

LUBRICATION SYSTEM

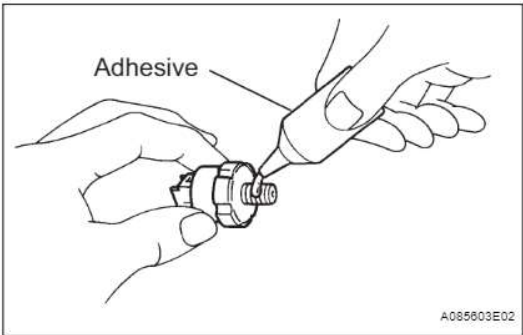
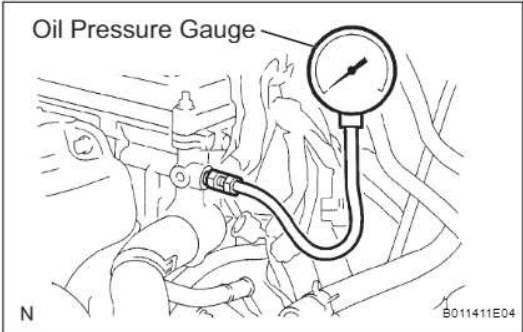
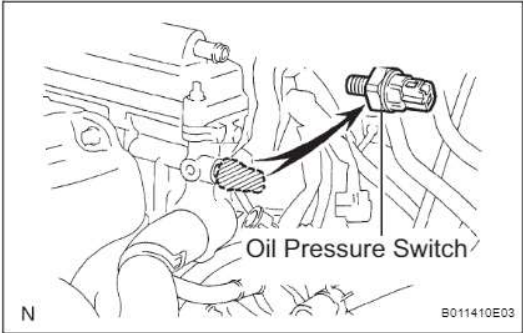
ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL
- (a) Warm up the engine, stop the engine and wait for 5 minutes.

(b) Check that the engine oil level is between the L and F marks of the oil dipstick.
If low, check for leakage and add oil up to the F mark.

NOTICE:
Do not fill with engine oil above the F mark.
2. CHECK OIL PRESSURE
- (a) Disconnect the oil pressure switch connector.

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



- (c) Install the oil pressure gauge.
- (d) Start and warm up the engine.
- (e) Check the oil pressure. If the oil pressure is not specified, check the oil pump (See page [LU-12](#))
- Oil pressure**

Condition	Specified Condition
When idling	29 kPa (0.3 kgf/cm ² , 4.3 psi) or more
At 3,000 rpm	245 to 539 kPa (2.5 to 5.5 kgf/cm ² , 36 to 78 psi)

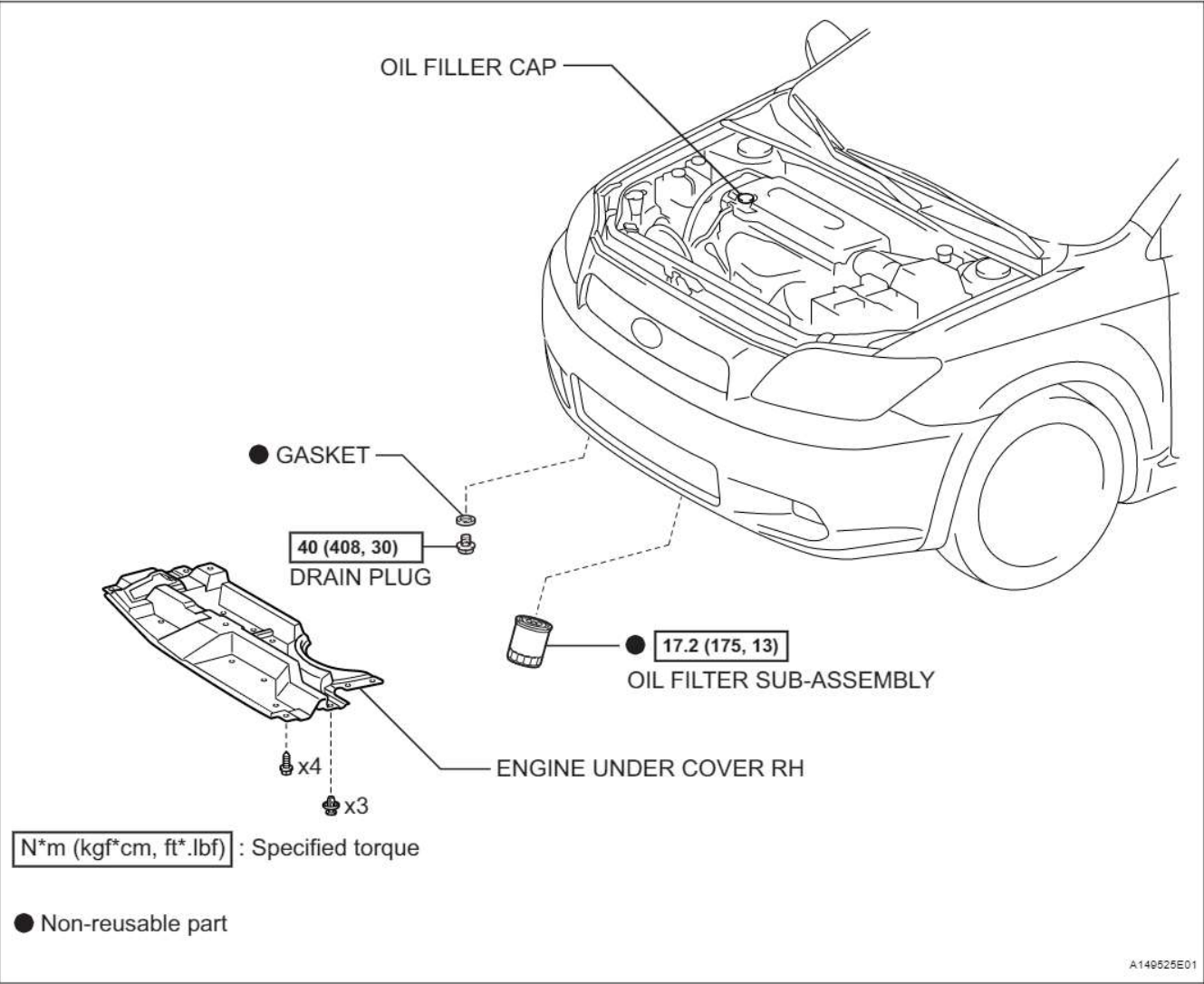
- (f) Apply adhesive to 2 or 3 threads of the oil pressure switch.
- Adhesive:**
Toyota Genuine Adhesive 1334, Three Bond 1344 or equivalent
- (g) Using a 24 mm deep socket wrench, install the oil pressure switch.
- Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)**
- NOTICE:**
Do not start the engine within 1 hour of installation.
- (h) Connect the oil pressure switch connector.

