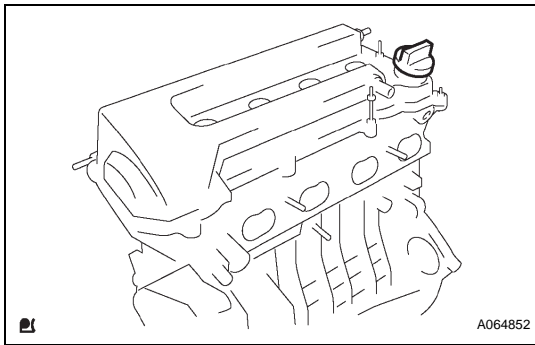
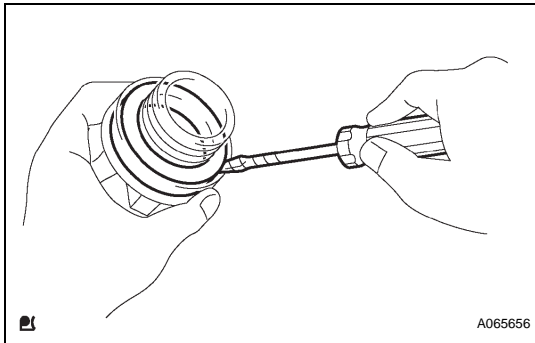
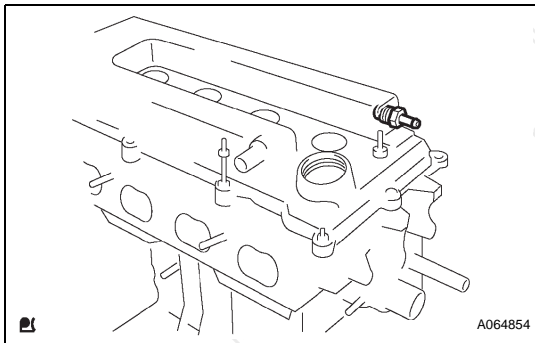


**DISASSEMBLY****1. REMOVE OIL FILLER CAP SUB-ASSEMBLY**

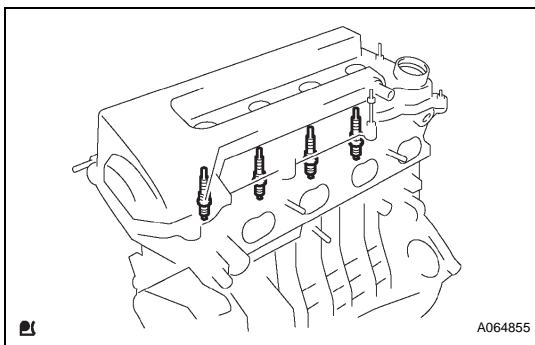
- (a) Remove the oil filler cap from the cylinder head cover.

**2. REMOVE OIL FILLER CAP GASKET**

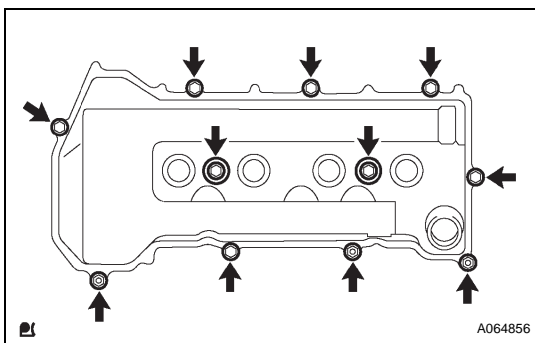
- (a) Using a screwdriver, remove the gasket from the oil filler cap.

**3. REMOVE VENTILATION VALVE SUB-ASSEMBLY**

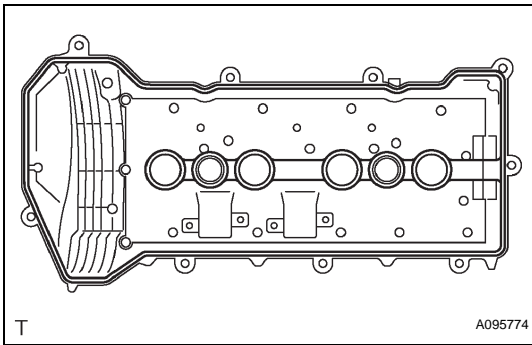
- (a) Remove the ventilation valve from the cylinder head cover.

**4. REMOVE SPARK PLUG**

- (a) Using a spark plug wrench, remove the 4 spark plugs.

