

# Timing Belt

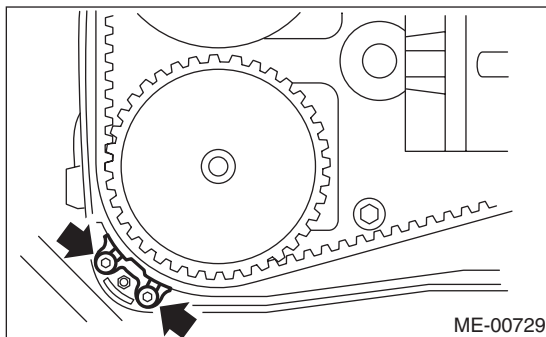
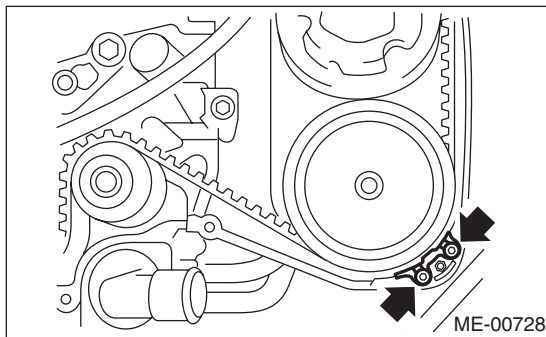
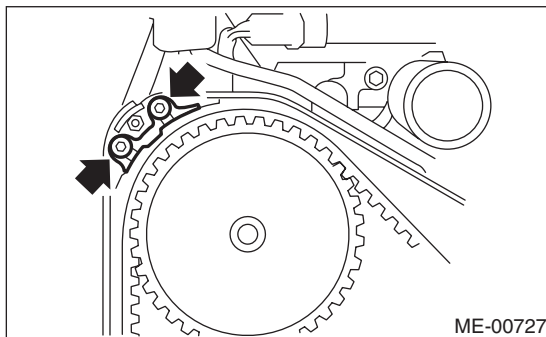
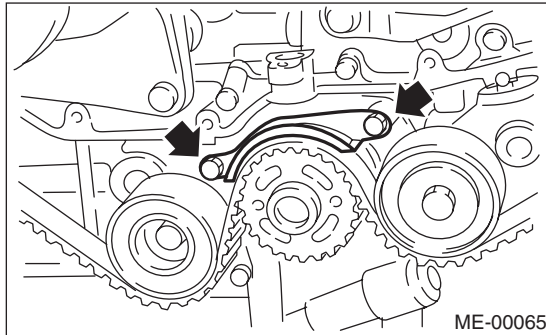
MECHANICAL

## 15. Timing Belt

### A: REMOVAL

#### 1. TIMING BELT

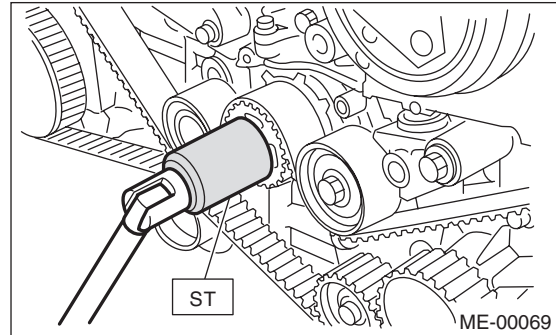
- 1) Remove the V-belts. <Ref. to ME(H4DOTC)-36, REMOVAL, V-belt.>
- 2) Remove the crank pulley. <Ref. to ME(H4DOTC)-39, REMOVAL, Crank Pulley.>
- 3) Remove the timing belt cover. <Ref. to ME(H4DOTC)-41, REMOVAL, Timing Belt Cover.>
- 4) Remove the timing belt guide. (Model with timing belt guide)



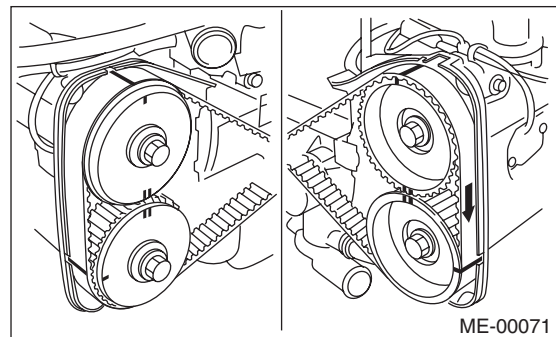
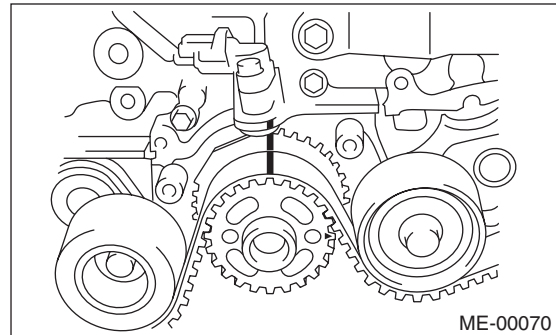
- 5) If the alignment mark or arrow mark (which indicates the direction of rotation) on timing belt fade away, put new marks before removing the timing belt as shown in procedures below.

