

LUBRICATION SYSTEM (2AZ-FE)(From July, 2003)

1701Z-10

ON-VEHICLE INSPECTION

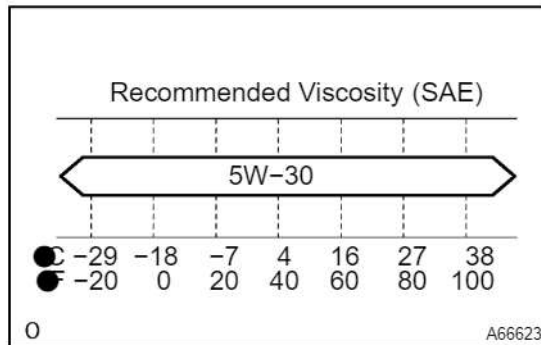
1. CHECK ENGINE OIL LEVEL

- (a) Warm up the engine, stop the engine and wait for 5 minutes. The oil level should be between the dipstick's low level mark and full level mark.

If the oil level is 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.

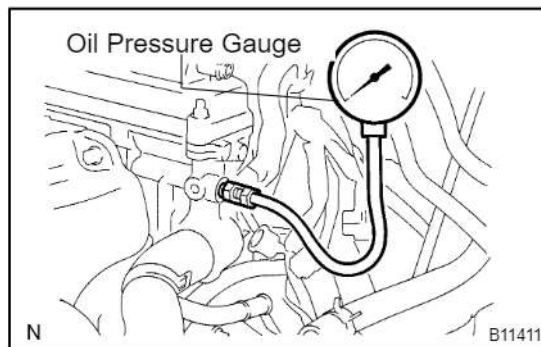
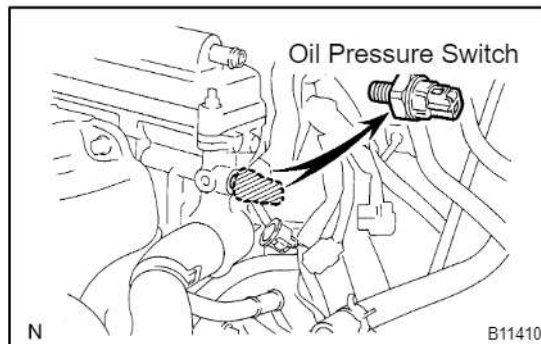
If the quality is visibly poor, replace the oil.

Oil grade:

ILSAC multigrade engine oil is recommended. SAE 5W-30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.

3. REMOVE OIL PRESSURE SWITCH ASSY

- (a) Disconnect the oil pressure switch connector.
(b) Remove the oil pressure switch.



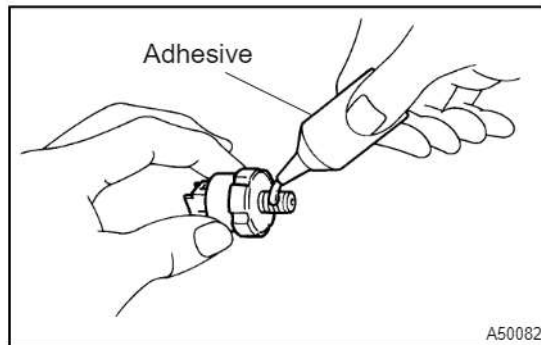
4. INSTALL OIL PRESSURE GAUGE

- (a) Install the oil pressure gauge.

5. WARM UP ENGINE

6. CHECK OIL PRESSURE**Specification:**

Item	Oil Pressure
Idle	29 kPa (0.3 kgf-cm ² , 4.3 psi) or more
3,000 rpm	245 to 539 kPa (2.5 to 5.5 kgf-cm ² , 36 to 78 psi) or more

**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) Install the oil pressure switch.

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

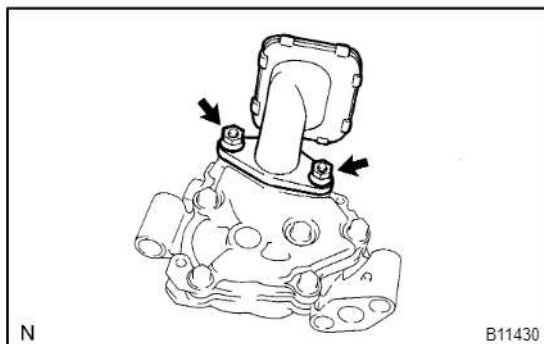
NOTICE:

Do not start the engine for at least 1 hour after installation of the switch.

- (d) Connect the oil pressure switch connector.

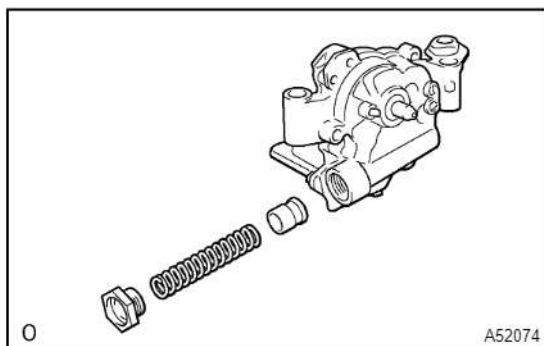
8. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

OVERHAUL



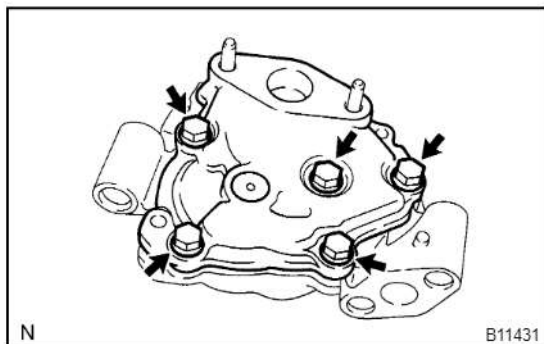
1. REMOVE OIL PUMP STRAINER SET

- (a) Remove the 2 nuts and oil pump strainer.



2. REMOVE OIL PUMP RELIEF VALVE

- (a) Using a socket wrench (27mm), remove the plug.
(b) Remove the valve spring and relief valve.



3. REMOVE OIL PUMP COVER

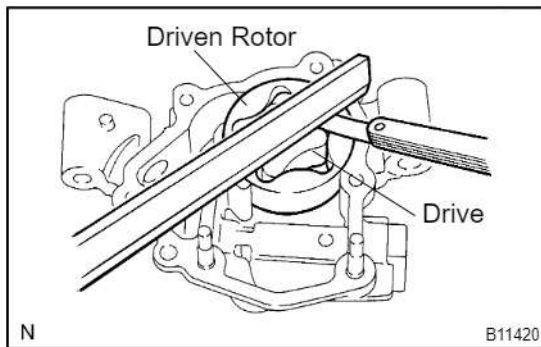
- (a) Remove the 5 bolts and oil pump cover.



4. INSPECT OIL PUMP RELIEF VALVE

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

If it does not, replace the relief valve. If necessary, replace the oil pump assy.



5. INSPECT OIL PUMP ROTOR

- (a) Check the clearance between the drive and driven rotor.
- (1) Place a precision straight edge on the top surface of the drive. Insert a feeler gauge between the bottom edge of the precision straight edge and the top surface of the driven rotor. Measure the clearance.

Specified clearance:

0.030 to 0.160 mm (0.0012 to 0.0063 in.)

If the clearance is greater than the maximum, replace the oil pump assy.

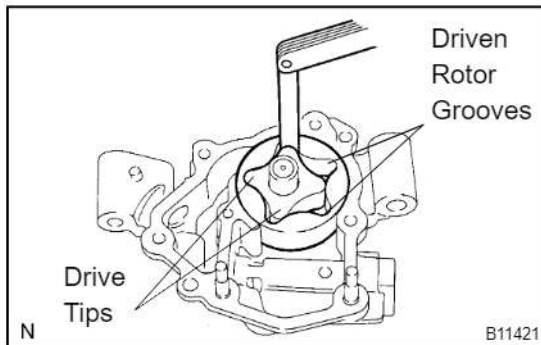
- (b) Check the clearance between the drive tips and driven rotor grooves.

- (1) Insert a feeler gauge between each drive tip and driven rotor groove. Measure the clearance.

Specified tip clearance:

0.080 to 0.350 mm (0.0031 to 0.0138 in.)

If the tip clearance is greater than the maximum, replace the oil pump assy.



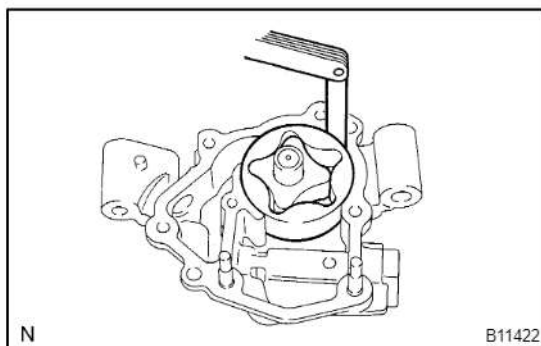
- (c) Check the clearance between the driven rotor and body.
- (1) Insert a feeler gauge between the driven rotor and body. Measure the clearance.

Specified body clearance:

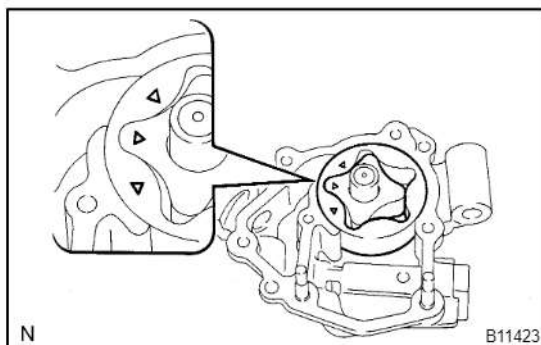
0.100 to 0.325 mm (0.0039 to 0.0128 in.)

- (d) Remove the oil pump rotors.

If the body clearance is greater than the maximum, replace the oil pump assy.

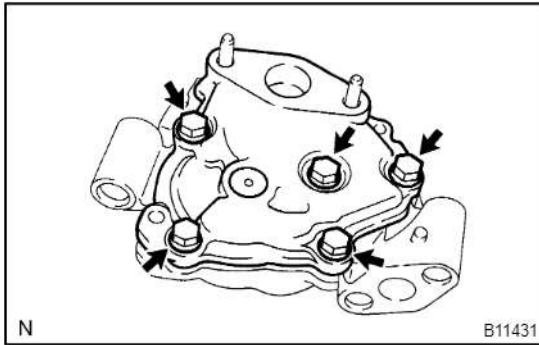


6. REMOVE OIL PUMP ROTOR

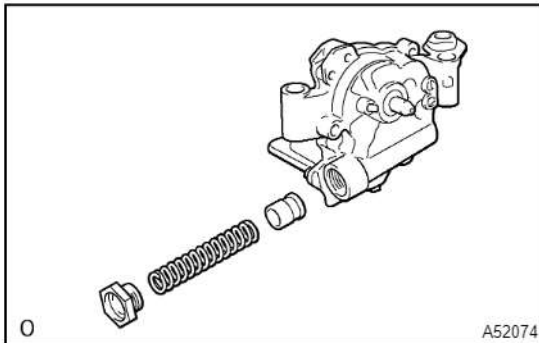


7. INSTALL OIL PUMP ROTOR

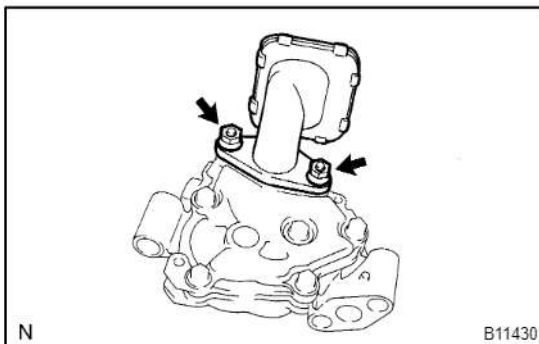
- (a) Coat the drive rotor and driven rotors with engine oil.
- (b) Place the drive and driven rotors into the pump body with the marks facing the pump body cover side.

**8. INSTALL OIL PUMP COVER**

- (a) Install the pump body cover with the 5 bolts.
Torque: 8.8 N·m (90 kgf·cm, 79 in·lbf)

**9. INSTALL OIL PUMP RELIEF VALVE**

- (a) Coat the relief valve with engine oil.
(b) Insert the relief valve and spring into the pump body hole.
(c) Using a socket wrench (27 mm), install the plug.

**10. INSTALL OIL PUMP STRAINER SET**

- (a) Place a new gasket on the oil pump.
(b) Install the oil strainer with the 2 nuts.
Torque: 8.8 N·m (90 kgf·cm, 79 in·lbf)

LUBRICATION SYSTEM (1MZ-FE/3MZ-FE)

17020-10

ON-VEHICLE INSPECTION

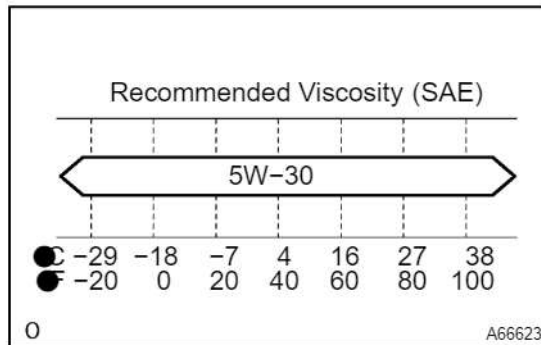
1. CHECK ENGINE OIL LEVEL

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If the oil level is 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.

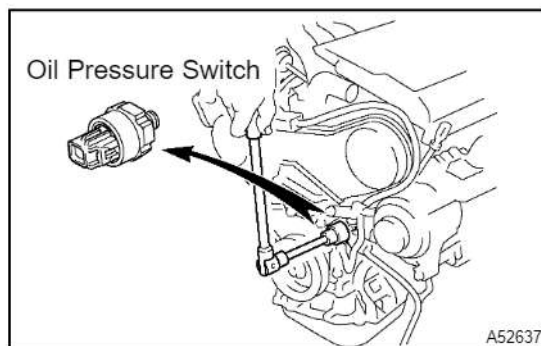
If the quality is visibly poor, replace the oil.

Oil grade:

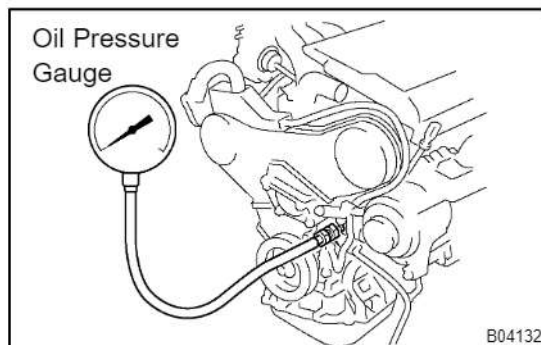
API grade SL, Energy-Conserving or ILSAC, multi-grade engine oil is recommended. SAE 5W-30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.

