

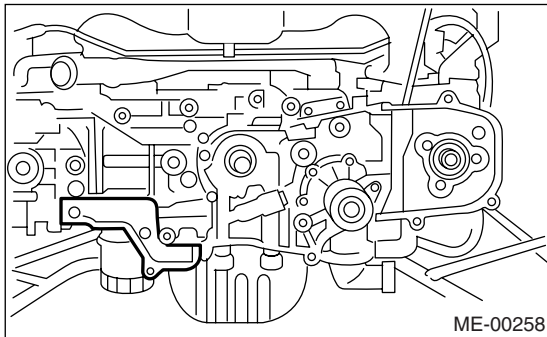
## 19. Camshaft

### A: REMOVAL

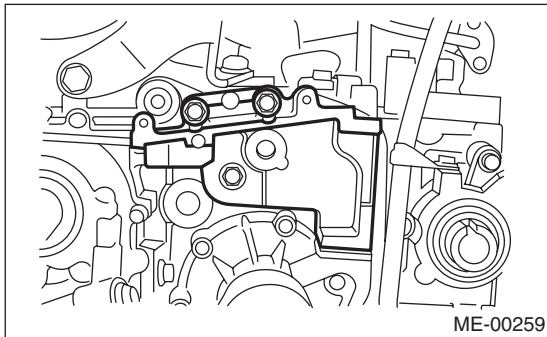
- 1) Remove the V-belt. <Ref. to ME(H4SO)-42, INSTALLATION, V-belt.>
- 2) Remove the crank pulley. <Ref. to ME(H4SO)-44, REMOVAL, Crank Pulley.>
- 3) Remove the timing belt cover. <Ref. to ME(H4SO)-45, REMOVAL, Timing Belt Cover.>
- 4) Remove the timing belt assembly. <Ref. to ME(H4SO)-46, REMOVAL, Timing Belt Assembly.>
- 5) Remove the cam sprocket. <Ref. to ME(H4SO)-51, REMOVAL, Cam Sprocket.>
- 6) Remove the crank sprocket. <Ref. to ME(H4SO)-53, REMOVAL, Crankshaft Sprocket.>
- 7) Remove the timing belt cover No. 2 (LH).
- 8) Remove the timing belt cover No. 2 (RH).

### CAUTION:

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



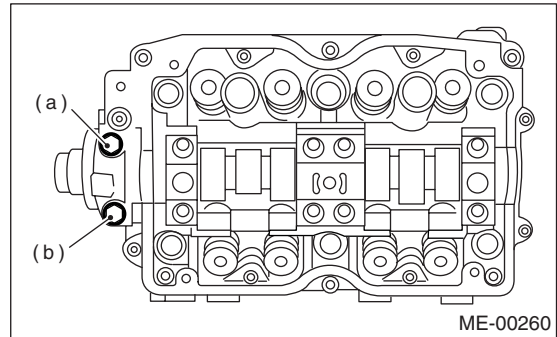
- 9) Remove the tensioner bracket.



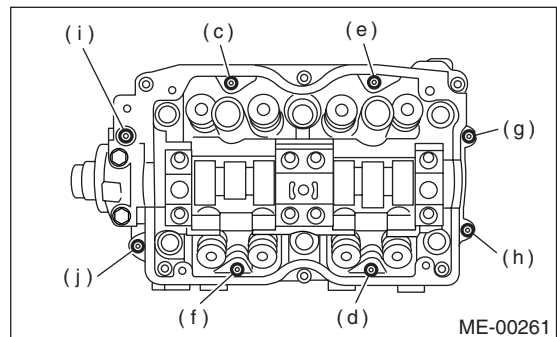
- 10) Remove the camshaft position sensor support. (LH side only)
- 11) Remove the oil level gauge guide. (LH side only)
- 12) Remove the valve rocker assembly. <Ref. to ME(H4SO)-54, REMOVAL, Valve Rocker Assembly.>

- 13) Remove the camshaft cap.

(1) Remove the bolts (a) through (b) in alphabetical sequence.

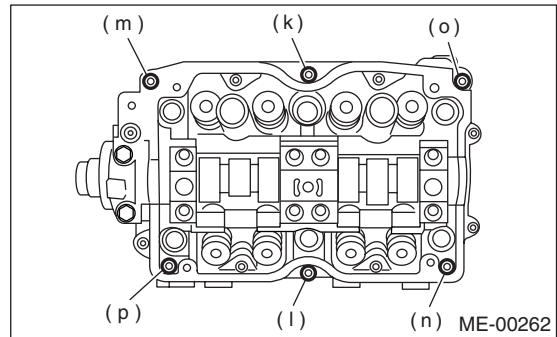


(2) Equally loosen the bolts (c) through (j) all the way in alphabetical sequence.