- (1) Turn the crankshaft using ST, and align the alignment marks on crank sprocket, intake cam sprocket (LH), exhaust cam sprocket (LH), intake cam sprocket (RH) and exhaust cam sprocket (RH) with notches of timing belt cover and cylinder block.

ST 499987500 CRANKSHAFT SOCKET



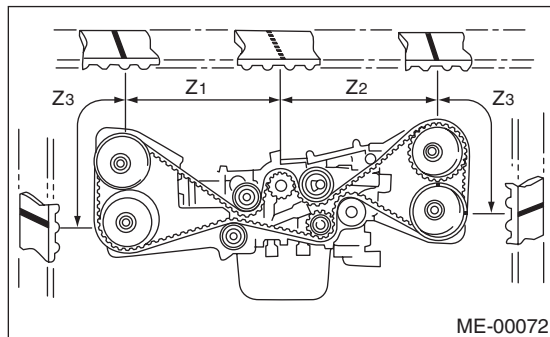
- (2) Using white paint, put alignment and/or arrow marks on timing belts in relation to the cam sprockets.



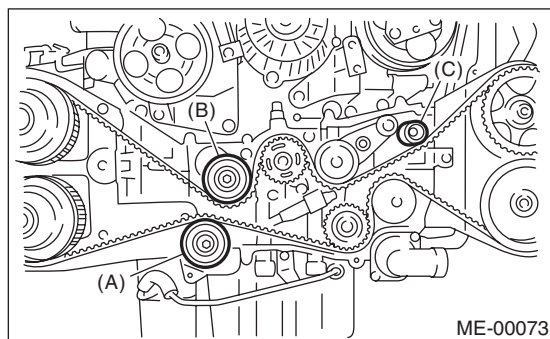
**$Z_1$ : 54.5-tooth length**

**$Z_2$ : 51-tooth length**

**$Z_3$ : 28-tooth length**



6) Remove the belt idler (A).



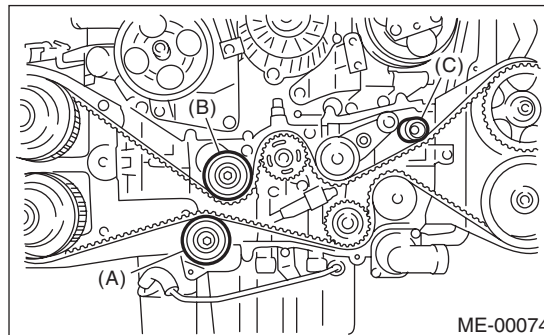
7) Remove the timing belt.

**CAUTION:**

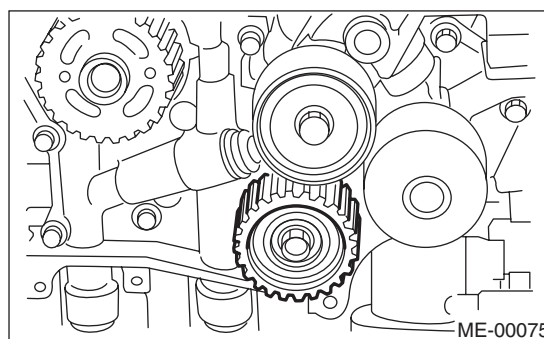
**After the timing belt has been removed, never rotate the intake and exhaust sprocket. If the cam sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.**

## 2. AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER

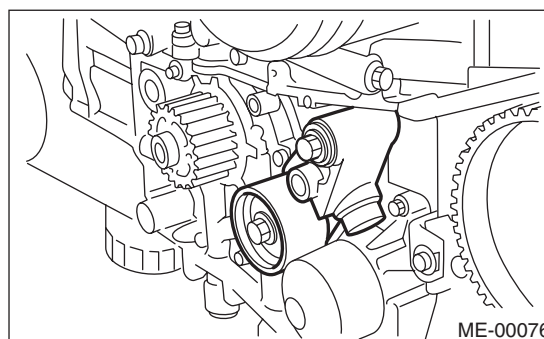
1) Remove the belt idler (B) and (C).



