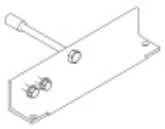
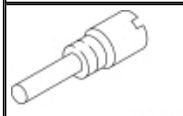
Oil Pump

Base Part Number: 6621

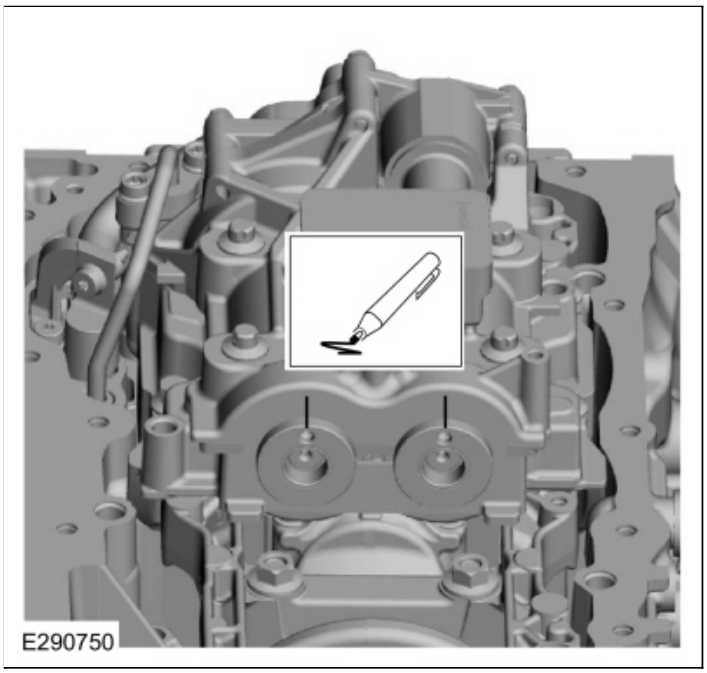
Special Tool(s) / General Equipment

 E139373	100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge
 E274105	303-1688 Preload Tool, Balance Shaft
 PZ21210	303-507 Timing Peg, Crankshaft TDC TKIT-2001N-FLM TKIT-2001N-ROW

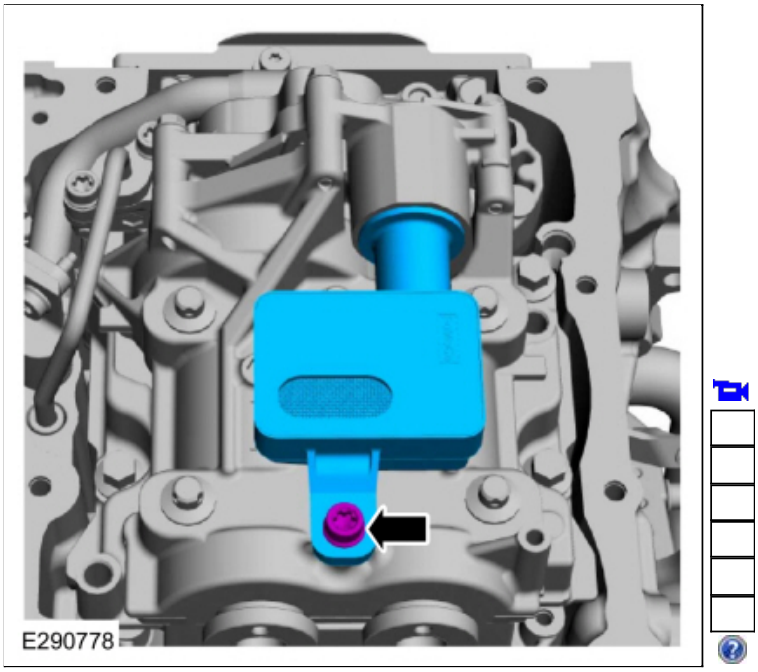
Removal

1. Remove the oil pan.
   Refer to: Oil Pan (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal and Installation).

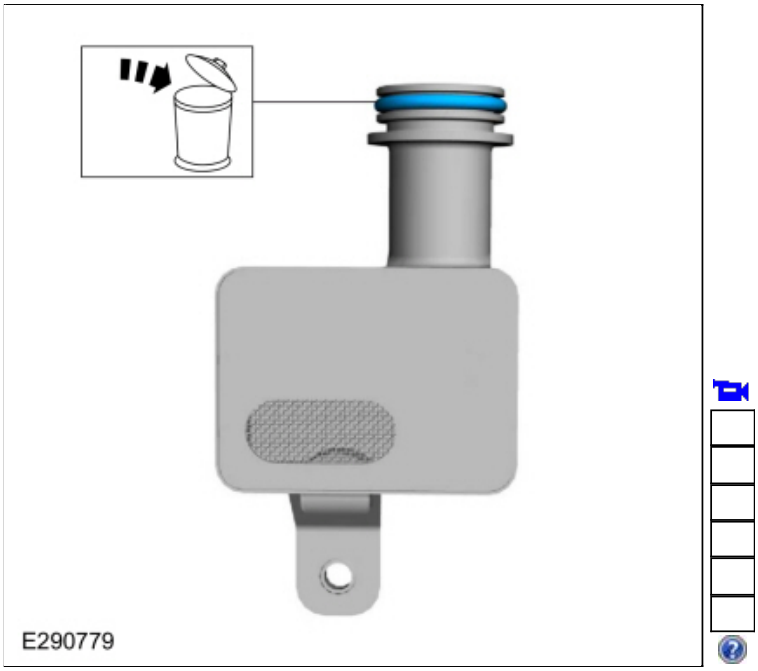
2. Mark the balancer unit and shafts on the top for reference that the balancer unit is at TDC.



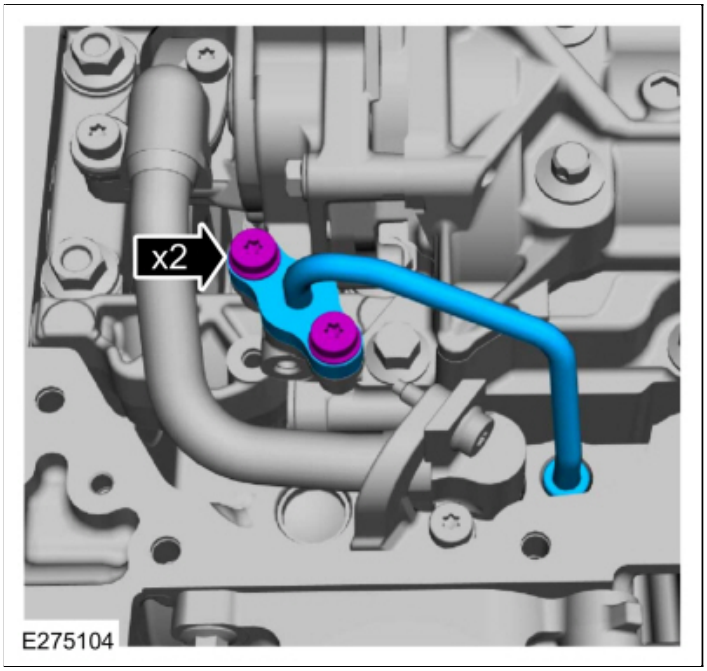
3. Remove the bolt and the oil screen and pickup tube.



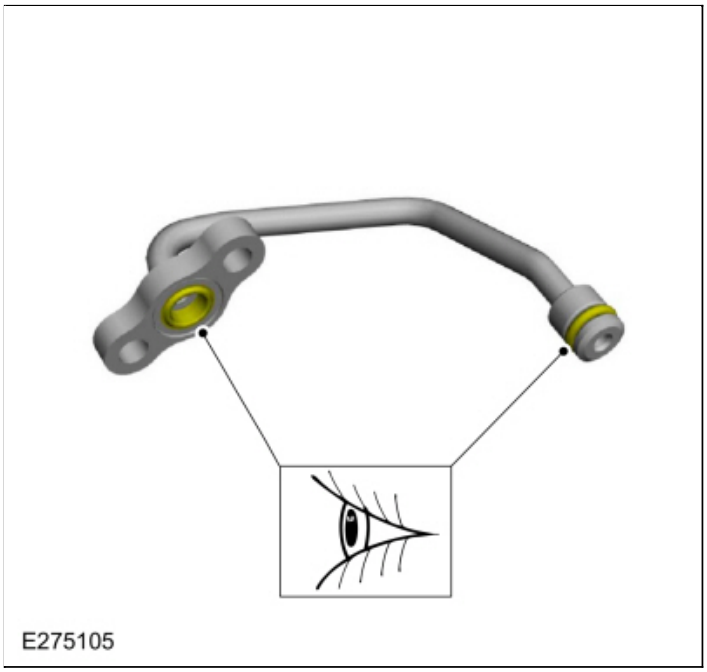
4. Remove and discard the oil screen and pickup tube O-ring seal.



