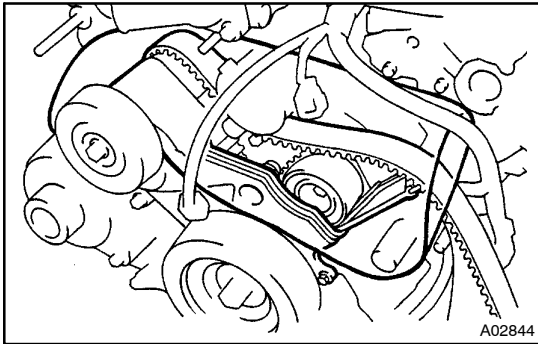


## REMOVAL

1. **DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS**  
(See page EM-14)
2. **REMOVE CAMSHAFT TIMING PULLEYS**  
(See page EM-14)
3. **REMOVE CAMSHAFT POSITION SENSOR**  
(See page IG-9)
4. **DISCONNECT PS PUMP FROM ENGINE**  
(See page EM-73)
5. **DISCONNECT FRONT EXHAUST PIPE FROM TWC**  
(See page EC-9)
6. **REMOVE TWC**  
(See page EC-9)
7. **REMOVE IGNITION COILS**  
(See page IG-6)
8. **REMOVE TIMING BELT REAR PLATES**
  - (a) Remove the 3 bolts, stud bolt, and RH No.1 and No.2 timing belt rear plates.
  - (b) Disconnect the wire clamp from the LH timing belt rear plate.
  - (c) Remove the 3 bolts, LH No.1 and No.2 timing belt rear plates.



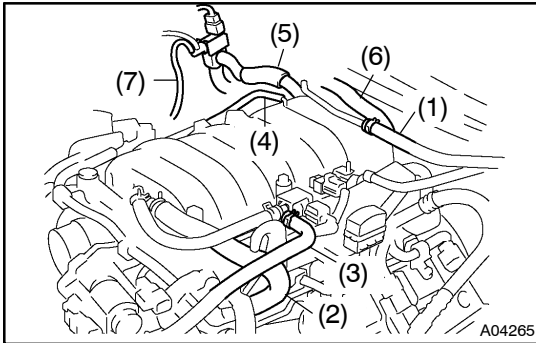
### NOTICE:

- **Be careful not to drop anything inside the timing belt cover.**
- **Do not allow the belt to come into contact with oil, water or dust.**

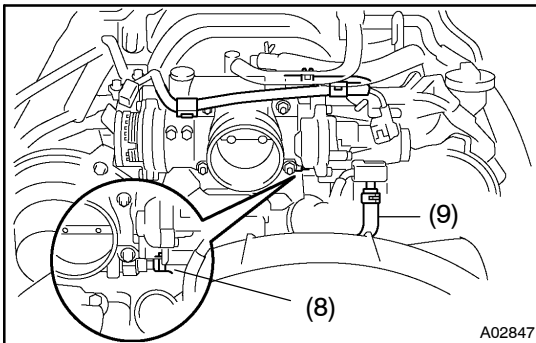
9. **DISCONNECT FUEL INLET HOSE**  
(See page SF-24)
10. **DISCONNECT ACCELERATOR CABLE**
11. **REMOVE V-BANK COVER BRACKETS**
  - (a) Remove the bolt and LH front V-bank cover bracket from the engine hanger.
  - (b) Remove the 2 nuts and accelerator cable bracket from the intake manifold.
  - (c) Remove the bolt and LH rear V-bank cover bracket from the intake manifold.
  - (d) Remove the bolt and RH rear V-bank cover bracket from the engine hanger.