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.



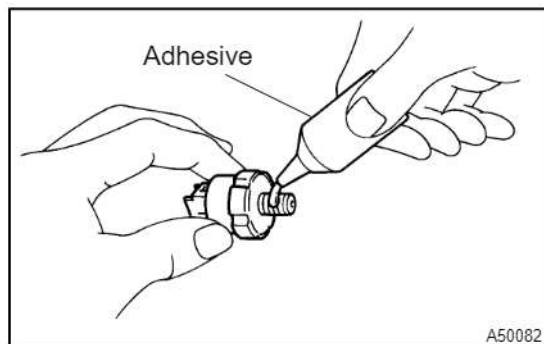
4. INSTALL OIL PRESSURE GAUGE

- (a) Install the oil pressure gauge.

5. WARM UP ENGINE

6. CHECK OIL PRESSURE**Specification:**

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- (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 at least 1 hour after installation of the switch.

- (d) Connect the oil pressure switch connector.

8. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

OIL FILTER SUB-ASSY (1MZ-FE/3MZ-FE)

1701H-08

REPLACEMENT

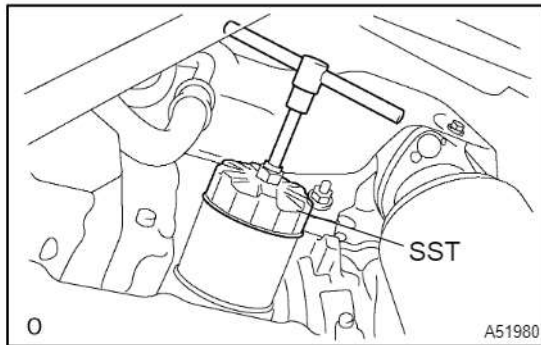
1. REMOVE ENGINE UNDER COVER RH

CAUTION:

- Prolonged and repeated contact of mineral oil with the skin will deplete the skin's natural fats, leading to dryness, irritation and dermatitis. In addition, used engine oil contains harmful contaminants which may cause skin cancer.
- Wear protective clothing and gloves to minimize the length and frequency of contact between the skin and used oil. If contact does occur wash your skin thoroughly with soap and water or waterless hand cleaner. Do not use gasoline, thinners or solvents to wash the skin.
- In order to preserve the environment, dispose of used oil and used oil filters only at designated disposal site.

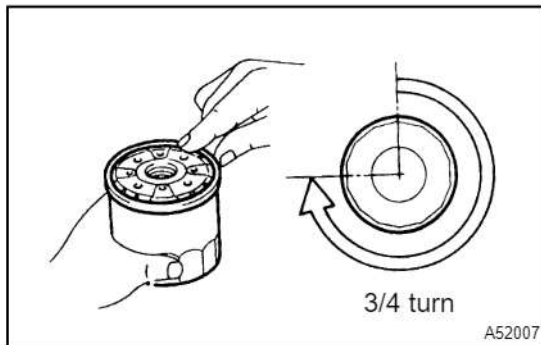
2. DRAIN ENGINE OIL

- Remove the oil filler cap.
- Remove the oil drain plug, and drain the oil into a container.



3. REMOVE OIL FILTER SUB-ASSY

- Using SST, remove the oil filter.
SST 09228-07501



4. INSTALL OIL FILTER SUB-ASSY

- Check and clean the oil filter installation surface.
- Apply clean engine oil to the gasket of a new oil filter.
- Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.
- Using SST, tighten the oil filter an additional 3/4 turn.
SST 09228-07501

5. ADD ENGINE OIL

- Clean and install the oil drain plug with a new gasket.
Torque: 45 N·m (459 kgf·cm, 33 ft·lbf)
- Fill with fresh engine oil.

Specification:

Item	Capacity
Drain and refill w/ oil filter change	4.7 liters (5.0 US qts, 4.1 Imp. qts)
Drain and refill w/o oil filter change	4.5 liters (4.8 US qts, 4.0 Imp. qts)
Dry fill	5.5 liters (5.8 US qts, 4.8 Imp. qts)

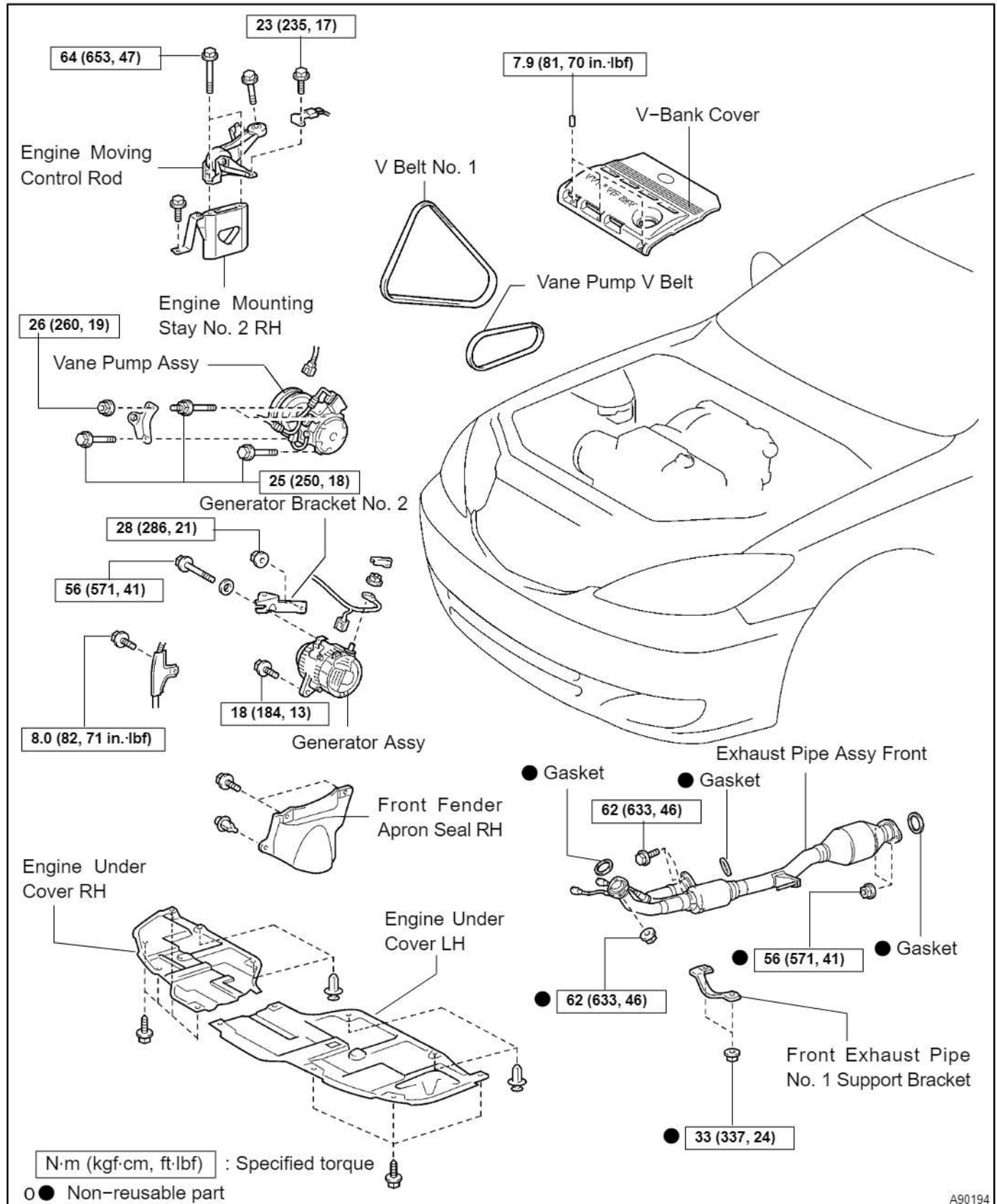
- Install the oil filler cap.

6. INSPECT CHECK FOR ENGINE OIL LEAKS
7. INSTALL ENGINE UNDER COVER RH

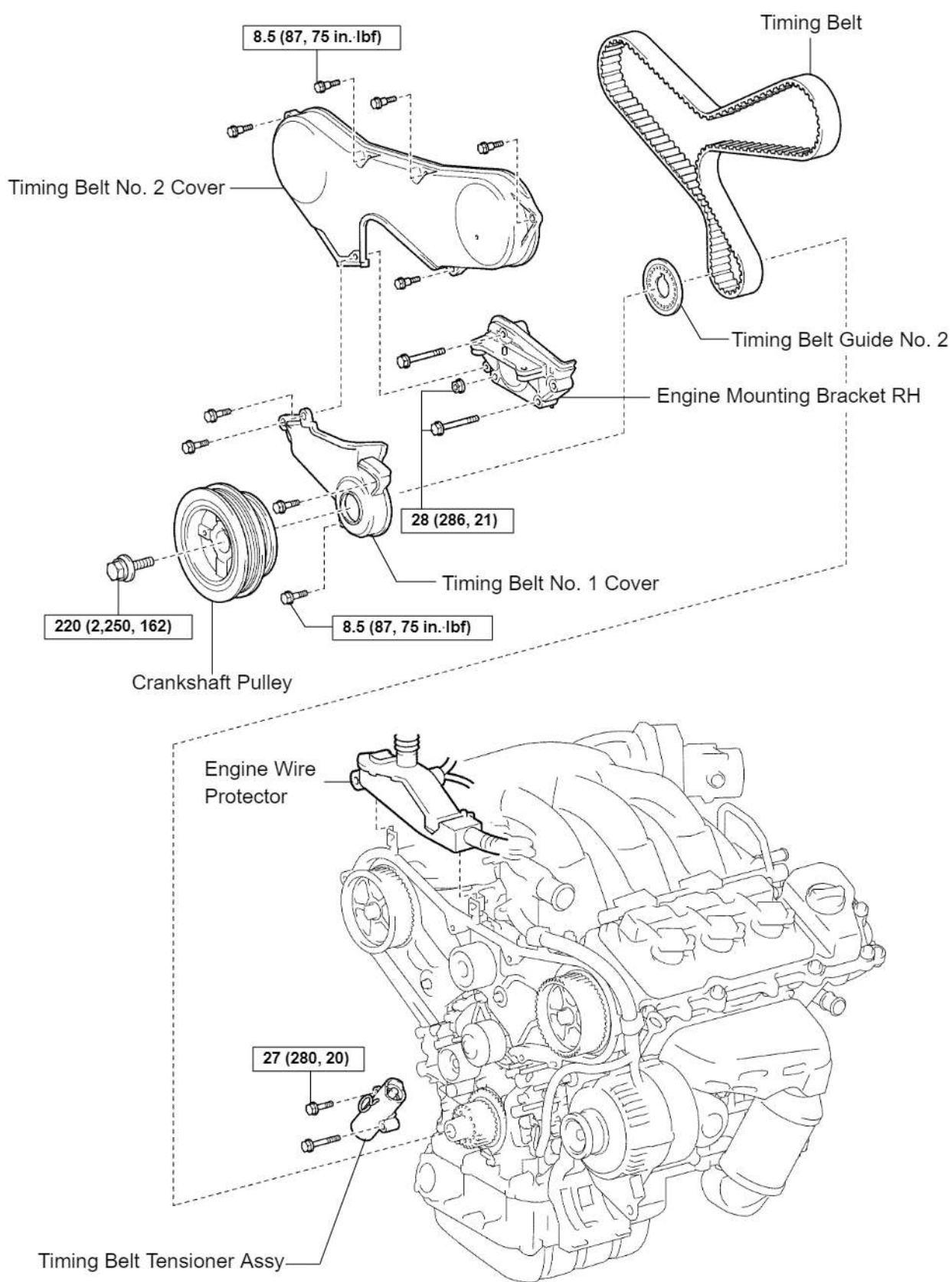
OIL PUMP ASSY (1MZ-FE/3MZ-FE)

