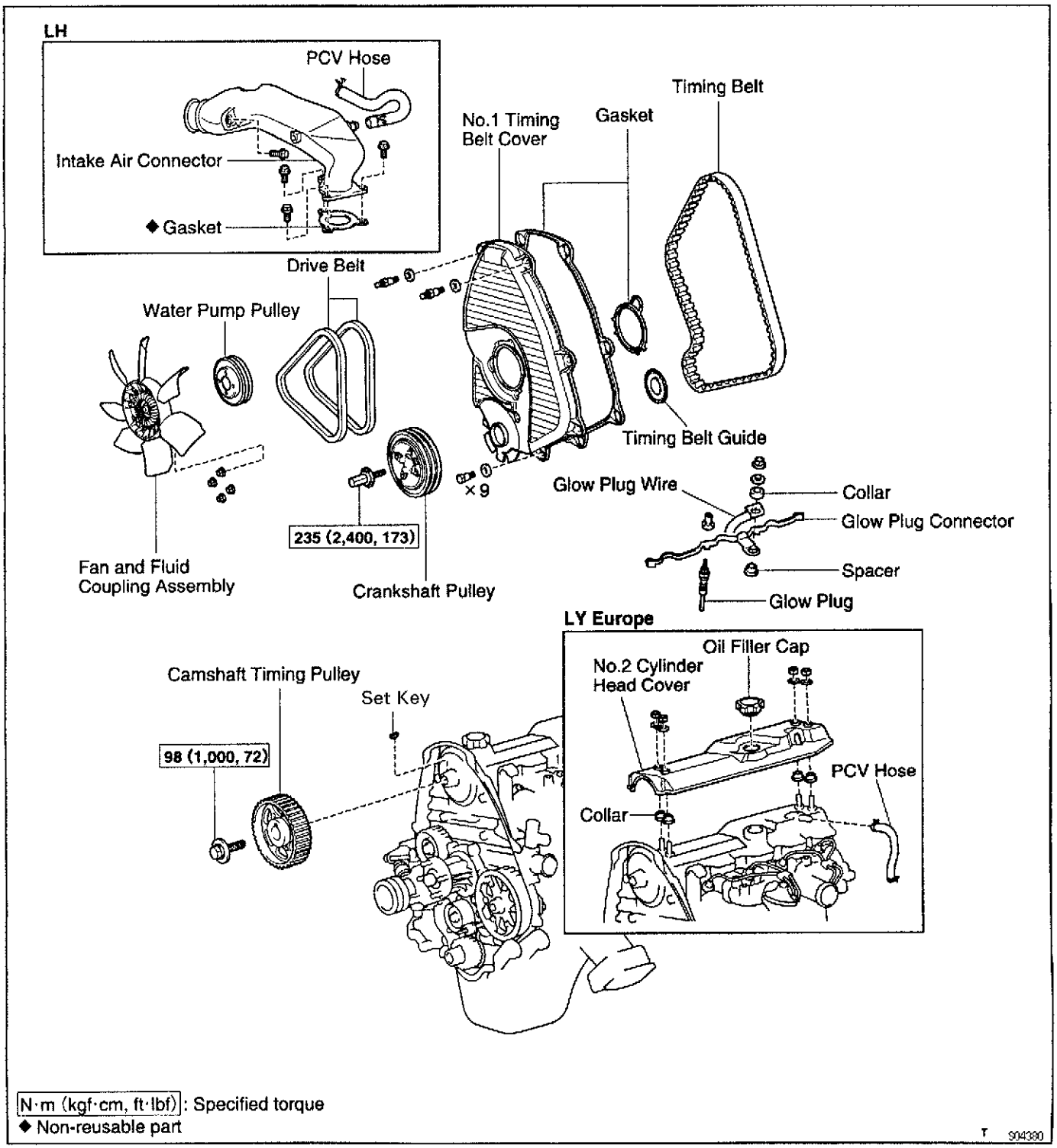
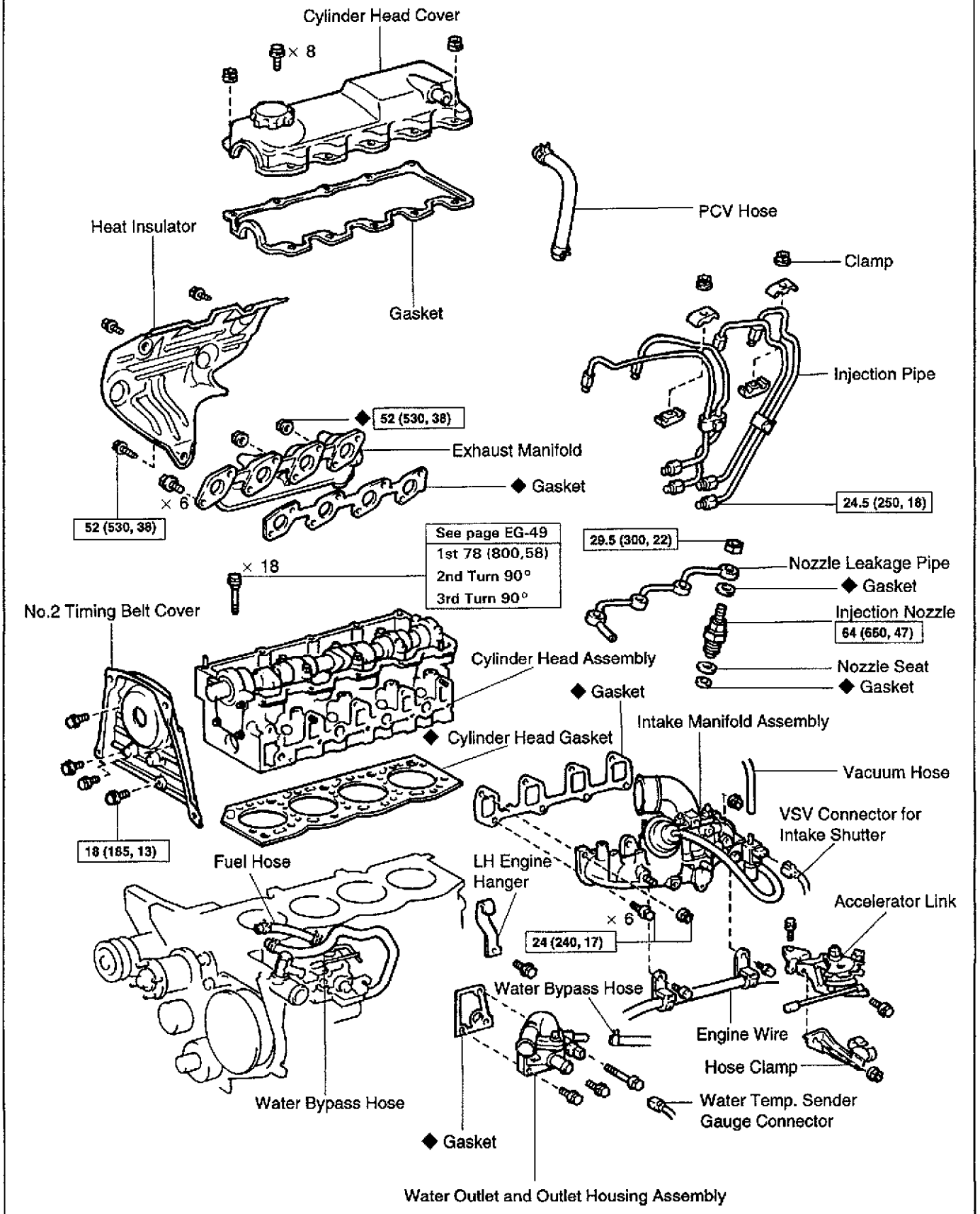
CYLINDER HEAD

EG5XF-04
HINT: If replacing the timing belt before the timing belt warning light comes on, (light comes on after 100,000 km of driving), be sure to reset the timing belt counter of the speedometer to zero.

EG

COMPONENTS FOR REMOVAL AND INSTALLATION





N·m (kgf·cm, ft·lbf) : Specified torque

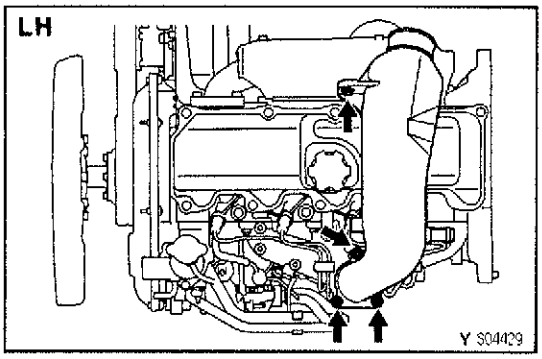
◆ Non-reusable part

Y

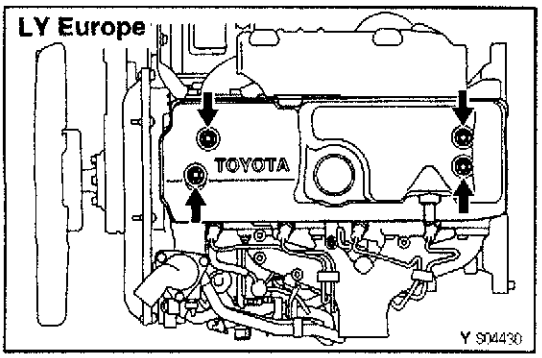
S04376

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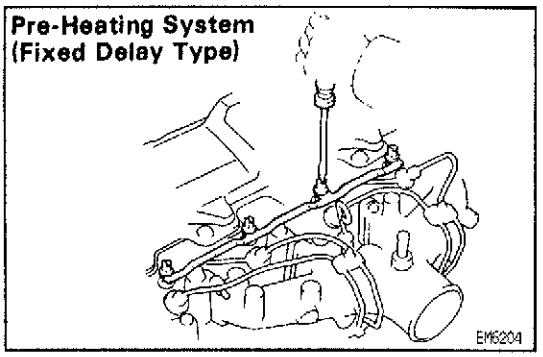
CYLINDER HEAD REMOVAL



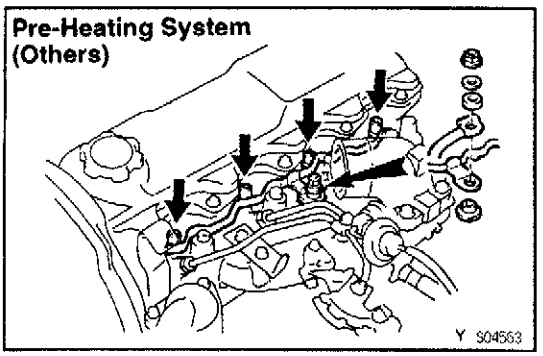
1. **DRAIN ENGINE COOLANT**
2. **REMOVE PCV HOSE**
3. **LH:**
   REMOVE INTAKE AIR CONNECTOR
   Remove the 4 bolts, intake air connector and gasket.



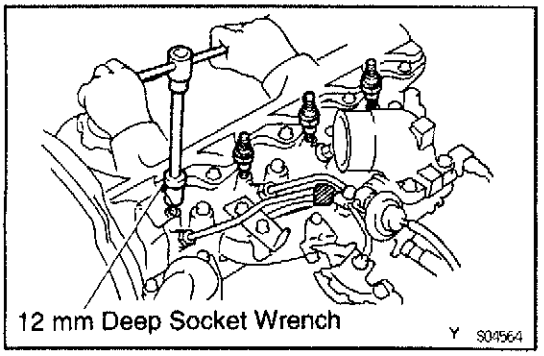
4. **LY Europe:**
   REMOVE NO.2 CYLINDER HEAD COVER
   (a) Remove the oil filler cap.
   (b) Remove the 4 nuts, plate washers, cylinder head cover and collars.
   (c) Remove the silencer, 4 grommets and bushings from the cylinder head cover.



