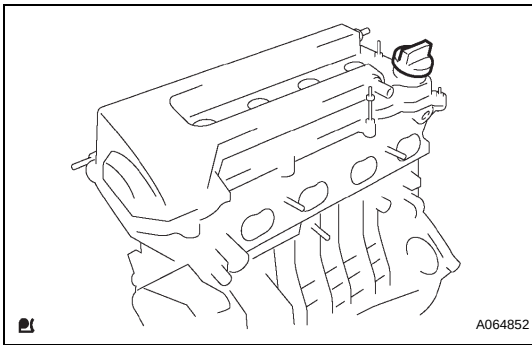


DISASSEMBLY

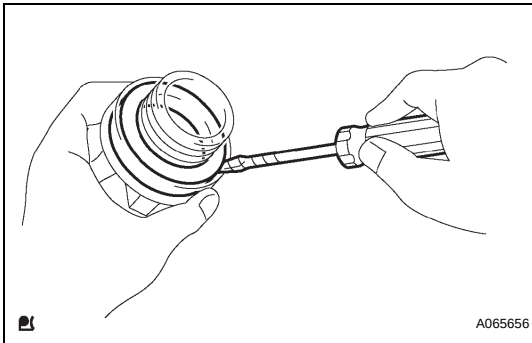
1. REMOVE OIL FILLER CAP SUB-ASSEMBLY

- (a) Remove the oil filler cap from the cylinder head cover.



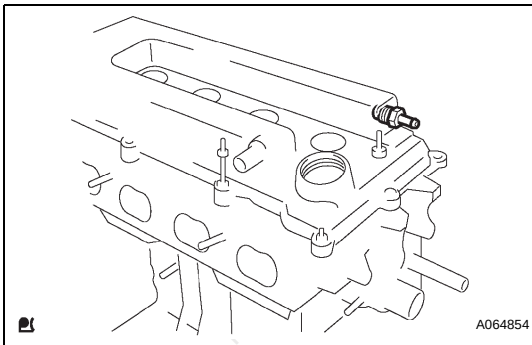
2. REMOVE OIL FILLER CAP GASKET

- (a) Using a screwdriver, remove the gasket from the oil filler cap.



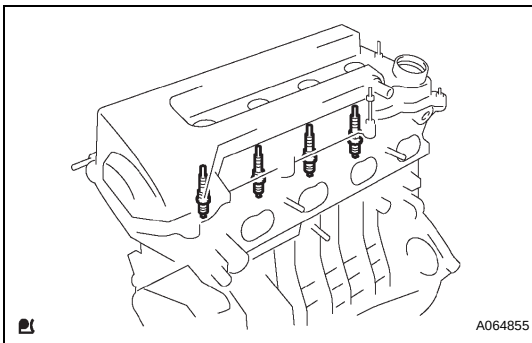
3. REMOVE VENTILATION VALVE SUB-ASSEMBLY

- (a) Remove the ventilation valve from the cylinder head cover.



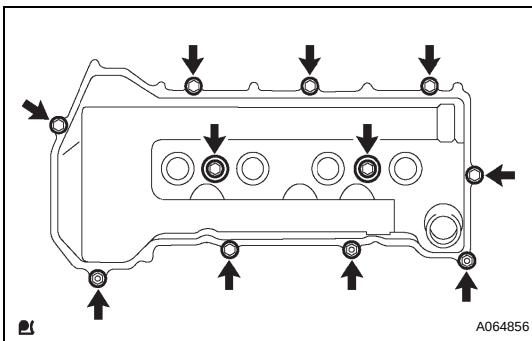
4. REMOVE SPARK PLUG

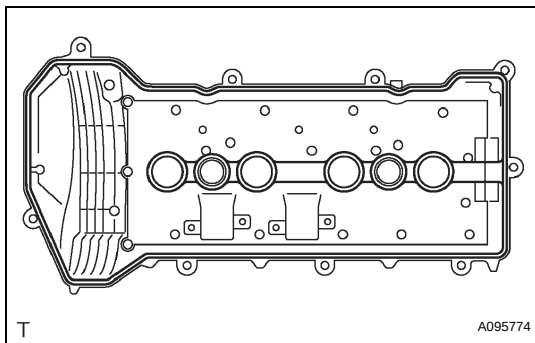
- (a) Using a spark plug wrench, remove the 4 spark plugs.



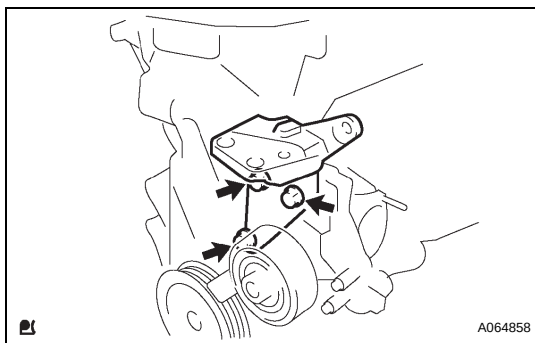
5. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY

- (a) Remove the 9 bolts, 2 seal washers and 2 nuts, then remove the cylinder head cover.

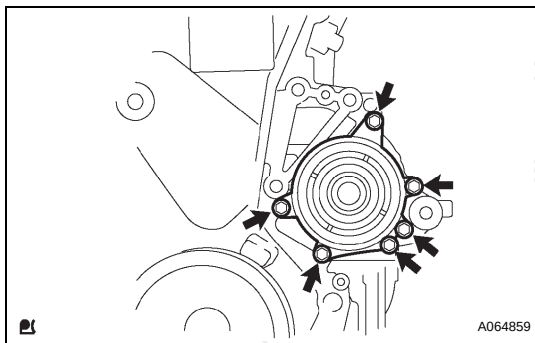


**6. REMOVE CYLINDER HEAD COVER GASKET**

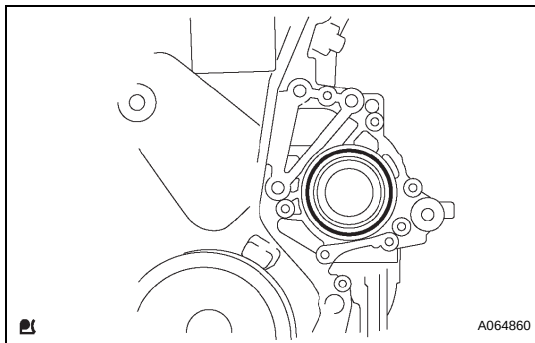
- (a) Remove the gasket from the cylinder head cover.

**7. REMOVE ENGINE MOUNTING BRACKET RH**

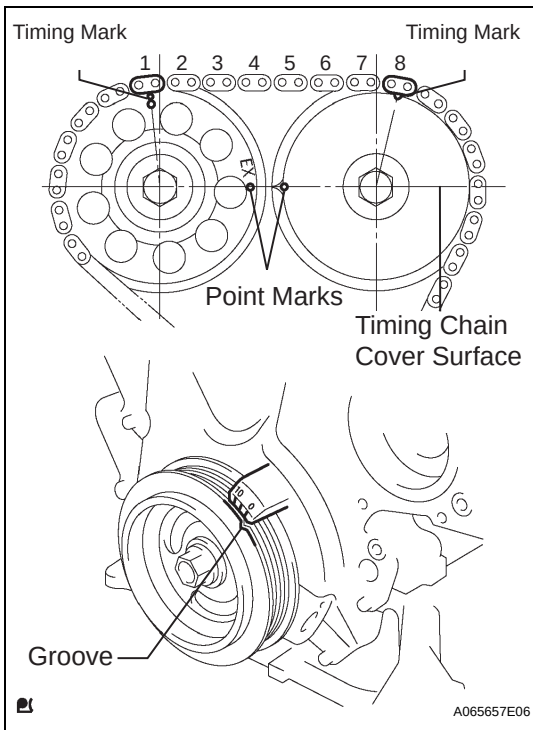
- (a) Remove the 3 bolts, then remove the engine mounting bracket RH.

**8. REMOVE WATER PUMP ASSEMBLY**

- (a) Remove the 6 bolts, then remove the water pump.

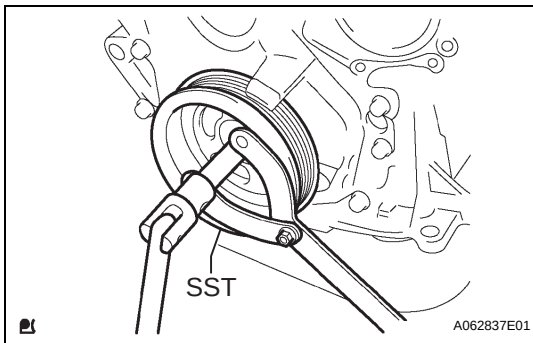
**9. REMOVE WATER PUMP O-RING**

- (a) Remove the O-ring from the timing chain cover.

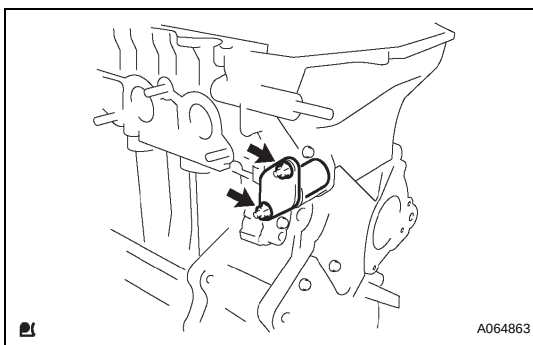


10. REMOVE CRANKSHAFT PULLEY

- (a) Set the No. 1 cylinder to the TDC/compression.
 - (1) Turn the crankshaft pulley until its groove and timing mark "0" of the timing chain cover are aligned.
 - (2) Check that the point marks of the camshaft timing gears are in a straight line on the timing chain cover surface as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) to align the marks as above.

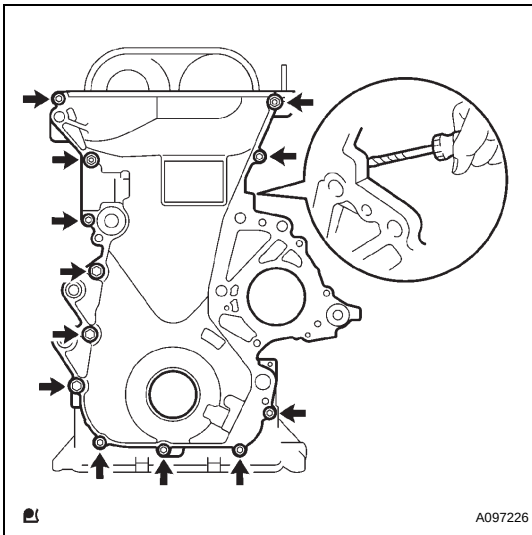


- (b) Using SST, remove the crankshaft pulley bolt.
SST 09960-10010 (09962-01000, 09963-01000)
- (c) Remove the crankshaft pulley from the crankshaft.



11. REMOVE CHAIN TENSIONER ASSEMBLY NO.1

- (a) Remove the 2 nuts, then remove the chain tensioner.

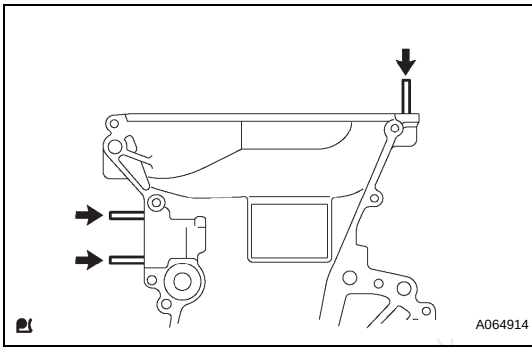


12. REMOVE TIMING CHAIN OR BELT COVER SUB-ASSEMBLY

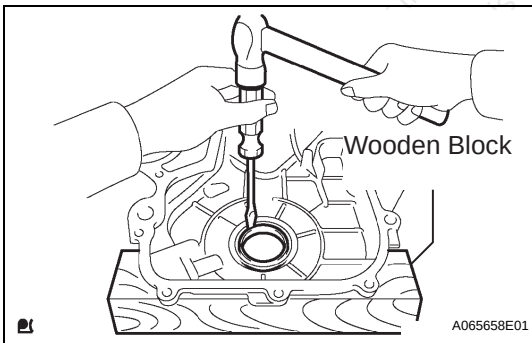
- Remove the 10 bolts and 2 nuts.
- Remove the timing chain cover by prying the portions between the timing chain cover, cylinder head and cylinder block with a screwdriver.

