

LUBRICATION SYSTEM (1GR-FE)

ON-VEHICLE INSPECTION

17009-02

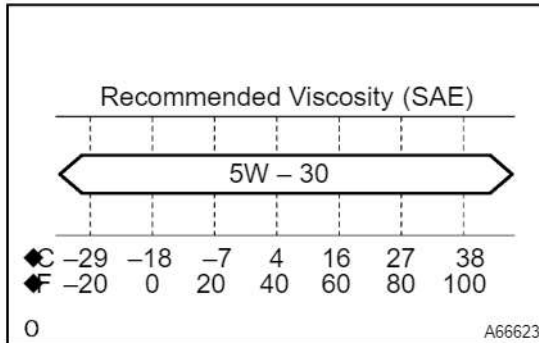
1. CHECK ENGINE OIL LEVEL

- (a) 5 minutes after the engine stop since the engine was warmed up, the oil level should be between the low-and full-level marks of the dipstick.

If low, check for leakage and add oil up to the full level mark.

NOTICE:

Do not fill with engine oil over the full level mark.



2. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, water mixing, discoloring or thinning.

- (b) If the oil quality is visibly poor, replace the oil.

HINT:

Oil grade:

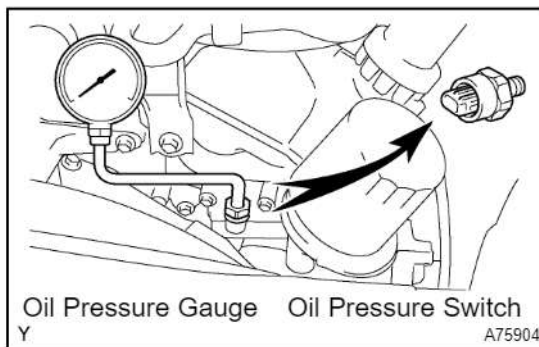
Use API grade SL "Energy-Conserving", or ILSAC multigrade engine oil.

SAE 5W-30 is the best choice for good fuel economy, and good starting in cold weather.

If SAE 5W-30 is not available, SAE 10W-30 may be used. However, it should be replaced with SAE 5W-30 at the next oil replacement.

3. REMOVE OIL PRESSURE SWITCH ASSY

- (a) Disconnect the oil pressure switch connector.
- (b) Using a 24 mm deep socket wrench, remove the oil pressure switch.



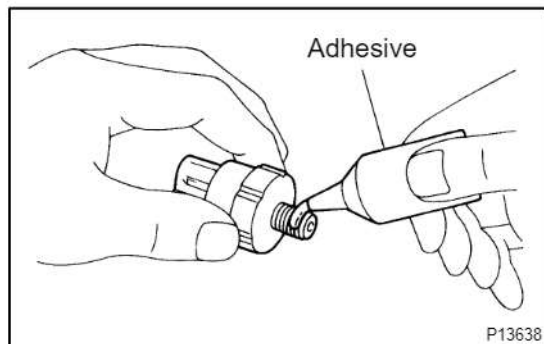
4. INSTALL OIL PRESSURE GAUGE

- (a) Install the oil pressure gauge.

5. WARM UP ENGINE

6. CHECK OIL PRESSURE**Oil pressure:**

At idle	29 kPa (0.3 kgf·cm ² , 4.2 psi) or more
At 3,000 rpm	294 – 588 kPa (3.0 – 6.0 kgf·cm ² , 43 – 85 psi)

**7. INSTALL OIL PRESSURE SWITCH**

- (a) Remove the oil pressure gauge.
- (b) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

**Part No. 08833 – 00080, THREE BOND 1344,
LOCTITE 242 or equivalent**

- (c) Using a 24 mm deep socket wrench, Install the oil pressure switch.

Torque: 15 N·m (152 kgf·cm, 11 ft·lbf)

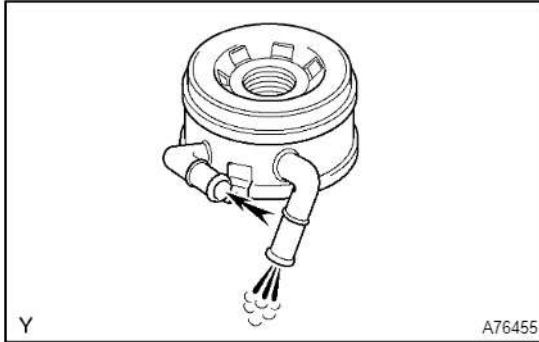
NOTICE:

Do not start the engine for 1 hour after the installation.

- (d) Connect the oil pressure switch connector.

8. START ENGINE AND CHECK FOR LEAKS

INSPECTION



1. INSPECT OIL COOLER ASSY

- (a) Check the oil cooler for damage or clogging.
If necessary, replace the oil cooler.

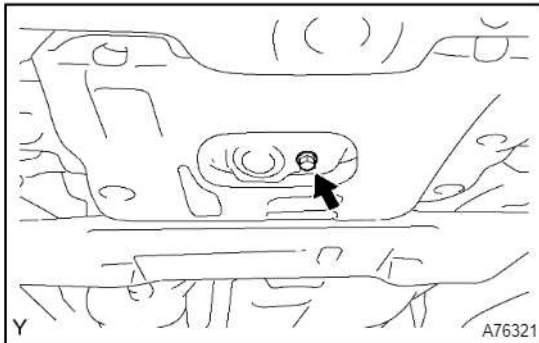
OIL FILTER SUB-ASSY (1GR-FE)

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REPLACEMENT

CAUTION:

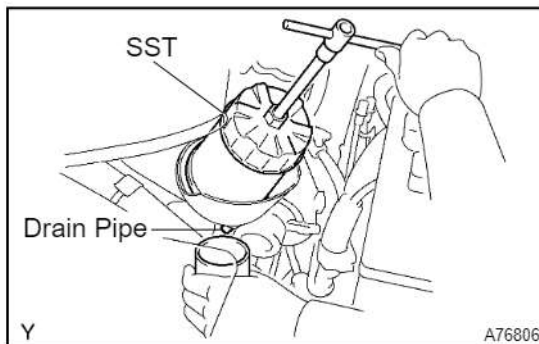
- ◆ Prolonged and repeated contact with engine oil will result in the removal of natural oils from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- ◆ Precautions should be taken when replacing engine oil to minimize the risk of your skin making contact with used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be washed with soap and water, or use water-less hand cleaner, to remove any used engine oil thoroughly. Do not use gasoline, thinners, or solvents.
- ◆ In order to preserve the environment, used oil and used oil filters must be disposed of at designated disposal sites.



1. DRAIN ENGINE OIL

- (a) Remove the engine under cover seal No. 3.
- (b) Remove the oil pan drain plug and drain the engine oil.
- (c) Clean the oil pan drain plug and install a new gasket and it.

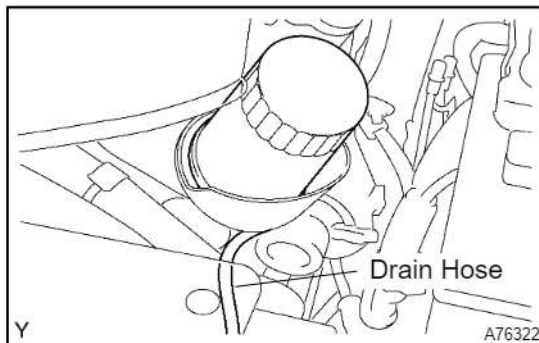
Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)



2. REMOVE OIL FILTER SUB-ASSY

- (a) Remove the drain pipe cap.
- (b) While removing the oil filter with SST, catch the oil from the oil filter with a container.
- (c) Install the drain pipe cap.
- (d) Clean the oil catch plate.

SST 09228-07501



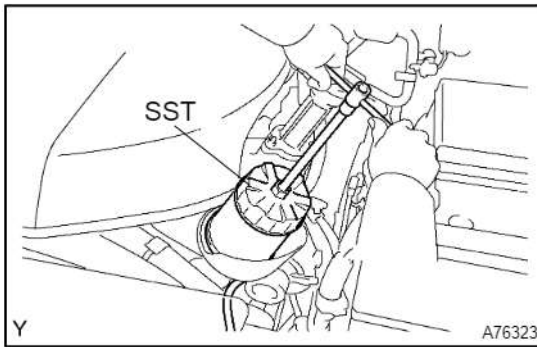
HINT:

When using a drain hose, perform the following procedure.

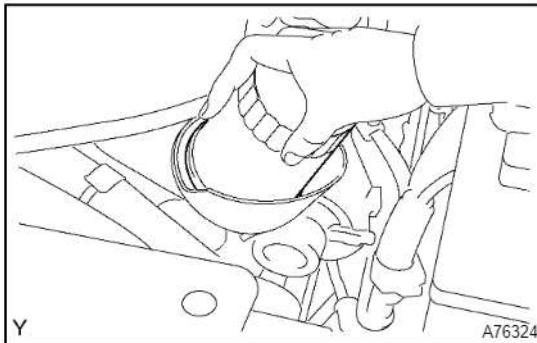
- (e) Remove the drain pipe cap.
- (f) Connect a drain hose to the oil filter bracket.

HINT:

- ◆ Drain hose inside diameter: 8 mm (0.31 in.)
- ◆ Drain hose length: 900 mm (35.43 in.)
- (g) Feed the drain hose down through the engine under cover, and put the drain oil container beneath the drain hose in order to catch the oil from the oil filter.

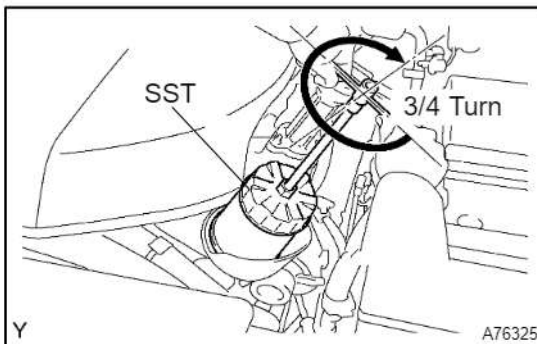


- (h) Using SST, remove the oil filter.
SST 09228-07501
- (i) Remove the drain hose and install the drain pipe cap.
- (j) Clean the oil catch plate.



3. INSTALL OIL FILTER SUB-ASSY

- (a) Clean the oil filter contact surface on the oil filter bracket.
- (b) Lubricate the rubber gasket of a new oil filter with clean engine oil.
- (c) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter bracket.



- (d) Using SST, give it an additional 3/4 turn to set the filter.
SST 09228-07501

4. ADD ENGINE OIL

- (a) Fill with new engine oil.

