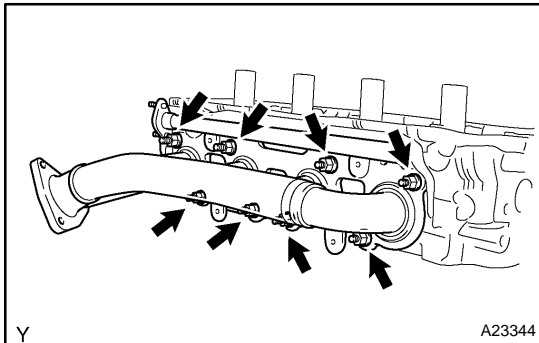


## INSTALLATION

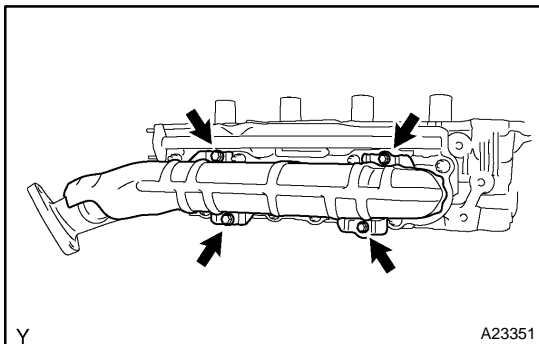
### 1. INSTALL RH EXHAUST MANIFOLD TO CYLINDER HEAD

- (a) Place a new gasket on the cylinder head.



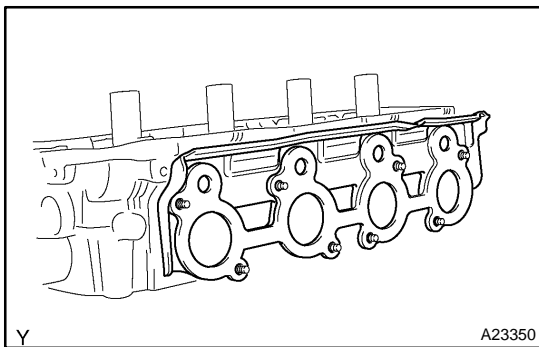
- (b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several steps.

**Torque: 44 N·m (450 kgf-cm, 32 ft-lbf)**



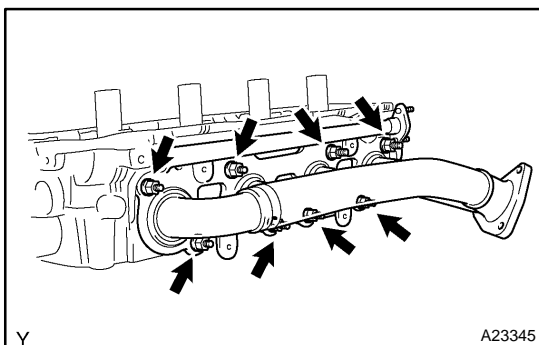
- (c) Install the heat insulator with the 4 bolts.

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



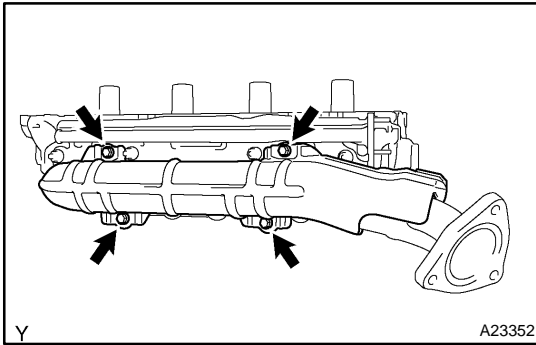
### 2. INSTALL LH EXHAUST MANIFOLD TO CYLINDER HEAD

- (a) Place a new gasket on the cylinder head.

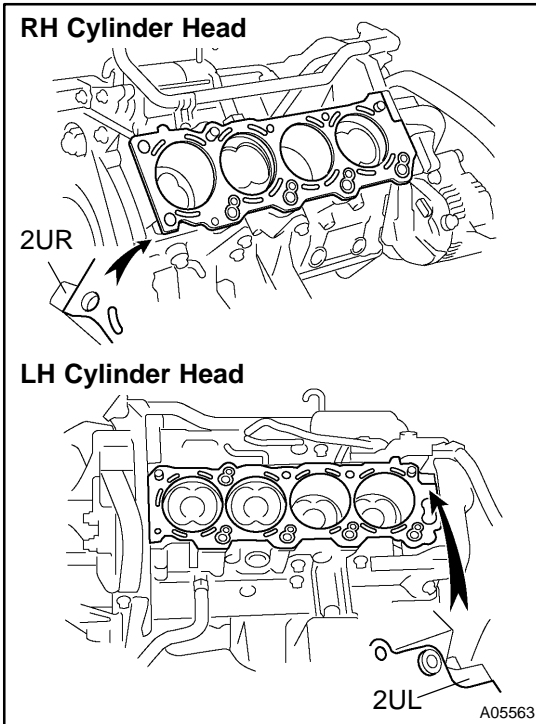


- (b) Install the exhaust manifold with 8 new nuts. Uniformly tighten the nuts in several steps.

**Torque: 44 N·m (450 kgf-cm, 32 ft-lbf)**



- (c) Install the heat insulator with the 4 bolts.  
**Torque: 7.5 N·m (76 kgf-cm, 66 in.-lbf)**



### 3. PLACE CYLINDER HEADS ON CYLINDER BLOCK

- (a) Place 2 new cylinder head gaskets in the positions on the cylinder block.

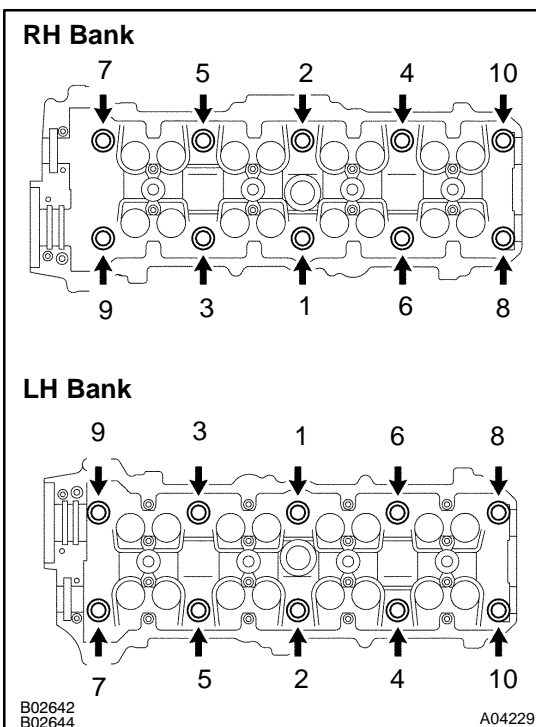
#### HINT:

On the rear side of the cylinder head gasket are marked to distinguish the LH and RH banks, a "2UR" mark for the RH bank and a "2UL" mark for the LH bank.

