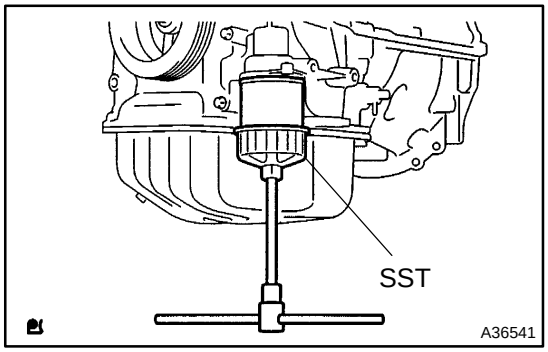
141J4−01

OVERHAUL



1. REMOVE OIL FILTER SUB−ASSY

(a) Using SST, remove the oil filter.
SST 09228−06501

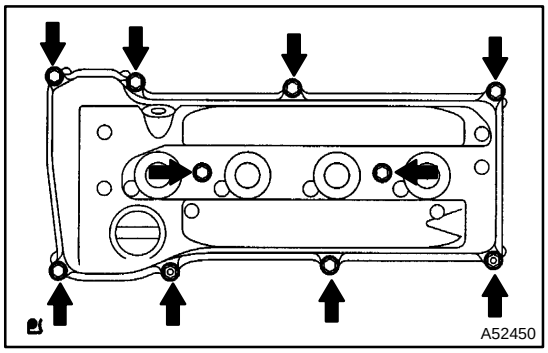
2. REMOVE OIL FILTER UNION

(a) Using a 12 mm hexagon wrench, remove the union.

3. REMOVE OIL FILLER CAP SUB−ASSY

4. REMOVE VENTILATION VALVE SUB−ASSY

5. REMOVE SPARK PLUG

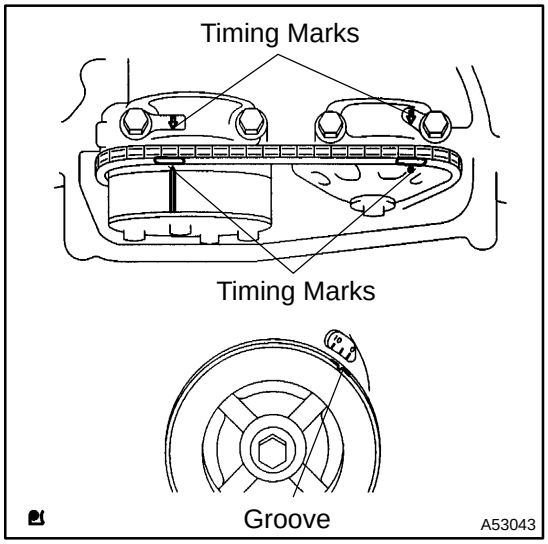


6. REMOVE CYLINDER HEAD COVER SUB−ASSY

(a) Remove the 8 bolts, 2 nuts, and cylinder head cover.

7. REMOVE CYLINDER HEAD COVER GASKET

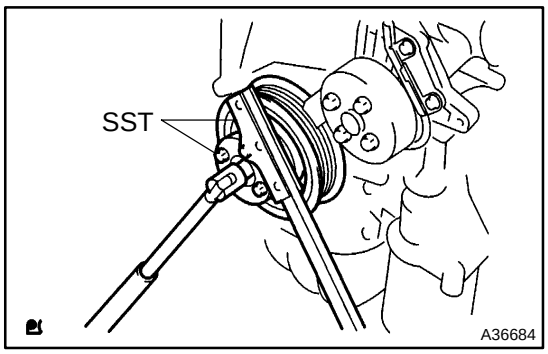
8. REMOVE CRANKSHAFT POSITION SENSOR



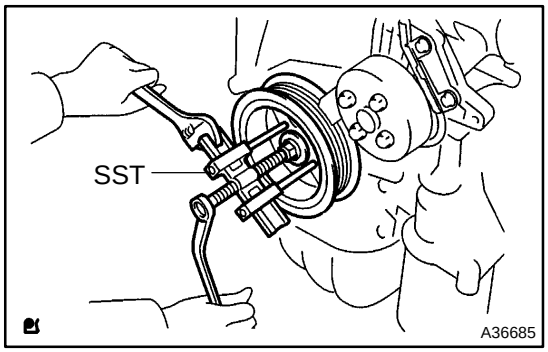
9. REMOVE CRANKSHAFT PULLEY

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

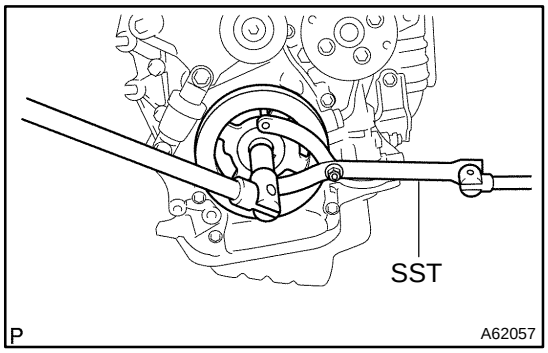
(b) Check that the timing marks of the camshaft timing sprockets are aligned with the timing marks of the No. 1 bearing cap, as shown in the illustration.



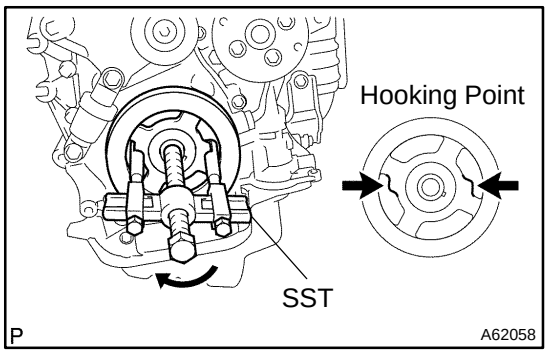
(c) TMC made:
Remove the crankshaft pulley.
(1) Using SST, fix the pulley and loosen the bolt.
SST 09213−54015 (91651−60855), 09330−00021



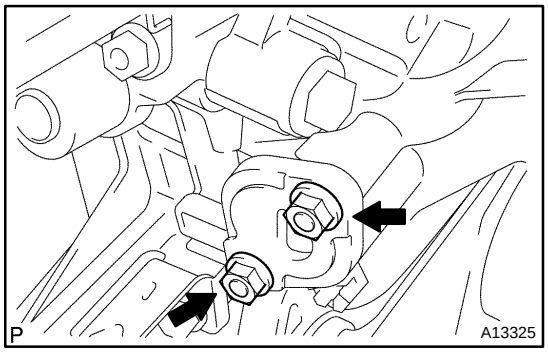
(2) Using SST, remove the bolt and pulley.
SST 09950−50013 (09951−05010, 09952−05010, 09953−05020, 09954−05021)



(d) TMMK made:
Remove the crankshaft pulley.
(1) Using SST, fix the crankshaft pulley and loosen a pulley set bolt.
SST 09960−10010 (09962−01000, 09963−01000)



(2) Using SST, remove the crankshaft pulley.
SST 09950−40011 (09951−04010, 09952−04010, 09953−04030, 09954−04010, 09955−04041, 09957−04010, 91111−51014)

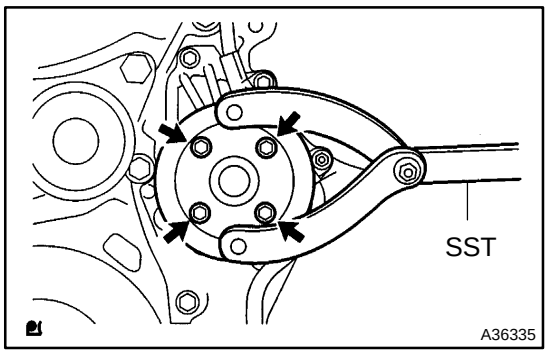


10. REMOVE CHAIN TENSIONER ASSY NO.1

(a) Remove the 2 nuts, chain tensioner and gasket.

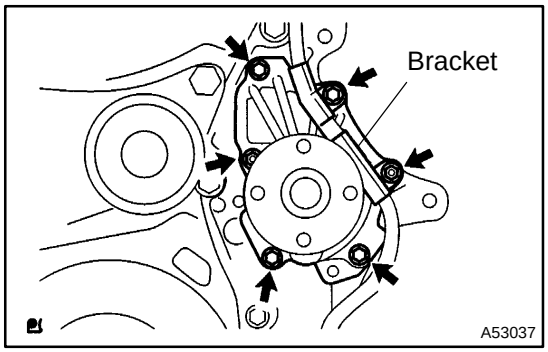
NOTICE:

Do not to turn the crankshaft without the chain tensioner.



11. REMOVE WATER PUMP PULLEY

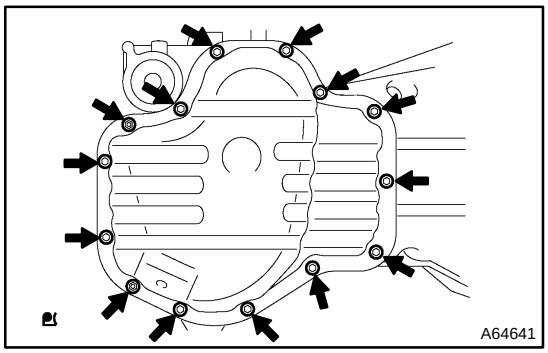
(a) Using SST, remove the water pump pulley.
SST 09960−10010 (09962−01000, 09963−00700)



12. REMOVE WATER PUMP ASSY

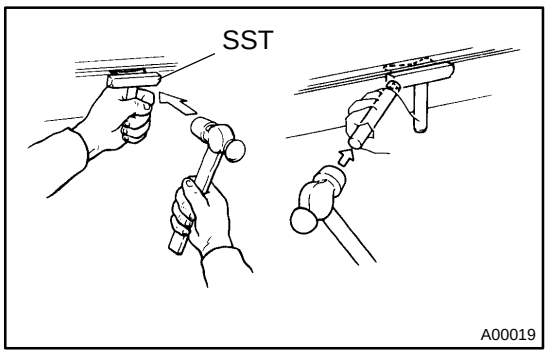
(a) Remove the 4 bolts, 2 nuts, bracket and water pump.

13. REMOVE OIL PAN DRAIN PLUG



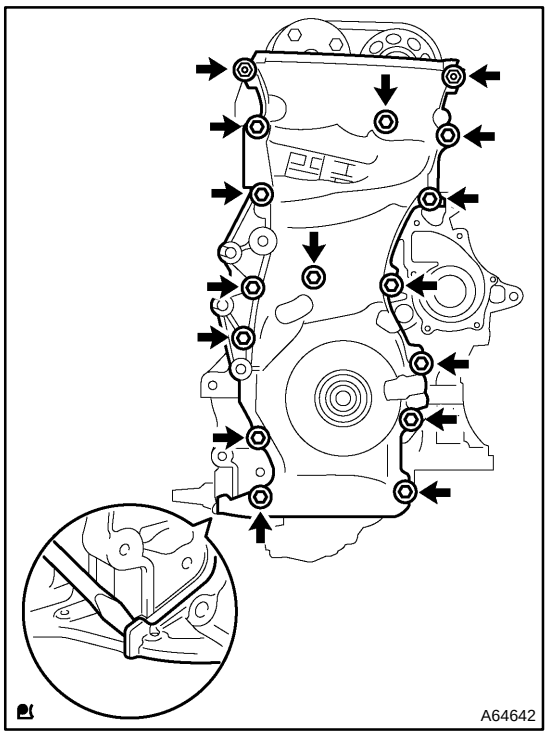
14. REMOVE OIL PAN SUB−ASSY

(a) Remove the 12 bolts and 2 nuts.



(b) Insert the blade of SST between the crankcase and oil pan. Cut off applied sealer and remove the oil pan.
SST 09032−00100

NOTICE:
Be careful not to damage the contact surface of the cylinder block and oil pan.



