front Oil Seal	303-635
 ST1287-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST1328-A	Installer, Front Cover Oil Seal	303-335 (T88T-6701-A)
 ST1288-A	Remover, Crankshaft Front Oil Seal	303-107 (T74P-6700-A)

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

REMOVAL

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

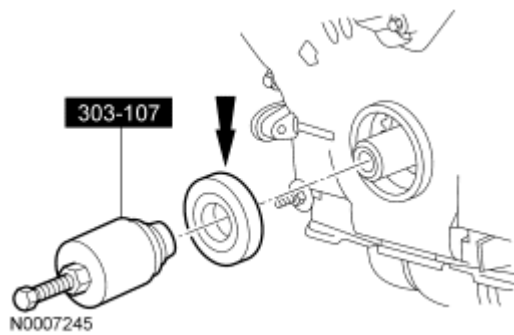


Fig. 34: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

INSTALLATION

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

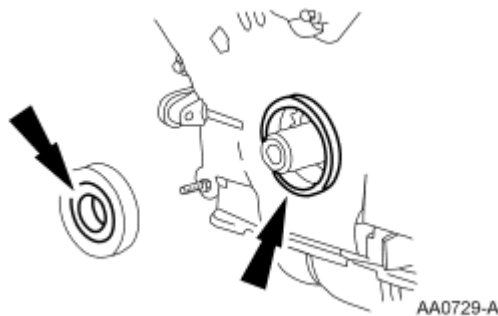


Fig. 35: Lubricating Engine Front Cover And Crankshaft Front Seal Inner Lip
Courtesy of FORD MOTOR CO.

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

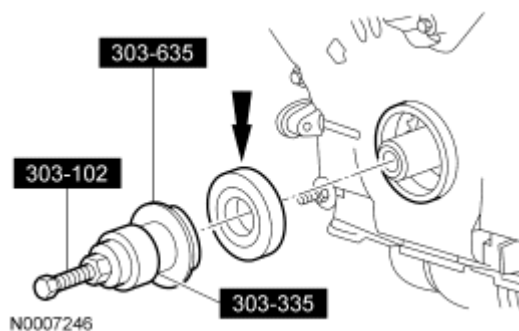


Fig. 36: Installing Crankshaft Front Seal Using Special Tools (303-102, 303-335, 303-635)
Courtesy of FORD MOTOR CO.

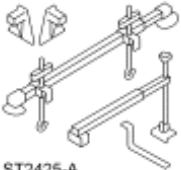
3. Install the crankshaft pulley. For additional information, refer to [Crankshaft Pulley](#).

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

ENGINE FRONT COVER

Special Tools

Illustration	Tool Name	Tool Number
 ST1603-A	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
 ST2176-B	Support Bar, Engine	303-F070
 ST2425-A	Support Bar, Engine	303-F072

Material

Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-

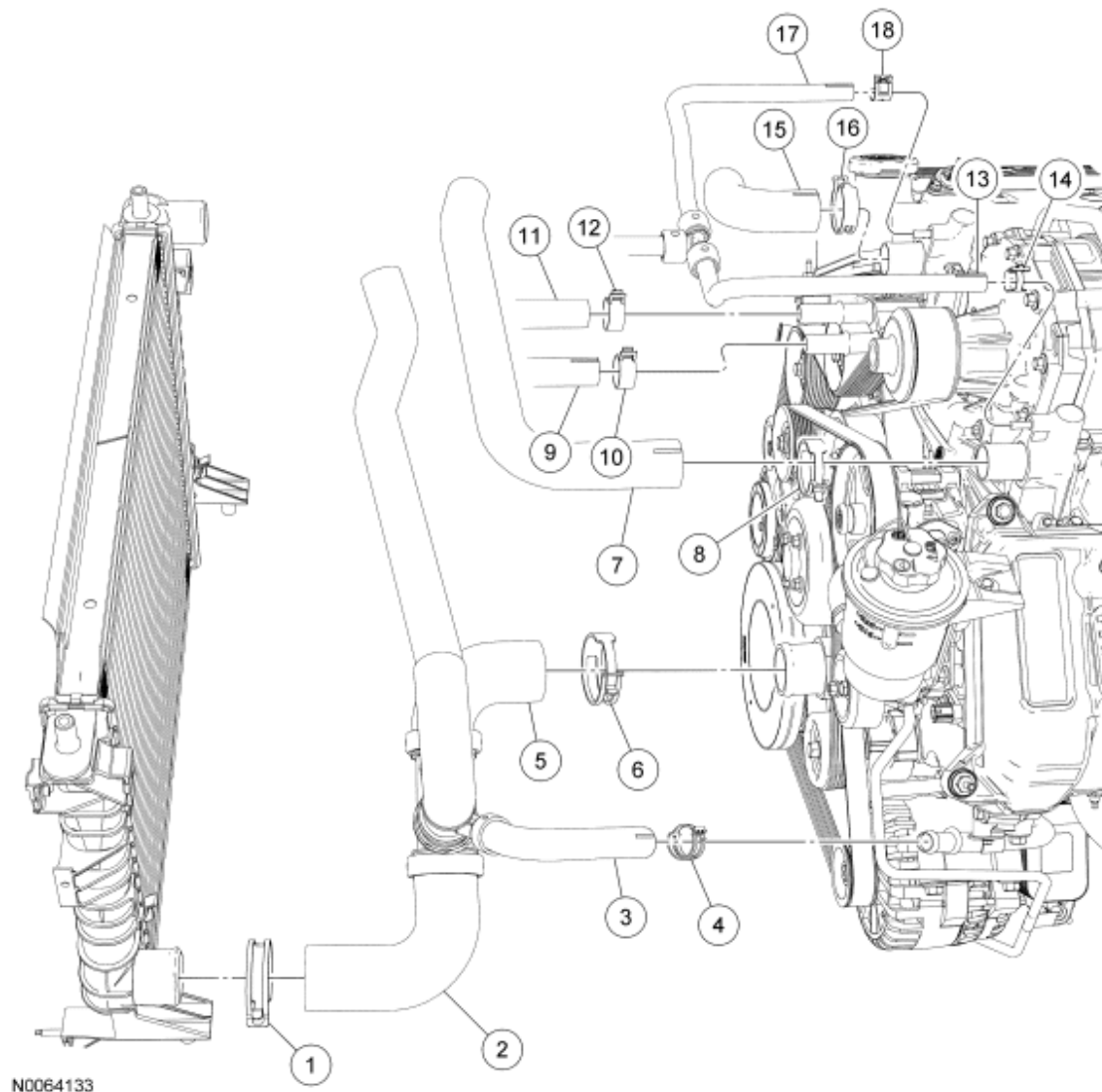


Fig. 37: Exploded View Of Engine Front Cover (1 Of 4)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	15161	Lower radiator hose assembly-to-radiator clamp
2	8B273	Lower radiator hose assembly-to-radiator
3	8B273	Lower radiator hose assembly-to-coolant tube assembly
4	15161	Lower radiator hose assembly-to-coolant tube assembly clamp
5	8B273	Lower radiator hose assembly-to-coolant pump
6	15161	Lower radiator hose assembly-to-coolant pump clamp
7	8A586	Upper radiator hose
8	15161	Upper radiator hose clamp
9	8D031	Charge Air Cooler (CAC) coolant hose
10	W527362	CAC coolant hose clamp

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11	8D030	CAC coolant hose
12	W527362	CAC coolant hose clamp
13	8276	Coolant vent hose
14	W527352	Coolant vent hose clamp
15	8A586	Upper radiator hose
16	15161	Upper radiator hose clamp
17	8276	Coolant vent hose
18	W527352	Coolant vent hose clamp

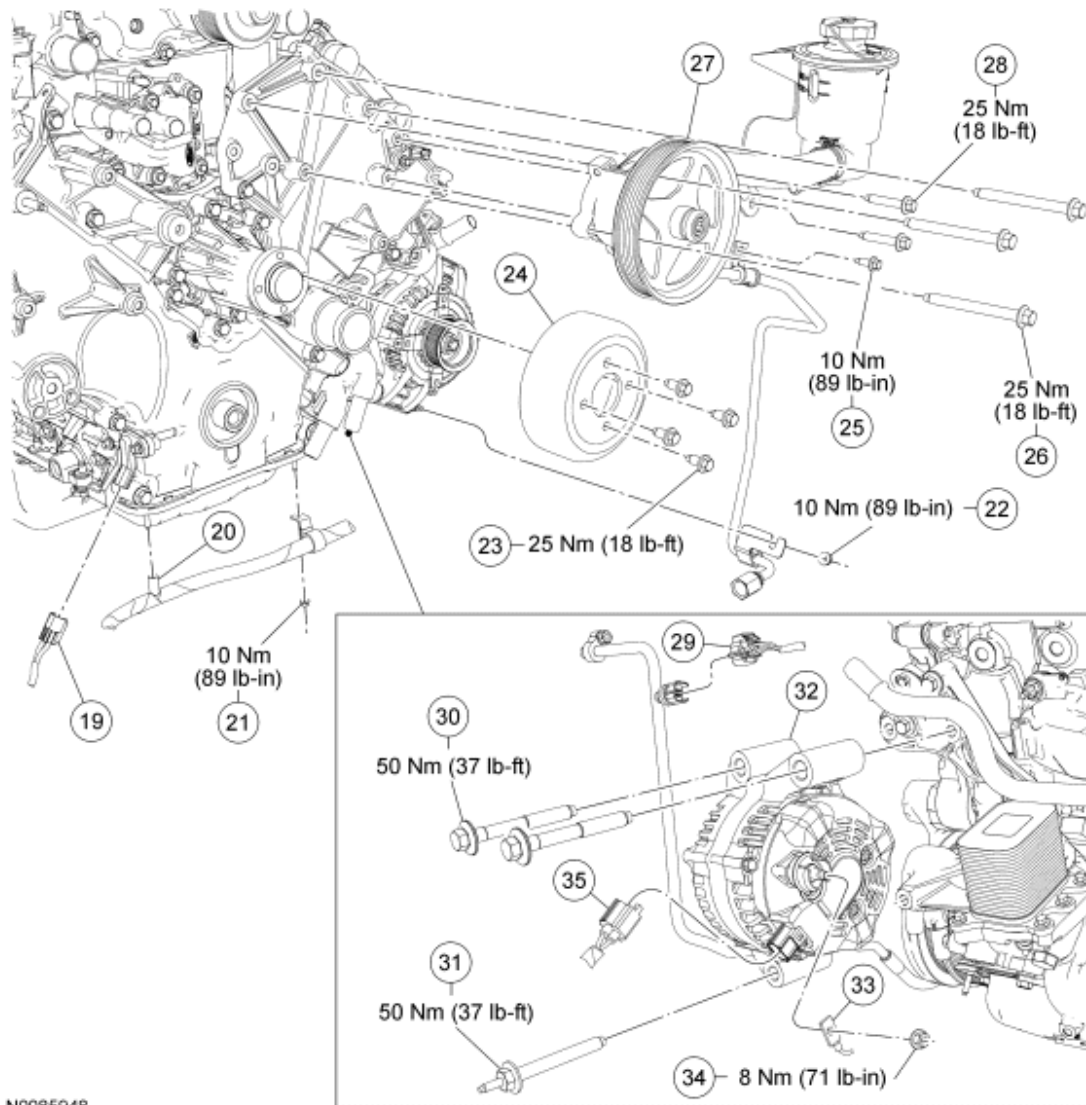


Fig. 38: Exploded View Of Engine Front Cover With Torque Specifications (2 Of 4)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
19	14A464	Crankshaft Position (CKP) sensor electrical connector

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		(12B637)
20	-	Wiring harness retainer (2 required) (part of 14305)
21	-	Wire harness retainer bracket nut
22	520111	Power steering tube bracket nut
23	N806282	Coolant pump pulley bolt (4 required)
24	8A528	Coolant pump pulley
25	W500212	Power steering tube bracket bolt
26	W706447	Power steering pump bolt (3 required)
27	3A696	Power steering pump
28	-	Power steering reservoir bolt (2 required)
29	14A464	A/C pressure transducer electrical connector (part of 12B637)
30	N805424	Generator bolt (2 required)
31	W704893	Generator stud bolt
32	10300	Generator
33	-	B+ wire terminal (part of 14305)
34	W705790	B+ wire terminal nut
35	14A464	Generator electrical connector (part of 12B637)

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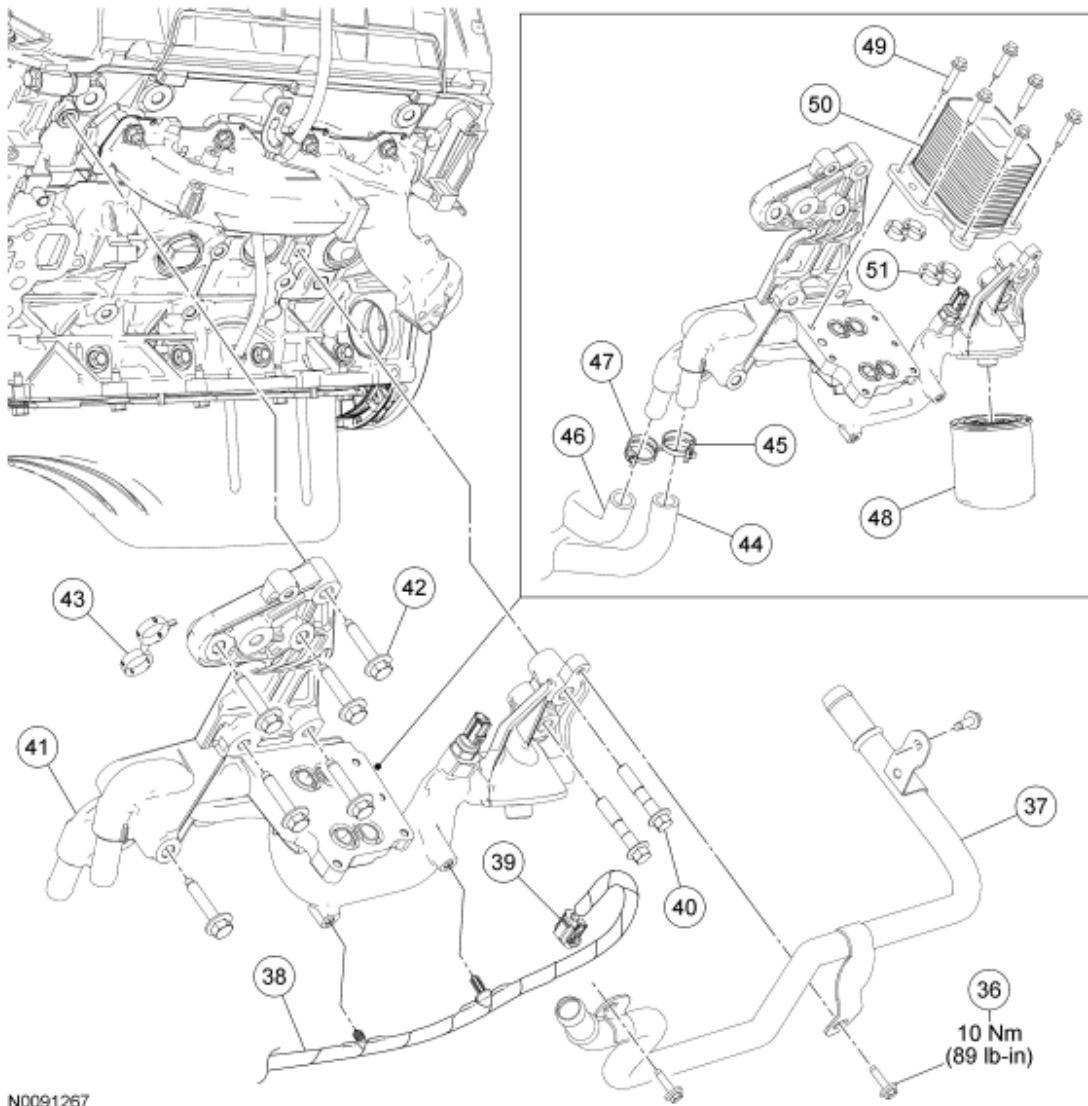


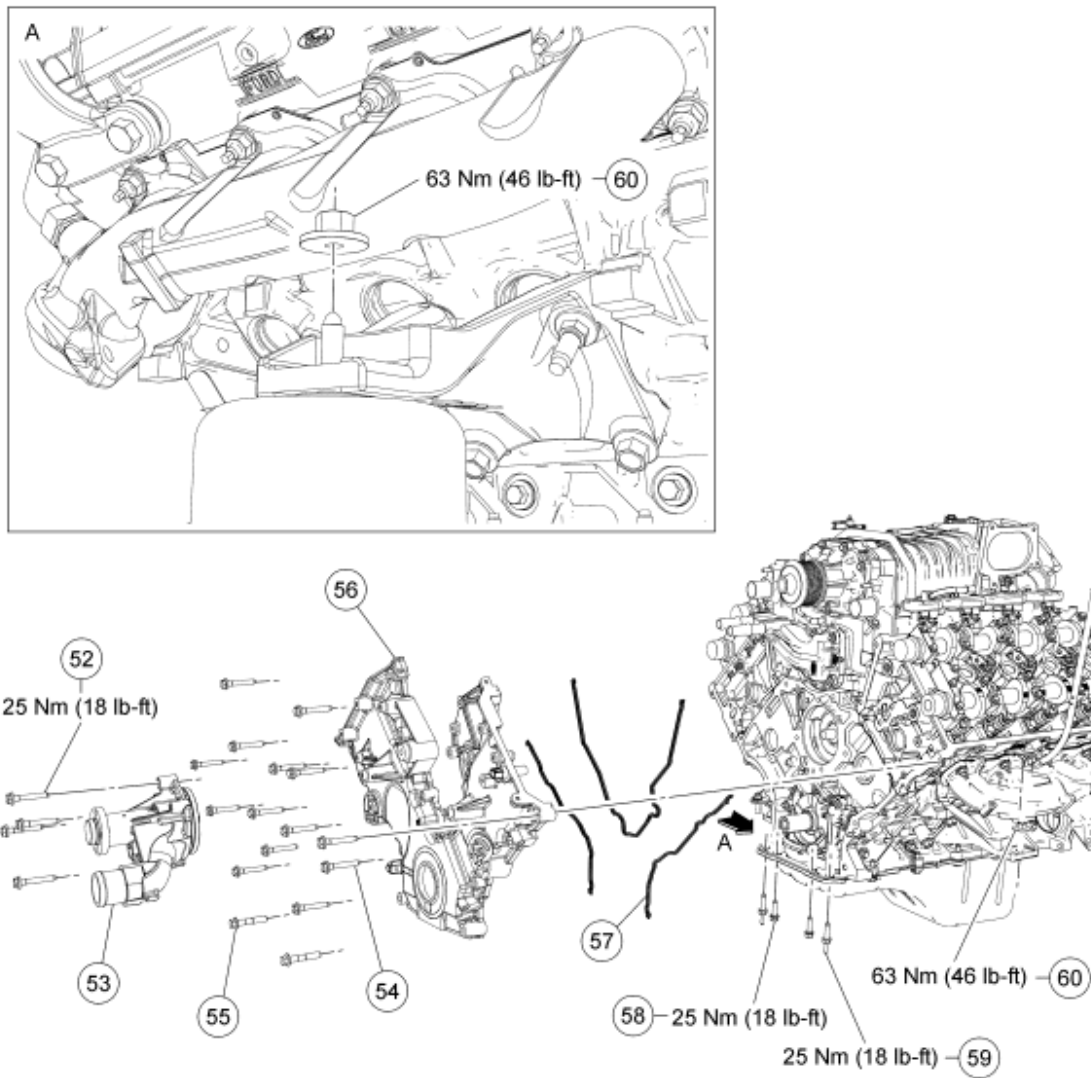
Fig. 39: Exploded View Of Engine Front Cover With Torque Specification (3 Of 4)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
36	N605891	Coolant tube assembly-to-oil filter adapter bolt (3 required)
37	18663	Coolant tube assembly
38	-	Wiring harness retainer (2 required) (part of 12B637)
39	14A464	Engine Oil Pressure (EOP) switch electrical connector (part of 12B637)
40	N606063	Oil filter adapter bolt (2 required)
41	6884	Oil filter adapter
42	N807724	Oil filter adapter bolt (6 required)
43	6A636	Oil filter adapter gasket
44	6B850	Coolant hose-to-oil filter adapter

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45	15161	Coolant hose-to-oil filter adapter clamp
46	6B851	Lower radiator hose assembly-to-oil filter adapter
47	15161	Lower radiator hose assembly-to-oil filter adapter clamp
48	6714	Engine oil filter
49	N605893	Oil cooler bolt (6 required)
50	6A642	Oil cooler
51	6N818	Oil cooler gasket (4 required)



N0091268

Fig. 40: Exploded View Of Engine Front Cover With Torque Specifications (4 Of 4)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
52	N806177	Coolant pump bolt (4 required)
53	8501	Coolant pump

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54	N806177	Engine front cover bolt (14 required)
55	N606063	Engine front cover bolt (2 required)
56	6C086	Engine front cover
57	6D081	Engine front cover gasket
58	W701605	Oil pan-to-engine front cover bolt (2 required)
59	W701606	Oil pan-to-engine front cover stud bolt (2 required)
60	W712530	Engine support insulator nut (2 required)

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
3. Remove the engine coolant degas bottle. For additional information, refer to **ENGINE COOLING**.
4. Remove the Supercharger (SC) coolant degas bottle. For additional information, refer to **SUPERCHARGER COOLING**.
5. Remove the 4 nuts and the strut tower cross brace.

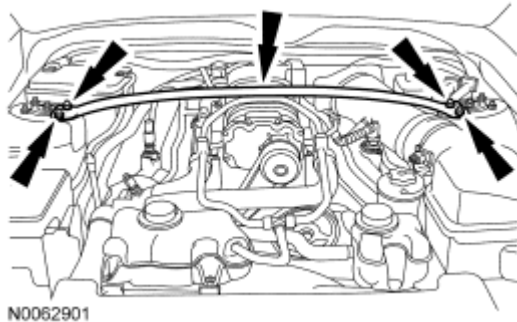


Fig. 41: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

6. Remove the RH and LH valve covers. For additional information, refer to **Valve Cover - RH** and **Valve Cover - LH**.
7. Loosen the 4 coolant pump pulley bolts.

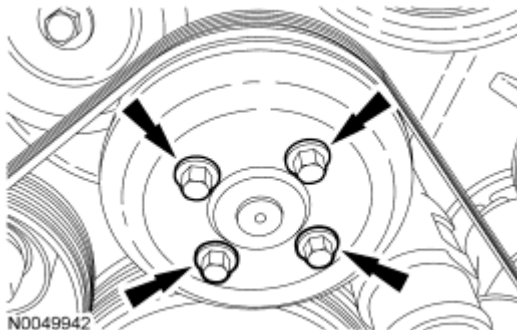


Fig. 42: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

8. Remove the accessory drive belt, the 2 accessory drive belt idler pulleys and the accessory drive belt tensioner. For additional information, refer to **ACCESSORY DRIVE** .
9. Remove the 4 bolts and the coolant pump pulley.
10. Remove the SC drive belt, SC drive belt tensioner and the 3 SC drive belt idler pulleys. For additional information, refer to **ACCESSORY DRIVE** .
11. Remove the thermostat housing. For additional information, refer to **ENGINE COOLING** .
12. Remove the crankshaft front seal. For additional information, refer to **Crankshaft Front Seal**.
13. Disconnect the 2 coolant vent hoses from the intake manifold.
14. Disconnect the 2 upper radiator hoses from the intake manifold.
15. Disconnect the coolant hoses from the Charge Air Cooler (CAC).
16. Disconnect the lower radiator hose assembly from the coolant pump, radiator, oil filter adapter and the coolant tube assembly (located above the generator).
 - Remove the lower radiator hose assembly from the vehicle.
17. Disconnect the A/C pressure transducer electrical connector.
18. Remove the power steering tube bracket nut from the generator stud bolt.
19. Remove the power steering tube bracket bolt from the engine front cover.
20. Remove the 2 bolts from the power steering reservoir bracket.
21. Remove the 3 bolts and position the power steering pump and reservoir assembly aside.
22. Disconnect the Crankshaft Position (CKP) sensor electrical connector.
23. Install the Engine Lifting Bracket.

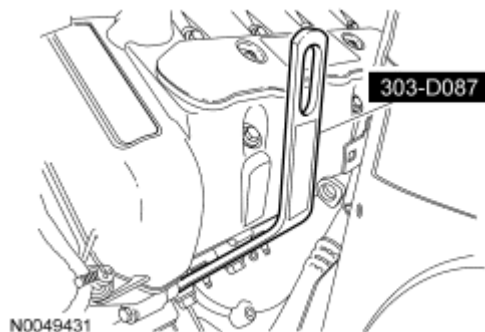


Fig. 43: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

24. Install the Engine Lifting Bracket.

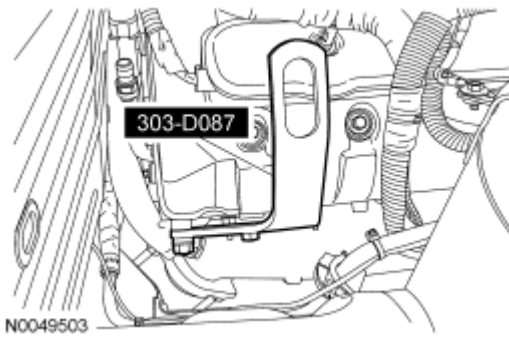


Fig. 44: Identifying Special Tool 303-D087
 Courtesy of FORD MOTOR CO.

NOTE: The heavy duty Engine Support Bar (303-F070) must be used with the draw screws from the light duty Engine Support Bar (303-F072). This will provide enough clearance between the SC and the Engine Support Bar, and enough clearance between the draw screw and the vehicle hood.

25. Install the Engine Support Bars.
 - Remove the LH and RH engine support insulator nuts.
 - Using the Engine Support Bars, raise the engine.

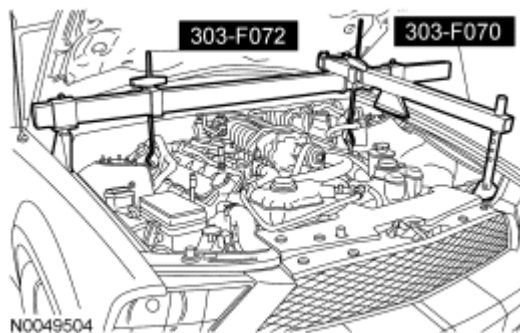


Fig. 45: Raising Engine Using Special Tools (303-F072) & (303-F070)
 Courtesy of FORD MOTOR CO.

26. Remove the nut and disconnect the B+ wire terminal from the generator.
27. Disconnect the generator electrical connector.
28. Detach the wiring harness retainer from the oil pan stud bolt.
29. Remove the nut and the wire harness retainer bracket from the oil pan stud bolt.
30. Remove the stud bolt, 2 bolts and the generator.
31. Disconnect the coolant hose from the oil filter adapter.

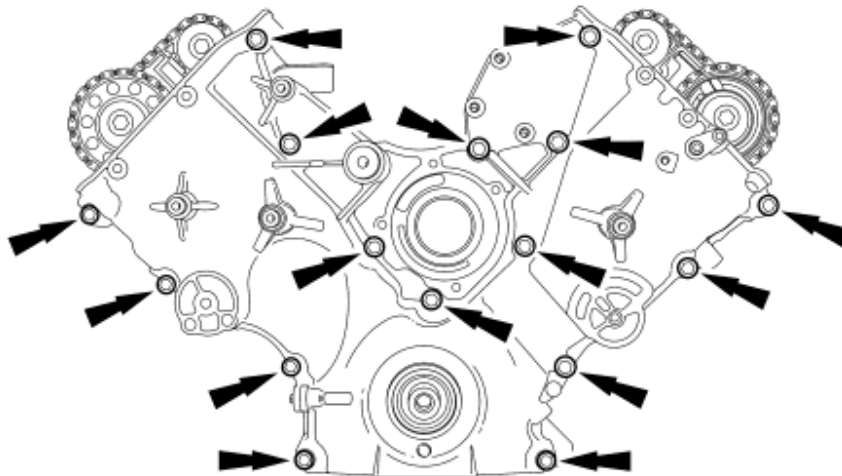
NOTE: If metal or aluminum material is present in the oil cooler, mechanical concerns exist. Failure to correct these concerns may cause engine failure. To diagnose mechanical concerns, refer to ENGINE SYSTEM -

GENERAL INFORMATION .

32. Remove the 6 bolts and the oil cooler.
 - Discard the gaskets.
 - Inspect the oil cooler.
33. Drain the engine oil.
 - Tighten the drain plug to 26 Nm (19 lb-ft).
34. Remove and discard the engine oil filter.
35. Remove the 3 coolant tube assembly bolts.
36. Disconnect the Engine Oil Pressure (EOP) switch electrical connector and the 2 wiring harness pin-type retainers.
37. Remove the 8 bolts and the oil filter adapter.
 - Discard the gasket.
38. Remove the 2 oil pan-to-engine front cover bolts and the 2 oil pan-to-engine front cover stud bolts.
39. Remove the 4 bolts and the coolant pump.
 - Discard the gasket.
40. Remove the 16 bolts and the engine front cover.
 - Remove and discard the engine front cover gaskets.

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

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



N0050049

Fig. 46: Inspecting Mating Surfaces

Courtesy of FORD MOTOR CO.

INSTALLATION

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

1. Apply silicone gasket and sealant in the locations shown.

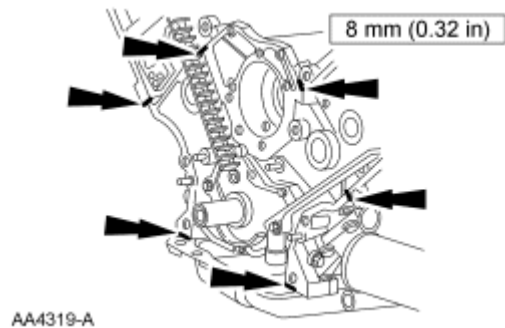


Fig. 47: Applying Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

2. Using new gaskets, install the engine front cover and the 16 bolts. Tighten the bolts in the sequence shown:

* Bolts 1 through 14 to 25 Nm (18 lb-ft).

* Bolts 15 and 16 to 50 Nm (37 lb-ft).

Item	Part Number	Description
1	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
2	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
3	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
4	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
5	N806177	Bolt, hex head pilot, M8 x

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		1.25 x 53
6	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
7	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
8	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
9	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
10	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
11	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
12	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
13	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
14	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
15	N606063	Bolt, hex flange head pilot, M10 x 1.50 x 55
16	N606063	Bolt, hex flange head pilot, M10 x 1.50 x 55

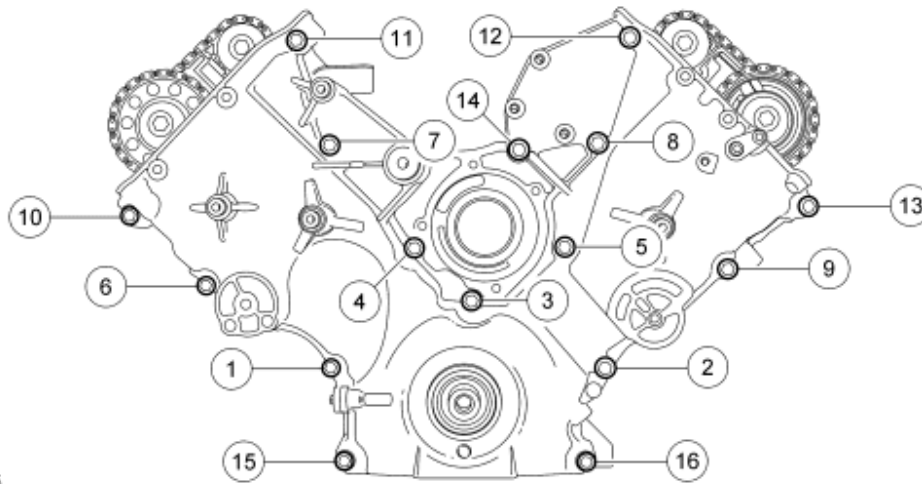


Fig. 48: Installing Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

3. Install the 2 oil pan-to-engine front cover bolts and the 2 oil pan-to-engine front cover stud bolts.
 - Tighten to 25 Nm (18 lb-ft).
4. Using a new gasket, install the coolant pump and the 4 bolts.
 - Tighten to 25 Nm (18 lb-ft).

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

5. Using a new gasket, install the oil filter adapter and the 8 bolts.
 - Tighten in the sequence shown:
 - Bolts 1 through 6 to 25 Nm (18 lb-ft).
 - Bolts 7 and 8 to 50 Nm (37 lb-ft).

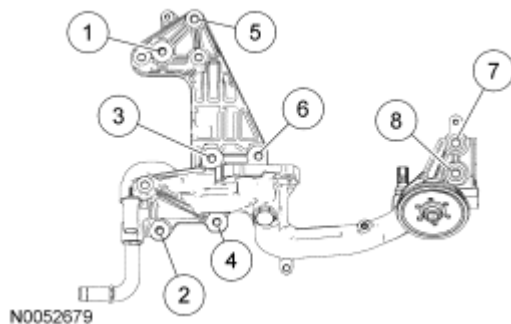


Fig. 49: Installing Oil Filter Adapter Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

6. Connect the EOP switch electrical connector and the 2 wiring harness pin-type retainers.
7. Install the 3 coolant tube assembly bolts.

- Tighten to 10 Nm (89 lb-in).
8. Install a new engine oil filter in the following sequence.
 1. Lubricate the oil filter gasket with clean engine oil and tighten until the seal makes contact.
 2. Using an oil filter strap wrench, tighten the filter an additional 270 degrees.

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

9. Using new gaskets, install the oil cooler and the 6 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

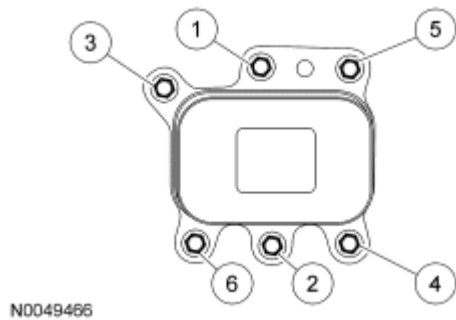


Fig. 50: Installing Oil Cooler Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

10. Connect the coolant hose to the oil filter adapter.
11. Install the generator, 2 bolts and the stud bolt.
 - Tighten to 50 Nm (37 lb-ft).
12. Install the wire harness retainer bracket on the oil pan stud bolt and install the nut.
 - Tighten to 10 Nm (89 lb-in).
13. Attach the wiring harness retainer to the oil pan stud bolt.
14. Connect the generator electrical connector.
15. Connect the B+ wire terminal to the generator and install the nut.
 - Tighten to 8 Nm (71 lb-in).
16. Using the Engine Support Bars, lower the engine onto the engine support insulators.

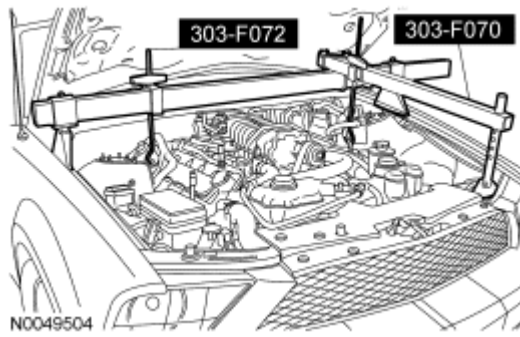


Fig. 51: Raising Engine Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

17. Install the LH and RH engine support insulator nuts.
 - Tighten to 63 Nm (46 lb-ft).
18. Connect the CKP sensor electrical connector.
19. Install the power steering pump and reservoir assembly and the 3 bolts.
 - Tighten to 25 Nm (18 lb-ft).
20. Install the 2 power steering reservoir bracket bolts.
 - Tighten to 25 Nm (18 lb-ft).
21. Install the power steering tube bracket bolt.
 - Tighten to 10 Nm (89 lb-in).
22. Install the power steering tube bracket nut to the generator stud bolt.
 - Tighten to 10 Nm (89 lb-in).
23. Connect the A/C pressure transducer electrical connector.
24. Install the lower radiator hose assembly to the coolant pump, radiator, oil filter adapter and the coolant tube assembly (located above the generator).
25. Connect the coolant hoses from the CAC.
26. Connect the 2 upper radiator hoses to the intake manifold.
27. Connect the 2 coolant vent hoses to the intake manifold.
28. Install the crankshaft front seal. For additional information, refer to **Crankshaft Front Seal**.
29. Install the thermostat housing. For additional information, refer to **ENGINE COOLING**.
30. Install the 3 SC drive belt idler pulleys, SC drive belt and the SC drive belt tensioner. For additional information, refer to **ACCESSORY DRIVE**.
31. Install the coolant pump pulley and the 4 bolts.
32. Install the 2 accessory drive belt idler pulleys, the accessory drive belt tensioner and the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE**.
33. Tighten the 4 coolant pump pulley bolts to 25 Nm (18 lb-ft).
34. Install the RH and LH valve covers. For additional information, refer to **Valve Cover - RH** and **Valve Cover - LH**.
35. Install the SC coolant degas bottle. For additional information, refer to **SUPERCHARGER COOLING**.

36. Install the engine coolant degas bottle. For additional information, refer to **ENGINE COOLING**.
37. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).

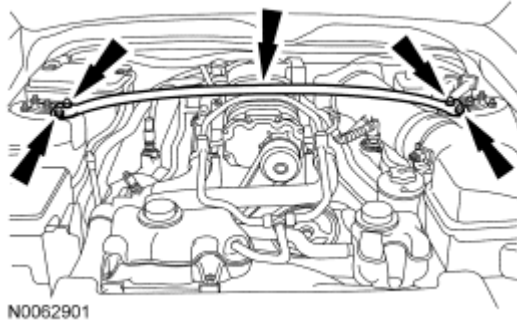


Fig. 52: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

38. Fill the engine with clean engine oil.
39. Fill and bleed the SC cooling system. For additional information, refer to **SUPERCHARGER COOLING**.
40. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING**.

TIMING DRIVE COMPONENTS

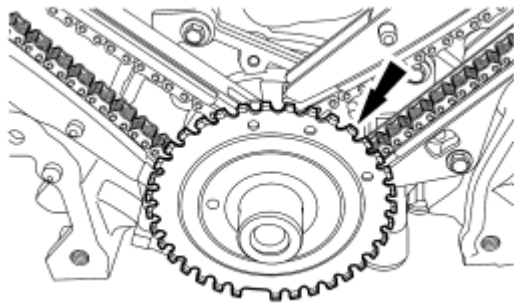
Special Tools

Illustration	Tool Name	Tool Number
 ST1335-A	Holding Tool, Crankshaft	303-448 (T93P-6303-A)

REMOVAL

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

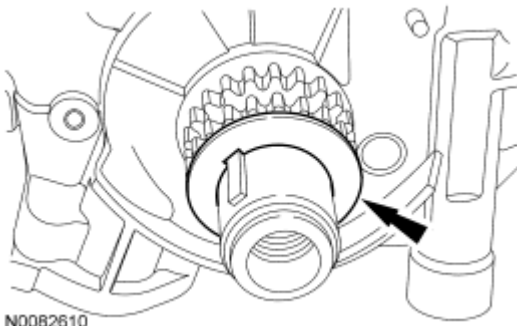
1. Remove the camshaft roller followers. For additional information, refer to **Valve Train Components - Exploded View** and **Camshaft Roller Follower**.
2. Remove the engine front cover. For additional information, refer to **Engine Front Cover**.
3. Remove the crankshaft sensor ring.



N0050053

Fig. 53: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

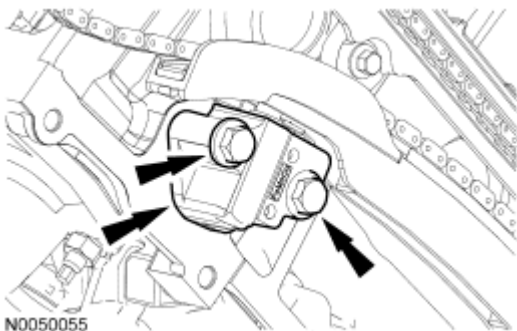
4. Remove the crankshaft washer.



N0082610

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

5. Remove the 2 bolts and the RH primary timing chain tensioner.



N0050055

Fig. 55: Locating RH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

6. Remove the RH primary timing chain tensioner arm.

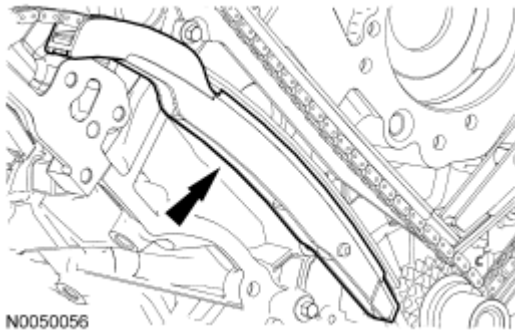


Fig. 56: Locating RH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

7. Remove the RH primary timing chain.

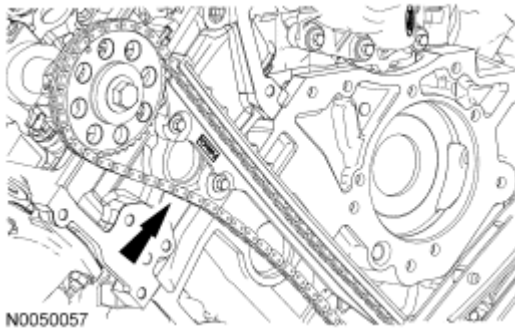


Fig. 57: Identifying RH Primary Timing Chain
Courtesy of FORD MOTOR CO.

8. Remove the 2 bolts and the RH primary timing chain guide.



Fig. 58: Locating RH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

9. Remove the 2 bolts and the LH primary timing chain tensioner.

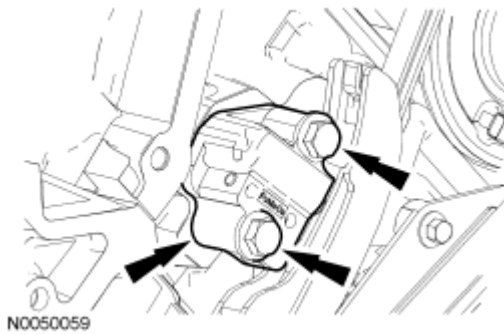


Fig. 59: Locating LH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

10. Remove the LH primary timing chain tensioner arm.

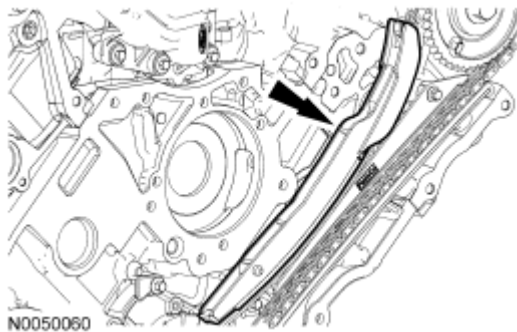


Fig. 60: Locating LH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

11. Remove the LH primary timing chain.

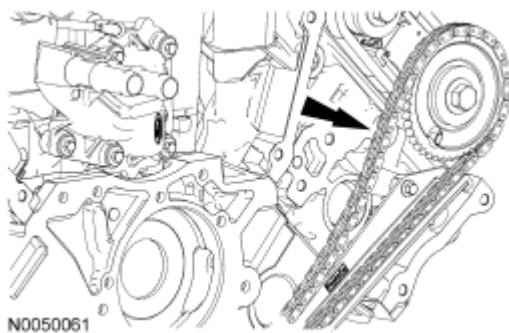


Fig. 61: Locating LH Primary Timing Chain
Courtesy of FORD MOTOR CO.

12. Remove the 2 bolts and the LH primary timing chain guide.

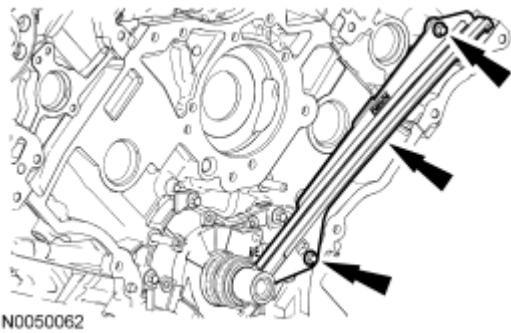


Fig. 62: Locating LH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

13. Remove the crankshaft sprocket.

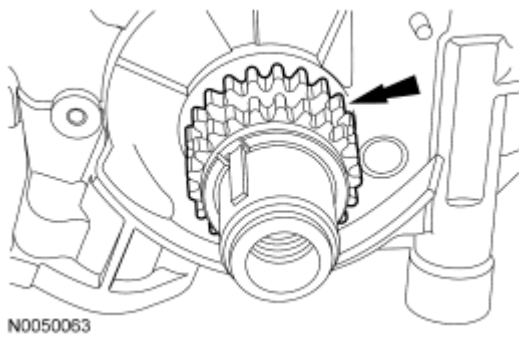


Fig. 63: Locating Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Do not compress the ratchet assembly. This will damage the ratchet assembly.

NOTE: LH shown, RH similar.

1. Compress each tensioner plunger, using an edge of a vise.

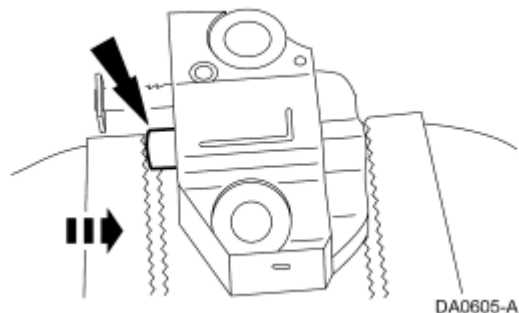


Fig. 64: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

2. Using a small screwdriver or pick, push back and hold the ratchet mechanism

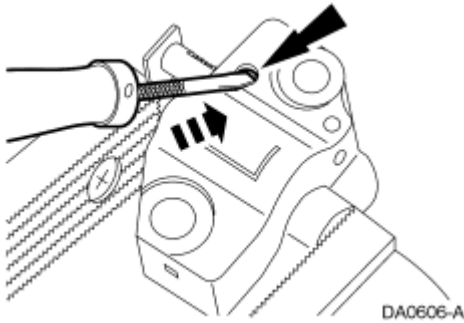


Fig. 65: Pushing Back And Holding Ratchet Mechanism
Courtesy of FORD MOTOR CO.

3. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.

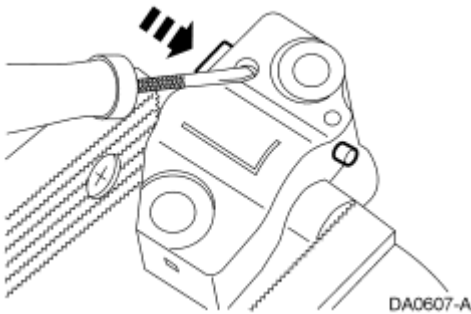


Fig. 66: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

4. Install a suitable pin into the hole of each tensioner housing to hold the ratchet assembly and plunger in place during installation.
 - Remove the tensioner from the vise.

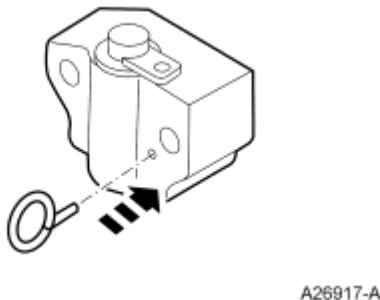
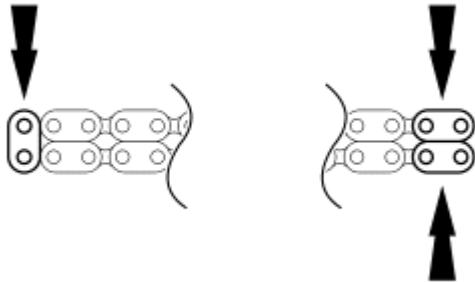


Fig. 67: Installing Paper Clip Into Tensioner Housing

Courtesy of FORD MOTOR CO.

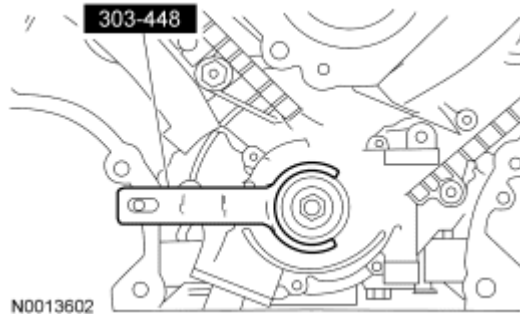
5. If the colored links are not visible, mark one link on one end and 2 links on the other end, and use as timing marks.



A0038720

Fig. 68: Locating Timing Chain Marks
Courtesy of FORD MOTOR CO.

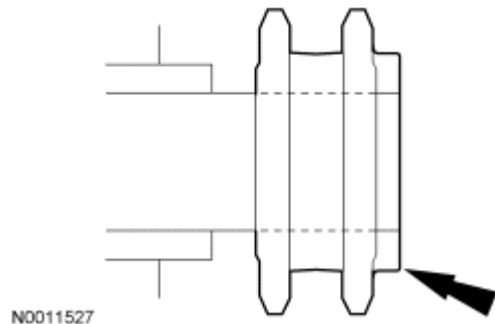
6. Using the Crankshaft Holding Tool, position the crankshaft.



N0013602

Fig. 69: Positioning Crankshaft With Special Tool (303-448)
Courtesy of FORD MOTOR CO.

7. Install the crankshaft sprocket with the flange facing forward.



N0011527

Fig. 70: Identifying Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

8. Install the LH primary timing chain guide and the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

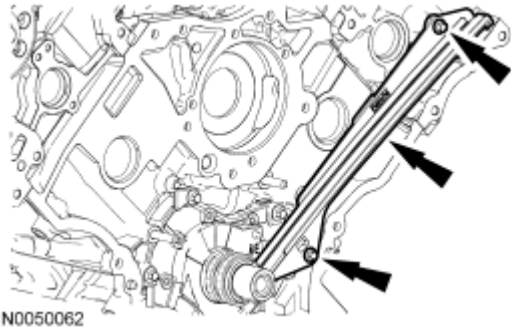


Fig. 71: Locating LH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

9. Position the camshaft sprocket timing marks as shown.

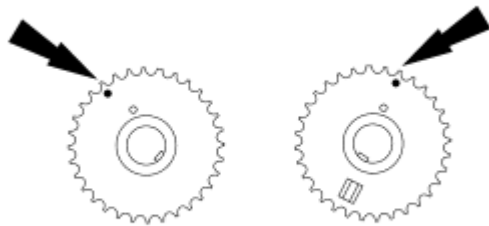


Fig. 72: Identifying Camshaft Sprocket Timing Marks
Courtesy of FORD MOTOR CO.

10. Position the LH (inner) timing chain onto the crankshaft sprocket, aligning the one colored link on the timing chain with the slot on the crankshaft sprocket.

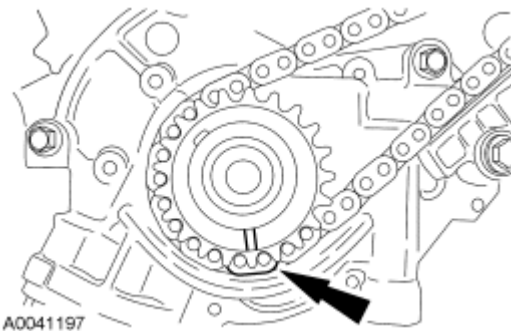
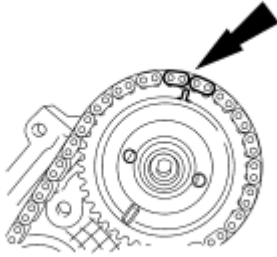


Fig. 73: Aligning Copper (Marked) Link With Timing Mark On Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

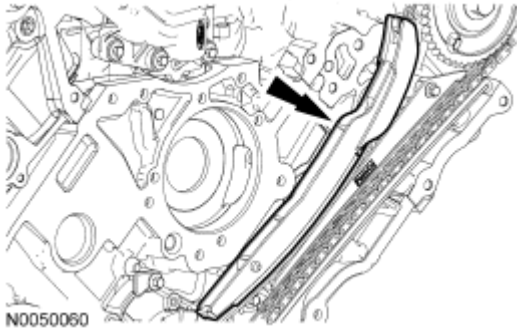
11. Install the LH timing chain on the camshaft sprocket, aligning the 2 colored links with the timing mark on the sprocket.



A0049191

Fig. 74: Aligning Timing Marks On Sprocket With Marked Chain Links
Courtesy of FORD MOTOR CO.

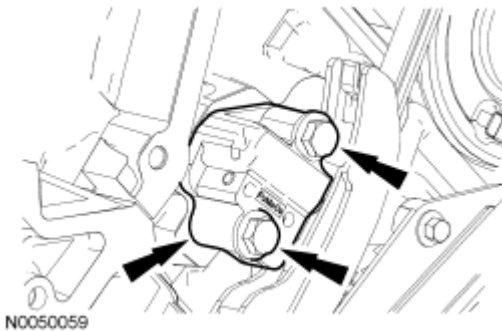
12. Install the LH primary timing chain tensioner arm.



N0050060

Fig. 75: Locating LH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

13. Install the LH primary timing chain tensioner and the 2 bolts.
 - Tighten to 25 Nm (18 lb-ft).
 - Remove the pin from the tensioner.



N0050059

Fig. 76: Locating LH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

14. Install the RH primary timing chain guide and the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

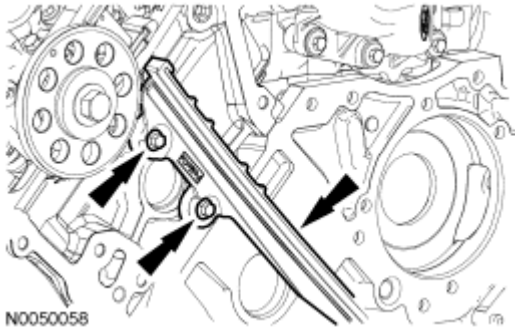


Fig. 77: Locating RH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

15. Position the RH (outer) timing chain on the crankshaft sprocket, aligning the colored link with the timing marks on the sprocket.

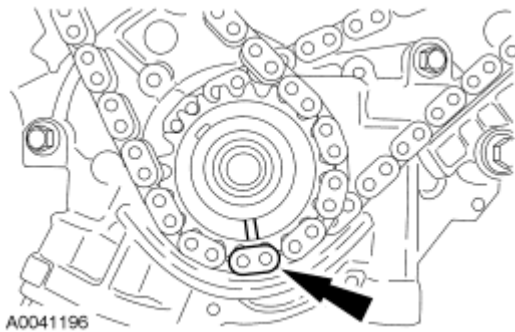


Fig. 78: Aligning Copper (Marked) Link With Timing Mark On Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

16. Install the RH timing chain on the camshaft sprocket, aligning the 2 colored links with the timing mark on the sprocket.

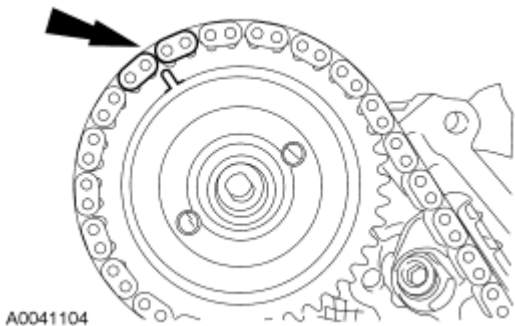


Fig. 79: Aligning Copper-Colored (Marked) Links With Camshaft Sprocket Timing Mark
Courtesy of FORD MOTOR CO.

17. Install the RH primary timing chain tensioner arm.

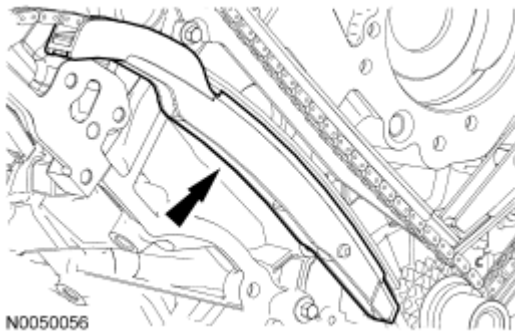


Fig. 80: Locating RH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

18. Install the RH primary timing chain tensioner and the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).
 - Remove the pin from the tensioner.

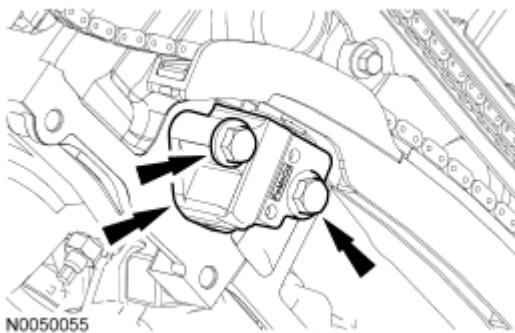


Fig. 81: Locating RH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

19. As a post-check, verify correct alignment of all timing marks. Make sure that the colored links are lined up with the marks on the crankshaft sprocket and the camshaft sprockets.

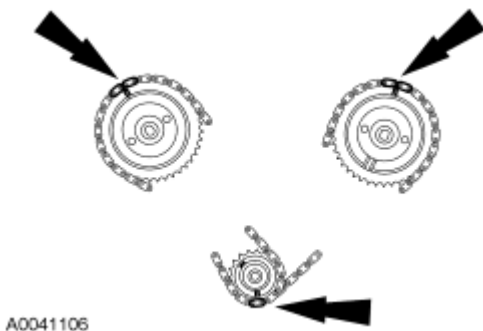


Fig. 82: Identifying Alignment Of All Timing Marks
Courtesy of FORD MOTOR CO.

20. Install the crankshaft washer.

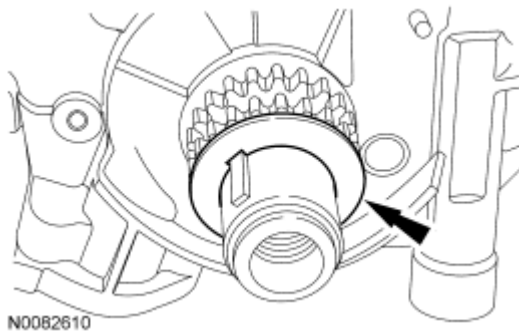


Fig. 83: Locating Crankshaft Washer
Courtesy of FORD MOTOR CO.

21. Install the crankshaft sensor ring.

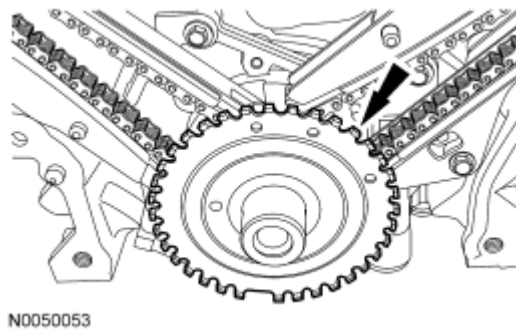
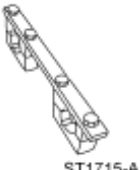


Fig. 84: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

22. Install the engine front cover. For additional information, refer to **Engine Front Cover**.
23. Install the camshaft roller followers. For additional information, refer to **Valve Train Components - Exploded View** and **Camshaft Roller Follower**.

CAMSHAFT - RH

Special Tools

Illustration	Tool Name	Tool Number
	Holding Tool, Camshaft	303-446 (T93P-6256-AHR)

Material

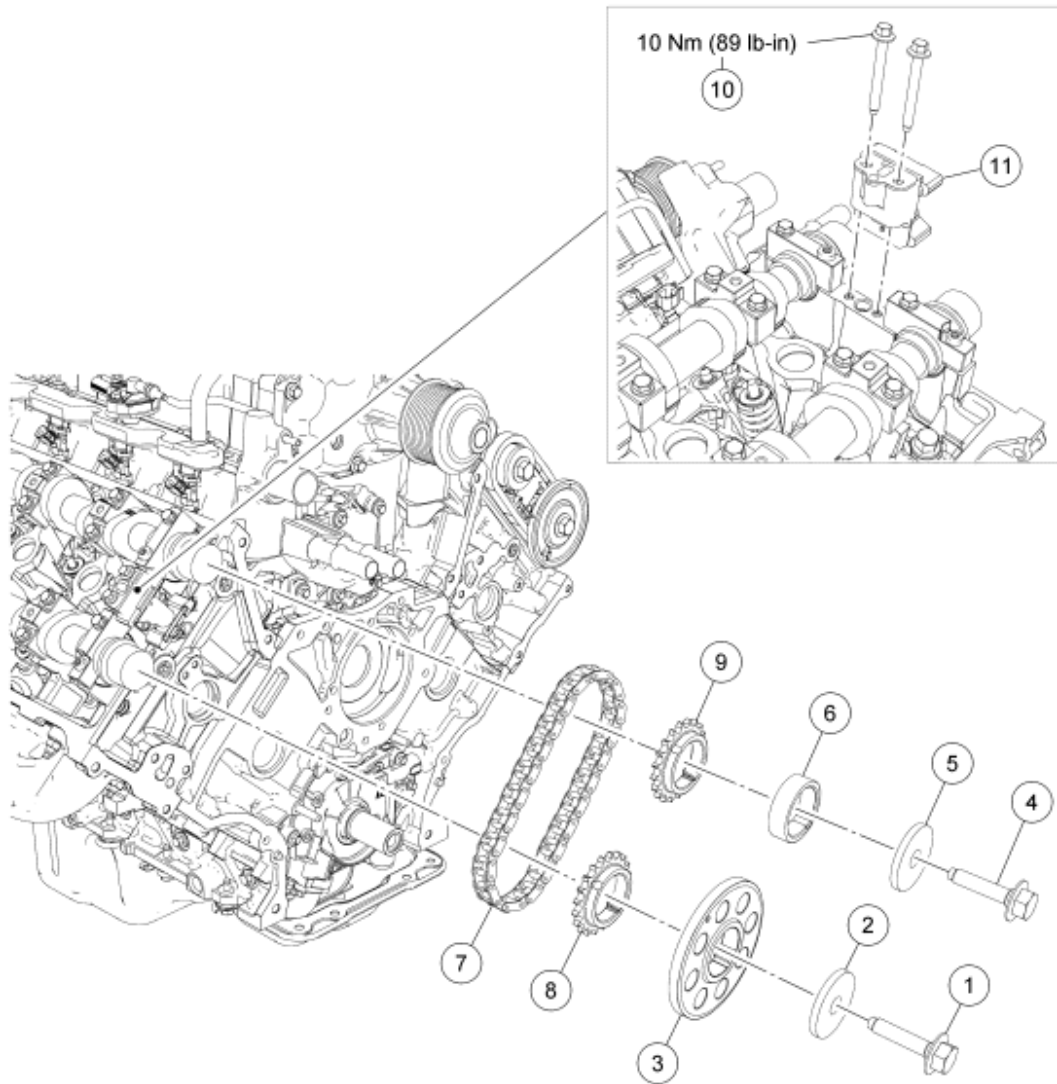
Item	Specification
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2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

Motorcraft SAE 5W-50 Full Synthetic Motor Oil
XO-5W50-QGT or equivalent

WSS-M2C931-B



N0050432

Fig. 85: Exploded View Of RH Camshaft With Torque Specification (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N811085	Camshaft drive sprocket bolt
2	N806164	Camshaft drive sprocket washer
3	6C253	Camshaft drive sprocket
4	N811085	Camshaft drive sprocket bolt
5	N806164	Camshaft drive sprocket washer
6	6265	Camshaft drive sprocket spacer
7	6268	Secondary timing chain

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

8	6256	Exhaust camshaft drive sprocket
9	6256	Intake camshaft drive sprocket
10	W500304	RH secondary timing chain tensioner bolt (2 required)
11	6C270	RH secondary timing chain tensioner

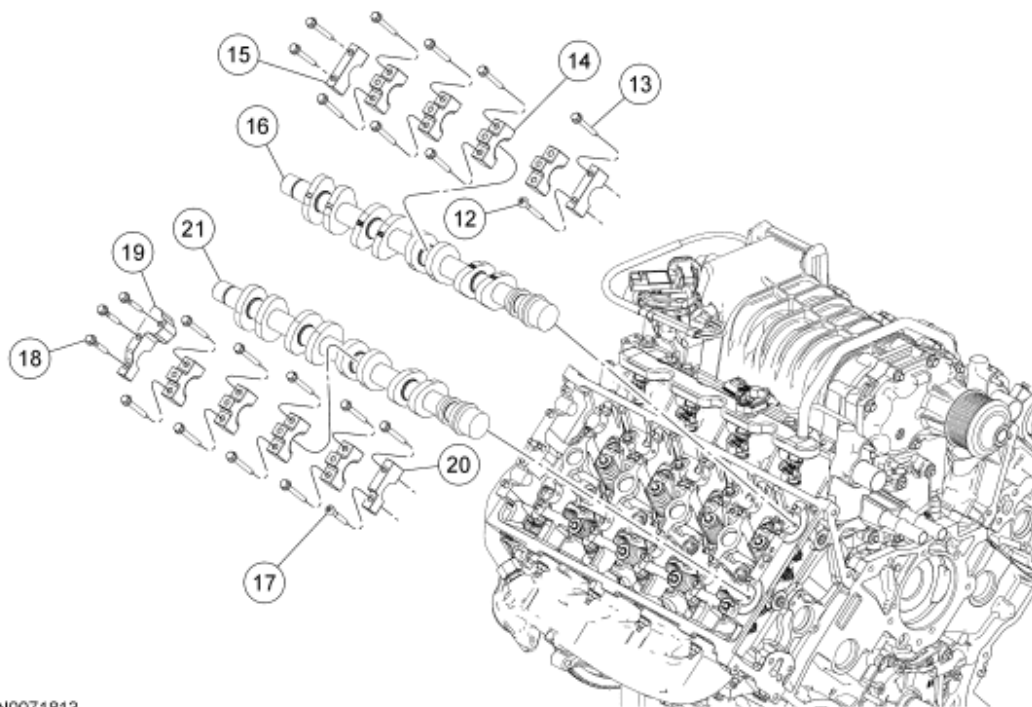


Fig. 86: Exploded View Of RH Camshaft (2 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
12	W710990	Intake camshaft bearing cap bolt
13	N807352	Intake/exhaust camshaft bearing cap bolt (22 required)
14	6B277	Intake/exhaust camshaft bearing cap (8 required)
15	6B277	Intake camshaft bearing cap (2 required)
16	6A270	RH intake camshaft
17	W710991	Exhaust camshaft bearing cap bolt
18	W705438	Exhaust camshaft bearing cap bolt (3 required)
19	6B278	Exhaust camshaft bearing cap
20	6B278	Exhaust camshaft bearing cap
21	6A272	RH exhaust camshaft

REMOVAL

1. Remove the timing drive components. For additional information, refer to **Timing Drive Components**.
2. Install the Camshaft Holding Tool.

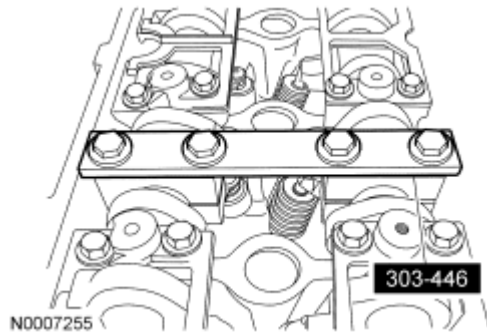


Fig. 87: Identifying Special Tool (303-446)
Courtesy of FORD MOTOR CO.

3. Remove the bolt, washer and camshaft drive sprocket.
4. Remove the bolt, washer and camshaft sprocket spacer.
5. Compress the secondary timing chain tensioner and install a lock pin.

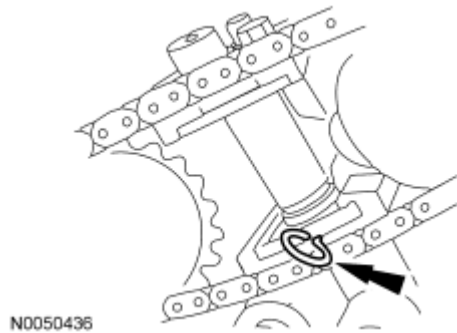
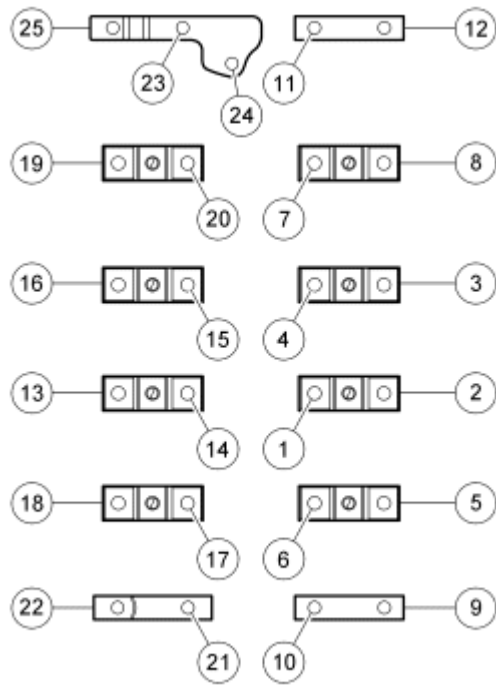


Fig. 88: Locating Secondary Timing Chain Tensioner & Lock pin
Courtesy of FORD MOTOR CO.

6. Remove the secondary timing chain and the 2 camshaft sprockets.
7. Remove the 2 bolts and the secondary timing chain tensioner.

NOTE: The camshaft bearing cap bolts vary in length and head design and must be installed in their original positions. Camshaft bearing caps are not interchangeable and must be installed in their original positions. If not reassembled in their original positions, severe engine damage may occur.

8. Remove the camshaft bearing cap bolts in the sequence shown.
 - Remove the camshaft bearing caps.
 - Remove the camshafts.



N0050438

Fig. 89: Removing/Installing Bearing Cap Bolts In Sequence
Courtesy of FORD MOTOR CO.

INSTALLATION

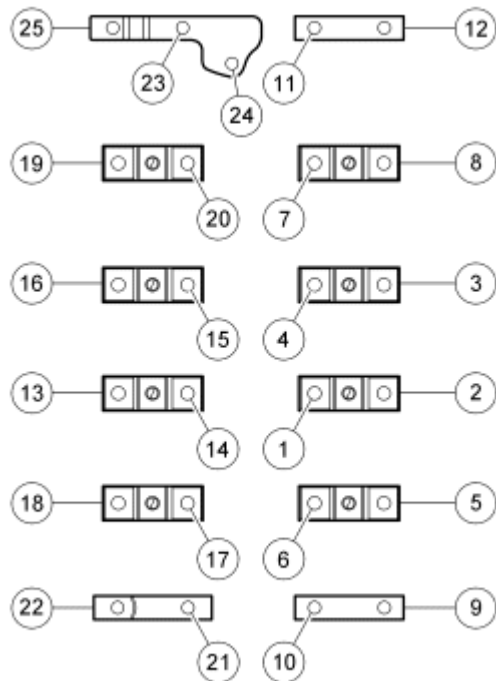
NOTE: Lubricate the camshafts with clean engine oil prior to installation.

1. Install the camshafts.

NOTE: The camshaft bearing cap bolts vary in length and head design and must be installed in their original positions. Camshaft bearing caps are not interchangeable and must be installed in their original positions. If not assembled in their original positions, severe engine damage may occur.

NOTE: Lubricate the camshaft bearing cap bearing surfaces with clean engine oil prior to installation.

2. Install the camshaft bearing caps.
 - Install the bearing cap bolts and tighten in the sequence shown to 10 Nm (89 lb-in).



N0050438

Fig. 90: Removing/Installing Bearing Cap Bolts In Sequence
Courtesy of FORD MOTOR CO.

3. Install the secondary timing chain tensioner and the bolts.
 - Tighten to 10 Nm (89 lb-in).
4. Index the keyways on the camshafts to the 6 o'clock position.



N0050439

Fig. 91: Identifying Keyways On Camshafts To 6 O'clock Position
Courtesy of FORD MOTOR CO.

NOTE: Timing marks must be at 12 o'clock position or damage to the engine may occur.

5. Install the camshaft sprockets and the secondary timing chain as an assembly.
 - Remove the lock pin from the secondary timing chain tensioner.

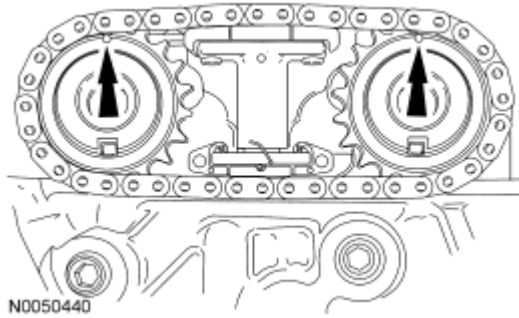


Fig. 92: Identifying Timing Marks At 12 O'clock Position
Courtesy of FORD MOTOR CO.

6. Install the Camshaft Holding Tool.

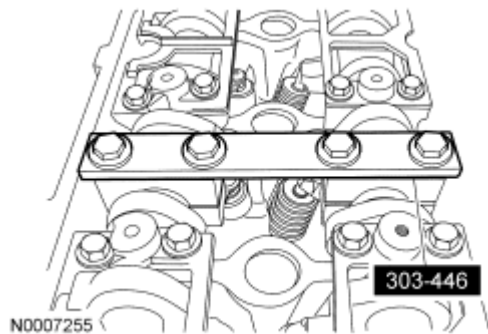


Fig. 93: Identifying Special Tool (303-446)
Courtesy of FORD MOTOR CO.

7. Install the camshaft drive sprocket spacer, washer and bolt, and hand-tighten the bolt.
8. Install the camshaft sprocket, washer and bolt, and hand-tighten the bolt.
9. Tighten the bolts in 2 stages:
- Stage 1: Tighten to 40 Nm (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

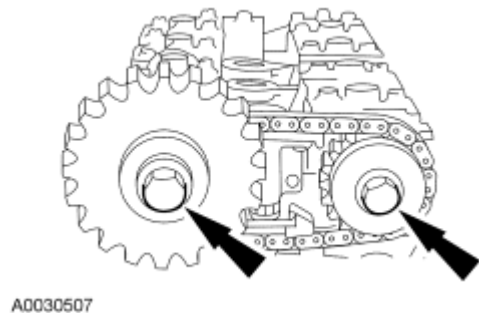


Fig. 94: Locating Camshaft Sprocket, Washer & Bolt
Courtesy of FORD MOTOR CO.

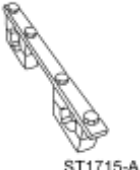
2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

10. Install the timing drive components. For additional information, refer to **Timing Drive Components**.

CAMSHAFT - LH

Special Tools

Illustration	Tool Name	Tool Number
 ST1715-A	Holding Tool, Camshaft	303-446 (T93P-6256-AHR)

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

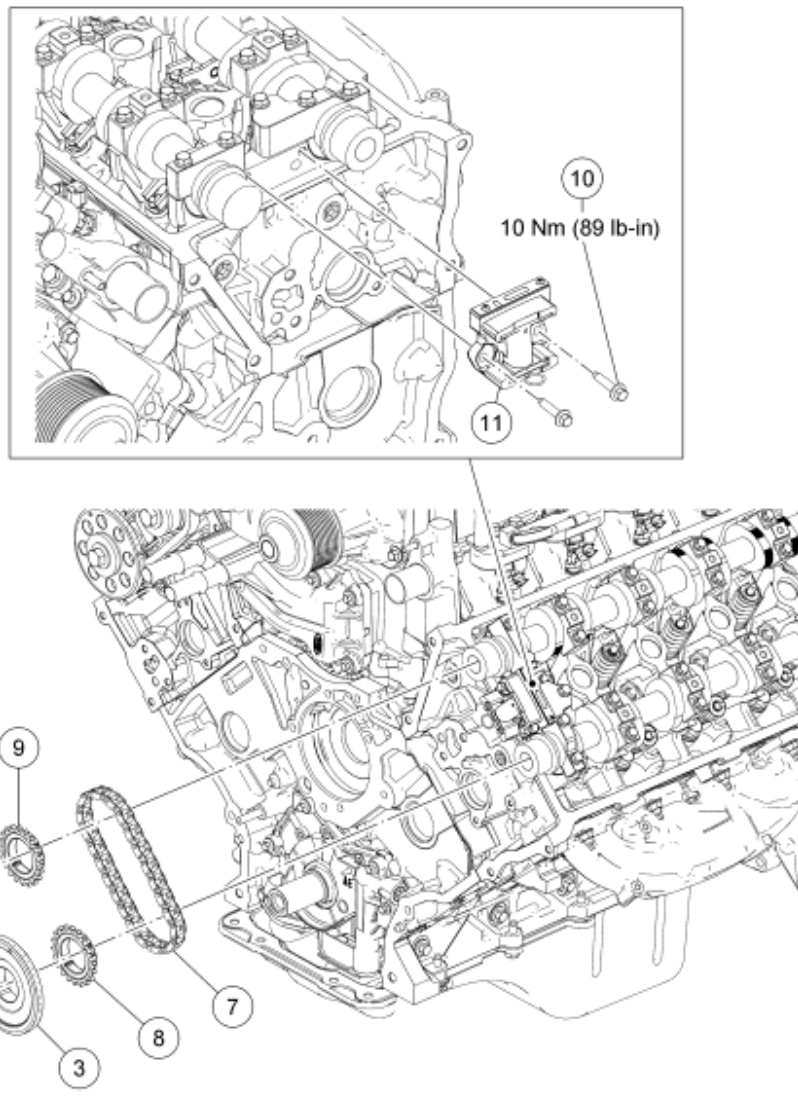


Fig. 95: Exploded View Of LH Camshaft With Torque Specification (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N811085	Camshaft drive sprocket bolt
2	N806164	Camshaft drive sprocket washer
3	6C253	Camshaft drive sprocket
4	N811085	Camshaft drive sprocket bolt
5	N806164	Camshaft drive sprocket washer
6	6265	Camshaft drive sprocket spacer
7	6268	Secondary timing chain
8	6256	Exhaust camshaft drive sprocket
9	6256	Intake camshaft drive sprocket
10	W500215	LH secondary timing chain tensioner bolt (2

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

		required)
11	6C271	LH secondary timing chain tensioner

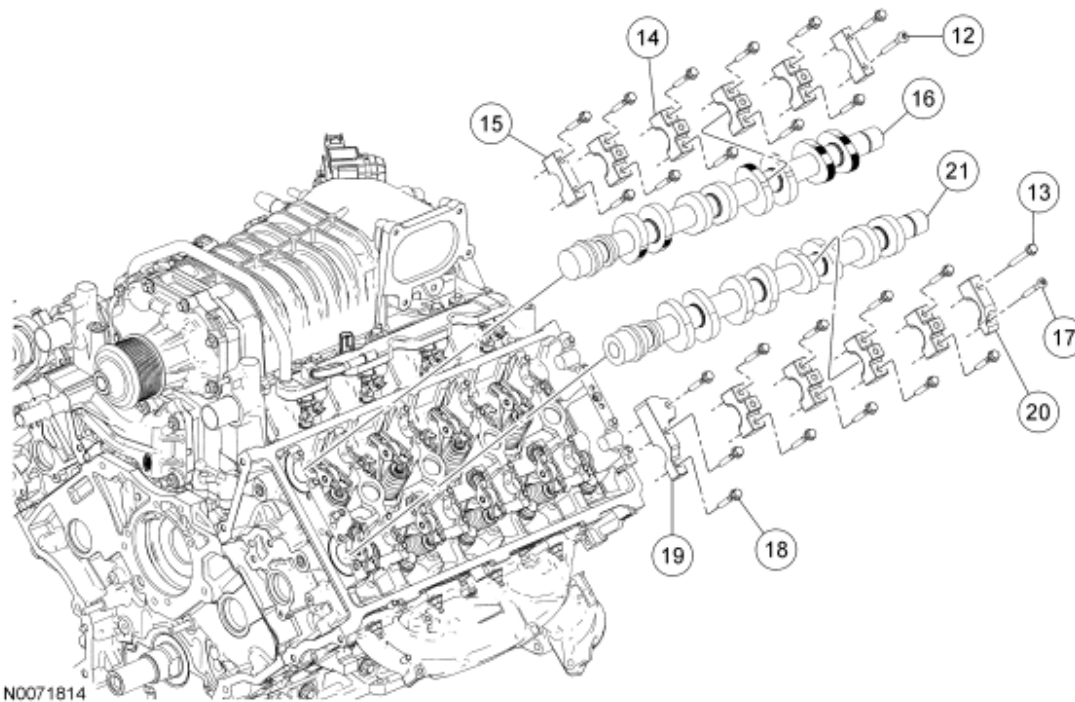


Fig. 96: Exploded View Of LH Camshaft (2 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
12	W710990	Intake camshaft bearing cap bolt
13	N807352	Intake/exhaust camshaft bearing cap bolt (22 required)
14	6B277	Intake/exhaust camshaft bearing cap (8 required)
15	6B277	Intake camshaft bearing cap (2 required)
16	6A271	LH intake camshaft
17	W710991	Exhaust camshaft bearing cap bolt
18	W705438	Exhaust camshaft bearing cap bolt (3 required)
19	6B278	Exhaust camshaft bearing cap
20	6B278	Exhaust camshaft bearing cap
21	6A273	LH exhaust camshaft

REMOVAL

1. Remove the timing drive components. For additional information, refer to **Timing Drive Components**.
2. Install the Camshaft Holding Tool.

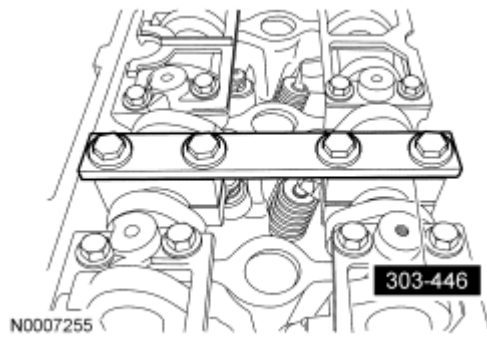


Fig. 97: Identifying Special Tool (303-446)
Courtesy of FORD MOTOR CO.

3. Remove the bolt, washer and camshaft drive sprocket.
4. Remove the bolt, washer and camshaft sprocket spacer.
5. Compress the secondary timing chain tensioner and install a lock pin.

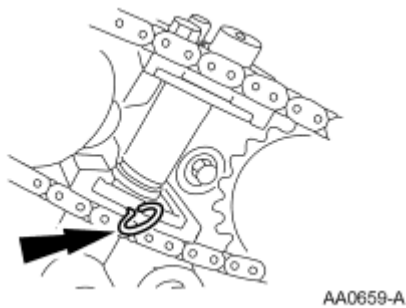


Fig. 98: Identifying Secondary Timing Chain Tensioner & Lock pin
Courtesy of FORD MOTOR CO.

6. Remove the timing chain and the 2 camshaft sprockets.
7. Remove the 2 bolts and the secondary timing chain tensioner.

NOTE: The camshaft bearing cap bolts vary in length and head design and must be installed in their original positions. Camshaft bearing caps are not interchangeable and must be installed in their original positions. If not reassembled in their original positions, severe engine damage may occur.

8. Remove the camshaft bearing cap bolts in the sequence shown.
 - Remove the camshaft bearing caps.
 - Remove the camshafts.

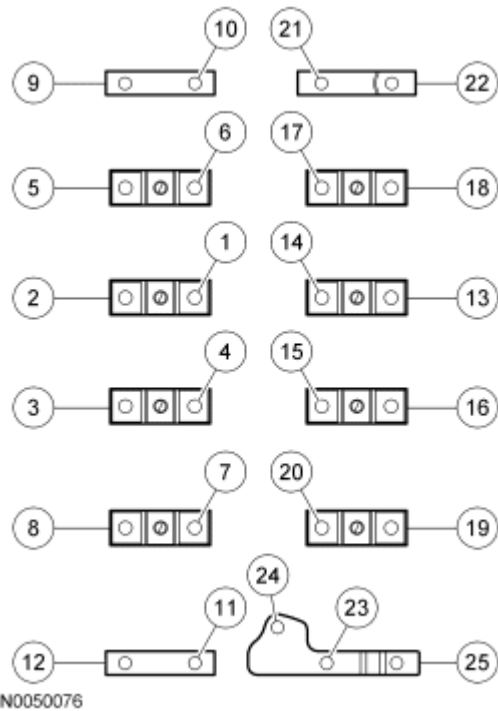


Fig. 99: Removing Camshaft Bearing Cap Bolts In Sequence
Courtesy of FORD MOTOR CO.

INSTALLATION

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

1. Install the camshafts.

NOTE: The camshaft bearing cap bolts vary in length and head design and must be installed in their original positions. Camshaft bearing caps are not interchangeable and must be installed in their original positions. If not reassembled in their original positions, severe engine damage may occur.

NOTE: Lubricate the camshaft bearing cap bearing surfaces with clean engine oil prior to installation.

2. Install the camshaft bearing caps.
 - Install the bearing cap bolts and tighten in the sequence shown to 10 Nm (89 lb-in).

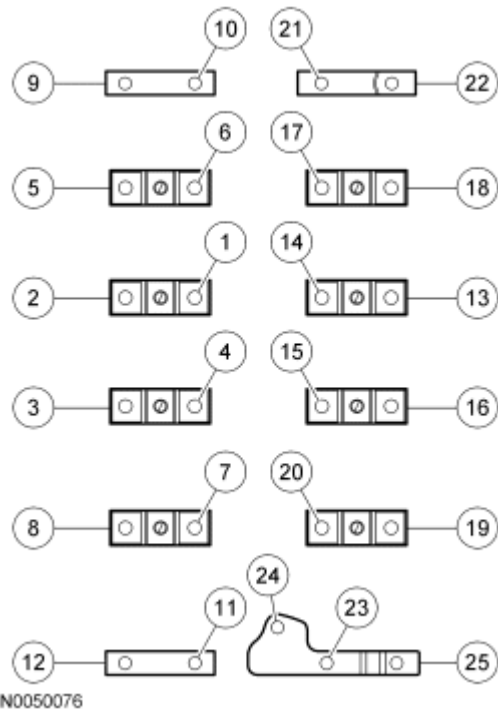


Fig. 100: Removing Camshaft Bearing Cap Bolts In Sequence
Courtesy of FORD MOTOR CO.

3. Install the secondary timing chain tensioner and the bolts.
 - Tighten to 10 Nm (89 lb-in).
4. Index the keyways on the camshafts to the 6 o'clock position.