(i) Check for engine oil leakage.

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2AZ-FE LUBRICATION – OIL AND OIL FILTER

OIL AND OIL FILTER
COMPONENTS



REPLACEMENT

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 sites.

1. REMOVE ENGINE UNDER COVER RH

2. DRAIN ENGINE OIL

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

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

3. REMOVE OIL FILTER SUB-ASSEMBLY

- Using SST, remove the oil filter.

SST 09228-06501

4. INSTALL OIL FILTER SUB-ASSEMBLY

- 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 by hand. Tighten it until the gasket contacts the seat.
- Using SST, tighten the oil filter.

SST 09228-06501

- Depending on the work space available, choose from the following.
 - If enough space is available, use a torque wrench to tighten the oil filter.

Torque: 17.2 N*m (175 kgf*cm, 13 ft.*lbf)

- If enough space is not available to use a torque wrench, tighten the oil filter a 3/4 turn by hand or use a common wrench.

5. ADD ENGINE OIL

- Add clean engine oil and install the oil filler cap.

Engine oil:

Oil grade	Oil Viscosity (SAE)
ILSAC multigrade engine oil	0W-20 5W-20 (0W-20 is best choice for fuel economy and good starting in cold weather.)

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2AZ-FE LUBRICATION – OIL AND OIL FILTER

Engine oil capacity:

Item	Capacity
Drain and refill with oil filter change	3.8 liters (4.0 US qts, 3.3 Imp. qts)
Drain and refill without 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)

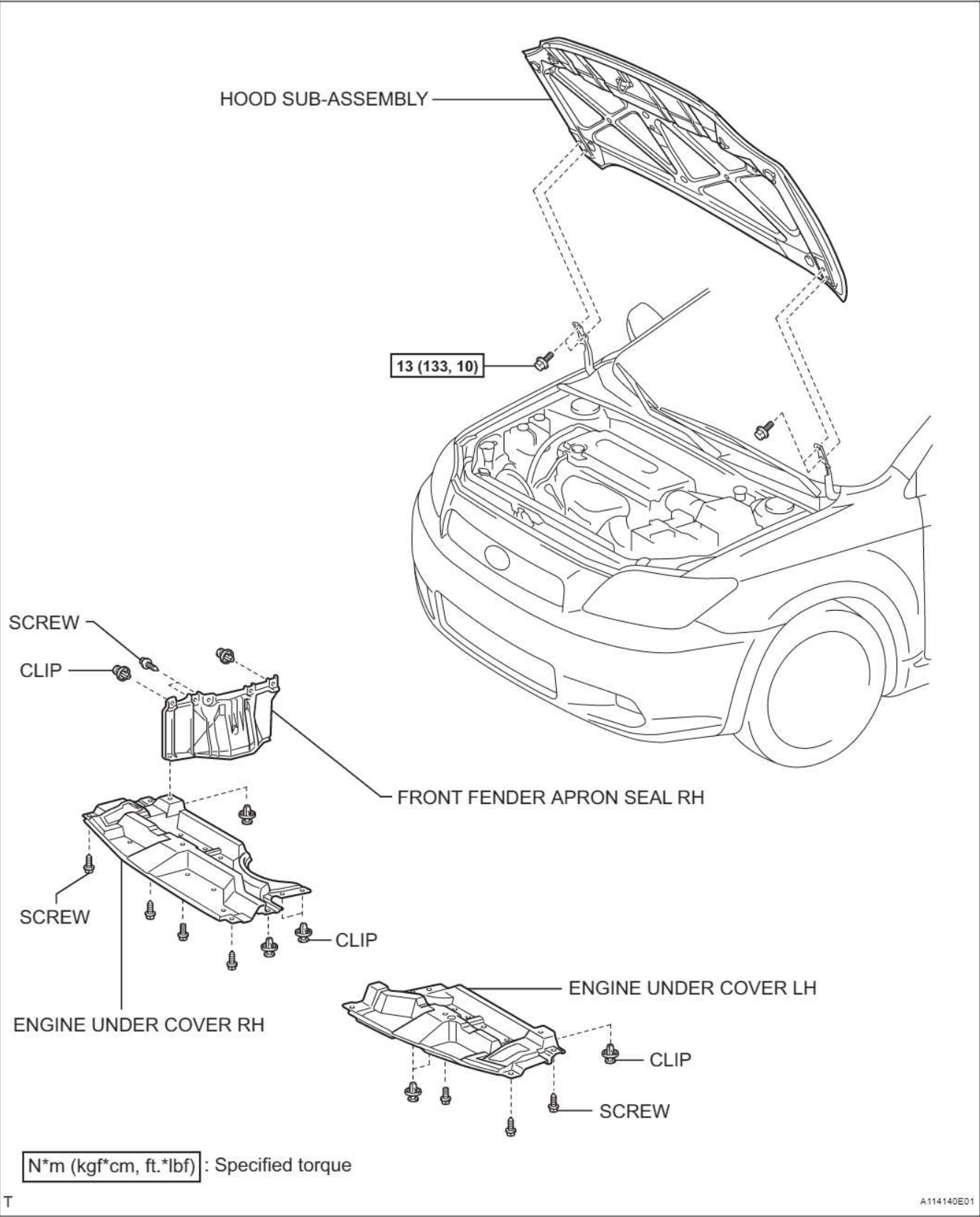
- 6. **CHECK FOR ENGINE OIL LEAKS**
(a) Warm up the engine and check for engine oil leaks.
- 7. **INSTALL ENGINE UNDER COVER RH**

