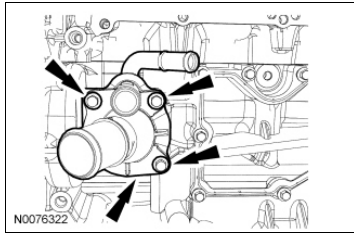
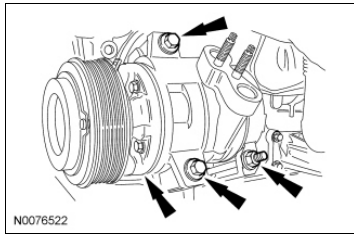


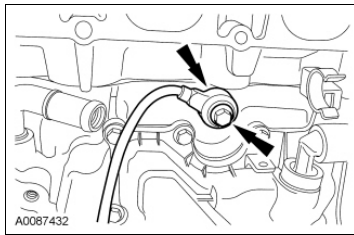
31. Remove the 3 bolts, thermostat housing and thermostat.



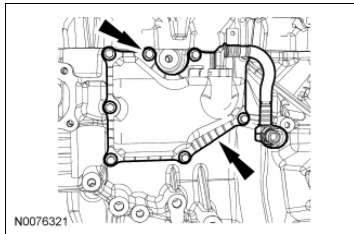
32. Remove the 2 bolts, stud bolt and the A/C compressor.



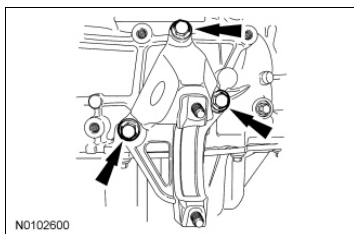
33. Remove the bolt and the KS .



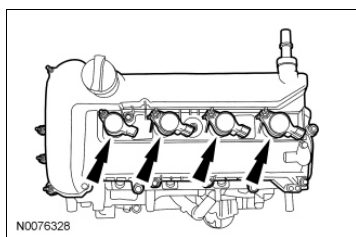
34. Remove the 8 bolts and the crankcase vent oil separator.



35. Remove the 3 bolts and the intermediate shaft bracket.

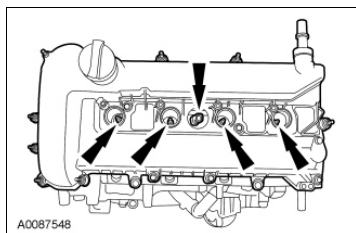


36. Remove the 4 bolts and the ignition coil-on-plugs.

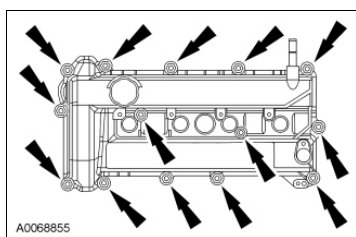


37. **NOTICE:** Only use hand tools when removing or installing the spark plugs, damage can occur to the cylinder head or spark plug.

Remove the spark plugs and the CHT sensor.



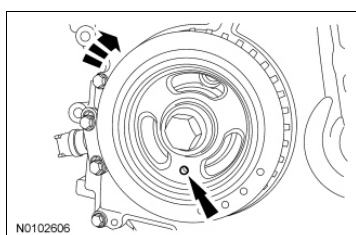
38. Remove the bolts and the valve cover.



39. **NOTICE:** Failure to position the No. 1 piston at Top Dead Center (TDC) can result in damage to the engine. Turn the engine in the normal direction of rotation only.

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

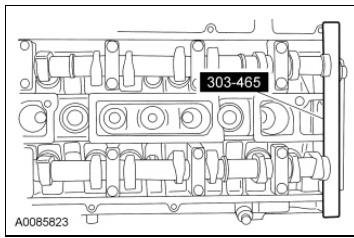
- The hole in the crankshaft pulley should be in the 6 o'clock position.



