



## Disassembly

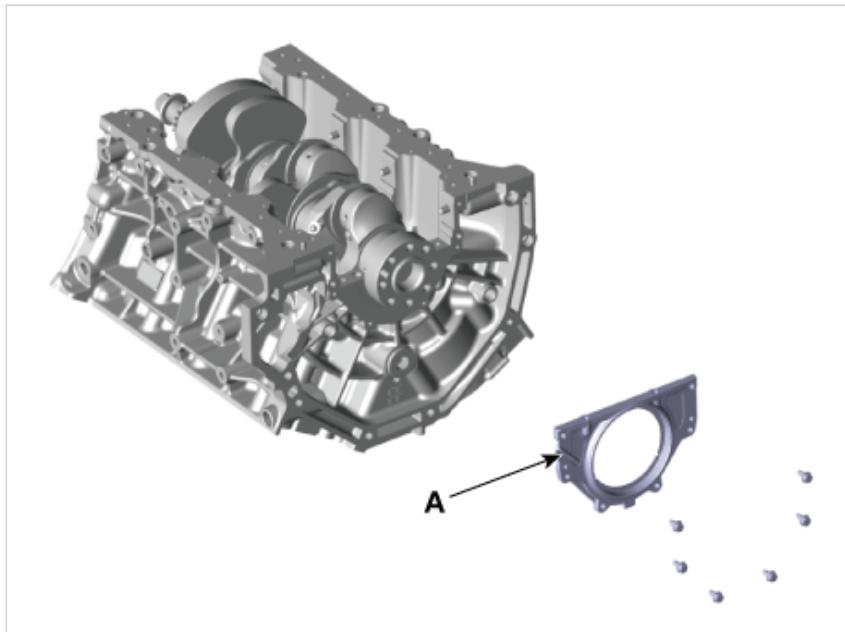
### NOTICE

- Use fender covers to avoid damaging painted surfaces.
- To avoid damage, unplug the wiring connectors carefully while holding the connector portion.

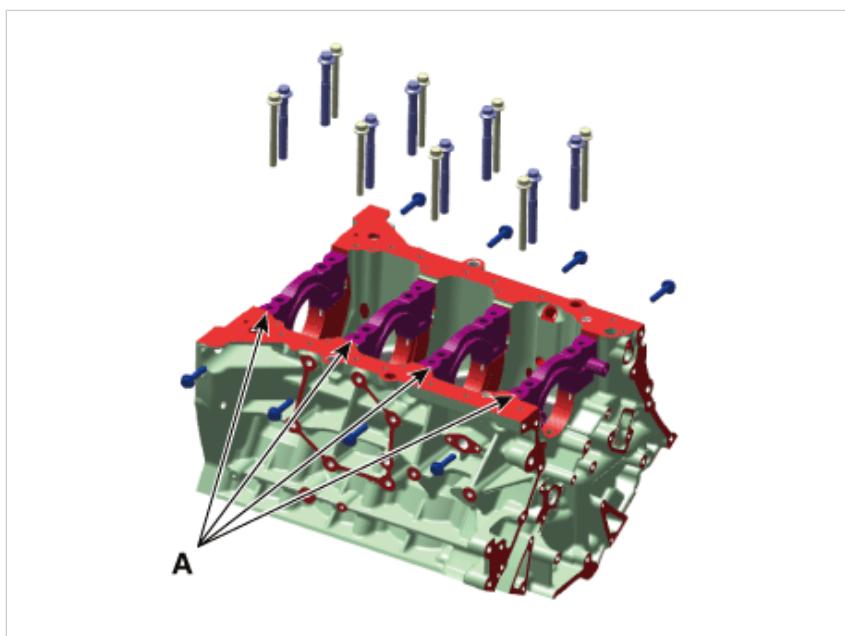
### Information

- Mark all wiring and hoses to avoid misconnection.
- Inspect the timing chain before removing the cylinder head.
- Turn the crankshaft pulley so that the No.1 piston is at top dead center (TDC).

