

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

2007 ENGINE**Engine - 3.0L (2V) - Ranger****SPECIFICATIONS****GENERAL SPECIFICATIONS****GENERAL SPECIFICATIONS**

Item	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Thread Sealant with PTFE TA-24	WSK-M2G350-A2
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada) or equivalent	WSS-M2C930-A
Gasket Maker TA-16	WSK-M2G348-A5
Silicone Gasket Remover ZC-30	-
Motorcraft Metal Surface Prep ZC-31	-
General Specifications	
Oil capacity	4.0 quarts + 1/2 quart with filter change (4.5 quarts total)

GENERAL SPECIFICATIONS**GENERAL SPECIFICATIONS**

Item	Specification
Displacement (CID)	3.0L
No. of Cylinders	6
Bore	89.00 mm (3.50 in)
Stroke	80.00 mm (3.14 in)
Firing Order	1-4-2-5-3-6
Oil Pressure (Hot 2500 RPM)	276-414 Kpa (40-60 psi)
Oil Capacity	4.0 quarts + 1/2 quart with filter change (4.5 quarts total)

CYLINDER HEAD AND VALVE TRAIN**CYLINDER HEAD AND VALVE TRAIN**

Item	Specification
Combustion Chamber Volume (cc)	50.1-47.1
Valve Guide Bore Diameter Intake and Exhaust	7.017-7.042 mm (0.2762-0.2772 in)

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Valve Seats

Width - Intake and Exhaust	2.0-2.5 mm (0.078-0.098 in)
Angle	44.5 Degrees
Runout (T.I.R.)	0.035 mm (0.0013 in)
Gasket Surface Flatness	0.08 mm (0.003 in) over 152.0 mm (6.00 in)

Valve Stem to Guide Clearance

Intake	0.026-0.071 mm (0.001-0.0027 in)
Exhaust	0.038-0.083 mm (0.0015-0.0032 in)

Valve Head Diameter

Intake	40.0 mm (1.57 in)
Exhaust	33.0 mm (1.30 in)
Valve Face Runout Limit	0.05 mm (0.002 in)
Valve Face Angle	45.62 Degrees

Valve Stem

Diameter (Std.)	
Intake	6.971-6.991 mm (0.2744-0.2752 in)
Exhaust	6.959-6.979 mm (0.2739-0.2747 in)
Oversize	
Intake	8.340-8.320 mm (0.3283-0.3276 in)
Exhaust	8.328-8.308 mm (0.3279-0.3271 in)
Oversize	
Intake	8.720-8.700 mm (0.3433-0.3425 in)
Exhaust	8.708-8.688 mm (0.3428-0.3420 in)

Valve Springs

Valve Open to Maximum Lift	912 N @ 29.74 mm (1.17 in)
Valve Closed	304 N @ 40.52 mm (1.60 in)
Free Length (Approximate)	46.4 mm (1.89 in)
Installed Spring Height	44.17-41.98 mm (1.736-1.650 in)
Service Limit	10% Force Loss @ Specified Height
Rocker Arm Ratio	1.61

Valve Tappet, Hydraulic

Diameter (Std.)	22.206 mm (0.874 in)
Clearance to Bore	0.018-0.069 mm (0.0007-0.0027 in)
Service Limit	0.127 mm (0.005 in)
Hydraulic Leak-Down Rate	a
Collapsed Tappet Gap	(Nominal)
Intake	2.23-4.77 mm (0.088-0.189 in)
Exhaust	2.23-4.77 mm (0.088-0.189 in)
Distributor Shaft Bearing Bore Diameter	22.268-22.230 mm (0.88767-0.8752 in)
Tappet Bore Diameter	22.224-22.275 mm (0.875-0.877 in)

Camshaft Bore Inside Diameter

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No. 1	54.688-54.713 mm (2.1531-2.1541 in)
No. 2	54.188-54.213 mm (2.1334-2.1344 in)
No. 3	54.188-54.213 mm (2.1334-2.1344 in)
No. 4	54.688-54.713 mm (2.1531-2.1541 in)

^a 20-200 seconds to leak-down 3.18 (0.125 in) with 225 Newtons (50 pounds) load and tappet filled with leak-down fluid.

CAMSHAFT**CAMSHAFT**

Item	Specification
Lobe Lift	
Intake	6.408 mm (0.260 in)
Exhaust	6.604 mm (0.260 in)
Allowable Lobe Lift Loss	0.127 mm (0.005 in)
Theoretical Valve Lift @ Zero Lash	
Intake	10.32 mm (0.419 in)
Exhaust	10.65 mm (0.419 in)
End Play	
Service Limit	0.003 mm (0.007 in)
Journal to Bearing Clearance	0.025-0.076 mm (0.001-0.003 in)
Journal Diameter	
All	50.987-51.013 mm (2.0074-2.0084 in)
Cam Bearing I.D.	51.038-51.063 mm (2.0094-2.0104 in)
Runout Limit	
Runout of No. 2 or No. 3	0.05 mm (0.002 in)
Relative to No. 1 and	
No. 4	
Out-of-Round Limit	0.025 mm (0.001 in)

CYLINDER BLOCK**CYLINDER BLOCK**

Item	Specification
Head Gasket	0.08 mm (0.003 in)
Surface Flatness	in 152.0 mm (6.00 in)
Head Gasket	
Surface Finish (RMS)	1.0-3.3 Micrometers
Cylinder Bore	
Diameter	89.00 mm (3.504 in)
Surface Finish (RMS)	0.45-0.96 micrometers
Out-of-Round Limit	0.025 mm (0.001 in)

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Out-of-Round Service Limit	0.050 mm (0.002 in)
Taper Service Limit	0.050 mm (0.002 in)
Main Bearing Bore Diameter	68.905 mm (2.713 in)
	68.885 mm (2.712 in)

CRANKSHAFT AND FLYWHEEL**CRANKSHAFT AND FLYWHEEL**

Item	Specification
Main Bearing Journal Diameter	63.983-64.003 mm (2.5190-2.5198 in)
Out-of-Round Limit	0.008 mm (0.0003 in)
Taper Limit	0.06 mm (0.0006 in) Total 0.013 mm (0.0003 in) per 25 mm (1 in)
Journal Runout Limit	0.05 mm (0.002 in) ^b 0.05 mm (0.002 in) ^c
Surface Finish (RMS)	0.25 Micrometers (10.0 Micro in)
Thrust Bearing Journal	
Length	25.775-25.825 mm (1.0148-1.067 in)
Connecting Rod Journal	
Diameter	53.983-54.003 mm (2.1253-2.1261 in)
Out-of-Round Limit	0.006 mm (0.0003 in) Max. 0.0150 mm (0.0006 in) Total
Taper Limit	0.008 mm per 25 mm (0.0003 in per in)
Surface Limit (RMS)	0.25 Micrometers (10.0 Micro in)
Main Bearing Thrust Face	
Surface Finish (RMS)	0.4 Micrometers (0.157 Micro in) Front; 0.4 Micrometers (0.157 Micro in) Rear
Runout Limit	0.025 mm (0.001 in)
Flywheel Ring Gear Lateral Runout (T.I.R.)	
Automatic Transmission	1.778 mm (0.07 in)
Crankshaft End Play	0.10-0.20 mm (0.004-0.008 in)
Connecting Rod Bearings	
Clearance to Crankshaft Desired	0.025-0.035 mm (0.001-0.0014 in)
Allowable	0.020-0.066 mm (0.00086-0.0027 in)
Bearing Wall Thickness (Std.)	1.557-1.570 mm (0.0612-0.0618 in)
Main Bearings	

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Clearance to Crankshaft	
Desired	0.25-0.035 mm (0.001-0.0014 in)
Allowable	0.020-0.066 mm (0.0005-0.0023 in)
Bearing Wall Thickness (Std.) 1st and 2nd	2.444-2.481 mm (0.0962-0.0967 in)
3rd and Rear	2.427-2.491 mm (0.0955-0.0980 in)

^b Runout of journals II and III to journals I and IV.

^c Runout of adjacent journals to each other.

CONNECTING ROD, PISTON AND RINGS**CONNECTING ROD, PISTON AND RINGS**

Item	Specification
Connecting Rod	
Piston Pin Bore Diameter	23.105-23.145 mm (0.9096-0.9112 in)
Crankshaft Bearing Bore Diameter	5.15-5.17 mm (2.250-2.251 in)
Length (Center-to-Center)	140.46-140.54 mm (5.530-5.533 in)
Alignment (Bore-to-Bore Max Diff.)	
Twist	0.075 per 25 mm (0.003 per in)
Bend	0.04 per 25 mm (0.0016 per in)
Side Clearance (Assembled to Crank)	
Standard	0.15-0.35 mm (0.006-0.014 in)
Service Limit	0.36 mm Max. (0.014 in Max.)

PISTON**PISTON**

Item	Specification
Diameter	
Coded Red	88.962-88.978 mm (3.5024-3.5031 in)
Coded Blue	88.988-89.004 mm (3.5035-3.5041 in)
Coded Yellow	89.014-89.030 mm (3.5045-3.5051 in)
Piston-to-Bore Clearance	0.030-0.056 mm (0.0012-0.0022 in)
Service Limit	0.081 mm Max.
Service Piston Selection^d	
Piston Bore Diameter	Service Piston Grade Required
89.009-89.035 mm (3.5043-3.05053 in)	Red
89.035-89.060 mm (3.5053-3.5063 in)	Blue

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89.060-89.086 mm (3.5063-3.5073 in)	Yellow
Ring Groove Width	
Compression (Top)	1.530-1.555 mm (0.0602-0.0612 in)
Compression (Bottom)	1.530-1.555 mm (0.602-0.612 in)
Oil	4.030-4.055 mm (0.1587-0.1596 in)
Piston Pin	
Length	76.5-77.2 mm (3.012-3.039 in)
Diameter	23.162-23.175 mm (0.9119-0.9124 in)
Pin to Piston Clearance	0.005-0.012 mm (0.0002-0.0005 in)
Pin to Rod Clearance	Press Kit 4 KiloNewtons (900 Lbs.)
Piston Pins	
Ring Width	
Compression (Top)	1.460-1.490 mm (0.0575-0.0587 in)
Compression (Bottom)	1.460-1.490 mm (0.0575-0.0587 in)
Oil Ring	Side Seal - Snug Fit
Service Limit	Side Clearance 0.15 mm Max. (0.006 in Max.)
Ring Gap	
Compression (Top) (in Gauge)	0.25-0.50 mm (0.01-0.02 in)
Compression (Bottom) (in Gauge)	0.25-0.50 mm (0.01-0.02 in)
Oil Ring (Steel Rail) (in Gauge)	0.25-1.25 mm (0.010-0.049 in)
Side Clearance	
1st Ring	0.040-0.095 mm (0.0016-0.0037 in)
2nd Ring	0.040-0.095 mm (0.0016-0.0037 in)
Engine packages equipped with Tripminder: Return line must be closed when checking pressure.	

^d When replacing pistons, measure the cylinder bore as described in Section 303-00, and install the indicated service piston.

LUBRICATION SYSTEM**LUBRICATION SYSTEM**

Item	Specification
Oil Pump	
Relief Valve Spring Tension (force @ length)	44.9-40.5 N (10.1-9.1 lb) @ 28.2 mm (1.11 in)
Relief Valve to Bore Clearance	0.073-0.043 mm (0.0029-0.0017 in)
Oil Pump Gear Backlash	0.02-0.03 mm (0.008-0.012 in)
Oil Pump Gear Radial Clearance	

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Idler and Driver	0.125-0.050 mm (0.0055-0.002 in)
Oil Pump Gear Height Clearance	0.069-0.039 mm (0.0027-0.0015 in)
Idler Shaft to Idler Gear Clearance	0.069-0.039 mm (0.0027-0.0015 in)
Driver Shaft to Housing Clearance	0.073-0.038 mm (0.0019-0.0005 in)

TORQUE SPECIFICATIONS**TORQUE SPECIFICATIONS**

Description	Nm	lb-ft	lb-in
A/C compressor and power steering pump bracket bolts and stud bolts	47	35	-
A/C line bracket nut	11	8	-
Accelerator cable bracket bolts	10	-	89
Accessory drive belt tensioner bolts	27	20	-
Camshaft position sensor bolts	3	-	27
Camshaft sprocket bolt	63	46	-
Camshaft synchronizer retaining bolt	30	22	-
Camshaft thrust plate bolts	10	-	89
Clutch pressure plate	32	24	-
Connecting rod bearing cap nuts	35	26	-
Coolant pump pulley bolts	25	18	-
Crankshaft damper bolts	145	107	-
Crankshaft position sensor bolts	10	-	89
Crankshaft pulley bolts	63	46	-
Cylinder head bolts ^a	-	-	-
Dual converter Y-pipe-to-exhaust manifold nuts	40	30	-
Engine lifting eye nuts	20	15	-
Engine support insulator bracket-to-engine bolts	48	35	-
Engine support insulator bracket-to-engine support insulator nuts	109	80	-
Engine support insulator-to-frame nuts	103	76	-
Exhaust gas recirculation (EGR) vacuum regulator solenoid stud bolt	10	-	89
EGR valve bolts	20	15	-
Exhaust manifolds bolts and stud bolts ^a	-	-	-
Exhaust manifold-to-EGR valve tube fittings	50	37	-
Fan shroud bolts	7	-	62
Flexplate bolts	80	59	-
Flywheel bolts	80	59	-
Front axle mounting bolts	66	49	-
Front cover bolts and studs	25	18	-
Front drive shaft strap bolts	19	14	-
Fuel rail bolts	10	-	89
Fuel tube bracket nuts	30	22	-

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Generator mounting bracket bolts	47	35	-
Ground cable nut	10	-	89
Hydraulic lash adjuster retainer bolts	12	9	-
Intake manifold bolts ^a	-	-	-
Knock sensor (KS) bolt	25	18	-
Lower intake manifold bolts	29	21	-
Main bearing caps bolts	80	59	-
Oil level indicator and tube bracket nut	18	13	-
Oil pan baffle nuts	32	24	-
Oil pan bolts	12	9	-
Oil pressure switch	20	15	-
Oil pump bolts	48	35	-
Powertrain control module (PCM) ground strap nut	10	-	89
Rocker arm bolts	32	24	-
Starter motor bolts	25	18	-
Throttle body bolts and stud bolt	10	-	89
Torque converter access plate bolts	12	9	-
Torque converter nuts	35	26	-
Transmission cooler line bracket bolt	11	8	-
Transmission-to-engine bolts	45	33	-
Upper intake manifold support bracket nut	6	-	53
Valve cover studs and bolts	12	9	-
Wiring harness bracket-to-A/C compressor and power steering pump bracket nut	10	-	89
Wiring harness bracket-to-transmission nut	30	22	-

^a Refer to the procedure in this article.

DESCRIPTION AND OPERATION

ENGINE

The 3.0L engine has:

- a V-block with 6 cylinders and splayed crankpins.
- a distributorless ignition system.
- a multi-port, sequential fuel injection (SFI) system.
- overhead valves.
- hydraulic valve tappets for automatic lash adjustment.
- connecting rod parting faces that are unique with an interference fit.

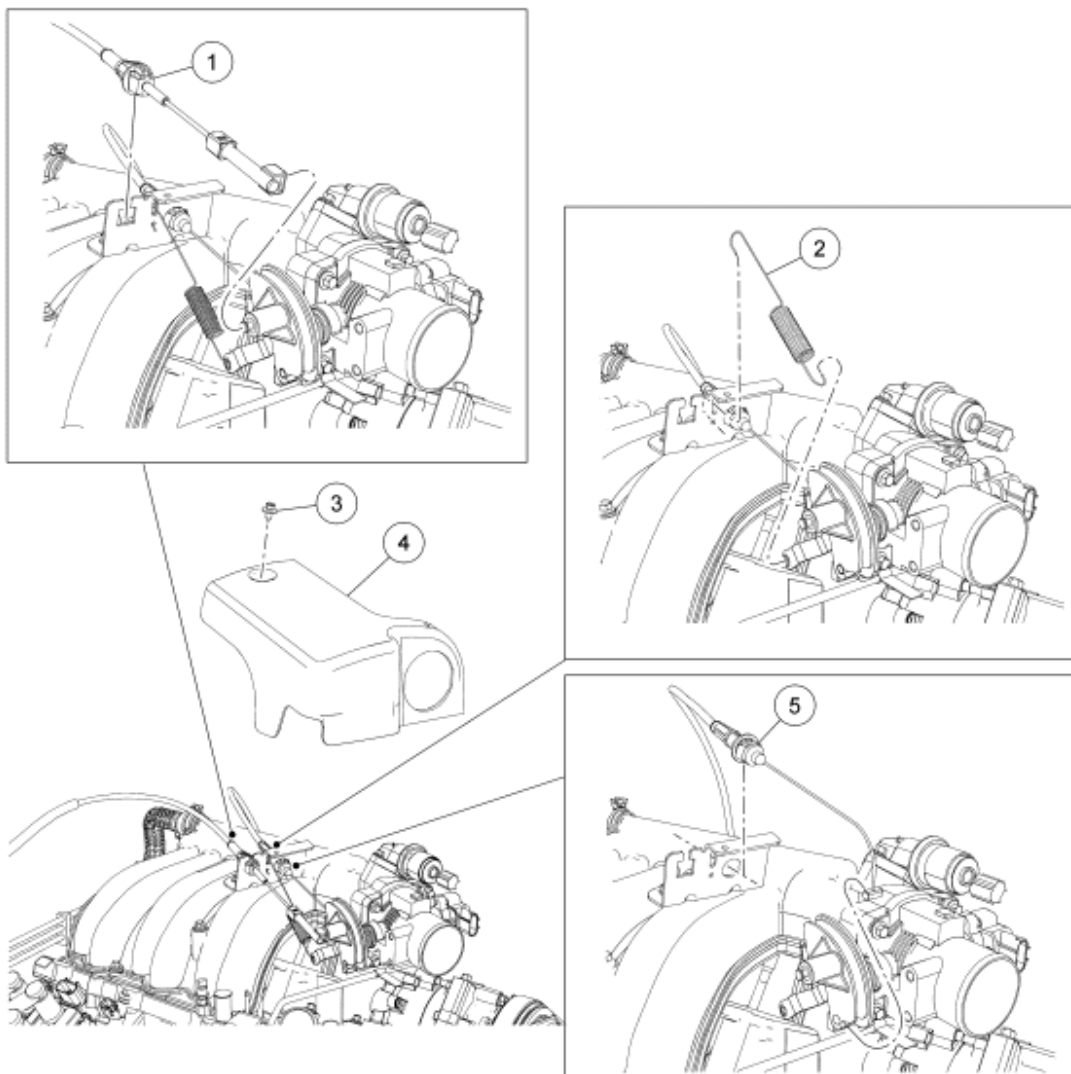
DIAGNOSTIC TESTS

ENGINE

For basic engine mechanical concerns, refer to [ENGINE SYSTEM - GENERAL INFORMATION](#) article.
For driveability concerns, refer to the [INTRODUCTION - GASOLINE ENGINES](#) article.

IN-VEHICLE SERVICING

UPPER INTAKE MANIFOLD



N0043286

Fig. 1: View Of Intake Manifold Upper 3.0L (1 Of 3)

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
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1	9A825	Speed control cable
2	9E894	Return spring
3	N800312	Bolt
4	9E766	Snow shield
5	9A758	Accelerator cable

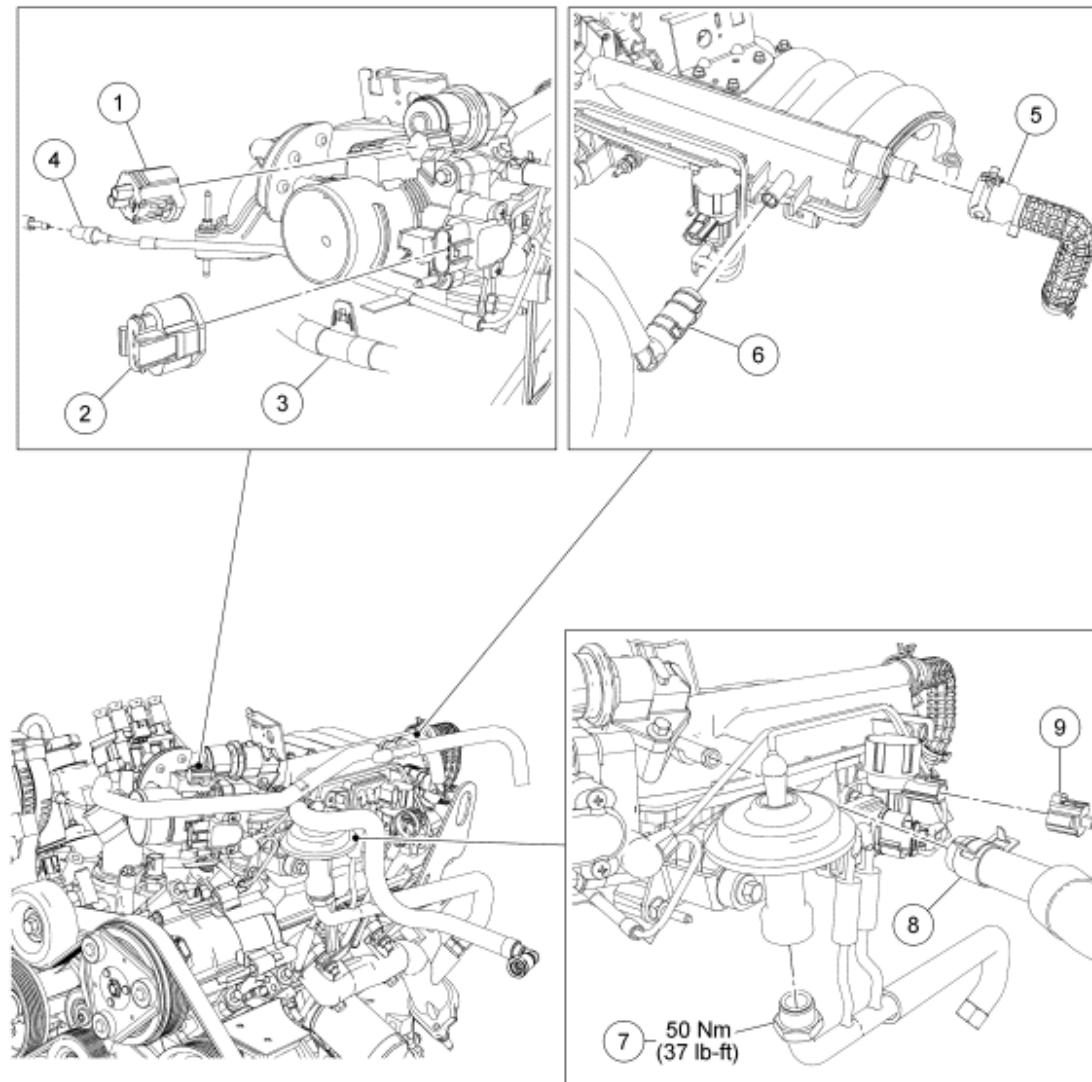


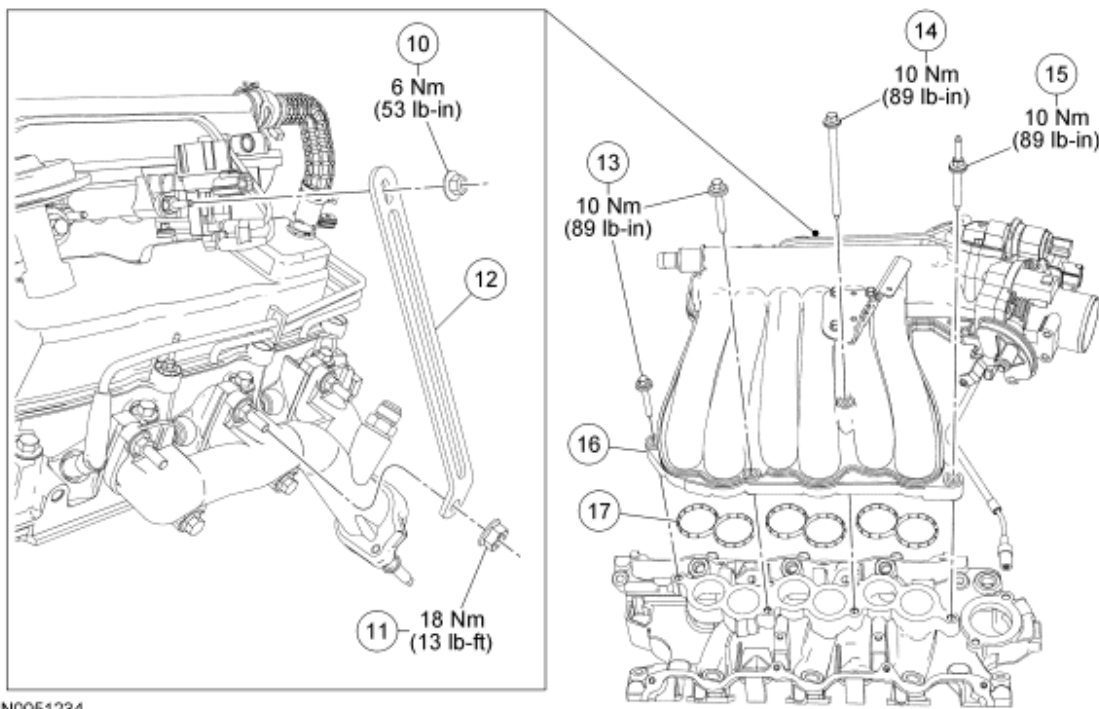
Fig. 2: View Of Intake Manifold Upper 3.0L With Torque Specifications (2 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Idle air control (IAC) valve electrical connector (part of 12B637)
2	14A464	Throttle position (TP) sensor electrical connector (part of 12B637)

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3	13A506	Wiring harness retainer
4	9E498	Vacuum hose
5	6C324	Positive crankcase ventilation (PCV) valve tube
6	9C482	Brake booster vacuum hose
7	9D477	Exhaust manifold-to-exhaust gas recirculation (EGR) valve tube
8	9Y476	Fuel vapor hose
9	14A464	EGR vacuum regulator solenoid electrical connector (part of 12B637)



N0051234

Fig. 3: View Of Intake Manifold Upper 3.0L With Torque Specifications (3 Of 3)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
10	N808338	Upper intake manifold brace upper nut
11	N804178	Upper intake manifold brace lower nut
12	95444	Upper intake manifold brace
13	W708242-S	Upper intake manifold bolt (2 required)
14	W706375-S	Upper intake manifold bolt
15	W707272-S	Upper intake manifold stud bolt
16	9424	Upper intake manifold
17	9H486	Upper intake manifold gasket (3 required)

REMOVAL

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Remove the air cleaner outlet pipe. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
3. Remove the bolt and the snow shield.
4. Disconnect the accelerator cable, speed control cable and the return spring.
5. Disconnect the accelerator cable and speed control cable from the accelerator bracket.
6. Disconnect the throttle position (TP) sensor and idle air control (IAC) valve electrical connectors. Disconnect the wire retainer.
7. Disconnect the engine vacuum harness-to-vacuum reservoir hose connection.
8. Disconnect the exhaust manifold-to-exhaust gas recirculation (EGR) valve tube from the EGR valve.
 - To install, tighten to 50 Nm (37 lb-ft).
9. Disconnect the fuel vapor hose from the intake manifold.
10. Disconnect the EGR vacuum regulator solenoid electrical connector.
11. Disconnect the brake booster vacuum hose and the positive crankcase ventilation (PCV) valve tube.
12. Remove the oil level indicator tube bracket nut and position the tube and bracket out of the way.
 - To install, tighten to 18 Nm (13 lb-ft).
13. Remove the nut and the upper intake manifold brace.

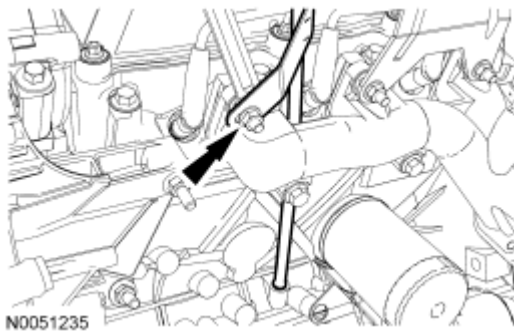


Fig. 4: Locating Nut & Upper Intake Manifold Brace
Courtesy of FORD MOTOR CO.

- To install, tighten to 6 Nm (53 lb-in).
14. Remove the bolts, the stud bolt and the upper intake manifold.
 - Remove and discard the gaskets.
 - Clean and inspect all mating surfaces.

NOTE: **Install new gaskets and tighten the upper intake manifold bolts and stud bolt in the sequence shown.**

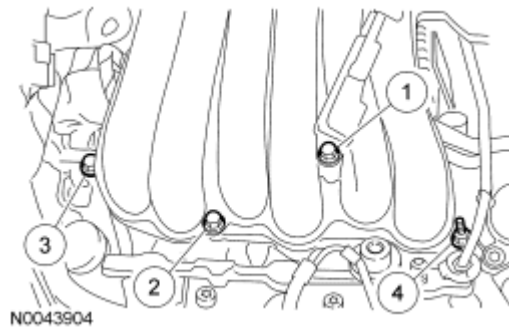


Fig. 5: Identifying Tightening Sequence Of Upper Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

15. To install, reverse the removal procedure.
- To install, tighten to 10 Nm (89 lb-in).

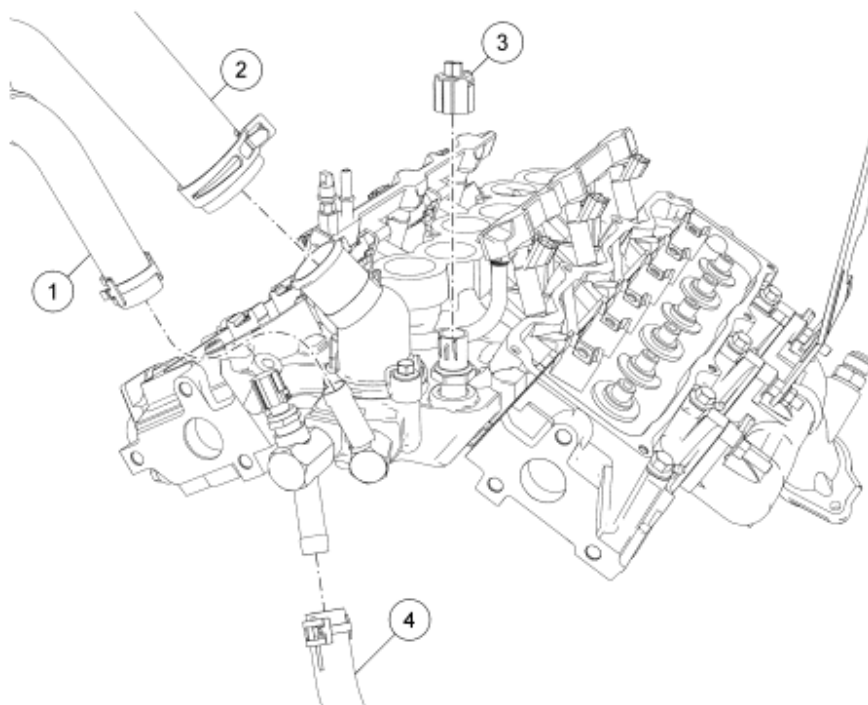
LOWER INTAKE MANIFOLD

Material

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

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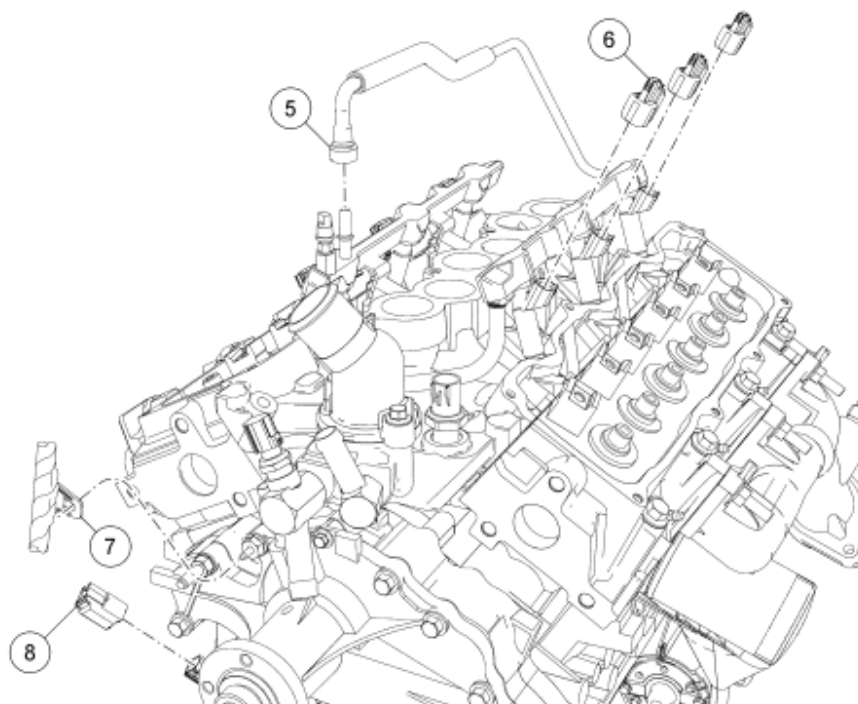
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Fig. 6: View Of Lower Intake Manifold Components (1 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	18C266	Heater hose
2	8B274	Upper radiator hose
3	14A464	Engine coolant temperature (ECT) sensor electrical connector
4	-	Coolant bypass hose (part of 8B273)

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Fig. 7: View Of Lower Intake Manifold Components (2 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
5	9J338	Fuel tube spring lock coupling
6	14A464	Fuel injector electrical connector (6 required) (part of 12B637)
7	13A506	Wiring harness retainer (part of 12B637)
8	14A464	Crankshaft position (CKP) sensor electrical connector (part of 12B637)

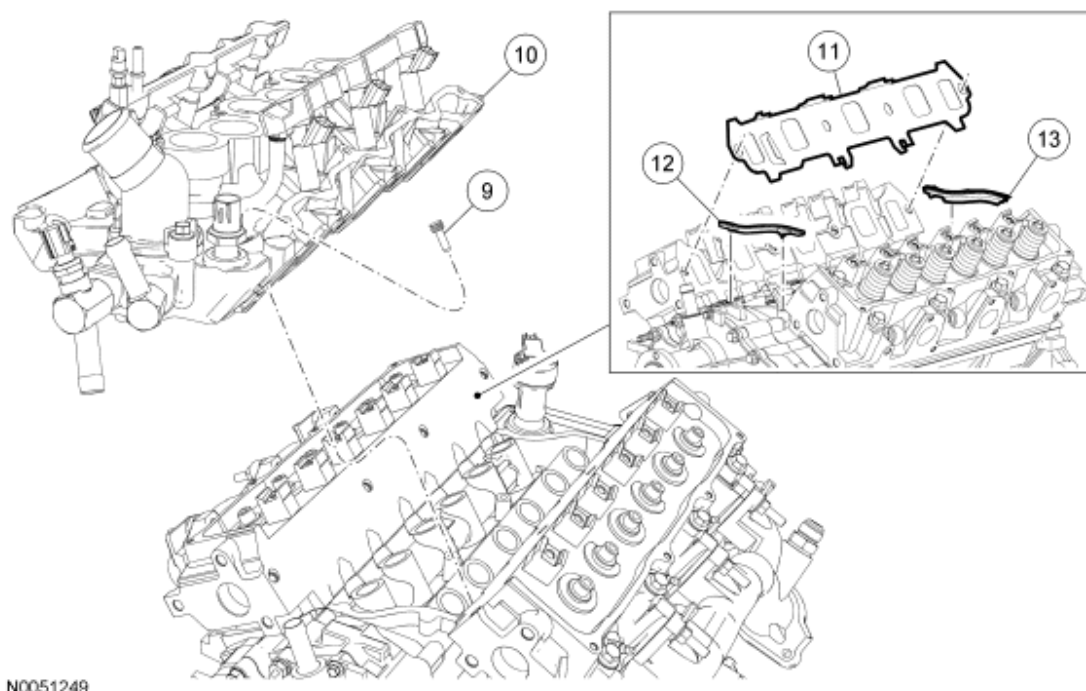


Fig. 8: View Of Lower Intake Manifold Components (3 Of 3)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
9	N803539	Lower intake manifold bolt (8 required)
10	9K461	Lower intake manifold
11	9439	Lower intake manifold gasket (2 required)
12	9A425	Lower intake manifold front seal
13	9A424	Lower intake manifold rear seal

REMOVAL

1. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING** article.
2. Remove both the valve covers. For additional information, refer to **Valve Cover - RH** and **Valve Cover - LH** in this article.
3. Disconnect the upper radiator hose, heater hose and coolant bypass hose.
4. Disconnect the engine coolant temperature (ECT) sensor electrical connector.
5. Disconnect the crankshaft position (CKP) sensor electrical connector and detach the wiring retainer from the stud bolt.
6. Disconnect the fuel injector electrical connectors and position the engine wiring harness aside.
7. Release the fuel pressure and disconnect the fuel tube spring lock coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
8. Loosen the rocker arm bolts.

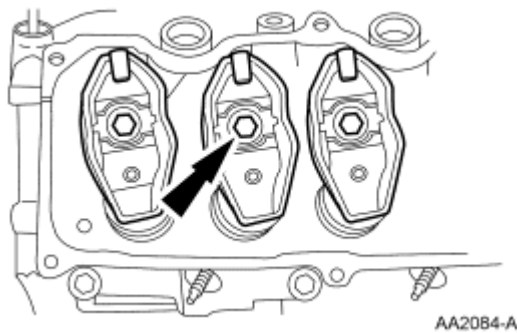


Fig. 9: Locating Rocker Arm Bolts
Courtesy of FORD MOTOR CO.

NOTE: Identify the location of each push rod. Each push rod is to be installed in the original location to prevent premature wear.

9. Remove all the push rods.
10. Remove the bolts from the lower intake manifold.

NOTE: Gently loosen the intake manifold to separate the silicone sealant from the cylinder block.

11. Remove the lower intake manifold.
12. Remove and discard the intake manifold gaskets and end seals.

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

NOTE: To clean the sealing area, use silicone gasket remover and metal surface prep. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and metal surface prep.

13. Clean the lower intake manifold gasket mating surfaces.

INSTALLATION

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

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. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and 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.

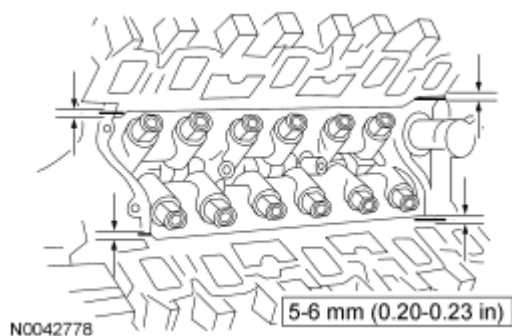


Fig. 10: Applying Beads Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

1. Apply a drop of silicone gasket and sealant at the 4 cylinder block-to-cylinder head seams.
2. Install the intake manifold gaskets and end seals.

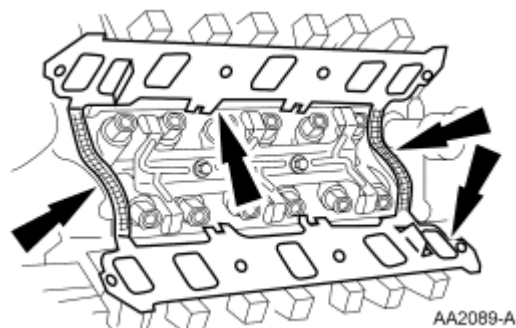
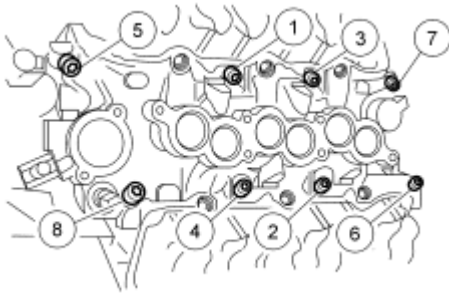


Fig. 11: Locating Intake Manifold Gaskets & End Seals
Courtesy of FORD MOTOR CO.

- Position the intake manifold gaskets.
 - Position the end seals.
3. Position the lower intake manifold.
 4. Install the bolts and tighten in 2 stages in the sequence shown.



N0042779

Fig. 12: Identifying Tightening Sequence Of Lower Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 15 Nm (11 lb-ft).
 - Stage 2: Tighten to 32 Nm (24 lb-ft).
5. Install the push rods.
 6. Tighten the rocker arm bolts.

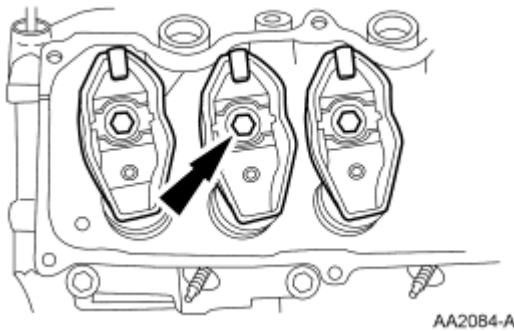


Fig. 13: Locating Rocker Arm Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 32 Nm (24 lb-ft).
7. Connect the fuel tube. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
 8. Connect the fuel injector electrical connectors.
 9. Connect the CKP sensor electrical connector and attach the wiring retainer to the stud bolt.
 10. Connect the ECT sensor electrical connector.
 11. Connect the upper radiator hose, heater hose and coolant bypass hose.
 12. Install both valve covers. For additional information, refer to **Valve Cover - RH** and **Valve Cover - LH** in this article.
 13. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING** article.

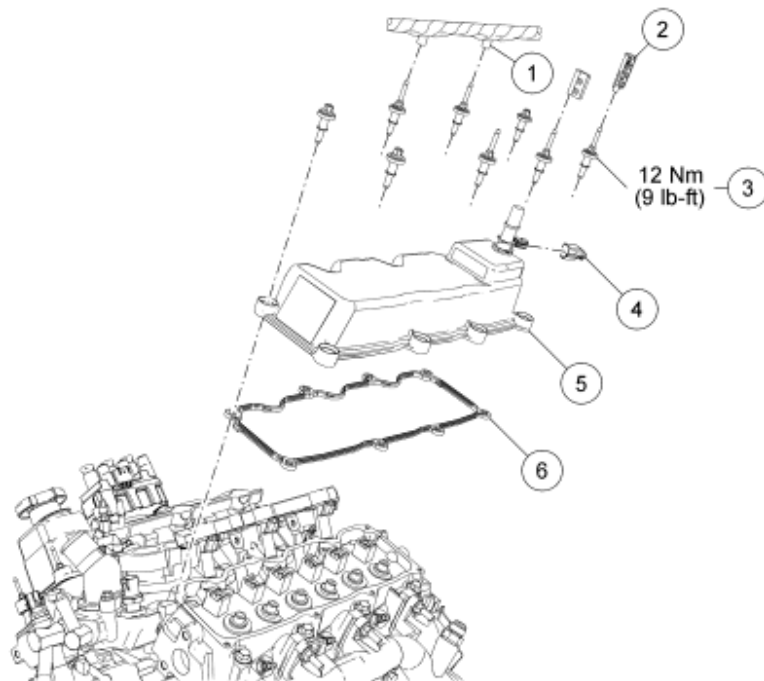
VALVE COVER - LH

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

Material

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



N0051251

Fig. 14: View Of Valve Cover - LH With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	13A506	Engine wiring harness retainer (part of 12B637)
2	12297	Spark plug wire holder
3	6C519	LH valve cover bolt (8 required)
4	14A464	Positive crankcase ventilation (PCV) valve electrical connector (part of 12B637)
5	6A513	LH valve cover
6	6584	LH valve cover gasket

REMOVAL

1. Remove the upper intake manifold. For additional information, refer to **Upper Intake Manifold** in this article.
2. Disconnect the LH spark plug wire holders.
3. Disconnect the engine wiring harness from the valve cover studs.
4. Disconnect the PCV valve electrical connector.
5. Remove the 3 bolts and the 5 stud bolts.

NOTE: To prevent stretching the valve cover gasket, loosen silicone gasket and sealant from the cylinder head by sliding a flat knife between the valve cover gasket and cylinder head.

6. Remove the valve cover.
7. Remove and discard the valve cover gasket.

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

NOTE: To clean the sealing area, use silicone gasket remover and metal surface prep. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and metal surface prep.

8. Clean the LH valve cover gasket mating surfaces.

INSTALLATION

1. Install a new valve cover gasket.

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

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. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and 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.

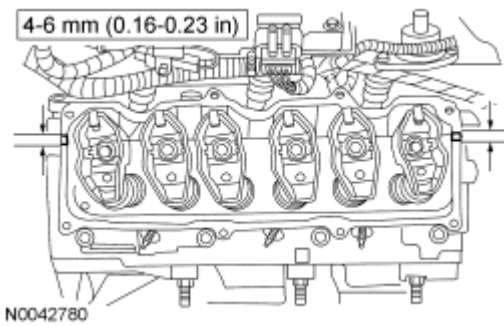


Fig. 15: Applying Bead Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

2. Apply a drop of silicone gasket and sealant at the 4 cylinder block-to-cylinder head seams.
3. Install the valve cover.
 - Tighten the 3 bolts and the 5 stud bolts in the sequence shown.