5. **REMOVE GLOW PLUGS**
   (a) Pre—Heating System (Fixed Delay Type):
   Remove the 4 bolts and glow plug connector.

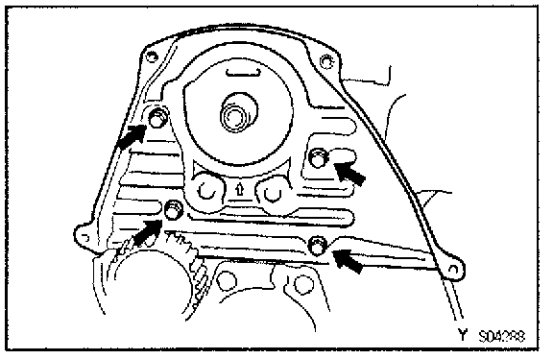


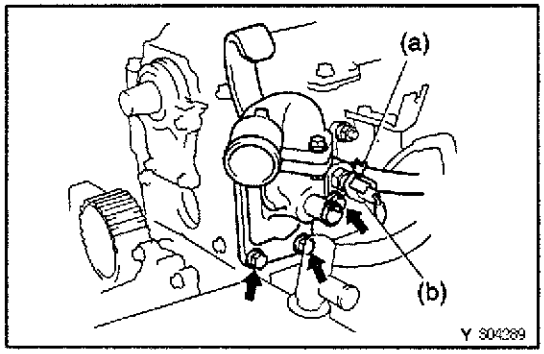
   (b) Pre—Heating System (Others):
   Remove the 4 nuts holding the glow plug connector to the glow plugs.
   (c) Pre—Heating System (Others):
   Remove the nut and plate washer holding the glow plug connector to the intake manifold, and disconnect the glow plug wire.
   NOTICE: In order not to short the glow plug wire, apply vinyl tape around the terminal.
   (d) Pre—Heating System (Others):
   Remove the glow plug connector and spacer.



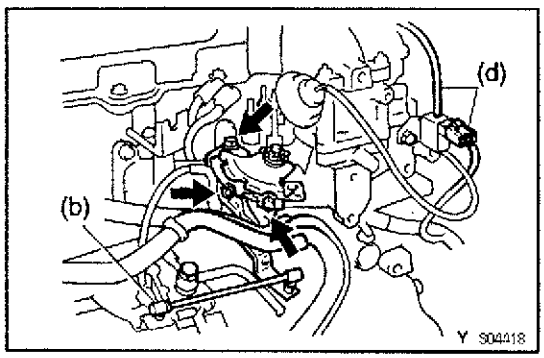
   (e) Using a 12 mm deep socket wrench, remove the 4 glow plugs.

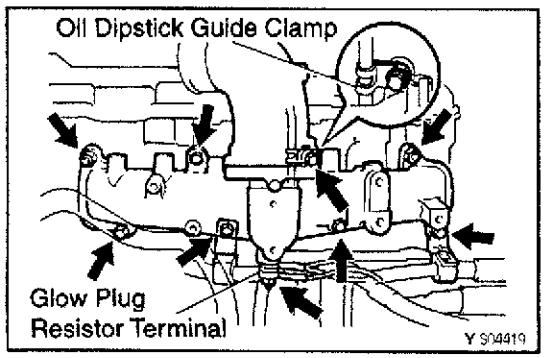
6. **REMOVE DRIVE BELTS, FAN, FLUID COUPLING ASSEMBLY AND WATER PUMP PULLEY**
   (See step 2 in water pump removal in Cooling System)
7. **REMOVE TIMING BELT**
   (See steps 3 to 7 in timing belt removal)
8. **REMOVE CAMSHAFT TIMING PULLEY**
   (See step 9 in timing belt removal)
9. **REMOVE INJECTION NOZZLES**
   (See steps 2 to 4 in injection nozzles removal in Fuel System)
10. **REMOVE NO.2 TIMING BELT COVER**
    Remove the 4 bolts and timing belt cover.

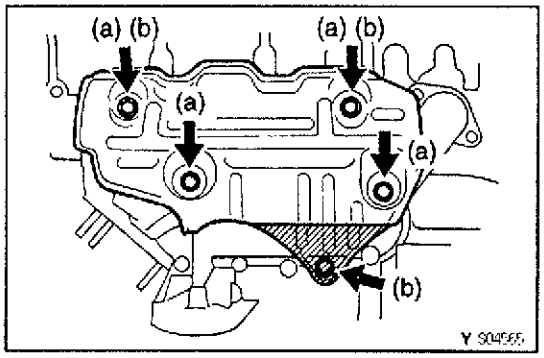




11. **REMOVE WATER OUTLET AND HOUSING ASSEMBLY**
(a) w/ ACSD:
Disconnect the water bypass hose from the water housing.
(b) Disconnect the water temperature sender gauge connector.
(c) Remove the 3 bolts, the water outlet, outlet housing assembly and gasket.
12. **REMOVE LH ENGINE HANGER**
13. **REMOVE INTAKE MANIFOLD ASSEMBLY**
(a) w/ ACSD:
Disconnect the 2 water bypass hoses from the hose clamp.
(b) Disconnect the accelerator link from the injection pump.
(c) Remove the 2 bolts, nut, accelerator link and hose clamp (w/ ACSD).
(d) LJ:
Disconnect the vacuum hose and connector from the VSV for intake shutter.
(e) Pre−Heating System (Super Glow Type):
Remove the nut and collar, disconnect the glow plug resistor terminals.
(f) Remove the 6 bolts, 2 nuts, 2 engine wire brackets, oil dipstick guide clamp (except LJ), intake manifold assembly and gasket.





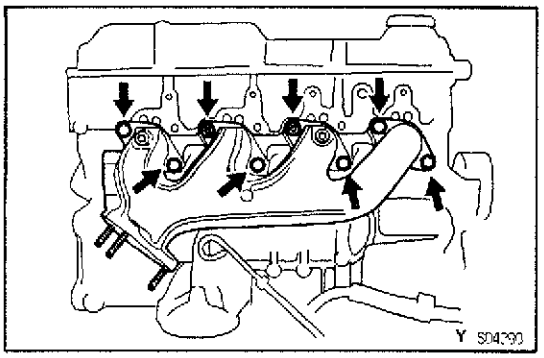


EG

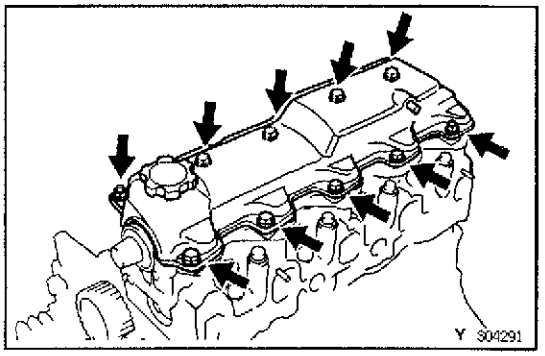
14. REMOVE EXHAUST MANIFOLD

(a) LN Thailand:
Remove the 4 bolts and heat insulator.

(b) Others:
Remove the 3 bolts and heat insulator.

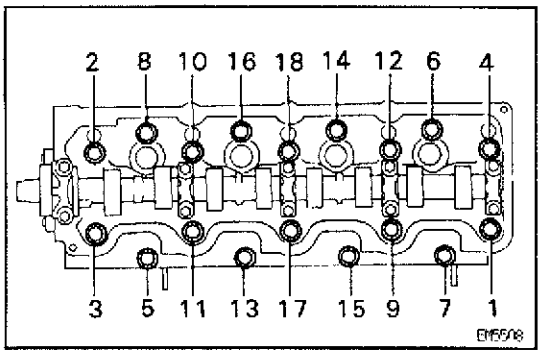


(c) Remove the 6 bolts, 2 nuts, exhaust manifold and gasket.



15. REMOVE CYLINDER HEAD COVER

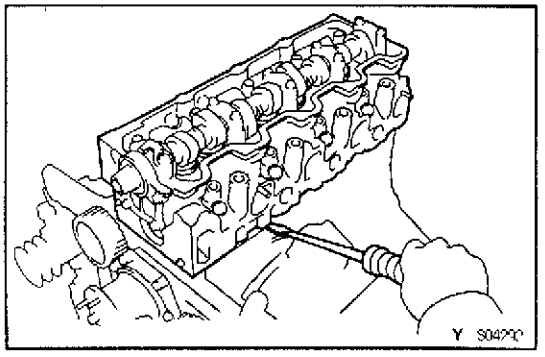
Remove the 8 bolts, 2 nuts, cylinder head cover and gasket.



16. REMOVE CYLINDER HEAD ASSEMBLY

(a) Uniformly loosen and remove the 18 cylinder head bolts, in several passes, in the sequence shown.

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



(b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

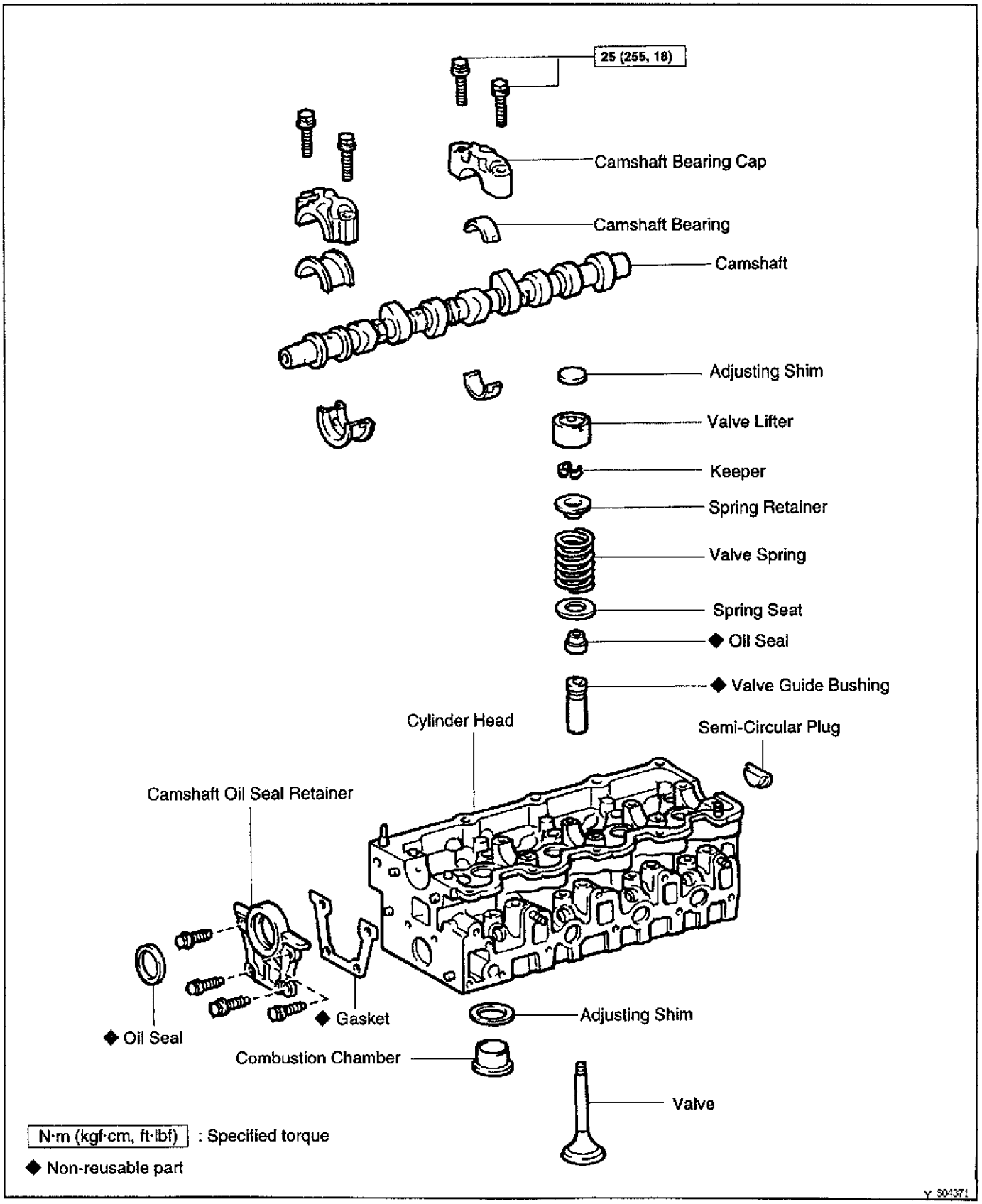
HINT: If the cylinder head is difficult to lift off, pry with a screwdriver between the cylinder head and block.