#### NOTICE:

**Be careful of the installation direction.**

- (b) Place the 2 cylinder heads in the positions on the cylinder head gaskets.



### 4. INSTALL CYLINDER HEAD BOLTS

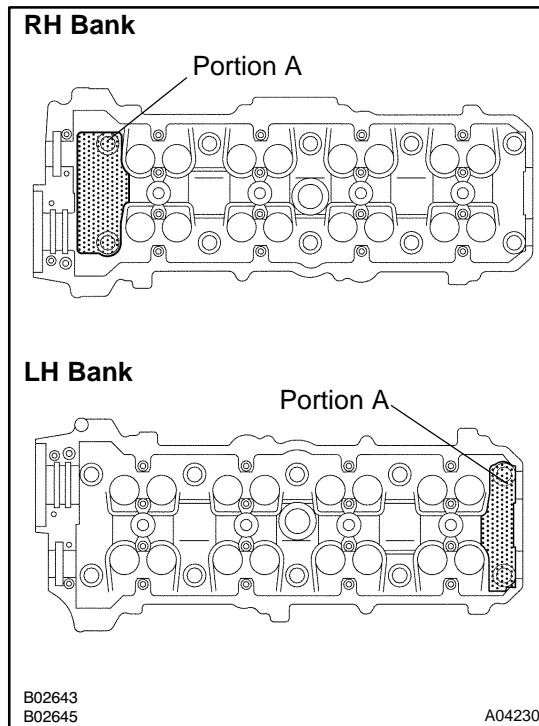
#### HINT:

- The cylinder head bolts are tightened in 2 progressive steps (steps (c) and (e)).
- If any cylinder head bolt is broken or deformed, replace it.

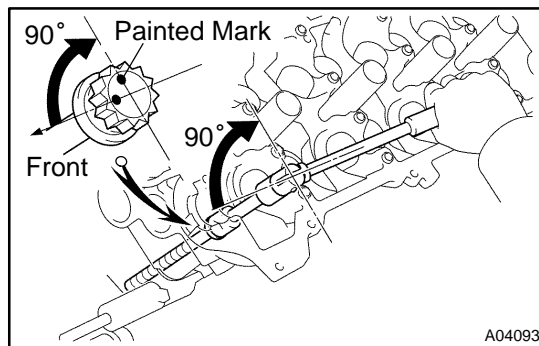
- (a) Apply a light coat of engine oil to the threads and under the heads of the cylinder head bolts.
- (b) Install the plate washer to the cylinder head bolt.
- (c) Install and uniformly tighten the 10 cylinder head bolts on one side of the cylinder head in several steps in the sequence shown, then perform the same procedure to the other side as shown.

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

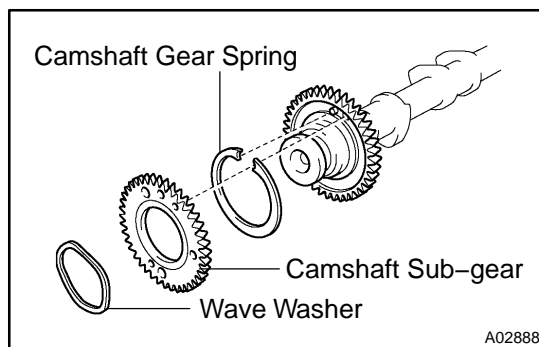
If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

**NOTICE:**

Do not drop the plate washer for cylinder head bolt into portion A of the cylinder head. If dropped into portion A, the plate washer will pass through the cylinder head and cylinder block into the oil pan.



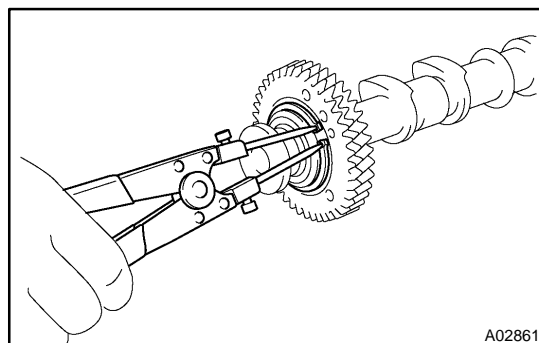
- (d) Mark the front of the cylinder head bolt with paint.
  - (e) Retighten the cylinder head bolts by 90° in the numerical order shown.
  - (f) Check that the painted mark is now at a 90° angle to front.
- 5. INSTALL SPARK PLUGS**

**6. ASSEMBLE EXHAUST CAMSHAFT**

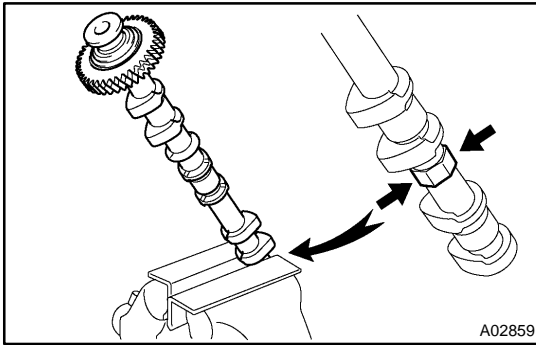
- (a) Install the camshaft gear spring, camshaft sub-gear and wave washer.

**HINT:**

Attach the pin on the gear to the gear spring end.



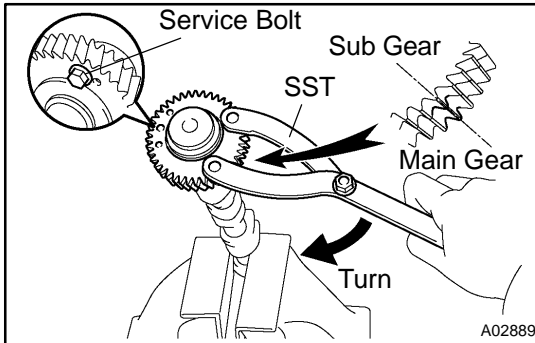
- (b) Using snap ring pliers, install the snap ring.



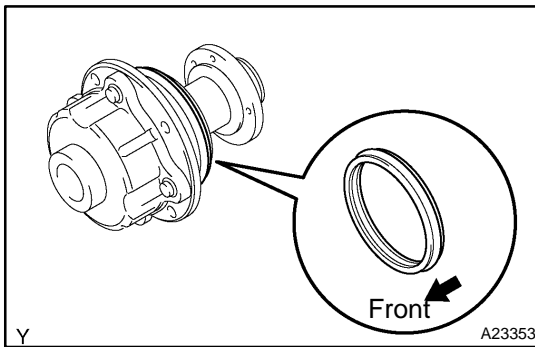
- (c) Mount the hexagon wrench head portion of the camshaft in a vise.

