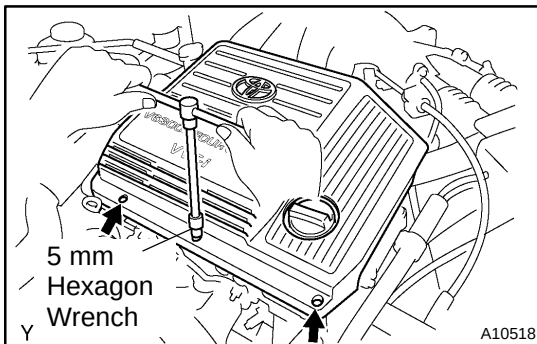


REMOVAL

NOTICE:

Do not remove or install the camshaft timing gear (VVT-i) beside changing VVT-i or the camshaft.

1. REMOVE OUTER FR COWL TOP PANEL ASSEMBLY (See page [BO-35](#))
2. DRAIN ENGINE COOLANT
3. REMOVE RH FENDER APRON SEAL
4. REMOVE GENERATOR DRIVE BELT (See page [CH-7](#))
5. REMOVE PS PUMP (See page [SR-24](#))
6. REMOVE FRONT EXHAUST PIPE (See page [EM-76](#))
7. REMOVE RH ENGINE MOUNTING STAY



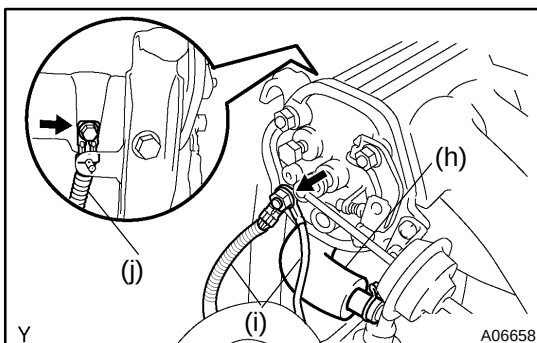
8. REMOVE V-BANK COVER

- (a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.
- (b) Loosen the V-bank cover fastener counterclockwise.
- (c) Remove the V-bank cover.

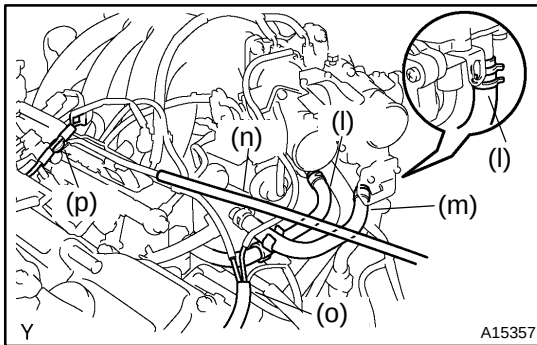
9. REMOVE AIR CLEANER HOSE WITH RESONATOR

10. REMOVE AIR INTAKE CHAMBER ASSEMBLY

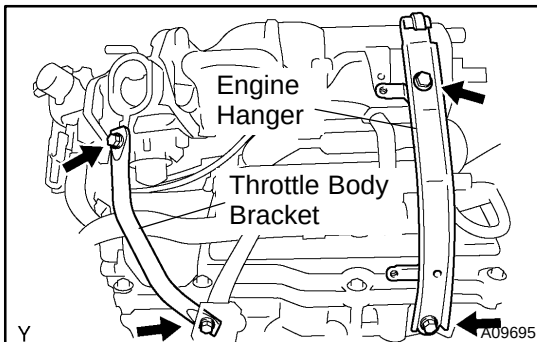
- (a) Disconnect the accelerator cable.
- (b) Disconnect the throttle position sensor connector.
- (c) Disconnect the IAC valve connector.
- (d) Disconnect the No.1 VSV connector for the ACIS.
- (e) Disconnect the No.2 VSV connector for the ACIS.
- (f) Disconnect the VSV connector for the EVAP.
- (g) Remove the 2 nuts, and disconnect the PS pressure tube from the No.1 engine hanger.