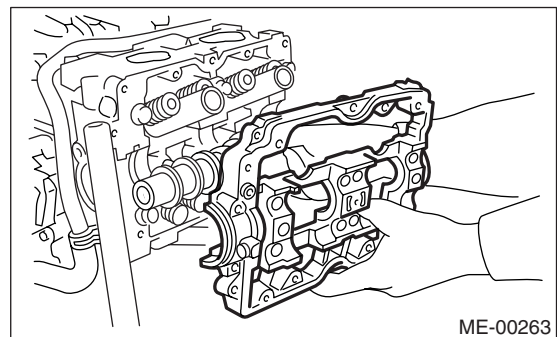


(3) Remove the bolts (k) through (p) in alphabetical sequence using ST.

ST 499497000 TORX® PLUS



- (4) Remove the camshaft cap.



- 14) Remove the camshaft.

- 15) Remove the oil seal.

16) Remove the plug from rear side of camshaft.

**CAUTION:**

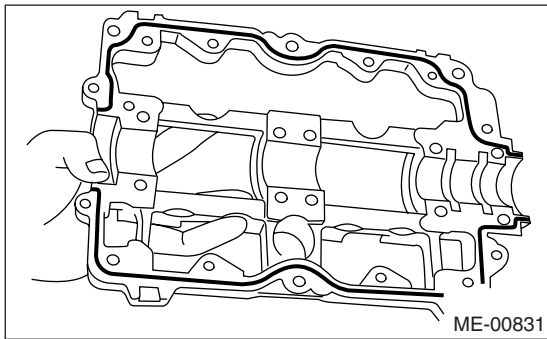
- Do not remove the oil seal unless necessary.
- Do not scratch the journal surface when removing oil seal.

**B: INSTALLATION**

- 1) Apply a coat of engine oil to the camshaft journals, and then install the camshaft.
- 2) Install the camshaft cap.
  - (1) Apply liquid gasket on the around of camshaft cap.

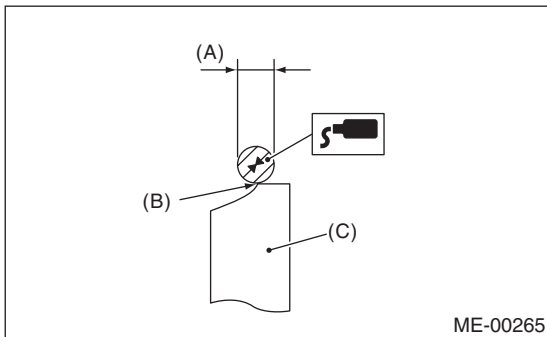
**Liquid gasket:**

**THREE BOND 1280B (P/N K0877YA018)**

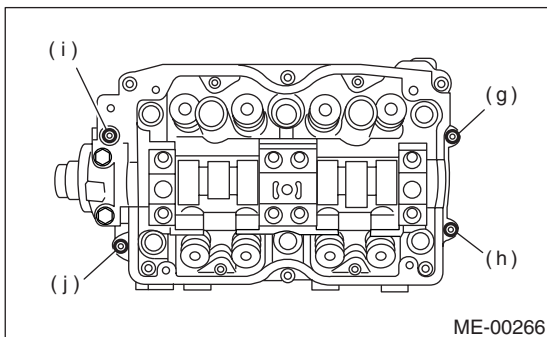


**NOTE:**

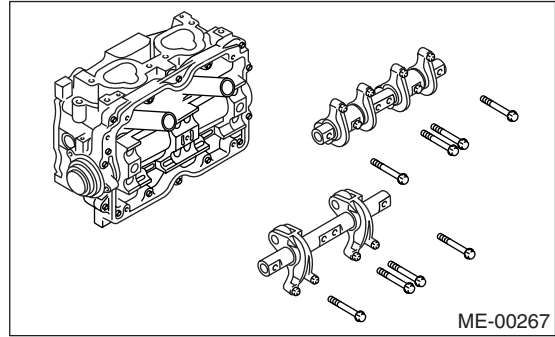
Apply a coat of 3 mm (0.12 in) dia (A). liquid gasket along edge (B) of the camshaft cap (C) mating surface.



(2) Temporarily tighten the bolts (g) through (j) in alphabetical sequence.



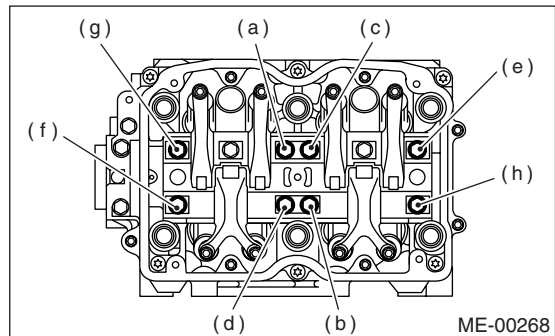
(3) Install the valve rocker assembly.



