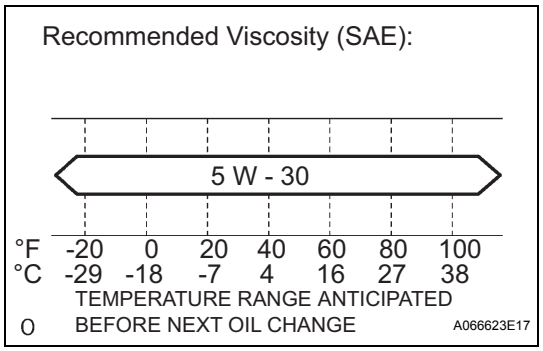
LUBRICATION SYSTEM

ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

(a) Warm up the engine, stop it and wait 5 minutes. The oil level should be between the dipstick's low level mark and full level mark.
If low, check for leakage and add oil up to the full level mark.
NOTICE:
Do not fill above the full level mark.



2. CHECK ENGINE OIL QUALITY

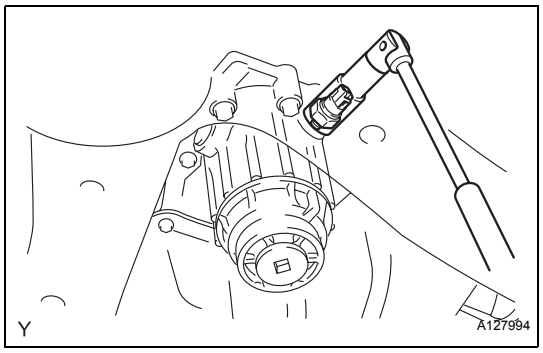
(a) Check the oil for deterioration, water contamination, discoloring or thinning.
If the quality is visibly poor, replace the oil.
Oil grade:
ILSAC multigrade engine oil is recommended. SAE 5W-30 is the best choice for good fuel economy and good starting in cold weather.
If SAE 5W-30 in not available, SAE 10W-30 may be used. However, it should be replaced with SAE 5W-30 at the next oil change.

3. REMOVE ENGINE UNDER COVER LH

4. REMOVE ENGINE UNDER COVER RH

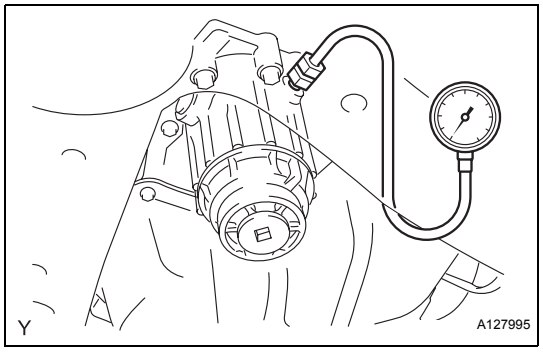
5. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY

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



6. INSTALL OIL PRESSURE GAUGE

(a) Install the oil pressure gauge with adapter.

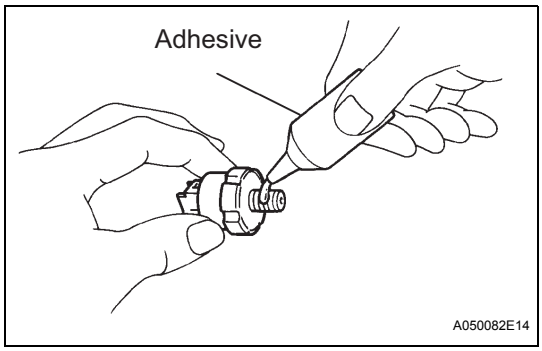


7. WARM UP ENGINE

8. CHECK OIL PRESSURE

Item	Oil Pressure
Idle	80 kPa (0.8 kgf*cm^2, 11.6 psi) or more
6,000 rpm	380 kPa (3.9 kgf*cm^2, 55.5 psi) or more

If the oil pressure is not as specified, check the oil pump (See page LU-14).

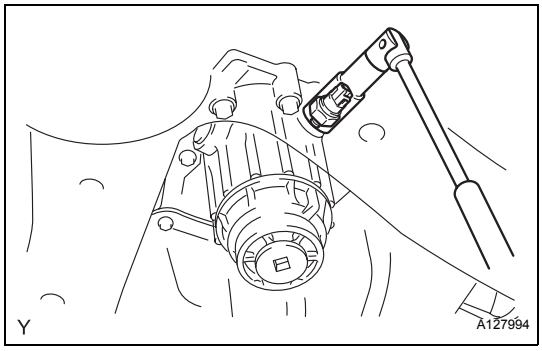


9. INSTALL OIL PRESSURE SWITCH

(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 (153 kgf*cm, 11 ft.*lbf)
NOTICE:
Do not start the engine within 1 hour after installation.

(d) Connect the oil pressure switch connector.

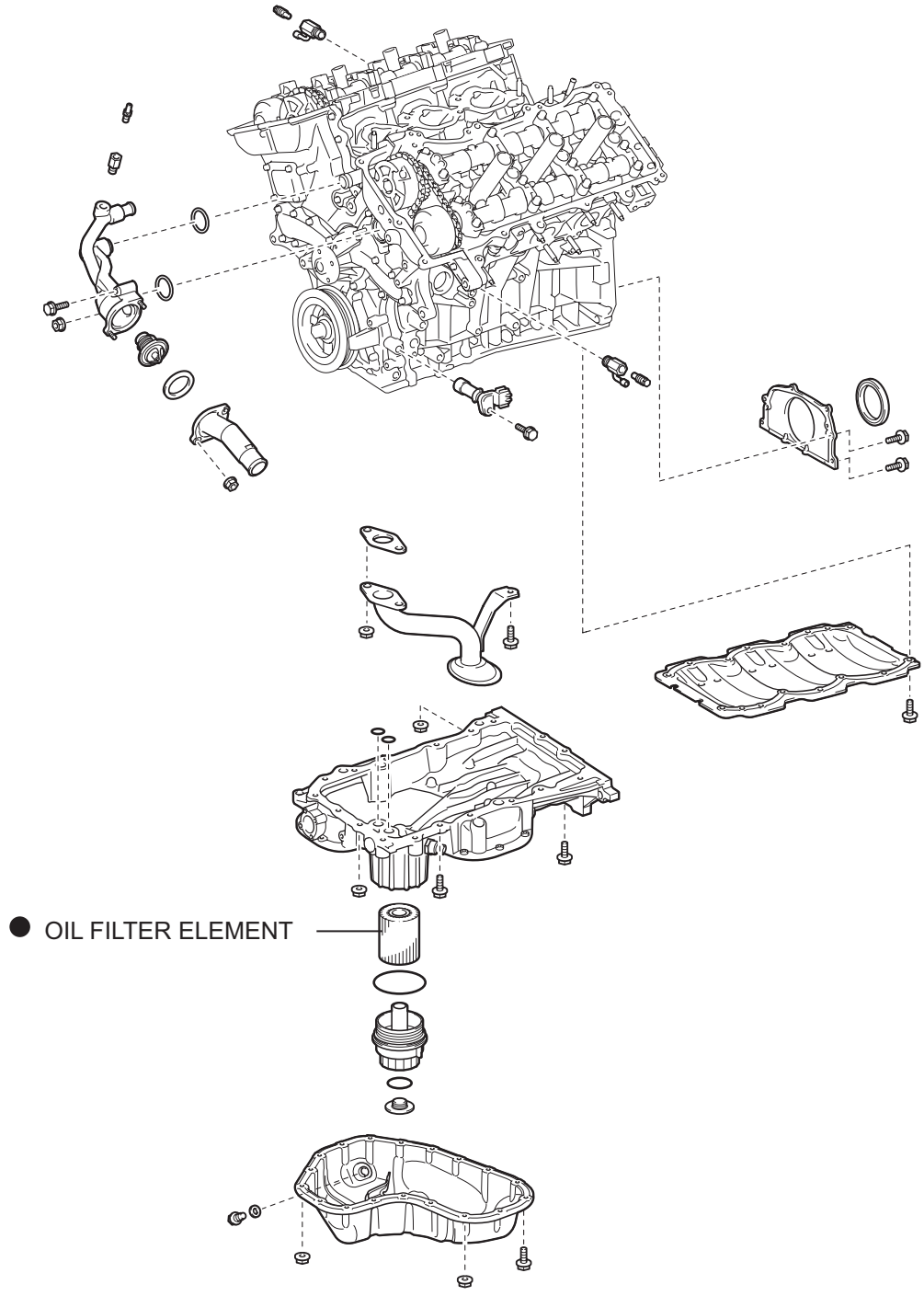
10. CHECK FOR ENGINE OIL LEAKS

11. INSTALL ENGINE UNDER COVER RH

12. INSTALL ENGINE UNDER COVER LH

OIL FILTER

COMPONENTS



● Non-reusable part

P

A114566E05

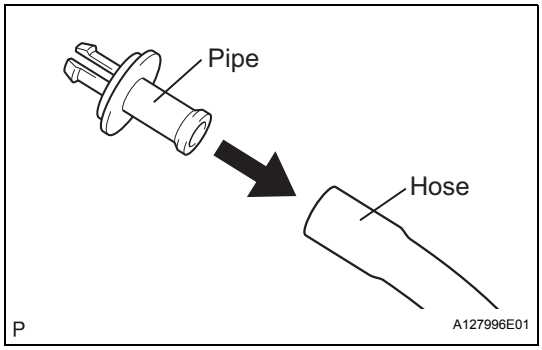
REPLACEMENT

CAUTION:

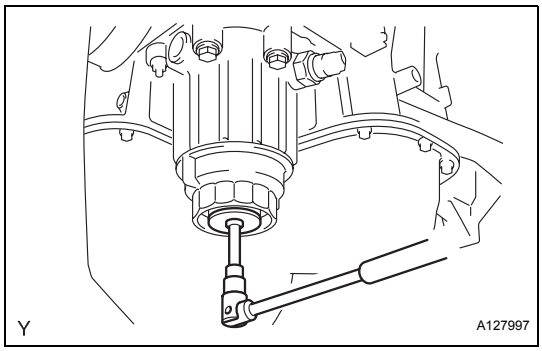
- **Prolonged and repeated contact with engine oil will result in the removal of natural oils from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- **Precautions should be taken when replacing engine oil to minimize the risk of your skin making contact with used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worm. 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. REMOVE OIL FILTER ELEMENT

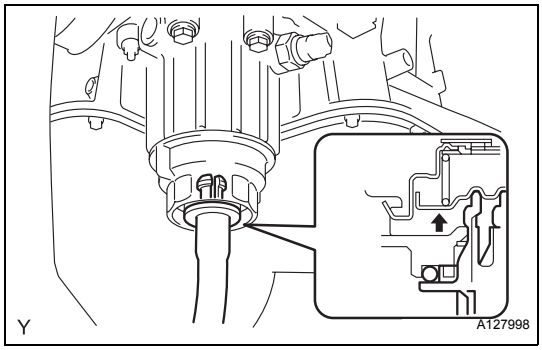
(a) Connect the hose (15 mm) to the pipe.

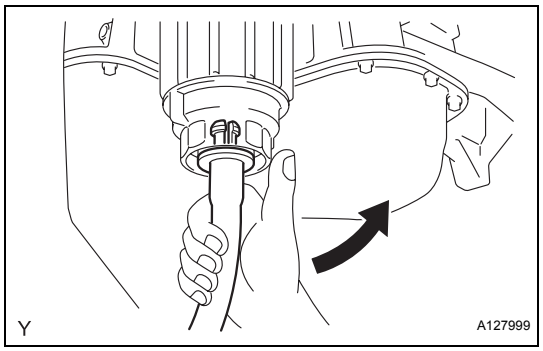


(b) Remove the oil filter drain plug from the oil filter cap.

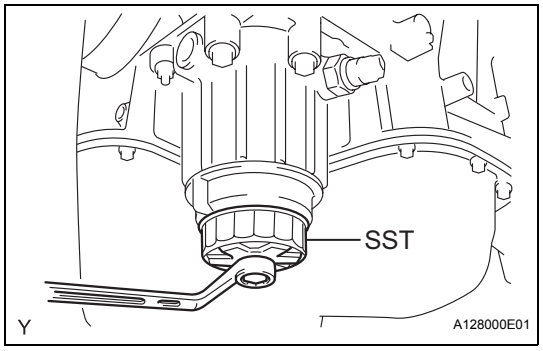


(c) Insert the pipe with the hose into the oil filter cap.
NOTICE:
Be sure to insert the pipe with the O-ring installed on the oil filter cap side.
HINT:
Place the hose end into a container before draining the oil from the hose.

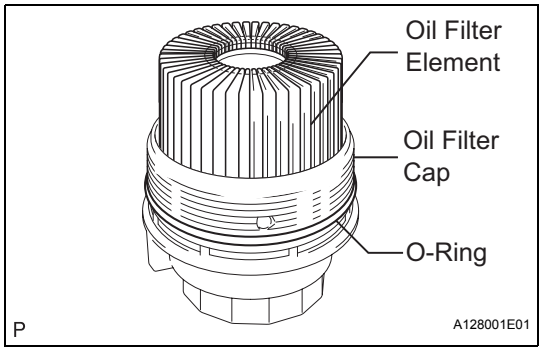




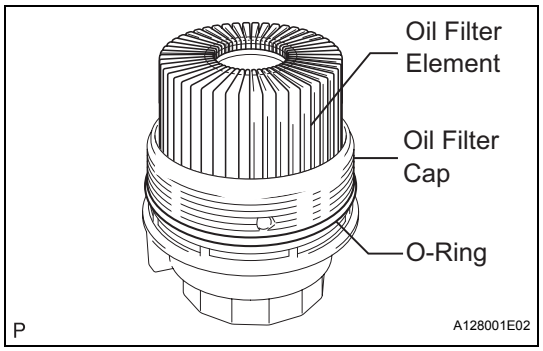
(d) Make sure that oil is completely drained, and remove the pipe and O-ring.
HINT:
Be sure to turn the pipe in the direction of the arrow to remove it.



(e) Using SST, remove the oil filter cap.
SST 09228-06501



(f) Remove the oil filter element and O-ring from the oil filter cap.
NOTICE:
Do not use any tools to remove the O-ring in order to prevent the cap from being damaged. Be sure to remove it by hand.



2. INSTALL OIL FILTER ELEMENT

(a) Clean the inside of the oil filter cap, threads, and O-ring groove.

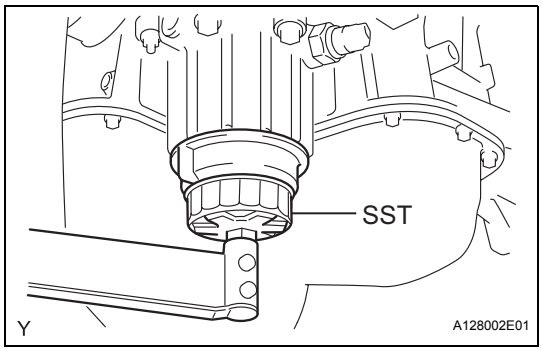
(b) Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.
NOTICE:
Make sure that the O-ring does not get twisted on the groove.

(c) Install a new oil filter element to the oil filter cap.

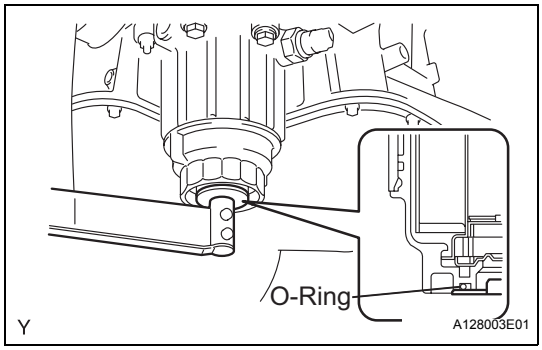
(d) Remove all dirt and foreign matter from the installation surface and the inside of the cap on the engine side.

(e) Apply a light coat of engine oil to the O-ring again and install the oil filter cap.
NOTICE:
Make sure that the O-ring does not get caught between the parts.

LU



(f) Using SST, install the oil filter cap.
SST 09228-06501
Torque: 25 N*m (255 kgf*cm, 18 ft.*lbf)
NOTICE:
Make sure that there is no clearance between the parts after tightening the oil filter cap.



(g) Apply a light coat of engine oil to a new O-ring and install it to the oil filter cap.
NOTICE:
Remove all dirt and foreign matter from the installation surface.

(h) Install the oil filter drain plug to the oil filter cap.
Torque: 13 N*m (127 kgf*cm, 10 ft.*lbf)
NOTICE:
Make sure that the O-ring does not get caught between the parts.