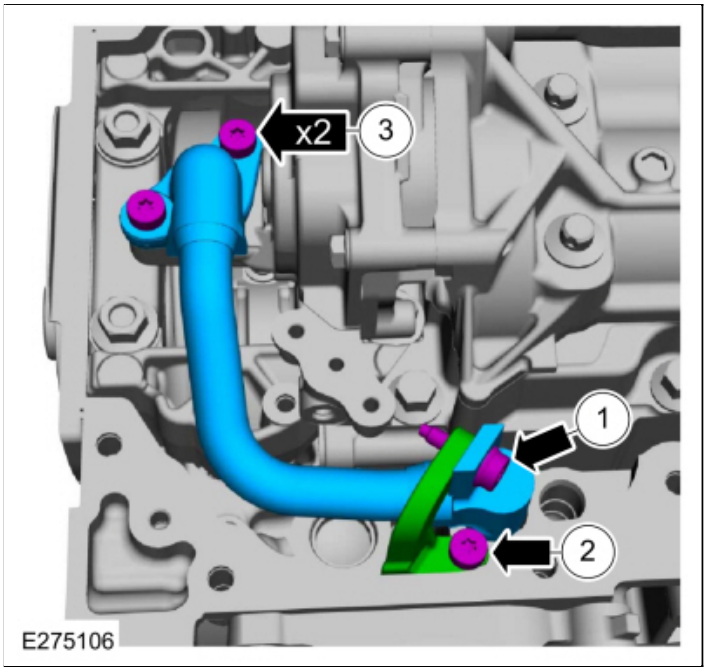
5. Remove the bolts and the oil outlet tube.



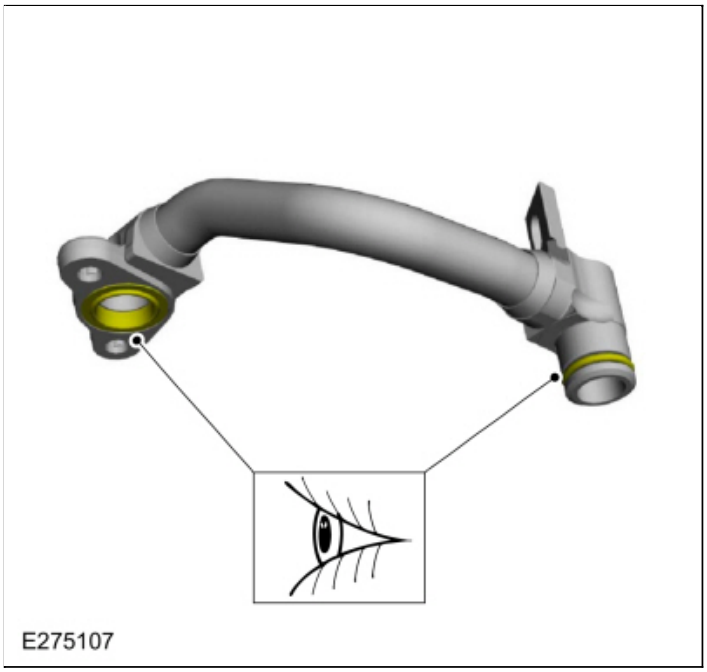
6. Inspect the oil outlet tube O-ring seal and replace if damaged.



7.
   1. Remove the oil inlet tube-to-bracket bolt.
   2. Remove the bolt and the oil inlet tube bracket.
   3. Remove the bolts and the oil inlet tube.

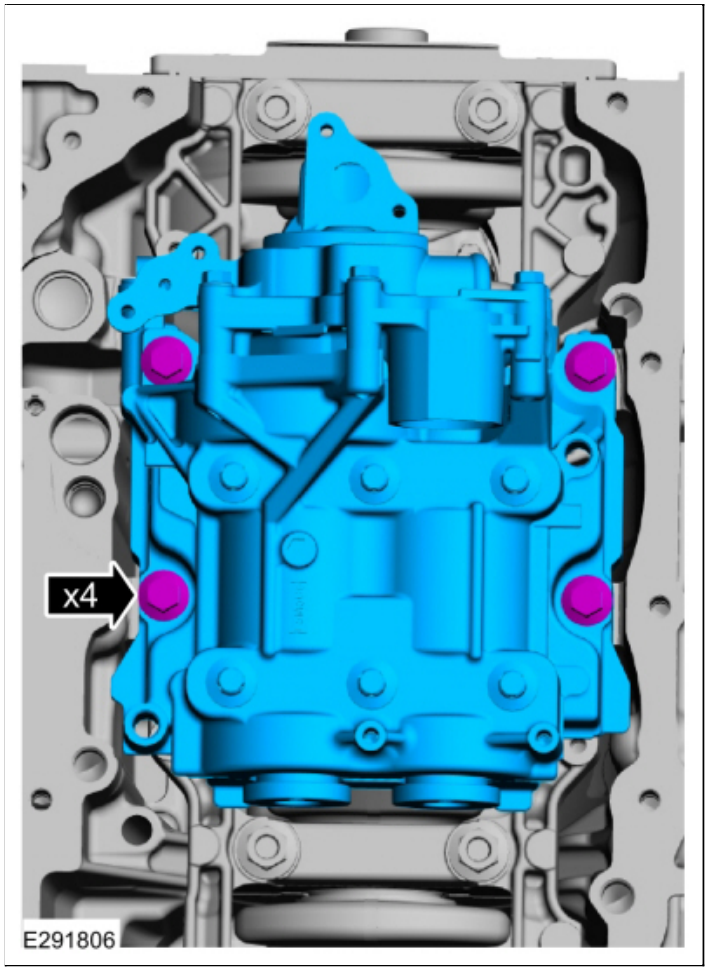


8. Inspect the oil inlet tube O-ring seal and replace if damaged.

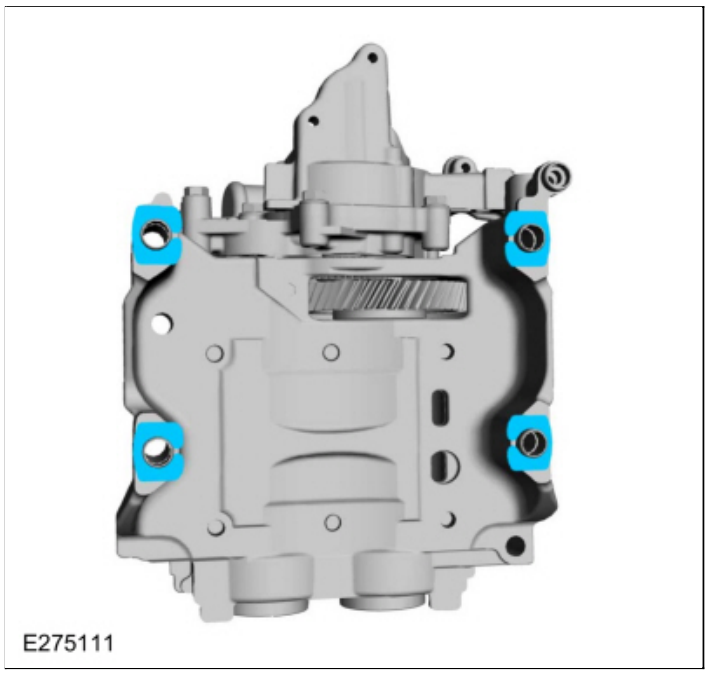


9. **NOTE:** *Due to the precision interior construction of the balancer unit, it should not be disassembled.*

   Remove the bolts and the balance unit.