NOTICE:

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

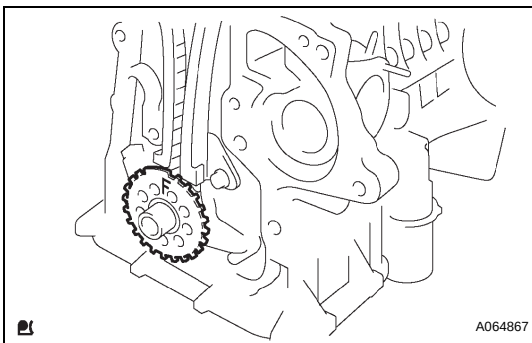


- Using a "TORX" socket wrench E5, remove the 3 stud bolts.



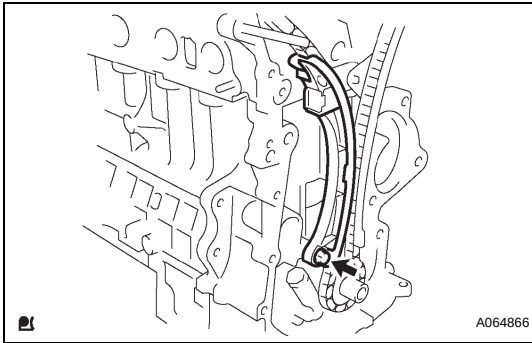
13. REMOVE TIMING CHAIN OR BELT COVER OIL SEAL

- Place the timing chain cover on wooden blocks.
- Using a screwdriver, remove the oil seal.

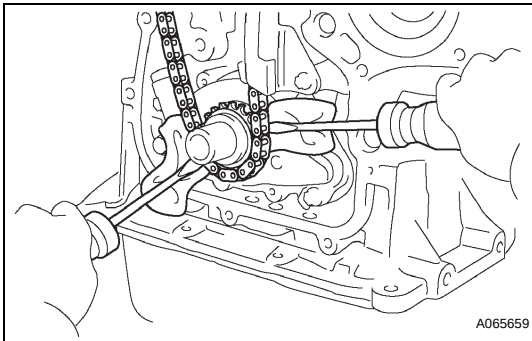


14. REMOVE CRANKSHAFT POSITION SENSOR PLATE NO.1

- Remove the crankshaft position sensor plate from the crankshaft.

**15. REMOVE CHAIN TENSIONER SLIPPER**

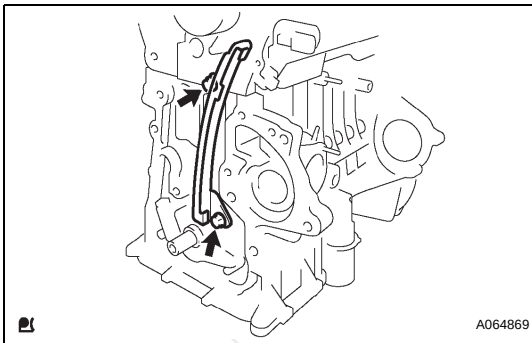
- (a) Remove the bolt, then remove the chain tensioner slipper.

**16. REMOVE CHAIN SUB-ASSEMBLY**

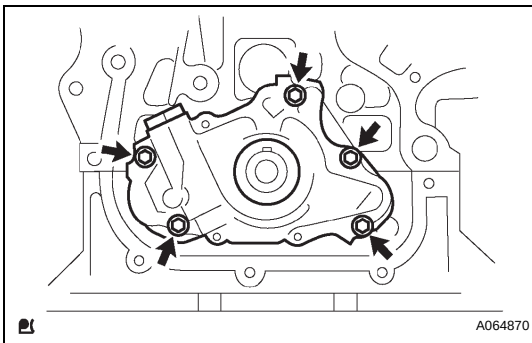
- (a) Using 2 screwdrivers, pry out the chain with the crankshaft timing gear, as shown in the illustration.

NOTICE:

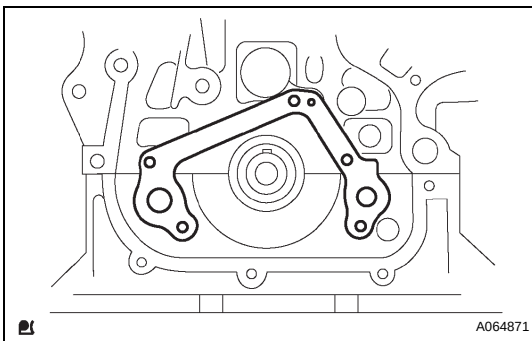
- Use a shop rag to protect the engine.
- If revolving the camshafts with the chain off the gears, turn the crankshaft 1/4 revolution to prevent the valves from coming into contact with the pistons.

**17. REMOVE CHAIN VIBRATION DAMPER NO.1**

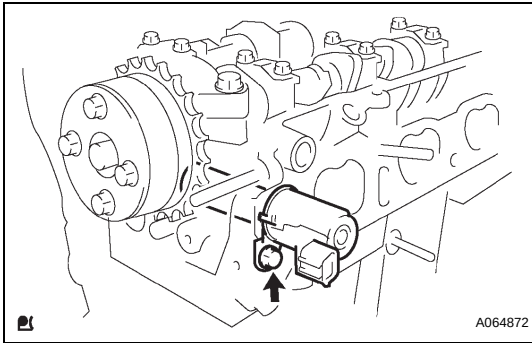
- (a) Remove the 2 bolts, then remove the chain vibration damper.

**18. REMOVE OIL PUMP ASSEMBLY**

- (a) Remove the 5 bolts, then remove the oil pump.

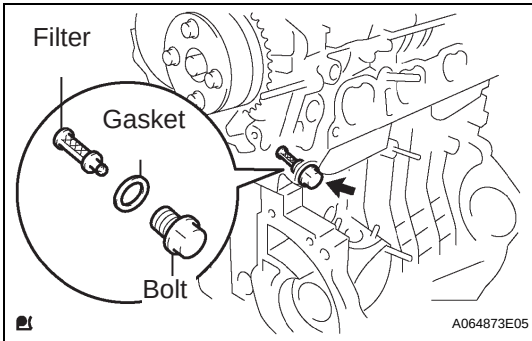
**19. REMOVE OIL PUMP GASKET**

- (a) Remove the gasket from the cylinder block.



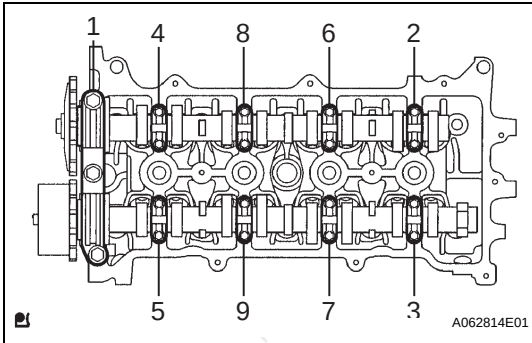
20. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

- (a) Remove the bolt, then remove the camshaft timing oil control valve.



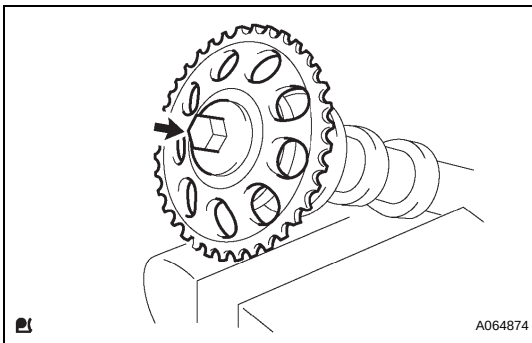
21. REMOVE OIL CONTROL VALVE FILTER

- (a) Remove the bolt together with the gasket and oil control valve filter.
- (b) Remove the gasket and oil control valve filter from the bolt.



22. REMOVE CAMSHAFT

- (a) Using several steps, uniformly loosen and remove the 19 bearing cap bolts in the sequence shown in the illustration.
- (b) Remove the 9 bearing caps, then remove the 2 camshafts from the cylinder head.

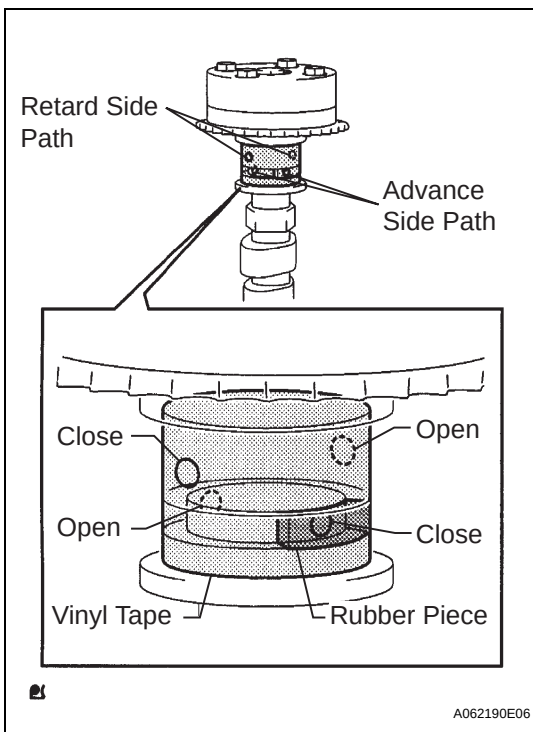


23. REMOVE CAMSHAFT TIMING GEAR OR SPROCKET

- (a) Clamp the camshaft in a vise, then remove the bolt and camshaft timing gear.

NOTICE:

Be careful not to damage the camshaft.



24. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

- (a) Check the lock of the camshaft timing gear.

- (1) Clamp the camshaft in a vise, then confirm that the camshaft timing gear is locked.

NOTICE:

Be careful not to damage the camshaft.

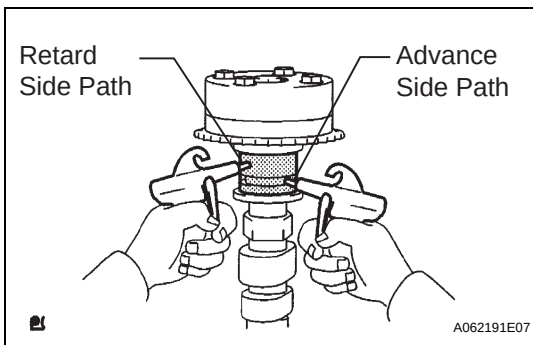
- (b) Release the lock pin.

- (1) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

HINT:

Two advance side paths are provided in the groove of the camshaft. Plug one of the paths with a piece of rubber.

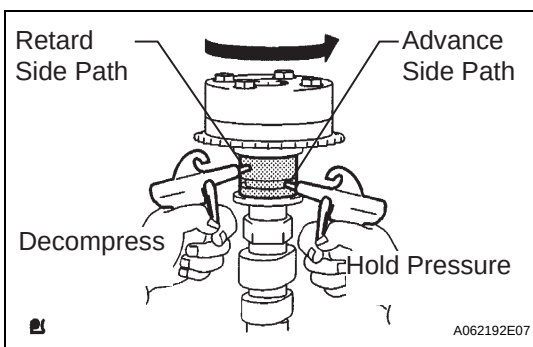
- (2) Puncture the tape over the advance side path and retard side path on the opposite side of the groove.



- (3) Apply air pressure to the two broken paths (the advance side path and retard side path) of about 150 kPa (1.5 kgf/cm²).

CAUTION:

Cover the paths with a shop rag to avoid oil splashes.



- (4) Confirm that the camshaft timing gear revolves in the timing advance direction when weakening the air pressure of the timing retard path.

HINT:

The lock pin is released, and the camshaft timing gear revolves in the advance direction.

- (5) When the camshaft timing gear comes to the most advanced position, release the air pressure of the timing retard side path, then release that of the timing advance side path.

CAUTION:

The camshaft timing gear occasionally shifts to the retard side abruptly if the air compression of the advance side path is released before the retard side path. This often causes the breakage of the lock pin.

- (c) Check the smooth revolution.
 - (1) Revolve the camshaft timing gear several times within the movable range except for the most retarded position and check that it turns smoothly.

CAUTION:

Be sure to perform this check by hand, instead of using air pressure.

- (d) Check that the lock is in the most retarded position.
 - (1) Confirm that the camshaft timing gear is locked in the most retarded position.

25. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

- (a) Clamp the camshaft in a vise, then confirm that the camshaft timing gear is locked.