NOTICE: Be careful no to damage the contact surfaces of the cylinder head and cylinder block.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

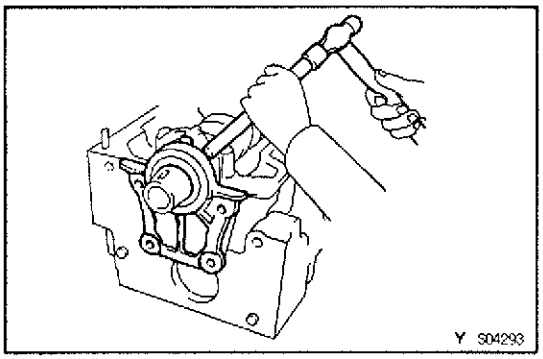
EG6004-04

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EG7AA-01

CYLINDER HEAD DISASSEMBLY



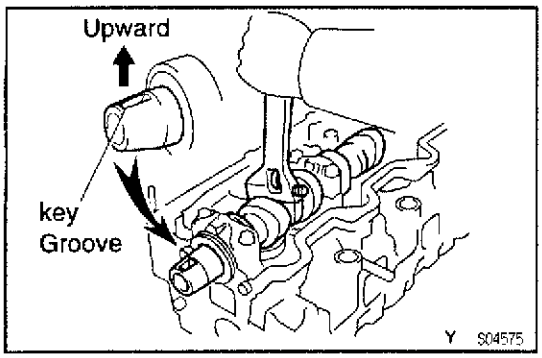
1. REMOVE SEMI-CIRCULAR PLUG

2. REMOVE CAMSHAFT OIL SEAL RETAINER

(a) Remove the 4 bolts.

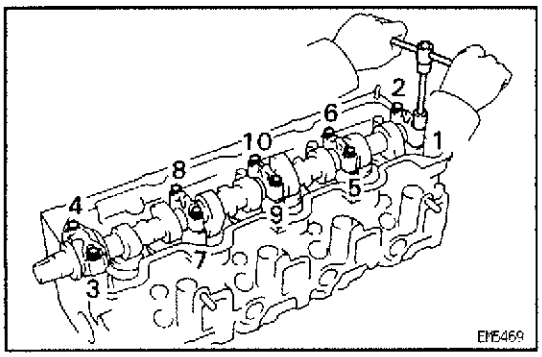
(b) Using a brass bar and hammer, remove the retainer.

(c) Remove the gasket.



3. REMOVE CAMSHAFT

(a) Set the key groove of the camshaft, facing upward by turning the camshaft with a wrench.



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

(c) Remove the 5 bearing caps and camshaft.

(d) Remove the 10 bearings from the bearing caps and cylinder head.

HINT: Arrange the bearing caps and bearings incorrect order.

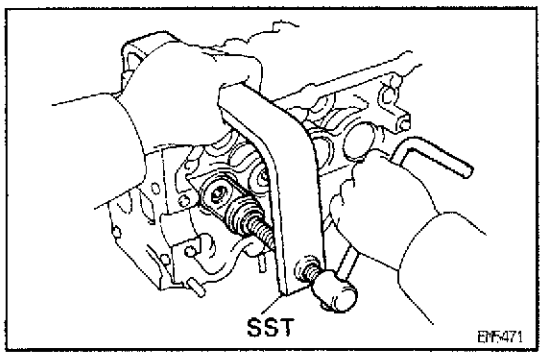
4. REMOVE VALVE LIFTERS AND SHIMS

HINT: Arrange the valve lifters and shims incorrect order.

5. REMOVE VALVES

(a) Using SST, compress the valve spring and remove the 2 keepers.

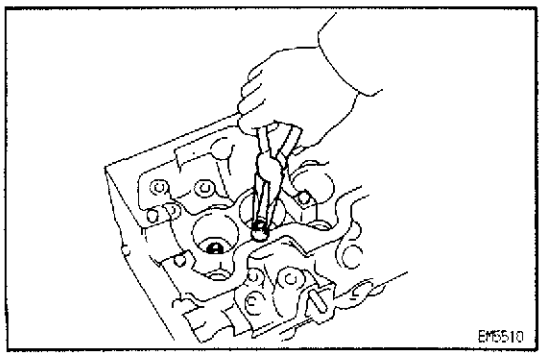
SST 09202-70020 (09202-00030)



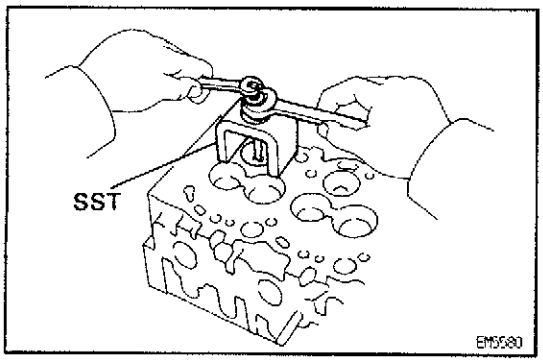
(b) Remove these parts:

- Spring retainer
- Valve spring
- Valve
- Spring seat

HINT: Arrange the valves, valve springs, spring seats and spring retainers incorrect order.



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



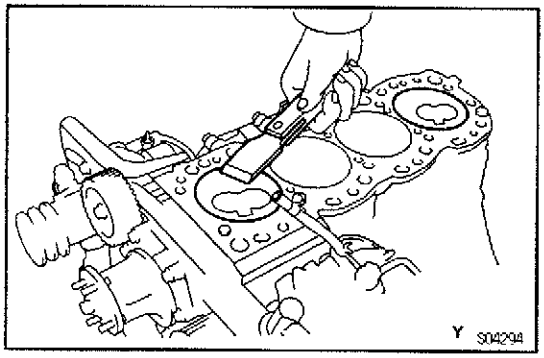
6. REMOVE COMBUSTION CHAMBERS

Using SST, remove the 4 combustion chambers (and shims).

SST 09208–48010

HINT: Arrange the combustion chambers (and shims) incorrect order.

EG

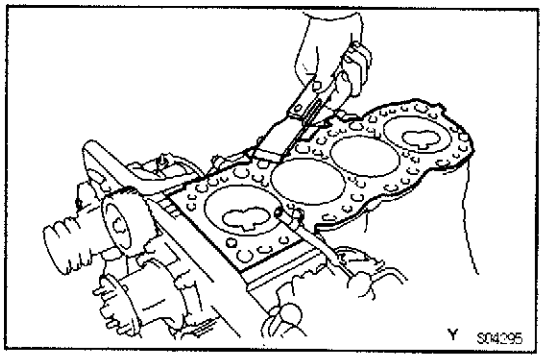


CYLINDER HEAD COMPONENTS INSPECTION AND REPAIR

E07DD-01

1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

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

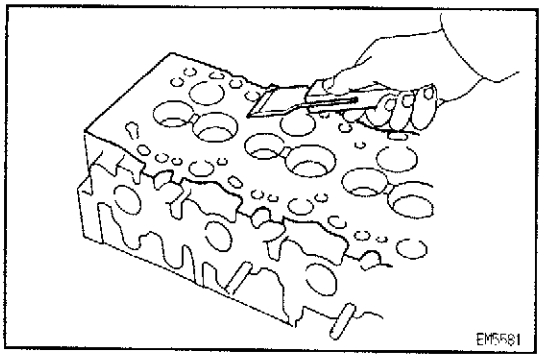


(b) Remove all the gasket material from the top of the cylinder block.

NOTICE: Be careful not to scratch the surfaces.

(c) Using compressed air, blow carbon and oil from the bolt holes.

CAUTION: Protect your eyes when using high – compressed air.

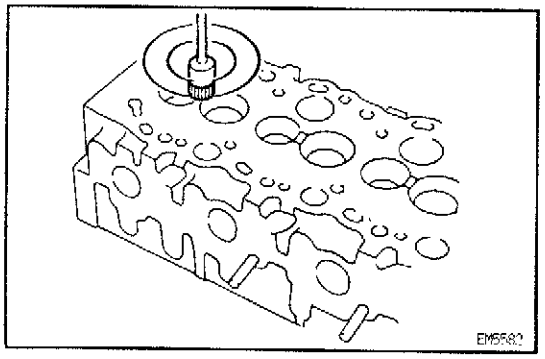


2. CLEAN CYLINDER HEAD

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.

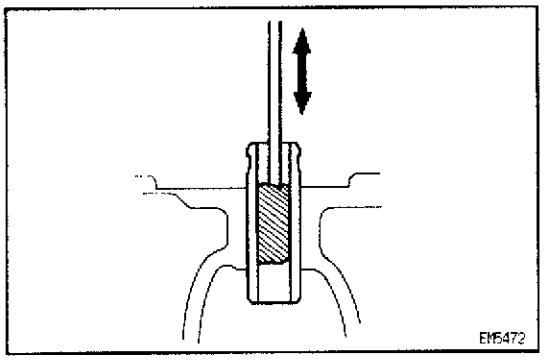


B. Clean intake and exhaust ports

Using a wire brush, remove all the carbon from the intake and exhaust ports.

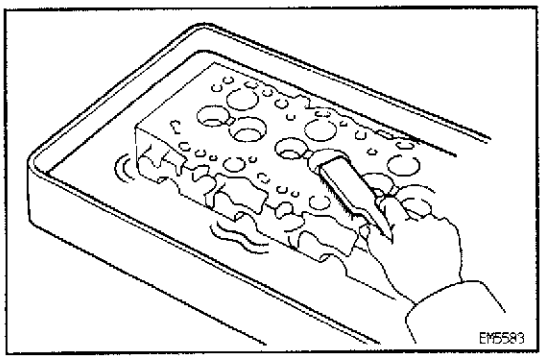
NOTICE: Be careful not to scratch the valve contact surface.

