

18. Camshaft

A: REMOVAL

NOTE:

Perform the work with the engine installed to body when replacing a single part. Refer to "Valve Clearance" for preparation. <Ref. to ME(H4DOTC)-26, INSPECTION, Valve Clearance.>

1) Remove the V-belts. <Ref. to ME(H4DOTC)-39, REMOVAL, V-belt.>

2) Remove the crank pulley. <Ref. to ME(H4DOTC)-47, REMOVAL, Crank Pulley.>

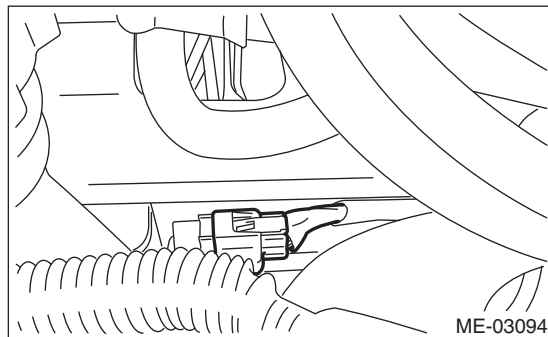
3) Remove the timing belt cover.

<Ref. to ME(H4DOTC)-49, REMOVAL, Timing Belt Cover.>

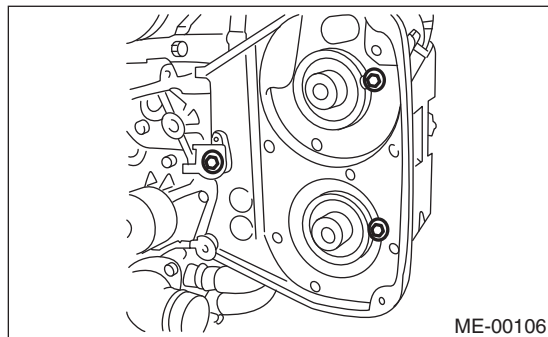
4) Remove the timing belt. <Ref. to ME(H4DOTC)-50, REMOVAL, Timing Belt.>

5) Remove the cam sprocket. <Ref. to ME(H4DOTC)-57, REMOVAL, Cam Sprocket.>

6) Disconnect the oil flow control solenoid valve connector.



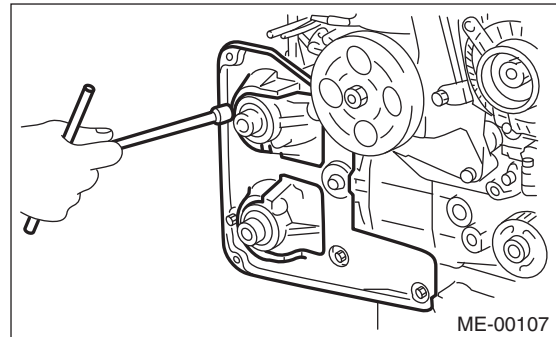
7) Remove the timing belt cover No. 2 LH.



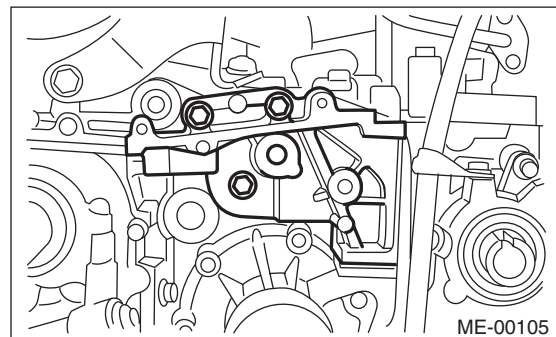
8) Remove the timing belt cover No. 2 RH.

NOTE:

Do not damage or lose the seal rubber when removing the timing belt covers.



9) Remove the tensioner bracket.



10) Remove the ignition coil. <Ref. to IG(H4DOTC)-7, REMOVAL, Ignition Coil.>

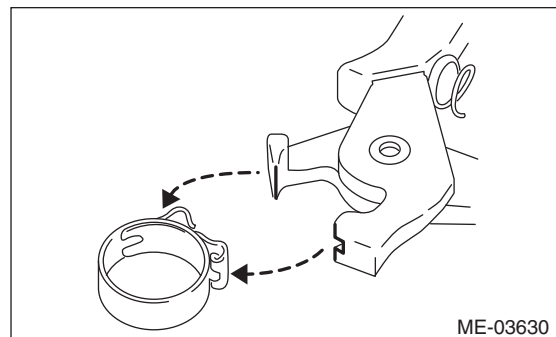
11) Disconnect the PCV hose from the rocker cover.