**NOTICE:**

**Be careful not to damage the camshaft.**



- (d) Using SST, align the holes of the camshaft main gear and sub-gear by turning the camshaft sub-gear counter-clockwise, and temporarily install a service bolt.  
SST 09960-10010 (09962-01000, 09963-00500)
- (e) Align the gear teeth of the main gear and sub-gear, and tighten the service bolt.

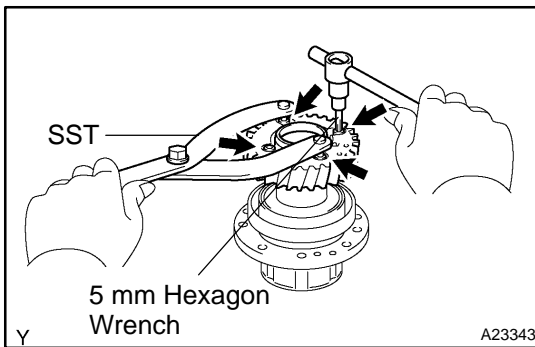


## 7. INSTALL CAMSHAFT TIMING TUBE TO INTAKE CAM-SHAFT

- (a) Place a new oil seal to the timing tube.

**NOTICE:**

**Be careful of the installation direction.**



- (b) Align the timing tube knock pin with the knock pin groove of the drive gear, and temporarily install the drive gear with the 4 bolts.

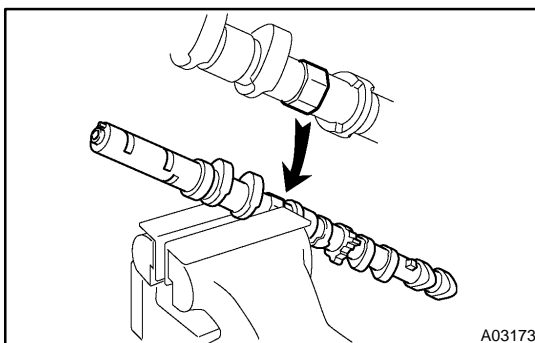
- (c) Using SST and a 5 mm hexagon wrench, uniformly tighten the 4 bolts in several steps.

SST 09960-10010 (09962-01000, 09963-00500)

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

**NOTICE:**

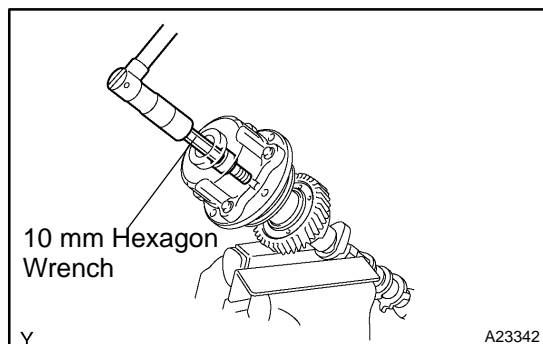
**Be careful not to damage the timing tube.**



- (d) Mount the hexagon head portion of the camshaft in a vise.

**NOTICE:**

**Be careful not to damage the camshaft.**



- (e) Align the camshaft knock pin with the knock pin groove of the timing tube, and push the timing tube by hand until you it touches the bottom.

- (f) Using a 10 mm hexagon wrench, install the bolt.

**Torque: 78 N·m (790 kgf-cm, 58 ft-lbf)**

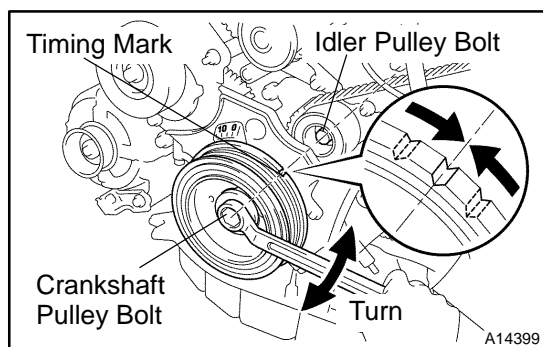
- (g) Install the seal washer and screw plug.

**Torque: 15 N·m (150 kgf-cm, 11 ft-lbf)**

## 8. INSTALL CAMSHAFTS

### NOTICE:

Since 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 receiving 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.

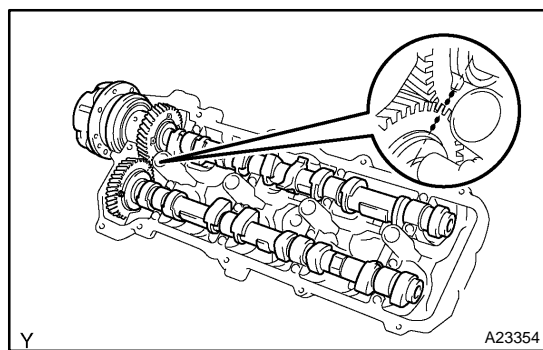


- (a) Set the crankshaft pulley position.

Turn the pulley clockwise or counterclockwise, and align the timing mark of the crankshaft pulley with the centers of the crankshaft pulley bolt and idler pulley bolt.

### NOTICE:

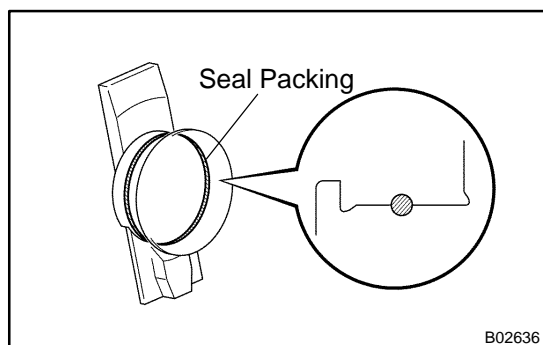
Having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you install the camshaft, causing damage. So always set the crankshaft pulley at the correct angle.



- (b) Install the LH camshafts.

- (1) Apply MP grease to the thrust portion of the intake and exhaust camshafts.

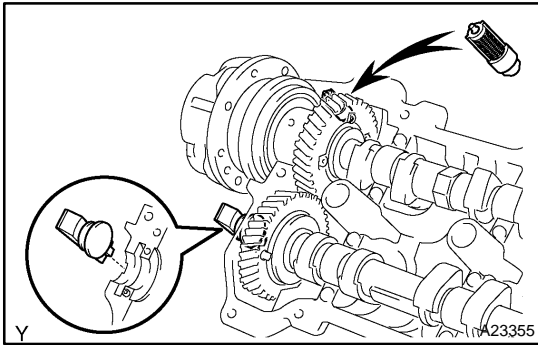
- (2) Align the timing marks (2-dot mark) of the camshaft drive and driven main gears, and place the intake and exhaust camshafts.



- (3) Apply seal packing to the camshaft housing plug.

- Remove the old packing material (FIPG).
- Apply seal packing to the housing plug.

