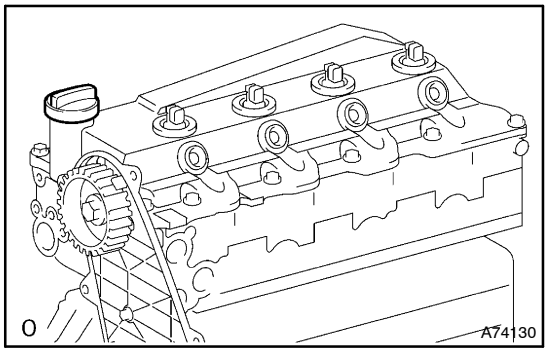
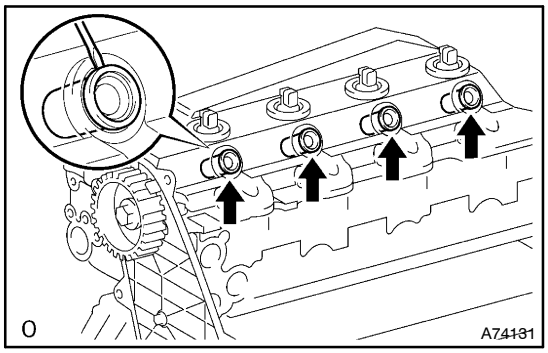
1412A–01

OVERHAUL

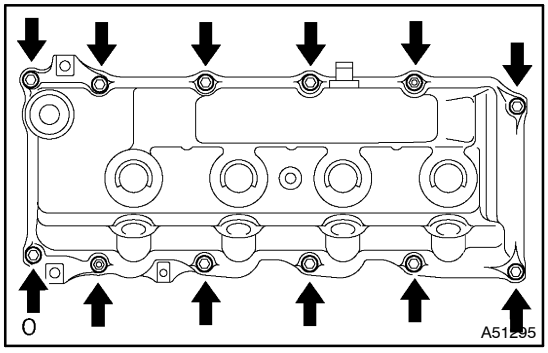


1. REMOVE OIL FILLER CAP SUB–ASSY



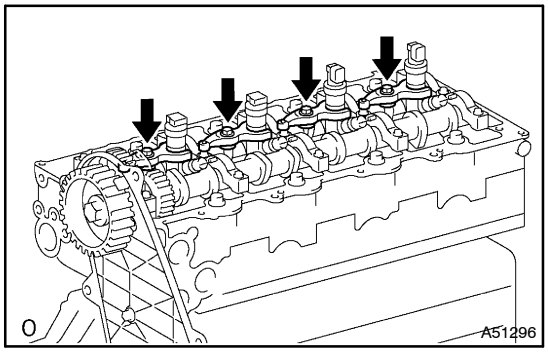
2. REMOVE NOZZLE HOLDER SEAL

(a) Pry out the 4 nozzle holder seals with a screwdriver.



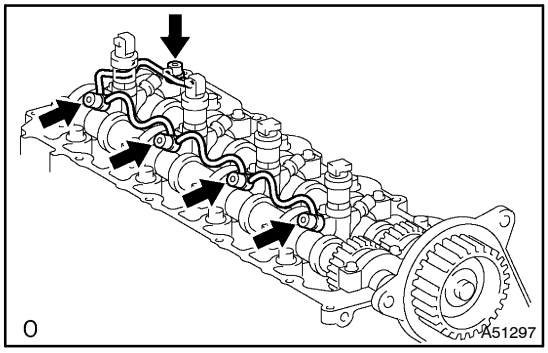
3. REMOVE CYLINDER HEAD COVER SUB–ASSY

(a) Remove the 10 bolts, 2 nuts, cylinder head cover and gasket.



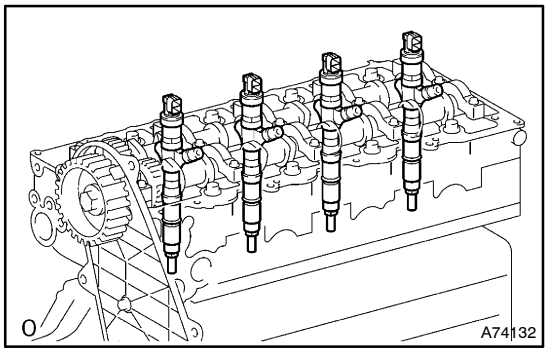
4. REMOVE NOZZLE HOLDER CLAMP

(a) Remove the 4 bolts, 4 washers and 4 nozzle holder clamps.



5. REMOVE NOZZLE LEAKAGE PIPE ASSY

(a) Remove the union bolt, 4 hollow screws, nozzle leakage pipe and 5 gaskets from the cylinder head and injector.

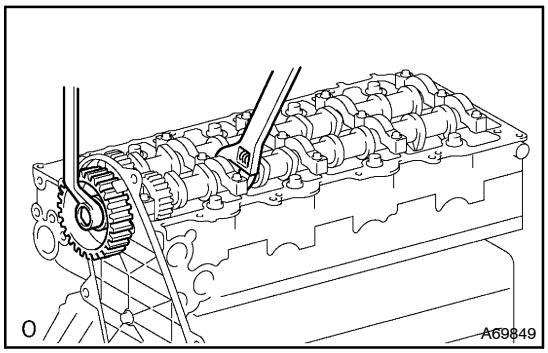


6. REMOVE INJECTOR ASSY

(a) Remove the 4 injectors from the cylinder head.

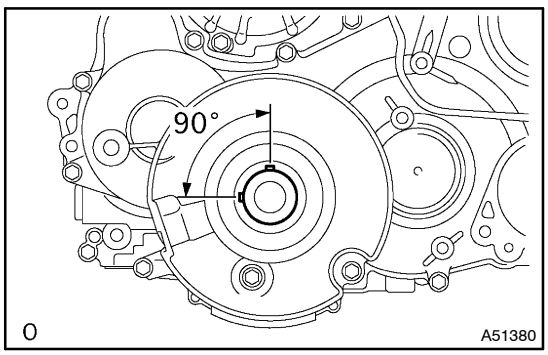
HINT:

Keep it in mind the installed locations of each injector before remove them from the cylinder head.

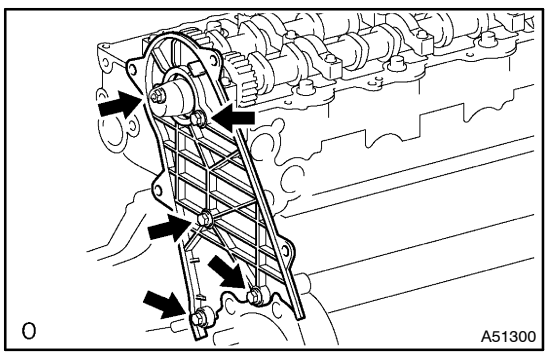


7. REMOVE CAMSHAFT TIMING PULLEY

(a) Remove the bolt, the timing pulley and the set key by holding the hexagon portion of the camshaft with a monkey wrench.

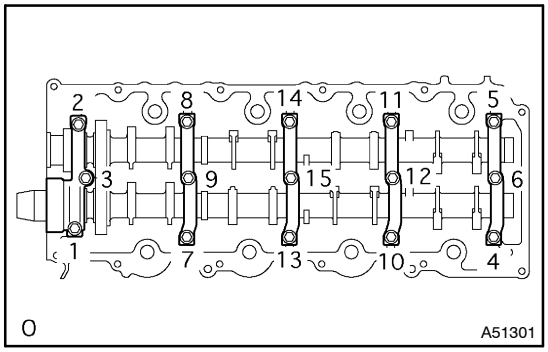


(b) Rotate the crankshaft about 90° counterclockwise from the TDC position to lower the piston.



8. REMOVE TIMING BELT NO.2 COVER

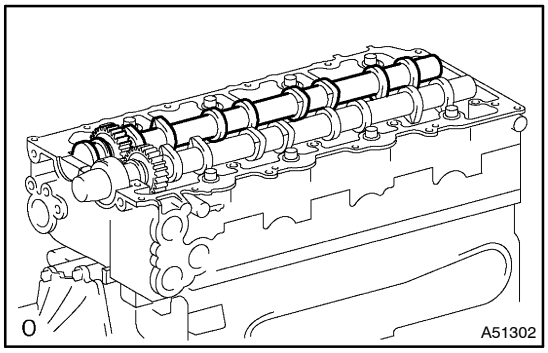
(a) Remove the 4 bolts, nut and timing belt No.2 cover.



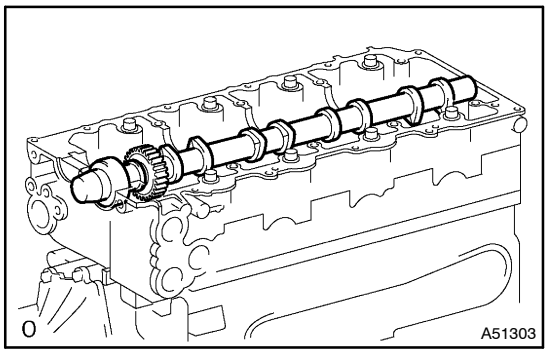
9. REMOVE NO.2 CAMSHAFT

(a) Uniformly loosen the 15 bearing cap bolts in the order indicated in the illustration and then remove them in the same order.

(b) Remove the 5 bearing caps.

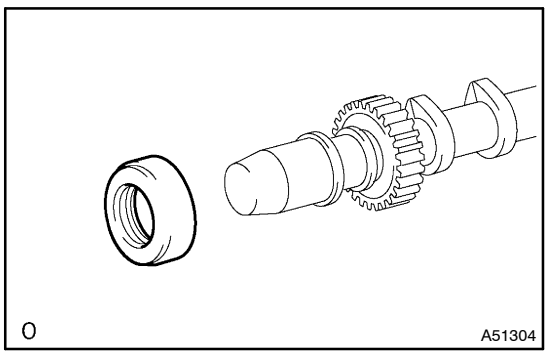


(c) Remove the camshaft No. 2.



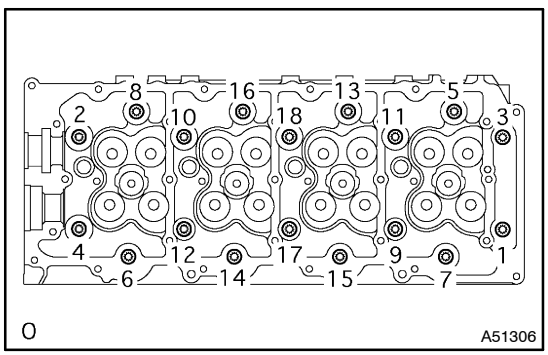
10. REMOVE CAMSHAFT

(a) Remove the camshaft from the cylinder head.



11. REMOVE CAMSHAFT SETTING OIL SEAL

(a) Remove the oil seal from the camshaft.



12. REMOVE CYLINDER HEAD SUB–ASSY

(a) Uniformly loosen the 18 cylinder head bolts in the order indicated in the illustration and then remove them in the same order.

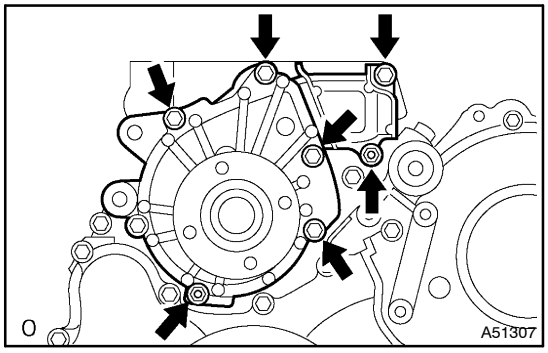
NOTICE:

Removing in incorrect order will cause a result that the cylinder head is warped.

(b) Remove the cylinder head from the cylinder block.

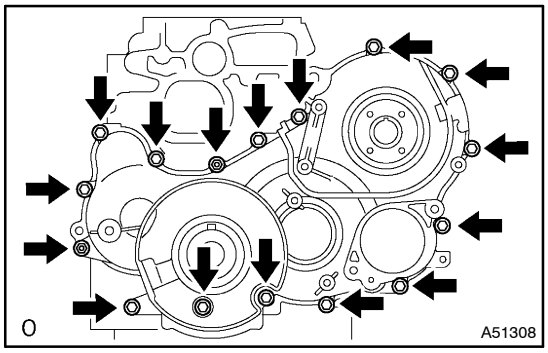
HINT:

Keep the removed cylinder head from damage.



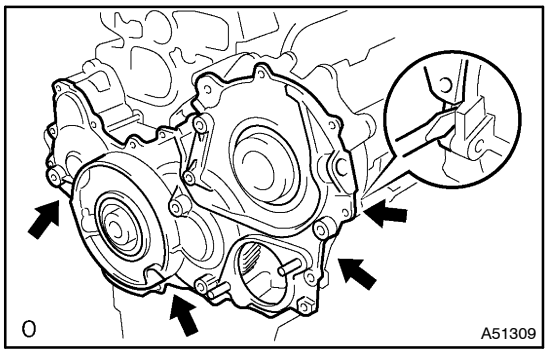
13. REMOVE WATER PUMP ASSY

(a) Remove the 5 bolts, 2 nuts, water pump and gasket.

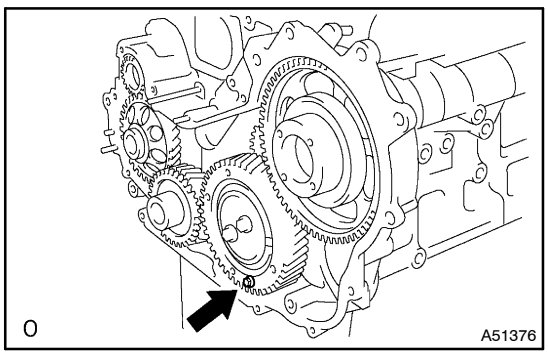


14. REMOVE TIMING GEAR CASE

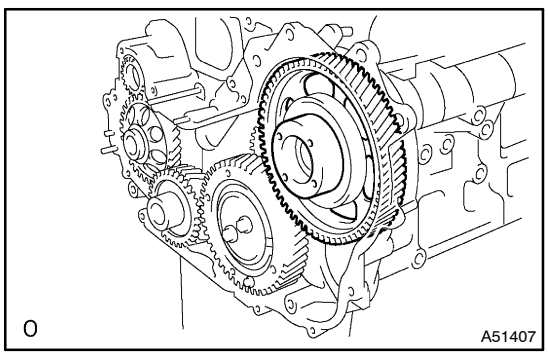
(a) Remove the 14 bolts and 2 nuts.



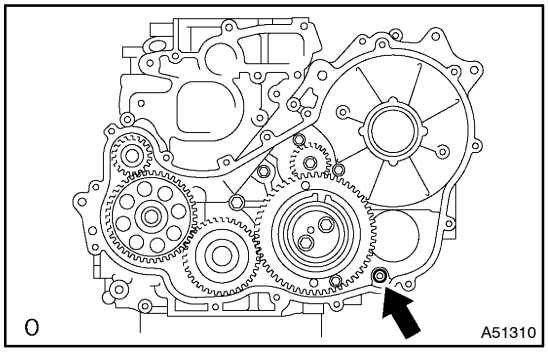
(b) Separate the timing gear case softly with a slotted–screwdriver.



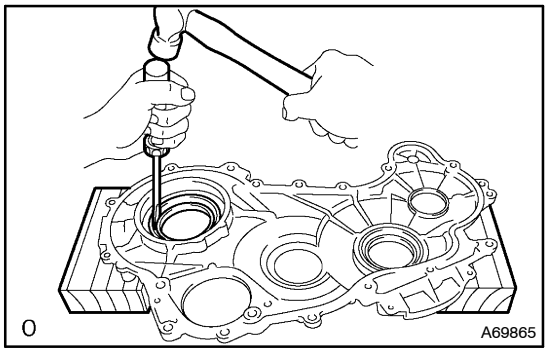
(c) Secure the idler sub–gears to the idler gear with a service bolt.



(d) Remove the injection gear.

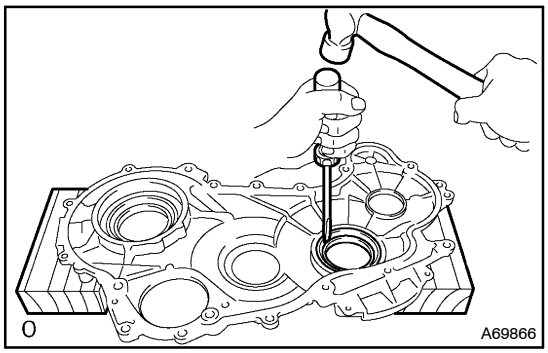


(e) Remove the O–ring.



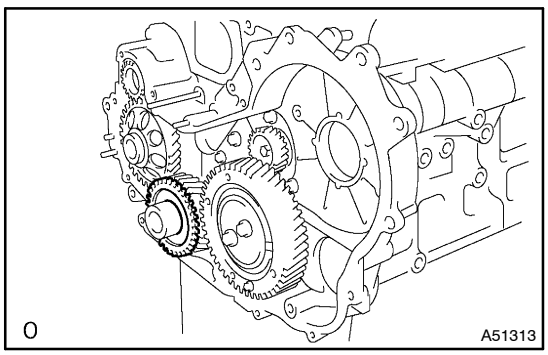
15. REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

(a) Remove the oil seal with a slotted–screwdriver and hammer.



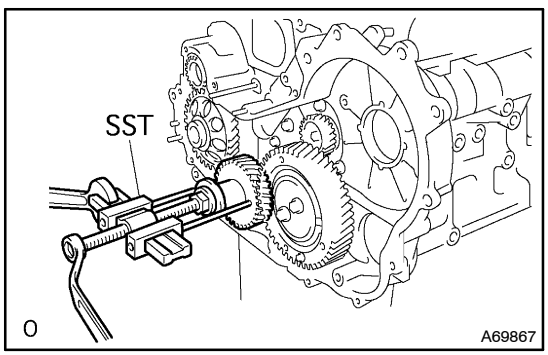
16. REMOVE TIMING GEAR COVER OIL SEAL

(a) Remove the oil seal with a slotted–screwdriver and hammer.