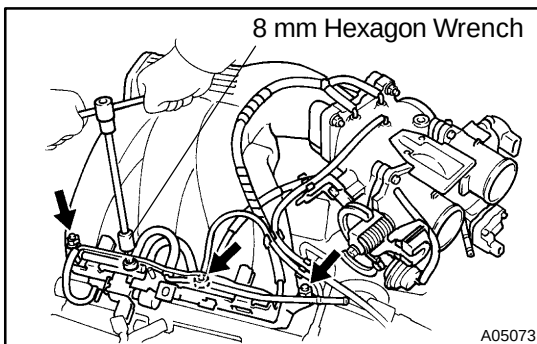
- (h) Disconnect the PCV hose from the PCV valve on the RH cylinder head.
- (i) Disconnect the ground strap and cable from the intake air control valve for the ACIS.
- (j) Disconnect the ground cable from the air intake chamber.
- (k) Disconnect the brake booster vacuum hose from the air intake chamber.



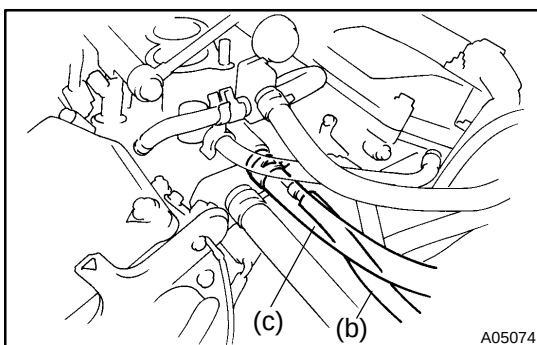
- (l) Disconnect the 2 water bypass hoses from the throttle body.
- (m) Disconnect the air assist hose from the throttle body.
- (n) Disconnect the purge hose from the pipe on the emission control valve set.
- (o) Disconnect the 2 vacuum hoses from the vacuum tank for the ACIS.
- (p) Disconnect the engine wire clamp from the emission control valve set.



- (q) Remove the 2 bolts and No.1 engine hanger.
- (r) Remove the 2 bolts and throttle body bracket.



- (s) Using an 8 mm hexagon wrench, remove the 2 bolts, 2 nuts, the air intake chamber assembly and gasket.



11. REMOVE INTAKE MANIFOLD ASSEMBLY

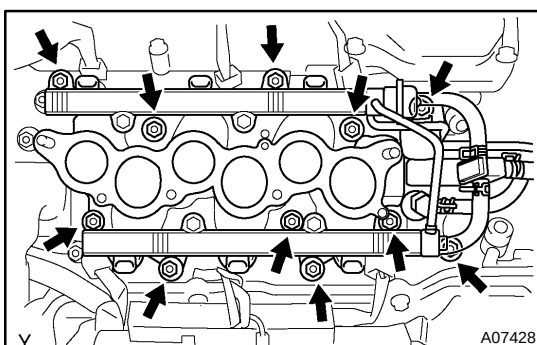
- (a) Disconnect the 6 injector connectors.
- (b) Disconnect the fuel inlet hose from the fuel filter.

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.

(See page [SF-1](#))

- (c) Disconnect the heater hose from the intake manifold.



- (d) Remove the 9 bolts, 2 nuts, 2 plate washers, the intake manifold, delivery pipes and injectors assembly.

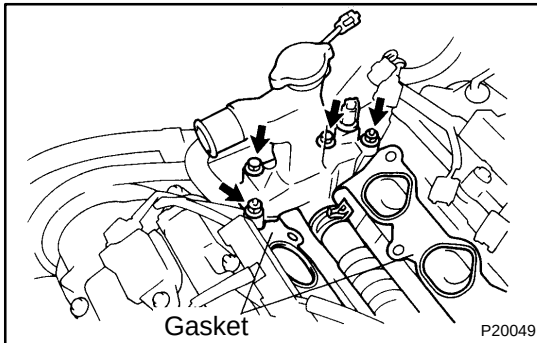
NOTICE:

- Be careful not to drop the injectors when removing the delivery pipes.
- Pay attention to put any hung load on the injector to and from the side direction.