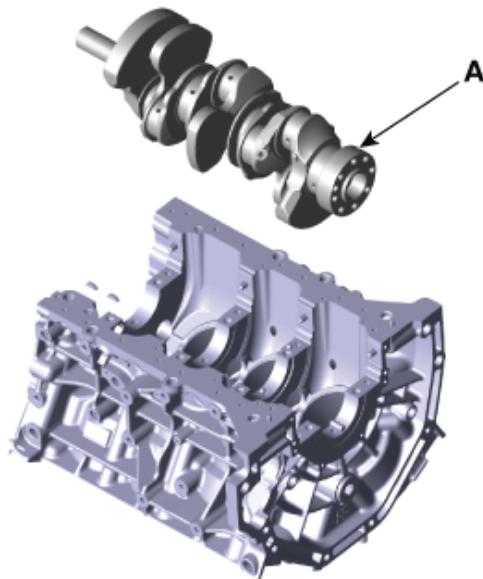
1. Remove the engine and transmission assembly.  
[\(Refer to Engine and Transmission Assembly - "Engine and Transmission Assembly"\)](#)
2. Remove the automatic transmission.  
[\(Refer to Automatic Transmission System - "Automatic Transmission"\)](#)
3. Remove the drive plate.  
[\(Refer to Cylinder Block - "Drive Plate"\)](#)
4. Remove the front driveshaft. (If equipped with AWD system)  
[\(Refer to Driveshaft and Axle - "Front Driveshaft"\)](#)
5. Remove the front differential assembly. (If equipped with AWD system)  
[\(Refer to Driveshaft and Axle - "Front Differential Carrier"\)](#)
6. Install the engine assembly to engine stand for disassembly.
7. Remove the surge tank.  
[\(Refer to Intake and Exhaust System - "Surge Tank"\)](#)
8. Remove the intake manifold.  
[\(Refer to Intake and Exhaust System - "Intake Manifold"\)](#)
9. Remove the turbo manifold module.  
[\(Refer to Intake and Exhaust System - "Turbo Manifold Module"\)](#)
10. Remove the water temperature control assembly and water center pipe.  
[\(Refer to Cooling System - "Water Temperature Control Assembly"\)](#)
11. Remove the cylinder head cover.  
[\(Refer to Cylinder Head Assembly - "Cylinder Head Cover"\)](#)
12. Remove the timing chain cover.  
[\(Refer to Timing System - "Timing Chain Cover"\)](#)
13. Remove the timing chain.  
[\(Refer to Timing System - "Timing Chain"\)](#)
14. Remove the RH / LH CVVT & camshaft assembly.  
[\(Refer to Cylinder Head Assembly - "CVVT & Camshaft"\)](#)
15. Remove the cylinder head.  
[\(Refer to Cylinder Head Assembly - "Cylinder Head"\)](#)
16. Remove the lower and upper oil pan.  
[\(Refer to Lubrication System - "Oil Pan"\)](#)
17. Remove the oil pump.  
[\(Refer to Lubrication System - "Oil Pump"\)](#)
18. Remove the piston and connecting rod assembly.  
[\(Refer to Cylinder Block - "Piston and Connecting Rod"\)](#)
19. Remove the rear oil seal case (A).



20. Remove the crankshaft main bearing caps (A).



21. 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 bearing caps and bearing halves.
  - (2) Clean each main journal and bearing half with a clean shop towel.
  - (3) Place one strip of plastigage across each main journal.
  - (4) Reinstall the bearings and caps, and torque the bolts.

**Tightening torque :**

No.1-8 :

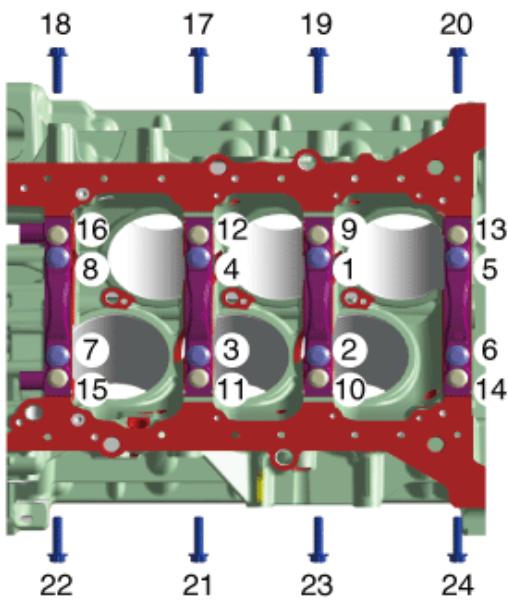
49.0 N·m (5.0 kgf·m, 36.2 lb·ft) + 90°

No.9-16 :

