

# OIL AND FILTER INSPECTION

LU008-01

## 1. CHECK ENGINE OIL QUALITY

- (a) Check the oil for deterioration, water mixing, discoloring or thinning.
- (b) If the oil quality is visibly poor, replace it.

### Oil grade:

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

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

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

## 2. CHECK ENGINE OIL LEVEL

Check the engine oil level 5 minutes or more after the engine has stopped.

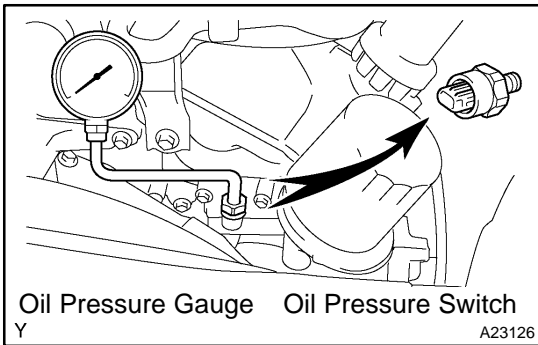
If the engine is too hot, a false level will be read. The oil level should be between the low and full level marks of the dipstick. If it is below the low level mark, check for leakage and add oil up to the full level mark.

### NOTICE:

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

## 3. REMOVE OIL PRESSURE SWITCH ASSY

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



## 4. INSTALL OIL PRESSURE GAUGE

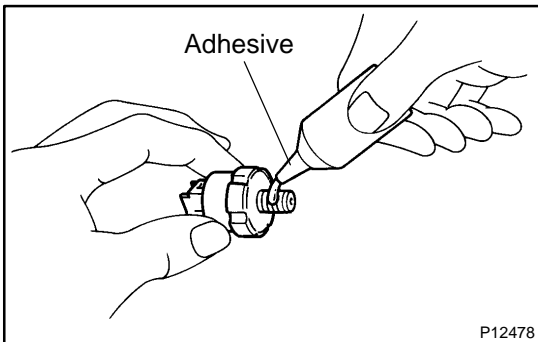
- (a) Install the oil pressure gauge.

## 5. WARM UP ENGINE

## 6. CHECK OIL PRESSURE

### Oil pressure:

At idle	29 kPa (0.3 kgf·cm <sup>2</sup> , 4.3 psi) or more
At 3,000 rpm	294 to 588 kPa (3.0 to 6.0 kgf·cm <sup>2</sup> , 43 to 85 psi)



## 7. INSTALL OIL PRESSURE SWITCH

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

### Adhesive:

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

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

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

HINT:

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

- (d) Connect the oil pressure switch connector.

**8. START ENGINE AND CHECK FOR LEAKS**

# REPLACEMENT

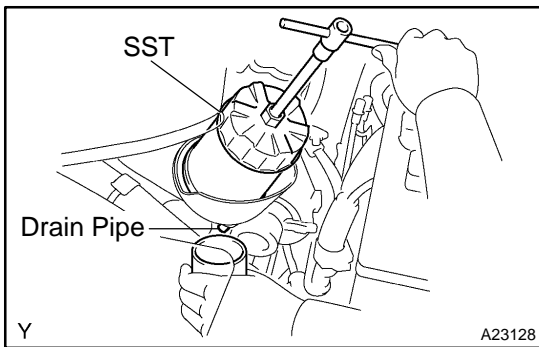
## CAUTION:

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

### 1. DRAIN ENGINE OIL

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

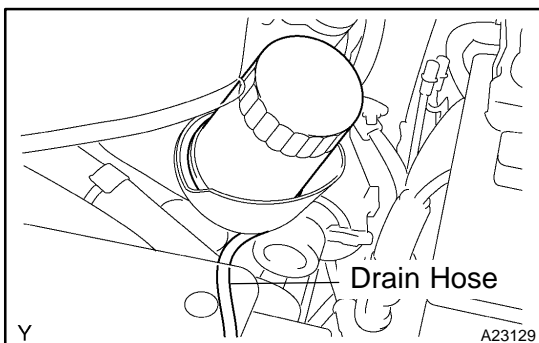
**Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)**



### 2. REMOVE OIL FILTER

#### When using a container:

- (a) Remove the drain pipe cap.
- (b) While removing the oil filter with SST, catch the oil from the oil filter with a container.  
SST 09228-07501
- (c) Install the drain pipe cap.
- (d) Clean the oil catch plate.

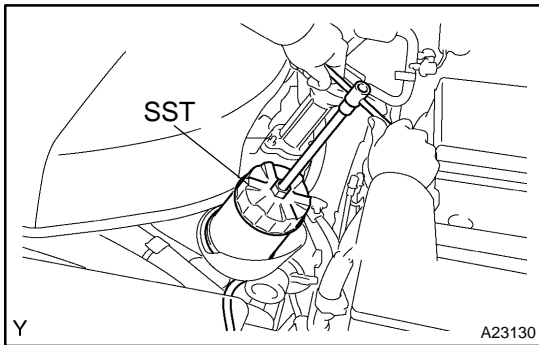


#### When using a drain hose:

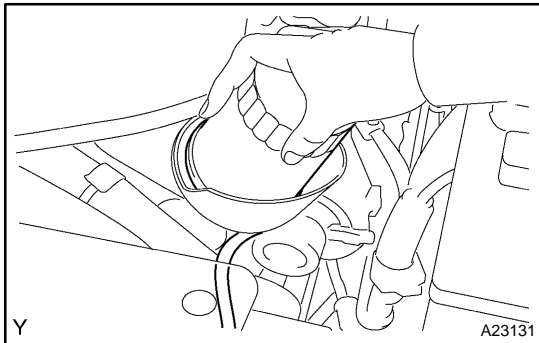
- (e) Remove the drain pipe cap.
- (f) Connect a drain hose to the oil filter bracket.

#### HINT:

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

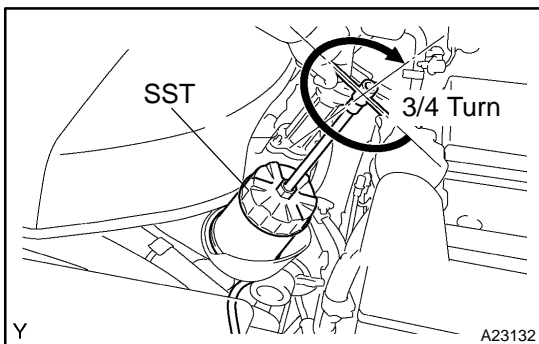


- (h) Using SST, remove the oil filter.  
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- (i) Remove the drain hose and install the drain pipe cap.
- (j) Clean the oil catch plate.



