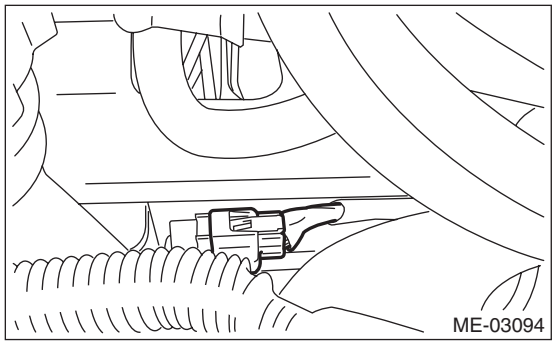
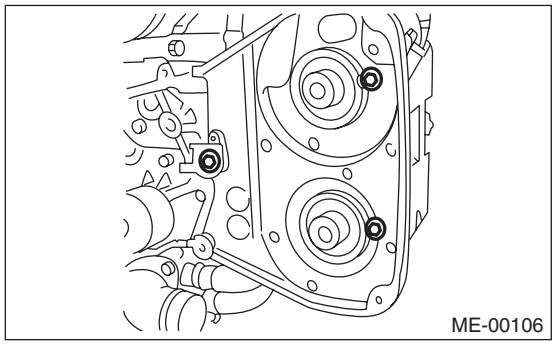
18.Camshaft

A: REMOVAL

1) Remove the V-belts. <Ref. to ME(H4DOTC)-40, 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)-59, REMOVAL, Cam Sprocket.>
6) Disconnect the oil flow control solenoid valve connector.

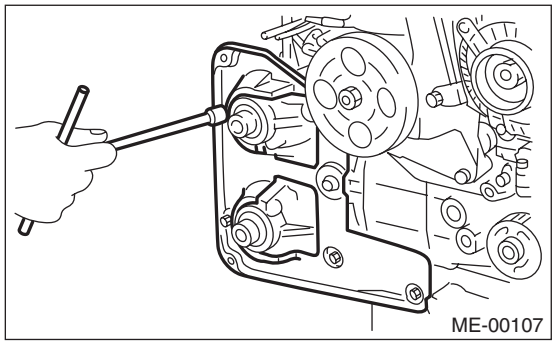

ME-03094

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

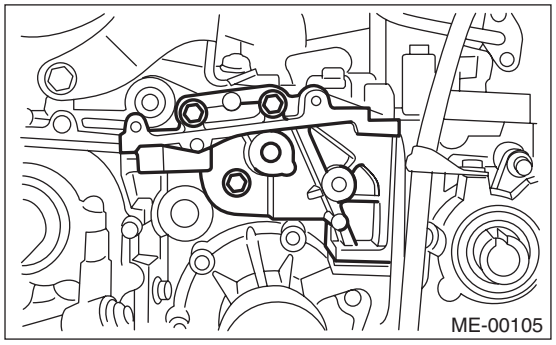

ME-00106

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

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

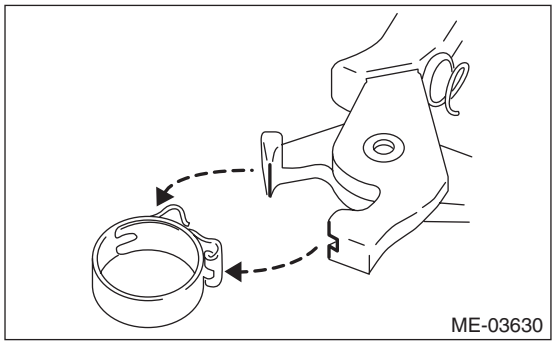

ME-00107

9) Remove the tensioner bracket.

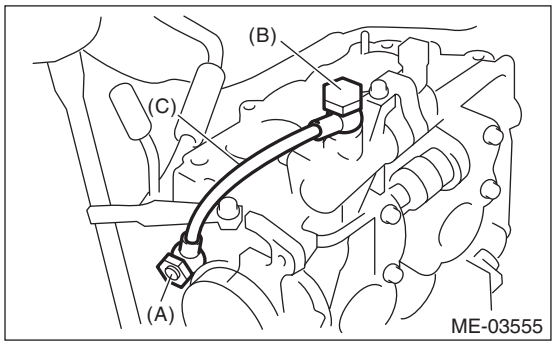

ME-00105

10) Remove the ignition coil. <Ref. to IG(H4DOTC)-6, 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


