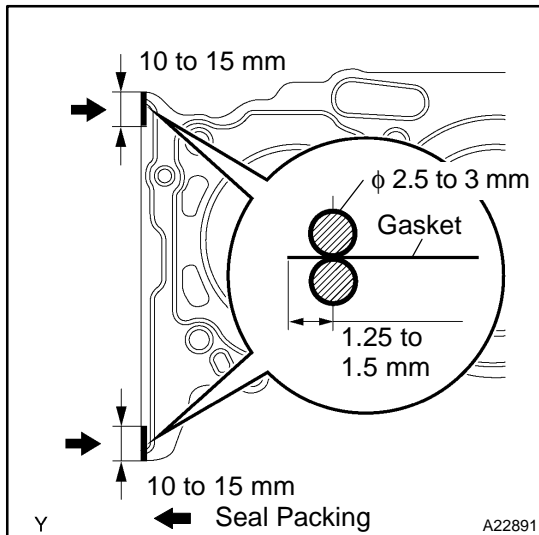


INSTALLATION

1. INSTALL CYLINDER HEAD GASKET

- (a) Remove any old packing material (FIPG) and be careful not to drop any oil on the contact surfaces of the cylinder head and cylinder block.
- (b) Install the RH cylinder head gasket.

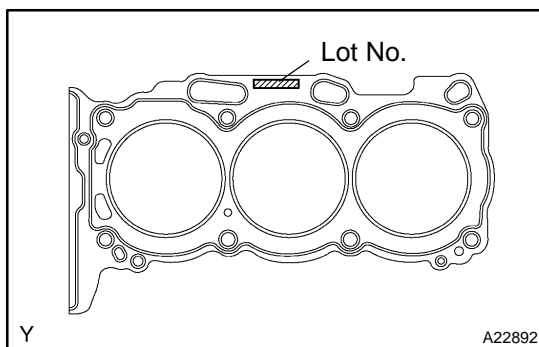


- (1) Apply a continuous bead of seal packing (diameter 2.5 to 3 mm (0.098 to 0.118 in.)) to a new cylinder head gasket as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

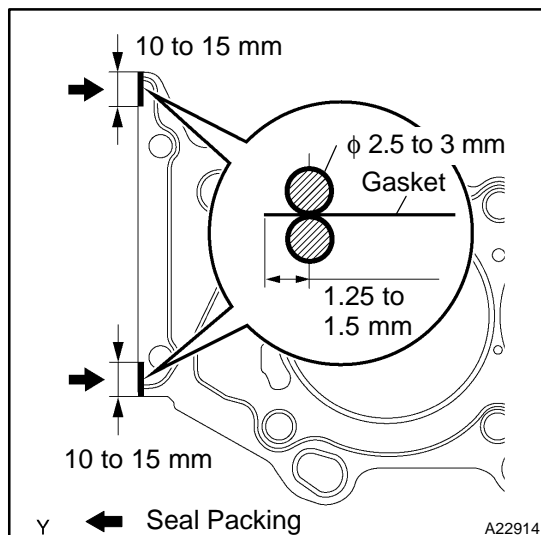
Install the cylinder head within 3 minutes after applying seal packing. After installing it, the cylinder head bolts must be tightened within 15 minutes. Otherwise the seal packing must be removed and reapplied.



- (2) Place the cylinder head gasket on the cylinder block surface with the Lot No. stamp upper side facing upward.

NOTICE:

- **Be careful of the installation direction.**
- **Place the cylinder head carefully in order not to damage the gasket with the bottom part of the head.**

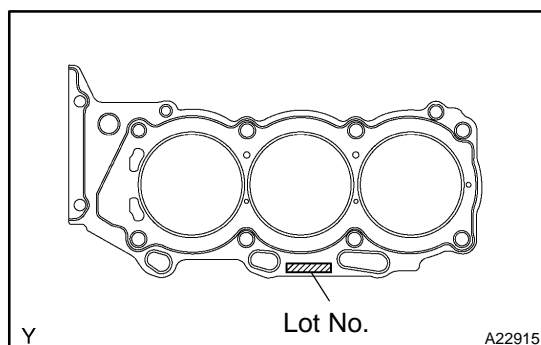


- (c) Install the LH cylinder head gasket.
- (1) Apply a continuous bead of seal packing (diameter 2.5 to 3 mm (0.098 to 0.118 in.)) to a new cylinder head gasket as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Install the cylinder head within 3 minutes after applying seal packing. After installing it, the cylinder head bolts must be tightened within 15 minutes. Otherwise the seal packing must be removed and reapplied.



- (2) Place the cylinder head gasket on the cylinder block surface with the Lot No. stamp upper side facing upward.

NOTICE:

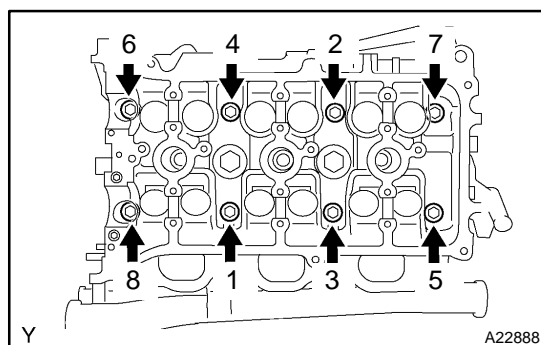
- Be careful of the installation direction.
- Place the cylinder head carefully in order not to damage the gasket with the bottom part of the head.

2. INSTALL CYLINDER HEAD

- (a) Place the RH cylinder head on the cylinder head gasket.
- (b) Install the 8 cylinder head bolts.

