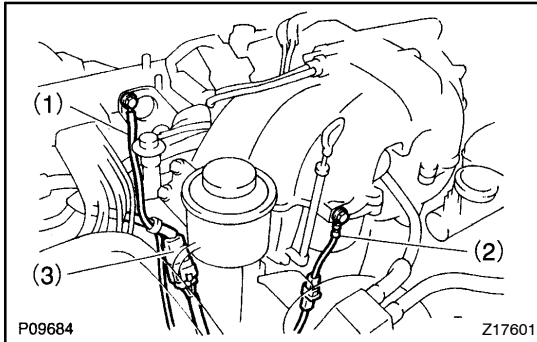


REMOVAL

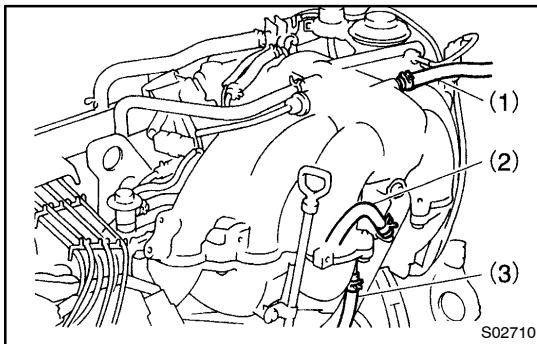
1. **DRAIN ENGINE COOLANT**
2. **REMOVE BATTERY AND BATTERY TRAY**
3. **REMOVE AIR CLEANER HOSE AND CAP**
4. **DISCONNECT CABLES**
 - (a) Disconnect the cruise control actuator cable.
 - (b) Disconnect the accelerator cable.
 - (c) Disconnect the throttle cable.



5. DISCONNECT GROUND STRAPS AND CONNECTOR

Disconnect the ground straps and connector:

- (1) Ground strap from No.1 engine hanger
- (2) Ground strap from air intake chamber
- (3) Connector on intake manifold



6. DISCONNECT HOSES

Disconnect these hoses:

- (1) Brake booster vacuum hose
- (2) EVAP hose
- (3) Fuel return hose

7. DISCONNECT HEATER HOSES

8. DISCONNECT ENGINE WIRE AND HEATER VALVE FROM COWL PANEL (See page [EM-67](#))

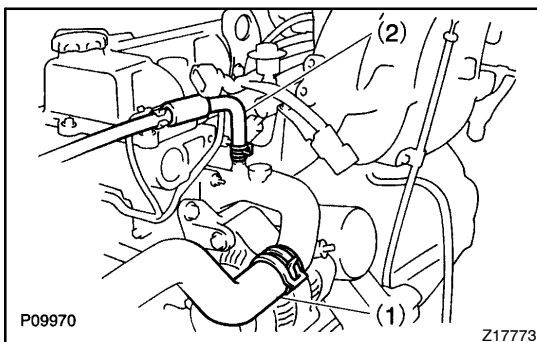
9. REMOVE NO.2 AND NO.3 CYLINDER HEAD COVERS

Remove the 4 bolts and head covers.

10. REMOVE DISTRIBUTOR WITH HIGH-TENSION CORDS (See page [IG-1](#))

11. DISCONNECT PS RESERVOIR FROM AIR INTAKE CHAMBER

Remove the 3 bolts, and disconnect the reservoir.



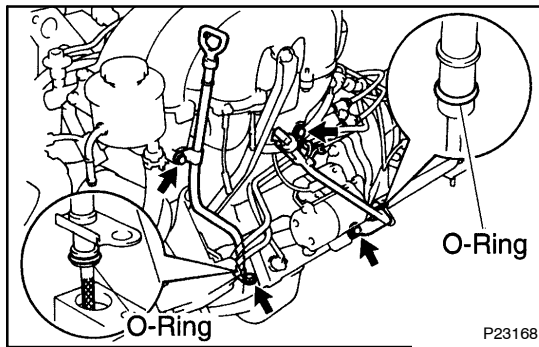
12. DISCONNECT HOSES

Disconnect these hoses:

- (1) Radiator inlet hose
- (2) No.3 water bypass hose

13. REMOVE GENERATOR (See page [CH-6](#))

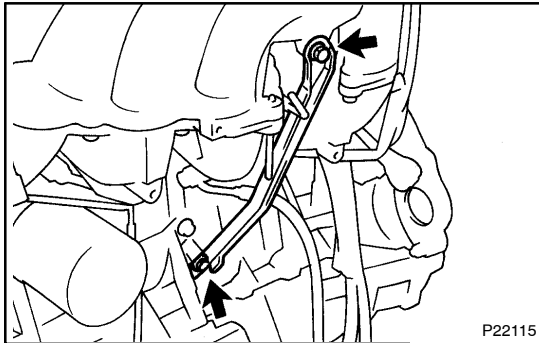
14. REMOVE THROTTLE BODY (See page [SF-41](#))

**15. REMOVE OIL DIPSTICK AND GUIDE FOR ENGINE**

- (a) Remove the 2 bolts.
- (b) Pull out the dipstick together with dipstick guide.
- (c) Remove the O-ring from the dipstick guide.

16. REMOVE OIL DIPSTICK AND GUIDE FOR A/T

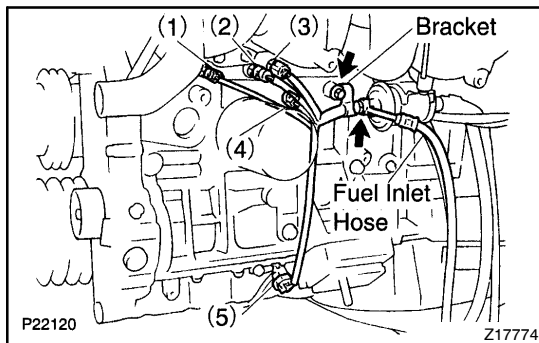
- (a) Remove the 2 bolts.
- (b) Pull out the dipstick together with dipstick guide.
- (c) Remove the O-ring from the dipstick guide.

**17. REMOVE INTAKE MANIFOLD STAY**

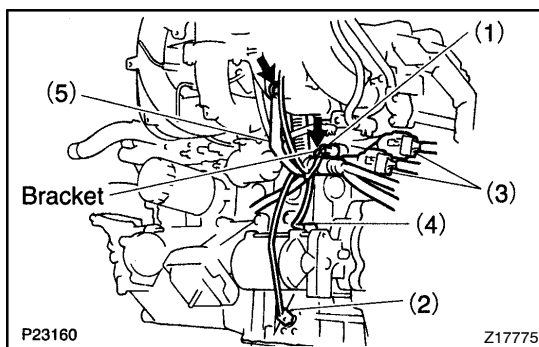
Remove the 2 bolts and intake manifold stay.

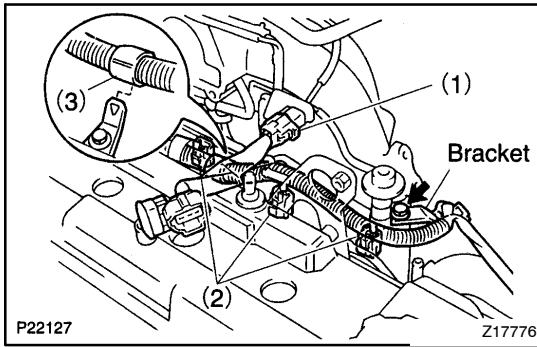
18. DISCONNECT FUEL INLET HOSE

Remove the union bolt and 2 gaskets, and disconnect the fuel inlet hose from the fuel filter.

