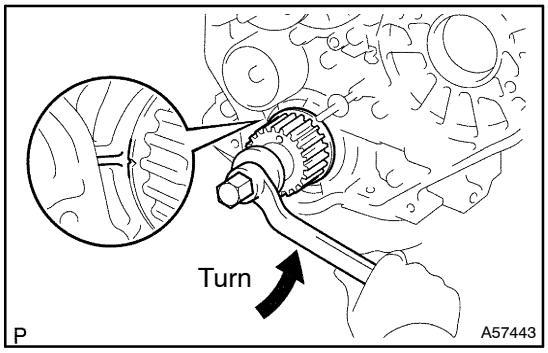
14110–01

OVERHAUL

1. REMOVE OIL FILLER CAP SUB–ASSY

2. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Remove the 9 bolts, nut, cylinder head cover and gasket.



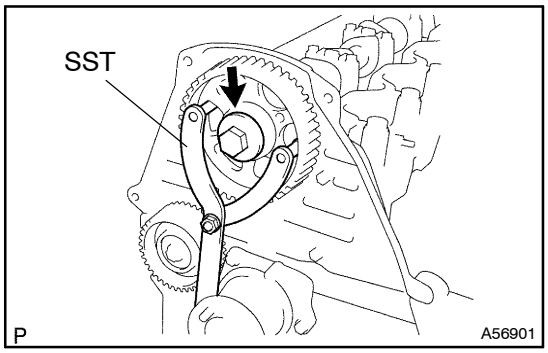
3. REMOVE CAMSHAFT TIMING PULLEY

(a) Set the No. 1 cylinder to approx. 90° BTDC/compression.

HINT:

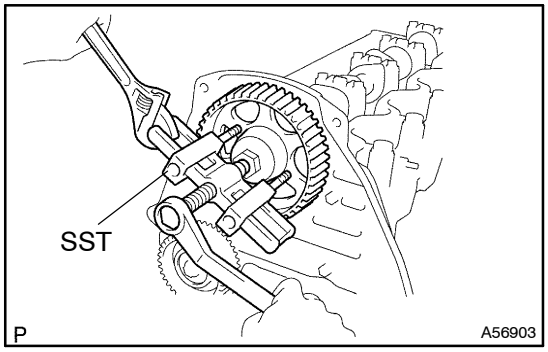
Set the No.1 cylinder to 90° BTDC/compression to avoid interference with the piston top and valve head.

(1) 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.



(b) Using SST, loosen the pulley bolt.

SST 09960–10010 (09962–01000, 09963–01000)



(c) Using SST, separate the timing pulley from the camshaft.

SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09954–05021)

(d) Remove the pulley bolt and timing pulley.

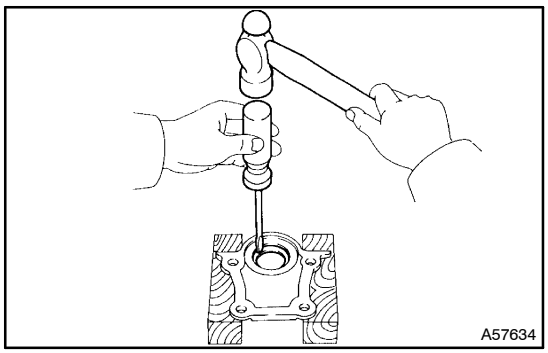
(e) Remove the timing gear woodruff key.

4. REMOVE TIMING BELT NO.2 COVER

(a) Remove the 4 bolts and timing belt cover.

5. REMOVE CAMSHAFT OIL SEAL RETAINER

(a) Remove the 4 bolts, retainer and gasket.



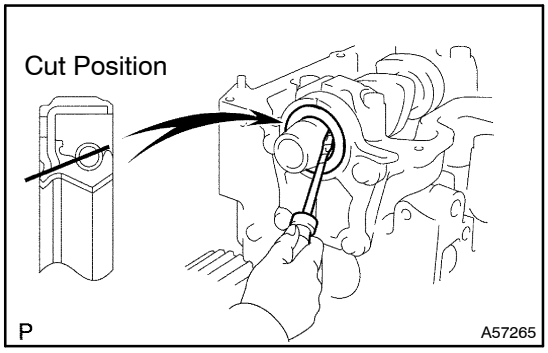
6. REMOVE OIL SEAL RETAINER, NO.2 OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to remove the oil seal.

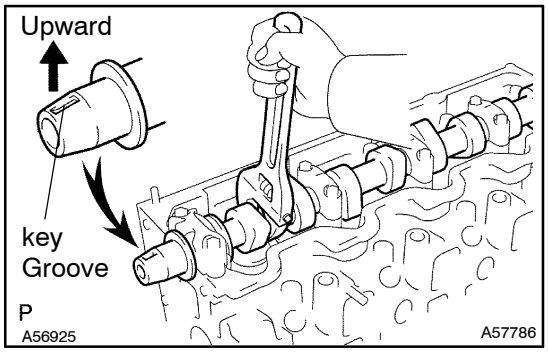
(a) If the camshaft oil seal retainer is removed from the cylinder head:

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



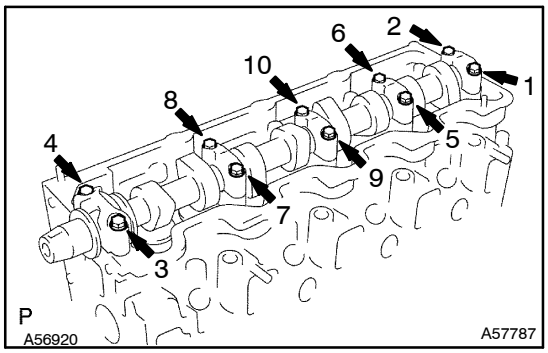
(b) If the camshaft oil seal retainer is installed to the cylinder head:
  (1) Using a knife, cut off the oil seal lip.
  (2) Using a screwdriver, pry out the oil seal.

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



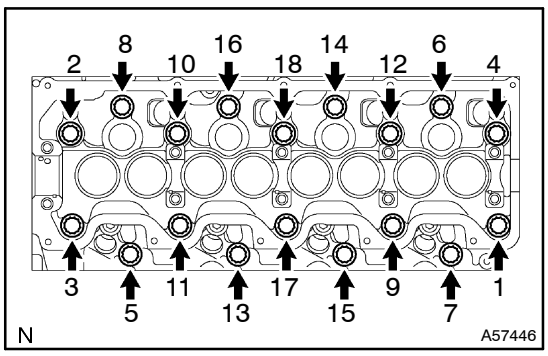
7. REMOVE CAMSHAFT

(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.

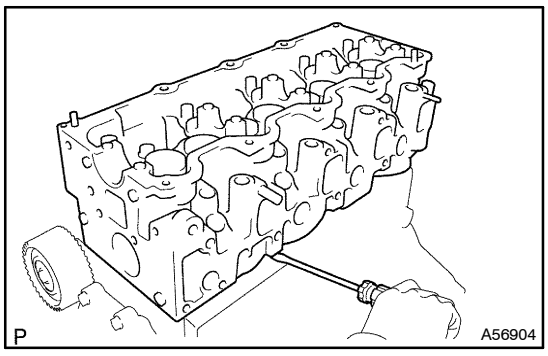
HINT:
Arrange the bearings incorrect order.



8. REMOVE CYLINDER HEAD SUB–ASSY

(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.