12. REMOVE WATER OUTLET

- (a) Disconnect the ECT sender gauge connector.
- (b) Disconnect the ECT sensor connector.

- (c) Disconnect the ground strap connector.
- (d) Disconnect the upper radiator hose.
- (e) Disconnect the engine coolant reservoir hose.



- (f) Remove the 2 bolts, 2 nuts and 2 plate washers.
- (g) Disconnect the water bypass hose, and remove the water outlet.
- (h) Remove the 2 gaskets.

13. REMOVE IGNITION COILS

14. REMOVE SPARK PLUGS

15. REMOVE TIMING BELT (See page [EM-16](#))

16. REMOVE CAMSHAFT TIMING PULLEYS

(See page [EM-16](#))

17. REMOVE NO.2 IDLER PULLEY (See page [EM-16](#))

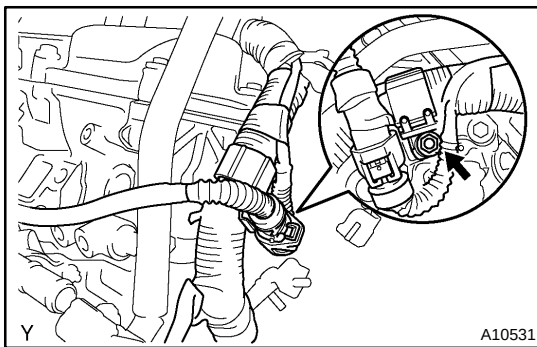
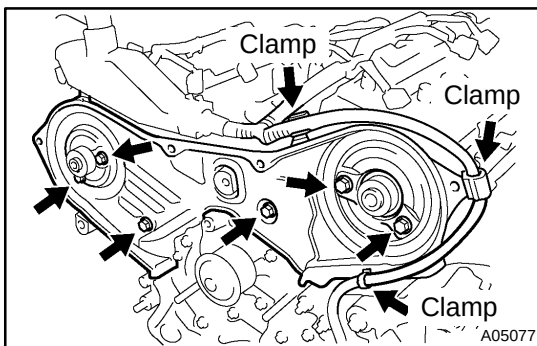
18. REMOVE NO.3 TIMING BELT COVER

- (a) Disconnect the 3 engine wire clamps from the timing belt cover.

- (b) Remove the 6 bolts and timing belt cover.

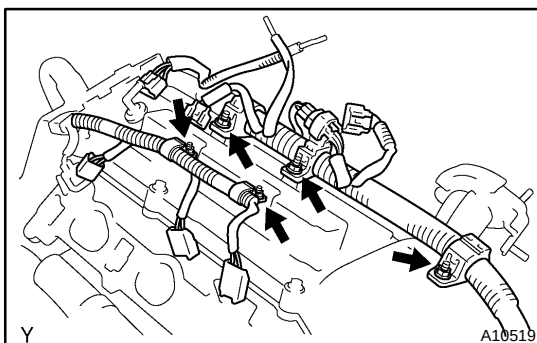
19. REMOVE CAMSHAFT POSITION SENSORS

20. REMOVE CAMSHAFT TIMING OIL CONTROL VALVES



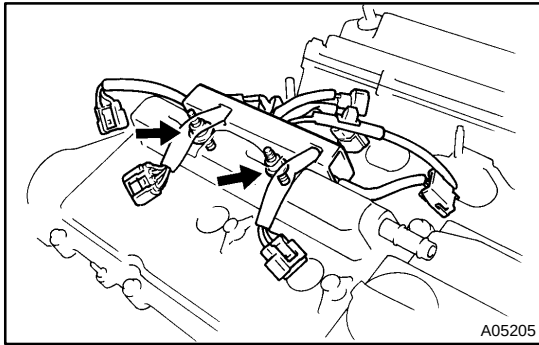
21. DISCONNECT ENGINE WIRE PROTECTOR FROM REAR SIDE

Remove the nut, and disconnect the engine wire protector from the RH cylinder head.