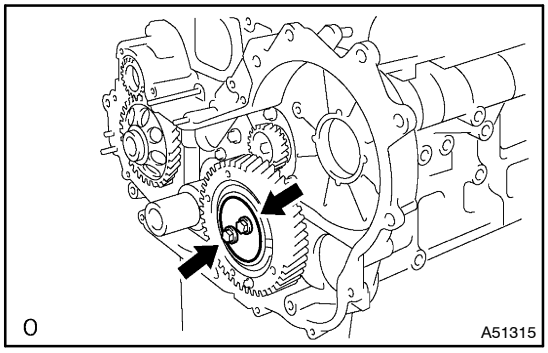
17. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Remove the crank angle sensor plate No. 1.



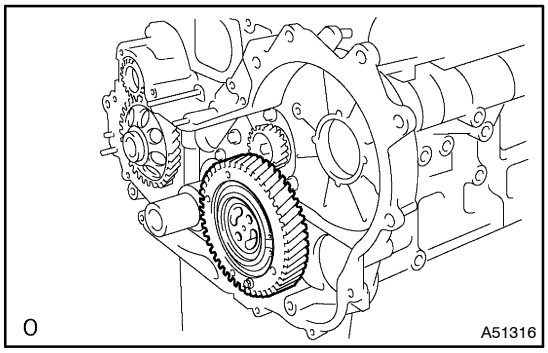
18. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

(a) Using SST, remove the crankshaft timing gear.
SST 09950–50013 (09951–05010, 09952–05010, 09953–05020, 09954–05010)



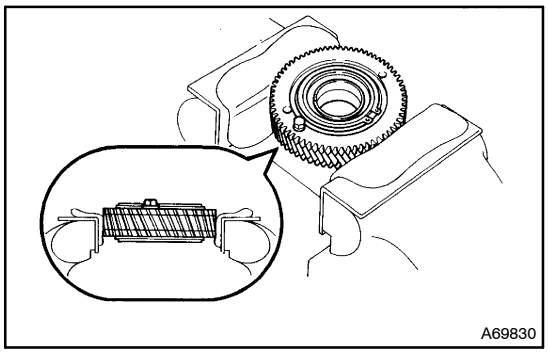
19. REMOVE IDLE GEAR THRUST PLATE

(a) Remove the 2 bolts, idle gear thrust plate.



20. REMOVE IDLE GEAR NO.1

(a) Remove the idle gear No. 1.

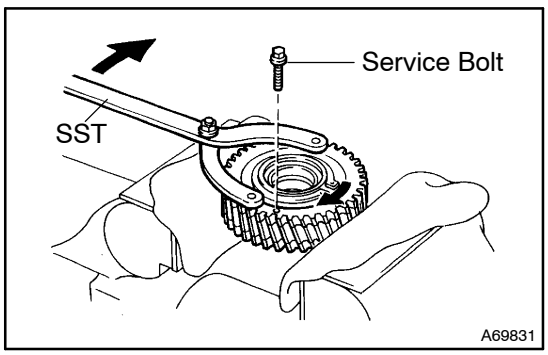


21. REMOVE IDLE SUB GEAR NO.1

(a) Set the idle gear No.1 and idle sub gear No.2 in a vise.

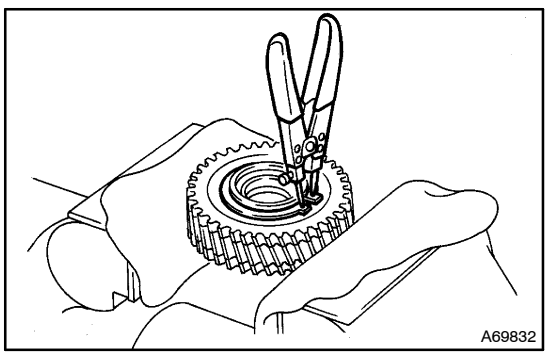
NOTICE:

Be careful not to damage the gears.

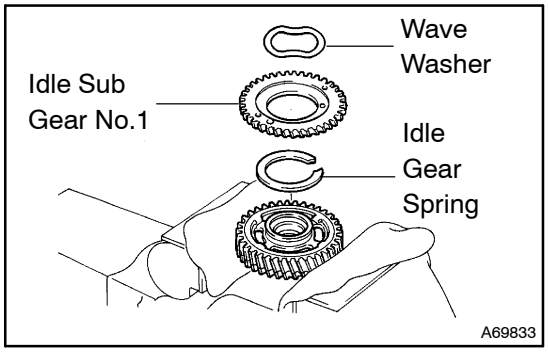


(b) Using SST, turn the idle sub gear No.1 clockwise and remove the service bolt.

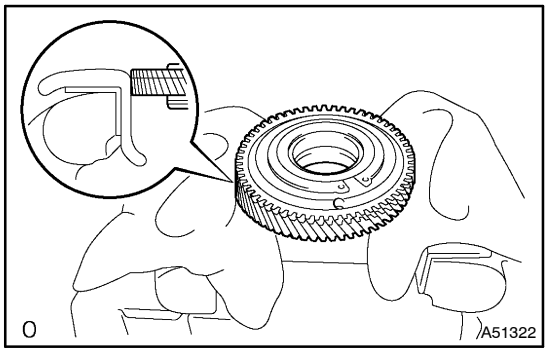
SST 09960–10010 (09962–01000, 09963–00600)



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



(d) Remove the wave washer.
(e) Remove the idle sub gear No.1.
(f) Remove the idle gear spring.
(g) Remove the idle gear No.1 from the vise.

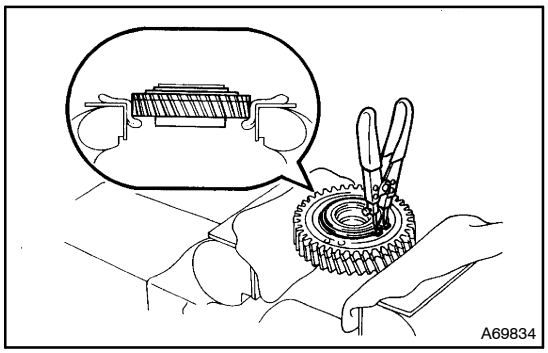


22. REMOVE IDLE SUB GEAR NO.2

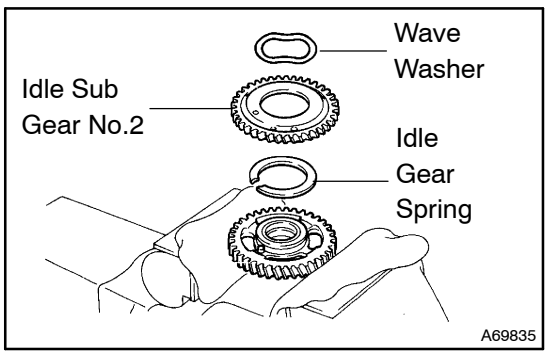
(a) Reverse the idle gear No.1 and reset it in the vise.

NOTICE:

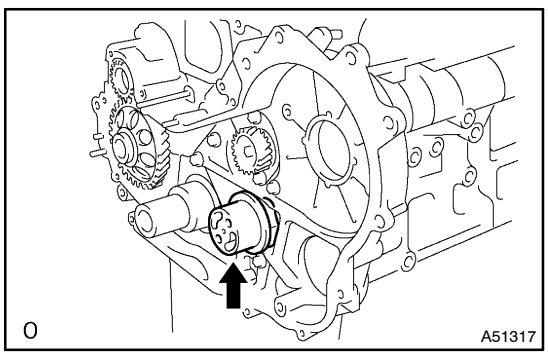
Be careful not a damage the gear.



(b) Using a snap ring pliers, remove the shaft snap ring.

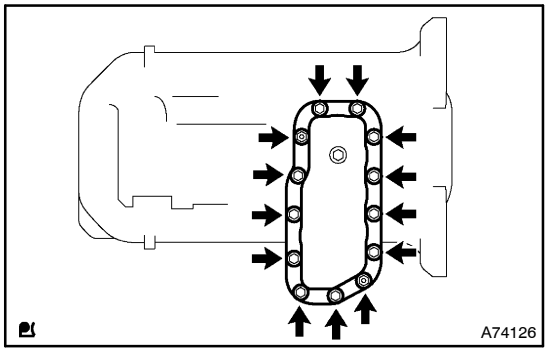


(c) Remove the wave washer.
(d) Remove the idle sub gear No.2.
(e) Remove the idle gear spring.



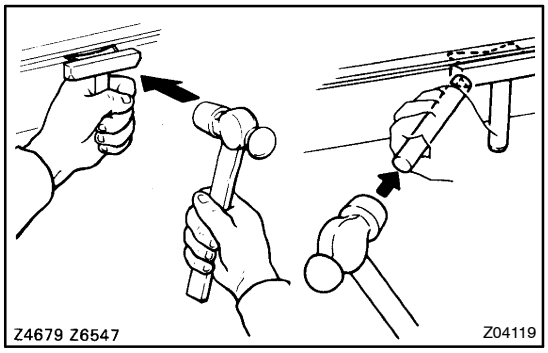
23. REMOVE IDLE GEAR SHAFT NO.1

(a) Remove the idle gear shaft No. 1.

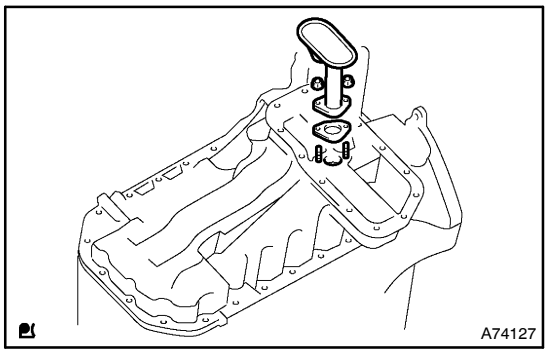


24. REMOVE OIL PAN SUB–ASSY NO.2

(a) Remove the 11 bolts and 2 nuts.

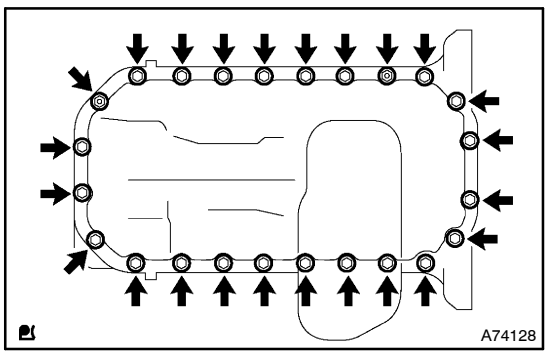


(b) Remove the oil pan No. 2 with SST.
SST 09032–00100



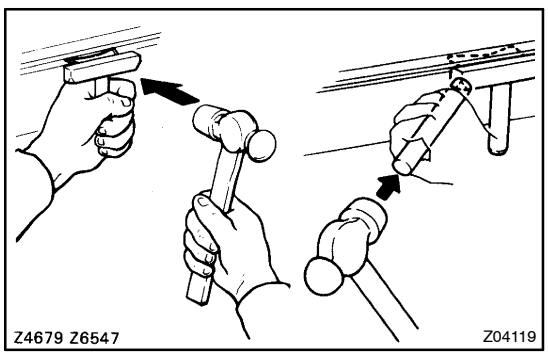
25. REMOVE OIL STRAINER SUB–ASSY

(a) Remove the 2 nuts, oil strainer sub–assy and gasket.



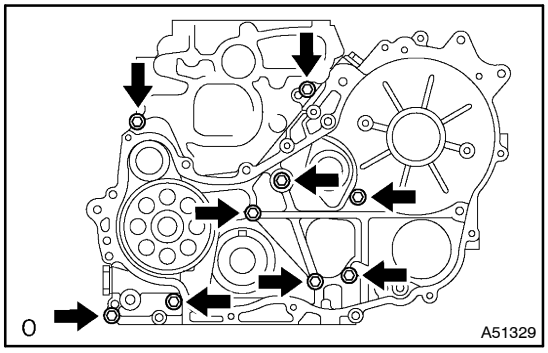
26. REMOVE OIL PAN SUB–ASSY

(a) Remove the 22 bolts and 2 nuts.



(b) Remove the oil pan sub–assy with SST.
SST 09032–00100

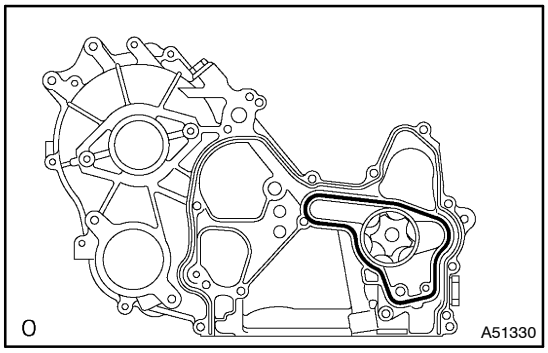
(c) Remove the oil pan gasket.



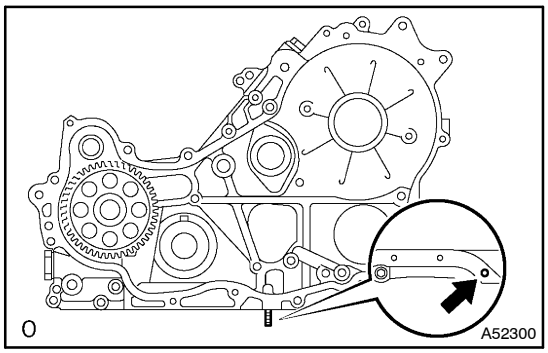
27. REMOVE TIMING GEAR CASE ASSY

(a) Remove the 8 bolts and union bolt.

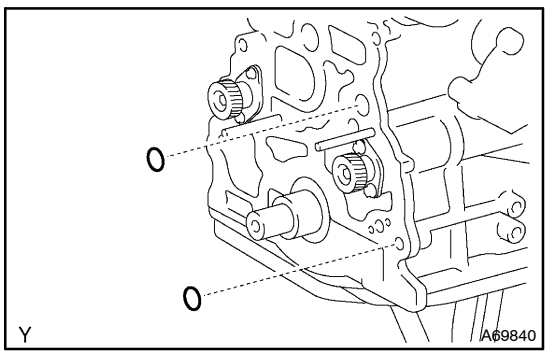
(b) Using a plastic–faced hammer, tap out the timing gear case.



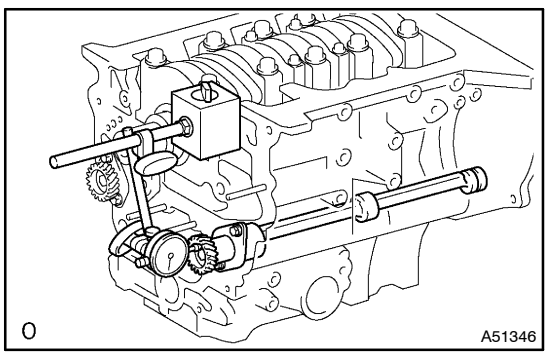
(c) Remove the oil pump gasket.



(d) Remove the stud bolt.



(e) Remove the 2 O–rings.



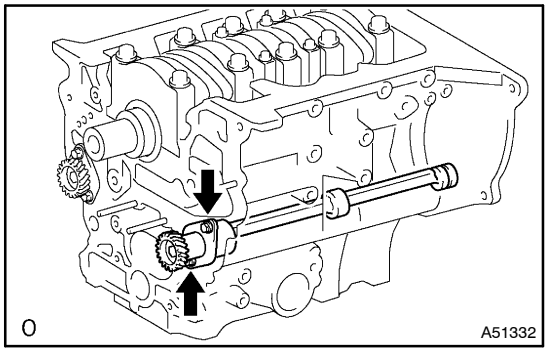
28. INSPECT NO.1 BALANCESHAFT SUB–ASSY

(a) Using a dial indicator, measure the thrust clearance by moving the balanceshaft back and forth.

Standard thrust clearance:
0.065 – 0.140 mm (0.0026 – 0.0055 in.)
Maximum thrust clearance: 0.25 mm (0.0098 in.)

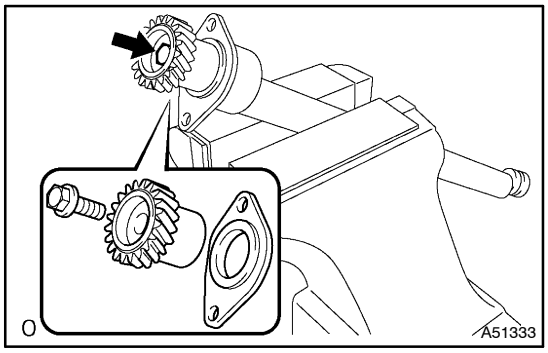
If the thrust clearance is greater than the maximum clearance, replace the balance shaft thrust washer.

If the thrust clearance would still be greater than the maximum clearance, replace the balanceshaft.



29. REMOVE NO.1 BALANCESHAFT SUB–ASSY

(a) Remove the 2 bolts and balanceshaft No.1.



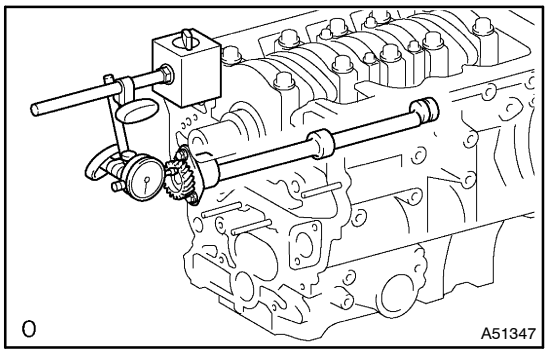
30. REMOVE BALANCESHAFT DRIVEN GEAR NO.1

(a) Mount the balanceshaft in a vise.

