

20. Cam Carrier

A: REMOVAL

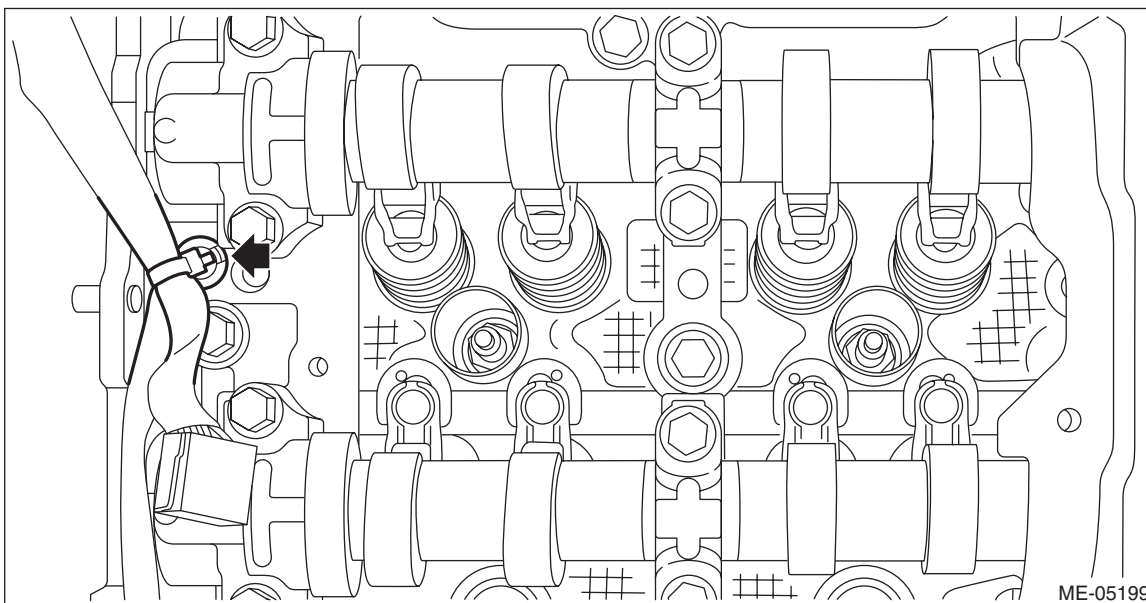
1. CAM CARRIER RH

- 1) Remove the engine from the vehicle. <Ref. to ME(H4DO(w/o HEV))-55, REMOVAL, Engine Assembly.>
- 2) Remove the chain cover. <Ref. to ME(H4DO(w/o HEV))-149, REMOVAL, Chain Cover.>
- 3) Remove the timing chain RH. <Ref. to ME(H4DO(w/o HEV))-169, TIMING CHAIN RH, REMOVAL, Timing Chain Assembly.>
- 4) Remove the cam sprocket RH. <Ref. to ME(H4DO(w/o HEV))-191, CAM SPROCKET RH, REMOVAL, Cam Sprocket.>

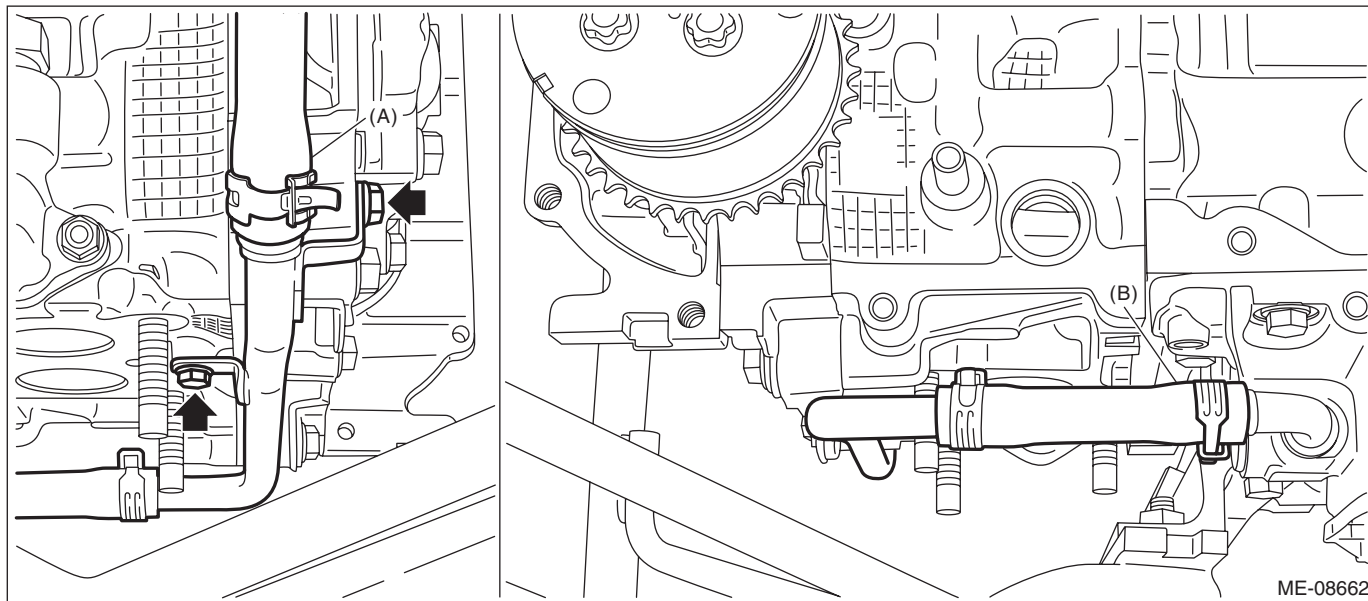
NOTE:

This procedure is required only when disassembling the cam carrier RH.

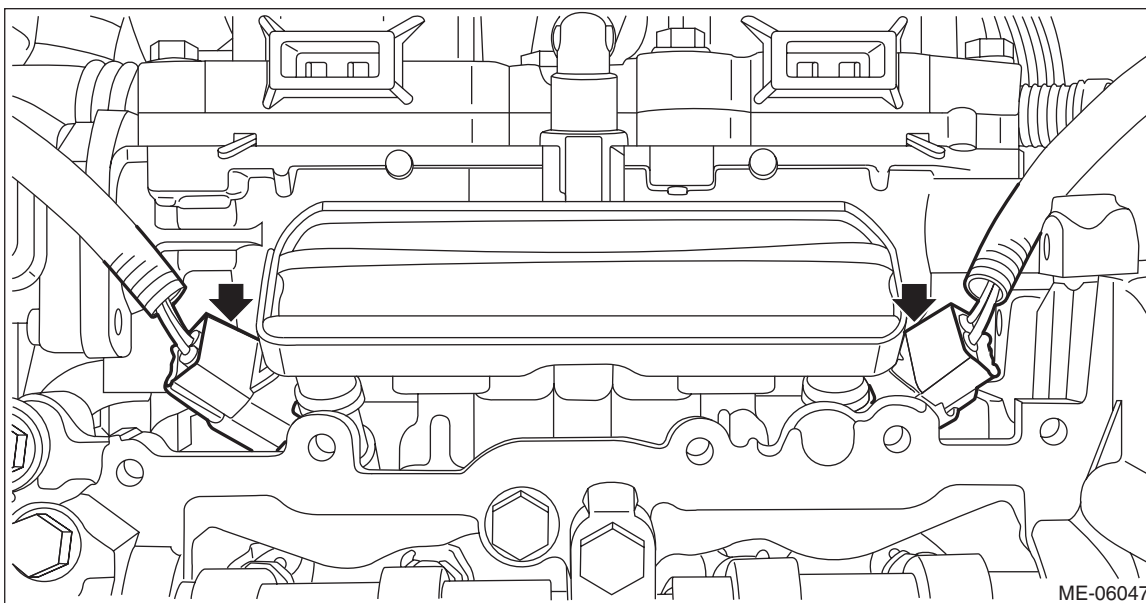
- 5) Remove the rocker cover RH. <Ref. to ME(H4DO(w/o HEV))-202, ROCKER COVER RH, REMOVAL, Rocker Cover.>
- 6) Remove the clip holding the engine harness from cam carrier RH.



- 7) Disconnect the engine coolant inlet hose (A) from the water pipe assembly RH.
- 8) Disconnect the water pipe hose (B) from oil pan upper, and remove the water pipe assembly RH.



- 9) Remove the fuel pipe RH and the fuel injector RH.
(1) Disconnect the connector from fuel injector RH.



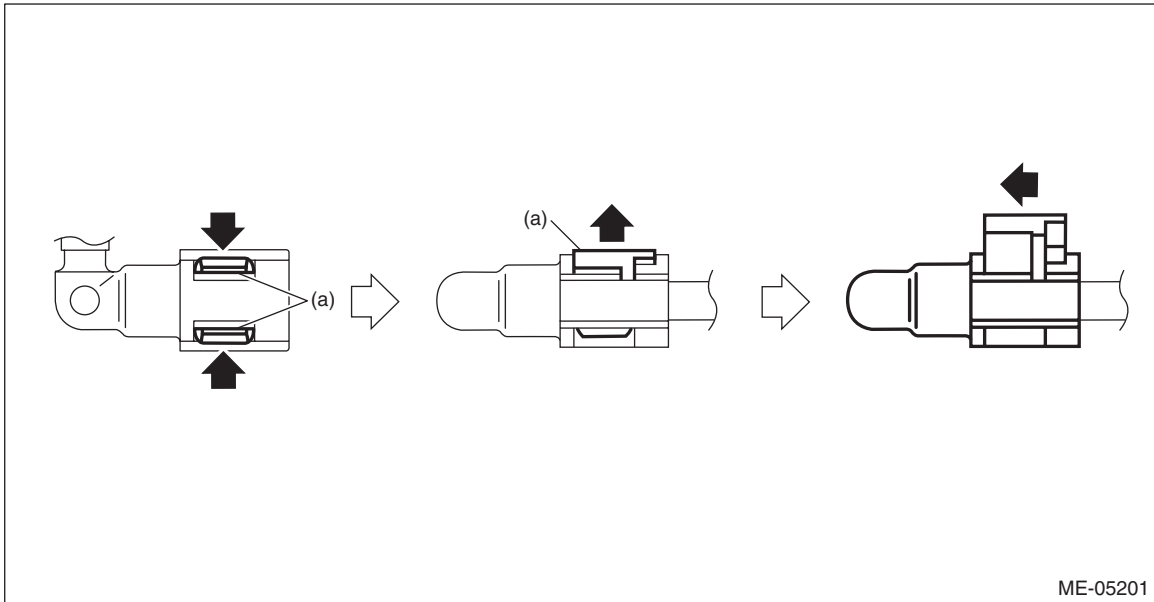
Cam Carrier

MECHANICAL

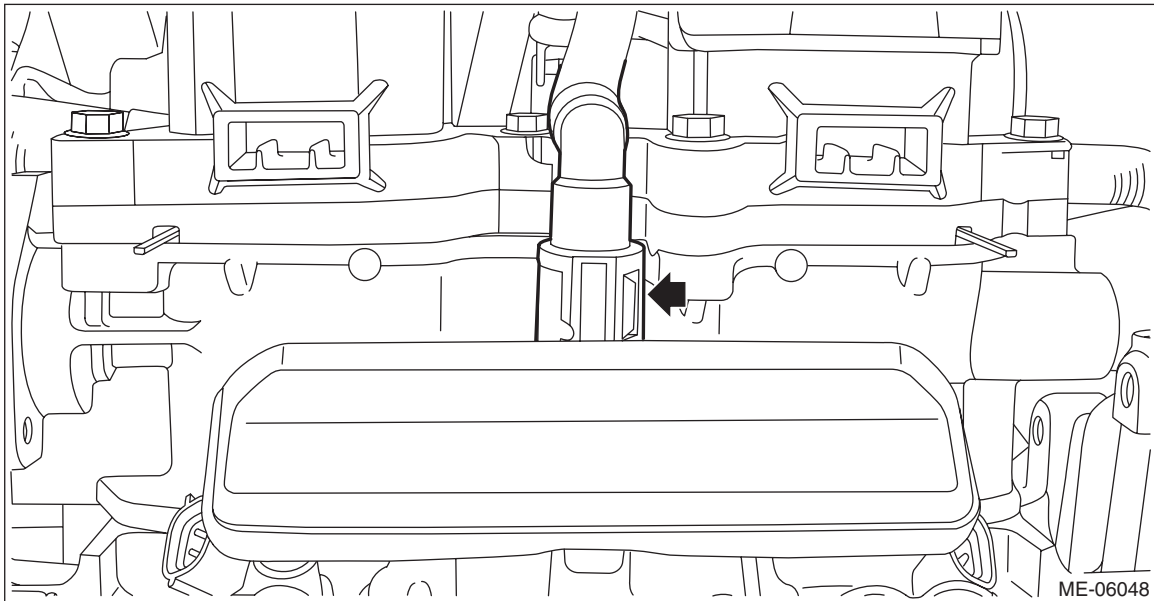
(2) Disconnect the quick connector from fuel pipe RH.

NOTE:

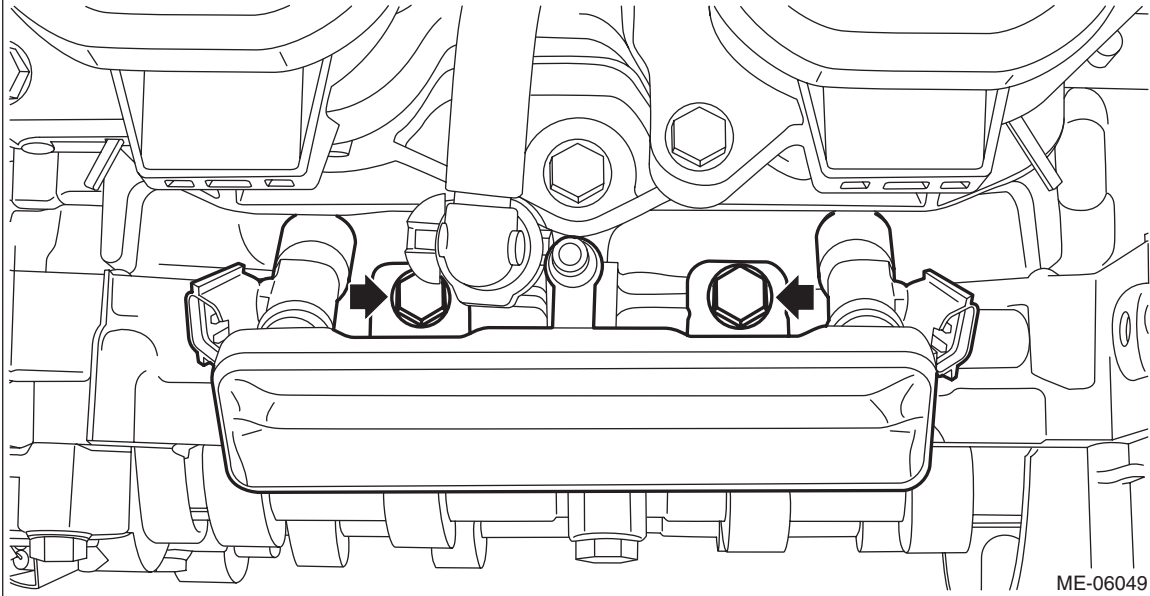
Disconnect the quick connector as shown in the figure.



(a) Slider



- (3) Remove the bolts securing the fuel pipe RH, and remove the fuel pipe RH and the fuel injector RH.

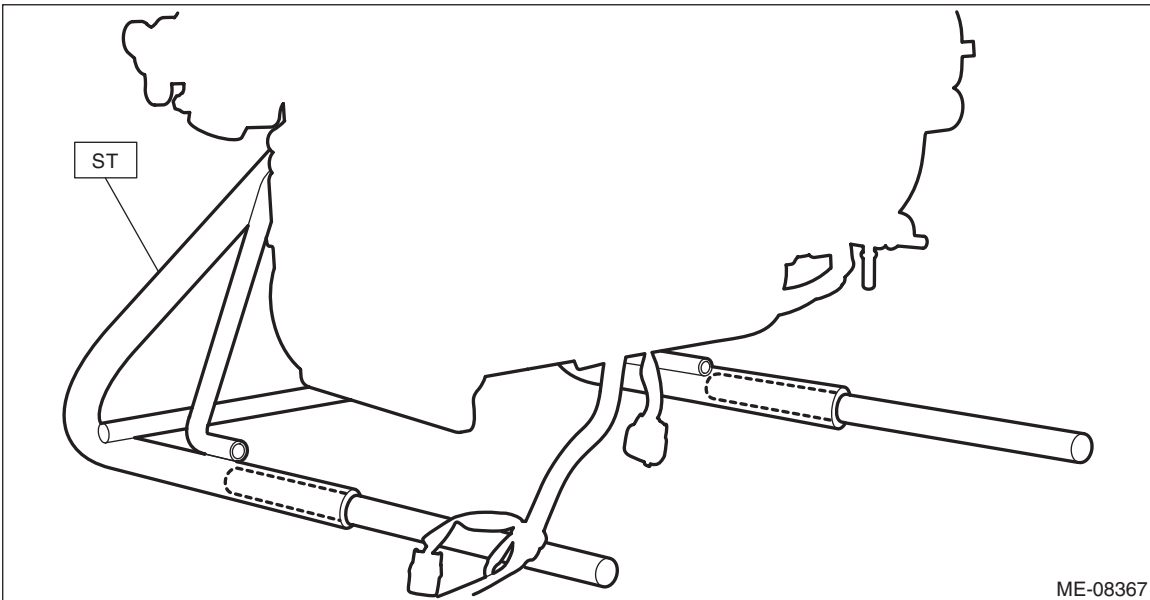


- 10) Insert the steel rods into ST, and set the engine so that the camshaft RH is facing up.

CAUTION:

- If the engine is standing on one side without inserting the steel rod into ST, engine may lose balance and fall down. Be sure to insert the steel rod into ST to extend the length.
- Use the steel rod with enough strength.
- Be careful not to pinch the engine harness with ST.

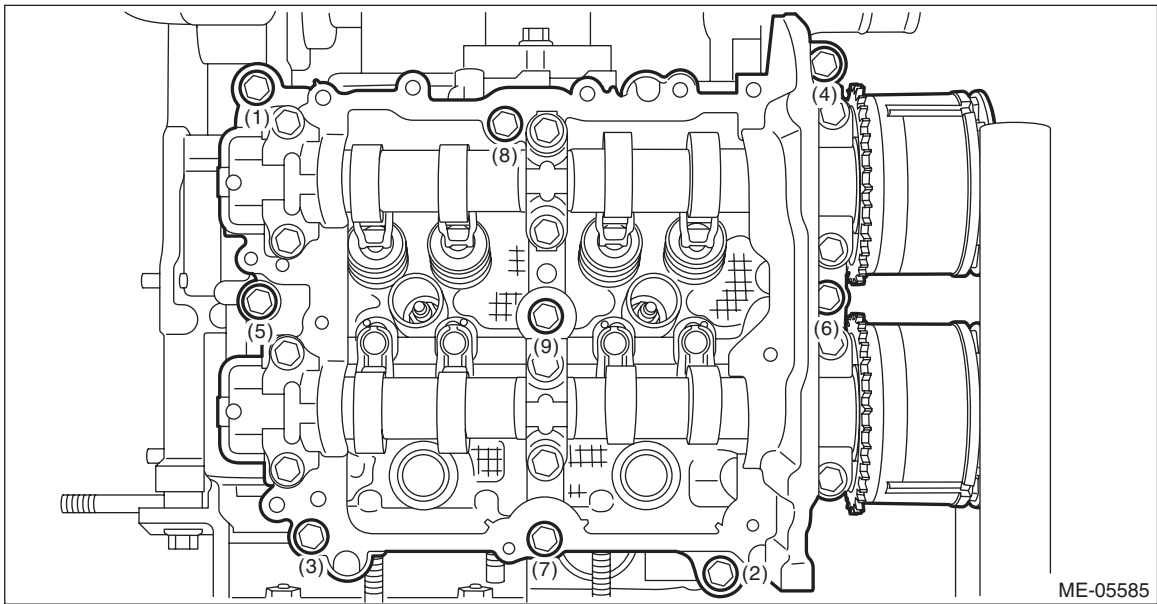
ST 499817100 ENGINE STAND



Cam Carrier

MECHANICAL

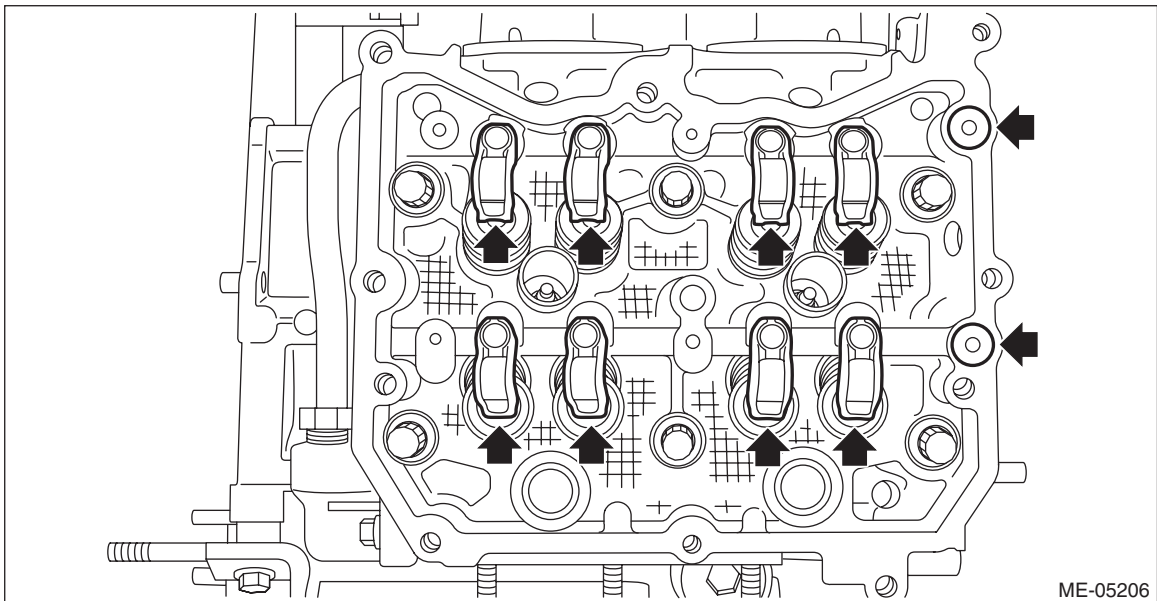
11) Loosen the bolts holding the cam carrier RH equally, a little at a time in numerical sequence as shown in the figure and remove the cam carrier RH.



12) Remove the O-ring and the roller rocker arm from cylinder head RH.

NOTE:

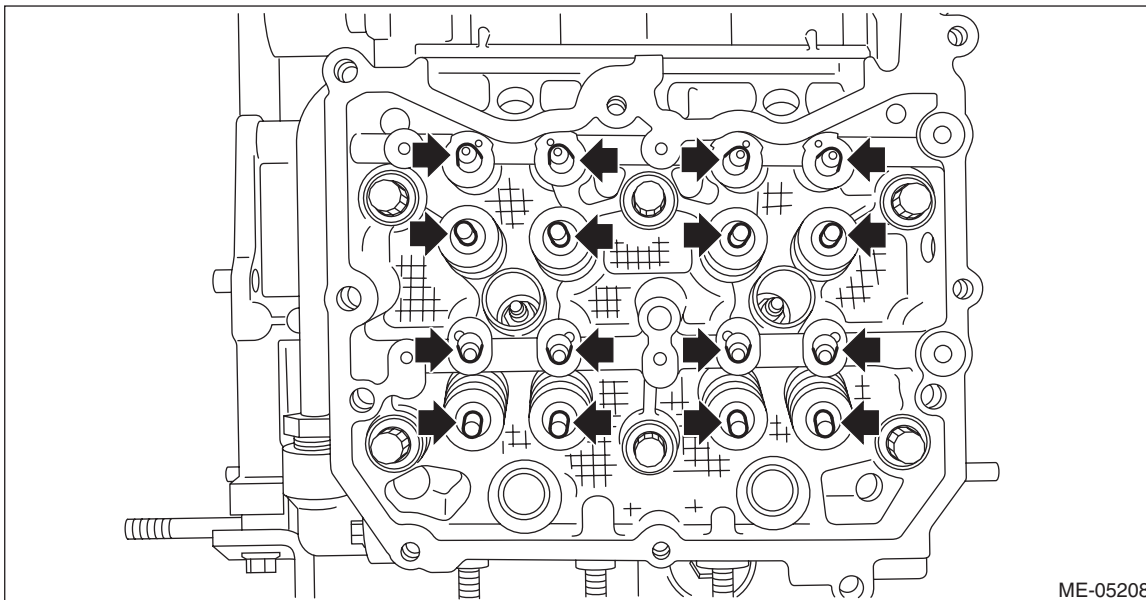
Be careful not to confuse the roller rocker arms.



13) Remove the valve shim and the roller rocker arm pivot from cylinder head RH.

NOTE:

Be careful not to confuse the valve shim and the roller rocker arm pivot.



14) Remove the liquid gasket from cam carrier RH and cylinder head RH.