HINT:

- The cylinder head bolts are tightened in 2 successive steps (steps (3) and (5)).
 - If any cylinder head bolt is broken or deformed, replace it.
- (1) Apply a light coat of engine oil to the threads of the cylinder head bolts.
- (2) Install the plate washer to the cylinder head bolt.



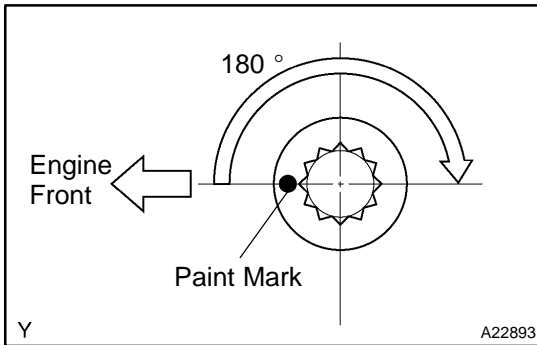
- (3) Using several steps, tighten each bolt with a 10 mm bi-hexagon wrench uniformly in the sequence as shown in the illustration.

Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)

If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

NOTICE:

Do not drop the washers into the cylinder head.

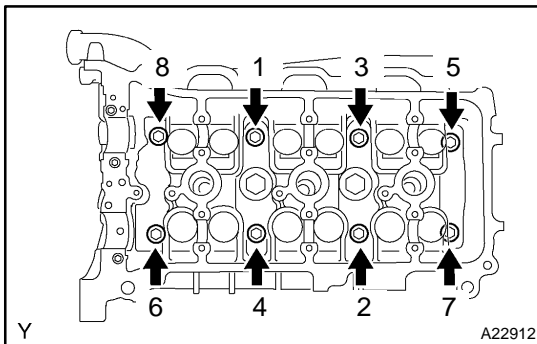


- (4) Mark the front side of each cylinder head bolt with paint.
- (5) Retighten the cylinder head bolts by 180° as shown.
- (6) Check that the painted marks are now at 180° opposite to the engine front.

- (c) Place the LH cylinder head on the cylinder head gasket.
- (d) Install the 8 cylinder head bolts.

HINT:

- The cylinder head bolts are tightened in 2 successive steps (steps (3) and (5)).
 - If any cylinder head bolt is broken or deformed, replace it.
- (1) Apply a light coat of engine oil to the threads of the cylinder head bolts.
 - (2) Install the plate washer to the cylinder head bolt.



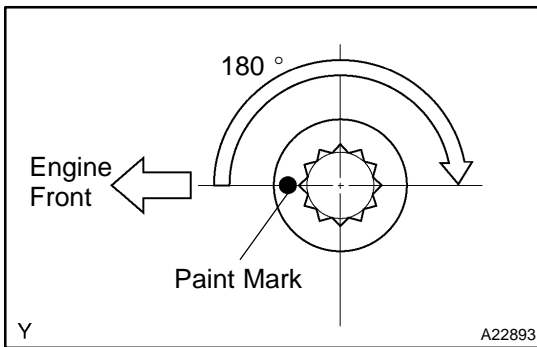
- (3) Using several steps, tighten each bolt with a 10 mm bi-hexagon wrench uniformly in the sequence as shown in the illustration.

Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)

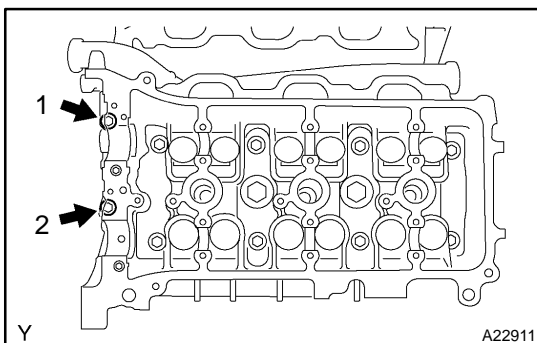
If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

NOTICE:

Do not drop the washers into the cylinder head.

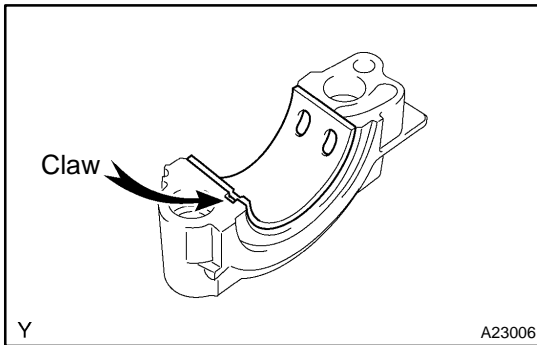


- (4) Mark the front side of each cylinder head bolt with paint.
- (5) Retighten the cylinder head bolts by 180° as shown.
- (6) Check that the painted marks are now at 180° opposite to the engine front.



- (e) Install the 2 cylinder head bolts.
- (1) Apply a light coat of engine oil to the threads of the cylinder head bolts.
- (2) Install the 2 cylinder head bolts. Using several steps, tighten the bolts uniformly in the sequence as shown in the illustration.

Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

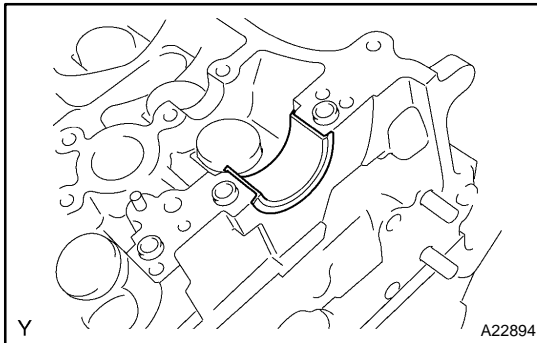


3. INSTALL CAMSHAFT BEARING NO.1

Align the bearing claw with the claw groove of the bearing cap, and push in the camshaft bearing.