CAUTION:

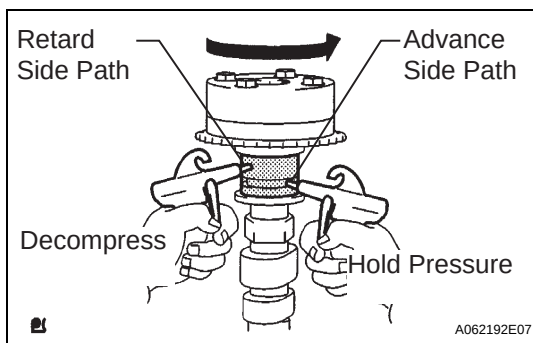
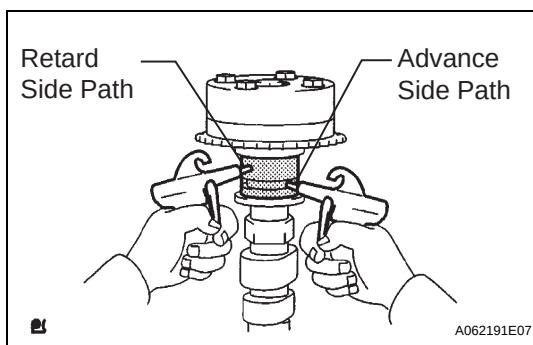
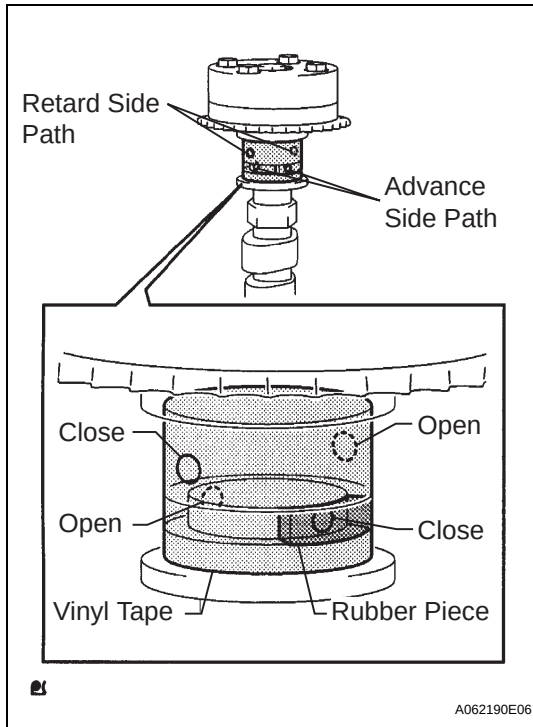
Be careful not to damage the camshaft.

- (b) Cover the 4 oil paths of the cam journal with vinyl tape as shown in the illustration.

HINT:

Two advance side paths are provided in the groove of the camshaft. Plug one of the paths with a piece of rubber.

- (c) Puncture the tape over the advance side path and retard side path on the opposite side of the groove.



- (d) Apply air pressure to the two broken paths (the advance side path and retard side path) of about 150 kPa (1.5 kgf/cm²).

CAUTION:

Cover the paths with a shop rag to avoid oil splashes.

- (e) Confirm that the camshaft timing gear revolves in the timing advance direction when weakening the air pressure of the timing retard path.

HINT:

The lock pin is released, and the camshaft timing gear revolves in the advance direction.

- (f) When the camshaft timing gear comes to the most advanced position, release the air pressure of the timing retard side path, then release that of the timing advance side path.

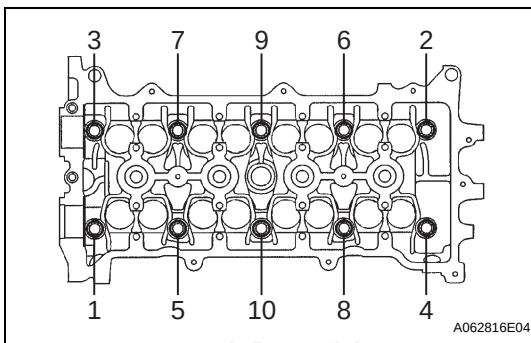
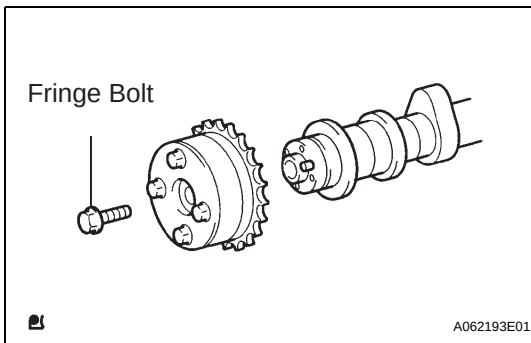
CAUTION:

The camshaft timing gear occasionally shifts to the retard side abruptly if the air compression of the advance side path is released before the retard side path. This often causes the breakage of the lock pin.

- (g) Remove the fringe bolt and camshaft timing gear.

NOTICE:

- Be sure not to remove the other 4 bolts.
- When reusing the camshaft timing gear, release the straight pin locking first, then install the gear.

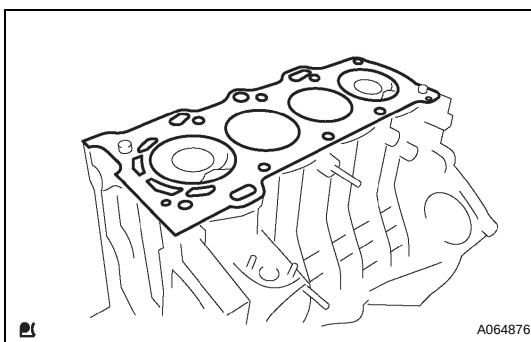
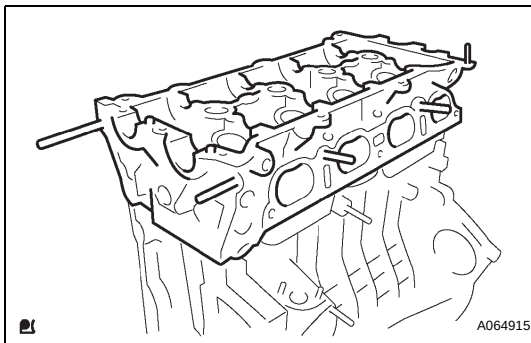
**26. REMOVE CYLINDER HEAD SUB-ASSEMBLY**

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

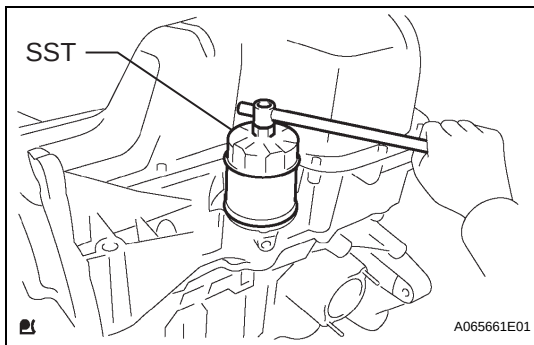
NOTICE:

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

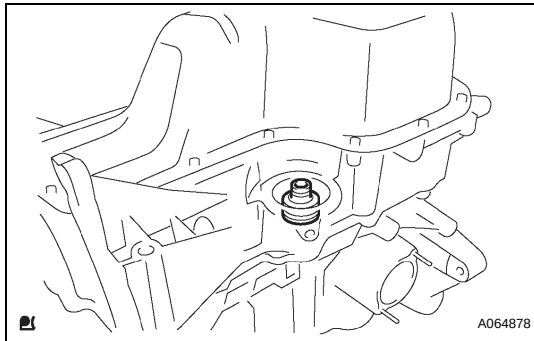
- (b) Remove the cylinder head from the cylinder block.

**27. REMOVE CYLINDER HEAD GASKET**

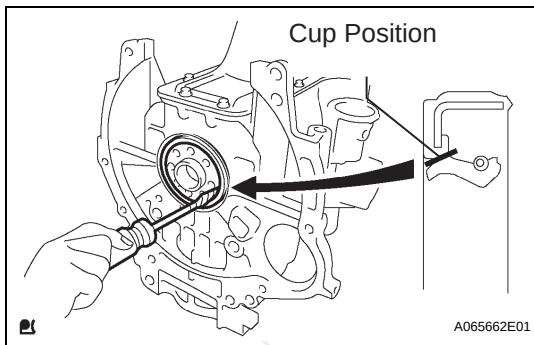
- (a) Remove the cylinder head gasket from the cylinder block.

**28. REMOVE OIL FILTER SUB-ASSEMBLY**

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

**29. REMOVE OIL FILTER UNION**

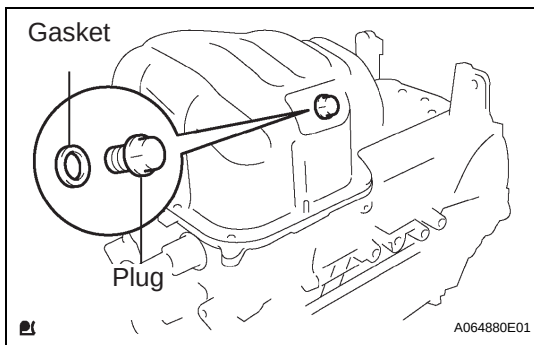
- (a) Using a socket hexagon wrench 12, remove the oil filter union.

**30. REMOVE ENGINE REAR OIL SEAL**

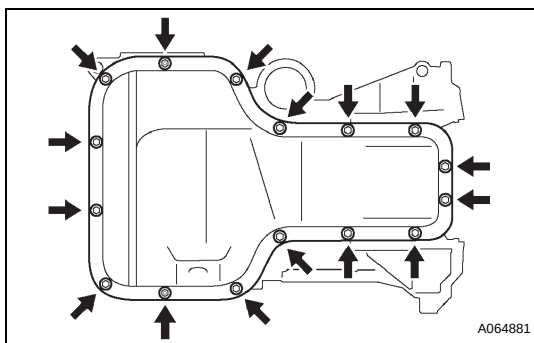
- (a) Using a knife, cut off the oil seal lip.
 (b) Using a screwdriver with its tip wrapped with tape, pry out the oil seal.

NOTICE:

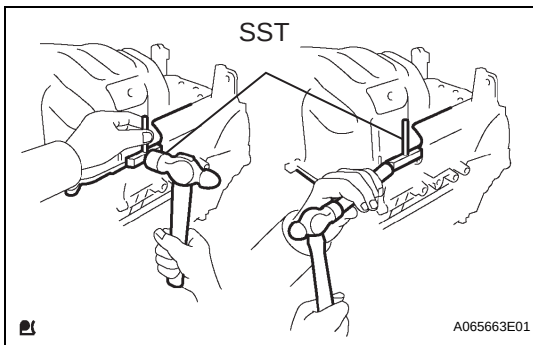
After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.

**31. REMOVE OIL PAN DRAIN PLUG**

- (a) Remove the oil pan drain plug and gasket from the oil pan.

**32. REMOVE OIL PAN SUB-ASSEMBLY**

- (a) Remove the 14 bolts and 2 nuts.

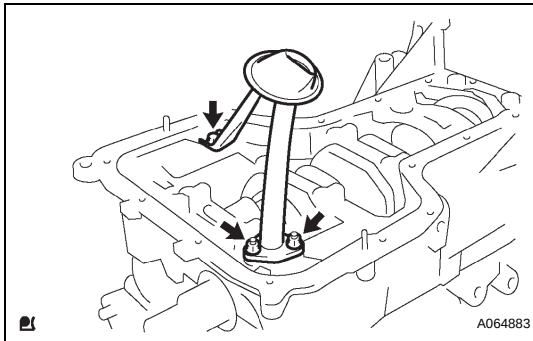


- (b) Insert the blade of SST between the bearing cap and oil pan, then cut off the applied sealer and remove the oil pan.

SST 09032-00100

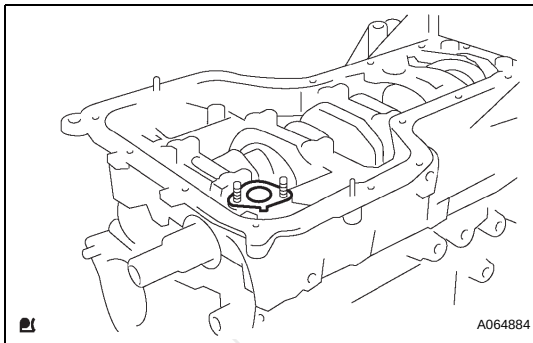
NOTICE:

Be careful not to damage the oil pan contact surface of the bearing cap and oil pan.