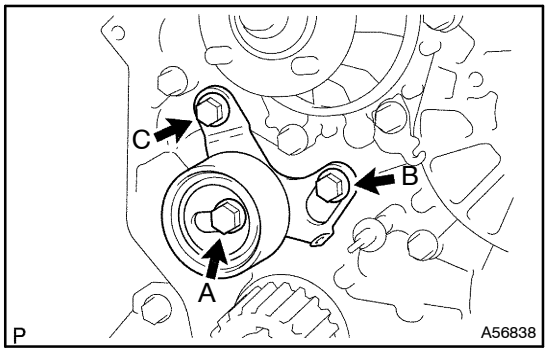


(b) Lift the cylinder head from the dowels on the cylinder block, and place the cylinder head on wooden blocks on a bench.

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

NOTICE:
Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

9. REMOVE CYLINDER HEAD GASKET



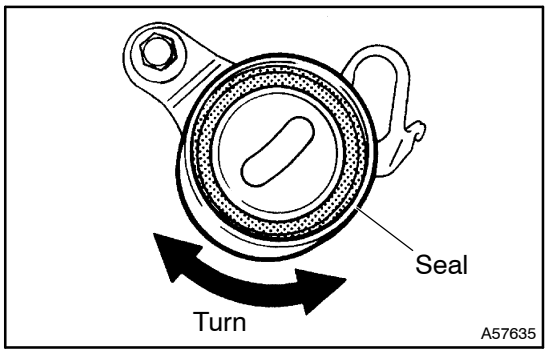
10. REMOVE TIMING BELT IDLER SUB–ASSY NO.1

(a) Remove the 2 bolts (A and B).

(b) Loosen the bolt (C), and remove the timing belt idler No.1.

11. REMOVE TIMING BELT IDLER SUB–ASSY NO.2

(a) Remove the bolt, timing belt idler No.2 and spacer.



12. INSPECT TIMING BELT IDLER SUB–ASSY NO.1

(a) Visually check the seal portion of the timing belt idler No.1 for oil leakage.

If leakage is found, replace the timing belt idler No.1.

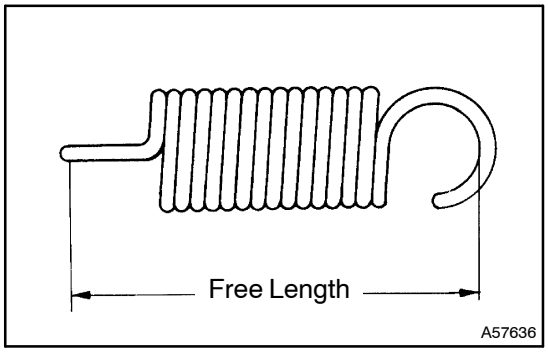
(b) Check that the timing belt idler No.1 turns smoothly.

If necessary, replace the timing belt idler No.1.

13. INSPECT TIMING BELT IDLER SUB–ASSY NO.2

(a) Check that the timing belt idler No.2 turns smoothly.

If necessary, replace the timing belt idler No.2.



14. INSPECT IDLER TENSION SPRING

(a) Measure the free length of tension spring.

Free length: 44.4 – 45.4 mm (1.748 – 1.787 in.)

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

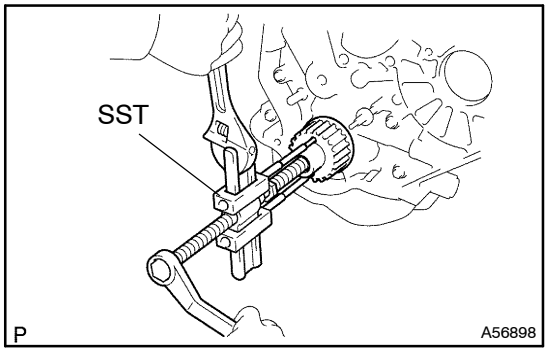
(b) Measure the tension of the tension spring at the specified installed length.

Installed tension:
53 – 59 N (5.42 – 5.98 kgf, 11.9 – 13.2 lbf)
at 52.1 mm (2.051 in.)

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

15. REMOVE WATER PUMP ASSY

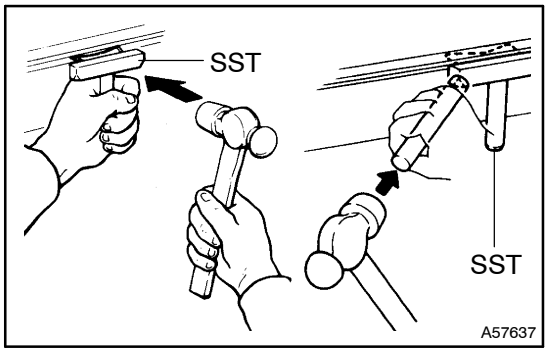
(a) Remove the 6 bolts, tension spring bracket, water pump and gasket.



16. REMOVE CRANKSHAFT TIMING PULLEY

If the pulley cannot be remove by screwdriver, use SST, remove the timing pulley.

SST 09950–50013 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05010)



17. REMOVE OIL PAN SUB–ASSY

(a) Remove the 16 bolts and 2 nuts.

(b) Insert the blade of SST between the oil pan and cylinder block, and cut off applied sealer and remove the oil pan.
SST 09032–00100

NOTICE:

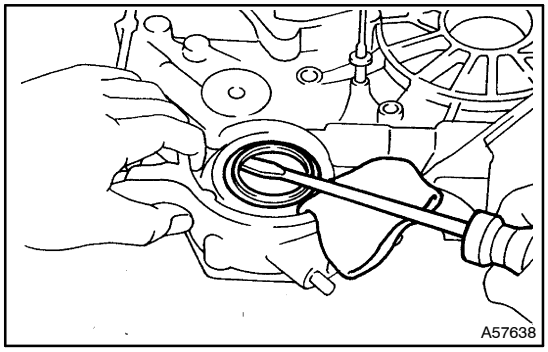
- **Do not use SST for the timing belt case side and rear oil seal retainer.**
- **Be careful not to damage the oil pan flange.**

18. REMOVE OIL STRAINER SUB–ASSY

(a) Remove the 2 bolts, 2 nuts, oil strainer and gasket.

19. REMOVE TIMING GEAR CASE SUB–ASSY

(a) Remove the 5 bolts, timing gear case and gasket.



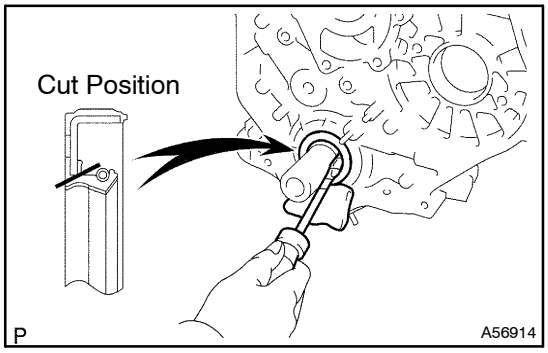
20. REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to remove the oil seal.

(a) If the timing gear case is removed from the cylinder block:

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



(b) If the timing gear case is installed to the cylinder block:

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

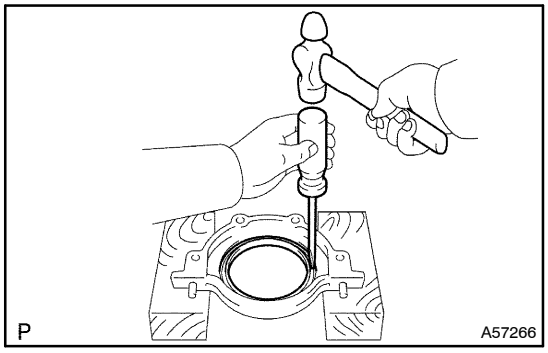
(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.

21. REMOVE ENGINE REAR OIL SEAL RETAINER

(a) Remove the 4 bolts, oil seal retainer and gasket.