EG



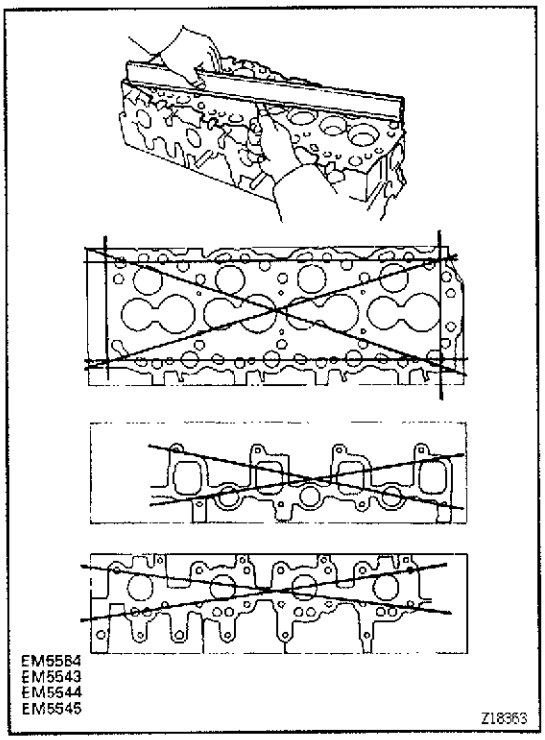
C. Clean valve guide bushings

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

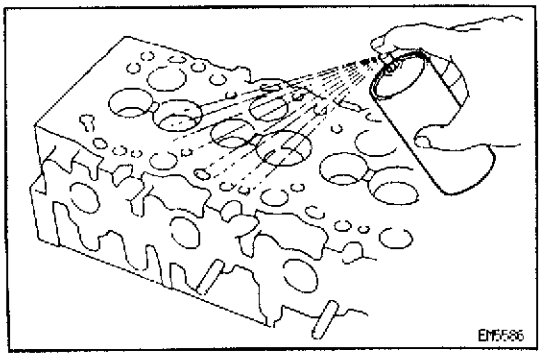
A. Inspect for flatness

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

Maximum warpage:

0.20 mm (0.0079 in.)

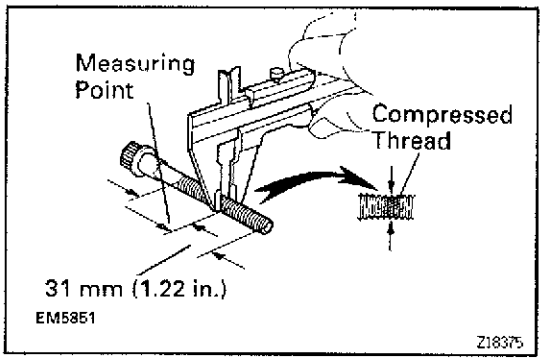
If warpage is greater than maximum, replace the cylinder head.



B. Inspect for cracks

Using a dye penetrant, check the intake ports, exhaust ports and surface contacting the cylinder block.

If cracked, replace the cylinder head.



C. Inspect cylinder head bolts

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

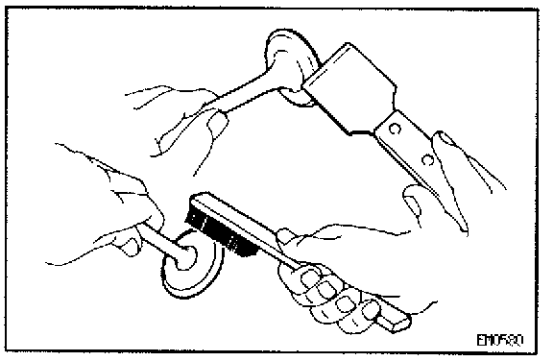
Standard outer diameter:

11.800 — 12.000 mm (0.4646 — 0.4724 in.)

Minimum outer diameter:

11.60 mm (0.4567 in.)

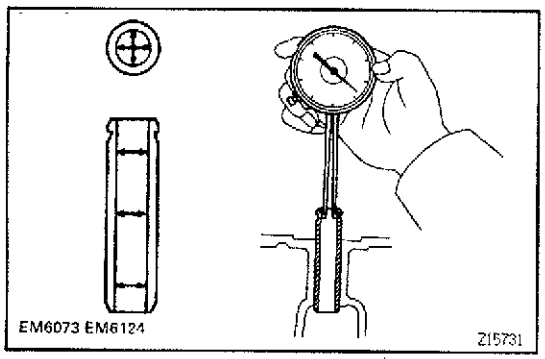
If the outer diameter is less than minimum, replace the bolt.



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.

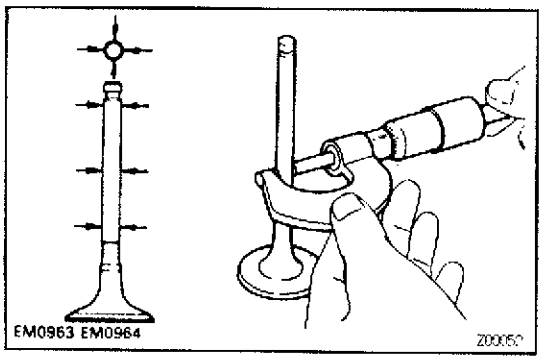


5. INSPECT VALVE STEMS AND GUIDE BUSHINGS

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

Bushing inside diameter:

8.010 — 8.030 mm (0.3154 — 0.3161 in.)



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

Valve stem diameter:

Intake

7.975 — 7.990 mm (0.3140 — 0.3146 in.)

Exhaust

7.960 — 7.975 mm (0.3134 — 0.3140 in.)

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

Standard oil clearance:

Intake

0.020 — 0.055 mm (0.0008 — 0.0022 in.)

Exhaust

0.035 — 0.070 mm (0.0014 — 0.0028 in.)

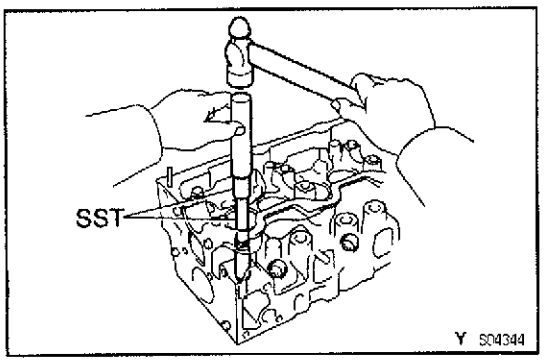
Maximum oil clearance:

Intake

0.08 mm (0.0031 in.)

Exhaust

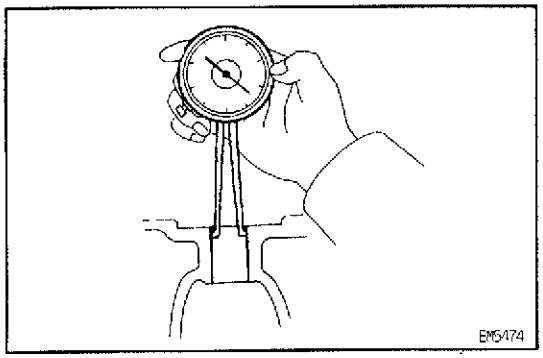
0.10 mm (0.0039 in.)



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

6. IF NECESSARY, REPLACE VALVE GUIDE BUSHING

(a) Using SST and a hammer, tap out the valve guide bushing.
SST 09201 – 10000 (09201 – 01080),
09950 – 70010 (09951 – 07100)

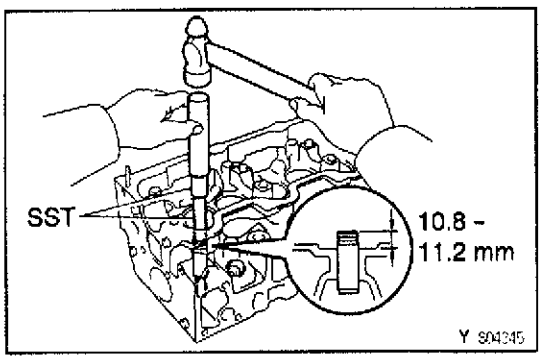


(b) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

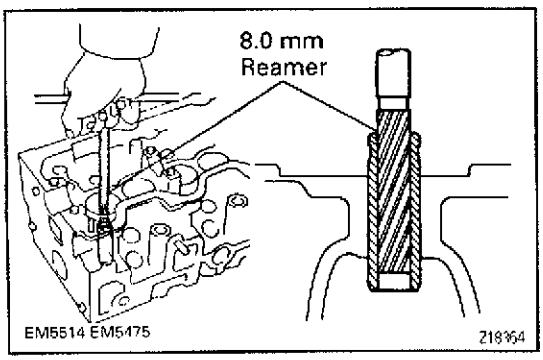
Bushing bore diameter mm (in.)	Bushing size
13.004 – 13.025 (0.5112 – 0.5128)	Use STD
13.054 – 13.075 (0.5139 – 0.5148)	Use O/S 0.05

V07987

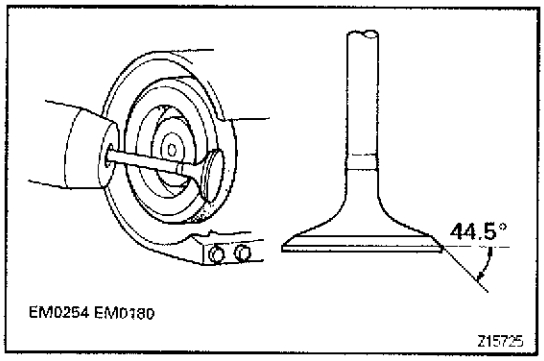
(c) Select a new guide bushing (STD or O/S 0.05).
If the bushing bore diameter of the cylinder head is greater than 13.025 mm (0.5128 in.), machine the bushing bore to the following dimension:
13.054 – 13.075 mm (0.5139 – 0.5148 in.)
If the bushing bore diameter of the cylinder head is greater than 13.075 mm (0.5148 in.), replace the cylinder head.



(d) Using SST and a hammer, tap in a new valve guide bushing to where there is 10.8 – 11.2 mm (0.425 – 0.441 in.) protruding from the cylinder head.
SST 09201 – 10000 (09201 – 01080),
09950 – 70010 (09951 – 07100)



(e) Using a sharp 8.0 mm reamer, ream the valve guide bushing to obtain the standard specified clearance (See step 5 above) between the valve guide bushing and new valve stem.



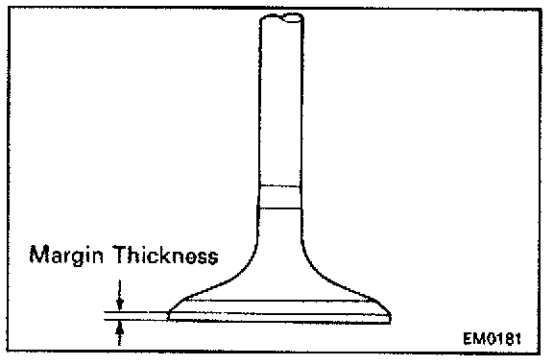
7. INSPECT AND GRIND VALVES

(a) Grind the valve only 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:

Intake

1.6 mm (0.063 in.)

Exhaust

1.7 mm (0.067 in.)

Minimum margin thickness:

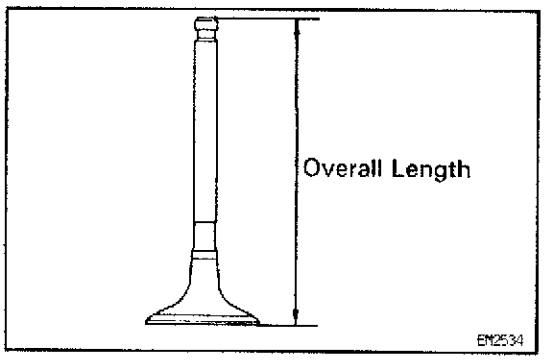
Intake

1.1 mm (0.043 in.)