**12. REMOVE INTAKE MANIFOLD ASSEMBLY****(a) Disconnect these connectors:**

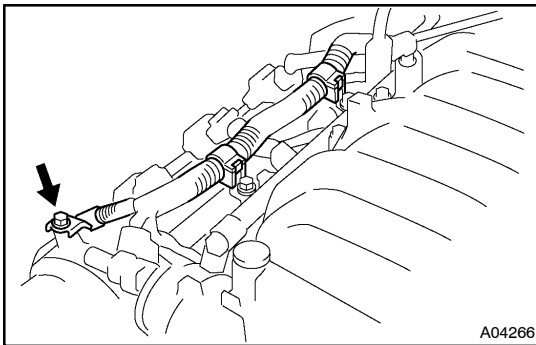
- Throttle position sensor connector
- Accelerator pedal position sensor connector
- Throttle control motor connector
- VSV connector for EVAP
- VSV connector for ACIS
- 8 injector connectors
- Noise filter connector
- Camshaft timing oil control valve connector

**(b) Disconnect these hoses:**

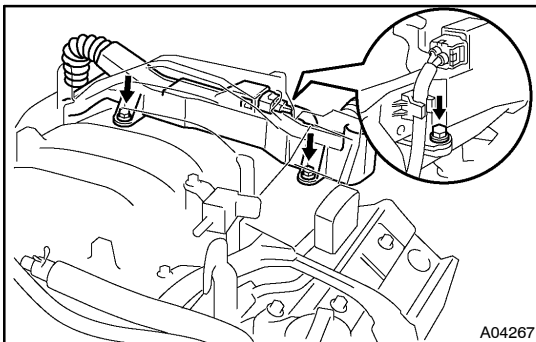
- (1) Brake booster vacuum hose
- (2) PCV hose from PCV valve on LH cylinder head
- (3) EVAP hose (from charcoal canister) from VSV for EVAP
- (4) PS air hose from intake manifold
- (5) Heater hose from rear water bypass joint
- (6) Heater hose from water bypass pipe
- (7) Vacuum hose (from VSV for heater water valve)



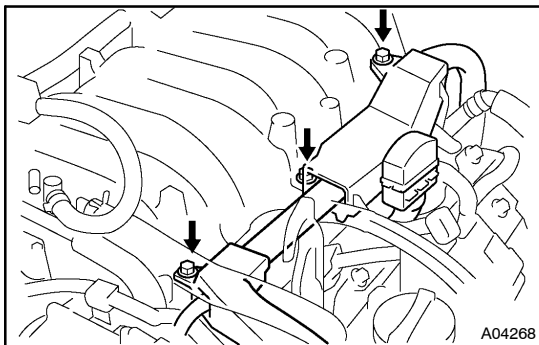
- (8) No.1 water bypass hose (from front water bypass joint) from throttle body
- (9) No.7 water bypass hose (from water inlet housing) from throttle body

**(c) Disconnect the 2 wire clamp from the throttle body.****(d) Disconnect the engine wire.**

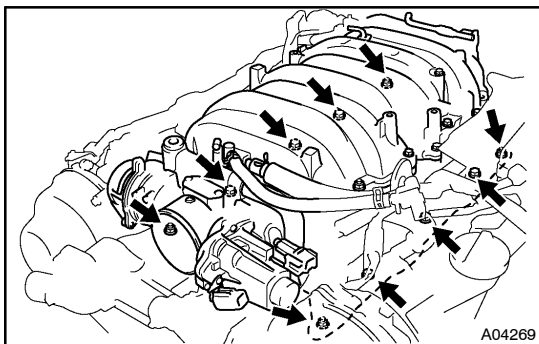
- (1) Disconnect the 2 wire clamps from the wire clamp bracket on the RH delivery pipe.
- (2) Remove the bolt and wire clamp bracket from the RH front bearing cap.



- (3) Remove the 3 bolts, and disconnect the engine wire protector from the rear water bypass joint and RH cylinder head.
- (4) Remove the bolt and VSV for EVAP.