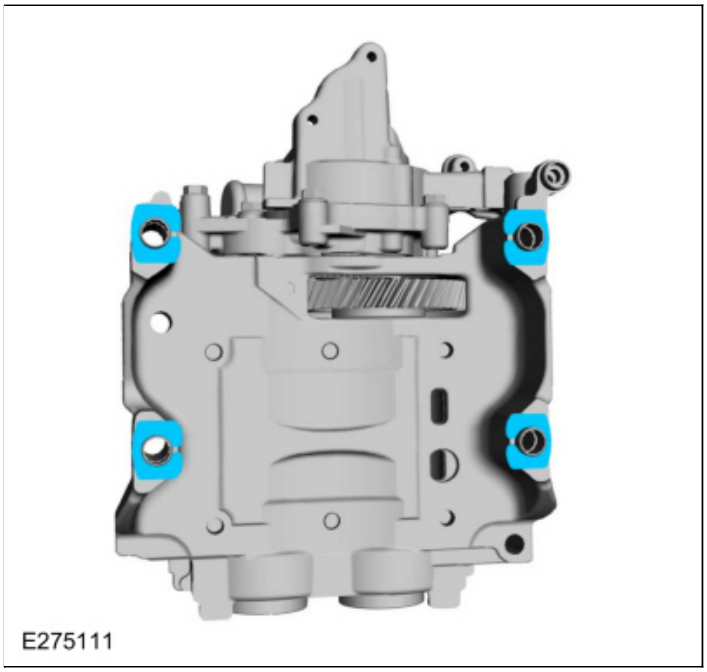


10. Remove the adjustment shims from the seat faces of the balancer unit.

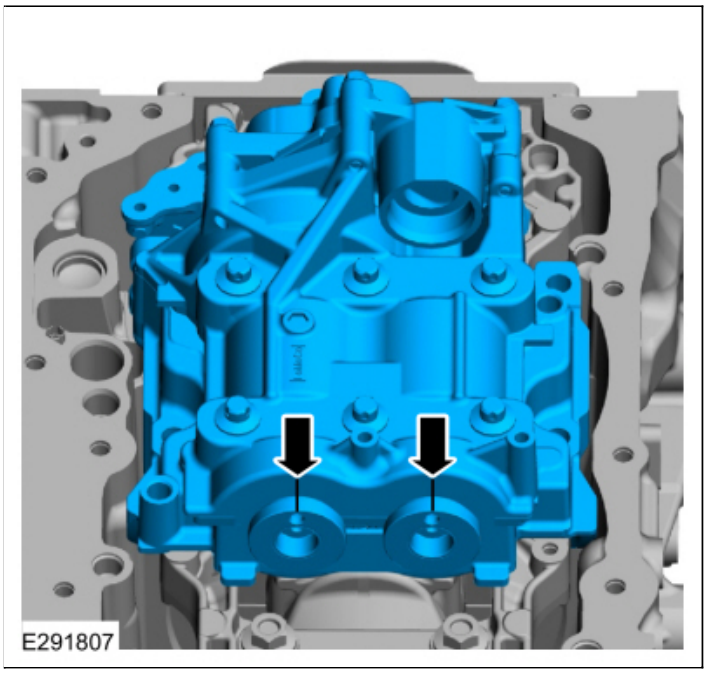


Installation

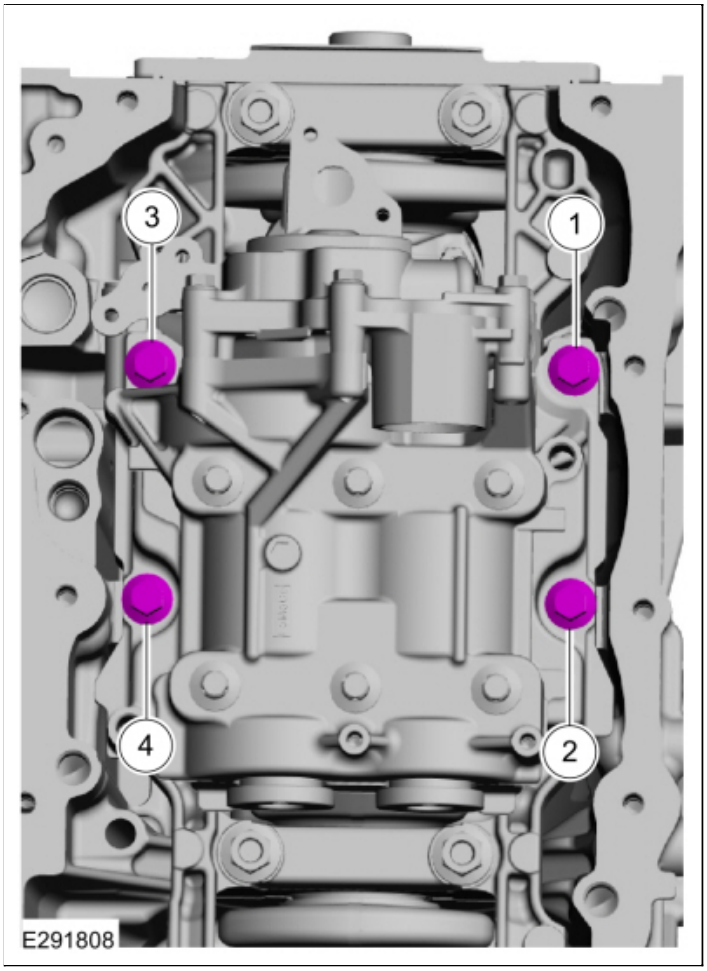
1. Prime the oil pump. Add 2 tablespoons of clean engine oil to the oil pump and rotate the oil pump by hand.
2. Install the master adjustment shims (No. 50) on the seat faces of the balancer unit.



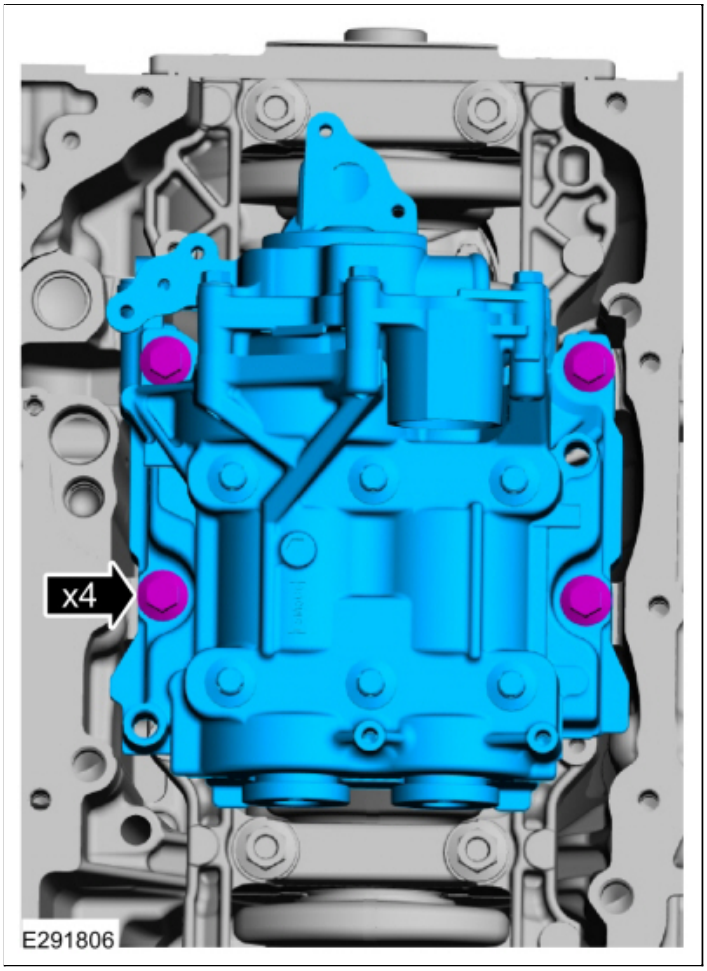
3. With the balancer unit shaft marks at the TDC position, slowly install the balancer unit to the cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



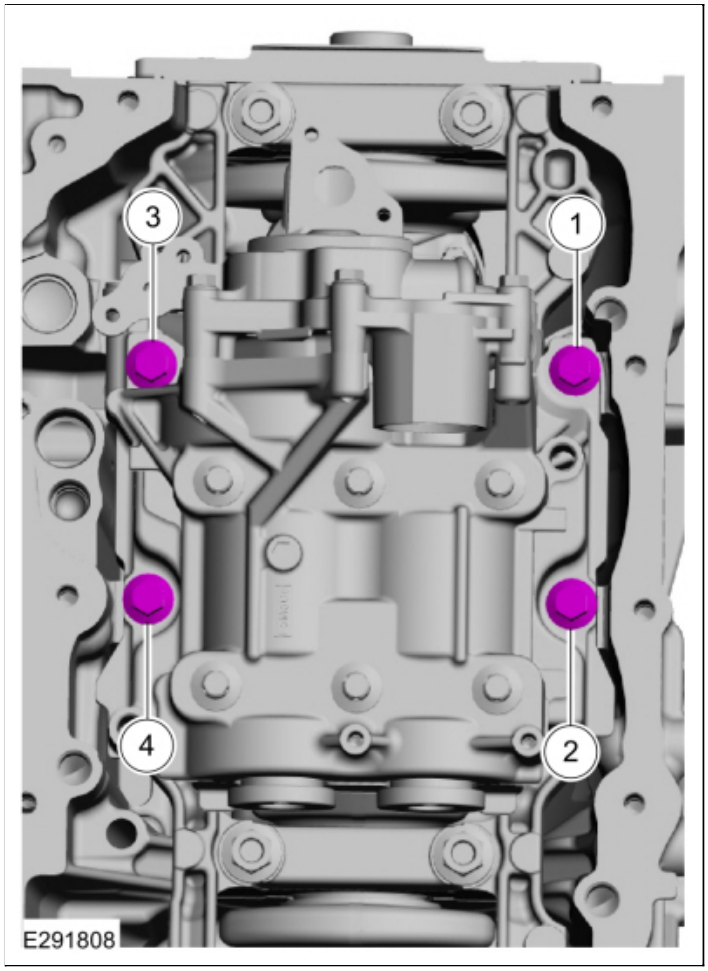
4. Install the bolts and tighten in sequence shown.
   Torque:
   Stage 1: 27 lb.ft (36 Nm)
   Stage 2: 60°