NOTICE:

- Install the bearing while aligning it with the oil hole in the bearing cap.
- Clean the backside of the bearing and the bearing surface of the bearing cap and prevent oil from adhering to them.



4. INSTALL CAMSHAFT BEARING NO.2

Install the camshaft bearing No. 2 to the cylinder head.

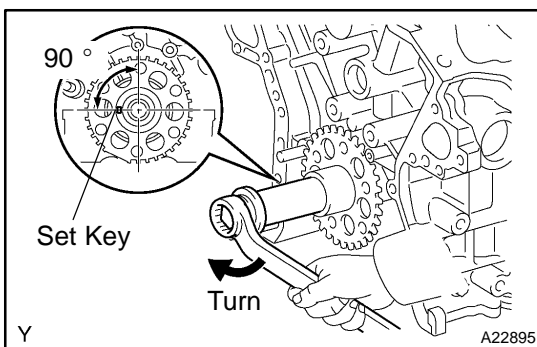
NOTICE:

Clean the backside of the bearing and the bearing surface of the cylinder head and prevent oil from adhering to them.

5. INSTALL CAMSHAFT

NOTICE:

As the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head which receives the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



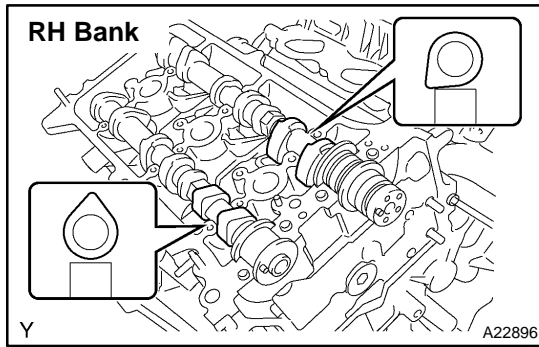
(a) Set the crankshaft position.

Using the crankshaft pulley set bolt, turn the crankshaft, and set the crankshaft set key into the left horizontal position.

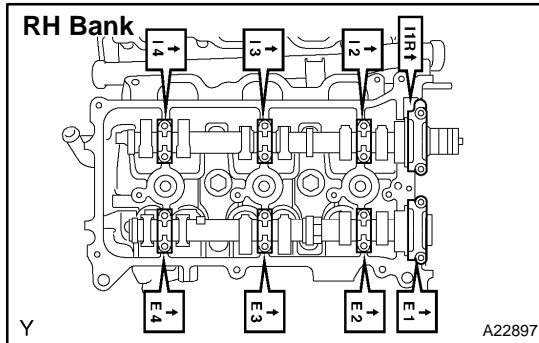
NOTICE:

Having the crankshaft at the wrong angle can cause the piston head and valve head to come into contact with each other when you install the camshaft, causing damage. So always set the crankshaft at the correct angle.

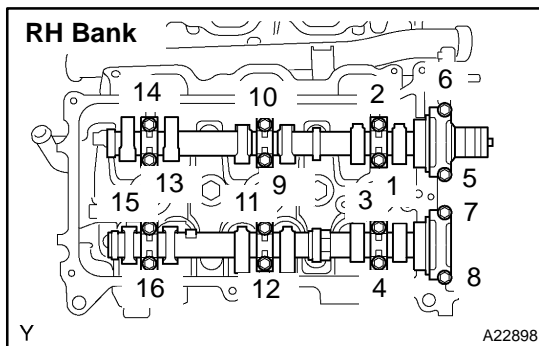
(b) Apply new engine oil to the thrust portion and journal of the camshafts.



- (c) Install the camshaft of the RH bank.
- (1) Place the 2 camshafts onto the RH cylinder head with the cam lobes of No. 1 cylinder facing each direction as shown in the illustration.



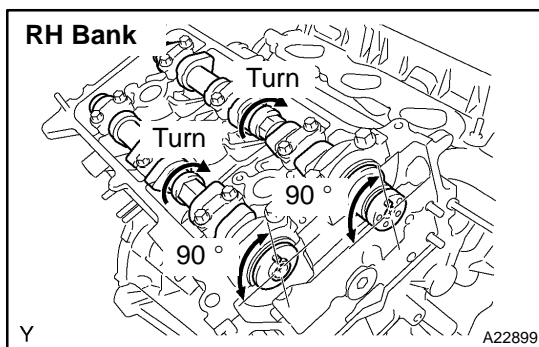
- (2) Install the 8 bearing caps in their proper locations.
- (3) Apply a light coat of engine oil to the threads of the bearing cap bolts.



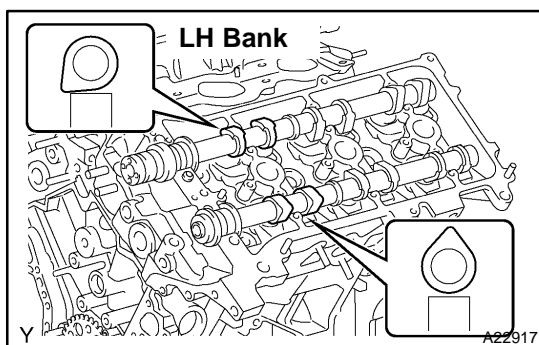
- (4) Install the 16 bearing cap bolts. Using several steps, tighten the bolts uniformly in the sequence as shown in the illustration.

