

# LUBRICATION SYSTEM (1NZ-FXE)

170JA-01

## ON-VEHICLE INSPECTION

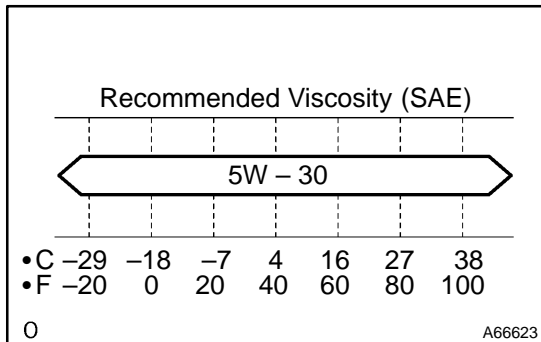
### 1. CHECK ENGINE OIL LEVEL

- (a) Warm up the engine, then stop the engine and wait for 5 minutes. Check that the engine oil level is between the low and full marks on the oil level gage.

If the engine oil level is low, check for oil leaks and add engine oil up to the full mark.

**NOTICE:**

**Do not add engine oil above the full mark.**



### 2. CHECK ENGINE OIL QUALITY

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

If the oil quality is visibly poor, replace the oil.

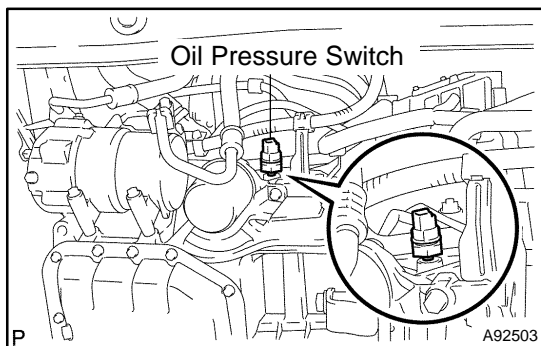
**Oil grade:**

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

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

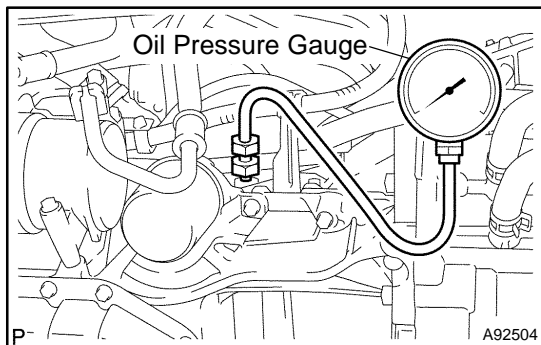
**If SAE 5W-30 is not available, SAE 10W-30 may be used.**

**However, it should be replaced with SAE 5W-30 at the next oil replacement.**



### 3. CHECK OIL PRESSURE

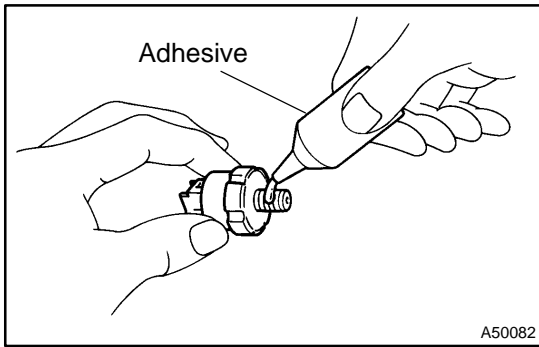
- (a) Remove the engine oil pressure switch assembly.
  - (1) Disconnect the oil pressure switch connector.
  - (2) Using a 24 mm deep socket wrench, remove the oil pressure switch.



- (b) Install an oil pressure gauge.
  - (1) Install the adaptor, then install an oil pressure gauge.
- (c) Set the vehicle to the "INSPECTION MOD1" (see page 01-5).
- (d) Warm up the engine.
- (e) Inspect the oil pressure.

At idle	59 kPa {0.6 kgf/cm <sup>2</sup> , 4.2 psi} or more
At 2,500 rpm	150 to 550 kPa {1.5 to 5.6 kgf/cm <sup>2</sup> , 22 to 80 psi}

- (f) Remove the oil pressure gauge.

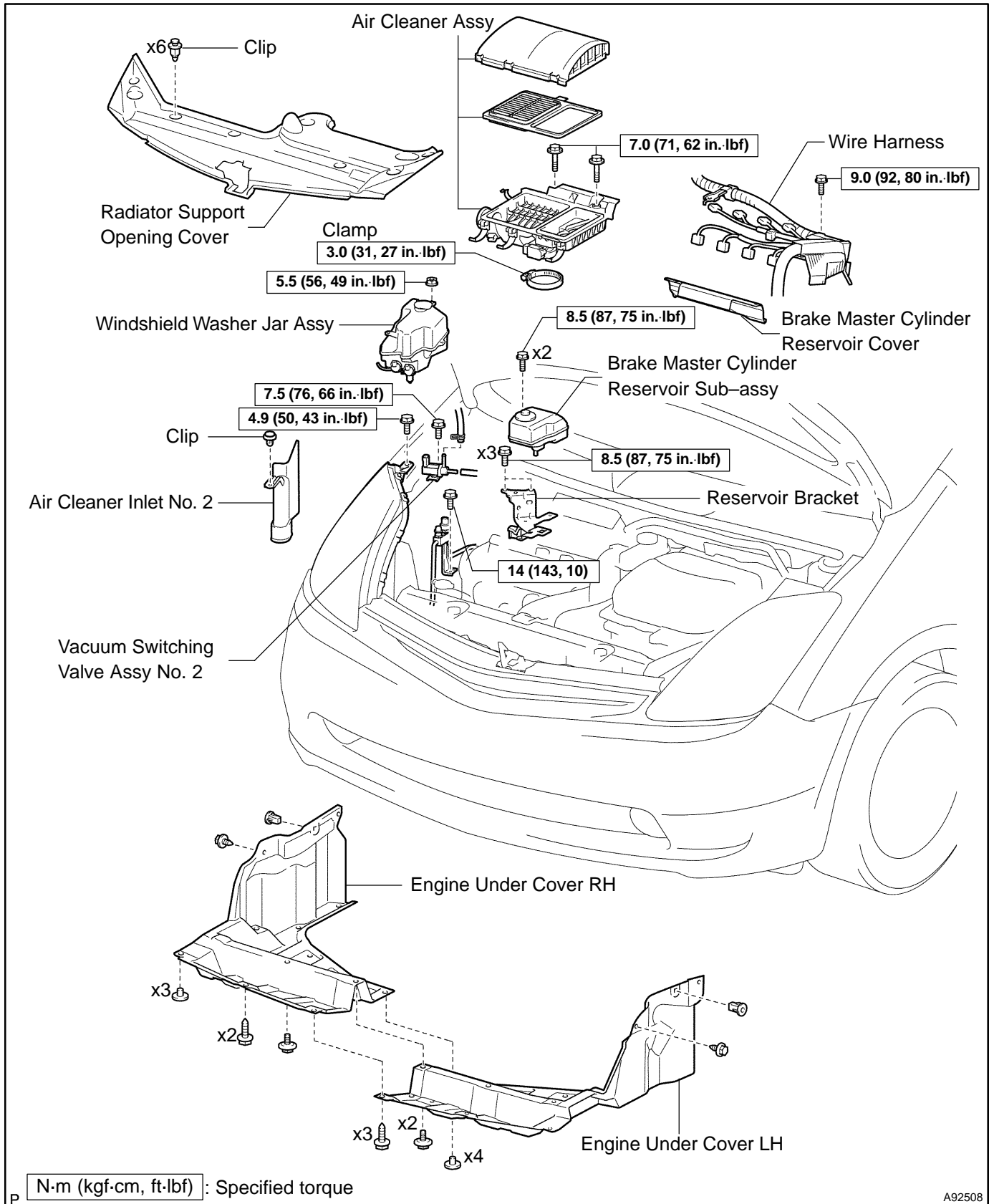


- (g) Install the engine oil pressure switch assembly.
- (1) Apply adhesive to the threads.  
**Adhesive:**  
**Part No. 08833-00070, THREE BOND 1324, or equivalent**
  - (2) Using a 24 mm deep socket wrench, install the oil pressure switch.  
**Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)**
- NOTICE:**  
**Do not start the engine within 1 hour of installation.**
- (3) Connect the oil pressure switch connector.