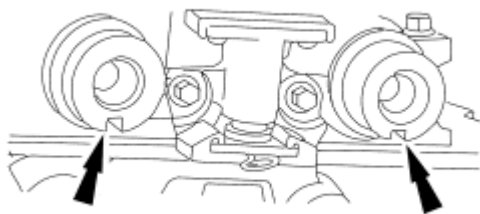


Fig. 101: Identifying Keyways On Camshafts To 6 O'clock Position
Courtesy of FORD MOTOR CO.

NOTE: Timing marks must be at 12 o'clock position or damage to the engine may occur.

5. Install the camshaft sprockets and the chain as an assembly.

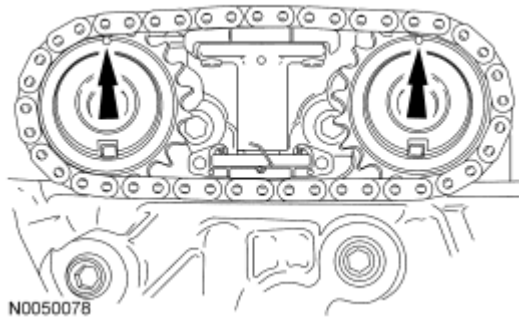


Fig. 102: Identifying Timing Marks At 12 O'clock Position
Courtesy of FORD MOTOR CO.

6. Install the Camshaft Holding Tool.

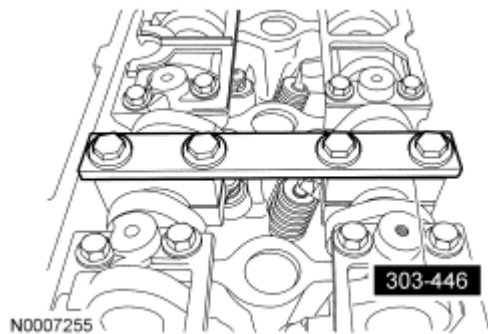


Fig. 103: Identifying Special Tool (303-446)
Courtesy of FORD MOTOR CO.

7. Install the camshaft sprocket spacer, washer and bolt, and hand-tighten the bolt.
8. Install the camshaft drive sprocket, washer and bolt, and hand-tighten the bolt.
9. Tighten the bolts in 2 stages:
- Stage 1: Tighten to 40 Nm (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

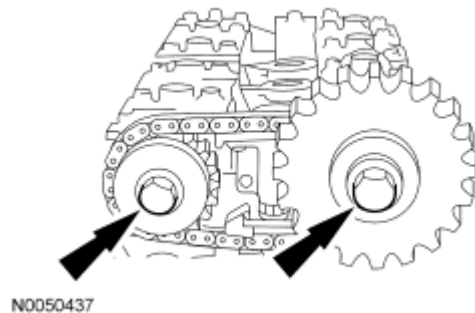
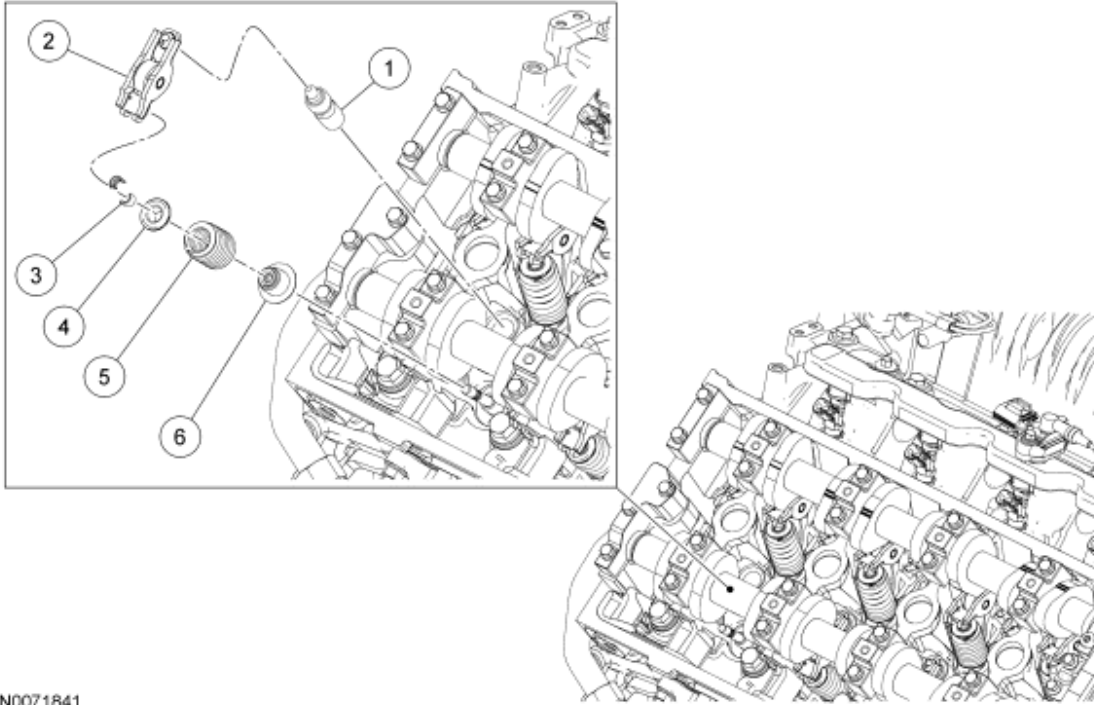


Fig. 104: Identifying Camshaft Drive Sprocket, Washer & Bolt
Courtesy of FORD MOTOR CO.

10. Install the timing drive components. For additional information, refer to **Timing Drive Components**.

VALVE TRAIN COMPONENTS - EXPLODED VIEW



N0071841

Fig. 105: Exploded View Of Valve Train Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6C501	Hydraulic lash adjuster (32 required)
2	6529	Camshaft roller follower (32 required)
3	6518	Valve spring retainer key (64 required)
4	6514	Valve spring retainer (32 required)
5	6513	Valve spring (32 required)
6	6A517	Valve seal (32 required)

1. For additional information, refer to the procedures.

CAMSHAFT ROLLER FOLLOWER

Special Tools

Illustration	Tool Name	Tool Number
	Compressor, Valve Spring	303-452 (T93P-6565-AR)

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang



ST1718-A

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

REMOVAL AND INSTALLATION

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

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

NOTE: If the engine is difficult to rotate while positioning the piston to the bottom of the cylinder, remove the spark plugs.

2. Position the camshaft lobe at base circle.

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

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



N0013704

Fig. 106: Using Special Tool (303-452) To Compress Valve Springs
Courtesy of FORD MOTOR CO.

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

4. Repeat the previous 2 steps to remove each of the roller followers.
 - Inspect the roller followers. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
5. To install, reverse the removal procedure.
 - Lubricate each of the roller followers with clean engine oil prior to installation.

HYDRAULIC LASH ADJUSTER

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

REMOVAL AND INSTALLATION

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

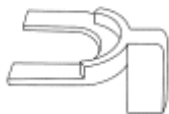
1. Remove the camshaft roller followers. For additional information, refer to **Camshaft Roller Follower**.

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

2. Remove the hydraulic lash adjusters.
 - Inspect the hydraulic lash adjusters. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
3. To install, reverse the removal procedure.
 - Lubricate each of the hydraulic lash adjusters with clean engine oil prior to installation.

VALVE SPRINGS

Special Tools

Illustration	Tool Name	Tool Number
 ST1331-A	Compressor Spacer, Valve Spring	303-382 (T91P-6565-AH)



ST1718-A

Compressor, Valve Spring

303-452 (T93P-6565-AR)

REMOVAL AND INSTALLATION

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

1. Depending on the valve being serviced, remove the RH or LH valve cover. For additional information, refer to Valve Cover - RH or Valve Cover - LH.
2. Remove the spark plug. For additional information, refer to ENGINE IGNITION - 5.4L (4V).
3. Rotate the crankshaft until the piston for the valve being serviced is at the top of its stroke with both the intake valve and the exhaust valve closed.

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

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

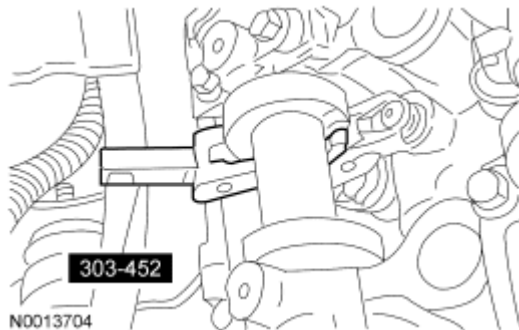


Fig. 107: Using Special Tool (303-452) To Compress Valve Springs
Courtesy of FORD MOTOR CO.

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

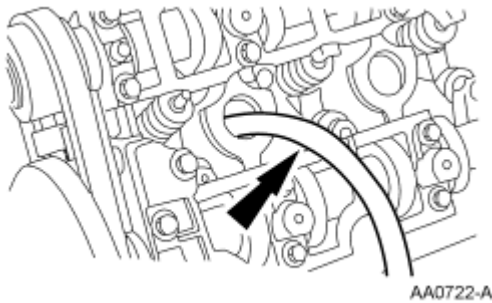


Fig. 108: Identifying Cylinder Valve
Courtesy of FORD MOTOR CO.

6. Install the Valve Spring Compressor Spacer between the valve spring coils to protect the valve seal from damage.

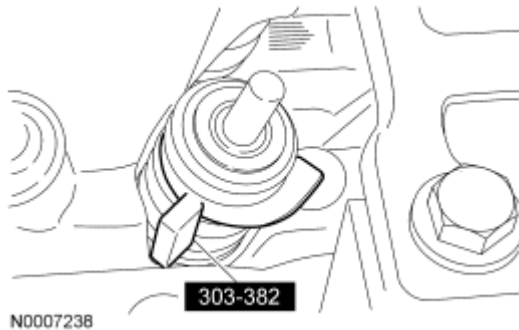


Fig. 109: Installing Special Tool (303-382) Between Valve Spring Coils
Courtesy of FORD MOTOR CO.

- NOTE:** If the components are to be reinstalled, they must be installed in their original positions. Mark the components for installation in their original locations. Failure to follow these instructions may result in engine damage.
- NOTE:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve to fall into the cylinder. If air pressure must be removed, support the valve prior to removal.
- NOTE:** If a valve drops into the cylinder, remove the cylinder head. For additional information, refer to Cylinder Head.
- NOTE:** Valve stem seals should be visually inspected if new seals are not installed.

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

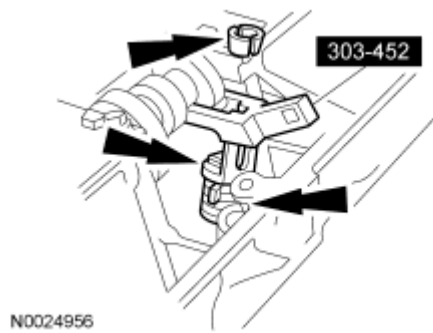
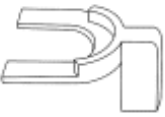


Fig. 110: Installing Valve Spring, Valve Spring Retainer & Valve Spring Retainer Keys Using Special Tool (303-452)
Courtesy of FORD MOTOR CO.

8. Inspect the components. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
9. To install, reverse the removal procedure.

VALVE SEALS

Special Tools

Illustration	Tool Name	Tool Number
 ST1331-A	Compressor Spacer, Valve Spring	303-382 (T91P-6565-AH)
 ST1718-A	Compressor, Valve Spring	303-452 (T93P-6565-AR)
 ST1332-A	Installer, Valve Stem Oil Seal	303-383 (T91P-6571-A)

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

REMOVAL AND INSTALLATION

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

1. Depending on the valve being serviced, remove the RH or LH valve cover. For additional information, refer to **Valve Cover - RH** or **Valve Cover - LH**.
2. Remove the spark plug. For additional information, refer to **ENGINE IGNITION - 5.4L (4V)**.
3. Rotate the crankshaft until the piston for the valve being serviced is at the top of its stroke with both the intake valve and the exhaust valve closed.

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

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



Fig. 111: Using Special Tool (303-452) To Compress Valve Springs
Courtesy of FORD MOTOR CO.

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

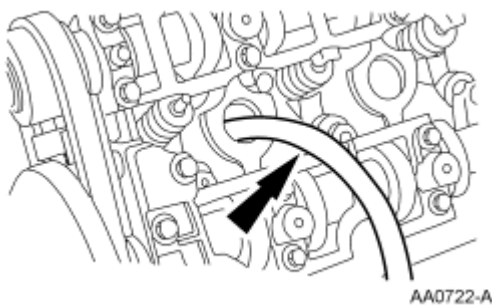


Fig. 112: Identifying Cylinder Valve
Courtesy of FORD MOTOR CO.

- NOTE:** If the components are to be reinstalled, they must be installed in their original positions. Mark the components for installation into their original locations. Failure to follow these instructions may result in engine damage.
- NOTE:** If air pressure has forced the piston to the bottom of the cylinder, any loss of air pressure will allow the valve to fall into the cylinder. If air pressure must be removed, support the valve prior to removal.
- NOTE:** If a valve drops into the cylinder, remove the cylinder head. For additional information, refer to Cylinder Head.

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

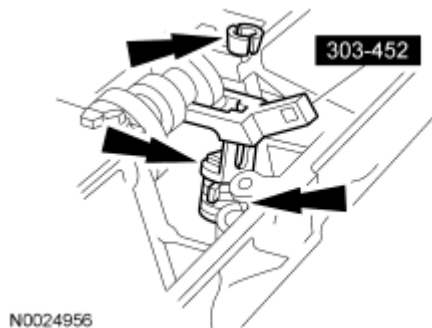


Fig. 113: Installing Valve Spring, Valve Spring Retainer & Valve Spring Retainer Keys Using Special Tool (303-452)
Courtesy of FORD MOTOR CO.

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

INSTALLATION

- NOTE:** Lubricate the valve seal and valve stem with clean engine oil prior to installation.

1. Using the Valve Spring Compressor and the Valve Stem Oil Seal Installer, install a new valve seal.

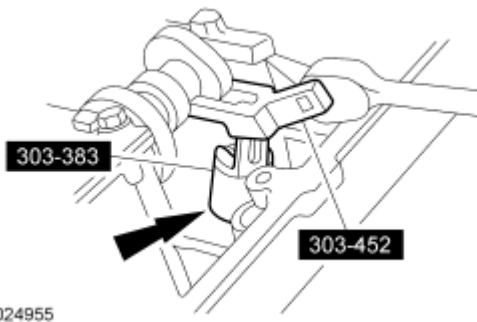


Fig. 114: Installing New Valve Seal Using Special Tools (303-383) & (303-452)
Courtesy of FORD MOTOR CO.

2. Install the Valve Spring Compressor Spacer between the valve spring coils to protect the valve stem seal from damage.

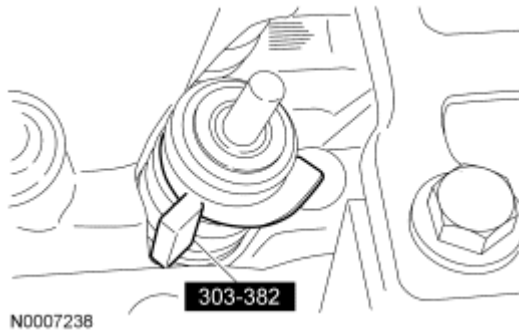


Fig. 115: Installing Special Tool (303-382) Between Valve Spring Coils
Courtesy of FORD MOTOR CO.

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

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

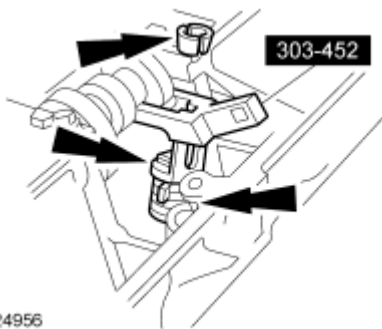


Fig. 116: Installing Valve Spring, Valve Spring Retainer & Valve Spring Retainer Keys Using

Special Tool (303-452)

Courtesy of FORD MOTOR CO.

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

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



Fig. 117: Using Special Tool (303-452) To Compress Valve Springs
Courtesy of FORD MOTOR CO.

5. Install the spark plug. For additional information, refer to **ENGINE IGNITION - 5.4L (4V)** .
6. Depending on the valve being serviced, install the RH or LH valve cover. For additional information, refer to **Valve Cover - RH** or **Valve Cover - LH** .

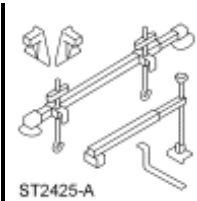
EXHAUST MANIFOLD - RH

Special Tools

Illustration	Tool Name	Tool Number
	Lifting Bracket, Engine	303-D087 (D93P-6001-A1) or equivalent
	Support Bar, Engine	303-F070
	Support Bar, Engine	303-F072

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Material

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

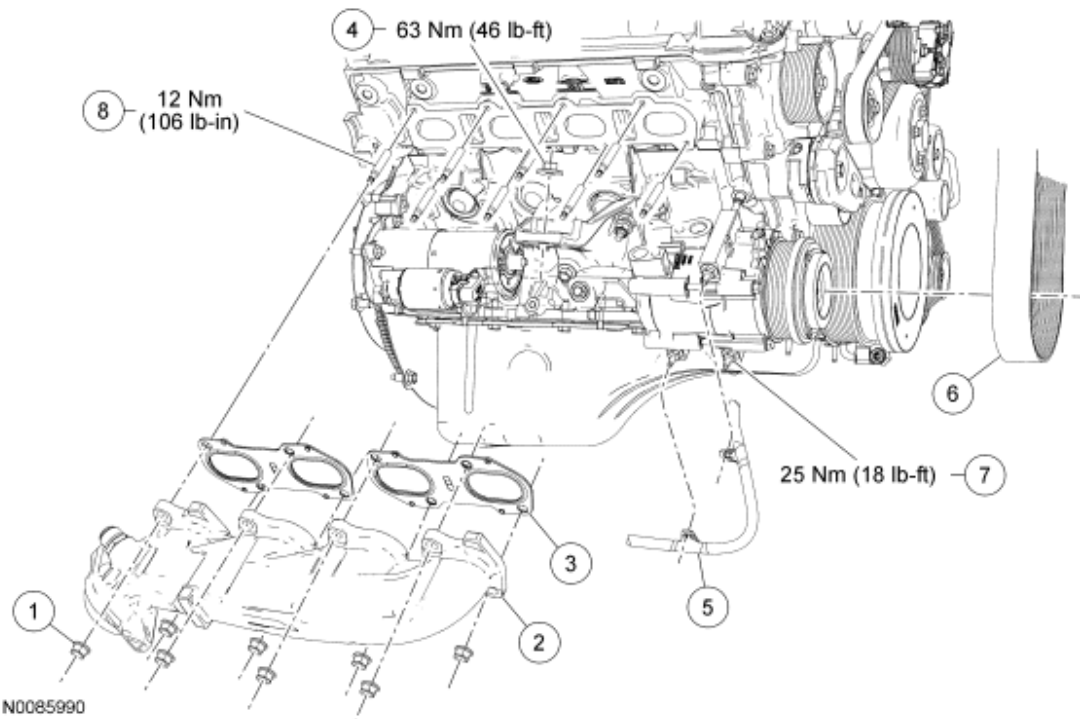


Fig. 118: Exploded View Of RH Exhaust Manifold With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W701706	RH exhaust manifold nut (8 required)
2	9428	RH exhaust manifold
3	9Y431	RH exhaust manifold gasket (2 required)
4	W712530	RH engine support insulator nut
5	-	Wiring harness retainer (part of 12B637)
6	8620	Supercharger (SC) drive belt
7	W707821	A/C compressor stud bolt (3 required)
8	W707747	RH exhaust manifold stud (8 required)

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** .
2. Remove the 4 nuts and the strut tower cross brace.

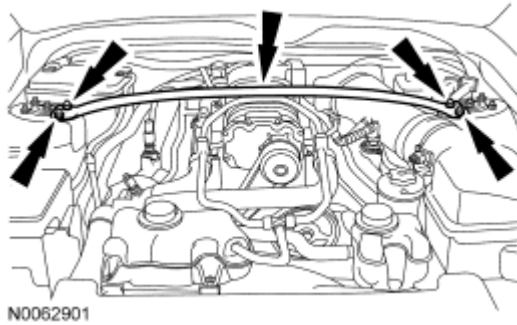


Fig. 119: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

3. Remove the EGR tube. For additional information, refer to **ENGINE EMISSION CONTROL** .
4. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM** .
5. Rotate the Supercharger (SC) drive belt tensioner clockwise and remove the drive belt from the SC drive pulley.

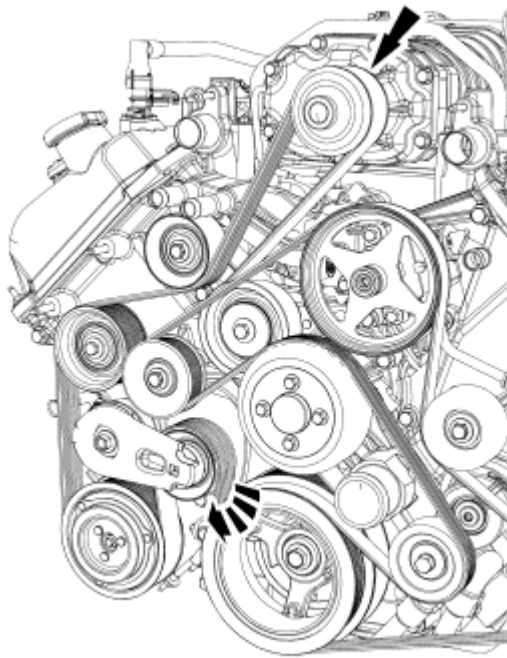


Fig. 120: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC
Courtesy of FORD MOTOR CO.

6. Install the Engine Lifting Bracket.

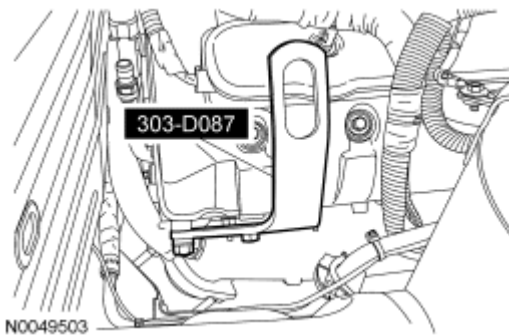


Fig. 121: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

NOTE: The heavy duty Engine Support Bar (303-F070) must be used with the draw screws from the light duty Engine Support Bar (303-F072). This will provide enough clearance between the SC and the Engine Support Bar, and enough clearance between the draw screw and the vehicle hood.

7. Install the Engine Support Bars.
- Remove the RH engine support insulator nut.
 - Using the Engine Support Bars, raise the RH side of the engine.

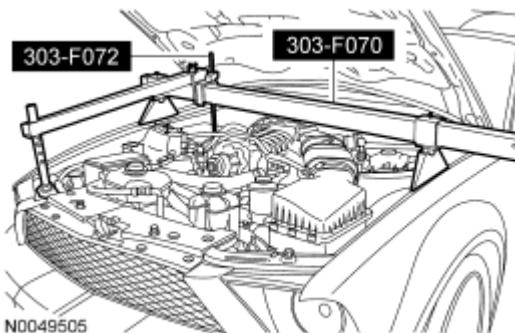


Fig. 122: Lowering Engine Onto Engine Support Insulator Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

8. Remove the SC drive belt from the A/C compressor pulley.
9. Remove the wiring harness retainers from the A/C compressor stud bolts and position the wiring harness aside.

NOTE: The A/C compressor stud bolts must be loosened to gain access to the RH exhaust manifold nuts.

10. Loosen the A/C compressor stud bolts 25 mm (0.98 in).

11. Remove the 8 nuts and the RH exhaust manifold.
 - Discard the nuts and gaskets.
12. Clean and inspect the RH exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
13. Remove and discard the 8 RH exhaust manifold studs.

INSTALLATION

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

1. Clean the exhaust manifold mating surface of the cylinder head with metal surface prep. Follow the directions on the packaging.
2. Install the 8 new RH exhaust manifold-to-cylinder head studs.
 - Tighten to 12 Nm (106 lb-in).
3. Install new gaskets, the RH exhaust manifold and 8 new nuts.
 - Tighten in the sequence shown to 20 Nm (177 lb-in).

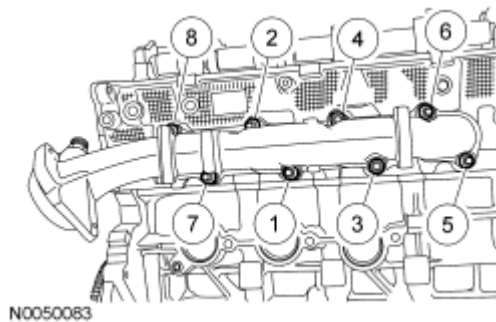


Fig. 123: Identifying RH Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

4. Tighten the A/C compressor stud bolts to 25 Nm (18 lb-ft).
5. Install the wiring harness retainers onto the A/C compressor stud bolts.
6. Position the SC drive belt onto the A/C compressor pulley.
7. Using the Engine Support Bars, lower the engine onto the engine support insulator.

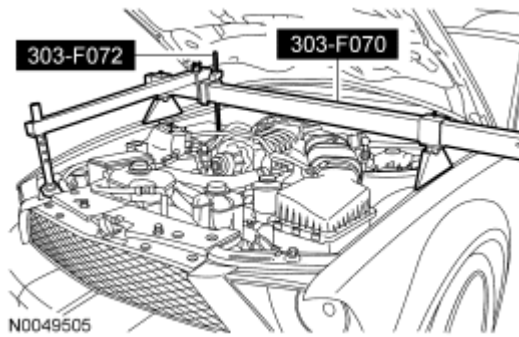


Fig. 124: Lowering Engine Onto Engine Support Insulator Using Special Tools (303-F072) & (303-F070)

Courtesy of FORD MOTOR CO.

8. Install the RH engine support insulator nut.
 - Tighten to 63 Nm (46 lb-ft).
9. Rotate the SC drive belt tensioner clockwise and install the drive belt onto the SC drive pulley.

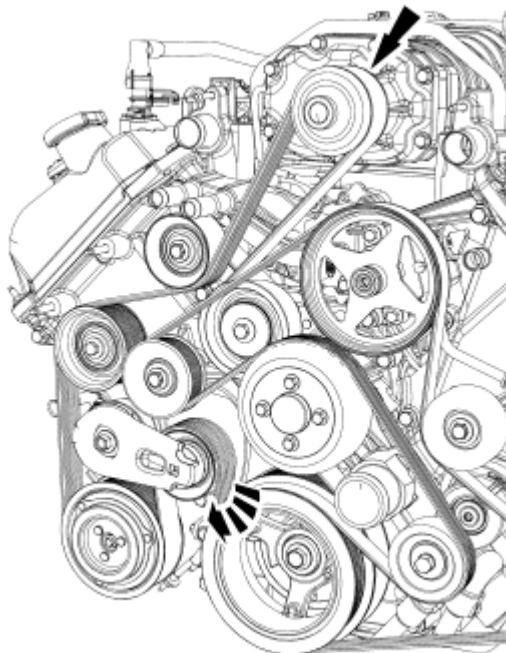


Fig. 125: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC

Courtesy of FORD MOTOR CO.

10. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
11. Install the EGR tube. For additional information, refer to **ENGINE EMISSION CONTROL**.
12. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).

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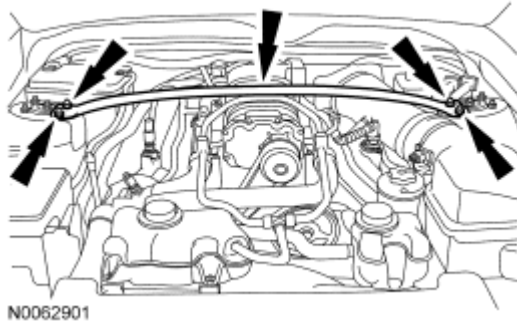
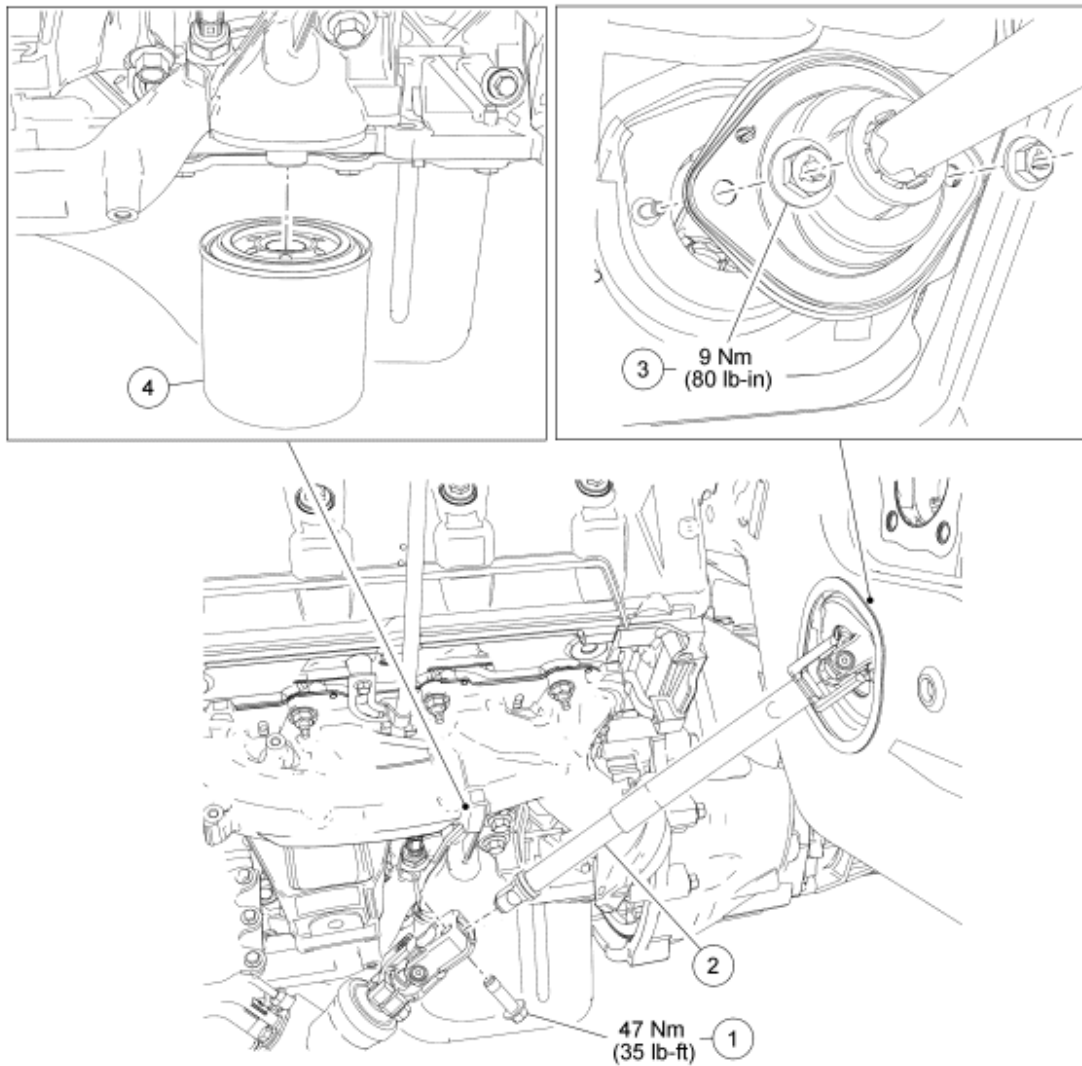


Fig. 126: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

EXHAUST MANIFOLD - LH

Material

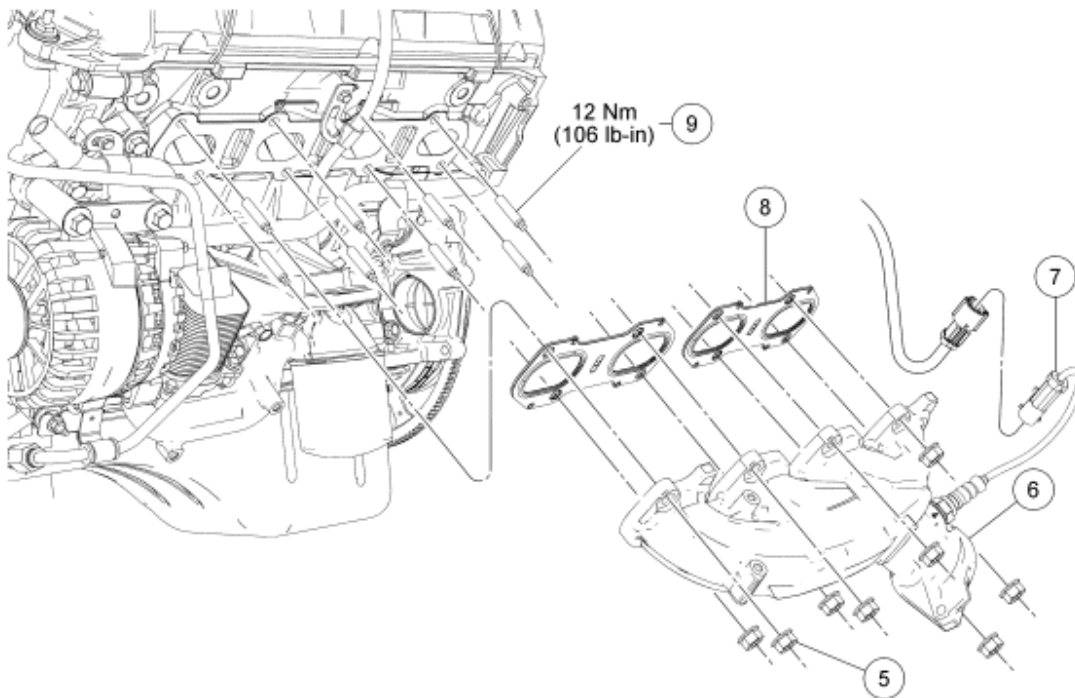
Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B



N0050518

Fig. 127: Exploded View Of LH Exhaust Manifold With Torque Specifications (1 Of 2)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W702600	Intermediate steering shaft bolt
2	3C662	Intermediate steering shaft
3	W707137	Dash boot nut (2 required)
4	6714	Engine oil filter



N0085991

Fig. 128: Exploded View Of LH Exhaust Manifold With Torque Specification (2 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
5	W701706	LH exhaust manifold nut (8 required)
6	9431	LH exhaust manifold
7	14A464	LH heated oxygen sensor (HO2S) electrical connector (part of 12B637)
8	9Y431	LH exhaust manifold gasket (2 required)
9	W707747	LH exhaust manifold stud (8 required)

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the Evaporative Emission (EVAP) canister purge valve. For additional information, refer to **EVAPORATIVE EMISSIONS**.
3. Remove the 2 dash boot nuts.
4. Remove the catalytic converter. For additional information, refer to **EXHAUST SYSTEM**.
5. Disconnect the LH Heated Oxygen Sensor (HO2S) electrical connector.
6. Remove and discard the engine oil filter.

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

7. Using a suitable holding device, hold the steering wheel in the straight-ahead position.

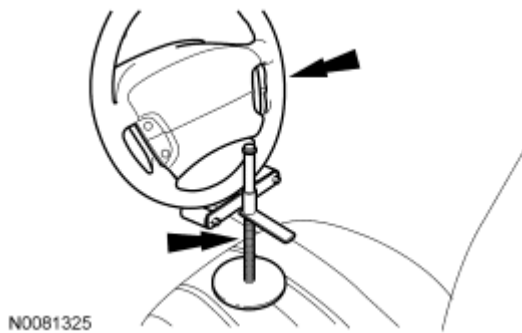


Fig. 129: Holding Steering Wheel In Straight-Ahead Position Using A Suitable Holding Device
Courtesy of FORD MOTOR CO.

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

8. Remove the upper bolt from the intermediate steering shaft and position the intermediate steering shaft aside.

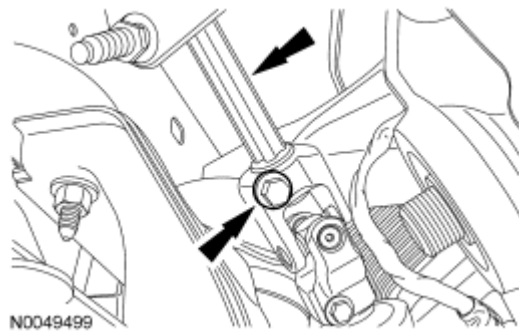


Fig. 130: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

9. Remove the 8 nuts and the LH exhaust manifold.
 - Discard the nuts and gaskets.
10. Clean and inspect the LH exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** .
11. Remove and discard the 8 LH exhaust manifold studs.

INSTALLATION

NOTE: Do not use metal scrapers, wire brushes, power abrasive discs or other

abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.

1. Clean the exhaust manifold mating surface of the cylinder head with metal surface prep. Follow the directions on the packaging.
2. Install 8 new LH exhaust manifold studs.
 - Tighten to 12 Nm (106 lb-in).
3. Install new gaskets, the LH exhaust manifold and 8 new nuts.
 - Tighten in the sequence shown to 20 Nm (177 lb-in).

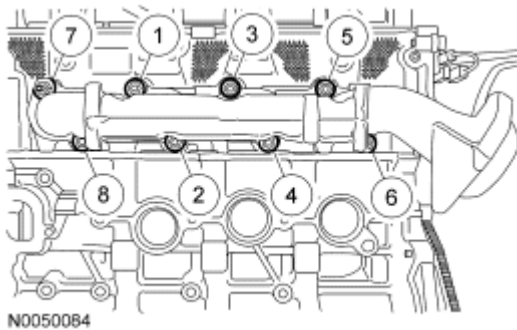


Fig. 131: Identifying LH Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

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

4. Install the intermediate steering shaft and the upper bolt.
 - Tighten to 47 Nm (35 lb-ft).

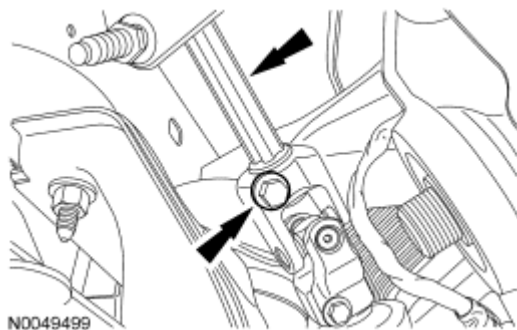


Fig. 132: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

5. Install a new engine oil filter.

- Lubricate the oil filter gasket with clean engine oil and tighten until the seal makes contact.
- Using an oil filter strap wrench, tighten the filter an additional 270 degrees.

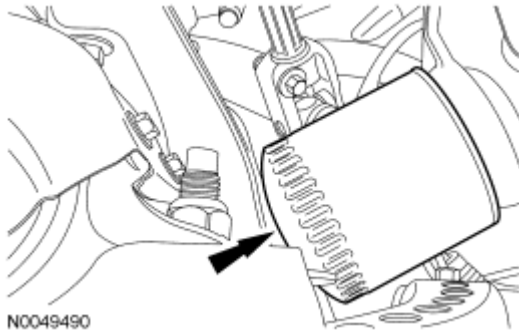


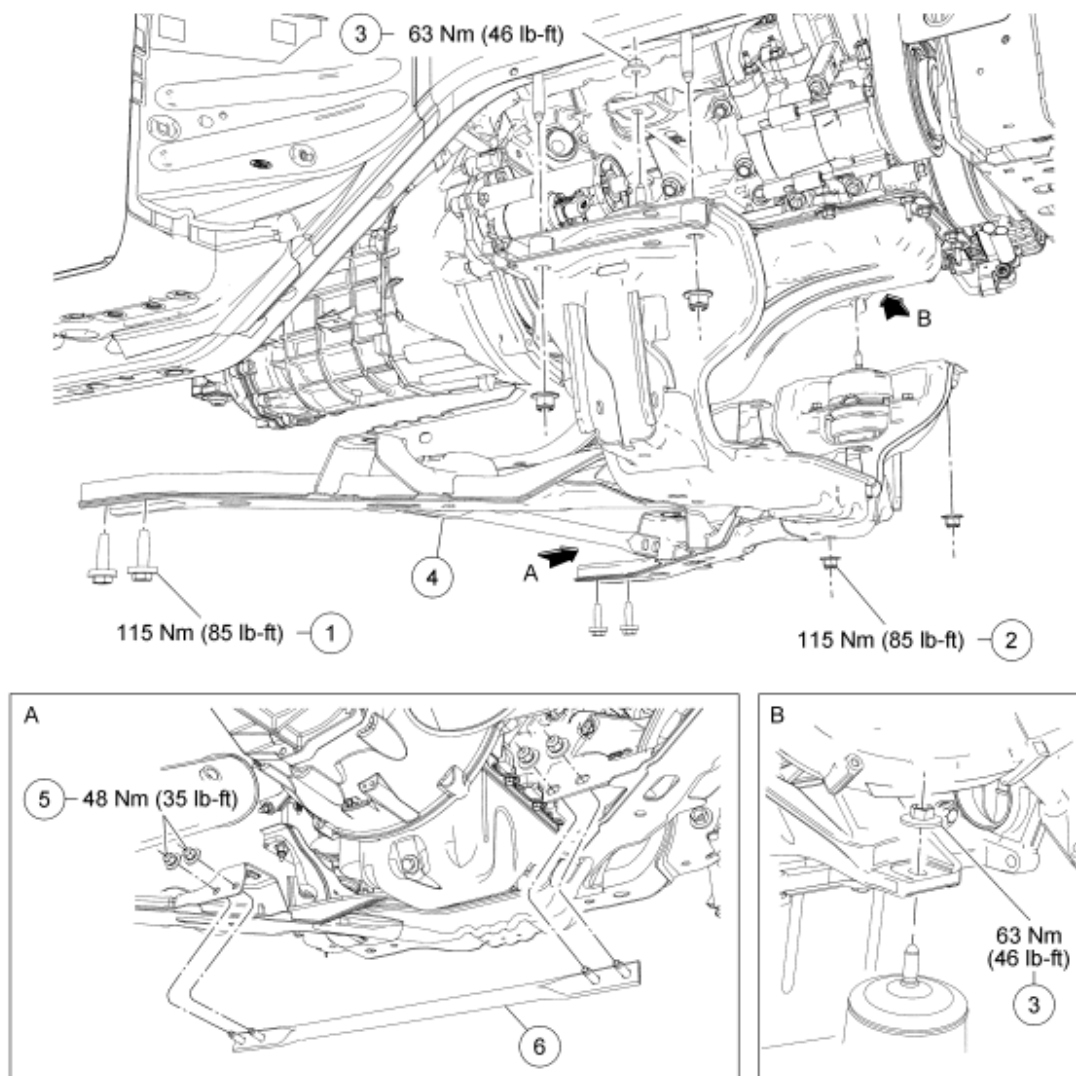
Fig. 133: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

6. Connect the LH HO2S electrical connector.
7. Install the catalytic converter. For additional information, refer to **EXHAUST SYSTEM** .
8. Install the 2 dash boot nuts.
 - Tighten to 9 Nm (80 lb-in).
9. Install the EVAP canister purge valve. For additional information, refer to **EVAPORATIVE EMISSIONS** .

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

2009 Ford Mustang GT

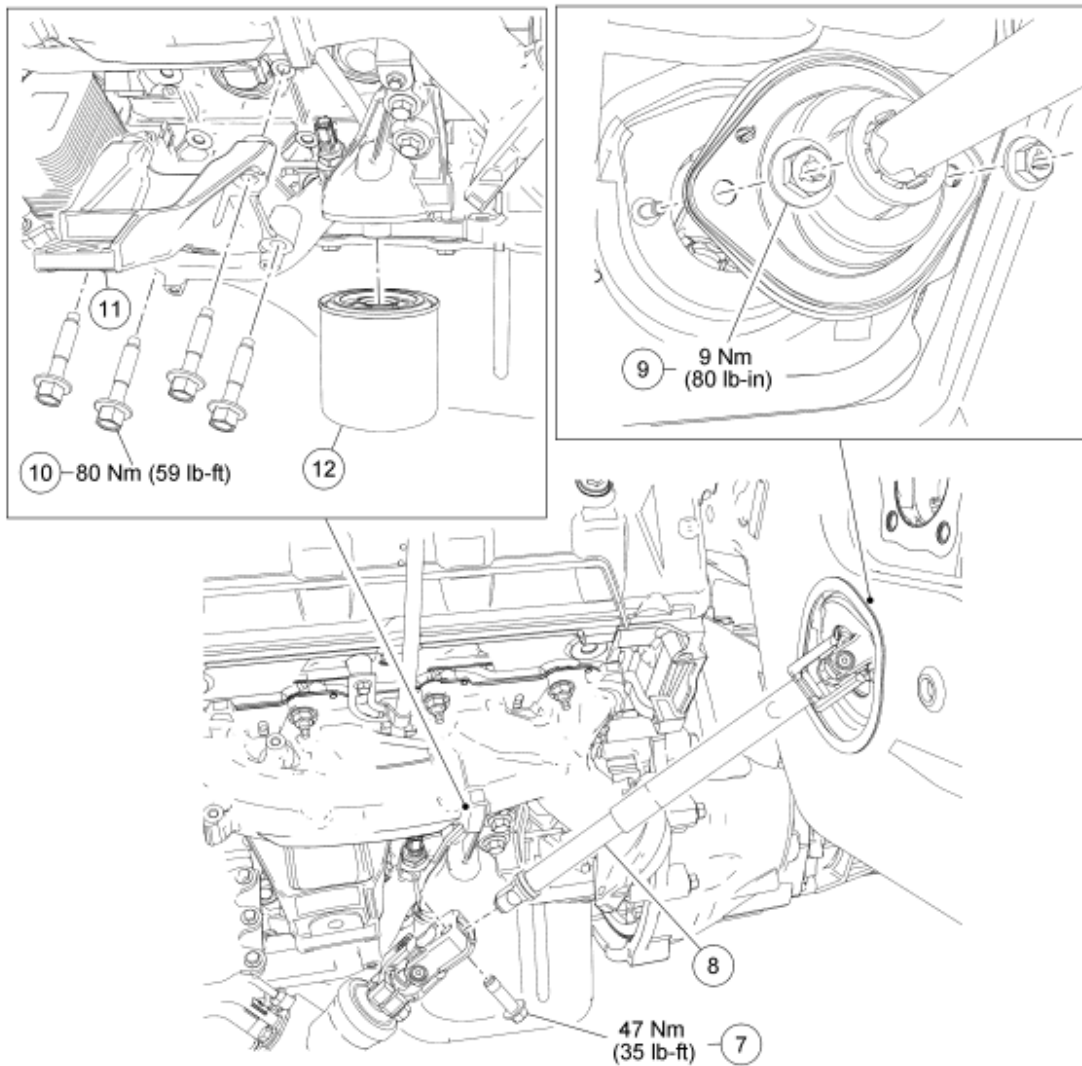
2009 ENGINE Engine - 5.4L (4V) - Mustang



N0071844

Fig. 134: Exploded View Of Engine Subframe & Engine Insulators With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W711075	Subframe bolt (4 required)
2	W707246	Subframe nut (4 required)
3	W712530	Engine support insulator nut (2 required)
4	5025	Subframe
5	W711553	Subframe cross brace nuts (4 required)
6	5A095	Subframe cross brace



N0071845

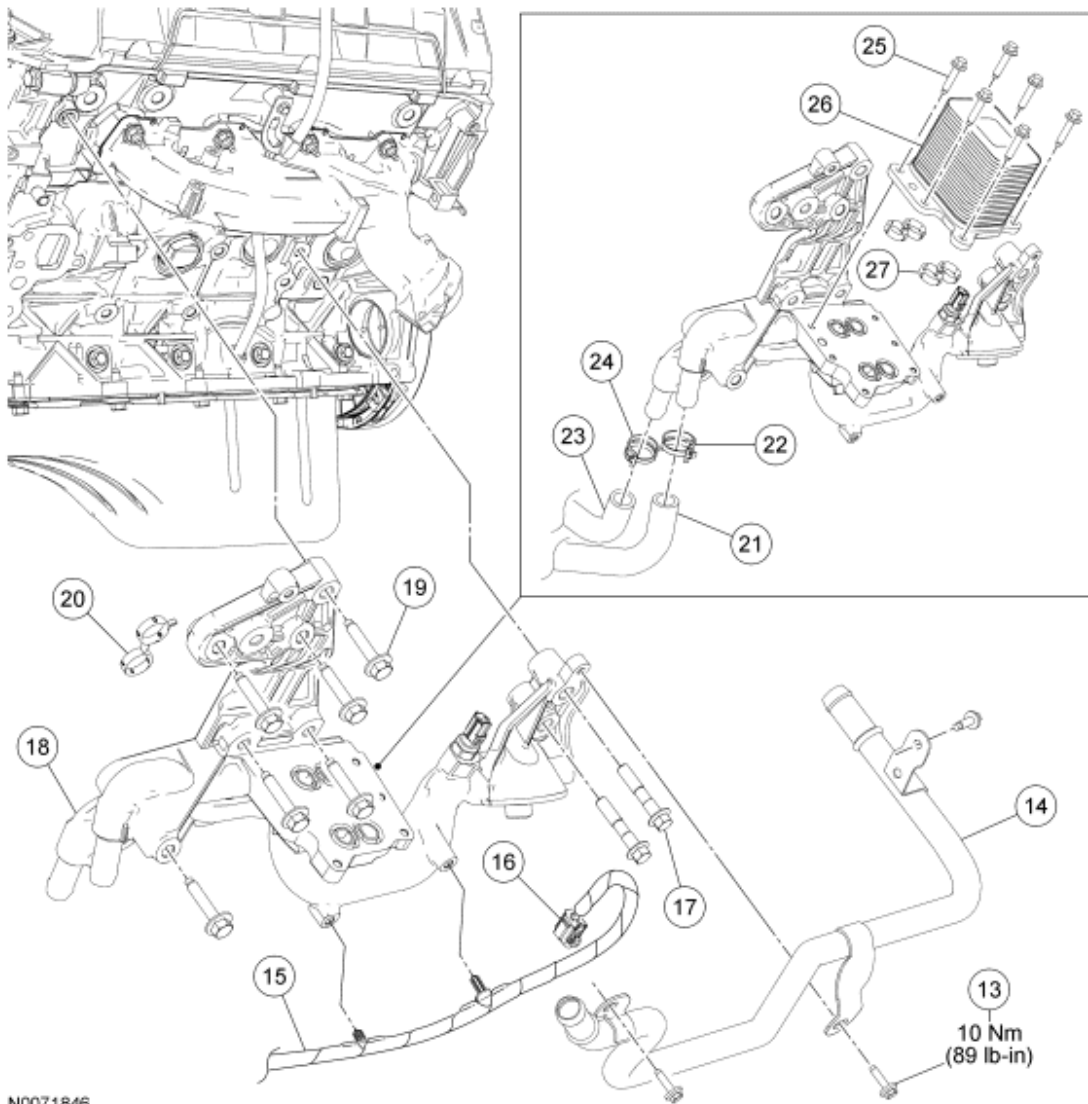
Fig. 135: Exploded View Of Intermediate Shaft, LH Support Insulator & Engine Oil Filter With Torque Specifications

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
7	W702600	Intermediate steering shaft bolt
8	3C662	Intermediate steering shaft
9	W707137	Dash boot nut (2 required)
10	W710565	LH engine support insulator bracket bolt (4 required)
11	6B033	LH engine support insulator bracket
12	6714	Engine oil filter

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang



N0071846

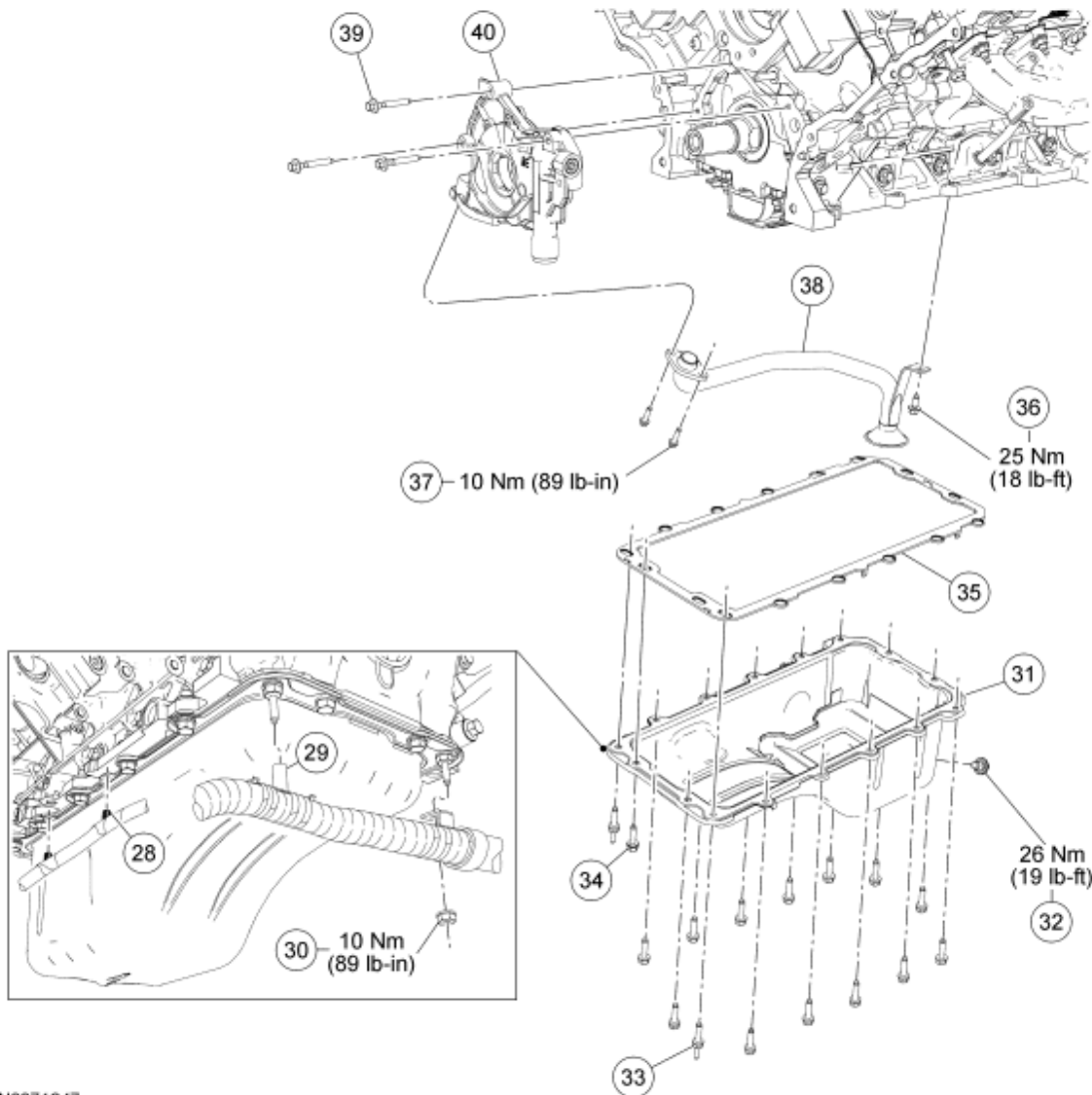
Fig. 136: Exploded View Of Oil Filter Adapter, Coolant Hoses & Oil Cooler With Torque Specification
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
13	N605891	Coolant tube assembly-to-oil filter adapter bolt (3 required)
14	18663	Coolant tube assembly
15	-	Wiring harness retainer (2 required) (part of 12B637)
16	14A464	Engine Oil Pressure (EOP) switch electrical connector (part of 12B637)
17	N606063	Oil filter adapter bolt (2 required)
18	6884	Oil filter adapter
19	N807724	Oil filter adapter bolt (6 required)
20	6A636	Oil filter adapter gasket
21	6B850	Coolant hose-to-oil filter adapter

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22	15161	Coolant hose-to-oil filter adapter clamp
23	6B851	Lower radiator hose assembly-to-oil filter adapter
24	15161	Lower radiator hose assembly-to-oil filter adapter clamp
25	N605893	Oil cooler bolt (6 required)
26	6A642	Oil cooler
27	6N818	Oil cooler gasket (4 required)



N0071847

Fig. 137: Exploded View Of Wiring Harness Retainers, Oil Pump, Oil Pump Screen & Pickup Tube & Oil Pan With Torque Specifications
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
28	-	Wiring harness retainer (2 required) (part of 12B637)
29	-	Wiring harness retainer (2 required) (part of 14305)

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30	-	Wire harness retainer bracket nut
31	6675	Oil pan
32	6730	Oil pan drain plug
33	W701606	Oil pan stud bolt (2 required)
34	W701605	Oil pan bolt (14 required)
35	6710	Oil pan gasket
36	N605904	Oil pump screen and pickup tube bolt (large)
37	N806155	Oil pump screen and pickup tube bolt (small) (2 required)
38	6622	Oil pump screen and pickup tube
39	N806183	Oil pump bolt (3 required)
40	6621	Oil pump

1. For additional information, refer to the procedures.

OIL COOLER

Material

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

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING**.
3. Remove the generator. For additional information, refer to **GENERATOR AND REGULATOR**.

NOTE: If metal or aluminum material is present in the oil cooler, mechanical concerns exist. Failure to correct these concerns may cause engine failure. To diagnose mechanical concerns, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.

4. Remove the 6 bolts and the oil cooler.
 - Discard the gaskets.
 - Inspect the oil cooler.

INSTALLATION

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

1. Using new gaskets, install the oil cooler and the 6 bolts.

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

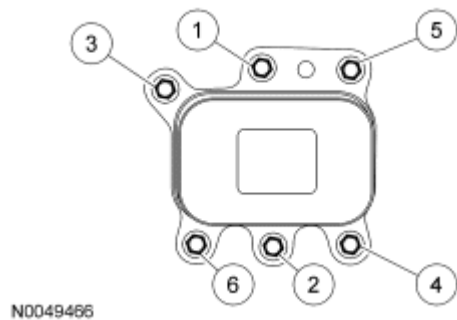
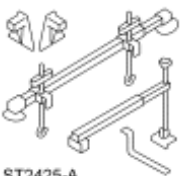


Fig. 138: Installing Oil Cooler Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

2. Install the generator. For additional information, refer to **GENERATOR AND REGULATOR**.
3. Fill and bleed engine cooling system. For additional information, refer to **ENGINE COOLING**.

OIL FILTER ADAPTER

Special Tools

Illustration	Tool Name	Tool Number
 ST1603-A	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
 ST2176-B	Support Bar, Engine	303-F070
 ST2425-A	Support Bar, Engine	303-F072

Material

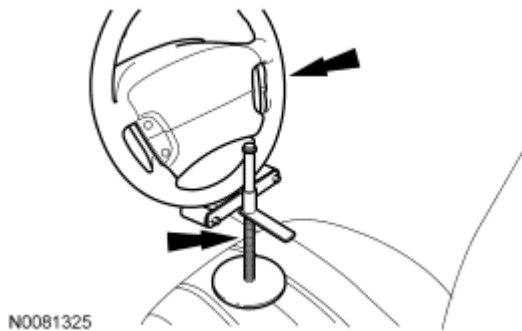
Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 2 dash boot nuts.

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

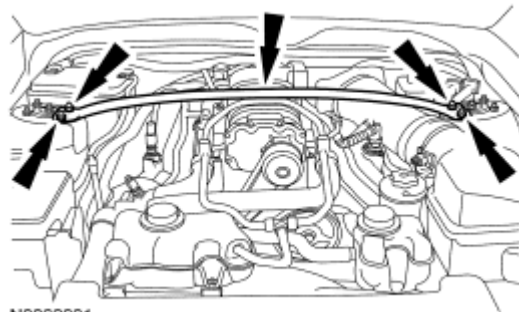
3. Using a suitable holding device, hold the steering wheel in the straight-ahead position.



N0081325

Fig. 139: Holding Steering Wheel In Straight-Ahead Position Using A Suitable Holding Device
Courtesy of FORD MOTOR CO.

4. Remove the 4 nuts and the strut tower cross brace.



N0062901

Fig. 140: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

5. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING**.
6. Remove the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
7. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
8. Remove the oil cooler. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Cooler**.

9. Install the Engine Lifting Bracket.

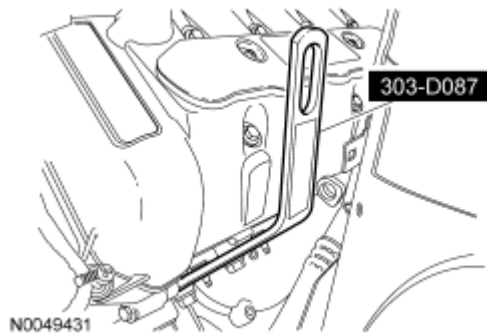


Fig. 141: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

10. Install the Engine Lifting Bracket.

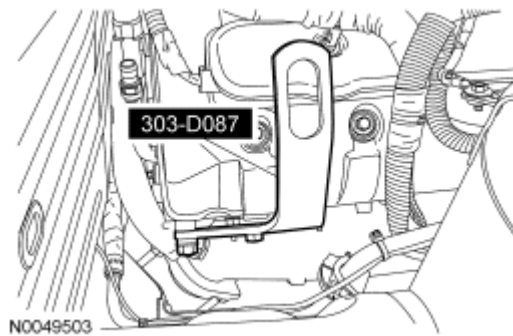


Fig. 142: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

11. Remove the LH and RH engine support insulator nuts.

NOTE: The heavy duty Engine Support Bar (303-F070) must be used with the draw screws from the light duty Engine Support Bar (303-F072). This will provide enough clearance between the Supercharger (SC) and the Engine Support Bar, and enough clearance between the draw screw and the vehicle hood.

12. Install the Engine Support Bars and raise the engine.

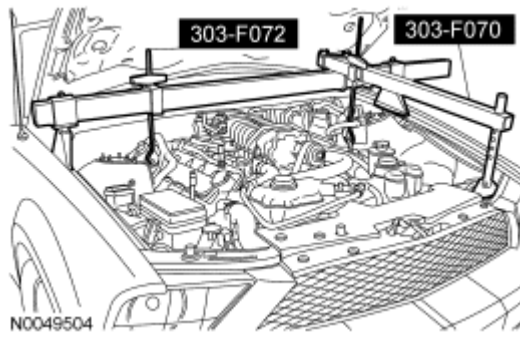


Fig. 143: Raising Engine Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

13. Drain the engine oil.
 - Tighten the drain plug to 26 Nm (19 lb-ft).
14. Remove and discard the engine oil filter.
15. Position a suitable adjustable jackstand under the subframe.

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

16. Remove the upper bolt from the intermediate steering shaft.

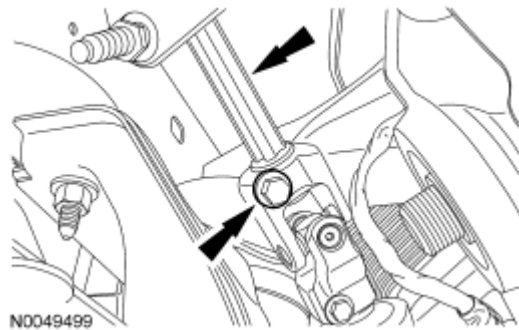


Fig. 144: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

17. Mark the position of the 4 subframe nuts and 4 subframe bolts for referencing during assembly.

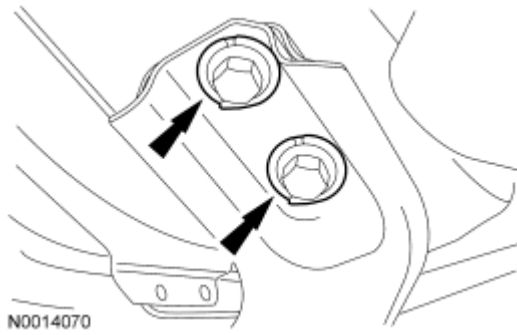


Fig. 145: Aligning Subframe Nuts And Bolts
Courtesy of FORD MOTOR CO.

18. Remove the 4 subframe nuts and 4 subframe bolts.
19. Using the adjustable jackstand, lower the subframe 50 mm (1.96 in).
20. Remove the 4 bolts and the LH engine support bracket.
21. Remove the 2 coolant tube assembly-to-oil filter adapter bolts.
22. Disconnect the 2 coolant hoses from the oil filter adapter.
23. Disconnect the Engine Oil Pressure (EOP) switch electrical connector and the 2 wiring harness pin-type retainers.
24. Remove the 8 bolts and the oil filter adapter.
 - Discard the gasket.

INSTALLATION

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

1. Using a new gasket, install the oil filter adapter and the 8 bolts.
 - Tighten in the sequence shown:
 - Bolts 1 through 6 to 25 Nm (18 lb-ft).
 - Bolts 7 and 8 to 50 Nm (37 lb-ft).

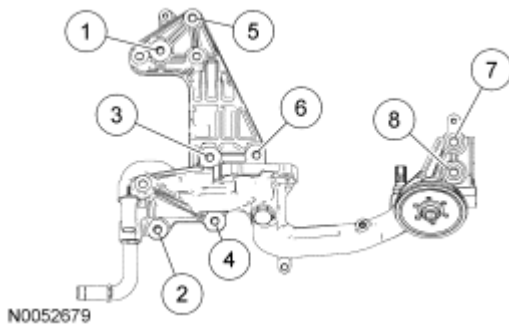


Fig. 146: Installing Oil Filter Adapter Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

2. Connect the EOP switch electrical connector and the 2 wiring harness pin-type retainers.
3. Connect the 2 coolant hoses to the oil filter adapter.
4. Install the 2 coolant tube assembly-to-oil filter adapter bolts.
 - Tighten to 10 Nm (89 lb-in).
5. Install the LH engine support bracket and the 4 bolts.
 - Tighten to 80 Nm (59 lb-ft).
6. Using the adjustable jackstand, raise the subframe.

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

7. Position the intermediate steering shaft and install the upper bolt.
 - Tighten to 47 Nm (35 lb-ft).

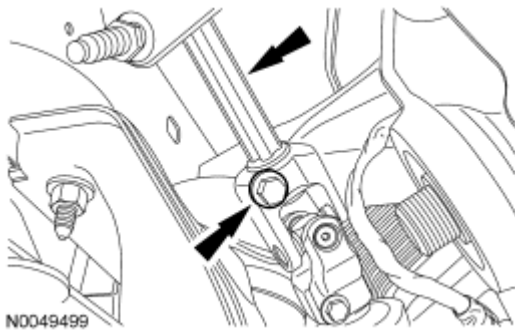


Fig. 147: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

NOTE: Do not tighten the subframe nuts and bolts at this time.

8. Install the 4 subframe nuts and 4 subframe bolts.
9. Align the subframe nuts and bolts with the reference marks made during removal.
 - Tighten the nuts to 115 Nm (85 lb-ft).
 - Tighten the bolts to 115 Nm (85 lb-ft).

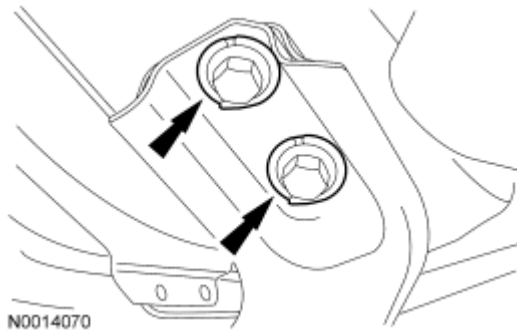


Fig. 148: Aligning Subframe Nuts And Bolts
Courtesy of FORD MOTOR CO.

10. Install a new engine oil filter.
 - Lubricate the oil filter gasket with clean engine oil and tighten until the seal makes contact.
 - Using a suitable oil filter strap wrench, tighten the filter an additional 270 degrees.
11. Using the Engine Support Bars, lower the engine onto the engine support insulators.

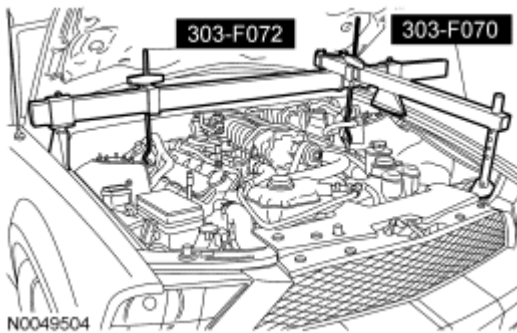


Fig. 149: Raising Engine Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

12. Install the LH and RH engine support insulator nuts.
 - Tighten to 63 Nm (46 lb-ft).
13. Install the oil cooler. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Cooler**.
14. Install the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
15. Install the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
16. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).

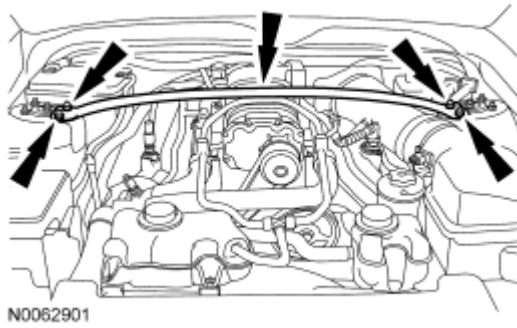
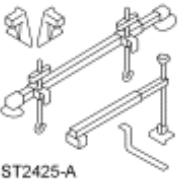


Fig. 150: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

17. Install the dash boot and the 2 nuts.
 - Tighten to 9 Nm (80 lb-in).
18. Fill the engine with clean engine oil.
19. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING**.

OIL PAN

Special Tools

Illustration	Tool Name	Tool Number
	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
	Support Bar, Engine	303-F070
	Support Bar, Engine	303-F072

Material

Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 2 dash boot nuts.

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

3. Using a suitable holding device, hold the steering wheel in the straight-ahead position.

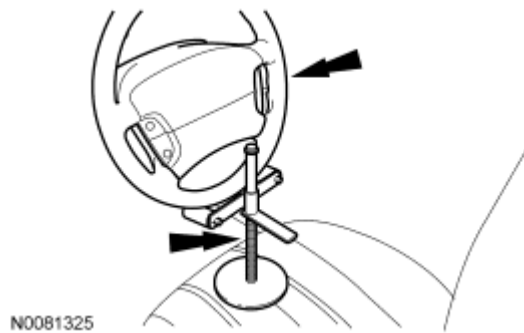


Fig. 151: Holding Steering Wheel In Straight-Ahead Position Using A Suitable Holding Device
Courtesy of FORD MOTOR CO.

4. Remove the 4 nuts and the strut tower cross brace.

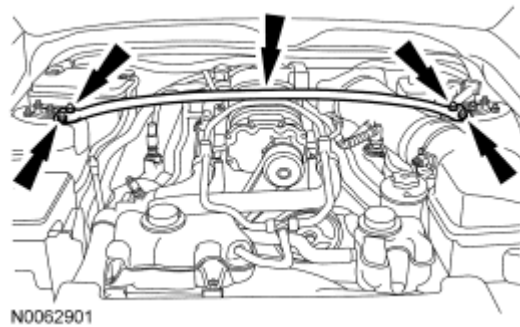


Fig. 152: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

5. Remove the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.

6. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
7. Install the Engine Lifting Bracket.

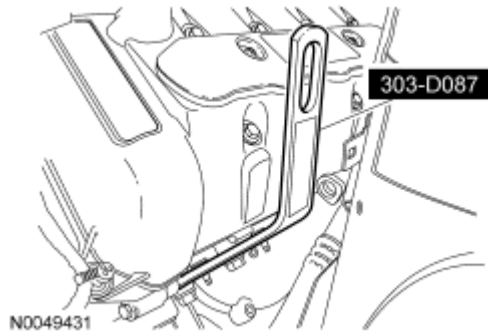


Fig. 153: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

8. Install the Engine Lifting Bracket.

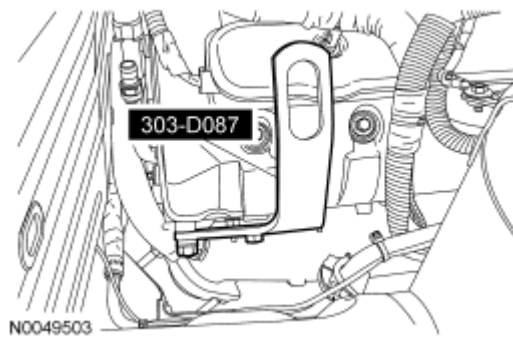


Fig. 154: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

9. Remove the LH and RH engine support insulator nuts.

NOTE: The heavy duty Engine Support Bar (303-F070) must be used with the draw screws from the light duty Engine Support Bar (303-F072). This will provide enough clearance between the Supercharger (SC) and the Engine Support Bar, and enough clearance between the draw screw and the vehicle hood.

10. Install the Engine Support Bars and raise the engine.

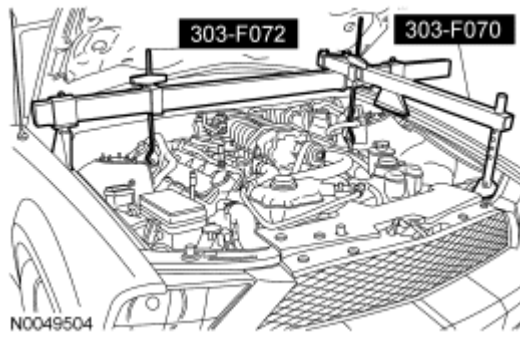


Fig. 155: Raising Engine Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

11. Drain the engine oil.
 - Tighten the drain plug to 26 Nm (19 lb-ft).
12. Remove the 4 nuts and the subframe cross brace.
13. Position a suitable adjustable jackstand under the subframe.

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

14. Remove the upper bolt from the intermediate steering shaft.

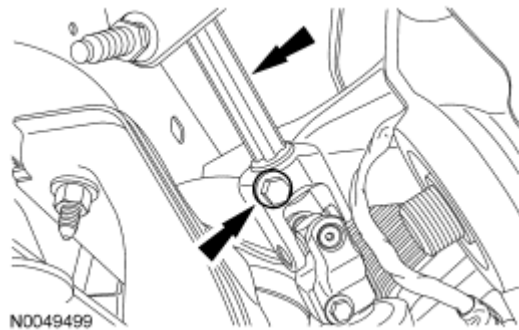


Fig. 156: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

15. Mark the position of the 4 subframe nuts and 4 subframe bolts for referencing during assembly.

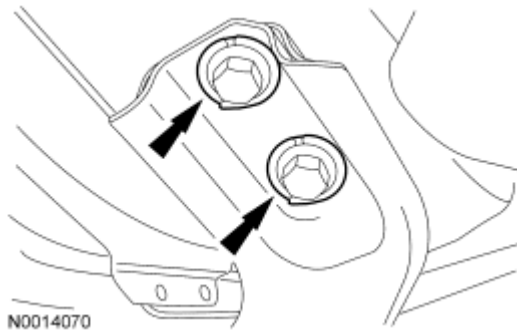


Fig. 157: Aligning Subframe Nuts And Bolts
Courtesy of FORD MOTOR CO.

16. Remove the 4 subframe nuts and 4 subframe bolts.
17. Using the adjustable jackstand, lower the subframe 50 mm (1.96 in).
18. Detach the 2 wiring harness retainers from the oil pan.
19. Detach the wiring harness retainer from the oil pan stud bolt.
20. Remove the nut and the wire harness retainer bracket from the oil pan stud bolt.
21. Remove the 14 bolts, 2 stud bolts and the oil pan.
 - Discard the gasket.

INSTALLATION

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

NOTE: Clean the sealing surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

1. Clean and inspect the mating surfaces of the engine block and oil pan.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

2. Apply silicone gasket and sealant at the engine front cover-to-cylinder block sealing joints and the crankshaft rear seal retainer plate-to-cylinder block sealing joints.

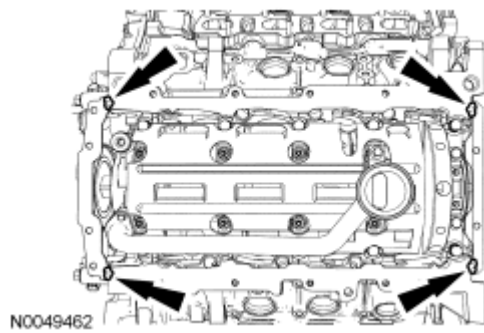


Fig. 158: Applying Silicone Gasket & Sealant At Engine Front Cover-To-Cylinder Block Sealing Joints

Courtesy of FORD MOTOR CO.

3. Using a new gasket, install the oil pan, 14 bolts and 2 stud bolts.
 - Tighten in the sequence shown to 25 Nm (18 lb-ft).

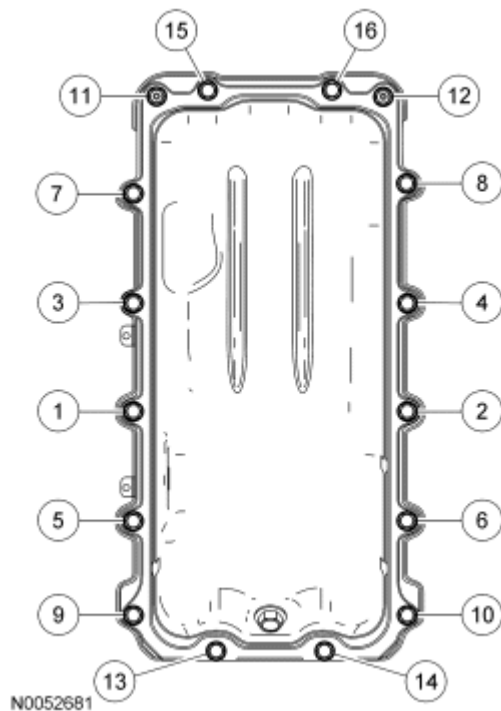


Fig. 159: Installing Oil Pan Bolts & Stud Bolts In Sequence

Courtesy of FORD MOTOR CO.

4. Install the wire harness retainer bracket on the oil pan stud bolt and install the nut.
 - Tighten to 10 Nm (89 lb-in).
5. Attach the wiring harness retainer to the oil pan stud bolt.
6. Attach the 2 wiring harness retainers to the oil pan.
7. Using the adjustable jackstand, raise the subframe.

- Install the steering intermediate shaft into the steering coupler.

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

- Position the intermediate steering shaft and install the upper bolt.
 - Tighten to 47 Nm (35 lb-ft).

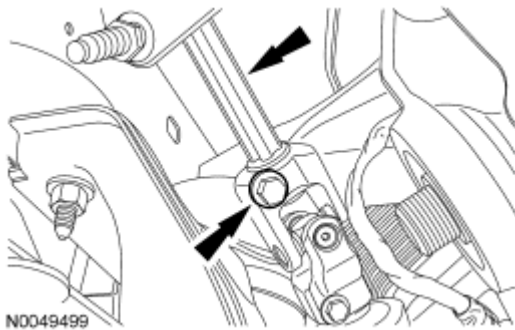


Fig. 160: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

NOTE: Do not tighten the subframe nuts and bolts at this time.

- Install the 4 subframe nuts and 4 subframe bolts.
- Align the subframe nuts and bolts with the reference marks made during removal.
 - Tighten the nuts to 115 Nm (85 lb-ft).
 - Tighten the bolts to 115 Nm (85 lb-ft).

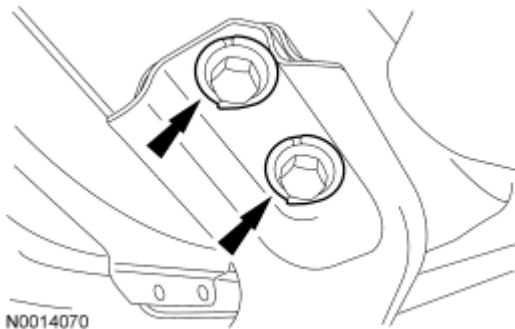


Fig. 161: Aligning Subframe Nuts And Bolts
Courtesy of FORD MOTOR CO.

- Install the subframe cross brace and the 4 nuts.

- Tighten to 48 Nm (35 lb-ft).
12. Using the Engine Support Bars, lower the engine onto the engine support insulators.

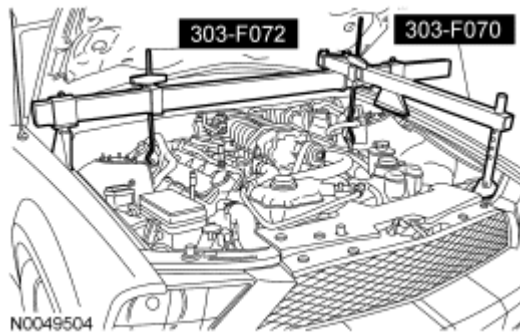


Fig. 162: Raising Engine Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

13. Install the LH and RH engine support insulator nuts.
 - Tighten to 63 Nm (46 lb-ft).
14. Install the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
15. Install the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
16. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).

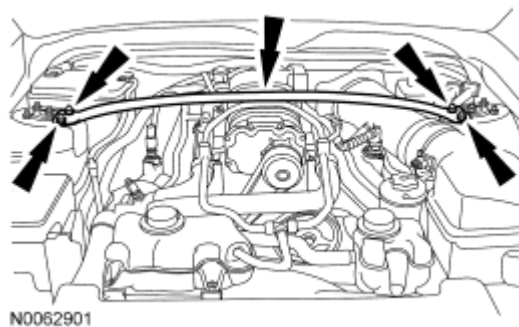


Fig. 163: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

17. Fill the engine with clean engine oil.
18. Install the dash boot and the 2 nuts.
 - Tighten to 9 Nm (80 lb-in).

OIL PUMP

Material

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

REMOVAL

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

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the timing drive components. For additional information, refer to **Timing Drive Components**.
3. Remove the oil pump screen and pickup tube. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pump Screen and Pickup Tube**.
4. Remove the 3 bolts and the oil pump.

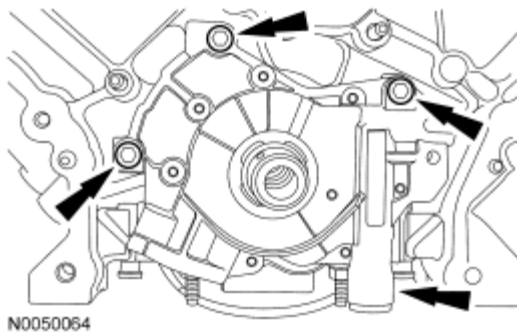


Fig. 164: Identifying Oil Pump & Bolts
Courtesy of FORD MOTOR CO.

INSTALLATION

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

1. Clean the sealing surfaces with metal surface prep. Follow the directions on the packaging.
 - Inspect the mating surfaces.
2. Install the oil pump and 3 bolts.
 - Tighten the bolts in the sequence shown to 10 Nm (89 lb-in).

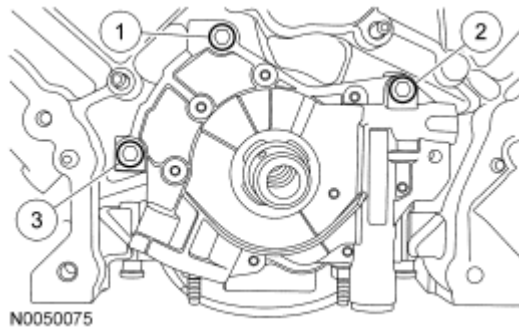


Fig. 165: Installing Oil Pump Bolts In Sequence
Courtesy of FORD MOTOR CO.

3. Install the oil pump screen and pickup tube. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pump Screen and Pickup Tube**.
4. Install the timing drive components. For additional information, refer to **Timing Drive Components**.

OIL PUMP SCREEN AND PICKUP TUBE

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

REMOVAL

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

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan**.
3. Remove the 3 bolts and the oil pump screen and pickup tube assembly.
 - Discard the O-ring seal.

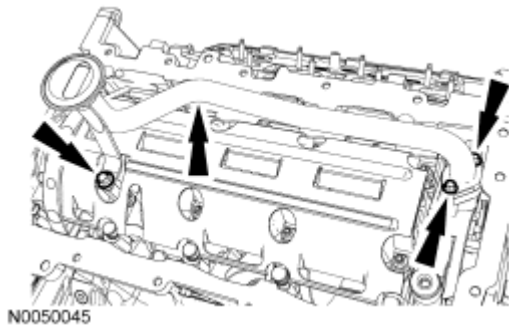


Fig. 166: Identifying Bolts, Oil Pump Screen & Pickup Tube Assembly
 Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Make sure the O-ring is in place and not damaged. A missing or damaged O-ring can cause foam in the lubrication system, low oil pressure and severe engine damage.

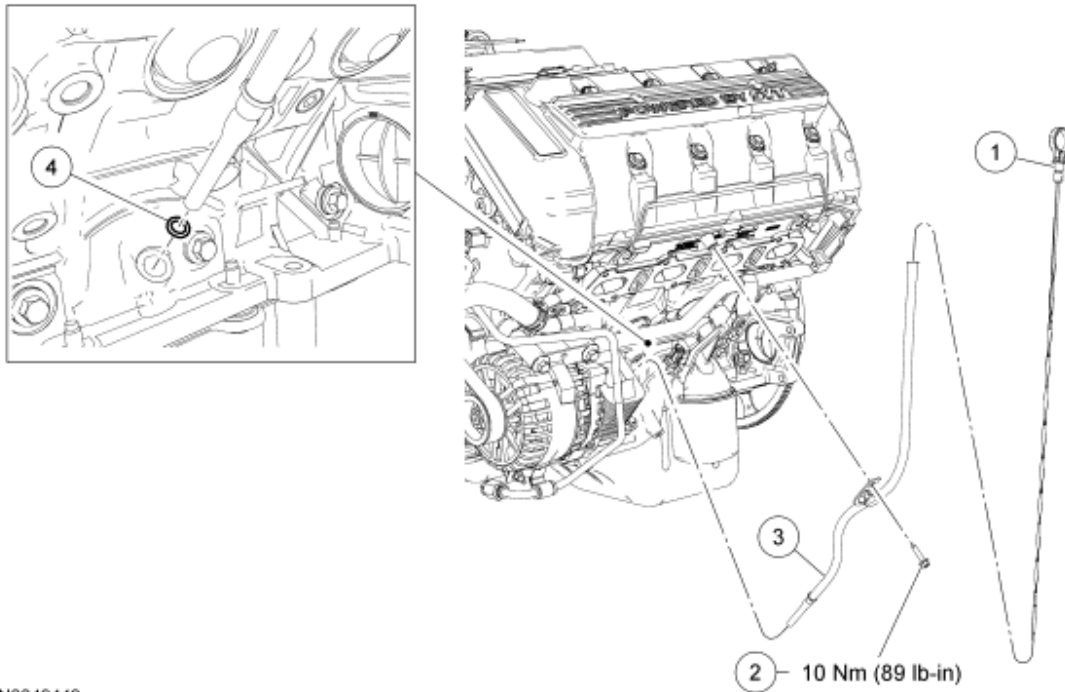
NOTE: Clean and inspect the mating surfaces and install a new O-ring. Lubricate the O-ring with clean engine oil prior to installation.