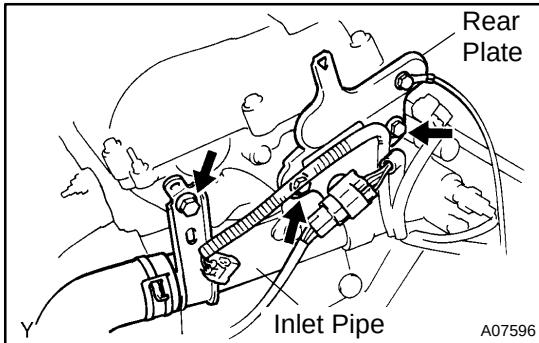
22. DISCONNECT ENGINE WIRE AND PROTECTOR FROM RH SIDE

Remove the 5 nuts, and disconnect the engine wire and protector from the RH cylinder head cover.



23. DISCONNECT ENGINE WIRE PROTECTOR FROM LH SIDE

Remove the 2 bolts, and disconnect the engine wire protector from the LH cylinder head cover.

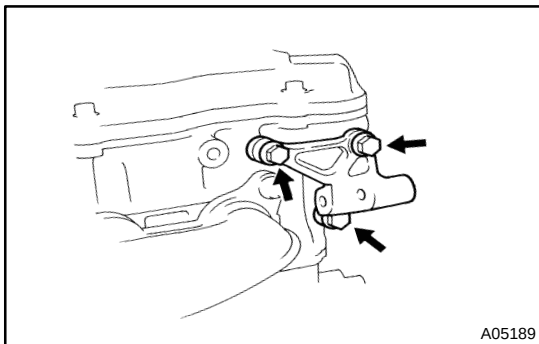


24. DISCONNECT CYLINDER HEAD REAR PLATE FROM LH CYLINDER HEAD

Remove the 2 bolts, and disconnect the rear plate.

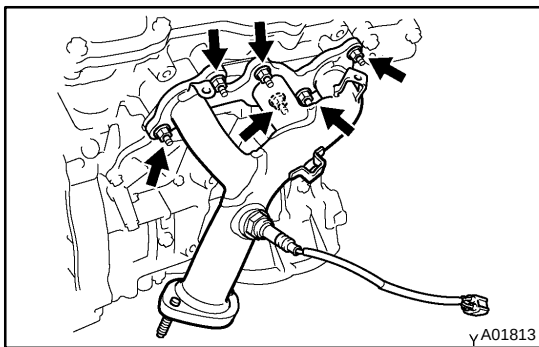
25. DISCONNECT WATER INLET PIPE FROM LH CYLINDER HEAD AND WATER INLET

- Remove the bolt, and disconnect the inlet pipe from the water inlet.
- Remove the O-ring from the inlet pipe.



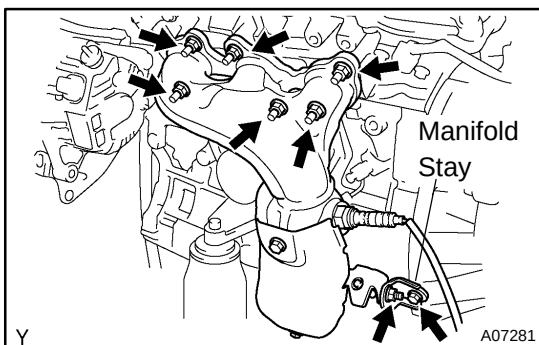
26. REMOVE PS PUMP BRACKET

Remove the 3 bolts and pump bracket.



