

Disassembly

⚠ WARNING

Be sure to read and follow the "General Safety Information and Caution" before doing any work related with the high voltage system. Failure to follow the safety instructions may result in serious electrical injuries.

Be sure to read and follow the "High Voltage Shut-off Procedures" before doing any work related with the high voltage system. Failure to follow the safety instructions may result in serious electrical injuries.

⚠ CAUTION

Use fender covers to avoid damaging painted surfaces.

To avoid damaging the cylinder head, wait until the engine coolant temperature drops below normal temperature (20°C [68°F]) before removing it.

When handling a metal gasket, take care not to fold the gasket or damage the contact surface of the gasket.

To avoid damage, unplug the wiring connectors carefully while holding the connector portion.

NOTICE

Mark all wiring and hoses to avoid misconnection.

Turn the crankshaft damper pulley so that the No.1 piston is at top dead center.

1. Remove the engine assembly from the vehicle.
(Refer to Engine and Transaxle Assembly - "Engine and Transaxle Assembly")
2. Remove the transaxle assembly from the engine assembly.
(Refer to Double Clutch Transmission (DCT) System - "Double Clutch Transmission (DCT)")
3. Remove the flywheel.
(Refer to Cylinder Block - "Flywheel")
4. Remove the rear oil seal.
(Refer to Cylinder Block - "Rear Oil Seal")
5. Install the engine to engine stand for disassembly.
6. Remove the intake manifold.
(Refer to Intake and Exhaust System - "Intake Manifold")
7. Remove the exhaust manifold.
(Refer to Intake and Exhaust System - "Exhaust Manifold")
8. Remove the hybrid starter generator (HSG).
(Refer to Hybrid Motor System - "Hybrid Starter Generator (HSG)")
9. Remove the timing chain.
(Refer to Timing System - "Timing Chain")
10. Remove the cylinder head assembly.
(Refer to Cylinder Head Assembly - "Cylinder Head")
11. Remove the thermostat.
(Refer to Cooling System - "Thermostat")
12. Remove the EGR cooler.
(Refer to Intake and Exhaust System - "EGR Cooler")
13. Remove the A/C compressor.
(Refer to Heating, Ventilation Air conditioning - "Compressor")
14. Remove the knock sensor.
(Refer to Engine Control / Fuel System - "Knock Sensor")
15. Remove the oil pan and oil screen.
(Refer to Lubrication System - "Oil Pan")
16. Remove the ladder frame.

(Refer to Cylinder Block - "Piston and Connecting Rod")

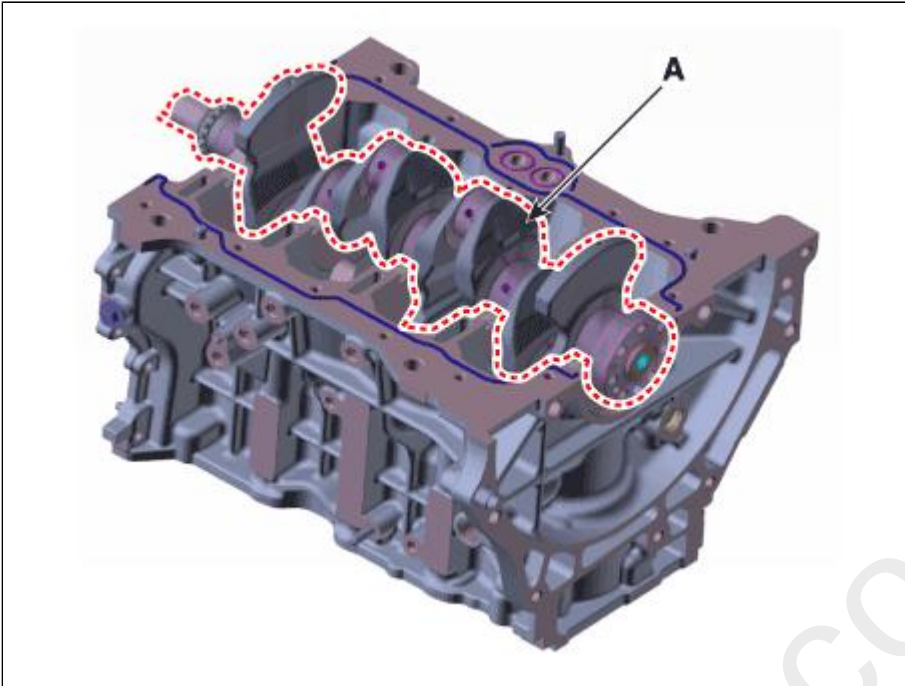
17. Remove the piston and connecting rod assemblies.