2) Remove the belt idler No. 2.



3) Remove the automatic belt tension adjuster assembly.



# Timing Belt

MECHANICAL

## B: INSTALLATION

### 1. AUTOMATIC BELT TENSION ADJUST-ER ASSEMBLY AND BELT IDLER

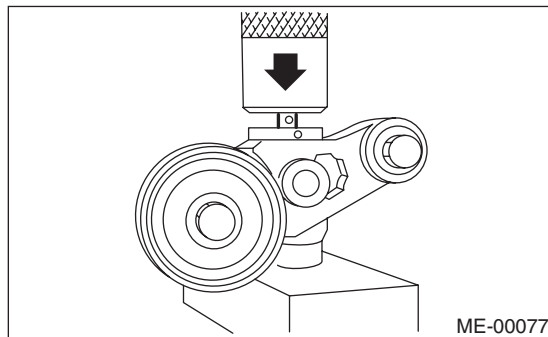
1) Preparation for installation of automatic belt tension adjuster assembly.

#### CAUTION:

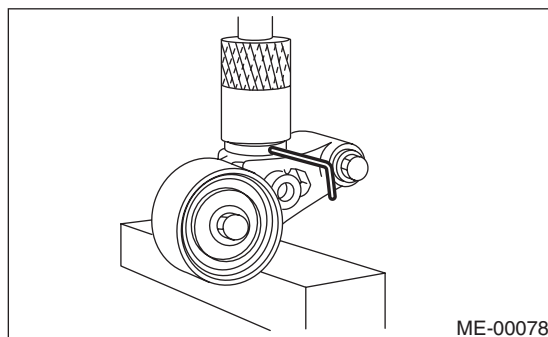
- Always use a vertical type pressing tool to move the adjuster rod down.
- Do not use a lateral type vise.
- Push the adjuster rod vertically.
- Press-in the push adjuster rod gradually taking more than three minutes.
- Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
- Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into the cylinder. Doing so may damage the cylinder.
- Do not release the press pressure until stopper pin is completely inserted.

(1) Attach the automatic belt tension adjuster assembly to vertical pressing tool.

(2) Slowly move the adjuster rod down with a pressure of 165 N (16.8 kgf, 37.1 lb) or more until the adjuster rod is aligned with the stopper pin hole in the cylinder.



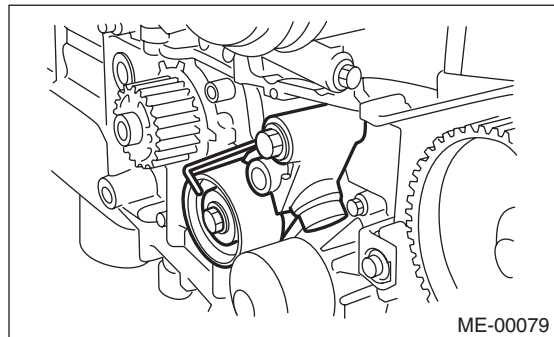
(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (nominal) dia. hex bar wrench inserted into the stopper pin hole in the cylinder, secure the adjuster rod.



2) Install the automatic belt tension adjuster assembly.

**Tightening torque:**

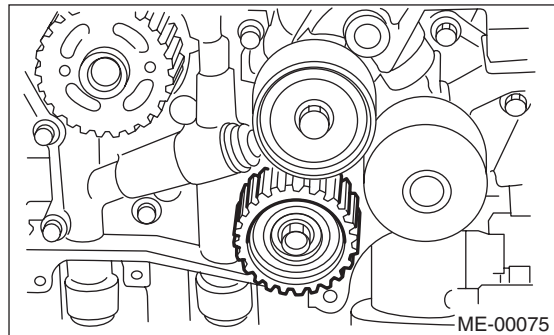
**39 N·m (4.0 kgf·m, 28.9 ft·lb)**



3) Install the belt idler No. 2.

**Tightening torque:**

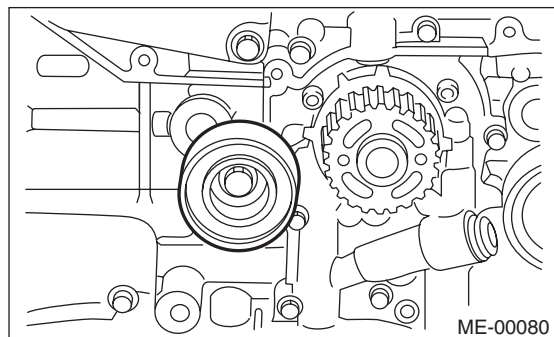
**39 N·m (4.0 kgf·m, 28.9 ft·lb)**



4) Install the belt idlers.