1. Position the oil pump screen and pickup tube and install the bolts.
 - Tighten the oil pump screen and pickup tube-to-oil pump bolts to 10 Nm (89 lb-in).
 - Tighten the oil pump screen and pickup tube-to-spacer bolt to 25 Nm (18 lb-ft).
2. Install the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan**.

OIL LEVEL INDICATOR AND TUBE

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B



N0049449

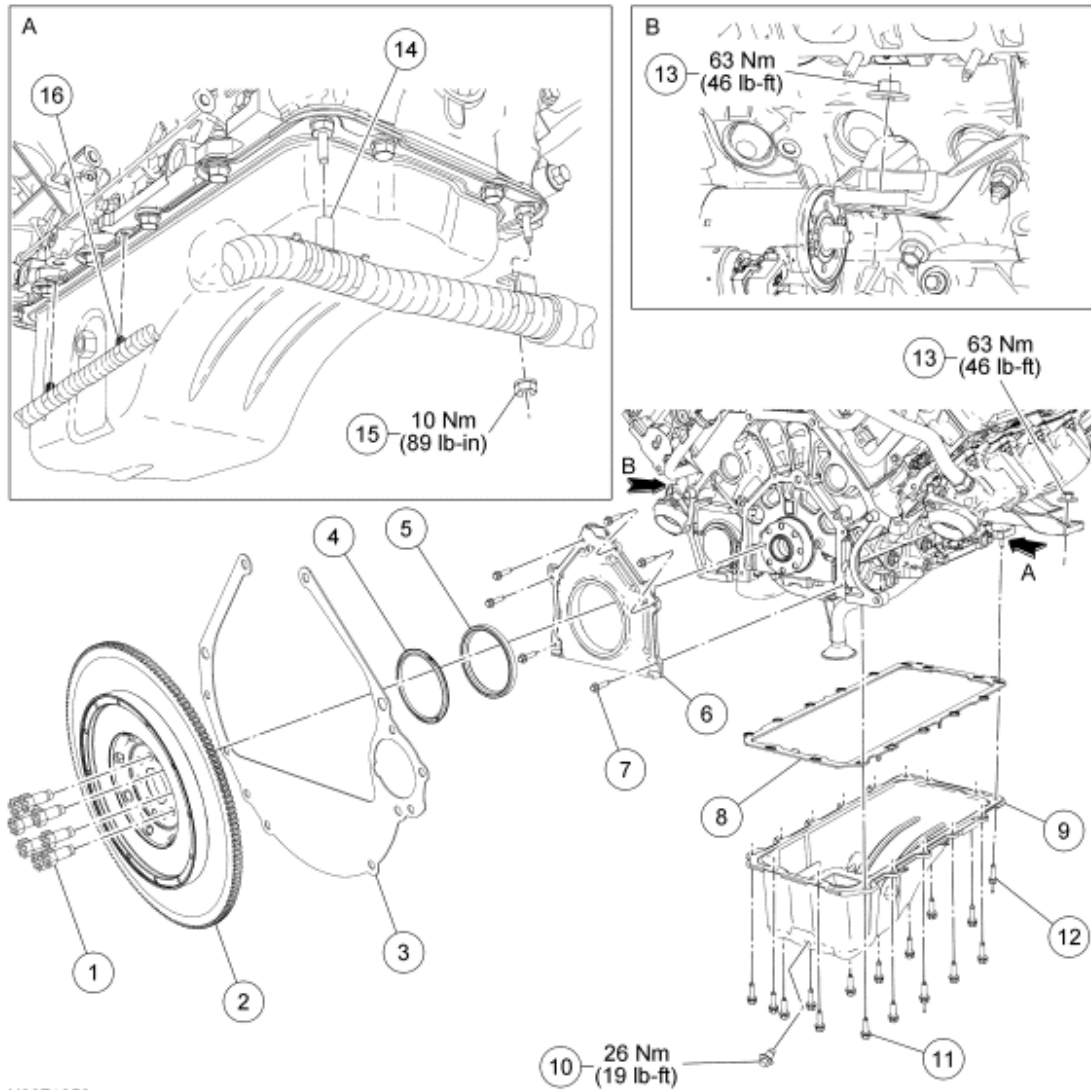
Fig. 167: Exploded View Of Oil Level Indicator & Tube With Torque Specification
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6750	Oil level indicator
2	N806155	Oil level indicator tube bolt
3	6754	Oil level indicator tube
4	-	O-ring seal

REMOVAL AND INSTALLATION

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the LH exhaust manifold. For additional information, refer to **Exhaust Manifold - LH**.
3. Remove the oil level indicator.
4. Remove the oil level indicator tube bolt.
 - To install, tighten to 10 Nm (89 lb-in).
5. Remove the oil level indicator tube.
 - Discard the O-ring seal.
6. To install, reverse the removal procedure.
 - Lubricate the new oil level indicator tube O-ring seal with clean engine oil prior to installation.

LOWER END COMPONENTS - EXPLODED VIEW, FLYWHEEL AND CRANKSHAFT REAR SEAL WITH RETAINER PLATE



N0071852

Fig. 168: Exploded View Of Flywheel & Crankshaft Rear Seal With Retainer Plate With Torque Specifications

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6379	Flywheel bolt (8 required)
2	6375	Flywheel
3	6A373	Engine-to-transmission spacer plate
4	6310	Crankshaft oil slinger
5	6701	Crankshaft rear seal
6	6K318	Crankshaft rear seal retainer plate
7	N806155	Crankshaft rear seal retainer plate bolt (6 required)
8	6710	Oil pan gasket

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

9	6675	Oil pan
10	6730	Oil pan drain plug
11	W701605	Oil pan bolt (14 required)
12	W701606	Oil pan stud bolt (2 required)
13	W12530	Engine support insulator nut (2 required)
14	-	Wiring harness retainer (part of 12B637)
15	-	Wire harness retainer bracket nut
16	-	Wiring harness retainer (2 required) (part of 14305)

1. For additional information, refer to the procedures.

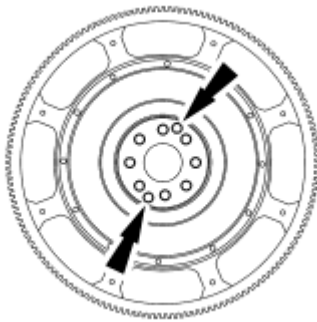
FLYWHEEL

REMOVAL

1. Remove the clutch. For additional information, refer to **CLUTCH**.
2. Remove the 8 flywheel bolts.

NOTE: The flywheel is a press fit on the crankshaft pilot. Do not use screwdrivers or prybars to remove the flywheel or damage to the flywheel or engine may occur.

3. Remove the flywheel.
 - Install 2 of the removed flywheel bolts in the 2 holes shown on the flywheel flange.
 - Tighten the 2 bolts evenly to push the flywheel off the crankshaft pilot.



N0076040

Fig. 169: Identifying Flywheel Bolts
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Position the flywheel on the crankshaft pilot and start the 8 flywheel bolts.
2. Tighten the flywheel bolts evenly in the sequence shown to fully seat the flywheel on the crankshaft pilot.
 - Tighten to 80 Nm (59 lb-ft).

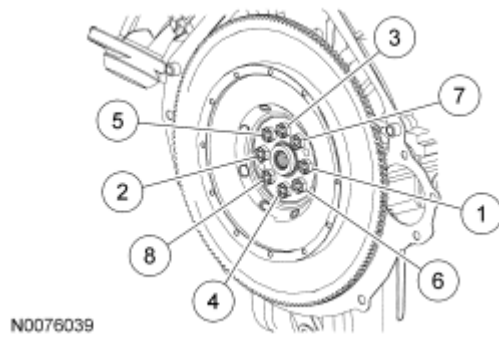
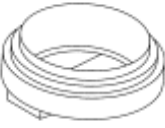
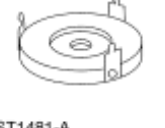


Fig. 170: Tightening Flywheel Bolts Evenly In Sequence
Courtesy of FORD MOTOR CO.

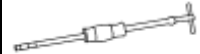
CRANKSHAFT REAR SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST1479-A	Installer, Crankshaft Rear Oil Seal	303-516 (T95P-6701-BH)
 ST1480-A	Installer, Crankshaft Rear Oil Seal	303-518 (T95P-6701-DH)
 ST1482-A	Installer, Crankshaft Rear Oil Slinger	303-517 (T95P-6701-CH)
 ST1382-A	Remover, Crankshaft Rear Oil Seal	303-519 (T95P-6701-EH)
 ST1481-A	Remover, Crankshaft Rear Oil Slinger	303-514 (T95P-6701-AH)

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang



ST1185-A

Slide Hammer

100-001 (T50T-100-A)

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

REMOVAL

1. Remove the flywheel. For additional information, refer to **Flywheel**.
2. Using the Slide Hammer and the Crankshaft Rear Oil Slinger Remover, remove the crankshaft rear seal oil slinger.

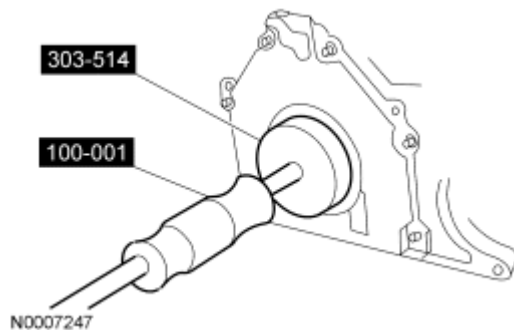


Fig. 171: Removing Crankshaft Rear Oil Seal Slinger
Courtesy of FORD MOTOR CO.

3. Using the Slide Hammer and the Crankshaft Rear Oil Seal Remover, remove the crankshaft rear seal.

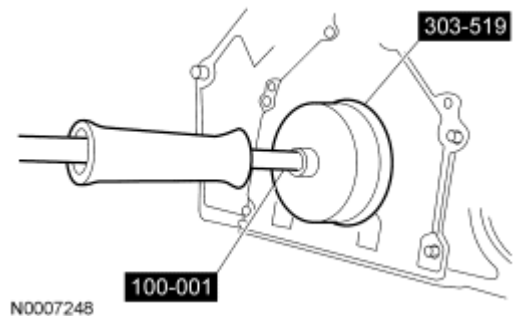


Fig. 172: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Lubricate the inner lip of the crankshaft rear seal with clean engine oil.

1. Using the Crankshaft Rear Oil Seal Installers, install the crankshaft rear seal.

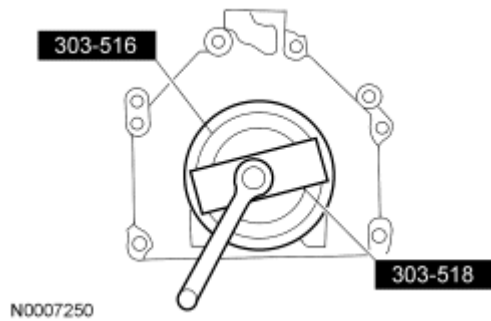


Fig. 173: Using Special Tools To Install New Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

2. Using the Crankshaft Rear Oil Slinger Installer, install the crankshaft rear oil slinger.

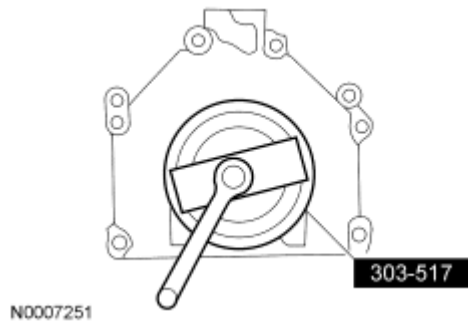
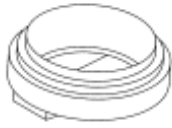


Fig. 174: Installing Crankshaft Rear Oil Slinger Using Special Tool (303-517)
Courtesy of FORD MOTOR CO.

3. Install the flywheel. For additional information, refer to [Flywheel](#).

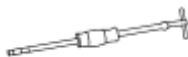
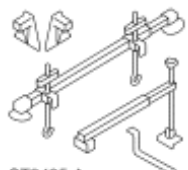
CRANKSHAFT REAR SEAL WITH RETAINER PLATE

Special Tools

Illustration	Tool Name	Tool Number
 ST1479-A	Installer, Crankshaft Rear Oil Seal	303-516 (T95P-6701-BH)
	Installer, Crankshaft Rear Oil Seal	303-518 (T95P-6701-DH)

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 ST1480-A		
 ST1482-A	Installer, Crankshaft Rear Oil Slinger	303-517 (T95P-6701-CH)
 ST1603-A	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
 ST1382-A	Remover, Crankshaft Rear Oil Seal	303-519 (T95P-6701-EH)
 ST1481-A	Remover, Crankshaft Rear Oil Slinger	303-514 (T95P-6701-AH)
 ST1185-A	Slide Hammer	100-001 (T50T-100-A)
 ST2176-B	Support Bar, Engine	303-F070
 ST2425-A	Support Bar, Engine	303-F072

Material

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 4 nuts and the strut tower cross brace.

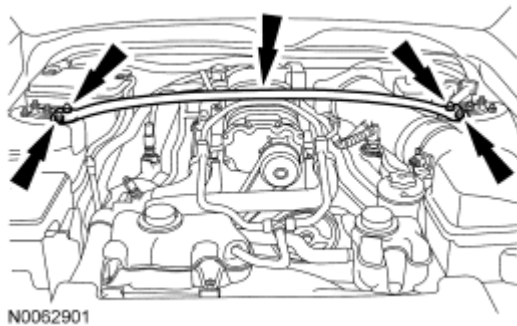


Fig. 175: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

3. Remove the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
4. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
5. Install the Engine Lifting Bracket.

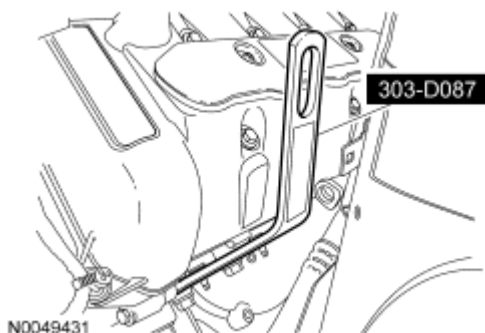


Fig. 176: Identifying Special Tool 303-D087

Courtesy of FORD MOTOR CO.

6. Install the Engine Lifting Bracket.

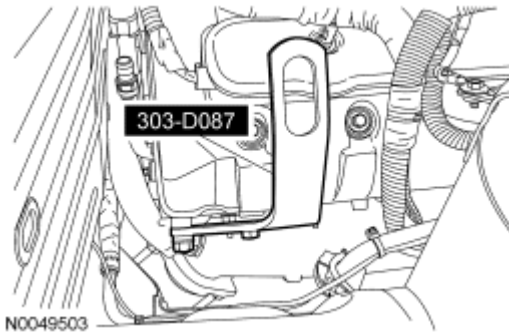


Fig. 177: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

7. Remove the flywheel. For additional information, refer to **Flywheel**.
8. Remove the engine-to-transmission spacer plate.
9. Remove the LH and RH engine support insulator nuts.

NOTE: The heavy duty Engine Support Bar (303-F070) must be used with the draw screws from the light duty Engine Support Bar (303-F072). This will provide enough clearance between the Supercharger (SC) and the Engine Support Bar, and enough clearance between the draw screw and the vehicle hood.

10. Install the Engine Support Bars and raise the engine.

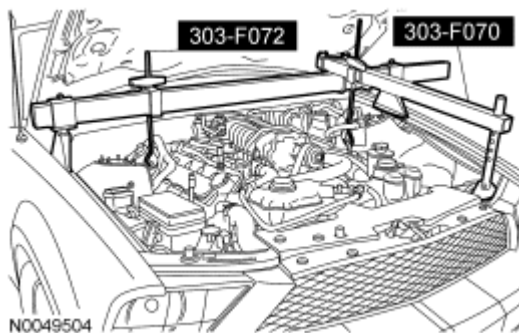


Fig. 178: Raising Engine Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

11. Drain the engine oil.
 - Tighten the drain plug to 26 Nm (19 lb-ft).
12. Detach the 2 wiring harness retainers from the oil pan.
13. Detach the wiring harness retainer from the oil pan stud bolt.

14. Remove the nut and the wire harness retainer bracket from the oil pan stud bolt.
15. Remove the 14 bolts, 2 stud bolts and the oil pan.
 - Discard the gasket.
16. Using the Slide Hammer and Crankshaft Rear Oil Slinger Remover, remove the crankshaft rear seal oil slinger.

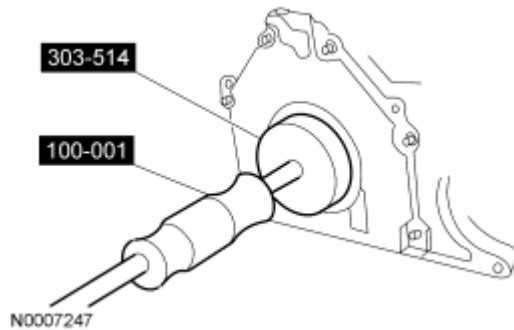


Fig. 179: Removing Crankshaft Rear Oil Seal Slinger
Courtesy of FORD MOTOR CO.

17. Using the Slide Hammer and the Crankshaft Rear Oil Seal Remover, remove the crankshaft rear seal.

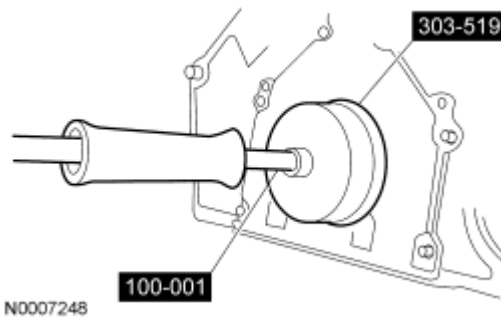


Fig. 180: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

18. Remove the 6 bolts and the crankshaft rear seal retainer plate.

INSTALLATION

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

NOTE: Clean the sealing surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

1. Clean and inspect the mating surfaces of the engine block, rear seal retainer plate and oil pan.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

2. Apply a 4 mm (0.15 in) bead of silicone gasket and sealant to the rear crankshaft seal retainer mating surface on the engine block.

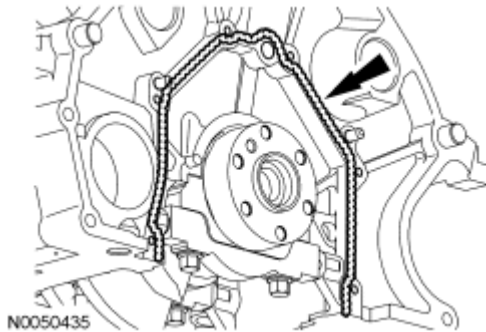


Fig. 181: Applying Bead Of Gasket Maker To Rear Crankshaft Seal Retainer
Courtesy of FORD MOTOR CO.

3. Install the crankshaft rear seal retainer plate and the 6 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

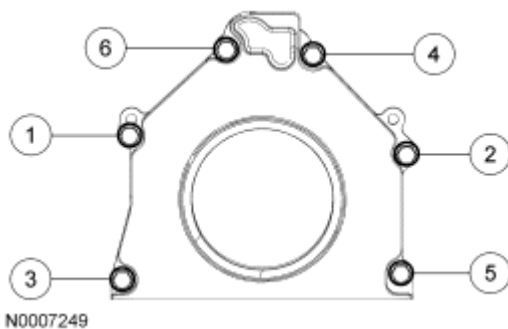


Fig. 182: Tightening Sequence Of Crankshaft Rear Seal Retainer Plate Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the inner lip of the crankshaft rear seal with clean engine oil.

4. Using the Crankshaft Rear Oil Seal Installers, install the crankshaft rear seal.

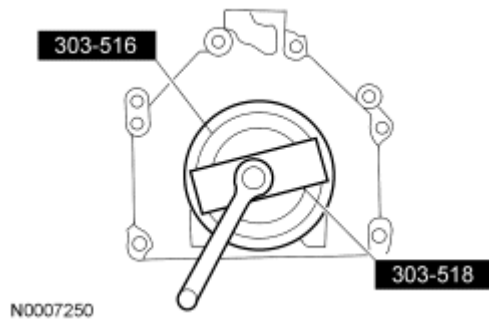


Fig. 183: Using Special Tools To Install New Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

5. Using the Crankshaft Rear Oil Slinger Installer, install the crankshaft rear oil slinger.

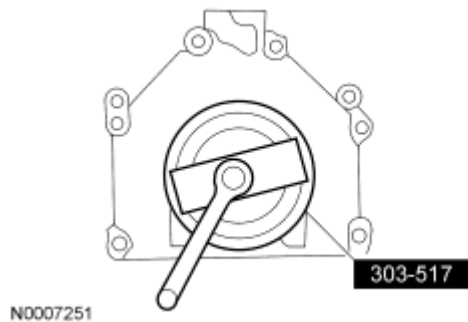


Fig. 184: Installing Crankshaft Rear Oil Slinger Using Special Tool (303-517)
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

6. Apply silicone gasket and sealant at the engine front cover-to-cylinder block sealing joints and the crankshaft rear seal retainer plate-to-cylinder block sealing joints.

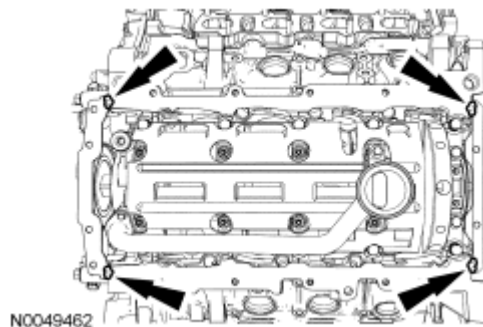


Fig. 185: Applying Silicone Gasket & Sealant At Engine Front Cover-To-Cylinder Block Sealing

Joints

Courtesy of FORD MOTOR CO.

7. Using a new gasket, install the oil pan, 14 bolts and 2 stud bolts.
 - Tighten in the sequence shown to 25 Nm (18 lb-ft).

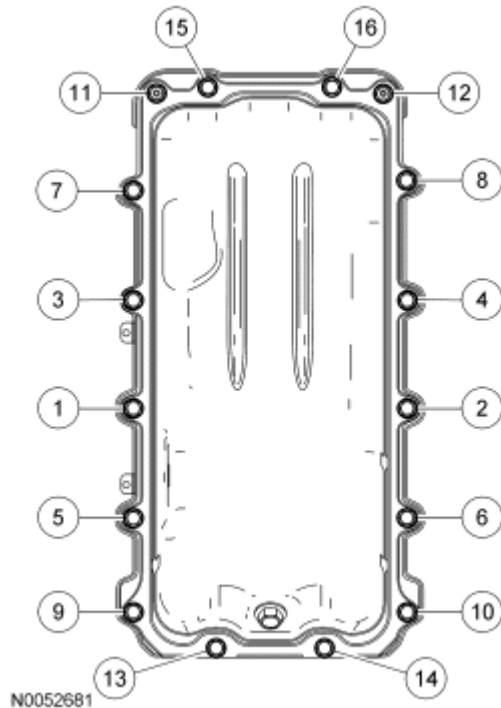


Fig. 186: Installing Oil Pan Bolts & Stud Bolts In Sequence
Courtesy of FORD MOTOR CO.

8. Install the wire harness retainer bracket on the oil pan stud bolt and install the nut.
 - Tighten to 10 Nm (89 lb-in).
9. Attach the wiring harness retainer to the oil pan stud bolt.
10. Attach the 2 wiring harness retainers to the oil pan.
11. Using the Engine Support Bars, lower the engine onto the engine support insulators.

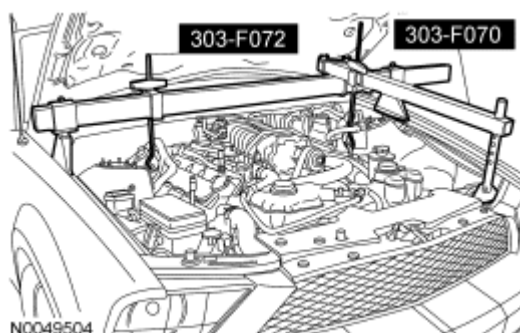


Fig. 187: Raising Engine Using Special Tools (303-F072) & (303-F070)

Courtesy of FORD MOTOR CO.

12. Install the LH and RH engine support insulator nuts.
 - Tighten to 63 Nm (46 lb-ft).
13. Install the engine-to-transmission spacer plate.
14. Install the flywheel. For additional information, refer to **Flywheel**.
15. Install the ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
16. Install the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
17. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).

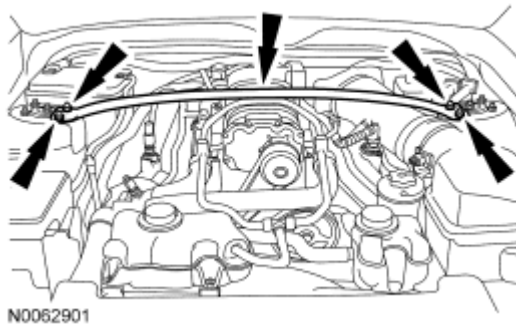


Fig. 188: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

18. Fill the engine with clean engine oil.

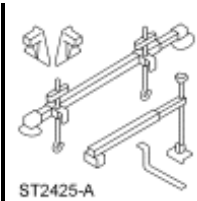
ENGINE SUPPORT INSULATORS

Special Tools

Illustration	Tool Name	Tool Number
	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
	Support Bar, Engine	303-F070

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang



Support Bar, Engine

303-F072

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

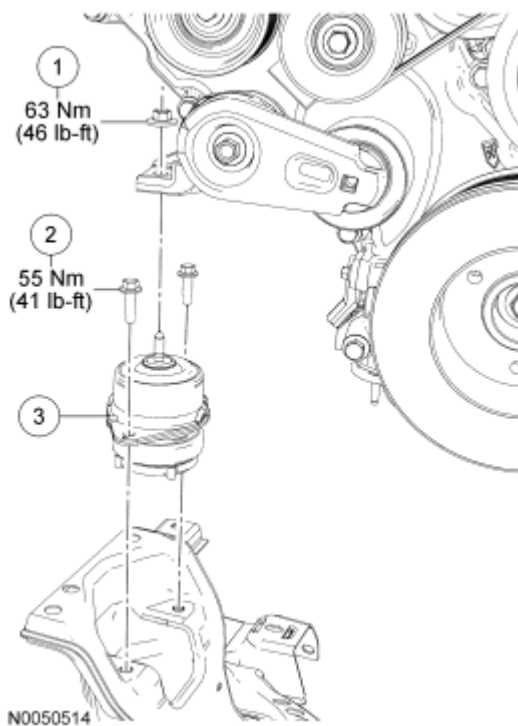
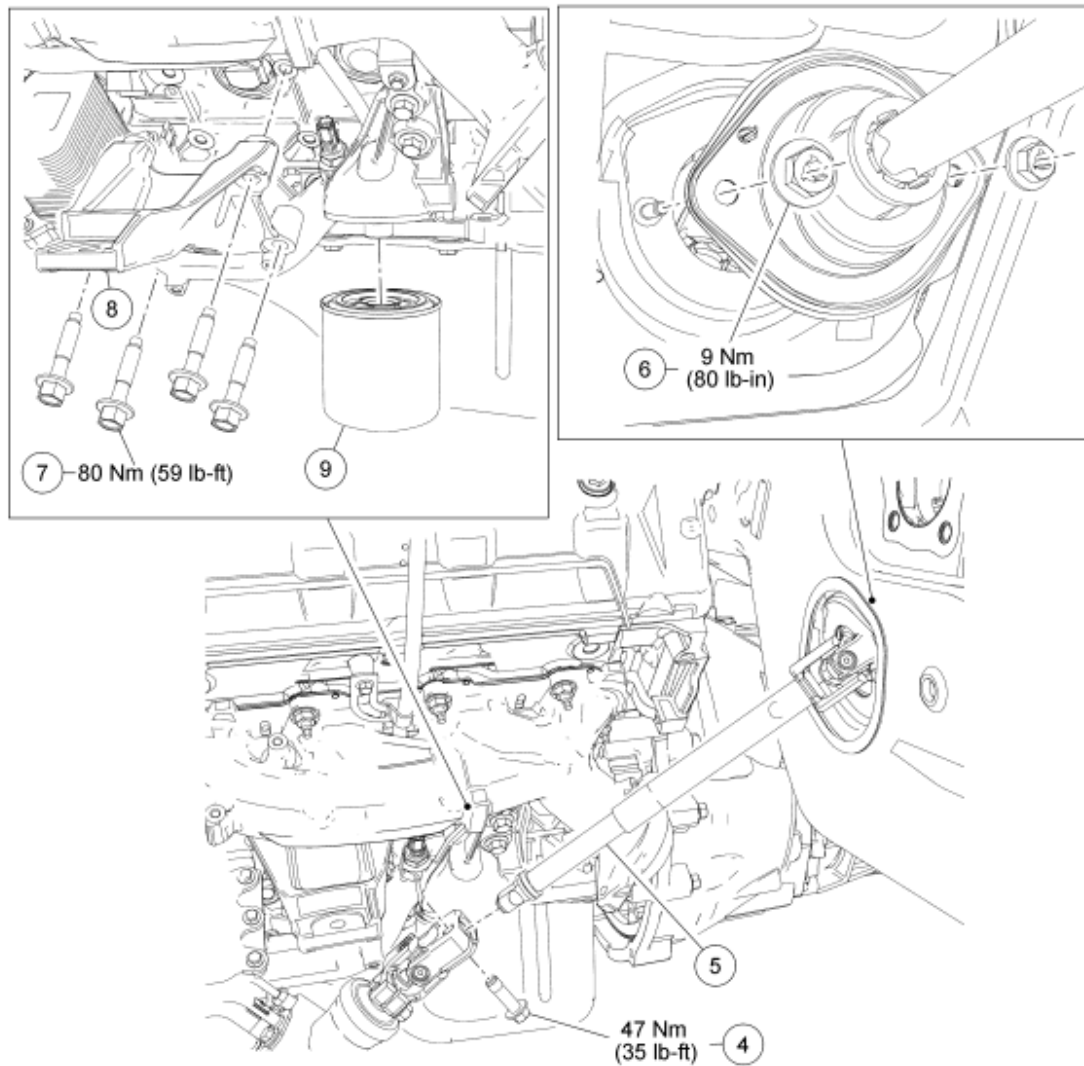


Fig. 189: Exploded View Of Engine Support Insulators With Torque Specifications (1 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W712530	RH engine support insulator nut
2	W707641	RH engine support insulator bolt (2 required)
3	6038	RH engine support insulator



N0071854

Fig. 190: Exploded View Of Engine Support Insulators With Torque Specifications (2 Of 3)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
4	W702600	Intermediate steering shaft bolt
5	3C662	Intermediate steering shaft
6	W707137	Dash boot nut (2 required)
7	W710565	LH engine support insulator bracket bolt (4 required)
8	6B033	LH engine support insulator bracket
9	6714	Engine oil filter

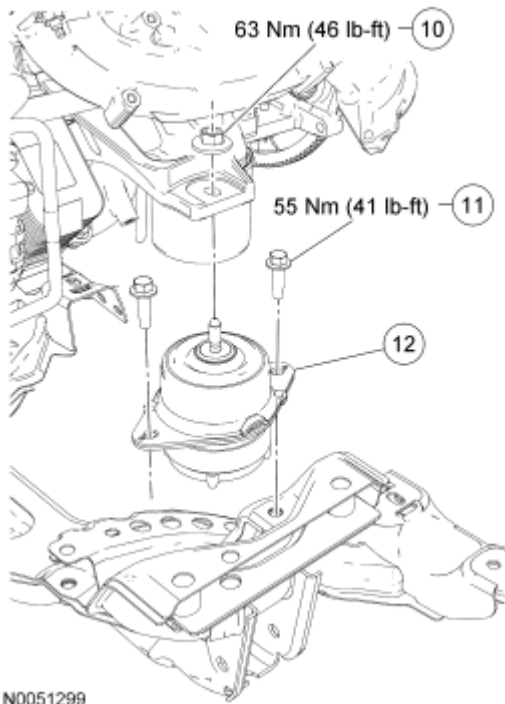


Fig. 191: Exploded View Of Engine Support Insulators With Torque Specifications (3 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
10	W712530	LH engine support insulator nut
11	W707641	LH engine support insulator bolt (2 required)
12	6038	LH engine support insulator

REMOVAL AND INSTALLATION

LH engine support insulator

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Remove the 2 dash boot nuts.
 - To install, tighten to 9 Nm (80 lb-in).

All engine support insulators

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

3. Using a suitable holding device, hold the steering wheel in the straight-ahead position.

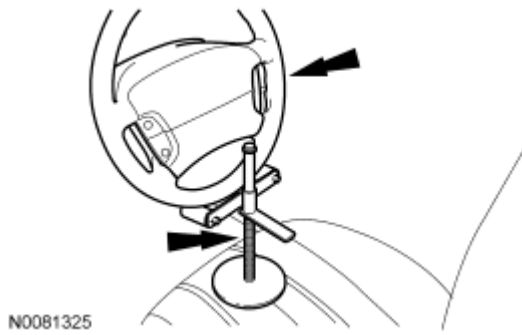


Fig. 192: Holding Steering Wheel In Straight-Ahead Position Using A Suitable Holding Device
Courtesy of FORD MOTOR CO.

4. Remove the 4 nuts and the strut tower cross brace.
 - To install, tighten to 35 Nm (26 lb-ft).

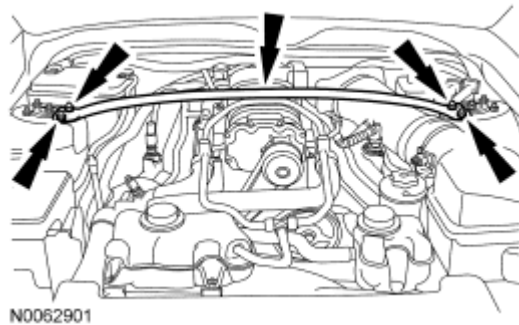


Fig. 193: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

5. Remove the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
6. Remove the Air Cleaner (ACL) outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
7. Install the Engine Lifting Bracket.

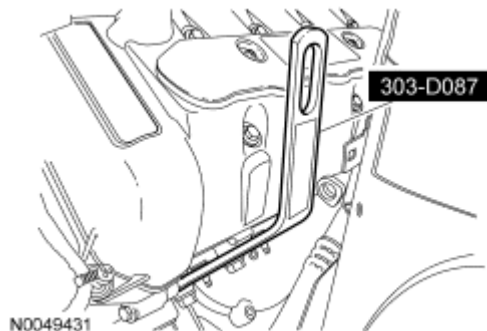


Fig. 194: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

8. Install the Engine Lifting Bracket.

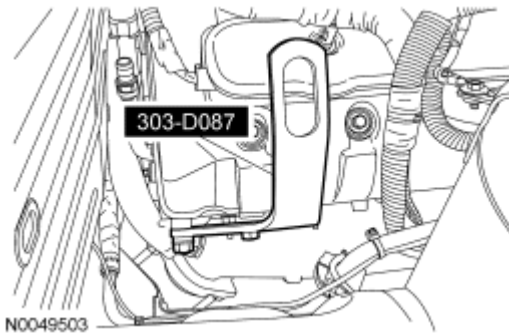


Fig. 195: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

NOTE: The heavy duty Engine Support Bar (303-F070) must be used with the draw screws from the light duty Engine Support Bar (303-F072). This will provide enough clearance between the Supercharger (SC) and the Engine Support Bar, and enough clearance between the draw screw and the vehicle hood.

9. Install the Engine Support Bars.
- Remove the LH and RH engine support insulator nuts.
 - To install, tighten to 63 Nm (46 lb-ft).
 - Using the Engine Support Bars, raise the engine.

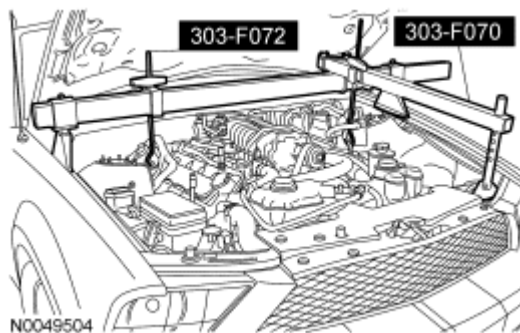


Fig. 196: Raising Engine Using Special Tools (303-F072) & (303-F070)
Courtesy of FORD MOTOR CO.

RH engine support insulator

10. Remove the 2 RH engine support insulator-to-subframe bolts and the RH engine support insulator.
- To install, tighten to 55 Nm (41 lb-ft).

LH engine support insulator

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

11. Remove the upper bolt from the intermediate steering shaft and position the intermediate steering shaft aside.
 - To install, tighten to 47 Nm (35 lb-ft).

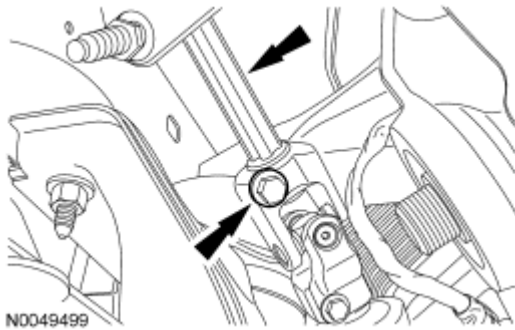


Fig. 197: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

12. Remove the 4 bolts and the LH engine support bracket.
 - To install, tighten to 63 Nm (46 lb-ft).
13. Remove and discard the engine oil filter.
 - To install, lubricate the oil filter gasket with clean engine oil and tighten until the seal makes contact.
 - Using a suitable oil filter strap wrench, tighten the filter an additional 270 degrees.
14. Remove the 2 LH engine support insulator-to-subframe bolts and the LH engine support insulator.
 - To install, tighten to 55 Nm (41 lb-ft).

All engine support insulators

15. To install, reverse the removal procedure.

REMOVAL

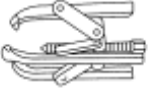
CYLINDER HEAD

Special Tools

Illustration	Tool Name	Tool Number

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

 ST1184-A	3-Jaw Puller	303-D121 or equivalent
 ST1718-A	Compressor, Valve Spring	303-452 (T93P-6565-AR)
 ST1730-A	Remover, Crankshaft Front Oil Seal	303-107 (T74P-6700-A)
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

Material

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

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

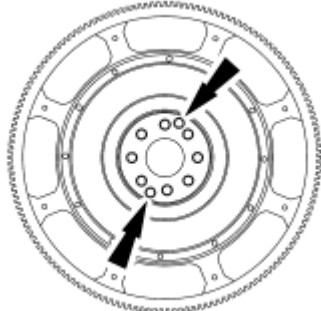
Both cylinder heads

1. Remove the engine from the vehicle. For additional information, refer to **Engine**.
2. Remove the 8 flywheel bolts.

NOTE: The flywheel is a press fit on the crankshaft pilot. Do not use screwdrivers or prybars to remove the flywheel or damage to the flywheel or engine may occur.

3. Remove the flywheel.

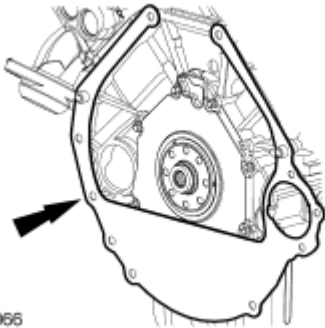
- Install 2 of the removed flywheel bolts in the 2 holes shown on the flywheel flange.
- Tighten the 2 bolts evenly to push the flywheel off the crankshaft pilot.



N0076040

Fig. 198: Identifying Flywheel Bolts
Courtesy of FORD MOTOR CO.

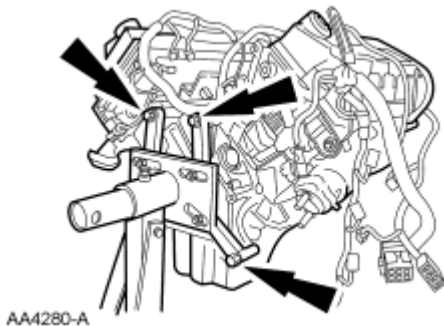
4. Remove the engine/transmission spacer plate.



N0050066

Fig. 199: Locating Engine/Transmission Spacer Plate
Courtesy of FORD MOTOR CO.

5. Mount the engine on a suitable work stand.



AA4280-A

Fig. 200: Mounting Engine On Suitable Work Stand
Courtesy of FORD MOTOR CO.

6. Disconnect the coolant hose from the thermostat housing.

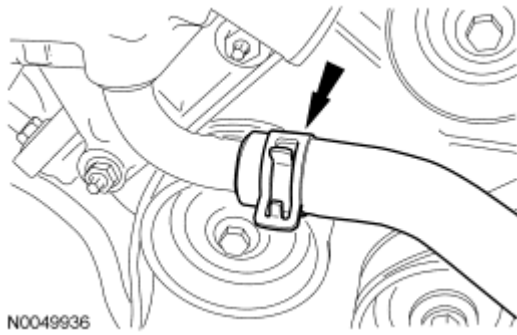


Fig. 201: Locating Coolant Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

7. Remove the coolant tube bracket nut.

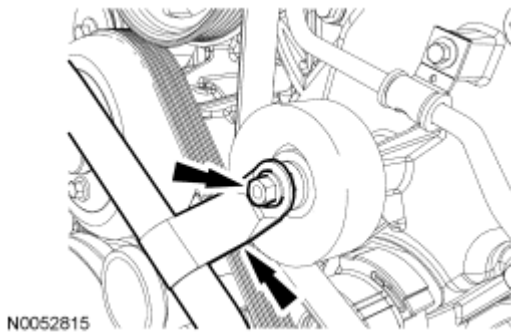


Fig. 202: Locating Coolant Tube Bracket Nut
Courtesy of FORD MOTOR CO.

8. Disconnect the 2 coolant vent hoses from the intake manifold.

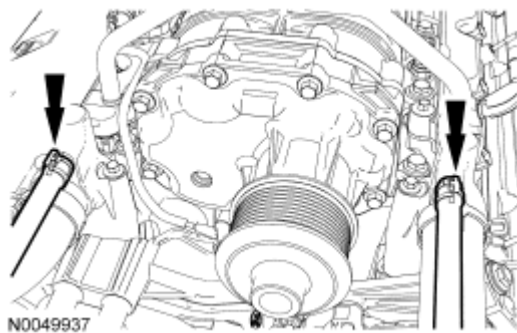


Fig. 203: Locating Coolant Vent Hoses From The Intake Manifold
Courtesy of FORD MOTOR CO.

9. Disconnect the 2 upper radiator hoses from the intake manifold.

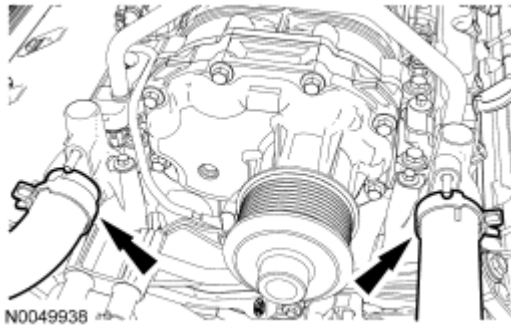


Fig. 204: Locating Upper Radiator Hoses From Intake Manifold
Courtesy of FORD MOTOR CO.

10. Disconnect the Engine Coolant Temperature (ECT) sensor electrical connector.

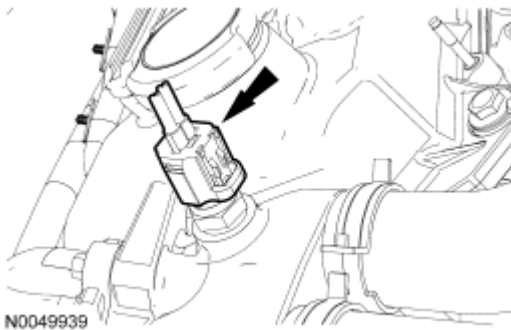


Fig. 205: Locating Engine Coolant Temperature (ECT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

11. Remove the 2 nuts and the thermostat housing assembly.

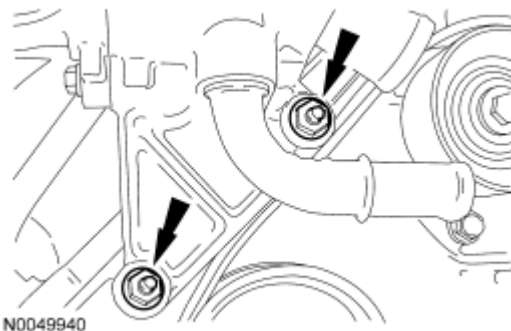


Fig. 206: Locating Thermostat Housing Assembly Nuts
Courtesy of FORD MOTOR CO.

12. Disconnect the coolant hose from the Charge Air Cooler (CAC).

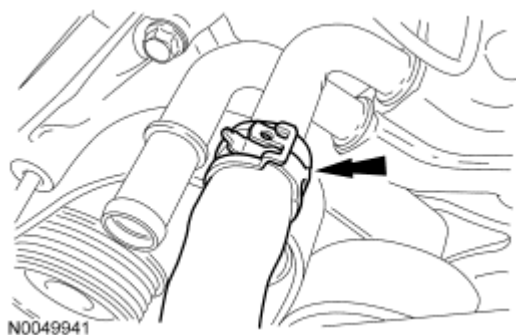


Fig. 207: Locating Coolant Hose From Charge Air Cooler (CAC)
Courtesy of FORD MOTOR CO.

13. Loosen the 4 coolant pump pulley bolts.

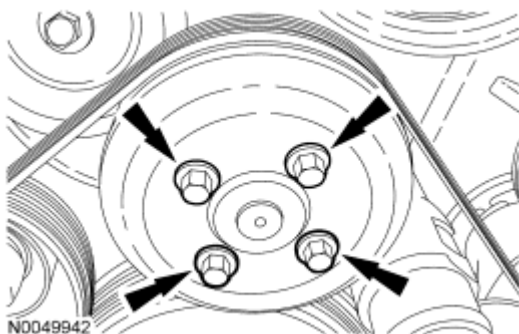


Fig. 208: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

14. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.

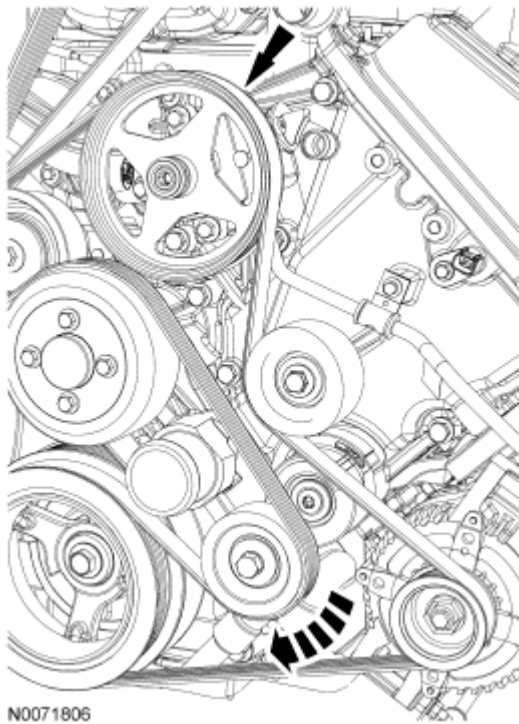


Fig. 209: Rotating Accessory Drive Belt Tensioner Clockwise & Removing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

15. Remove the bolt, Supercharger (SC) drive belt tensioner and the SC drive belt.

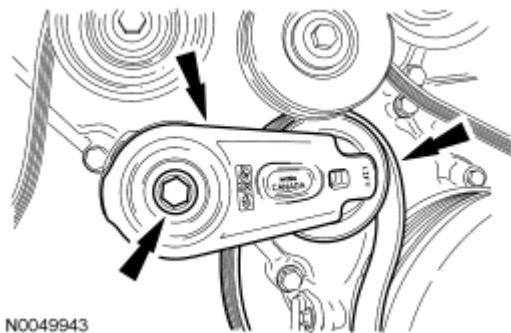


Fig. 210: Locating Bolt, Supercharger (SC) Drive Belt Tensioner & SC Drive Belt
Courtesy of FORD MOTOR CO.

16. Remove the power steering tube bracket nut.

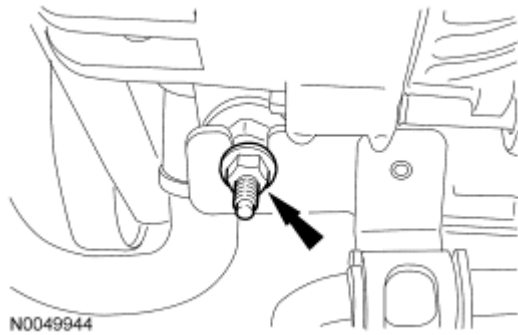


Fig. 211: Locating Power Steering Tube Bracket Nut
Courtesy of FORD MOTOR CO.

17. Remove the power steering tube bracket bolt.

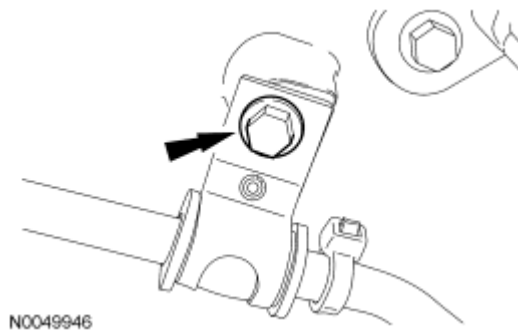


Fig. 212: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

18. Remove the 2 power steering reservoir bracket bolts.

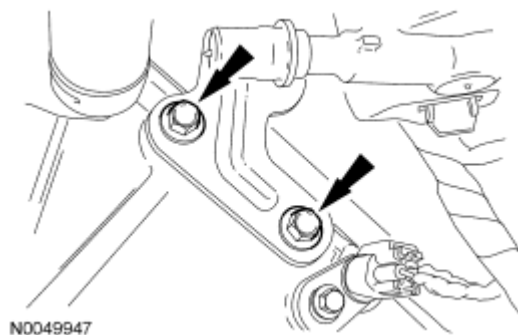


Fig. 213: Locating Power Steering Reservoir Bracket Bolts
Courtesy of FORD MOTOR CO.

19. Remove the 3 bolts and the power steering pump and reservoir assembly.

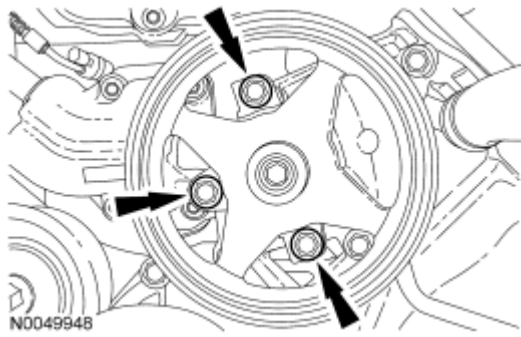


Fig. 214: Locating Power Steering Pump & Reservoir Assembly Bolts
Courtesy of FORD MOTOR CO.

20. Disconnect the generator electrical connector.

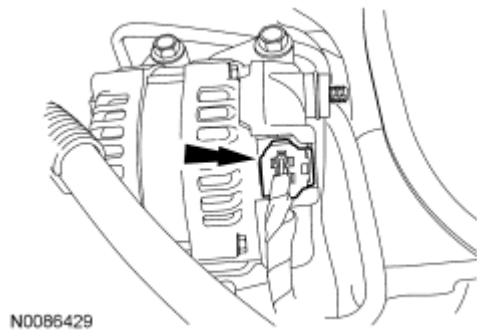
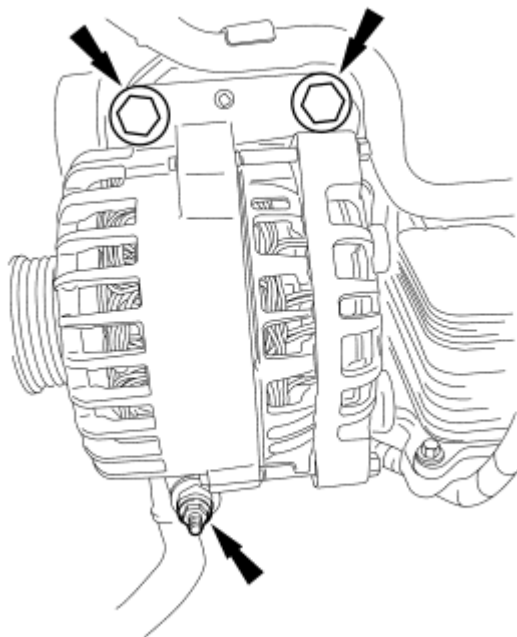


Fig. 215: Locating Generator Electrical Connector
Courtesy of FORD MOTOR CO.

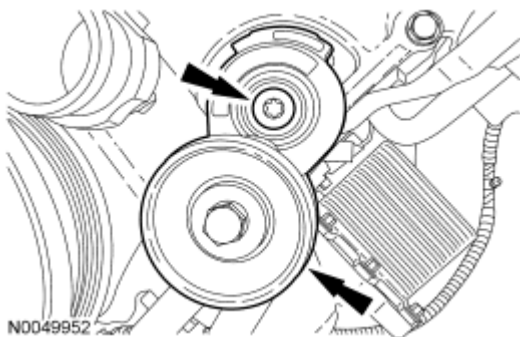
21. Remove the stud bolt, 2 bolts and the alternator.



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Fig. 216: Locating Stud Bolt, Bolts & Alternator
Courtesy of FORD MOTOR CO.

22. Remove the bolt and the accessory drive belt tensioner.



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Fig. 217: Locating Accessory Drive Belt Tensioner Bolt
Courtesy of FORD MOTOR CO.

23. Remove the stud bolt and the accessory drive belt idler pulley (smooth).

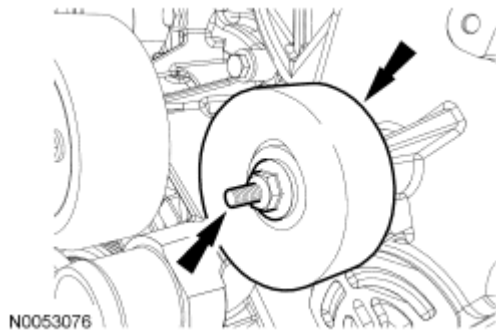


Fig. 218: Locating Stud Bolt & Accessory Drive Belt Idler Pulley
Courtesy of FORD MOTOR CO.

24. Remove the bolt and the accessory drive belt idler pulley (grooved).

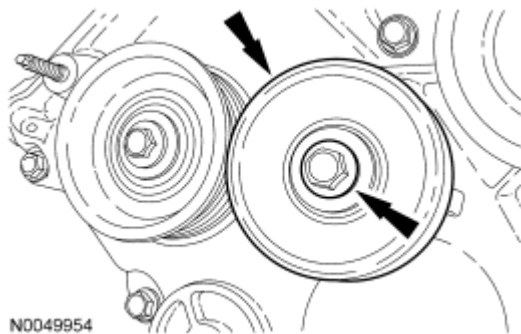


Fig. 219: Locating Accessory Drive Belt Idler Pulley Bolt
Courtesy of FORD MOTOR CO.

25. Remove the 4 bolts and the coolant pump pulley.

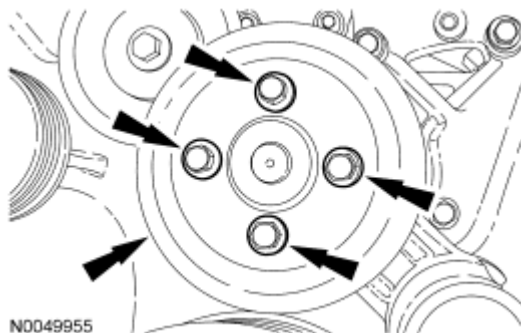


Fig. 220: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

26. Remove the 3 bolts and the 3 SC drive belt idler pulleys.

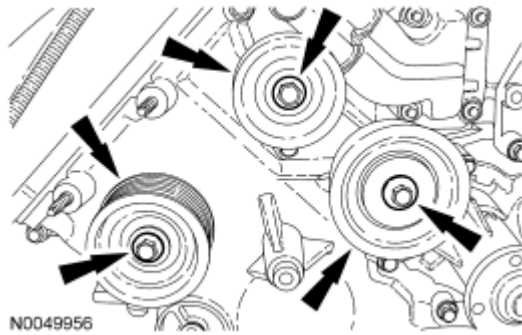


Fig. 221: Locating SC Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

27. Disconnect the 2 EGR tube fittings.
- Remove the EGR tube.

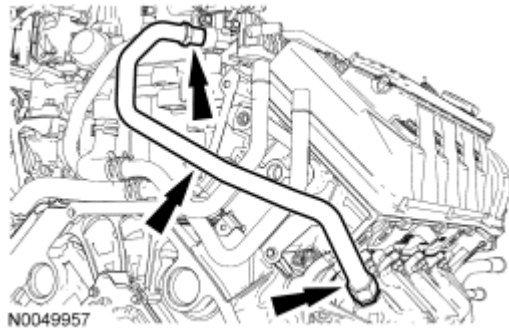


Fig. 222: Locating Exhaust Gas Recirculation (EGR) Tube Fittings
Courtesy of FORD MOTOR CO.

28. Disconnect and remove the crankcase ventilation tube.

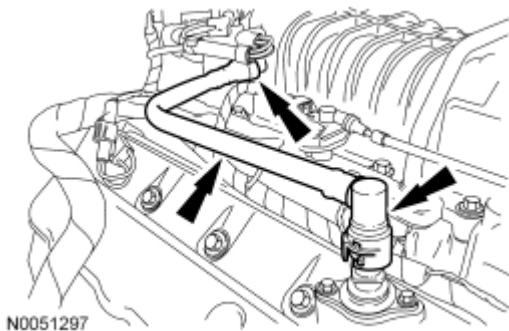


Fig. 223: Locating Crankcase Ventilation Tube
Courtesy of FORD MOTOR CO.

29. Disconnect the TP sensor electrical connector.

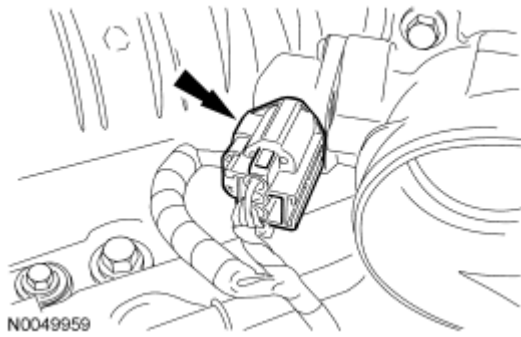


Fig. 224: Locating Throttle Position (TP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

30. Disconnect the Throttle Body (TB) control electrical connector.

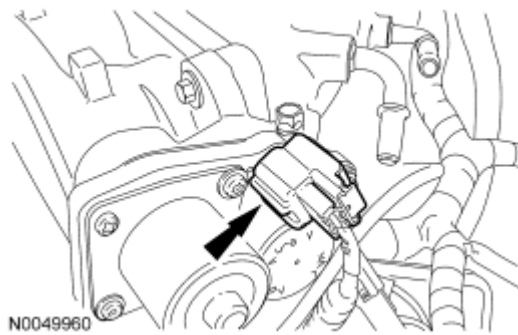


Fig. 225: Locating Throttle Body (TB) Control Electrical Connector
Courtesy of FORD MOTOR CO.

31. Remove the 4 bolts and the TB and spacer assembly.
- Discard the gasket.

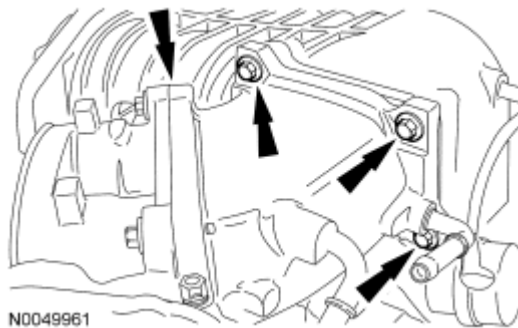


Fig. 226: Locating TB & Spacer Assembly Bolts
Courtesy of FORD MOTOR CO.

32. Disconnect the Cylinder Head Temperature (CHT) sensor electrical connector.

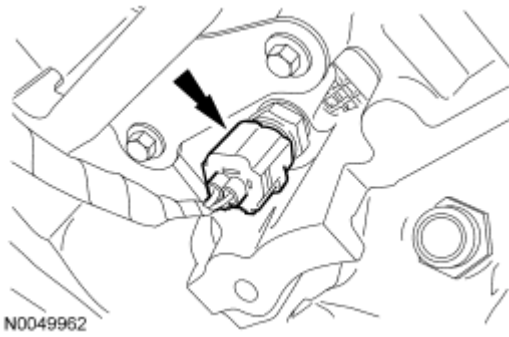


Fig. 227: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

33. Detach the 2 wiring harness pin-type retainers (1 shown) from the coolant tube assembly bracket.

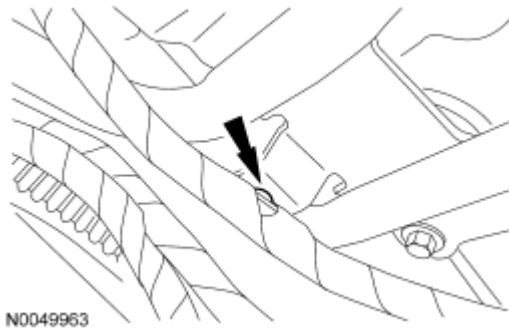


Fig. 228: Detaching Wiring Harness Pin-Type Retainer From Coolant Tube Assembly Bracket
Courtesy of FORD MOTOR CO.

34. Disconnect the LH Heated Oxygen Sensor (HO2S) electrical connector and pin-type retainer.

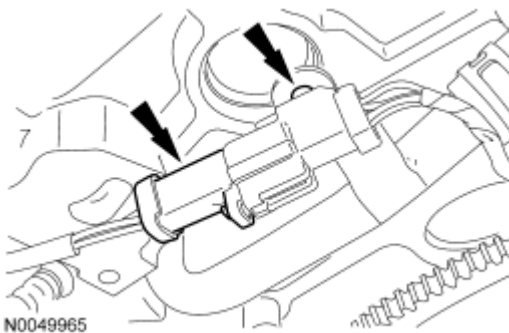


Fig. 229: Locating LH Heated Oxygen Sensor (HO2S) Electrical Connector & Pin-Type Retainer
Courtesy of FORD MOTOR CO.

35. Disconnect the bubbler tube from the SC.

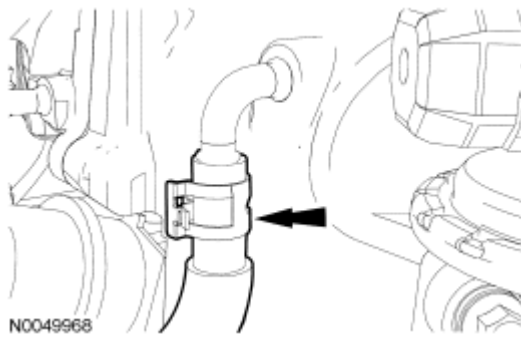


Fig. 230: Disconnecting Bubbler Tube From SC
Courtesy of FORD MOTOR CO.

36. Remove the 2 bolts and the wiring harness retaining bracket.

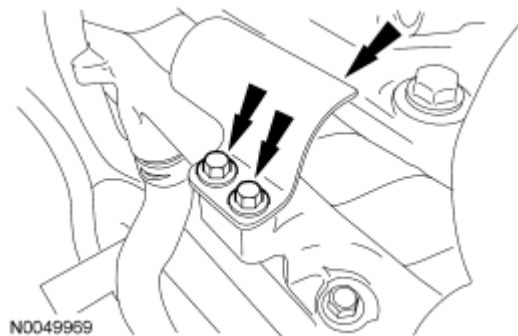


Fig. 231: Locating Wiring Harness Retaining Bracket & Bolts
Courtesy of FORD MOTOR CO.

37. Detach the 2 wiring harness pin-type retainers.

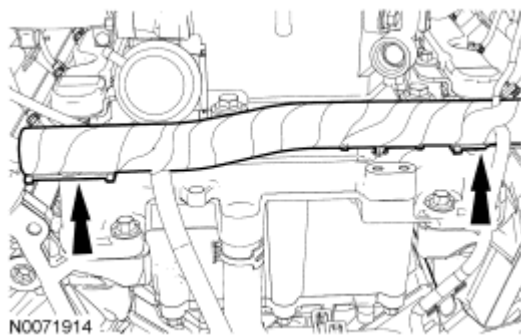


Fig. 232: Locating Wiring Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

38. Disconnect the PCV valve electrical connector.

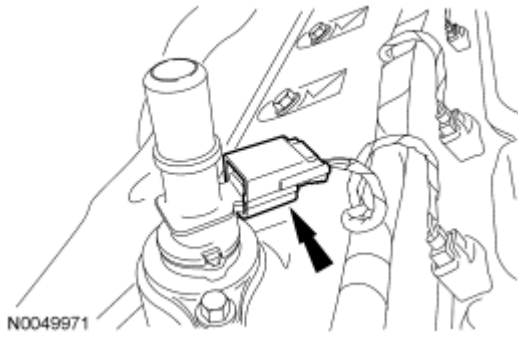


Fig. 233: Locating Positive Crankcase Ventilation (PCV) Valve Electrical Connector
Courtesy of FORD MOTOR CO.

39. Disconnect the 4 RH fuel injector electrical connectors.

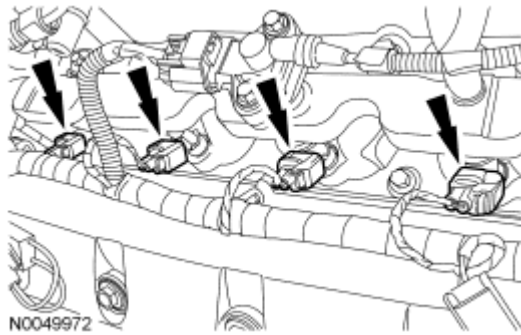


Fig. 234: Locating RH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

40. Disconnect the fuel rail pressure and temperature sensor electrical connector.

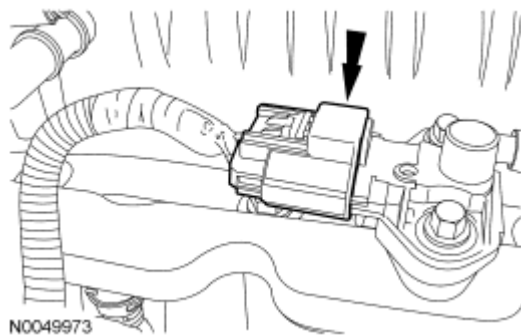


Fig. 235: Locating Fuel Rail Pressure & Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

41. Remove the nut and the RH radio interference capacitor.

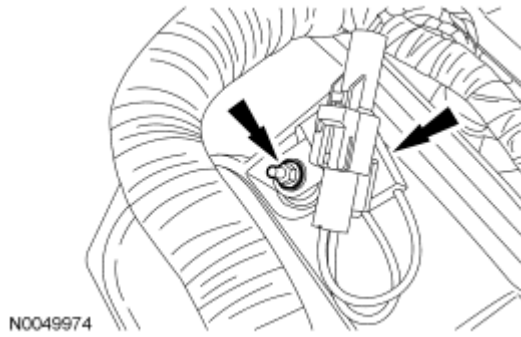


Fig. 236: Removing Nut & RH Radio Interference Capacitor
Courtesy of FORD MOTOR CO.

42. Disconnect the EGR valve electrical connector.

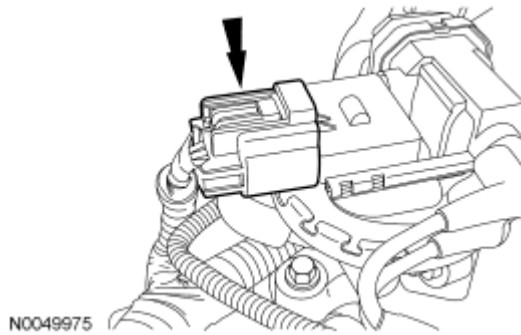


Fig. 237: Disconnecting EGR Valve Electrical Connector
Courtesy of FORD MOTOR CO.

43. Detach the wiring harness from the RH coil-on-plug cover stud bolt.

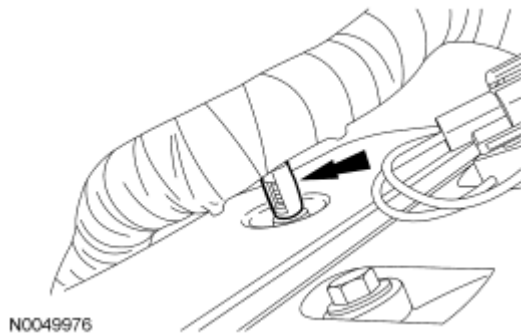


Fig. 238: Detaching Wiring Harness From RH Coil-On-Plug Cover Stud Bolt
Courtesy of FORD MOTOR CO.

44. Detach the wiring harness retainers from the RH valve cover stud bolts.

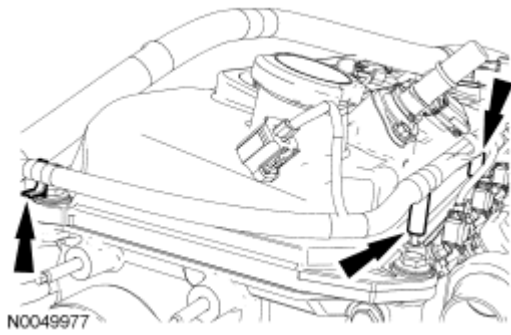


Fig. 239: Detaching Wiring Harness Retainers From RH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

45. Remove the bolt, stud bolt and the RH coil-on-plug cover.

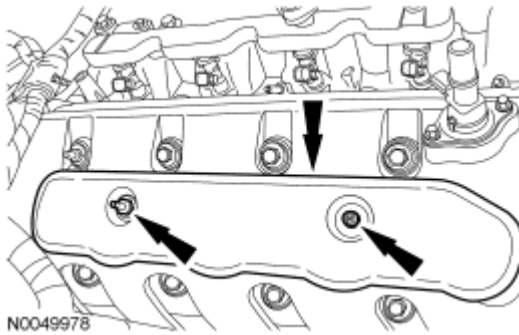


Fig. 240: Locating RH Coil-On-Plug Cover Bolt & Stud Bolt
Courtesy of FORD MOTOR CO.

46. Disconnect the 4 RH coil-on-plug electrical connectors.
- Remove the 4 RH coil-on-plugs.

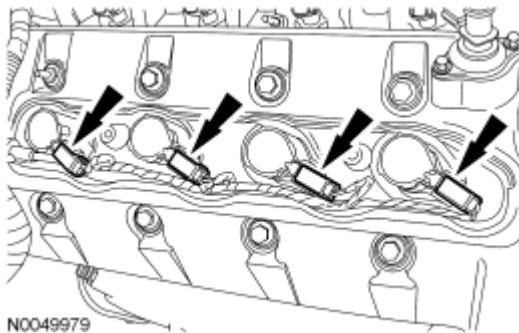


Fig. 241: Locating RH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

47. Disconnect the Engine Oil Pressure (EOP) switch electrical connector.

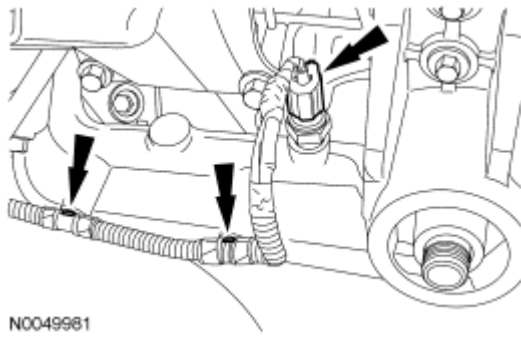


Fig. 242: Locating Engine Oil Pressure (EOP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

48. Disconnect the Camshaft Position (CMP) sensor electrical connector.

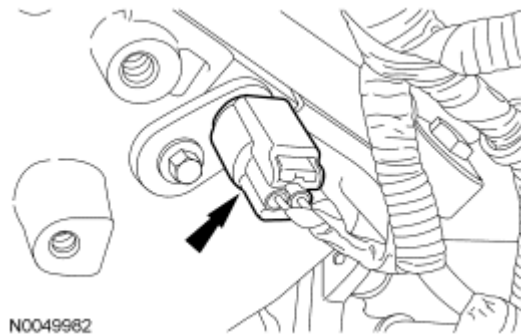


Fig. 243: Locating Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

49. Disconnect the Intake Air Temperature 2 (IAT2) sensor electrical connector.

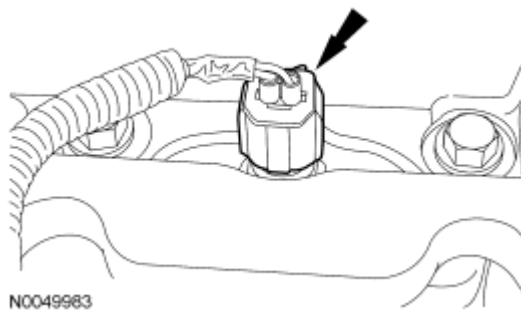


Fig. 244: Locating Intake Air Temperature (IAT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

50. Disconnect the 4 LH fuel injector electrical connectors.

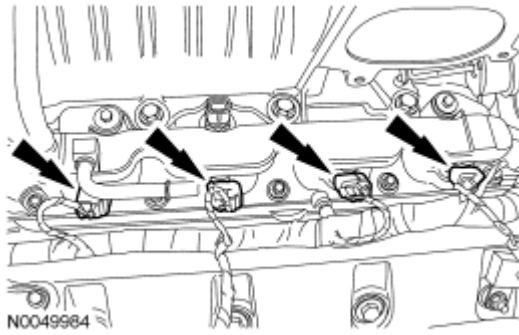


Fig. 245: Locating LH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

51. Remove the nut and the LH radio interference capacitor.

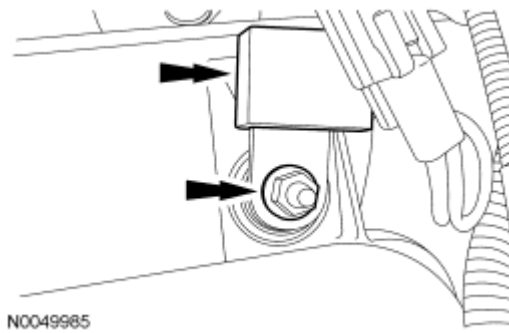


Fig. 246: Locating LH Radio Interference Capacitor Nut
Courtesy of FORD MOTOR CO.

52. Detach the wiring harness retainers from the LH valve cover stud bolts.

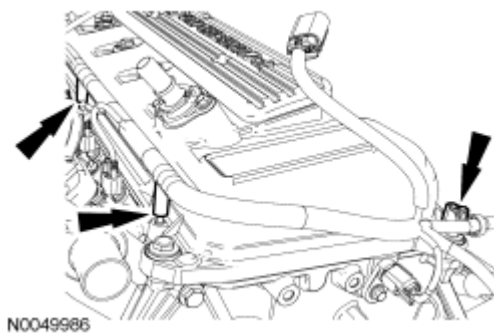
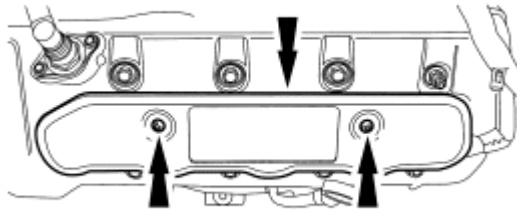


Fig. 247: Detaching Wiring Harness Retainers From LH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

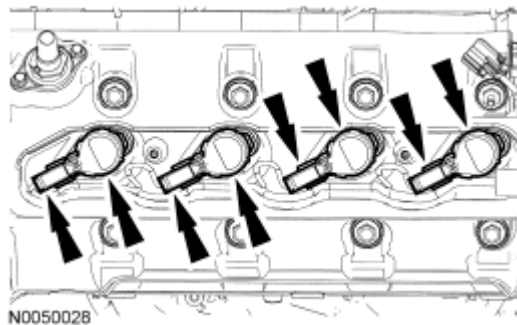
53. Remove the 2 bolts and the LH coil-on-plug cover.



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Fig. 248: Locating LH Coil-On-Plug Cover Bolts
 Courtesy of FORD MOTOR CO.

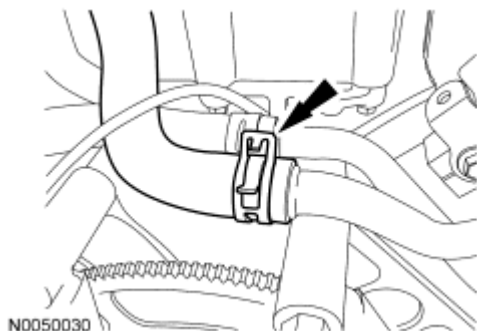
54. Disconnect the 4 LH coil-on-plug electrical connectors.
 - Remove the 4 LH coil-on-plugs.



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Fig. 249: Disconnecting LH Coil-On-Plug Electrical Connectors
 Courtesy of FORD MOTOR CO.

55. Remove the wiring harness assembly from the engine.
56. Disconnect the intake manifold-to-coolant tube assembly hose.



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Fig. 250: Disconnecting Intake Manifold-To-Coolant Tube Assembly Hose
 Courtesy of FORD MOTOR CO.

57. Remove the 14 bolts and the intake manifold assembly.
 - Remove and discard the 2 intake manifold gaskets.

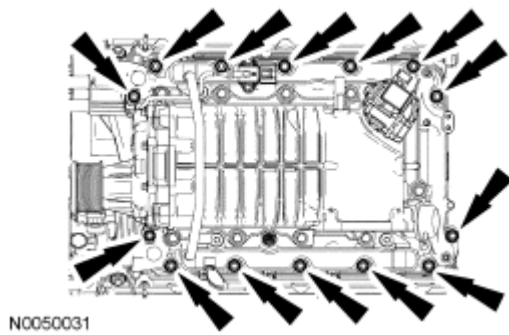


Fig. 251: Locating Intake Manifold Assembly & Bolts
Courtesy of FORD MOTOR CO.

58. Remove the 3 coolant tube assembly bolts.

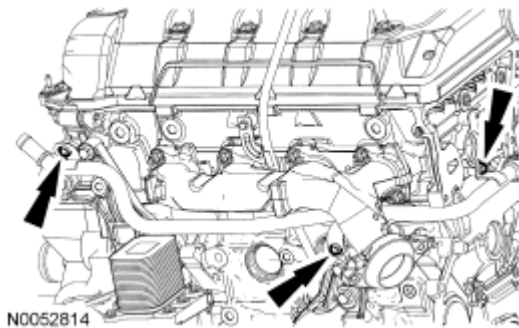


Fig. 252: Identifying Coolant Tube Assembly Bolts
Courtesy of FORD MOTOR CO.

59. Remove the 6 bolts and the oil cooler.
- Remove and discard the oil cooler gasket.

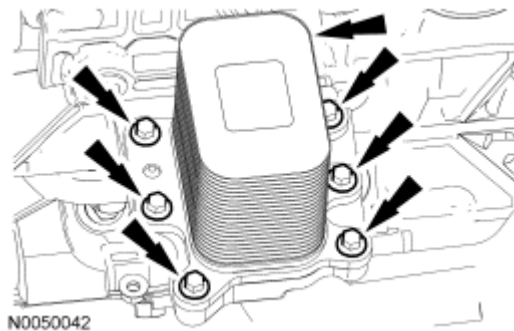


Fig. 253: Identifying Oil Cooler Bolts
Courtesy of FORD MOTOR CO.

60. Remove the 8 bolts and the oil filter adapter.
- Remove and discard the oil filter adapter gasket.

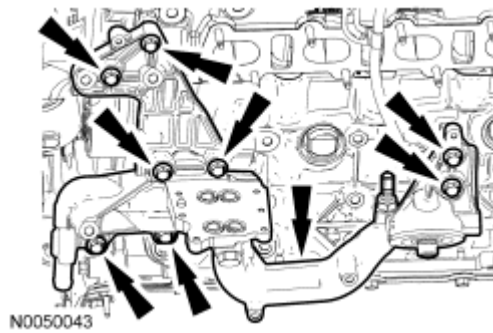


Fig. 254: Identifying Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

61. Remove the oil level indicator, the bolt and the oil level indicator tube.
 - Remove and discard the oil level indicator tube O-ring seal.

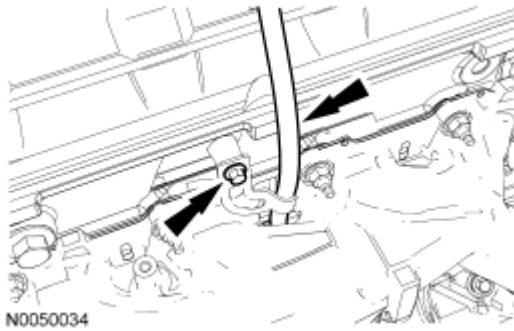


Fig. 255: Locating Oil Level Indicator & Bolt
Courtesy of FORD MOTOR CO.

NOTE: The RH engine support insulator bracket must be removed to access the RH block drain plug.

62. Remove the stud bolt, 3 bolts and the RH engine support insulator bracket.

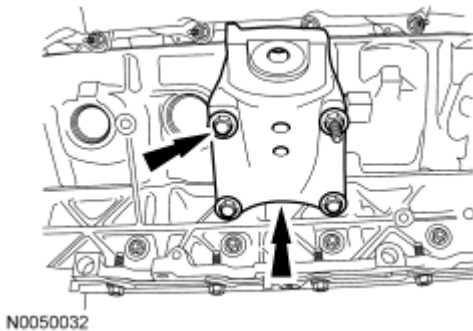


Fig. 256: Locating RH Engine Support Insulator Bracket Bolts & Stud Bolt
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

63. Remove the LH and RH block drain plugs.

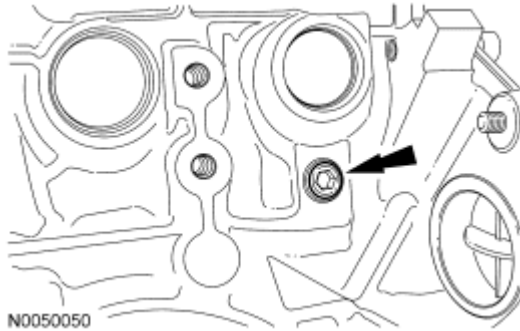


Fig. 257: Locating LH & RH Block Drain Plugs
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

64. Remove the 8 bolts, 2 stud bolts and the valve covers.
- Remove and discard the gaskets.

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

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

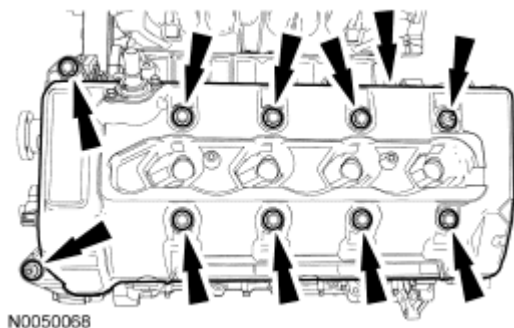


Fig. 258: Locating Valve Covers Bolts
Courtesy of FORD MOTOR CO.

65. Remove the bolt and the Crankshaft Position (CKP) sensor.

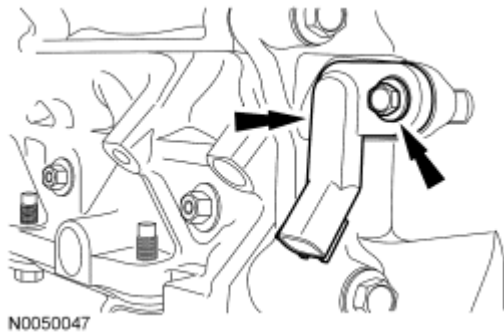


Fig. 259: Locating Crankshaft Position (CKP) Sensor Bolt
Courtesy of FORD MOTOR CO.

66. Remove the bolt and the CMP sensor.

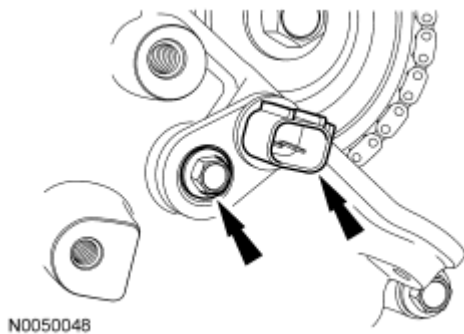


Fig. 260: Locating CMP Sensor Bolt
Courtesy of FORD MOTOR CO.

67. Remove the 4 bolts and the coolant pump.

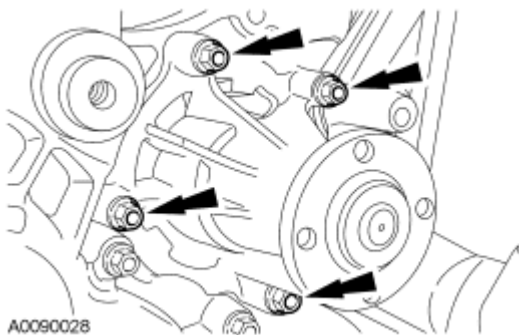


Fig. 261: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

68. Using the Strap Wrench, remove the crankshaft pulley bolt and the washer.
- Discard the bolt.

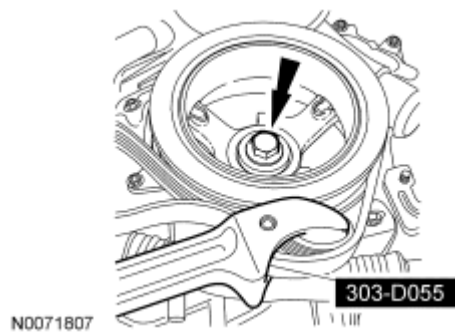


Fig. 262: Removing Crankshaft Pulley Bolt & Washer Using Strap Wrench
Courtesy of FORD MOTOR CO.

