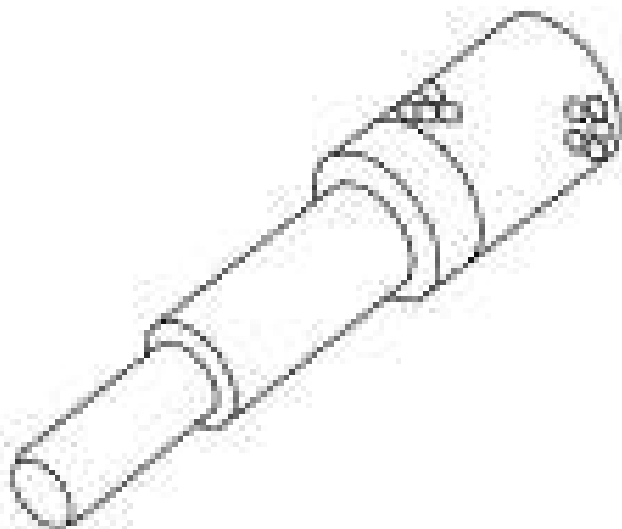


ASSEMBLY

ENGINE

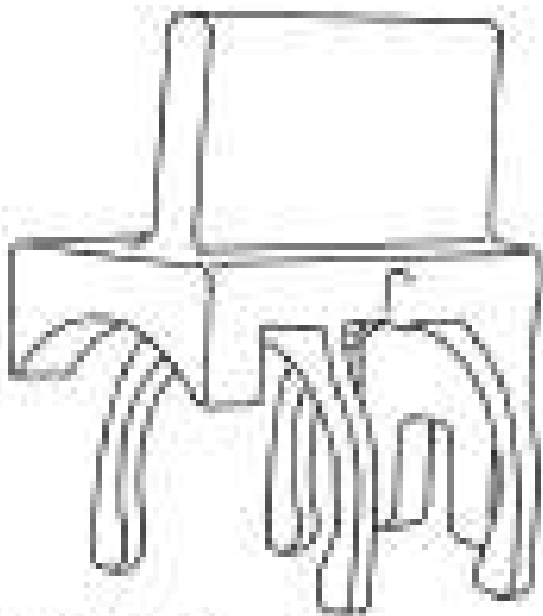
Special Tool(s)

SPECIAL TOOL SPECIFICATION



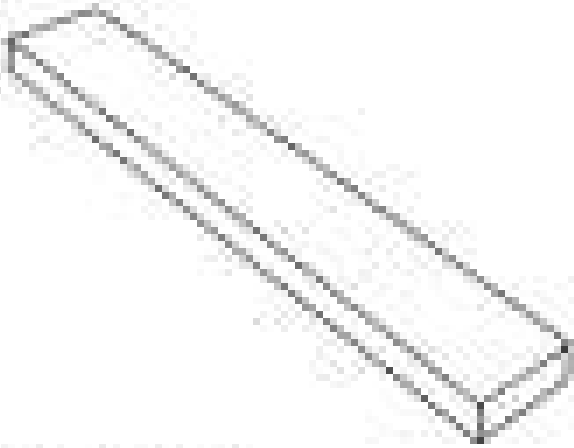
ST1751-A

Aligner, Clutch Disc
308-006 (T71P-7137-H)



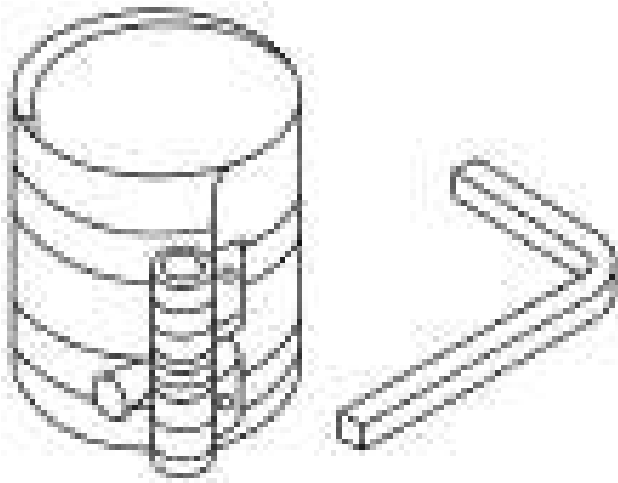
ST3055A

Aligner, Crankshaft Sensor
303-1417



ST2599-A

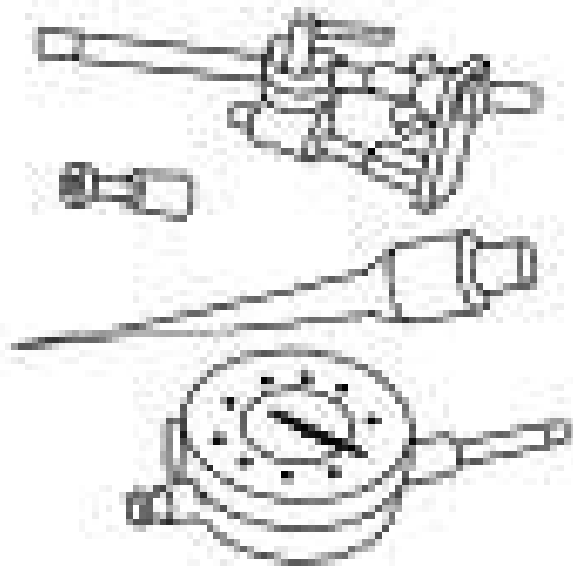
Alignment Plate, Camshaft
303-465 (T94P-6256-CH)



ST1376-A

Compressor, Piston Ring
303-D032 (D81L-6002-C) or equivalent

Dial Indicator Gauge with Holding Fixture
100-002 (TOOL-4201-C)



ST1214-A



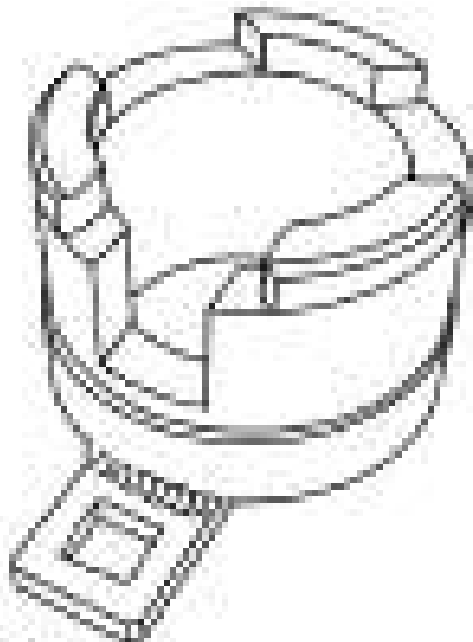
ST1910-A

Engine Stand
014-0232 or equivalent



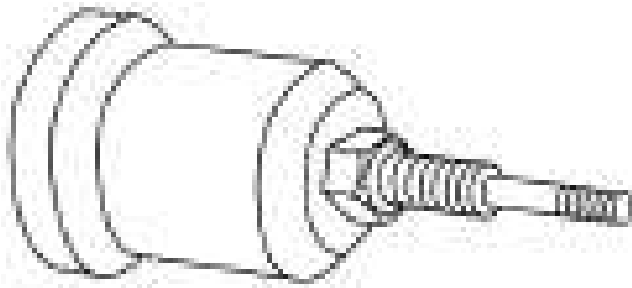
ST1341-A

Heavy-Duty Floor Crane
014-00071 or equivalent



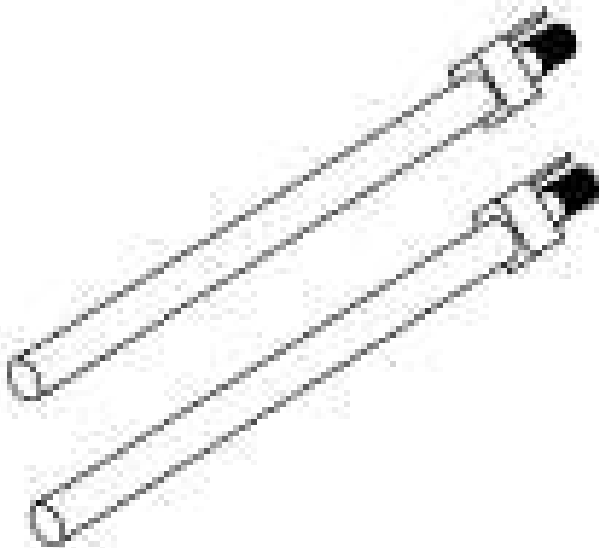
ST3054-A

Holding Tool, Crankshaft Damper
303-1416



Installer, Camshaft Front Oil Seal
303-096 (T74P-6150-A)

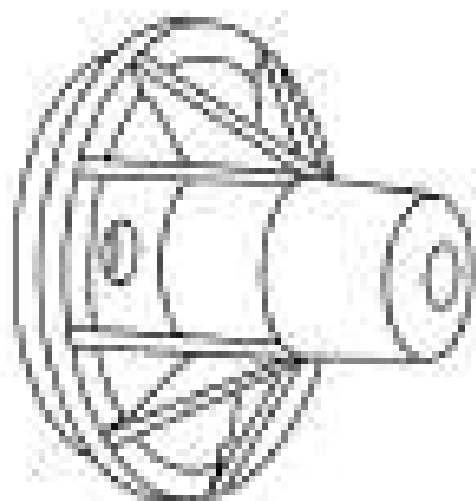
ST1917-A



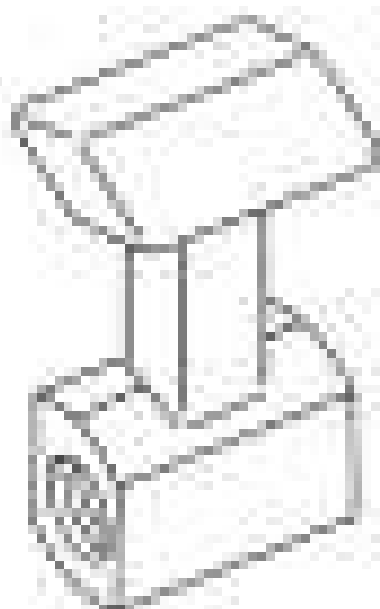
Installer, Connecting Rod
303-462 (T94P-6136-AH)

ST1982-A

Installer, Crankshaft Rear Main Oil Seal
303-328 (T88P-6701-B1)



ST1506-A



ST2768-A

Locking Tool, Flywheel
303-103 (T74P-8375-A)



ST1400-A

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



ST2538-A

Timing Peg, Crankshaft
303-507

General Equipment

GENERAL EQUIPMENT REFERENCE

6 mm x 18 mm bolt

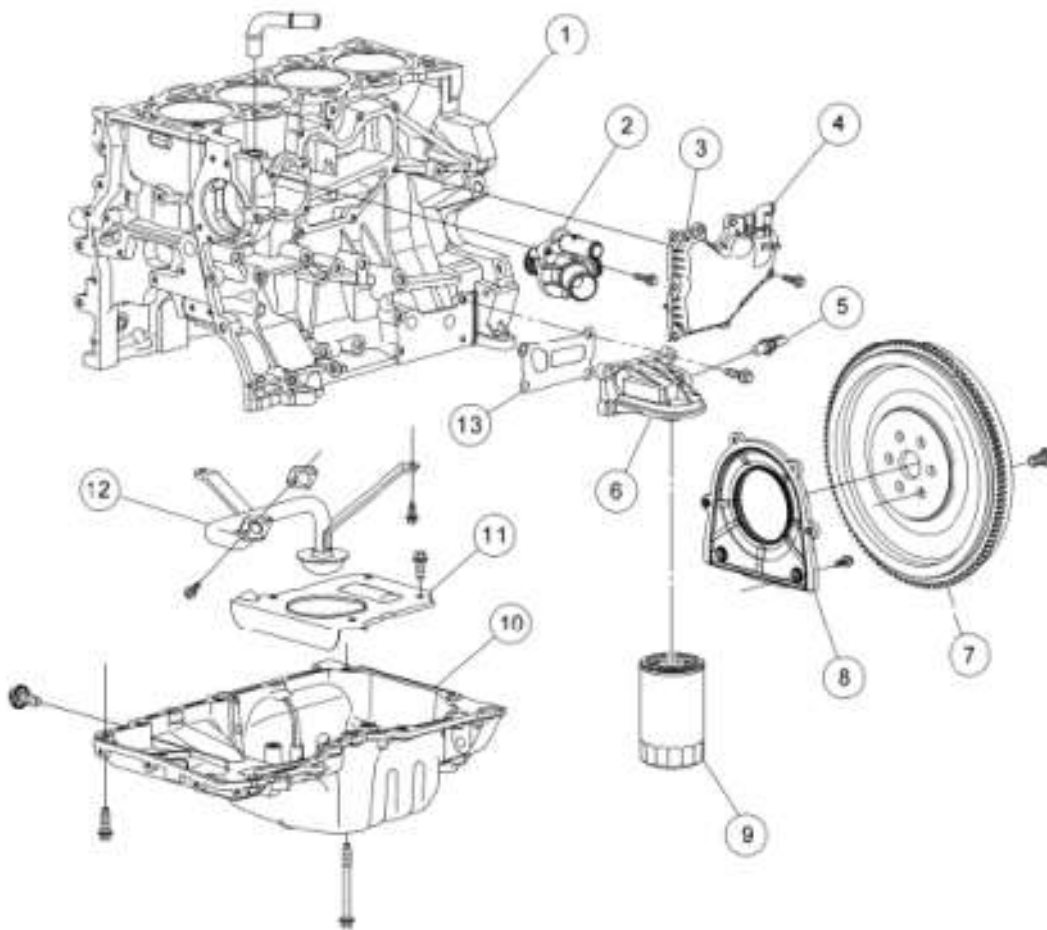
Material

MATERIAL SPECIFICATION

Item	Specification
High Temperature 4x4 Front Axle and Wheel Bearing Grease XG-11	WSS-M1C267-A1

Motorcraft® Metal Surface Prep ZC-31-A	-
Motorcraft® Premium Gold Engine Coolant with Bittering Agent (US); Motorcraft® Premium Gold Engine Coolant (Canada) VC-7-B (US); CVC-7-A (Canada); or equivalent (yellow color)	WSS-M97B51-A1
Motorcraft® SAE 5W-20 Premium Synthetic Blend Motor Oil XO-5W20-QSP (US); Motorcraft® SAE 5W-20 Super Premium Motor Oil CXO-5W20-LSP12 (Canada); or equivalent	WSS-M2C930-A
Silicone Brake Caliper Grease and Dielectric Compound XG-3-A	ESE-M1C171-A
Silicone Gasket and Sealant TA-30	WSE-M4G323-A4
Silicone Gasket Remover ZC-30	-

Engine - Lower Engine Block (View 1)



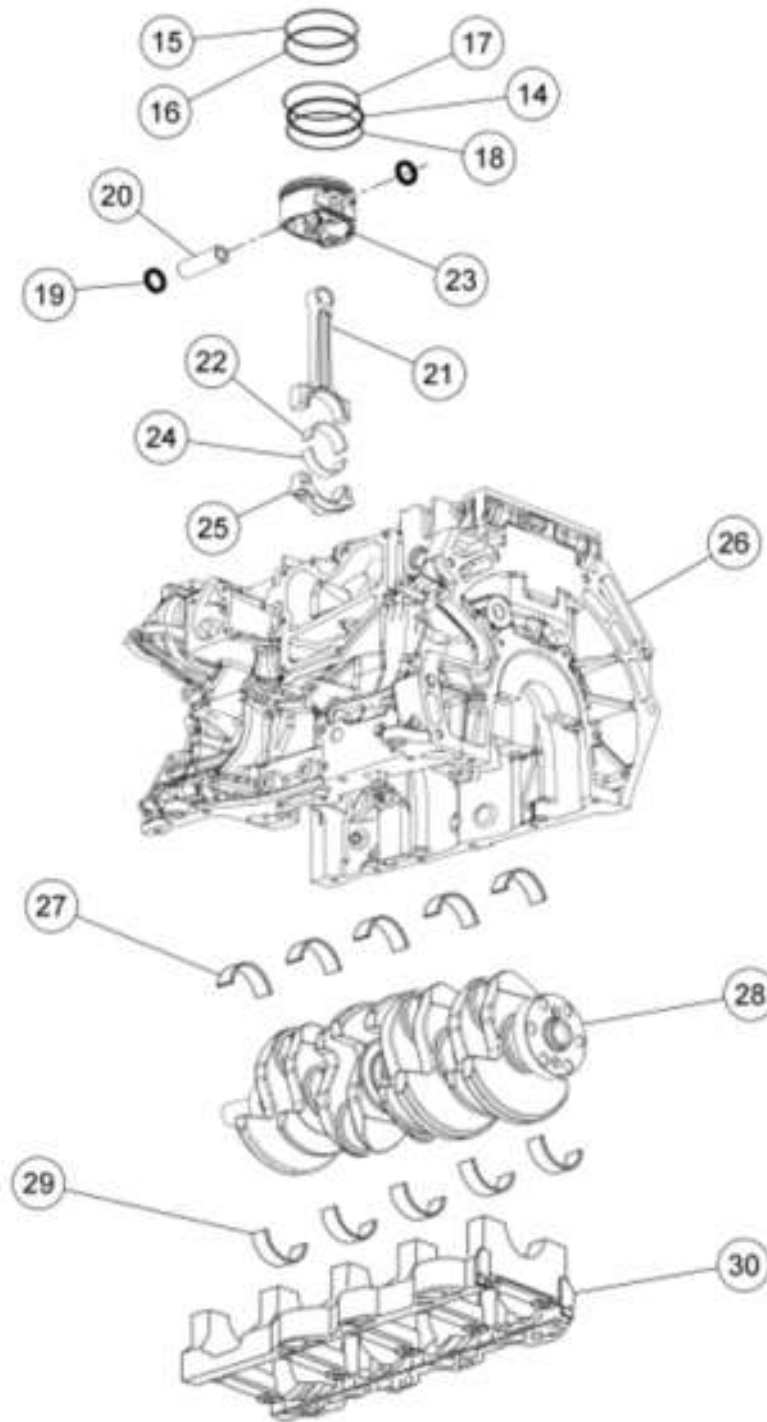
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Fig. 226: Exploded View Of Lower Engine Block (1 Of 2)
Courtesy of FORD MOTOR CO.