**3. INSTALL OIL FILTER**

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



- (d) Using SST, give it an additional 3/4 turn to set the filter.  
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**4. ADD ENGINE OIL**

- (a) Fill with new engine oil.

**Capacity:**

**Drain and refill:**

**w/ Oil filter change: 4.5 liters (4.8 US qts, 4.0 Imp. qts)**

**w/o Oil filter change: 4.2 liters (4.4 US qts, 3.7 Imp. qts)**

**Dry fill: 5.6 liters (5.9 US qts, 4.9 Imp. qts)**

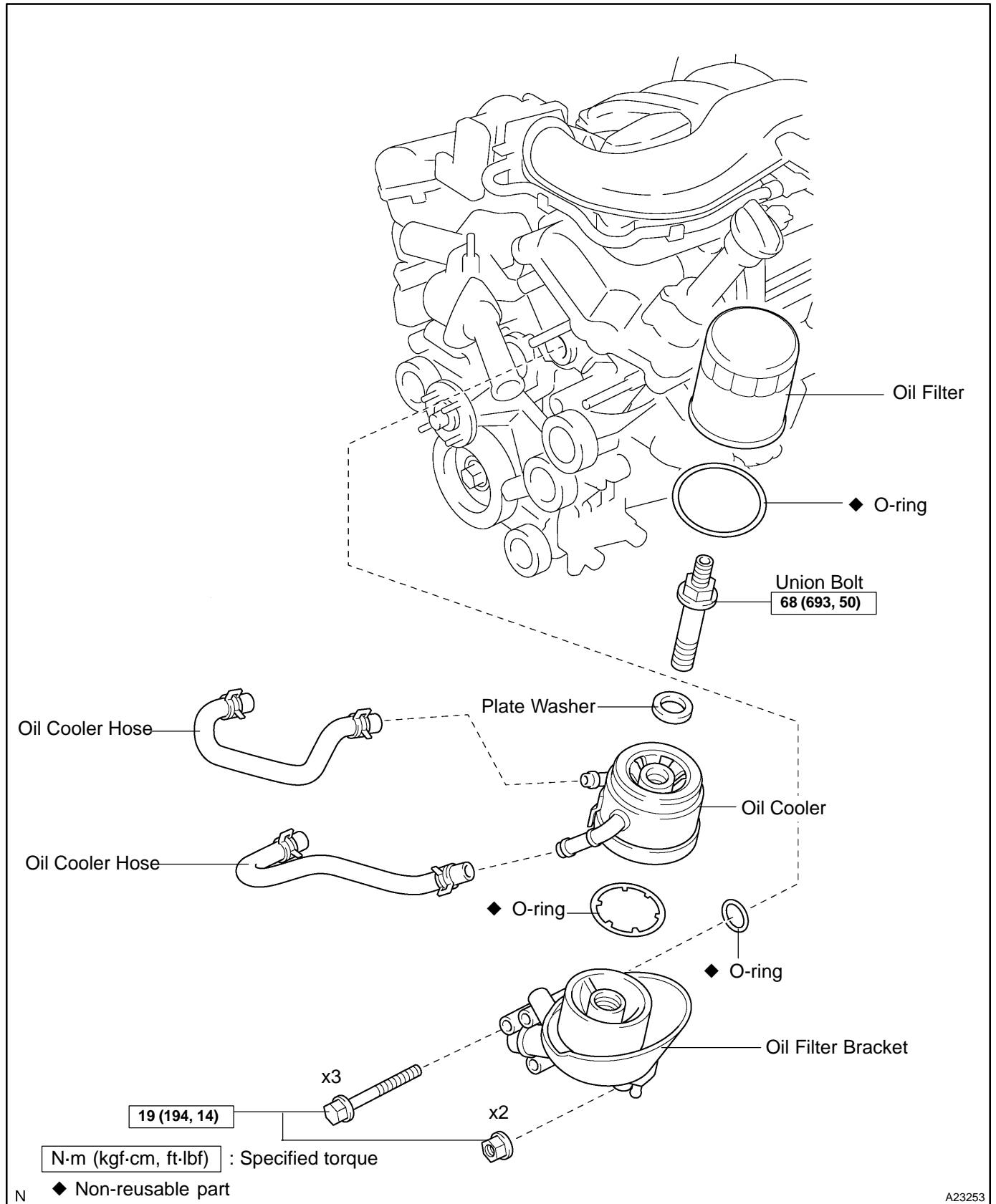
- (b) Reinstall the oil filler cap.

**5. CHECK FOR ENGINE OIL LEAKS**

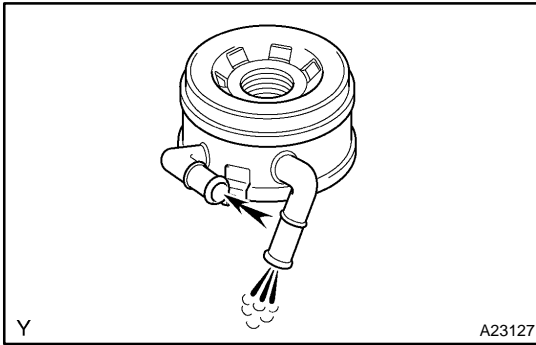
**6. CHECK ENGINE OIL LEVEL**

# OIL COOLER COMPONENTS

LU00F-01



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## INSPECTION

### INSPECT OIL COOLER

Check the oil cooler for damage or clogging.  
If necessary, replace the oil cooler.

## INSTALLATION

### 1. INSTALL OIL FILTER BRACKET

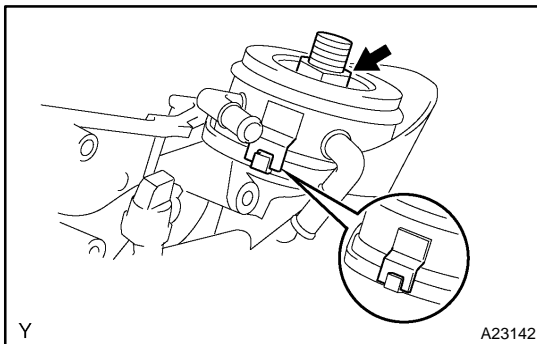
- (a) Install a new O-ring and oil filter bracket with the 2 nuts and 3 bolts.

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

- (b) Connect the lower radiator hose.

### 2. INSTALL OIL COOLER

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



- (d) Install the oil cooler and plate washer with the union bolt.

