

15. Timing Belt

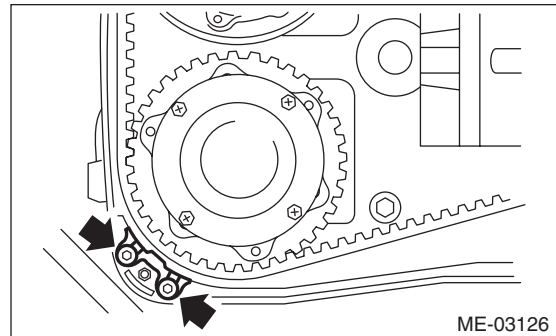
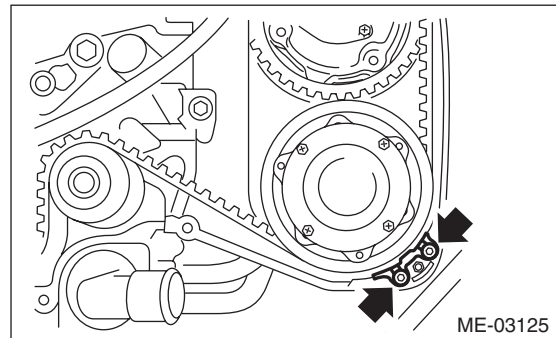
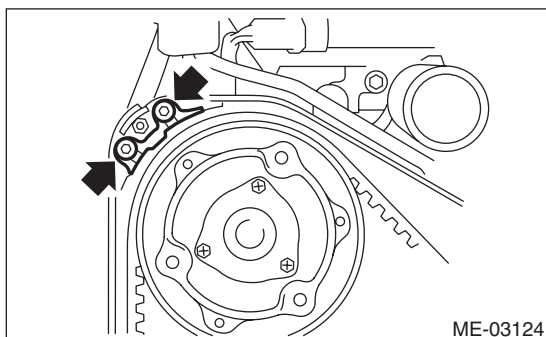
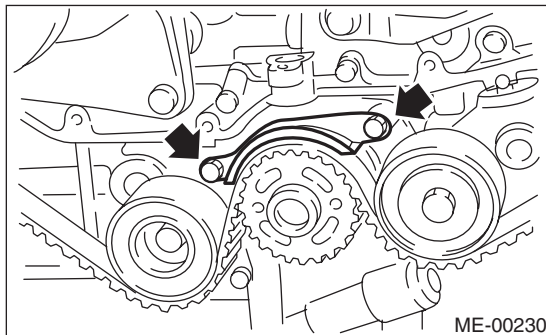
A: REMOVAL

NOTE:

- When replacing a single part, perform the work with the engine assembly installed to body.
- When performing the work with the engine installed to body, the following parts must also be removed/installed.
 - Radiator main fan motor assembly <Ref. to CO(STI)-23, REMOVAL, Radiator Main Fan and Fan Motor.> <Ref. to CO(STI)-23, INSTALLATION, Radiator Main Fan and Fan Motor.>
 - Radiator sub fan motor assembly <Ref. to CO(STI)-25, REMOVAL, Radiator Sub Fan and Fan Motor.> <Ref. to CO(STI)-25, INSTALLATION, Radiator Sub Fan and Fan Motor.>
- When performing the work with the engine installed to body, protect the radiator with cardboards or blankets.

1. TIMING BELT

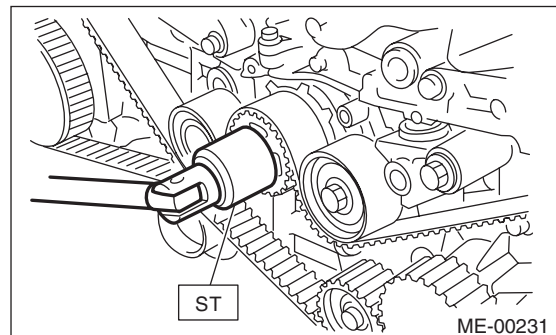
- 1) Remove the crank pulley. <Ref. to ME(STI)-47, REMOVAL, Crank Pulley.>
- 2) Remove the timing belt cover. <Ref. to ME(STI)-49, REMOVAL, Timing Belt Cover.>
- 3) Remove the timing belt guide.