ME-03630

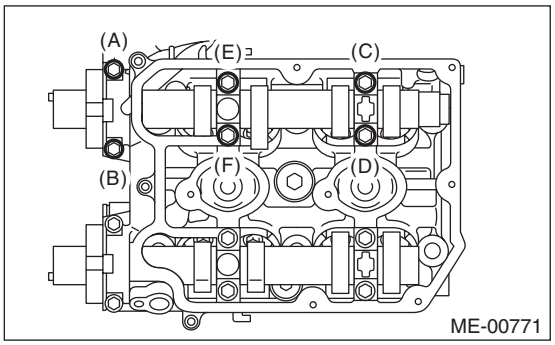
12) Remove the rocker cover and gasket.
13) Remove the union screw without filter (without protrusion) which secures the oil pipe to the front camshaft cap.



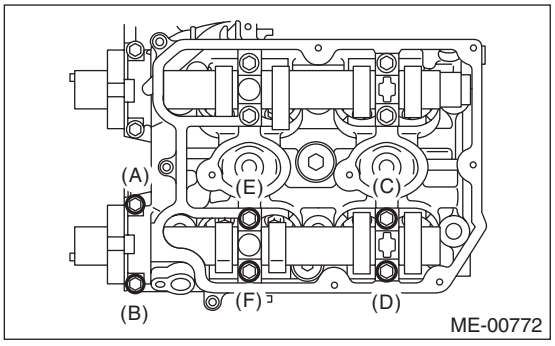
ME-03555

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

14) Loosen the upper side of the front camshaft cap and the intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



15) Loosen the lower side of the front camshaft cap and the exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence 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.

CAUTION:
Do not scratch the journal surface when removing the oil seal.
20) Similarly, remove the camshaft RH and related parts.

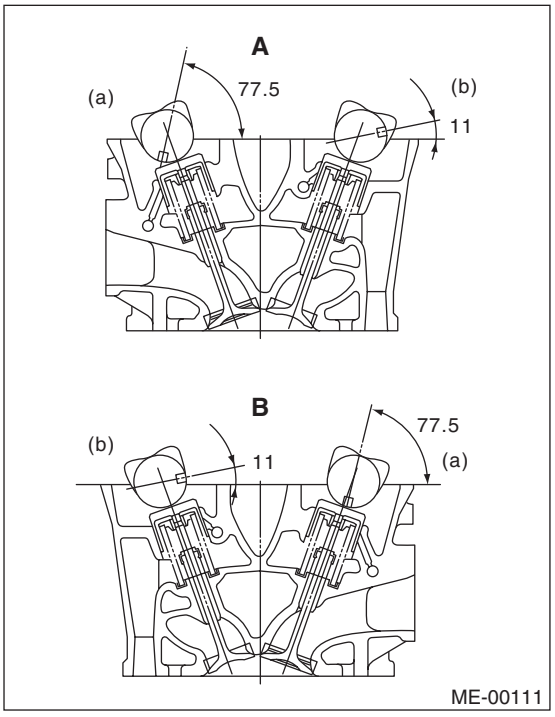
B: INSTALLATION

1) Install the camshaft.
Apply engine oil to the cylinder head at camshaft bearing 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 the camshaft RH when installing the timing belt, but it is necessary to rotate the camshaft LH slightly.

Intake camshaft LH:
Rotate 80° clockwise.

Exhaust camshaft LH:
Rotate 45° counterclockwise.

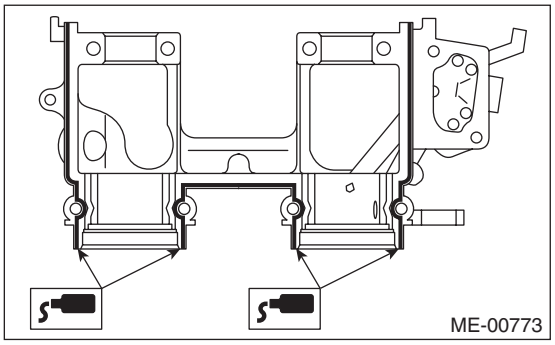


A Cylinder head LH
B Cylinder head RH
(a) Intake camshaft
(b) Exhaust camshaft

2) Install the camshaft cap.
(1) Apply small amount of liquid gasket to the mating surface of cap.