19.6 N·m (2.0 kgf·m, 14.5 lb·ft) + 120°

No.17-24 :

29.4 - 31.4 N·m (3.0 - 3.2 kgf·m, 21.7 - 23.1 lb·ft)



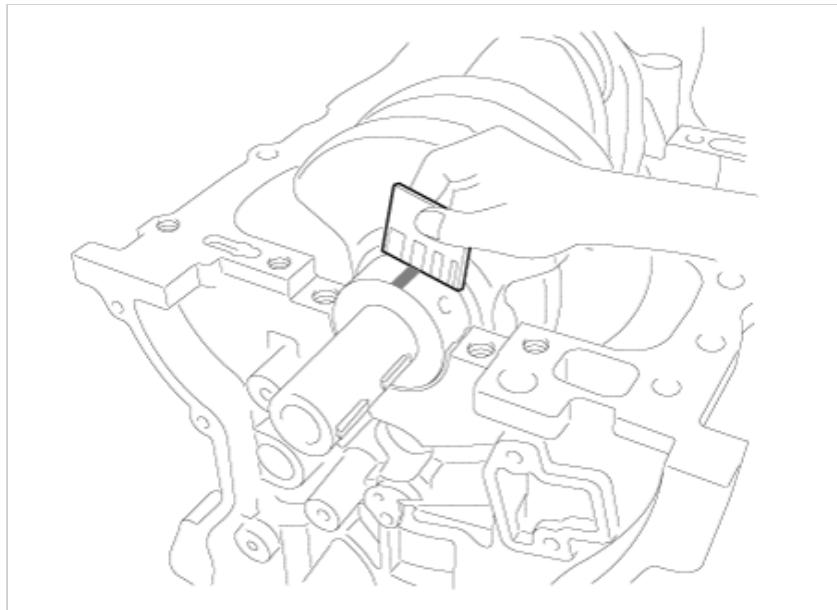
**NOTICE**

- Always use new crankshaft main bearing cap bolts. Crankshaft main bearing cap bolts are torque-to-yield bolts designed to be permanently elongated beyond the state of elasticity when torqued, so if the bolts are removed and reused, it may cause the bolts to break or fail to maintain clamping force.
- Do not turn the crankshaft.

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

**Standard oil clearance :**

0.023 - 0.041 mm (0.0009 - 0.0016 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.

**NOTICE**

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

(7) If the plastigage shows that 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.

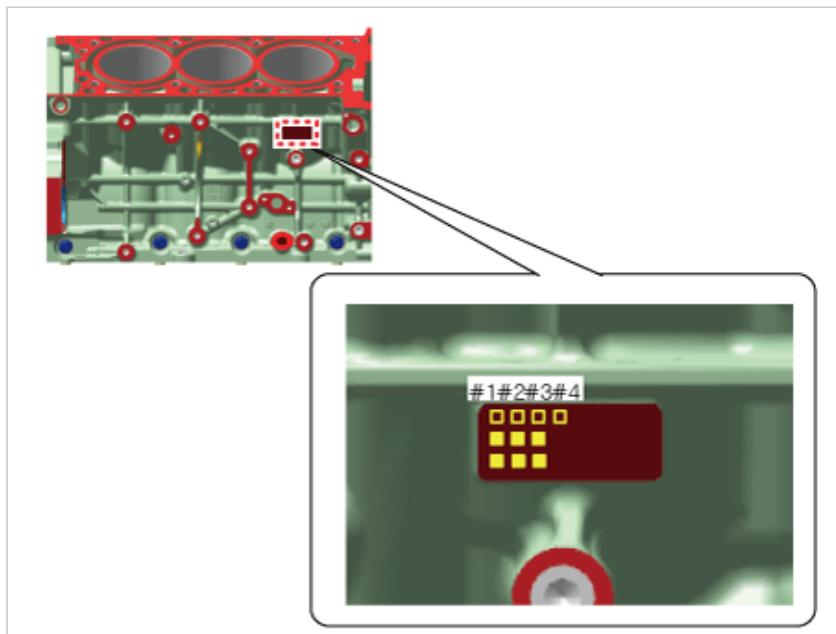
**NOTICE**

If the marks are indecipherable because of an accumulation of dirt and dust, clean with solvent or detergent instead of scrubbing with a wire brush or scraper.

