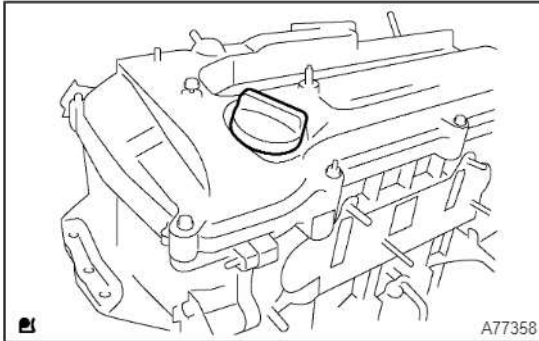
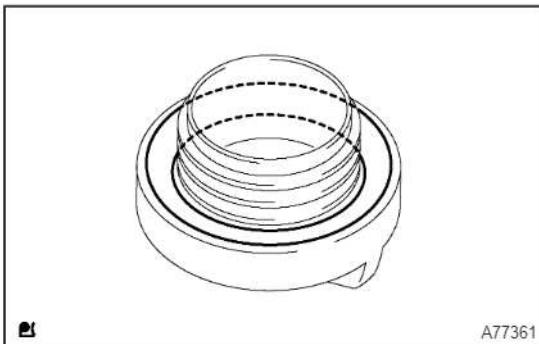


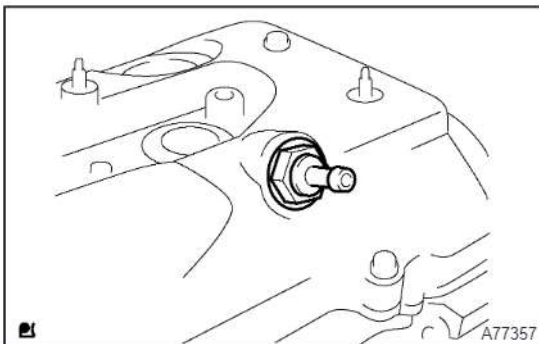
OVERHAUL



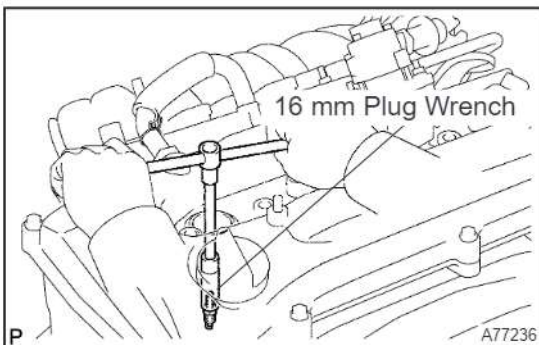
1. REMOVE OIL FILLER CAP SUB-ASSY



2. REMOVE OIL FILLER CAP GASKET

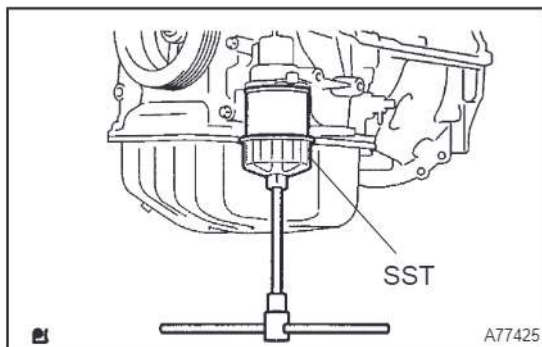


3. REMOVE VENTILATION VALVE SUB-ASSY



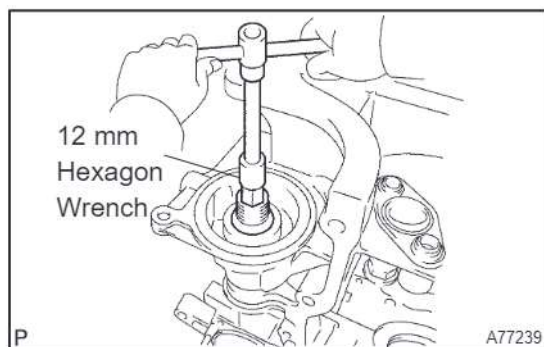
4. REMOVE SPARK PLUG

- (a) Using a 16 mm plug wrench, remove the spark plugs.



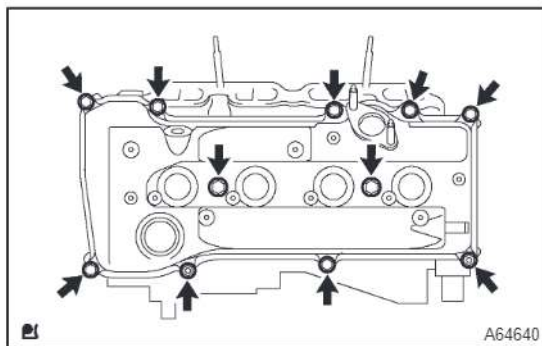
5. REMOVE OIL FILTER SUB-ASSY

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



6. REMOVE OIL FILTER UNION

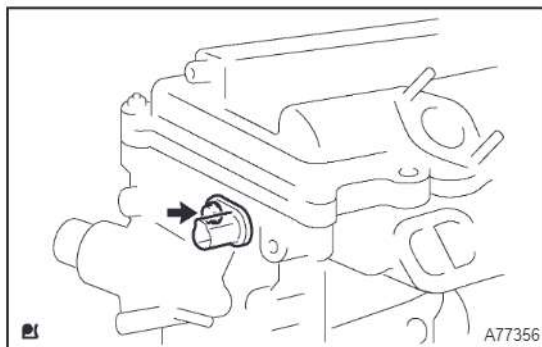
- (a) Using a 12 mm socket hexagon wrench, remove the oil filter union.



7. REMOVE CYLINDER HEAD COVER SUB-ASSY

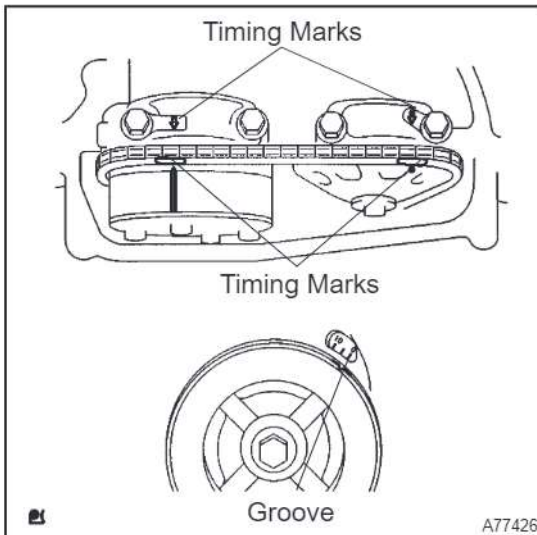
- (a) Remove 9 bolts and 2 nuts from the cylinder head cover.
(b) Remove the cylinder head cover.

8. REMOVE CYLINDER HEAD COVER GASKET



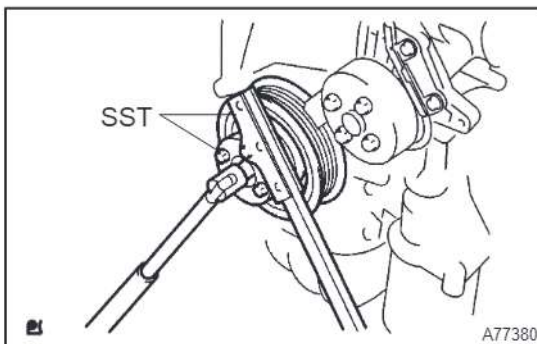
9. REMOVE CAMSHAFT POSITION SENSOR

- (a) Remove the bolt and the camshaft position sensor.

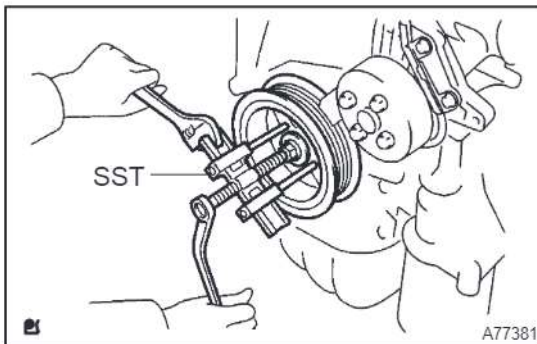


10. REMOVE CRANKSHAFT PULLEY

- (a) Set No. 1 cylinder to TDC/ compression.
- (1) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.
 - (2) 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.
- If not, turn the crankshaft 1 revolution (360°) and align the mark as above.



- (b) Remove the crankshaft pulley.
- (1) Using SST, fix the crankshaft pulley and loosen the pulley set bolt.
- SST 09213-54015 (91651-60855), 09330-00021,



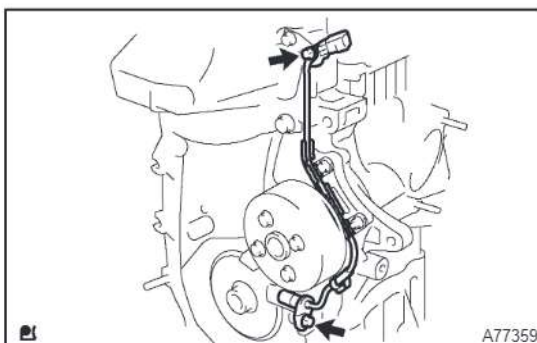
- (2) Using the pulley set bolt and SST, remove the crankshaft pulley.
- SST 09950-50013 (09951-05010, 09952-05010, 09953-05020, 09954-05021)

11. REMOVE CHAIN TENSIONER ASSY NO.1

NOTICE:

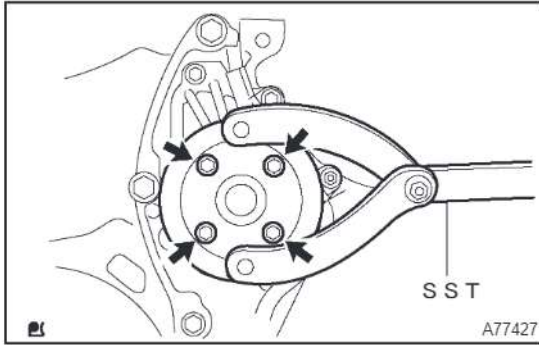
Do not turn the crankshaft.

- (a) Separate a clamp.

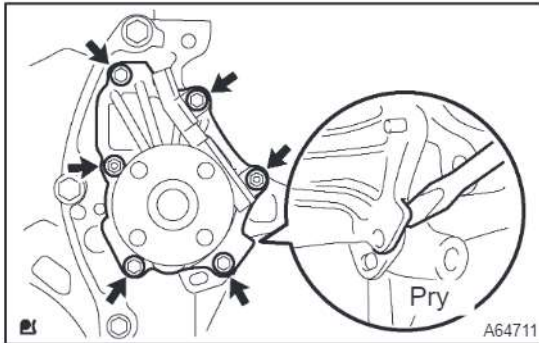


12. REMOVE CRANKSHAFT POSITION SENSOR

- (a) Remove the 2 bolts and the crankshaft position sensor.

**13. REMOVE WATER PUMP PULLEY**

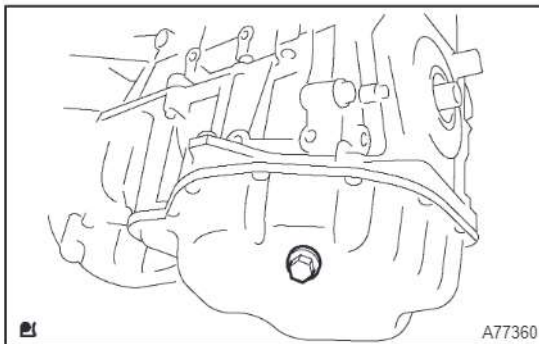
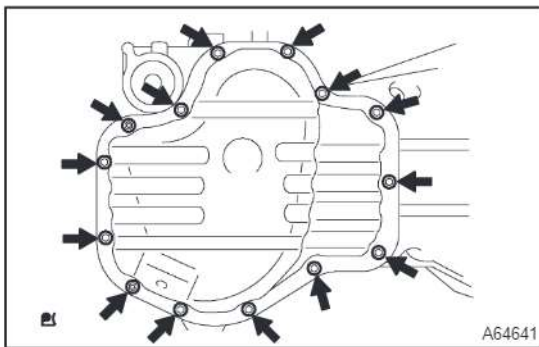
- (a) Using SST, remove the 4 bolts and the water pump pulley.
SST 09960-10010 (09962-01000, 09963-00700)

**14. REMOVE WATER PUMP ASSY**

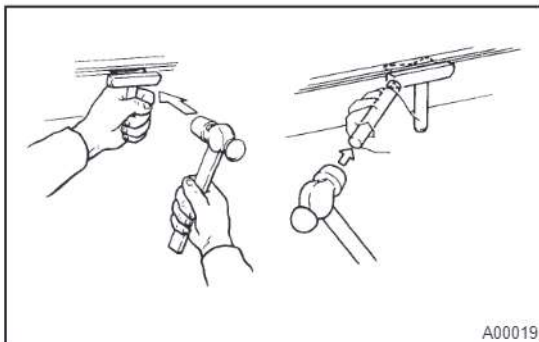
- (a) Remove the 4 bolts, 2 nuts and clamp.
(b) Using a screw driver, pry between the water pump and cylinder block, and then remove the water pump.

NOTICE:

Be careful not to damage the contact surface of the water pump and cylinder block.

**15. REMOVE OIL PAN DRAIN PLUG****16. REMOVE OIL PAN SUB-ASSY**

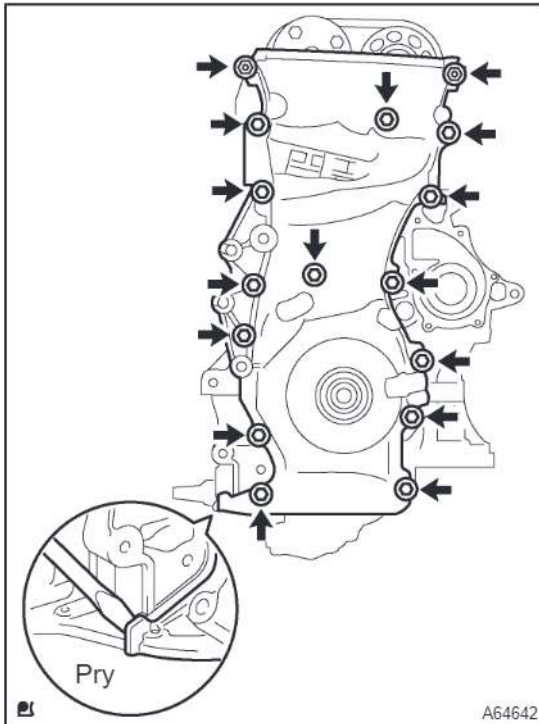
- (a) Remove the 12 bolts and 2 nuts.



- (b) Insert the blade of SST between the crank case, timing chain cover 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 timing chain cover, crank case and oil pan.

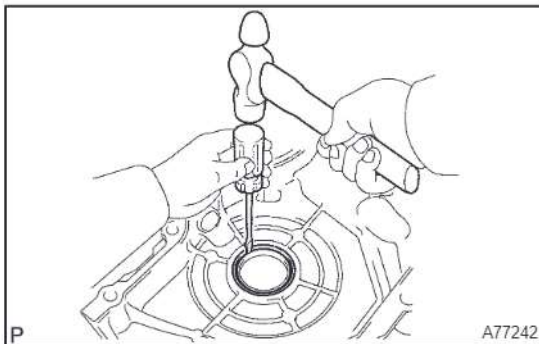


17. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSY

- Remove the 14 bolts and 2 nuts.
- Using a screwdriver, pry between the timing chain cover and cylinder head or cylinder block.
- Remove the timing chain cover.