COMPONENTS

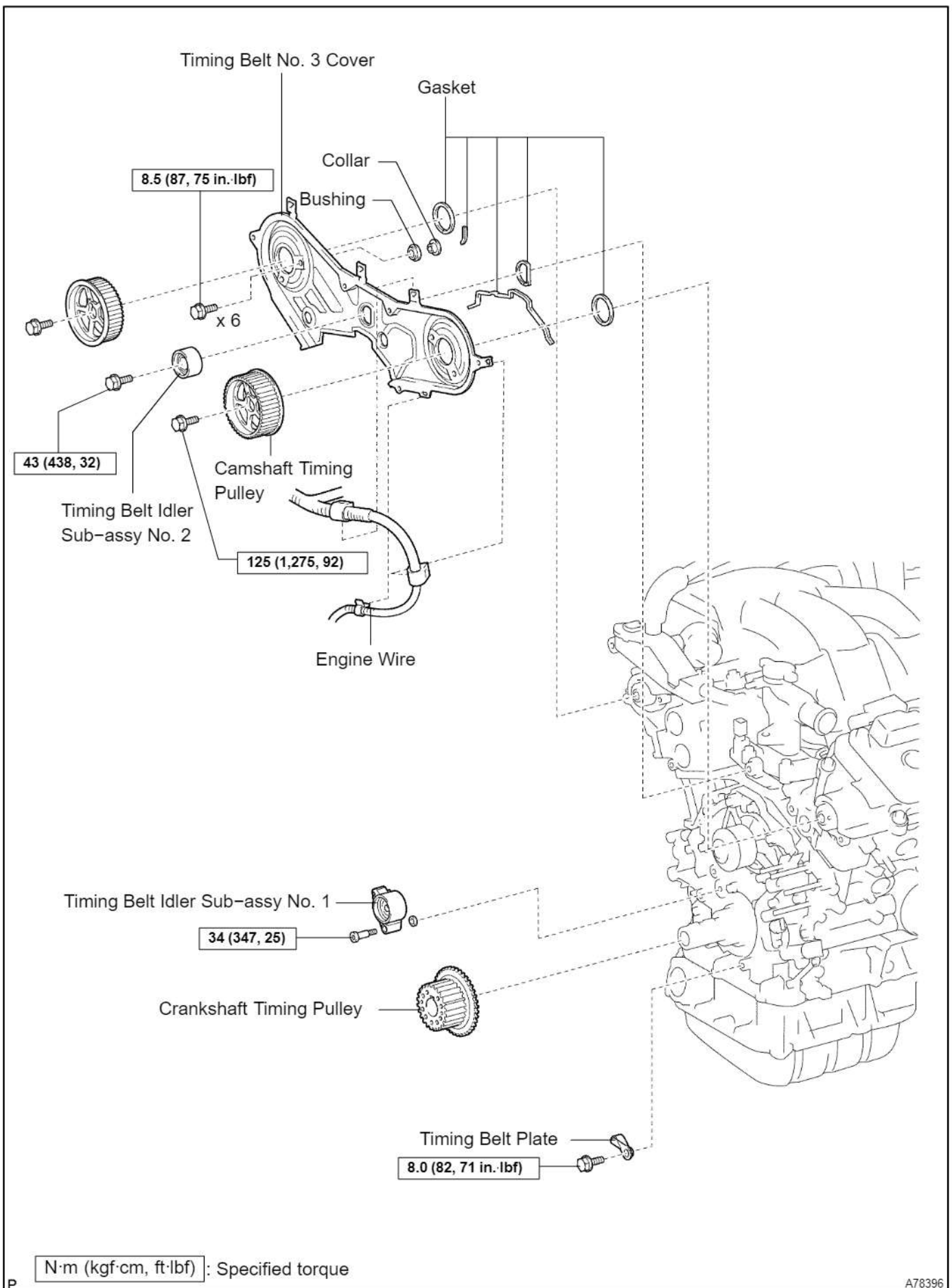
170HG-02

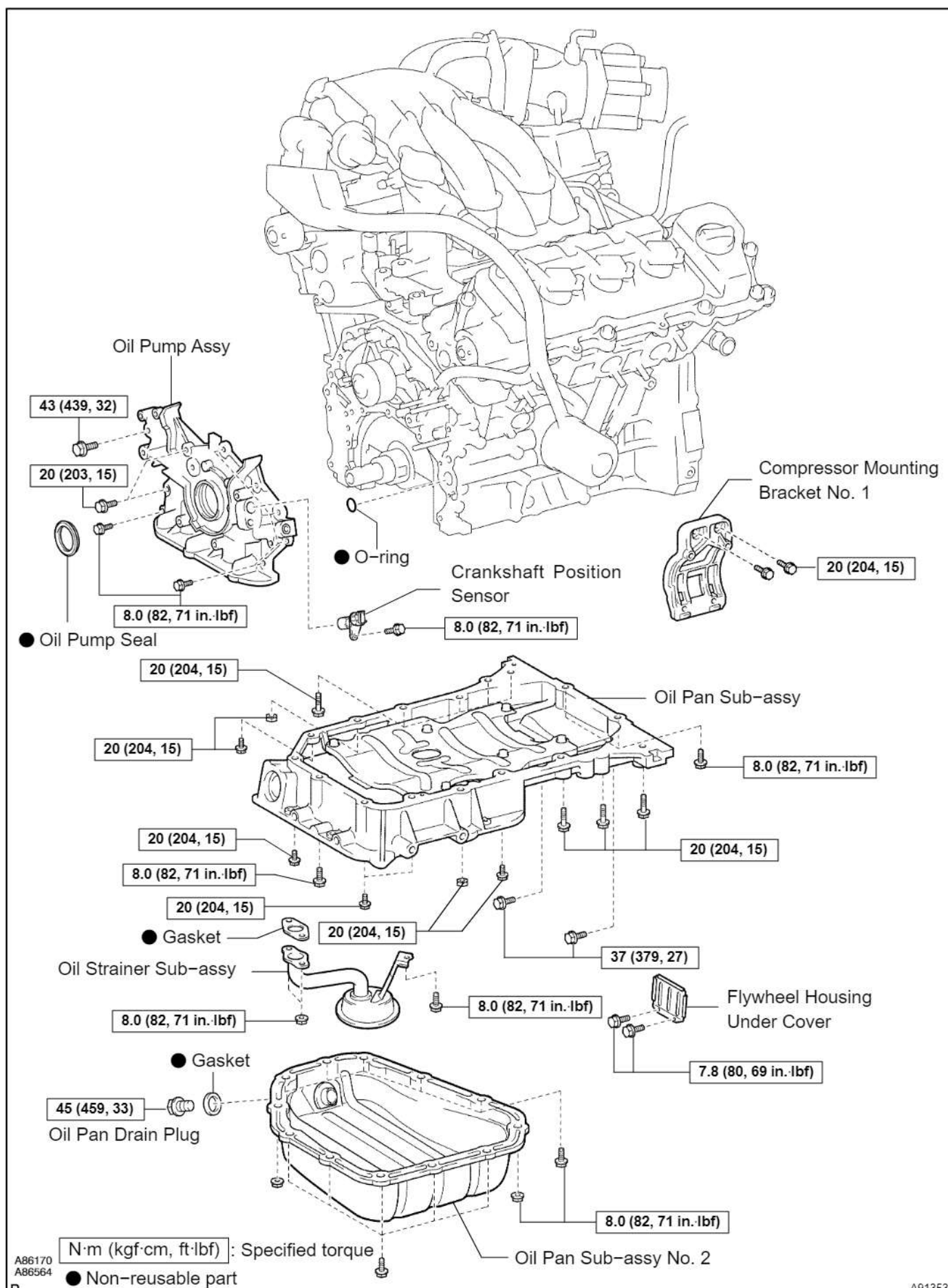


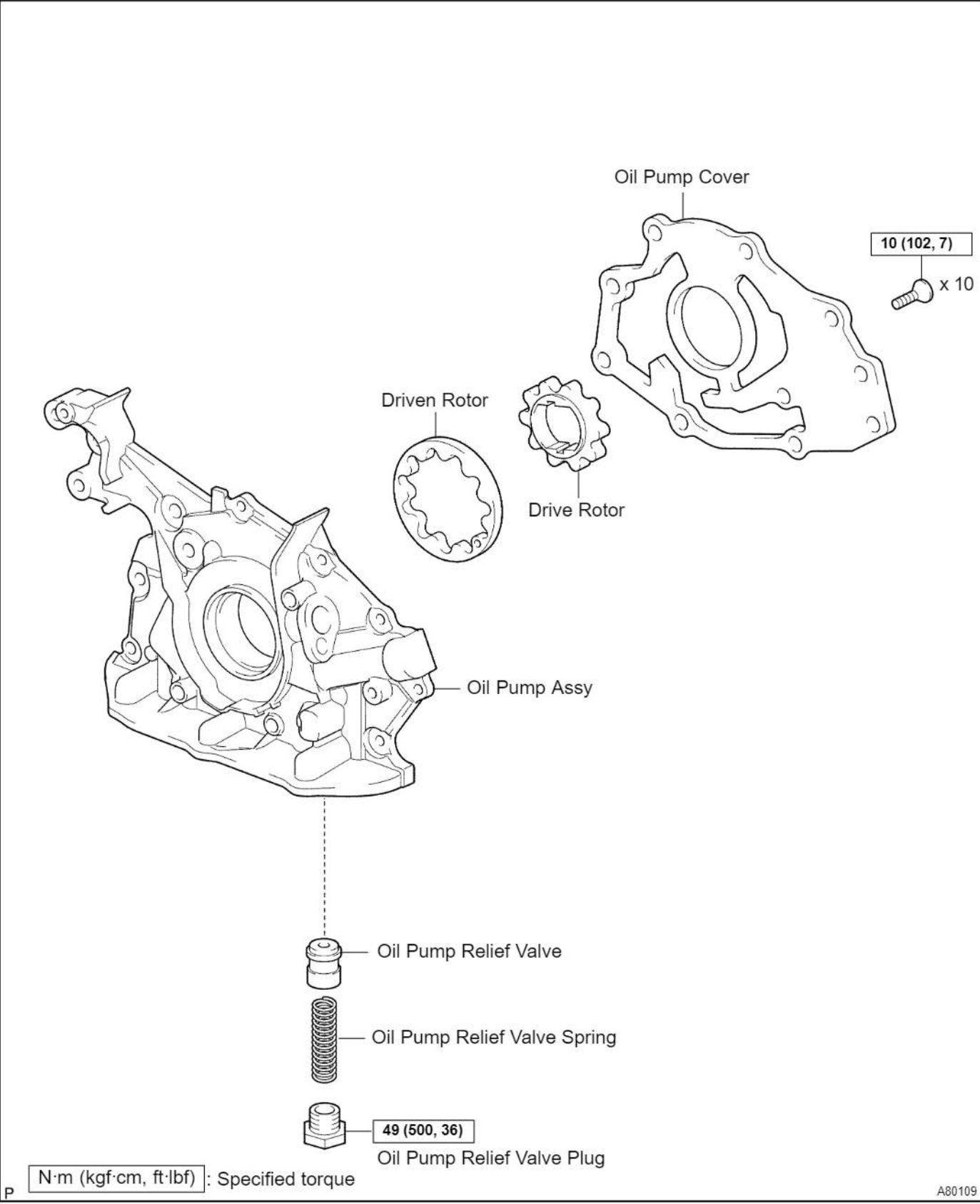
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N·m (kgf·cm, ft·lbf) : Specified torque







OIL FILTER SUB-ASSY (2AZ-FE)(From July, 2003)

REPLACEMENT

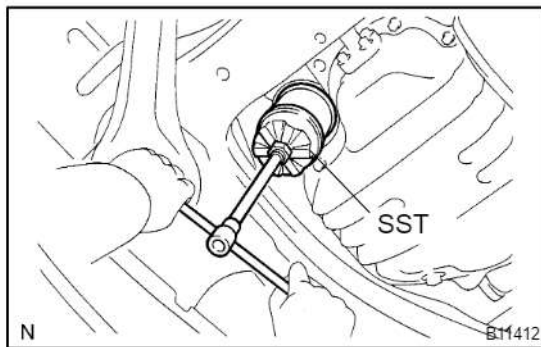
1701X-07

CAUTION:

- Prolonged and repeated contact of mineral oil with the skin will deplete the skin's natural fats, leading to dryness, irritation and dermatitis. In addition, used engine oil contains harmful contaminants which may cause skin cancer.
- Wear protective clothing and gloves to minimize the length and frequency of contact between the skin and used oil. If contact does occur wash your skin thoroughly with soap and water or waterless hand cleaner. Do not use gasoline, thinners or solvents to wash the skin.
- In order to preserve the environment, dispose of used oil and used oil filters only at designated disposal site.

1. DRAIN ENGINE OIL

- Remove the oil filler cap.
- Remove the oil drain plug, and drain the oil into a container.

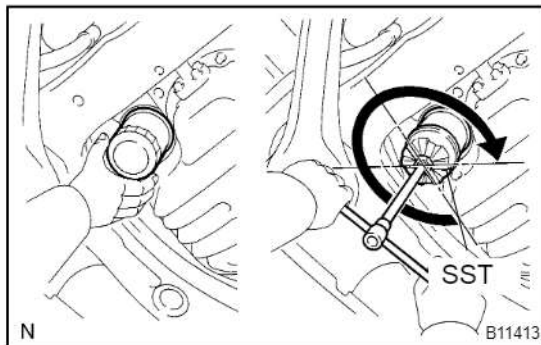


2. REMOVE OIL FILTER SUB-ASSY

- Using SST, remove the oil filter.
SST 09228-06501

3. INSTALL OIL FILTER SUB-ASSY

- Check and clean the oil filter installation surface.
- Apply clean engine oil to the gasket of a new oil filter.



- Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.
- Using SST, tighten the oil filter an additional 3/4 turn.
SST 09228-06501

4. ADD ENGINE OIL

- Clean and install the oil drain plug with a new gasket.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)
- Fill with fresh engine oil.

Specification:

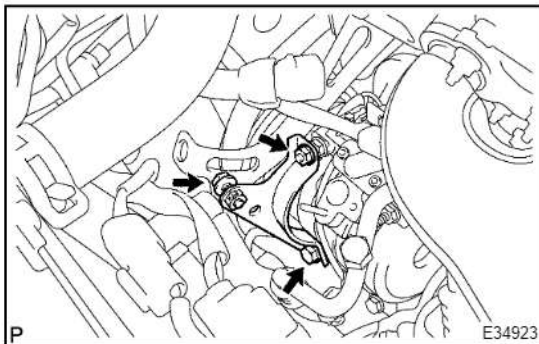
Item	Capacity
Drain and refill w/ oil filter change	3.8 liters (4.0 US qts, 3.3 Imp. qts)
Drain and refill w/o oil filter change	3.6 liters (3.8 US qts, 3.2 Imp. qts)
Dry fill	4.5 liters (4.88 US qts, 4.0 Imp. qts)

- Install the oil filler cap.

5. INSPECT CHECK FOR ENGINE OIL LEAKS

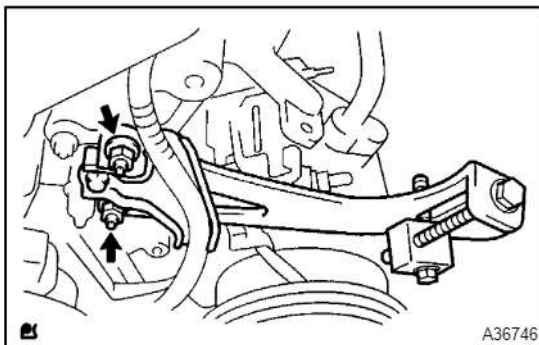
REPLACEMENT

1. REMOVE FRONT WHEEL RH
2. REMOVE FRONT FENDER APRON SEAL RH
3. REMOVE ENGINE UNDER COVER RH
4. DRAIN ENGINE OIL
 - (a) Install a new gasket after draining engine oil.
Torque: 45 N·m (459 kgf·cm, 33 ft·lbf)
5. REMOVE FRONT SUSPENSION UPPER BRACE CENTER (W/ FRONT SUSPENSION BRACE UPPER CENTER)
6. REMOVE V BELT NO. 1 (See page 14-140)
7. REMOVE VANE PUMP V BELT (See page 14-140)
8. REMOVE ENGINE MOVING CONTROL ROD (See page 14-164)
9. REMOVE ENGINE MOUNTING STAY NO.2 RH (See page 14-164)
10. REMOVE GENERATOR BRACKET NO.2
11. REMOVE CRANKSHAFT PULLEY (See page 14-186)
12. REMOVE TIMING BELT NO.1 COVER (See page 14-186)
13. REMOVE TIMING BELT NO.2 COVER (See page 14-186)
14. REMOVE TIMING BELT GUIDE NO.2
15. REMOVE TIMING BELT (See page 14-186)
16. REMOVE EXHAUST PIPE NO.1 SUPPORT BRACKET
17. REMOVE EXHAUST PIPE ASSY FRONT
18. REMOVE EXHAUST PIPE SUPPORT BRACKET NO.1

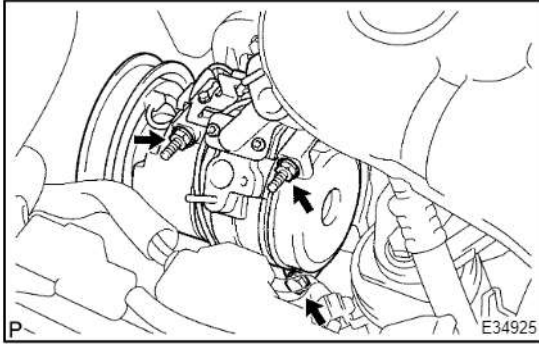


19. SEPARATE COMPRESSOR AND MAGNETIC CLUTCH

- (a) Remove the 2 bolts, nut and the drive belt adjusting bar bracket.



- (b) Remove the 2 nuts, the generator bracket adjusting bar with wire harness clamp bracket.
- (c) Disconnect the compressor, magnetic clutch connector and the wire harness clamp.