Exhaust

1.2 mm (0.047 in.)

If the margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.

Standard overall length:

Intake

103.29 – 103.69 mm (4.0665 – 4.0823 in.)

Exhaust

103.14 – 103.54 mm (4.0606 – 4.0764 in.)

Minimum overall length:

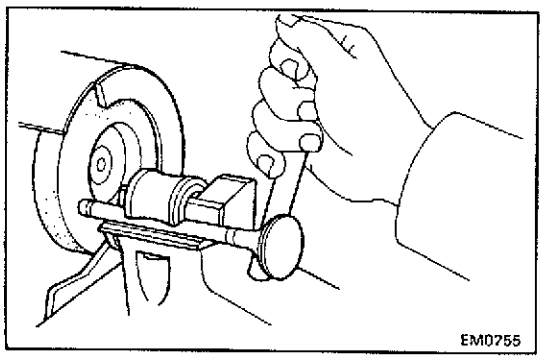
Intake

102.79 mm (4.0468 in.)

Exhaust

102.64 mm (4.0409 in.)

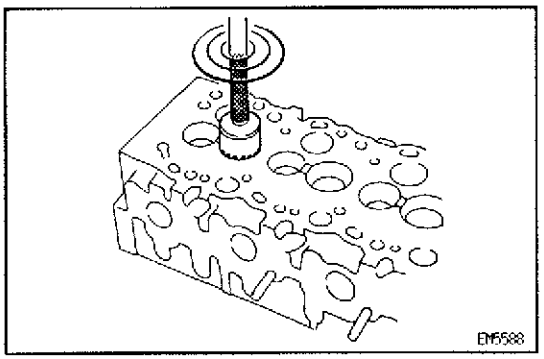
If the overall length is less than minimum, replace the valve.



(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.

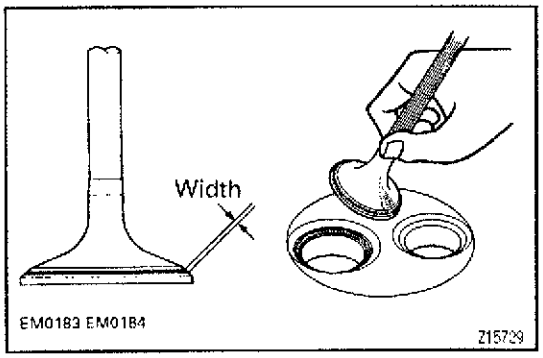
NOTICE: Do not grind off more than minimum.



EG

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:

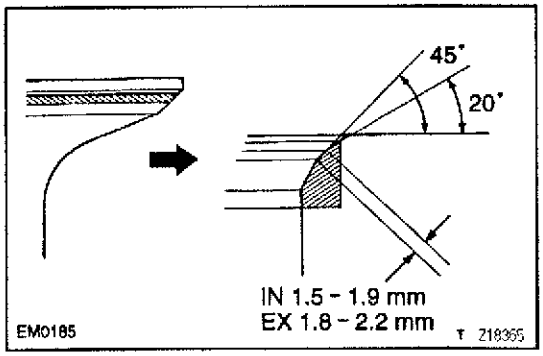
- If blue appears 360° around the valve face, the valve is concentric. If not, replace the valve.
- If blue appears 360° around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:

Intake

1.5 – 1.9 mm (0.059 – 0.075 in.)

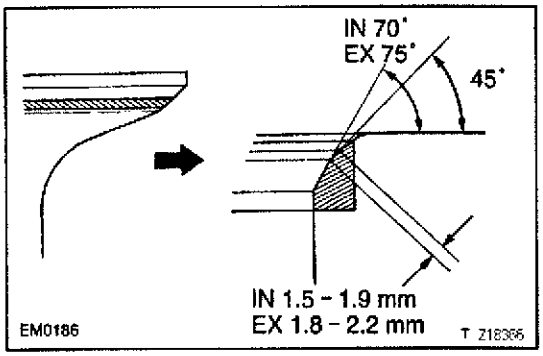
Exhaust

1.8 – 2.2 mm (0.071 – 0.087 in.)

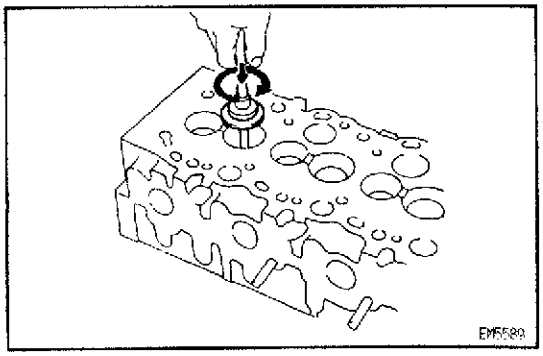


If not, correct the valve seats as follows:

(1) If the seating is too high on the valve face, use 20° and 45° cutters to correct the seat.

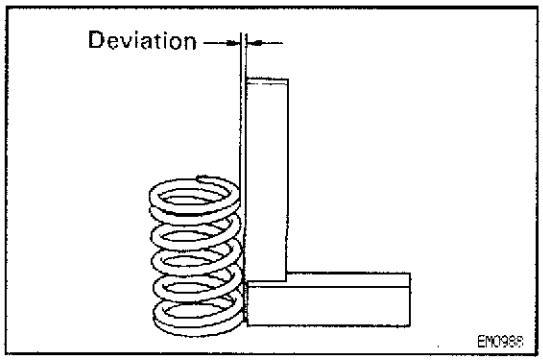


(2) If the seating is too low on the valve face, use 70° (Intake), 75° (Exhaust) and 45° cutters to correct the seat.



(d) Hand–lap the valve and valve seat with an abrasive compound.

(e) After hand–lapping, clean the valve and valve seat.



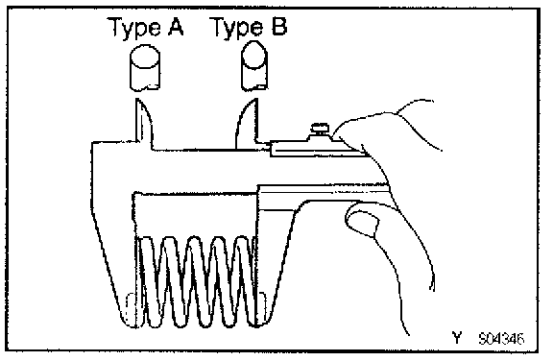
9. INSPECT VALVE SPRINGS

(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 vernier calipers, measure the free length of the valve spring.

Free length:

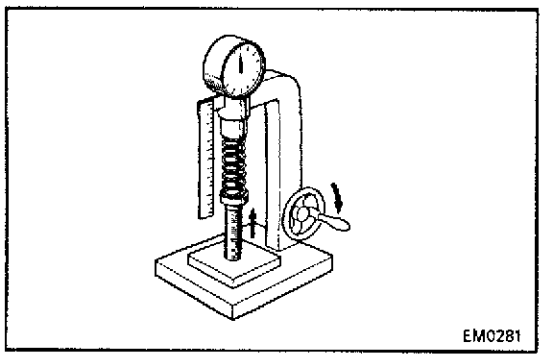
Type A

46.20 mm (1.8189 in.)

Type B

48.54 mm (1.9110 in.)

If the free length is not as specified, replace the valve spring.



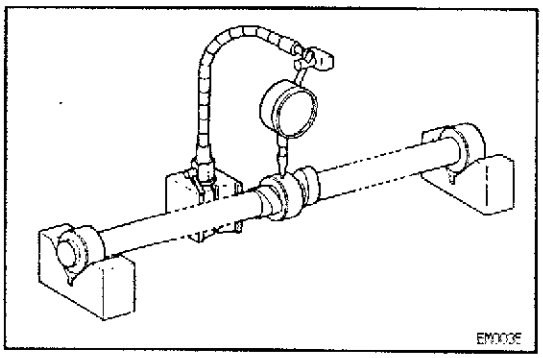
(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:

301 – 322 N (30.7 – 33.9 kgf, 67.7 – 74.7 lbf)

at 37.0 mm (1.457 in.)

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



10. INSPECT CAMSHAFT AND BEARINGS

A. Inspect camshaft for runout

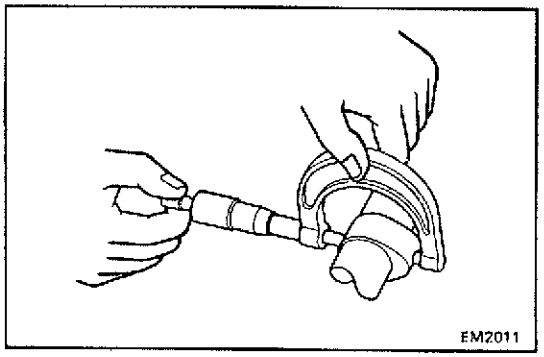
(a) Place the camshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.10 mm (0.0039 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

2L

53.850 – 53.870 mm (2.1201 – 2.1209 in.)

3L

54.290 – 54.310 mm (2.1374 – 2.1382 in.)

Exhaust

54.990 – 55.010 mm (2.1650 – 2.1657 in.)

EG

Minimum cam lobe height:

Intake

2L

53.35 mm (2.1004 in.)

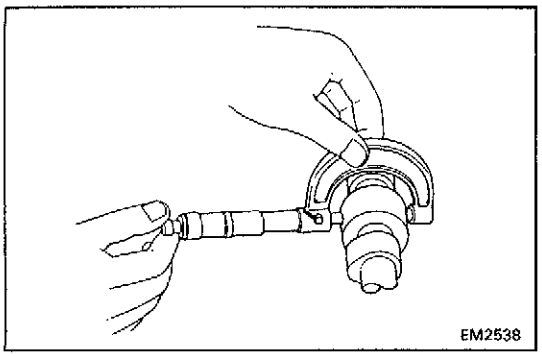
3L

53.79 mm (2.1177 in.)

Exhaust

54.49 mm (2.1453 in.)

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



C. Inspect camshaft journals

Using a micrometer, measure the journal diameter.

Journal diameter:

STD

No.1

34.969 – 34.985 mm (1.3767 – 1.3774 in.)

Others

27.969 – 27.985 mm (1.1011 – 1.1018 in.)

U/S 0.125

No.1

34.844 – 34.860 mm (1.3718 – 1.3724 in.)

Others

27.844 – 27.860 mm (1.0962 – 1.0968 in.)

U/S 0.250

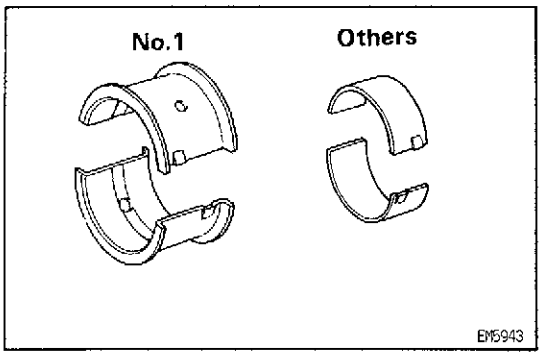
No.1

34.719 – 34.735 mm (1.3669 – 1.3675 in.)

Others

27.719 – 27.735 mm (1.0913 – 1.0919 in.)