(Refer to Cylinder Block - "Piston and Connecting Rod")

18. Remove the main bearing caps and check oil clearance.

19. Check the crankshaft end play.

20. Lift the crankshaft (A) out of engine, being careful not to damage journals.



NOTICE

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

Inspection

1. Check the crankshaft bearing oil clearance.

(1) To check main bearing-to-journal oil clearance, remove the main bearings.

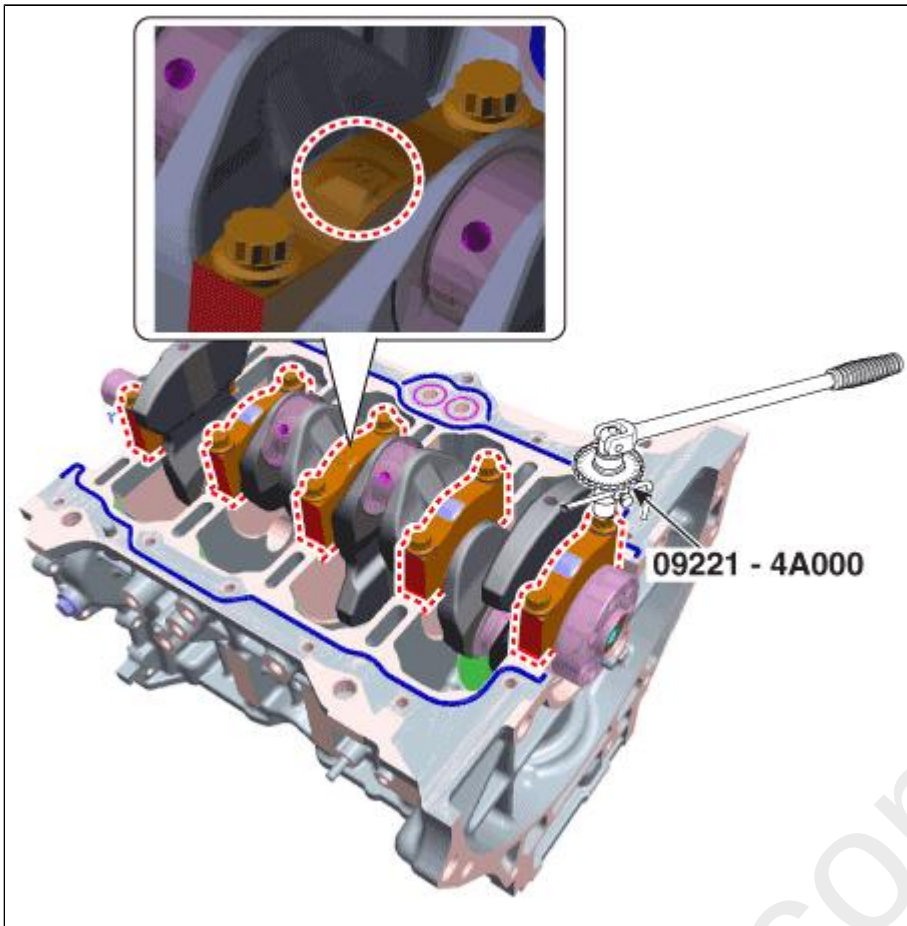
(2) Clean each main journal and bearing half with a clean shop towel.

(3) Place one strip of plastigage across each main journal.