(d) Remove the 3 bolts, the compressor and magnetic clutch.

HINT:

Hang up the hoses instead of detaching.

20. REMOVE TIMING BELT IDLER SUB-ASSY NO.2 (See page 14-186)

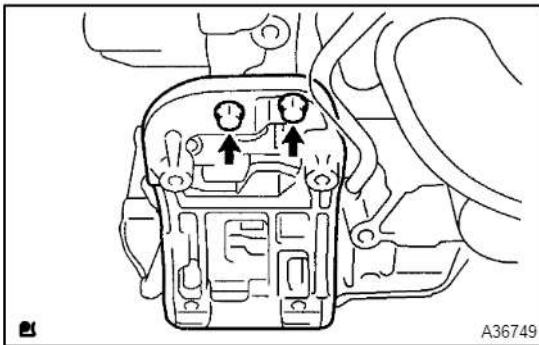
21. REMOVE CAMSHAFT TIMING PULLEY (See page 14-186)

22. REMOVE TIMING BELT IDLER SUB-ASSY NO.1

(a) Using a 10 mm socket hexagon wrench, remove the timing belt idler and plate washer.

23. REMOVE CRANKSHAFT TIMING PULLEY (See page 14-186)

24. REMOVE TIMING BELT NO.3 COVER (See page 14-186)

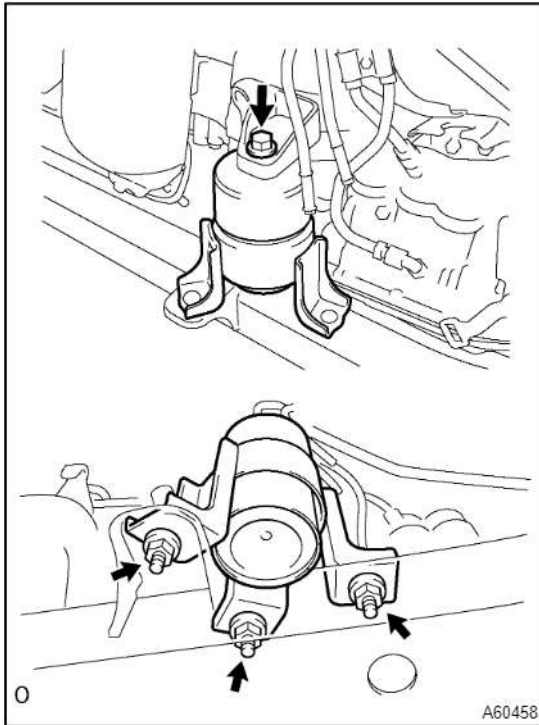


25. REMOVE COMPRESSOR MOUNTING BRACKET NO.1

(a) Remove the 2 bolts and mounting bracket.

26. REMOVE OIL LEVEL GAGE GUIDE

(a) Remove the bolt and gage guide.

**27. SEPARATE ENGINE MOUNTING INSULATOR FR**

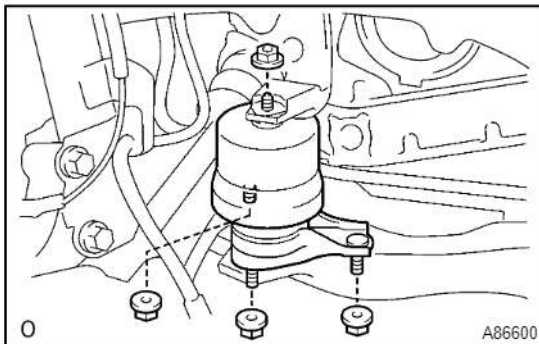
- (a) Remove the 3 nuts and bolt. Then separate the engine mounting insulator.

NOTICE:

Do not remove the engine mounting insulator.

28. REMOVE ENGINE MOUNTING INSULATOR RH

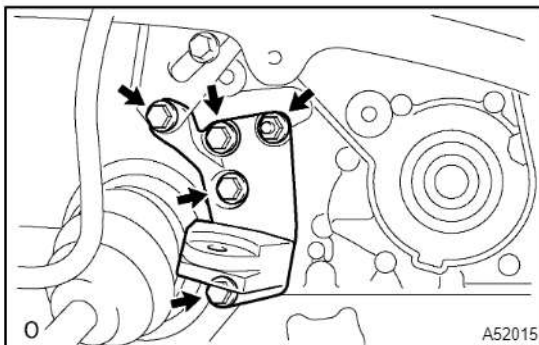
- (a) Remove the bolt and disconnect the power steering return hose clamp from the frame.



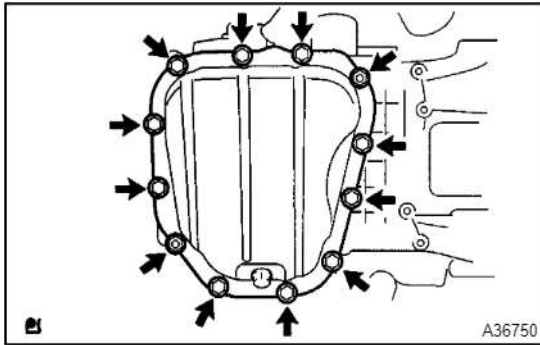
- (b) Remove the 4 nuts.
 (c) Prepare a jack. Place a wooden block on the jack and set the jack under the engine. Remove the engine mounting insulator.
 (d) Raise the jack and lift up the engine. Then remove the engine mounting insulator RH.

NOTICE:

Be careful not to damage the contact surfaces of the oil pan.

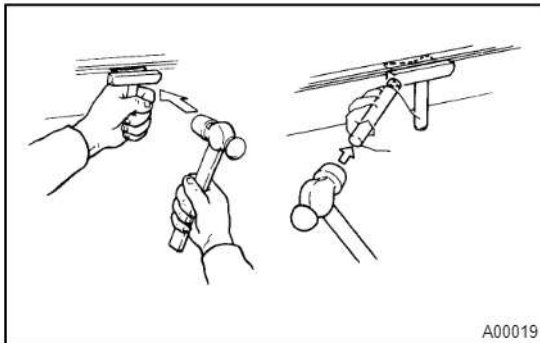
**29. REMOVE ENGINE MOUNTING BRACKET RH**

- (a) Remove the 4 bolts, nut and bracket.



30. REMOVE OIL PAN SUB-ASSY NO.2

- (a) Remove the 10 bolts, 2 nuts and oil pan.



- (b) Insert the blade of SST between the oil pan No. 1 and oil pan No. 2, cut through the sealer and remove oil pan No. 2.

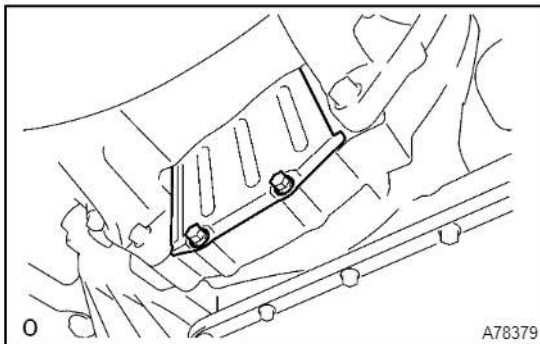
SST 09032-00100

NOTICE:

- Do not damage the contact surface of oil pan No. 1 and oil pan No. 2.
- Do not damage the flange portion of oil pan No.2 during removal.

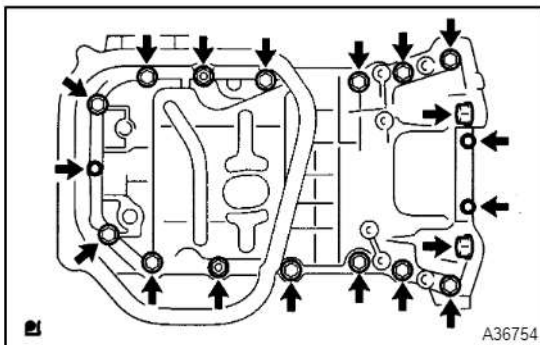
31. REMOVE OIL STRAINER SUB-ASSY

- (a) Remove the bolt and 2 nuts, and remove the oil strainer and gasket.

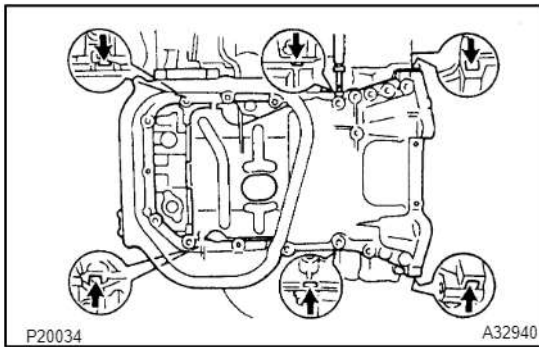


32. REMOVE OIL PAN SUB-ASSY

- (a) Remove the 2 bolts and the flywheel housing under cover.



- (b) Uniformly loosen the 17 bolts and 2 nuts. Remove the bolts and nuts.



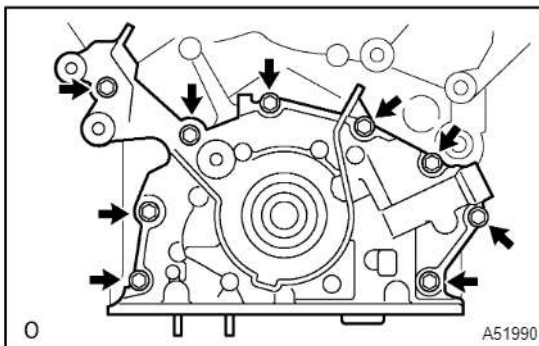
- (c) Using a screwdriver, remove the oil pan by prying the portions between the cylinder block and oil pan shown in the illustration.

NOTICE:

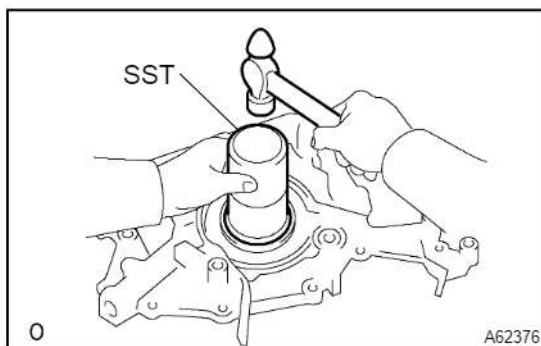
Be careful not to damage the contact surfaces of the cylinder block and oil pan.

33. REMOVE CRANKSHAFT POSITION SENSOR

- (a) Disconnect the sensor connector.
- (b) Remove the bolt and sensor.

**34. REMOVE OIL PUMP ASSY**

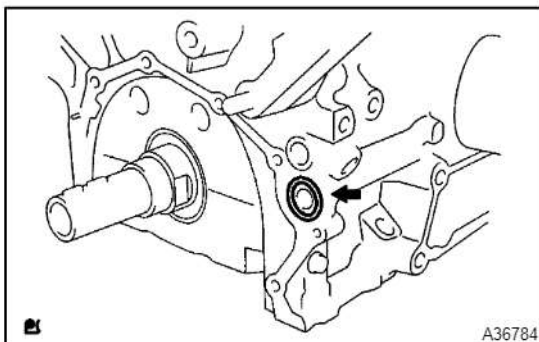
- (a) Remove the 9 bolts.
- (b) Using a screwdriver, remove the oil pump by prying between the oil pump and the main bearing cap.
- (c) Remove the O-ring.

**35. INSTALL OIL PUMP ASSY**

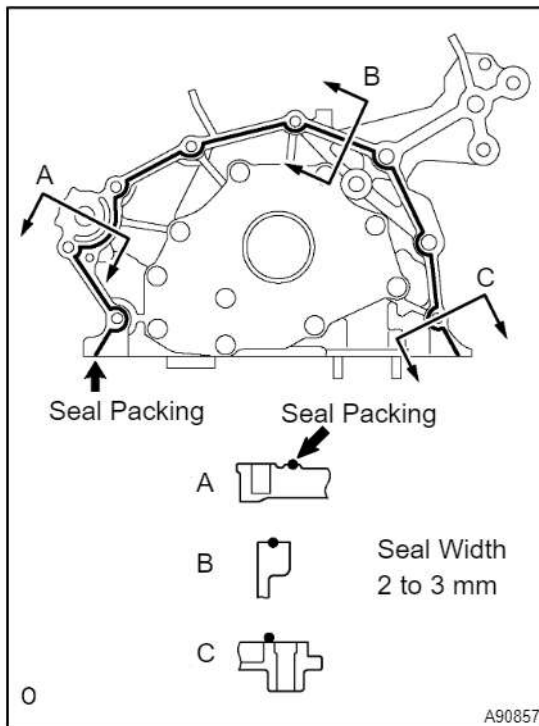
- (a) Using SST and a hammer, install a new oil seal. Tap the surface of the SST with the hammer until the oil seal's surface is flush with oil pump body edge.
SST 09223-00010

NOTICE:

- **Be careful not to tap the oil seal at an angle.**
 - **Keep the gap between the oil pump body edge and the oil seal free from contamination.**
- (b) Apply a small amount of MP grease to the oil seal lip.
 - (c) Remove any old seal packing material from the contact surface.



- (d) Apply a light coat of engine oil to a new O-ring and place it on the cylinder block.

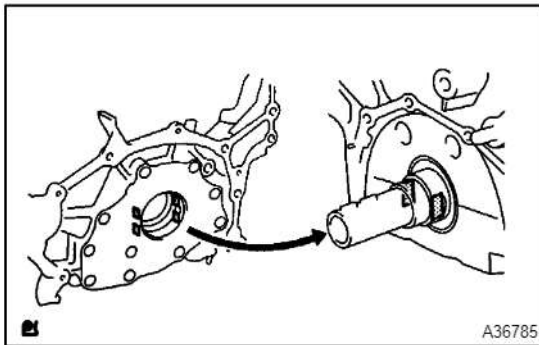


- (e) Apply a continuous bead of seal packing (diameter 2 to 3 mm (0.08 to 0.12 in.)) as shown in the illustration.

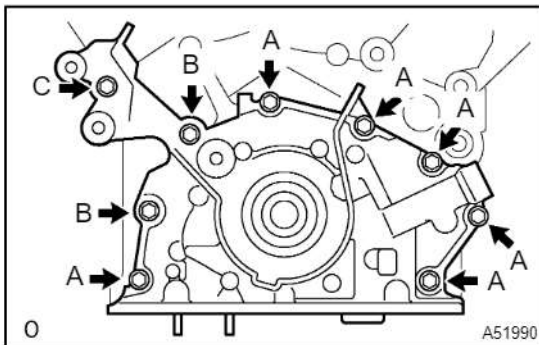
Seal packing: Part No. 08226-00080 or equivalent

NOTICE:

- Remove any oil from contact surface.
- Apply seal packing to the inner side of the bolt holes.
- Install the oil pump within 3 minutes after applying seal packing.
- Do not expose the seal to engine oil for at least 2 hours after installing the oil pump.



