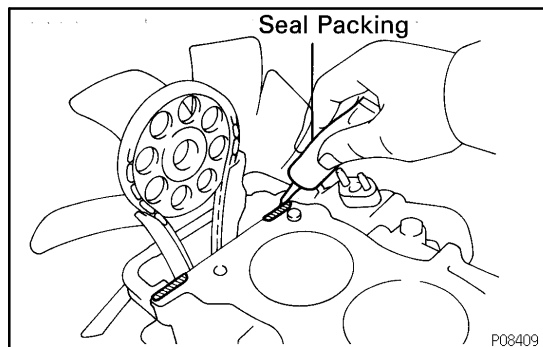




INSTALLATION

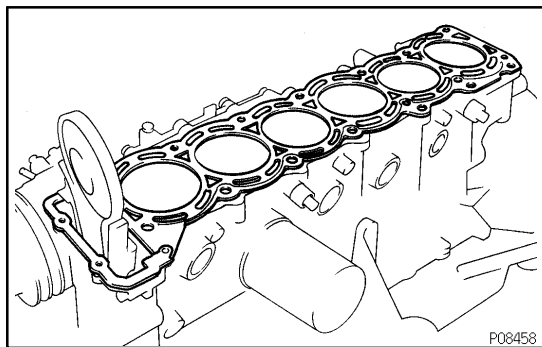
1. INSTALL CYLINDER HEAD AND INTAKE MANIFOLD ASSEMBLY

- (a) Place the cylinder head on the cylinder head.
 - (1) Apply seal packing to the 2 locations as shown.

Seal packing: Part No. 08826-00080 or equivalent

NOTICE:

Do not apply too much seal packing

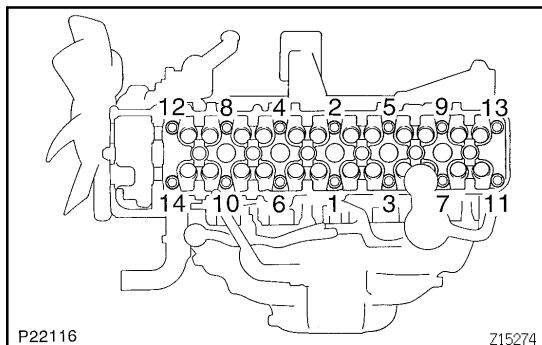


- (2) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be careful of the installation direction.

- (3) Place the cylinder head in position on the cylinder head gasket.



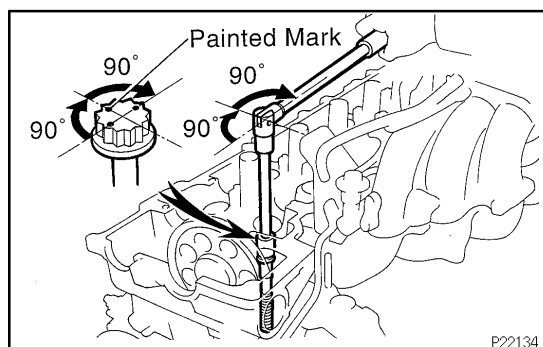
- (b) Install the cylinder head bolts.

HINT:

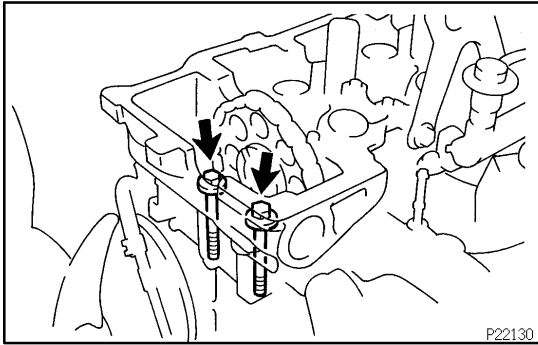
- The cylinder head bolts are tightened in 3 progressive steps (steps (b), (d) and (e)).
 - If any cylinder head bolt is broken or deformed, replace it.
- (1) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.
 - (2) Install and uniformly tighten the 14 cylinder head bolts and plate washers in several passes, in the sequence shown.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

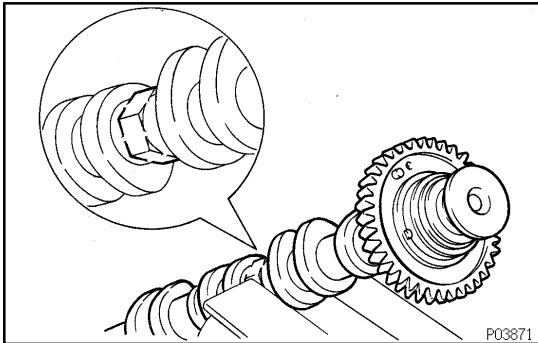
If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



- (3) Mark the front of the cylinder head bolt head with paint.
- (4) Retighten the cylinder head bolts by 90° in the numerical order shown.
- (5) Retighten the cylinder head bolts by an additional 90°.
- (6) Check that the painted mark is now facing rearward.



