

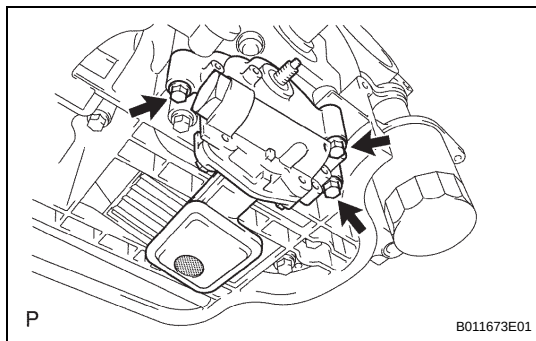
REMOVAL

1. REMOVE CHAIN SUB-ASSEMBLY

- (a) Remove the chain (see page [EM-22](#)).

2. REMOVE OIL PUMP ASSEMBLY

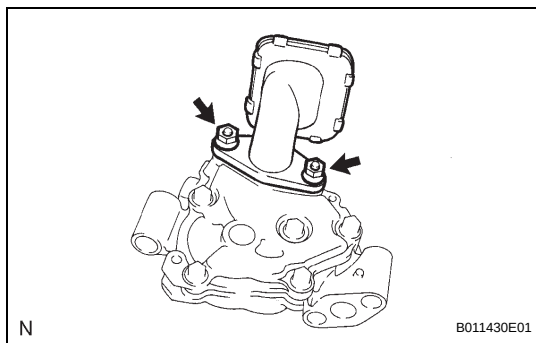
- (a) Remove the 3 bolts, oil pump and gasket.



DISASSEMBLY

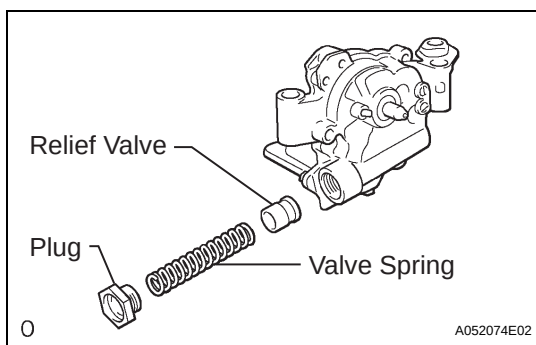
1. REMOVE OIL PUMP STRAINER

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



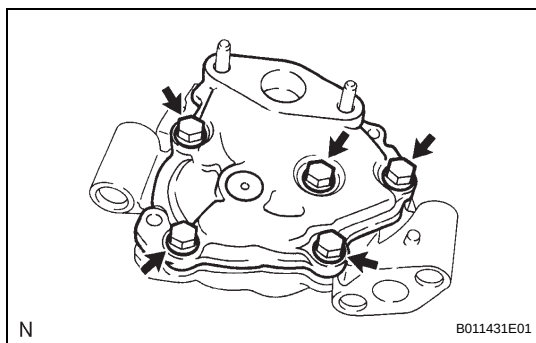
2. REMOVE OIL PUMP RELIEF VALVE

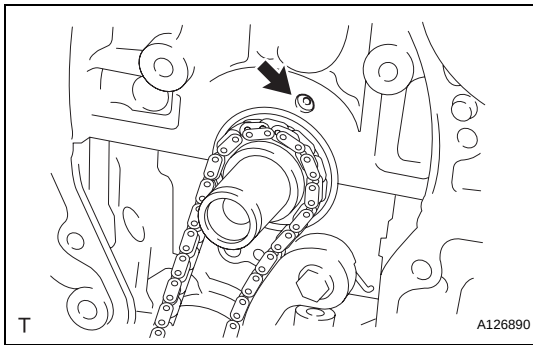
- (a) Using a 27 mm socket wrench, remove the plug.
(b) Remove the valve spring and relief valve.



3. REMOVE OIL PUMP COVER

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

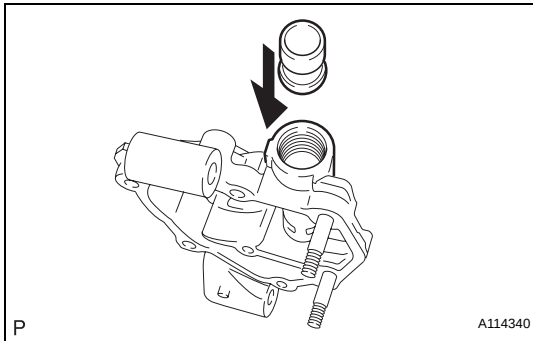




INSPECTION

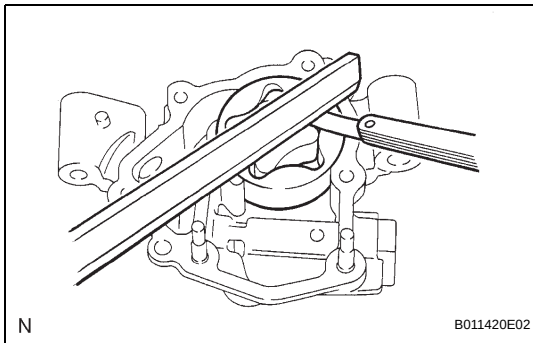
1. INSPECT OIL JET

- (a) Check the oil jet for damage or clogging.
If necessary, repair the cylinder block.



2. 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.



3. 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.

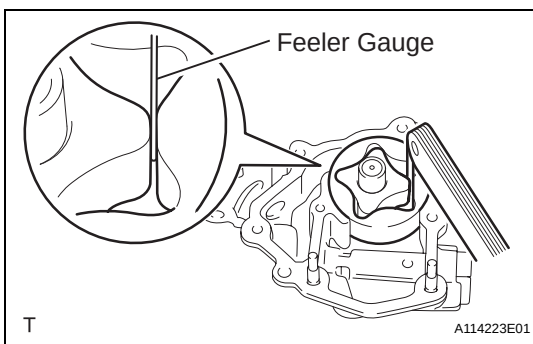
Standard clearance:

0.030 to 0.085 mm (0.0012 to 0.0033 in.)