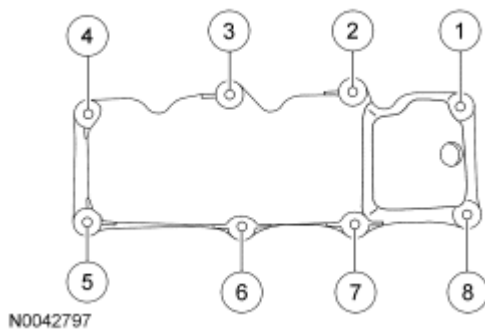


Fig. 16: Identifying Tightening Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 12 Nm (9 lb-ft).
4. Connect the PCV valve electrical connector.
 5. Connect the engine wiring harness to the valve cover studs.
 6. Connect the LH spark plug wire holders.
 7. Install the upper intake manifold. For additional information, refer to **Upper Intake Manifold** in this article.

VALVE COVER - RH

Material

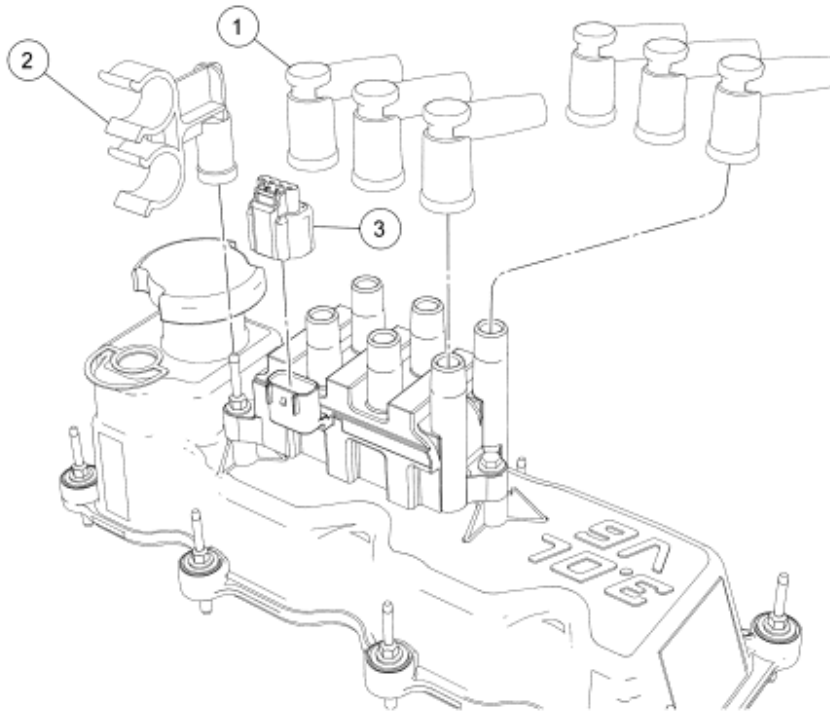
Item	Specification
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft Metal Surface Prep ZC-31	-

2007 Ford Ranger

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Silicone Gasket Remover
ZC-30

-



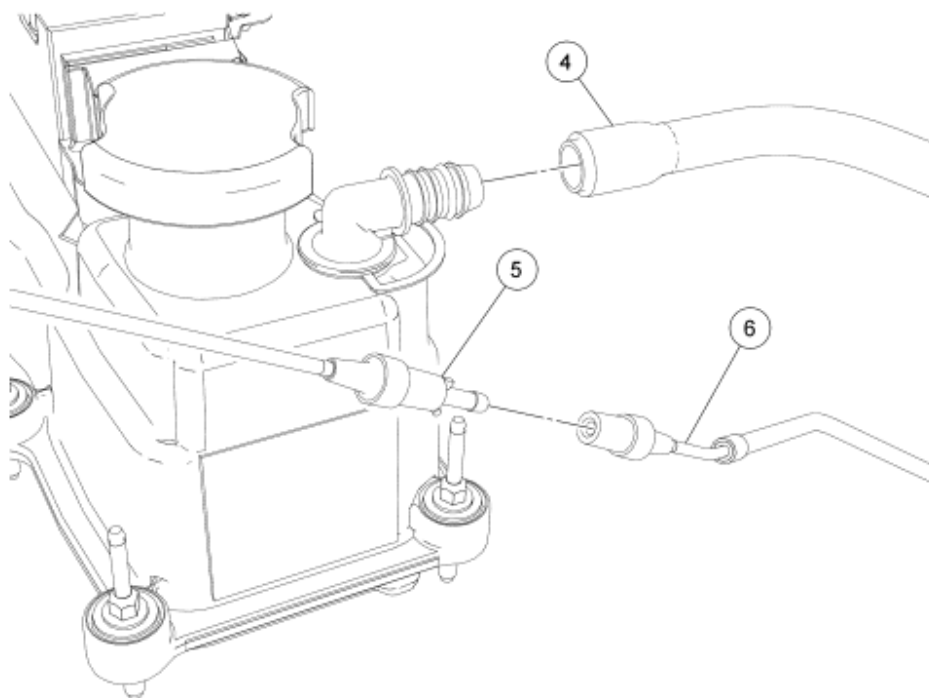
N0043125

Fig. 17: View Of Spark Plug Wires And Heater Hose Support (1 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	12286	Spark plug wires
2	18D331	Heater hose support
3	14A464	Ignition coil electrical connector

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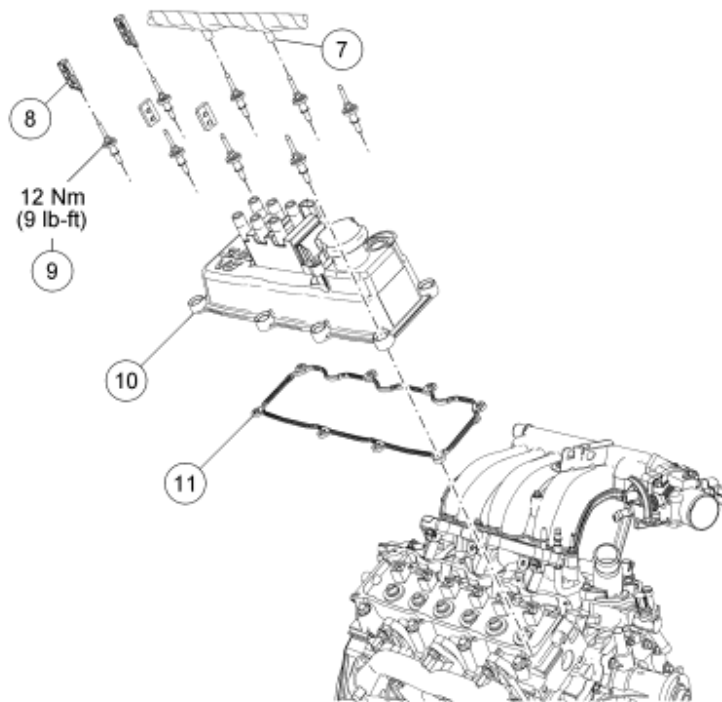
2007 ENGINE Engine - 3.0L (2V) - Ranger



N0051252

Fig. 18: View Of Spark Plug Wires And Heater Hose Support (2 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
4	6C342	Crankcase ventilation tube
5	19C828	A/C vacuum hose
6	9E498	Main vacuum hose



N0051253

Fig. 19: View Of Spark Plug Wires And Heater Hose Support With Torque Specifications (3 Of 3)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
7	13A506	Engine wiring harness retainer (part of 12B637)
8	12297	Spark plug wire holder
9	6C520	RH valve cover bolt (8 required)
10	6583	RH valve cover
11	6584	RH valve cover gasket

REMOVAL

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Disconnect the ignition coil electrical connector.

CAUTION: Do not pull on the spark plug wire as it may separate from the spark plug wire connector inside the spark plug boot.

3. Disconnect the spark plug wires from the ignition coil by twisting while pulling upward.
4. Disconnect the heater hose support from the stud.
5. Disconnect the spark plug wire holders.
6. Disconnect the vacuum hose.

7. Disconnect the engine wiring harness from the valve cover studs.
8. Disconnect the crankcase ventilation tube.

NOTE: To prevent stretching the valve cover gasket, loosen silicone gasket and sealant from the cylinder head by sliding a flat knife between the valve cover gasket and cylinder head.

9. Remove the 8 bolts and remove the valve cover.
10. Remove and discard the valve cover gasket.

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

NOTE: To clean the sealing area, use silicone gasket remover and metal surface prep. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and metal surface prep.

11. Clean the RH valve cover gasket mating surfaces.

INSTALLATION

1. Install a new valve cover gasket.

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

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. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and 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.

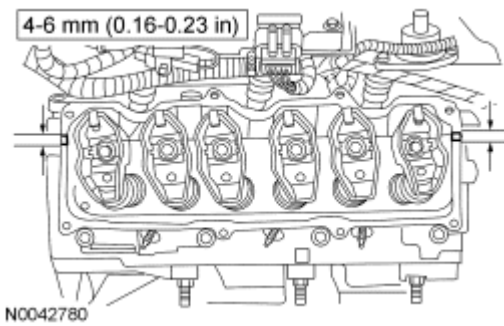


Fig. 20: Applying Bead Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

2. Apply a drop of silicone gasket and sealant at the 4 cylinder block-to-cylinder head seams.
3. Install the valve cover.
 - Tighten the 8 bolts in the sequence shown.

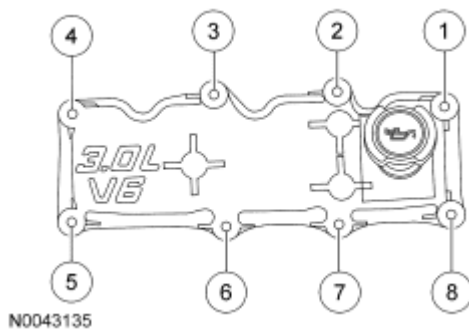


Fig. 21: Identifying Tightening Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 12 Nm (9 lb-ft).
4. Connect the crankcase ventilation tube.
 5. Connect the engine wiring harness to the valve cover studs.
 6. Connect the vacuum hose.
 7. Connect the RH spark plug wire holders.
 8. Connect the heater hose support.
 9. Connect the spark plug wires to the ignition coil.
 10. Connect the ignition coil electrical connector.
 11. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

LOWER END COMPONENTS - EXPLODED VIEW

2007 Ford Ranger

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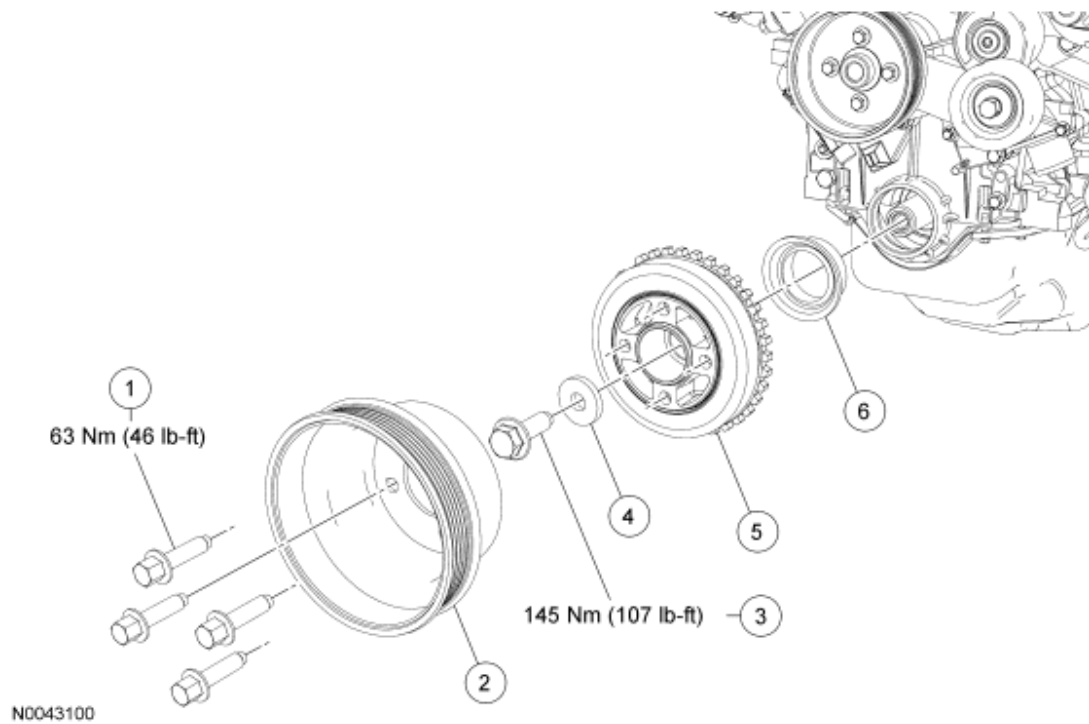


Fig. 22: Exploded View Of Lower End Components With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N807551	Crankshaft pulley bolt (4 required)
2	6312	Crankshaft pulley
3	N808089-S	Crankshaft damper bolt
4	6373	Crankshaft damper bolt washer
5	6316	Crankshaft damper
6	6700	Crankshaft front seal

1. For additional information, refer to the procedures in this article.

CRANKSHAFT PULLEY

Special Tools

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

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ST1387-A

Damper

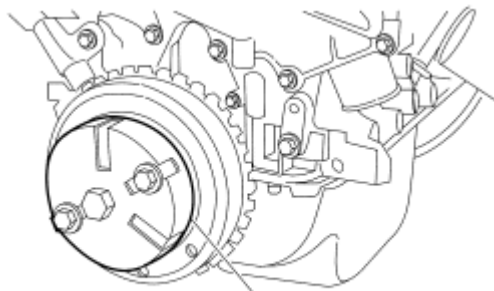
303-175 (T82L-6316-A)

Material

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

REMOVAL

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Remove the air cleaner outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
3. Remove the fan blade and the fan shroud. For additional information, refer to **ENGINE COOLING** article.
4. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.
5. Remove the 4 bolts and the crankshaft pulley.
6. Remove the crankshaft bolt and the washer.
7. Using the special tool, remove the crankshaft damper.



N0020154

303-009

Fig. 23: Removing Crankshaft Damper Using Special Tool
Courtesy of FORD MOTOR CO.

8. Remove the crankshaft key, if necessary.

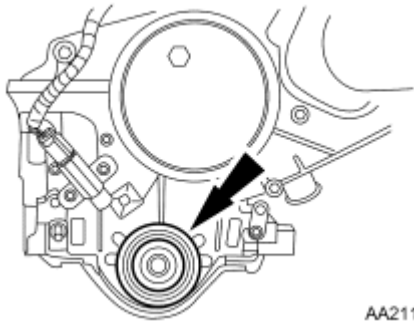


Fig. 24: Locating Crankshaft Key
Courtesy of FORD MOTOR CO.

INSTALLATION

NOTE: Apply a drop of silicone gasket and sealant, securing crankshaft key in position.

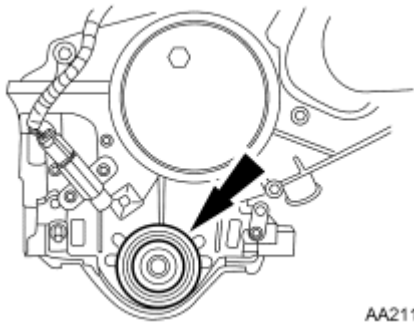


Fig. 25: Locating Crankshaft Key
Courtesy of FORD MOTOR CO.

1. If removed, install the crankshaft key.
2. Using the special tool, install the crankshaft damper.

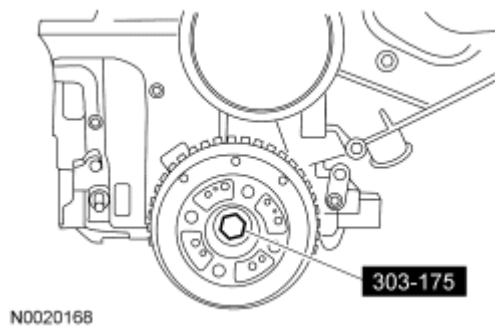


Fig. 26: Installing Crankshaft Damper Using Special Tool (303-175)
Courtesy of FORD MOTOR CO.

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- Coat the sealing surfaces of the crankshaft damper with clean engine oil.
 - Coat the crankshaft damper keyway with silicone gasket and sealant.
 - Install the crankshaft damper.
3. Install the crankshaft bolt and the washer.
 - Tighten to 145 Nm (107 lb-ft).
 4. Install the crankshaft pulley and 4 bolts.
 - Tighten to 63 Nm (46 lb-ft).
 5. Install the drive belt. For additional information, refer to **ACCESSORY DRIVE** article.
 6. Install the fan blade and the fan shroud. For additional information, refer to **ENGINE COOLING** article.
 7. Install the air cleaner outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
 8. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

CRANKSHAFT FRONT SEAL

Special Tools

Illustration	Tool Name	Tool Number
 ST1387-A	Installer, Crankshaft Vibration Damper	303-175 (T82L-6316-A)

Material

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

REMOVAL

1. Remove the crankshaft vibration damper. For additional information, refer to **Lower End Components - Exploded View** and **Crankshaft Pulley** in this article.
2. Remove the crankshaft front seal.

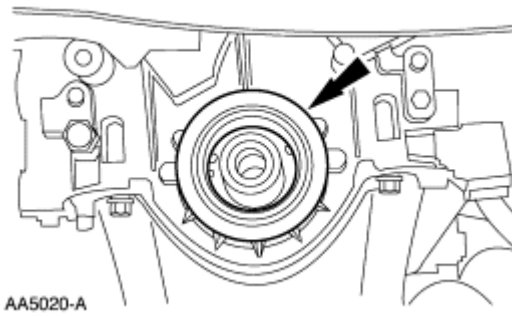


Fig. 27: Locating Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Install the crankshaft front seal.
 - Lubricate the seal lip with clean engine oil.
 - Using the special tool, install the crankshaft front seal.

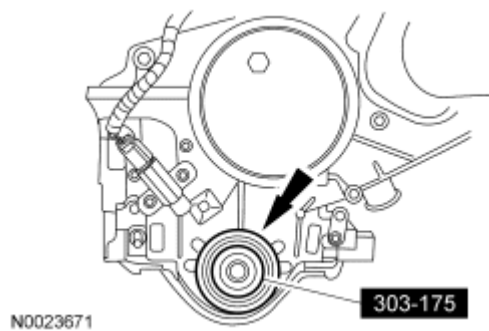


Fig. 28: Installing Crankshaft Front Seal Using Special Tool (303-175)
Courtesy of FORD MOTOR CO.

2. Install the crankshaft damper. For additional information, refer to [Lower End Components - Exploded View](#) and [Crankshaft Pulley](#) in this article.

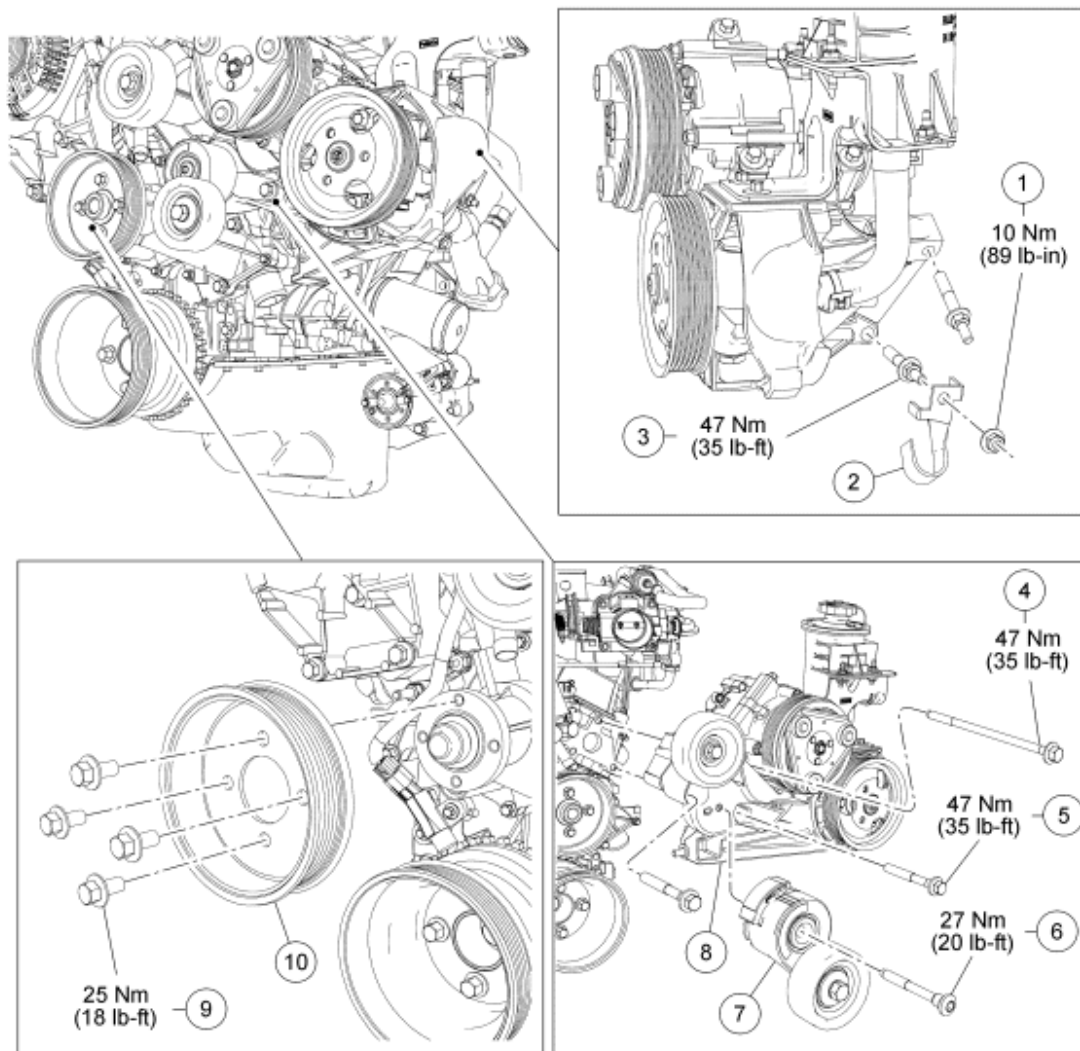
ENGINE FRONT COVER

Material

Item	Specification
Thread Sealant with PTFE TA-24	WSK-M2G350-A2
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A

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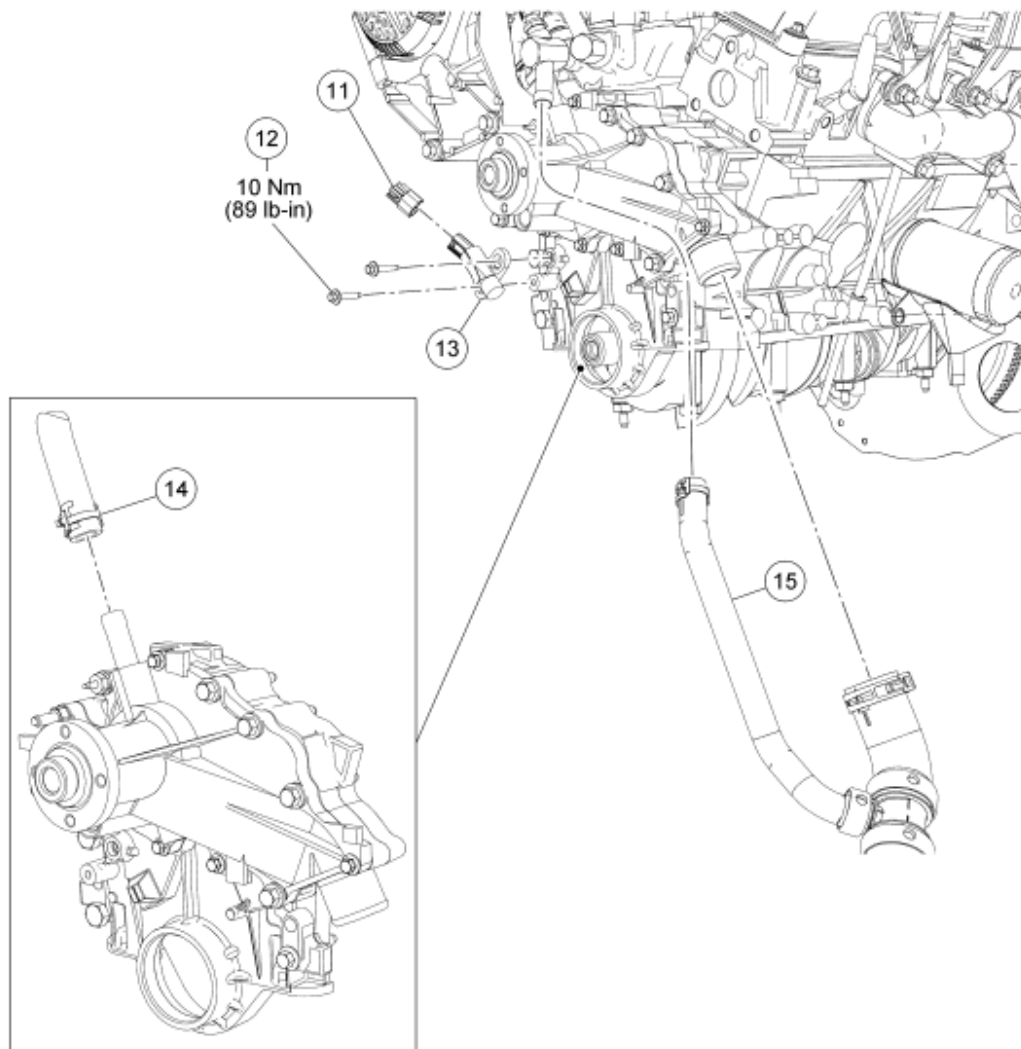
Fig. 29: View Of Engine Front Cover With Torque Specifications (1 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W620481-S	Wiring harness bracket nut
2	7B085	Wiring harness bracket (part of 14A280)
3	N807123-S	A/C compressor and power steering pump bracket stud bolt (2 required)
4	N807124-S	A/C compressor and power steering pump bracket bolt
5	N606068-S	A/C compressor and power steering pump bracket bolt (2 required)
6	2021BA209	Belt tensioner bolt
7	6B209	Belt tensioner

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

8	19E708	A/C compressor and power steering pump bracket
9	N605784-S	Coolant pump pulley bolt (4 required)
10	8A528	Coolant pump pulley



N0051255

Fig. 30: View Of Engine Front Cover With Torque Specifications (2 Of 3)
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
11	14A464	Crankshaft position sensor electrical connector (part of 12B637)
12	W706175-S	Crankshaft position sensor bolt (2 required)
13	6C315	Crankshaft position sensor

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

14	18C266	Heater hose
15	8B273	Lower radiator hose assembly

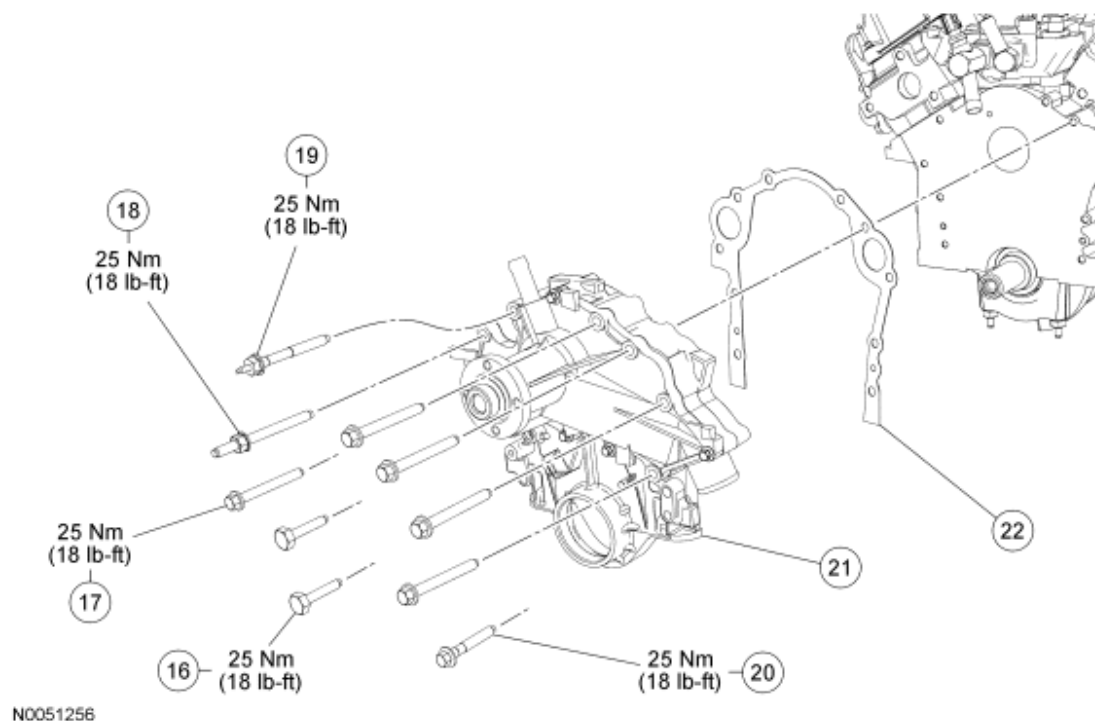


Fig. 31: View Of Engine Front Cover With Torque Specifications (3 Of 3)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
16	N-804113-S	Engine front cover bolt (2 required)
17	N811375-S	Engine front cover bolt (5 required)
18	N807515-S	Engine front cover stud bolt
19	N708249-S	Engine front cover stud bolt
20	N606543-S	Engine front cover bolt
21	6059	Engine front cover
22	6020	Engine front cover gasket

REMOVAL

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Drain the engine coolant. For additional information, refer to **ENGINE COOLING** article.
3. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.
4. Remove the fan and shroud assembly. For additional information, refer to **ENGINE COOLING** article.
5. Remove the bolts and the coolant pump pulley.
6. Remove the nut and detach the wiring harness bracket.

7. Remove the nut and position the bracket aside.

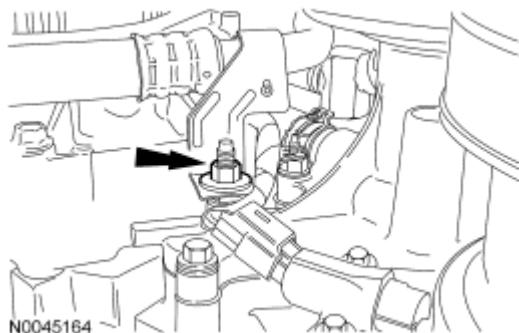
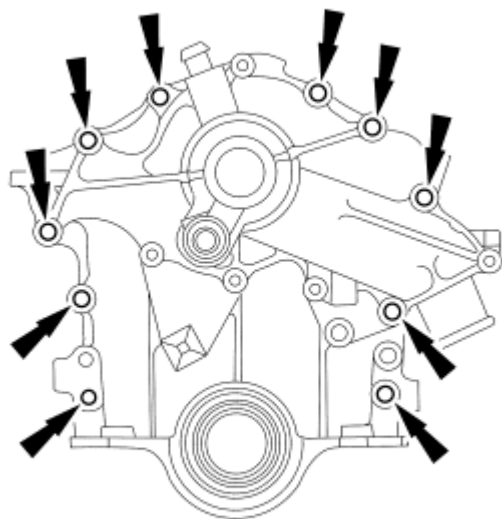


Fig. 32: Locating Clamp & Nut
Courtesy of FORD MOTOR CO.

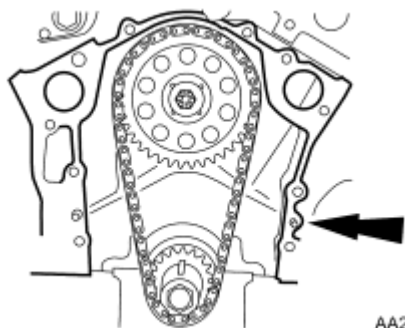
8. Remove the stud bolts from the A/C compressor mounting bracket.
9. Remove the bolt and the accessory drive belt tensioner.
10. Remove the bolts and position the power steering bracket and compressor aside.
11. Disconnect the heater hose at the coolant pump.
12. Disconnect the lower radiator hose assembly at the coolant pump outlet and lower intake manifold.
13. Remove the crankshaft front seal. For additional information, refer to **Lower End Components - Exploded View** or **Crankshaft Front Seal** in this article.
14. Remove the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** or **Oil Pan - Rear Wheel Drive (RWD)** or **Oil Pan - Four Wheel Drive (4WD)** in this article.
15. Remove the crankshaft position (CKP) sensor.
 - Disconnect the CKP sensor electrical connector.
 - Remove the 2 bolts.
 - Remove the CKP sensor.
16. Remove the engine front cover and the coolant pump as an assembly.



GA6100-A

Fig. 33: Locating Bolts On Engine Front Cover
Courtesy of FORD MOTOR CO.

- Remove the bolts.
17. Remove and discard the front cover gasket.



AA2117-A

Fig. 34: Locating Front Cover Gasket
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Clean all sealing surfaces and position a new front cover gasket.

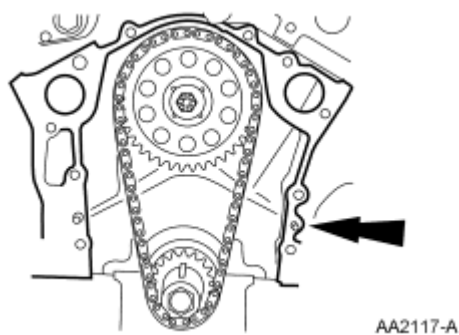


Fig. 35: Locating Front Cover Gasket
Courtesy of FORD MOTOR CO.

2. Position the engine front cover.

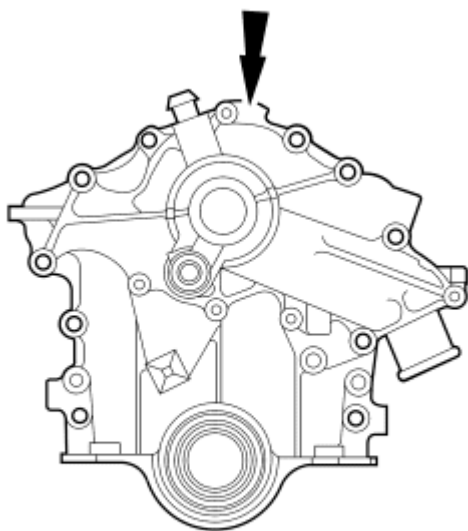
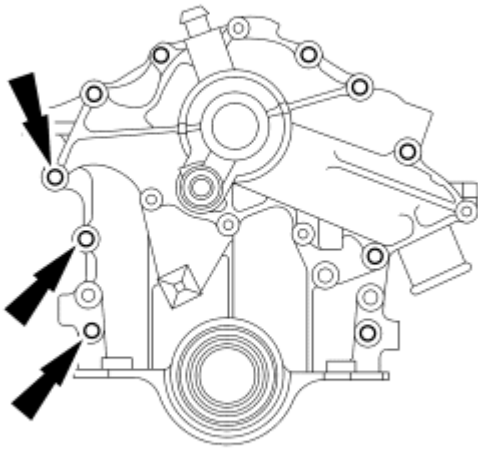


Fig. 36: Locating Engine Front Cover
Courtesy of FORD MOTOR CO.

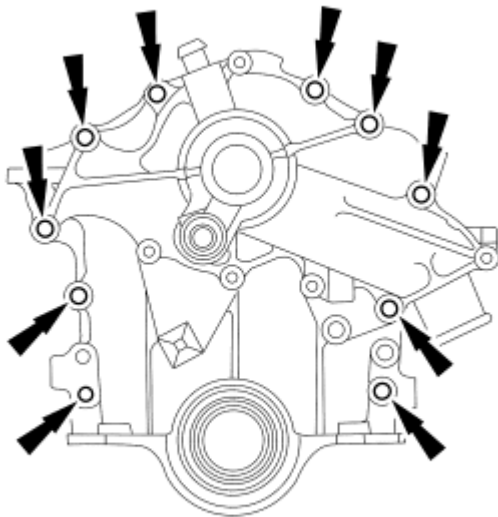
3. Apply pipe sealant with PTFE to the bolts to be installed in the locations shown.



A0042493

Fig. 37: Applying Pipe Sealant To Bolts
Courtesy of FORD MOTOR CO.

4. Install the engine front cover bolts.



GA6100-A

Fig. 38: Locating Engine Front Cover Bolts

Courtesy of FORD MOTOR CO.

- Tighten to 25 Nm (18 lb-ft).
5. Position the CKP and install the 2 bolts.
 - Tighten to 10 Nm (89 lb-in).
 6. Connect the CKP sensor electrical connector.
 7. Install the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** or **Oil Pan - Rear Wheel Drive (RWD)** or **Oil Pan - Four Wheel Drive (4WD)** in this article.
 8. Install the crankshaft front seal. For additional information, refer to **Lower End Components - Exploded View** or **Crankshaft Front Seal** in this article.
 9. Connect the lower radiator hose assembly at the coolant pump outlet and lower intake manifold.
 10. Connect the heater hose at the coolant pump.
 11. Position back the A/C compressor and power steering bracket. Install the bolts.
 - Tighten to 47 Nm (35 lb-ft).
 12. Install the accessory drive belt tensioner and install the bolt.
 - Tighten to 27 Nm (20 lb-ft).
 13. Install the stud bolts to the A/C compressor mounting bracket.
 - Tighten to 47 Nm (35 lb-ft).
 14. Position the bracket and install the nut.

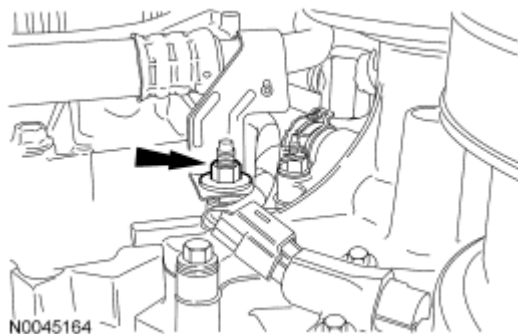
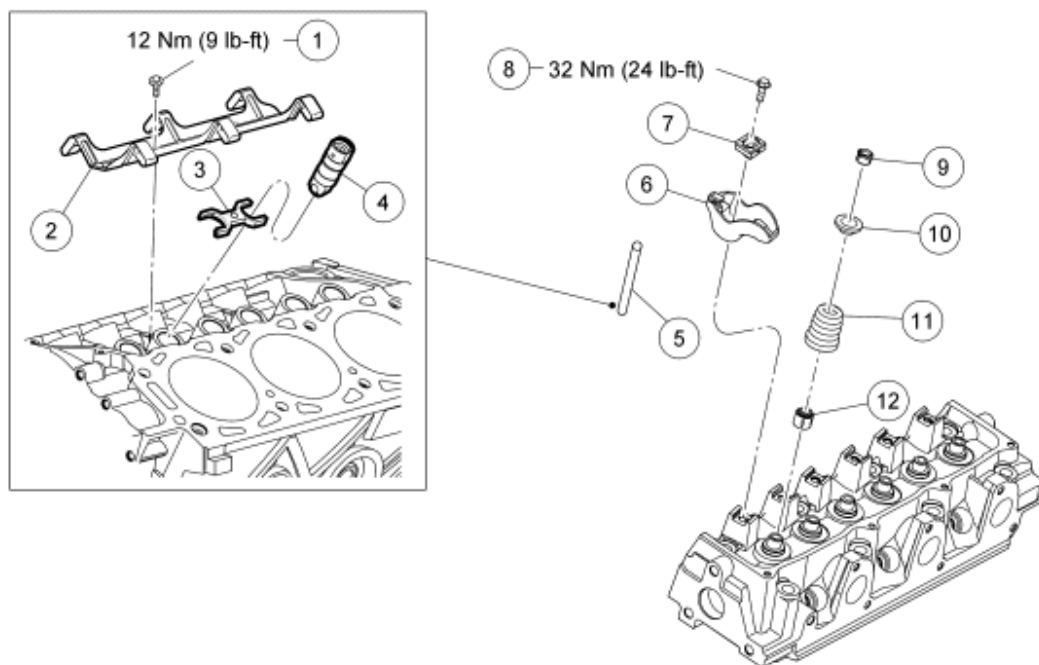


Fig. 39: Locating Clamp & Nut
Courtesy of FORD MOTOR CO.

- Tighten to 11 Nm (8 lb-ft).
15. Position the wiring harness bracket and install the nut.
 - Tighten to 10 Nm (89 lb-in).
 16. Install the coolant pump pulley and the bolts.
 - Tighten to 25 Nm (18 lb-ft).
 17. Install the fan and shroud assembly. For additional information, refer to **ENGINE COOLING** article.
 18. Install the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.
 19. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

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

VALVE TRAIN COMPONENTS - EXPLODED VIEW



N0044749

Fig. 40: Exploded View Of Valve Train Components With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N605890	Hydraulic lash adjuster plate retainer bolt (2 required)
2	6K564	Hydraulic lash adjuster plate retainer
3	6K512	Hydraulic lash adjuster guide plate (6 required)
4	6500	Hydraulic lash adjuster (12 required)
5	6565	Push rod (12 required)
6	6564	Rocker arm (12 required)
7	6A528	Rocker arm fulcrum (12 required)
8	6513	Rocker arm bolt (12 required)
9	6518	Valve spring retainer key (24 required)
10	6514	Valve spring retainer (12 required)
11	6513	Valve spring (12 required)
12	6A517	Valve seal (12 required)

1. For additional information, refer to the procedures in this article.

VALVE SEALS

Special Tools

Illustration	Tool Name	Tool Number
 ST1383-A	Compressor, Valve Spring	303-163 (T81P-6513-A)

REMOVAL AND INSTALLATION

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

1. Remove the rocker arms. For additional information, refer to [Valve Train Components - Exploded View](#) or [Rocker Arm](#) in this article.

NOTE: Install an air line with an adapter in the spark plug hole and turn on the air supply. If the air pressure fails to hold the valve(s) closed while performing the following steps, valve or valve seat damage is indicated and the cylinder head must be removed.

NOTE: Apply a minimum of 689 kPa (100 psi) of compressed air to the cylinder.

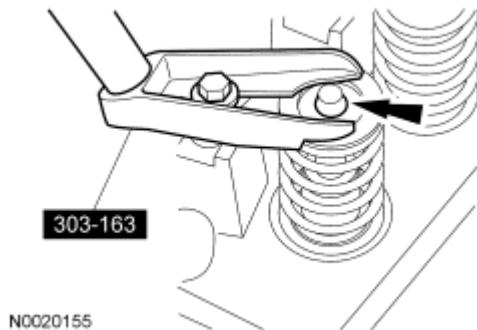


Fig. 41: Removing Valve Spring Retainer Keys Using Special Tool (303-163)
Courtesy of FORD MOTOR CO.

2. Using the special tool, remove the valve spring retainer keys.
3. Remove the valve spring retainer.
4. Remove the valve spring and inspect. Refer to [ENGINE SYSTEM - GENERAL INFORMATION](#) article for component tests for the valve spring.
5. Remove the valve stem seal.

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

- To install, reverse the removal procedure.

HYDRAULIC LASH ADJUSTER

Material

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

REMOVAL

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

NOTE: For a valve train noise concern, inspect the valve-to-rocker arm clearance, rocker arms and push rods for wear. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

- Remove the lower intake manifold. For additional information, refer to Lower Intake Manifold in this article.
- Remove the 2 bolts and the hydraulic lash adjuster guide plate retainer.
- Remove the hydraulic lash adjuster guide plates.
- Remove the hydraulic lash adjusters.

INSTALLATION

NOTE: Lubricate the hydraulic lash adjusters and the hydraulic lash adjuster bores with clean engine oil prior to installation.

- Install the hydraulic lash adjusters.
- Install the hydraulic lash adjuster guide plates.
- Install the hydraulic lash adjuster guide plate retainer and the 2 bolts.
 - Tighten to 12 Nm (9 lb-ft).
- Install the lower intake manifold. For additional information, refer to Lower Intake Manifold in this article.

ROCKER ARM

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

Material

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

REMOVAL AND INSTALLATION

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

1. Remove the valve cover. For additional information, refer to Valve Cover - LH and/or Valve Cover - RH in this article.

NOTE: Identify and mark the location of each rocker arm. Each rocker arm must be installed in the original location.

2. Remove the bolts and the rocker arms and fulcrums.
 - To install, tighten to 32 Nm (24 lb-ft).
3. To install, reverse the removal procedure.
 - Lubricate the rocker arms and fulcrums with clean engine oil.

PUSH ROD

Material

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

REMOVAL AND INSTALLATION

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

1. Remove the rocker arms. For additional information, refer to Valve Train Components - Exploded View or Rocker Arm in this article.

NOTE: Identify and mark the location of each push rod. Each push rod must be

installed in the original location.

2. Remove the push rods.
3. To install, reverse the removal procedure.
 - Lubricate the push rods with clean engine oil.

CAMSHAFT

Material

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

REMOVAL

1. Remove the radiator assembly. For additional information, refer to **ENGINE COOLING** article.
2. Remove the hydraulic lash adjusters. For additional information, refer to **Hydraulic Lash Adjuster** in this article.
3. Remove the timing chain. For additional information, refer to **Timing Chain** in this article.
4. Remove the camshaft synchronizer assembly. For additional information, refer to **ELECTRONIC ENGINE CONTROLS** article.
5. Remove the bolts and the camshaft thrust plate.

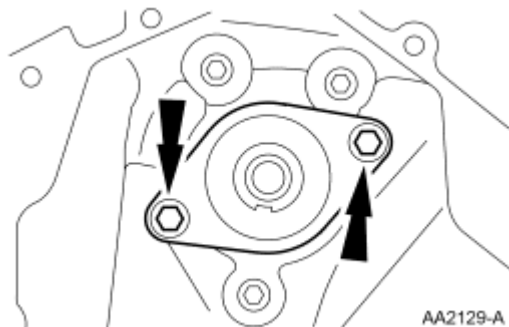


Fig. 42: Locating Bolts & Camshaft Thrust Plate
Courtesy of FORD MOTOR CO.