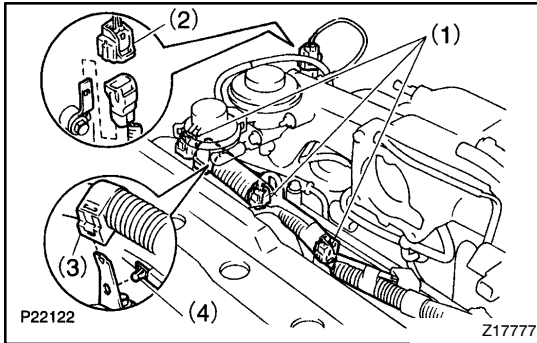
**19. DISCONNECT ENGINE WIRE**

- (a) Disconnect these connectors:
 - (1) ECT sender gauge connector
 - (2) ECT cut switch connector
 - (3) ECT sensor connector
 - (4) Knock sensor 1 connector
 - (5) Crankshaft position sensor connector
- (b) Remove the bolt, and disconnect the engine wire bracket from the cylinder block.
- (c) Disconnect the connectors and cable:
 - (1) Knock sensor 2 connector
 - (2) Oil level sensor connector
 - (3) 2 connectors from transmission
 - (4) Starter connector
 - (5) Ground cable
- (d) Disconnect the heated oxygen sensor (bank 1 sensor 1, 2) connectors.
- (e) Disconnect the PNP switch connector.
- (f) Remove the bolt, and disconnect the engine wire bracket from the intake manifold and cylinder block.
- (g) Disconnect the PCV hose from the PCV valve.
- (h) Remove the bolt, and disconnect the engine wire bracket from the intake manifold.

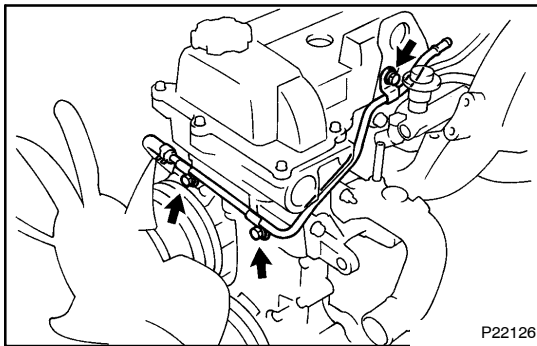




- (i) Disconnect the connectors and clamp:
- (1) Connector for emission control valve set assembly
 - (2) 3 injector connectors
 - (3) Engine wire clamp from bracket



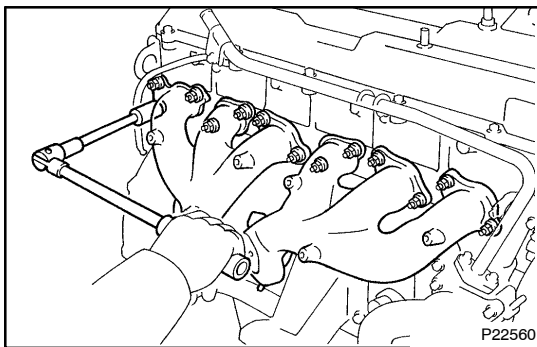
- (j) Disconnect these connectors and clamps:
- (1) 3 injector connectors
 - (2) EGR gas temperature sensor connector
 - (3) Engine wire clamp from bracket
 - (4) Clamp of No.6 injector wire from bracket
- (k) Disconnect the engine wire from the cylinder head and intake manifold.



20. DISCONNECT NO.2 WATER BYPASS PIPE

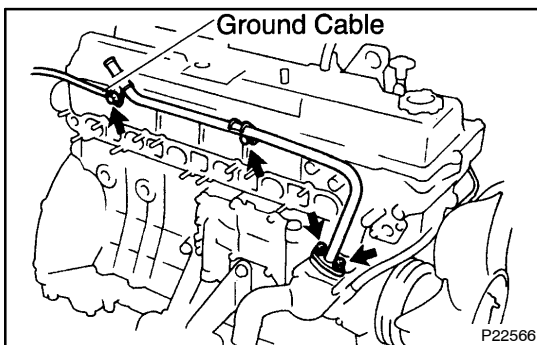
Remove the 3 bolts, and disconnect the bypass pipe from the cylinder head.