**Tightening torque:**

**39 N·m (4.0 kgf·m, 28.9 ft·lb)**

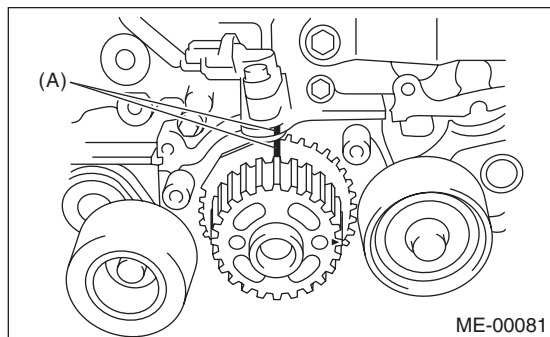


## 2. TIMING BELT

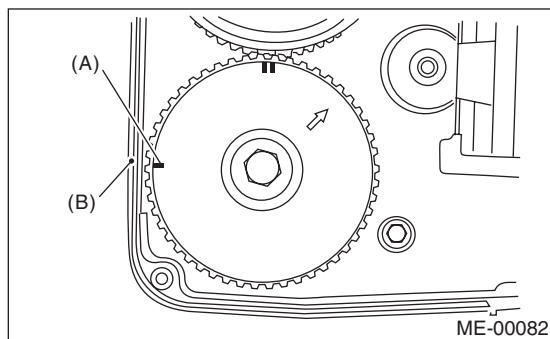
1) Preparation for installation of automatic belt tension adjuster assembly. <Ref. to ME(H4DOTC)-44, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

2) Crankshaft and camshaft sprocket alignment

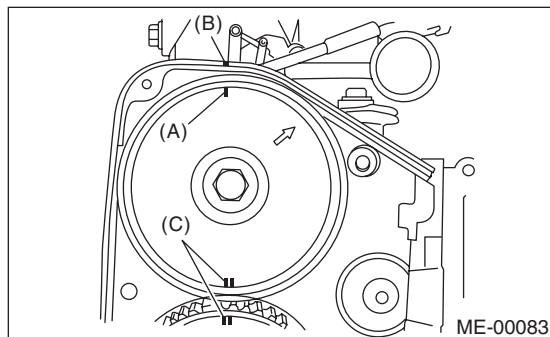
(1) Align the mark (A) on crank sprocket with the mark on oil pump cover at cylinder block.



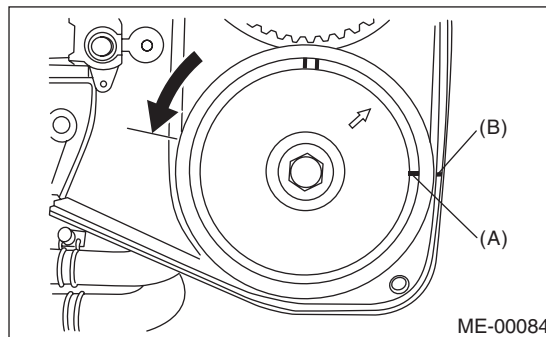
(2) Align single line mark (A) on the exhaust cam sprocket (RH) with notch (B) on timing belt cover.



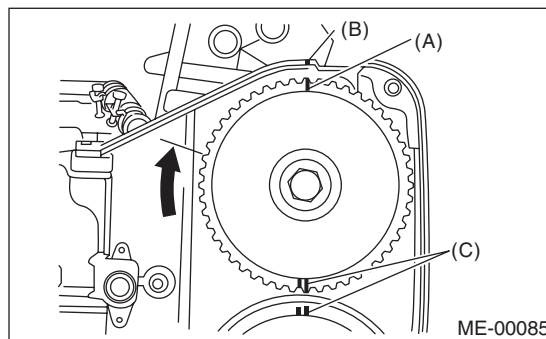
(3) Align single line mark (A) on the intake cam sprocket (RH) with notch (B) on timing belt cover. (Ensure double lines (C) on intake and exhaust camshaft sprockets are aligned.)



(4) Align the single line mark (A) on exhaust cam sprocket (LH) with notch (B) on timing belt cover by turning the sprocket counterclockwise (as viewed from front of engine).



(5) Align the single line mark (A) on intake cam sprocket (LH) with notch (B) on timing belt cover by turning the sprocket clockwise (as viewed from front of engine). Make sure the double line marks (C) on the intake and exhaust cam sprockets are aligned.