Capacity:

Drain and refill:

w/ Oil filter change: 5.2 liters (5.5 US qts, 4.6 Imp. qts)

w/o Oil filter change: 4.9 liters (5.2 US qts, 4.3 Imp. qts)

Dry fill: 6.0 liters (6.3 US qts, 5.3 Imp. qts)

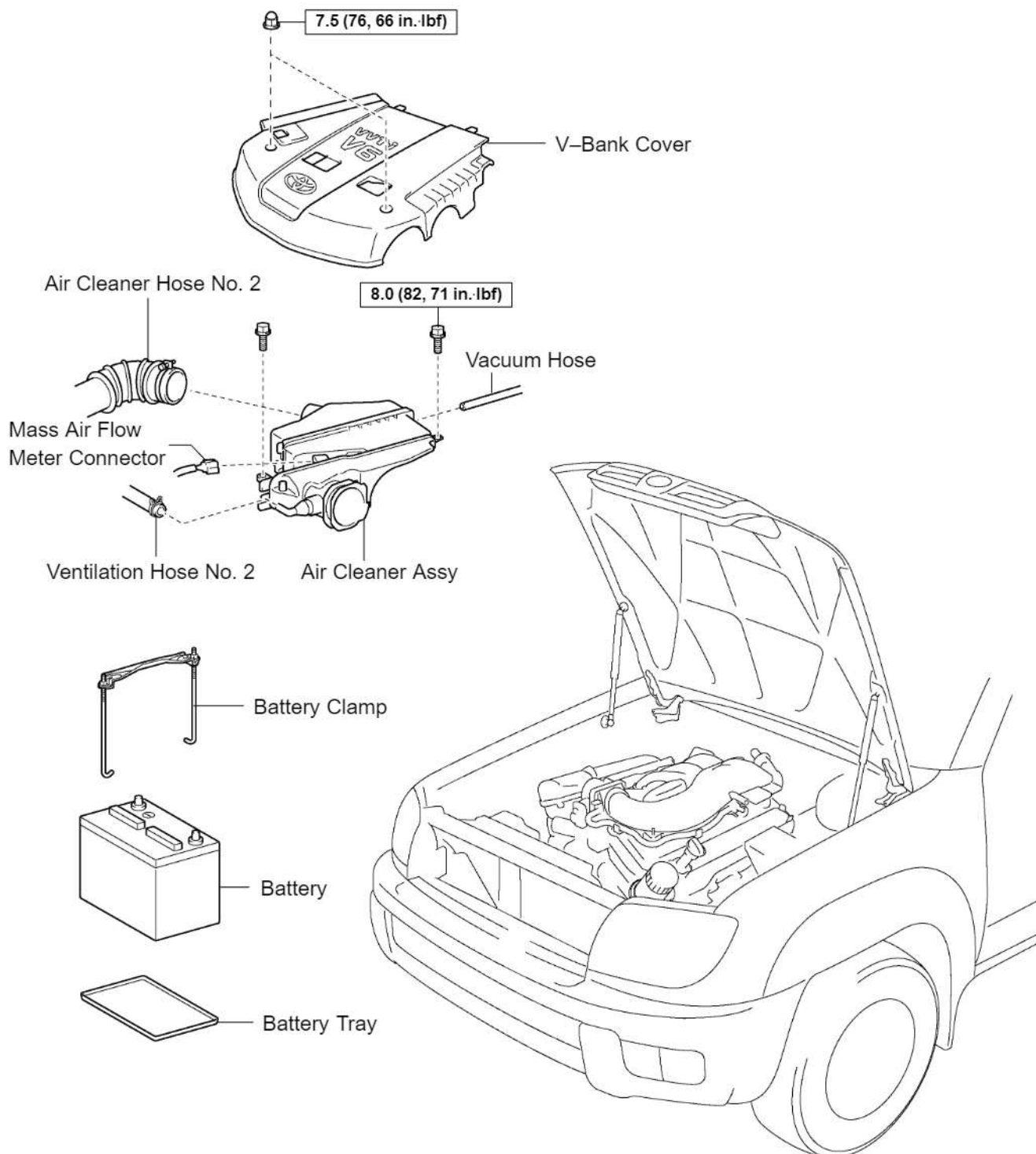
- (b) Reinstall the oil filler cap.

5. CHECK FOR ENGINE OIL LEAKS

6. CHECK ENGINE OIL LEVEL

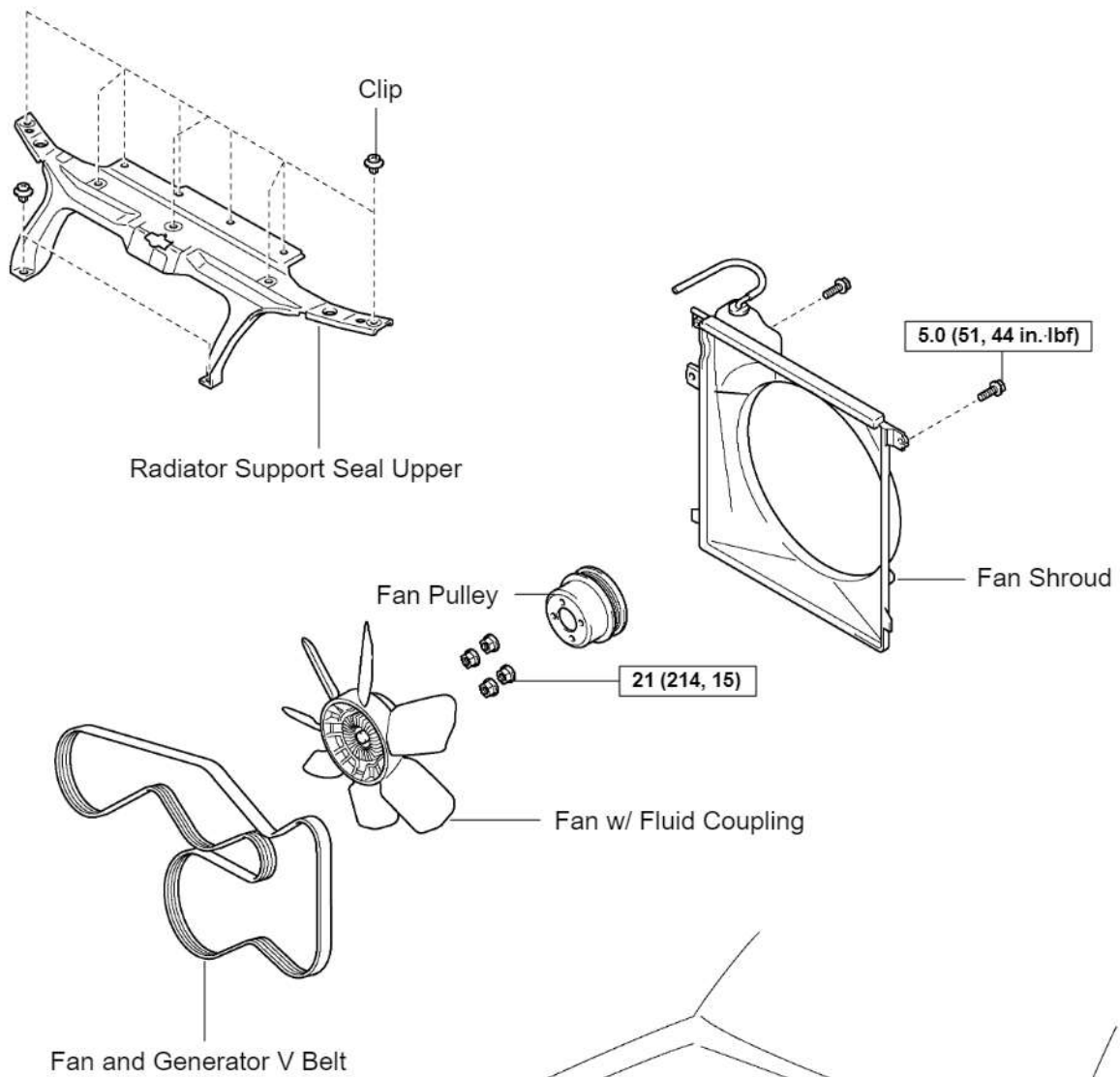
TIMING CHAIN OR BELT COVER SUB-ASSY (1GR-FE) COMPONENTS

17001-02



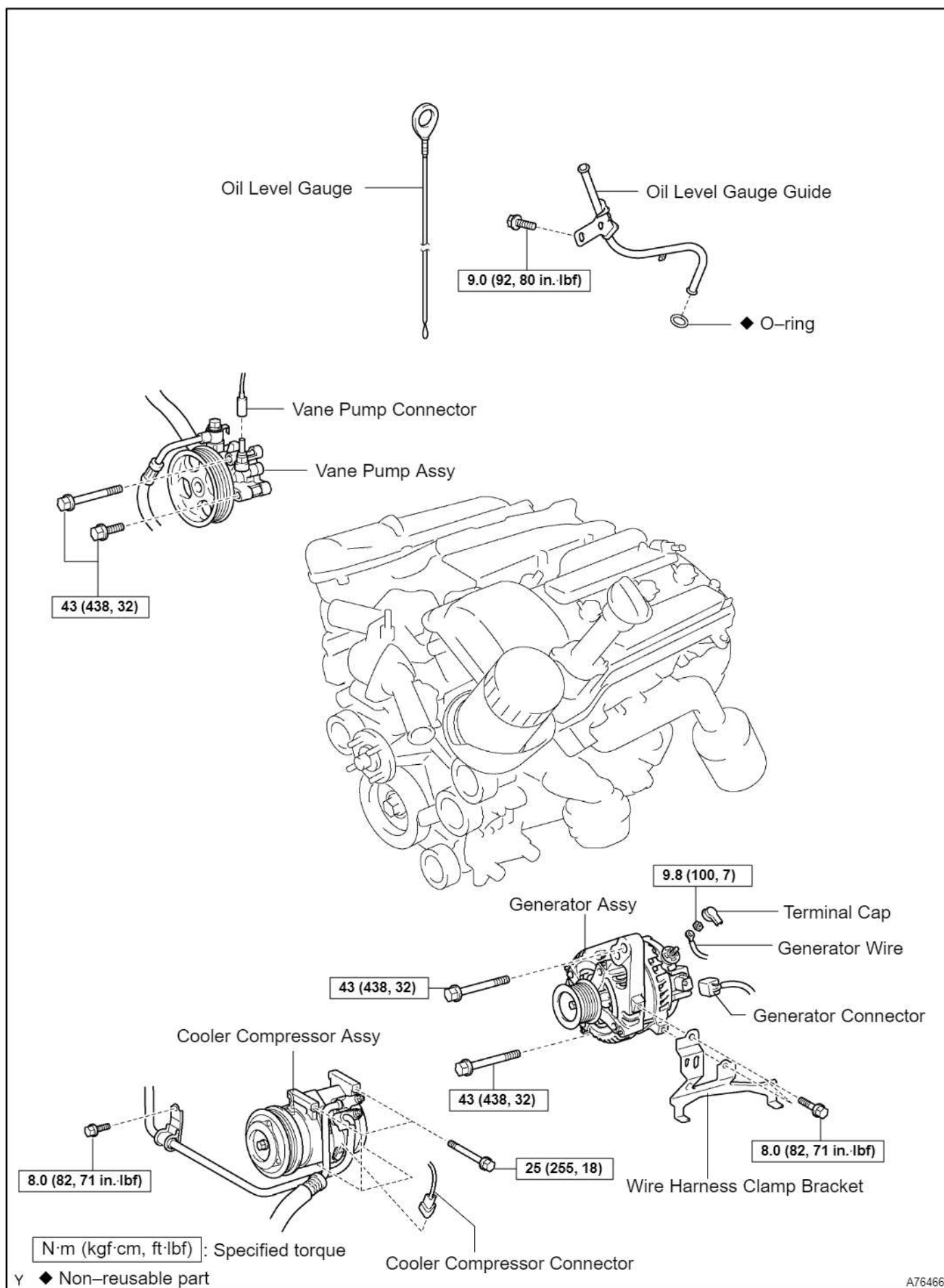
Y N·m (kgf·cm, ft·lbf) : Specified torque