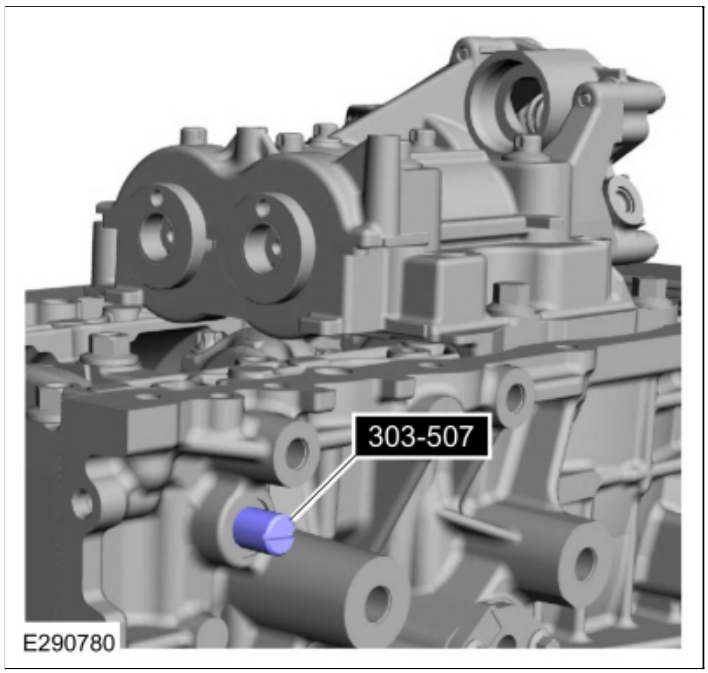
5. Loosen the bolts.



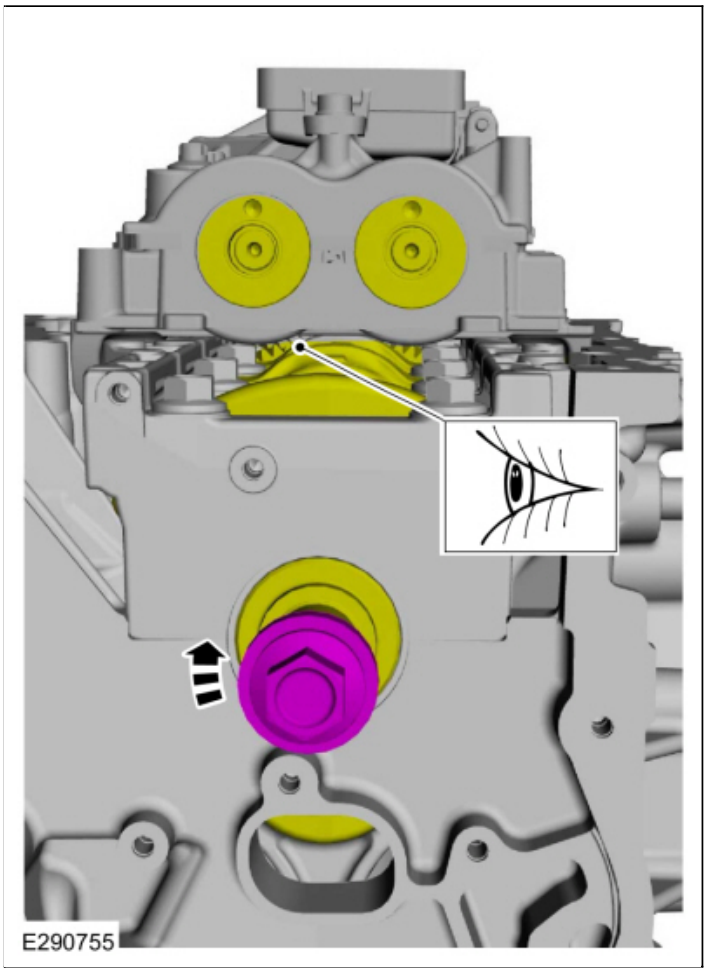
6. Tighten the bolts in sequence shown.
   Torque:
   Stage 1: 133 lb.in (15 Nm)
   Stage 2: 45°



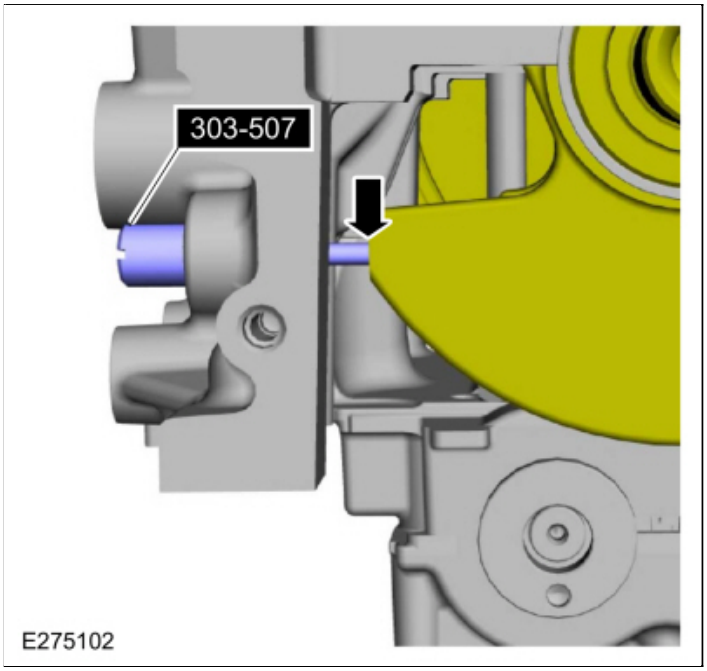
7. Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



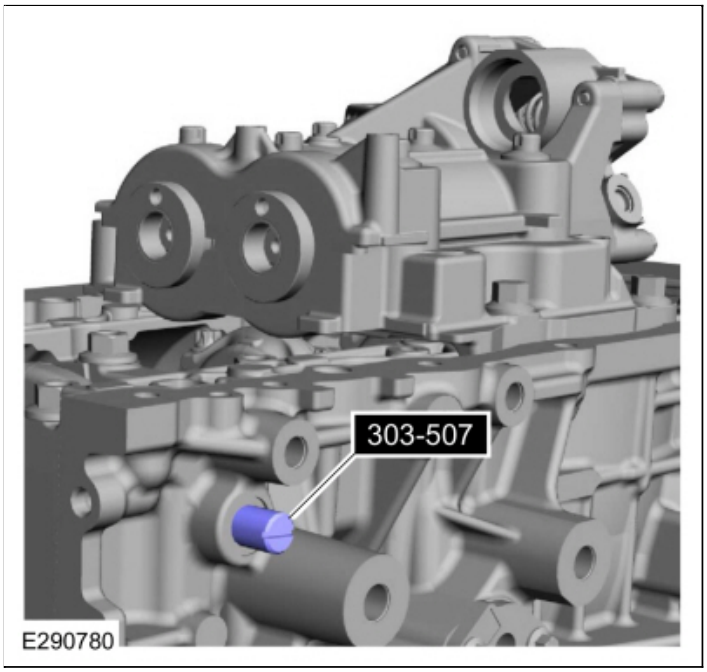
8. Install the crankshaft pulley bolt and rotate the crankshaft to confirm that there are no meshing problems between the balancer unit gear and the crankshaft gear.



9. Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC.
Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



10. Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



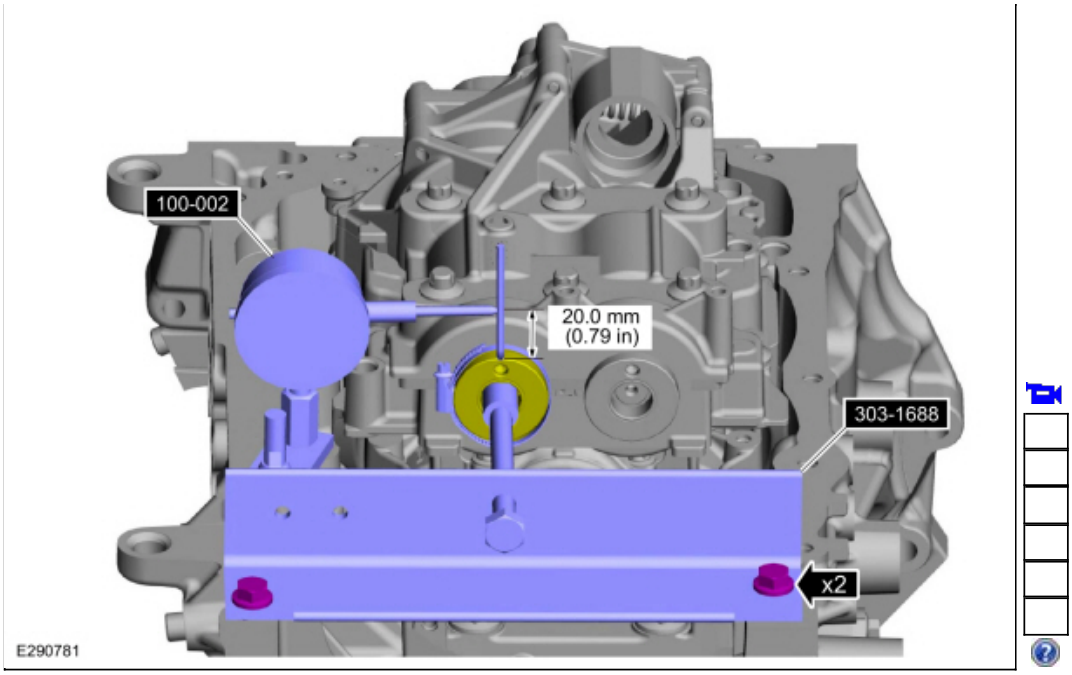
11. **NOTE:** *Measure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.*

    NOTE: *The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown. Mark the Allen wrench with a file 20 mm (0.79 in) above the driven gear top surface. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.*

    - **NOTE:** *Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.*

Install the 5-mm Allen wrench and tighten worm clamp as shown.

- Mark the Allen wrench with a file 20 mm (0.79 in) above the driven gear top surface.
- Install the balance shaft preload tool and bolts as shown.
  Use Special Service Tool: 303-1688 Preload Tool, Balance Shaft.
- Install and position the dial indicator gauge with holding fixture on the Allen wrench 20 mm (0.79 in) as shown.
  Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.
- Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.



12. Using the backlash measurement, select the proper shims from the Adjustment Shim Selection Table.
    1. Backlash
    2. Selection shim (No.)
    3. Shim thickness

1	2	3
0.267-0.273 mm (0.0105-0.0107 in)	15	1.15 mm (0.0452 in)
0.260-0.266 mm (0.0102-0.0104 in)	16	1.16 mm (0.0456 in)
0.253-0.259 mm (0.0100-0.0101 in)	17	1.17 mm (0.0460 in)
0.246-0.252 mm (0.0097-0.0099 in)	18	1.18 mm (0.0464 in)
0.239-0.245 mm (0.0094-0.0096 in)	19	1.19 mm (0.0468 in)
0.232-0.238 mm (0.0091-0.0093 in)	20	1.20 mm (0.0472 in)
0.225-0.231 mm (0.0089-0.0090 in)	21	1.21 mm (0.0476 in)
0.218-0.224 mm (0.0086-0.0088 in)	22	1.22 mm (0.0480 in)
0.211-0.217 mm (0.0083-0.0085 in)	23	1.23 mm (0.0484 in)
0.204-0.210 mm (0.0080-0.0082 in)	24	1.24 mm (0.0488 in)
0.197-0.203 mm (0.0078-0.0079 in)	25	1.25 mm (0.0492 in)
0.190-0.196 mm (0.0075-0.0077 in)	26	1.26 mm (0.0496 in)
0.183-0.189 mm (0.0072-0.0074 in)	27	1.27 mm (0.0499 in)
0.176-0.182 mm (0.0069-0.0071 in)	28	1.28 mm (0.0503 in)
0.169-0.175 mm (0.0066-0.0068 in)	29	1.29 mm (0.0507 in)
0.162-0.168 mm (0.0064-0.0066 in)	30	1.30 mm (0.0511 in)
0.155-0.161 mm (0.0061-0.0063 in)	31	1.31 mm (0.0515 in)
0.148-0.154 mm (0.0058-0.0060 in)	32	1.32 mm (0.0519 in)
0.141-0.147 mm (0.0056-0.0057 in)	33	1.33 mm (0.0523 in)
0.134-0.140 mm (0.0053-0.0055 in)	34	1.34 mm (0.0527 in)

1	2	3
0.127-0.133 mm (0.0050-0.0052 in)	35	1.35 mm (0.0531 in)
0.120-0.126 mm (0.0047-0.0049 in)	36	1.36 mm (0.0535 in)
0.113-0.119 mm (0.0045-0.0046 in)	37	1.37 mm (0.0539 in)
0.106-0.112 mm (0.0042-0.0044 in)	38	1.38 mm (0.0543 in)
0.099-0.105 mm (0.0040-0.0041 in)	39	1.39 mm (0.0547 in)
0.092-0.098 mm (0.0037-0.0039 in)	40	1.40 mm (0.0551 in)
0.085-0.091 mm (0.0034-0.0036 in)	41	1.41 mm (0.0555 in)
0.078-0.084 mm (0.0031-0.0033 in)	42	1.42 mm (0.0559 in)
0.071-0.077 mm (0.0028-0.0030 in)	43	1.43 mm (0.0562 in)
0.064-0.070 mm (0.0025-0.0027 in)	44	1.44 mm (0.0566 in)
0.057-0.063 mm (0.0023-0.0024 in)	45	1.45 mm (0.0570 in)
0.050-0.056 mm (0.0020-0.0022 in)	46	1.46 mm (0.0574 in)
0.043-0.049 mm (0.0017-0.0019 in)	47	1.47 mm (0.0578 in)
0.036-0.042 mm (0.0014-0.0016 in)	48	1.48 mm (0.0582 in)
0.029-0.035 mm (0.0011-0.0013 in)	49	1.49 mm (0.0586 in)
0.022-0.028 mm (0.0009-0.0011 in)	50 (master)	1.50 mm (0.0590 in)
0.015-0.021 mm (0.0006-0.0008 in)	51	1.51 mm (0.0594 in)
0.008-0.014 mm (0.0003-0.0005 in)	52	1.52 mm (0.0598 in)
0.001-0.007 mm (0.0001-0.0002 in)	53	1.53 mm (0.0602 in)
0.000-0.000 mm (0.0000-0.0000 in)	54	1.54 mm (0.0606 in)