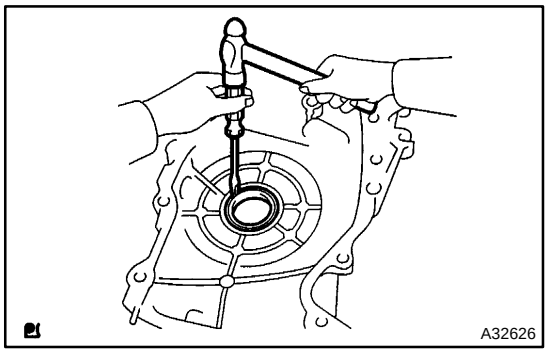
15. REMOVE TIMING CHAIN OR BELT COVER SUB−ASSY

(a) Remove the 14 bolts and 2 nuts.

(b) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the timing chain cover, cylinder block and cylinder head.



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

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

17. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

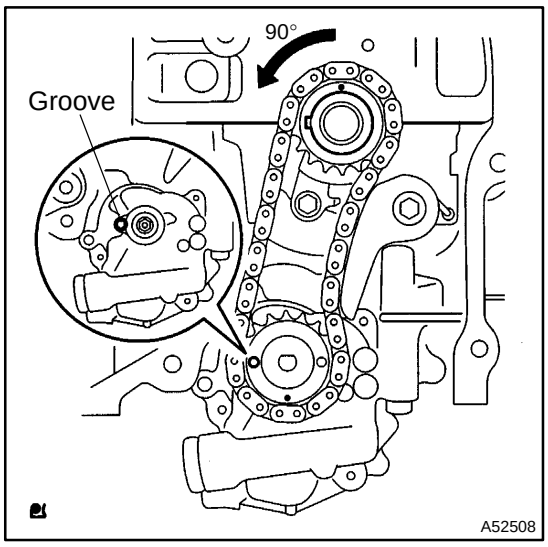
18. REMOVE TIMING CHAIN GUIDE

19. REMOVE CHAIN TENSIONER SLIPPER

20. REMOVE CHAIN VIBRATION DAMPER NO.1

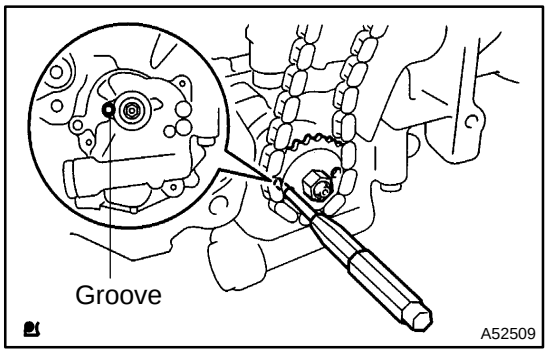
21. REMOVE CHAIN SUB−ASSY

22. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET

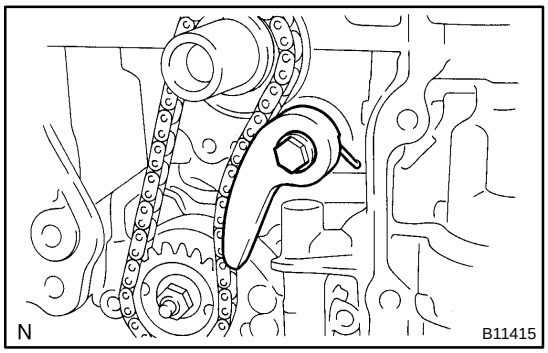


23. REMOVE NO.2 CHAIN SUB−ASSY

(a) Turn the crankshaft counterclockwise by 90°, and align the adjusting hole of the oil pump driven sprocket with the groove of the oil pump.

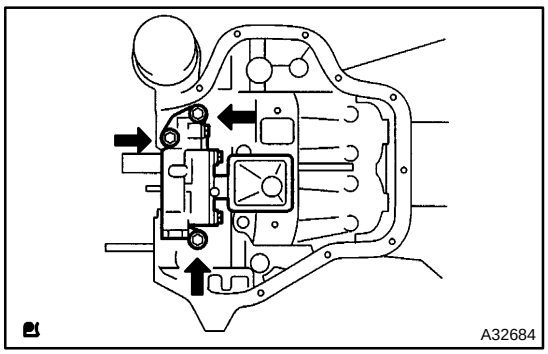


(b) Put a bar (ϕ 4 mm) in the adjusting hole of the oil pump driven sprocket to temporarily lock the sprocket in position. Remove the nut.



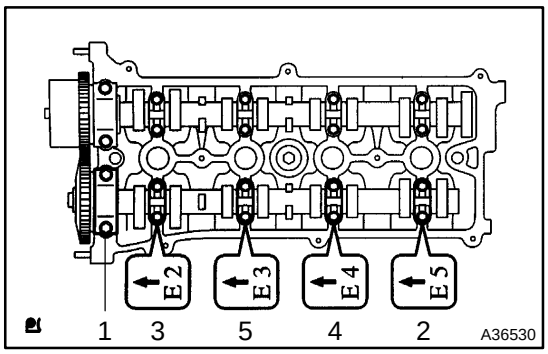
(c) Remove the bolt, chain tensioner plate and spring.

(d) Remove the oil pump drive sprocket, oil pump driven sprocket and chain.



24. REMOVE OIL PUMP ASSY

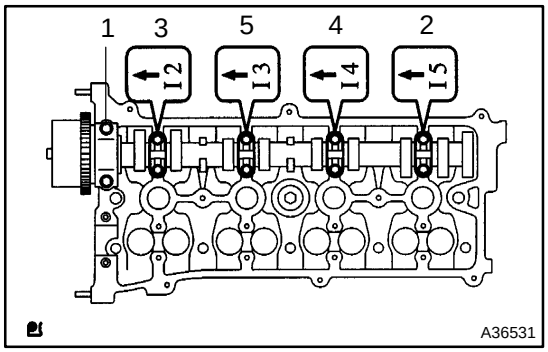
(a) Remove the 3 bolts, oil pump and gasket.



25. REMOVE NO.2 CAMSHAFT

(a) Uniformly loosen and remove the No. 2 camshaft's 10 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearings.

(b) Remove the camshaft.

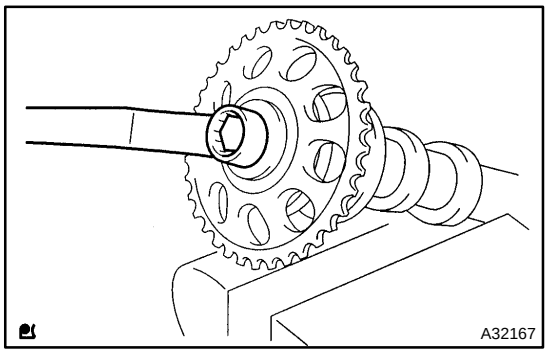


26. REMOVE CAMSHAFT

(a) Uniformly loosen and remove the No. 2 camshaft's 10 bearing cap bolts in the sequence shown in the illustration. Then remove the 5 bearings.

(b) Remove the camshaft.

27. REMOVE CAMSHAFT BEARING NO.1

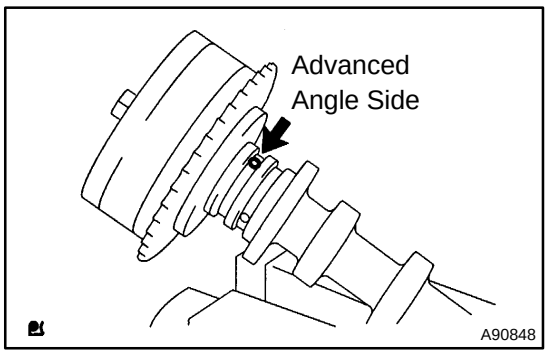


28. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET

(a) Fix the camshaft with a vise and remove the camshaft timing sprocket.

NOTICE:

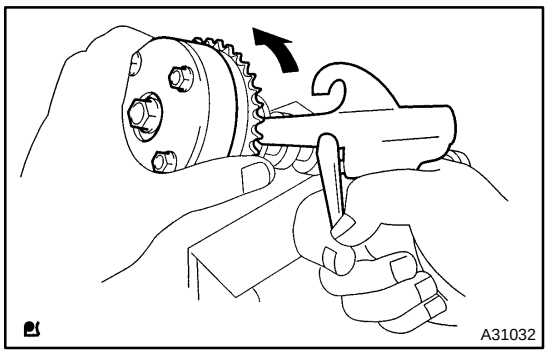
Be careful not to damage the camshaft.



29. REMOVE CAMSHAFT TIMING GEAR ASSY

(a) Fix the camshaft with a vise, and make sure that the camshaft timing gear does not move.

(b) Cover all the oil ports with vinyl tape except the advanced angle side, as shown in the illustration.



(c) Using an air gun, apply about 150 kPA (1.5 kgf/cm, 21 psi) of air pressure to the port on the advanced angle side.

CAUTION:

Some oil spraying will occur. Contain the spray with a shop rag.

HINT:

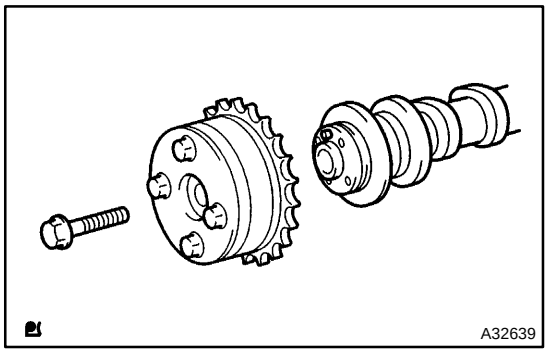
This operation releases the lock pin for the extreme retarded angle lock.

(d) Under the condition above, check that the camshaft timing gear can be turned by hand to the advanced angle side (counterclockwise), the direction of the arrow in the illustration.

Standard: Must turn

HINT:

The camshaft timing gear will turn to the advanced angle side without applying force by hand depending on the force of the air pressure applied. Also, if applying pressure to the oil path is difficult as a result of air leakage from the port, the lock−pin may be difficult to release.



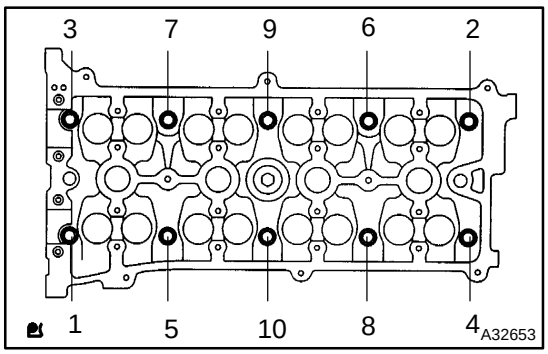
(e) Remove the fringe bolt from the camshaft timing gear.

NOTICE:

- **Be sure not to remove the other 4 bolts.**
- **If planning to reuse the camshaft timing gear, release the straight pin lock first, and then install the gear.**

30. REMOVE CAMSHAFT BEARING NO.2

31. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSY



32. REMOVE CYLINDER HEAD SUB−ASSY

(a) Using a 10 mm bi−hexagon wrench, uniformly loosen the 10 bolts in the sequence shown in the illustration. Remove the 10 cylinder head bolts and plate washers.

NOTICE:

- **Be careful not to drop washers into the cylinder head.**
- **Head warpage or cracking could result from removing bolts in an incorrect order.**

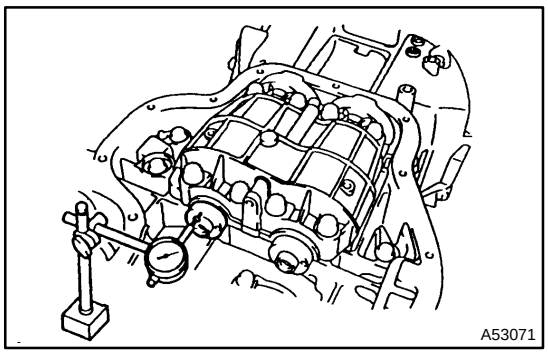
33. REMOVE CYLINDER HEAD GASKET

34. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB−ASSY

35. REMOVE OIL CONTROL VALVE FILTER

(a) Using a 6 mm socket hexagon wrench, remove the plug and filter.