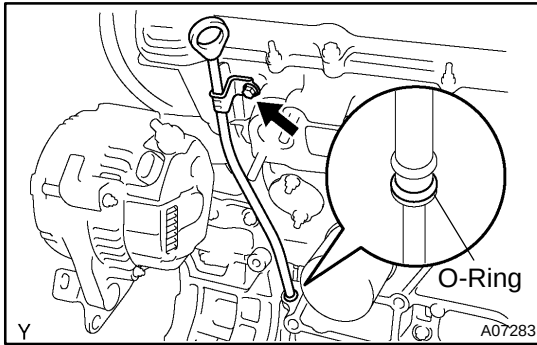
27. REMOVE RH EXHAUST MANIFOLD

- Disconnect the oxygen sensor (bank 1 sensor 1) connector.
- Remove the 3 bolts and heat insulator.
- Remove the 6 nuts, exhaust manifold and gasket.

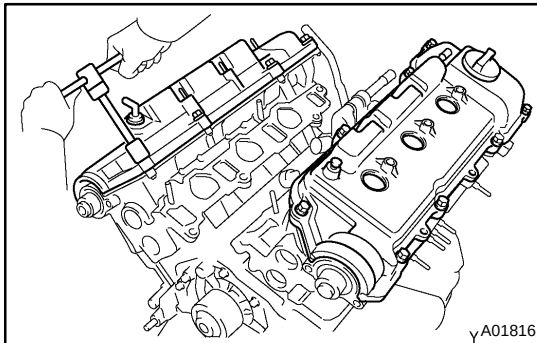


28. REMOVE LH EXHAUST MANIFOLD

- Disconnect the oxygen sensor (bank 2 sensor 1) connector.
- Remove the bolt, nut and exhaust manifold stay.
- Remove the 3 bolts and heat insulator.
- Remove the 6 nuts, exhaust manifold and gasket.

**29. REMOVE OIL DIPSTICK AND GUIDE**

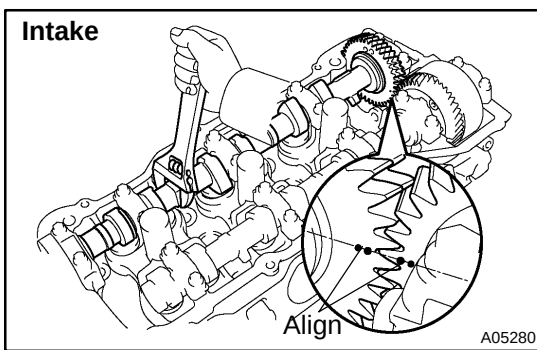
- (a) Remove the bolt holding the dipstick guide to the LH cylinder head.
- (b) Pull out the dipstick guide together with the dipstick from the No.1 oil pan.
- (c) Remove the O-ring from the dipstick guide.

**30. REMOVE CYLINDER HEAD COVERS**

Remove the 8 bolts, cylinder head cover and gasket. Remove the 2 cylinder head covers.

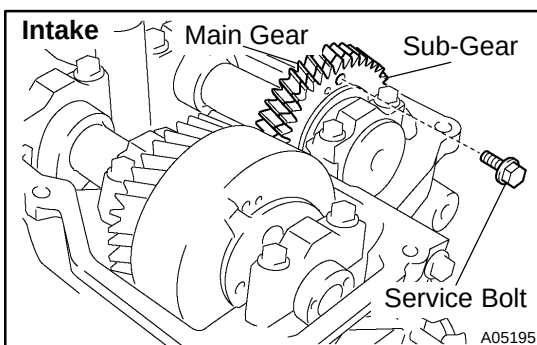
31. REMOVE CAMSHAFTS OF RH CYLINDER HEAD**NOTICE:**

Since the thrust clearance of the camshaft is small, the camshaft must be held 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) Remove the intake camshaft.