Maximum clearance:

0.16 mm (0.0063 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.

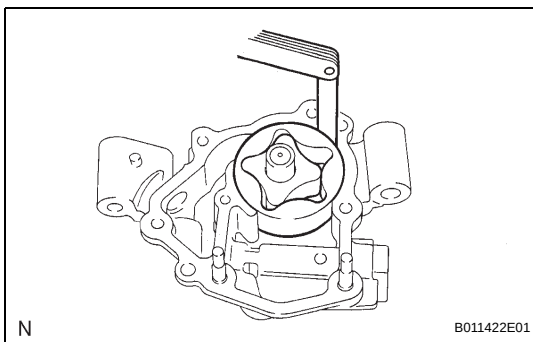
Standard clearance:

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.

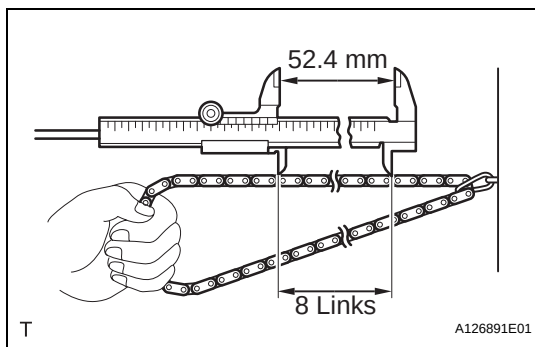
Standard clearance:

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.



4. INSPECT OIL PUMP DRIVE CHAIN AND 2 OIL PUMP SPROCKETS

- (a) Using vernier calipers, measure the length of the 8 links with the chain fully stretched.

Maximum chain elongation:

52.4 mm (2.063 in.)

If the elongation is greater than the maximum, replace the chain.

HINT:

Make the measurements at 3 or more places selected at random.

- (b) Wrap the chain around the oil pump sprocket.

- (c) Using vernier calipers, measure the sprocket diameter with the chain.

NOTICE:

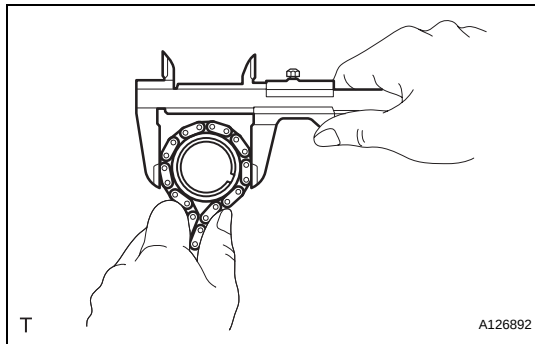
Vernier calipers must contact the chain rollers when measuring.

Minimum sprocket diameter (with chain):

Crankshaft 48.2 mm (1.898 in.)

Oil pump drive shaft 48.2 mm (1.898 in.)

If the diameter is less than the minimum, replace the chain and sprockets.



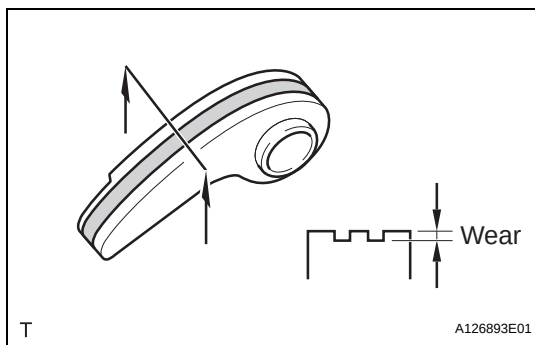
5. INSPECT CHAIN TENSIONER PLATE

- (a) Measure the chain tensioner plate wear.

Maximum wear:

0.5 mm (0.020 in.)

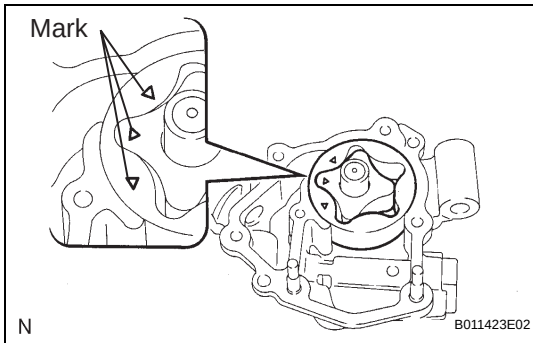
If the wear is greater than the maximum, replace the chain tensioner plate.



REASSEMBLY

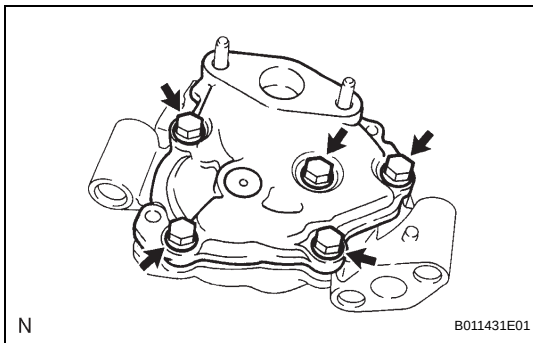
1. INSTALL OIL PUMP ROTOR

- Coat the drive rotor and driven rotor with engine oil.
- Place the drive and driven rotors into the oil pump with the marks facing the pump cover side.