CAUTION: Damage to the camshaft and/or the camshaft bearings can occur if the camshaft is allowed to drop on the bearing surface or cylinder block.

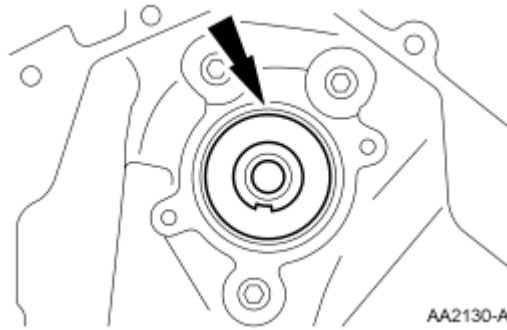


Fig. 43: Locating Camshaft Bearings
Courtesy of FORD MOTOR CO.

6. Remove the camshaft.

INSTALLATION

CAUTION: Damage to the camshaft and/or the camshaft bearings can occur if the camshaft is allowed to drop on the bearing surface or cylinder block.

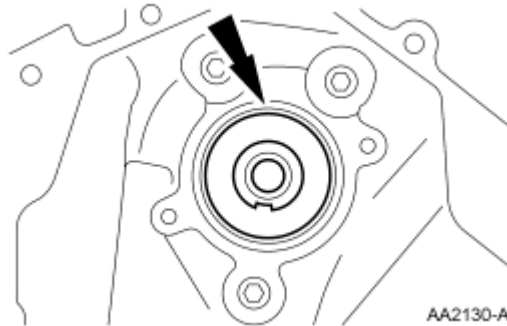


Fig. 44: Locating Camshaft Bearings
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the camshaft, the camshaft bearings and the camshaft position sensor drive gear with clean engine oil prior to installation.

1. Install the camshaft.

NOTE: Lubricate the camshaft thrust plate with clean engine oil prior to installation.

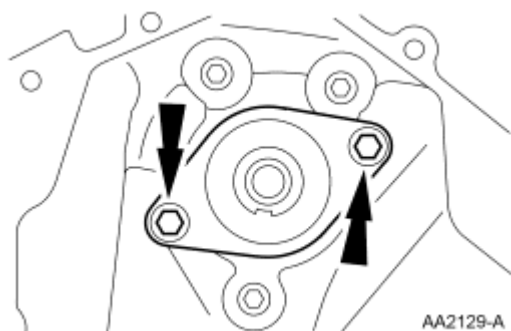


Fig. 45: Locating Camshaft Thrust Plate & Bolts
Courtesy of FORD MOTOR CO.

2. Install the camshaft thrust plate and the bolts.
 - Tighten to 10 Nm (89 lb-in).
3. Measure the camshaft end play. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
4. Install the timing chain. For additional information, refer to **Timing Chain** in this article.

CAUTION: If a new camshaft is installed, always add the rest of the clean engine oil to the engine oil by pouring it through the distributor hole onto the camshaft drive gear. Run engine at idle for 5 minutes before driving vehicle.

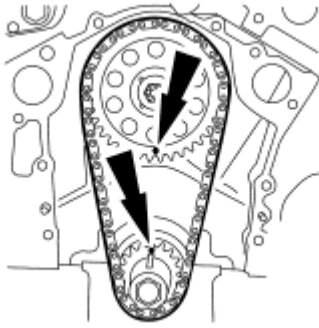
NOTE: Completely coat camshaft synchronizer gear teeth with clean engine oil.

5. Install the camshaft synchronizer assembly. For additional information, refer to **ELECTRONIC ENGINE CONTROLS** article.
6. Install the hydraulic lash adjusters. For additional information, refer to **Hydraulic Lash Adjuster** in this article.
7. Install the radiator assembly. For additional information, refer to **ENGINE COOLING** article.
8. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
9. Drain the engine oil.
10. Fill the engine with clean engine oil.
11. Fill and bleed the cooling system. For additional information, refer to **ENGINE COOLING** article.

TIMING CHAIN

REMOVAL

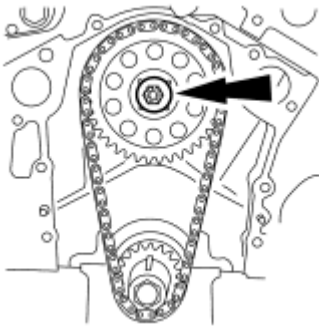
1. Remove the engine front cover. For additional information, refer to **Engine Front Cover** in this article.
2. Rotate the crankshaft and align the timing marks.



AA2120-A

Fig. 46: Locating Timing Marks On Crankshaft
Courtesy of FORD MOTOR CO.

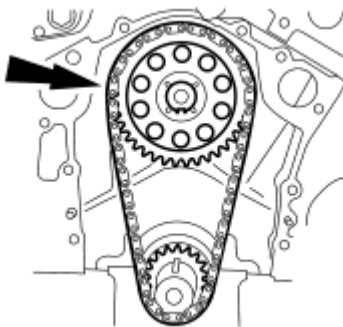
3. Remove the bolt.



AA2121-A

Fig. 47: Locating Bolt On Crankshaft
Courtesy of FORD MOTOR CO.

4. Remove the timing chain, the camshaft sprocket and the crankshaft sprocket as an assembly.



AA2123-A

Fig. 48: Locating Timing Chain & Camshaft Sprocket
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Align the timing marks.

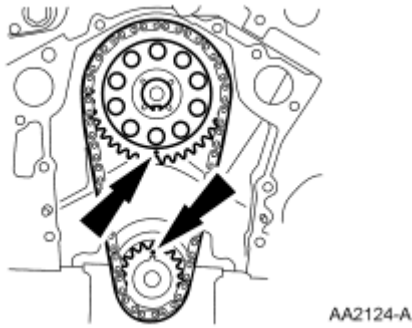


Fig. 49: Aligning Timing Marks
Courtesy of FORD MOTOR CO.

2. Install the timing chain, the camshaft sprocket and the crankshaft sprocket as an assembly.

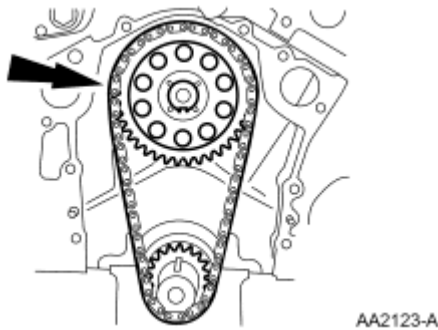


Fig. 50: Locating Timing Chain & Camshaft Sprocket
Courtesy of FORD MOTOR CO.

3. Install the bolt.

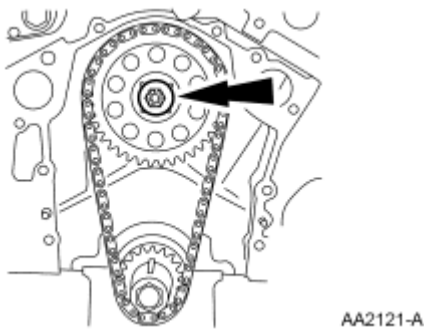


Fig. 51: Locating Bolt On Crankshaft
Courtesy of FORD MOTOR CO.

- Tighten to 63 Nm (46 lb-ft).

4. Install the engine front cover. For additional information, refer to **Engine Front Cover** in this article.

EXHAUST MANIFOLD - LH

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

Material

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

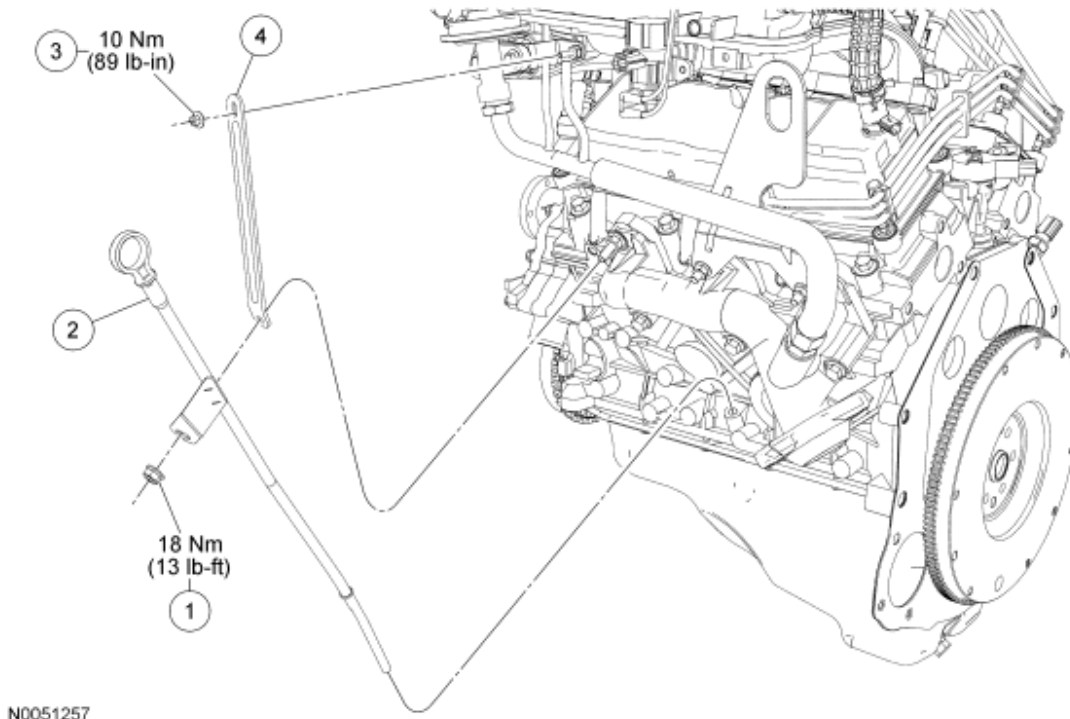
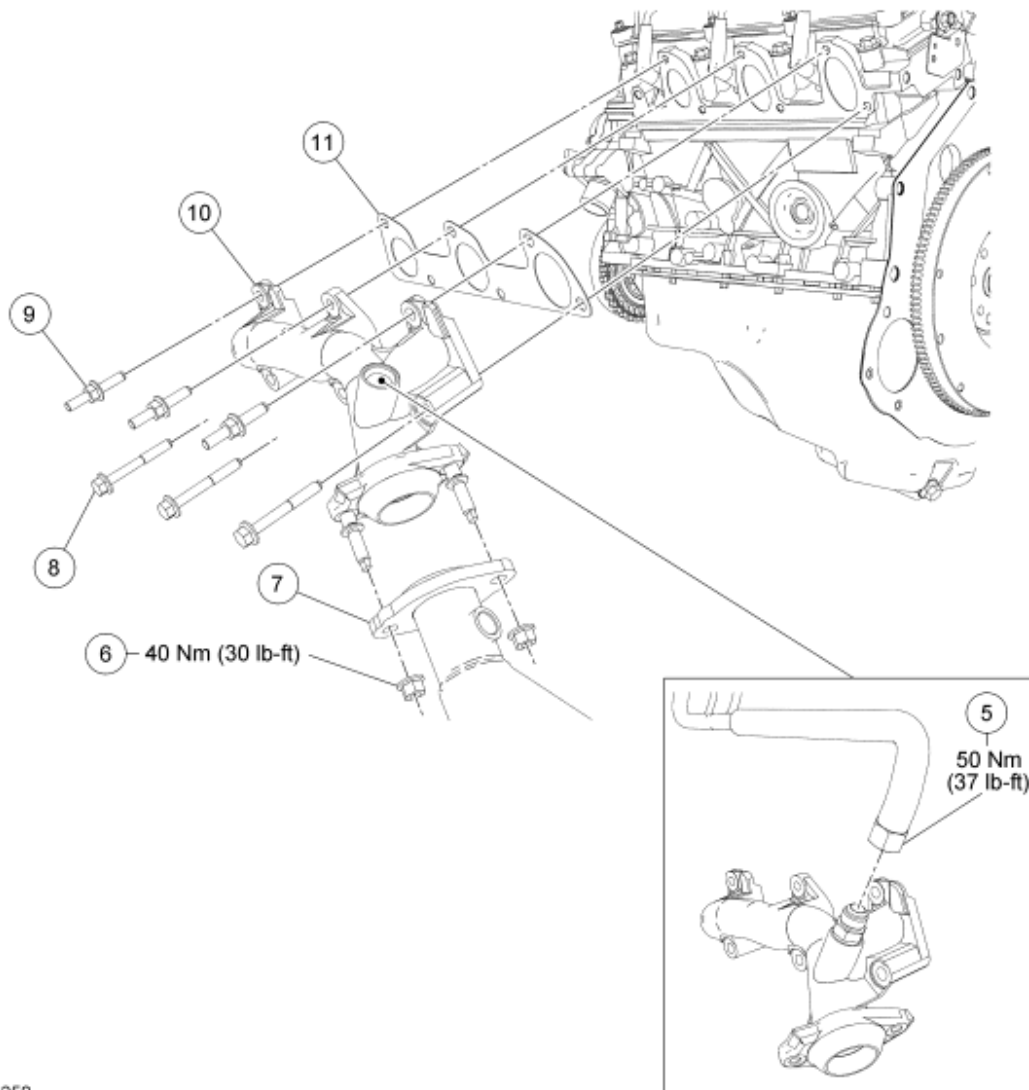


Fig. 52: View Of Exhaust Manifold - LH With Torque Specifications (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	N804178-S	Oil level indicator and tube assembly nut
2	6754	Oil level indicator and tube assembly
3	N808338-S	Upper intake manifold support brace nut
4	95444	Upper intake manifold support brace



N0051258

Fig. 53: View Of Exhaust Manifold - LH With Torque Specifications (2 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
5	9D477	Exhaust manifold-to-exhaust gas recirculation (EGR) valve tube
6	W705443-S	Exhaust flange nut (2 required)
7	5F250	Exhaust pipe
8	N811573-S	LH exhaust manifold bolt (3 required)
9	N811572-S	LH exhaust manifold stud bolt (3 required)
10	9431	LH exhaust manifold
11	9448	LH exhaust manifold gasket

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the exhaust flange nuts.
4. Remove the nut and the oil level indicator and tube assembly.
5. Remove the nut and the upper intake manifold support brace.
6. Detach the exhaust manifold-to-exhaust gas recirculation (EGR) valve tube from the exhaust manifold.
7. Remove the bolts, stud bolts, exhaust manifold and gasket.
 - Discard the bolts, stud bolts and exhaust manifold gasket.
8. Clean and inspect the exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

INSTALLATION

NOTE: Install a new exhaust manifold gasket, bolts and stud bolts.

1. Install the exhaust manifold gasket, exhaust manifold, bolts and stud bolts.
 - Tighten in the sequence shown in 2 stages:

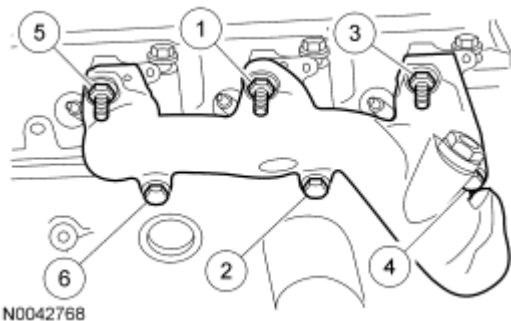


Fig. 54: Identifying Tightening Sequence Of Exhaust Manifold Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 10 Nm (89 lb-in).
 - Stage 2: Tighten to 23 Nm (17 lb-ft).
2. Attach the exhaust manifold-to-EGR valve tube to the exhaust manifold.
 - Tighten to 50 Nm (37 lb-ft).
 3. Install the upper intake manifold support brace and nut.
 - Tighten to 10 Nm (89 lb-in).

NOTE: The end of the oil level indicator tube should be cleaned with metal surface prep before application of the sealant.

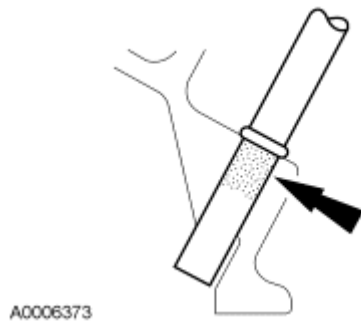
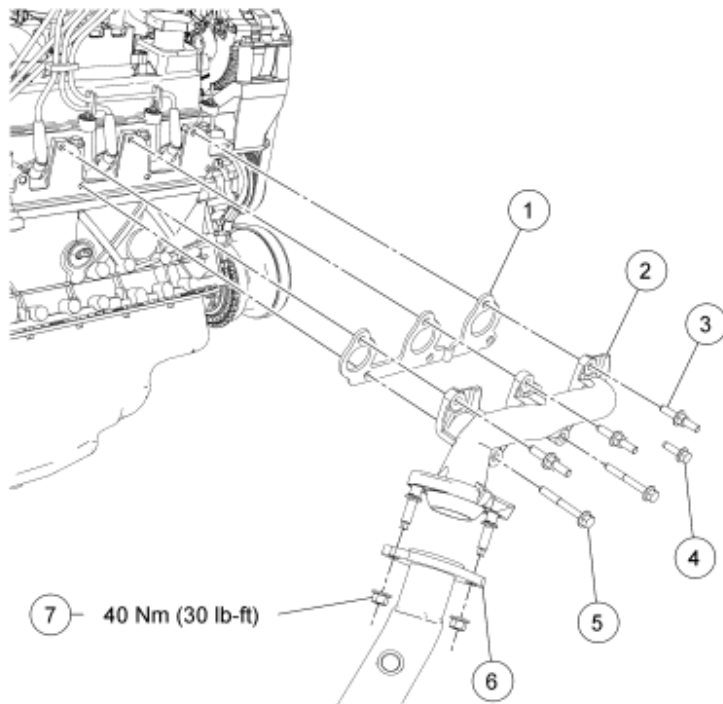


Fig. 55: Locating Oil Level Indicator Tube
Courtesy of FORD MOTOR CO.

4. Install the oil level indicator and tube assembly.
 - Coat the oil level indicator tube with silicone gasket and sealant.
5. Install the oil level indicator tube bracket nut.
 - Tighten to 18 Nm (13 lb-ft).
6. Install the exhaust flange nuts.
 - Tighten to 40 Nm (30 lb-ft).
7. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

EXHAUST MANIFOLD - RH



N0045162

Fig. 56: View Of Exhaust Manifold - RH With Torque Specifications

Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9448	RH exhaust manifold gasket
2	9430	RH exhaust manifold
3	N811572-S	RH exhaust manifold stud bolt (3 required)
4	N811571-S	RH exhaust manifold bolt
5	N811573-S	RH exhaust manifold bolt (2 required)
6	5F250	Exhaust pipe
7	W705443-S	Exhaust flange nut (2 required)

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the exhaust flange nuts.
3. Remove the bolts, stud bolts, exhaust manifold and gasket.
 - Discard the bolts, stud bolts and exhaust manifold gasket.
4. Clean and inspect the exhaust manifold. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

INSTALLATION

NOTE: Install a new exhaust manifold gasket, bolts and stud bolts.

1. Install the exhaust manifold gasket, exhaust manifold, bolts and stud bolts.
 - Tighten in the sequence shown in 2 stages.

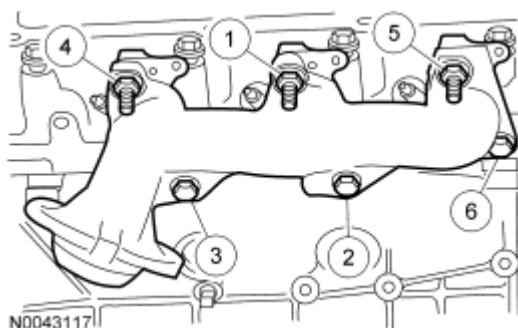


Fig. 57: Identifying Tightening Sequence Of Exhaust Manifold Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 10 Nm (89 lb-in).
- Stage 2: Tighten to 23 Nm (17 lb-ft).

2007 Ford Ranger

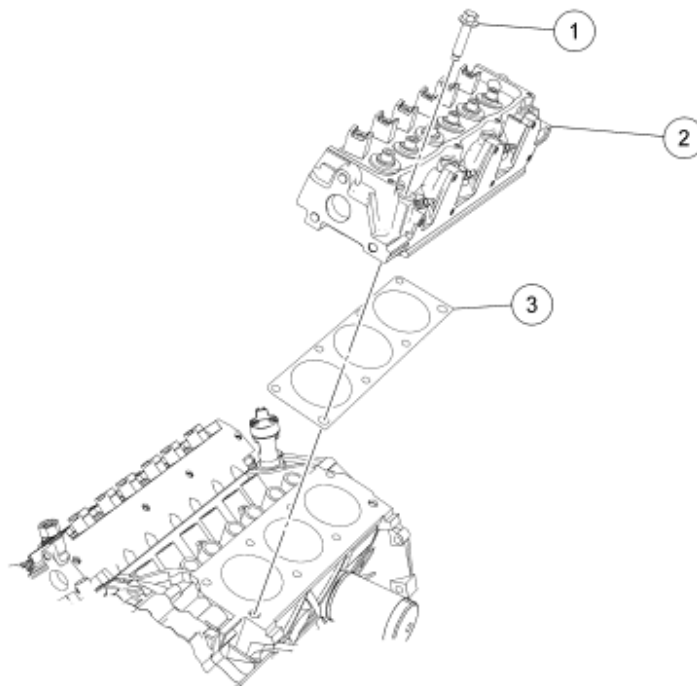
2007 ENGINE Engine - 3.0L (2V) - Ranger

2. Install the exhaust flange nuts.

CYLINDER HEAD

Material

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



N0043151

Fig. 58: View Of Cylinder Head Gasket
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W705608	Cylinder head bolt (8 required)
2	6050	LH cylinder head
3	6083	Cylinder head gasket

REMOVAL

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Remove the lower intake manifold. For additional information, refer to **Lower Intake Manifold** in this article.
3. Remove the A/C compressor. For additional information, refer to **CLIMATE CONTROL** article.
4. Remove the generator. For additional information, refer to **GENERATOR AND REGULATOR** article.
5. Remove the power steering pump. For additional information, refer to **POWER STEERING** article.
6. Remove the bolts and the generator mounting bracket.

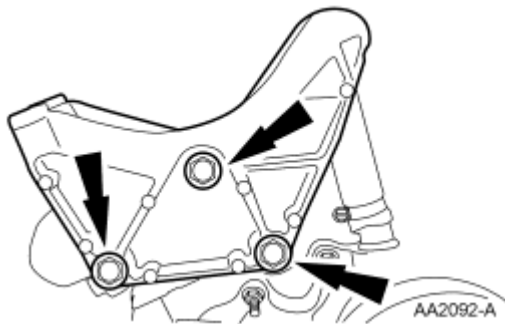


Fig. 59: Locating Bolts On Generator Mounting Bracket
Courtesy of FORD MOTOR CO.

7. Remove the bolts and the rocker arms.

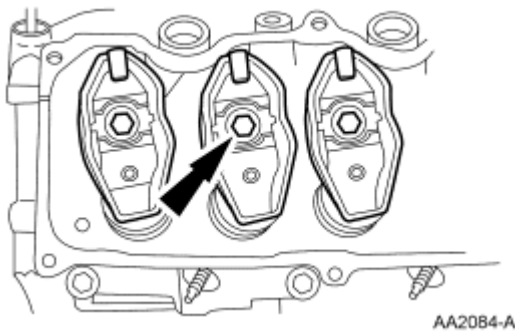


Fig. 60: Locating Bolts & Rocker Arms
Courtesy of FORD MOTOR CO.

8. Remove the nut and detach the wiring harness bracket.

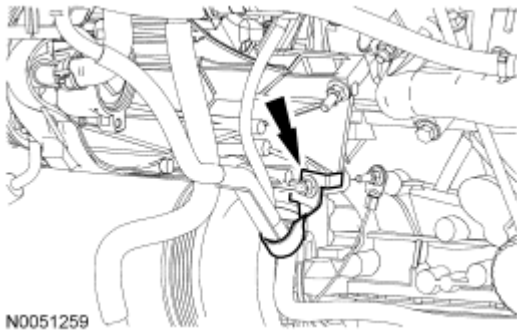


Fig. 61: Locating Nut & Wiring Harness Bracket
Courtesy of FORD MOTOR CO.

9. Remove the 2 stud bolts from the rear of the A/C compressor mounting bracket.

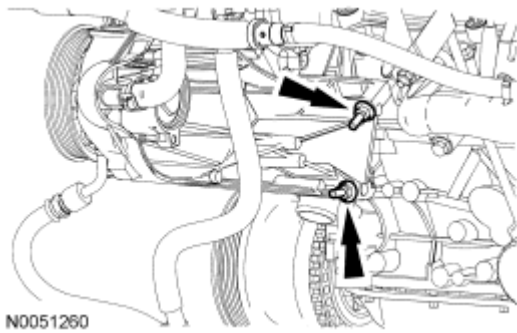


Fig. 62: Locating Stud Bolts & Rear Of A/C Compressor Mounting Bracket
Courtesy of FORD MOTOR CO.

10. Remove the accessory drive belt tensioner.

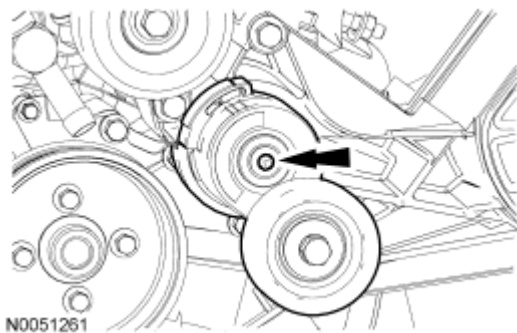


Fig. 63: Locating Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

11. Remove the bolts and remove the front of the A/C compressor mounting bracket.

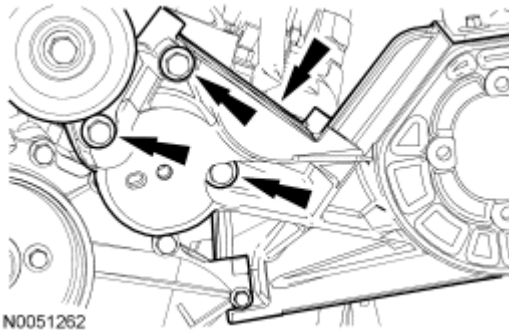


Fig. 64: Locating Bolts & Front Of A/C Compressor Mounting Bracket
Courtesy of FORD MOTOR CO.

12. Remove the exhaust manifolds. For additional information, refer to **Exhaust Manifold - RH** and **Exhaust Manifold - LH** in this article.

NOTE: RH shown, LH similar.

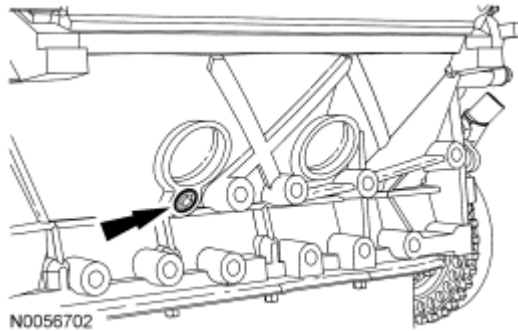


Fig. 65: Locating Cylinder Block Coolant Drain Plugs
Courtesy of FORD MOTOR CO.

13. Remove the 2 cylinder block coolant drain plugs.
14. Remove and discard the 8 cylinder head bolts.

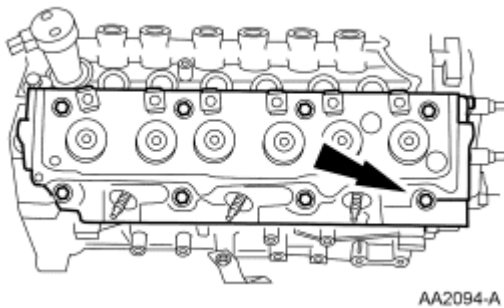


Fig. 66: Locating Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

15. Remove the cylinder heads.

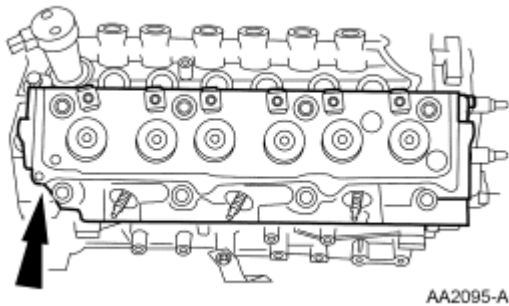


Fig. 67: Locating Cylinder Heads
Courtesy of FORD MOTOR CO.

16. Remove and discard the cylinder head gaskets.

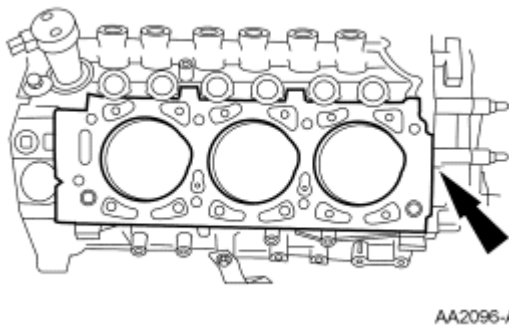


Fig. 68: Locating Cylinder Head Gaskets
Courtesy of FORD MOTOR CO.

INSTALLATION

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

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

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

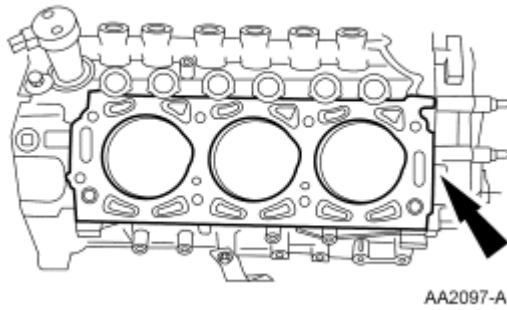


Fig. 69: Locating Cylinder Head-To-Cylinder Block
Courtesy of FORD MOTOR CO.

1. Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block.
 - Remove any large deposits of silicone or gasket material with a plastic scraper.
 - Apply silicone gasket remover, following package directions, and allow to set for several minutes.
 - 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.
 - 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.
2. Check the cylinder head for flatness. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
3. Clean the cylinder head bolt holes in the cylinder block. Make sure all coolant, oil or other foreign material is removed.

NOTE: The "V" notch in the head gasket faces the front of the engine.

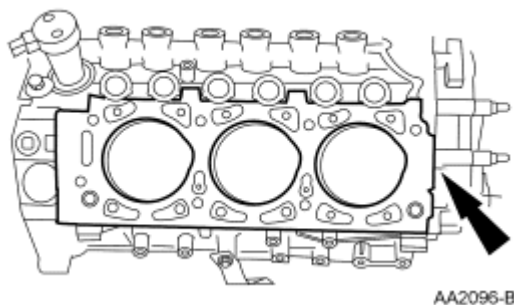


Fig. 70: Locating Cylinder Head Gaskets
Courtesy of FORD MOTOR CO.

4. Install new cylinder head gaskets.
5. Install the cylinder heads.

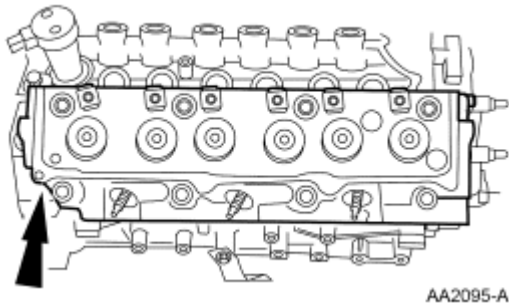


Fig. 71: Locating Cylinder Heads
Courtesy of FORD MOTOR CO.

6. Install the bolts.
 - Tighten the bolts in 5 stages in the sequence shown.

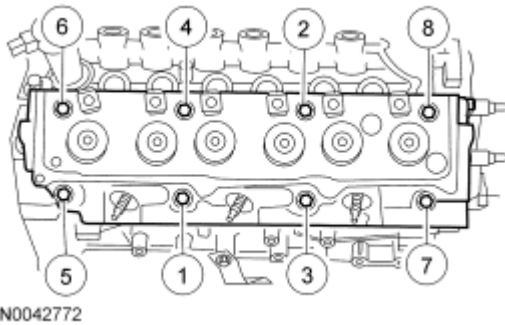


Fig. 72: Identifying Tightening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 50 N.m (37 lb-ft).
- Stage 2: Loosen one full turn.
- Stage 3: Tighten to 30 N.m (22 lb-ft).
- Stage 4: Tighten 90 degrees.
- Stage 5: Tighten an additional 90 degrees.

NOTE: RH shown, LH similar.

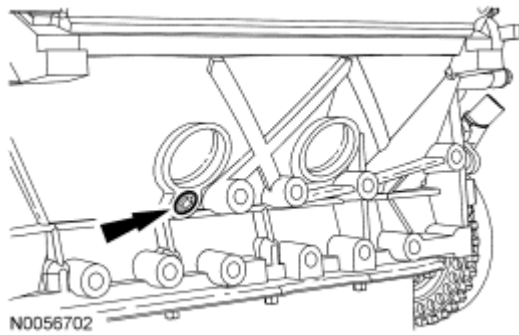


Fig. 73: Locating Cylinder Block Coolant Drain Plugs
Courtesy of FORD MOTOR CO.

7. Install the 2 cylinder block coolant drain plugs.
 - Tighten to 24 Nm (18 lb-ft).
8. Install the exhaust manifolds. For additional information, refer to **Exhaust Manifold - RH** and **Exhaust Manifold - LH** in this article.
9. Install the A/C compressor mounting bracket and bolts.

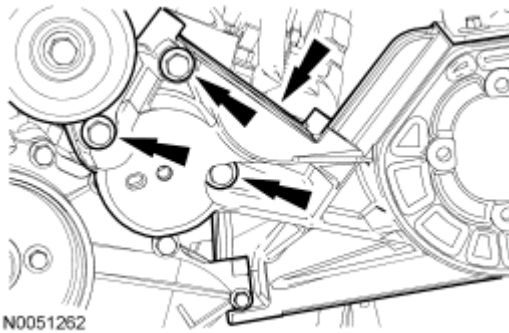


Fig. 74: Locating A/C Compressor Mounting Bracket & Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 47 Nm (35 lb-ft).
10. Install the accessory drive belt tensioner.

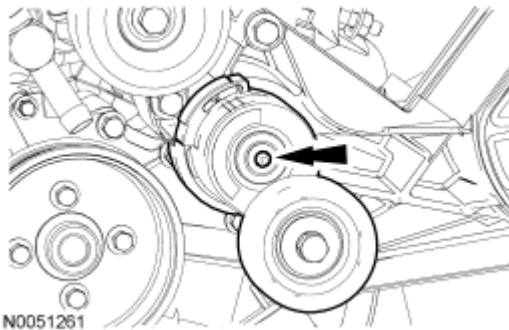


Fig. 75: Locating Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

- Tighten to 27 Nm (20 lb-ft).

11. Install the stud bolts to the A/C compressor mounting bracket.

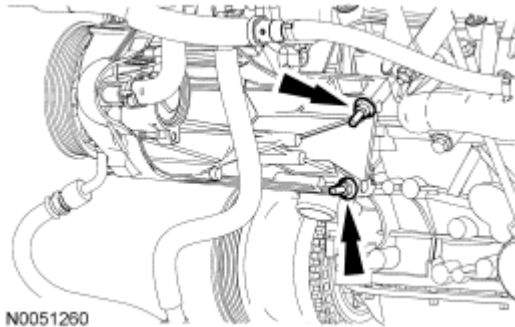


Fig. 76: Locating Stud Bolts & A/C Compressor Mounting Bracket
Courtesy of FORD MOTOR CO.

- Tighten to 47 Nm (35 lb-ft).

12. Position the wiring harness bracket and install the nut.

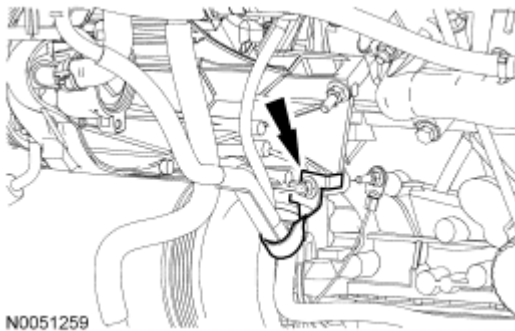


Fig. 77: Locating Wiring Harness Bracket & Nut
Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).

NOTE: Do not tighten the rocker arm bolts at this time.

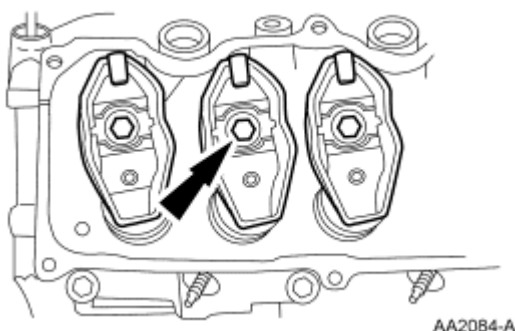


Fig. 78: Locating Rocker Arms & Bolts

Courtesy of FORD MOTOR CO.

13. Install the rocker arms and bolts.
14. Install the generator mounting bracket and bolts.

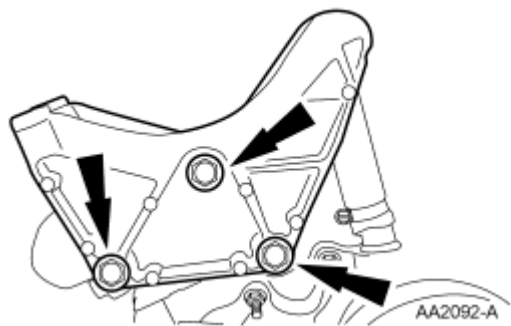


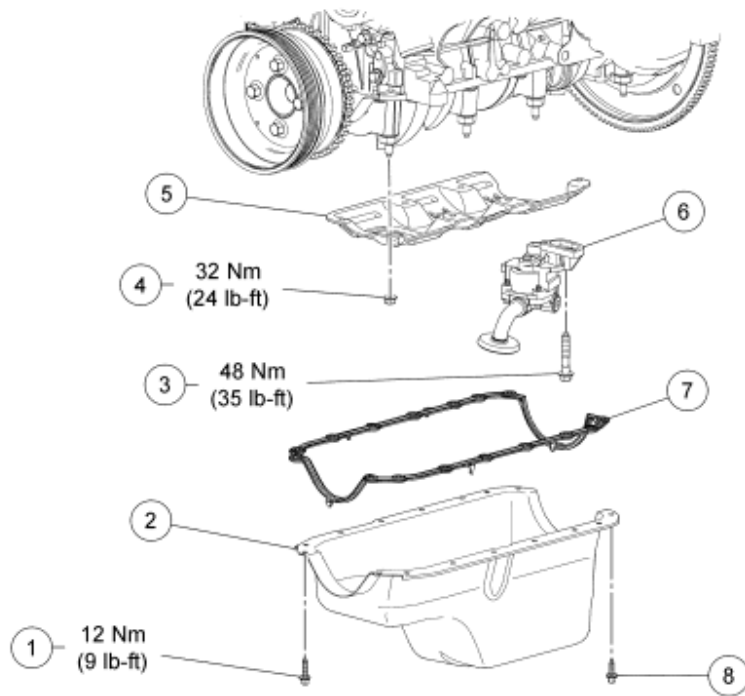
Fig. 79: Locating Generator Mounting Bracket & Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 47 Nm (35 lb-ft).
15. Install the power steering pump. For additional information, refer to **POWER STEERING** article.
 16. Install the generator. For additional information, refer to **GENERATOR AND REGULATOR** article.
 17. Install the A/C compressor. For additional information, refer to **CLIMATE CONTROL** article.
 18. Install the lower intake manifold. For additional information, refer to **Lower Intake Manifold** in this article.
 19. Drain the engine oil.
 20. Fill the engine with clean engine oil.
 21. Fill and bleed the cooling system. For additional information, refer to **ENGINE COOLING** article.
 22. Fill the power steering system. For additional information, refer to **POWER STEERING** article.
 23. Charge the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.

ENGINE LUBRICATION COMPONENTS - EXPLODED VIEW

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger



N0043144

Fig. 80: Exploded View Of Engine Lubrication Components With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W708366	Oil pan bolt (2 required)
2	6675	Oil pan
3	N606563	Oil pump bolt
4	W520513	Oil pan baffle nut (7 required)
5	6687	Oil pan baffle
6	6600	Oil pump
7	6710	Oil pan gasket
8	W708365	Oil pan bolt (14 required)

1. For additional information, refer to the procedures in this article.

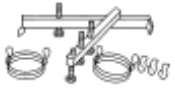
OIL PAN - REAR WHEEL DRIVE (RWD)

Special Tools

Illustration	Tool Name	Tool Number
	Lifting Eyes	303-D030 (D81L-6001-D) or equivalent

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger



ST1703-A

Three-Bar Engine Support Kit

303-D063 (D88L-6000-A) or equivalent

Material

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

REMOVAL

All vehicles

1. Remove the flywheel or flexplate. For additional information, refer to **Flywheel** or **Flexplate** in this article.
2. Drain the engine oil.

Vehicles equipped with coil springs

1. Remove the air cleaner outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.
2. Remove the nuts from the engine mounts.

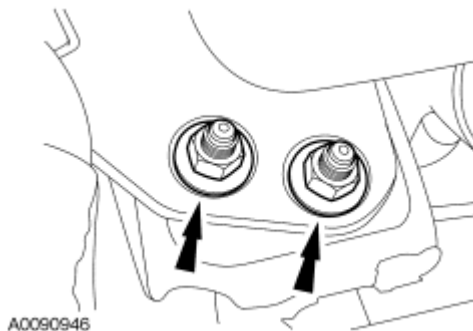


Fig. 81: Locating Engine Mount Nuts
Courtesy of FORD MOTOR CO.

3. Install the Lifting Eyes, the Three-Bar Engine Support and raise the engine 43 mm (1.72 in).
4. Install blocks between the engine mounts and the support brackets.

All vehicles

1. Remove the bolts and the oil pan.
 - Discard the oil pan gasket.

INSTALLATION**All vehicles**

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

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. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and 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.

1. Thoroughly clean the oil pan and the old sealer from all gasket surfaces. Thoroughly clean all exposed areas with metal surface prep. Thoroughly clean the transmission bell housing area. Clean and inspect the oil inlet tube.

CAUTION: The thickness of the sealant must be between 4-6 mm (0.16-0.23 in) or oil leaks may occur.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned.

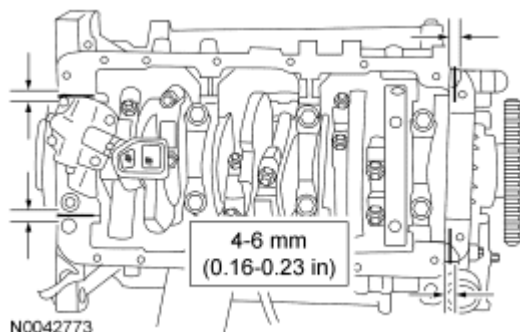


Fig. 82: Applying Bead Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

2. Apply a 4-6 mm (0.16-0.23 in) bead of silicone gasket and sealant to the junction of the main bearing cap and the cylinder block and to the junction of the front cover assembly and the cylinder block.
3. Position the oil pan gasket to the oil pan by aligning the fastener holes and securing the gasket with the gasket clips.

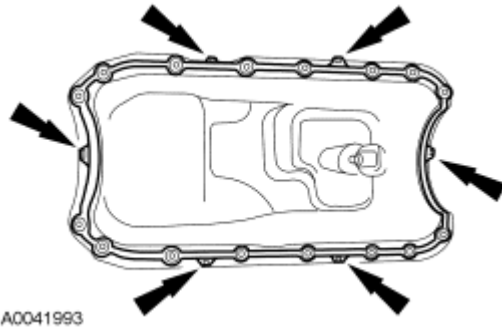


Fig. 83: Locating Oil Pan Gasket
Courtesy of FORD MOTOR CO.

NOTE: Make sure the fasteners are clean and dry prior to installation.

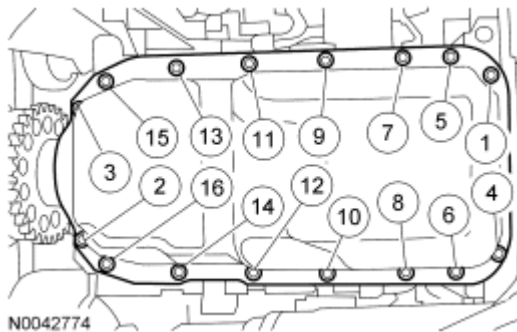


Fig. 84: Identifying Tightening Sequence Of Oil Pan Bolts
Courtesy of FORD MOTOR CO.

4. Install the oil pan and bolts. Tighten in the sequence shown.
 - Tighten to 12 Nm (9 lb-ft).

Vehicles equipped with coil springs

1. Remove the blocks from between the engine mounts and the support brackets.
2. Lower the engine and remove the Three-Bar Engine Support and the Lifting Eyes.
3. Install the nuts.

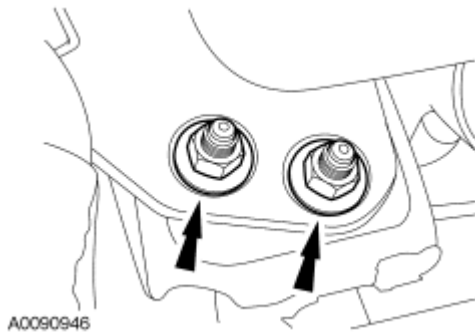


Fig. 85: Locating Engine Mount Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 109 Nm (80 lb-ft).
- 4. Install the air cleaner outlet tube. For additional information, refer to **INTAKE AIR DISTRIBUTION AND FILTERING** article.

All vehicles

1. Install the flywheel or flexplate. For additional information, refer to **Flywheel** or **Flexplate** in this article.
2. Fill the engine with clean engine oil.
3. Start the engine and check for leaks.