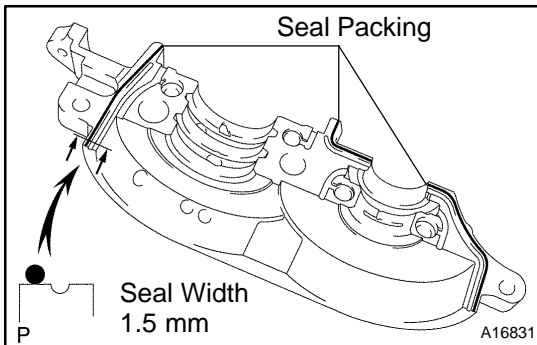
**Seal packing: Part No. 08826-00080 or equivalent**



- (4) Install the camshaft housing plug to the cylinder head as shown in the illustration.
- (5) Install the strainer to the cylinder head.

**NOTICE:**

**Be careful of the installation direction.**

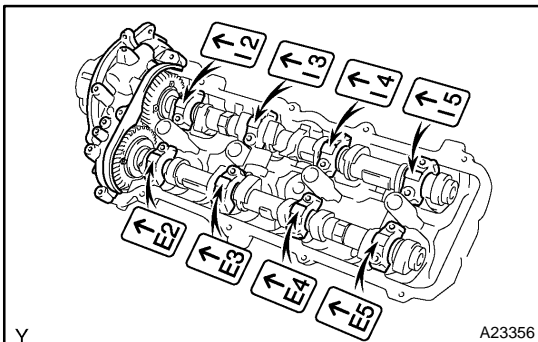


- (6) Apply seal packing to the front bearing cap.
  - Remove any old packing material (FIPG) and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head. Using a razor blade and gasket scraper, remove all the old packing material (FIPG) from the gasket surfaces and groove. Thoroughly clean all components to remove all the loose material. Using a non-residue solvent, clean both sealing surfaces.
  - Apply seal packing to the bearing cap as shown in the illustration. Install a nozzle that has been cut to a 1.5 mm (0.059 in.) opening. Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied. Immediately remove the nozzle from the tube and reinstall cap.

**Seal packing: Part No. 08826-00080 or equivalent**

**NOTICE:**

**Do not apply seal packing to the front bearing cap grooves.**

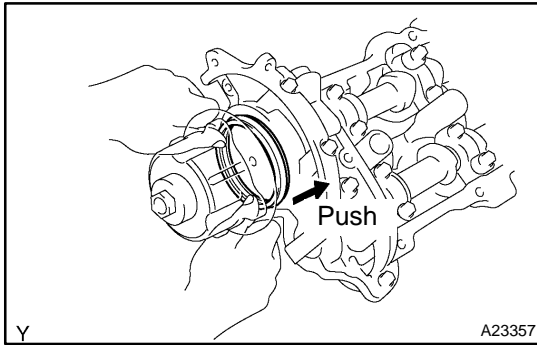


- (7) Install the front bearing cap.

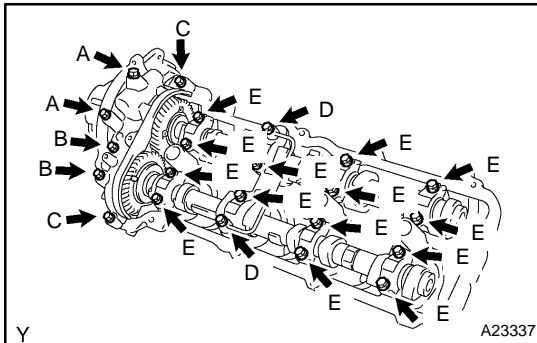
**HINT:**

Installing the front bearing cap will determine the thrust portion of the camshaft.

- (8) Install the other bearing caps in the sequence shown with the arrow mark facing forward.



- (9) Push in the camshaft oil seal.



- (10) Install 4 new seal washers to the bearing cap bolts (A and B).  
 (11) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts (D and E).

**NOTICE:**

**Do not apply engine oil under the heads of the bearing cap bolts (A), (B) and (C).**

**HINT:**

Each bolt length is indicated in the illustration.

Bolt length:

94 mm (3.70 in.) for A with seal washer

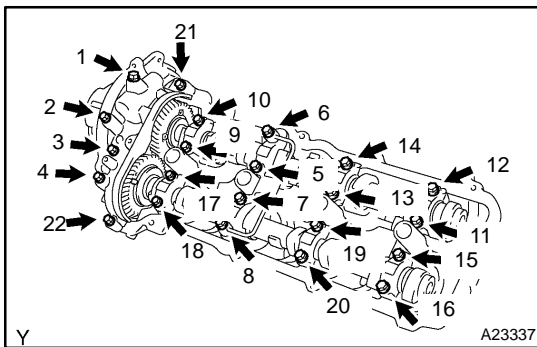
72 mm (2.83 in.) for B with seal washer

25 mm (0.98 in.) for C

52 mm (2.05 in.) for D

38 mm (1.50 in.) for E

- (12) Install the oil feed pipe and the 22 bearing cap bolts as shown in the illustration.

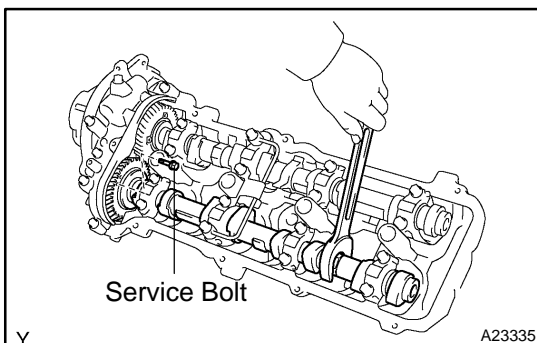


- (13) Uniformly tighten the 22 bearing cap bolts in several steps, in the sequence shown.

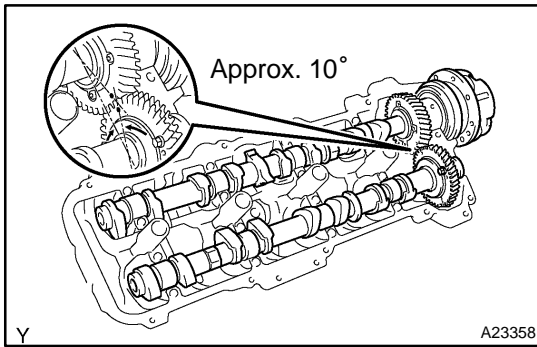
**Torque:**

**7.5 N·m (76 kgf·cm, 66 in.-lbf) for bolt C**

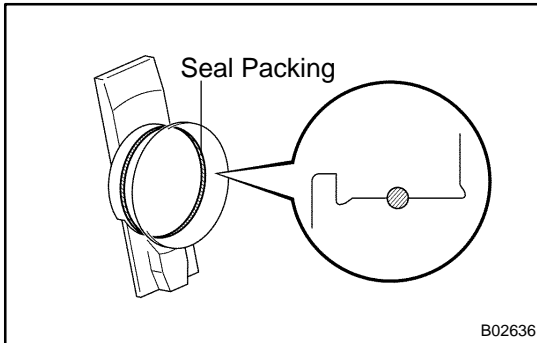
**16 N·m (160 kgf·cm, 12 ft-lbf) for others**



- (14) Remove the service bolt.