36. REMOVE W/HEAD TAPER SCREW PLUG NO.1

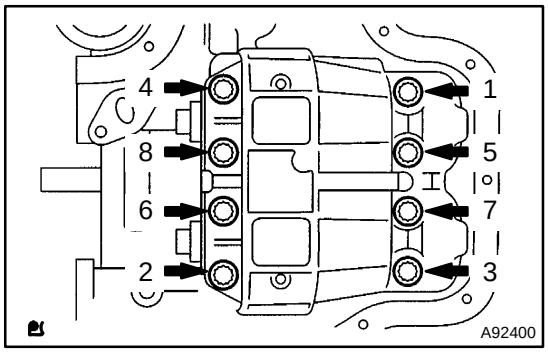


37. INSPECT BALANCESHAFT THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance while moving the balance shaft back and forth.

Specified thrust clearance:
0.050 to 0.090 mm (0.0020 to 0.0035 in.)

If the thrust clearance is greater than the maximum, replace the balance shaft housing and bearings. If necessary, replace the balance shaft.



38. INSPECT BALANCESHAFT OIL CLEARANCE

(a) Uniformly loosen and remove the 8 bolts in the sequence shown in the illustration.

NOTICE:

Be careful not to damage the contact surfaces of the balance shaft housing and crankcase.

HINT:

Keep the lower bearing and balance shaft housing together.

(b) Lift out the No. 1 and No. 2 balance shafts.

HINT:

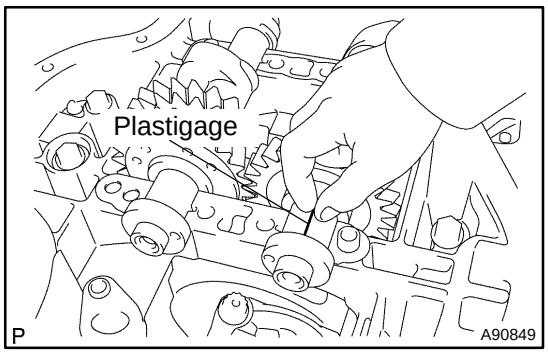
Keep the upper bearing with the crankcase.

(c) Clean each bearing and journal.

(d) Check each bearing and journal for pitting and scratches.

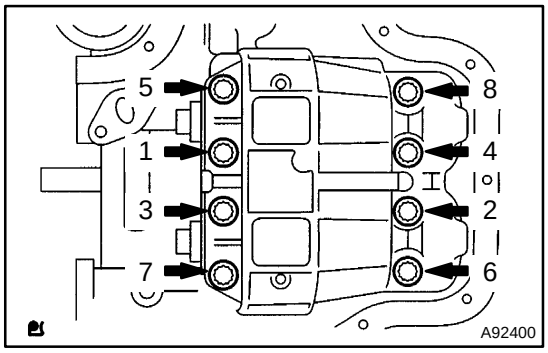
If a bearing or journal is damaged, replace the bearings. If necessary, replace the balance shaft.

(e) Place the No. 1 and No. 2 balance shafts on the crankcase.



(f) Lay a strip of Plastigage across each journal, and install the balance shaft housing.

(g) Apply light coat of engine oil on the threads and under the heads of the balance shaft housing bolts.

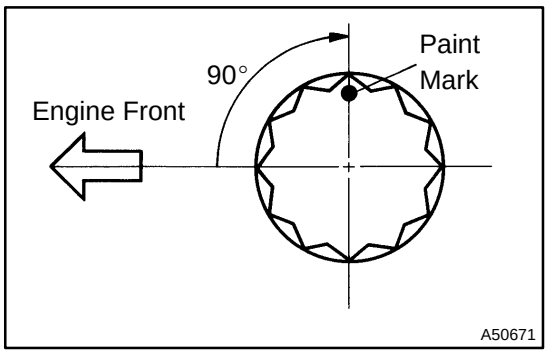


(h) Uniformly tighten the 8 bolts in the sequence shown in the illustration.

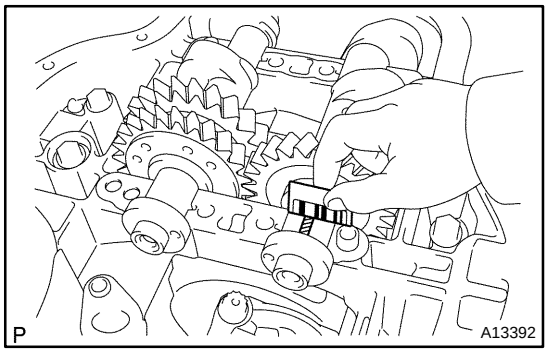
Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

HINT:

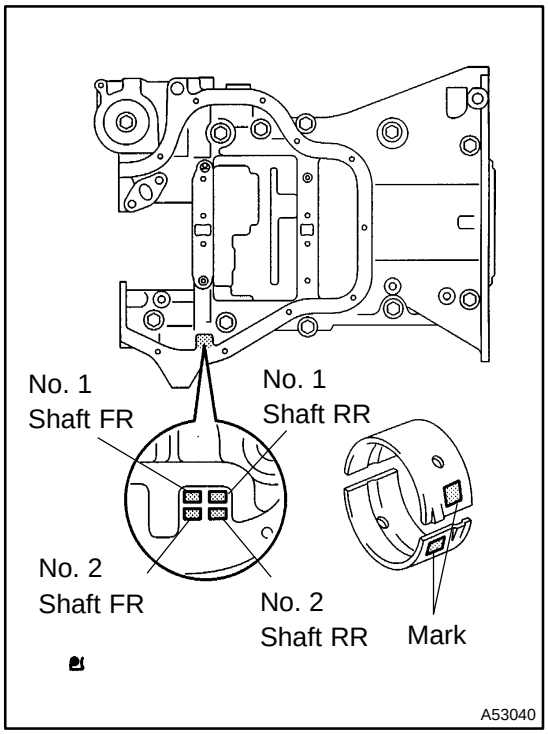
The balance shaft housing bolts are tightened in 2 progressive steps.



(i) Mark the front side of each balance shaft housing bolt head with paint.
(j) Retighten the bolts by 90° as shown in the illustration.
(k) Check that the paint marks are now at a 90° angle to the front.



(l) Remove the balance shaft housing, and measure the Plastigage at its widest point.
Specified oil clearance:
0.004 to 0.031 mm (0.0002 to 0.0012 in.)
(m) Completely remove the plastigage after the inspection.
If the clearance is greater than the maximum, replace the bearing. If necessary, replace the balance shaft.



HINT:
If replacing a bearing, replace it with one that has the same number as the stiffening crankcase. There are 3 sizes of standard bearings: 1, 2 and 3.

Balance shaft housing journal bore diameter:

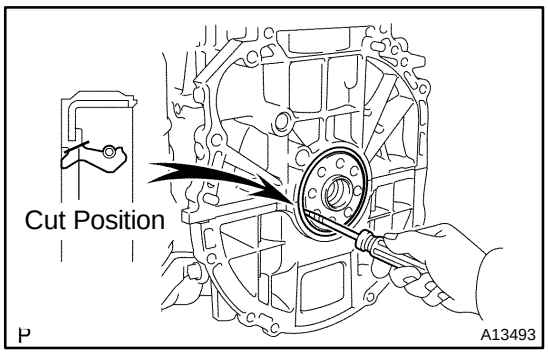
Mark 1	26.000 to 26.006 mm (1.0236 to 1.0239 in.)
Mark 2	26.006 to 26.012 mm (1.0239 to 1.0241 in.)
Mark 3	26.012 to 26.018 mm (1.0241 to 1.0243 in.)

Balance shaft journal diameter:
22.985 to 23.000 mm (0.9049 to 0.9055 in.)
Standard bearing center wall thickness:

Mark 1	1.486 to 1.489 mm (0.0585 to 0.0586 in.)
Mark 2	1.489 to 1.492 mm (0.0586 to 0.0587 in.)
Mark 3	1.492 to 1.495 mm (0.0587 to 0.0589 in.)

(n) Completely remove the Plastigage after the inspection.

39. REMOVE BALANCESHAFT
40. REMOVE BALANCESHAFT BEARING NO. 1



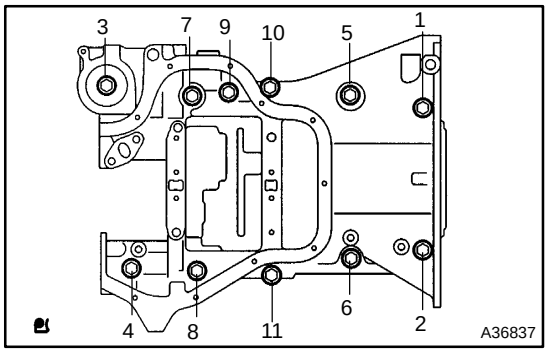
41. REMOVE ENGINE REAR OIL SEAL

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

(b) Using a screwdriver with its tip taped, pry out the oil seal.

NOTICE:

After the removal, check the crankshaft for damage. If it is damaged, smooth the surface with 400−grit sandpaper.



42. REMOVE STIFFENING CRANKCASE ASSY

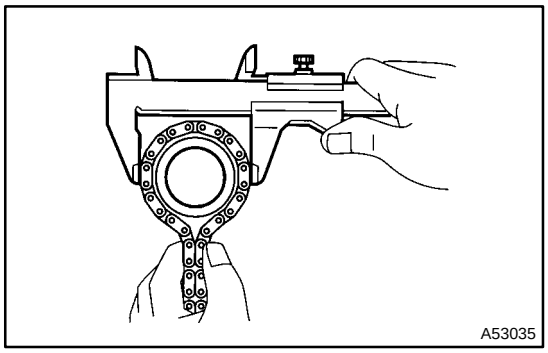
(a) Uniformly loosen and remove the 11 bolts in the sequence shown in the illustration.

(b) Using a screwdriver, remove the crankcase by prying the portions between the crankcase and cylinder block.

NOTICE:

Be careful not to damage the contact surfaces of the crankcase and cylinder block.

(c) Remove the O−ring from the cylinder block.



43. INSPECT OIL PUMP DRIVE SPROCKET

(a) Wrap the chain around the drive sprocket.

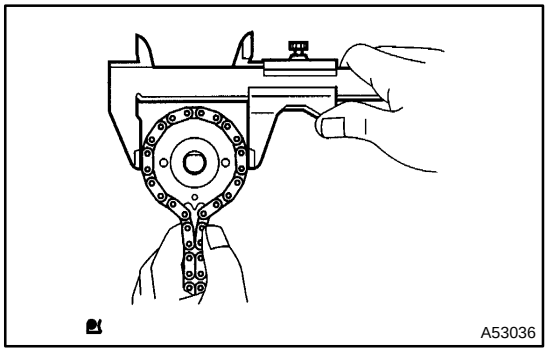
(b) Using a vernier caliper, measure the drive sprocket diameter with the chain.

NOTICE:

The vernier caliper must contact the chain rollers for the measurement.

Minimum sprocket diameter (w/ chain):
48.2 mm (1.898 in.)

If the diameter is less than the minimum, replace the chain and sprocket.



44. INSPECT OIL PUMP DRIVEN SPROCKET

(a) Wrap the chain around the driven sprocket.

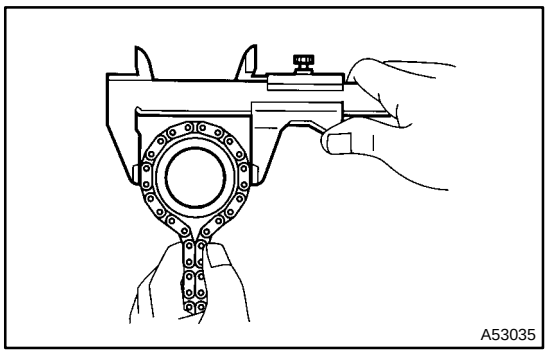
(b) Using a vernier caliper, measure the driven sprocket diameter with the chain.

NOTICE:

The vernier caliper must contact the chain rollers for the measurement.

Minimum sprocket diameter (w/ chain):
48.2 mm (1.898 in.)

If the diameter is less than the minimum, replace the chain and drive shaft gear.



45. INSPECT CRANKSHAFT TIMING GEAR OR SPROCKET

(a) Wrap the chain around the timing sprocket.