2. CAM CARRIER LH

1) Remove the engine from the vehicle. <Ref. to ME(H4DO(w/o HEV))-55, REMOVAL, Engine Assembly.>

2) Remove the chain cover. <Ref. to ME(H4DO(w/o HEV))-149, REMOVAL, Chain Cover.>

3) Remove the timing chain LH. <Ref. to ME(H4DO(w/o HEV))-171, TIMING CHAIN LH, REMOVAL, Timing Chain Assembly.>

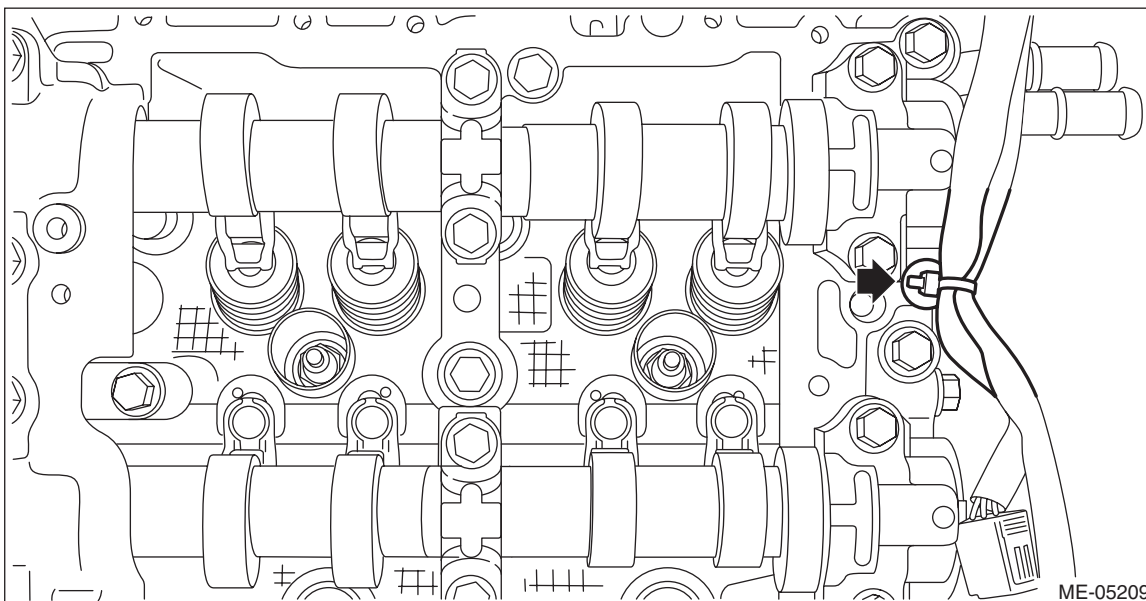
4) Remove the cam sprocket LH. <Ref. to ME(H4DO(w/o HEV))-193, CAM SPROCKET LH, REMOVAL, Cam Sprocket.>

NOTE:

This procedure is required only when disassembling the cam carrier LH.

5) Remove the rocker cover LH. <Ref. to ME(H4DO(w/o HEV))-206, ROCKER COVER LH, REMOVAL, Rocker Cover.>

6) Remove the clip holding the engine harness from cam carrier LH.

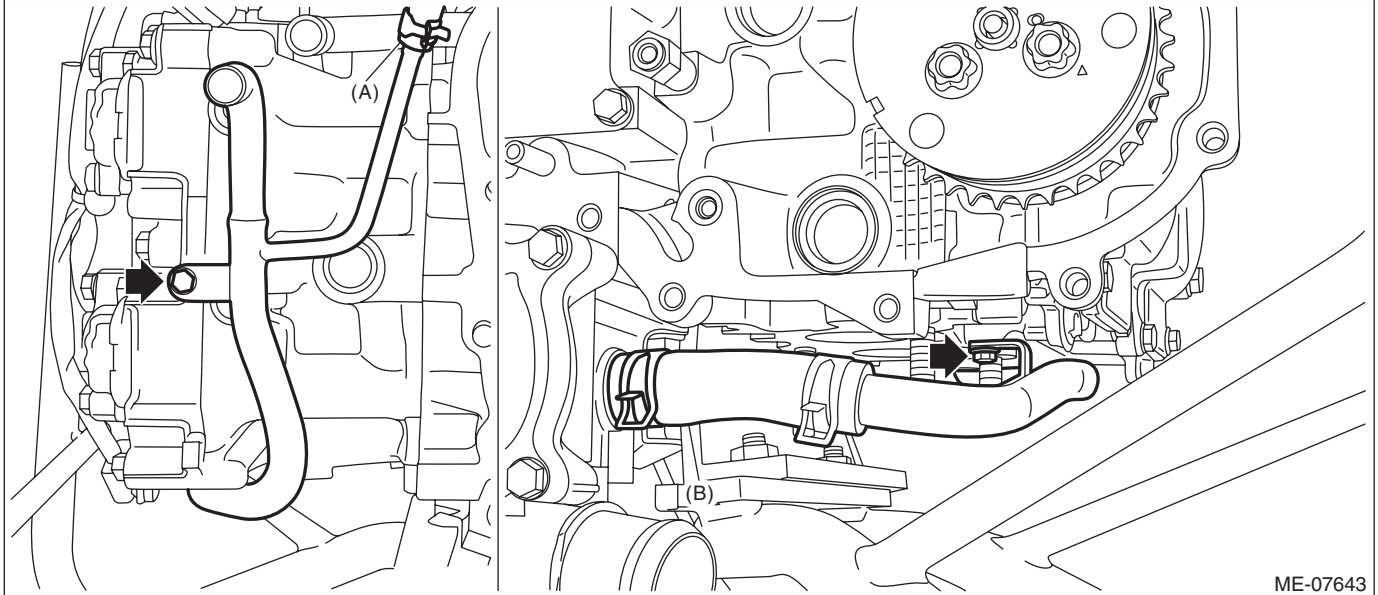


Cam Carrier

MECHANICAL

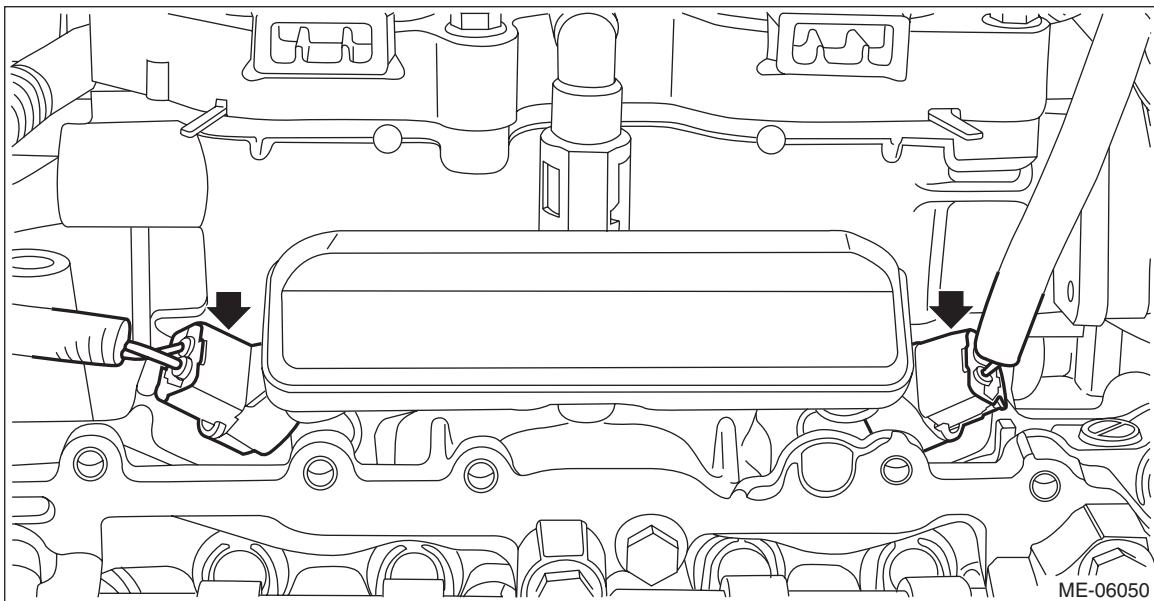
7) Disconnect the preheater hose (A) from the water pipe assembly LH, and remove the water pipe assembly LH.

8) Disconnect the water pipe hose (B) from the oil pan upper.



9) Remove the fuel pipe LH and the fuel injector LH.

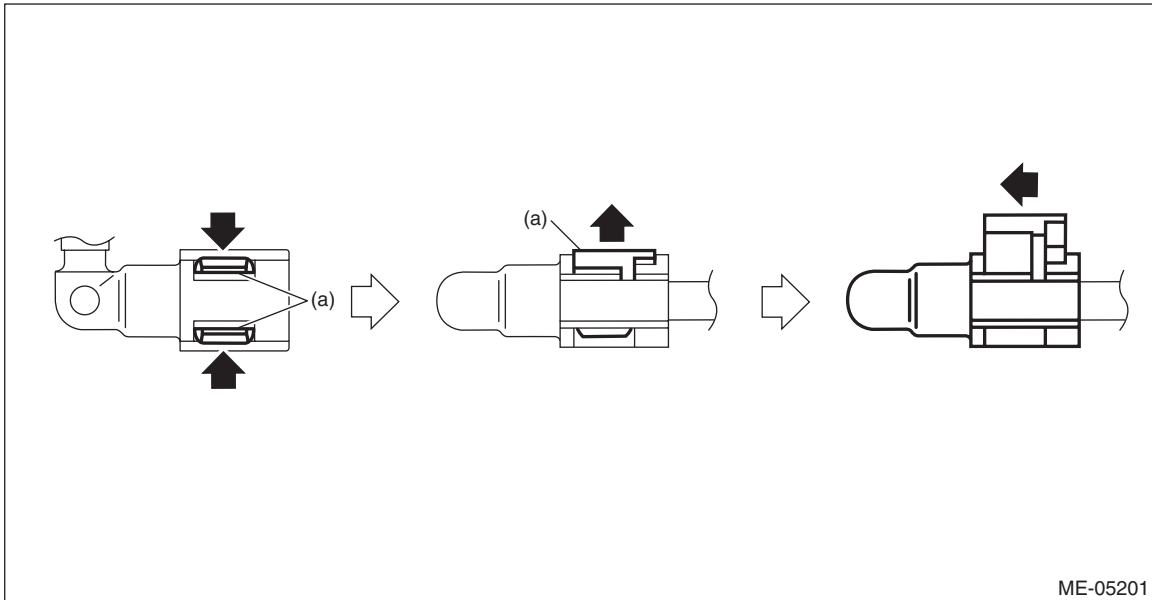
(1) Disconnect the connector from fuel injector LH.



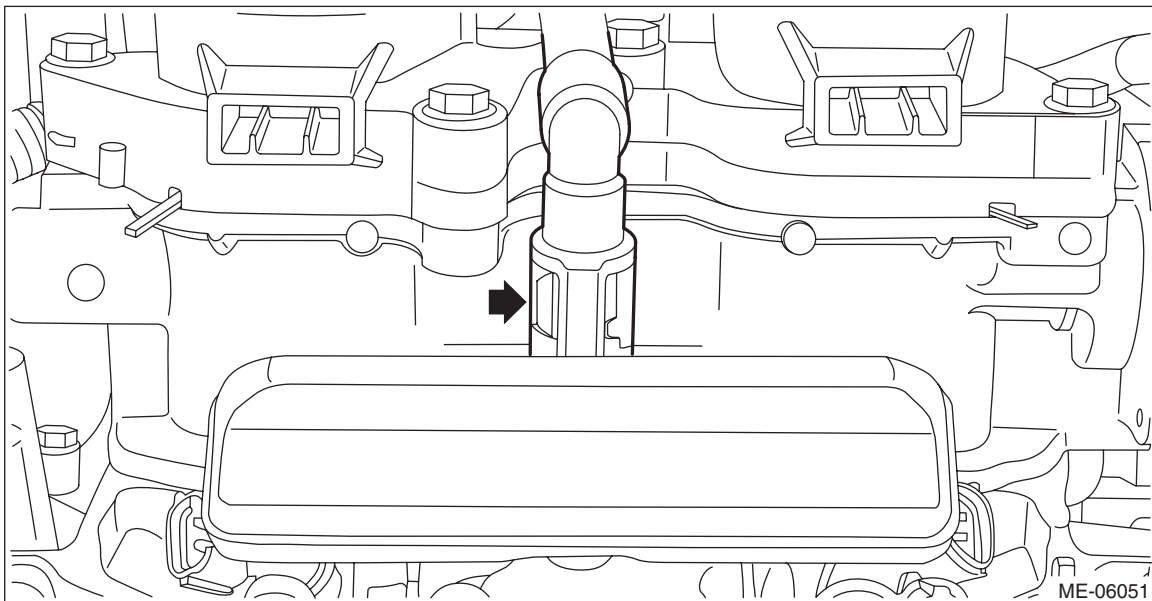
(2) Disconnect the quick connector from fuel pipe LH.

NOTE:

Disconnect the quick connector as shown in the figure.



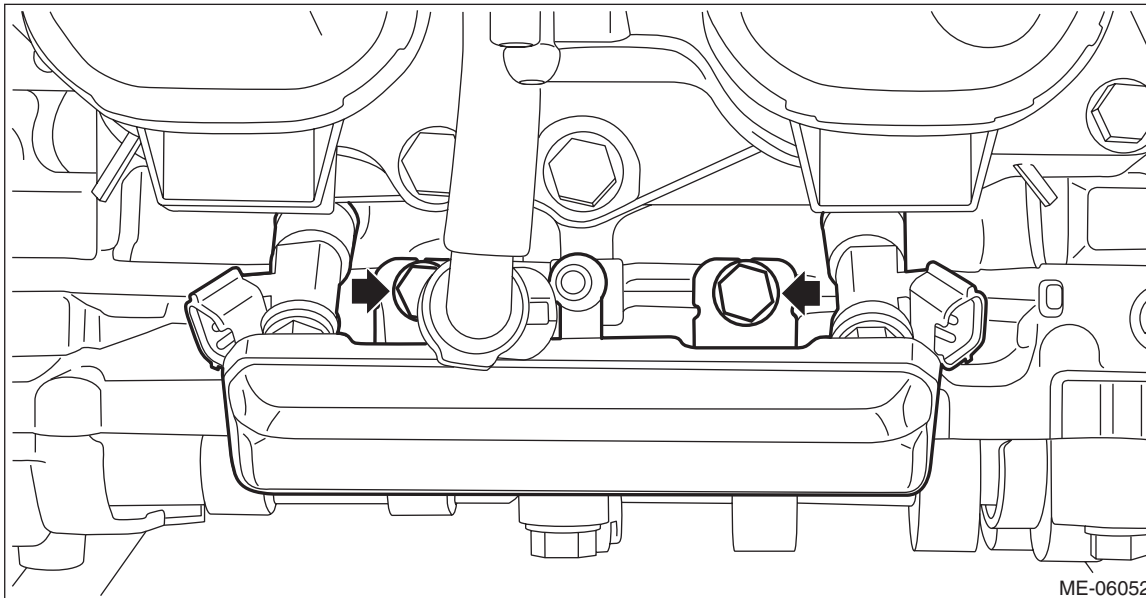
(a) Slider



Cam Carrier

MECHANICAL

- (3) Remove the bolts securing the fuel pipe LH, and remove the fuel pipe LH and the fuel injector LH.

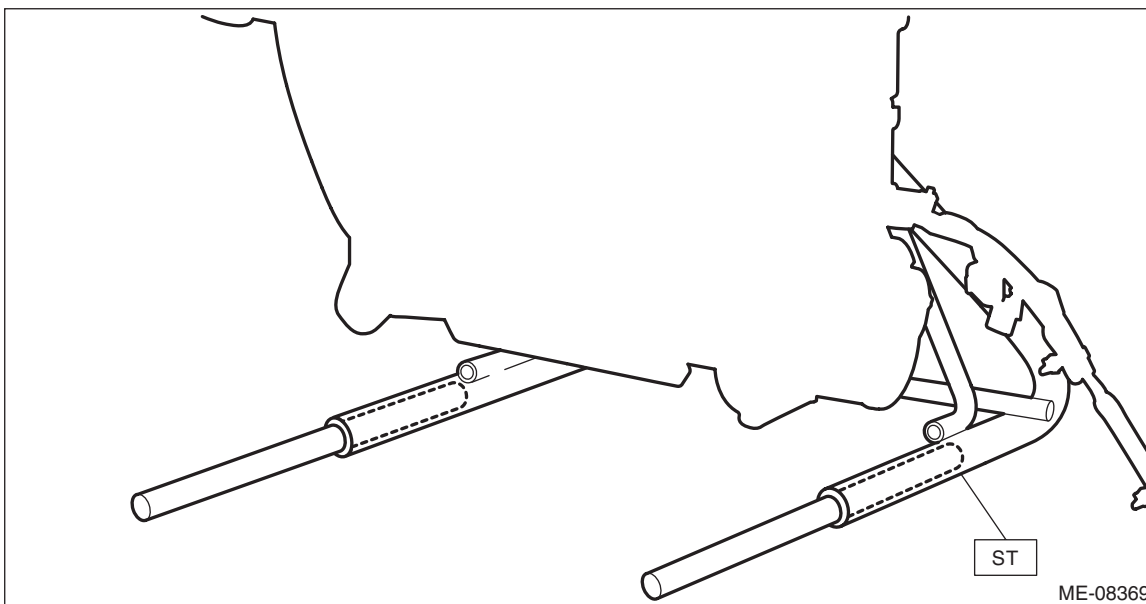


- 10) Insert the steel rods into ST, and set the engine so that the camshaft LH is facing up.

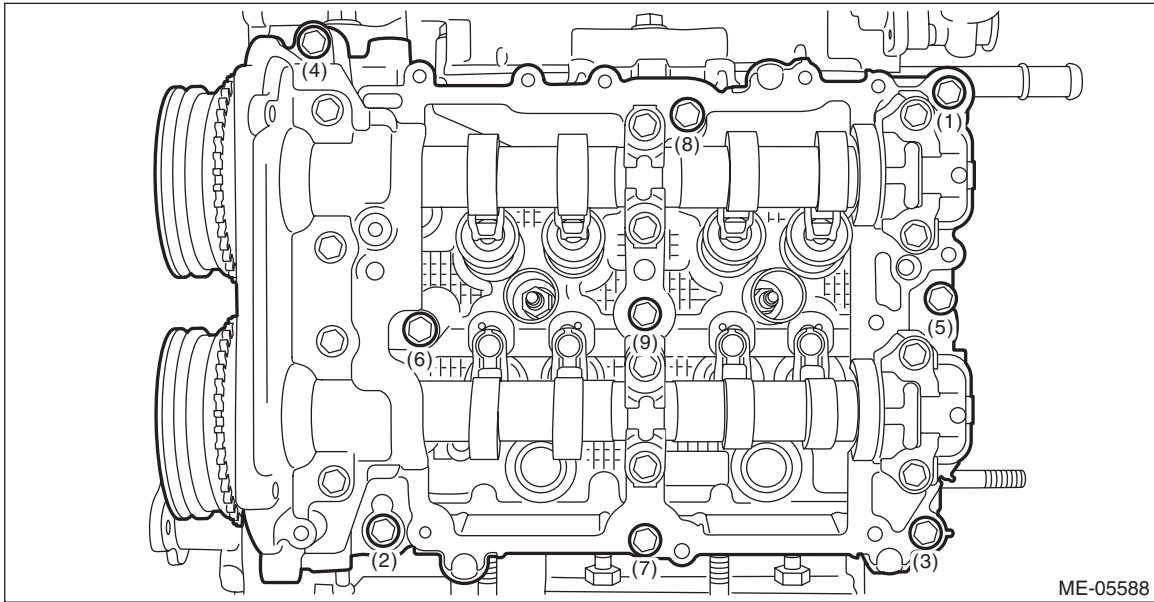
CAUTION:

- If the engine is standing on one side without inserting the steel rod into ST, engine may lose balance and fall down. Be sure to insert the steel rod into ST to extend the length.
- Use the steel rod with enough strength.
- Be careful not to pinch the engine harness with ST.

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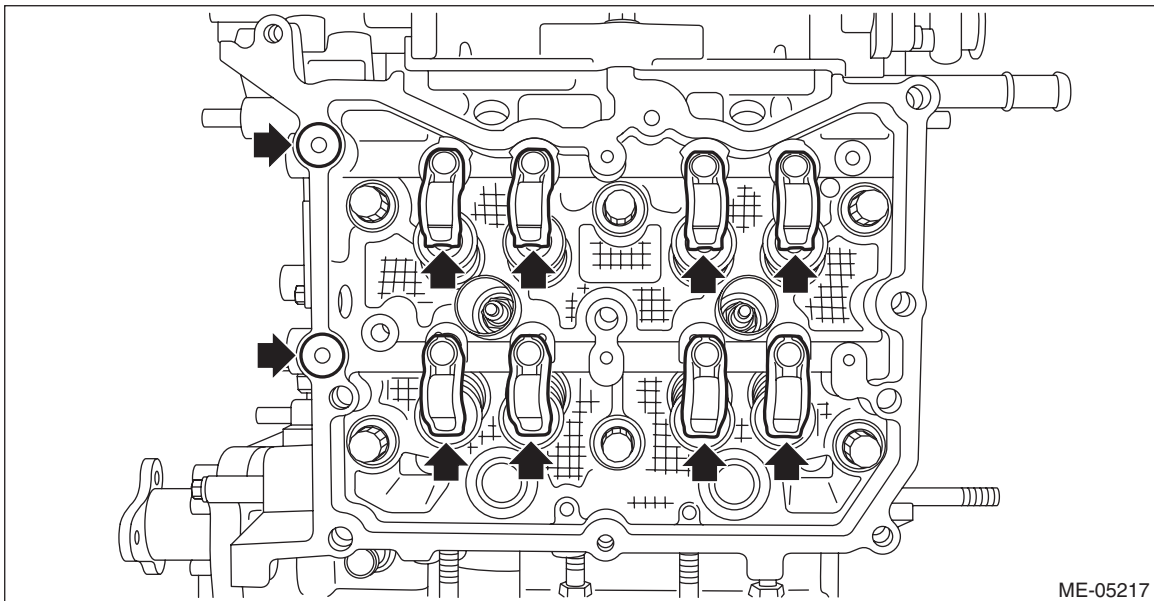
11) Loosen the bolts holding the cam carrier LH equally, a little at a time in numerical sequence as shown in the figure and remove the cam carrier LH.



12) Remove the O-ring and the roller rocker arm from cylinder head LH.

NOTE:

Be careful not to confuse the roller rocker arms.



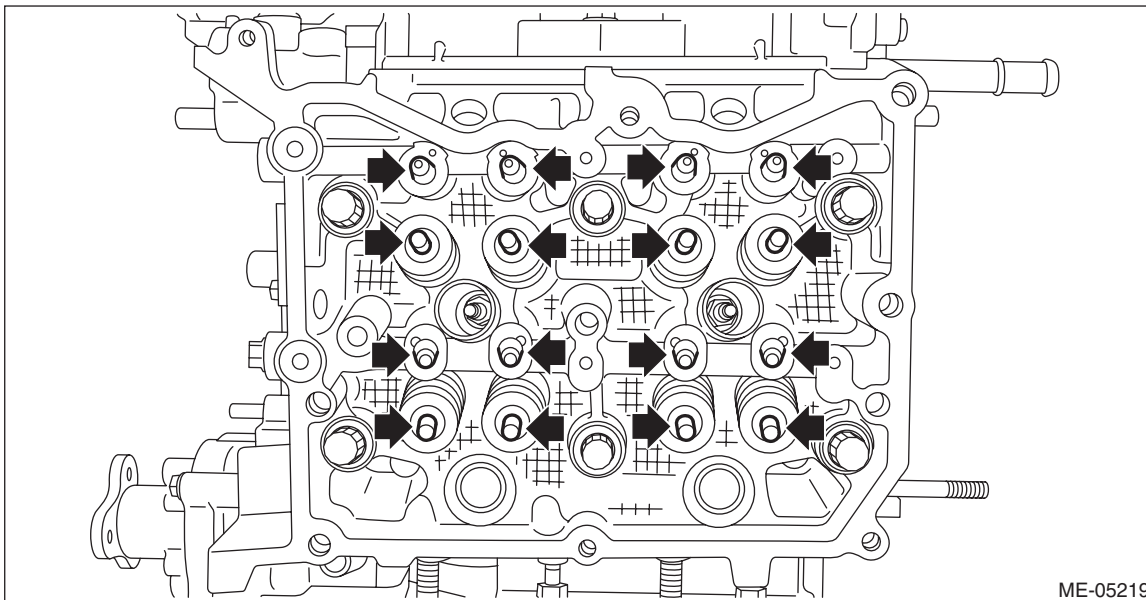
Cam Carrier

MECHANICAL

13) Remove the valve shim and the roller rocker arm pivot from cylinder head LH.

NOTE:

Be careful not to confuse the valve shim and the roller rocker arm pivot.



14) Remove the liquid gasket from cam carrier LH and cylinder head LH.