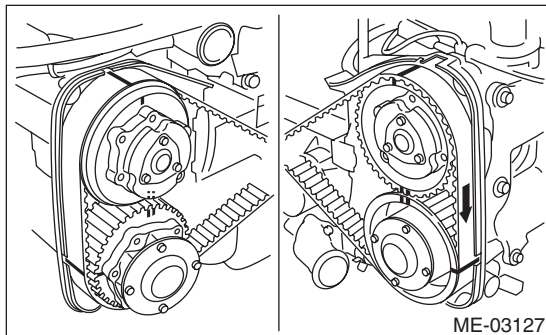
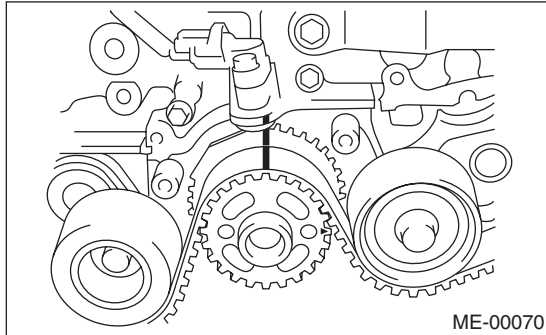
- 4) If the alignment mark or arrow mark (which indicates the direction of rotation) on timing belt fade away, put new marks before removing the timing belt as shown in procedures below.

- (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 marks on oil pump and notches of timing belt cover.

ST 499987500 CRANKSHAFT SOCKET



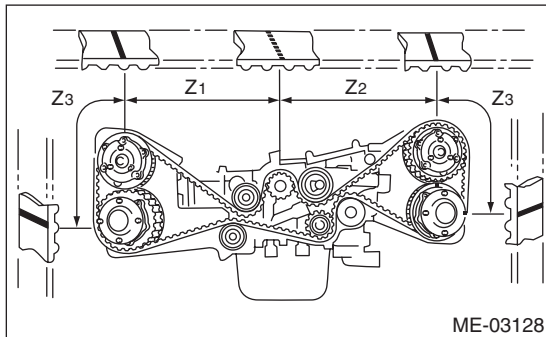
(2) Using white paint, put an alignment mark or an arrow mark on timing belts in relation to the crank sprocket and cam sprockets.



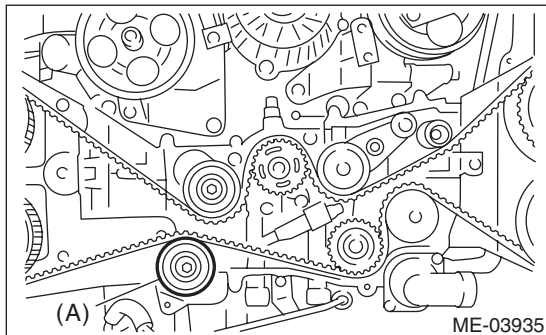
Z_1 : 54.5 teeth

Z_2 : 51 teeth

Z_3 : 28 teeth



5) Remove the belt idler (A).



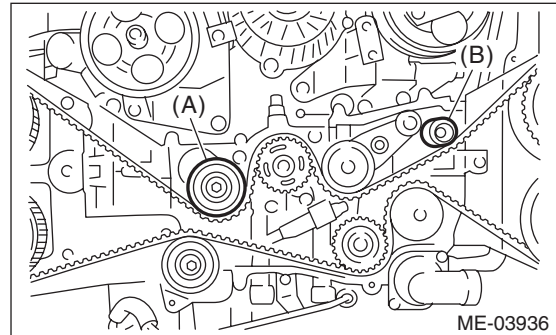
6) Remove the timing belt.

CAUTION:

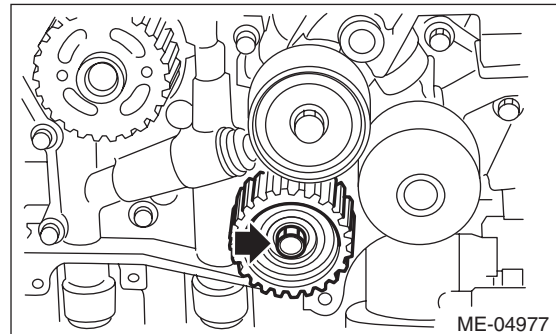
After the timing belt has been removed, never rotate the intake and exhaust sprocket. If the cam sprocket is rotated, the intake and exhaust valve heads strike together and valve stems are bent.

2. AUTOMATIC BELT TENSION ADJUST-ER ASSEMBLY AND BELT IDLER

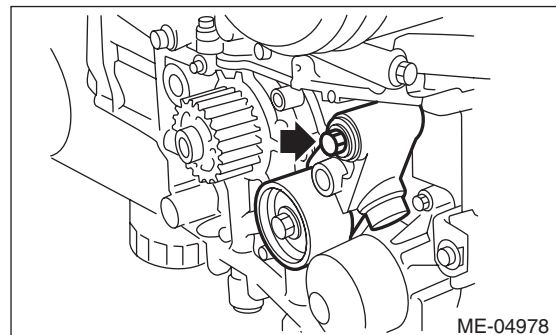
1) Remove the belt idler (A) and (B).



2) Remove the belt idler No. 2.



3) Remove the automatic belt tension adjuster assembly.