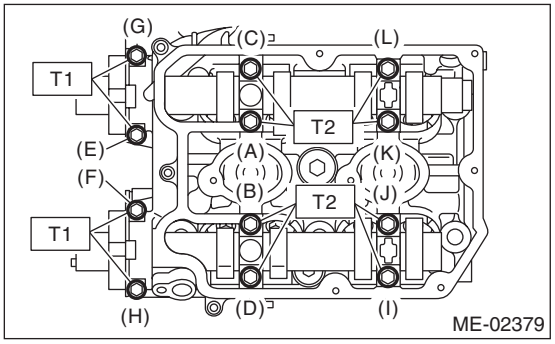
NOTE:
- Install within 5 min. after applying liquid gasket.
- Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to come out and flow toward oil seal, resulting in oil leak.

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.

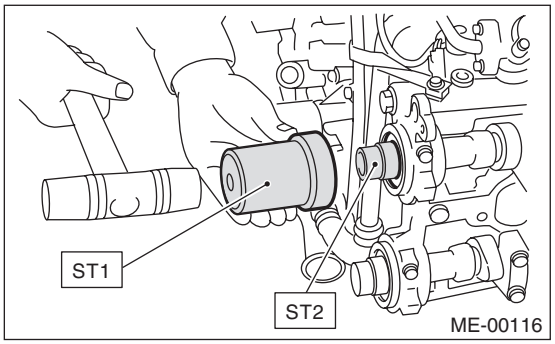
Tightening torque:
T1: 9.75 N·m (1.0 kgf-m, 7.2 ft-lb)
T2: 20 N·m (2.0 kgf-m, 14.8 ft-lb)



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

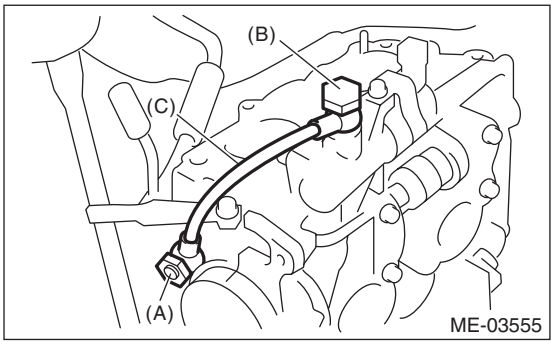
3) Apply a thin coat of engine oil to the periphery of the camshaft oil seal and oil seal lip, and install the oil seal on the camshaft using ST1 and ST2.

NOTE:
Use a new oil seal.
ST1 499587600 OIL SEAL INSTALLER
ST2 499597200 OIL SEAL GUIDE



4) Install the oil pipe to the front camshaft cap using the union screw without filter (without protrusion).

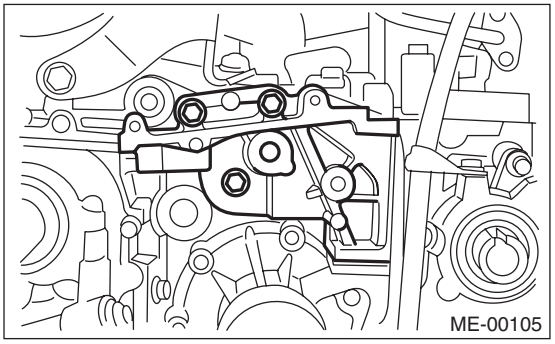
Tightening torque:
29 N·m (3.0 kgf-m, 21.4 ft-lb)



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

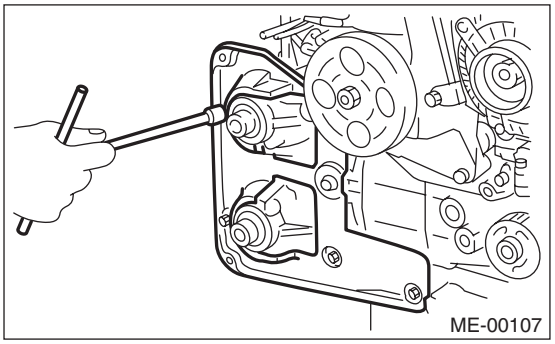
5) Similarly, install the parts on right-hand side.
6) Install the tensioner bracket.

Tightening torque:
24.5 N·m (2.5 kgf-m, 18.1 ft-lb)



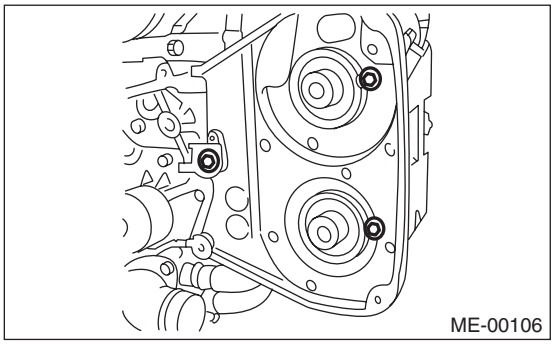
7) Install the timing belt cover No. 2 RH.