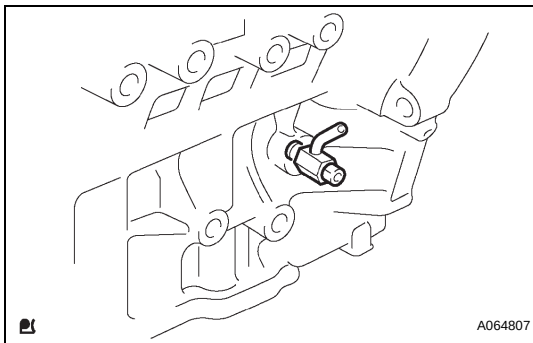
33. REMOVE OIL STRAINER SUB-ASSEMBLY

- (a) Remove the bolt and 2 nuts, then remove the oil strainer.



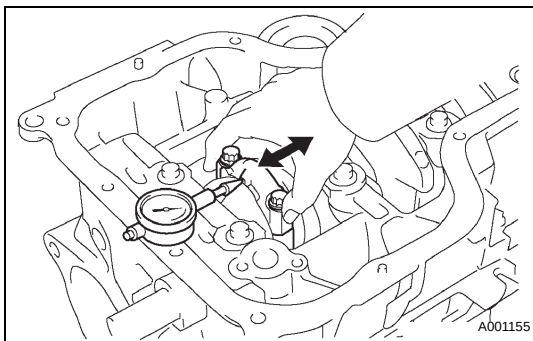
34. REMOVE OIL STRAINER FLANGE GASKET

- (a) Remove the gasket from the cylinder block.



35. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

- (a) Remove the cylinder block water drain cock from the cylinder block.



36. CHECK CONNECTING ROD THRUST CLEARANCE

- (a) Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance:

0.160 to 0.342 mm (0.0063 to 0.0135 in.)

Maximum thrust clearance:

0.342 mm (0.0135 in.)

- If the thrust clearance is greater than maximum, replace the connecting rod.
- If necessary, replace the crankshaft.

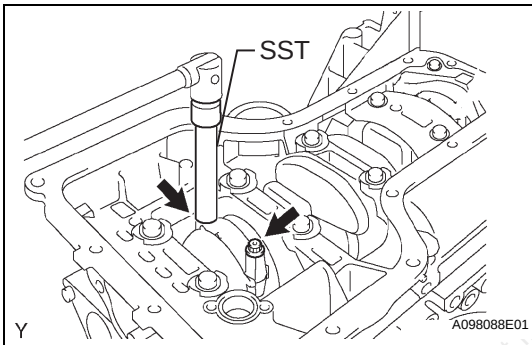
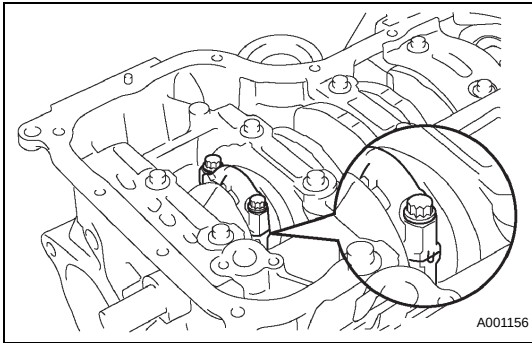
37. CHECK CONNECTING ROD OIL CLEARANCE**NOTICE:**

Do not turn the crankshaft during the measurement.

- (a) Using marking paint, write the matched cylinder number on each connecting rod and cap.

HINT:

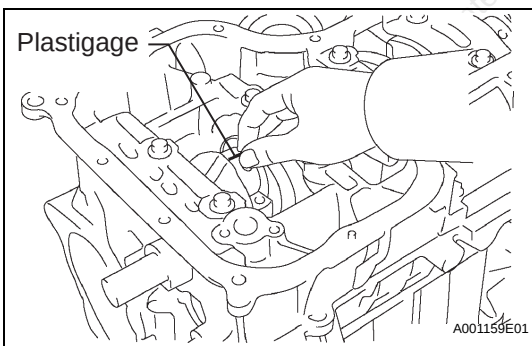
The matchmarks on the connecting rods and caps are for ensuring the correct reassembly.



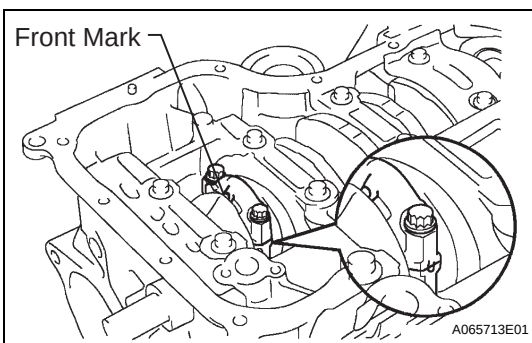
- (b) Using SST, remove the 2 bolts and connecting rod cap.

SST 09205-16010

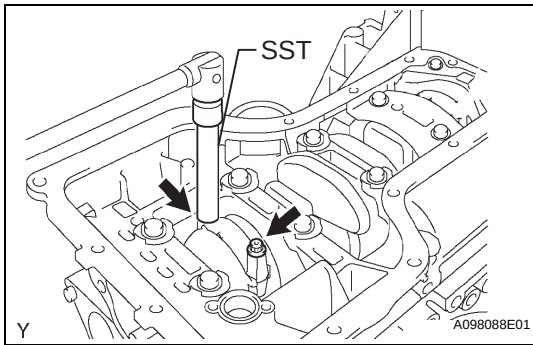
- (c) Clean the crank pin and bearing.
(d) Check the crank pin and bearing for pitting and scratches.



- (e) Lay a strip of the Plastigage across the crank pin.



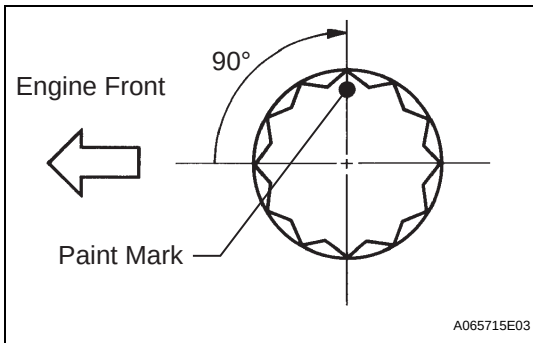
- (f) Check that the front mark of the connecting rod cap is facing in the correct direction.
(g) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.



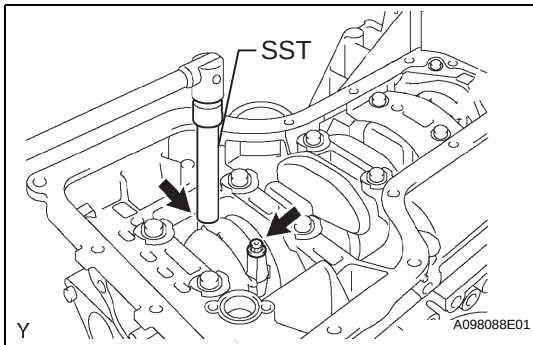
- (h) Using SST, tighten the bolts in several passes to the specified torque.

SST 09205-16010

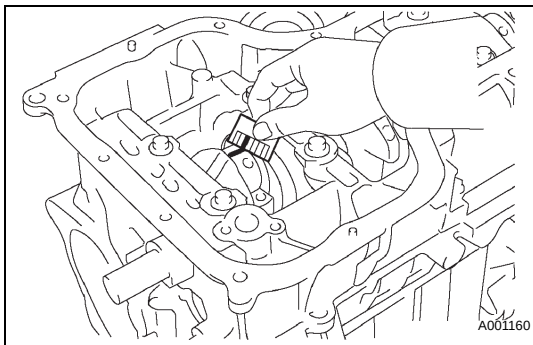
Torque: 20 N*m (204 kgf*cm, 15 ft.*lbf)



- (i) Mark the front of the connecting cap bolts with paint.
 (j) Retighten the cap bolts by 90° as shown in the illustration.
 (k) Check that the crankshaft turns smoothly.



- (l) Remove the 2 bolts and connecting rod cap.



- (m) Measure the Plastigage at its widest point.

Standard oil clearance:

0.028 to 0.060 mm (0.0011 to 0.0024 in.)

Maximum oil clearance:

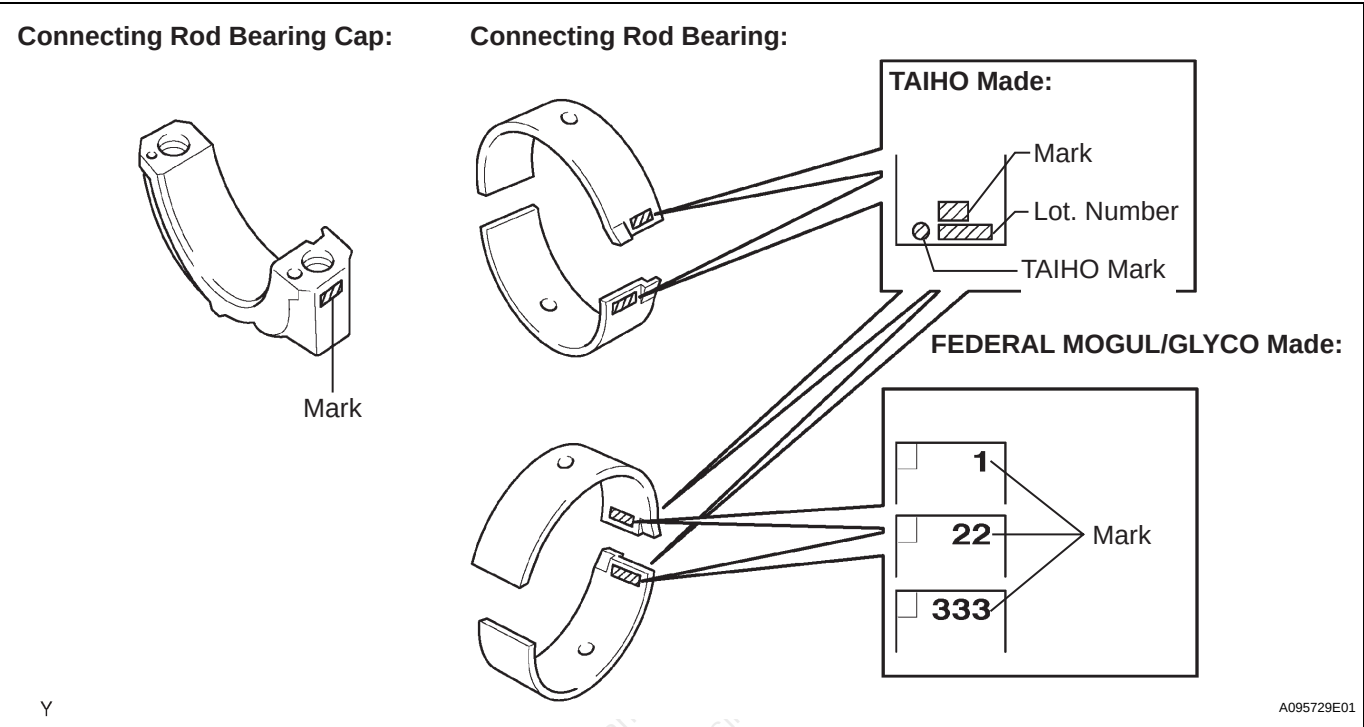
0.080 mm (0.0032 in.)

NOTICE:

Remove the Plastigage completely after the measurement.

- If the oil clearance is greater than maximum, replace the connecting rod bearing.
- If necessary, grind or replace the crankshaft.

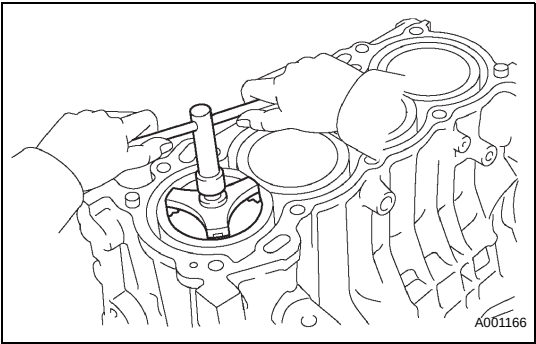
EM



HINT:

- The TAIHO mark is either on the claw side or the opposite side.
- If replacing a bearing, select a new one with the same number as marked on the connecting rod bearing cap. There are 3 sizes of standard bearings, marked "1", "2" and "3" accordingly.

Item	Mark	mm (in.)
Connecting rod large end bore diameter	1	47.000 to 47.008 (1.8504 to 1.8507)
	2	47.009 to 47.016 (1.8507 to 1.8510)
	3	47.017 to 47.024 (1.8511 to 1.8513)
Connecting rod bearing thickness	1	1.486 to 1.490 (0.0585 to 0.0587)
	2	1.491 to 1.494 (0.0587 to 0.0588)
	3	1.495 to 1.498 (0.0589 to 0.0590)
Crankshaft pin outer diameter	-	43.992 to 44.000 (1.7320 to 1.7323)

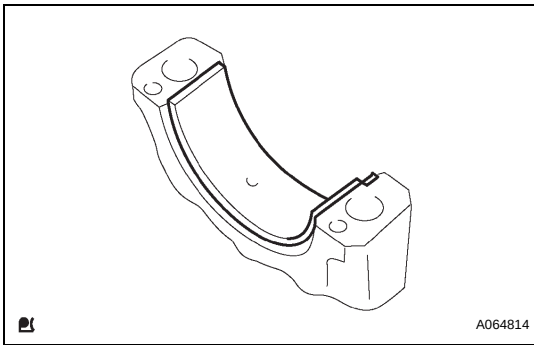


38. REMOVE CONNECTING ROD SUB-ASSEMBLY

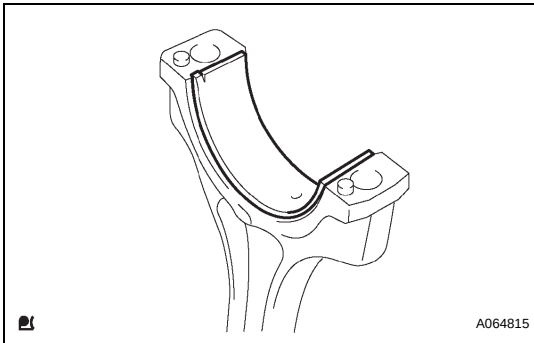
- Using a ridge reamer, remove all carbon from the top of the cylinder.
- Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

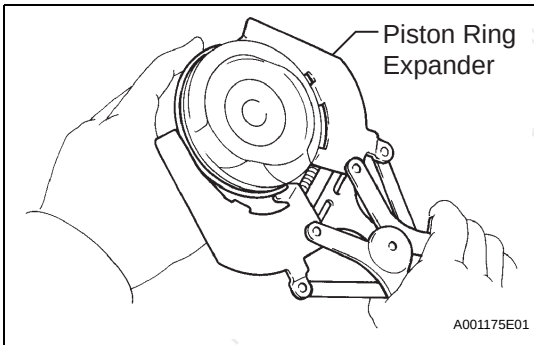
- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.

**39. REMOVE CONNECTING ROD BEARING**

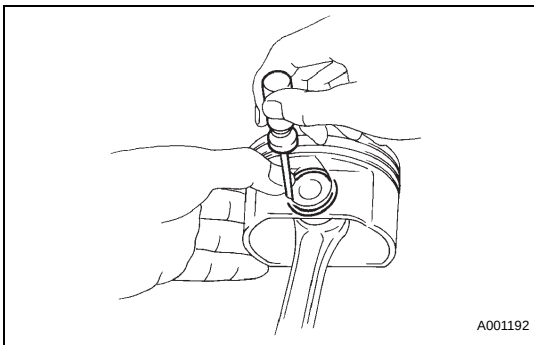
- (a) Remove the connecting rod bearing from the connecting rod cap.



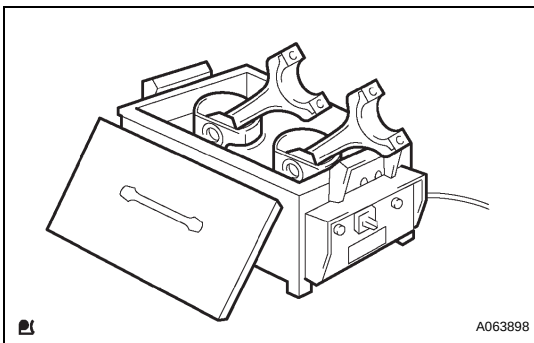
- (b) Remove the connecting rod bearing from the connecting rod.

**40. REMOVE PISTON RING SET**

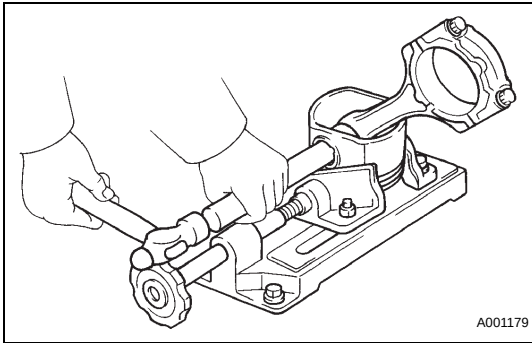
- (a) Using a piston ring expander, remove the 2 compression rings.
(b) Remove the 2 side rails and oil ring by hand.

**41. REMOVE W/PIN PISTON SUB-ASSEMBLY**

- (a) Using a small screwdriver, pry out the 2 snap rings.



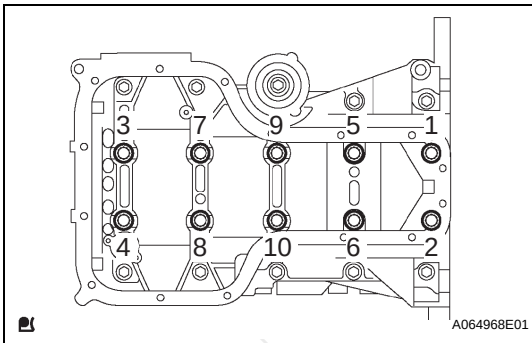
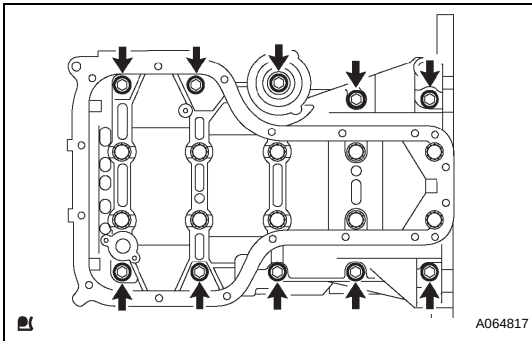
- (b) Gradually heat the piston up to 80 to 90°C (176 to 194°F).



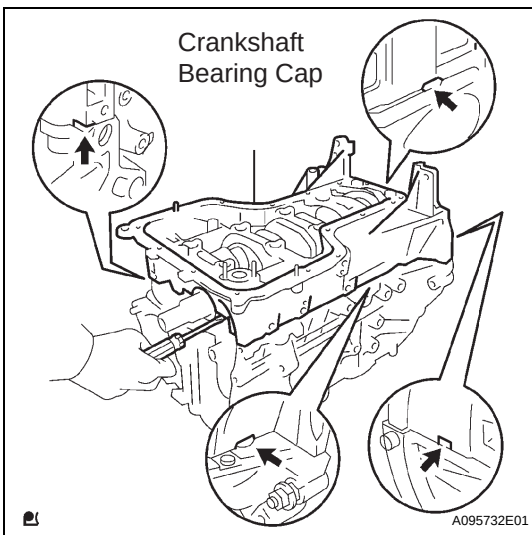
- (c) Using a plastic hammer and brass bar, lightly tap out the piston pin, then remove the connecting rod.
- HINT:
- The piston and pin are a matched set.
 - Arrange the piston, pin, ring, connecting rod and bearings in the correct order.

42. REMOVE CRANKSHAFT

- (a) Remove the 10 bolts from the crankshaft bearing cap.



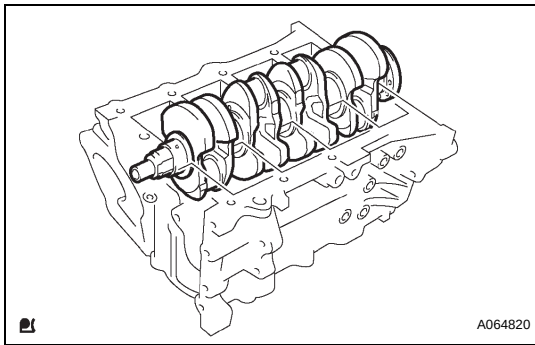
- (b) Uniformly loosen the 10 bearing cap bolts in several passes in the sequence shown in the illustration.



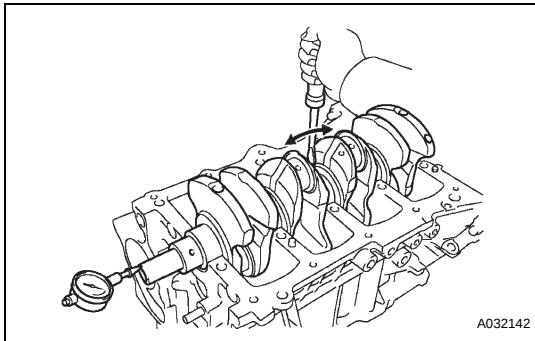
- (c) Using a screwdriver, remove the crankshaft bearing cap by prying the indicated portions between the cylinder block and crankshaft bearing cap.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder block and crankshaft bearing cap.



- (d) Remove the crankshaft from the cylinder block.



43. CHECK CRANKSHAFT THRUST CLEARANCE

- (a) Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

0.04 to 0.24 mm (0.0016 to 0.0094 in.)

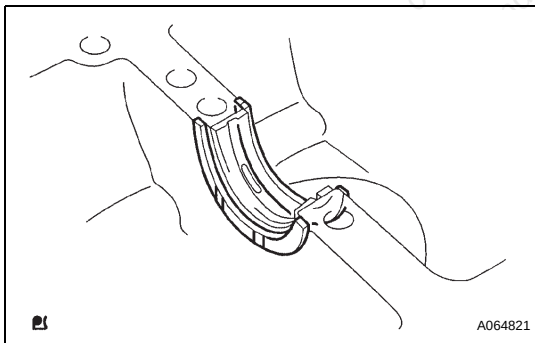
Maximum thrust clearance:

0.30 mm (0.0118 in.)

- If the thrust clearance is greater than maximum, measure the thrust washer thickness.
- If the thickness is not as specified, replace the thrust washer.

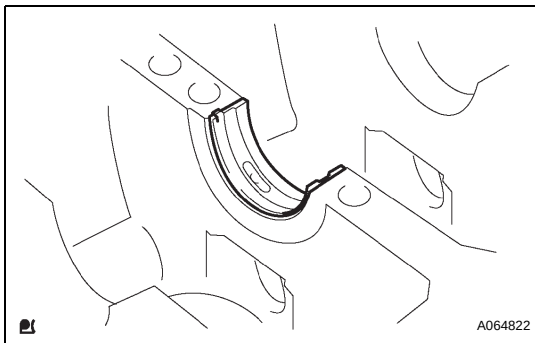
HINT:

Thrust washer thickness: 2.430 to 2.480 mm (0.0957 to 0.0976 in.).



44. REMOVE CRANKSHAFT THRUST WASHER UPPER

- (a) Remove the 2 crankshaft thrust washers from the cylinder block.

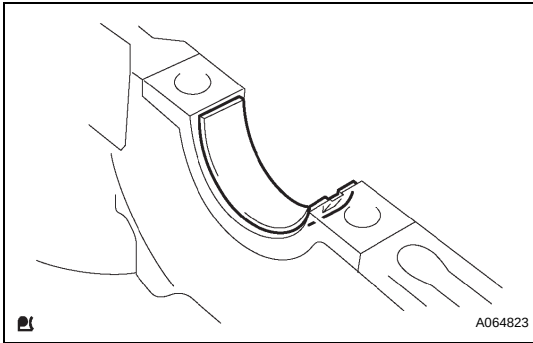


45. REMOVE CRANKSHAFT BEARING

- (a) Remove the 5 crankshaft bearings from the cylinder block.

NOTICE:

Arrange the main bearings and thrust washers in the correct order.



- (b) Remove the 5 crankshaft bearings from the bearing caps.

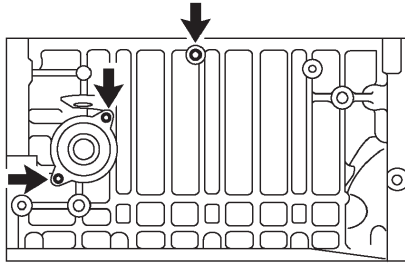
NOTICE:

Arrange the main bearings and thrust washers in the correct order.

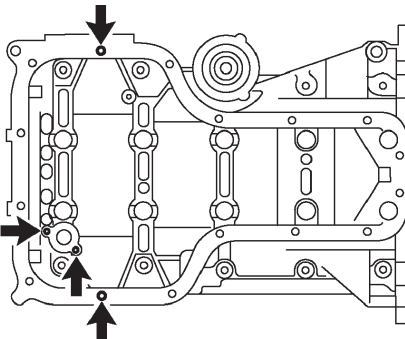
46. REMOVE STUD BOLT

- (a) Using "TORX" socket wrenches E5 and E7, remove the 9 stud bolts.

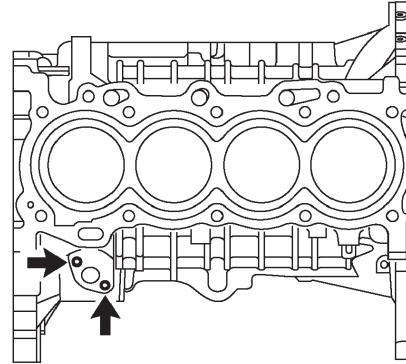
Intake Side:



Bearing Cap Lower Side:



Upper Side:

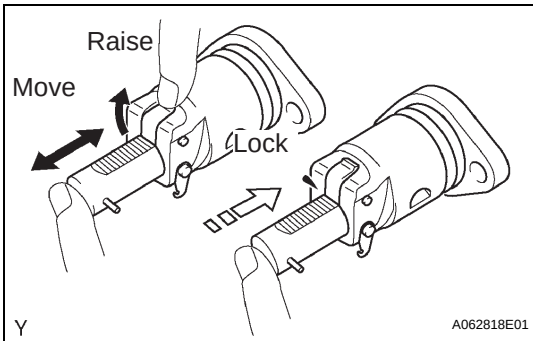


A064969E01

INSPECTION

1. INSPECT CHAIN TENSIONER ASSEMBLY NO.1

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



2. INSPECT CHAIN SUB-ASSEMBLY

- (a) Using a spring tension gauge and vernier calipers, pull the timing chain with 140 N (14.3 kgf, 31.5 lb), then measure its length.

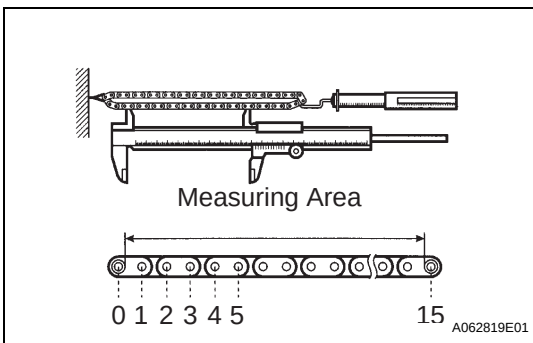
Maximum chain elongation:

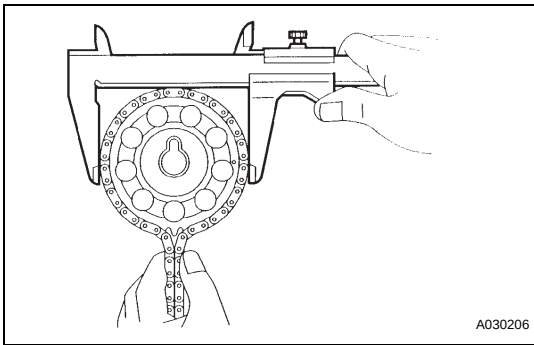
115.3 mm (4.539 in.)

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

HINT:

Take the same measurements by pulling at 3 or more places selected at random.





3. INSPECT CAMSHAFT TIMING GEAR OR SPROCKET

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

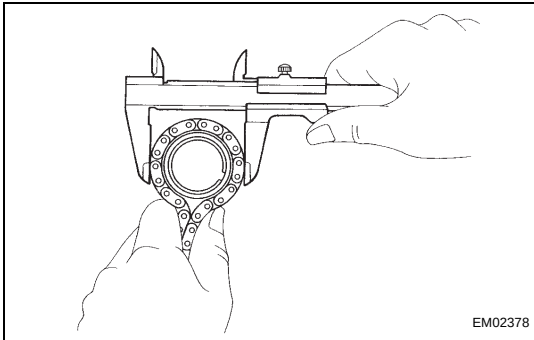
Minimum gear diameter (w/ chain):

96.8 mm (3.811 in.)

NOTICE:

The vernier calipers must be in contact with the chain rollers when measuring.

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



4. INSPECT CRANKSHAFT TIMING GEAR OR SPROCKET

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

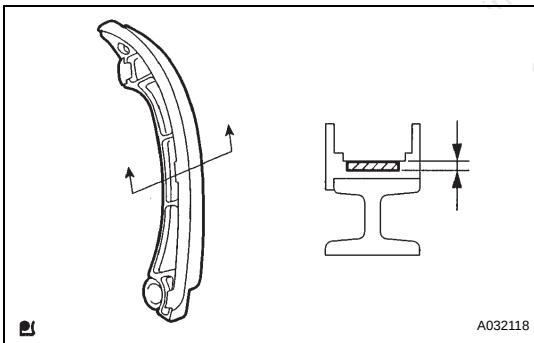
Minimum gear diameter (w/ chain):

51.0 mm (2.008 in.)

NOTICE:

The vernier calipers must be in contact with the chain rollers when measuring.

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



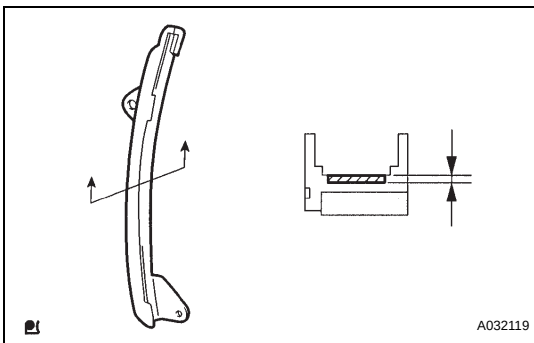
5. INSPECT CHAIN TENSIONER SLIPPER

- (a) Using verniers calipers, measure the chain tensioner slipper wear.

Maximum wear:

1.0 mm (0.039 in.)

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



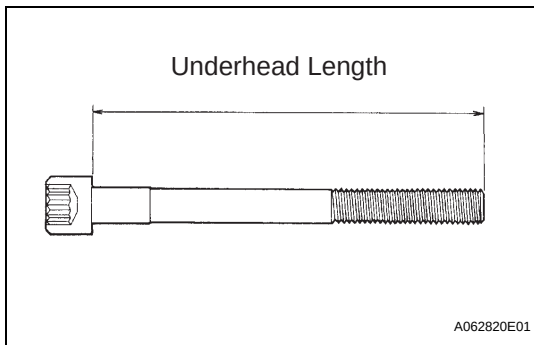
6. INSPECT CHAIN VIBRATION DAMPER NO.1

- (a) Using vernier calipers, measure the vibration damper wears.

Maximum wear:

1.0 mm (0.039 in.)

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



7. INSPECT CYLINDER HEAD SET BOLT

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

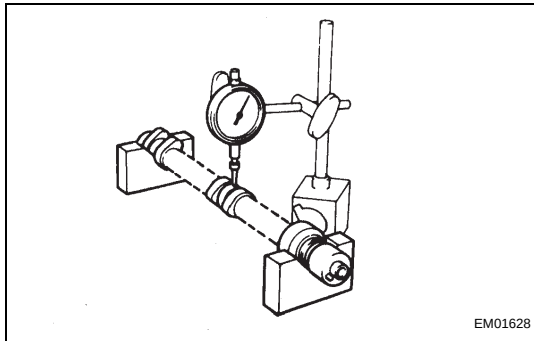
Standard bolt length:

146.8 to 148.2 mm (5.780 to 5.835 in.)

Maximum bolt length:

148.5 mm (5.846 in.)

If the bolt length is greater than maximum, replace the cylinder head set bolt.



8. INSPECT CAMSHAFT

- (a) Check the camshaft for runout.

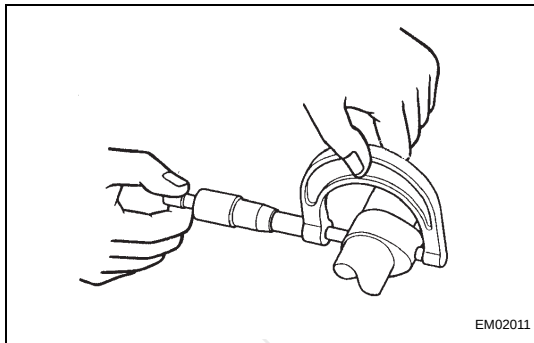
- (1) Place the camshaft on V-blocks.

- (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 maximum, replace the camshaft.



- (b) Inspect the cam lobes.

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

Standard cam lobe height:

Intake:

44.333 to 44.433 mm (1.7454 to 1.7493 in.)

Exhaust:

43.761 to 43.861 mm (1.7229 to 1.7268 in.)

Minimum cam lobe height:

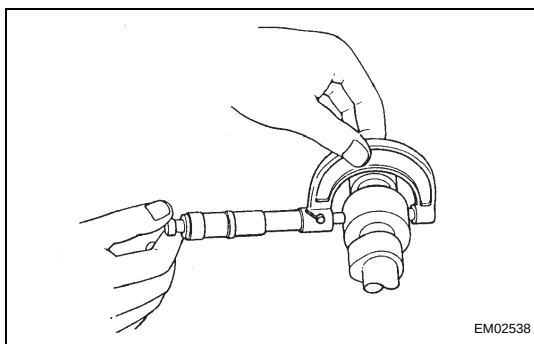
Intake:

44.18 mm (1.7394 in.)

Exhaust:

43.61 mm (1.7169 in.)

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



- (c) Inspect the camshaft journals.

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

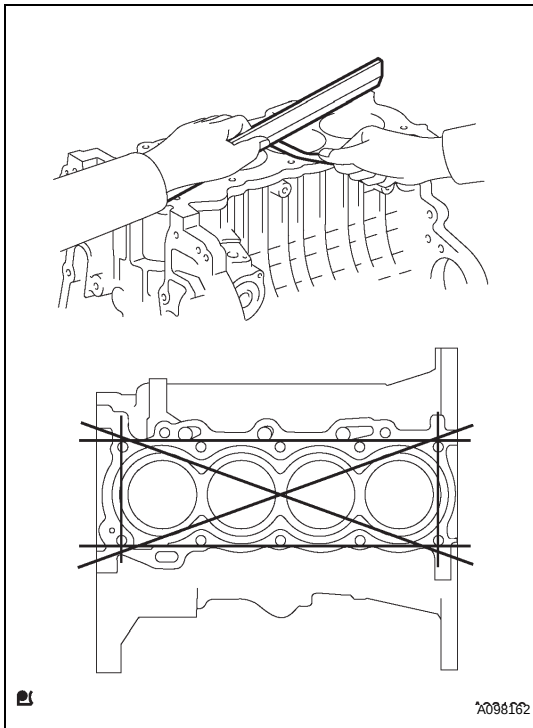
No. 1 journal diameter:

34.449 to 34.465 mm (1.3563 to 1.3569 in.)

Other journal diameters:

22.949 to 22.965 mm (0.9035 to 0.9041 in.)

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



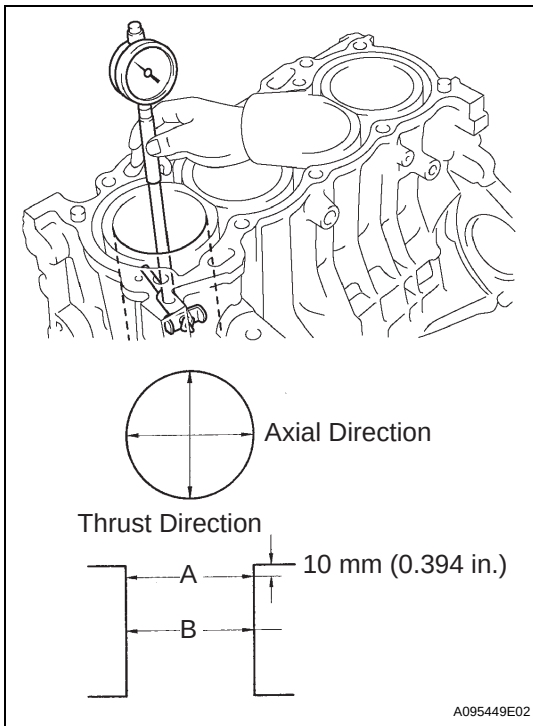
9. CHECK CYLINDER BLOCK FOR FLATNESS

- (a) Using a precision straight edge and feeler gauge, measure the warpage on the surface that is in contact with the cylinder head gasket.

Maximum warpage:

0.05 mm (0.0020 in.)

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



10. INSPECT CYLINDER BORE

- (a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in the thrust and axial directions.

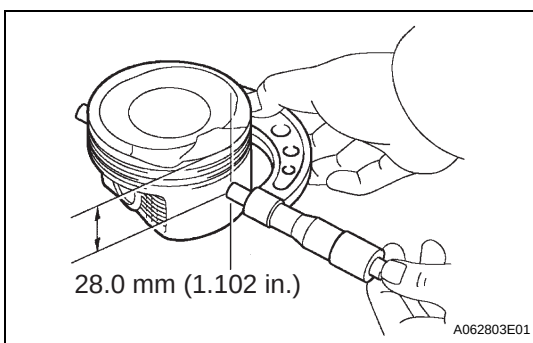
Standard diameter:

79.000 to 79.013 mm (3.1102 to 3.1107 in.)

Maximum diameter::

79.133 mm (3.1155 in.)

If the average diameter of 4 positions is greater than maximum, replace the cylinder block.



11. INSPECT W/PIN PISTON SUB-ASSEMBLY

- (a) Using a micrometer, measure the piston diameter at right angles to the piston pin hole, and at a piston of 28.0 mm (1.102 in.) from the top the piston head.

Piston diameter:

78.917 to 78.927 mm (3.1070 to 3.1074 in.)

If the diameter is not as specified, replace the piston assembly.

12. CHECK PISTON OIL CLEARANCE

- (a) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

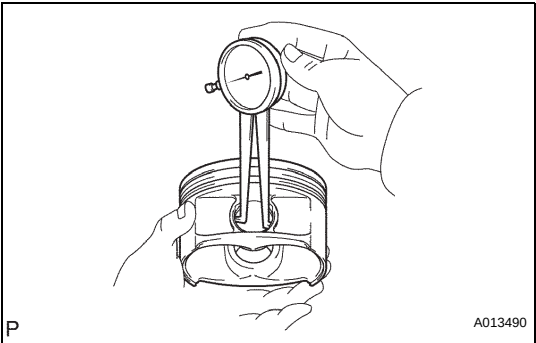
Standard oil clearance:

0.073 to 0.096 mm (0.0029 to 0.0038 in.)

Maximum oil clearance:

0.10 mm (0.0039 in.)

- If the oil clearance is greater than maximum, replace all pistons.
- If necessary, replace the cylinder block.



13. CHECK PISTON PIN OIL CLEARANCE

- (a) Using a caliper gauge, measure the piston pin bore diameter.

Piston pin bore diameter:

20.006 to 20.015 mm (0.7876 to 0.7880 in.)

Mark	mm (in.)
A	20.006 to 20.009 (0.7876 to 0.7878)
B	20.010 to 20.012 (0.7878 to 0.7879)
C	20.013 to 20.015 (0.7879 to 0.7880)

If the bore diameter is not as specified, replace the piston assembly.

- (b) Using a micrometer, measure the piston pin outer diameter.

Piston pin outer diameter:

20.004 to 20.013 mm (0.7876 to 0.7879 in.)

Mark	mm (in.)
A	20.004 to 20.007 (0.7876 to 0.7877)
B	20.008 to 20.010 (0.7877 to 0.7878)
C	20.011 to 20.013 (0.7878 to 0.7879)

If the outer diameter is not as specified, replace the piston assembly.

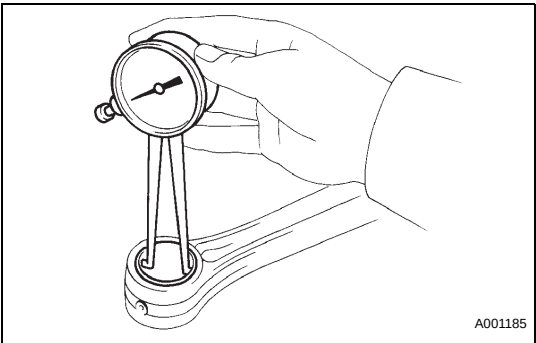
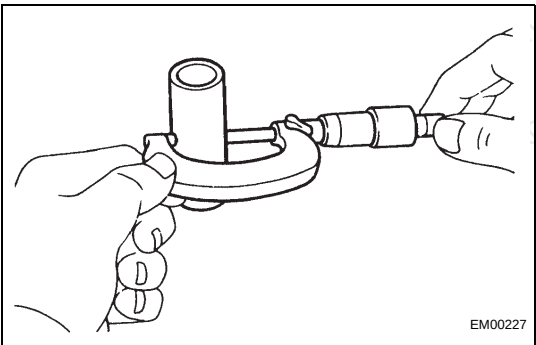
- (c) Using a caliper gauge, measure the connecting rod small end bore diameter.

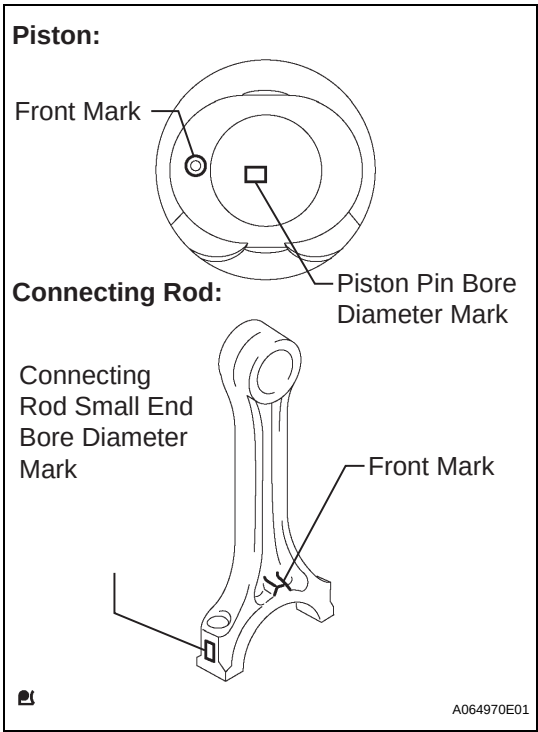
Connecting rod small end bore diameter:

20.012 to 20.021 mm (0.7879 to 0.7882 in.)

Mark	mm (in.)
A	20.012 to 20.015 (0.7879 to 0.7880)
B	20.016 to 20.018 (0.7880 to 0.7881)
C	20.019 to 20.021 (0.7881 to 0.7882)

If the diameter is not as specified, replace the connecting rod assembly.





- (d) Subtract the piston pin outer diameter measurement from the piston pin bore diameter measurement.

Standard oil clearance:

0.002 to 0.011 mm (0.0001 to 0.0004 in.)

Maximum oil clearance:

0.011 mm (0.0004 in.)

- If the oil clearance is greater than maximum, replace the connecting rod assembly.
- If necessary, replace the piston assembly.

- (e) Subtract the piston pin outer diameter measurement from the connecting rod small end bore diameter measurement.

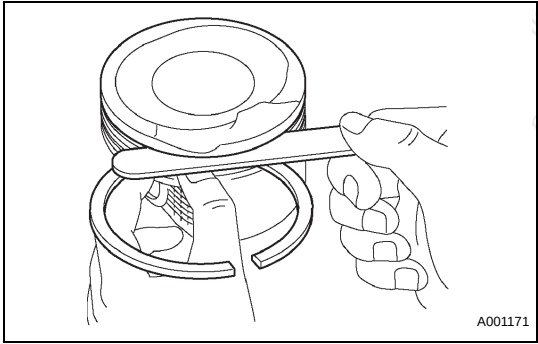
Standard oil clearance:

-0.001 to 0.017 mm (-0.00004 to 0.0007 in.)

Maximum oil clearance:

0.017 mm (0.0007 in.)

- If the oil clearance is greater than maximum, replace the connecting rod assembly.
- If necessary, replace both the connecting rod assembly and piston assembly.



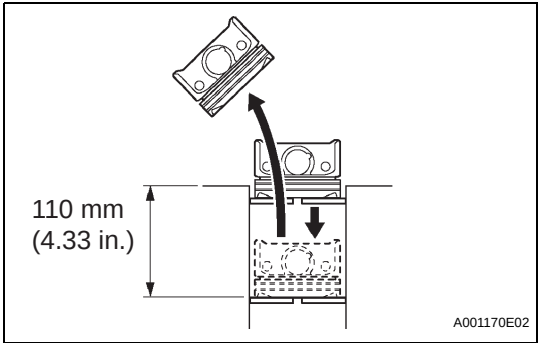
14. CHECK RING GROOVE CLEARANCE

- (a) Using a feeler gauge, measure the clearance between the new piston ring and the wall of the ring groove.

Ring groove clearance

Item	Specification
No. 1 ring	0.02 to 0.07 mm (0.0008 to 0.0028 in.)
No. 2 ring	0.03 to 0.07 mm (0.0012 to 0.0028 in.)
Oil ring	0.03 to 0.11 mm (0.0012 to 0.0043 in.)

If the groove clearance is not as specified, replace the piston assembly.

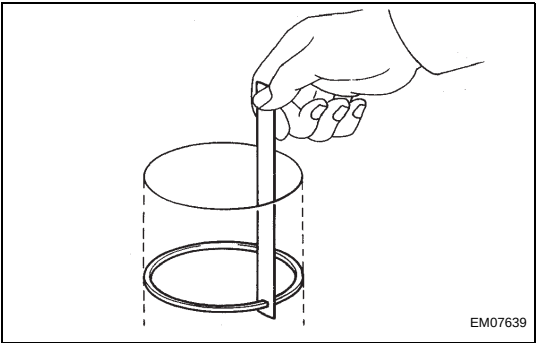


15. CHECK PISTON RING END GAP

- (a) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 110 mm (4.33 in.) from the top of the cylinder block.

EM

cardiagn.com



- (b) Using a feeler gauge, measure the end gap.
Standard end gap

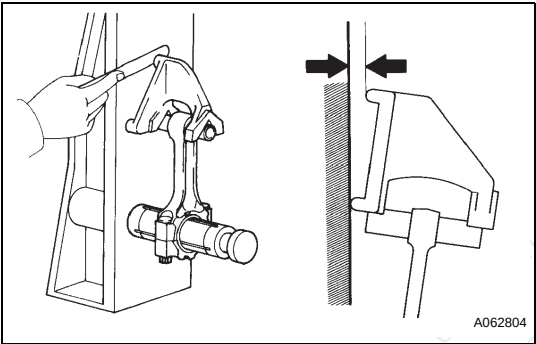
Item	Specification
No. 1 ring	0.25 to 0.35 mm (0.0098 to 0.0138 in.)
No. 2 ring	0.35 to 0.50 mm (0.0138 to 0.0197 in.)
Oil ring	0.15 to 0.40 mm (0.0059 to 0.0157 in.)

Maximum end gap

Item	Specification
No. 1 ring	1.05 mm (0.0413 in.)
No. 2 ring	1.20 mm (0.0472 in.)

- If the end gap is greater than maximum, replace the piston ring.
- If the end gap is greater than maximum, even with a new piston ring, replace the cylinder block.

EM



16. INSPECT CONNECTING ROD SUB-ASSEMBLY

- (a) Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.

- (1) Check for misalignment.

Maximum misalignment:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

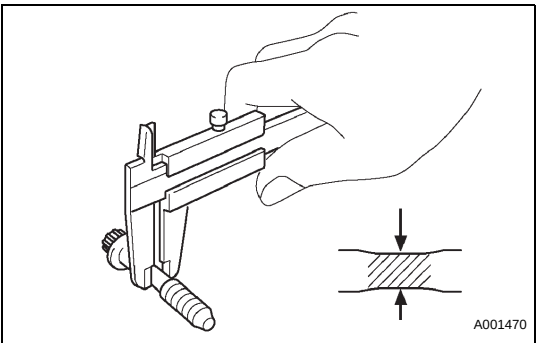
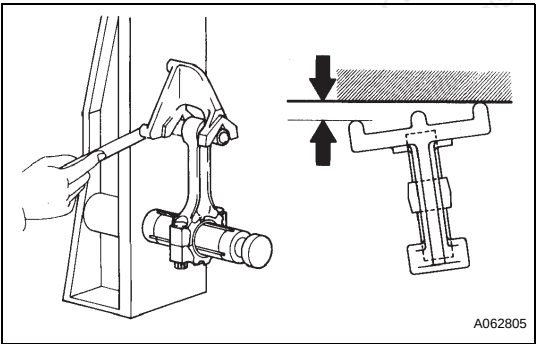
If the misalignment is greater than maximum, replace the connecting rod assembly.

- (2) Check for twist.

Maximum twist:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If the twist is greater than maximum, replace the connecting rod assembly.



17. INSPECT CONNECTING ROD BOLT

- (a) Using vernier calipers, measure the tension portion diameter of the bolts.

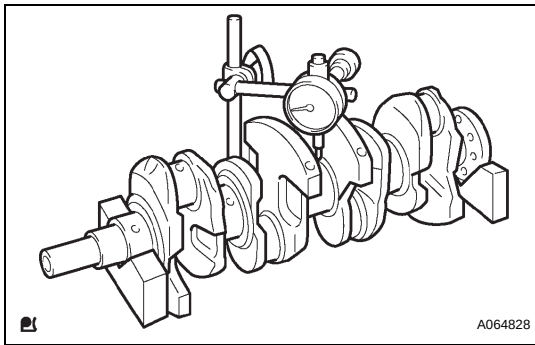
Standard diameter:

6.6 to 6.7 mm (0.260 to 0.264 in.)

Minimum diameter:

6.4 mm (0.252 in.)

If the diameter is less than minimum, replace the connecting rod bolt.



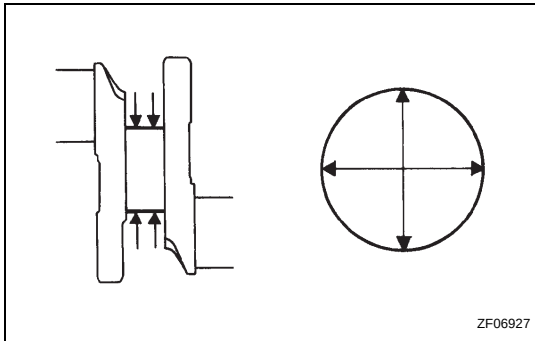
18. INSPECT CRANKSHAFT

- (a) Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

Maximum circle runout:

0.03 mm (0.0012 in.)

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



- (b) Using a micrometer, measure the diameter of each main journal at the points shown in the illustration.

Diameter:

47.988 to 48.000 mm (1.8893 to 1.8898 in.)

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

- (c) Check each main journal for taper and distortion as shown.

Maximum taper and distortion:

0.02 mm (0.0008 in.)

If the taper and distortion are greater than maximum, replace the crankshaft.

- (d) Using a micrometer, measure the diameter of each crank pin at the points shown in the illustration.

Diameter:

43.992 to 44.000 mm (1.7320 to 1.7323 in.)

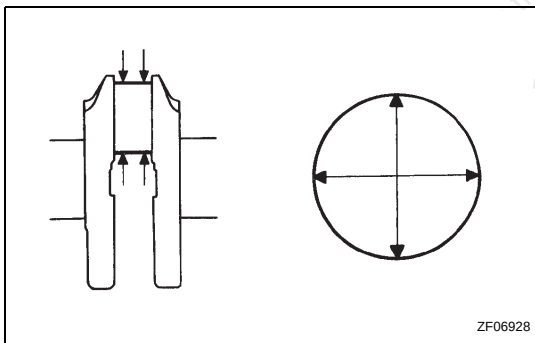
If the diameter is not as specified, check the connecting rod oil clearance.

- (e) Check each crank pin for taper and distortion.

Maximum taper and distortion:

0.02 mm (0.0008 in.)

If the taper and distortion are greater than maximum, replace the crankshaft.



19. INSPECT CRANKSHAFT BEARING CAP SET BOLT

- (a) Using vernier calipers, measure the tension portion diameter of the bolts.

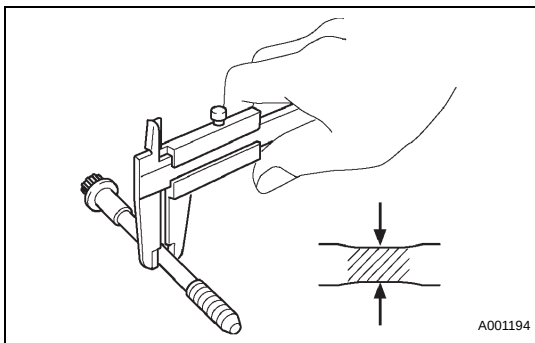
Standard diameter:

7.3 to 7.5 mm (0.287 to 0.295 in.)

Minimum diameter:

7.3 mm (0.287 in.)

If the diameter is less than minimum, replace the crankshaft bearing cap set bolt.



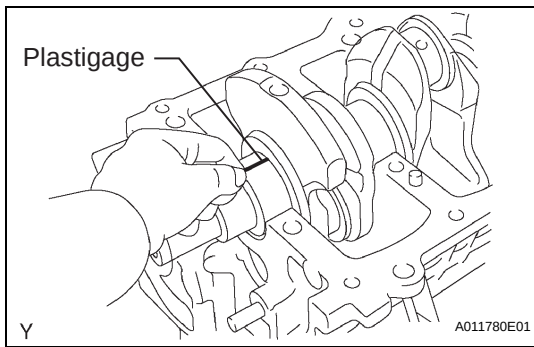
20. CHECK CRANKSHAFT OIL CLEARANCE

NOTICE:

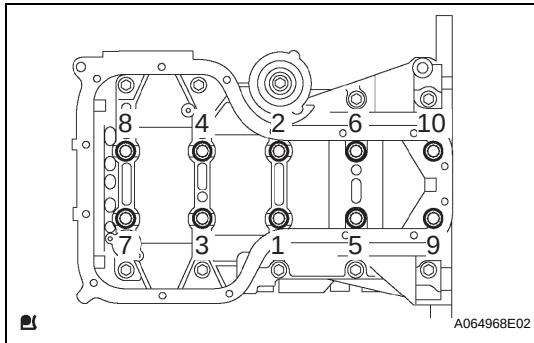
Do not turn the crankshaft.

EM

cardiagn.com

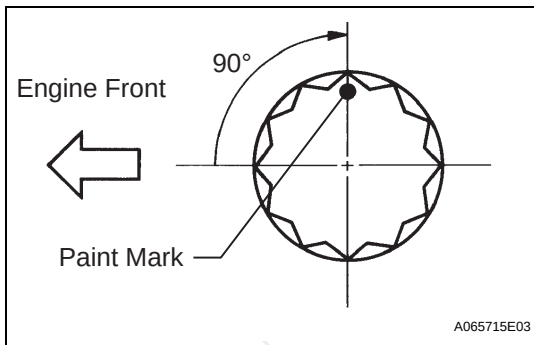


- (a) Clean each main journal and bearing.
- (b) Place the crankshaft on the cylinder block.
- (c) Lay a strip of the Plastigage across each journal.

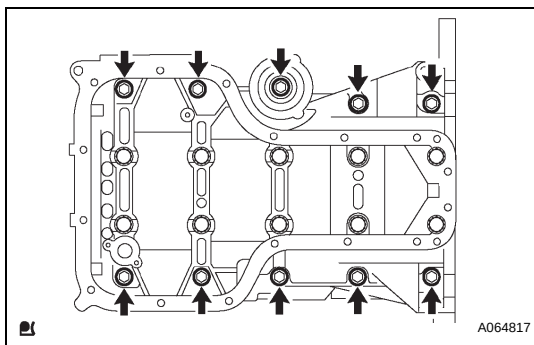


- (d) Using SST, tighten the bolts to the specified torque in the several passes in the sequence shown.

Torque: 44 N*m (449 kgf*cm, 33 ft.*lbf)



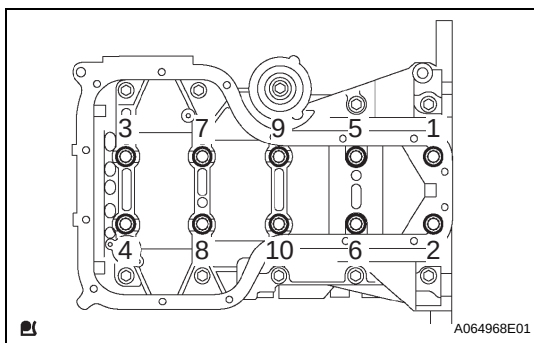
- (e) Mark the front of the bearing cap bolts with paint.
- (f) Retighten the bearing cap bolts by 90° as shown in the illustration.
- (g) Check that the painted mark of each bolt is now at a 90° angle to the front.



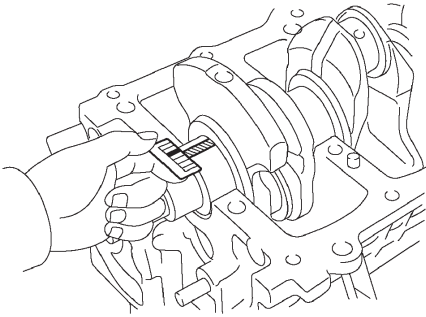
- (h) Tighten the 10 other bolts for the bearing cap.

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

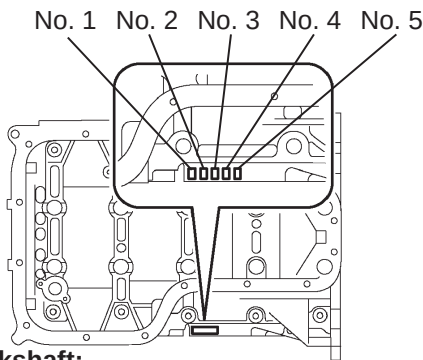
- (i) Remove the 10 bolts.



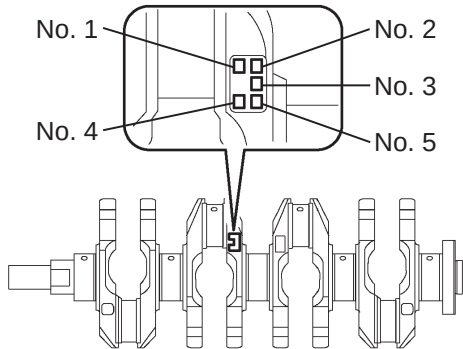
- (j) Uniformly loosen the 10 bearing cap bolts in several passes in the sequence shown in the illustration.



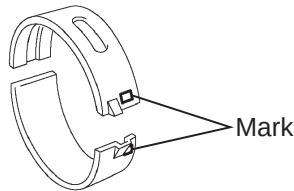
Cylinder Block:



Crankshaft:



Bearing:



A136861E02

(k) Measure the Plastigage at its widest point.

Standard oil clearance:

0.015 to 0.032 mm (0.0006 to 0.0013 in.)

Maximum oil clearance:

0.05 mm (0.0020 in.)

NOTICE:

Completely remove the Plastigage.

- If the oil clearance is greater than maximum, replace the crankshaft bearing.
- If necessary, replace the crankshaft.

HINT:

If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft, then select a new bearing with the calculated number. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4" accordingly.

Cylinder block (A) + Crankshaft (B)	0 to 2	3 to 5	6 to 8	9 to 11
Use bearing	"1"	"2"	"3"	"4"

EXAMPLE:

Cylinder block "3" (A) + Crankshaft "4" (B) = Total number 7 (Use bearing "3")

Item	Mark	mm (in.)
Cylinder block journal bore diameter (A)	"0"	52.000 to 52.002 (2.0472 to 2.0473)
	"1"	52.003 to 52.004 (2.0474 to 2.0474)
	"2"	52.005 to 52.006 (2.0474 to 2.0475)
	"3"	52.007 to 52.009 (2.0475 to 2.0476)
	"4"	52.010 to 52.011 (2.0476 to 2.0477)
	"5"	52.012 to 52.013 (2.0477 to 2.0478)
	"6"	52.014 to 52.015 (2.0478 to 2.0478)
Crankshaft journal diameter (B)	"0"	47.999 to 48.000 (1.8897 to 1.8898)
	"1"	47.997 to 47.998 (1.8896 to 1.8897)
	"2"	47.995 to 47.996 (1.8896 to 1.8896)
	"3"	47.993 to 47.994 (1.8895 to 1.8895)
	"4"	47.991 to 47.992 (1.8894 to 1.8894)
	"5"	47.988 to 47.990 (1.8893 to 1.8894)
Standard bearing center wall thickness	"1"	1.994 to 1.997 (0.0785 to 0.0786)
	"2"	1.998 to 2.000 (0.0787 to 0.0787)
	"3"	2.001 to 2.003 (0.0788 to 0.0789)
	"4"	2.004 to 2.006 (0.0789 to 0.0790)

EM

cardiagn.com