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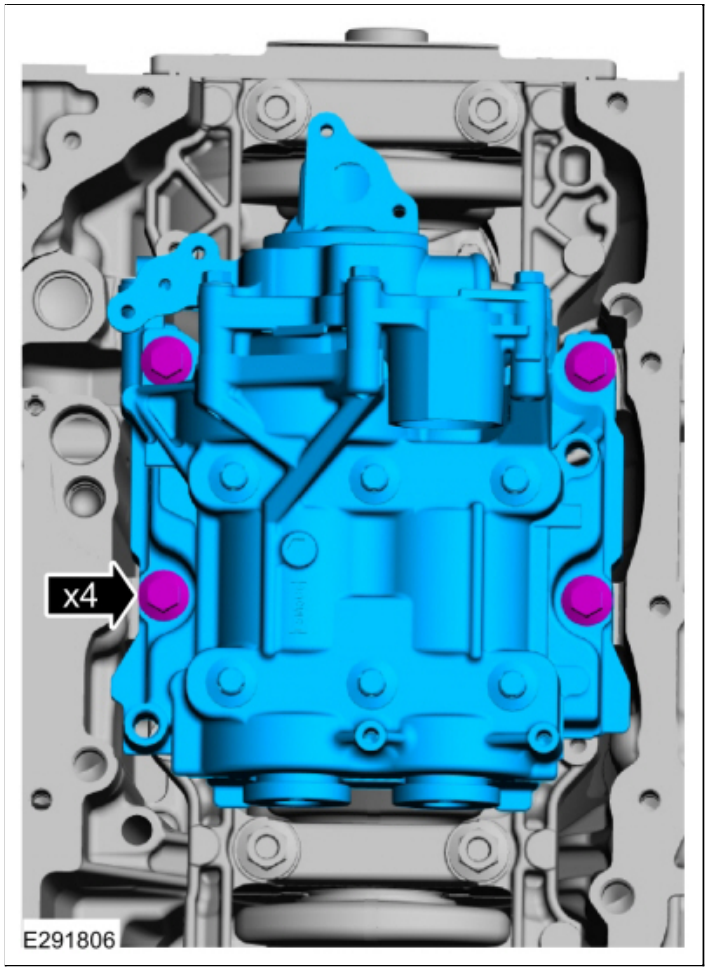
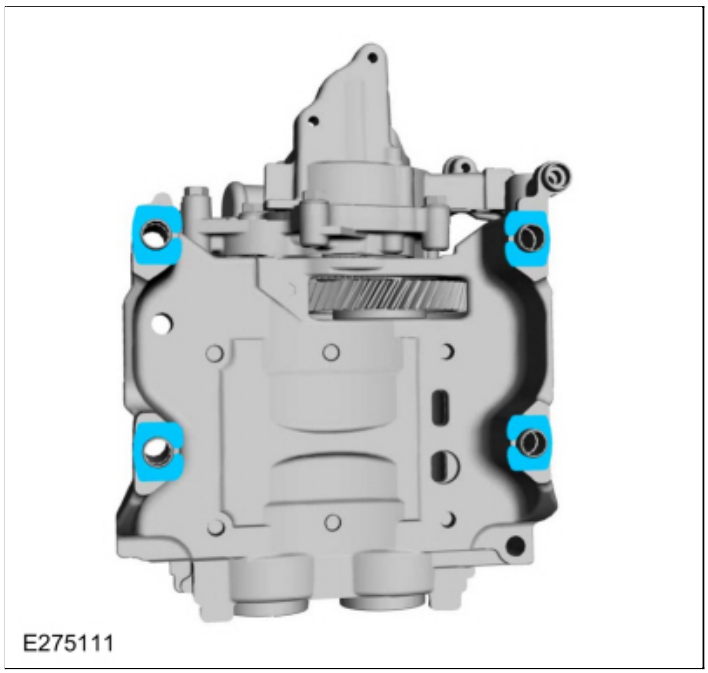
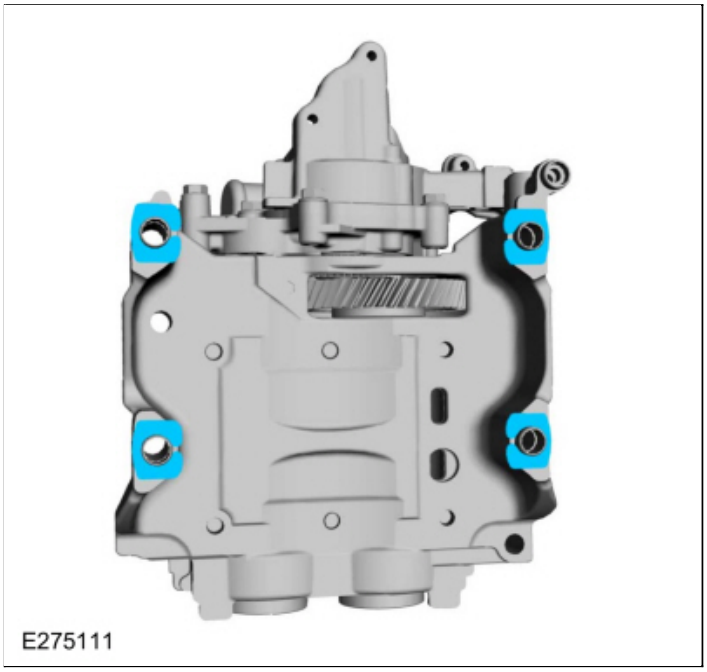
13. Remove the bolts and the balance unit.



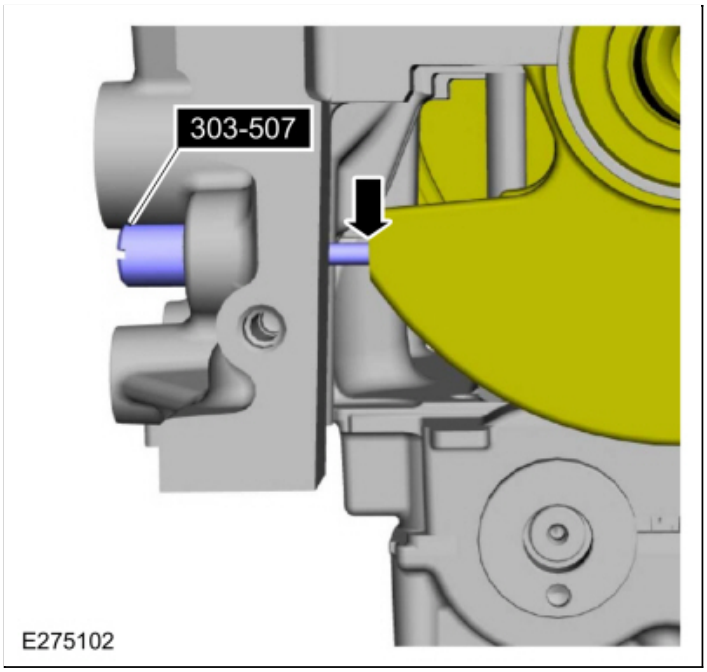
14. Remove the master adjustment shims (No. 50) from the balancer unit.



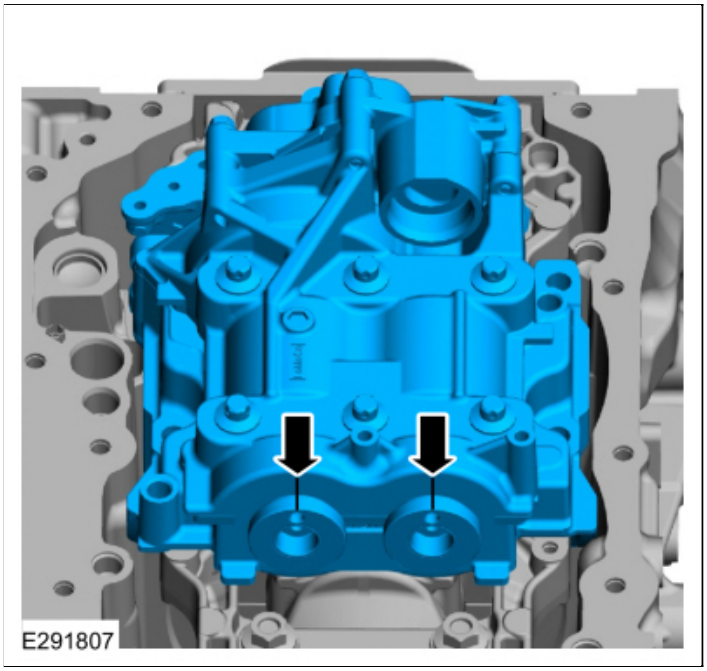
15. Install the selected adjustment shims on the seat faces of the balancer unit.



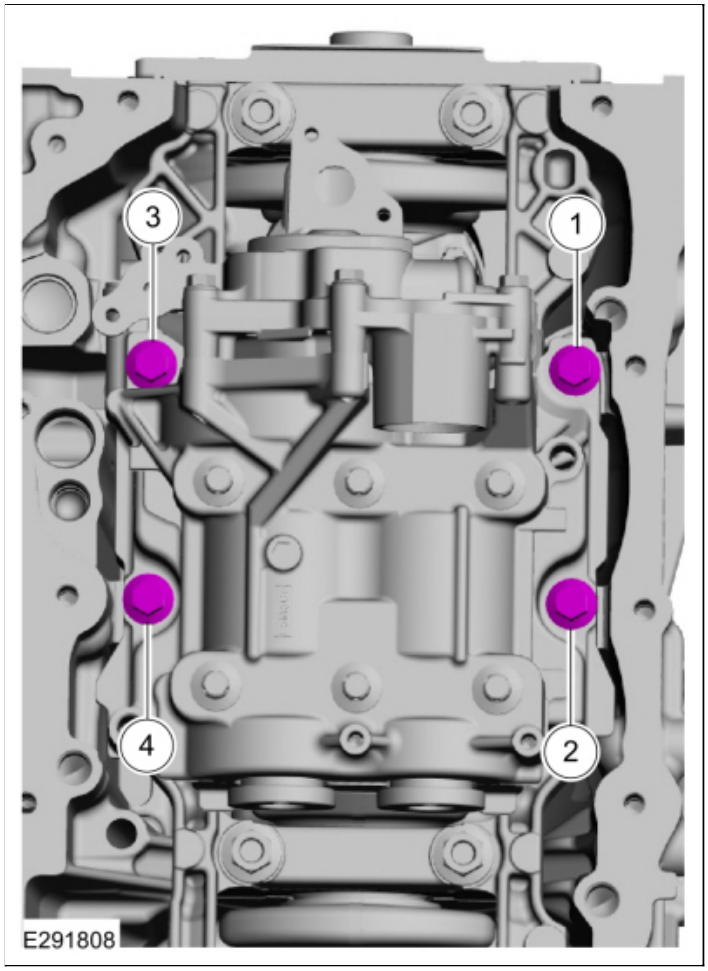
16. Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC.
Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



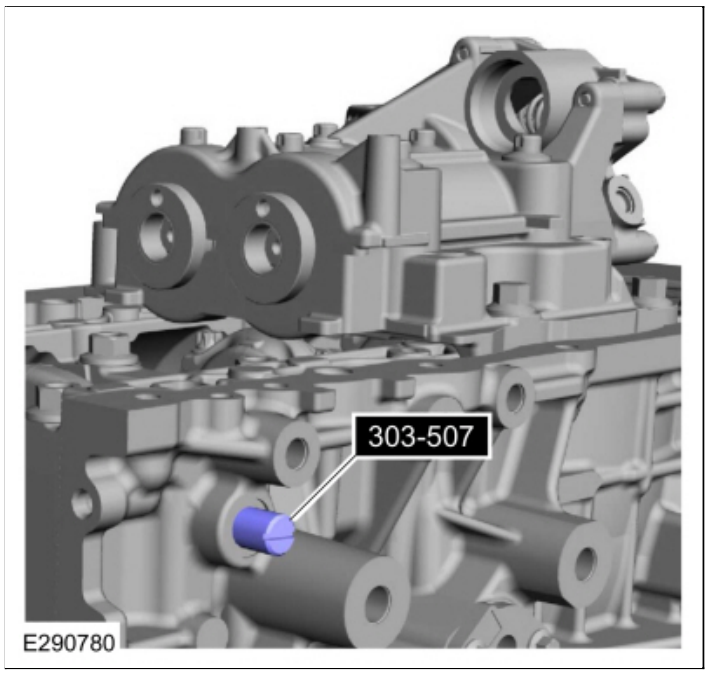
17. With the balancer unit shaft marks at the TDC position, slowly install the balancer unit to the cylinder block to avoid interference between the crankshaft drive gear and the balancer unit driven gear.