69. Using the 3-Jaw Puller, remove the crankshaft pulley.

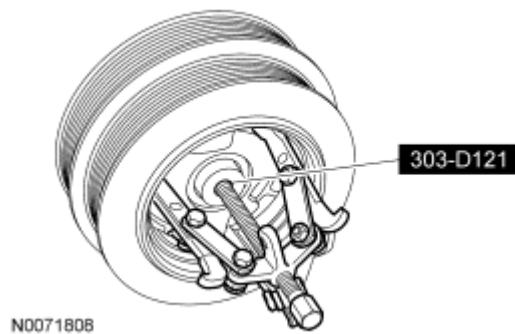


Fig. 263: Removing Crankshaft Pulley Using 3-Jaw Puller
Courtesy of FORD MOTOR CO.

70. Using the Crankshaft Front Oil Seal Remover, remove the crankshaft front seal.

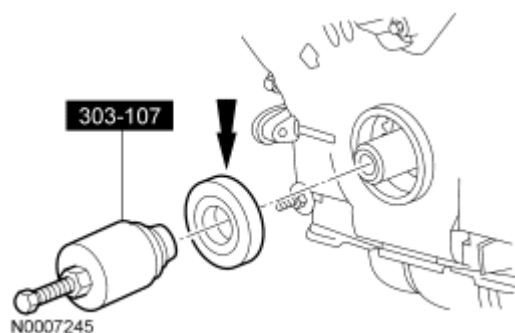


Fig. 264: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

71. Remove the 2 oil pan-to-engine front cover bolts and the 2 oil pan-to-engine front cover stud bolts.

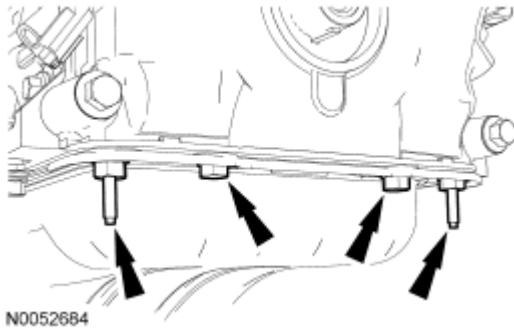


Fig. 265: Locating Oil Pan-To-Engine Front Cover Bolts & Oil Pan-To-Engine Front Cover Stud Bolts

Courtesy of FORD MOTOR CO.

72. Remove the 16 bolts and the engine front cover.
 - Remove and discard the engine front cover gaskets.

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

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

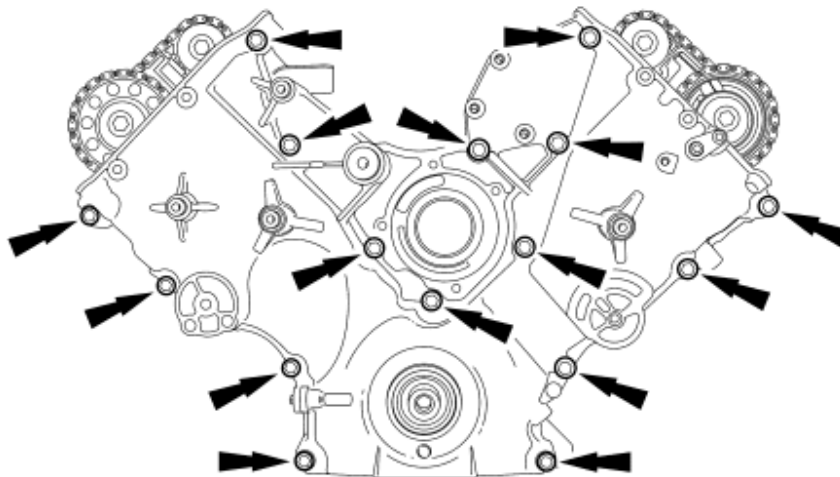


Fig. 266: Inspecting Mating Surfaces

Courtesy of FORD MOTOR CO.

NOTE: Only use hand tools when removing or installing the spark plugs, or damage may occur to the cylinder head or spark plugs.

NOTE: Use compressed air to remove any foreign material in the spark plug well before removing the spark plugs.

NOTE: RH shown, LH similar.

73. Remove the 8 spark plugs.

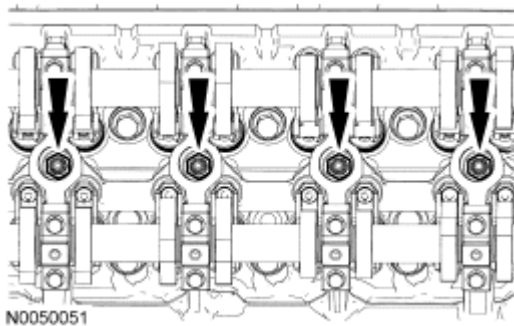


Fig. 267: Identifying Spark Plugs
Courtesy of FORD MOTOR CO.

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

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

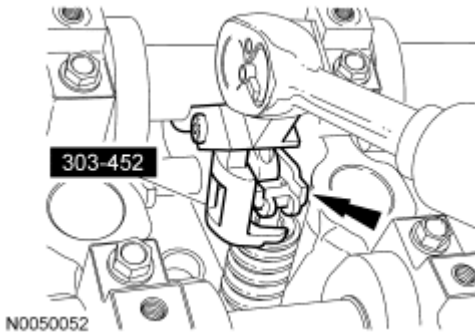


Fig. 268: Compressing Valve Spring & Removing Valve Spring Retainer Keys Using Special Tool (303-452)
Courtesy of FORD MOTOR CO.

75. Repeat the previous step to remove all the roller followers. Inspect roller followers. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** .

NOTE: If the components are to be reinstalled, they must be installed in their original positions. Mark the components for installation into their original

locations. Failure to follow these instructions may result in engine damage.

76. Remove the hydraulic lash adjusters.

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

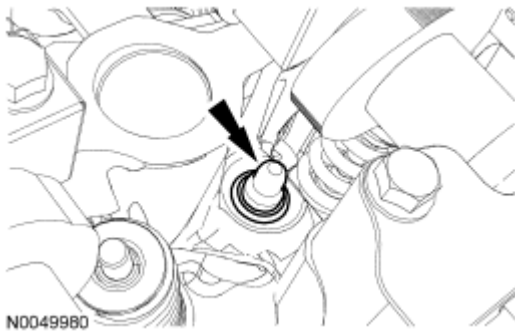


Fig. 269: Identifying Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

77. Remove the crankshaft sensor ring.

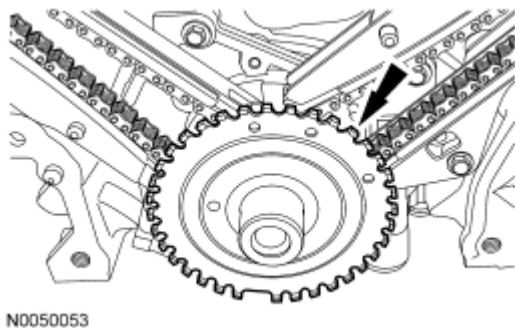


Fig. 270: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

78. Remove the crankshaft washer.

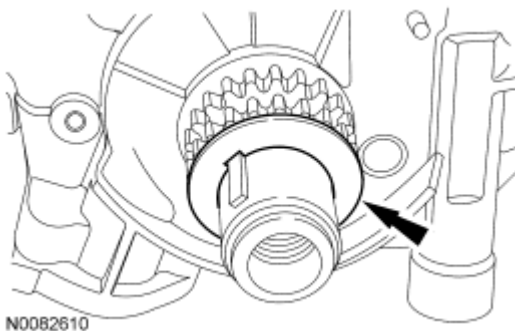


Fig. 271: Locating Crankshaft Washer
Courtesy of FORD MOTOR CO.

79. Remove the 2 bolts and the RH primary timing chain tensioner.

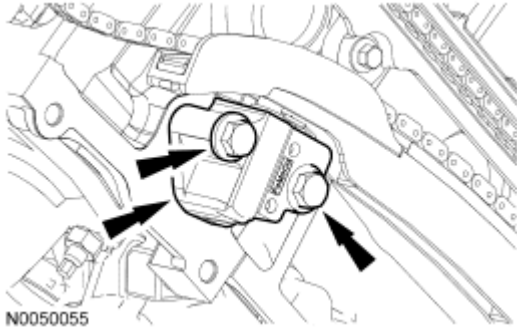


Fig. 272: Locating RH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

80. Remove the RH primary timing chain tensioner arm.

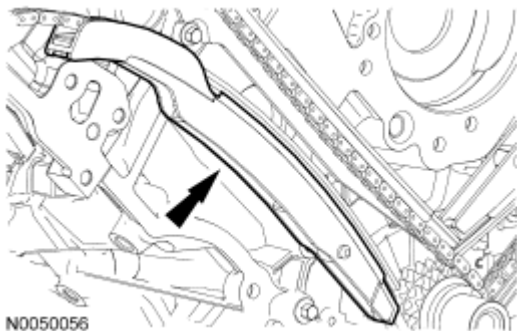


Fig. 273: Locating RH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

81. Remove the RH primary timing chain.

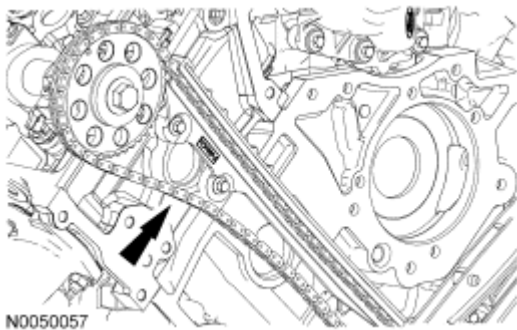


Fig. 274: Identifying RH Primary Timing Chain
Courtesy of FORD MOTOR CO.

82. Remove the 2 bolts and the RH primary timing chain guide.

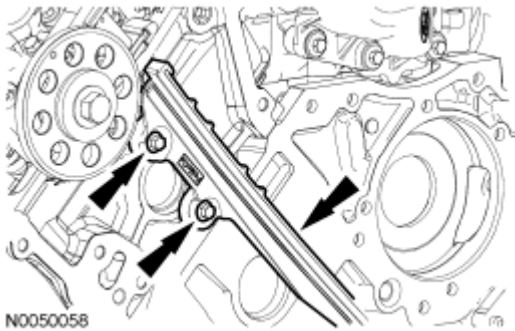


Fig. 275: Locating RH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

83. Remove the 2 bolts and the LH primary timing chain tensioner.

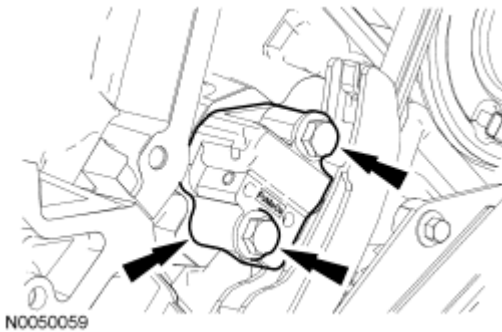


Fig. 276: Locating LH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

84. Remove the LH primary timing chain tensioner arm.

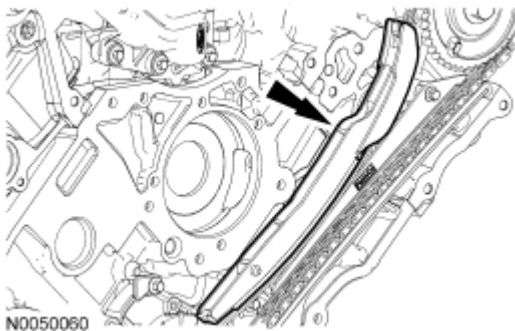


Fig. 277: Locating LH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

85. Remove the LH primary timing chain.

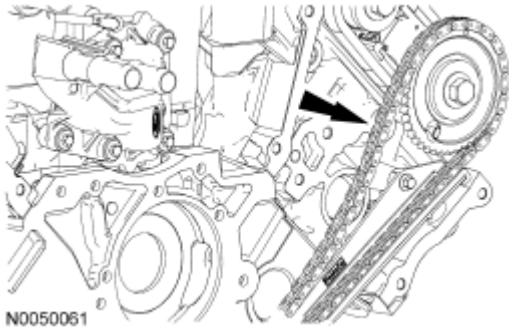


Fig. 278: Locating LH Primary Timing Chain
Courtesy of FORD MOTOR CO.

86. Remove the 2 bolts and the LH primary timing chain guide.

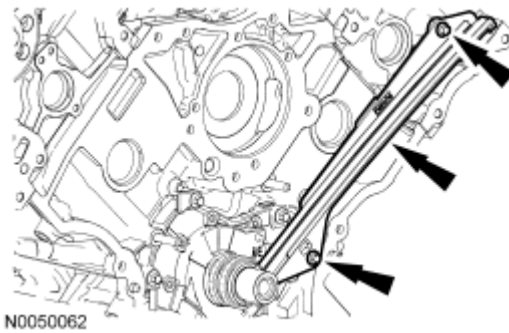


Fig. 279: Locating LH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

87. Remove the crankshaft sprocket.

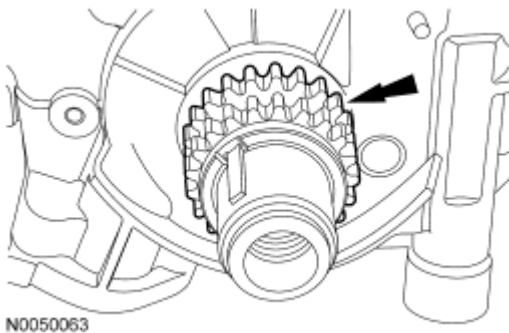


Fig. 280: Locating Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

LH cylinder head

88. Remove 8 nuts and the LH exhaust manifold.
- Discard the nuts and gaskets.

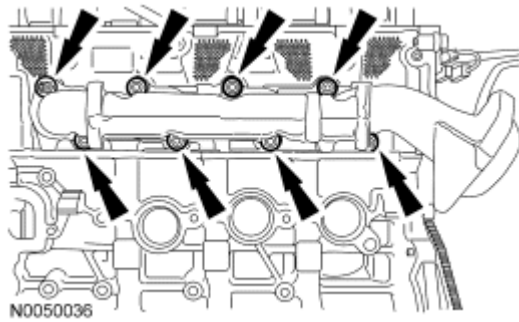


Fig. 281: Identifying LH Exhaust Manifold Nuts
 Courtesy of FORD MOTOR CO.

89. Clean and inspect the LH exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
90. Remove and discard the 8 LH exhaust manifold studs.

RH cylinder head

91. Remove 8 nuts and the RH exhaust manifold.
 - Discard the nuts and gaskets.

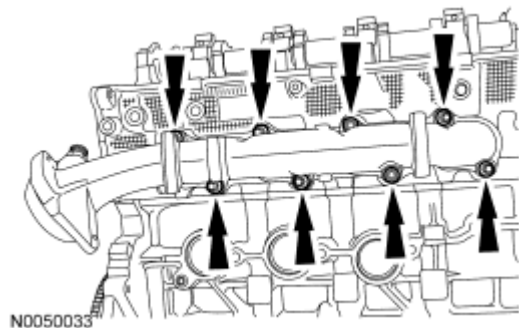


Fig. 282: Identifying RH Exhaust Manifold Nuts
 Courtesy of FORD MOTOR CO.

92. Clean and inspect the RH exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
93. Remove and discard the 8 RH exhaust manifold studs.
94. Remove the 3 coolant tube assembly bolts.

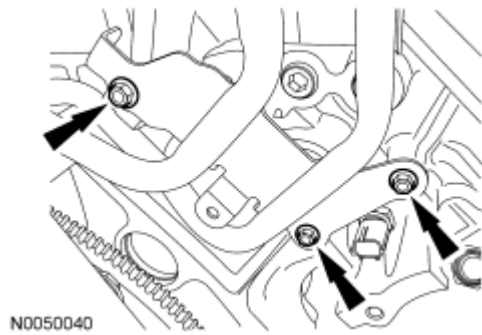


Fig. 283: Identifying Coolant Tube Assembly Bolts
Courtesy of FORD MOTOR CO.

Both cylinder heads

- NOTE:** The cylinder head must be cool before removing it from the engine. Cylinder head warpage can result if a warm or hot cylinder head is removed.
- NOTE:** Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.
- NOTE:** The cylinder head bolts must be discarded and new bolts must be installed. They are a tighten-to-yield design and cannot be reused.
- NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.
- NOTE:** Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.
- NOTE:** LH shown, RH similar.

95. Remove the 10 bolts and the cylinder head.
- Discard the bolts.
 - Remove and discard the cylinder head gaskets.

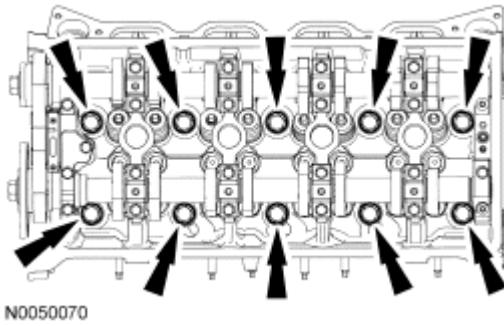


Fig. 284: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

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

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

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

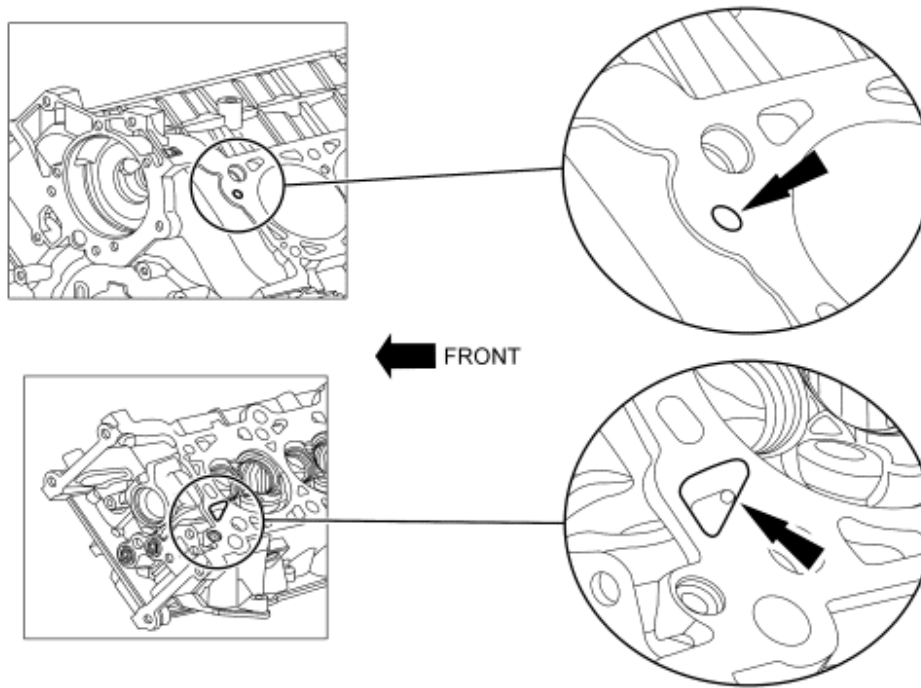
96. Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block in the following sequence.
1. Remove any large deposits of silicone or gasket material with a plastic scraper.
 2. Apply silicone gasket remover, following package directions and allow to set for several minutes.
 3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
 4. Apply metal surface prep, following package directions, to remove any remaining traces of oil or coolant and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

NOTE: Make sure all cylinder head surfaces are clear of any gasket material, RTV, oil and coolant. The cylinder head surface must be clean and dry before running a flatness check.

NOTE: Use a straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot length. For example, if the straightedge is 61 cm (24 in) long, the machine edge must be flat within 0.010 mm (0.0004 in) from end to end.

NOTE: LH shown, RH similar.

97. Support the cylinder heads on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion, paying particular attention to the oil pressure feed area. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** .



A0079634

Fig. 285: Identifying Cylinder Head/Cylinder Block Oil Pressure Feed Areas
Courtesy of FORD MOTOR CO.

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1341-A	Heavy Duty Floor Crane	014-00071 or equivalent
 ST1603-A	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
	Lifting Bracket, Engine	303-D089 (D93P-6001-A3) or equivalent

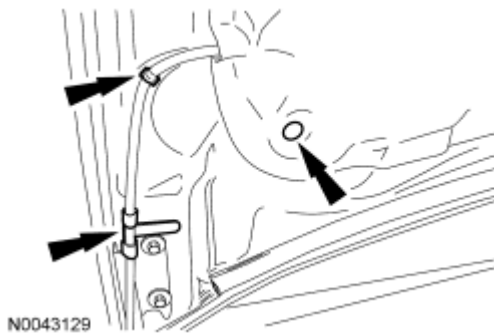


ST1602-A

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

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

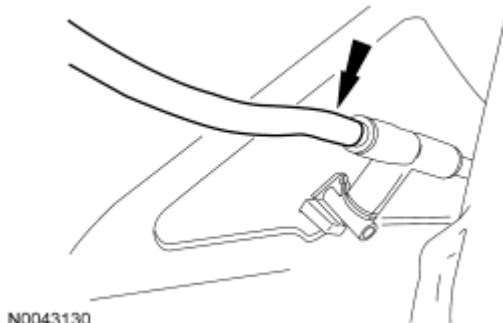
1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING**.
2. Release the 2 windshield washer hose retainers and the one hood insulation pin-type retainer.



N0043129

Fig. 286: Locating Windshield Washer Hose Retainers
Courtesy of FORD MOTOR CO.

3. Position the hood insulation aside and disconnect the windshield washer hose.



N0043130

Fig. 287: Locating Windshield Washer Hose
Courtesy of FORD MOTOR CO.

NOTE: Index-mark the hood hinge location to aid in hood installation.

4. Remove the 4 bolts and the hood.
5. Release the fuel system pressure. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION**.
6. Remove the 4 nuts and the strut tower cross brace.

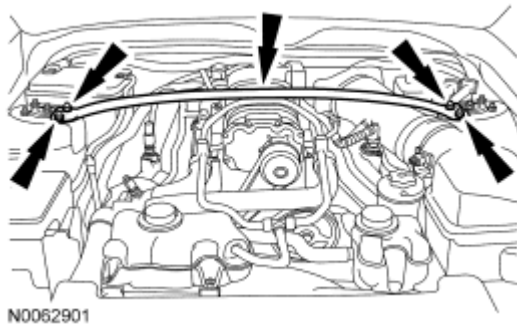


Fig. 288: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

7. Remove the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
8. Remove the Air Cleaner (ACL) and ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.
9. Remove the 2 steering column dash boot nuts.

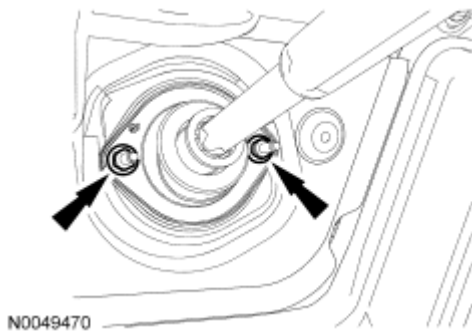


Fig. 289: Locating Steering Column Dash Boot Nuts
Courtesy of FORD MOTOR CO.

10. Drain the cooling system. For additional information, refer to **ENGINE COOLING**.
11. Drain the Supercharger (SC) cooling system. For additional information, refer to **SUPERCHARGER COOLING**.
12. Remove the engine coolant degas bottle. For additional information, refer to **ENGINE COOLING**.

13. Remove the SC coolant degas bottle. For additional information, refer to **SUPERCHARGER COOLING**.
14. Disconnect the upper radiator hose from the thermostat housing.

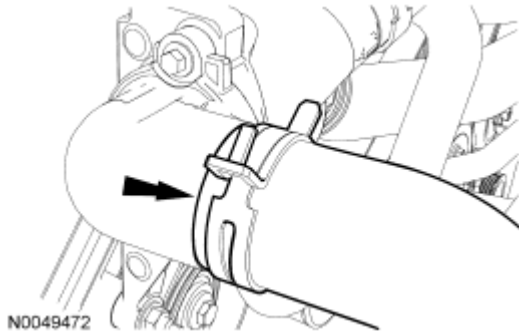


Fig. 290: Disconnecting Upper Radiator Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

15. Disconnect the cooling fan electrical connector.

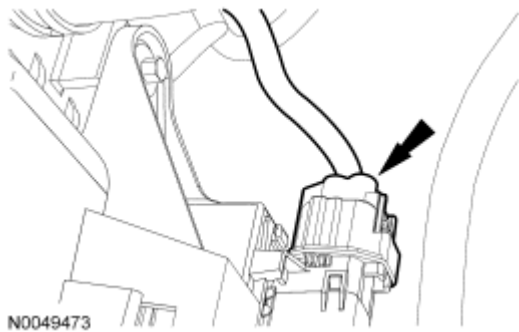


Fig. 291: Disconnecting Cooling Fan Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: RH bolt shown, LH similar.

16. Remove the 2 bolts and the cooling fan assembly.

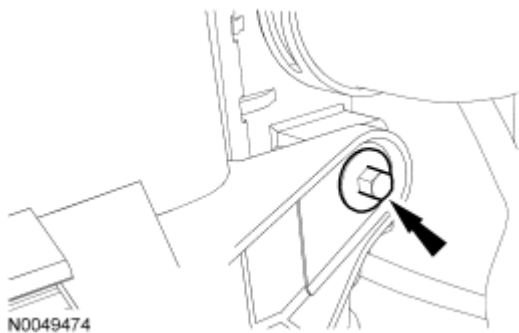


Fig. 292: Locating Cooling Fan Assembly Bolts

Courtesy of FORD MOTOR CO.

17. Disconnect the coolant hose from the Charge Air Cooler (CAC).

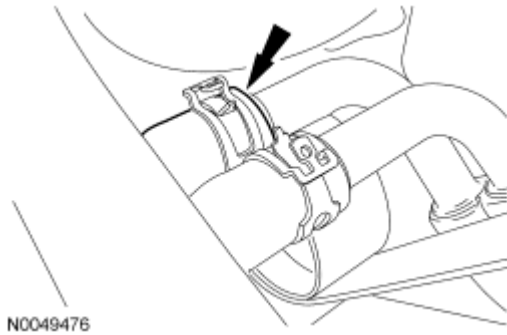


Fig. 293: Disconnecting Coolant Hose From Charge Air Cooler (CAC)
Courtesy of FORD MOTOR CO.

18. Disconnect the coolant hose from the coolant tube assembly (above the generator).

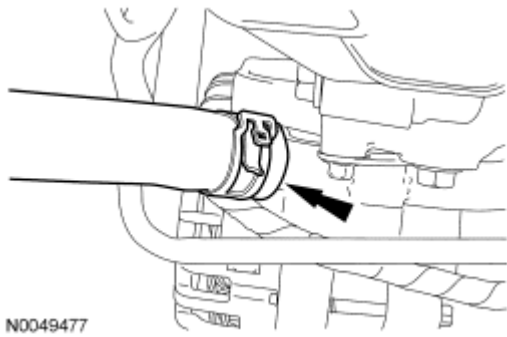


Fig. 294: Disconnecting Coolant Hose From Coolant Tube Assembly
Courtesy of FORD MOTOR CO.

19. Disconnect the coolant hose from the thermostat housing.

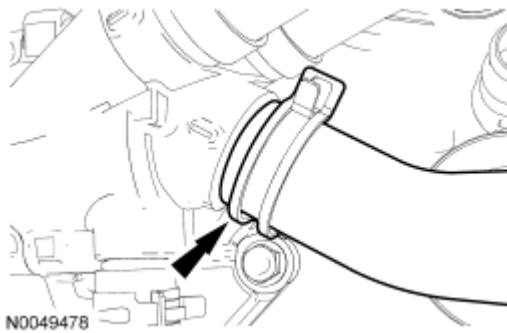


Fig. 295: Disconnecting Coolant Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

20. Disconnect the coolant hose from the coolant pump.



Fig. 296: Disconnecting Coolant Hose From Coolant Pump
Courtesy of FORD MOTOR CO.

21. Disconnect the fuel supply tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** .

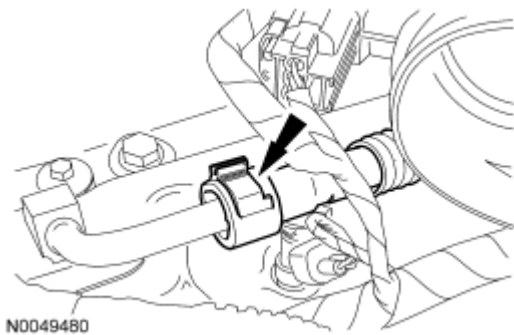


Fig. 297: Locating Fuel Supply Tube
Courtesy of FORD MOTOR CO.

22. Disconnect the Evaporative Emission (EVAP) tube and brake booster vacuum supply tube from the Throttle Body (TB) spacer.



Fig. 298: Disconnecting Evaporative Emissions (EVAP) Tube & Brake Booster Vacuum Supply Tube From Throttle Body (TB) Spacer
Courtesy of FORD MOTOR CO.

23. Disconnect the lower EVAP tube and electrical connector from the EVAP canister purge valve.
- Remove the EVAP canister purge valve.

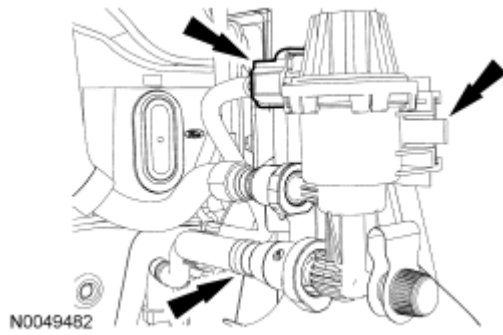


Fig. 299: Disconnecting Lower EVAP Tube & Electrical Connector From EVAP Canister Purge Valve

Courtesy of FORD MOTOR CO.

24. Disconnect the 2 heater hoses from the coolant tube assembly at the rear of the engine.

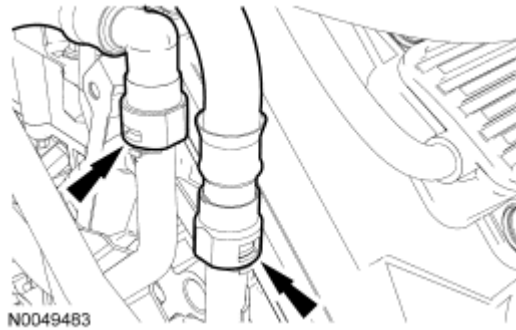


Fig. 300: Disconnecting Heater Hoses From Coolant Tube Assembly At Rear Of Engine

Courtesy of FORD MOTOR CO.

25. Detach the pin-type wire harness retainer from the cowl.

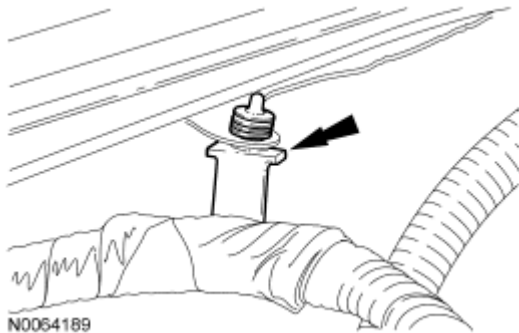


Fig. 301: Detaching Pin-Type Wire Harness Retainer From Cowl

Courtesy of FORD MOTOR CO.

26. Detach the pin-type wiring harness retainer.

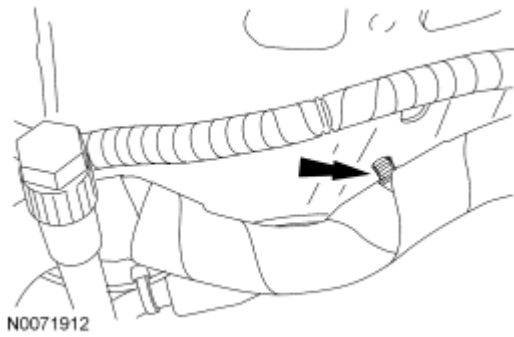


Fig. 302: Locating Pin-Type Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

27. Remove the Power Distribution Box (PDB) cover.
28. Detach the PDB upper housing from the lower housing, loosen the bolt, then disconnect the 68-pin connector from the PDB.

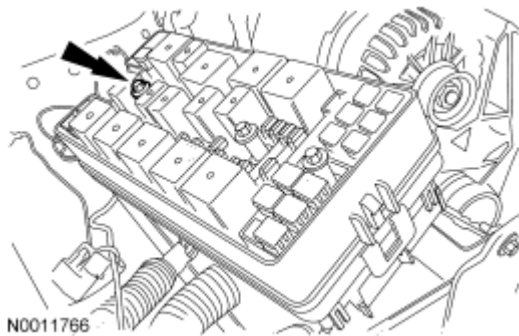


Fig. 303: Locating Power Distribution Box Upper Housing Bolt
Courtesy of FORD MOTOR CO.

29. Disconnect the jumper harness electrical connector.

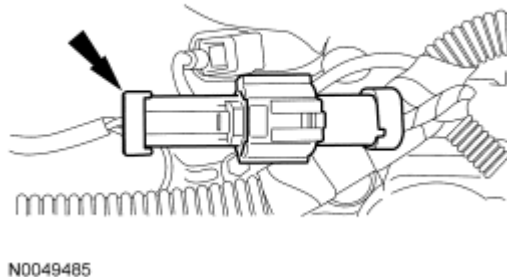


Fig. 304: Identifying Jumper Harness Electrical Connector
Courtesy of FORD MOTOR CO.

30. Disconnect the upper and lower PCM electrical connectors.

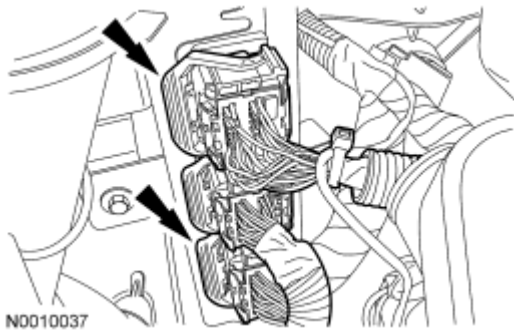


Fig. 305: Identifying Upper & Lower Powertrain Control Module (PCM) Electrical Connectors
Courtesy of FORD MOTOR CO.

31. Disconnect the 16-pin electrical connector and detach the 2 wiring retainers.

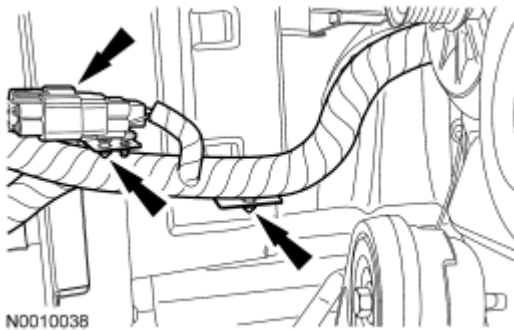


Fig. 306: Locating 16-Pin Electrical Connector
Courtesy of FORD MOTOR CO.

32. Disconnect the hose from the power steering reservoir.
- Drain the power steering fluid into a suitable container.

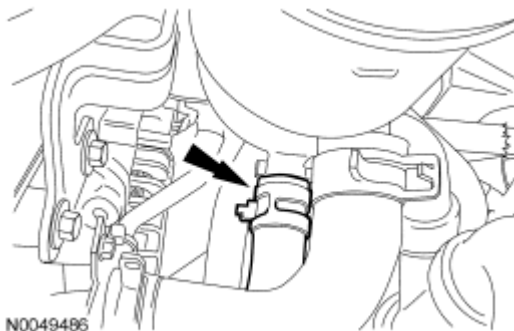


Fig. 307: Power Steering Reservoir Hose
Courtesy of FORD MOTOR CO.

33. Disconnect the A/C pressure transducer electrical connector.

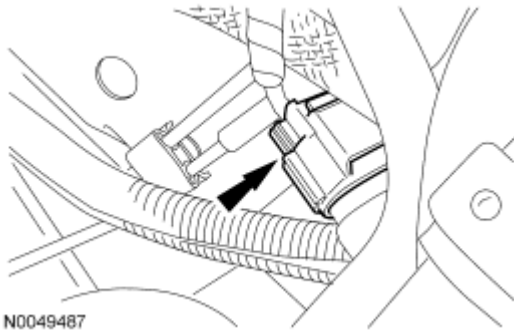


Fig. 308: A/C Pressure Transducer Electrical Connector
Courtesy of FORD MOTOR CO.

34. Rotate the SC drive belt tensioner clockwise and remove the drive belt from the SC drive pulley.

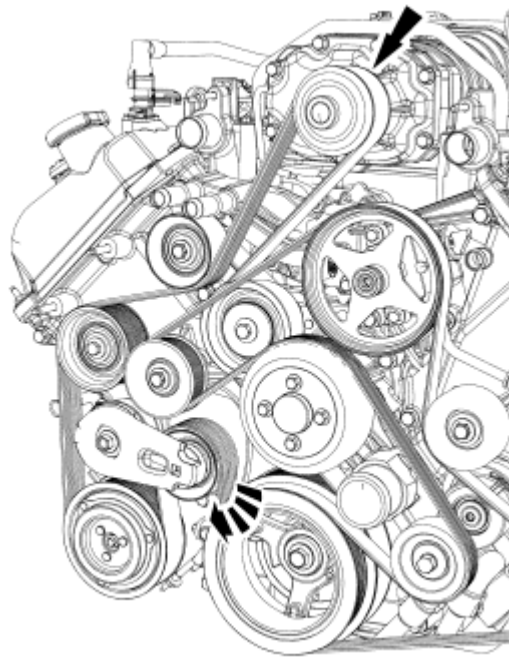


Fig. 309: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC
Courtesy of FORD MOTOR CO.

35. Disconnect the coolant hose from the oil cooler.

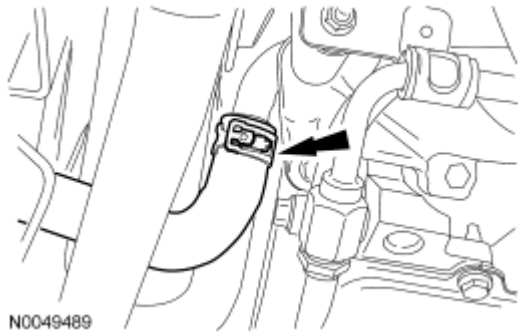


Fig. 310: Disconnecting Coolant Hose From Oil Cooler
Courtesy of FORD MOTOR CO.

36. Disconnect the lower radiator hose from the radiator.
- Remove the lower radiator hose assembly from the vehicle.

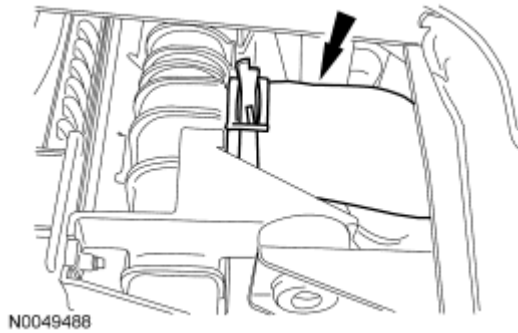


Fig. 311: Disconnecting Lower Radiator Hose From Radiator
Courtesy of FORD MOTOR CO.

37. Disconnect the Power Steering Pressure (PSP) tube fitting.
- Discard the Teflon® seal.

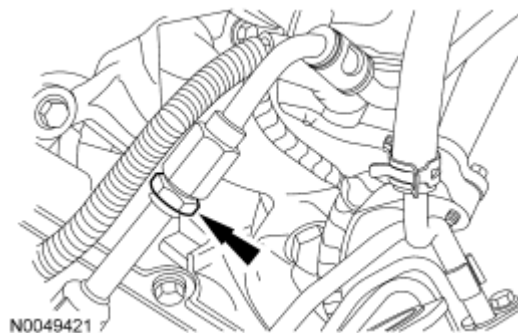


Fig. 312: Locating Power Steering Pressure (PSP) Tube Fitting
Courtesy of FORD MOTOR CO.

38. Disconnect the power steering return hose.

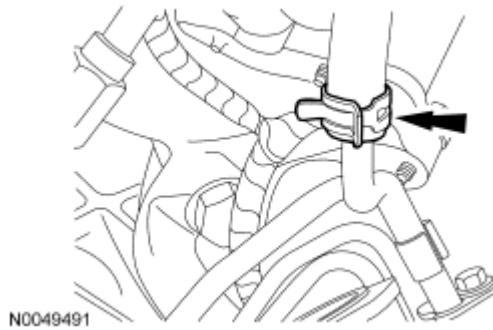


Fig. 313: Locating Power Steering Return Hose
Courtesy of FORD MOTOR CO.

39. Remove the nut and disconnect the B+ wire from the generator.

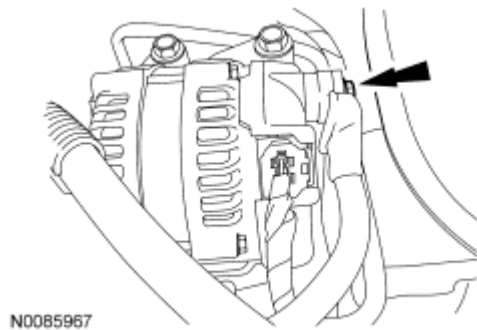


Fig. 314: Locating B+ Wire From Generator
Courtesy of FORD MOTOR CO.

40. Detach the wiring harness retainer from the oil pan stud bolt.

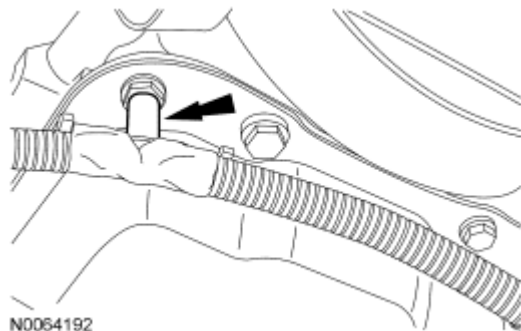


Fig. 315: Detaching Wiring Harness Retainer From Oil Pan Stud Bolt
Courtesy of FORD MOTOR CO.

41. Remove the nut and wire harness bracket from the oil pan stud bolt.

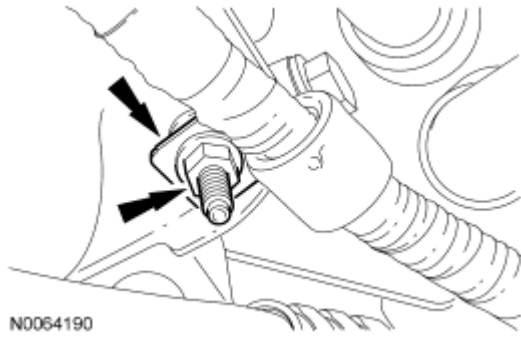


Fig. 316: Removing Nut & Wire Harness Bracket From Oil Pan Stud Bolt
Courtesy of FORD MOTOR CO.

42. Disconnect the Crankshaft Position (CKP) sensor electrical connector.

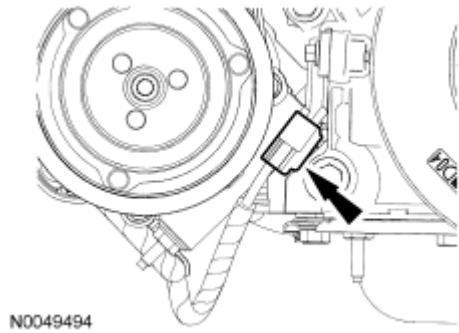


Fig. 317: Locating Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

43. Detach the wire harness retainer from the A/C compressor stud bolt.

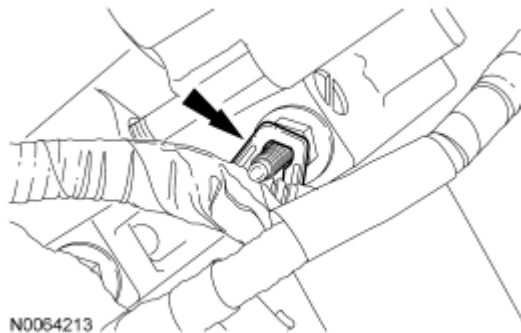


Fig. 318: Locating Wire Harness Retainer From A/C Compressor Stud Bolt
Courtesy of FORD MOTOR CO.

44. Disconnect the A/C compressor electrical connector.

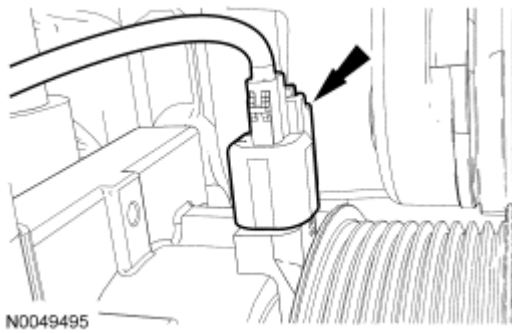


Fig. 319: Identifying A/C Compressor Electrical Connector
Courtesy of FORD MOTOR CO.

45. Detach the wiring harness pin-type retainer from the back of the A/C compressor.

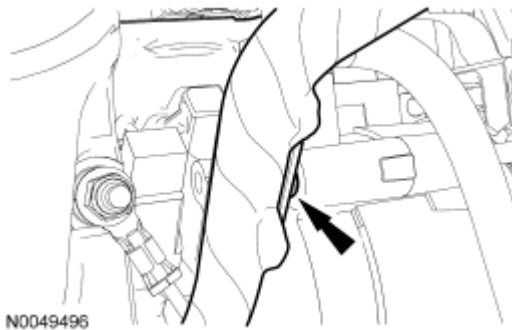


Fig. 320: Detaching Wiring Harness Pin-Type Retainer From Back Of A/C Compressor
Courtesy of FORD MOTOR CO.

46. Position the SC drive belt away from the A/C compressor and detach the 2 wiring harness retainers from the A/C compressor stud bolts.

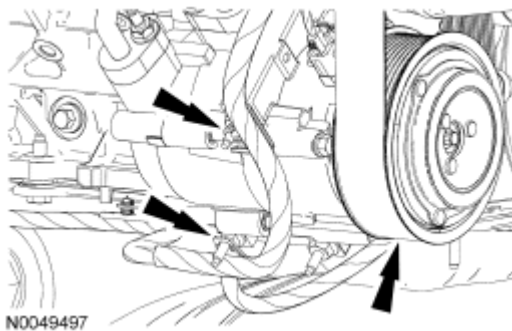


Fig. 321: Identifying SC Drive Belt, A/C Compressor, Wiring Harness Retainers & A/C Compressor Stud Bolts
Courtesy of FORD MOTOR CO.

47. Remove the 3 stud bolts and position the A/C compressor aside.

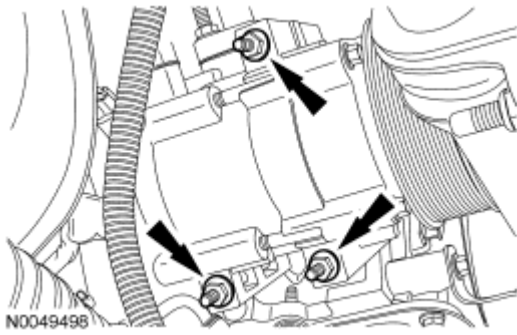


Fig. 322: Identifying Stud Bolts & A/C Compressor Aside
Courtesy of FORD MOTOR CO.

48. Remove the nut and the ground wire from the RH engine support insulator bracket stud bolt.

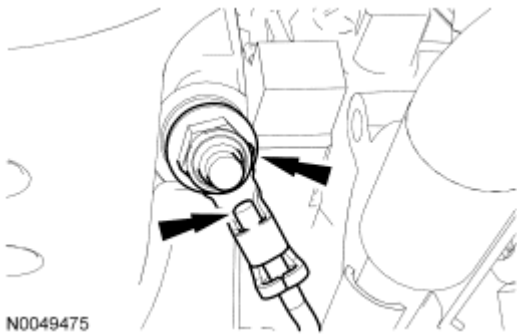


Fig. 323: Locating Ground Wire From RH Engine Support Insulator Bracket Stud Bolt
Courtesy of FORD MOTOR CO.

49. Detach the 2 wiring harness pin-type retainers from the oil pan.

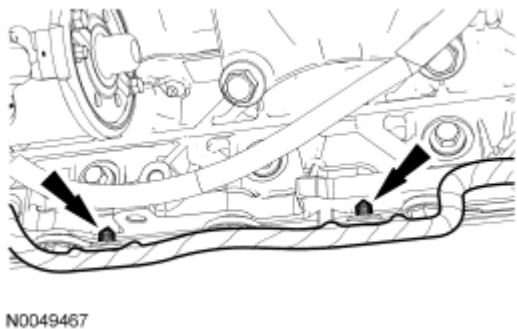


Fig. 324: Locating Wiring Harness Pin-Type Retainers From Oil Pan
Courtesy of FORD MOTOR CO.

50. Remove the starter solenoid terminal cover.

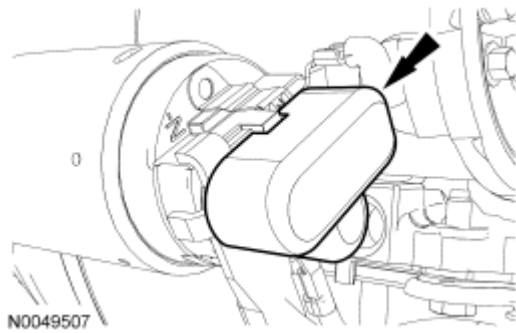


Fig. 325: Locating Starter Solenoid Terminal Cover
Courtesy of FORD MOTOR CO.

51. Remove the 2 nuts and disconnect the 2 wires from the starter solenoid.

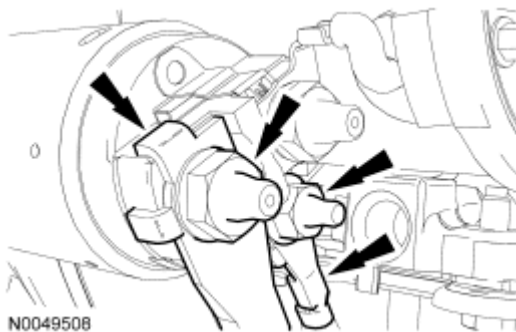


Fig. 326: Disconnecting Wires From Starter Solenoid
Courtesy of FORD MOTOR CO.

52. Remove the 3 bolts and the starter.

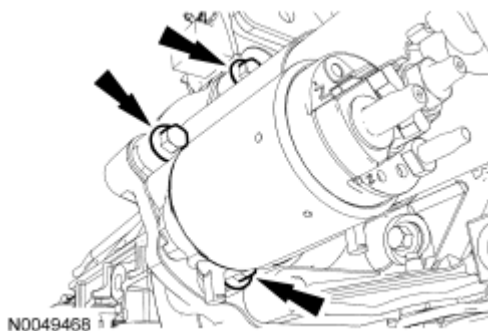


Fig. 327: Locating Starter Bolts
Courtesy of FORD MOTOR CO.

53. Drain the engine oil.
- Install the drain plug and tighten to 26 Nm (19 lb-ft).
54. Remove and discard the engine oil filter.

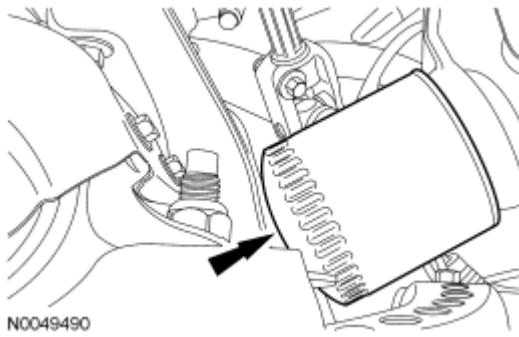


Fig. 328: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

NOTE: Use a steering wheel holding device (such as Hunter® 28-75-1 or equivalent).

55. Using a suitable holding device, hold the steering wheel in the straight-ahead position.

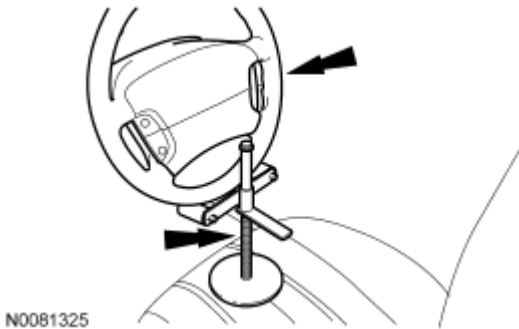


Fig. 329: Holding Steering Wheel In Straight-Ahead Position Using A Suitable Holding Device
Courtesy of FORD MOTOR CO.

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

56. Remove the upper bolt from the intermediate steering shaft.
- Position the intermediate steering shaft aside.

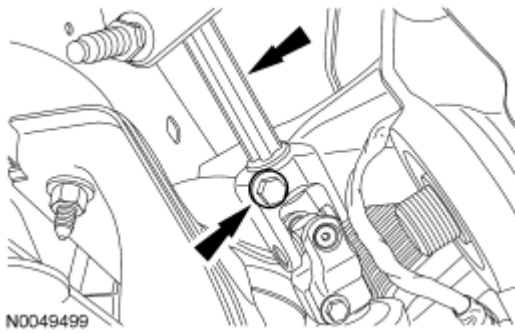


Fig. 330: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

57. Remove the clutch disc and pressure plate. For additional information, refer to **CLUTCH**.
58. Remove the bolt and the ground wire from the rear of the LH cylinder head.

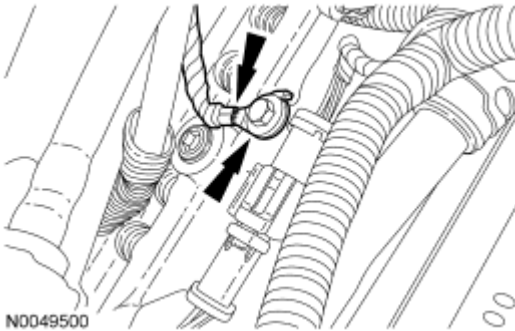


Fig. 331: Identifying Ground Wire From Rear Of LH Cylinder Head
Courtesy of FORD MOTOR CO.

59. Install the Engine Lifting Bracket.

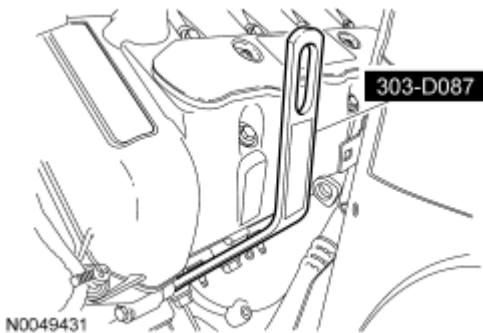


Fig. 332: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

60. Install the Engine Lifting Bracket.

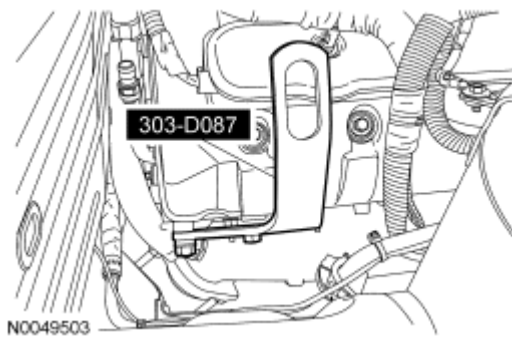


Fig. 333: Identifying Special Tool 303-D087
Courtesy of FORD MOTOR CO.

61. Remove the RH engine support insulator nut.

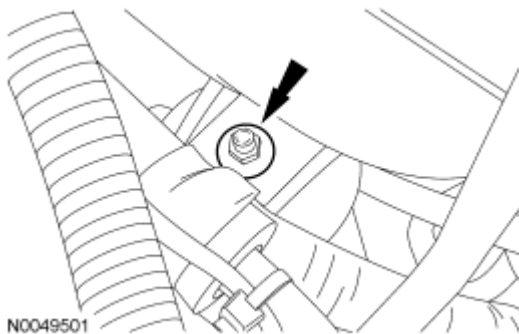


Fig. 334: Locating RH Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

62. Remove the LH engine support insulator nut.

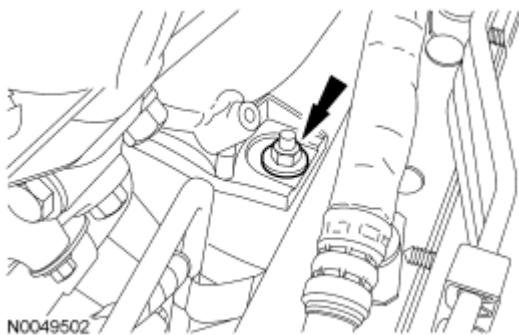


Fig. 335: Locating LH Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

63. Install the Heavy Duty Floor Crane and the Engine Lifting Bracket.
- Remove the engine from the vehicle.

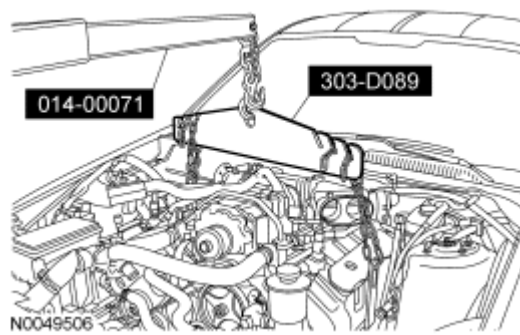
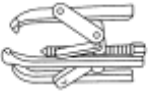
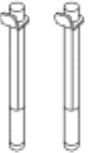
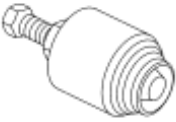


Fig. 336: Identifying Special Tools (014-00071) & (303-D089)
Courtesy of FORD MOTOR CO.

DISASSEMBLY

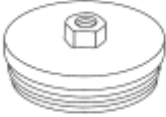
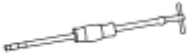
ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1184-A	3-Jaw Puller	303-D121 or equivalent
 ST1718-A	Compressor, Valve Spring	303-452 (T93P-6565-AR)
 ST1337-A	Installer, Connecting Rod	303-442 (T93P-6136-A)
 ST1730-A	Remover, Crankshaft Front Oil Seal	303-107 (T74P-6700-A)
	Remover, Crankshaft Rear Oil Slinger	303-514 (T95P-6701-AH)

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

 ST1481-A		
 ST1382-A	Remover, Crankshaft Rear Oil Seal	303-519 (T95P-6701-EH)
 ST1185-A	Slide Hammer	100-001 (T50T-100-A)
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

Material

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

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

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

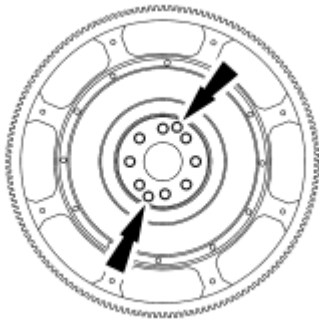
NOTE: The flywheel, crankshaft rear oil slinger, crankshaft rear seal and crankshaft rear seal retainer plate must be removed before mounting the engine on the engine stand.

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

1. Remove the 8 flywheel bolts.

NOTE: The flywheel is a press fit on the crankshaft pilot. Do not use screwdrivers or prybars to remove the flywheel or damage to the flywheel or engine may occur.

2. Remove the flywheel.
 - Install 2 of the removed flywheel bolts in the 2 holes shown on the flywheel flange.
 - Tighten the 2 bolts evenly to push the flywheel off the crankshaft pilot.



N0076040

Fig. 337: Identifying Flywheel Bolts
Courtesy of FORD MOTOR CO.

3. Remove the engine/transmission spacer plate.
4. Using the Slide Hammer and the Crankshaft Rear Oil Seal Remover, remove the crankshaft rear oil slinger.

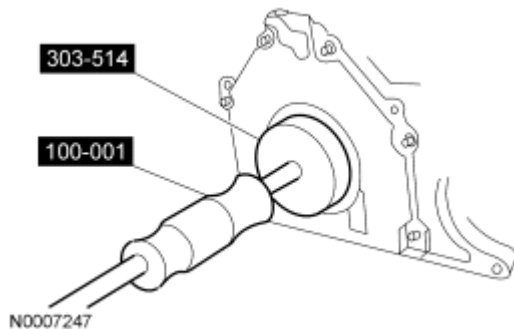


Fig. 338: Removing Crankshaft Rear Oil Seal Slinger
Courtesy of FORD MOTOR CO.

5. Using the Slide Hammer and the Crankshaft Rear Oil Seal Remover, remove the crankshaft rear seal.

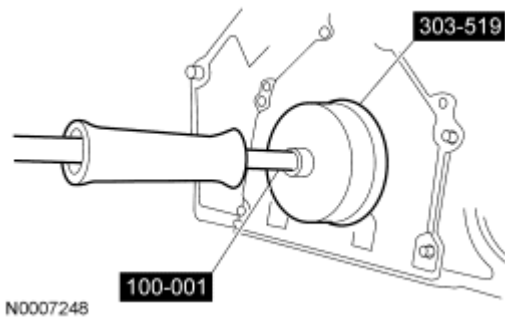


Fig. 339: Removing Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

6. Remove the 8 bolts and the rear seal retainer plate.

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

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

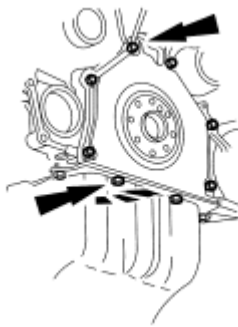


Fig. 340: Identifying Crankshaft Rear Seal Retainer Plate Bolts
Courtesy of FORD MOTOR CO.

7. Mount the engine on a suitable work stand.

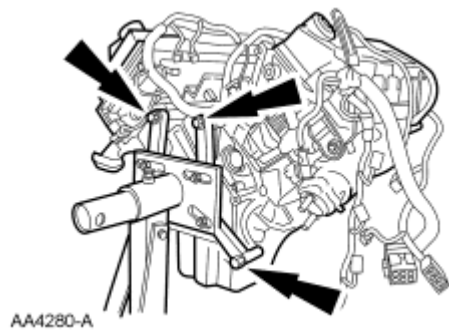


Fig. 341: Mounting Engine On Suitable Work Stand
Courtesy of FORD MOTOR CO.

8. Disconnect the coolant hose from the thermostat housing.

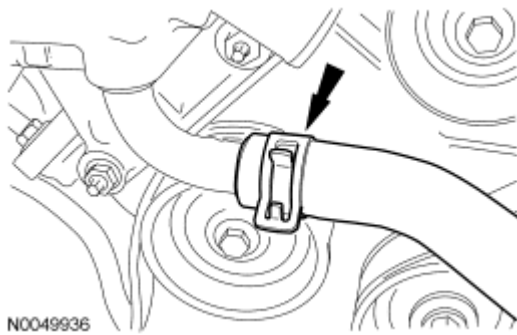


Fig. 342: Locating Coolant Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

9. Remove the coolant tube bracket nut.

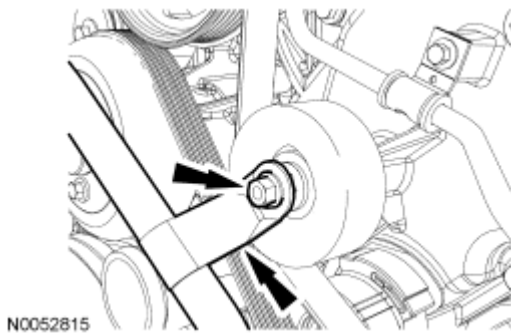


Fig. 343: Locating Coolant Tube Bracket Nut
Courtesy of FORD MOTOR CO.

10. Disconnect the 2 coolant vent hoses from the intake manifold.

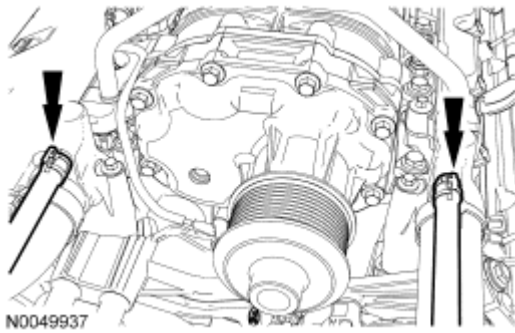


Fig. 344: Locating Coolant Vent Hoses From Intake Manifold
Courtesy of FORD MOTOR CO.

11. Disconnect the 2 upper radiator hoses from the intake manifold.

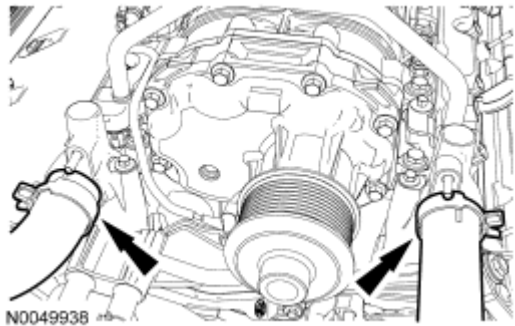


Fig. 345: Locating Upper Radiator Hoses From Intake Manifold
Courtesy of FORD MOTOR CO.

12. Disconnect the Engine Coolant Temperature (ECT) sensor electrical connector.

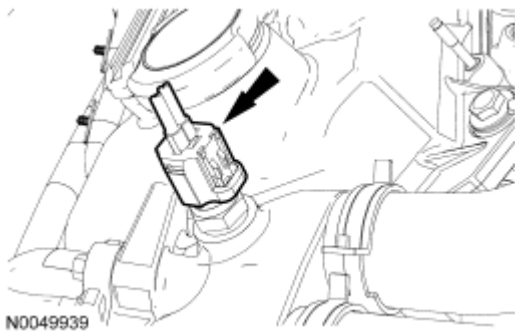


Fig. 346: Locating Engine Coolant Temperature (ECT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

13. Remove the 2 nuts and the thermostat housing assembly.

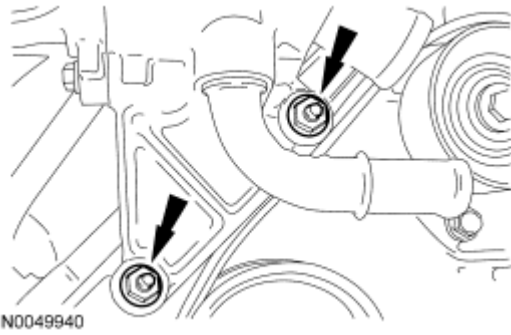


Fig. 347: Locating Thermostat Housing Assembly Nuts
Courtesy of FORD MOTOR CO.

14. Disconnect the coolant hose from the Charge Air Cooler (CAC).

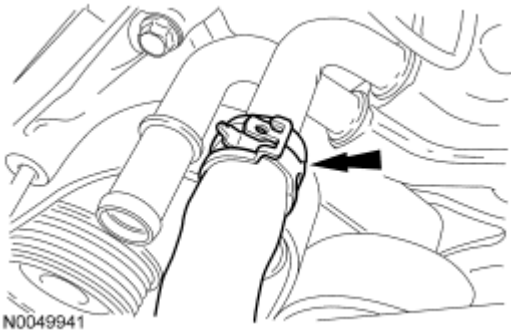


Fig. 348: Locating Coolant Hose From Charge Air Cooler (CAC)
Courtesy of FORD MOTOR CO.

15. Loosen the 4 coolant pump pulley bolts.

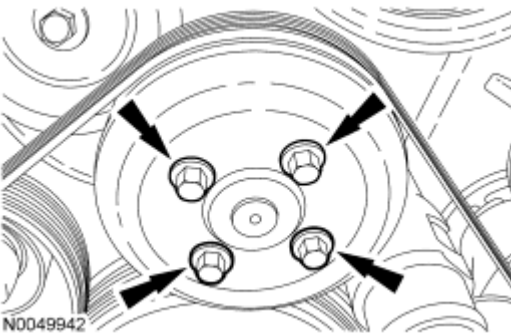


Fig. 349: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

16. Rotate the accessory drive belt tensioner clockwise and remove the accessory drive belt.

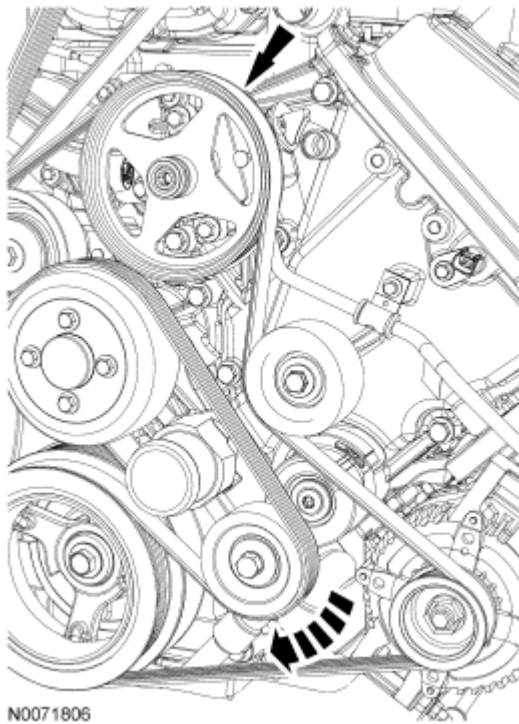


Fig. 350: Rotating Accessory Drive Belt Tensioner Clockwise & Removing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

17. Remove the bolt, Supercharger (SC) drive belt tensioner and the SC drive belt.

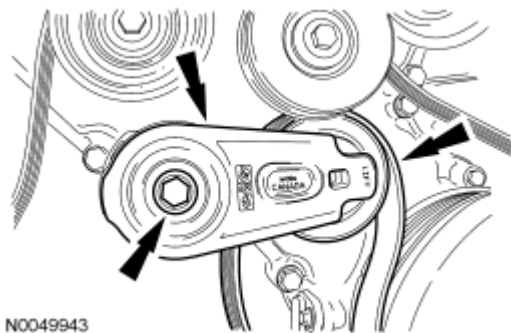


Fig. 351: Locating Bolt, Supercharger (SC) Drive Belt Tensioner & SC Drive Belt
Courtesy of FORD MOTOR CO.

18. Remove the power steering tube bracket nut.

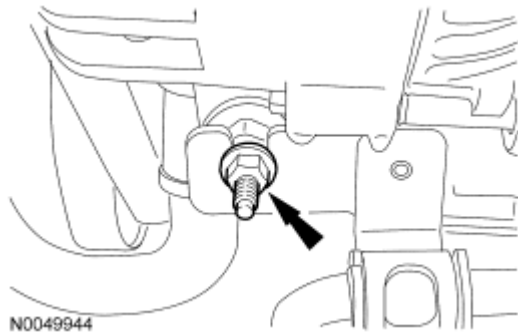


Fig. 352: Locating Power Steering Tube Bracket Nut
Courtesy of FORD MOTOR CO.

19. Remove the power steering tube bracket bolt.

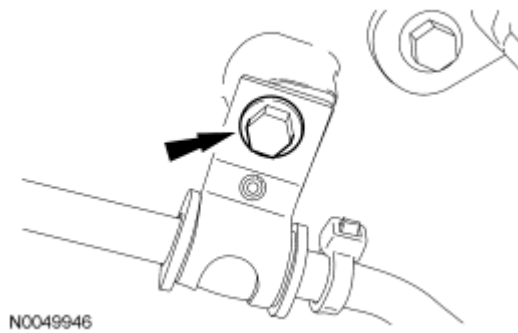


Fig. 353: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

20. Remove the 2 power steering reservoir bracket bolts.

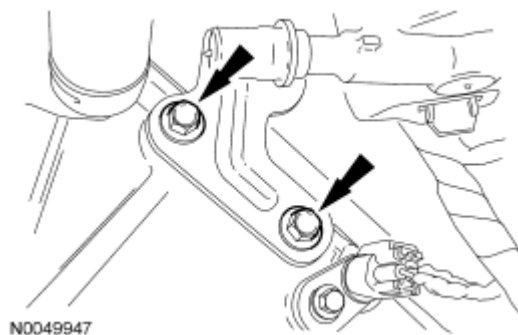


Fig. 354: Locating Power Steering Reservoir Bracket Bolts
Courtesy of FORD MOTOR CO.

21. Remove the 3 bolts and the power steering pump and reservoir assembly.

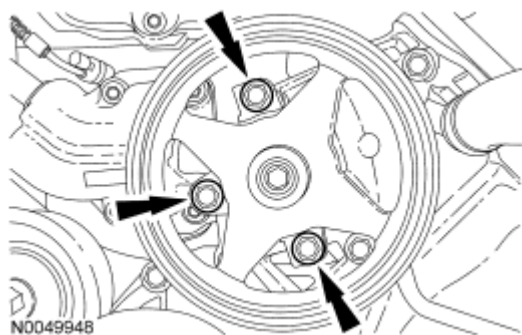


Fig. 355: Locating Power Steering Pump & Reservoir Assembly Bolts
Courtesy of FORD MOTOR CO.

22. Disconnect the generator electrical connector.

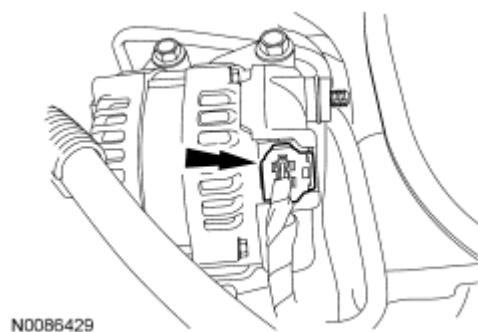
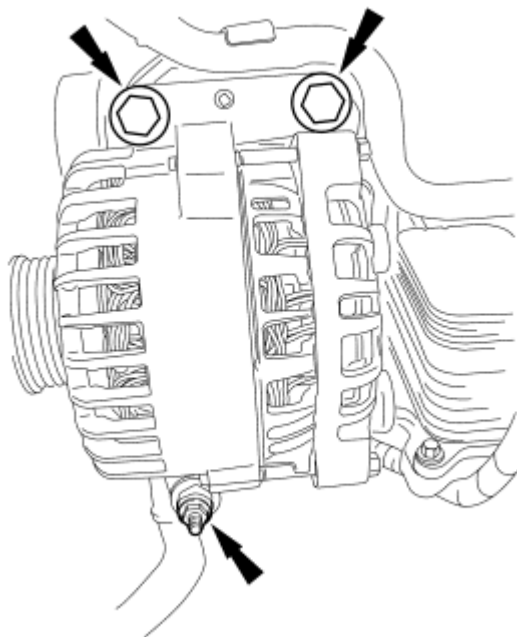


Fig. 356: Locating Generator Electrical Connector
Courtesy of FORD MOTOR CO.

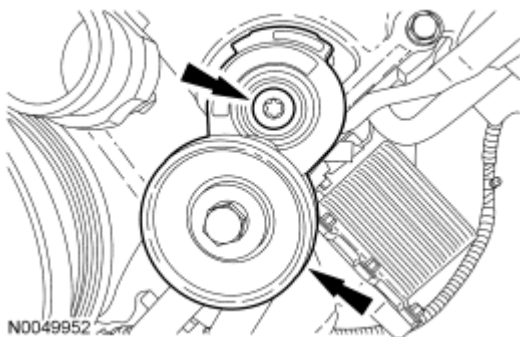
23. Remove the stud bolt, 2 bolts and the generator.



N0049951

Fig. 357: Locating Stud Bolt, Bolts & Alternator
Courtesy of FORD MOTOR CO.

24. Remove the bolt and the accessory drive belt tensioner.



N0049952

Fig. 358: Locating Accessory Drive Belt Tensioner Bolt
Courtesy of FORD MOTOR CO.

25. Remove the stud bolt and the accessory drive belt idler pulley (smooth).

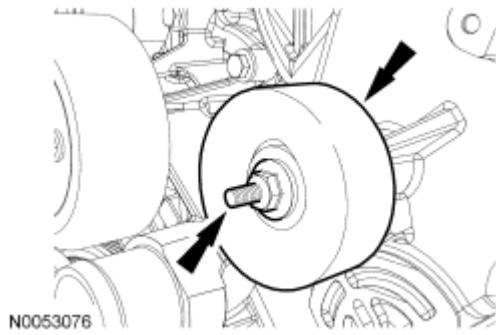


Fig. 359: Locating Stud Bolt & Accessory Drive Belt Idler Pulley
Courtesy of FORD MOTOR CO.

26. Remove the bolt and the accessory drive belt idler pulley (grooved).

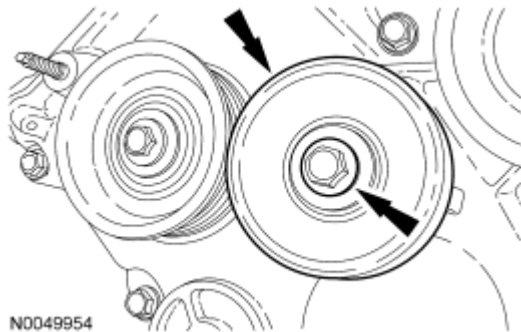


Fig. 360: Locating Accessory Drive Belt Idler Pulley Bolt
Courtesy of FORD MOTOR CO.

27. Remove the 4 bolts and the coolant pump pulley.

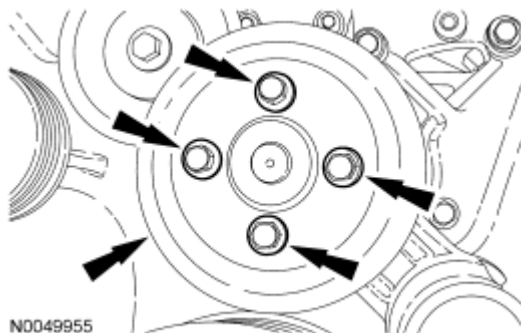


Fig. 361: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

28. Remove the 3 bolts and the 3 SC drive belt idler pulleys.

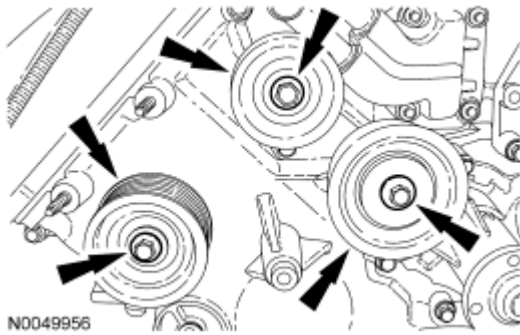


Fig. 362: Locating SC Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

29. Disconnect the 2 EGR tube fittings.
- Remove the EGR tube.

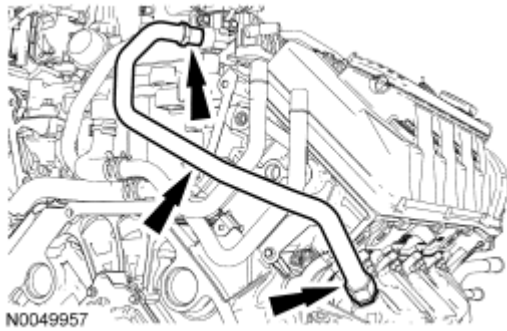


Fig. 363: Locating Exhaust Gas Recirculation (EGR) Tube Fittings
Courtesy of FORD MOTOR CO.

30. Disconnect and remove the crankcase ventilation tube.

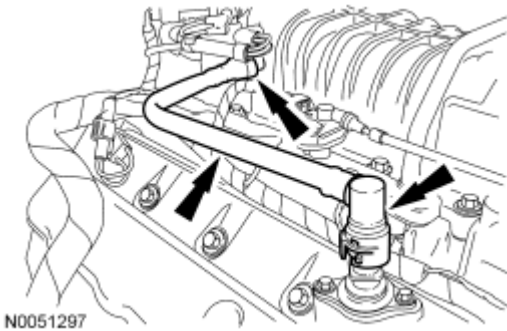


Fig. 364: Locating Crankcase Ventilation Tube
Courtesy of FORD MOTOR CO.

31. Disconnect the Throttle Position (TP) sensor electrical connector.

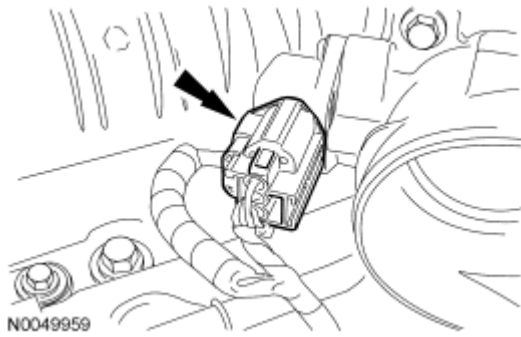


Fig. 365: Locating Throttle Position (TP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

32. Disconnect the electronic throttle control electrical connector.

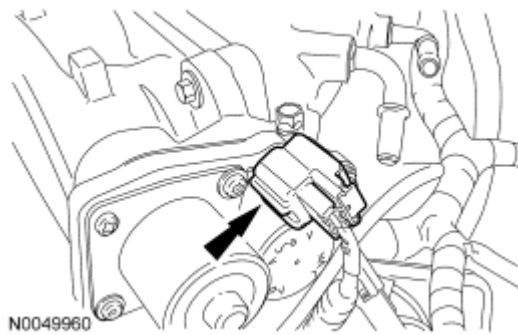


Fig. 366: Locating Throttle Body (TB) Control Electrical Connector
Courtesy of FORD MOTOR CO.

33. Remove the 4 bolts and the TB and spacer assembly.

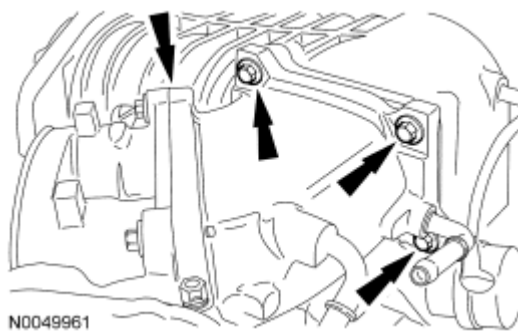


Fig. 367: Locating TB & Spacer Assembly Bolts
Courtesy of FORD MOTOR CO.

34. Disconnect the Cylinder Head Temperature (CHT) sensor electrical connector.

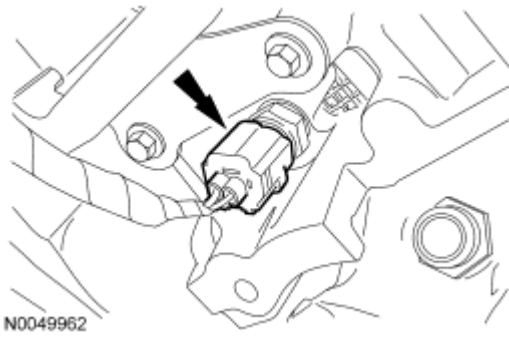


Fig. 368: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

35. Detach the 2 wiring harness pin-type retainers (1 shown) from the coolant tube assembly bracket.

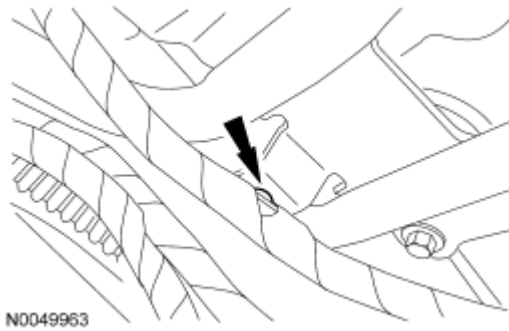


Fig. 369: Detaching Wiring Harness Pin-Type Retainer From Coolant Tube Assembly Bracket
Courtesy of FORD MOTOR CO.

36. Disconnect the LH Heated Oxygen Sensor (HO2S) electrical connector and pin-type retainer.

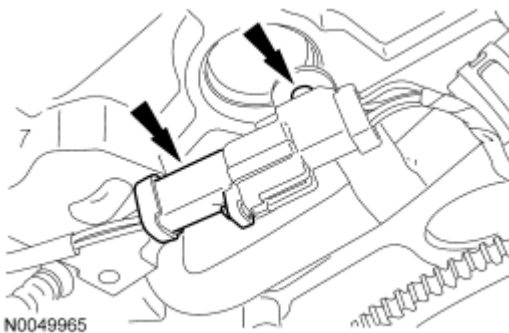


Fig. 370: Locating LH Heated Oxygen Sensor (HO2S) Electrical Connector & Pin-Type Retainer
Courtesy of FORD MOTOR CO.

37. Disconnect the bubbler tube from the SC.

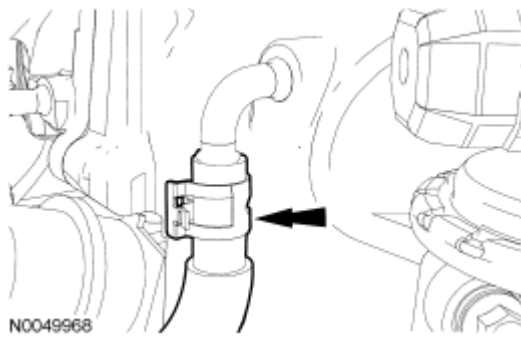


Fig. 371: Disconnecting Bubbler Tube From SC
Courtesy of FORD MOTOR CO.

38. Remove the 2 bolts and the wiring harness retaining bracket.

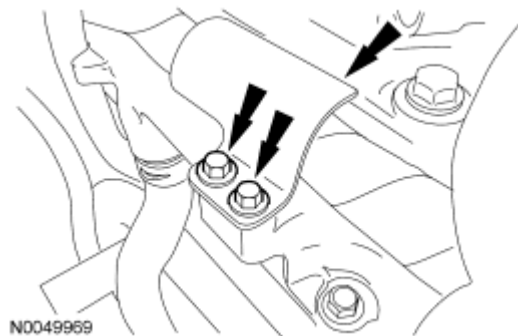


Fig. 372: Locating Wiring Harness Retaining Bracket & Bolts
Courtesy of FORD MOTOR CO.

39. Detach the 2 wiring harness pin-type retainers.

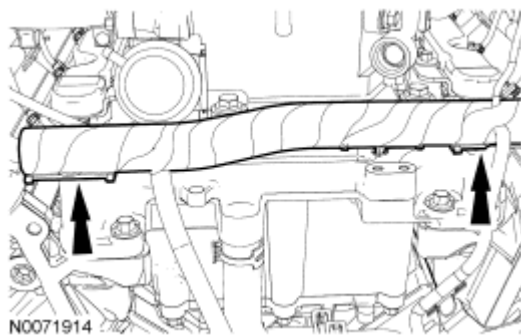


Fig. 373: Locating Wiring Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

40. Disconnect the PCV valve electrical connector.

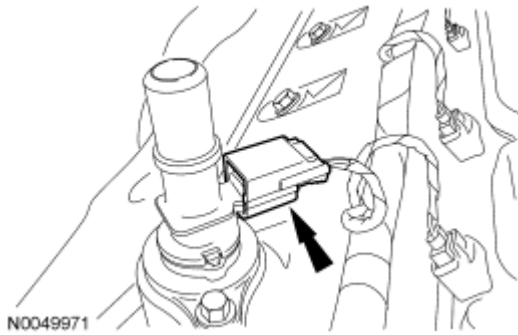


Fig. 374: Locating Positive Crankcase Ventilation (PCV) Valve Electrical Connector
Courtesy of FORD MOTOR CO.