- (7) Install and torque the 2 mounting bolts.
Torque: 21N·m (210 kgf·cm, 15 ft·lbf)

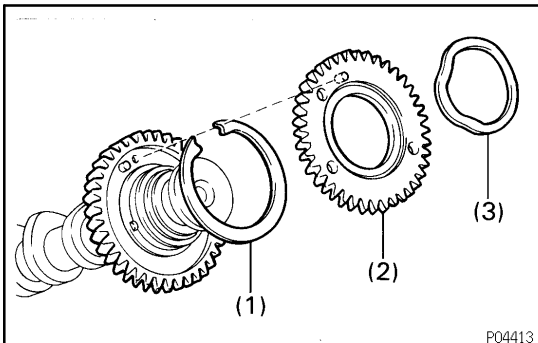


2. ASSEMBLE EXHAUST CAMSHAFT

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

NOTICE:

Be careful not to damage the camshaft.

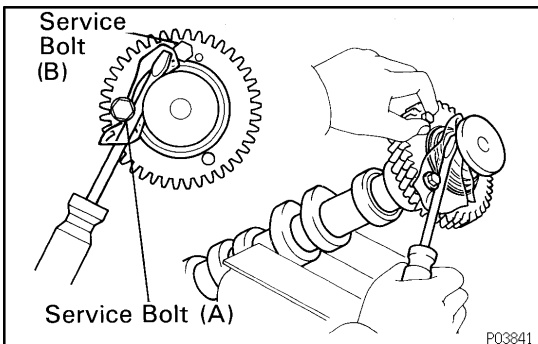


- (b) Install the camshaft gear spring (1), camshaft sub-gear (2) and wave washer (3).

HINT:

Align the pins on the gears with the spring ends.

- (c) Using snap ring pliers, install the snap ring.



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

- (e) Using a screwdriver, align the holes of the camshaft main gear and sub-gear by turning camshaft sub-gear clockwise, and install a service bolt (B).

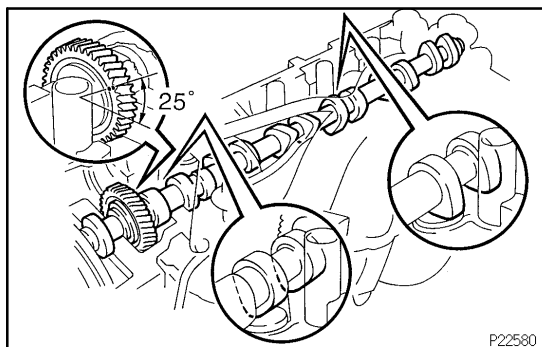
NOTICE:

Be careful not to damage the camshaft.

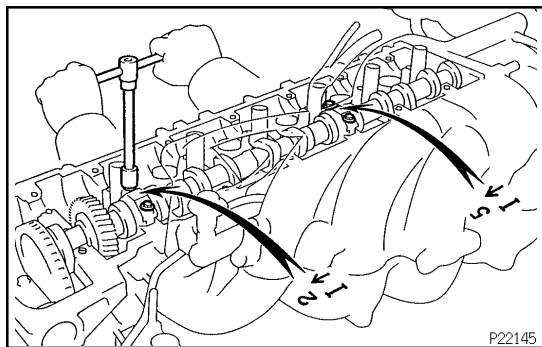
3. INSTALL CAMSHAFTS

NOTICE:

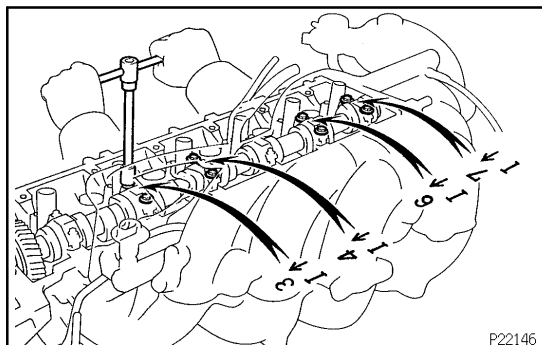
Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following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



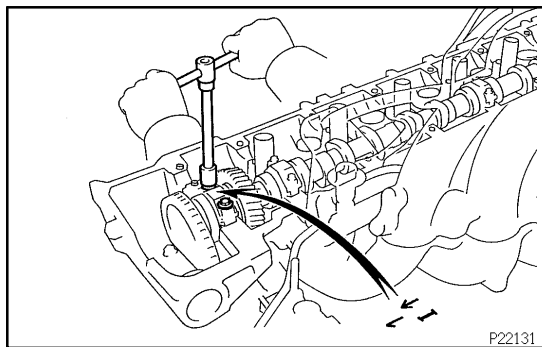
- (a) Install the intake camshaft.
- (1) Apply engine oil to the thrust portion of the intake camshaft.
 - (2) Lightly place the intake camshaft on top of the cylinder head as shown in the illustration so that the No. 1 and No. 4 cylinder cam lobes face downward.
 - (3) Lightly push the camshaft towards the front without applying excessive force.