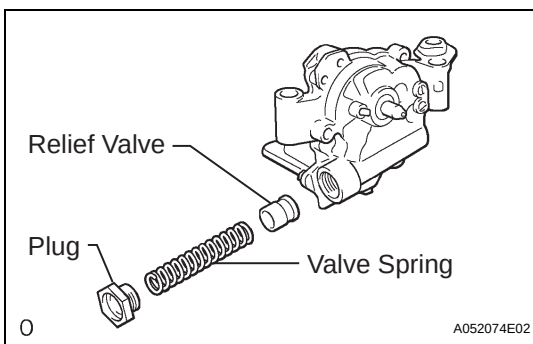
2. INSTALL OIL PUMP COVER

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



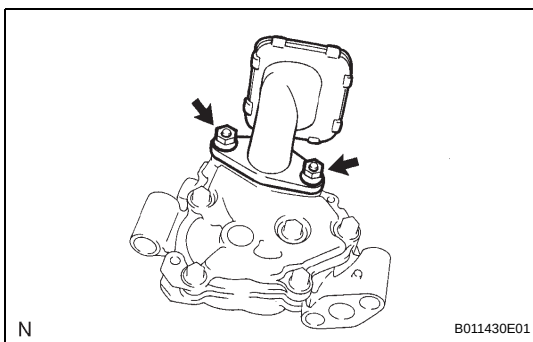
3. INSTALL OIL PUMP RELIEF VALVE

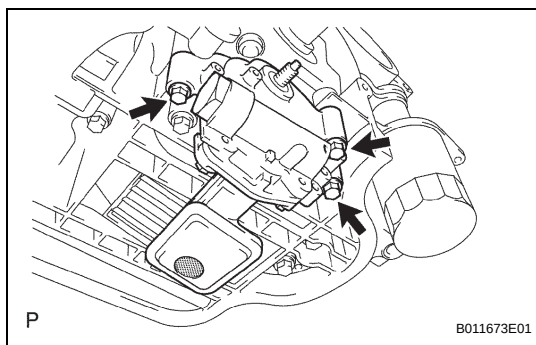
- Coat the relief valve with engine oil.
- Insert the relief valve and spring into the pump body hole.
- Using a 27 mm socket wrench, install the plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



4. INSTALL OIL PUMP STRAINER

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





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 CHAIN SUB-ASSEMBLY

- (a) Install the chain (see page [EM-32](#)).

LUBRICATION SYSTEM

ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

- Warm up the engine, stop the engine and wait for 5 minutes.
- 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:

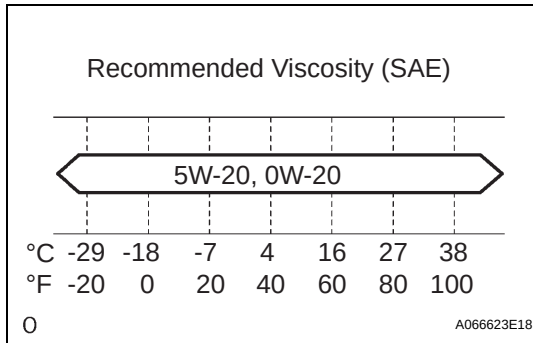
Do not add engine oil above the F mark.

2. CHECK ENGINE OIL QUALITY

- Check the oil for deterioration, water intrusion, discoloration or thinning.
If the quality is visibly poor, replace the oil.

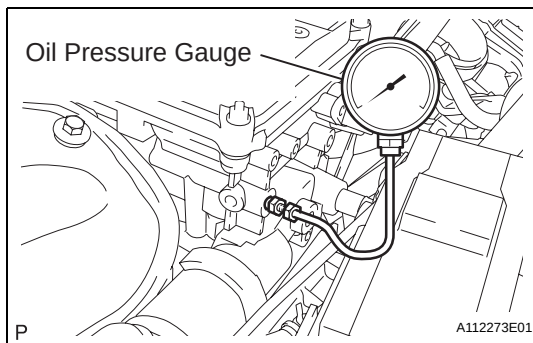
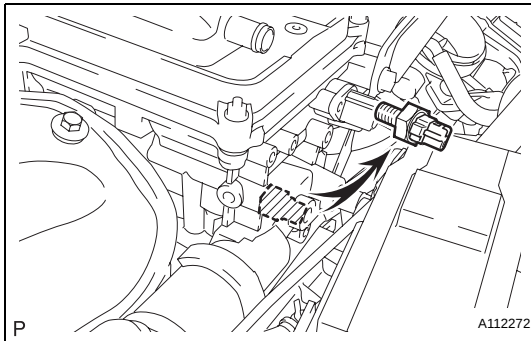
Oil grade:

Use API grade SL "Energy-Conserving" or ILSAC multigrade engine oil. SAE 5W-20 and SAE 0W-20 engine oil may be used. However, SAE 0W-20 is the best choice for good fuel economy and good starting in cold weather.



3. CHECK OIL PRESSURE

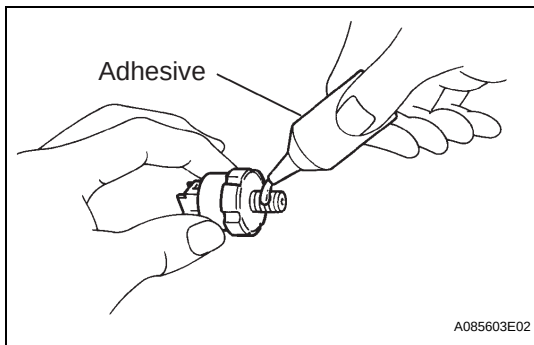
- Disconnect the oil pressure switch connector.
- Using a 24 mm deep socket wrench, remove the oil pressure switch.



- Install the oil pressure gauge.
- Warm up the engine.
- Measure the oil pressure.

Standard oil pressure

Condition	Specified Condition
Idle	29 kPa (0.3 kgf/cm ² , 4.3 psi) or more
3,000 rpm	160 to 539 kPa (1.6 to 5.5 kgf/cm ² , 23 to 78 psi)



- (f) Apply adhesive to 2 or 3 threads of the oil pressure switch.