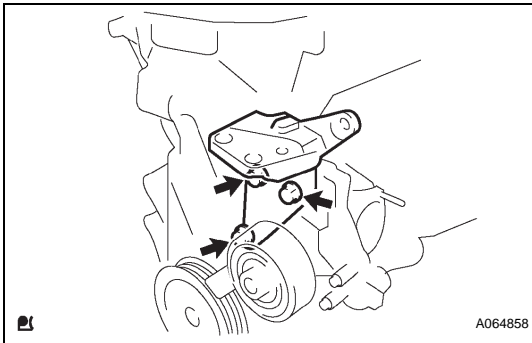
**5. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY**

- (a) Remove the 9 bolts, 2 seal washers and 2 nuts, then remove the cylinder head cover.



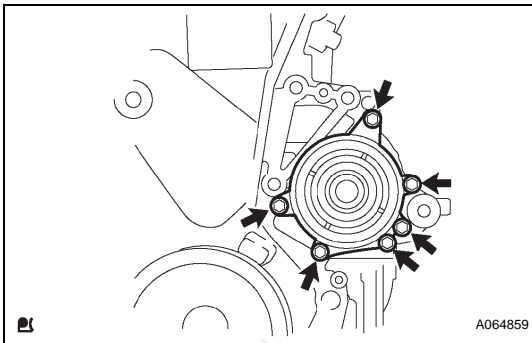
## 6. REMOVE CYLINDER HEAD COVER GASKET

- (a) Remove the gasket from the cylinder head cover.



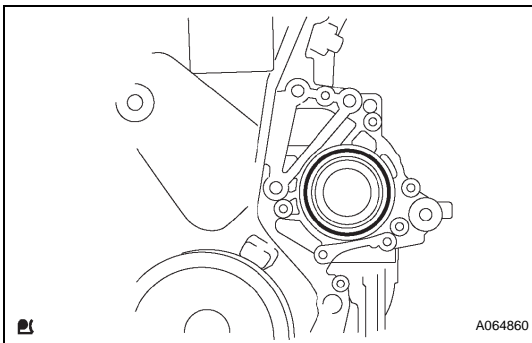
## 7. REMOVE ENGINE MOUNTING BRACKET RH

- (a) Remove the 3 bolts, then remove the engine mounting bracket RH.



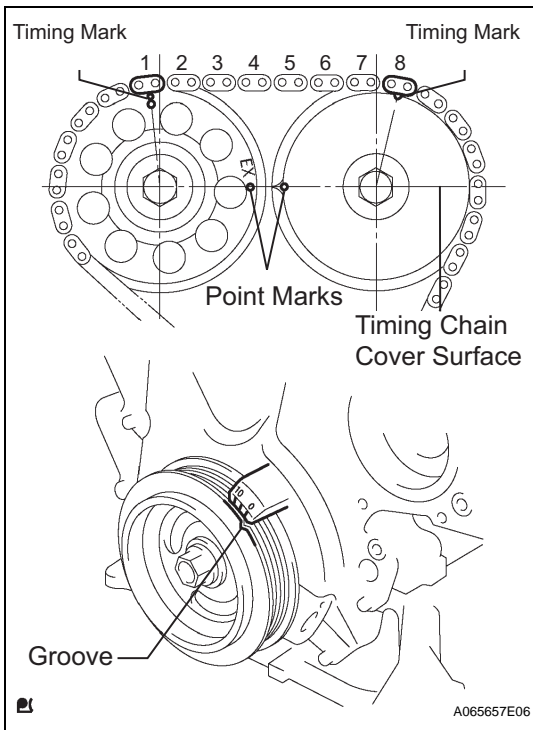
## 8. REMOVE WATER PUMP ASSEMBLY

- (a) Remove the 6 bolts, then remove the water pump.



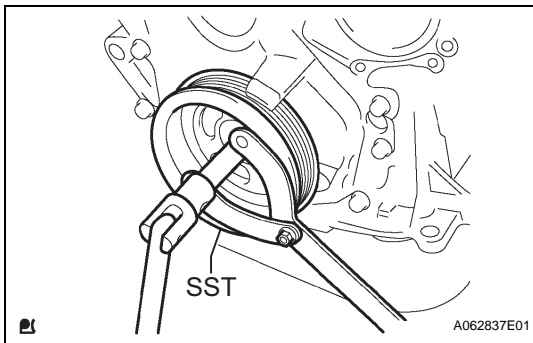
## 9. REMOVE WATER PUMP O-RING

- (a) Remove the O-ring from the timing chain cover.