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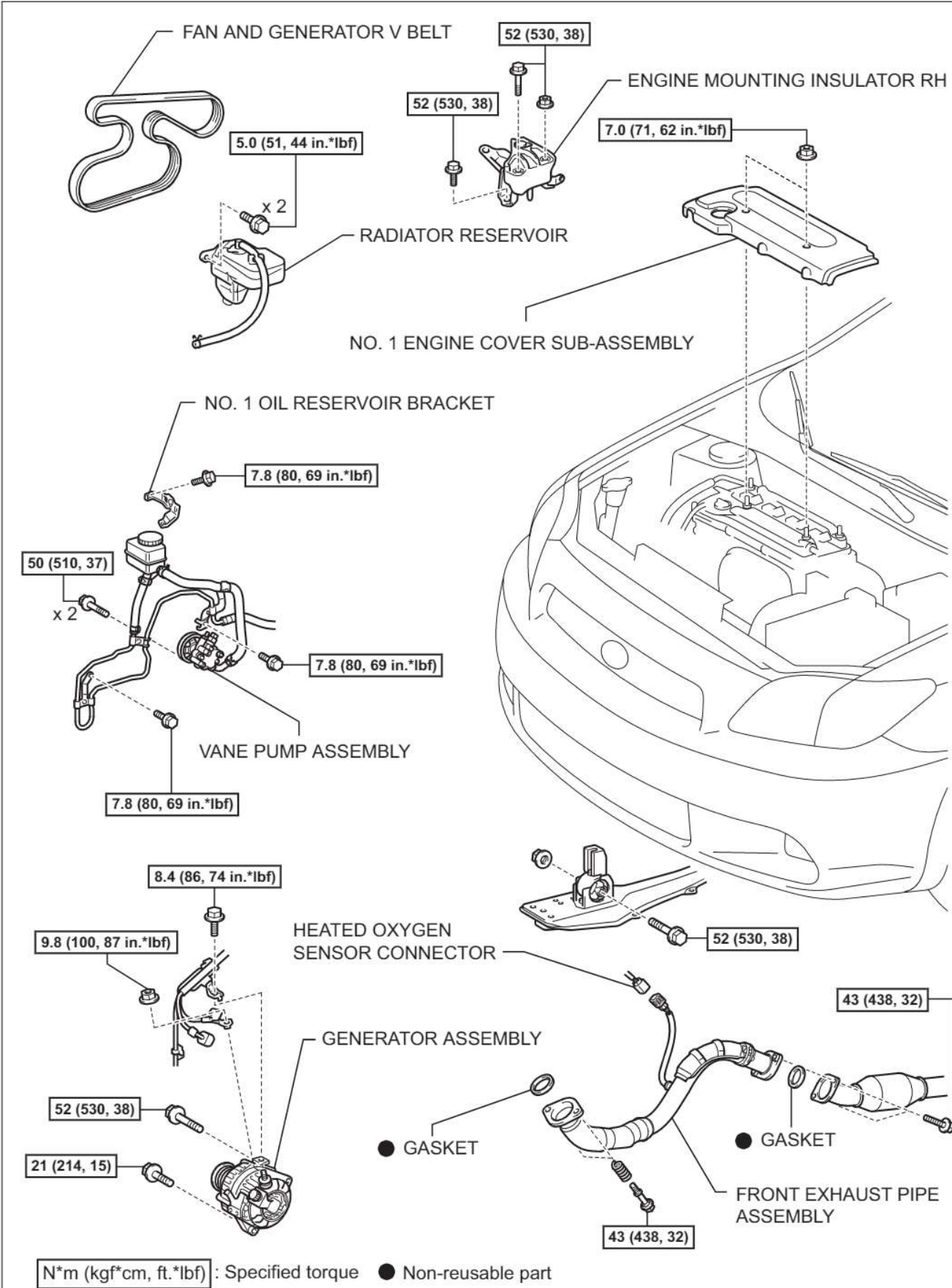
2AZ-FE LUBRICATION – OIL PUMP

