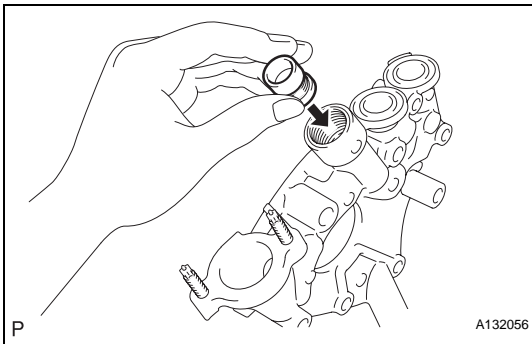


INSPECTION

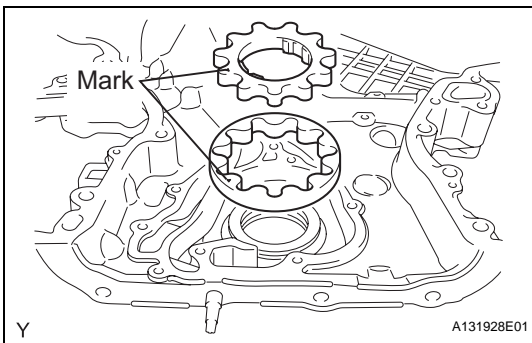
1. INSPECT OIL PUMP RELIEF VALVE

- (a) Coat the relief valve with engine oil and drop it into the relief valve hole.
- (b) Check that the relief valve falls in smoothly by its own weight.
If it does not, replace the relief valve. If necessary, replace the timing chain cover.



2. INSPECT OIL PUMP ROTOR SET

- (a) Install the drive and driven rotors into the timing chain cover with the rotors' marks facing the cylinder block side. Check that the rotors revolve smoothly.

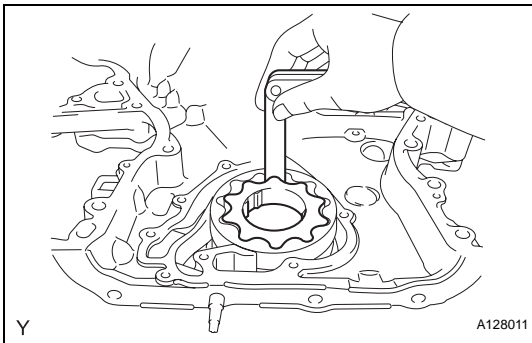


- (b) Check the tip clearance.
 - (1) Using a feeler gauge, measure the clearance between the drive rotor and driven rotor tips.

Standard tip clearance:
0.060 to 0.160 mm (0.0024 to 0.0063 in.)

Maximum tip clearance:
0.16 mm (0.0063 in.)

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

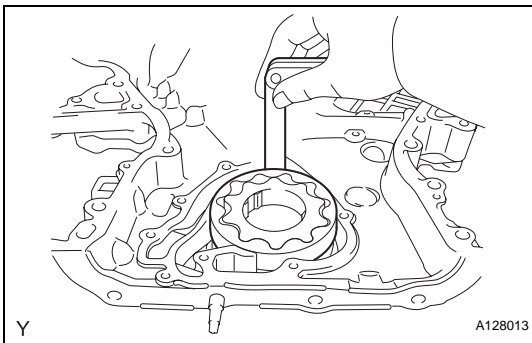


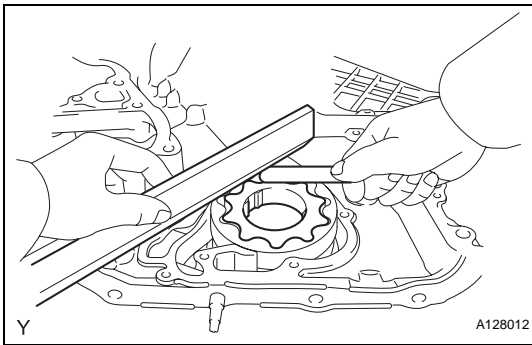
- (c) Check the body clearance.
 - (1) Using a feeler gauge, measure the clearance between the timing chain cover and driven rotor.