- (4) Place the No. 2 and No. 5 bearing caps in their proper location.
- (5) Temporarily tighten these bearing cap bolts uniformly and alternately in several passes until the bearing caps are snug with the cylinder head.

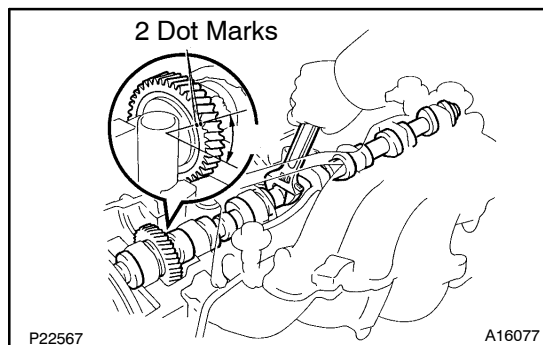


- (6) Place the No. 3, No. 4, No. 6 and No. 7 bearing caps in their proper location.
- (7) Temporarily tighten these bearing cap bolts, alternately tightening the left and right bolts uniformly.

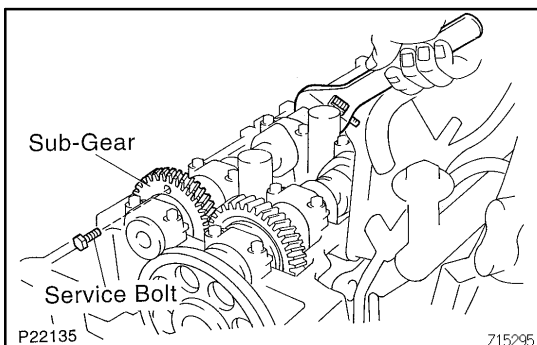
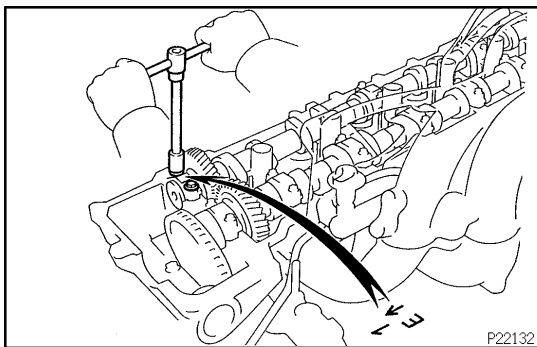
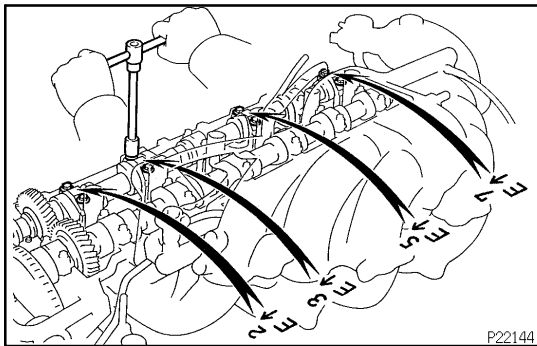
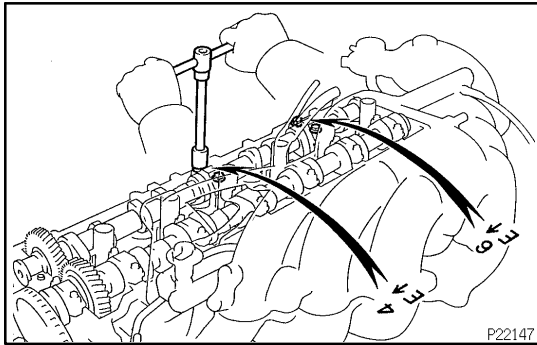
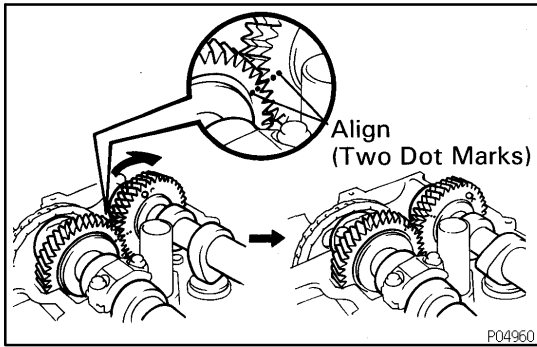


- (8) Place the No. 1 bearing cap in its proper location. When doing this, check that there is no gap between the cylinder head and the contact surface of bearing cap.
- (9) Temporarily tighten the bearing cap bolts, alternately tightening the left and right bolts uniformly.
- (10) Uniformly tighten the 14 bearing cap bolts in several passes.