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



D. Inspect camshaft bearings

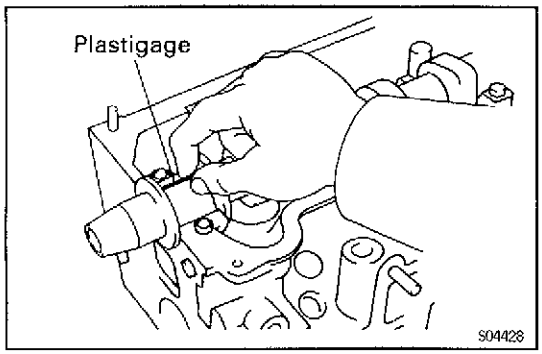
Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearings.

E. Inspect camshaft journal oil clearance

(a) Install the bearings to the bearing caps and cylinder head.

(b) Clean the bearings and camshaft journals.

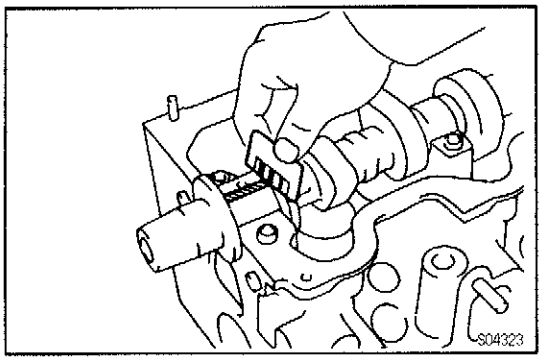


(c) Place the camshaft on the cylinder head.

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

(e) Install the bearing caps.
(See step 4 in cylinder head assembly)
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)
NOTICE: Do not turn the camshaft.

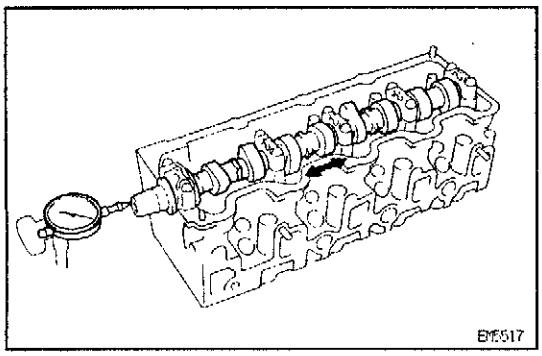
(f) Remove the bearing caps.



(g) Measure the Plastigage at its widest point.
Standard oil clearance:
0.022 — 0.074 mm (0.0009 — 0.0029 in.)
Maximum oil clearance:
0.10 mm (0.0039 in.)
If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the camshaft.

(h) Completely remove the Plastigage.

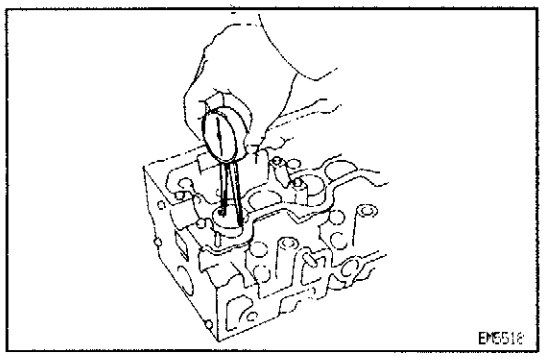
F. If necessary, grind and hone camshaft journals
Grind and hone the journals to U/S diameter.
(See procedure C.)
Install new journal U/S bearings.



G. Inspect camshaft thrust clearance

(a) Install the camshaft.
(See step 4 in cylinder head assembly)

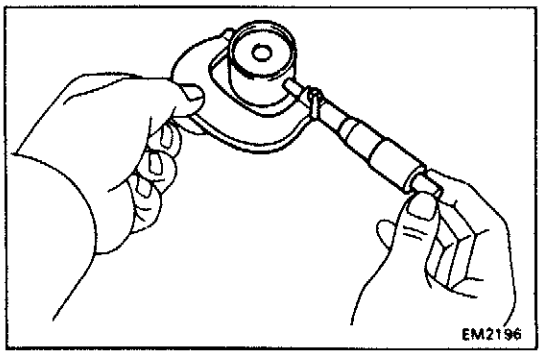
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.080 — 0.280 mm (0.0031 — 0.0110 in.)
Maximum thrust clearance:
0.35 mm (0.0138 in.)
If the thrust clearance is greater than maximum, replace the No.1 bearing. If necessary, replace the camshaft.



(c) Remove the camshaft.

11. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Lifter bore diameter:
40.960 — 40.980 mm (1.6126 — 1.6134 in.)



(b) Using a micrometer, measure the lifter diameter.
Lifter diameter:
40.892 — 40.902 mm (1.6099 — 1.6103 in.)

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

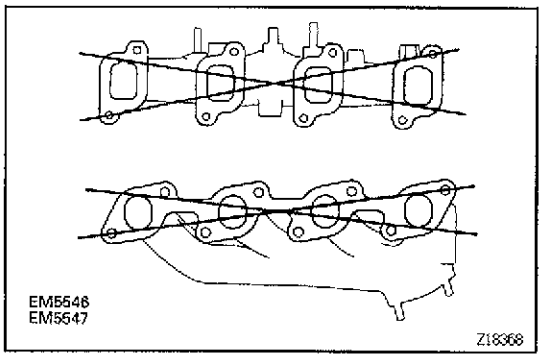
Standard oil clearance:

0.058 — 0.088 mm (0.0023 — 0.0035 in.)

Maximum oil clearance:

0.10 mm (0.0039 in.)

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



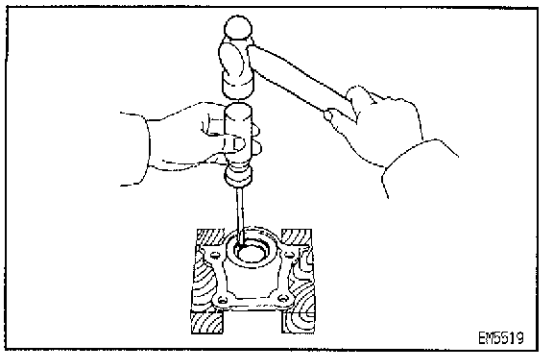
12. INSPECT INTAKE AND EXHAUST MANIFOLDS

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

Maximum warpage:

0.40 mm (0.0157 in.)

If warpage is greater than maximum, replace the manifold.



CAMSHAFT OIL SEAL REPLACEMENT

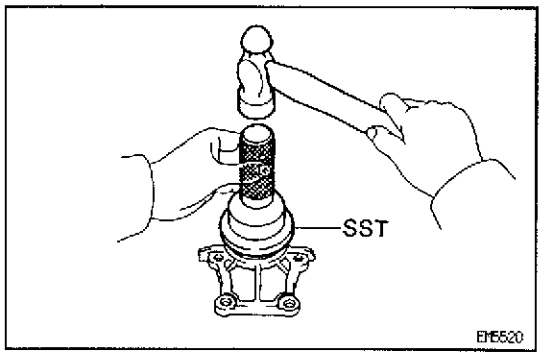
EG33K-05

HINT: There are 2 methods (A and B) to replace the oil seal which are as follows:

REPLACE CAMSHAFT OIL SEAL

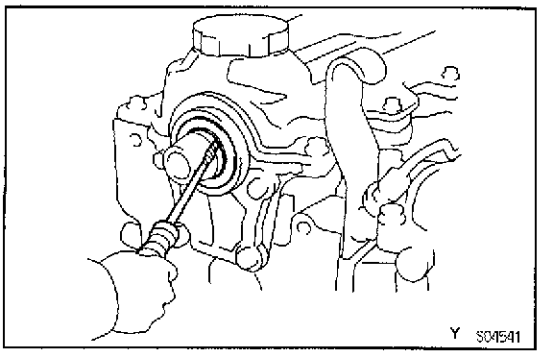
A. If camshaft oil seal retainer is removed from cylinder head:

(a) Using a screwdriver and hammer, tap out the oil seal.



(b) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil seal retainer edge.
SST 09223—46011

(c) Apply MP grease to the oil seal lip.

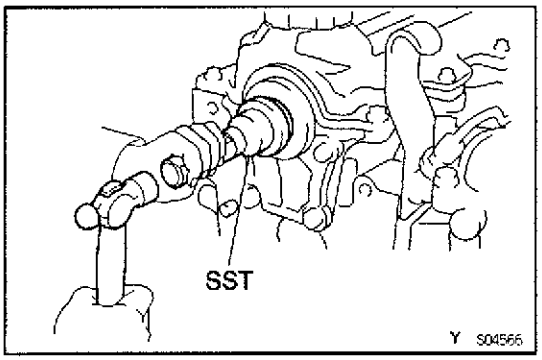


B. If camshaft oil seal retainer is installed to cylinder head:

(a) Using a knife, cut off the oil seal lip.

(b) Using a screwdriver, pry out the oil seal.

NOTICE: Be careful not to damage the camshaft. Tape the screwdriver tip.



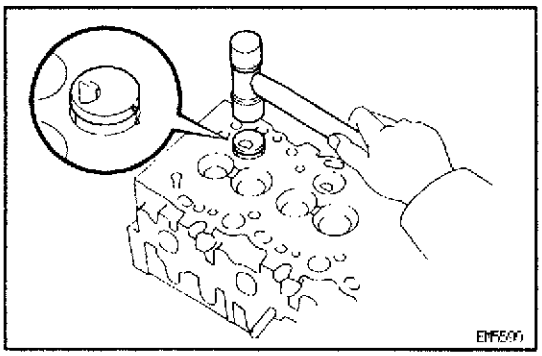
(c) Apply MP grease to a new oil seal lip.
(d) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil seal retainer edge.
SST 09223–46011

EG

CYLINDER HEAD ASSEMBLY

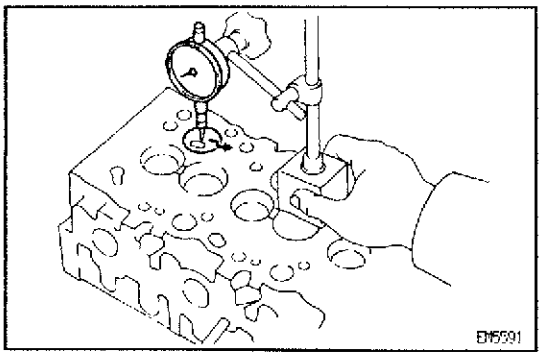
EG7AC–01

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



1. INSTALL COMBUSTION CHAMBERS

(a) Align the combustion chamber knock pin with the cylinder head notch.
(b) Using a plastic–faces hammer, tap in the combustion chamber.



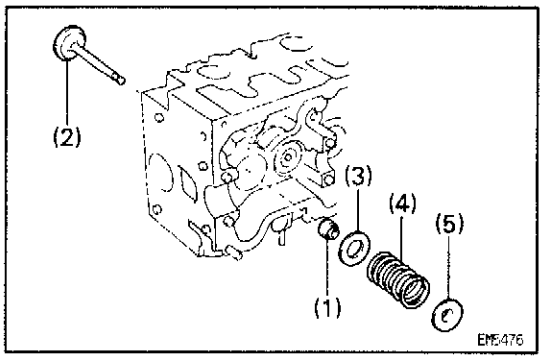
(c) Using a dial indicator, check the combustion chamber protrusion.

Combustion chamber protrusion:
Minus 0.03 – Plus 0.03 mm
(Minus 0.0012 – Plus 0.0012 in.)

If the protrusion is less than specified, adjust with shims.

Shim thickness:
0.03 mm (0.0012 in.)