Torque:

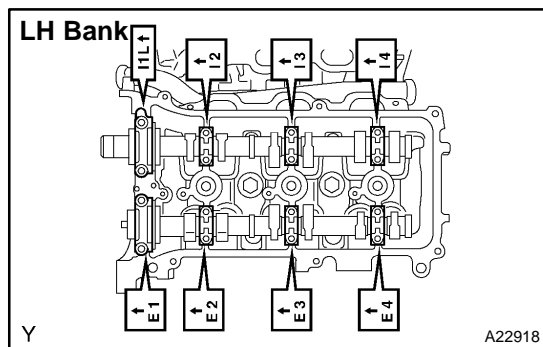
9.0 N·m (92 kgf·cm, 80 in.-lbf) for 10 mm (0.39 in.) head
24 N·m (245 kgf·cm, 18 ft-lbf) for 12 mm (0.47 in.) head



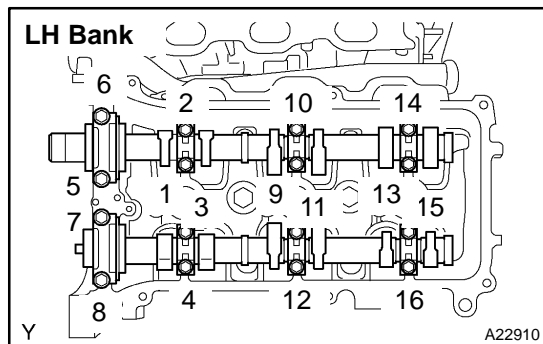
- (5) Turn the camshafts clockwise with a wrench until the camshaft knock pin comes 90° position to the cylinder head.



- (d) Install the camshafts of the LH bank.
- (1) Place the 2 camshafts onto the LH cylinder head with the cam lobes of No. 2 cylinder facing as shown in the illustration.



- (2) Install the 8 bearing caps in their proper locations.
- (3) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.

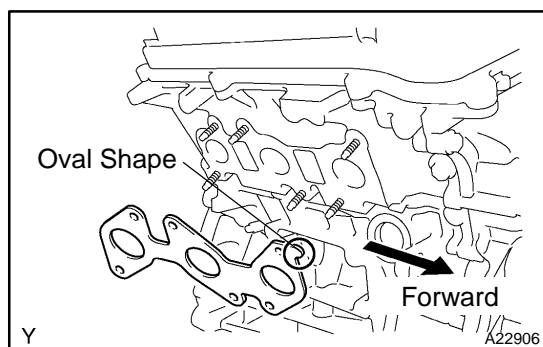


- (4) Install the 16 bearing cap bolts. Using several steps, tighten the bolts uniformly in the sequence as shown in the illustration.

Torque:

9.0 N·m (92 kgf·cm, 80 in.-lbf) for 10 mm (0.39 in.) head
24 N·m (245 kgf·cm, 18 ft.-lbf) for 12 mm (0.47 in.) head

6. **INSTALL TIMING CHAIN** (See page [EM-44](#))
7. **INSTALL TIMING CHAIN COVER** (See page [EM-44](#))
8. **INSTALL OIL PAN** (See page [EM-44](#))

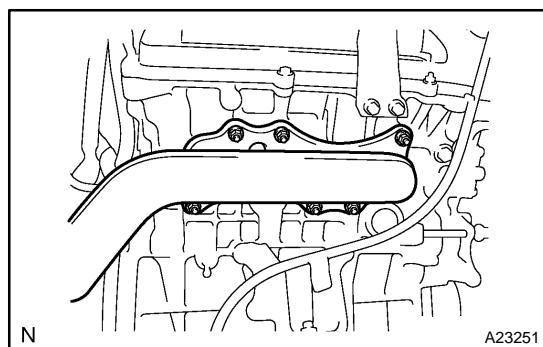


9. INSTALL EXHAUST MANIFOLD

- (a) Install the RH exhaust manifold.
 - (1) Set a new gasket to the RH cylinder head with the oval shape facing forward.

NOTICE:

Be careful of the installation direction.

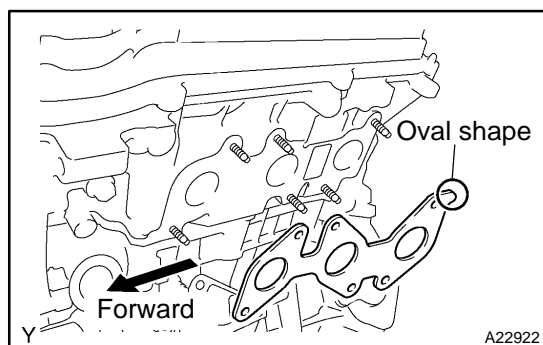


- (2) Install the exhaust manifold with the 6 nuts. Tighten the nuts uniformly in several steps.

Torque: 21 N·m (214 kgf·cm, 15 ft.-lbf)

- (3) Connect the A/F sensor connector.
- (4) Install the manifold stay with the 3 bolts.

Torque: 40 N·m (408 kgf·cm, 30 ft.-lbf)

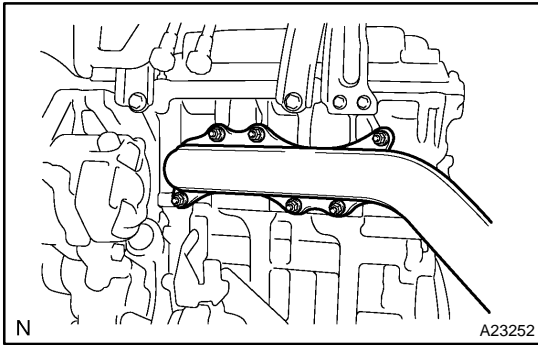


- (b) Install the LH exhaust manifold.

- (1) Set a new gasket to the LH cylinder head with the oval shape facing backward.

NOTICE:

Be careful of the installation direction.