B: INSTALLATION

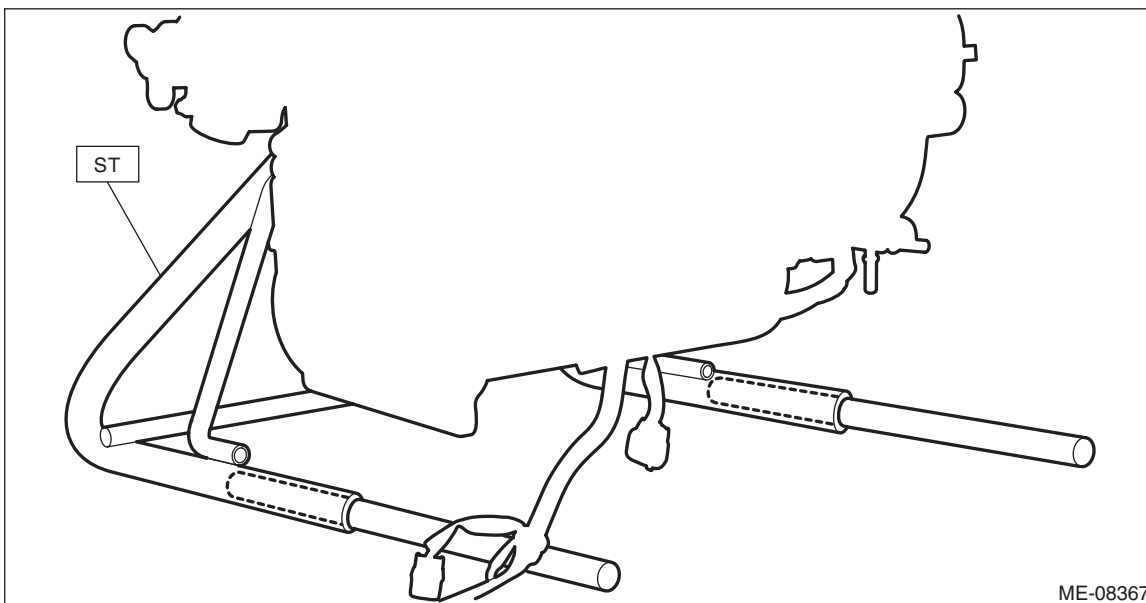
1. CAM CARRIER RH

1) Insert the steel rods into ST, and set the engine so that the camshaft RH is facing up.

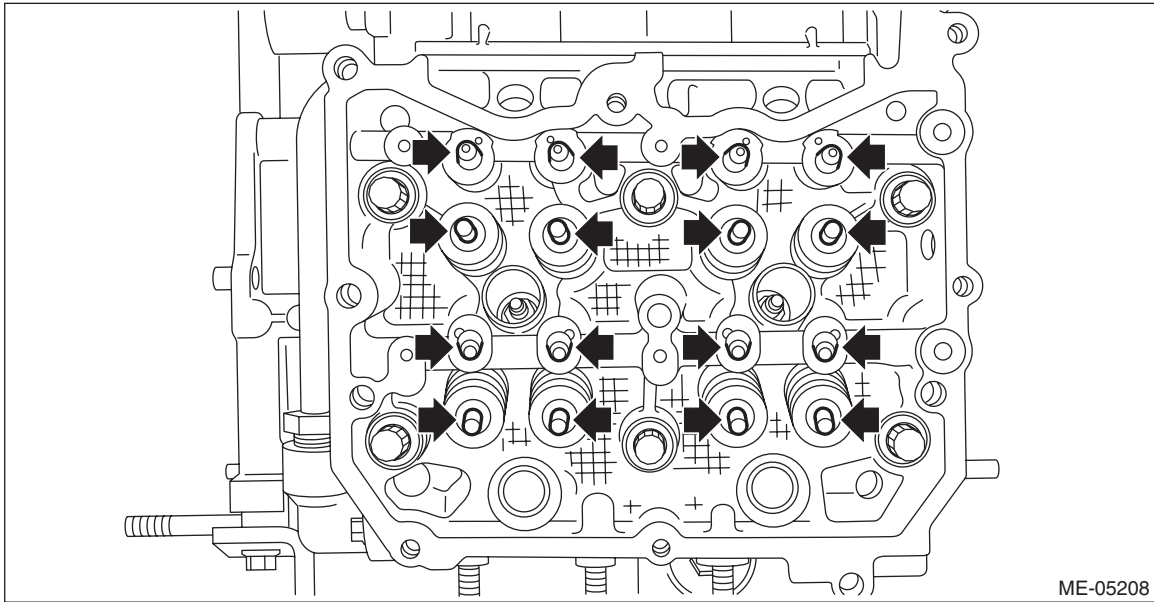
CAUTION:

- If the engine is standing on one side without inserting the steel rod into ST, engine may lose balance and fall down. Be sure to insert the steel rod into ST to extend the length.
- Use the steel rod with enough strength.
- Be careful not to pinch the engine harness with ST.

ST 499817100 ENGINE STAND



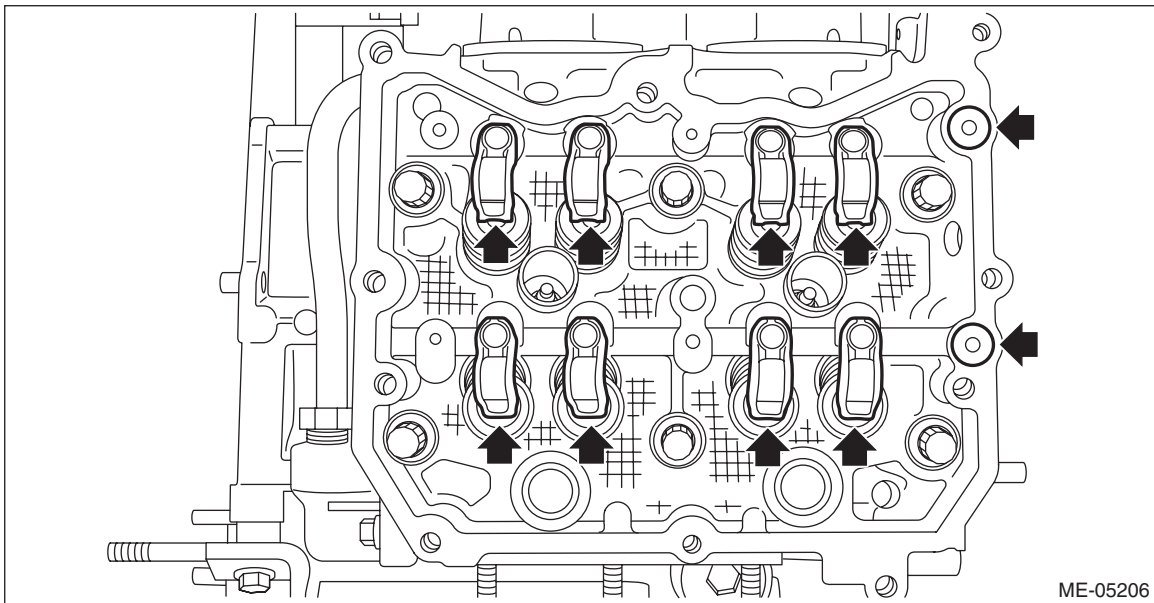
2) Apply engine oil to the valve shim and the roller rocker arm pivot, and install the valve shim and the roller rocker arm pivot to the cylinder head RH.



3) Apply engine oil to the O-ring and the roller rocker arm, and install the O-ring and the roller rocker arm to the cylinder head RH.

NOTE:

Use new O-rings.



Cam Carrier

MECHANICAL

4) Apply liquid gasket to the mating surface of cam carrier RH as shown in the figure.

NOTE:

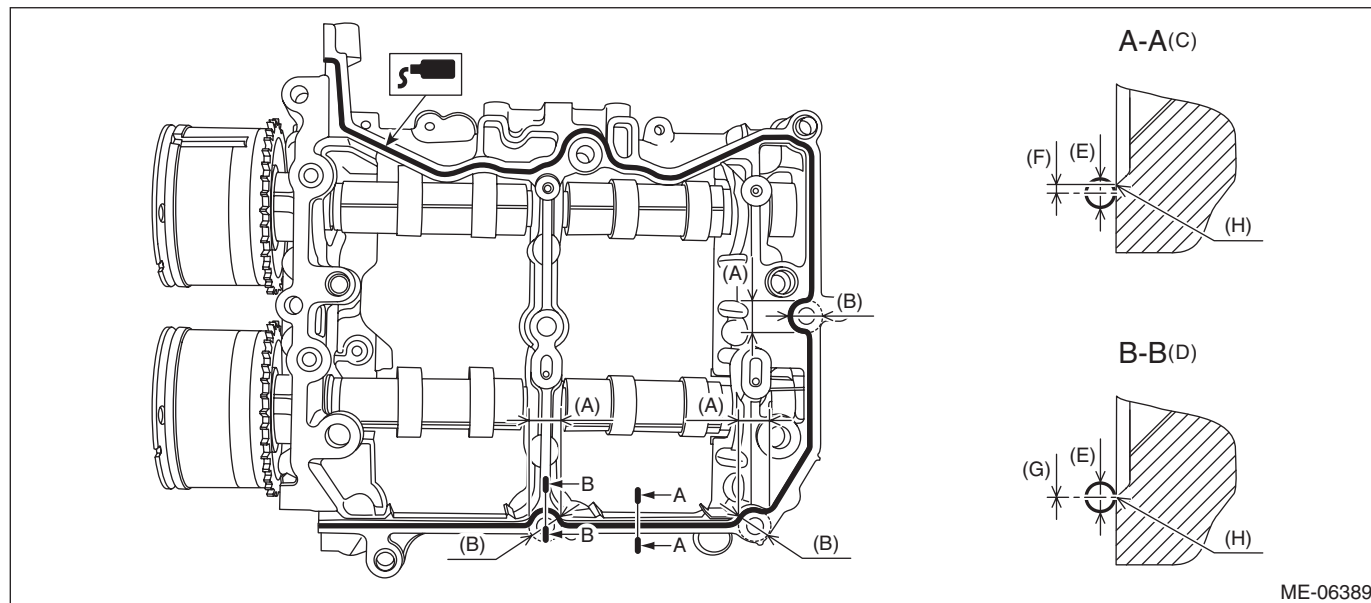
- Before applying liquid gasket, degrease the old liquid gasket seal surface of the cylinder head RH and cam carrier RH.
- Install within 5 min. after applying liquid gasket.

Liquid gasket:

THREE BOND 1217G (Part No. 0877Y0100), THREE BOND 1217H or equivalent

Liquid gasket applying diameter:

3.1 ± 0.5 mm (0.1220 ± 0.0197 in)



ME-06389

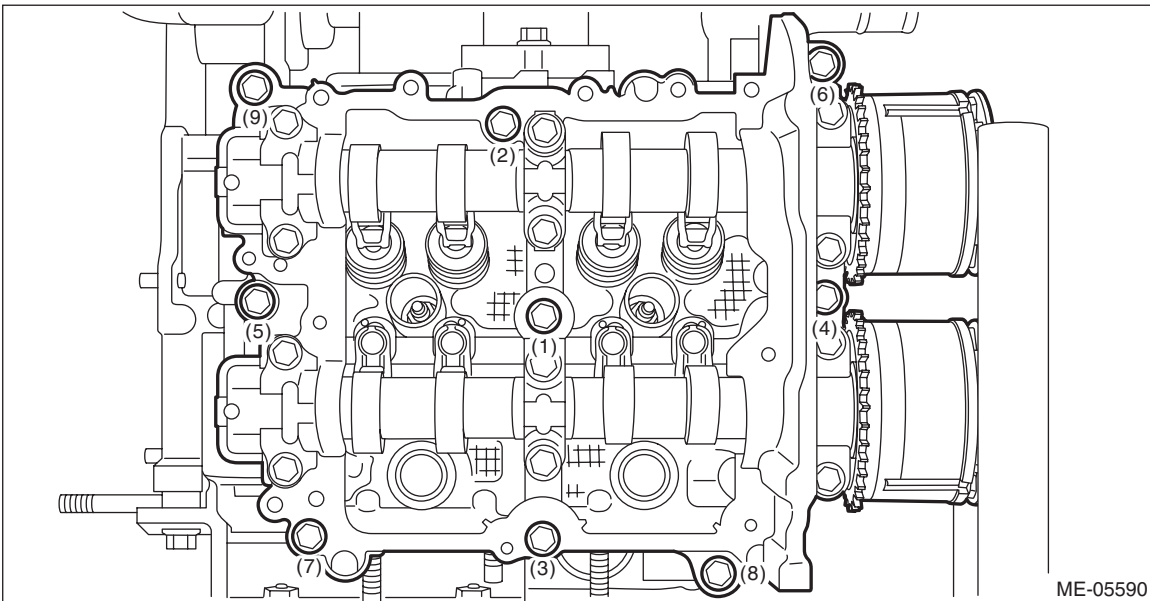
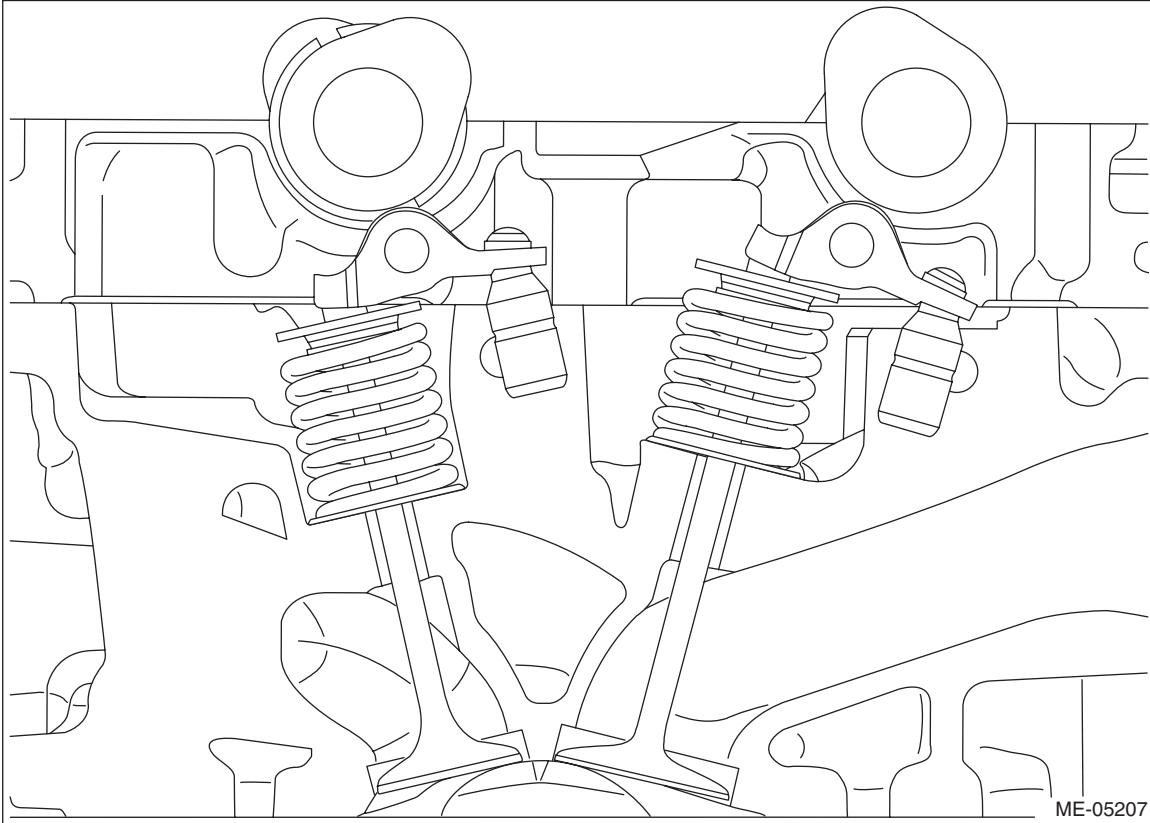
- | | | |
|---|---|---|
| (A) Range A | (D) Liquid gasket applying position of mating surfaces of range A | (G) 0 ± 0.5 mm (0 ± 0.0197 in) |
| (B) $\phi 18$ mm (0.7087 in) | (E) $\phi 3.1 \pm 0.5$ mm (0.1220 ± 0.0197 in) | (H) Chamfer edge |
| (C) Liquid gasket applying position of mating surfaces other than range A | (F) 1 mm (0.0394 in) or less | |

5) Install the cam carrier RH to the cylinder head RH.

(1) Mount the cam carrier RH, then tighten all bolts with a torque of 18 N·m (1.8 kgf-m, 13.3 ft-lb) in numerical order as shown in the figure.

NOTE:

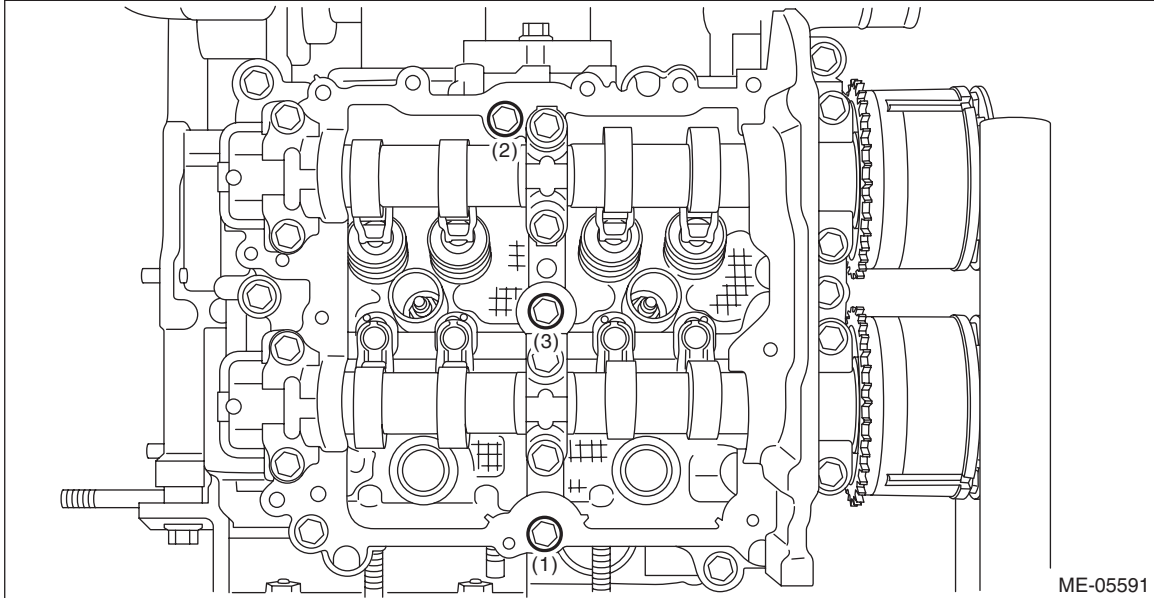
Set the intake camshaft RH and the exhaust camshaft RH to the zero-lift position.



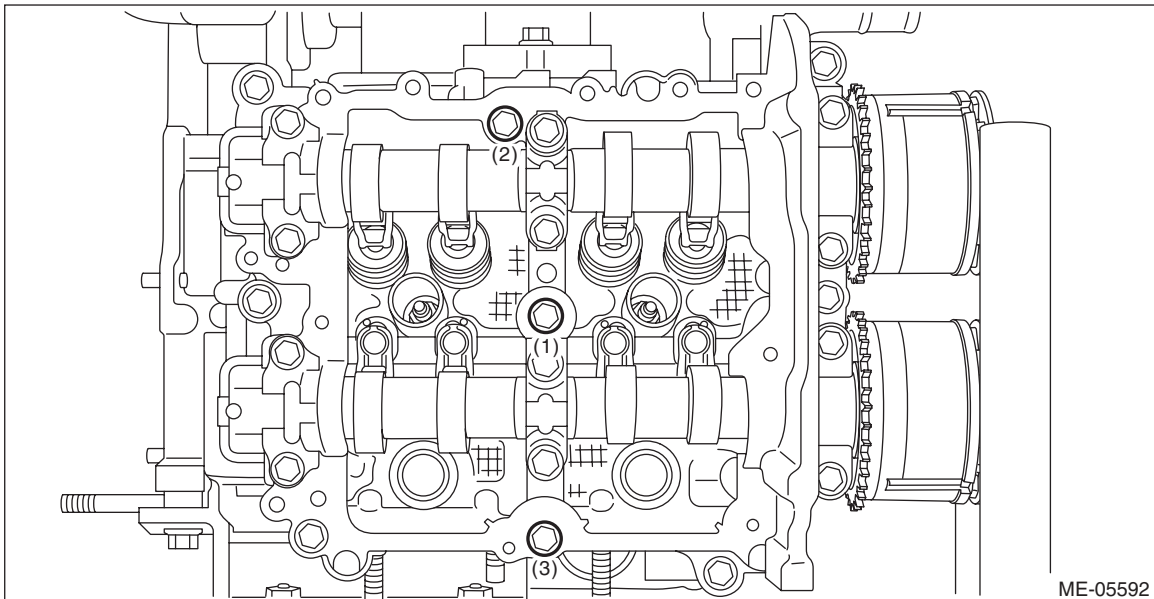
Cam Carrier

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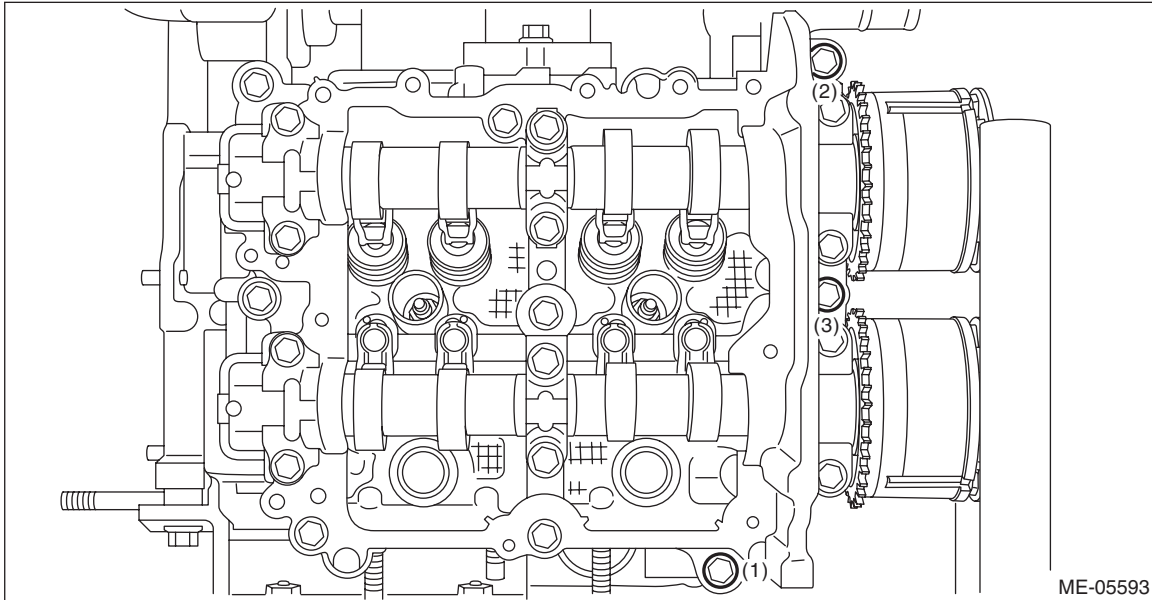
(2) Loosen the bolts (3 places) by 180° in numerical order as shown in the figure.



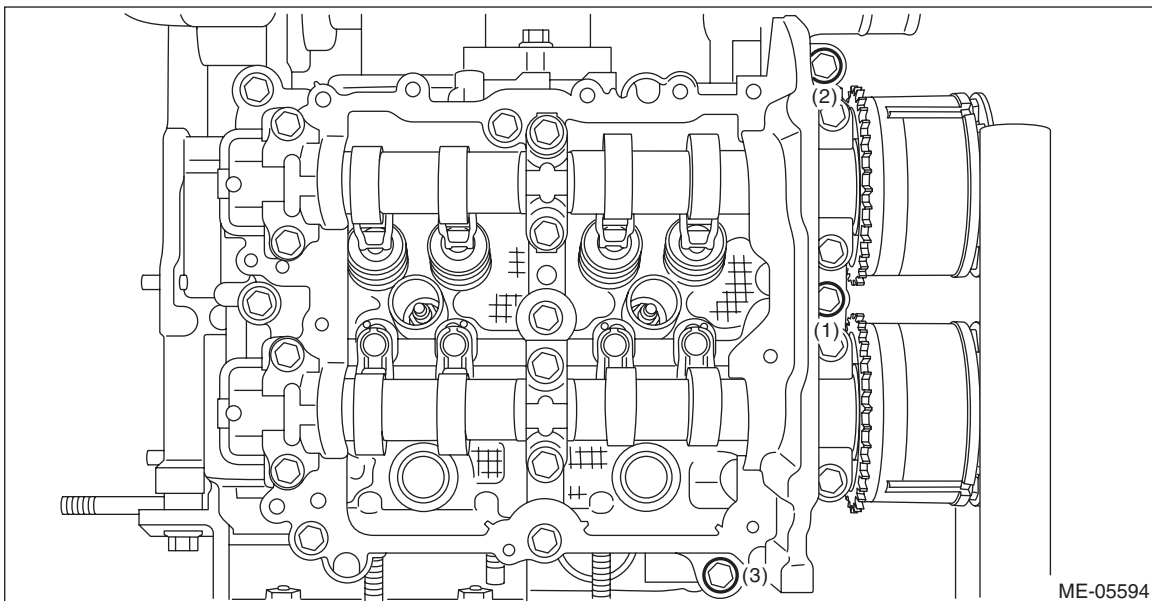
(3) Tighten the bolts (3 places) with a torque of 18 N·m (1.8 kgf·m, 13.3 ft·lb) in numerical order as shown in the figure.



