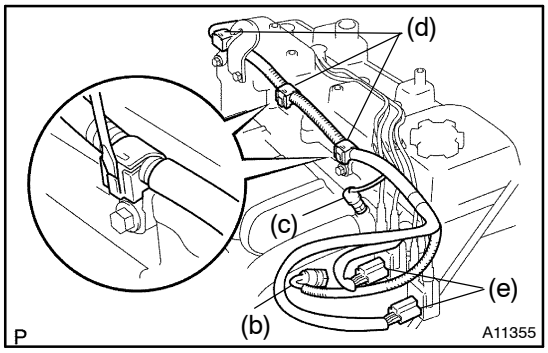
EM152–01

# REMOVAL

**1. DRAIN ENGINE COOLANT**

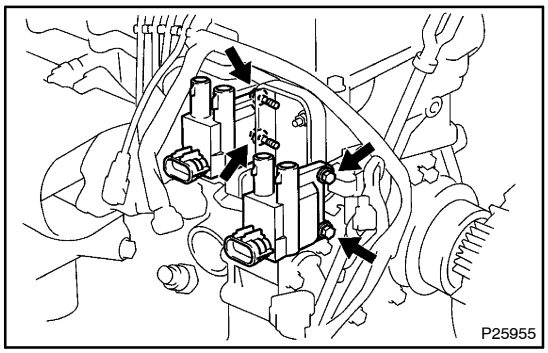
**2. REMOVE OIL DIPSTICK GAUIDE**

**3. REMOVE PCV HOSES**




**4. DISCONNECT ENGINE WIRE**

(a) Disconnect the A/C compressor connector.
(b) Disconnect the oil pressure sensor connector.
(c) Disconnect the water temp sender gauge connector.
(d) Disconnect the 3 engine wire clamps and engine wire.
(e) Disconnect the ignition coil connectors.



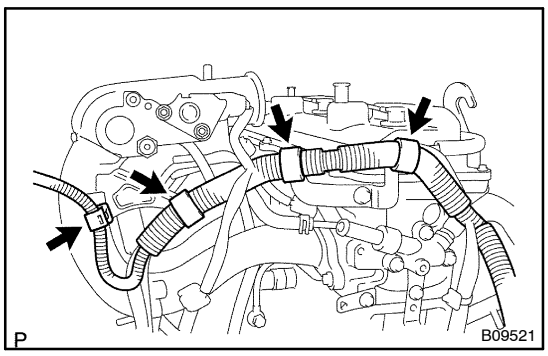

**5. REMOVE IGNITION COILS**

(a) Disconnect high–tension cords at the rubber boot from the cylinder head.

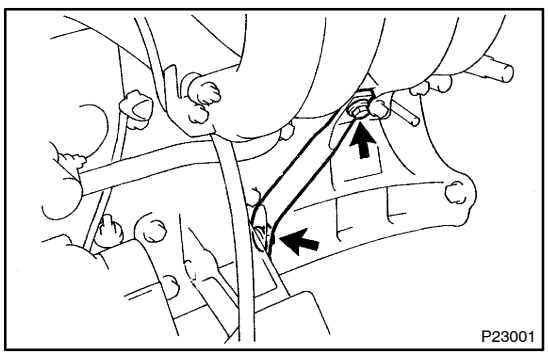
**NOTICE:**

**Pulling on or bending the cords may damage the conductor inside.**

(b) Remove the 4 bolts and 2 ignition coils.

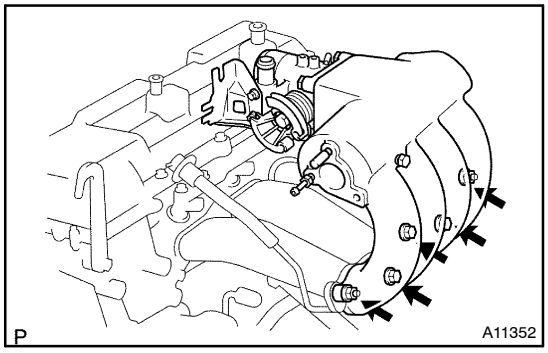



(c) Disconnect the 4 engine wire clamps and engine wire
(d) Disconnect the ISC valve connector.
(e) Disconnect the throttle position sensor connector.
(f) Disconnect the crankshaft position sensor connector.
(g) Disconnect the knock sensor connector
(h) Disconnect the check connector from the bracket.