PART NUMBER REFERENCE

Item	Part Number	Description
1	6010	Cylinder block
2	8575	Thermostat assembly
3	6A785	Crankcase vent oil separator
4	6A666	PCV valve
5	9278	Oil pressure sensor
6	6881	Oil filter adapter
7	6375	Flywheel
8	6K301	Crankshaft rear oil seal and retainer
9	6731	Oil filter
10	6675	Oil pan
11	6687	Oil pan baffle
12	6622	Oil pump screen and pickup tube
13	6840	Oil filter adapter gasket

Lower Engine Block (View 2)



N0110079

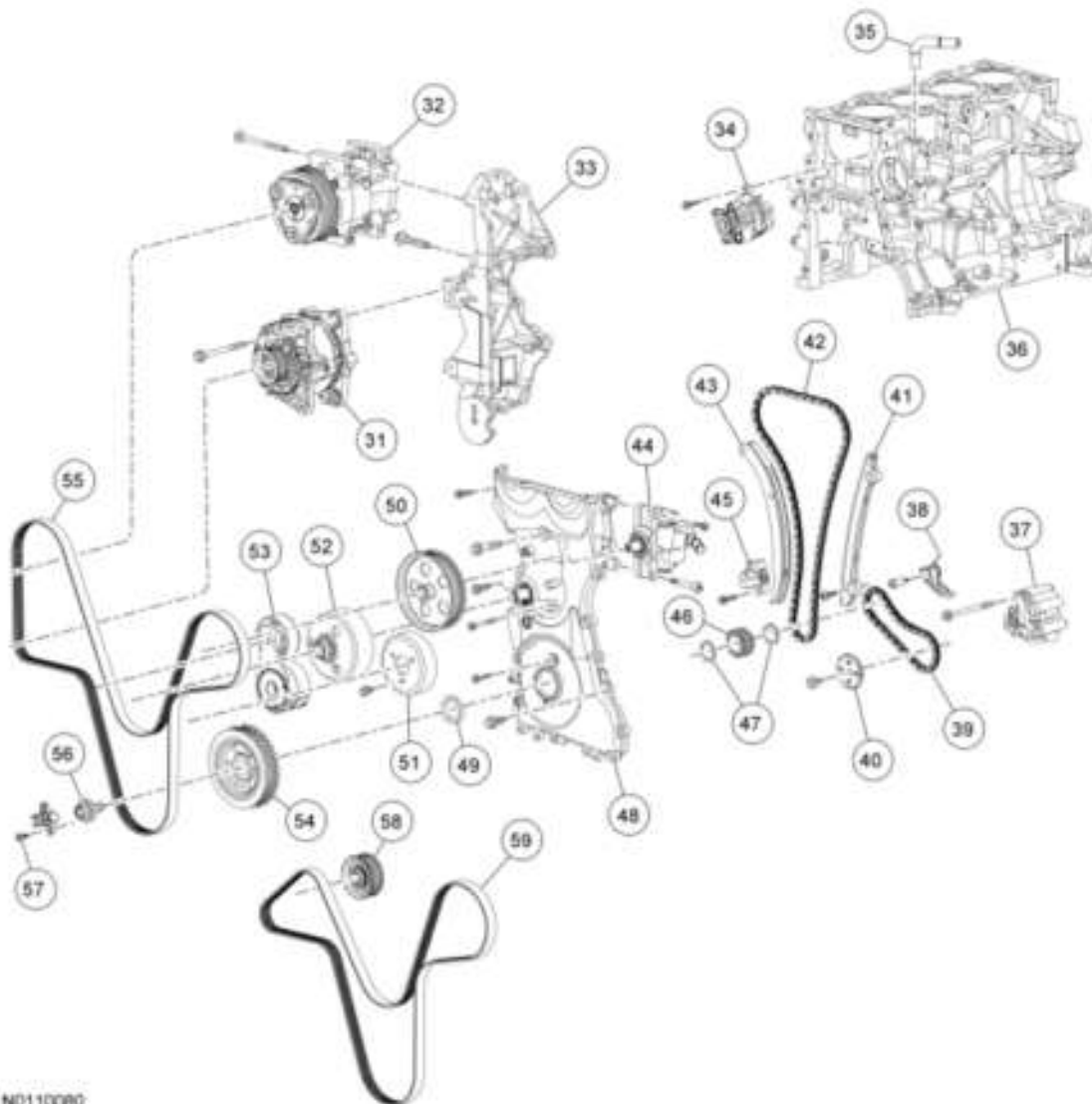
Fig. 227: Exploded View Of Lower Engine Block (2 Of 2)
 Courtesy of FORD MOTOR CO.

PART NUMBER REFERENCE

Item	Part Number	Description
14	6161	Piston oil control spacer (4 required)
15	6150	Piston compression upper ring (4 required)
16	6152	Piston compression lower ring (4 required)
17	6159	Piston oil control upper segment ring (4 required)
18	6159	Piston oil control lower segment ring (4 required)

19	6140	Piston pin retainer (8 required)
20	6135	Piston pin (4 required)
21	6200	Connecting rod (4 required)
22	6211	Connecting rod upper bearing (4 required)
23	6110	Piston (4 required)
24	6211	Connecting rod lower bearing (4 required)
25	6210	Connecting rod cap (4 required)
26	6010	Cylinder block
27	6333	Cylinder block crankshaft main bearing (5 required)
28	6303	Crankshaft
29	6333	Crankshaft main bearing beam bearing (5 required)
30	6F098	Main bearing beam

Engine - Front Engine Block



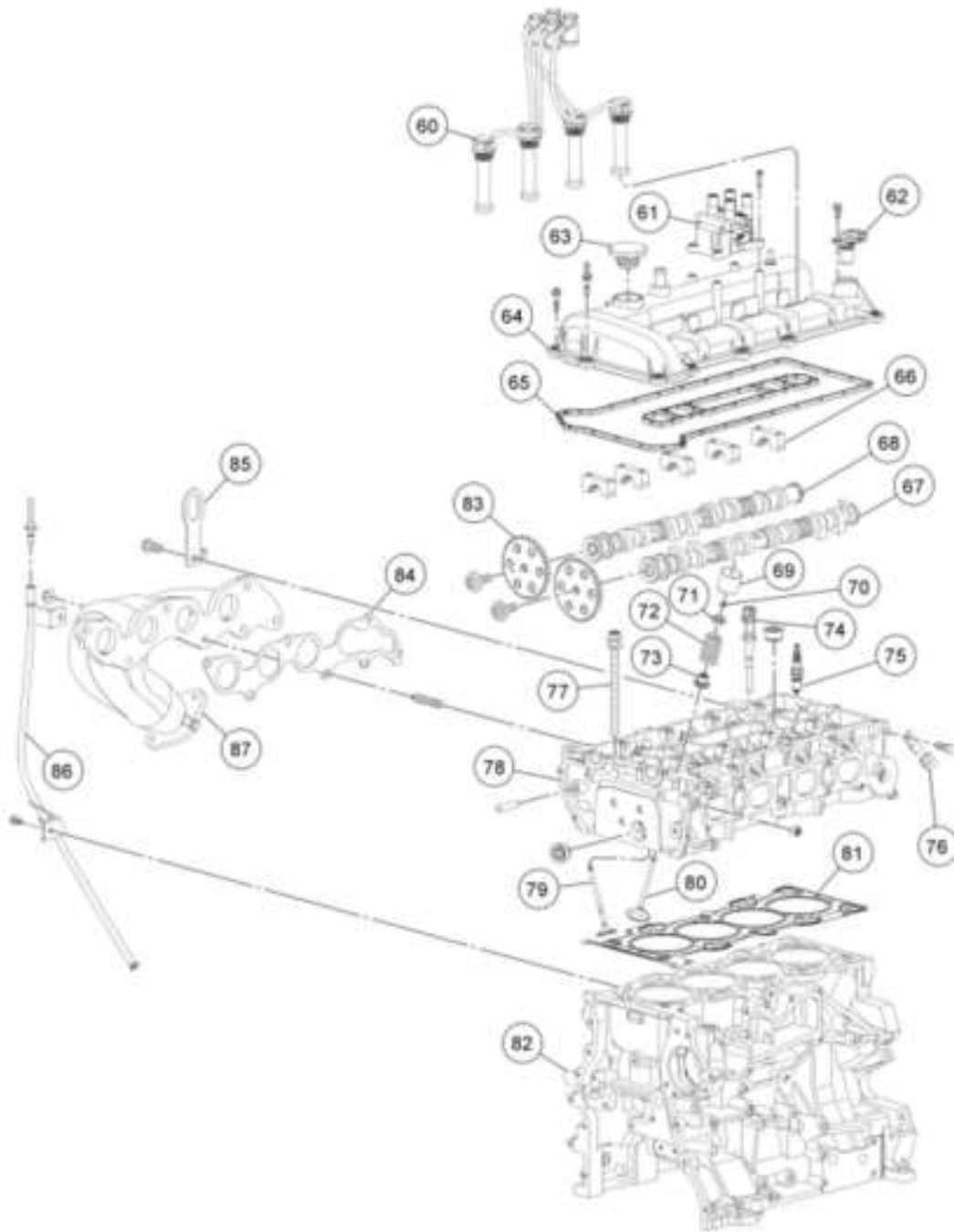
ND11008G

Fig. 228: Exploded View Of Front Engine Block
 Courtesy of FORD MOTOR CO.

PART NUMBER REFERENCE

Item	Part Number	Description
31	10300	Generator
32	19D629	A/C compressor
33	19E708	Front End Accessory Drive (FEAD) mounting bracket
34	8501	Coolant pump
35	8597	Coolant bypass tube
36	6010	Cylinder block
37	6600	Oil pump
38	6C271	Oil pump chain tensioner
39	6A895	Oil pump chain
40	6652	Oil pump drive gear
41	6K297	Timing chain guide
42	6268	Timing chain
43	-	Timing chain tensioner arm
44	3A674	Power steering pump
45	6K254	Timing chain tensioner
46	6306	Crankshaft sprocket
47	6378	Diamond washers (2 required)
48	6019	Engine front cover
49	6700	Crankshaft front oil seal
50	3A733	Power steering pump pulley
51	8509	Coolant pump pulley
52	8610	Fan drive pulley
53	6B209	Drive belt tensioner
54	6316	Crankshaft damper
55	8620	Accessory drive belt (with A/C)
56	6A340	Crankshaft pulley bolt
57	6C315	Crankshaft Position (CKP) sensor
58	6C348	Drive belt pulley idler (without A/C)
59	8620	Accessory drive belt (without A/C)

Engine - Cylinder Head



ND110081

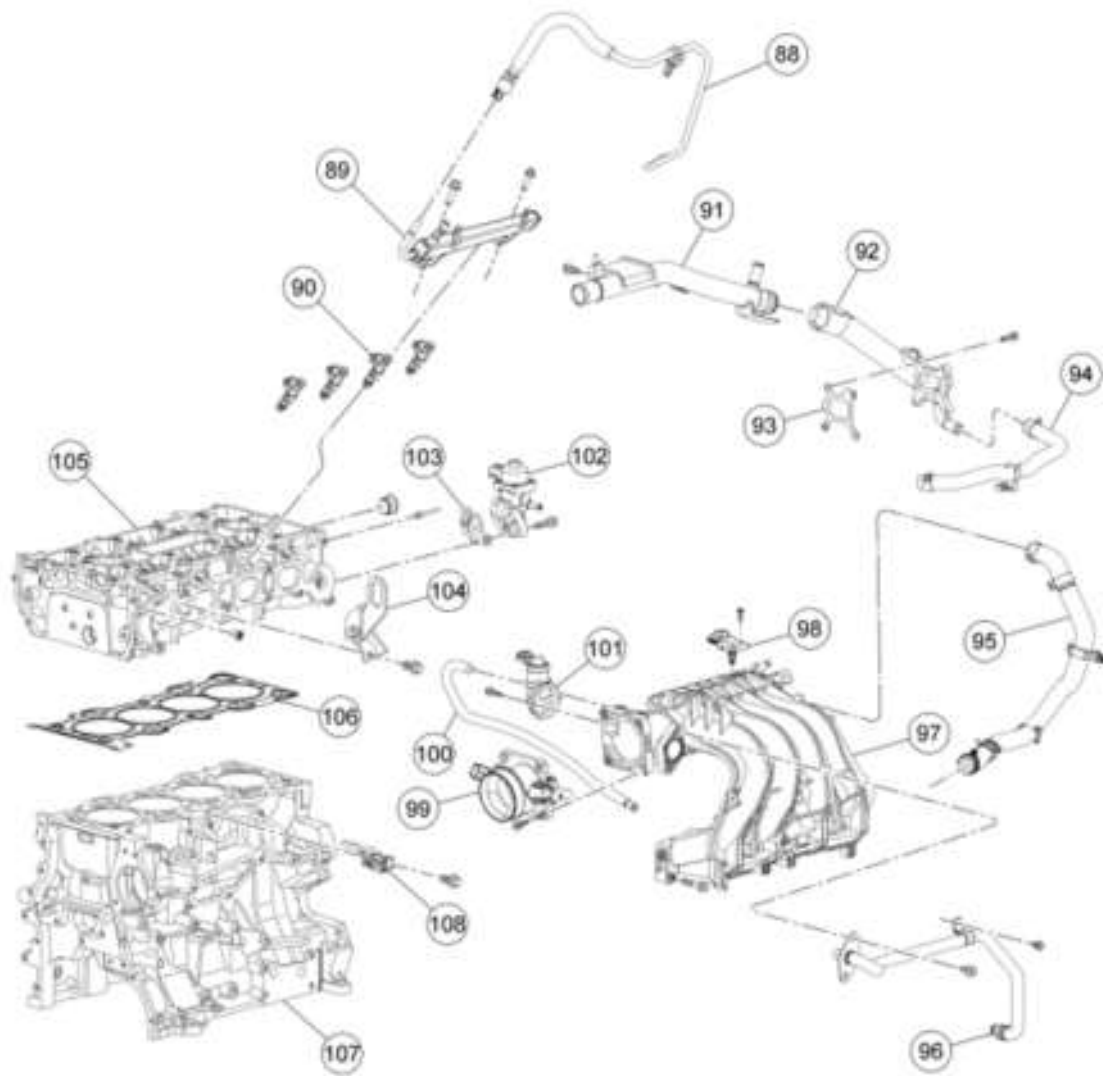
Fig. 229: Exploded View Of Cylinder Head
 Courtesy of FORD MOTOR CO.

PART NUMBER REFERENCE

Item	Part Number	Description
60	12281	Spark plug wire set
61	12029	Ignition coil
62	6B288	Camshaft Position (CMP) sensor
63	6766	Oil filler cap
64	6582	Valve cover

65	-	Valve cover gasket
66	-	Camshaft bearing cap
67	6250	Camshaft (intake)
68	6250	Camshaft (exhaust)
69	6500	Valve tappet (16 required)
70	6518	Valve spring retainer key (16 required)
71	6514	Valve spring retainer (16 required)
72	6513	Valve spring (16 required)
73	6571	Valve stem seal (16 required)
74	-	Cylinder Head Temperature (CHT) sensor
75	12405	Spark plug (4 required)
76	18801	Radio noise suppressor
77	6065	Cylinder head bolt (10 required)
78	6049	Cylinder head
79	6505	Exhaust valve (8 required)
80	6507	Intake valve (8 required)
81	6051	Head gasket
82	6010	Cylinder block
83	6256	Camshaft sprocket (2 required)
84	9448	Exhaust manifold gasket
85	17K004	Engine lifting eye
86	6754	Oil level indicator tube assembly
87	9430	Exhaust manifold

Engine - Intake Manifold



ND110082

Fig. 230: Exploded View Of Intake Manifold
 Courtesy of FORD MOTOR CO.

PART NUMBER REFERENCE

Item	Part Number	Description
88	-	High pressure fuel line (supply)
89	9D280	Fuel rail
90	9F593	Fuel injector (4 required)
91	-	Coolant outlet adapter assembly (front)
92	-	Coolant outlet adapter assembly (rear)
93	8255	Coolant outlet connector gasket
94	8A852	Coolant bypass hose and clamp assembly
95	6758	Crankcase ventilation tube
96	9E470	EGR valve-to-exhaust manifold tube
97	9424	Intake manifold
98	9F479	Manifold Absolute Pressure (MAP) sensor
99	9E926	Throttle Body (TB) assembly
100	9G297	Evaporative Emission (EVAP) hose

101	9F715	Idle Air Control (IAC) valve assembly
102	9D475	EGR valve
103	9D476	EGR valve mounting gasket
104	17K004	Engine lifting eye
105	6049	Cylinder head
106	6051	Cylinder head gasket
107	6010	Cylinder block
108	12A699	Knock Sensor (KS)

NOTE: During engine repair procedures, cleanliness is extremely important. Foreign material, including any material created while cleaning gasket surfaces may enter the cylinders, oil passages, coolant passages or the oil pan, and cause engine failure.