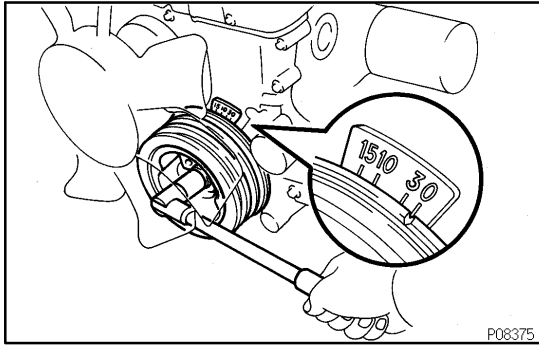
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)



- (b) Install the exhaust camshaft.
- (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.

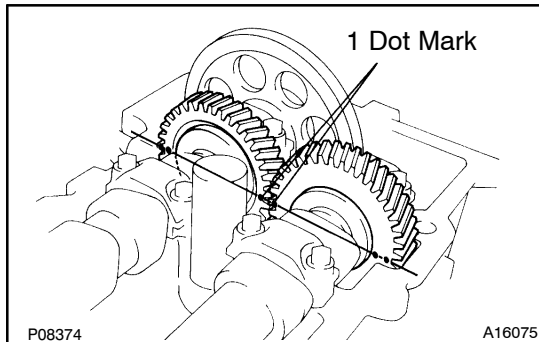


- (2) Apply engine oil to thrust portion of the exhaust camshaft.
 - (3) Engage the exhaust camshaft gear to the intake camshaft gear by matching the timing marks (two dot marks) on each gear.
 - (4) Roll down the exhaust camshaft onto the bearing journals while engaging gears with each other.
 - (5) Lightly push the intake camshaft towards the front without applying excessive force.
 - (6) Install the No. 4 and No. 6 bearing caps in their proper location.
 - (7) Temporarily tighten the bearing cap bolts uniformly and alternately in several passes until the bearing caps are snug with the cylinder head.
 - (8) Place the No. 2, No. 3, No. 5 and No. 7 bearing caps in their proper location.
 - (9) Temporarily tighten these bearing cap bolts, alternately tightening the left and right bolts uniformly.
 - (10) Place the No. 1 bearing cap in its proper location. When doing this, check that there is no gap between the cylinder head and the contact surface of bearing cap.
 - (11) Temporarily tighten the bearing cap bolts, alternately tightening the left and right bolts uniformly.
 - (12) Uniformly tighten the 14 bearing cap bolts in several passes.
- Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)**
- (13) Bring the service bolt installed in the driven sub-gear upward by turning the hexagon wrench head portion of the camshaft with a wrench.
 - (14) Remove the service bolt.
 - (15) Check that the intake and exhaust camshafts turn smoothly.

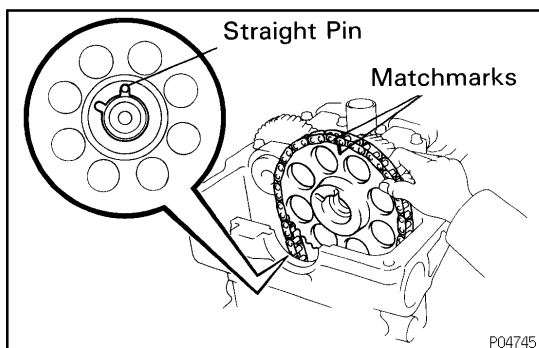


4. SET NO.1 CYLINDER TO TDC/COMPRESSION

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



- (b) Turn the camshafts so that the timing marks with 1 and 2 dots will be in straight line on the cylinder head surface as shown in the illustration.

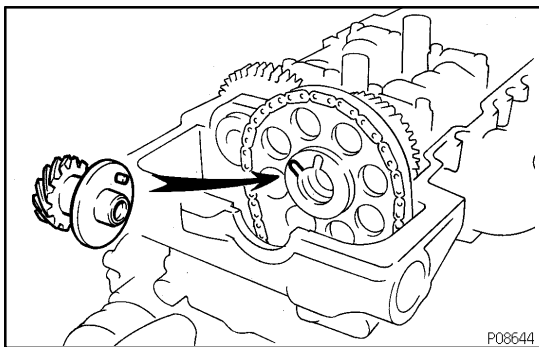


5. INSTALL CAMSHAFT TIMING GEAR

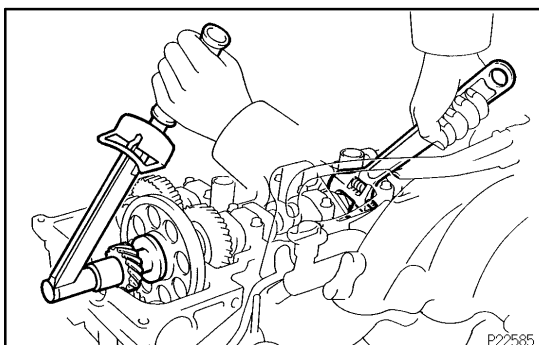
HINT:

Check that the matchmarks on the camshaft timing gear and timing chain are aligned.