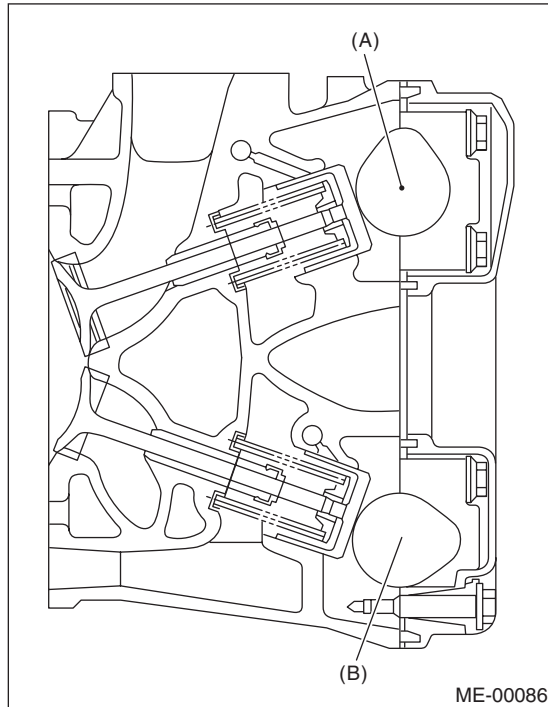
# Timing Belt

## MECHANICAL

(6) Make sure that the cam and crank sprockets are positioned properly.

### CAUTION:

• Intake and exhaust camshafts for this DOHC engine can be independently rotated with the timing belts removed. As can be seen from the figure, if the intake and exhaust valves are lifted simultaneously, the valve heads will interfere with each other, resulting in bent valves.



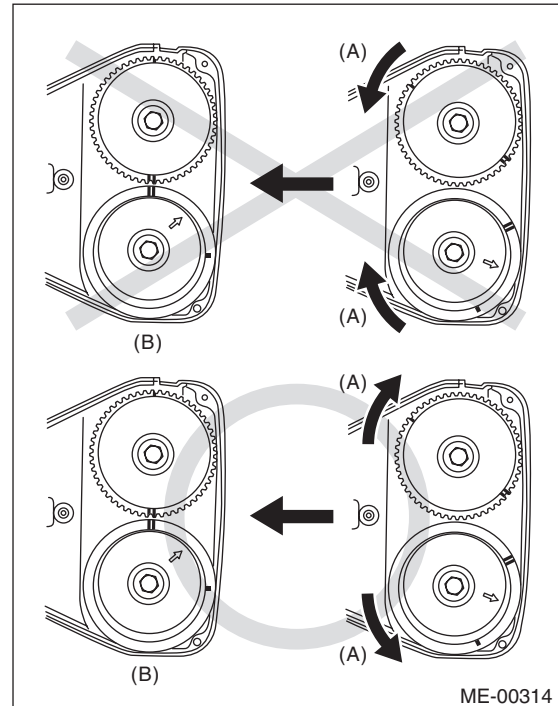
- (A) Intake camshaft
- (B) Exhaust camshaft

• When the timing belts are not installed, four camshafts are held at the “zero-lift” position, where all cams on camshafts do not push the intake and exhaust valves down. (Under this condition, all valves remain unlifted.)

• When the camshafts are rotated to install the timing belts, #2 intake and #4 exhaust cam of camshafts (LH) are held to push their corresponding valves down. (Under this condition, these valves are held lifted.) Right-side camshafts are held so that their cams do not push valves down.

• Camshafts (LH) must be rotated from the “zero-lift” position to the position where the timing belt is to be installed with the smallest possible angle, in order to prevent mutual interference of intake and exhaust valve heads.

• Do not allow the camshafts to rotate in the direction shown in the figure because both intake and exhaust valves may lift simultaneously, and the valve heads may interfere with each other.