Standard body clearance:
0.250 to 0.325 mm (0.0098 to 0.0128 in.)

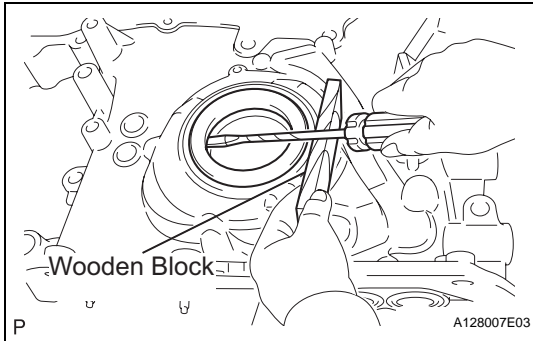
Maximum body clearance:
0.325 mm (0.0128 in.)

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





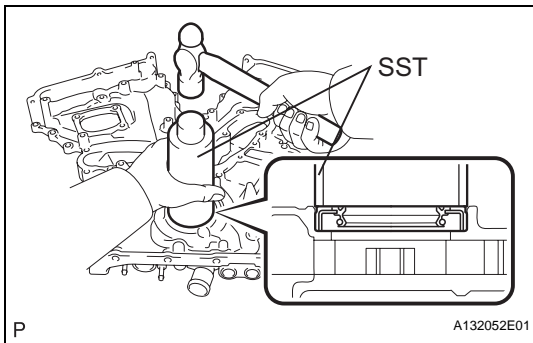
- (d) Check the side clearance.
- (1) Using a feeler gauge and precision straightedge, measure the clearance between the rotors and precision straightedge.
- Standard side clearance:**
0.030 to 0.090 mm (0.0012 to 0.0035 in.)
- Maximum side clearance:**
0.090 mm (0.0035 in.)
- If the side clearance is greater than the maximum, replace the timing chain cover.



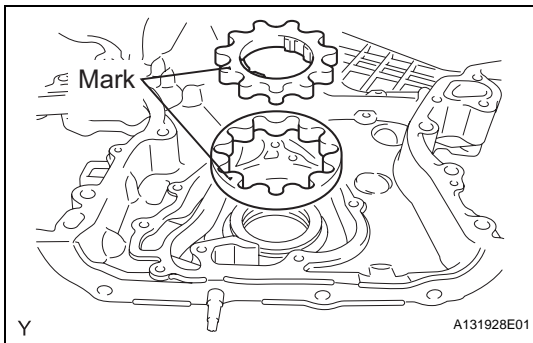
REPLACEMENT

1. REPLACE TIMING CHAIN COVER OIL SEAL

- (a) Using a screwdriver, pry out the oil seal.
- HINT:**
 Tape the screwdriver tip before use.
- NOTICE:**
Do not damage the surface of the oil seal press fit hole.



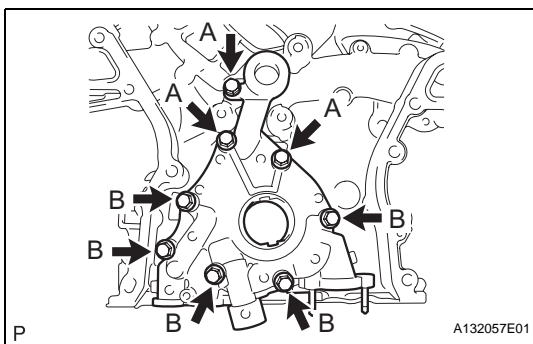
- (b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the timing chain cover edge.
- SST 09316-60011 (09316-00011)**
- NOTICE:**
- Keep the lip free from foreign matter.
 - Do not tap the oil seal at an angle.
 - Make sure that the oil seal edge does not stick out of the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