- (1) Align the timing marks (2 dot marks) of the camshaft drive and driven gears by turning the camshaft with a wrench.



- (2) Secure the exhaust camshaft sub-gear to the main gear with a service bolt.

Recommended service bolt:

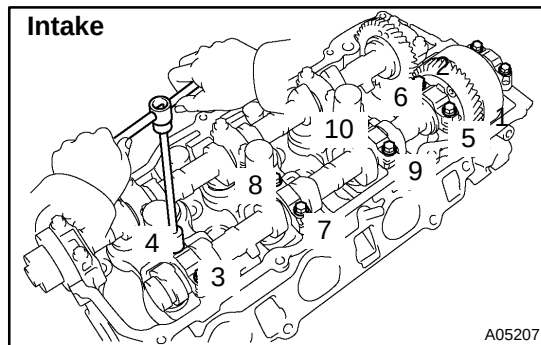
Thread diameter 6 mm

Thread pitch 1.0 mm

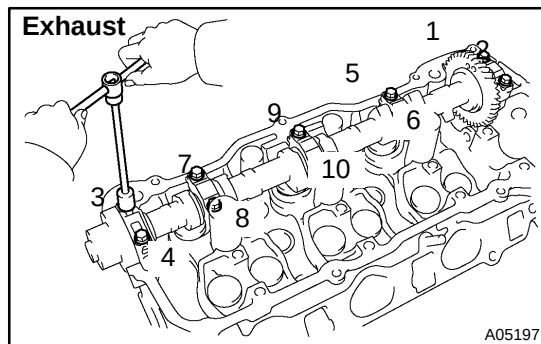
Bolt length 16 - 20 mm

HINT:

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



- (3) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
- (4) Remove the 5 bearing caps and intake camshaft.

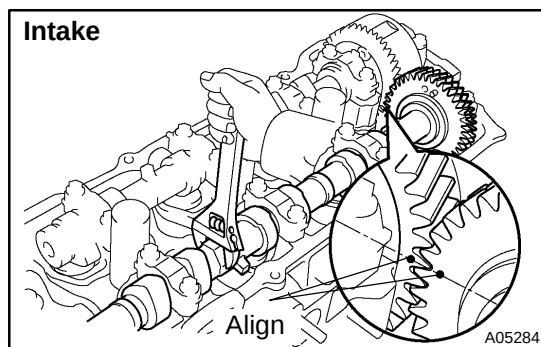


- (b) Remove the exhaust camshaft.
 - (1) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
 - (2) Remove the 5 bearing caps, oil seal and exhaust camshaft.

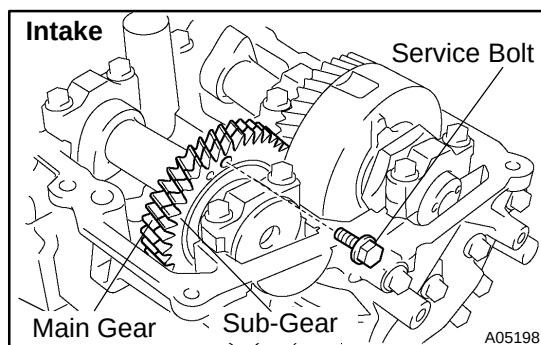
32. REMOVE CAMSHAFTS OF LH CYLINDER HEAD

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be held 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) Remove the intake camshaft.
 - (1) Align the timing marks (1 dot mark) of the camshaft drive and driven gears by turning the camshaft with a wrench.



- (2) Secure the exhaust camshaft sub-gear to the main gear with a service bolt.