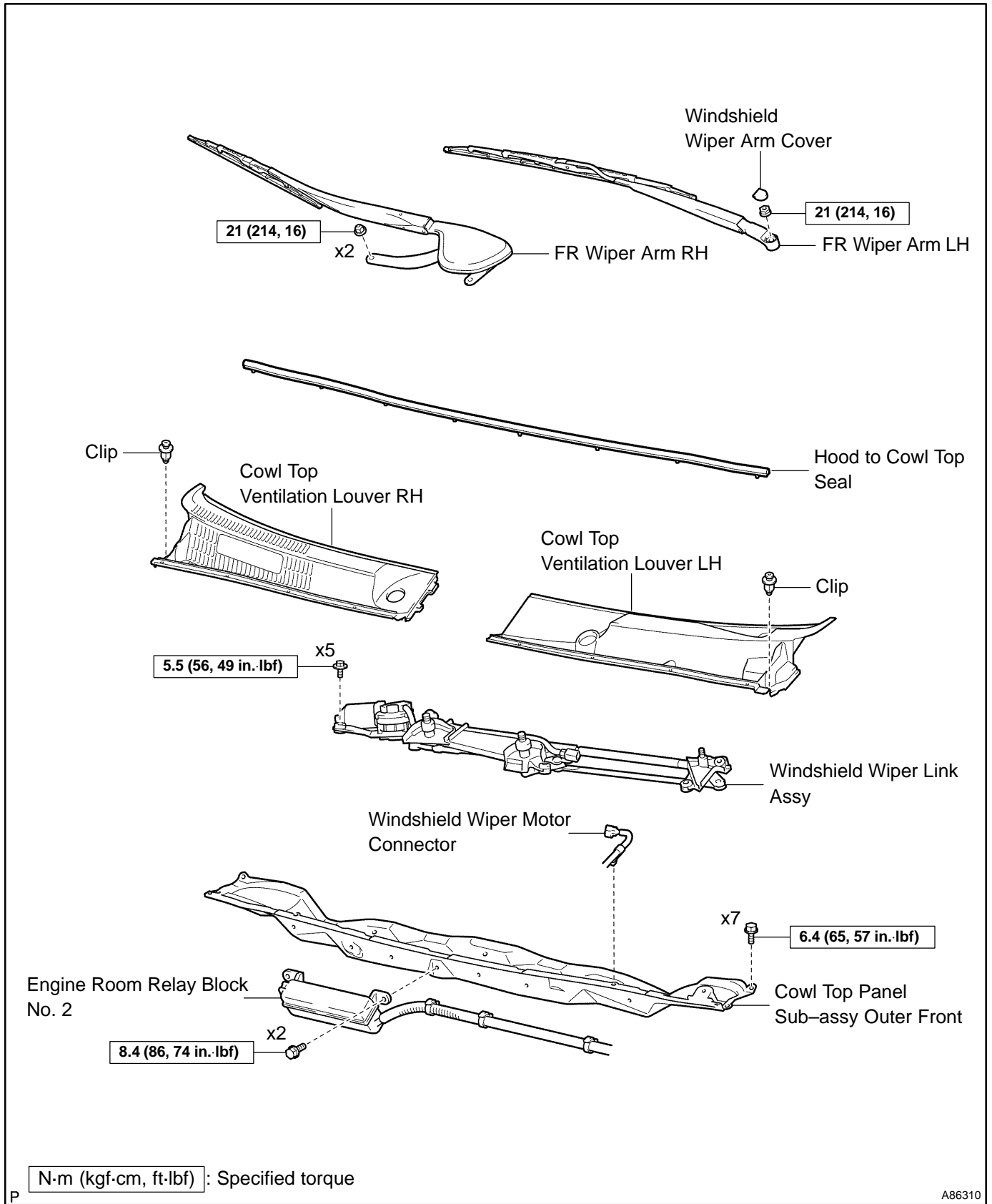
#### 4. CHECK FOR ENGINE OIL LEAKS

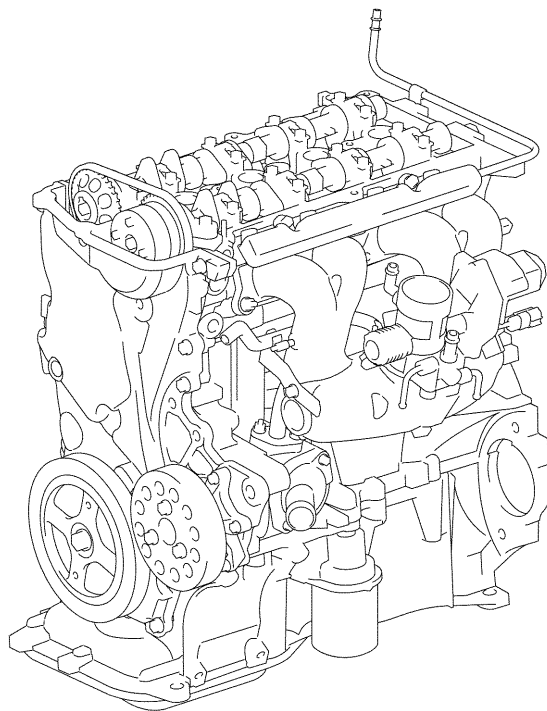
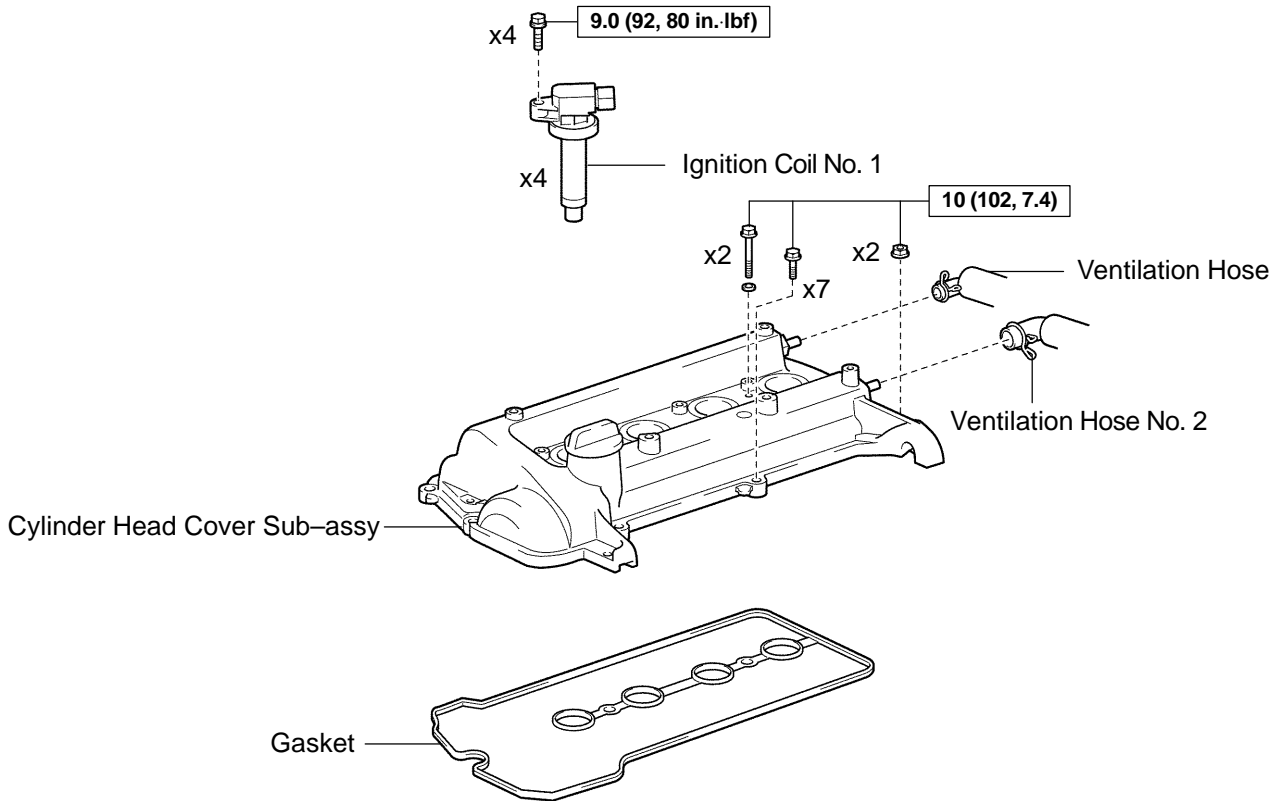
# OIL PUMP ASSY (1NZ-FXE) COMPONENTS