41. Disconnect the 4 RH fuel injector electrical connectors.

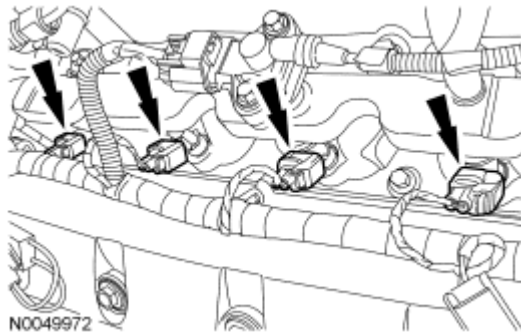


Fig. 375: Locating RH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

42. Disconnect the fuel rail pressure and temperature sensor electrical connector.

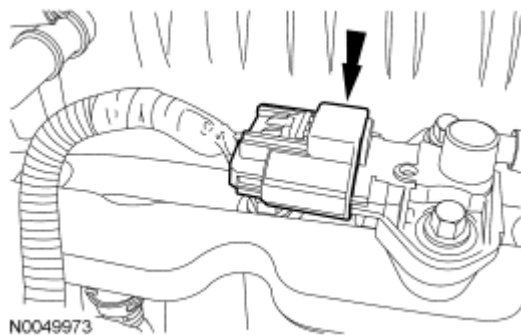


Fig. 376: Locating Fuel Rail Pressure & Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

43. Remove the nut and the RH radio interference capacitor.

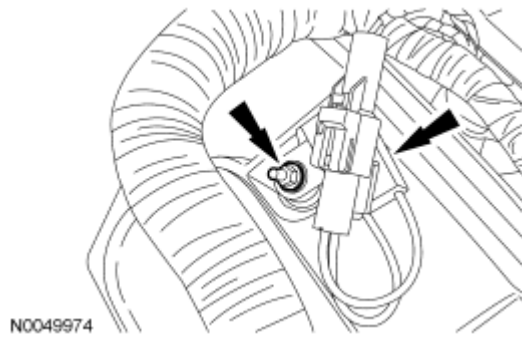


Fig. 377: Removing Nut & RH Radio Interference Capacitor
Courtesy of FORD MOTOR CO.

44. Disconnect the EGR valve electrical connector.

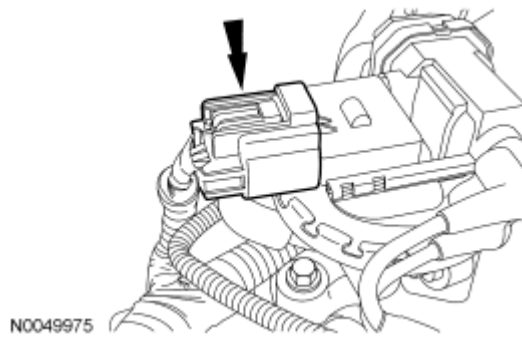


Fig. 378: Disconnecting EGR Valve Electrical Connector
Courtesy of FORD MOTOR CO.

45. Detach the wiring harness from the RH coil-on-plug cover stud bolt.

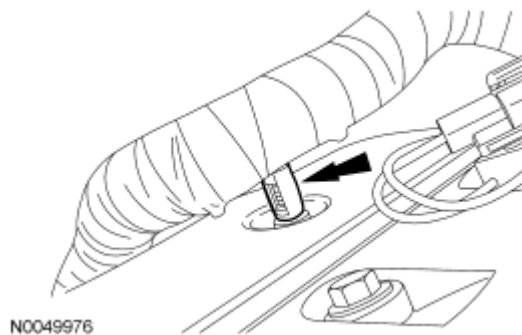


Fig. 379: Detaching Wiring Harness From RH Coil-On-Plug Cover Stud Bolt
Courtesy of FORD MOTOR CO.

46. Detach the wiring harness retainers from the RH valve cover stud bolts.

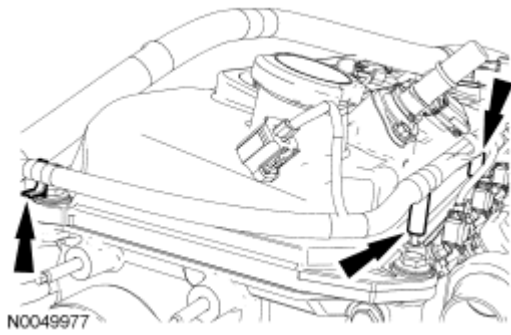


Fig. 380: Detaching Wiring Harness Retainers From RH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

47. Remove the bolt, stud bolt and the RH coil-on-plug cover.

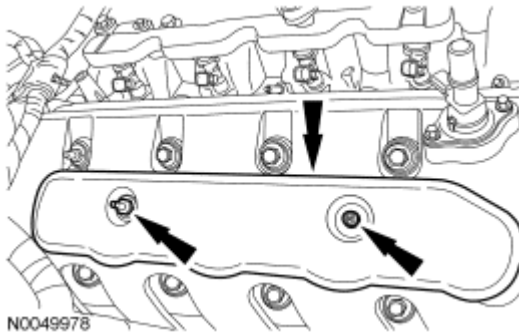


Fig. 381: Locating RH Coil-On-Plug Cover Bolt & Stud Bolt
Courtesy of FORD MOTOR CO.

48. Disconnect the 4 RH coil-on-plug electrical connectors.
 - Remove the 4 RH coil-on-plugs.

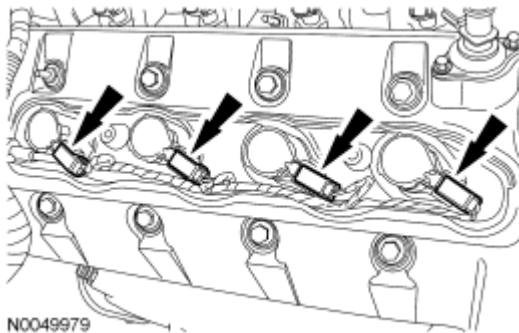


Fig. 382: Locating RH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

49. Disconnect the Engine Oil Pressure (EOP) switch electrical connector and the 2 wiring harness pin-type retainers.

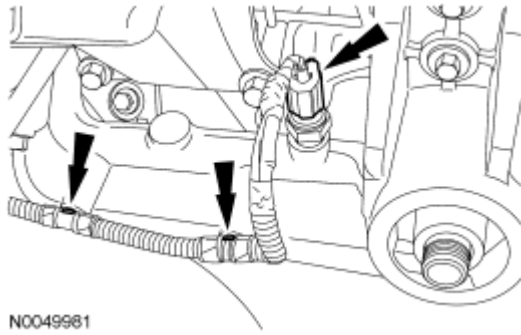


Fig. 383: Locating Engine Oil Pressure (EOP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

50. Disconnect the Camshaft Position (CMP) sensor electrical connector.

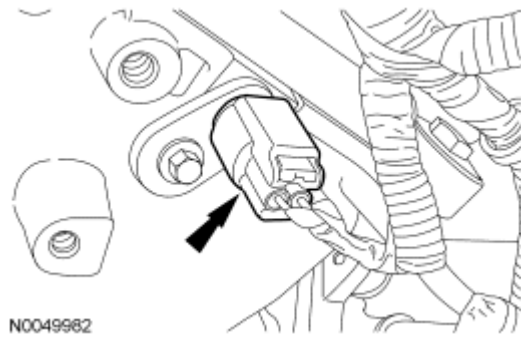


Fig. 384: Locating Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

51. Disconnect the Intake Air Temperature 2 (IAT2) sensor electrical connector.

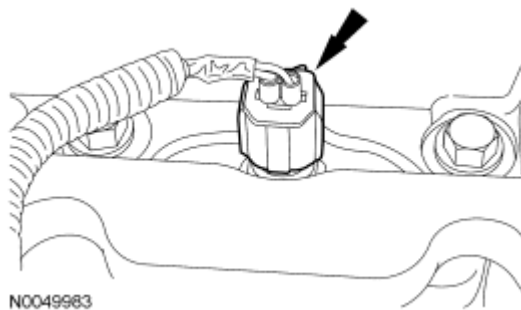


Fig. 385: Locating Intake Air Temperature (IAT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

52. Disconnect the 4 LH fuel injector electrical connectors.

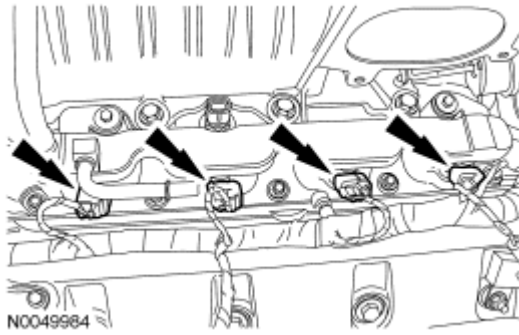


Fig. 386: Locating LH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

53. Remove the nut and the LH radio interference capacitor.

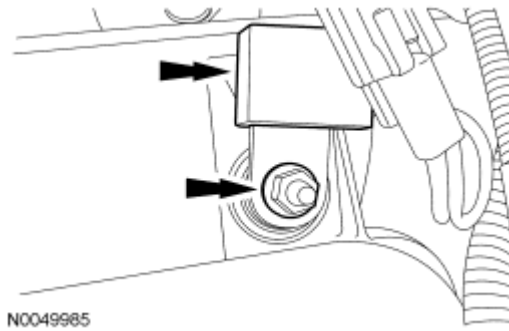


Fig. 387: Locating LH Radio Interference Capacitor Nut
Courtesy of FORD MOTOR CO.

54. Detach the wiring harness retainers from the LH valve cover stud bolts.

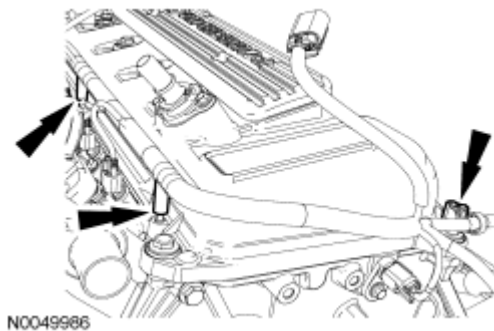
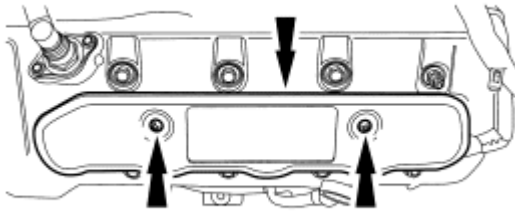


Fig. 388: Detaching Wiring Harness Retainers From LH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

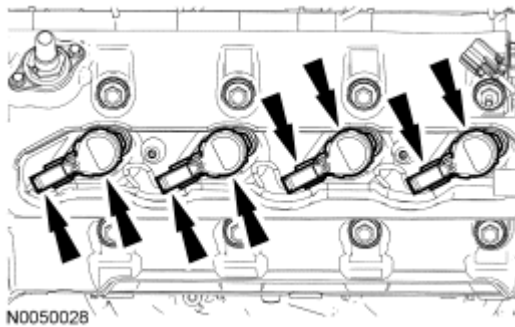
55. Remove the 2 bolts and the LH coil-on-plug cover.



N0050027

Fig. 389: Locating LH Coil-On-Plug Cover Bolts
Courtesy of FORD MOTOR CO.

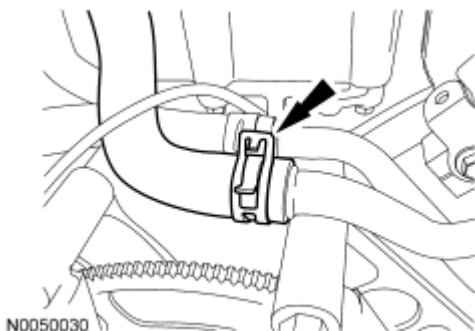
56. Disconnect the 4 LH coil-on-plug electrical connectors.
 - Remove the 4 LH coil-on-plugs.



N0050028

Fig. 390: Disconnecting LH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

57. Remove the wiring harness assembly from the engine.
58. Disconnect the intake manifold-to-coolant tube assembly hose.



N0050030

Fig. 391: Disconnecting Intake Manifold-To-Coolant Tube Assembly Hose
Courtesy of FORD MOTOR CO.

59. Remove the 14 bolts and the intake manifold assembly.
 - Remove and discard the 2 intake manifold gaskets.

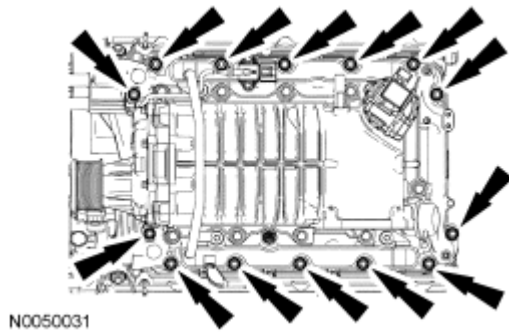


Fig. 392: Locating Intake Manifold Assembly & Bolts
Courtesy of FORD MOTOR CO.

60. Remove the stud bolt, 3 bolts and the RH engine support insulator bracket.

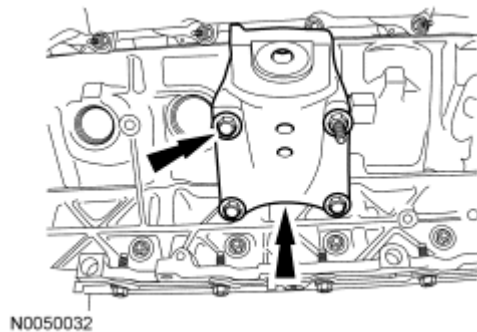


Fig. 393: Locating RH Engine Support Insulator Bracket Bolts & Stud Bolt
Courtesy of FORD MOTOR CO.

61. Remove 8 nuts and the RH exhaust manifold.
- Discard the nuts and gaskets.

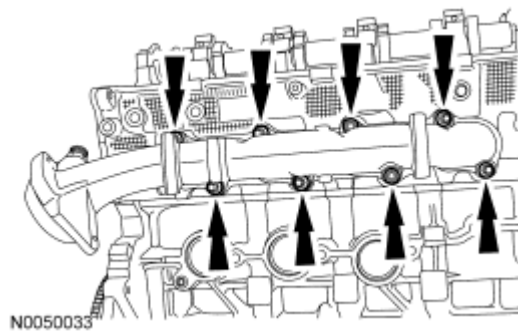


Fig. 394: Identifying RH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

62. Clean and inspect the RH exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
63. Remove and discard the 8 RH exhaust manifold studs.

64. Remove the 4 bolts and the LH engine support insulator bracket.

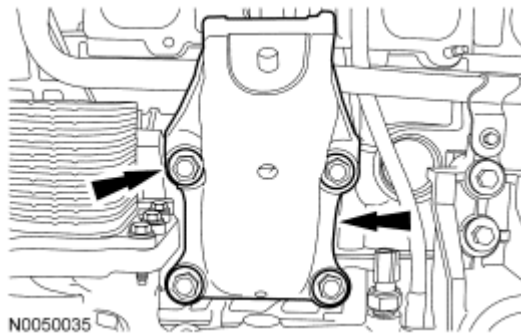


Fig. 395: Identifying LH Engine Support Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

65. Remove 8 nuts and the LH exhaust manifold.
- Discard the nuts and gaskets.

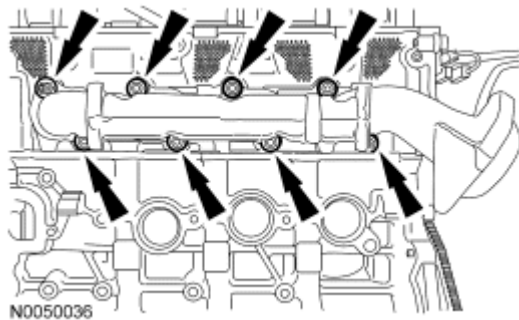


Fig. 396: Identifying LH Exhaust Manifold Nuts
Courtesy of FORD MOTOR CO.

66. Clean and inspect the LH exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.
67. Remove and discard the 8 LH exhaust manifold studs.
68. Remove the 3 coolant tube assembly bolts.

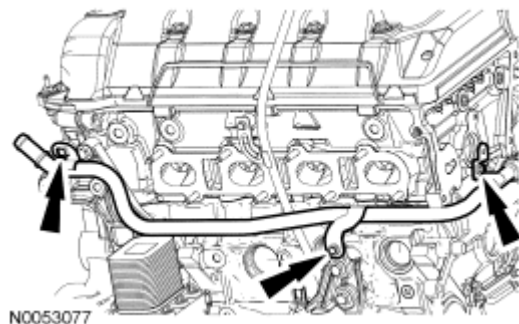


Fig. 397: Identifying Coolant Tube Assembly Bolts

Courtesy of FORD MOTOR CO.

69. Remove the oil level indicator, the bolt and the oil level indicator tube.
- Remove and discard the oil level indicator tube O-ring seal.

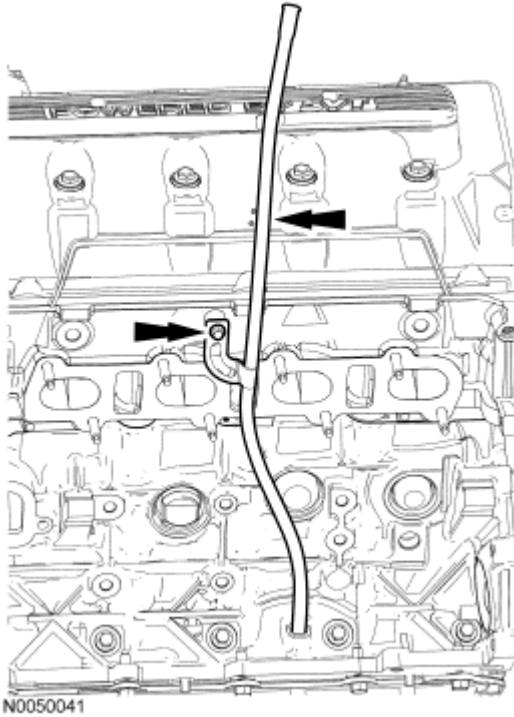


Fig. 398: Identifying Oil Level Indicator Tube & Bolt
Courtesy of FORD MOTOR CO.

70. Remove the 3 bolts and the coolant tube assembly.

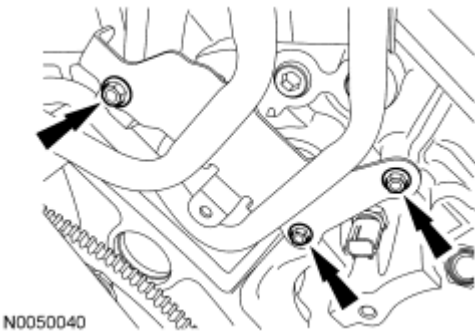


Fig. 399: Identifying Coolant Tube Assembly Bolts
Courtesy of FORD MOTOR CO.

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

71. Remove the 6 bolts and the oil cooler.
- Discard the oil cooler and the gaskets.

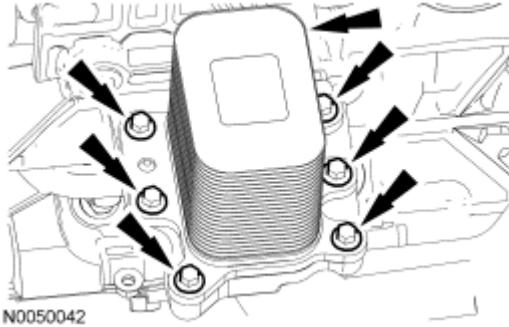


Fig. 400: Identifying Oil Cooler Bolts
Courtesy of FORD MOTOR CO.

72. Remove the 8 bolts and the oil filter adapter.
- Discard the oil filter adapter gasket.

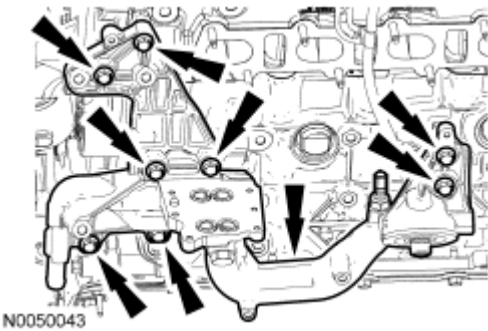


Fig. 401: Identifying Oil Filter Adapter Bolts
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

73. Remove the LH and RH block drain plugs.

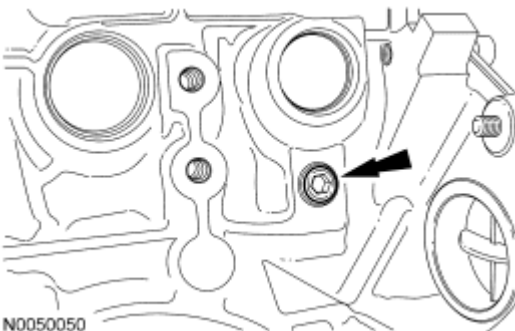
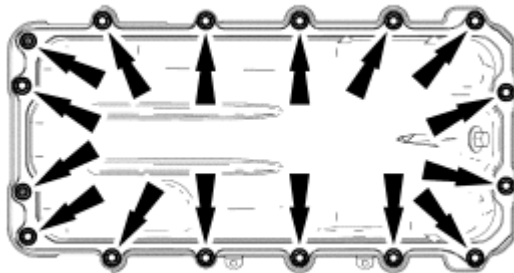


Fig. 402: Locating LH & RH Block Drain Plugs

Courtesy of FORD MOTOR CO.

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

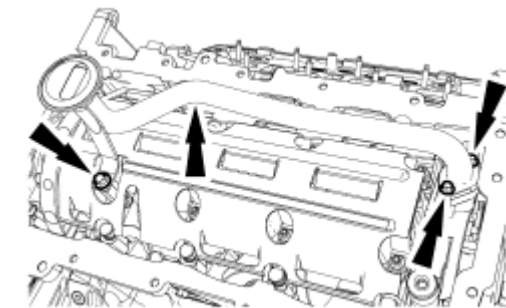
74. Remove the 14 bolts, 2 stud bolts and the oil pan.
 - Remove and discard the oil pan gasket.
 - Clean the mating surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
 - Inspect the mating surfaces.



N0050044

Fig. 403: Inspecting Mating Surfaces
Courtesy of FORD MOTOR CO.

75. Remove the 3 bolts and the oil pump screen and pickup tube assembly.
 - Discard the O-ring seal.



N0050045

Fig. 404: Identifying Bolts, Oil Pump Screen & Pickup Tube Assembly
Courtesy of FORD MOTOR CO.

76. Remove the spacer, 7 nuts and the windage tray.

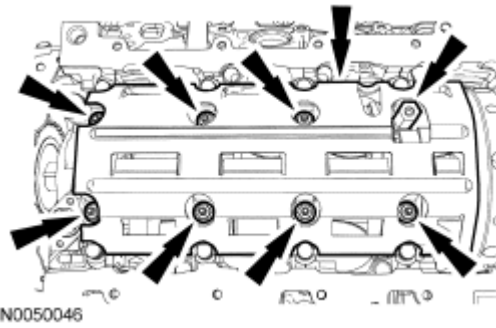


Fig. 405: Identifying Windage Tray Spacer & Nuts
Courtesy of FORD MOTOR CO.

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

77. Remove the bolts, stud bolts and RH valve cover.

- Remove and discard the gaskets.
- Clean the mating surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the mating surfaces.

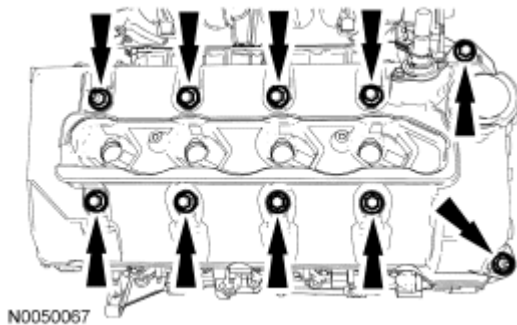


Fig. 406: Identifying RH Valve Cover Bolts & Stud Bolts
Courtesy of FORD MOTOR CO.

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

78. Remove the bolts, stud bolts and LH valve cover.

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

- Inspect the mating surfaces.

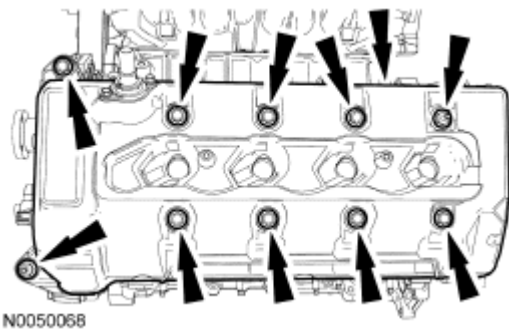


Fig. 407: Locating Valve Covers Bolts
Courtesy of FORD MOTOR CO.

79. Remove the bolt and the Crankshaft Position (CKP) sensor.

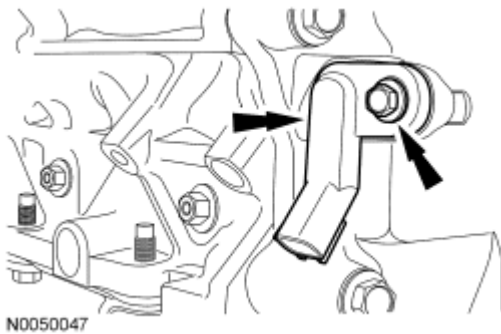


Fig. 408: Locating Crankshaft Position (CKP) Sensor Bolt
Courtesy of FORD MOTOR CO.

80. Remove the bolt and the CMP sensor.

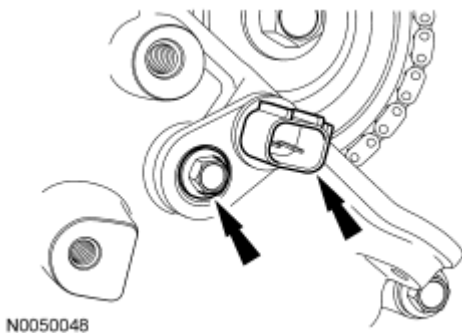


Fig. 409: Locating CMP Sensor Bolt
Courtesy of FORD MOTOR CO.

81. Remove the 4 bolts and the coolant pump.

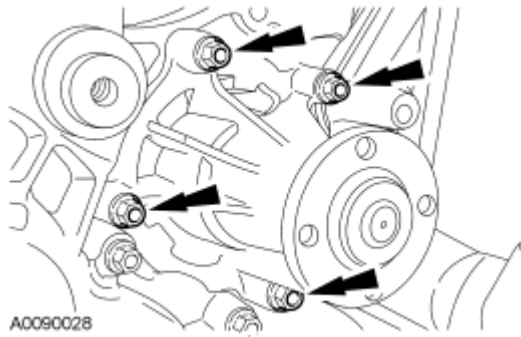


Fig. 410: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

82. Using the Strap Wrench, remove the crankshaft pulley bolt and the washer.
- Discard the bolt.

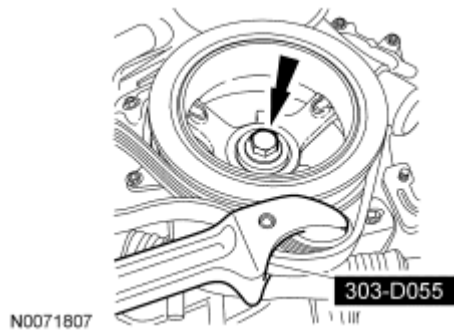


Fig. 411: Removing Crankshaft Pulley Bolt & Washer Using Strap Wrench
Courtesy of FORD MOTOR CO.

83. Using the 3-Jaw Puller, remove the crankshaft pulley.

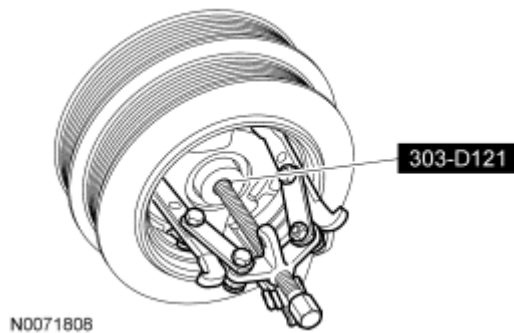


Fig. 412: Removing Crankshaft Pulley Using 3-Jaw Puller
Courtesy of FORD MOTOR CO.

84. Using the Crankshaft Front Oil Seal Remover, remove the crankshaft front seal.

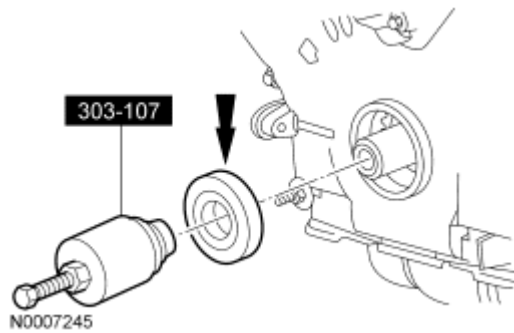


Fig. 413: Removing Crankshaft Front Seal Using Special Tool
Courtesy of FORD MOTOR CO.

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

85. Remove the 16 bolts and the engine front cover.

- Remove and discard the engine front cover gaskets.
- Clean the mating surfaces with silicone gasket remover and metal surface prep. Follow the directions on the packaging.
- Inspect the mating surfaces.

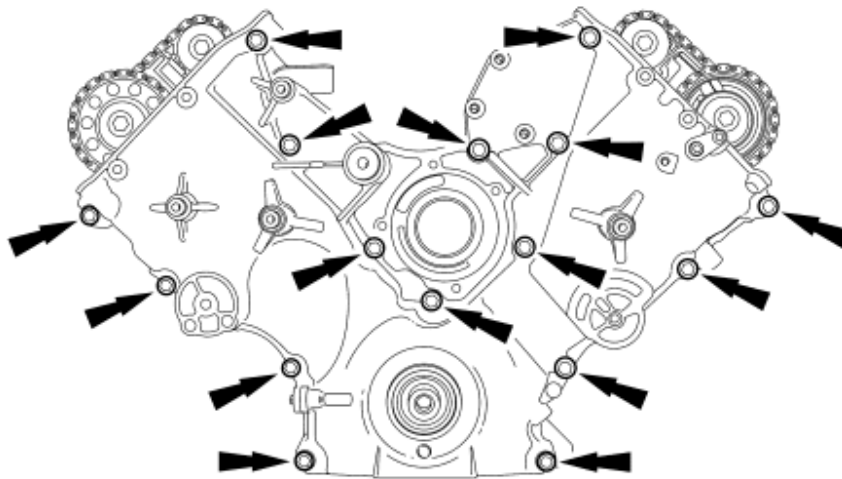


Fig. 414: Inspecting Mating Surfaces
Courtesy of FORD MOTOR CO.

NOTE: Only use hand tools when removing or installing the spark plugs, or damage may occur to the cylinder head or spark plugs.

NOTE: Use compressed air to remove any foreign material in the spark plug well

before removing the spark plugs.

NOTE: RH shown, LH similar.

86. Remove the 8 spark plugs.

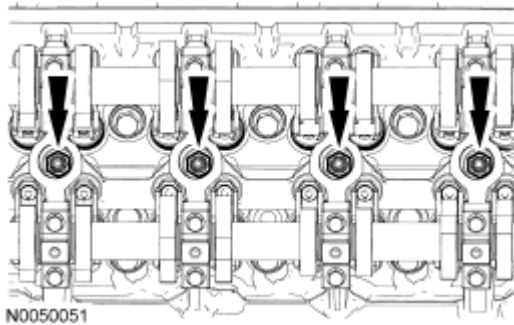


Fig. 415: Identifying Spark Plugs
Courtesy of FORD MOTOR CO.

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

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

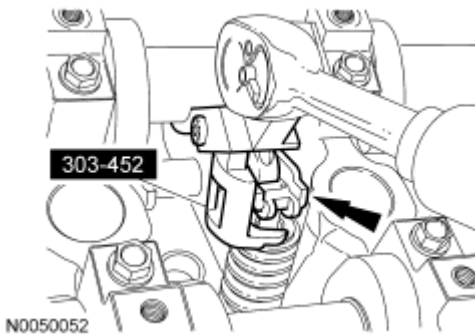


Fig. 416: Compressing Valve Spring & Removing Valve Spring Retainer Keys Using Special Tool (303-452)
Courtesy of FORD MOTOR CO.

88. Repeat the previous step to remove each of the roller followers. Inspect the roller followers. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.

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

damage.

89. Remove the hydraulic lash adjusters.

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

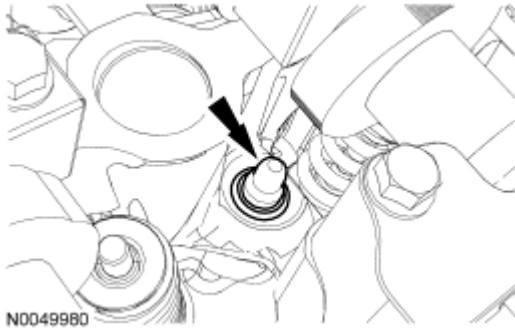


Fig. 417: Identifying Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

90. Remove the crankshaft sensor ring.

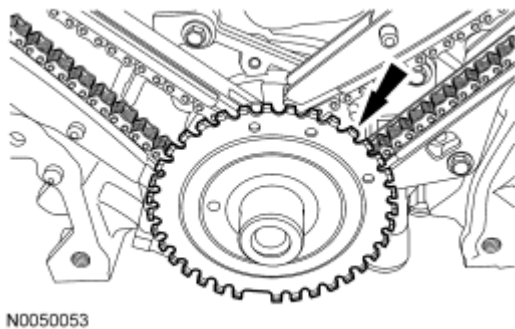


Fig. 418: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

91. Remove the crankshaft washer.

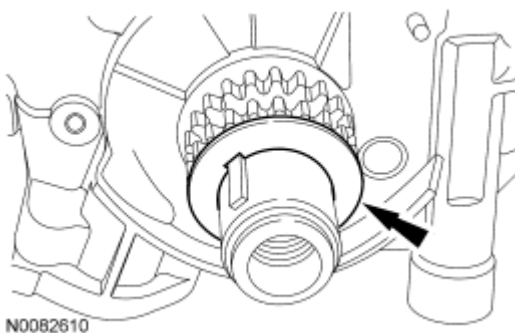


Fig. 419: Locating Crankshaft Washer

Courtesy of FORD MOTOR CO.

92. Remove the 2 bolts and the RH primary timing chain tensioner.

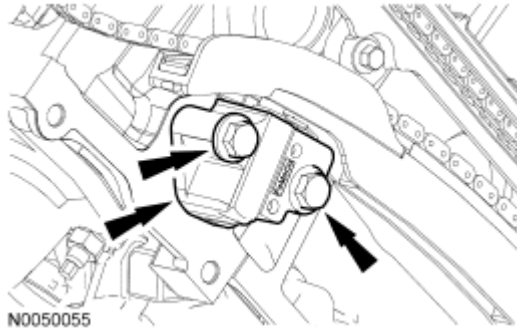


Fig. 420: Locating RH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

93. Remove the RH primary timing chain tensioner arm.

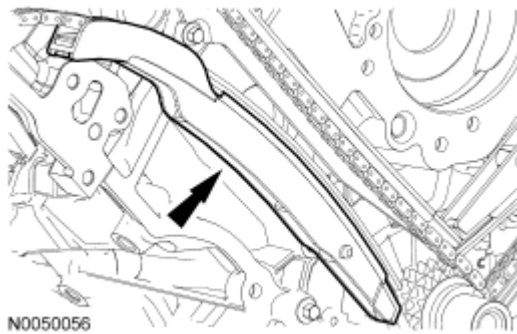


Fig. 421: Locating RH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

94. Remove the RH primary timing chain.

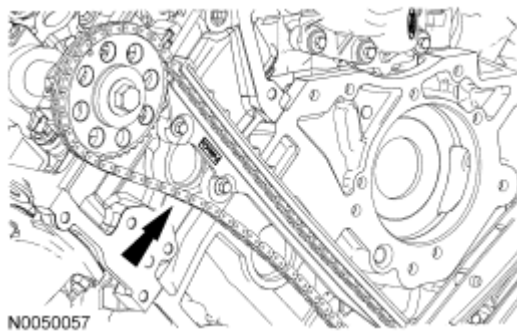


Fig. 422: Identifying RH Primary Timing Chain
Courtesy of FORD MOTOR CO.

95. Remove the 2 bolts and the RH primary timing chain guide.

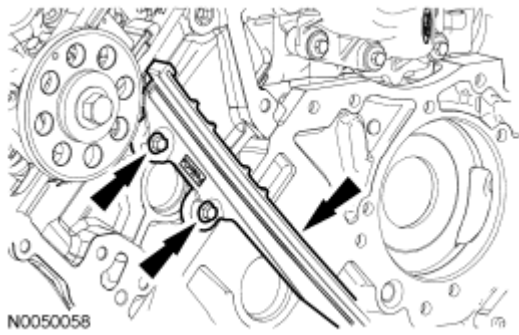


Fig. 423: Locating RH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

96. Remove the 2 bolts and the LH primary timing chain tensioner.

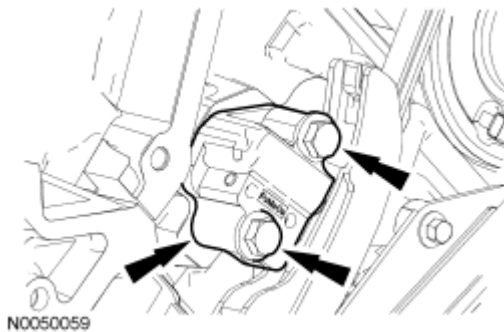


Fig. 424: Locating LH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

97. Remove the LH primary timing chain tensioner arm.

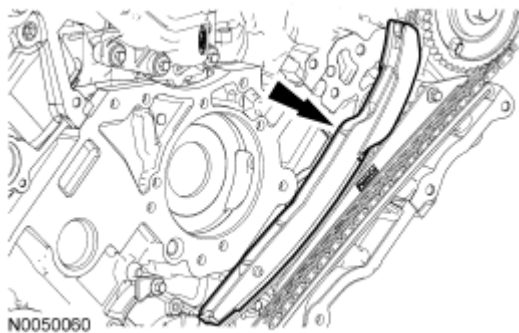


Fig. 425: Locating LH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

98. Remove the LH primary timing chain.

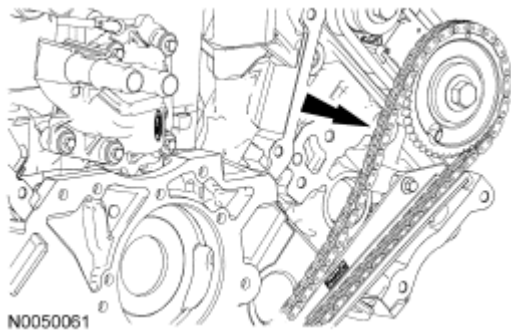


Fig. 426: Locating LH Primary Timing Chain
Courtesy of FORD MOTOR CO.

99. Remove the 2 bolts and the LH primary timing chain guide.

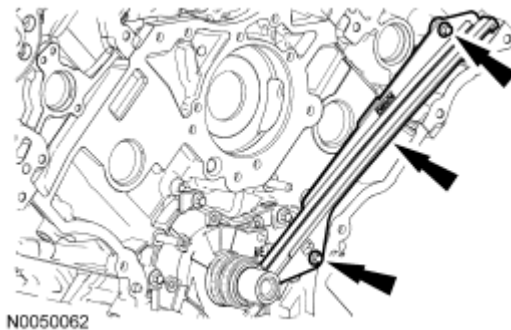


Fig. 427: Locating LH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

100. Remove the crankshaft sprocket.

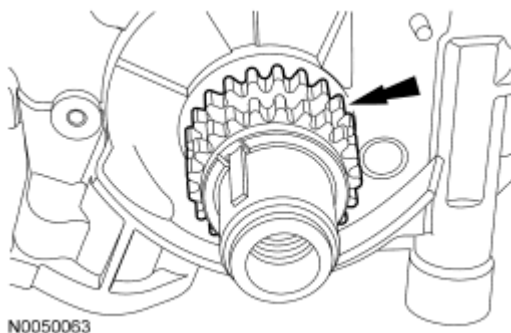


Fig. 428: Locating Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

101. Remove the 3 bolts and the oil pump.

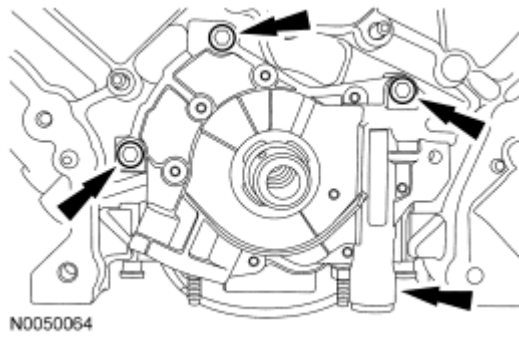


Fig. 429: Identifying Oil Pump & Bolts
Courtesy of FORD MOTOR CO.

- NOTE:** The cylinder head must be cool before removing it from the engine. Cylinder head warpage can result if a warm or hot cylinder head is removed.
- NOTE:** Place clean shop towels over exposed engine cavities. Carefully remove the towels so foreign material is not dropped into the engine.
- NOTE:** The cylinder head bolts must be discarded and new bolts must be installed. They are a tighten-to-yield design and cannot be reused.
- NOTE:** Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges that make leak paths. Use a plastic scraping tool to remove all traces of the head gasket.
- NOTE:** Aluminum surfaces are soft and can be scratched easily. Never place the cylinder head gasket surface, unprotected, on a bench surface.
- NOTE:** LH shown, RH similar.

102. Remove the bolts, the RH cylinder head and the LH cylinder head.

- Discard the bolts.
- Remove and discard the cylinder head gaskets.

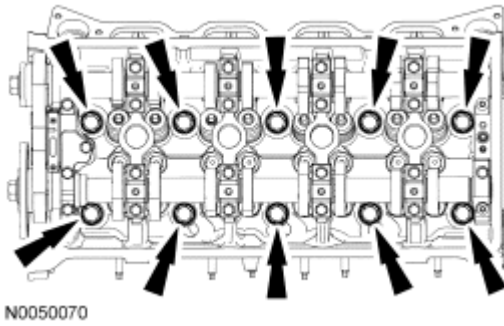


Fig. 430: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

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

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

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

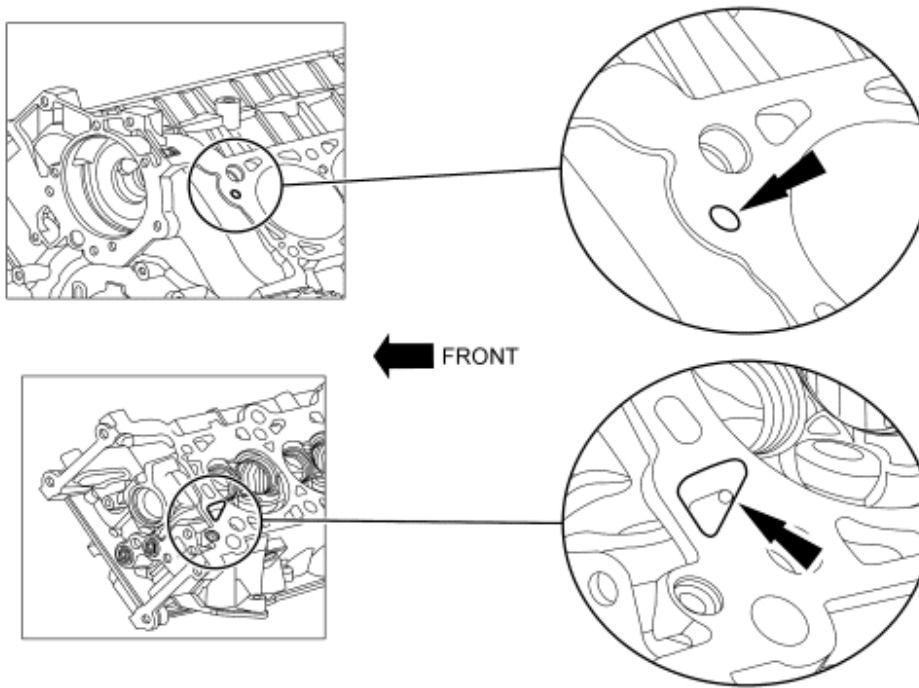
103. Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block in the following sequence.
1. Remove any large deposits of silicone or gasket material with a plastic scraper.
 2. Apply silicone gasket remover, following package directions and allow to set for several minutes.
 3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
 4. Apply metal surface prep, following package directions, to remove any remaining traces of oil or coolant and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.

NOTE: Make sure all cylinder head surfaces are clear of any gasket material, RTV, oil and coolant. The cylinder head surface must be clean and dry before running a flatness check.

NOTE: Use a straightedge that is calibrated by the manufacturer to be flat within 0.005 mm (0.0002 in) per running foot length. For example, if the straightedge is 61 cm (24 in) long, the machine edge must be flat within 0.010 mm (0.0004 in) from end to end.

NOTE: LH shown, RH similar.

104. Support the cylinder heads on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion, paying particular attention to the oil pressure feed area. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.



A0079634

Fig. 431: Identifying Cylinder Head/Cylinder Block Oil Pressure Feed Areas
Courtesy of FORD MOTOR CO.

105. Before removing the pistons, inspect the top of the cylinder bores. If necessary, remove the ridge or carbon deposits from each cylinder using an abrasive pad or equivalent, following manufacturer's instructions.

NOTE: Verify that the connecting rods and rod caps have orientation numbers cast into them. If not, number the connecting rods and rod caps for correct orientation

106. Remove the bolts and the connecting rod caps for pistons No. 1 and No. 6.
- Carefully tap the connecting rod bolts out of the connecting rod caps. Avoid damaging the rod caps.

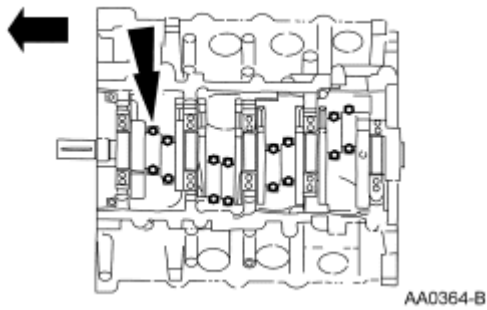


Fig. 432: Identifying Rod Caps & Rod Bolts
Courtesy of FORD MOTOR CO.

NOTE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod.

107. Using the Connecting Rod Installer, push pistons 1 through 6 through the top of the cylinder block.

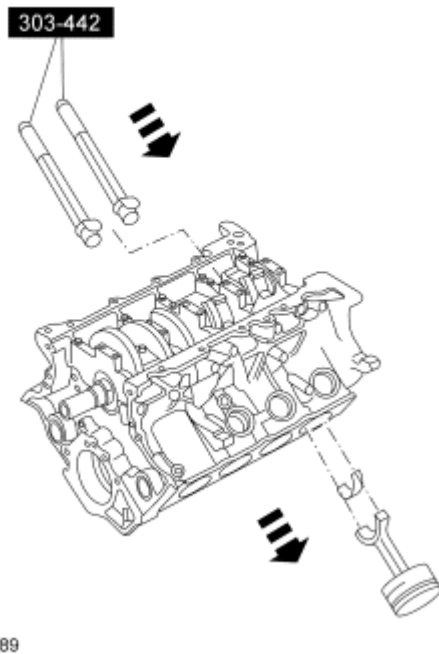
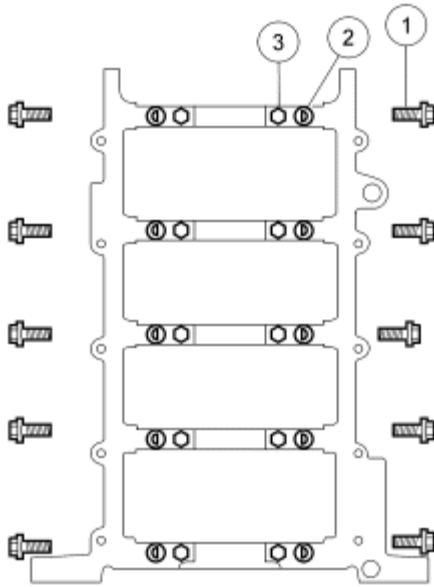


Fig. 433: Pushing Piston Through Top Of Cylinder Block
Courtesy of FORD MOTOR CO.

108. To remove pistons 2, 3, 4, 5, 7 and 8, turn the crankshaft 90 degrees and repeat the previous steps.

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

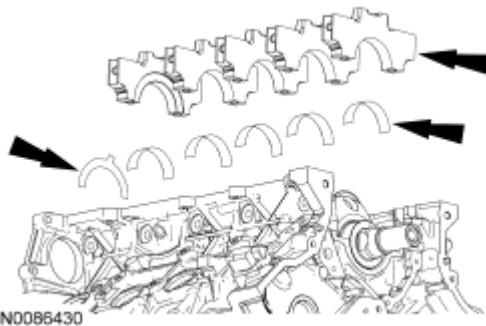
109. Remove the crankshaft main bearing cap fasteners.
1. Remove and discard the side bolts.
 2. Remove and discard the main bearing cap bolts.
 3. Remove the dowel pins.



N0050071

Fig. 434: Locating Main Bearing Cap Bolts
Courtesy of FORD MOTOR CO.

110. Remove the main bearing caps, the lower crankshaft main bearings and the lower thrust washer.



N0086430

Fig. 435: Identifying Main Bearing Caps, Lower Crankshaft Main Bearings & Lower Thrust Washer
Courtesy of FORD MOTOR CO.

111. Remove the crankshaft, the upper crankshaft main bearings and the upper thrust washers from the cylinder block.

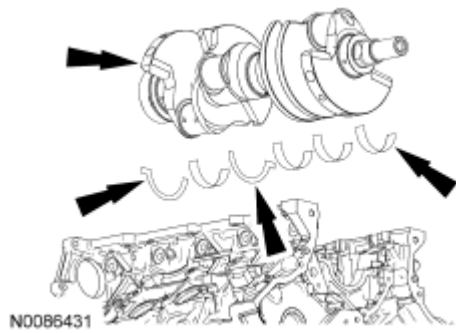


Fig. 436: Identifying Crankshaft, Upper Crankshaft Main Bearings & Upper Thrust Washers
Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

INTAKE MANIFOLD ASSEMBLY

Material

Item	Specification
Motorcraft Premium Gold Engine Coolant with Bittering Agent (bittered in US only) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B
Threadlock and Sealer TA-25	WSK-M2G351-A5

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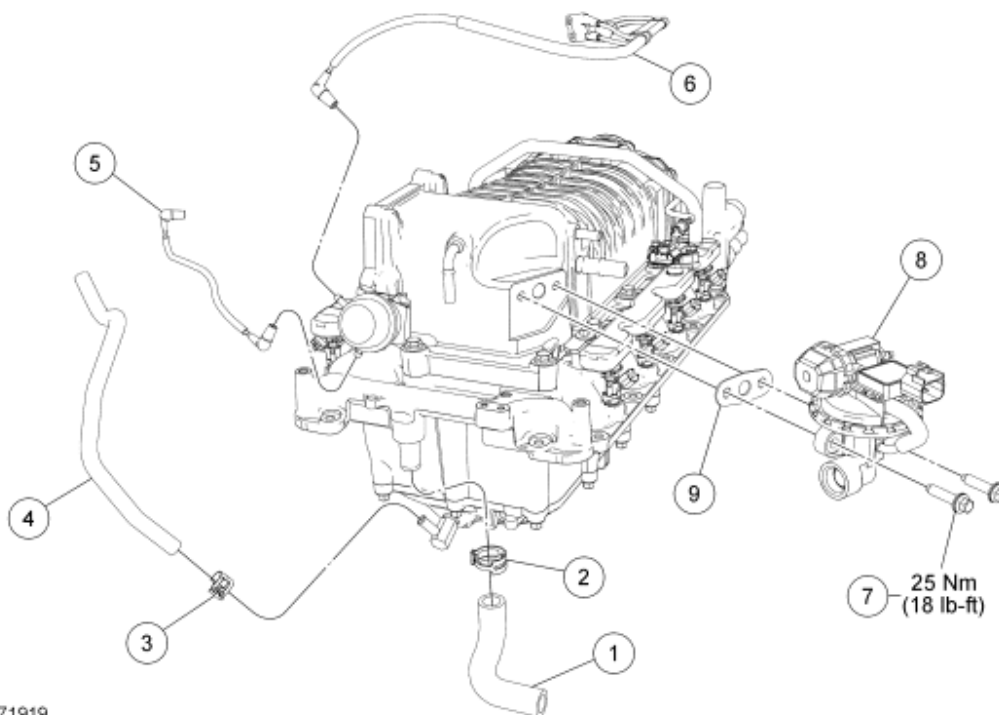


Fig. 437: Exploded View Of Intake Manifold Assembly With Torque Specification (1 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	18C553	Heater hose
2	-	Heater hose clamp (part of 18C553)
3	W527352	Supercharger (SC) bubbler hose clamp
4	6C324	SC bubbler hose
5	9E498	Lower SC bypass actuator vacuum tube
6	9E498	Upper SCSC bypass actuator vacuum tube
7	W701232	EGR system module bolt (2 required)
8	9Y456	EGR system module
9	9D476	EGR system module gasket

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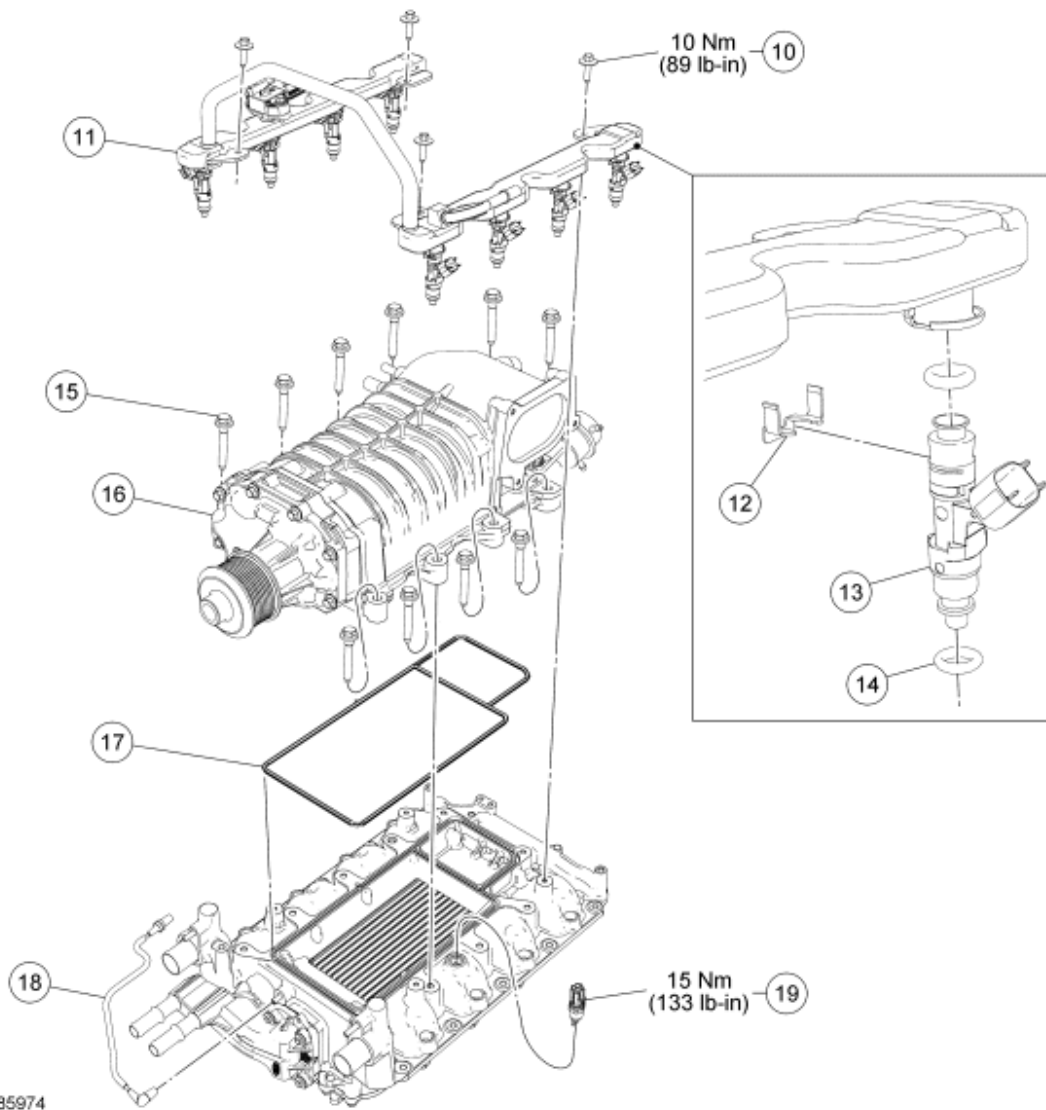


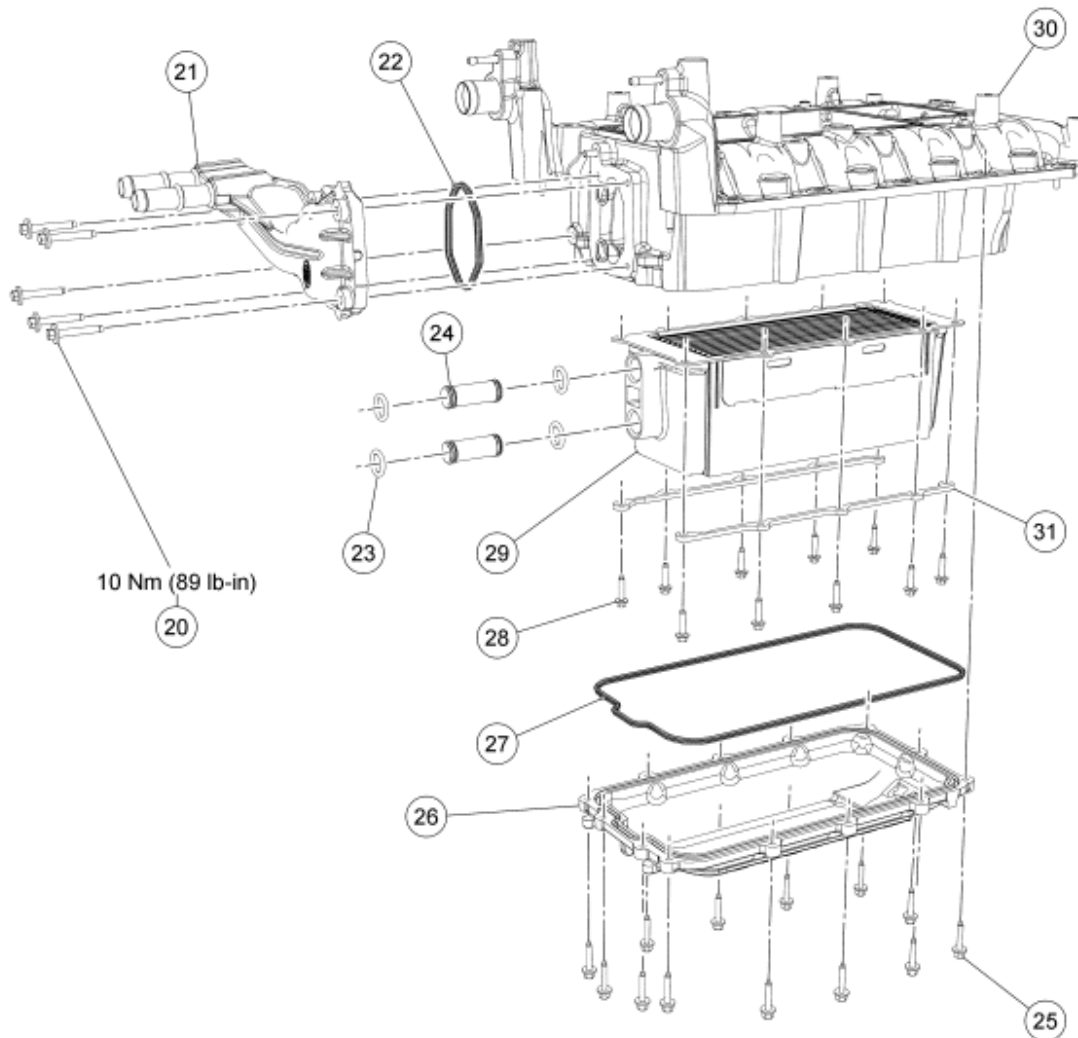
Fig. 438: Exploded View Of Intake Manifold Assembly With Torque Specification (2 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
10	N804394	Fuel rail bolt (4 required)
11	9F792	Fuel rail
12	9F907	Fuel injector clip (8 required)
13	9F593	Fuel injector (8 required)
14	9229	Fuel injector O-ring (16 required)
15	N806177	SC bolt (10 required)
16	6F066	SC
17	9H486	SC gasket
18	9E498	Fuel rail and pressure and temperature sensor vacuum tube

19

12A697

Intake Air Temperature 2 (IAT2) sensor



N0076038

Fig. 439: Exploded View Of Intake Manifold Assembly With Torque Specifications (3 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
20	N807071	Charge Air Cooler (CAC) coolant tube assembly bolt (5 required)
21	9N491	CAC coolant tube assembly
22	9L438	CAC coolant tube assembly gasket
23	N802927	CAC tube O-ring seal (4 required)
24	9L442	CAC coolant connector tube (2 required)
25	W704682	Lower intake manifold cover bolt (13 required)
26	9S455	Lower intake manifold cover

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27	9E436	Lower intake manifold cover gasket
28	N605893	CAC bolt (10 required)
29	6K775	CAC
30	9424	Upper intake manifold
31	6K808	CAC rail support (2 required)

DISASSEMBLY

1. Remove the heater hose.
2. Remove the Supercharger (SC) bubbler hose.
3. Remove the upper and lower SC bypass actuator vacuum tubes.
4. Remove the 2 bolts and the EGR system module.
 - Discard the gasket.
5. Disconnect the vacuum tube from the fuel rail and pressure temperature sensor.
6. Remove the 4 fuel rail bolts.
 - Remove the fuel rail and injectors as an assembly.

NOTE: The fuel injector clip can be reused if it is not damaged during removal.

7. Remove the clips and the fuel injectors from the fuel rail.

NOTE: Use O-ring seals that are made of special fuel-resistant material. Use of ordinary O-ring seals can cause the fuel system to leak. Do not reuse the O-ring seals.

8. Remove and discard the fuel injector O-ring seals.
9. Remove the 10 bolts and the SC.
 - Discard the gasket.
10. Remove the vacuum tube.
11. Remove the Intake Air Temperature 2 (IAT2) sensor.
12. Remove the 5 bolts and the CAC tube assembly.
 - Discard the gasket.
13. Remove the 2 CAC coolant connector tubes.
 - Discard the O-ring seals.
14. Remove the 13 bolts and the lower intake manifold cover.
 - Discard the gasket.
15. Remove the 10 bolts, the 2 CAC rail supports and the CAC.

ASSEMBLY

NOTE: Apply threadlock and sealer to the CAC bolts prior to installation.

1. Position the CAC, the 2 CAC rail supports and install the 10 bolts.
 - Tighten the bolts in the sequence shown in 2 stages:
 - Stage 1: Tighten to 2 Nm (18 lb-in).
 - Stage 2: Tighten to 10 Nm (89 lb-in).

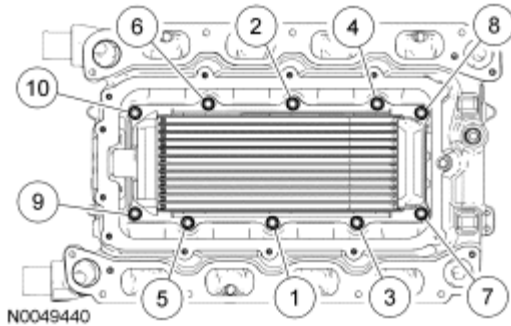


Fig. 440: Positioning CAC & Tightening Bolts In Sequence
Courtesy of FORD MOTOR CO.

2. Install a new gasket, the lower intake manifold cover and the 13 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

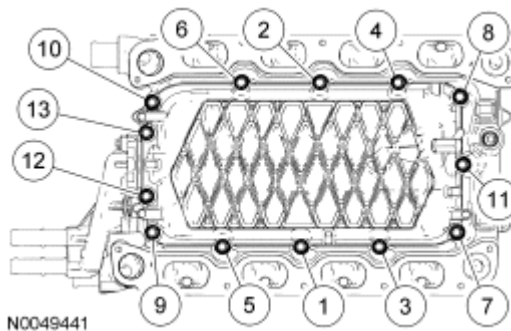


Fig. 441: Positioning Gasket Lower Intake Manifold Cover & Tightening Bolts In Sequence
Courtesy of FORD MOTOR CO.

NOTE: Apply clean engine coolant to the new CAC coolant connector tube O-ring seals.

3. Install new O-ring seals on the CAC coolant connector tubes.
 - Install the CAC coolant connector tubes.
4. Install a new gasket, the CAC coolant tube assembly and the 5 bolts.
 - Tighten to 10 Nm (89 lb-in).
5. Install the IAT2 sensor.
 - Tighten to 15 Nm (133 lb-in).
6. Install the vacuum tube.

7. Install a new gasket, the SC and the 10 bolts.
 - Tighten the bolts in the sequence shown in 2 stages:
 - Tighten to 5 Nm (44 lb-in).
 - Tighten to 25 Nm (18 lb-ft).

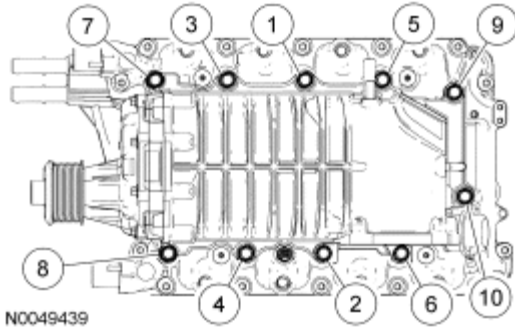


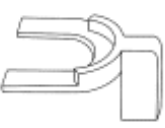
Fig. 442: Positioning Supercharger & Tightening Bolts In Sequence
Courtesy of FORD MOTOR CO.

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

8. Install new O-ring seals on each of the fuel injectors.
9. Install the fuel injectors onto the fuel rail and install the locking clips.
10. Install the fuel rail and fuel injector assembly onto the intake manifold.
11. Install the 4 fuel rail bolts.
 - Tighten to 10 Nm (89 lb-in).
12. Connect the vacuum tube to the fuel rail and pressure temperature sensor.
13. Install a new gasket, the EGR system module and the 2 bolts.
 - Tighten to 25 Nm (18 lb-ft).
14. Install the upper and lower SC bypass actuator vacuum tubes.
15. Install the SC bubbler hose.
16. Install the heater hose.

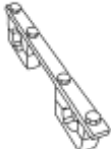
CYLINDER HEAD

Special Tools

Illustration	Tool Name	Tool Number
 ST1331-A	Compressor Spacer, Valve Spring	303-382 (T91P-6565-AH)

2009 Ford Mustang GT

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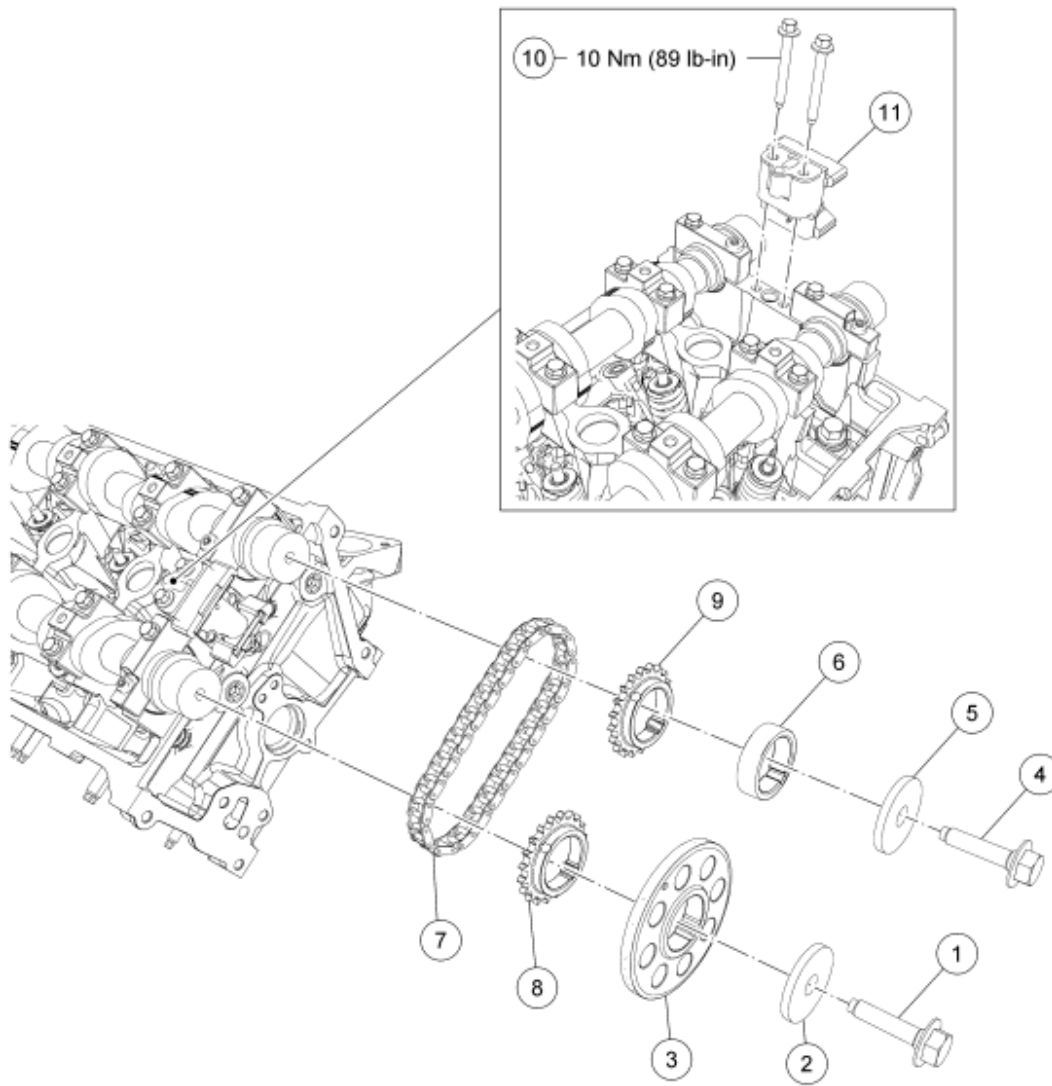
 ST1718-A	Compressor, Valve Spring	303-452 (T93P-6565-AR)
 ST1715-A	Holding Tool, Camshaft	303-446 (T93P-6256-AHR)
 ST1332-A	Installer, Valve Stem Oil Seal	303-383 (T91P-6571-A)

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

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N0049451

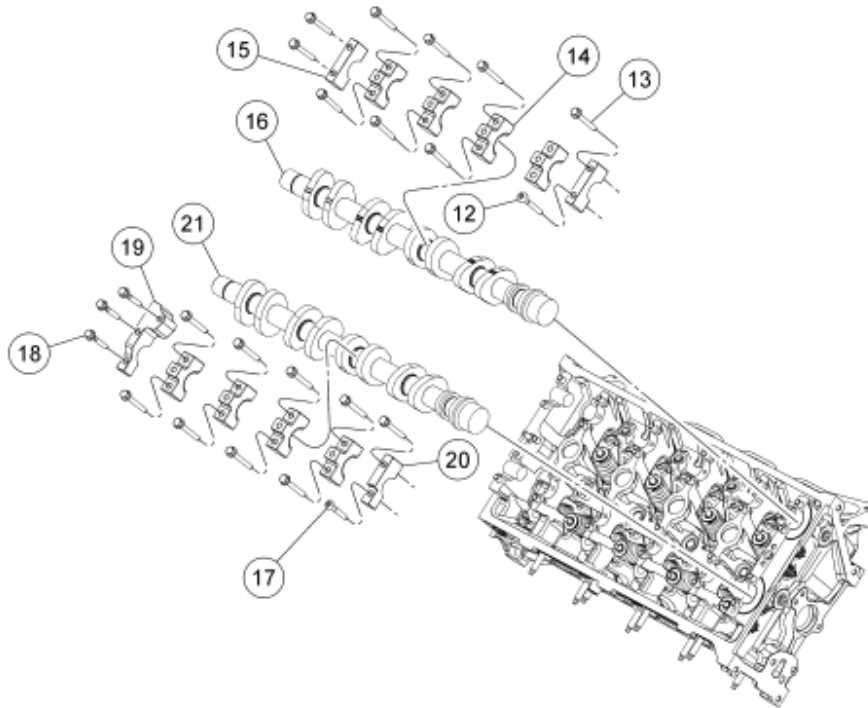
Fig. 443: Exploded View Of Cylinder Head With Torque Specification (1 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N811085	Camshaft drive sprocket bolt
2	N806164	Camshaft drive sprocket washer
3	6C252 RH/ 6C253 LH	Camshaft drive sprocket
4	N811085	Camshaft drive sprocket bolt
5	N806164	Camshaft drive sprocket washer
6	6265	Camshaft drive sprocket spacer
7	6268	Secondary timing chain
8	6256	Exhaust camshaft drive sprocket
9	6256	Intake camshaft drive sprocket
10	W500304 RH/ W500215 LH	Secondary timing chain tensioner bolt (2

2009 Ford Mustang GT

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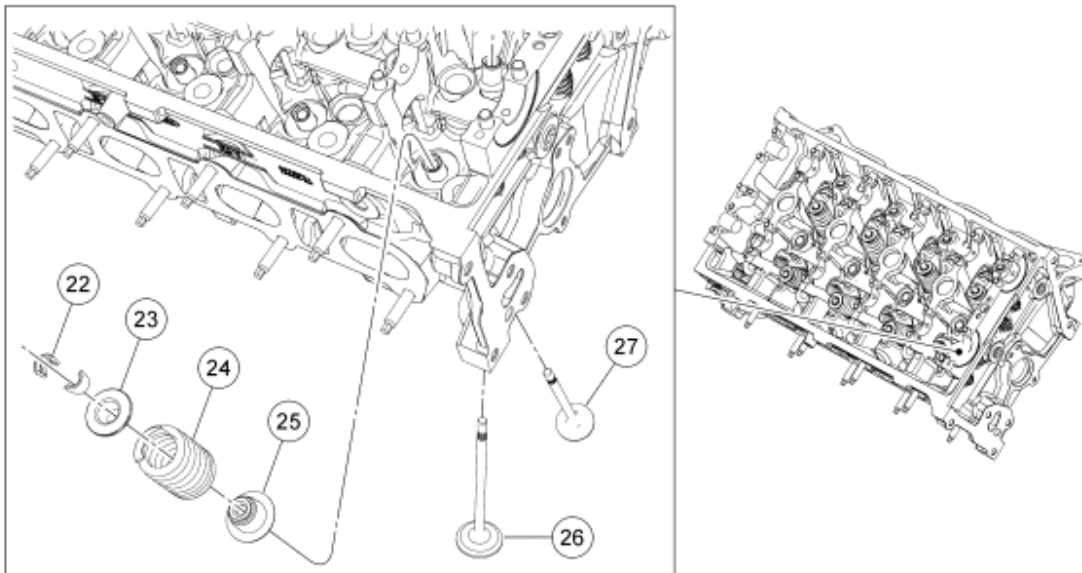
		required)
11	6C270 RH/ 6C271 LH	Secondary timing chain tensioner



N0071923

Fig. 444: Exploded View Of Cylinder Head (2 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
12	W710990	Intake camshaft bearing cap bolt
13	N807352	Intake/Exhaust camshaft bearing cap bolt (22 required)
14	6B277	Intake/Exhaust camshaft bearing cap (8 required)
15	6B277	Intake camshaft bearing cap (2 required)
16	6A270 RH/ 6A271 LH	Intake camshaft
17	W710991	Exhaust camshaft bearing cap bolt
18	W705438	Exhaust camshaft bearing cap bolt
19	6B278	Exhaust camshaft bearing cap
20	6B278	Exhaust camshaft bearing cap
21	6A272 RH/ 6A273 LH	Exhaust camshaft



N0071924

Fig. 445: Exploded View Of Cylinder Head (3 Of 3)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
22	6518	Retainer key (32 required)
23	6514	Valve spring retainer (16 required)
24	6513	Valve spring
25	6A517	Valve seal
26	6507	Intake valve
27	6505	Exhaust valve

DISASSEMBLY

NOTE: Before disassembly begins, mark the valve position on the face of each valve being removed. The valves must be reinstalled into their original positions or damage to the engine may occur.

1. Install the Camshaft Holding Tool.

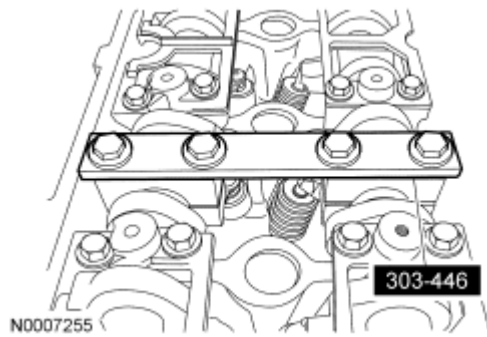


Fig. 446: Identifying Special Tool (303-446)
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

2. Remove the bolt, washer and camshaft drive sprocket.

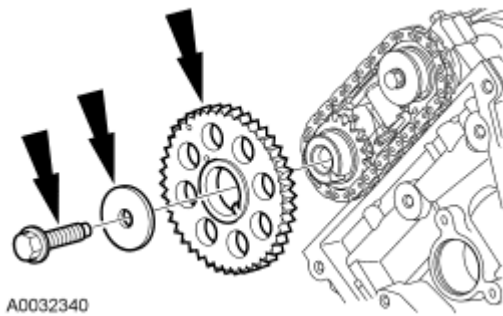


Fig. 447: Identifying Camshaft Sprocket, Washer & Bolt
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

3. Remove the bolt, washer and spacer.

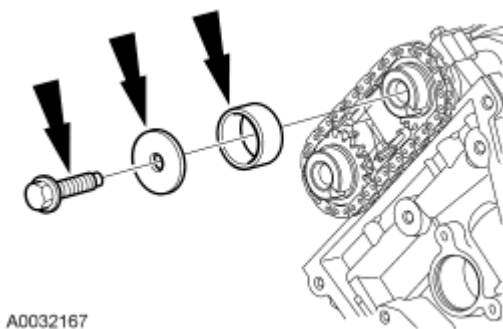


Fig. 448: Identifying Bolt, Washer & Spacer
Courtesy of FORD MOTOR CO.

4. Compress the secondary timing chain tensioner and install a lock pin.

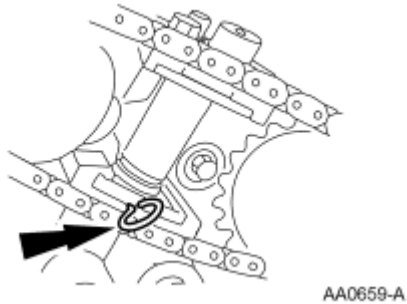


Fig. 449: Identifying Secondary Timing Chain Tensioner & Lock pin
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

5. Remove the timing chain and the 2 camshaft sprockets.

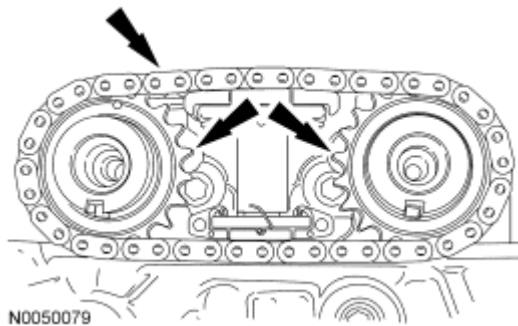


Fig. 450: Identifying Timing Chain & Camshaft Sprockets
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

6. Remove the 2 bolts and the secondary timing chain tensioner.

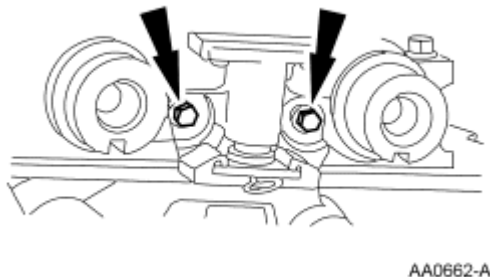


Fig. 451: Locating Secondary Timing Chain Tensioner Bolts

Courtesy of FORD MOTOR CO.

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

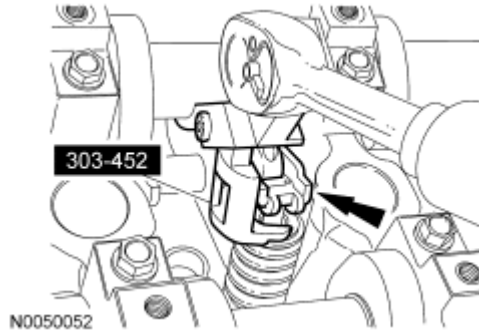


Fig. 452: Compressing Valve Spring & Removing Valve Spring Retainer Keys Using Special Tool (303-452)

Courtesy of FORD MOTOR CO.

8. Remove the valve, spring retainer, valve spring and the valve seal.
- Discard the valve seal.
 - Remove the valve.

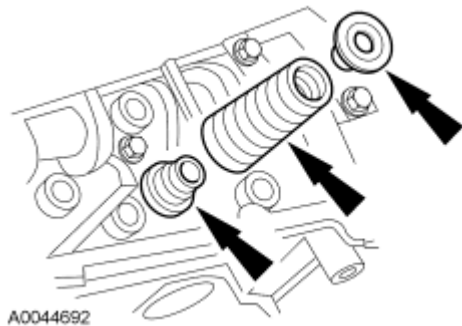


Fig. 453: Locating Valve, Spring Retainer, Valve Spring & Valve Seal

Courtesy of FORD MOTOR CO.

9. Repeat the previous 2 steps and remove all of the retainer keys, spring retainers, valve springs, valve seals and valves.

NOTE: The camshaft bearing cap bolts vary in length and head design and must be installed in their original positions. Camshaft bearing caps are not interchangeable and must be installed in their original positions or damage to the engine may occur.

NOTE: The camshaft bearing cap with 3 bolts is located at the front of the LH cylinder head and at the rear of the RH cylinder head.

10. Remove the camshaft bearing cap bolts in the sequence shown.

- Remove the camshaft bearing caps.
- Remove the camshafts.

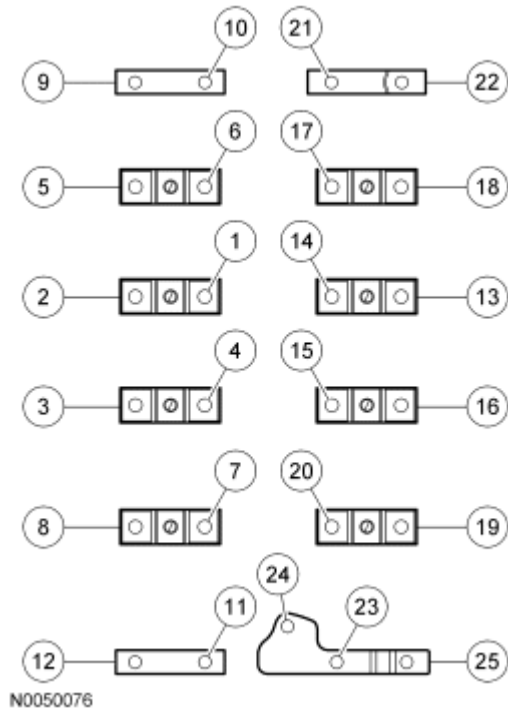


Fig. 454: Removing Camshaft Bearing Cap Bolts In Sequence
 Courtesy of FORD MOTOR CO.

ASSEMBLY

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

NOTE: RH shown, LH similar.

1. Install the camshafts.

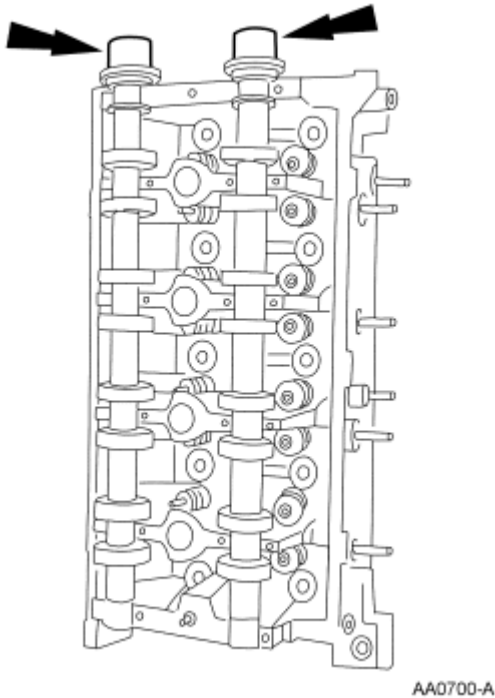


Fig. 455: Identifying Camshafts
Courtesy of FORD MOTOR CO.

NOTE: The camshaft bearing cap bolts vary in length and head design and must be installed in their original positions. Camshaft bearing caps are not interchangeable and must be installed in their original positions or damage to the engine may occur.

NOTE: The camshaft bearing cap with 3 bolts is located at the front of the LH cylinder head and at the rear of the RH cylinder head.

NOTE: Lubricate the camshaft bearing cap bearing surfaces with clean engine oil prior to installation.

2. Install the camshaft bearing caps.
 - Install the bearing cap bolts and tighten in the sequence shown to 10 Nm (89 lb-in).

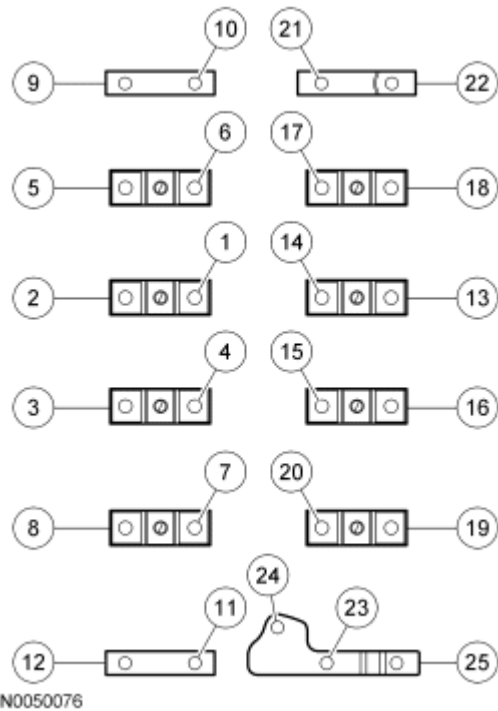


Fig. 456: Removing Camshaft Bearing Cap Bolts In Sequence
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the valve seal and valve stem with clean engine oil prior to installation.