NOTICE:

Be careful not to damage the balanceshaft.

(b) Remove the bolt, balanceshaft driven gear No.1 and balanceshaft thrust washer.



31. INSPECT NO.2 BALANCESHAFT SUB–ASSY

(a) Using a dial indicator, measure the thrust clearance by moving the balanceshaft back and forth.

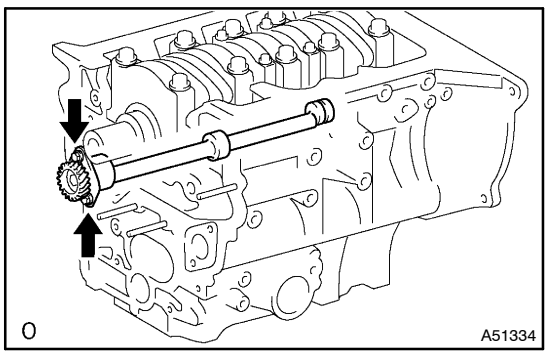
Standard thrust clearance:

0.065 – 0.140 mm (0.0026 – 0.0055 in.)

Maximum thrust clearance: 0.25 mm (0.0098 in.)

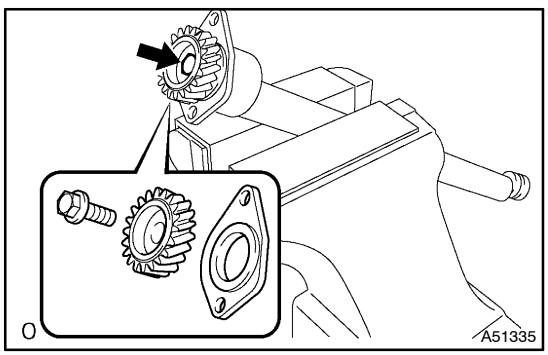
If the thrust clearance is greater than the maximum clearance, replace the balance shaft thrust washer.

If the thrust clearance would still be greater than the maximum clearance, replace the balanceshaft.



32. REMOVE NO.2 BALANCESHAFT SUB–ASSY

(a) Remove the 2 bolts and balanceshaft No.2.



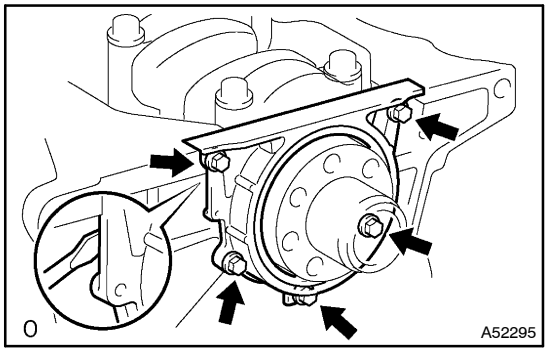
33. REMOVE BALANCESHAFT DRIVEN GEAR NO.2

(a) Mount the balanceshaft in a vise.

NOTICE:

Be careful not to damage the balanceshaft.

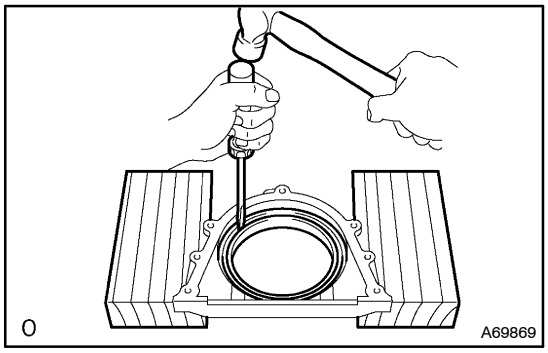
(b) Remove the bolt, balanceshaft driven gear No.2 and balanceshaft thrust washer.



34. REMOVE ENGINE REAR OIL SEAL RETAINER

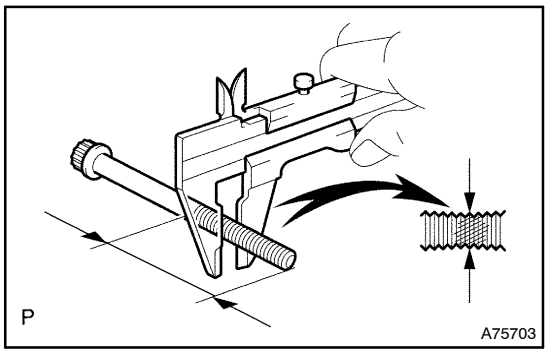
(a) Remove the 5 bolts.

(b) Separate the engine rear oil seal retainer from the cylinder block with a slotted–screwdriver.



35. REMOVE ENGINE REAR OIL SEAL

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

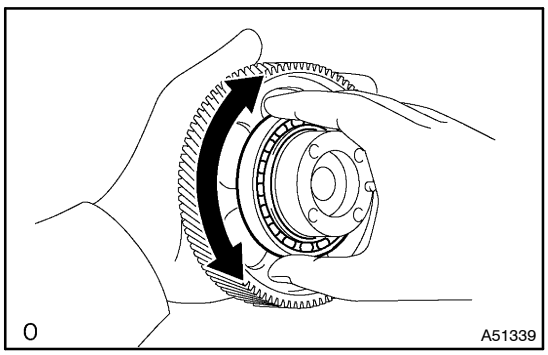


36. INSPECT CYLINDER HEAD SET BOLT

(a) Using the vernier calipers, measure the outer diameter of the thread.

Standard outer diameter:
11.76 – 11.97 mm (0.4630 – 0.4713 in.)
Minimum outer diameter: 11.6 mm (0.457 in.)

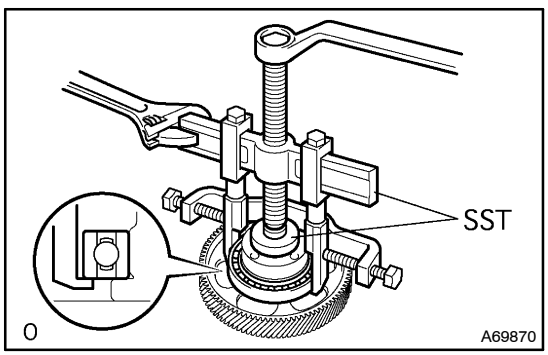
If the is less than the minimum, replace the bolt.



37. INSPECT INJECTION GEAR

(a) Check a condition of the bearing.

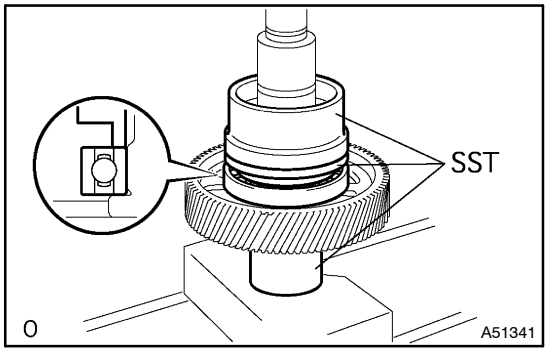
Replace the bearing if it is worn.



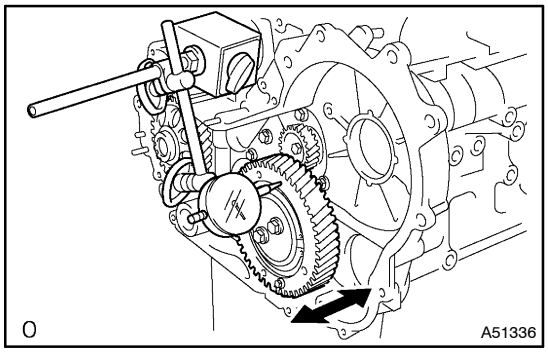
38. REPLACE INJECTION GEAR BEARING

(a) Using SST, remove the bearing.

SST 09950–40011 (09951–04020, 09952–04010, 09953–04030, 09954–04010, 09955–04061, 09957–04010, 09958–04011), 09950–60010 (09951–00480)



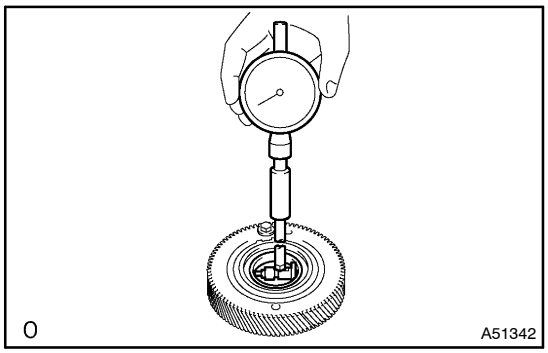
(b) Using SST and a press, press in a new bearing.
SST 09223–00010, 09223–15020,
09502–12010



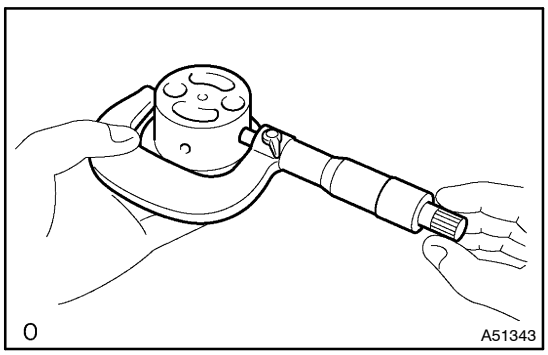
39. INSPECT IDLE GEAR NO.1

(a) Using a dial indicator, measure the thrust clearance.
Standard thrust clearance:
0.06 – 0.11 mm (0.0024 – 0.0043 in.)
Maximum thrust clearance: 0.30 mm (0.0118 in.)

If the thrust clearance is greater than the maximum clearance, replace the thrust plate. If the thrust clearance would still be greater than the maximum clearance, replace the idler gear and/or idler gear shaft.



(b) Using a cylinder gauge, measure the diameter of the idler gear.
Inside diameter of the idle gear:
44.000 – 44.025 mm (1.7323 – 1.7333 in.)



(c) Using a micrometer, measure the diameter of the idler gear shaft.
Idler gear shaft diameter:
43.955 – 43.990 mm (1.7305 – 1.7319 in.)

(d) Subtract the idler gear shaft diameter from the inside diameter of the idler.
Standard oil clearance:
0.010 – 0.070 mm (0.0004 – 0.0028 in.)
Maximum oil clearance: 0.20 mm (0.0079 in.)

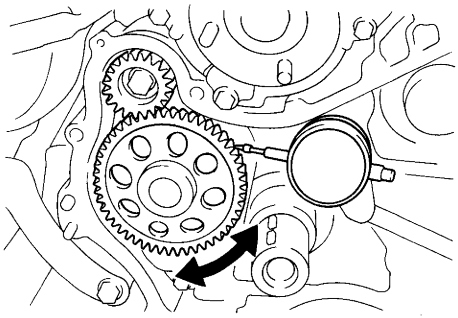
If the clearance is greater than the maximum clearance, replace the gear and shaft.

40. INSPECT BACKLASH

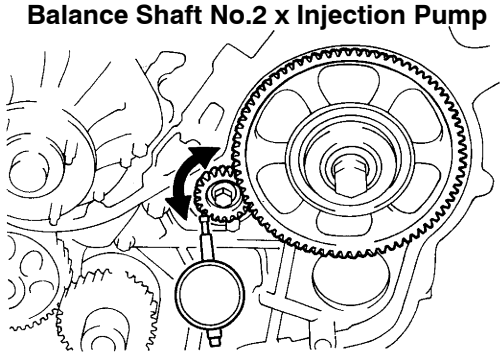
(a) Using a dial indicator, measure the backlash.
Standard gear backlash:
0.02 – 0.15 mm (0.0008 – 0.0060 in.)
Maximum gear backlash: 0.20 mm (0.0079 in.)

If the gear backlash is greater than the maximum backlash, replace the gears as a set.

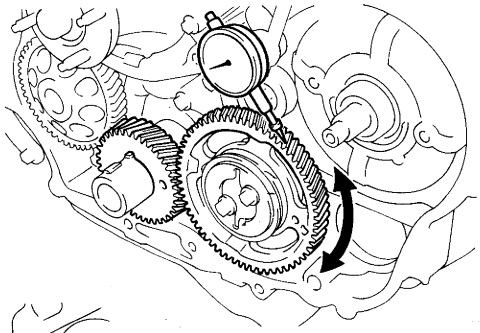
Balance Shaft No.1 x Oil Pump



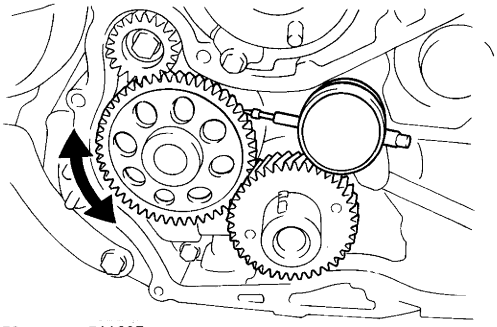
Balance Shaft No.2 x Injection Pump



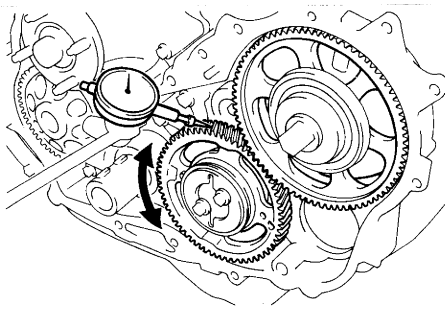
Crankshaft x Idler



Oil Pump x Crankshaft

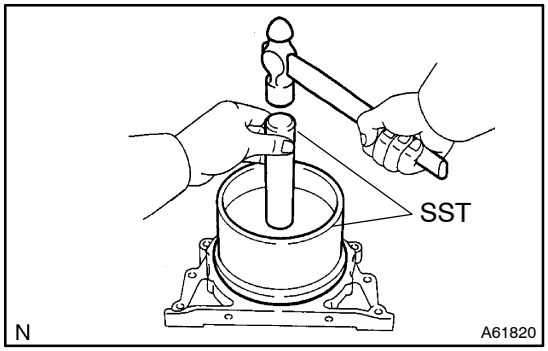


Injection Pump x Idler



P11653 P11695
P11652 P11671 P11670

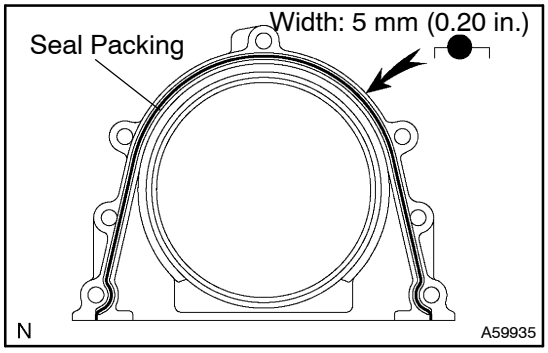
A69837



41. INSTALL ENGINE REAR OIL SEAL

(a) Using SST and a hammer, tap in a new oil seal until its surface reaches the rear oil seal retainer.
SST 09223–15030, 09950–70010 (09951–07100)

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



42. INSTALL ENGINE REAR OIL SEAL RETAINER

(a) Remove old seal packing (FIPG) from the rear oil seal retainer and cylinder block.

(b) Apply a seal packing to the specific places described in the illustration.

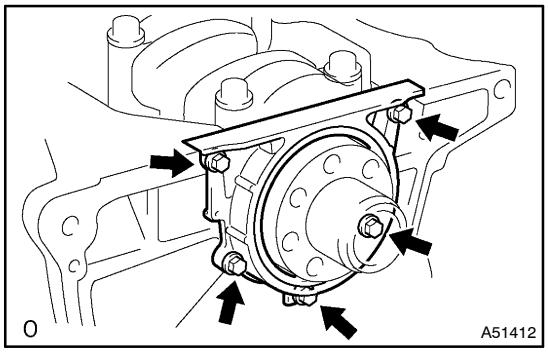
Seal packing: Part No. 08826–00080 or equivalent

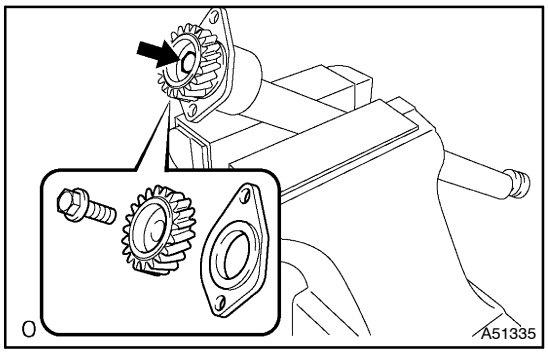
NOTICE:

Install the engine rear oil retainer within 3 minutes and tighten its bolts within 15 minutes as soon as applying FIPG is competed.

(c) Install the retainer with the 5 bolts.

Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)





43. INSTALL BALANCESHAFT DRIVEN GEAR NO.2

(a) Mount the balance shaft in a vise.

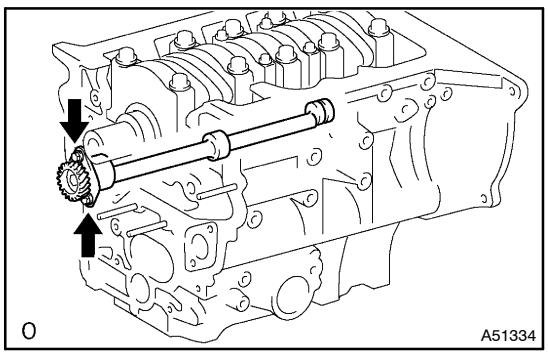
NOTICE:

Be careful not to damage the balance shafts.

(b) Align the balanceshaft knock pin with the knock pin hole install the balanceshaft thrust washer and balanceshaft driven gear No.2.

(c) Install and torque the bolt.

