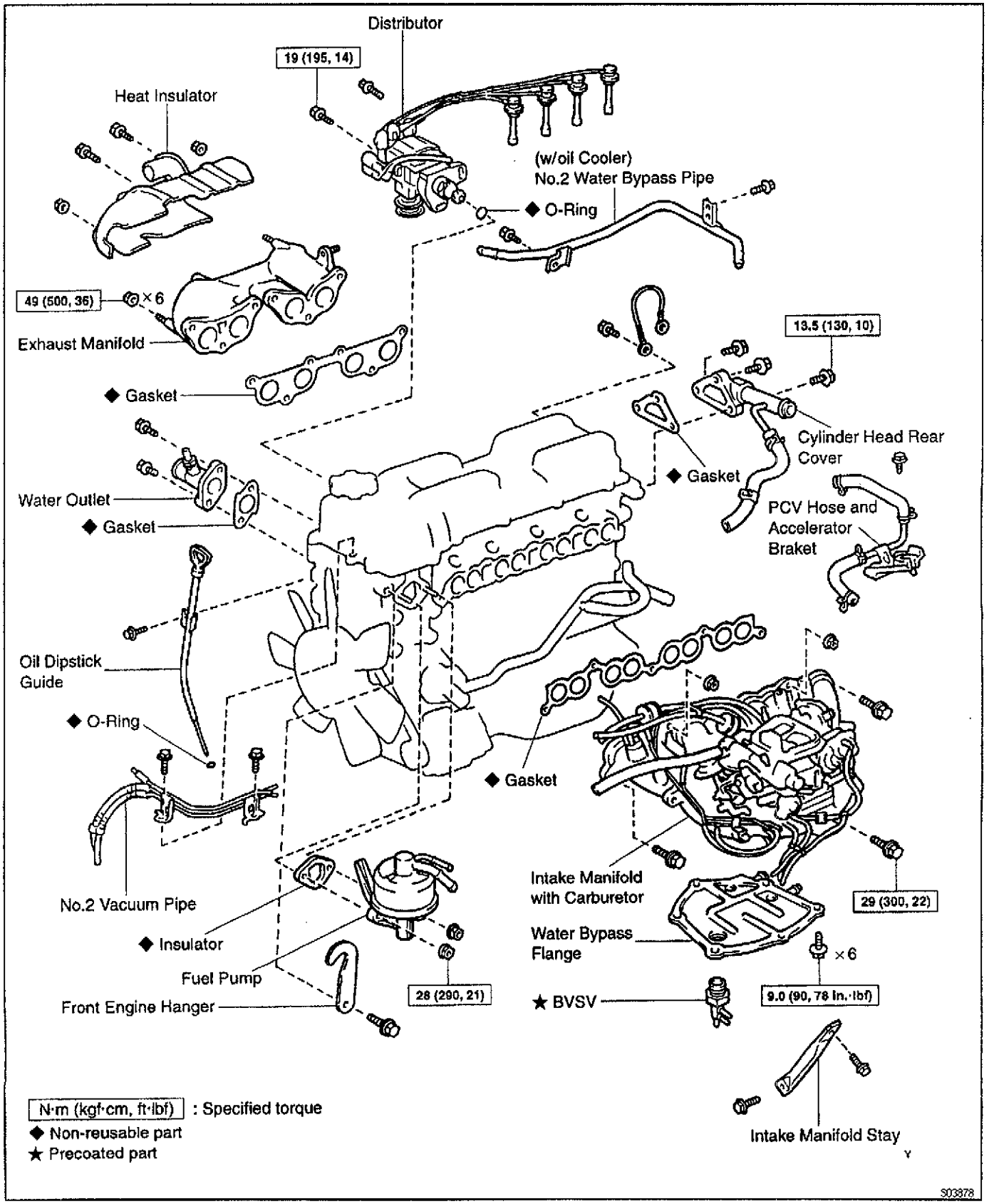
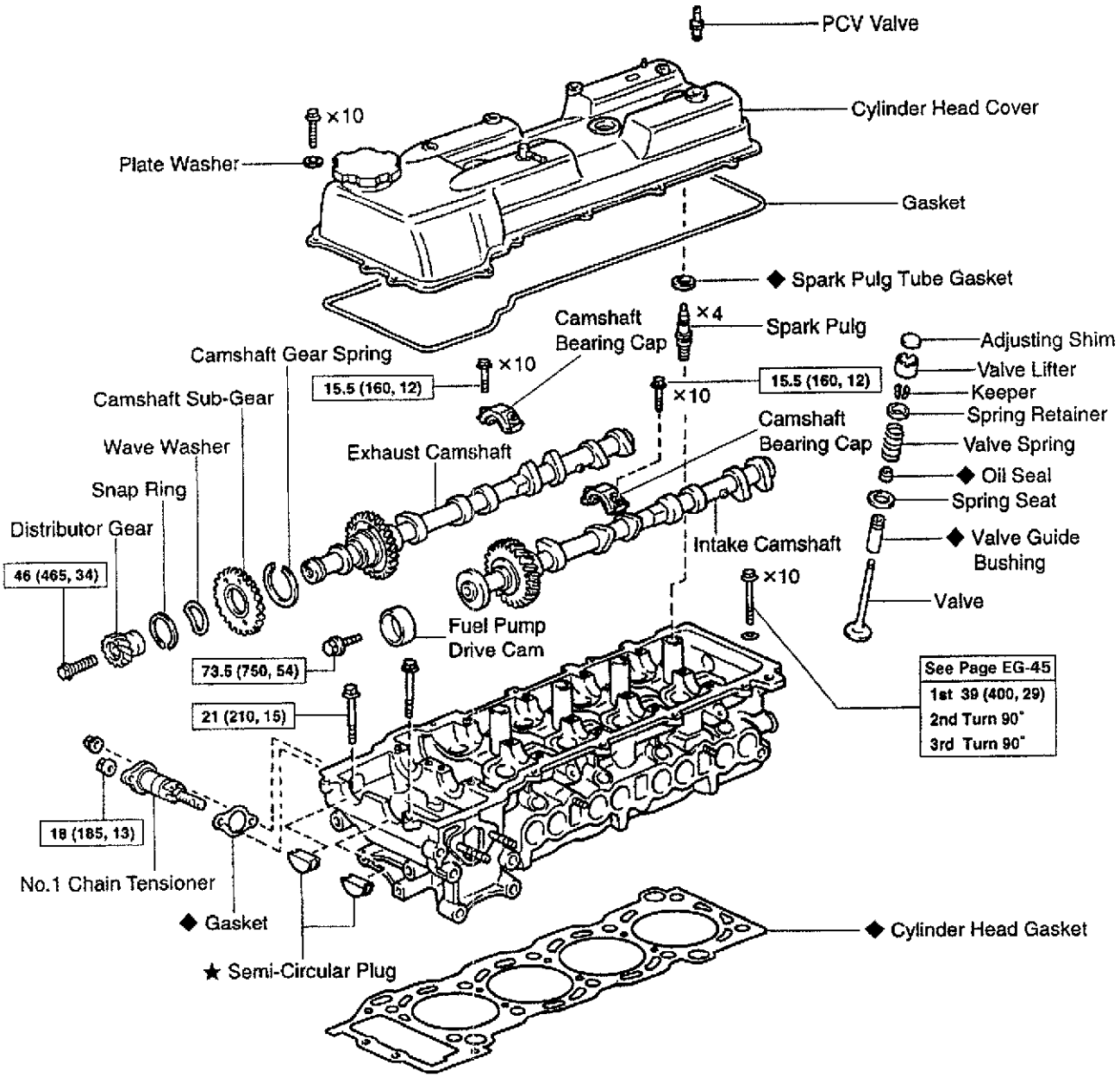
CYLINDER HEAD (3RZ–F)

EG0BK–0F

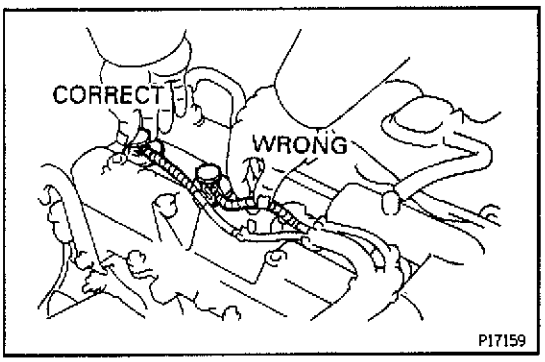
COMPONENTS FOR REMOVAL AND INSTALLATION



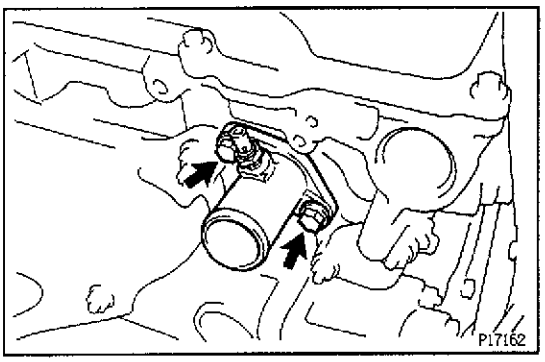

PCV Valve
×10
Plate Washer
Cylinder Head Cover
Gasket
◆ Spark Pulg Tube Gasket
Camshaft Bearing Cap
×4
Spark Pulg
Adjusting Shim
Valve Lifter
Keeper
Spring Retainer
Valve Spring
◆ Oil Seal
Spring Seat
◆ Valve Guide Bushing
Valve
Camshaft Gear Spring
15.5 (160, 12)
×10
Camshaft Sub-Gear
Wave Washer
Snap Ring
Distributor Gear
46 (465, 34)
Exhaust Camshaft
Camshaft Bearing Cap
Intake Camshaft
Fuel Pump Drive Cam
73.5 (750, 54)
21 (210, 15)
See Page EG-45
1st 39 (400, 29)
2nd Turn 90°
3rd Turn 90°
18 (185, 13)
No.1 Chain Tensioner
◆ Gasket
★ Semi-Circular Plug
◆ Cylinder Head Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
S03883

EG78J-01

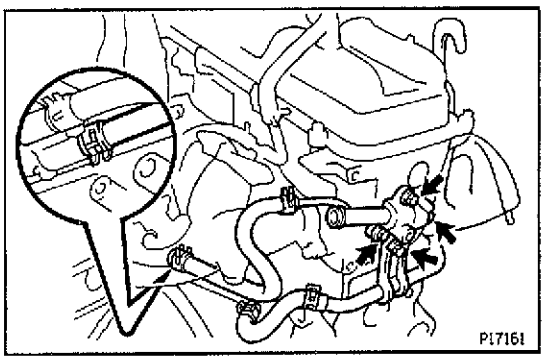
CYLINDER HEAD REMOVAL



1. **DRAIN ENGINE COOLANT**
2. **REMOVE DISTRIBUTOR**
   (See distributor removal in Ignition System)
3. **REMOVE OIL DIPSTICK GUIDE**



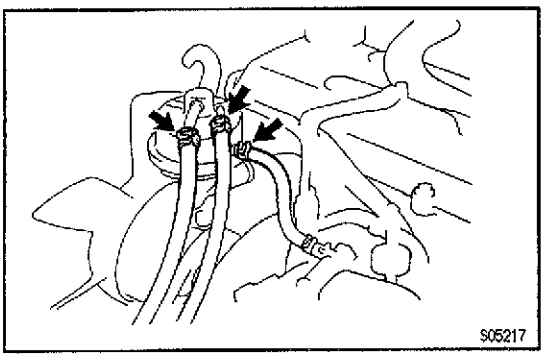
4. **REMOVE WATER OUTLET**
   Remove the 2 bolts, water outlet and gasket.



5. **REMOVE CYLINDER HEAD REAR COVER**

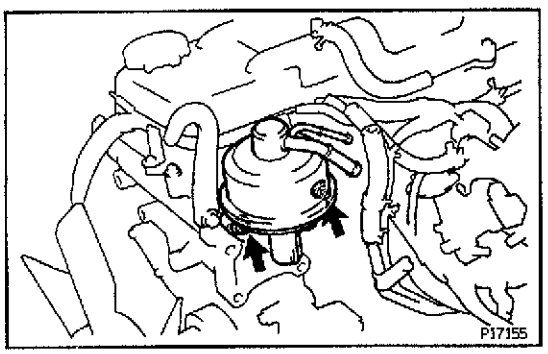
(a) Remove the 3 bolts and the rear cover and gasket.

(b) w/ Oil cooler:
Remove the No.2 water bypass mounting bolt.

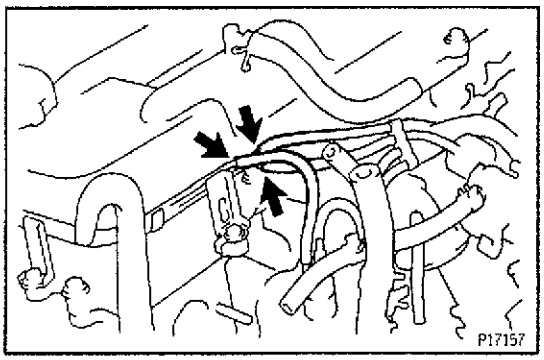


6. **REMOVE FUEL PUMP**

(a) Disconnect the 3 fuel hoses.

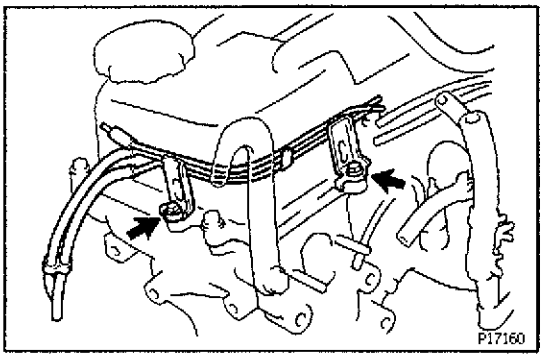


(b) Remove the 2 nuts, fuel pump and insulator.

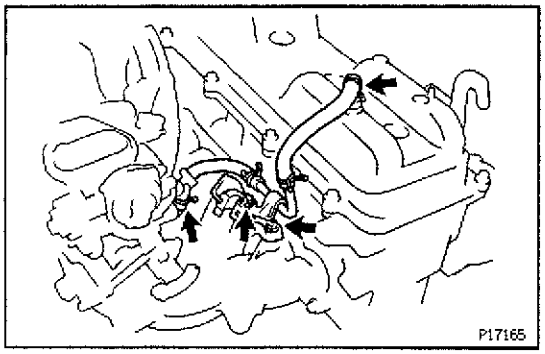


7. REMOVE NO.2 VACUUM PIPE

(a) Disconnect the 3 vacuum hoses.



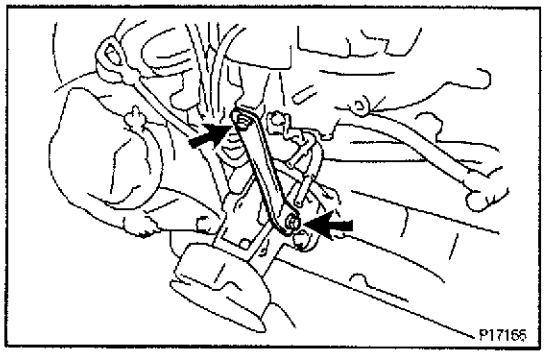
(b) Remove the 2 bolts and vacuum pipe.



