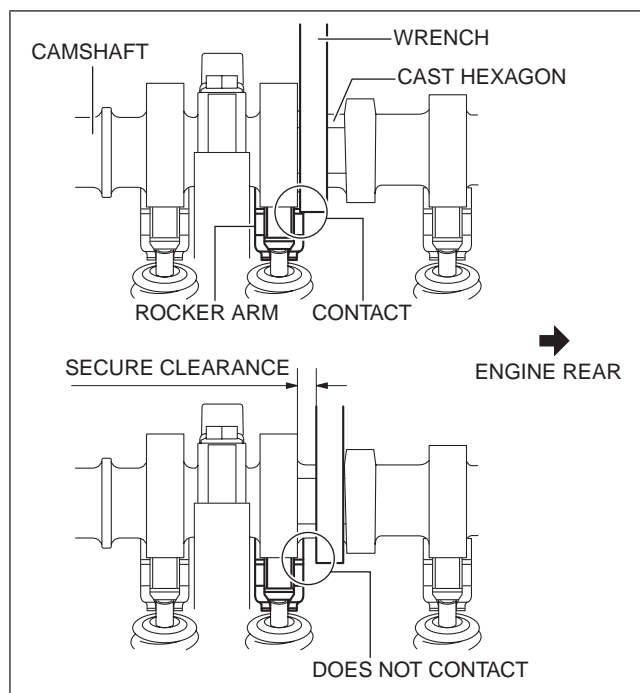


TIMING CHAIN ASSEMBLY

id011000505600

Caution

- When rotating the camshaft using a wrench on the cast hexagon, the wrench may contact the rocker arm and damage the rocker arm. To prevent damage to the rocker arm when holding the camshaft on the cast hexagon, use the wrench at engine rear side as shown in the figure to secure a clearance between the cam.

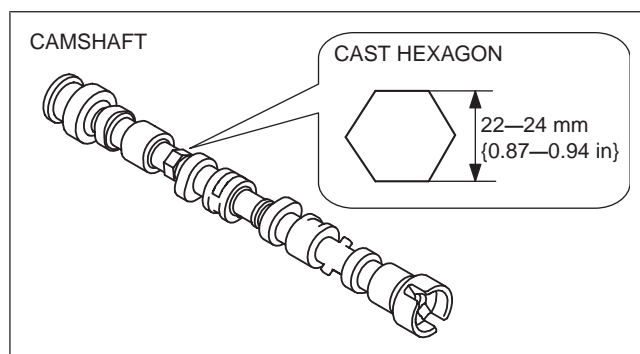


am3uuw00008837

Note

- Width at the cast hexagon of the camshaft is 22—24 mm {0.87—0.94 in}.

- Assemble in the order indicated in the table.



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8	Crankshaft sprocket (See Timing Chain Assembly Note.)
9	Timing chain (See Timing Chain Assembly Note.)
10	Timing chain guide (See Timing Chain Assembly Note.)
11	Timing chain tensioner arm (See Timing Chain Assembly Note.)
12	Timing chain tensioner (See Timing Chain Assembly Note.)
13	Engine front cover (See Engine Front Cover Assembly Note.)
14	Oil pan (See Oil Pan Assembly Note.)
15	Front oil seal (See Front Oil Seal Assembly Note.)

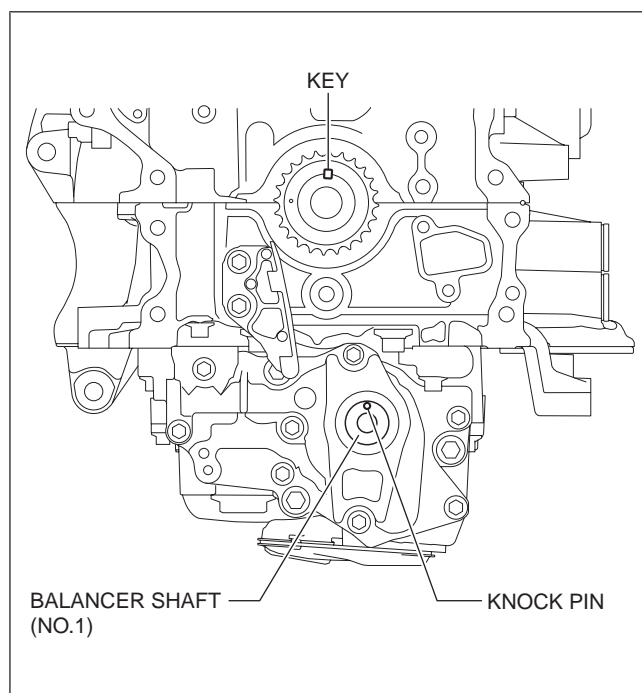
16	Crankshaft pulley
17	Crankshaft pulley lock bolt (See Crankshaft Pulley Lock Bolt Assembly Note.)
18	Water pipe (See Water Pipe Assembly Note.)
19	Oil shower pipe (See Oil Shower Pipe Assembly Note.)
20	Pressure regulator valve (See Pressure Regulator Valve Assembly Note.)
21	Oil baffle plate
22	Cylinder head cover (See Cylinder Head Cover Assembly Note.)
23	Dipstick

Oil Pump Chain Assembly Note

- Verify that the key and knock pin are aligned to the positions shown in the figure.
 - If they are not in the positions shown in the figure, rotate the crankshaft and balancer shaft (No.1) to set cylinder No.1 to top dead center (TDC).

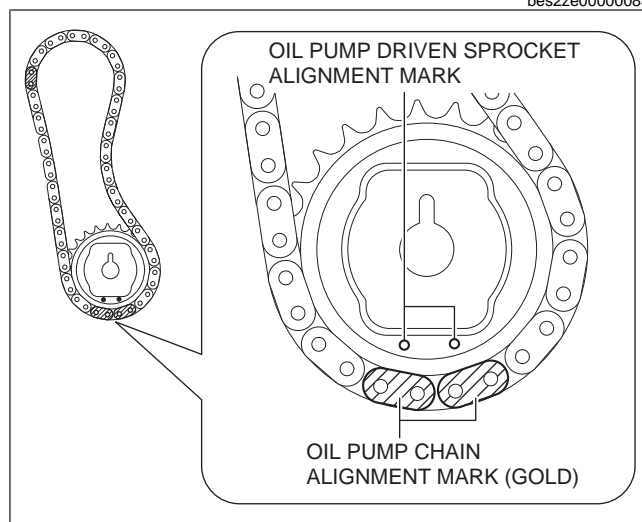
Note

- When rotating the balancer shaft (No.1), temporarily assemble the oil pump driven sprocket and rotate while holding the sprocket with a hand.



