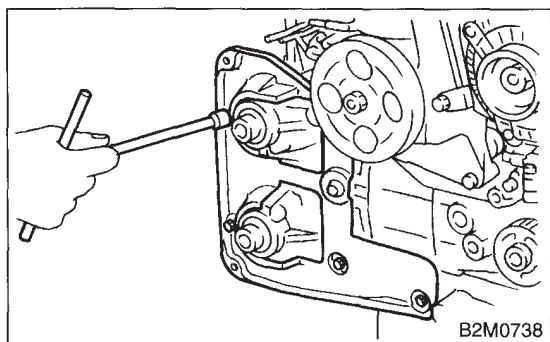


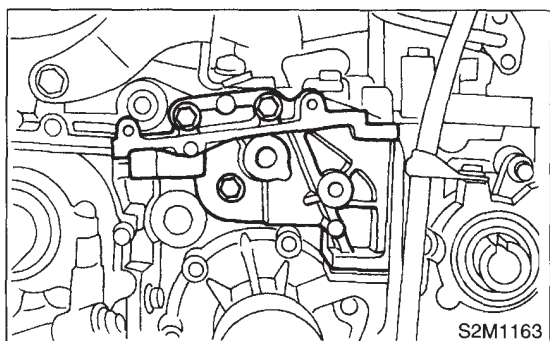
## 18. Camshaft

### A: REMOVAL

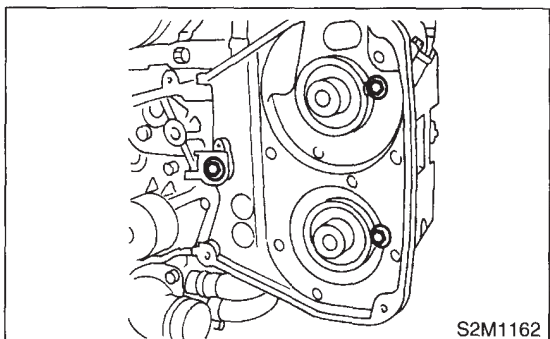
- 1) Remove the V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>
- 2) Remove the crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, REMOVAL, Crankshaft Pulley.>
- 3) Remove the belt cover. <Ref. to ME(DOHC TURBO)-47, REMOVAL, Belt Cover.>
- 4) Remove the timing belt assembly. <Ref. to ME(DOHC TURBO)-48, REMOVAL, Timing Belt Assembly.>
- 5) Remove the camshaft sprocket. <Ref. to ME(DOHC TURBO)-57, REMOVAL, Camshaft Sprocket.>
- 6) Remove the crankshaft sprocket. <Ref. to ME(DOHC TURBO)-58, REMOVAL, Crankshaft Sprocket.>
- 7) Remove the right-hand belt cover No.2.



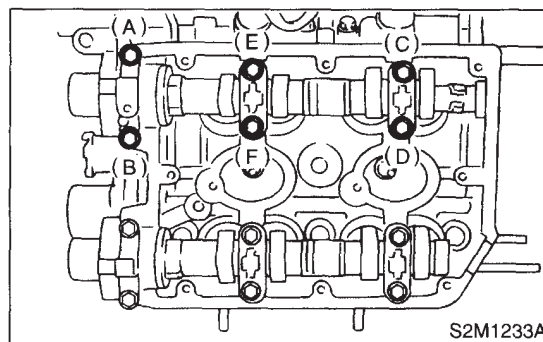
- 8) Remove the tensioner bracket.



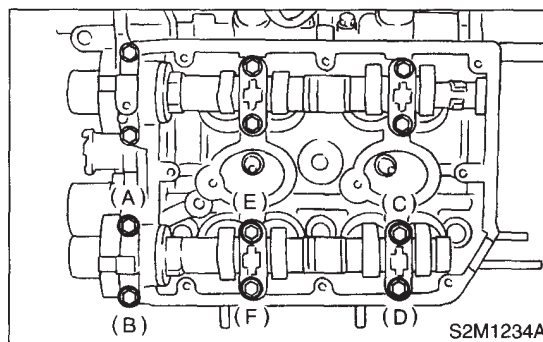
- 9) Remove the left-hand belt cover No. 2.



- 10) Remove the oil level gauge guide. (LH side only)
- 11) Remove the spark plug cord.
- 12) Remove the rocker cover and gasket.
- 13) Loosen the intake camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



- 14) Remove the camshaft caps and intake camshaft.
- 15) Loosen the exhaust camshaft cap bolts equally, a little at a time in alphabetical sequence shown in the figure.



- 16) Remove the camshaft caps and exhaust camshaft.

### CAUTION:

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

- 17) Similarly, remove the right-hand camshafts and related parts.