**Torque: 68 N·m (693 kgf·cm, 50 ft·lbf)**

- (e) Connect the 2 oil cooler hoses to the oil cooler.

### 3. INSTALL OIL FILTER

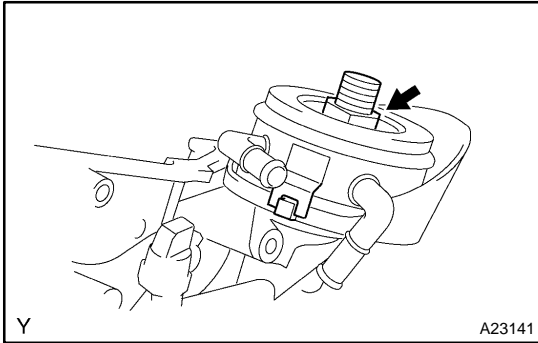
### 4. ADD ENGINE COOLANT

### 5. ADD ENGINE OIL

### 6. INSTALL V-BANK COVER

## REMOVAL

1. DRAIN ENGINE COOLANT
2. REMOVE OIL FILTER
3. REMOVE V-BANK COVER
4. REMOVE OIL COOLER
  - (a) Disconnect the 2 oil cooler hoses from the oil cooler.

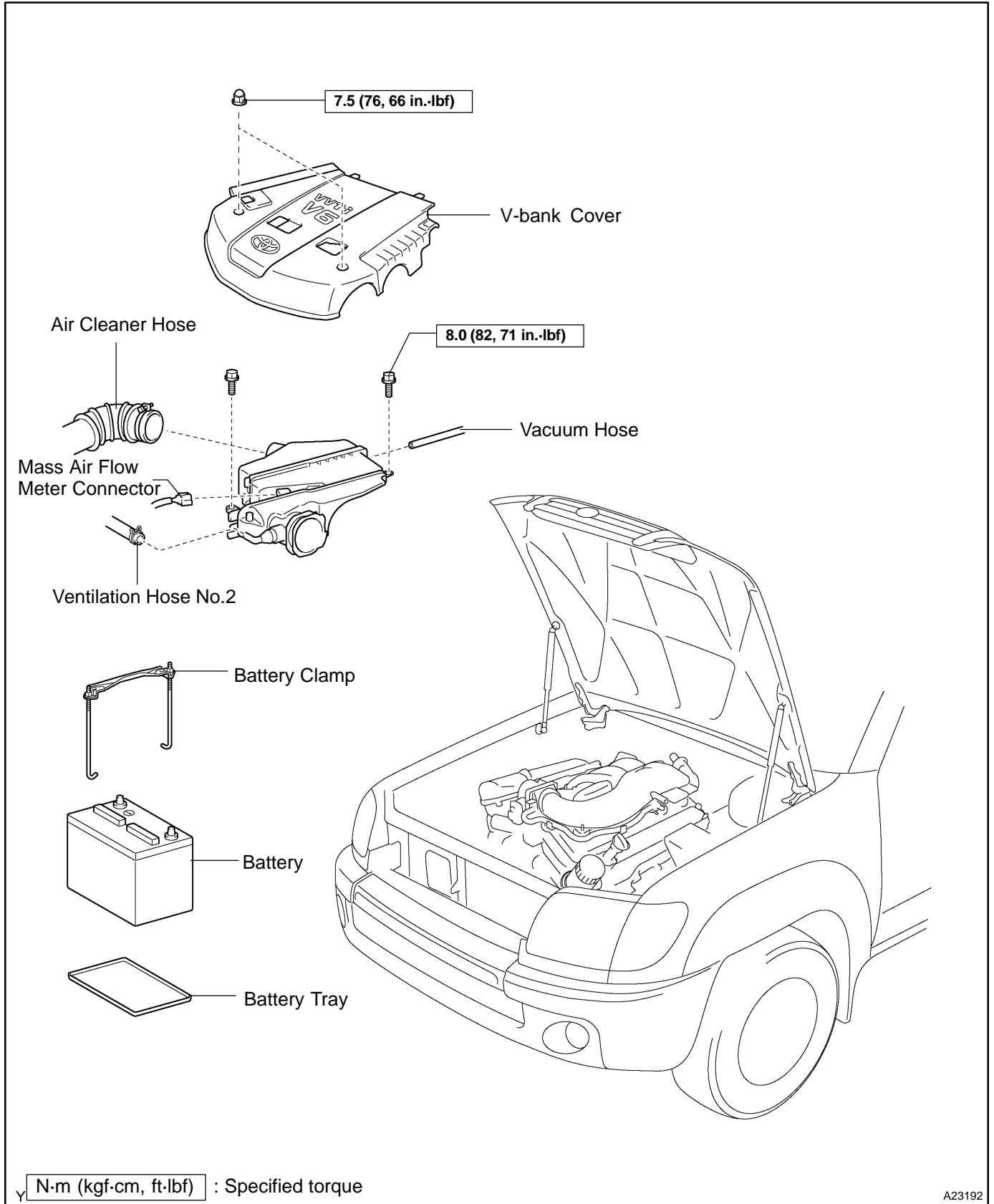


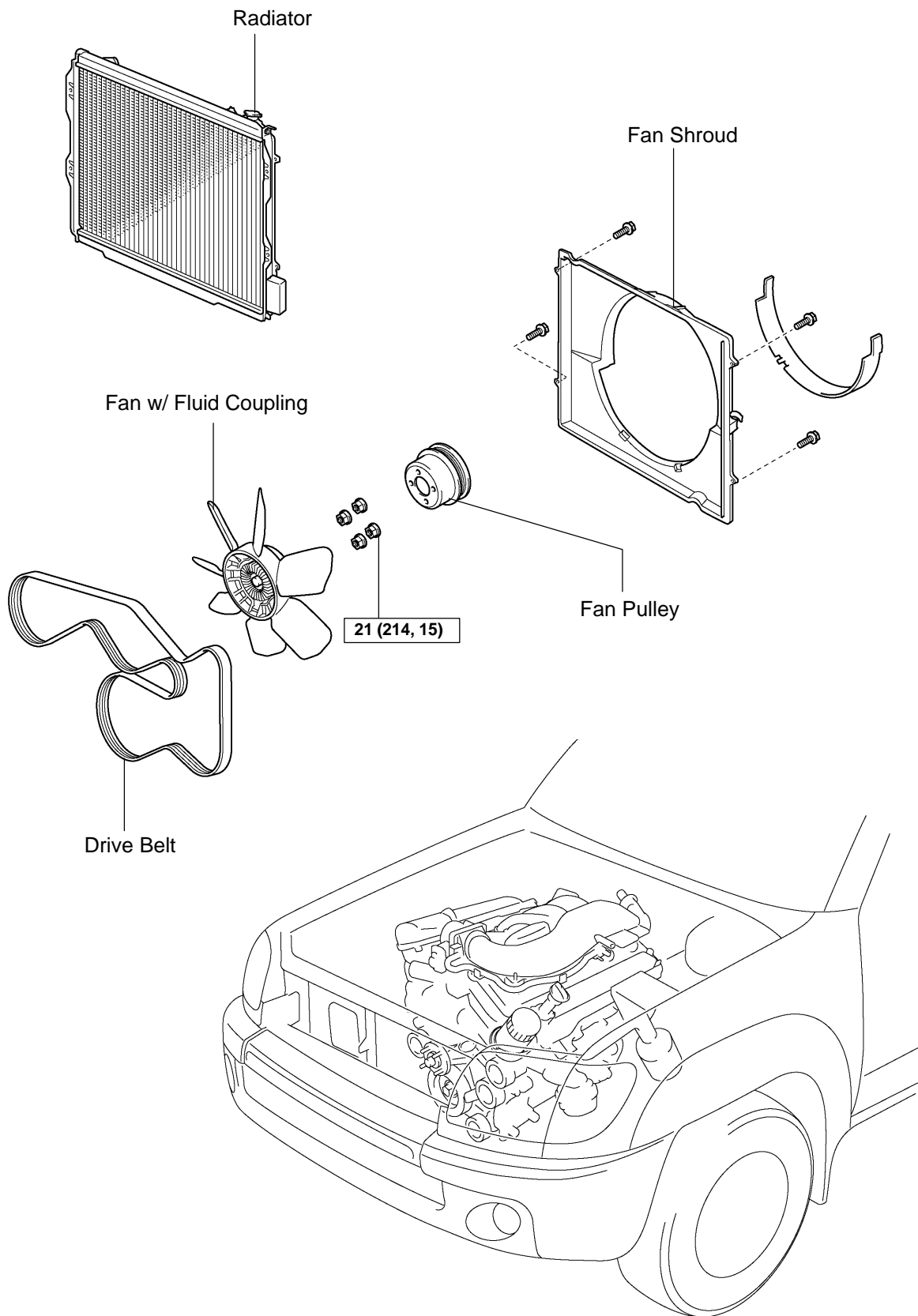
- (b) Remove the union bolt, plate washer and oil cooler.
  - (c) Remove the O-ring from the oil cooler.
5. REMOVE OIL FILTER BRACKET
  - (a) Disconnect the lower radiator hose.
  - (b) Remove the 2 nuts, 3 bolts, oil filter bracket and O-ring.



# OIL PUMP COMPONENTS

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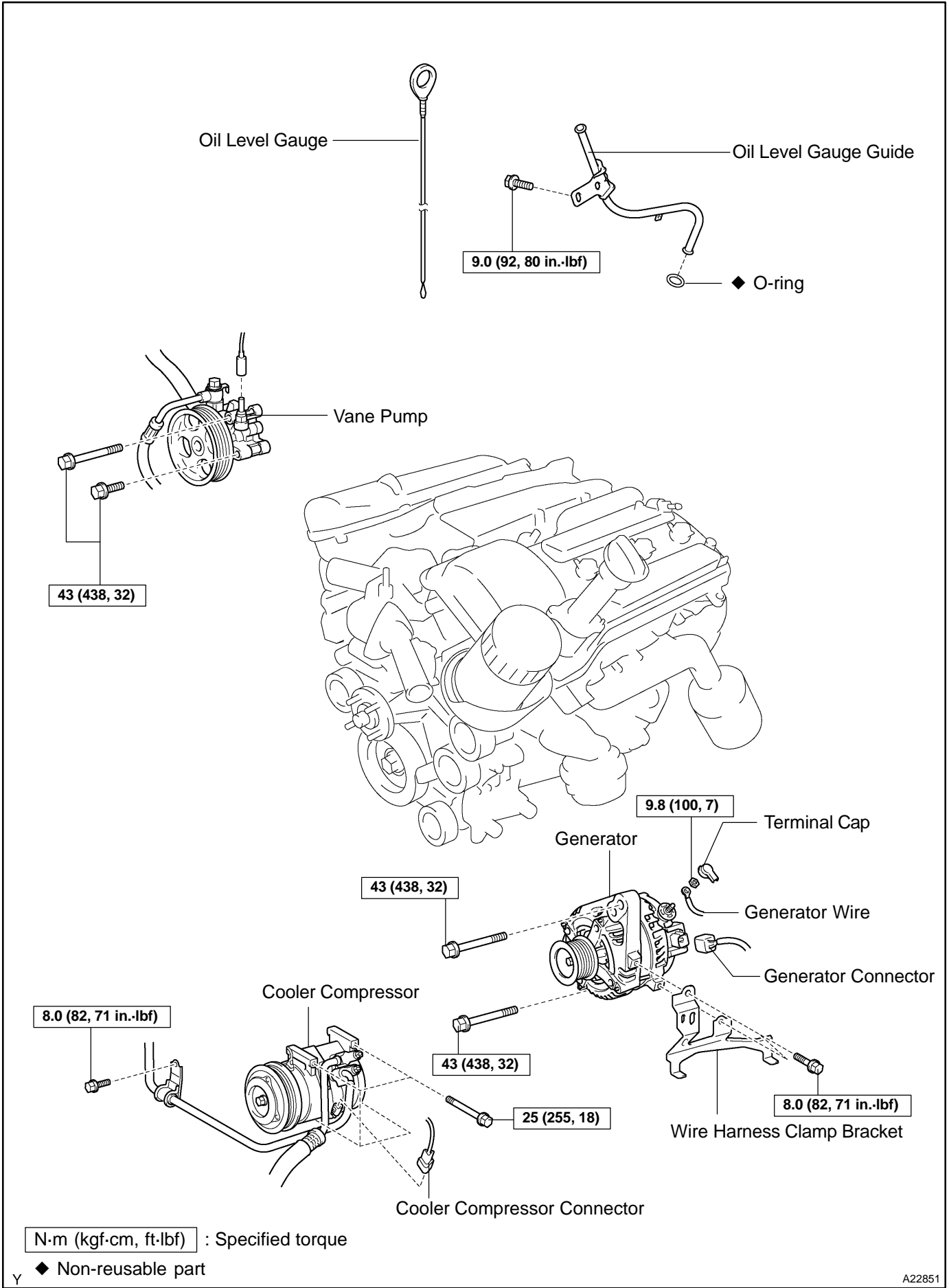