3. Using the Valve Stem Oil Seal Installer and the Valve Spring Compressor, install a new valve seal.
 - Repeat step to install all of the new valve seals.

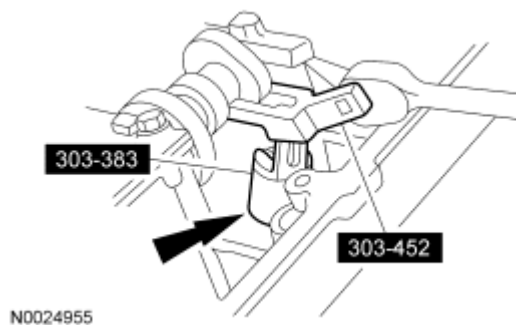


Fig. 457: Installing New Valve Seal Using Special Tools (303-383) & (303-452)
Courtesy of FORD MOTOR CO.

4. Position the valve, the valve spring and the spring retainer into the cylinder head.

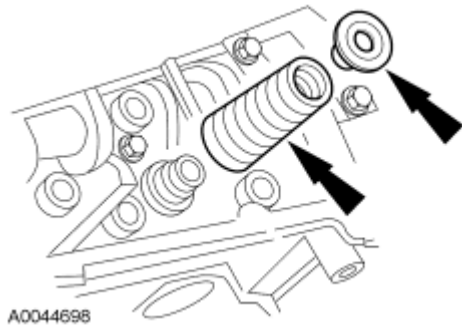


Fig. 458: Identifying Valve, Valve Spring & Spring Retainer
Courtesy of FORD MOTOR CO.

5. Install the Valve Spring Compressor Spacer between the valve spring coils to protect the valve seal from damage.

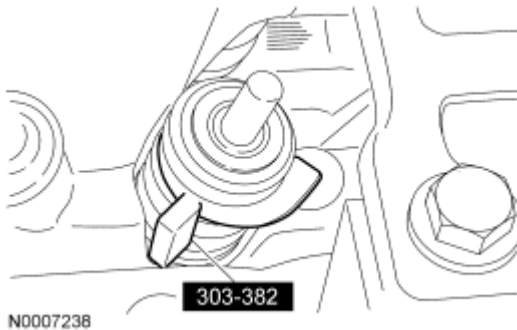


Fig. 459: Installing Special Tool (303-382) Between Valve Spring Coils
Courtesy of FORD MOTOR CO.

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

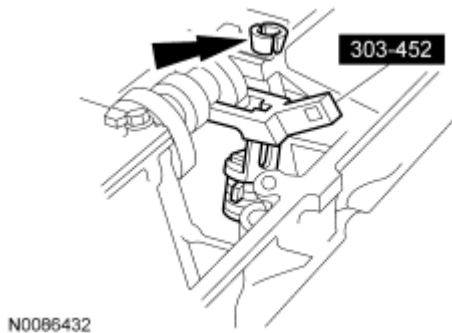
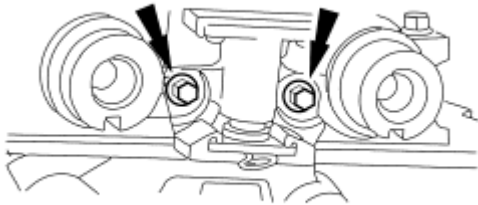


Fig. 460: Compressing Valve Spring & Installing Retainer Keys Using Valve Spring Compressor
Courtesy of FORD MOTOR CO.

7. Repeat the previous 3 steps and install all of the valves, valve springs, valve spring retainers and retainer keys.

NOTE: LH shown, RH similar.

8. Install the secondary timing chain tensioner and the bolts.
 - Tighten to 10 Nm (89 lb-in).



A0100110

Fig. 461: Identifying Secondary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

9. Index the keyways on the camshafts to the 6 o'clock position.



N0050077

Fig. 462: Identifying Keyways On Camshafts To 6 O'clock Position
Courtesy of FORD MOTOR CO.

NOTE: Timing marks must be at 12 o'clock position or damage to the engine may occur.

NOTE: LH shown, RH similar.

10. Install the camshaft sprockets and the chain as an assembly.
 - Remove the lock pin from the secondary timing chain tensioner.

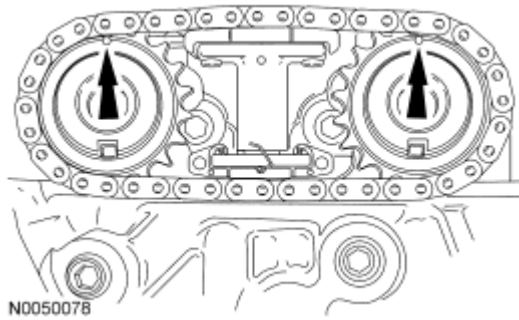


Fig. 463: Identifying Timing Marks At 12 O'clock Position
Courtesy of FORD MOTOR CO.

11. Install the Camshaft Holding Tool.

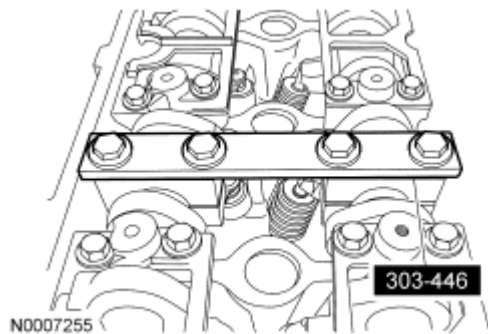


Fig. 464: Identifying Special Tool (303-446)
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

12. Install the camshaft spacer, washer and bolt, and hand-tighten the bolt.

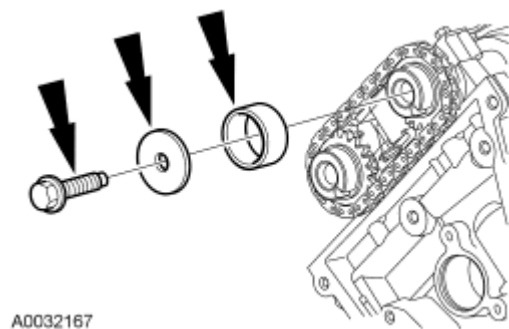


Fig. 465: Identifying Bolt, Washer & Spacer
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

13. Install the camshaft sprocket, washer and bolt, and hand-tighten the bolt.

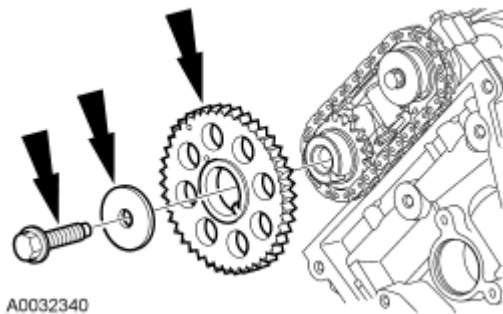


Fig. 466: Identifying Camshaft Sprocket, Washer & Bolt
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

14. Tighten the bolts in 2 stages:
- Stage 1: Tighten to 40 Nm (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.

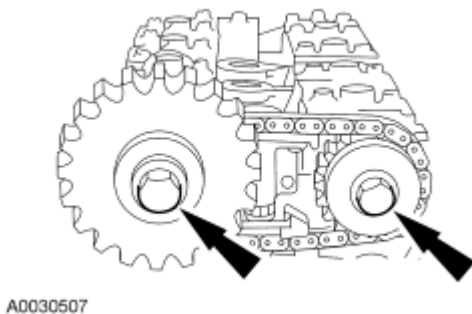


Fig. 467: Locating Camshaft Sprocket, Washer & Bolt
Courtesy of FORD MOTOR CO.

PISTON

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B



N0010114

Fig. 468: Exploded View Of Piston Components
Courtesy of FORD MOTOR CO.

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

DISASSEMBLY

1. Remove the piston rings from the piston.
 - Discard the piston rings.
2. Remove the piston pin retainers and the piston pin.
3. Separate the piston from the connecting rod.
4. Clean and inspect the piston and connecting rod. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.

ASSEMBLY

NOTE: The connecting rod must be installed into the piston with identification markings toward the front.

1. Position the connecting rod in the piston.

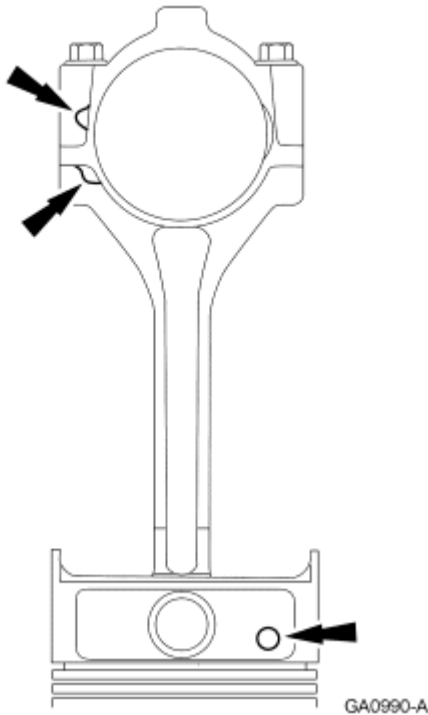


Fig. 469: Positioning Connecting Rod In Piston
Courtesy of FORD MOTOR CO.

2. Lubricate the piston pin and pin bore with clean engine oil.
3. Install the piston pin in the piston and connecting rod assembly.
4. Install the piston pin retaining clips in the piston.
5. Lubricate the piston and the new piston rings with clean engine oil.
6. Install the piston rings onto the piston.

ASSEMBLY

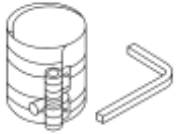
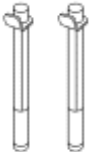
ENGINE

Special Tools

Illustration	Tool Name	Tool Number
		303-D032 (D81L-6002-C) or

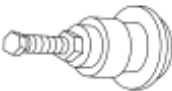
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 ST1376-A	Compressor, Piston Ring	equivalent
 ST1718-A	Compressor, Valve Spring	303-452 (T93P-6565-AR)
 ST1341-A	Heavy Duty Floor Crane	014-00071 or equivalent
 ST1335-A	Holding Tool, Crankshaft	303-448 (T93P-6303-A)
 ST1337-A	Installer, Connecting Rod	303-442 (T93P-6136-A)
 ST2197-A	Installer, Crankshaft Front Oil Seal	303-635
 ST1482-A	Installer, Crankshaft Rear Oil Slinger	303-517 (T95P-6701-CH)
 ST1479-A	Installer, Crankshaft Rear Oil Seal	303-516 (T95P-6701-BH)

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2009 ENGINE Engine - 5.4L (4V) - Mustang

 ST1480-A	Installer, Crankshaft Rear Oil Seal	303-518 (T95P-6701-DH)
 ST1287-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST1328-A	Installer, Front Cover Oil Seal	303-335 (T88T-6701-A)
 ST1602-A	Lifting Bracket, Engine	303-D089 (D93P-6001-A3) or equivalent
 ST1603-A	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

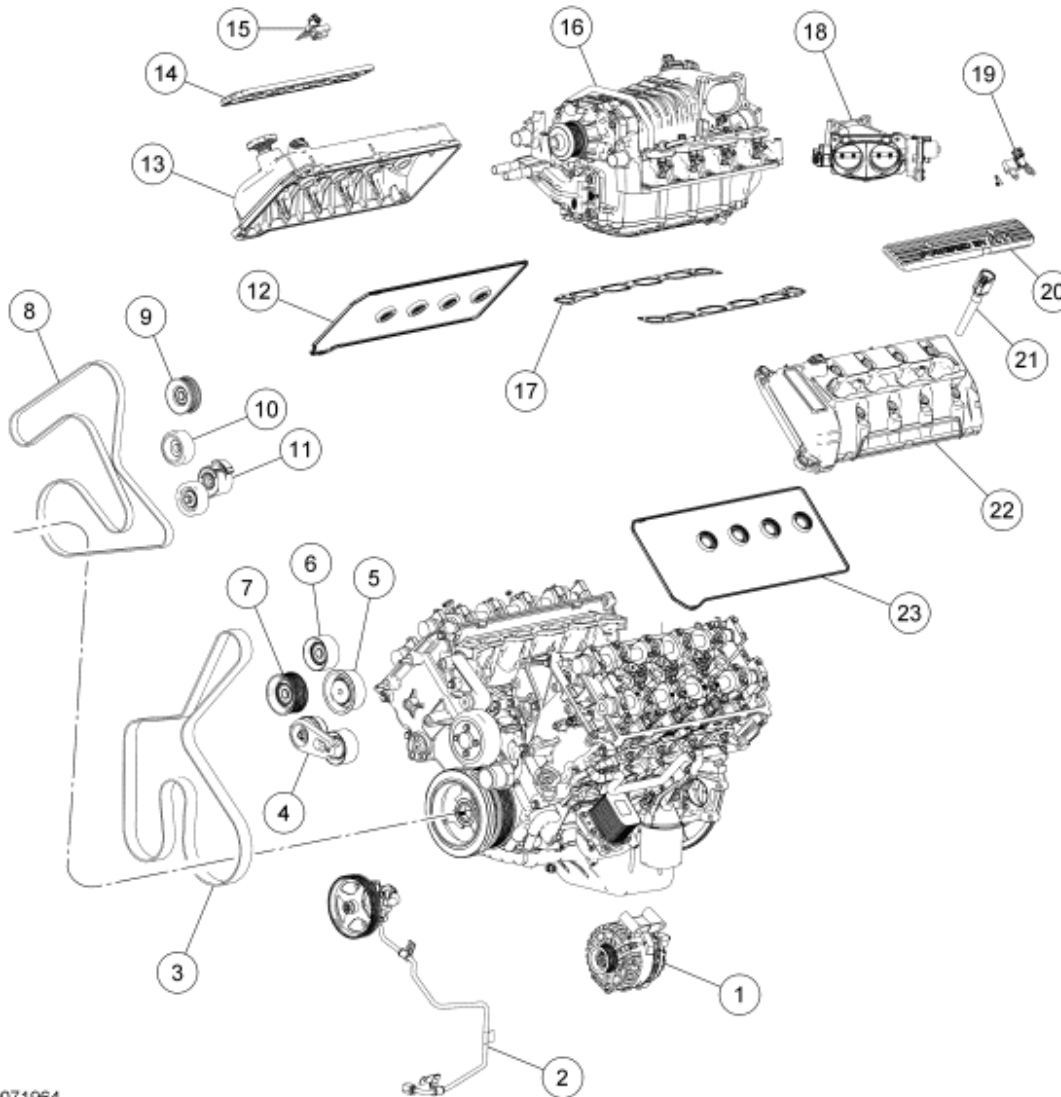
Material

Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

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Silicone Gasket Remover
ZC-30



N0071954

Fig. 470: Exploded View Of Upper End Components & Front End Accessory Drive (FEAD) Components
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	10300	Generator
2	3A696	Power steering pump
3	8620	Supercharger (SC) drive belt
4	6B209	SC drive belt tensioner
5	19A216	SC drive belt heavy load idler pulley
6	19A216	SC drive belt smooth idler pulley
7	6C348	SC drive belt grooved idler pulley

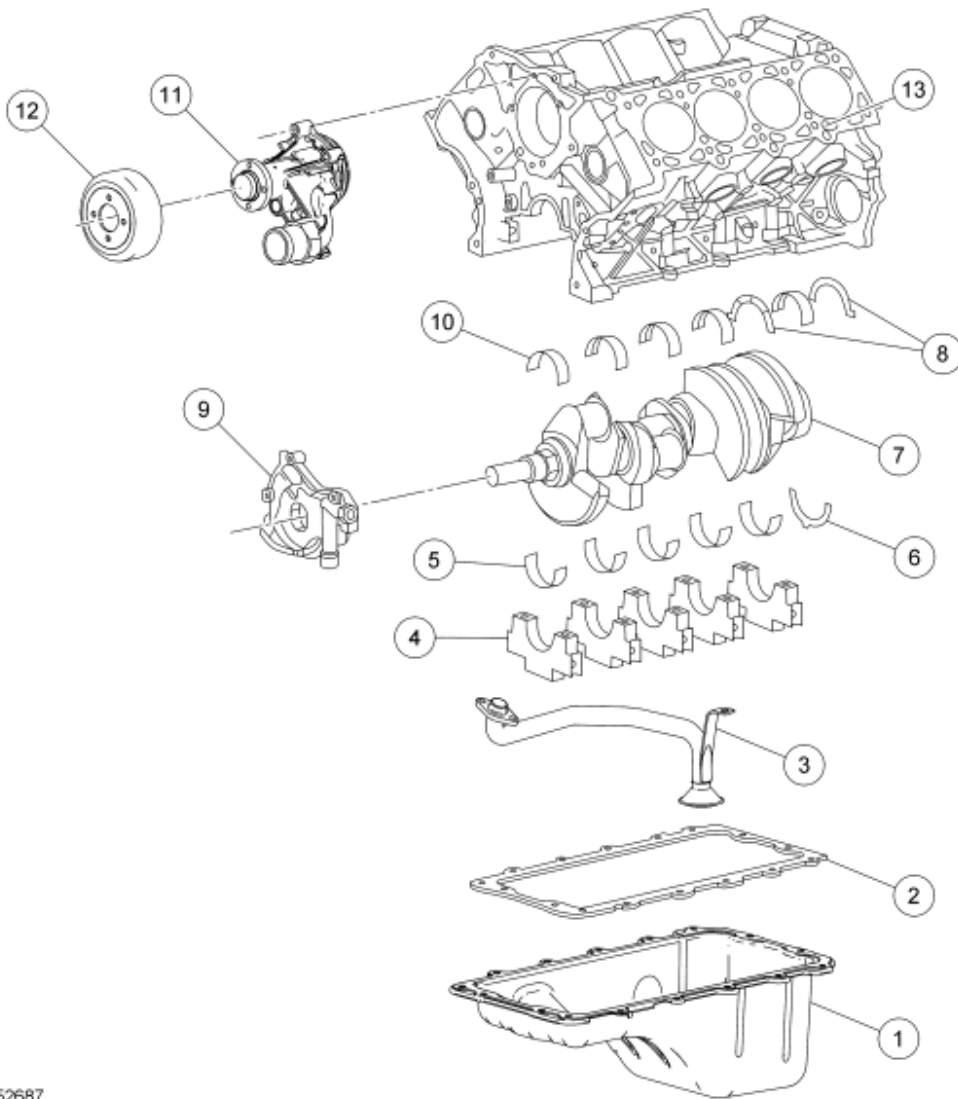
2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

8	8620	Engine accessory drive belt
9	19A216	Engine accessory drive belt grooved idler pulley
10	19A216	Engine accessory drive belt smooth idler pulley
11	6B209	Engine accessory drive belt tensioner
12	6584	RH valve cover gasket
13	6582	RH valve cover
14	6P067	RH ignition coil-on-plug cover
15	18801	RH radio interference capacitor
16	9H487	Intake manifold assembly
17	9439	Intake manifold assembly gasket (2 required)
18	9E822	Throttle Body (TB) assembly
19	18801	LH radio interference capacitor
20	6P067	LH ignition coil-on-plug cover
21	12A366	Ignition coil-on-plug (8 required)
22	6A505	LH valve cover
23	6584	LH valve cover gasket

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N0052687

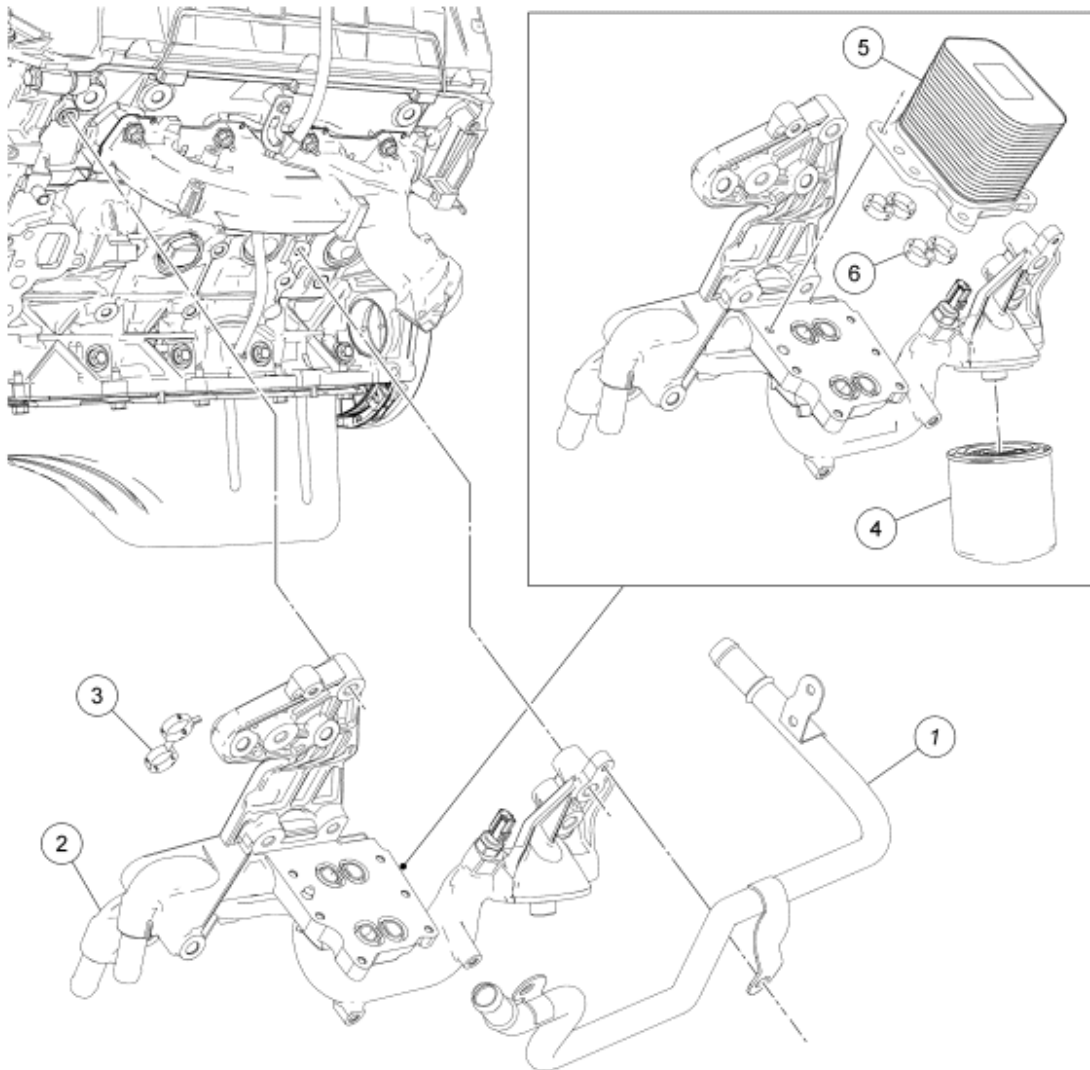
Fig. 471: Exploded View Of Lower End Components & Coolant Pump
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6675	Oil pan
2	6710	Oil pan gasket
3	6622	Oil pump screen and pickup tube
4	6325	Main bearing cap
5	6A338	Crankshaft lower main bearing (5 required)
6	6K302	Crankshaft lower thrust washer
7	6303	Crankshaft
8	6A341	Crankshaft upper thrust washers (2 required)

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9	6621	Oil pump
10	6333	Crankshaft upper main bearing (5 required)
11	8501	Coolant pump
12	8A528	Coolant pump pulley
13	6010	Cylinder block



N0052688

Fig. 472: Exploded View Of Oil Filter Adapter Assembly
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	18663	Coolant tube assembly
2	6884	Oil filter adapter
3	6A636	Oil filter adapter gasket

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4	6714	Engine oil filter
5	6A642	Oil cooler
6	6N818	Oil cooler gasket (4 required)

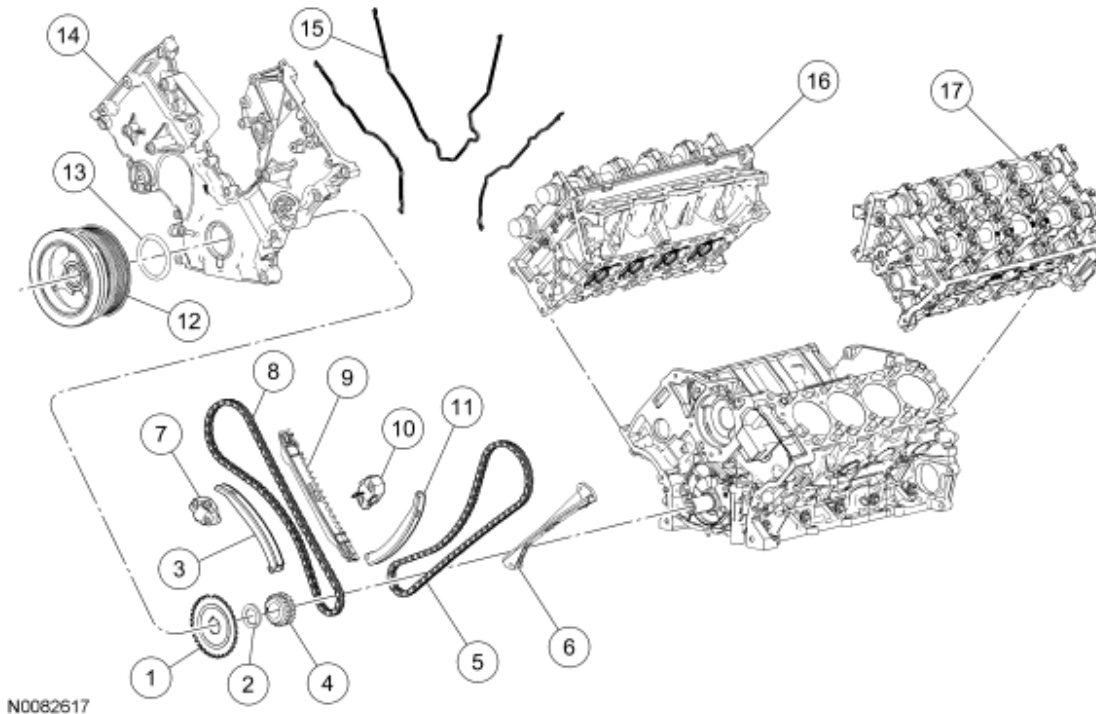


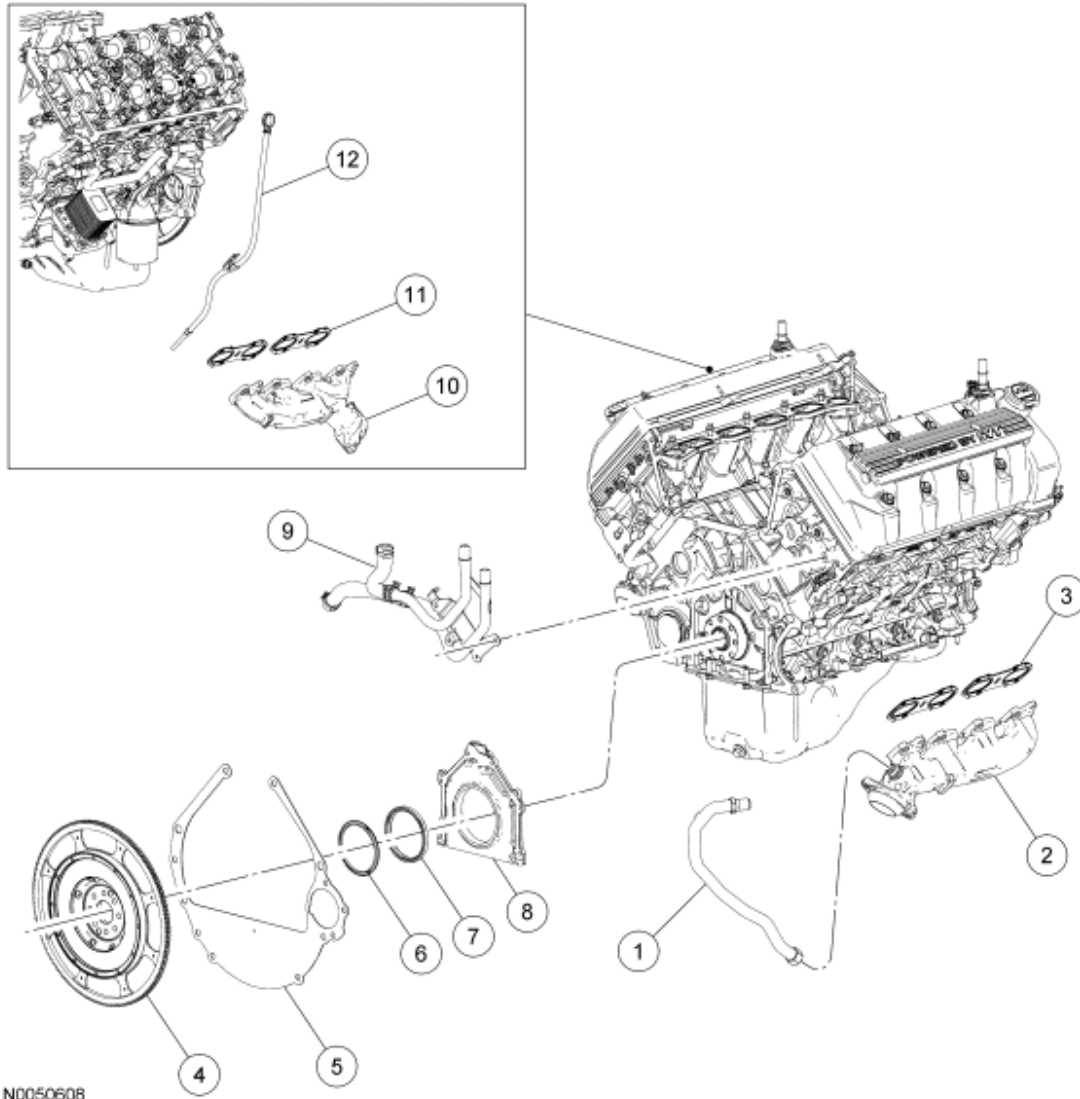
Fig. 473: Exploded View Of Timing Drive Components & Cylinder Heads
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	12A227	Crankshaft sensor ring
2	6378	Crankshaft washer
3	6K255	RH timing chain tensioner arm
4	6306	Crankshaft timing sprocket
5	6268	LH primary timing chain
6	6B274	LH primary timing chain guide
7	6L266	RH primary timing chain tensioner
8	6268	RH primary timing chain
9	6M256	RH primary timing chain guide
10	6L266	LH primary timing chain tensioner
11	6M274	LH timing chain tensioner arm
12	6316	Crankshaft pulley
13	6700	Crankshaft front seal
14	6C086	Engine front cover
15	6D081	Engine front cover gasket

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16	6F093	RH cylinder head assembly
17	6M099	LH cylinder head assembly



N0050608

Fig. 474: Exploded View Of Flywheel & Exhaust Manifolds
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9D477	EGR tube
2	9428	RH exhaust manifold
3	9Y431	RH exhaust manifold gasket (2 required)
4	6375	Flywheel
5	6A373	Engine-to-transmission spacer plate
6	6310	Crankshaft oil slinger
7	6701	Crankshaft rear seal

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8	6K318	Crankshaft rear seal retainer plate
9	18C553	Coolant tube assembly
10	9431	LH exhaust manifold
11	9Y431	LH exhaust manifold gasket (2 required)
12	6754	Oil level indicator tube assembly

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

NOTE: During engine assembly it may become necessary to check bearing clearances and end play. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION .

1. Record the first character code information on the cylinder block.

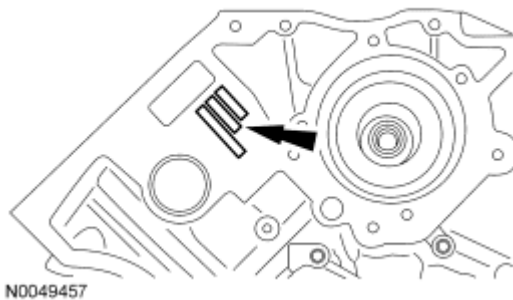


Fig. 475: Recording First Character Code Information On Cylinder Block
Courtesy of FORD MOTOR CO.

2. Note the first character on the No. 7 crankshaft counterweight.

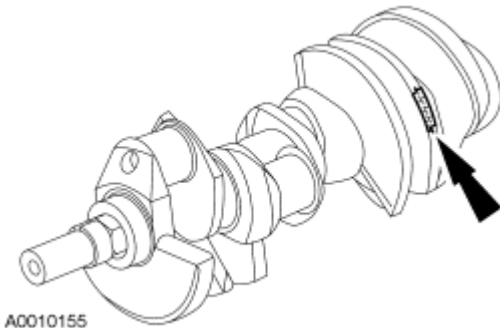


Fig. 476: Identifying Main Bearing Code Found On Crankshaft Counterweight
Courtesy of FORD MOTOR CO.

3. Using the data recorded in the previous 2 steps, cross-reference using the chart to obtain bearing grade.

MINIMUM BLOCK DIA

		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
		.401	.402	.403	.404	.405	.406	.407	.408	.409	.410	.411	.412	.413	.414	.415	.416	.417	.418	.419	.420	.421	.422	.423	.424
MAXIMUM CRANKSHAFT DIA	X	67.504	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	W	67.503	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	V	67.502	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	U	67.501	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	T	67.500	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	S	67.499	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	R	67.498	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	Q	67.497	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	P	67.496	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	O	67.495	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	N	67.494	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	M	67.493	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	L	67.492	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	K	67.491	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	J	67.490	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	I	67.489	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	H	67.488	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
	G	67.487	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	F	67.486	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	E	67.485	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	D	67.484	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	C	67.483	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	B	67.482	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	A	67.481	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

A0031544

Fig. 477: Bearing Select Fit Chart (Standard Bearings)
Courtesy of FORD MOTOR CO.

NOTE: Before assembling the cylinder block, all sealing surfaces must be free of chips, dirt, paint and foreign material. Also, make sure the coolant and oil passages are clear.

- Lubricate the upper crankshaft main bearings with clean engine oil and install into the cylinder block.

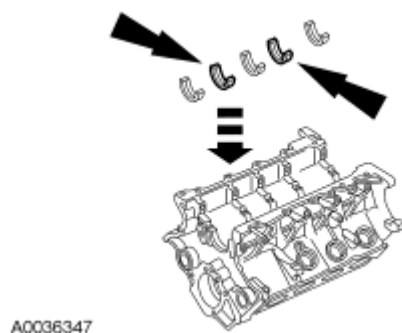
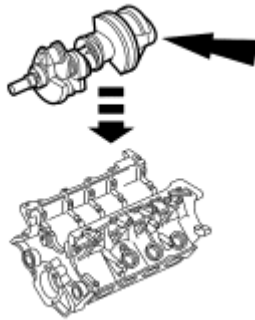


Fig. 478: Lubricating Upper Crankshaft Main Bearings With Clean Engine Oil
Courtesy of FORD MOTOR CO.

NOTE: Do not install the upper thrust bearings until the crankshaft is installed.

NOTE: Lubricate the thrust surfaces of the crankshaft with clean engine oil.

5. Install the crankshaft onto the upper main bearings.

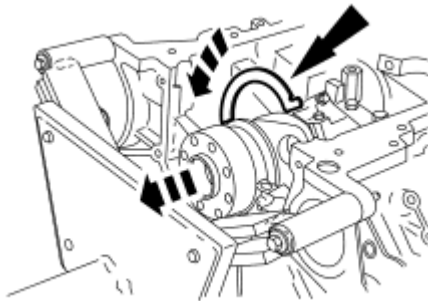


A0036348

Fig. 479: Installing Crankshaft Onto Upper Main Bearings
Courtesy of FORD MOTOR CO.

NOTE: Make sure the side of the thrust washer, with three 5-mm wide oil grooves, faces the crankshaft thrust surface.

6. Push the crankshaft rearward and install the rear crankshaft upper thrust washer at the back of the No. 5 main boss.



DA0596-A

Fig. 480: Installing Rear Crankshaft Upper Thrust Washer
Courtesy of FORD MOTOR CO.

NOTE: Make sure the side of the thrust washer, with three 5-mm wide oil grooves, faces the crankshaft thrust surface.

7. Push the crankshaft forward and install the front crankshaft upper thrust washer at the front of the No. 5 main boss.

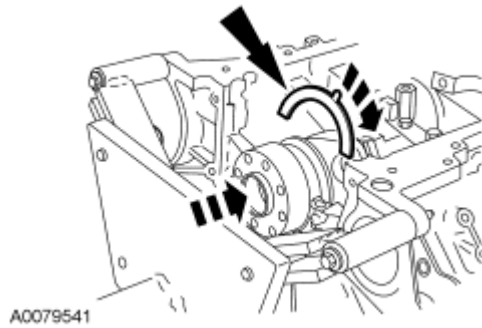


Fig. 481: Identifying Front Upper Crankshaft Thrust Washer
Courtesy of FORD MOTOR CO.

NOTE: Make sure the side of the thrust washer, with three 5-mm wide oil grooves, faces the crankshaft thrust surface.

NOTE: To aid in assembly, apply petroleum jelly to the back of the crankshaft thrust washer.

8. Install the lower crankshaft thrust washer to the back side of the No. 5 main bearing cap, with the tab aligned with the cutout in the main bearing cap.

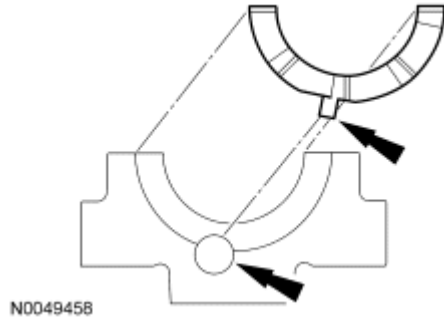
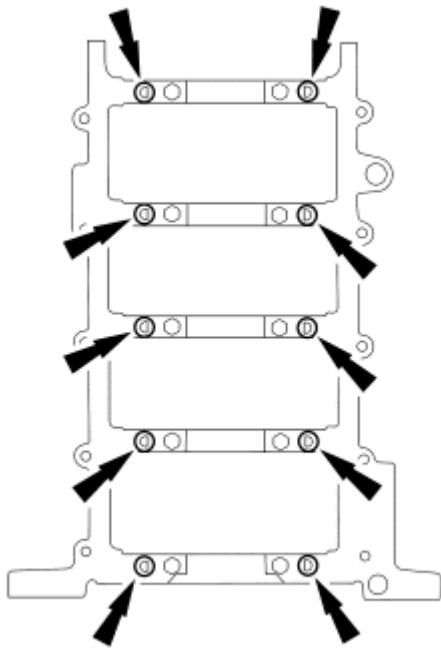


Fig. 482: Installing Lower Crankshaft Thrust Washer To Back Side Of No. 5 Main Bearing Cap
Courtesy of FORD MOTOR CO.

9. Lubricate the crankshaft lower main bearings and install them into the main bearing caps. Locate the main bearing caps on the cylinder block and, keeping the caps as square as possible, alternately draw the caps down evenly using the new cap fasteners.

NOTE: Crankshaft not shown for clarity.

10. Install the main bearing cap dowel pins so the flat sides face the crankshaft.

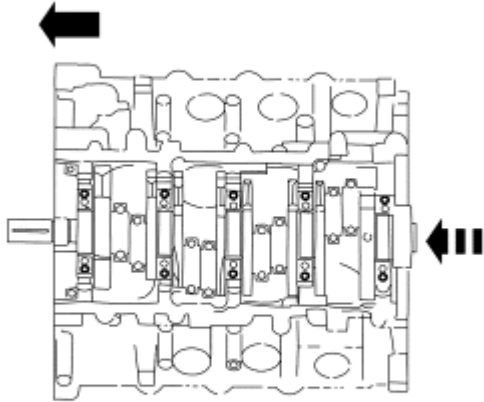


N0049461

Fig. 483: Lubricating Crankshaft Lower Main Bearings & Installing Them Into Main Bearing Caps

Courtesy of FORD MOTOR CO.

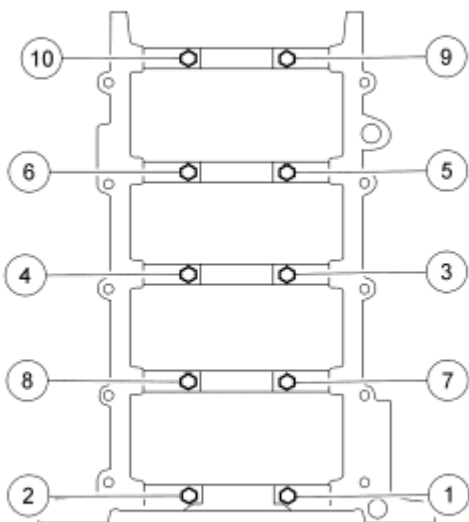
11. Push the crankshaft forward to seat the crankshaft thrust washer. Hold the crankshaft in the forward position.



AA0362-A

Fig. 484: Pushing Crankshaft Forward To Seat Crankshaft Thrust Washer
Courtesy of FORD MOTOR CO.

12. Tighten the vertical main bearing cap fasteners in the sequence shown, in 3 stages.
 - Stage 1: Tighten to 10 Nm (89 lb-in).
 - Stage 2: Tighten to 40 Nm (30 lb-ft).
 - Stage 3: Tighten an additional 90 degrees.

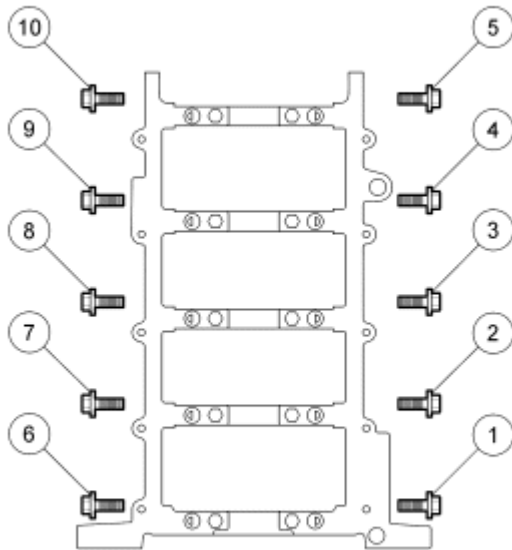


N0049459

Fig. 485: Tightening Vertical Main Bearing Cap Fasteners In Sequence
Courtesy of FORD MOTOR CO.

NOTE: Crankshaft not shown for clarity.

13. Install the new side bolts and tighten them in the sequence shown, in 2 stages.
 - Stage 1: Tighten to 40 Nm (30 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.



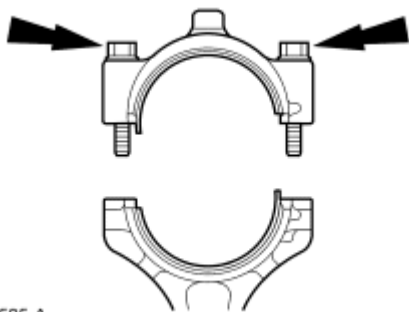
N0049460

Fig. 486: Installing New Side Bolts In Sequence
Courtesy of FORD MOTOR CO.

14. Check that crankshaft torque-to-turn does not exceed 6 Nm (53 lb-in).
15. Check the crankshaft end play. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION**.

NOTE: Verify correct orientation of connecting rod and rod cap.

16. Prepare the connecting rod and cap.
 - Insert the bolts in the rod cap.
 - Insert the upper and lower rod bearings into the rod and cap.



AA5585-A

Fig. 487: Positioning Bearing, Rod Cap & Bolts
Courtesy of FORD MOTOR CO.

NOTE: Do not scratch the cylinder walls or crankshaft journals with the connecting rod.

NOTE: The next 3 steps are for all 8 connecting rods, rod caps and pistons. Only 1 connecting rod, rod cap and piston is shown.

NOTE: Make sure the identification marks on the piston and connecting rod face toward the front of the engine.

17. Using the Piston Ring Compressor and the Connecting Rod Installer, install the No. 1 and No. 6 piston and the connecting rod assemblies.
- Lubricate the piston and rings with clean engine oil.
 - Lubricate the rod bearings with clean engine oil.
 - Lubricate the cylinder bores with clean engine oil.

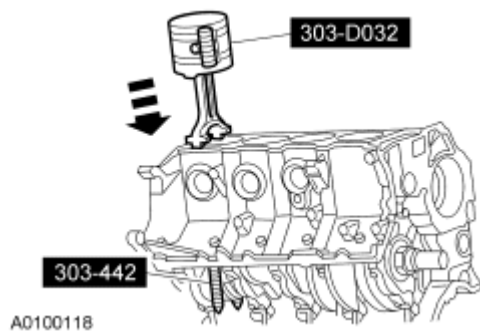


Fig. 488: Installing No. 1 & No. 6 Piston & Connecting Rod Assemblies Using Special Tools (303-442) & (303-D032)

Courtesy of FORD MOTOR CO.

18. Seat the connecting rods on the crankshaft journals and remove the Connecting Rod Installer.

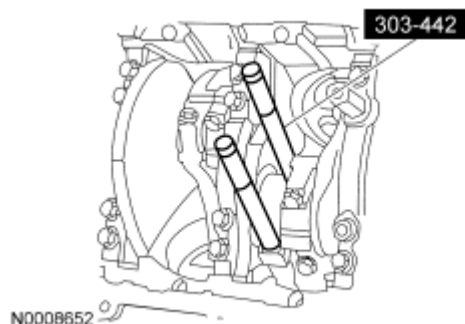


Fig. 489: Identifying Special Tool (303-442)

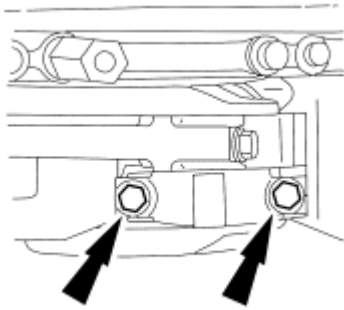
Courtesy of FORD MOTOR CO.

NOTE: The rod cap installation must keep the same orientation as marked during disassembly or damage to the engine may occur.

NOTE: Rotate the crankshaft after each connecting rod is installed and tightened, to check for assembly binding.

19. Install the rod bearing caps and tighten the bolts in 2 stages.

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



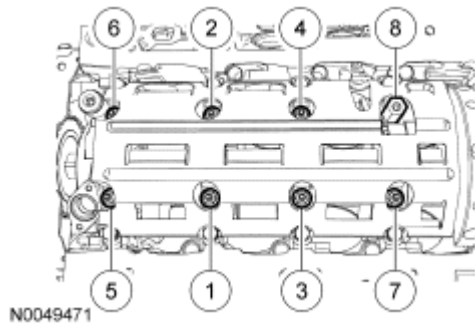
AA5330-A

Fig. 490: Identifying Rod Bearing Cap Bolts
Courtesy of FORD MOTOR CO.

20. Install the piston assemblies 3 and 5, 4 and 7, 2 and 8, by turning the crankshaft 90 degrees and repeating the previous steps.

21. Install the windage tray, the 7 nuts and the spacer.

- Tighten in the sequence shown to 25 Nm (18 lb-ft).



N0049471

Fig. 491: Installing Windage Tray Nuts & Spacer In Sequence
Courtesy of FORD MOTOR CO.

22. Install the oil pump and 3 bolts.

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

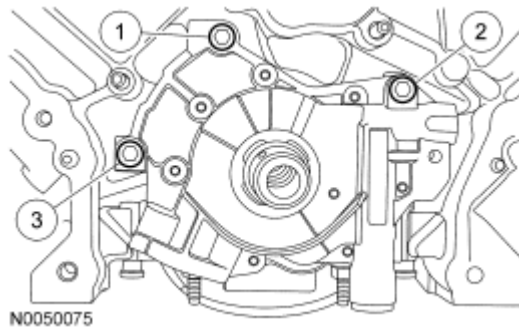


Fig. 492: Installing Oil Pump Bolts In Sequence
Courtesy of FORD MOTOR CO.

NOTE: Install a new O-ring seal on the oil pump screen and pickup tube.

23. Install the oil pump screen and pickup tube and the 3 bolts.
- Tighten the 2 small bolts to 10 Nm (89 lb-in).
 - Tighten the large bolt to 25 Nm (18 lb-ft).

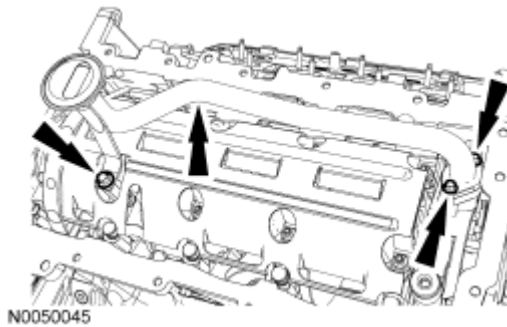


Fig. 493: Identifying Bolts, Oil Pump Screen & Pickup Tube Assembly
Courtesy of FORD MOTOR CO.

NOTE: The gasket sealing surfaces on the cylinder head and the cylinder block must be clean. Failure to follow these instructions may result in engine damage. For additional information, refer to Cylinder Head.

NOTE: The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry. Failure to follow these instructions may result in engine damage.

NOTE: The new gasket has a film coating which is crucial to the gasket's ability to seal correctly. Do not scratch the gasket.

NOTE: RH head gasket shown, LH head gasket similar.

24. Install the RH and LH head gasket over the dowel pins.

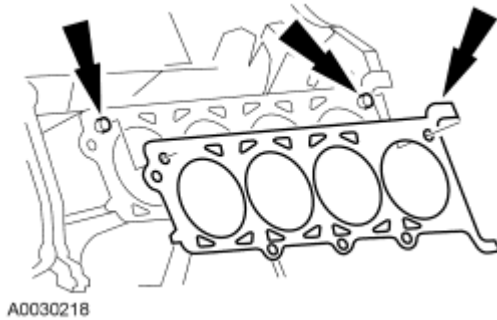


Fig. 494: Head Gasket & Dowel Pins
Courtesy of FORD MOTOR CO.

- NOTE:** Cylinder head machining or milling is not authorized by the Ford Motor Company. Cylinder head flatness must be within 0.0254 mm (0.001 in) across a 38.1 mm (1.5 in) square area. Failure to follow these instructions may result in engine damage.
- NOTE:** The gasket sealing surfaces on the cylinder head and the cylinder block must be clean. Do not use metal scrapers, wire brushes, power abrasive discs or other abrasive means to clean the sealing surfaces. These tools cause scratches and gouges which make leak paths. Use a plastic scraping tool to remove all traces of old sealant.
- NOTE:** The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry. Failure to follow these instructions may result in engine damage.
- NOTE:** Do not allow the dowels to scratch the sealing surface of the cylinder head during cylinder head installation. Failure to follow these instructions may result in engine damage.
- NOTE:** LH shown, RH similar.

25. Install the RH and LH cylinder heads on the dowels and the head gaskets.
- Loosely install new bolts.

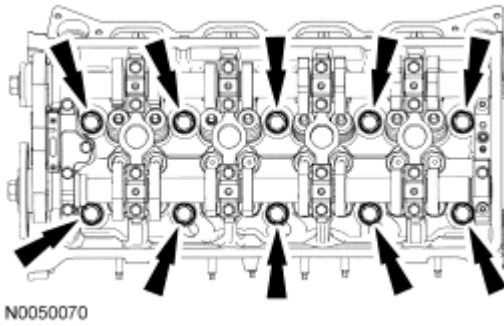


Fig. 495: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

26. Tighten the new RH cylinder head bolts in 5 stages in the sequence shown.

- Stage 1: Tighten to 20 Nm (177 lb-in).
- Stage 2: Tighten to 50 Nm (37 lb-ft).
- Stage 3: Tighten to 80 Nm (59 lb-ft).
- Stage 4: Tighten an additional 90 degrees.
- Stage 5: Tighten an additional 90 degrees.

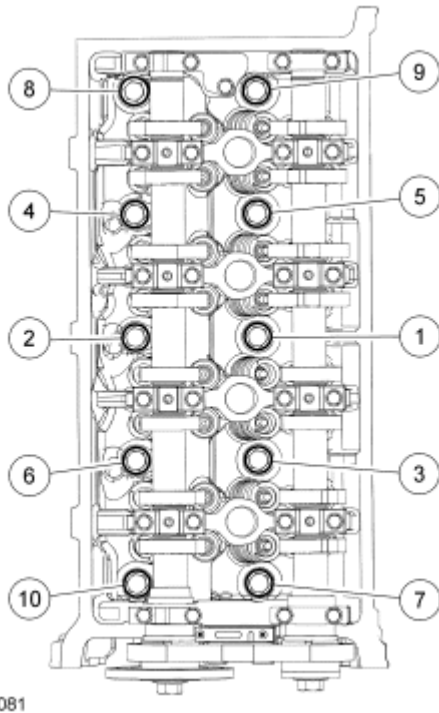
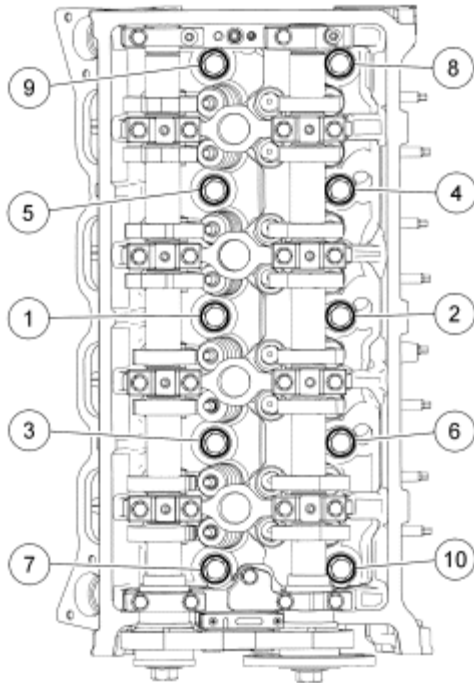


Fig. 496: Tightening New Cylinder Head Bolts In Sequence
Courtesy of FORD MOTOR CO.

27. Tighten the new LH cylinder head bolts in 5 stages in the sequence shown.

- Stage 1: Tighten to 20 Nm (177 lb-in).

- Stage 2: Tighten to 50 Nm (37 lb-ft).
- Stage 3: Tighten to 80 Nm (59 lb-ft).
- Stage 4: Tighten an additional 90 degrees.
- Stage 5: Tighten an additional 90 degrees.



N0050082

Fig. 497: Tightening New Cylinder Head Bolts In Sequence
Courtesy of FORD MOTOR CO.

NOTE: Do not compress the ratchet assembly. This will damage the ratchet assembly.

NOTE: LH shown, RH similar.

28. Compress each tensioner plunger, using an edge of a vise.

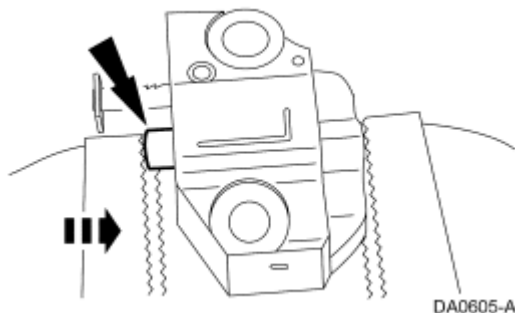


Fig. 498: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

29. Using a small screwdriver or pick, push back and hold the ratchet mechanism.

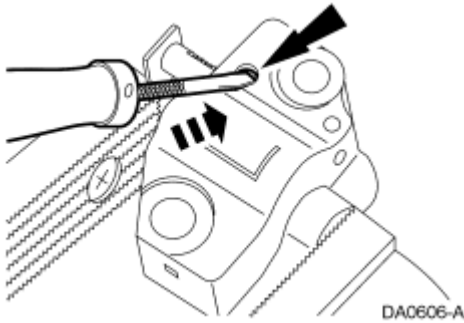


Fig. 499: Pushing Back And Holding Ratchet Mechanism
Courtesy of FORD MOTOR CO.

30. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.

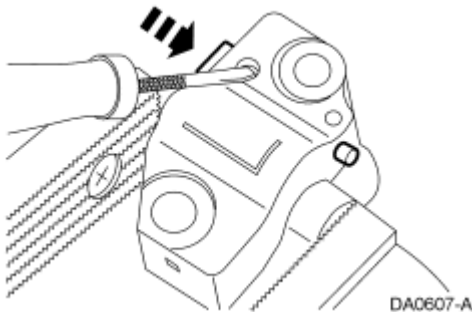


Fig. 500: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

31. Install a suitable pin into the hole of each tensioner housing to hold the ratchet assembly and plunger in place during installation.
- Remove the tensioner from the vise.

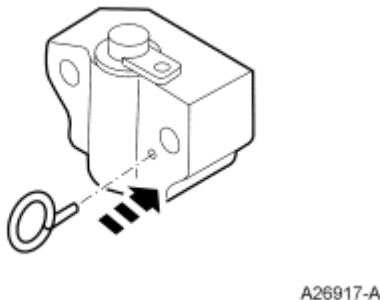
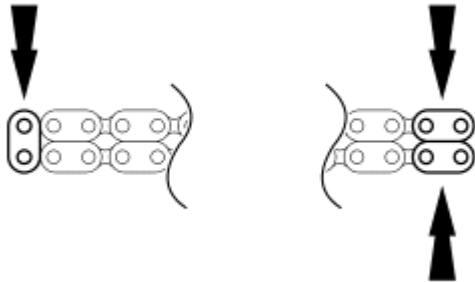


Fig. 501: Installing Paper Clip Into Tensioner Housing

Courtesy of FORD MOTOR CO.

32. If the colored links are not visible, mark one link on one end and 2 links on the other end, and use as timing marks.



A0038720

Fig. 502: Locating Timing Chain Marks
Courtesy of FORD MOTOR CO.

33. Using the Crankshaft Holding Tool, position the crankshaft.

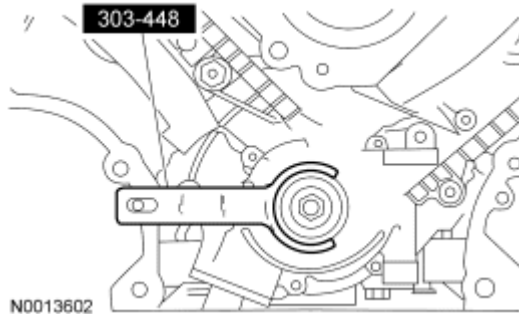


Fig. 503: Positioning Crankshaft With Special Tool (303-448)
Courtesy of FORD MOTOR CO.

34. Install the crankshaft sprocket with the flange facing forward.

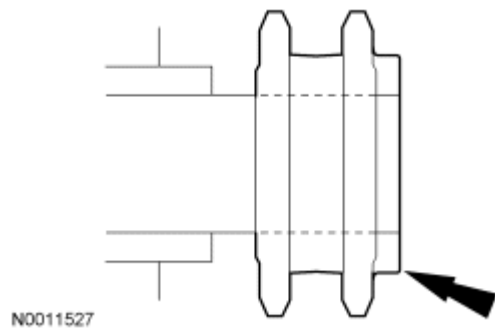
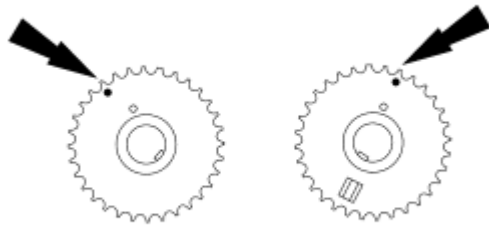


Fig. 504: Identifying Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

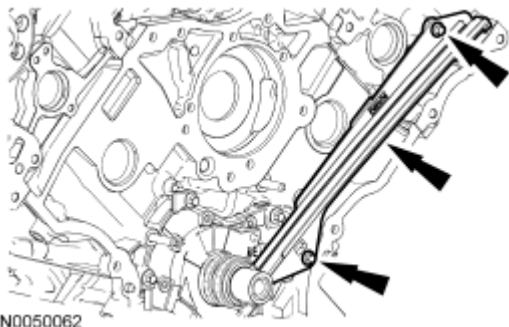
35. Position the camshaft sprocket timing marks as shown.



A0037294

Fig. 505: Identifying Camshaft Sprocket Timing Marks
Courtesy of FORD MOTOR CO.

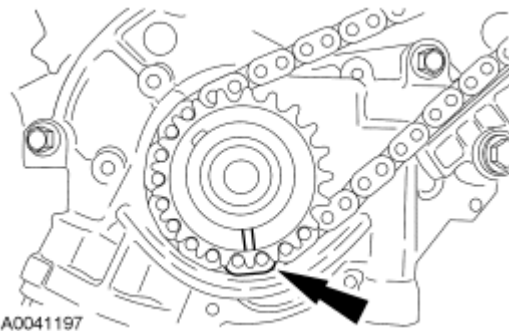
36. Install the LH primary timing chain guide and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).



N0050062

Fig. 506: Locating LH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

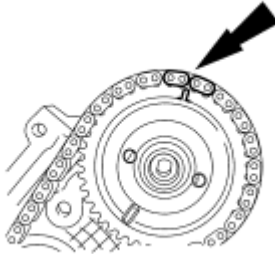
37. Position the LH (inner) timing chain onto the crankshaft sprocket, aligning the one colored link on the timing chain with the slot on the crankshaft sprocket.



A0041197

Fig. 507: Aligning Copper (Marked) Link With Timing Mark On Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

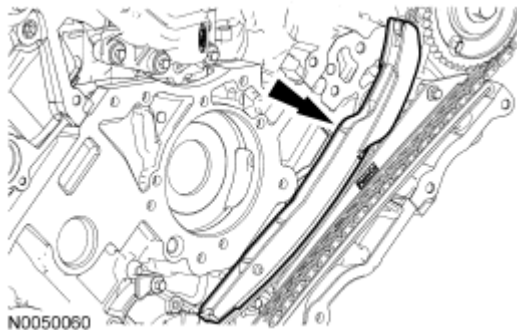
38. Install the LH timing chain on the camshaft sprocket, aligning the 2 colored links with the timing mark on the sprocket.



A0049191

Fig. 508: Aligning Timing Marks On Sprocket With Marked Chain Links
Courtesy of FORD MOTOR CO.

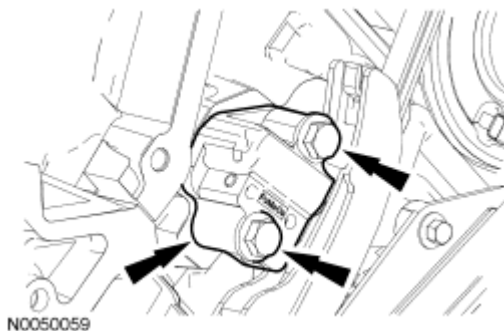
39. Install the LH primary timing chain tensioner arm.



N0050060

Fig. 509: Locating LH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

40. Install the LH primary timing chain tensioner and the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).
 - Remove the pin from the tensioner.



N0050059

Fig. 510: Locating LH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

41. Install the RH primary timing chain guide and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

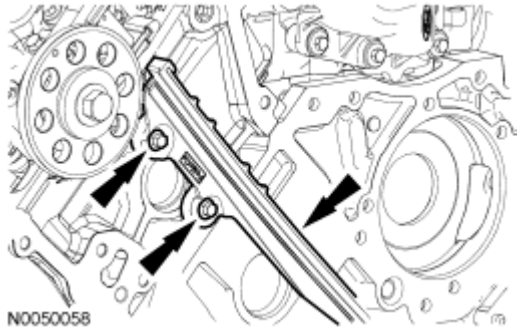


Fig. 511: Locating RH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

42. Position the RH (outer) timing chain on the crankshaft sprocket, aligning the colored link with the timing marks on the sprocket.

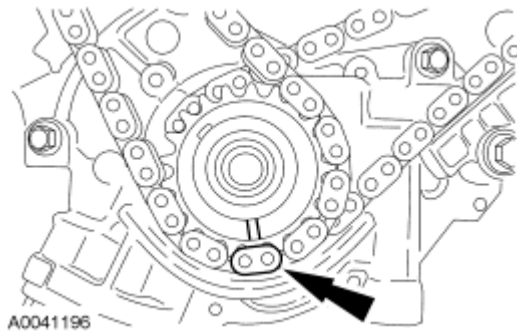


Fig. 512: Aligning Copper (Marked) Link With Timing Mark On Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

43. Install the RH timing chain on the camshaft sprocket, aligning the 2 colored links with the timing mark on the sprocket.

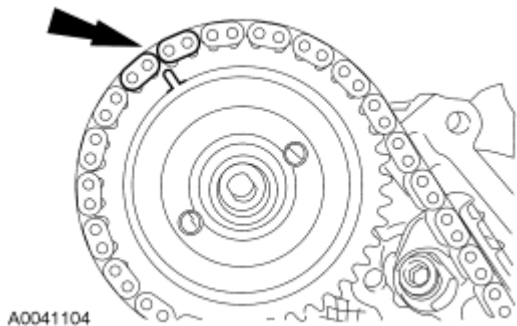


Fig. 513: Aligning Copper-Colored (Marked) Links With Camshaft Sprocket Timing Mark
Courtesy of FORD MOTOR CO.

44. Install the RH primary timing chain tensioner arm.

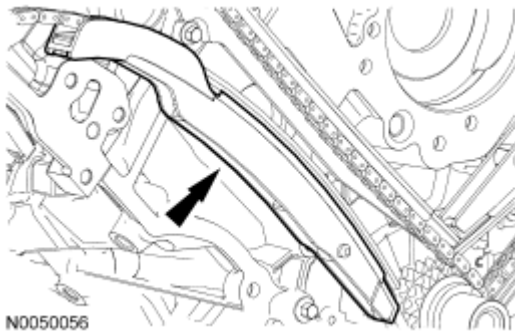


Fig. 514: Locating RH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

45. Install the RH primary timing chain tensioner and the 2 bolts.
- Tighten to 25 Nm (18 lb-ft).
 - Remove the pin from the tensioner.

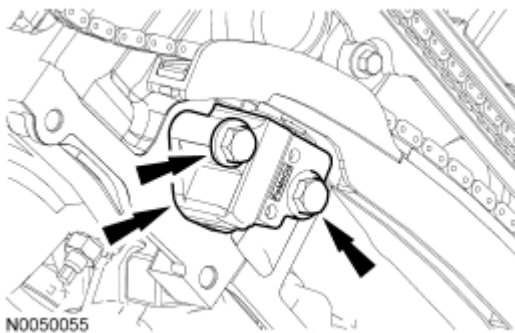


Fig. 515: Locating RH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

46. As a post-check, verify correct alignment of all timing marks. Make sure that the colored links are lined up with the marks on the crankshaft sprocket and the camshaft sprockets.

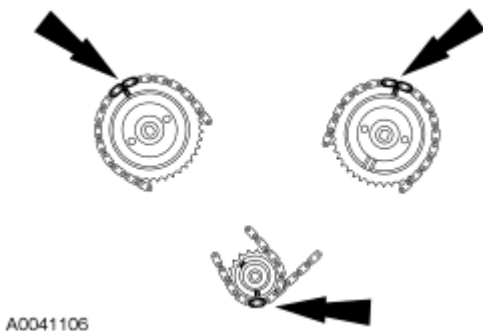


Fig. 516: Identifying Alignment Of All Timing Marks
Courtesy of FORD MOTOR CO.

47. Install the crankshaft washer.

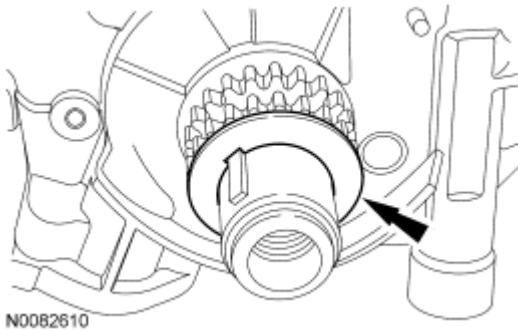


Fig. 517: Locating Crankshaft Washer
Courtesy of FORD MOTOR CO.

48. Install the crankshaft sensor ring.

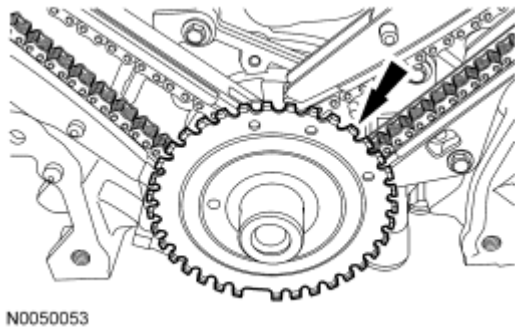


Fig. 518: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in their original positions or damage to the engine may occur.

49. Install the hydraulic lash adjusters.

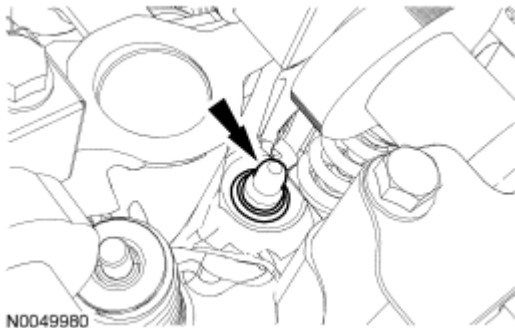


Fig. 519: Identifying Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

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



Fig. 520: Using Special Tool (303-452) To Compress Valve Springs
Courtesy of FORD MOTOR CO.

51. Repeat the previous step to install all the roller followers.

NOTE: RH shown, LH similar.

52. Install the 8 spark plugs.
- Tighten to 18 Nm (159 lb-in).

NOTE: If the engine front cover is not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface cleaner. Allow to dry until there is no sign of wetness or 4 minutes, whichever is longer. Failure to follow this procedure can result in future oil leakage.

53. Apply silicone gasket and sealant in the locations shown.

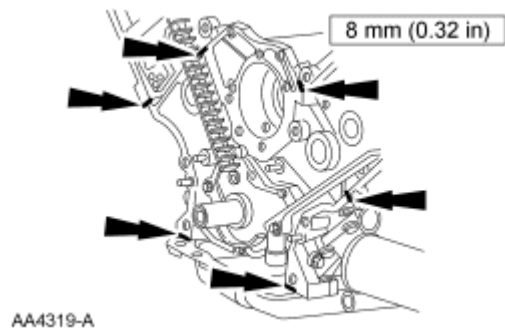


Fig. 521: Applying Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

54. Using new gaskets, install the engine front cover and the 16 bolts. Tighten the bolts in the sequence shown:

* Bolts 1 through 14 to 25 Nm (18 lb-ft).

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

* Bolts 15 and 16 to 50 Nm (37 lb-ft).

Item	Part Number	Description
1	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
2	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
3	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
4	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
5	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
6	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
7	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
8	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
9	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
10	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
11	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
12	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
13	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
14	N806177	Bolt, hex head pilot, M8 x 1.25 x 53

15	N606063	Bolt, hex flange head pilot, M10 x 1.50 x 55
16	N606063	Bolt, hex flange head pilot, M10 x 1.50 x 55

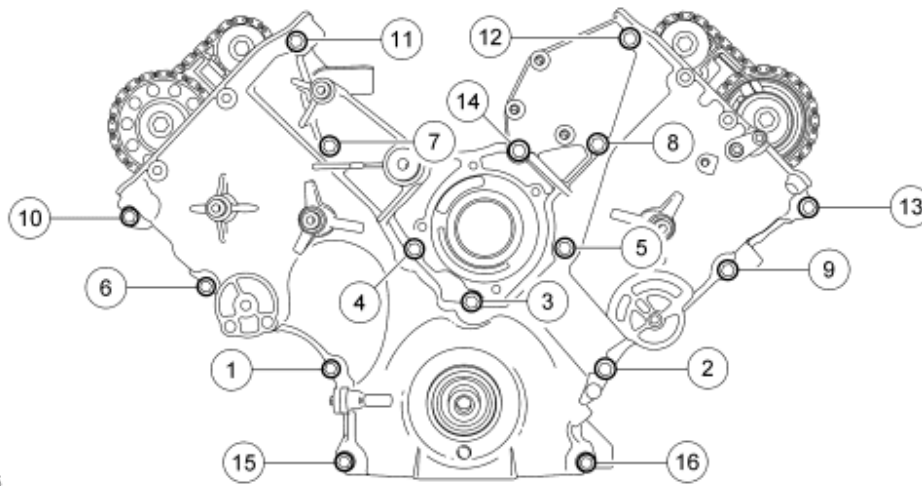


Fig. 522: Installing Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

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

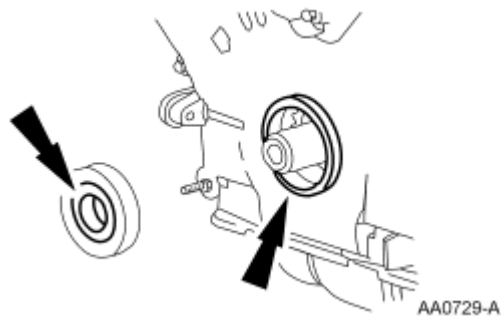


Fig. 523: Lubricating Engine Front Cover And Crankshaft Front Seal Inner Lip
Courtesy of FORD MOTOR CO.

56. Using the Crankshaft Vibration Damper Installer, Front Cover Oil Seal Installer and the Crankshaft Front Oil Seal Installer, install the crankshaft front seal.

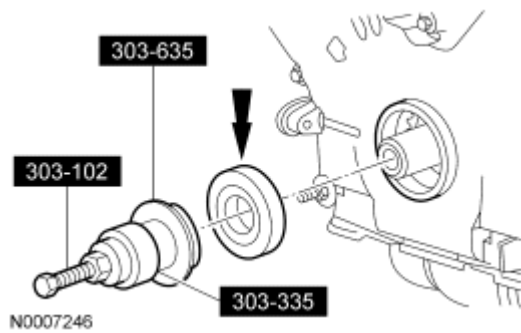


Fig. 524: Installing Crankshaft Front Seal Using Special Tools (303-102, 303-335, 303-635)
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

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

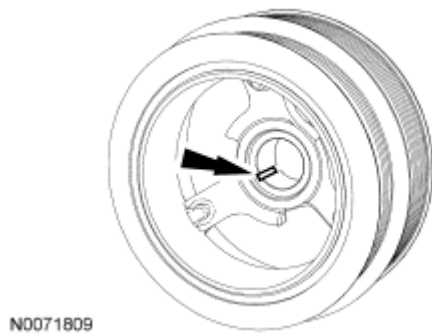


Fig. 525: Applying Silicone Gasket & Sealant To Woodruff Key Slot On Crankshaft Pulley
Courtesy of FORD MOTOR CO.

58. Lubricate the crankshaft pulley sealing surface with clean engine oil prior to installation.

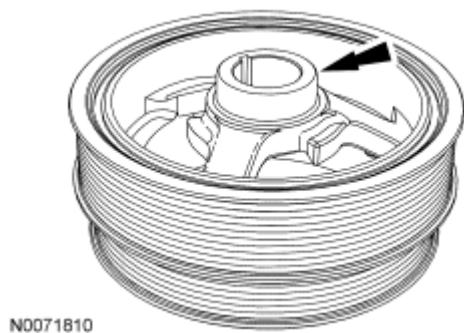


Fig. 526: Lubricating Crankshaft Pulley Sealing Surface With Clean Engine Oil Prior To Installation

Courtesy of FORD MOTOR CO.

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

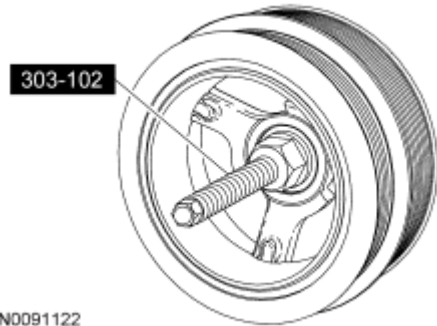


Fig. 527: Installing Crankshaft Pulley Using Crankshaft Vibration Damper Installer
Courtesy of FORD MOTOR CO.

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

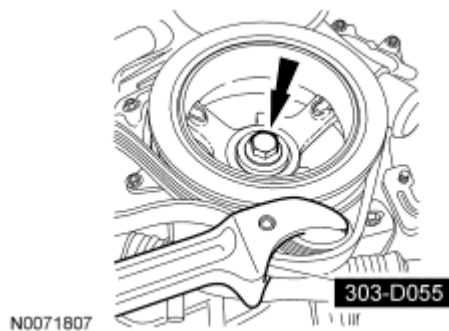


Fig. 528: Removing Crankshaft Pulley Bolt & Washer Using Strap Wrench
Courtesy of FORD MOTOR CO.

61. Install the coolant pump and the 4 bolts.
- Tighten to 25 Nm (18 lb-ft).

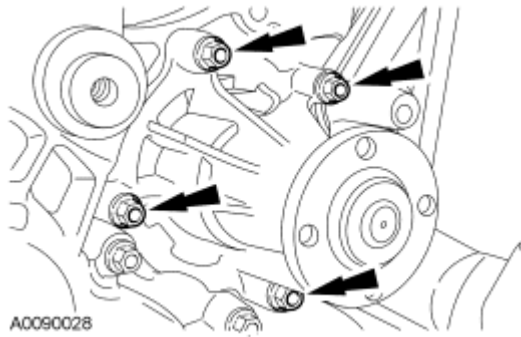


Fig. 529: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

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

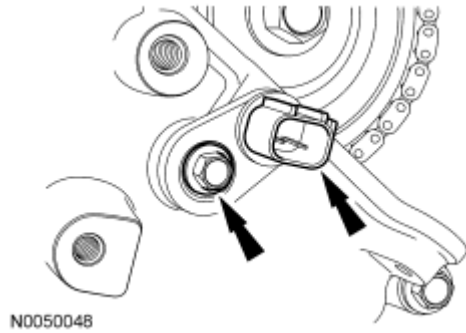


Fig. 530: Locating CMP Sensor Bolt
Courtesy of FORD MOTOR CO.

63. Install the Crankshaft Position (CKP) sensor and the bolt.
- Tighten to 10 Nm (89 lb-in).

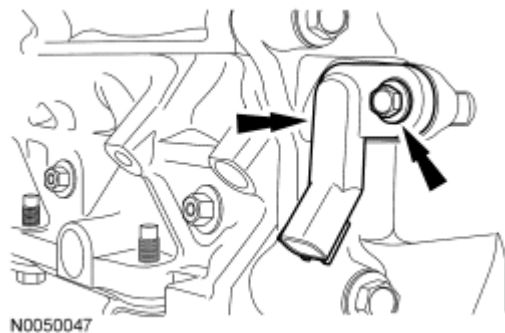
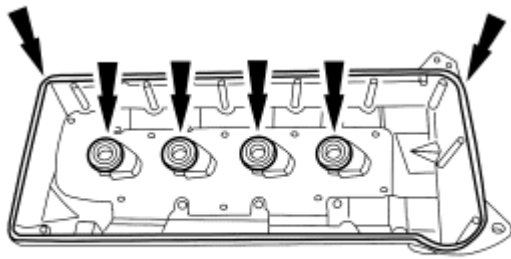


Fig. 531: Locating Crankshaft Position (CKP) Sensor Bolt
Courtesy of FORD MOTOR CO.

64. Install new gaskets. Make sure the gaskets are correctly seated on the valve cover.



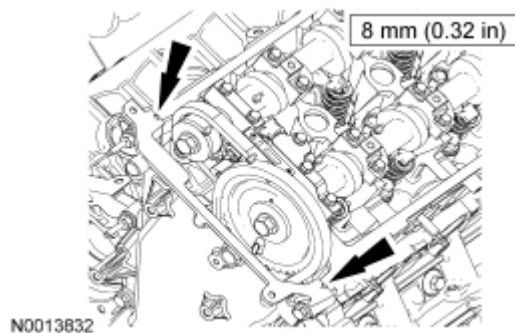
A0056221

Fig. 532: Locating Gaskets On Valve Cover
Courtesy of FORD MOTOR CO.

NOTE: If the valve covers are not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface cleaner. 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.

NOTE: LH shown, RH similar.

65. Apply silicone gasket and sealant to the engine front cover-to-cylinder block joints.



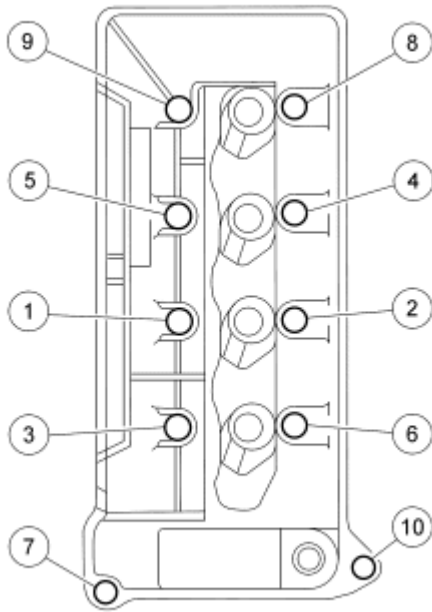
N0013832

Fig. 533: Applying Bead Of Silicone Gasket & Sealant In 2 Places Where Engine Front Cover Meets Cylinder Head
Courtesy of FORD MOTOR CO.

NOTE: If the valve covers are not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface cleaner. 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.

NOTE: RH shown, LH similar.

66. Install the valve covers, bolts and stud bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

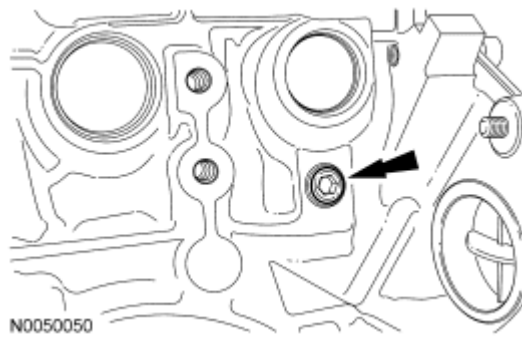


A0100043

Fig. 534: Tightening Valve Covers Bolts In Sequence
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

67. Install the LH and RH block drain plugs.
 - Tighten to 14 Nm (124 lb-in).



N0050050

Fig. 535: Locating LH & RH Block Drain Plugs
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the new oil level indicator tube O-ring seal with clean engine oil prior to installation.

68. Using a new O-ring seal, install the oil level indicator tube, bolt and oil level indicator.
 - Tighten to 10 Nm (89 lb-in).

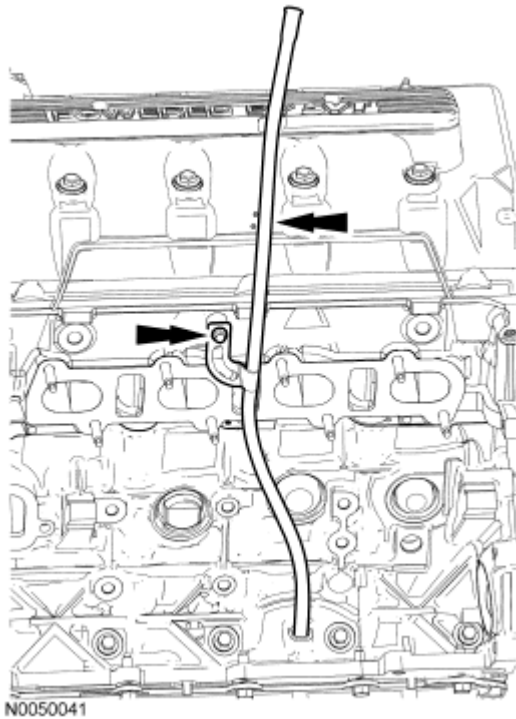


Fig. 536: Identifying Oil Level Indicator Tube & Bolt
Courtesy of FORD MOTOR CO.

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

69. Using a new gasket, install the oil filter adapter and the 8 bolts.
 - Tighten in the sequence shown:
 - Bolts 1 through 6 to 25 Nm (18 lb-ft).
 - Bolts 7 and 8 to 50 Nm (37 lb-ft).

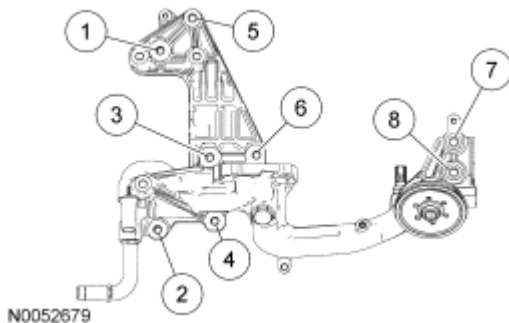


Fig. 537: Installing Oil Filter Adapter Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

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

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

70. Using new gaskets, install a new oil cooler and the 6 bolts.
- Tighten in the sequence shown to 10 Nm (89 lb-in).

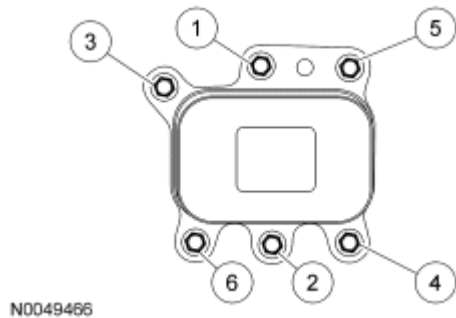


Fig. 538: Installing Oil Cooler Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

71. Install the coolant tube assembly and the 3 bolts.
- Tighten to 10 Nm (89 lb-in).

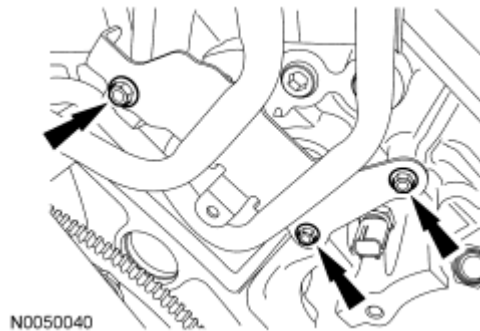


Fig. 539: Identifying Coolant Tube Assembly Bolts
Courtesy of FORD MOTOR CO.

72. Install the 3 coolant tube assembly bolts.
- Tighten to 10 Nm (89 lb-in).

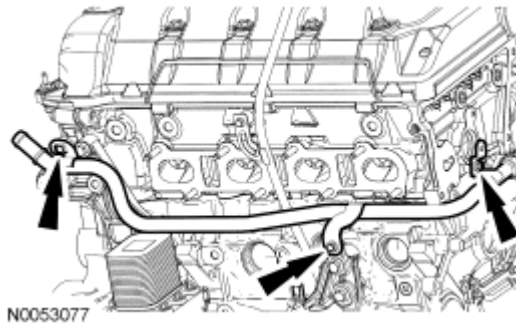


Fig. 540: Identifying Coolant Tube Assembly Bolts
Courtesy of FORD MOTOR CO.