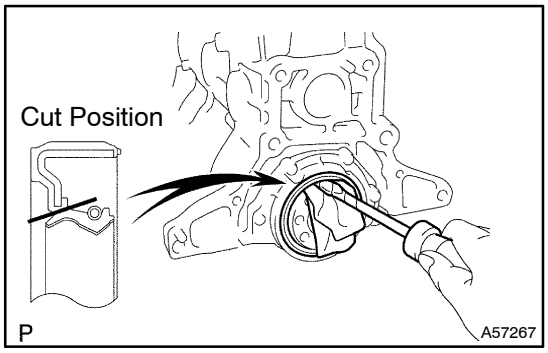
22. REMOVE ENGINE REAR OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to remove the oil seal.

(a) If the rear oil seal retainer is removed from the cylinder block:

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



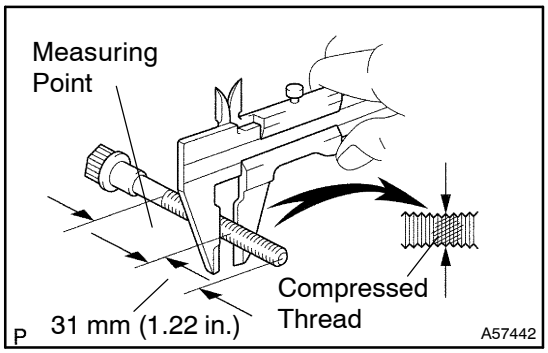
(b) If the rear oil seal retainer is installed to the cylinder block:

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

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

NOTICE:

Be careful not to damage the crankshaft. Tape the screwdriver tip.



23. INSPECT CYLINDER HEAD SET BOLT

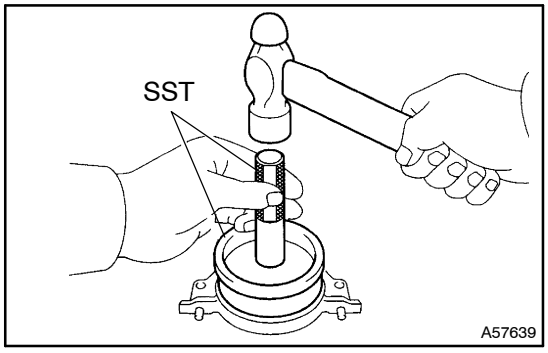
(a) Using vernier calipers, measure the minimum outer diameter of the compressed thread at the measuring point.

Standard outer diameter:

11.80 – 12.00 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.



24. INSTALL ENGINE REAR OIL SEAL

HINT:

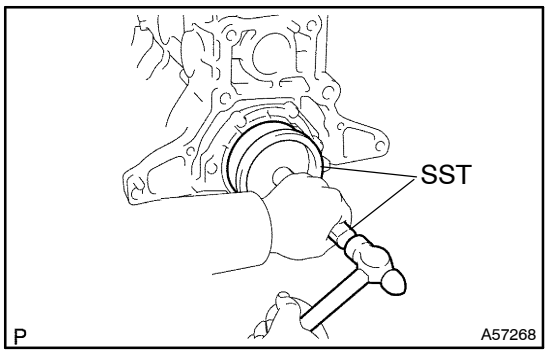
There are 2 methods ((a) and (b)) to install the oil seal.

(a) If the rear oil seal retainer is removed from the cylinder block:

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

SST 09223–15030, 09950–70010 (09951–07100)

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



(b) If the rear oil seal retainer is installed to the cylinder block:

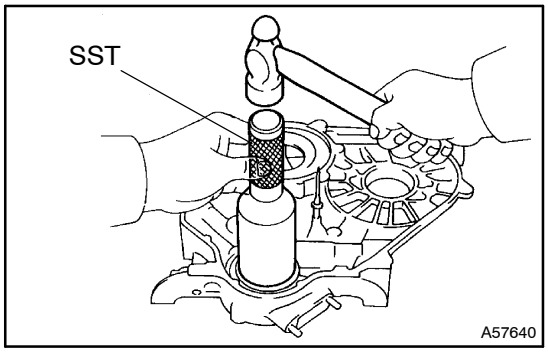
(1) Apply MP grease to a new oil seal lip.

(2) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

SST 09223–15030, 09950–70010 (09951–07100)

25. INSTALL ENGINE REAR OIL SEAL RETAINER

(a) Install a new gasket and the retainer with the 4 bolts.
Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

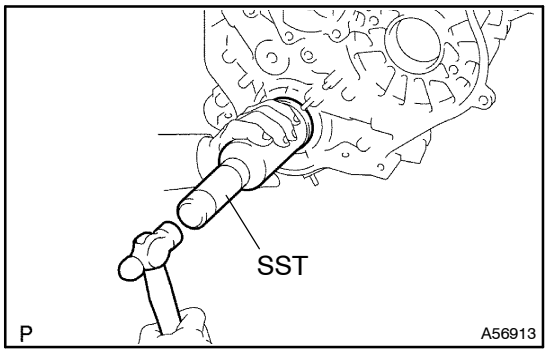


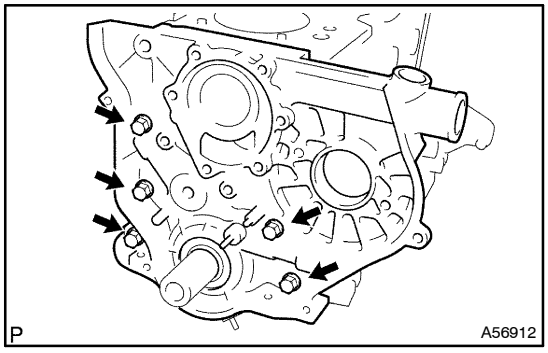
26. INSTALL TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

HINT:
There are 2 methods ((a) and (b)) to install the oil seal.

(a) If the timing gear case is removed from the cylinder block:
(1) Using SST and a hammer, tap in a new oil seal to the depth of 0.5 mm (0.020 in.) from the oil pump case edge.
SST 09214–60010
(2) Apply MP grease to the oil seal lip.

(b) If the timing gear case is installed to the cylinder block:
(1) Apply MP grease to a new oil seal lip.
(2) Using SST and a hammer, tap in the oil seal to the depth of 0.5 mm (0.020 in.) from the oil pump case edge.
SST 09214–60010





27. INSTALL TIMING GEAR CASE SUB–ASSY

(a) Place a new gasket on the cylinder block.
(b) Install the timing gear case with the 5 bolts.
Torque: 23 N·m (230 kgf·cm, 17 ft·lbf)

28. INSTALL OIL STRAINER SUB–ASSY

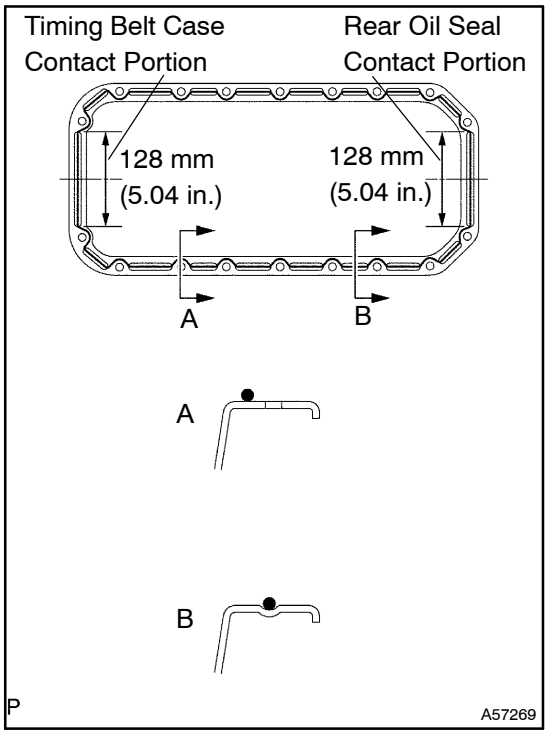
(a) Install a new gasket and oil strainer with the 2 bolts and 2 nuts.
Torque:
21 N·m (210 kgf·cm, 15 ft·lbf) for nut
18 N·m (180 kgf·cm, 13 ft·lbf) for bolt

29. INSTALL OIL PAN SUB–ASSY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pan and cylinder block.

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

NOTICE:
Do not use a solvent which will affect the painted surfaces.