OIL PUMP
COMPONENTS



2AZ-FE LUBRICATION – OIL PUMP

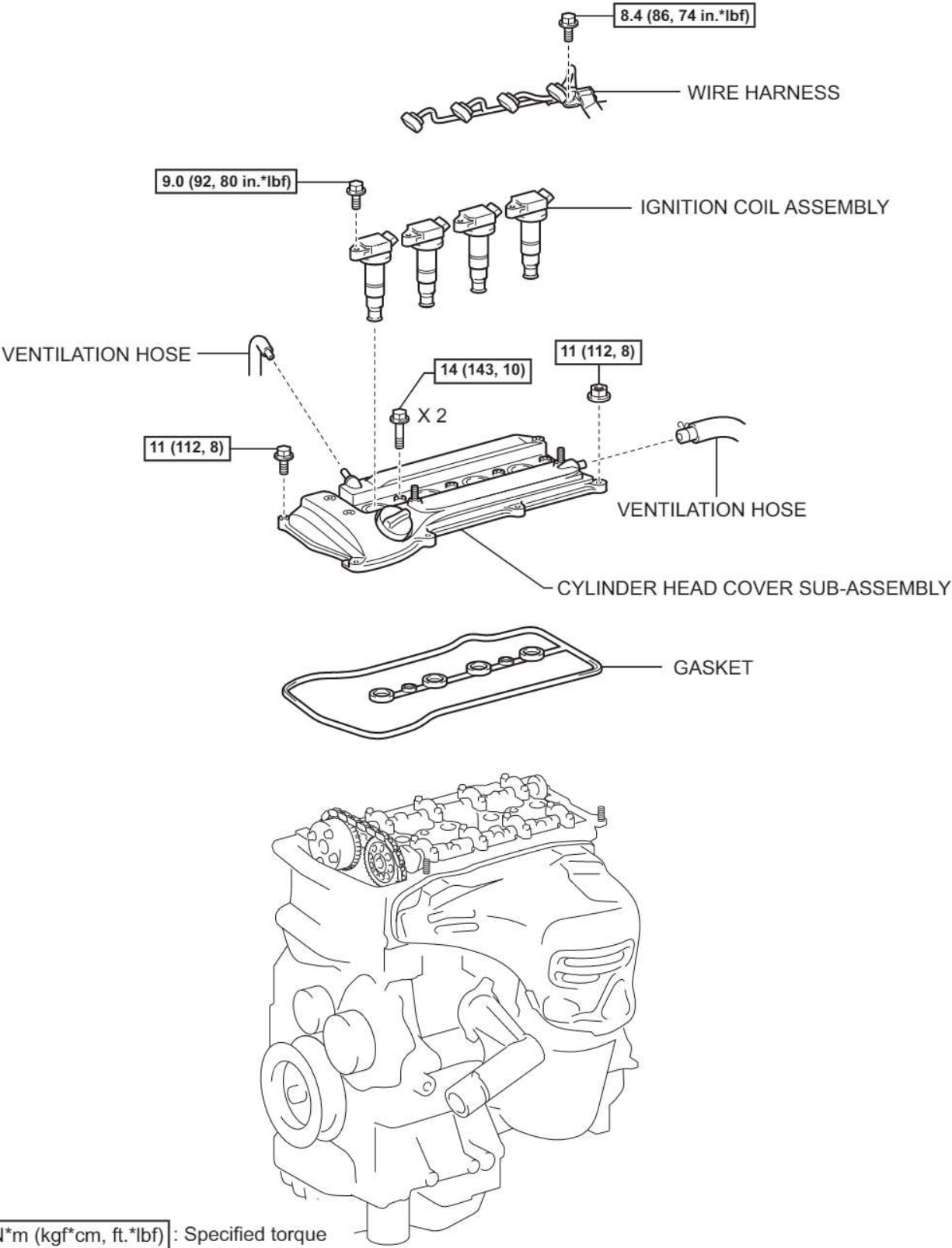
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2AZ-FE LUBRICATION – OIL PUMP

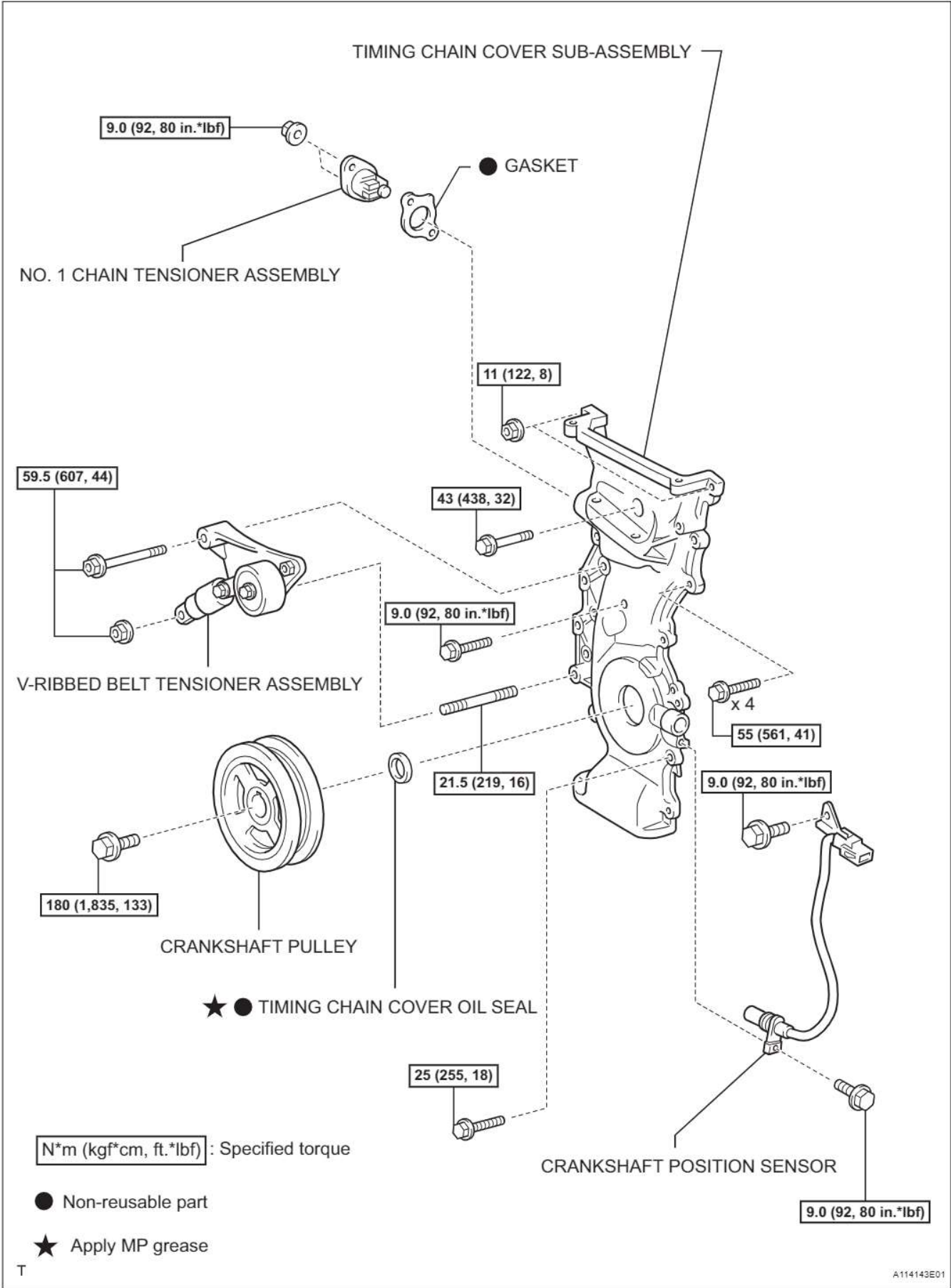


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2AZ-FE LUBRICATION – OIL PUMP