A76464

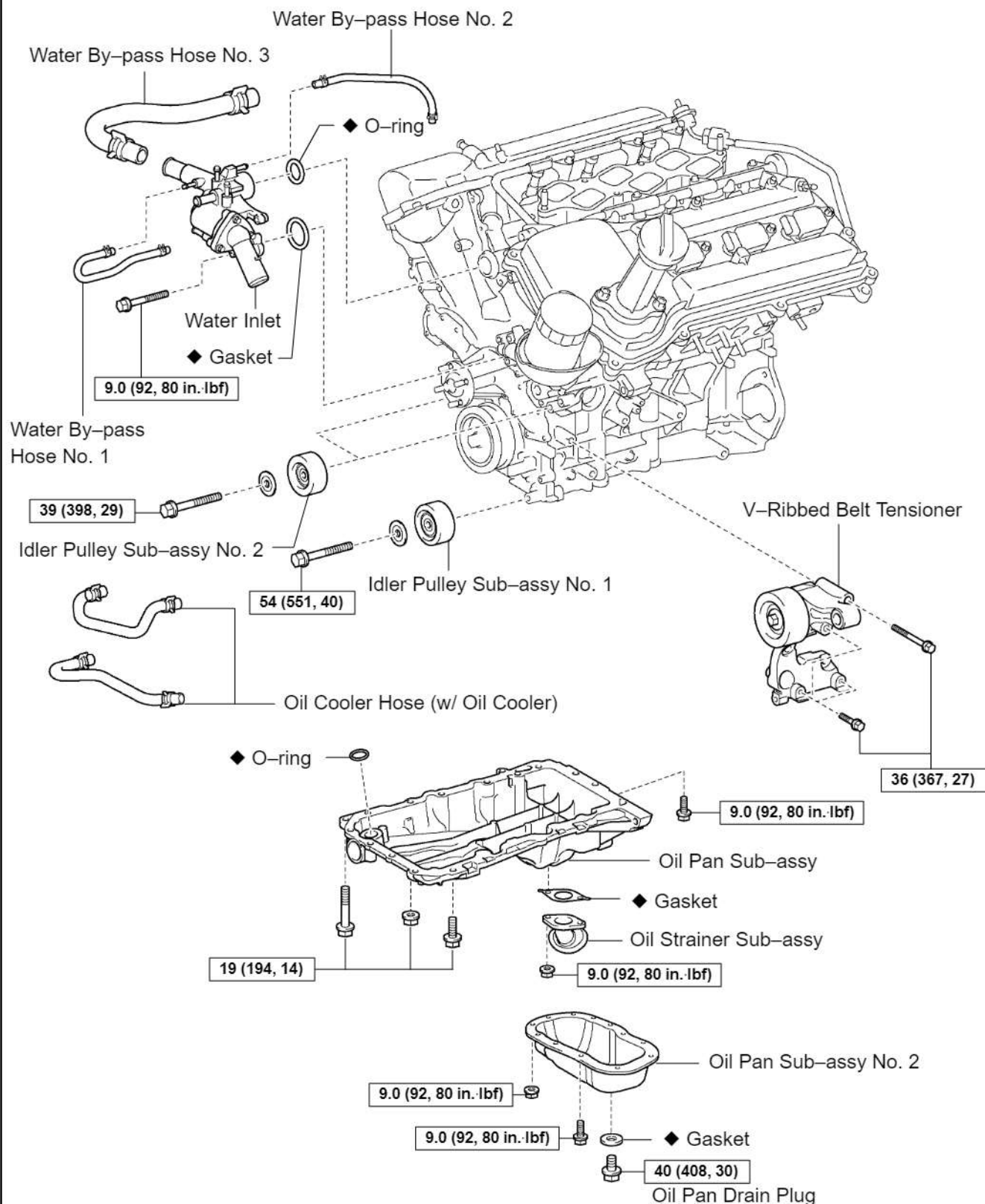


γ N·m (kgf·cm, ft·lbf) : Specified torque

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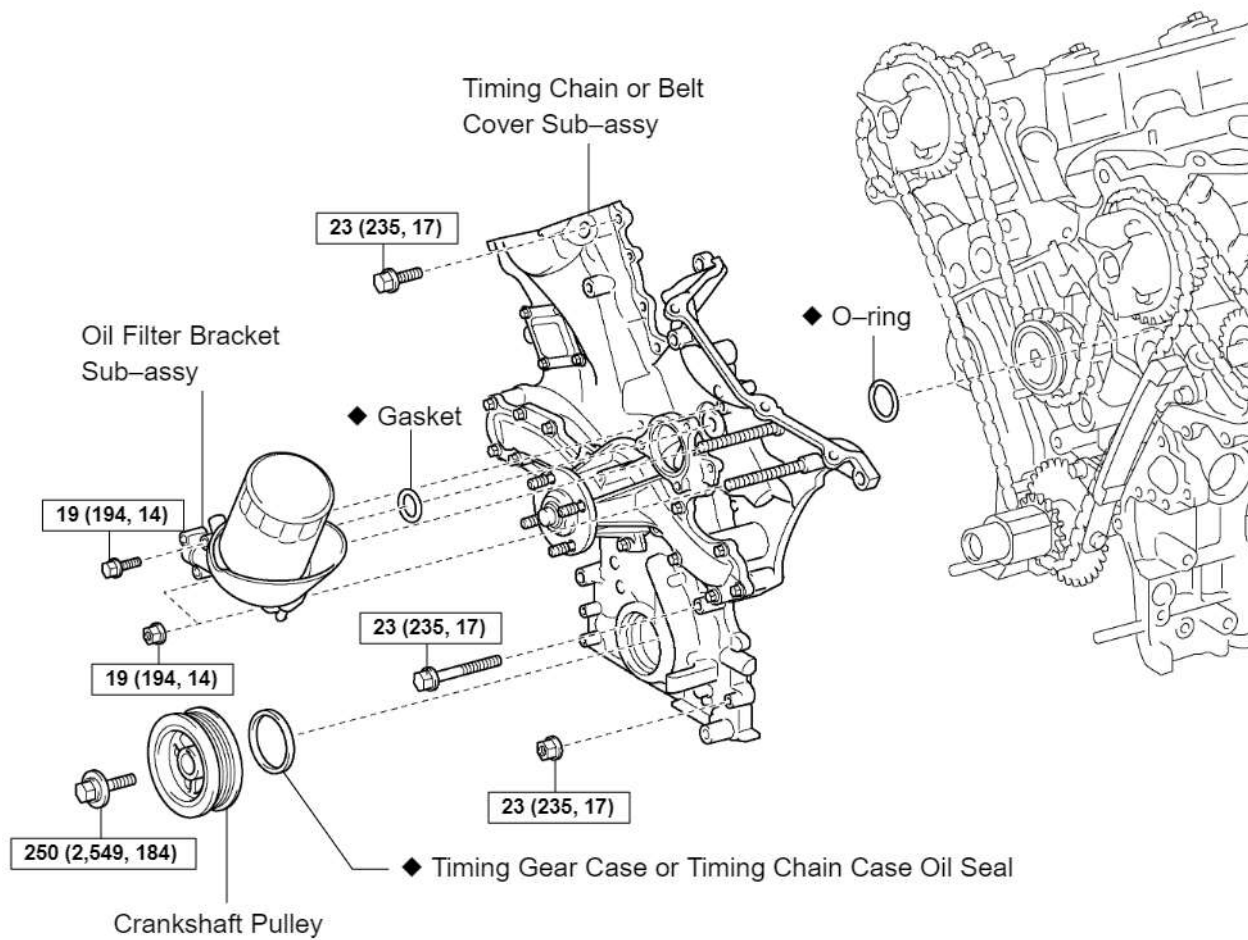
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N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

A76467



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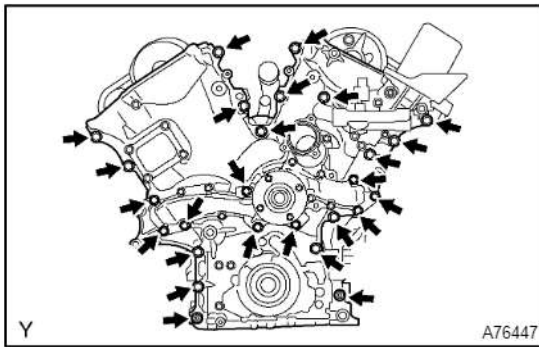
N·m (kgf·cm, ft·lbf): Specified torque

◆ Non-reusable part

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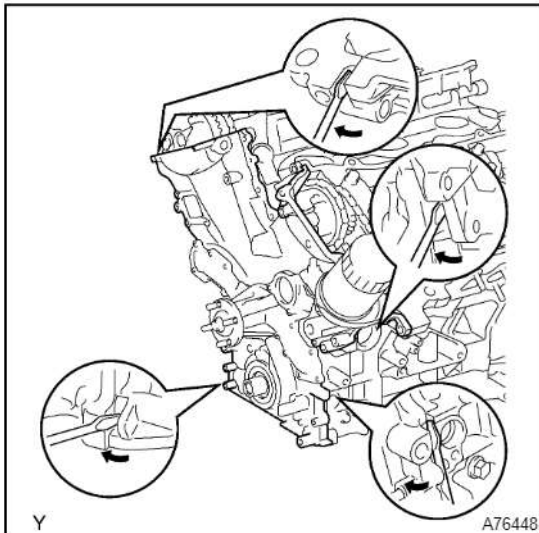
REPLACEMENT