- (4) Loosen the bolts (3 places) by 180° in numerical order as shown in the figure.



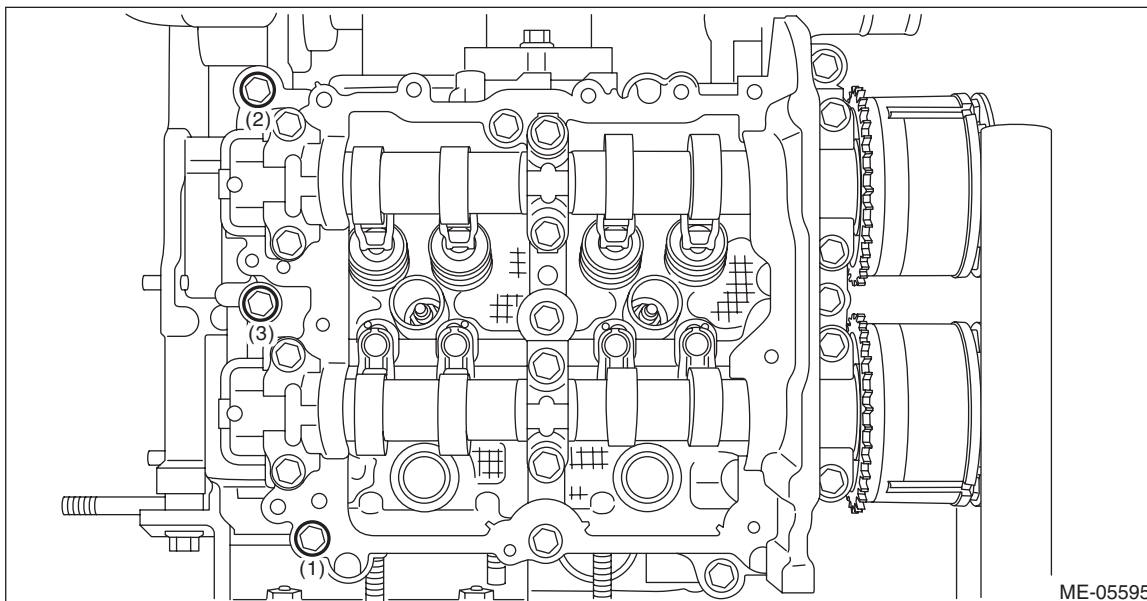
- (5) Tighten the bolts (3 places) with a torque of 18 N·m (1.8 kgf·m, 13.3 ft·lb) in numerical order as shown in the figure.



Cam Carrier

MECHANICAL

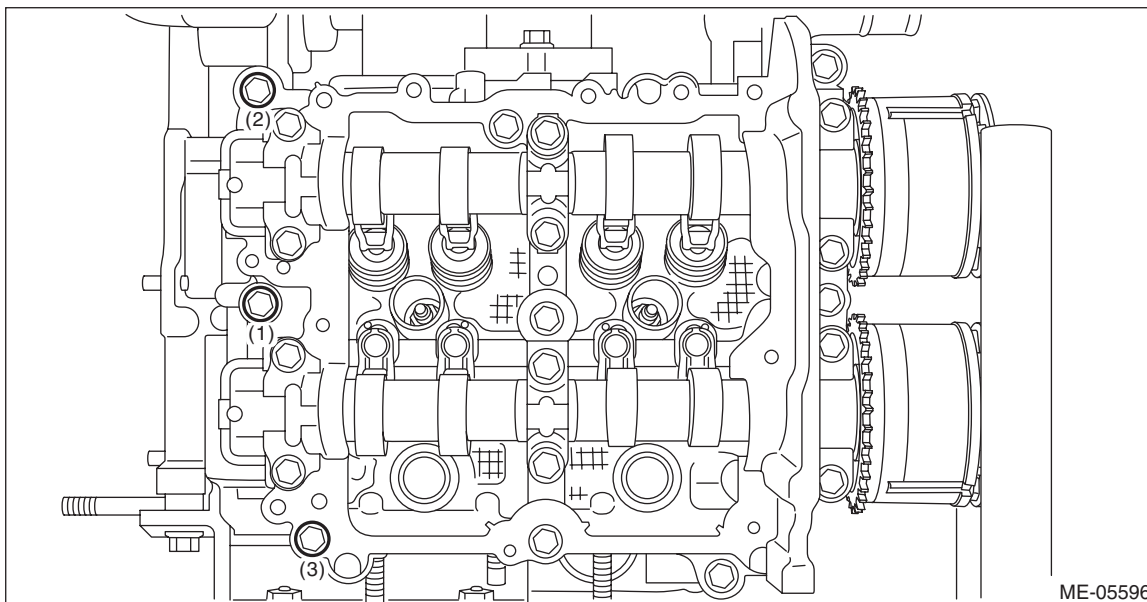
- (6) Loosen the bolts (3 places) by 180° in numerical order as shown in the figure.



- (7) Tighten the bolts (3 places) with a torque of 18 N·m (1.8 kgf-m, 13.3 ft-lb) in numerical order as shown in the figure.

NOTE:

After tightening, if the liquid gasket is squeezed out onto the seal surface of the chain cover, completely remove any squeezed-out liquid gasket.



- 6) Set the part so that the intake manifold is on the upper side.
7) Install the cam sprocket RH. <Ref. to ME(H4DO(w/o HEV))-195, CAM SPROCKET RH, INSTALLATION, Cam Sprocket.>

NOTE:

This procedure is required only when the cam carrier RH is removed for disassembly.

- 8) Check the cam clearance. <Ref. to ME(H4DO(w/o HEV))-51, WHEN TIMING CHAIN ASSEMBLY IS REMOVED, INSPECTION, Cam Clearance.>

- 9) Install the timing chain RH. <Ref. to ME(H4DO(w/o HEV))-184, TIMING CHAIN RH, INSTALLATION, Timing Chain Assembly.>

10) Install the fuel pipe RH and the fuel injector RH.

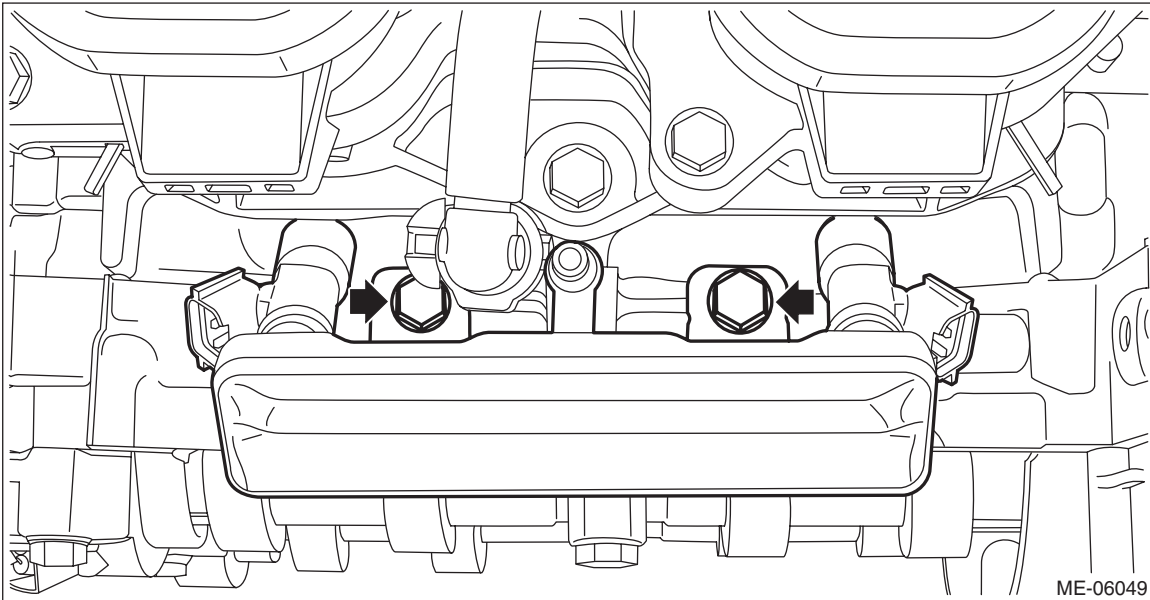
(1) Install the fuel pipe RH and the fuel injector RH, and install the bolts which secure the fuel pipe RH.

NOTE:

- Use new O-rings, rubbers, seal rings, and fuel injector holder.
- Refer to “Fuel Injector” for removal and installation procedure of fuel injector holder. <Ref. to FU(H4DO(HEV))-69, REMOVAL, Fuel Injector.> <Ref. to FU(H4DO(HEV))-72, INSTALLATION, Fuel Injector.>

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



ME-06049

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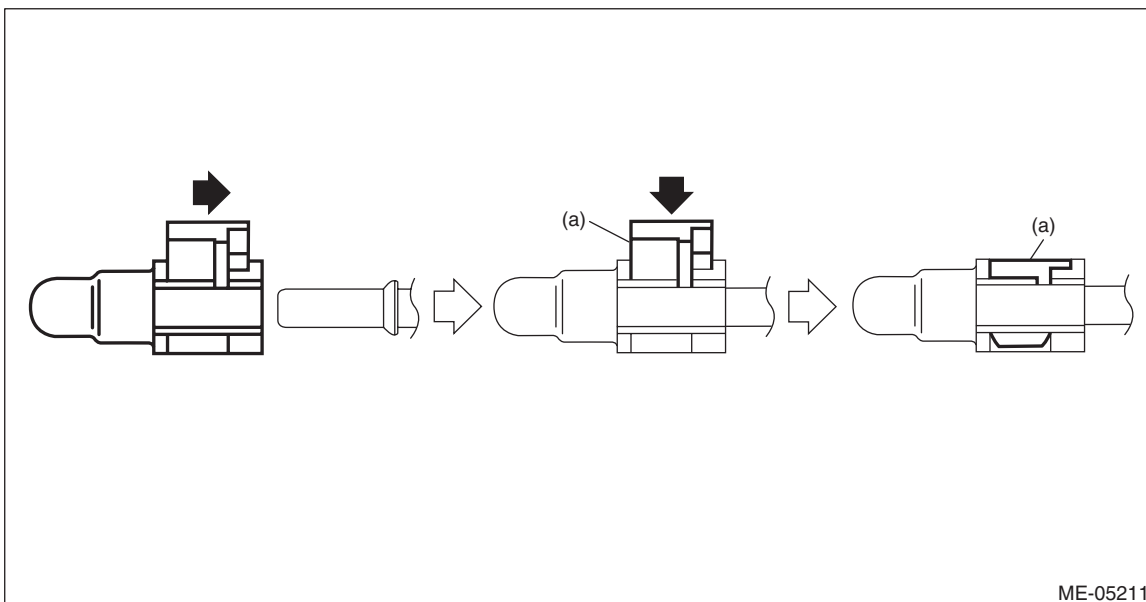
(2) Connect the quick connector to the fuel pipe RH.

CAUTION:

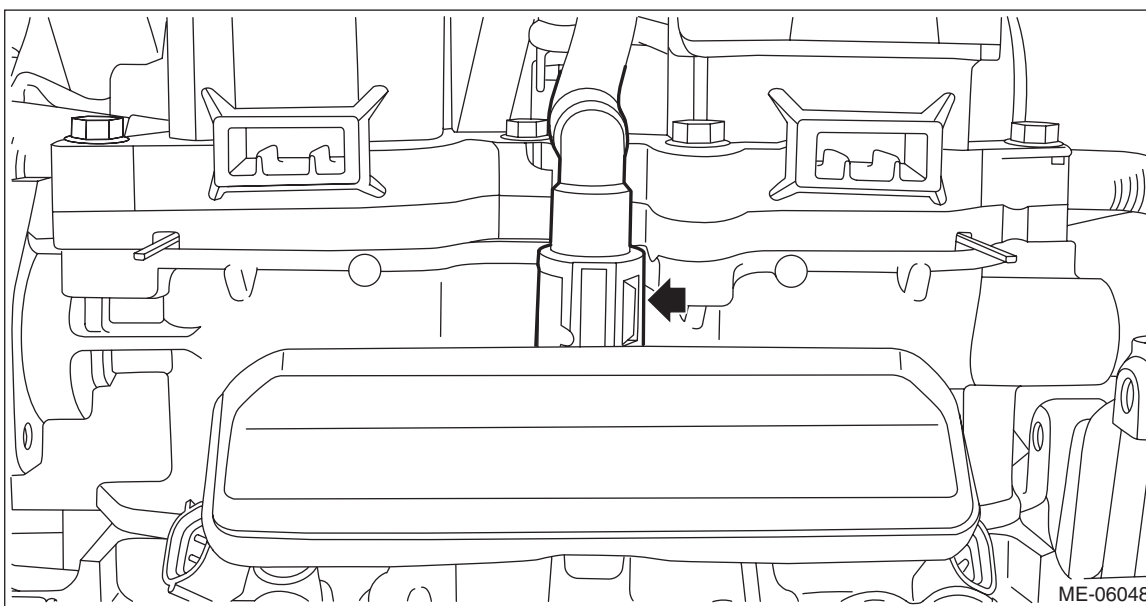
- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.

NOTE:

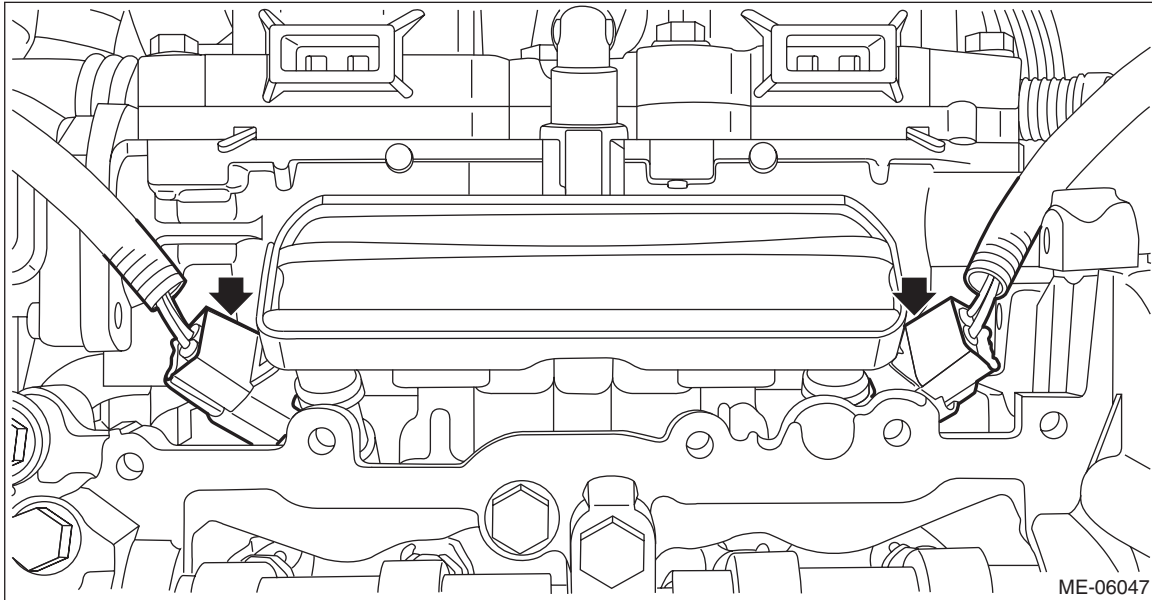
Connect the quick connector as shown in the figure.



(a) Slider



(3) Connect the connectors to the fuel injector RH.

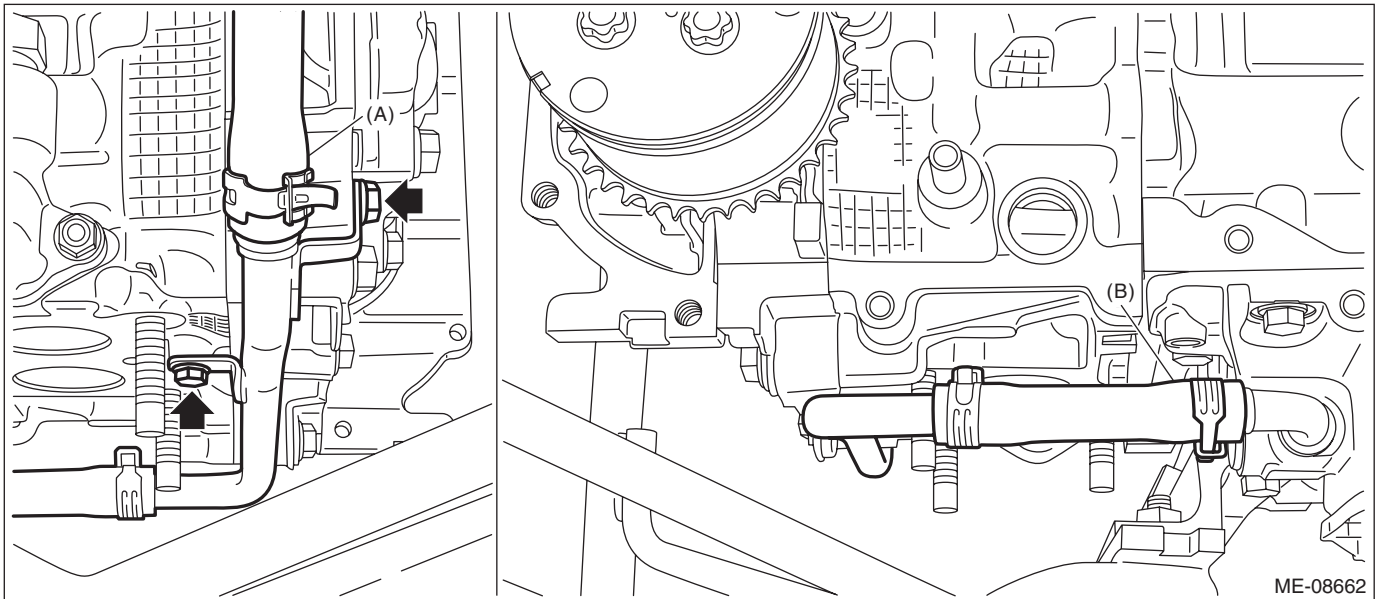


11) Connect the water pipe hose (B) to the oil pan upper.

12) Install the water pipe assembly RH and connect the engine coolant inlet hose (A) to the water pipe assembly RH.

Tightening torque:

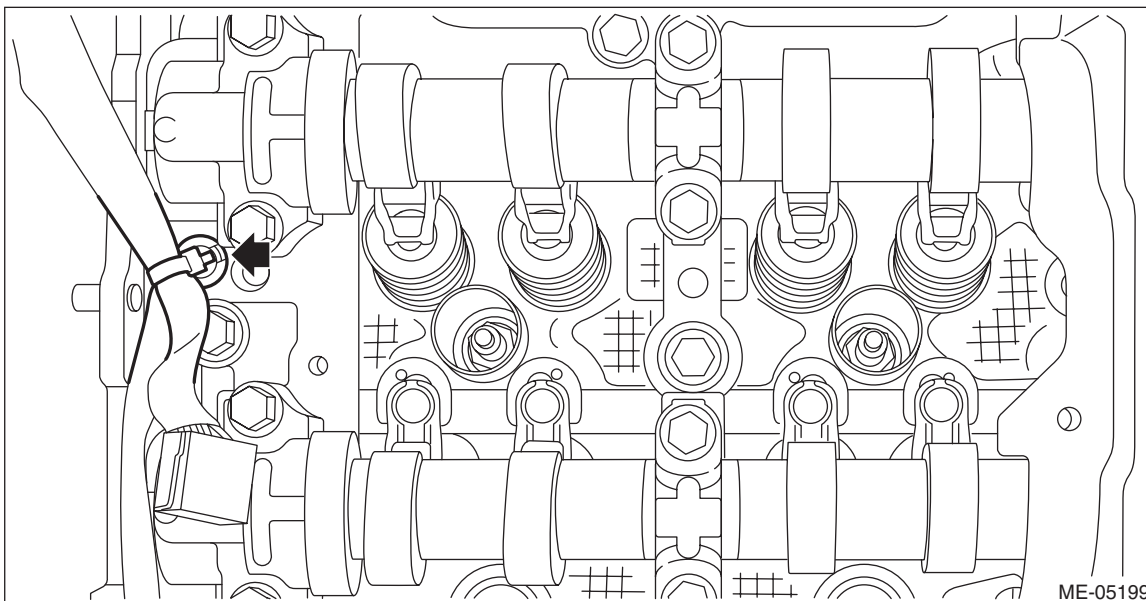
6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



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13) Secure the engine harness to the cam carrier RH with a clip.



14) Install the rocker cover RH. <Ref. to ME(H4DO(w/o HEV))-210, ROCKER COVER RH, INSTALLATION, Rocker Cover.>

15) Install the chain cover. <Ref. to ME(H4DO(w/o HEV))-156, INSTALLATION, Chain Cover.>

16) Install the engine to the vehicle. <Ref. to ME(H4DO(w/o HEV))-88, INSTALLATION, Engine Assembly.>

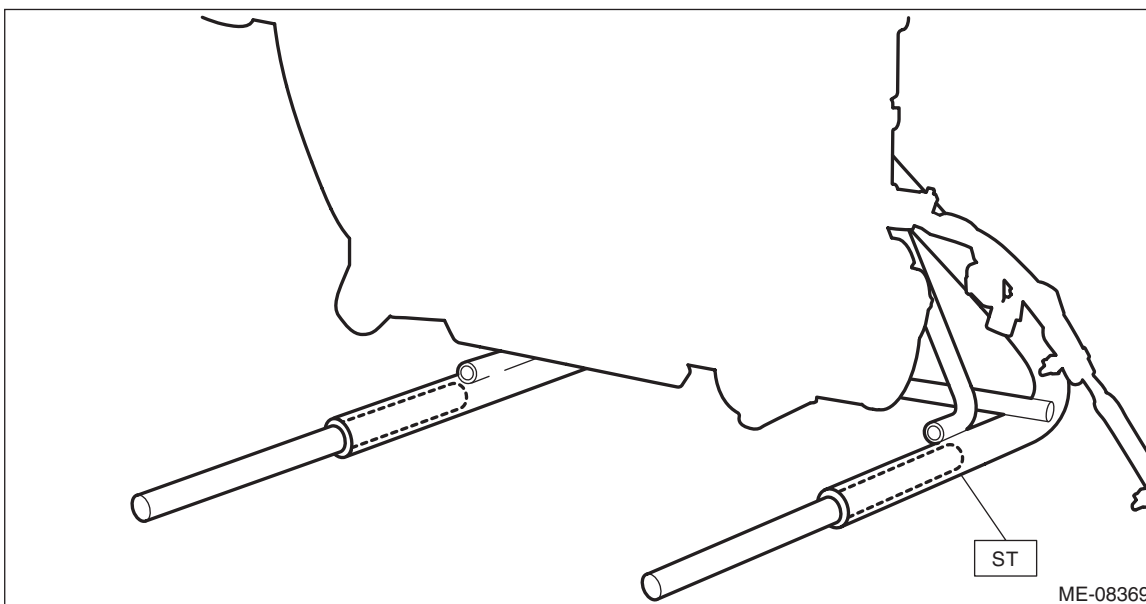
2. CAM CARRIER LH

1) Insert the steel rods into ST, and set the engine so that the camshaft LH is facing up.

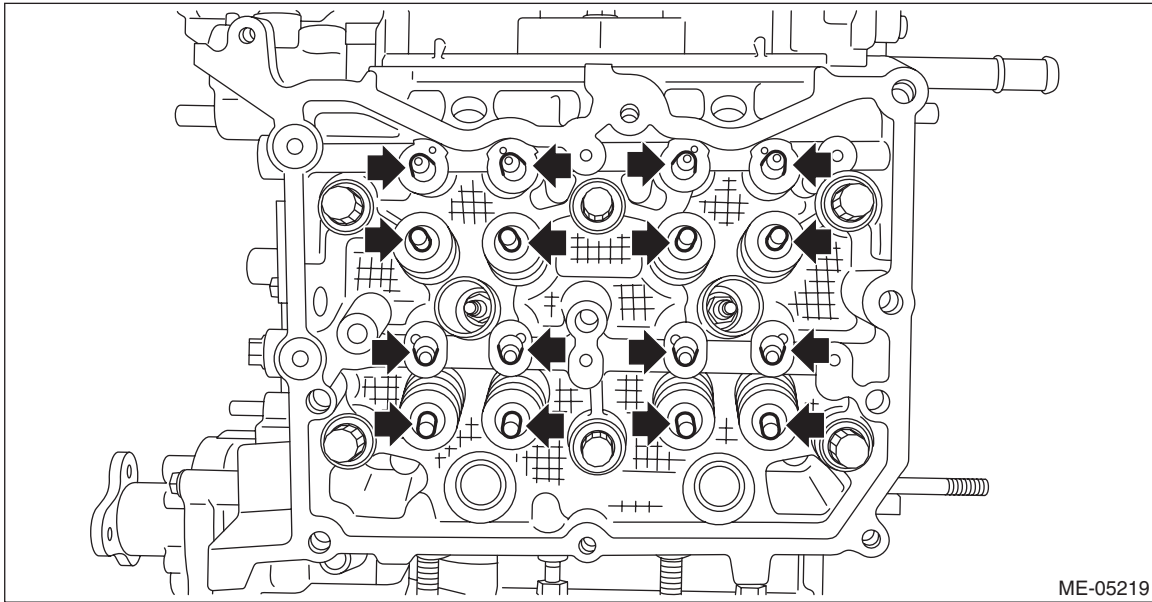
CAUTION:

- If the engine is standing on one side without inserting the steel rod into ST, engine may lose balance and fall down. Be sure to insert the steel rod into ST to extend the length.
- Use the steel rod with enough strength.
- Be careful not to pinch the engine harness with ST.