170JB-01



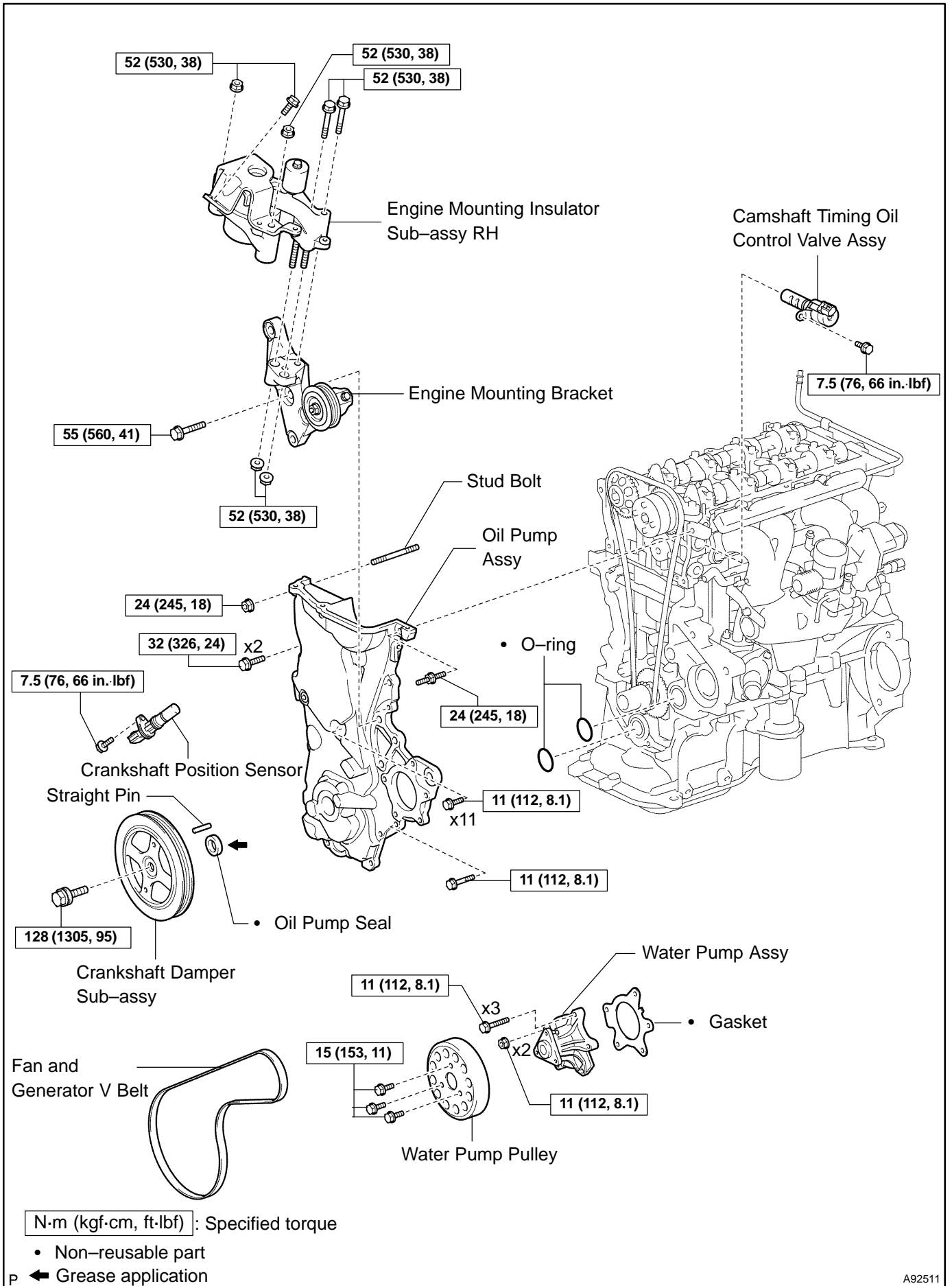
A92508





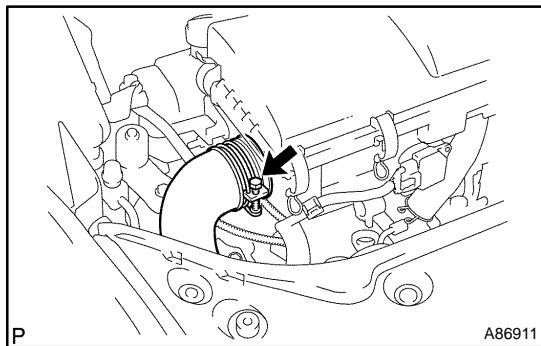
**N·m (kgf·cm, ft·lbf) : Specified torque**

A92510



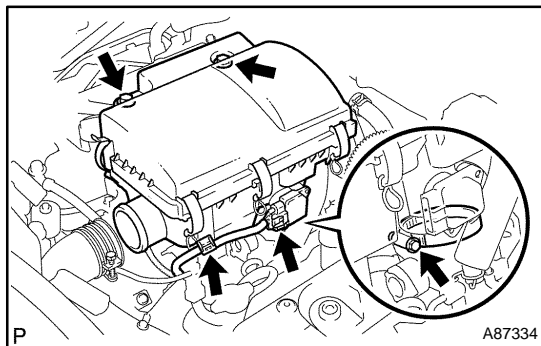
# REPLACEMENT

1. REMOVE REAR FLOOR BOARD NO.2 (See page 21-116)
2. REMOVE DECK FLOOR BOX REAR (See page 21-116)
3. REMOVE REAR FLOOR BOARD NO.3 (See page 21-116)
4. DISCONNECT BATTERY NEGATIVE TERMINAL (See page 21-116)
5. REMOVE RADIATOR SUPPORT OPENING COVER (See page 16-11)
6. REMOVE FRONT WHEEL RH
7. REMOVE ENGINE UNDER COVER LH
8. REMOVE ENGINE UNDER COVER RH
9. DRAIN ENGINE COOLANT (See page 16-11)
10. DRAIN ENGINE OIL
11. REMOVE WINDSHIELD WIPER LINK ASSY (See page 66-14)
12. REMOVE COWL TOP PANEL SUB-ASSY OUTER FRONT (See page 11-15)

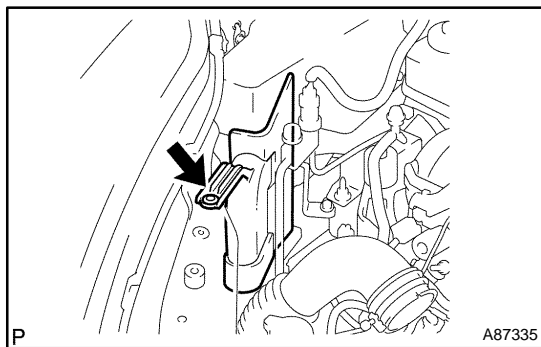


### 13. REMOVE AIR CLEANER ASSY

- (a) Loosen the clamp, then disconnect the air cleaner inlet No. 1 from the air cleaner case.

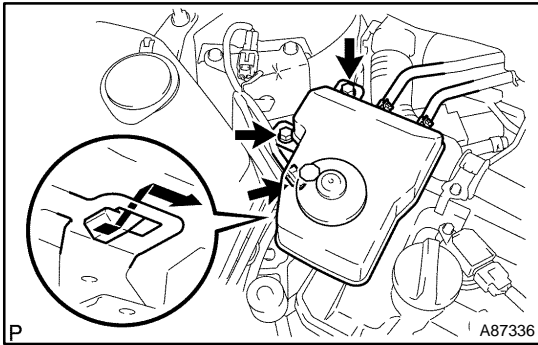


- (b) Disconnect the intake air flow meter connector, then remove the wire harness clamp.
- (c) Loosen the clamp, then remove the 2 bolts and air cleaner assembly.



### 14. REMOVE AIR CLEANER INLET NO.2

- (a) Remove the clip and air cleaner inlet No. 2.

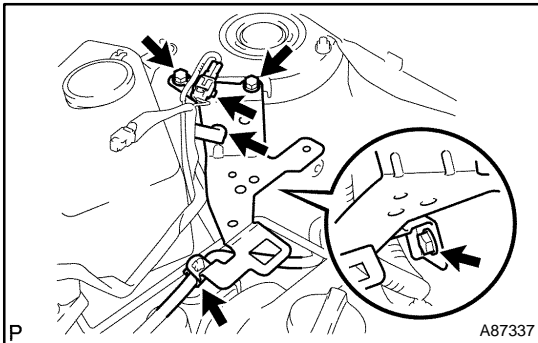


### 15. SUSPEND BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY

- Disconnect the connector.
- Remove the 2 bolts.
- Separate the claw fitting, then suspend the brake master cylinder reservoir with rope.

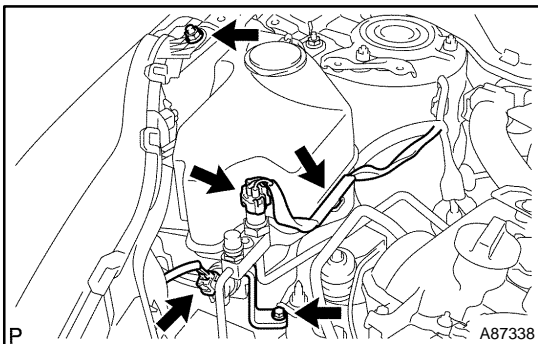
#### NOTICE:

Be careful of the angle of the brake master cylinder reservoir when suspending to prevent air from coming into the hose.