NOTE: The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, using diamond washers between the flange faces on each part. For that reason, the crankshaft sprocket is also unfastened if the pulley is loosened. Therefore, the engine must be retimed each time the damper is removed. Otherwise severe engine damage may occur.

NOTE: Assembly of the engine requires various inspections/measurements of the engine components (engine block, crankshaft, connecting rods, pistons and piston rings). These inspections/measurements will aid in determining if the engine components will require replacement. For additional information, refer to **ENGINE SYSTEM - GENERAL INFORMATION** .

All vehicles

NOTE: If the oil squirters are being reused, they must be installed in the same location as marked during disassembly.

1.

NOTE: The front bulkhead does not have an oil squirter.

Install the 4 oil squirters.

- Tighten to 4 Nm (35 lb-in).

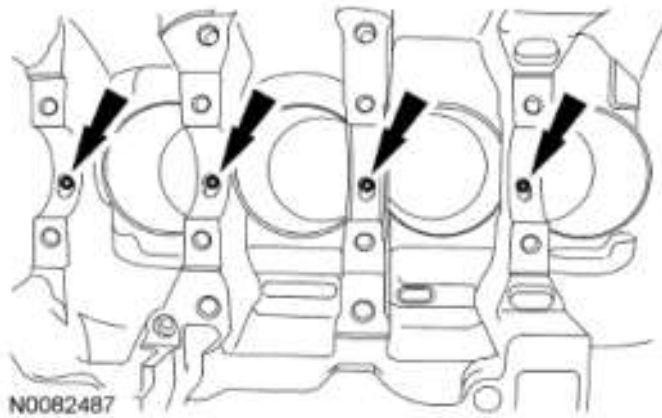


Fig. 231: Locating Oil Squirters
 Courtesy of FORD MOTOR CO.

2. Measure each of the crankshaft main bearing journal diameters in at least 2 directions and record the smallest diameter for each journal.

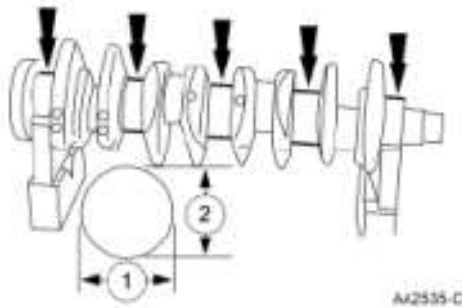


Fig. 232: Measuring Crankshaft Main Bearing Journal Diameters
 Courtesy of FORD MOTOR CO.

3. Position the main bearing beam in the engine block with the main bearing beam mounted flush with the rear face of the engine block.

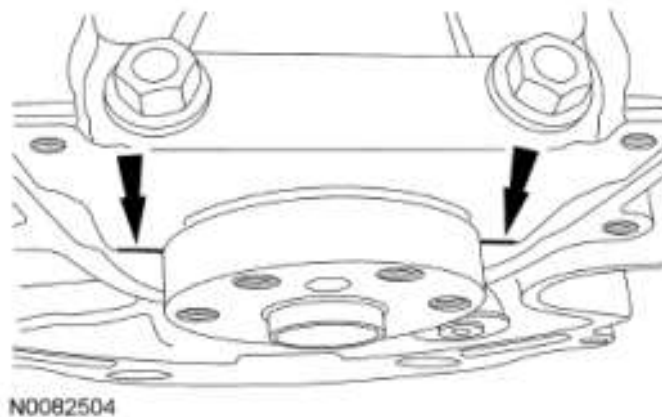


Fig. 233: Locating Main Bearing Beam
 Courtesy of FORD MOTOR CO.

4. Using the original main bearing beam bolts, install and tighten the 10 main bearing beam bolts.

- Tighten the bolts in the sequence shown in illustration in 3 stages.
- Stage 1: Tighten to 5 Nm (44 lb-in).
- Stage 2: Tighten to 25 Nm (18 lb-ft).
- Stage 3: Tighten an additional 90 degrees.

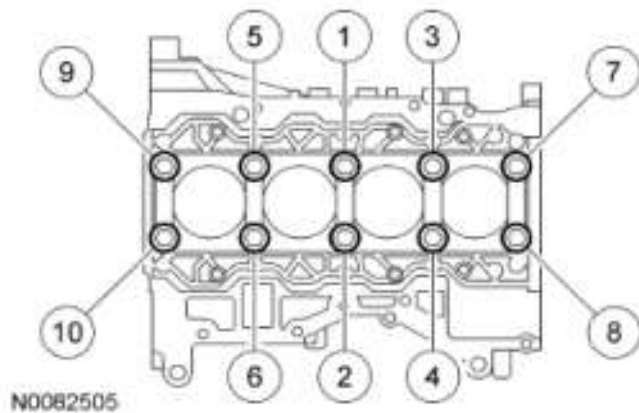


Fig. 234: Identifying Main Bearing Beam Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

5. Measure each crankshaft block main bearing bore diameter.
 - Remove the bolts and the main bearing beam.
 - Discard the main bearing beam bolts.

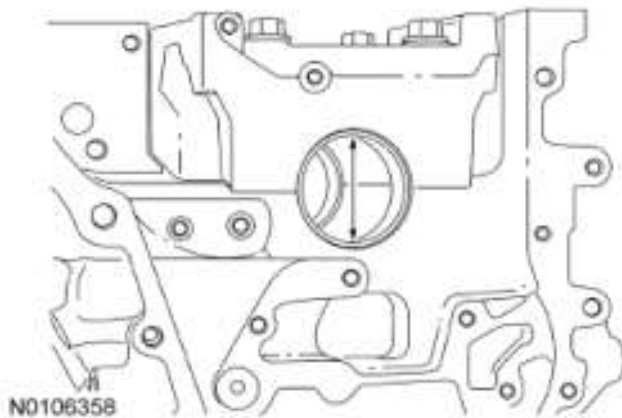


Fig. 235: Measuring Crankshaft Block Main Bearing Bore Diameter
 Courtesy of FORD MOTOR CO.

6. Using the chart, select the crankshaft main bearings.

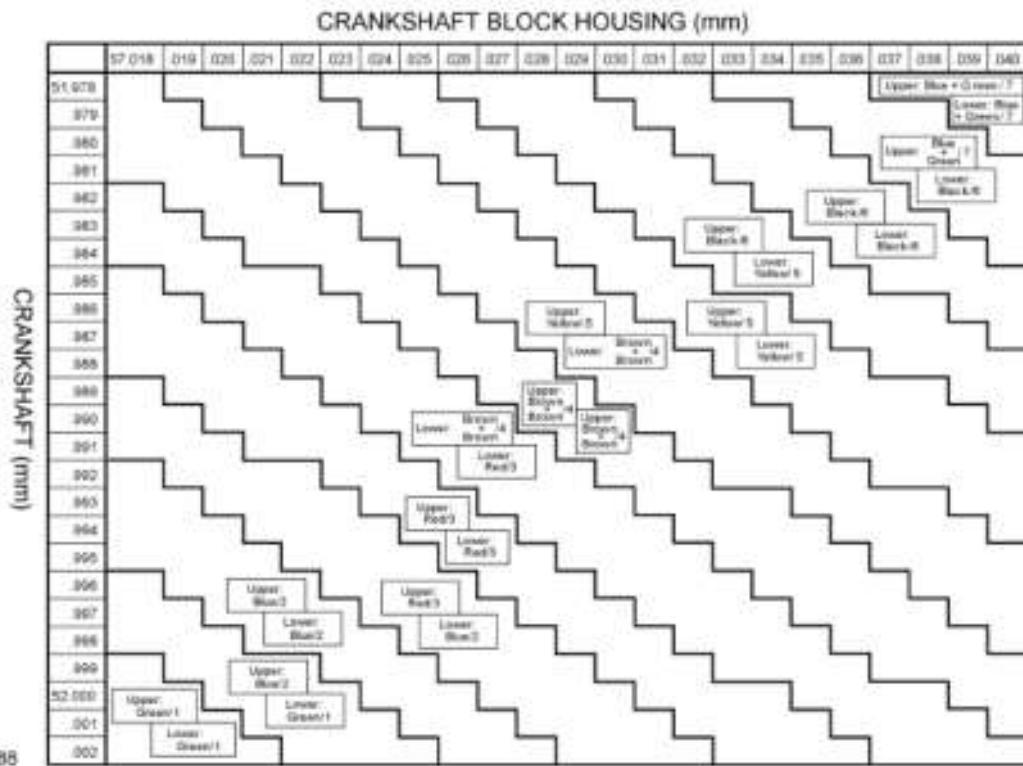
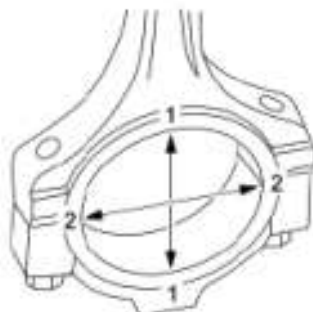


Fig. 236: Crankshaft Main Bearings Chart
 Courtesy of FORD MOTOR CO.

NOTE: The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.

7.
 - Tighten the bolts in 2 stages.
 - Stage 1: Tighten to 29 Nm (21 lb-ft).
 - Stage 2: Tighten an additional 90 degrees.
8. Measure the connecting rod large end bore in 2 directions. Record the smallest measurement for each connecting rod.
 - Remove the bolts and the connecting rod cap.
 - Discard the connecting rod cap bolts.



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Fig. 237: Measuring Connecting Rod Large End Bore

Courtesy of FORD MOTOR CO.

- Measure each of the crankshaft connecting rod bearing journal diameters in at least 2 directions. Record the smallest measurement for each connecting rod journal.

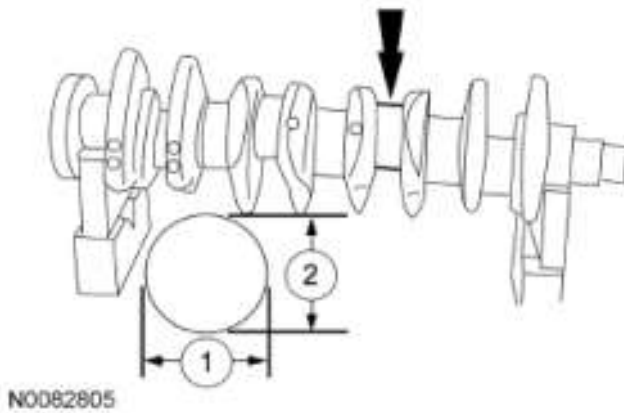


Fig. 238: Measuring Crankshaft Connecting Rod Bearing Journal Diameters
 Courtesy of FORD MOTOR CO.

- Using the chart, select the correct connecting rod bearings for each crankshaft connecting rod journal.

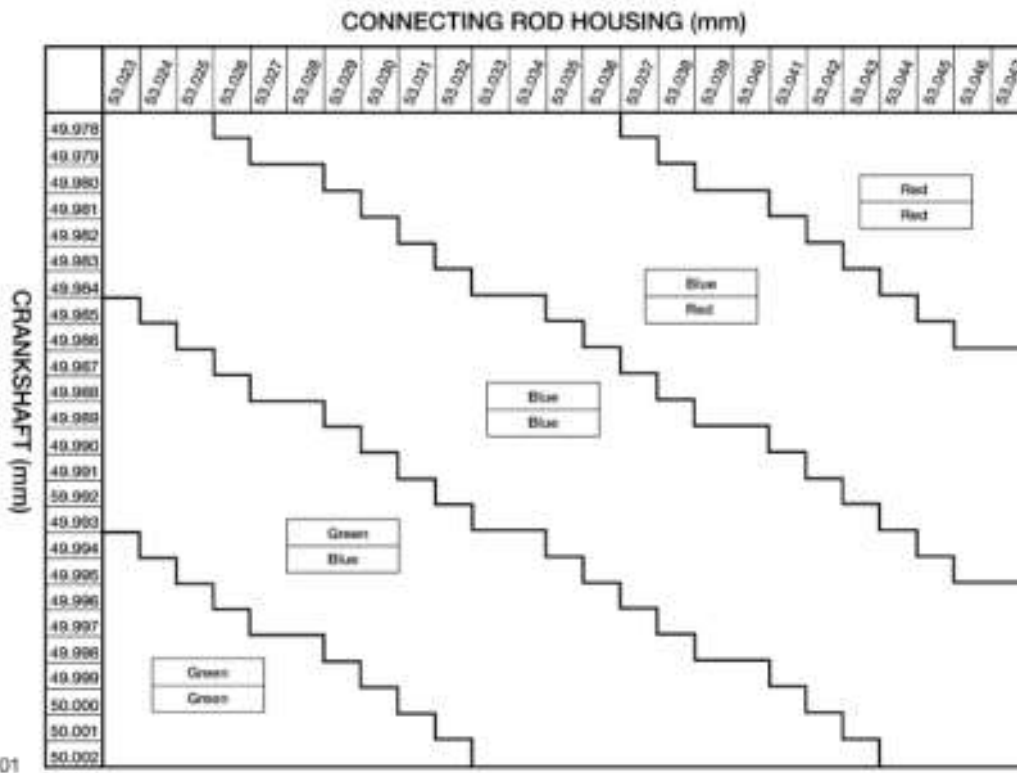


Fig. 239: Connecting Rod Bearings Chart
 Courtesy of FORD MOTOR CO.

NOTE: Before assembling the cylinder block, all sealing surfaces must be free of chips, dirt, paint and foreign material. Also, make sure the coolant and oil passages are clear.

NOTE: If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

NOTE: The center bulkhead is the thrust bearing.

Lubricate the upper crankshaft main bearings with clean engine oil and install the 5 crankshaft main bearings in the cylinder block.

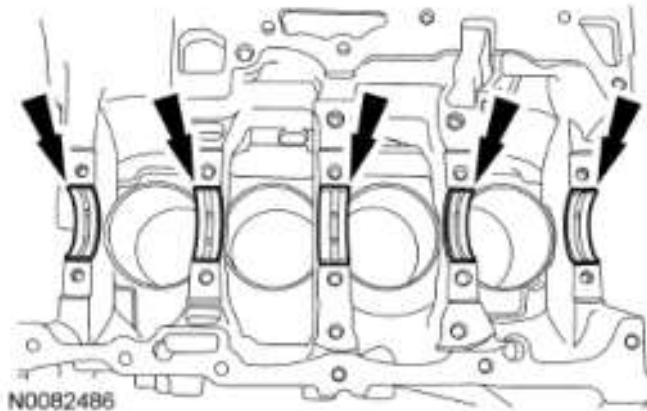


Fig. 240: Locating Main Bearings On Cylinder Block
Courtesy of FORD MOTOR CO.

12. **NOTE:** If reusing the crankshaft main bearings, install them in their original positions and orientation as noted during disassembly.

Lubricate the crankshaft main bearings with clean engine oil and install the 5 crankshaft main bearings in the main bearing beam.

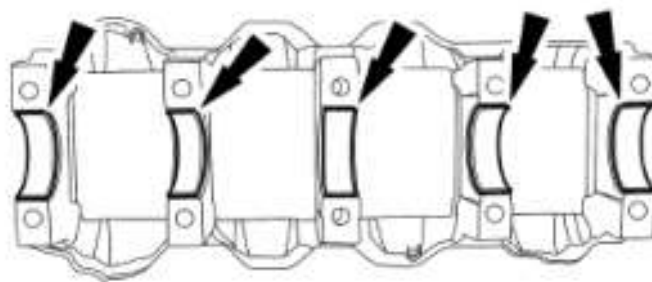


Fig. 241: Locating Main Bearings
Courtesy of FORD MOTOR CO.

13. Lubricate journals on the crankshaft with clean engine oil.
14. Position the crankshaft in the cylinder block.

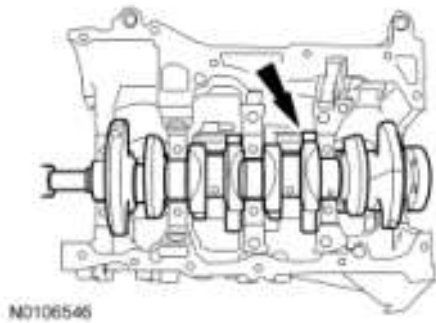


Fig. 242: Locating Crankshaft
 Courtesy of FORD MOTOR CO.

15. Lubricate the 10 main bearing beam side fit surfaces (front 2 shown in illustration) with clean engine oil.

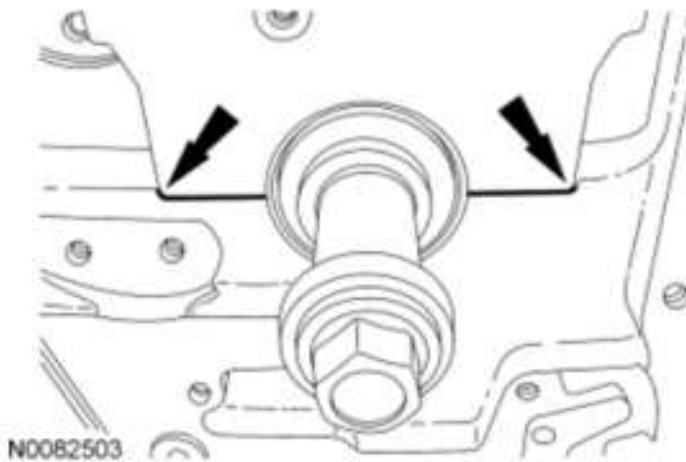


Fig. 243: Locating Main Bearing Beam
 Courtesy of FORD MOTOR CO.