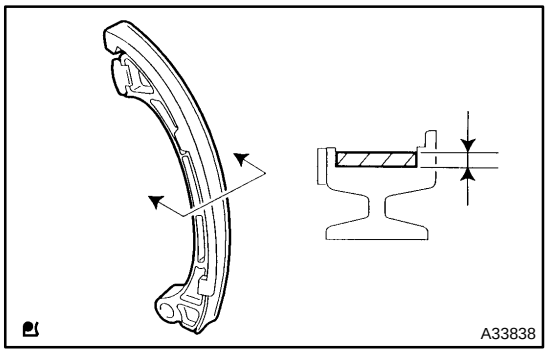
(b) Using a vernier caliper, measure the timing sprocket diameter with the chain.

NOTICE:

The vernier caliper must contact the chain rollers for the measurement.

Minimum sprocket diameter (w/ chain):
51.6 mm (2.031 in.)

If the diameter is less than the minimum, replace the chain and timing gear.

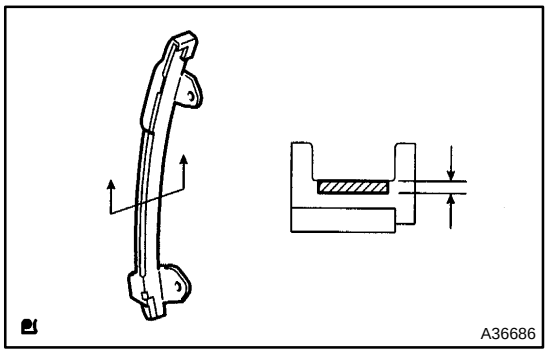


46. INSPECT CHAIN TENSIONER SLIPPER

(a) Measure the tensioner slipper wear.

Maximum wear: 1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the tensioner slipper.

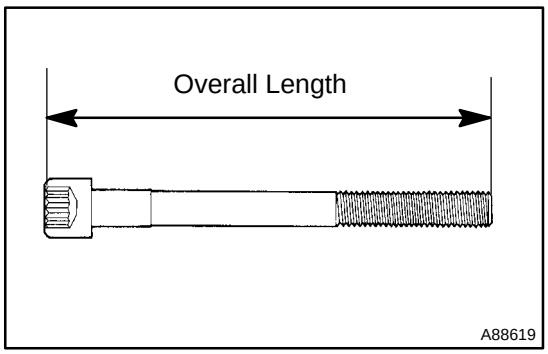


47. INSPECT CHAIN VIBRATION DAMPER NO.1

(a) Measure the vibration damper wear.

Maximum wear: 1.0 mm (0.039 in.)

If the wear is greater than the maximum, replace the vibration damper.

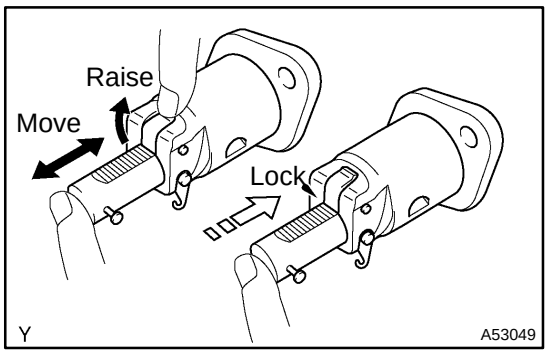


48. INSPECT CYLINDER HEAD SET BOLT

(a) Using a vernier caliper, measure the length of the head bolts from the seat to the end.

Specified bolt length:
161.3 to 164.2 mm (6.350 to 6.465 in.)

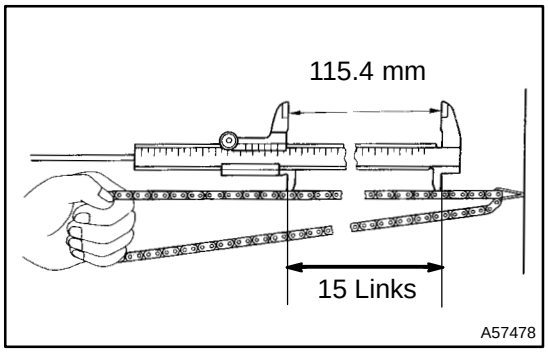
If the length is greater than the maximum, replace the bolt.



49. INSPECT CHAIN TENSIONER ASSY NO.1

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

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



50. INSPECT CHAIN SUB−ASSY

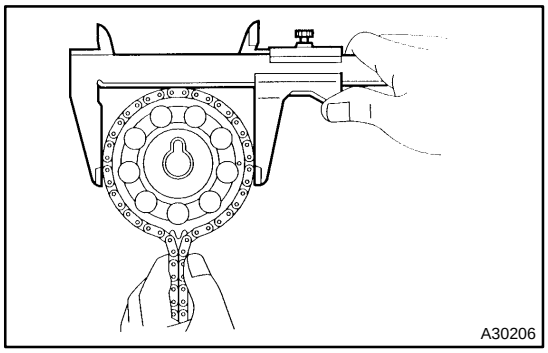
(a) Using a vernier caliper, measure the length of 15 links with the chain fully stretched.

Maximum chain elongation: 115.4 mm (4.543 in.)

If the elongation is greater than the maximum, replace the chain.

NOTICE:

Make the same measurements pulling at 3 or more places selected at random. Average the measurements.



51. INSPECT CAMSHAFT TIMING GEAR OR SPROCKET

(a) Wrap the chain around the timing sprocket.

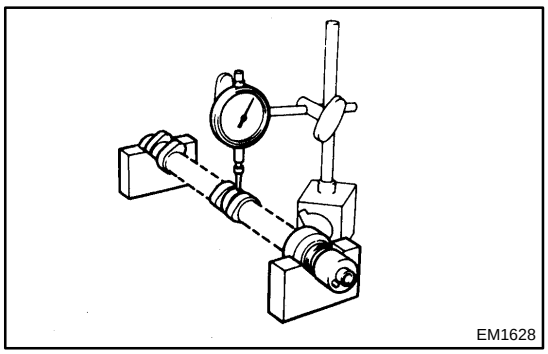
(b) Using a vernier caliper, measure the timing sprocket diameter with the chain.

Minimum sprocket diameter (w/chain): 97.3 mm (3.831 in.)

NOTICE:

The vernier caliper must contact the chain rollers for the measurement.

If the diameter is less than the minimum, replace the chain and timing gear.



52. INSPECT CAMSHAFT

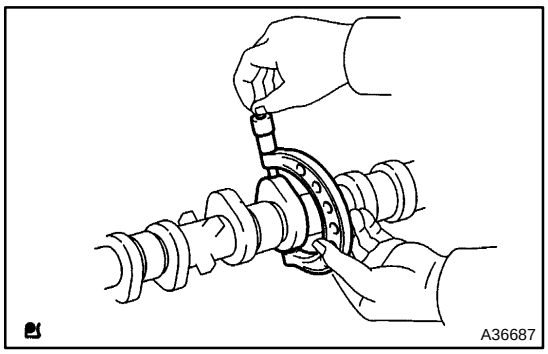
(a) Check the camshaft for runout.

(1) Place the camshaft on V−blocks.

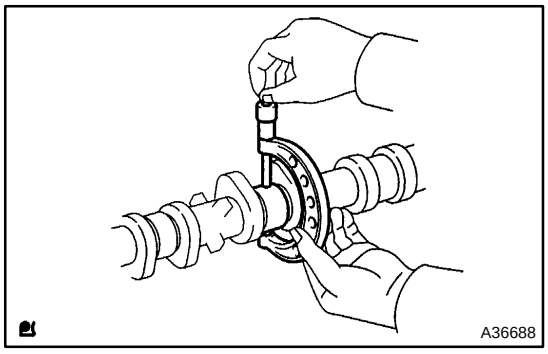
(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.03 mm (0.0012 in.)

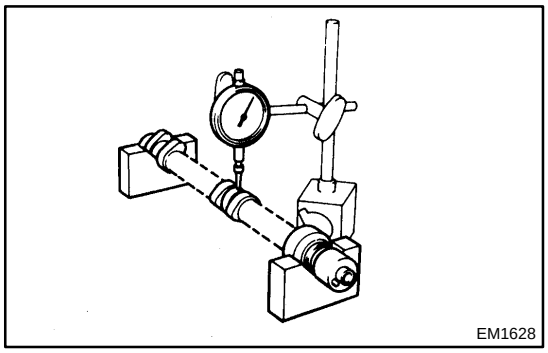
If the circle runout is greater than the maximum, replace the camshaft.



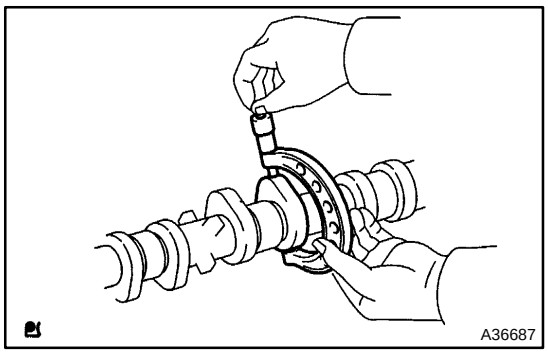
(b) Using a micrometer, measure the cam lobe height.
Specified cam lobe height:
46.599 to 46.809 mm (1.8346 to 1.8429 in.)
If the cam lobe height is less than the minimum, replace the camshaft.



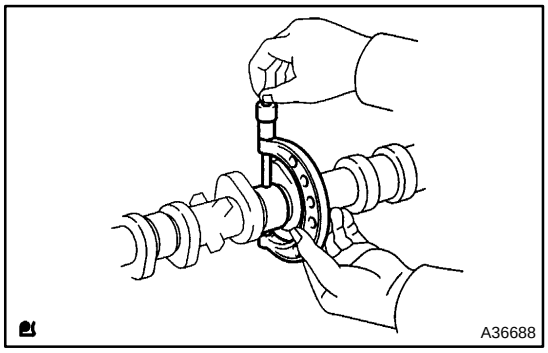
(c) Using a micrometer, measure the journal diameter.
No. 1 journal diameter:
35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other journal diameter:
22.959 to 22.975 mm (0.9039 to 0.9045 in.)
If the journal diameter is not as specified, check the oil clearance.



53. INSPECT NO.2 CAMSHAFT
(a) Check the camshaft for runout.
(1) Place the camshaft on V−blocks.
(2) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout: 0.03 mm (0.0012 in.)
If the circle runout is greater than the maximum, replace the camshaft.



(b) Using a micrometer, measure the cam lobe height.
Specified cam lobe height:
45.599 to 46.809 mm (1.8346 to 1.8429 in.)
If the cam lobe height is less than the minimum, replace the camshaft.

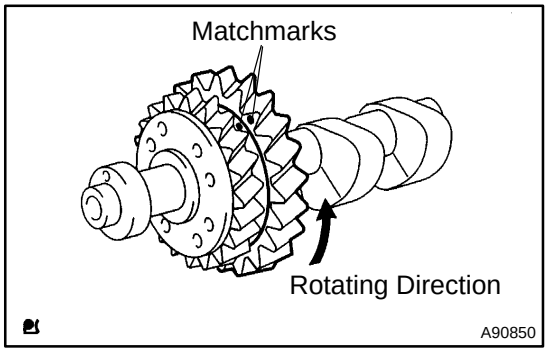


(c) Using a micrometer, measure the journal diameter.
No. 1 journal diameter:
35.971 to 35.985 mm (1.4162 to 1.4167 in.)
Other journal diameter:
22.959 to 22.975 mm (0.9039 to 0.9045 in.)
If the journal diameter is not as specified, check the oil clearance.

54. INSTALL BALANCESHAFT BEARING NO.1

(a) Install the bearings in the crankcase and balance shaft housing.

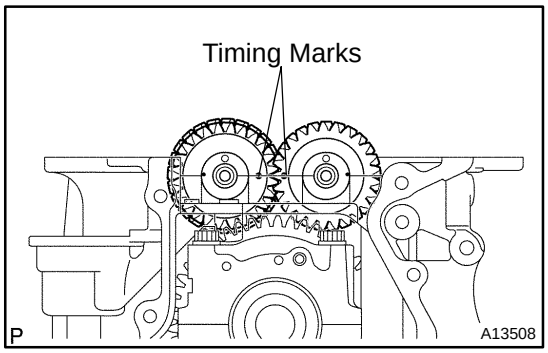
(b) Apply a light coat of engine oil on the bearings.



55. INSTALL BALANCESHAFT NO. 1 AND NO. 2

(a) Rotate the driven gear No. 1 of balance shaft No. 1 for the rotating direction until it hits the stopper.