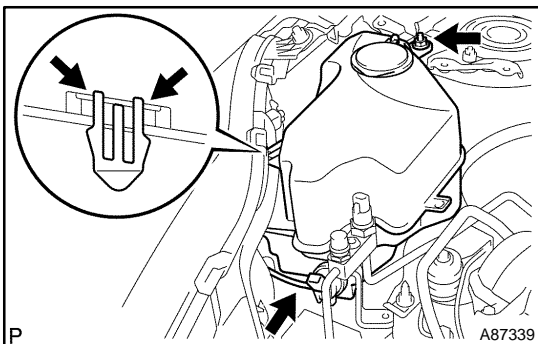
### 16. REMOVE RESERVOIR BRACKET

- Disconnect the hose from the brake master cylinder reservoir bracket.
- Remove the 3 bolts and wire harness clamp, then remove the brake master cylinder reservoir bracket.



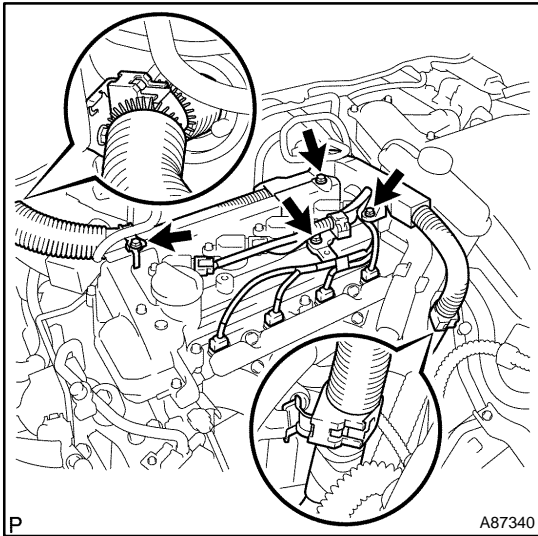
### 17. REMOVE WINDSHIELD WASHER JAR ASSY

- Loosen the bolt which holds the head lamp RH.
- Disconnect the connector and remove the wire harness clamp.
- Remove the bolt and bracket.

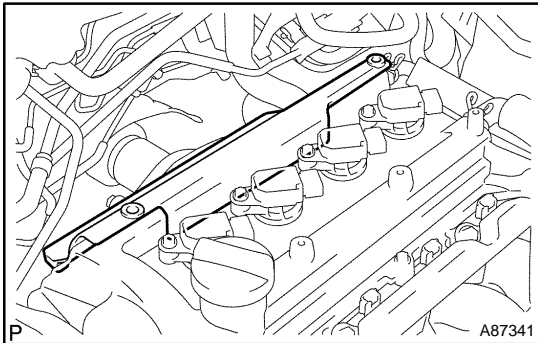


- Remove the nut.
- Slightly lift the head lamp RH and separate the claw fitting, then remove the washer jar assembly.
- Disconnect the hose from the washer jar assembly.

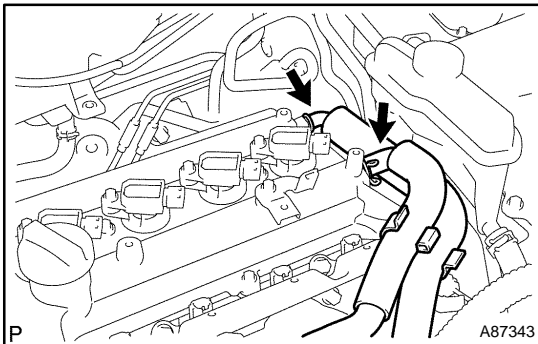


**18. REMOVE CYLINDER HEAD COVER SUB-ASSY**

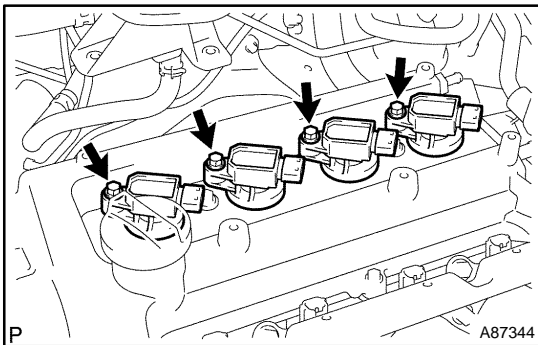
- (a) Disconnect the fuel injector connector and ignition coil connector.
- (b) Remove the 3 bolts and wire harness clamp, then disconnect the wire harness.



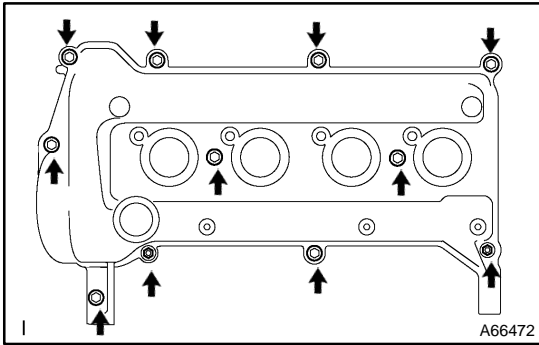
- (c) Remove the brake master cylinder reservoir cover.



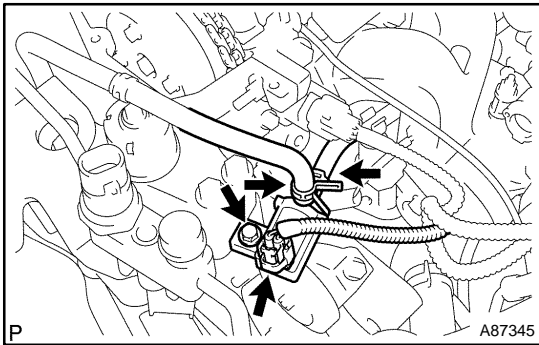
- (d) Disconnect the ventilation hose and ventilation hose No. 2.



- (e) Remove the bolt and ignition coil.



- (f) Remove the 9 bolts and 2 nuts, then remove the cylinder head cover.

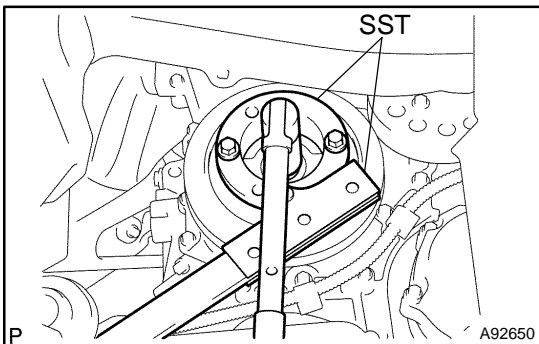


- 19. REMOVE VACUUM SWITCHING VALVE ASSY NO.2**
  - (a) Disconnect the connector and hose.
  - (b) Remove the bolt and vacuum switching valve assembly.

**20. REMOVE FAN AND GENERATOR V BELT**

**21. REMOVE WATER PUMP ASSY**

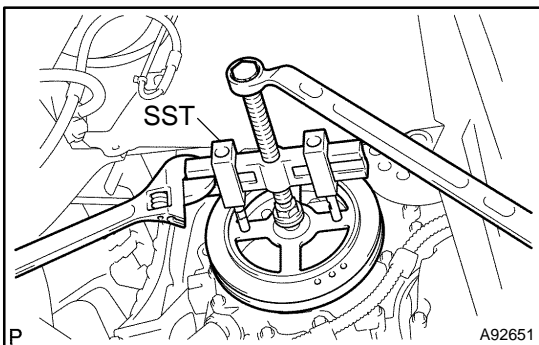
SST 09960-10010 (09962-01000, 09963-00600)



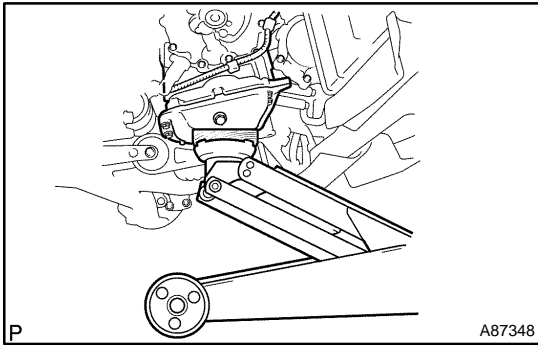
- 22. REMOVE CRANKSHAFT DAMPER SUB-ASSY**
  - (a) Using SST, hold the crankshaft damper and loosen the crankshaft bolt.  
SST 09213-58013 (91111-50845), 09330-00021

**NOTICE:**

**When installing SST, be careful that the bolt which holds SST does not interfere with the chain cover.**

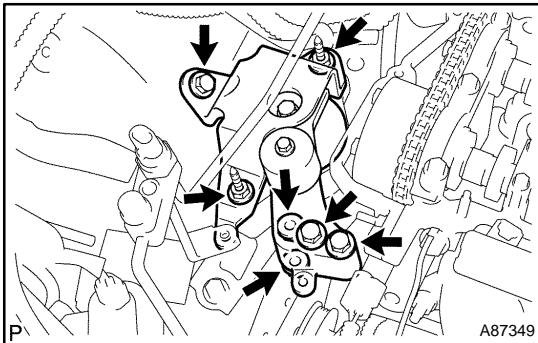


- (b) Loosen the crankshaft bolt until the 2 to 3 threads of the bolt is tightened to the crankshaft.
- (c) Using SST, remove the crankshaft damper.  
SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)
- (d) Remove the crankshaft bolt.