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)



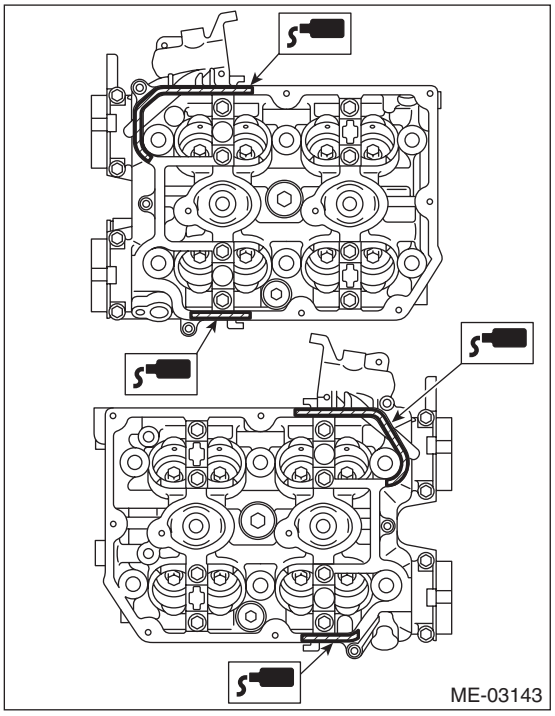
9) Install the cam sprocket. <Ref. to ME(H4DOTC)-59, INSTALLATION, Cam Sprocket.>
10) Install the timing belt. <Ref. to ME(H4DOTC)-52, INSTALLATION, Timing Belt.>
11) Adjust the valve clearance. <Ref. to ME(H4DOTC)-28, ADJUSTMENT, Valve Clearance.>
12) Install the rocker cover.
(1) Install the rocker cover gasket to the rocker cover. (Outer section and ignition coil section)

NOTE:
Use a new rocker cover gasket.

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

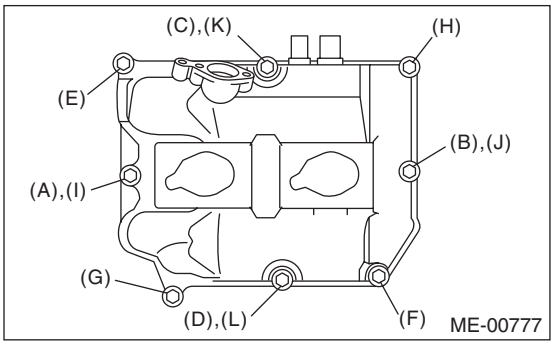
NOTE:
Install within 5 min. after applying liquid gasket.

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



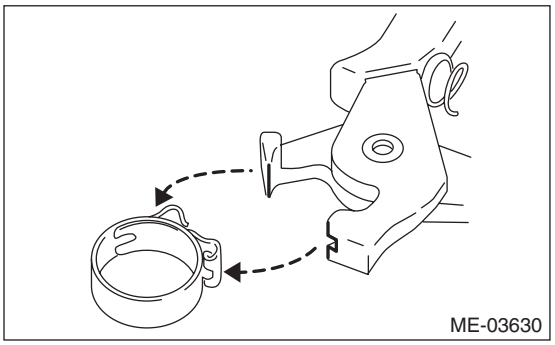
(3) Install the rocker cover onto cylinder heads. Ensure the gasket is properly positioned during installation.
(4) Temporarily tighten the rocker cover tightening bolts in alphabetical order shown in the figure, and then tighten to specified torque in alphabetical order.

Tightening torque:
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

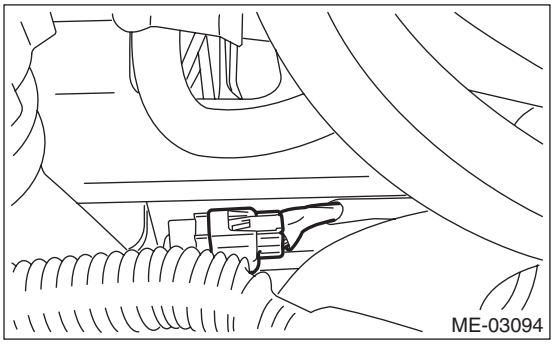


13) Connect the PCV hose to the rocker cover.