73. Install 8 new LH exhaust manifold studs.
 - Tighten to 12 Nm (106 lb-in).
74. Install new gaskets, the LH exhaust manifold and 8 new nuts.
 - Tighten in the sequence shown to 20 Nm (177 lb-in).

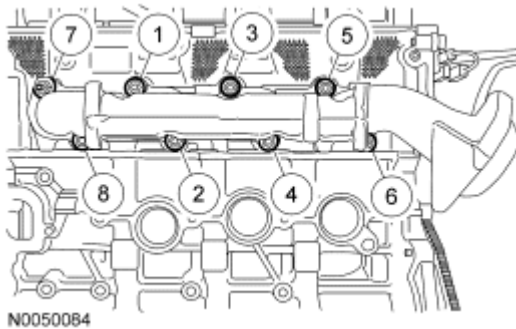


Fig. 541: Identifying LH Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

75. Install the LH engine support insulator bracket and the 4 bolts.
 - Tighten to 63 Nm (46 lb-ft).

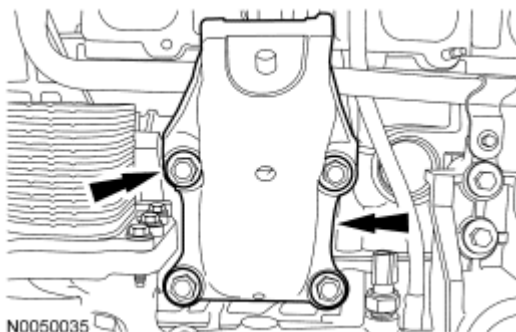


Fig. 542: Identifying LH Engine Support Insulator Bracket Bolts
Courtesy of FORD MOTOR CO.

76. Install 8 new RH exhaust manifold studs.
- Tighten to 12 Nm (106 lb-in).
77. Install new gaskets, the RH exhaust manifold and 8 new nuts.
- Tighten in the sequence shown to 20 Nm (177 lb-in).

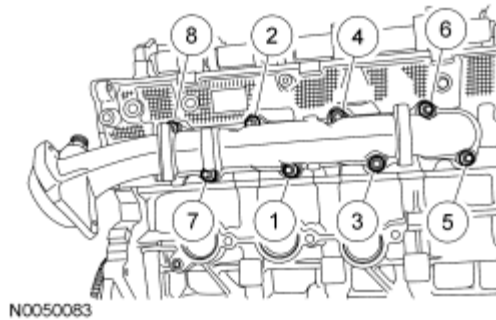


Fig. 543: Identifying RH Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

78. Install the RH engine support insulator bracket, the stud bolt, and the 3 bolts.
- Tighten to 63 Nm (46 lb-ft).

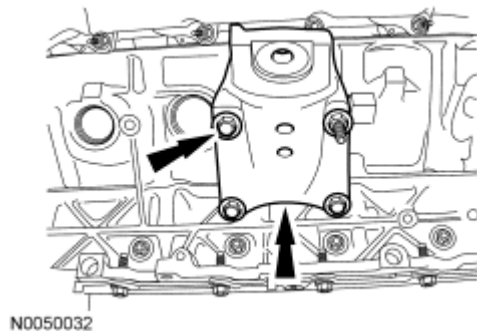


Fig. 544: Locating RH Engine Support Insulator Bracket Bolts & Stud Bolt
Courtesy of FORD MOTOR CO.

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

79. Using new intake manifold gaskets, install the intake manifold and the 14 bolts.
- Tighten in the sequence shown to 10 Nm (89 lb-in).

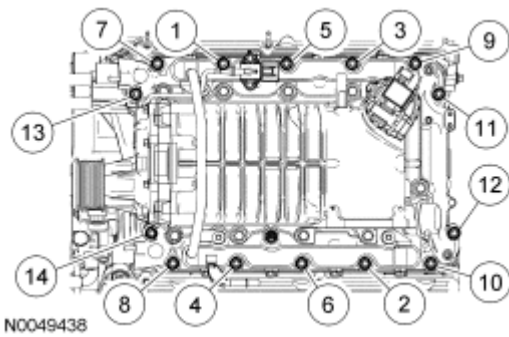


Fig. 545: Identifying Intake Manifold Gasket Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

80. Connect the intake manifold-to-coolant tube assembly hose.

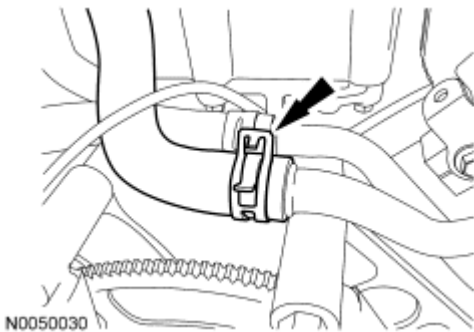


Fig. 546: Disconnecting Intake Manifold-To-Coolant Tube Assembly Hose
Courtesy of FORD MOTOR CO.

81. Position the wiring harness assembly onto the engine.

NOTE: Apply a light film of brake dielectric grease to the inside of the coil boots before installation.

82. Install the 4 LH coil-on-plugs.
- Connect the 4 LH coil-on-plug electrical connectors.

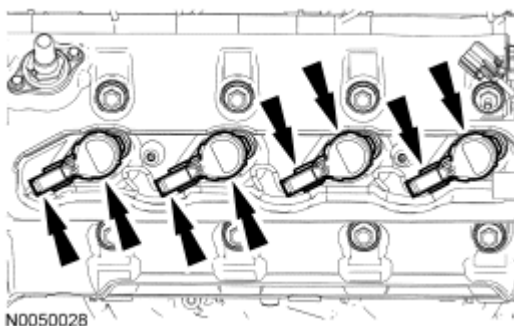
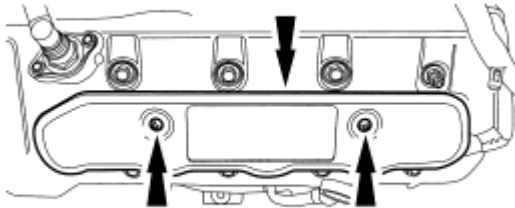


Fig. 547: Disconnecting LH Coil-On-Plug Electrical Connectors

Courtesy of FORD MOTOR CO.

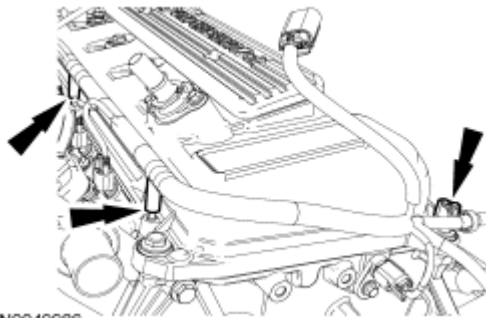
83. Install the LH coil-on-plug cover and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).



N0050027

Fig. 548: Locating LH Coil-On-Plug Cover Bolts
Courtesy of FORD MOTOR CO.

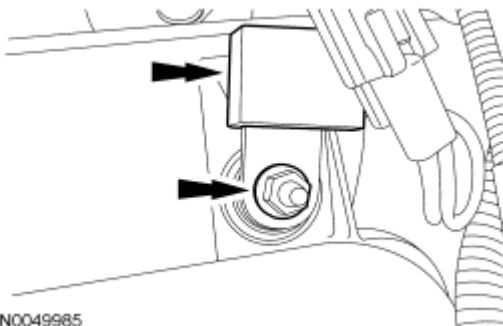
84. Attach the wiring harness retainers to the LH valve cover stud bolts.



N0049986

Fig. 549: Detaching Wiring Harness Retainers From LH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

85. Install the LH radio interference capacitor and the nut.
- Tighten to 10 Nm (89 lb-in).



N0049985

Fig. 550: Locating LH Radio Interference Capacitor Nut

Courtesy of FORD MOTOR CO.

86. Connect the 4 LH fuel injector electrical connectors.

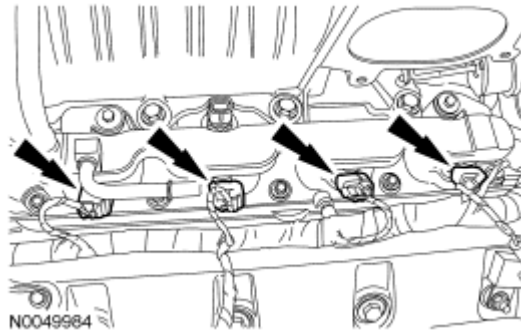


Fig. 551: Locating LH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

87. Connect the Intake Air Temperature 2 (IAT2) sensor electrical connector.

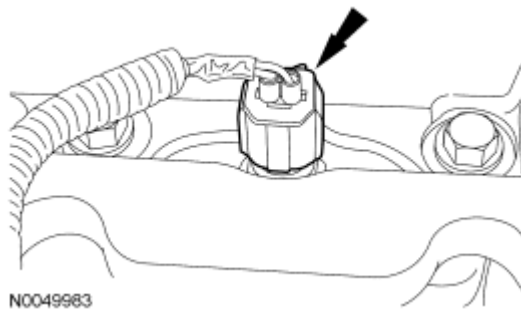


Fig. 552: Locating Intake Air Temperature (IAT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

88. Connect the CMP sensor electrical connector.

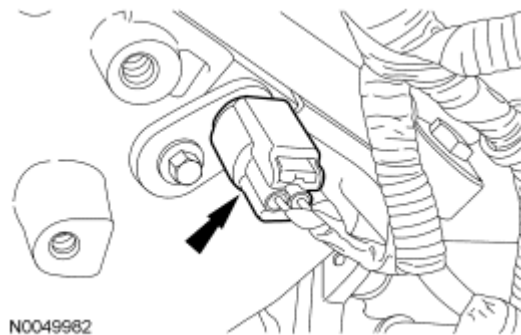


Fig. 553: Locating Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

89. Connect the Engine Oil Pressure (EOP) switch electrical connector and the 2 wiring harness pin-type

retainers.

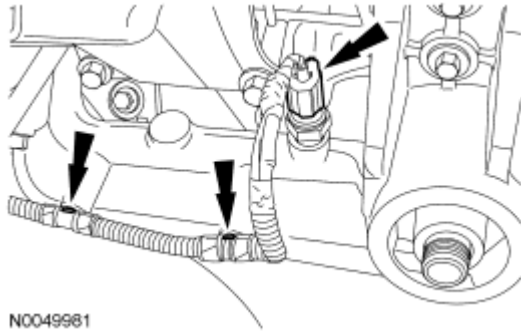


Fig. 554: Locating Engine Oil Pressure (EOP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: Apply a light film of brake dielectric grease to the inside of the coil boots before installation.

90. Install the 4 RH coil-on-plugs.
- Connect the 4 RH coil-on-plug electrical connectors.

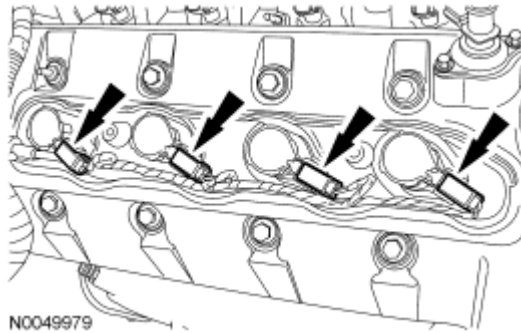


Fig. 555: Locating RH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

91. Install the RH coil-on-plug cover, bolt and stud bolt.
- Tighten to 10 Nm (89 lb-in).

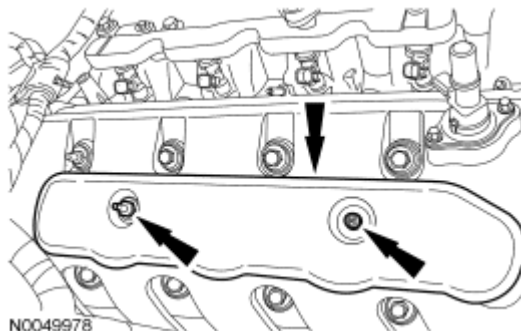


Fig. 556: Locating RH Coil-On-Plug Cover Bolt & Stud Bolt
Courtesy of FORD MOTOR CO.

92. Attach the wiring harness retainers to the RH valve cover stud bolts.

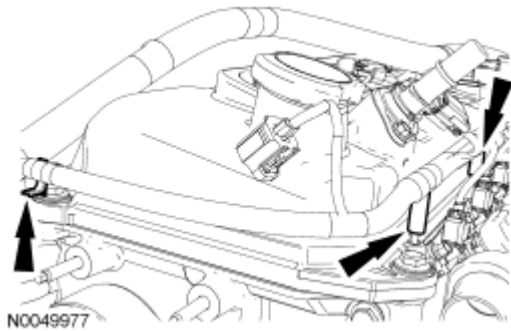


Fig. 557: Detaching Wiring Harness Retainers From RH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

93. Attach the wiring harness to the RH coil-on-plug cover stud bolt.

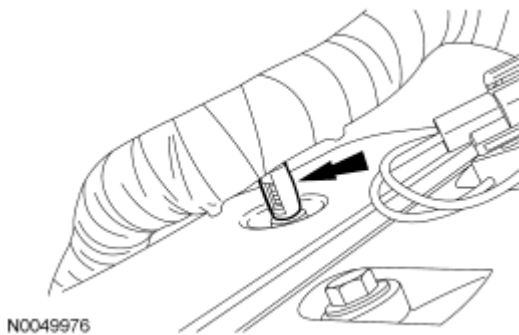


Fig. 558: Detaching Wiring Harness From RH Coil-On-Plug Cover Stud Bolt
Courtesy of FORD MOTOR CO.

94. Connect the EGR valve electrical connector.

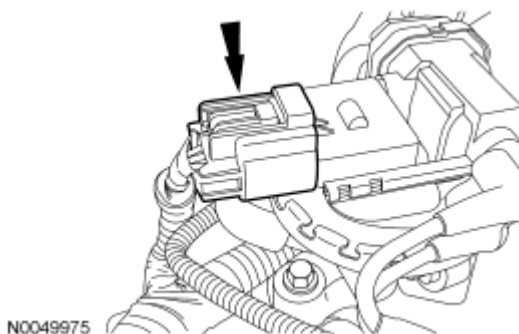


Fig. 559: Disconnecting EGR Valve Electrical Connector
Courtesy of FORD MOTOR CO.

95. Install the RH radio interference capacitor and the nut.
- Tighten to 10 Nm (89 lb-in).

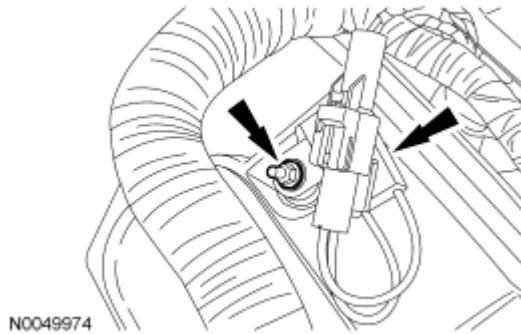


Fig. 560: Removing Nut & RH Radio Interference Capacitor
Courtesy of FORD MOTOR CO.

96. Connect the fuel rail pressure and temperature sensor electrical connector.

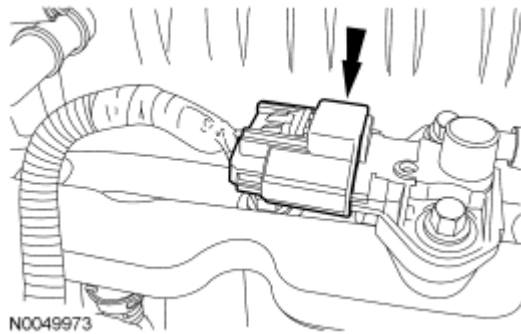


Fig. 561: Locating Fuel Rail Pressure & Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

97. Connect the 4 RH fuel injector electrical connectors.

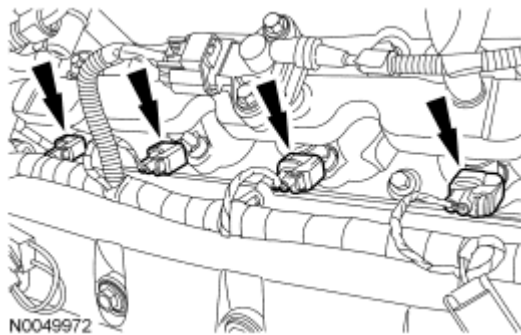


Fig. 562: Locating RH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

98. Connect the PCV valve electrical connector.

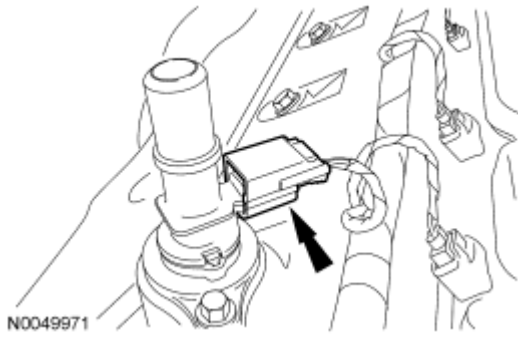


Fig. 563: Locating Positive Crankcase Ventilation (PCV) Valve Electrical Connector
Courtesy of FORD MOTOR CO.

99. Attach the 2 wiring harness pin-type retainers.

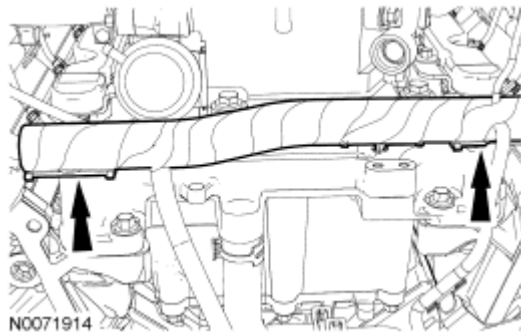


Fig. 564: Locating Wiring Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

100. Install the wiring harness retaining bracket and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

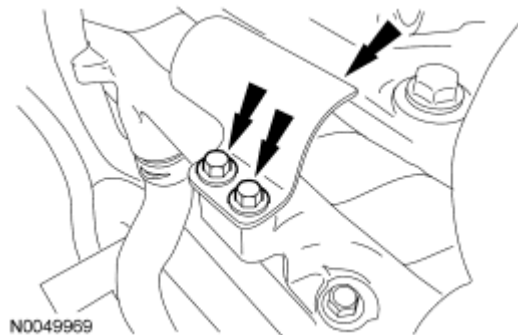


Fig. 565: Locating Wiring Harness Retaining Bracket & Bolts
Courtesy of FORD MOTOR CO.

101. Connect the bubbler tube from the Supercharger (SC).

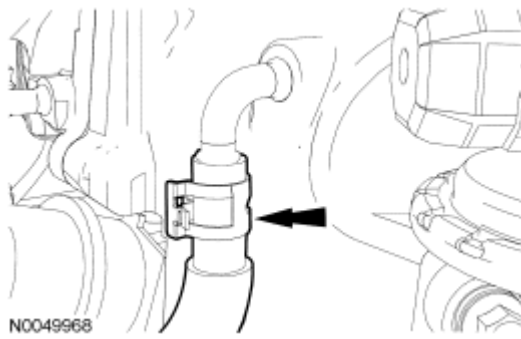


Fig. 566: Disconnecting Bubbler Tube From SC
Courtesy of FORD MOTOR CO.

102. Connect the LH Heated Oxygen Sensor (HO2S) electrical connector and pin-type retainer.

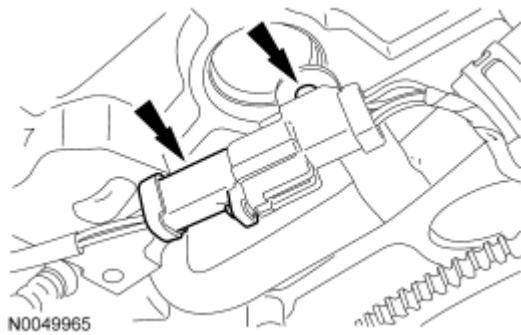


Fig. 567: Locating LH Heated Oxygen Sensor (HO2S) Electrical Connector & Pin-Type Retainer
Courtesy of FORD MOTOR CO.

103. Attach the 2 wiring harness pin-type retainers (1 shown) to the coolant tube assembly bracket.

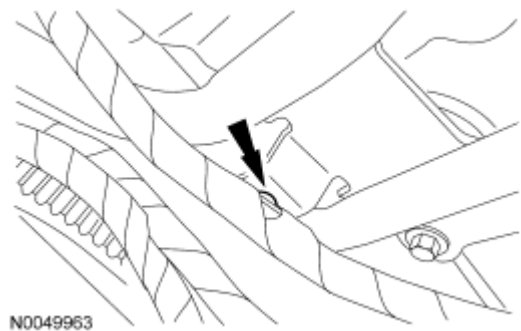


Fig. 568: Detaching Wiring Harness Pin-Type Retainer From Coolant Tube Assembly Bracket
Courtesy of FORD MOTOR CO.

104. Connect the Cylinder Head Temperature (CHT) sensor electrical connector.

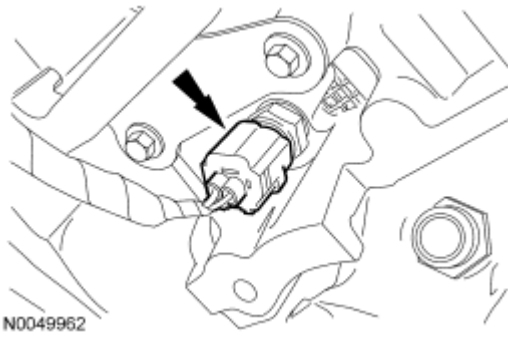


Fig. 569: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

105. Install a new gasket, the Throttle Body (TB) and spacer assembly and the 4 bolts.
- Tighten to 10 Nm (89 lb-in).

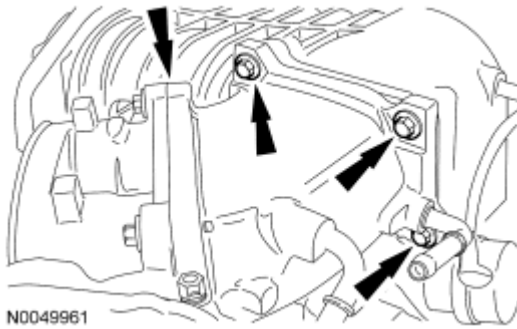


Fig. 570: Locating TB & Spacer Assembly Bolts
Courtesy of FORD MOTOR CO.

106. Connect the electronic throttle control electrical connector.

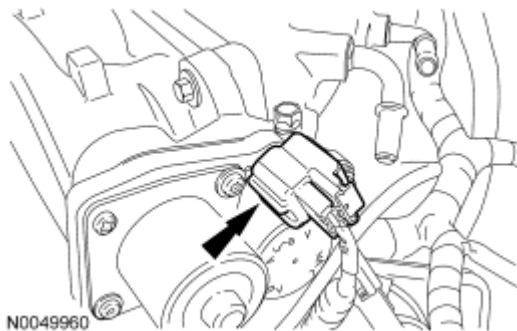


Fig. 571: Locating Throttle Body (TB) Control Electrical Connector
Courtesy of FORD MOTOR CO.

107. Connect the Throttle Position (TP) sensor electrical connector.

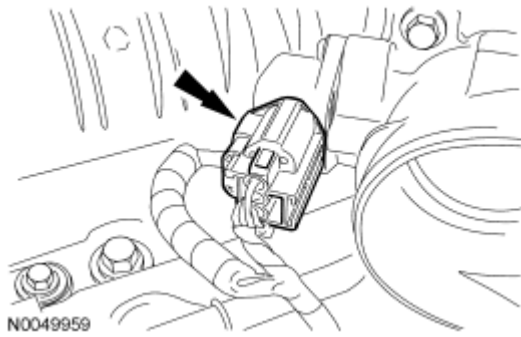


Fig. 572: Locating Throttle Position (TP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

108. Install and connect the crankcase ventilation tube.

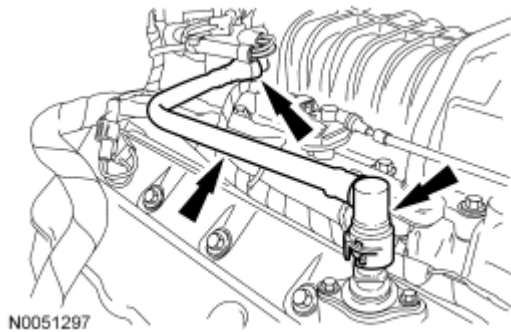


Fig. 573: Locating Crankcase Ventilation Tube
Courtesy of FORD MOTOR CO.

109. Install the EGR tube.

- Tighten to 40 Nm (30 lb-ft).

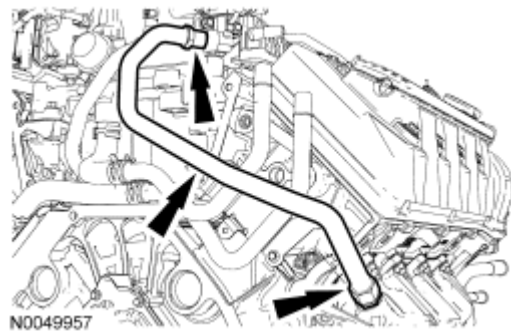


Fig. 574: Locating Exhaust Gas Recirculation (EGR) Tube Fittings
Courtesy of FORD MOTOR CO.

110. Install the 3 SC drive belt idler pulleys and the 3 bolts.

- Tighten the heavy load idler pulley (closest to centerline of engine) to 48 Nm (35 lb-ft).
- Tighten the smooth idler pulley and the grooved idler pulley to 25 Nm (18 lb-ft).

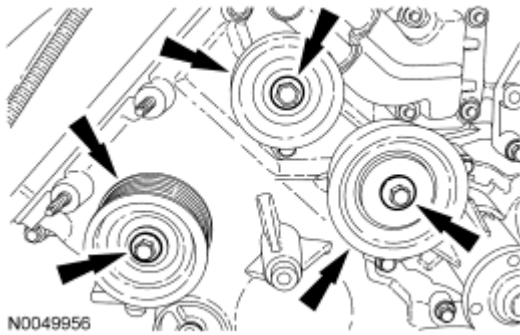


Fig. 575: Locating SC Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

111. Install the coolant pump pulley and install the 4 bolts hand-tight.

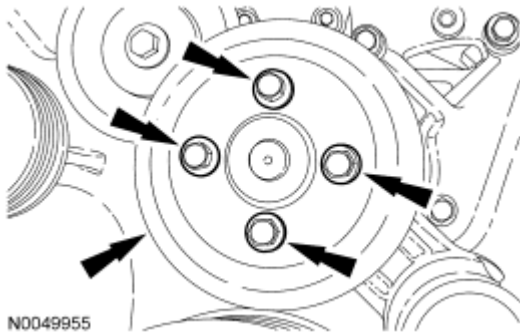


Fig. 576: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

112. Install the accessory drive belt idler pulley (grooved) and the bolt.
- Tighten to 25 Nm (18 lb-ft).

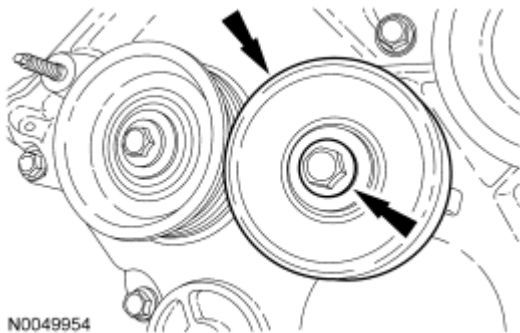


Fig. 577: Locating Accessory Drive Belt Idler Pulley Bolt
Courtesy of FORD MOTOR CO.

113. Install the accessory drive belt idler pulley (smooth) and the stud bolt.
- Tighten to 25 Nm (18 lb-ft).

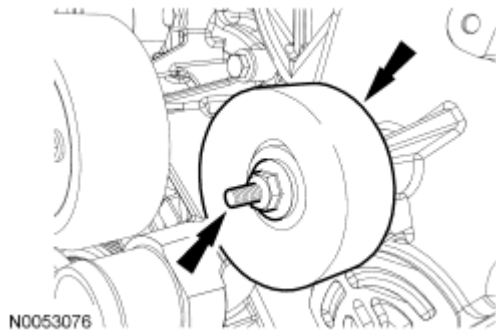


Fig. 578: Locating Stud Bolt & Accessory Drive Belt Idler Pulley
Courtesy of FORD MOTOR CO.

114. Install the accessory drive belt tensioner and the bolt.
- Tighten to 25 Nm (18 lb-ft).

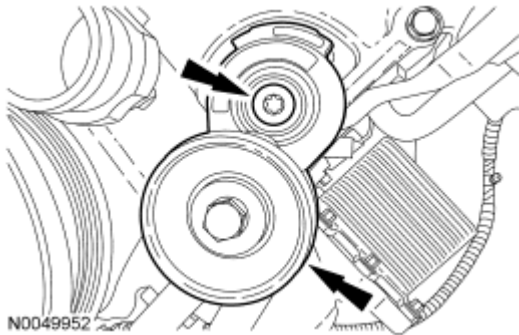
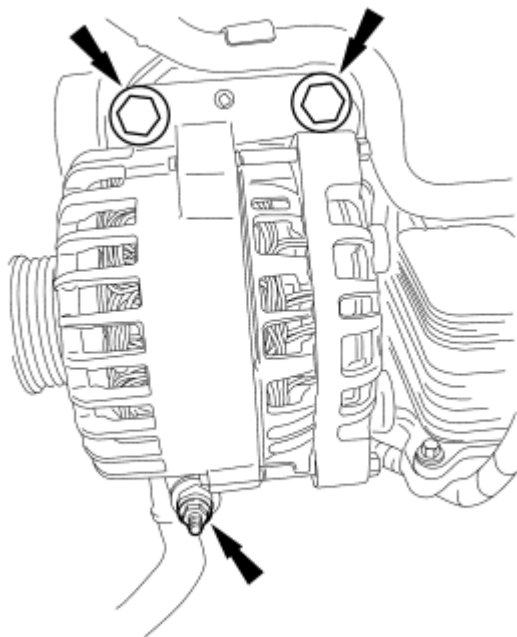


Fig. 579: Locating Accessory Drive Belt Tensioner Bolt
Courtesy of FORD MOTOR CO.

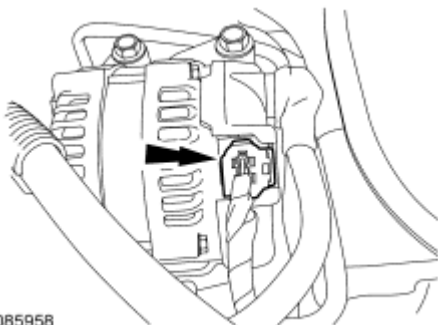
115. Install the generator, 2 bolts and the stud bolt.
- Tighten to 50 Nm (37 lb-ft).



N0049951

Fig. 580: Locating Stud Bolt, Bolts & Alternator
Courtesy of FORD MOTOR CO.

116. Connect the generator electrical connector.



N0085958

Fig. 581: Locating Generator Electrical Connector
Courtesy of FORD MOTOR CO.

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

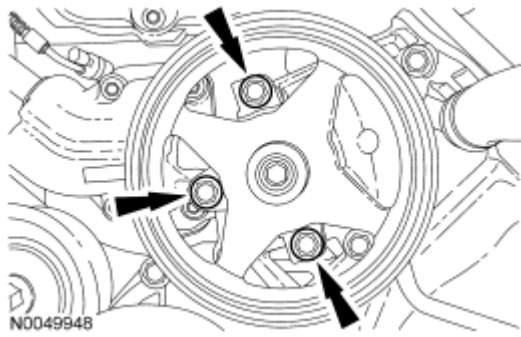


Fig. 582: Locating Power Steering Pump & Reservoir Assembly Bolts
Courtesy of FORD MOTOR CO.

118. Install the power steering reservoir bracket bolts.
- Tighten to 25 Nm (18 lb-ft).

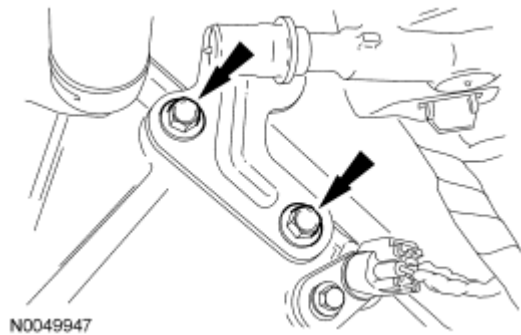


Fig. 583: Locating Power Steering Reservoir Bracket Bolts
Courtesy of FORD MOTOR CO.

119. Install the power steering tube bracket bolt.
- Tighten to 10 Nm (89 lb-in).

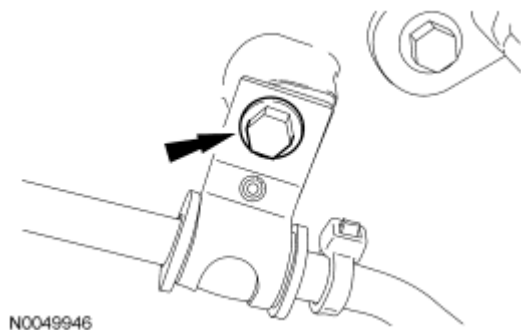


Fig. 584: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

120. Install the power steering tube bracket nut.
- Tighten to 10 Nm (89 lb-in).

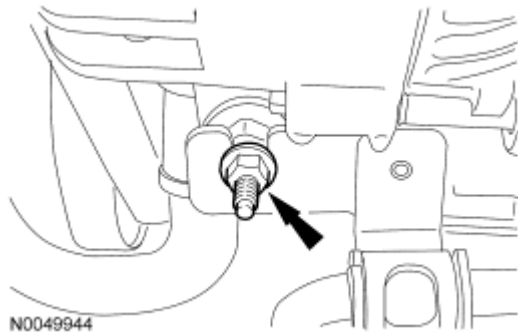


Fig. 585: Locating Power Steering Tube Bracket Nut
Courtesy of FORD MOTOR CO.

121. Position the SC drive belt and install the SC drive belt tensioner and bolt.
- Tighten to 48 Nm (35 lb-ft).

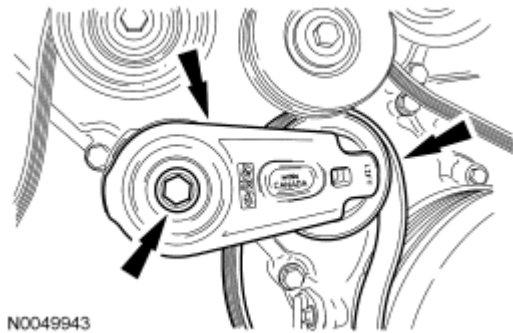


Fig. 586: Locating Bolt, Supercharger (SC) Drive Belt Tensioner & SC Drive Belt
Courtesy of FORD MOTOR CO.

122. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt.

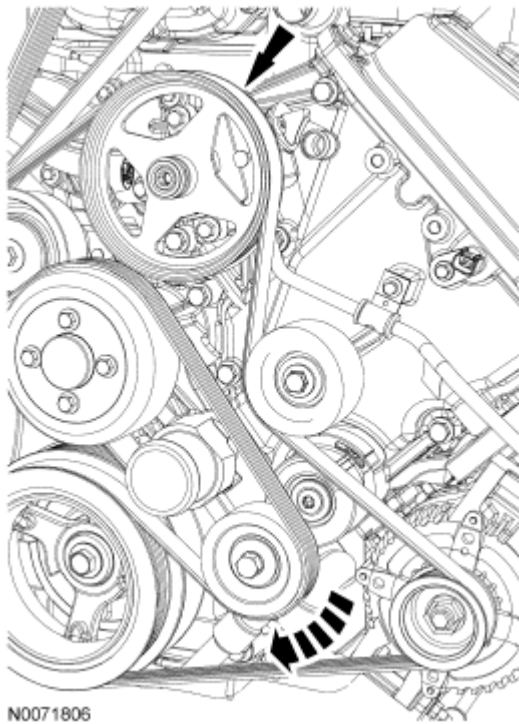


Fig. 587: Rotating Accessory Drive Belt Tensioner Clockwise & Removing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

123. Tighten the 4 coolant pump pulley bolts to 25 Nm (18 lb-ft).

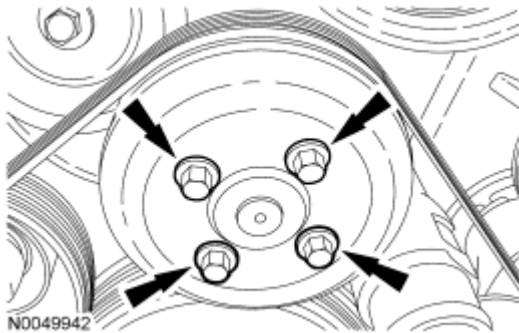


Fig. 588: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

124. Connect the coolant hose from the Charge Air Cooler (CAC).

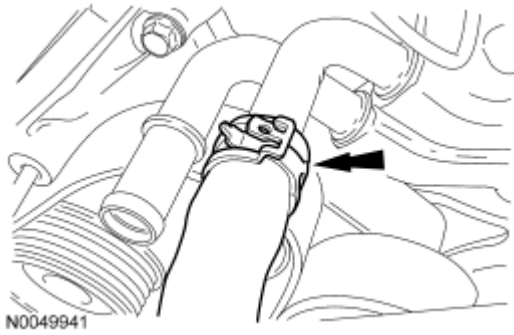


Fig. 589: Locating Coolant Hose From Charge Air Cooler (CAC)
Courtesy of FORD MOTOR CO.

125. Install the thermostat housing assembly and the 2 nuts.
- Tighten to 25 Nm (18 lb-ft).

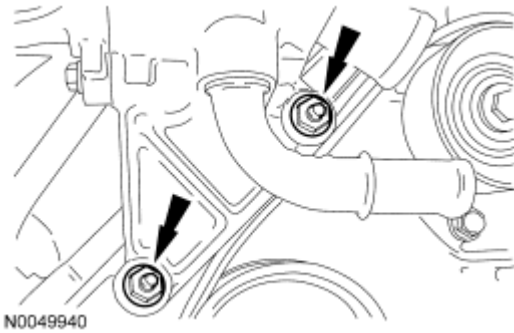


Fig. 590: Locating Thermostat Housing Assembly Nuts
Courtesy of FORD MOTOR CO.

126. Connect the Engine Coolant Temperature (ECT) sensor electrical connector.

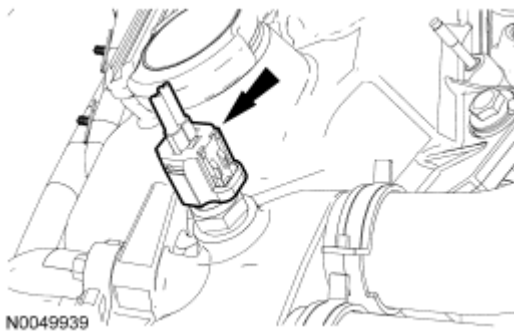


Fig. 591: Locating Engine Coolant Temperature (ECT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

127. Connect the 2 upper radiator hoses to the intake manifold.

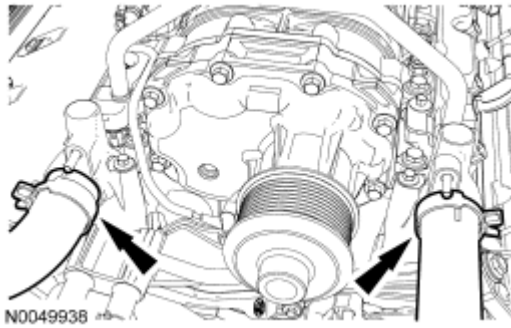


Fig. 592: Locating Upper Radiator Hoses From Intake Manifold
Courtesy of FORD MOTOR CO.

128. Connect the 2 coolant vent hoses to the intake manifold.

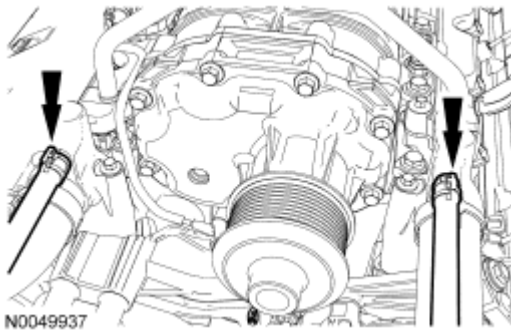


Fig. 593: Locating Coolant Vent Hoses From The Intake Manifold
Courtesy of FORD MOTOR CO.

129. Install the coolant tube bracket nut.
- Tighten to 9 Nm (80 lb-in).

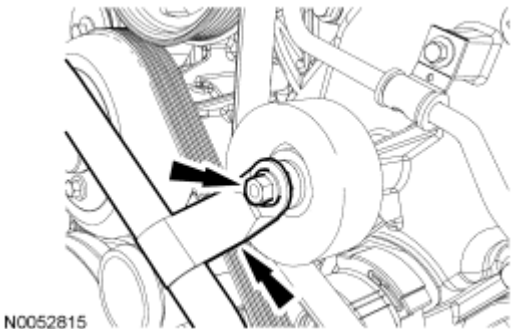


Fig. 594: Locating Coolant Tube Bracket Nut
Courtesy of FORD MOTOR CO.

130. Connect the coolant hose to the thermostat housing.

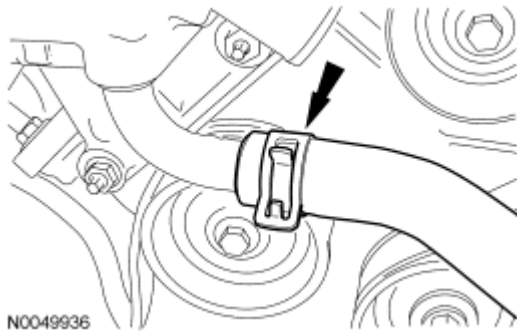


Fig. 595: Locating Coolant Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

131. Install the Engine Lifting Bracket.

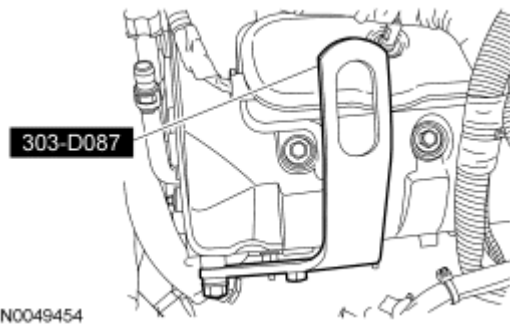


Fig. 596: Identifying Special Tool (303-D087)
Courtesy of FORD MOTOR CO.

132. Install the Engine Lifting Bracket.

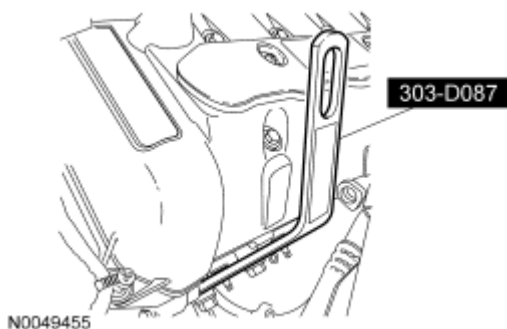


Fig. 597: Identifying Special Tool (303-D087)
Courtesy of FORD MOTOR CO.

133. Using the Heavy Duty Floor Crane and the Engine Lifting Bracket, remove the engine from the work stand.

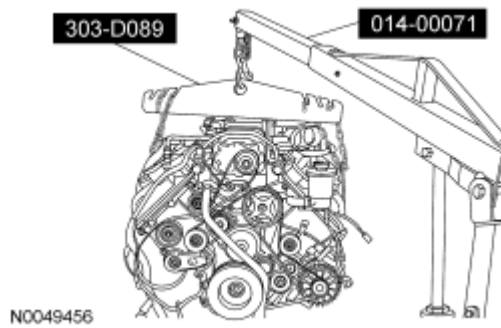


Fig. 598: Removing Engine From Work Stand Using Special Tools (303-D089) & (014-00071)
Courtesy of FORD MOTOR CO.

134. Apply a 4 mm (0.15 in) bead of silicone gasket and sealant to the rear crankshaft seal retainer mating surface on the engine block.

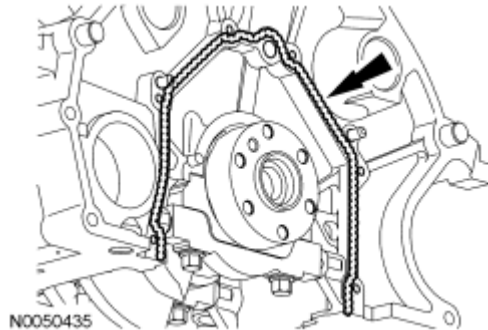


Fig. 599: Applying Bead Of Gasket Maker To Rear Crankshaft Seal Retainer
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

135. Install the crankshaft rear seal retainer plate and the 6 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

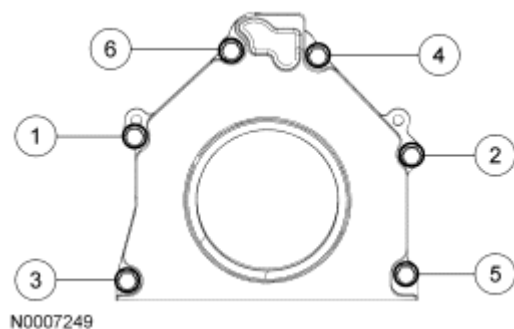


Fig. 600: Tightening Sequence Of Crankshaft Rear Seal Retainer Plate Bolts
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the inner lip of the crankshaft rear seal with clean engine oil.

136. Using the Crankshaft Rear Oil Seal Installers, install the crankshaft rear seal.

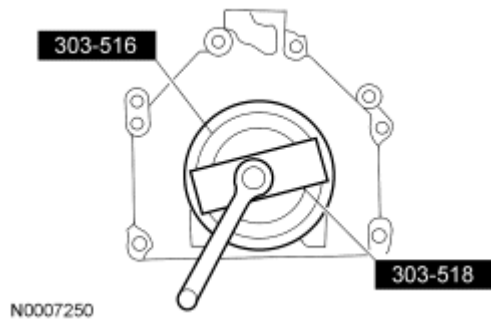


Fig. 601: Using Special Tools To Install New Crankshaft Rear Seal
Courtesy of FORD MOTOR CO.

137. Using the Crankshaft Rear Oil Seal Installers and the Crankshaft Rear Oil Slinger Installer, install the crankshaft rear seal.

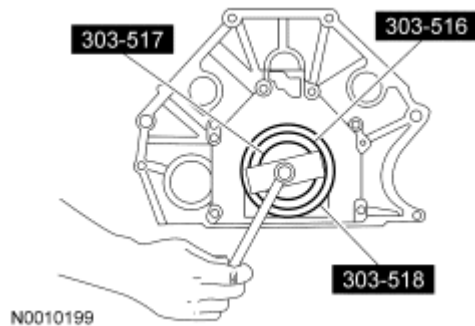


Fig. 602: Installing Crankshaft Rear Oil Slinger Using Special Tools
Courtesy of FORD MOTOR CO.

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

138. Inspect the oil pan. Clean the mating surface for the oil pan with silicone gasket remover and metal surface prep. Follow the directions on the packaging.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging.

Failure to follow this procedure can cause future oil leakage.

139. Apply silicone gasket and sealant at the engine front cover-to-cylinder block sealing joints and the crankshaft rear seal retainer plate-to-cylinder block sealing joints.

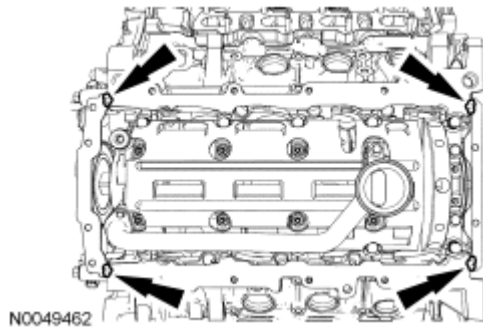


Fig. 603: Applying Silicone Gasket & Sealant At Engine Front Cover-To-Cylinder Block Sealing Joints
 Courtesy of FORD MOTOR CO.

140. Using a new gasket, install the oil pan, 14 bolts and 2 stud bolts.
- Tighten in the sequence shown to 25 Nm (18 lb-ft).

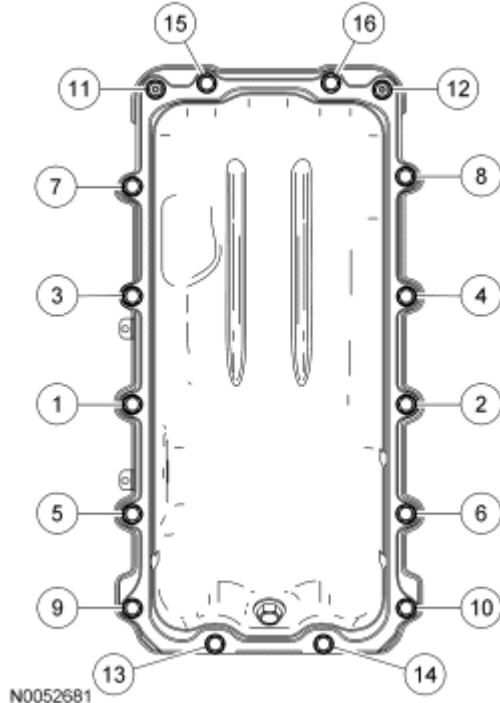


Fig. 604: Installing Oil Pan Bolts & Stud Bolts In Sequence
 Courtesy of FORD MOTOR CO.

141. Install the engine/transmission spacer plate.

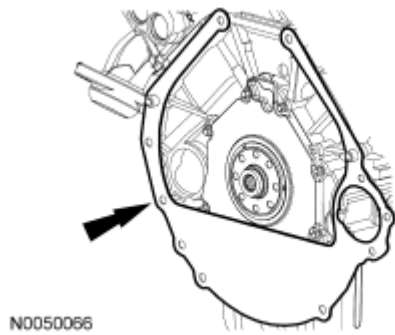


Fig. 605: Locating Engine/Transmission Spacer Plate
Courtesy of FORD MOTOR CO.

142. Position the flywheel on the crankshaft pilot and start the 8 flywheel bolts.
143. Tighten the flywheel bolts evenly in the sequence shown to fully seat the flywheel on the crankshaft pilot.
 - Tighten to 80 Nm (59 lb-ft).

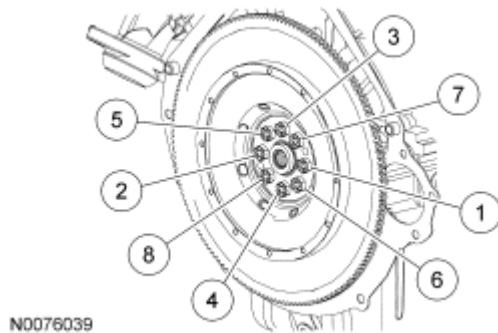


Fig. 606: Tightening Flywheel Bolts Evenly In Sequence
Courtesy of FORD MOTOR CO.

INSTALLATION

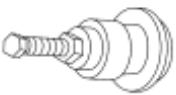
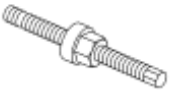
CYLINDER HEAD

Special Tools

Illustration	Tool Name	Tool Number
 ST1718-A	Compressor, Valve Spring	303-452 (T93P-6565-AR)
	Heavy Duty Floor Crane	014-00071 or equivalent

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

 ST1341-A		
 ST1335-A	Holding Tool, Crankshaft	303-448 (T93P-6303-A)
 ST1328-A	Installer, Front Cover Oil Seal	303-335 (T88T-6701-A)
 ST2197-A	Installer, Crankshaft Front Oil Seal	303-635
 ST1287-A	Installer, Crankshaft Vibration Damper	303-102 (T74P-6316-B)
 ST1602-A	Lifting Bracket, Engine	303-D089 (D93P-6001-A3) or equivalent
 ST1603-A	Lifting Bracket, Engine (2 required)	303-D087 (D93P-6001-A1) or equivalent
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

Material

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

Item	Specification
Motorcraft Metal Surface Prep ZC-31-A	-
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-

Both cylinder heads

- NOTE:** The gasket sealing surfaces on the cylinder head and the cylinder block must be clean. Failure to follow these instructions may result in engine damage. For additional information, refer to Cylinder Head.
- NOTE:** The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry. Failure to follow these instructions may result in engine damage.
- NOTE:** The new gasket has a film coating which is crucial to the gasket's ability to seal correctly. Do not scratch the gasket.
- NOTE:** RH head gasket shown, LH head gasket similar.

1. Install the head gasket over the dowel pins.

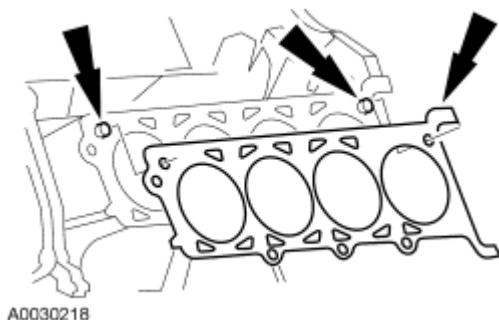


Fig. 607: Head Gasket & Dowel Pins
Courtesy of FORD MOTOR CO.

- NOTE:** Cylinder head machining or milling is not authorized by the Ford Motor Company. Cylinder head flatness must be within 0.0254 mm (0.001 in)

across a 38.1 mm (1.5 in) square area. Failure to follow these instructions may result in engine damage.

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

NOTE: The use of sealing aids (aviation cement, copper spray and glue) is not permitted. The gasket must be installed dry. Failure to follow these instructions may result in engine damage.

NOTE: Do not allow the dowels to scratch the sealing surface of the cylinder head during cylinder head installation. Failure to follow these instructions may result in engine damage.

NOTE: LH shown, RH similar.

2. Install the cylinder head on the dowels and the head gasket.
 - Loosely install the new bolts.

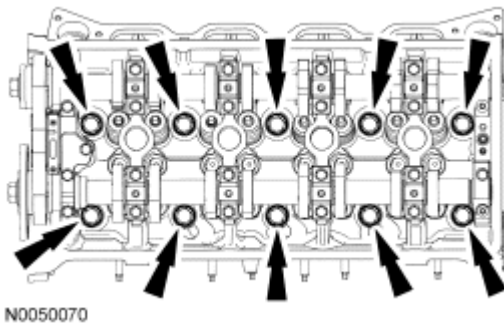


Fig. 608: Identifying Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

RH cylinder head

3. Tighten the new cylinder head bolts in 5 stages in the sequence shown.
 - Stage 1: Tighten to 20 Nm (177 lb-in).
 - Stage 2: Tighten to 50 Nm (37 lb-ft).
 - Stage 3: Tighten to 80 Nm (59 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.
 - Stage 5: Tighten an additional 90 degrees.

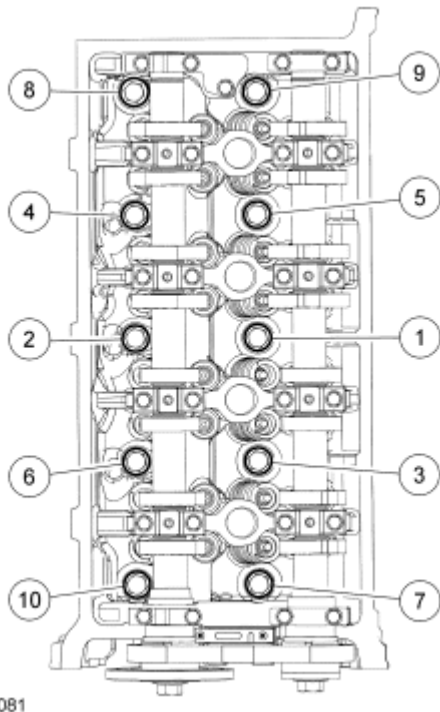


Fig. 609: Tightening New Cylinder Head Bolts In Sequence
Courtesy of FORD MOTOR CO.

4. Install the 3 coolant tube assembly bolts.
 - Tighten 10 Nm (89 lb-in).

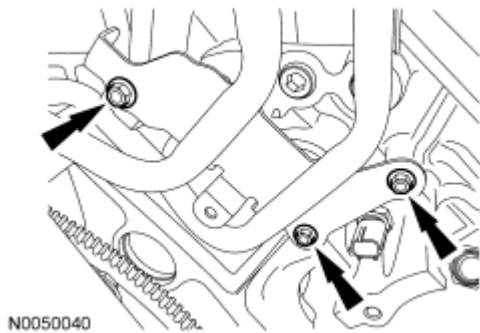


Fig. 610: Identifying Coolant Tube Assembly Bolts
Courtesy of FORD MOTOR CO.

5. Install 8 new RH exhaust manifold studs.
 - Tighten to 12 Nm (106 lb-in).
6. Install new RH exhaust manifold gaskets, the RH exhaust manifold and 8 new nuts.
 - Tighten in the sequence shown to 20 Nm (177 lb-in).

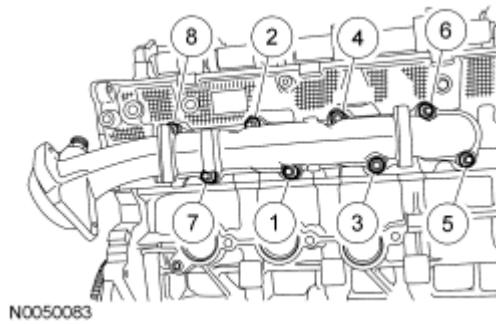


Fig. 611: Identifying RH Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

LH cylinder head

7. Tighten the new cylinder head bolts in 5 stages in the sequence shown.
 - Stage 1: Tighten to 20 Nm (177 lb-in).
 - Stage 2: Tighten to 50 Nm (37 lb-ft).
 - Stage 3: Tighten to 80 Nm (59 lb-ft).
 - Stage 4: Tighten an additional 90 degrees.
 - Stage 5: Tighten an additional 90 degrees.

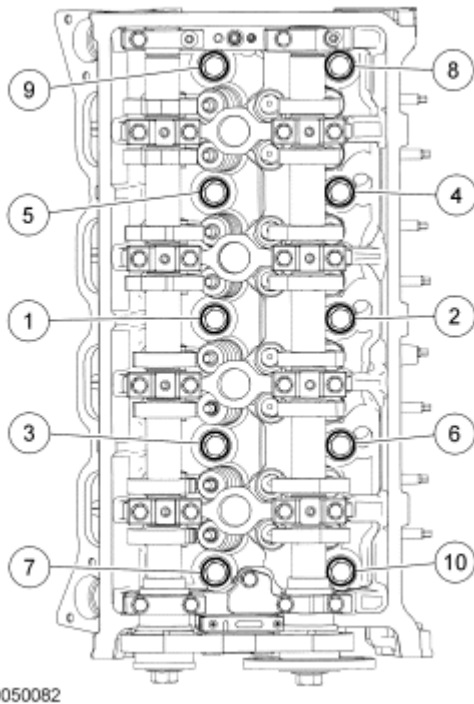


Fig. 612: Tightening New Cylinder Head Bolts In Sequence
Courtesy of FORD MOTOR CO.

8. Install 8 new LH exhaust manifold studs.

- Tighten to 12 Nm (106 lb-in).
9. Install new LH exhaust manifold gaskets, the LH exhaust manifold and 8 new nuts.
- Tighten in the sequence shown to 20 Nm (177 lb-in).

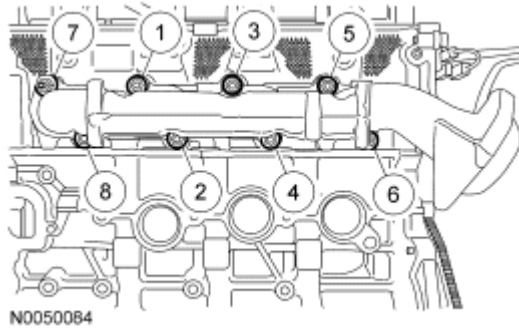


Fig. 613: Identifying LH Exhaust Manifold Nuts Tightening Sequence
Courtesy of FORD MOTOR CO.

Both cylinder heads

NOTE: Do not compress the ratchet assembly. This will damage the ratchet assembly.

NOTE: LH shown, RH similar.

10. Compress each tensioner plunger, using an edge of a vise.

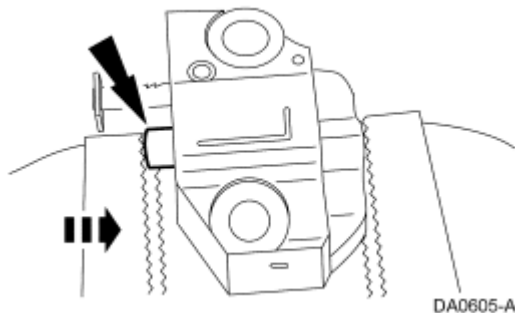


Fig. 614: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

11. Using a small screwdriver or pick, push back and hold the ratchet mechanism.

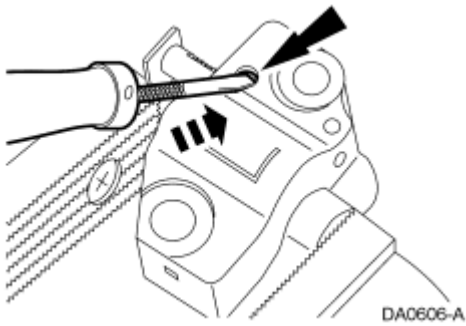


Fig. 615: Pushing Back And Holding Ratchet Mechanism
Courtesy of FORD MOTOR CO.

12. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.

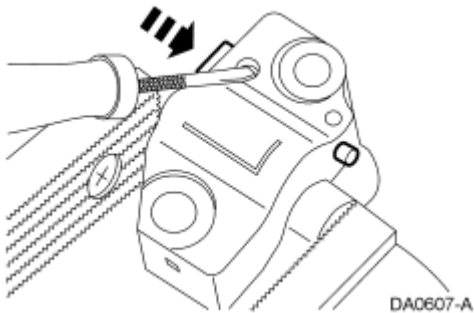


Fig. 616: Compressing Tensioner Plunger
Courtesy of FORD MOTOR CO.

13. Install a suitable pin into the hole of each tensioner housing to hold the ratchet assembly and plunger in place during installation.
- Remove the tensioner from the vise.

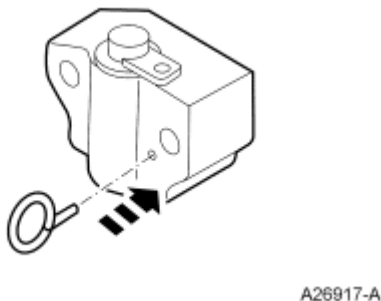
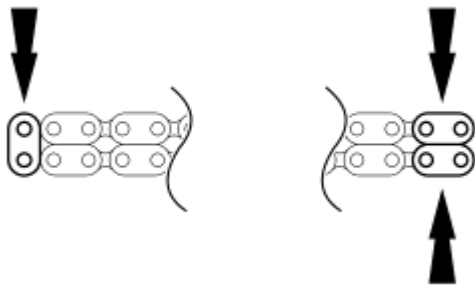


Fig. 617: Installing Paper Clip Into Tensioner Housing
Courtesy of FORD MOTOR CO.

14. If the colored links are not visible, mark one link on one end and 2 links on the other end, and use as timing marks.



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Fig. 618: Locating Timing Chain Marks
Courtesy of FORD MOTOR CO.

15. Using the Crankshaft Holding Tool, position the crankshaft.

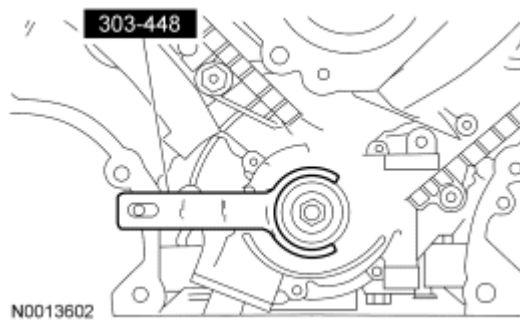


Fig. 619: Positioning Crankshaft With Special Tool (303-448)
Courtesy of FORD MOTOR CO.

16. Install the crankshaft sprocket with the flange facing forward.

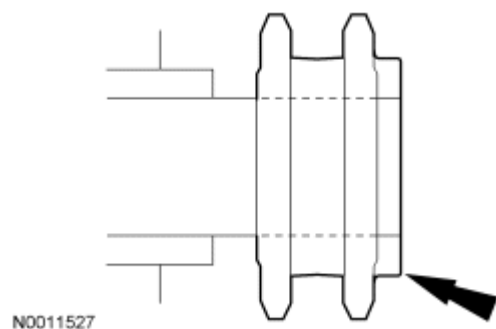


Fig. 620: Identifying Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

17. Install the LH primary timing chain guide and the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).

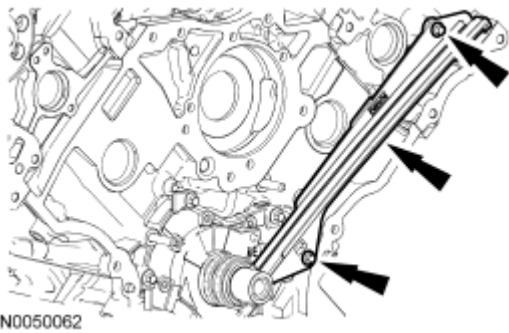
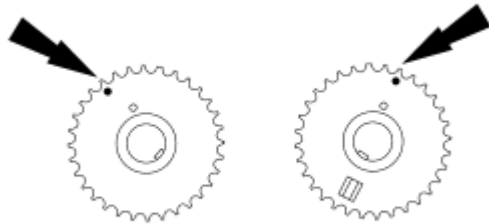


Fig. 621: Locating LH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

18. Position the camshaft sprocket timing marks as shown.



A0037294

Fig. 622: Identifying Camshaft Sprocket Timing Marks
Courtesy of FORD MOTOR CO.

19. Position the LH (inner) timing chain onto the crankshaft sprocket, aligning the one colored link on the timing chain with the slot on the crankshaft sprocket.

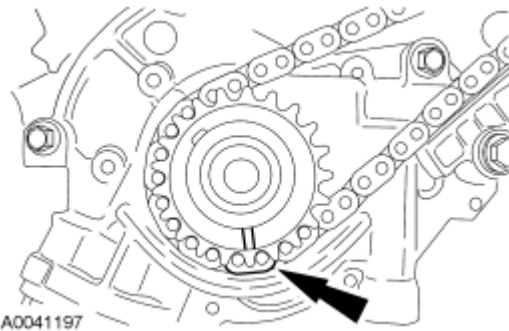
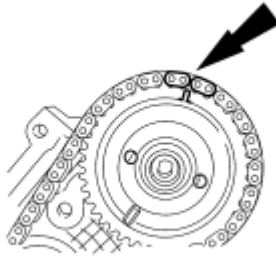


Fig. 623: Aligning Copper (Marked) Link With Timing Mark On Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

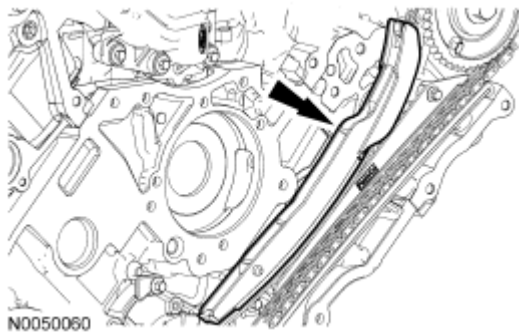
20. Install the LH timing chain on the camshaft sprocket, aligning the 2 colored links with the timing mark on the sprocket.



A0049191

Fig. 624: Aligning Timing Marks On Sprocket With Marked Chain Links
Courtesy of FORD MOTOR CO.

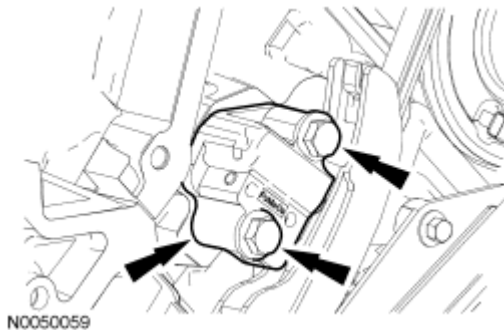
21. Install the LH primary timing chain tensioner arm.



N0050060

Fig. 625: Locating LH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

22. Install the LH primary timing chain tensioner and the 2 bolts.
- Tighten to 25 N.m (18 lb-ft).
 - Remove the pin from the tensioner.



N0050059

Fig. 626: Locating LH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

23. Install the RH primary timing chain guide and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

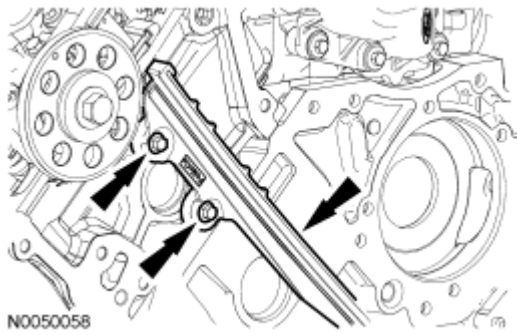


Fig. 627: Locating RH Primary Timing Chain Guide Bolts
Courtesy of FORD MOTOR CO.

24. Position the RH (outer) timing chain on the crankshaft sprocket, aligning the colored link with the timing marks on the sprocket.

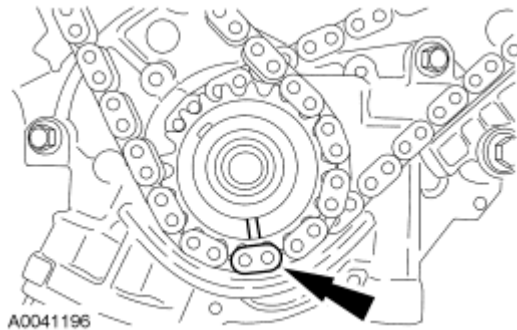


Fig. 628: Aligning Copper (Marked) Link With Timing Mark On Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

25. Install the RH timing chain on the camshaft sprocket, aligning the 2 colored links with the timing mark on the sprocket.

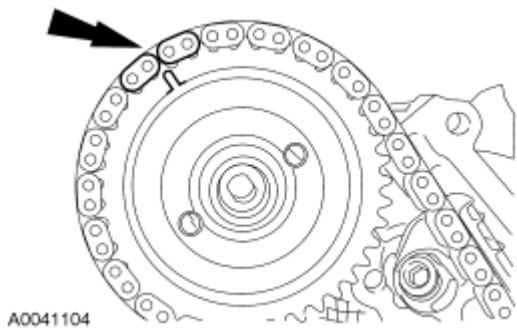


Fig. 629: Aligning Copper-Colored (Marked) Links With Camshaft Sprocket Timing Mark
Courtesy of FORD MOTOR CO.

26. Install the RH primary timing chain tensioner arm.

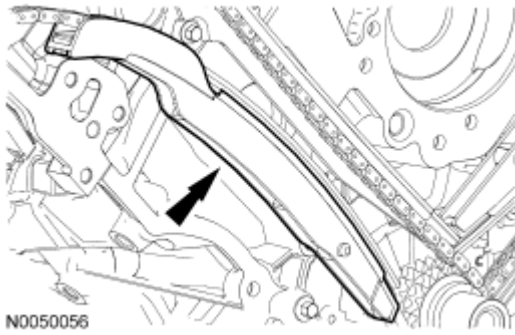


Fig. 630: Locating RH Primary Timing Chain Tensioner Arm
Courtesy of FORD MOTOR CO.

27. Install the RH primary timing chain tensioner and the 2 bolts.
 - Tighten to 25 N.m (18 lb-ft).
 - Remove the pin from the tensioner.

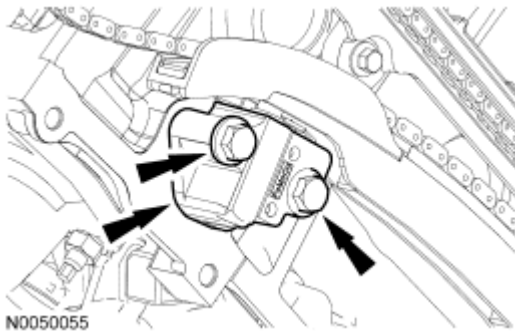


Fig. 631: Locating RH Primary Timing Chain Tensioner Bolts
Courtesy of FORD MOTOR CO.

28. As a post-check, verify correct alignment of all timing marks. Make sure that the colored links are lined up with the marks on the crankshaft sprocket and the camshaft sprockets.

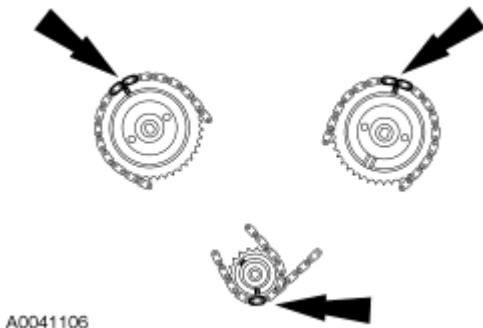


Fig. 632: Identifying Alignment Of All Timing Marks
Courtesy of FORD MOTOR CO.

29. Install the crankshaft washer.

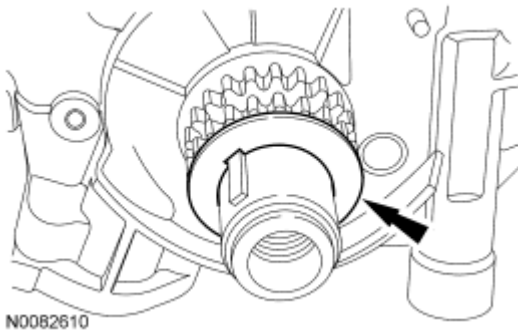


Fig. 633: Locating Crankshaft Washer
Courtesy of FORD MOTOR CO.

30. Install the crankshaft sensor ring.

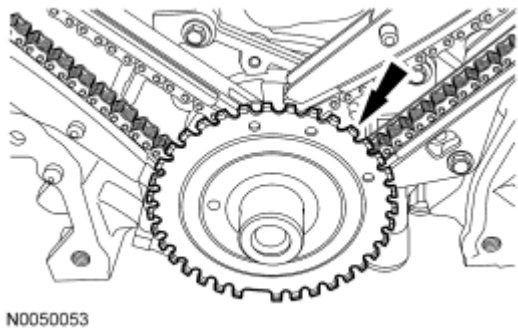


Fig. 634: Locating Crankshaft Sensor Ring
Courtesy of FORD MOTOR CO.

NOTE: If the components are to be reinstalled, they must be installed in their original positions or damage to the engine may occur.

31. Install the hydraulic lash adjusters.

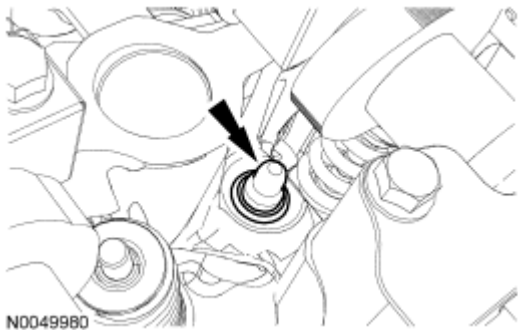


Fig. 635: Identifying Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

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



Fig. 636: Using Special Tool (303-452) To Compress Valve Springs
Courtesy of FORD MOTOR CO.

33. Repeat the previous step to install all the roller followers.

NOTE: Only use hand tools when removing or installing the spark plugs, or damage may occur to the cylinder head or spark plugs.

NOTE: RH shown, LH similar.

34. Install the 8 spark plugs.
- Tighten to 18 Nm (159 lb-in).

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

35. Apply silicone gasket and sealant in the locations shown.

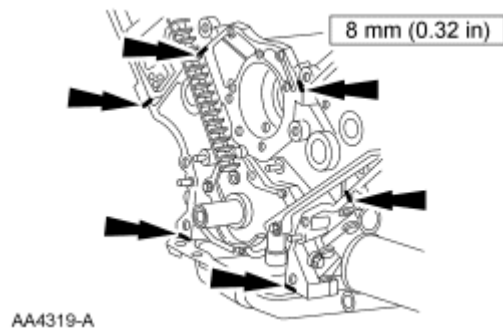


Fig. 637: Applying Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

36. Using new gaskets, install the engine front cover and the 16 bolts. Tighten the bolts in the sequence shown:

2009 Ford Mustang GT

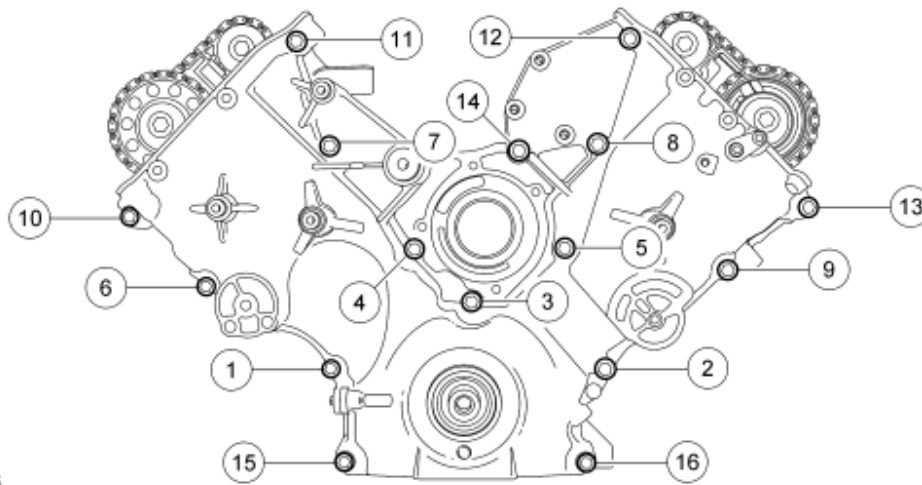
2009 ENGINE Engine - 5.4L (4V) - Mustang

* Bolts 1 through 14 to 25 Nm (18 lb-ft).

* Bolts 15 and 16 to 50 Nm (37 lb-ft).

Item	Part Number	Description
1	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
2	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
3	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
4	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
5	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
6	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
7	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
8	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
9	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
10	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
11	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
12	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
13	N806177	Bolt, hex head pilot, M8 x 1.25 x 53
		Bolt, hex head

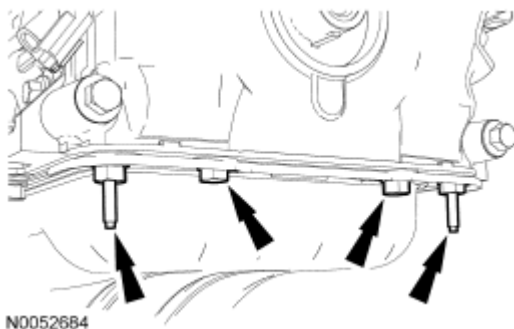
14	N806177	pilot, M8 x 1.25 x 53
15	N606063	Bolt, hex flange head pilot, M10 x 1.50 x 55
16	N606063	Bolt, hex flange head pilot, M10 x 1.50 x 55



N0050085

Fig. 638: Installing Engine Front Cover Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

37. Install the 2 oil pan-to-engine front cover bolts and the 2 oil pan-to-engine front cover stud bolts.
 - Tighten to 25 Nm (18 lb-ft).



N0052684

Fig. 639: Locating Oil Pan-To-Engine Front Cover Bolts & Oil Pan-To-Engine Front Cover Stud Bolts
Courtesy of FORD MOTOR CO.

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

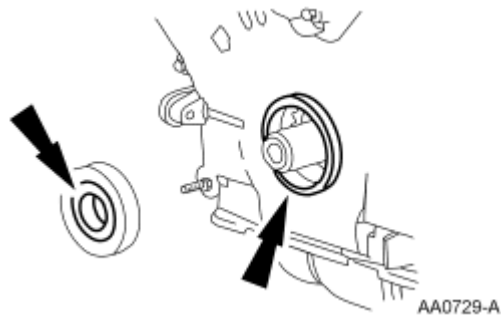


Fig. 640: Lubricating Engine Front Cover And Crankshaft Front Seal Inner Lip
Courtesy of FORD MOTOR CO.

39. Using the Crankshaft Vibration Damper Installer, Front Cover Oil Seal Installer and the Crankshaft Front Oil Seal Installer, install the crankshaft front seal.

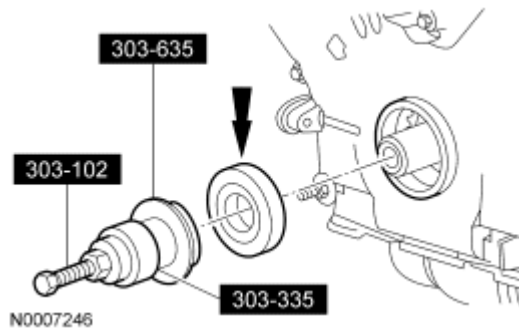


Fig. 641: Installing Crankshaft Front Seal Using Special Tools (303-102, 303-335, 303-635)
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. Follow the directions on the packaging. Failure to follow this procedure can cause future oil leakage.

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

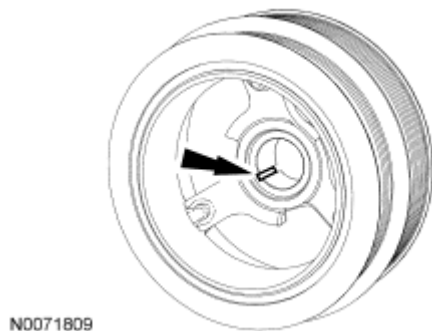
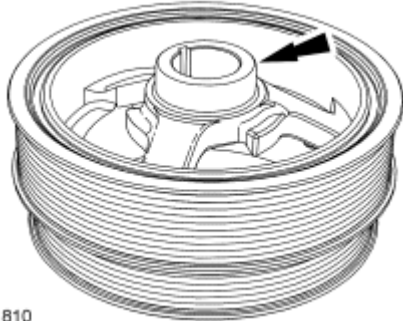


Fig. 642: Applying Silicone Gasket & Sealant To Woodruff Key Slot On Crankshaft Pulley

Courtesy of FORD MOTOR CO.

41. Lubricate the crankshaft pulley sealing surface with clean engine oil prior to installation.

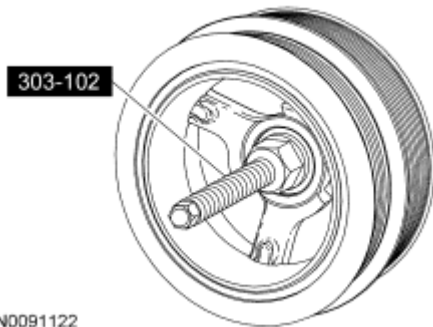


N0071810

Fig. 643: Lubricating Crankshaft Pulley Sealing Surface With Clean Engine Oil Prior To Installation

Courtesy of FORD MOTOR CO.

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



N0091122

Fig. 644: Installing Crankshaft Pulley Using Crankshaft Vibration Damper Installer

Courtesy of FORD MOTOR CO.

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

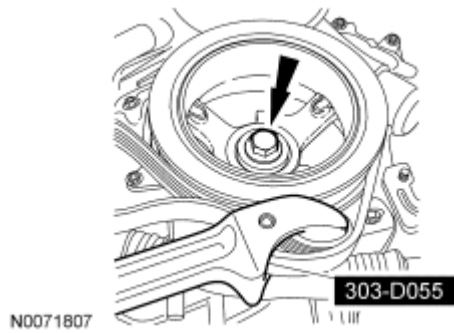


Fig. 645: Removing Crankshaft Pulley Bolt & Washer Using Strap Wrench
Courtesy of FORD MOTOR CO.

44. Install the coolant pump and the 4 bolts.
- Tighten to 25 Nm (18 lb-ft).

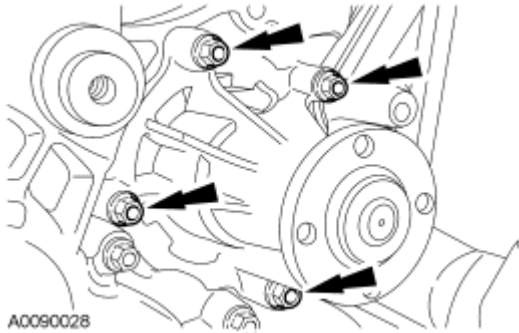


Fig. 646: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

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

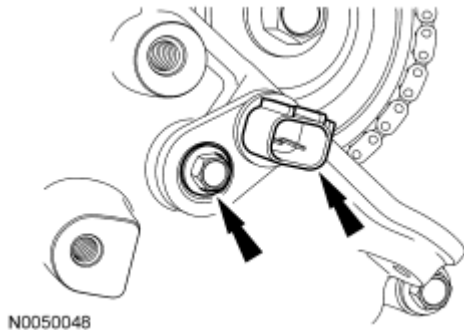


Fig. 647: Locating CMP Sensor Bolt
Courtesy of FORD MOTOR CO.

46. Install the Crankshaft Position (CKP) sensor and the bolt.
- Tighten to 10 Nm (89 lb-in).

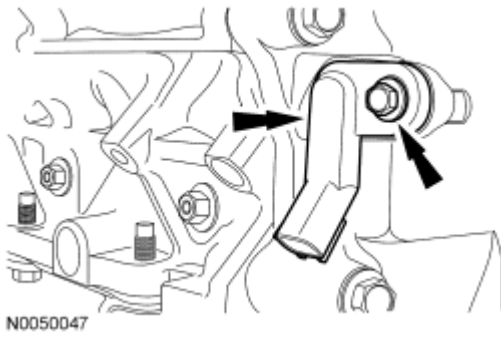


Fig. 648: Locating Crankshaft Position (CKP) Sensor Bolt
Courtesy of FORD MOTOR CO.

47. Install new gaskets. Make sure the gaskets are correctly seated on the valve cover.

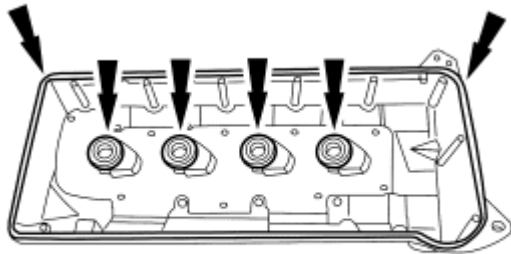


Fig. 649: Locating Gaskets On Valve Cover
Courtesy of FORD MOTOR CO.