(b) Apply seal packing to the oil pan as shown in the illustration.

HINT:
Apply at least 5 mm (0.20 in.) (preferably slightly more) of seal packing to the portions of the oil pan in contact with the timing belt case and rear oil seal retainer.

Seal packing: Part No. 08826–00080 or equivalent

- Install a nozzle that has been cut to a 4 – 5 mm (0.16 – 0.20 in.) opening.

HINT:
Avoid applying an excessive amount to the surface. Be particularly careful near oil passages.

- 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.

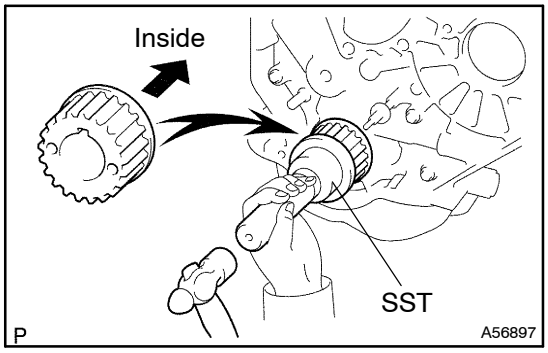
(c) Install be oil pan with the 16 bolts and 2 nuts. Uniformly tighten the bolts the bolts and nuts in several passes.

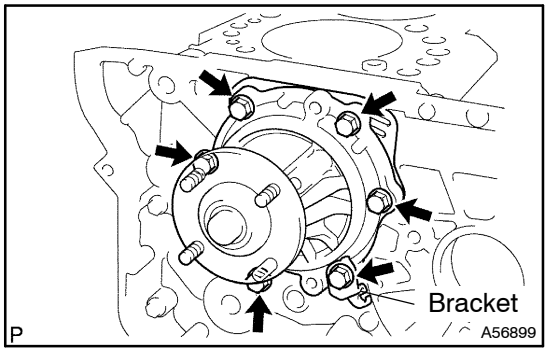
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

30. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the pulley set key with the key groove of the timing pulley.

(b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward.
SST 09223–46011





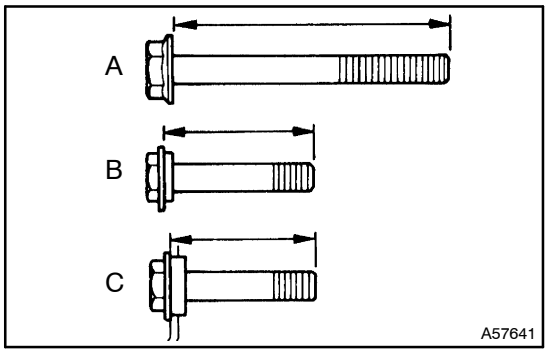
31. INSTALL WATER PUMP ASSY

(a) Install a new gasket, the water pump and tension spring bracket with the 6 bolts.
Torque: 23 N·m (230 kgf·cm, 17 ft·lbf)

32. INSTALL TIMING BELT IDLER SUB–ASSY NO.2

(a) Install the spacer and timing belt idler No.2 with the bolt.
Torque: 33 N·m (340 kgf·cm, 24 ft·lbf)

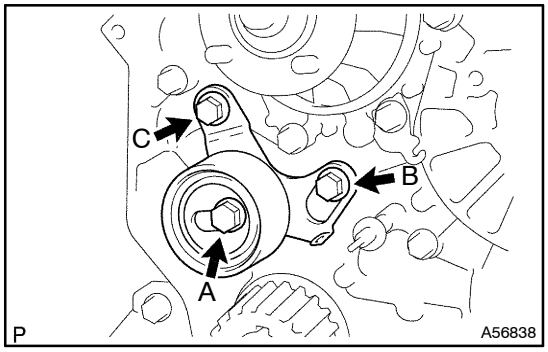
(b) Check that the timing belt idler No.2 moves smoothly.



33. INSTALL TIMING BELT IDLER SUB–ASSY NO.1

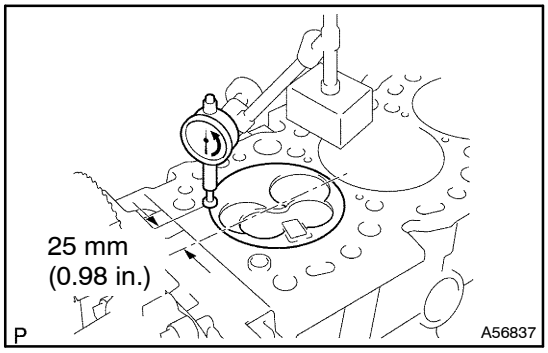
HINT:

- The bolt lengths for bolt types A, B and C shown in the illustration are:
  A: 76.5 mm (3.012 in.)
  B: 42.9 mm (1.689 in.), Color: Yellow
  C: 41.3 mm (1.626 in.), Color: Silver
- Bolt C is combined with the timing belt idler No.1.



(a) Install the timing belt idler No.1 with the 3 bolts.

(b) Tighten the bolt (C).
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

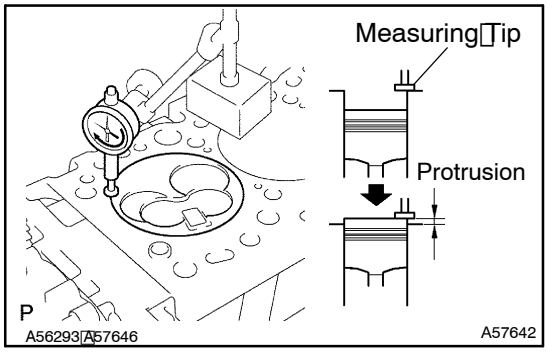


34. INSTALL CYLINDER HEAD GASKET

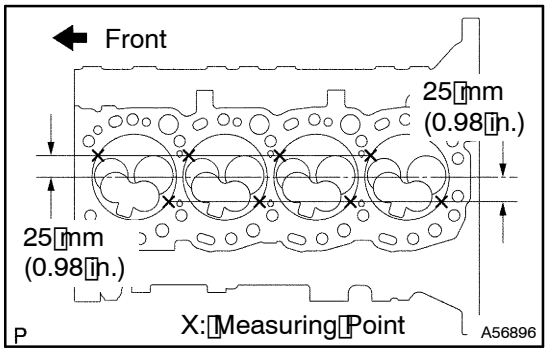
(a) Check the piston protrusions for each cylinder
  (1) Clean the cylinder block with solvent.
  (2) Set the piston of the cylinder to be measured to slightly before TDC.
  (3) Place a dial indicator on the cylinder block, set the measuring tip as shown in the illustration.
  (4) Set the dial indicator 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.



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



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

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

Piston protrusion: 0.68 – 0.97 mm (0.0268 – 0.0382 in.)

HINT:

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 page 14–38).

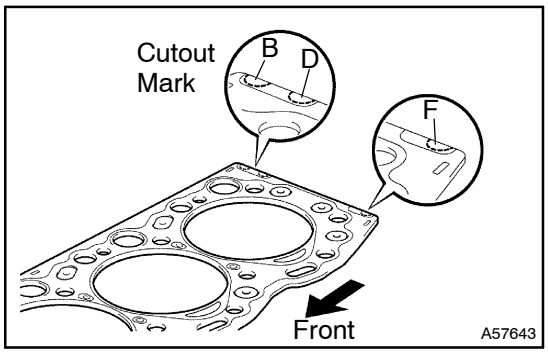
(b) Select a new cylinder head gasket.