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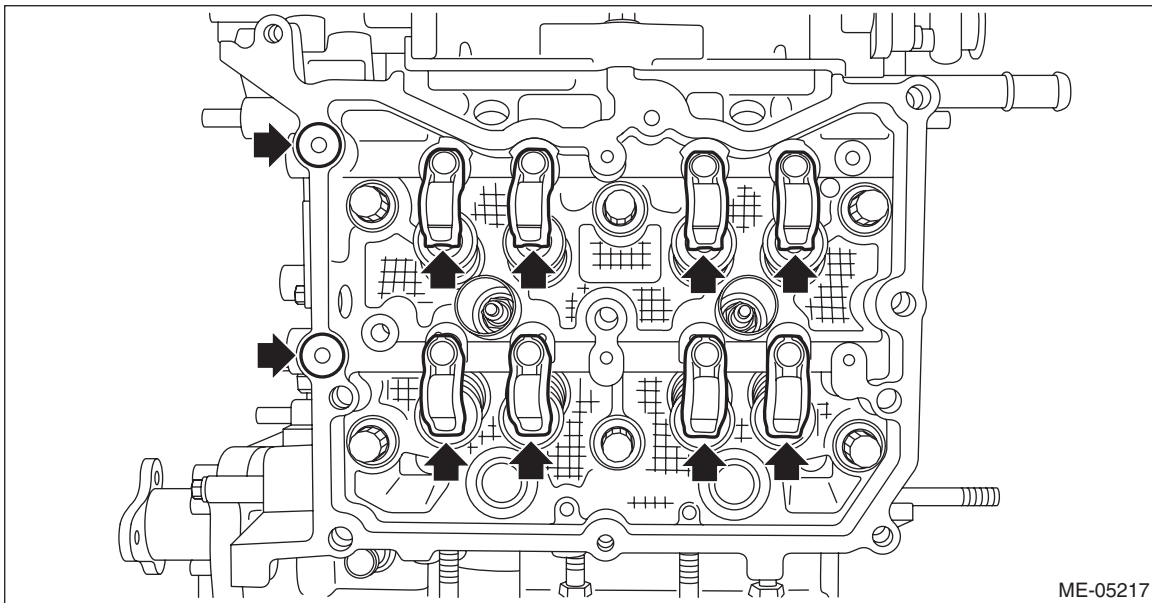
2) Apply engine oil to the valve shim and the roller rocker arm pivot, and install the valve shim and the roller rocker arm pivot to the cylinder head LH.



3) Apply engine oil to the O-ring and the roller rocker arm, and install the O-ring and the roller rocker arm to the cylinder head LH.

NOTE:

Use new O-rings.



Cam Carrier

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4) Apply liquid gasket to the mating surface of cam carrier LH as shown in the figure.

NOTE:

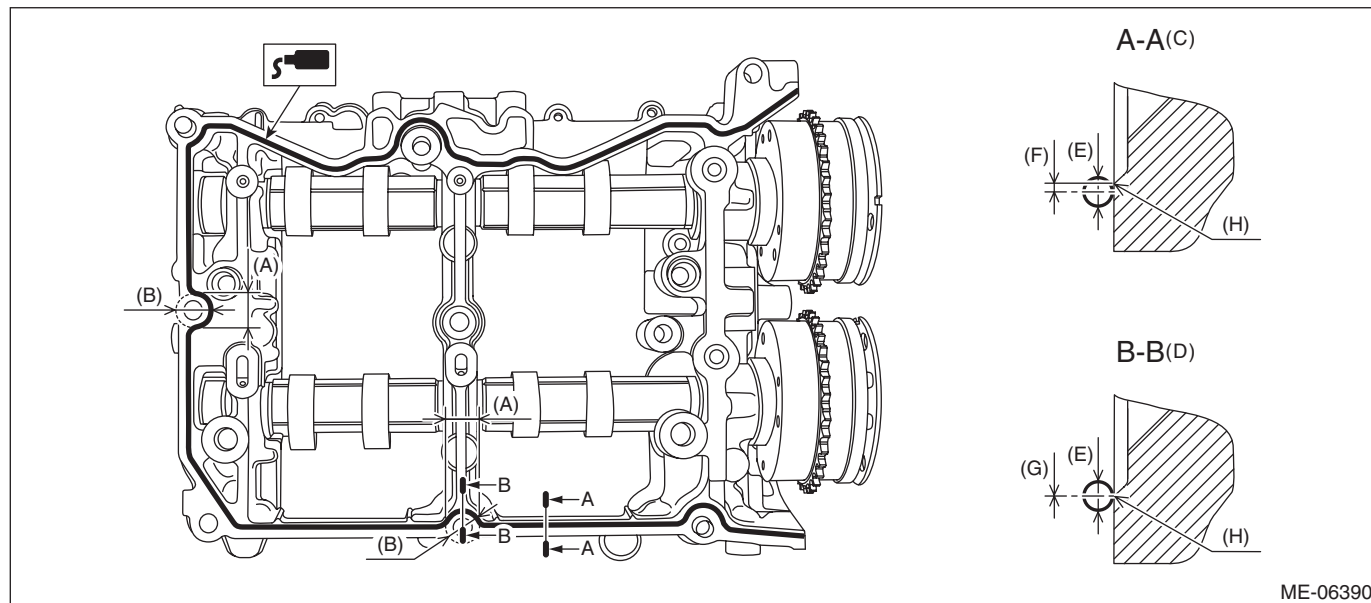
- Before applying liquid gasket, degrease the old liquid gasket seal surface of the cylinder head LH and cam carrier LH.
- Install within 5 min. after applying liquid gasket.

Liquid gasket:

THREE BOND 1217G (Part No. 0877Y0100), THREE BOND 1217H or equivalent

Liquid gasket applying diameter:

3.1 ± 0.5 mm (0.1220 ± 0.0197 in)



ME-06390

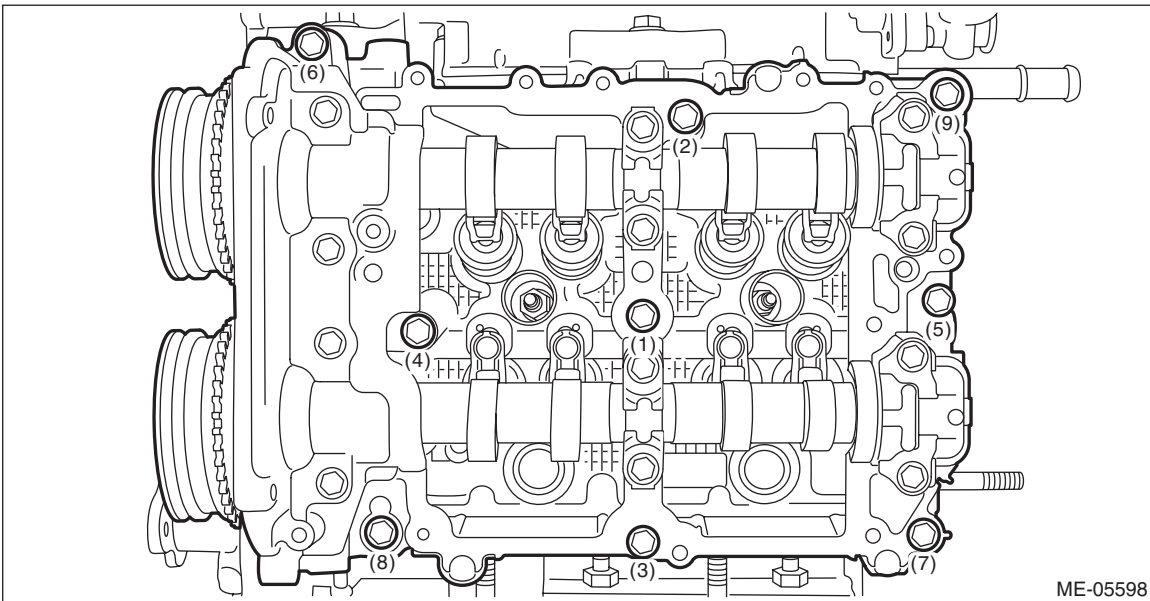
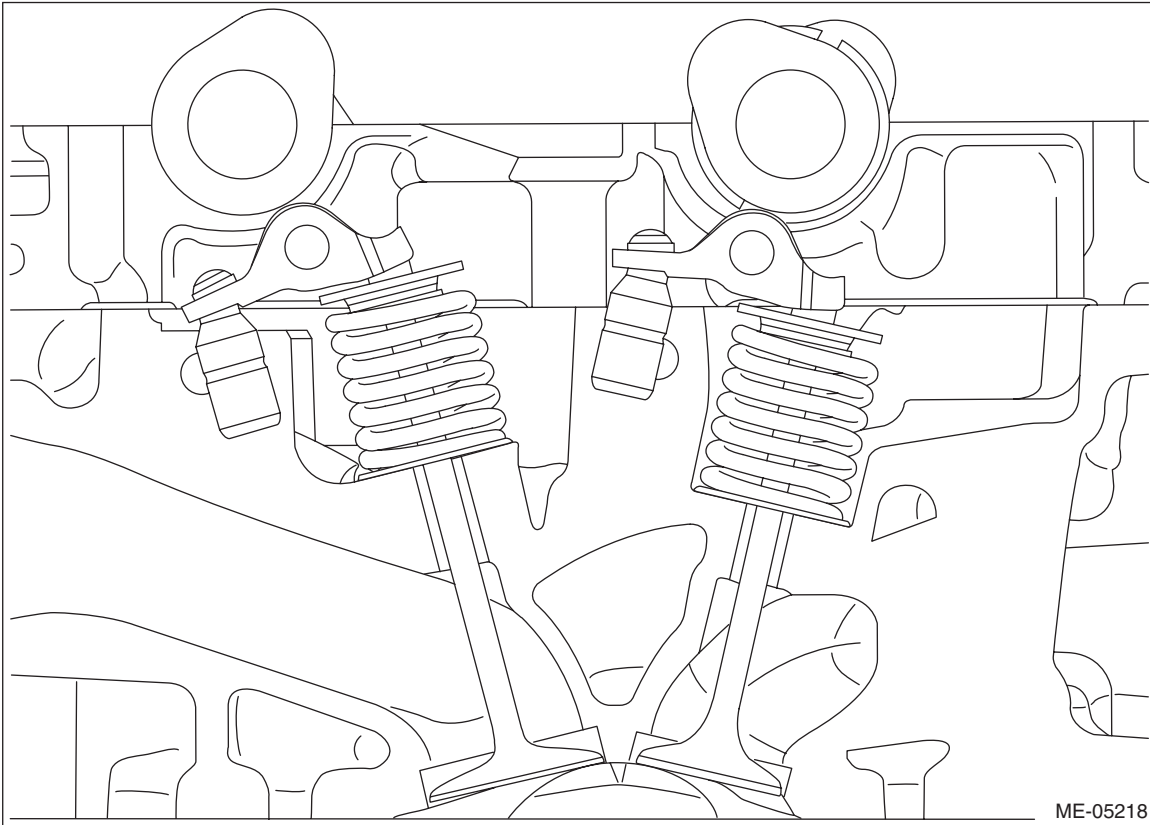
- | | | |
|---|---|---|
| (A) Range A | (D) Liquid gasket applying position of mating surfaces of range A | (G) 0 ± 0.5 mm (0 ± 0.0197 in) |
| (B) $\phi 18$ mm (0.7087 in) | (E) $\phi 3.1 \pm 0.5$ mm (0.1220 ± 0.0197 in) | (H) Chamfer edge |
| (C) Liquid gasket applying position of mating surfaces other than range A | (F) 1 mm (0.0394 in) or less | |

5) Install the cam carrier LH to the cylinder head LH.

(1) Mount the cam carrier LH, then tighten all bolts with a torque of 18 N·m (1.8 kgf-m, 13.3 ft-lb) in numerical order as shown in the figure.

NOTE:

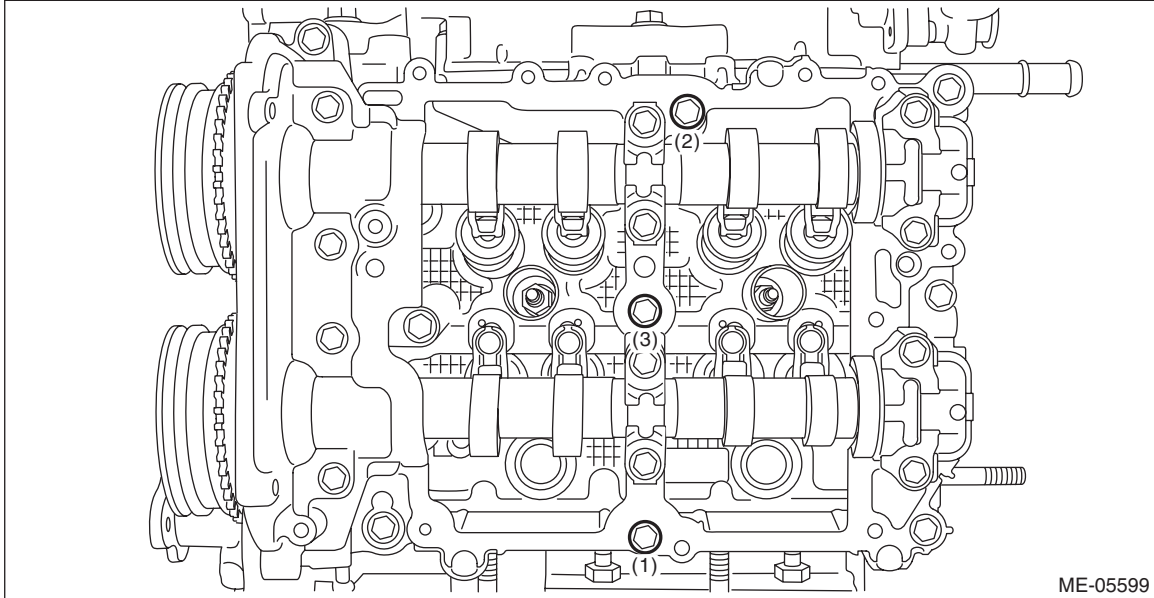
Set the intake camshaft LH and the exhaust camshaft LH to the zero-lift position.



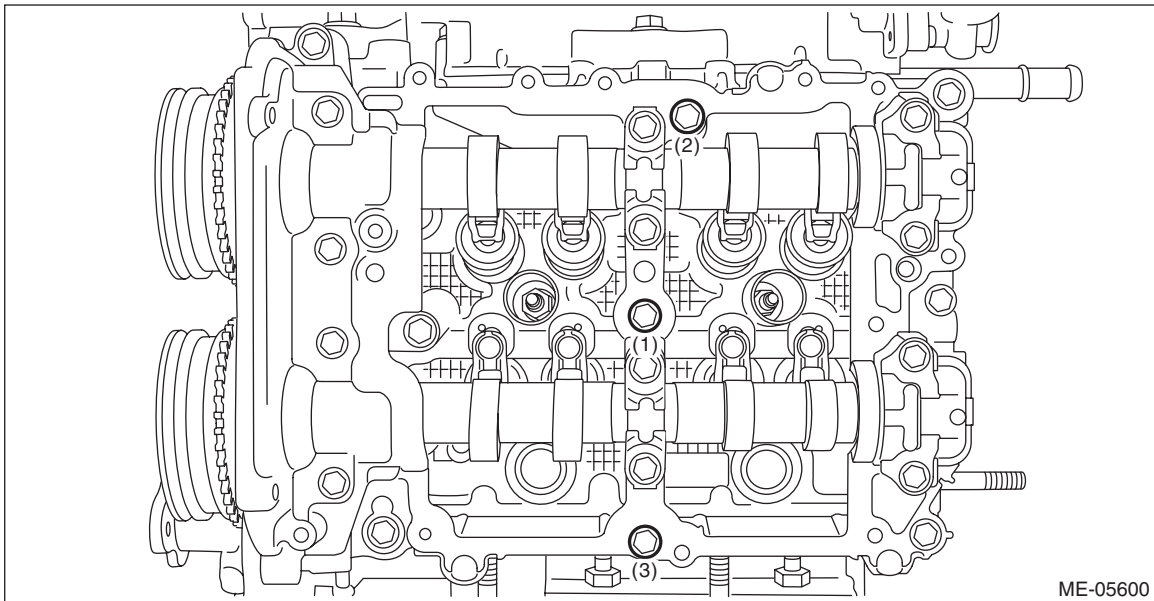
Cam Carrier

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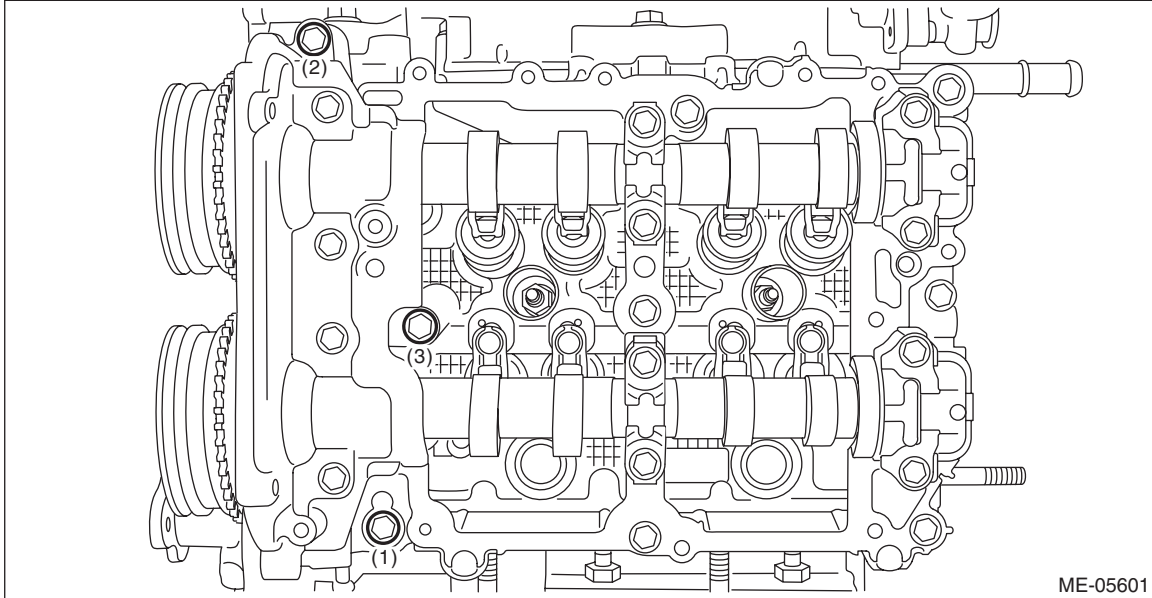
(2) Loosen the bolts (3 places) by 180° in numerical order as shown in the figure.



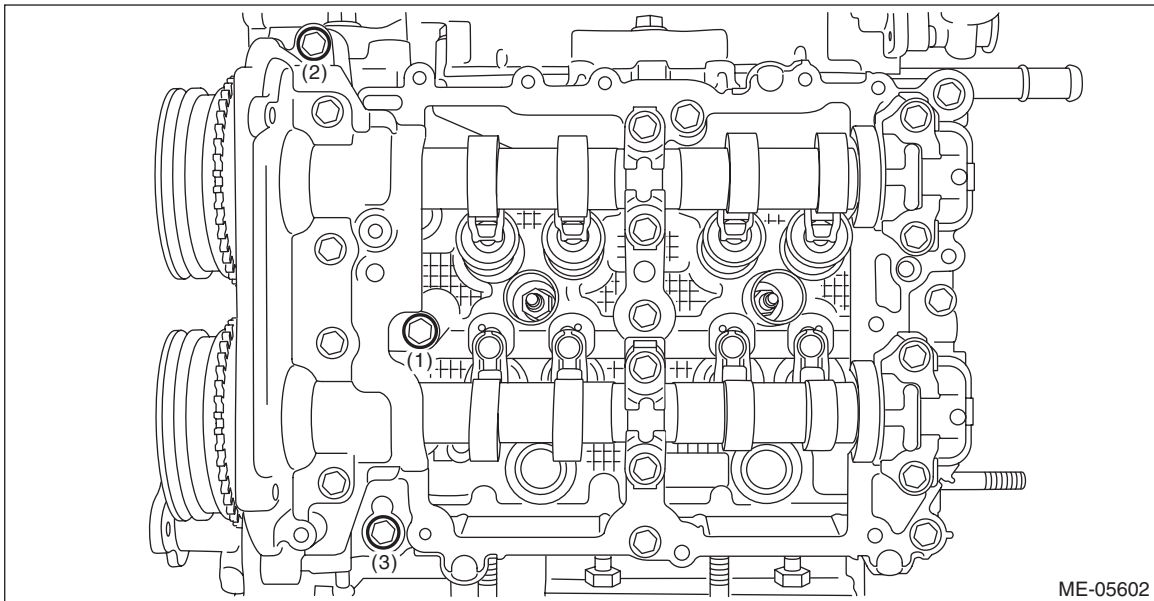
(3) Tighten the bolts (3 places) with a torque of 18 N·m (1.8 kgf·m, 13.3 ft·lb) in numerical order as shown in the figure.



- (4) Loosen the bolts (3 places) by 180° in numerical order as shown in the figure.



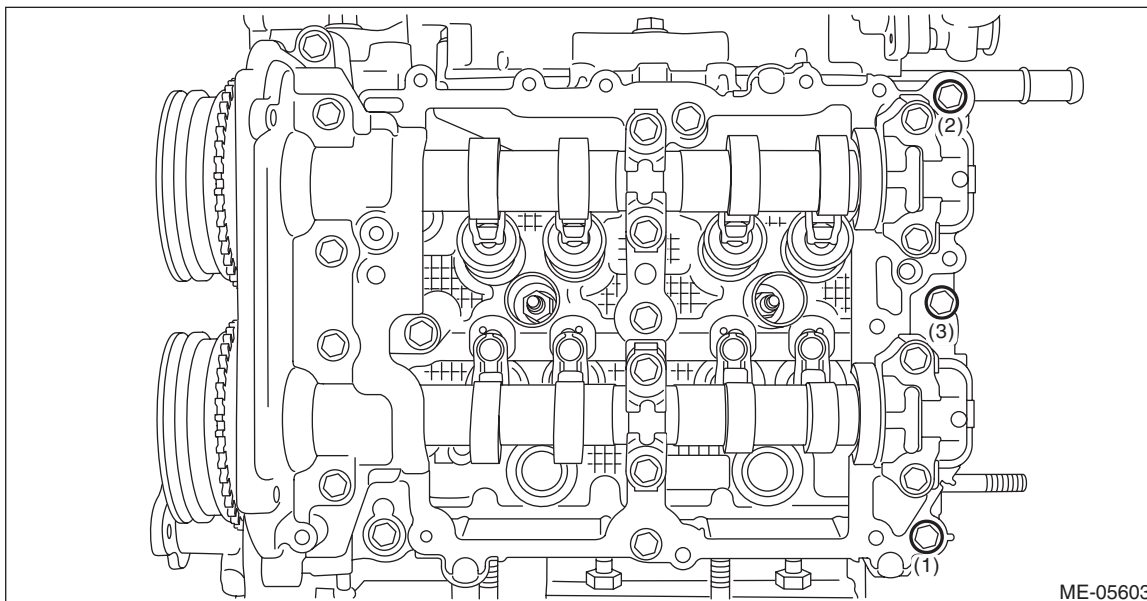
- (5) Tighten the bolts (3 places) with a torque of 18 N·m (1.8 kgf·m, 13.3 ft·lb) in numerical order as shown in the figure.