Adhesive:

TOYOTA Genuine Adhesive 1344, Three Bond 1344 or Equivalent

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

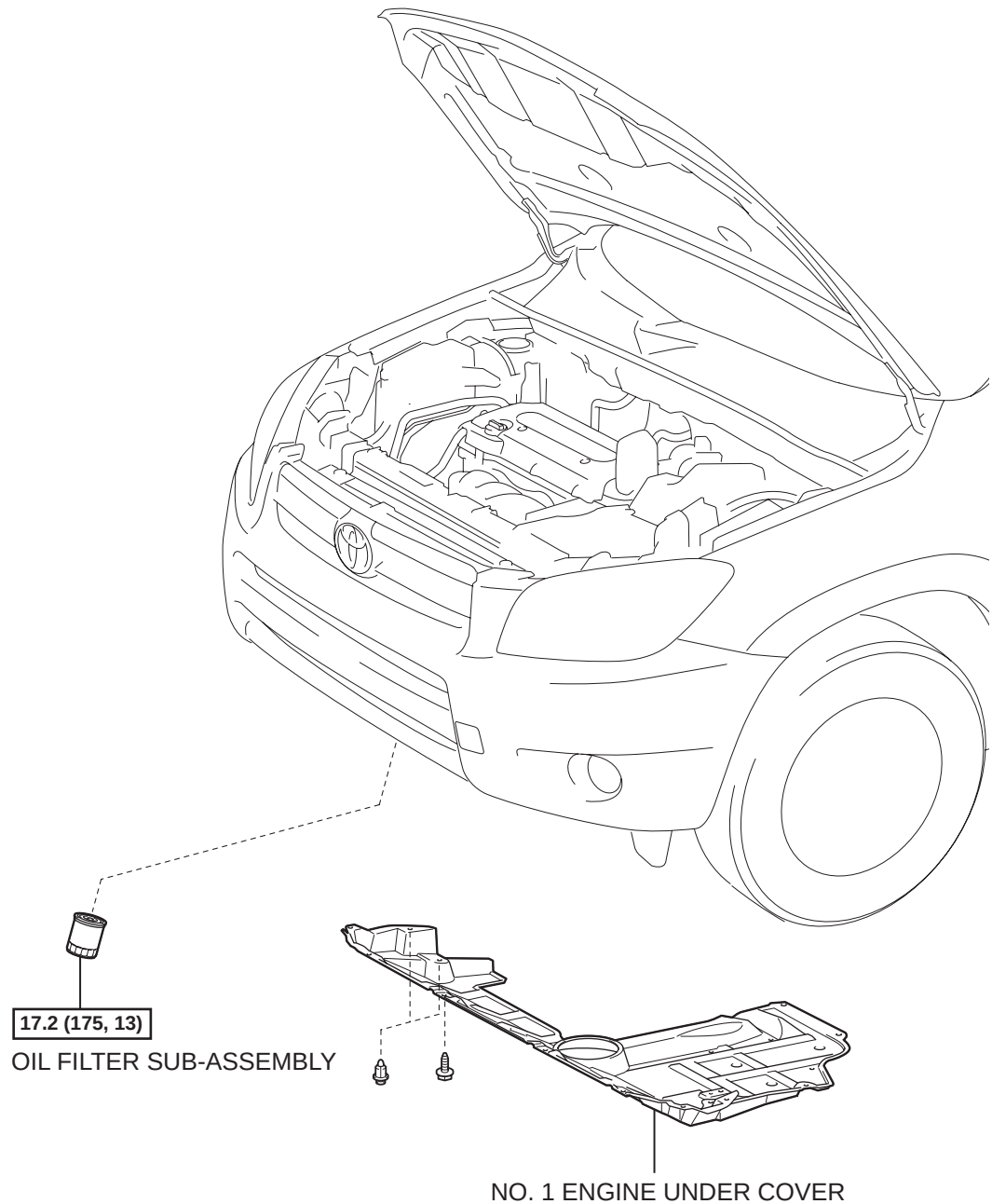
Torque: 15 N*m (153 kgf*cm, 11 ft.*lbf)

NOTICE:

Do not start the engine within 1 hour of installation.

- (h) Connect the oil pressure switch connector.
(i) Check for engine oil leakage.

OIL FILTER COMPONENTS



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

REPLACEMENT

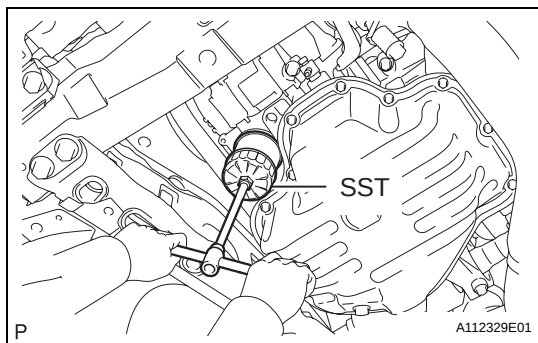
CAUTION:

- Prolonged and repeated contact with engine oil will cause the loss 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 waterless hand cleaner to remove any used engine oil. Do not use gasoline, thinners or solvents.
- For environmental protection, used oil and used oil filters must be disposed of at designated disposal sites.

1. REMOVE NO. 1 ENGINE UNDER COVER

2. DRAIN ENGINE OIL

- (a) Remove the oil filler cap.
- (b) Remove the oil drain plug and drain the oil into a container.



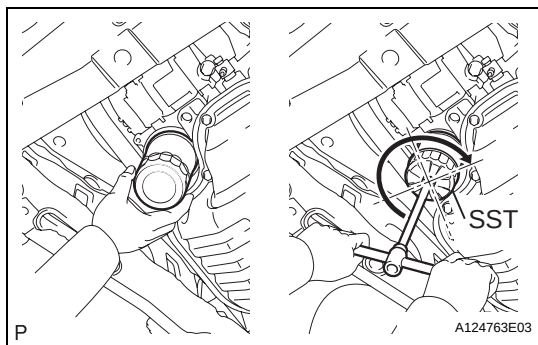
3. REMOVE OIL FILTER SUB-ASSEMBLY

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

SST 09228-06501

4. INSTALL OIL FILTER SUB-ASSEMBLY

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



- (c) Lightly screw the oil filter into place by hand. Tighten it until the gasket contacts the seat.

- (d) Using SST, tighten the oil filter.

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- (1) Depending on the work space available, choose from the following.