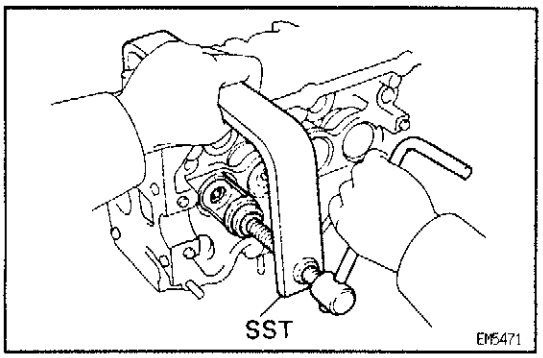
If the protrusion is greater than specified, replace the chamber and recheck the protrusion.



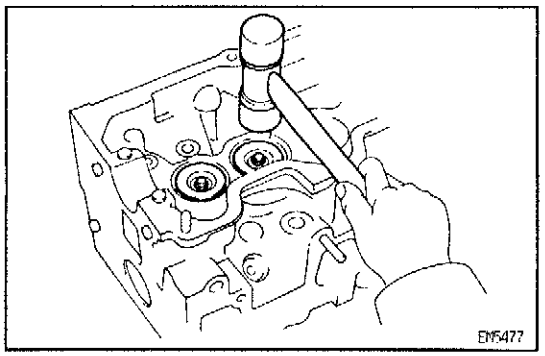
EG

2. INSTALL VALVES

(a) Install these parts:
- (1) Oil seal
- (2) Valve
- (3) Spring seat
- (4) Valve spring
- (5) Spring retainer



(b) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202–70020 (09202–00030)

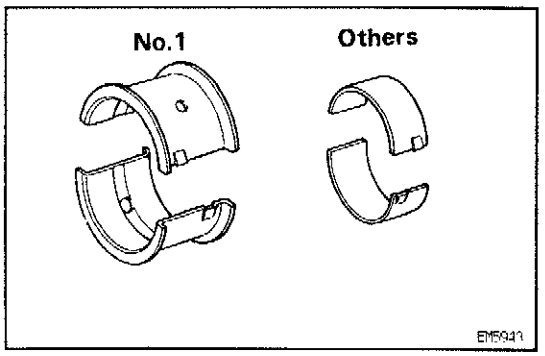


(c) Using a plastic–faced hammer, lightly tap the valve stem tip to assure a proper fit.

3. INSTALL VALVE LIFTERS AND SHIMS

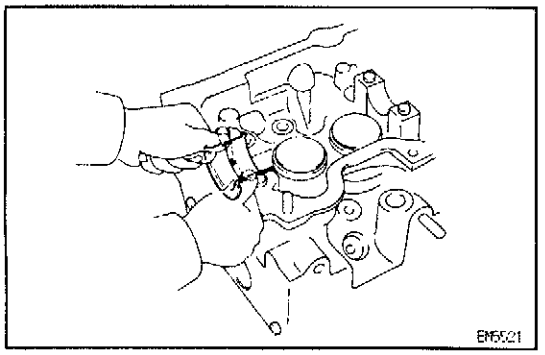
(a) Install the valve lifter and shim.

(b) Check that the valve lifter rotates smoothly by hand.

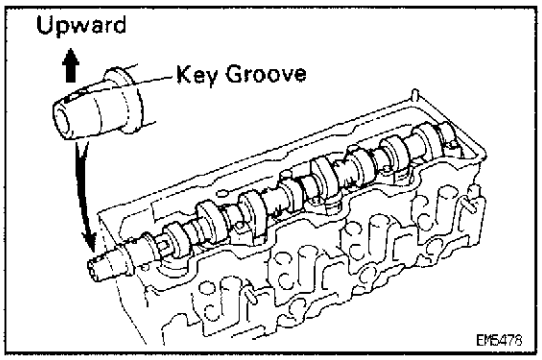


4. INSTALL CAMSHAFT

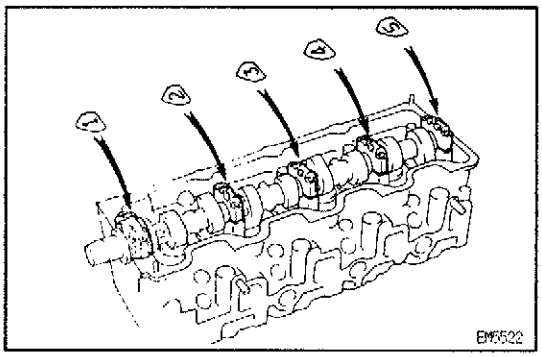
HINT: Different the bearing are used for the No.1 and others.



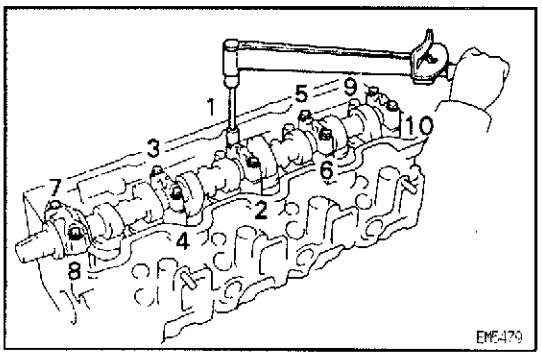
(a) Install the 10 bearings to the bearing caps and cylinder head.



(b) Place the camshaft on the cylinder head, facing the key groove upward.



(c) Install the 5 bearing caps in their proper locations.



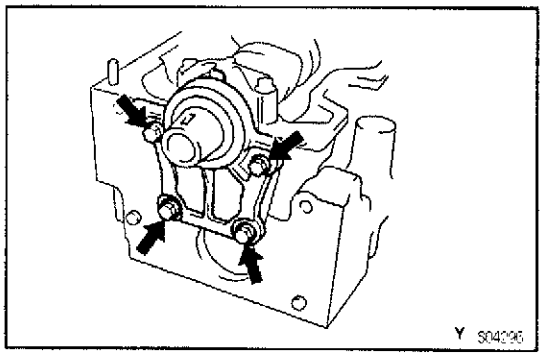
(d) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

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

Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)

5. CHECK AND ADJUST VALVE CLEARANCE

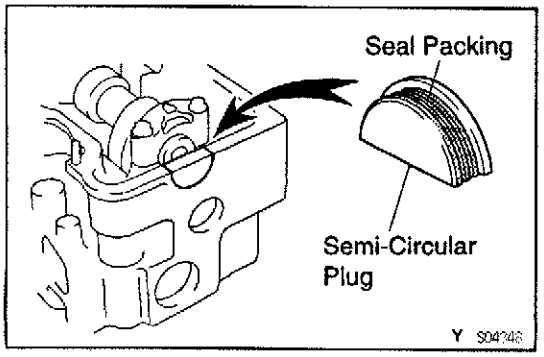
(See steps 5 and 6 in valve clearance inspection and adjustment)



6. INSTALL CAMSHAFT OIL SEAL RETAINER

Install a new gasket and the retainer with the 4 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



7. INSTALL SEMI—CIRCULAR PLUG

(a) Remove any old packing (FIPG) material.

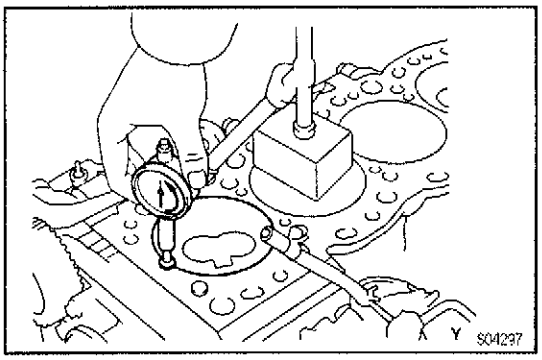
(b) Apply seal packing to the semi — circular plug as shown in the illustration.

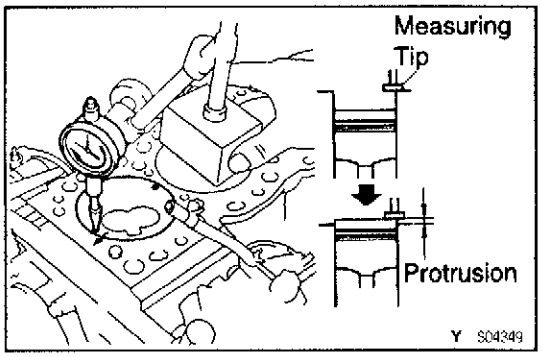
Seal packing:

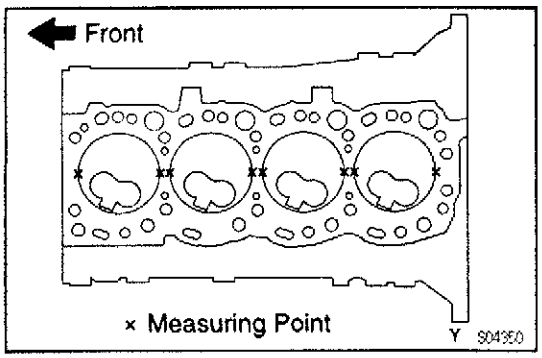
Part No. 08826—00080 or equivalent

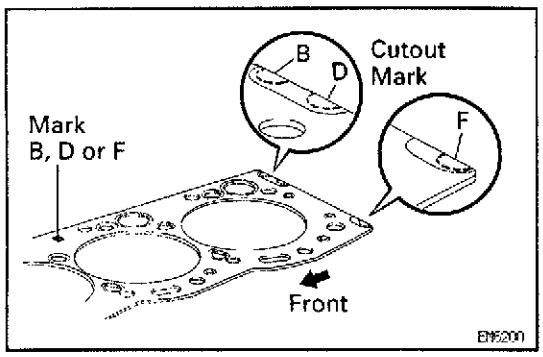
(c) Install the semi—circular plug to the cylinder head.

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CYLINDER HEAD INSTALLATION

EG7AD-01

1. CHECK PISTON PROTRUSION AND SELECT CYLINDER HEAD GASKET

A. Check piston protrusions for each cylinder

(a) Clean the cylinder block with solvent.

(b) Set the piston of the cylinder to be measured to slightly before TDC.

(c) Place a dial indicator on the cylinder block, and set the dial indicator at 0 mm (0 in.).

HINT:

- Use a dial indicator measuring tip as shown in the illustration.
- Make sure that the measuring tip is square to the cylinder block gasket surface and piston head when taking the measurements.

(d) Find where the piston head protrudes most by slowly turning the crankshaft clockwise and counterclockwise.

(e) Measure each cylinder at 2 places as shown in the illustration, making a total of 8 measurements.

(f) For the piston protrusion value of each cylinder, use the average of the 2 measurements of each cylinder.

Protrusion:

0.68 — 0.97 mm (0.0268 — 0.0382 in.)

When removing piston and connecting rod assembly: If the protrusion is not as specified, remove the piston and connecting rod assembly and reinstall it.

(See cylinder block disassembly and assembly)

B. Select new cylinder head gasket

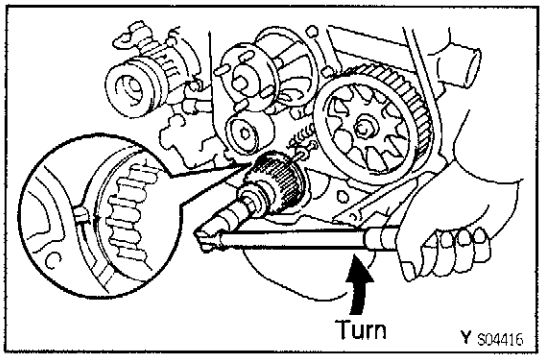
HINT: There are 3 sizes of new cylinder head gaskets, marked "B", "D" or "F" accordingly.