- (2) Install the exhaust manifold with the 6 nuts. Tighten the nuts uniformly in several steps.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

- (3) Connect the A/F sensor connector.

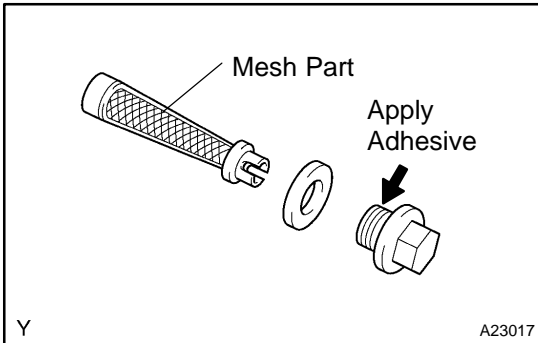
- (4) Install the manifold stay with the 3 bolts.

Torque: 40 N·m (408 kgf·cm, 30 ft·lbf)

10. INSTALL RH AND LH FRONT EXHAUST PIPE

(See page [EM-138](#))

11. INSTALL VVT SENSOR (See page [IG-12](#))



12. INSTALL OIL CONTROL VALVE FILTER

- (a) Check that no foreign objects on the mesh part of the 2 filters.

- (b) Install 2 new gaskets to each new plug.

- (c) Insert the filters to the plugs.

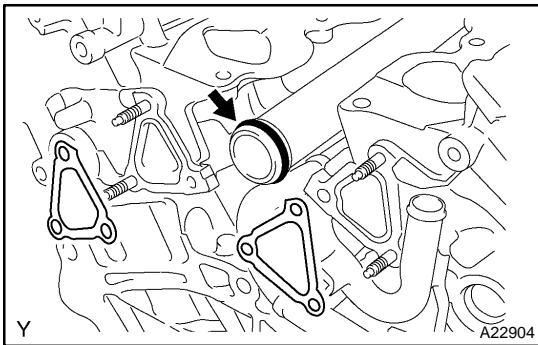
- (d) Apply adhesive to 2 or 3 threads of the plugs.

**Adhesive: Part No. 08833-00080, THREE BOND 1344
LOCTITE 242 or equivalent**

- (e) Install the plugs to each cylinder head.

Torque: 62 N·m (632 kgf·cm, 46 ft·lbf)

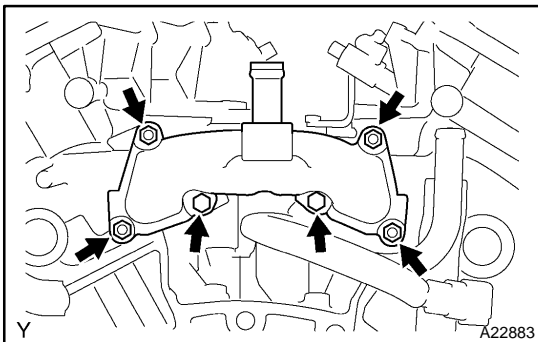
13. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE



14. INSTALL WATER BY-PASS JOINT

- (a) Install a new O-ring to the water outlet pipe.

- (b) Apply soapy water to the O-ring.

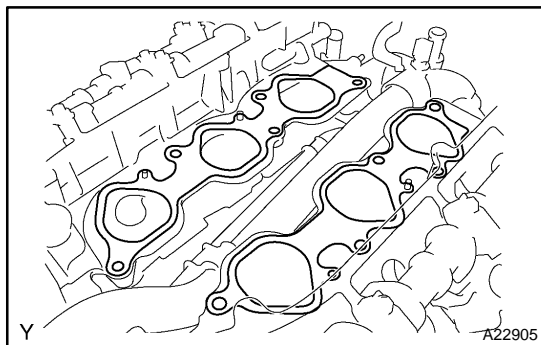


- (c) Install 2 new gaskets and water by-pass joint with the 2 bolts and 4 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

- (d) Connect the heater hose.

- (e) Connect the engine coolant temperature sensor connector.

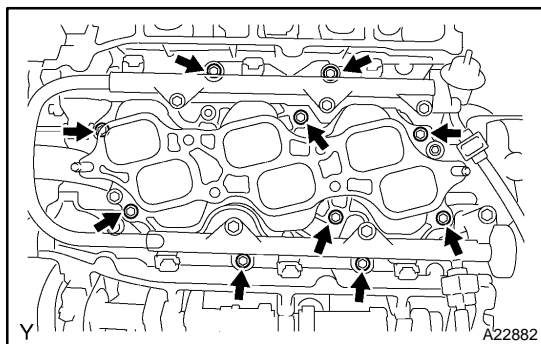


15. INSTALL INTAKE MANIFOLD

- (a) Set a new gasket on each cylinder head.

NOTICE:

- **Align the port holes of the gasket and cylinder head.**
 - **Be careful of the installation direction.**
- (b) Set the intake manifold on the cylinder heads.



- (c) Install and tighten the 10 bolts uniformly in several steps.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

- (d) Connect the 6 fuel injector connectors.

16. INSTALL CYLINDER HEAD COVER

- (a) Install the RH cylinder head cover.

- (1) Remove any old packing material (FIPG) and be careful not to drop any oil on the contact surfaces of the cylinder head, timing chain cover and cylinder head cover.

- (2) Apply a continuous bead of seal packing (diameter 2 to 3 mm (0.08 to 0.12 in.)) to the cylinder head and timing chain cover as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Install the cylinder head cover within 3 minutes after applying seal packing. After installing it, cylinder head cover bolts and nuts must be tightened within 15 minutes. Otherwise the seal packing must be removed and reapplied.