NOTICE:

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



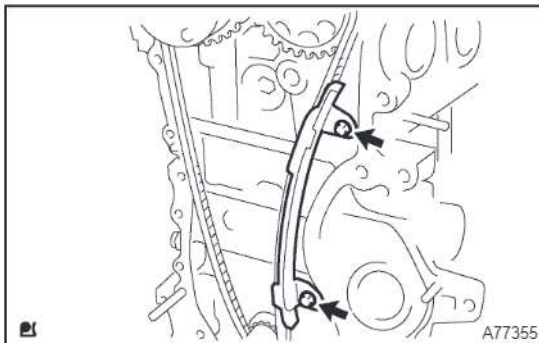
18. REMOVE TIMING GEAR CASE OR TIMING CHAIN CASE OIL SEAL

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

19. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

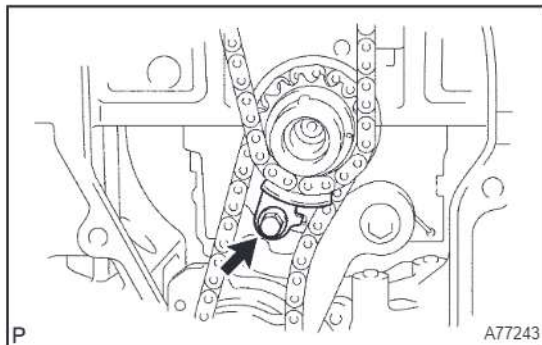
20. REMOVE CHAIN TENSIONER SLIPPER

- Remove the bolt and chain tensioner slipper.

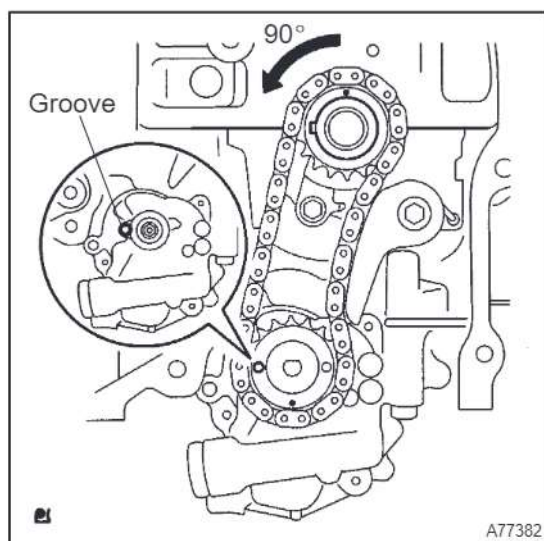


21. REMOVE CHAIN VIBRATION DAMPER NO.1

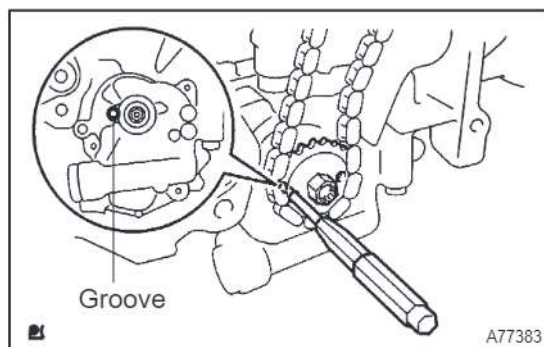
- Remove the 2 bolts and the chain vibration damper No. 1.

**22. REMOVE TIMING CHAIN GUIDE**

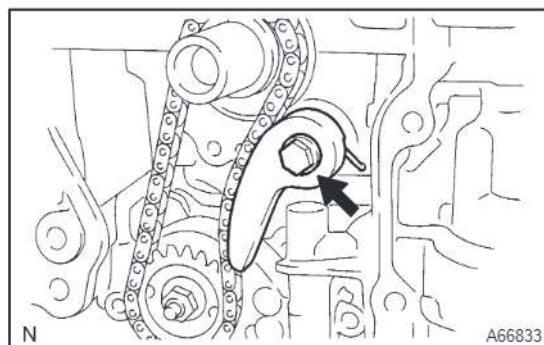
- (a) Remove the bolt and the timing chain guide.

23. REMOVE CHAIN SUB-ASSY**24. REMOVE CRANKSHAFT TIMING GEAR OR SPROCKET****25. REMOVE NO.2 CHAIN SUB-ASSY**

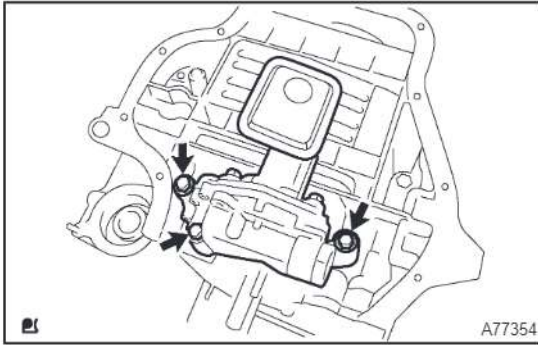
- (a) Turn the crankshaft counterclockwise 90°, and align adjusting hole of the oil pump drive shaft gear with the groove of the oil pump.



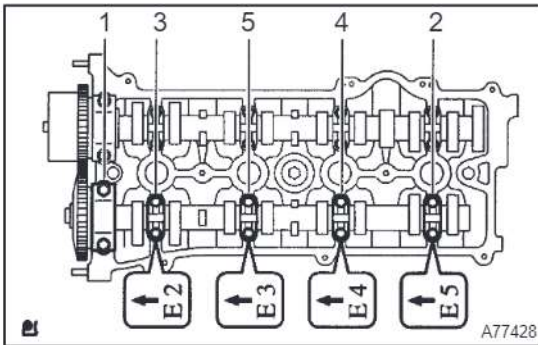
- (b) Insert a 4 mm diameter bar in the adjusting hole drive shaft gear to lock in position, and remove the nut.



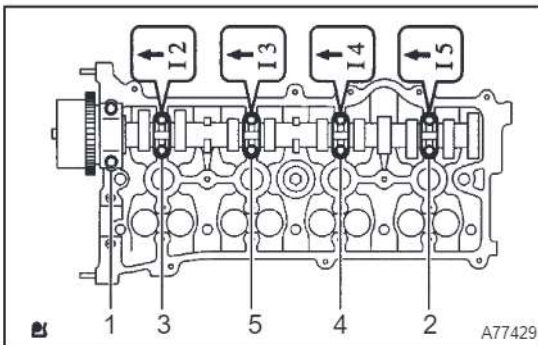
- (c) Remove the bolt, chain tensioner and spring.
(d) Remove the oil pump drive shaft gear and chain No.2.

**26. REMOVE OIL PUMP ASSY**

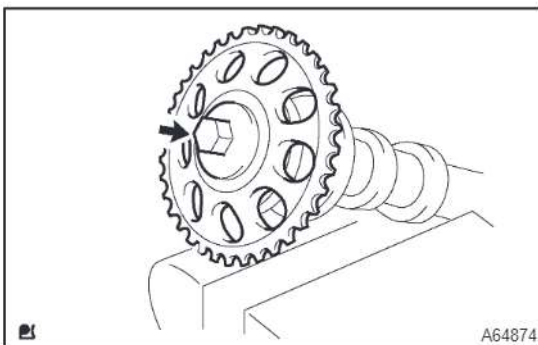
- (a) Remove the 3 bolts, then remove the oil pump and gasket.

**27. REMOVE NO.2 CAMSHAFT**

- (a) Remove the No. 2 and No. 3 camshaft bearing caps in the sequence shown in the illustration.
(b) Remove the No. 2 camshaft.

**28. REMOVE CAMSHAFT**

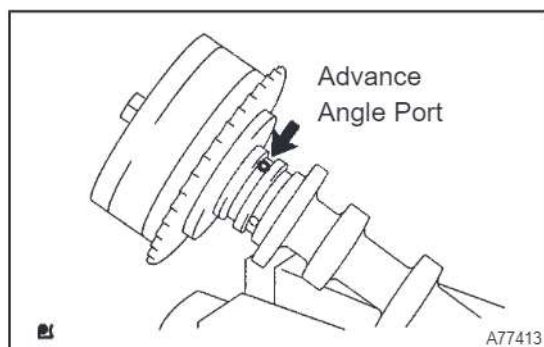
- (a) Remove the No. 1 and No. 3 camshaft bearing caps in the sequence shown in the illustration.
(b) Remove the camshaft.

29. REMOVE CAMSHAFT BEARING NO.1**30. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET**

- (a) Clamp the No. 2 camshaft in a vise, and remove the camshaft timing gear.

NOTICE:

Be careful not to damage the No. 2 camshaft.



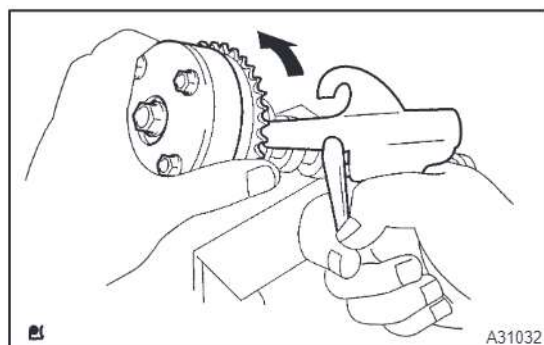
31. REMOVE CAMSHAFT TIMING GEAR ASSY

- (a) Clamp the camshaft in a vise, and make sure the camshaft timing gear assembly does not move.

NOTICE:

Be careful not to damage the camshaft.

- (b) Cover all the oil ports with vinyl tape except the advance angle port as shown in the illustration.



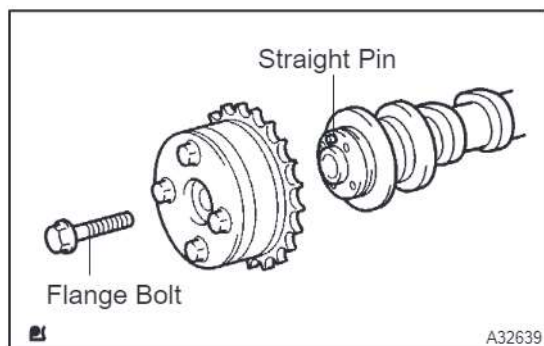
- (c) Put air pressure into the oil port with 150 kPa (1.5 kgf/cm² 21 psi), and turn the camshaft timing gear assembly to the advance direction (counterclockwise) by force.

NOTICE:

Some oil spraying will occur. Be prepared to catch the spray with a shop rag.

HINT:

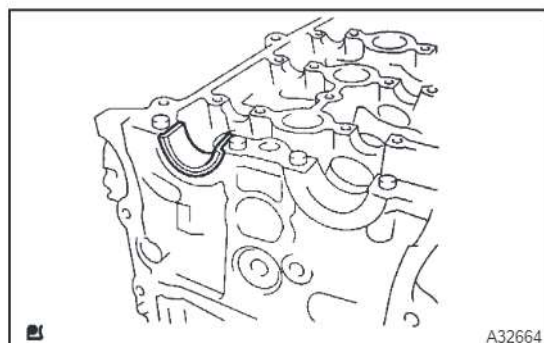
Depending on the pressure, the VVT timing sprocket may turn to the advance angle side without applying force by hand. Also, if the pressure can be hardly applied because of the air leakage from the port, it might be difficult to get the lock-pin to release.



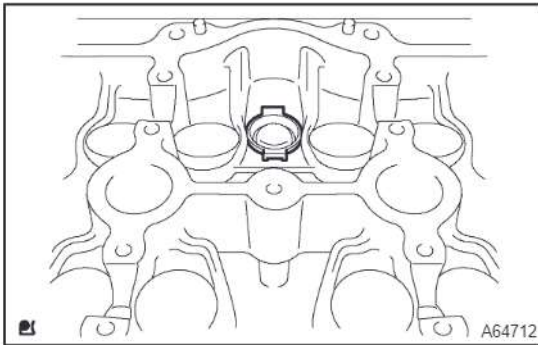
- (d) Remove the flange bolt from the camshaft timing gear assembly.

NOTICE:

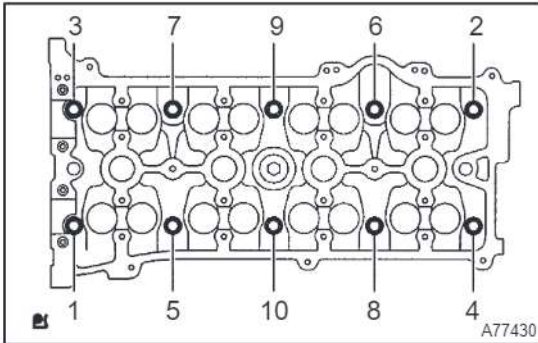
- Be sure not to remove the other 4 bolts.
- In case of reusing the camshaft timing gear assembly, release the straight pin lock first, and then install the gear.



32. REMOVE CAMSHAFT BEARING NO.2



33. REMOVE CAMSHAFT HOUSING PLUG



34. REMOVE CYLINDER HEAD SUB-ASSY

- (a) Using several steps, loosen the 10 cylinder head bolts with a 10 mm bi-hexagon wrench uniformly in the sequence shown.
- (b) Remove 10 cylinder head bolts and plate washers.

NOTICE:

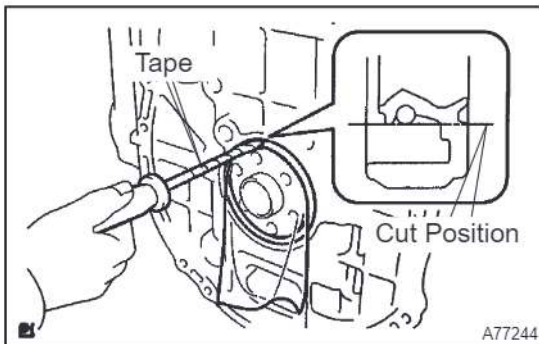
- Be careful not to drop washers into the cylinder head.
- Head warpage or cracking could result from removing bolts in an incorrect order.

35. REMOVE CYLINDER HEAD GASKET

36. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSY

37. REMOVE OIL CONTROL VALVE FILTER

- (a) Using a 12 mm hexagon wrench, remove the plug, gasket and oil control valve filter.

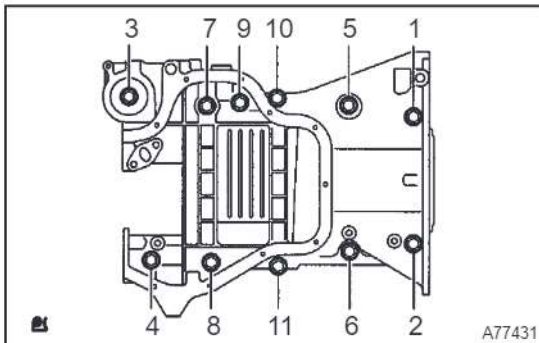


38. REMOVE ENGINE REAR OIL SEAL

- (a) Using a knife, cut off the oil seal lip.
- (b) Using a screwdriver with the tip wrapped in tape, pry out the oil seal.

NOTICE:

After the removal, check the crankshaft is not damaged. If it is damaged, smooth the surface with 400 grit sand paper.



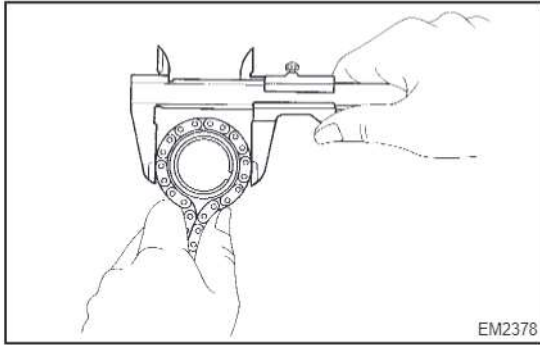
39. REMOVE STIFFENING CRANKCASE ASSY

- (a) Loosen and remove the 11 bolts uniformly in several steps, in the sequence shown.
- (b) Using a screw driver, remove the crankcase by prying the 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.

**40. INSPECT OIL PUMP DRIVE GEAR**

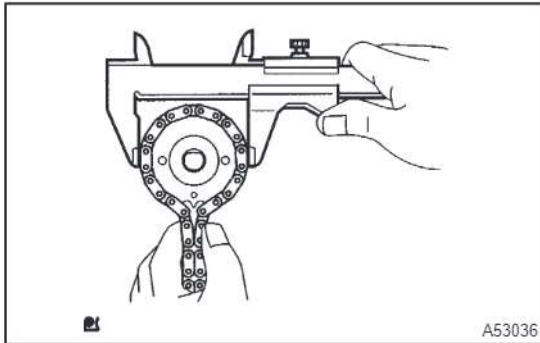
- (a) Wrap the chain around the drive gear.
- (b) Using vernier calipers, measure the drive gear diameter with the chain wrapped.