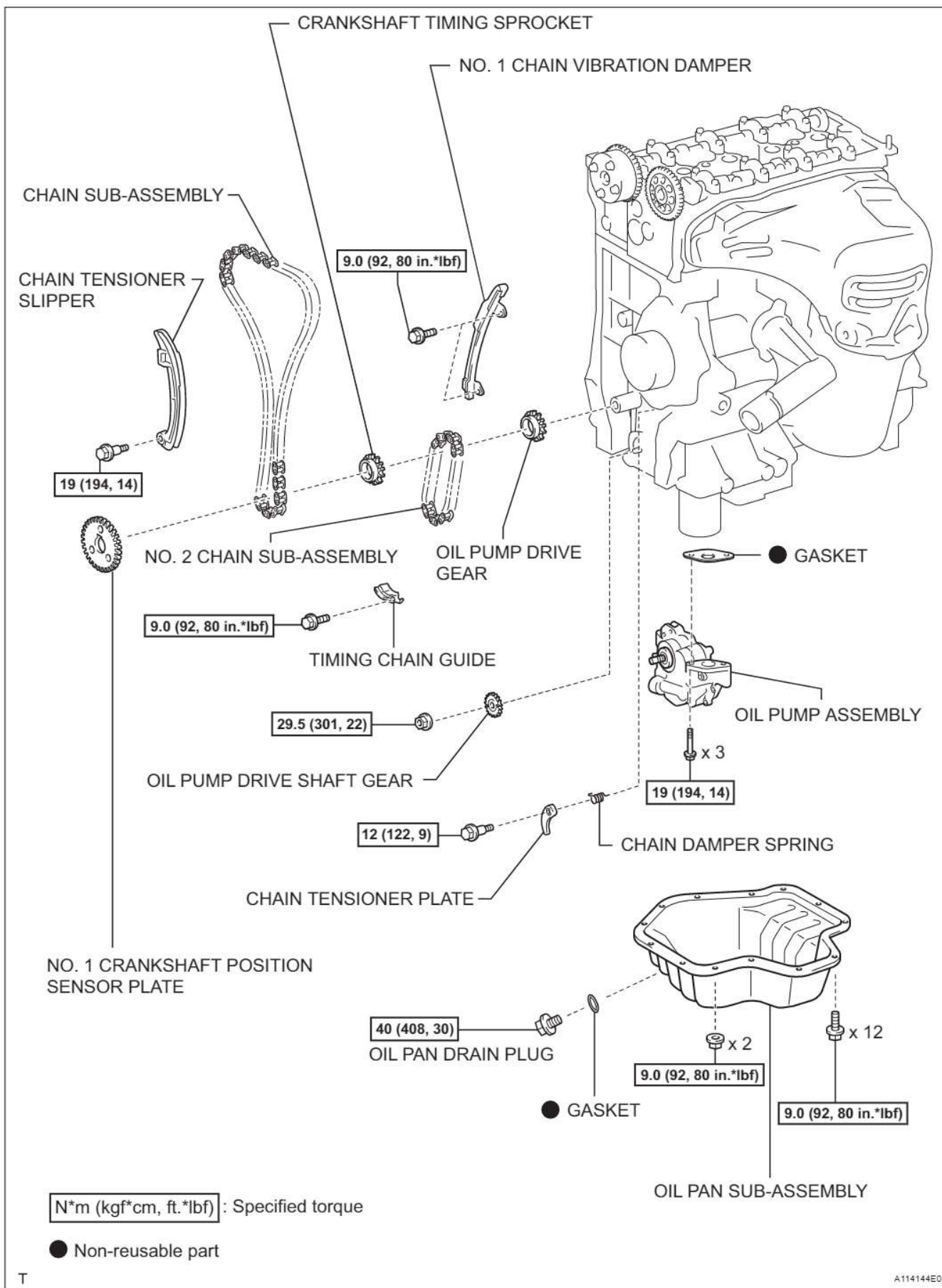
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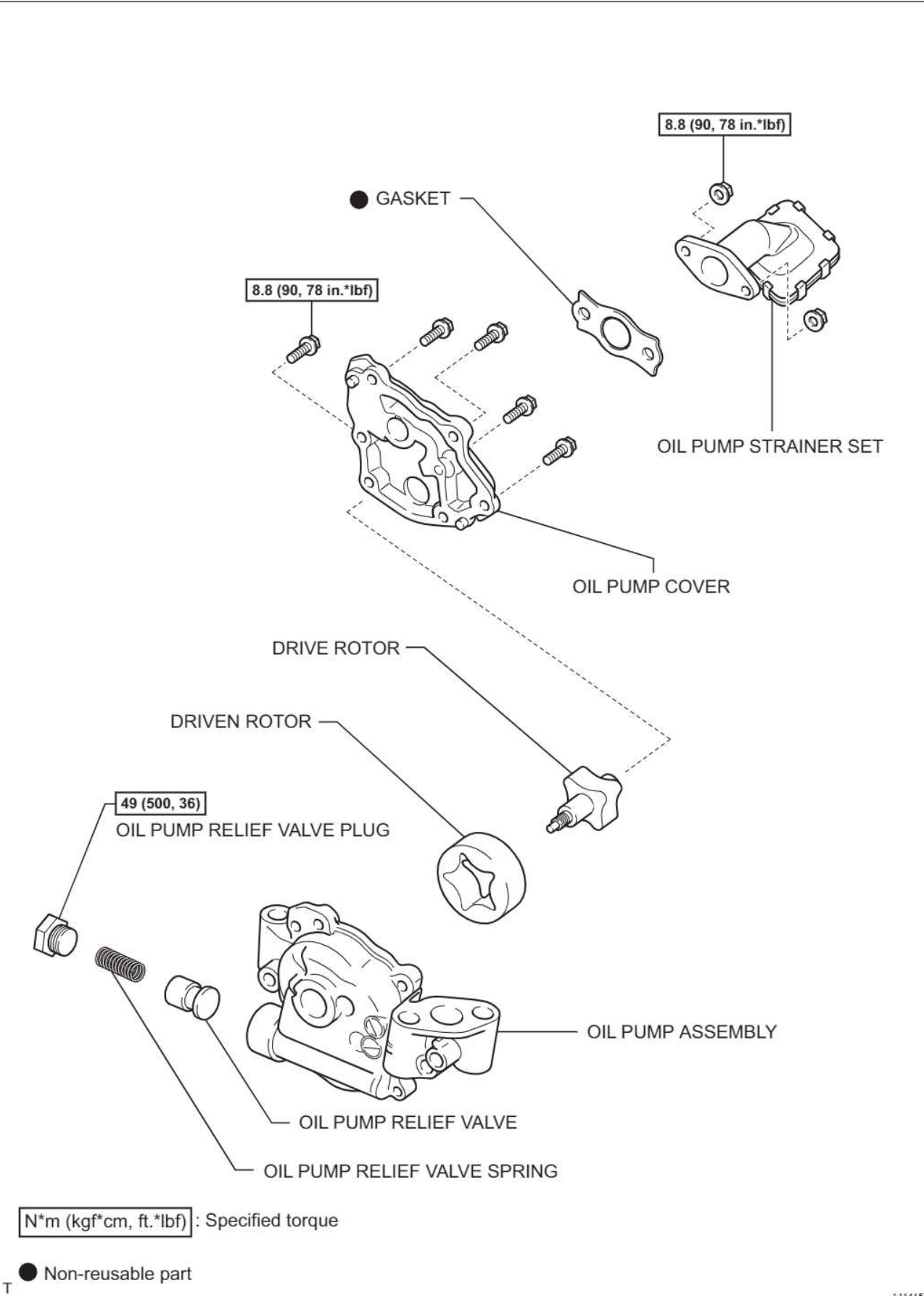
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2AZ-FE LUBRICATION – OIL PUMP