1. REMOVE POWER STEERING LINK ASSY (See page 51-20)
2. REMOVE DIFFERENTIAL CARRIER ASSY FRONT (4WD DRIVE TYPE) (See page 29-8)
3. DRAIN ENGINE COOLANT (See page 16-5)
4. DRAIN ENGINE OIL (See page 17-4)
5. REMOVE BATTERY
6. REMOVE V-BANK COVER (See page 10-7)
7. REMOVE RADIATOR SUPPORT SEAL UPPER
 - (a) Remove the 11 clips and radiator support seal upper.
8. LOOSEN FAN W/ FLUID COUPLING (See page 16-6)
9. REMOVE FAN AND GENERATOR V BELT (See page 14-5)
10. REMOVE FAN W/ FLUID COUPLING (See page 16-6)
11. DISCONNECT VENTILATION HOSE NO.2 (See page 10-7)
12. REMOVE AIR CLEANER ASSY (See page 10-7)
13. REMOVE OIL LEVEL GAUGE GUIDE
 - (a) Remove the oil level gauge.
 - (b) Remove the bolt and pull out the oil level gauge guide.
 - (c) Remove the O-ring from the oil level gauge guide.
14. REMOVE WATER INLET (See page 16-6)
15. SEPARATE VANE PUMP ASSY (See page 14-119)
16. REMOVE GENERATOR ASSY (See page 19-26)
17. SEPARATE COOLER COMPRESSOR ASSY (See page 18-7)
18. REMOVE V-RIBBED BELT TENSIONER ASSY (See page 14-119)
19. REMOVE IDLER PULLEY SUB-ASSY NO.2
 - (a) Remove the 2 bolts and 2 idler pulleys.
20. REMOVE IDLER PULLEY SUB-ASSY NO.1
 - (a) Remove the bolt and idler pulley.
21. REMOVE CRANKSHAFT PULLEY (See page 14-119)
SST 09213-54015 (91651-60855), 09330-00021, 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05030)
22. REMOVE OIL PAN SUB-ASSY NO.2 (See page 14-119)
SST 09032-00100
23. REMOVE OIL STRAINER SUB-ASSY (See page 14-119)
24. REMOVE OIL PAN SUB-ASSY (See page 14-119)
25. REMOVE INTAKE AIR SURGE TANK (See page 14-132)
26. REMOVE IGNITION COIL ASSY
27. REMOVE CYLINDER HEAD COVER SUB-ASSY (See page 14-132)
28. REMOVE CYLINDER HEAD COVER SUB-ASSY LH (See page 14-132)
29. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY
 - (a) Disconnect the 2 oil control valve connectors.
 - (b) Remove the 2 bolts and 2 camshaft timing oil control valves.
30. REMOVE VVT SENSOR (See page 18-5)
31. REMOVE OIL FILTER BRACKET SUB-ASSY
 - (a) Remove the 3 bolts, 2 nuts, oil filter bracket and gasket.



32. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY

- (a) Remove the 24 bolts and 2 nuts.

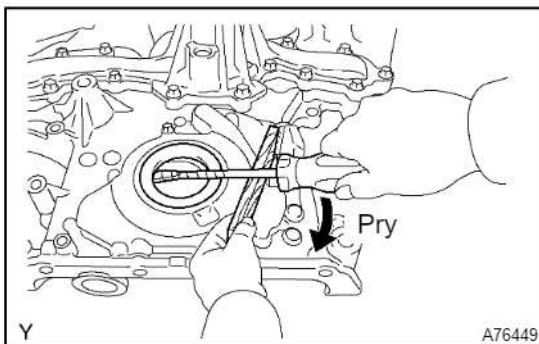


- (b) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the timing chain cover, cylinder block and cylinder head.

- (c) Remove the O-ring from the LH cylinder head.

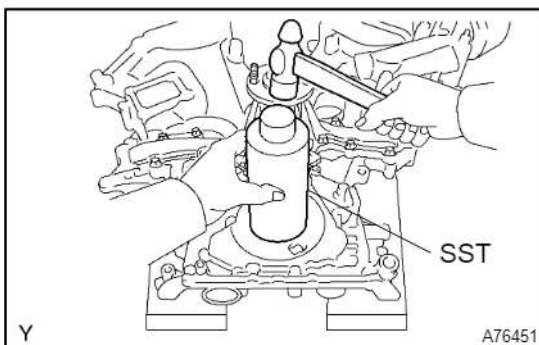


33. REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the oil pump assembly. Wrap a tip of the screwdriver with tape.



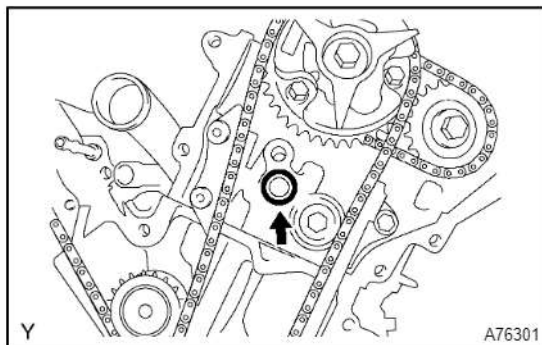
34. INSTALL TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

- (a) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.
SST 09226-10010

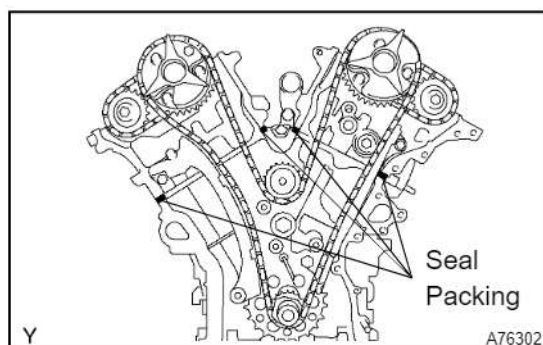
- (b) Apply MP grease to the oil seal lip.

35. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY

- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head and cylinder block.

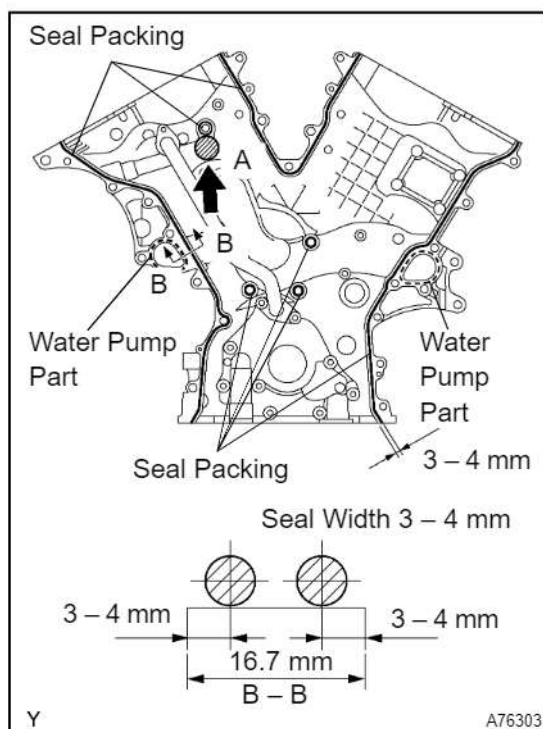


- (b) Install a new O-ring to the LH cylinder head as shown in the illustration.



- (c) Apply a continuous bead of the seal packing (diameter 3 – 4 mm (0.12 – 0.16 in.)) to 4 locations as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent



- (d) Apply a continuous bead of the seal packing (diameter 3 – 4 mm (0.12 – 0.16 in.)) to the timing chain cover as shown in the illustration.

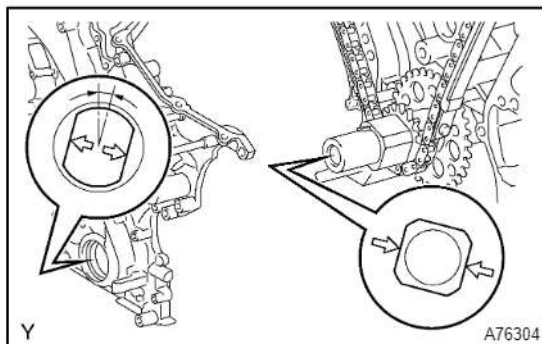
Seal packing:

Water pump part: Part No. 08826-00100 or equivalent

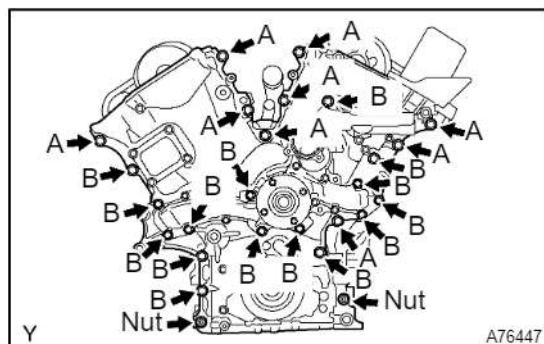
Other part: Part No. 08826-00080 or equivalent

NOTICE:

- ◆ Install the timing chain cover within 3 minutes after applying seal packing. After installing it, timing chain cover bolts and nuts must be tightened within 15 minutes. Otherwise the seal packing must be removed and reapplied.
- ◆ Do not apply seal packing to the "A" as shown in the illustration.



- (e) Align the key way of the oil pump drive rotor with the rectangular portion of the crankshaft timing gear, and slide the timing chain cover into place.



- (f) Install the timing chain cover with the 24 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)

NOTICE:

Pay attention not to wrap the chain and slipper over the timing chain cover seal line.

HINT:

Each bolt length as follows:

A 25 mm (0.98 in.)

B 55 mm (2.17 in.)

36. INSTALL OIL FILTER BRACKET SUB-ASSY

- (a) Install a new gasket and oil filter bracket with the 3 bolts and 2 nuts.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

37. INSTALL VVT SENSOR (See page 18-5)

38. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY

- (a) Insert the camshaft timing oil control valves to each cylinder head, and tighten the 2 bolts.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