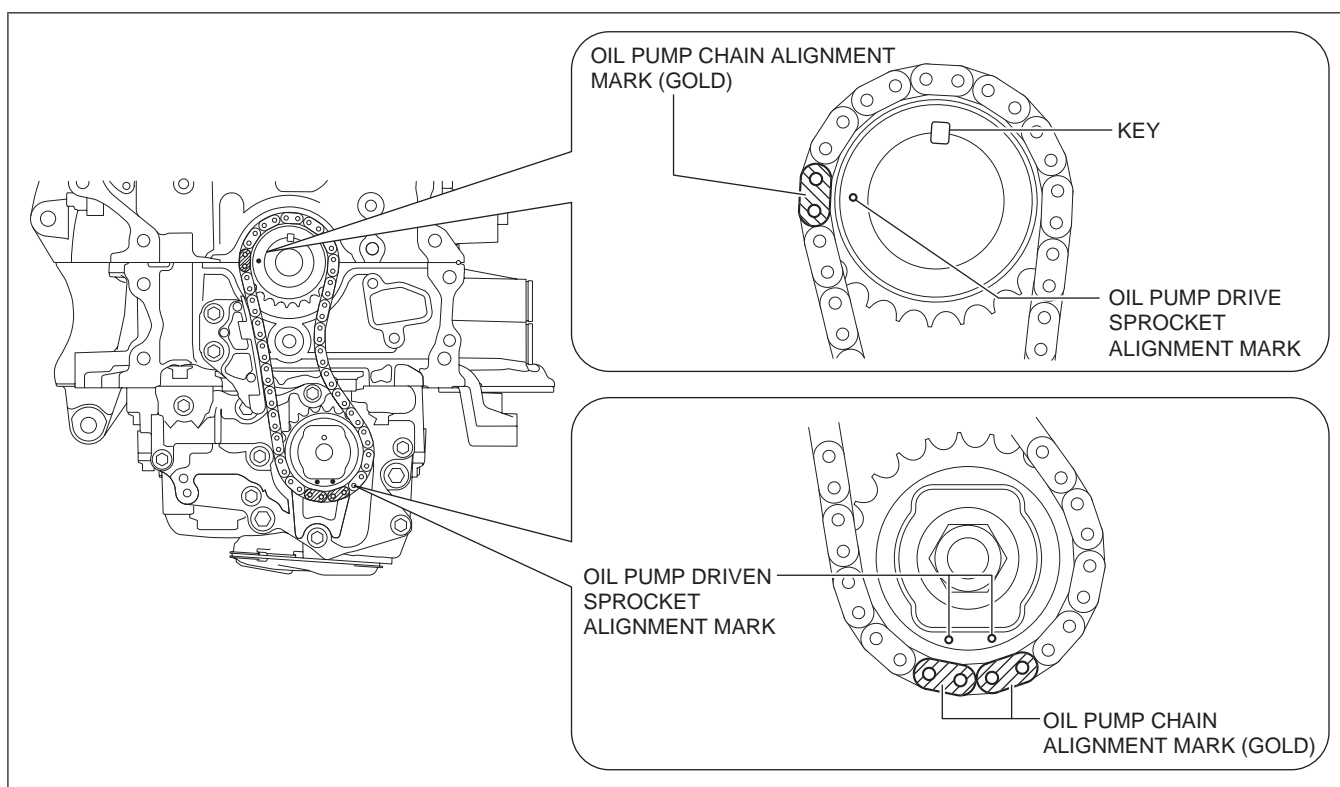
bes2ze00000083

- Align the oil pump chain alignment marks with the oil pump driven sprocket alignment marks.



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- Install the oil pump chain and oil pump driven sprocket as a single unit while aligning the alignment marks on each sprocket and oil pump chain as shown in the figure.



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4. Temporarily tighten the oil pump driven sprocket installation bolt.
5. Install the oil pump chain tensioner.

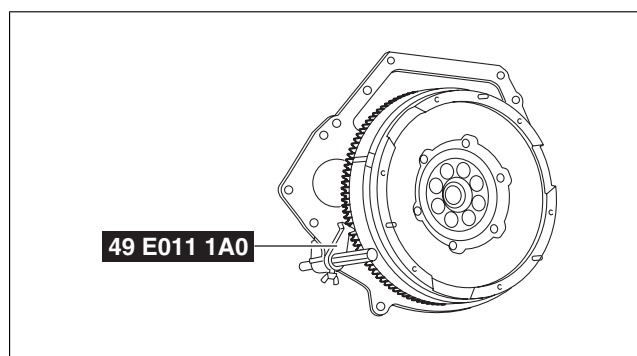
Caution

- At this stage, do not remove the wire or paper clip installed to the oil pump chain tensioner.

6. Tighten the oil pump driven sprocket installation bolt using the following procedure:

(1) Hold the crankshaft using the **SST**.

MTX



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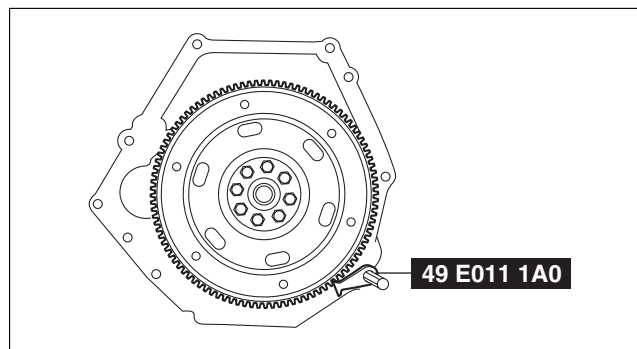
ATX

- (2) Tighten the oil pump driven sprocket installation bolt.

Tightening torque

123—140 N·m {13—14 kgf·m, 91—103 ft·lbf}

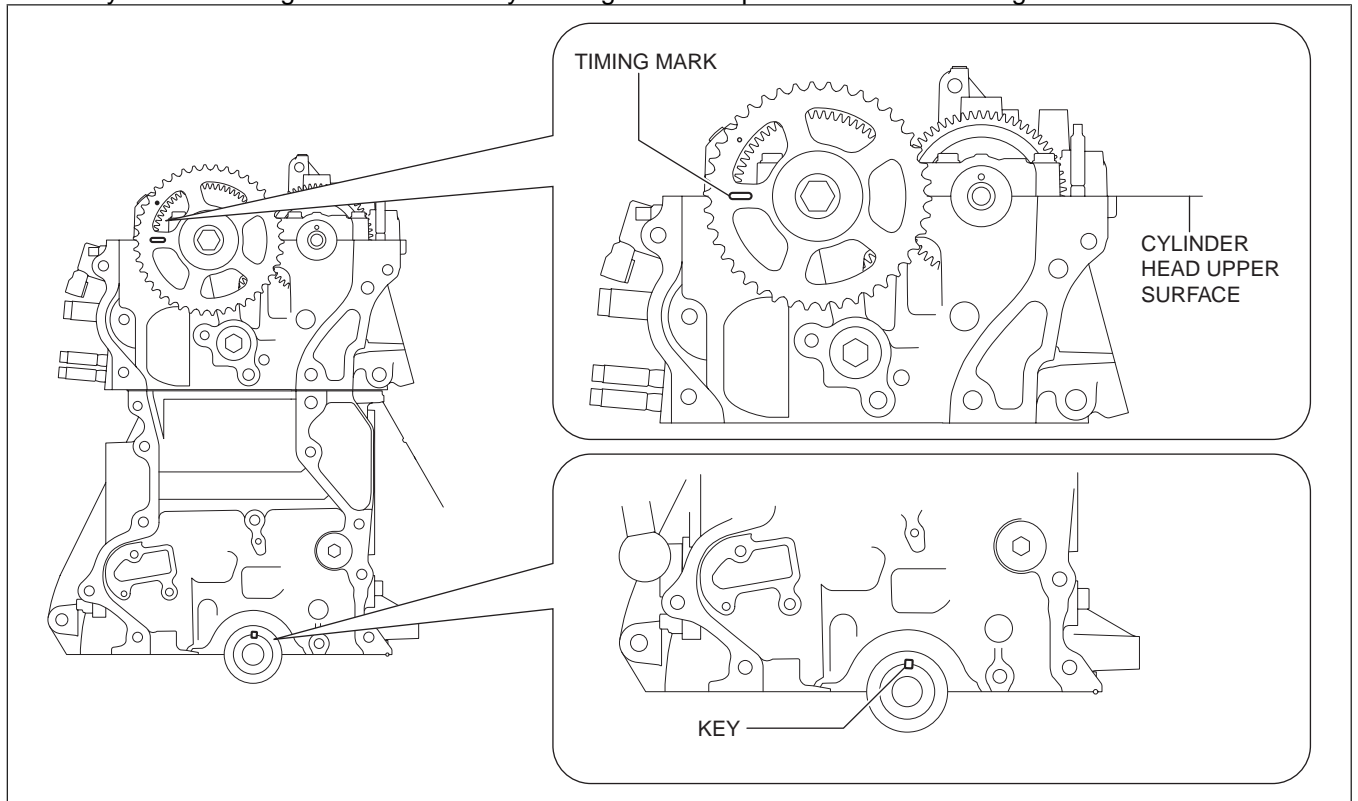
7. Remove the wire or paper clip installed to the oil pump chain tensioner and apply tension to the oil pump chain.
 - If a new oil pump chain tensioner is used, remove the installed stopper.