8. REMOVE PCV HOSE AND ACCELERATOR CABLE BRACKET

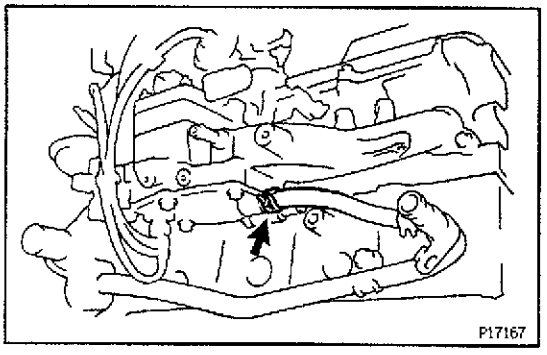
(a) Disconnect the 2 PCV hoses.

(b) Remove the 2 bolts and accelerator cable bracket.



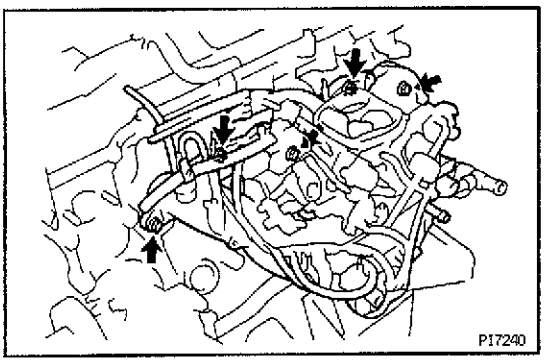
9. REMOVE INTAKE MANIFOLD STAY

Remove the 2 bolts and intake manifold stay.

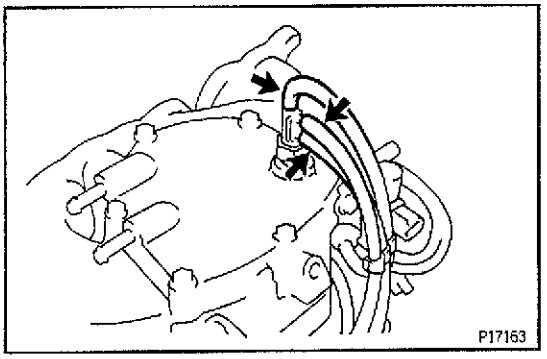


10. REMOVE INTAKE MANIFOLD WITH CARBURETOR

(a) Disconnect the water bypass hose from intake manifold.

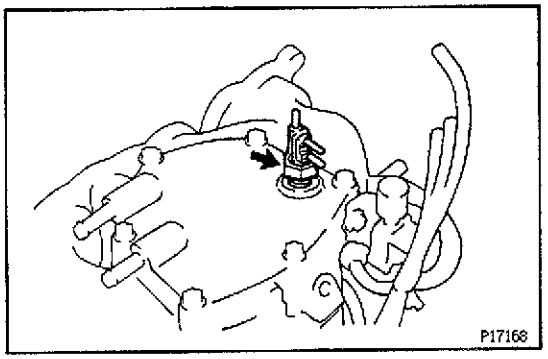


(b) Remove the 3 bolts, 2 nuts intake manifold and gasket.

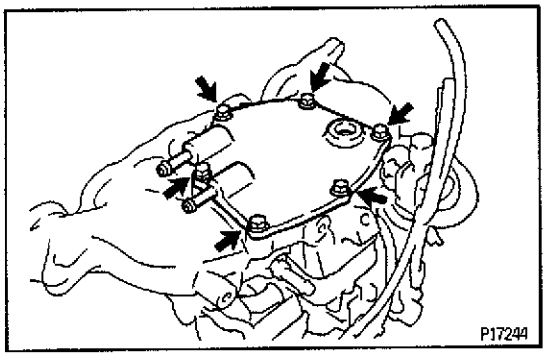


11. IF NECESSARY, REMOVE WATER BYPASS FLANGE

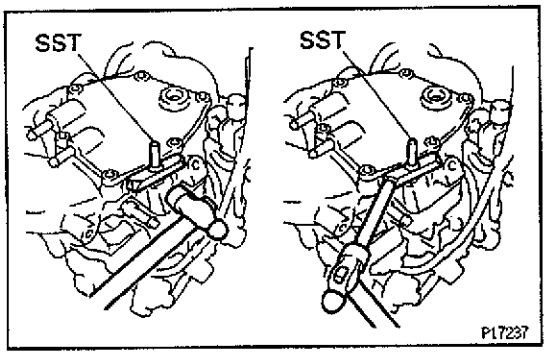
(a) Disconnect the 3 vacuum hoses from the BVSV.



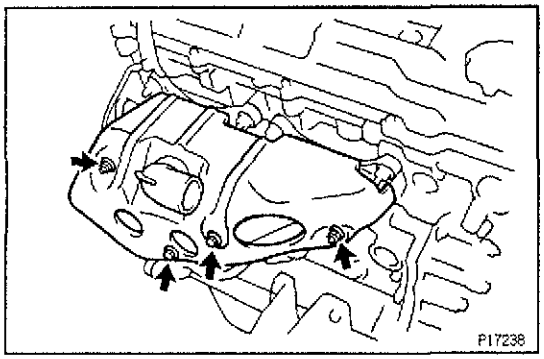
(b) Remove the BVSV.



(c) Remove the 6 bolts.

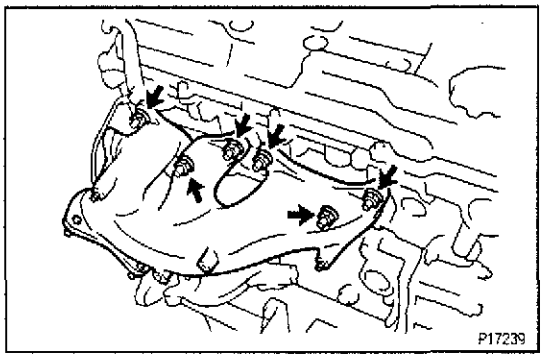


(d) Insert the blade of SST between the intake manifold and water bypass flange, and cut off applied sealer and remove the flange.
SST 09302–00100
NOTICE: Be careful not to damage the intake manifold and flange.



12. REMOVE EXHAUST MANIFOLD

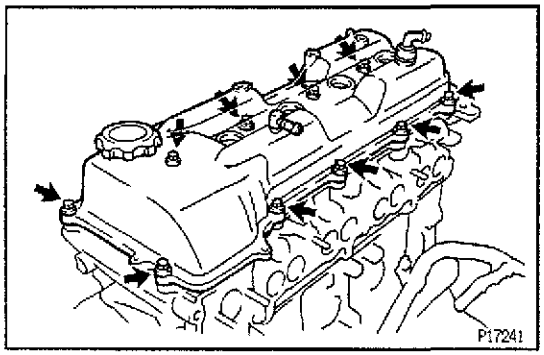
(a) Remove the 2 bolts, 2 nuts and heat insulator.



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

13. REMOVE FRONT ENGINE HANGER

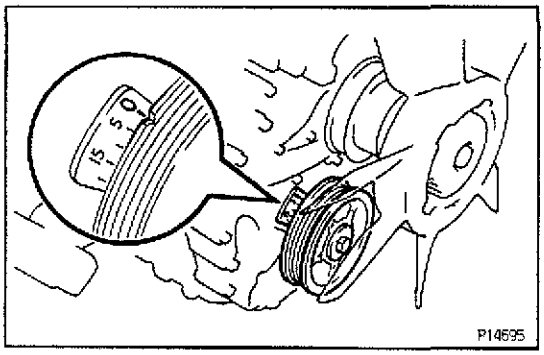
14. REMOVE GROUND STRAP



15. REMOVE CYLINDER HEAD COVER

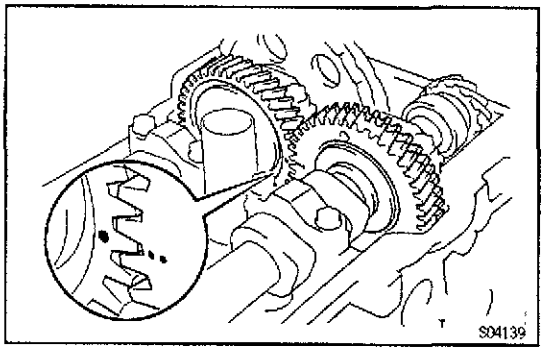
Remove the 10 bolts, cylinder head cover and gasket.

16. REMOVE SPARK PLUGS

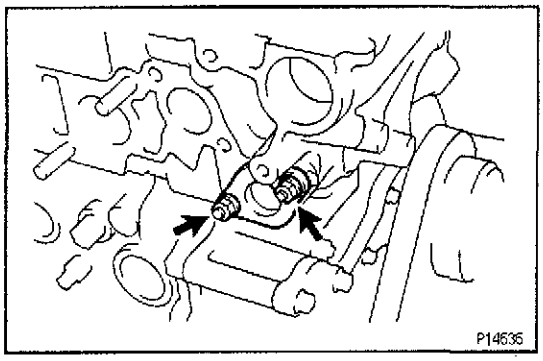


17. SET NO.1 CYLINDER TO TDC/COMPRESSION

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

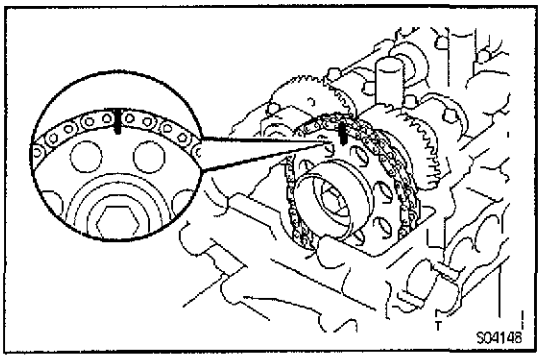


(b) Check that the timing marks (one and two dots) of the camshaft drive and driven gears are in straight line on the cylinder head surface as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) and align the marks as above.



18. REMOVE CHAIN TENSIONER

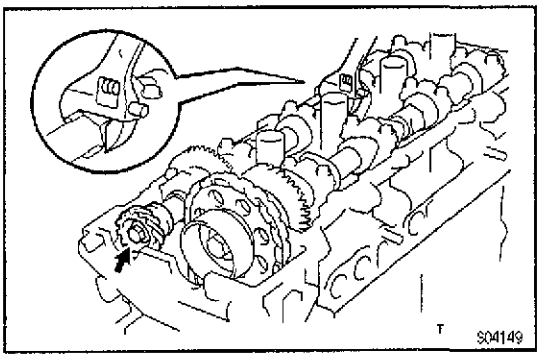
Remove the 2 nuts, chain tensioner and gasket.



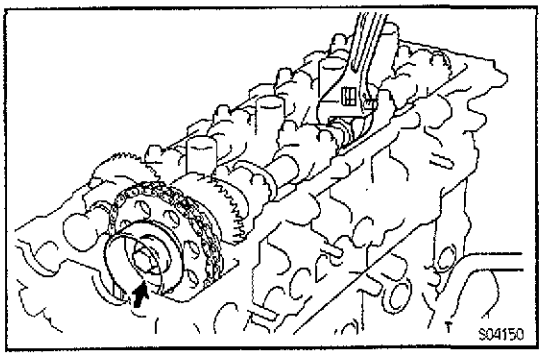
19. REMOVE CAMSHAFT TIMING GEAR

(a) Remove the 2 semi–circular plugs.

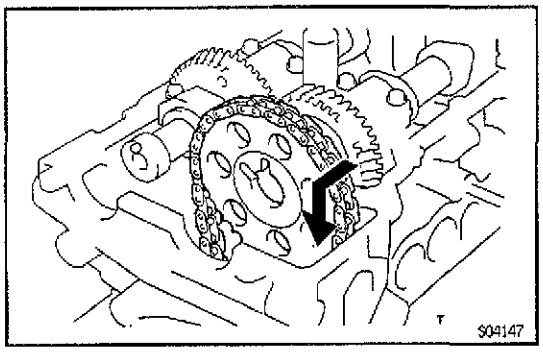
(b) Place the matchmarks on the camshaft timing gear and No.1 timing chain.



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



(d) Hold the intake camshaft with a wrench and remove the bolt and fuel pump drive cam.

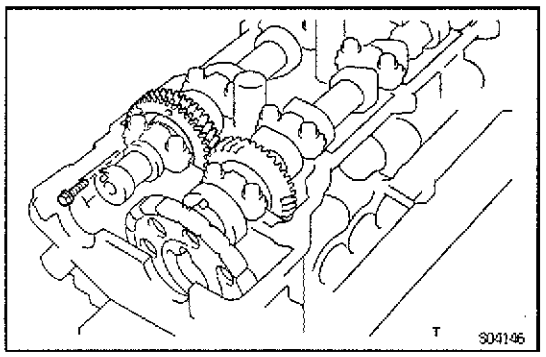


(e) Remove the camshaft timing gear and chain from the intake camshaft and leave on the slipper and damper.

20. 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.

EG



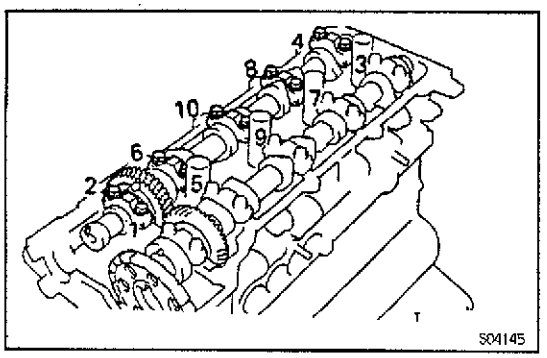
A. Remove exhaust camshaft

(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:

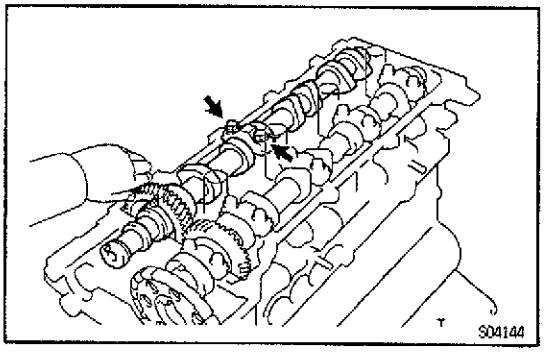
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm (0.63 – 0.79 in.)

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



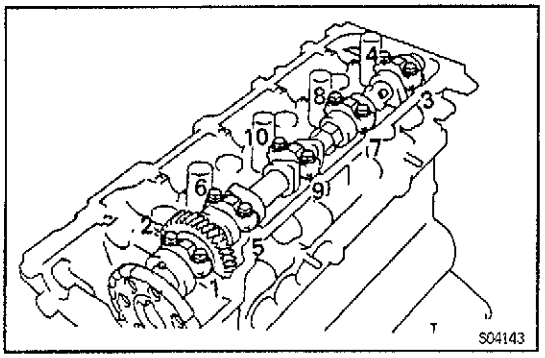
(c) Uniformly loosen and remove the 10 bearing cap bolts in several passes, in the sequence shown.