- (f) Align the key of the oil pump drive gear with the key way located on the crankshaft, and slide the oil pump into place.



- (g) Install the oil pump by tightening the 9 bolts uniformly.

Torque:

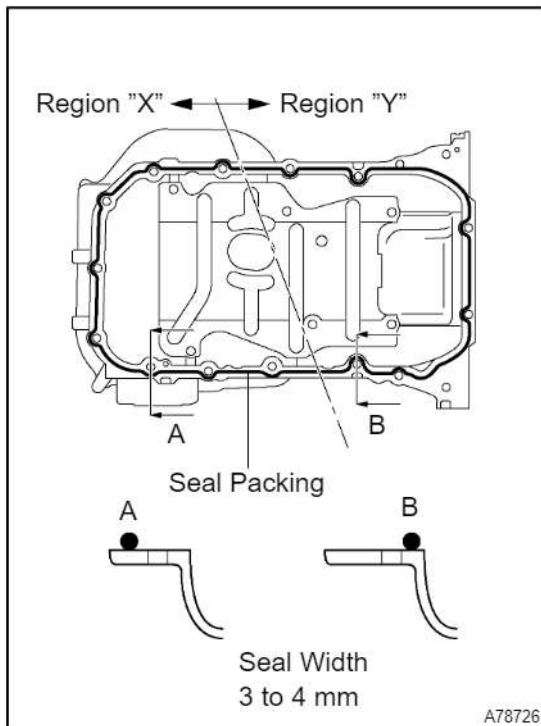
8.0 N·m (82 kgf·cm, 71 in.·lbf) for bolt A

20 N·m (203 kgf·cm, 15 ft·lbf) for bolt B

43 N·m (439 kgf·cm, 32 ft·lbf) for bolt C

36. INSTALL CRANKSHAFT POSITION SENSOR

Torque: 8 N·m (82 kgf·cm, 71 in.·lbf)

**37. INSTALL OIL PAN SUB-ASSY**

- Remove any old seal packing from the contact surface.
- Apply a continuous bead of seal packing (diameter 3 to 4 mm (0.12 to 0.16 in.)) as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

- Remove any oil from the contact surface.
 - Apply seal packing to the outer side of the bolt holes in the region "X".
 - Apply seal packing to the inner side of the bolt holes in the region "Y".
 - Install the oil pan within 3 minutes after applying seal packing.
 - Do not expose the seal to engine oil for at least 2 hours after installing the oil pan.
- Install the oil pan No.1 by tightening the oil pan's 17 bolts and 2 nuts uniformly.

Torque:

8.0 N·m (82 kgf·cm, 71 in·lbf) for 10 mm head

20 N·m (204 kgf·cm, 15 ft·lbf) for 12 mm head

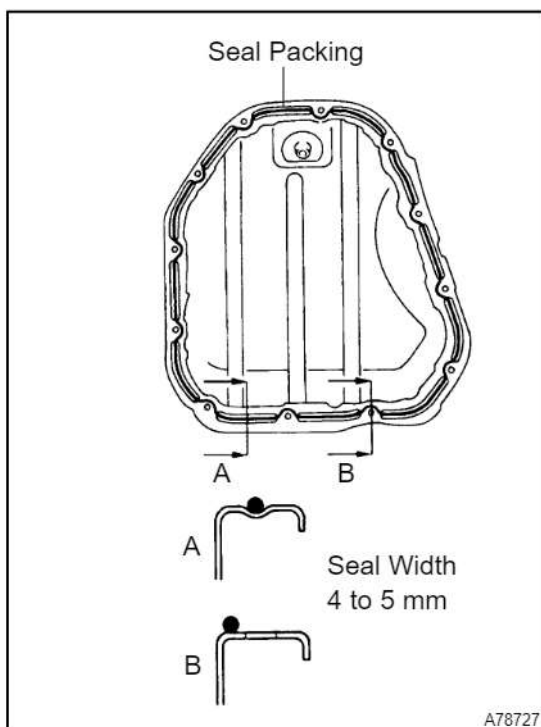
37 N·m (379 kgf·cm, 27 ft·lbf) for 14 mm head

- Install the flywheel housing under cover with the 2 bolts.
Torque: 7.8 N·m (80 kgf·cm, 69 in·lbf)

38. INSTALL OIL STRAINER SUB-ASSY

- Install a new gasket and the oil strainer with the bolt and 2 nuts.

Torque: 8 N·m (82 kgf·cm, 71 in·lbf)

**39. INSTALL OIL PAN SUB-ASSY NO.2**

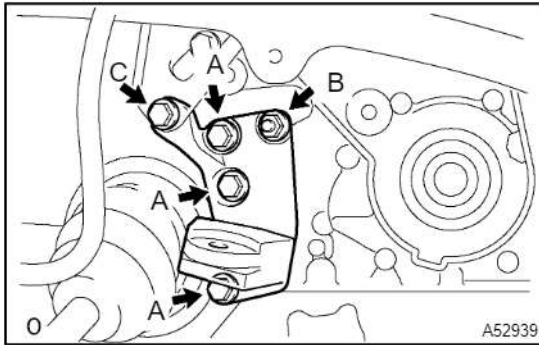
- Remove any old seal packing from the contact surface.
- Apply a continuous bead of seal packing (diameter 4 to 5 mm (0.16 to 0.20 in.)) as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

- Remove any oil from the contact surface.
 - Apply seal packing to the inner side of the bolt holes.
 - Install the oil pan within 3 minutes after applying seal packing.
 - Do not expose the seal to engine oil for at least 2 hours after installing the oil pan.
- Install the oil pan with the 10 bolts and 2 nuts.

Torque: 8.0 N·m (82 kgf·cm, 71 in·lbf)

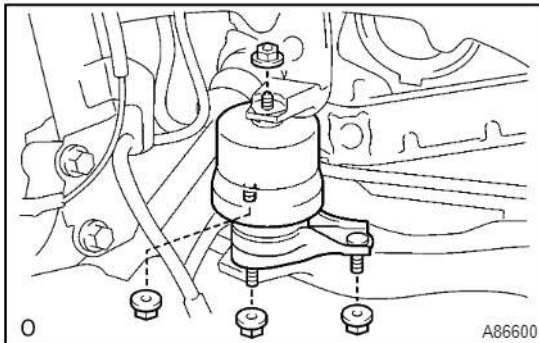
**40. INSTALL ENGINE MOUNTING BRACKET RH**

Torque:

54 N·m (550 kgf·cm, 40 ft·lbf) for bolt A

54 N·m (550 kgf·cm, 40 ft·lbf) for nut B

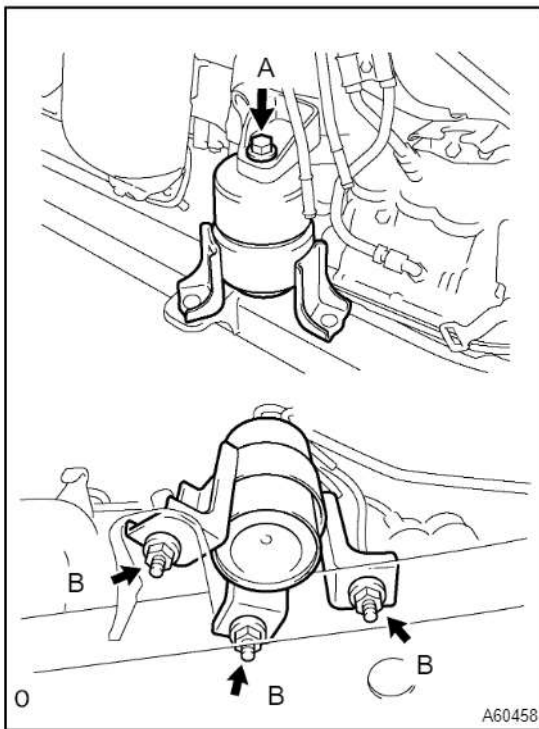
43 N·m (439 kgf·cm, 32 ft·lbf) for bolt C

**41. INSTALL ENGINE MOUNTING INSULATOR RH**

Torque:

95 N·m (969 kgf·cm, 70 ft·lbf) for nut A

87 N·m (887 kgf·cm, 64 ft·lbf) for nut B

**42. INSTALL ENGINE MOUNTING INSULATOR FR**

Torque:

87 N·m (887 kgf·cm, 64 ft·lbf) for bolt A

52 N·m (531 kgf·cm, 38 ft·lbf) for nut B

43. INSTALL OIL LEVEL GAGE GUIDE

- (a) Install a new O-ring, bolt and gage guide.

Torque: 8 N·m (82 kgf·cm, 71 in·lbf)

44. INSTALL COMPRESSOR MOUNTING BRACKET NO.1

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

45. INSTALL TIMING BELT NO.3 COVER (See page 14-186)**46. INSTALL TIMING BELT IDLER SUB-ASSY NO.1**

- (a) Using a 10 mm hexagon wrench, install the plate washer and idler pulley with the pivot bolt.

Torque: 34 N·m (347 kgf·cm, 25 ft·lbf)

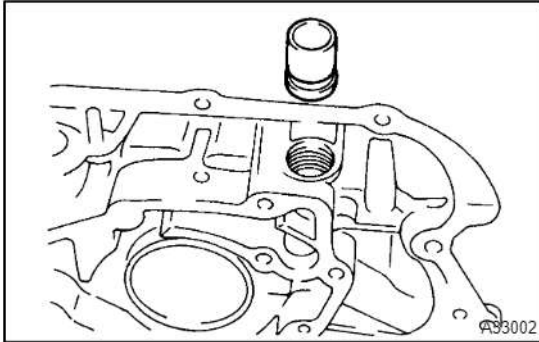
47. INSTALL TIMING BELT IDLER SUB-ASSY NO.2 (See page 14-186)

48. INSTALL CAMSHAFT TIMING PULLEY (See page [14-186](#))
49. INSTALL COMPRESSOR AND MAGNETIC CLUTCH
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)
50. INSTALL EXHAUST PIPE SUPPORT BRACKET NO.1 (See page [15-7](#))
51. INSTALL EXHAUST PIPE ASSY FRONT (See page [15-7](#))
52. INSTALL EXHAUST PIPE NO.1 SUPPORT BRACKET (See page [15-7](#))
53. INSPECT TIMING BELT (See page [14-186](#))
54. INSTALL TIMING BELT (See page [14-186](#))
55. INSTALL TIMING BELT GUIDE NO.2
56. INSTALL TIMING BELT NO.2 COVER (See page [14-186](#))
57. INSTALL TIMING BELT NO.1 COVER (See page [14-186](#))
58. INSTALL CRANKSHAFT PULLEY (See page [14-186](#))
59. INSTALL GENERATOR BRACKET NO.2
Torque: 28 N·m (286 kgf·cm, 21 in·lbf)
60. INSTALL ENGINE MOUNTING STAY NO.2 RH (See page [14-164](#))
61. INSTALL ENGINE MOVING CONTROL ROD (See page [14-164](#))
62. INSTALL VANE PUMP V BELT (See page [14-140](#))
63. INSTALL V BELT NO. 1 (See page [14-140](#))
64. INSPECT DRIVE BELT TENSION (See page [14-136](#))
65. INSTALL FRONT SUSPENSION UPPER BRACE CENTER (W/ FRONT SUSPENSION BRACE UPPER CENTER)
Torque: 80 N·m (816 kgf·cm, 59 ft·lbf)
66. ADD ENGINE OIL
67. INSPECT CHECK FOR ENGINE OIL LEAKS
68. INSTALL FRONT WHEEL RH
69. CHECK FOR EXHAUST GAS LEAKS

OVERHAUL

1. REMOVE OIL PUMP RELIEF VALVE

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



2. INSPECT OIL PUMP RELIEF VALVE

- (a) Apply a light coat of engine oil.
 (b) Check that the valve falls smoothly into the valve hole by its own weight.

If it does not, replace the relief valve. If necessary, replace the oil pump assy.

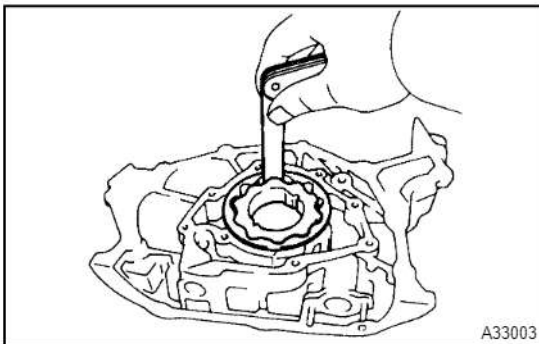
3. INSPECT OIL PUMP COVER

- (a) Remove the 10 screws and the oil pump cover.

4. INSPECT OIL PUMP ROTOR

- (a) Apply a light coat of engine oil to the oil pump rotor set and place them into the oil pump body. Check that the rotors revolve smoothly.

If the result is not as specified, replace the oil pump assy.

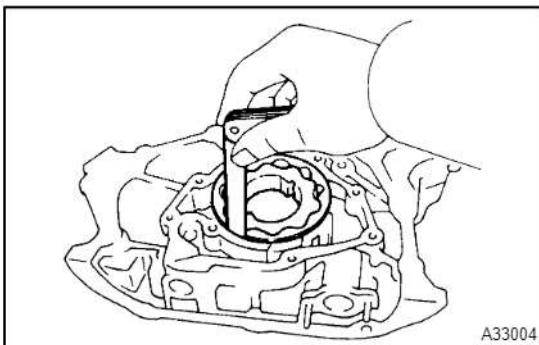


- (b) Check the clearance between the drive tips and driven rotor grooves.
 (1) Insert a feeler gauge between each drive tip and driven rotor groove. Measure the clearances.

Specified tip clearance:

0.060 to 0.300 mm (0.0024 to 0.0118 in.)

If the tip clearance is greater than the maximum, replace the oil pump assy.

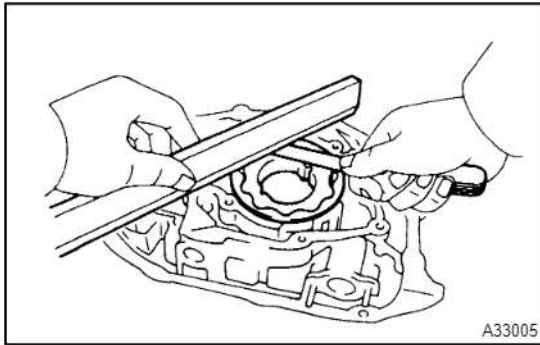


- (c) Check the clearance between the driven rotor and body.
 (1) Insert a feeler gauge between the driven rotor and body. Measure the clearance.

Specified body clearance:

0.250 to 0.500 mm (0.0098 to 0.0128 in.)

If the body clearance is greater than the maximum, replace the oil pump assy.