1. 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)

2. 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

- (a) Clean and install the oil drain plug with a new gasket.

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

(b) Add new oil.

Standard capacity

Item	Standard Condition
Drain and refill with oil filter change	4.3 liters (4.5 US qts, 3.8 Imp. qts)
Drain and refill without oil filter change	4.1 liters (4.3 US qts, 3.6 Imp. qts)
Dry fill	5.0 liters (5.3 US qts, 4.4 Imp. qts)

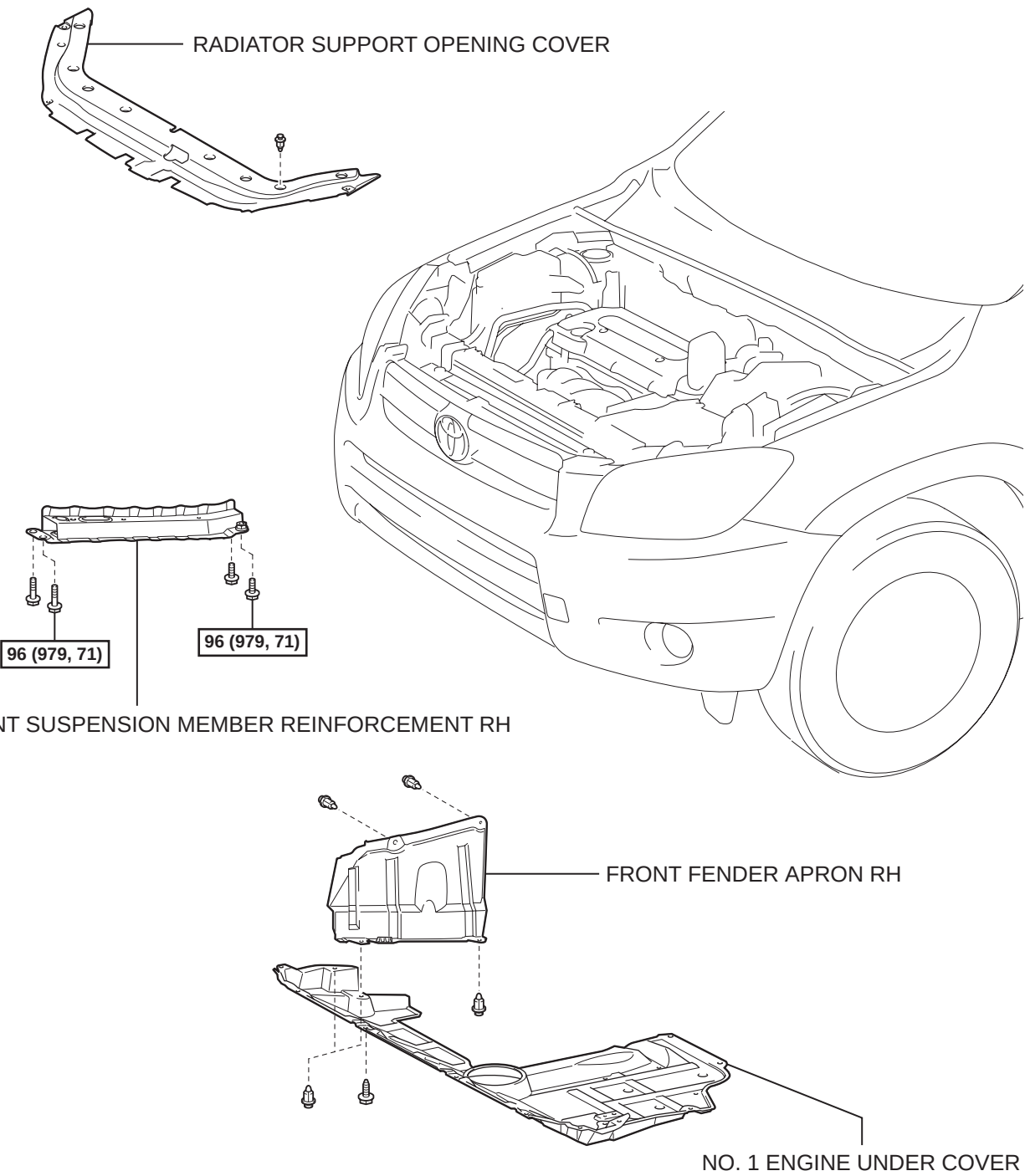
(c) Install the oil filler cap.