16. Lubricate the crankshaft bearing journals on the main bearing beam with clean engine oil. Then position the main bearing beam in the engine block with the main bearing beam mounted flush with the rear face of the engine block.

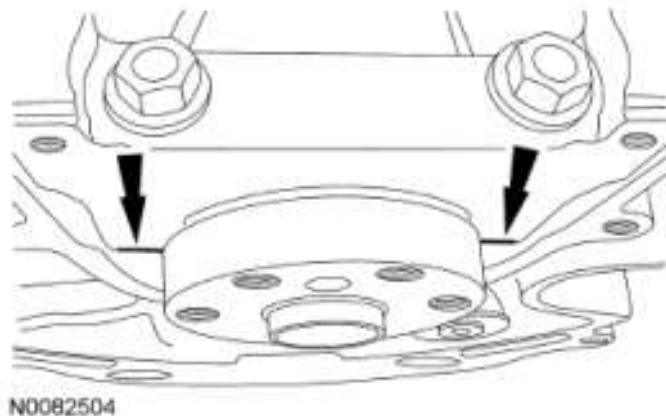


Fig. 244: Locating Main Bearing Beam
 Courtesy of FORD MOTOR CO.

17. **NOTE:** Lubricate the main bearing beam bolts threads and under the bolt heads with clean engine oil.

NOTE: Position the crankshaft to the rear of the cylinder block, then position the crankshaft to the front of the cylinder block before tightening the main bearing beam bolts.

Install and tighten the 10 main bearing beam bolts.

- Tighten the bolts in the sequence shown in illustration in 3 stages.
- Stage 1: Tighten to 5 Nm (44 lb-in).
- Stage 2: Tighten to 25 Nm (18 lb-ft).
- Stage 3: Tighten an additional 90 degrees.

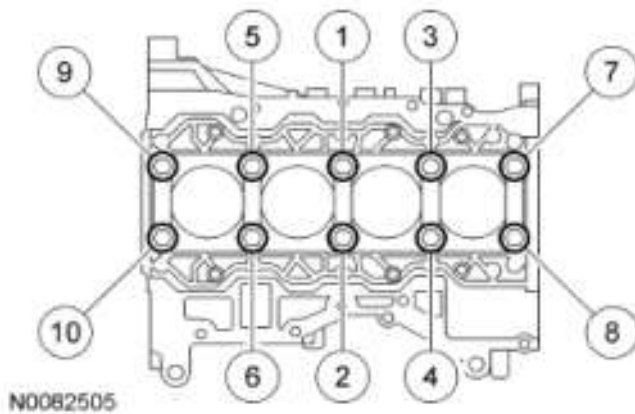


Fig. 245: Identifying Main Bearing Beam Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

18. Using the Dial Indicator Gauge with Holding Fixture, measure crankshaft end play.
- Position the crankshaft to the rear of the cylinder block.
 - Zero the Dial Indicator Gauge with Holding Fixture.
 - Move the crankshaft to the front of the cylinder block. Note and record the crankshaft end play.
 - Acceptable crankshaft end play is 0.22-0.43 mm (0.008-0.016 in). If the crankshaft end play exceeds the specified range, install new parts as necessary.

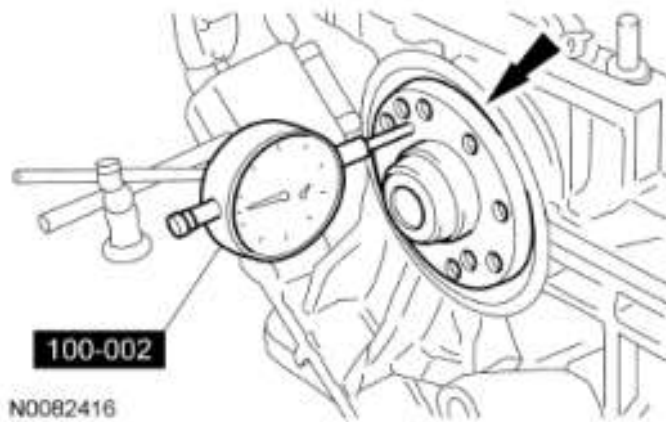
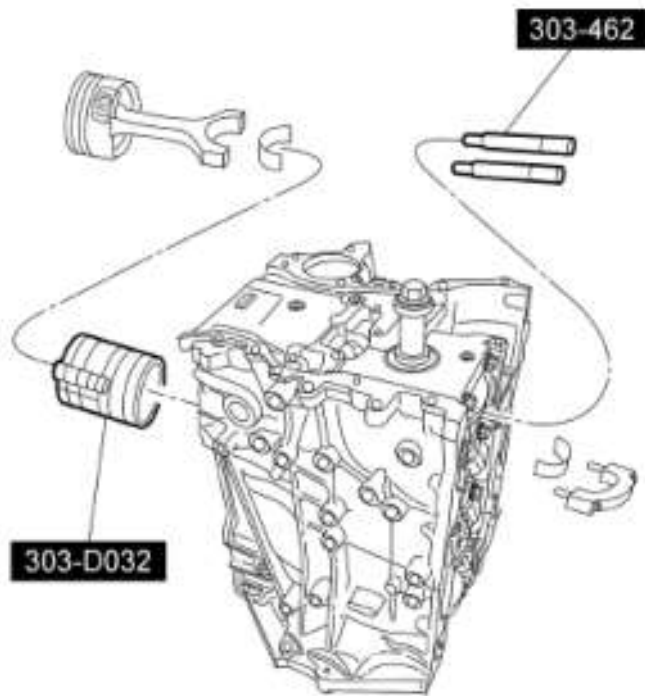


Fig. 246: Measuring Crankshaft End Play
Courtesy of FORD MOTOR CO.

19. **NOTE:** Be sure not to scratch the cylinder wall or crankshaft journal with the connecting rod. Push the piston down until the connecting rod bearing seats on the crankshaft journal.
- NOTE:** Lubricate the pistons, piston rings, connecting rod bearings and the entire cylinder bores with clean engine oil.
- NOTE:** Make sure the piston arrow on top is facing toward the front of the engine.

Using the Piston Ring Compressor and the Connecting Rod Installer, install the piston and connecting rod assemblies.

- When installing the pistons and connecting rod assemblies, the oil ring gaps must be positioned 60 degrees apart from each other and a minimum of 90 degrees from the expander gap.
- The position of the upper and lower compression ring gaps are not controlled for installation.



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Fig. 247: Installing Pistons And Connecting Rod
Courtesy of FORD MOTOR CO.

20. **NOTE:** The rod cap installation must keep the same orientation as marked during disassembly or engine damage may occur.
- NOTE:** Install connecting rod caps and bolts on the connecting rods for cylinders 1 and 4 first and tighten. Then rotate crankshaft 180 degrees and install connecting rod caps and bolts on connecting rods for cylinders 2 and 3 and tighten.
- NOTE:** After installation of each connecting rod cap, rotate the crankshaft to verify smooth operation.

Install the connecting rod caps and bolts.

- Tighten the bolts in 2 stages.
- Stage 1: Tighten to 29 Nm (21 lb-ft).
- Stage 2: Tighten an additional 90 degrees.

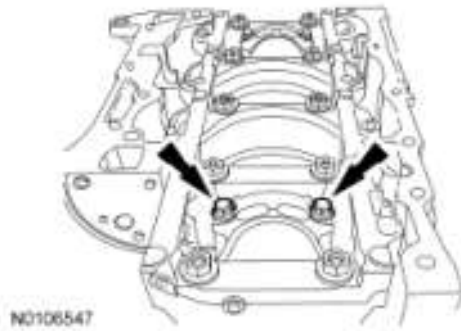


Fig. 248: Locating Connecting Rod Caps Bolts
 Courtesy of FORD MOTOR CO.

21. **NOTE:** Failure to position the No. 1 piston at Top Dead Center (TDC) may result in damage to the engine.

NOTE: Turn the crankshaft in the normal direction of rotation only, or the engine may be damaged.

Using the crankshaft pulley bolt, turn the crankshaft clockwise to position the No. 1 piston at Top Dead Center (TDC).

22. Remove the timing peg plug.

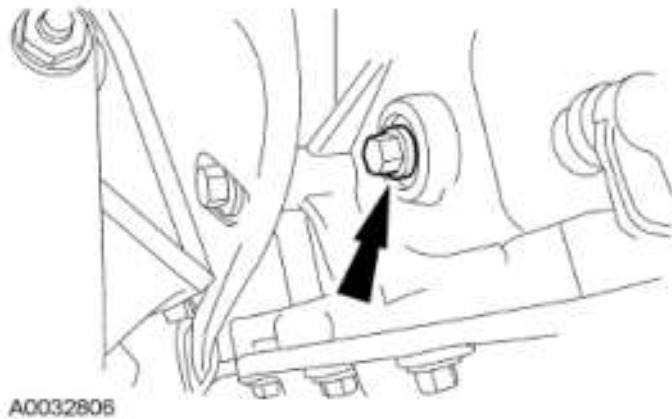
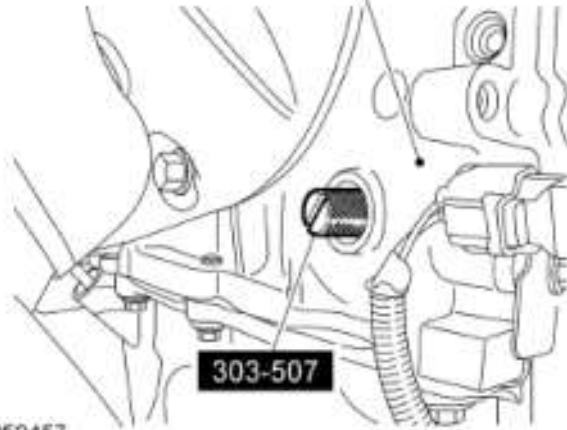
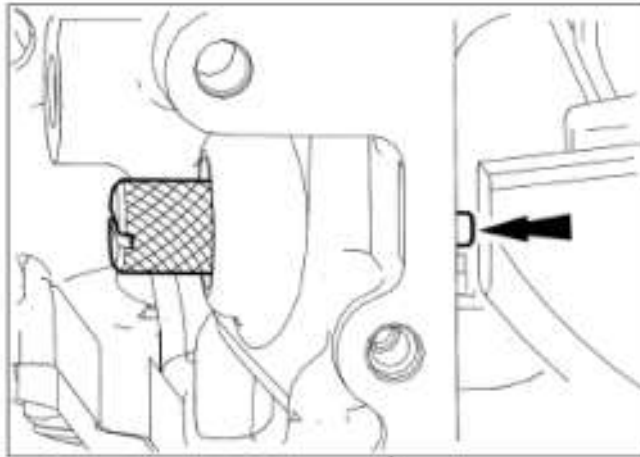


Fig. 249: Locating Timing Peg Plug
 Courtesy of FORD MOTOR CO.

23. **NOTE:** The Crankshaft Timing Peg will contact the crankshaft and prevent it from turning past TDC . However, the crankshaft can still be rotated in the counterclockwise direction. The crankshaft must remain in the TDC position during the crankshaft pulley removal and installation.

Install the Crankshaft Timing Peg.



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Fig. 250: Locating Crankshaft Timing Peg
Courtesy of FORD MOTOR CO.

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

24.

Position the oil pump assembly and tighten the 4 bolts in the sequence shown in illustration, in 2 stages.

- Stage 1: Tighten to 10 Nm (89 lb-in).
- Stage 2: Tighten to 20 Nm (177 lb-in).

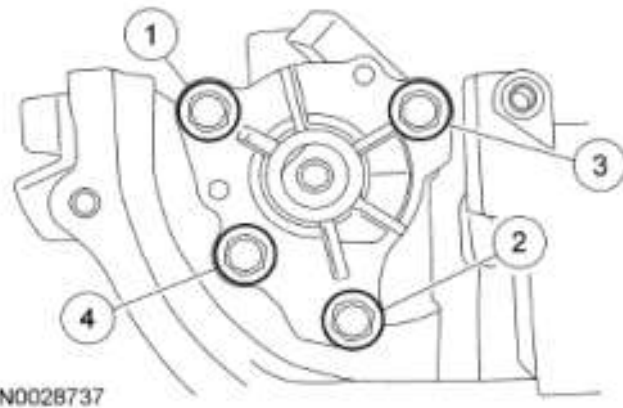


Fig. 251: Locating Oil Pump Assembly Bolts
 Courtesy of FORD MOTOR CO.

25. **NOTE:** Clean the sealing surface with metal surface prep. Observe all warnings and cautions and follow all application directions contained on the packaging of the metal surface prep.

Position a new oil pump pickup tube gasket and the pickup tube, and tighten the 4 bolts in the sequence shown in illustration.

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

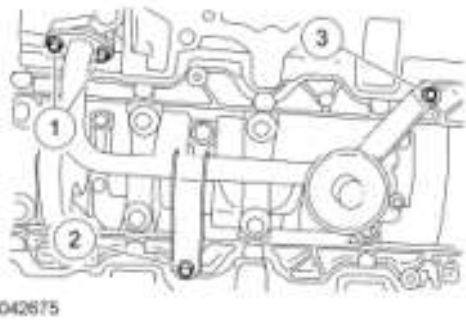


Fig. 252: Identifying Oil Pump Pickup Tube With Bolts
 Courtesy of FORD MOTOR CO.

26. Using the Crankshaft Rear Main Oil Seal Installer, install the a new crankshaft rear seal and retainer plate assembly.

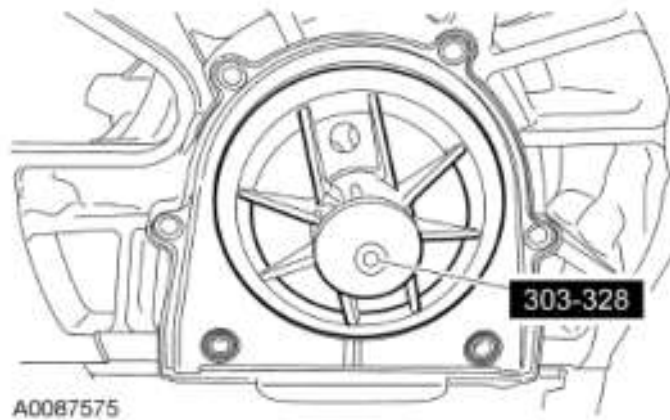


Fig. 253: Installing Crankshaft Rear Seal
 Courtesy of FORD MOTOR CO.

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

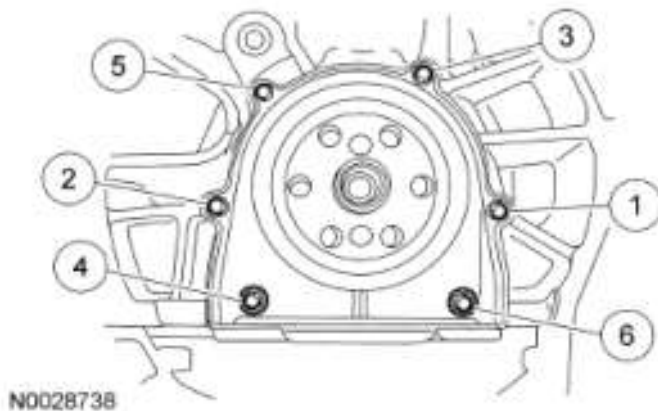


Fig. 254: Identifying Crankshaft Rear Seal Plate Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

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

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

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.

Apply a 2.5 mm (0.1 in) bead of silicone gasket and sealant to the oil pan. Install the oil pan. Tighten the 13 oil pan bolts in the sequence shown in illustration.

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

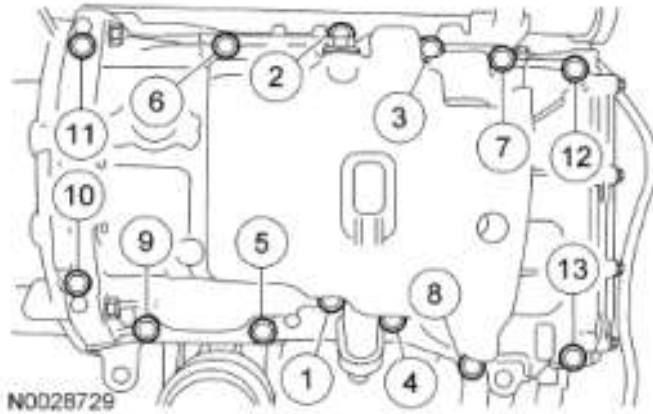


Fig. 255: Identifying Oil Pan Bolts Tightening Sequence
Courtesy of FORD MOTOR CO.

29.

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

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

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

Clean the cylinder head-to-cylinder block mating surfaces of both the cylinder head and the cylinder block in the following sequence.

1. Remove any large deposits of silicone or gasket material with a plastic scraper.
 2. Apply silicone gasket remover, following package directions, and allow to set for several minutes.
 3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
 4. Apply metal surface prep, following package directions, to remove any remaining traces of oil or coolant, and to prepare the surfaces to bond with the new gasket. Do not attempt to make the metal shiny. Some staining of the metal surfaces is normal.
30. Support the cylinder head on a bench with the head gasket side up. Check the cylinder head and the cylinder block distortion. For additional information, refer to **ENGINE SYSTEM - GENERAL**

INFORMATION .