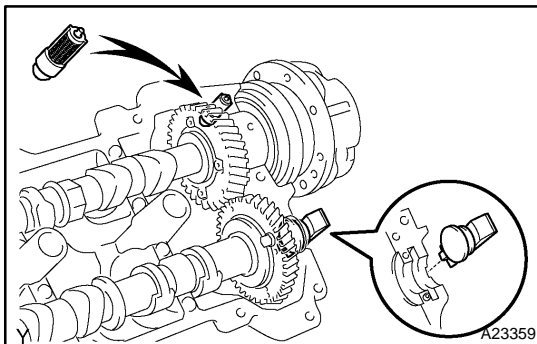


- (c) Install the RH camshafts.
- (1) Apply MP grease to the thrust portions of the intake and exhaust camshafts.
  - (2) Align the timing marks (1-dot mark) of the camshaft drive and driven main gears, and place the intake and exhaust camshafts.
  - (3) Set the timing mark (1-dot mark) of the camshaft drive and driven main gears at approx. 10° angle.



- (4) Apply seal packing to the camshaft housing plug.
  - Remove the old packing material (FIPG).
  - Apply seal packing to the housing plug.

**Seal packing: Part No. 08826-00080 or equivalent**

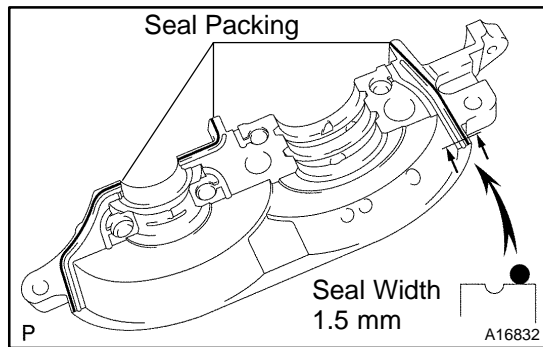


- (5) Install the camshaft housing plug to the cylinder head as shown in the illustration.
- (6) Install the strainer to the cylinder head.

**NOTICE:**

**Be careful of the installation direction.**



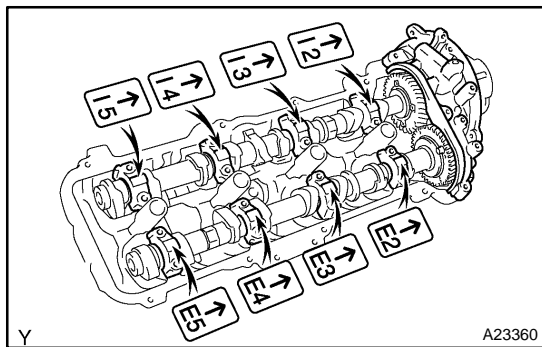


- (7) Apply seal packing to the front bearing cap.
- Remove any old packing material (FIPG) and be careful not to drop any oil on the contact surfaces of the bearing cap and cylinder head. Using a razor blade and gasket scraper, remove all the old packing material (FIPG) from the gasket surfaces and groove. Thoroughly clean all components to remove all the loose material. Using a non-residue solvent, clean both sealing surfaces.
  - Apply seal packing to the bearing cap as shown in the illustration. Install a nozzle that has been cut to a 1.5 mm (0.059 in.) opening. Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied. Immediately remove the nozzle from the tube and reinstall cap.

**Seal packing: Part No. 08826-00080 or equivalent**

**NOTICE:**

**Do not apply seal packing to the front bearing cap grooves.**

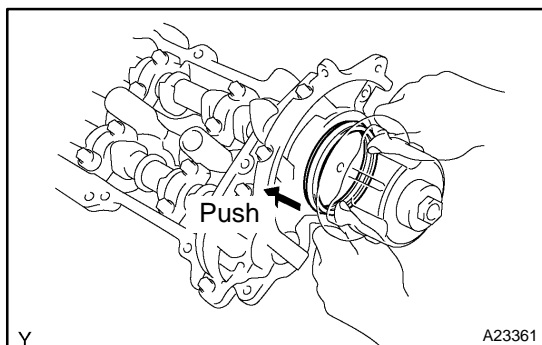


- (8) Install the front bearing cap.

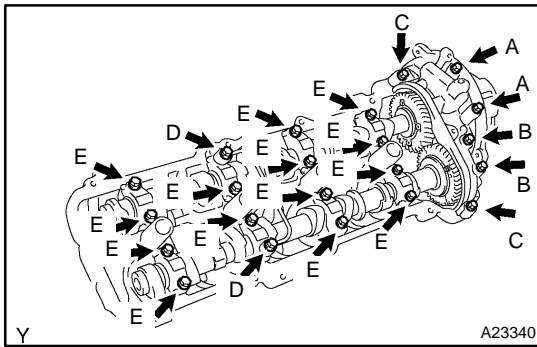
**HINT:**

Installing the front bearing cap will determine the thrust portion of the camshaft.

- (9) Install the other bearing caps in the sequence shown with the arrow mark facing forward.



- (10) Push in the camshaft oil seal.



- (11) Install 4 new seal washers to the bearing cap bolts (A and B).
- (12) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts (D and E).

**NOTICE:**

**Do not apply engine oil under the heads of the bearing cap bolts (A), (B) and (C).**

**HINT:**

Each bolt length is indicated in the illustration.

Bolt length:

94 mm (3.70 in.) for A with seal washer

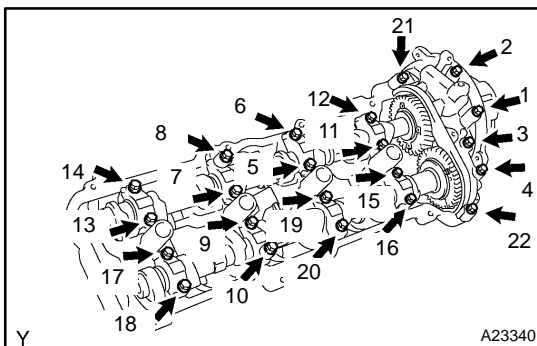
72 mm (2.83 in.) for B with seal washer

25 mm (0.98 in.) for C

52 mm (2.05 in.) for D

38 mm (1.50 in.) for E

- (13) Install the oil feed pipe and the 22 bearing cap bolts as shown in the illustration.

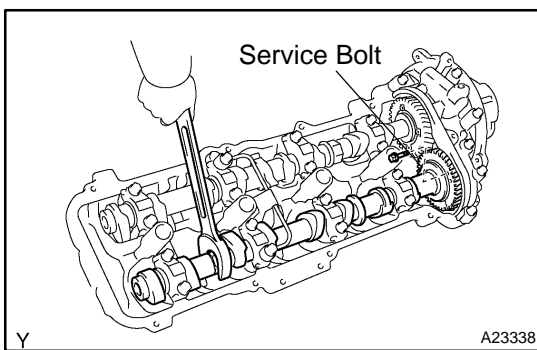


- (14) Uniformly tighten the 22 bearing cap bolts in several steps, in the sequence shown.