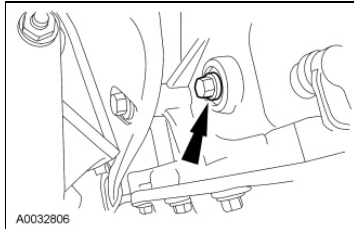
40. **NOTICE:** The Camshaft Alignment Plate is for camshaft alignment only. Using this tool to prevent engine rotation can result in engine damage.

NOTE: The camshaft timing slots are offset. If the Camshaft Alignment Plate cannot be installed, rotate the crankshaft one complete revolution clockwise to correctly position the camshafts.

Install the Camshaft Alignment Plate in the slots on the rear of both camshafts.

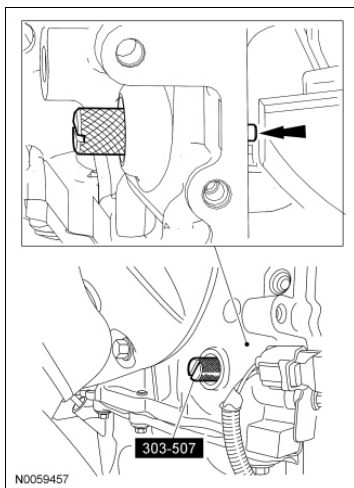


41. Remove the engine plug bolt.



42. **NOTE:** The Crankshaft TDC 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 at the TDC position during disassembly.

Install the Crankshaft TDC Timing Peg.

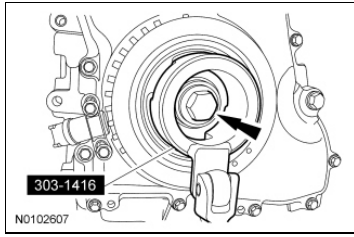


43. **NOTICE:** The crankshaft must remain in the Top Dead Center (TDC) position during removal of the pulley bolt or damage to the engine can occur. Therefore, the crankshaft pulley must be held in place with the Crankshaft Damper Holding Tool, and the bolt should be removed using an air impact wrench (1/2-in drive minimum).

NOTICE: The crankshaft sprocket diamond washer may come off with the crankshaft pulley. The diamond washer must be replaced. Remove and discard the diamond washer. If the diamond washer is not installed, engine damage may occur.

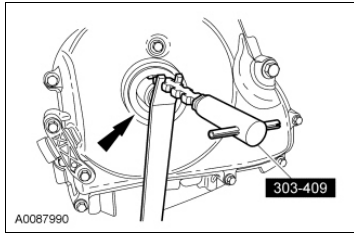
Use the Crankshaft Damper Holding Tool and a suitable 1/2-in drive hand tool to hold the crankshaft pulley. Use an air impact wrench to remove the crankshaft pulley bolt.

- Remove and discard the crankshaft pulley bolt and washer.
- Remove the crankshaft pulley.
- Remove the diamond washer and discard.

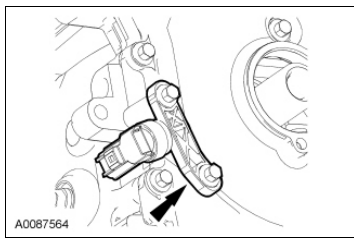


44. **NOTICE:** Use care not to damage the engine front cover or the crankshaft when removing the seal.

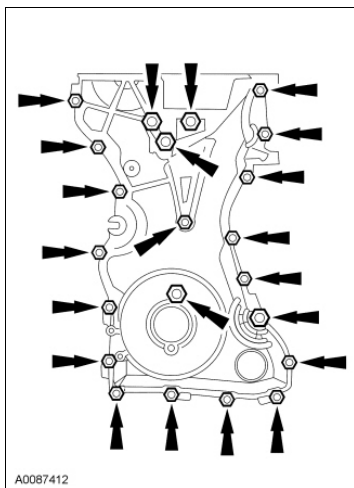
Using the Oil Seal Remover, remove the crankshaft front seal.