# CAMSHAFT

## MECHANICAL

### B: INSTALLATION

#### 1) Camshaft installation:

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

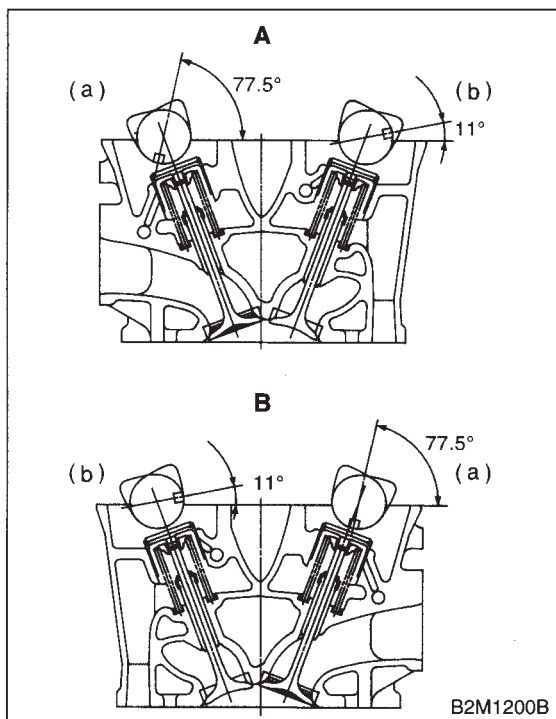
#### CAUTION:

- When the camshafts are positioned as shown in the figure, camshafts need to be rotated at a minimum to align with the timing belt during installation.

- Right-hand camshaft need not be rotated when set at the position shown in the figure.

Left-hand intake camshaft: Rotate 80° clockwise.

Left-hand exhaust camshaft: Rotate 45° counterclockwise.



- A Left side cylinder head
- B Right side cylinder head
- (a) Intake camshaft
- (b) Exhaust camshaft

#### 2) Camshaft cap installation:

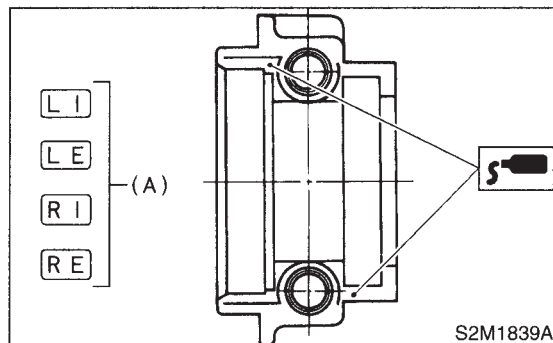
- (1) Apply fluid packing sparingly to the cap mating surface.

#### CAUTION:

**Do not apply fluid packing excessively. Failure to do so may cause excess packing to come out and flow toward oil seal, resulting in oil leaks.**

#### Fluid packing:

**THREE BOND 1215 or equivalent**

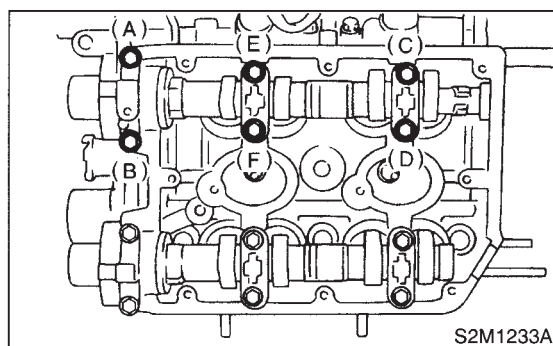


- (2) Apply engine oil to cap bearing surface and install the cap on camshaft as shown by identification mark (A).

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

#### Tightening torque:

**20 N·m (2.0 kgf·m, 14.5 ft·lb)**



- (4) Similarly, tighten the cap on exhaust side. After tightening the cap, ensure the camshaft rotates only slightly while holding it at "base" circle.

#### Tightening torque:

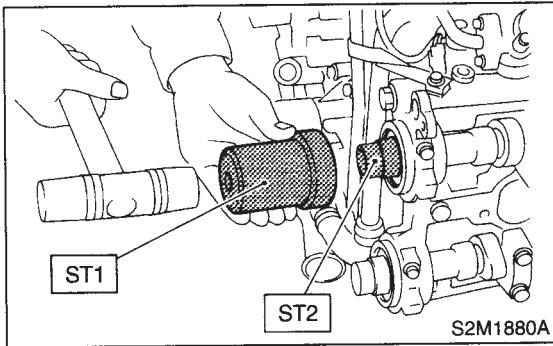
**20 N·m (2.0 kgf·m, 14.5 ft·lb)**

3) Camshaft oil seal installation:  
Apply grease to the new oil seal lips and press onto the front end of camshaft by using ST1 and ST2.