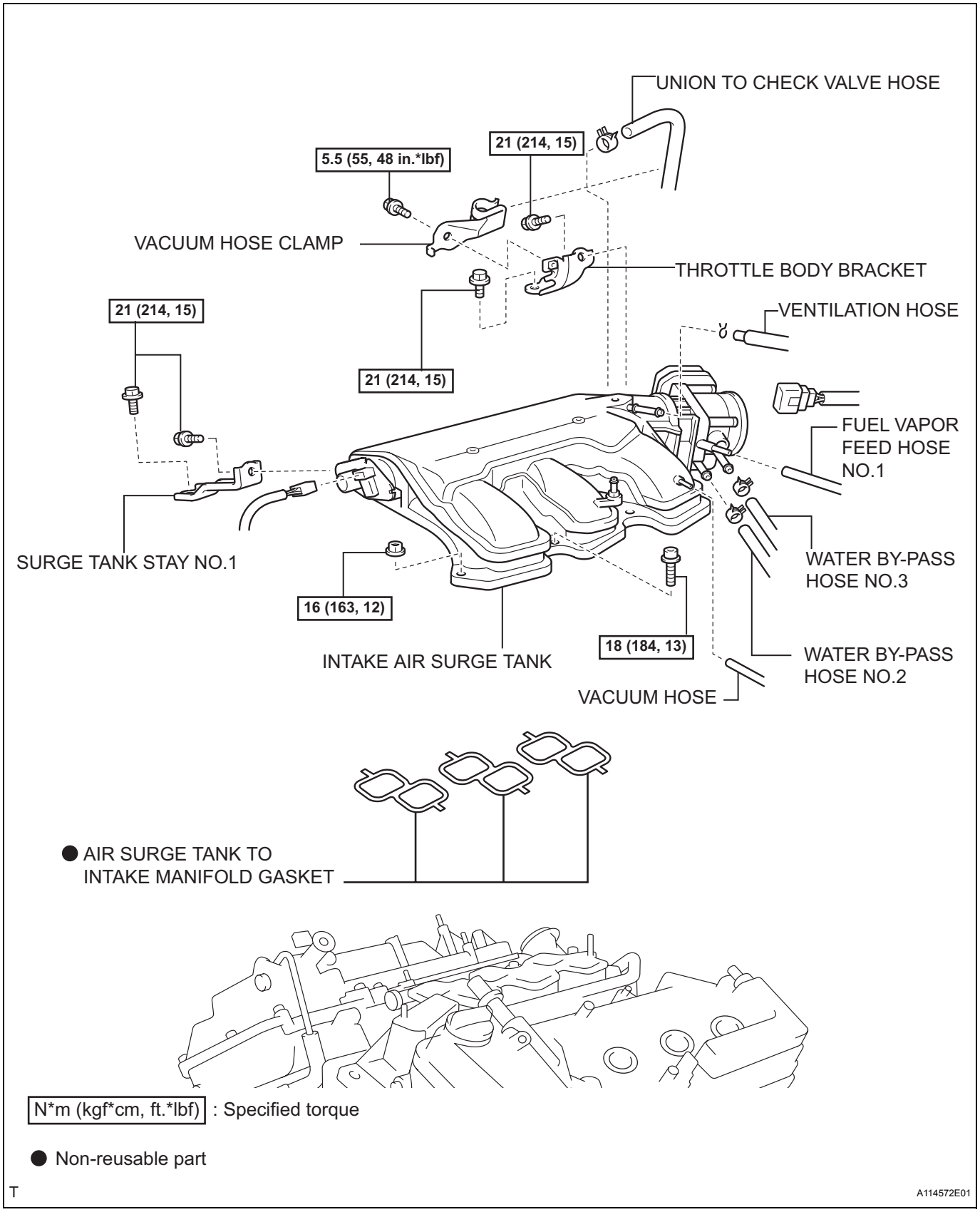
3. ADD ENGINE OIL

4. INSPECT ENGINE OIL LEAKS

(a) Start the engine. Check for oil leaks from the connected parts of the oil filter cap and oil filter drain plug.

OIL PUMP

COMPONENTS



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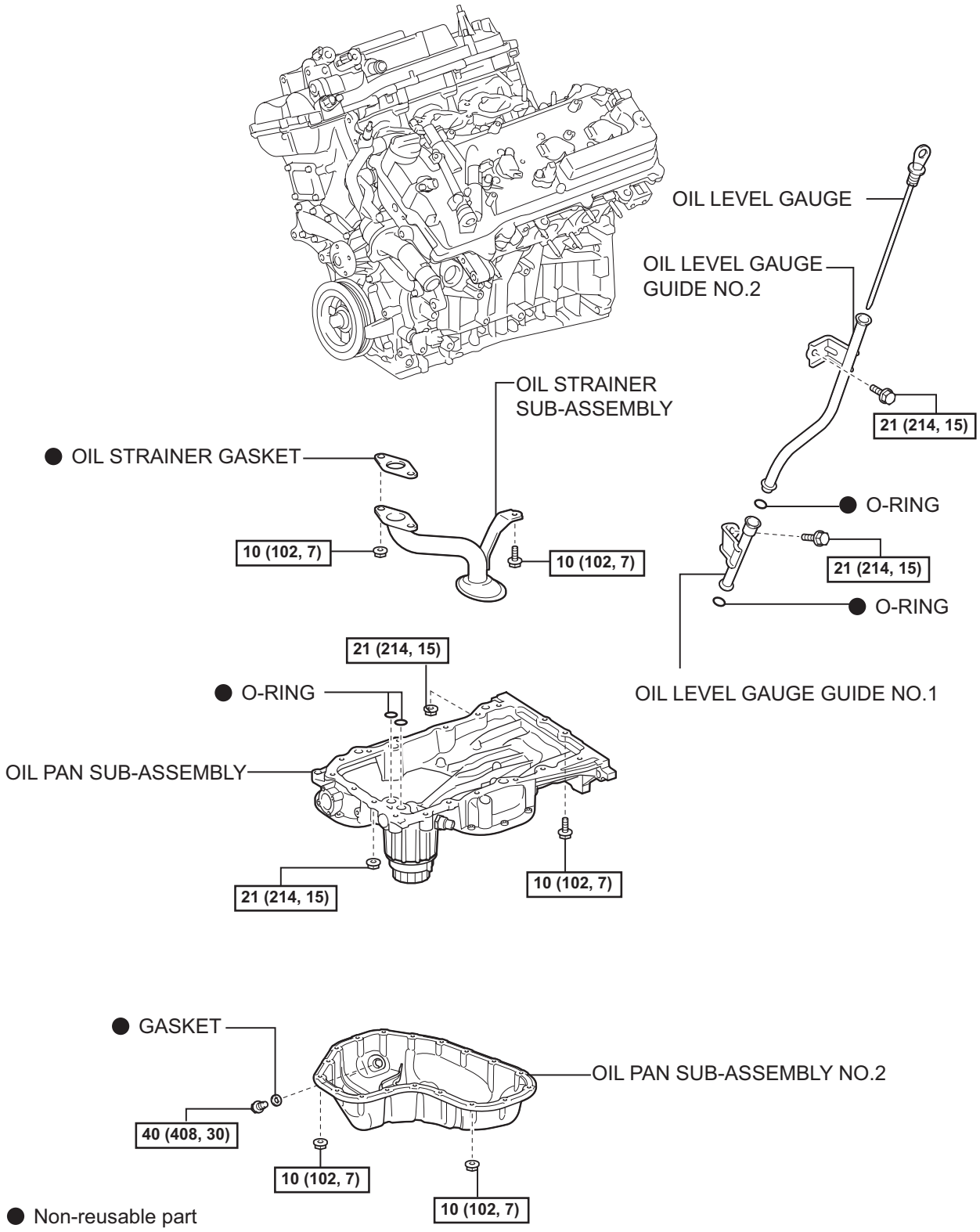