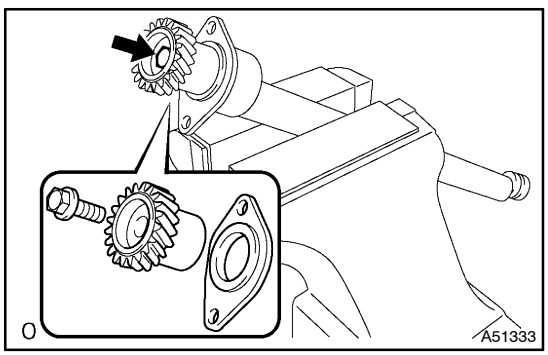
Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)



44. INSTALL NO.2 BALANCESHAFT SUB–ASSY

(a) Install the balanceshaft No.2 with the 2 bolts.

Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



45. INSTALL BALANCESHAFT DRIVEN GEAR NO.1

(a) Mount the balanceshaft in a vise.

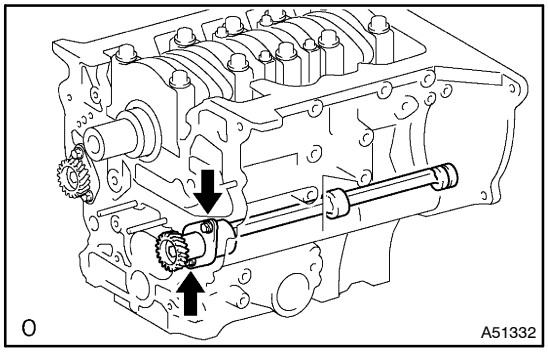
NOTICE:

Be careful not to damage the balance shafts.

(b) Align the balanceshaft knock pin with the knock pin hole install the balanceshaft thrust washer and balanceshaft driven gear No.1.

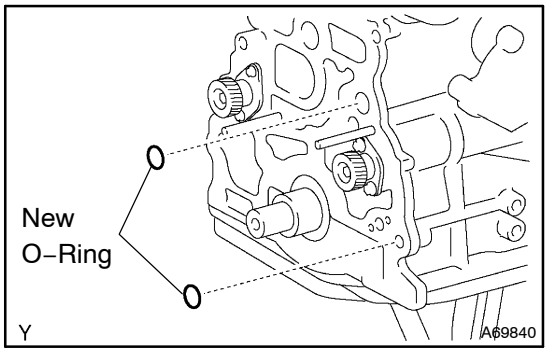
(c) Install and torque the bolt.

Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)



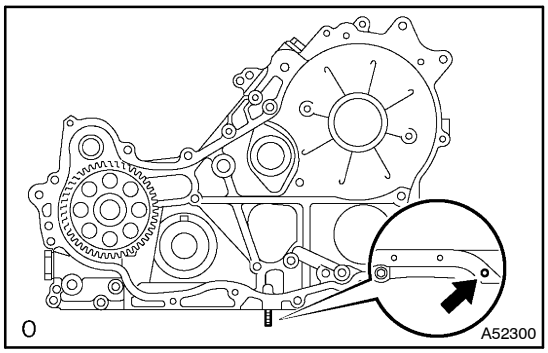
46. INSTALL NO.1 BALANCESHAFT SUB–ASSY

(a) Install the balanceshaft No.1 with the 2 bolts.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

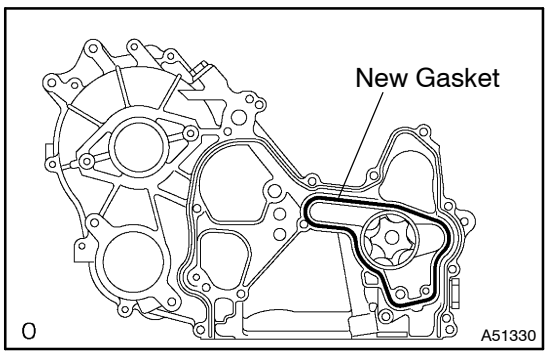


47. INSTALL TIMING GEAR CASE ASSY

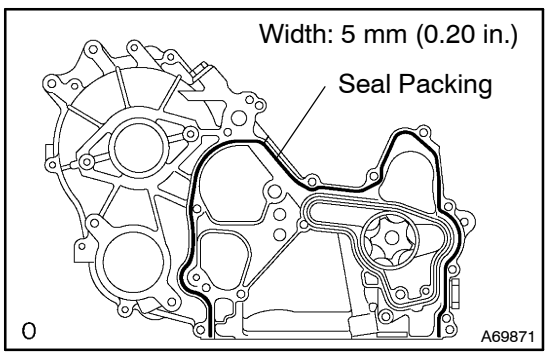
(a) Install the 2 new O–rings to the cylinder block.



(b) Install the stud bolt.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



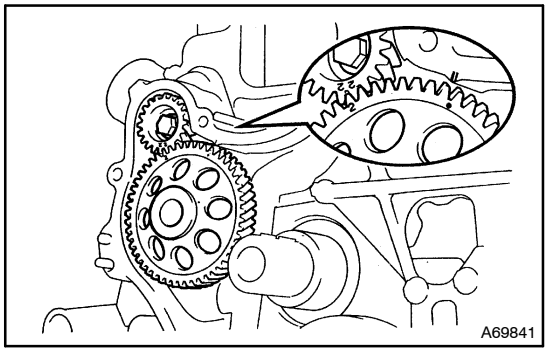
(c) Place a new gasket into the groove of the timing gear case as shown in the illustration.



(d) Remove old seal packing (FIPG) from the timing gear case and cylinder block.

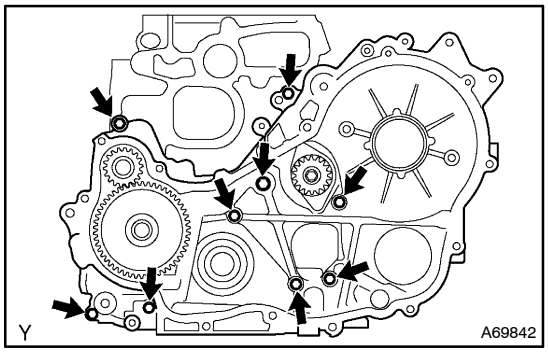
(e) Apply a seal packing to the specific places described in the illustration.
Seal packing: part No. 08826 – 00080 or equivalent

NOTICE:
Install the timing gear case within 3 minutes and tighten the bolts within 15 minutes as soon as applying FIPG is competed.



(f) Align the match mark on the balanceshaft driven gear No.1 with the ”2” mark on the pump drive gear.

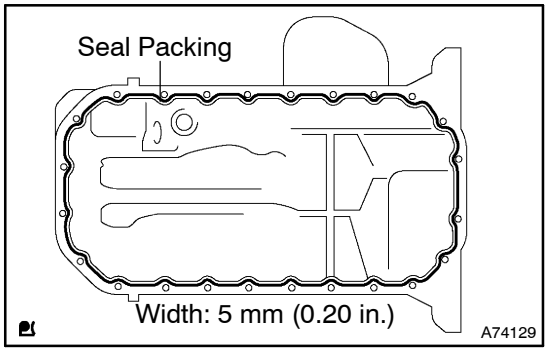
(g) Align the mark on the oil pump drive gear with the mark on the timing gear case.



(h) Install the 8 bolts and union bolt.
Torque:
13 N·m (130 kgf·cm, 9 ft·lbf) for Bolt
16 N·m (160 kgf·cm, 12 ft·lbf) for Union bolt

48. INSTALL OIL PAN SUB–ASSY

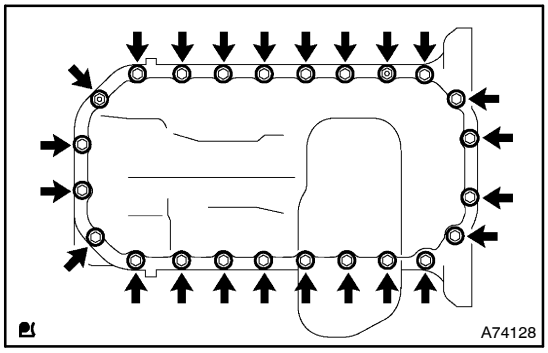
(a) Remove old seal packing (FIPG) from the oil pan sub–assy and cylinder block.



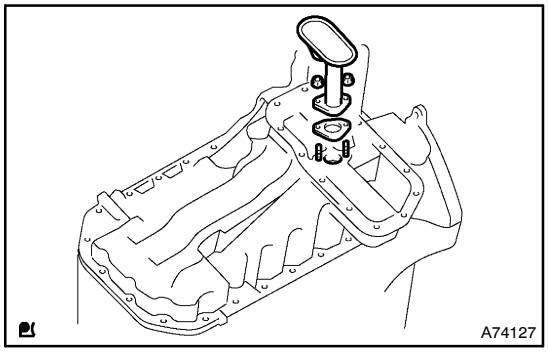
(b) Apply a seal packing to the specific places described in the illustration.

(c) Set a new oil pan gasket to the oil pan sub–assy.
Seal packing: Part No. 08826–00080 or equivalent

NOTICE:
Install the oil pan within 3 minutes and tighten its bolts within 15 minutes as soon as applying FIPG is competed.

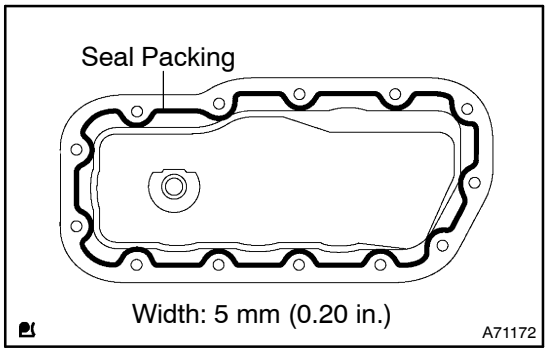


(d) Install the oil pan with the 22 bolts and 2 nuts.
Torque: 15 N·m (148 kgf·cm, 11 ft·lbf)



49. INSTALL OIL STRAINER SUB–ASSY

(a) Set a new gasket, and install the oil strainer with 2 nuts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

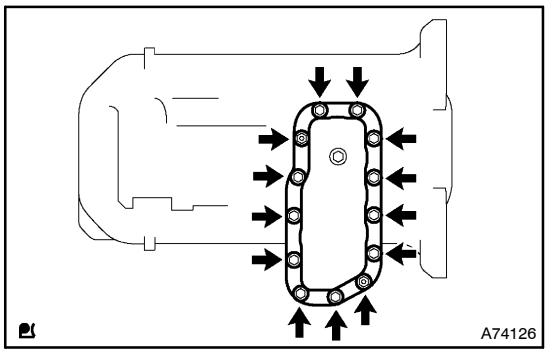


50. INSTALL OIL PAN SUB–ASSY NO.2

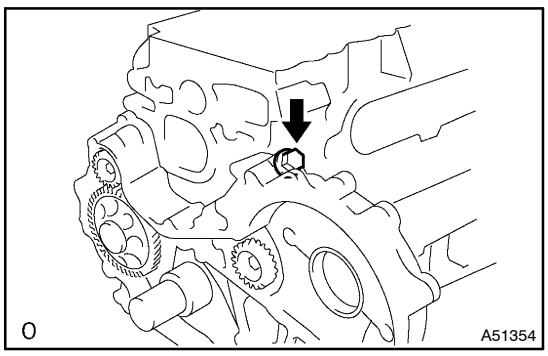
(a) Remove old seal packing (FIPG) from the oil pan sub–assy and cylinder block.

(b) Apply a seal packing to the specific places described in the illustration.
Seal packing: Part No. 08826–00080 or equivalent

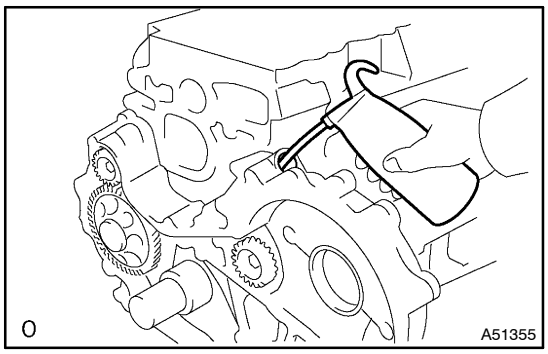
NOTICE:
Install the oil pan No. 2 within 3 minutes and tighten its bolts and nuts within 15 minutes as soon as applying FIPG is competed.



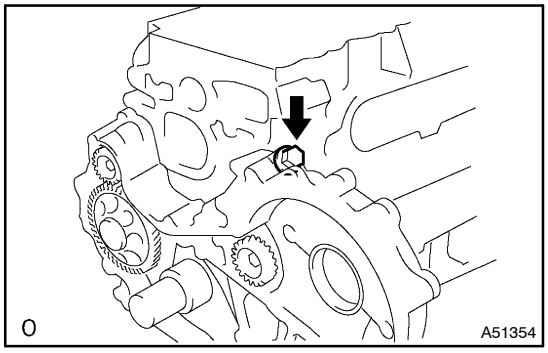
(c) Install the oil pan No. 2 with the 11 bolts and 2 nuts.
Torque: 9 N·m (92 kgf·cm, 80 in.·lbf)



(d) Remove the plug and gasket.



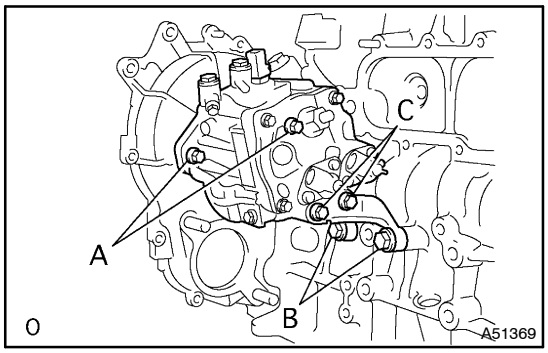
(e) Pour the engine oil into the oil pump for approx. 50 cc (3.05 cu in.).



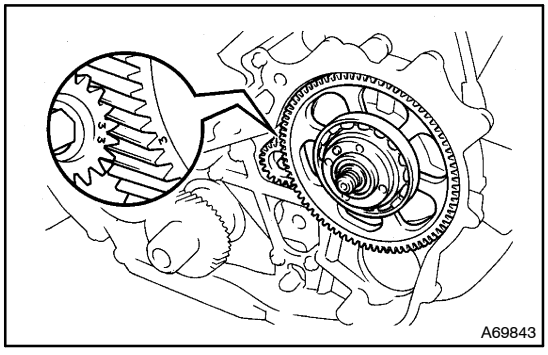
(f) Set a new gasket and install the plug.
Torque: 44 N·m (449 kgf·cm, 33 ft·lbf)

51. INSTALL INJECTION GEAR

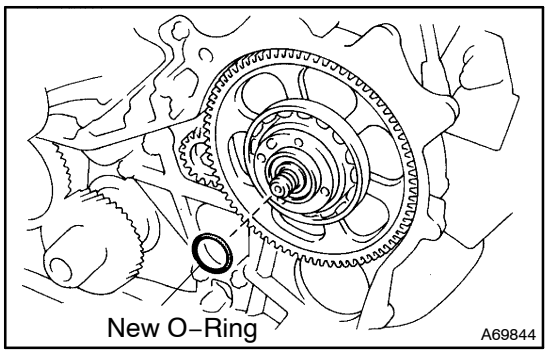
(a) Install a new O–ring to the injection pump assy.
(b) Fit the spline with the match mark on the pump housing.



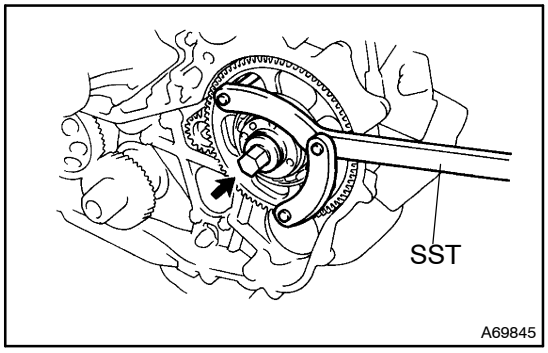
(c) Temporality install the injection pump assy with the 2 nuts (A).
(d) Temporality install the infection pump stay No.1 with the 2 bolts (B).
(e) Tighten the 2 nuts (A) at the injection pump assy.
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)
(f) Install the injection pump stay No.1 to the both of the cylinder block and injection pump assy and tighten the 2 bolts (C).
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)
(g) Tighten the 2 bolts (B).
Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)



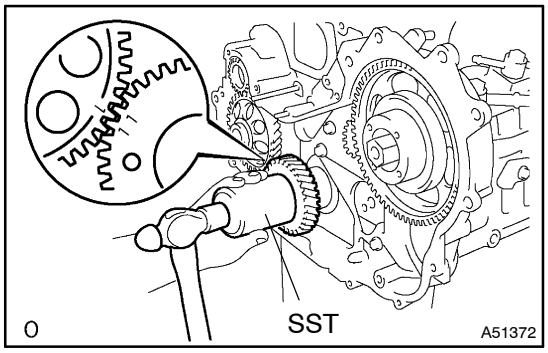
(h) The match marks on the balanceshaft driven gear No.2 should be aligned with ”3” marks.



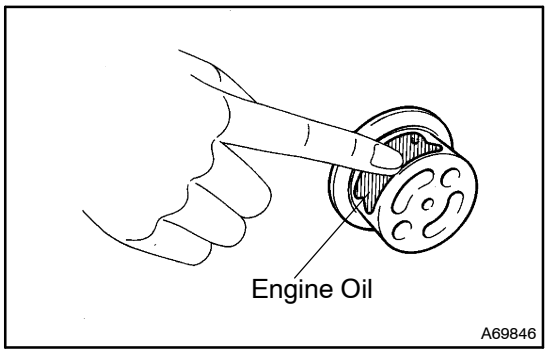
(i) Install a new O–ring to the injection gear.