- (a) Place the gear over the straight pin of the intake camshaft.

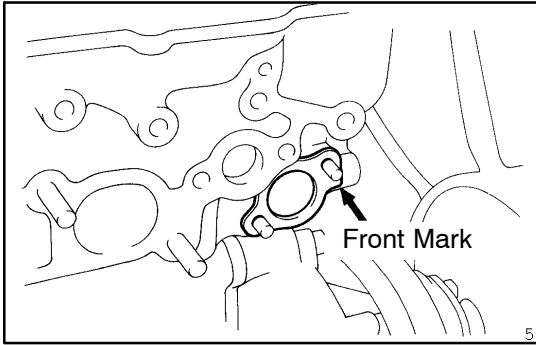


- (b) Align the straight pin of distributor gear with the straight pin groove of the intake camshaft gear as shown.



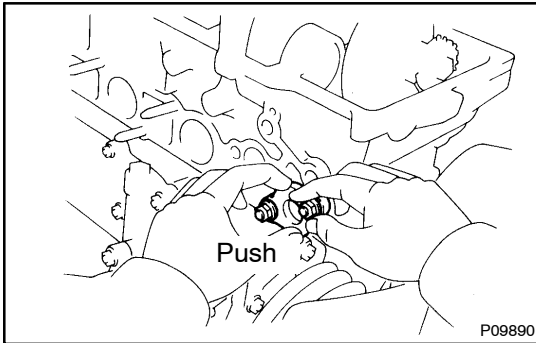
- (c) Hold the intake camshaft with a wrench, install and torque the bolt.

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)



6. INSTALL CHAIN TENSIONER

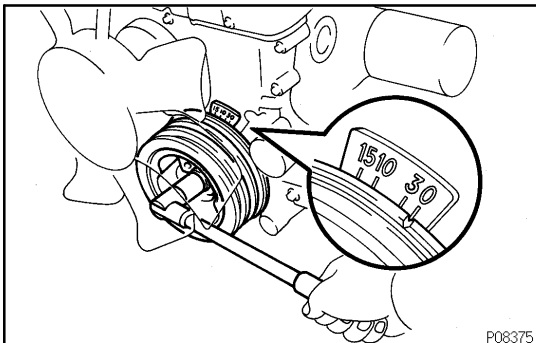
- (a) Place a new gasket so that the front mark is toward the front side.



- (b) Push the tensioner by hand until it touches the head installation surface, then install the 2 nuts.

- (c) Tighten the 2 nuts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

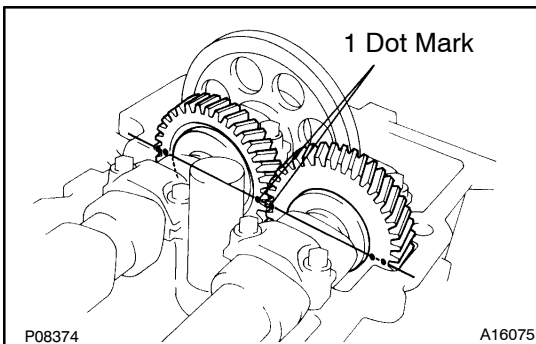


7. CHECK VALVE TIMING

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

NOTICE:

Always turn the crankshaft clockwise.



- (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.

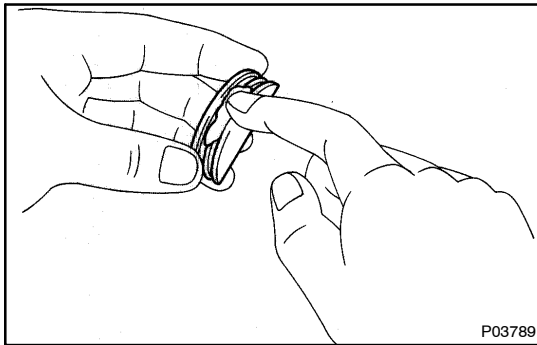
8. CHECK AND ADJUST VALVE CLEARANCE (See page EM-4)

Turn the camshaft and position the cam lobe upward and check and adjust the valve clearance.

Valve clearance (Cold):

Intake	0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust	0.25 – 0.35 mm (0.010 – 0.041 in.)

9. INSTALL SPARK PLUGS

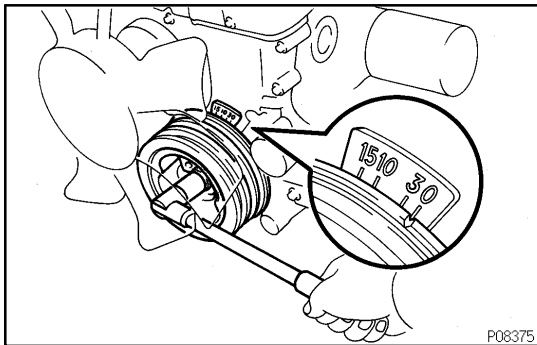


10. INSTALL SEMI-CIRCULAR PLUG

- (a) Remove any old packing (FIPG) material.
- (b) Apply seal packing to the cylinder head installation surface of the semi-circular plug.