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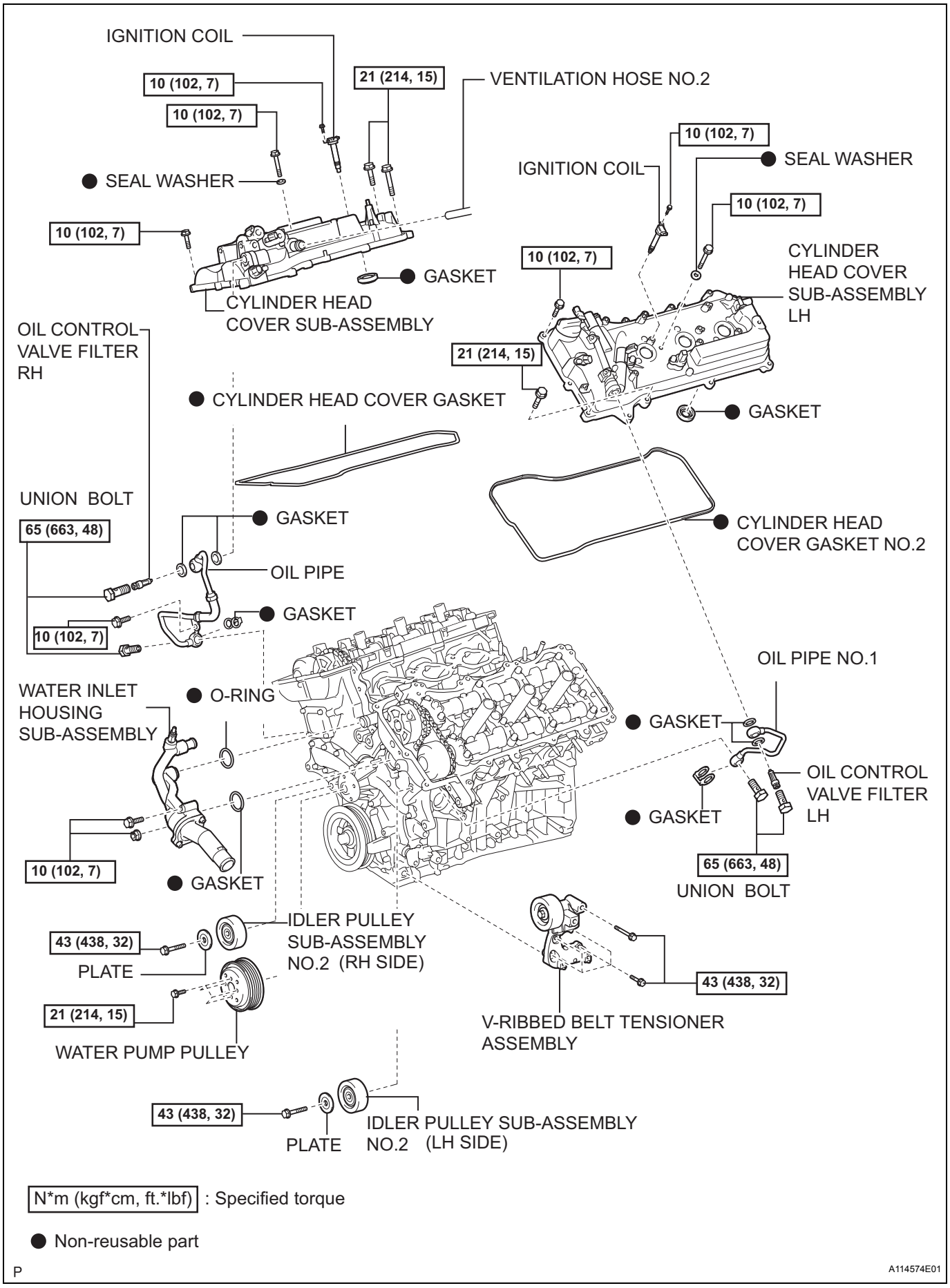

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

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A114574E01

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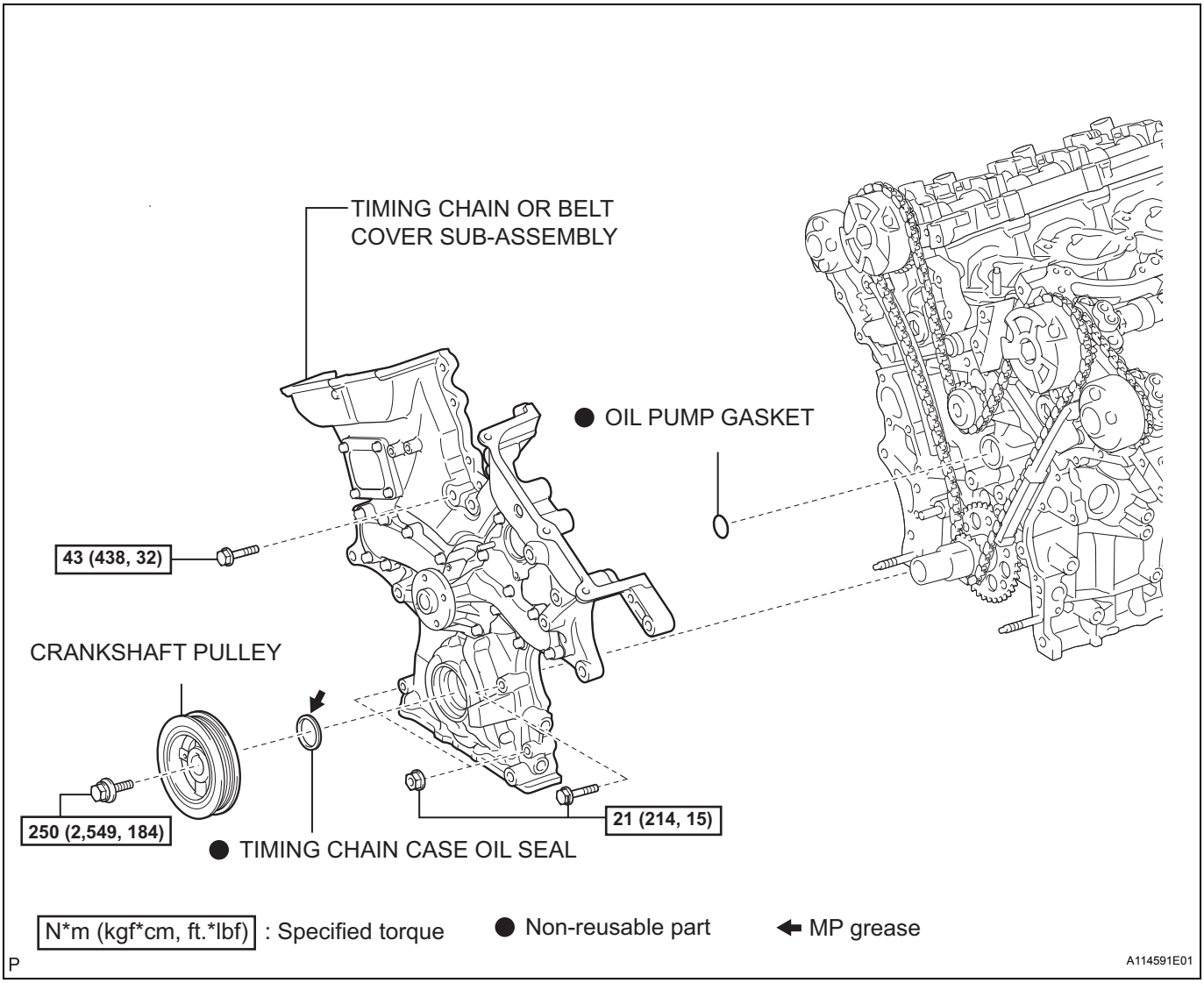
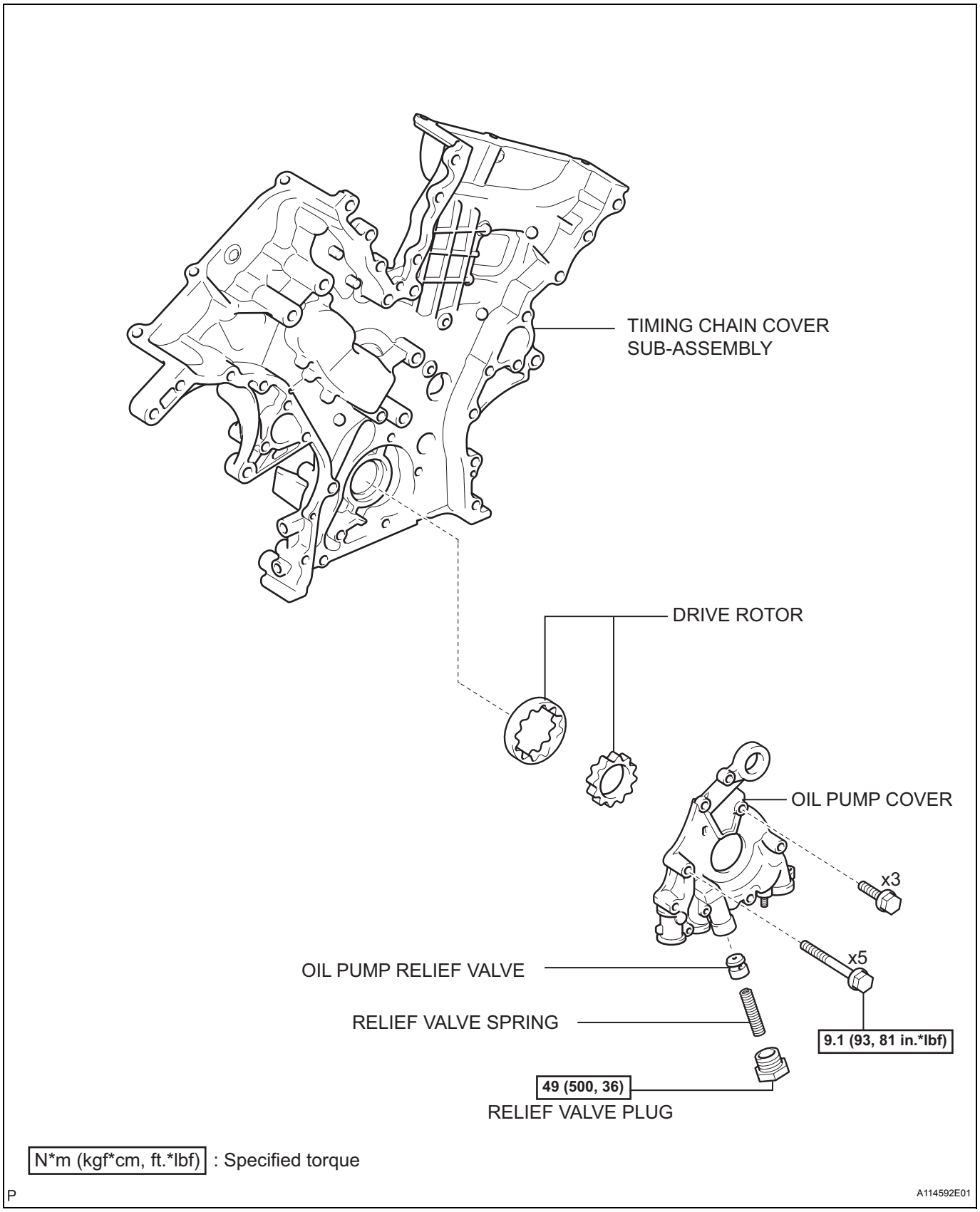
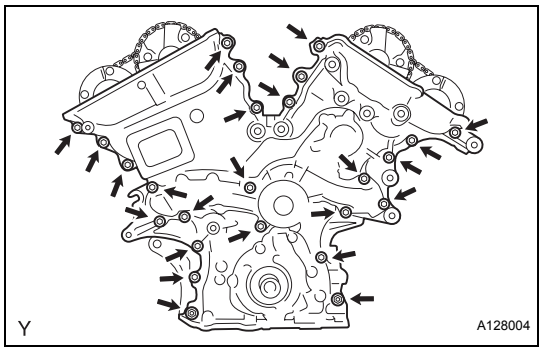