39. INSTALL CYLINDER HEAD COVER SUB-ASSY LH (See page 14-132)

40. INSTALL CYLINDER HEAD COVER SUB-ASSY (See page 14-132)

41. INSTALL IGNITION COIL ASSY

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

42. INSTALL INTAKE AIR SURGE TANK (See page 14-132)

43. INSTALL OIL PAN SUB-ASSY (See page 14-119)

44. INSTALL OIL STRAINER SUB-ASSY (See page 14-119)

45. INSTALL OIL PAN SUB-ASSY NO.2 (See page 14-119)

46. INSTALL CRANKSHAFT PULLEY (See page 14-119)

SST 09213-54015 (91651-60855), 09330-00021

47. INSTALL IDLER PULLEY SUB-ASSY NO.1 (See page 14-119)

48. INSTALL IDLER PULLEY SUB-ASSY NO.2 (See page 14-119)

49. INSTALL V-RIBBED BELT TENSIONER ASSY (See page 14-119)

50. INSTALL COOLER COMPRESSOR ASSY (See page 18-7)

51. INSTALL GENERATOR ASSY (See page 19-26)

52. INSTALL VANE PUMP ASSY (See page 14-119)

53. INSTALL WATER INLET (See page 16-6)

54. INSTALL OIL LEVEL GAUGE GUIDE (See page 14-119)

55. INSTALL AIR CLEANER ASSY (See page 10-7)

56. CONNECT VENTILATION HOSE NO.2

57. INSTALL FAN W/ FLUID COUPLING (See page 16-6)

58. INSTALL FAN AND GENERATOR V BELT (See page 14-5)

59. FULLY TIGHTEN FAN W/ FLUID COUPLING (See page 16-6)

60. INSTALL RADIATOR SUPPORT SEAL UPPER

61. INSTALL BATTERY

62. INSTALL DIFFERENTIAL CARRIER ASSY FRONT (4WD DRIVE TYPE) (See page 29-8)

63. INSTALL POWER STEERING LINK ASSY (See page 51-20)

64. ADD ENGINE OIL (See page 17-4)

65. ADD ENGINE COOLANT (See page 16-5)

66. CHECK FOR ENGINE OIL LEAKS

67. CHECK FOR ENGINE COOLANT LEAKS (See page 16-1)

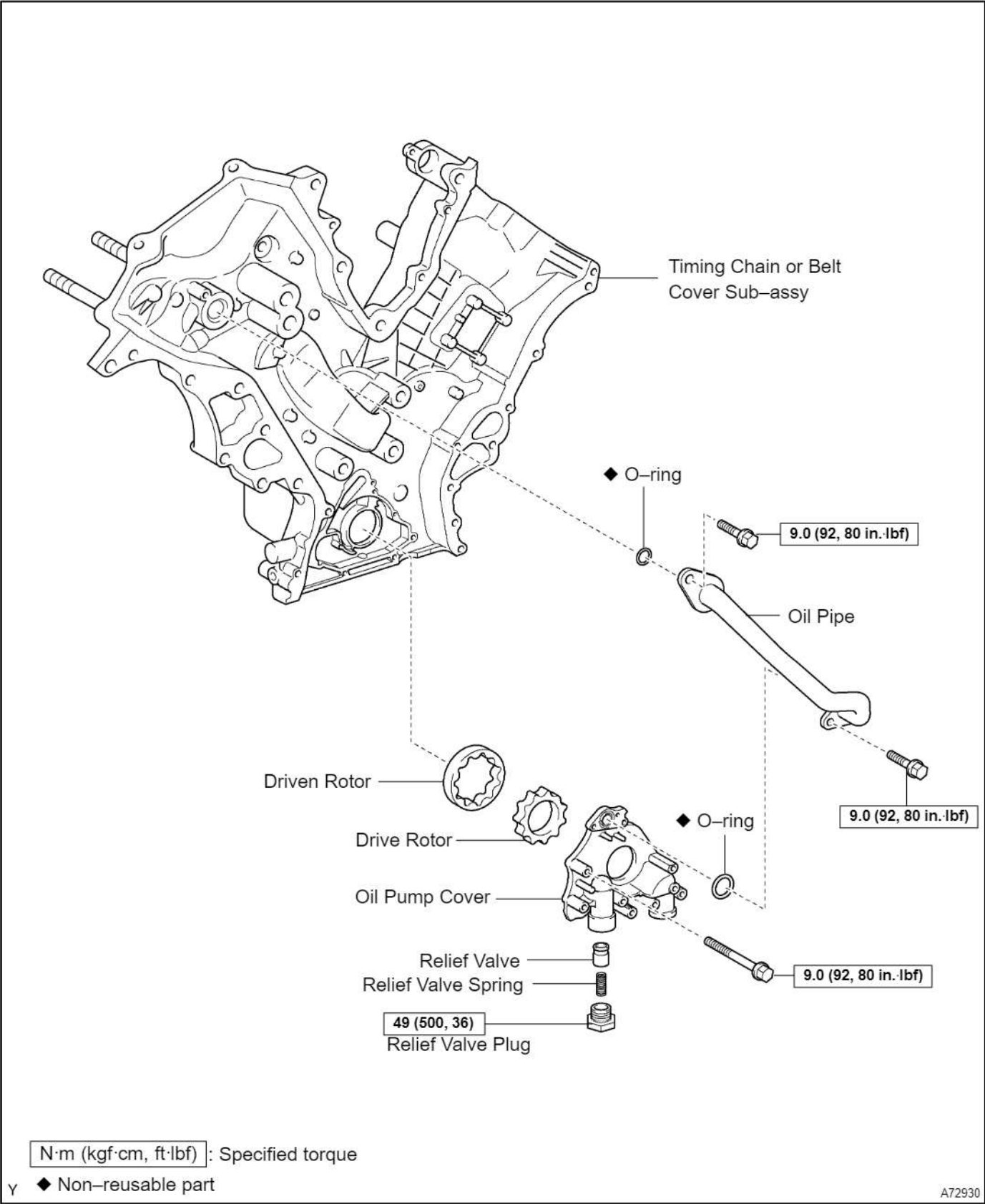
68. INSTALL V-BANK COVER

- (a) Install the V-bank cover with the 2 nuts.

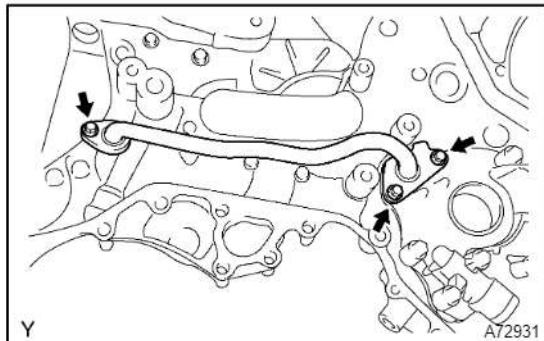
Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

OIL PUMP ASSY (1GR-FE) COMPONENTS

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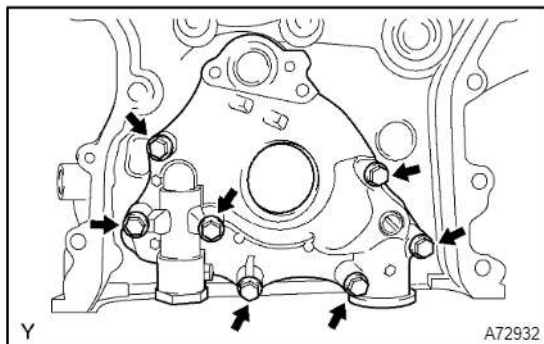


OVERHAUL



1. REMOVE OIL PUMP COVER

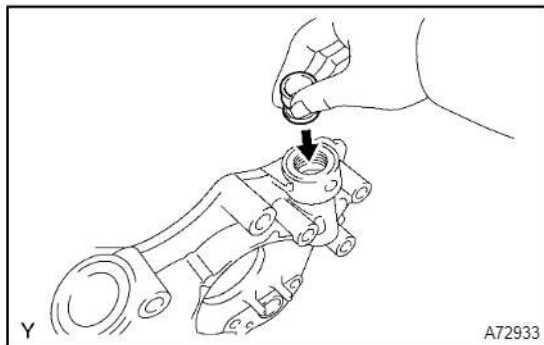
- (a) Remove the 3 bolts and oil pipe.
- (b) Remove the 2 O-rings.



- (c) Remove the 7 bolts, oil pump cover, drive rotor and driven rotor.

2. REMOVE OIL PUMP RELIEF VALVE

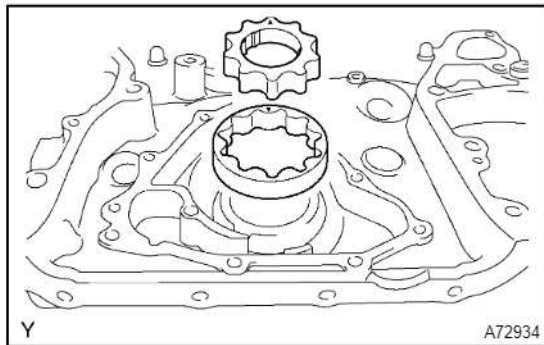
- (a) Remove the plug, spring and relief valve.



3. INSPECT OIL PUMP RELIEF VALVE

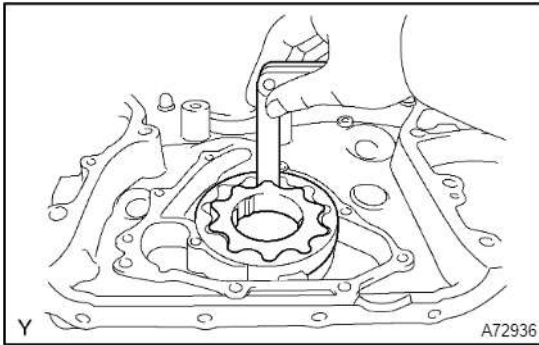
- (a) Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If not, replace the relief valve. If necessary, replace the oil pump assembly.



4. INSPECT OIL PUMP ROTOR SET

- (a) Place the drive and driven rotors into the timing chain cover with the marks facing upward.



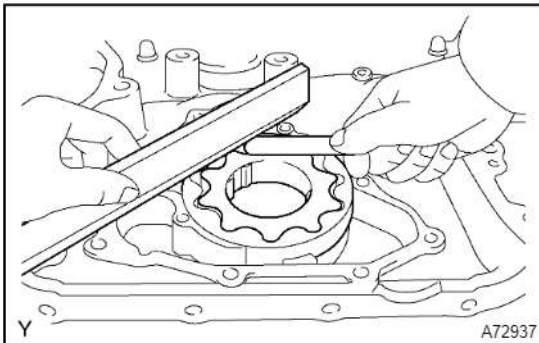
- (b) Inspect rotor tip clearance.
 (1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard clearance:

0.06 – 0.16 mm (0.0024 – 0.0063 in.)

Maximum tip clearance: 0.16 mm (0.0063 in.)

If the clearance is greater than maximum, replace the rotor as a set.



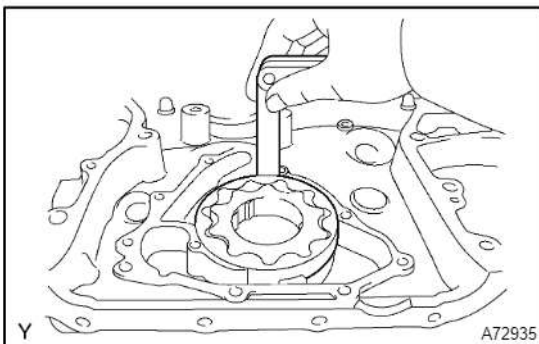
- (c) Inspect rotor side clearance.
 (1) Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Standard clearance:

0.03 – 0.09 mm (0.0012 – 0.0035 in.)

Maximum side clearance: 0.09 mm (0.0035 in.)

If the clearance is greater than maximum, replace the drive and driven rotors. If necessary, replace the timing chain cover assembly.



- (d) Inspect rotor body clearance.
 (1) Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard clearance:

0.250 – 0.325 mm (0.0098 – 0.0128 in.)