(d) Remove the 5 bearing caps and 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.

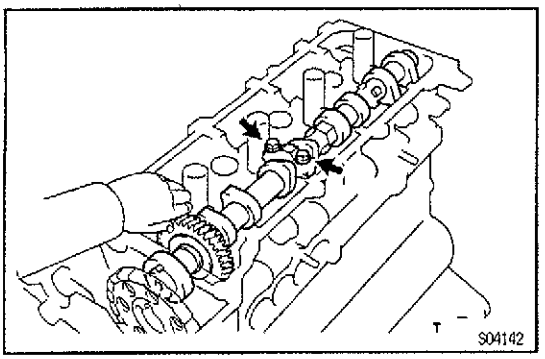
NOTICE: Do not pry on or attempt to force the camshaft with a tool or other object.



B. Remove intake camshaft

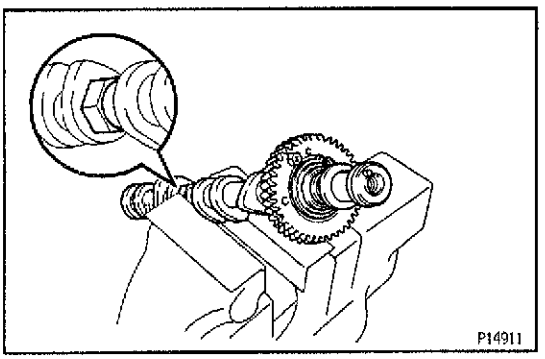
(a) Uniformly loosen and remove 10 bearing cap bolts in several passes, in the sequence shown.

(b) Remove the 5 bearing caps and 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.

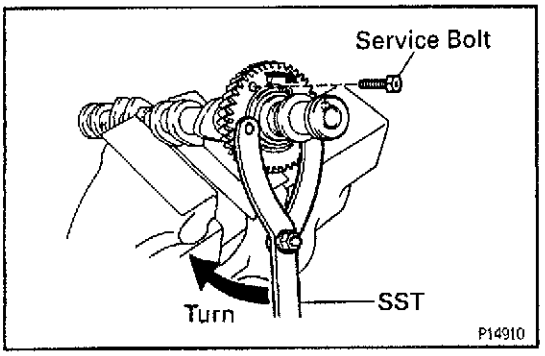
NOTICE: Do not pry on or attempt to force the camshaft with a tool or other object.



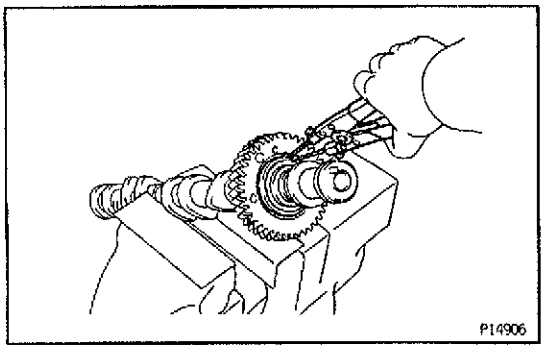
21. DISASSEMBLE EXHAUST CAMSHAFT

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

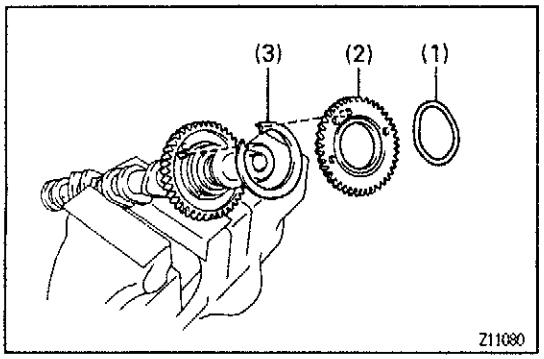
NOTICE: Be careful not to damage the camshaft.



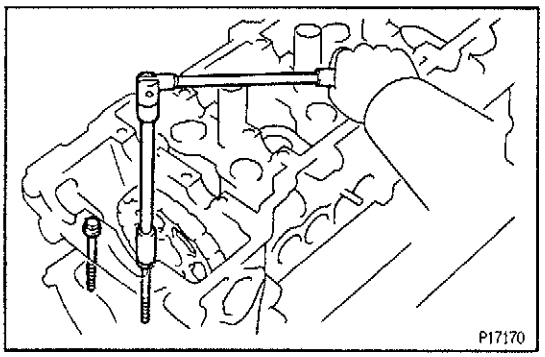
(b) Using SST, turn the sub–gear clockwise, and remove the service bolt.
SST 09960–10010 (09962–01000, 09963–00500)



(c) Using snap ring pliers, remove the snap ring.

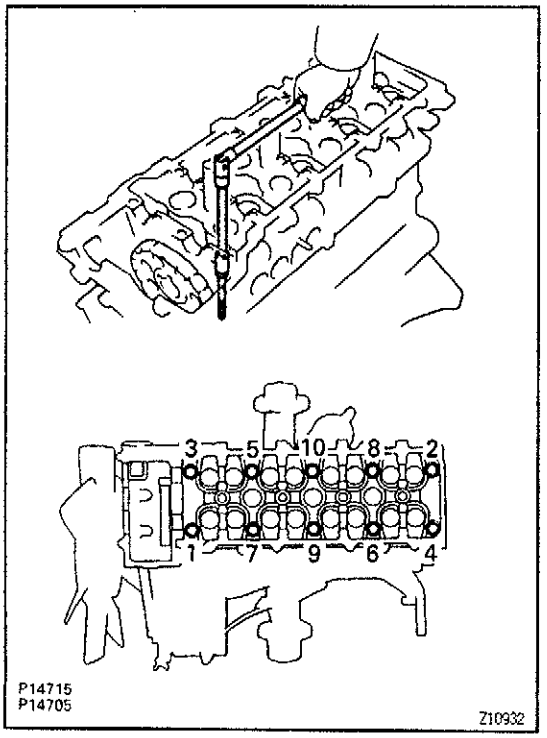


(d) Remove the following parts:
(1) Wave washer
(2) Camshaft sub–gear
(3) Camshaft gear spring

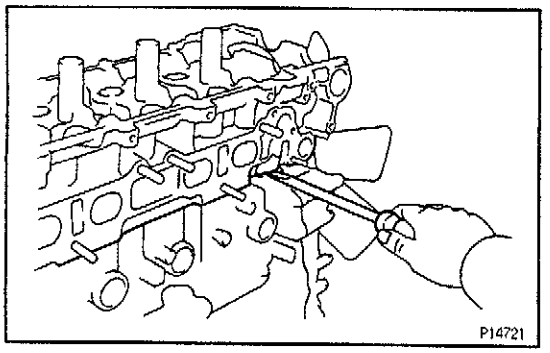


22. REMOVE CYLINDER HEAD

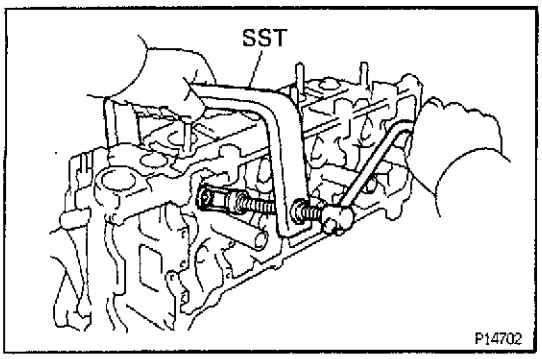
(a) Remove the 2 bolts in front of the head before the other head bolts are removed.



(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.



EG

CYLINDER HEAD DISASSEMBLY

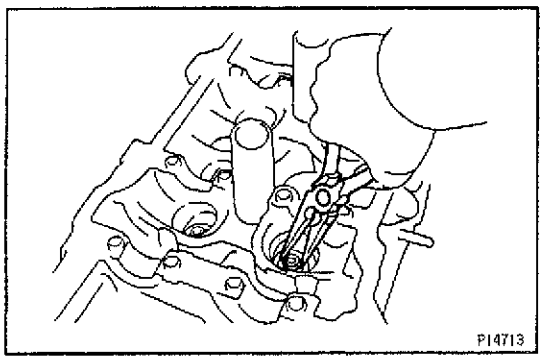
EG78K–01

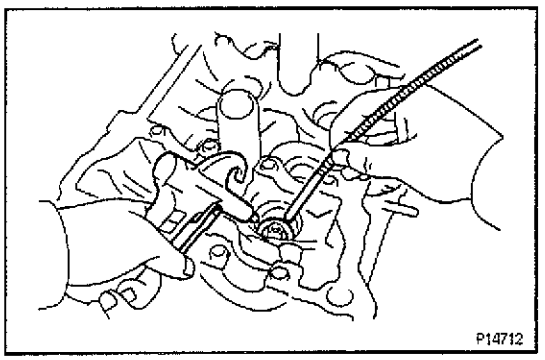
1. **REMOVE VALVE LIFTERS AND SHIMS**
   HINT: Arrange the valve lifters and shims in correct order.
2. **REMOVE VALVES**

(a) Using SST, compress the valve spring and remove the 2 keepers.
SST 09202–70020 (09202–00010)

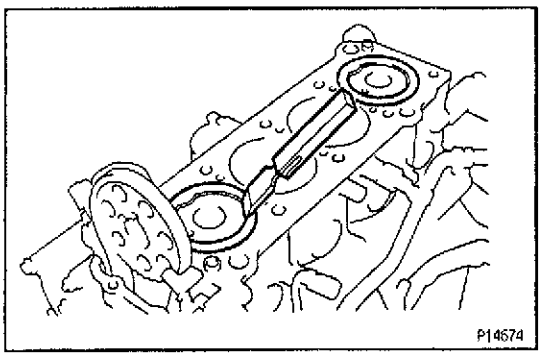
(b) Remove the spring retainer, valve spring and valve.

(c) Using needle–nose pliers, remove the oil seal.





(d) Using compressed air and a magnetic finger, remove the spring seat by blowing air.
HINT: Arrange the valves, valve springs, spring seats and spring retainers in correct order.

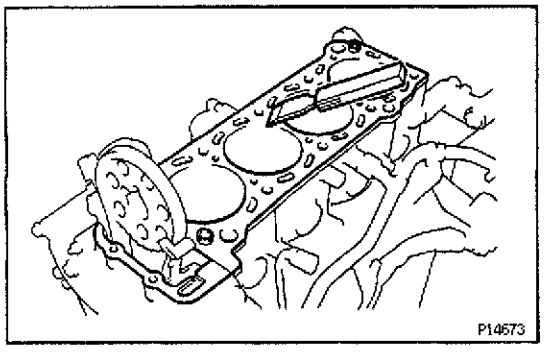


CYLINDER HEAD COMPONENTS INSPECTION, CLEANING AND REPAIR

EG78L–01

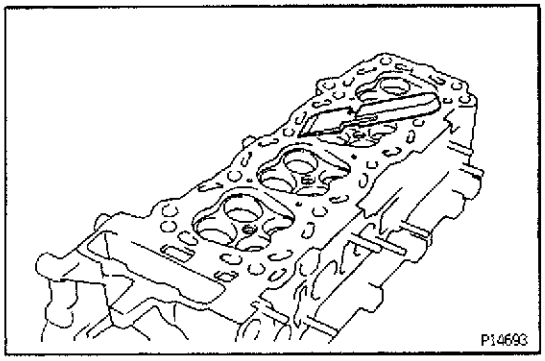
1. **CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK**

(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.



(b) Using a gasket scraper, remove all the gasket material from the cylinder block surface.

(c) Using compressed air, blow carbon and oil from the bolt holes.
CAUTION: Protect your eyes when using high–pressure.

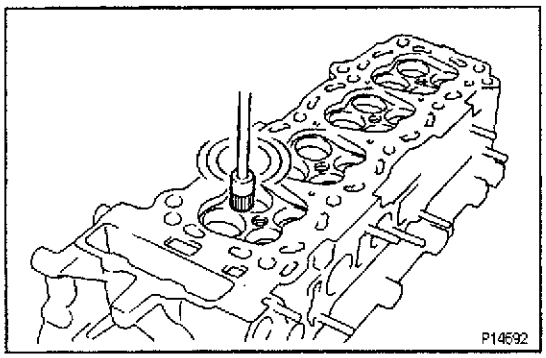


2. CLEAN CYLINDER HEAD

A. Remove gasket material

Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

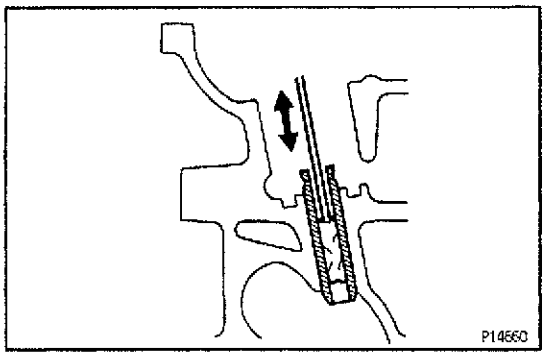
NOTICE: Be careful not to scratch the cylinder block contact surface.



B. Clean combustion chambers

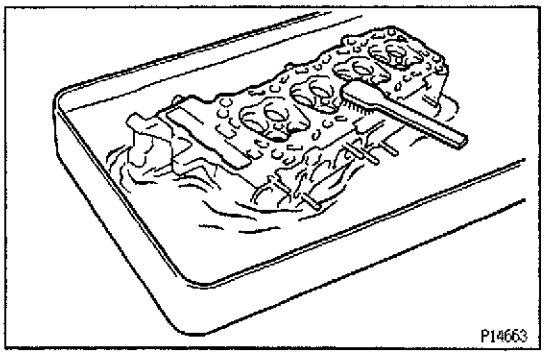
Using a wire brush, remove all the carbon from the combustion chambers.

NOTICE: Be careful not to scratch the cylinder block contact surface.



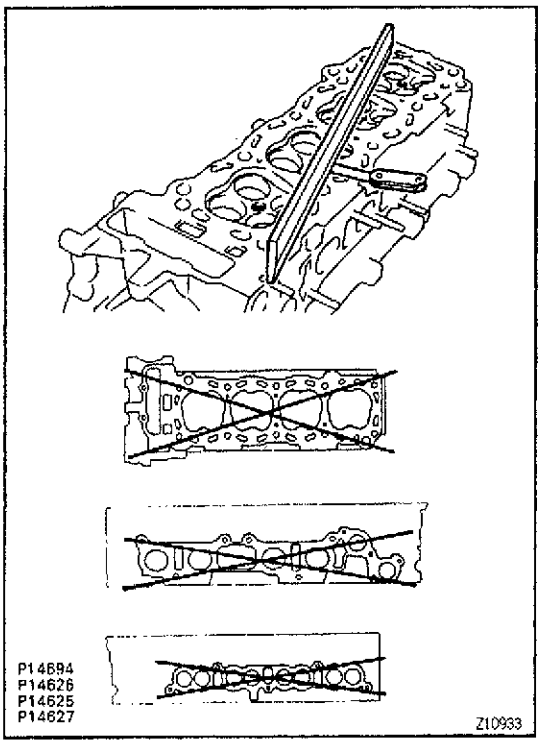
C. Clean valve guide bushings

Using a valve guide bushing brush and solvent, clean all the guide bushings.