6. CHECK FOR ENGINE OIL LEAKS

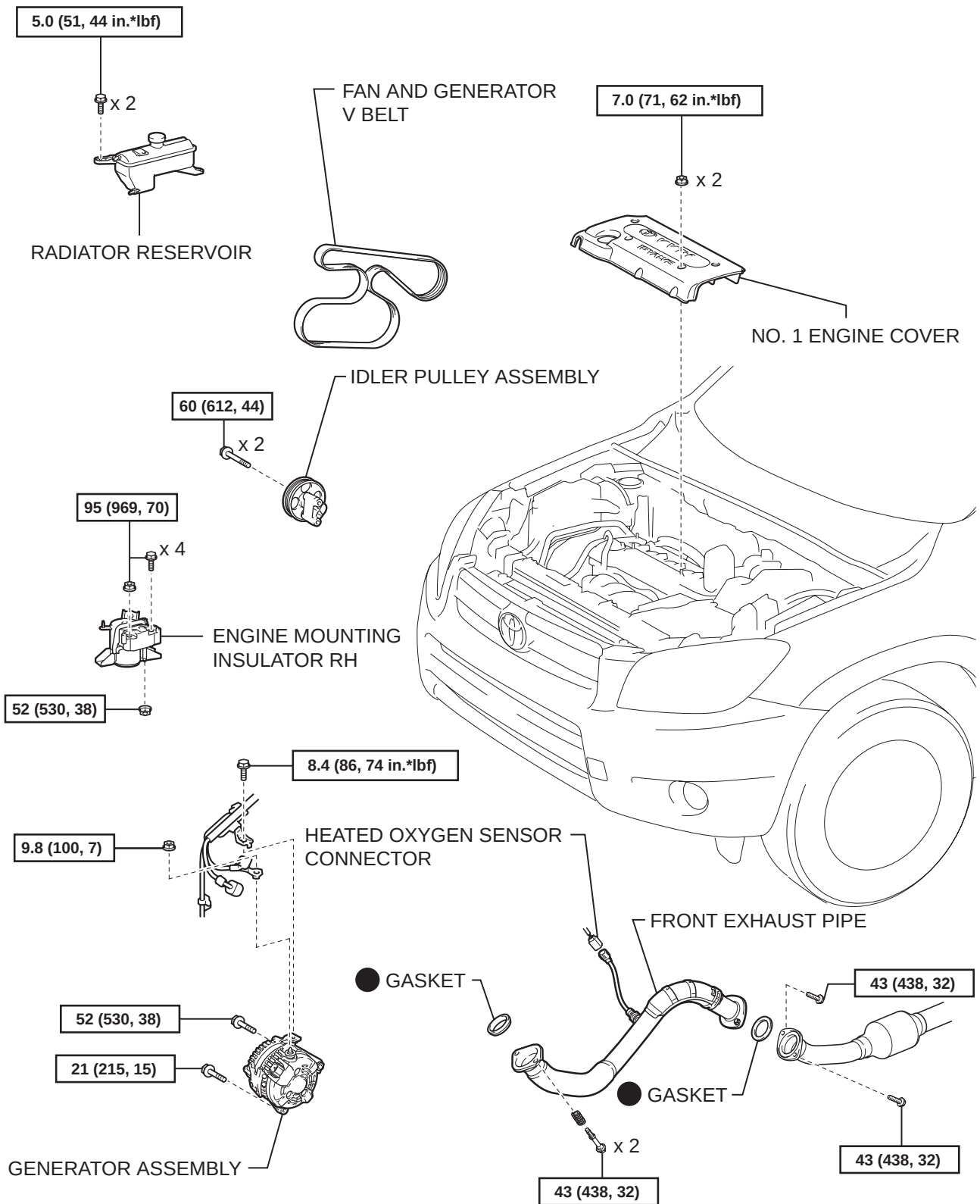
7. INSTALL NO. 1 ENGINE UNDER COVER

OIL PUMP

COMPONENTS



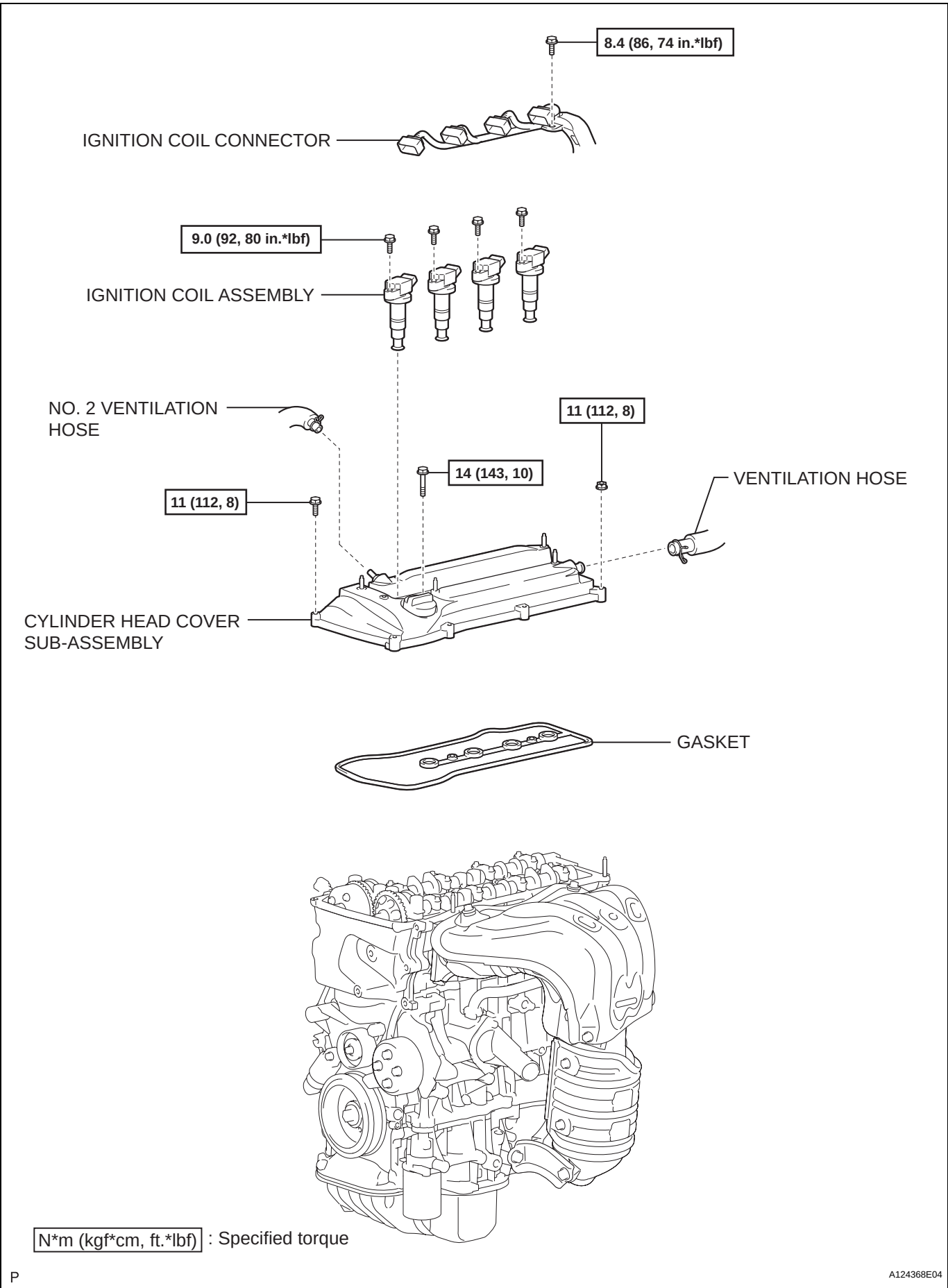
N*m (kgf*cm, ft.*lbf) : Specified torque