(4) Tighten the bolts (a) through (h) in alphabetical sequence.

**Tightening torque:**

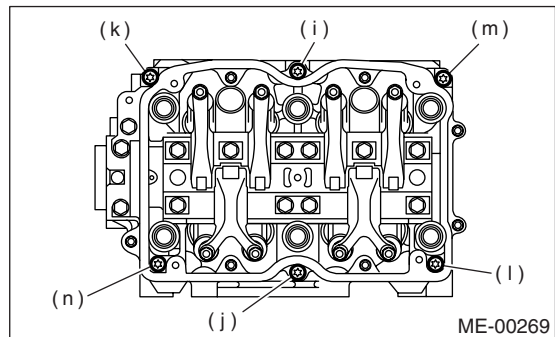
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



(5) Tighten the TORX® bolts (i) through (n) in alphabetical sequence using ST. ST 499497000 TORX® PLUS

**Tightening torque:**

**18 N·m (1.8 kgf-m, 13.0 ft-lb)**



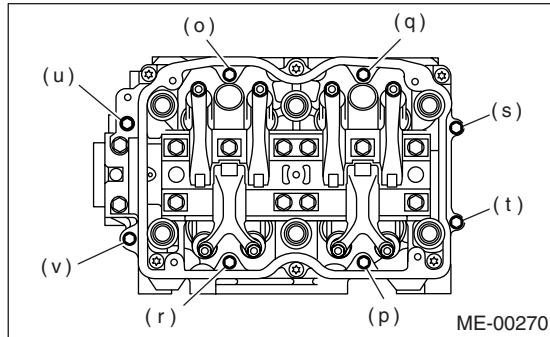
# CAMSHAFT

## MECHANICAL

(6) Tighten the bolts (o) through (v) in alphabetical sequence.

### Tightening torque:

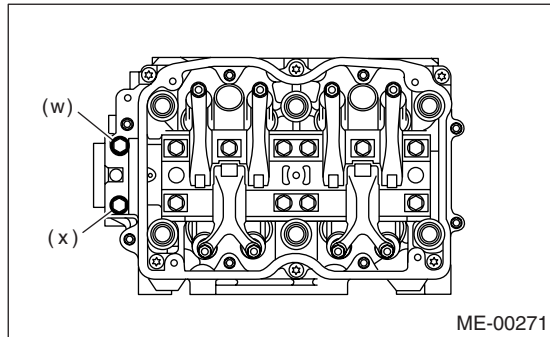
**10 N·m (1.0 kgf·m, 7.2 ft·lb)**



(7) Tighten the bolts (w) through (x) in alphabetical sequence.

### Tightening torque:

**10 N·m (1.0 kgf·m, 7.2 ft·lb)**

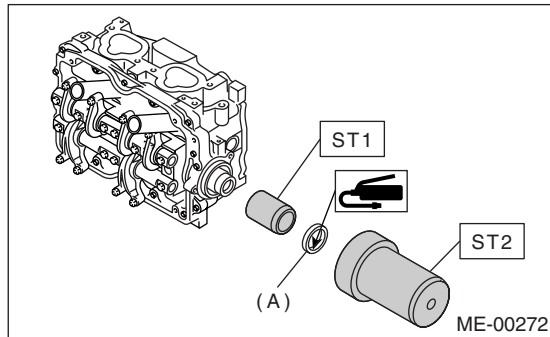


3) Apply a coat of grease to oil seal lips, and then install the oil seal (A) on camshaft using ST1 and ST2.

### NOTE:

Use a new oil seal.

ST1 499597000 OIL SEAL GUIDE  
ST2 499587500 OIL SEAL INSTALLER



4) Install the plug using ST.

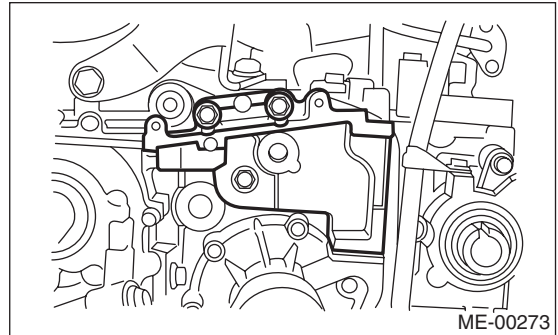
ST 499587700 CAMSHAFT OIL SEAL INSTALLER

5) Adjust the valve clearance. <Ref. to ME(H4SO)-32, ADJUSTMENT, Valve Clearance.>

6) Install the rocker cover and connect PCV hose.  
7) Install the oil level gauge guide. (LH side only)  
8) Install the camshaft position sensor support. (LH side only)  
9) Install the tensioner bracket.