OIL PAN - FOUR WHEEL DRIVE (4WD)

Material

Item	Specification
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4

REMOVAL

1. Remove the flywheel or flexplate. For additional information, refer to **Flywheel** or **Flexplate** in this article.

CAUTION: Tape the U-joint bearing caps to prevent them from falling off the U-joints.

CAUTION: Index-mark the front axle pinion flange to the front driveshaft.

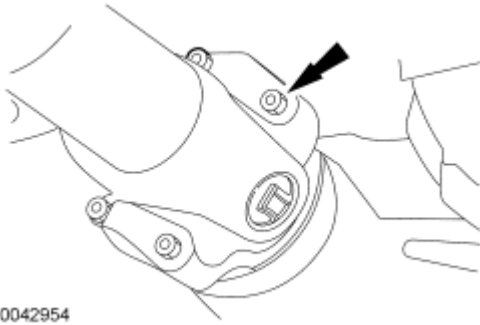


Fig. 86: Locating Driveshaft Bolts
Courtesy of FORD MOTOR CO.

2. Remove and discard the bolts and straps. Secure the driveshaft aside.
3. Drain the engine oil.
4. Secure the front axle housing to a suitable jack.

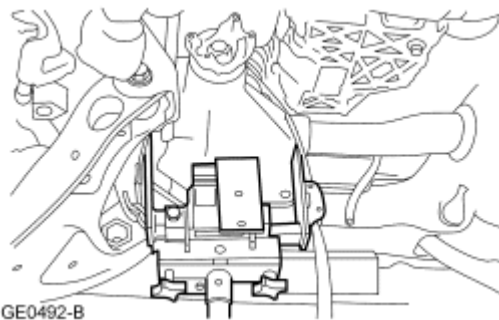


Fig. 87: Securing Front Axle Housing To Suitable Jack
Courtesy of FORD MOTOR CO.

NOTE: Only 2 bolts shown.

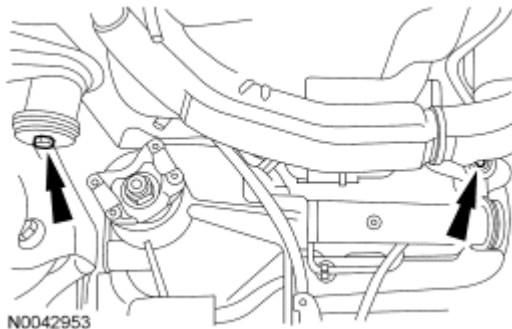


Fig. 88: Locating Axle Housing Mounting Bolts
Courtesy of FORD MOTOR CO.

5. Remove the 3 axle housing mounting bolts and lower the axle housing approximately 2 inches.
6. Remove the oil pan bolts and the oil pan.
 - Discard the oil pan gasket.

INSTALLATION

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

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. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and 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.

1. Thoroughly clean the oil pan and the old sealer from all gasket surfaces. Thoroughly clean all exposed areas with metal surface cleaner. Thoroughly clean the transmission bell housing area. Clean and inspect the oil inlet tube.

CAUTION: The thickness of the sealant must be between 4-6 mm (0.16-0.23 inch) or oil leaks could occur.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned.

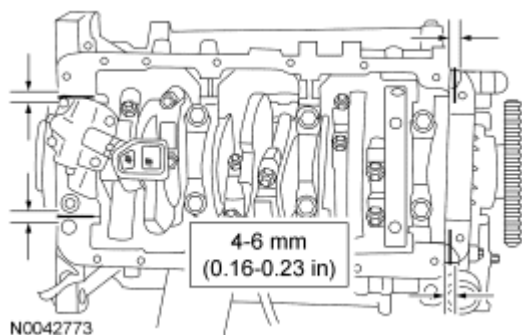
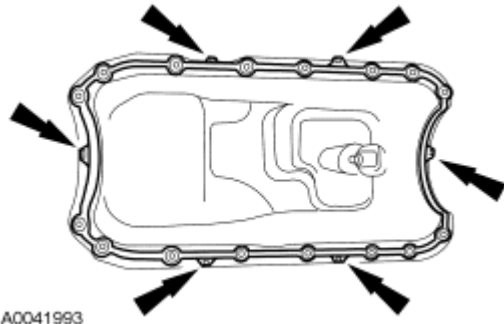


Fig. 89: Applying Bead Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

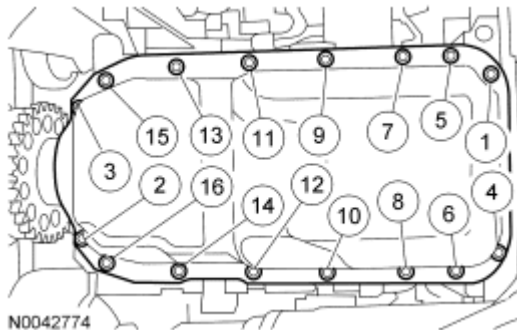
2. Apply a 4.0-6.0 mm (0.16-0.23 inch) bead of silicone gasket and sealant to the junction of the rear main bearing cap and the cylinder block, and to the junction of the front cover assembly and cylinder block.
3. Position the oil pan gasket to the oil pan by aligning the fastener holes and securing the gasket with the gasket clips.



A0041993

Fig. 90: Locating Oil Pan Gasket
Courtesy of FORD MOTOR CO.

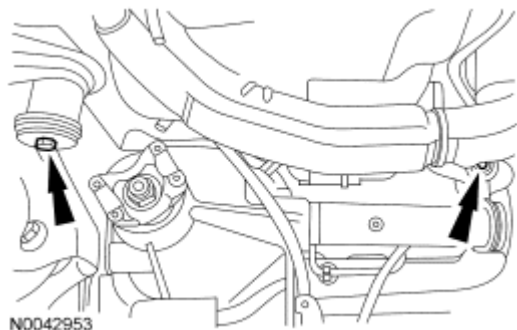
NOTE: Make sure the fasteners are clean and dry prior to installation.



N0042774

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

4. Install the oil pan and bolts. Tighten in the sequence shown.
 - Tighten to 12 Nm (9 lb-ft).
5. Raise the front axle into place and install the 3 front axle mounting bolts.



N0042953

Fig. 92: Locating Axle Housing Mounting Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 66 Nm (49 lb-ft).
6. Remove the jack.



Fig. 93: Securing Front Axle Housing To Suitable Jack
Courtesy of FORD MOTOR CO.

CAUTION: Remove the tape applied during removal.

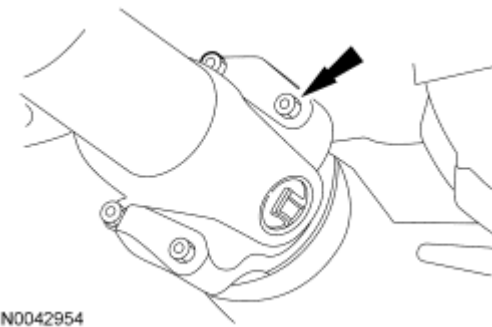


Fig. 94: Locating Driveshaft Bolts
Courtesy of FORD MOTOR CO.

7. Align the index marks and install new front driveshaft straps and bolts.
 - Tighten to 19 Nm (14 lb-ft).
8. Install the flywheel or flexplate. For additional information, refer to **Flywheel** or **Flexplate** in this article.
9. Fill the engine with clean engine oil.

OIL PAN BAFFLE

REMOVAL AND INSTALLATION

1. Remove the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan - Rear Wheel Drive (RWD)** or **Oil Pan - Four Wheel Drive (4WD)**.

2. Remove the 7 nuts and the oil pan baffle.
 - To install, tighten to 32 Nm (24 lb-ft).
3. To install reverse the removal procedure.

OIL PUMP

REMOVAL

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Remove the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan - Rear Wheel Drive (RWD)** or **Oil Pan - Four Wheel Drive (4WD)** in this article.
3. Remove the bolt and the oil pump.
4. Clean and inspect the oil pump assembly. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

INSTALLATION

1. Clean all the sealing surfaces.

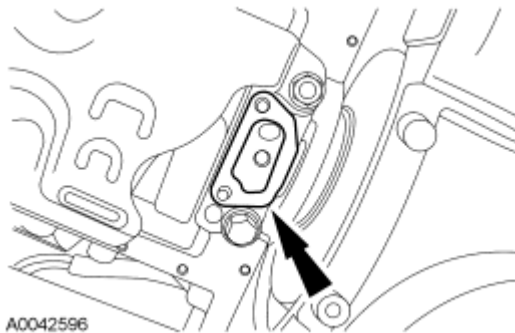


Fig. 95: Locating Sealing Surfaces
Courtesy of FORD MOTOR CO.

2. Install the oil pump and the bolt.
 - Tighten to 48 Nm (35 lb-ft).
3. Install the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan - Rear Wheel Drive (RWD)** or **Oil Pan - Four Wheel Drive (4WD)** in this article.
4. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

OIL LEVEL INDICATOR AND TUBE

Material

Item	Specification
Silicone Gasket and Sealant	

2007 Ford Ranger

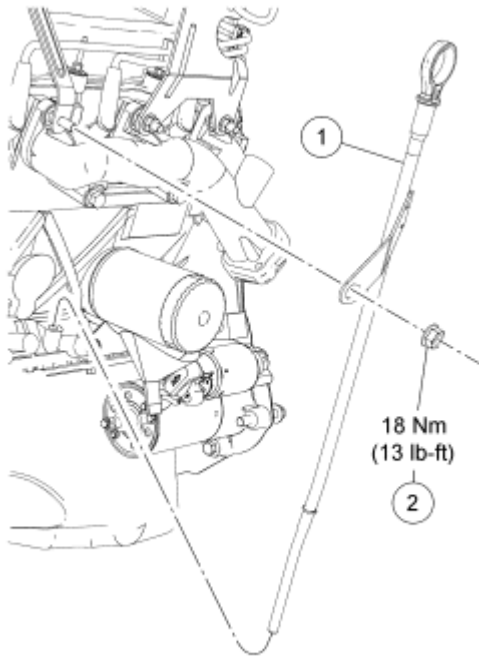
2007 ENGINE Engine - 3.0L (2V) - Ranger

TA-26

WSE-M4G323-A4

Motorcraft Metal Surface Prep
ZC-31

-



N0042846

Fig. 96: Exploded View Of Oil Level Indicator And Tube With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6754	Oil level indicator tube assembly
2	N804178-S	Nut

REMOVAL

1. Remove the nut and the oil level indicator tube assembly.

INSTALLATION

NOTE: The end of the oil level indicator tube should be cleaned with metal surface prep before application of the sealant.

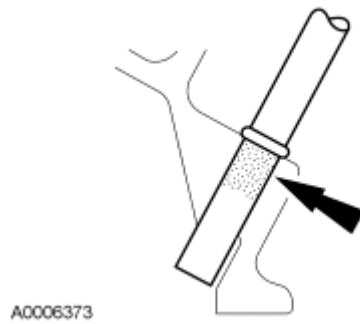


Fig. 97: Locating Oil Level Indicator Tube
Courtesy of FORD MOTOR CO.

1. Coat the sealing surfaces of the oil level indicator tube with silicone gasket and sealant.
2. Install the oil level indicator tube assembly and nut.
 - Tighten to 18 Nm (13 lb-ft).

OIL PRESSURE SWITCH

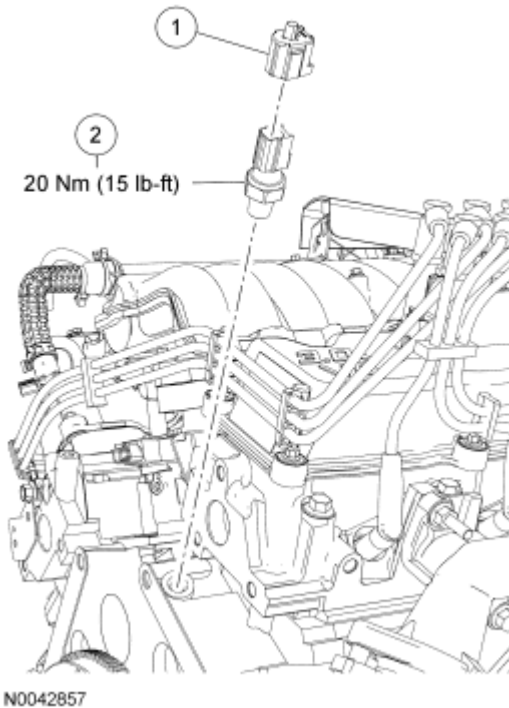


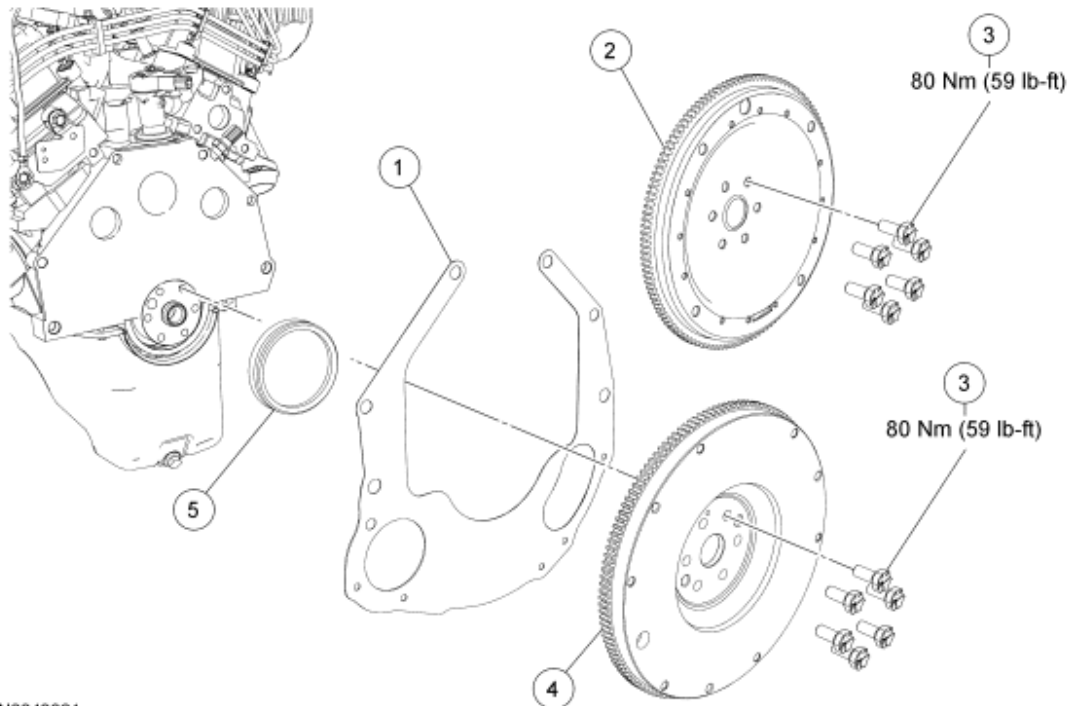
Fig. 98: Exploded View Of Oil Pressure Switch With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	14A464	Oil pressure sensor electrical connector (part of 12B637)

2 | 9278 | Oil pressure sensor

REMOVAL AND INSTALLATION

1. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
2. Disconnect the oil pressure sensor electrical connector from the oil pressure sensor.
3. Remove the oil pressure sensor.
 - To install, tighten to 20 Nm (15 lb-ft).
4. To install, reverse the removal procedure.

FLEXPLATE OR FLYWHEEL AND CRANKSHAFT REAR SEAL - EXPLODED VIEW

N0043061

Fig. 99: Exploded View Flexplate Or Flywheel & Crankshaft Rear Seal With Torque Specifications
 Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6A372	Engine-to-transmission spacer plate
2	6375	Flexplate
3	N802012-S	Flexplate/flywheel bolt
4	6375	Flywheel
5	6701	Crankshaft rear seal

1. For additional information, refer to the procedures in this article.

FLYWHEEL**REMOVAL**

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

INSTALLATION

1. Install the flywheel.
 - Install the 6 bolts. Tighten the bolts in a criss-cross pattern.
 - Tighten to 80 Nm (59 lb-ft).
2. Install the clutch. For additional information, refer to **CLUTCH** article.

FLEXPLATE**REMOVAL**

1. Remove the transmission. For additional information, refer to **AUTOMATIC TRANSMISSION - 5R44E AND 5R55E** article.
2. Remove the bolts and the flexplate.
 - Inspect the flexplate for cracks or other damage. Install a new flexplate if necessary.

INSTALLATION

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

1. Position the flexplate on the crankshaft and install the bolts.
 - Tighten the bolts in a criss-cross pattern.
 - Tighten to 80 Nm (59 lb-ft).
2. Install the transmission. For additional information, refer to **AUTOMATIC TRANSMISSION - 5R44E AND 5R55E** article.

CRANKSHAFT REAR SEAL**Special Tools**

Illustration	Tool Name	Tool Number
 ST2527-A	Installer, Crankshaft Rear Main Oil Seal	303-323 (T88L-6701-A)

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger



ST1807-A

Remover, Jet Plug

310-005 (T77L-9533-B)

Material

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

REMOVAL

1. Remove the flywheel or flexplate. For additional information, refer to **Flexplate or Flywheel and Crankshaft Rear Seal - Exploded View** and **Flywheel** or **Flexplate** in this article.

CAUTION: Use care to avoid scratching or damaging the oil seal surface or leakage may occur.

2. Using a sharp awl, punch one hole into the crankshaft rear oil seal metal surface between the seal lip and the cylinder block.
3. Screw the threaded end of the special tool into the oil seal. Use the special tool to remove the crankshaft rear oil seal.

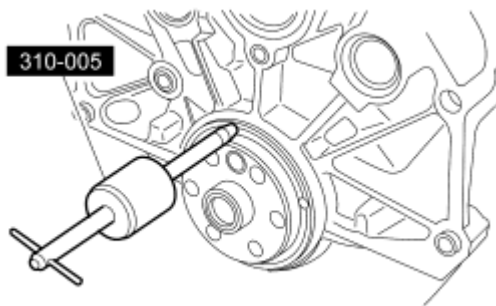


Fig. 100: Removing Crankshaft Rear Seal Using Special Tools (310-005)
Courtesy of FORD MOTOR CO.

INSTALLATION

1. Lubricate the outer lips and the inner seal on the crankshaft rear oil seal with clean engine oil.
2. Using the special tool, install the crankshaft rear oil seal. Alternate bolt tightening to correctly seat the crankshaft rear oil seal.

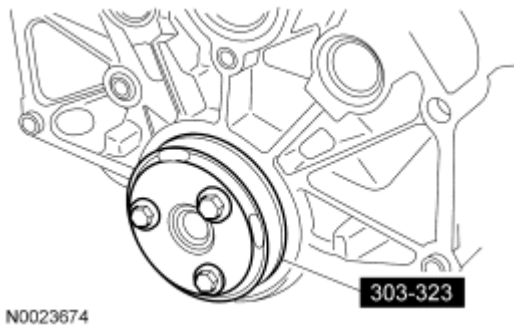


Fig. 101: Installing Crankshaft Rear Seal Using Special Tools (303-323)
Courtesy of FORD MOTOR CO.

3. Install the flywheel or flexplate. For additional information, refer to **Flexplate or Flywheel and Crankshaft Rear Seal - Exploded View** and **Flywheel** or **Flexplate** in this article.

CONNECTING ROD BEARINGS

Material

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

REMOVAL

1. Remove the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan - Rear Wheel Drive (RWD)** or **Oil Pan - Four Wheel Drive (4WD)** in this article.
2. Remove the 7 nuts and the oil pan baffle.

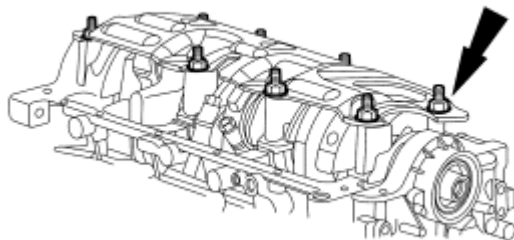


Fig. 102: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

CAUTION: The connecting rod bearing caps and the connecting rods are a matched set. Installing the incorrect connecting rod bearing cap on a

connecting rod may result in engine damage.

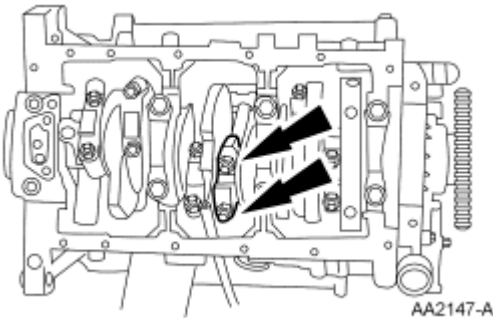


Fig. 103: Locating Nuts & Connecting Rod Bearing Cap
Courtesy of FORD MOTOR CO.

3. Remove the 2 nuts and the connecting rod bearing cap.
4. Lift the piston slightly and remove the connecting rod bearings.

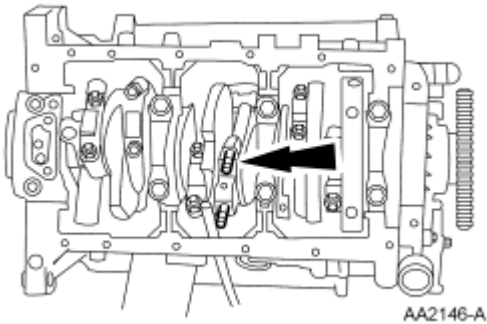


Fig. 104: Locating Connecting Rod Bearings
Courtesy of FORD MOTOR CO.

INSTALLATION

1. The connecting rod bearings are precision fit. Refer to **ENGINE SYSTEM - GENERAL INFORMATION** article for checking clearances or bearing selection.

CAUTION: The connecting rod bearings must be lubricated with clean engine oil prior to installation or damage to the connecting rod bearing may occur.

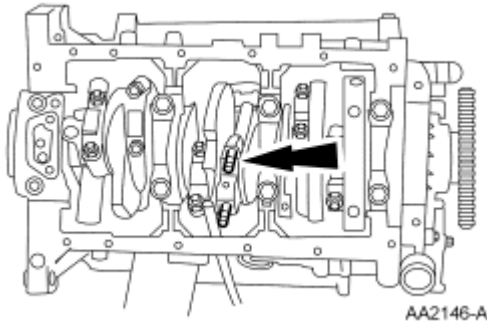


Fig. 105: Locating Connecting Rod Bearings
Courtesy of FORD MOTOR CO.

2. Install the connecting rod bearings.

CAUTION: Bearing caps are directional and must be installed exactly as they were removed.

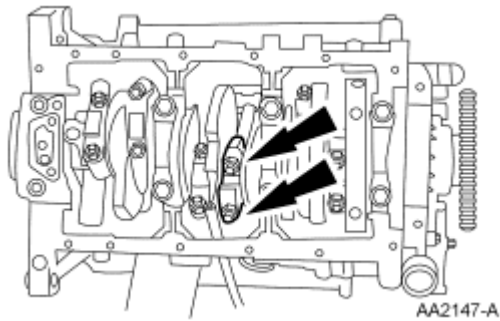


Fig. 106: Locating Connecting Rod Bearing Cap & Nuts
Courtesy of FORD MOTOR CO.

3. Install the connecting rod bearing cap and 2 nuts.
 - Tighten to 35 Nm (26 lb-ft).
4. Repeat the procedure until all the connecting rod bearings are installed.
5. Install the oil pan baffle and 7 nuts.

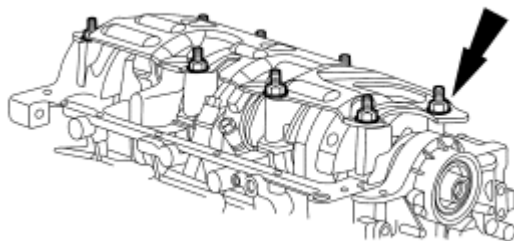
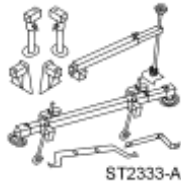


Fig. 107: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 32 Nm (24 lb-ft).
6. Install the oil pan. For additional information, refer to **Engine Lubrication Components - Exploded View** and **Oil Pan - Rear Wheel Drive (RWD)** or **Oil Pan - Four Wheel Drive (4WD)** in this article.

ENGINE SUPPORT INSULATORS - LH

Special Tools

Illustration	Tool Name	Tool Number
	Lifting Eyes	303-D030 (D81L-6001-D) or equivalent
	Three-Bar Engine Support Kit	303-F073 or equivalent

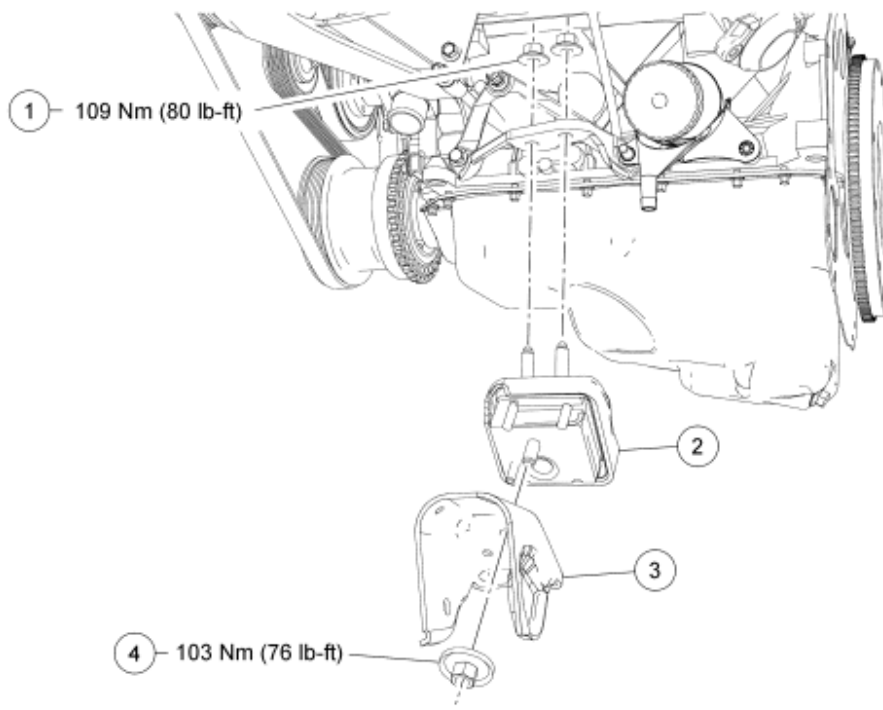


Fig. 108: View Of Engine Support Insulators - LH With Torque Specifications
Courtesy of FORD MOTOR CO.

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

Item	Part Number	Description
1	W710719	Engine support insulator nut (2 required)
2	6B032	Engine support insulator
3	31570	Engine mounting bracket (part of 5005)
4	W710657	Engine support insulator nut

REMOVAL

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the hood.
4. Remove the fan. For additional information, refer to **ENGINE COOLING** article.
5. Attach the Lifting Eyes.
6. Remove the engine support insulator nuts.

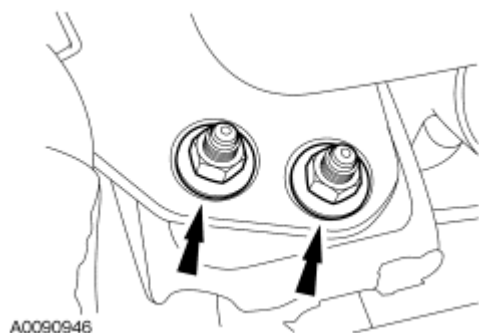
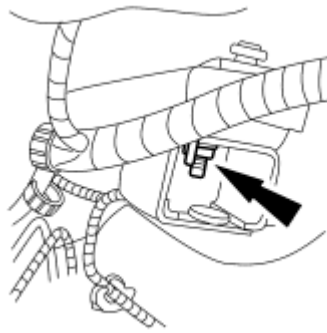


Fig. 109: Locating Engine Mount Nuts
Courtesy of FORD MOTOR CO.

7. Raise the engine and support with a Three-Bar Engine Support.

Rear wheel drive (RWD) vehicles

1. Remove the engine support insulator nut.



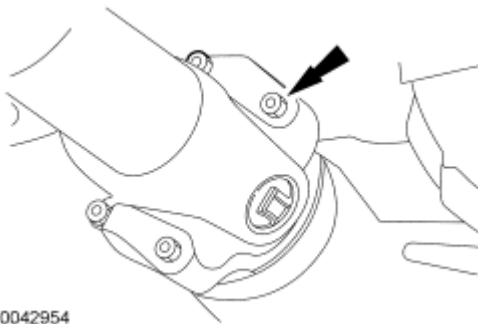
AA2149-A

Fig. 110: Locating Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

Four wheel drive (4WD) vehicles

CAUTION: Tape the U-joint bearing caps to prevent them from falling off the U-joints.

CAUTION: Index-mark the front axle pinion flange to the front driveshaft.



N0042954

Fig. 111: Locating Driveshaft Bolts
Courtesy of FORD MOTOR CO.

1. Remove and discard the bolts and straps. Secure the driveshaft aside.
2. Secure the front axle housing to a suitable jack.



Fig. 112: Securing Front Axle Housing To Suitable Jack
Courtesy of FORD MOTOR CO.

NOTE: Only 2 axle housing mounting bolts shown.

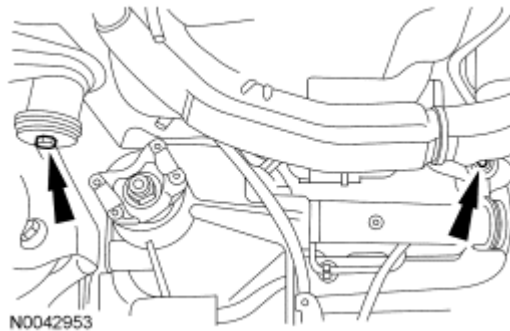


Fig. 113: Locating Axle Housing Mounting Bolts
Courtesy of FORD MOTOR CO.

3. Remove the 3 axle housing mounting bolts and lower the axle housing approximately 50 mm (2 inches).
4. Remove the engine support insulator nut.

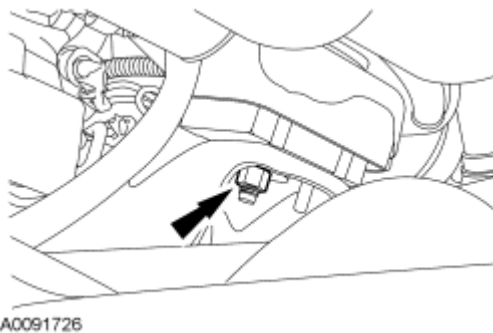


Fig. 114: Locating Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

All vehicles

1. Remove the engine support insulator.

INSTALLATION**All vehicles**

1. Position the engine support insulator.

4WD vehicles

1. Install the engine support insulator nut.

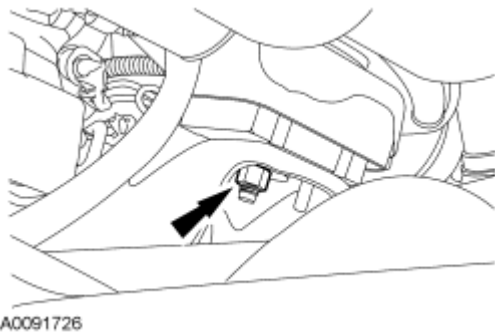


Fig. 115: Locating Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

- Tighten to 103 Nm (76 lb-ft).
2. Raise the front axle into place and install the 3 front axle mounting bolts.

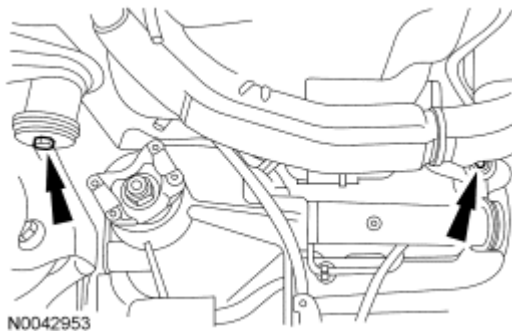


Fig. 116: Locating Axle Housing Mounting Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 66 Nm (49 lb-ft).
3. Remove the jack.



Fig. 117: Securing Front Axle Housing To Suitable Jack
Courtesy of FORD MOTOR CO.

CAUTION: Remove the tape applied during removal.

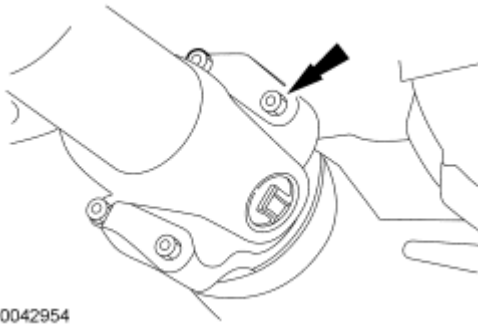


Fig. 118: Locating Driveshaft Bolts
Courtesy of FORD MOTOR CO.

4. Align the index marks and install new front driveshaft straps and bolts.
 - Tighten to 19 Nm (14 lb-ft).

RWD vehicles

1. Install the engine support insulator nut.

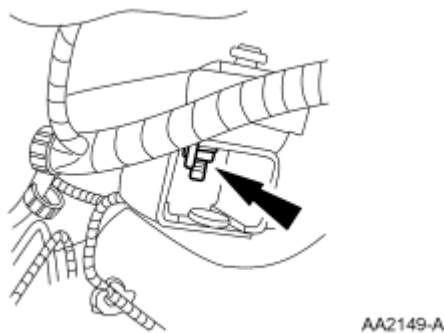


Fig. 119: Locating Engine Support Insulator Nut

Courtesy of FORD MOTOR CO.

- Tighten to 103 Nm (76 lb-ft).

All vehicles

1. Lower the engine and remove the Three-Bar Engine Support.
2. Install the engine support insulator nuts.

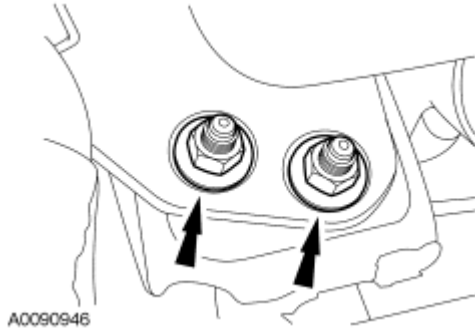
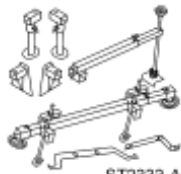
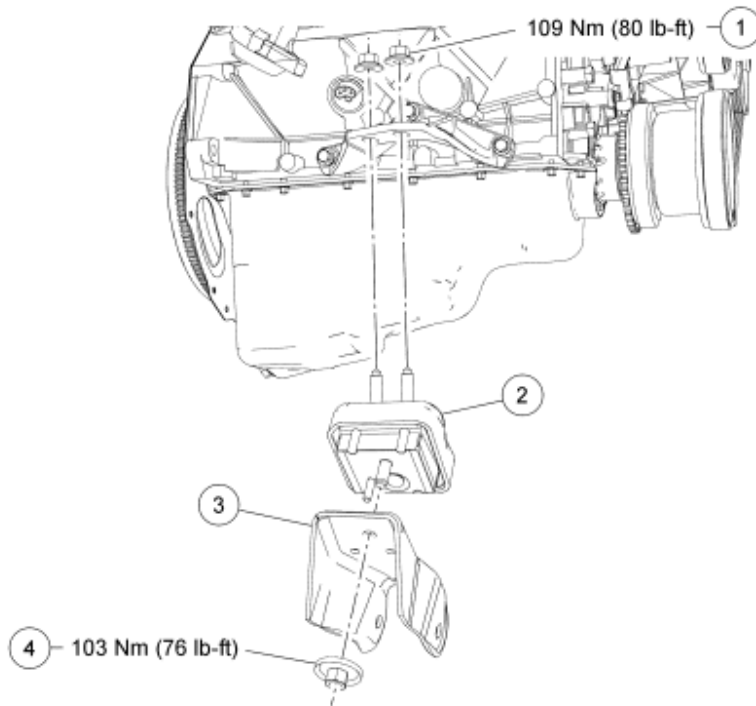


Fig. 120: Locating Engine Mount Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 109 Nm (80 lb-ft).
3. Remove the Lifting Eyes.
 4. Install the fan blade. For additional information, refer to **ENGINE COOLING** article.
 5. Install the hood.
 6. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

ENGINE SUPPORT INSULATORS - RH**Special Tools**

Illustration	Tool Name	Tool Number
 ST1831-A	Lifting Eyes	303-D030 (D81L-6001-D) or equivalent
 ST2333-A	Three-Bar Engine Support Kit	303-F073 or equivalent



N0053060

Fig. 121: View Of Engine Support Insulators - RH With Torque Specifications
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	W710749	Engine support insulator nut (2 required)
2	6038	Engine support insulator
3	31569	Engine mounting bracket (part of 5005)
4	W710657	Engine support insulator nut

REMOVAL

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Disconnect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.
3. Remove the hood.
4. Remove the fan blade. For additional information, refer to **ENGINE COOLING** article.
5. Attach the Lifting Eyes.
6. Remove the engine support insulator nuts.

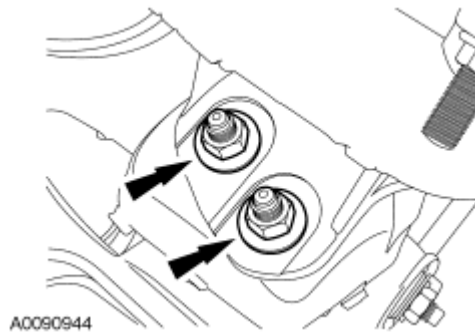


Fig. 122: Locating Engine Support Insulator Nuts
Courtesy of FORD MOTOR CO.

7. Raise the engine and support with a Three-Bar Engine Support Kit.

Rear wheel drive (RWD) vehicles

1. Remove the right front spring. For additional information, refer to **FRONT SUSPENSION - REAR WHEEL DRIVE (RWD)** article.
2. Remove the engine support insulator nut.

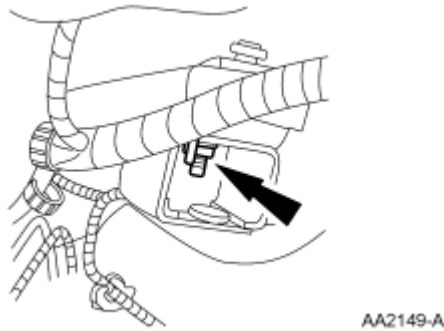


Fig. 123: Locating Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

Four wheel drive (4WD) vehicles

1. Remove the RH front halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.
2. Remove the engine support insulator nut.

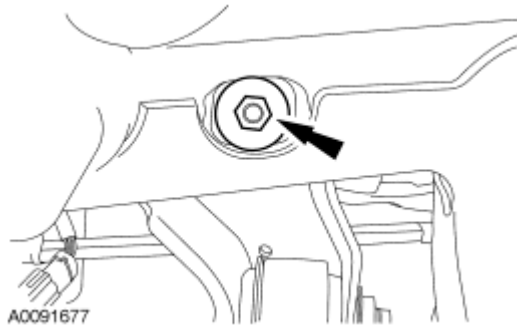


Fig. 124: Locating Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

All vehicles

1. Remove the engine support insulator.

INSTALLATION

All vehicles

1. Position the engine support insulator.

4WD vehicles

1. Install the engine support insulator nut.

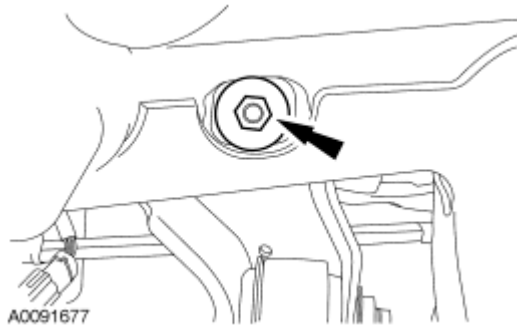
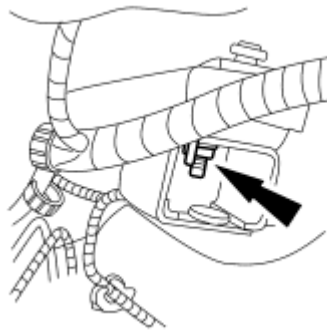


Fig. 125: Locating Engine Support Insulator Nut
Courtesy of FORD MOTOR CO.

- Tighten to 103 Nm (76 lb-ft).
2. Install the RH front halfshaft. For additional information, refer to **FRONT DRIVE HALFSHAFTS** article.

RWD vehicles

1. Install the engine support insulator nut.



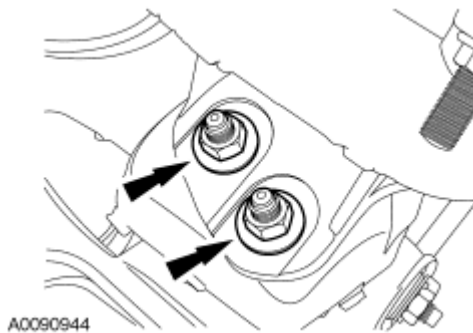
AA2149-A

Fig. 126: Locating Engine Support Insulator Nut
 Courtesy of FORD MOTOR CO.

- Tighten to 103 Nm (76 lb-ft).
2. Install the right front spring. For additional information, refer to **FRONT SUSPENSION - REAR WHEEL DRIVE (RWD)** article.

All vehicles

1. Lower the engine and remove the Three-Bar Engine Support Kit.
2. Install the engine support insulator nuts.



A0090944

Fig. 127: Locating Engine Support Insulator Nuts
 Courtesy of FORD MOTOR CO.

- Tighten to 109 Nm (80 lb-ft).
3. Remove the Lifting Eyes.
 4. Install the fan blade. For additional information, refer to **ENGINE COOLING** article.
 5. Install the hood.
 6. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND CABLES** article.

REMOVAL

ENGINE

2007 Ford Ranger

2007 ENGINE Engine - 3.0L (2V) - Ranger

Special Tools

Illustration	Tool Name	Tool Number
 ST1831-A	Lifting Eyes	303-D030 (D81L-6001-D) or equivalent
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

REMOVAL

All vehicles

1. With the vehicle in NEUTRAL, position it on a hoist. For additional information, refer to **JACKING AND LIFTING** article.
2. Drain the engine cooling system. For additional information, refer to **ENGINE COOLING** article.
3. Remove the hood.
4. Remove the upper intake manifold. For additional information, refer to **Upper Intake Manifold** in this article.
5. Remove the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.

CAUTION: The fan clutch has left-hand threads.

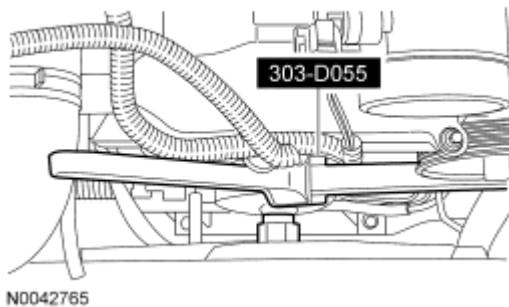


Fig. 128: Using Special Tool (303-D055) To Remove Fan Clutch And Blade As An Assembly
Courtesy of FORD MOTOR CO.

6. Using the special tool, remove the fan clutch and the fan blade as an assembly.
7. Remove the fan shroud.

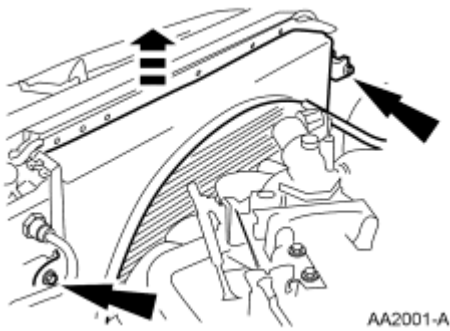


Fig. 129: Locating Fan Shroud & Bolts
Courtesy of FORD MOTOR CO.

- Remove the bolts.
 - Remove the fan shroud.
8. Remove the radiator. For additional information, refer to **ENGINE COOLING** article.
 9. Disconnect the heater hoses.

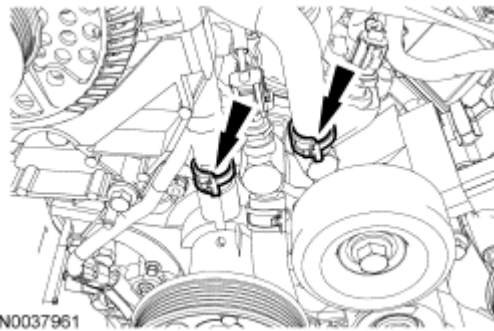


Fig. 130: Locating Heater Hoses
Courtesy of FORD MOTOR CO.

10. Recover the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.
11. Disconnect the A/C manifold and tube.

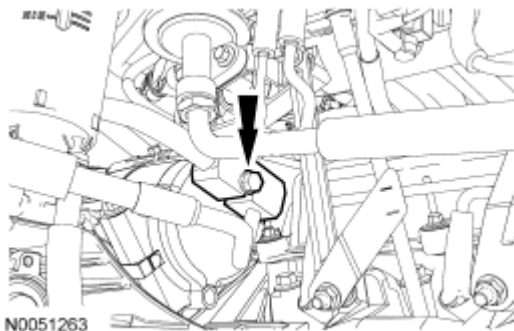


Fig. 131: Locating A/C Manifold & Tube
Courtesy of FORD MOTOR CO.