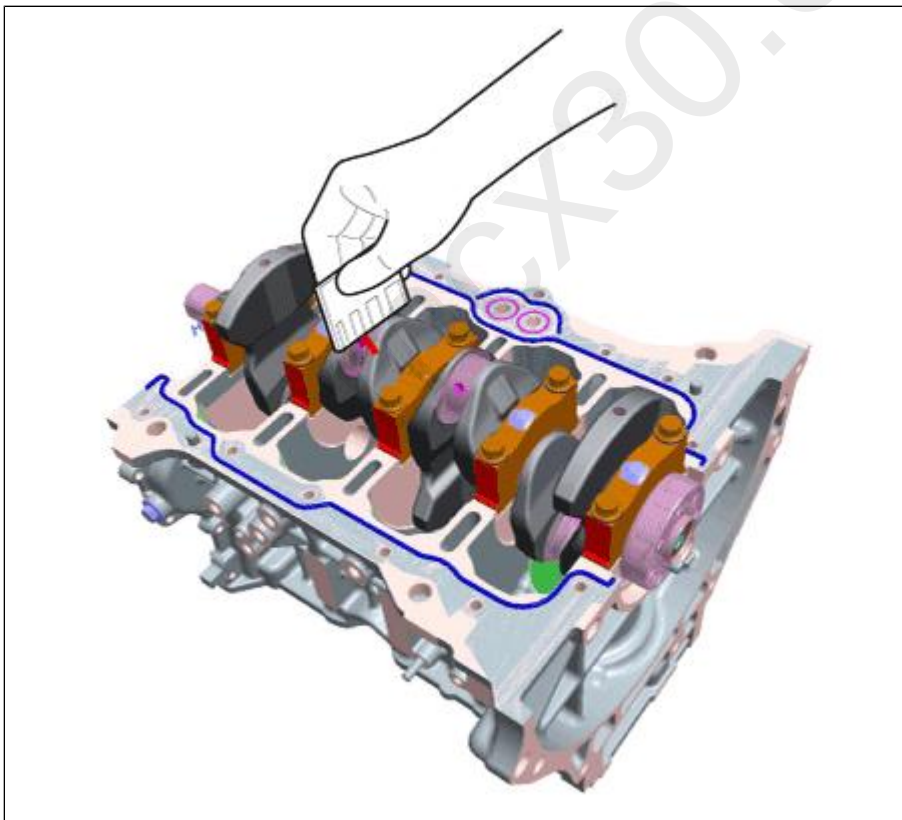
(4) Use the SST (09221-4A000), reinstall the bearings and bolts as following method with specified torque. In the sequence.

Tightening torque :

17.7 - 21.6 N.m (1.8 - 2.2 kgf.m, 13.0 - 15.9 lb-ft) + 88 - 92°



(5) Remove the cap and bearing again, and measure the widest part of the plastigage.



Standard oil clearance :
 0.012 - 0.030 mm (0.0004 - 0.0011 in)

(6) If the plastigage measures too wide or too narrow, remove the upper half of the bearing, install a new, complete bearing with the same color mark (select the color as shown in the next column), and recheck the clearance.

⚠ CAUTION

Do not file, shim, or scrape the bearings or the caps to adjust clearance.

- (7) If the plastigage shows the clearance is still incorrect, try the next larger or smaller bearing (the color listed above or below that one), and check clearance again.

NOTICE

If the proper clearance cannot be obtained by using the appropriate larger or smaller bearings, replace the crankshaft and start over.

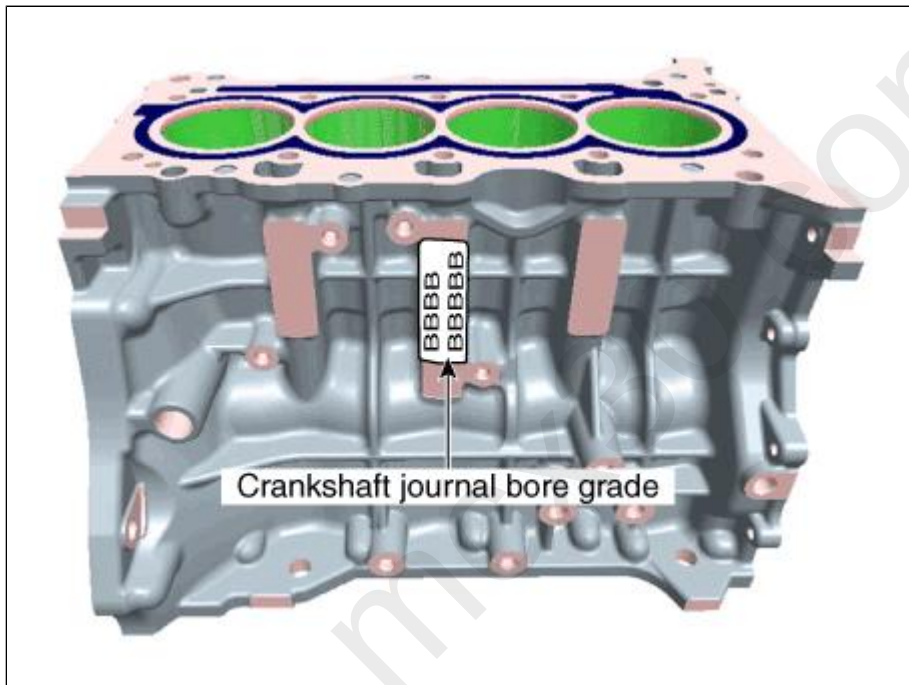
⚠ CAUTION

If the marks are indecipherable because of an accumulation of dirt and dust, do not scrub them with a wire brush or scraper. Clean them only with solvent or detergent.