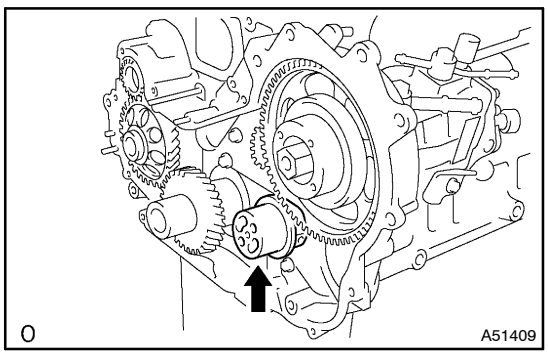
(j) Install the injection gear set nut.
(k) Using SST, tighten the nut.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



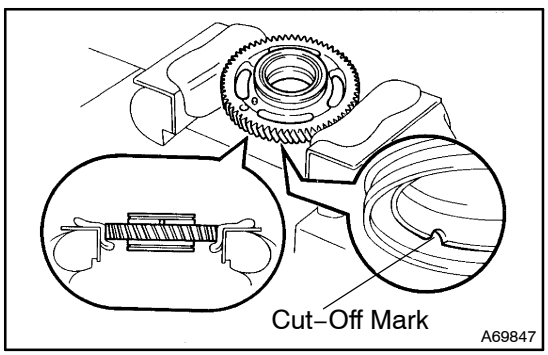
52. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET
(a) The matchmarks on the oil pump drive gear should be aligned with ”1” marks.
(b) Using SST and a hammer, tap in the timing gear.
SST 09223–00010



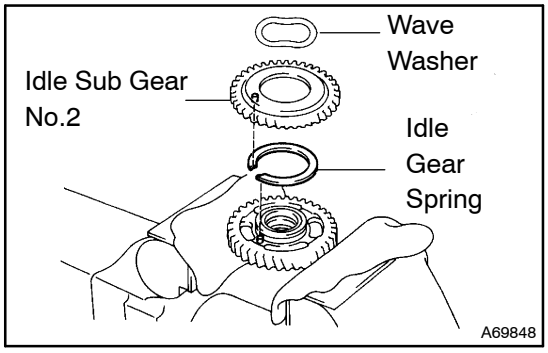
53. INSTALL IDLE GEAR SHAFT NO.1
(a) Coat the idler gear shaft No.1 with engine oil as shown in the illustration.



(b) Install the idler gear shaft No.1 to the cylinder block.

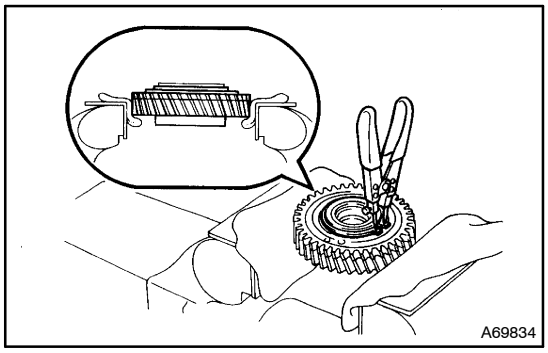


54. INSTALL IDLE SUB GEAR NO.2
(a) Set the idle gear No.1 in a vise.
HINT:
The cut–off mark of the idle gear faces down.
NOTICE:
Be careful not to damage the gear.

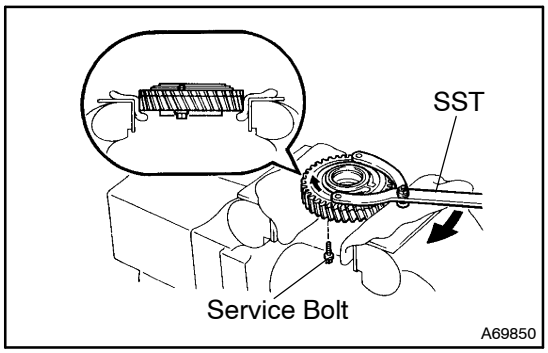


(b) Install the idle gear spring.
(c) Install the No.2 idle sub–gear.
(d) Install the wave washer.

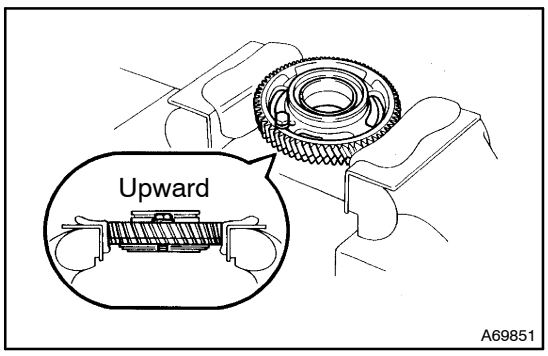
HINT:
Fit the pins on the gears to the spring ends.



(e) Using a snap ring pliers, install the snap ring.



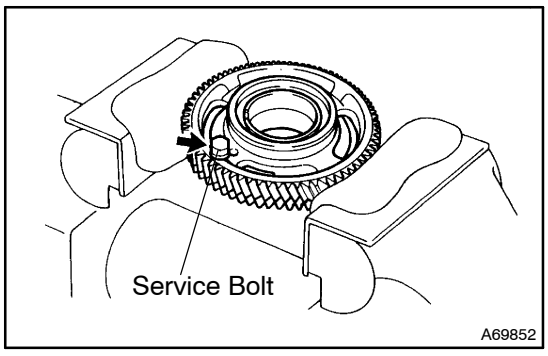
(f) Using SST, align the holes of the idle gear No.1 and idle sub gear No.2 by turning the idle sub gear No.2 clockwise, and install a service bolt.
SST 09960–10010 (09962–01000, 09963–00600)
(g) Remove the idle gear No.1 from the vise and turn it upside down.



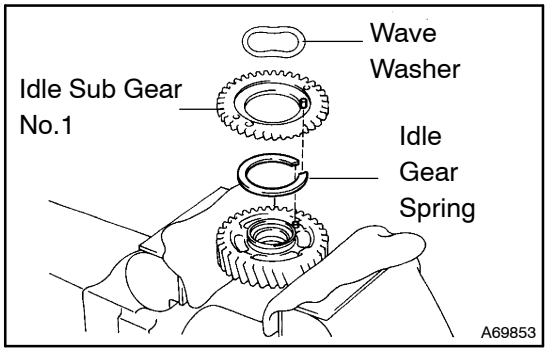
55. INSTALL IDLE SUB GEAR NO.1

(a) Set the idle gear No.1 and idle sub gear No.2 in a vise.

NOTICE:
Be careful not to damage the gears.

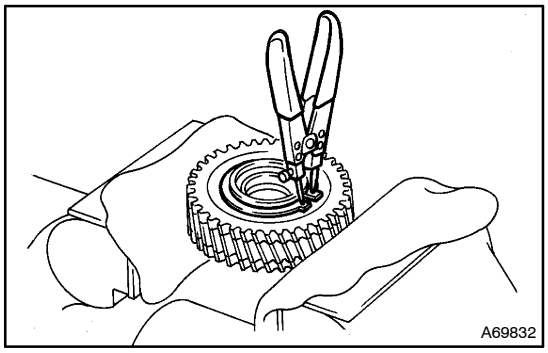


(b) Remove the service bolt.

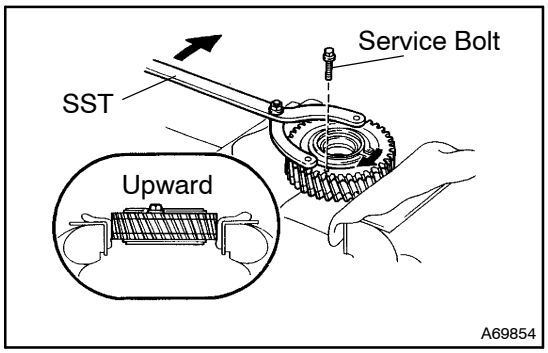


(c) Install the idle gear spring.
(d) Install the idle sub gear No.1.
(e) Install the wave washer.

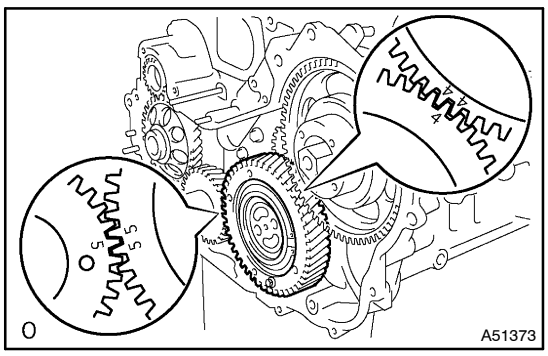
HINT:
Fit the pins on the gears to the spring ends.



(f) Using a snap ring pliers, install the snap ring.

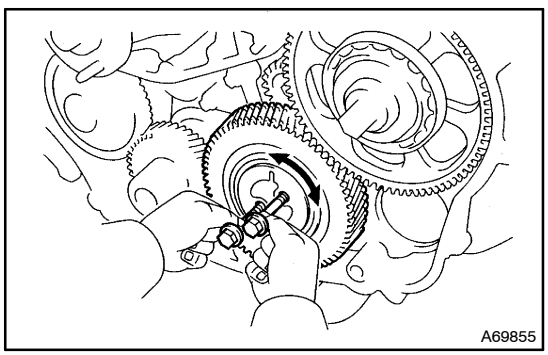


(g) Using SST, align the holes of the idler gear No.1 and idle sub gear No.1 by turning the idle sub gear No.1 clockwise, and install a service bolt.
SST 09960–10010 (09962–01000, 09963–00600)



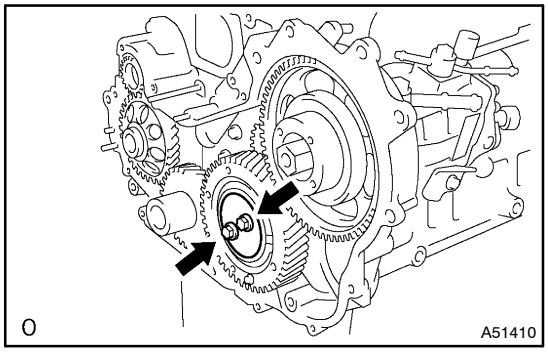
56. INSTALL IDLE GEAR NO.1

(a) Align the mark ”4” and mark ”5” of idler gear No. 1 with the mark ”5” of crankshaft timing gear and mark ”4” of the injection gear.

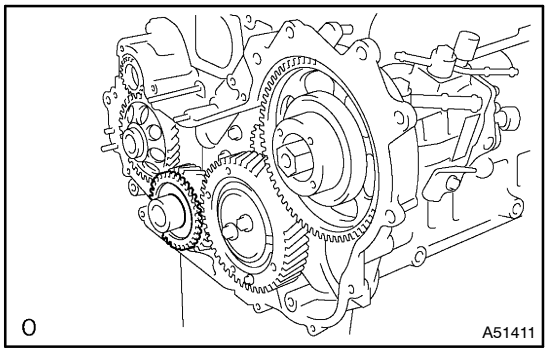


57. INSTALL IDLE GEAR THRUST PLATE

(a) Align the holes for the idle gear thrust plate set bolt .

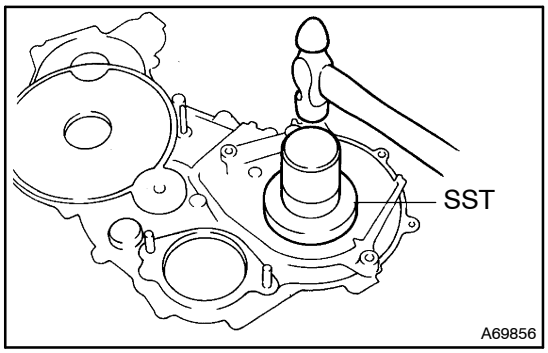


(b) Install the idle gear thrust plate with the 2 bolts.
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)



58. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

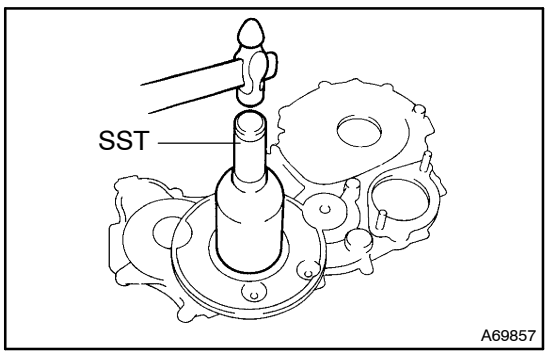
(a) Install the crank angle sensor plate No. 1.



59. INSTALL TIMING GEAR COVER OIL SEAL

(a) Using SST and a hammer, tap in a new oil seal until its surface reaches the timing gear case.
SST 09223–78010

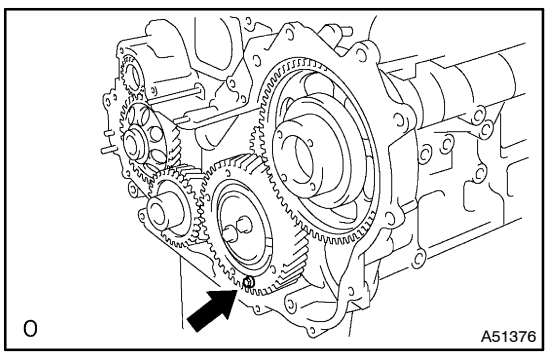
(b) Apply MP grease to the oil seal lip.



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

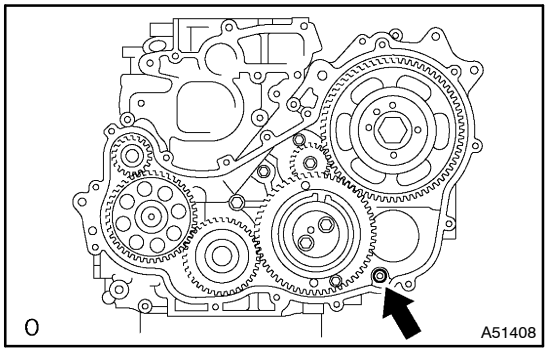
(a) Using SST and a hammer, tap in a new oil seal until its surface reaches the timing gear case .
SST 09214–76011

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

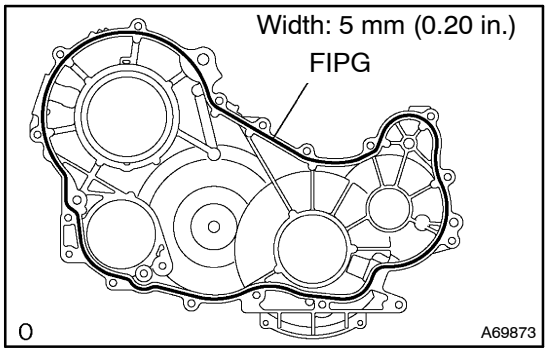


61. INSTALL TIMING GEAR CASE

(a) Remove the service bolt.

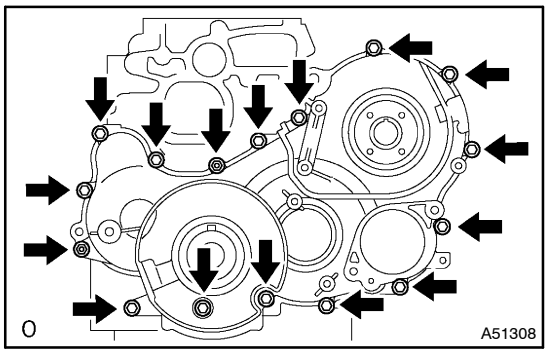


(b) Install a new O–ring to the timing gear case.

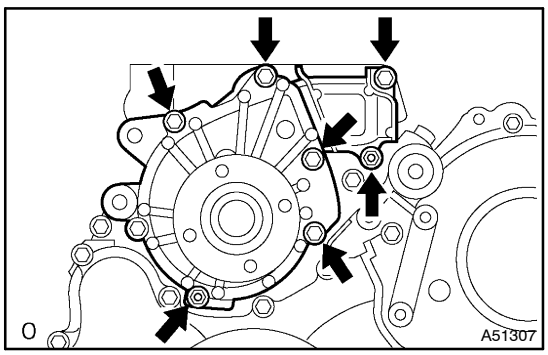


(c) Apply FPG (seal packing) to the timing gear case as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent

NOTICE:
Install the timing case cover within 3 minutes and tighten its bolts and nuts within 15 minutes as soon as applying FIPG is competed.

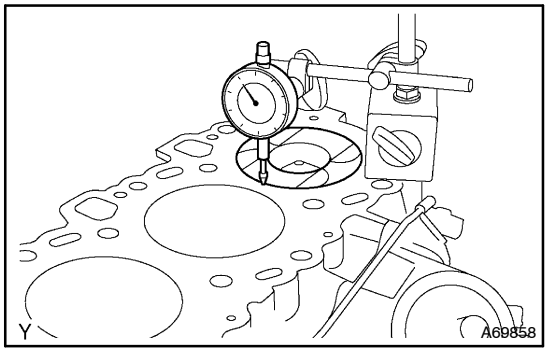


(d) Install the timing gear case with the 14 bolts and 2 nuts.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



62. INSTALL WATER PUMP ASSY

(a) Install the 5 bolts, 2 nuts, water pump and gasket.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)



63. INSTALL CYLINDER HEAD SUB–ASSY

(a) Checking the each piston head protrusion.

(1) Using a dial indicator, measure how length a piston head juts out from the top surface of the cylinder head.

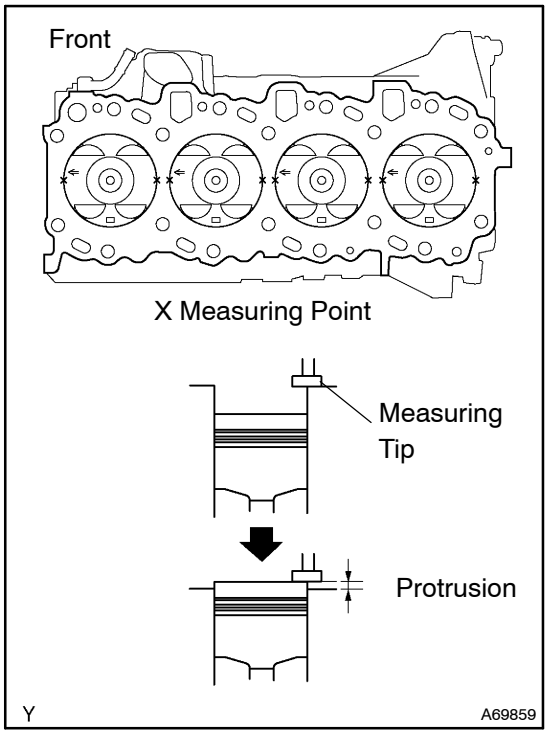
(2) Measure each cylinder at 2 places as shown in the illustration, making a total of 8 measurement.