HINT:

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

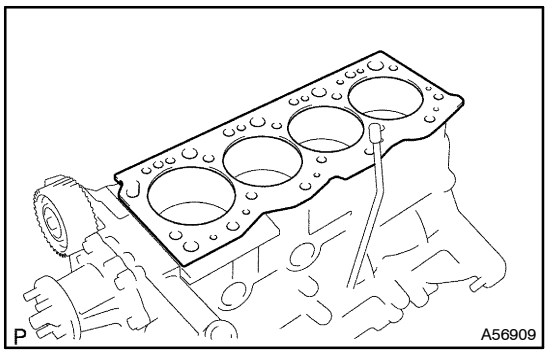
New installed cylinder head gasket thickness:

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



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

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



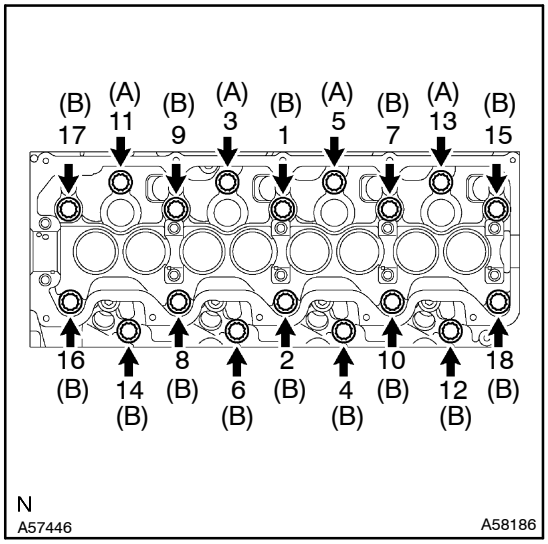
(c) Place a new cylinder head gasket in position on the cylinder block.

NOTICE:

Be careful of the installation direction.

35. INSTALL CYLINDER HEAD SUB–ASSY

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



(b) Install the cylinder head bolts.

HINT:

- The cylinder head bolts are tightened in 3 progressive steps (steps (2), (4) and (5)).
- If any bolts is broken or deformed, replace it.

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

(2) Install and uniformly tighten the 18 cylinder head bolts, in several passes, in the sequence shown.

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

HINT:

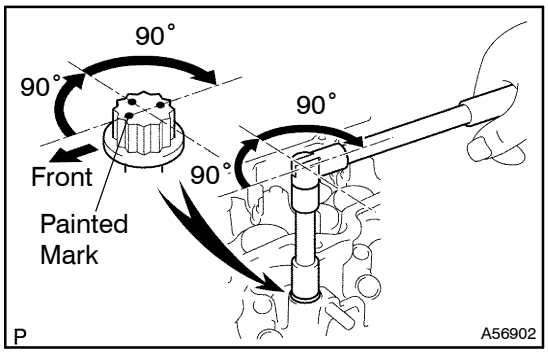
Each bolt length is indicated in the illustration.

Bolt length:

107 mm (4.12 in.) for A

127 mm (5.00 in.) for B

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

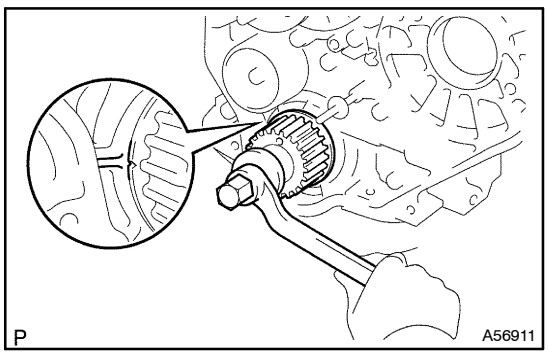


(3) Mark the front of the cylinder head bolt with paint.

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

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

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



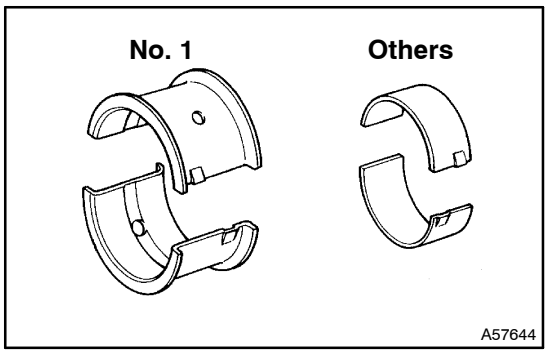
36. INSTALL CAMSHAFT

(a) Set the 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.

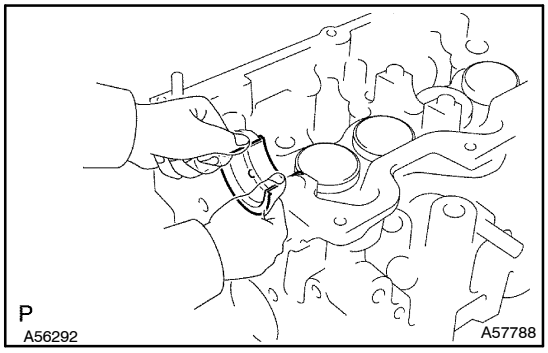
(1) Using the crankshaft pulley bolt, turn the crankshaft, and put the timing mark of the crankshaft timing pulley with the protrusion of the timing belt case.



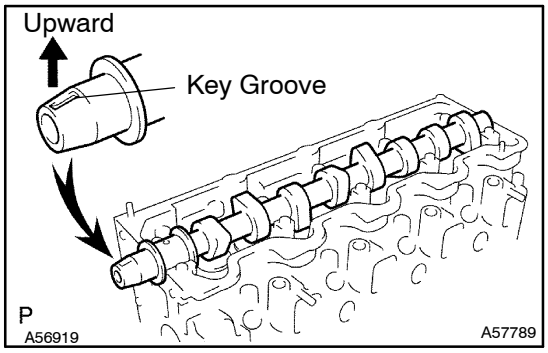
(b) Install the camshaft.

HINT:

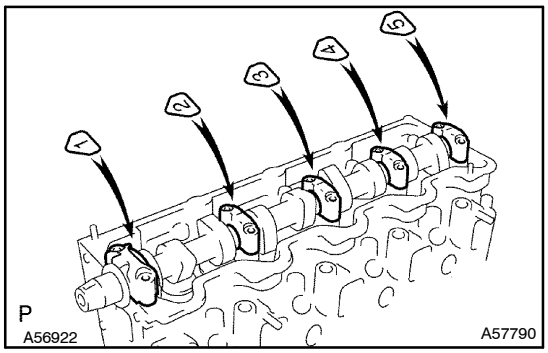
Different the bearing are used for the No. 1 and others.



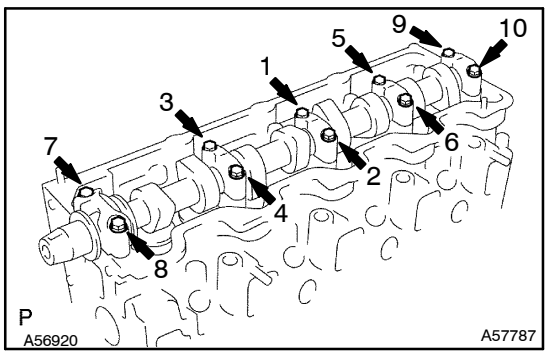
(1) Install the 10 bearings to the bearing caps and cylinder head.