Cylinder block crankshaft journal bore mark location

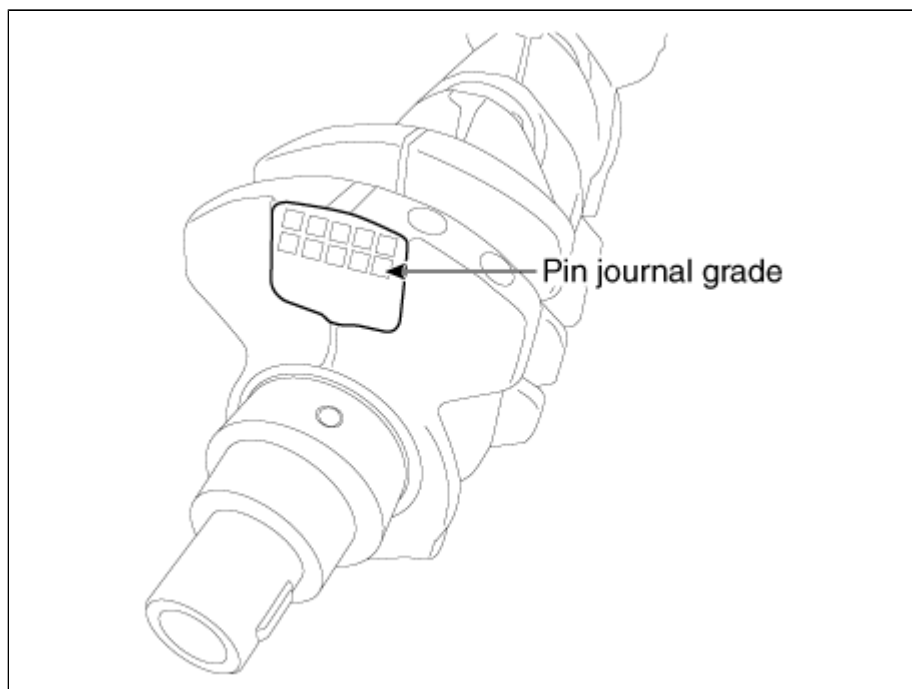
Letters have been stamped on the block as a mark for the size of each of the 5 main journal bores.

Use them, and the numbers or bar stamped on the crank (marks for main journal size), to choose the correct bearings.



Grade	Mark	Cylinder block journal inner diameter
a	A	52.000 to 52.006 mm (2.0472 to 2.0475 in)
b	B	over 52.006 to 52.012 mm (over 2.0475 to 2.0477 in)
c	C	over 52.012 to 52.018 mm (over 2.0477 to 2.0479 in)