21. REMOVE FRONT EXHAUST PIPE (See page [EM-67](#))



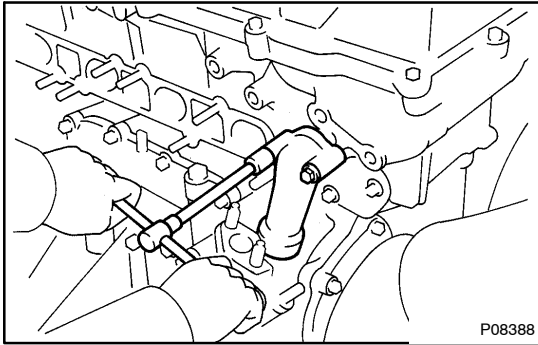
22. REMOVE NO.1 AND NO.2 EXHAUST MANIFOLDS

- (a) Remove the 3 bolts and No.1 heat insulator.
- (b) Remove the 3 bolts and No.2 heat insulator.
- (c) Remove the 6 nuts, No.1 exhaust manifold and gasket.
- (d) Remove the 7 nuts, No.2 exhaust manifold and gasket.

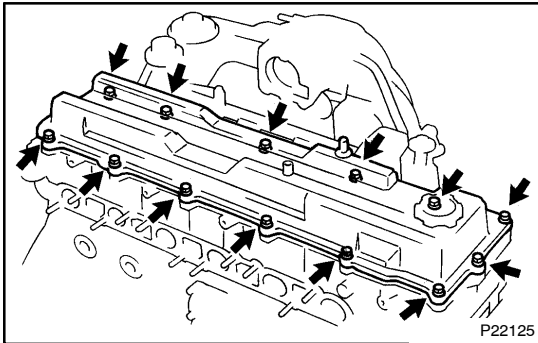


23. REMOVE HEATER PIPE

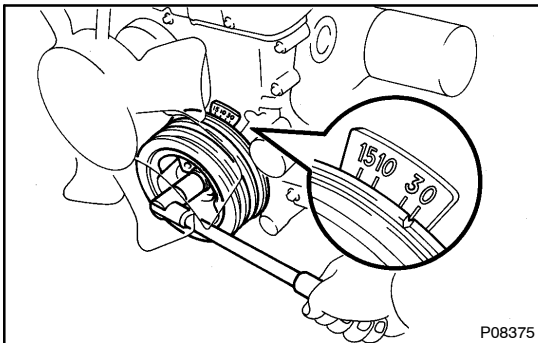
Remove the 2 bolts, 2 nuts, ground cable, heater pipe and gasket.

**24. REMOVE WATER BYPASS OUTLET AND PIPE**

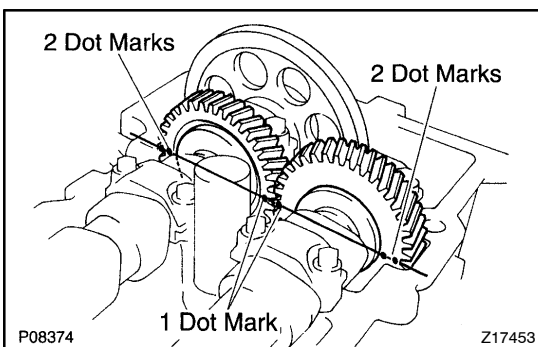
- (a) Remove the 2 bolts and water bypass outlet and pipe.
- (b) Remove the 3 O-rings from the water bypass outlet and pipe.

**25. REMOVE CYLINDER HEAD COVER**

- (a) Disconnect the PCV hose from the PCV valve.
- (b) Remove the 13 bolts, cylinder head cover and gasket.

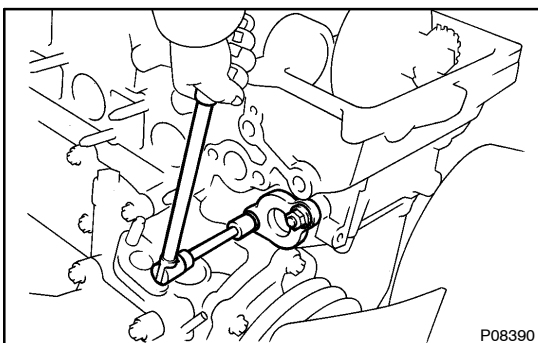
26. REMOVE SPARK PLUGS**27. SET NO.1 CYLINDER TO TDC/COMPRESSION**

- (a) Turn the crankshaft pulley, and align its groove with timing mark "0" of the timing chain cover.