NOTE:

For the PCV hose affixed with the clamp, fit the depression in the ST with the protrusion of the clamp as shown in the figure below, unlock the clamp and disconnect.

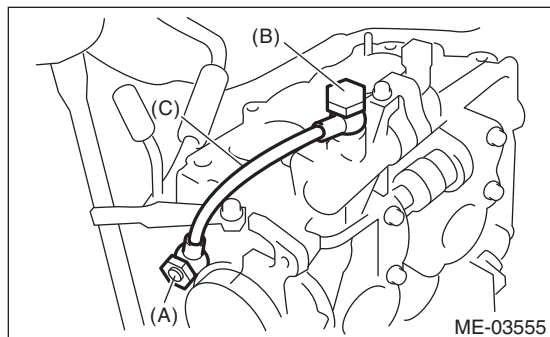
ST 18353AA000

CLAMP PLIERS



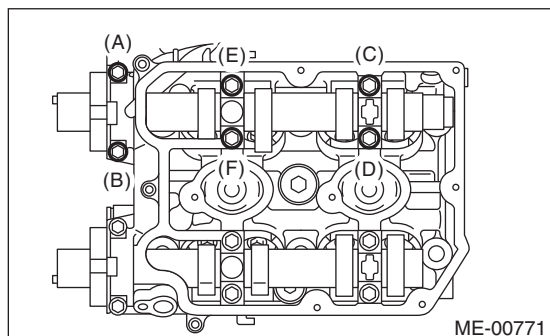
12) Remove the rocker cover and gasket.

13) Remove the oil pipe.

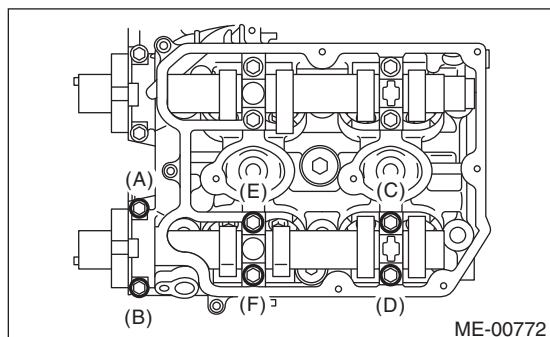


- (A) Union screw with filter (with protrusion)
- (B) Union screw without filter (without protrusion)
- (C) Oil pipe

14) Loosen the front camshaft cap upper area and intake camshaft cap bolts equally, a little at a time in alphabetical order as shown in the figure.



15) Loosen the front camshaft cap lower area and exhaust camshaft cap bolts equally, a little at a time in alphabetical order as shown in the figure.



16) Remove the front camshaft cap.

17) Remove the intake camshaft caps and intake camshaft.

18) Remove the exhaust camshaft caps and exhaust camshaft.

NOTE:

Arrange camshaft caps in order so that they can be installed in their original positions.

19) Remove the oil seal.

NOTE:

Do not scratch the journal surface when removing the oil seal.

20) Similarly, remove the camshaft RH and related parts.

B: INSTALLATION

1) Install the camshaft.

Apply engine oil to the cylinder head at camshaft journal installation location before installing the camshaft. Install the camshaft so that each valve is close to or in contact with base circle of the cam lobe.