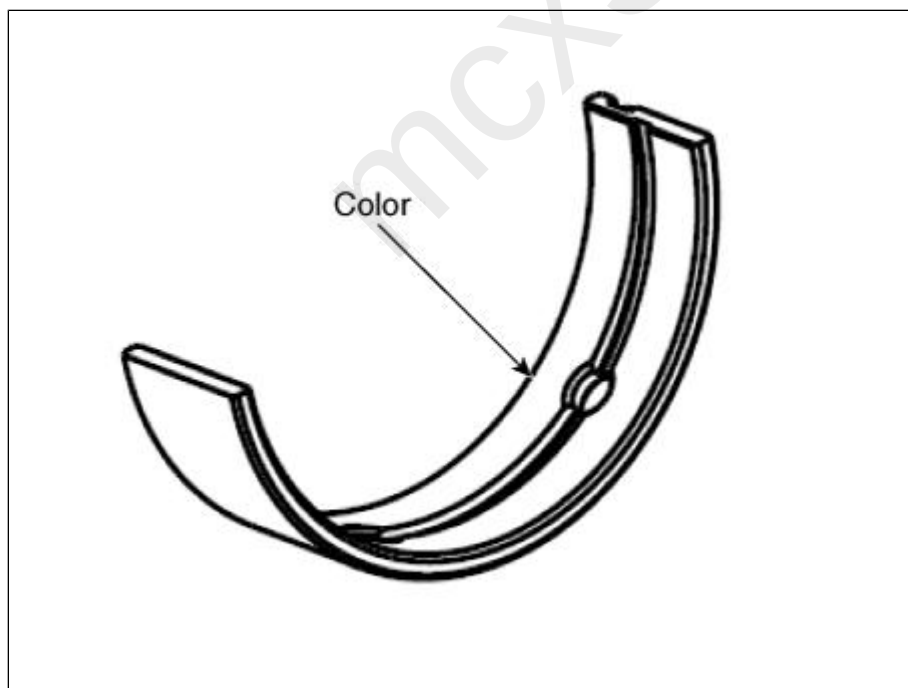
Crankshaft Main Journal Mark Location



Discrimination of Crankshaft Main Journal

Class	Mark	Crankshaft main journal outer diameter
I	1	47.954 - 47.960 mm (1.8879 - 1.8881 in)
II	2	47.948 - 47.954 mm (1.8877 - 1.8879 in)
III	3	47.942 - 47.948 mm (1.8874 - 1.8877 in)

Crankshaft Main Bearing Mark Location



Mark	Color	Connecting Rod Bearing Thickness
1	Blue	2.023 - 2.026 mm (0.0796 - 0.0798 in)
2	Black	2.020 - 2.023 mm (0.0795 - 0.0796 in)

3	None	2.017 - 2.020 mm (0.0794 - 0.0795 in)
4	Green	2.014 - 2.017 mm (0.0793 - 0.0794 in)
5	Yellow	2.011 - 2.014 mm (0.0791 - 0.0793 in)

(8) Select the bearing by using selection table.

Crankshaft Main Bearing Selection Table

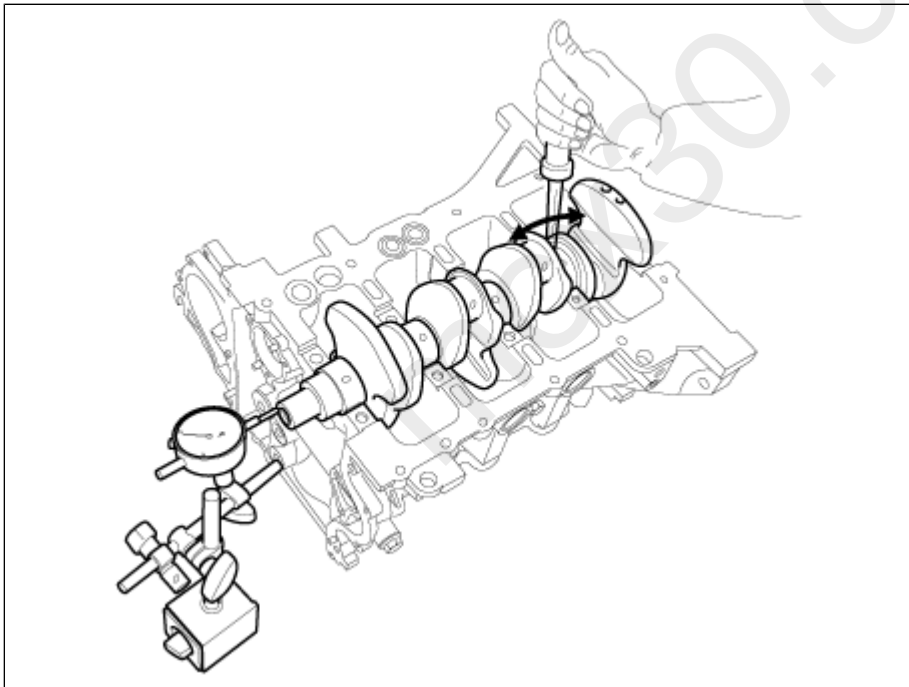
Crankshaft Main Bearing		Cylinder Block Crankshaft Journal Bore Mark		
		a(A)	b(B)	c(C)
Crank shaft main journal mark	I(1)	5 (Yellow)	4 (Green)	3 (None)
	II(2)	4 (Green)	5 (None)	2 (Black)
	III(3)	3 (None)	2 (Black)	1 (Blue)

2. Check crankshaft end play.

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

Standard end play :

0.07 - 0.25 mm (0.0028 - 0.0098 in)



If the end play is greater than maximum, replace the center bearings as a set.