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

Protrusion: 0.005 – 0.255 mm (0.00020 – 0.01004 in.)

HINT:

Measurement should be done at two locations, forward and backward, of each piston head.

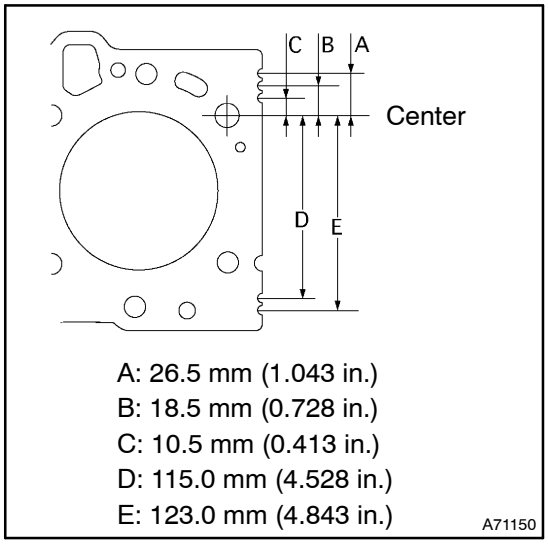


(b) Selecting an appropriate cylinder head gasket.

HINT:

Each cylinder head gasket A to E has a unique notch position at its back–end, which helps you to identify an individual gasket.

(1) Find the maximum value among all the measurement piston head protrusion length to select an appropriate cylinder head gasket from A to E.

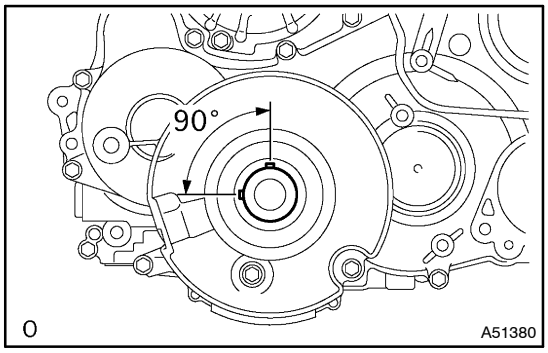


Gasket size	Piston protrusion mm (in.)
A	0.005 – 0.054 (0.0002 – 0.00213)
B	0.055 – 0.104 (0.00217 – 0.00409)
C	0.105 – 0.154 (0.00413 – 0.00606)
D	0.155 – 0.204 (0.00610 – 0.00803)
E	0.205 – 0.255 (0.00807 – 0.01004)

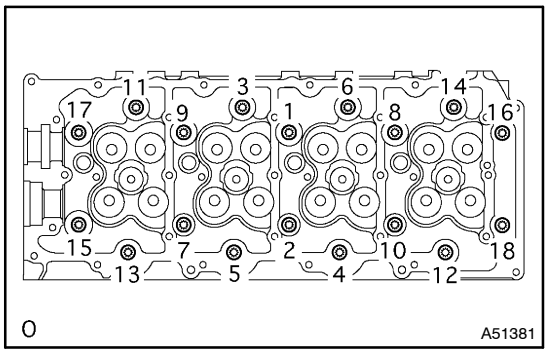
Cylinder heard gasket thickness:

Gasket size	Gasket thickness mm (in.)
A	0.80 – 0.90 (0.0315 – 0.0354)
B	0.85 – 0.95 (0.0335 – 0.0374)
C	0.90 – 1.00 (0.0354 – 0.0394)
D	0.95 – 1.05 (0.0374 – 0.0413)
E	1.00 – 1.10 (0.0394 – 0.0433)

(2) Install the selected gasket to the cylinder block.



(c) Down the piston by rotating crankshaft about 90° counterclockwise from the TDC position.



(d) Install the cylinder head bolts.

HINT:

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.

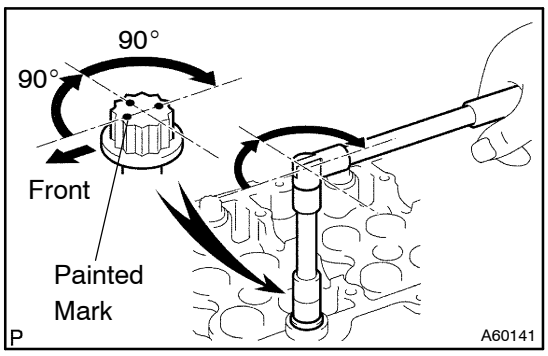
Torque: 85 N·m (867 kgf·cm, 63 ft·lbf)

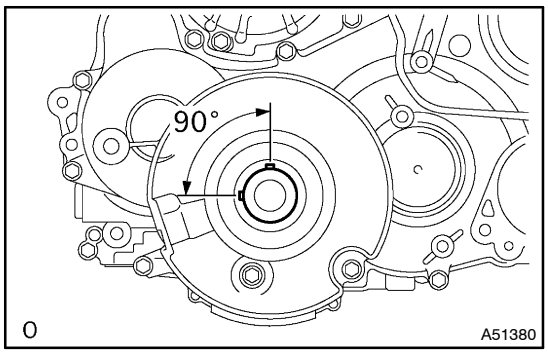
(3) Mark the front of the cylinder head bolt with paint.

(4) Retighten the cylinder head bolts 90°.

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

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

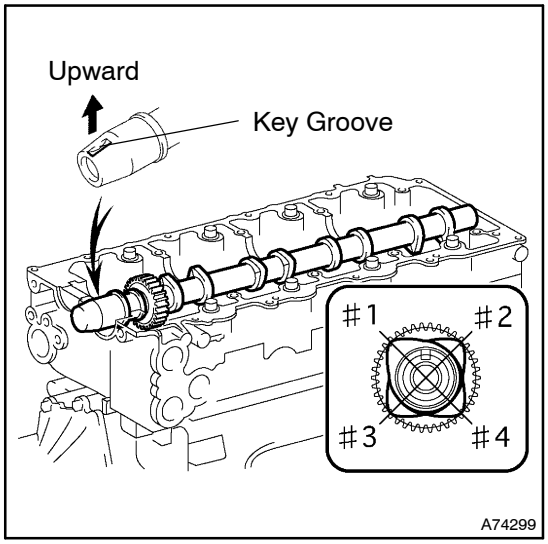




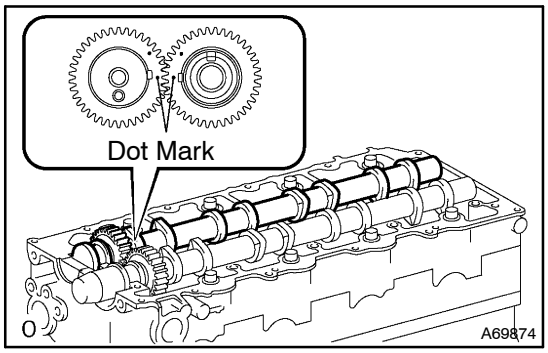
64. INSPECT VALVE CLEARANCE

(a) Install the camshaft and camshaft No. 2.

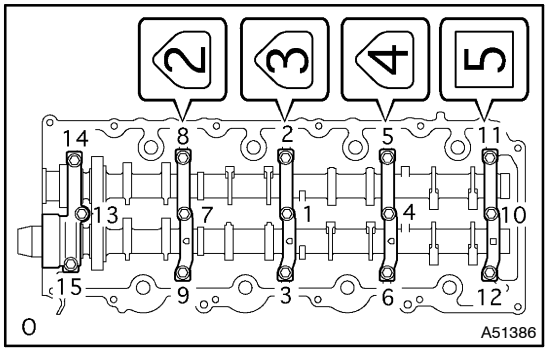
(1) Set the crankshaft and turn it 90° counterclockwise from the TDC position.



(2) Place the camshaft to the cylinder head like shown in the illustration.



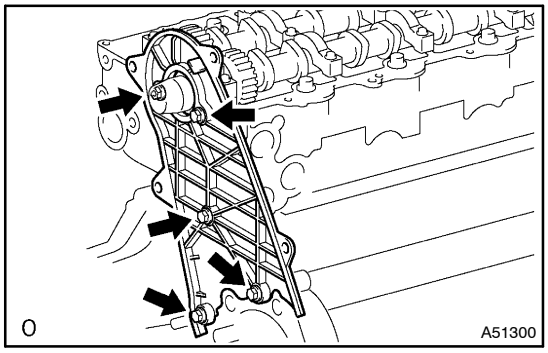
(3) Align the dot marks of the camshaft and camshaft No. 2 by meshing the 2 gears before place the camshaft No. 2.



(4) Install the camshaft bearing cap as shown in the illustration.

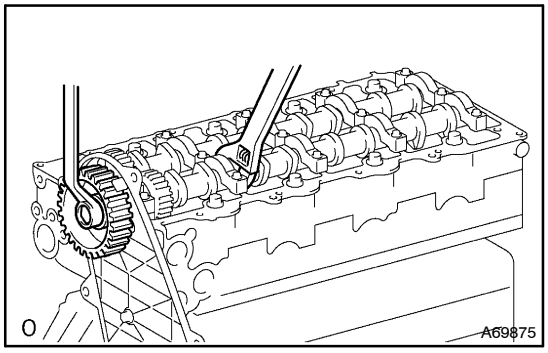
(5) Fasten 15 bolts for the camshaft bearing cap in the specified order described in the illustration.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



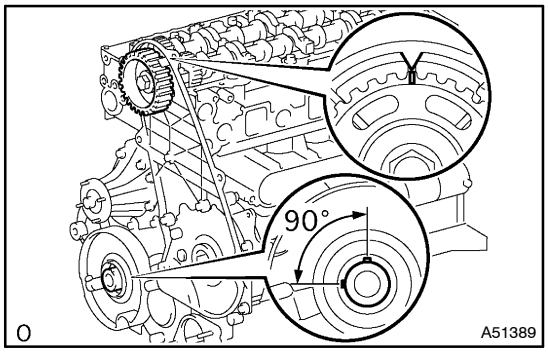
(b) Install the timing belt No.2 cover with the 4 bolts and nut.

Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)

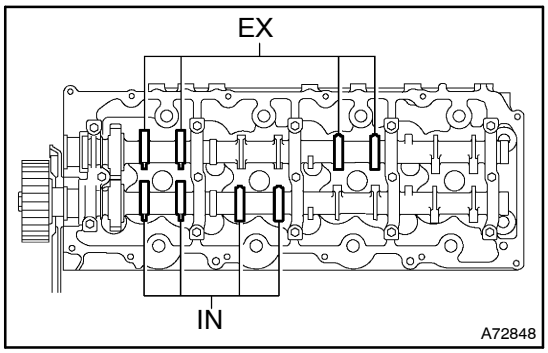


(c) Install the camshaft timing pulley.
(1) Install the set key to the key groove of the camshaft.
(2) Align the set key with the key groove of the timing pulley.
(3) Hold the hexagonal portion of the camshaft, and install the timing pulley with the bolt.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

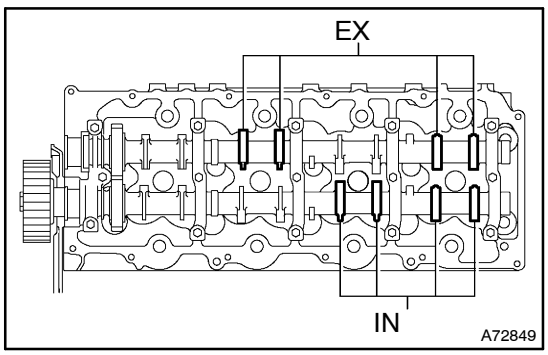


(d) Inspect the valve clearance.
(1) Down the piston by rotating the crankshaft about 90° counterclockwise from the TDC position to lower.
(2) Align the timing mark of the camshaft timing pulley with the arrow mark of the timing belt No.2 cover.

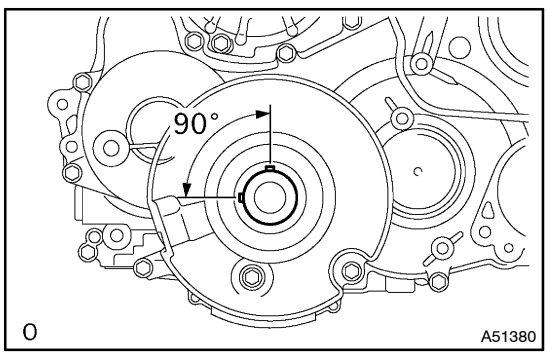


(3) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
(4) Record the out–of–specification valve clearance measurements. They will be used later to determine the required replacement valve lifter.

Valve clearance (cold):
Intake 0.20 – 0.30 mm (0.0079 – 0.0118 in.)
Exhaust 0.35 – 0.45 mm (0.0138 – 0.0177 in.)

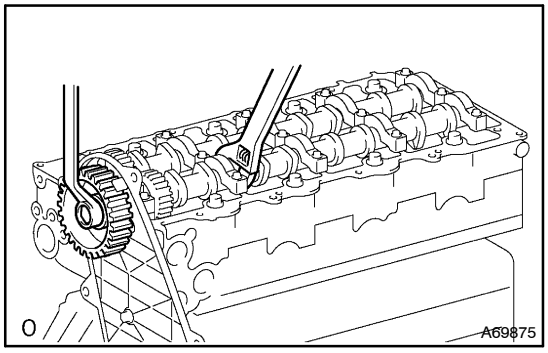


(5) Turn the crankshaft in 360° to set the No. 4 cylinder to TDC/ position.
(6) Check only the valves indicated as shown. Measure the valve clearance (See procedure (C) above).

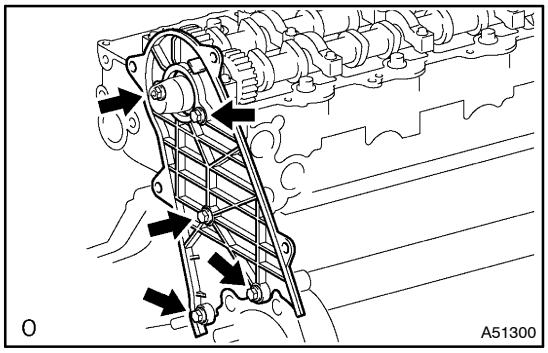


65. ADJUST VALVE CLEARANCE

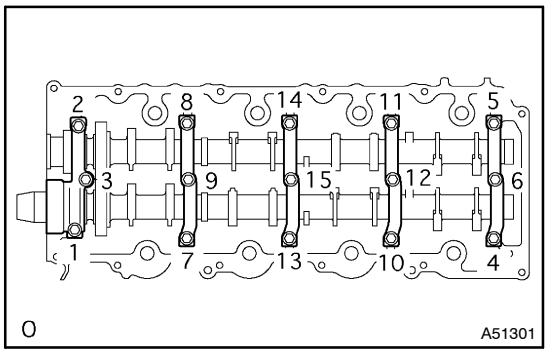
(a) Set the crankshaft and turn it 90° counterclockwise from the TDC position.



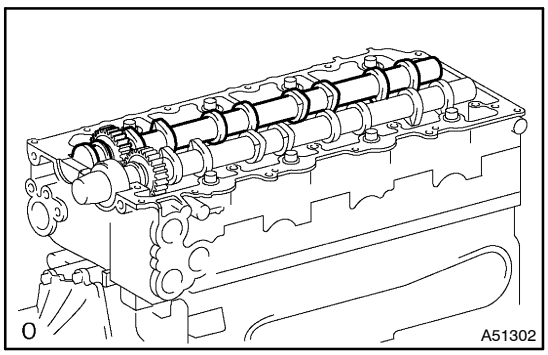
(b) Remove the camshaft timing pulley.
(1) Hold the hexagonal portion of the camshaft, with a monkey wrench, remove the bolt, timing pulley and set key.



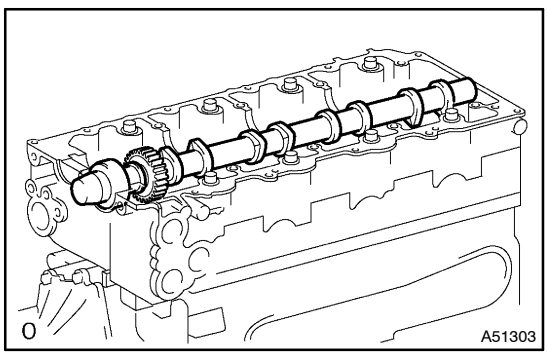
(c) Remove the 4 bolts, nut and timing belt No.2 cover.



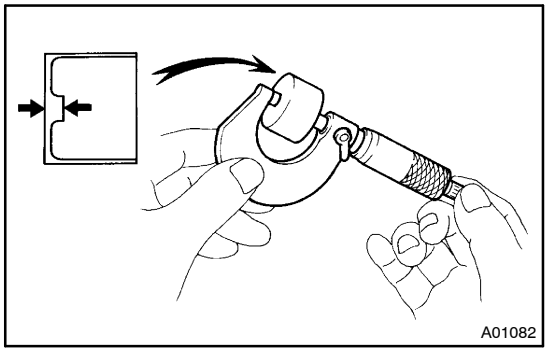
(d) Remove the camshaft and camshaft No.2.
(1) Uniformly loosen the 15 bearing cap bolts in order indicated in the illustration and remove them in the same order.
(2) Remove the 5 bearing caps.



(3) Remove the camshaft No.2 from the cylinder head.



(4) Remove the camshaft from the cylinder head.