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

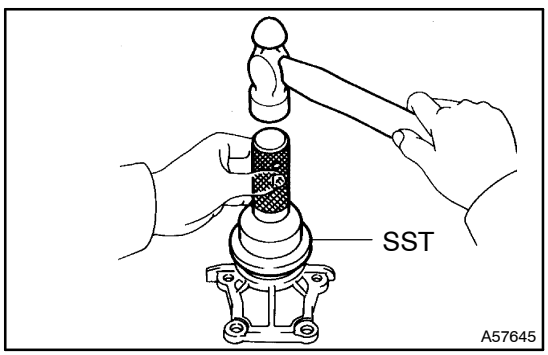


(3) Install the 5 bearing caps in their proper locations.



(4) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(5) 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)

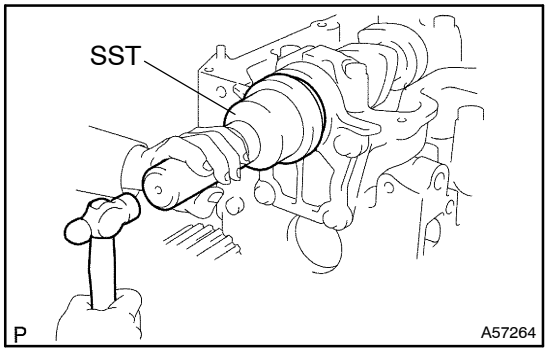


37. INSTALL OIL SEAL RETAINER, NO.2 OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to install the oil seal.

(a) If the camshaft oil seal retainer is removed from the cylinder head:
  (1) 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
  (2) Apply MP grease to the oil seal lip.



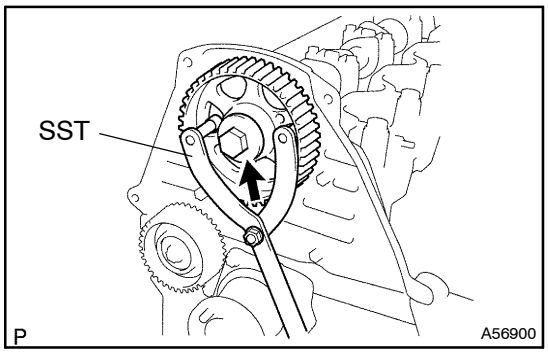
(b) If the camshaft oil seal retainer is installed to the cylinder head:
(1) Apply MP grease to a new oil seal lip.
(2) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil seal retainer edge.
SST 09223–46011

38. INSTALL CAMSHAFT OIL SEAL RETAINER

(a) Install a new gasket and the retainer with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

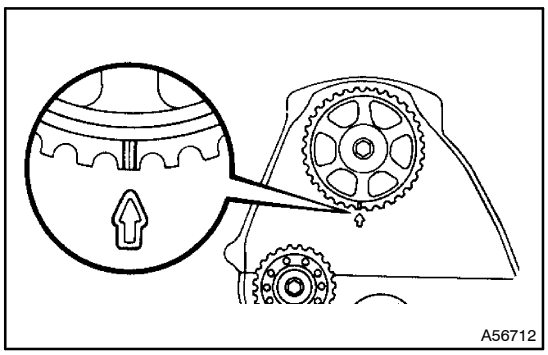
39. INSTALL TIMING BELT NO.2 COVER

(a) Install the timing belt cover with the 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



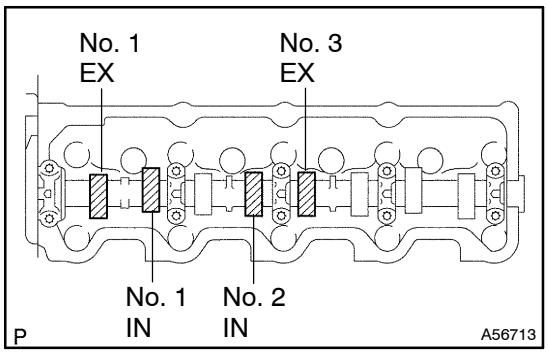
40. INSTALL CAMSHAFT TIMING PULLEY

(a) Install the woodruff key to the key groove of the camshaft.
(b) Align the pulley set key with the timing mark outward.
(c) Using SST, install the pulley with the bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)



41. INSPECT VALVE CLEARANCE

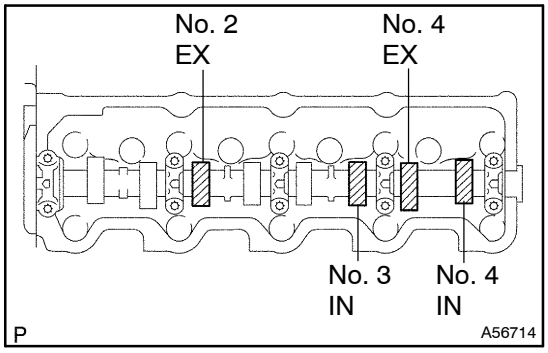
(a) Align the timing mark of the camshaft timing pulley with the arrow mark of the timing belt No. 2 cover.



(b) Check only the valves indicated.
(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
(2) Record the out–of–specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

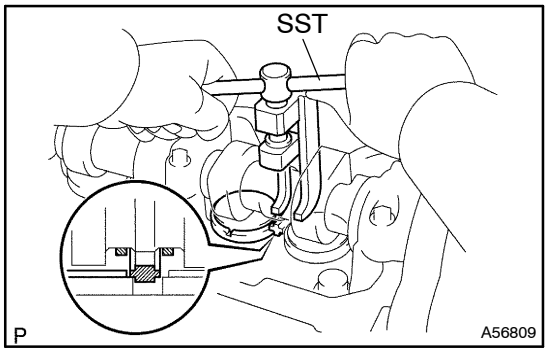
Valve clearance (Cold):

Intake	0.20 – 0.30 mm (0.008 – 0.012 in.)
Exhaust	0.40 – 0.50 mm (0.016 – 0.020 in.)



(c) Turn the camshaft 1/2 revolutions (180°).

(d) Check only the valves indicated as shown. Measure the valve clearance (See procedure (b) above).



42. ADJUST VALVE CLEARANCE

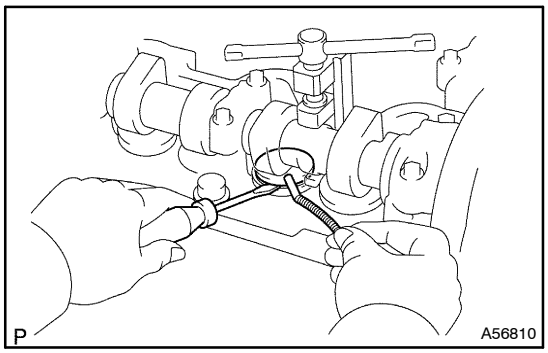
(a) Remove the adjusting shim.

(1) Turn the crankshaft so that the cam lobe of the camshaft on the adjusting valve points upward.

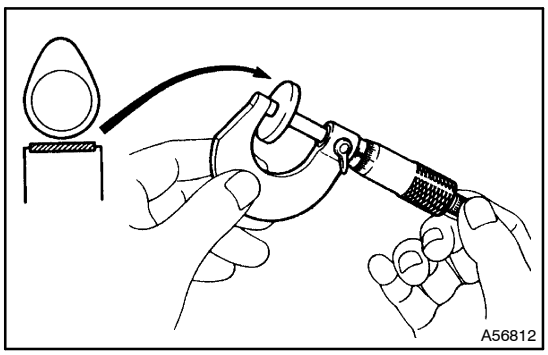
(2) Using SST, press down the valve lifter.

SST 09248–64011

(3) Position the notch of the valve lifter facing the exhaust manifold side.



(4) Remove the adjusting shim with a small screwdriver and magnetic finger.



(b) Determine the replacement adjusting shim size by following the Formula or Charts:

(1) Using a micrometer, measure the thickness of the removed shim.

(2) Calculate the thickness of a new shim so that the valve clearance comes within specified value.

T = Thickness of removed shim

A = Measured valve clearance

N = Thickness of new shim

Intake	N = T + (A – 0.25 mm (0.010 in.))
Exhaust	N = T + (A – 0.45 mm (0.018 in.))

(3) Select a new shim with a thickness as close as possible to the calculated value.

HINT:

Shims are available in 17 sizes in increments of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).

Adjusting Shim Selection Using Chart (Intake)

Measured clearance mm (in.)	Installed shim thickness mm (in.) 2.500 (0.0984)	2.520 (0.0992)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.580 (0.1016)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.650 (0.1043)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.750 (0.1083)	2.760 (0.1087)	2.780 (0.1094)	**2.800 (0.1102)**	2.820 (0.1110)	2.840 (0.1118)	2.850 (0.1122)	2.860 (0.1126)	2.880 (0.1134)	2.900 (0.1142)	2.920 (0.1150)	2.940 (0.1157)	2.950 (0.1161)	2.960 (0.1165)	2.980 (0.1173)	3.000 (0.1181)	3.020 (0.1189)	3.040 (0.1197)	3.050 (0.1201)	3.060 (0.1205)	3.080 (0.1213)	3.100 (0.1220)	3.120 (0.1228)	3.140 (0.1236)	3.150 (0.1240)	3.160 (0.1244)	3.180 (0.1252)	3.200 (0.1260)	3.220 (0.1268)	3.240 (0.1276)	3.250 (0.1280)	3.260 (0.1283)	3.280 (0.1291)	3.300 (0.1299)
0.000 – 0.020 (0.0000 – 0.0008)													01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47
0.021 – 0.040 (0.0008 – 0.0016)												01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31
0.041 – 0.060 (0.0016 – 0.0024)										01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31
0.061 – 0.080 (0.0024 – 0.0031)									01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31
0.081 – 0.100 (0.0032 – 0.0039)								01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48
0.101 – 0.120 (0.0040 – 0.0047)							01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48
0.121 – 0.140 (0.0048 – 0.0055)						01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36
0.141 – 0.160 (0.0056 – 0.0063)				01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36
0.161 – 0.180 (0.0063 – 0.0071)			01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36
0.181 – 0.199 (0.0071 – 0.0078)		01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49
0.200 – 0.300 (0.0079 – 0.0118)	
0.301 – 0.320 (0.0119 – 0.0126)	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.321 – 0.340 (0.0126 – 0.0134)	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.341 – 0.360 (0.0134 – 0.0142)	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	**21**	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.361 – 0.380 (0.0142 – 0.0150)	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41
0.381 – 0.400 (0.0150 – 0.0157)	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.401 – 0.420 (0.0158 – 0.0165)	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.421 – 0.440 (0.0166 – 0.0173)	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.441 – 0.460 (0.0174 – 0.0181)	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.461 – 0.480 (0.0181 – 0.0189)	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41
0.481 – 0.500 (0.0189 – 0.0197)	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.501 – 0.520 (0.0197 – 0.0205)	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.521 – 0.540 (0.0205 – 0.0213)	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.541 – 0.560 (0.0213 – 0.0220)	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.561 – 0.580 (0.0221 – 0.0228)	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41
0.581 – 0.600 (0.0229 – 0.0236)	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.601 – 0.620 (0.0237 – 0.0244)	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.621 – 0.640 (0.0244 – 0.0252)	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.641 – 0.660 (0.0252 – 0.0260)	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.661 – 0.680 (0.0260 – 0.0268)	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41
0.681 – 0.700 (0.0268 – 0.0276)	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.701 – 0.720 (0.0276 – 0.0283)	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.721 – 0.740 (0.0284 – 0.0291)	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.741 – 0.760 (0.0292 – 0.0299)	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.761 – 0.780 (0.0300 – 0.0307)	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41
0.781 – 0.800 (0.0307 – 0.0315)	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.801 – 0.820 (0.0315 – 0.0323)	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41
0.821 – 0.840 (0.0323 – 0.0331)	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.841 – 0.860 (0.0331 – 0.0339)	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41
0.861 – 0.880 (0.0339 – 0.0346)	31	48	48	48	36	36	36	49	49	49	41	41	41	41
0.881 – 0.900 (0.0347 – 0.0354)	48	48	36	36	36	36	49	49	41	41	41	41	41
0.901 – 0.920 (0.0355 – 0.0362)	48	36	36	36	36	49	49	41	41	41	41	41
0.921 – 0.940 (0.0363 – 0.0370)	36	36	36	49	49	49	41	41	41	41	41
0.941 – 0.960 (0.0370 – 0.0378)	36	36	49	49	49	41	41	41	41	41
0.961 – 0.980 (0.0378 – 0.0386)	36	49	49	49	41	41	41	41
0.981 – 1.000 (0.0386 – 0.0394)	49	49	41	41	41	41	41
1.001 – 1.020 (0.0394 – 0.0402)	49	41	41	41	41	41
1.021 – 1.040 (0.0402 – 0.0409)	41	41	41	41	41
1.041 – 1.060 (0.0410 – 0.0417)	41	41	41	41
1.061 – 1.080 (0.0418 – 0.0425)	41	41
1.081 – 1.100 (0.0426 – 0.0433)	41

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
01	2.50 (0.0984)	46	2.95 (0.1161)
42	2.55 (0.1004)	26	3.00 (0.1181)
06	2.60 (0.1024)	47	3.05 (0.1201)
43	2.65 (0.1043)	31	3.10 (0.1220)
11	2.70 (0.1063)	48	3.15 (0.1240)
44	2.75 (0.1083)	36	3.20 (0.1260)
16	2.80 (0.1102)	49	3.25 (0.1280)
45	2.85 (0.1122)	41	3.30 (0.1299)
21	2.90 (0.1142)		

Intake valve clearance (Cold):
0.20 – 0.30 mm (0.008 – 0.012 in.)

EXAMPLE:
The 2.800 mm (0.1102 in.) shim is installed and the measured clearance is 0.350 mm (0.0138 in.). Replace the 2.800 mm (0.1102 in.) shim with a No. 21 shim.

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Adjusting Shim Selection Using Chart (Exhaust)