3. Inspect the crankshaft main journals and pin journals.

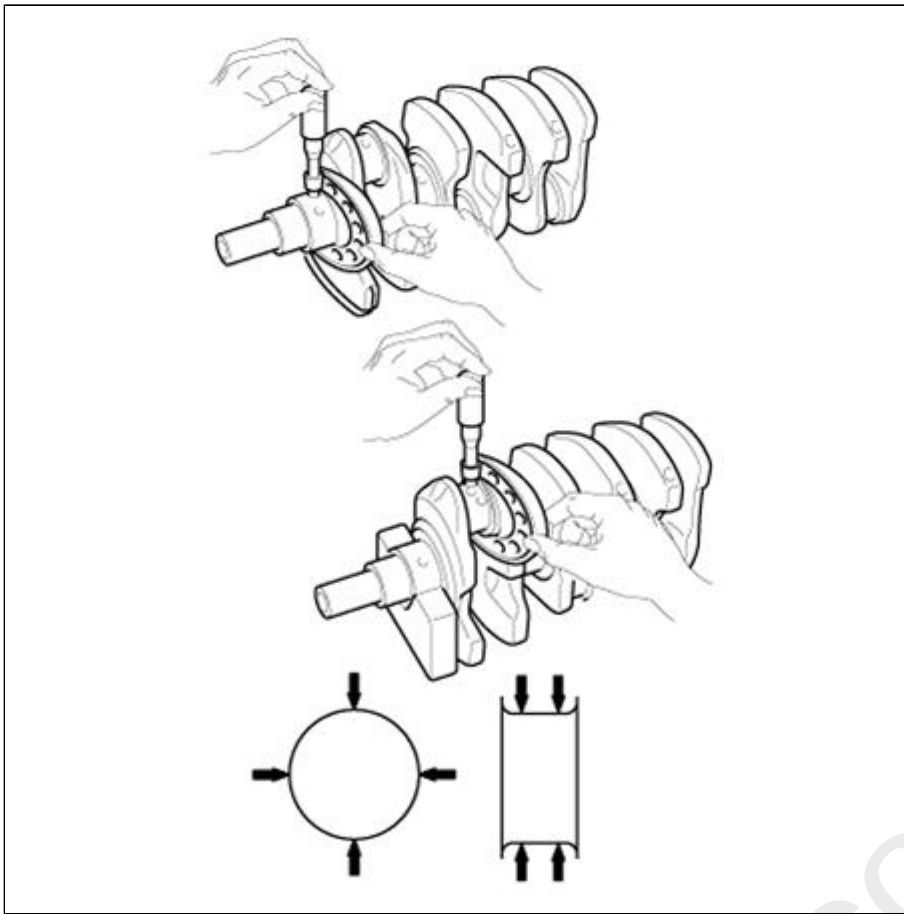
Using a micrometer, measure the diameter of each main journal and pin journal.

Main journal diameter :

47.942 - 47.960 mm (1.8874 - 1.8881 in)

Pin journal diameter :

38.954 - 38.972 mm (1.5336 - 1.5343 in)



Reassembly

NOTICE

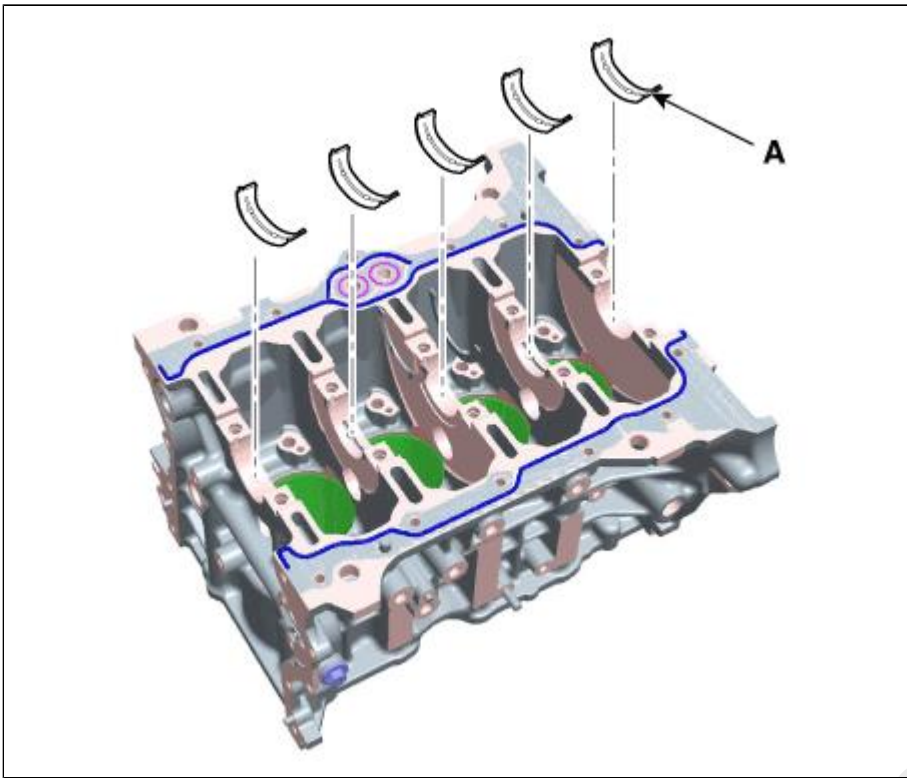
Thoroughly clean all parts to be assembled.
Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
Replace all gaskets, O-rings and oil seals with new parts.