12. Disconnect the A/C manifold and tube at the accumulator.

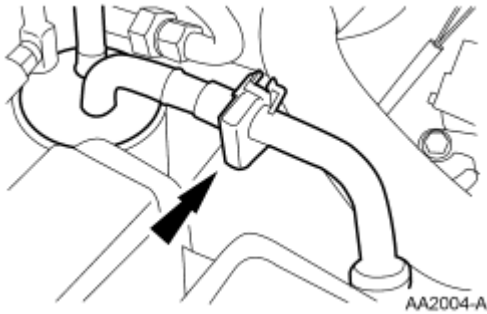


Fig. 132: Locating A/C Manifold & Tube At Accumulator
Courtesy of FORD MOTOR CO.

13. Remove the nut and position the line aside.

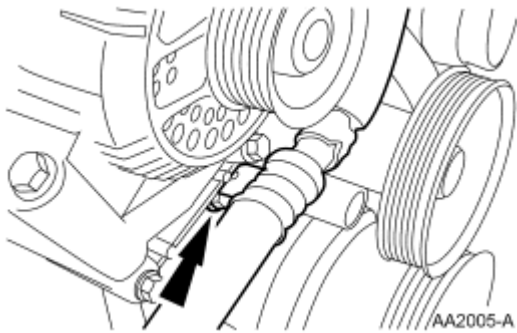


Fig. 133: Removing Nut & Positioning Line Aside
Courtesy of FORD MOTOR CO.

14. Disconnect the A/C compressor electrical connector and detach the wiring harness retainer.

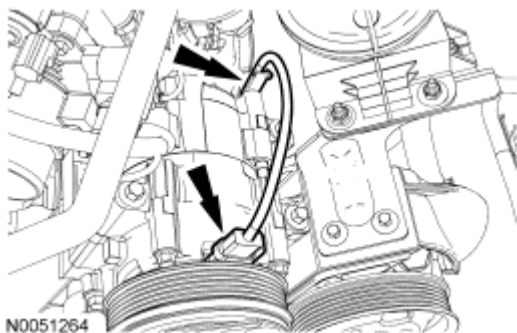


Fig. 134: Locating A/C Compressor Electrical Connector
Courtesy of FORD MOTOR CO.

15. Remove the nuts and detach the ground wire and the wiring harness bracket.



Fig. 135: Locating Ground Wire & Wiring Harness Bracket
Courtesy of FORD MOTOR CO.

16. Remove the stud bolts.



Fig. 136: Locating Stud Bolts
Courtesy of FORD MOTOR CO.

17. Remove the accessory drive belt tensioner.

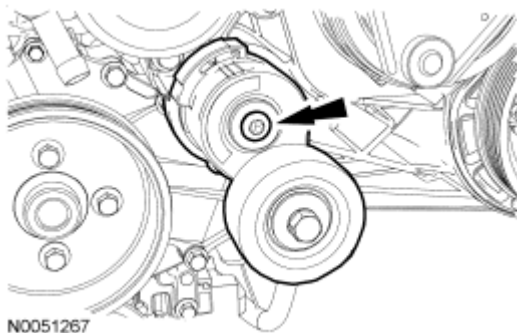


Fig. 137: Locating Accessory Drive Belt Tensioner
Courtesy of FORD MOTOR CO.

18. Remove the bolts and set the A/C compressor, the power steering pump and the mounting bracket aside as an assembly.

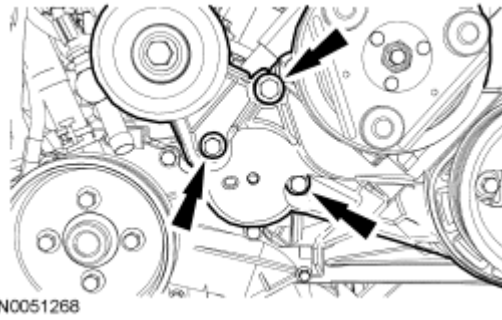


Fig. 138: Locating Bolts & A/C Compressor
Courtesy of FORD MOTOR CO.

19. Disconnect the generator electrical connectors and detach the wiring harness retainer.

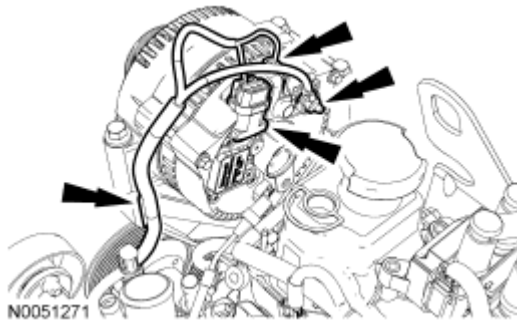


Fig. 139: Locating Generator Electrical Connectors
Courtesy of FORD MOTOR CO.

- Position the wiring harness aside.
20. Disconnect the 2 in-line electrical connectors.

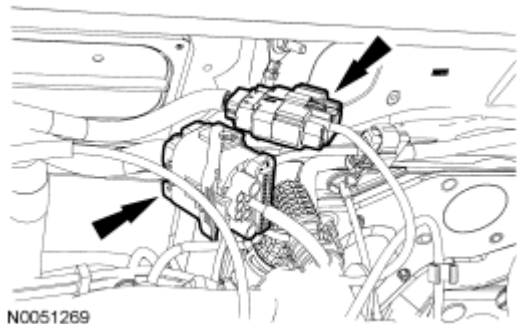


Fig. 140: Locating 2 In-Line Electrical Connectors
Courtesy of FORD MOTOR CO.

21. Remove the nut and position the ground cable aside.

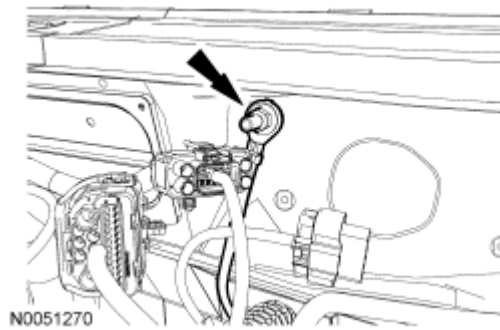


Fig. 141: Removing Nut & Positioning Ground Cable Aside
Courtesy of FORD MOTOR CO.

22. Disconnect the fuel tube spring lock coupling. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.
23. Disconnect the powertrain control module (PCM) electrical connectors.

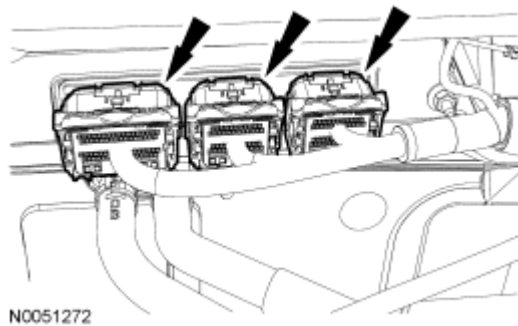


Fig. 142: Locating Powertrain Control Module (PCM) Electrical Connectors
Courtesy of FORD MOTOR CO.

24. Remove the nut and detach the wiring harness retainer.

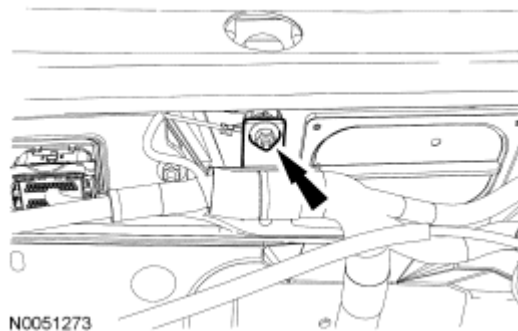


Fig. 143: Locating Nut & Detaching Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

25. Remove the stud bolt and the PCM ground strap.

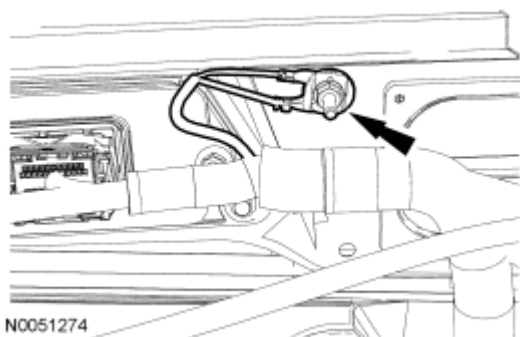


Fig. 144: Locating Stud Bolt & PCM Ground Strap
Courtesy of FORD MOTOR CO.

26. Disconnect both heated oxygen sensors (HO2S).

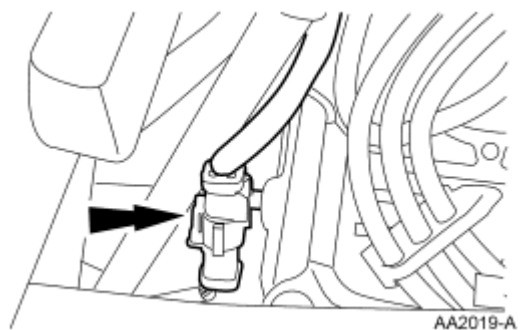


Fig. 145: Locating Heated Oxygen Sensors
Courtesy of FORD MOTOR CO.

27. Disconnect the vacuum hose to the vacuum reservoir.

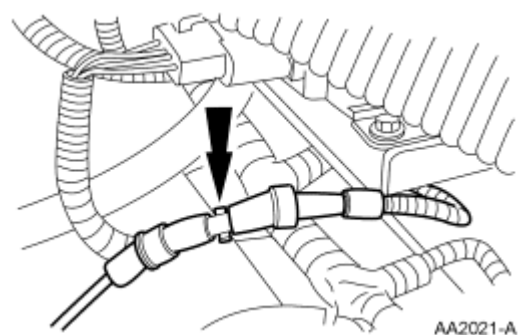


Fig. 146: Locating Vacuum Hose & Vacuum Reservoir
Courtesy of FORD MOTOR CO.

28. Disconnect the mass air flow (MAF) sensor.

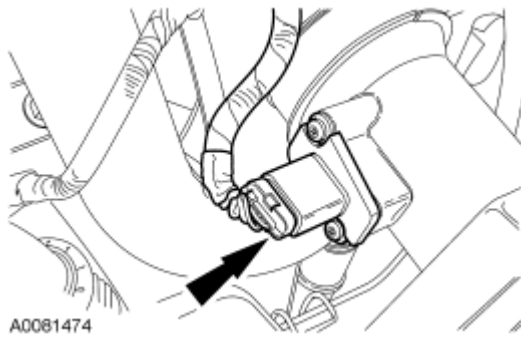


Fig. 147: Locating Mass Air Flow Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

29. Remove the LH HO2S.

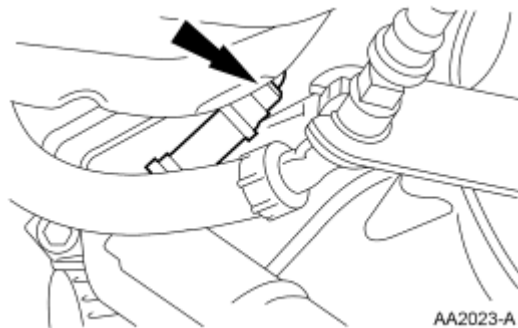


Fig. 148: Locating LH HO2S
Courtesy of FORD MOTOR CO.

NOTE: LH shown, RH similar.

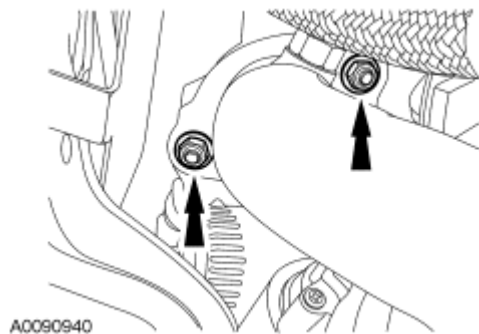


Fig. 149: Locating Dual Converter Y-Pipe Nuts
Courtesy of FORD MOTOR CO.

30. Remove the 4 nuts and disconnect the dual converter Y-pipe from both exhaust manifolds.
31. Remove the starter motor. For additional information, refer to **STARTING SYSTEM** article.
32. Detach the wiring harness retainer from the transmission crossmember and disconnect the electrical connector.

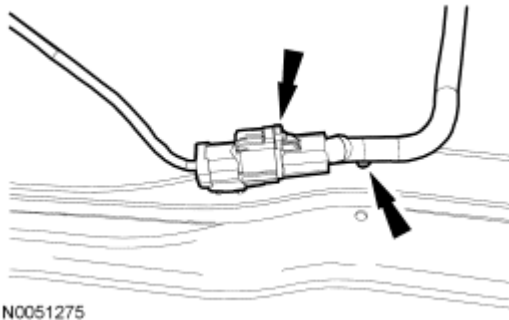


Fig. 150: Locating Wiring Harness Retainer & Electrical Connector
Courtesy of FORD MOTOR CO.

Vehicles equipped with automatic transmission

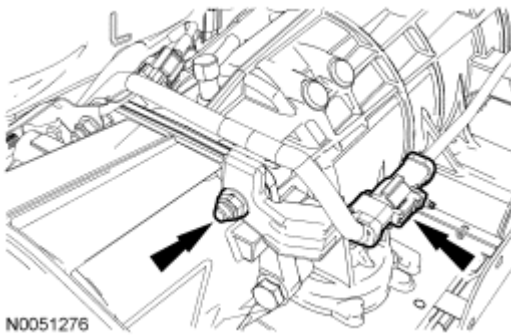


Fig. 151: Locating RH Catalyst Monitor Sensor Electrical Connector & Nut
Courtesy of FORD MOTOR CO.

1. Disconnect the RH catalyst monitor sensor electrical connector and remove the nut.
 - Route the wiring harness over the transmission.
2. Detach the wiring harness retainer. Disconnect the transmission electrical connectors.

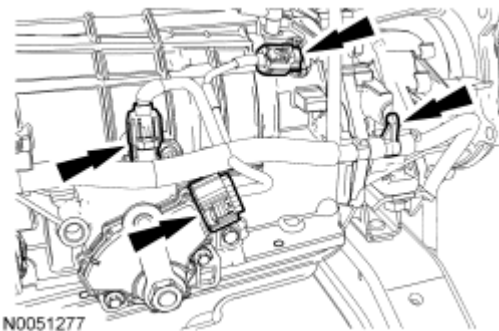


Fig. 152: Locating Wiring Harness Retainer & Transmission Electrical Connectors
Courtesy of FORD MOTOR CO.

3. Detach the wiring harness retainer. Disconnect the LH catalyst monitor sensor and transmission electrical connectors.

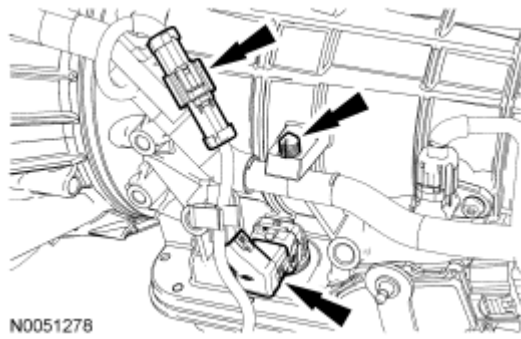


Fig. 153: Locating LH Catalyst Monitor Sensor & Transmission Electrical Connectors
Courtesy of FORD MOTOR CO.

NOTE: Mark 1 stud and the flexplate for installation reference.

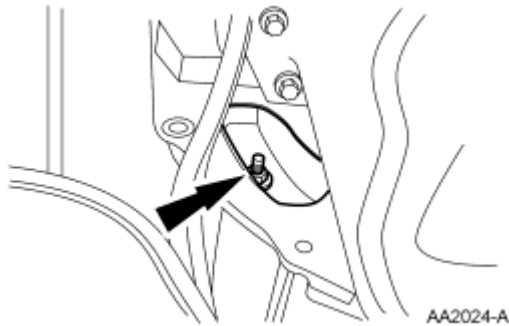


Fig. 154: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

4. Remove the torque converter nuts.
 - Remove the access plate.
 - Remove the 4 nuts.
5. Disconnect the wire push pin retainers.

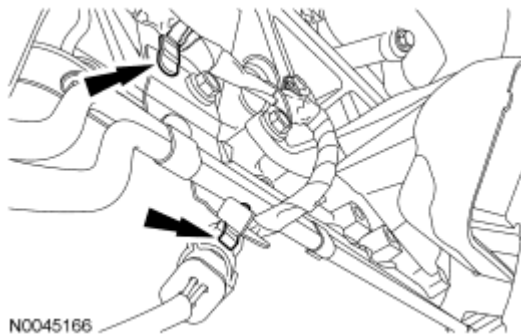


Fig. 155: Locating Wire Push-Pin Retainers
Courtesy of FORD MOTOR CO.

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

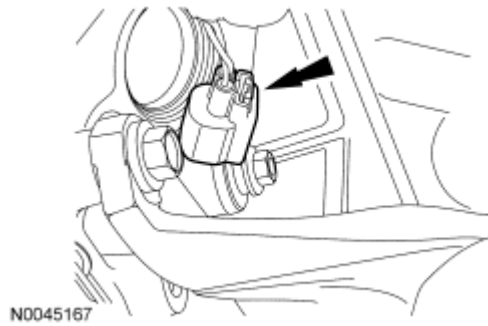


Fig. 156: Locating Knock Sensor (KS) Electrical Connector
Courtesy of FORD MOTOR CO.

7. Remove the bolt.

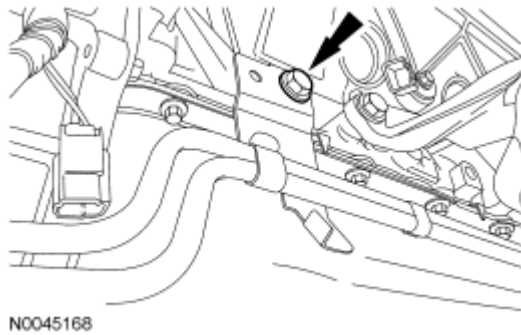


Fig. 157: Locating Transmission Cooler Line Bracket Bolt
Courtesy of FORD MOTOR CO.

Vehicles equipped with a manual transmission

1. Disconnect the RH catalyst monitor sensor electrical connector and remove the nut.

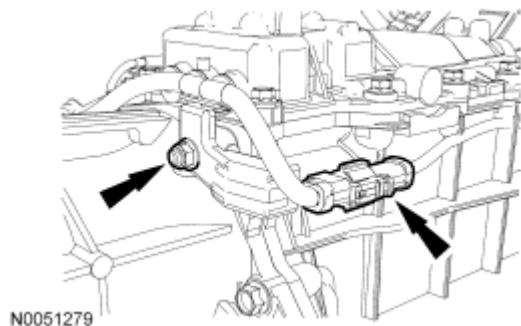


Fig. 158: Locating RH Catalyst Monitor Sensor Electrical Connector & Nut
Courtesy of FORD MOTOR CO.

- Route the wiring harness over the transmission.
2. Detach the wiring harness retainer. Disconnect the transmission electrical connector.

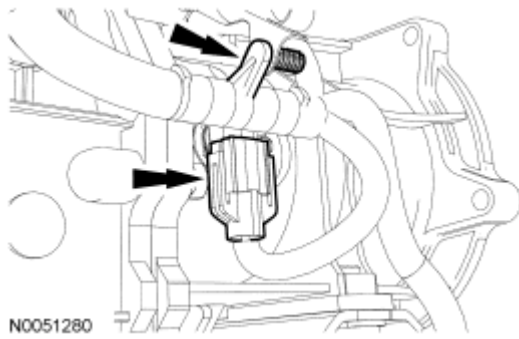


Fig. 159: Locating Wiring Harness Retainer & Transmission Electrical Connector
Courtesy of FORD MOTOR CO.

3. Detach the wiring harness retainers. Disconnect the LH catalyst monitor and transmission electrical connectors.

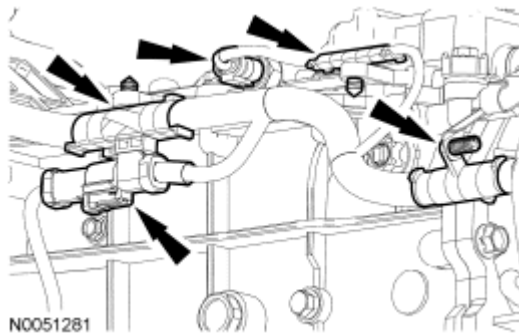


Fig. 160: Locating LH Catalyst Monitor & Transmission Electrical Connectors
Courtesy of FORD MOTOR CO.

All vehicles

1. Remove the nuts and position the fuel tube bracket aside.

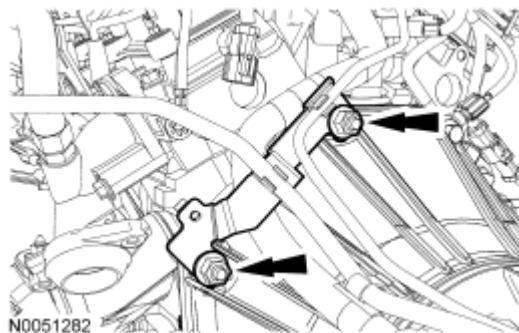


Fig. 161: Locating Fuel Tube Bracket Aside & Nut
Courtesy of FORD MOTOR CO.

- Make sure all the transmission electrical connectors and wiring harness retainers are disconnected and route the wiring harness to the engine.

2. Remove the 8 transmission-to-engine bolts.

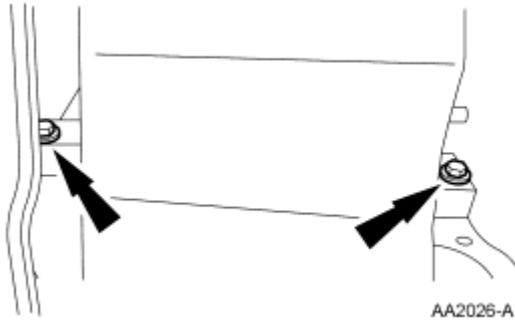


Fig. 162: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

NOTE: RH shown, LH similar.

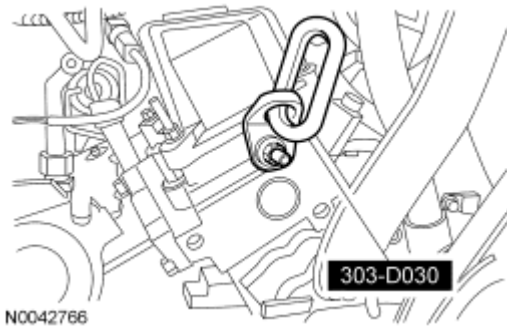


Fig. 163: Identifying Special Tool (303-D030)
Courtesy of FORD MOTOR CO.

3. Install the Lifting Eyes.
4. Remove the 4 nuts.

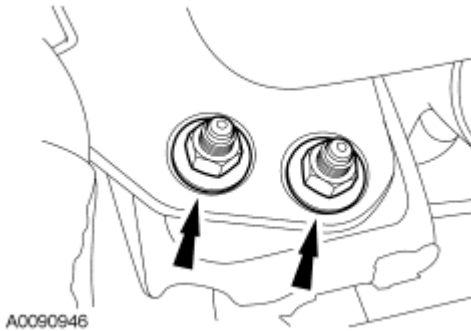


Fig. 164: Locating Engine Mount Nuts
Courtesy of FORD MOTOR CO.

5. Support the transmission with a floor jack.

2007 Ford Ranger

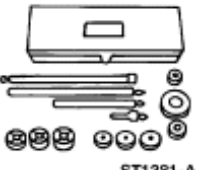
2007 ENGINE Engine - 3.0L (2V) - Ranger

6. Remove the engine from the vehicle.

DISASSEMBLY

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1286-A	Remover, Crankshaft Vibration Damper	303-009 (T58P-6316-D)
 ST1381-A	Service Set, Camshaft	303-017 (T65L-6250-A)
 ST1394-A	Spark Plug Wire Remover	303-106 (T74P-6666-A)

DISASSEMBLY

Vehicles equipped with a manual transmission

CAUTION: If the clutch disc and pressure plate are to be reinstalled, bolts must be removed evenly or permanent damage to the diaphragm spring will occur resulting in complete clutch release.

NOTE: If the parts are to be reused, index-mark the clutch pressure plate to the flywheel.

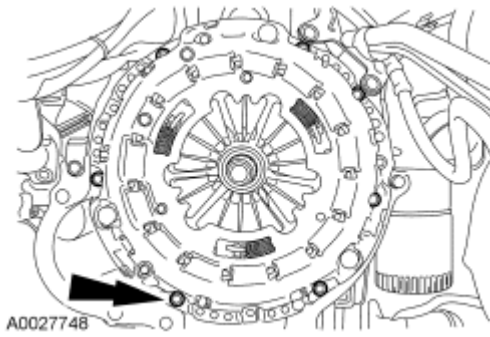


Fig. 165: Locating Clutch Pressure Plate Bolts
Courtesy of FORD MOTOR CO.

1. Remove the bolts, the clutch pressure plate and the clutch disc.

All vehicles

1. Remove the flywheel or flexplate.
2. Remove the engine-to-transmission spacer plate.

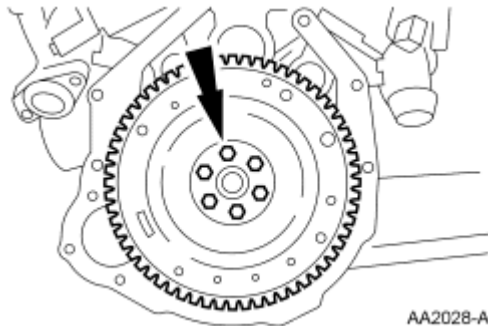


Fig. 166: Locating Engine-To-Transmission Spacer Plate
Courtesy of FORD MOTOR CO.

3. Mount the engine to a suitable engine stand and remove the lifting equipment and Lifting Eyes.

CAUTION: Do not pull on the spark plug wires. Twist the boot while pulling upwards.

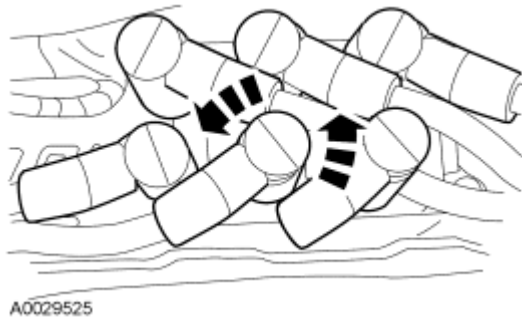


Fig. 167: Disconnecting Spark Plug Wires From Ignition Coil
Courtesy of FORD MOTOR CO.

4. Disconnect the spark plug wires from the ignition coil.

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

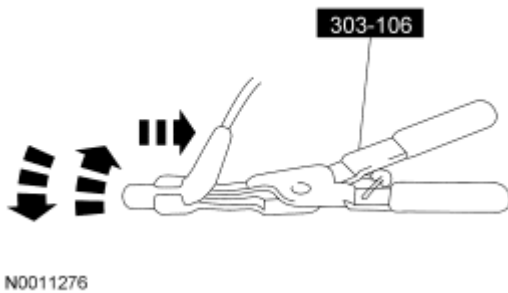


Fig. 168: Removing Spark Plug Wire From Spark Plug Using Special Tool (303-106)
Courtesy of FORD MOTOR CO.

5. With a twisting motion, use the special tool to pull the spark plug wires off the spark plugs.
6. Detach the spark plug wire retainers from the LH valve cover stud bolts.

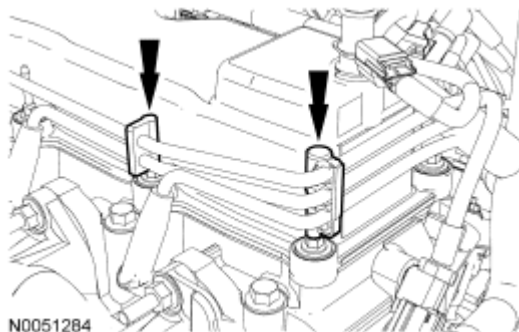


Fig. 169: Locating Spark Plug Wire Retainers & LH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

7. Detach the spark plug wire retainers from the RH valve cover stud bolts and remove the spark plug wires.

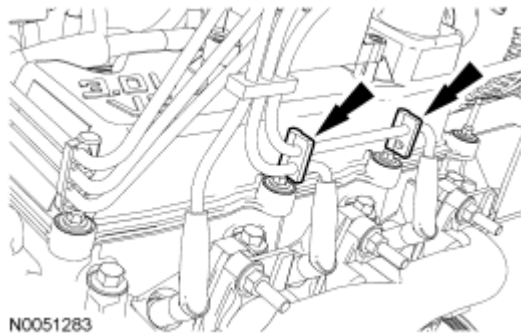


Fig. 170: Locating Spark Plug Wire Retainers & RH Valve Cover Stud Bolts
Courtesy of FORD MOTOR CO.

8. Disconnect the crankshaft position (CKP) sensor electrical connector. Detach the wiring harness retainer.

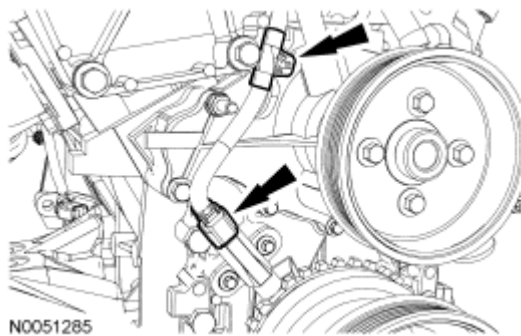


Fig. 171: Locating Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

9. Detach the wiring harness retainer from the generator.

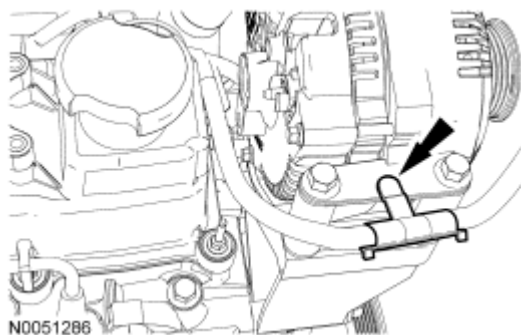


Fig. 172: Locating Wiring Harness Retainer & Generator
Courtesy of FORD MOTOR CO.

10. Disconnect the camshaft position (CMP) sensor, the oil pressure switch and, if necessary, the knock sensor electrical connectors. Detach the wiring harness and electrical connector retainers.

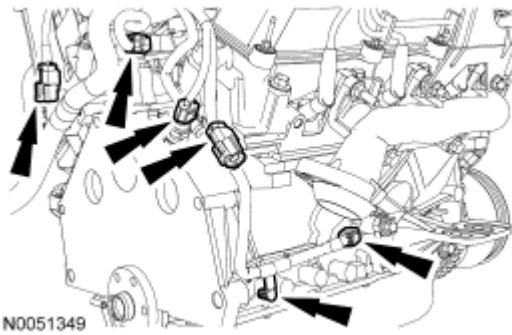


Fig. 173: Locating Camshaft Position (CMP) Sensor
Courtesy of FORD MOTOR CO.

11. Disconnect the positive crankcase ventilation (PCV) valve and the differential pressure feedback exhaust gas recirculation (EGR) sensor electrical connectors. Detach the wiring harness retainer from the differential pressure feedback EGR sensor.

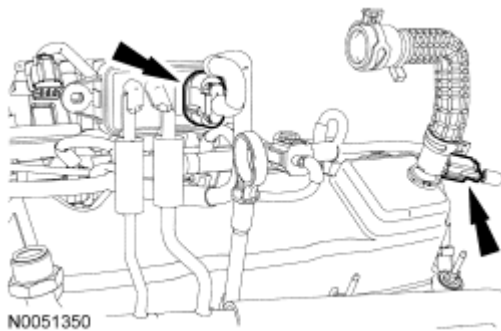


Fig. 174: Locating Positive Crankcase Ventilation (PCV) Valve
Courtesy of FORD MOTOR CO.

12. Disconnect the ignition coil, the engine coolant temperature (ECT) sensor and 6 fuel injector electrical connectors. Detach the 5 wiring harness retainers from the valve cover stud bolts. Remove the wiring harness.

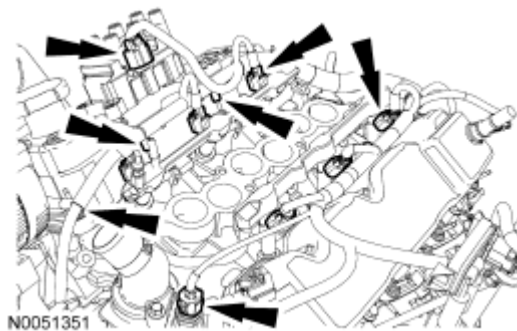


Fig. 175: Locating Ignition Coil & Engine Coolant Temperature (ECT) Sensor
Courtesy of FORD MOTOR CO.

13. Remove the bolt and the engine ground strap.

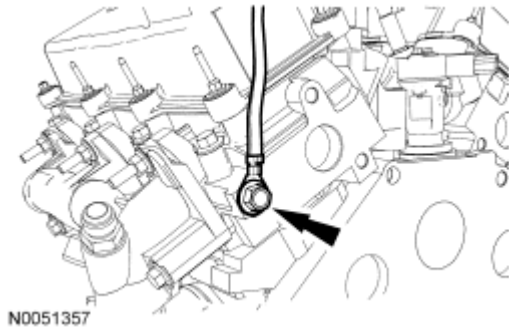


Fig. 176: Locating Bolt & Engine Ground Strap
Courtesy of FORD MOTOR CO.

14. Remove the nuts and the LH engine lifting eye.

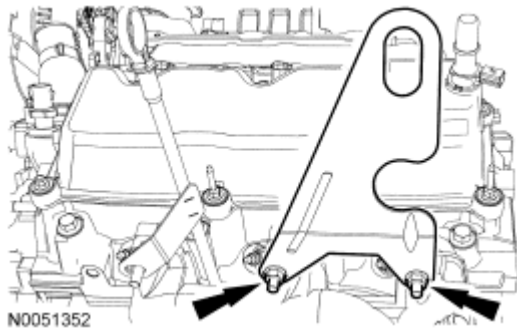


Fig. 177: Locating Nuts & LH Engine Lifting Eye
Courtesy of FORD MOTOR CO.

15. Remove the nuts and the RH engine lifting eye.

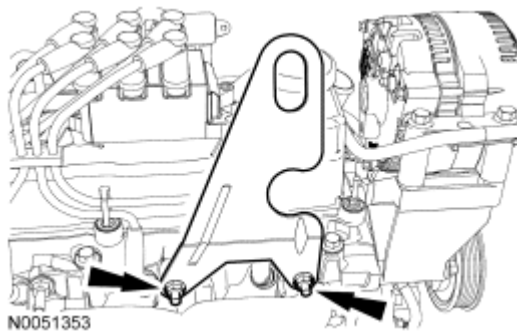


Fig. 178: Locating Nuts & RH Engine Lifting Eye
Courtesy of FORD MOTOR CO.

16. Remove the bolts and the ignition coil assembly.

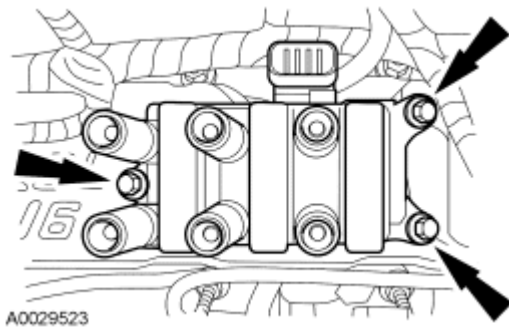


Fig. 179: Locating Ignition Coil Assembly Bolts
Courtesy of FORD MOTOR CO.

17. Remove the bolts and the generator mounting bracket.

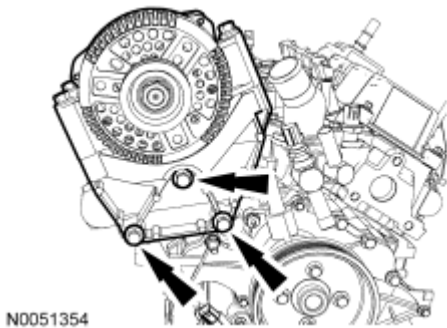


Fig. 180: Locating Bolts & Generator Mounting Bracket
Courtesy of FORD MOTOR CO.

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

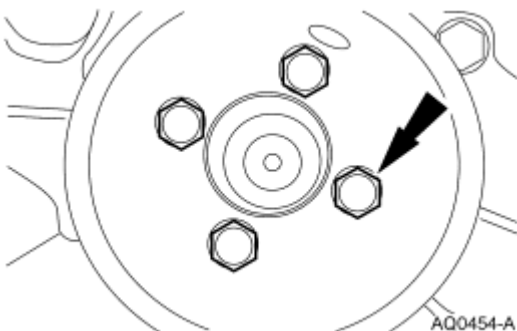
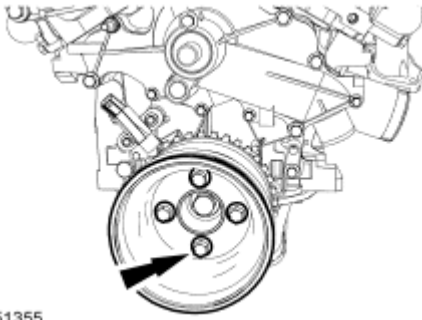


Fig. 181: Locating Bolts & Coolant Pump Pulley
Courtesy of FORD MOTOR CO.

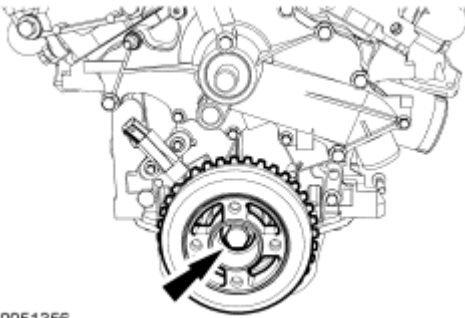
19. Remove the 4 bolts and the crankshaft pulley.



N0051355

Fig. 182: Locating Bolts & Crankshaft Pulley
Courtesy of FORD MOTOR CO.

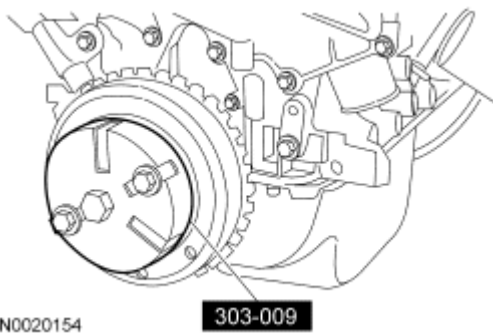
20. Remove the crankshaft damper bolt.



N0051356

Fig. 183: Locating Crankshaft Damper Bolt
Courtesy of FORD MOTOR CO.

21. Using a the special tool, remove the crankshaft damper.



N0020154

303-009

Fig. 184: Removing Crankshaft Damper Using Special Tool
Courtesy of FORD MOTOR CO.

NOTE: To prevent stretching the valve cover gasket, loosen silicone gasket and sealant from the cylinder head by sliding a flat knife between the valve cover gasket and cylinder head.

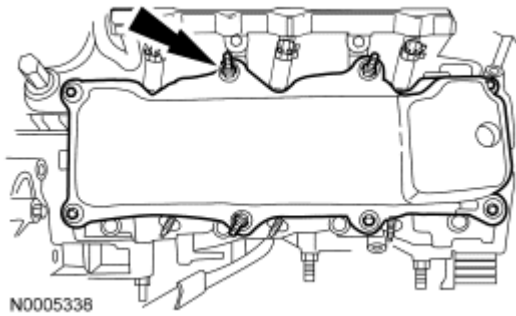


Fig. 185: Locating Valve Covers
Courtesy of FORD MOTOR CO.

22. Remove the valve covers.
23. Remove and discard the valve cover gaskets.

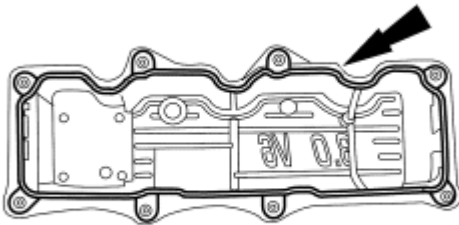


Fig. 186: Locating Valve Cover Gasket
Courtesy of FORD MOTOR CO.

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

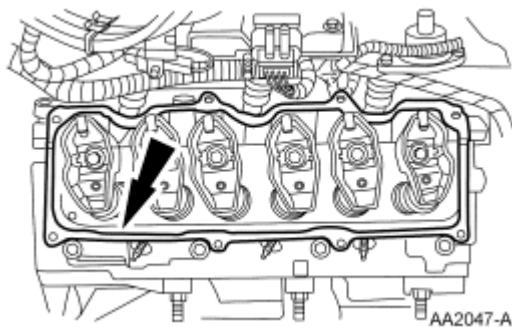


Fig. 187: Cleaning Sealing Surfaces
Courtesy of FORD MOTOR CO.

24. Clean the sealing surfaces.
25. Remove the rocker arms and the push rods.

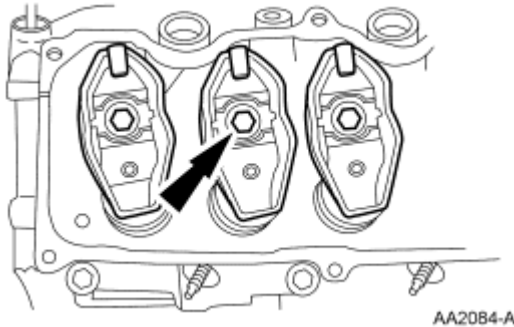


Fig. 188: Locating Rocker Arms & Push Rods
Courtesy of FORD MOTOR CO.

26. Remove the 4 bolts, the fuel rail and the fuel injectors.

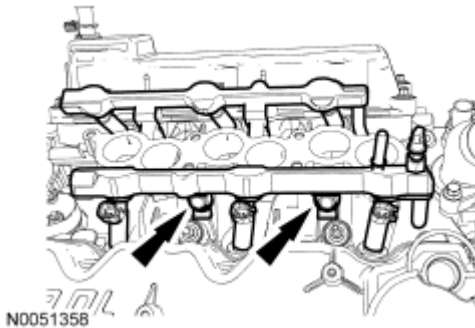


Fig. 189: Locating Bolts, Fuel Rail & Fuel Injectors
Courtesy of FORD MOTOR CO.

27. Remove the lower intake manifold.

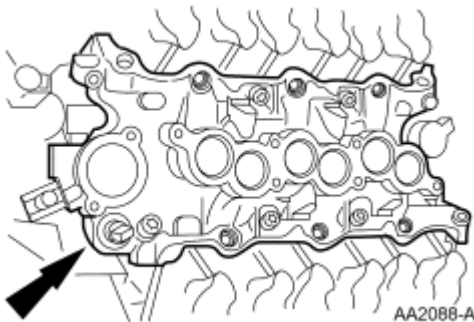


Fig. 190: Locating Lower Intake Manifold
Courtesy of FORD MOTOR CO.

- Remove the 8 bolts.

- Remove the lower intake manifold.
28. Remove and discard the intake manifold gaskets and end seals.

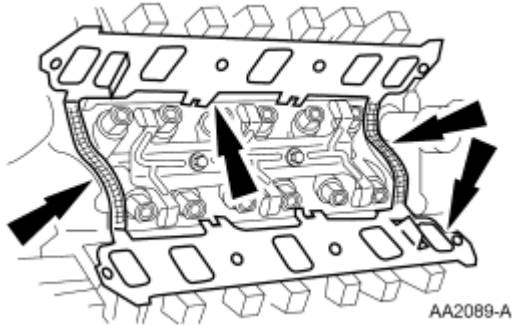


Fig. 191: Locating Intake Manifold Gaskets & End Seals
Courtesy of FORD MOTOR CO.

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

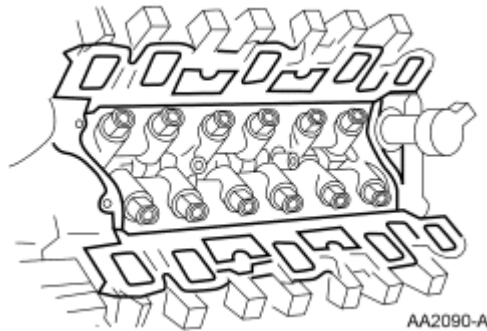


Fig. 192: Using Plastic Scraping Tool To Remove All Traces Of Old Sealant
Courtesy of FORD MOTOR CO.

29. Clean the sealing surfaces.
30. Remove the screws and the camshaft position (CMP) sensor.

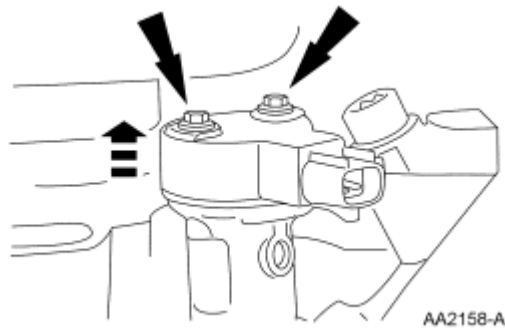


Fig. 193: Locating Screws & Camshaft Position (CMP) Sensor
Courtesy of FORD MOTOR CO.

31. Remove the camshaft synchronizer bolt.

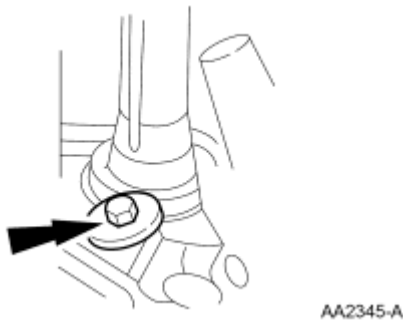


Fig. 194: Locating Camshaft Synchronizer Bolt
Courtesy of FORD MOTOR CO.