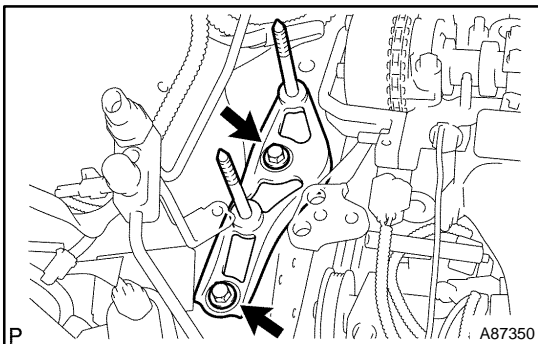


### 23. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSY RH

- (a) Put a wooden block on a jack underneath the oil pan to support the oil pan.

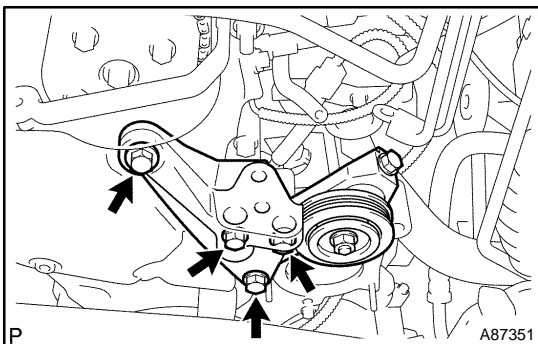


- (b) Remove the 3 bolts and 4 nuts, then remove the engine mounting insulator RH.



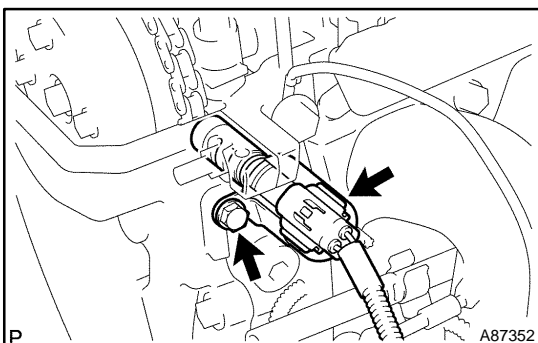
### 24. REMOVE ENGINE MOUNTING SPACER

- (a) Remove the 2 bolts and engine mounting spacer.



### 25. REMOVE TRANSVERSE ENGINE ENGINE MOUNTING BRACKET

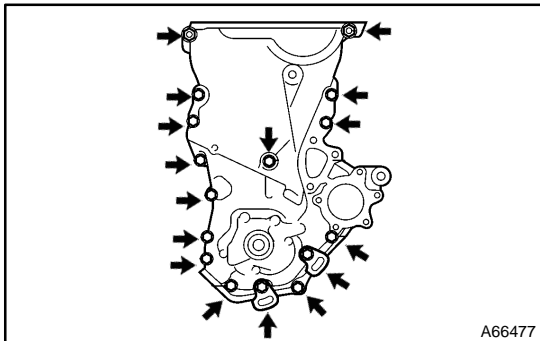
- (a) Remove the 4 bolts and engine mounting bracket.



### 26. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY

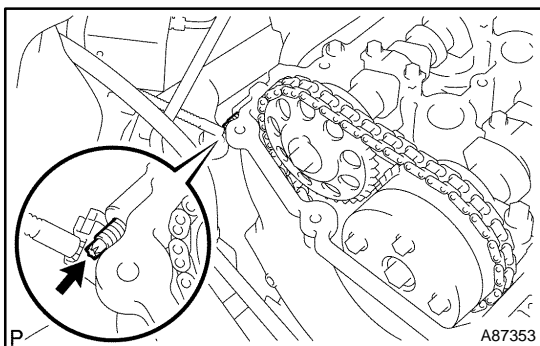
- (a) Disconnect the connector.  
 (b) Remove the bolt and camshaft timing oil control valve assembly.

## 27. REMOVE CRANK POSITION SENSOR (See page 18-10)

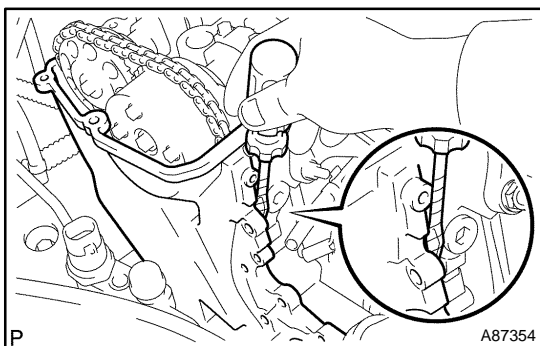


## 28. REMOVE OIL PUMP ASSY

(a) Remove the 15 bolts and nut.



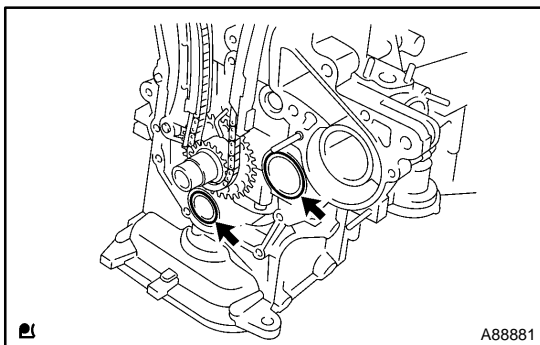
(b) Using a Torx socket wrench E8, remove the stud bolt.



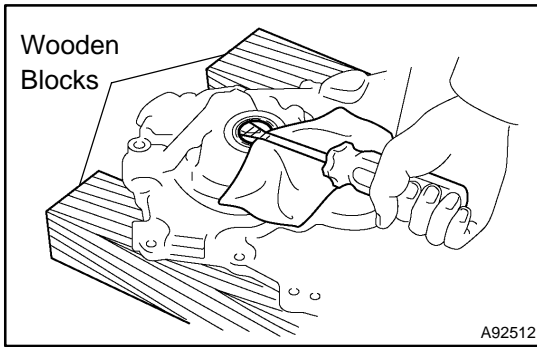
(c) Using a screwdriver with its tip wrapped in tape, remove the oil pump assembly by prying out between the cylinder head and cylinder block.

### NOTICE:

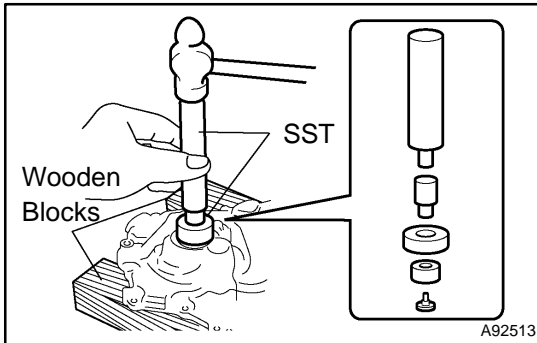
**Be careful not to damage the contact surfaces of the oil pump assembly, cylinder head and cylinder block.**



(d) Remove the 2 O-rings.

**29. REMOVE OIL PUMP SEAL**

- (a) Using a screwdriver with its tip wrapped in tape, remove the oil seal.

**30. INSTALL OIL PUMP SEAL**

- (a) Using SST, uniformly tap in a new oil seal until its surface is flush with the oil pump edge.

SST 09950-60010 (09951-00250, 09951-00380, 09952-06010), 09950-70010 (09951-07100)

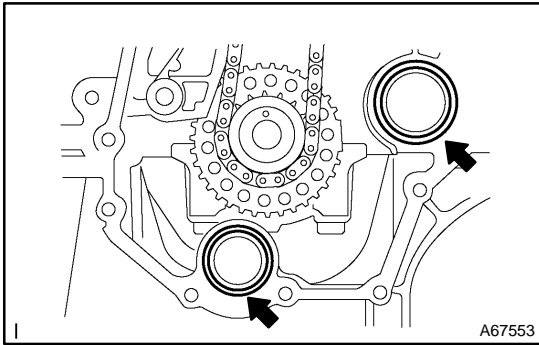
**HINT:**

Be careful not to tap the oil seal at an angle.