1. Install the crankshaft main bearings.

NOTICE

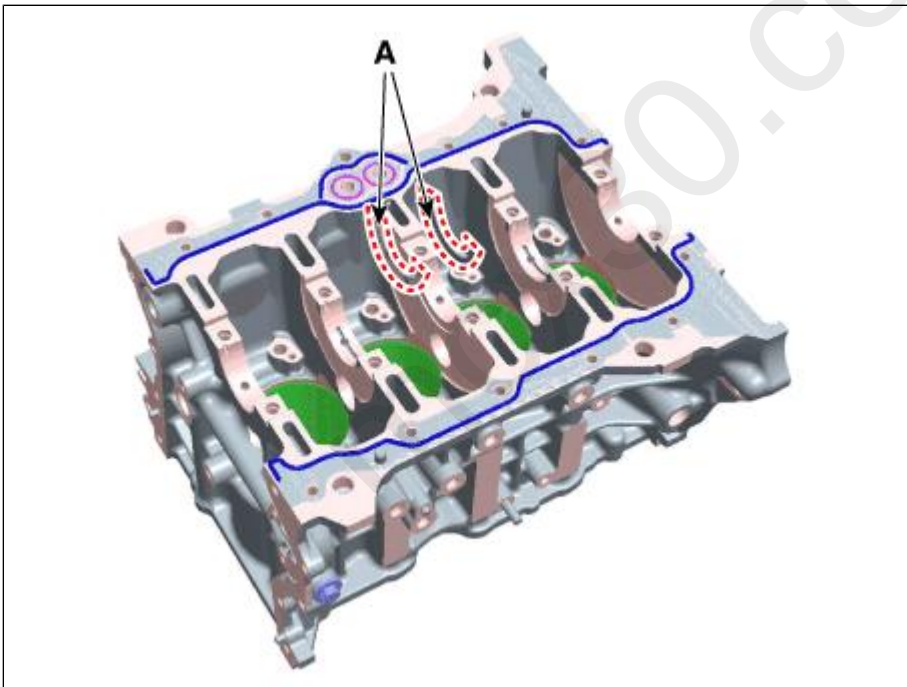
Upper bearings have an oil groove of oil holes Lower bearings do not.

(1) Align the bearing claw with the claw groove of the cylinder block, push in the 5 upper bearings (A).



(2) Install the thrust bearings.

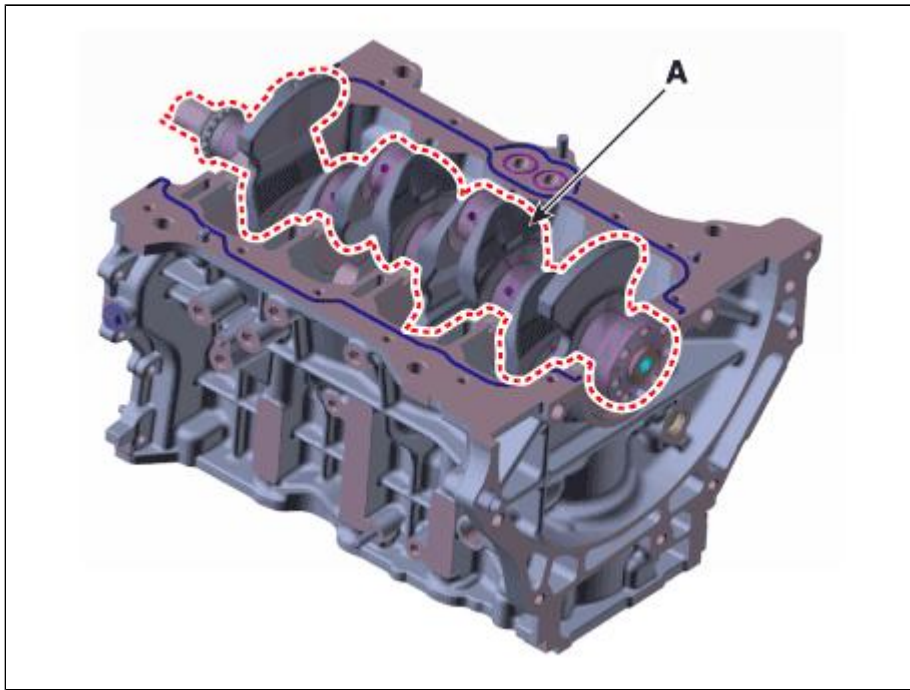
Install the 2 thrust bearings (A) under the No.3 journal position of the cylinder block with the oil grooves facing outward.