2AZ-FE LUBRICATION – OIL PUMP

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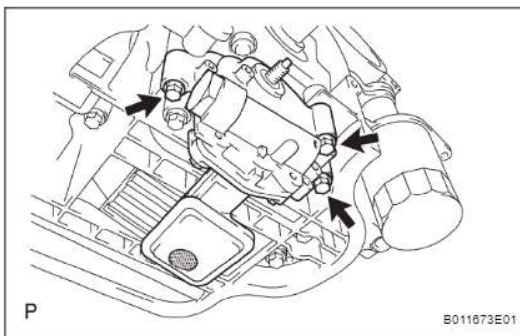
REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL
CAUTION:
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to prevent airbag and seat belt pretensioner activation.
2. REMOVE HOOD SUB-ASSEMBLY
3. REMOVE FRONT WHEEL RH
4. REMOVE ENGINE UNDER COVER RH
5. REMOVE ENGINE UNDER COVER LH
6. REMOVE FRONT FENDER APRON SEAL RH
7. REMOVE NO. 1 ENGINE COVER SUB-ASSEMBLY
8. DRAIN ENGINE OIL (See page [LU-3](#))
9. REMOVE FRONT EXHAUST PIPE ASSEMBLY (See page [EX-2](#))
10. REMOVE FAN AND GENERATOR V BELT (See page [EM-6](#))
11. REMOVE GENERATOR ASSEMBLY (See page [CH-10](#))
12. DISCONNECT VANE PUMP ASSEMBLY
13. REMOVE ENGINE MOUNTING INSULATOR RH (See page [EM-22](#))
14. REMOVE IGNITION COIL ASSEMBLY (See page [IG-9](#))
15. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY (See page [EM-24](#))
16. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page [EM-25](#))
17. REMOVE CRANKSHAFT POSITION SENSOR (See page [ES-375](#))
18. REMOVE OIL PAN SUB-ASSEMBLY (See page [EM-25](#))
19. SET NO. 1 CYLINDER TO TDC/COMPRESSION (See page [EM-26](#))
20. REMOVE CRANKSHAFT PULLEY (See page [EM-26](#))
21. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY (See page [EM-27](#))
22. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY (See page [EM-27](#))
23. REPLACE TIMING CHAIN COVER OIL SEAL (See page [EM-130](#))
24. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE
25. REMOVE TIMING CHAIN GUIDE (See page [EM-28](#))

2AZ-FE LUBRICATION – OIL PUMP

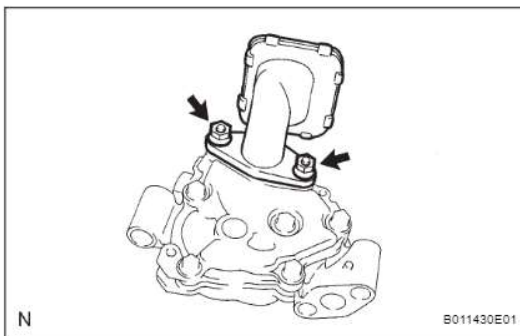
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26. REMOVE CHAIN TENSIONER SLIPPER (See page [EM-28](#))
27. REMOVE CHAIN SUB-ASSEMBLY
28. REMOVE NO. 1 CHAIN VIBRATION DAMPER (See page [EM-28](#))
29. REMOVE CRANKSHAFT TIMING SPROCKET
30. REMOVE NO. 2 CHAIN SUB-ASSEMBLY (See page [EM-28](#))
31. REMOVE OIL PUMP DRIVE GEAR
32. REMOVE OIL PUMP ASSEMBLY
 - (a) Remove the 3 bolts, oil pump and gasket.