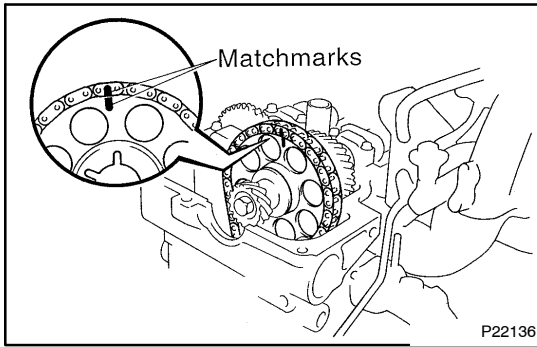


- (b) Check that the timing marks (1 and 2 dots) of the camshaft drive and driven gears are in straight line on the cylinder head surface as shown in the illustration.

If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

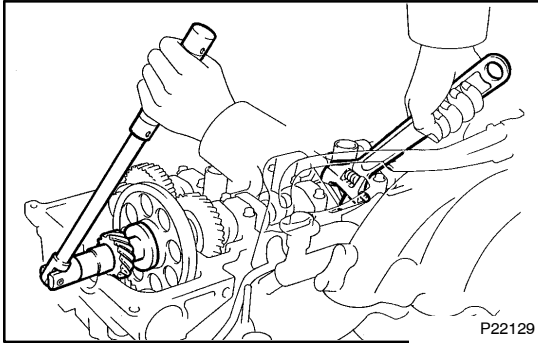
**28. REMOVE CHAIN TENSIONER**

Remove the 2 nuts, chain tensioner and gasket.

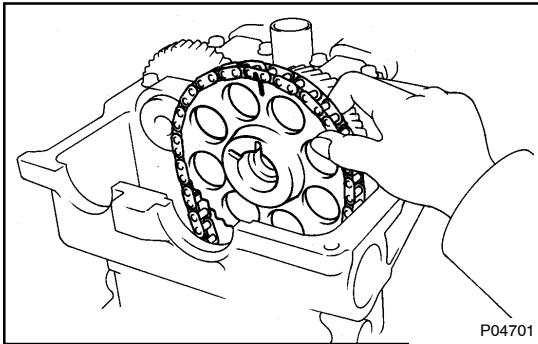


29. REMOVE CAMSHAFT TIMING GEAR

- (a) Remove the semi-circular plug.
- (b) Place the matchmarks on the camshaft timing gear and timing chain.



- (c) Hold the intake camshaft with a wrench, remove the bolt and distributor gear.



- (d) Remove the camshaft timing gear and chain from the intake camshaft, and leave on the slipper and damper.

30. 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.

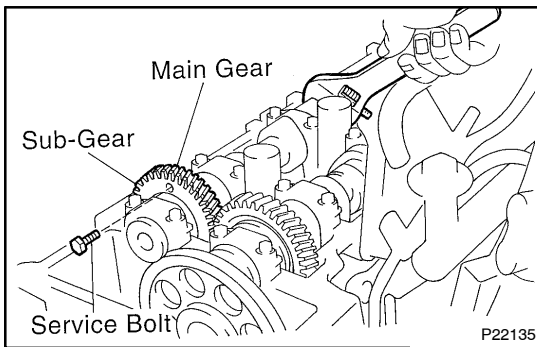
- (a) Remove the exhaust camshaft.
 - (1) Bring the service bolt hole of the driven sub-gear upward by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.
 - (2) Secure the exhaust camshaft sub-gear to the main gear with a service bolt.

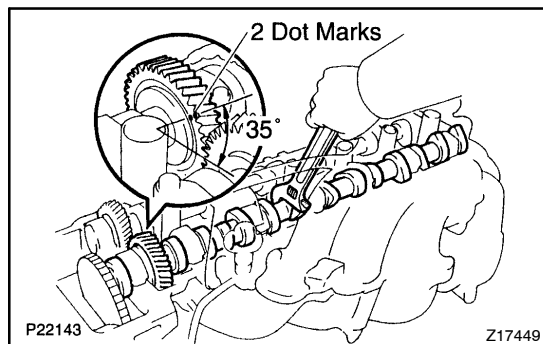
Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm (0.63 – 0.79 in.)