(3) Install the crankshaft lower main bearing.

Align the bearing claw with the groove of the crankshaft lower bearing and crankshaft main bearing cap.

2. Place the crankshaft (A) on the cylinder block.



3. Install the main bearing cap (A).

NOTICE

Always use new main bearing cap bolts.
If any of the bearing cap bolts are broken or deformed, replace it.

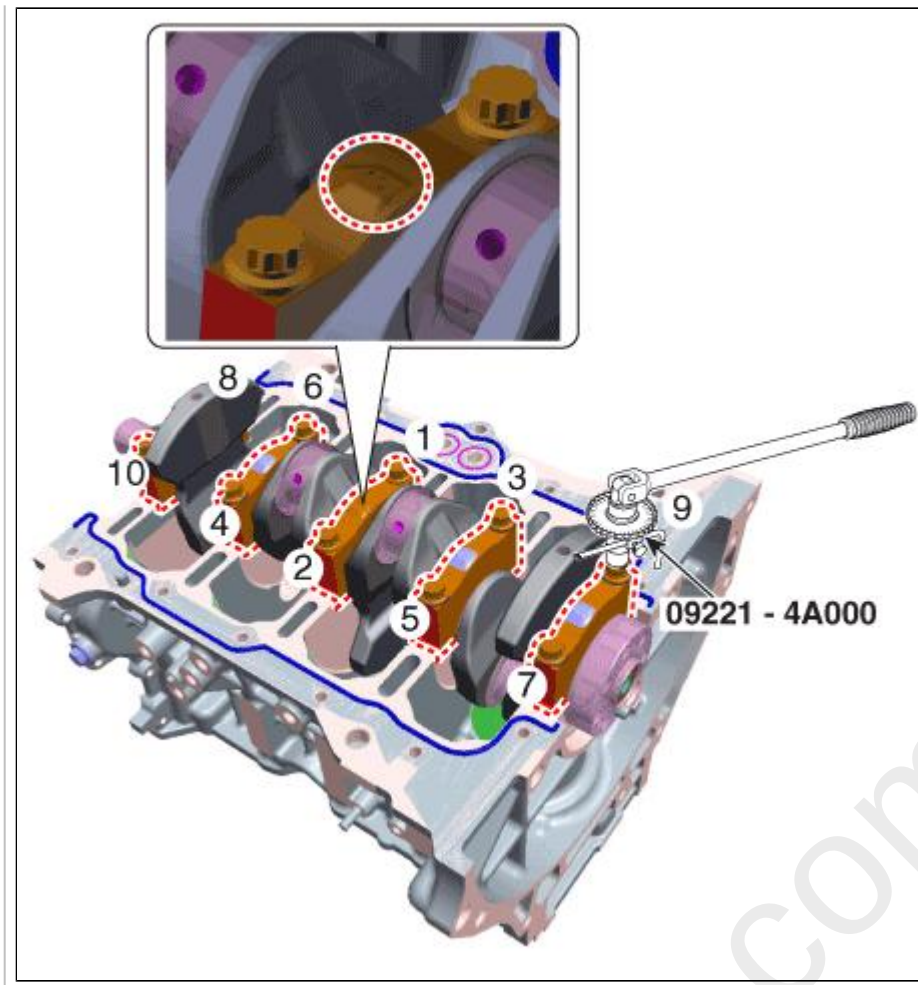
- (1) Apply a light coat of engine oil on the threads and under the bearing cap bolts.
- (2) Install and uniformly tighten the 10 bearing cap bolts, in several passes, in the sequence shown.

Tightening torque :

17.7 - 21.6 N.m (1.8 - 2.2 kgf.m, 13.0 - 15.9 lb-ft) + 88 - 92°

NOTICE

Using the SST (09221-4A000), tighten the bolts which need to be tightened with the angular tightening method.



(3) Check that the crankshaft turns smoothly.

4. Check the crankshaft end play.

5. Assemble the other parts in the reverse order of disassembly.

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