bes2ze00000086

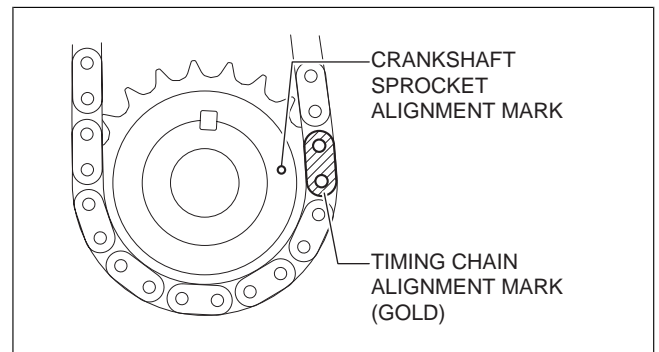
Timing Chain Assembly Note

1. Verify that the timing marks and the key are aligned to the position shown in the figure.



bes2ze00000087

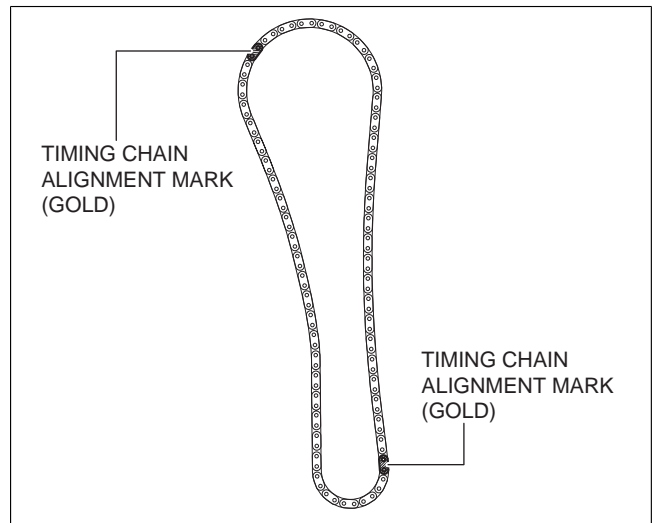
- If they are not in the position shown in the figure, rotate the camshaft and crankshaft to set the cylinder No. 1 top dead center (TDC).
2. Align the timing chain alignment mark with the crankshaft sprocket alignment mark.



bes2ze00000088

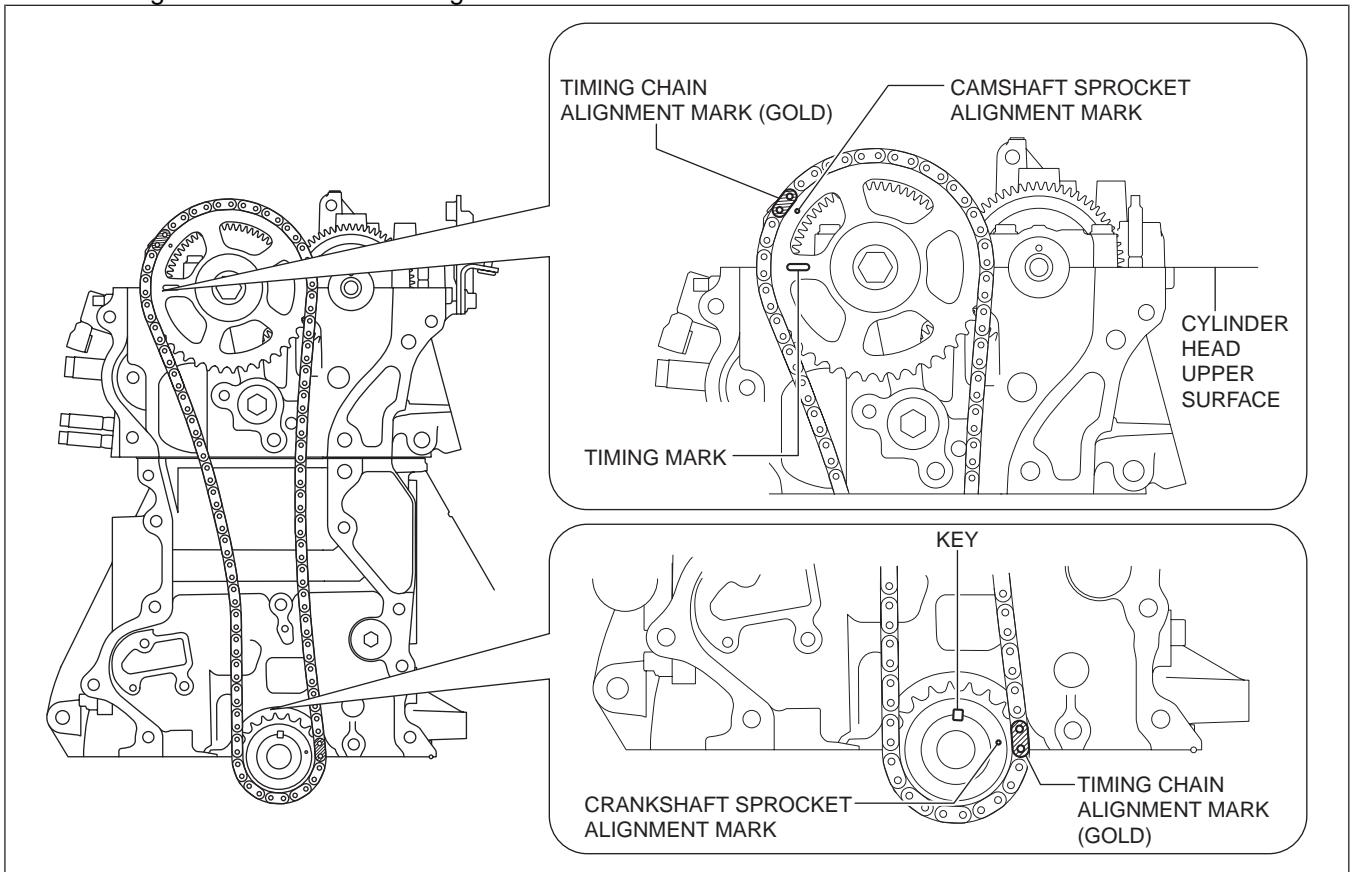
Note

- There are two timing chain alignment marks as shown in the figure. When assembling the timing chain and crankshaft sprocket, either timing chain alignment mark can be used.



bes2ze00000089

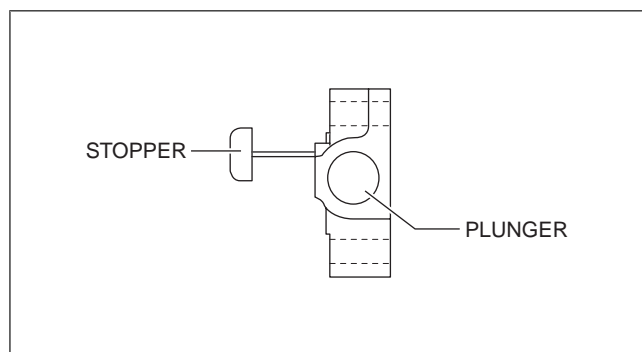
3. Install the timing chain and crankshaft sprocket as a single unit while aligning the marks on each sprocket and the timing chain as shown in the figure.