NOTE: If the valve covers are not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface prep. 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.

NOTE: LH shown, RH similar.

48. Apply silicone gasket sealant in the locations shown.

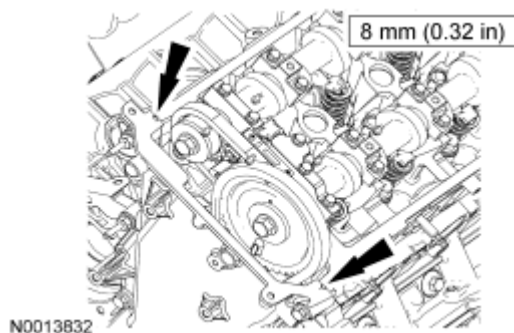


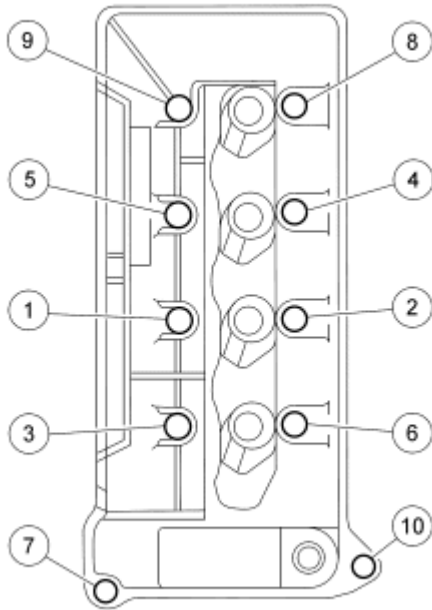
Fig. 650: Applying Bead Of Silicone Gasket & Sealant In 2 Places Where Engine Front Cover Meets Cylinder Head

Courtesy of FORD MOTOR CO.

NOTE: If the valve covers are not secured within 4 minutes, the sealant must be removed and the sealing area cleaned with metal surface prep. 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.

NOTE: LH shown, RH similar.

49. Install the valve covers and the bolts.
- Tighten in the sequence shown to 10 Nm (89 lb-in).



AO100043

Fig. 651: Tightening Valve Covers Bolts In Sequence

Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

50. Install the LH and RH block drain plugs.
- Tighten to 14 Nm (124 lb-in).

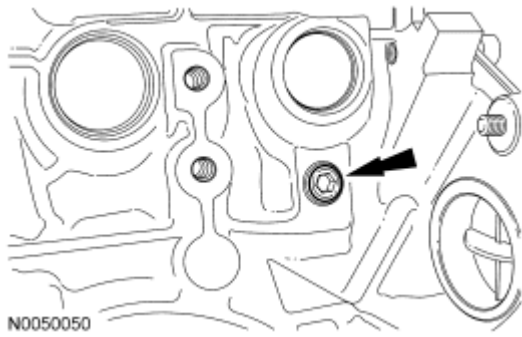


Fig. 652: Locating LH & RH Block Drain Plugs
Courtesy of FORD MOTOR CO.

51. Install the RH engine insulator bracket, the stud bolt, and the 3 bolts.
- Tighten to 63 Nm (46 lb-ft).

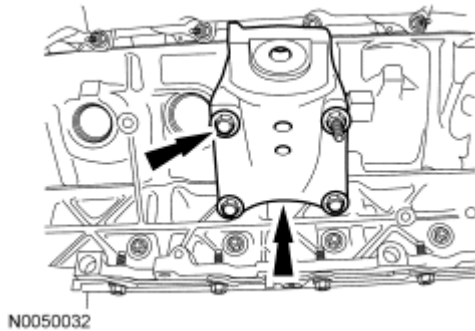


Fig. 653: Locating RH Engine Support Insulator Bracket Bolts & Stud Bolt
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the new oil level indicator tube O-ring seal with clean engine oil prior to installation.

52. Using a new O-ring seal, install the oil level indicator tube, bolt and oil level indicator.
- Tighten to 10 Nm (89 lb-in).

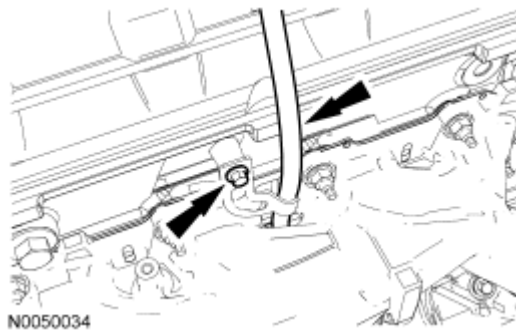


Fig. 654: Locating Oil Level Indicator & Bolt
Courtesy of FORD MOTOR CO.

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

53. Using a new gasket, install the oil filter adapter and the 8 bolts.

- Tighten in the sequence shown:
 - Bolts 1 through 6 to 25 Nm (18 lb-ft).
 - Bolts 7 and 8 to 50 Nm (37 lb-ft).

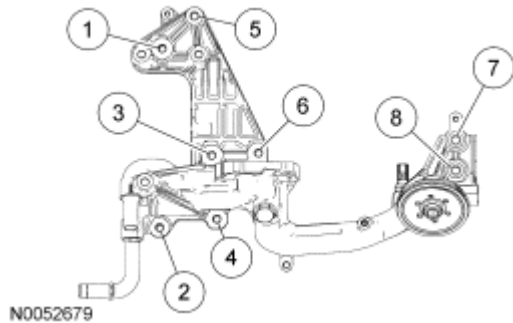


Fig. 655: Installing Oil Filter Adapter Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

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

54. Using a new gasket, install the oil cooler and the 6 bolts.

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

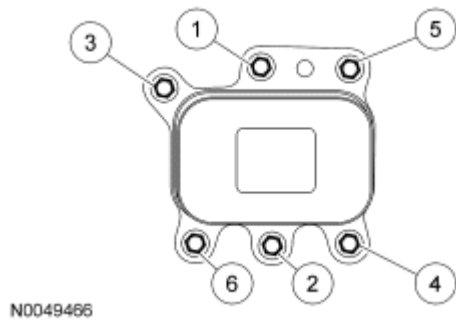


Fig. 656: Installing Oil Cooler Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

55. Install the 3 coolant tube assembly bolts.

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



Fig. 657: Identifying Coolant Tube Assembly Bolts
Courtesy of FORD MOTOR CO.

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

56. Using new intake manifold gaskets, install the intake manifold and the 14 bolts.
 - Tighten in the sequence shown to 10 Nm (89 lb-in).

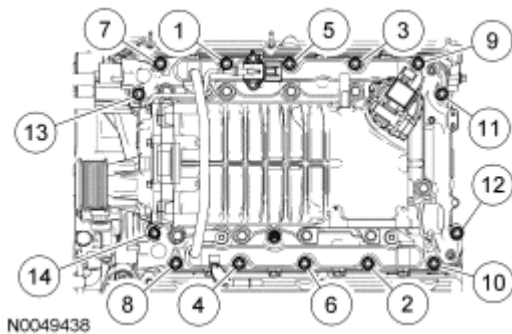


Fig. 658: Identifying Intake Manifold Gasket Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

57. Connect the intake manifold-to-coolant tube assembly hose.

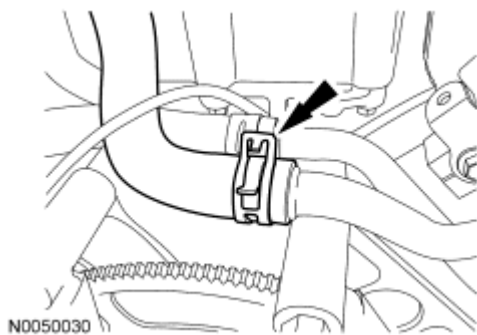


Fig. 659: Disconnecting Intake Manifold-To-Coolant Tube Assembly Hose
Courtesy of FORD MOTOR CO.

58. Position the wiring harness assembly onto the engine.

NOTE: Apply a light film of brake dielectric grease to the inside of the coil boots before installation.

59. Install the 4 LH coil-on-plugs.

- Connect the 4 LH coil-on-plug electrical connectors.

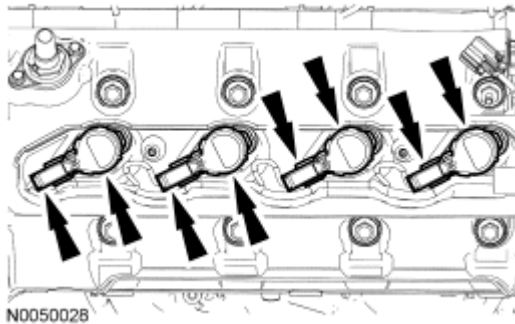


Fig. 660: Disconnecting LH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

60. Install the LH coil-on-plug cover and the 2 bolts.

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

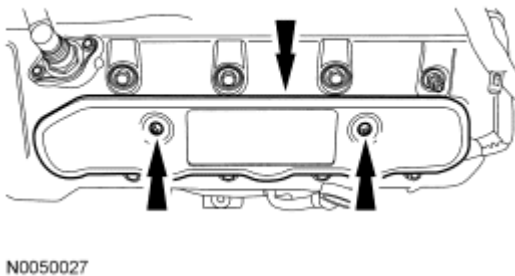


Fig. 661: Locating LH Coil-On-Plug Cover Bolts
Courtesy of FORD MOTOR CO.

61. Attach the wiring harness retainers to the LH valve cover stud bolts.

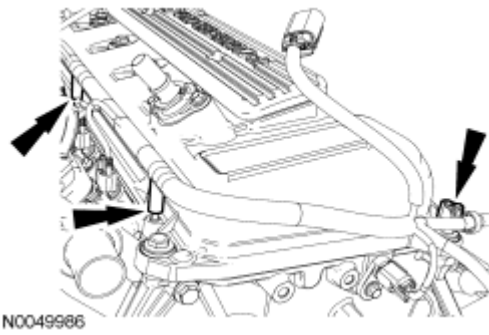


Fig. 662: Detaching Wiring Harness Retainers From LH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

62. Install the LH radio interference capacitor and the nut.
- Tighten to 10 Nm (89 lb-in).

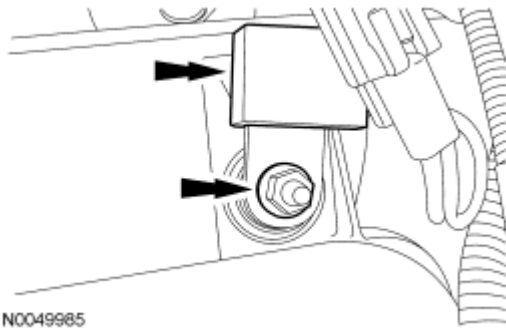


Fig. 663: Locating LH Radio Interference Capacitor Nut
Courtesy of FORD MOTOR CO.

63. Connect the 4 LH fuel injector electrical connectors.

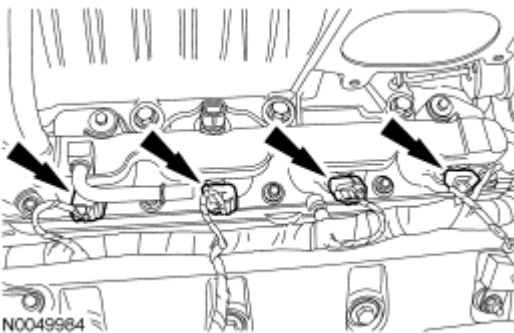


Fig. 664: Locating LH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

64. Connect the Intake Air Temperature 2 (IAT2) sensor electrical connector.

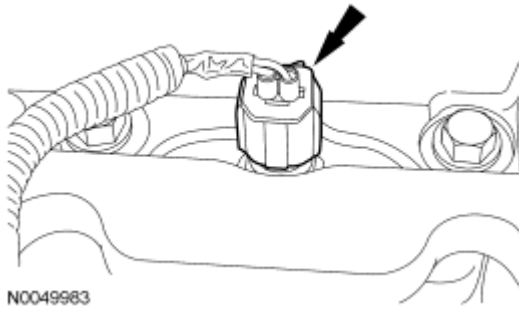


Fig. 665: Locating Intake Air Temperature (IAT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

65. Connect the CMP sensor electrical connector.

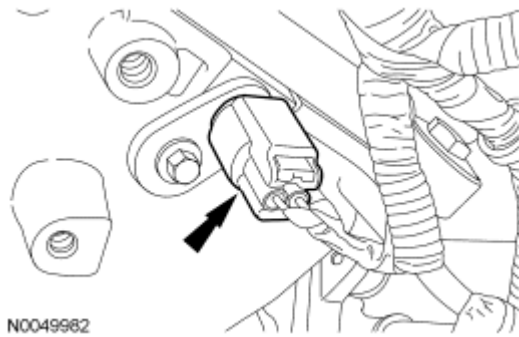


Fig. 666: Locating Camshaft Position (CMP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

66. Connect the Engine Oil Pressure (EOP) switch electrical connector.

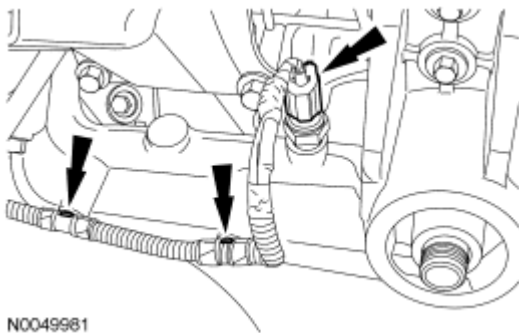


Fig. 667: Locating Engine Oil Pressure (EOP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

NOTE: Apply a light film of brake dielectric grease to the inside of the coil boots before installation.

67. Install the 4 RH coil-on-plugs.

- Connect the 4 RH coil-on-plug electrical connectors.

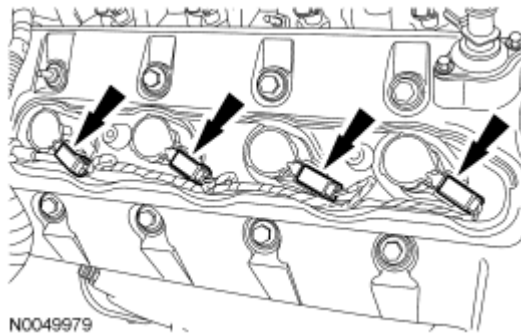


Fig. 668: Locating RH Coil-On-Plug Electrical Connectors
Courtesy of FORD MOTOR CO.

68. Install the RH coil-on-plug cover, bolt and stud bolt.
 - Tighten to 10 Nm (89 lb-in).

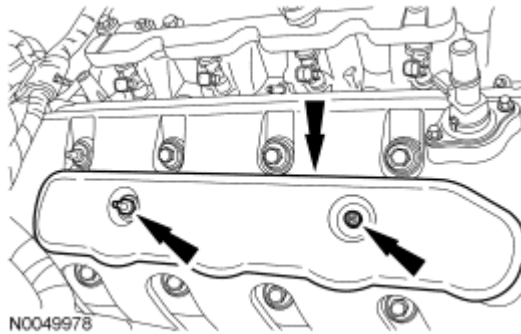


Fig. 669: Locating RH Coil-On-Plug Cover Bolt & Stud Bolt
Courtesy of FORD MOTOR CO.

69. Attach the wiring harness retainers to the RH valve cover stud bolts.

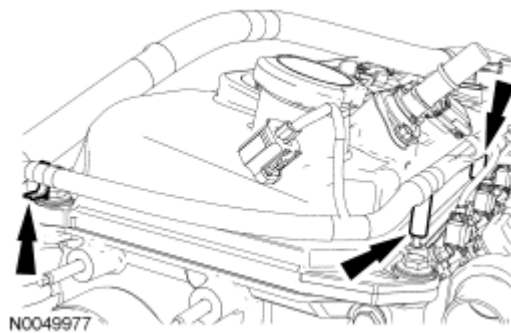


Fig. 670: Detaching Wiring Harness Retainers From RH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

70. Attach the wiring harness to the RH coil-on-plug cover stud bolt.

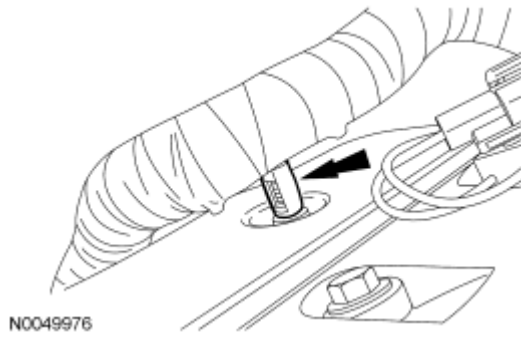


Fig. 671: Detaching Wiring Harness From RH Coil-On-Plug Cover Stud Bolt
Courtesy of FORD MOTOR CO.

71. Connect the EGR valve electrical connector.

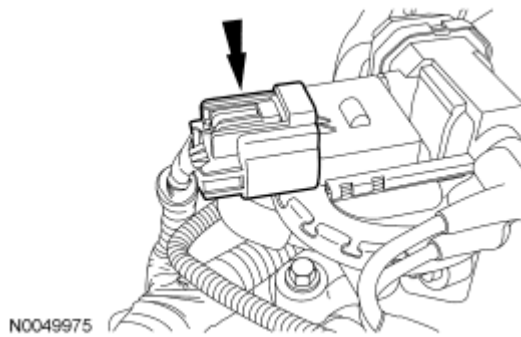


Fig. 672: Disconnecting EGR Valve Electrical Connector
Courtesy of FORD MOTOR CO.

72. Install the RH radio interference capacitor and the nut.
- Tighten to 10 Nm (89 lb-in).

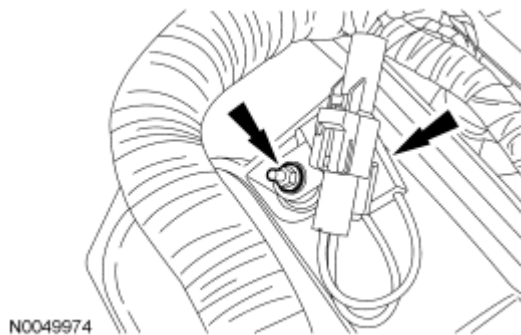


Fig. 673: Removing Nut & RH Radio Interference Capacitor
Courtesy of FORD MOTOR CO.

73. Connect the fuel rail pressure and temperature sensor electrical connector.

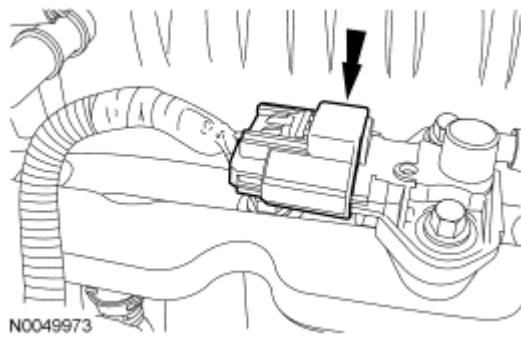


Fig. 674: Locating Fuel Rail Pressure & Temperature Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

74. Connect the 4 RH fuel injector electrical connectors.

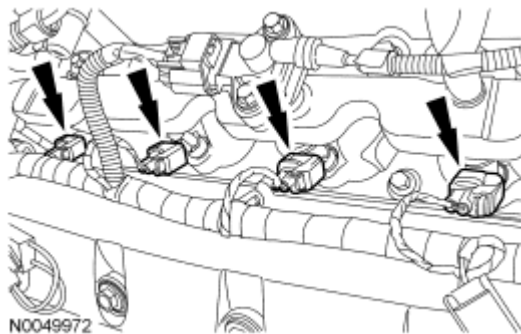


Fig. 675: Locating RH Fuel Injector Electrical Connectors
Courtesy of FORD MOTOR CO.

75. Connect the PCV valve electrical connector.

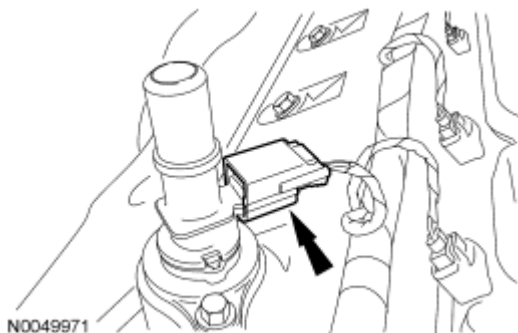


Fig. 676: Locating Positive Crankcase Ventilation (PCV) Valve Electrical Connector
Courtesy of FORD MOTOR CO.

76. Attach the 2 wiring harness pin-type retainers.

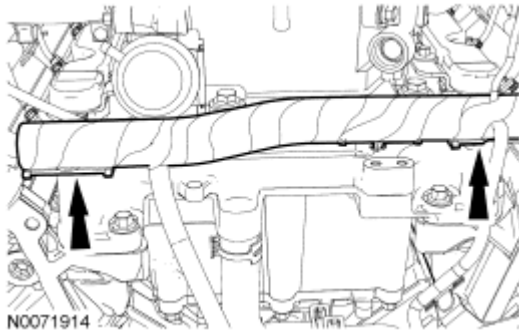


Fig. 677: Locating Wiring Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

77. Install the wiring harness retaining bracket and the 2 bolts.
- Tighten to 10 Nm (89 lb-in).

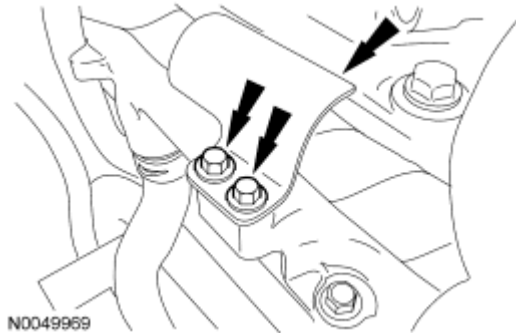


Fig. 678: Locating Wiring Harness Retaining Bracket & Bolts
Courtesy of FORD MOTOR CO.

78. Connect the bubbler tube from the Supercharger (SC).

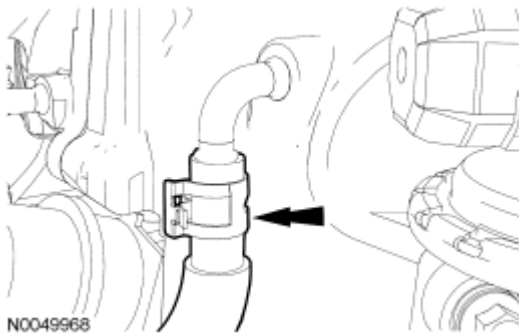


Fig. 679: Disconnecting Bubbler Tube From SC
Courtesy of FORD MOTOR CO.

79. Connect the LH Heated Oxygen Sensor (HO2S) electrical connector and pin-type retainer.

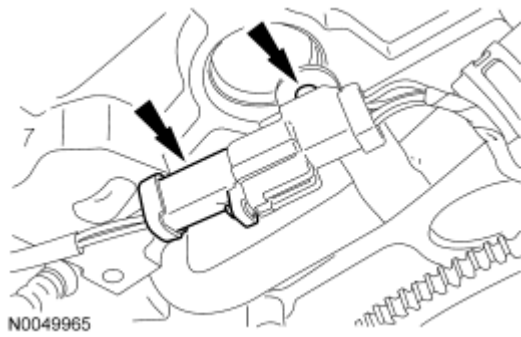


Fig. 680: Locating LH Heated Oxygen Sensor (HO2S) Electrical Connector & Pin-Type Retainer
Courtesy of FORD MOTOR CO.

80. Attach the 2 wiring harness pin-type retainers (1 shown) to the coolant tube assembly bracket.

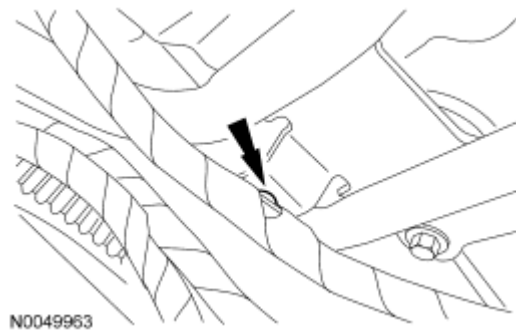


Fig. 681: Detaching Wiring Harness Pin-Type Retainer From Coolant Tube Assembly Bracket
Courtesy of FORD MOTOR CO.

81. Connect the Cylinder Head Temperature (CHT) sensor electrical connector.

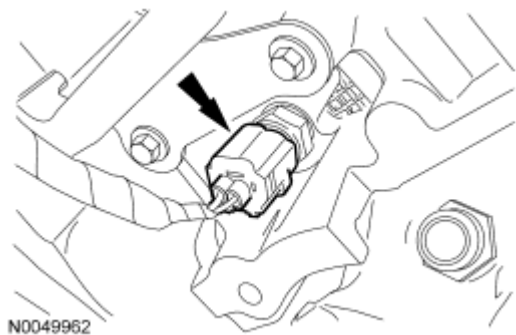


Fig. 682: Locating Cylinder Head Temperature (CHT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

82. Install a new gasket, the Throttle Body (TB) and spacer assembly and the 4 bolts.
- Tighten to 10 Nm (89 lb-in).

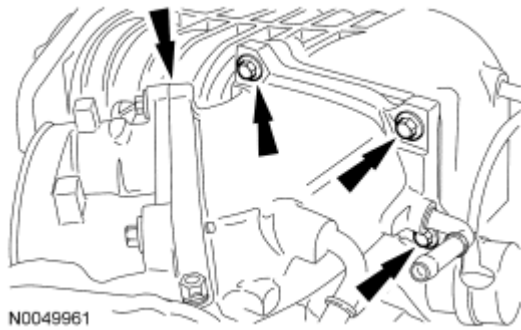


Fig. 683: Locating TB & Spacer Assembly Bolts
Courtesy of FORD MOTOR CO.

83. Connect the TB control electrical connector.

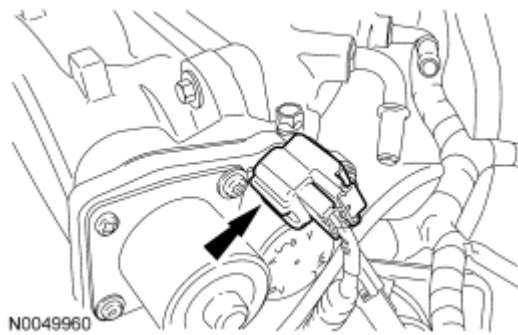


Fig. 684: Locating Throttle Body (TB) Control Electrical Connector
Courtesy of FORD MOTOR CO.

84. Connect the TP sensor electrical connector.

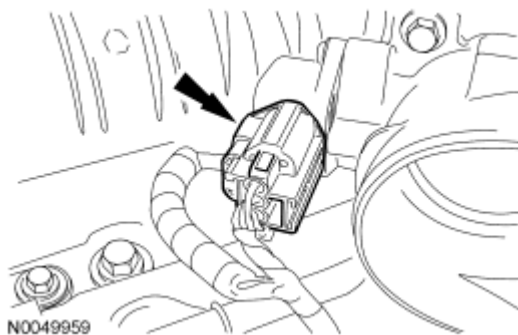


Fig. 685: Locating Throttle Position (TP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

85. Install and connect the crankcase ventilation tube.

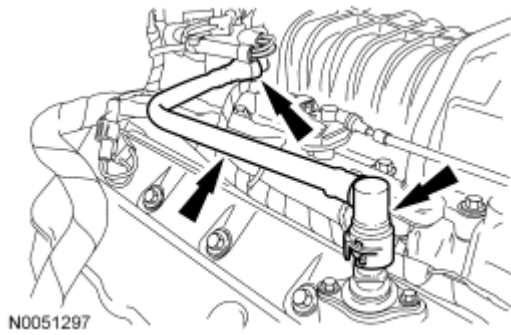


Fig. 686: Locating Crankcase Ventilation Tube
Courtesy of FORD MOTOR CO.

86. Install the EGR tube.
- Tighten to 40 Nm (30 lb-ft).

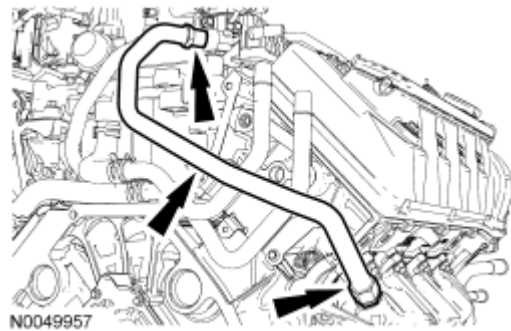


Fig. 687: Locating Exhaust Gas Recirculation (EGR) Tube Fittings
Courtesy of FORD MOTOR CO.

87. Install the 3 SC drive belt idler pulleys and the 3 bolts.
- Tighten the heavy load idler pulley (closest to centerline of engine) to 48 Nm (35 lb-ft).
 - Tighten the smooth idler pulley and the grooved idler pulley to 25 Nm (18 lb-ft).

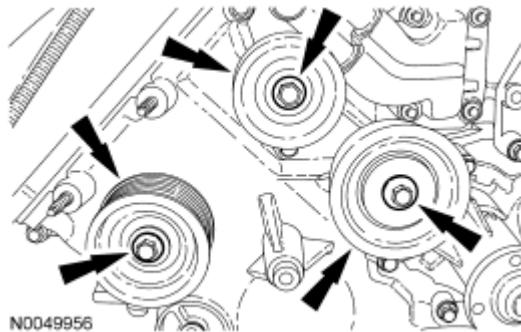


Fig. 688: Locating SC Drive Belt Idler Pulley Bolts
Courtesy of FORD MOTOR CO.

88. Install the coolant pump pulley and the 4 bolts.

- Do not tighten the bolts at this time.

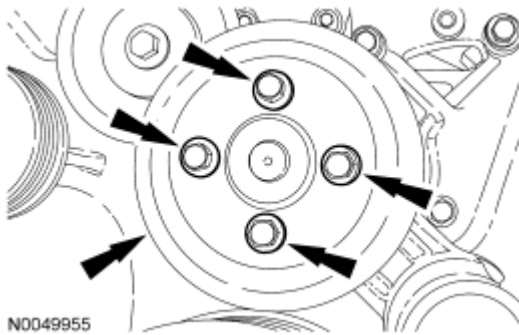


Fig. 689: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

89. Install the accessory drive belt idler pulley (grooved) and the bolt.
- Tighten to 25 Nm (18 lb-ft).

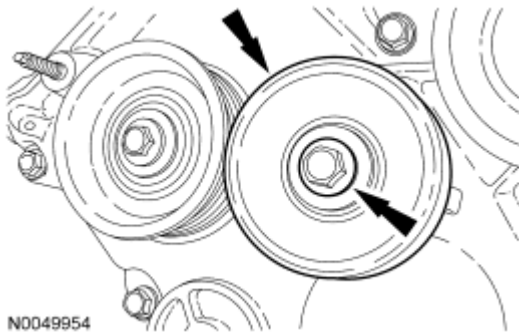


Fig. 690: Locating Accessory Drive Belt Idler Pulley Bolt
Courtesy of FORD MOTOR CO.

90. Install the accessory drive belt idler pulley (smooth) and the stud bolt.
- Tighten to 25 Nm (18 lb-ft).

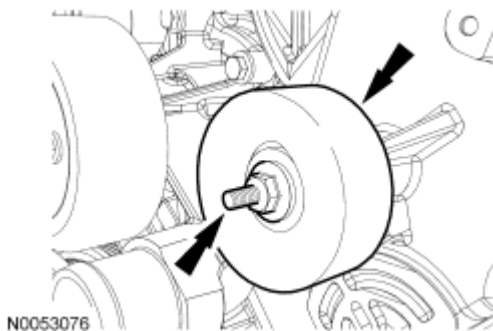


Fig. 691: Locating Stud Bolt & Accessory Drive Belt Idler Pulley
Courtesy of FORD MOTOR CO.

91. Install the accessory drive belt tensioner and the bolt.
- Tighten to 25 Nm (18 lb-ft).

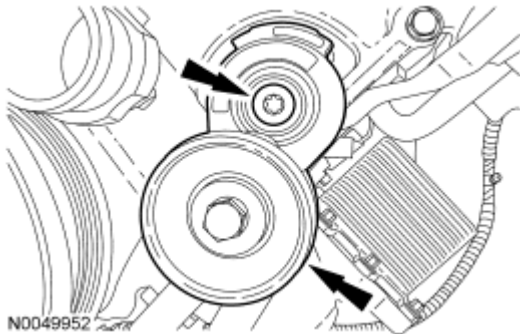


Fig. 692: Locating Accessory Drive Belt Tensioner Bolt
Courtesy of FORD MOTOR CO.

92. Install the alternator, 2 bolts and the stud bolt.
- Tighten to 50 Nm (37 lb-ft).

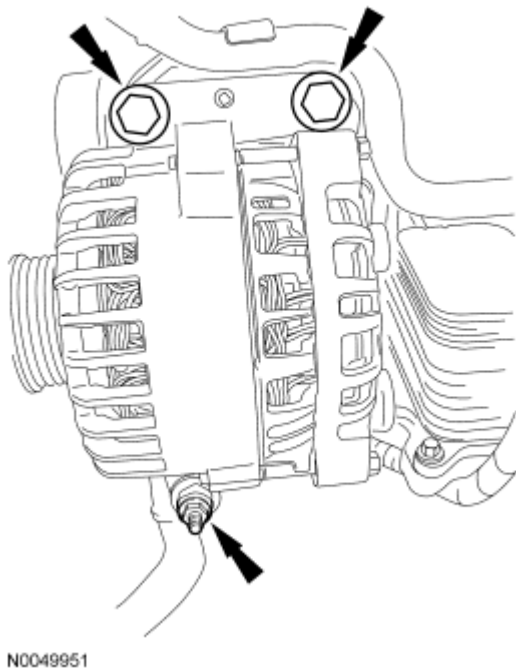


Fig. 693: Locating Stud Bolt, Bolts & Alternator
Courtesy of FORD MOTOR CO.

93. Connect the generator electrical connector.

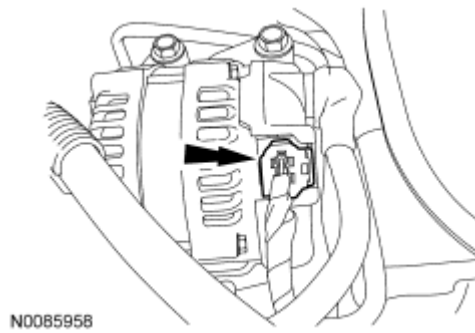


Fig. 694: Locating Generator Electrical Connector
Courtesy of FORD MOTOR CO.

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

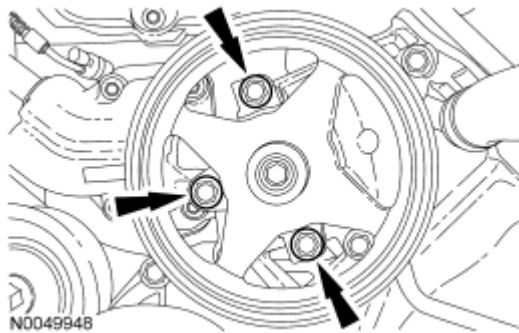


Fig. 695: Locating Power Steering Pump & Reservoir Assembly Bolts
Courtesy of FORD MOTOR CO.

95. Install the power steering reservoir bracket bolts.
- Tighten to 25 Nm (18 lb-ft).

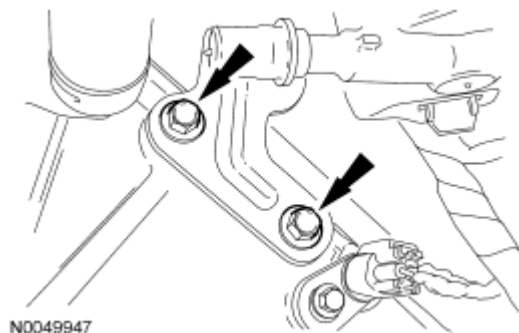


Fig. 696: Locating Power Steering Reservoir Bracket Bolts
Courtesy of FORD MOTOR CO.

96. Install the power steering tube bracket bolt.
- Tighten to 10 Nm (89 lb-in).

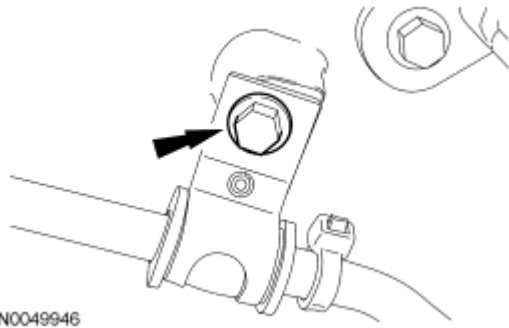


Fig. 697: Locating Power Steering Tube Bracket Bolt
Courtesy of FORD MOTOR CO.

97. Install the power steering tube bracket nut.
 - Tighten to 10 Nm (89 lb-in).

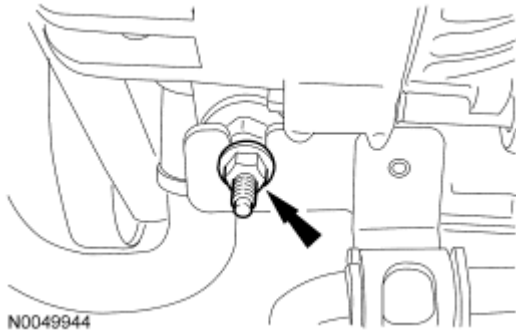


Fig. 698: Locating Power Steering Tube Bracket Nut
Courtesy of FORD MOTOR CO.

98. Position the SC drive belt and install the SC drive belt tensioner and bolt.
 - Tighten to 48 Nm (35 lb-ft).

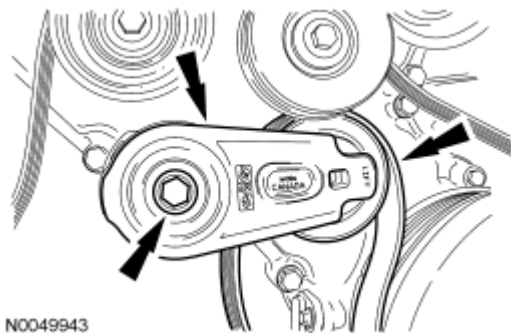


Fig. 699: Locating Bolt, Supercharger (SC) Drive Belt Tensioner & SC Drive Belt
Courtesy of FORD MOTOR CO.

99. Rotate the accessory drive belt tensioner clockwise and install the accessory drive belt.

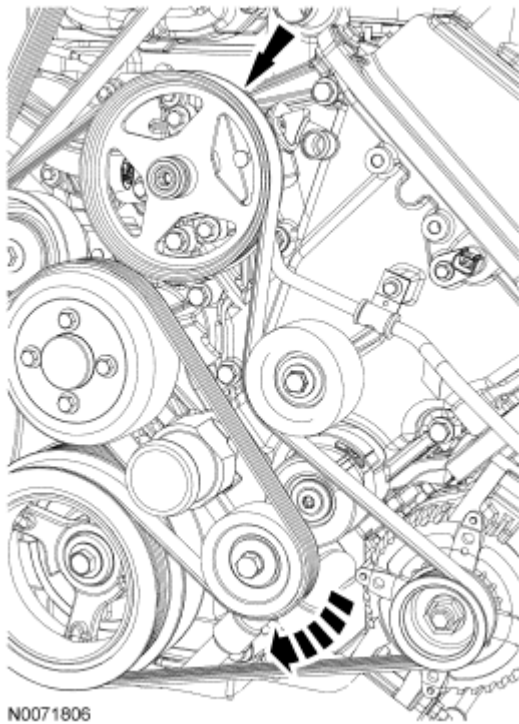


Fig. 700: Rotating Accessory Drive Belt Tensioner Clockwise & Removing Accessory Drive Belt
Courtesy of FORD MOTOR CO.

100. Tighten the 4 coolant pump pulley bolts to 25 Nm (18 lb-ft).

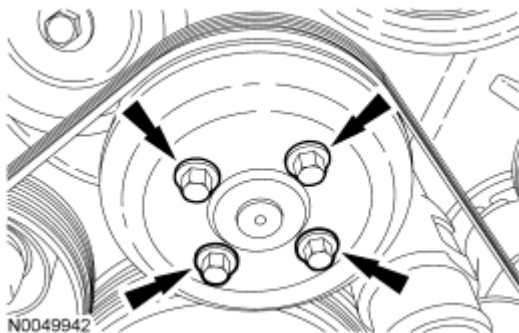


Fig. 701: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

101. Connect the coolant hose from the Charge Air Cooler (CAC).

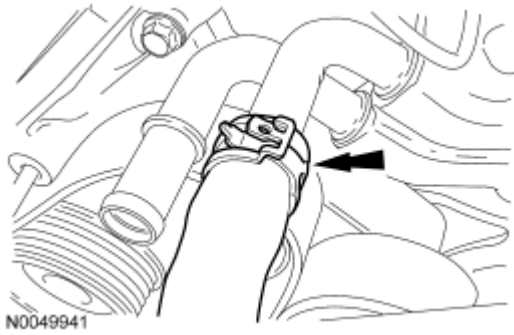


Fig. 702: Locating Coolant Hose From Charge Air Cooler (CAC)
Courtesy of FORD MOTOR CO.

102. Install the thermostat housing assembly and the 2 nuts.
- Tighten to 25 Nm (18 lb-ft).

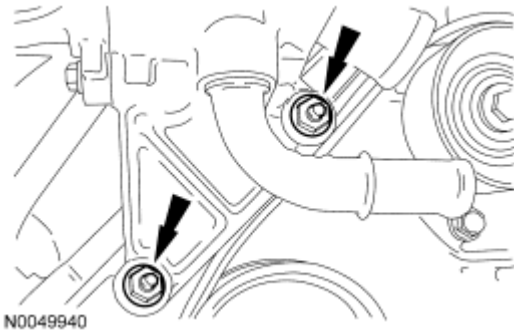


Fig. 703: Locating Thermostat Housing Assembly Nuts
Courtesy of FORD MOTOR CO.

103. Connect the Engine Coolant Temperature (ECT) sensor electrical connector.

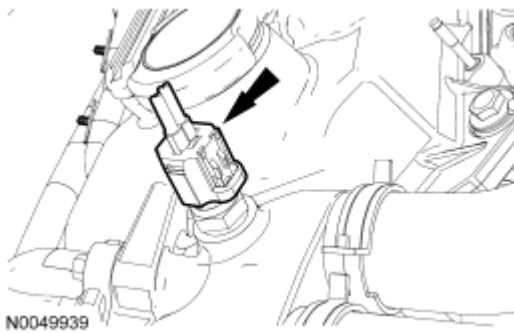


Fig. 704: Locating Engine Coolant Temperature (ECT) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

104. Connect the 2 upper radiator hoses to the intake manifold.

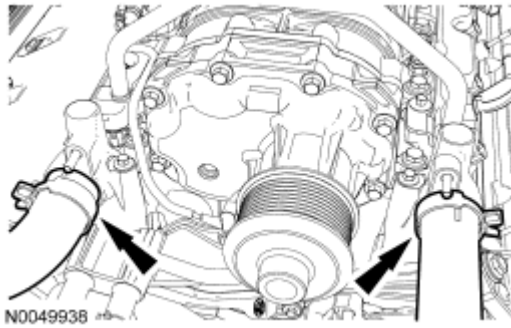


Fig. 705: Locating Upper Radiator Hoses From Intake Manifold
Courtesy of FORD MOTOR CO.

105. Connect the 2 coolant vent hoses to the intake manifold.

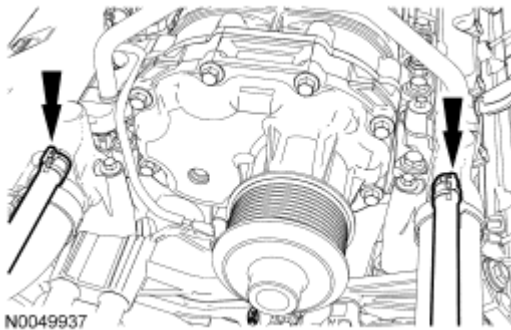


Fig. 706: Locating Coolant Vent Hoses From The Intake Manifold
Courtesy of FORD MOTOR CO.

106. Install the coolant tube bracket nut.

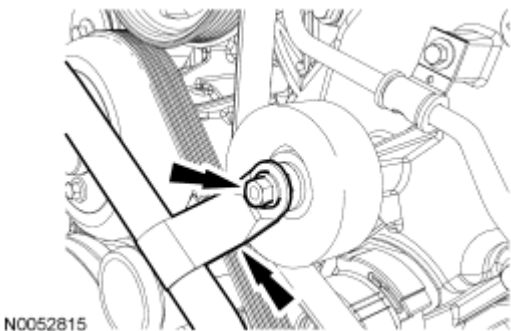


Fig. 707: Locating Coolant Tube Bracket Nut
Courtesy of FORD MOTOR CO.

107. Connect the coolant hose to the thermostat housing.

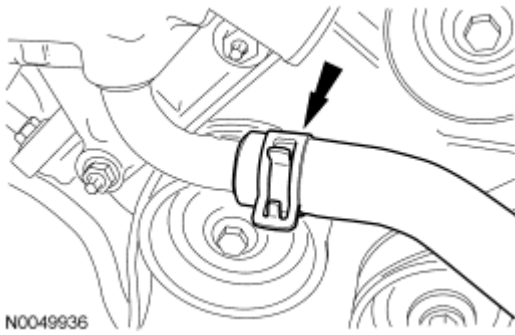


Fig. 708: Locating Coolant Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

108. Install the Engine Lifting Bracket.

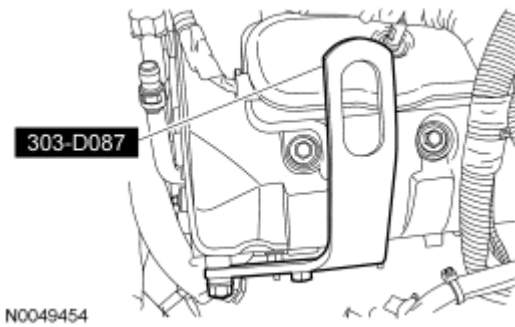


Fig. 709: Identifying Special Tool (303-D087)
Courtesy of FORD MOTOR CO.

109. Install the Engine Lifting Bracket.

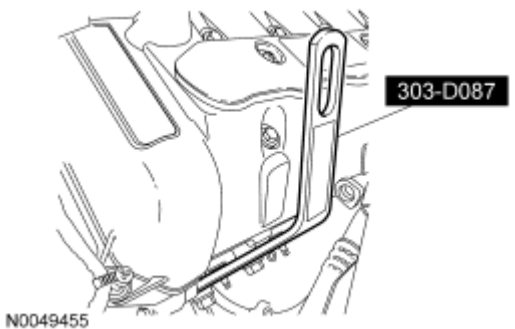


Fig. 710: Identifying Special Tool (303-D087)
Courtesy of FORD MOTOR CO.

110. Using the Heavy Duty Floor Crane and the Engine Lifting Bracket, remove the engine from the work stand.

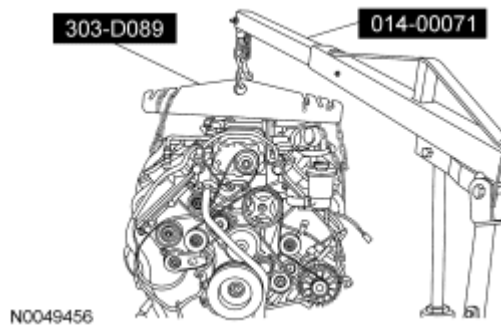


Fig. 711: Removing Engine From Work Stand Using Special Tools (303-D089) & (014-00071)
Courtesy of FORD MOTOR CO.

111. Install the engine/transmission spacer plate.

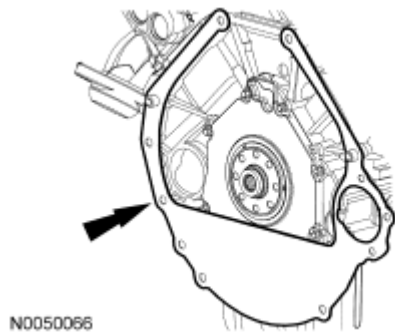


Fig. 712: Locating Engine/Transmission Spacer Plate
Courtesy of FORD MOTOR CO.

112. Install the flywheel and the 8 bolts.
- Tighten to 80 Nm (59 lb-ft) in the sequence shown.

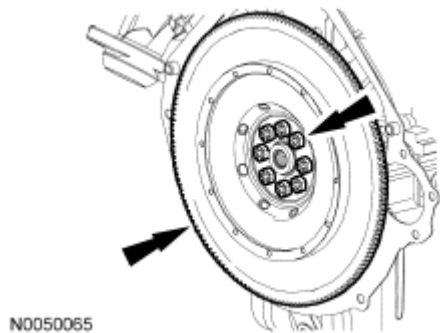


Fig. 713: Locating Bolts On Flywheel
Courtesy of FORD MOTOR CO.

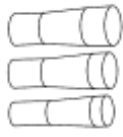
113. Install the engine into the vehicle. For additional information, refer to **Engine**.

ENGINE

2009 Ford Mustang GT

2009 ENGINE Engine - 5.4L (4V) - Mustang

Special Tools

Illustration	Tool Name	Tool Number
 ST1341-A	Heavy Duty Floor Crane	014-00071 or equivalent
 ST1444-A	Installer Set, Teflon® Seal	211-D027 (D90P-3517-A) or equivalent
 ST1602-A	Lifting Bracket, Engine	303-D089 (D93P-6001-A3) or equivalent

Material

Item	Specification
Motorcraft SAE 5W-50 Full Synthetic Motor Oil XO-5W50-QGT or equivalent	WSS-M2C931-B

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

1. Using the Heavy Duty Floor Crane and the Engine Lifting Bracket, install the engine into the vehicle.

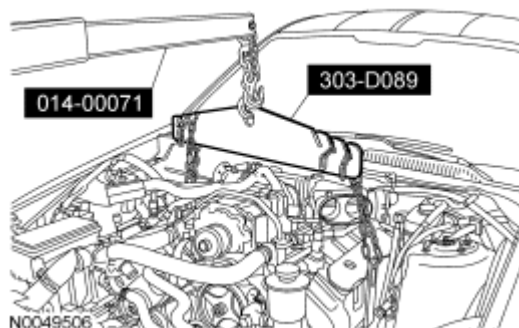


Fig. 714: Identifying Special Tools (014-00071) & (303-D089)
Courtesy of FORD MOTOR CO.

2. Install the LH engine insulator nut.

- Tighten to 63 Nm (46 lb-ft).

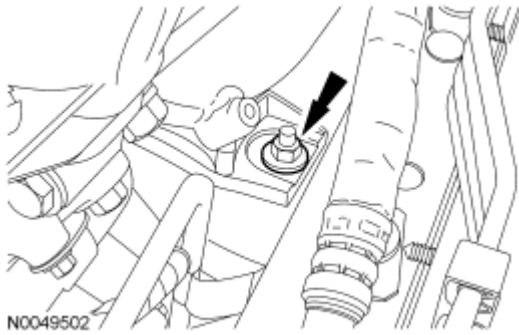


Fig. 715: Locating LH Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

3. Install the RH engine insulator nut.
 - Tighten to 63 Nm (46 lb-ft).

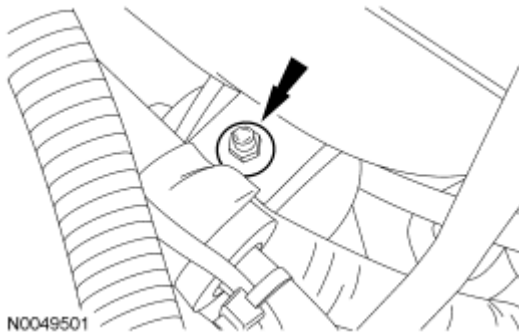


Fig. 716: Locating RH Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

4. Install the ground wire and the bolt to the rear of the LH cylinder head.
 - Tighten to 10 Nm (89 lb-in).

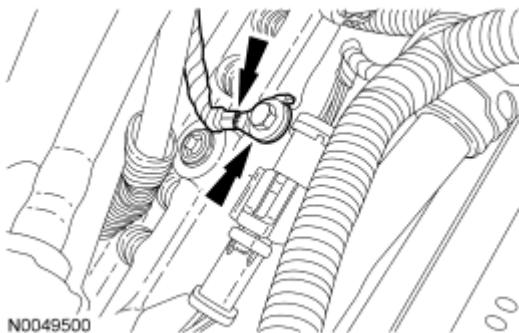


Fig. 717: Identifying Ground Wire From Rear Of LH Cylinder Head
Courtesy of FORD MOTOR CO.

5. Install the clutch disc and pressure plate. For additional information, refer to **CLUTCH** .

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

6. Install the intermediate steering shaft and the upper bolt.
- Tighten to 47 Nm (35 lb-ft).

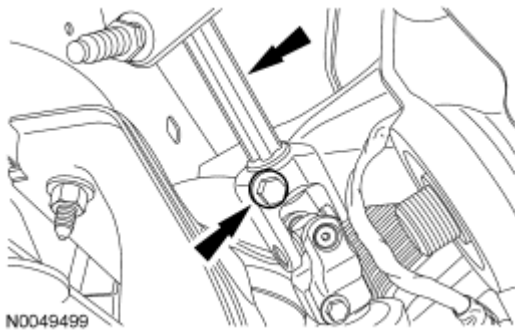


Fig. 718: Locating Upper Bolt From Intermediate Steering Shaft
Courtesy of FORD MOTOR CO.

7. Install a new engine oil filter in the following sequence.
1. Lubricate the oil filter gasket with clean engine oil and tighten until the seal makes contact.
 2. Using an oil filter strap wrench, tighten the filter an additional 270 degrees.

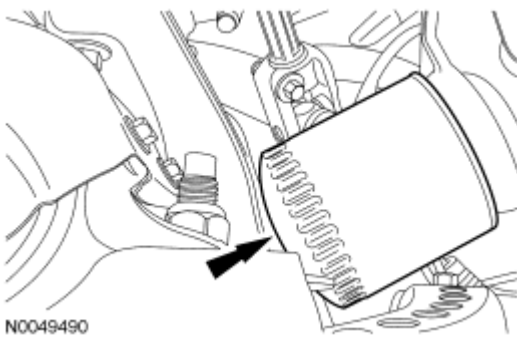


Fig. 719: Identifying Engine Oil Filter
Courtesy of FORD MOTOR CO.

NOTE: For correct starter installation, the upper bolt must be tightened first.

NOTE: Clean the starter motor mounting flange and mating surface of the starter motor to make sure there is a correct ground connection.

8. Install the starter and the 3 bolts finger-tight.
 1. Tighten the upper bolt to 25 Nm (18 lb-ft).
 2. Tighten the 2 lower bolts to 25 Nm (18 lb-ft).

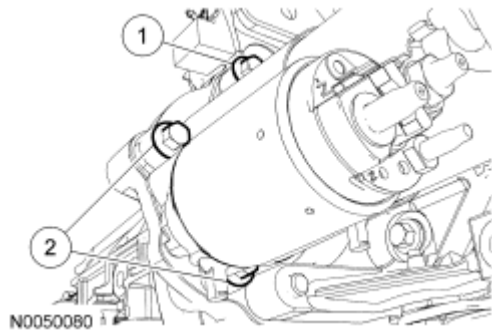


Fig. 720: Installing Starter & Bolts
Courtesy of FORD MOTOR CO.

9. Connect the 2 wires and install the 2 nuts on the starter solenoid.
 - Tighten the B+ terminal to 12 Nm (106 lb-in).
 - Tighten the S-terminal to 5 Nm (44 lb-in).

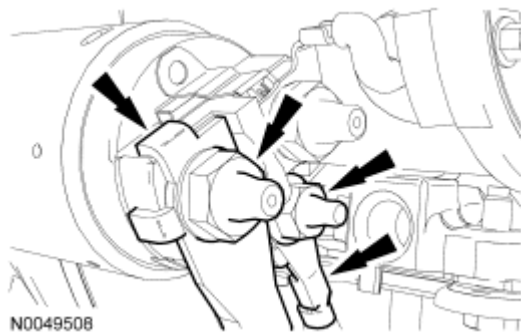


Fig. 721: Disconnecting Wires From Starter Solenoid
Courtesy of FORD MOTOR CO.

10. Install the starter solenoid terminal cover.

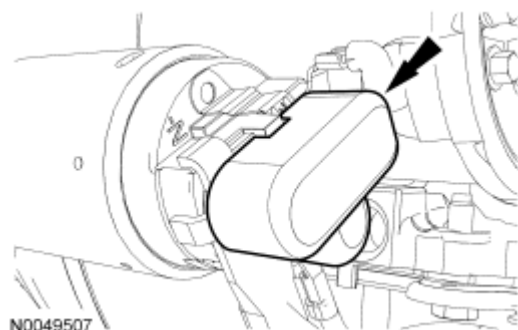
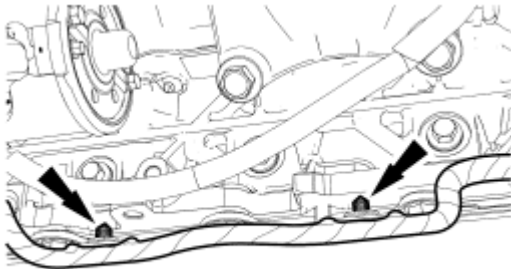


Fig. 722: Locating Starter Solenoid Terminal Cover
Courtesy of FORD MOTOR CO.

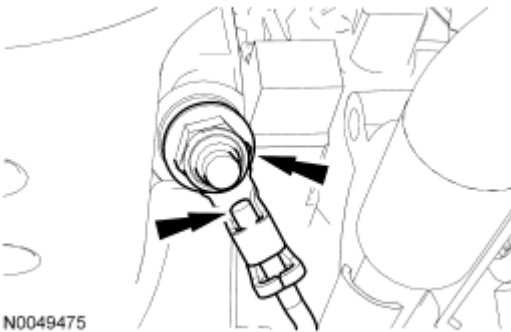
11. Attach the 2 wiring harness pin-type retainers to the oil pan.



N0049467

Fig. 723: Locating Wiring Harness Pin-Type Retainers From Oil Pan
Courtesy of FORD MOTOR CO.

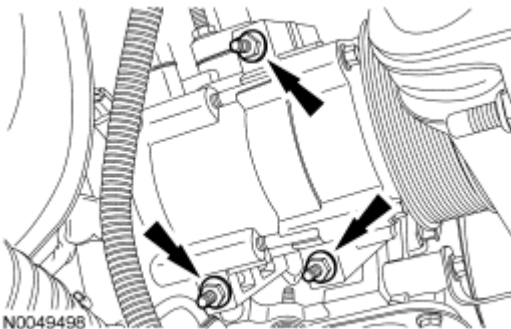
12. Install the ground wire and the nut to the RH engine insulator bracket stud bolt.
- Tighten to 25 Nm (18 lb-ft).



N0049475

Fig. 724: Locating Ground Wire From RH Engine Support Insulator Bracket Stud Bolt
Courtesy of FORD MOTOR CO.

13. Install the A/C compressor and the 3 stud bolts.
- Tighten to 25 Nm (18 lb-ft).



N0049498

Fig. 725: Identifying Stud Bolts & A/C Compressor Aside
Courtesy of FORD MOTOR CO.

14. Position the Supercharger (SC) drive onto the A/C compressor and attach the 2 wiring harness retainers onto the A/C compressor stud bolts.

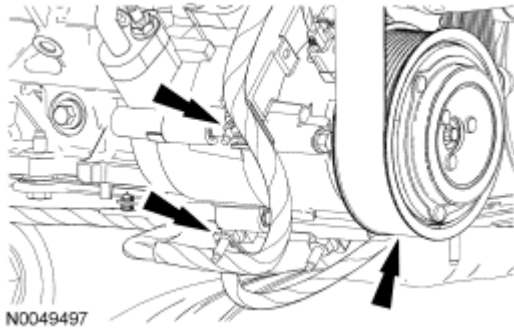


Fig. 726: Identifying SC Drive Belt, A/C Compressor, Wiring Harness Retainers & A/C Compressor Stud Bolts
Courtesy of FORD MOTOR CO.

15. Attach the wiring harness pin-type retainer to the back of the A/C compressor.

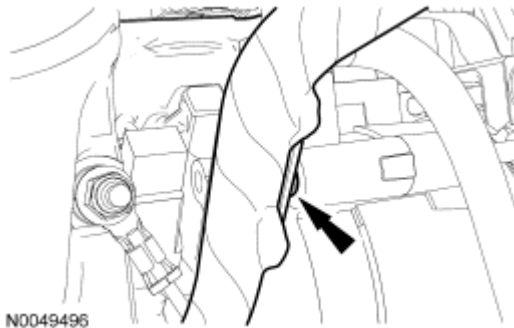


Fig. 727: Detaching Wiring Harness Pin-Type Retainer From Back Of A/C Compressor
Courtesy of FORD MOTOR CO.

16. Connect the A/C compressor electrical connector.

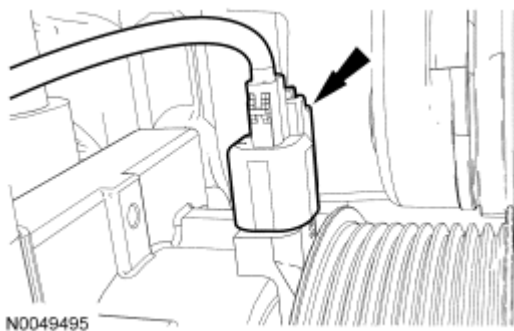


Fig. 728: Identifying A/C Compressor Electrical Connector

Courtesy of FORD MOTOR CO.

17. Attach the wire harness retainer to the A/C compressor stud bolt.

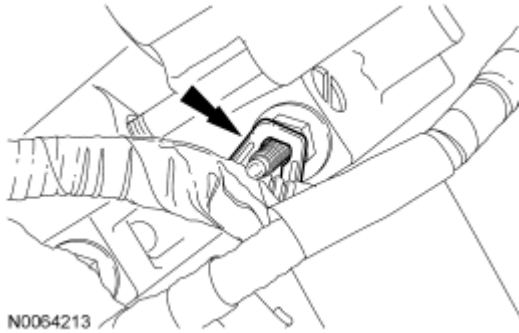


Fig. 729: Locating Wire Harness Retainer From A/C Compressor Stud Bolt
Courtesy of FORD MOTOR CO.

18. Connect the Crankshaft Position (CKP) sensor electrical connector.

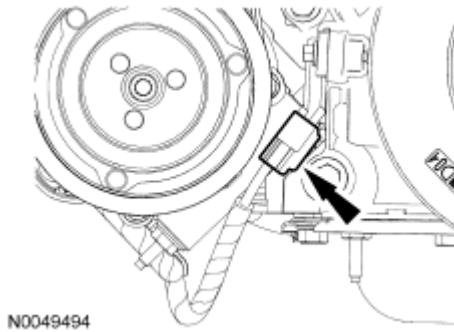


Fig. 730: Locating Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

19. Install the wire harness bracket to the oil pan stud bolt and install the nut.
- Tighten to 10 Nm (89 lb-in).

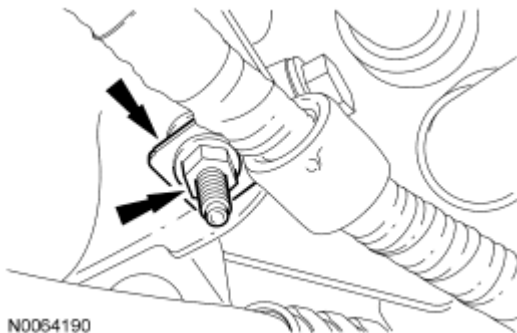


Fig. 731: Removing Nut & Wire Harness Bracket From Oil Pan Stud Bolt
Courtesy of FORD MOTOR CO.

20. Attach the wiring harness retainer to the oil pan stud bolt.

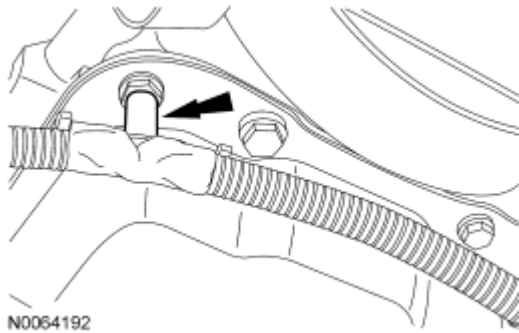


Fig. 732: Detaching Wiring Harness Retainer From Oil Pan Stud Bolt
Courtesy of FORD MOTOR CO.

21. Connect the B+ wire to the generator and install the nut.
- Tighten to 8 Nm (71 lb-in).

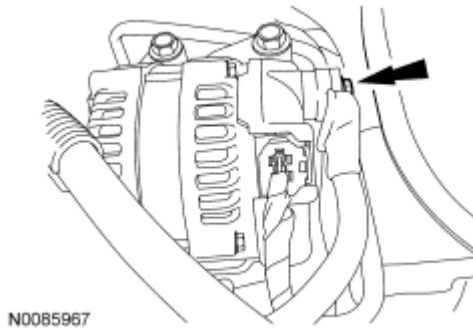


Fig. 733: Locating B+ Wire From Generator
Courtesy of FORD MOTOR CO.

22. Connect the power steering return hose.

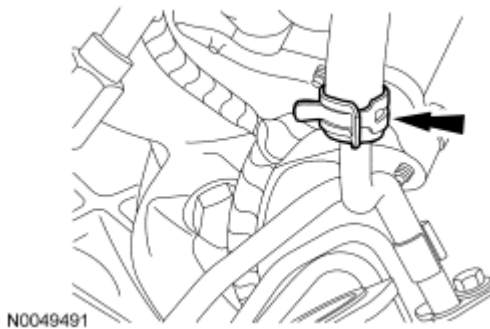
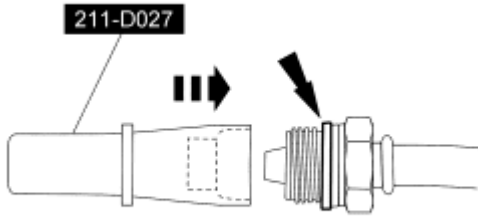


Fig. 734: Locating Power Steering Return Hose
Courtesy of FORD MOTOR CO.

NOTE: A new Teflon® seal must be installed.

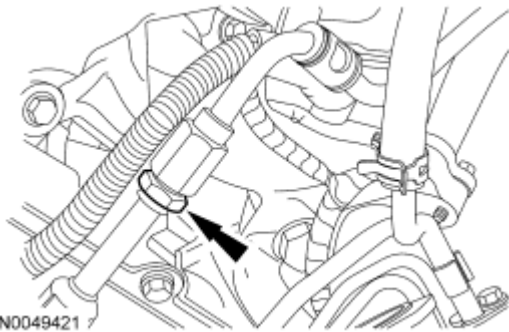
23. Using the Teflon® Seal Installer Set, install a new Teflon® seal on the Power Steering Pressure (PSP) tube fitting.



N0032102

Fig. 735: Installing Teflon(R) Seal Using Special Tool 211-D027
Courtesy of FORD MOTOR CO.

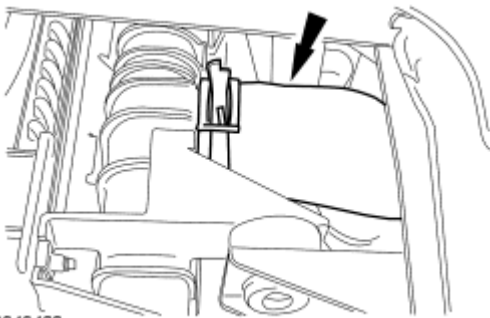
24. Connect the pressure PSP tube fitting.
- Tighten to 65 Nm (48 lb-ft).



N0049421

Fig. 736: Locating Power Steering Pressure (PSP) Tube Fitting
Courtesy of FORD MOTOR CO.

25. Position the lower radiator hose assembly into the vehicle.
- Connect the lower radiator hose to the radiator.



N0049488

Fig. 737: Disconnecting Lower Radiator Hose From Radiator
Courtesy of FORD MOTOR CO.

26. Connect the coolant hose to the oil cooler.

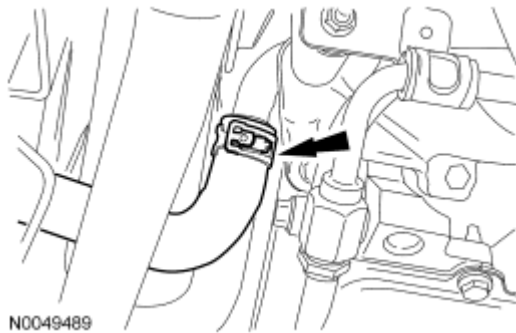


Fig. 738: Disconnecting Coolant Hose From Oil Cooler
Courtesy of FORD MOTOR CO.

27. Rotate the SC drive belt tensioner clockwise and install the drive belt onto the SC drive pulley.

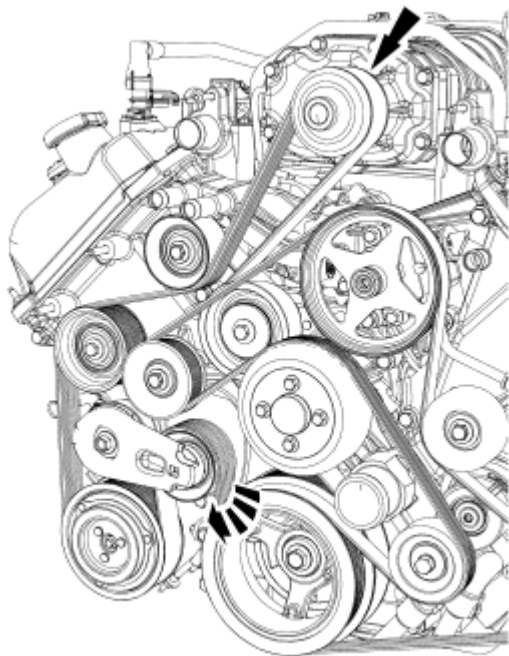


Fig. 739: Rotating SC Belt Tensioner Clockwise & Remove SC Belt Off SC
Courtesy of FORD MOTOR CO.

28. Connect the A/C pressure transducer electrical connector.

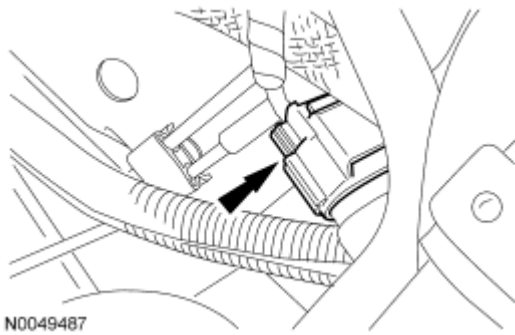


Fig. 740: A/C Pressure Transducer Electrical Connector
Courtesy of FORD MOTOR CO.

29. Connect the hose to the power steering reservoir.

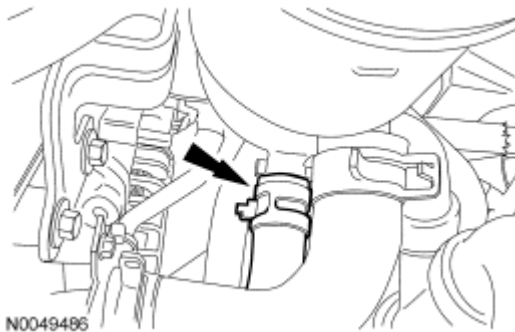


Fig. 741: Power Steering Reservoir Hose
Courtesy of FORD MOTOR CO.

30. Connect the 16-pin electrical connector and attach the 2 wiring retainers

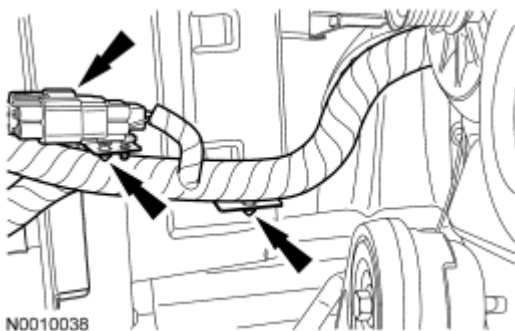


Fig. 742: Locating 16-Pin Electrical Connector
Courtesy of FORD MOTOR CO.

31. Connect the upper and lower PCM electrical connectors.

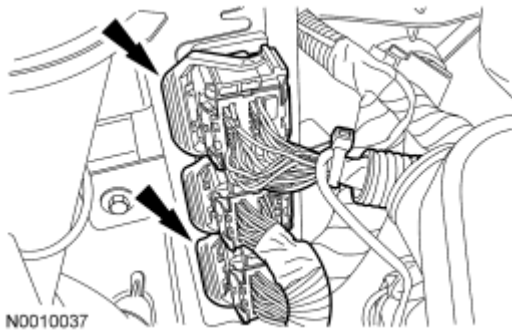


Fig. 743: Identifying Upper & Lower Powertrain Control Module (PCM) Electrical Connectors
Courtesy of FORD MOTOR CO.

32. Connect the 68-pin connector to the Power Distribution Box (PDB).
 - Tighten to 6 Nm (53 lb-in).
 - Attach the PDB upper housing to the lower housing.

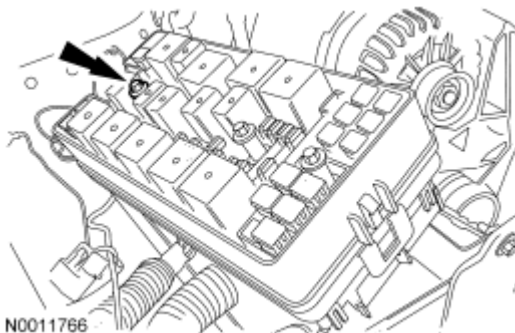


Fig. 744: Locating Power Distribution Box Upper Housing Bolt
Courtesy of FORD MOTOR CO.

33. Install the PDB cover.
34. Attach the 2 wiring harness pin-type retainers.

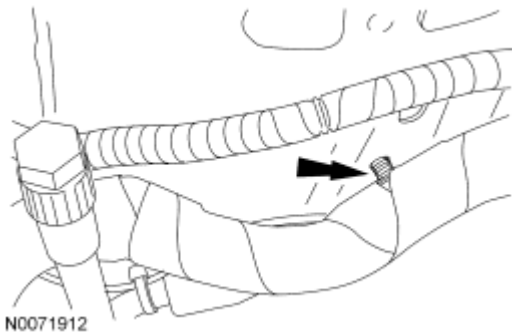


Fig. 745: Locating Pin-Type Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

35. Attach the pin-type wire harness retainer to the cowl.

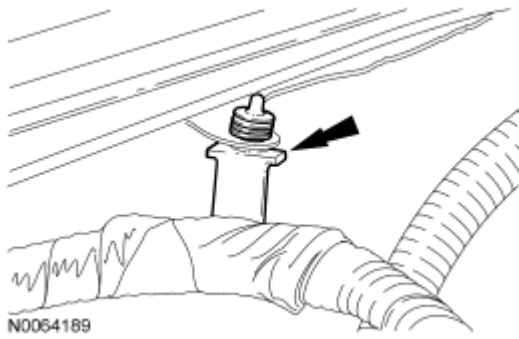


Fig. 746: Detaching Pin-Type Wire Harness Retainer From Cowl
Courtesy of FORD MOTOR CO.

36. Connect the 2 heater hoses to the coolant tube assembly at the rear of the engine.

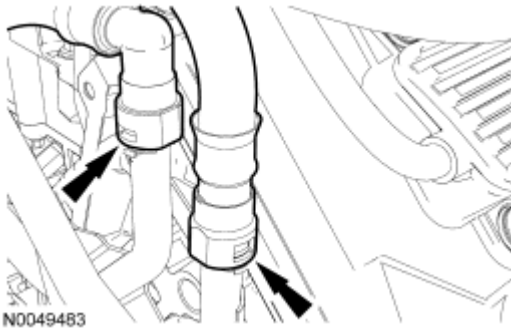


Fig. 747: Disconnecting Heater Hoses From Coolant Tube Assembly At Rear Of Engine
Courtesy of FORD MOTOR CO.

37. Install the Evaporative Emission (EVAP) canister purge valve.
- Connect the lower EVAP tube and electrical connector to the EVAP canister purge valve.

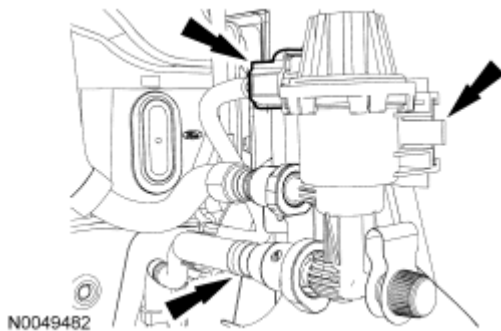


Fig. 748: Disconnecting Lower EVAP Tube & Electrical Connector From EVAP Canister Purge Valve
Courtesy of FORD MOTOR CO.

38. Connect the EVAP tube and brake booster vacuum supply tube to the Throttle Body (TB) spacer.

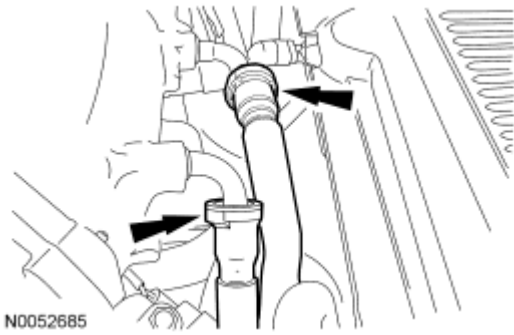


Fig. 749: Disconnecting Evaporative Emissions (EVAP) Tube & Brake Booster Vacuum Supply Tube From Throttle Body (TB) Spacer
Courtesy of FORD MOTOR CO.

39. Connect the fuel supply tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** .

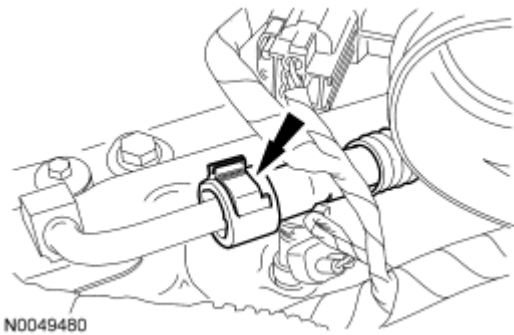


Fig. 750: Locating Fuel Supply Tube
Courtesy of FORD MOTOR CO.

40. Connect the coolant hose to the coolant pump.



Fig. 751: Disconnecting Coolant Hose From Coolant Pump
Courtesy of FORD MOTOR CO.

41. Connect the coolant hose to the thermostat housing.

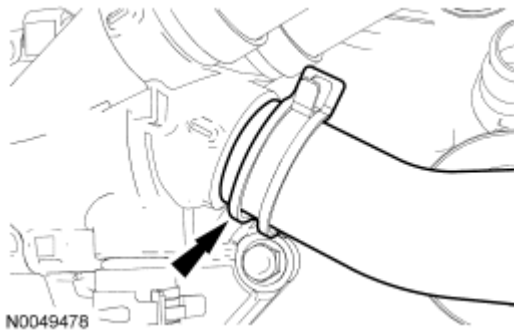


Fig. 752: Disconnecting Coolant Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

42. Connect the coolant hose to the coolant tube assembly (above the generator).

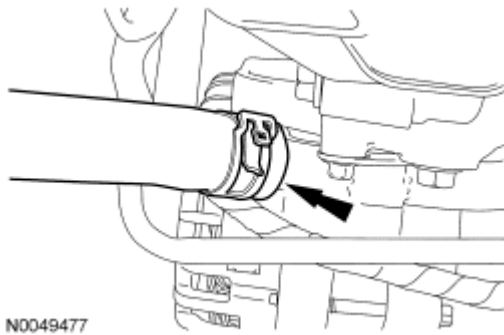


Fig. 753: Disconnecting Coolant Hose From Coolant Tube Assembly
Courtesy of FORD MOTOR CO.

43. Connect the coolant hose from the Charge Air Cooler (CAC).

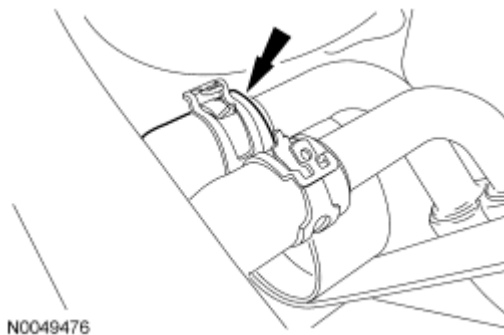


Fig. 754: Disconnecting Coolant Hose From Charge Air Cooler (CAC)
Courtesy of FORD MOTOR CO.

NOTE: RH bolt shown, LH similar.

44. Install the cooling fan assembly and the 2 bolts.
- Tighten to 9 Nm (80 lb-in).

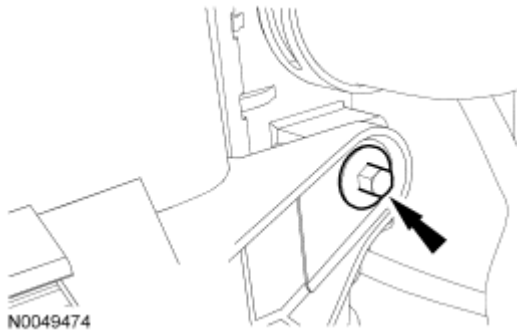


Fig. 755: Locating Cooling Fan Assembly Bolts
Courtesy of FORD MOTOR CO.

45. Connect the cooling fan electrical connector.

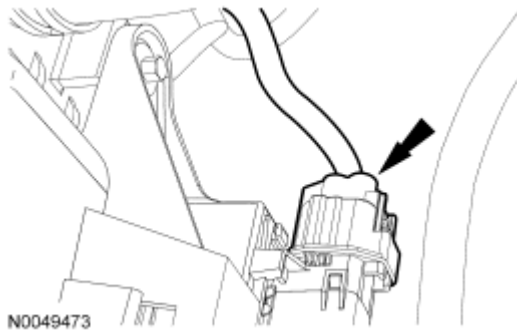


Fig. 756: Disconnecting Cooling Fan Electrical Connector
Courtesy of FORD MOTOR CO.

46. Connect the upper radiator hose from the thermostat housing.

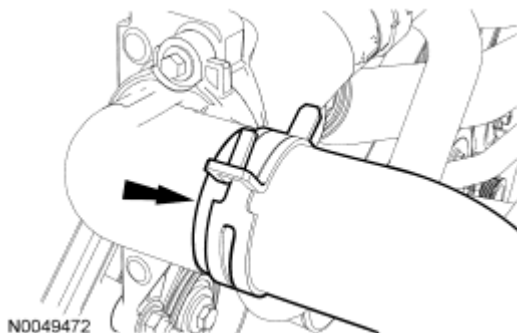


Fig. 757: Disconnecting Upper Radiator Hose From Thermostat Housing
Courtesy of FORD MOTOR CO.

47. Install the SC coolant degas bottle. For additional information, refer to **SUPERCHARGER COOLING** .
48. Install the engine coolant degas bottle. For additional information, refer to **ENGINE COOLING** .
49. Install the 2 steering column dash boot nuts.
- Tighten to 9 Nm (80 lb-in).

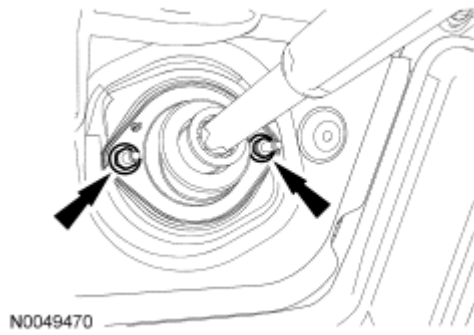


Fig. 758: Locating Steering Column Dash Boot Nuts
Courtesy of FORD MOTOR CO.

50. Install the battery tray and battery. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
51. Install the Air Cleaner (ACL) and ACL outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING**.

NOTE: Use the hood hinge location index marks made during removal to aid in hood installation.

52. Install the hood and 4 bolts.
 - Tighten to 12 Nm (106 lb-in).
53. Connect the windshield washer hose and position the hood insulation.

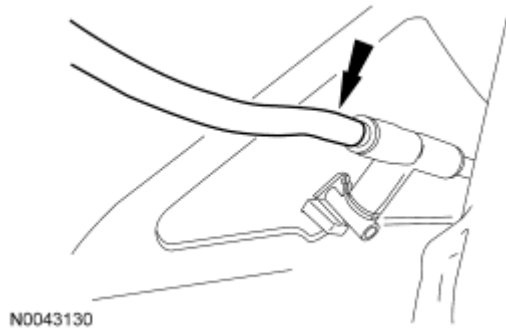


Fig. 759: Locating Windshield Washer Hose
Courtesy of FORD MOTOR CO.

54. Install the hood insulation pin-type retainer and attach the 2 windshield washer hose retainers.

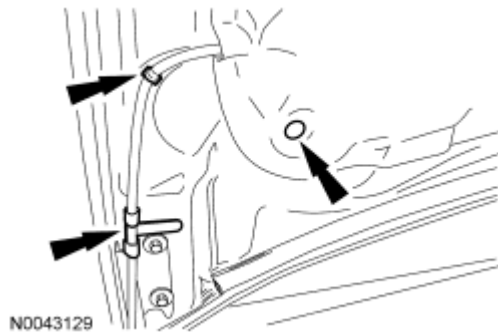


Fig. 760: Locating Windshield Washer Hose Retainers
Courtesy of FORD MOTOR CO.

55. Install the strut tower cross brace and the 4 nuts.
 - Tighten to 35 Nm (26 lb-ft).

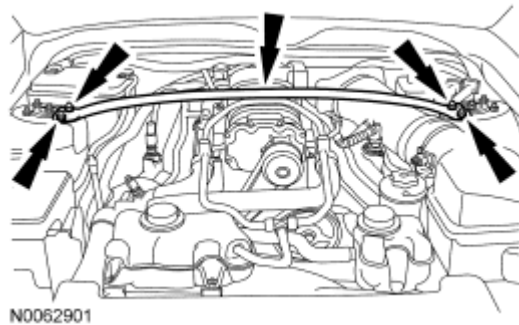


Fig. 761: Locating Strut Tower Cross Brace & Nuts
Courtesy of FORD MOTOR CO.

56. Fill the engine with clean engine oil.
57. Install the battery and tray. For additional information, refer to **BATTERY, MOUNTING AND CABLES**.
58. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING**.
59. Fill and bleed the SC cooling system. For additional information, refer to **SUPERCHARGER COOLING**.
60. Fill the power steering system. For additional information, refer to **STEERING SYSTEM - GENERAL INFORMATION**.