45. Remove the 2 bolts and the CKP sensor.

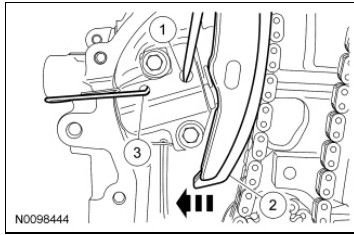


46. Remove the 22 bolts and the engine front cover.

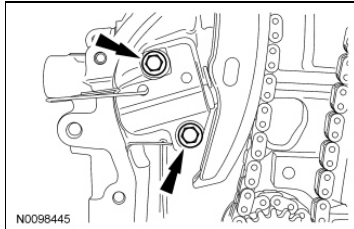


47. Compress the timing chain tensioner in the following sequence.

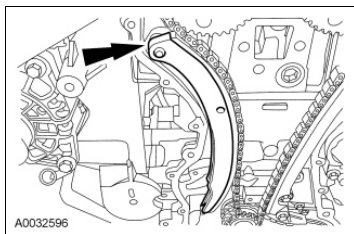
1. Using a small pick, release and hold the ratchet mechanism.
2. While holding the ratchet mechanism in the released position, compress the tensioner by pushing the timing chain arm toward the tensioner.
3. Insert a paper clip into the hole to retain the tensioner.



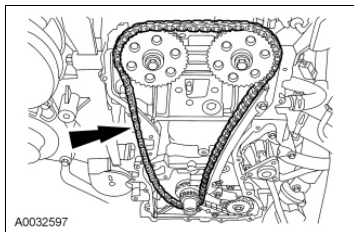
48. Remove the 2 bolts and the timing chain tensioner.



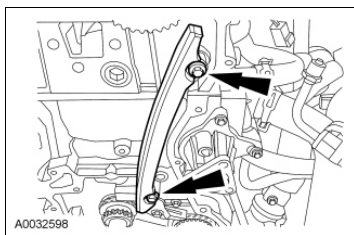
49. Remove the RH timing chain guide.



50. Remove the timing chain.

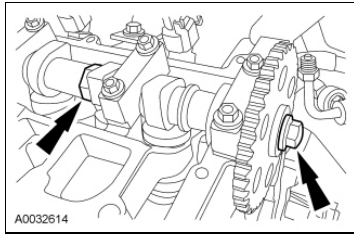


51. Remove the 2 bolts and the LH timing chain guide.



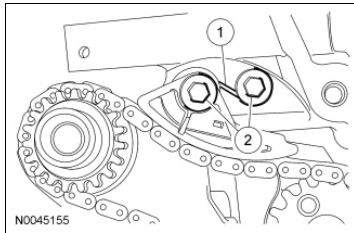
52. **NOTICE:** Do not rely on the Camshaft Alignment Plate to prevent camshaft rotation. Damage to the tool or the camshaft can occur.

Using the flats on the camshaft to prevent camshaft rotation, remove the bolts and the camshaft sprockets.



53. Remove the oil pump drive chain tensioner.

1. Release the tension on the tensioner spring.
2. Remove the tensioner and the 2 shoulder bolts.

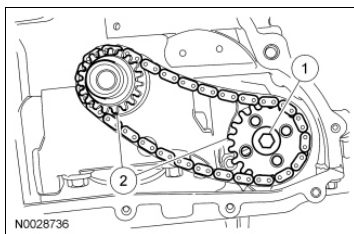


54. **NOTE:** Remove and discard the crankshaft sprocket diamond washer located behind the crankshaft sprocket.

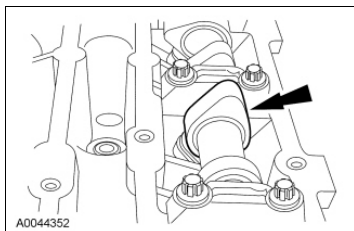
NOTE: The oil pump chain sprocket must be held in place.

Remove the oil pump chain and sprockets.

1. Remove the bolt.
2. Remove the chain and sprockets.



55. Mark the position of the camshaft lobes on the No. 1 cylinder for assembly reference.

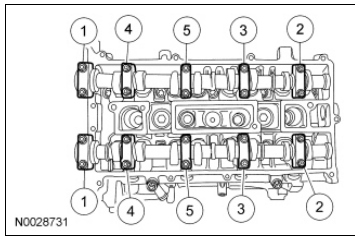


56. **NOTICE:** Failure to follow the camshaft loosening procedure can result in damage to the camshafts.