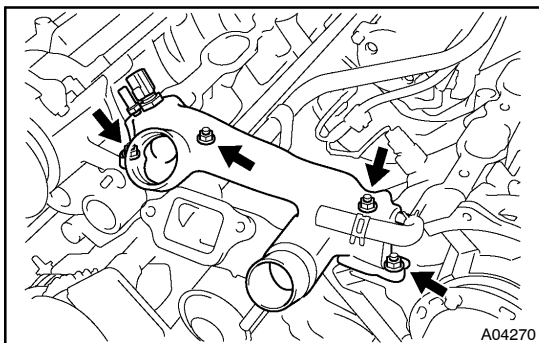
- (5) Remove the bolt and wire clamp bracket from the LH cylinder head cover.
- (6) Remove the 4 bolts, and disconnect the engine wire protector from the intake manifold and LH front bearing cap.



- (e) Remove the 6 bolts, 4 nuts, intake manifold assembly and 2 gaskets.

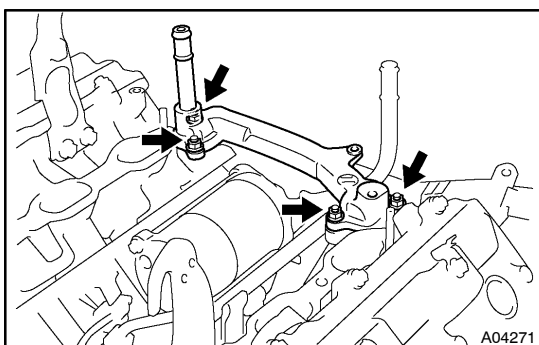
### 13. REMOVE WATER INLET AND INLET HOUSING ASSEMBLY

(See page CO-7)



### 14. REMOVE FRONT WATER BYPASS JOINT

- (a) Disconnect these connectors:
  - ECT sensor connector
  - ECT sender gauge connector
- (b) Remove the 4 nuts, water bypass joint and 2 gaskets.



### 15. REMOVE REAR WATER BYPASS JOINT

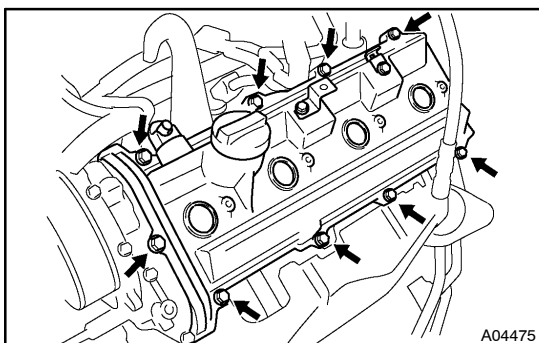
Remove the 4 nuts, water bypass joint and 2 gaskets.

### 16. REMOVE VVT SENSORS

### 17. REMOVE ENGINE HANGERS

### 18. REMOVE OIL DIPSTICK AND GUIDE FOR A/T (See page EM-73)

### 19. REMOVE OIL DIPSTICK AND GUIDE FOR ENGINE (See page LU-8)

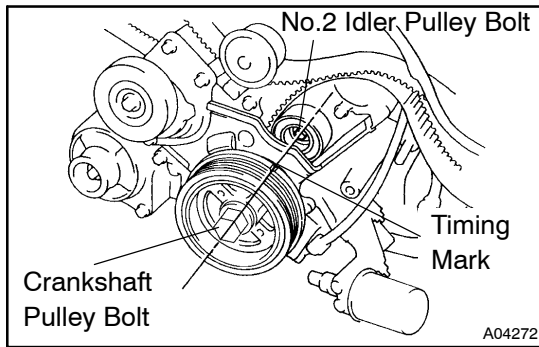


### 20. REMOVE CYLINDER HEAD COVERS

Remove the 9 bolts, 9 seal washers, cylinder head cover and gasket. Remove the 2 cylinder head covers.