18. Install the bolts and tighten in sequence shown.
Torque:
Stage 1: 133 lb.in (15 Nm)
Stage 2: 45°



19. Remove Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.

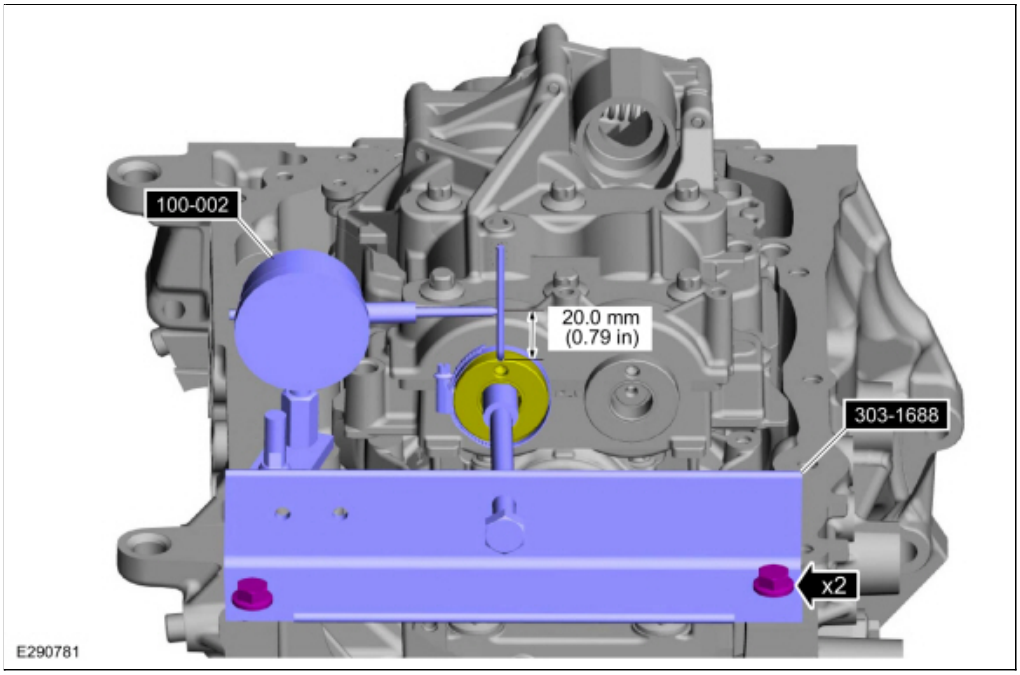


20. **NOTE:** *Measure the backlash and verify that it is within specified range at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees. It will be necessary to reset the measuring equipment between measurements.*

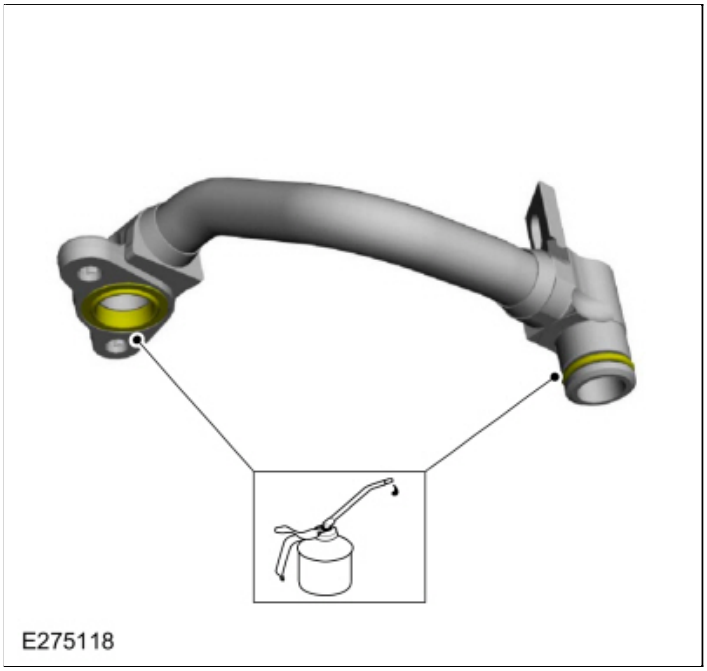
    NOTE: *The measurement must be taken with the Dial Indicator Gauge with Holding Fixture, a 5-mm Allen wrench and worm clamp set up as shown. Mark the Allen wrench with a file 20 mm (0.79 in) above the driven gear top surface. Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.*

    - **NOTE:** *Make sure the worm clamp and Allen wrench are not touching the balance shaft housing.*

      Install the 5-mm Allen wrench and tighten worm clamp as shown.
    - Mark the Allen wrench with a file 20 mm (0.79 in) above the driven gear top surface.
    - Install the balance shaft preload tool and bolts as shown.
      Use Special Service Tool: 303-1688 Preload Tool, Balance Shaft.
    - Install and position the dial indicator gauge with holding fixture on the Allen wrench 20 mm (0.79 in) as shown.
      Use Special Service Tool: 100-002 (TOOL-4201-C) Holding Fixture with Dial Indicator Gauge.
    - Rotate the crankshaft clockwise and measure the backlash at all of the following 6 positions: 10 degrees, 30 degrees, 100 degrees, 190 degrees, 210 degrees and 280 degrees.
    - If the backlash exceeds the specified range of 0.040 to 0.140 mm (0.00157 to 0.0055 in), install a new balancer unit and repeat the procedure.

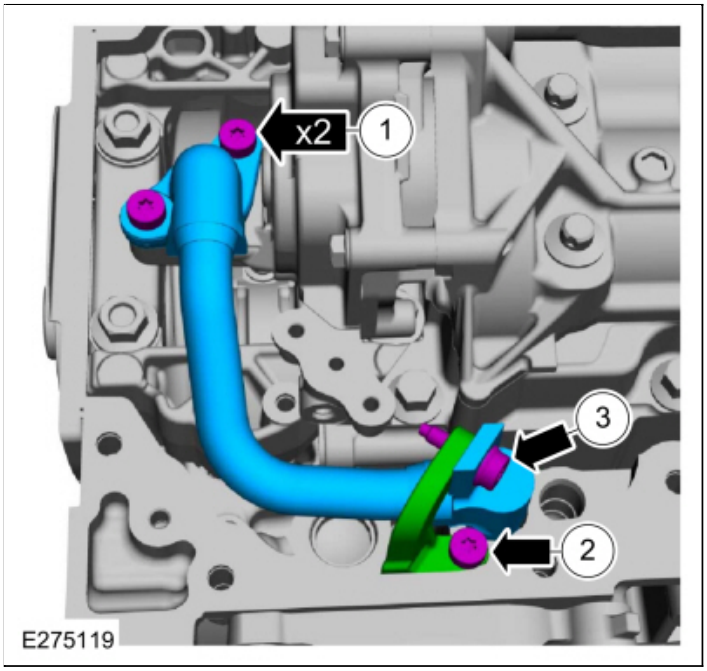


21. Lubricate the oil inlet tube O-ring seal with clean engine oil.

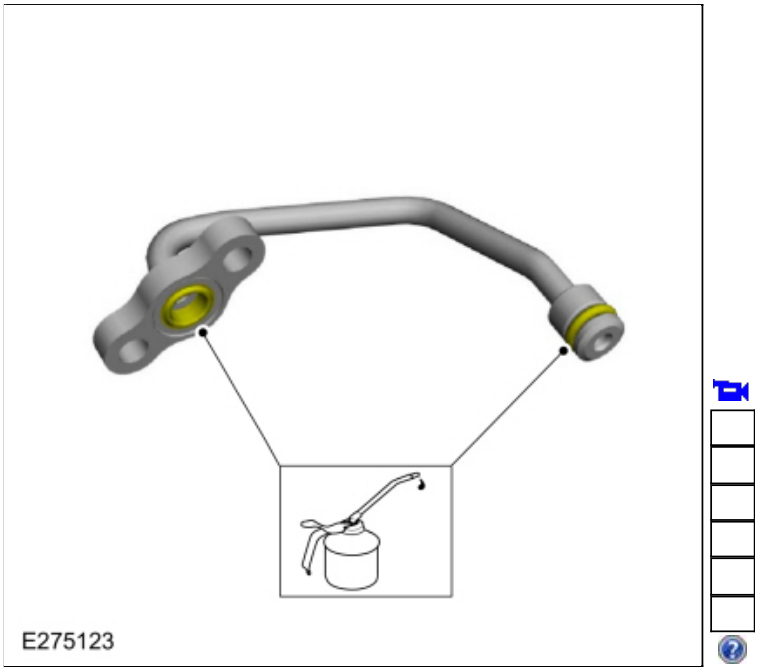


22.