### Tightening torque:

**25 N·m (2.5 kgf·m, 18.1 ft·lb)**



10) Install the timing belt cover No. 2 (RH).

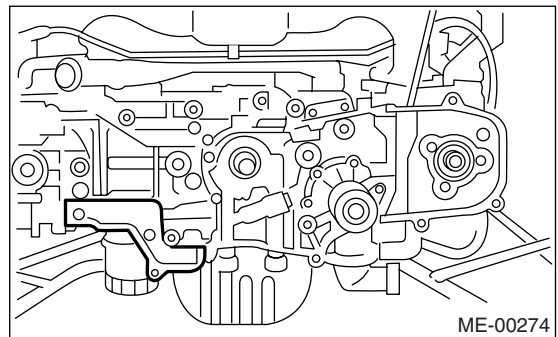
### Tightening torque:

**5 N·m (0.5 kgf·m, 3.6 ft·lb)**

11) Install the timing belt cover No. 2 (LH).

### Tightening torque:

**5 N·m (0.5 kgf·m, 3.6 ft·lb)**



12) Install the crank sprocket. <Ref. to ME(H4SO)-53, INSTALLATION, Crankshaft Sprocket.>

13) Install the cam sprocket. <Ref. to ME(H4SO)-51, INSTALLATION, Cam Sprocket.>

14) Install the timing belt assembly. <Ref. to ME(H4SO)-47, INSTALLATION, Timing Belt Assembly.>

15) Install the timing belt cover. <Ref. to ME(H4SO)-45, INSTALLATION, Timing Belt Cover.>

16) Install the crank pulley. <Ref. to ME(H4SO)-44, INSTALLATION, Crank Pulley.>

17) Install the V-belt. <Ref. to ME(H4SO)-42, INSTALLATION, V-belt.>

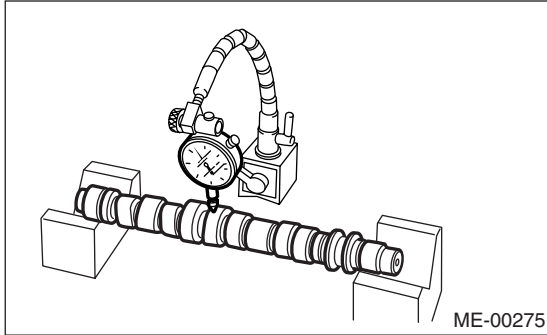
## C: INSPECTION

### 1. CAMSHAFT

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

**Limit:**

**0.025 mm (0.0010 in)**



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

3) Measure the outside diameter of camshaft journal and inside diameter of cylinder head journal, and determine the difference between two (= oil clearance). If the oil clearance exceeds specifications, replace the camshaft or cylinder head as necessary.

Unit: mm (in)		
Clearance at journal	Standard	0.055 — 0.090 (0.0022 — 0.0035)
	Limit	0.10 (0.0039)
Camshaft journal O.D.		31.928 — 31.945 (1.2570 — 1.2577)
Journal hole I.D.		32.000 — 32.018 (1.2598 — 1.2605)

4) Check the cam face condition; remove the minor faults by grinding with oil stone. Measure the cam height H; replace if the limit has been exceeded.

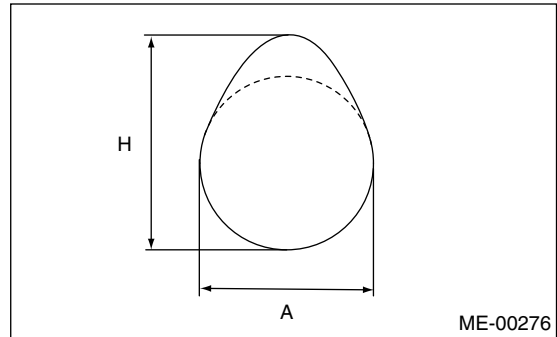
**Cam height: H**

Item	Unit: mm (in)	
Intake	Standard	39.485 — 39.585 (1.5545 — 1.5585)
	Limit	39.385 (1.5506)
Exhaust	Standard	39.257 — 39.357 (1.5455 — 1.5495)
	Limit	39.157 (1.5416)

**Cam base circle diameter A:**

**IN: 34.00 mm (1.3386 in)**

**EX: 34.00 mm (1.3386 in)**



### 2. CAMSHAFT SUPPORT

Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace the camshaft support.

**Standard:**

**0.030 — 0.090 mm (0.0012 — 0.0035 in)**

**Limit:**

**0.10 mm (0.0039 in)**