**Torque:**

**7.5 N·m (76 kgf-cm, 66 in.-lbf) for bolt C**

**16 N·m (160 kgf-cm, 12 ft-lbf) for others**

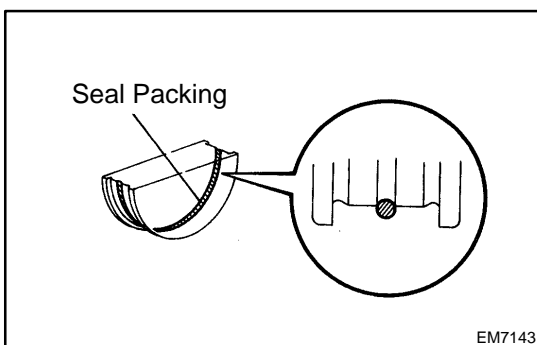


- (15) Remove the service bolt.

## 9. CHECK AND ADJUST VALVE CLEARANCE (See page [EM-4](#))

Turn the camshaft so that the cam lobe faces upward, and check and adjust the valve clearance.

## 10. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE (See page [SF-50](#))



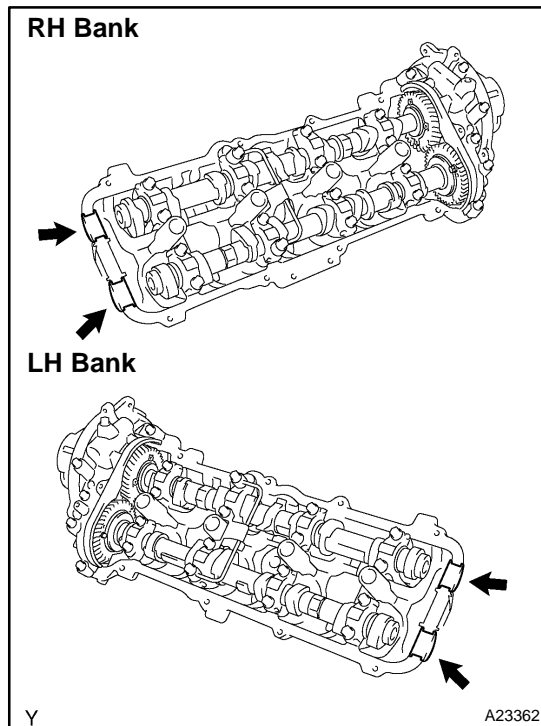
## 11. INSTALL SEMI-CIRCULAR PLUGS

- (a) Remove any old packing material (FIPG).

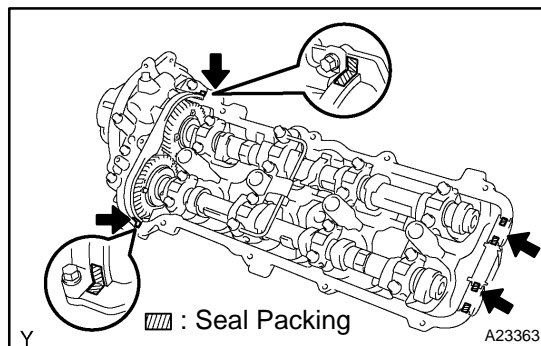
- (b) Apply seal packing to the semi-circular plug grooves.

**Seal packing:**

**Part No. 08826-00080 or equivalent**



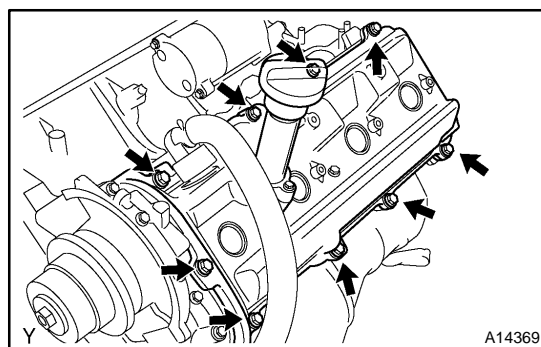
- (c) Install the 4 semi-circular plugs to the cylinder heads as shown in the illustration.



## 12. INSTALL LH CYLINDER HEAD COVER

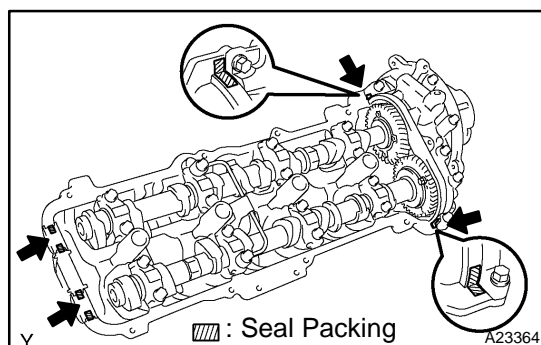
- (a) Remove any old packing material (FIPG).  
 (b) Apply seal packing to the cylinder heads as shown in the illustration.

**Seal packing: Part No. 08826-00080 or equivalent**



- (c) Install the gasket to the cylinder head cover.  
 (d) Install the seal washer to the bolt.  
 (e) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several steps.

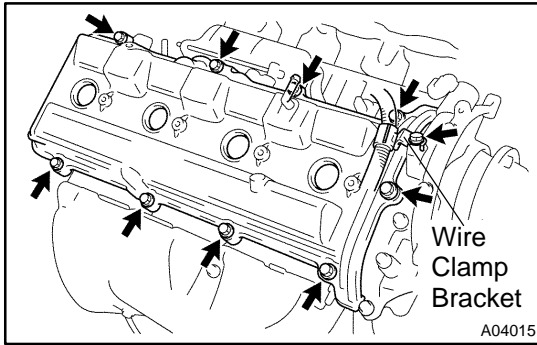
**Torque: 6.0 N·m (60 kgf·cm, 53 in.-lbf)**



## 13. INSTALL RH CYLINDER HEAD COVER

- (a) Remove any old packing material (FIPG).  
 (b) Apply seal packing to the cylinder heads as shown in the illustration.

**Seal packing: Part No. 08826-00080 or equivalent**



- (c) Install the gasket to the cylinder head cover.
- (d) Install the seal washer to the bolt.
- (e) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several steps. Install the 2 cylinder head covers.