bes2ze00000090

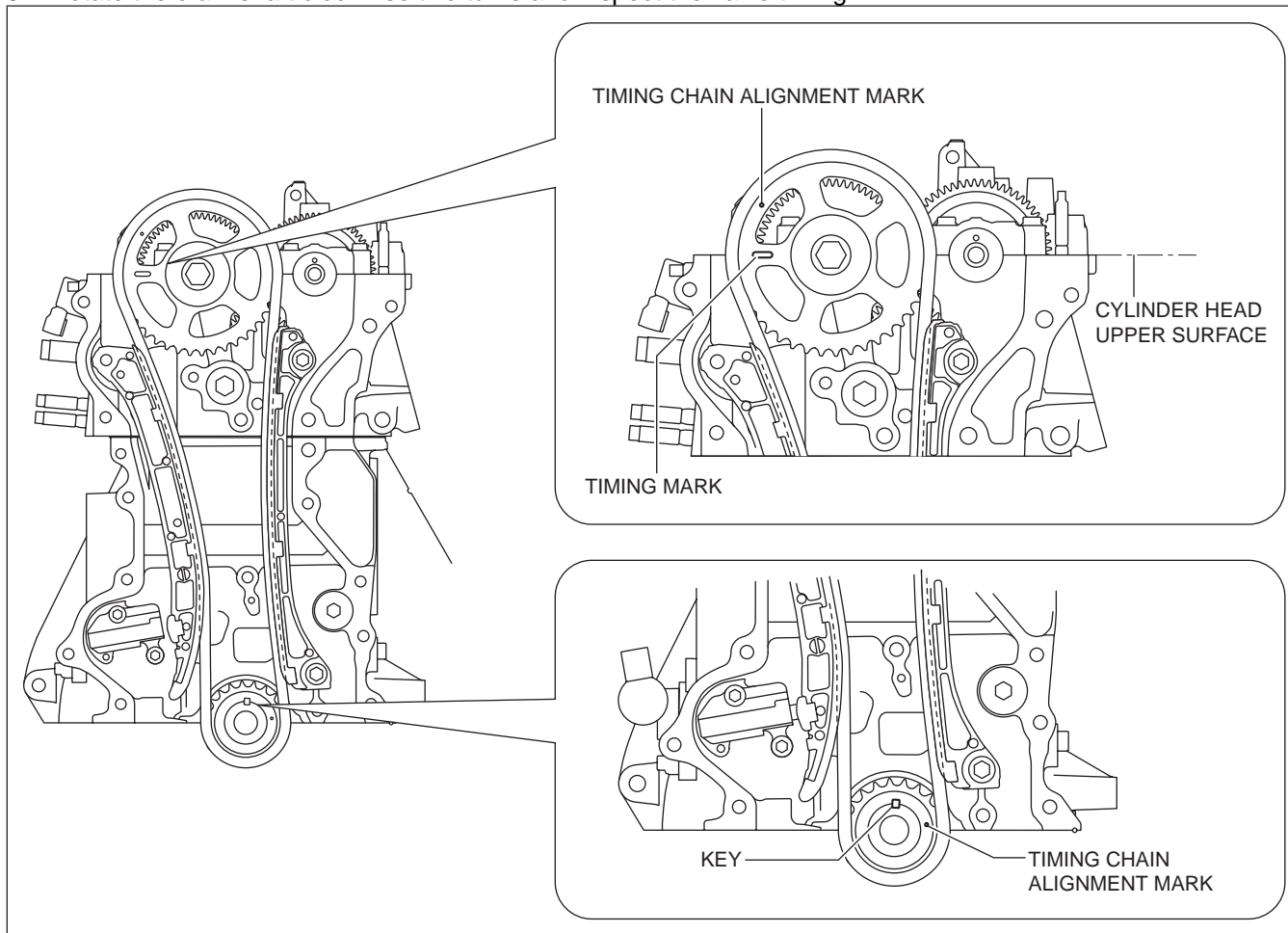
4. Install the timing chain guide.
5. Install the timing chain tensioner arm.
6. Install the timing chain tensioner.
7. After installing the chain tensioner, remove the installed wire or paper clip, and then apply tension to the timing chain.

- If a new chain tensioner is used, remove the installed stopper.
8. Verify that there is no looseness in the timing chain, and re-verify that each sprocket is in the specified location.



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9. Rotate the crankshaft clockwise two turns and inspect the valve timing.

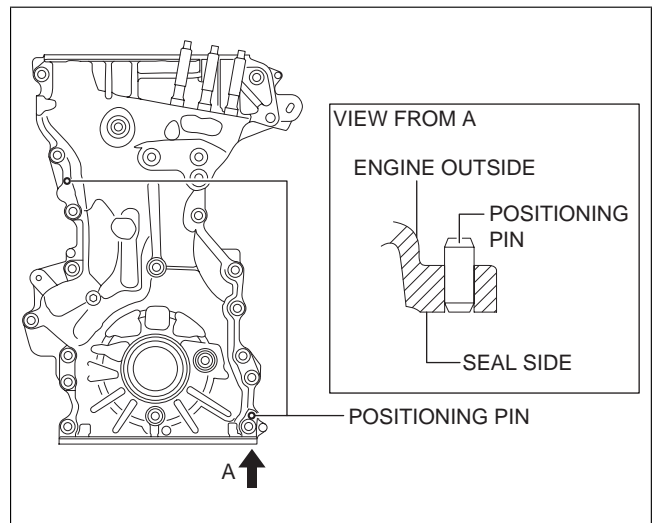


bes2ze00000091

Engine Front Cover Assembly Note

Note

- For a new engine front cover, the positioning pins in the two locations shown in the figure project to the outside of the engine.

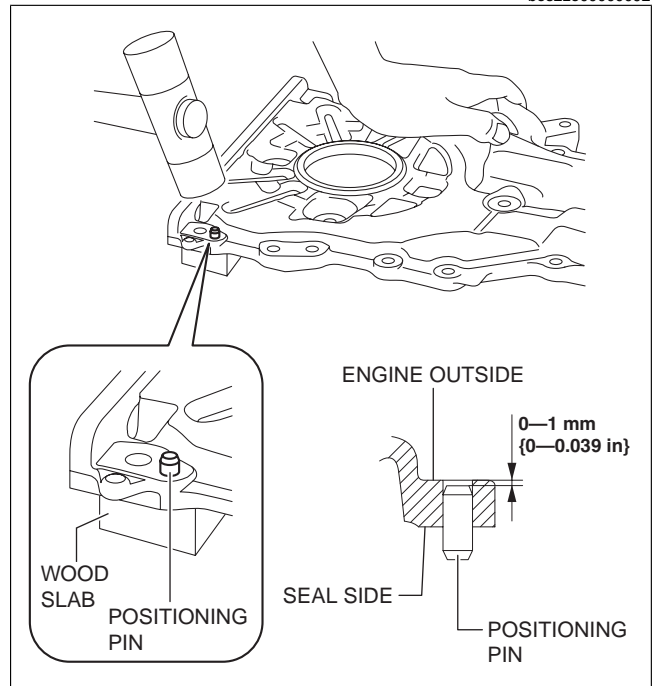


bes2ze00000092

- If the engine front cover is newly replaced, tap the positioning pins in the two locations to the seal surface side.
- Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the engine front cover, cylinder head, and cylinder block.
- When reusing the engine front cover installation bolts, clean any old sealant from the bolts.

Caution

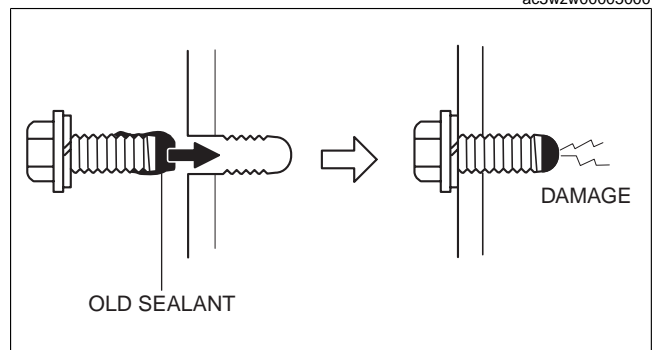
- Apply the silicon sealant in a single, unbroken line.
- To prevent silicone sealant from hardening, adhere the engine front cover to the cylinder block within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.