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

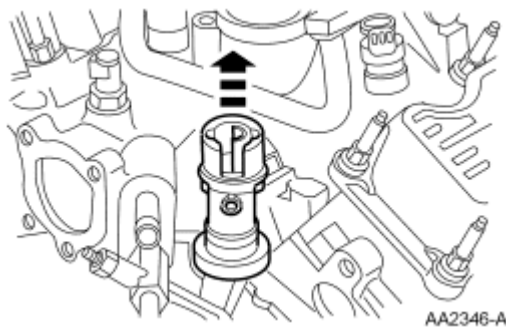


Fig. 195: Locating Camshaft Synchronizer
Courtesy of FORD MOTOR CO.

32. Remove the camshaft synchronizer.
33. Remove the nut, the bolt and the starter splash shield.

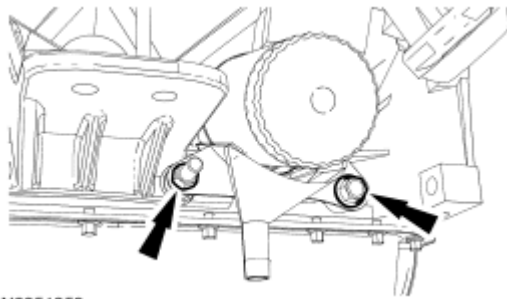


Fig. 196: Locating Nut, Bolt & Starter Splash Shield
Courtesy of FORD MOTOR CO.

34. Remove the 2 stud bolts, the bolt and the LH engine support insulator bracket.

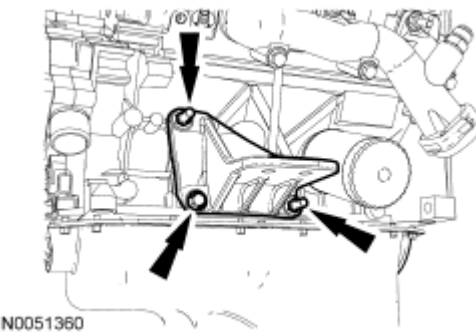


Fig. 197: Locating Stud Bolts & LH Engine Support Insulator Bracket
Courtesy of FORD MOTOR CO.

35. Remove the bolts and the RH engine support insulator bracket.

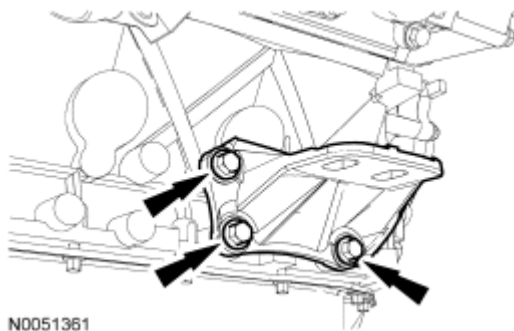


Fig. 198: Locating Bolts & RH Engine Support Insulator Bracket
Courtesy of FORD MOTOR CO.

36. Remove the exhaust manifold-to-EGR valve tube.

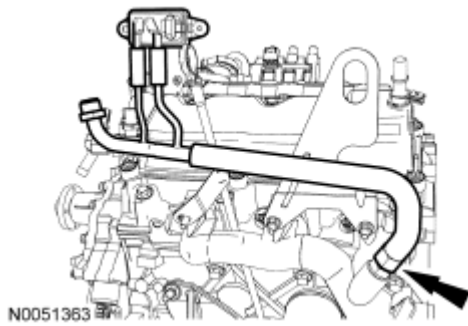


Fig. 199: Locating Exhaust Manifold-To-EGR Valve Tube
Courtesy of FORD MOTOR CO.

37. Remove the stud bolts, the bolts, both exhaust manifolds and the gaskets.

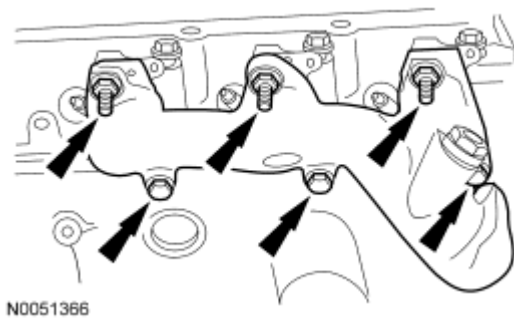


Fig. 200: Locating Stud Bolts, Exhaust Manifolds & Gaskets
Courtesy of FORD MOTOR CO.

- Discard the stud bolts, the bolts and the gaskets.

38. Remove the bolts and oil pan.

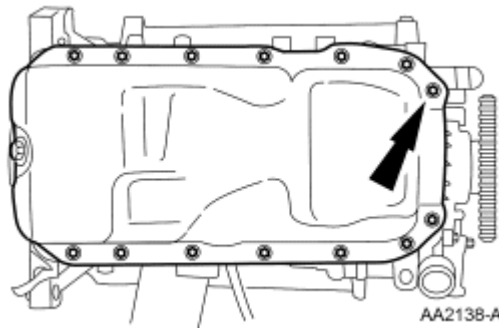
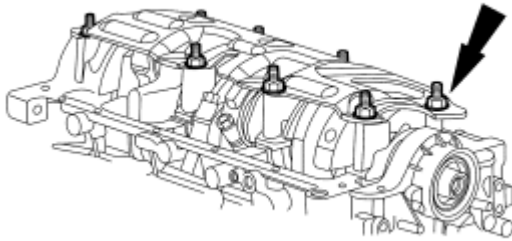


Fig. 201: Locating Bolts & Oil Pan
Courtesy of FORD MOTOR CO.

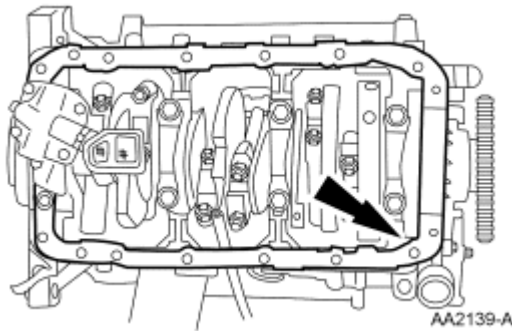
39. Remove the nuts and oil pan baffle.



A0042084

Fig. 202: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

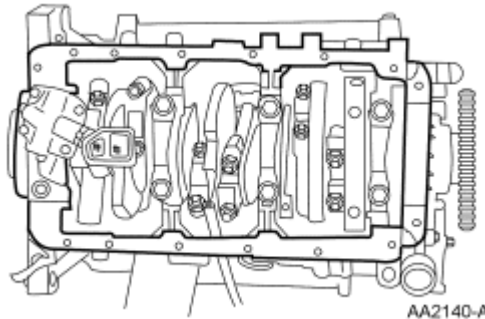
40. Remove and discard the oil pan gasket.



AA2139-A

Fig. 203: Locating Oil Pan Gasket
Courtesy of FORD MOTOR CO.

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



AA2140-A

Fig. 204: Using Plastic Scraping Tool To Remove All Traces Of Old Sealant
Courtesy of FORD MOTOR CO.

41. Clean the surfaces.
42. Remove the bolts and the crankshaft position (CKP) sensor.

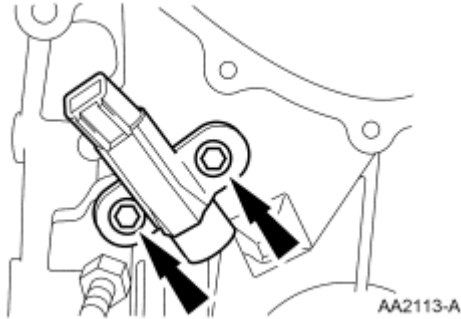


Fig. 205: Locating Crankshaft Position (CKP) Sensor Bolt
Courtesy of FORD MOTOR CO.

43. Remove the bolt and knock sensor (KS).

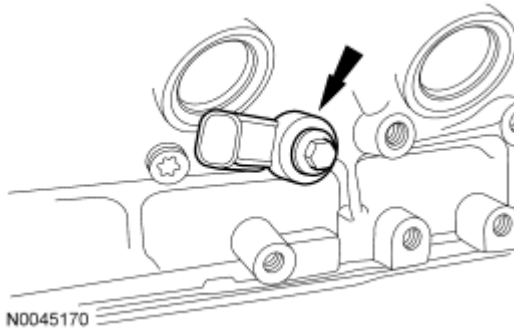


Fig. 206: Locating Knock Sensor (KS) Bolt
Courtesy of FORD MOTOR CO.

44. Remove the 10 bolts and the engine front cover.

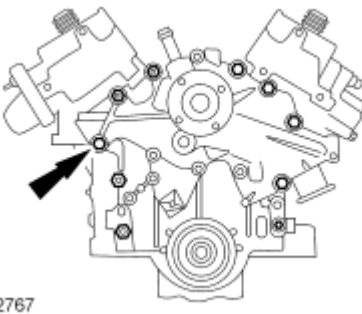


Fig. 207: Locating Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.

45. Remove and discard the engine front cover gasket.

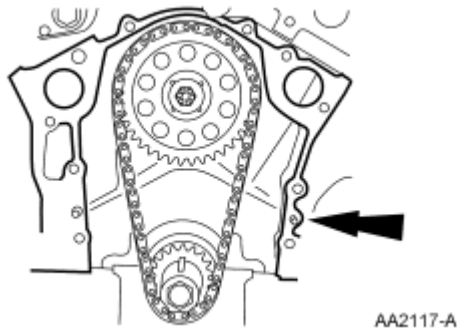


Fig. 208: Locating Engine Front Cover Gasket
Courtesy of FORD MOTOR CO.

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

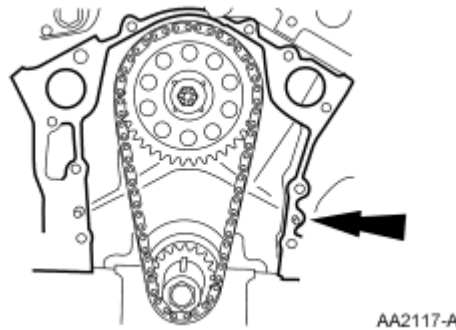


Fig. 209: Using Plastic Scraping Tool To Remove All Traces Of Old Sealant
Courtesy of FORD MOTOR CO.

46. Clean the sealing surfaces.
47. Remove the oil level indicator tube.

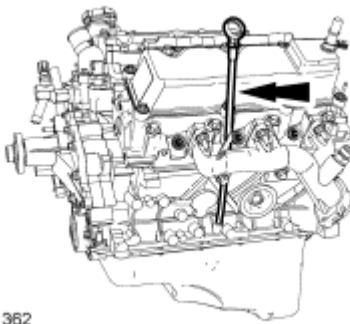


Fig. 210: Locating Oil Level Indicator Tube
Courtesy of FORD MOTOR CO.

48. Remove and discard the oil filter.

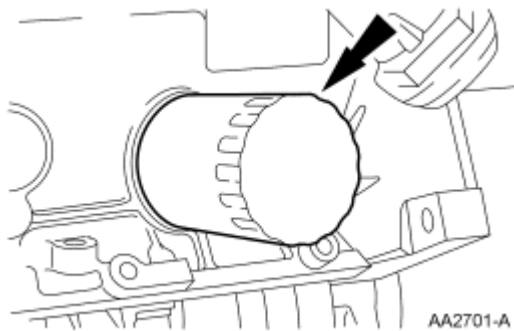


Fig. 211: Locating Oil Filter
Courtesy of FORD MOTOR CO.

49. Remove the bolts.

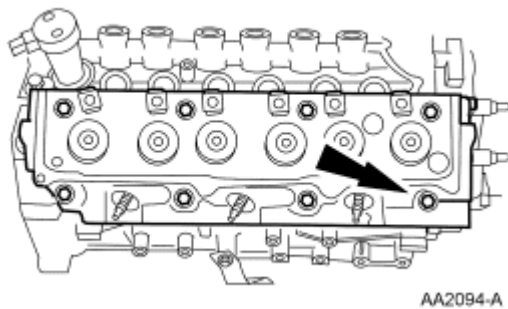


Fig. 212: Locating Bolts
Courtesy of FORD MOTOR CO.

50. Remove the cylinder heads.

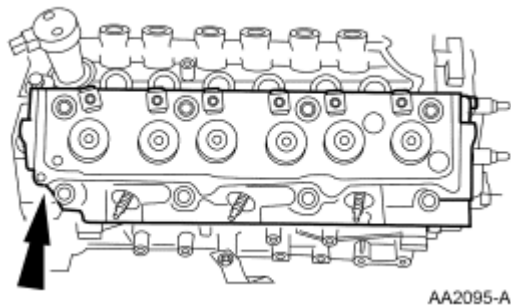


Fig. 213: Locating Cylinder Heads
Courtesy of FORD MOTOR CO.

51. Remove and discard the head gaskets.

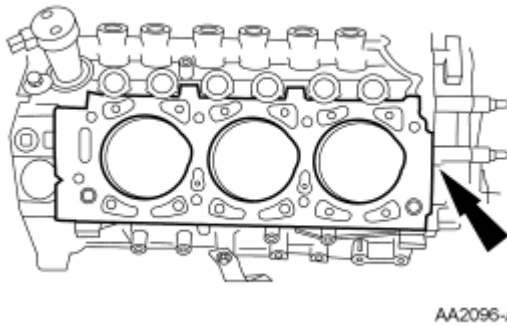


Fig. 214: Locating Head Gaskets
Courtesy of FORD MOTOR CO.

52. Remove the bolts and the hydraulic lash adjuster guide plate retainer.

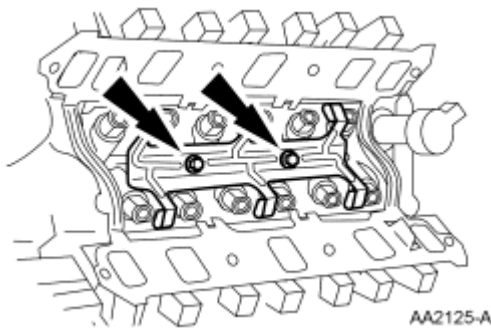


Fig. 215: Locating Hydraulic Lash Adjuster Guide Plate Retainer
Courtesy of FORD MOTOR CO.

53. Remove the hydraulic lash adjuster guide plates.

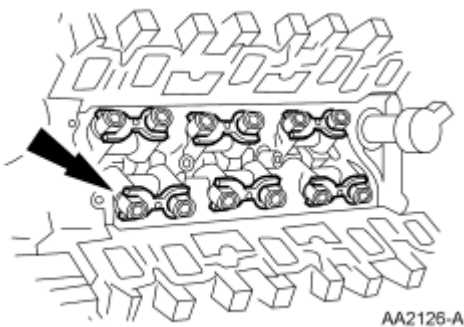


Fig. 216: Locating Hydraulic Lash Adjuster Guide Plates
Courtesy of FORD MOTOR CO.

NOTE: The hydraulic lash adjusters are positional. Identify each hydraulic lash adjuster for installation in its original position.

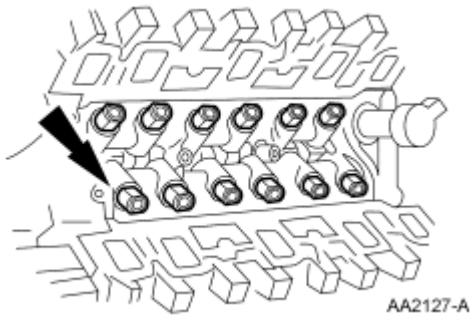


Fig. 217: Locating Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

54. Remove the hydraulic lash adjusters.
55. Align the timing marks.

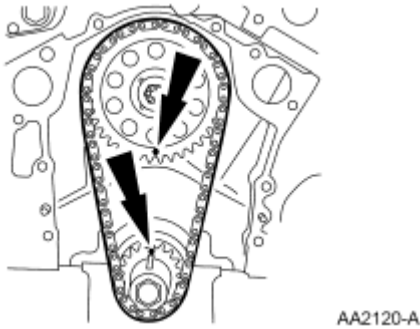


Fig. 218: Locating Timing Marks
Courtesy of FORD MOTOR CO.

56. Remove the bolt.

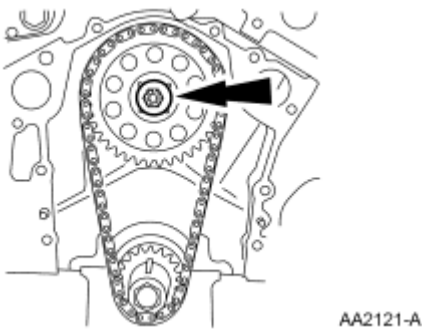


Fig. 219: Locating Bolt
Courtesy of FORD MOTOR CO.

57. Remove the timing sprockets and the timing chain as an assembly.

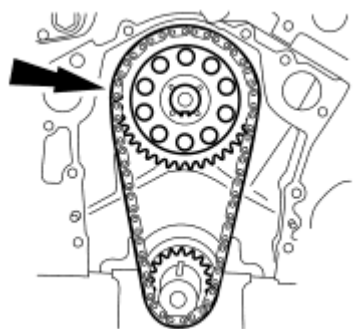


Fig. 220: Locating Timing Sprockets & Timing Chain
Courtesy of FORD MOTOR CO.

58. Remove the camshaft retainer.

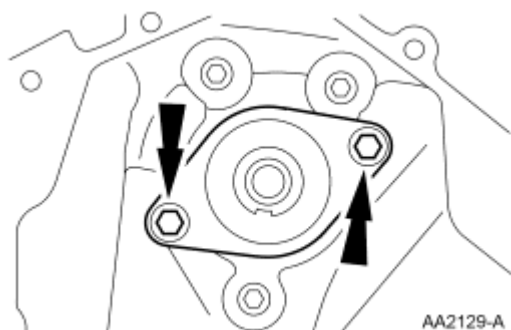


Fig. 221: Locating Camshaft Retainer
Courtesy of FORD MOTOR CO.

59. Remove the camshaft.

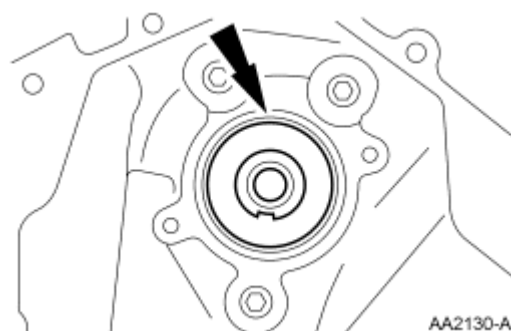


Fig. 222: Locating Camshaft
Courtesy of FORD MOTOR CO.

60. If required, remove the camshaft bearings.

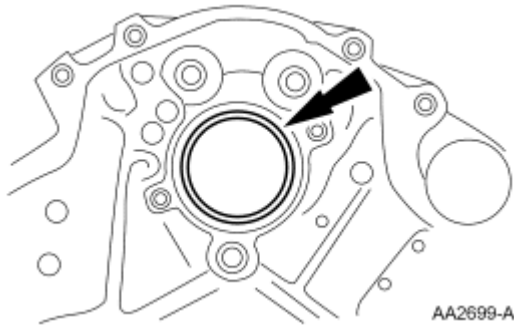


Fig. 223: Locating Camshaft Bearings
Courtesy of FORD MOTOR CO.

- Use the Camshaft Service Set.

61. Remove the oil pump.

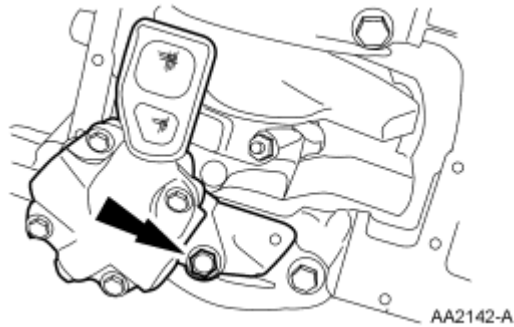
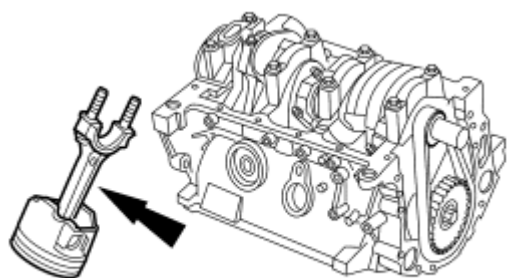


Fig. 224: Locating Oil Pump
Courtesy of FORD MOTOR CO.

NOTE: Before removing the piston and connecting rod assemblies, inspect the top of the cylinder bores. If necessary remove the cylinder ridge. For additional information, refer to ENGINE SYSTEM - GENERAL INFORMATION article.

62. Remove the piston and connecting rod assemblies one at a time.
- Remove the connecting rod nuts in pairs.
 - Remove the connecting rod cap.

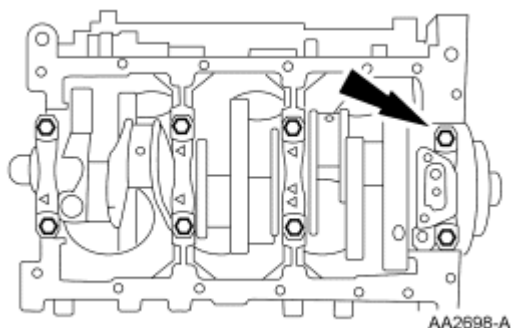


AA2700-A

Fig. 225: Locating Connecting Rod Cap
Courtesy of FORD MOTOR CO.

- Remove the piston and connecting rod assembly.

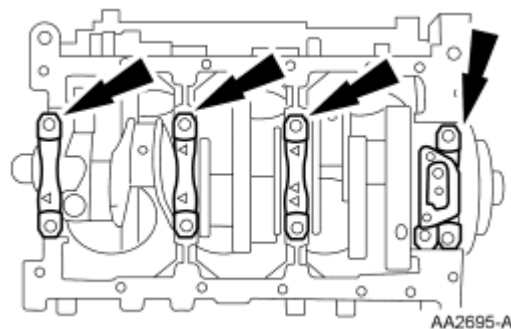
63. Remove the bolts.



AA2698-A

Fig. 226: Locating Bolts
Courtesy of FORD MOTOR CO.

64. Remove the main bearing caps.



AA2695-A

Fig. 227: Locating Main Bearing Caps
Courtesy of FORD MOTOR CO.

65. Remove the lower crankshaft main bearings.

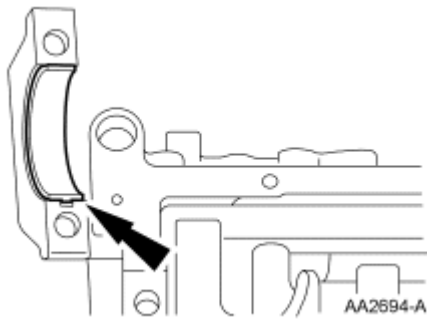


Fig. 228: Locating Lower Crankshaft Main Bearings
Courtesy of FORD MOTOR CO.

66. Remove the crankshaft rear oil seal.

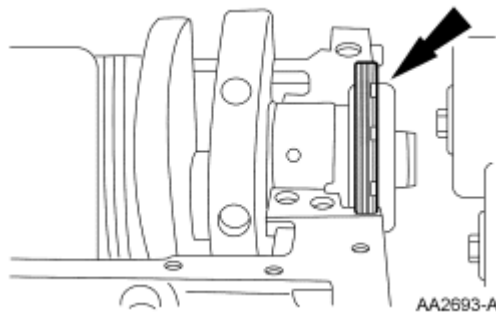


Fig. 229: Locating Crankshaft Rear Oil Seal
Courtesy of FORD MOTOR CO.

67. Remove the crankshaft.

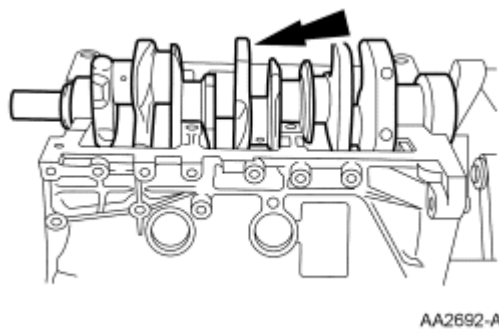


Fig. 230: Locating Crankshaft
Courtesy of FORD MOTOR CO.

68. Remove the crankshaft upper main bearings.

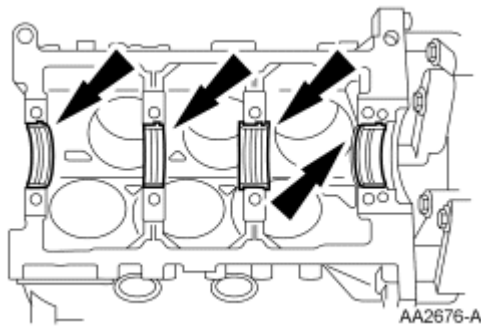


Fig. 231: Locating Crankshaft Upper Main Bearings
 Courtesy of FORD MOTOR CO.

DISASSEMBLY AND ASSEMBLY OF SUBASSEMBLIES

CYLINDER HEAD

Special Tools

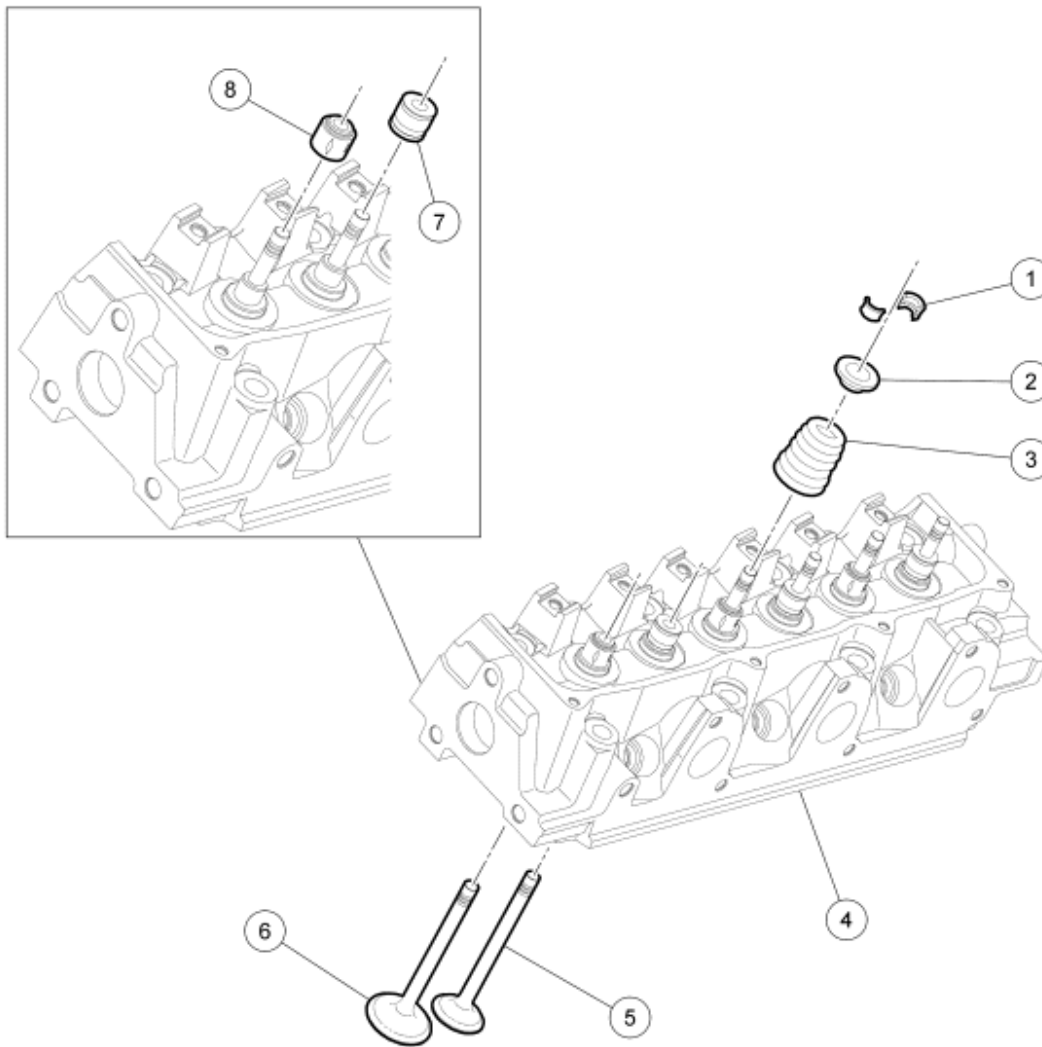
Illustration	Tool Name	Tool Number
 ST1383-A	Compressor, Valve Spring	303-163 (T81P-6513-A)

Material

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

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N0020182

Fig. 232: View Of Cylinder Head
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6518	Valve spring retainer key (12 required)
2	6514	Valve spring retainer (6 required)
3	6513	Valve spring (6 required)
4	6050	Cylinder head
5	6505	Exhaust valve (3 required)
6	6507	Intake valve (3 required)
7	6A517	Exhaust valve seal (3 required)
8	6A517	Intake valve seal (3 required)

DISASSEMBLY

1. Remove the bolts, stud bolts, exhaust manifold and gasket.

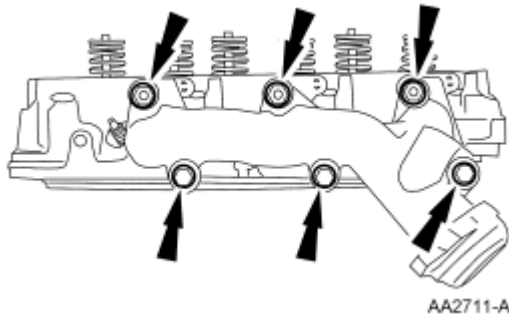


Fig. 233: Locating Bolts, Stud Bolts & Exhaust Manifold And Gasket
Courtesy of FORD MOTOR CO.

- Discard the bolts, stud bolts and exhaust manifold gasket.
2. Check the exhaust manifold for warpage. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
 3. Using the special tool, remove the valve spring retainer keys.

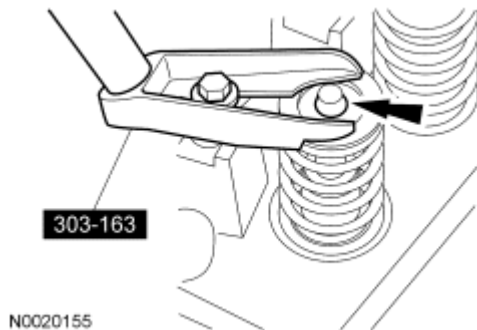


Fig. 234: Removing Valve Spring Retainer Keys Using Special Tool (303-163)
Courtesy of FORD MOTOR CO.

4. Remove the valve spring retainer and the valve spring.

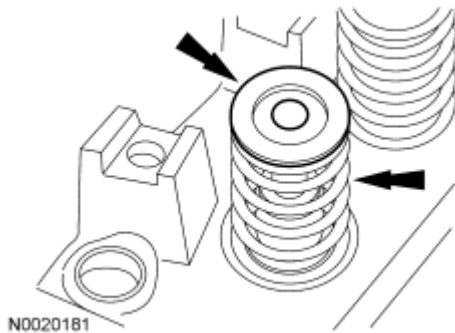


Fig. 235: Locating Valve Spring & Valve Spring Retainer
Courtesy of FORD MOTOR CO.

- For component tests for the valve spring, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

5. Remove the valve stem seal.

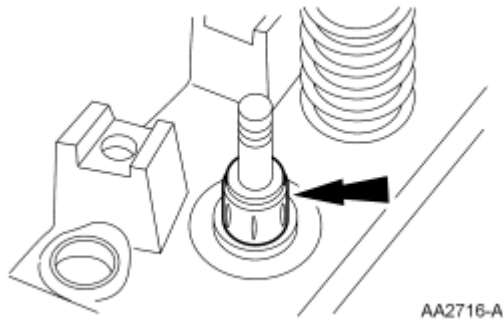


Fig. 236: Locating Valve Stem Seal
Courtesy of FORD MOTOR CO.

6. Remove the valve.

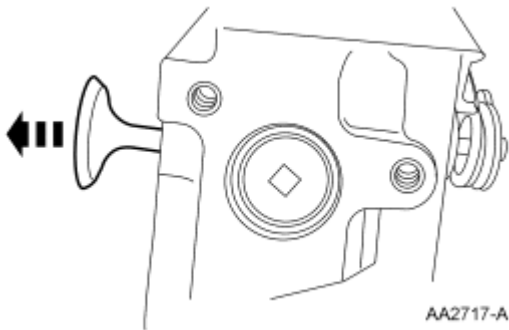


Fig. 237: Locating Valve
Courtesy of FORD MOTOR CO.

- For component tests for the valve, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
- For component tests for the cylinder head, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

ASSEMBLY

NOTE: Lubricate the valve stem with clean engine oil.

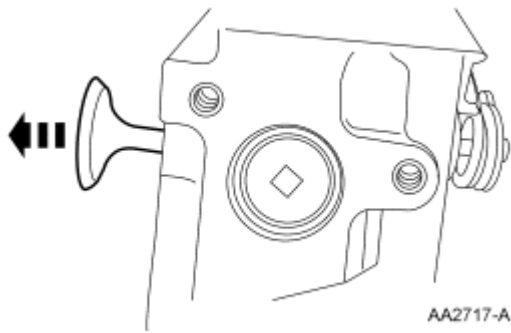


Fig. 238: Locating Valve
Courtesy of FORD MOTOR CO.

1. Install the valve.

NOTE: Lubricate the valve stem seal with clean engine oil.

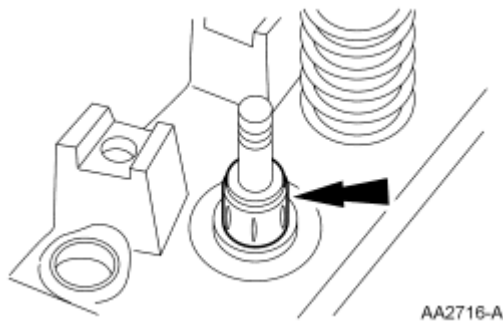


Fig. 239: Locating Valve Stem Seal
Courtesy of FORD MOTOR CO.

2. Install the valve stem seal.
3. Install the valve spring and the valve spring retainer.

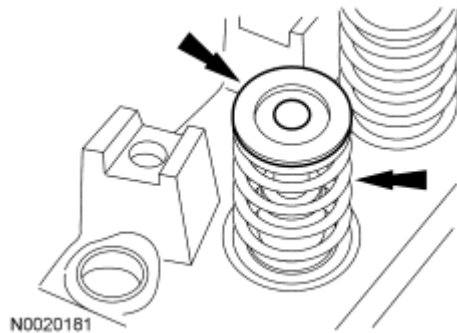


Fig. 240: Locating Valve Spring & Valve Spring Retainer
Courtesy of FORD MOTOR CO.

4. Using the special tool, install the valve spring retainer keys.

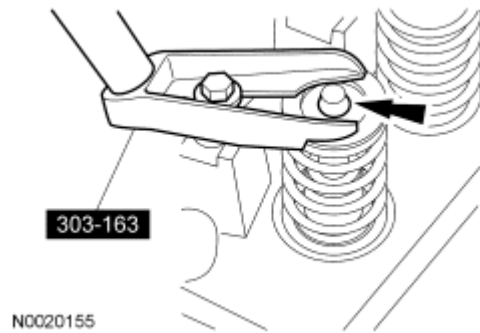


Fig. 241: Removing Valve Spring Retainer Keys Using Special Tool (303-163)
Courtesy of FORD MOTOR CO.

NOTE: Install a new exhaust manifold gasket, bolts and stud bolts.

5. Install the exhaust manifold gasket, exhaust manifold, bolts and stud bolts.
 - Tighten in the sequence shown in 2 stages.

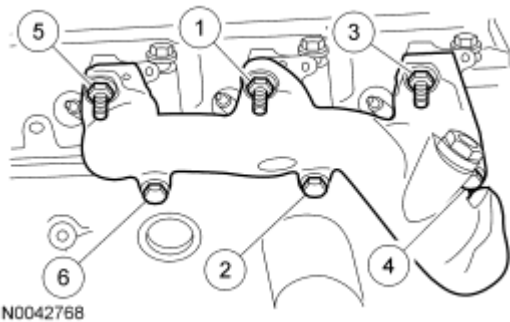


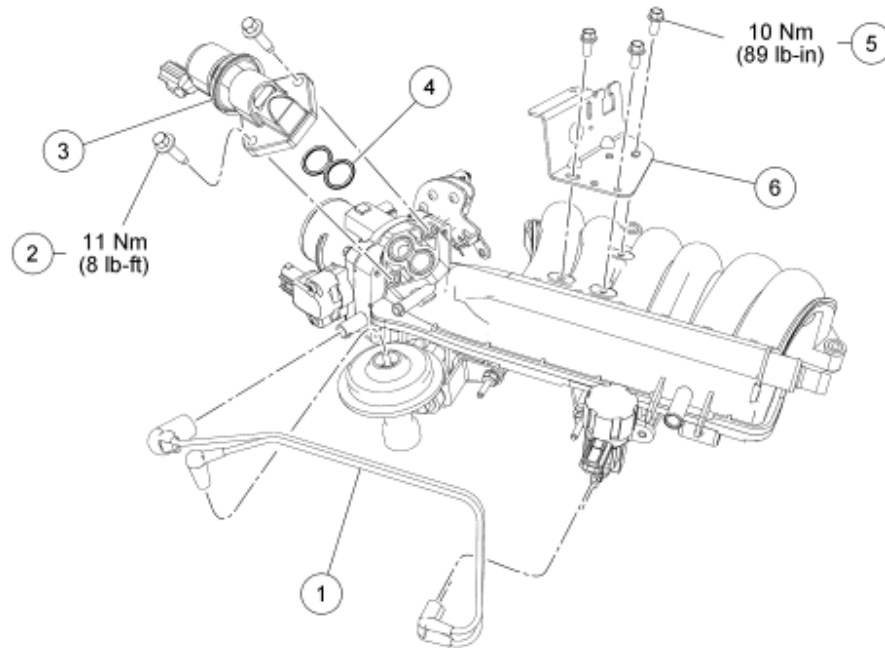
Fig. 242: Identifying Tightening Sequence Of Exhaust Manifold Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 10 Nm (89 lb-in).
- Stage 2: Tighten to 23 Nm (17 lb-ft).

INTAKE MANIFOLD ASSEMBLY

2007 Ford Ranger

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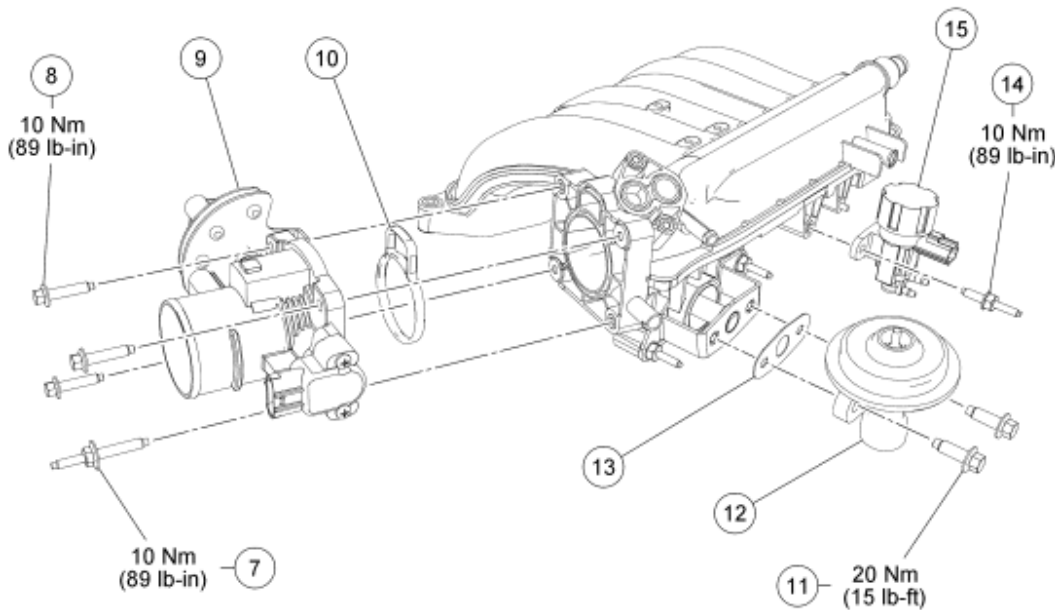
N0051364

Fig. 243: Exploded View Of Intake Manifold Assembly With Torque Specifications (1 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9E498	Vacuum harness
2	W500214	Idle air control (IAC) valve bolt (2 required)
3	9F715	IAC valve
4	-	IAC valve gasket
5	-	Accelerator cable bracket bolt (3 required)
6	-	Accelerator cable bracket

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N0051365

Fig. 244: Exploded View Of Intake Manifold Assembly With Torque Specifications (2 Of 2)
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
7	W701632	Throttle body (TB) stud bolt
8	W701669	TB bolt (3 required)
9	9E926	TB
10	9E936	TB gasket
11	W500224	Exhaust gas recirculation (EGR) valve bolt (2 required)
12	9E444	EGR valve
13	9D476	EGR valve gasket
14	-	EGR vacuum regulator solenoid valve stud bolt
15	9J489	EGR vacuum regulator solenoid

DISASSEMBLY AND ASSEMBLY

1. Disconnect the vacuum harness from the intake manifold, the exhaust gas recirculation (EGR) valve and the EGR vacuum regulator solenoid.
2. Remove the bolts, the intake air control (IAC) valve and the gasket.
 - Discard the gasket.
 - To assemble, tighten to 11 Nm (8 lb-ft).
3. Remove the bolts and the accelerator cable bracket.

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- To assemble, tighten to 10 Nm (89 lb-in).
- 4. Remove the bolts, the stud bolt, the throttle body and the gasket.
 - Discard the gasket.
 - To assemble, tighten to 10 Nm (89 lb-in).
- 5. Remove the bolts, the EGR valve and the gasket.
 - Discard the gasket.
 - To assemble, tighten to 20 Nm (15 lb-ft).
- 6. Remove the stud bolt and the EGR vacuum regulator solenoid.
 - To assemble, tighten to 10 Nm (89 lb-in).
- 7. To assemble, reverse the disassembly procedure.
 - Install new EGR valve, IAC valve and TB gaskets.

PISTON

Special Tools

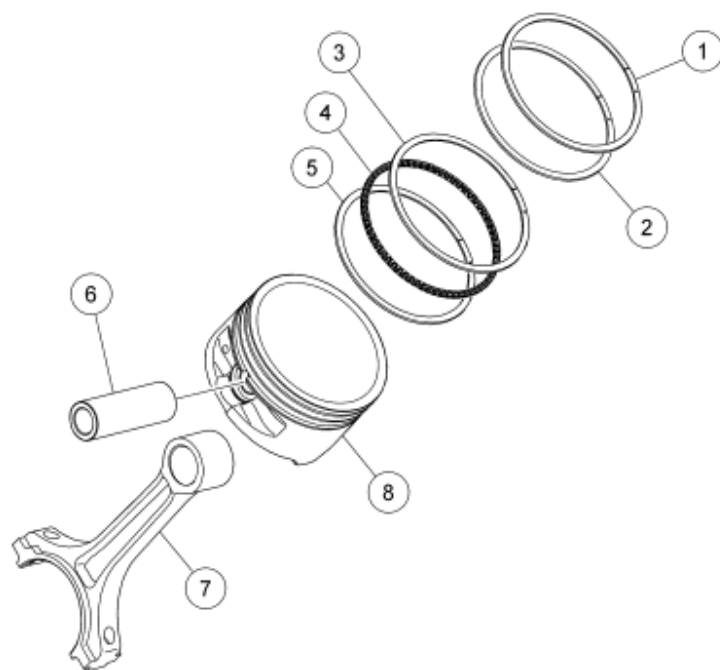
Illustration	Tool Name	Tool Number
 ST1336-A	Service Set, Piston Pin	303-S024 (T68P-6135-A)

Material

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

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N0006375

Fig. 245: Exploded View Of Piston
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 control lower segment ring
6	6135	Piston pin
7	6200	Connecting rod
8	6110	Piston

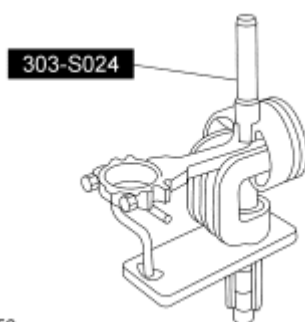
DISASSEMBLY

CAUTION: Use a suitable ring expander to remove piston rings to prevent damage.

1. Remove the piston rings one at a time, starting with the top compression ring and finishing with the lower oil control ring.
 - Discard the piston rings.

NOTE: Take note of piston connecting rod assembly and index-mark the connecting rod and the piston to make sure of correct orientation during

reassembly.



N0020156

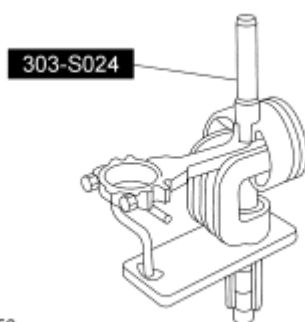
Fig. 246: Using Special Tool (303-S024) To Remove Piston Pin
Courtesy of FORD MOTOR CO.

2. Using the special tool, press the piston pin out of the piston connecting rod assembly.
3. Remove the connecting rod from the piston.
4. Clean and inspect the connecting rod and the piston. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

ASSEMBLY

1. Lubricate the piston pin and piston pin bore.
 - Use clean engine oil.

NOTE: During assembly, the small end of the connecting rod must be heated to 232°-316°C (450°-600°F).



N0020156

Fig. 247: Using Special Tool (303-S024) To Install Piston Pin
Courtesy of FORD MOTOR CO.

2. Using the special tool, press the piston pin into the piston and the connecting rod.

NOTE: Lubricate the piston and the piston rings with clean engine oil.