**CAUTION:**

**Use a new oil seal.**

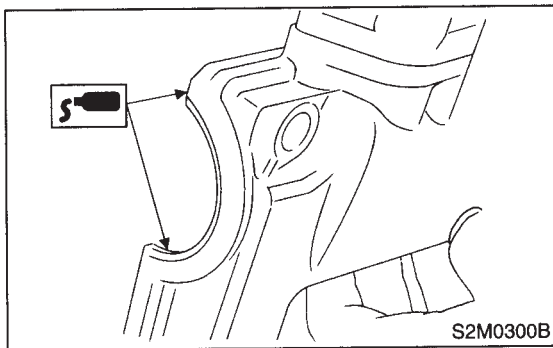
- ST1 499587600 OIL SEAL INSTALLER
- ST2 499597200 OIL SEAL GUIDE



4) Rocker cover installation:  
(1) Install the gasket on rocker cover. Install the peripheral gasket and ignition coil gasket.  
(2) Apply fluid packing to four front open edges of peripheral gasket.

**Fluid packing:**

**THREE BOND 1215 or equivalent**

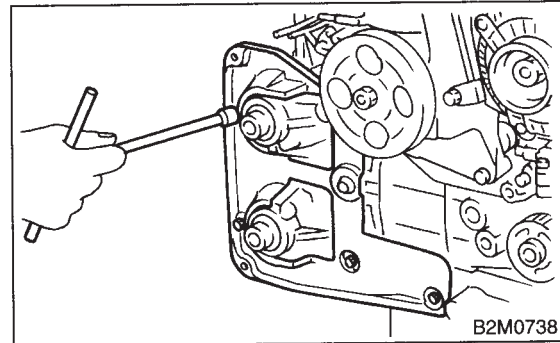


(3) Install the rocker cover on cylinder head. Ensure the gasket is properly positioned during installation.  
5) Install the spark plug cord.  
6) Similarly, install the parts on right-hand side.

7) Install the right-hand belt cover No. 2.

**Tightening torque:**

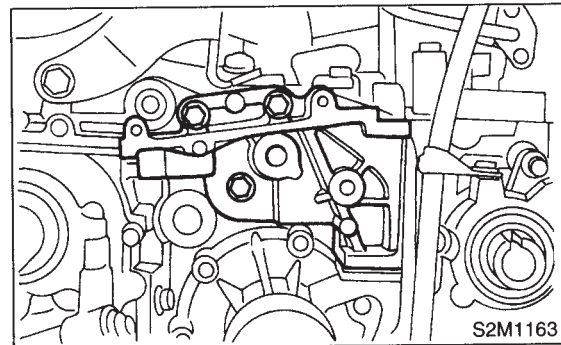
**5 N·m (0.5 kgf-m, 3.6 ft-lb)**



8) Install the tensioner bracket.

**Tightening torque:**

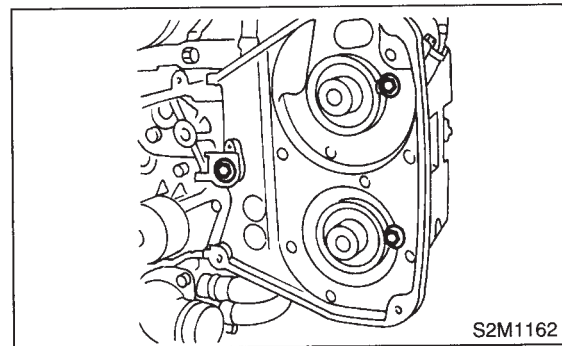
**25 N·m (2.5 kgf-m, 18.1 ft-lb)**



9) Install the left-hand belt cover No. 2.

**Tightening torque:**

**5 N·m (0.5 kgf-m, 3.6 ft-lb)**



10) Install the crankshaft sprocket. <Ref. to ME(DOHC TURBO)-58, INSTALLATION, Crankshaft Sprocket.>

11) Install the camshaft sprockets. <Ref. to ME(DOHC TURBO)-57, INSTALLATION, Camshaft Sprocket.>

12) Install the timing belt assembly. <Ref. to ME(DOHC TURBO)-50, INSTALLATION, Timing Belt Assembly.>

13) Install the belt cover. <Ref. to ME(DOHC TURBO)-47, INSTALLATION, Belt Cover.>

# CAMSHAFT

## MECHANICAL

14) Install the crankshaft pulley. <Ref. to ME(DOHC TURBO)-46, INSTALLATION, Crankshaft Pulley.>