### 21. IF NECESSARY, REMOVE SEMI-CIRCULAR PLUGS

### 22. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE (See page SF-51)



### 23. REMOVE CAMSHAFTS

#### NOTICE:

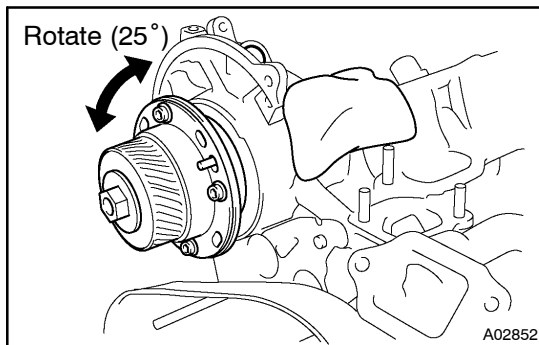
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following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

- (a) Check the crankshaft pulley position.

Check that the timing mark of the crankshaft pulley is in aligned with the centers of the crankshaft pulley bolt and idler pulley bolt.

#### NOTICE:

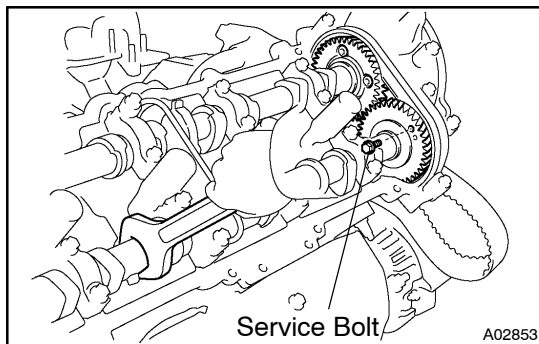
Having the crankshaft pulley at the wrong angle can cause the piston head and valve head to come into contact with each other when you remove the camshaft, causing damage. So always set the crankshaft pulley at the correct angle.



- (b) Rotate the VVT-i pulley from left to right 2 to 3 times within its range of movement (25° < 50° CA) and use a waste cloth to collect the oil from the camshaft timing oil control valve installation hole.

#### NOTICE:

Approximately 20 cc (1.2 cu in.) of oil will be ejected, so take care not to spill it.



- (c) Remove the RH camshafts.

- (1) Boring the service bolt hole of the sub-gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.
- (2) Secure the sub-gear to the main gear with a service bolt.

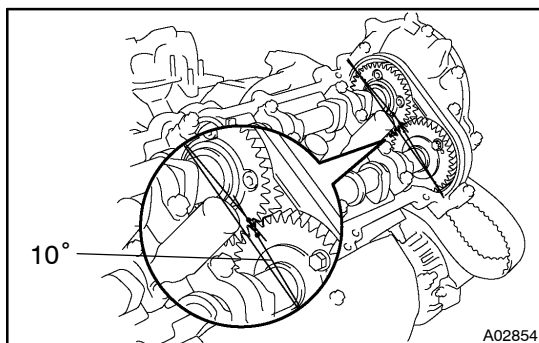
#### Recommended service bolt:

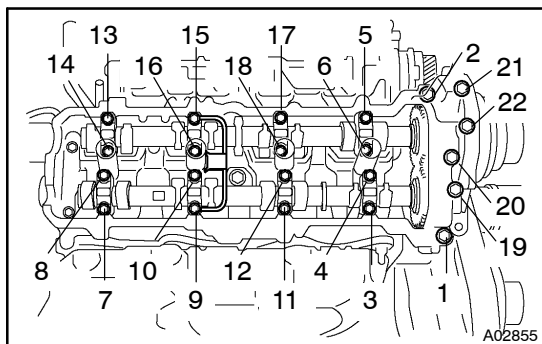
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm

#### HINT:

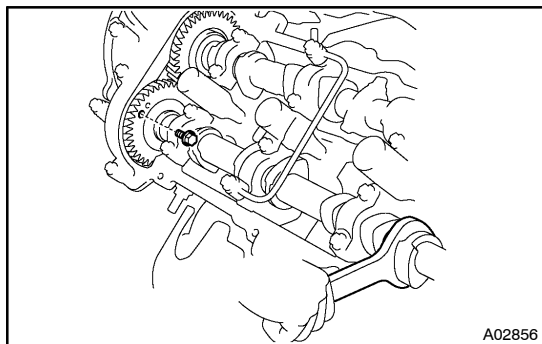
When removing the camshafts, make sure that the torsional spring force of the sub-gear has been eliminated by the above operation.