NOTICE:

Vernier calipers must contact the chain rollers for the measuring.

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

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

**41. INSPECT OIL PUMP DRIVE SHAFT GEAR**

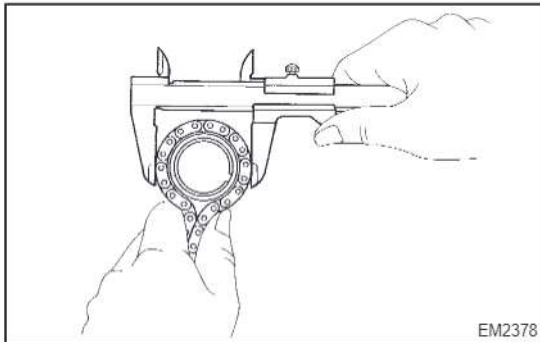
- (a) Wrap the chain around the drive shaft gear.
- (b) Using vernier calipers, measure the drive shaft gear diameter with the chain wrapped.

NOTICE:

Vernier calipers must contact the chain rollers for the measuring.

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

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

**42. INSPECT CRANKSHAFT TIMING GEAR OR SPROCKET**

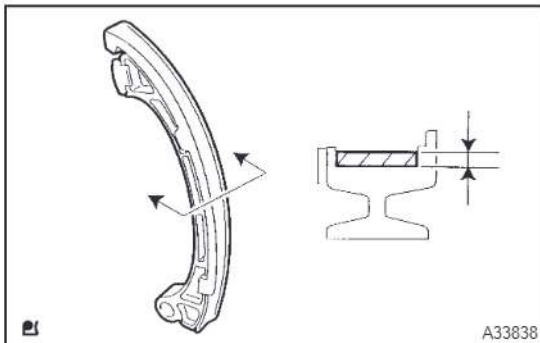
- (a) Wrap the chain around the timing gear.
- (b) Using vernier calipers, measure the timing gear diameter with the chain wrapped.

NOTICE:

Vernier calipers must contact the chain rollers for the measuring.

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

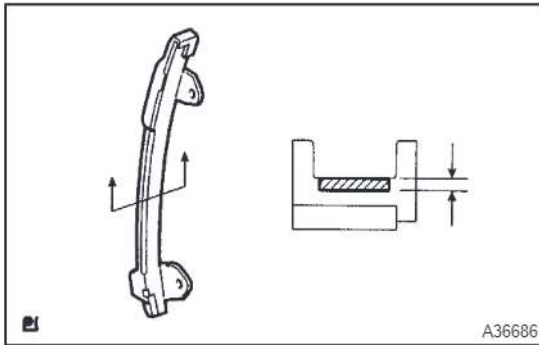
If the diameter is less than minimum, replace the chain and timing gear.

**43. INSPECT CHAIN TENSIONER SLIPPER**

- (a) Measure the chain tensioner slipper wears.

Maximum wear: 1.0 mm (0.039 in.)

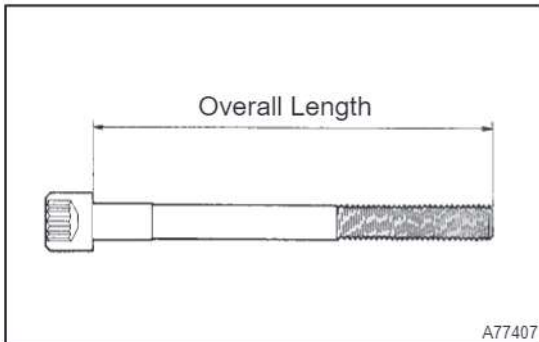
If the wear is greater than maximum, replace the chain tensioner slipper.

**44. INSPECT CHAIN VIBRATION DAMPER NO.1**

- (a) Measure the chain vibration damper No. 1 wears.

Maximum wear: 1.0 mm (0.039 in.)

If the wear is greater than maximum, replace the chain vibration damper No. 1

**45. INSPECT CYLINDER HEAD SET BOLT**

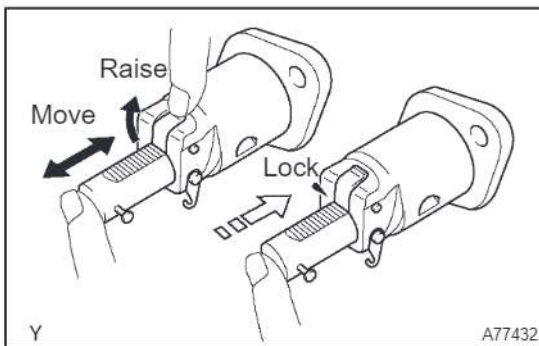
- (a) Using vernier calipers, measure the length of head bolts from the seat to the end.

Standard bolt length:

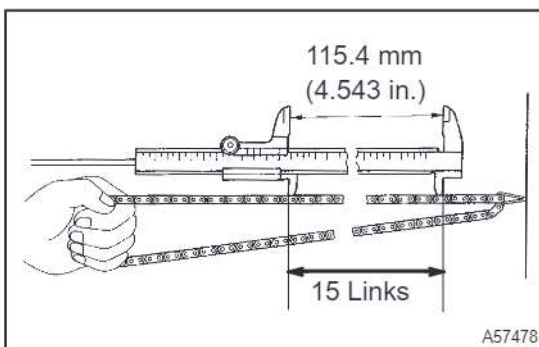
161.3 to 162.7 mm (6.350 to 6.406 in.)

Maximum bolt length: 164.2 mm (6.465 in.)

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

**46. INSPECT CHAIN TENSIONER ASSY NO.1**

- (a) Check the plunger moves smoothly when the ratchet pawl is raised, and when the ratchet pawl is released, the plunger is locked in place.
- (b) Replace the ratchet pawl and check that the plunger is locked in place by the ratchet pawl and does not move when pushing with your finger.

**47. INSPECT CHAIN SUB-ASSY**

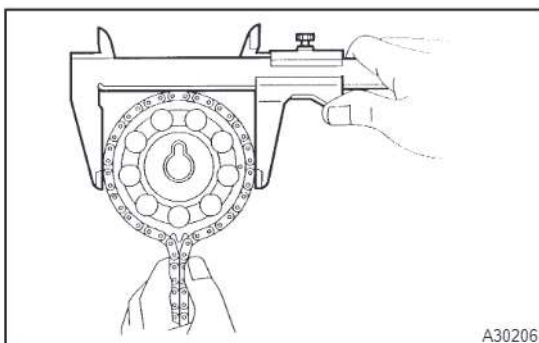
- (a) Using vernier calipers, measure length of the 15 links with the chain dully stretched.

Maximum chain elongation: 115.4 mm (4.543 in.)

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

NOTICE:

Make the same measurements pulling at 3 or more random places to obtain an average length.

**48. INSPECT CAMSHAFT TIMING GEAR OR SPROCKET**

- (a) Wrap the chain around the timing sprocket.
- (b) Using vernier calipers, measure the timing sprocket diameter with the chain wrapped.

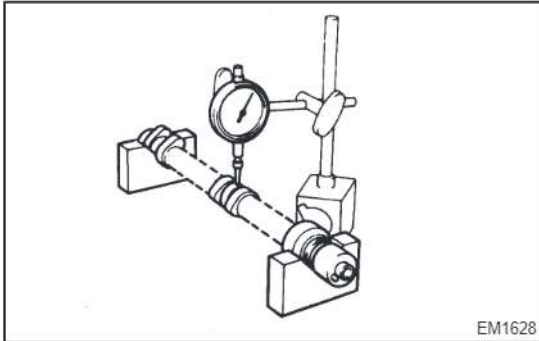
Minimum sprocket diameter (w/ chain):

97.3 mm (3.831 in.)

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

NOTICE:

Vernier calipers must contact the chain rollers for the measuring.



EM1628

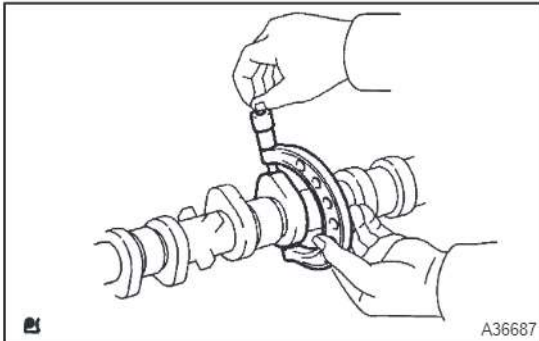
49. INSPECT CAMSHAFT

(a) Inspect 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: 0.05 mm (0.0020 in.)

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



A36687

(b) Inspect cam lobe height.

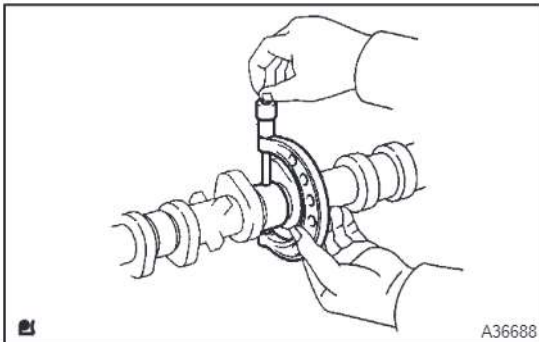
- (1) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

45.510 to 45.610 mm (1.7917 to 1.7957 in.)

Minimum cam lobe height: 45.400 mm (1.7874 in.)

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



A36688

(c) Inspect camshaft journals.

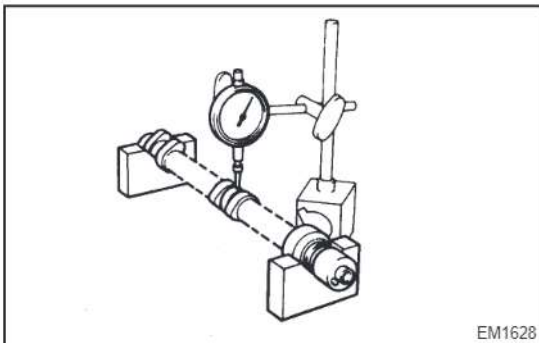
- (1) Using a micrometer, measure the journal diameter.

Journal diameter:

No. 1 35.971 to 35.985 mm (1.4162 to 1.4167 in.)

Others 22.959 to 22.975 mm (0.9040 to 0.9045 in.)

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



EM1628

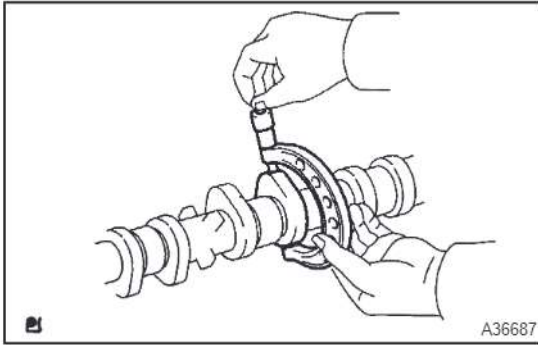
50. INSPECT NO.2 CAMSHAFT

(a) Inspect the No. 2 camshaft for runout.

- (1) Place the No. 2 camshaft on V-blocks.
- (2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.05 mm (0.0020 in.)

If the circle runout is greater than maximum, replace the No. 2 camshaft.



(b) Inspect cam lobe height.

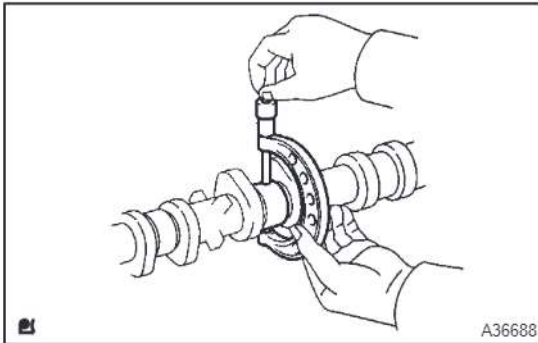
(1) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

45.983 to 46.083 mm (1.8106 to 1.8143 in.)

Minimum cam lobe height: 45.873 mm (1.8060 in.)

If the cam lobe height is less than minimum, replace the No. 2 camshaft.



(c) Inspect camshaft journals.

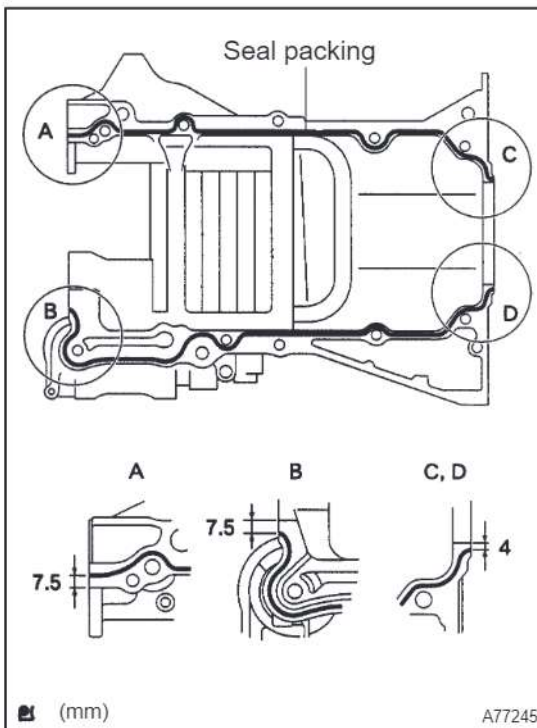
(1) Using a micrometer, measure the journal diameter.

Journal diameter:

No. 1 35.971 to 35.985 mm (1.4162 to 1.4167 in.)

Others 22.959 to 22.975 mm (0.9040 to 0.9045 in.)

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



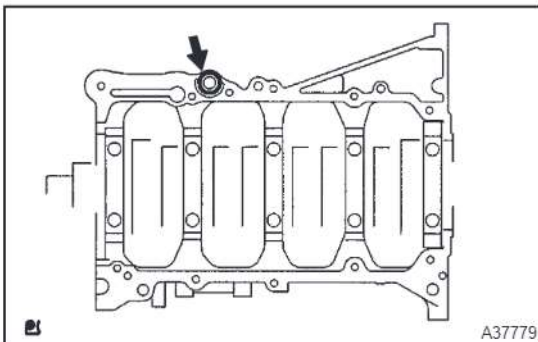
51. INSTALL STIFFENING CRANKCASE ASSY

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

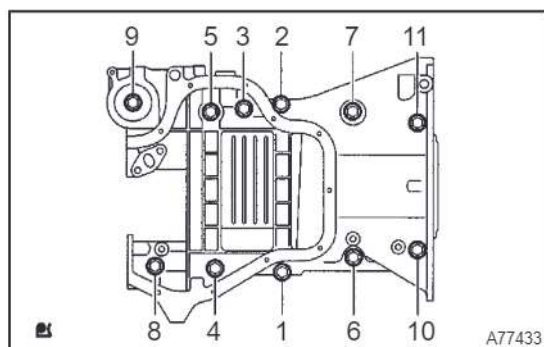
Seal Packing: Part No. 08826 – 00080 or equivalent

NOTICE:

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

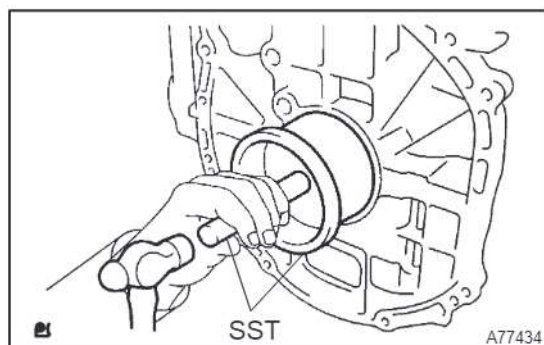


(b) Install a new O-ring to the place shown in the illustration.



- (c) Tighten the 11 bolts in several steps in the sequence shown in the illustration.