NOTE: Use a suitable ring expander to install the piston rings. Make sure ring end

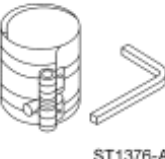
gaps are equally spaced around the circumference of the piston for all piston rings.

3. Install the piston rings.
4. Check piston ring end gap and ring-to-groove side clearance. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.

ASSEMBLY

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1376-A	Compressor, Piston Ring	303-D032 (D81L-6002-C)
 ST1381-A	Service Set, Camshaft	303-017 (T65L-6250-A)
 ST1387-A	Installer, Crankshaft Vibration Damper	303-175 (T82L-6316-A)
 ST1831-A	Lifting Eyes	303-D030 (D81L-6001-D) or equivalent
 ST1751-A	Aligner, Clutch Disc	308-006 (T71P-7137-H)
	Synchronizer Alignment Gauge	303-589

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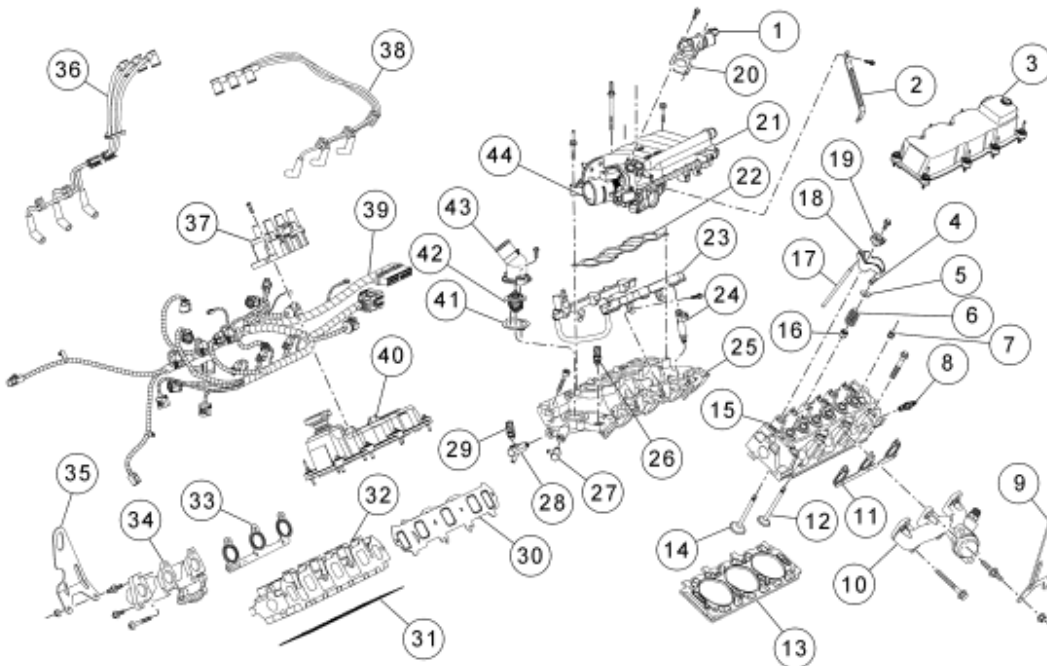
2007 ENGINE Engine - 3.0L (2V) - Ranger



ST2362-A

Material

Item	Specification
Gasket Maker TA-16	WSK-M2G348-A5
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Motorcraft SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Thread Sealant with PTFE TA-24	WSK-M2G350-A2
Motorcraft Metal Surface Prep ZC-31	-
Silicone Gasket Remover ZC-30	-



N0005335

Fig. 248: Identifying Major Upper Engine Components

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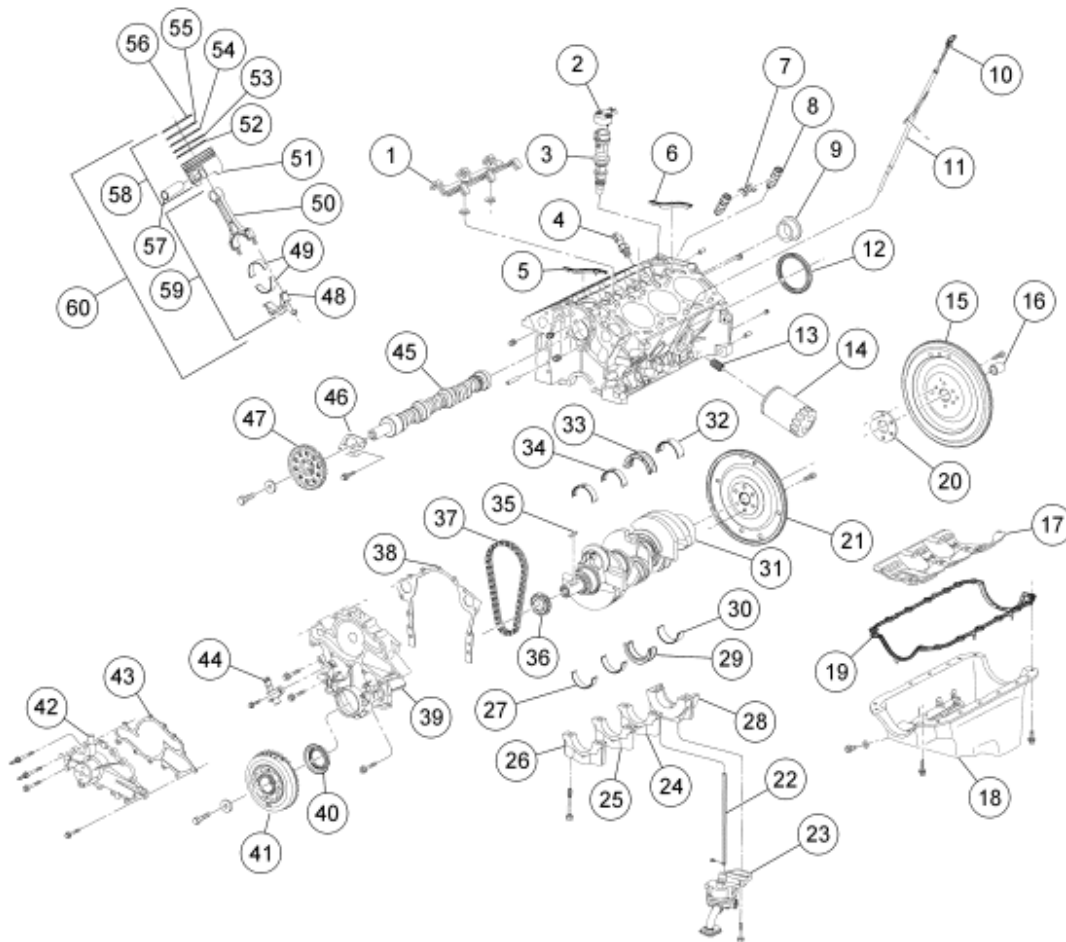
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	9F715	Idle air control valve (IAC)
2	9J444	Intake manifold support bracket
3	6A505	Valve cover - LH
4	6518	Valve spring retainer key
5	6514	Valve spring retainer
6	6513	Valve spring
7	6A517	Valve stem seal
8	12405	Spark plug
9	17A084	Engine lifting bracket
10	9431	Exhaust manifold - LH
11	9448	Exhaust manifold gasket
12	6505	Exhaust valve
13	6051	Cylinder head gasket
14	6507	Intake valve
15	6050	Cylinder head
16	6A517	Valve stem seal
17	6565	Push rod
18	6564	Rocker arm
19	6A528	Rocker arm fulcrum
20	9F760	Idle air control valve gasket
21	9K479	Intake manifold - upper
22	9H486	Upper intake manifold gasket
23	9F792	Fuel rail
24	9F593	Fuel injector
25	9J447	Intake manifold - lower
26	12A648	Engine coolant temperature (ECT) sensor
27	N808344	Heater connection elbow
28	18599	Engine coolant hose connection
29	12A648	Engine coolant temperature (ECT) sensor
30	9439	Lower intake manifold gasket
31	6051	Cylinder head gasket - RH
32	6049	Cylinder head - RH
33	9448	Exhaust manifold gasket - RH
34	9430	Exhaust manifold - RH
35	17A084	Engine lifting bracket
36	12280	Ignition wire set - RH
37	12A310	Ignition coil
38	12281	Ignition wire set - LH

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39	12B637	Engine wiring harness assembly
40	6582	Valve cover - RH
41	8255	Thermostat housing gasket
42	8575	Thermostat
43	8594	Thermostat housing
44	-	Throttle body



A0044784

Fig. 249: Cylinder block - Lower
Courtesy of FORD MOTOR CO.

Item	Part Number	Description
1	6K564	Hydraulic lash adjuster guide plate retainer
2	6B288	Camshaft position sensor

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3	12A362	Camshaft synchronizer
4	9278	Oil pressure sender
5	9A425	Lower intake manifold gasket
6	9A424	Lower intake manifold gasket
7	6K512	Hydraulic lash adjuster guide plate
8	6500	Hydraulic lash adjuster
9	6266	Camshaft rear bearing cover
10	6750	Oil level indicator
11	6754	Oil level indicator tube
12	6701	Rear main seal
13	6890	Oil filter mounting insert
14	6714	Oil filter
15	6375	Flywheel (manual transmission)
16	7120	Pilot shaft bearing (manual transmission)
17	6687	Windage tray
18	6675	Oil pan
19	6710	Oil pan gasket
20	6A366	Flywheel reinforcement plate
21	6375	Flexplate (automatic transmission)
22	6A605	Oil pump drive
23	6600	Oil pump assembly
24	6327	Crankshaft thrust bearing cap
25	6334	Crankshaft main bearing cap
26	6329	Crankshaft front main bearing cap
27	6333	Crankshaft main bearing
28	6325	Crankshaft rear main bearing cap
29	6337	Crankshaft thrust bearing (lower)
30	6W331	Crankshaft rear main bearing (lower)
31	6303	Crankshaft
32	6W332	Crankshaft rear main bearing (upper)
33	6A339	Crankshaft thrust bearing (upper)
34	6A338	Crankshaft main bearings (upper)
35	W705401	Key
36	6306	Crankshaft timing sprocket
37	6268	Timing chain
38	6020	Engine front cover gasket
39	6059	Engine front cover
40	6700	Crankshaft front seal
41	6316	Crankshaft pulley (harmonic balancer)
42	8501	Coolant pump
43	8507	Coolant pump gasket
...		

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	9278	Crankshaft position (CKP) sensor
45	6250	Camshaft
46	6269	Camshaft thrust plate
47	6256	Camshaft sprocket
48	6210	Connecting rod bearing cap
49	6211	Connecting rod bearings
50	6214	Piston connecting rod
51	6110	Piston
52	6159	Oil ring (lower)
53	6161	Oil ring baffle
54	6159	Oil ring (upper)
55	6152	Piston compression ring (lower)
56	6150	Piston ring (upper)
57	6135	Piston pin
58	6110	Piston assembly
59	6200	Connecting rod assembly
60	6100	Piston and connecting rod assembly

All vehicles

1. Install the crankshaft upper main bearings.

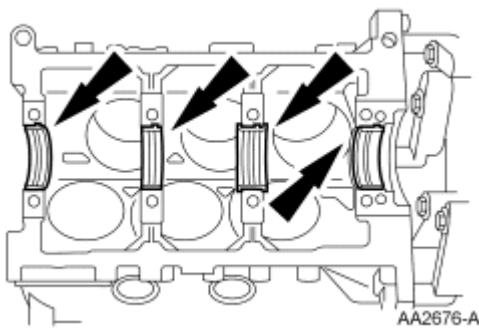


Fig. 250: Locating Crankshaft Upper Main Bearings
Courtesy of FORD MOTOR CO.

NOTE: Lubricate the crankshaft journals and the crankshaft main bearings with clean engine oil.

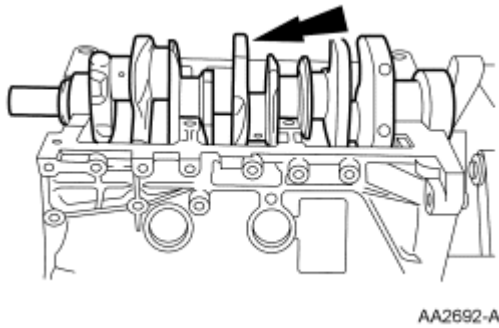


Fig. 251: Locating Crankshaft
Courtesy of FORD MOTOR CO.

2. Install the crankshaft.

NOTE: Lubricate the inner and outer sealing surfaces of the crankshaft rear oil seal with clean engine oil.

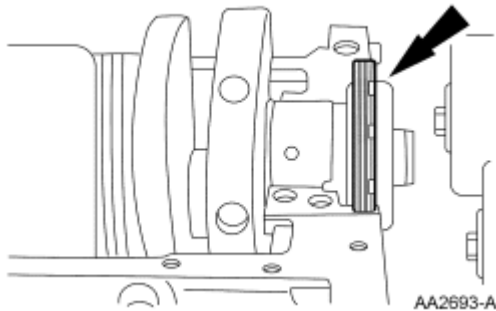


Fig. 252: Locating Crankshaft Rear Oil Seal
Courtesy of FORD MOTOR CO.

3. Install the crankshaft rear oil seal.
4. Apply 2 dots of gasket maker between the rear bearing cap and the cylinder block.

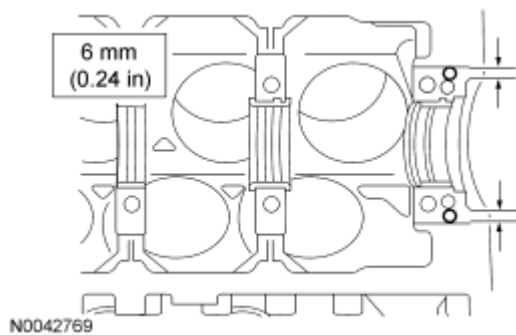


Fig. 253: Applying Dots Of Gasket Maker
Courtesy of FORD MOTOR CO.

5. Install the crankshaft lower main bearings.

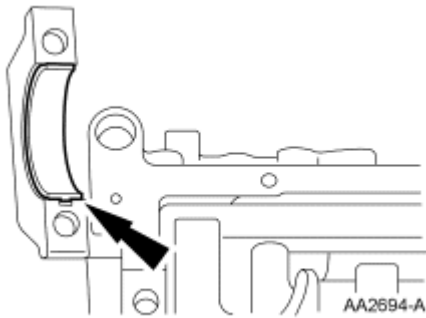


Fig. 254: Locating Crankshaft Lower Main Bearings
Courtesy of FORD MOTOR CO.

6. Install the main bearing caps.

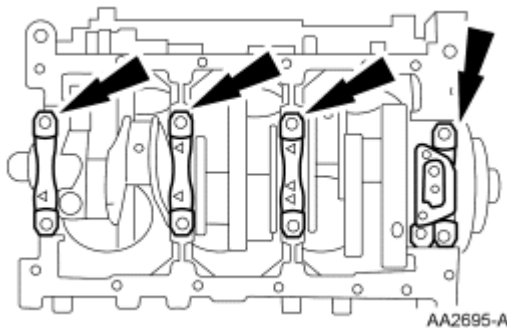


Fig. 255: Locating Main Bearing Caps
Courtesy of FORD MOTOR CO.

7. Wedge a large screwdriver at the location shown to hold the crankshaft forward until all the bolts are tightened.

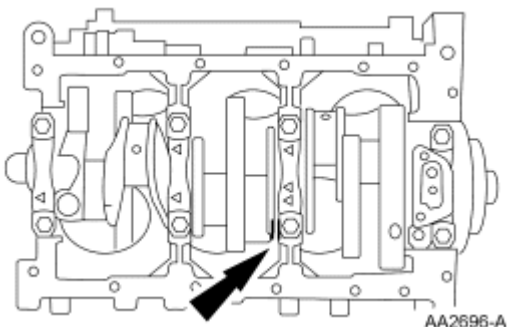


Fig. 256: Wedging Large Screwdriver At Location Shown
Courtesy of FORD MOTOR CO.

8. Install the bolts and tighten in the sequence shown.

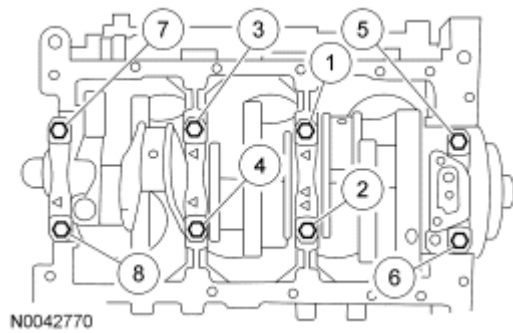


Fig. 257: Identifying Tightening Sequence Of Crankshaft Bearing Caps Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 80 Nm (59 lb-ft).
 - For crankshaft and crankshaft bearing component tests, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
9. If removed, install the camshaft bearings.

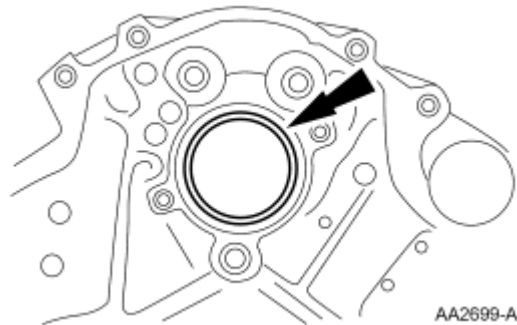


Fig. 258: Locating Camshaft Bearings
Courtesy of FORD MOTOR CO.

- Use the Camshaft Service Set.

NOTE: Lubricate the camshaft and the camshaft bearings with clean engine oil.

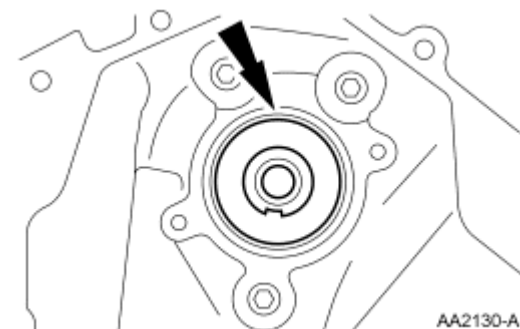


Fig. 259: Locating Camshaft
Courtesy of FORD MOTOR CO.

10. Install the camshaft.
11. Install the camshaft retainer.

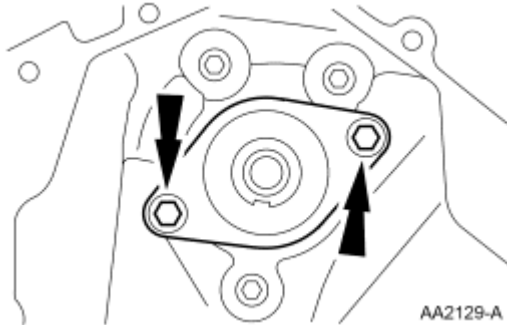


Fig. 260: Locating Camshaft Retainer
Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).
12. Inspect the camshaft end play. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
 13. Align the timing marks.

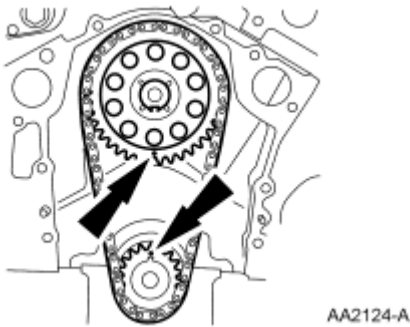


Fig. 261: Locating Timing Marks
Courtesy of FORD MOTOR CO.

14. Install the timing chain, the camshaft sprocket and the crankshaft sprocket as an assembly.

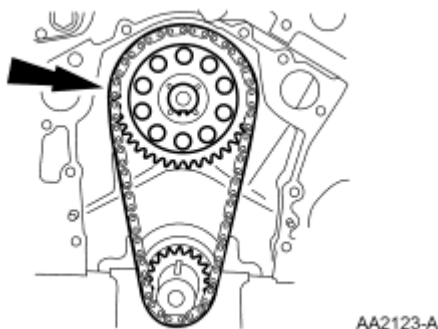


Fig. 262: Locating Timing Chain & Camshaft Sprocket

Courtesy of FORD MOTOR CO.

15. Install the bolt.

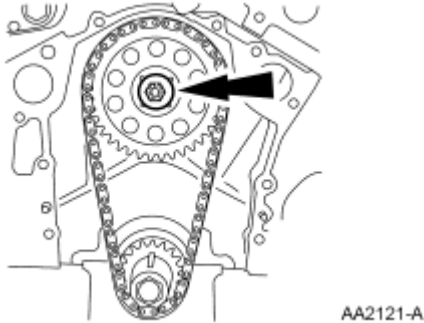


Fig. 263: Locating Bolt
Courtesy of FORD MOTOR CO.

- Tighten to 63 Nm (46 lb-ft).

NOTE: Lubricate the piston and connecting rod assemblies with clean engine oil.

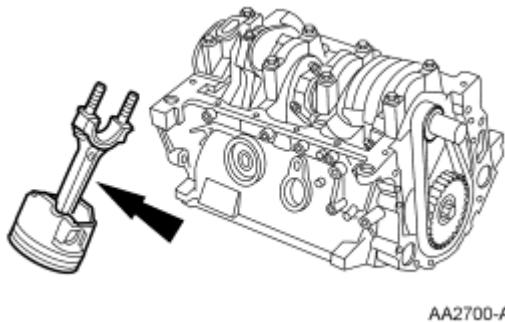


Fig. 264: Locating Piston & Connecting Rod Assemblies
Courtesy of FORD MOTOR CO.

16. Install the piston and connecting rod assemblies.
 - Use a piston ring compressor.

NOTE: Lubricate the connecting rod bearings with clean engine oil.

17. Install the connecting rod bearings.
18. Install the connecting rod caps and nuts.

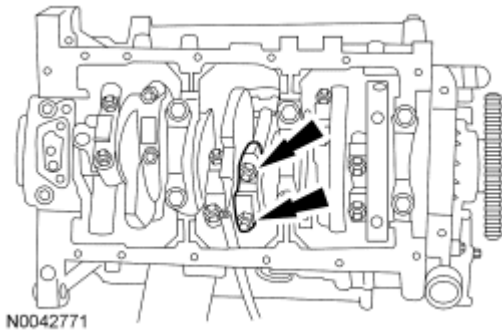


Fig. 265: Locating Connecting Rod Bearings Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 35 Nm (26 lb-ft).
19. Install the oil pan baffle and nuts.

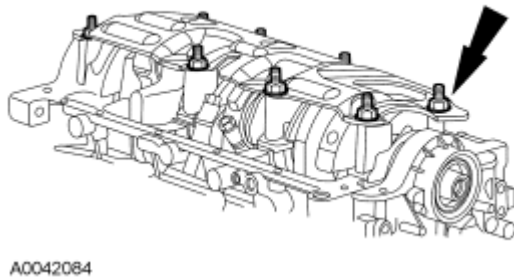


Fig. 266: Locating Oil Pan Baffle Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 32 Nm (24 lb-ft).
20. Install the oil pump and bolt.

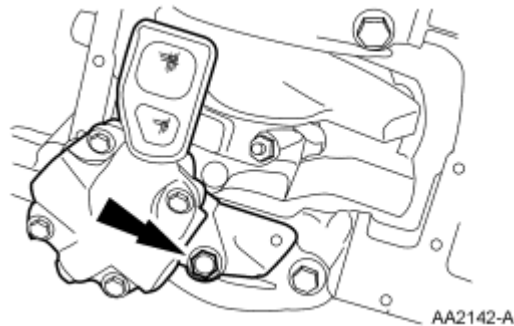


Fig. 267: Locating Oil Pump & Bolt
Courtesy of FORD MOTOR CO.

- Tighten to 48 Nm (35 lb-ft).

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

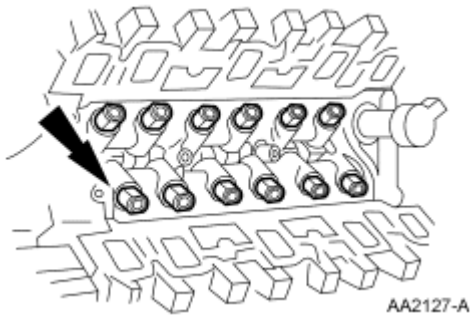


Fig. 268: Locating Hydraulic Lash Adjusters
Courtesy of FORD MOTOR CO.

21. Install the hydraulic lash adjusters.
22. Install the hydraulic lash adjuster guide plates.

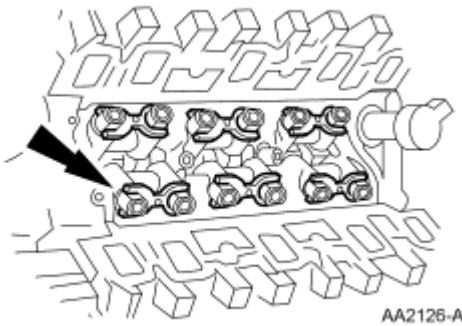


Fig. 269: Locating Hydraulic Lash Adjuster Guide Plates
Courtesy of FORD MOTOR CO.

23. Install the hydraulic lash adjuster guide plate retainer.

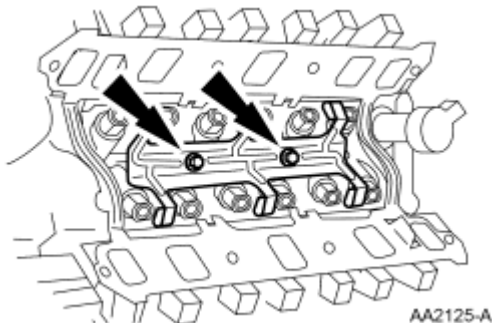


Fig. 270: Locating Hydraulic Lash Adjuster Guide Plate Retainer
Courtesy of FORD MOTOR CO.

- Tighten to 12 Nm (9 lb-ft).

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

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

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

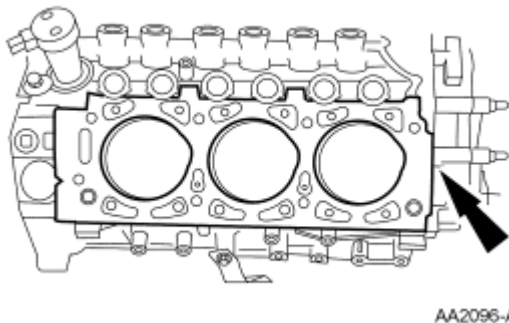


Fig. 271: Locating Head Gaskets
Courtesy of FORD MOTOR CO.

24. Install new head gaskets.
25. Install the cylinder heads.

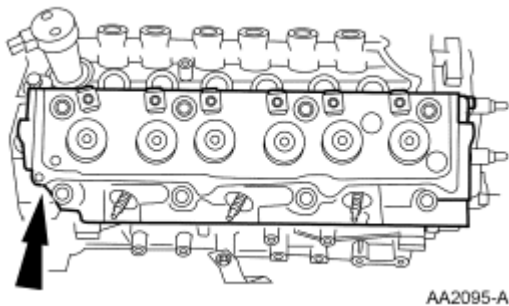
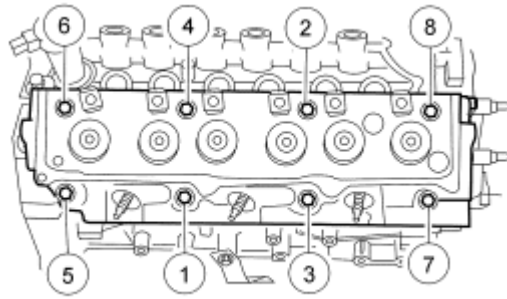


Fig. 272: Locating Cylinder Heads
Courtesy of FORD MOTOR CO.

26. Install the bolts. Tighten the bolts in the sequence shown in 5 stages.

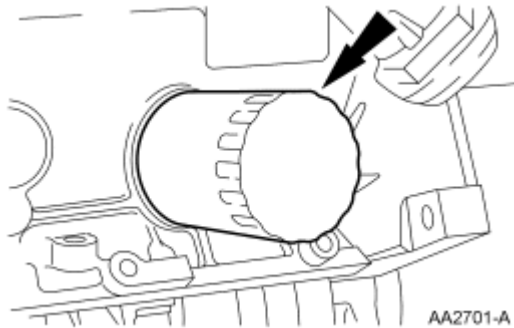


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Fig. 273: Identifying Tightening Sequence Of Cylinder Head Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 50 N.m (37 lb-ft).
- Stage 2: Loosen one full turn.
- Stage 3: Tighten to 30 N.m (22 lb-ft).
- Stage 4: Tighten 90 degrees.
- Stage 5: Tighten an additional 90 degrees.

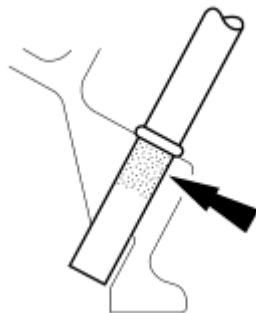
27. Install a new oil filter.



AA2701-A

Fig. 274: Locating Oil Filter
Courtesy of FORD MOTOR CO.

NOTE: The end of the oil level tube should be cleaned with metal surface prep before application of the sealant.



A0006373

Fig. 275: Locating Oil Level Indicator Tube
Courtesy of FORD MOTOR CO.

28. Install the oil level indicator and tube assembly.
 - Coat the oil level indicator tube with silicone gasket and sealant.

CAUTION: All timing marks must be aligned with the No. 1 cylinder set on top dead center (TDC) of the compression stroke or the synchronizer assembly will not be installed correctly.

NOTE: The crankshaft must not be turned until the camshaft synchronizer is installed.

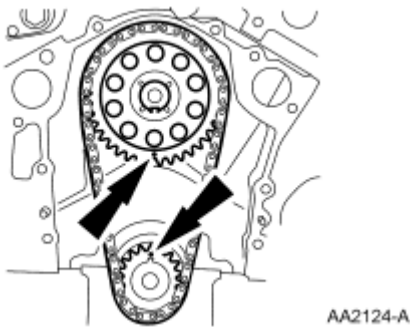


Fig. 276: Locating Timing Marks
Courtesy of FORD MOTOR CO.

29. Align the timing marks.
30. Install a new engine front cover gasket and the engine front cover.

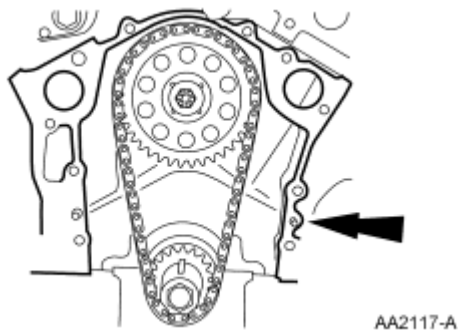


Fig. 277: Locating Engine Front Cover Gasket & Engine Front Cover
Courtesy of FORD MOTOR CO.

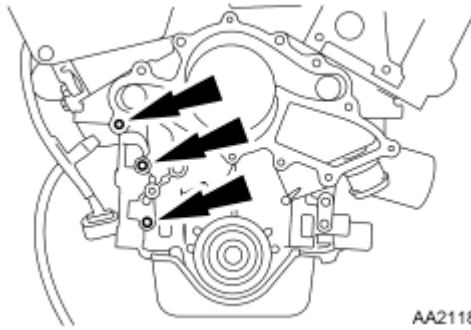


Fig. 278: Apply Thread Sealant With PTFE On Bolts
Courtesy of FORD MOTOR CO.

31. Apply thread sealant with PTFE on the bolts to be installed in the locations shown.
32. Install the 10 bolts.

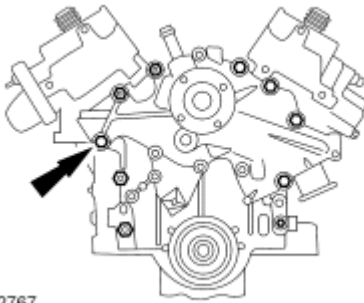


Fig. 279: Locating Engine Front Cover Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 25 Nm (18 lb-ft).
33. Install the knock sensor (KS) and bolt.

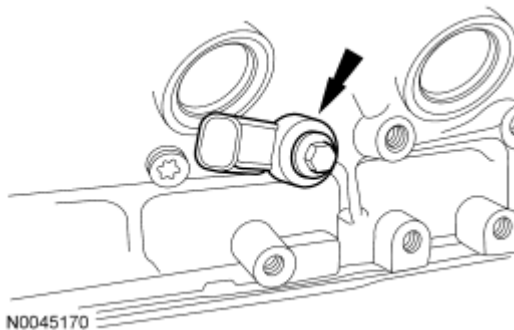


Fig. 280: Locating Knock Sensor (KS) Bolt
Courtesy of FORD MOTOR CO.

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

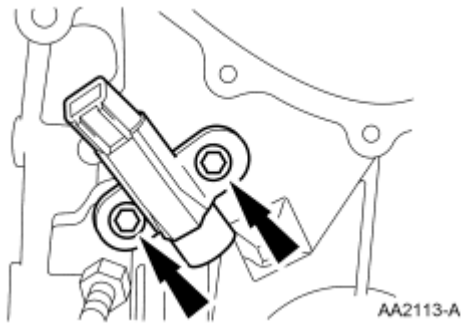


Fig. 281: Locating Crankshaft Position (CKP) Sensor & Bolts
Courtesy of FORD MOTOR CO.

34. Install the crankshaft position (CKP) sensor and bolts.
 - Tighten to 10 Nm (89 lb-in).

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

CAUTION: The thickness of the sealant must be between 4-6 mm (0.16-0.23 inch) or oil leaks could occur.

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. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and 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.

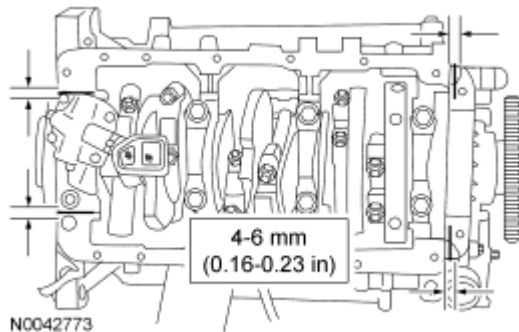
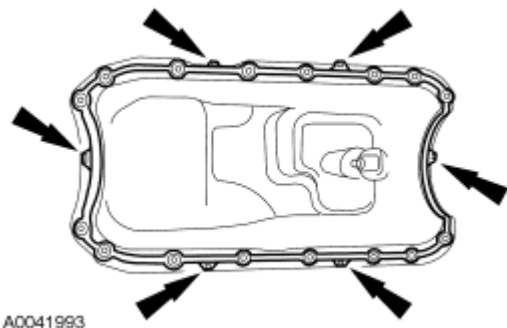


Fig. 282: Applying Bead Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

35. Apply a 4.0-6.0 mm (0.16-0.23 inch) bead of silicone gasket and sealant to the junction of the rear main

bearing cap and the cylinder block, and to the junction of the front cover assembly and cylinder block.

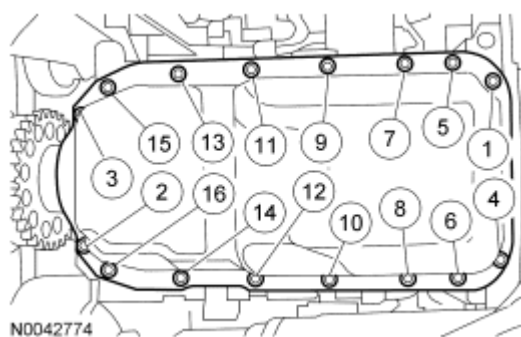
36. Position a new oil pan gasket to the oil pan by aligning the fastener holes and securing the gasket with the gasket clips.



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Fig. 283: Locating Oil Pan Gasket
Courtesy of FORD MOTOR CO.

NOTE: Make sure the fasteners are clean and dry prior to installation.



N0042774

Fig. 284: Identifying Tightening Sequence Of Oil Pan Bolts
Courtesy of FORD MOTOR CO.

37. Install the oil pan and bolts. Tighten in the sequence shown.
 - Tighten to 12 Nm (9 lb-ft).
38. Clean and inspect the exhaust manifolds. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** article.
39. Position a new exhaust manifold gasket and the LH exhaust manifold. Install new bolts and stud bolts and tighten in the sequence shown in 2 stages.

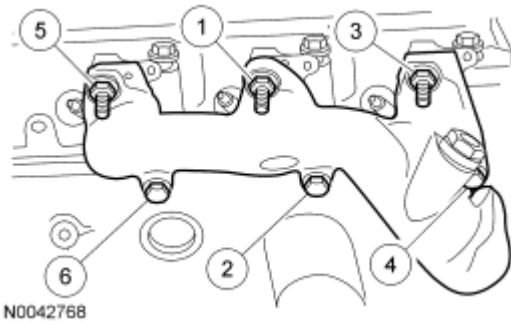


Fig. 285: Identifying Tightening Sequence Of Exhaust Manifold Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 10 Nm (89 lb-in).
- Stage 2: Tighten to 23 Nm (17 lb-ft).

NOTE: Do not tighten the exhaust manifold-to-exhaust gas recirculation (EGR) valve fitting at this time. The fitting will be tightened after the intake is installed and the other fitting is connected to the EGR valve

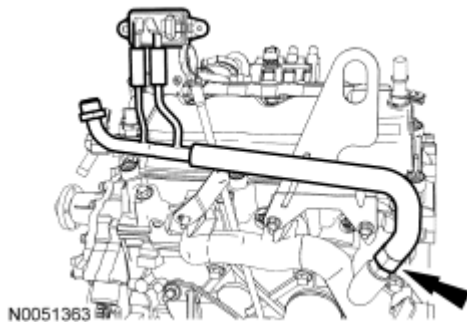


Fig. 286: Locating Exhaust Manifold-To-EGR Valve Tube
Courtesy of FORD MOTOR CO.

40. Position the exhaust manifold-to-EGR valve tube. Finger tighten the fitting.
41. Position a new exhaust manifold gasket and the RH exhaust manifold and install new bolts and stud bolts. Tighten the bolts and stud bolts in the sequence shown in 2 stages.

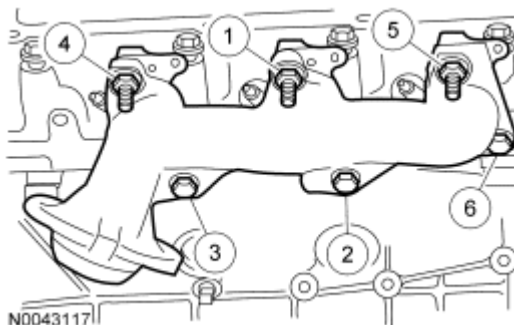


Fig. 287: Identifying Tightening Sequence Of Exhaust Manifold Bolts
Courtesy of FORD MOTOR CO.

- Stage 1: Tighten to 10 Nm (89 lb-in).
- Stage 2: Tighten to 23 Nm (17 lb-ft).

42. Position the RH engine support insulator bracket and install the bolts.

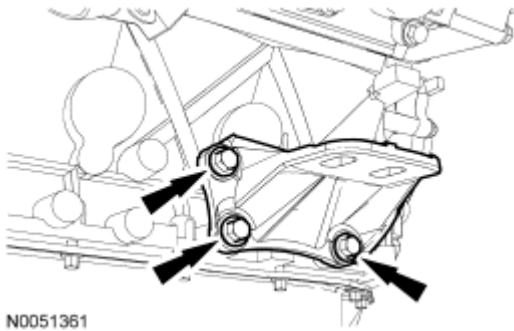


Fig. 288: Locating RH Engine Support Insulator Bracket & Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 48 Nm (35 lb-ft).

43. Position the LH engine support insulator bracket and install the bolt and the stud bolts.

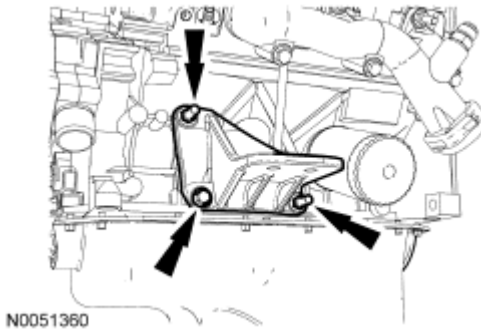
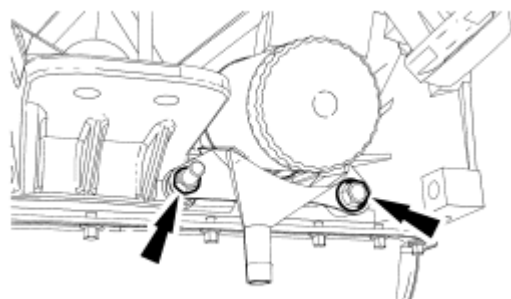


Fig. 289: Locating LH Engine Support Insulator Bracket & Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 48 Nm (35 lb-ft).

44. Position the starter splash shield and install the bolt and the nut.



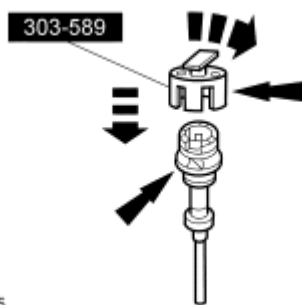
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Fig. 290: Locating Starter Splash Shield & Bolts
 Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).

CAUTION: A synchronizer alignment gauge must be used during the installation of the synchronizer assembly. Failure to follow this procedure will result in the fuel system being out of time with the engine, possibly causing engine damage.

CAUTION: After installation, do not loosen the synchronizer bolt and rotate the synchronizer assembly. The synchronizer assembly is not adjustable. Do not loosen the synchronizer bolt after the alignment tool has been removed in order to align the CMP electrical connector for any reason. If the electrical connector is not in the correct position, the synchronizer assembly must be removed, the alignment tool and the assembly reinstalled if the engine has not been rotated from TDC of the compression stroke on the No. 1 cylinder.



N0042775

Fig. 291: Installing Special Tool (303--589) On Camshaft Synchronizer
 Courtesy of FORD MOTOR CO.

45. Install the special tool on the camshaft synchronizer by rotating the tool until it engages the notch in the camshaft synchronizer housing.

NOTE: Always coat the synchronizer drive gear with clean engine oil prior to installation.

NOTE: During installation, the arrow on the special tool will rotate clockwise as the gears engage.

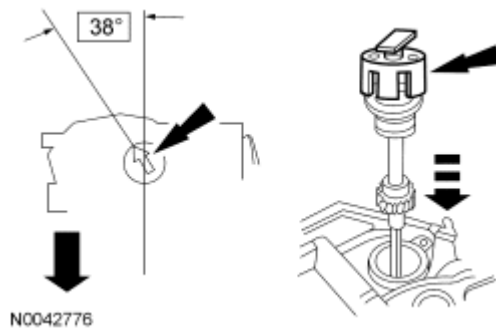


Fig. 292: Installing Camshaft Synchronizer Housing Assembly
Courtesy of FORD MOTOR CO.

46. Install the camshaft synchronizer housing assembly so the arrow on the synchronizer alignment gauge is 38 degrees from the centerline of the engine.
47. Install the camshaft synchronizer retaining bolt.

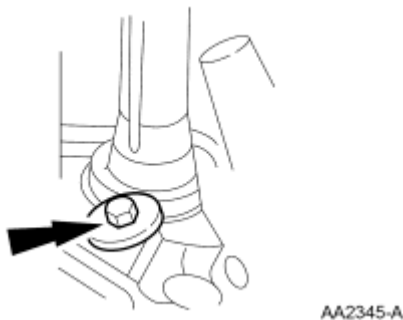


Fig. 293: Locating Camshaft Synchronizer Retaining Bolt
Courtesy of FORD MOTOR CO.

- Tighten to 30 Nm (22 lb-ft).
48. Install the camshaft position (CMP) sensor.

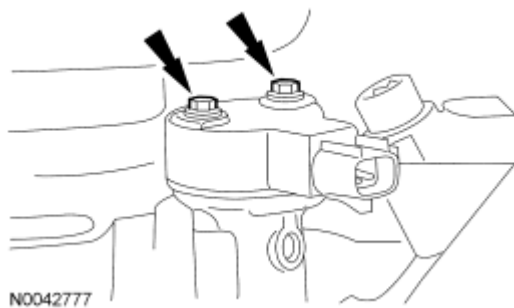


Fig. 294: Locating Camshaft Position (CMP) Sensor Bolts

Courtesy of FORD MOTOR CO.

- Tighten to 3 Nm (27 lb-in).

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

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. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and 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.

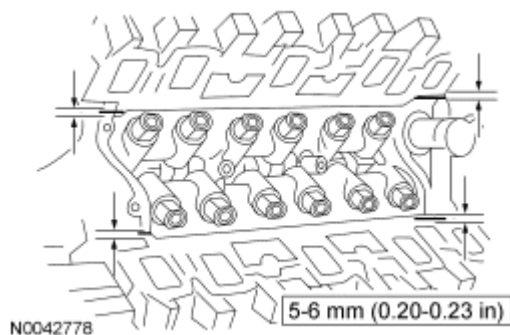


Fig. 295: Applying Beads Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

49. Apply 4 beads of silicone gasket and sealant.
50. Install new intake manifold gaskets and end seals.

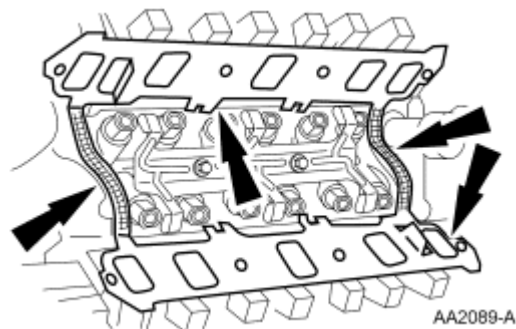
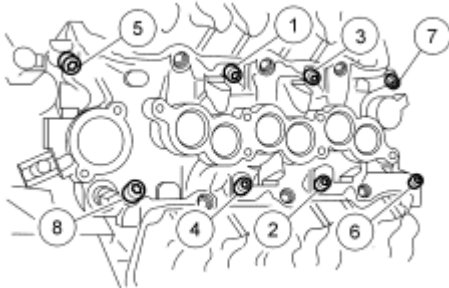


Fig. 296: Locating Intake Manifold Gaskets & End Seals
Courtesy of FORD MOTOR CO.