- (3) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10° angle by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.





- (4) Uniformly loosen and remove the 22 bearing cap bolts in several passes, in the sequence shown.
- (5) Remove the oil feed pipe, 9 bearing caps, cam shaft timing oil control valve filter and camshafts.



- (d) Remove the LH camshafts.
  - (1) Boring the service bolt hole of the sub-gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.
  - (2) Secure the sub-gear to the main gear with a service bolt.

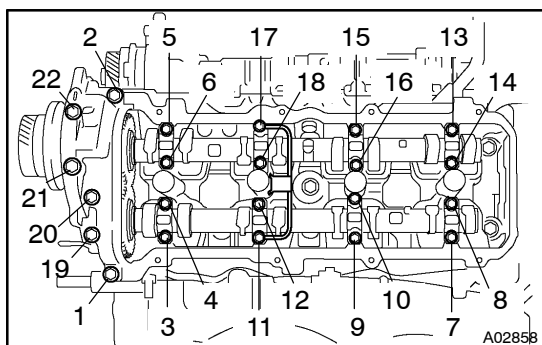
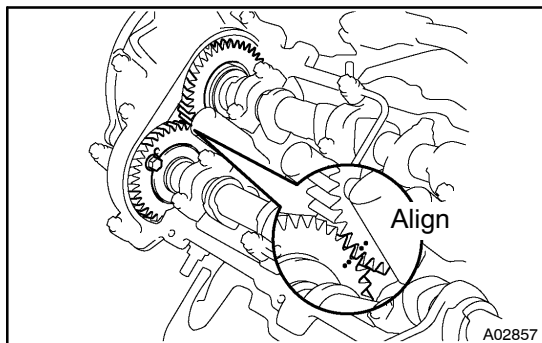
**Recommended service bolt:**

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm

**HINT:**

When removing the camshaft, make sure that the torsional spring force of the sub-gear has been eliminated by the above operation.

- (3) Align the timing mark (2 dot marks) of the camshaft drive gear by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.



- (4) Uniformly loosen and remove the 22 bearing cap bolts in several passes, in the sequence shown.
- (5) Remove the oil feed pipe, 9 bearing caps, cam shaft timing oil control valve filter and camshafts.

**HINT:**

Arrange the bearing caps in correct order.

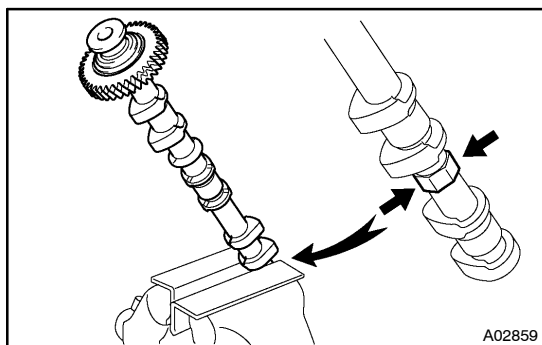
**24. IF NECESSARY REMOVE CAMSHAFT HOUSING PLUGS**