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



52. INSTALL ENGINE REAR OIL SEAL

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

NOTICE:

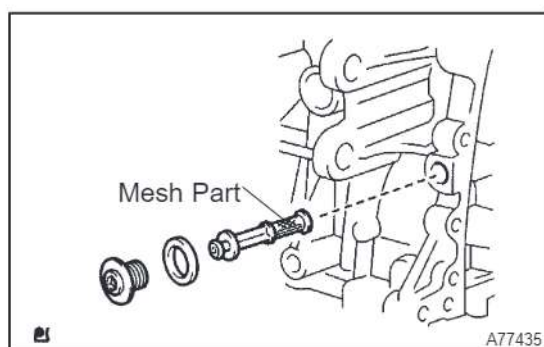
Keep the lip free of foreign material.

- (b) Using SST and a hammer, equally 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.

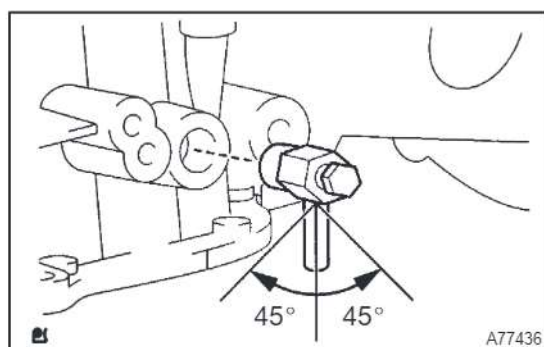


53. INSTALL OIL CONTROL VALVE FILTER

- (a) Check that no foreign material on the mesh part of the filter.

- (b) Using a 6 mm socket hexagon wrench, install the oil control valve filter with a new gasket.

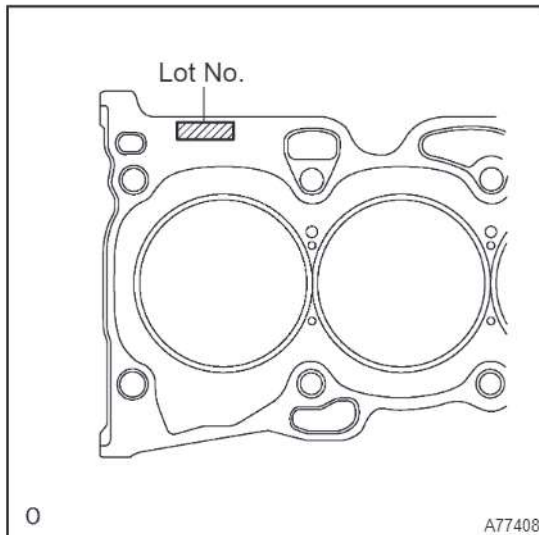
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)



54. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSY

- (a) Install the water drain cock sub assembly within the range shown in the illustration.

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

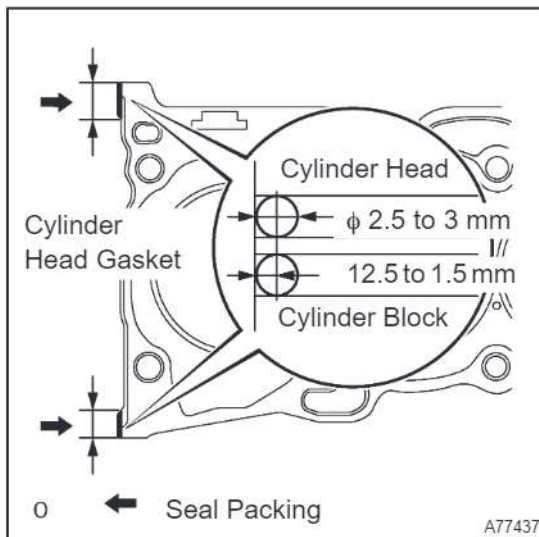


55. INSTALL CYLINDER HEAD GASKET

- (a) Place a new cylinder head 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.
- Place the cylinder head carefully in order not to damage the gasket with the bottom part of the head.



56. INSTALL CYLINDER HEAD SUB-ASSY

HINT:

The cylinder head bolts are tightened in 2 successive steps.

- (a) Apply a continuous bead (Diameter 2.5 to 3.0 mm (0.098 to 0.118 in.)) of seal packing on the places as shown in the illustration.

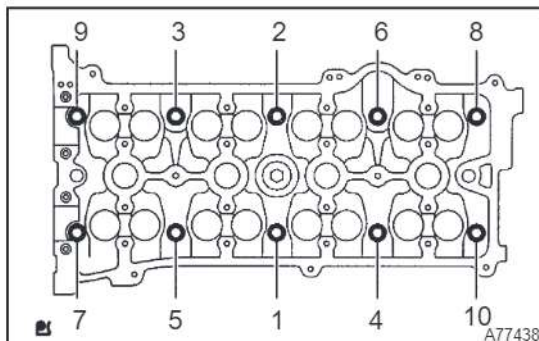
Seal Packing: Part No. 08826 – 00080, or equivalent.

NOTICE:

- Remove any oil from the contact surface.
 - Install the cylinder head within 3 minutes after applying seal packing.
 - Do not start the engine within 2 hours after installing.
- (b) Apply a light coat of engine oil on the threads of the cylinder head bolts.
- (c) Install the bolts and plate washers to the cylinder head.

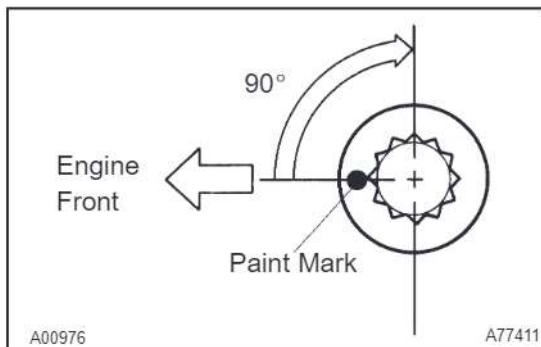
NOTICE:

Do not drop the washers into the cylinder head.

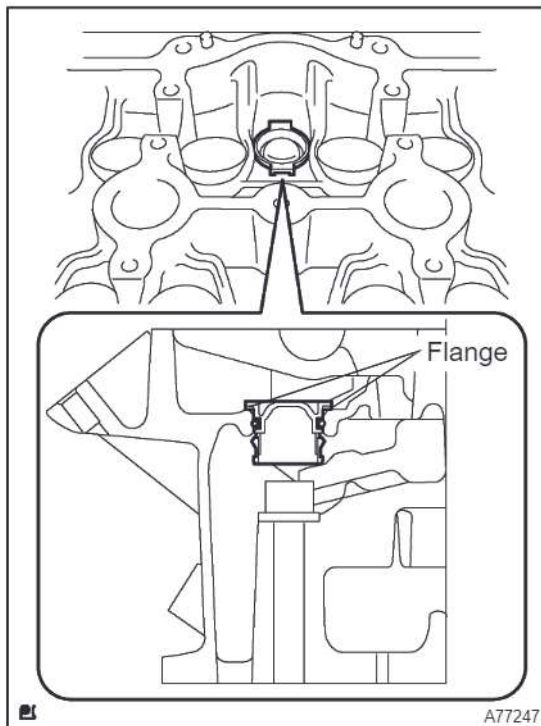


- (d) Using several steps tighten each bolt with a 10 mm bi-hexagon wrench uniformly in the sequence shown in the illustration.

Torque: 79 N·m (806 kgf·cm, 58 ft·lbf)



- (e) Mark each cylinder head bolt head on the front side with paint.
- (f) Retighten the cylinder head bolts by 90° in the same sequence shown as step (b).
- (g) Check that each painted mark is now at a 90° angle to the front.



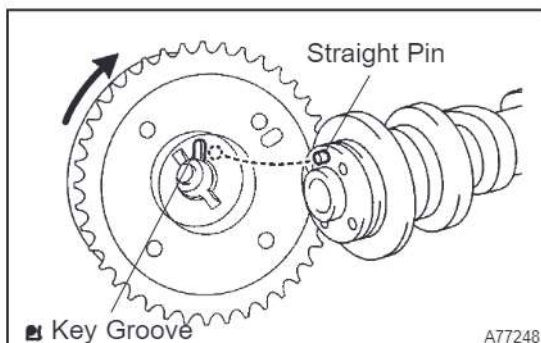
57. INSTALL CAMSHAFT HOUSING PLUG

- (a) Apply engine oil to a new O-ring, and install the camshaft housing plug.

NOTICE:

- Install the plug with its flange portions faced the manifold.
- Insert the plug into the cylinder head until its flange portions reach the installation surface of the cylinder head.

58. INSTALL CAMSHAFT BEARING NO.2



59. INSTALL CAMSHAFT TIMING GEAR ASSY

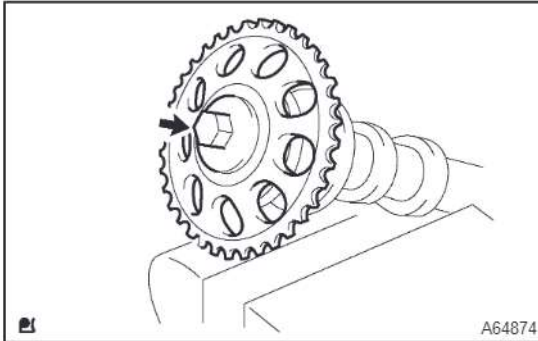
- (a) Align the key groove of the camshaft timing gear with the straight pin located on the camshaft, then fit the timing gear into place.
- (b) Turn the camshaft timing gear assembly to the left direction (as shown in the illustration) while pushing it lightly against the camshaft. Push further at the position where the pin gets into the groove.

CAUTION:

Be sure not to turn the camshaft timing gear to the retard 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, 49 ft·lbf)

- (e) Check that the camshaft timing gear assembly can move to the retard angle side (the right direction), and is locked at the most retarded position.



60. INSTALL CAMSHAFT TIMING GEAR OR SPROCKET

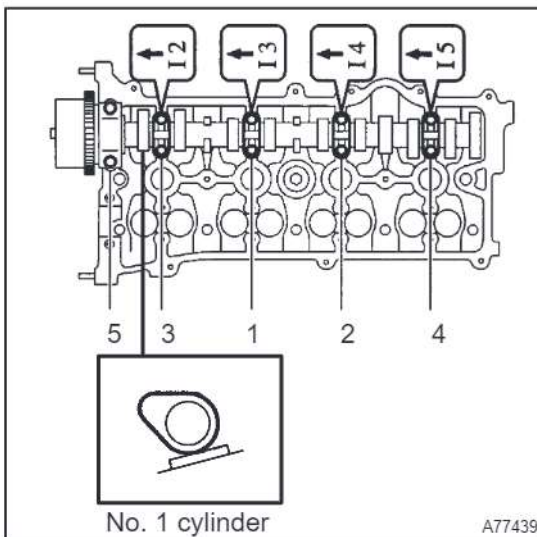
- (a) Clamp the camshaft No. 2 in a vise, and install the camshaft No. 2 timing gear.

Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

NOTICE:

Be careful not to damage the No. 2 camshaft.

61. INSTALL CAMSHAFT BEARING NO.1



62. INSTALL CAMSHAFT

- (a) Place the camshaft on the cylinder head as shown in the illustration.

- (b) Tighten the camshaft bearing cap No. 1 and No. 3 in the sequence shown in the illustration.

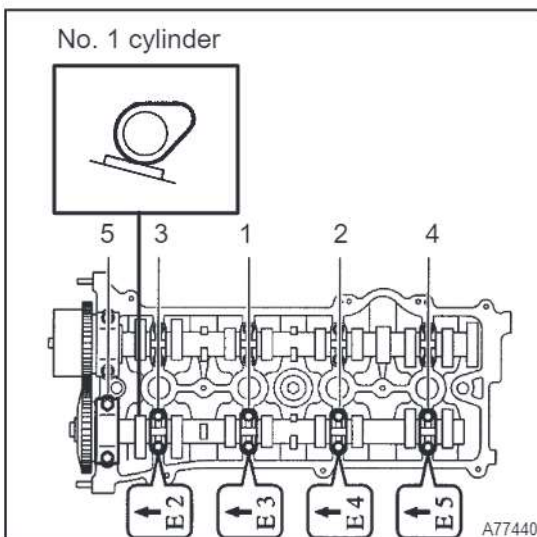
Torque:

Bearing cap No. 1 30 N·m (301 kgf·cm, 22 ft·lbf)

Bearing cap No. 3 9 N·m (92 kgf·cm, 80 in·lbf)

NOTICE:

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



63. INSTALL NO.2 CAMSHAFT

- (a) Place the No. 2 camshaft on the cylinder head as shown in the illustration.

- (b) Tighten the camshaft bearing cap No. 2 and No. 3 in the sequence shown in the illustration.

Torque:

Bearing cap No. 2 30 N·m (301 kgf·cm, 22 ft·lbf)

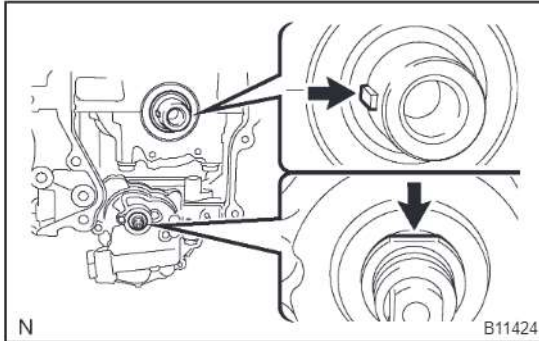
Bearing cap No. 3 9 N·m (92 kgf·cm, 80 in·lbf)

NOTICE:

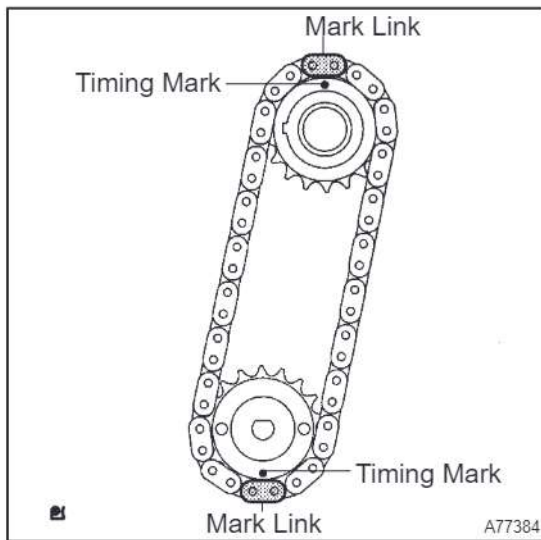
- Tighten the bolts after deciding the position for the thrust direction of the camshaft by bearing cap No. 2.
- Install the camshaft with its timing mark of camshaft timing gear upward.

64. INSTALL OIL PUMP ASSY

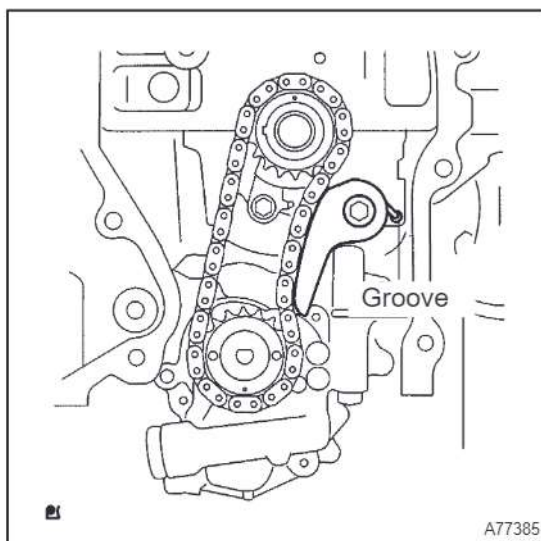
- (a) Install the oil pump assembly with the 3 bolts and a new gasket.
Torque: 19 N·m (194 kgf·cm, 14 ft·lbf)

**65. INSTALL NO.2 CHAIN SUB-ASSY**

- (a) Set the crankshaft key in the left side position.
 (b) Turn the flat portion of the drive shaft upward.

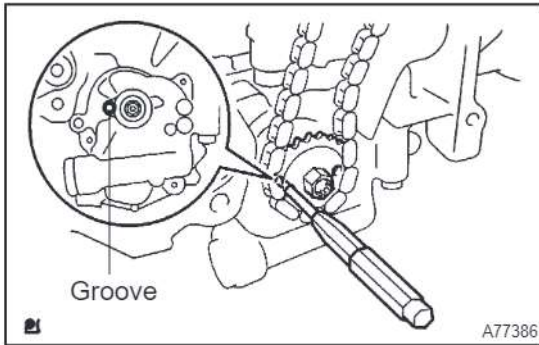


- (c) Align the mark links (yellow colored links) with the timing marks of the gears as shown in the illustration.
 (d) With the chain wrapped, insert the gears to the crankshaft and oil pump shaft.
 (e) Temporarily secure the oil pump drive shaft gear with a nut.



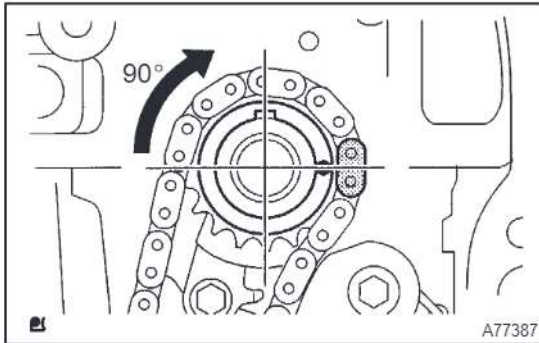
- (f) Insert the damper spring into the adjusting hole of the cylinder block, and install the chain tensioner plate with the bolt.

Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



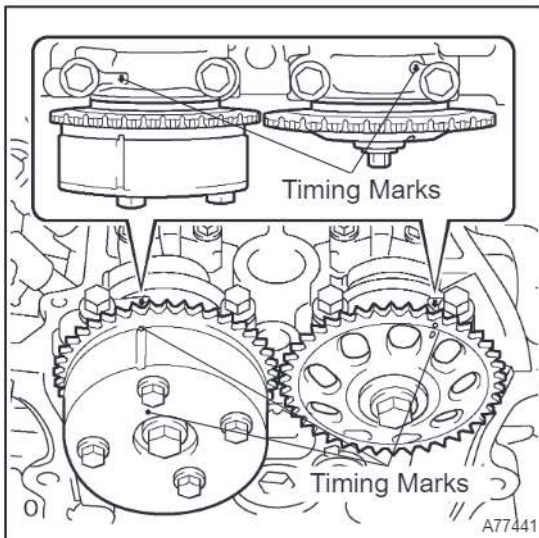
- (g) Align the adjusting hole of the sprocket with the groove of the oil pump.
- (h) Put a 4 mm diameter bar into the adjusting hole to lock in position, and assemble the nut.

Torque: 30 N·m (301 kgf·cm, 22 ft·lbf)



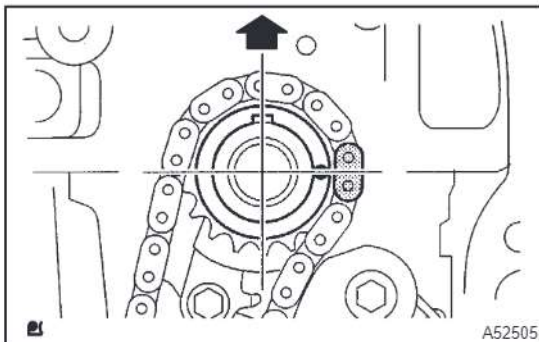
- (i) Rotate the crankshaft 90° clockwise, and position the key of the crankshaft upward.

66. INSTALL CRANKSHAFT TIMING GEAR OR SPROCKET

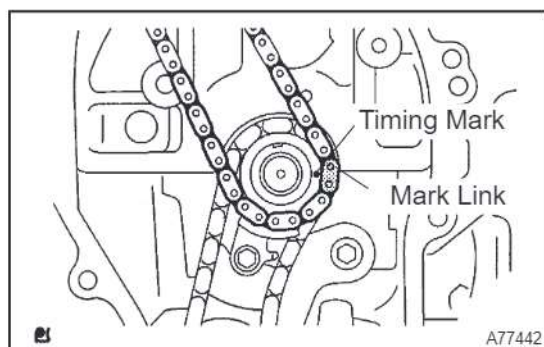


67. INSTALL CHAIN SUB-ASSY

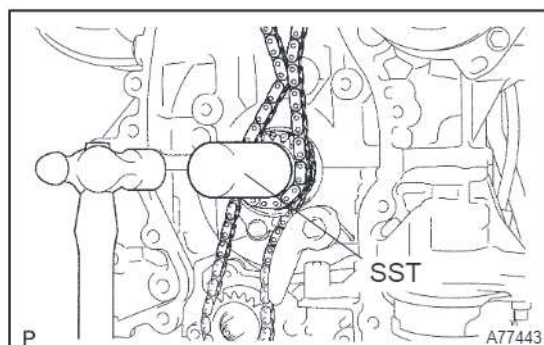
- (a) Set No. 1 cylinder to TDC/ compression.
 - (1) Align the timing marks of the camshaft timing sprockets with the timing marks located on the No. 1 bearing caps.



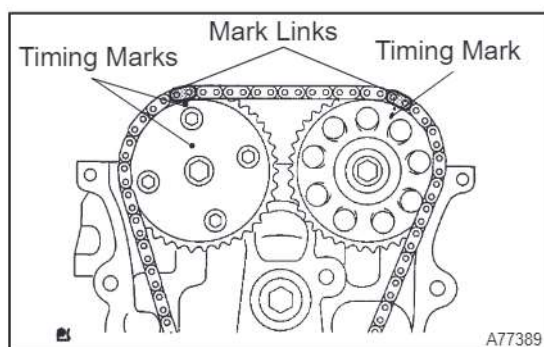
- (2) Using the crankshaft pulley bolt, turn the crankshaft and set the key on the crankshaft upward.



- (b) Align the mark link (blue or orange colored link) with the timing mark located on the crankshaft timing gear.



- (c) Using SST, install the sprocket.
SST 09309-37010



- (d) Align the mark links (gold or yellow colored links) with each timing mark located on the camshaft timing gear, and on the timing sprocket to install the chain.

68. INSTALL TIMING CHAIN GUIDE

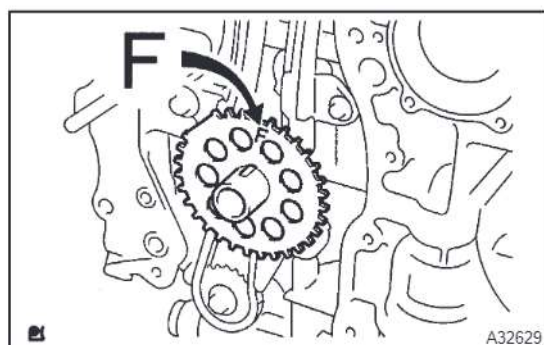
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

69. INSTALL CHAIN VIBRATION DAMPER NO.1

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

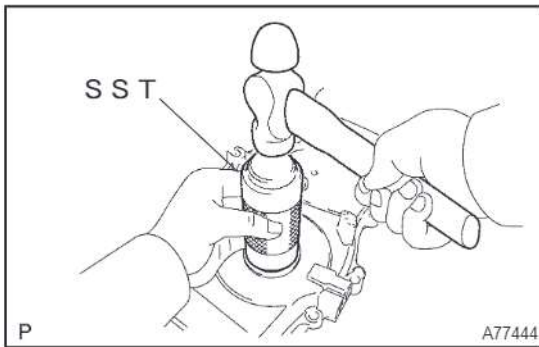
70. INSTALL CHAIN TENSIONER SLIPPER

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



71. INSTALL CRANKSHAFT POSITION SENSOR PLATE NO.1

- (a) Install the crankshaft position sensor plate with the "F" mark facing forward.



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

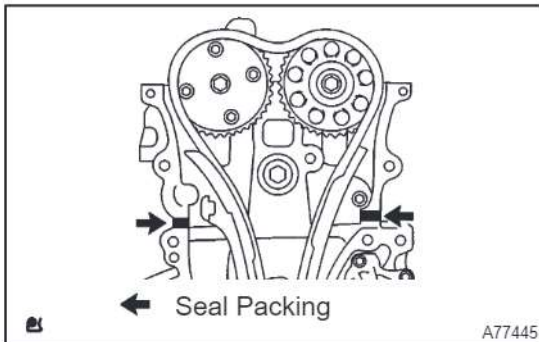
- (a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.

SST 09223-22010

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

NOTICE:

Keep the lip free of foreign material.



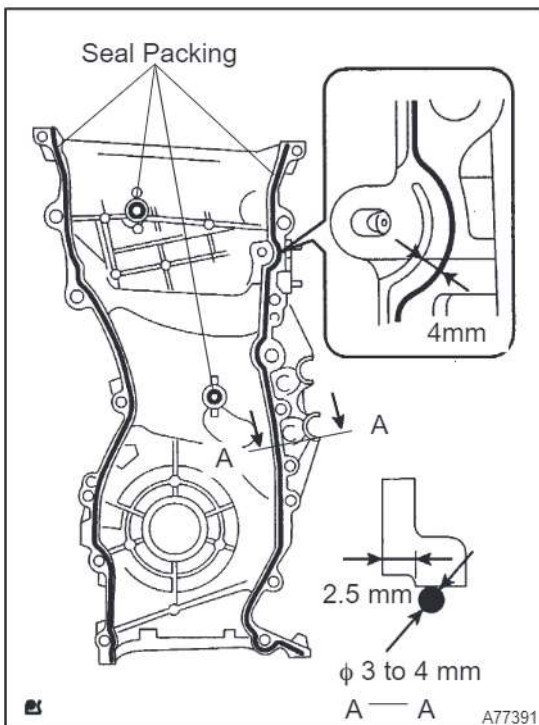
73. INSTALL TIMING CHAIN OR BELT COVER SUB-ASSY

NOTICE:

- Remove any oil from the contact surface.
 - Install the chain cover within 3 minutes after applying seal packing.
 - Do not start the engine within 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.

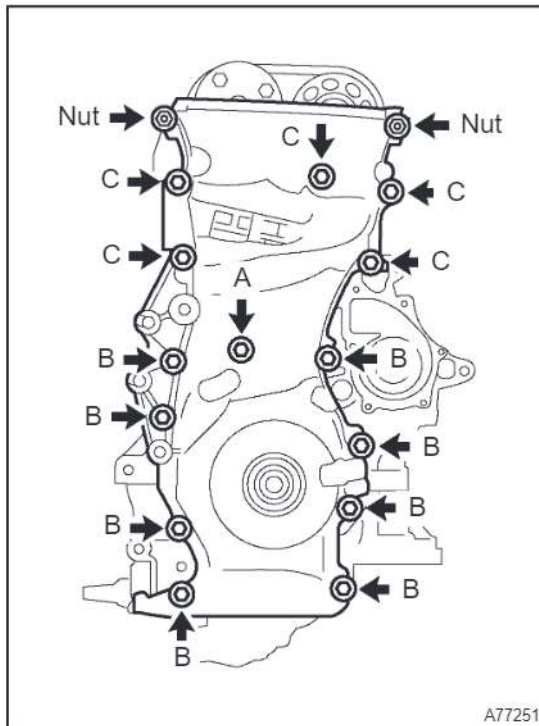
- (b) Apply a continuous bead (Diameter 2 mm (0.09 in.)) of seal packing as shown in the illustration.

Seal packing: Part No. 08826 – 00080 or equivalent



- (c) Apply a continuous bead (Diameter 3 to 4 mm (0.118 to 0.157 in.)) of seal packing 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.

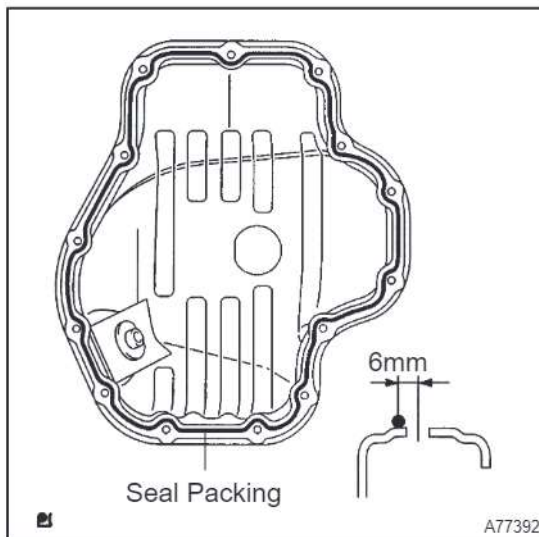
Torque:

Bolt A 9.0 N·m (92 kgf·cm, 80 in·lbf)

Bolt B 21 N·m (214 kgf·cm, 15 ft·lbf)

Bolt C 43 N·m (438 kgf·cm, 32 ft·lbf)

Nut 9.0 N·m (92 kgf·cm, 80 in·lbf)

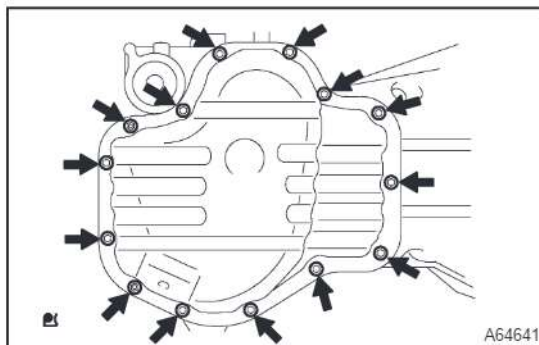


74. INSTALL OIL PAN SUB-ASSY

NOTICE:

- Remove any oil from the contact surface.
 - Install the oil pan within 3 minutes after applying seal packing.
 - Do not start the engine within 2 hours after installing.
- (a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface of the cylinder block and oil pan.
- (b) Apply a continuous bead (Diameter 3 mm to 4 mm (0.079 to 0.118 in.)) of seal packing as shown in the illustration, and install the oil pan.

Seal packing: Part No. 08826 – 00080 or equivalent



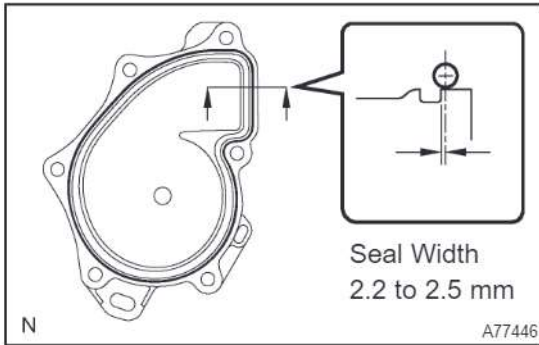
- (c) Install the oil pan with the 12 bolts and 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

75. INSTALL OIL PAN DRAIN PLUG

- (a) Install the oil pan drain plug and a new gasket.

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

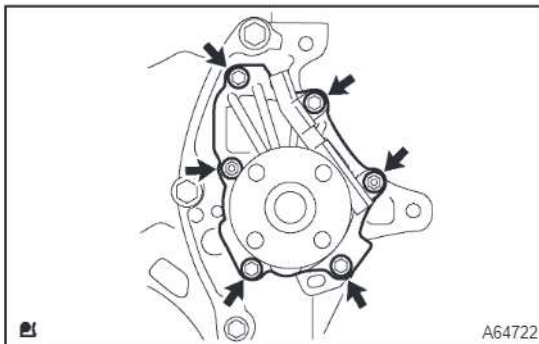
**76. INSTALL WATER PUMP ASSY**

- (a) Clean the contact surface of the cylinder block.
- (b) Apply a continuous bead (Diameter 2.2 to 2.5 mm(0.087 to 0.098in.)) of seal packing 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 within 2 hours after installing.

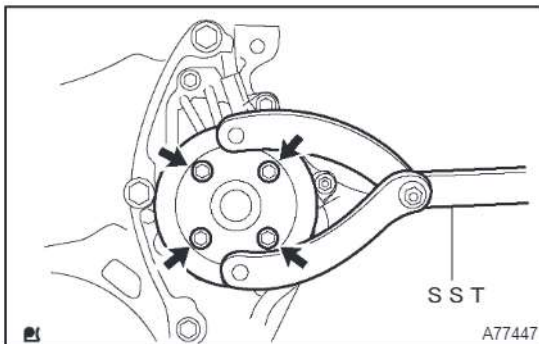


- (c) Install the clamp and the water pump assembly with the 4 bolts and 2 nuts.

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

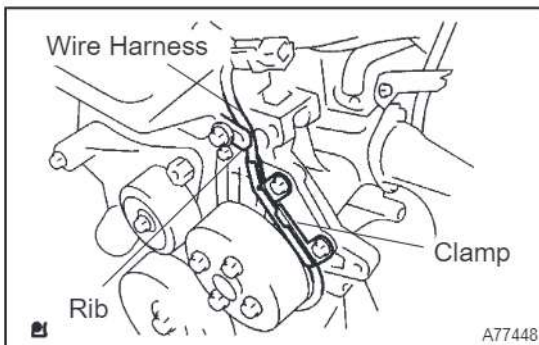
NOTICE:

Tighten the outside bolts and nuts.

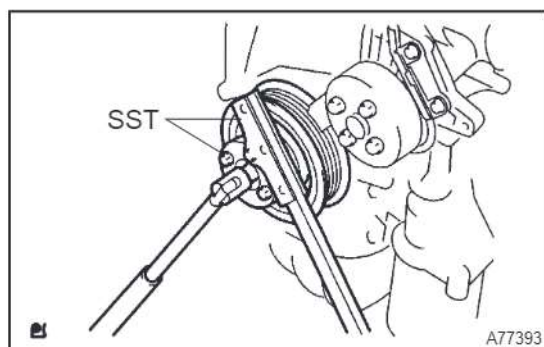
**77. INSTALL WATER PUMP PULLEY**

- (a) Using SST, install the water pump pulley with the 4 bolts. SST 09960-10010 (09962-01000, 09963-00700)

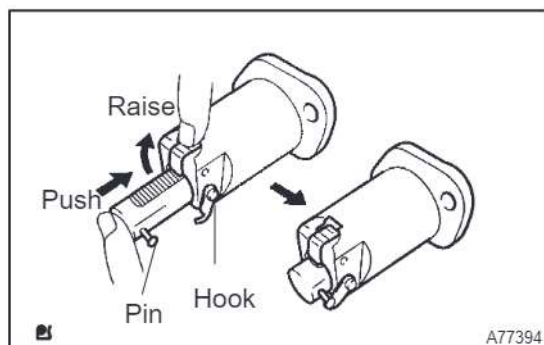
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

**78. INSTALL CRANKSHAFT POSITION SENSOR**

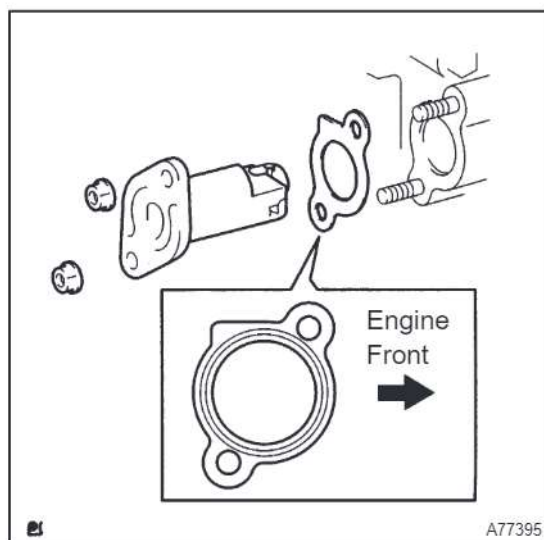
- (a) Apply a light coat of engine oil to the O-ring.
- (b) Install the crankshaft position sensor with the bolt. **Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)**
- (c) Confirm the wire harness of the crankshaft position sensor is placed as shown in the illustration.

**79. INSTALL CRANKSHAFT PULLEY**

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

**80. 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 is locked in the position.

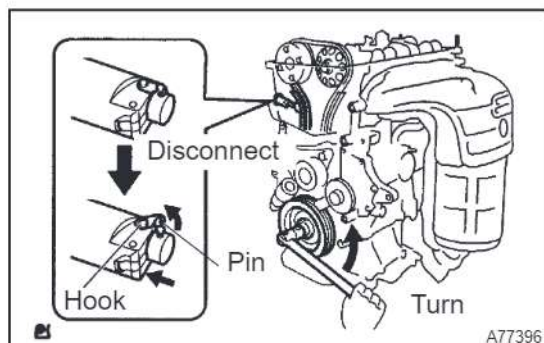


- (b) Install a new gasket and the chain tensioner with the 2 nuts.

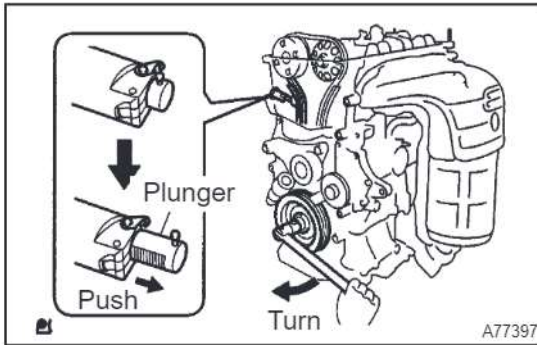
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

NOTICE:

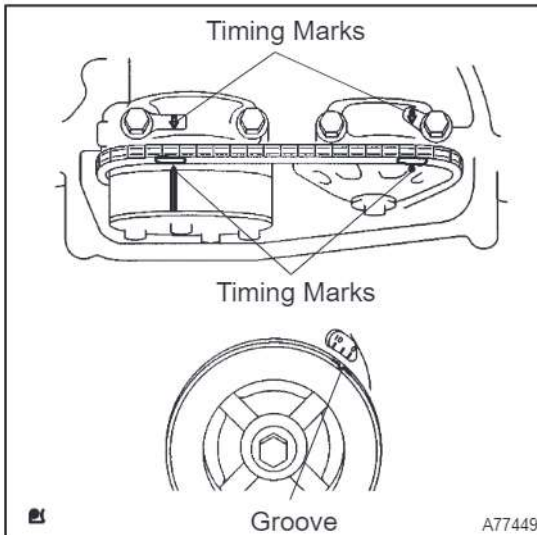
If the hook is disengaged while installing, re-apply the hook and then insert the chain tensioner.



- (c) Turn the crankshaft pulley counterclockwise, and check that the plunger knock pin is free from the hook.

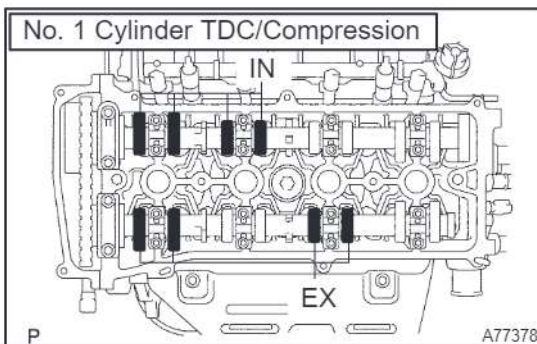


- (d) Turn the crankshaft clockwise, and check that the plunger is extended.



81. INSPECT VALVE CLEARANCE

- (a) Turn the crankshaft pulley, and align its groove with the 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 located on the No. 1 bearing cap as shown in the illustration.



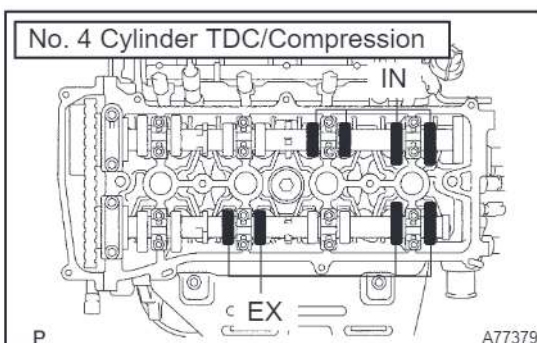
- (c) Check only the valve indicated as shown in the illustration.
- (1) Using a feeler gauge, measure the clearance between the valve lifter and the camshaft.
 - (2) Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifter.

Valve clearance (cold):

Intake 0.19 to 0.29 mm (0.007 to 0.011 in.)

Exhaust 0.30 to 0.40 mm (0.012 to 0.016 in.)

- (d) Turn the crankshaft 1 revolution (360°) clockwise, and set the No. 4 cylinder to TDC/compression.

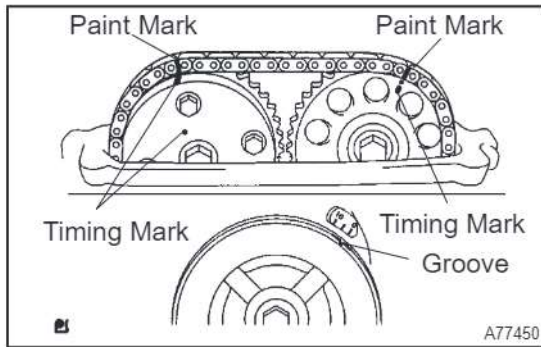


- (e) Check only the valve indicated as shown in the illustration.
- (1) Using a feeler gauge, measure the clearance between the valve lifter and the camshaft.
 - (2) Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement valve lifter.

Valve clearance (cold):

Intake 0.19 to 0.29 mm (0.007 to 0.011 in.)

Exhaust 0.30 to 0.40 mm (0.012 to 0.016 in.)

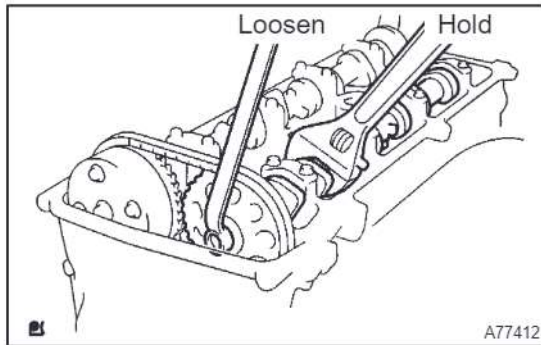


82. ADJUST VALVE CLEARANCE

NOTICE:

Do not turn the crankshaft without the chain tensioner.

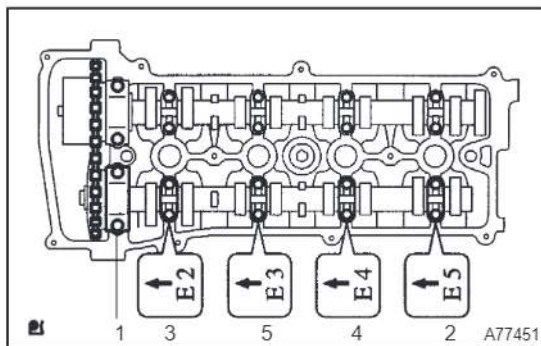
- Turn the crankshaft 1 revolution (360°) clockwise, and set the No. 1 cylinder to TDC/compression.
- Place matchmarks on the timing chain and camshaft timing gear.
- Remove the 2 bolts and the chain tensioner.



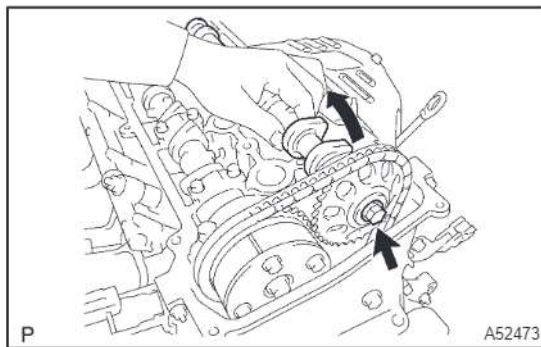
- Fix the camshaft with a wrench, then loosen the camshaft timing gear set bolt.

NOTICE:

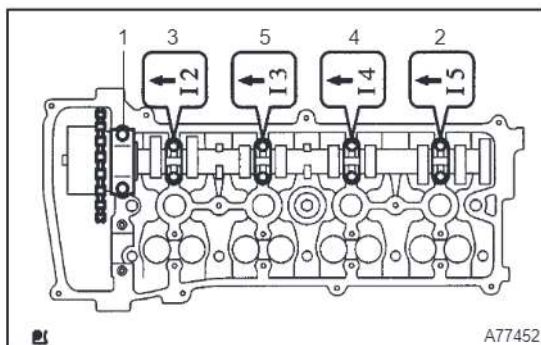
Be careful not to damage the valve lifter.



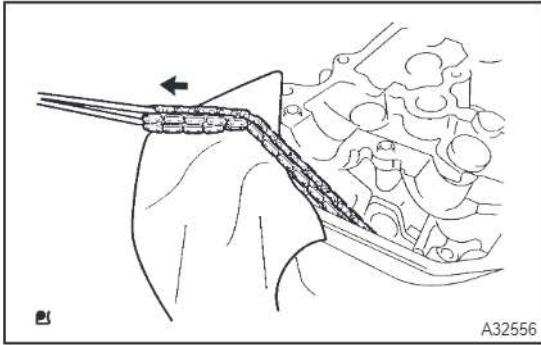
- Using several steps, loosen the camshaft bearing cap bolts on the No. 2 camshaft in the sequence shown in the illustration, and then remove the bearing caps.



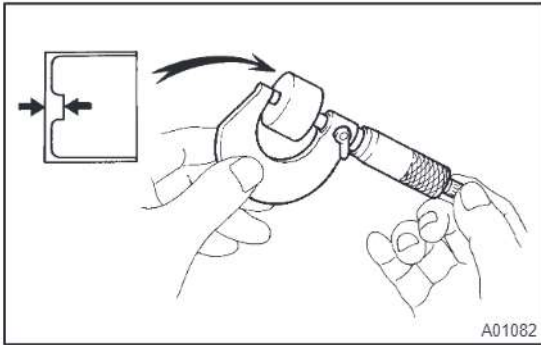
- Raising the No. 2 camshaft, remove the set bolt.
- Remove the timing chain sprocket from the No. 2 camshaft with the timing chain assembled.
- Remove the timing chain sprocket from the timing chain.



- Using several steps, loosen the camshaft bearing cap bolts on the camshaft in the sequence shown in the illustration, then remove the bearing caps.
- Remove the intake camshaft.



(k) Tie the timing chain with a string.



(l) Using a micrometer, measure the thickness of the removed lifter.

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

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

Valve clearance:

Intake $A = B + (C - 0.24 \text{ mm (0.0094 in.)})$

Exhaust $A = B + (C - 0.35 \text{ mm (0.0138 in.)})$

EXAMPLE: (Intake)

Measure valve clearance = 0.44 mm (0.0173 in.)

0.44 mm (0.0173 in.) – 0.24 mm (0.0094 in.) = 0.20 mm (0.0079 in.)

(Measured – Specification = Excess clearance)

Used shim measurement = 5.30 mm (0.2087 in.)

0.20 mm (0.0079 in.) + 5.30 mm (0.2087 in.) = 5.50 mm (0.2165 in.)

(Excess clearance + Used shim = Ideal new shim)

Closest new shim = 5.50 mm (0.2165 in.) = Shim No. "50"

HINT:

- Select a new lifter with a thickness as close as possible to the calculated values.
- Lifter 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.)
- Refer to new Lifter Thickness table on the following 2 pages.

Measure clearance mm (in.)	Installed lifter thickness mm (in.)		New Lifter Thickness																						
	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness	Lifter No.	Thickness													
0.000 (-0.030) (0.0000 - 0.0012)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.031 (-0.050) (0.0012 - 0.0020)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.057 (-0.070) (0.0020 - 0.0028)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.071 (-0.090) (0.0028 - 0.0035)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.091 (-0.110) (0.0036 - 0.0043)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.111 (-0.130) (0.0044 - 0.0051)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.131 (-0.150) (0.0052 - 0.0059)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.151 (-0.170) (0.0059 - 0.0067)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.171 (-0.189) (0.0067 - 0.0074)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.190 (-0.209) (0.0075 - 0.0114)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.291 (-0.310) (0.0115 - 0.0122)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.311 (-0.330) (0.0122 - 0.0130)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.331 (-0.350) (0.0130 - 0.0138)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.351 (-0.370) (0.0138 - 0.0146)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.371 (-0.390) (0.0146 - 0.0154)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.391 (-0.410) (0.0154 - 0.0161)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.411 (-0.430) (0.0162 - 0.0169)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.431 (-0.450) (0.0170 - 0.0177)	06	08	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42	44	46	48	50	52	54
0.451 (-0.470) (0.0178 - 0.0185)	06	08	10	12	14	16	18	20	22																

Intake valve clearance (Cold):
0.19 to 0.29 mm (0.008 to 0.011 in.)

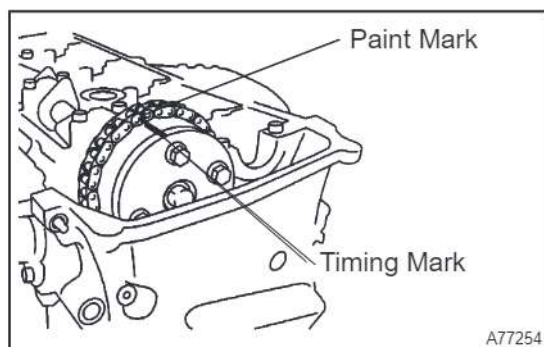
EXAMPLE:

The 5.250 mm (0.2067 in.) lifter is installed, and the measured clearance is 0.400 mm (0.0157 in.). Replace the 5.250 mm (0.2067 in.) lifter with a new No. 42 lifter.

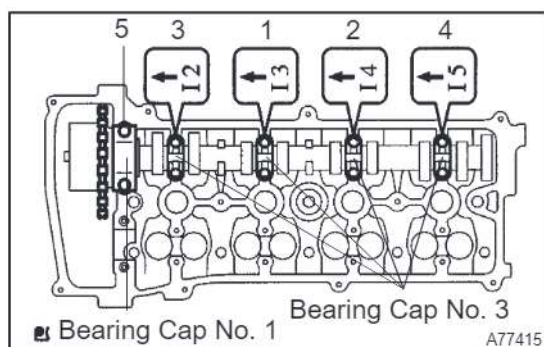
Lifter No.	New Lifter Thickness				mm (in.)
	Thickness	Lifter No.	Thickness	Lifter No.	
06	5.060(0.1992)	30	5.300(0.2087)	54	5.540(0.2181)
08	5.080(0.2000)	32	5.320(0.2094)	56	5.560(0.2189)
10	5.100(0.2008)	34	5.340(0.2102)	58	5.580(0.2197)
12	5.120(0.2016)	36	5.360(0.2110)	60	5.600(0.2205)
14	5.140(0.2024)	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)		

Valve Lifter Selection Chart (Exhaust)

Measure clearance mm (in.)	Installed lifter thickness mm (in.)	5.080 (0.1992)	5.120 (0.2008)	5.160 (0.2031)	5.200 (0.2047)	5.240 (0.2063)	5.280 (0.2079)	5.320 (0.2094)	5.360 (0.2110)	5.400 (0.2126)	5.440 (0.2142)	5.480 (0.2157)	5.520 (0.2173)	5.560 (0.2188)	5.600 (0.2204)	5.640 (0.2220)	5.680 (0.2236)	5.720 (0.2252)	5.760 (0.2268)	5.800 (0.2284)	5.840 (0.2299)	5.880 (0.2315)	5.920 (0.2331)	5.960 (0.2347)	6.000 (0.2362)	6.040 (0.2378)	6.080 (0.2394)	6.120 (0.2409)	6.160 (0.2425)	6.200 (0.2441)	6.240 (0.2457)	6.280 (0.2473)	6.320 (0.2489)	6.360 (0.2505)	6.400 (0.2521)	6.440 (0.2537)	6.480 (0.2553)	6.520 (0.2569)	6.560 (0.2585)	6.600 (0.2601)	6.640 (0.2617)	6.680 (0.2633)	6.720 (0.2649)	6.760 (0.2665)	6.800 (0.2681)	6.840 (0.2697)	6.880 (0.2713)	6.920 (0.2729)	6.960 (0.2745)	7.000 (0.2761)	7.040 (0.2777)	7.080 (0.2793)	7.120 (0.2809)	7.160 (0.2825)	7.200 (0.2841)	7.240 (0.2857)	7.280 (0.2873)	7.320 (0.2889)	7.360 (0.2905)	7.400 (0.2921)	7.440 (0.2937)	7.480 (0.2953)	7.520 (0.2969)	7.560 (0.2985)	7.600 (0.3001)	7.640 (0.3017)	7.680 (0.3033)	7.720 (0.3049)	7.760 (0.3065)	7.800 (0.3081)	7.840 (0.3097)	7.880 (0.3113)	7.920 (0.3129)	7.960 (0.3145)	8.000 (0.3161)	8.040 (0.3177)	8.080 (0.3193)	8.120 (0.3209)	8.160 (0.3225)	8.200 (0.3241)	8.240 (0.3257)	8.280 (0.3273)	8.320 (0.3289)	8.360 (0.3305)	8.400 (0.3321)	8.440 (0.3337)	8.480 (0.3353)	8.520 (0.3369)	8.560 (0.3385)	8.600 (0.3401)	8.640 (0.3417)	8.680 (0.3433)	8.720 (0.3449)	8.760 (0.3465)	8.800 (0.3481)	8.840 (0.3497)	8.880 (0.3513)	8.920 (0.3529)	8.960 (0.3545)	9.000 (0.3561)	9.040 (0.3577)	9.080 (0.3593)	9.120 (0.3609)	9.160 (0.3625)	9.200 (0.3641)	9.240 (0.3657)	9.280 (0.3673)	9.320 (0.3689)	9.360 (0.3705)	9.400 (0.3721)	9.440 (0.3737)	9.480 (0.3753)	9.520 (0.3769)	9.560 (0.3785)	9.600 (0.3801)	9.640 (0.3817)	9.680 (0.3833)	9.720 (0.3849)	9.760 (0.3865)	9.800 (0.3881)	9.840 (0.3897)	9.880 (0.3913)	9.920 (0.3929)	9.960 (0.3945)	10.000 (0.3961)	10.040 (0.3977)	10.080 (0.3993)	10.120 (0.4009)	10.160 (0.4025)	10.200 (0.4041)	10.240 (0.4057)	10.280 (0.4073)	10.320 (0.4089)	10.360 (0.4105)	10.400 (0.4121)	10.440 (0.4137)	10.480 (0.4153)	10.520 (0.4169)	10.560 (0.4185)	10.600 (0.4201)	10.640 (0.4217)	10.680 (0.4233)	10.720 (0.4249)	10.760 (0.4265)	10.800 (0.4281)	10.840 (0.4297)	10.880 (0.4313)	10.920 (0.4329)	10.960 (0.4345)	11.000 (0.4361)	11.040 (0.4377)	11.080 (0.4393)	11.120 (0.4409)	11.160 (0.4425)	11.200 (0.4441)	11.240 (0.4457)	11.280 (0.4473)	11.320 (0.4489)	11.360 (0.4505)	11.400 (0.4521)	11.440 (0.4537)	11.480 (0.4553)	11.520 (0.4569)	11.560 (0.4585)	11.600 (0.4601)	11.640 (0.4617)	11.680 (0.4633)	11.720 (0.4649)	11.760 (0.4665)	11.800 (0.4681)	11.840 (0.4697)	11.880 (0.4713)	11.920 (0.4729)	11.960 (0.4745)	12.000 (0.4761)	12.040 (0.4777)	12.080 (0.4793)	12.120 (0.4809)	12.160 (0.4825)	12.200 (0.4841)	12.240 (0.4857)	12.280 (0.4873)	12.320 (0.4889)	12.360 (0.4905)	12.400 (0.4921)	12.440 (0.4937)	12.480 (0.4953)	12.520 (0.4969)	12.560 (0.4985)	12.600 (0.5001)	12.640 (0.5017)	12.680 (0.5033)	12.720 (0.5049)	12.760 (0.5065)	12.800 (0.5081)	12.840 (0.5097)	12.880 (0.5113)	12.920 (0.5129)	12.960 (0.5145)	13.000 (0.5161)	13.040 (0.5177)	13.080 (0.5193)	13.120 (0.5209)	13.160 (0.5225)	13.200 (0.5241)	13.240 (0.5257)	13.280 (0.5273)	13.320 (0.5289)	13.360 (0.5305)	13.400 (0.5321)	13.440 (0.5337)	13.480 (0.5353)	13.520 (0.5369)	13.560 (0.5385)	13.600 (0.5401)	13.640 (0.5417)	13.680 (0.5433)	13.720 (0.5449)	13.760 (0.5465)	13.800 (0.5481)	13.840 (0.5497)	13.880 (0.5513)	13.920 (0.5529)	13.960 (0.5545)	14.000 (0.5561)	14.040 (0.5577)	14.080 (0.5593)	14.120 (0.5609)	14.160 (0.5625)	14.200 (0.5641)	14.240 (0.5657)	14.280 (0.5673)	14.320 (0.5689)	14.360 (0.5705)	14.400 (0.5721)	14.440 (0.5737)	14.480 (0.5753)	14.520 (0.5769)	14.560 (0.5785)	14.600 (0.5801)	14.640 (0.5817)	14.680 (0.5833)	14.720 (0.5849)	14.760 (0.5865)	14.800 (0.5881)	14.840 (0.5897)	14.880 (0.5913)	14.920 (0.5929)	14.960 (0.5945)	15.000 (0.5961)	15.040 (0.5977)	15.080 (0.5993)	15.120 (0.6009)	15.160 (0.6025)	15.200 (0.6041)	15.240 (0.6057)	15.280 (0.6073)	15.320 (0.6089)	15.360 (0.6105)	15.400 (0.6121)	15.440 (0.6137)	15.480 (0.6153)	15.520 (0.6169)	15.560 (0.6185)	15.600 (0.6201)	15.640 (0.6217)	15.680 (0.6233)	15.720 (0.6249)	15.760 (0.6265)	15.800 (0.6281)	15.840 (0.6297)	15.880 (0.6313)	15.920 (0.6329)	15.960 (0.6345)	16.000 (0.6361)	16.040 (0.6377)	16.080 (0.6393)	16.120 (0.6409)	16.160 (0.6425)	16.200 (0.6441)	16.240 (0.6457)	16.280 (0.6473)	16.320 (0.6489)	16.360 (0.6505)	16.400 (0.6521)	16.440 (0.6537)	16.480 (0.6553)	16.520 (0.6569)	16.560 (0.6585)	16.600 (0.6601)	16.640 (0.6617)	16.680 (0.6633)	16.720 (0.6649)	16.760 (0.6665)	16.800 (0.6681)	16.840 (0.6697)	16.880 (0.6713)	16.920 (0.6729)	16.960 (0.6745)	17.000 (0.6761)	17.040 (0.6777)	17.080 (0.6793)	17.120 (0.6809)	17.160 (0.6825)	17.200 (0.6841)	17.240 (0.6857)	17.280 (0.6873)	17.320 (0.6889)	17.360 (0.6905)	17.400 (0.6921)	17.440 (0.6937)	17.480 (0.6953)	17.520 (0.6969)	17.560 (0.6985)	17.600 (0.7001)	17.640 (0.7017)	17.680 (0.7033)	17.720 (0.7049)	17.760 (0.7065)	17.800 (0.7081)	17.840 (0.7097)	17.880 (0.7113)	17.920 (0.7129)	17.960 (0.7145)	18.000 (0.7161)	18.040 (0.7177)	18.080 (0.7193)	18.120 (0.7209)	18.160 (0.7225)	18.200 (0.7241)	18.240 (0.7257)	18.280 (0.7273)	18.320 (0.7289)	18.360 (0.7305)	18.400 (0.7321)	18.440 (0.7337)	18.480 (0.7353)	18.520 (0.7369)	18.560 (0.7385)	18.600 (0.7401)	18.640 (0.7417)	18.680 (0.7433)	18.720 (0.7449)	18.760 (0.7465)	18.800 (0.7481)	18.840 (0.7497)	18.880 (0.7513)	18.920 (0.7529)	18.960 (0.7545)	19.000 (0.7561)	19.040 (0.7577)	19.080 (0.7593)	19.120 (0.7609)	19.160 (0.7625)	19.200 (0.7641)	19.240 (0.7657)	19.280 (0.7673)	19.320 (0.7689)	19.360 (0.7705)	19.400 (0.7721)	19.440 (0.7737)	19.480 (0.7753)	19.520 (0.7769)	19.560 (0.7785)	19.600 (0.7801)	19.640 (0.7817)	19.680 (0.7833)	19.720 (0.7849)	19.760 (0.7865)	19.800 (0.7881)	19.840 (0.7897)	19.880 (0.7913)	19.920 (0.7929)	19.960 (0.7945)	20.000 (0.7961)	20.040 (0.7977)	20.080 (0.7993)	20.120 (0.8009)	20.160 (0.8025)	20.200 (0.8041)	20.240 (0.8057)	20.280 (0.8073)	20.320 (0.8089)	20.360 (0.8105)	20.400 (0.8121)	20.440 (0.8137)	20.480 (0.8153)	20.520 (0.8169)	20.560 (0.8185)	20.600 (0.8201)	20.640 (0.8217)	20.680 (0.8233)	20.720 (0.8249)	20.760 (0.8265)	20.800 (0.8281)	20.840 (0.8297)	20.880 (0.8313)	20.920 (0.8329)	20.960 (0.8345)	21.000 (0.8361)	21.040 (0.8377)	21.080 (0.8393)	21.120 (0.8409)	21.160 (0.8425)	21.200 (0.8441)	21.240 (0.8457)	21.280 (0.8473)	21.320 (0.8489)	21.360 (0.8505)	21.400 (0.8521)	21.440 (0.8537)	21.480 (0.8553)	21.520 (0.8569)	21.560 (0.8585)	21.600 (0.8601)	21.640 (0.8617)	21.680 (0.8633)	21.720 (0.8649)	21.760 (0.8665)	21.800 (0.8681)	21.840 (0.8697)	21.880 (0.8713)	21.920 (0.8729)	21.960 (0.8745)	22.000 (0.8761)	22.040 (0.8777)	22.080 (0.8793)	22.120 (0.8809)	22.160 (0.8825)	22.200 (0.8841)	22.240 (0.8857)	22.280 (0.8873)	22.320 (0.8889)	22.360 (0.8905)	22.400 (0.8921)	22.440 (0.8937)	22.480 (0.8953)	22.520 (0.8969)	22.560 (0.8985)	22.600 (0.9001)	22.640 (0.9017)	22.680 (0.9033)	22.720 (0.9049)	22.760 (0.9065)	22.800 (0.9081)	22.840 (0.9097)	22.880 (0.9113)	22.920 (0.9129)	22.960 (0.9145)	23.000 (0.9161)	23.040 (0.9177)	23.080 (0.9193)	23.120 (0.9209)	23.160 (0.9225)	23.200 (0.9241)	23.240 (0.9257)	23.280 (0.9273)	23.320 (0.9289)	23.360 (0.9305)	23.400 (0.9321)	23.440 (0.9337)	23.480 (0.9353)	23.520 (0.9369)	23.560 (0.9385)	23.600 (0.9401)	23.640 (0.9417)	23.680 (0.9433)	23.720 (0.9449)	23.760 (0.9465)	23.800 (0.9481)	23.840 (0.9497)	23.880 (0.9513)	23.920 (0.9529)	23.960 (0.9545)	24.000 (0.9561)	24.040 (0.9577)	24.080 (0.9593)	24.120 (0.9609)	24.160 (0.9625)	24.200 (0.9641)	24.240 (0.9657)	24.280 (0.9673)	24.320 (0.9689)	24.360 (0.9705)	24.400 (0.9721)	24.440 (0.9737)	24.480 (0.9753)	24.520 (0.9769)	24.560 (0.9785)	24.600 (0.9801)	24.640 (0.9817)	24.680 (0.9833)	24.720 (0.9849)	24.760 (0.9865)	24.800 (0.9881)	24.840 (0.9897)	24.880 (0.9913)	24.920 (0.9929)	24.960 (0.9945)	25.000 (0.9961)	25.040 (0.9977)	25.080 (0.9993)	25.120 (1.0009)	25.160 (1.0025)	25.200 (1.0041)	25.240 (1.0057)	25.280 (1.0073)	25.320 (1.0089)	25.360 (1.0105)	25.400 (1.0121)	25.440 (1.0137)	25.480 (1.0153)	25.520 (1.0169)	25.560 (1.0185)	25.600 (1.0201)	25.640 (1.0217)	25.680 (1.0233)	25.720 (1.0249)	25.760 (1.0265)	25.800 (1.0281)	25.840 (1.0297)	25.880 (1.0313)	25.920 (1.0329)	25.960 (1.0345)	26.000 (1.0361)	26.040 (1.0377)	26.080 (1.0393)	26.120 (1.0409)	26.160 (1.0425)	26.200 (1.0441)	26.240 (1.0457)	26.280 (1.0473)	26.320 (1.0489)	26.360 (1.0505)	26.400 (1.0521)	26.440 (1.0537)	26.480 (1.0553)	26.520 (1.0569)	26.560 (1.0585)	26.600 (1.0601)	26.640 (1.0617)	26.680 (1.0633)	26.720 (1.0649)	26.760 (1.0665)	26.800 (1.0681)	26.840 (1.0697)	26.880 (1.0713)	26.920 (1.0729)	26.960 (1.0745)	27.000 (1.0761)	27.040 (1.0777)	27.080 (1.0793)	27.120 (1.0809)	27.160 (1.0825)	27.200 (1.0841)	27.240 (1.0857)	27.280 (1.0873)	27.320 (1.0889)	27.360 (1.0905)	27.400 (1.0921)	27.440 (1.0937)	27.480 (1.0953)	27.520 (1.0969)	27.560 (1.0985)	27.600 (1.1001)	27.640 (1.1017)	27.680 (1.1033)	27.720 (1.1049)	27.760 (1.1065)	27.800 (1.1081)	27.840 (1.1097)	27.880 (1.1113)	27.920 (1.1129)	27.960 (1.1145)	28.000 (1.1161)	28.040 (1.1177)	28.080 (1.1193)	28.120 (1.1209)	28.160 (1.1225)	28.200 (1.1241)	28.240 (1.1257)	28.280 (1.1273)	28.320 (1.1289)	28.360 (1.1305)	28.400 (1.1321)	28.440 (1.1337)	28.480 (1.1353)	28.520 (1.1369)	28.560 (1.1385)	28.600 (1.1401)	28.640 (1.1417)	28.680 (1.1433)	28.720 (1.1449)	28.760 (1.1465)	28.800 (1.1481)	28.840 (1.1497)	28.880 (1.1513)	28.920 (1.1529)	28.960 (1.1545)	29.000 (1.1561)	29.040 (1.1577)	29.080 (1.1593)	29.120 (1.1609)	29.160 (1.1625)	29.200 (1.1641)	29.240 (1.1657)	29.280 (1.1673)	29.320 (1.1689)	29.360 (1.1705)	29.400 (1.1721)	29.440 (1.1737)	29.480 (1.1753)	29.520 (1.1769)	29.560 (1.1785)	29.600 (1.1801)	29.640 (1.1817)	29.680 (1.1833)	29.720 (1.1849)	29.760 (1.1865)	29.800 (1.1881)	29.840 (1.1897)	29.880 (1.1913)	29.920 (1.1929)	29.960 (1.1945)	30.000 (1.1961)	30.040 (1.1977)	30.080 (1.1993)	30.120 (1.2009)	30.160 (1.2025)	30.200 (1.2041)	30.240 (1.2057)	30.280 (1.2073)	30.320 (1.2089)	30.360 (1.2105)	30.400 (1.2121)	30.440 (1.2137)	30.480 (1.2153)	30.520 (1.2169)	30.560 (1.2185)	30.600 (1.2201)	30.640 (1.2217)	30.680 (1.2233)	30.720 (1.2249)	30.760 (1.2265)	30.800 (1.2281)	30.840 (1.2297)	30.880 (1.2313)	30.920 (1.2329)	30.960 (1.2345)	31.000 (1.2361)	31.040 (1.2377)	31.080 (1.2393)	31.120 (1.2409)	31.160 (1.2425)	31.200 (1.2441)	31.240 (1.2457)	31.280 (1.2473)	31.320 (1.2489)	31.360 (1.2505)	31.400 (1.2521)	31.440 (1.2537)	31.480 (1.2553)	31.520 (1.2569)	31.560 (1.2585)	31.600 (1.2601)	31.640 (1.2617)	31.680 (1.2633)	31.720 (1.2649)	31.760 (1.2665)	31.800 (1.2681)	31.840 (1.2697)	31.880 (1.2713)	31.920 (1.2729)	31.960 (1.2745)	32.000 (1.2761)	32.040 (1.2777)	32.080 (1.2793)	32.120 (1.2809)	32.160 (1.2825)	32.200 (1.2841)	32.240 (1.2857)	32.280 (1.2873)	32.320 (1.2889)	32.360 (1.2905)	32.400 (1.2921)
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- (n) Install the timing chain on the camshaft timing gear, with the painted links aligned with the timing marks on the camshaft timing sprockets.

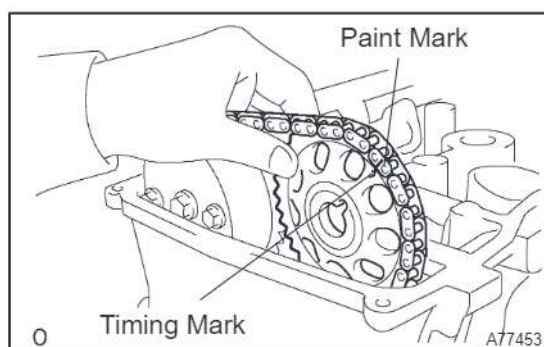


- (o) Examine the front marks and numbers and tighten the bolts in the sequence shown in the illustration.

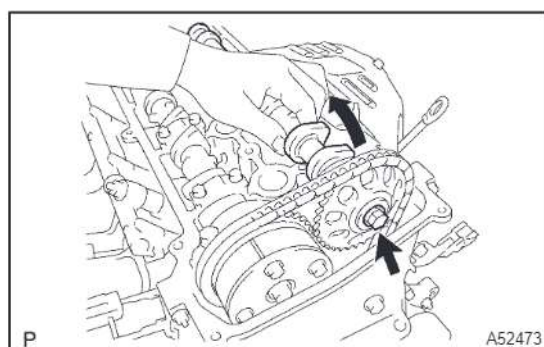
Torque:

Bearing cap No. 1 30 N·m (301 kgf·cm, 22 ft·lbf)

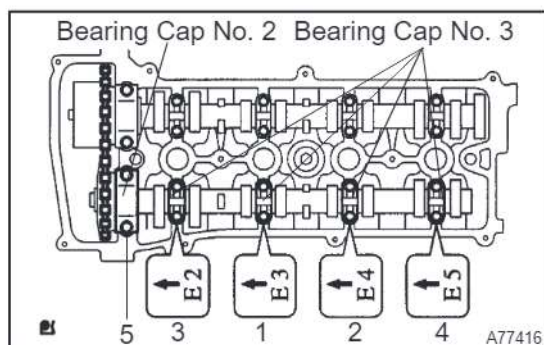
Bearing cap No. 3 9.0 N·m (92 kgf·cm, 80 in·lbf)



- (p) Put the camshaft No. 2 on the cylinder head with the painted links of chain aligned with the timing mark on the camshaft timing sprockets.



- (q) Raising the No. 2 camshaft, tighten the set bolt temporarily.

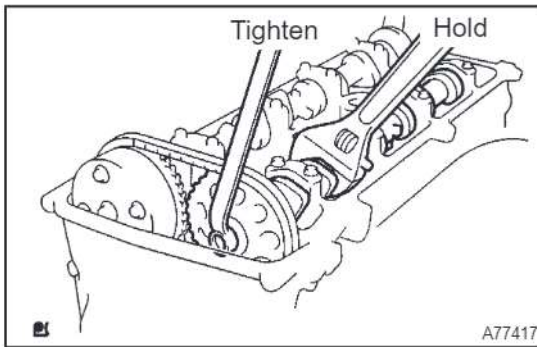


- (r) Examine the front marks and numbers and tighten the bolts in the sequence shown in the illustration.

Torque:

Bearing cap No. 2 30 N·m (301 kgf·cm, 22 ft·lbf)

Bearing cap No. 3 9.0 N·m (92 kgf·cm, 80 in·lbf)

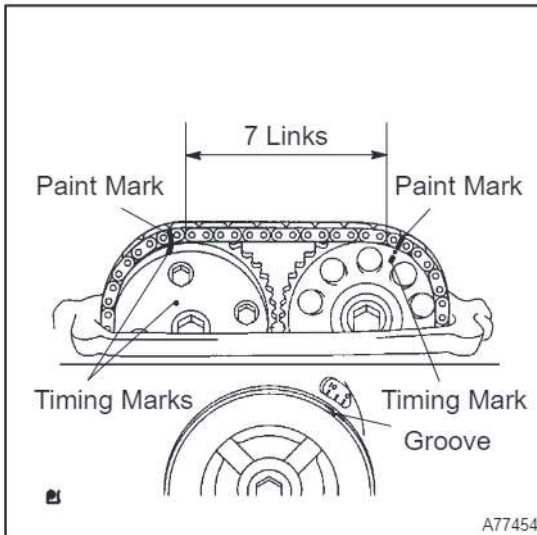


- (s) Fix the camshaft with a wrench, then tighten the camshaft timing gear set bolt.

Torque: 54 N·m (551 kgf·cm, 40 ft·lbf)

NOTICE:

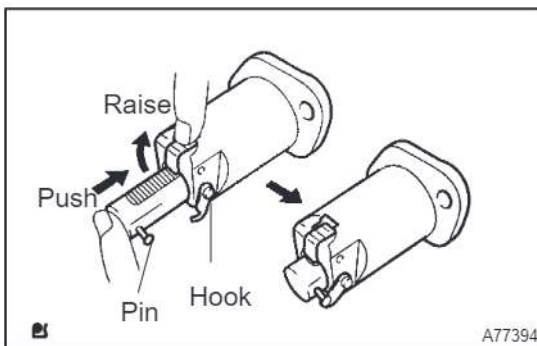
Be careful not to damage the valve lifter.



- (t) Check that each pair of the matchmarks are aligning as shown in the illustration.

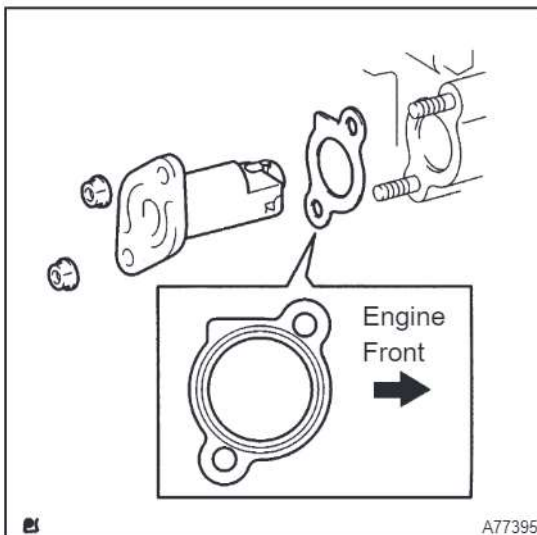
HINT:

There are 7 links between the two paint marks.



- (u) Install the chain tensioner.

- (1) Release the ratchet pawl, fully push in the plunger and apply the hook to the pin so that the plunger is locked in the position.

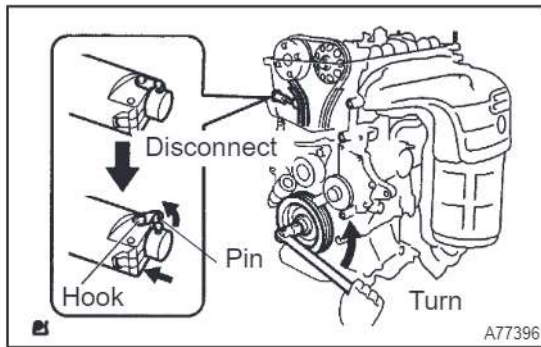


- (2) Install a new gasket and the chain tensioner with the 2 nuts.

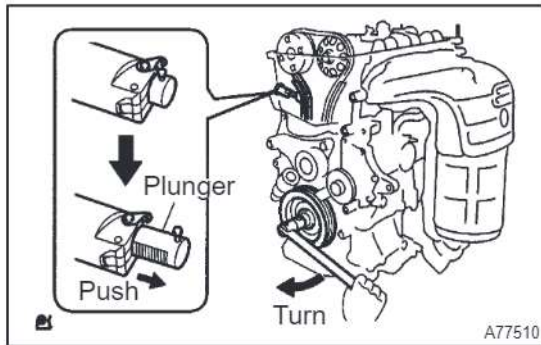
Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

NOTICE:

If the hook is disengaged from the pin, re-apply the hook then resume installation.



- (3) Turn the crankshaft counterclockwise, and disengage the hook from the pin to free the plunger.

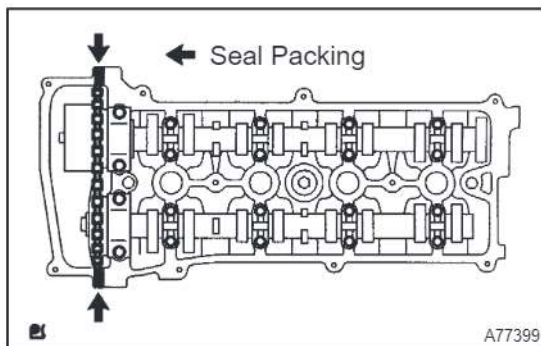


- (4) Turn the crankshaft clockwise, and check that the plunger is pushed by the slipper.

83. INSTALL CAMSHAFT POSITION SENSOR

Torque: 9.0 N·m (92 kgf·cm, 80 in·lbf)

84. INSTALL CYLINDER HEAD COVER GASKET



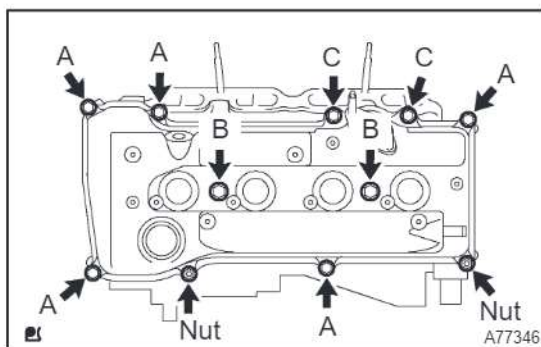
85. INSTALL CYLINDER HEAD COVER SUB-ASSY

- Remove any old packing (FIPG) material.
- 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 expose seal packing to engine oil 2 hours after installing.



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

Torque:

Bolt A 11 N·m (112 kgf·cm, 8 ft·lbf)

Bolt B 14 N·m (143 kgf·cm, 10 ft·lbf)

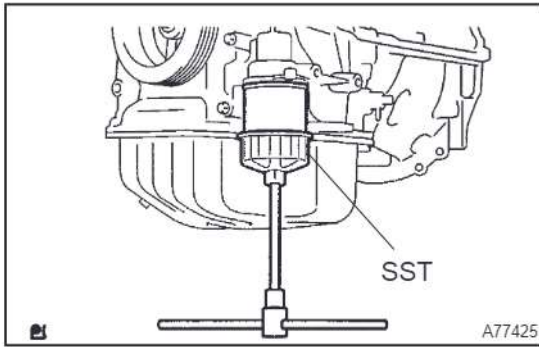
Bolt C 21 N·m (214 kgf·cm, 15 ft·lbf)

Nut 11 N·m (112 kgf·cm, 8 ft·lbf)

86. 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)

**87. 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

88. INSTALL SPARK PLUG

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

89. INSTALL VENTILATION VALVE SUB-ASSY

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

Torque: 15 N·m (153 kgf·cm, 11 ft·lbf)

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

90. INSTALL OIL FILLER CAP GASKET**91. INSTALL OIL FILLER CAP SUB-ASSY**