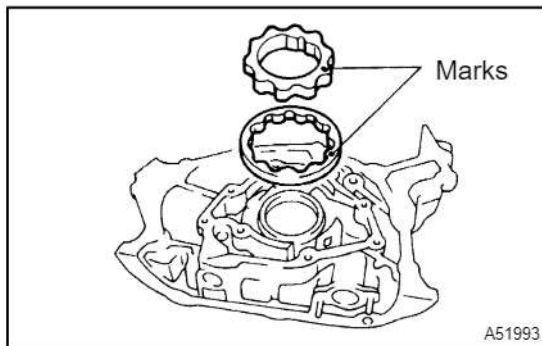
- (d) Check the clearance between the drive and driven rotor.
- (1) Place a precision straight edge on the top surface of the drive. Insert a feeler gauge between the bottom edge of the precision straight edge and the top surface of the driven rotor. Measure the clearance.

Specified side clearance:

0.030 to 0.150 mm (0.0012 to 0.0059 in.)

If the side clearance is greater than the maximum, replace the oil pump assy.

5. REMOVE OIL PUMP ROTOR



6. INSTALL OIL PUMP ROTOR

- (a) Apply a light coat of engine oil to the oil pump gear set and place it into the pump body with the marks facing the pump body cover side.

7. INSTALL OIL PUMP COVER

- (a) Install the oil pump cover with the 10 screws.

Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

8. INSTALL OIL PUMP RELIEF VALVE

- (a) Apply a light coat of engine oil to the relief valve, and insert the relief valve and spring into the pump body hole.

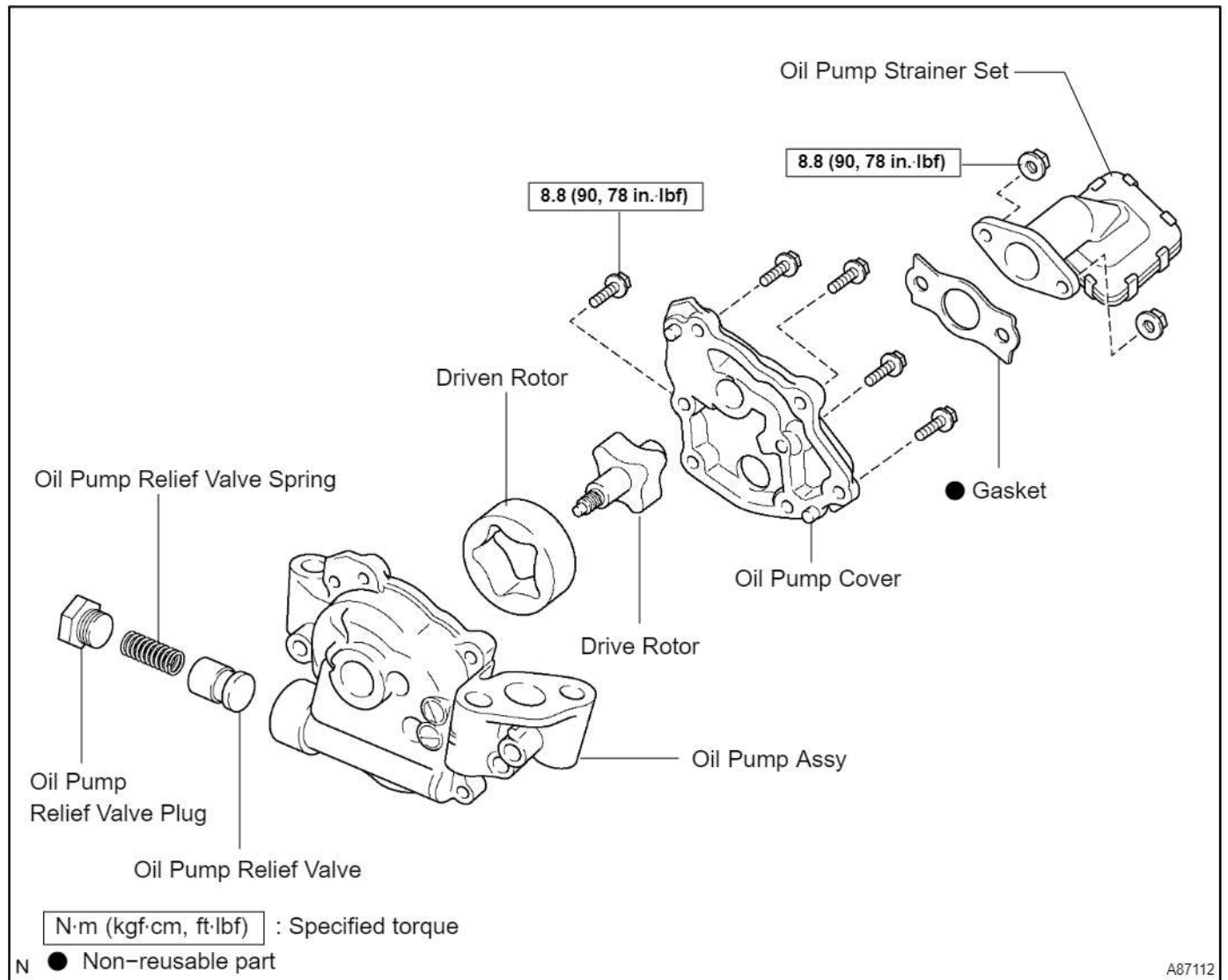
- (b) Install the plug.

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

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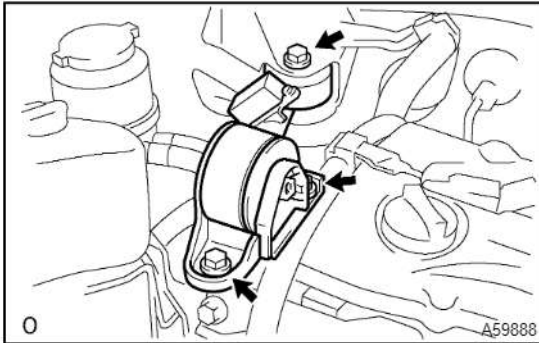






REPLACEMENT

1. REMOVE FRONT WHEEL RH
2. REMOVE ENGINE UNDER COVER LH
3. REMOVE ENGINE UNDER COVER RH
4. REMOVE FRONT FENDER APRON SEAL RH
5. DRAIN ENGINE OIL
 - (a) Install a new gasket and the drain plug after draining engine oil.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)
6. REMOVE EXHAUST PIPE ASSY FRONT



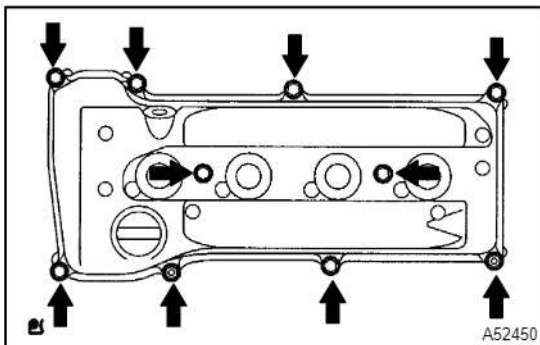
7. REMOVE ENGINE MOVING CONTROL ROD W/BRACKET
 - (a) Remove the 3 bolts and control rod.

8. REMOVE ENGINE MOUNTING STAY NO.2 RH
9. REMOVE ENGINE MOUNTING BRACKET NO.2 RH
10. REMOVE FAN AND GENERATOR V BELT (See page 14-5)
11. REMOVE ENGINE COVER SUB-ASSY NO.1
12. DISCONNECT ENGINE WIRE
13. REMOVE GENERATOR ASSY (See page 19-17)
14. REMOVE VANE PUMP ASSY (See page 51-8)

NOTICE:

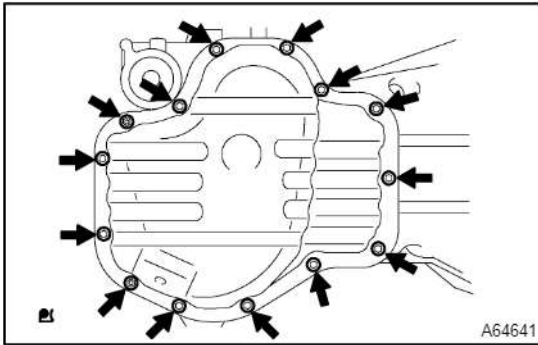
Do not disconnect the hose.

15. REMOVE IGNITION COIL ASSY
16. DISCONNECT VENTILATION HOSE
17. DISCONNECT VENTILATION HOSE NO.2



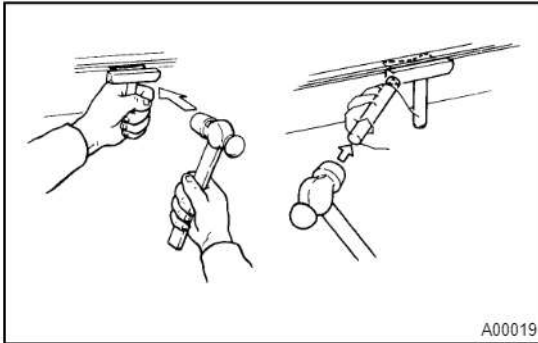
18. REMOVE CYLINDER HEAD COVER SUB-ASSY
 - (a) Remove the bolt and disconnect the engine wire harness clamp.
 - (b) Remove the 8 bolts and 2 nuts, and disconnect the cylinder head cover.

19. SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page 14-7)
20. REMOVE CRANKSHAFT PULLEY (See page 14-47)
21. REMOVE CRANKSHAFT POSITION SENSOR



22. REMOVE OIL PAN SUB-ASSY

- (a) Remove the 12 bolts and 2 nuts.

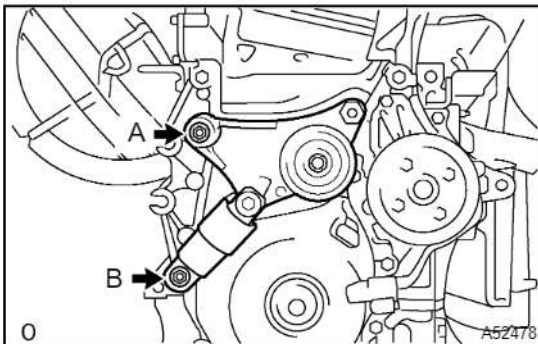


- (b) Insert the blade of SST between the crankcase and oil pan, cut through applied sealer and remove the oil pan.
SST 09032-00100

NOTICE:

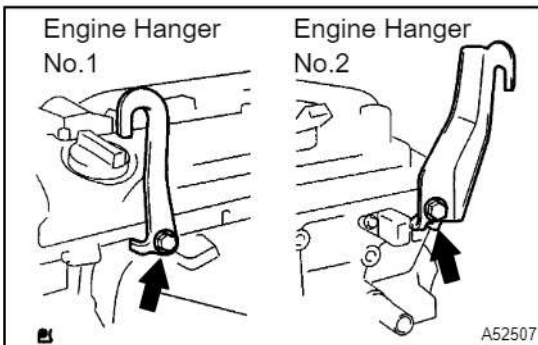
Do not damage the contact surface of the cylinder block and oil pan.

23. REMOVE CHAIN TENSIONER ASSY NO.1 (See page 14-47)



24. REMOVE V-RIBBED BELT TENSIONER ASSY

- (a) Remove the bolt labeled A and the bolt labeled B. Then remove the tensioner.



25. REMOVE ENGINE HANGER NO.1

- (a) Install the engine hanger No. 1 and No. 2 with their respective bolts, as shown in the illustration.

Parts No.:

Engine hanger No. 1	12281-28010
Engine hanger No. 2	12282-28010
Bolt	91512-61020

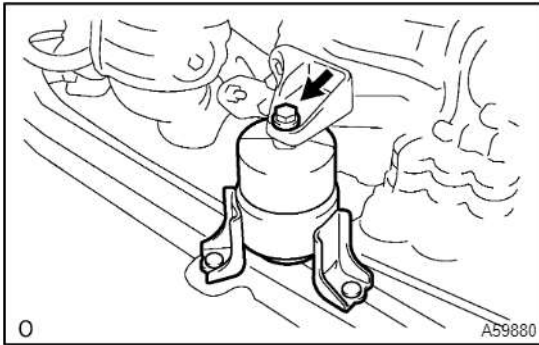
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)

26. REMOVE ENGINE MOUNTING INSULATOR

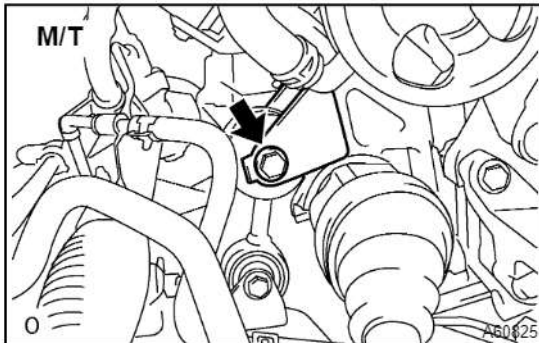
- (a) Attach the engine chain hoist to the engine hangers.

CAUTION:

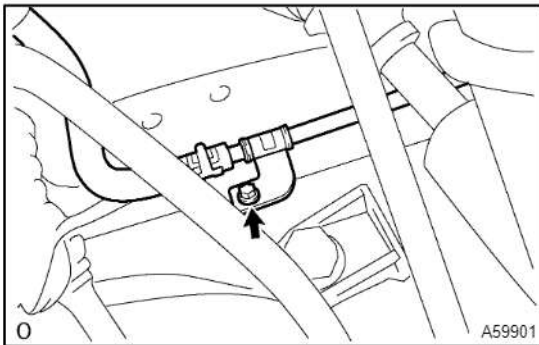
Do not attempt to hang the engine by hooking the chain to any other part.



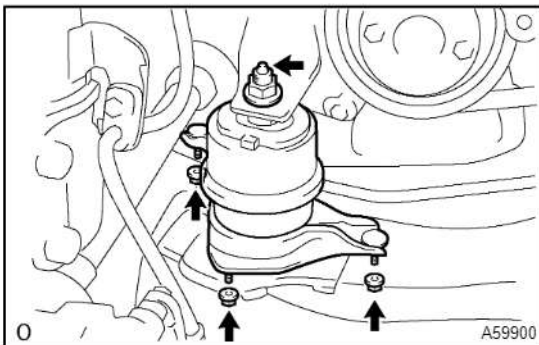
- (b) Remove the bolt and disconnect the engine mounting insulator FR.



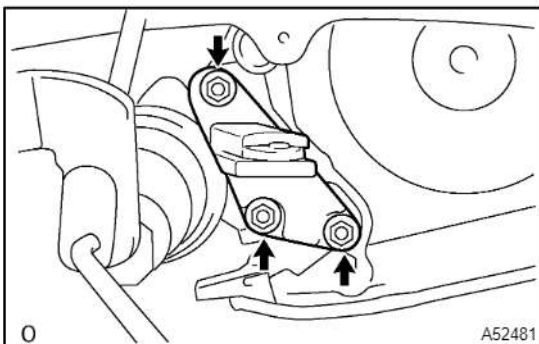
- (c) M/T:
Remove the bolt and disconnect the engine lateral control rod.