TIMING CHAIN OR BELT
COVER SUB-ASSEMBLY
OIL PUMP GASKET
43 (438, 32)
CRANKSHAFT PULLEY
250 (2,549, 184)
21 (214, 15)
TIMING CHAIN CASE OIL SEAL
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
MP grease
P
A114591E01

LU


TIMING CHAIN COVER
SUB-ASSEMBLY
DRIVE ROTOR
OIL PUMP COVER
x3
x5
OIL PUMP RELIEF VALVE
RELIEF VALVE SPRING
9.1 (93, 81 in.*lbf)
49 (500, 36)
RELIEF VALVE PLUG
N*m (kgf*cm, ft.*lbf) : Specified torque
P
A114592E01

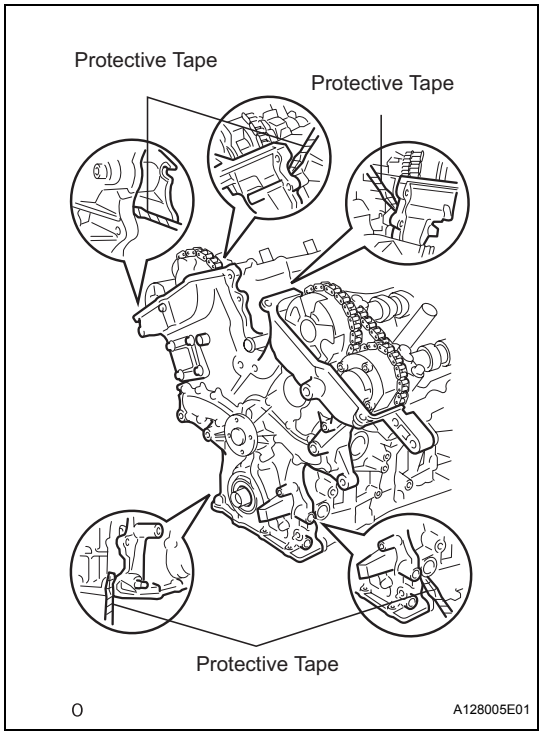
REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-32)
2. REMOVE ENGINE WIRE
3. REMOVE FRONT FRAME ASSEMBLY (See page EM-33)
4. REMOVE STARTER ASSEMBLY (See page ST-72)
5. REMOVE AUTOMATIC TRANSAXLE ASSEMBLY
6. REMOVE OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY (See page EM-34)
7. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY RH (See page EM-34)
8. REMOVE EXHAUST MANIFOLD SUB-ASSEMBLY LH (See page EM-35)
9. REMOVE DRIVE PLATE & RING GEAR SUB-ASSEMBLY (See page EM-16)
10. FIX ENGINE ASSEMBLY
11. REMOVE IDLER PULLEY SUB-ASSEMBLY NO.2 (See page EM-36)
12. REMOVE V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-7)
13. REMOVE WATER PUMP PULLEY (See page CO-17)
14. REMOVE WATER INLET HOUSING (See page CO-16)
15. REMOVE CRANKSHAFT PULLEY (See page EM-59)
16. REMOVE OIL PAN SUB-ASSEMBLY NO.2 (See page EM-61)
17. REMOVE OIL STRAINER SUB-ASSEMBLY (See page EM-61)
18. REMOVE OIL PAN SUB-ASSEMBLY (See page EM-62)
19. REMOVE INTAKE AIR SURGE TANK ASSEMBLY (See page FU-12)
20. REMOVE IGNITION COIL ASSEMBLY (See page EM-34)
21. REMOVE OIL PIPE NO.1 (See page EM-57)
22. REMOVE OIL PIPE NO.2 (See page EM-57)
23. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY RH (See page EM-61)
24. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY LH (See page EM-61)



25. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

(a) Remove the 23 bolts and 2 nuts as shown in the illustration.



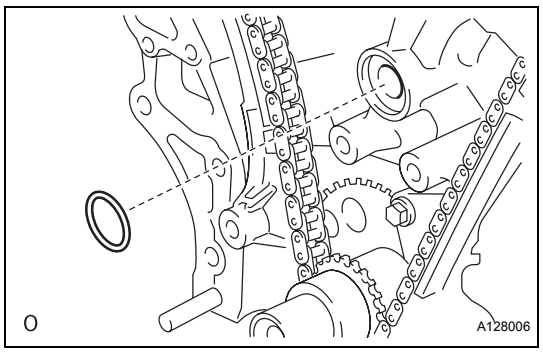
(b) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

NOTICE:

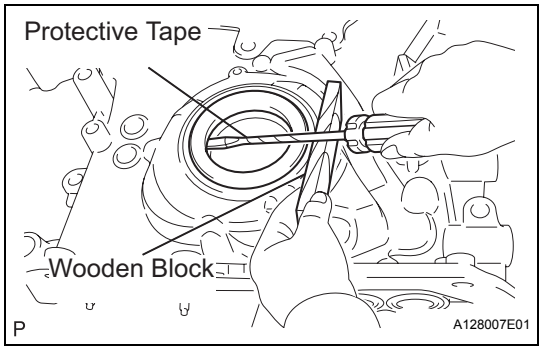
Be careful not to damage the contact surfaces of the cylinder head, cylinder block and chain cover.

HINT:

Tape the screwdriver tip before use.



(c) Remove the gasket.



26. REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

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

HINT:

Tape the screwdriver tip before use.