REASSEMBLY

1. INSTALL OIL PUMP COVER

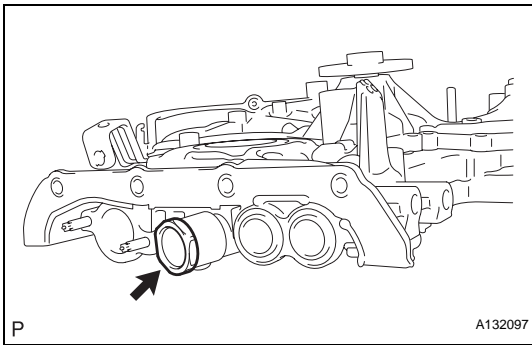
- (a) Install the drive and driven rotors into the timing chain cover with the rotors' marks facing the cylinder block side. Check that the rotors revolve smoothly.



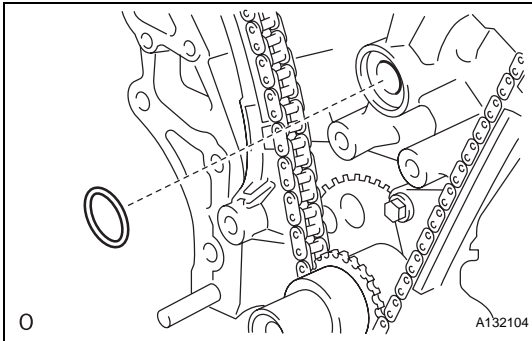
- (b) Install the oil pump cover with the 8 bolts.
- Torque: 9.0 N*m (92 kgf*cm, 80 in.*lbf)**
- HINT:**
 Bolt length:
 22 mm (0.87 in.) for bolt A
 40 mm (1.58 in.) for bolt B

2. INSTALL OIL PUMP RELIEF VALVE

- (a) Coat the oil pump relief valve with engine oil.
- (b) Install the relief valve and relief valve spring into the timing chain cover hole.



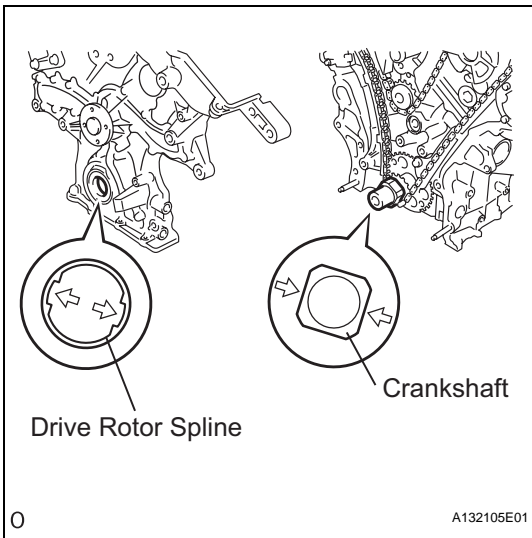
- (c) Using a 27 mm socket wrench, install the plug.
Torque: 49 N*m (500 kgf*cm, 36 ft.*lbf)