Recommended service bolt:

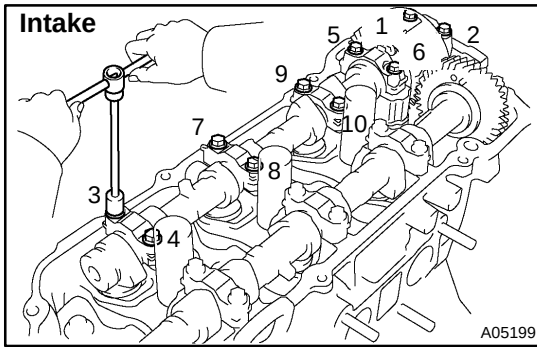
Thread diameter 6 mm

Thread pitch 1.0 mm

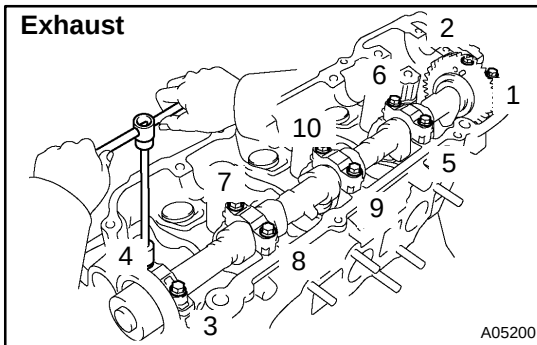
Bolt length 16 - 20 mm

HINT:

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



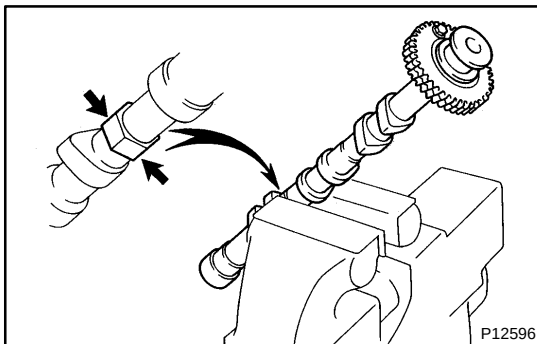
- (b) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
- (c) Remove the 5 bearing caps and intake camshaft.



- (d) Remove the exhaust camshaft
 - (1) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.
 - (2) Remove the 5 bearing caps, oil seal and exhaust camshaft.

HINT:

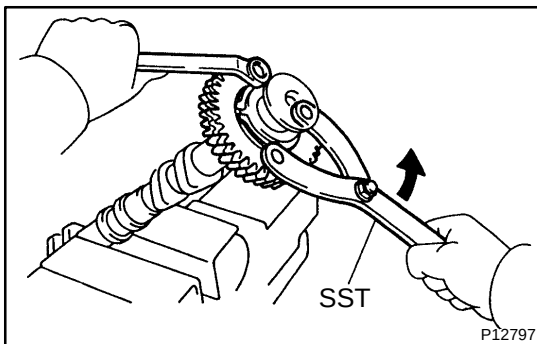
- Arrange the camshafts in the correct order.
- Arrange the bearing caps in the correct order.

**33. DISASSEMBLE EXHAUST CAMSHAFTS**

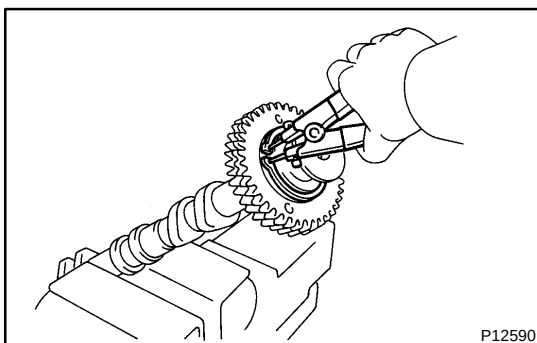
- (a) Mount the hexagonal wrench head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.