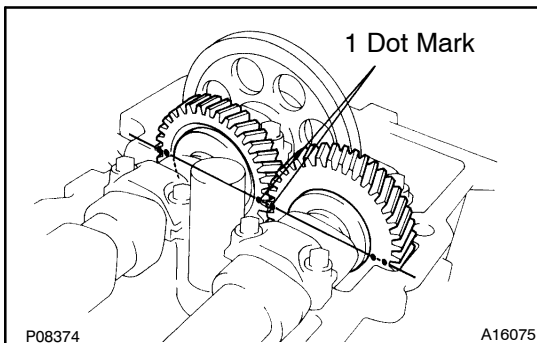
Seal packing: Part No. 08826-00080 or equivalent

- (c) Install the semi-circular plug to the cylinder head.



11. SET NO. 1 CYLINDER TO TDC/COMPRESSION

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

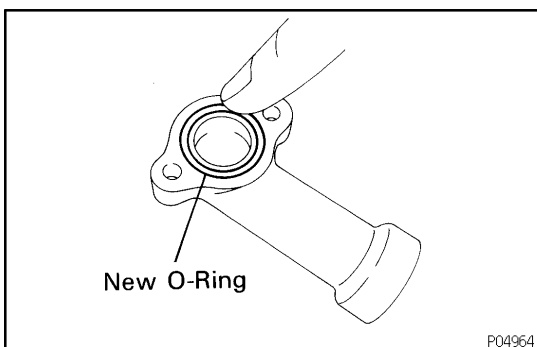


- (b) Check that the timing marks with 1 and 2 dots are in straight line on the cylinder head surface as shown in the illustration.

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

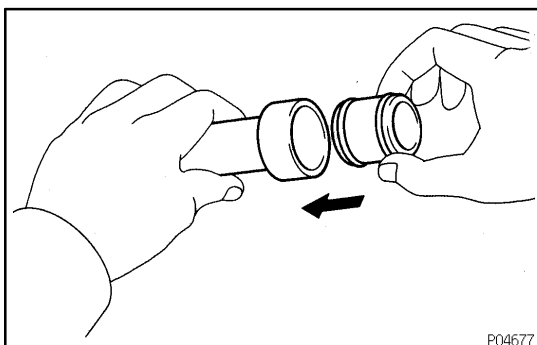
12. INSTALL CYLINDER HEAD COVER

- (a) Install the gasket to the cylinder head cover.
- (b) Install the cylinder head cover with the 13 bolts.



13. INSTALL WATER BYPASS OUTLET AND PIPE

- (a) Install a new O-ring to the water bypass outlet.



- (b) Install 2 new O-rings to the water bypass pipe.
- (c) Apply soapy water to the O-rings.
- (d) Assemble the water bypass outlet and pipe.
- (e) Install the water bypass outlet and pipe with the 2 bolts.

Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

14. INSTALL HEATER PIPE

Install a new gasket, the heater pipe and ground cable with the 2 bolts and 2 nuts.

Torque:

20 N·m (200 kgf·cm, 14 ft·lbf) for bolt:

21 N·m (210 kgf·cm, 15 ft·lbf) for nut

15. INSTALL NO. 1 AND NO. 2 EXHAUST MANIFOLDS

- (a) Install 2 new gaskets, No. 1 exhaust manifold and No. 2 exhaust manifold with the 13 nuts.

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

- (b) Install the No. 1 heat insulator and No. 2 heat insulator with the 6 bolts.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

16. INSTALL FRONT EXHAUST PIPE

- (a) Install 2 new gaskets and the front exhaust pipe with the 4 nuts.

Torque: 63 N·m (630 kgf·cm, 46 ft·lbf)

- (b) Install the No. 1 support bracket with the 2 bolts.

Torque: 24 N·m (240 kgf·cm, 17 ft·lbf)

- (c) Connect the clamp and tighten the clamp bolt.

Torque: 19.5 N·m (195 kgf·cm, 14 ft·lbf)

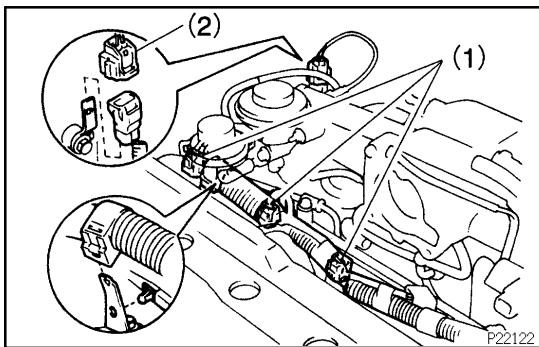
- (d) Connect the front exhaust pipe to the rear TWC with a new gasket, 2 bolts and 2 nuts.