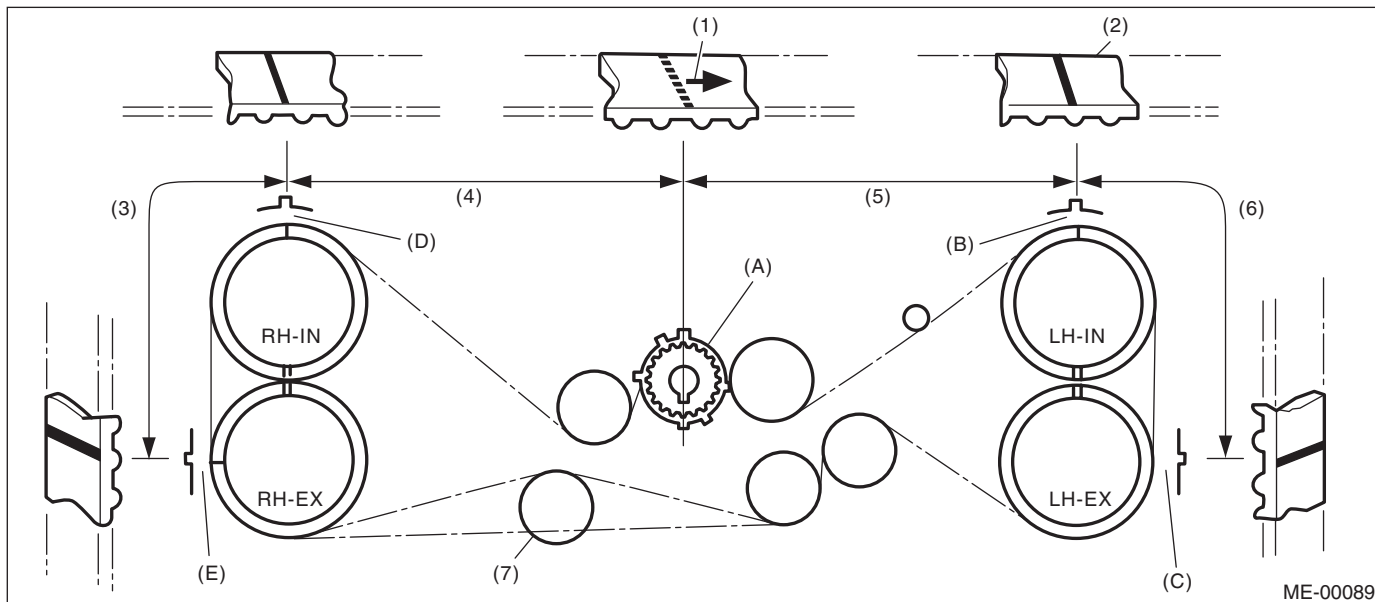
- (A) Direction of rotation
- (B) Timing belt installation position

### 3) Installation of timing belt:

Align the alignment mark on the timing belt with marks on the sprockets in the alphabetical order shown in the figure. While aligning marks, position the timing belt properly.

#### CAUTION:

- If the timing belt slips by 3 or more teeth, the valve and piston may hit each other.
- Make sure that the direction of belt rotation is correct.



- |                     |                       |                           |
|---------------------|-----------------------|---------------------------|
| (1) Arrow mark      | (4) 54.5 tooth length | (6) 28 tooth length       |
| (2) Timing belt     | (5) 51 tooth length   | (7) Install it in the end |
| (3) 28 tooth length |                       |                           |

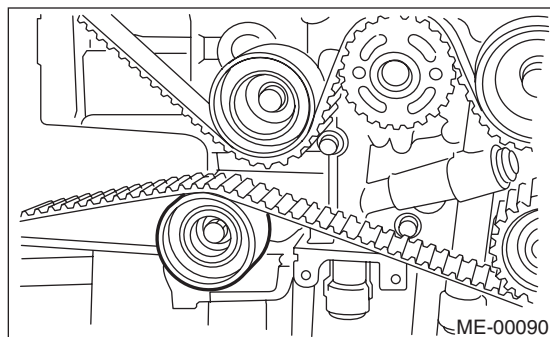
### 4) Install the belt idlers.

#### Tightening torque:

**39 N·m (4.0 kgf·m, 28.9 ft·lb)**

#### NOTE:

Make sure that the marks on the timing belt and sprockets are aligned.



5) After ensuring that the marks on the timing belt and sprockets are aligned, remove the stopper pin from tensioner adjuster.