- (3) Install the seal washers to the bolts.
(4) Install the cylinder head cover with the 10 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

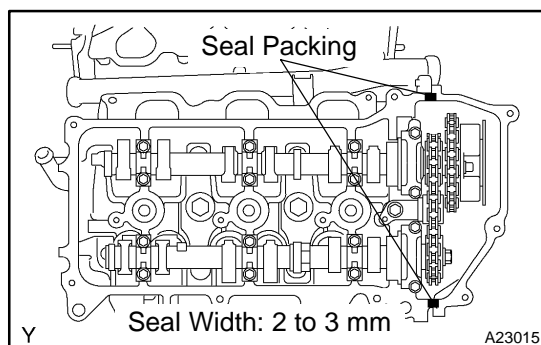
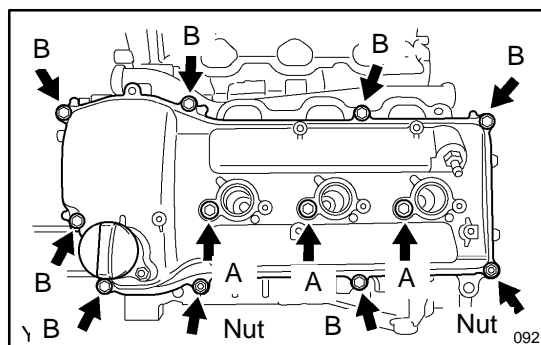
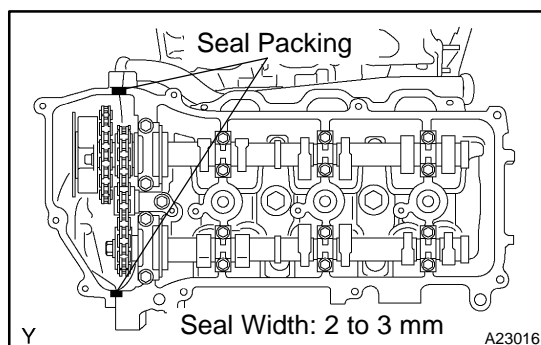
Torque:

Bolt A, Nut: 9.0 N·m (92 kgf·cm, 80 in·lbf)

Bolt B: 10 N·m (102 kgf·cm, 7 ft·lbf)

- (b) Install a new gasket and oil filler cap housing with the 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)



- (c) Install the LH cylinder head cover.

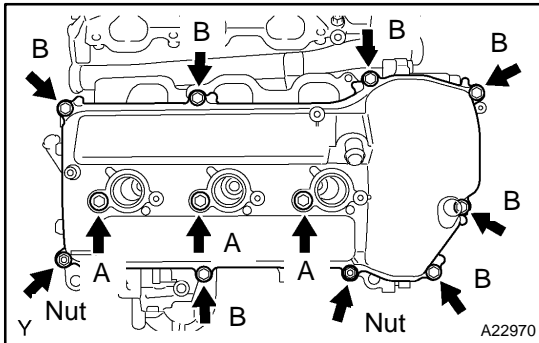
- (1) Apply a continuous bead of seal packing (diameter 2 to 3 mm (0.08 to 0.12 in.)) to the cylinder head and timing chain cover as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Install the cylinder head cover within 3 minutes after applying seal packing. After installing it, cylinder head cover bolts and nuts must be tightened within 15 minutes. Otherwise the seal packing must be removed and reapplied.

- (2) Install the seal washers to the bolts.



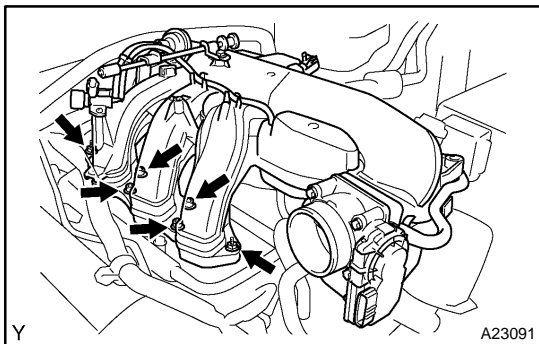
- (3) Install the cylinder head cover with the 10 bolts and 2 nuts. Tighten the bolts and nuts uniformly in several steps.

Torque:

Bolt A, Nut: 9.0 N·m (92 kgf·cm, 80 in·lbf)

Bolt B: 10 N·m (102 kgf·cm, 7 ft·lbf)

17. INSTALL IGNITER



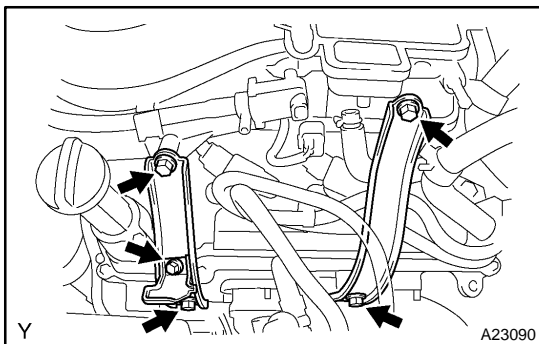
18. INSTALL INTAKE AIR SURGE TANK

- (a) Install a new gasket to the intake air surge tank.
 (b) Using the socket hexagon wrench 8, install the intake air surge tank with the 4 bolts.

Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)

- (c) Install the 2 intake air surge tank nuts.

Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)

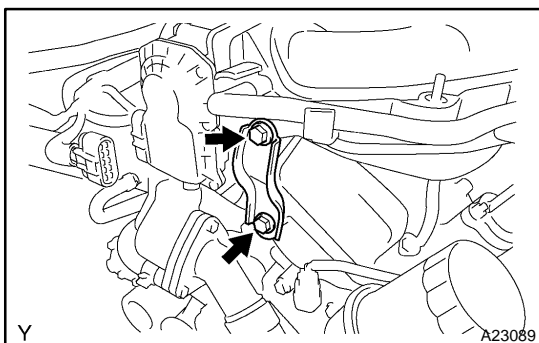


- (d) Install the 2 surge tank stays with the 4 bolts.

Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)

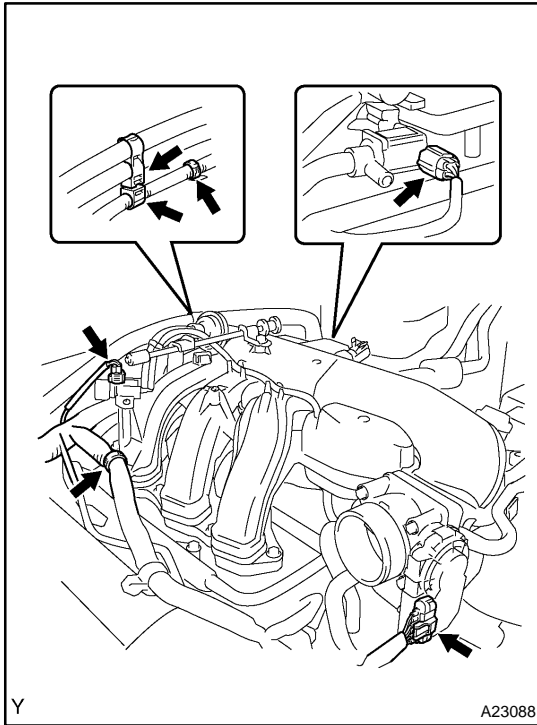
- (e) Install the oil baffle plate with the bolt.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

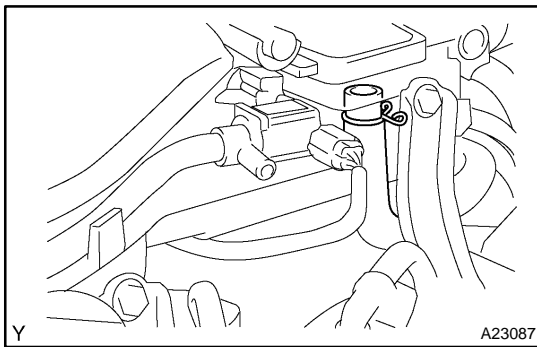


- (f) Install the throttle body bracket with the 2 bolts.

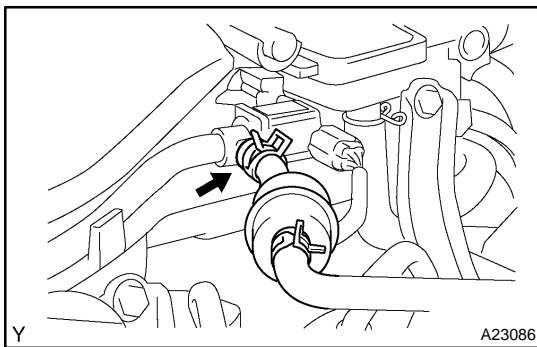
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)



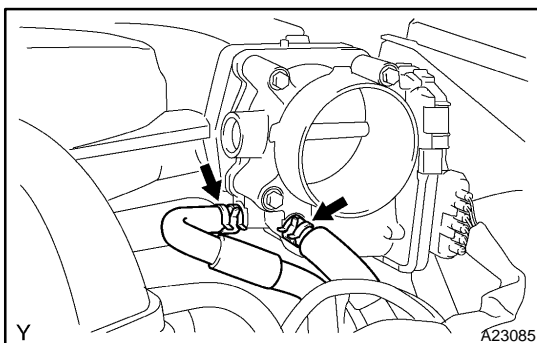
- (g) Install the 3 wire harness clamps and hose clamp.
- (h) Connect the throttle body w/ motor connector.
- (i) Connect the 2 VSV connectors.



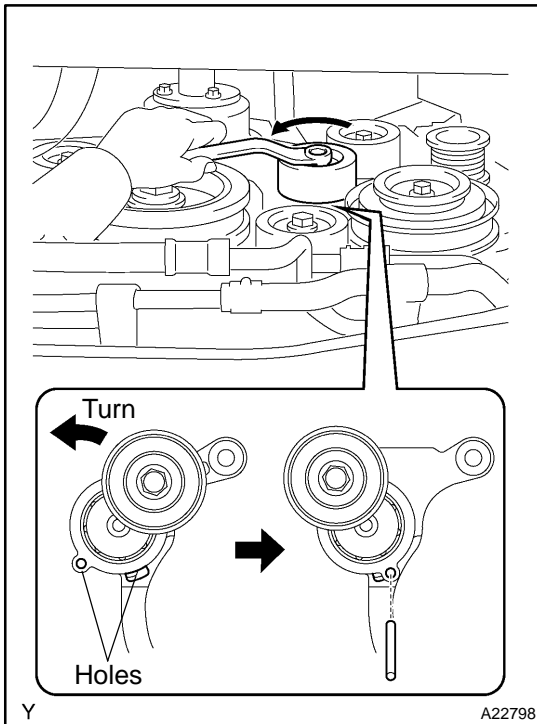
- (j) Connect the ventilation hose.



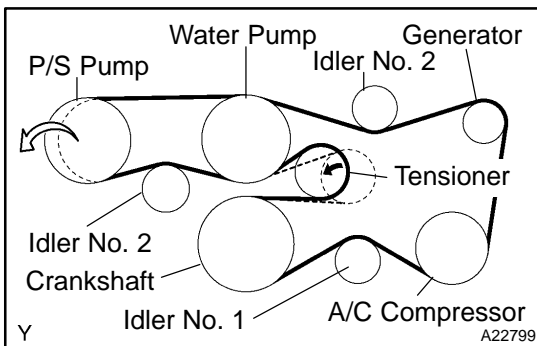
- (k) Connect the fuel vapor feed hose.