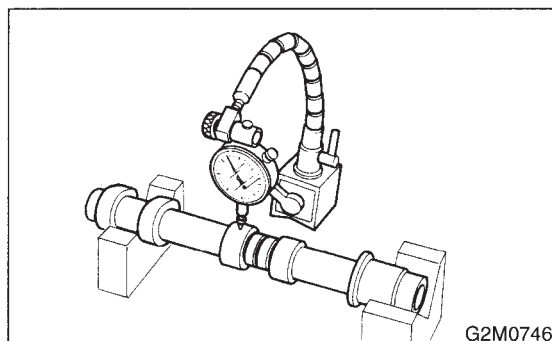
15) Install the V-belt. <Ref. to ME(DOHC TURBO)-44, INSTALLATION, V-belt.>

## C: INSPECTION

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

**Limit:**

**0.020 mm (0.0008 in)**



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

3) Measure the outside diameter of camshaft journal. If the journal diameter is not as specified, check the oil clearance.

	Camshaft journal	
	Front	Center, rear
Standard	37.946 — 37.9635 mm (1.4939 — 1.4946 in)	29.946 — 29.963 mm (1.1790 — 1.1796 in)

4) Measurement of the camshaft journal oil clearance:

(1) Clean the bearing caps and camshaft journals.

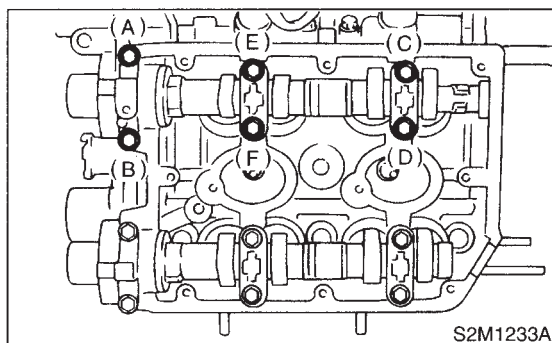
(2) Place the camshafts on the cylinder head. (Without installing the valve rocker.)

(3) Place a plastigauge across each of the camshaft journals.

(4) Gradually tighten the cap in at least two stages in alphabetical sequence shown in the figure, and then tighten to specified torque.

**Tightening torque:**

**20 N·m (2.0 kgf·m, 14.5 ft·lb)**



**CAUTION:**  
Do not turn the camshaft.

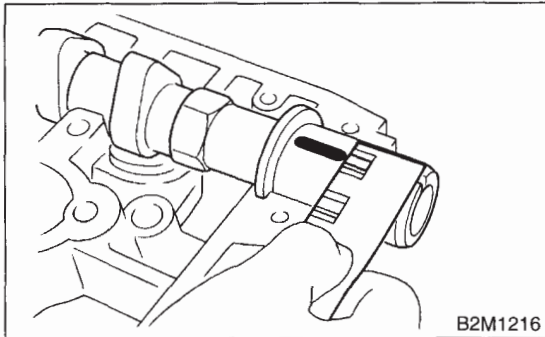
- (5) Remove the bearing caps.  
 (6) Measure the widest point of the plastigauge on each journal.  
 If the oil clearance exceeds the limit, replace the camshaft. If necessary, replace the camshaft caps and cylinder head as a set.

**Standard:**

**0.037 — 0.072 mm (0.0015 — 0.0028 in)**

**Limit:**

**0.10 mm (0.0039 in)**



- (7) Completely remove the plastigauge.  
 5) 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****Standard:****Intake:**

**46.25 — 46.35 mm (1.821 — 1.825 in)**

**Exhaust:**

**46.15 — 46.25 mm (1.817 — 1.821 in)**

**Limit:****Intake:**

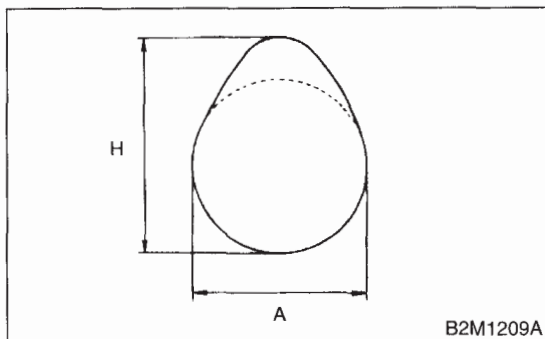
**46.15 mm (1.817 in)**

**Exhaust:**

**46.05 mm (1.813 in)**

**Cam base circle diameter A:**

**37.0 mm (1.457 in)**



- 6) Measure the thrust clearance of camshaft with dial gauge. If the clearance exceeds the limit, replace the caps and cylinder head as a set. If necessary replace the camshaft.

**Standard:**

**0.015 — 0.070 mm (0.0006 — 0.0028 in)**

**Limit:**

**0.1 mm (0.004 in)**