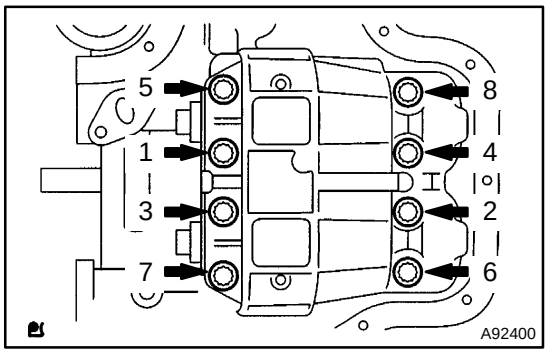
(b) Confirm that the matchmarks on driven gear No. 1 and No. 2 are matched.



(c) Align the timing marks of the No. 1 and No. 2 balance shafts as shown in the illustration.

(d) Place the No. 1 and No. 2 balance shafts on the crank case.

(e) Apply a light coat of engine oil under the heads of the balance shaft housing bolts.

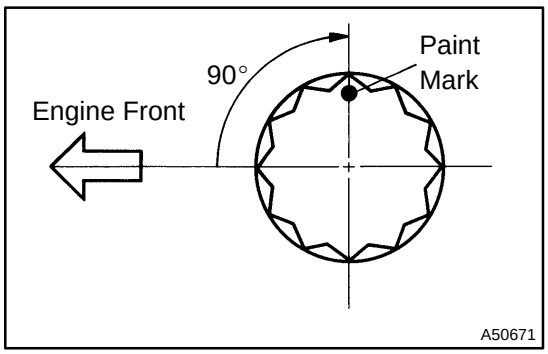


(f) Uniformly tighten the 8 bolts in the sequence shown in the illustration.

Torque: 22 N·m (220 kgf·cm, 16 ft·lbf)

HINT:

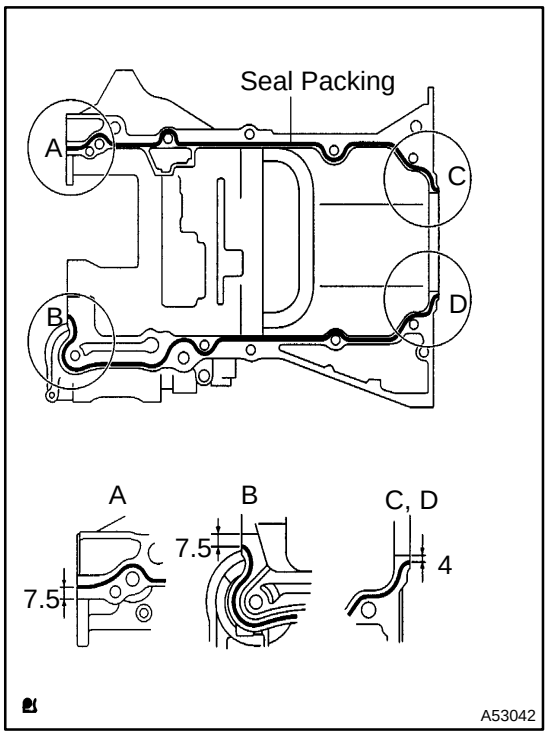
The balance shaft housing bolts are tightened in 2 progressive steps.



(g) Mark the front side of each balance shaft housing bolt head with paint.

(h) Retighten the bolts by 90° as shown in the illustration.

(i) Check that the painted marks are now at a 90° angle to the front.



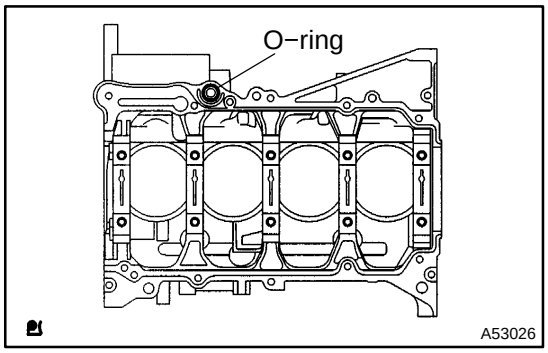
56. INSTALL STIFFENING CRANKCASE ASSY

(a) Apply seal packing in a continuous bead (diameter: 2.5 to 3 mm (0.098 to 0.118 in.)) to the places shown in the illustration.

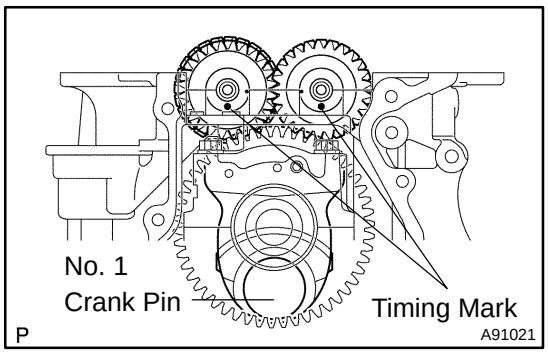
Seal packing: Part No. 08826−00080 or equivalent

NOTICE:

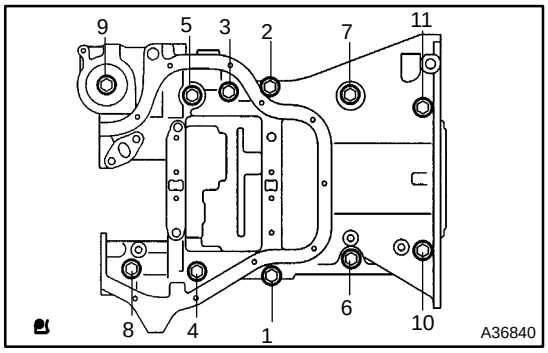
- **Remove any oil from the contact surface.**
- **Install the crankcase within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**



(b) Place a new O−ring on the cylinder block, as shown in the illustration.

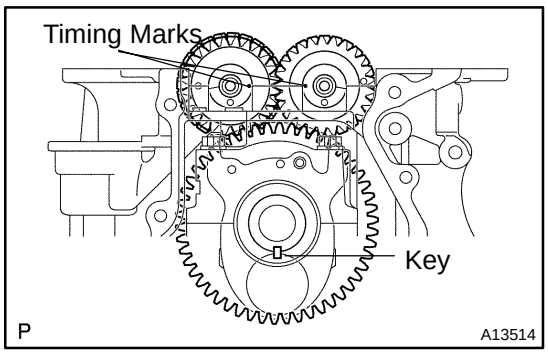


(c) With the No. 1 crank pin of the crankshaft placed at 6 o'clock, install the No. 1 and No. 2 balanceshaft and the adjusting hole as shown in the illustration.

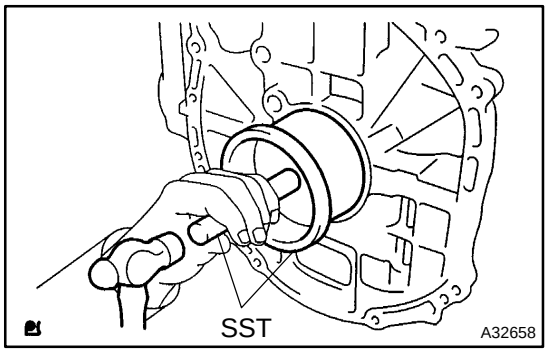


(d) Uniformly tighten the 11 bolts in the sequence shown in the illustration.

Torque: 33 N·m (332 kgf·cm, 24 ft·lbf)



(e) Confirm that the timing marks of the balanceshafts are matched when the key groove is placed at 6 o'clock, as shown in the illustration.



57. INSTALL ENGINE REAR OIL SEAL

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

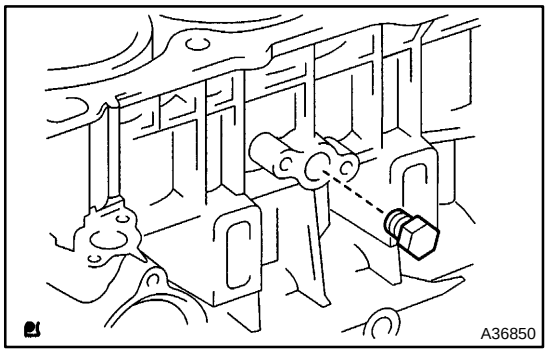
NOTICE:

Keep the lip off the foreign materials.

(b) Using SST and a hammer, evenly tap the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223−15030, 09950−70010 (09951−07100)

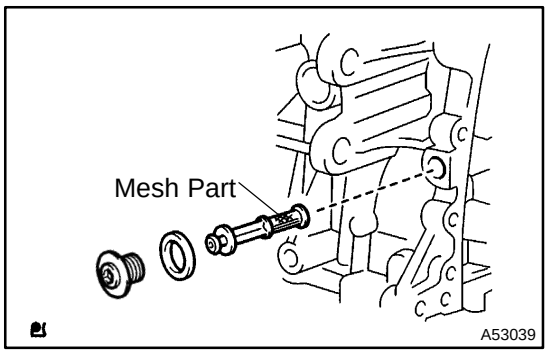
NOTICE:

Wipe off extra grease on the crankshaft.



58. INSTALL W/HEAD TAPER SCREW PLUG NO.1

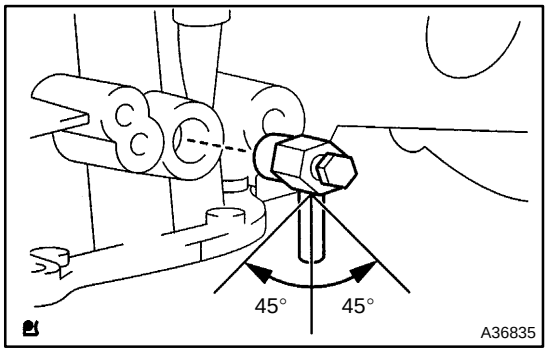
(a) Apply adhesive to the threads of the plug and install it.
Adhesive:
Part No. 08833−00070, THREE BOND 1324 or equivalent
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



59. INSTALL OIL CONTROL VALVE FILTER

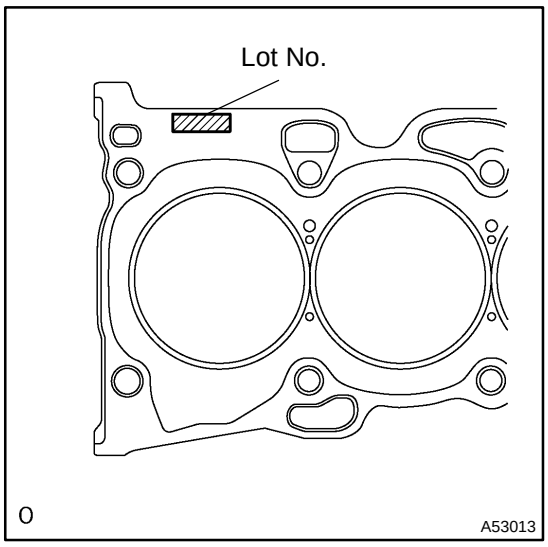
(a) Check that no foreign substance is on the mesh part of the filter.

(b) Using a 6 mm socket hexagon wrench, install a new gasket and the oil control valve filter with the screw plug.
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)



60. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB−ASSY

(a) Install the water drain cock within the range shown in the illustration.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)



61. INSTALL CYLINDER HEAD GASKET

(a) Place a new gasket on the cylinder block surface with the Lot No. stamp upward.

NOTICE:

- **Remove any oil from contact surface.**
- **Be careful of the installation direction.**
- **To avoid damage to the gasket, place the cylinder head on the gasket carefully.**

62. INSTALL CYLINDER HEAD SUB−ASSY

HINT:

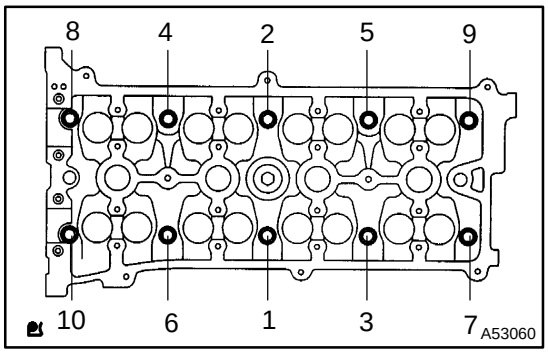
The cylinder head bolts are tightened in 2 progressive steps.