NOTE:
Use a new clamp for the PCV hose clamp, fit the cut out in the ST with the protrusion on the clamp as shown in the figure, and lock the clamp.
ST 18353AA000 CLAMP PLIERS



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



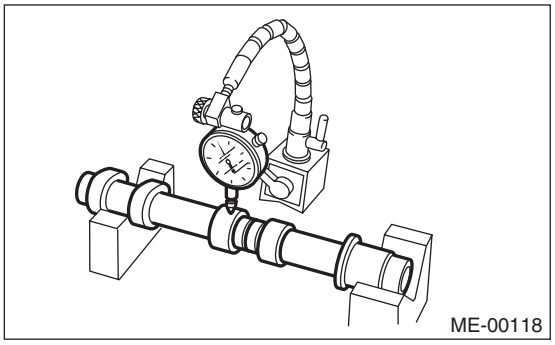
15) Install the ignition coil. <Ref. to IG(H4DOTC)-6, INSTALLATION, Ignition Coil.>
16) Install the timing belt cover. <Ref. to ME(H4DOTC)-49, INSTALLATION, Timing Belt Cover.>

17) Install the crank pulley. <Ref. to ME(H4DOTC)-47, INSTALLATION, Crank Pulley.>
18) Install the V-belts. <Ref. to ME(H4DOTC)-40, INSTALLATION, V-belt.>

C: INSPECTION

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

Camshaft bend limit:
0.020 mm (0.00079 in)

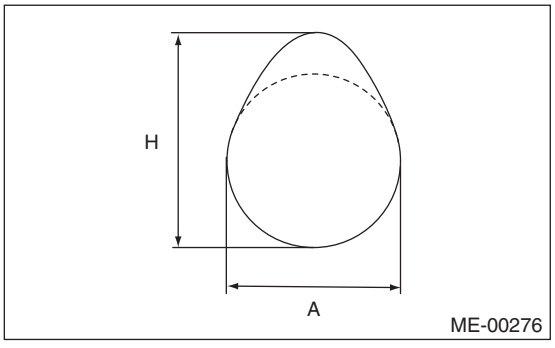


2) Check the journal for damage and wear. Replace if faulty.
3) Check the cutout portion used for camshaft sensor for damage. Replace if faulty.
4) Check the cam face condition, and remove the minor faults by grinding with oil stone. If offset wear occurs, replace it.
5) Measure the cam lobe height H and cam base circle diameter A. If it exceeds the standard or offset wear occurs, replace it.

Cam lobe 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:
Standard
37.0 mm (1.457 in)

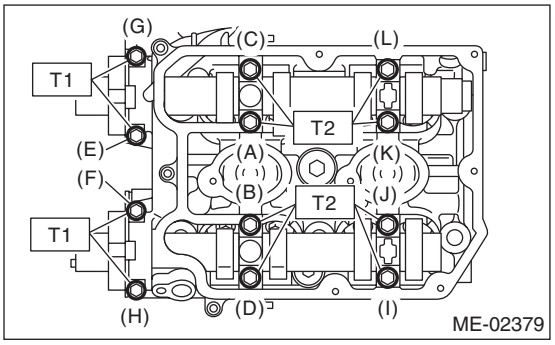


6) Measure the outside diameter of camshaft journal. If the journal diameter is not within specification, check the oil clearance.

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

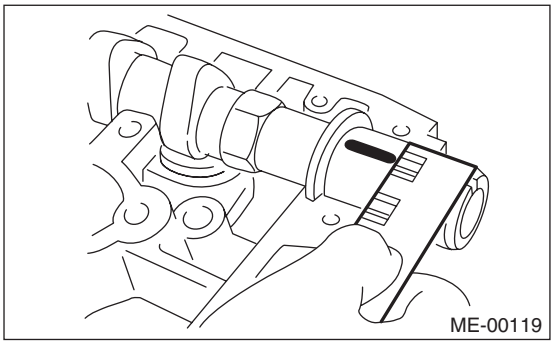
7) Measure the oil clearance of camshaft journal.
(1) Clean the camshaft cap and cylinder head camshaft journal.
(2) Place the camshaft on cylinder head. (Without installing the valve lifter)
(3) Place a plastigauge across each camshaft journals.
(4) Gradually tighten the camshaft cap in at least two 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.

Camshaft oil clearance:
Standard
0.037 — 0.072 mm (0.0015 — 0.0028 in)



(7) Completely remove the plastigauge.

8) Measure the thrust clearance with setting the dial gauge at end surface 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.

Camshaft thrust clearance:
Standard
0.068 — 0.116 mm (0.0027 — 0.0047 in)