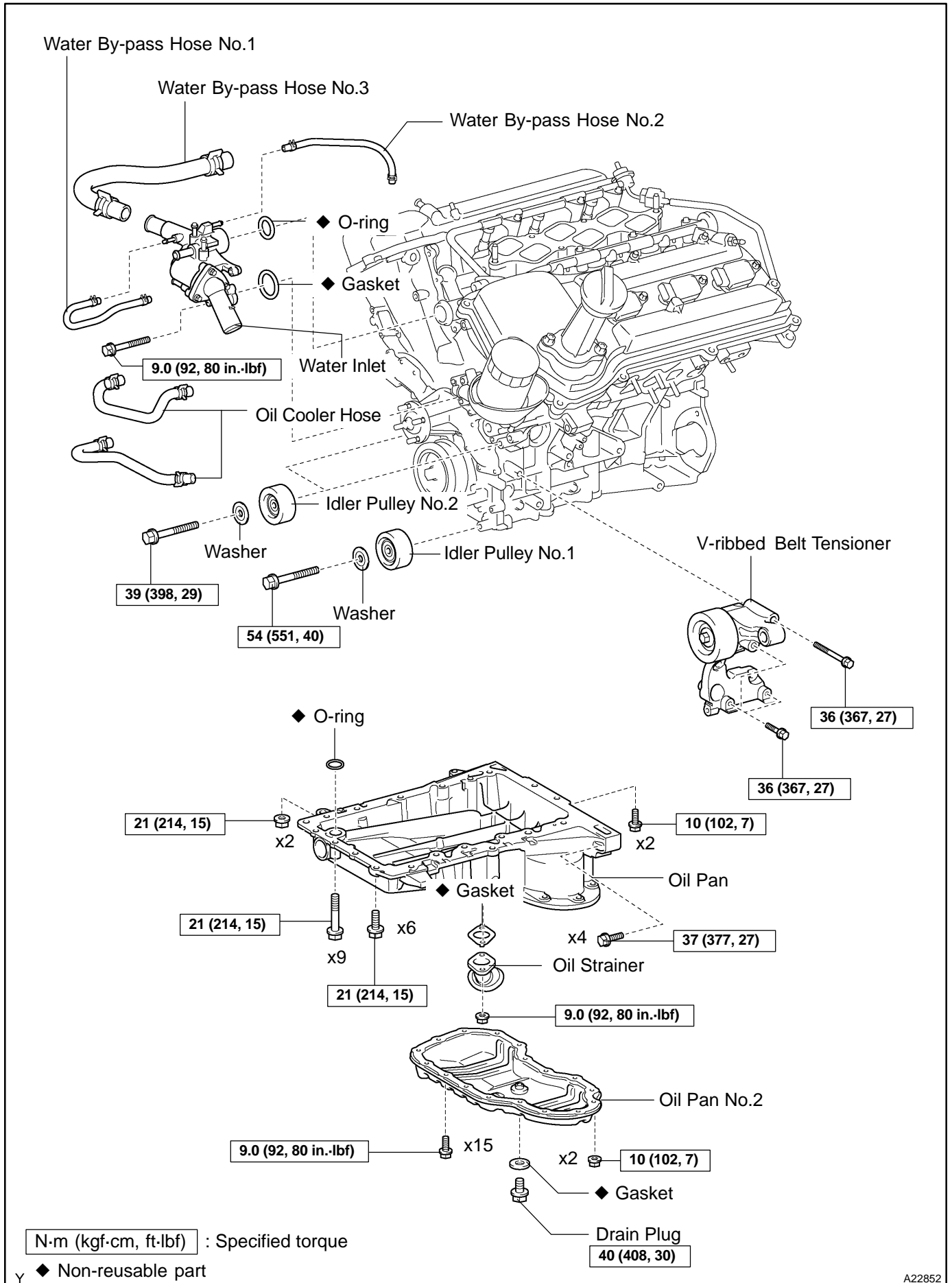
γ N·m (kgf·cm, ft·lbf) : Specified torque

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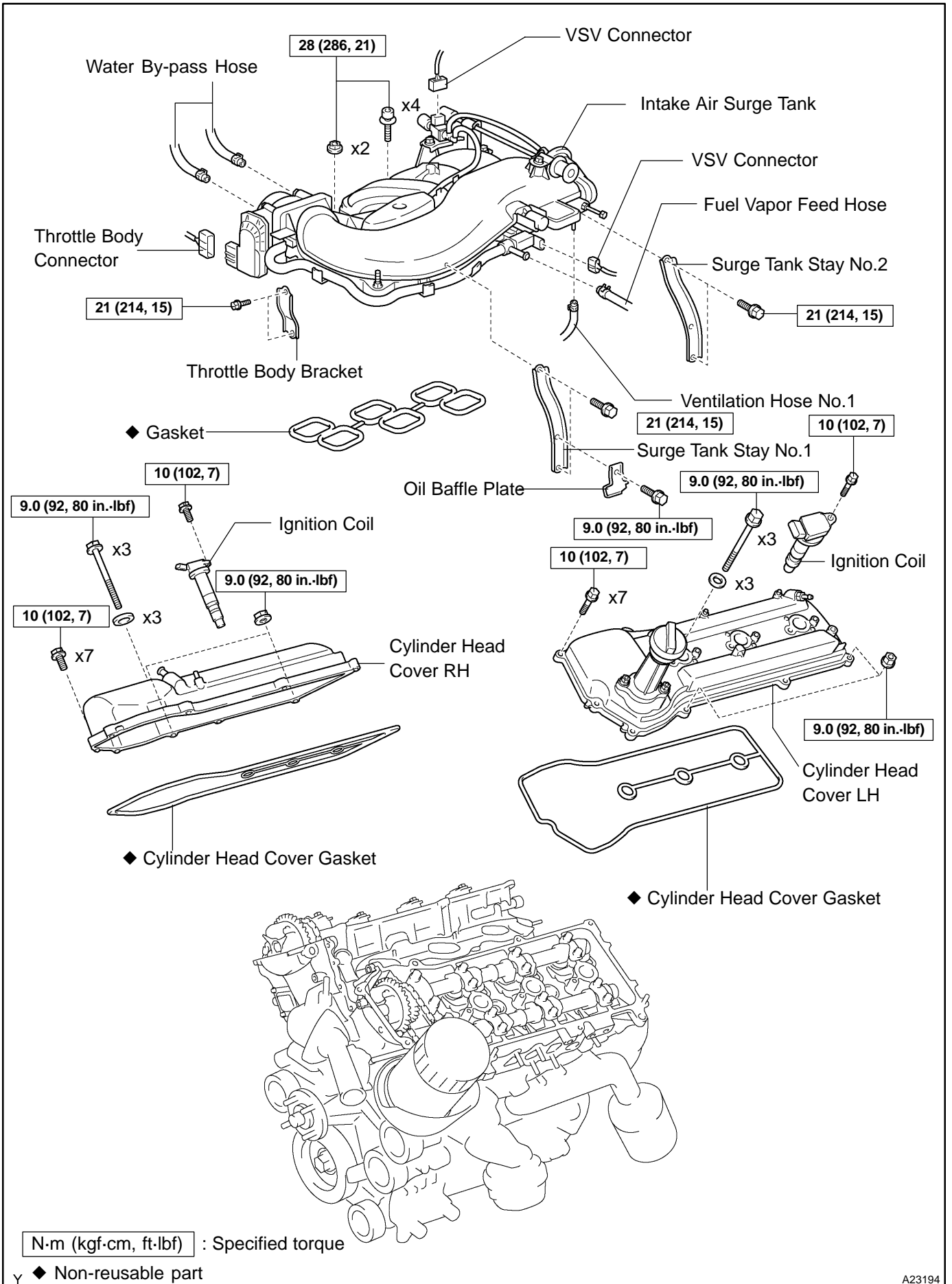
LUBRICATION (1GR-FE) - OIL PUMP