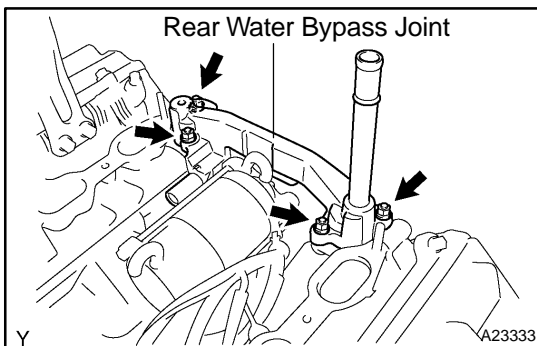
**Torque: 6.0 N·m (60 kgf-cm, 53 in.-lbf)**

- (f) Install the wire clamp bracket on the engine wire to the camshaft bearing cap.

#### 14. INSTALL ENGINE HANGERS

**Torque: 37 N·m (380 kgf-cm, 27 ft-lbf)**

- 15. INSTALL VVT SENSORS (See page [SF-79](#))
- 16. INSTALL OIL DIPSTICK AND GUIDE FOR ENGINE
- 17. INSTALL OIL DIPSTICK AND GUIDE FOR A/T
- 18. INSTALL IGNITION COILS (See page [IG-6](#))



#### 19. INSTALL REAR WATER BYPASS JOINT

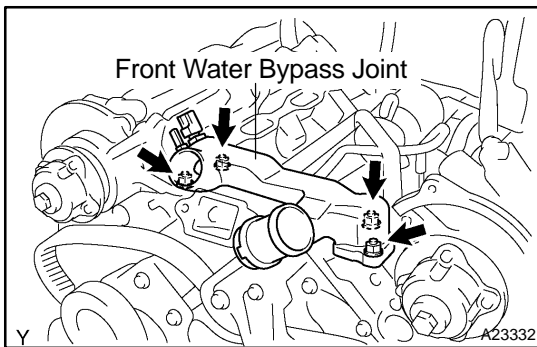
- (a) Install 2 new gaskets to the cylinder head.
- (b) Install the the water bypass joint with the 4 nuts to the cylinder heads. Alternately tighten the nuts.

**Torque: 18 N·m (185 kgf-cm, 13 ft-lbf)**

#### 20. INSTALL NO.2 AIR SWITCHING VALVES

(See page [EC-27](#))

#### 21. INSTALL AIR PUMP ASSEMBLY (See page [EC-27](#))

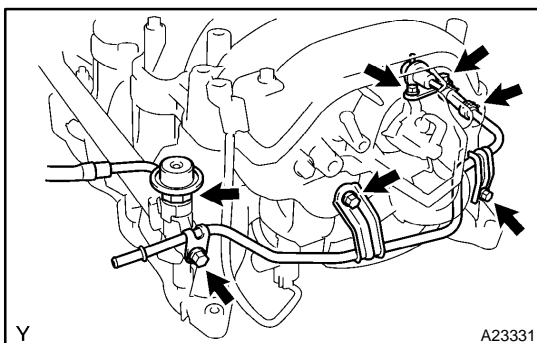


#### 22. INSTALL FRONT WATER BYPASS JOINT

Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.

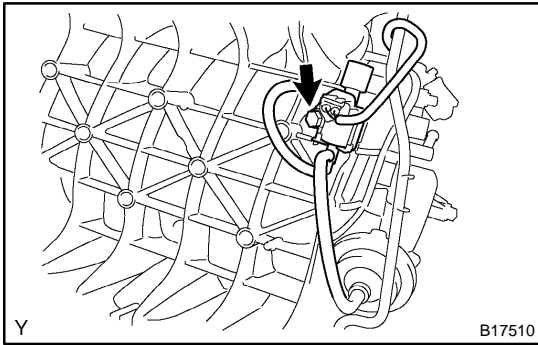
**Torque: 18 N·m (185 kgf-cm, 13 ft-lbf)**

#### 23. INSTALL WATER INLET AND INLET HOUSING ASSEMBLY (See page [CO-8](#))

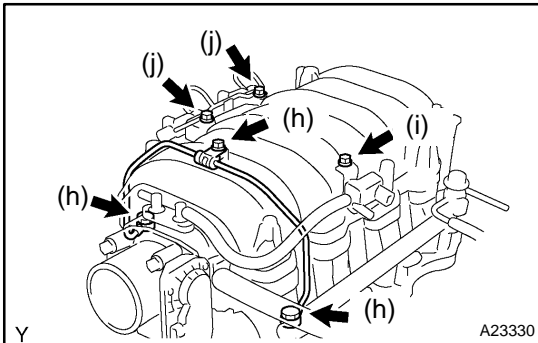


#### 24. ASSEMBLE INTAKE MANIFOLDS

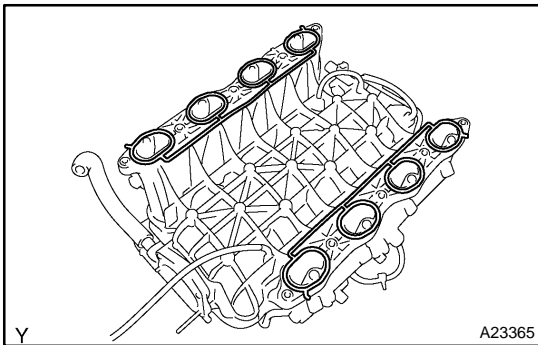
- (a) Install the 2 delivery pipes and 8 injectors (see page [SF-31](#)).
- (b) Install 2 new gaskets and fuel pulsation damper.
- (c) Install a new O-ring and fuel pressure regulator with the 2 bolts.
- (d) Install the fuel return pipe to the intake manifold with the 3 bolts.
- (e) Connect the fuel return hose to the fuel pressure regulator.



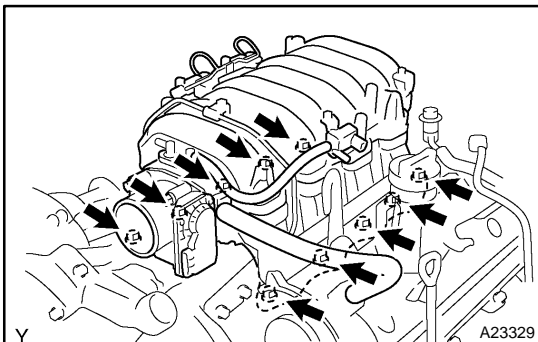
- (f) Install the VSV for ACIS with the bolt.  
**Torque: 7.5 N·m (76 kgf·cm, 66 in.-lbf)**
- (g) Install the throttle body (See page [SF-45](#)).