INSTALLATION

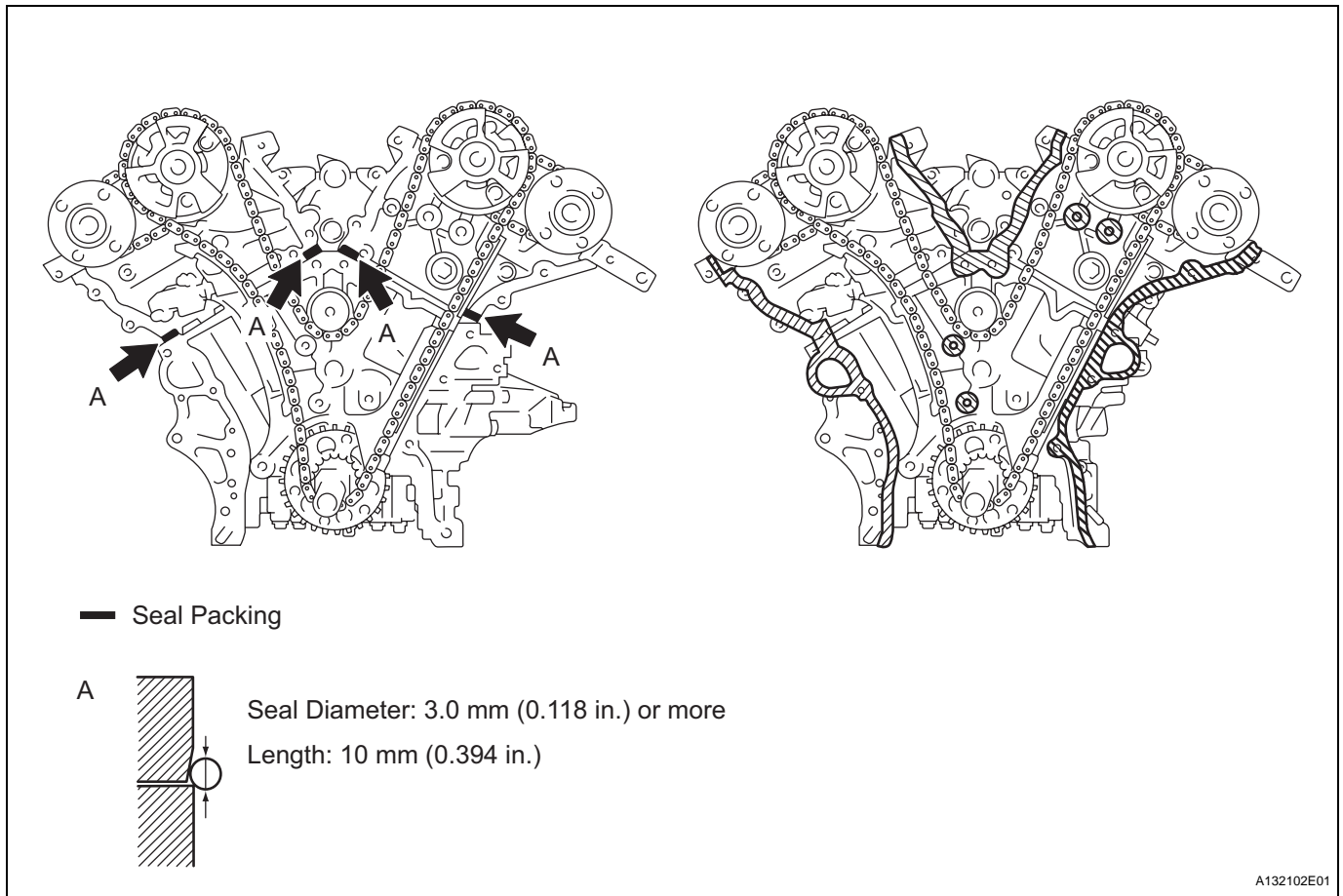
1. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY (w/ Oil Pump)

- (a) Install a new gasket.



- (b) Align the oil pump's drive rotor spline and the crankshaft as shown in the illustration.

- (c) Apply seal packing in a continuous bead to the engine unit as shown in the illustration.



Seal packing:

Toyota Genuine Seal Packing Block, Three Bond 1207B or Equivalent.

Standard seal diameter:

3.0 mm (0.118 in.) or more

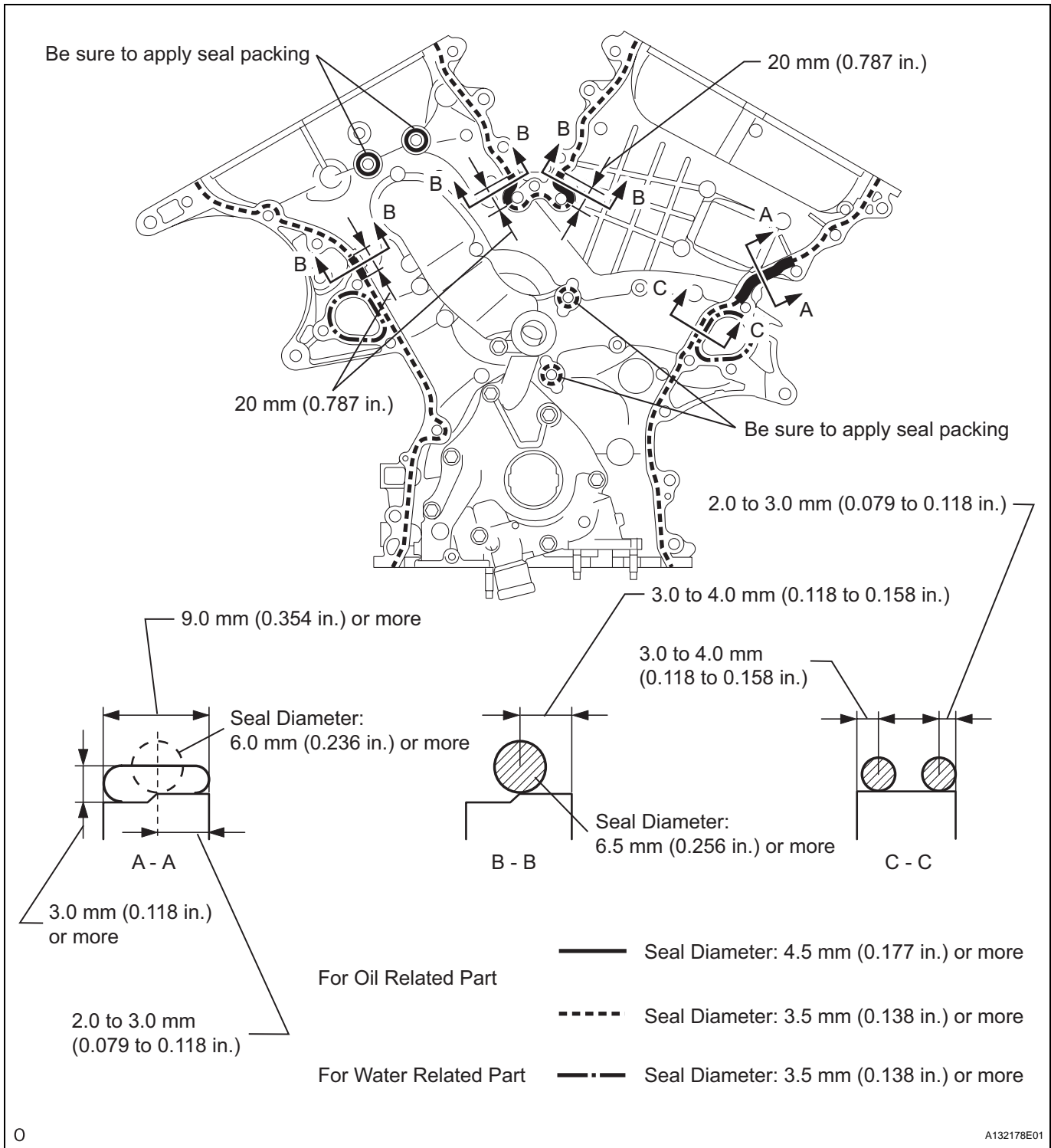
Standard length:

10 mm (0.394 in.)

NOTICE:

- Be sure to clean and degrease the contact surfaces, especially the hatched areas in the illustration.
- When the contact surfaces are wet, wipe them off with an oil-free cloth before applying seal packing.
- Install the timing chin 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 the installation.

(d) Apply seal packing in a continuous line to the timing chain cover as shown in the illustration.