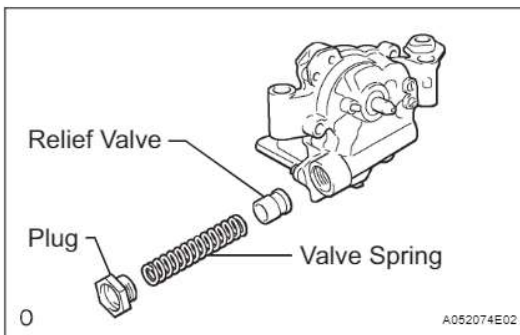


DISASSEMBLY

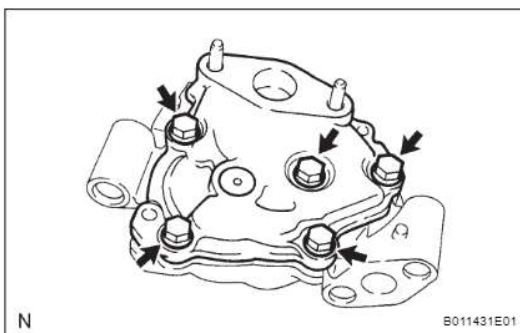
1. REMOVE OIL PUMP STRAINER SET
 - (a) Remove the 2 nuts, oil pump strainer and gasket.



2. REMOVE OIL PUMP RELIEF VALVE
 - (a) Using a 27 mm socket wrench, remove the plug.
 - (b) Remove the valve spring and relief valve.

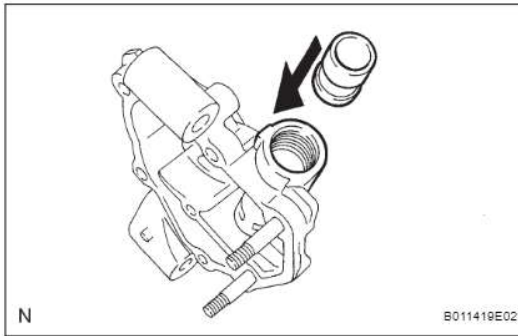


3. REMOVE OIL PUMP COVER
 - (a) Remove the 5 bolts and oil pump cover.



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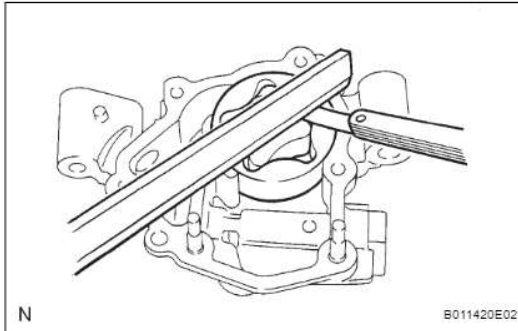
2AZ-FE LUBRICATION – OIL PUMP



INSPECTION

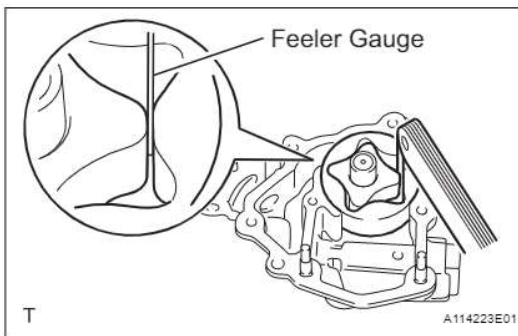
1. INSPECT OIL PUMP RELIEF VALVE

- (a) Check the relief valve.
- (1) Coat the valve with engine oil, and then 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 assembly.

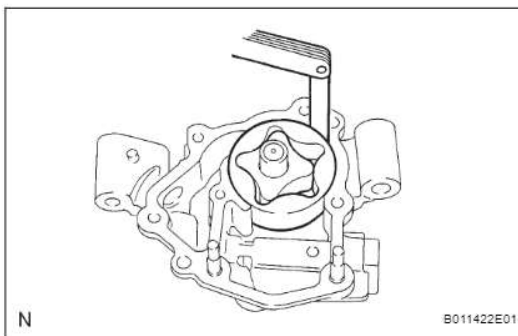


2. INSPECT OIL PUMP ROTOR

- (a) Check the side clearance.
- (1) Using a feeler gauge and precision straightedge, measure the clearance between the rotors and precision straightedge.
Standard clearance:
0.100 to 0.170 mm (0.0039 to 0.0067 in.)
Maximum clearance:
0.325 mm (0.0128 in.)
If the side clearance is greater than the maximum, replace the oil pump assembly.



- (b) Check the tip clearance.
- (1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.
Standard clearance:
0.080 to 0.160 mm (0.0031 to 0.0063 in.)
Maximum clearance:
0.35 mm (0.0138 in.)
If the tip clearance is greater than the maximum, replace the oil pump assembly.



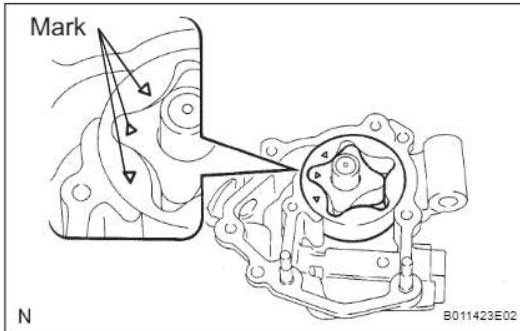
- (c) Check the body clearance.
- (1) Using a feeler gauge, measure the clearance between the driven rotor and pump body.
Standard clearance:
0.100 to 0.170 mm (0.0039 to 0.0067 in.)
Maximum clearance:
0.325 mm (0.0128 in.)
If the body clearance is greater than the maximum, replace the oil pump assembly.

2AZ-FE LUBRICATION – OIL PUMP

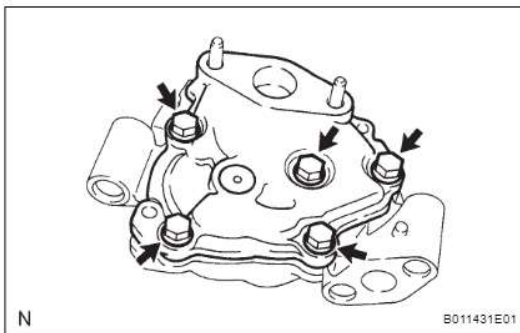
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REASSEMBLY**1. INSTALL OIL PUMP ROTOR**

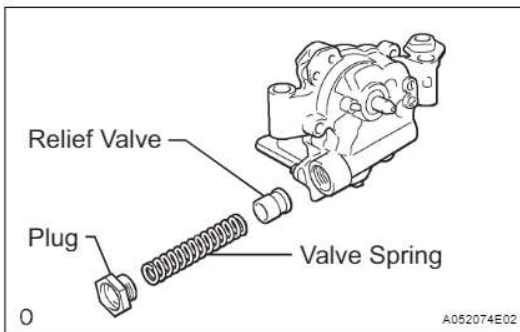
- (a) Remove the oil pump rotor.
- (b) Coat the drive rotor and driven rotor with engine oil.
- (c) Place the drive and driven rotors into the oil pump with the marks facing the pump cover side.

**2. INSTALL OIL PUMP COVER**

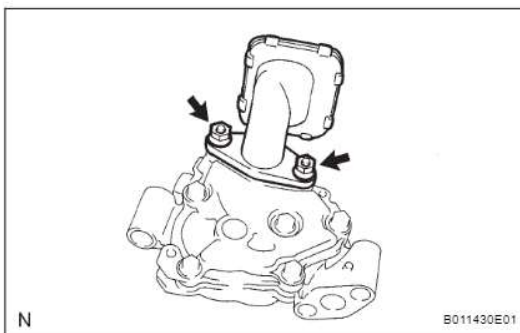
- (a) Install the oil pump cover with the 5 bolts.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

**3. 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 27 mm socket wrench, install the plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)

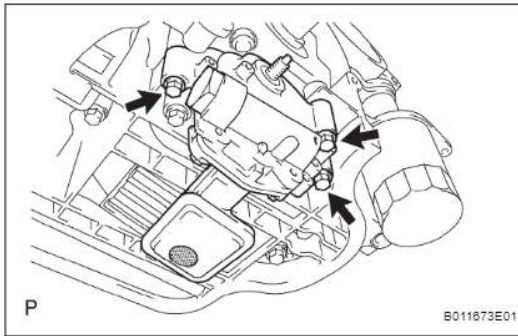
**4. INSTALL OIL PUMP STRAINER SET**

- (a) Install a new gasket and the oil strainer with the 2 nuts.
Torque: 8.8 N*m (90 kgf*cm, 78 in.*lbf)

**LU**

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2AZ-FE LUBRICATION – OIL PUMP



INSTALLATION

1. **INSTALL OIL PUMP ASSEMBLY**
 - (a) Install a new gasket and the oil pump with the 3 bolts.
Torque: 19 N*m (194 kgf*cm, 14 ft.*lbf)
2. **INSTALL OIL PUMP DRIVE GEAR**
3. **INSTALL NO. 2 CHAIN SUB-ASSEMBLY** (See page [EM-31](#))
4. **INSTALL CRANKSHAFT TIMING SPROCKET**
5. **INSTALL NO. 1 CHAIN VIBRATION DAMPER** (See page [EM-32](#))
6. **INSTALL CHAIN SUB-ASSEMBLY** (See page [EM-32](#))
7. **INSTALL CHAIN TENSIONER SLIPPER** (See page [EM-33](#))
8. **INSTALL TIMING CHAIN GUIDE** (See page [EM-33](#))
9. **INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE** (See page [EM-34](#))
10. **INSTALL TIMING CHAIN COVER OIL SEAL** (See page [EM-130](#))
11. **INSTALL TIMING CHAIN COVER SUB-ASSEMBLY** (See page [EM-34](#))
12. **INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY** (See page [EM-36](#))
13. **INSTALL CRANKSHAFT PULLEY** (See page [EM-37](#))
14. **INSTALL CAMSHAFT TIMING GEAR ASSEMBLY** (See page [EM-77](#))
15. **INSTALL OIL PAN SUB-ASSEMBLY** (See page [EM-38](#))
16. **INSTALL CRANKSHAFT POSITION SENSOR** (See page [ES-375](#))
17. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY** (See page [EM-39](#))
18. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY** (See page [EM-39](#))
19. **INSTALL IGNITION COIL ASSEMBLY** (See page [IG-9](#))
20. **INSTALL ENGINE MOUNTING INSULATOR RH** (See page [EM-40](#))
21. **INSTALL VANE PUMP ASSEMBLY**
22. **INSTALL GENERATOR ASSEMBLY** (See page [CH-17](#))
23. **INSTALL FAN AND GENERATOR V BELT** (See page [EM-6](#))
24. **INSTALL EXHAUST PIPE ASSEMBLY** (See page [EX-3](#))
25. **ADD ENGINE OIL** (See page [LU-3](#))

26. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL
27. CHECK FOR ENGINE OIL LEAKS
28. INSTALL NO. 1 ENGINE COVER SUB-ASSEMBLY
(See page [EM-42](#))
29. INSTALL FRONT FENDER APRON SEAL RH (See page [CH-18](#))
30. INSTALL ENGINE UNDER COVER LH
31. INSTALL ENGINE UNDER COVER RH
32. INSTALL FRONT WHEEL RH (See page [BR-29](#))
33. INSTALL HOOD SUB-ASSEMBLY (See page [ED-1](#))
34. PERFORM INITIALIZATION
Perform initialization (see page [IN-23](#)).
NOTICE:
Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.