- (d) Remove the bolt and disconnect the steering gear return hose clamp from the frame.

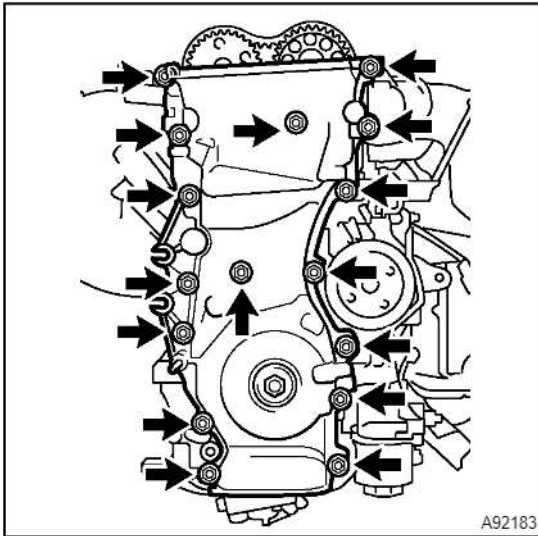


- (e) Remove the 4 nuts from the engine mounting insulator RH.
(f) Prepare a jack. Place a wooden block on the jack and set the jack under the engine. Remove the engine mounting insulator.
(g) Raise the jack and lift up the engine. Then remove the engine mounting insulator RH.



27. REMOVE ENGINE MOUNTING BRACKET RH

- (a) Remove the 3 bolts and engine mounting bracket RH.



28. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY

- Remove the stud bolt for drive belt tensioner from the cylinder block.
- Remove the 14 bolts and 2 nuts.
- Pry out the timing chain cover using a screwdriver.

NOTICE:

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

29. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

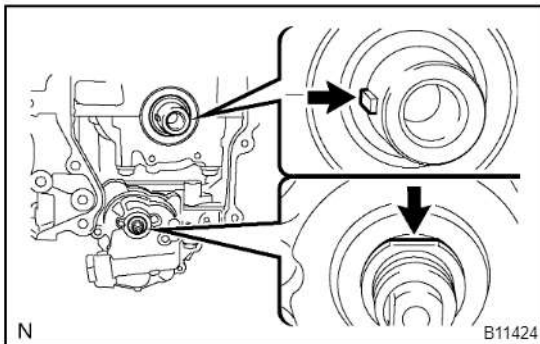
30. REMOVE CHAIN TENSIONER SLIPPER

31. REMOVE CHAIN VIBRATION DAMPER NO.1

32. REMOVE CHAIN SUB-ASSY

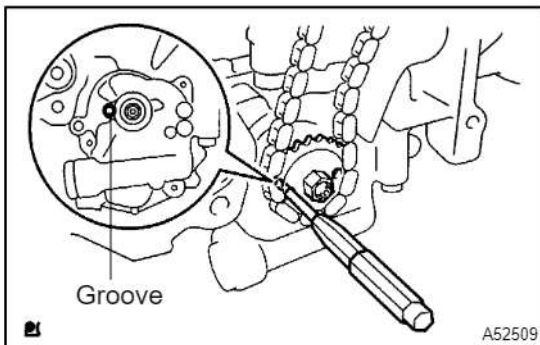
33. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

- Remove the bolt and timing chain guide.
- Remove the timing gear or sprocket.

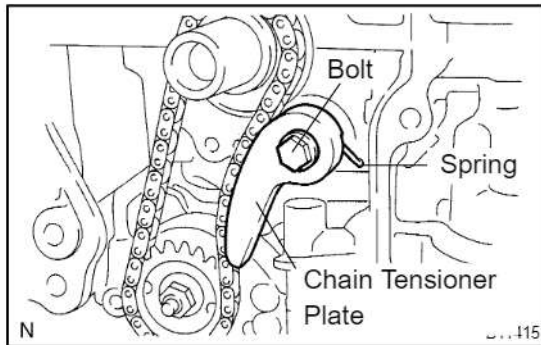


34. REMOVE NO.2 CHAIN SUB-ASSY

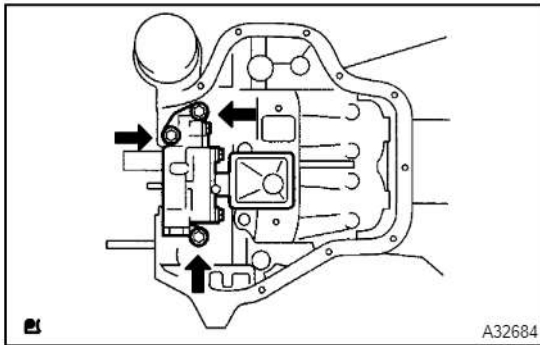
- Turn the crankshaft counterclockwise 90° and turn the cutout of the oil pump drive shaft gear to the top.



- Align the adjusting hole of the oil pump drive shaft gear with the groove of the oil pump.
- Put a bar ($\varnothing$ 4 mm (0.16 in.)) in the adjusting hole of the oil pump drive shaft gear to temporarily lock the gear in position. Remove the nut.



- (d) Remove the bolt, chain tensioner plate and spring.
- (e) Remove the oil pump drive shaft gear and chain.



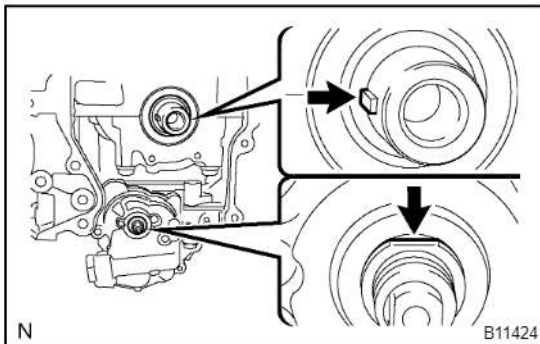
35. REMOVE OIL PUMP ASSY

- (a) Remove the 3 bolts and pump.

36. INSTALL OIL PUMP ASSY

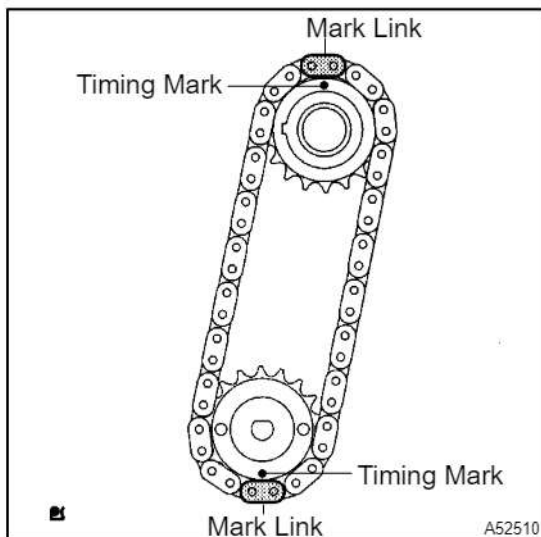
- (a) Place a new gasket on the cylinder block.
- (b) Install the pump with the 3 bolts.

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

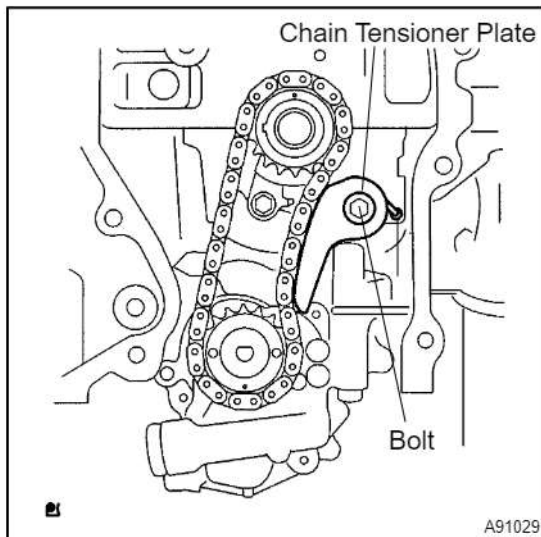


37. INSTALL NO.2 CHAIN SUB-ASSY

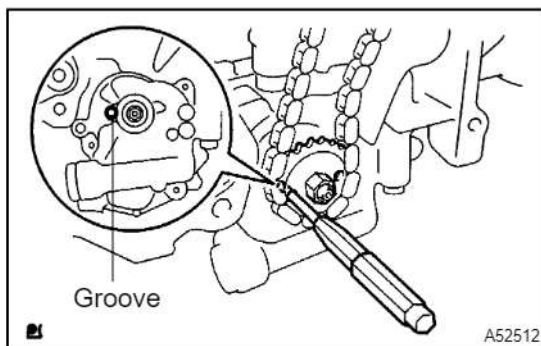
- (a) Set the crankshaft key into the left horizontal position.
- (b) Turn the cutout of the drive shaft gear to the top.



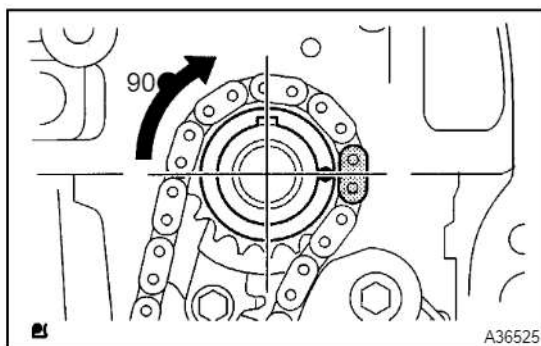
- (c) Align the mark links (yellow colored links) with the timing marks of the gear as shown in the illustration.
- (d) Insert the gears and chain to the crankshaft and oil pump shaft.
- (e) Temporarily tighten the oil pump drive shaft gear with the a nut.



- (f) Inset the damper spring into the adjusting hole, and install the chain tensioner plate with the nut.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



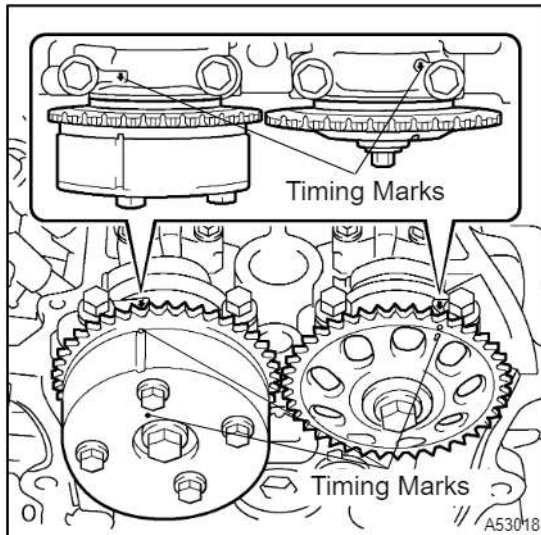
- (g) Align the adjusting hole of the oil pump drive shaft gear with the groove of the oil pump.
 (h) Put a bar (ϕ 4 mm (0.16 in.)) in the adjusting hole of the oil pump drive shaft gear to temporarily lock the gear in position. Install the nut.
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)



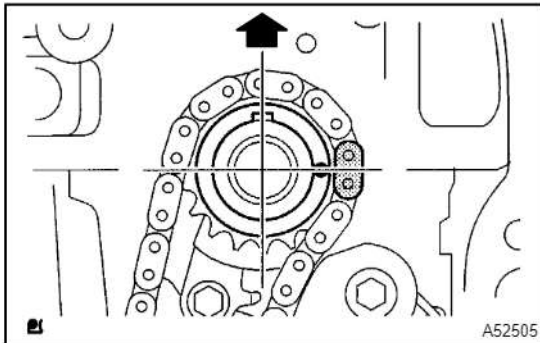
- (i) Rotate the crankshaft clockwise 90° and align the crankshaft key to the top.

38. INSTALL CHAIN VIBRATION DAMPER NO.1

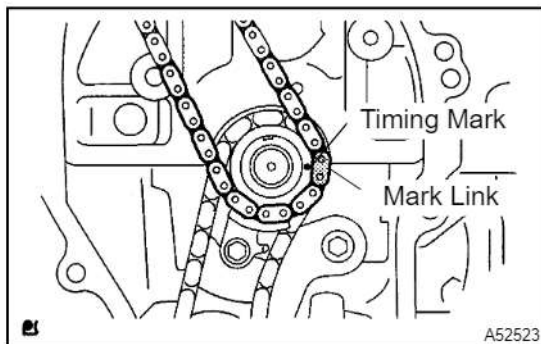
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

**39. INSTALL CHAIN SUB-ASSY**

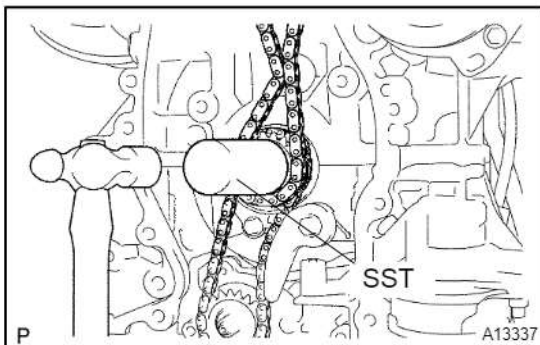
- (a) Set the No.1 cylinder to TDC/compression.
 (1) Align the timing marks of the camshaft timing sprockets and bearing caps (No. 1 and No. 2).



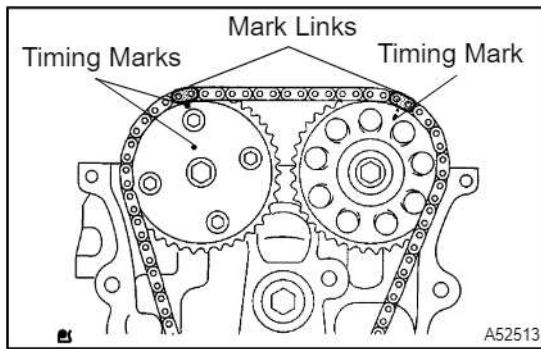
- (2) Using the crankshaft pulley bolt, turn the crankshaft and set the set key on the crankshaft upward.



- (b) Align the mark link (gold or orange colored link) with the timing mark of the crankshaft timing sprocket.



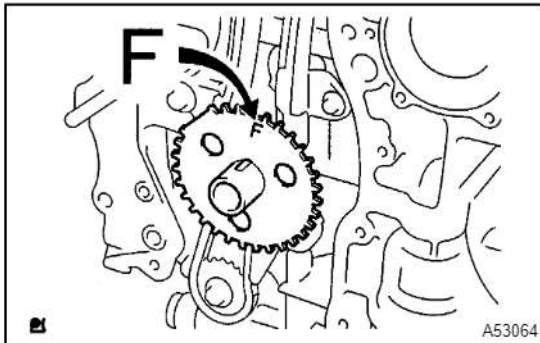
- (c) Using SST, tap in the sprocket.
 SST 09309-37010



- (d) Align the mark links (gold or yellow colored links) with the timing marks of the camshaft timing gear and camshaft timing sprocket, and install the chain.