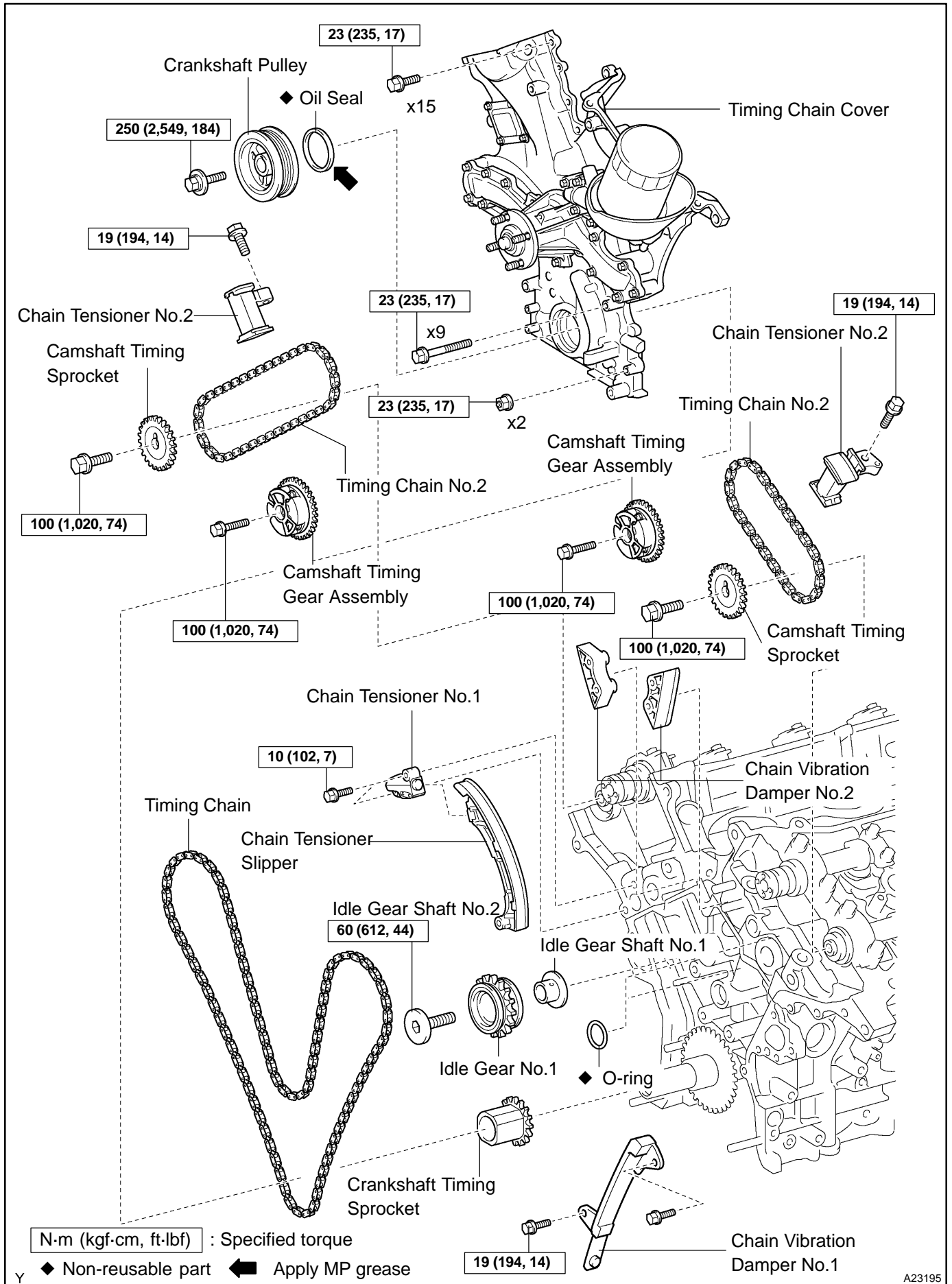
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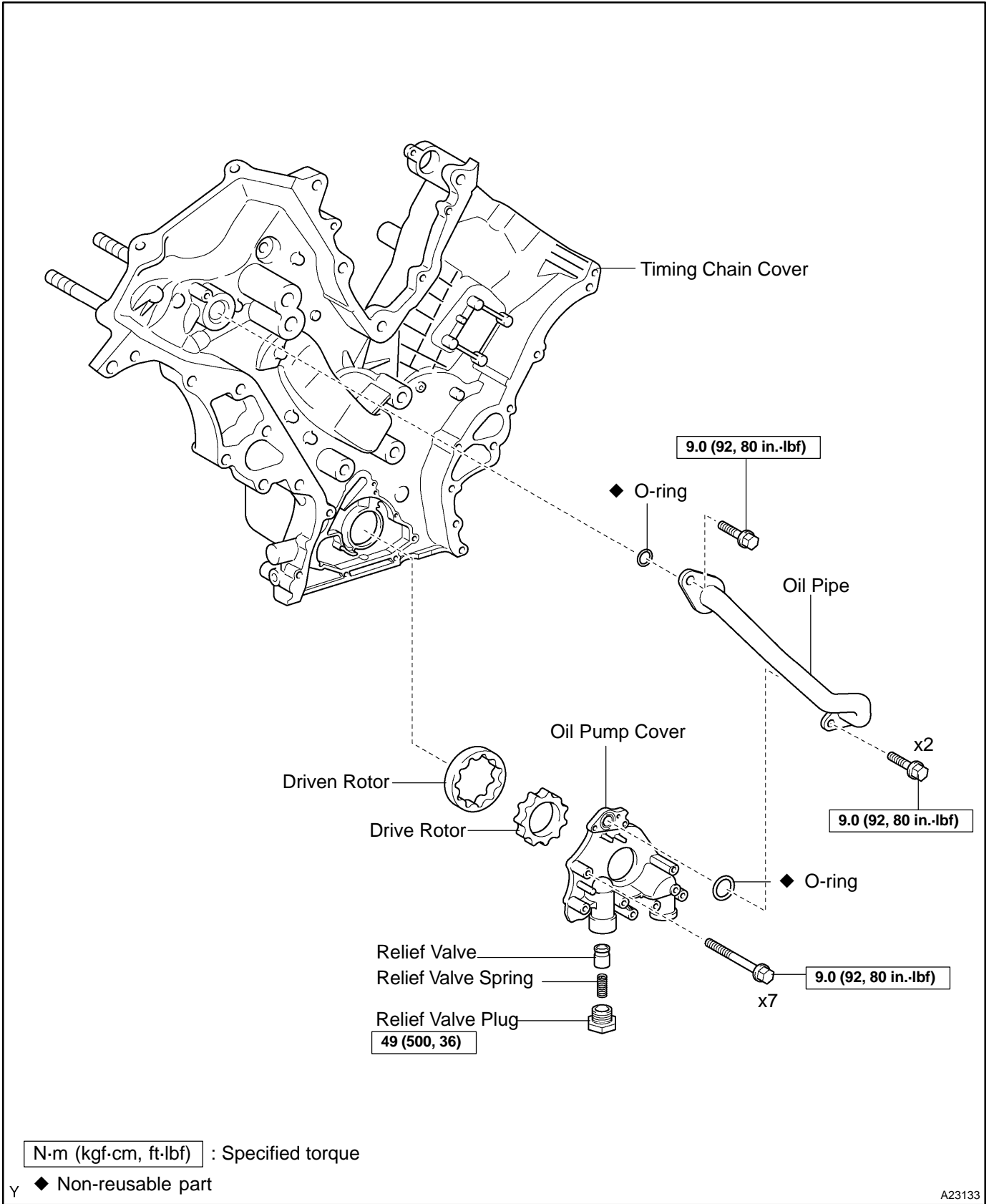
LUBRICATION (1GR-FE) - OIL PUMP