Measured clearance mm (in.)	Installed shim thickness mm (in.)																																																
	2.500 (0.0984)	2.520 (0.0992)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.580 (0.1016)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.650 (0.1043)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.750 (0.1083)	2.760 (0.1087)	2.780 (0.1094)	**2.800 (0.1102)**	2.820 (0.1110)	2.840 (0.1118)	2.850 (0.1122)	2.860 (0.1126)	2.880 (0.1134)	2.900 (0.1142)	2.920 (0.1150)	2.940 (0.1157)	2.950 (0.1161)	2.960 (0.1165)	2.980 (0.1173)	3.000 (0.1181)	3.020 (0.1189)	3.040 (0.1197)	3.050 (0.1201)	3.060 (0.1205)	3.080 (0.1213)	3.100 (0.1220)	3.120 (0.1228)	3.140 (0.1236)	3.150 (0.1240)	3.160 (0.1244)	3.180 (0.1252)	3.200 (0.1260)	3.220 (0.1268)	3.240 (0.1276)	3.250 (0.1280)	3.260 (0.1283)	3.280 (0.1291)	3.300 (0.1299)
0.000 – 0.020 (0.0000 – 0.0008)																									01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45
0.021 – 0.040 (0.0008 – 0.0016)																								01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21
0.041 – 0.060 (0.0016 – 0.0024)																						01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21
0.061 – 0.080 (0.0024 – 0.0031)																					01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21
0.081 – 0.100 (0.0032 – 0.0039)																				01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46
0.101 – 0.120 (0.0040 – 0.0047)																			01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46
0.121 – 0.140 (0.0048 – 0.0055)																		01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26
0.141 – 0.160 (0.0056 – 0.0063)																01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26
0.161 – 0.180 (0.0063 – 0.0071)															01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26
0.181 – 0.200 (0.0071 – 0.0079)														01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47
0.201 – 0.220 (0.0079 – 0.0087)													01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47
0.221 – 0.240 (0.0087 – 0.0094)												01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31
0.241 – 0.260 (0.0095 – 0.0102)										01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31
0.261 – 0.280 (0.0103 – 0.0110)									01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31
0.281 – 0.300 (0.0111 – 0.0118)								01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48
0.301 – 0.320 (0.0119 – 0.0126)							01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48
0.321 – 0.340 (0.0126 – 0.0134)						01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36
0.341 – 0.360 (0.0134 – 0.0142)				01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	**11**	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36
0.361 – 0.380 (0.0142 – 0.0150)			01	01	01	01	01	42	42	42	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36
0.381 – 0.399 (0.0150 – 0.0157)		01	01	01	01	01	42	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49
0.400 – 0.500 (0.0157 – 0.0197)																																																	
0.501 – 0.520 (0.0197 – 0.0205)	42	06	06	06	06	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41	
0.521 – 0.540 (0.0205 – 0.0213)	06	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41		
0.541 – 0.560 (0.0213 – 0.0220)	06	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41			
0.561 – 0.580 (0.0221 – 0.0228)	06	43	43	43	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41					
0.581 – 0.600 (0.0229 – 0.0236)	43	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41						
0.601 – 0.620 (0.0237 – 0.0244)	43	11	11	11	11	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41							
0.621 – 0.640 (0.0244 – 0.0252)	11	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41								
0.641 – 0.660 (0.0252 – 0.0260)	11	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41									
0.661 – 0.680 (0.0260 – 0.0268)	11	44	44	44	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41											
0.681 – 0.700 (0.0268 – 0.0276)	44	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41												
0.701 – 0.720 (0.0276 – 0.0283)	44	16	16	16	16	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41													
0.721 – 0.740 (0.0284 – 0.0291)	16	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41														
0.741 – 0.760 (0.0292 – 0.0299)	16	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41															
0.761 – 0.780 (0.0300 – 0.0307)	16	45	45	45	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41																	
0.781 – 0.800 (0.0307 – 0.0315)	45	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41																		
0.801 – 0.820 (0.0315 – 0.0323)	45	21	21	21	21	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41																			
0.821 – 0.840 (0.0323 – 0.0331)	21	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41																				
0.841 – 0.860 (0.0331 – 0.0339)	21	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41																					
0.861 – 0.880 (0.0339 – 0.0346)	21	46	46	46	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41																							
0.881 – 0.900 (0.0347 – 0.0354)	46	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41																								
0.901 – 0.920 (0.0355 – 0.0362)	46	26	26	26	26	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41																									
0.921 – 0.940 (0.0363 – 0.0370)	26	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41																										
0.941 – 0.960 (0.0370 – 0.0378)	26	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41																											
0.961 – 0.980 (0.0378 – 0.0386)	26	47	47	47	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41																													
0.981 – 1.000 (0.0386 – 0.0394)	47	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41																														
1.001 – 1.020 (0.0394 – 0.0402)	47	31	31	31	31	48	48	36	36	36	36	49	49	41	41	41	41	41																															
1.021 – 1.040 (0.0402 – 0.0409)	31	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41																																
1.041 – 1.060 (0.0410 – 0.0417)	31	31	48	48	48	36	36	36	49	49	49	41	41	41	41	41																																	
1.061 – 1.080 (0.0418 – 0.0425)	31	48	48	48	36	36	36	49	49	49	41	41	41	41																																			
1.081 – 1.100 (0.0426 – 0.0433)	48	48	36	36	36	36	49	49	41	41	41	41	41																																				
1.101 – 1.120 (0.0433 – 0.0441)	48	36	36	36	36	49	49	41	41	41	41	41																																					
1.121 – 1.140 (0.0441 – 0.0449)	36	36	36	49	49	49	41	41	41	41	41																																						
1.141 – 1.160 (0.0449 – 0.0457)	36	36	49	49	49	41	41	41	41	41																																							
1.161 – 1.180 (0.0457 – 0.0465)	36	49	49	49	41	41	41	41																																									
1.181 – 1.200 (0.0465 – 0.0472)	49	49	41	41	41	41	41																																										
1.201 – 1.220 (0.0473 – 0.0480)	49	41	41	41	41	41																																											
1.221 – 1.240 (0.0481 – 0.0488)	41	41	41	41	41																																												
1.241 – 1.260 (0.0489 – 0.0496)	41	41	41	41																																													
1.261 – 1.280 (0.0496 – 0.0504)	41	41																																															
1.281 – 1.300 (0.0504 – 0.0512)	41																																																

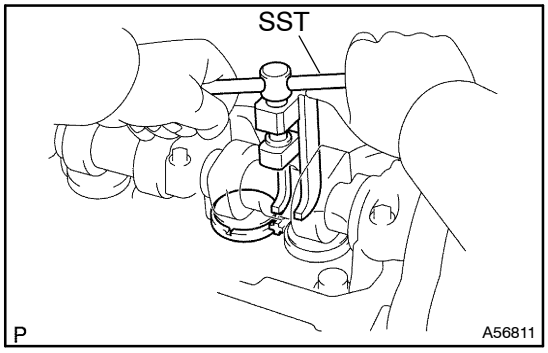
New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
01	2.50 (0.0984)	46	2.95 (0.1161)
42	2.55 (0.1004)	26	3.00 (0.1181)
06	2.60 (0.1024)	47	3.05 (0.1201)
43	2.65 (0.1043)	31	3.10 (0.1220)
11	2.70 (0.1063)	48	3.15 (0.1240)
44	2.75 (0.1083)	36	3.20 (0.1260)
16	2.80 (0.1102)	49	3.25 (0.1280)
45	2.85 (0.1122)	41	3.30 (0.1299)
21	2.90 (0.1142)		

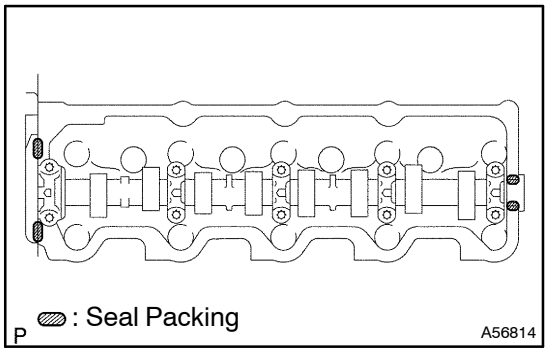
Exhaust valve clearance (Cold):
0.40 – 0.50 mm (0.016 – 0.020 in.)

EXAMPLE:
The 2.800 mm (0.1102 in.) shim is installed and the measured is 0.350 mm (0.0138 in.). Replace the 2.800 mm (0.1102 in.) shim with a No. 11 shim.

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(c) Install a new adjusting shim.
  (1) Place a new adjusting shim on the valve lifter.
  (2) Remove the SST.
(d) Recheck the valve clearance.



43. INSTALL CYLINDER HEAD COVER SUB–ASSY

(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 9 bolts and nut. Uniformly tighten the bolts and nuts in several passes.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

44. INSTALL OIL FILLER CAP SUB–ASSY