31. Install the 2 cylinder head alignment dowels. Dowels must be fully seated in the cylinder block.

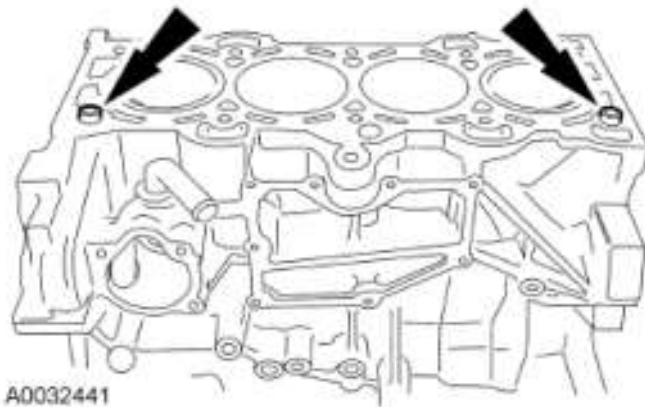


Fig. 256: Locating Cylinder Head Alignment Dowels
Courtesy of FORD MOTOR CO.

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

NOTE: Clean the sealing 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.

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.

Apply silicone gasket and sealant to the locations shown in illustration.

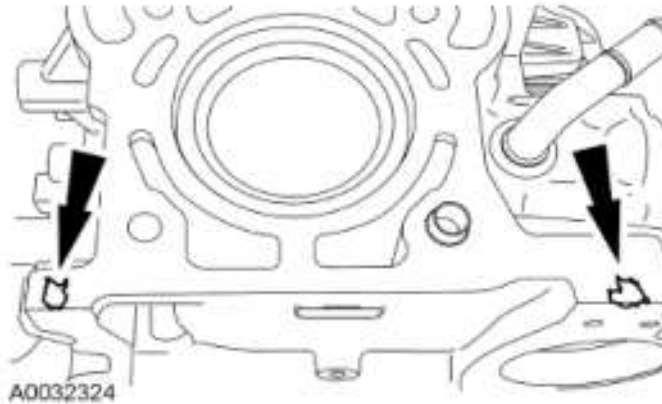


Fig. 257: Identifying Sealant Applying Area
 Courtesy of FORD MOTOR CO.

33. Install a new cylinder head gasket.

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.

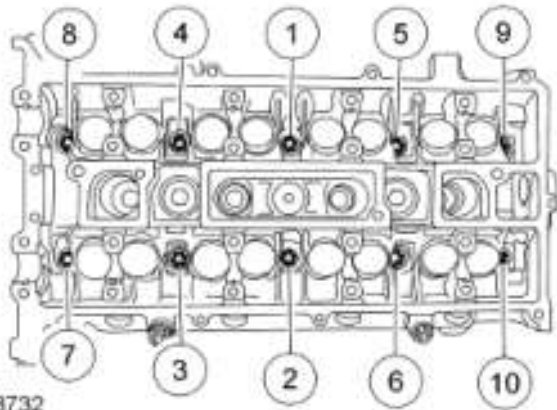
- 34.

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

NOTE: Lubricate the cylinder head bolts with clean engine oil.

Install the cylinder head and the 10 new bolts. Tighten the bolts in the sequence shown in illustration, in 5 stages.

- Stage 1: Tighten to 5 Nm (44 lb-in).
- Stage 2: Tighten to 15 Nm (133 lb-in).
- Stage 3: Tighten to 45 Nm (33 lb-ft).
- Stage 4: Tighten an additional 90 degrees (one-fourth turn).
- Stage 5: Tighten an additional 90 degrees (one-fourth turn).



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Fig. 258: Identifying Cylinder Head Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

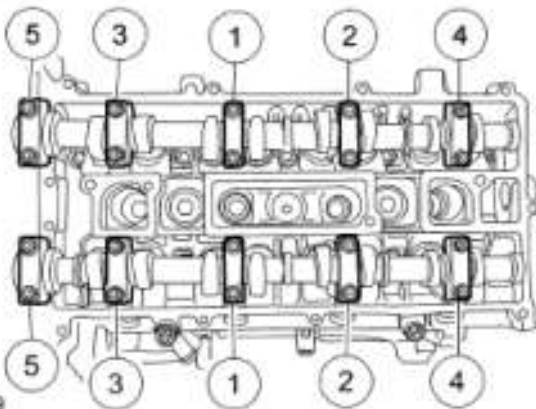
NOTE: Install the camshafts with the alignment slots in the camshaft lined up so the camshaft alignment plate can be installed without rotating the camshafts. Make sure the lobes on the No. 1 cylinder are in the same position as noted in the disassembly procedure. Rotating the camshafts, or installing the camshafts 180 degrees out of position may cause severe damage to the valves and pistons.

35.

NOTE: Lubricate the camshaft journals and bearing caps with clean engine oil.

Install the camshafts and bearing caps in their original location and orientation. Tighten the 20 bearing cap bolts in the sequence shown in illustration in 3 stages:

- Stage 1: Tighten the camshaft bearing caps one turn at a time until tight.
- Stage 2: Tighten the bolts to 7 Nm (62 lb-in).
- Stage 3: Tighten the bolts to 16 Nm (142 lb-in).



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Fig. 259: Identifying Camshaft Bearing Caps Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

NOTE: The crankshaft, the crankshaft sprocket and the pulley are fitted together by friction, with diamond washers between the flange faces on

36.

36. **each part. The new diamond washers must be installed correctly, or severe engine damage may result.**

Install the new diamond washers and the oil pump chain and sprockets.

- The crankshaft sprocket flange must be facing away from the engine block.

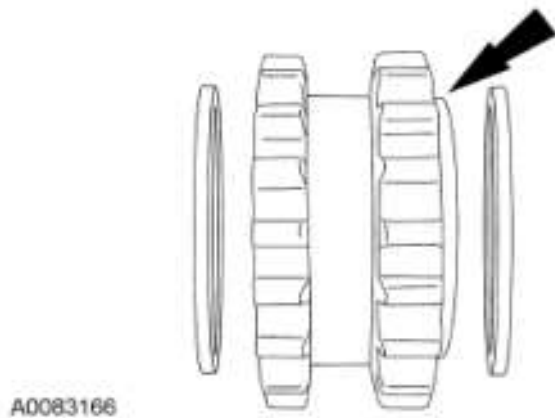


Fig. 260: Locating Crankshaft Sprocket
Courtesy of FORD MOTOR CO.

37. **NOTE: The oil pump chain sprocket must be held in place.**

Tighten the oil pump sprocket bolt.

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

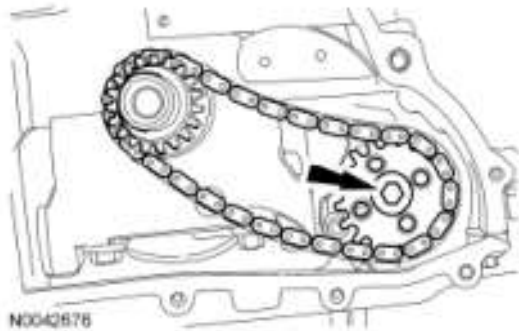


Fig. 261: Locating Oil Pump Sprocket Bolt
Courtesy of FORD MOTOR CO.

38. Install the oil pump chain drive tensioner shoulder bolt.
- Tighten to 10 Nm (89 lb-in).

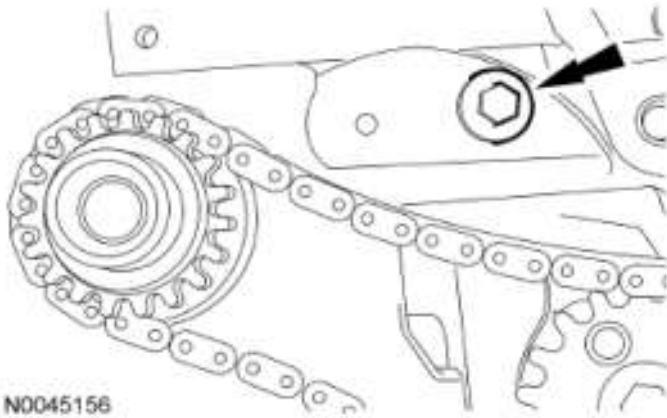


Fig. 262: Locating Oil Pump Chain Drive Tensioner Shoulder Bolt
 Courtesy of FORD MOTOR CO.

39. Install the oil pump chain tensioner. Hook the tensioner spring around the shoulder bolt and tighten the tensioner bolt.
 - Tighten to 10 Nm (89 lb-in).

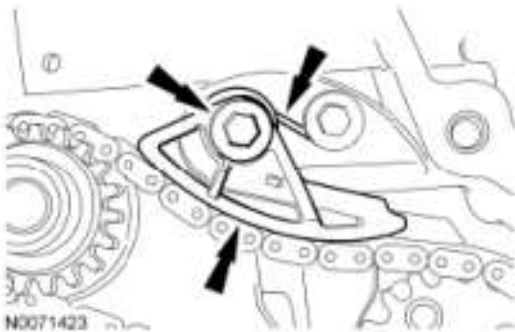


Fig. 263: Locating Oil Pump Chain Tensioner With Bolt
 Courtesy of FORD MOTOR CO.

40. **NOTE:** **Sprockets must turn freely on the camshafts.**

Position the camshaft sprockets and loosely install the bolts. Do not tighten the sprocket bolts at this time.

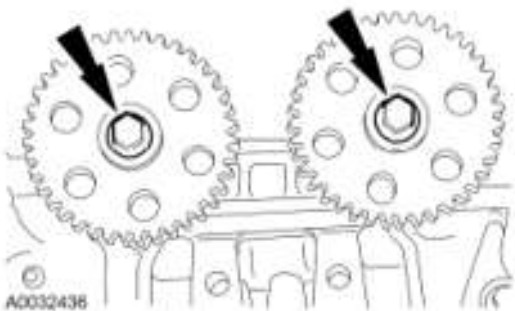
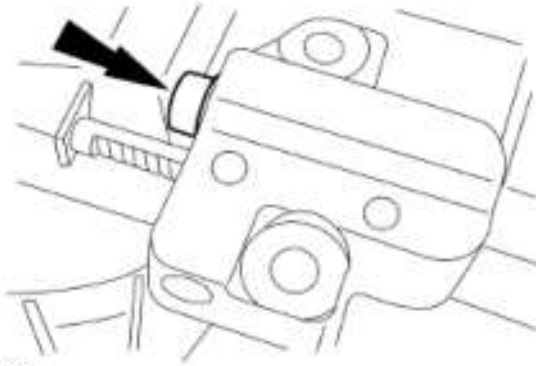


Fig. 264: Locating Camshaft Drive Sprockets Bolts
 Courtesy of FORD MOTOR CO.

NOTE: If the timing chain plunger and ratchet assembly are not pinned in the compressed position, follow the next 4 steps.

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

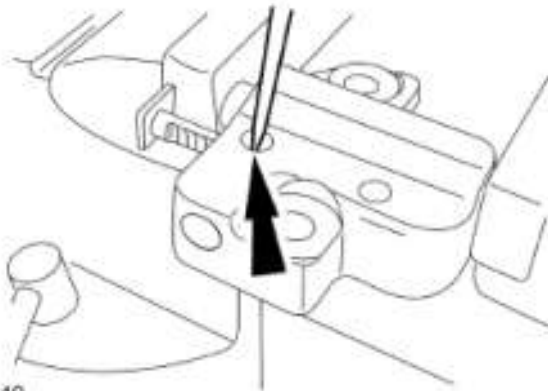
Using the edge of a vise, compress the timing chain tensioner plunger.



A0032539

Fig. 265: Compressing Timing Chain Tensioner Plunger
Courtesy of FORD MOTOR CO.

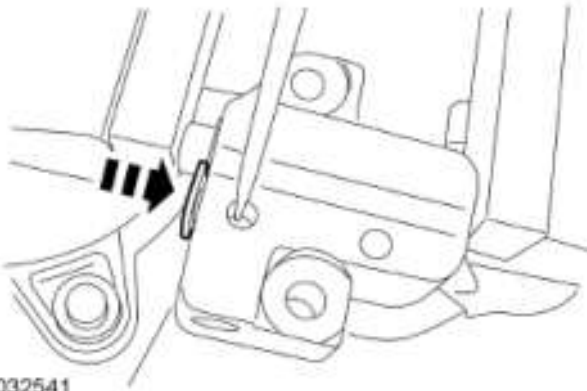
42. Using a small pick, push back and hold the ratchet mechanism.



A0032540

Fig. 266: Holding Ratchet Mechanism
Courtesy of FORD MOTOR CO.

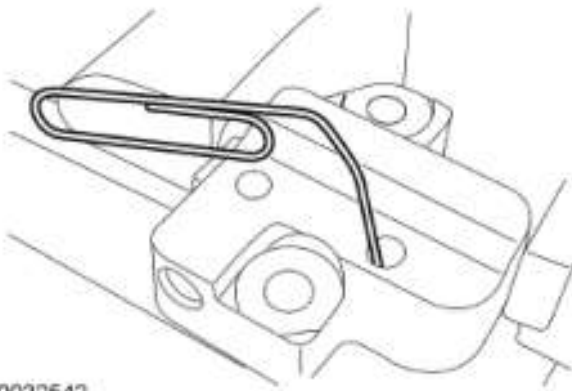
43. While holding the ratchet mechanism, push the ratchet arm back into the tensioner housing.



A0032541

Fig. 267: Pushing Ratchet Arm
Courtesy of FORD MOTOR CO.

44. Install a paper clip into the hole in the tensioner housing to hold the ratchet assembly and the plunger in during installation.



A0032542

Fig. 268: Installing Paper Clip Into Hole In Tensioner Housing
Courtesy of FORD MOTOR CO.

45. Install the timing chain.

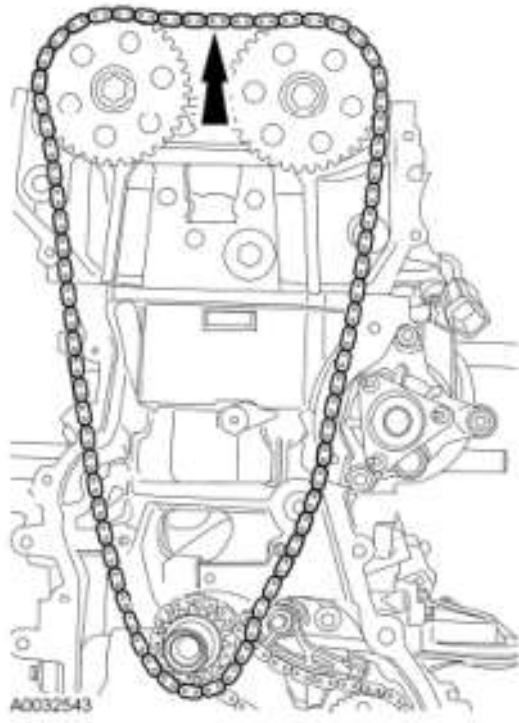


Fig. 269: Locating Timing Chain
Courtesy of FORD MOTOR CO.

46. Position the timing chain guides and install the 2 LH guide bolts.
 - Tighten to 10 Nm (89 lb-in).

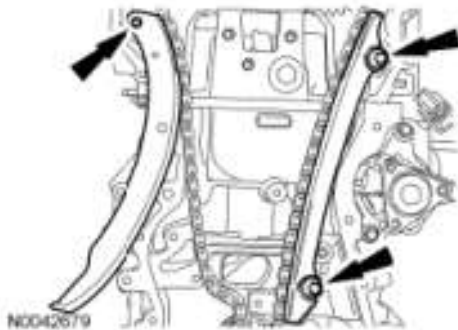


Fig. 270: Locating Timing Chain Guides Bolts
Courtesy of FORD MOTOR CO.

47. Install the timing chain tensioner and the 2 bolts. Remove the paper clip to apply tension to the timing chain.
 - Tighten to 10 Nm (89 lb-in).

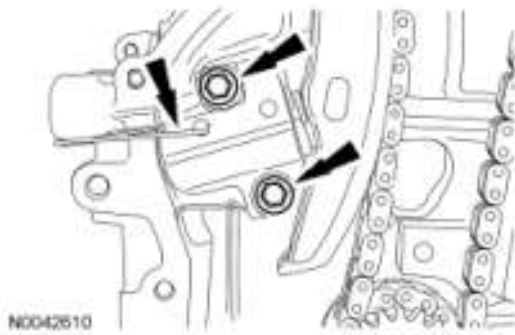


Fig. 271: Locating Timing Chain Tensioner Bolts
 Courtesy of FORD MOTOR CO.

48. **NOTE:** The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation may result in engine damage.

Install the Camshaft Alignment Plate in the timing slots on rear of both camshafts. Timing slots are offset from the centerline of the camshaft.

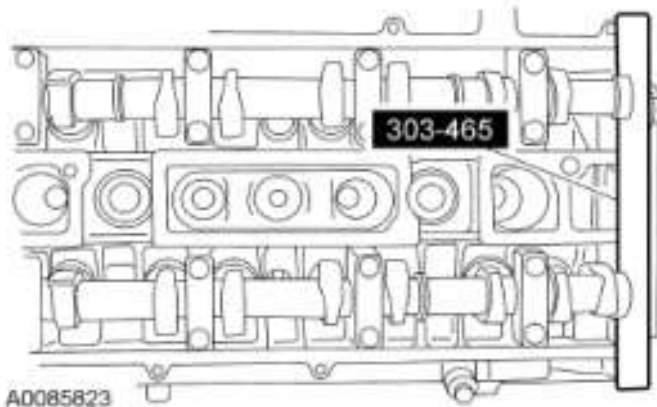


Fig. 272: Identifying Camshaft Alignment Plate
 Courtesy of FORD MOTOR CO.

49. **NOTE:** The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation may result in engine damage.

NOTE: Use a wrench on the flats between cylinders No. 1 and No. 2 to hold the camshafts in place.

Tighten the camshaft sprocket bolts.

- Tighten to 72 Nm (53 lb-ft).