D. Clean cylinder head

Using a soft brush and solvent, thoroughly clean the cylinder head.



3. INSPECT CYLINDER HEAD

A. Inspect for flatness

Using a precision straight edge and thickness gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

Maximum warpage:

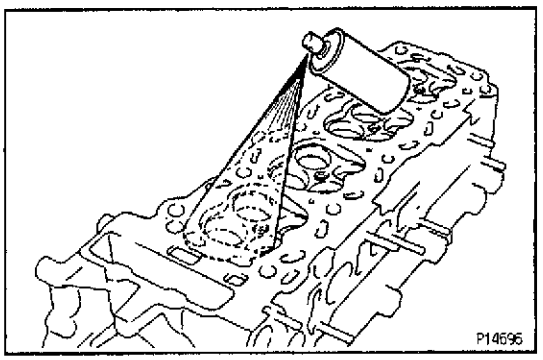
Cylinder block side

0.05 mm (0.0020 in.)

Manifold side

0.10 mm (0.0039 in.)

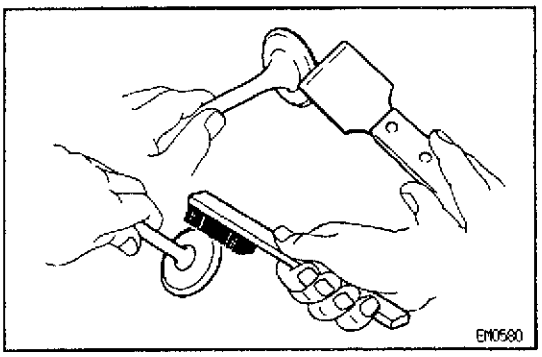
If warpage is greater than maximum, replace the cylinder head.



B. Inspect for cracks

Using a dye penetrant, check the combustion chambers, intake ports, exhaust ports and cylinder block surface for cracks.

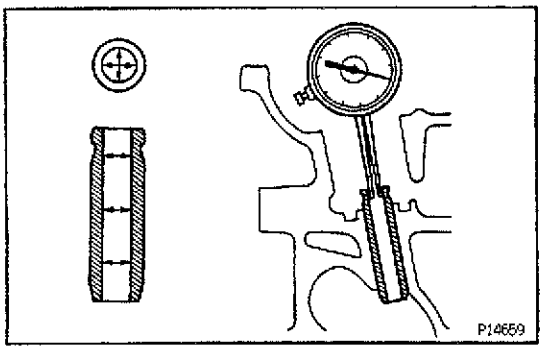
If cracked, replace the cylinder head.



4. CLEAN VALVES

(a) Using a gasket scraper, chip off any carbon from the valve head.

(b) Using a wire brush, thoroughly clean the valve.

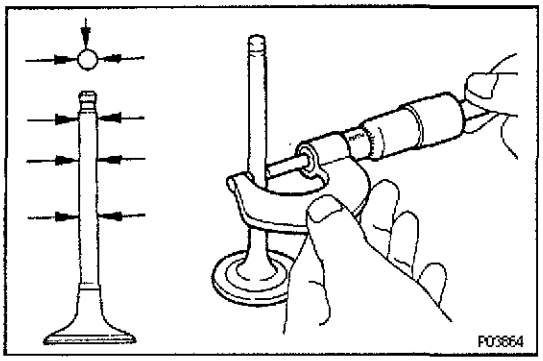


5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Bushing inside diameter:

6.010 – 6.030 mm (0.2366 – 0.2374 in.)



(b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:

Intake

5.970 – 5.985 mm (0.2350 – 0.2356 in.)

Exhaust

5.965 – 5.980 mm (0.2348 – 0.2354 in.)

EG

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:

Intake

0.025 – 0.060 mm (0.0010 – 0.0024 in.)

Exhaust

0.030 – 0.065 mm (0.0012 – 0.0026 in.)

Maximum oil clearance:

Intake

0.08 mm (0.0031 in.)

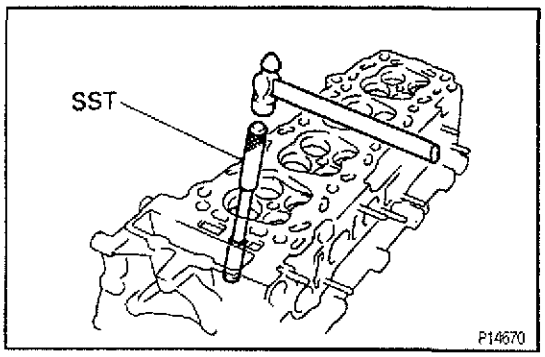
Exhaust

0.10 mm (0.0039 in.)

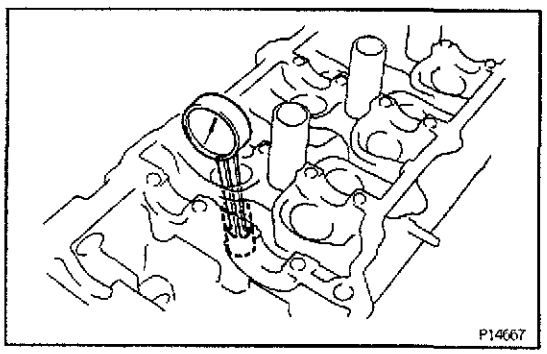
If the clearance is greater than maximum, replace the valve and guide bushing.

6. IF NECESSARY, REPLACE VALVE GUIDE BUSHINGS

(a) Gradually heat the cylinder head to 80 – 100°C (176 – 212°F).



(b) Using SST and a hammer, tap out the guide bushing.
SST 09201–10000 (09201–01060),
09550–10012 (09252–10010)



(c) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

EG

Both intake and exhaust

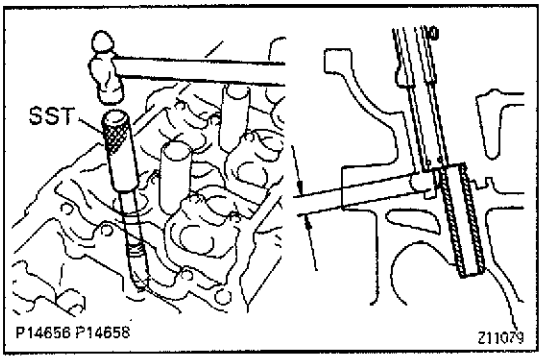
Bushing bore diameter mm (in.)	Bushing size
11.000 - 11.027 (0.4331 - 0.4341)	Use STD
11.050 - 11.077 (0.4350 - 0.4361)	Use O/S 0.05

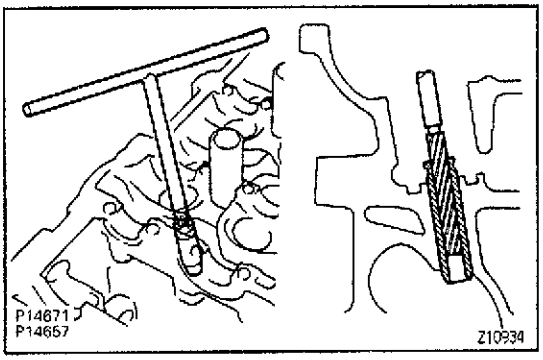
W04903

(d) Select a new guide bushing (STD size or O/S 0.05).
If the bushing bore diameter of the cylinder head is greater than 11.027 mm (0.4341 in.), machine the bushing bore to the following dimension:
11.050 — 11.077 mm (0.4350 — 0.4361 in.)
If the bushing bore diameter of the cylinder head is greater than 11.077 mm (0.4361 in.), replace the cylinder head.

(e) Gradually heat the cylinder head to 80 — 100°C (176 — 212°F).

(f) Using SST and a hammer, tap in a new guide bushing to where there is 8.2 — 8.6 mm (0.323 — 0.339 in.) protruding from the cylinder head.
SST 09201—10000 (09201—01060),
09550—10012 (09252—10010)



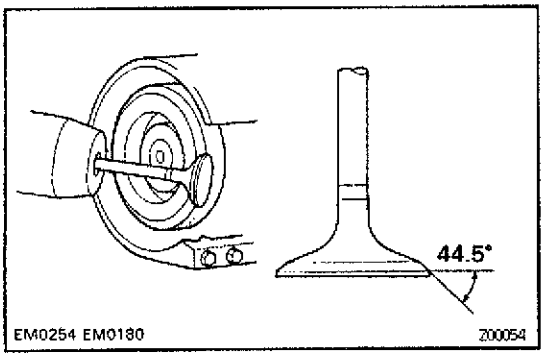


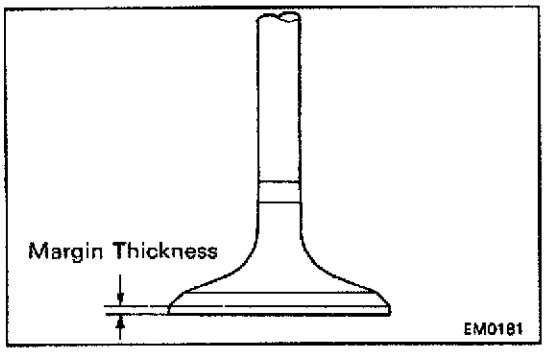
(g) Using a sharp 6 mm reamer, ream the guide bushing to obtain the standard specified clearance (See step—5) between the guide bushing and valve stem.

7. INSPECT AND GRIND VALVES

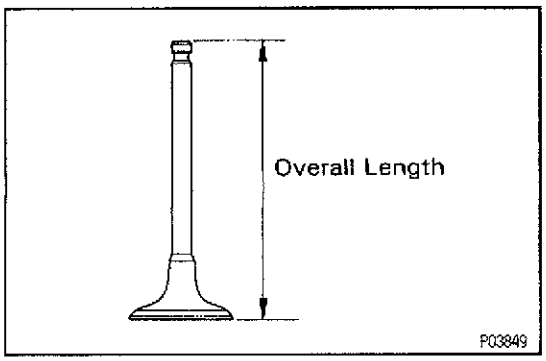
(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.
Valve face angle:
44.5°





(c) Check the valve head margin thickness.
Standard margin thickness:
1.0 mm (0.039 in.)
Minimum margin thickness:
0.5 mm (0.020 in.)
If the margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:

Intake

103.45 mm (4.0728 in.)

Exhaust

103.60 mm (4.0787 in.)

Minimum overall length:

Intake

102.95 mm (4.0531 in.)

Exhaust

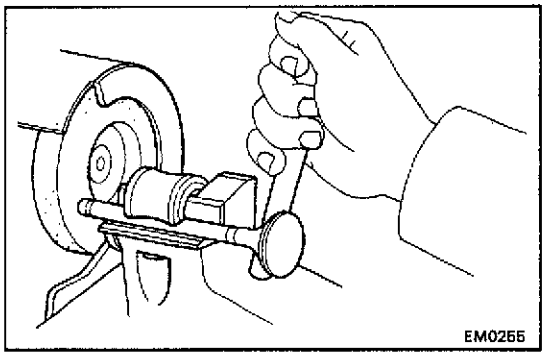
103.10 mm (4.0590 in.)

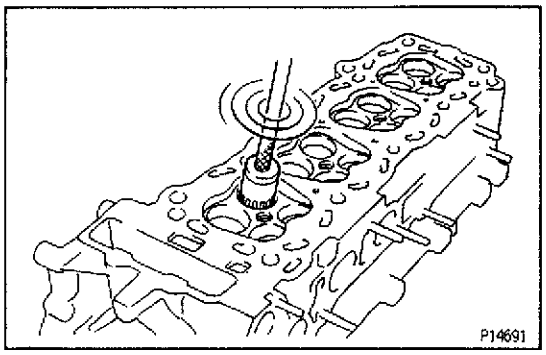
If the overall length is less than minimum, replace the valve.

(e) Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

NOTICE: Do not grind off more than minimum.





8. INSPECT AND CLEAN VALVE SEATS

(a) Using a 45° carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.

(b) Check the valve seating position.

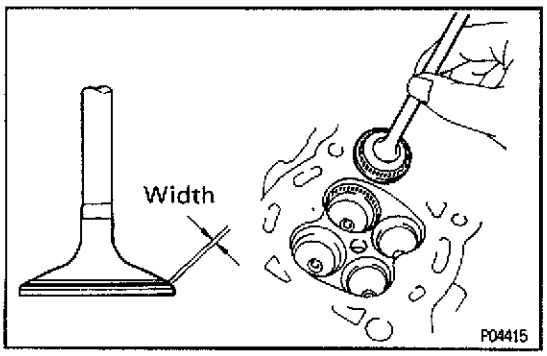
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.

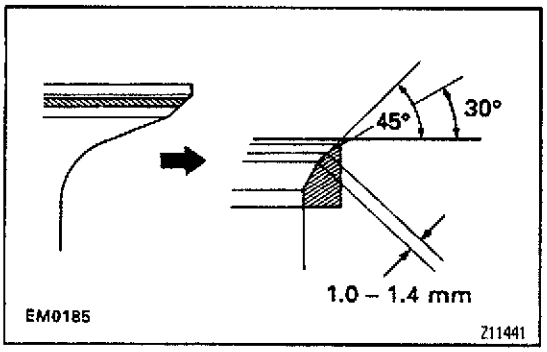
(c) Check the valve face and seat for the following:

- If blue appears 360° around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:

  1.0 – 1.4 mm (0.039 – 0.055 in.)

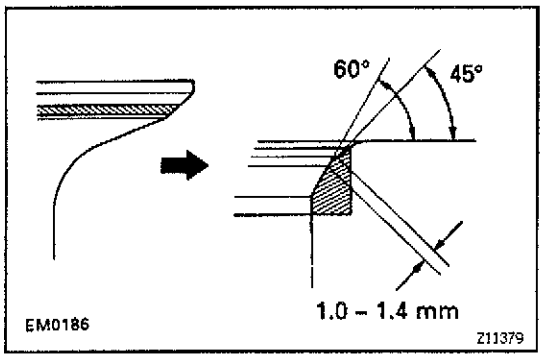
If not, correct the valve seats as follows:



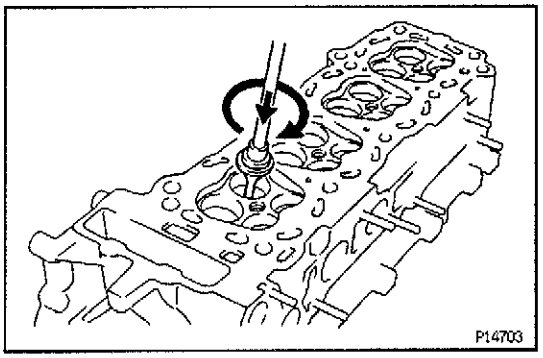


(1) Intake:

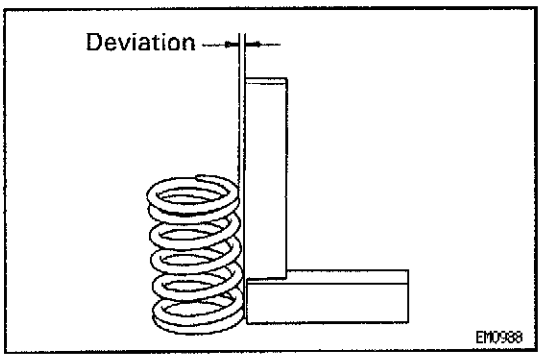
If the seating is too high on the valve face, use 30° and 45° cutters to correct the seat.