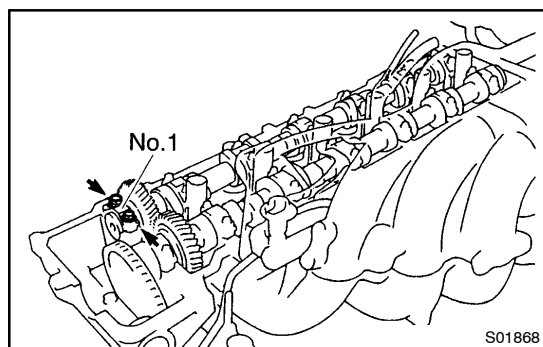
HINT:

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

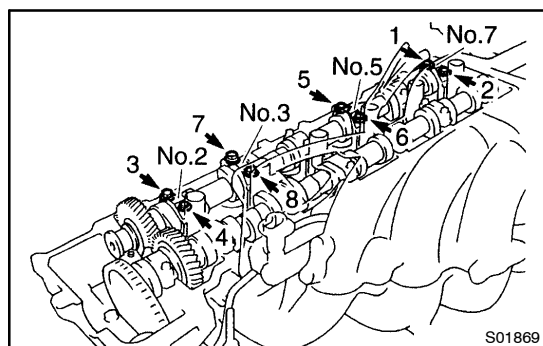




- (1) Set the timing mark (2 dot marks) of the camshaft drive gear at approx. 35° angle by turning the hexagon wrench head portion of the intake camshaft with a wrench.



- (2) Lightly push the camshaft towards the rear without applying excessive force.
- (3) Loosen and remove the 2 No.1 bearing cap bolts, alternately on the left and right sides in several passes.
- (4) Remove the No.1 bearing cap.

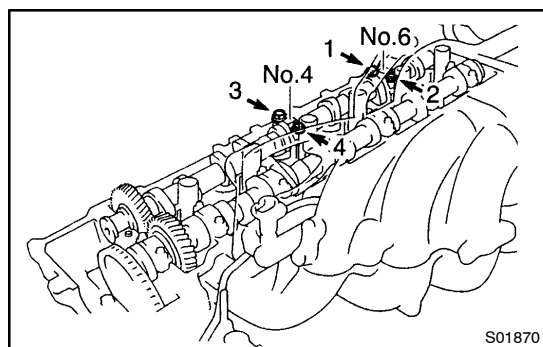


- (5) Uniformly loosen and remove the 8 bolts on the No.2, No.3, No.5 and No.7 bearing caps in several passes, in the sequence shown.

NOTICE:

Do not remove the No.4 and No.6 bearing cap bolts at this stage.

- (6) Remove the No.2, No.3, No.5 and No.7 bearing caps.



- (7) Uniformly loosen and remove the 4 bolts on the No.4 and No.6 bearing caps in several passes, in the sequence shown.

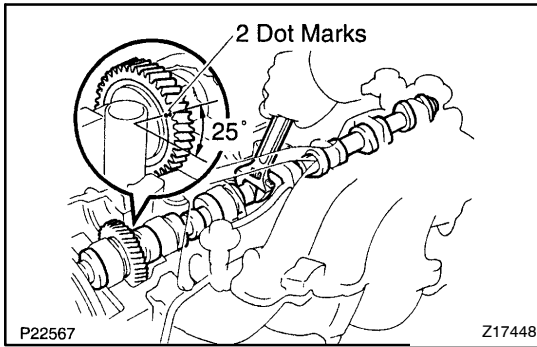
HINT:

- As the 4 bolts on the No.4 and No.6 bearing caps are loosened, make sure that the camshaft is lifted out straight and level.
- If the camshaft is not being lifted out straight and level, retighten the 4 bolts on the No.4 and No.6 bearing caps. Then reverse the order of above steps from (i) to (e) and repeat steps from (c) to (i) once again.

NOTICE:

Do not pry on or attempt to force the camshaft with a tool or other object.

- (8) Remove the No.4, No.6 bearing caps and exhaust camshaft.