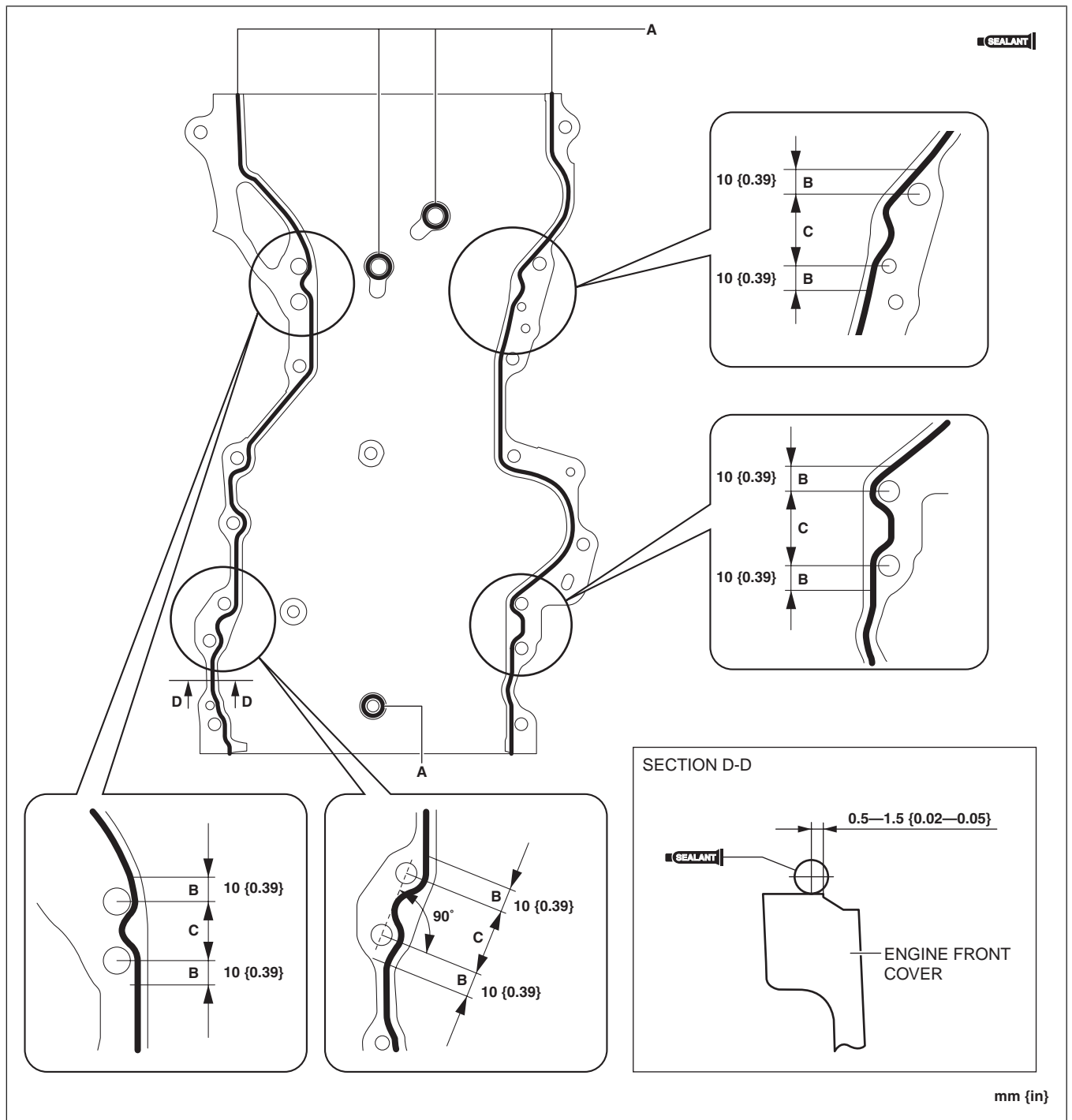
ac5wzw00005000

- Using bolts with the old seal adhering could cause cracks in the cylinder head and cylinder block.

- Apply silicone sealant to the engine front cover as shown in the figure.



bpe1ze00000008



bes2ze00000093

Bead thickness

A: 2—6 mm {0.1—0.2 in}

B: 4—6 mm {0.16—0.23 in}

C: 4—8 mm {0.2—0.3 in}

5. Apply silicone sealant to the areas shown in the figure.

Caution

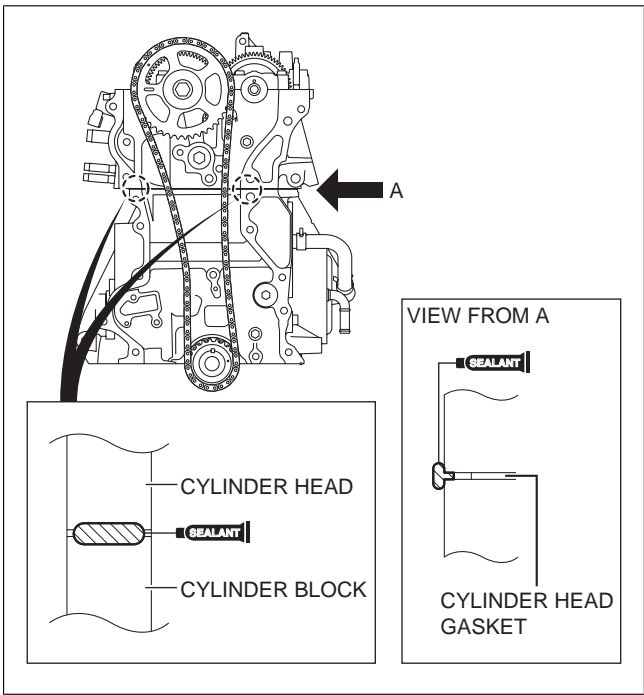
- Apply the silicone sealant so that it goes into the cylinder head gasket.

6. Install the engine front cover to the engine.

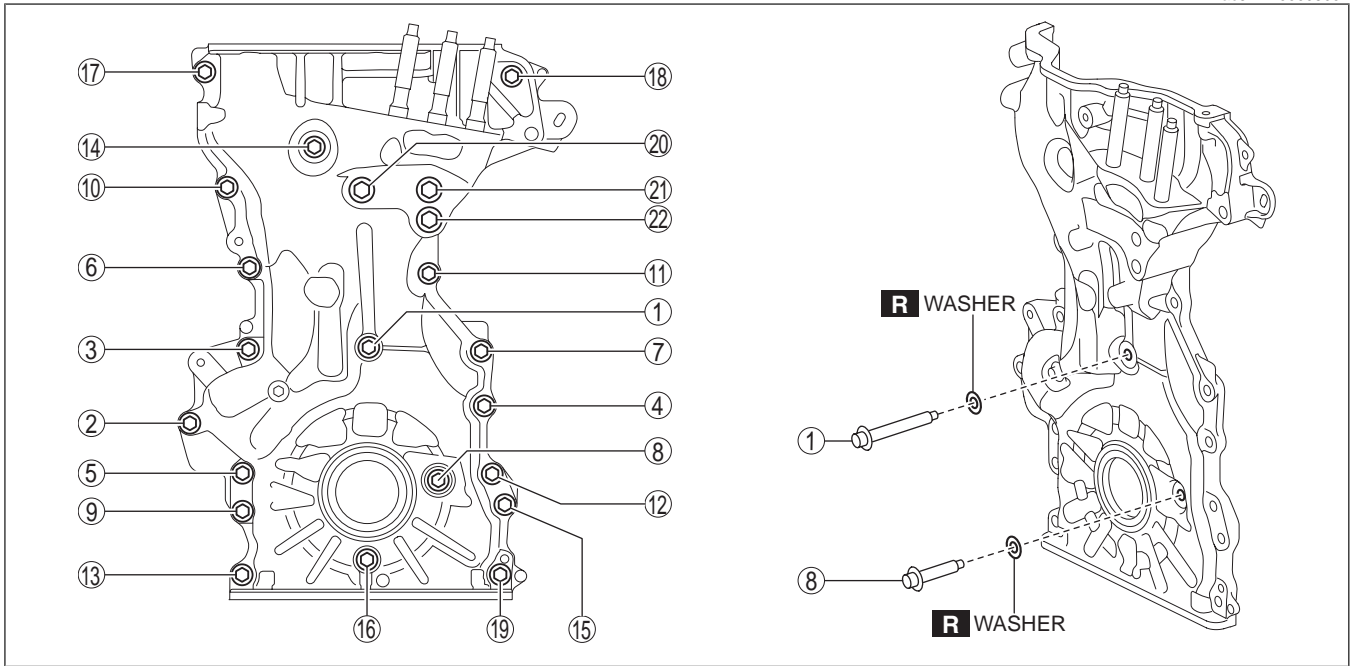
Caution

- For the number 1 and 8 bolts of the tightening order, install the bolts with new washers.

7. Tighten the engine front cover installation bolts in the order shown in the figure.



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Tightening torque

Installation position	Tightening torque
1—19	20—26 N·m {2.1—2.6 kgf·m, 15—19 ft·lbf}
20—22	40—55 N·m {4.1—5.6 kgf·m, 30—40 ft·lbf}

Oil Pan Assembly Note

1. Completely clean and remove any oil, dirt, sealant or other foreign material that may be adhering to the cylinder block and oil pan.

Caution

- Apply the silicon sealant in a single, unbroken line around the whole perimeter.
- To prevent silicone sealant from hardening, adhere the oil pan to the cylinder block within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.

-
- The diagram shows the oil pan with a thick black line indicating the sealant application area around the perimeter. Two arrows labeled 'A' point to the top edge of the pan, indicating the location of cross-section A-A.
- Cross-section A-A:** This detailed view shows the gap between the oil pan and the cylinder block. The gap is filled with sealant, with a specified thickness of 0.5—1.5 mm {0.02—0.05 in}. The components are labeled 'CYLINDER BLOCK' and 'OIL PAN', and the sealant is labeled 'SEALANT'.

Thickness
3—7 mm {0.12—0.27 in}

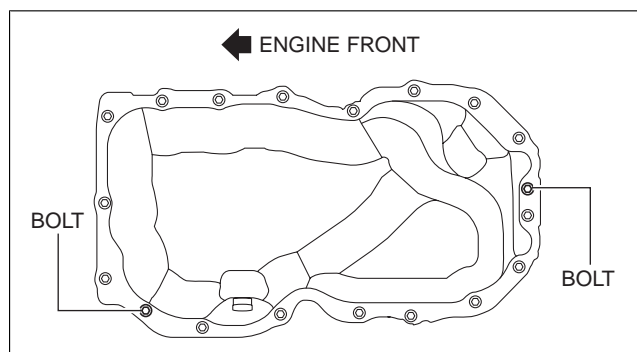
- ### Caution

- There are two types of oil pan installation bolts of different lengths and shapes. Install each bolt to the specified position according to the following procedure. In addition, use new bolts because the oil pan installation bolts cannot be reused.