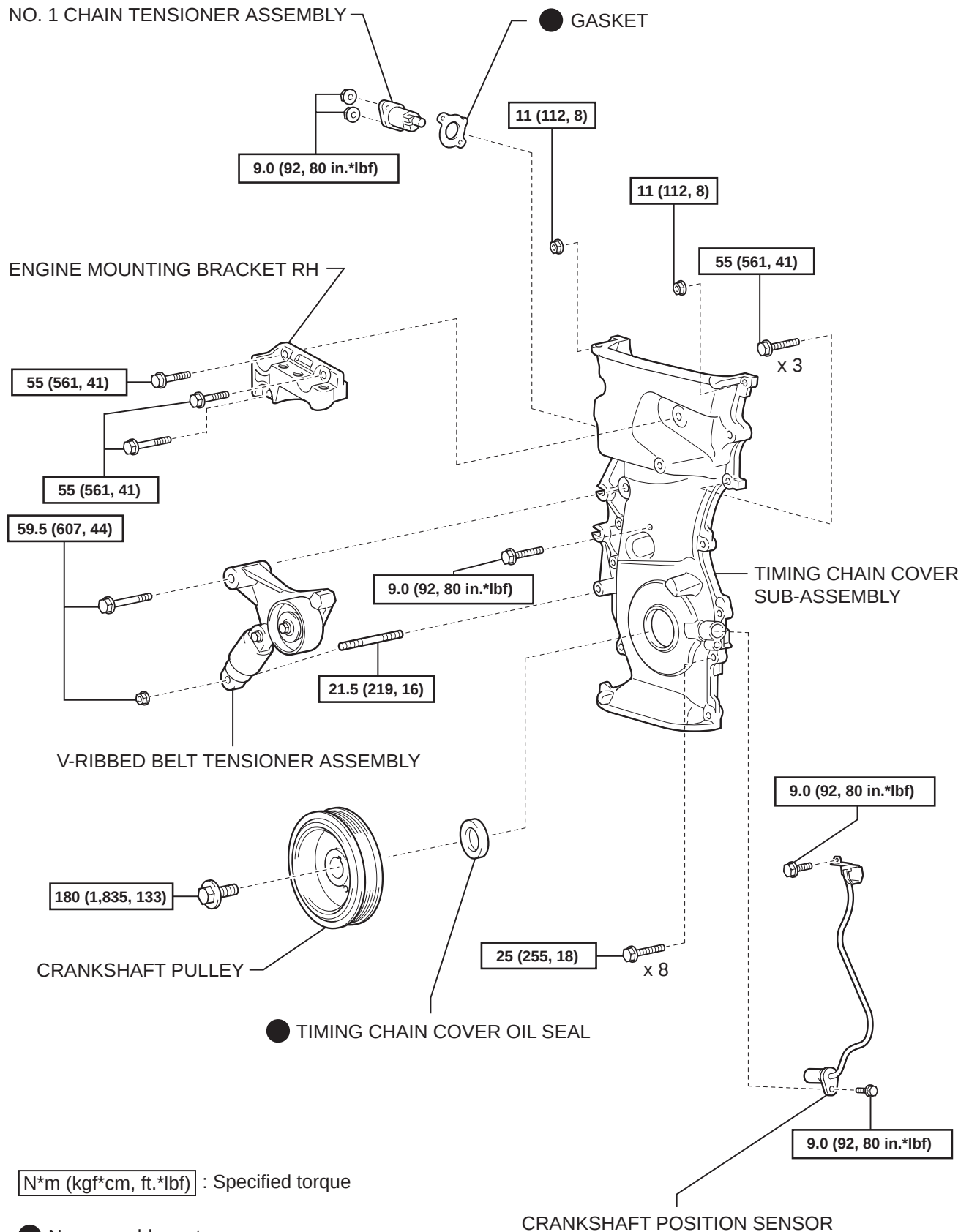


N*m (kgf*cm, ft.*lbf) : Specified torque

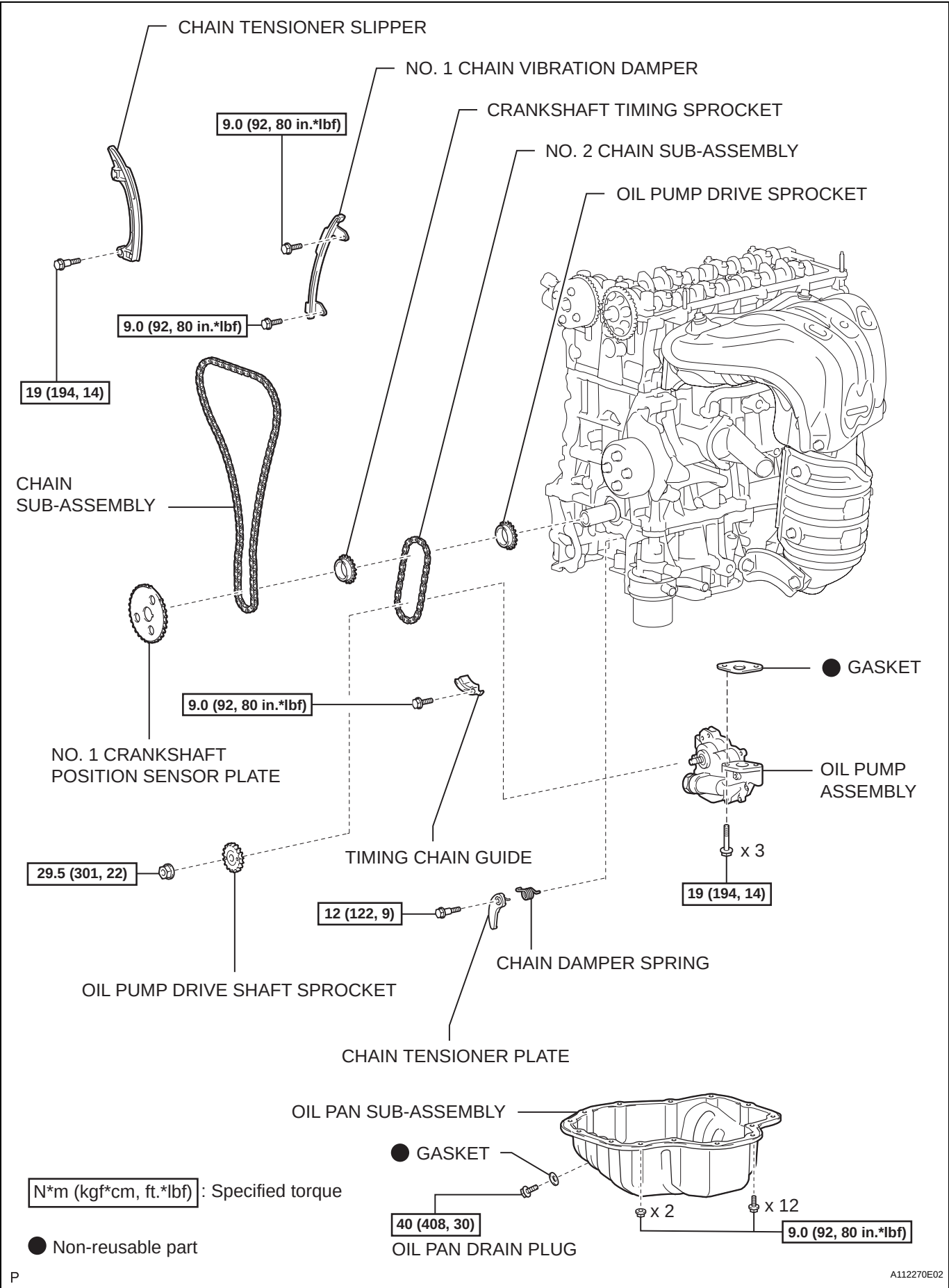
● Non-reusable part

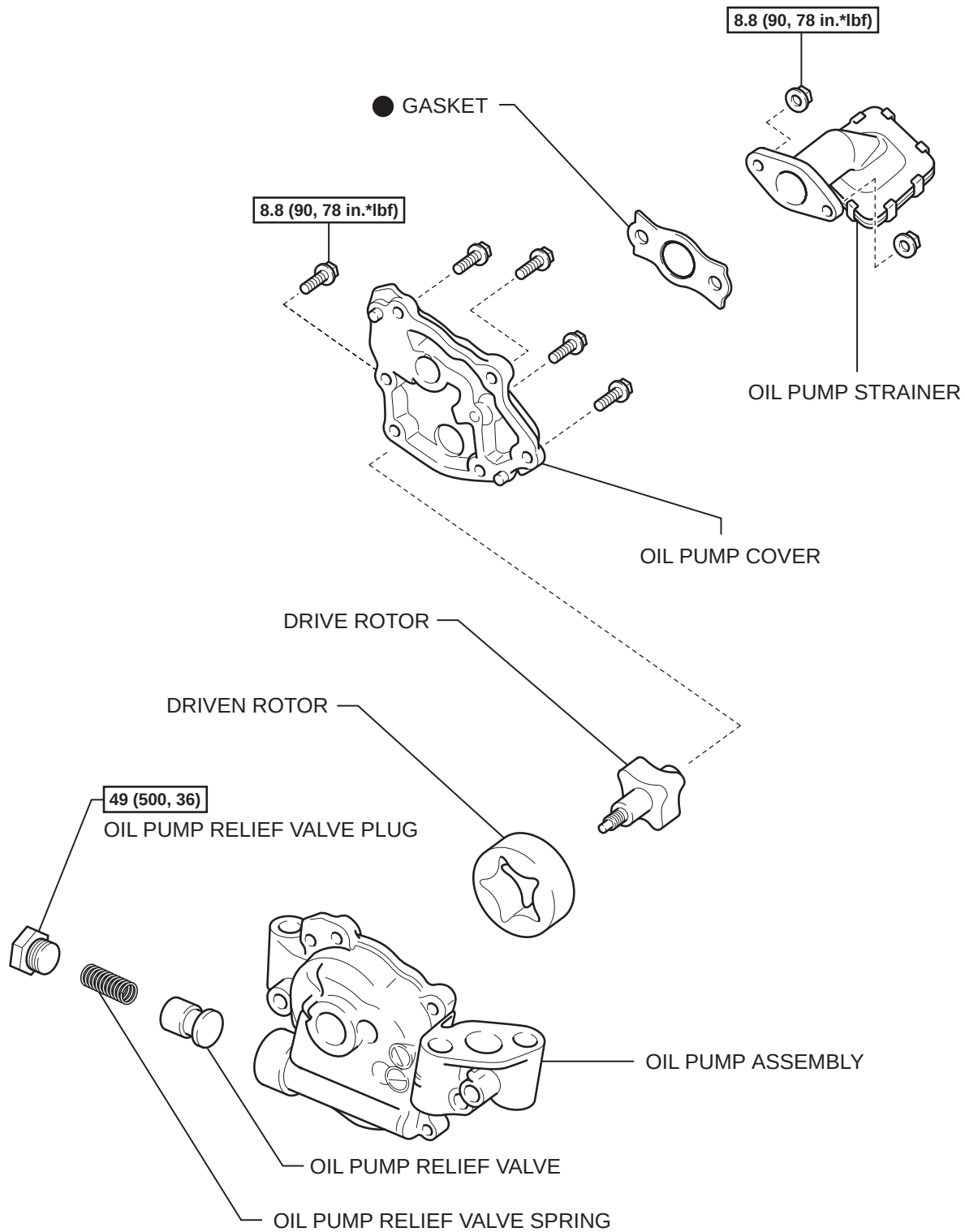
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N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

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