NOTE:

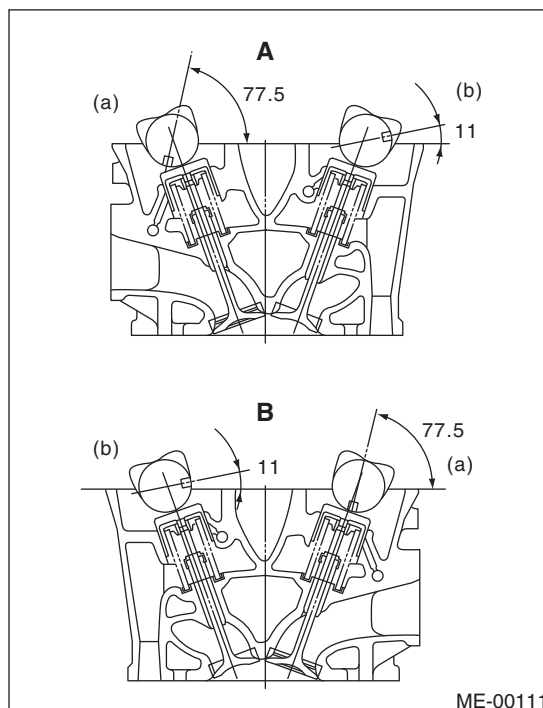
- Set the camshaft to the position shown in the figure.
- When set at the position shown in the figure, it is not necessary to rotate camshaft RH when installing the timing belt, but it is necessary to rotate camshaft LH slightly.

Intake camshaft LH:

Rotate 80° clockwise.

Exhaust camshaft LH:

Rotate 45° counterclockwise.



- A Cylinder head LH
- B Cylinder head RH
- (a) Intake camshaft
- (b) Exhaust camshaft

Camshaft

MECHANICAL

2) Install the camshaft cap.

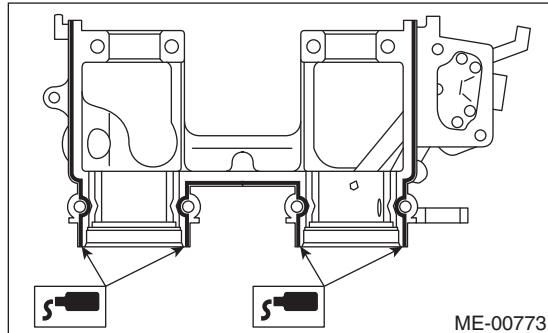
- (1) Apply small amount of liquid gasket to the mating surface of cap.

NOTE:

- Install within 5 min. after applying liquid gasket.
- Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to come out and flow toward oil seal, resulting in oil leak.

Liquid gasket:

THREE BOND 1217G (Part No. K0877Y0100) or equivalent



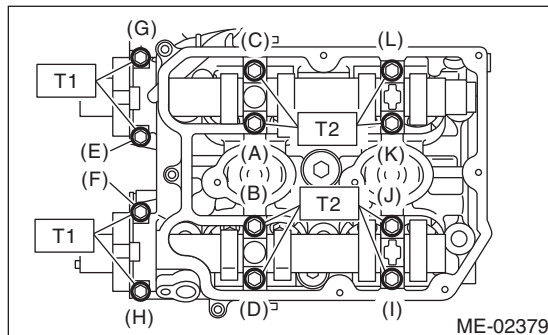
- (2) Apply a thin coat of engine oil to the cap journal surface, and install the camshaft cap to the camshaft.

- (3) Gradually tighten the camshaft cap in at least two steps, in alphabetical order shown in the figure, and then tighten to the specified torque.

Tightening torque:

T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)

T2: 20 N·m (2.0 kgf-m, 14.8 ft-lb)



- (4) After tightening the camshaft cap, ensure the camshaft rotates only slightly while holding it at base circle.

- 3) Apply a coat of engine oil to the camshaft oil seal periphery and oil seal lips, then install the oil seal on the camshaft using ST1 and ST2.

NOTE:

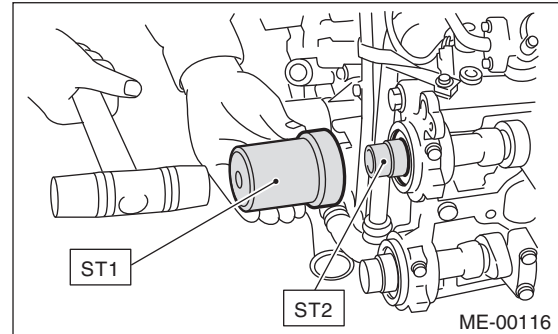
Use a new oil seal.