Cam Carrier

MECHANICAL

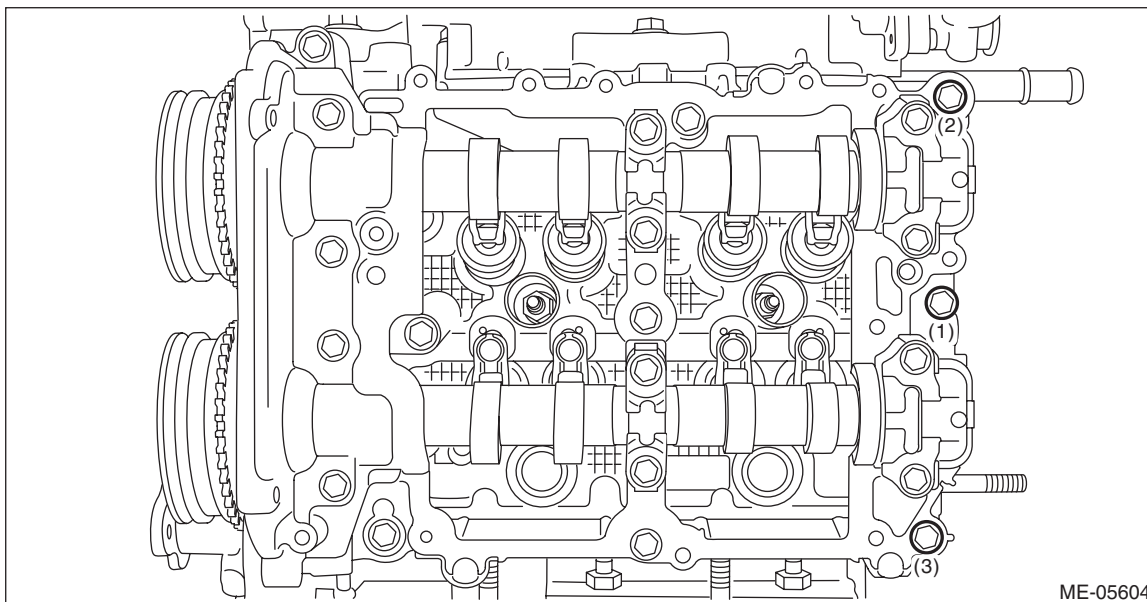
- (6) Loosen the bolts (3 places) by 180° in numerical order as shown in the figure.



- (7) Tighten the bolts (3 places) with a torque of 18 N·m (1.8 kgf·m, 13.3 ft·lb) in numerical order as shown in the figure.

NOTE:

After tightening, if the liquid gasket is squeezed out onto the seal surface of the chain cover, completely remove any squeezed-out liquid gasket.



- 6) Set the part so that the intake manifold is on the upper side.
7) Install the cam sprocket LH. <Ref. to ME(H4DO(w/o HEV))-198, CAM SPROCKET LH, INSTALLATION, Cam Sprocket.>

NOTE:

This procedure is required only when the cam carrier LH is removed for disassembly.

- 8) Check the cam clearance. <Ref. to ME(H4DO(w/o HEV))-51, WHEN TIMING CHAIN ASSEMBLY IS REMOVED, INSPECTION, Cam Clearance.>

- 9) Install timing chain LH. <Ref. to ME(H4DO(w/o HEV))-176, TIMING CHAIN LH, INSTALLATION, Timing Chain Assembly.>

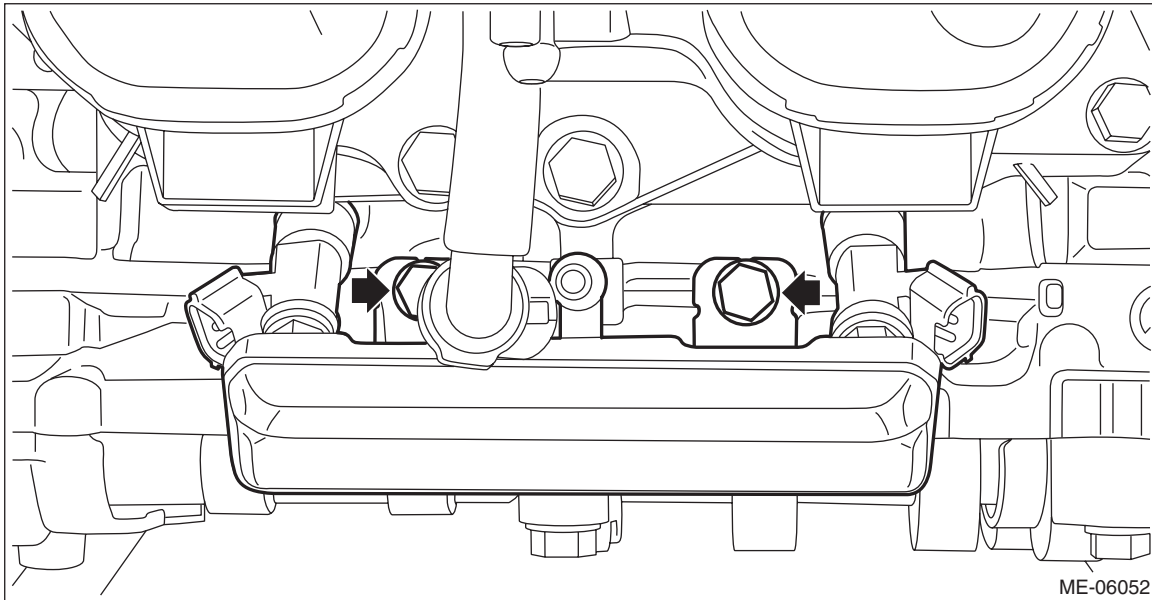
10) Install the fuel pipe LH and the fuel injector LH.

(1) Install the fuel pipe LH and the fuel injector LH, and install the bolts which secure the fuel pipe LH.

- Use new O-rings, rubbers, seal rings, and fuel injector holder.
- Refer to “Fuel Injector” for removal and installation procedure of fuel injector holder. <Ref. to FU(H4DO(HEV))-69, REMOVAL, Fuel Injector.> <Ref. to FU(H4DO(HEV))-72, INSTALLATION, Fuel Injector.>

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)



Cam Carrier

MECHANICAL

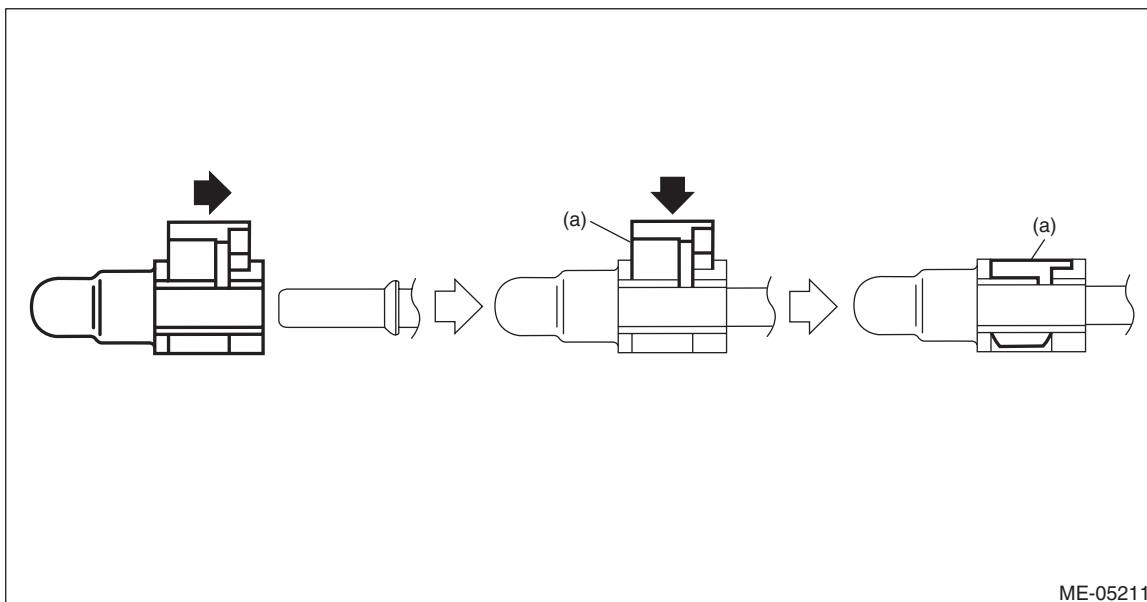
(2) Connect the quick connector to the fuel pipe LH.

CAUTION:

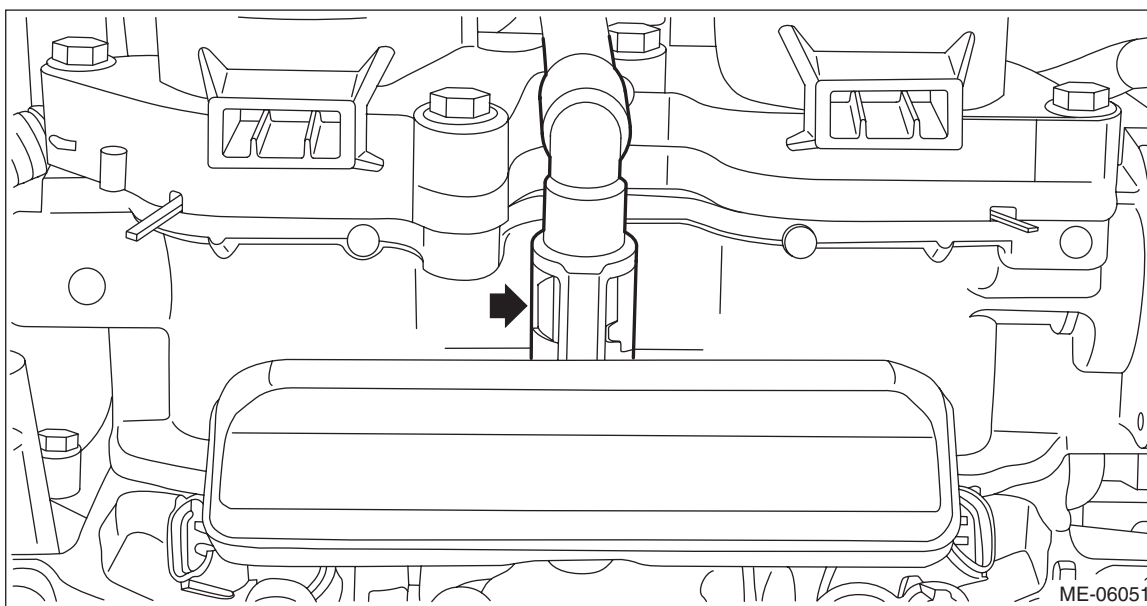
- Check that there is no damage or dust on the quick connector. If necessary, clean the seal surface of the pipe.
- When connecting the quick connector, make sure to insert the pipe all the way in before locking the slider.
- When it is difficult to lock the slider, check that the pipe is fully inserted.
- Make sure that the quick connector is securely connected.

NOTE:

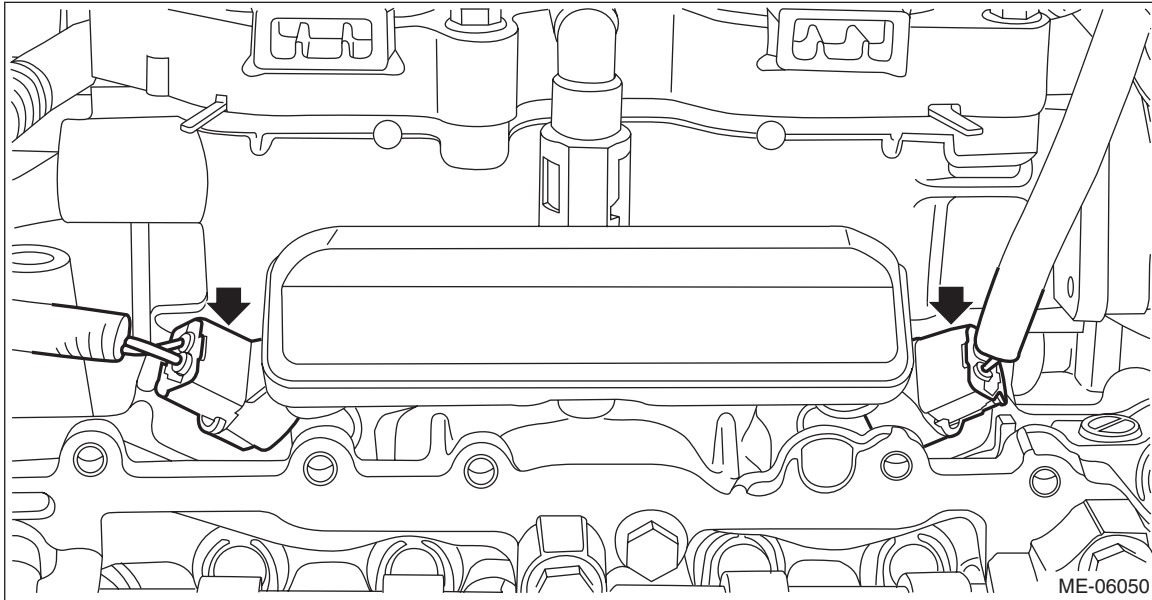
Connect the quick connector as shown in the figure.



(a) Slider



(3) Connect the connectors to the fuel injector LH.

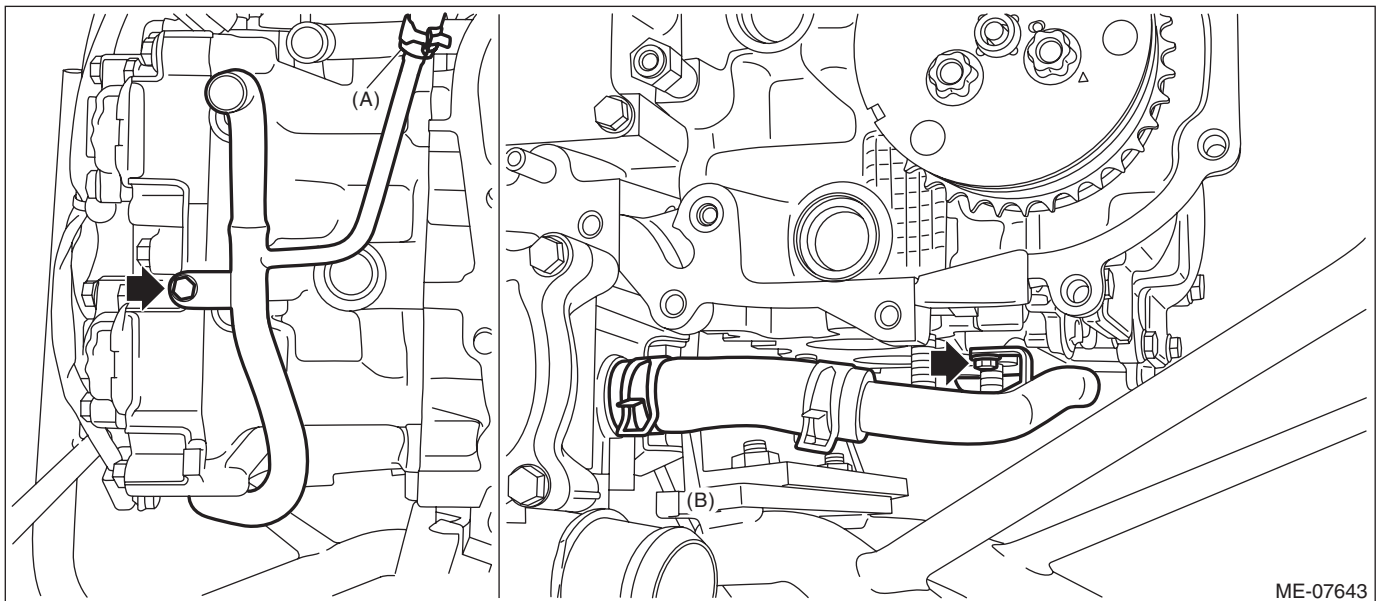


11) Connect the water pipe hose (B) to the oil pan upper, and install the water pipe assembly LH.

Tightening torque:

6.4 N·m (0.7 kgf-m, 4.7 ft-lb)

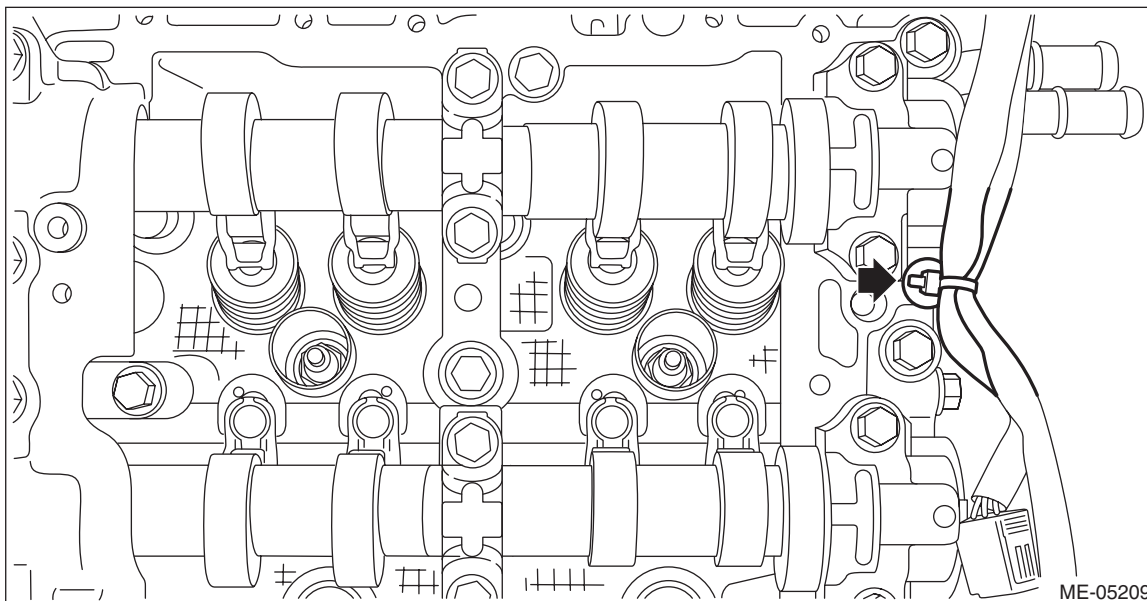
12) Connect the preheater hose (A) to the water pipe assembly LH.



Cam Carrier

MECHANICAL

13) Secure the engine harness to the cam carrier LH with a clip.



14) Install the rocker cover LH. <Ref. to ME(H4DO(w/o HEV))-214, ROCKER COVER LH, INSTALLATION, Rocker Cover.>

15) Install the chain cover. <Ref. to ME(H4DO(w/o HEV))-156, INSTALLATION, Chain Cover.>

16) Install the engine to the vehicle. <Ref. to ME(H4DO(w/o HEV))-88, INSTALLATION, Engine Assembly.>

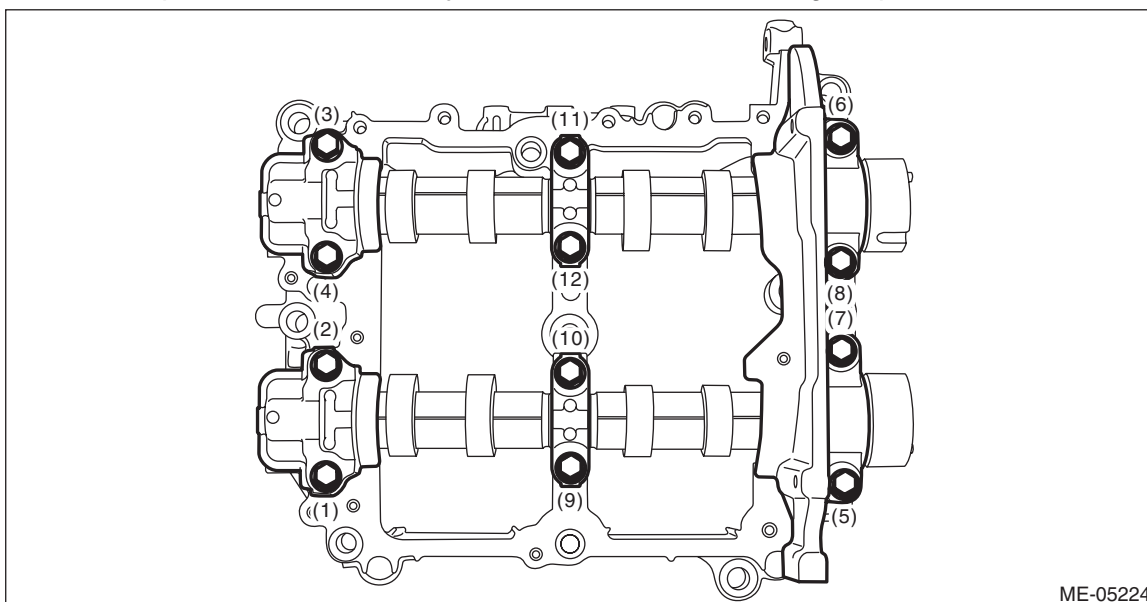
C: DISASSEMBLY

1. CAM CARRIER RH

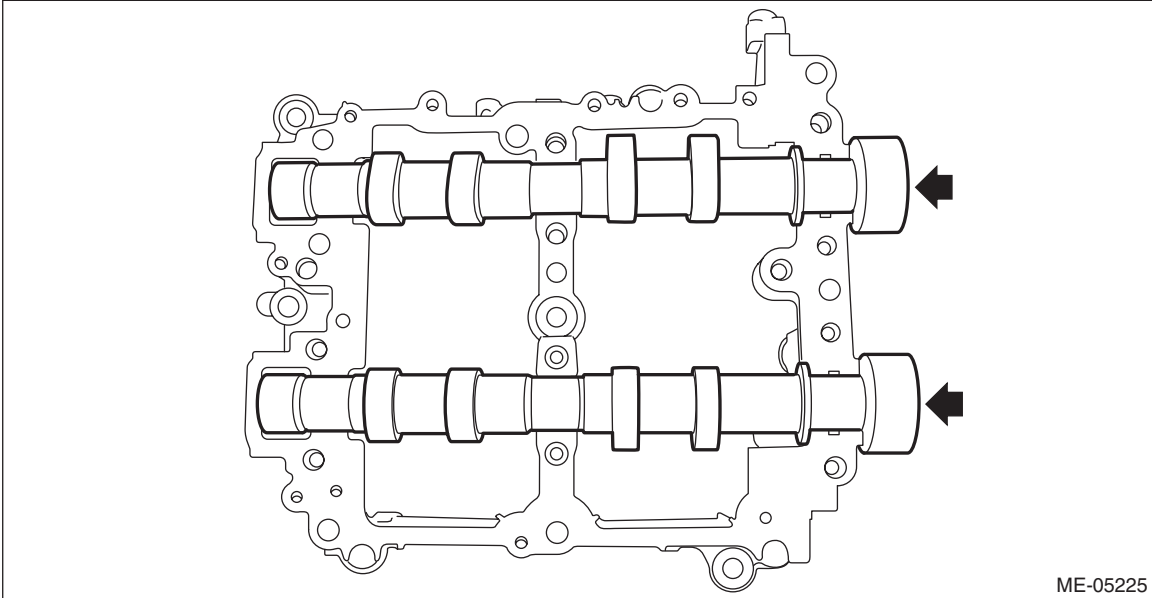
1) Loosen the bolts (front camshaft cap RH, intake center camshaft cap RH, intake rear camshaft cap RH, exhaust center camshaft cap RH, and exhaust rear camshaft cap RH) equally, a little at a time in numerical sequence as shown in the figure, and remove each camshaft cap.

NOTE:

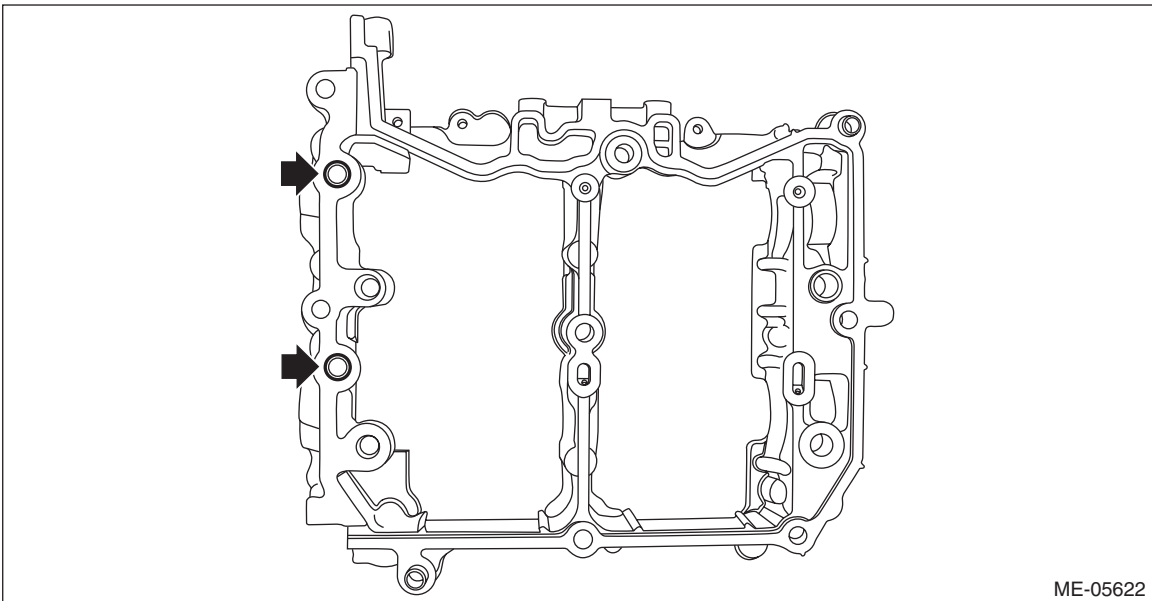
Arrange camshaft caps in order so that they can be installed in their original positions.



- 2) Remove the intake camshaft RH and the exhaust camshaft RH from cam carrier RH.



- 3) Remove the filter from cam carrier RH.