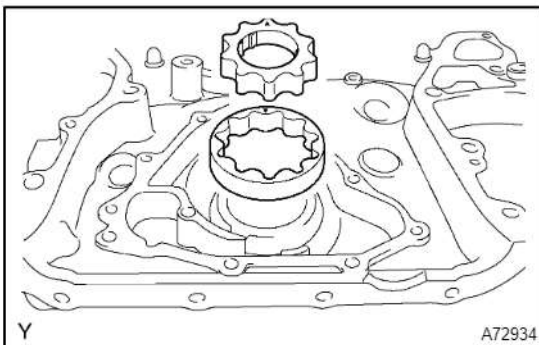
Maximum body clearance: 0.325 mm (0.0128 in.)

If the clearance is greater than maximum, replace the drive and driven rotors. If necessary, replace the timing chain cover assembly.

5. INSTALL OIL PUMP RELIEF VALVE

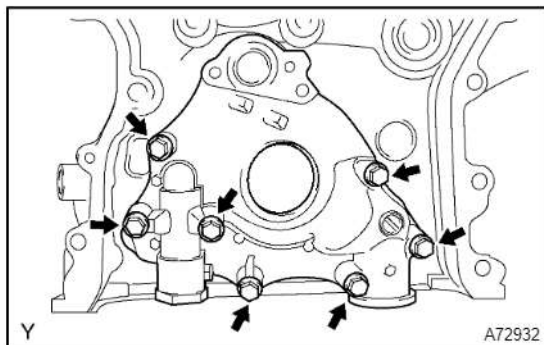
- (a) Coat the relief valve with engine oil and insert the relief valve and spring into the valve hole.
 (b) Install the relief valve plug.

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

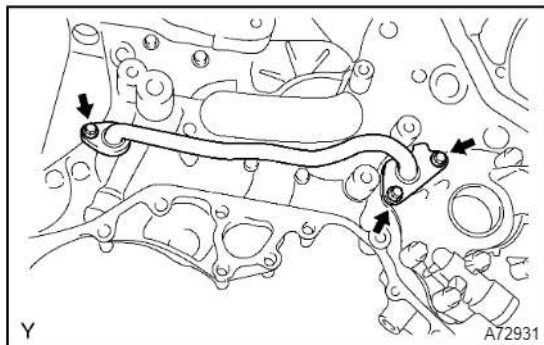


6. INSTALL OIL PUMP COVER

- (a) Apply new engine oil to the drive and driven rotors.
 (b) Place the drive and driven rotors into the timing chain cover with the marks facing the oil pump cover side.



- (c) Install the oil pump cover with the 7 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)
- (d) Install a new O-ring to the oil pump cover.
- (e) Install a new O-ring to the oil pipe.



- (f) Install the oil pipe with the 3 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

OIL COOLER ASSY (1GR-FE)

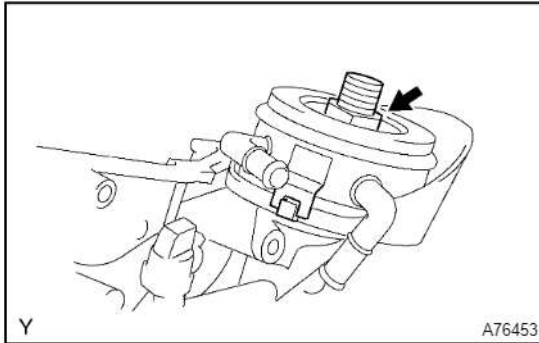
1700G-02

REPLACEMENT

1. DRAIN ENGINE COOLANT (See page 16-5)
2. REMOVE OIL FILTER SUB-ASSY (See page 17-4)
SST 09228-07501
3. REMOVE V-BANK COVER (See page 10-7)

4. REMOVE OIL COOLER ASSY

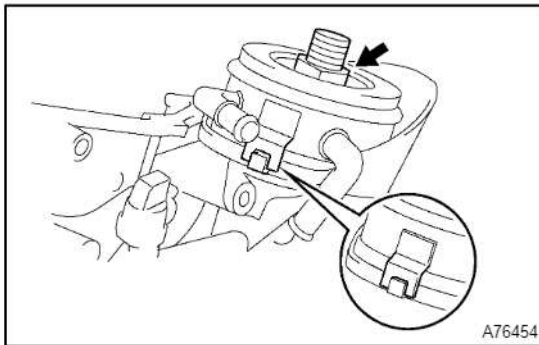
- (a) Disconnect the 2 oil cooler hoses from the oil cooler.



- (b) Remove the union bolt, plate washer and oil cooler.
- (c) Remove the O-ring from the oil cooler.

5. INSTALL OIL COOLER ASSY

- (a) Clean the oil cooler contact surface on the cooler mounting.
- (b) Place a new O-ring to the oil cooler.
- (c) Apply a light coat of engine oil on the threads of the union bolt.



- (d) Install the oil cooler and plate washer with the union bolt.
Torque: 68 N·m (693 kgf·cm, 50 ft·lbf)
- (e) Connect the 2 oil cooler hoses to the oil cooler.

6. INSTALL OIL FILTER SUB-ASSY (See page 17-4)
SST 09228-07501
7. ADD ENGINE COOLANT (See page 16-5)
8. ADD ENGINE OIL
9. CHECK ENGINE OIL LEVEL (See page 17-4)
10. CHECK FOR ENGINE OIL LEAKS
11. CHECK FOR ENGINE COOLANT LEAKS (See page 16-1)
12. INSTALL V-BANK COVER
 - (a) Install the V-bank cover with the 2 nuts.
Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)

LUBRICATION SYSTEM (2UZ-FE)

1709K-03

ON-VEHICLE INSPECTION

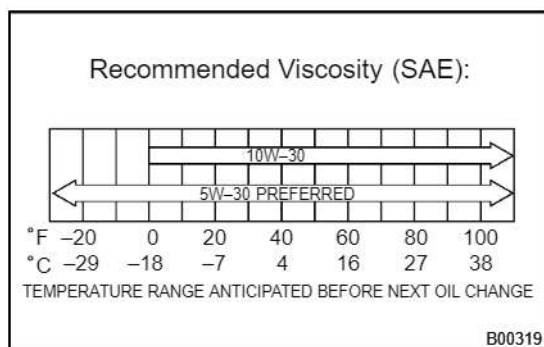
1. CHECK ENGINE OIL LEVEL

- (a) After warm up the engine and then 5 minutes after the engine stop, oil level should be between the low level and full level marks of the dipstick.

If low, check for leakage and add oil up to the full level mark.

NOTICE:

Do not fill with engine oil above the full level mark.



2. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, entry of water, discoloring or thinning.

- (b) If the quality is visibly poor, replace the oil.

HINT:

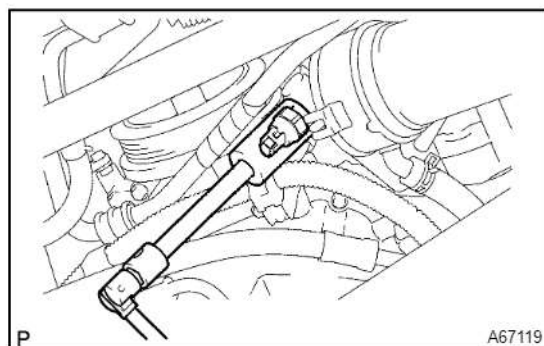
Oil grade:

Use API grade SL "Energy-Conserving", or ILSAC multigrade engine oil.

SAE 5W-30 is the best choice for good fuel economy, and good starting in cold weather.

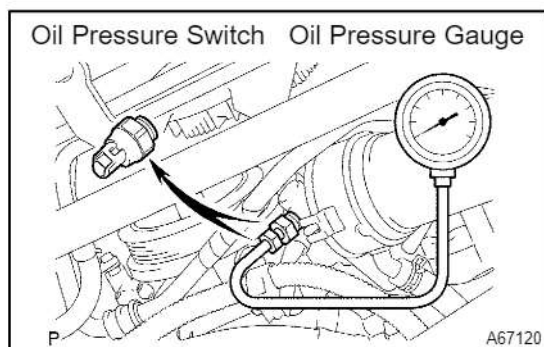
If SAE 5W-30 is not available,

SAE 10W-30 may be used. However, it should be replaced with SAE 5W-30 at the next oil change.



3. REMOVE OIL PRESSURE SWITCH ASSY

- (a) Remove the engine under cover.
- (b) Disconnect the oil pressure switch connector.
- (c) Using a 24 mm deep socket wrench, remove the oil pressure switch.



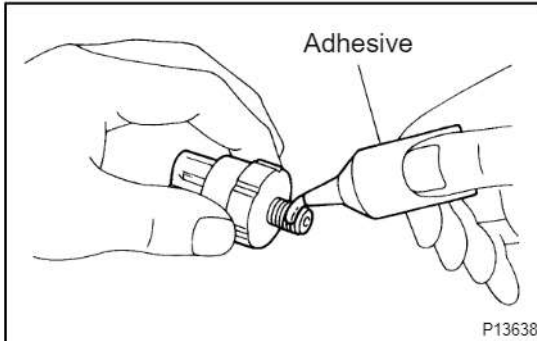
4. INSTALL OIL PRESSURE GAUGE

- (a) Install the oil pressure gauge.

5. WARM UP ENGINE

6. CHECK OIL PRESSURE**Oil pressure:**

At idle	29 kPa (0.3 kgf·cm ² , 4.2 psi) or more
At 3,000 rpm	294 – 588 kPa (3.0 – 6.0 kgf·cm ² , 43 – 85 psi)

**7. INSTALL OIL PRESSURE SWITCH**

- (a) Remove the oil pressure gauge.
- (b) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

**Part No. 08833 – 00080, THREE BOND 1344,
LOCTITE 242 or equivalent**

- (c) Using a 24 mm deep socket wrench, Install the oil pressure switch.

Torque: 15 N·m (152 kgf·cm, 11 ft·lbf)

- (d) Connect the oil pressure switch connector.

8. START ENGINE AND CHECK FOR LEAKS

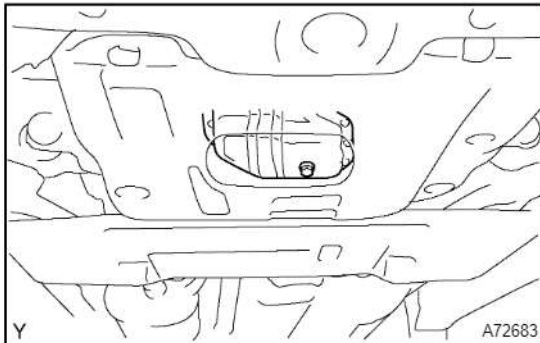
OIL FILTER ASSY (2UZ-FE)

1709W-03

REPLACEMENT

CAUTION:

- ◆ Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- ◆ Care should be taken, therefore, when changing engine oil to minimize the frequency and length of time your skin is exposed to used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be thoroughly washed with soap and water, or use water-less hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.
- ◆ In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.