Seal packing:

For oil related part:

Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent

For water related part:

Toyota Genuine Seal Packing 1282B, Three Bond 1282B or Equivalent

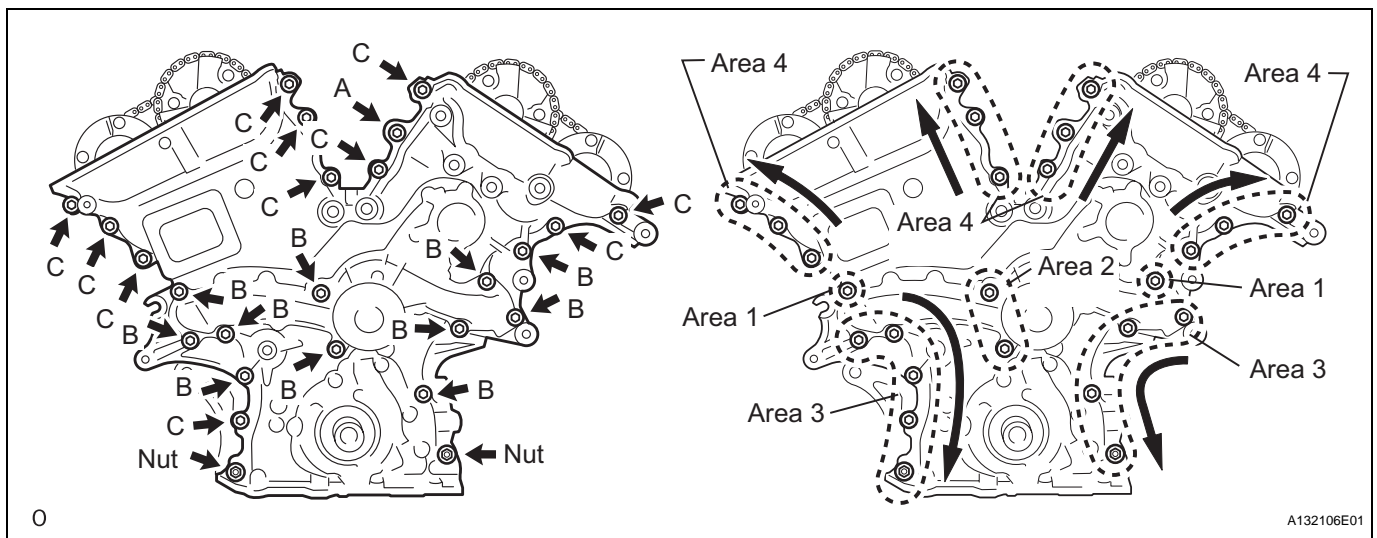
Standard seal diameter

Position	Specified Condition
A - A	6.0 mm (0.236 in.)
B - B	6.5 mm (0.256 in.)
Continuous line area	4.5 mm (0.138 in.) or more
Dashed line area	3.5 mm (0.138 in.) or more
Alternate long and short dashed line area	3.5 mm (0.138 in.) or more

NOTICE:

- When the contact surfaces are wet, wipe them 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 the installation.

(e) Temporarily install the timing chain cover with the 23 bolts and 2 nuts.

**NOTICE:**

Make sure there is no oil on the bolts. If there is oil on the bolts, clean them before installing them.

HINT:

Bolt length:

40 mm (1.57 in.) for bolt A

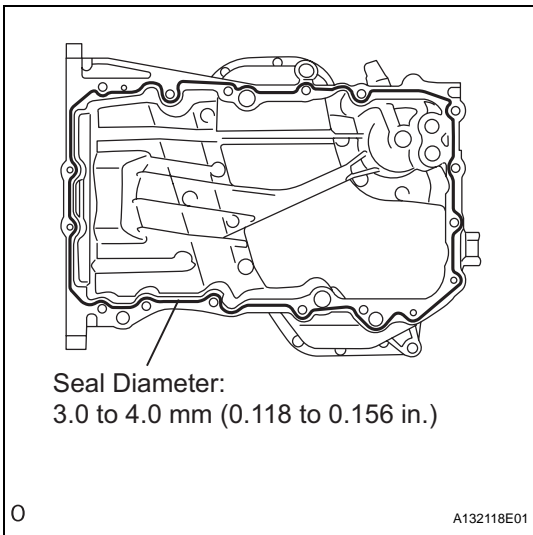
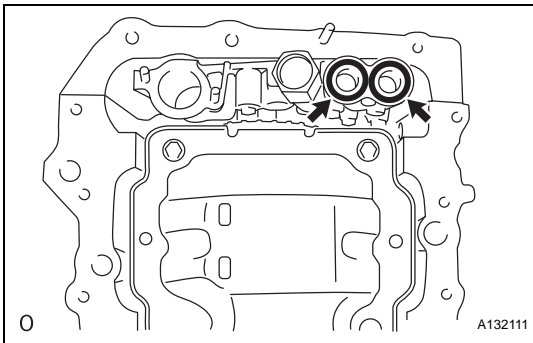
55 mm (2.17 in.) for bolt B