- (b) Apply a light coat of multipurpose grease No. 2 to the lip of the new oil seal.

**NOTICE:**

**Keep the lip free of foreign objects.**



**31. INSTALL OIL PUMP ASSY**

- (a) Install 2 new O-rings to the 2 locations as shown in the illustration.
- (b) Apply seal packing to the engine body and oil pump as shown in the illustration below.

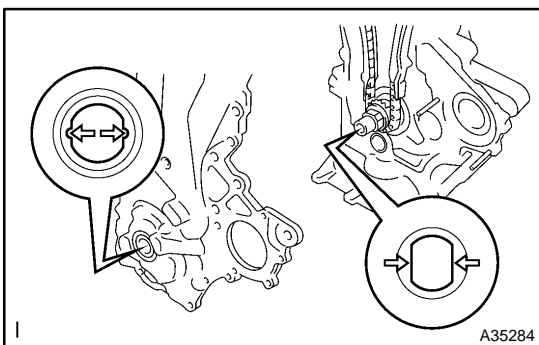
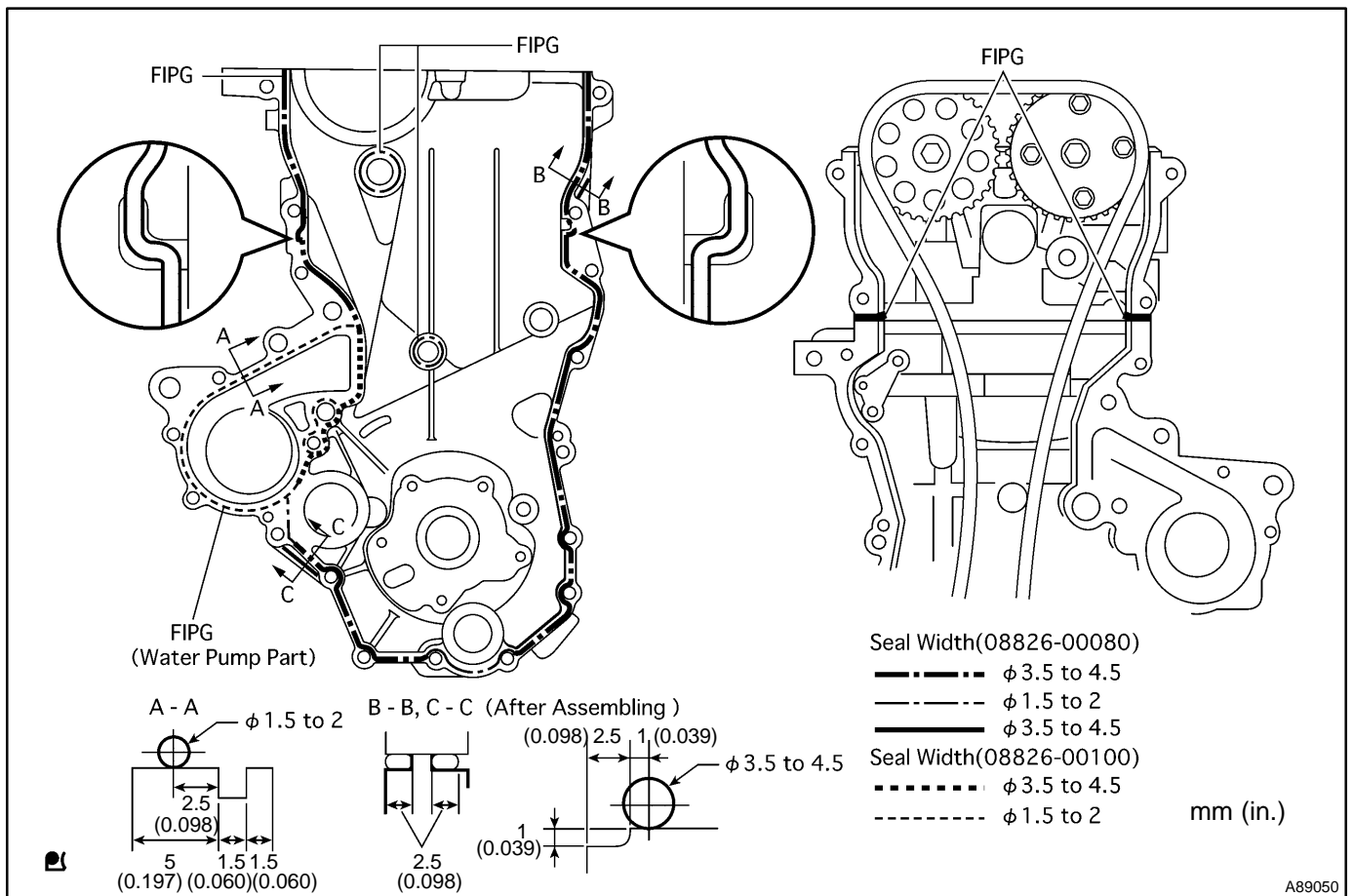
**Seal packing:**

**Water pump part part No. 08826-00100 or equivalent**

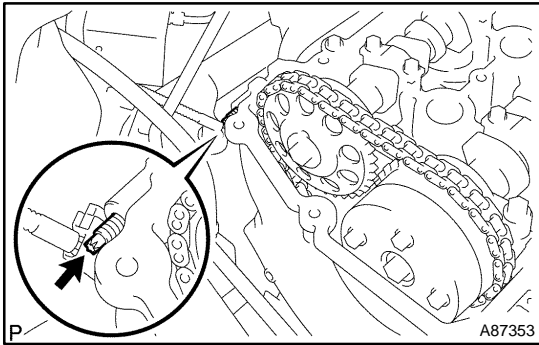
**Other part part No. 08826-00080 or equivalent**

**NOTICE:**

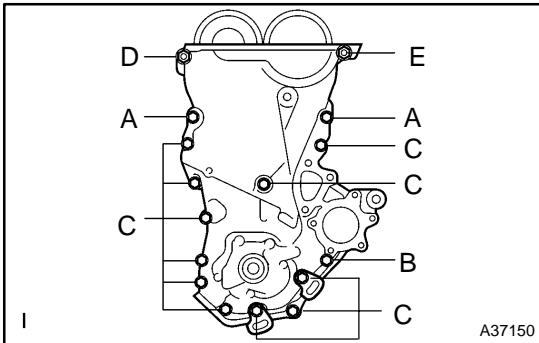
- Remove pump any oil from the contact surface.
- Install the oil pump within 3 minutes, and tighten the bolts within 15 minutes after applying seal packing.
- Do not expose the seal packing to engine oil within 2 hours of installation.



- (c) Align the drive rotor spline of the oil pump with the rectangular portion of the crankshaft, then slide the oil pump assembly into place.



- (d) Using a Torx socket wrench E8, install the stud bolt.  
**Torque: 10 N·m (102 kgf·cm, 7.4 ft·lbf)**



- (e) Install the oil pump assembly with the 15 bolts and nut as illustrated.

**Torque:**  
**32 N·m (326 kgf·cm, 24 ft·lbf) for bolt A**  
**11 N·m (112 kgf·cm, 8.1 ft·lbf) for bolt B**  
**11 N·m (112 kgf·cm, 8.1 ft·lbf) for bolt C**  
**24 N·m (245 kgf·cm, 18 ft·lbf) for nut D**  
**24 N·m (245 kgf·cm, 18 ft·lbf) for bolt E**

**NOTICE:**

- Be careful that the chain does not contact the seal packing when installing the oil pump assembly.
- Install the engine mounting bracket RH and water pump assembly within 15 minutes after installing the oil pump assembly.