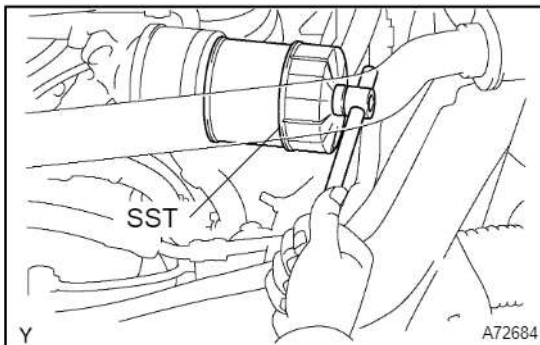


1. DRAIN ENGINE OIL

- (a) Remove the engine under cove seal No. 3.
- (b) Remove the oil pan drain plug and drain the engine oil.
- (c) Clean the oil pan drain plug and install a new gasket and it.

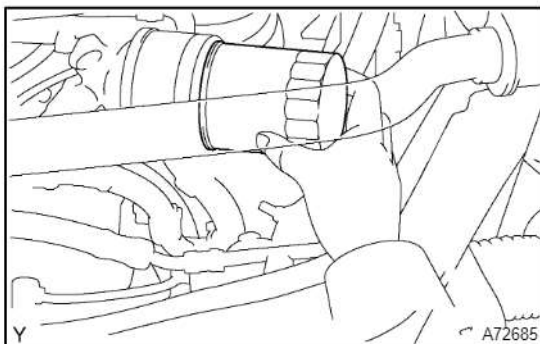
Torque: 39 N·m (398 kgf·cm, 29 ft·lbf)

2. REMOVE ENGINE UNDER COVER SUB-ASSY NO.1



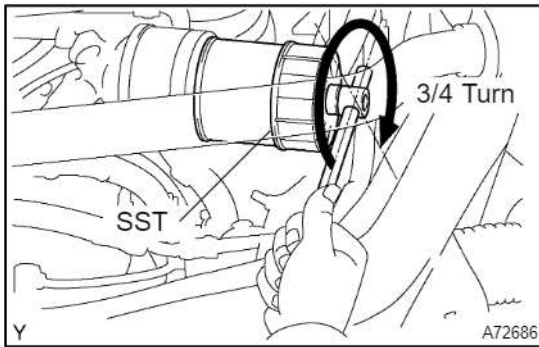
3. REMOVE OIL FILTER ASSY

- (a) Using SST, remove the oil filter.
SST 09228-07501



4. INSTALL OIL FILTER ASSY

- (a) Clean the oil filter contact surface on the oil filter mounting.
- (b) Lubricate the filter rubber gasket with clean engine oil.
- (c) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



- (d) Using SST, give it an additional 3/4 turn to set the filter.
SST 09228-07501

5. ADD ENGINE OIL

- (a) Fill with new engine oil.

Capacity:

Drain and refill:

w/ Oil filter change: 6.2 liters (6.5 US qts, 5.5 Imp. qts)

w/o Oil filter change: 5.7 liters (6.0 US qts, 5.0 Imp. qts)

Dry fill: 7.1 liters (7.5 US qts, 6.2 Imp. qts)

- (b) Reinstall the oil filler cap.

6. CHECK FOR ENGINE OIL LEAKS

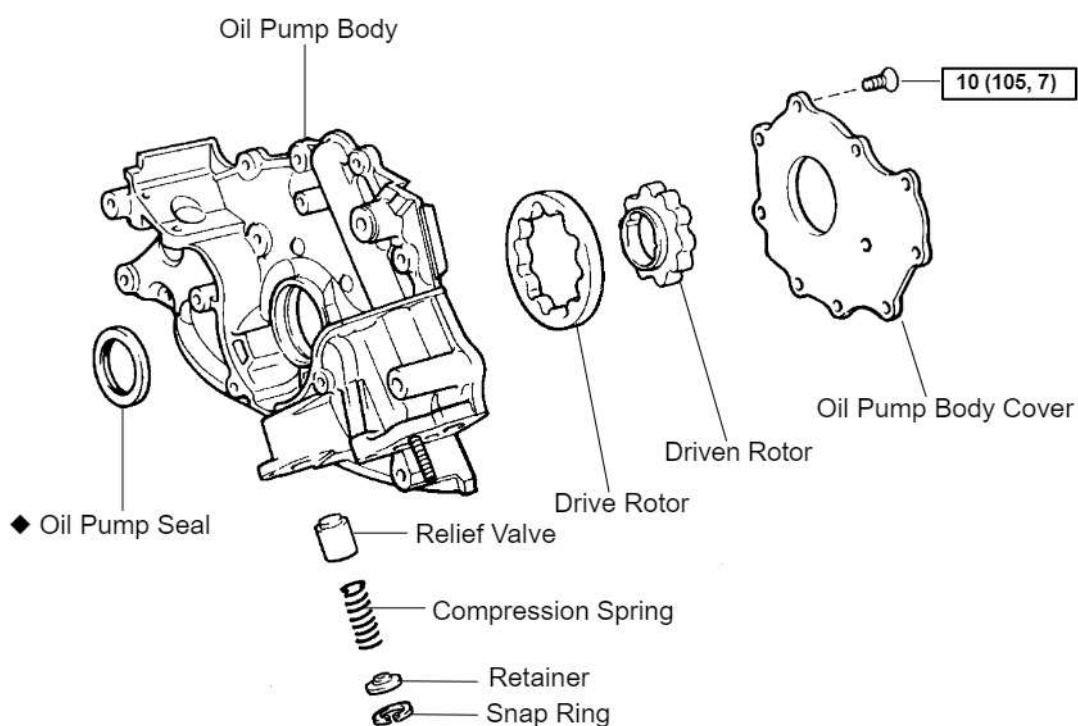
7. CHECK ENGINE OIL LEVEL

8. INSTALL ENGINE UNDER COVER SUB-ASSY NO.1

OIL PUMP ASSY (2UZ-FE)

COMPONENTS

1709X-03



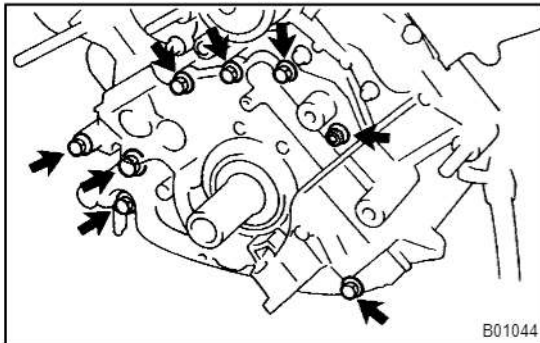
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

B03735

REPLACEMENT

1. REMOVE ENGINE ASSY (See page 14-210)
2. REMOVE TIMING BELT (See page 14-296)
3. REMOVE CRANKSHAFT TIMING PULLEY (See page 14-337)
4. REMOVE CRANK POSITION SENSOR (See page 18-12)
5. REMOVE OIL COOLER ASSY (See page 17-33)
6. REMOVE OIL PAN SUB-ASSY NO.2 (See page 14-220)
7. REMOVE OIL STRAINER SUB-ASSY (See page 14-220)
8. REMOVE OIL PAN BAFFLE PLATE (See page 14-220)
9. REMOVE OIL PAN SUB-ASSY (See page 14-220)

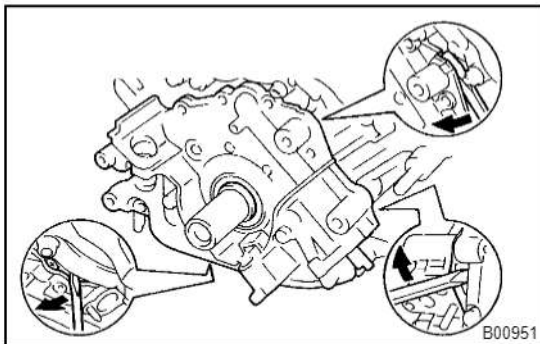


10. REMOVE OIL PUMP ASSY

- (a) Remove the 8 bolts.

HINT:

Use a 6 mm hexagon wrench for the hexagon head bolt.



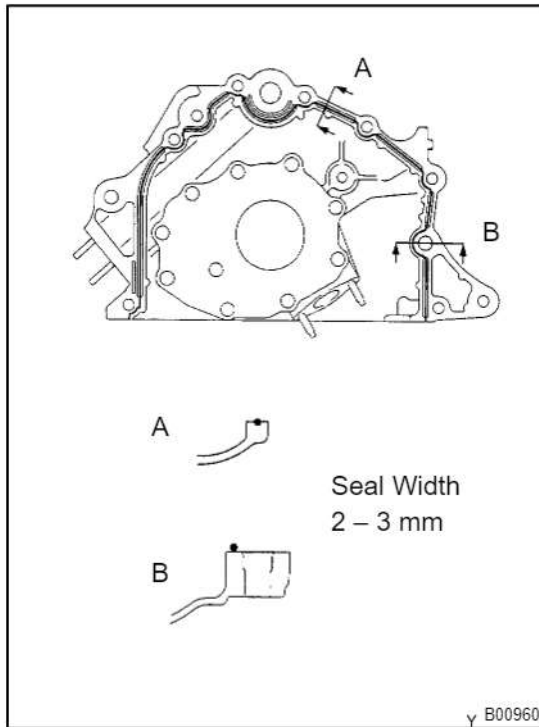
- (b) Using a screwdriver, remove the oil pump by prying the portions between the oil pump and cylinder block.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder block and oil pump.

- (c) Remove the O-ring from the cylinder block.

11. INSTALL OIL PUMP SEAL (See page 14-337)



12. INSTALL OIL PUMP ASSY

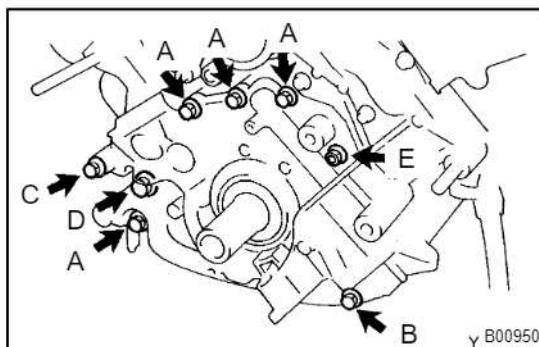
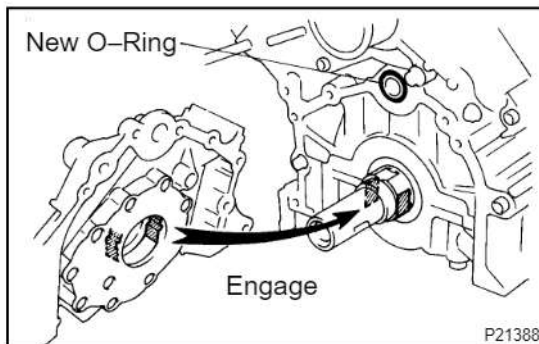
- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pump and cylinder block.
 - (1) Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
 - (2) Thoroughly clean all components to remove all the loose material.
 - (3) Using a non-residue solvent, clean both sealing surfaces.
- (b) Install the oil pump seal (See page 14-220).
- (c) Apply seal packing to the oil pump as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Avoid applying an excessive amount to the surface. Be particularly careful near oil passage.