# Timing Belt

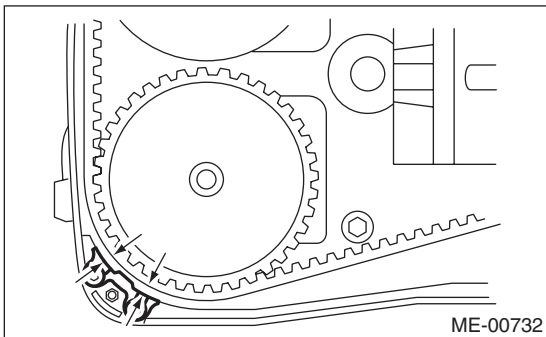
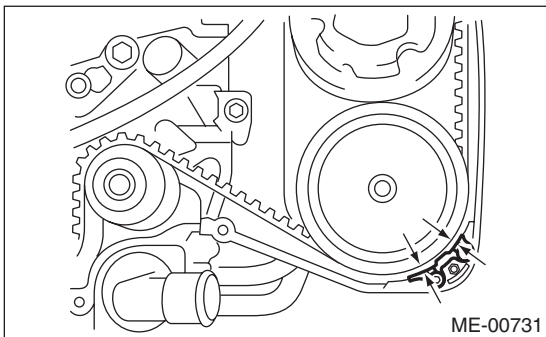
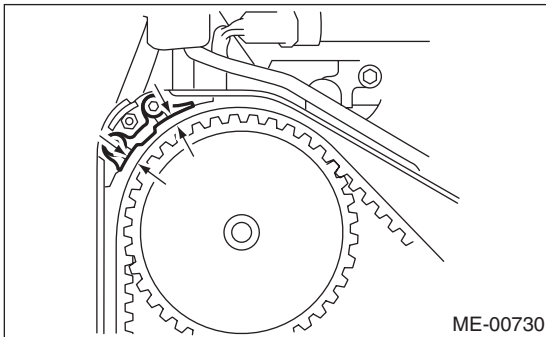
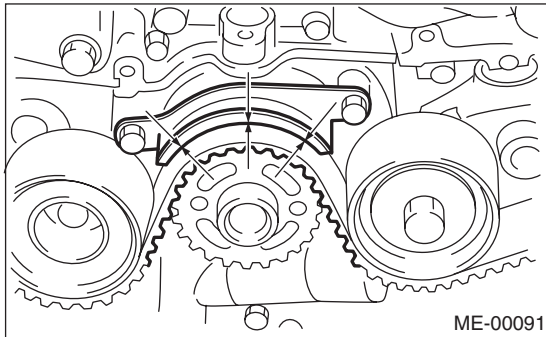
## MECHANICAL

6) Install the timing belt guide. (Model with timing belt guide)

- (1) Temporarily tighten the bolts.
- (2) Check and adjust the clearance between timing belt and timing belt guide.

**Clearance:**

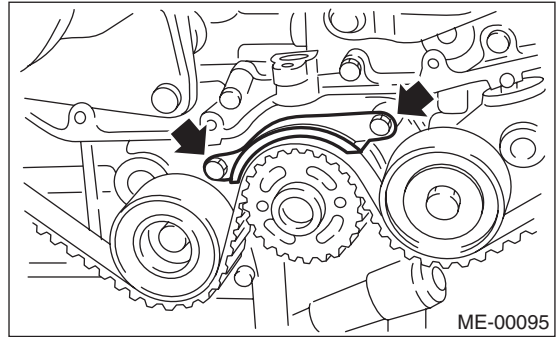
**$1.0 \pm 0.5$  mm ( $0.039 \pm 0.020$  in)**



(3) Tighten the bolt.