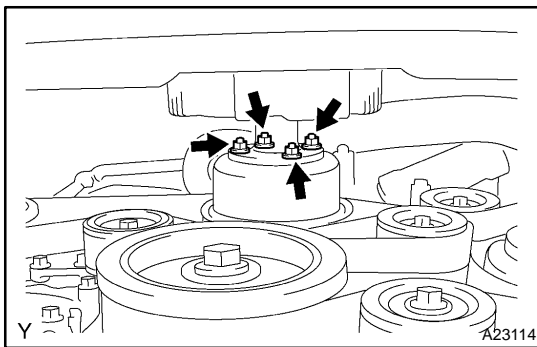
- (l) Connect the 2 water by-pass hoses.
19. **CONNECT HEATER WATER OUTLET AND INLET HOSE**
 20. **INSTALL COOLER COMPRESSOR**
(See page [AC-58](#))
 21. **INSTALL GENERATOR** (See page [CH-15](#))
 22. **INSTALL VANE PUMP** (See page [SR-57](#))
 23. **INSTALL FAN W/FLUID COUPLING**

**24. INSTALL DRIVE BELT**

- (a) While turning the belt tensioner counterclockwise, align with the holes. Insert a bar of 6 mm (0.24 in.) into the holes to fix the belt tensioner.
- (b) Install the V-ribbed belt.
- (c) While turning the belt tensioner counterclockwise, remove the bar.

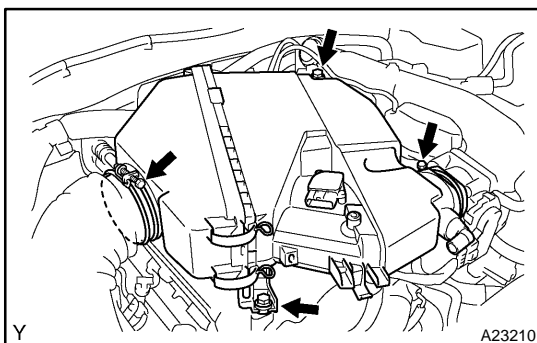


- (d) If it is hard to install the V-ribbed belt, perform the following procedure.
 - (1) Put the V-ribbed belt on every parts except the P/S pump as shown in the illustration.
 - (2) While releasing the belt tension by turning the belt tensioner counterclockwise, put the V-ribbed belt on the P/S pump.

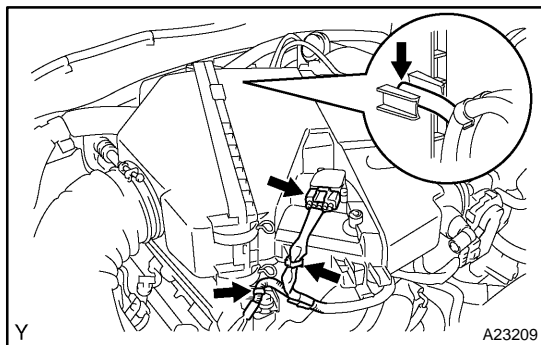
**25. TIGHTEN FAN W/FLUID COUPLING**

Tighten the 4 fluid coupling bolts.

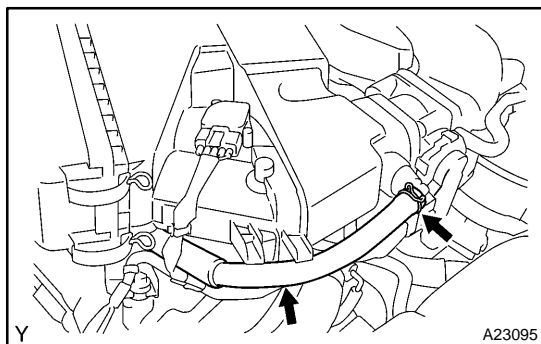
Torque: 21 N·m (214 kgf-cm, 15 ft-lbf)

26. INSTALL RADIATOR (See page [CO-18](#))**27. INSTALL FAN SHROUD****28. CONNECT FUEL PIPE (See page [SF-1](#))****29. INSTALL AIR CLEANER**

- (a) Install the air cleaner with the 2 bolts.
Torque: 8.0 N·m (82 kgf-cm, 71 in.-lbf)
- (b) Tighten the 2 hose clamps.



- (c) Install the 2 wire harness clamps.
- (d) Connect the mass air flow meter connector.
- (e) Connect the vacuum hose.

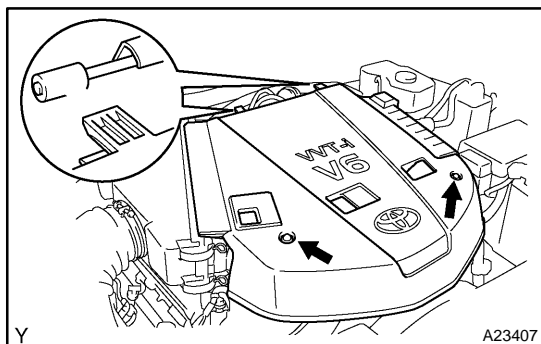


- (f) Connect the ventilation hose No.2.

30. ADD ENGINE COOLANT

31. ADD ENGINE OIL

32. CHECK FOR LEAK



33. INSTALL V-BANK COVER

Install the V-bank cover with the 2 nuts.

Torque: 7.5 N·m (76 kgf·cm, 66 in.-lbf)