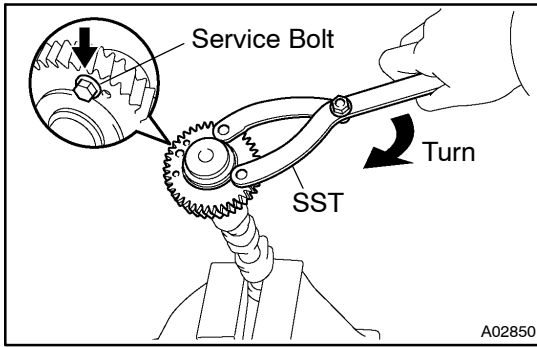
**25. DISASSEMBLE EXHAUST CAMSHAFTS**

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

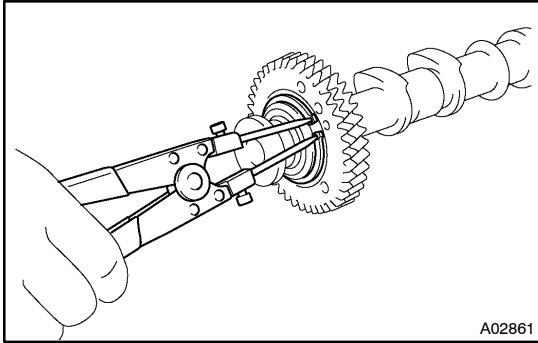
**NOTICE:**

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





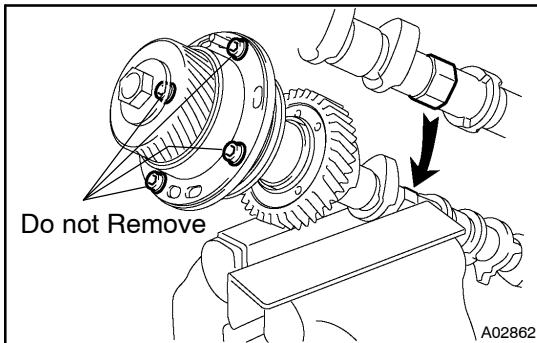
- (b) Using SST, turn the sub-gear clockwise, and remove the service bolt.  
SST 09960-10010 (09962-01000, 09963-00500)



- (c) Using snap ring pliers, remove the snap ring.  
(d) Remove these parts:
- Wave washer
  - Camshaft sub-gear
  - Camshaft gear spring

**HINT:**

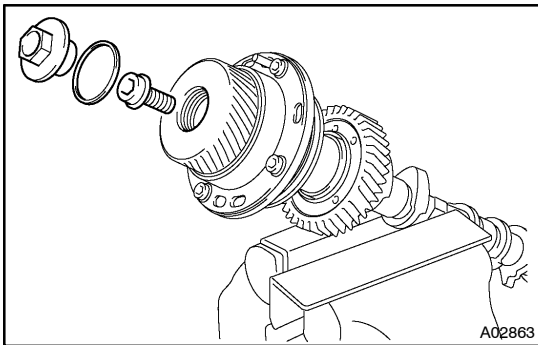
Arrange the camshaft sub-gears and gear spring (RH and LH sides).

**26. REMOVE CAM SHAFT TIMING TUBES**

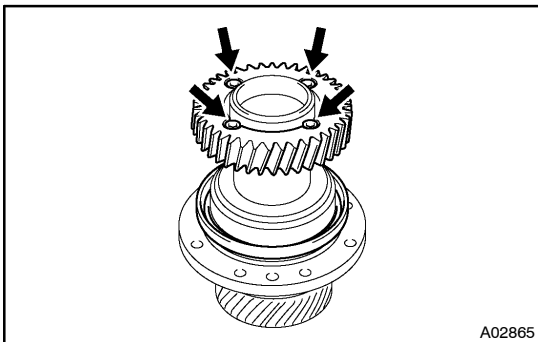
- (a) Mount the hexagon wrench head portion of the intake camshaft in a vise.

**NOTICE:**

- **Be careful not to damage the camshaft.**
- **The 4 bolts shown in the illustration determine the backlash of the gear in the timing tube, so do not remove them. If any of the 4 bolts are removed, install a new camshaft timing tube assembly.**



- (b) Remove the straight screw plug and seal washer.  
(c) Using a 10 mm hexagon wrench, and remove the set bolt and camshaft timing tube.