NOTE: Mark the location and orientation of each camshaft bearing cap.

Remove the camshafts from the engine.

- Loosen the camshaft bearing bolts in the sequence shown, one turn at a time. Repeat until all the tension is released.
- Remove the camshaft bearing caps.
- Remove the camshafts.



57. **NOTE:** If the camshafts and valve tappets are to be reused, mark the location of the valve tappets to make sure they are assembled in their original positions.

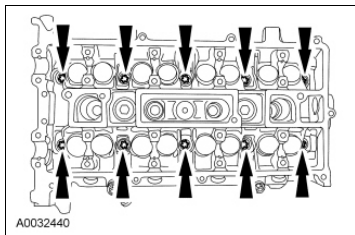
Remove the valve tappets.

58. **NOTE:** The number on the valve tappets only reflects the digits that follow the decimal. For example, a tappet with the number 0.650 has the thickness of 3.650 mm.

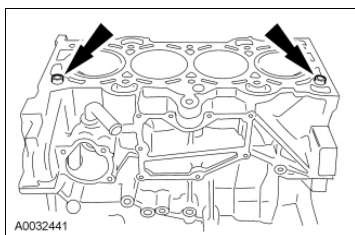
Inspect the valve tappets. For additional information, refer to [Section 303-00](#).

59. Remove the cylinder head.

- Remove and discard the 10 cylinder head bolts.
- Remove the cylinder head.
- Remove and discard the cylinder head gasket.



60. Remove the cylinder head alignment dowels.



61. **NOTICE:** 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 and cautions and follow all application directions contained on the packaging of the silicone gasket remover and the metal surface prep.

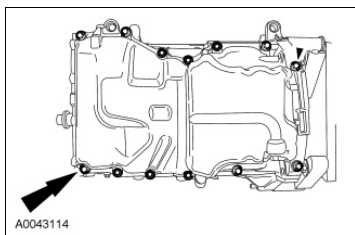
NOTE: If there is no residual gasket material present, metal surface prep can be used to clean and prepare the surfaces.

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

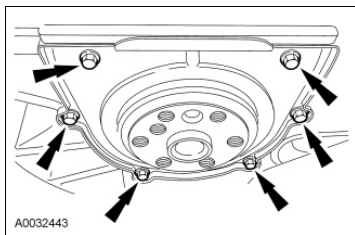
1. Remove any large deposits of silicone or gasket material with a plastic scraper.
2. Apply silicone gasket remover, following package directions, and allow to set for several minutes.
3. Remove the silicone gasket remover with a plastic scraper. A second application of silicone gasket remover may be required if residual traces of silicone or gasket material remain.
4. Apply metal surface prep, following package directions, to remove any 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.

62. Support the cylinder head on a bench with the head gasket side up. Check the cylinder head distortion and the cylinder block distortion. For additional information, refer to [Section 303-00](#) .

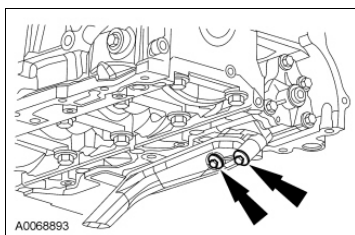
63. Remove the 13 bolts and the oil pan.



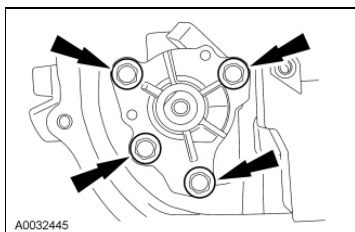
64. Remove the 6 bolts and the crankshaft rear seal with retainer plate.



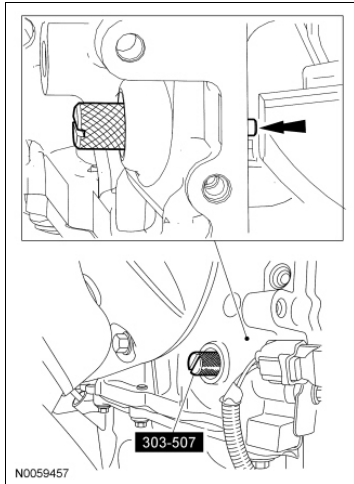
65. Remove the 2 bolts, oil pump pickup tube and gasket.
• Discard the gasket.



66. Remove the 4 bolts and the oil pump.



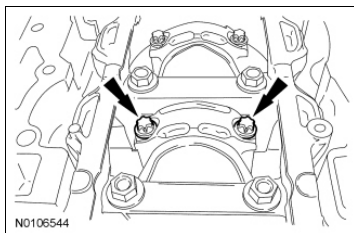
67. Remove the Crankshaft TDC Timing Peg.



68. Before removing the pistons, inspect the top of the cylinder bores. If necessary, remove the ridge or carbon deposits from each cylinder using an abrasive pad or equivalent, following manufacturer's instructions.

69. **NOTE:** Clearly mark the connecting rods, connecting rod caps and connecting rod bearings in numerical order for correct orientation for reassembly.

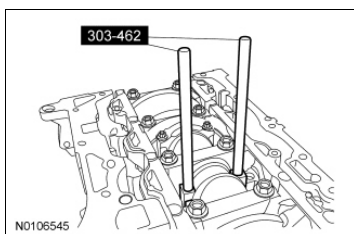
Remove the connecting rod cap bolts and cap.



70. **NOTICE:** Do not scratch the cylinder walls or crankshaft journals with the connecting rod.

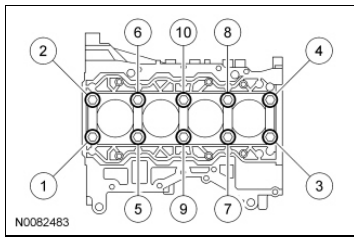
Using the Connecting Rod Installer, remove the piston/rod assembly from the engine block.

- Repeat the previous 2 steps until all the piston/rod assemblies are removed from the engine block.

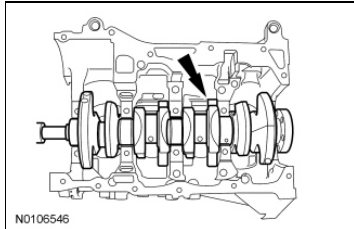


71. Remove the bolts in the sequence shown.

- Remove the main bearing beam.
- Discard the bolts.

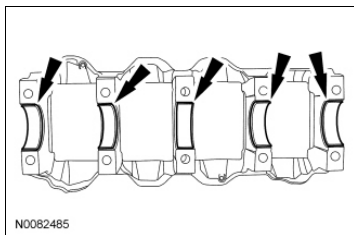


72. Remove the crankshaft from the engine block.



73. **NOTE:** If the main bearings are being reused, mark them in order for correct orientation and reassembly.

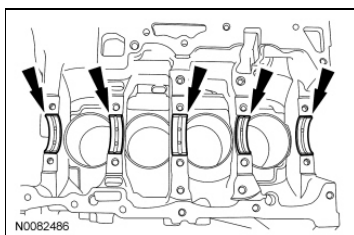
Remove the main bearings from the main bearing beam.



74. **NOTE:** If the main bearings are being reused, mark them in order for correct orientation and reassembly.

NOTE: The center bulkhead has the thrust bearing.

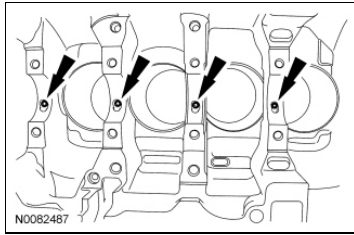
Remove the main bearings from the cylinder block.



75. **NOTE:** If the oil squirters are being reused, mark them in order for correct location during reassembly.

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

Remove the 4 oil squirters.



76. Inspect the cylinder block, main bearing beam, pistons and connecting rods. For additional information, refer to [Section 303-00](#) .
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