- 4) Remove the liquid gasket from cam carrier RH and front camshaft cap RH, intake rear camshaft cap RH and exhaust rear camshaft cap RH.

Cam Carrier

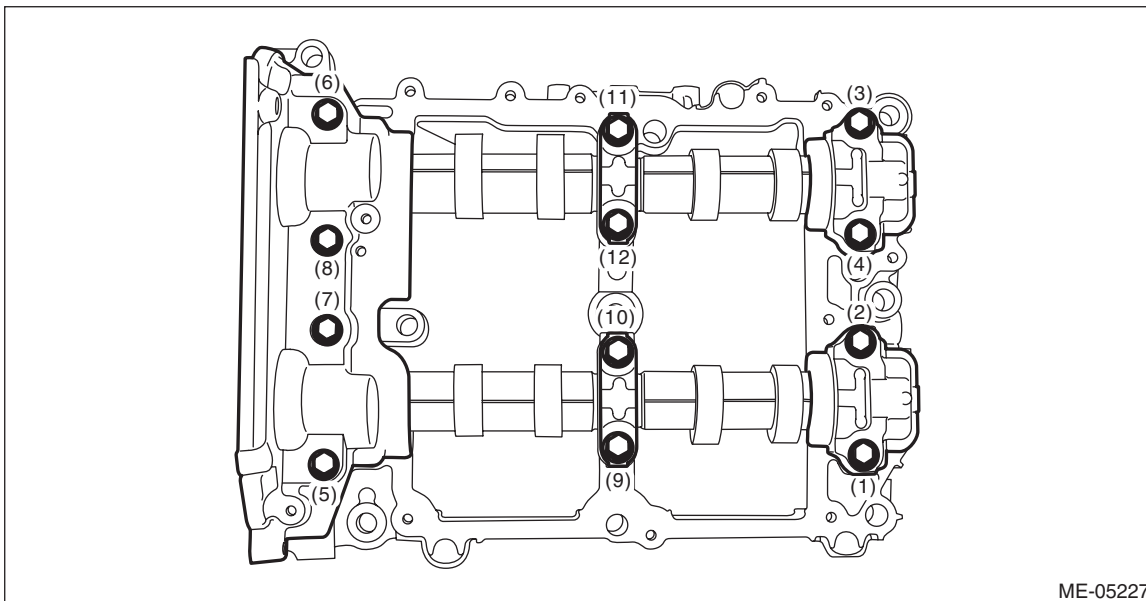
MECHANICAL

2. CAM CARRIER LH

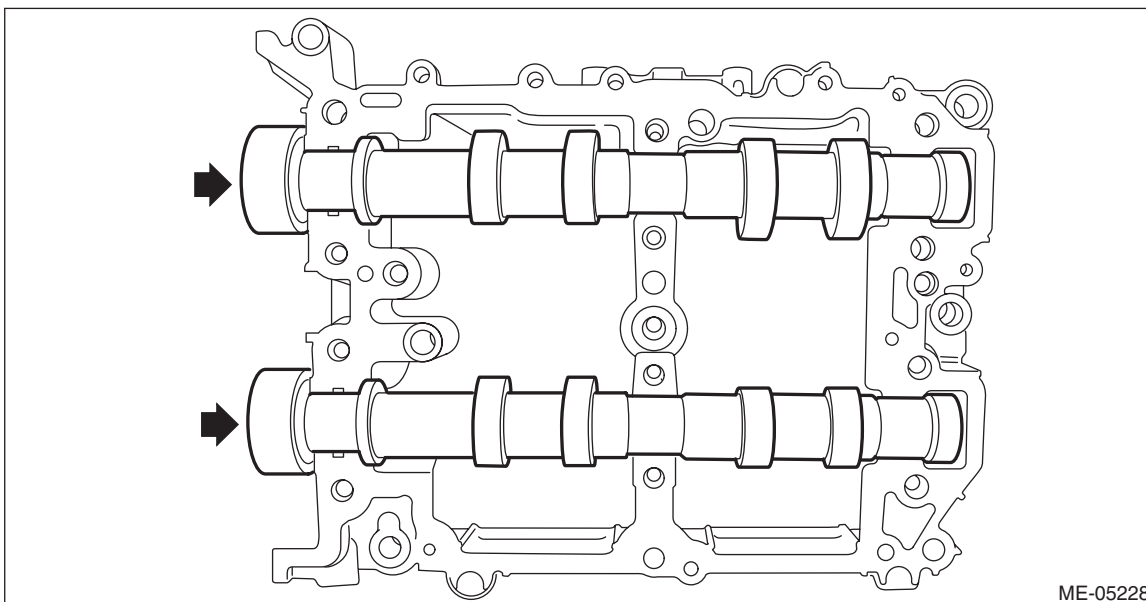
1) Loosen the bolts (front camshaft cap LH, intake center camshaft cap LH, intake rear camshaft cap LH, exhaust center camshaft cap LH and exhaust rear camshaft cap LH) equally, a little at a time in numerical sequence as shown in the figure, and remove each camshaft cap.

NOTE:

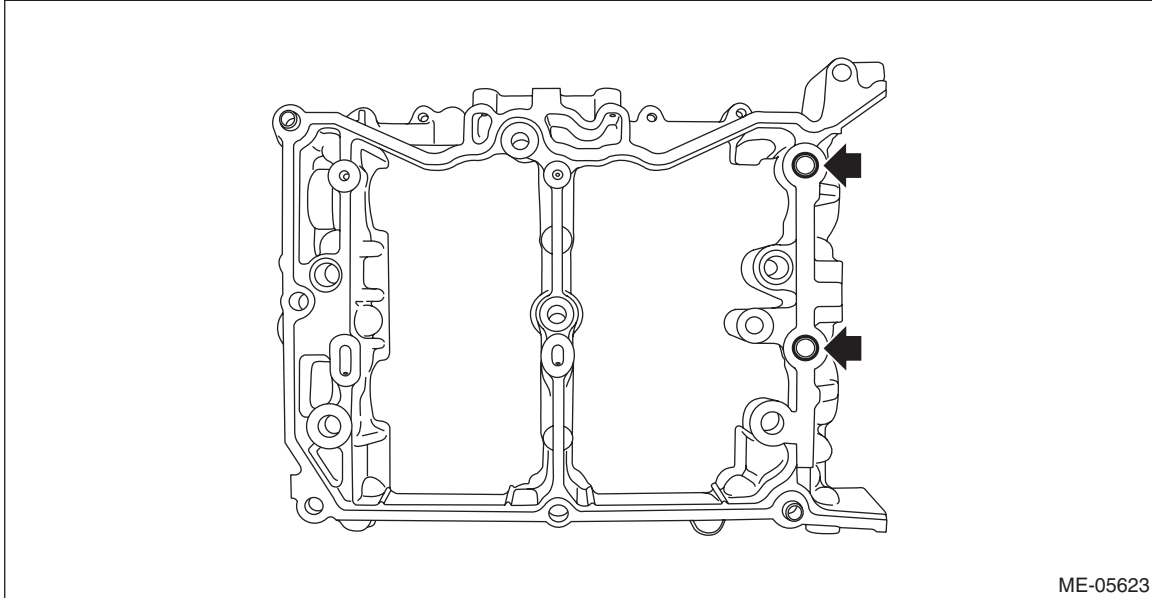
Arrange camshaft caps in order so that they can be installed in their original positions.



2) Remove the intake camshaft LH and the exhaust camshaft LH from cam carrier LH.



3) Remove the filter from cam carrier LH.



4) Remove the liquid gasket from cam carrier LH and front camshaft cap LH, intake rear camshaft cap LH and exhaust rear camshaft cap LH.

D: ASSEMBLY

1. CAM CARRIER RH

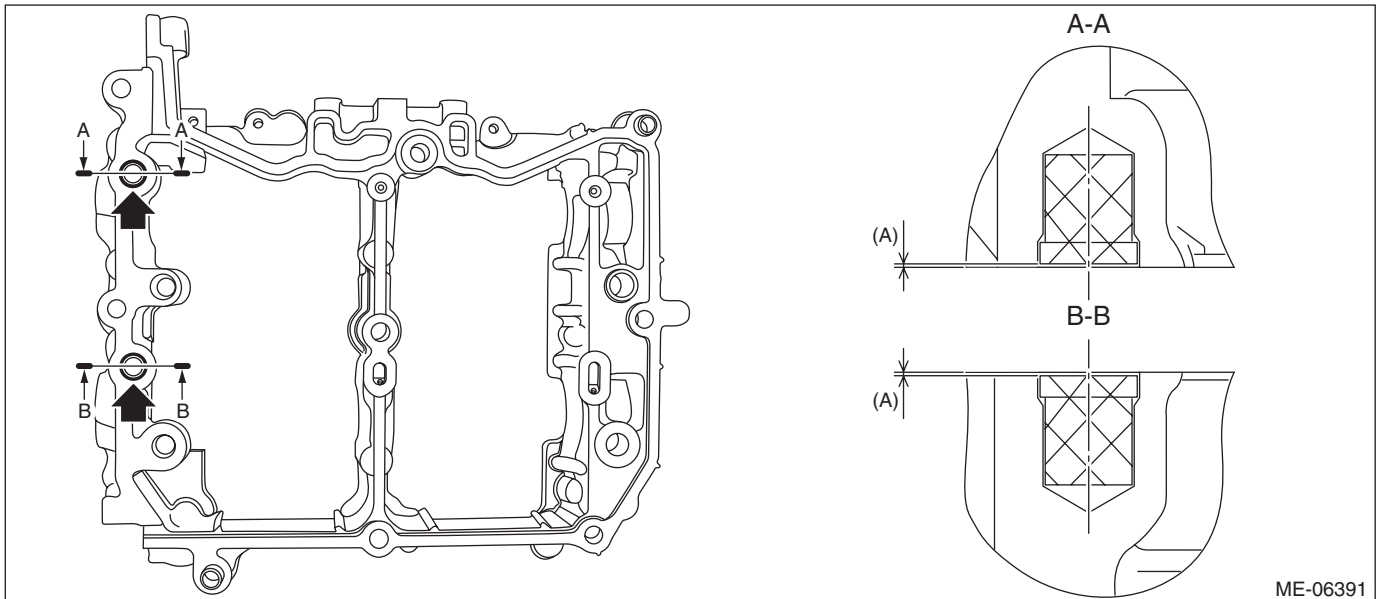
1) Install the filter to the cam carrier RH.

NOTE:

Use a new filter.

Filter insert position:

Cam carrier RH end face $0^{+0}_{-0.5}$ mm ($^{+0}_{-0.0197}$ in) position



(A) 0 — 0.5 mm (0 — 0.0197 in)

Cam Carrier

MECHANICAL

2) Set the intake camshaft RH and the exhaust camshaft RH to the cam carrier RH.

NOTE:

Apply engine oil to the journals of cam carrier RH before setting the intake camshaft RH and exhaust camshaft RH.

3) Install the front camshaft cap RH, intake center camshaft cap RH, intake rear camshaft cap RH, exhaust center camshaft cap RH and exhaust rear camshaft cap RH.

(1) Apply liquid gasket to the mating surface of front camshaft cap RH, intake rear camshaft cap RH and exhaust rear camshaft cap RH as shown in the figure.

CAUTION:

- Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to flow toward camshaft journal, resulting in engine seizure.
- Do not apply liquid gasket excessively to the intake center camshaft cap RH and exhaust center camshaft cap RH.

NOTE:

- Before applying liquid gasket, degrease the old liquid gasket seal surface of the front camshaft cap RH, intake rear camshaft cap RH, exhaust rear camshaft cap RH, and cam carrier RH.
- Install within 5 min. after applying liquid gasket.

Liquid gasket:

THREE BOND 1217G (Part No. 0877Y0100), THREE BOND 1217H or equivalent

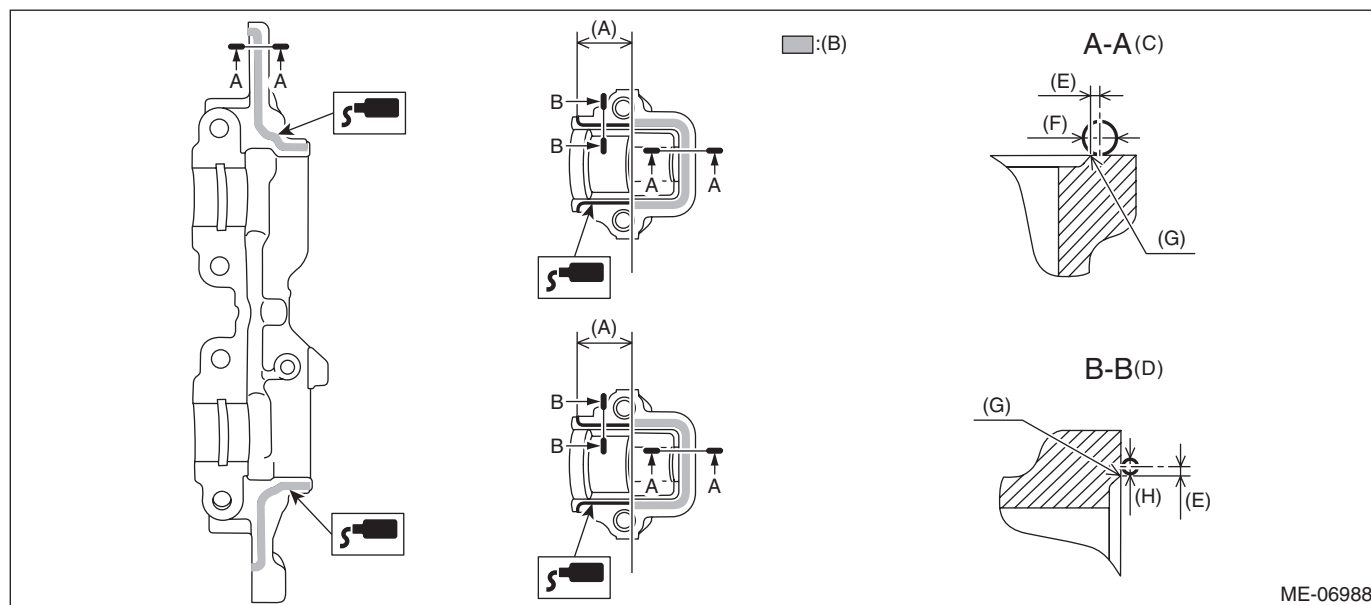
Liquid gasket applying diameter:

Mating surfaces other than range A

2 ± 0.5 mm (0.0787 ± 0.0197 in)

Mating surfaces of range A

3.5 ± 0.5 mm (0.1378 ± 0.0197 in)



ME-06988

(A) 28.5 mm (1.122 in)

(D) Liquid gasket applying position of mating surfaces other than range A

(G) Chamfer edge

(B) Range A

(E) 1 mm (0.0394 in) or less

(H) $\phi 2 \pm 0.5$ mm (0.0787 ± 0.0197 in)

(C) Liquid gasket applying position of mating surfaces of range A

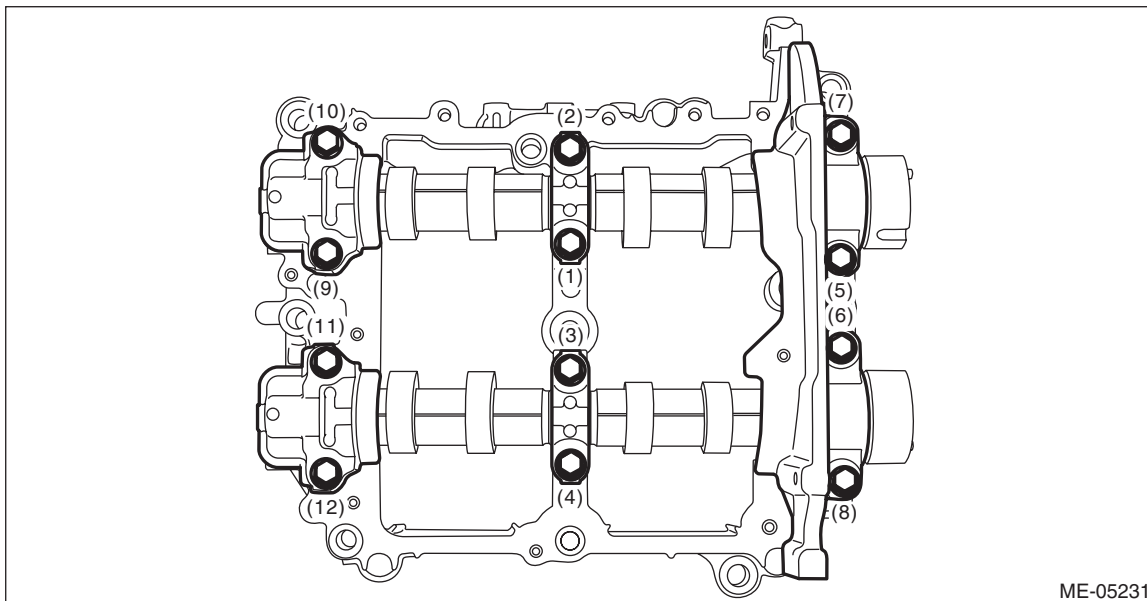
(F) $\phi 3.5 \pm 0.5$ mm (0.1378 ± 0.0197 in)

(2) Apply engine oil to the journals of each camshaft cap before setting the camshaft cap.

(3) Tighten the bolts which secure front camshaft cap RH, intake center camshaft cap RH, intake rear camshaft cap RH, exhaust center camshaft cap RH and exhaust rear camshaft cap RH in numerical order as shown in the figure.

Tightening torque:

18 N·m (1.8 kgf·m, 13.3 ft·lb)



2. CAM CARRIER LH

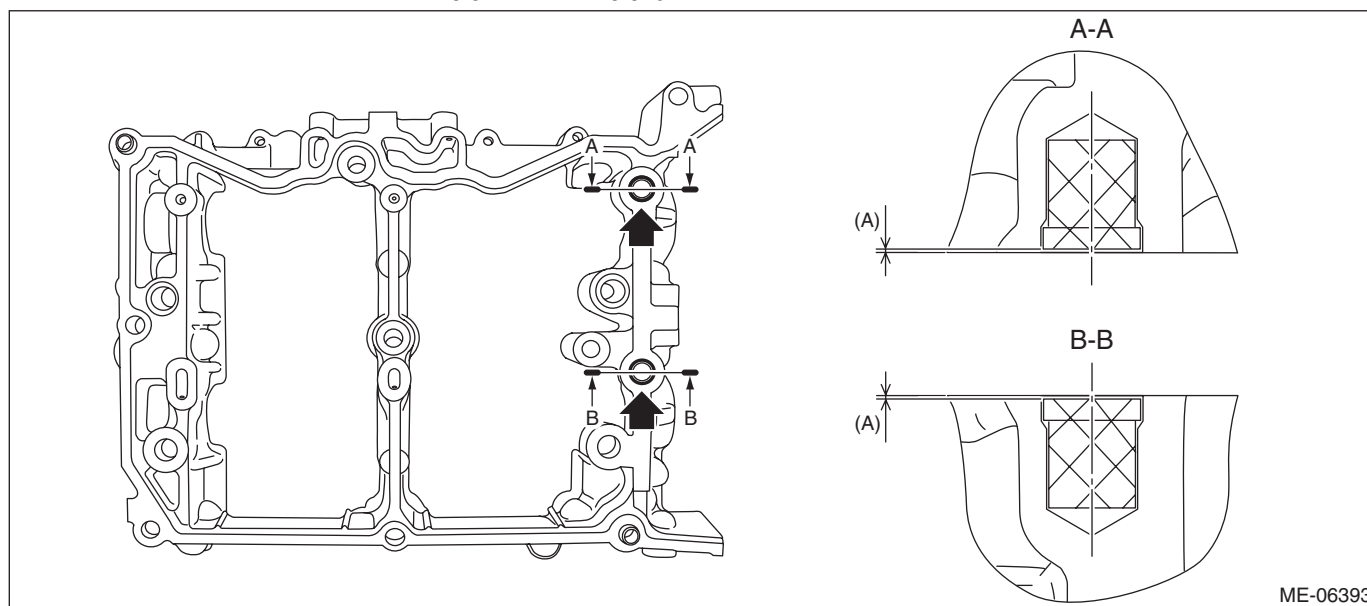
1) Install the filter to the cam carrier LH.

NOTE:

Use a new filter.

Filter insert position:

Cam carrier LH end face $0^{+0}_{-0.5}$ mm ($^{+0}_{-0.0197}$ in) position



(A) 0 — 0.5 mm (0 — 0.0197 in)

2) Set the intake camshaft LH and the exhaust camshaft LH to the cam carrier LH.

NOTE:

Apply engine oil to the journals of cam carrier LH before setting the intake camshaft LH and exhaust camshaft LH.

Cam Carrier

MECHANICAL

3) Install the front camshaft cap LH, intake center camshaft cap LH, intake rear camshaft cap LH, exhaust center camshaft cap LH and exhaust rear camshaft cap LH.

(1) Apply liquid gasket to the mating surface of front camshaft cap LH, intake rear camshaft cap LH and exhaust rear camshaft cap LH as shown in the figure.

CAUTION:

- Do not apply liquid gasket excessively. Applying excessively may cause excess gasket to flow toward camshaft journal, resulting in engine seizure.
- Do not apply liquid gasket excessively to the intake center camshaft cap LH and exhaust center camshaft cap LH.

NOTE:

- Before applying liquid gasket, degrease the old liquid gasket seal surface of the front camshaft cap LH, intake rear camshaft cap LH, exhaust rear camshaft cap LH, and cam carrier LH.
- Install within 5 min. after applying liquid gasket.

Liquid gasket:

THREE BOND 1217G (Part No. 0877Y0100), THREE BOND 1217H or equivalent

Liquid gasket applying diameter:

Mating surfaces other than ranges A, B and C

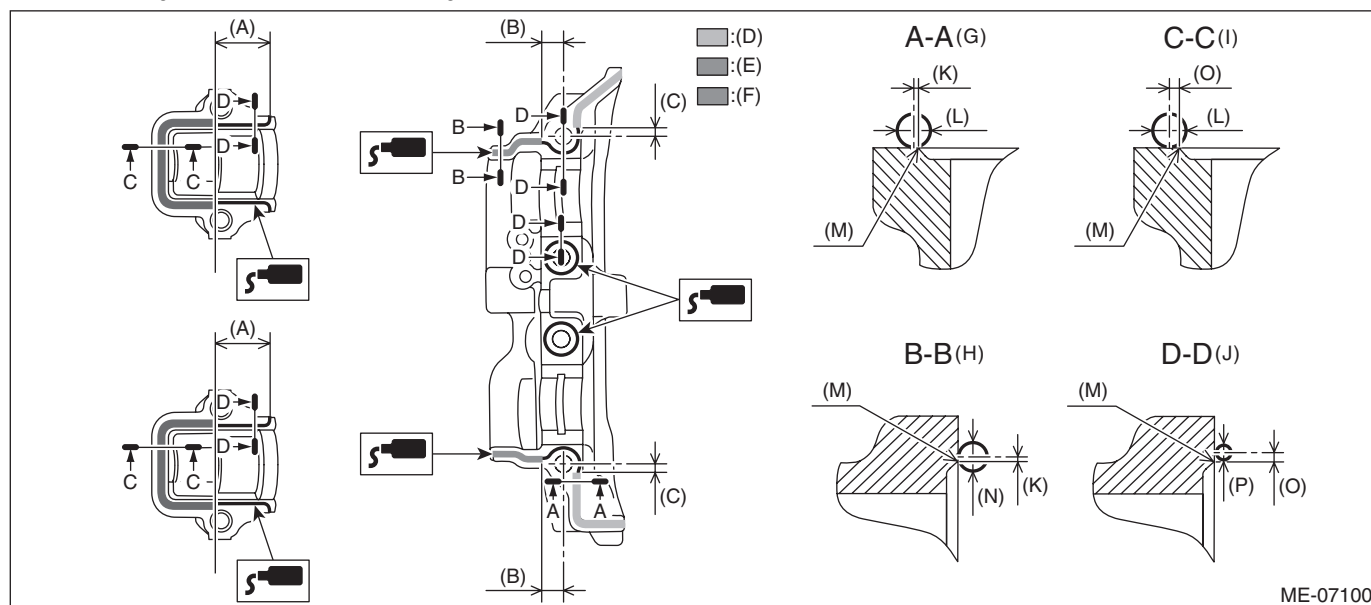
2 ± 0.5 mm (0.0787 ± 0.0197 in)

Mating surfaces of ranges A and C

3.5 ± 0.5 mm (0.1378 ± 0.0197 in)

Mating surfaces of range B

$3^{+0.5}_{-0}$ mm ($0.1181^{+0.0197}_{-0}$ in)



ME-07100

(A) 28.5 mm (1.122 in)

(B) 11.6 mm (0.4567 in)

(C) 5.1 mm (0.2008 in)

(D) Range A

(E) Range B

(F) Range C

(G) Liquid gasket applying position of mating surfaces of range A

(H) Liquid gasket applying position of mating surfaces of range B

(I) Liquid gasket applying position of mating surfaces of range C

(J) Liquid gasket applying position of mating surfaces other than range A, range B and range C

(K) 0.5 mm (0.0197 in)

(L) $\phi 3.5 \pm 0.5$ mm (0.1378 ± 0.0197 in)

(M) Chamfer edge

(N) $\phi 3^{+0.5}_{-0}$ mm ($^{+0.0197}_{-0}$ in)

(O) 1 mm (0.0394 in) or less

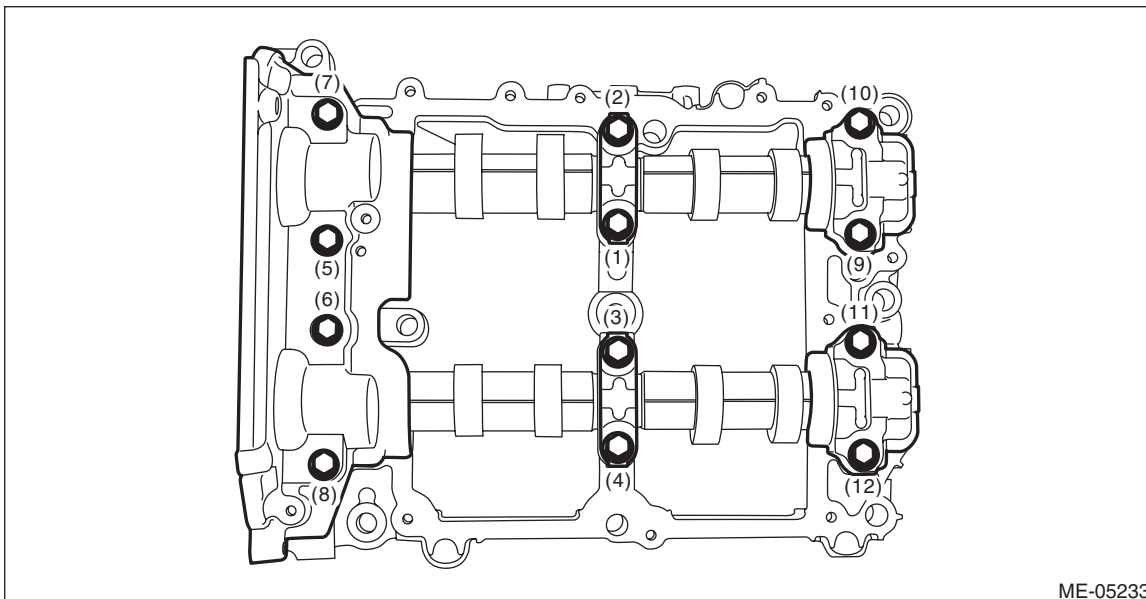
(P) $\phi 2 \pm 0.5$ mm (0.0787 ± 0.0197 in)

(2) Apply engine oil to the journals of each camshaft cap before setting the camshaft cap.