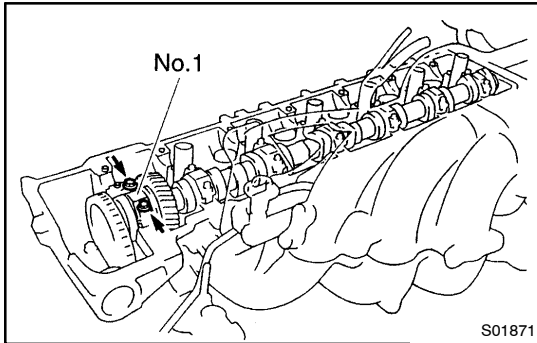


(b) Remove the intake camshaft.

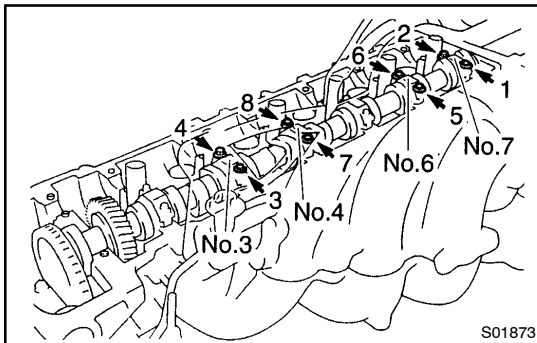
- (1) Set the timing mark (2 dot marks) of the camshaft drive gear at approx. 25° angle by turning the hexagon wrench head portion of the camshaft with a wrench.

HINT:

The above angle arrows the No.1 and No.4 cylinder cam lobes of the intake camshaft to push their valve lifters evenly.



- (2) Lightly push the intake camshaft towards the front without applying excessive force.
- (3) Loosen and remove the No.1 bearing cap bolts, alternately on the left and right sides in several passes.
- (4) Remove the No.1 bearing cap.

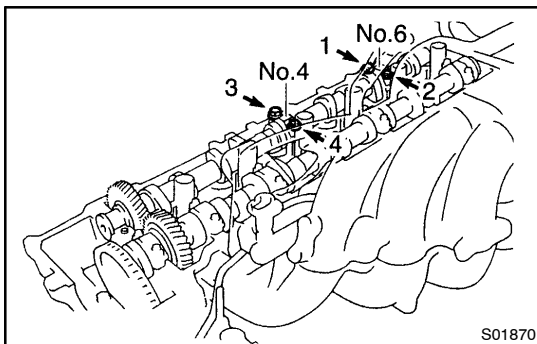


- (5) Uniformly loosen and remove the 8 bolts on the No.3, No.4, No.6 and No.7 bearing caps in several passes, in the sequence shown.

NOTICE:

Do not remove the No.2 and No.5 bearing cap bolts at this stage.

- (6) Remove the No.3, No.4, No.6 and No.7 bearing caps.



- (7) Uniformly loosen and remove the 4 bolts on the No.2 and No.5 bearing cap in several passes, in the sequence shown.

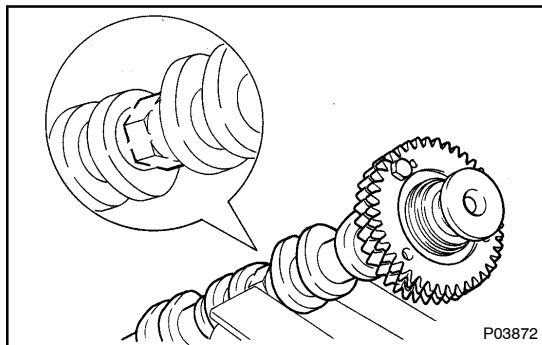
HINT:

- As the 4 bolts on the No.2 and No.5 bearing caps are loosened, make sure that the camshaft is lifted out straight and level.
- If the camshaft is not being lifted out straight and level, retighten the 4 bolts on the No.2 and No.5 bearing caps. Then reverse the order of above steps from (g) to (c) and repeat steps from (a) to (g) once again.

NOTICE:

Do not pry on or attempt to force the camshaft with a tool or other object.

- (8) Remove the No.2, No.5 bearing caps and intake camshaft.

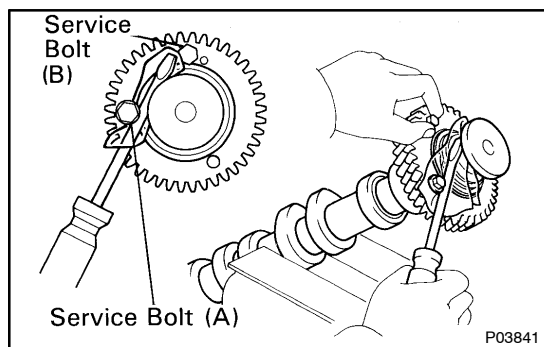


31. DISASSEMBLE EXHAUST CAMSHAFT

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

NOTICE:

Be careful not to damage the camshaft.

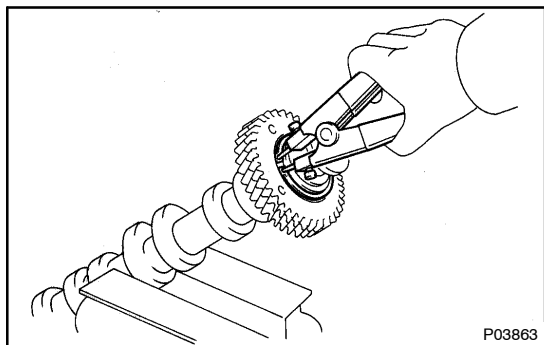


- (b) Insert a service bolt (A) into the service hole of the camshaft sub-gear.

- (c) Using a screwdriver, turn the sub-gear clockwise, and remove the service bolt (B).

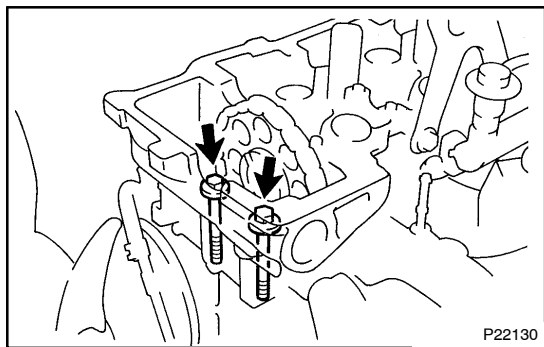
NOTICE:

Be careful not to damage the camshaft.



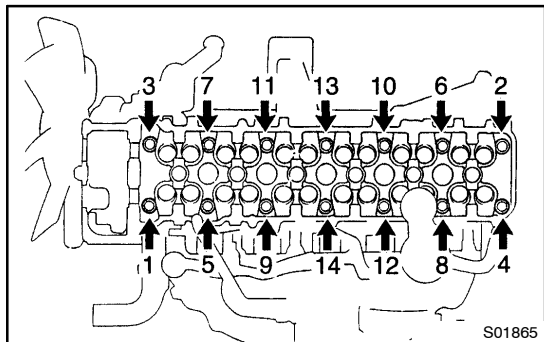
- (d) Using snap ring pliers, remove the snap ring.

- (e) Remove the wave washer, camshaft sub-gear and camshaft gear spring.



32. REMOVE CYLINDER HEAD ASSEMBLY

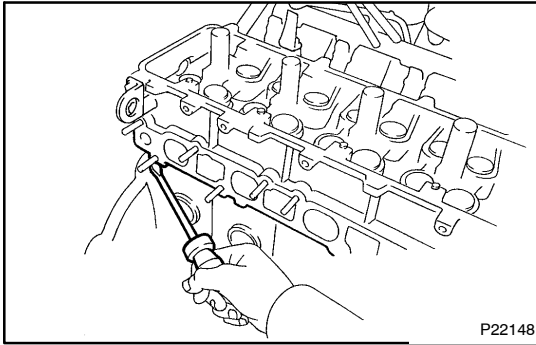
- (a) Remove the 2 bolts on front side of the cylinder head.



- (b) Uniformly loosen and remove the 14 cylinder head bolts in several passes, in the sequence shown.

NOTICE:

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



- (c) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head 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.