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

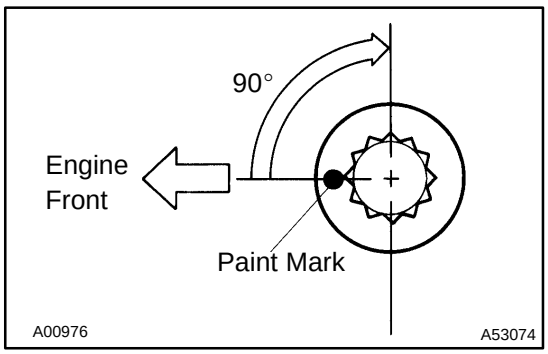
(b) Install the 10 bolts and plate washers to the cylinder head.

NOTICE:

Do not drop the washers into the cylinder head.



(c) Using a 10 mm bi−hexagon wrench, uniformly tighten the 10 bolts in the sequence shown in the illustration.
Torque: 79 N·m (806 kgf·cm, 58 ft·lbf)

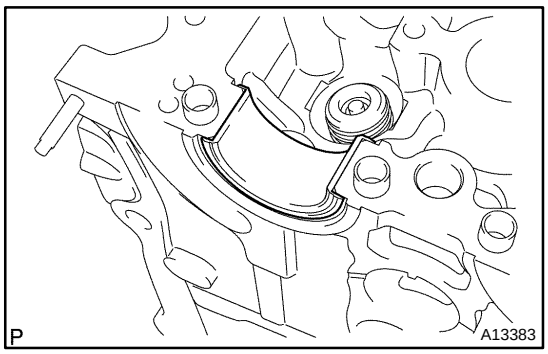


(d) Mark the front side of each cylinder head bolt with paint.

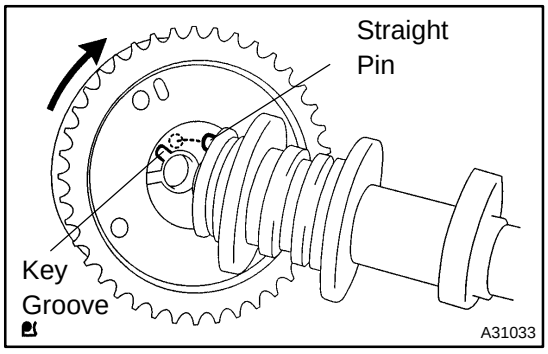
(e) Retighten the cylinder head bolts by 90° in the sequence shown in the illustration.

(f) Check that the painted marks are now at a 90° angle to the front.

63. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSY
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



64. INSTALL CAMSHAFT BEARING NO.2



65. INSTALL CAMSHAFT TIMING GEAR ASSY

(a) Put the camshaft timing gear and the camshaft together with the straight pin and key groove.

(b) Turn the camshaft timing gear (as shown in the illustration) while pushing it lightly against the camshaft. Push further at the position where the pin enters the groove.

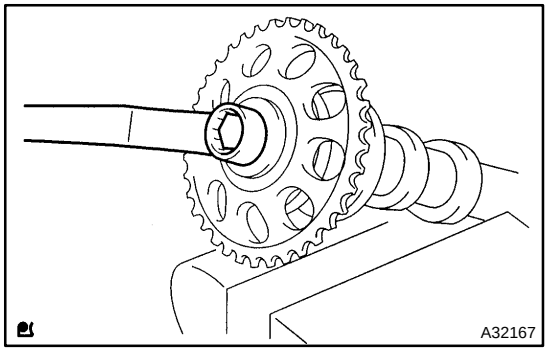
CAUTION:

Be sure not to turn the camshaft timing gear to the retarded angle side (to the right angle).

(c) Check that there is no clearance between the gear's fringe and the camshaft.

(d) Tighten the fringe bolt with the camshaft timing gear fixed.
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

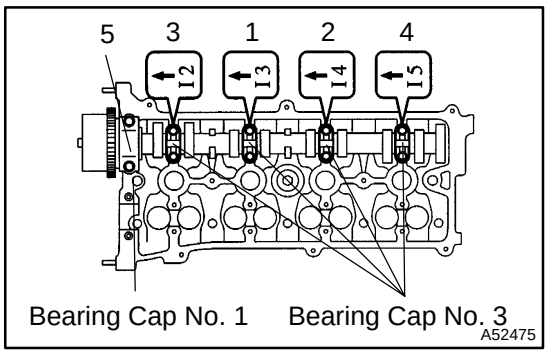
(e) Check that the camshaft timing gear can move to the retarded angle side (the right direction) and is locked at the extreme retarded angle position.



66. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET

(a) Fix the camshaft with a vise, and install the camshaft No. 2 timing gear.
Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

67. INSTALL CAMSHAFT BEARING NO.1



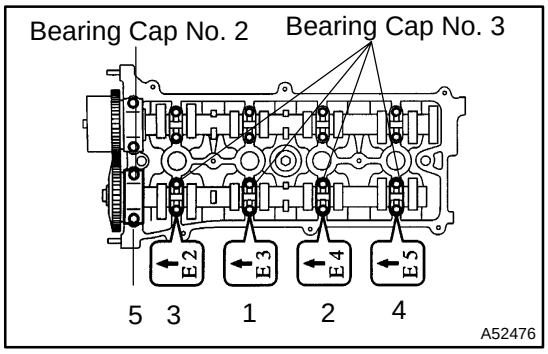
68. INSTALL CAMSHAFT

(a) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.

Torque:
30 N·m (301 kgf·cm, 22 ft·lbf) for bearing cap No. 1
9.0 N·m (92 kgf·cm, 80 in.·lbf) for bearing cap No. 3

NOTICE:

- **Tighten the bolts after deciding the position for the thrust direction of the camshaft by the bearing cap No. 1.**
- **Install the camshaft with its timing mark of the camshaft timing gear on top.**



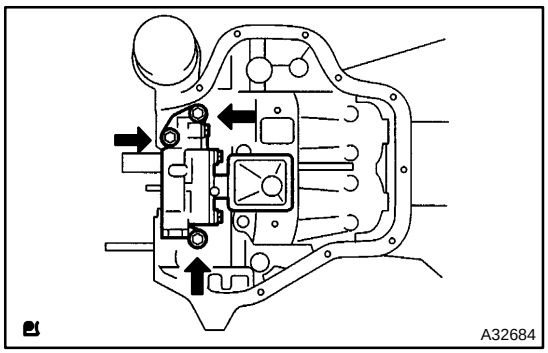
69. INSTALL NO.2 CAMSHAFT

(a) Examine the front marks and numbers of the 5 bearing caps and install them. Then install the 10 bearing cap bolts. Uniformly tighten the bolts in the sequence shown in the illustration.

Torque:
30 N·m (301 kgf·cm, 22 ft·lbf) for bearing cap No. 2
9.0 N·m (92 kgf·cm, 80 in.·lbf) for bearing cap No. 3

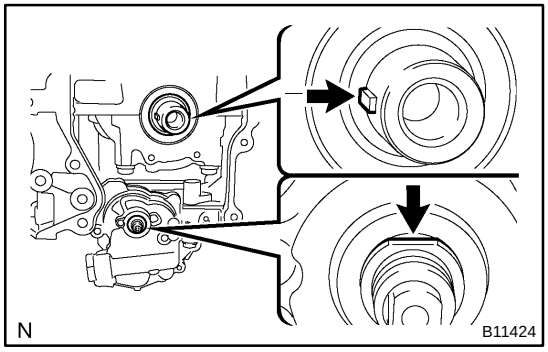
NOTICE:

- **Tighten the bolts after deciding the position for the thrust direction of the camshaft by the bearing cap No. 2.**
- **Install the camshaft with its timing mark of the camshaft timing gear on top.**



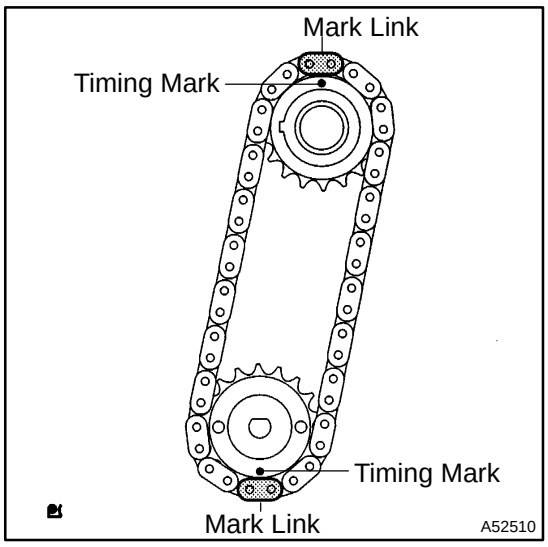
70. INSTALL OIL PUMP ASSY

(a) Install a new gasket and oil pump with the 3 bolts.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)



71. INSTALL NO.2 CHAIN SUB−ASSY

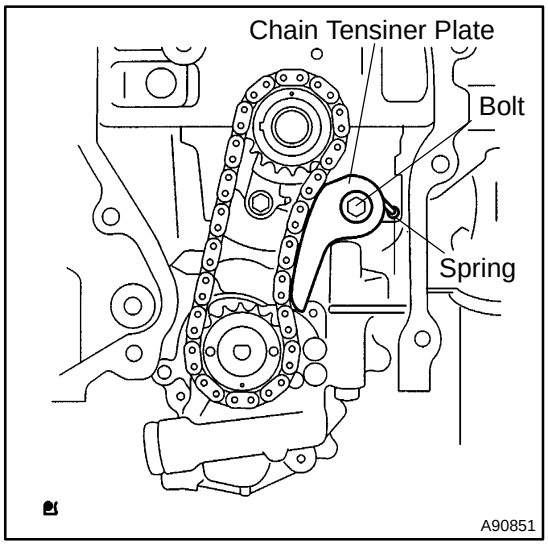
(a) Set the crankshaft key into the left horizontal position.
(b) Turn the cutout of the drive shaft to the top.



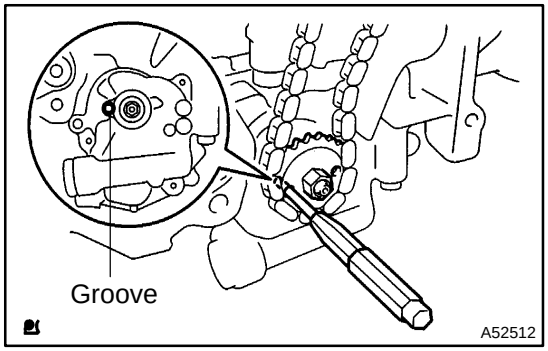
(c) Align the mark links (yellow colored links) with the timing marks of the sprocket as shown in the illustration.

(d) Insert the sprocket with chain to the crankshaft and oil pump shaft.

(e) Temporarily tighten the oil pump driven sprocket with the nut.

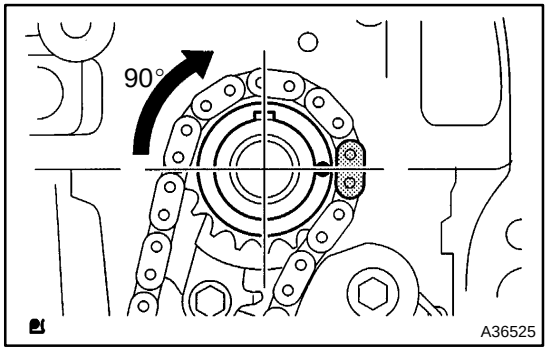


(f) Insert the damper spring into the adjusting hole, and install the chain tensioner plate by the bolt.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



(g) Align the adjusting hole of the sprocket with the groove of the oil pump.