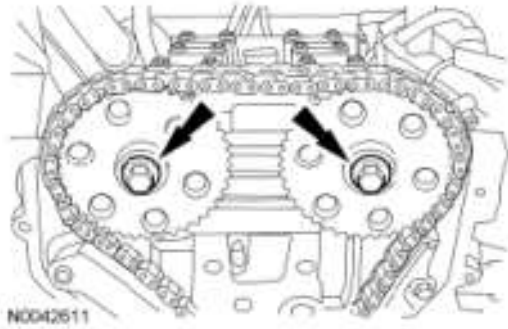


Fig. 273: Locating Camshafts Sprocket Bolts
Courtesy of FORD MOTOR CO.

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

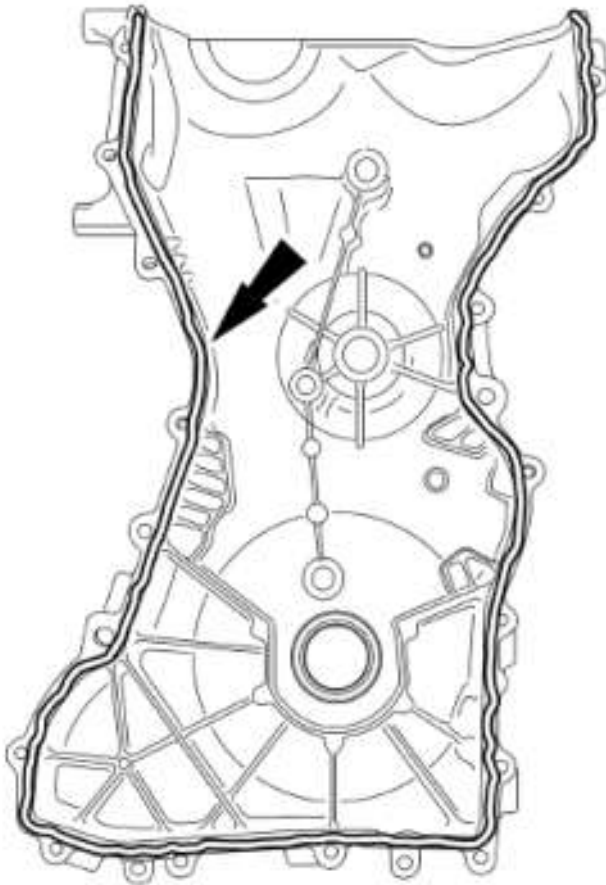
NOTE: Clean the sealing surface with silicone gasket remover and metal surface prep. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and metal surface prep.

Clean the engine front cover gasket surface with silicone gasket remover and metal surface prep.

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

NOTE: 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.

Apply a 2.5 mm (0.1 in) bead of silicone gasket and sealant to the front cover.



A0032803

Fig. 274: Identifying Silicone Gasket Applying Area
Courtesy of FORD MOTOR CO.

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

52.

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.

Apply silicone gasket and sealant to the locations shown in illustration.



Fig. 275: Identifying Sealant Applying Area
 Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. 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.

53.

Install the front cover. Tighten the bolts in the sequence shown in illustration in 3 stages.

- Stage 1: Tighten the seventeen 8-mm bolts and the stud bolt to 10 Nm (89 lb-in).
- Stage 2: Tighten the 10-mm bolt to 25 Nm (18 lb-ft).
- Stage 3: Tighten the two 13-mm bolts to 48 Nm (35 lb-ft).

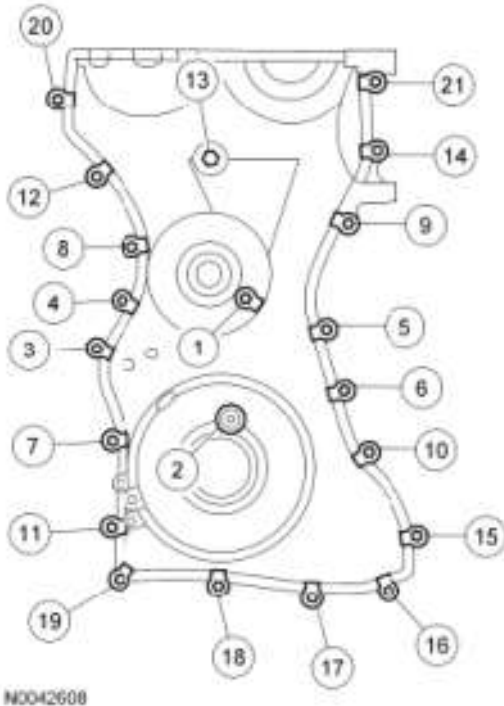


Fig. 276: Identifying Front Cover Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

54. **NOTE:** Remove the through-bolt from the Camshaft Front Oil Seal Installer.

NOTE: Lubricate the crankshaft front seal with clean engine oil.

Using the Camshaft Front Oil Seal Installer, install a new crankshaft front seal.

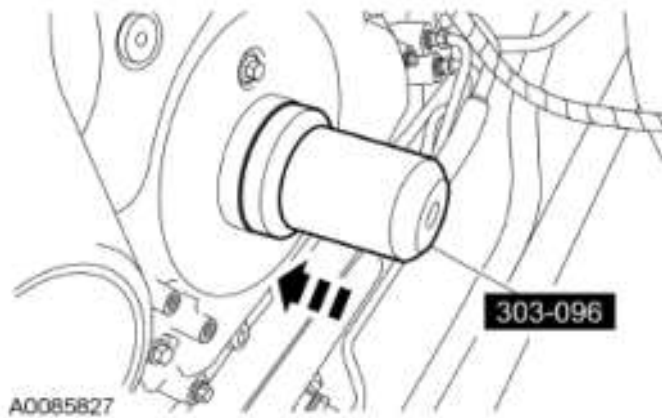


Fig. 277: Installing Crankshaft Front Seal
Courtesy of FORD MOTOR CO.

55. **NOTE:** Do not install the crankshaft pulley bolt at this time.

NOTE: Apply clean engine oil to the seal area prior to installing.

Position the crankshaft pulley onto the crankshaft with the hole in the pulley at the 6 o'clock position.

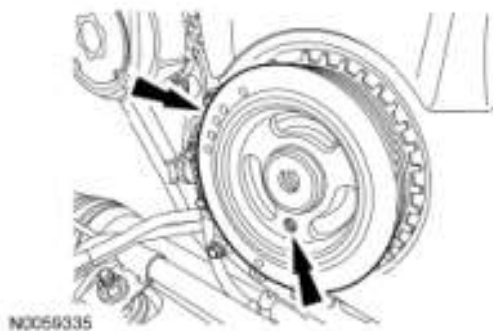


Fig. 278: Locating Crankshaft Pulley Hole
Courtesy of FORD MOTOR CO.

56. **NOTE:** Only hand-tighten the 6 mm x 18 mm bolt or damage to the front cover may occur.

NOTE: This step will correctly align the crankshaft pulley to the crankshaft.

Install a standard 6 mm x 18 mm bolt through the crankshaft pulley and thread it into the front cover.

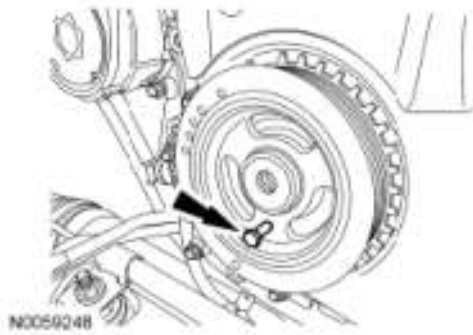


Fig. 279: Locating Crankshaft Pulley Bolt
 Courtesy of FORD MOTOR CO.

57.

NOTE: The crankshaft must remain in the Top Dead Center (TDC) position during installation of the pulley bolt or damage to the engine may occur. Therefore, the crankshaft pulley must be held in place with the Crankshaft Damper Holding Tool and the bolt should be installed using hand tools only.

NOTE: Do not reuse the crankshaft pulley bolt.

Install a new crankshaft pulley bolt. Using the Crankshaft Damper Holding Tool and a suitable 1/2-in drive hand tool to hold the crankshaft pulley in place, tighten the crankshaft pulley bolt in 2 stages:

- Stage 1: Tighten to 100 Nm (74 lb-ft).
- Stage 2: Rotate an additional 90 degrees.

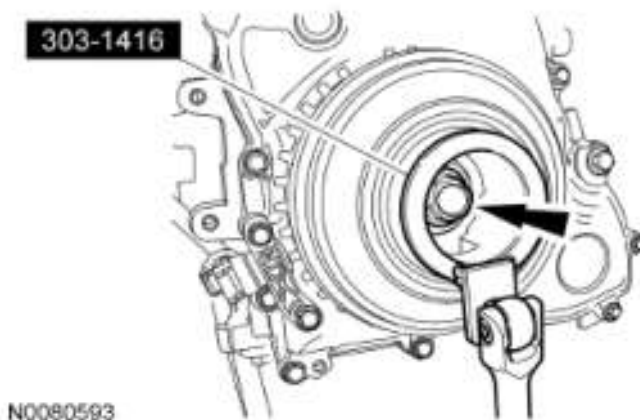


Fig. 280: Locating Crankshaft Pulley With Crankshaft Damper Holding Tool
 Courtesy of FORD MOTOR CO.

58. Remove the 6 mm x 18 mm bolt.

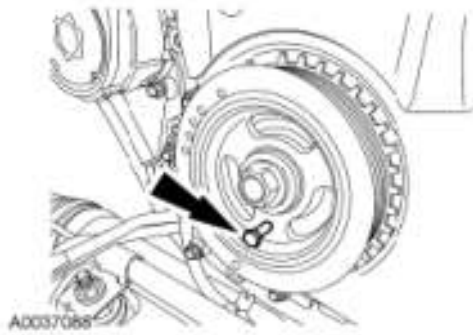


Fig. 281: Locating Crankshaft Pulley Bolt
Courtesy of FORD MOTOR CO.

59. Remove the Crankshaft Timing Peg.

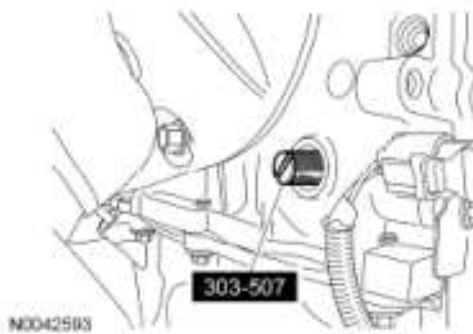


Fig. 282: Identifying Crankshaft Timing Peg
Courtesy of FORD MOTOR CO.

60. Remove the Camshaft Alignment Plate.

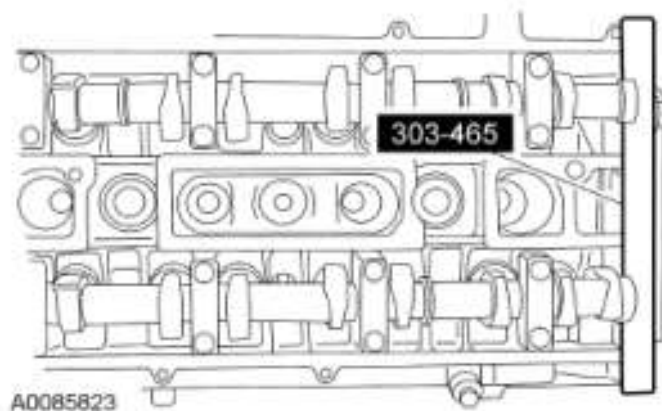


Fig. 283: Identifying Camshaft Alignment Plate
Courtesy of FORD MOTOR CO.

61. **NOTE:** Only turn the crankshaft in the normal direction of rotation.

Turn the crankshaft clockwise one and three-fourths turn.

62. Install the Crankshaft Timing Peg.



Fig. 284: Identifying Crankshaft Timing Peg
 Courtesy of FORD MOTOR CO.

63. **NOTE:** Only turn the crankshaft in the normal direction of rotation.

Turn the crankshaft clockwise until the crankshaft contacts the Crankshaft Timing Peg.

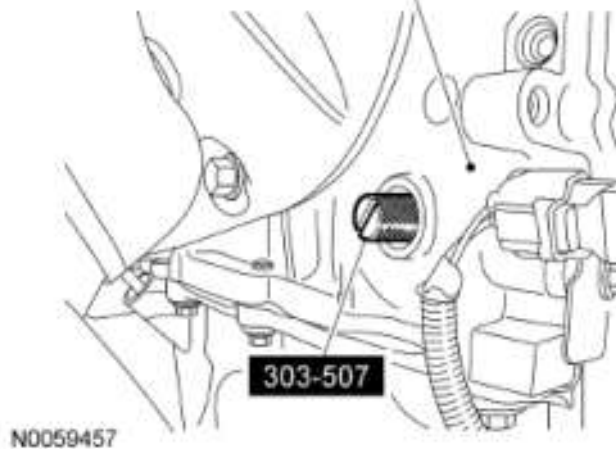
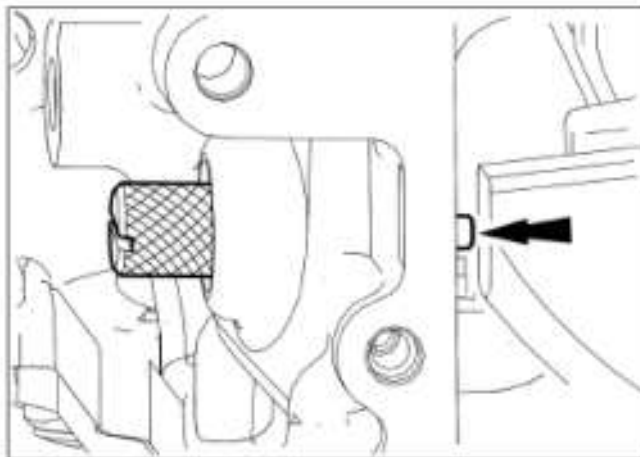


Fig. 285: Locating Crankshaft Timing Peg
 Courtesy of FORD MOTOR CO.

64. **NOTE:** Only hand-tighten the 6 mm x 18 mm bolt or damage to the front cover may occur.

Using the 6 mm x 18 mm bolt, check the position of the crankshaft pulley.

- If it is not possible to install the bolt, correct the engine timing.

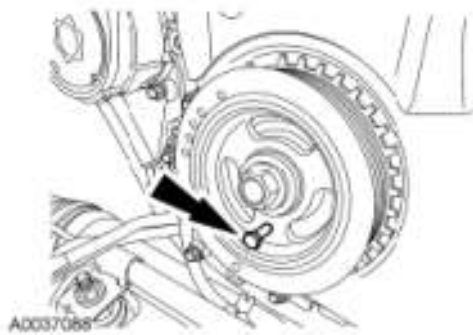


Fig. 286: Locating Crankshaft Pulley Bolt
Courtesy of FORD MOTOR CO.

65. Install the Camshaft Alignment Plate to check the position of the camshafts.
- If it is not possible to install the Camshaft Alignment Plate, correct the engine timing.

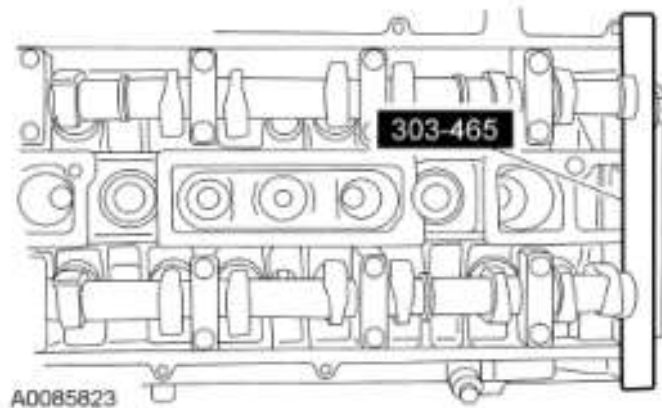


Fig. 287: Identifying Camshaft Alignment Plate
Courtesy of FORD MOTOR CO.

66. Remove the Camshaft Alignment Plate.

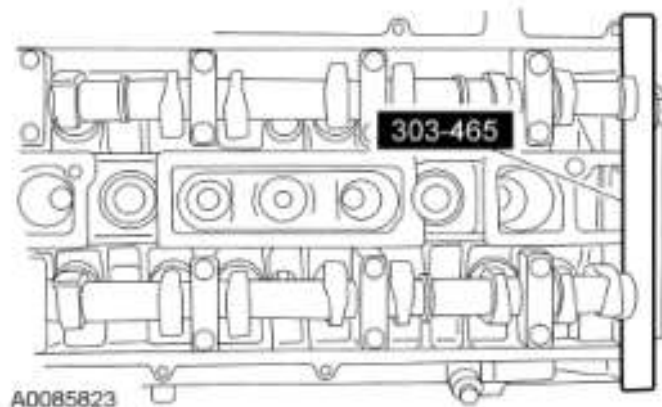


Fig. 288: Identifying Camshaft Alignment Plate

Courtesy of FORD MOTOR CO.

67. Position a new Crankshaft Position (CKP) sensor and loosely install the 2 bolts.

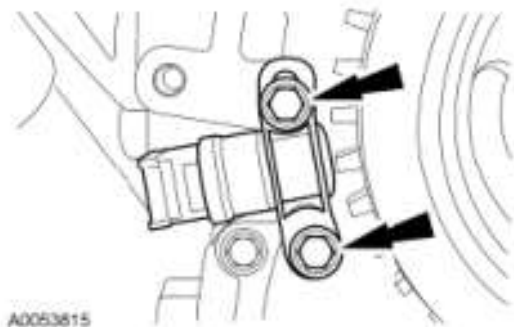


Fig. 289: Locating Crankshaft Position Sensor
Courtesy of FORD MOTOR CO.