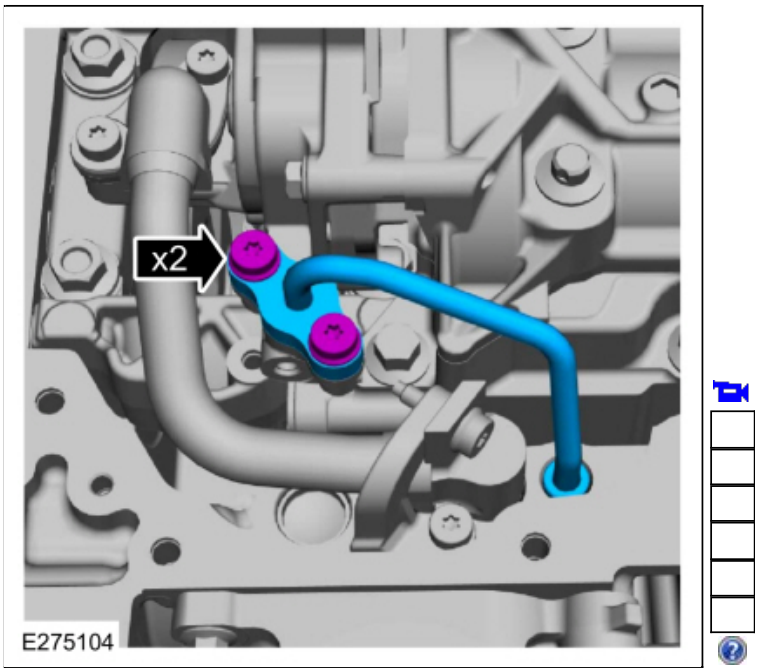
1. Install the oil inlet tube and the bolts.
   Torque: 97 lb.in (11 Nm)
2. Install the oil inlet tube bracket and the bolt.
   Torque: 97 lb.in (11 Nm)
3. Install the oil inlet tube-to-bracket bolt.
   Torque: 97 lb.in (11 Nm)



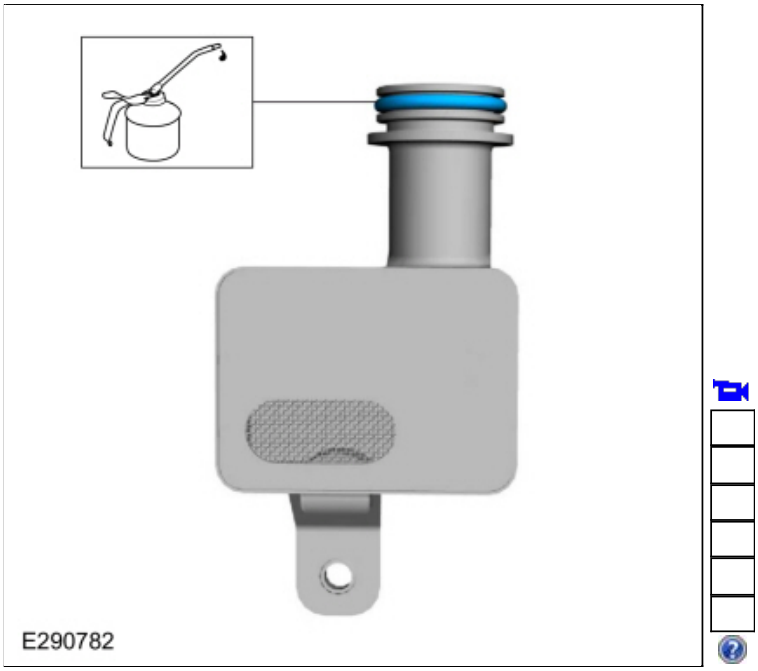
23. Lubricate the oil outlet tube O-ring seals with clean engine oil.



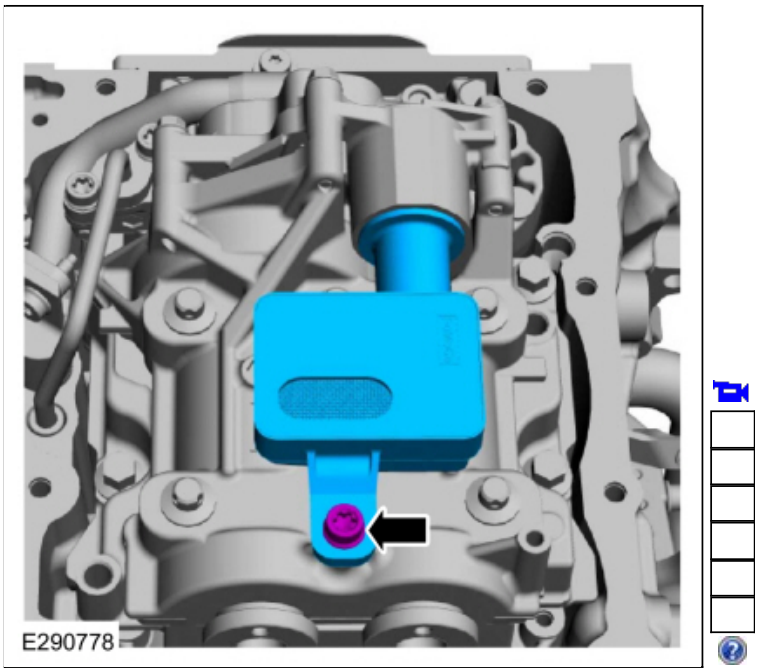
24. Install the oil outlet tube and the bolts.
Torque: 97 lb.in (11 Nm)



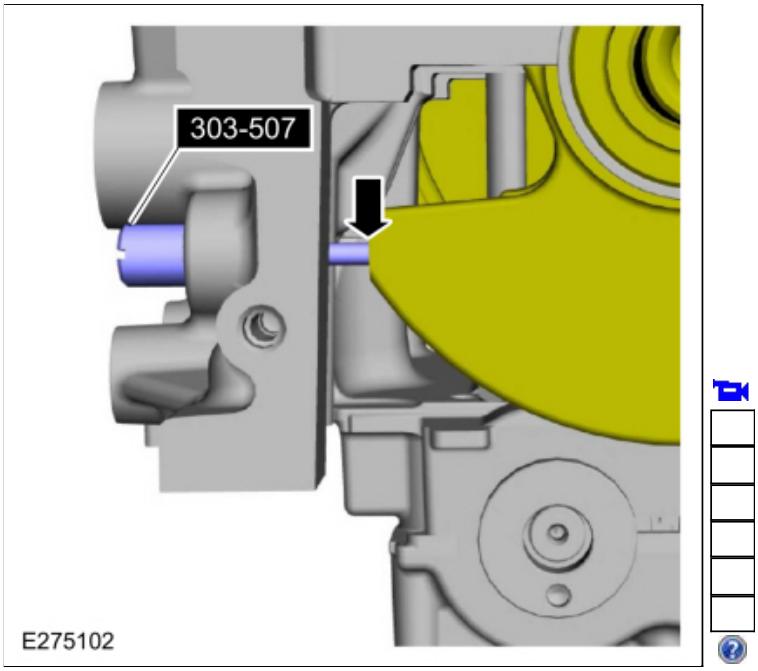
25. Install a new O-ring seal and lubricate with clean engine oil.



26. Install the oil screen and pickup tube and the bolt.
Torque: 97 lb.in (11 Nm)



27. Install the special tool and rotate the crankshaft slowly clockwise until the crankshaft balance weight is up against the Crankshaft TDC Timing Peg. The engine is now at TDC.
Use Special Service Tool: 303-507 Timing Peg, Crankshaft TDC.



28. Install the oil pan.
Refer to: Oil Pan (303-01 Engine - 2.3L EcoBoost (201kW/273PS), Removal and Installation).