**32. INSTALL CRANK POSITION SENSOR (See page 18-10)**

**33. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY**

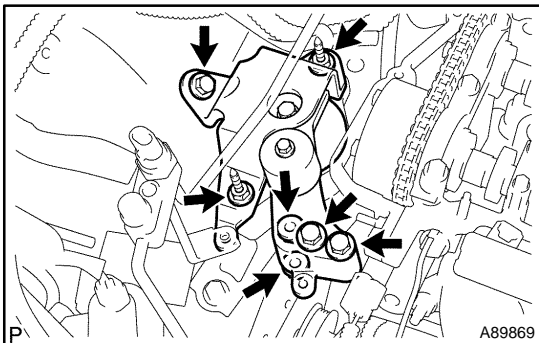
- (a) Apply a light coat of engine oil to the O-ring.  
 (b) Install the camshaft timing oil control valve assembly with the bolt.  
**Torque: 7.5 N·m (76 kgf·cm, 66 in·lbf)**

**34. INSTALL TRANSVERSE ENGINE ENGINE MOUNTING BRACKET**

**Torque: 55 N·m (561 kgf·cm, 41 ft·lbf)**

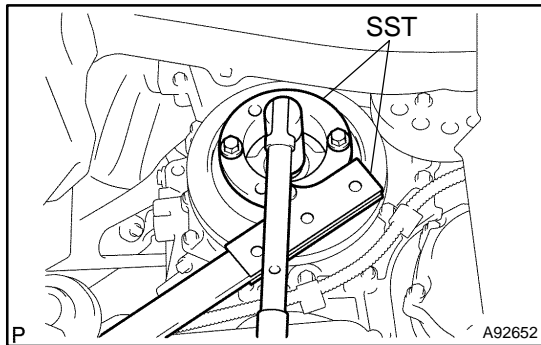
**35. INSTALL ENGINE MOUNTING SPACER**

**Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)**



**36. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSY RH**

- (a) Install the engine mounting insulator RH with the 3 bolts and 4 nuts.  
**Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)**

**37. INSTALL CRANKSHAFT DAMPER SUB-ASSY**

- (a) Align the hole of the crankshaft damper with the straight pin, then install the crankshaft damper.
- (b) Using SST, hold the crankshaft damper and tighten the crankshaft bolt.

SST 09213-58013 (91111-50845), 09330-00021

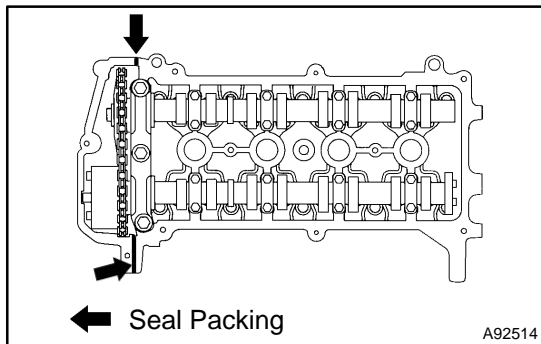
**Torque: 128 N·m (1305 kgf·cm, 95 ft·lbf)**

**NOTICE:**

When installing SST, be careful that the bolt which holds SST does not interfere with the chain cover.

**38. INSTALL WATER PUMP ASSY (See page 16-15)**

SST 09960-10010 (09962-01000, 09963-00600)

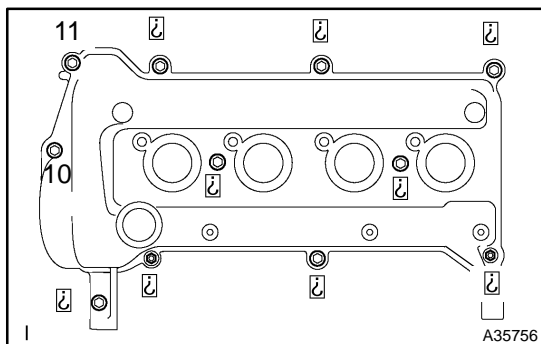
**39. INSTALL FAN AND GENERATOR V BELT (See page 14-5)****40. INSPECT DRIVE BELT DEFLECTION AND TENSION (See page 14-1)****41. INSTALL VACUUM SWITCHING VALVE ASSY NO.2****42. INSTALL CYLINDER HEAD COVER SUB-ASSY**

- (a) Apply seal packing to the 2 locations as shown in the illustration, then install the cylinder head cover.

**Seal packing: Part No. 08826-00080 or equivalent**

**NOTICE:**

- Remove any oil from the contact surface.
- Install the cylinder head cover within 3 minutes after applying seal packing.
- Do not start the engine within 2 hours of installing.



- (b) Install the cylinder head cover with the 9 bolts and 2 nuts.

- (c) Using several steps, tighten the bolts and nuts with the specified torque in the sequence shown in the illustration.

**Torque: 10 N·m (102 kgf·cm, 74 ft·lbf)**

- (d) Install the ignition coil with the bolt.

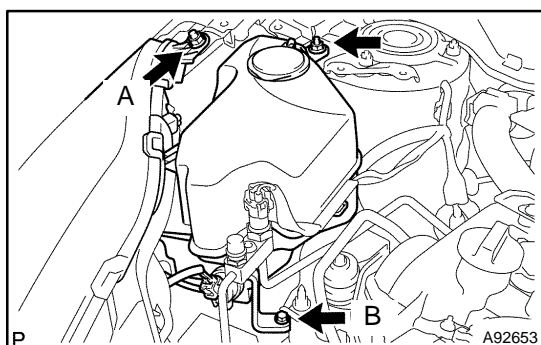
**Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**

- (e) Install the brake master cylinder reservoir cover to the cylinder head cover.

- (f) Install the wire harness and brake master cylinder reservoir cover with the 3 bolts.

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

- (g) Connect the fuel injector connector and ignition coil connector.

**43. INSTALL WINDSHIELD WASHER JAR ASSY**

**Torque:**

**4.9 N·m (50 kgf·cm, 43 in·lbf) for bolt A**

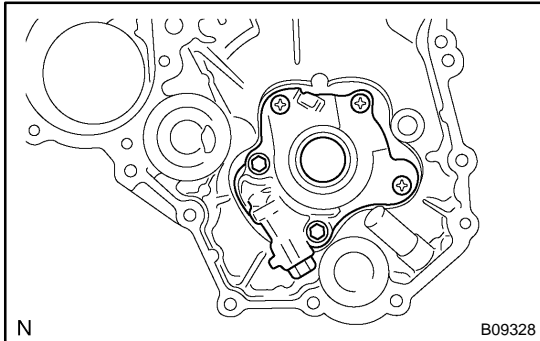
**14 N·m (143 kgf·cm, 10 ft·lbf) for bolt B**

**5.5 N·m (56 kgf·cm, 49 in·lbf) for nut**



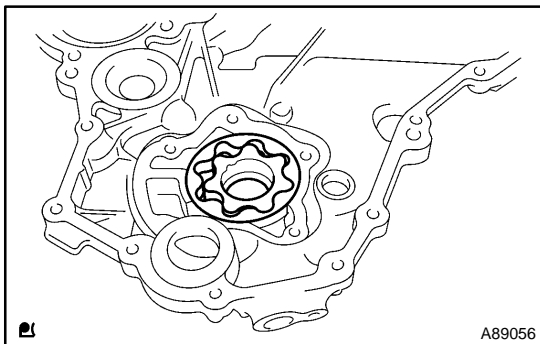
44. **INSTALL RESERVOIR BRACKET**  
Torque: 8.5 N·m (87 kgf·cm, 75 in·lbf)
45. **INSTALL BRAKE MASTER CYLINDER RESERVOIR SUB-ASSY**  
Torque: 8.5 N·m (87 kgf·cm, 75 in·lbf)
46. **INSTALL AIR CLEANER INLET NO.2**
47. **INSTALL AIR CLEANER ASSY**  
Torque:  
7.0 N·m (71 kgf·cm, 62 in·lbf) for Bolt  
3.0 N·m (31 kgf·cm, 27 in·lbf) for Clamp
48. **INSTALL COWL TOP PANEL SUB-ASSY OUTER FRONT (See page 11-15)**
49. **INSTALL WINDSHIELD WIPER LINK ASSY (See page 66-14)**
50. **ADD ENGINE OIL (See page 17-21)**
51. **CONNECT BATTERY NEGATIVE TERMINAL**  
Torque: 6.0 N·m (61 kgf·cm, 53 in·lbf)
52. **INSTALL REAR FLOOR BOARD NO.3**
53. **INSTALL DECK FLOOR BOX REAR**
54. **INSTALL REAR FLOOR BOARD NO.2**
55. **ADD ENGINE COOLANT (See page 16-11)**
56. **CHECK FOR ENGINE COOLANT LEAKS (See page 16-2)**
57. **INSPECT ENGINE OIL LEAKS**
58. **INSTALL RADIATOR SUPPORT OPENING COVER**
59. **INSTALL ENGINE UNDER COVER RH**
60. **INSTALL ENGINE UNDER COVER LH**
61. **INSTALL FRONT WHEEL RH**  
Torque: 103 N·m (1050 kgf·cm, 76 ft·lbf)
62. **POWER WINDOW CONTROL SYSTEM INITIALIZE (See page 01-28)**

## OVERHAUL



### 1. REMOVE OIL PUMP ROTOR SET

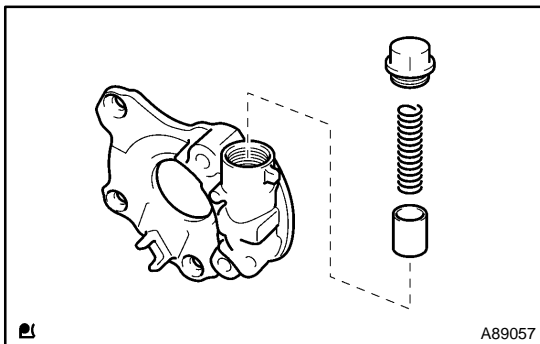
- (a) Remove the 2 bolts and 3 screws, then remove the oil pump cover.