New installed cylinder head gasket thickness:

Mark B	1.40 — 1.50 mm (0.0551 — 0.0591 in.)
Mark D	1.50 — 1.60 mm (0.0591 — 0.0630 in.)
Mark F	1.60 — 1.70 mm (0.0630 — 0.0669 in.)

Select the largest piston protrusion value from the measurements made, then select a new appropriate gasket according to the table below.

Piston protrusion mm (in.)	Gasket size
0.68 — 0.77 (0.0268 — 0.0303)	Use B
0.78 — 0.87 (0.0307 — 0.0343)	Use D
0.88 — 0.97 (0.0346 — 0.0382)	Use F

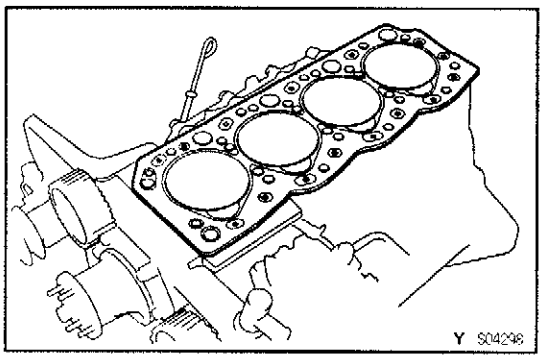


2. SET NO.1 CYLINDER TO 90° BTDC/COMPRESSION

HINT: Set the No.1 cylinder to 90° BTDC/compression to avoid interference with the piston top and valve head.

Using the crankshaft pulley bolt, turn the crankshaft 90° counterclockwise, and put the timing mark of the crankshaft timing pulley with the protrusion of the timing belt case.

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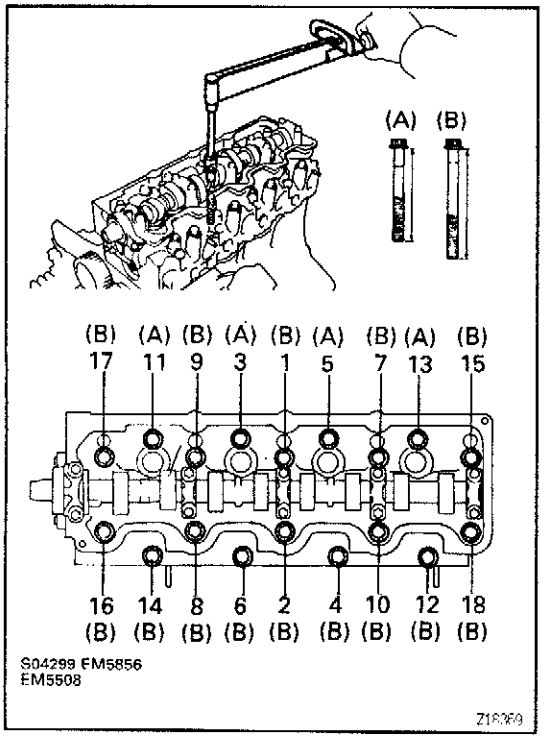
3. INSTALL CYLINDER HEAD

A. Place cylinder head on cylinder block

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

NOTICE: Be careful of the installation direction.

(b) 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), (d) and (e)).
- If any bolts 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 18 cylinder head bolts, in several passes, in the sequence shown.

Torque: 78 N·m (800 kgf·cm, 58 ft·lbf)

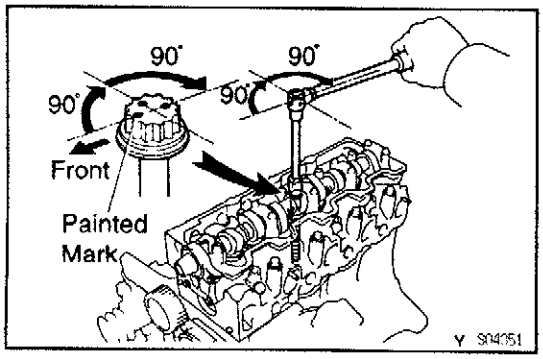
HINT: Each bolt length is indicated in the illustration.

Bolt length:

A 107 mm (4.12 in.)

B 127 mm (5.00 in.)

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

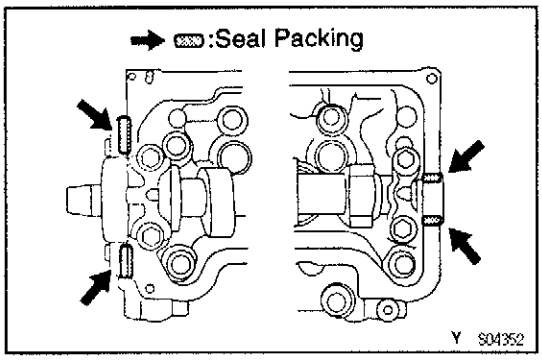


(c) Mark the front of the cylinder head bolt with paint.

(d) Retighten the cylinder head bolts 90° in the numerical order shown.

(e) Retighten cylinder head bolts by an additional 90°.

(f) Check that the painted mark is now facing rearward.



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4. INSTALL CYLINDER HEAD COVER

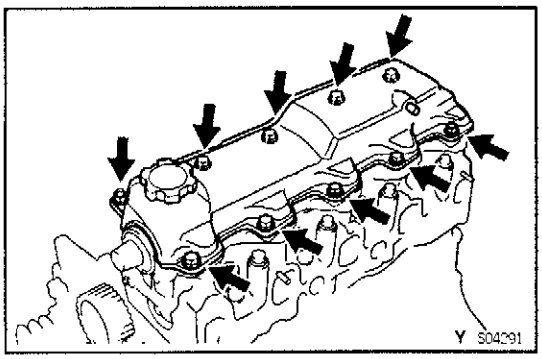
(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the cylinder head as shown in the illustration.

Seal packing:

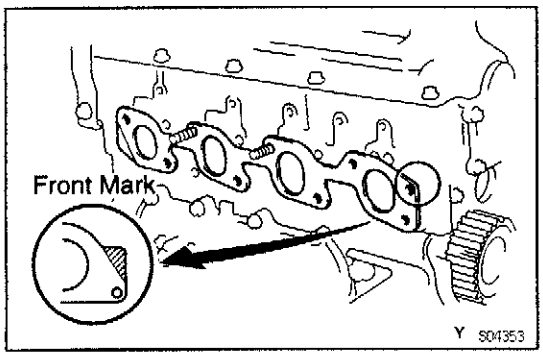
Part No. 08826–00080 or equivalent

(c) Install the gasket to the cylinder head cover.



(d) Install the cylinder head cover with 8 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)



5. INSTALL EXHAUST MANIFOLD

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

HINT: The direction of a new gasket is in the illustration.

(b) Install the exhaust manifold with the 6 bolts and 2 new nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)

(c) LN Thailand:

Install the heat insulator with the 4 bolts.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

(d) Others:

Install the heat insulator with the 3 bolts.

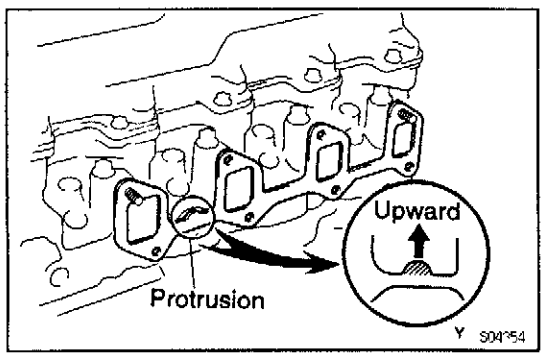
Torque:

Exhaust manifold side

12 N·m (120 kgf·cm, 9 ft·lbf)

Oil cooler side

19 N·m (195 kgf·cm, 14 ft·lbf)



6. INSTALL INTAKE MANIFOLD ASSEMBLY

(a) Install a new gasket to the cylinder head, facing the protrusion upward.

(b) Install the intake manifold, 2 engine wire brackets, oil dipstick guide bracket (except LJ) with the 6 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

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

(c) Pre—Heating System (Super Glow Type):
Install the glow plug resistor terminals and collar with the nut.

(d) LJ:
Connect the vacuum hose and connector to the VSV for intake shutter.

(e) Install the accelerator link and hose clamp (w/ ACSD) with the 2 bolts and nut.

(f) Connect the accelerator link to the injection pump.

(g) w/ ACSD:
Connect the 2 water bypass hoses to the hose clamp.

7. INSTALL LH ENGINE HANGER
Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)

8. INSTALL WATER OUTLET AND OUTLET HOUSING ASSEMBLY

(a) Install a new gasket, the water outlet and outlet housing assembly with the 3 bolts.
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

(b) Connect the water temperature sender gauge connector.

(c) w/ ACSD:
Connect the water bypass hose to the water housing.

9. INSTALL NO.2 TIMING BELT COVER
Install the timing belt cover with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

10. INSTALL INJECTION NOZZLES
(See steps 1 to 3 in injection nozzles installation in Fuel System)

11. INSTALL CAMSHAFT TIMING PULLEY
(See step 4 in timing belt installation)

12. INSTALL TIMING BELT
(See steps 6 to 11 in timing belt installation)

13. INSTALL WATER PUMP PULLEY, FAN, FLUID COUPLING ASSEMBLY AND DRIVE BELTS
(See step 4 in water pump installaiton in Cooling System)

14. INSTALL GLOW PLUGS

(a) Using a 12 mm deep socket wrench, install the 4 glow plugs.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(b) Pre—Heating System (Fixed Delay Type):
Install the glow plug connector with the 4 nuts.
Torque: 1.0 N·m (10 kgf·cm, 8.7 in.·lbf)

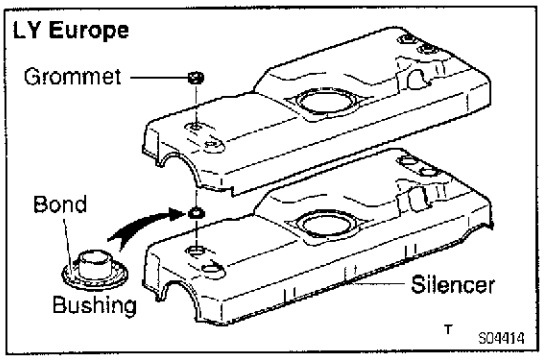
(c) Pre—Heating System (Others):
Place the spacer on the intake manifold.

(d) Pre—Heating System (Others):
Place the glow plug connector on the glow plugs and spacer.

(e) Pre–Heating System (Others):
Install the glow plug wire and collar with the plate washer and nut.

(f) Pre–Heating System (Others):
Install the 4 nuts holding the glow plugs to the glow plug connector.

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15. LY Europe:
INSTALL NO.2 CYLINDER HEAD COVER

(a) Apply bond to the bushings as shown in the illustration.

(b) Install the 4 grommets, bushings and silencer to the cylinder head cover.

(c) Install the cylinder head cover with the 4 plate washers and nuts.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

(d) Install the oil filler cap.

16. LH:
INSTALL INTAKE AIR CONNECTOR

(a) Install a new gasket to the intake manifold.

(b) Install the intake air connector with the 4 bolts.

17. INSTALL PCV HOSE

18. FILL WITH ENGINE COOLANT

19. START ENGINE AND CHECK FOR LEAKS

20. RECHECK ENGINE COOLANT LEVEL AND OIL LEVEL