- [illegible]

bes2ze00000096

- (2) Temporarily tighten the two bolts shown in the figure.

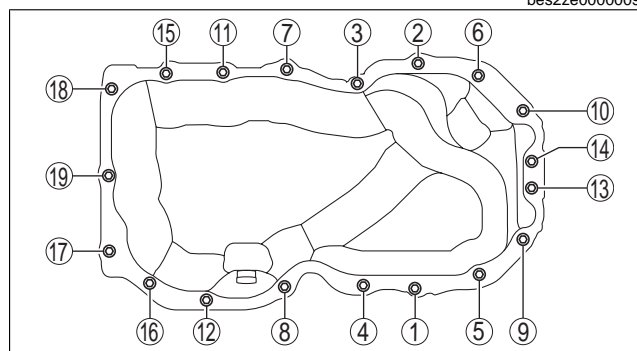


bes2ze00000097

- (3) Tighten the bolts in the order shown in the figure.

Tightening torque

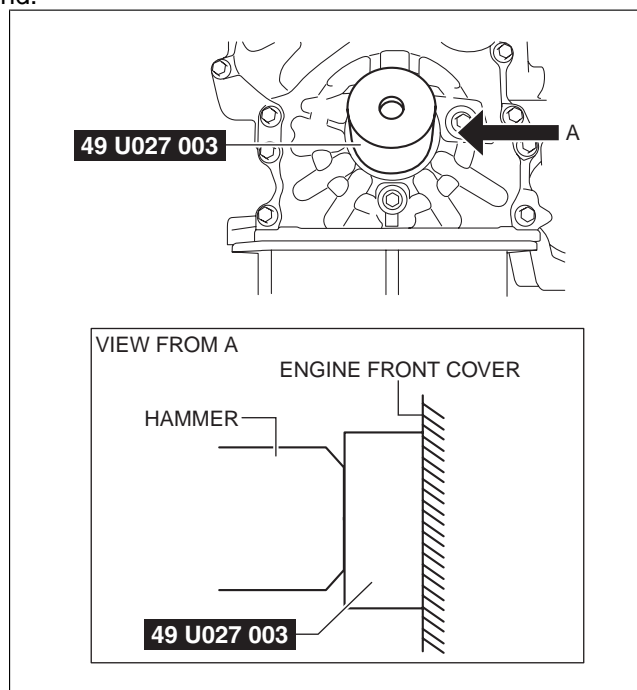
8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}



ac5ijw00004192

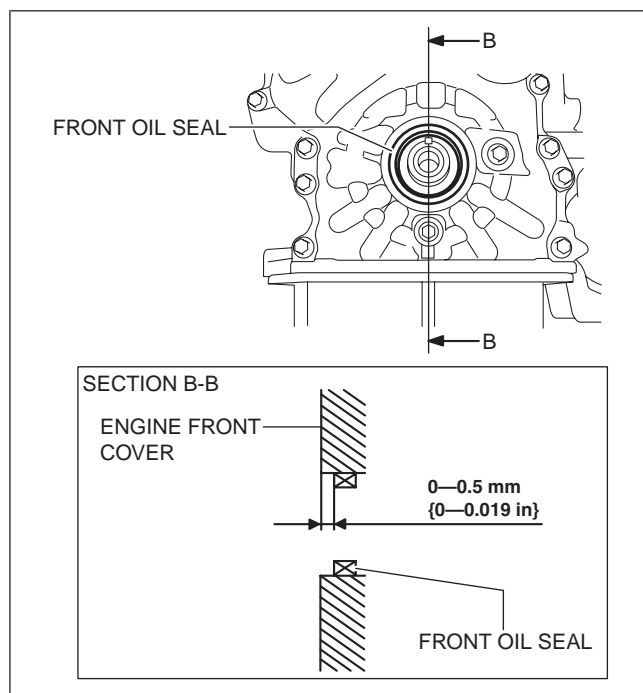
Front Oil Seal Assembly Note

1. Apply clean engine oil to the inner surface of a new front oil seal.
2. Insert the front oil seal into the engine front cover by hand.
3. Tap the oil seal in evenly using the **SST** and a hammer.



bes2ze00000098

Front oil seal press-in amount
0—0.5 mm {0—0.019 in}



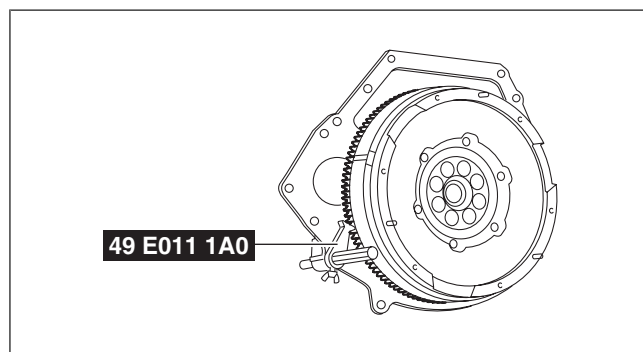
bes2ze00000099

Crankshaft Pulley Lock Bolt Assembly Note

1. Tighten the crankshaft pulley lock bolt using the following procedure:

(1) Hold the crankshaft using the **SST**.

MTX



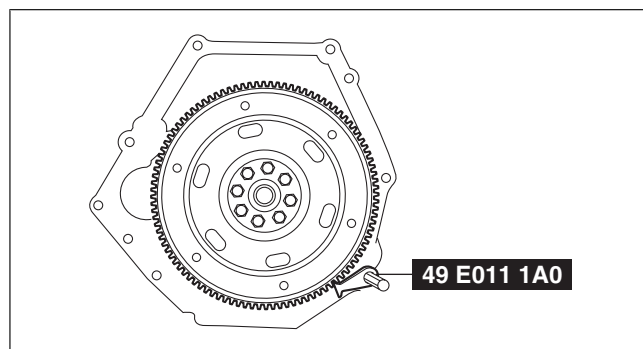
bes2ze00000085

ATX

(2) Tighten the crankshaft pulley lock bolt.

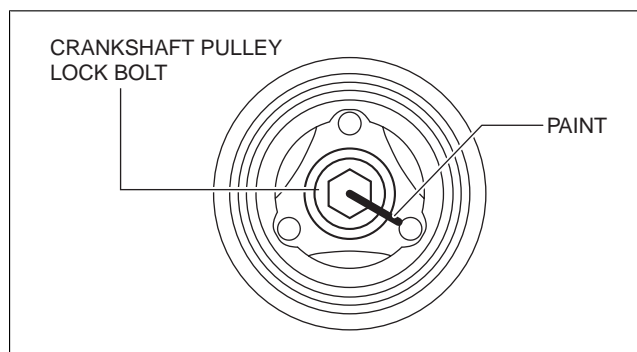
Tightening procedure

Step 1: 100—120 N·m {11—12 kgf·m, 74—88 ft·lbf}



bes2ze00000086

- (3) Place a paint mark on the crankshaft pulley lock bolt and crankshaft pulley as shown in the figure to tighten the bolt to the specified angle correctly.

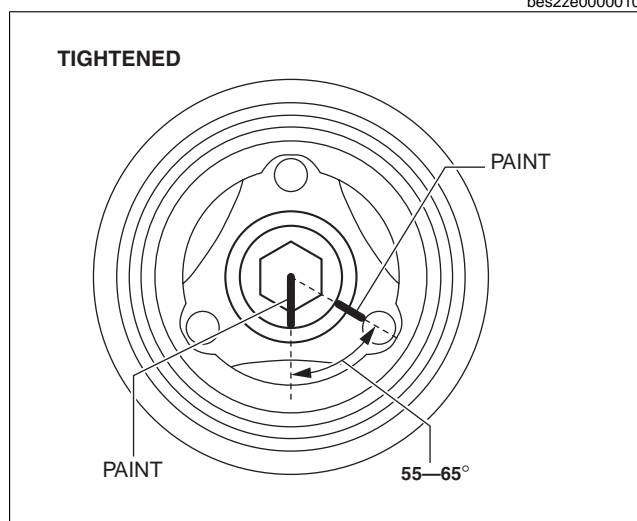


bes2ze00000100

- (4) Tighten the crankshaft pulley lock bolt to the specified angle.