ST1 499587600

ST2 499597200

OIL SEAL INSTALLER

OIL SEAL GUIDE



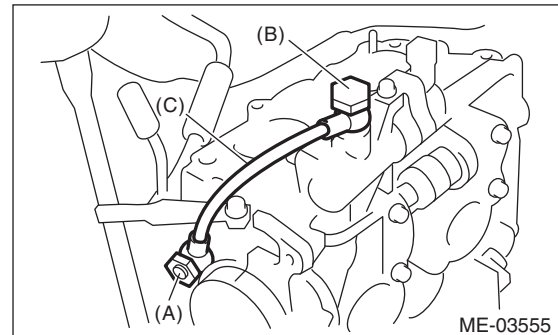
- 4) Install the oil pipe.

NOTE:

Make sure not to mix up the union screws with filter and without filter as their installation positions are different.

Tightening torque:

29 N·m (3.0 kgf-m, 21.4 ft-lb)



(A) Union screw with filter (with protrusion)

(B) Union screw without filter (without protrusion)

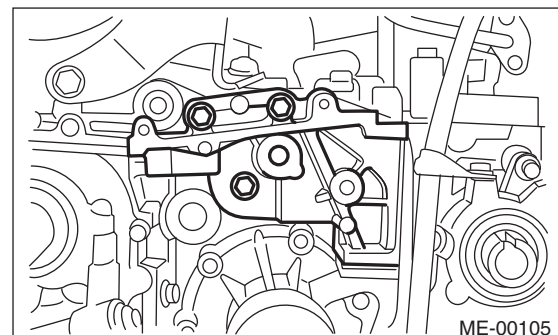
(C) Oil pipe

- 5) Similarly, install the parts on right-hand side.

- 6) Install the tensioner bracket.

Tightening torque:

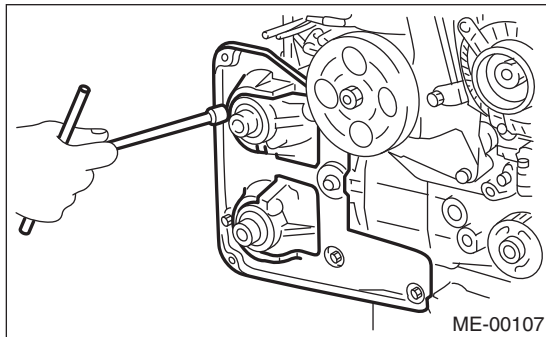
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



7) Install the timing belt cover No. 2 RH.

Tightening torque:

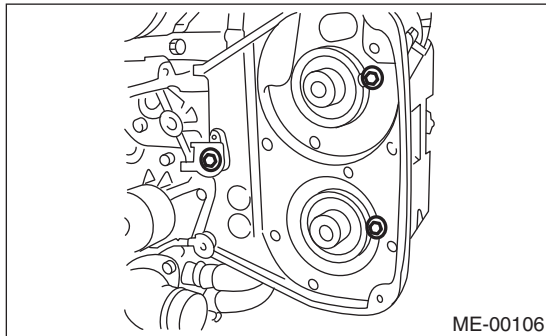
5 N·m (0.5 kgf-m, 3.7 ft-lb)



8) Install the timing belt cover No. 2 LH.

Tightening torque:

5 N·m (0.5 kgf-m, 3.7 ft-lb)



9) Install the cam sprocket.

<Ref. to ME(H4DOTC)-57, INSTALLATION, Cam Sprocket.>

10) Install the timing belt. <Ref. to ME(H4DOTC)-51, INSTALLATION, Timing Belt.>

11) Adjust the valve clearance. <Ref. to ME(H4DOTC)-28, ADJUSTMENT, Valve Clearance.>

12) Install the rocker cover.

(1) Install the rocker cover gasket to the rocker cover. (Outer periphery and ignition coil section)

NOTE:

Use a new rocker cover gasket.