(3) Tighten the bolts which secure front camshaft cap LH, intake center camshaft cap LH, intake rear camshaft cap LH, exhaust center camshaft cap LH and exhaust rear camshaft cap LH in numerical order as shown in the figure.

Tightening torque:

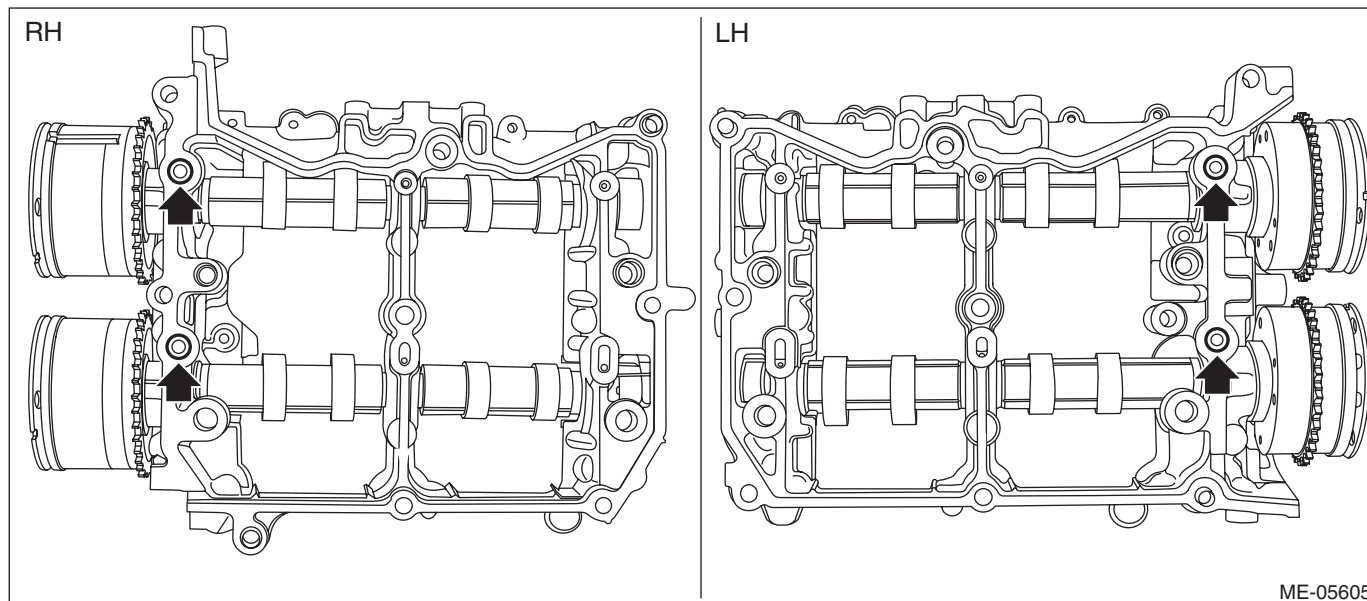
18 N·m (1.8 kgf-m, 13.3 ft-lb)



ME-05233

E: INSPECTION

1) Visually check the cam carrier filter, and if clogging is found, replace with a new part.



ME-05605

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

3) Check the cam face condition of camshaft, and remove the minor faults by grinding with oil stone. Replace the camshaft if uneven wear is found.

Cam Carrier

MECHANICAL

4) Using a dial gauge, check the camshaft bend. If it exceeds the limit, replace the camshaft.

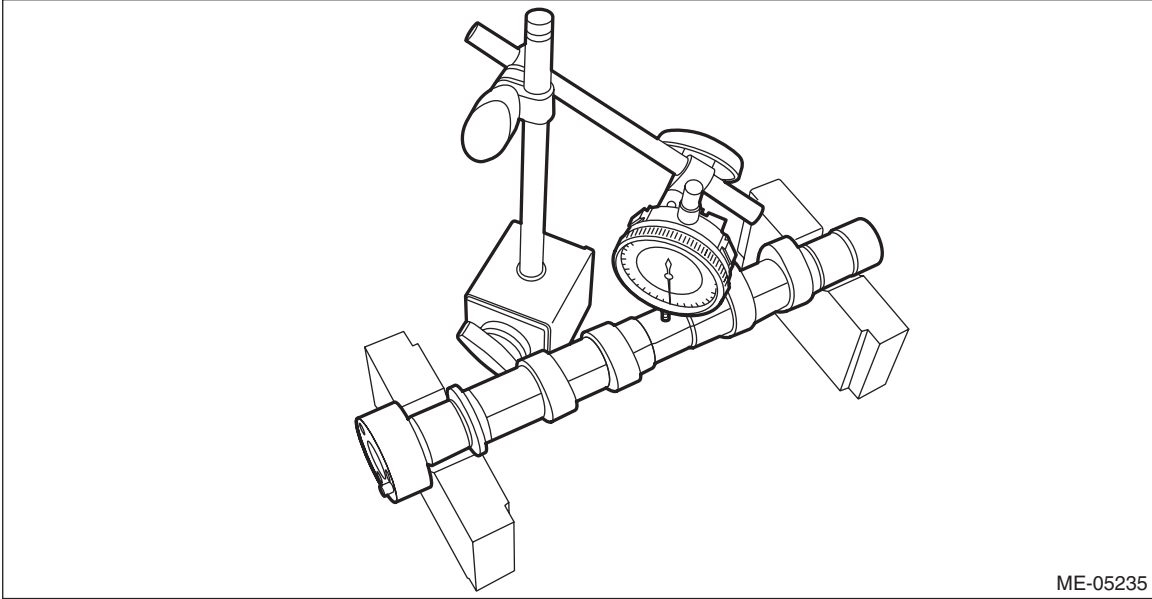
NOTE:

Measurement should be performed at a temperature of 20°C (68°F).

Camshaft bend:

Limit

0.020 mm (0.00079 in)



ME-05235

5) Check the cam lobe height “H” and cam base circle diameter “A” of camshaft as shown in the figure, using micrometer. If it is not within the standard, replace the camshaft.

NOTE:

Measurement should be performed at a temperature of 20°C (68°F).

Camshaft cam lobe overall height H:

Intake

Standard

40.34 — 40.44 mm (1.588 — 1.592 in)

Exhaust

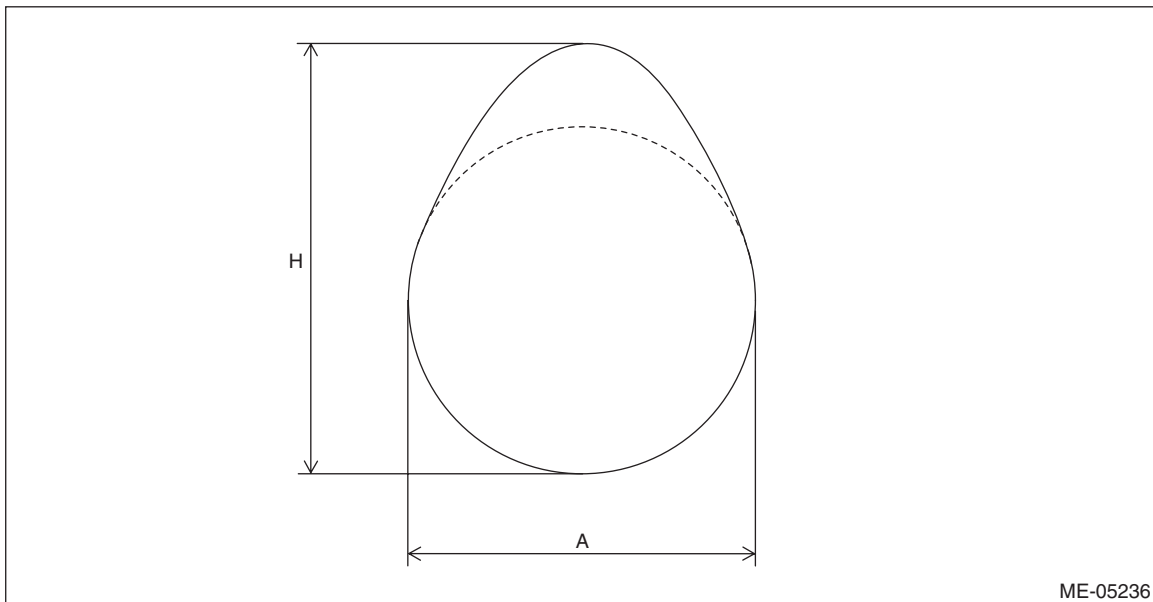
Standard

39.66 — 39.76 mm (1.561 — 1.565 in)

Camshaft cam base circle diameter A:

Standard

34.0 mm (1.339 in)



Cam Carrier

MECHANICAL

6) Check the camshaft journal outer diameter using micrometer. If it is not within the standard, replace the camshaft.

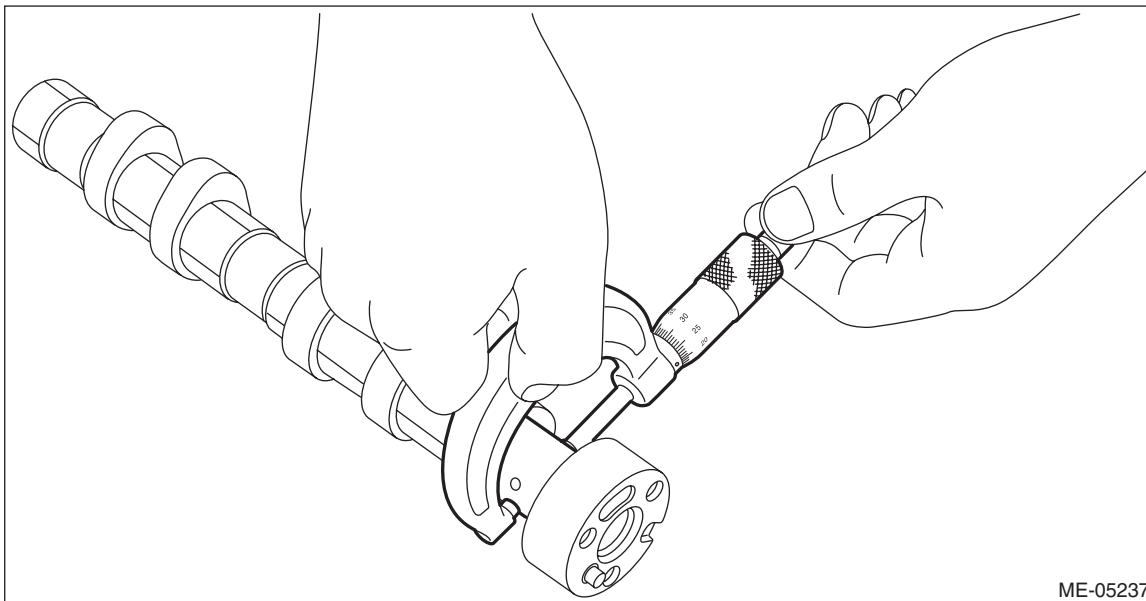
NOTE:

- Measurement should be performed at a temperature of 20°C (68°F).
- Measure outer diameter of each journal at several points, and read the value of most worn location.

Camshaft journal outer diameter:

Standard

25.946 — 25.963 mm (1.0215 — 1.0222 in)



7) Using a dial gauge, check the thrust clearance of the camshaft. If it is not within the standard or if uneven wear is found, replace each camshaft cap and cam carrier as a set. If necessary replace the camshaft.

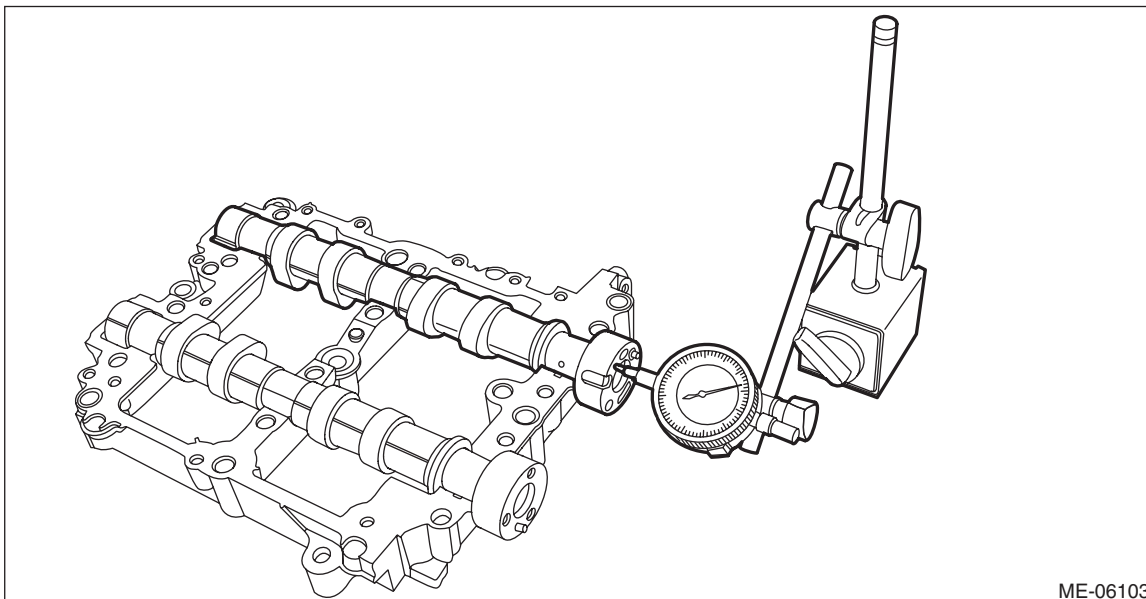
NOTE:

- Measurement should be performed at a temperature of 20°C (68°F).
- Set the dial gauge at end surface of camshaft.

Camshaft thrust clearance:

Standard

0.068 — 0.116 mm (0.0027 — 0.0047 in)



8) Check the oil clearance on the camshaft using a plastigauge.

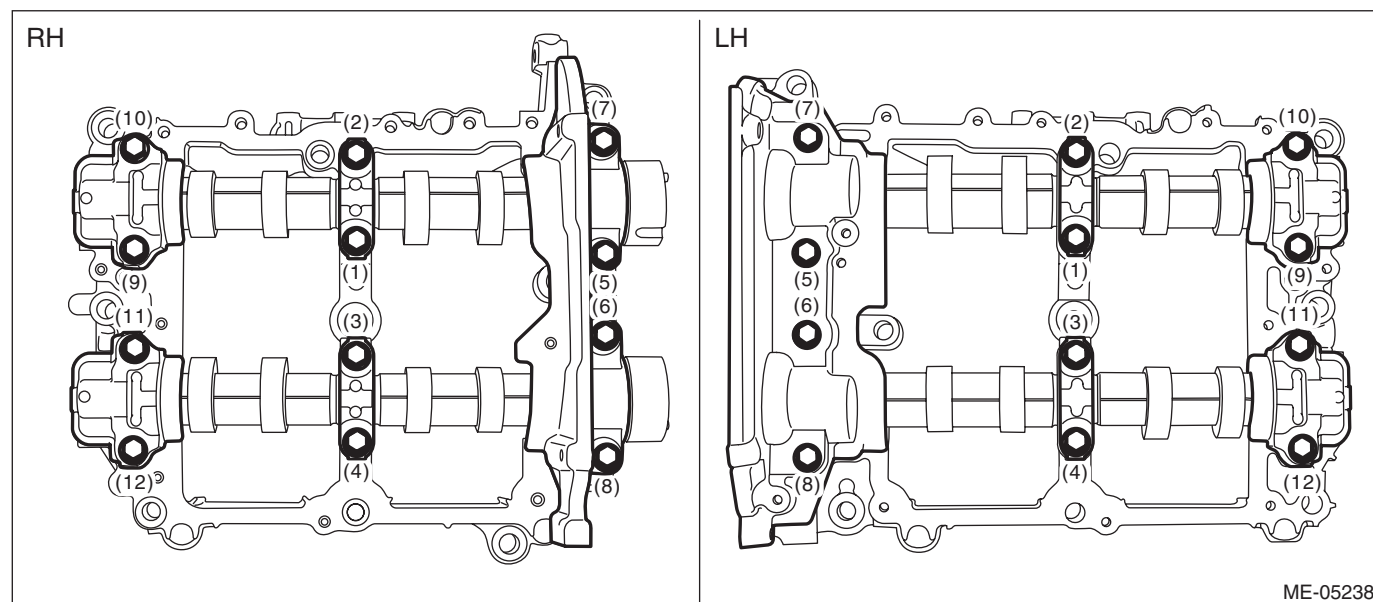
NOTE:

Measurement should be performed at a temperature of 20°C (68°F).

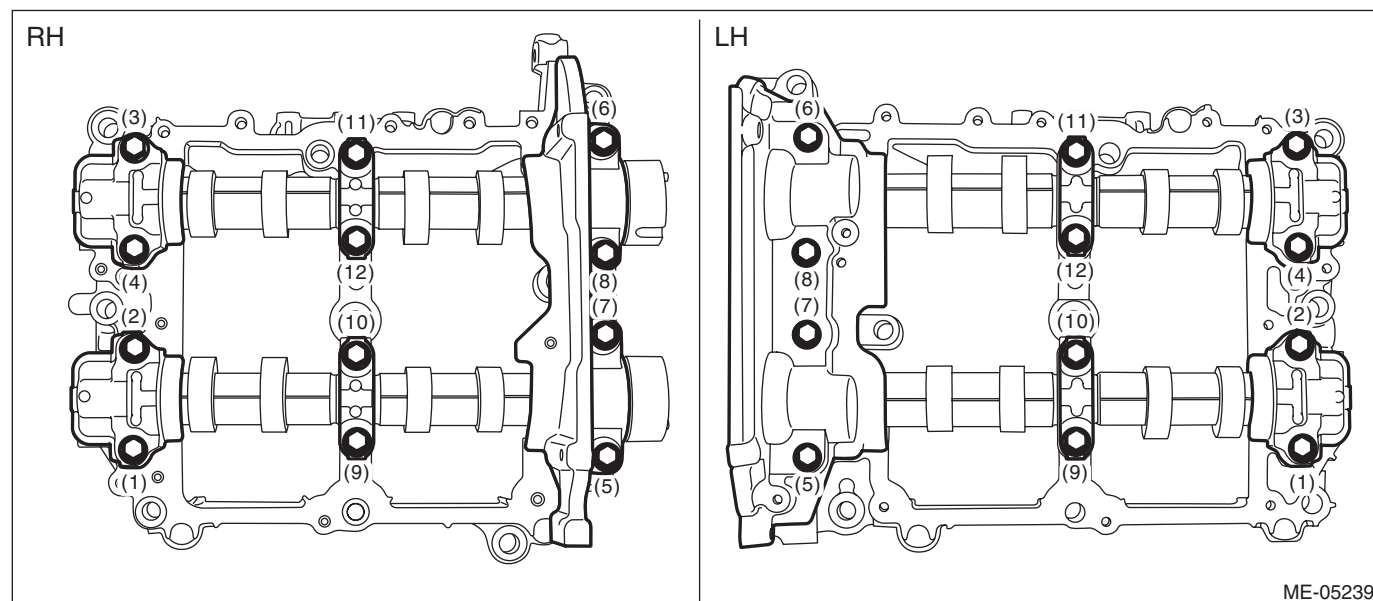
- (1) Remove the liquid gasket from cam carrier and front camshaft cap, intake rear camshaft cap and exhaust rear camshaft cap.
- (2) Clean each camshaft cap and cam carrier journals.
- (3) Set the camshaft to the cam carrier.
- (4) Place a plastigauge across the camshaft journals of each camshaft and set the camshaft caps.
- (5) Tighten the bolts which secure front camshaft cap, intake center camshaft cap, intake rear camshaft cap, exhaust center camshaft cap and exhaust rear camshaft cap in numerical order as shown in the figure.

Tightening torque:

18 N·m (1.8 kgf-m, 13.3 ft-lb)



- (6) Loosen the bolts (front camshaft cap, intake center camshaft cap, intake rear camshaft cap, exhaust center camshaft cap and exhaust rear camshaft cap) equally, a little at a time in numerical sequence as shown in the figure, and remove each camshaft cap.



Cam Carrier

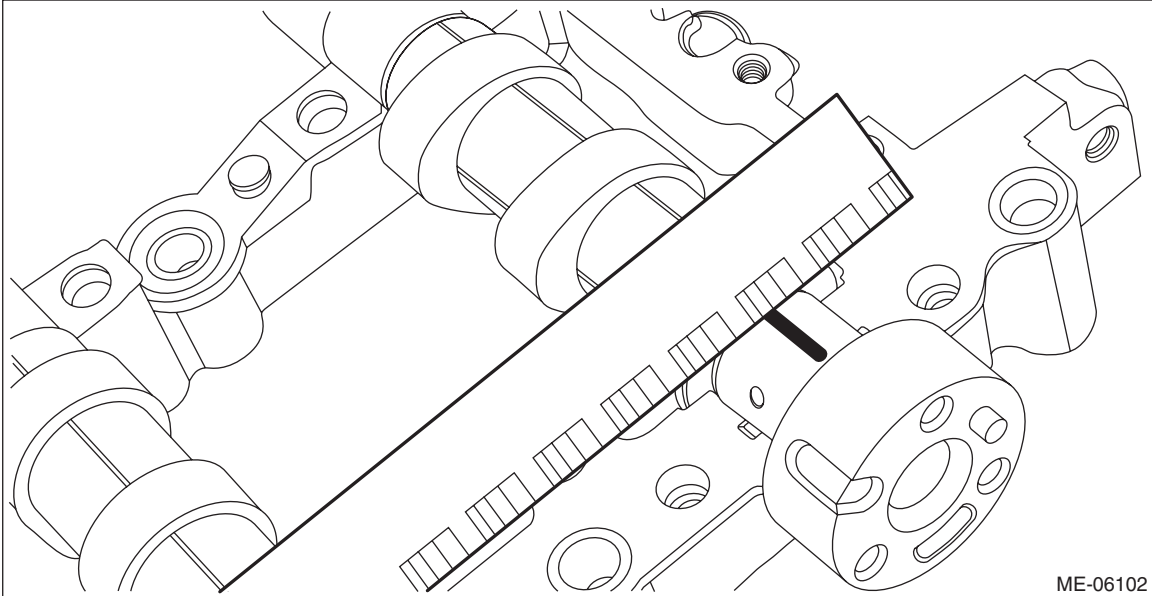
MECHANICAL

(7) Determine camshaft oil clearance by matching the widest point of plastigauge on each journal against scale printed on a package of plastigauge. If it is not within the standard, replace each camshaft cap and cam carrier as a set. If necessary replace the camshaft.

Camshaft oil clearance:

Standard

0.037 — 0.072 mm (0.0015 — 0.0028 in)



(8) Completely remove the plastigauge.