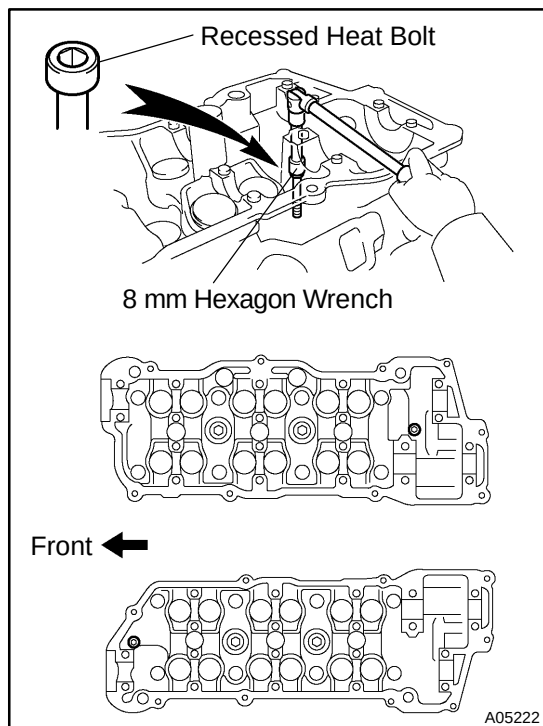
- (b) Using SST, turn the sub-gear counterclockwise, and remove the service bolt.
SST 09960-10010 (09962-01000, 09963-00500)



- (c) Using snap ring pliers, remove the snap ring.
- (d) Remove the wave washer.
- (e) Remove the camshaft sub-gear.
- (f) Remove the camshaft gear spring.

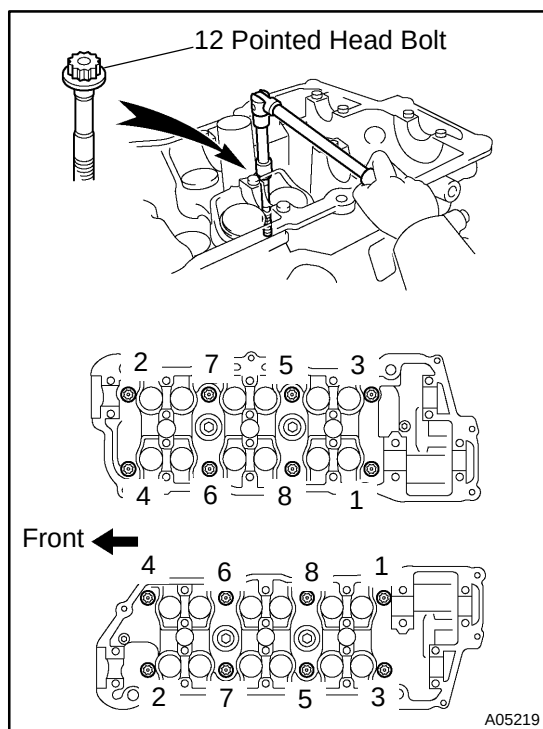
HINT:

Arrange the camshaft sub-gears and gear springs (RH and LH side).



34. REMOVE CYLINDER HEADS

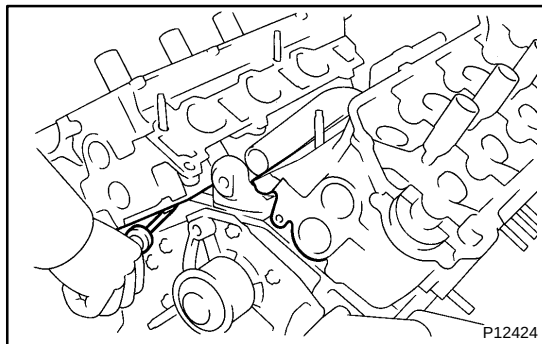
- (a) Using an 8 mm hexagon wrench, remove the cylinder head (recessed head) bolt on each cylinder head, then repeat for the other side, as shown.



- (b) Uniformly loosen and remove the 8 cylinder head (12 pointed head) bolts on each cylinder head, in several passes, in the sequence shown, then repeat for the other side, as shown. Remove the 16 cylinder head bolts and plate washers.

NOTICE:

Head warpage or cracking could result from removing bolts in an incorrect order.



- (c) 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 difficult to 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.