(e) Adjest the valve clearance.

HINT:

Determine the replacement valve lifter size according to these Formula or Charts:

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

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

A	Thickness of new lifter
B	Thickness of used lifter
C	Measured valve clearance

Valve clearance:

Intake A = B + (C – 0.25 mm (0.0098 in.))

Exhaust A = B + (C – 0.40 mm (0.0158 in.))

(3) Select a new lifter with a thickness as close as possible to the calculated values.

HINT:

Valve lifters are available in 35 sizes in increments of 0.020 mm (0.0008 in.), from 5.060 mm (0.1992 in.) to 5.740 mm (0.2260 in.).

(4) Install the selected valve lifter.

Valve Lifter Selection Chart (Exhaust)

Measure clearance mm (in.) \ Installed lifter thickness mm (in.)	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	5.590 (0.2201)	5.600 (0.2205)	5.620 (0.2213)	5.640 (0.2220)	5.660 (0.2228)	5.680 (0.2236)	5.700 (0.2244)	5.720 (0.2252)	5.740 (0.2260)
0.000 - 0.020 (0.0000 - 0.0008)																																	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	24	26	28	30	32	34	36
0.021 - 0.040 (0.0008 - 0.0016)																															06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	26	28	30	32	34	36	38
0.041 - 0.060 (0.0016 - 0.0024)																													06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	28	30	32	34	36	38	40
0.061 - 0.080 (0.0024 - 0.0031)																										06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	30	32	34	36	38	40	42
0.081 - 0.100 (0.0032 - 0.0039)																									06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	32	34	36	38	40	42	44
0.101 - 0.120 (0.0040 - 0.0047)																							06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	34	36	38	40	42	44	46
0.121 - 0.140 (0.0048 - 0.0055)																					06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	36	38	40	42	44	46	48
0.141 - 0.160 (0.0056 - 0.0063)																				06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	38	40	42	44	46	48	50
0.161 - 0.180 (0.0063 - 0.0071)																06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	40	42	44	46	48	50	52
0.181 - 0.200 (0.0071 - 0.0079)														06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	42	44	46	48	50	52	54
0.201 - 0.220 (0.0079 - 0.0087)												06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	44	46	48	50	52	54	56
0.221 - 0.240 (0.0087 - 0.0094)										06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56	58
0.241 - 0.260 (0.0095 - 0.0102)								06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58	60
0.261 - 0.280 (0.0103 - 0.0110)							06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60	62
0.281 - 0.300 (0.0111 - 0.0118)						06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62	64
0.301 - 0.320 (0.0119 - 0.0126)					06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	52	54	56	58	60	62	64	66
0.321 - 0.340 (0.0126 - 0.0134)					08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	56	58	60	62	64	66	68
0.341 - 0.344 (0.0134 - 0.0135)				06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68
0.350 - 0.450 (0.0138 - 0.0177)																																																										
0.451 - 0.470 (0.0178 - 0.0185)	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	70	72	74		
0.471 - 0.490 (0.0185 - 0.0193)	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74			
0.491 - 0.510 (0.0193 - 0.0201)	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	74				
0.511 - 0.530 (0.0201 - 0.0209)	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74					
0.531 - 0.550 (0.0209 - 0.0217)	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74						
0.551 - 0.570 (0.0217 - 0.0224)	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74								
0.571 - 0.590 (0.0225 - 0.0232)	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74										
0.591 - 0.610 (0.0233 - 0.0240)	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74												
0.611 - 0.630 (0.0241 - 0.0248)	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74														
0.631 - 0.650 (0.0248 - 0.0256)	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																
0.651 - 0.670 (0.0256 - 0.0264)	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																		
0.671 - 0.690 (0.0264 - 0.0272)	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																				
0.691 - 0.710 (0.0272 - 0.0280)	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																					
0.711 - 0.730 (0.0280 - 0.0287)	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																						
0.731 - 0.750 (0.0288 - 0.0295)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																							
0.751 - 0.770 (0.0296 - 0.0303)	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																							
0.771 - 0.790 (0.0304 - 0.0311)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																							
0.791 - 0.810 (0.0311 - 0.0319)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																							
0.811 - 0.830 (0.0319 - 0.0327)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74																							
0.831 - 0.850 (0.0327 - 0.0335)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74																							
0.851 - 0.870 (0.0335 - 0.0343)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74																							
0.871 - 0.890 (0.0343 - 0.0350)	54	56	58	60	62	64	66	68	70	70	72	72	74	74																							
0.891 - 0.910 (0.0351 - 0.0358)	56	58	60	62	64	66	68	70	72	72	74	74																							
0.911 - 0.930 (0.0359 - 0.0366)	58	60	62	64	66	68	70	72	74	74																									
0.931 - 0.950 (0.0367 - 0.0374)	60	62	64	66	68	70	72	74																											
0.951 - 0.970 (0.0374 - 0.0382)	62	64	66	68	70	72	74																												
0.971 - 0.990 (0.0382 - 0.0390)	64	66	68	70	72	74																													
0.991 - 1.010 (0.0390 - 0.0398)	66	68	70	72	74																														
1.011 - 1.030 (0.0398 - 0.0406)	68	70	72	74																															
1.031 - 1.050 (0.0406 - 0.0413)	70	72	74																																
1.051 - 1.070 (0.0414 - 0.0421)	72	74																																	
1.071 - 1.090 (0.0422 - 0.0429)	74																																		

Exhaust valve clearance (Cold):
0.35 – 0.45 mm (0.0138 – 0.0177 in.)

EXAMPLE:
The 5.340 mm (0.2102 in.) lifter is installed, and the measured clearance is 0.480 mm (0.0189 in.). Replace the 5.340 mm (0.2102 in.) shim with a new No. 42 lifter.

New Lifter Thickness mm (in.)

No.	Thickness	No.	Thickness	No.	Thickness
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)		

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Valve Lifter Selection Chart (Intake)

Measure clearance mm (in.) \ Installed lifter thickness mm (in.)	5.060 (0.1992)	5.080 (0.2000)	5.100 (0.2008)	5.120 (0.2016)	5.140 (0.2024)	5.160 (0.2031)	5.180 (0.2039)	5.200 (0.2047)	5.210 (0.2051)	5.220 (0.2055)	5.230 (0.2059)	5.240 (0.2063)	5.250 (0.2067)	5.260 (0.2071)	5.270 (0.2075)	5.280 (0.2079)	5.290 (0.2083)	5.300 (0.2087)	5.310 (0.2091)	5.320 (0.2094)	5.330 (0.2098)	5.340 (0.2102)	5.350 (0.2106)	5.360 (0.2110)	5.370 (0.2114)	5.380 (0.2118)	5.390 (0.2122)	5.400 (0.2126)	5.410 (0.2130)	5.420 (0.2134)	5.430 (0.2138)	5.440 (0.2142)	5.450 (0.2146)	5.460 (0.2150)	5.470 (0.2154)	5.480 (0.2157)	5.490 (0.2161)	5.500 (0.2165)	5.510 (0.2169)	5.520 (0.2173)	5.530 (0.2177)	5.540 (0.2181)	5.550 (0.2185)	5.560 (0.2189)	5.570 (0.2193)	5.580 (0.2197)	5.590 (0.2201)	5.600 (0.2205)	5.620 (0.2213)	5.640 (0.2220)	5.660 (0.2228)	5.680 (0.2236)	5.700 (0.2244)	5.720 (0.2252)	5.740 (0.2260)
0.000 - 0.020 (0.0000 - 0.0008)																06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	40	42	44	46	48	50
0.021 - 0.040 (0.0008 - 0.0016)															06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	42	44	46	48	50	52
0.041 - 0.060 (0.0016 - 0.0024)													06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	44	46	48	50	52	54
0.061 - 0.080 (0.0024 - 0.0031)											06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	46	48	50	52	54	56
0.081 - 0.100 (0.0032 - 0.0039)									06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	48	50	52	54	56	58
0.101 - 0.120 (0.0040 - 0.0047)								06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	50	52	54	56	58	60
0.121 - 0.140 (0.0048 - 0.0055)							06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	52	54	56	58	60	62
0.141 - 0.160 (0.0056 - 0.0063)						06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64
0.161 - 0.180 (0.0063 - 0.0071)					06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	54	56	58	60	62	64	66
0.181 - 0.200 (0.0071 - 0.0079)				06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	58	60	62	64	66	68
0.200 - 0.300 (0.0079 - 0.0118)																																																								
0.301 - 0.320 (0.0119 - 0.0126)	12	14	16	18	20	22	24	26	28	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	70	72	74							
0.321 - 0.340 (0.0126 - 0.0134)	14	16	18	20	22	24	26	28	30	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	72	74							
0.341 - 0.360 (0.0134 - 0.0142)	16	18	20	22	24	26	28	30	32	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	74							
0.361 - 0.380 (0.0142 - 0.0150)	18	20	22	24	26	28	30	32	34	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74								
0.381 - 0.400 (0.0150 - 0.0157)	20	22	24	26	28	30	32	34	36	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74									
0.401 - 0.420 (0.0158 - 0.0165)	22	24	26	28	30	32	34	36	38	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74										
0.421 - 0.440 (0.0166 - 0.0173)	24	26	28	30	32	34	36	38	40	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74	74												
0.441 - 0.460 (0.0174 - 0.0181)	26	28	30	32	34	36	38	40	42	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74															
0.461 - 0.480 (0.0181 - 0.0189)	28	30	32	34	36	38	40	42	44	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																	
0.481 - 0.500 (0.0189 - 0.0197)	30	32	34	36	38	40	42	44	46	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																			
0.501 - 0.520 (0.0197 - 0.0205)	32	34	36	38	40	42	44	46	48	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																					
0.521 - 0.540 (0.0205 - 0.0213)	34	36	38	40	42	44	46	48	50	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																							
0.541 - 0.560 (0.0213 - 0.0220)	36	38	40	42	44	46	48	50	52	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																									
0.561 - 0.580 (0.0221 - 0.0228)	38	40	42	44	46	48	50	52	54	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																											
0.581 - 0.600 (0.0229 - 0.0236)	40	42	44	46	48	50	52	54	56	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																													
0.601 - 0.620 (0.0237 - 0.0244)	42	44	46	48	50	52	54	56	58	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																													
0.621 - 0.640 (0.0244 - 0.0252)	44	46	48	50	52	54	56	58	60	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																													
0.641 - 0.660 (0.0252 - 0.0260)	46	48	50	52	54	56	58	60	62	62	64	64	66	66	68	68	70	70	72	72	74	74																													
0.661 - 0.680 (0.0260 - 0.0268)	48	50	52	54	56	58	60	62	64	64	66	66	68	68	70	70	72	72	74	74																													
0.681 - 0.700 (0.0268 - 0.0276)	50	52	54	56	58	60	62	64	66	66	68	68	70	70	72	72	74	74																													
0.701 - 0.720 (0.0276 - 0.0283)	52	54	56	58	60	62	64	66	68	68	70	70	72	72	74	74																													
0.721 - 0.740 (0.0284 - 0.0291)	54	56	58	60	62	64	66	68	70	70	72	72	74	74																													
0.741 - 0.760 (0.0292 - 0.0299)	56	58	60	62	64	66	68	70	72	72	74	74																													
0.761 - 0.780 (0.0300 - 0.0307)	58	60	62	64	66	68	70	72	74	74																													
0.781 - 0.800 (0.0307 - 0.0315)	60	62	64	66	68	70	72	74																													
0.801 - 0.820 (0.0315 - 0.0323)	62	64	66	68	70	72	74																												
0.821 - 0.840 (0.0323 - 0.0331)	64	66	68	70	72	74																													
0.841 - 0.860 (0.0331 - 0.0339)	66	68	70	72	74																														
0.861 - 0.880 (0.0339 - 0.0346)	68	70	72	74																															
0.881 - 0.900 (0.0347 - 0.0354)	70	72	74																																
0.901 - 0.920 (0.0355 - 0.0362)	72	74																																	
0.921 - 0.940 (0.0363 - 0.0370)	74																																		

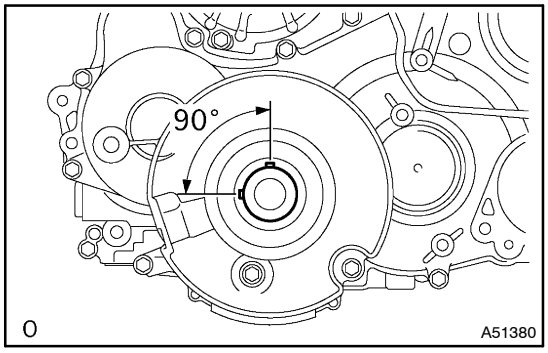
Intake valve clearance (Cold):
0.20 – 0.30 mm (0.0079 – 0.00118 in.)

EXAMPLE:
The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0158 in.). Replace the 5.250 mm (0.2067 in.) shim with a new No. 40 lifter.

New Lifter Thickness mm (in.)

No.	Thickness	No.	Thickness	No.	Thickness
06	5.060 (0.1992)	30	5.300 (0.2087)	54	5.540 (0.2181)
08	5.080 (0.2000)	32	5.320 (0.2094)	56	5.560 (0.2189)
10	5.100 (0.2008)	34	5.340 (0.2102)	58	5.580 (0.2197)
12	5.120 (0.2016)	36	5.360 (0.2110)	60	5.600 (0.2205)
14	5.140 (0.2024)	38	5.380 (0.2118)	62	5.620 (0.2213)
16	5.160 (0.2031)	40	5.400 (0.2126)	64	5.640 (0.2220)
18	5.180 (0.2039)	42	5.420 (0.2134)	66	5.660 (0.2228)
20	5.200 (0.2047)	44	5.440 (0.2142)	68	5.680 (0.2236)
22	5.220 (0.2055)	46	5.460 (0.2150)	70	5.700 (0.2244)
24	5.240 (0.2063)	48	5.480 (0.2157)	72	5.720 (0.2252)
26	5.260 (0.2071)	50	5.500 (0.2165)	74	5.740 (0.2260)
28	5.280 (0.2079)	52	5.520 (0.2173)		

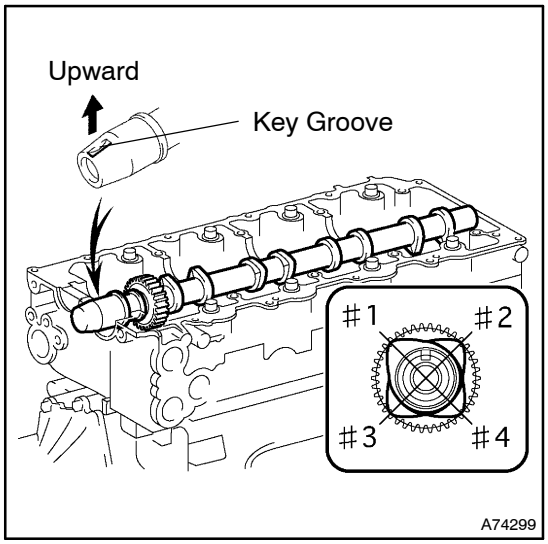
A72846



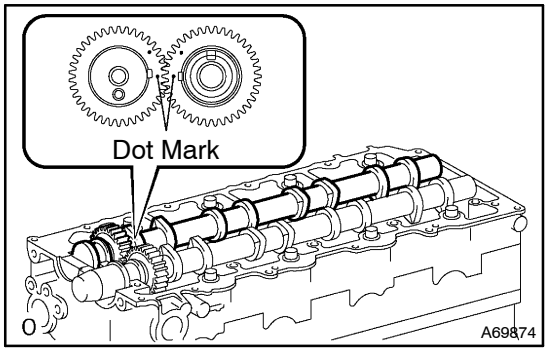
66. INSTALL CAMSHAFT

(a) Install the camshaft and camshaft No.2.

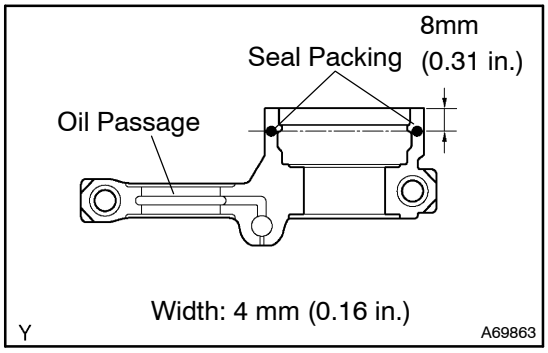
(1) Set the crankshaft and turn it 90° counterclockwise from the TDC position.



(2) Place the camshaft to the cylinder head like shown in the illustration.



(3) Align the dot marks of the camshaft and camshaft No. 2 by meshing the both two gears before placing the camshaft No. 2.



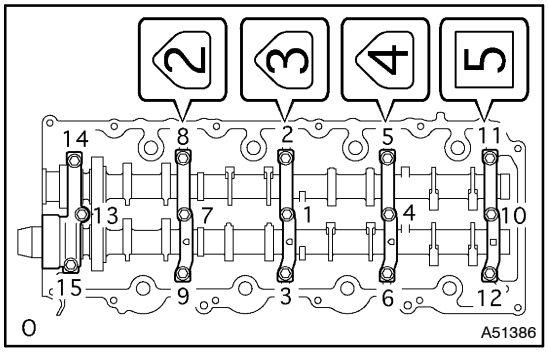
(4) Remove old seal packing (FIPG) from the camshaft bearing cap and cylinder head.

(5) Apply a seal packing to the specific places described in the illustration.

Seal packing: Part No. 08826–00080 or equivalent
Thickness: 1 mm (0.04 in.)