- (1) Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- (2) Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- (3) Immediately remove nozzle from the tube and reinstall cap.
- (d) Install a new O-ring to the cylinder block.
- (e) Engage the spline teeth of the oil pump drive gear with the large teeth of the crankshaft, and slide the oil pump on the crankshaft.



- (f) Install the oil pump with the 8 bolts. Uniformly tighten the bolts in several passes.

Torque:

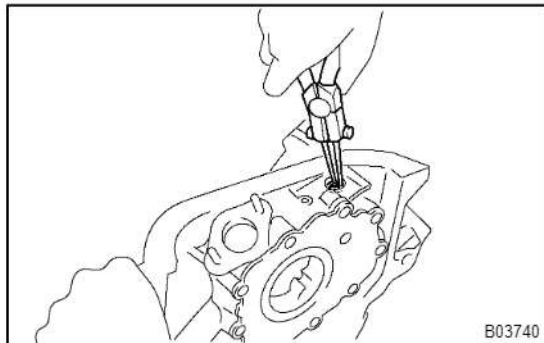
16 N·m (158 kgf·cm, 11 ft·lbf)

for 12 mm head and 6 mm hexagon head

31 N·m (311 kgf·cm, 23 ft·lbf) for 14 mm

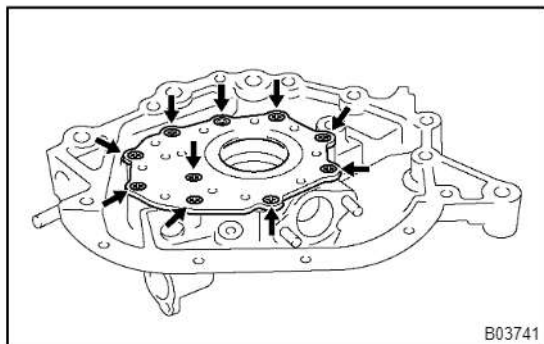
13. INSTALL OIL PAN SUB-ASSY (See page [14-220](#))
14. INSTALL OIL PAN BAFFLE PLATE (See page [14-220](#))
15. INSTALL OIL STRAINER SUB-ASSY (See page [14-220](#))
16. INSTALL OIL PAN SUB-ASSY NO.2 (See page [14-220](#))
17. INSTALL OIL COOLER ASSY (See page [17-33](#))
18. INSTALL CRANK POSITION SENSOR (See page [18-12](#))
19. INSTALL CRANKSHAFT TIMING PULLEY (See page [14-337](#))
20. INSTALL TIMING BELT (See page [14-296](#))
21. INSTALL ENGINE ASSY (See page [14-210](#))

OVERHAUL



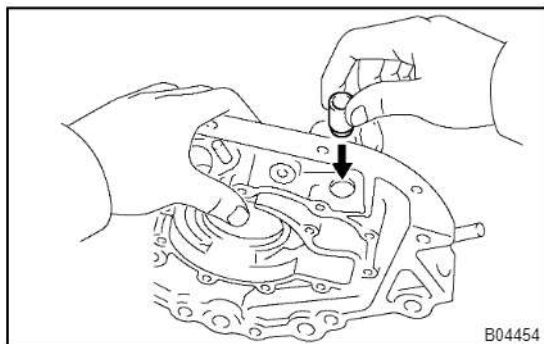
1. REMOVE OIL PUMP RELIEF VALVE

- (a) Using snap ring pliers, remove the snap ring.
- (b) Remove the retainer, spring and relief valve.



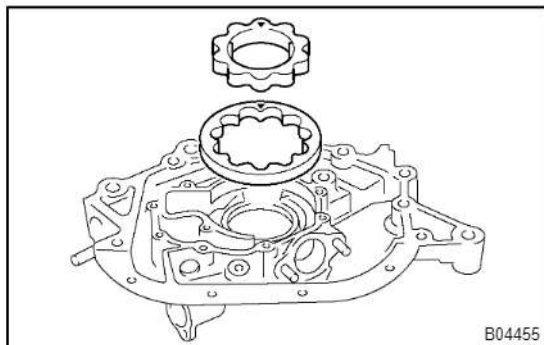
2. REMOVE OIL PUMP ROTOR SET

- (a) Remove the 10 screws, pump body cover and the drive and driven rotors.



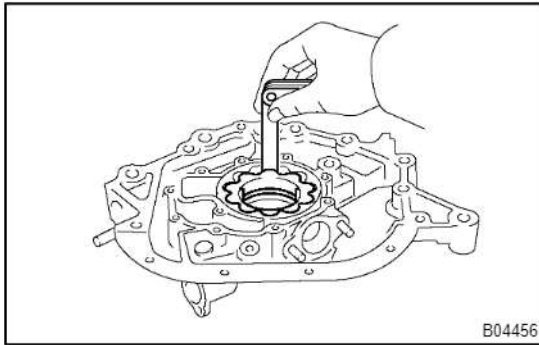
3. INSPECT OIL PUMP RELIEF VALVE

- (a) Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight. If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.



4. INSPECT OIL PUMP ROTOR SET

- (a) Place the drive and driven rotors into the oil pump body with the mark facing upward.



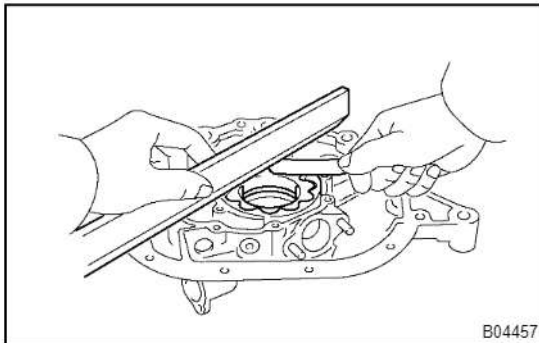
- (b) Inspect rotor tip clearance.
 (1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:

0.110 – 0.240 mm (0.0043 – 0.0094 in.)

Maximum tip clearance: 0.35 mm (0.0138 in.)

If the tip clearance is greater than maximum, replace the rotor as a set.



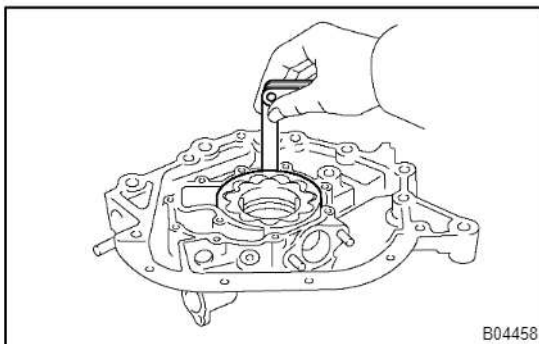
- (c) Inspect rotor side clearance.
 (1) Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Standard side clearance:

0.030 – 0.090 mm (0.0012 – 0.0035 in.)

Maximum side clearance: 0.15 mm (0.0059 in.)

If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



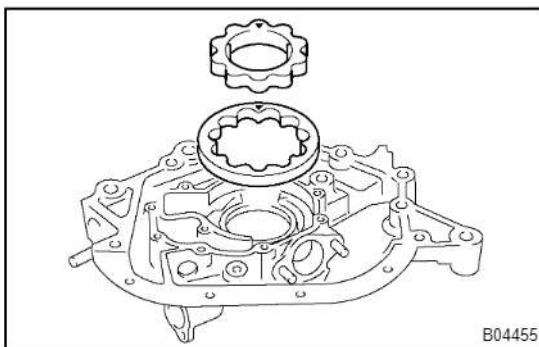
- (d) Inspect rotor body clearance.
 (1) Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard body clearance:

0.100 – 0.175 mm (0.0039 – 0.0069 in.)

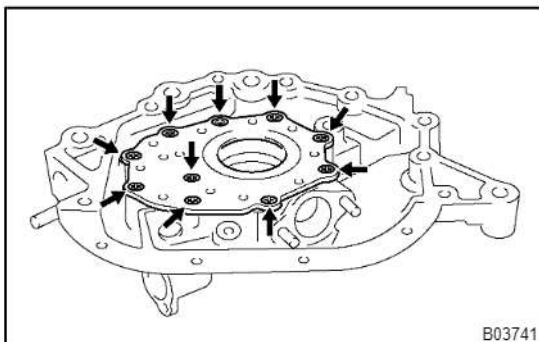
Maximum body clearance: 0.30 mm (0.0118 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

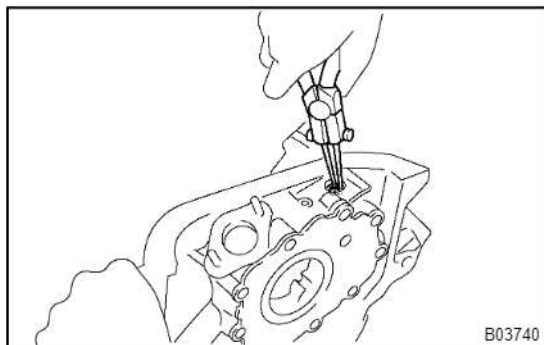


5. INSTALL OIL PUMP ROTOR SET

- (a) Place the drive and driven rotors into pump body with the marks facing the pump body cover side.



- (b) Install the oil pump body cover with the 10 screws.
Torque: 10 N·m (105 kgf·cm, 7 ft·lbf)

**6. INSTALL OIL PUMP RELIEF VALVE**

- (a) Insert the relief valve, spring and retainer into the oil pump body hole.
- (b) Using snap ring pliers, install the snap ring.

OIL COOLER ASSY (2UZ-FE)

170AD-03

REPLACEMENT

1. REMOVE ENGINE UNDER COVER ASSY REAR
2. DRAIN ENGINE OIL
3. DRAIN ENGINE COOLANT (See page 16-17)
4. REMOVE OIL FILTER ASSY (See page 17-24)
5. REMOVE OIL COOLER ASSY
 - (a) Disconnect the 2 oil cooler hoses from oil cooler.
 - (b) Remove the union bolt, plate washer and the oil cooler.
 - (c) Remove the O-ring from the oil cooler.
6. INSTALL OIL COOLER ASSY
 - (a) Clean the oil cooler contact surface on the cooler mounting.
 - (b) Install a new O-ring to the oil cooler.
 - (c) Apply a light coat of engine oil on the threads and under the head of the union bolt.
 - (d) Install the plate washer and union bolt.

Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)
 - (e) Connect the 2 oil cooler hoses to the oil cooler.
7. INSTALL OIL FILTER ASSY (See page 17-24)
8. ADD ENGINE OIL (See page 17-24)
9. REFILL ENGINE COOLANT (See page 16-17)
10. CHECK FOR ENGINE OIL LEAKS
11. CHECK FOR ENGINE COOLANT LEAKS
12. INSTALL ENGINE UNDER COVER ASSY REAR