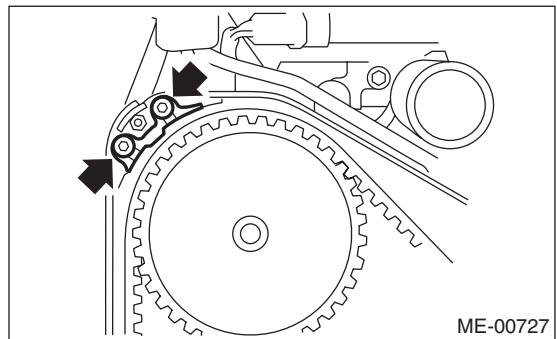
**Tightening torque:**

**$9.75$  N·m ( $1.0$  kgf·m,  $7.2$  ft·lb)**



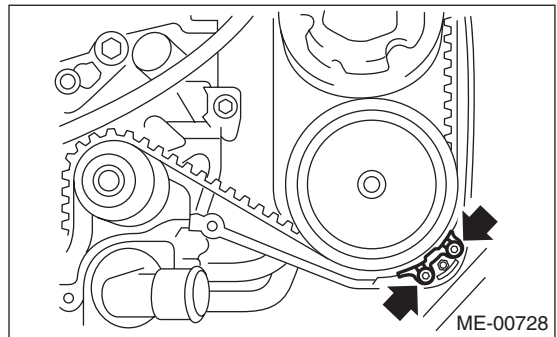
**Tightening torque:**

**$6.4$  N·m ( $0.65$  kgf·m,  $4.7$  ft·lb)**



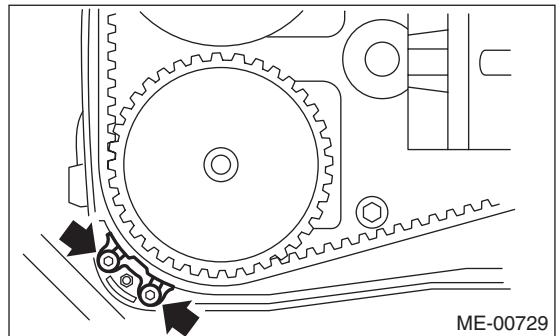
**Tightening torque:**

**$6.4$  N·m ( $0.65$  kgf·m,  $4.7$  ft·lb)**



**Tightening torque:**

**$6.4$  N·m ( $0.65$  kgf·m,  $4.7$  ft·lb)**



- 7) Install the timing belt cover.  
<Ref. to ME(H4DOTC)-41, INSTALLATION, Timing Belt Cover.>
- 8) Install the crank pulley.  
<Ref. to ME(H4DOTC)-39, INSTALLATION, Crank Pulley.>
- 9) Install the V-belts. <Ref. to ME(H4DOTC)-37, INSTALLATION, V-belt.>

## C: INSPECTION

### 1. TIMING BELT

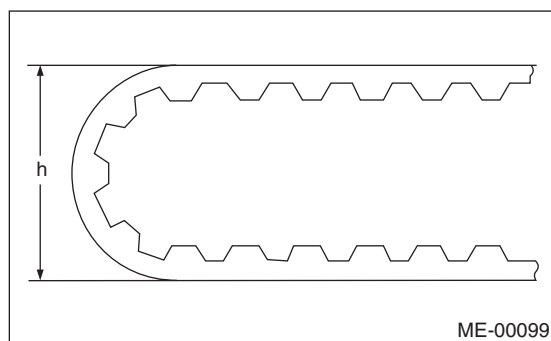
- 1) Check the timing belt teeth for breaks, cracks or wear. If any fault is found, replace the timing belt.
- 2) Check the condition on the backside of the timing belt. If cracks are found, replace the timing belt.

#### CAUTION:

- Be careful not to let oil, grease or coolant contact the belt. Remove quickly and thoroughly if this happens.
- Do not bend the timing belt sharply.

In radial diameter *h*:

**60 mm (2.36 in) or more**



### 2. AUTOMATIC BELT TENSION ADJUSTER

- 1) Visually check the oil seals for leaks, and rod ends for abnormal wear and scratches. If necessary, replace the automatic belt tension adjuster assembly.

#### NOTE:

Slight traces of oil on the oil seal of the rod does not indicate a problem.

- 2) Check that the adjuster rod does not move when a pressure of 165 N (16.8 kgf, 37.1 lb) is applied to it. This is to check adjuster rod stiffness.
- 3) If the adjuster rod is not stiff and moves freely when applying 165 N (16.8 kgf, 37.1 lb), check it using the following procedures:

- (1) Slowly press the adjuster rod down to the end surface of cylinder. Repeat this operation two to three times.
- (2) With the adjuster rod moved all the way up, apply a pressure of 165 N (16.8 kgf, 37.1 lb) to it. Check the adjuster rod stiffness.

- (3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new part.

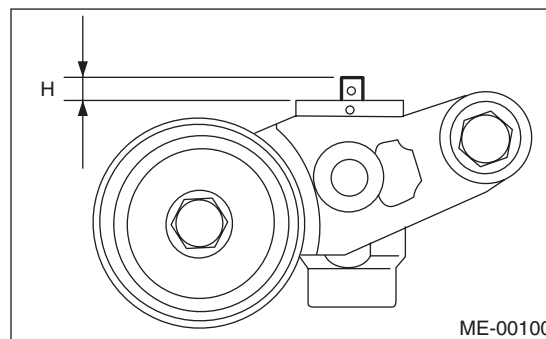
#### CAUTION:

- Always use a vertical type pressing tool to move the adjuster rod down.
- Do not use a lateral type vise.
- Push the adjuster rod vertically.
- Press-in the push adjuster rod gradually taking more than three minutes.
- Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lb).
- Press the adjuster rod as far as the end surface of the cylinder. Do not press the adjuster rod into cylinder. Doing so may damage the cylinder.

- 4) Measure the amount of rod protrusion beyond the body. If it is not within specified range, replace with new part.

**Amount of rod protrusion *H*:**

**5.7±0.5 mm (0.224±0.020 in)**



### 3. BELT TENSION PULLEY

- 1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. If defective, replace the belt tension pulley.
- 2) Check the belt tension pulley for smooth rotation. Replace if noise or excessive play occurs.
- 3) Check the belt tension pulley for grease leakage.

### 4. BELT IDLER

- 1) Check the belt idler for smooth rotation. Replace if noise or excessive play occurs.
- 2) Check the outer contacting surfaces of idler pulley for abnormal wear and scratches.
- 3) Check the belt idler for grease leakage.