NOTICE:

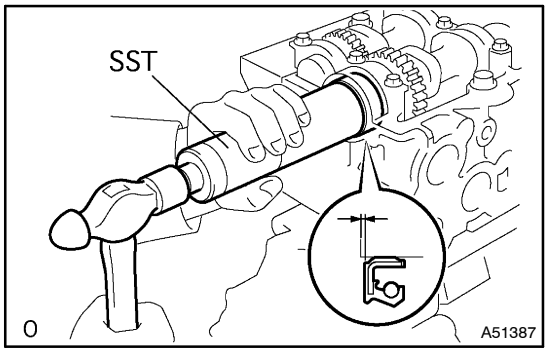
- **Beware sticking FIPG in the oil passage of the bearing cap.**
- **Once completed applying FIPG, install the camshaft bearing cap within 3 minutes and fasten its bolts within 15 minutes.**
- **Do not start the engine 2 hours after the installation.**



(6) Install the camshaft bearing cap as shown in the illustration.

(7) Fasten 15 bolts for the camshaft bearing cap in the specified order described in the illustration.

Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



67. INSTALL CAMSHAFT SETTING OIL SEAL

(a) Install the oil seal.

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

NOTICE:

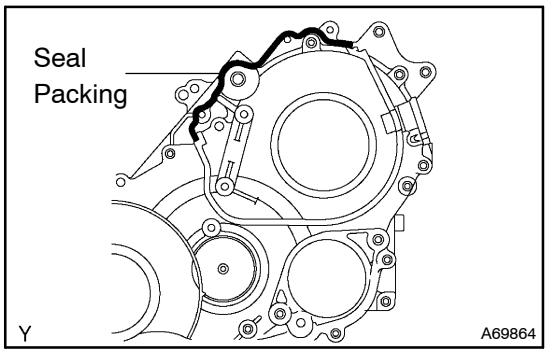
Keep the lip clean. Not to bring dirt and dust on that area.

(2) Fit the oil seal by using SST and a hammer.

SST 09608–06041

Oil seal depth from the flat–end surface :

0.5 to – 1.5 mm (0.020 to – 0.060 in.)



68. INSTALL TIMING BELT NO.2 COVER

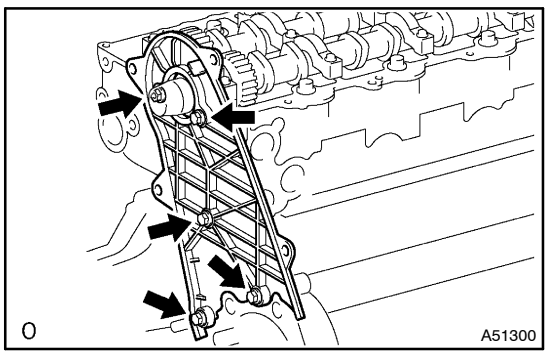
(a) Remove old packing (FIPG) from the timing gear case.

(b) Apply a seal packing to the specific places described in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

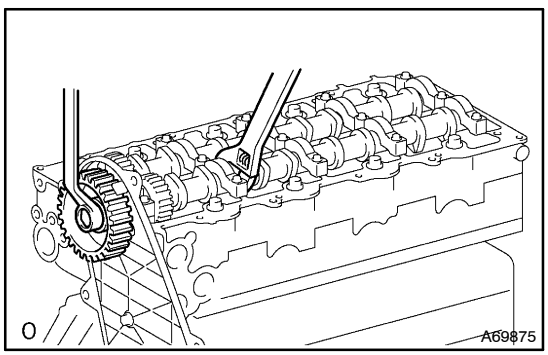
NOTICE:

Install the timing belt No. 2 cover within 3 minutes and tighten its bolts and nut within 15 minutes as soon as applying FIPG is competed.



(c) Install the timing belt No.2 cover with the 4 bolts and nut.

Torque: 10 N·m (102 kgf·cm, 7 ft·lbf)



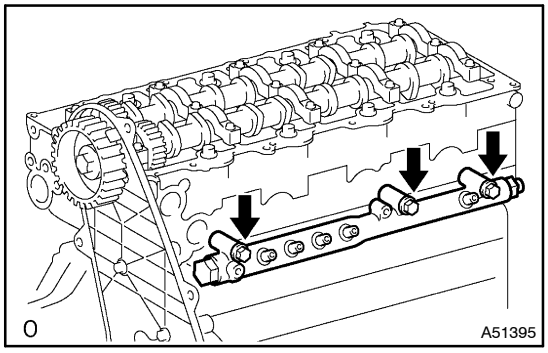
69. INSTALL CAMSHAFT TIMING PULLEY

(a) Install the set key to the key groove of the camshaft.

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

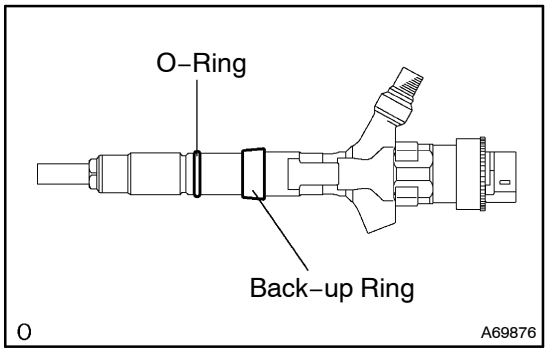
(c) Hold the hexagonal portion of the camshaft, and install the timing pulley with the bolt.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

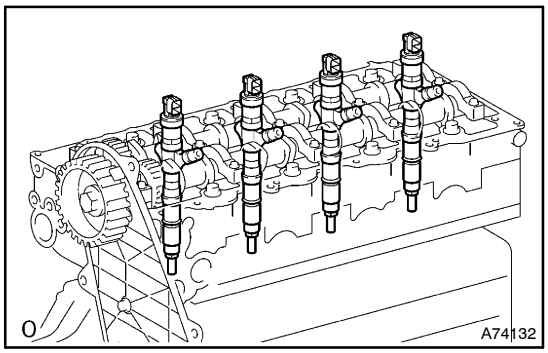


70. INSTALL INJECTOR ASSY

(a) Install the common rail with the 3 bolts.
Torque: 38 N·m (387 kgf·cm, 28 ft·lbf)



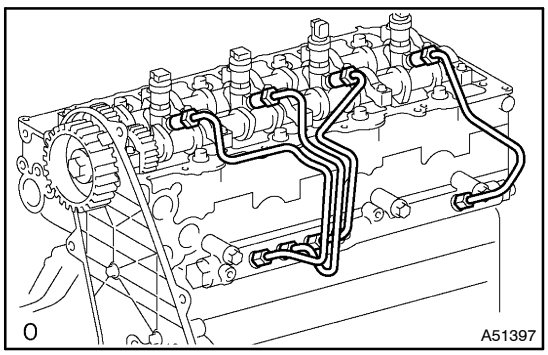
(b) Apply a light coat of engine oil onto the new O–ring to the each injector.
(c) Install a new back–up ring to each injector.



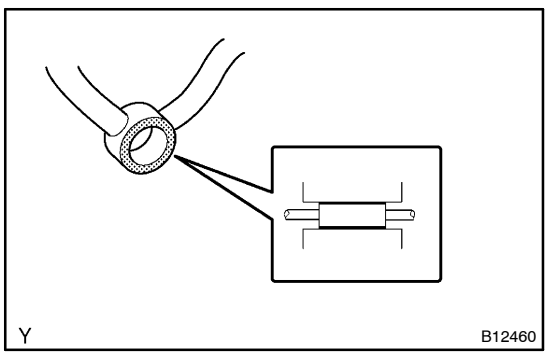
(d) Install the 4 new nozzle seats to the cylinder head.
(e) Install the injector to the cylinder head.

NOTICE:

- **At this time, insert the injector until it touches the nozzle sheet surface.**
- **When installing the injector to the cylinder head, if the injector comes to float up with the reaction of O–ring, pull out the injector and install it again.**
- **Do not exchange the injector.**

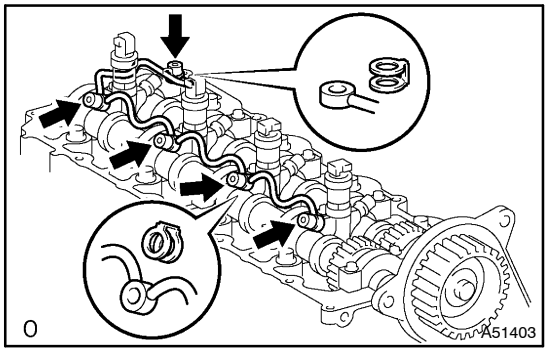


(f) Temporarily install the 4 injection pipes.

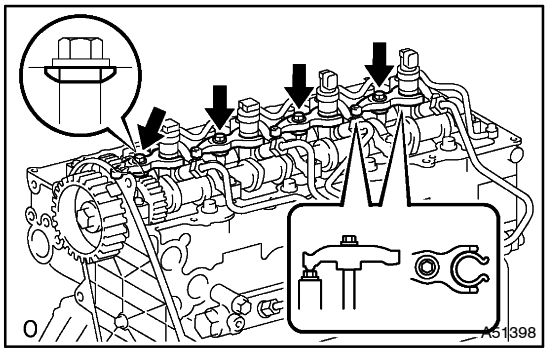


(g) Check before installing the nozzle leakage pipe using the straight edge that there is no scratch and deformation (dent) on the seal surface of the unions (at five positions).

HINT:
In case of having any scratch or deformation, change it to a new one.



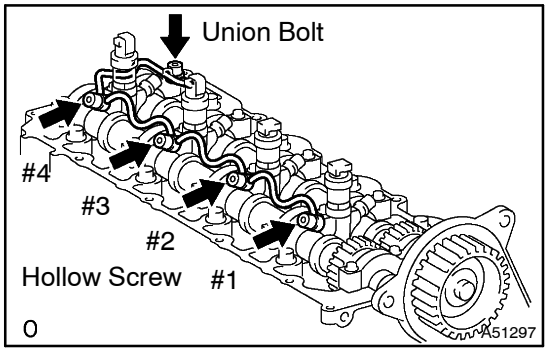
(h) Place the nozzle leakage pipe and 5 new gaskets.
(i) Apply a light coat of engine oil onto the 4 hollow screws and union bolt.
(j) Temporarily install the leakage pipe with the 4 hollow screws and union bolt.



(k) Set the spring to each injector like shown in the illustration.
(l) Set new washer on the nozzle holder clamp like shown in the illustration.
(m) Tighten the bolt.
Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

NOTICE:

- **Clip the infector at the fork portion with a clamp which is set on the head of the cam cap bolt. At this time, check that the clamp does not hold the injector at the part where the spring is attached.**
- **To fasten the clamp bolt, temporally torque it with hand until the bearing surface of the bolt touches the washer, then tighten by the specified torque.**
- **In case of tighten by the specified torque, pay attention not to tilt the bolt and the clamp.**
- **The washer can not be reused.**
- **In case of tightening the washer with over–torque, replace it with new one.**



(n) Tighten the 4 hollow screws from #1 to #4 in order.
Torque: 16 N·m (163 kgf·cm, 12 ft·lbf)

NOTICE:

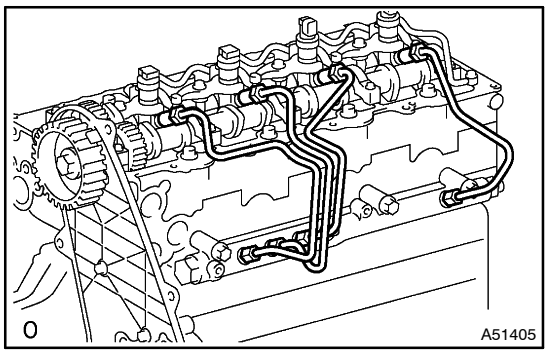
In case of over–torque, replace the nozzle leakage pipe assy with new one.

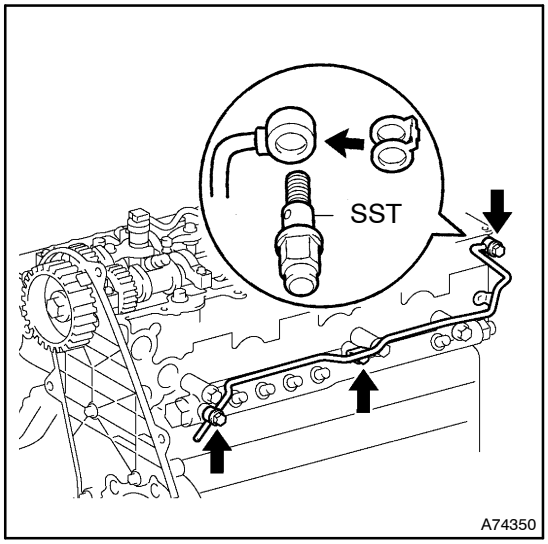
(o) Tighten the union bolt.
Torque: 12.5 N·m (127 kgf·cm, 9 ft·lbf)

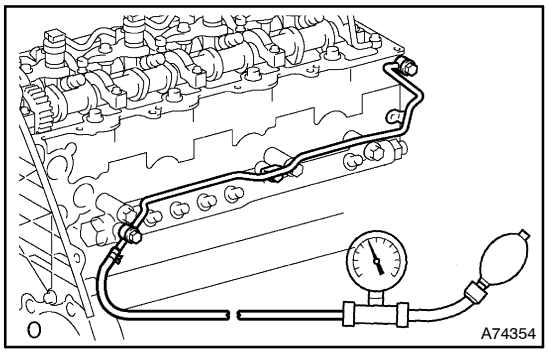
NOTICE:

In case of over–torque, replace the nozzle leakage pipe assy with new one.

(p) Remove the 4 infection pipes.







(q) Check that there are no leaks from the nozzle leakage pipe connection.

(1) Using SST, install the nozzle leakage pipe No.2 and new gasket to the cylinder head.

SST 09280–00010

Torque: 21 N·m (214 kgf·cm, 16 ft·lbf)

(2) install the nozzle leakage pipe assy No.2 and new gasket with union bolt.

Torque: 13 N·m (129 kgf·cm, 9 ft·lbf)

(3) Install the nozzle leakage pipe assy No.2 and flange bolt.

Torque: 13 N·m (129 kgf·cm, 9 ft·lbf)

(4) Apply a light coat of engine oil (any fluid to detect fuel leakage) on the nozzle leakage pipe connection.

(5) Using SST (turbo charger pressure gauge), apply the SST to the leakage pipe No. 2 and maintain 100 kPa (1.0 kgf/cm^2, 14.5 psi) of pressure for 60 seconds to check that there are no leaks from the leakage pipe No. 1.

SST 09992–00242

NOTICE:

Be sure to do by specified pressure, preventing from leakage.

HINT:

- Apply a coat of engine oil on the leakage pipe connection, check that there are no bubbles from where the engine oil place.
- Check that the SST (turbo charger pressure gauge) does not go down was applied.

(6) After checking fuel leaks, wipe off engine oil from the leakage pipe connection.

(r) Remove the SST, union bolt, bolt and nozzle leakage pipe No.2.

(s) Remove the 3 bolts and common rail.

71. INSTALL CYLINDER HEAD COVER SUB–ASSY

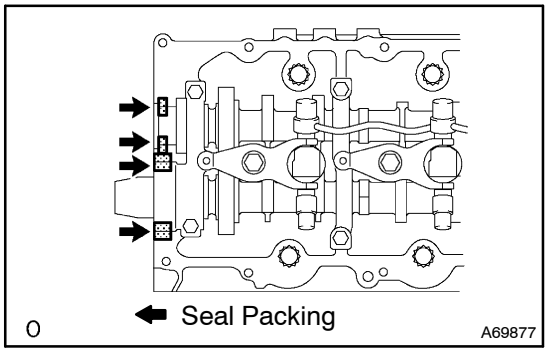
(a) Remove old seal packing (FIPG) from the cylinder head.

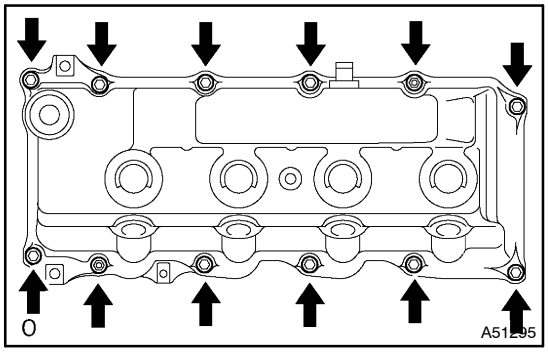
(b) Apply a seal packing to the specific places described in the illustration.

Seal packing: Part No. 08826–00080 or equivalent

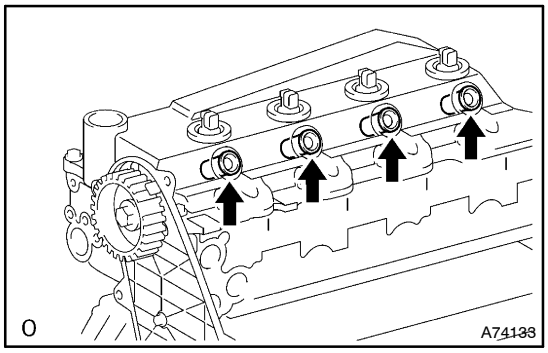
NOTICE:

After applying the seal packing, parts must be assembled within 3 minutes, and then tighten them within 15 minutes.

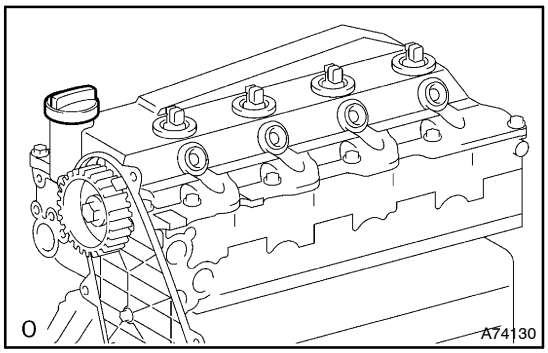




(c) Install the gasket to the cylinder head cover.
(d) Install the cylinder head cover with 10 bolts and 2 nuts. Uniformly tighten the bolts and nuts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



72. INSTALL NOZZLE HOLDER SEAL
(a) Install the 4 new nozzle holder seals.



73. INSTALL OIL FILLER CAP SUB–ASSY