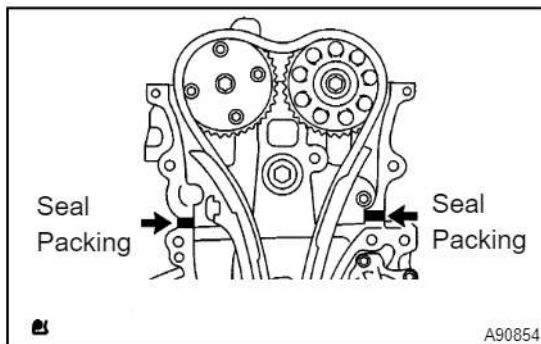
40. INSTALL CHAIN TENSIONER SLIPPER

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



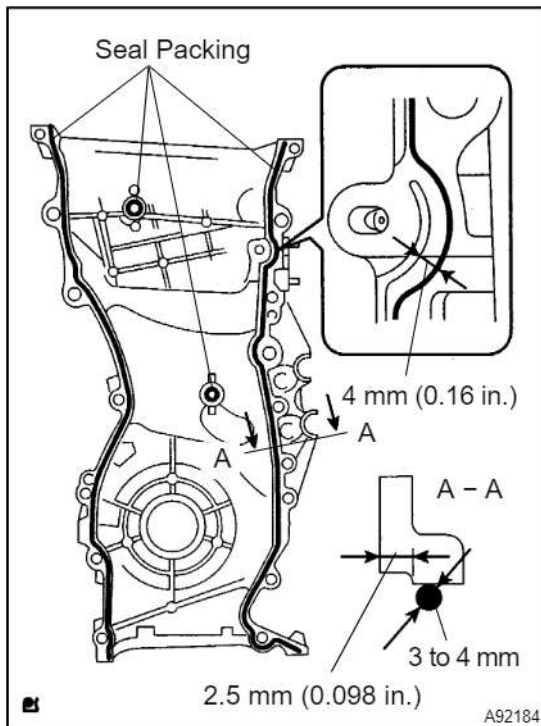
41. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

- (a) Install the sensor plate with the F mark facing outward.

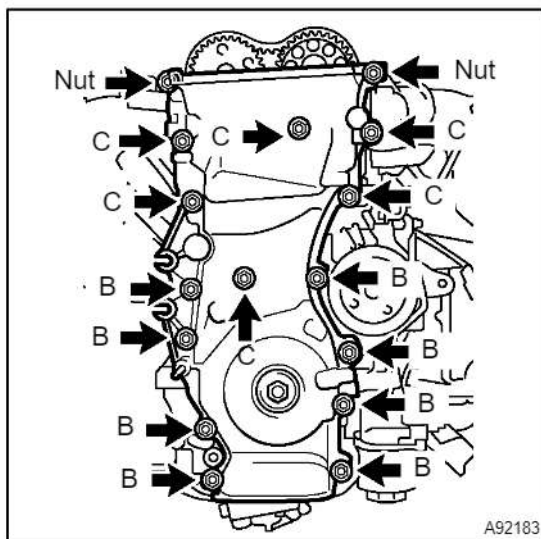


42. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY NOTICE:

- Remove any oil from the contact surface.
 - Install the chain cover within 3 minutes after applying seal packing.
 - Do not start the engine for at least 2 hours after installing the chain cover.
- (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) Apply a continuous bead of seal packing (diameter: 2 mm (0.099 in.)), as shown in the illustration.
- Seal packing: Part No. 08826-00080 or equivalent**

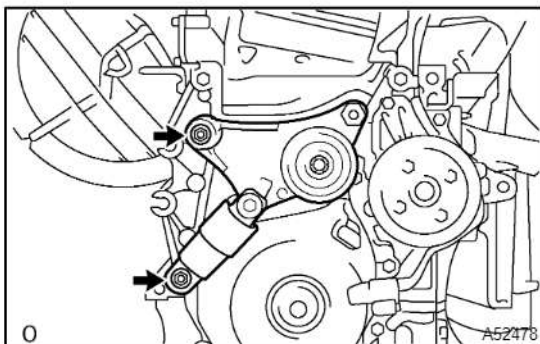


- (c) Apply a continuous bead of seal packing (diameter: 3 to 4 mm (0.118 to 0.157 in.)), as shown in the illustration.
Seal packing: Part No. 08826-00080 or equivalent

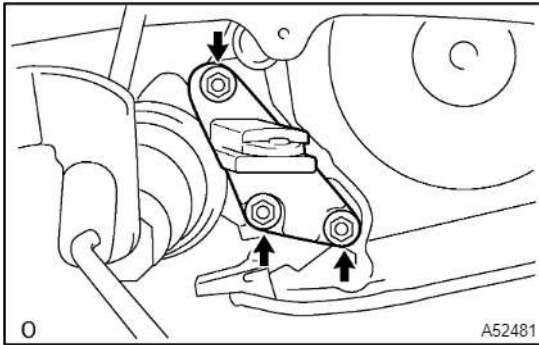


- (d) Install the timing chain cover with the 14 bolts and 2 nuts.
Torque:
9.0 N·m (92 kgf·cm, 80 in·lbf) for bolt A
21 N·m (214 kgf·cm, 15 ft·lbf) for bolt B
43 N·m (438 kgf·cm, 32 ft·lbf) for bolt C
9.0 N·m (92 kgf·cm, 80 in·lbf) for nut
 (e) Install the stud bolt to the drive belt tensioner.
Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

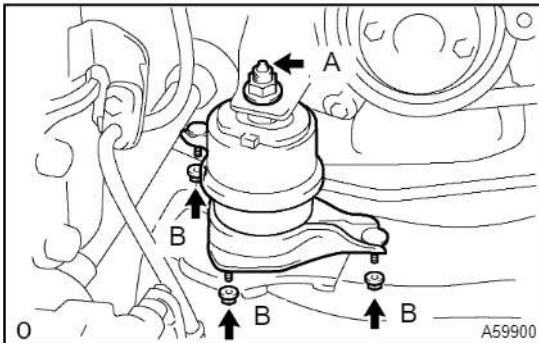
43. INSTALL CHAIN TENSIONER ASSY NO.1 (See page 14-47)



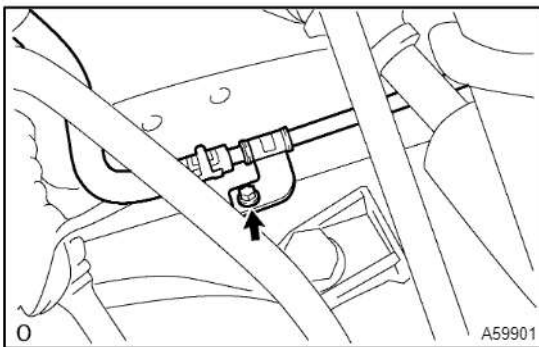
- 44. INSTALL V-RIBBED BELT TENSIONER ASSY**
 (a) Install the tensioner with the bolt and nut.
Torque: 59.5 N·m (607 kgf·cm, 44 ft·lbf)

**45. INSTALL ENGINE MOUNTING BRACKET RH**

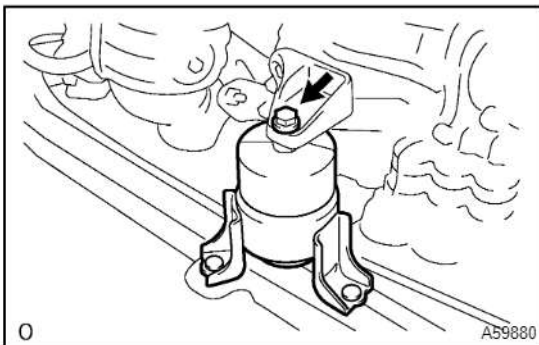
- (a) Install the engine mounting bracket RH with the 3 bolts.
Torque: 54 N·m (551 kgf·cm, 41 ft·lbf)

**46. INSTALL ENGINE MOUNTING INSULATOR**

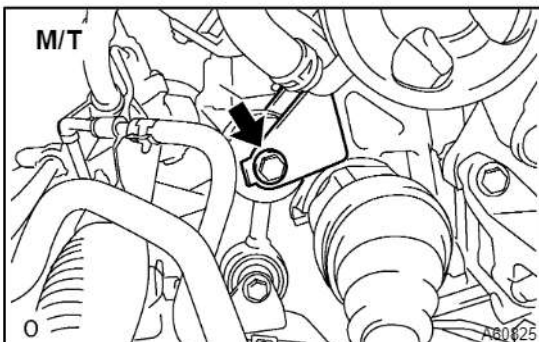
- (a) Raise the engine and install the engine mounting insulator RH.
 (b) Install the engine mounting insulator RH with the 4 nuts.
Torque:
95 N·m (969 kgf·cm, 70 ft·lbf) for bolt A
87 N·m (888 kgf·cm, 64 ft·lbf) for bolt B



- (c) Install the bolt and disconnect the steering gear return hose clamp from the frame.
Torque: 8.0 N·m (80 kgf·cm, 71 in·lbf)



- (d) Install the engine mounting insulator FR with the bolt.
Torque: 87 N·m (888 kgf·cm, 64 ft·lbf)

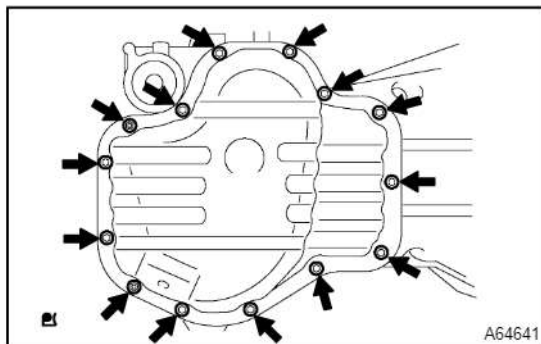


- (e) M/T:
 Install the engine lateral control rod with the bolt.
Torque: 89 N·m (910 kgf·cm, 66 ft·lbf)

**47. INSTALL OIL PAN SUB-ASSY****NOTICE:**

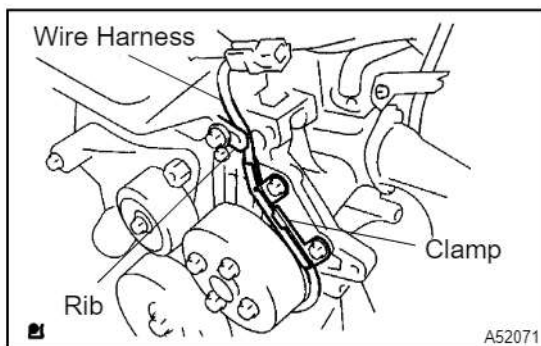
- Remove any oil from the contact surface.
 - Install the oil pan within 3 minutes after applying seal packing.
 - Do not start the engine for at least 2 hours after installing.
- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the cylinder block and oil pan.
- (b) Apply a continuous bead of seal packing in the shape of bead (diameter: 3 to 4 mm (0.157 in.)) as shown in the illustration, and install the oil pan.

Seal packing: Part No. 08826-00080 or equivalent



- (c) Install the oil pan with the 12 bolts and 2 nuts.

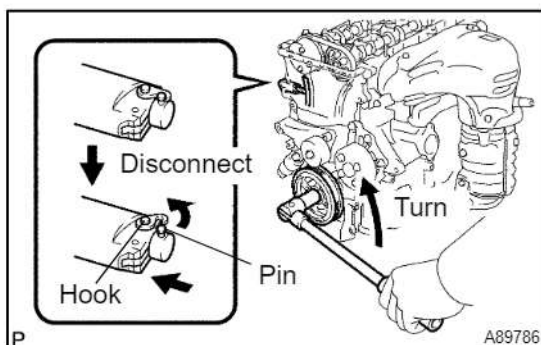
Torque: 9.0 N·m (92 kgf·cm, 80 in.-lbf)

**48. INSTALL CRANKSHAFT POSITION SENSOR**

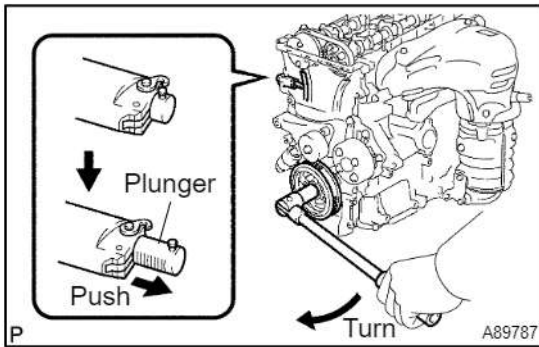
- (a) Install the bolt and sensor.
Torque: 9.0 N·m (92 kgf·cm, 80 in.-lbf)
- (b) Confirm the wire harness of the sensor is placed as shown in the illustration.

49. INSTALL CRANKSHAFT PULLEY

- (a) Install the crankshaft pulley (see page 14-47).

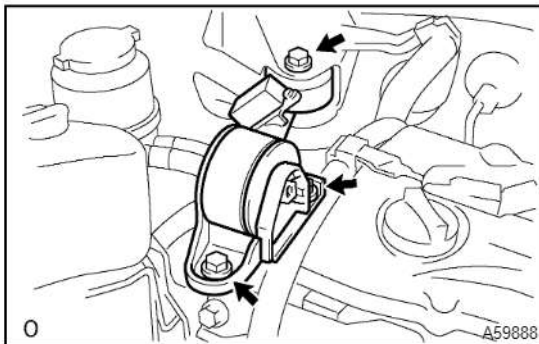


- (b) Disconnect the plunger knock pin.
- (1) Turn the crankshaft counterclockwise and disconnect the plunger knock pin from the hook.



- (2) Turn the crankshaft clockwise and check that the slipper is pushed by the plunger.

50. INSTALL CYLINDER HEAD COVER SUB-ASSY (See page 14-47)
51. INSTALL IGNITION COIL ASSY
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)
52. INSTALL VANE PUMP ASSY (See page 51-8)
53. INSTALL GENERATOR ASSY (See page 19-17)
54. INSTALL ENGINE WIRE
55. INSTALL FAN AND GENERATOR V BELT (See page 14-5)
56. INSTALL ENGINE MOUNTING BRACKET NO.2 RH
Torque: 52 N·m (531 kgf·cm, 38 ft·lbf)
57. INSTALL ENGINE MOUNTING STAY NO.2 RH
Torque: 64 N·m (653 kgf·cm, 47 ft·lbf)



58. INSTALL ENGINE MOVING CONTROL ROD W/BRACKET
 - (a) Install the engine mounting control rod with the 3 bolts.
Torque: 64 N·m (653 kgf·cm, 47 ft·lbf)

59. INSTALL EXHAUST PIPE ASSY FRONT (See page 15-3)
60. INSTALL FRONT WHEEL RH
61. ADD ENGINE OIL
62. INSPECT CHECK FOR ENGINE OIL LEAKS