(2) If the seating is too low on the valve face, use 60° and 45° cutters to correct the seat.



(d) Hand–lap the valve and valve seat with an abrasive compound.
(e) After hand–lapping, clean the valve and valve seat.



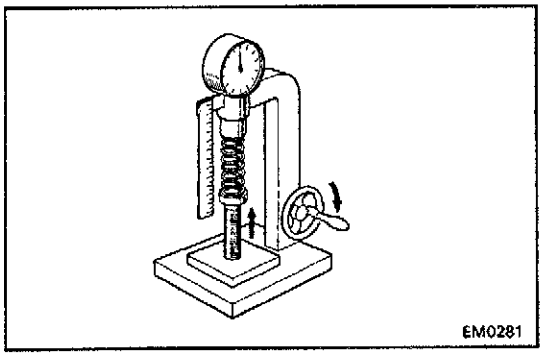
9. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation:

2.0 mm (0.079 in.)

If the deviation is greater than maximum, replace the valve spring.



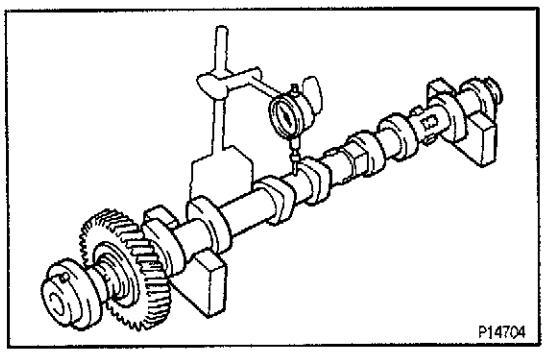
(b) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:

At 35.7 mm (1.406 in.):

177 – 204 N (18.0 – 20.8 kgf, 45.9 – 39.7 lbf)

If the installed tension is not as specified, replace the valve spring.



10. INSPECT CAMSHAFTS AND BEARINGS

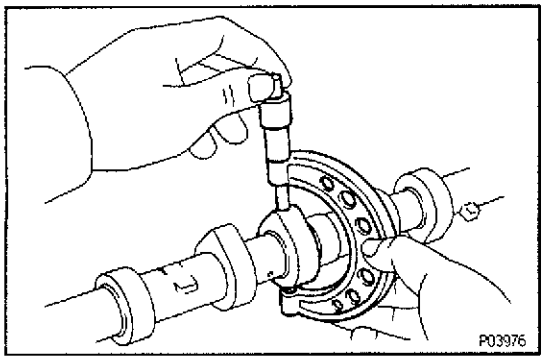
A. Inspect camshaft for runout

(a) Place the camshaft on V–blocks.
(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.06 mm (0.0024 in.)

If the circle runout is greater than maximum, replace the camshaft.



B. Inspect cam lobes

Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

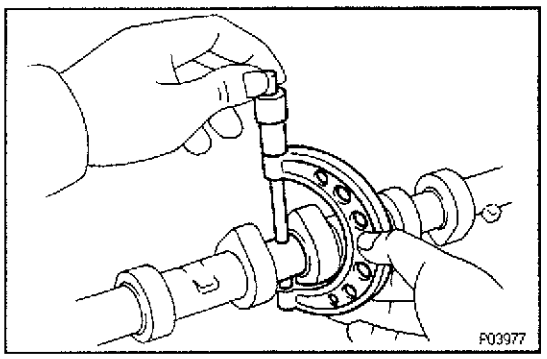
Intake

45.31 – 45.41 mm (1.7839 – 1.7878 in.)

Exhaust

45.06 – 45.16 mm (1.7740 – 1.7779 in.)

If the cam lobe height is less than standard allowable, replace the camshaft.



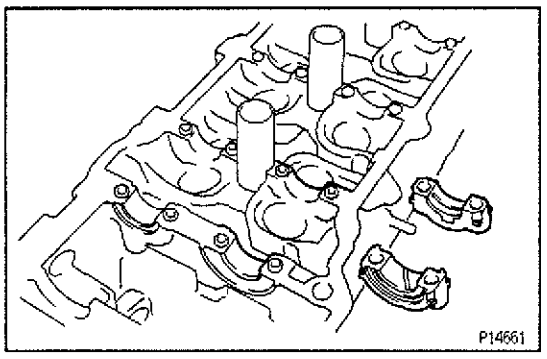
C. Inspect camshaft journals

Using a micrometer, measure the journal diameter.

Journal diameter:

26.959 – 26.975 mm (1.0614 – 1.0620 in.)

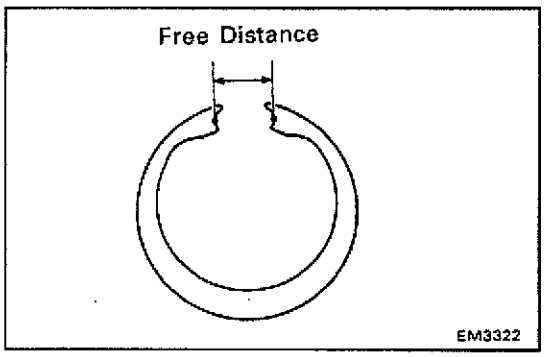
If the journal diameter is not as specified, check the oil clearance.



D. Inspect camshaft bearings

Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.



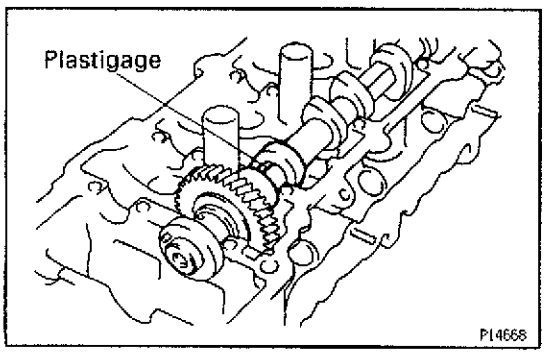
E. Inspect camshaft gear spring

Using a vernier caliper, measure the free distance between the spring ends.

Free distance:

22.5 – 22.9 mm (0.886 – 0.902 in.)

If the free distance is not as specified, replace the gear spring.

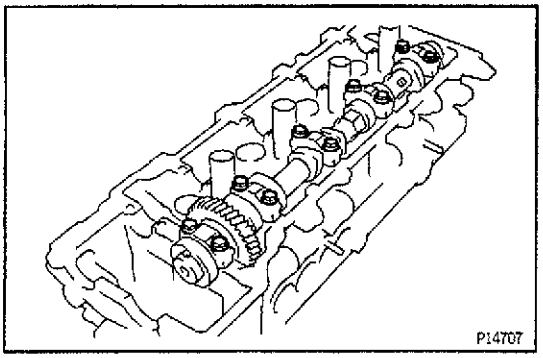


F. Inspect camshaft journal oil clearance

(a) Clean the bearing caps and camshaft journals.

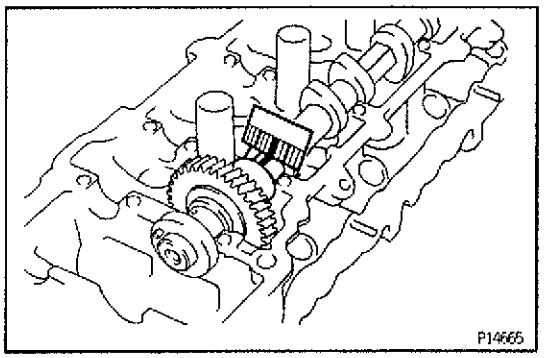
(b) Place the camshafts on the cylinder head.

(c) Lay a strip of Plastigage across each of the camshaft journals.



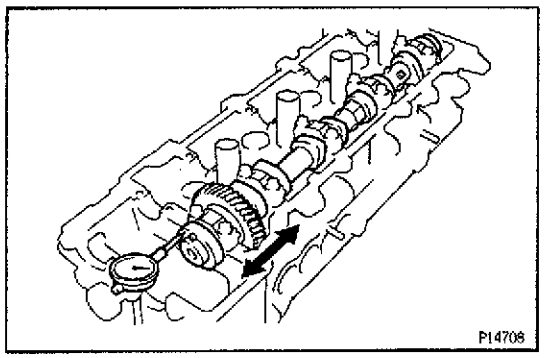
(d) Install the bearing caps.
(See step 3 in cylinder head installation)
Torque: 15.5 N·m (160 kgf·cm, 12 ft·lbf)
NOTICE: Do not turn the camshaft.

(e) Remove the bearing caps.



(f) Measure the Plastigage at its widest point.
Standard oil clearance:
0.025 — 0.062 mm (0.0010 — 0.0024 in.)
Maximum oil clearance:
0.08 mm (0.0031 in.)
If the oil clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

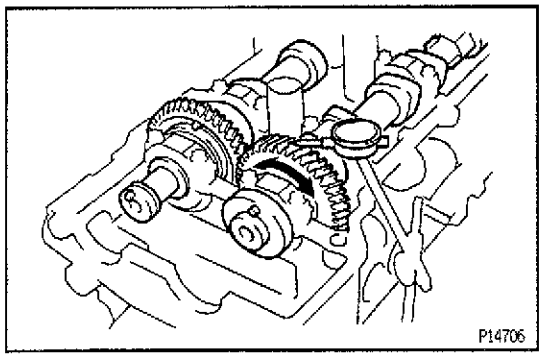
(g) Completely remove the Plastigage.



G. Inspect camshaft thrust clearance

(a) Install the camshaft.
(See step 3 in cylinder head installation)

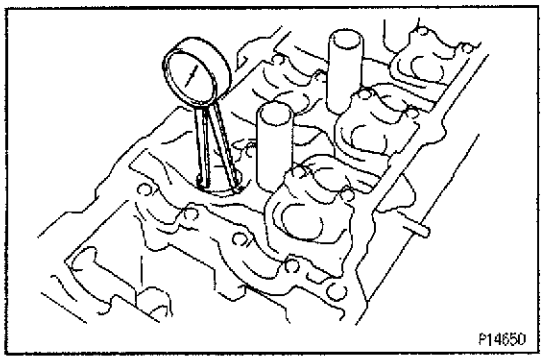
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.040 — 0.095 mm (0.0016 — 0.0037 in.)
Maximum thrust clearance:
0.12 mm (0.0047 in.)
If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.



H. Inspect camshaft gear backlash

(a) Install the camshafts without installing the exhaust cam sub—gear.
(See step 5 in cylinder head installation)

(b) Using a dial indicator, measure the backlash.
Standard backlash:
0.020 — 0.200 mm (0.0008 — 0.0079 in.)
Maximum backlash:
0.30 mm (0.0188 in.)
If the backlash is greater than maximum, replace the camshafts.

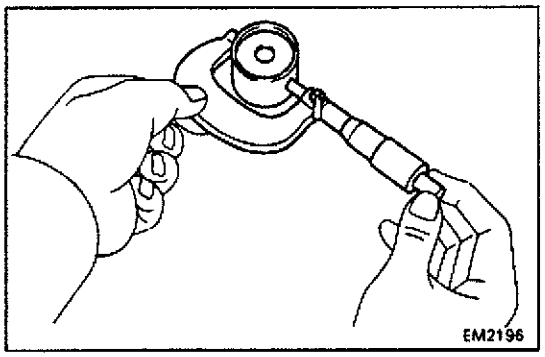


11. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Lifter bore diameter:

31.000 — 31.016 mm (1.2205 — 1.2211 in.)



(b) Using a micrometer, measure the lifter diameter.

Lifter diameter:

30.966 — 30.976 mm (1.1578 — 1.2195 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.

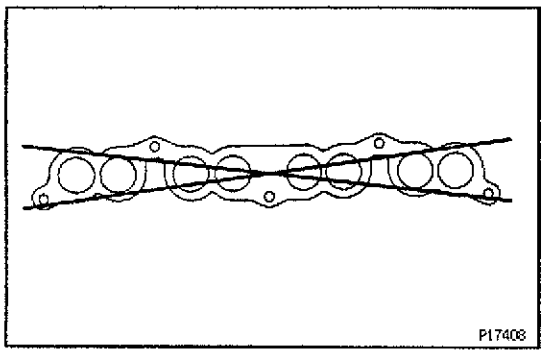
Standard oil clearance:

0.024 — 0.050 mm (0.0008 — 0.0020 in.)

Maximum oil clearance:

0.07 mm (0.0028 in.)

If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.



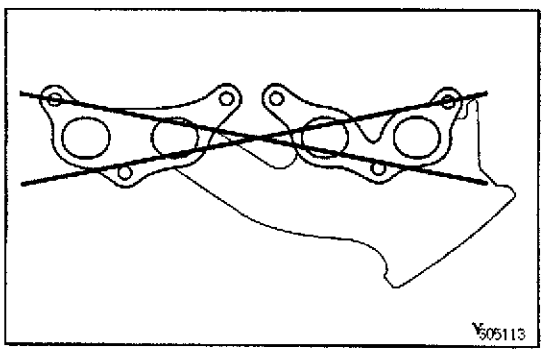
12. INSPECT INTAKE MANIFOLD

Using a precision straight edge and thickness gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage:

0.20 mm (0.0078 in.)

If warpage is greater than maximum, replace the manifold.



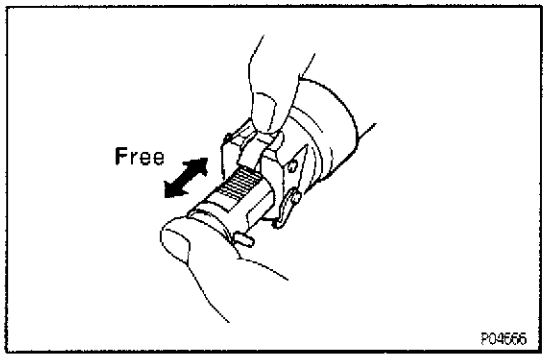
13. INSPECT EXHAUST MANIFOLD

Using a precision straight edge and thickness gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage:

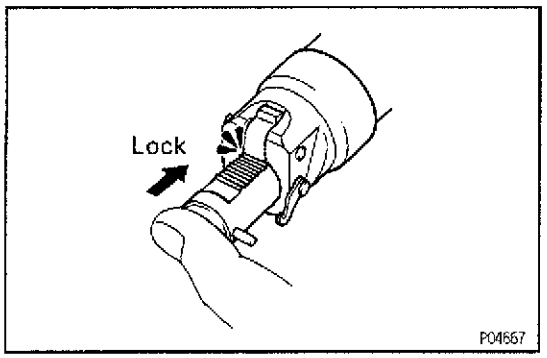
0.50 mm (0.0197 in.)

If warpage is greater than maximum, replace the manifold.