Torque: 46 N·m (470 kgf·cm, 34 ft·lbf)

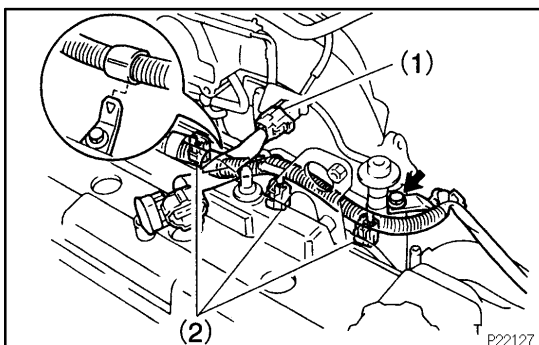
17. CONNECT NO. 2 WATER BYPASS PIPE

Connect the bypass pipe to the cylinder head with the 3 bolts.

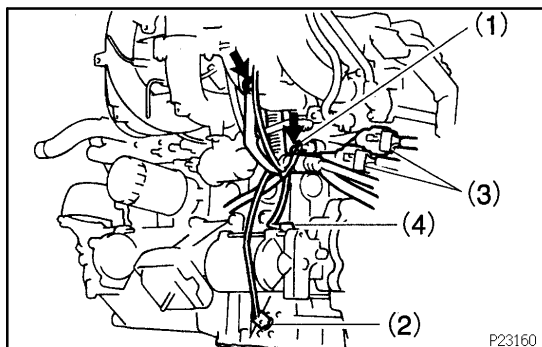
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

**18. CONNECT ENGINE WIRE**

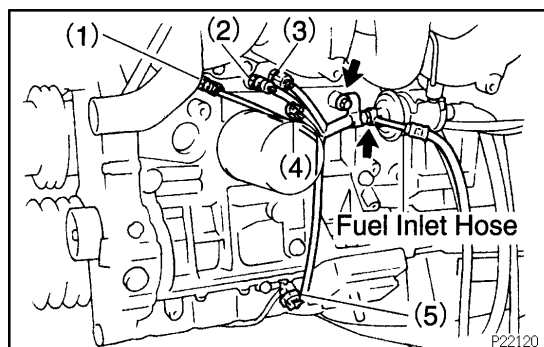
- (a) Place the engine wire on the intake manifold.
- (b) Connect the connectors.
- (1) Connect the 3 injector connectors.
- (2) Connect the EGR gas temp. sensor connector.
- (c) Connect the clamp of the No.6 injector wire to the bracket.
- (d) Connect the engine wire clamp.



- (e) Connect the engine wire clamp.
- (f) Connect the connectors.
- (1) Connect the connector for the emission control valve set assembly.
- (2) Connect the 3 injector connectors.
- (g) Install the bolt holding the engine wire to the intake manifold.



- (h) Connect the engine wire to the intake manifold and cylinder block with the 2 bolts.
- (i) Connect the PNP switch connector.
- (j) Connect the 2 heated oxygen sensor connectors.
- (k) Connect the connectors.
 - (1) Connect the Knock sensor connector.
 - (2) Connect the oil level sensor connector.
 - (3) Connect the 2 connectors to the transmission.
 - (4) Connect the starter connector.



- (l) Connect the engine wire to the cylinder block with the bolt.
- (m) Connect the connectors.
 - (1) Connect the ECT sender gauge connector.
 - (2) Connect the ECT cut switch connector.
 - (3) Connect the ECT sensor connector.
 - (4) Connect the knock sensor connector.
 - (5) Connect the crankshaft position sensor connector.

19. CONNECT FUEL INLET HOSE

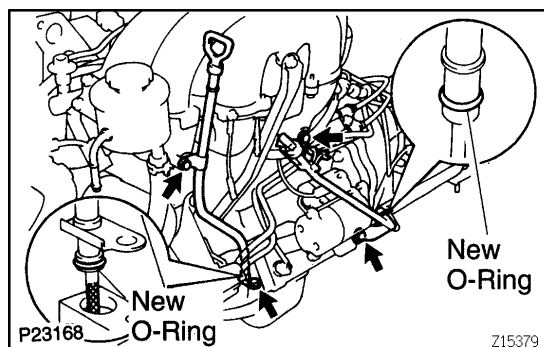
Connect the fuel inlet hose to the fuel filter with 2 new gaskets and the union bolt.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

20. INSTALL INTAKE MANIFOLD STAY

Install the intake manifold stay with the 2 bolts.