**6. REMOVE INTAKE CHAMBER STAY**

Remove the 2 bolts and intake chamber stay.




**7. REMOVE AIR INTAKE CHAMBER ASSEMBLY**

(a) Disconnect the brake booster vacuum hose from the union.

(b) Disconnect the water bypass hose from the water bypass pipe.

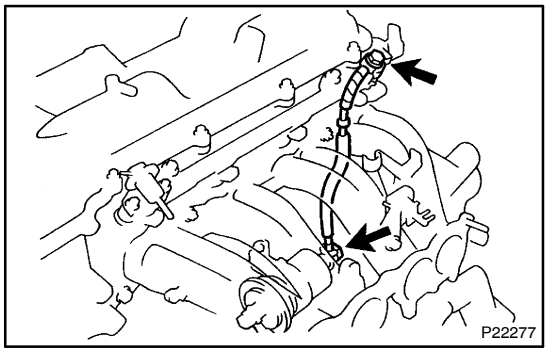
(c) Disconnect the water bypass hose from the cylinder head rear cover.

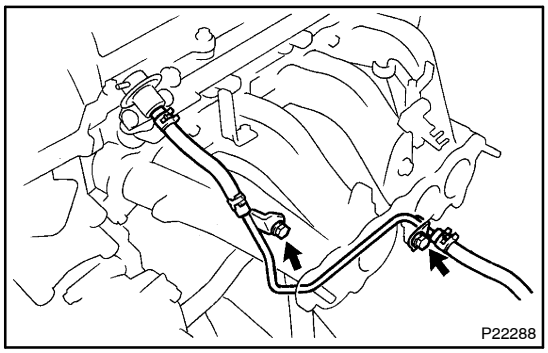
(d) Remove the 3 bolts, 2 nuts, air intake chamber assembly and gasket.

**8. DISCONNECT INJECTOR CONNECTORS**

**9. REMOVE FUEL INLET PIPE**

Remove the 2 union bolts, 4 gaskets and fuel inlet pipe.



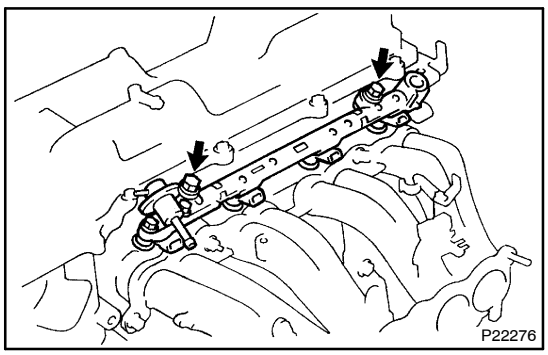




**10. REMOVE FUEL RETURN PIPE**

(a) Disconnect the fuel return hose from the fuel pressure regulator.

(b) Disconnect the fuel return hose from the fuel return pipe.

(c) Remove the 2 bolts and fuel return pipe.

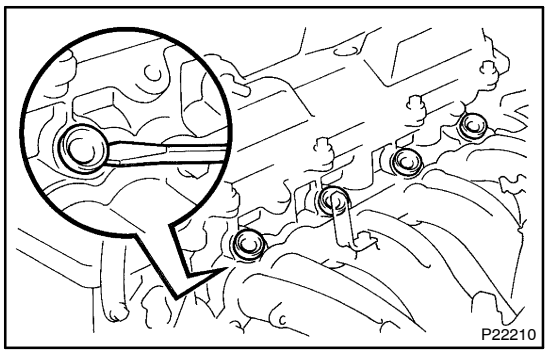



**11. REMOVE DELIVERY PIPE AND INJECTORS**

(a) Remove the 2 bolts and delivery pipe together with the 4 injectors.