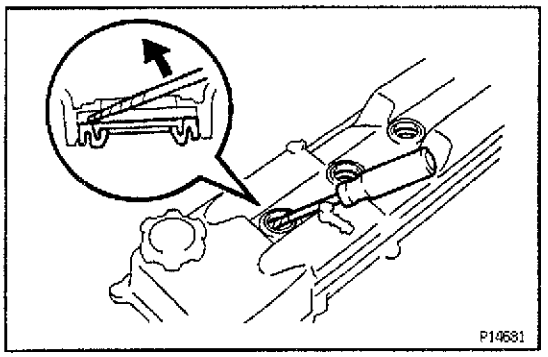


14. INSPECT CHAIN TENSIONER

(a) Check that the plunger moves smoothly when the ratchet pawl is raised with your finger.

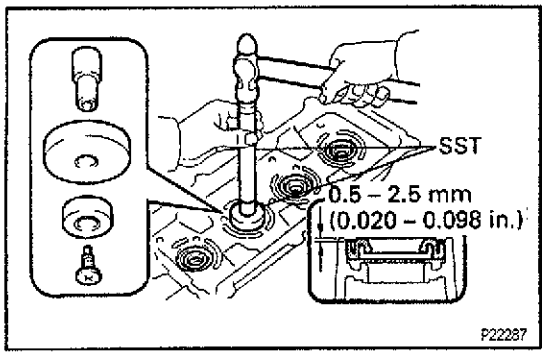


(b) Released the ratchet pawl and check that the plunger is locked in place by the ratchet pawl and does not move when pushed with your finger.



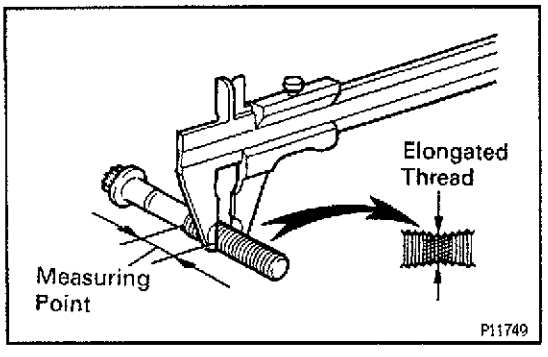
15. IF NECESSARY, REPLACE SPARK PLUG TUBE GASKETS

(a) Using a screwdriver, pry out the tube gasket.



(b) Using SST and a hammer, tap in a new tube gasket as shown in the illustration.
SST 09950–60010 (09951–00260, 09951–00490, 09952–06010), 09950–70010 (09951–07150)

(c) Apply a light coat of MP grease to the gasket lip.



16. INSPECT CYLINDER HEAD BOLTS

Using vernier calipers, measure the minimum diameter of the elongated thread at the measuring point.

Standard diameter:

10.76 – 10.97 mm (0.4236 – 0.4319 in.)

Minimum diameter:

10.40 mm (0.4094 in.)

If the diameter is less than minimum, replace the bolt.

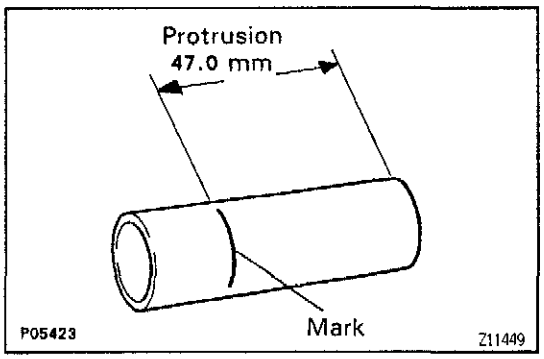
EG76M–01

CYLINDER HEAD ASSEMBLY

HINT:

- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- Replace all gaskets and oil seals with new ones.

EG



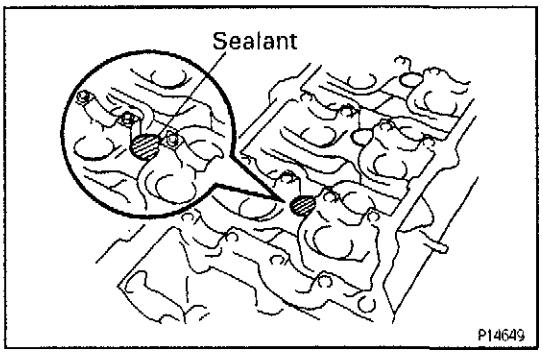
1. INSTALL SPARK PLUG TUBES

HINT: When using a new cylinder head, spark plug tubes must be installed.

(a) Mark the standard position away from the edge, onto the spark plug tube.

Standard protrusion:

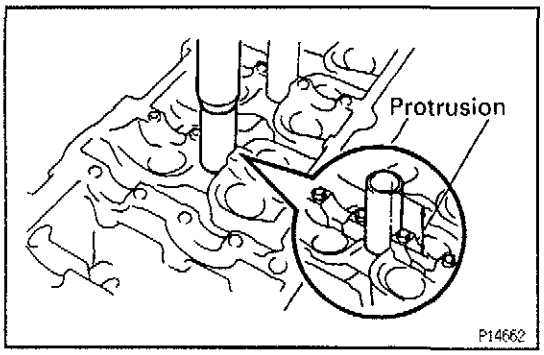
47.0 mm (1.850 in.)



(b) Apply adhesive to the spark plug tube hole of the cylinder head.

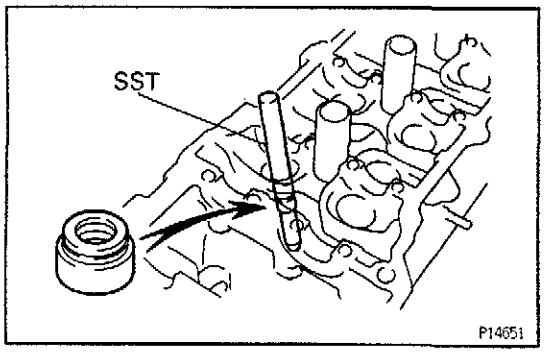
Sealant:

Part No. 08833 – 00070, Adhesive 1324, THREE BOND 1324 or equivalent



(c) Using a press, press in a new spark plug tube until there is 47.0 mm (1.850 in.) protruding from the camshaft bearing cap installation surface of the cylinder head.

NOTICE: Avoid pressing a new spark plug tube in too far by measuring the amount of protrusion while pressing.



2. INSTALL VALVES

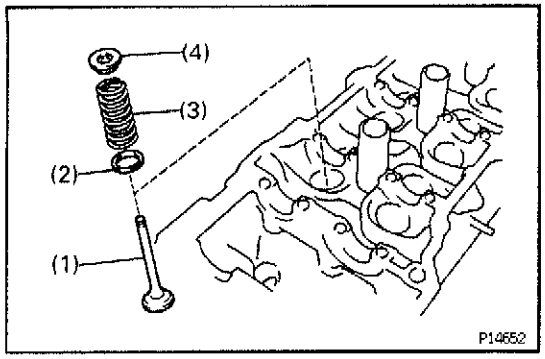
(a) Using SST, push in a new oil seal.

SST 09236–00101 (09236–15010)

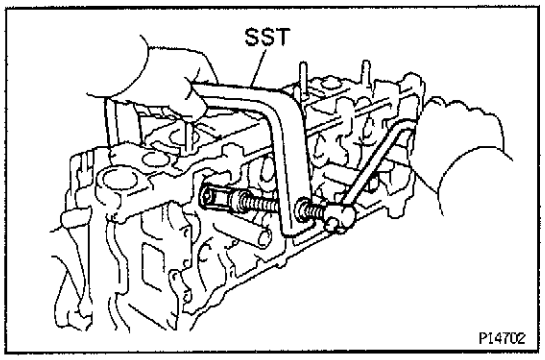
HINT: Different oil seals are used for the intake and exhaust.

Code mark (Intake side only):

"H"



(b) Install the following parts:
(1) Valve
(2) Spring seat
(3) Valve spring
(4) Spring retainer



(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202–70020 (09202–00010)
(d) Using a plastic–faced hammer, lightly tap the valve stem tip to on sure a proper fit.

3. INSTALL VALVE LIFTERS AND SHIMS

(a) Install the valve lifter and shim.
(b) Check that the valve lifter rotates smoothly by hand.

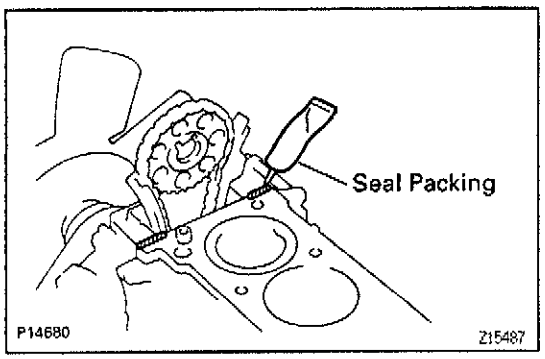
EGTBN–02

CYLINDER HEAD INSTALLATION

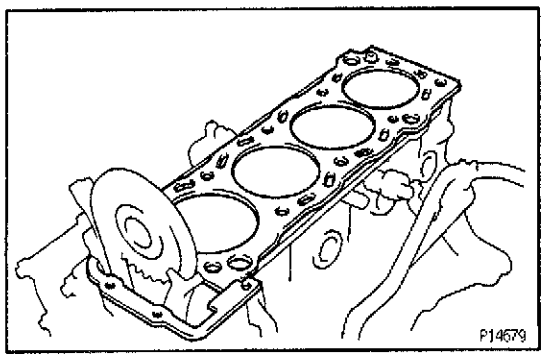
1. INSTALL CYLINDER HEAD

A. Place cylinder head on cylinder block

(a) 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.

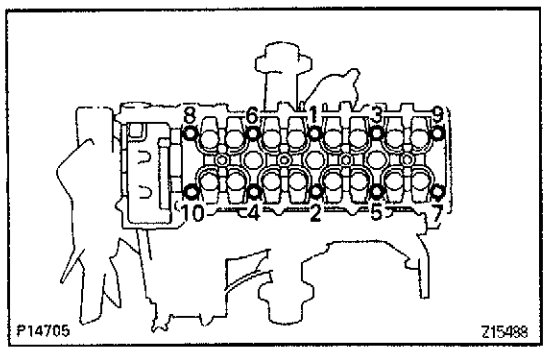


(b) Place a new cylinder head gasket in position on the cylinder block.
NOTICE: Be careful of the installation direction.
(c) Place the cylinder head in position on the cylinder head gasket.



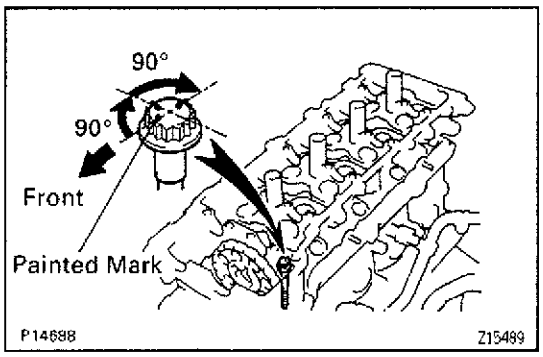
B. Install cylinder head bolts
HINT:
- The cylinder head bolts are tightened in 3 progressive steps (steps (b) and (d)).
- If any cylinder head bolt is broken or deformed, replace it.

(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

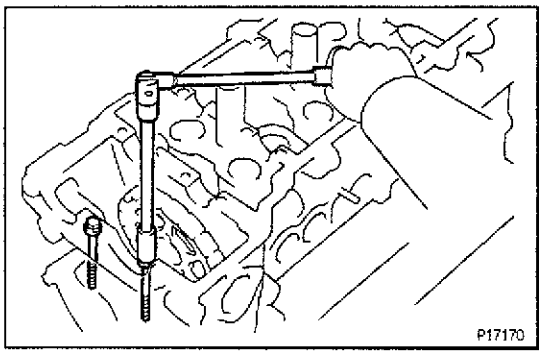


(b) Install and uniformly tighten the 10 cylinder head bolts and plate washers in several passes, in the sequence shown.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

EG



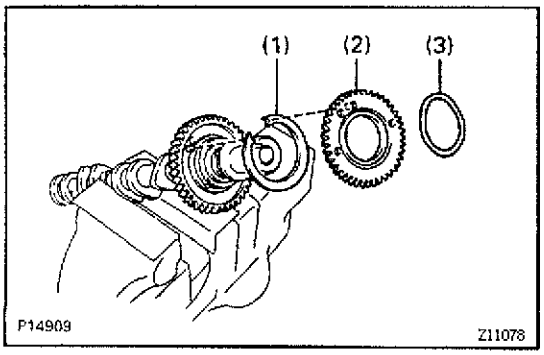
(c) Mark the front of the cylinder head bolt head with paint.
(d) Retighten the cylinder head bolts by 90° in the numerical order shown.
(e) Retighten the cylinder head bolts by an additional 90°.
(f) Check that the painted mark is now facing rearward.



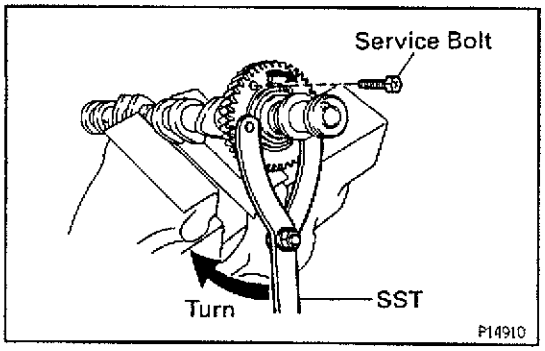
(g) Install and torque the 2 mounting bolts.
Torque: 21N·m (210 kgf·cm, 15 ft·lbf)

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 following parts:
(1) Camshaft gear spring
(2) Camshaft sub–gear
(3) Wave washer
HINT: Align the pins on the gears with the spring ends.
(c) Using snap ring pliers, install the snap ring.

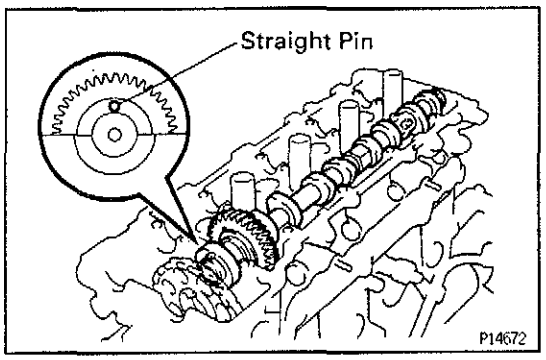


(d) Using SST, align the holes of the camshaft main gear and sub–gear by turning sub–gear clockwise, and install a service bolt.
SST 09960–10010 (09962–01000, 09963–00500)

EG

3. INSTALL CAMSHAFTS

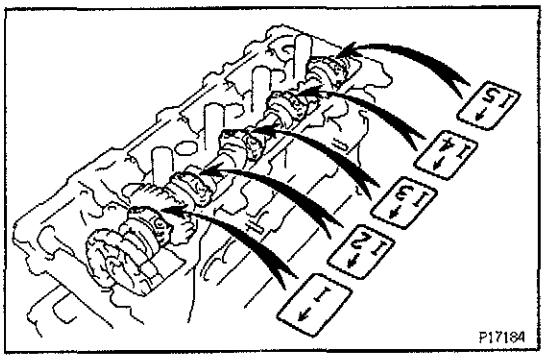
NOTICE: Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being installed. If the camshaft is not kept level, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the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



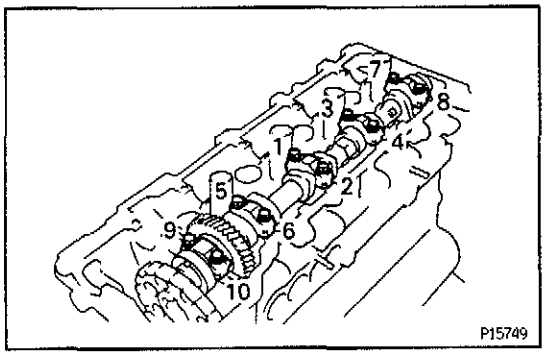
A. Install intake camshaft

(a) Apply MP grease to the thrust portion of the intake camshaft.