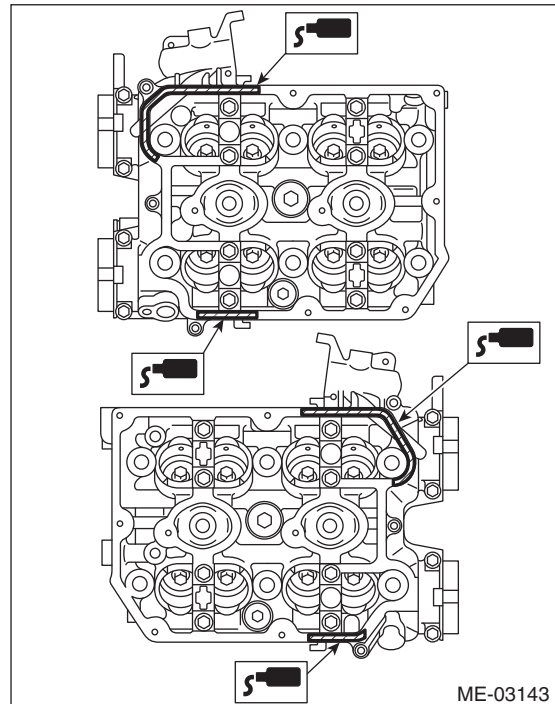
(2) Apply liquid gasket to the specified point of the cylinder head.

NOTE:

Install within 5 min. after applying liquid gasket.

Liquid gasket:

THREE BOND 1217G (Part No. K0877Y0100) or equivalent

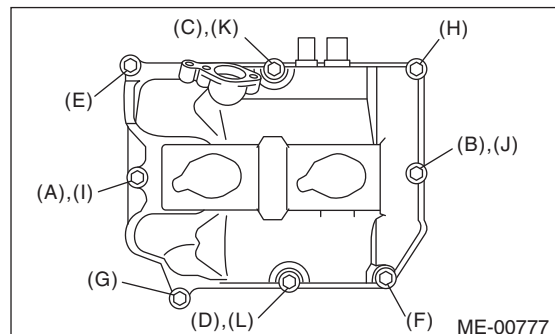


(3) Install the rocker cover on cylinder head. Ensure the gasket is properly positioned during installation.

(4) Temporarily tighten the rocker cover tightening bolt in alphabetical sequence shown in the figure, and then tighten to specified torque in alphabetical order.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

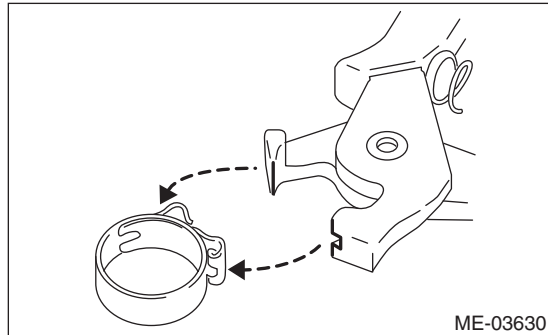


13) Connect the PCV hose to the rocker cover.

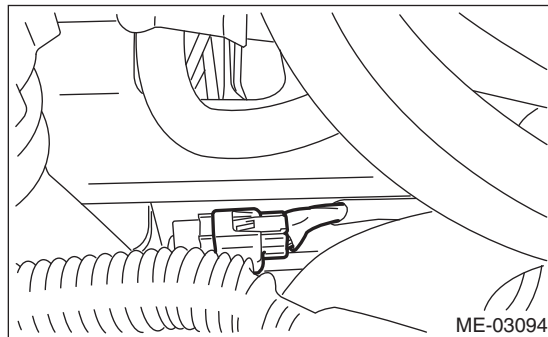
NOTE:

For the PVC hose clamp, use a new clamp. Sandwich the protruding part of the clamp with the ST and lock the clamp.

ST 18353AA000 CLAMP PLIERS



14) Connect the connector to the oil flow control solenoid valve.



15) Attach the ignition coil. <Ref. to IG(H4DOTC)-7, INSTALLATION, Ignition Coil.>

16) Install the timing belt cover.

<Ref. to ME(H4DOTC)-49, INSTALLATION, Timing Belt Cover.>

17) Install the crank pulley.

<Ref. to ME(H4DOTC)-47, INSTALLATION, Crank Pulley.>

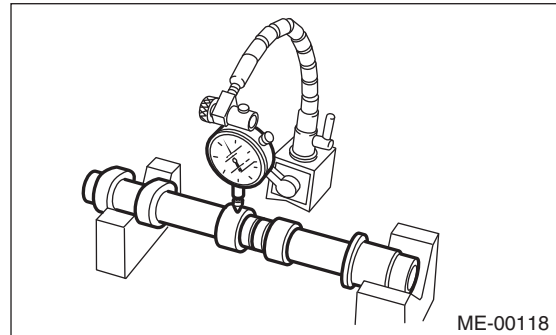
18) Install the V-belts. <Ref. to ME(H4DOTC)-39, INSTALLATION, V-belt.>

C: INSPECTION

1) Measure the bend, and repair or replace if necessary.