**NOTICE:**

**Be careful not to drop the injectors when removing the delivery pipe.**

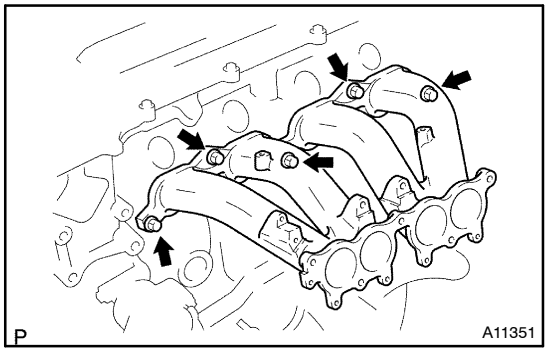



(b) Remove the 4 insulators from the 4 spacers.

(c) Pull out the 4 injectors from the delivery pipe.

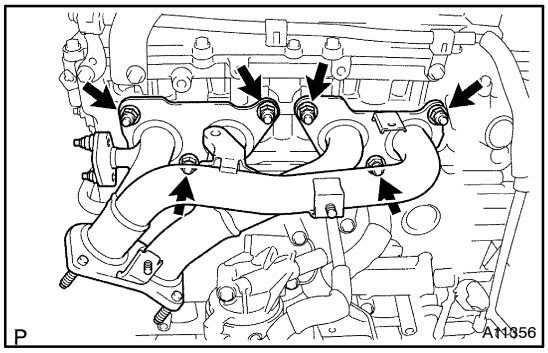
(d) Remove the O–ring and grommet from each injector.

(e) Using a screwdriver, pry out the 4 spacers.




**12. REMOVE INTAKE MANIFOLD**

Remove the 3 bolts, 2 nuts, intake manifold and gasket.




**13. REMOVE EXHAUST MANIFOLD**

(a) Remove the 2 bolts, 2 nuts and heat insulator.

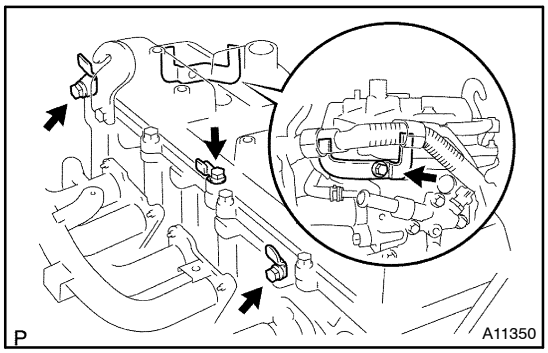
(b) Remove the 6 nuts, exhaust manifold and gasket.

**14. REMOVE WATER OUTLET**

Remove the 2 bolts, water outlet and gasket.

**15. REMOVE CYLINDER HEAD REAR COVER**

Remove the 3 bolts, cylinder head rear cover and gasket.

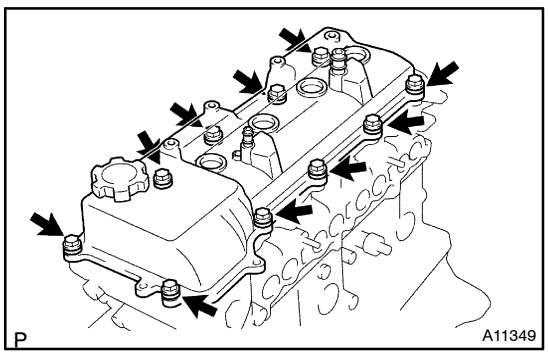



**16. REMOVE SPARK PLUGS**

**17. REMOVE FRONT ENGINE HANGER**

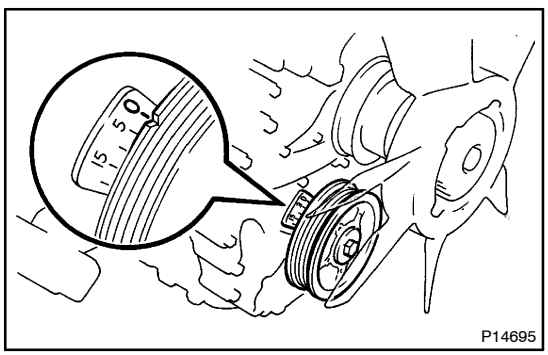
**18. REMOVE ENGINE WIRE BRACKETS**

Remove the 4 bolts and 4 wire brackets.