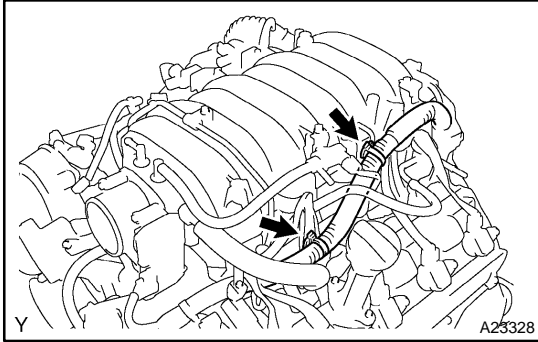
- (h) Install 4 new gaskets and front fuel pipe with the bolt and 2 unions to the intake manifold.  
**Torque:**  
**39 N·m (400 kgf·cm, 29 ft·lbf) for union bolts**  
**7.5 N·m (80 kgf·cm, 66 in.-lbf) for bolt**
- (i) Install the VSV for EVAP with the bolt to the intake manifold and connect the EVAP hose.  
**Torque: 7.5 N·m (76 kgf·cm, 66 in.-lbf)**
- (j) Install the 2 VSVs for air injection system with the 2 bolts.  
**Torque: 7.5 N·m (76 kgf·cm, 66 in.-lbf)**



- 25. INSTALL INTAKE MANIFOLD ASSEMBLY**
- (a) Place 2 new gaskets on the intake manifold.



- (b) Place the intake manifold assembly on the cylinder heads.
- (c) Install and uniformly tighten the 6 bolts and 4 nuts in several steps.  
**Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)**



- (d) Install the throttle body cover bracket to the intake manifold.

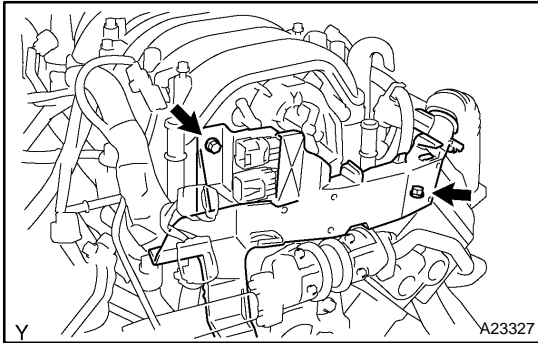
**Torque: 7.5 N·m (76 kgf·cm, 66 in.-lbf)**

- (e) Install the wire bracket to the intake manifold with the bolt.

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

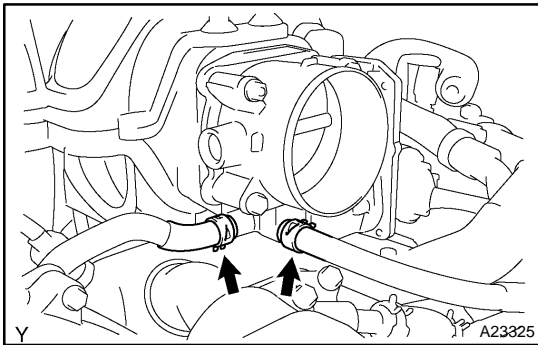
- (f) Connect the engine wire to the engine hanger and wire bracket.

- (g) Install the engine wire to the LH No.1 timing belt rear plate.

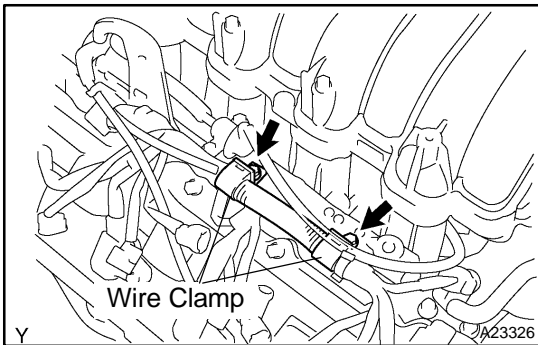


- (h) Connect the wire protector to the intake manifold and cylinder heads with the 2 bolts.

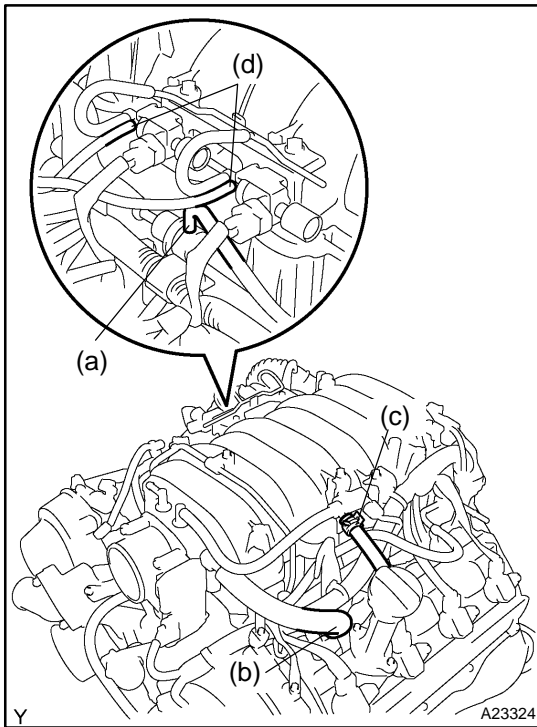
- (i) Install the 2 ground cables with the 2 bolts to the RH and LH cylinder heads.



- (j) Connect the 2 water bypass hoses to the throttle body.



- (k) Connect the 2 wire clamps to the wire clamp bracket on the RH delivery pipe.

**26. CONNECT HOSES TO INTAKE MANIFOLD**

- (a) Connect the vacuum hose to the fuel pressure regulator.
- (b) Connect the PCV hose to the PCV valve on the LH the cylinder head.
- (c) Connect the EVAP hose (from charcoal canister) to the VSV for EVAP.
- (d) Connect the 2 vacuum hoses to the VSV for the air injection system.
- (e) Connect the brake booster tube.

**27. CONNECT CONNECTORS TO INTAKE MANIFOLD**

- (a) Connect the throttle control connector.
- (b) Connect the 2 VSV connectors for the air injection system.
- (c) Connect the VSV connector for the EVAP.
- (d) Connect the 8 injector connectors.
- (e) Connect the ECT sensor connector.
- (f) Connect the 2 air fuel ratio sensor connectors.

**28. CONNECT FUEL INLET HOSE (See page SF-31) AND FUEL RETURN HOSE****29. INSTALL TIMING BELT REAR PLATES**

- (a) Install the RH No.1 timing belt rear plates.  
Install the RH No.1 timing belt rear plates to the cylinder head with the 3 bolts and stud bolt.

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

- (b) Install the LH No.1 timing belt rear plates.
  - (1) Connect the wire clamp to the No.1 timing belt rear plate.
  - (2) Install the LH No.1 timing belt rear plates to the cylinder head with the 3 bolts and stud bolt.

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

**30. INSTALL THROTTLE BODY COVER****31. INSTALL IGNITION COILS (See page IG-6)****32. INSTALL OIL DIPSTICK AND GUIDE FOR A/T****33. INSTALL FRONT EXHAUST PIPE (See page EM-127)****34. INSTALL PS PUMP (See page EM-83)****35. INSTALL CAMSHAFT POSITION SENSOR (See page IG-9)****36. INSTALL CAMSHAFT TIMING PULLEYS (See page EM-23)****37. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS (See page EM-23)****38. CHECK ENGINE OIL LEVEL**