68. Adjust the CKP with the Crankshaft Sensor Aligner, the tool must engage a tooth of the vibration damper, and tighten the 2 bolts.
- Tighten to 7 Nm (62 lb-in).

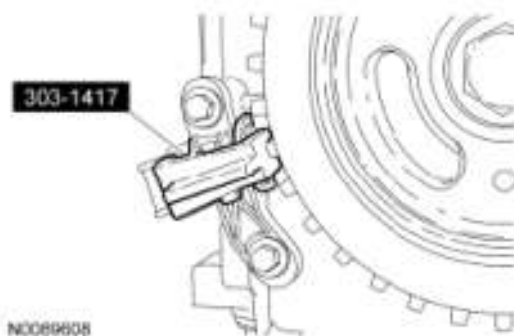


Fig. 290: Identifying CKP With Crankshaft Sensor Aligner
Courtesy of FORD MOTOR CO.

69. Remove the 6 mm x 18 mm bolt.

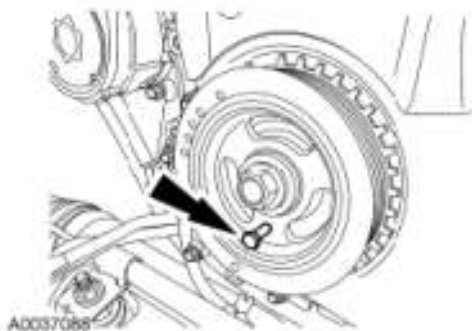


Fig. 291: Locating Crankshaft Pulley Bolt
Courtesy of FORD MOTOR CO.

70. Remove the Crankshaft Timing Peg.



Fig. 292: Identifying Crankshaft Timing Peg
 Courtesy of FORD MOTOR CO.

71. Install the timing peg plug.
 - Tighten to 20 Nm (177 lb-in).

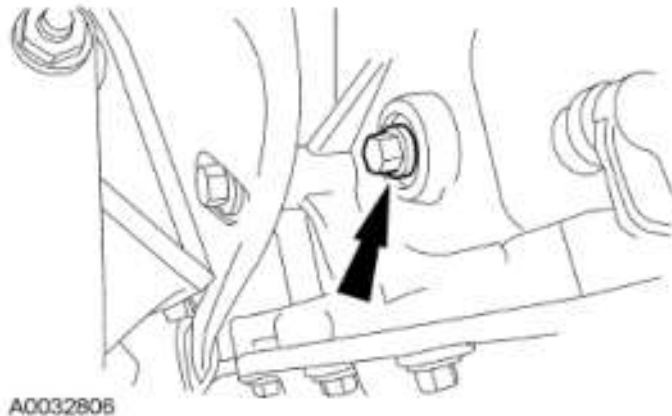


Fig. 293: Locating Timing Peg Plug
 Courtesy of FORD MOTOR CO.

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

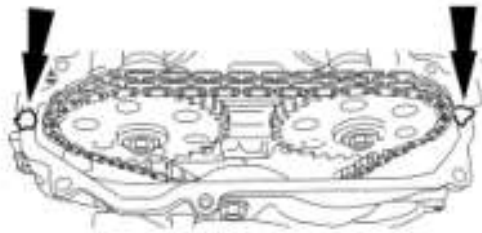
72. Clean the valve cover gasket sealing surface with silicone gasket remover and metal surface prep. Observe all warnings and cautions and follow all application directions contained on the packaging of the silicone gasket remover and metal surface prep.

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

73. **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.

Apply silicone gasket and sealant to the locations shown in illustration.



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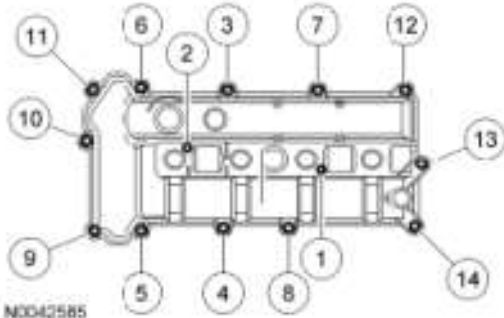
Fig. 294: Identifying Sealant Applying Area
Courtesy of FORD MOTOR CO.

NOTE: If not secured within 4 minutes, the sealant must be removed and the sealing area cleaned. To clean the sealing area, use silicone gasket remover and metal surface prep. 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.

74.

Install the valve cover and the 14 fasteners.

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



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Fig. 295: Identifying Valve Cover Fasteners
Courtesy of FORD MOTOR CO.

75. Install the following:

1. Crankshaft Position (CKP) sensor and the bolt
 - Tighten to 7 Nm (62 lb-in).
2. Cylinder Head Temperature (CHT) sensor
 - Tighten to 12 Nm (106 lb-in).

3. Spark plugs

- Tighten to 15 Nm (133 lb-in).

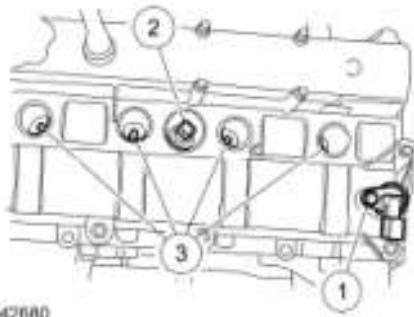


Fig. 296: Identifying Crankshaft Position Sensor, Cylinder Head Temperature Sensor And Spark Plugs

Courtesy of FORD MOTOR CO.

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

76.

NOTE: Clean the 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.

NOTE: Lubricate the coolant pump O-ring seal with clean engine coolant prior to assembly.

Using a new O-ring seal, install the coolant pump and the 3 bolts.

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

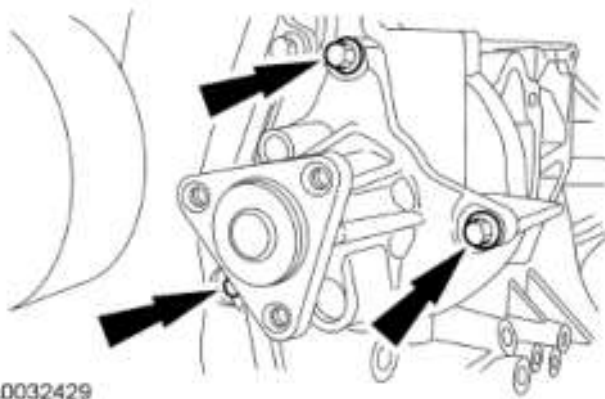


Fig. 297: Locating Coolant Pump Bolts
Courtesy of FORD MOTOR CO.

77. Install the coolant pump pulley and the 3 bolts.
- Tighten to 20 Nm (177 lb-in).

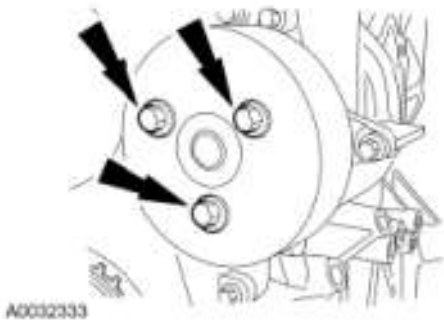


Fig. 298: Locating Coolant Pump Pulley Bolts
Courtesy of FORD MOTOR CO.

78. **NOTE:** Lubricate the fuel injector O-ring seals with clean engine oil prior to installation.

Using new O-ring seals, install the fuel rail and fuel injectors as an assembly, the ground strap and the bolt.

- Tighten the 2 fuel rail bolts to 25 Nm (18 lb-ft).
- Tighten ground strap bolt to 10 Nm (89 lb-in).

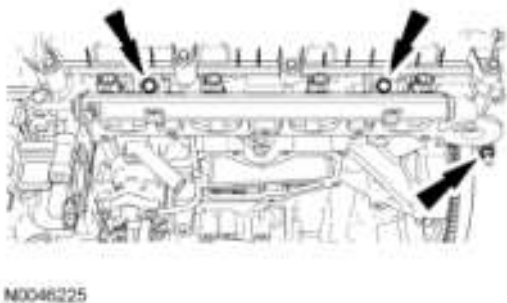


Fig. 299: Locating Fuel Rail Bolts
Courtesy of FORD MOTOR CO.

79. Install the left motor mount and the 4 bolts.
- Tighten to 49 Nm (36 lb-ft).

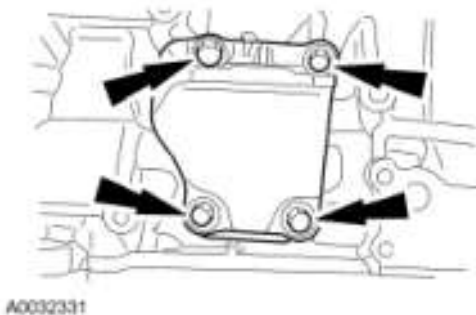


Fig. 300: Locating LH Engine Mount Bracket Bolts
Courtesy of FORD MOTOR CO.

80. **NOTE:** The Knock Sensor (KS) must not touch the crankcase vent oil separator.

Install the crankcase vent oil separator, the KS and the 9 bolts.

- Tighten the KS bolt to 20 Nm (177 lb-in).
- Tighten the 8 crankcase vent oil separator bolts to 10 Nm (89 lb-in).

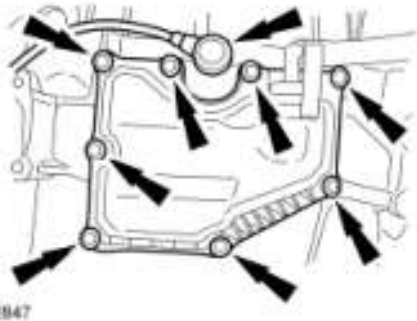


Fig. 301: Locating Engine Vent Cover Bolts
Courtesy of FORD MOTOR CO.

81. **NOTE:** Clean the 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.

Using a new gasket, install the thermostat housing and the 3 bolts.

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

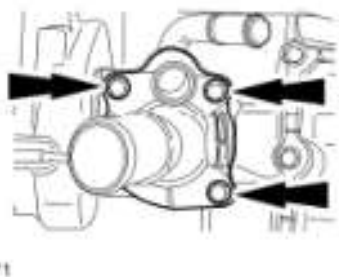


Fig. 302: Locating Thermostat Housing Bolts
Courtesy of FORD MOTOR CO.

82. Install the ignition coil and the 4 bolts.
- Tighten to 6 Nm (53 lb-in).

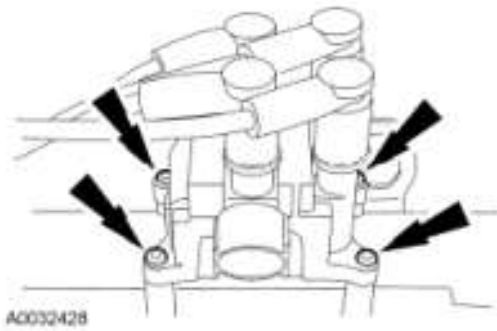


Fig. 303: Locating Ignition Coil Bolts
 Courtesy of FORD MOTOR CO.

83. **NOTE:** Apply silicone brake caliper grease and dielectric compound to the inside of the spark plug boots prior to installation.

Connect the spark plug wires to the spark plugs.

84. Position the fuel charging wiring harness. Attach the fuel charging wiring harness to the valve cover studs.

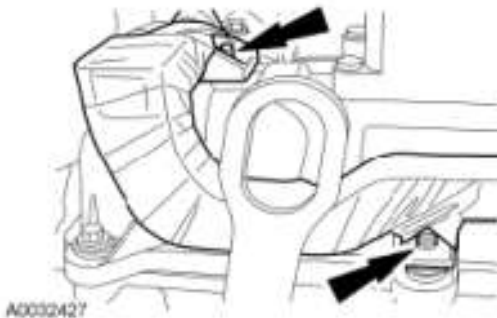


Fig. 304: Locating Engine Wiring Harness Anchors
 Courtesy of FORD MOTOR CO.

85. Connect the ignition coil and the CHT sensor electrical connectors. Position the CHT sensor cover.

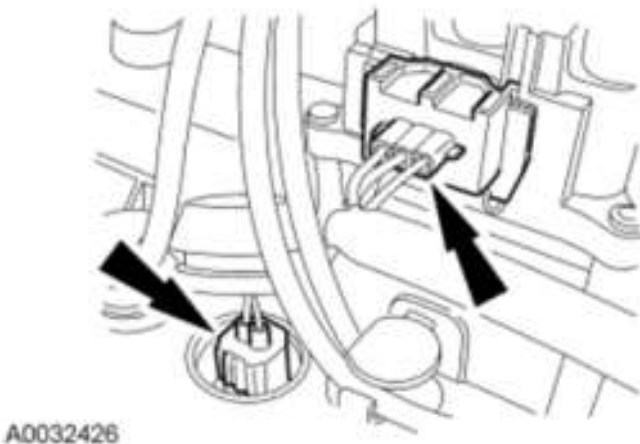


Fig. 305: Locating Coolant Pump Bolts

Courtesy of FORD MOTOR CO.

86. Connect the fuel injector electrical connectors and attach the wiring harness pin-type retainers.

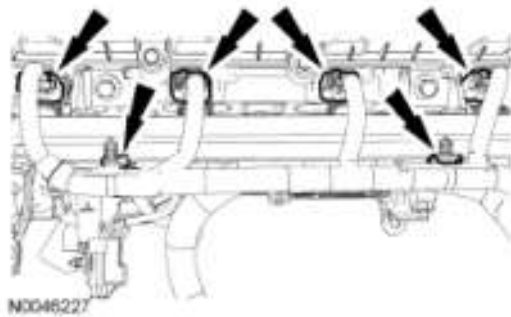


Fig. 306: Locating Fuel Injector Electrical Connectors And Wiring Harness Pin-Type Retainers
Courtesy of FORD MOTOR CO.

87. Inspect and install new intake manifold gaskets, if necessary.

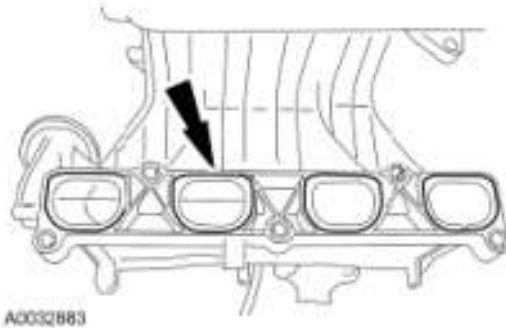


Fig. 307: Locating Intake Manifold Gaskets
Courtesy of FORD MOTOR CO.

88. **NOTE:** If the engine is repaired or replaced because of upper engine failure, typically including valve or piston damage, check the intake manifold for metal debris. If metal debris is found, install a new intake manifold. Failure to follow these instructions can result in engine damage.

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

NOTE: Clean the sealing 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.

Install the intake manifold and the 5 bolts.

- Tighten to 18 Nm (159 lb-in).

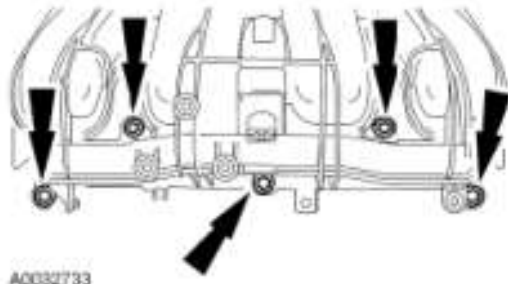


Fig. 308: Locating Intake Manifold Bolts
 Courtesy of FORD MOTOR CO.

89. Install the EGR tube.
- Install the EGR tube bracket and the bolt to the intake manifold.
 - Tighten to 10 Nm (89 lb-in).
 - Connect the EGR tube to the cylinder head.
 - Tighten to 55 Nm (41 lb-ft).

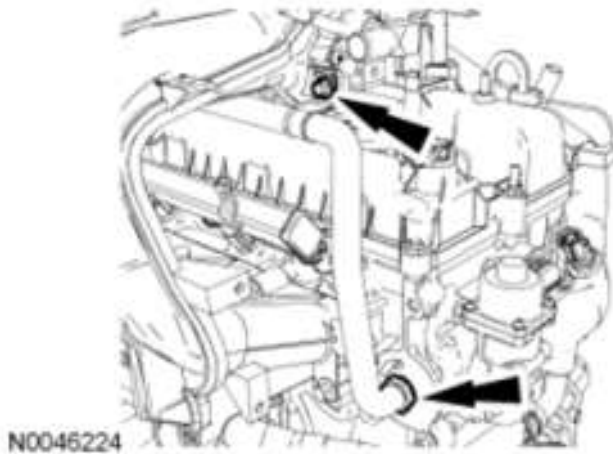


Fig. 309: Locating EGR Tube Bracket Bolt
 Courtesy of FORD MOTOR CO.

90. Connect the EGR tube to the intake manifold.
- Tighten to 18 Nm (159 lb-in).

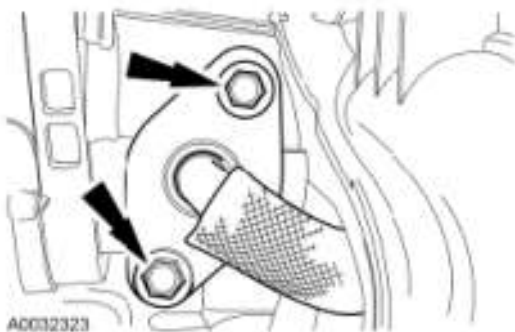


Fig. 310: Locating EGR Tube Bolts
 Courtesy of FORD MOTOR CO.