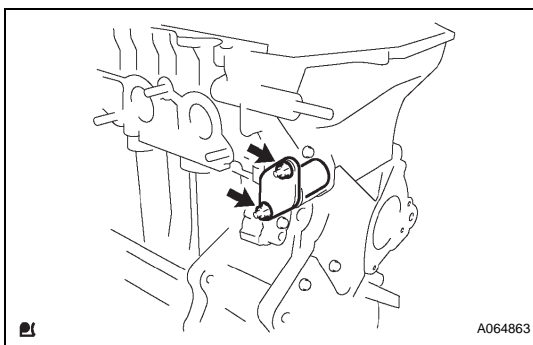


## 10. REMOVE CRANKSHAFT PULLEY

- (a) Set the No. 1 cylinder to the TDC/compression.
  - (1) Turn the crankshaft pulley until its groove and timing mark "0" of the timing chain cover are aligned.
  - (2) Check that the point marks of the camshaft timing gears are in a straight line on the timing chain cover surface as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) to align the marks as above.

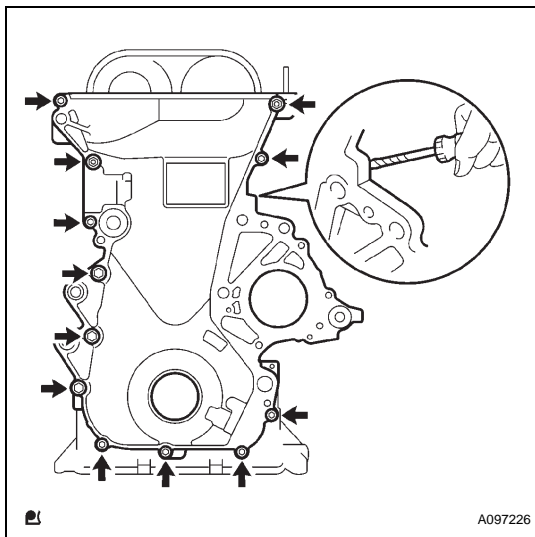


- (b) Using SST, remove the crankshaft pulley bolt.  
**SST 09960-10010 (09962-01000, 09963-01000)**
- (c) Remove the crankshaft pulley from the crankshaft.



## 11. REMOVE CHAIN TENSIONER ASSEMBLY NO.1

- (a) Remove the 2 nuts, then remove the chain tensioner.

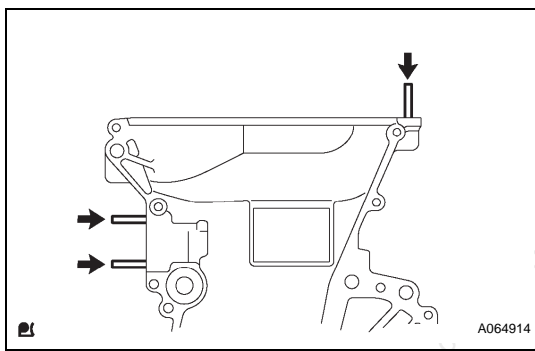


## 12. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

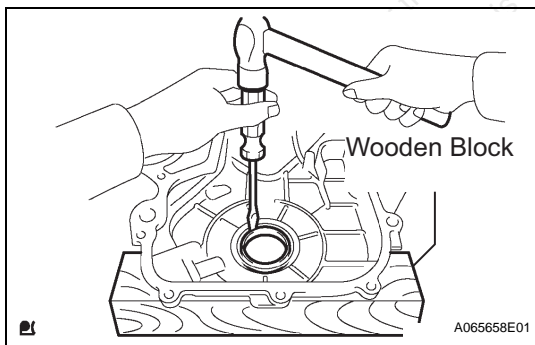
- Remove the 10 bolts and 2 nuts.
- Remove the timing chain cover by prying the portions between the timing chain cover, cylinder head and cylinder block with a screwdriver.

### NOTICE:

**Be careful not to damage the contact surfaces of the timing chain cover, cylinder head and cylinder block.**

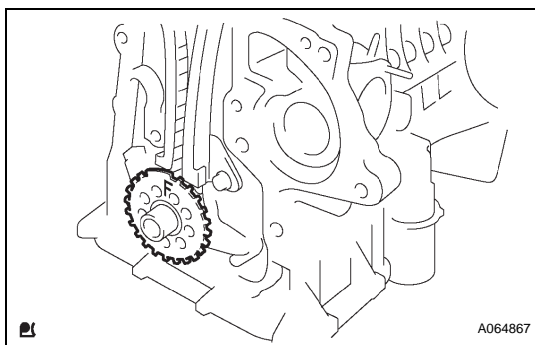


- Using a "TORX" socket wrench E5, remove the 3 stud bolts.



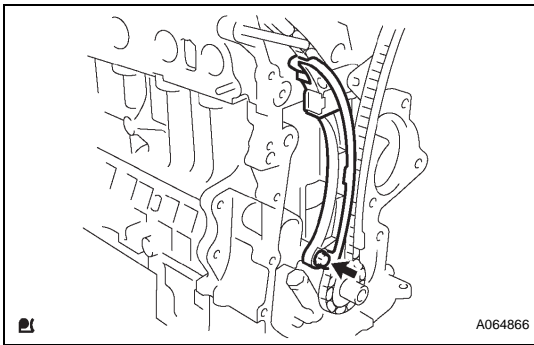
## 13. REMOVE TIMING CHAIN OR BELT COVER OIL SEAL

- Place the timing chain cover on wooden blocks.
- Using a screwdriver, remove the oil seal.

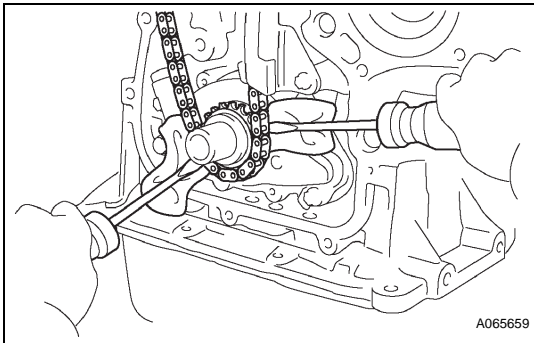


## 14. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

- Remove the crankshaft position sensor plate from the crankshaft.

**15. REMOVE CHAIN TENSIONER SLIPPER**

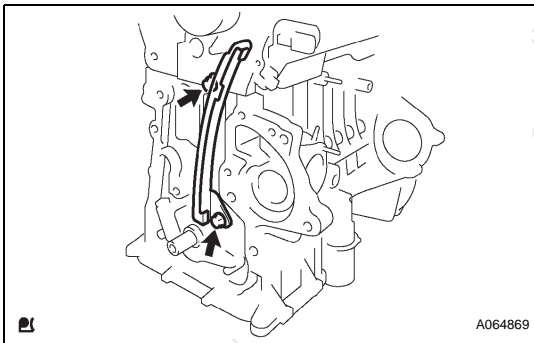
- (a) Remove the bolt, then remove the chain tensioner slipper.

**16. REMOVE CHAIN SUB-ASSEMBLY**

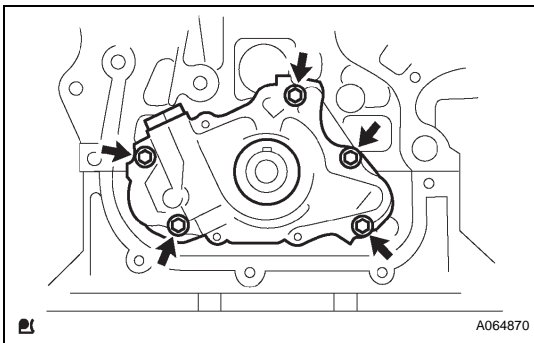
- (a) Using 2 screwdrivers, pry out the chain with the crankshaft timing gear, as shown in the illustration.

**NOTICE:**

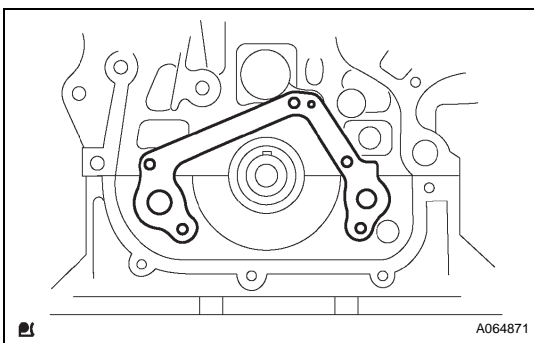
- Use a shop rag to protect the engine.
- If revolving the camshafts with the chain off the gears, turn the crankshaft 1/4 revolution to prevent the valves from coming into contact with the pistons.

**17. REMOVE CHAIN VIBRATION DAMPER NO.1**

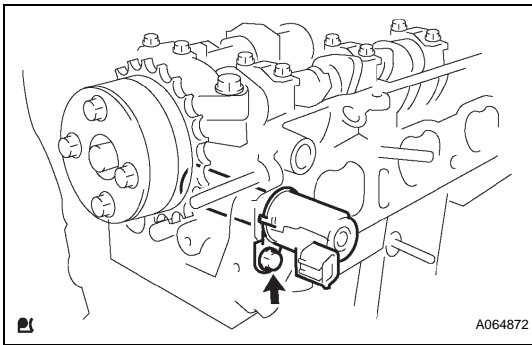
- (a) Remove the 2 bolts, then remove the chain vibration damper.

**18. REMOVE OIL PUMP ASSEMBLY**

- (a) Remove the 5 bolts, then remove the oil pump.

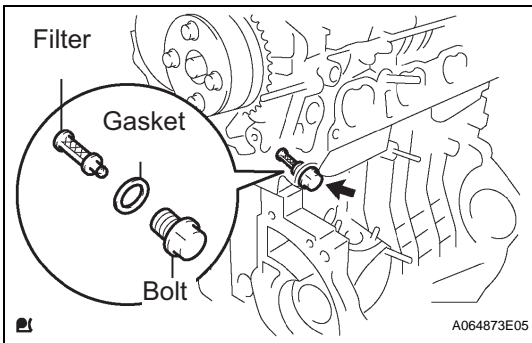
**19. REMOVE OIL PUMP GASKET**

- (a) Remove the gasket from the cylinder block.



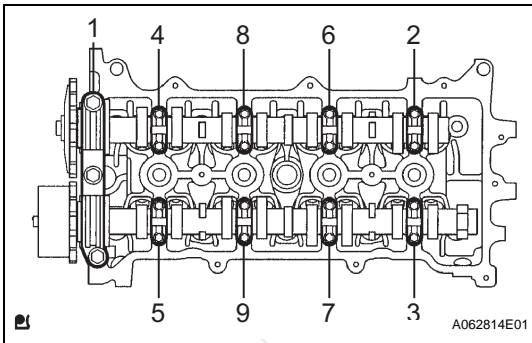
## 20. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

- (a) Remove the bolt, then remove the camshaft timing oil control valve.



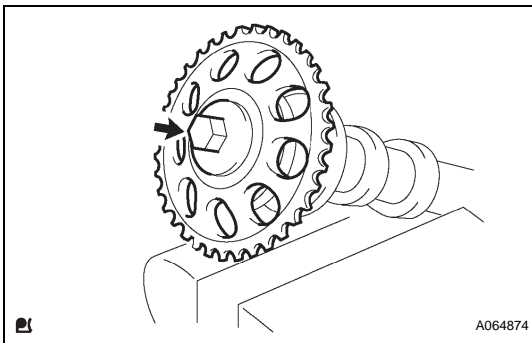
## 21. REMOVE OIL CONTROL VALVE FILTER

- (a) Remove the bolt together with the gasket and oil control valve filter.
- (b) Remove the gasket and oil control valve filter from the bolt.



## 22. REMOVE CAMSHAFT

- (a) Using several steps, uniformly loosen and remove the 19 bearing cap bolts in the sequence shown in the illustration.
- (b) Remove the 9 bearing caps, then remove the 2 camshafts from the cylinder head.

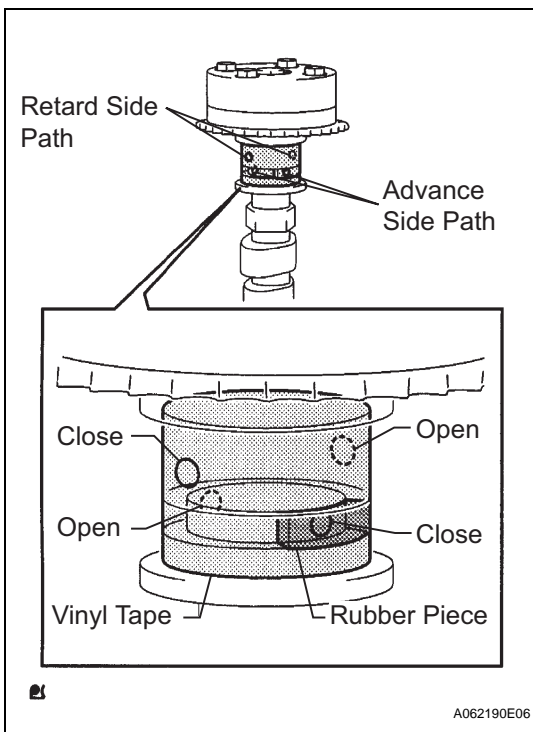


## 23. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET

- (a) Clamp the camshaft in a vise, then remove the bolt and camshaft timing gear.

### NOTICE:

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



## 24. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Check the lock of the camshaft timing gear.

- (1) Clamp the camshaft in a vise, then confirm that the camshaft timing gear is locked.

**NOTICE:**

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

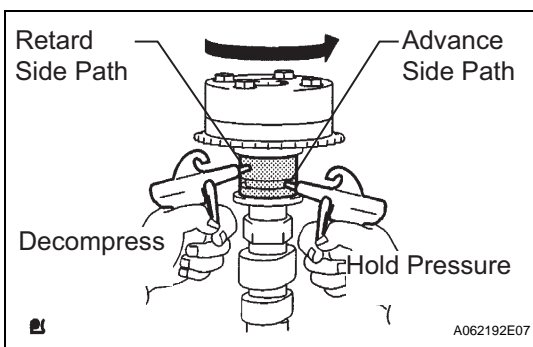
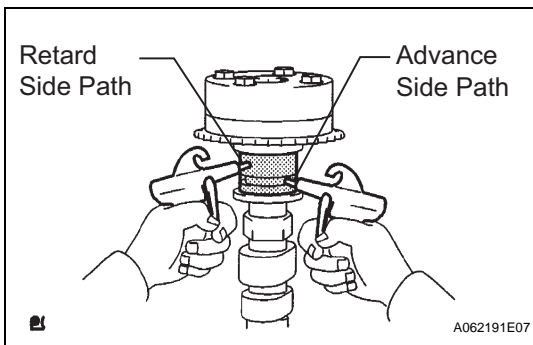
(b) Release the lock pin.

- (1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

**HINT:**

Two advance side paths are provided in the groove of the camshaft. Plug one of the paths with a piece of rubber.

- (2) Puncture the tape over the advance side path and retard side path on the opposite side of the groove.



- (3) Apply air pressure to the two broken paths (the advance side path and retard side path) of about 150 kPa (1.5 kgf/cm<sup>2</sup>).

**CAUTION:**

**Cover the paths with a shop rag to avoid oil splashes.**

- (4) Confirm that the camshaft timing gear revolves in the timing advance direction when weakening the air pressure of the timing retard path.

**HINT:**

The lock pin is released, and the camshaft timing gear revolves in the advance direction.

- (5) When the camshaft timing gear comes to the most advanced position, release the air pressure of the timing retard side path, then release that of the timing advance side path.

**CAUTION:**

**The camshaft timing gear occasionally shifts to the retard side abruptly if the air compression of the advance side path is released before the retard side path. This often causes the breakage of the lock pin.**

- (c) Check the smooth revolution.  
 (1) Revolve the camshaft timing gear several times within the movable range except for the most retarded position and check that it turns smoothly.

**CAUTION:**

**Be sure to perform this check by hand, instead of using air pressure.**

- (d) Check that the lock is in the most retarded position.  
 (1) Confirm that the camshaft timing gear is locked in the most retarded position.

**25. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY**

- (a) Clamp the camshaft in a vise, then confirm that the camshaft timing gear is locked.

**CAUTION:**

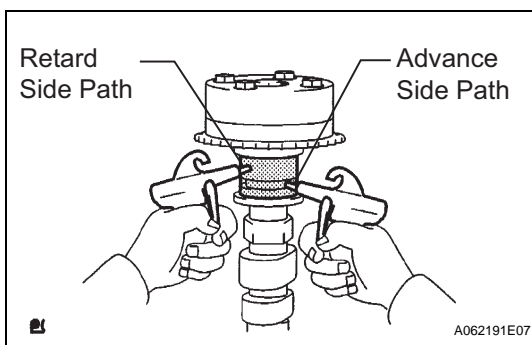
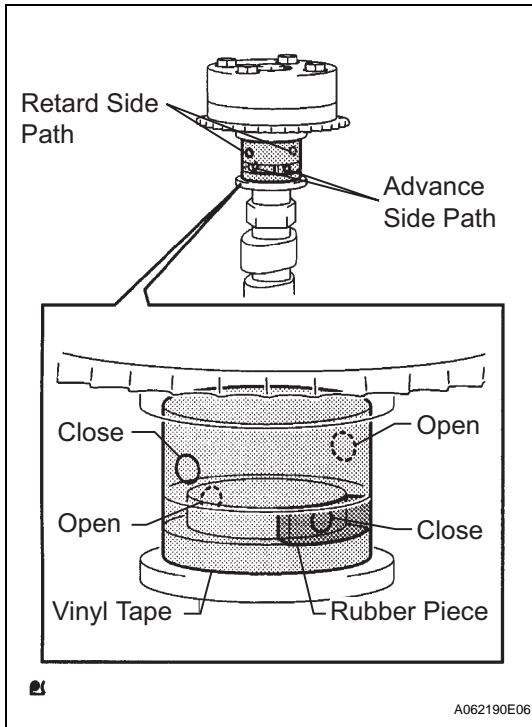
**Be careful not to damage the camshaft.**

- (b) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

**HINT:**

Two advance side paths are provided in the groove of the camshaft. Plug one of the paths with a piece of rubber.

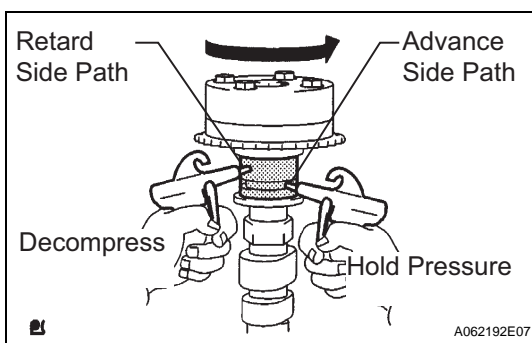
- (c) Puncture the tape over the advance side path and retard side path on the opposite side of the groove.



- (d) Apply air pressure to the two broken paths (the advance side path and retard side path) of about 150 kPa (1.5 kgf/cm<sup>2</sup>).

**CAUTION:**

**Cover the paths with a shop rag to avoid oil splashes.**



- (e) Confirm that the camshaft timing gear revolves in the timing advance direction when weakening the air pressure of the timing retard path.

**HINT:**

The lock pin is released, and the camshaft timing gear revolves in the advance direction.



- (f) When the camshaft timing gear comes to the most advanced position, release the air pressure of the timing retard side path, then release that of the timing advance side path.

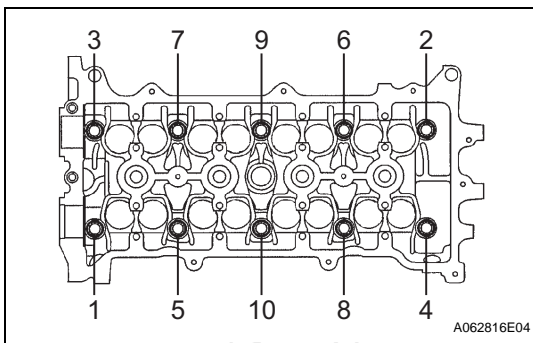
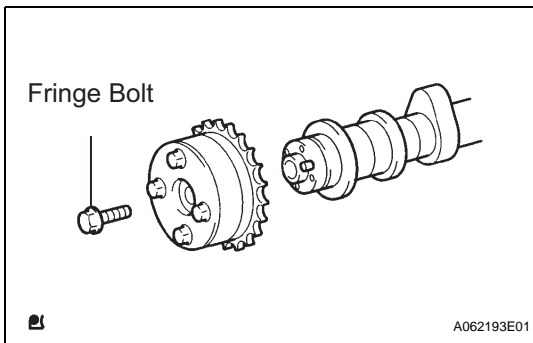
**CAUTION:**

The camshaft timing gear occasionally shifts to the retard side abruptly if the air compression of the advance side path is released before the retard side path. This often causes the breakage of the lock pin.

- (g) Remove the fringe bolt and camshaft timing gear.

**NOTICE:**

- Be sure not to remove the other 4 bolts.
- When reusing the camshaft timing gear, release the straight pin locking first, then install the gear.

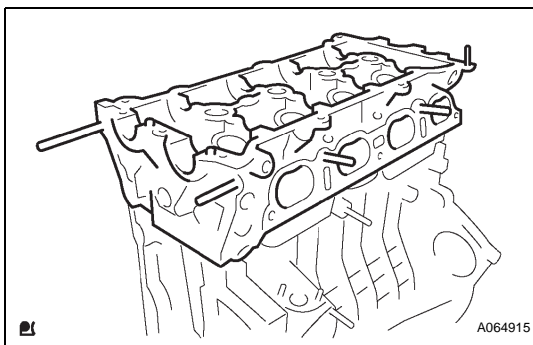
**26. REMOVE CYLINDER HEAD SUB-ASSEMBLY**

- (a) Using several steps, uniformly loosen and remove the 10 cylinder head bolts with a bi-hexagon wrench 10 mm in the sequence shown in the illustration. Remove the 10 cylinder head bolts and 10 plate washers.

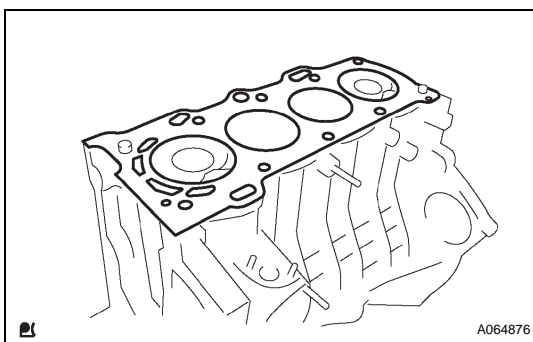
**NOTICE:**

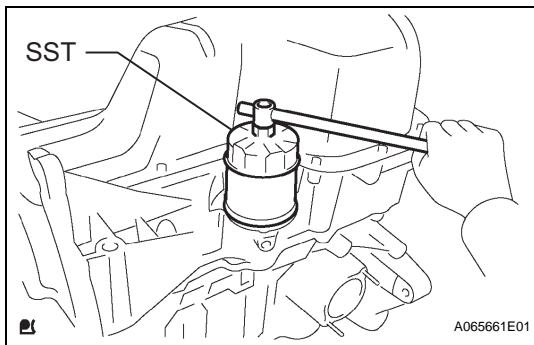
- Be careful not to drop the plate washers into the cylinder head.
- Head warpage or cracking could result from removing the bolts in the wrong order.

- (b) Remove the cylinder head from the cylinder block.

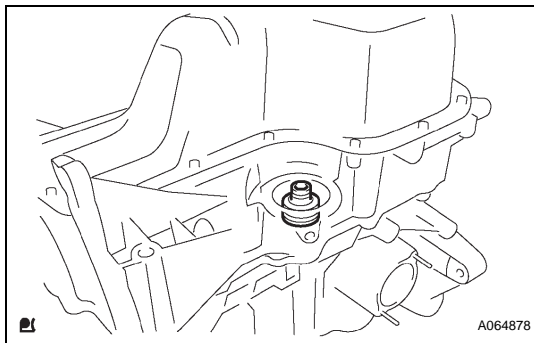
**27. REMOVE CYLINDER HEAD GASKET**

- (a) Remove the cylinder head gasket from the cylinder block.

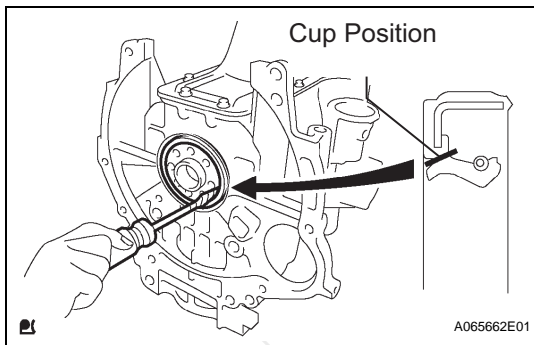


**28. REMOVE OIL FILTER SUB-ASSEMBLY**

- (a) Using SST, remove the oil filter.  
**SST 09228-06501**

**29. REMOVE OIL FILTER UNION**

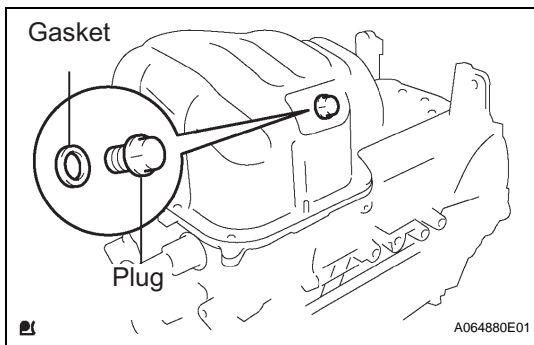
- (a) Using a socket hexagon wrench 12, remove the oil filter union.

**30. REMOVE ENGINE REAR OIL SEAL**

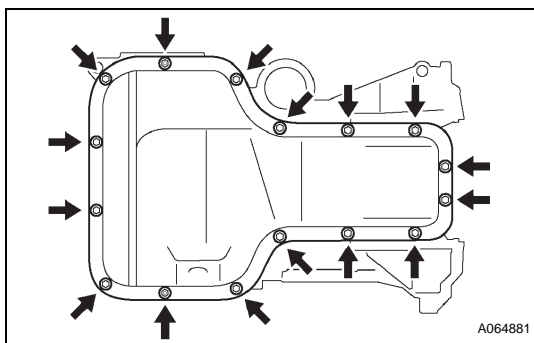
- (a) Using a knife, cut off the oil seal lip.  
 (b) Using a screwdriver with its tip wrapped with tape, pry out the oil seal.

**NOTICE:**

**After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.**

**31. REMOVE OIL PAN DRAIN PLUG**

- (a) Remove the oil pan drain plug and gasket from the oil pan.

**32. REMOVE OIL PAN SUB-ASSEMBLY**

- (a) Remove the 14 bolts and 2 nuts.