25 mm (0.98 in.) for bolt C

- (f) Tighten the bolts in this order: Area 1, Area 2, Area 3, Area 4.

Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf) for Area 1, 2 bolt
 21 N*m (214 kgf*cm, 15 ft.*lbf) for Area 3 bolt, nut
 43 N*m (438 kgf*cm, 32 ft.*lbf) for Area 4 bolt A
 21 N*m (214 kgf*cm, 15 ft.*lbf) for Area 4 except bolt A

2. INSTALL CRANKSHAFT PULLEY (See page [EM-126](#))
3. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 2) (See page [EM-127](#))
4. INSTALL NO. 1 OIL PIPE (See page [EM-128](#))
5. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY (for Bank 1) (See page [EM-127](#))
6. INSTALL OIL PIPE (See page [EM-127](#))
7. INSTALL WATER INLET HOUSING (See page [CO-14](#))
8. INSTALL OIL PAN SUB-ASSEMBLY
 - (a) Install 2 new O-rings to the timing chain cover.



- (b) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:

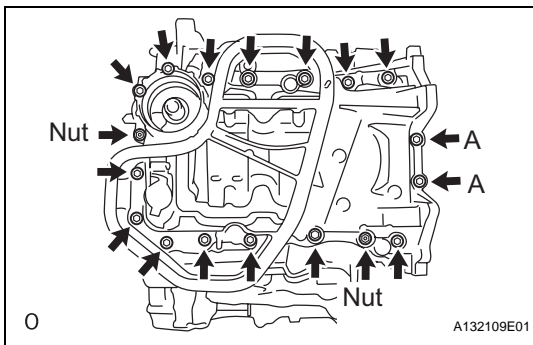
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent

Standard seal diameter:

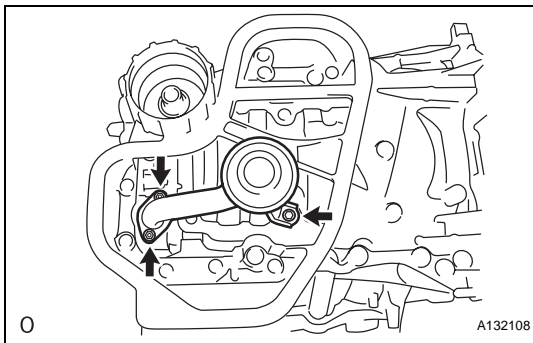
3.0 to 4.0 mm (0.118 to 0.156 in.)

NOTICE:

- Remove any oil from the contact surface.
- Install the oil pan 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 the installation.

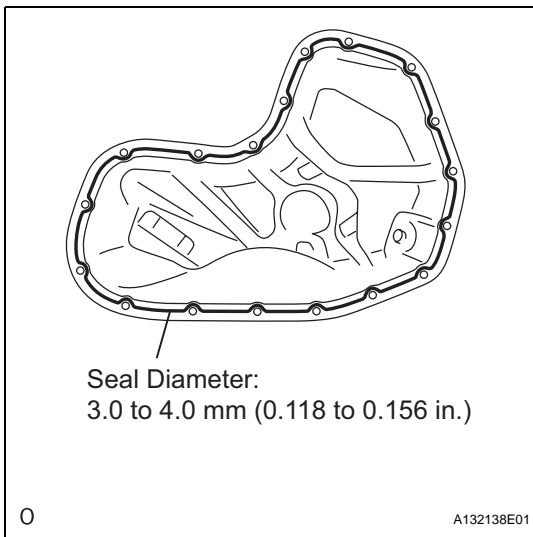


- (c) Install the oil pan with the 16 bolts and 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf) for bolt A
21 N*m (214 kgf*cm, 15 ft.*lbf) for
except bolt A, nut