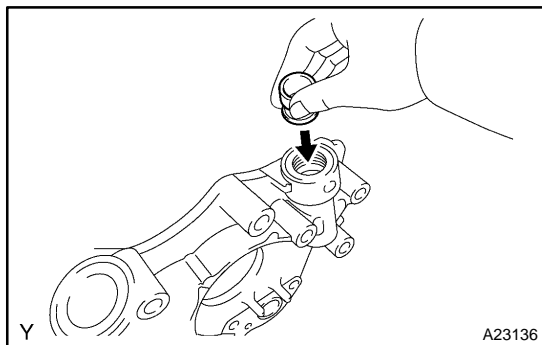


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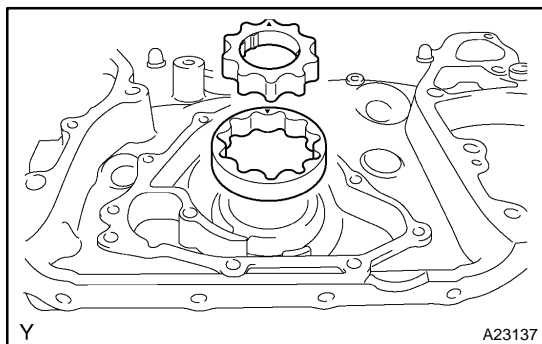


## INSPECTION

### 1. INSPECT OIL PUMP RELIEF VALVE

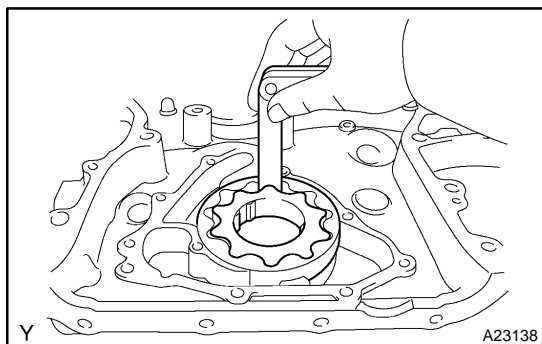
Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

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



### 2. INSPECT OIL PUMP ROTOR SET

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



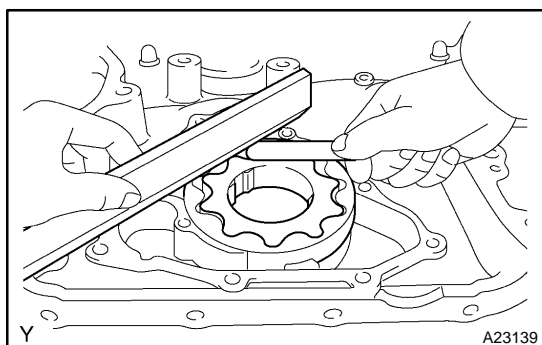
- (b) Inspect rotor tip clearance.  
Using a feeler gauge, measure the clearance between each drive and driven rotor tip.

**Standard clearance:**

**0.06 to 0.16 mm (0.0024 to 0.0063 in.)**

**Maximum tip clearance: 0.16 mm (0.0063 in.)**

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



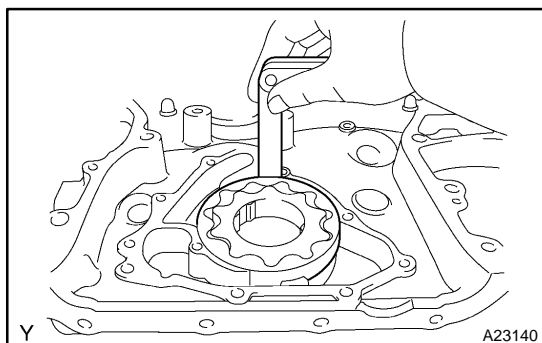
- (c) Inspect rotor side clearance.  
Using a feeler gauge and precision straight edge, measure the clearance between the rotors and the precision straight edge.