Tightening procedure

Step 2: 55—65°



bes2ze00000101

Water Pipe Assembly Note

Caution

- Do not apply oil (such as engine oil, ATF) to the O-ring. Otherwise, the O-ring could swell causing a seal malfunction.
- Install the water pipe so as not to damage the O-ring. Otherwise, it could cause a seal malfunction.

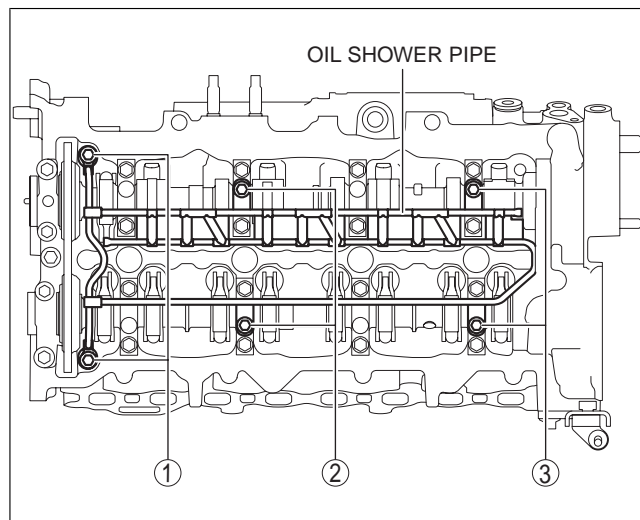
1. Install the water pipe following procedure:
 - (1) Apply engine coolant to the O-ring.
 - (2) Install the water pipe.

Tightening torque

8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}

Oil Shower Pipe Assembly Note

1. Install the oil shower pipe in the order shown in the figure.



ac5wzw00005013

Tightening torque

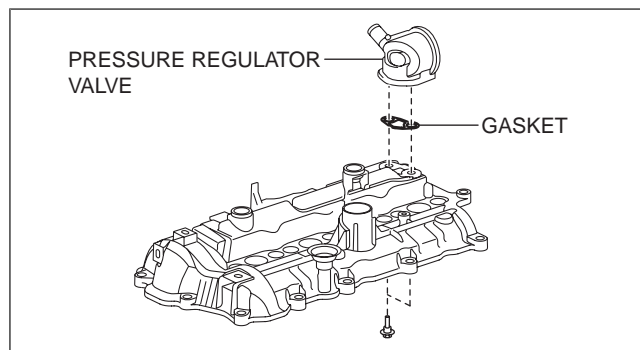
Installation position	Tightening torque
1	9—12 N·m {92—122 kgf·cm, 80—106 in·lbf}
2, 3	8.0—9.0 N·m {82—91 kgf·cm, 71—79 in·lbf}

Pressure Regulator Valve Assembly Note

1. Verify that there is no damage on the gasket shown in the figure.
 - If there is any malfunction, replace the OCV.
2. Install the pressure regulator valve.

Tightening torque

8—11 N·m {82—112 kgf·cm, 71—97 in·lbf}



bes2ze00000102

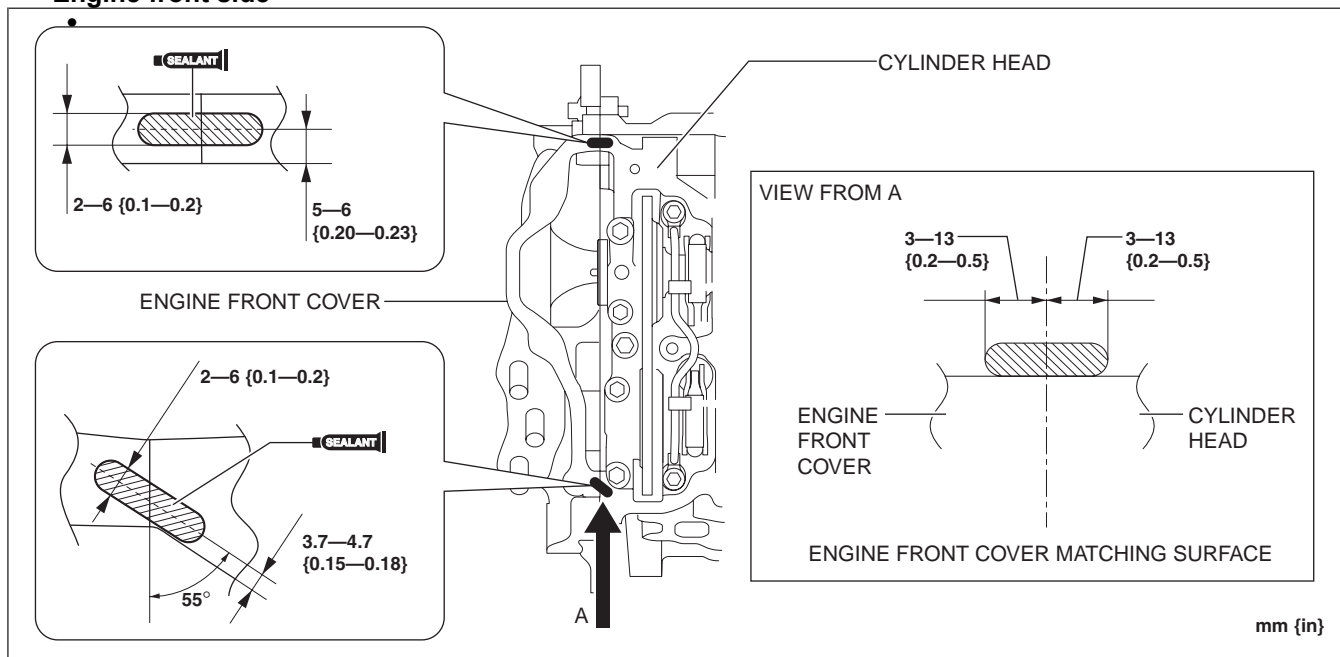
Cylinder Head Cover Assembly Note

Caution

- To assure the sealing performance of the cylinder head cover, be careful of the following:
 - Verify that the cylinder head cover gasket is inserted into the cylinder head cover groove and install the cylinder head cover.
 - Completely clean and remove any oil, dirt, sealant or other foreign material from the seal surface.
- To prevent silicone sealant from hardening, adhere the cylinder head cover and the cylinder head within 10 min. after silicone sealant is applied. Tighten the installation bolts completely soon after adhering.

1. Insert a new cylinder head cover gasket into the cylinder head cover groove.
2. Apply silicone sealant to the areas shown in the figure.