(h) Put a bar (ϕ 4 mm) into the adjusting hole of the sprocket to temporarily lock the sprocket in position. Install the nut.
Torque: 30 N·m (301 kgf·cm, 22 ft·lbf)

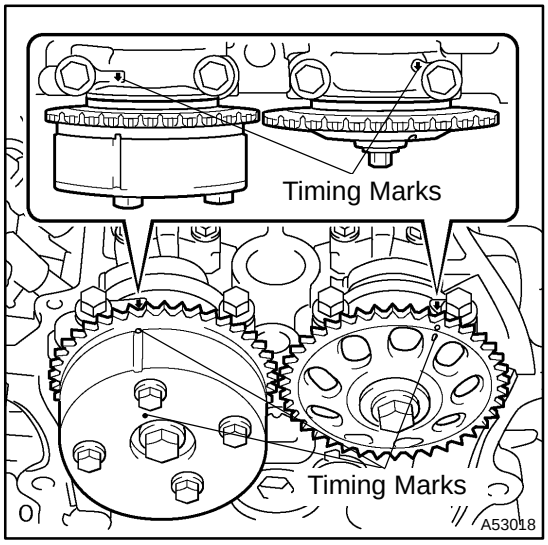


(i) Rotate the crankshaft clockwise by 90°, and align the crankshaft key with the top.

72. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

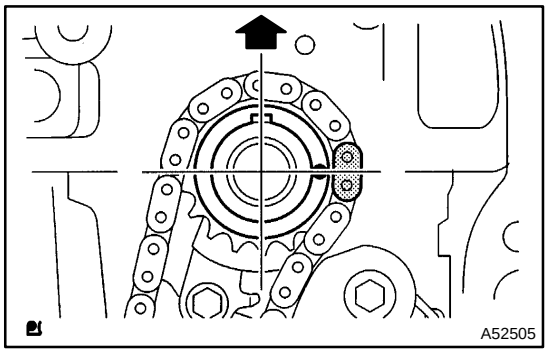
73. INSTALL CHAIN VIBRATION DAMPER NO.1

(a) Install the chain vibration damper with the 2 bolts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

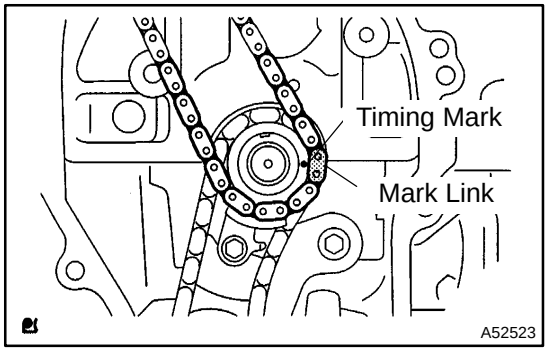


74. INSTALL CHAIN SUB−ASSY

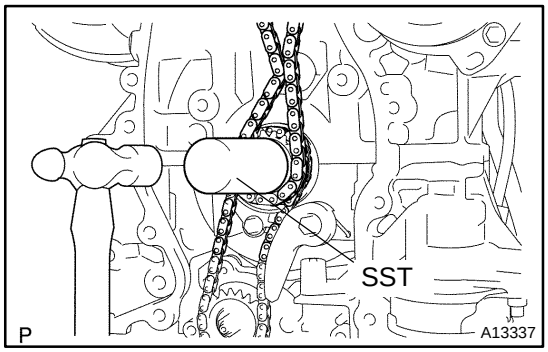
(a) Set the No. 1 cylinder to TDC/compression.
(1) Align the timing marks of the camshaft timing gear/sprocket and bearing caps (No. 1 and No. 2).



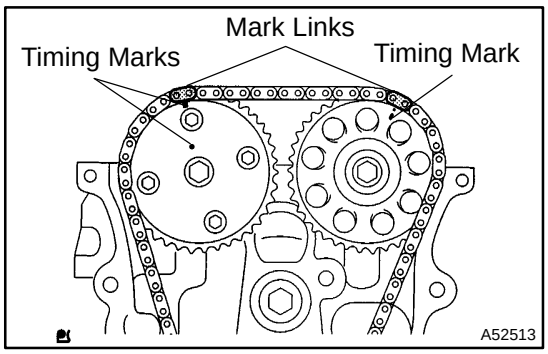
(2) Using the crankshaft pulley bolt, turn the crankshaft and set the set key on the crankshaft upward.



(b) Align the mark link (blue or orange colored link) with the timing mark of the crankshaft timing sprocket.



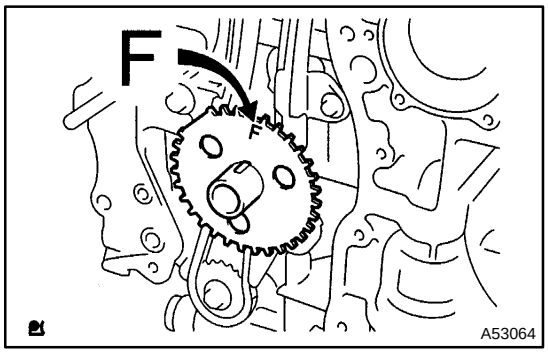
(c) Using SST, tap in the sprocket.
SST 09309−37010



(d) Align the mark links (gold or yellow colored links) with the timing marks of the camshaft timing gear and camshaft timing sprocket, and install the chain.

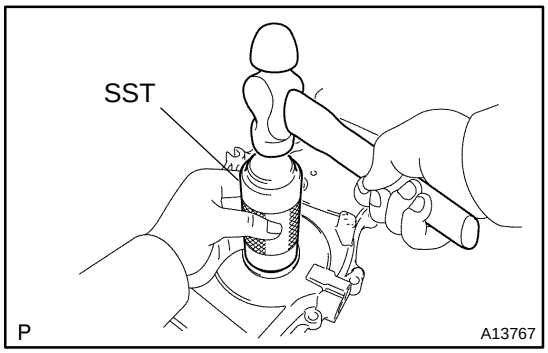
75. INSTALL CHAIN TENSIONER SLIPPER
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

76. INSTALL TIMING CHAIN GUIDE
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



77. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

(a) Install the sensor plate with the F mark facing forward.

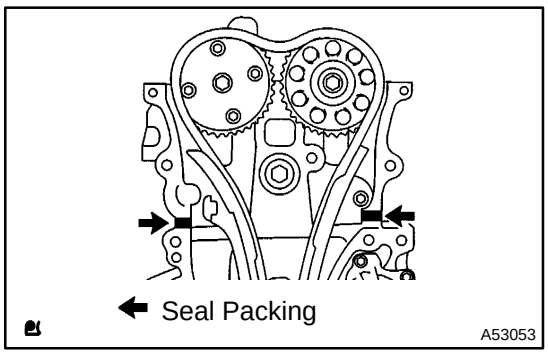


78. INSTALL TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

(a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.
SST 09223−22010

(b) Apply a light coat of MP grease to the lip of the oil seal.

NOTICE:
Keep the gap between the timing chain cover edge and the oil seal free of foreign matter.

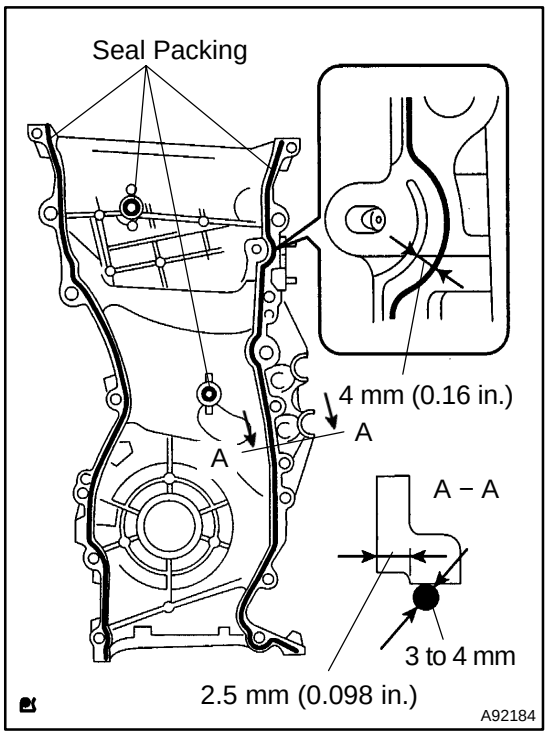


79. INSTALL TIMING CHAIN OR BELT COVER SUB−ASSY

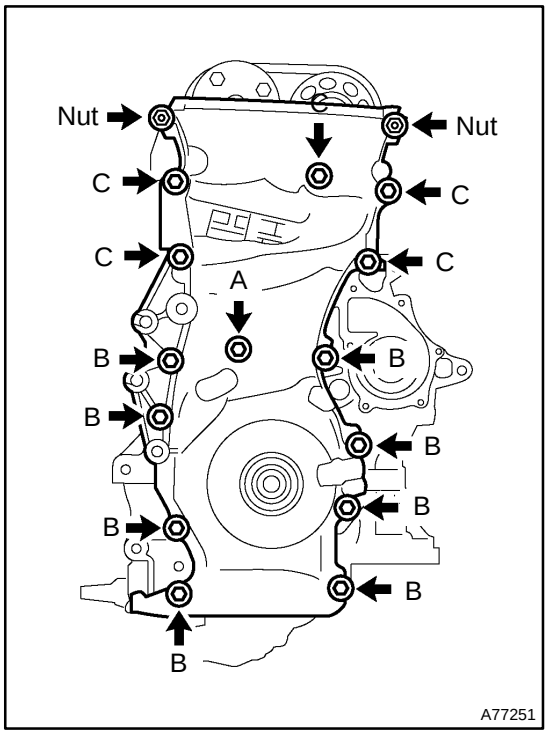
NOTICE:
- **Remove any oil from the contact surface.**
- **Install the chain cover within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

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

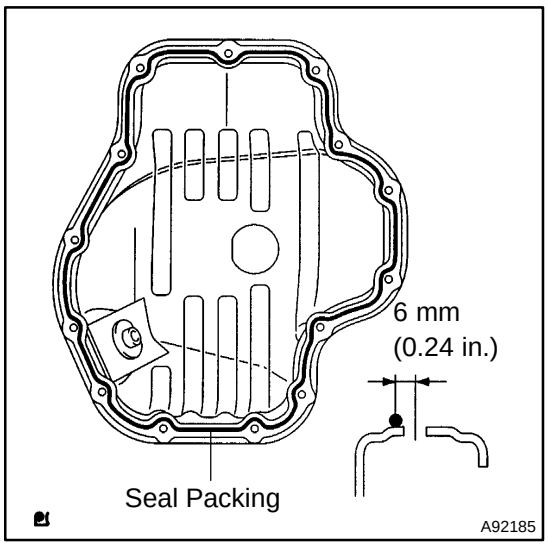
(b) Apply seal packing in a continuous bead (diameter: 2 mm (0.09 in.)) as shown in the illustration.
Seal packing: Part No. 08826−00080 or equivalent



(c) Apply seal packing in a continuous bead (diameter: 3 to 4 mm (0.12 to 0.16 in.)) as shown in the illustration.
Seal packing: Part No. 08826−00080 or equivalent



(d) Install the timing chain cover with the 14 bolts and 2 nuts.
Torque:
9.0 N·m (92 kgf·cm, 80 in.·lbf) for bolt A
21 N·m (214 kgf·cm, 15 ft·lbf) for bolt B
43 N·m (438 kgf·cm, 32 ft·lbf) for bolt C
9.0 N·m (92 kgf·cm, 80 in.·lbf) for nut



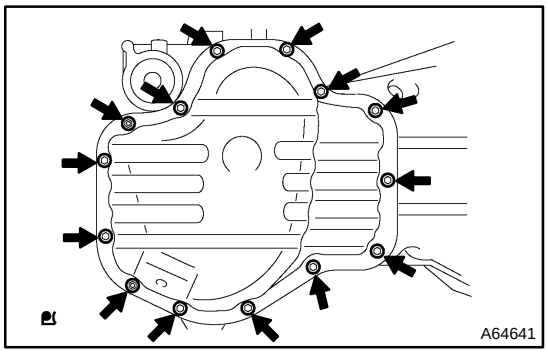
80. INSTALL OIL PAN SUB−ASSY

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the oil pan within 3 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**

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

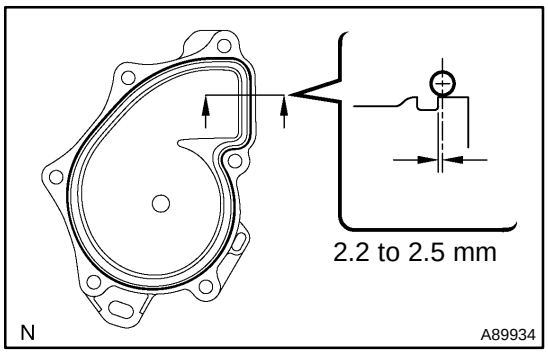
(b) Apply seal packing in a continuous bead (diameter: 3 mm to 4 mm (0.157 in.)) as shown in the illustration, and install the oil pan.
Seal packing: Part No. 08826−00080 or equivalent



(c) Install the oil pan with the 12 bolts and 2 nuts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

81. INSTALL OIL PAN DRAIN PLUG

(a) Install a new gasket and oil pan drain plug with a new gasket.
Torque: 25 N·m (255 kgf·cm, 18 ft·lbf)



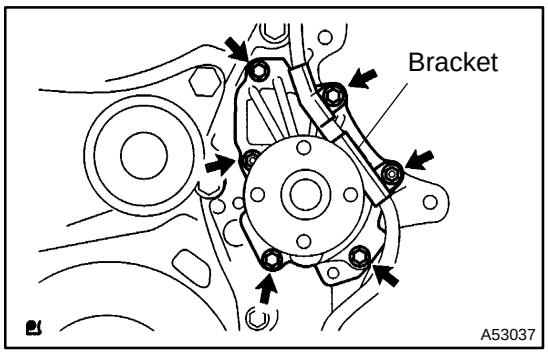
82. INSTALL WATER PUMP ASSY

(a) Clean the contact surface of the cylinder block.