(b) Place the intake camshaft with knock pin facing upward of camshaft angle on the cylinder head.



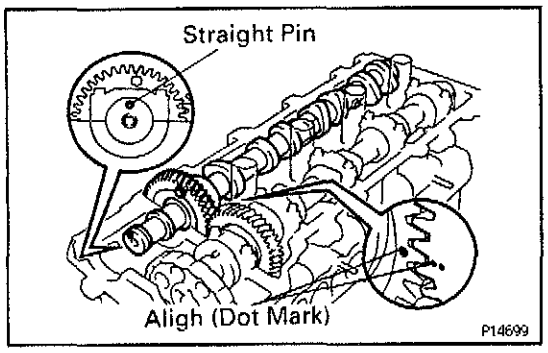
(c) Install the bearing caps in their proper locations.



(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

(e) Install and uniformly tighten the 10 bearing cap bolts in the sequence shown.

Torque: 15.5 N·m (160 kgf·cm, 12 ft·lbf)



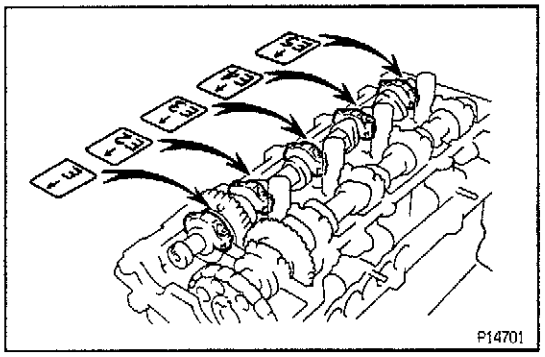
B. Install exhaust camshaft

(a) Apply MP grease to the thrust portion of the exhaust camshaft.

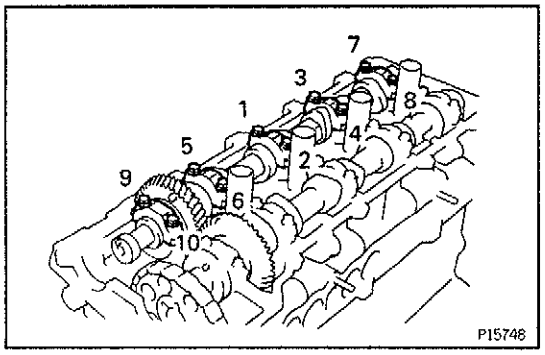
(b) Engage the exhaust camshaft gear to the intake camshaft gear by matching the timing marks (1 and 2 dots) on each gear.

NOTICE: There are also timing marks (for TDC) on each gear as shown in the illustration. Do not use these marks.

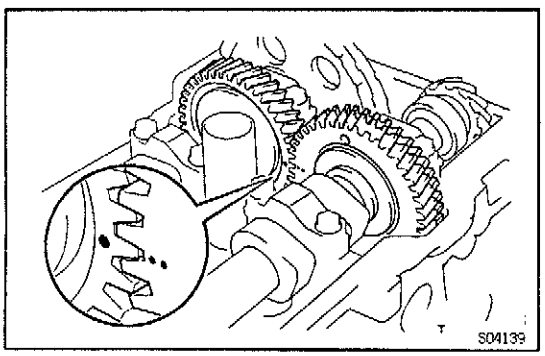
(c) Roll down the exhaust camshaft onto the bearing journals while engaging gears with each other.



(d) Install the bearing caps in their proper locations.

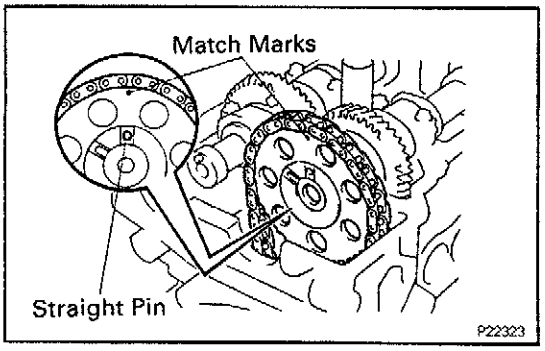


(e) Apply light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(f) Install and uniformly tighten the 10 bearing cap bolts in several passes in the sequence shown.
Torque: 15.5 N·m (160 kgf·cm, 12 ft·lbf)
(g) Remove the service bolt.
(h) Check that the intake and exhaust camshafts turn smoothly.



4. SET NO.1 CYLINDER TO TDC/COMPRESSION

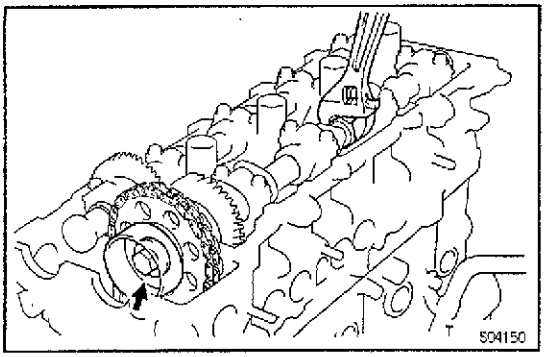
(a) Turn the crankshaft pulley clockwise, and align its groove with the timing mark "0" of the timing chain cover.
(b) Turn the camshafts so that the timing marks with 1 and 2 dots will be in straight line on the cylinder head surface as shown in the illustration.



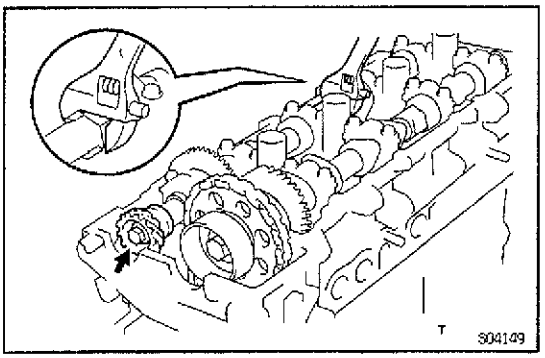
5. INSTALL CAMSHAFT TIMING GEAR

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.
HINT: Install the fuel pump drive cam on white paint marking side at upward.

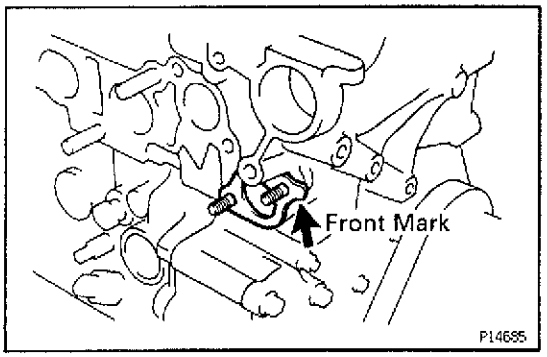
EG



(b) Hold the intake camshaft with a wrench, install the fuel pump drive cam and torque the bolt.
Torque: 73.5 N·m (750 kgf·cm, 54 ft·lbf)

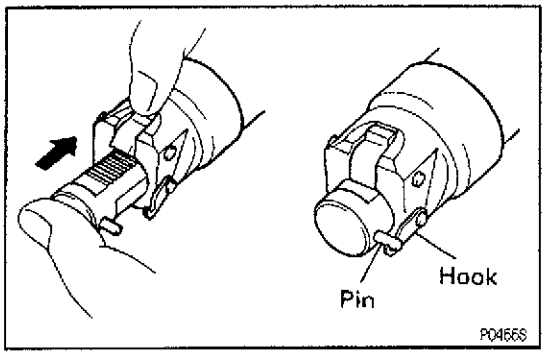


(c) Hold the exhaust camshaft with a wrench install the bolt and distributor gear.
Torque: 46 N·m (470 kgf·cm, 34 ft·lbf)



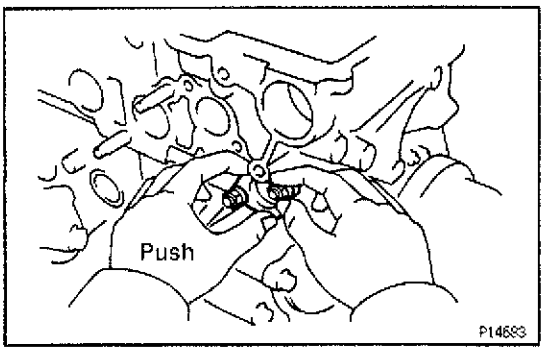
6. INSTALL CHAIN TENSIONER

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

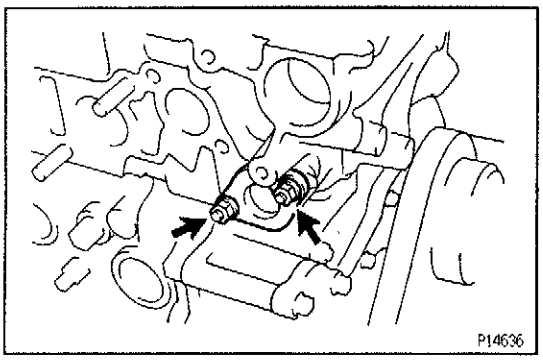


(b) Release the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger cannot spring out.

(c) Turn the crankshaft pulley clockwise to provide some slack for the chain on the tensioner side.
NOTICE: Do not turn the pulley counterclockwise.

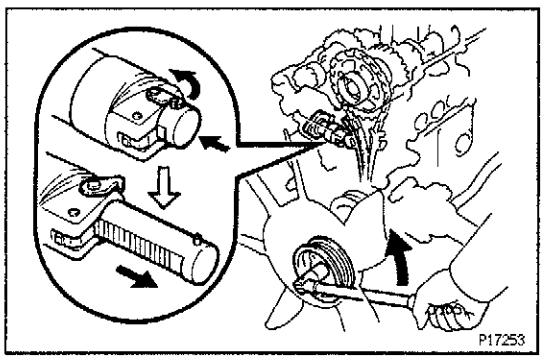


(d) Push the tensioner by hand until it touches the head installation surface, then install the 2 nuts.



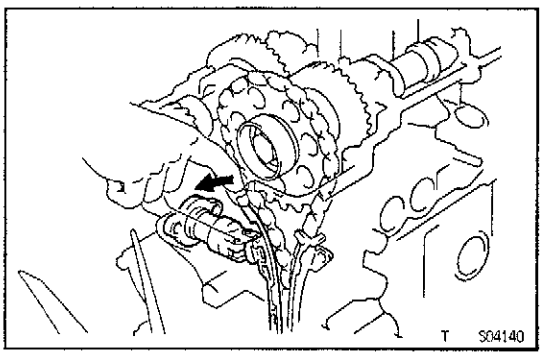
(e) Tighten the 2 nuts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(f) Check that the hook of the tensioner is not released.
NOTICE: If the plunger springs out during installation of the chain tensioner, repeat the operation in step (b) before installing the tensioner.

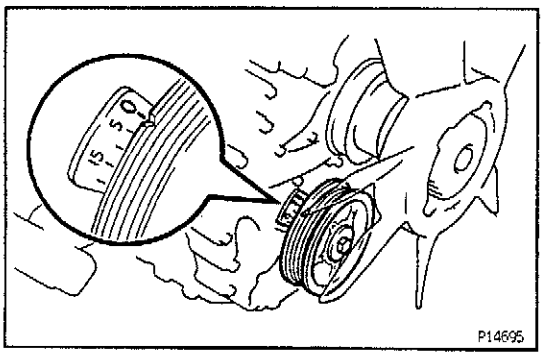


7. SET CHAIN TENSIONER

Turn the crankshaft to the left so that the hook of the chain tensioner is released from the pin of the plunger, causing the plunger to spring out and the slipper to be pushed into the chain.

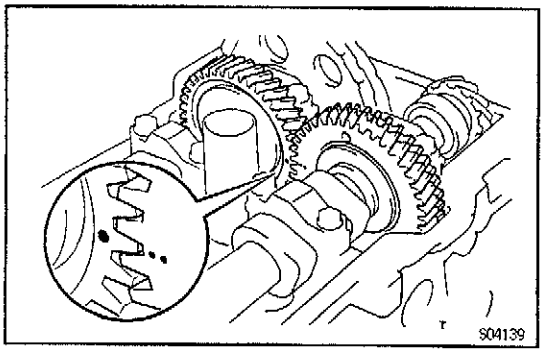


HINT: If the plunger does not spring out, press the slipper into the chain tensioner with a screwdriver or your finger so that the hook is released and the plunger springs out.



8. 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.

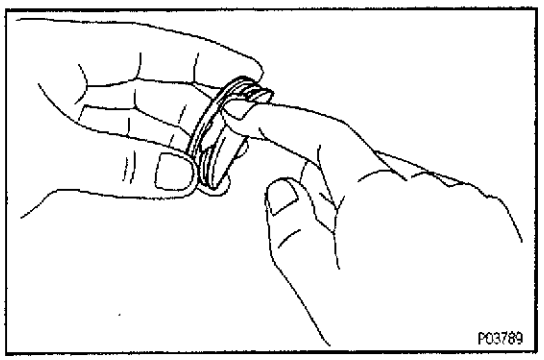


(b) Check that the timing marks (1 and 2 dots) of the camshaft drive and driven gears are in straight line on the cylinder head surface as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

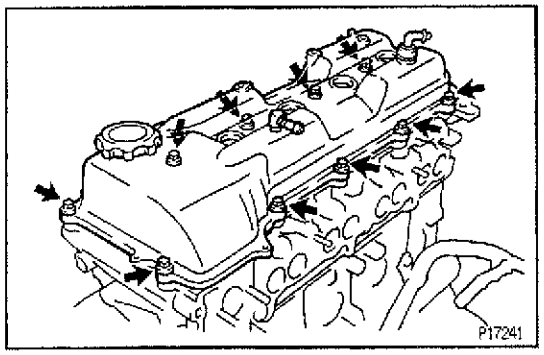
EG

9. **CHECK AND ADJUST VALVE CLEARANCE**
(See step 8 and 9 in valve clearance inspection and adjustment)
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 – 0.014 in.)