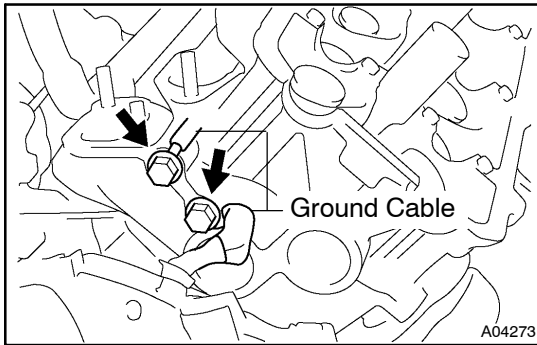


- (d) Using a 5 mm hexagon wrench, and remove the 4 bolts, camshaft drive gear and oil seal.

**NOTICE:**

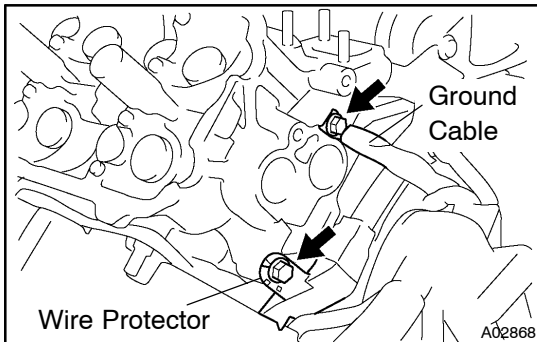
**Be careful not to damage the camshaft timing tube.**

**27. REMOVE SPARK PLUGS**

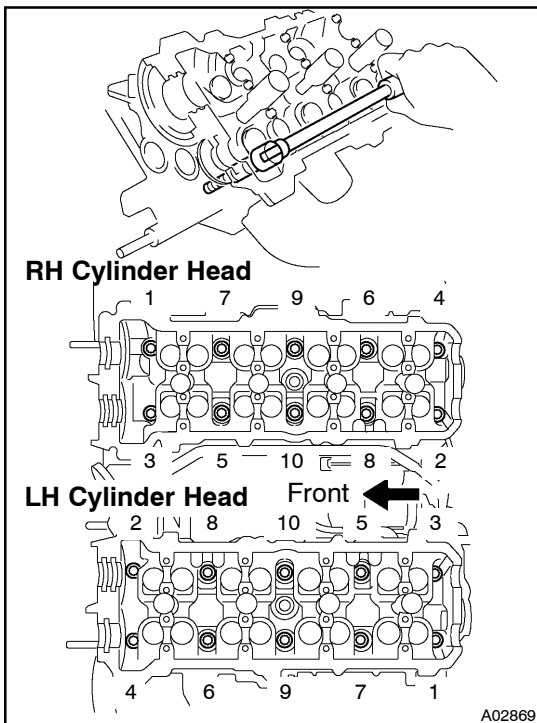


## 28. REMOVE CYLINDER HEAD AND EXHAUST MANIFOLD ASSEMBLIES

- (a) Disconnect the 2 heated oxygen sensor connectors.
- (b) Remove the 2 bolts, and disconnect the 2 ground cables from the RH cylinder head.



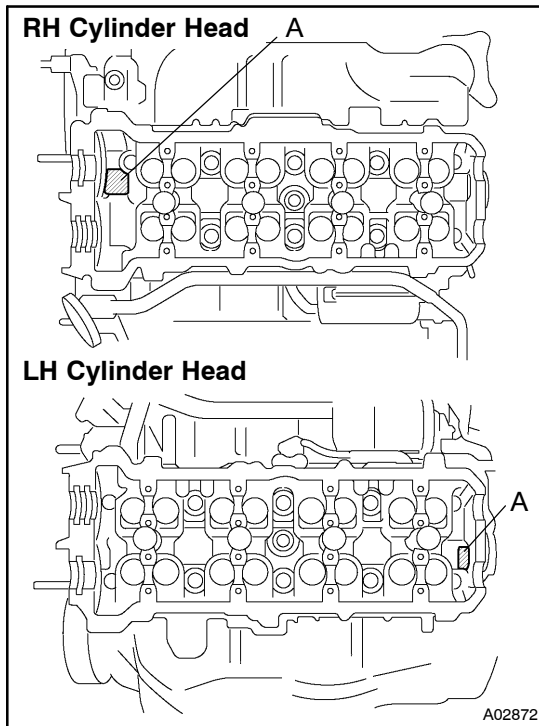
- (c) Remove the bolt, and disconnect the ground cable from the LH cylinder head.
- (d) Remove the bolt, and disconnect the engine wire protector from the LH cylinder head.