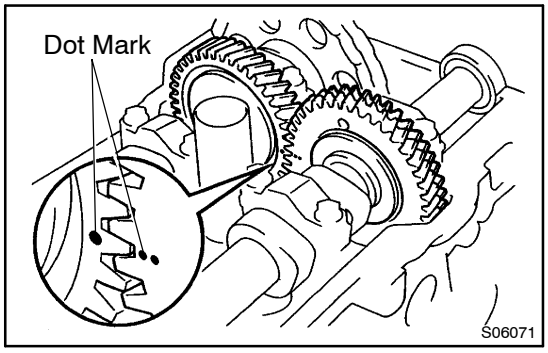

**19. REMOVE CYLINDER HEAD COVER**

Remove the 10 bolts, seal washers, cylinder head cover and gasket.

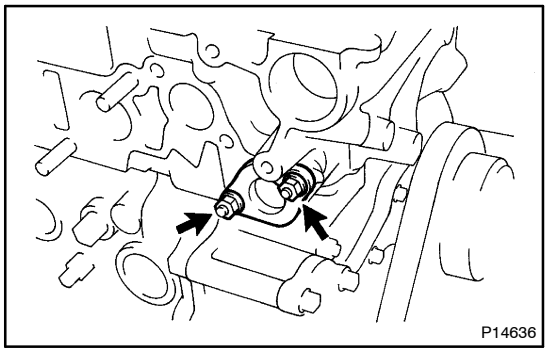



**20. SET NO.1 CYLINDER TO TDC/COMPRESSION**

(a) Turn the crankshaft pulley clockwise and align its groove with the ”0” mark on the timing chain cover.



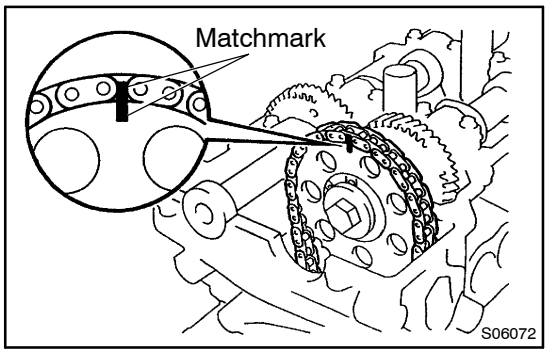

(b) Check that the timing marks (1 and 2 dots) of the camshaft drive and driven gears are in straight line on the cylinder head surface as shown in the illustration. If not, turn the crankshaft 1 revolution (360˚) and align the marks as above.




**21. REMOVE CHAIN TENSIONER**

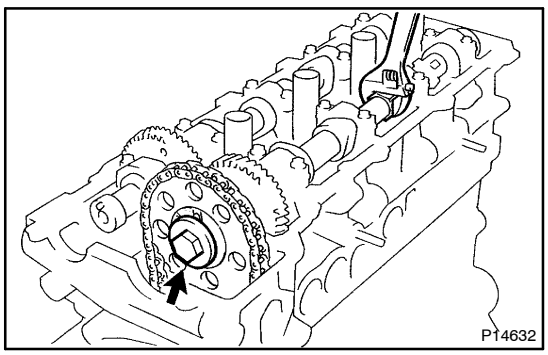
Remove the 2 nuts, chain tensioner and gasket.

**22. REMOVE SEMI–CIRCULAR PLUGS**



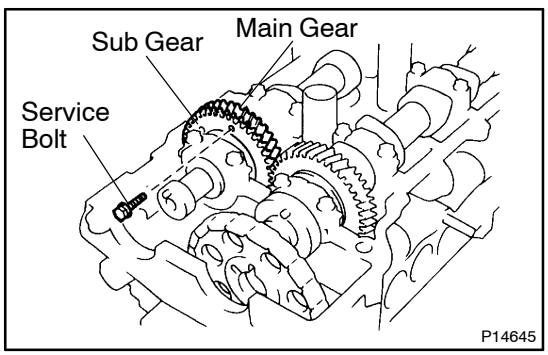

**23. REMOVE CAMSHAFT TIMING GEAR**

(a) Place the matchmarks on the camshaft timing gear and No.1 timing chain.