**Standard clearance:**

**0.03 to 0.09 mm (0.0012 to 0.0035 in.)**

**Maximum side clearance: 0.09 mm (0.0035 in.)**

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



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

**Standard clearance:**

**0.250 to 0.325 mm (0.0098 to 0.0128 in.)**

**Maximum body clearance: 0.325 mm (0.0128 in.)**

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

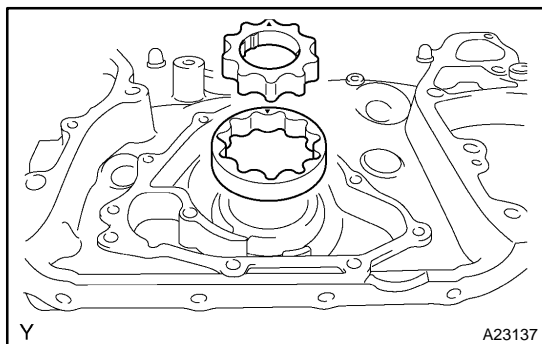


## INSTALLATION

### 1. INSTALL OIL PUMP RELIEF VALVE

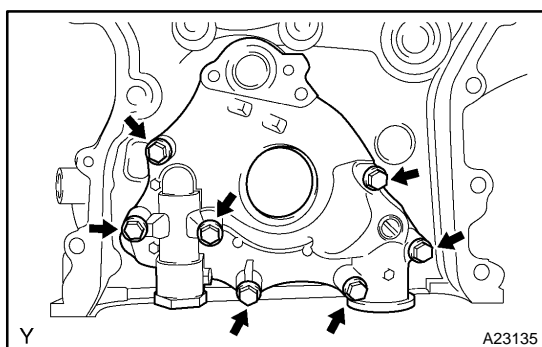
- (a) Coat the relief valve with engine oil and insert the relief valve and spring into the valve hole.
- (b) Install the relief valve plug.

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



### 2. INSTALL OIL PUMP COVER

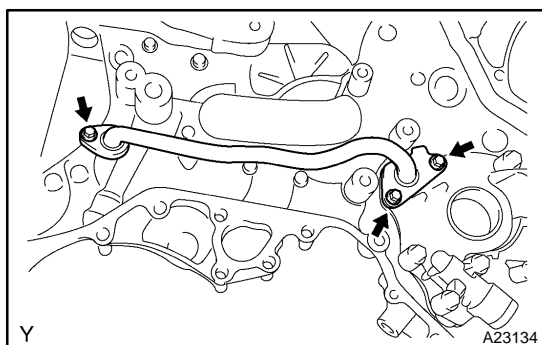
- (a) Apply new engine oil to the drive and driven rotors.
- (b) Place the drive and driven rotors into the timing chain cover with the marks facing upward.



- (c) Install the oil pump cover with the 7 bolts.

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

- (d) Install a new O-ring to the oil pump cover.
- (e) Install a new O-ring to the oil pipe.



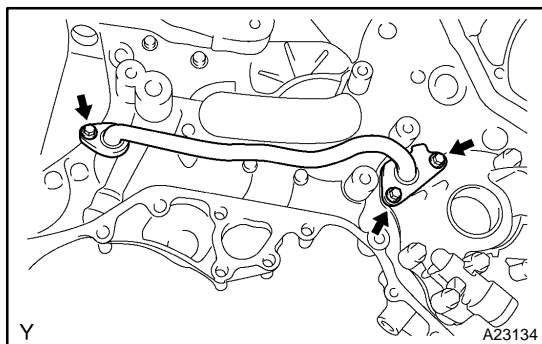
- (f) Install the oil pipe with the 3 bolts.

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

### 3. INSTALL TIMING CHAIN COVER (See page [EM-44](#))

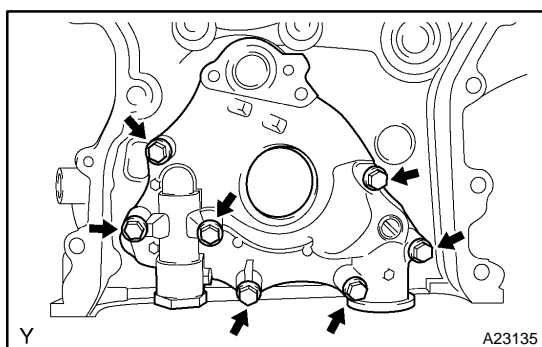
## REMOVAL

### 1. REMOVE TIMING CHAIN COVER (See page EM-32 )



### 2. REMOVE OIL PUMP COVER

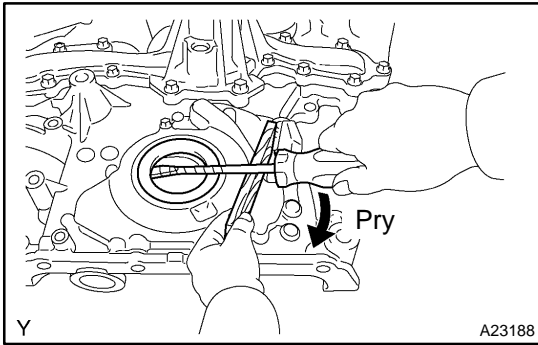
- (a) Remove the 3 bolts and oil pipe.
- (b) Remove the 2 O-rings.



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

### 3. REMOVE OIL PUMP RELIEF VALVE

Remove the plug, spring and relief valve.



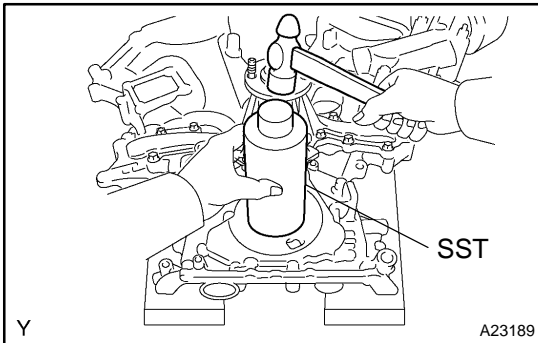
## REPLACEMENT

### REPLACE TIMING CHAIN COVER OIL SEAL

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

#### NOTICE:

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



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

SST 09226-10010

(c) Apply MP grease to the oil seal lip.