- Position the intake manifold gaskets.

- Position the end seals.

51. Install the lower intake manifold and bolts. Tighten in sequence shown.



N0042779

Fig. 297: Identifying Tightening Sequence Of Lower Intake Manifold Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 29 Nm (21 lb-ft).

NOTE: Install new O-ring seals on the fuel injectors and lubricate them with clean engine oil.

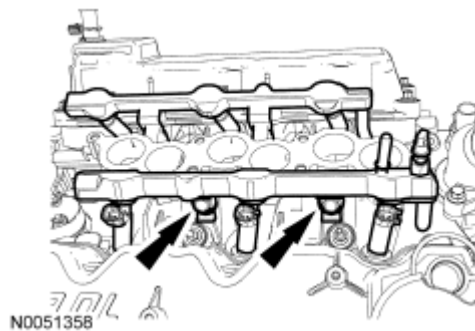


Fig. 298: Locating O-Ring Seals & Fuel Injectors
Courtesy of FORD MOTOR CO.

52. Position the fuel rail and fuel injectors and install the bolts.

53. Install the push rods and the rocker arms.

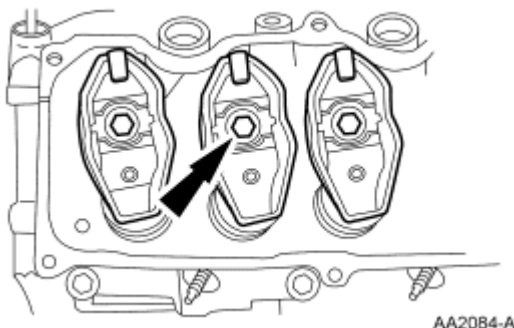


Fig. 299: Locating Push Rods & Rocker Arms
Courtesy of FORD MOTOR CO.

- Install the push rods.
- Install the rocker arms and bolts.
- Tighten to 32 Nm (24 lb-ft).

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

NOTE: Clean the valve cover gasket sealing surface with silicone gasket remover and metal surface prep. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and metal surface prep.

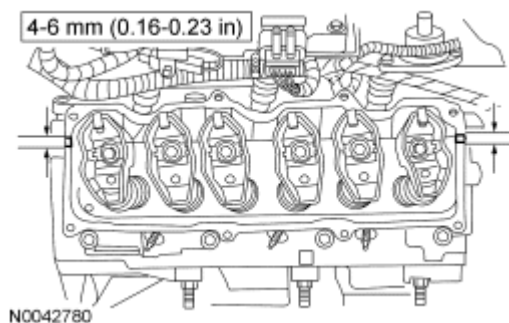


Fig. 300: Applying Bead Of Silicone Gasket & Sealant
Courtesy of FORD MOTOR CO.

54. Apply a bead of silicone gasket and sealant to the 4 intake-to-cylinder head seams.
55. Install new valve cover gaskets.

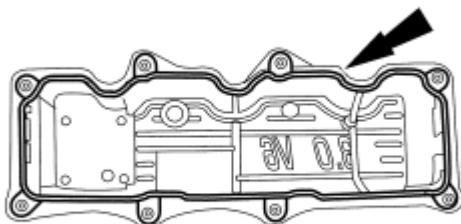


Fig. 301: Locating Valve Cover Gasket
Courtesy of FORD MOTOR CO.

56. Install the valve covers and bolts. Tighten in the sequence shown.

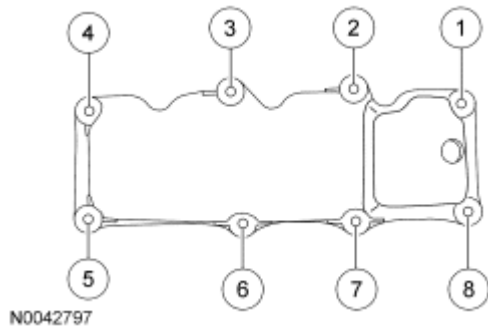


Fig. 302: Identifying Tightening Sequence Of Valve Cover Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 12 Nm (9 lb-ft).

57. Using the special tool, install the crankshaft damper.

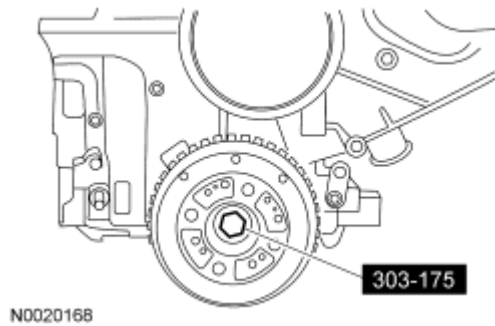


Fig. 303: Installing Crankshaft Damper Using Special Tool (303-175)
Courtesy of FORD MOTOR CO.

58. Install the bolt.

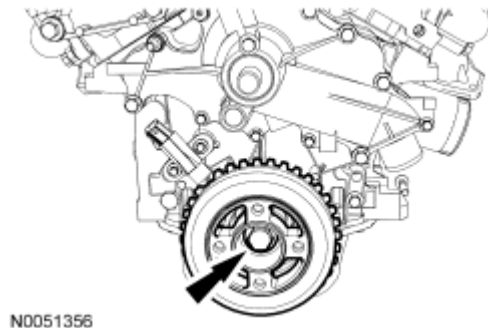
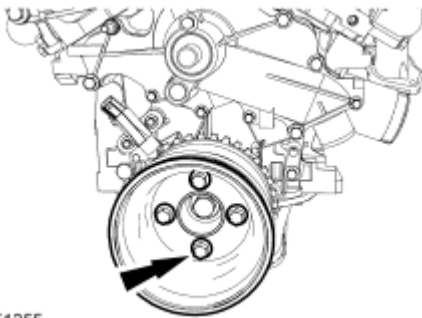


Fig. 304: Locating Bolt
Courtesy of FORD MOTOR CO.

- Tighten to 145 Nm (107 lb-ft).

59. Install the crankshaft pulley and the 4 bolts.

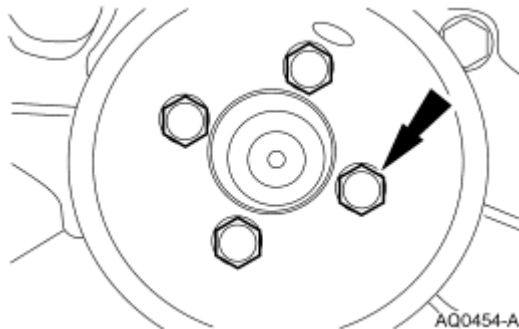


N0051355

Fig. 305: Locating Crankshaft Pulley & Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 63 Nm (46 lb-ft).

60. Install the coolant pump pulley and the 4 bolts.

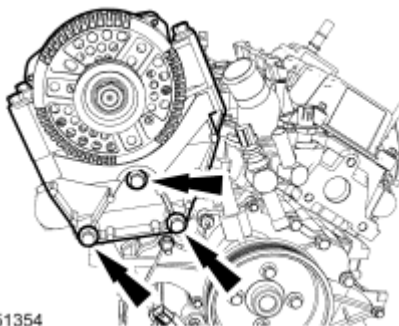


AQ0454-A

Fig. 306: Locating Coolant Pump Pulley & Bolts
Courtesy of FORD MOTOR CO.

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

61. Install the generator mounting bracket and the bolts.



N0051354

Fig. 307: Locating Generator Mounting Bracket & Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 47 Nm (35 lb-ft).

62. Position the ignition coil assembly and install the bolts.

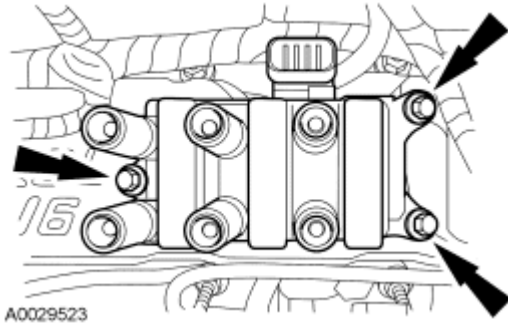


Fig. 308: Locating Ignition Coil Assembly Bolts
Courtesy of FORD MOTOR CO.

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

63. Position the RH engine lifting eye and install the nuts.

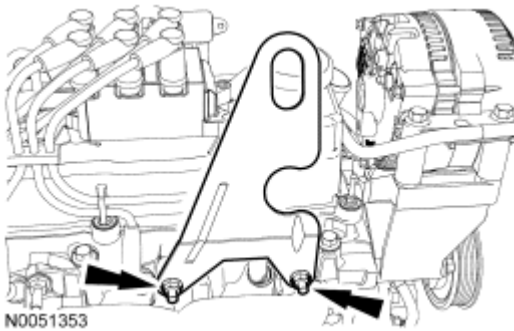


Fig. 309: Locating RH Engine Lifting Eye & Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 20 Nm (15 lb-ft).

64. Position the LH engine lifting eye and install the nuts.

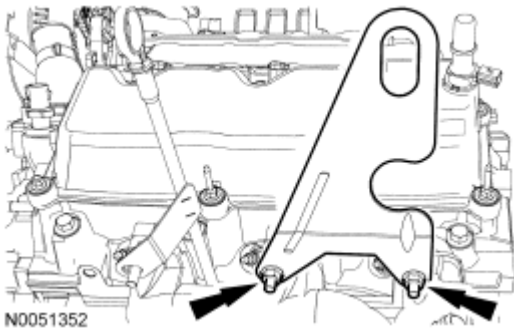


Fig. 310: Locating LH Engine Lifting Eye & Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 20 Nm (15 lb-ft).

65. Position the engine ground strap and install the bolt.

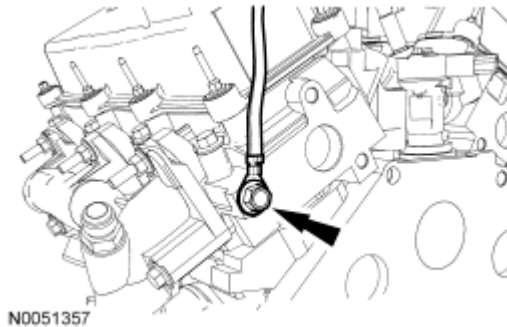


Fig. 311: Locating Engine Ground Strap & Bolt
Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).

66. Install the spark plug wires. For additional information, refer to **ENGINE IGNITION - 3.0L (2V)** article.
67. Position the wiring harness and attach the wiring harness retainers to the valve cover studs. Connect the fuel injector, engine coolant temperature (ECT) sensor and ignition coil electrical connectors.

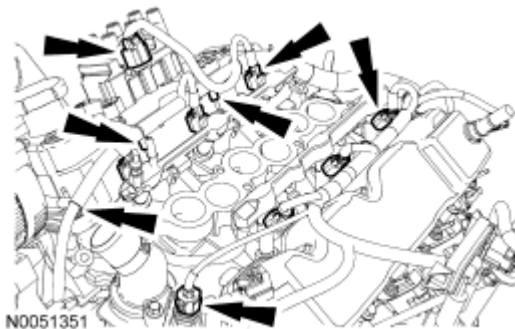


Fig. 312: Locating Fuel Injector, Engine Coolant Temperature (ECT) Sensor & Ignition Coil Electrical Connectors
Courtesy of FORD MOTOR CO.

68. Connect the positive crankcase ventilation (PCV) valve and differential pressure feedback EGR sensor electrical connectors. Attach the wiring harness retainer to the differential pressure feedback EGR sensor.

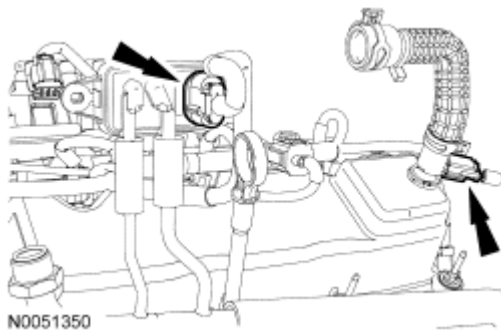


Fig. 313: Locating Positive Crankcase Ventilation (PCV) Valve
Courtesy of FORD MOTOR CO.

69. Connect the camshaft position sensor, the oil pressure switch, and, if the vehicle is equipped with a manual transmission, the knock sensor electrical connectors. Attach the wiring harness and electrical connector retainers.

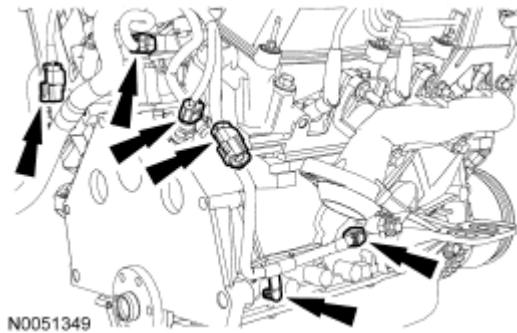


Fig. 314: Locating Camshaft Position Sensor & Oil Pressure Switch
Courtesy of FORD MOTOR CO.

70. Attach the wiring harness retainer to the generator.

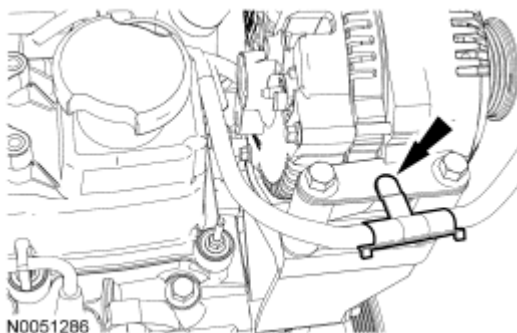


Fig. 315: Locating Wiring Harness Retainer & Generator
Courtesy of FORD MOTOR CO.

71. Attach the wiring harness retainer and connect the crankshaft position (CKP) sensor electrical connector.

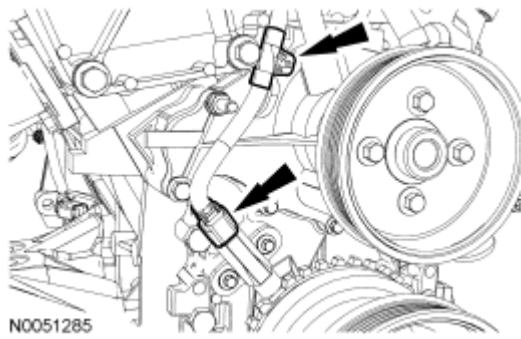


Fig. 316: Locating Wiring Harness Retainer & Crankshaft Position (CKP) Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

72. Install the Lifting Eyes and the lifting equipment.
73. Remove the engine from work stand.
74. Install the engine-to-transmission spacer plate.
75. Install the flywheel or flexplate.

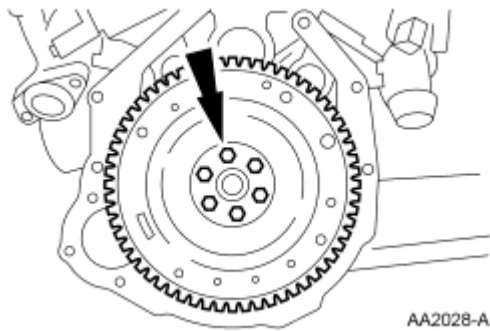


Fig. 317: Locating Flywheel Or Flexplate
Courtesy of FORD MOTOR CO.

- Tighten to 80 Nm (59 lb-ft).

Vehicles equipped with a manual transmission

1. Adjust the clutch pressure plate.

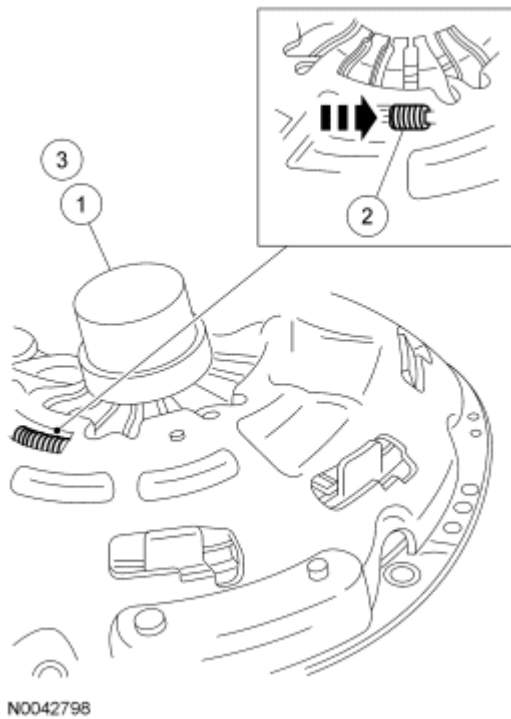


Fig. 318: Adjusting Clutch Pressure Plate
Courtesy of FORD MOTOR CO.

- Using a suitable press, press downward on the fingers until the adjusting ring moves freely.
 - Rotate the adjusting ring counterclockwise to compress the tension springs. Hold the adjusting ring in this position.
 - Release the pressure on the fingers. The adjusting ring will stay in the reset position.
2. Using the special tool, position the clutch disc on the flywheel.

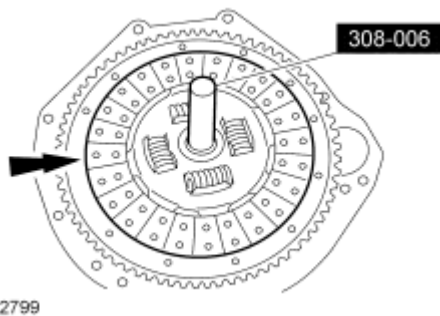


Fig. 319: Using Special Tool (308-006) To Position Clutch Disk On Flywheel
Courtesy of FORD MOTOR CO.

NOTE: If reusing the clutch pressure plate and flywheel, align the marks made during removal.

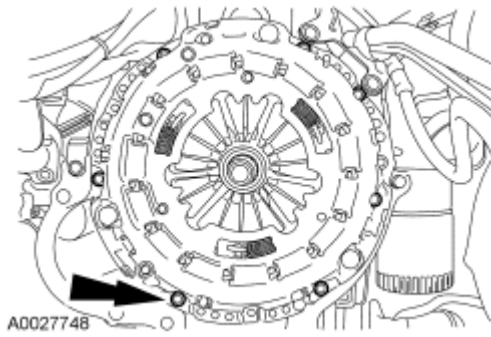


Fig. 320: Locating Clutch Pressure Plate Bolts
 Courtesy of FORD MOTOR CO.

3. Position the clutch pressure plate and install the bolts. Tighten the bolts in a star pattern.
 - Tighten to 32 Nm (24 lb-ft).

INSTALLATION

ENGINE

Special Tools

Illustration	Tool Name	Tool Number
 ST1831-A	Lifting Eyes	303-D030 (D81L-6001-D) or equivalent
 ST1438-A	Strap Wrench	303-D055 (D85L-6000-A) or equivalent

Material

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

All vehicles

NOTE: For vehicles equipped with an automatic transmission, make sure the torque converter stud and the flexplate marks made during removal are

aligned.

1. Position the engine in the vehicle.
2. Install the 4 nuts.

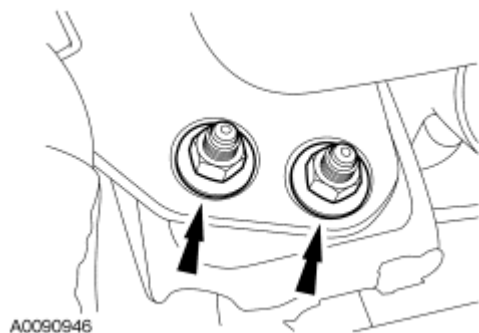


Fig. 321: Locating Engine Mount Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 109 Nm (80 lb-ft).

NOTE: RH shown, LH similar.

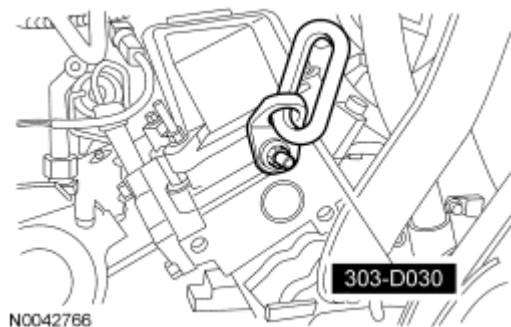


Fig. 322: Identifying Special Tool (303-D030)
Courtesy of FORD MOTOR CO.

3. Remove the Lifting Eyes.
4. Install the 8 transmission-to-engine bolts.

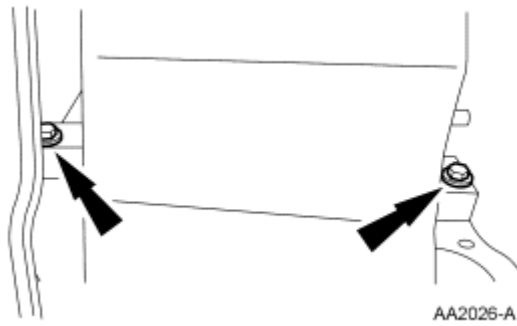


Fig. 323: Locating Transmission-To-Engine Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 45 Nm (33 lb-ft).
5. Route the wiring harness to the transmission. Position the fuel tube bracket and install the nuts.

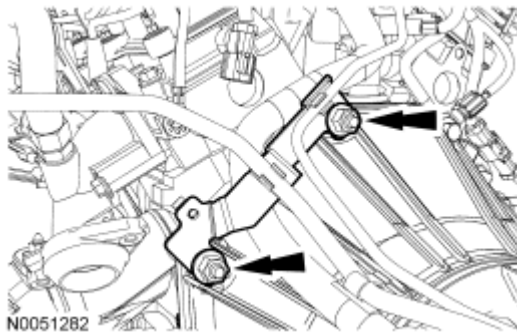


Fig. 324: Locating Fuel Tube Bracket & Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 30 Nm (22 lb-ft).

Vehicles equipped with a manual transmission

1. Connect the transmission and the LH catalyst monitor sensor electrical connectors and attach the wiring harness retainers.

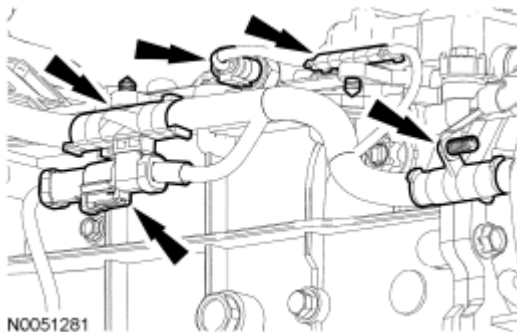


Fig. 325: Locating LH Catalyst Monitor Sensor Electrical Connectors
Courtesy of FORD MOTOR CO.

2. Connect the transmission electrical connector and attach the wiring harness retainer.

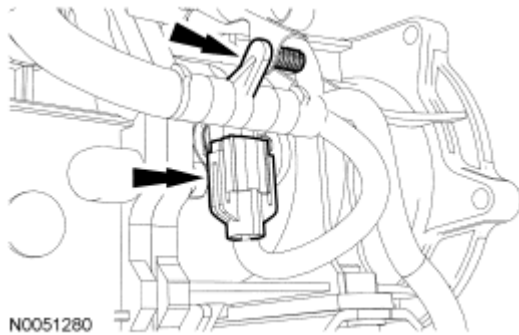


Fig. 326: Locating Transmission Electrical Connector & Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

3. Route the wiring harness over the transmission and position the wiring harness bracket. Install the nut and connect the RH catalyst monitor sensor electrical connector.

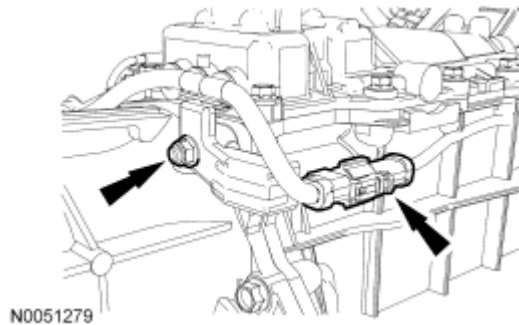


Fig. 327: Locating Nut & RH Catalyst Monitor Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

- Tighten to 30 Nm (22 lb-ft).

Vehicles equipped with automatic transmission

1. Install the transmission cooler line bracket and bolt.

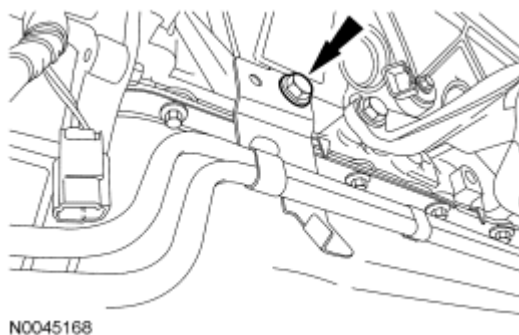


Fig. 328: Locating Transmission Cooler Line Bracket Bolt

Courtesy of FORD MOTOR CO.

- Tighten to 11 Nm (8 lb-ft).
2. Connect the knock sensor (KS) electrical connector.

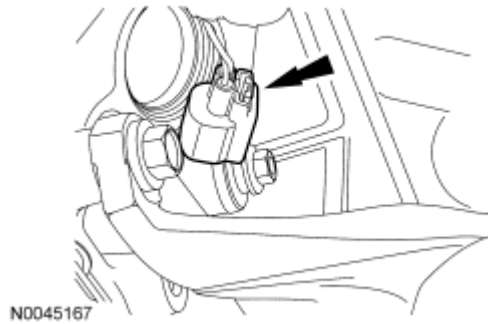


Fig. 329: Locating Knock Sensor (KS) Electrical Connector
Courtesy of FORD MOTOR CO.

3. Connect the wire push pin retainers.

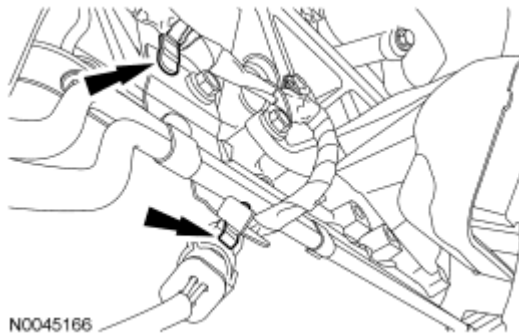


Fig. 330: Locating Wire Push-Pin Retainers
Courtesy of FORD MOTOR CO.

4. Install the 4 torque converter nuts.

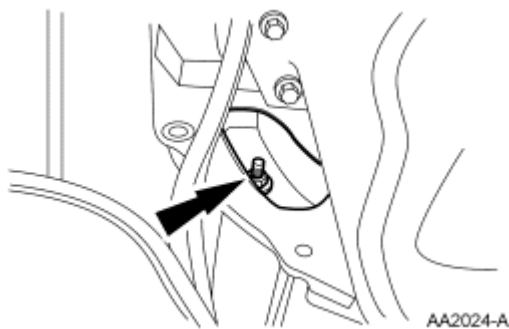


Fig. 331: Locating Torque Converter Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 35 Nm (26 lb-ft).
 - Install the access plate.
5. Connect the LH catalyst monitor sensor and transmission electrical connectors. Attach the wiring harness retainer.

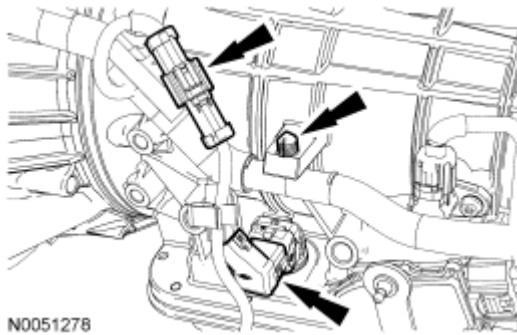


Fig. 332: Locating LH Catalyst Monitor Sensor And Transmission Electrical Connectors
Courtesy of FORD MOTOR CO.

6. Connect the transmission electrical connectors. Attach the wiring harness retainer.

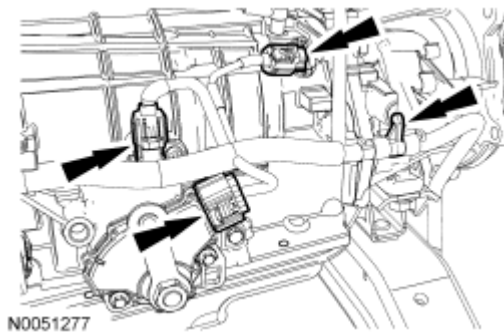


Fig. 333: Locating Transmission Electrical Connectors & Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

7. Route the wiring harness over the transmission and position the wiring harness bracket. Install the nut and connect the RH catalyst monitor sensor.

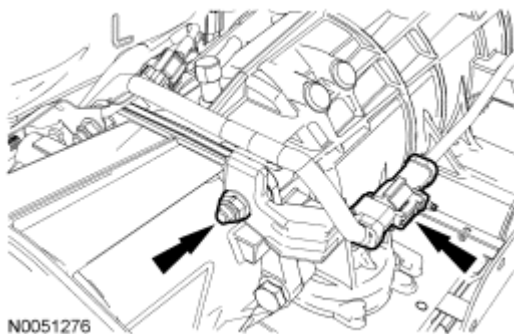


Fig. 334: Locating Nut & RH Catalyst Monitor Sensor

Courtesy of FORD MOTOR CO.

- Tighten to 30 Nm (22 lb-ft).

All Vehicles

1. Connect the electrical connector and attach it to the transmission crossmember.

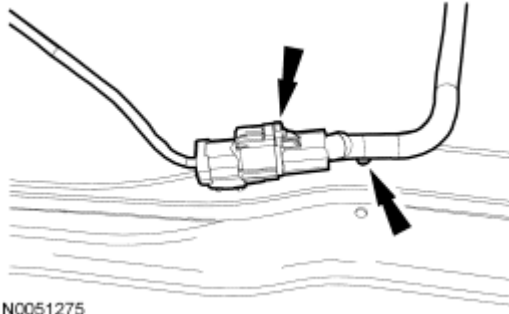


Fig. 335: Locating Electrical Connector & Transmission Crossmember
Courtesy of FORD MOTOR CO.

2. Install the starter motor. For additional information, refer to **STARTING SYSTEM** article.

NOTE: LH shown, RH similar.

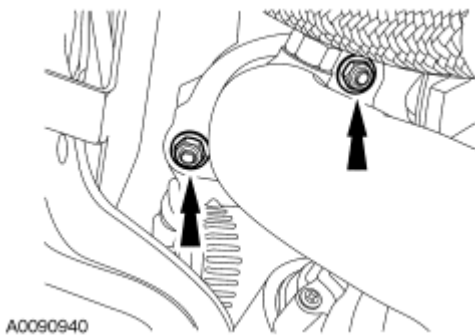


Fig. 336: Locating Dual Converter Y-Pipe Nuts
Courtesy of FORD MOTOR CO.

3. Connect the dual converter Y-pipe and install the nuts.
 - Tighten to 40 Nm (30 lb-ft).
4. Install the LH heated oxygen sensor (HO2S). For additional information, refer to **ELECTRONIC ENGINE CONTROLS** article.
5. Connect the engine sensor control wiring to the mass air flow (MAF) sensor.

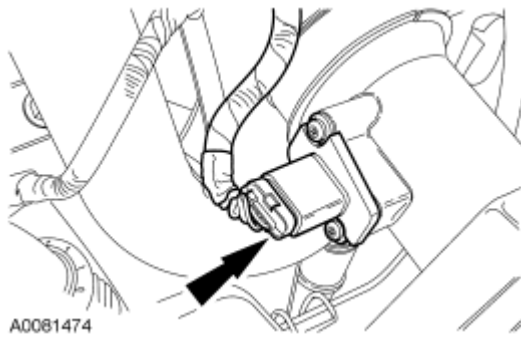


Fig. 337: Locating Mass Air Flow Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

6. Connect the vacuum hose to the vacuum reservoir.

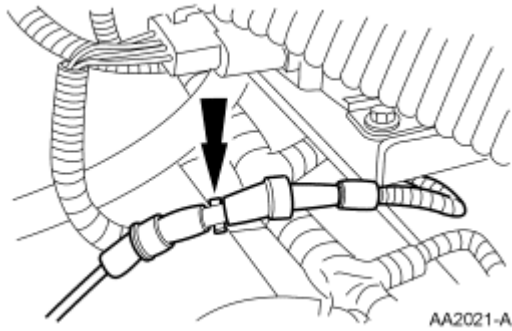


Fig. 338: Locating Vacuum Hose & Vacuum Reservoir
Courtesy of FORD MOTOR CO.

7. Connect both HO2S electrical connectors.

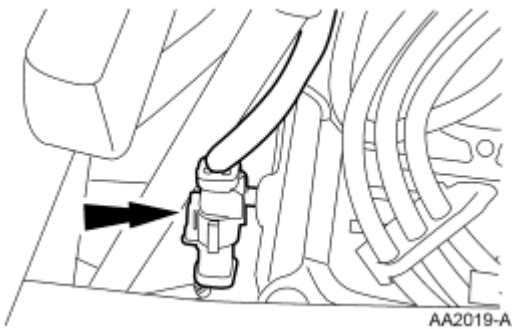


Fig. 339: Locating HO2S Electrical Connectors
Courtesy of FORD MOTOR CO.

8. Position the powertrain control module (PCM) ground strap and install the stud bolt.

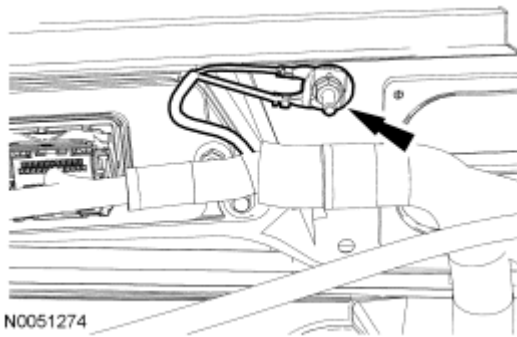


Fig. 340: Locating Powertrain Control Module (PCM) Ground Strap
Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).
9. Position the PCM wiring harness bracket and install the nut.

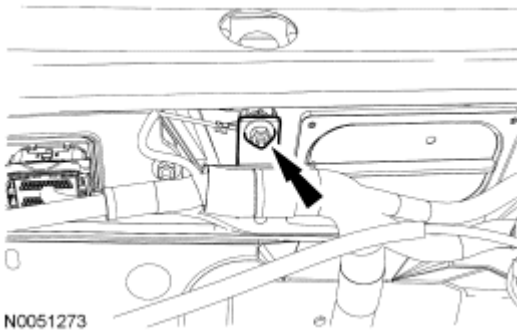


Fig. 341: Locating PCM Wiring Harness Bracket & Nut
Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).
10. Connect the PCM electrical connectors.

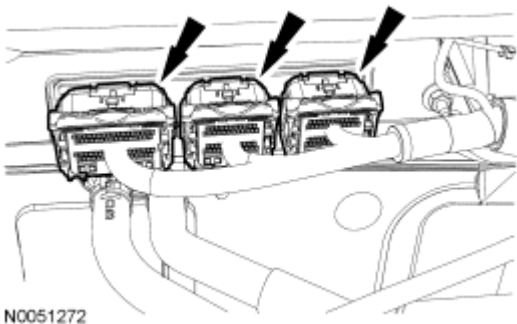


Fig. 342: Locating PCM Electrical Connectors
Courtesy of FORD MOTOR CO.

11. Connect the fuel tubes. For additional information, refer to **FUEL SYSTEM - GENERAL INFORMATION** article.

12. Position the ground cable and install the nut.

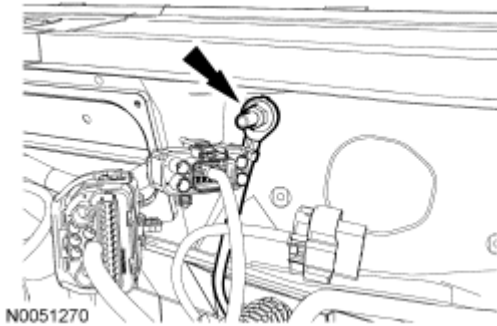


Fig. 343: Locating Ground Cable & Nut
Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).

13. Connect the 2 in-line electrical connectors.

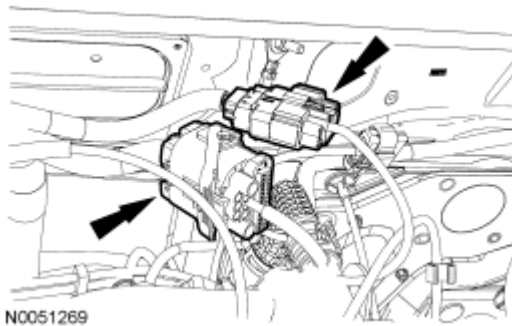


Fig. 344: Locating 2 In-Line Electrical Connectors
Courtesy of FORD MOTOR CO.

14. Connect the generator electrical connectors and install the nut.

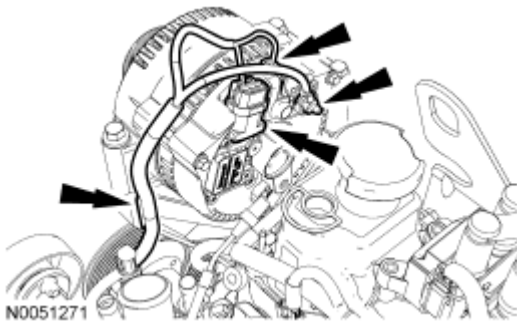


Fig. 345: Locating Generator Electrical Connectors & Nut
Courtesy of FORD MOTOR CO.

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

15. Position the A/C compressor, the power steering pump and the mounting bracket as an assembly and install the bolts.

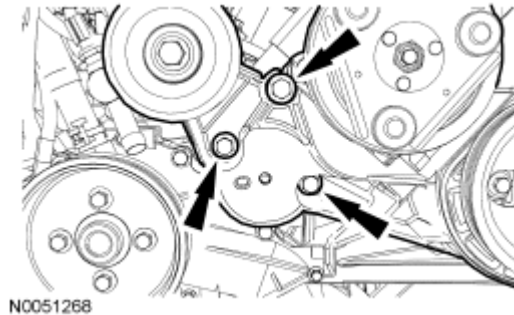


Fig. 346: Locating Power Steering Pump & Mounting Bracket
Courtesy of FORD MOTOR CO.

- Tighten to 47 Nm (35 lb-ft).

16. Position the accessory drive belt tensioner and install the bolt.

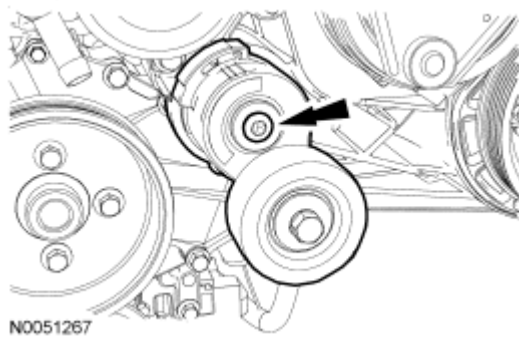


Fig. 347: Locating Accessory Drive Belt Tensioner & Bolt
Courtesy of FORD MOTOR CO.

- Tighten to 27 Nm (20 lb-ft).

17. Install the stud bolts.



Fig. 348: Locating Stud Bolts
Courtesy of FORD MOTOR CO.

- Tighten to 47 Nm (35 lb-ft).

18. Position the wiring harness bracket and the ground strap and install the nuts.



Fig. 349: Locating Wiring Harness Bracket, Ground Strap & Nuts
Courtesy of FORD MOTOR CO.

- Tighten to 10 Nm (89 lb-in).

19. Connect the A/C compressor electrical connector and attach the wiring harness retainer.

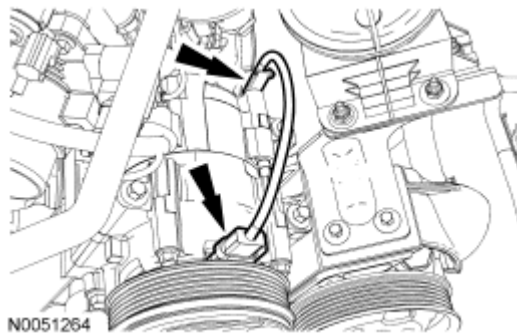


Fig. 350: Locating A/C Compressor Electrical Connector & Wiring Harness Retainer
Courtesy of FORD MOTOR CO.

20. Position the A/C suction/discharge tube and install the nut.

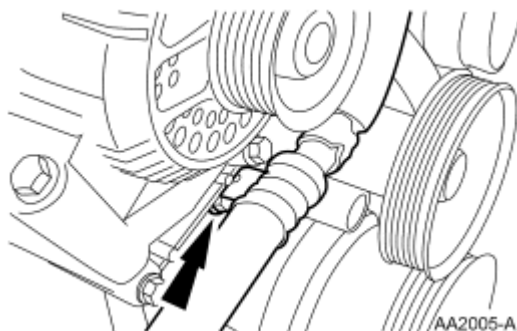


Fig. 351: Locating A/C Suction/Discharge Tube & Nut
Courtesy of FORD MOTOR CO.

- Tighten to 11 Nm (8 lb-ft).

21. Connect the A/C tube at the accumulator.

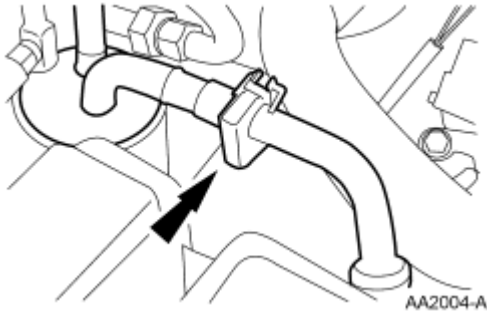


Fig. 352: Locating A/C tube & accumulator
Courtesy of FORD MOTOR CO.

NOTE: Install new O-ring seals.

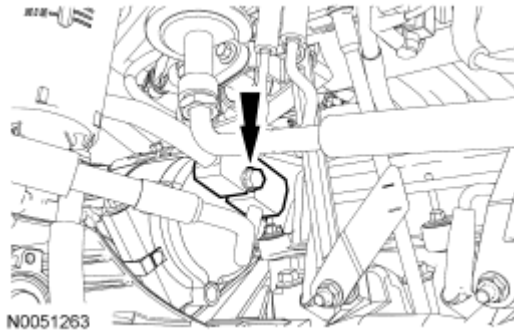


Fig. 353: Locating O-Ring Seals
Courtesy of FORD MOTOR CO.

22. Position the A/C manifold on the A/C compressor and install the bolt.

- Tighten to 20 Nm (15 lb-ft).

23. Connect the heater hoses.

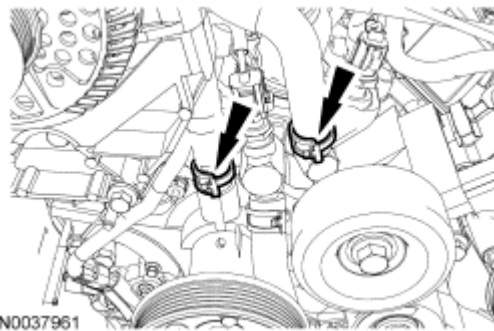


Fig. 354: Locating Heater Hoses

Courtesy of FORD MOTOR CO.

24. Install the radiator. For additional information, refer to **ENGINE COOLING** article.
25. Install the fan shroud.

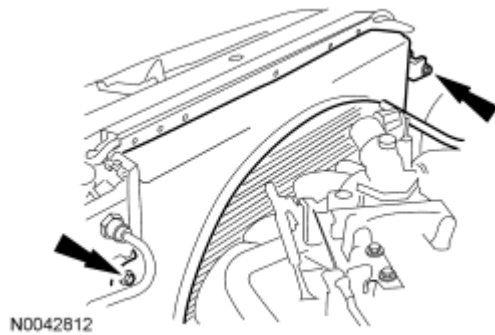


Fig. 355: Locating Fan Shroud & Bolt
Courtesy of FORD MOTOR CO.

- Position the fan shroud.
- Install the bolts.
- Tighten to 7 Nm (62 lb-in).

CAUTION: The fan clutch has left-hand threads.

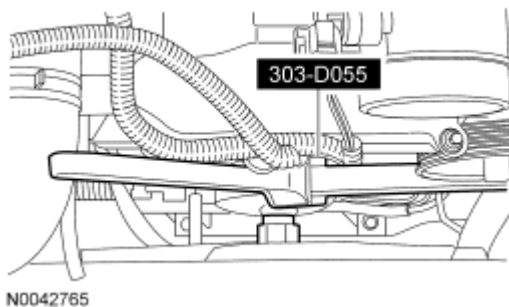


Fig. 356: Using Special Tool (303-D055) To Remove Fan Clutch And Blade As An Assembly
Courtesy of FORD MOTOR CO.

26. Using the special tool, install the fan clutch and the fan blade.
27. Install the accessory drive belt. For additional information, refer to **ACCESSORY DRIVE** article.
28. Install the upper intake manifold. For additional information, refer to **Upper Intake Manifold** in this article.
29. Install the hood.
30. Fill the engine with clean engine oil.
31. Connect the battery ground cable. For additional information, refer to **BATTERY, MOUNTING AND**

CABLES article.

32. Fill and bleed the engine cooling system. For additional information, refer to **ENGINE COOLING** article.
33. Charge the A/C system. For additional information, refer to **CLIMATE CONTROL SYSTEM - GENERAL INFORMATION AND DIAGNOSTICS** article.
34. Inspect the engine and cooling system for leaks.