(b) Hold the intake camshaft with a wrench and remove the bolt.

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




**24. REMOVE CAMSHAFTS**

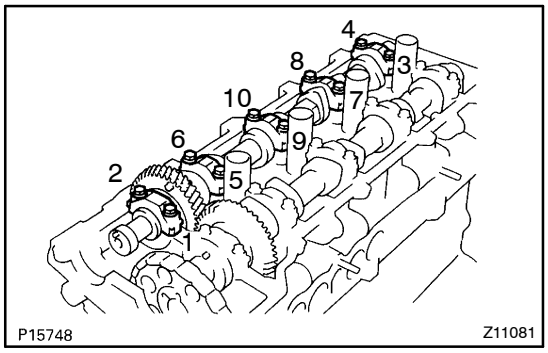
**NOTICE:**

**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, these steps should be carried out.**

(a) 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.

(b) Secure the exhaust camshaft sub–gear to the main gear with a service bolt.

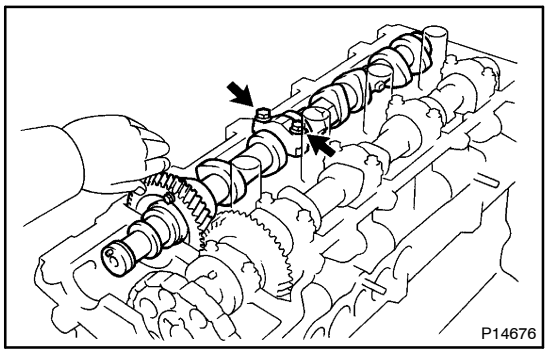
**Recommended service bolt:**
**Thread diameter 6 mm**
**Thread pitch 1.0 mm**
**Bolt length 16 – 20 mm (0.63 – 0.79 in.)**




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

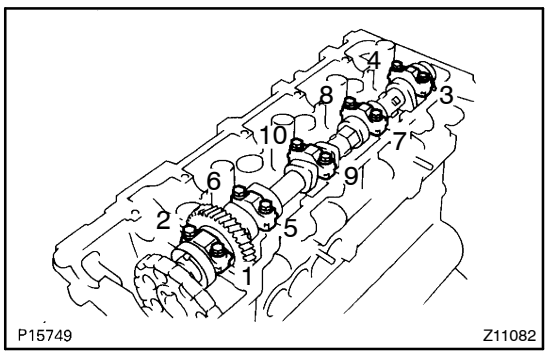
(c) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.

(d) Remove the 5 bearing caps and exhaust camshaft.



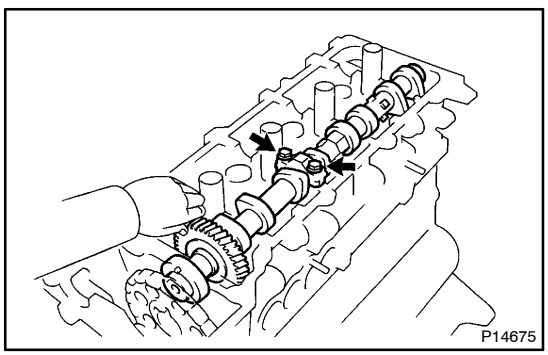

HINT:
If the camshaft is not being lifted out straight and level, reinstall the No.3 bearing cap with the 2 bolts. Then alternately loosen and remove the bearing cap bolts with the camshaft gear pulled up.

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



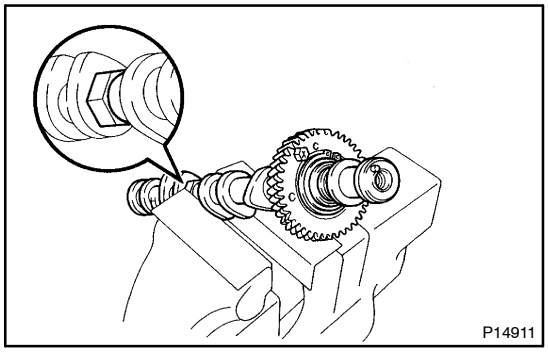

(e) Uniformly loosen and remove the 10 bearing cap bolts, in several passes, in the sequence shown.

(f) Remove the 5 bearing caps and intake camshaft.




HINT:
If the camshaft is not being lifted out straight and level, reinstall the No.3 bearing cap with the 2 bolts. Then alternately loosen and remove the 2 bearing cap bolts with the camshaft gear pulled up.

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

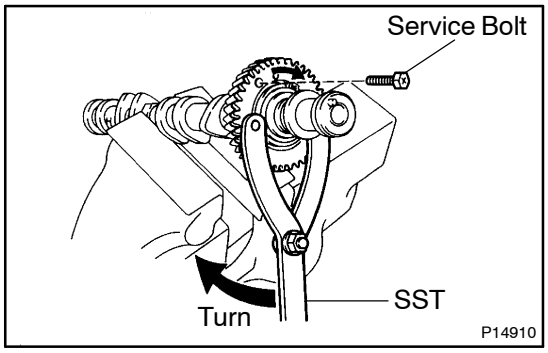



**25. DISASSEMBLE EXHAUST CAMSHAFT**

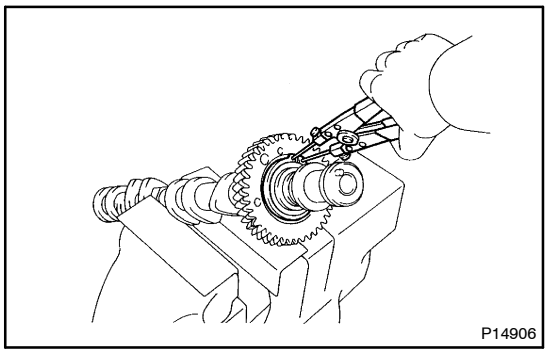
(a) Mount the hexagon wrench head portion of the camshaft in a vise.

**NOTICE:**

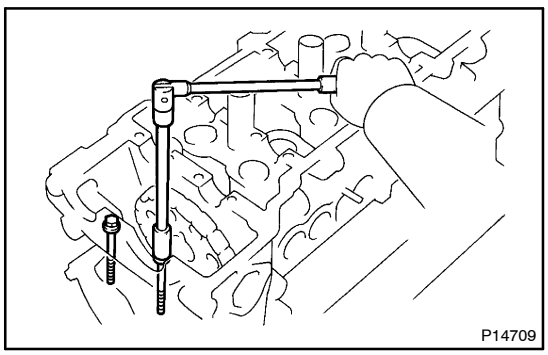
**Be careful not to damage the camshaft.**




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

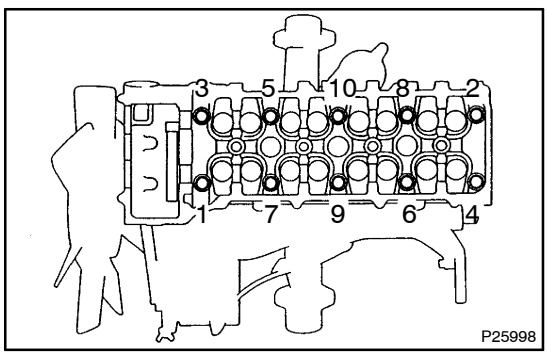



(c) Using snap ring pliers, remove the snap ring.
(d) Remove the wave washer, camshaft sub–gear and camshaft gear spring.




**26. REMOVE CYLINDER HEAD**

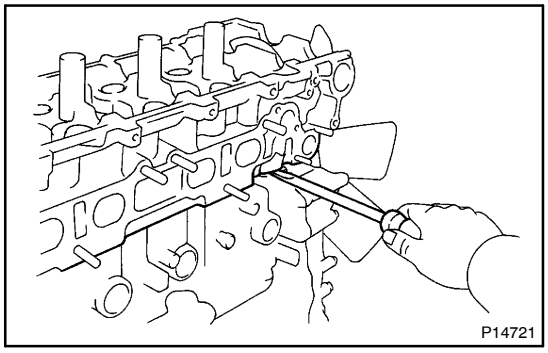
(a) Remove the 2 bolts in front of the head before the other head bolts are removed.




(b) Uniformly loosen and remove the 10 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.**