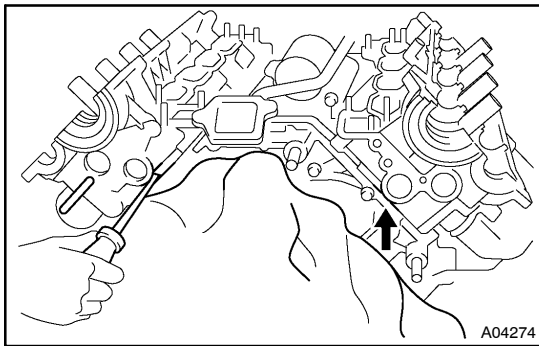
- (e) Uniformly loosen the 10 cylinder head bolts on one side of each cylinder head in several passes, in the sequence shown, then do the other side as shown. Remove the 20 cylinder head bolts and plate washers.

### NOTICE:

- **Cylinder head warpage or cracking could result from removing bolts in incorrect order.**



- 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.



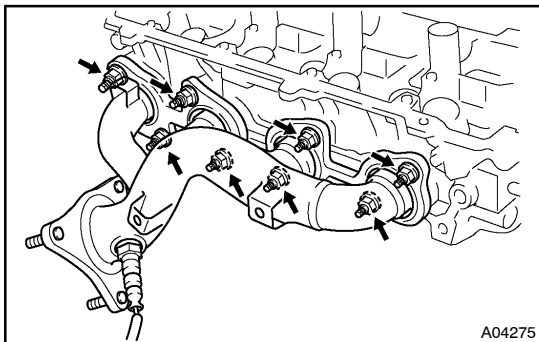
- (f) Lift the cylinder head from the dowels on the cylinder block, and place the 2 cylinder heads on wooden blocks on a bench.

**HINT:**

If the cylinder head is lift off, pry between the cylinder head and cylinder block with a screwdriver.

**NOTICE:**

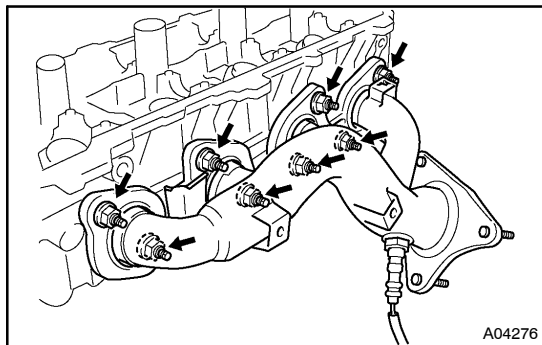
- Be careful not to damage the contact surfaces of the cylinder head and cylinder block.
- The cylinder head should not be tilted so as to secure the valve lifter. If the cylinder head is tilted, remove the valve lifter and check that the adjusting shim is set correctly.



**29. REMOVE RH EXHAUST MANIFOLD FROM CYLINDER HEAD**

- Remove the 3 bolts and heat insulator.
- Remove the 8 nuts, exhaust manifold and gasket.



**30. REMOVE LH EXHAUST MANIFOLD FROM CYLINDER HEAD**

- (a) Remove the 3 bolts and heat insulator.
- (b) Remove the 8 nuts, exhaust manifold and gasket.