Torque: 36 N·m (360 kgf·cm, 26 ft·lbf)



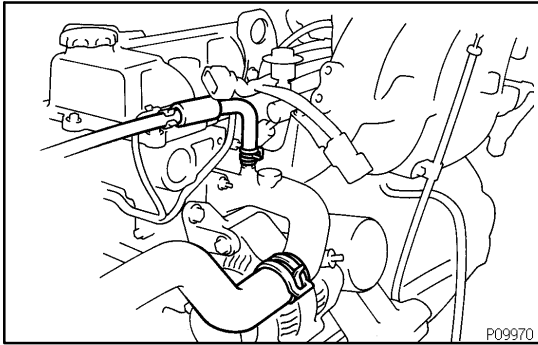
21. INSTALL OIL DIPSTICKS AND GUIDES FOR ENGINE AND TRANSMISSION

- (a) Install a new O-ring to the dipstick guide.
- (b) Apply a light coat of engine oil on the O-ring.
- (c) Push in the dipstick guide into the guide hole of the oil pan.
- (d) Install the dipstick guide with the 2 bolts.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

22. INSTALL THROTTLE BODY (See page [SF-48](#))

23. INSTALL GENERATOR AND DRIVE BELTS (See page [CH-19](#))

**24. CONNECT NO. 3 WATER BYPASS HOSE****25. CONNECT RADIATOR INLET HOSE****26. CONNECT PS RESERVOIR TANK**

Connect the reservoir tank with the 3 bolts.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

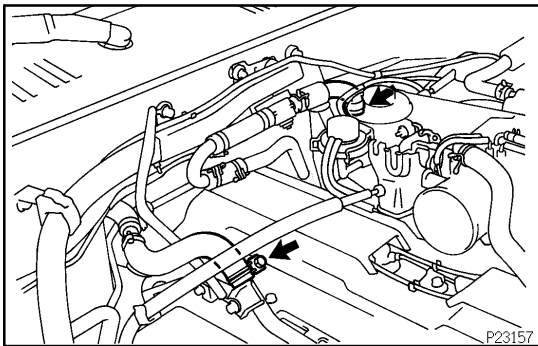
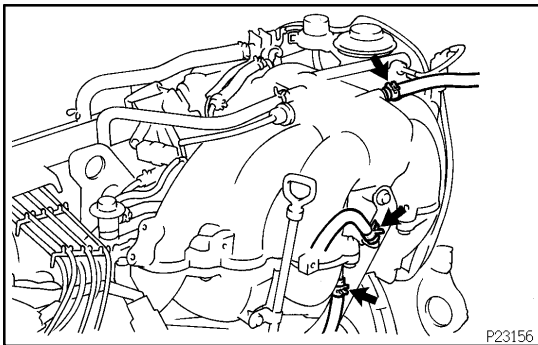
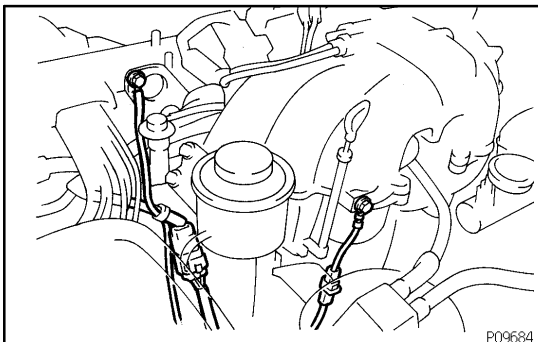
27. INSTALL DISTRIBUTOR (See page IG-11)**28. INSTALL NO. 2 AND NO. 3 CYLINDER HEAD COVERS**

Install the head covers with the 4 bolts.

29. CONNECT HEATER VALVE AND ENGINE WIRE TO COWL PANEL

(a) Connect the heater valve with the 2 bolts.

(b) Connect the engine wire and ground strap with the 2 bolts.

**30. CONNECT HEATER HOSES****31. CONNECT FUEL RETURN HOSE****32. CONNECT EVAP HOSE****33. CONNECT BRAKE BOOSTER VACUUM HOSE****34. CONNECT CONNECTOR ON INTAKE MANIFOLD TO LH FENDER APRON****35. CONNECT ENGINE GROUND STRAPS**

(a) Connect the ground strap to the No. 1 engine hanger.

(b) Connect the ground strap to the air intake chamber.

36. CONNECT THROTTLE CABLE TO THROTTLE BODY**37. CONNECT ACCELERATOR CABLE TO THROTTLE BODY****38. CONNECT CRUISE CONTROL ACTUATOR CABLE TO THROTTLE BODY**

39. INSTALL AIR CLEANER HOSE AND CAP**40. INSTALL BATTERY TRAY AND BATTERY**

- (a) Install the battery tray with the 5 bolts.
- (b) Connect the ground strap with the bolt.
- (c) Install the battery and hold-down clamp with the nuts.
- (d) Connect the battery cables.

41. FILL RADIATOR WITH ENGINE COOLANT**42. START ENGINE AND CHECK FOR LEAKS****43. ADJUST IGNITION TIMING (See page [EM-10](#))****44. PERFORM ROAD TEST**

Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

45. RECHECK ENGINE COOLANT LEVEL