91. Attach the engine wiring harness pin-type retainers to the intake manifold.
92. Connect the **CMP** sensor electrical connector and the PCV hose.

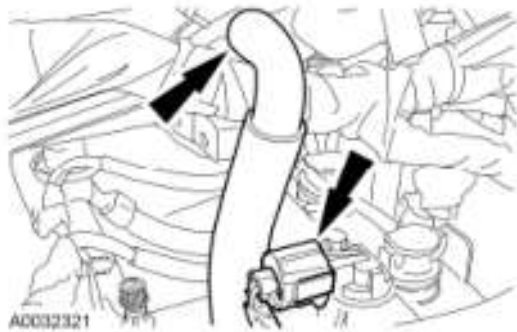


Fig. 311: Locating Camshaft Position Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

93. Install the engine wiring harness connector bracket, the 3 bolts and connect the **KS** electrical connector.
 - Tighten to 10 Nm (89 lb-in).

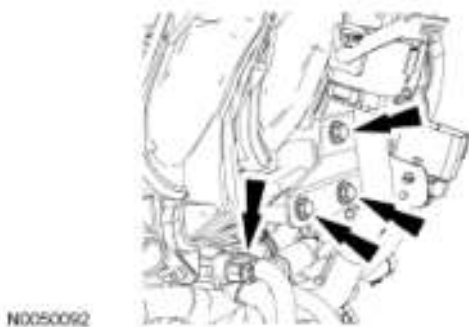


Fig. 312: Locating Knock Sensor Electrical Connector
Courtesy of FORD MOTOR CO.

94. Connect the **CKP** sensor electrical connection and attach the wiring pin-type retainers.

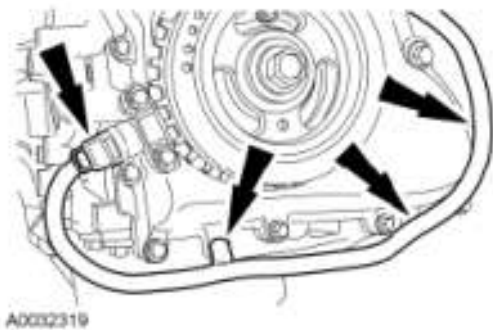


Fig. 313: Identifying CKP Sensor
Courtesy of FORD MOTOR CO.

95. Connect the following electrical connectors:
 - Manifold Absolute Pressure (MAP) sensor

- Throttle Position (TP) sensor
- Idle Air Control (IAC) valve

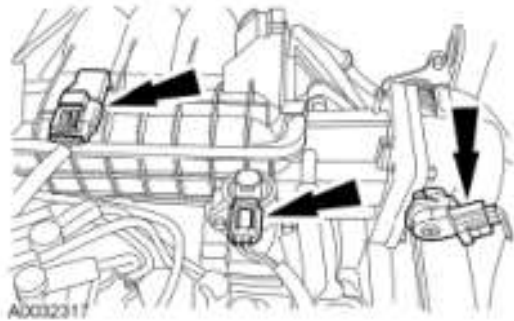


Fig. 314: Identifying Manifold Absolute Pressure Sensor
 Courtesy of FORD MOTOR CO.

96. Install the power steering pump assembly and the 4 bolts.
- Tighten to 25 Nm (18 lb-ft).

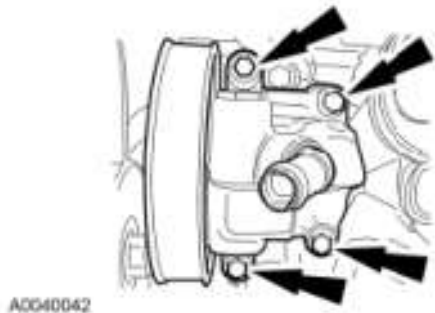


Fig. 315: Locating Power Steering Pump Assembly Bolts
 Courtesy of FORD MOTOR CO.

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

97.

NOTE: Clean the 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.

Install the EGR valve.

1. Using a new gasket, position the EGR valve and install the 2 bolts.
 - Tighten to 20 Nm (177 lb-in).
2. Connect the coolant hose.
3. Connect the electrical connector.

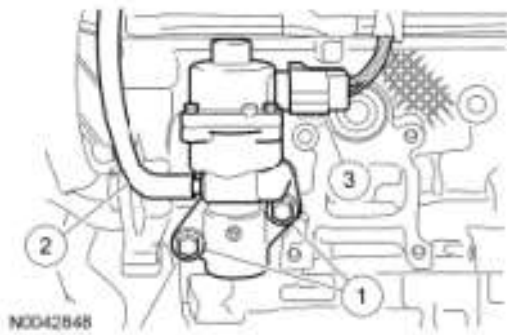


Fig. 316: Identifying Coolant Hose And Electrical Connector
 Courtesy of FORD MOTOR CO.

98.

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

NOTE: Clean the sealing 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.

Install the rear coolant outlet pipe.

1. Using a new gasket, install the rear coolant outlet pipe and the 4 bolts.
 - Tighten to 10 Nm (89 lb-in).
2. Connect the coolant hose.

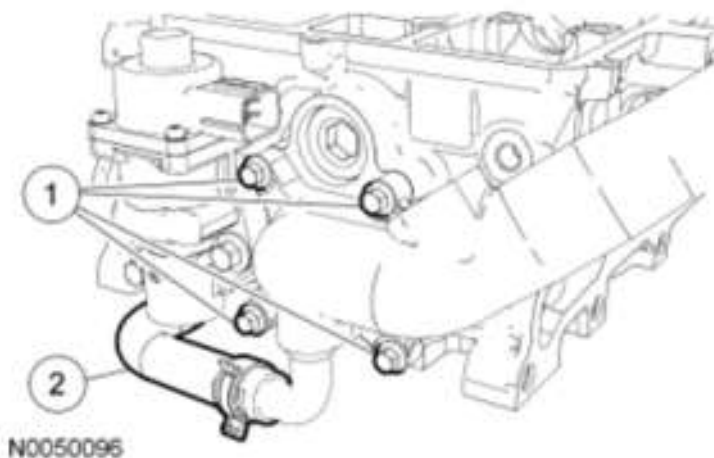


Fig. 317: Identifying Rear Coolant Outlet Pipe Bolts
 Courtesy of FORD MOTOR CO.

99. If equipped, install the block heater.

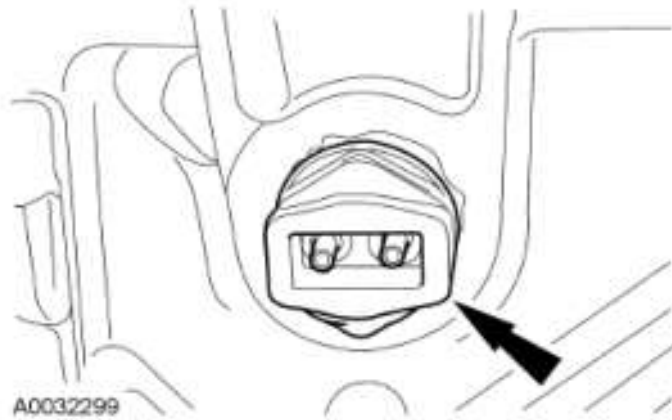


Fig. 318: Locating Block Heater
 Courtesy of FORD MOTOR CO.

100. Install 7 new exhaust manifold-to-cylinder head studs.
 - Tighten to 17 Nm (150 lb-in).
101. Position a new gasket and install the exhaust manifold and 7 new nuts.
 - Tighten to 54 Nm (40 lb-ft).

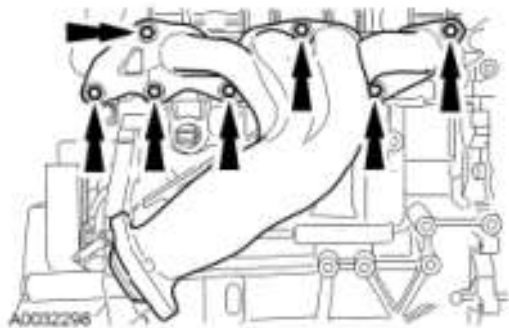


Fig. 319: Locating Exhaust Manifold Nuts
 Courtesy of FORD MOTOR CO.

102. Position the coolant tube assembly and install the 2 nuts.
 - Tighten to 20 Nm (177 lb-in).



Fig. 320: Locating Coolant Tube Nuts
 Courtesy of FORD MOTOR CO.

103. Connect the coolant hose to the thermostat and the PCV fitting on the intake manifold.

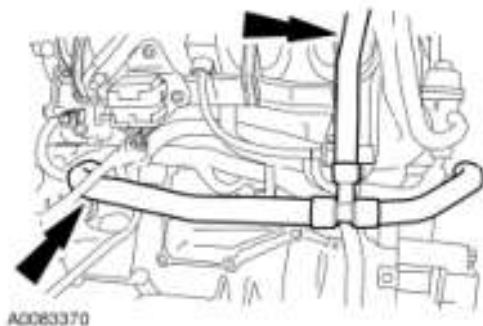


Fig. 321: Locating Coolant Hose
Courtesy of FORD MOTOR CO.

104. Position the right motor mount and install the 4 bolts.

- Tighten to 49 Nm (36 lb-ft).

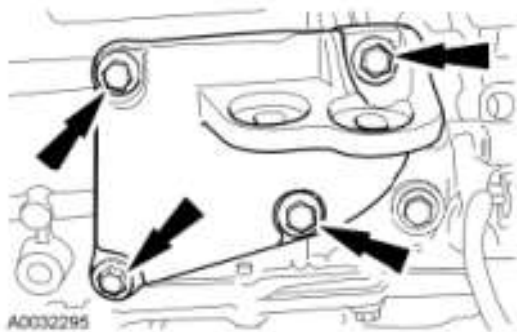


Fig. 322: Locating RH Engine Mount Bracket Bolts
Courtesy of FORD MOTOR CO.

105. Position the generator and support bracket assembly and install the 5 bolts in the sequence shown in illustration, in 2 stages.

- Stage 1: Install finger-tight.
- Stage 2: Tighten to 47 Nm (35 lb-ft).

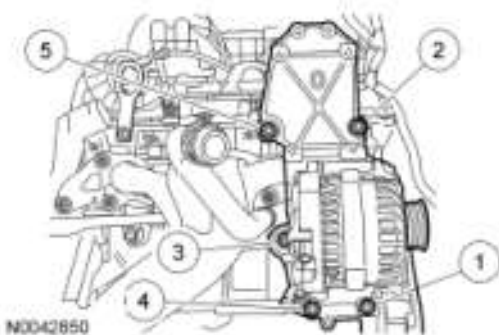


Fig. 323: Identifying Generator And Support Bracket Assembly With Bolts
Courtesy of FORD MOTOR CO.

106. Position the A/C compressor and install the 4 bolts.

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

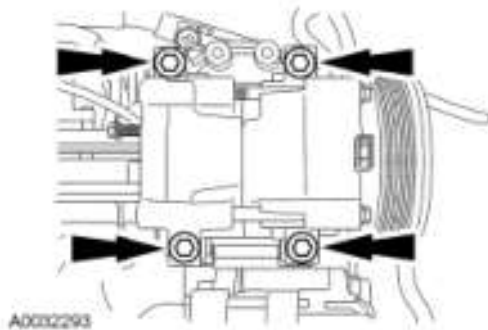


Fig. 324: Locating A/C Compressor Bolts
 Courtesy of FORD MOTOR CO.

107. **NOTE:** Lubricate the new O-ring seal with clean engine coolant prior to installation.

Position the front coolant outlet pipe and install the 2 bolts.

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

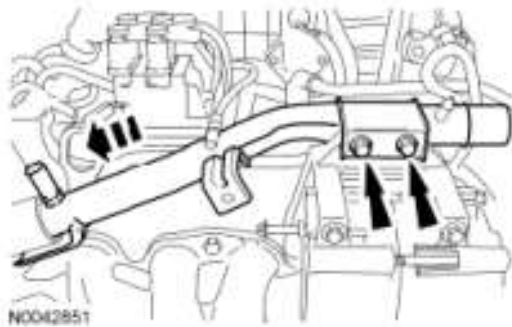


Fig. 325: Locating Front Coolant Outlet Pipe Bolts
 Courtesy of FORD MOTOR CO.

108. **NOTE:** Lubricate the new O-ring seal with clean engine oil prior to installation.

Install the engine oil level indicator tube and the bolt.

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



Fig. 326: Locating Engine Oil Level Indicator
 Courtesy of FORD MOTOR CO.

109. Install the accessory drive belt.

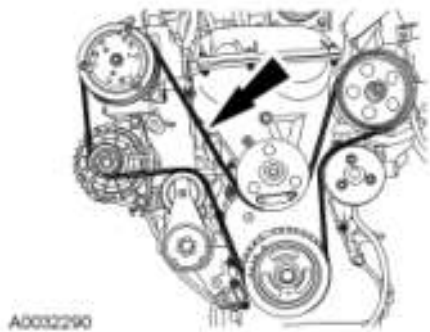


Fig. 327: Locating Drive Belt
 Courtesy of FORD MOTOR CO.

110. Using the Spreader Bar and the Heavy Duty Floor Crane, remove the engine from the Engine Stand.
111. Position the flywheel or the flexplate and loosely install the 6 bolts.
112. Using the Flywheel Locking Tool, tighten the 6 bolts in the sequence shown in illustration, in 3 stages.
 - Stage 1: Tighten to 50 Nm (37 lb-ft).
 - Stage 2: Tighten to 80 Nm (59 lb-ft).
 - Stage 3: Tighten to 112 Nm (83 lb-ft).

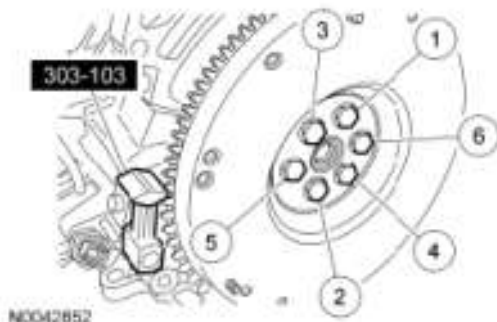
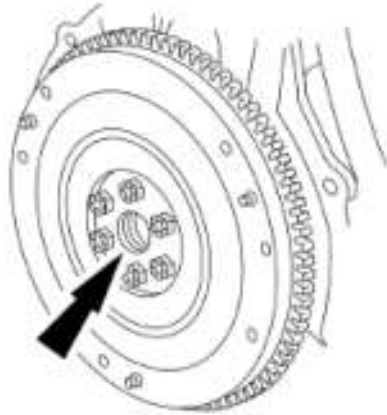


Fig. 328: Identifying Flexplate Bolts Tightening Sequence
 Courtesy of FORD MOTOR CO.

Vehicles with manual transmission

113. Lubricate the transmission input shaft pilot bearing with front axle grease.

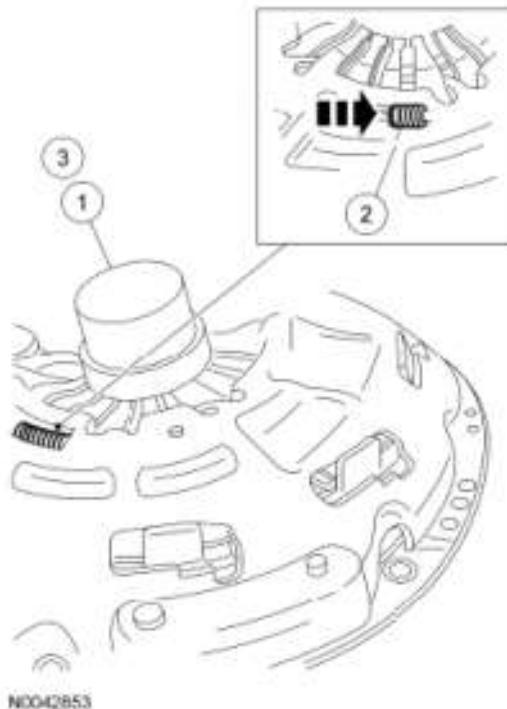


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Fig. 329: Locating Transmission Input Shaft Pilot Bearing
Courtesy of FORD MOTOR CO.

114. Adjust the clutch pressure plate.

1. Using a suitable press, press downward on the fingers until the adjusting ring moves freely.
2. Rotate the adjusting ring counterclockwise to compress the tension springs. Hold the adjusting ring in this position.
3. Release the pressure on the fingers. The adjusting ring will stay in the reset position.



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Fig. 330: Adjusting Clutch Pressure Plate
Courtesy of FORD MOTOR CO.

115. Using the Clutch Disc Aligner, position the clutch disc on the flywheel.



Fig. 331: Identifying Clutch Disc On Flywheel
Courtesy of FORD MOTOR CO.

116. **NOTE:** If reusing the clutch pressure plate and flywheel, align the marks made during removal.

Position the clutch pressure plate and install the 6 bolts. Tighten the bolts in a star pattern sequence.

- Tighten to 32 Nm (24 lb-ft).

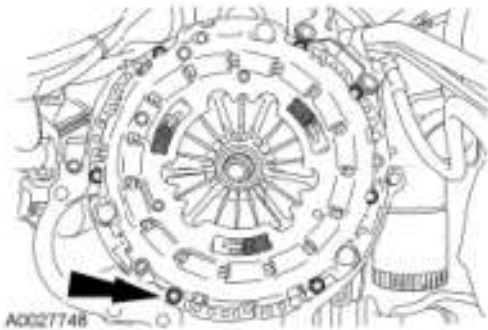


Fig. 332: Locating Clutch Pressure Plate Bolts
Courtesy of FORD MOTOR CO.