B: INSTALLATION

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

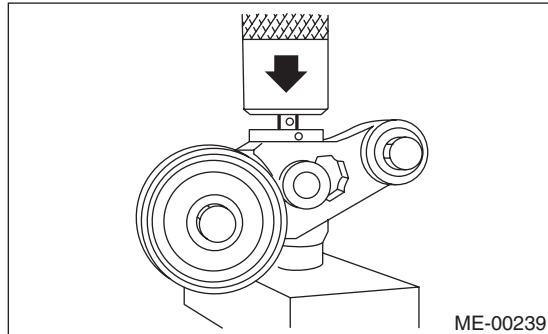
1) Prepare for installation of the automatic belt tension adjuster assembly.

CAUTION:

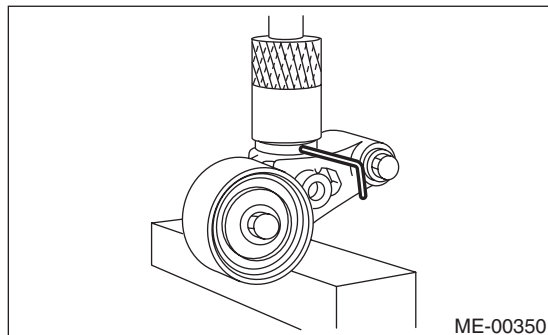
- Always use a vertical type pressing tool to move the adjuster rod down.
- Do not use a lateral type vise.
- Push the adjuster rod vertically.
- Press-in the push adjuster rod gradually taking three minutes or more.
- Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
- Push in the adjuster rod to the end face of the cylinder. However, do not press the adjuster rod below the end face of 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 push in the adjuster rod with a pressure of 165 N (16.8 kgf, 37.1 lbf) or more until the adjuster rod is aligned with the stopper pin hole in the cylinder.



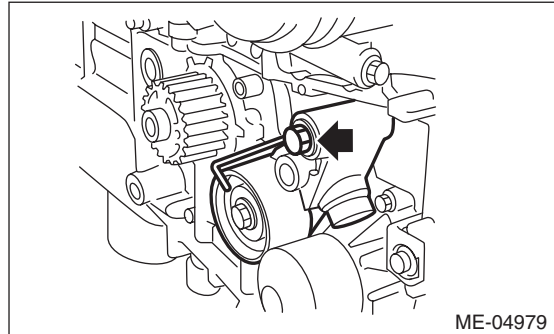
(3) With a 2 mm (0.08 in) dia. stopper pin or a 2 mm (nominal) dia. hex wrench inserted into the stopper pin hole in cylinder, secure the adjuster rod.



2) Install the automatic belt tension adjuster assembly.

Tightening torque:

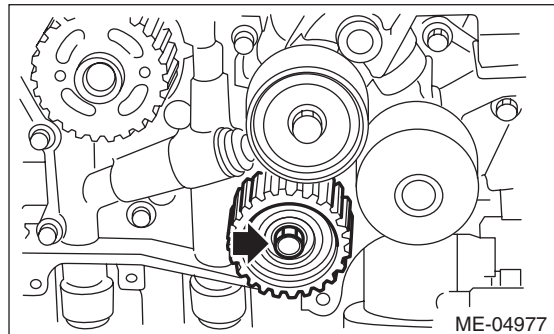
39 N·m (4.0 kgf-m, 28.8 ft-lb)



3) Install the belt idler No. 2.

Tightening torque:

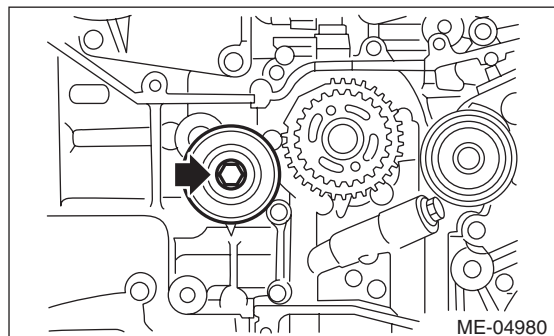
39 N·m (4.0 kgf-m, 28.8 ft-lb)



4) Install the belt idlers.

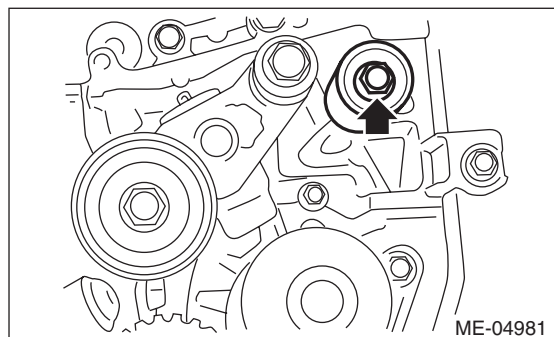
Tightening torque:

39 N·m (4.0 kgf-m, 28.8 ft-lb)



Tightening torque:

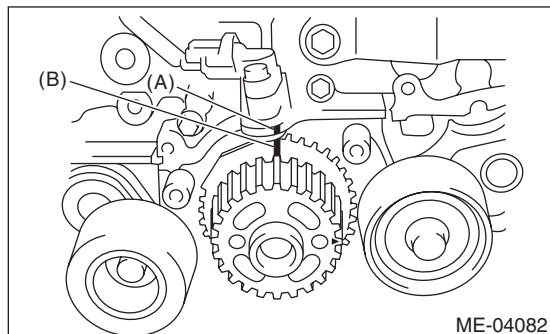
25 N·m (2.5 kgf-m, 18.4 ft-lb)



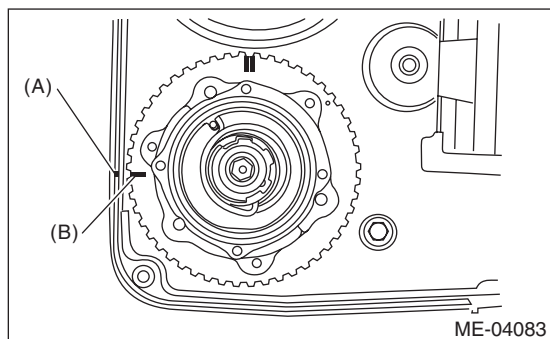
2. TIMING BELT

1) Prepare for installation of the automatic belt tension adjuster assembly. <Ref. to ME(STI)-52, AUTOMATIC BELT TENSION ADJUSTER ASSEMBLY AND BELT IDLER, INSTALLATION, Timing Belt.>

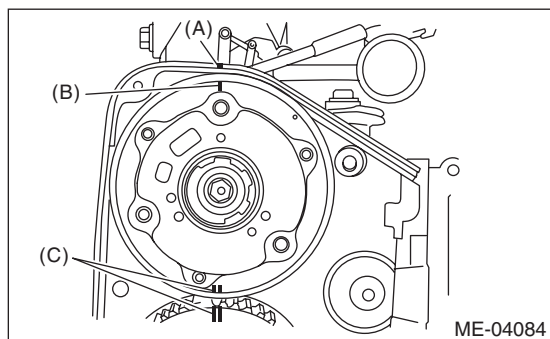
2) Align the mark (B) on crank sprocket with the mark (A) on oil pump.



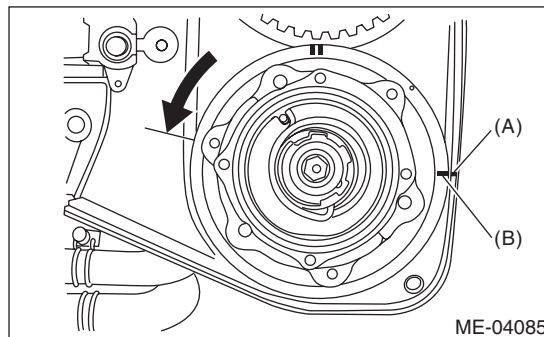
3) Align the single line mark (B) on the exhaust cam sprocket RH with notch (A) on the timing belt cover.



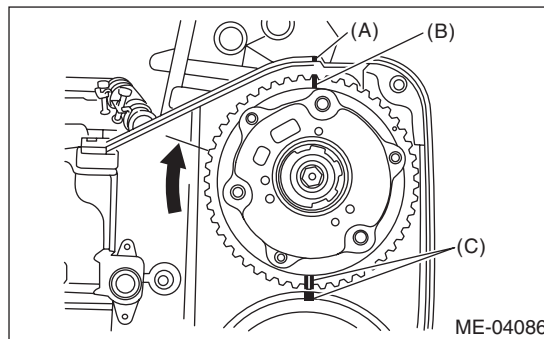
4) Align the single line mark (B) on the intake cam sprocket RH with notch (A) on the timing belt cover. Make sure that the double line marks (C) on intake and exhaust cam sprockets are aligned.



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



6) Align the single line mark (B) on intake cam sprocket LH with notch (A) on the 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.



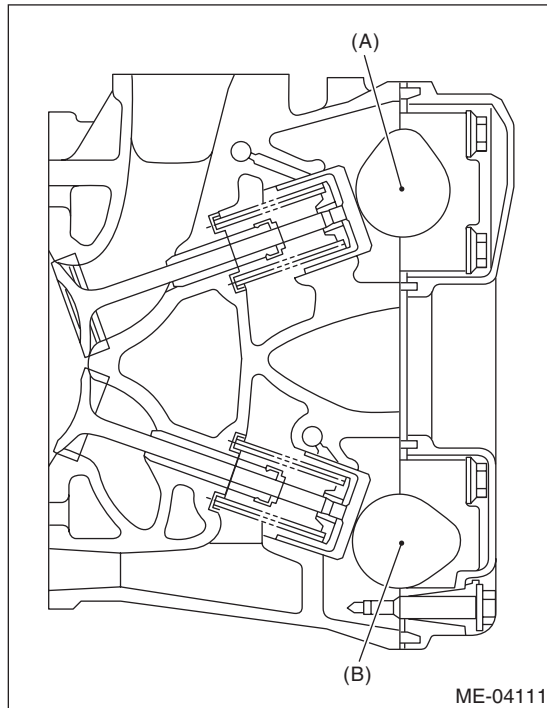
Timing Belt

MECHANICAL

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

CAUTION:

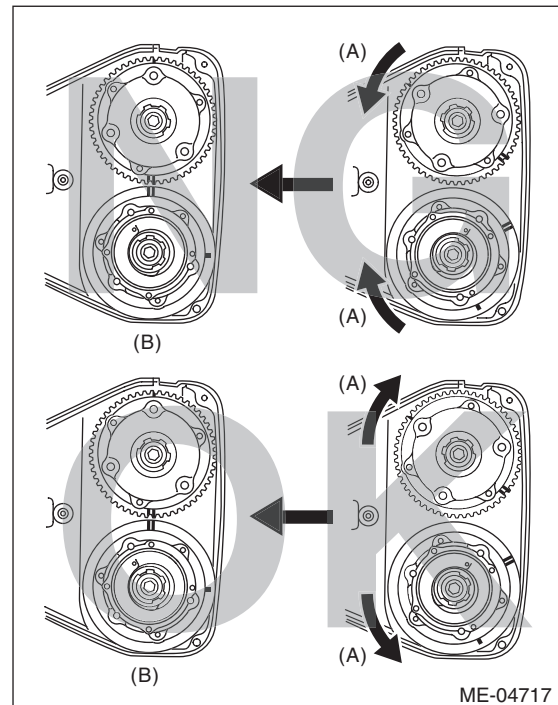
- Intake and exhaust camshafts for this DOHC engine can be independently rotated with the timing belts removed. As can be seen from the figure, if the intake and exhaust valves are lifted simultaneously, heads will interfere with each other, resulting in bent valves.



(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 are not pushing down on the intake and exhaust valves. (Under this condition, all valves remain unlifted.)
- When the camshafts are rotated to install the timing belts, #2 intake and #4 exhaust cam of camshaft LH are held, pushing their corresponding valves down. (Under this condition, these valves are held lifted.) Camshaft RH are held so that their cams do not push the 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 upper figure. Doing this may cause both the intake and exhaust valves to lift simultaneously, resulting in mutual interference of valve heads.



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

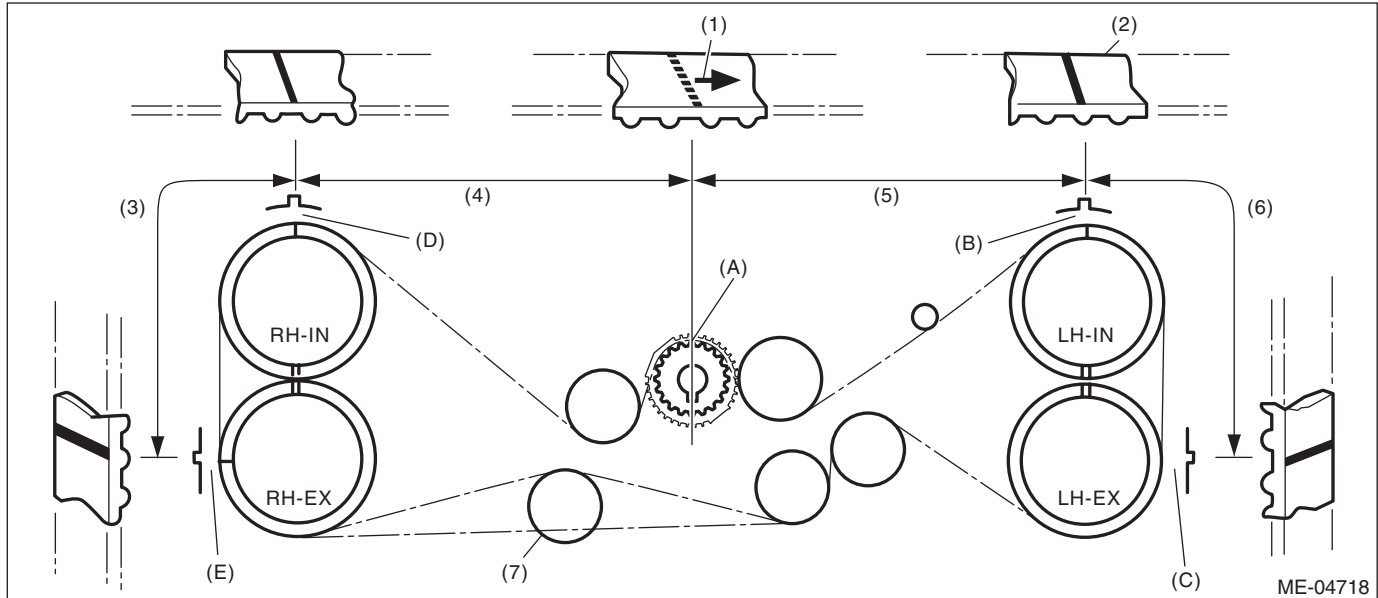
Timing Belt

MECHANICAL

8) 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, and install the timing belt.

CAUTION:

- If the timing belt slips by 1 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 teeth | (6) 28 teeth |
| (2) Timing belt | (5) 51 teeth | (7) Install it in the end |
| (3) 28 teeth | | |

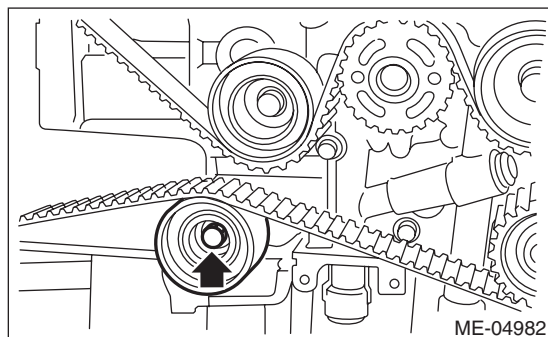
9) Install the belt idlers.

Tightening torque:

39 N·m (4.0 kgf·m, 28.8 ft·lb)

NOTE:

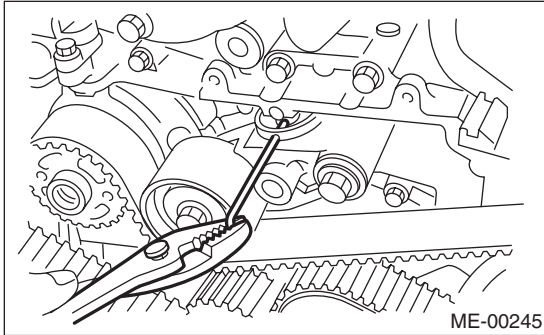
Make sure that the marks on the timing belt and sprockets are aligned.



Timing Belt

MECHANICAL

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



11) Install the timing belt guide.

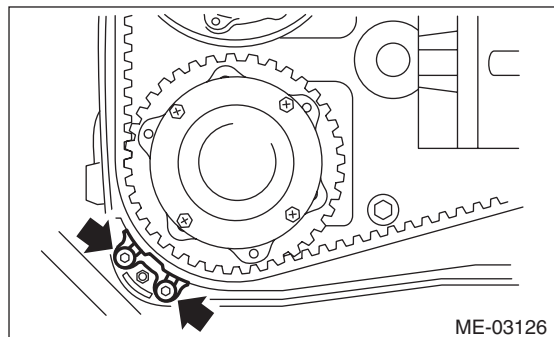
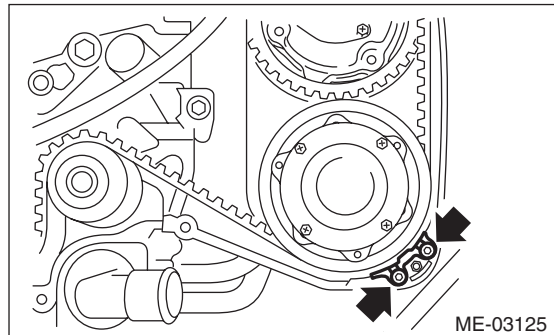
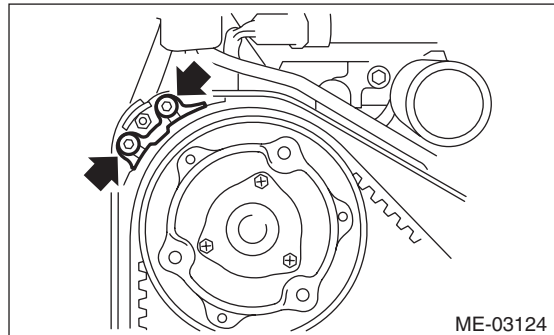
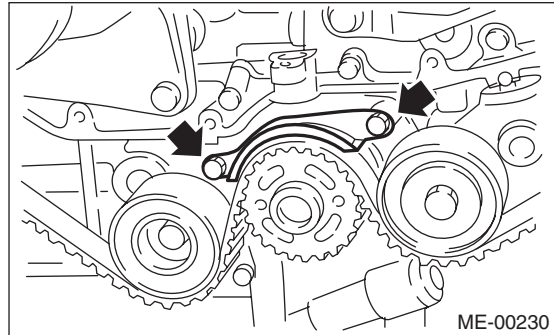
(1) Temporarily tighten the bolts mounting the timing belt guide.

NOTE:

- Before installing the timing belt guide, clean the timing belt guide mounting bolt holes of the timing belt cover No. 2.
- Apply liquid gasket to the thread of the timing belt guide mounting bolt on the cam sprocket section. (when reusing bolts)

Liquid gasket:

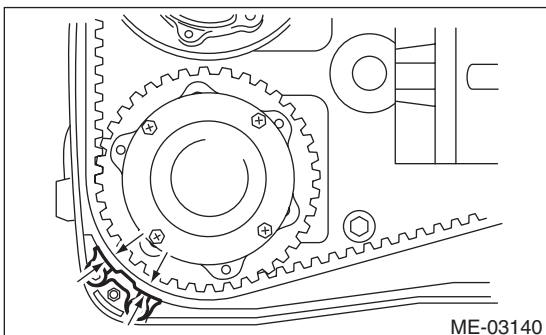
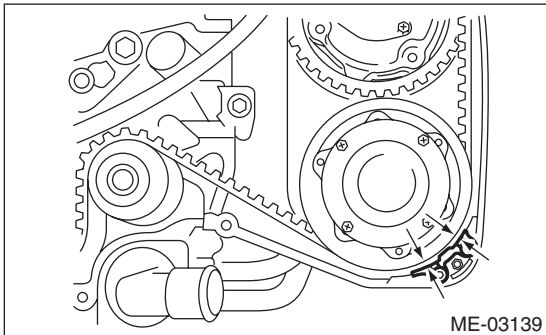
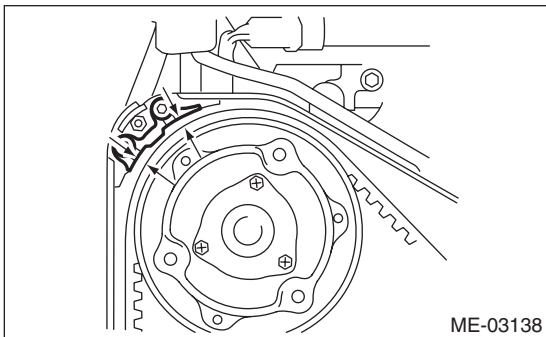
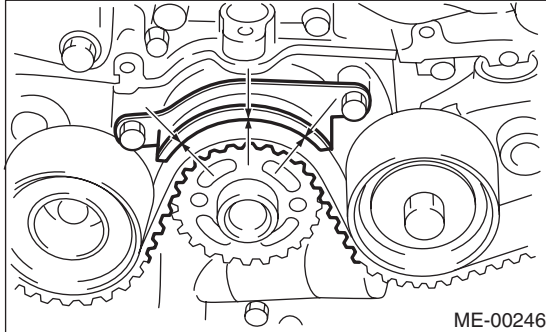
THREE BOND 1324 (Part No. 004403042) or equivalent



(2) Adjust the clearance between timing belt and timing belt guide using a thickness gauge and tighten.

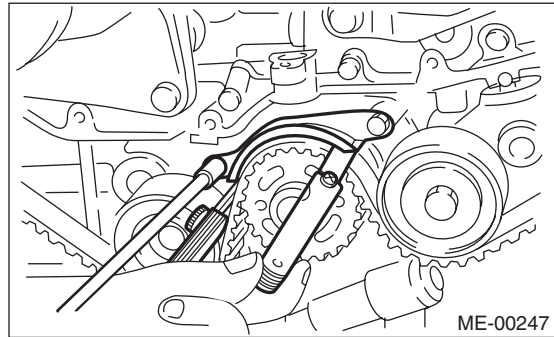
Clearance:

$1.0 \pm 0.5 \text{ mm}$ ($0.039 \pm 0.020 \text{ in}$)



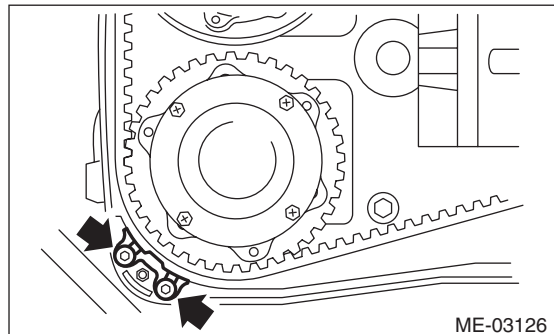
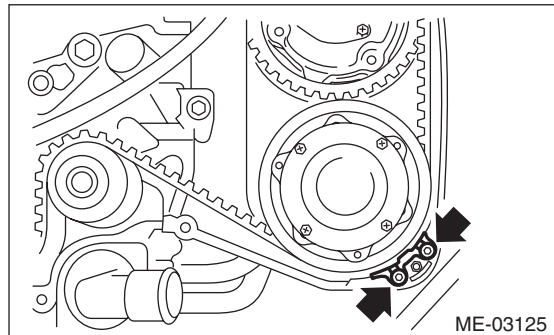
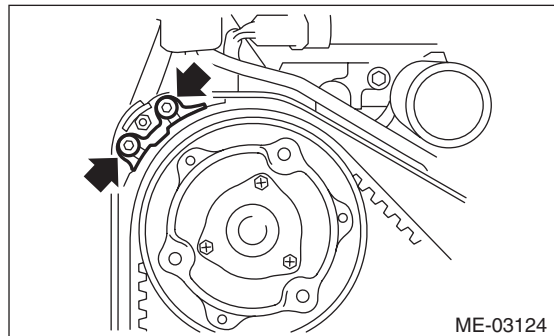
Tightening torque:

$9.75 \text{ N}\cdot\text{m}$ ($1.0 \text{ kgf}\cdot\text{m}$, $7.2 \text{ ft}\cdot\text{lb}$)



Tightening torque:

$6.4 \text{ N}\cdot\text{m}$ ($0.7 \text{ kgf}\cdot\text{m}$, $4.7 \text{ ft}\cdot\text{lb}$)



12) Install the timing belt cover. <Ref. to ME(STI)-49, INSTALLATION, Timing Belt Cover.>

13) Install the crank pulley. <Ref. to ME(STI)-47, INSTALLATION, Crank Pulley.>

C: INSPECTION

1. TIMING BELT

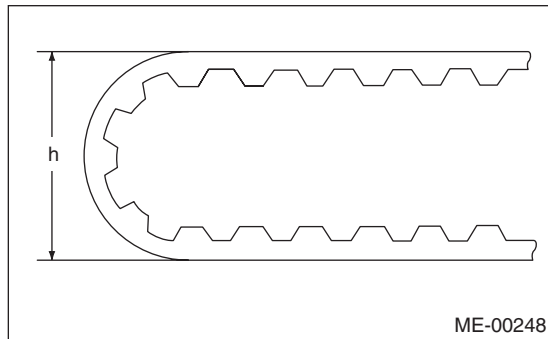
- 1) Check the timing belt teeth for breaks, cracks or wear. If any fault is found, replace the timing belt.
- 2) Check the condition on the back surface of the timing belt. If cracks are found, replace the timing belt.

CAUTION:

- Be careful not to let oil, grease or coolant contact the timing 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 ADJUST-ER

- 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 at the rod oil seal 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 lbf) is applied to it. This is to check adjuster rod stiffness.

- 3) If the adjuster rod is not stiff enough and moves freely when applying 165 N (16.8 kgf, 37.1 lbf), 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 lbf) to it, and check the adjuster rod stiffness.

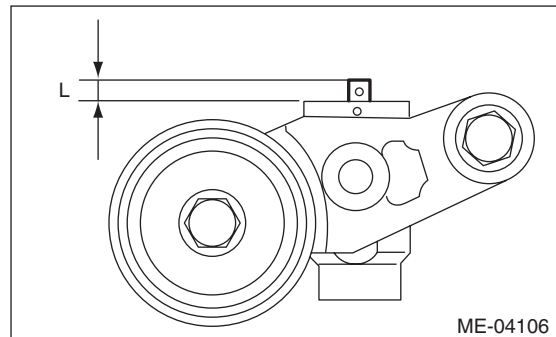
- (3) If the adjuster rod is not stiff and moves down, replace the automatic belt tension adjuster assembly with a new part.

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 three minutes or more.
 - Do not allow press pressure to exceed 9,807 N (1,000 kgf, 2,205 lbf).
 - Push in the adjuster rod to the end face of the cylinder. However, do not press the adjuster rod below the end face of the cylinder. Doing so may damage the cylinder.
- 4) Measure the amount of adjuster rod protrusion "L" from the end surface of the cylinder. If it is not within specifications, replace the automatic belt tension adjuster assembly with a new part.

Protrusion amount of adjuster rod L:

5.2 — 6.2 mm (0.205 — 0.244 in)



3. BELT TENSION PULLEY

- 1) Check the mating surfaces of timing belt and contact point of adjuster rod for abnormal wear or scratches. Replace the automatic belt tension adjuster assembly with a new part if faulty.
- 2) Check the belt tension pulley for smooth rotation. Replace the automatic belt tension adjuster assembly with a new part if abnormal 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.