10. **INSTALL SPARK PLUGS**
(See Ignition System)

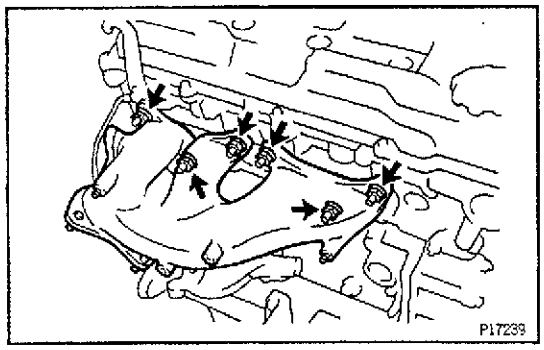


11. **INSTALL SEMI–CIRCULAR PLUGS**
(a) Remove any old packing (FIPG) material.
(b) Apply seal packing to the cylinder head installation surface of the semi–circular plugs.
Seal packing:
Part No. 08826–00080 or equivalent
(c) Install the semi–circular plug to the cylinder head.

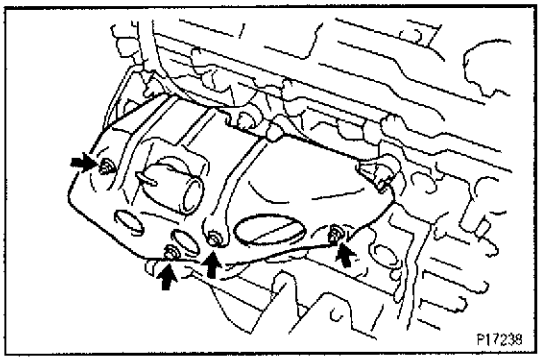


12. **INSTALL CYLINDER HEAD COVER**
(a) Install the gasket to the cylinder head cover.
(b) Install the cylinder head cover with the 10 bolts.

13. **INSTALL FRONT ENGINE HANGER**
Install the front engine hanger with the bolt.
Torque: 42 N·m (420 kgf·cm, 30 ft·lbf)



14. **INSTALL EXHAUST MANIFOLD**
(a) Install a new gasket and exhaust manifold with the 6 nuts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

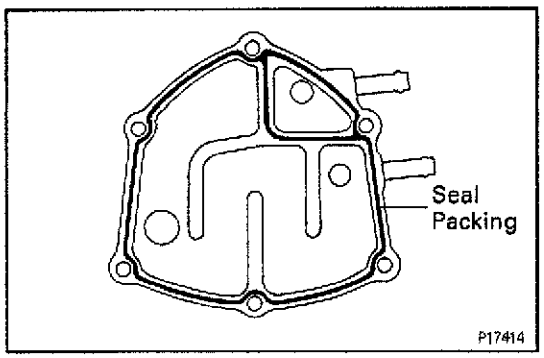


(b) Install the heat insulator with the 2 bolts and 2 nuts.
Torque: 5.5 N·m (55 kgf·cm, 48 in.·lbf)

15. INSTALL WATER BYPASS FLANGE

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the water bypass and intake manifold.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

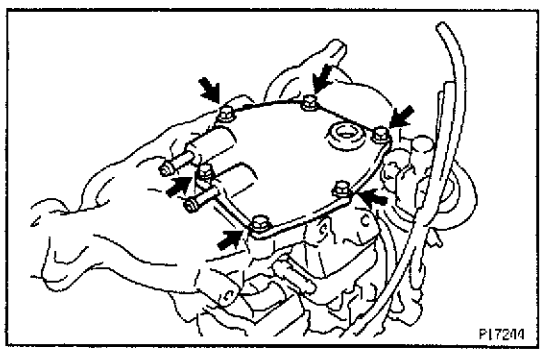


(b) Apply seal packing to the water bypass flange as shown in the illustration.
Seal packing:
Part No.08826–00080 or equivalent

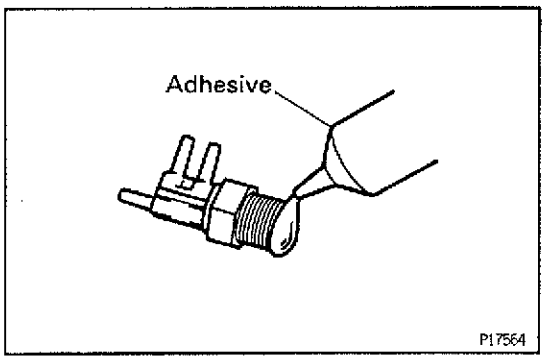
- Install a nozzle that has been cut to a 3 – 4 mm (0.12 – 0.16 in.) opening.

HINT: Avoid applying an excessive amount to the surface.

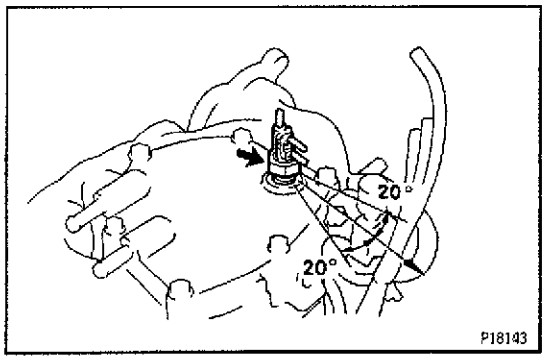
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



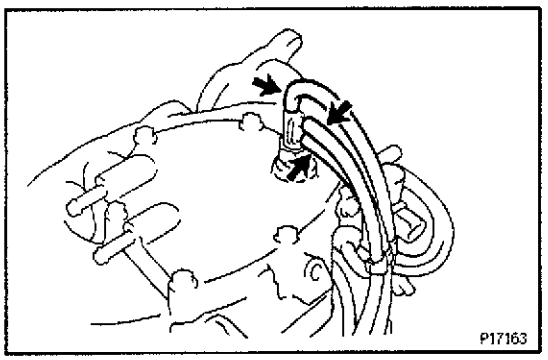
(c) Install the water bypass flange with the 6 bolts.
Torque: 9.0 N·m (90 kgf·cm, 78 in.·lbf)



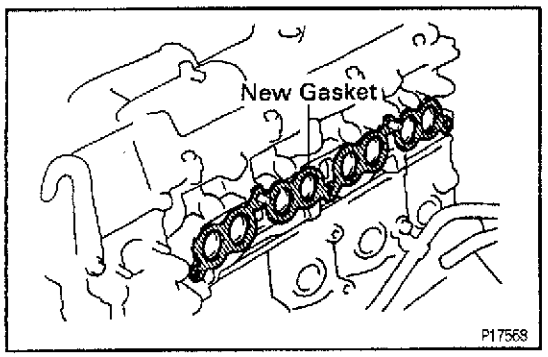
(d) Apply adhesive to 2 or 3 threads of the BVSV.
Adhesive:
Part No.08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent



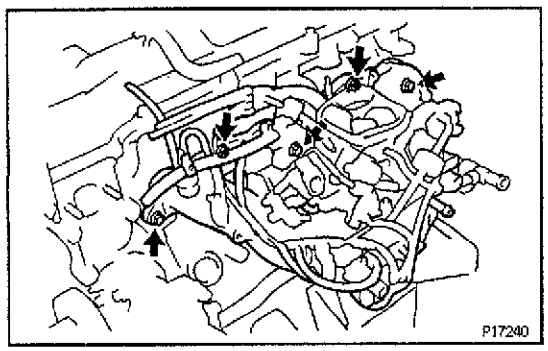
(e) Install the BVSV.
HINT: The BVSV may be set within 20° of either side of the prescribed position.



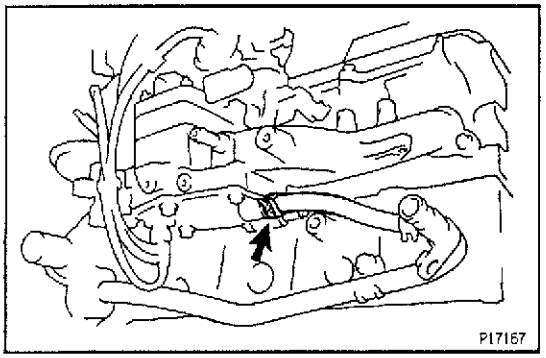
(f) Connect the 3 vacuum hoses to the BVSV.



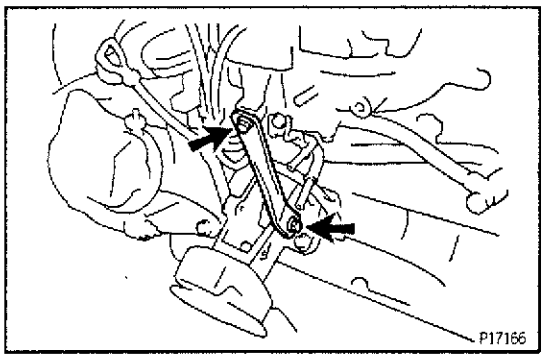
16. INSTALL INTAKE MANIFOLD WITH CARBURETOR
(a) Install a new gasket to the cylinder head.



(b) Install the intake manifold with the 3 bolts and 2 nuts.
Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



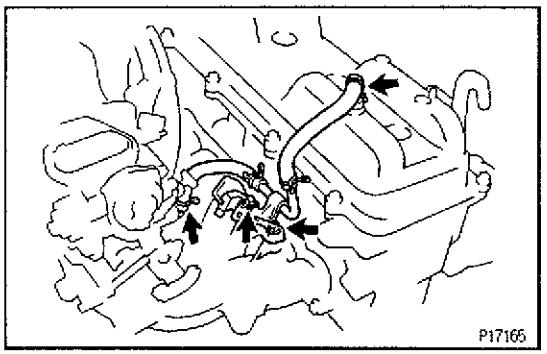
(b) Connect the water bypass hose to the intake manifold.



17. INSTALL INTAKE MANIFOLD STAY

Install the intake manifold stay with the 2 bolts.

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

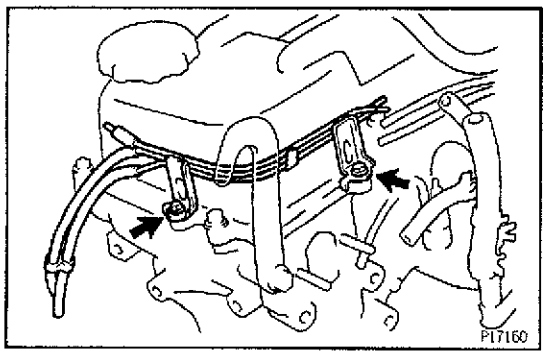


18. INSTALL PCV HOSE AND ACCELERATOR CABLE BRACKET

(a) Install the accelerator cable bracket with the 2 bolts.

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

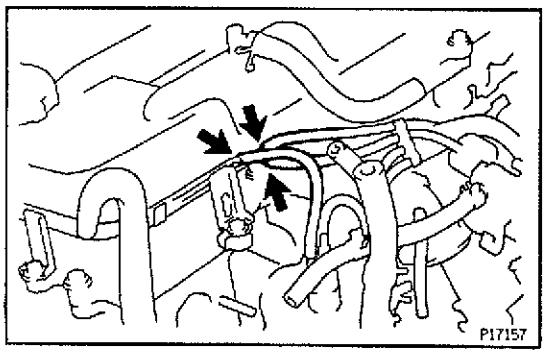
(b) Connect the 2 PCV hoses.



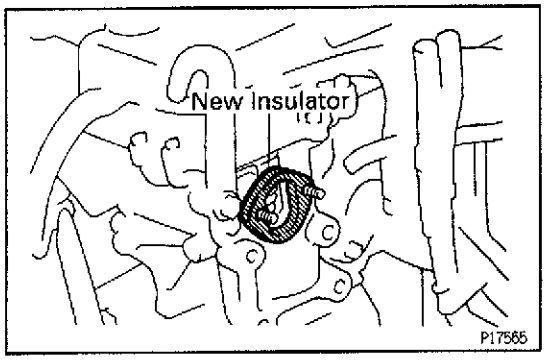
19. INSTALL NO.2 VACUUM PIPE

(a) Install the vacuum pipe with the 2 bolts.

Torque: 8.5 N·m (85 kgf·cm, 74 in.·lbf)

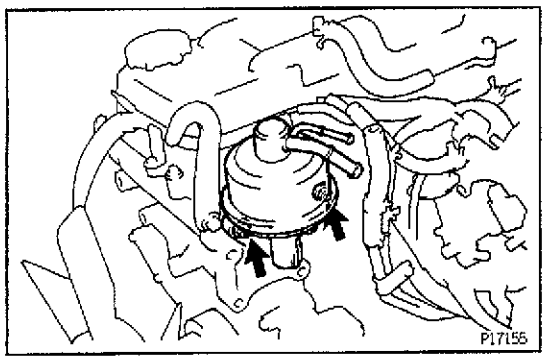


(b) Connect the 3 vacuum hoses to the vacuum pipe.

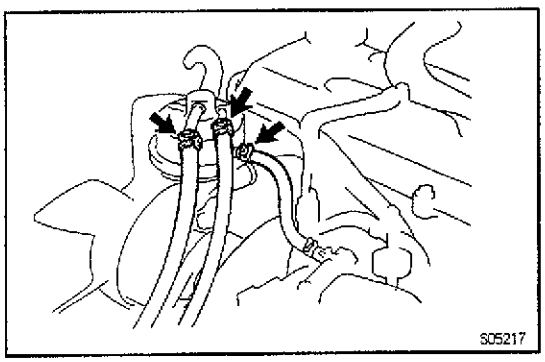


20. INSTALL FUEL PUMP

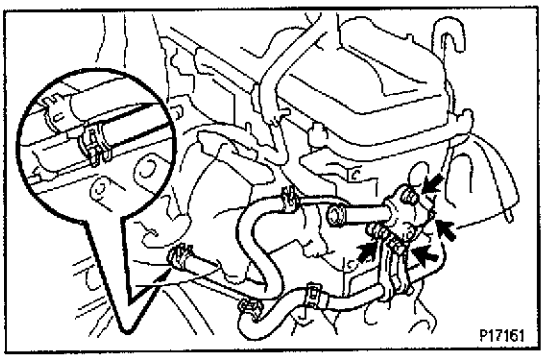
(a) Install a new insulator to the cylinder head.



(b) Install the fuel pump with the 2 nuts.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)



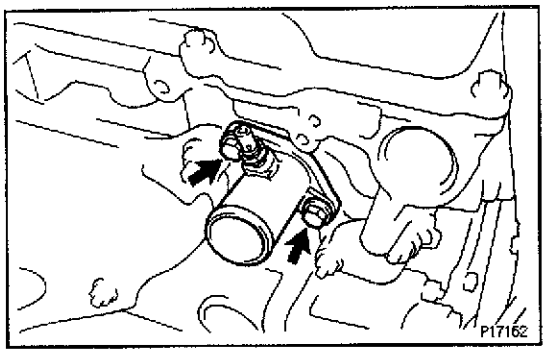
(c) Connect the 3 fuel hoses.



21. INSTALL CYLINDER HEAD REAR COVER

(a) Install a new gasket and rear cover with the 3 bolts.
Torque: 13.5 N·m (135 kgf·cm, 10 ft·lbf)

(b) w/ Oil cooler:
Install the No.2 water bypass pipe mounting bolt.
Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)



22. INSTALL WATER OUTLET
Install a new gasket and water outlet with the 2 bolts.
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

23. INSTALL OIL DIPSTICK GUIDE

24. INSTALL DISTRIBUTOR
(See distributor installation in Ignition System)

25. FILL WITH ENGINE COOLANT