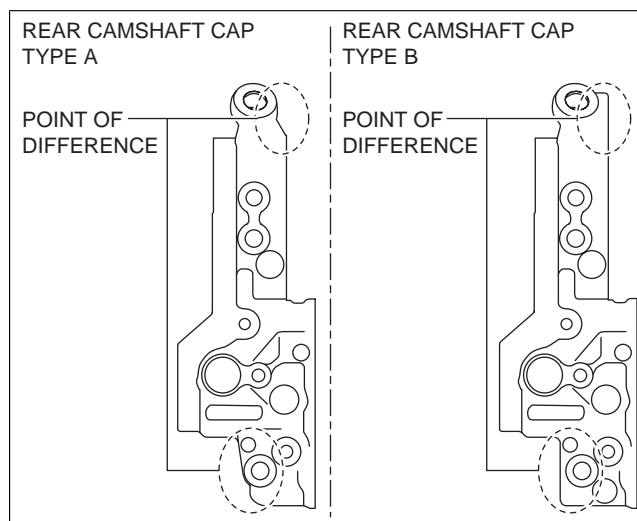
Engine front side



bes2ze00000103

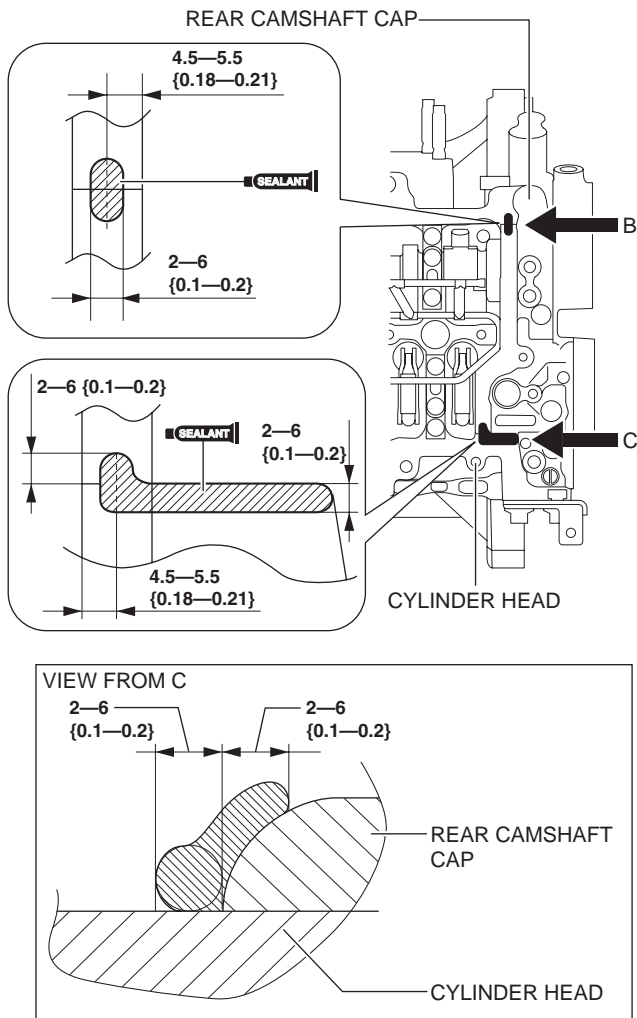
Engine rear side

- There are two types of rear camshaft caps and the application procedures for the silicone sealant differ. Verify the shape of the rear camshaft cap beforehand and apply silicone sealant as shown in the figure.

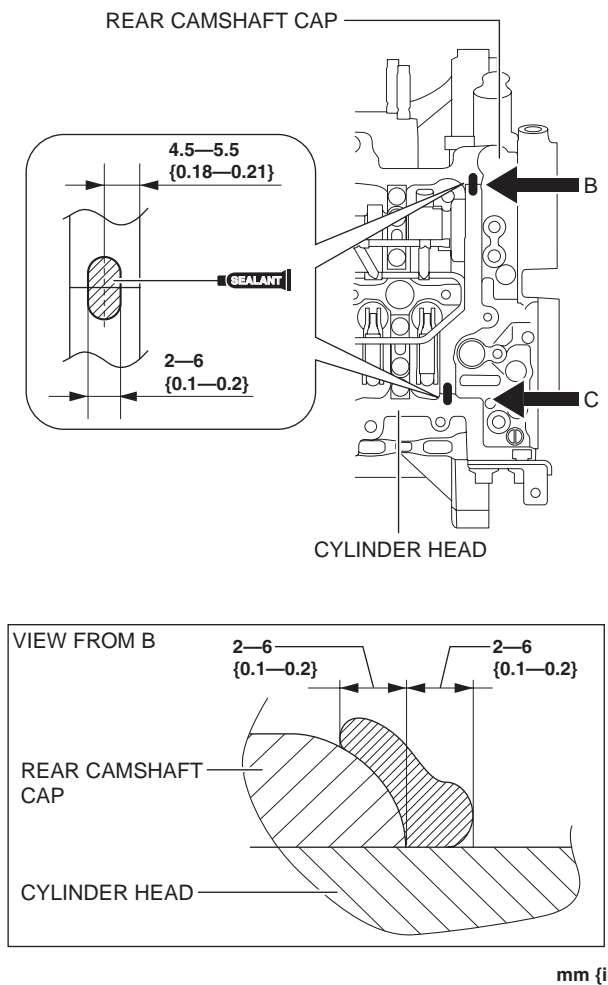


bes2ze00000104

REAR CAMSHAFT CAP IS TYPE A

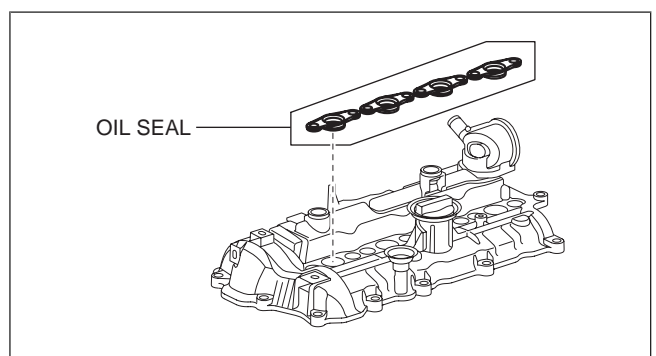


REAR CAMSHAFT CAP IS TYPE B



bes2ze00000105

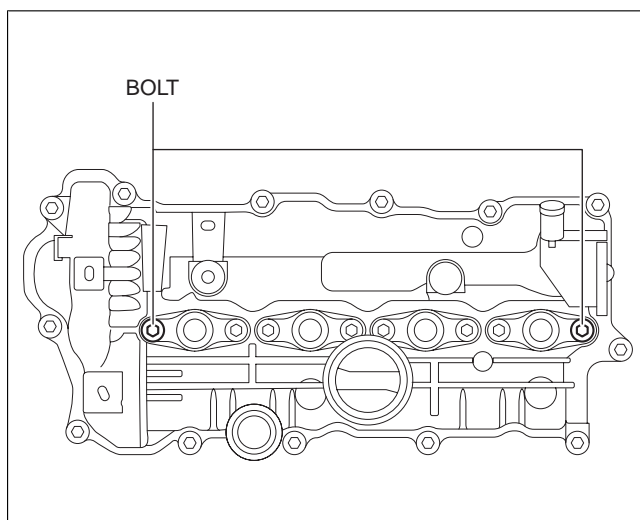
3. Install the cylinder head cover.
 - Verify that the oil seal shown in the figure is not damaged, and replace the oil seal if it is damaged.



bes2ze00000106

4. Tighten the cylinder head cover installation bolts using the following procedure:

- (1) Temporarily tighten the two bolts shown in the figure.

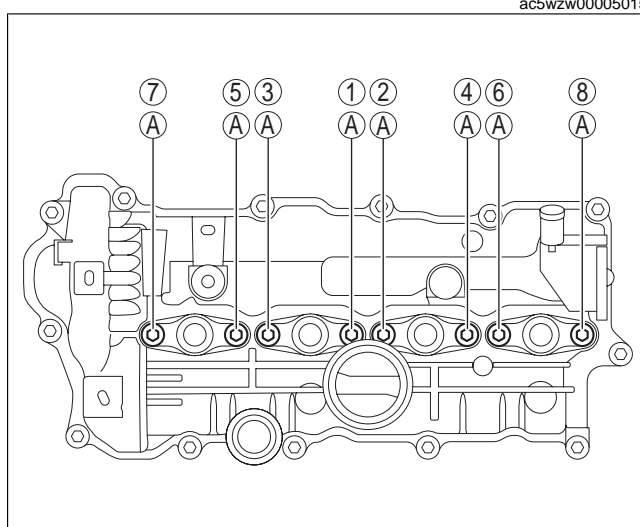


ac5wzw00005015

- (2) Tighten installation bolts A in the order shown in the figure.

Tightening torque

4.5—7.0 N·m {46—71 kgf·cm, 40—61 in·lbf}

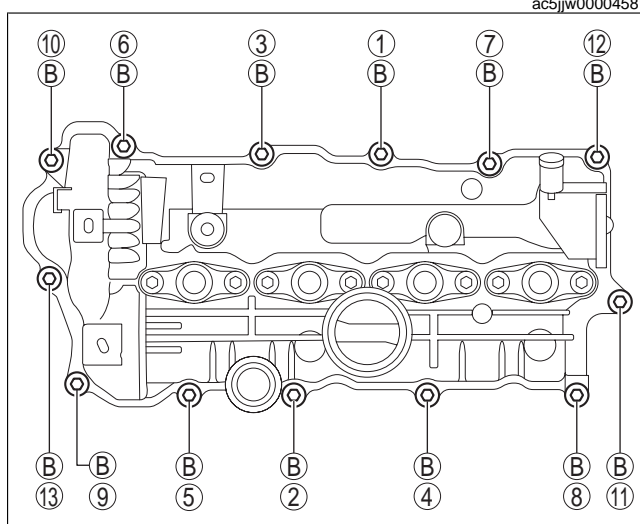


ac5jjw00004581

- (3) Tighten installation bolts B in the order shown in the figure.

Tightening torque

4.5—7.0 N·m {46—71 kgf·cm, 40—61 in·lbf}



ac5jjw00004582