9. INSTALL OIL STRAINER SUB-ASSEMBLY

- (a) Install a new gasket and the oil strainer with the bolt and 2 nuts.
Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)



10. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY

- (a) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:

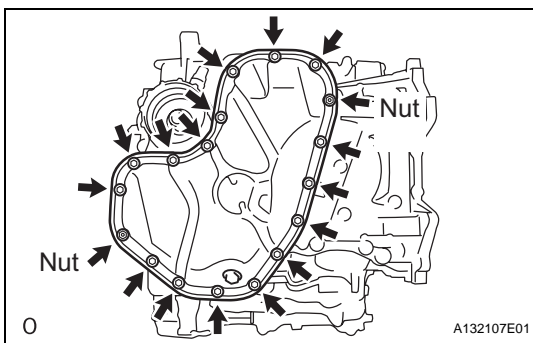
Toyota Genuine Seal Packing Black, Three Bond 1207B or Equivalent

Standard seal diameter:

3.0 to 4.0 mm (0.118 to 0.156 in.)

NOTICE:

- Remove any oil from the contact surface.
- Install the oil pan within 3 minutes and tighten the bolts within 10 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after the installation.



- (b) Install the oil pan with the 16 bolts and 2 nuts.

Torque: 10 N*m (102 kgf*cm, 7 ft.*lbf)

- (c) Install a new gasket and the drain plug.

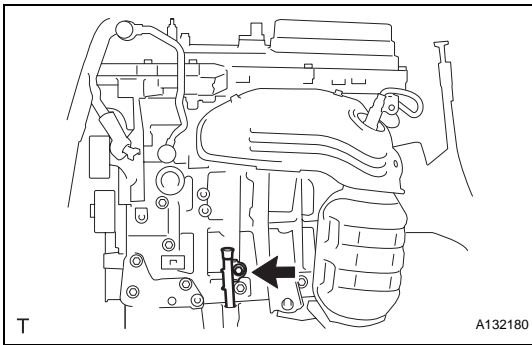
Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

11. INSTALL OIL FILTER ELEMENT KIT (See page LU-5)

12. INSTALL OIL FILTER CAP ASSEMBLY (See page LU-5)

13. INSTALL OIL DIPSTICK GUIDE

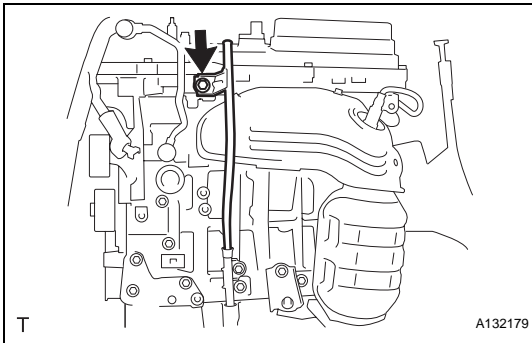
- (a) Install a new O-ring to the dipstick guide.



- (b) Install the dipstick guide with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

14. INSTALL NO. 2 OIL DIPSTICK GUIDE

- (a) Install a new O-ring to the dipstick guide.



- (b) Install the dipstick guide with the bolt.
Torque: 21 N*m (214 kgf*cm, 15 ft.*lbf)

- (c) Install the oil dipstick.

15. REMOVE ENGINE FROM STAND

16. INSTALL ENGINE ASSEMBLY

- (a) Install the engine to the vehicle (see page [EM-31](#)).

17. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL