





Engine

Special Tool(s)

 ST1505A	Crankshaft Rear Seal Pilot 303-329 (T88P-6701-B2)
 ST1505A	Crankshaft Rear Seal Replacer 303-328 (T88P-6701-B1)
 ST1504A	Oil Pump Seal Replacer 303-164 (T81P-6700-A)
 D88L6000A	Strap Wrench 303-D055 (D85L-6000-A) or equivalent

Material

Engine oil	WSS-M2C153-H
Silicone gasket and sealant	F6AZ-19562-AA or equivalent Ford specification WSE-M4G323-A6

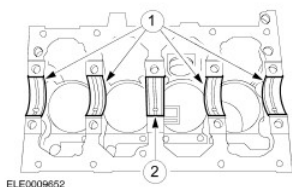
-  **CAUTION:** Do not use abrasive grinding discs to remove the gasket material; use only plastic manual scrapers. Do not scratch or gouge aluminium sealing surfaces.

NOTE: All bearing surfaces must be lubricated before assembly or installation.

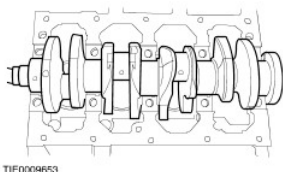
NOTE: The crankshaft main bearings are precision selective fit. For additional information, refer to Section [303-00](#).

Install the main bearings.

- Upper crankshaft main bearing.
- Crankshaft thrust main bearing.



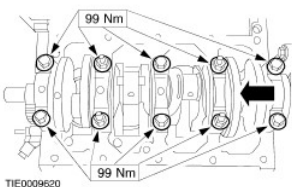
- Install the crankshaft.



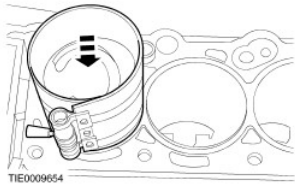
- NOTE:** The crankshaft main bearings are numbered 1 to 5 with No. 1 at the front of the engine. Make sure the arrow faces the front of the engine.

NOTE: Apply axial load to the rear of the crankshaft simultaneously to tightening of the bolts. For additional information, refer to Section [303-00](#).

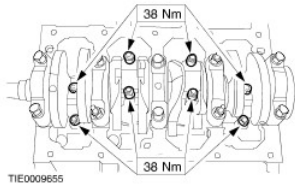
Install the five lower crankshaft main bearings and the five main bearing caps.



- Install the piston and connection rod assemblies.



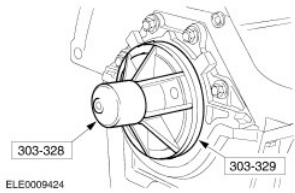
5. Install the four crankshaft rod caps.



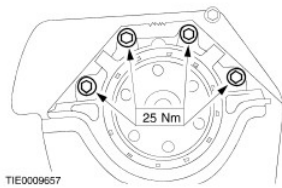
6. **NOTE:** Coat the rear oil seal area and the crankshaft rear oil seal lip with engine oil.

NOTE: Make sure the crankshaft rear oil seal is on correctly and that the edges are not rolled over.

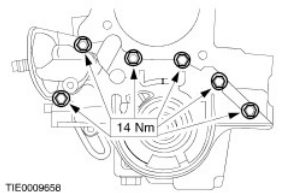
Using the special tools, install a new crankshaft rear oil seal.



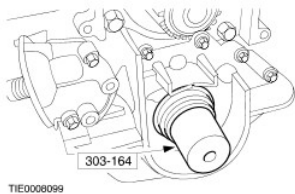
7. Install the crankshaft rear seal retainer.
- Use a new gasket.



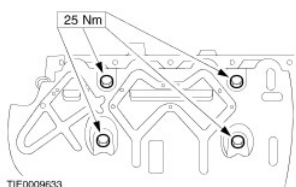
8. Install the oil pump.
- Use a new gasket.



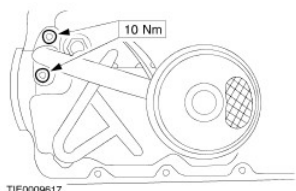
9. Using the special tool, install a new oil pump seal.



10. Install the oil baffle.

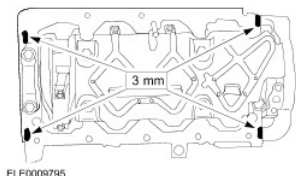


11. Install the oil pump screen cover and tube.
 - Use a new gasket.



12. Clean and inspect the mounting faces of both the oil pan and the cylinder block. To remove all traces of previous sealant, use solvent to clean the cylinder block and oil pan. Both surfaces must be flat, clean and dry.
13. **NOTE:** Install the oil pan within ten minutes after the sealant is applied.

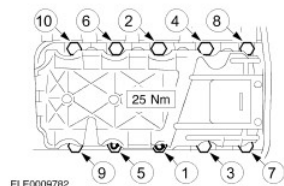
Apply silicone gasket and sealant F6AZ-19562-AA or equivalent Ford specification WSE-M4G323-A6 approximately 3 mm (0.125 In) wide at the oil pan to cylinder block joints and the crankshaft rear oil seal retainer to cylinder block joints.



14. **NOTE:** Make sure the press fit tabs are fully engaged in the oil pan gasket channel when installing the oil pan gasket and oil pan.
- NOTE:** The rear edge of the oil pan must be aligned with the rear face of the cylinder block using a straight edge.

Install the oil pan. Tighten the bolts in the sequence shown.

- The stud bolt locations are one and five.

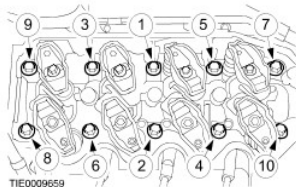


15. **CAUTION:** Always use new cylinder head bolts.

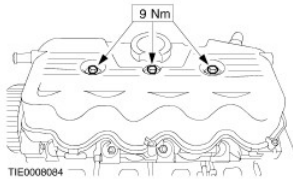
NOTE: Lubricate the cylinder head bolts with engine oil prior to installation.

Install a new gasket and tighten the cylinder head bolts in the following sequence.

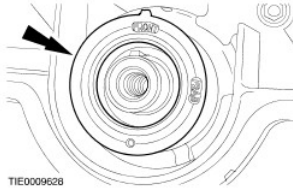
1. Tighten all the bolts in a single sequence to 50 Nm.
2. Back the bolts off one-half turn.
3. Tighten all the bolts in the sequence shown to 50 Nm.
4. Rotate all the bolts in a single sequence an additional 180 degrees, in two steps of 90 degrees each.



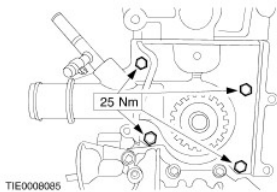
16. **NOTE:** Inspect the valve cover gasket. Install a new gasket if it is cracked, torn, distorted or damaged.
- Install the valve cover.



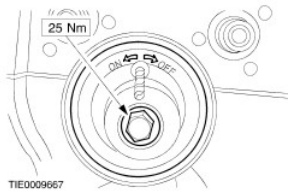
17. Install the timing belt guide and the crankshaft sprocket.



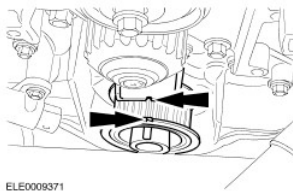
18. Install the water pump.
- Use a new gasket.



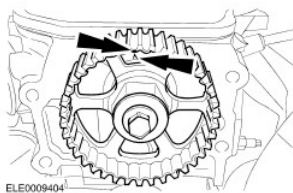
19. Install the timing belt tensioner.



20. Line up the timing marks of the crankshaft.



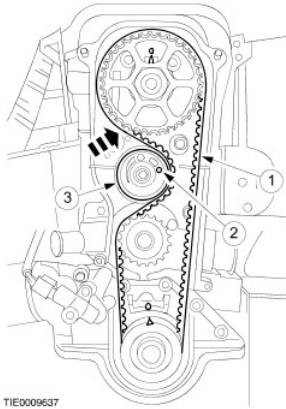
21. Line up the timing marks of the camshaft.



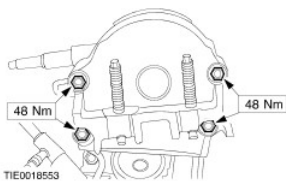
22. **NOTE:** Install the timing belt over the sprockets in a counterclockwise direction starting at the crankshaft. Keep the belt span from the crankshaft to the camshaft tight while installing the timing belt over the camshaft.

Install the timing belt.

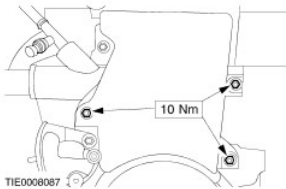
1. Position the timing belt.
2. Remove the holding tool.
3. Release the tensioner.



23. Rotate the crankshaft two turns and recheck the timing marks.
24. Install the upper timing belt cover.



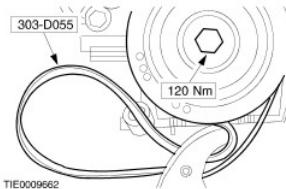
25. Install the timing belt cover.



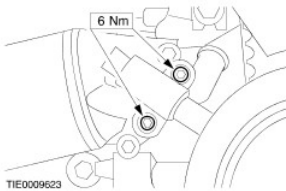
26. **NOTE:** Using the special tool, hold the crankshaft pulley.

Install the crankshaft pulley.

- Install the bolt.

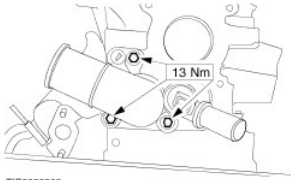


27. Install the crankshaft position (CKP) sensor.



28. Install the spark plugs. For additional information, refer to Section 303-07D.
29. **NOTE:** Inspect the water outlet connection gasket. Install a new gasket if it is cracked, torn, or damaged.

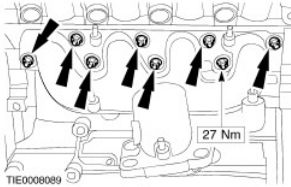
Install the water outlet connection.



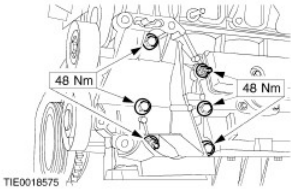
30. **NOTE:** Tighten the bolts evenly.

Install the exhaust manifold.

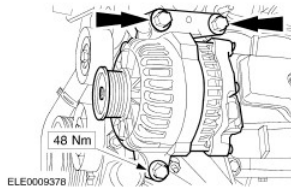
- Use a new gasket.



31. Install the accessory drive bracket.

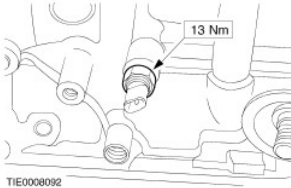


32. Install the generator (if necessary).

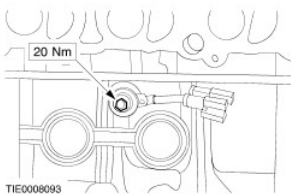


33. **NOTE:** Wrap the threads with Teflon® tape.

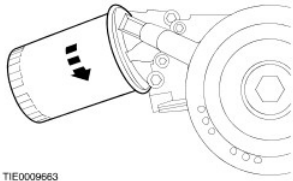
Install the oil pressure sender unit.



34. Install the knock sensor.

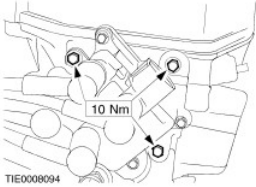


35. Install the oil filter.



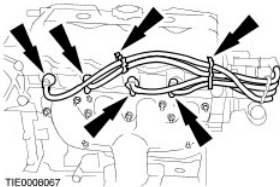
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36. Install the coil bracket, coil and spark plug wires.



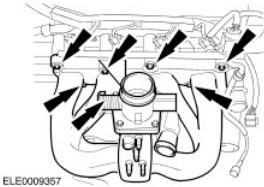
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37. Connect the spark plug wires.



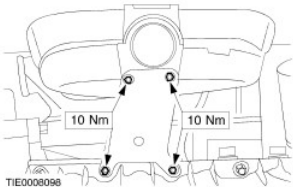
TIE0008067

38. Install a new gasket and the intake manifold.
- Tighten the nuts and bolts to 10 Nm and 90 degrees.



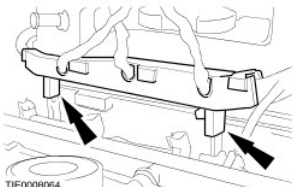
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39. Install the intake manifold bracket.



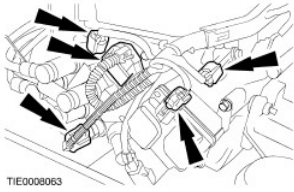
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40. Position the fuel charging wire harness.

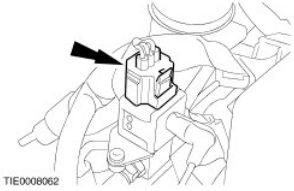


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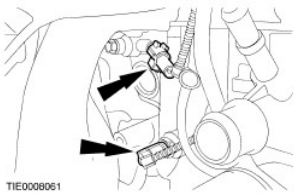
41. Connect the electrical connectors.
- Camshaft position (CMP) sensor
 - IMRC
 - Ignition coil
 - Capacitor
 - Water temperature sender unit



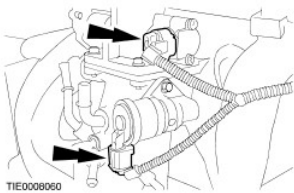
42. Connect the fuel pressure sensor electrical connectors.



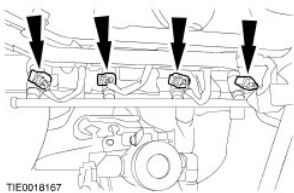
43. Connect the oil pressure sender unit and the knock sensor electrical connectors.



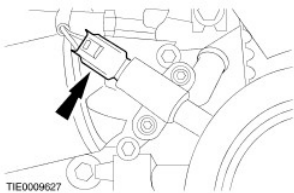
44. Connect the idle air control valve and the throttle position sensor.



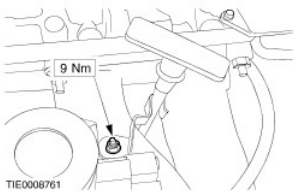
45. Connect the fuel injectors electrical connectors.



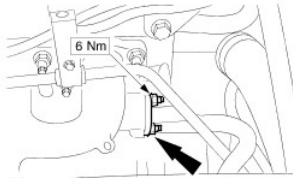
46. Connect the crankshaft position sensor electrical connector.



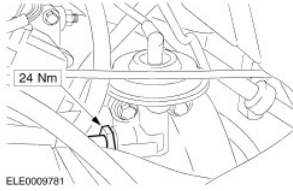
47. Install the oil indicator tube.



48. Connect the EGR tube to the exhaust manifold.
- Use a new gasket.

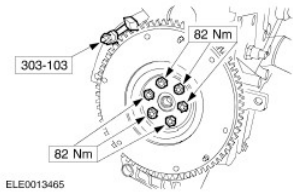


49. Install the EGR tube to the EGR valve.



50. Remove the engine from the stand.

51. Install the flywheel.
- Tighten the bolts fingertight.
 - Install the special tool.
 - Tighten the bolts.



52. Install the clutch (if equipped). For additional information, refer to Section [308-01A](#).

53. Install and connect:
- Fresh air and positive crankcase ventilation hoses
 - Coolant hoses and tubes
 - Vacuum hoses