(b) Apply seal packing in a continuous bead (diameter: 2.2 to 2.5 mm (0.09 to 0.10 in.)) to the outside edge of the water pump.
Seal packing: Part No. 08826−00100 or equivalent

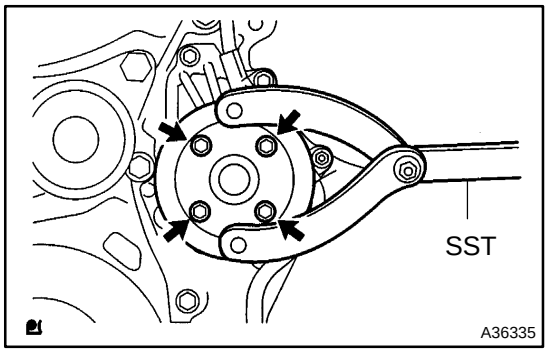
NOTICE:

- **Remove any oil from the contact surface.**
- **Install the water pump within 5 minutes after applying seal packing.**
- **Do not start the engine for at least 2 hours after installing.**



(c) Install the water pump and bracket with the 4 bolts and 2 nuts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

NOTICE:
Tighten the outside bolts and nuts with the clamp.

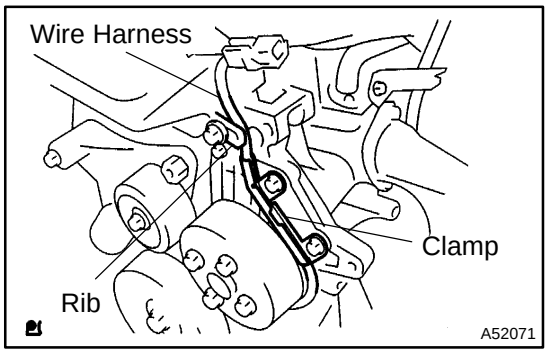


83. INSTALL WATER PUMP PULLEY

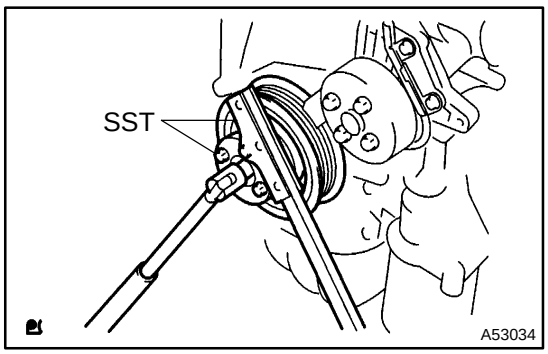
(a) Using SST, install the water pump pulley.
SST 09960−10010 (09962−01000, 09963−00700)
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

84. INSTALL CRANKSHAFT POSITION SENSOR

(a) Install the sensor with the bolt.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)



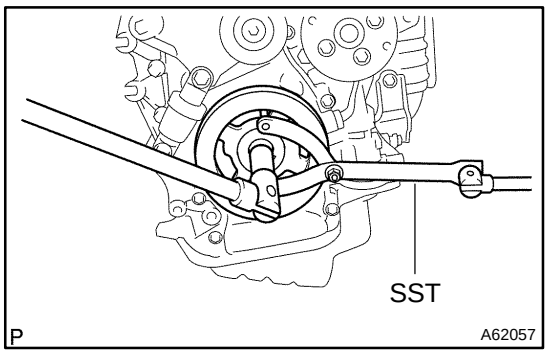
(b) Confirm that the wire harness of the sensor is placed as shown in the illustration.



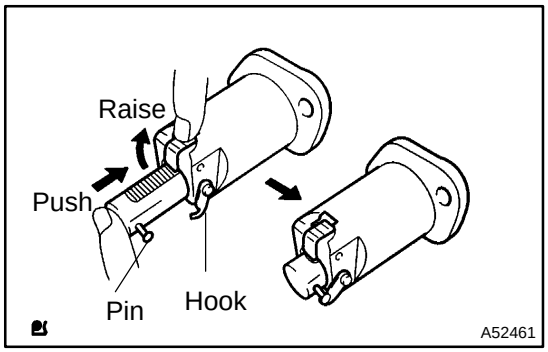
85. INSTALL CRANKSHAFT PULLEY

(a) Install the pulley.

(b) TMC made:
Using SST, tighten the bolt.
SST 09213−54015 (91651−60855), 09330−00021
Torque: 170 N·m (1,733 kgf·cm, 125 ft·lbf)

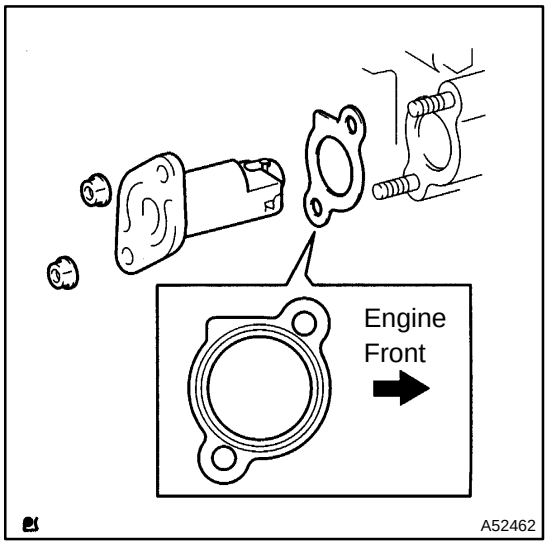


(c) TMMK made:
Using SST, tighten the set bolt.
SST 09960−10010 (09962−01000, 09963−01000)
Torque: 170 N·m (1,733 kgf·cm, 125 ft·lbf)



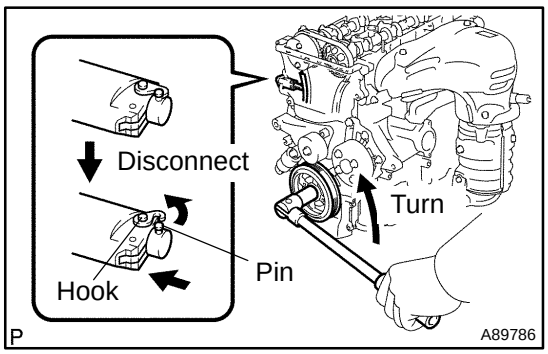
86. INSTALL CHAIN TENSIONER ASSY NO.1

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

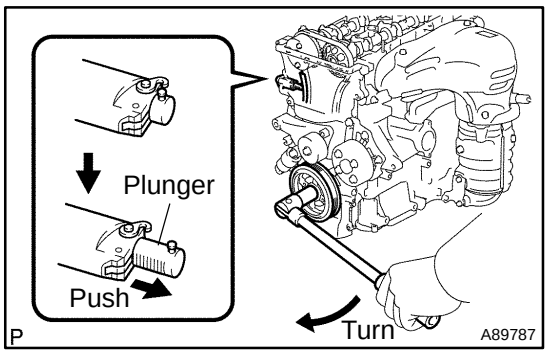


(b) Install a new gasket and the chain tensioner with the 2 nuts.
Torque: 9.0 N·m (92 kgf·cm, 80 in.·lbf)

NOTICE:
If the hook is released while inserting, apply the hook again, and insert the chain tensioner.



(c) Turn the crankshaft counterclockwise and check that the plunger knock pin is disconnected from the hook.



(d) Turn the crankshaft clockwise and check that the slipper is pushed by the plunger.

87. INSPECT VALVE CLEARANCE (See page 14−7)

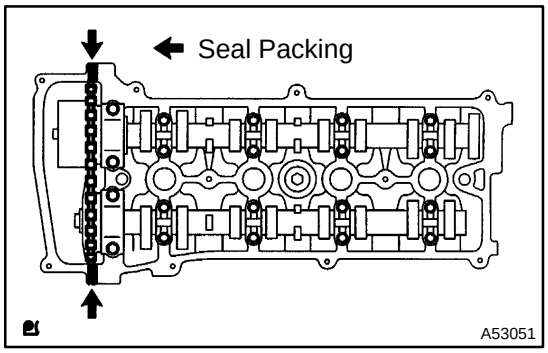
88. ADJUST VALVE CLEARANCE (See page 14−7)

89. INSTALL CYLINDER HEAD COVER GASKET

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

90. INSTALL CYLINDER HEAD COVER SUB−ASSY

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

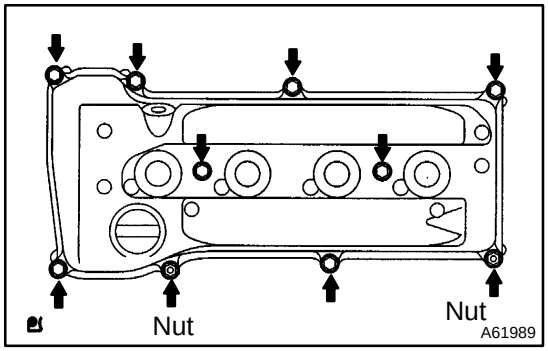


(b) Apply seal packing to the 2 locations shown in the illustration.

Seal packing: Part No. 08826−00080 or equivalent

NOTICE:

- **Remove any oil from the contact surface.**
- **Install the cylinder head cover within 5 minutes after applying seal packing.**
- **Do not apply engine oil for at least 2 hours after installing.**



(c) Install the cylinder head cover with the 8 bolts and 2 nuts.

Torque: 11 N·m (112 kgf·cm, 8 ft·lbf)

91. INSTALL SPARK PLUG

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

92. INSTALL VENTILATION VALVE SUB−ASSY

(a) Apply adhesive on the threads of the ventilation valve.

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

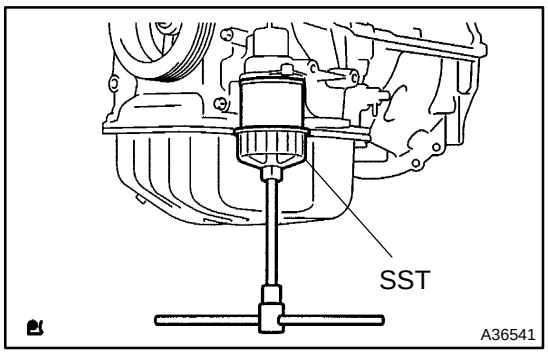
Adhesive: Part No. 08833−00070 THREE BOND 1324 or equivalent

93. INSTALL OIL FILLER CAP SUB−ASSY

94. INSTALL OIL FILTER UNION

(a) Using a 12 mm hexagon wrench, install the oil filter union.

Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)



95. INSTALL OIL FILTER SUB−ASSY

(a) Check and clean the oil filter installation surface.

(b) Apply clean engine oil to the gasket of a new oil filter.

(c) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.

(d) Using SST, tighten it an additional 3/4 turn.
SST 09228−06501