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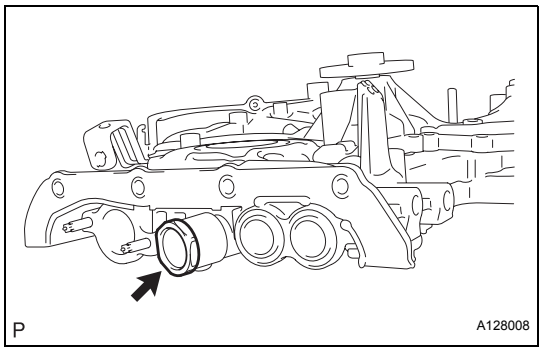
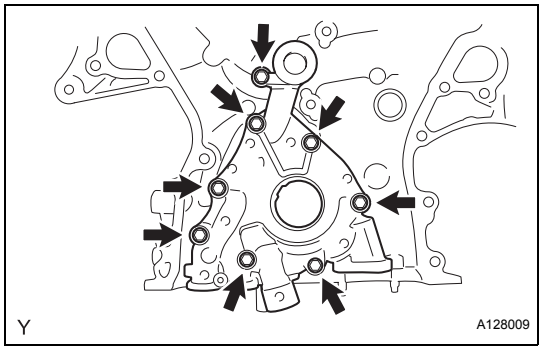


DISASSEMBLY

1. REMOVE OIL PUMP RELIEF VALVE

(a) Using a 27 mm socket wrench, remove the relief valve plug.

(b) Remove the valve spring and oil pump relief valve.



2. REMOVE OIL PUMP COVER

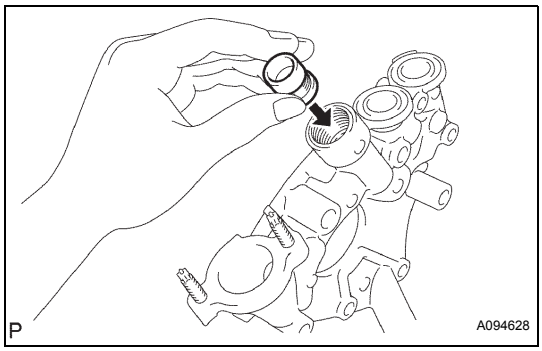
(a) Remove the 8 bolts, oil pump cover, drive rotor and driven rotor.

INSPECTION

1. INSPECT OIL PUMP RELIEF VALVE

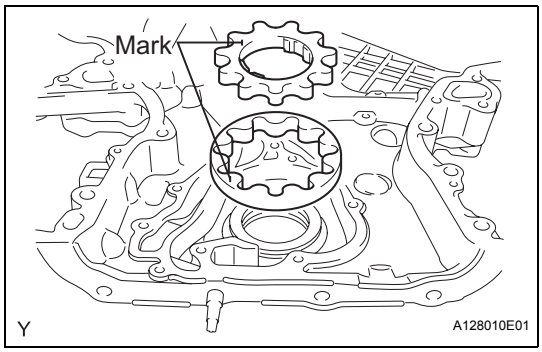
(a) Coat the relief valve with engine oil and check that it falls smoothly into the valve hole under its own weight.

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



2. INSPECT OIL PUMP ROTOR SET

(a) Install the rotors to the timing chain cover with the rotors' marks facing outward. Check that the rotors revolve smoothly.

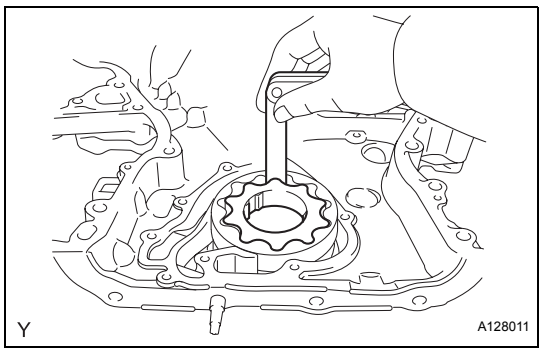


(b) Check the tip clearance.

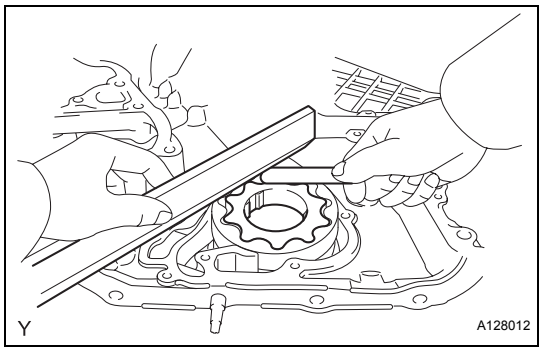
(1) Using a feeler gauge, measure the clearance between the drive and driven rotor tips, as shown in the illustration.

Tip clearance

Standard	Maximum
0.060 to 0.160 mm (0.0024 to 0.0063 in.)	0.16 mm (0.0063 in.)



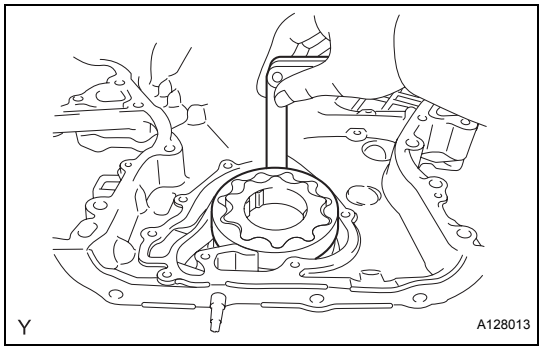
If the tip clearance is greater than the maximum, replace the drive and driven rotors.



(c) Check the side clearance.
(1) Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge, as shown in the illustration.
Side clearance

Standard	Maximum
0.030 to 0.090 mm (0.0012 to 0.0035 in.)	0.090 mm (0.0035 in.)

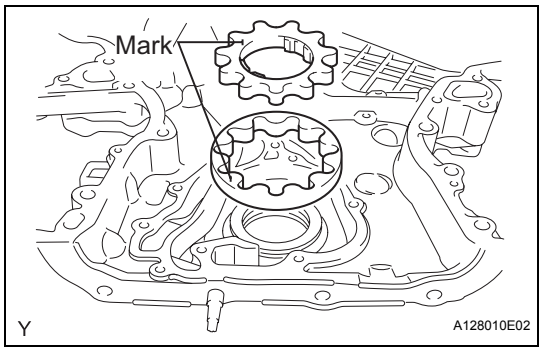
If the side clearance is greater than the maximum, replace the timing chain cover.



(d) Check the body clearance.
(1) Using a feeler gauge, measure the clearance between the timing chain cover and driven rotor, as shown in the illustration.
Body clearance

Standard	Maximum
0.250 to 0.325 mm (0.0098 to 0.0128 in.)	0.325 mm (0.0128 in.)

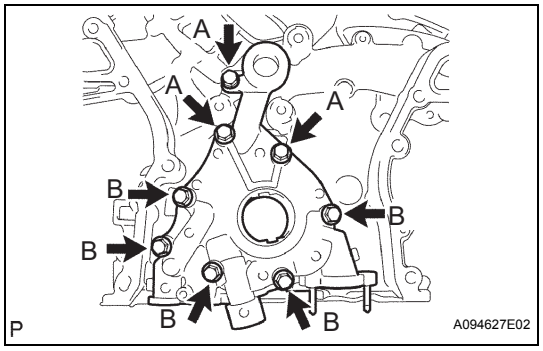
If the body clearance is greater than the maximum, replace the timing chain cover.



REASSEMBLY

1. INSTALL OIL PUMP COVER

(a) Coat the drive and driven rotors with engine oil and place them into the timing chain cover with the marks facing outward (oil pump cover side). Check that the rotors revolve smoothly.



(b) Install the oil pump cover with the 8 bolts.
Torque: 9.1 N*m (93 kgf*cm, 81 in.*lbf)
HINT:
Bolt length:
– 22 mm (0.87 in.) for bolt A
– 40 mm (1.58 in.) for bolt B

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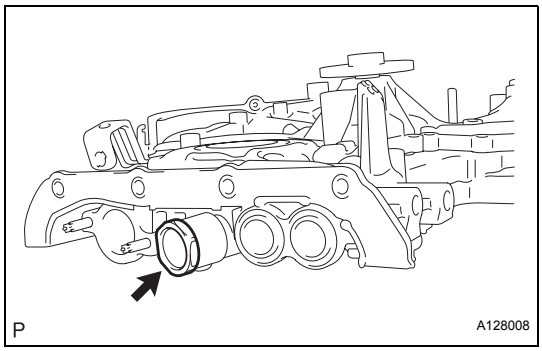


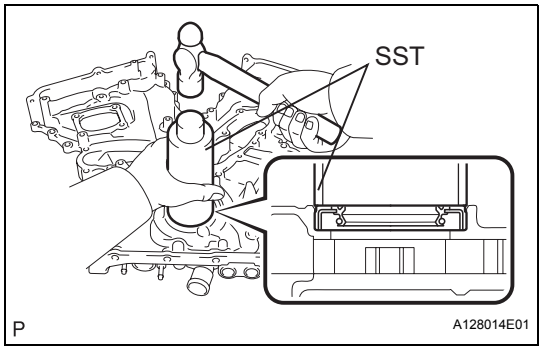
2. INSTALL OIL PUMP RELIEF VALVE

(a) Coat the oil pump relief valve with engine oil.

(b) Insert the relief valve and relief valve spring into the oil pump cover hole.

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

INSTALLATION



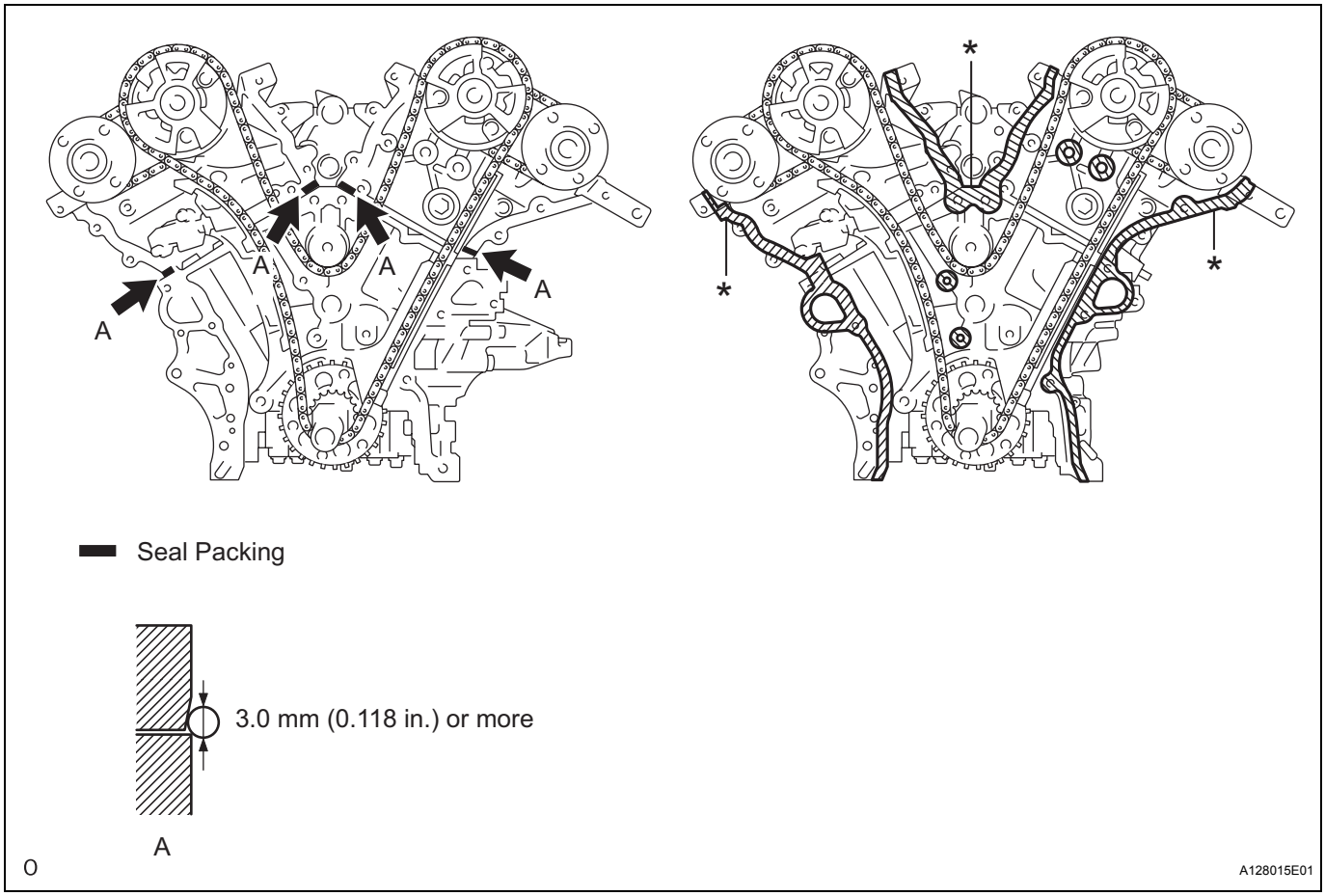
1. INSTALL TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

(a) Using SST, tap in a new oil seal until its surface is flush with the timing chain case edge.
SST 09316-60011 (09316-00011)
NOTICE:
- **Keep the lip free from foreign matter.**
- **Do not tap on the oil seal at an angle.**
- **Make sure that the oil seal edge does not stick out of the timing chain case.**

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

2. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

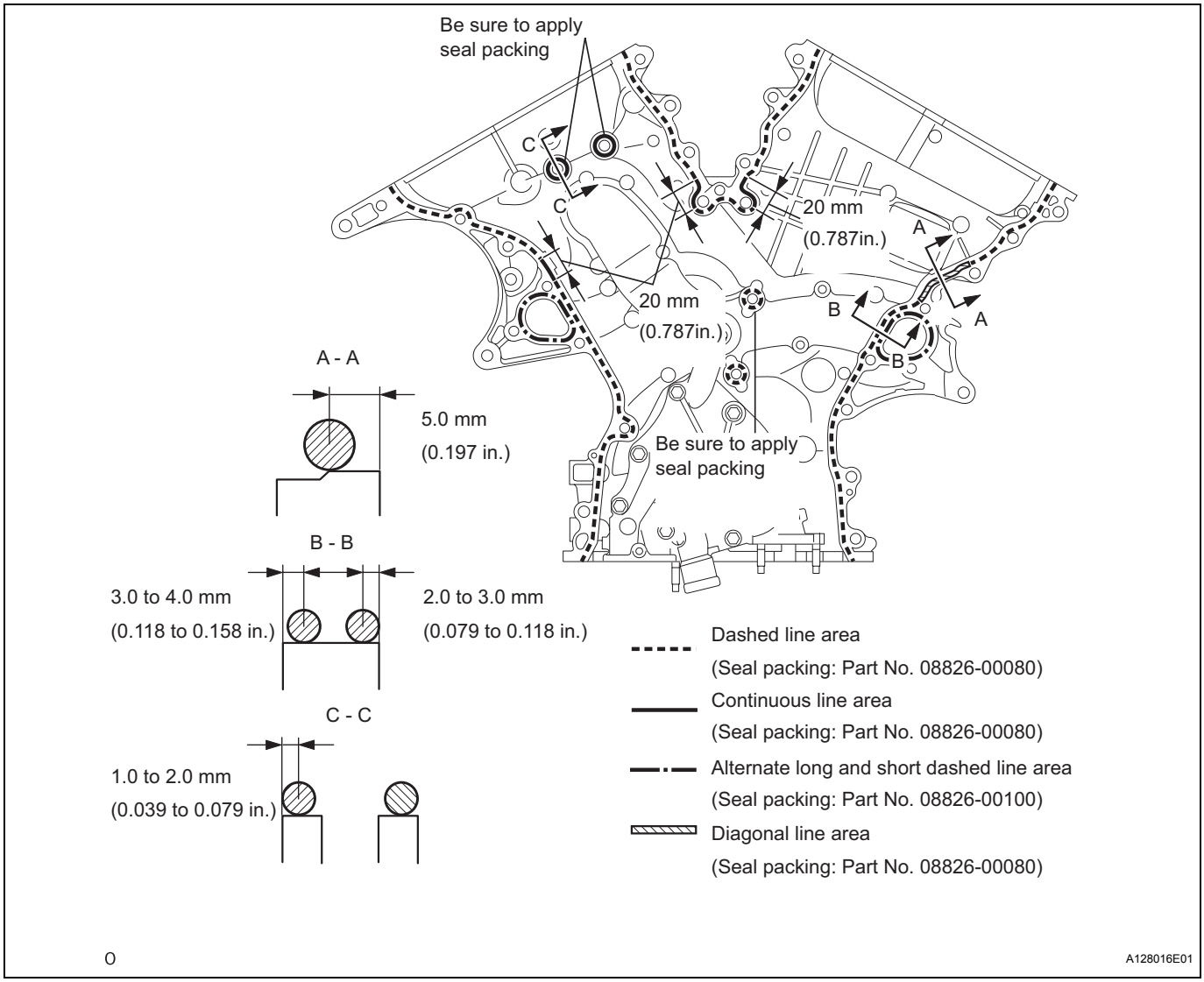
(a) Apply seal packing in a continuous bead to the engine until as shown in the following illustration.



Seal packing:
Part No. 08826-00080 or equivalent
Seal width:
3.0 mm (0.118 in.) or more
NOTICE:

- **Be sure to clean and degrease the contact surfaces, especially the areas indicated by * in the illustration.**
- **When the contact surfaces are wet, wipe off with an oil-free cloth before applying seal packing.**
- **Install the timing chain cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installation.**

(b) Apply seal packing in a continuous bead to the timing chain cover as shown in the following illustration.



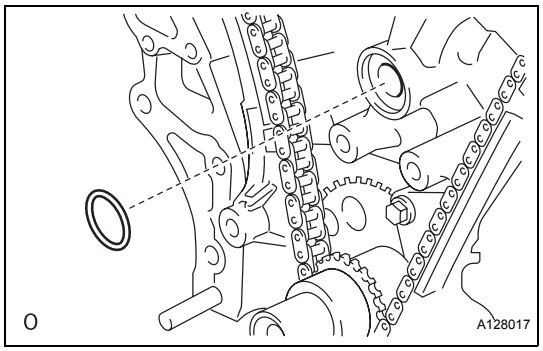
Seal packing:
Part No. 08826-00080 or equivalent
Seal packing:
Part No. 08826-00100 or equivalent
NOTICE:

- **When the contact surfaces are wet, wipe off with an oil-free cloth before applying seal packing.**
- **Install the timing chain cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installation.**

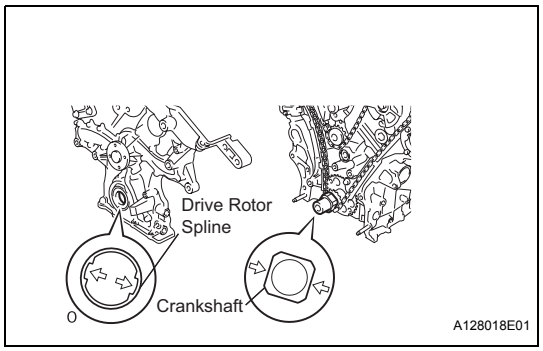
HINT:
Apply seal packing referring to the table and illustration below.

	Seal packing diameter	Application position from inside seal line
Dashed line area	3.5 mm (0.138 in.) or more	3.0 to 4.0 mm (0.118 to 0.158 in.)

	Seal packing diameter	Application position from inside seal line
Continuous line area	4.5 mm (0.177 in.) or more	3.0 to 4.0 mm (0.118 to 0.158 in.)
Alternate long and short dashed line area	3.5 mm (0.138 in.) or more	2.0 to 3.0 mm (0.079 to 0.118 in.)
Diagonal line area	6.0 mm (0.236 in.) or more	5.0 mm (0.197 in.)

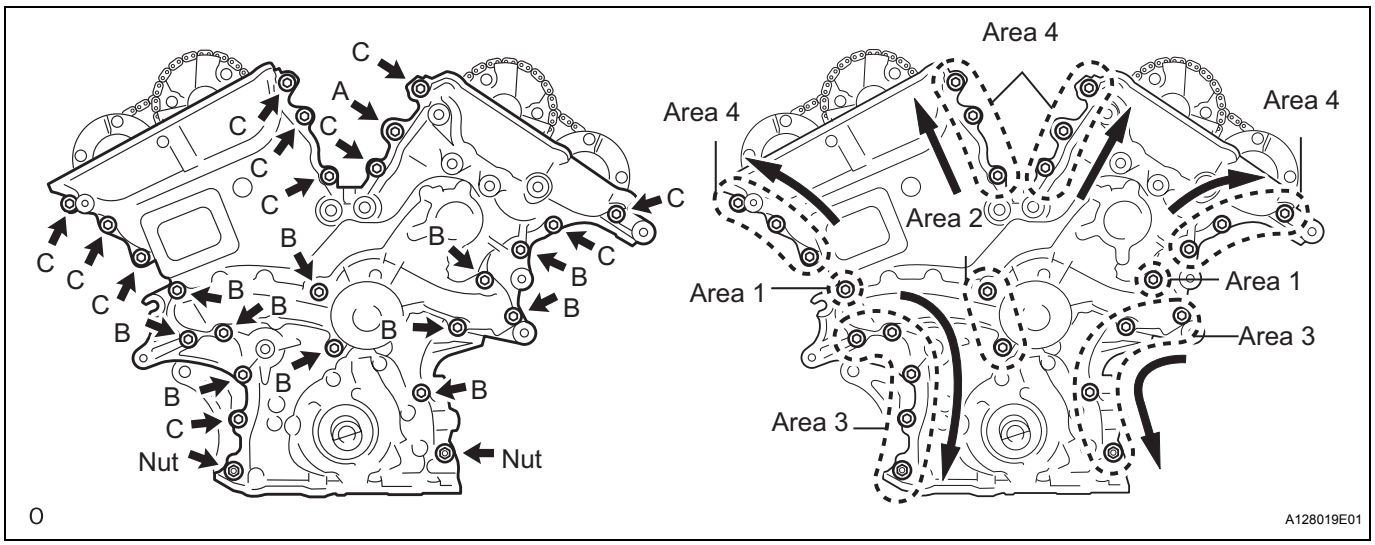


(c) Install a new gasket.



(d) Align the oil pump's drive rotor spline and the crankshaft as shown in the illustration. Install the spline and chain cover to the crankshaft.

(e) Loosely install the timing chain cover with the 23 bolts and 2 nuts, but do not tighten the bolts and nuts yet.



NOTICE:
Make sure that there is no oil on the bolt threads.

HINT:

Bolt length:

– 40 mm (1.57 in.) for bolt A
– 55 mm (2.17 in.) for bolt B
– 25 mm (0.98 in.) for bolt C

(f) Fully tighten the bolts in this order: Areas 1 and Area 2.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

(g) Fully tighten the bolts and nuts in this order: Areas 3.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

(h) Fully tighten the bolts in this order: Areas 4.
Torque: Bolt A
43 N*m (438 kgf*cm, 32 ft.*lbf)
Bolts except A
21 N*m (214 kgf*cm, 15 ft.*lbf)

3. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY LH (See page EM-144)**
4. **INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY RH (See page EM-143)**
5. **INSTALL OIL PIPE NO.2 (See page EM-147)**
6. **INSTALL OIL PIPE NO.1 (See page EM-146)**
7. **INSTALL IGNITION COIL ASSEMBLY (See page EM-40)**
8. **INSTALL INTAKE AIR SURGE TANK ASSEMBLY (See page FU-17)**
9. **INSTALL OIL PAN SUB-ASSEMBLY (See page EM-140)**
10. **INSTALL OIL STRAINER SUB-ASSEMBLY (See page EM-142)**
11. **INSTALL OIL PAN SUB-ASSEMBLY NO.2 (See page EM-142)**
12. **INSTALL CRANKSHAFT PULLEY (See page EM-145)**
13. **INSTALL WATER INLET HOUSING (See page CO-19)**
14. **INSTALL WATER PUMP PULLEY (See page CO-19)**
15. **INSTALL V-RIBBED BELT TENSIONER ASSEMBLY (See page EM-8)**
16. **INSTALL IDLER PULLEY SUB-ASSEMBLY NO.2 (See page EM-38)**
17. **REMOVE AUTOMATIC TRANSAXLE ASSEMBLY (See page AX-158)**
18. **INSTALL DRIVE PLATE & RING GEAR SUB-ASSEMBLY (See page EM-40)**
19. **INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY LH (See page EM-39)**
20. **INSTALL EXHAUST MANIFOLD SUB-ASSEMBLY RH (See page EM-40)**
21. **INSTALL OIL LEVEL GAUGE GUIDE SUB-ASSEMBLY (See page EM-39)**
22. **INSTALL AUTOMATIC TRANSAXLE ASSEMBLY (See page AX-160)**
23. **INSTALL STARTER ASSEMBLY (See page ST-79)**

24. **INSTALL FRONT FRAME ASSEMBLY (See page EM-40)**
25. **INSTALL ENGINE WIRE**
26. **INSTALL ENGINE ASSEMBLY WITH TRANSAXLE (See page EM-41)**