- (b) Remove the oil pump rotor set from the oil pump body.

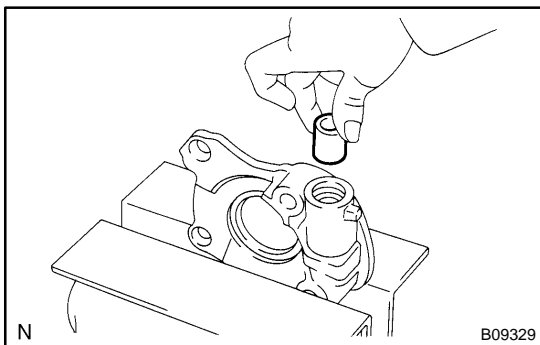
#### NOTICE:

Keep the 2 removed rotors without changing the arrangement or turning them over.



### 2. REMOVE OIL PUMP RELIEF VALVE

- (a) Remove the oil pump relief valve plug, then remove the oil pump relief valve spring and oil pump relief valve.

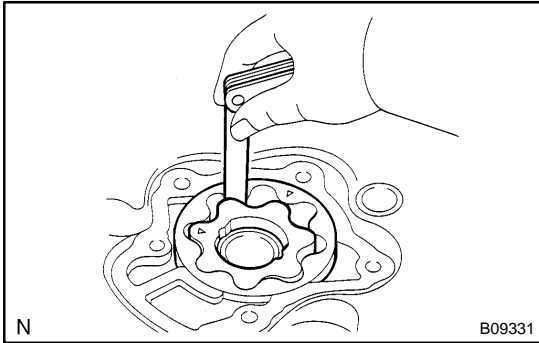


### 3. INSPECT OIL PUMP RELIEF VALVE

- (a) Apply engine oil to the oil pump relief valve. Check that the valve falls smoothly into the valve hole of the oil pump body by its own weight.

**4. INSPECT OIL PUMP ASSY**

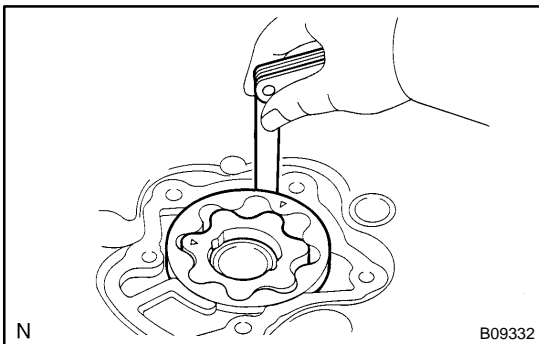
- (a) Check the operation.
  - (1) Apply engine oil to the drive and driven rotors. Install the rotors to the oil pump body, then check that the rotors revolve smoothly.



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

**Standard tip clearance:**  
**0.060 to 0.180 mm (0.0024 to 0.0071 in.)**  
**Maximum tip clearance: 0.28 mm (0.0110 in.)**

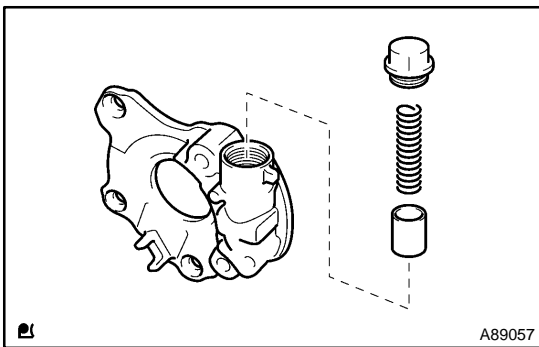
If the tip clearance is greater than maximum, replace the oil pump assembly.



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

**Standard body clearance:**  
**0.250 to 0.325 mm (0.0098 to 0.0128 in.)**  
**Maximum body clearance: 0.425 mm (0.0167 in.)**

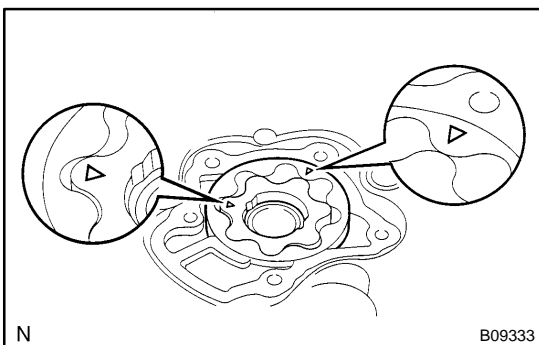
If the body clearance is greater than maximum, replace the oil pump assembly.



**5. INSTALL OIL PUMP RELIEF VALVE**

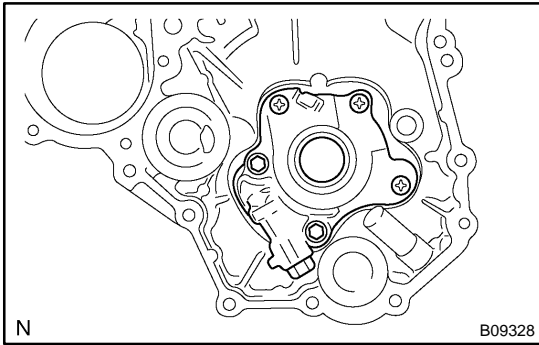
- (a) Apply engine oil to the oil pump relief valve.
- (b) Install the oil pump relief valve and oil pump relief valve spring to the oil pump cover.
- (c) Install the oil pump relief valve plug.

**Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)**



**6. INSTALL OIL PUMP ROTOR SET**

- (a) Apply engine oil to the drive and driven rotors.
- (b) Install the rotors to the the oil pump body with the marks facing upward.



- (c) Install the oil pump cover with the 2 bolts and 3 screws.

**Torque:**

**8.8 N·m (90 kgf·cm, 78 in·lbf) for bolt**

**10 N·m (102 kgf·cm, 7.4 ft·lbf) for screw**

# OIL FILTER SUB-ASSY (1NZ-FXE)

170JE-01

## REPLACEMENT

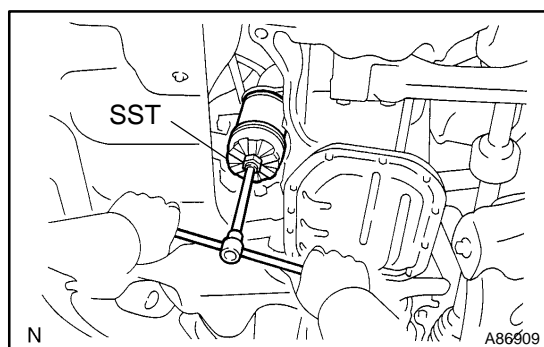
### CAUTION:

- Prolonged and repeated contact with engine oil will cause 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. Wear protective clothing and gloves. Wash your skin thoroughly with soap and water, or use a water-less hand cleaner to remove any used engine oil. Do not use gasoline, thinners or solvents.
- For environmental protection, used oil and used oil filter must be disposed of at designated disposal sites.

### 1. DRAIN ENGINE OIL

- Remove the oil filler cap.
- Remove the oil drain plug, then drain the oil into a container.
- Clean and install the oil drain plug with a new gasket.

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

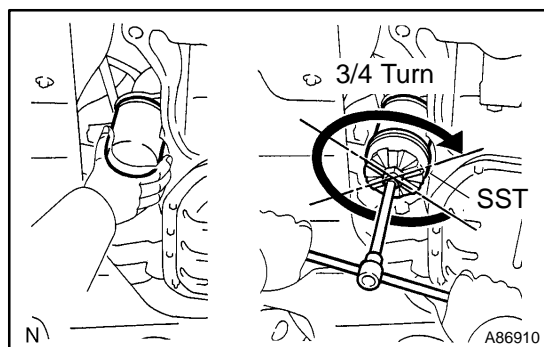


### 2. REMOVE OIL FILTER SUB-ASSY

- 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, retighten it by a 3/4 turn.  
SST 09228-06501

**Torque: 17.5 N·m (178 kgf·cm, 13 ft·lbf)**

### 4. ADD ENGINE OIL

- Fill with fresh engine oil.

#### Capacity:

**Drain and refill with oil filter replacement 3.7 liters (3.9 US qts, 3.3 Imp. qts)**

**Drain and refill without oil filter replacement 3.4 liters (3.6 US qts, 3.0 Imp. qts)**

**Dry fill 4.1 liters (4.3 US qts, 3.6 Imp. qts)**

- Install the oil filler cap.

### 5. INSPECT ENGINE OIL (See page 17-1)