Service limit:

0.020 mm (0.00079 in)



2) Check the journal for damage and wear. Replace if faulty.

3) Check the cutout portion used for camshaft sensor for damage. Replace if faulty.

4) Measure the outside diameter of camshaft journal. If the journal diameter is not within the standard value, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard mm (in)	37.946 — 37.963 (1.4939 — 1.4946)	29.946 — 29.963 (1.1790 — 1.1796)

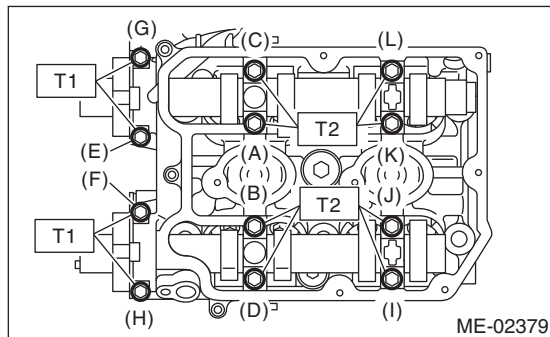
5) Measure the camshaft journal oil clearance.

- (1) Clean the camshaft cap and cylinder head camshaft journal.
- (2) Place the camshaft on the cylinder head. (Without installing the valve lifter)
- (3) Place a plastigauge across each camshaft journals.
- (4) Gradually tighten the camshaft cap in at least two steps, in alphabetical order shown in the figure, and then tighten to the specified torque. Do not turn the camshaft.

Tightening torque:

T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)

T2: 20 N·m (2.0 kgf-m, 14.8 ft-lb)

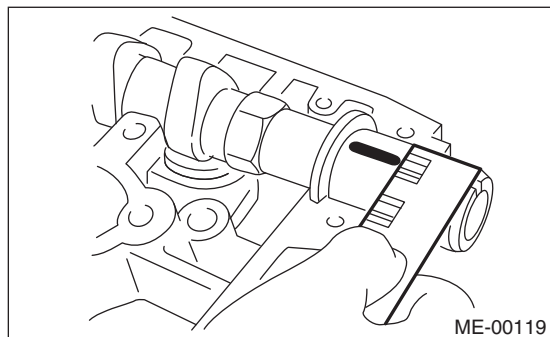


(5) Remove the camshaft cap.

- (6) Measure the widest point of the plastigauge on each journal. If oil clearance exceeds the standard, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

Standard:

0.037 — 0.072 mm (0.0015 — 0.0028 in)



(7) Completely remove the plastigauge.

- (6) Check the cam face condition; remove the minor faults by grinding with oil stone. Measure the cam height H. If it exceeds the standard or offset wear occurs, replace it.

Cam height H:

Standard

Intake

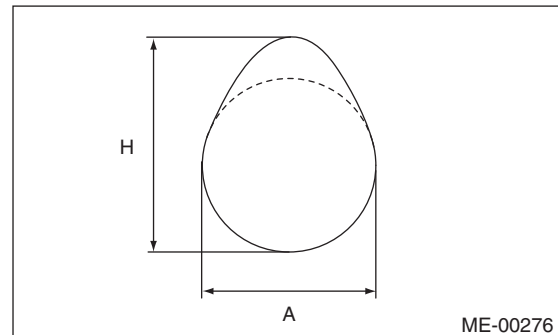
46.55 — 46.65 mm (1.833 — 1.837 in)

Exhaust

46.75 — 46.85 mm (1.841 — 1.844 in)

Cam base circle diameter A:

37.0 mm (1.457 in)



- (7) Measure the thrust clearance of camshaft with setting the dial gauge at end of camshaft. If the thrust clearance is not within the standard or there is offset wear, replace the camshaft caps and cylinder head as a set. If necessary replace the camshaft.

Standard:

0.068 — 0.116 mm (0.0027 — 0.0047 in)