**Crankshaft bore mark location**

Letters are stamped on the block as a mark for the size of each of the 4 main journal bores.

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

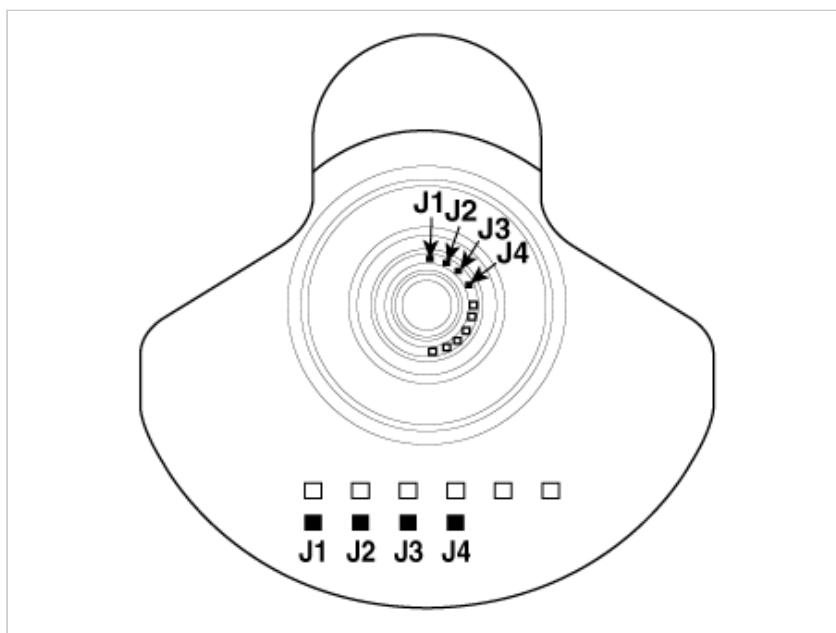


### Identification of Cylinder Block

Class	Mark	Inside Diameter
a	A	73.500 - 73.506 mm (2.8937 - 2.8939 in.)
b	B	73.506 - 73.512 mm (2.8939 - 2.8942 in.)
c	C	73.512 - 73.518 mm (2.8942 - 2.8944 in.)

### Crankshaft Journal Mark Location

#### Identification of Crankshaft



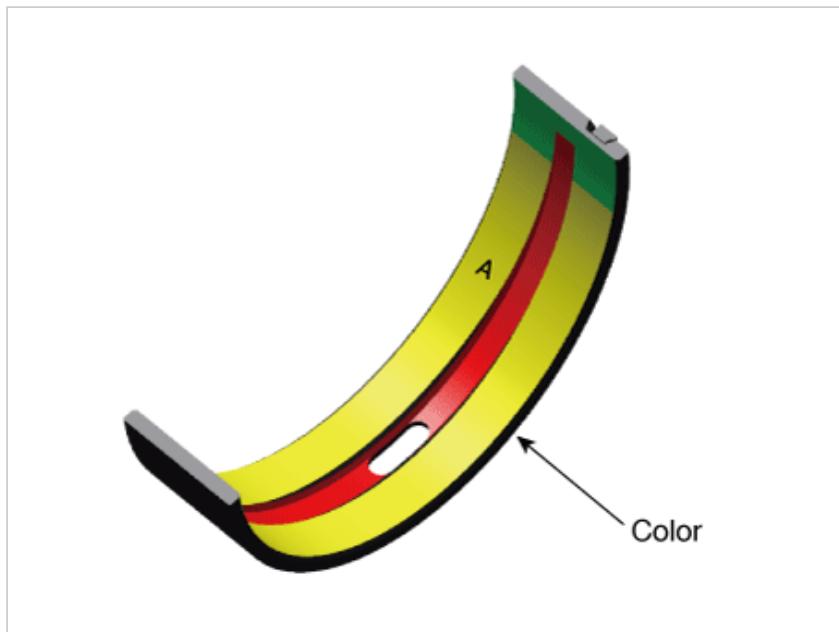
#### Identification of Crankshaft

Class	Mark	Outside Diameter of Journal
I	1 or A	68.954 - 68.960 mm (2.7147 - 2.7150 in.)

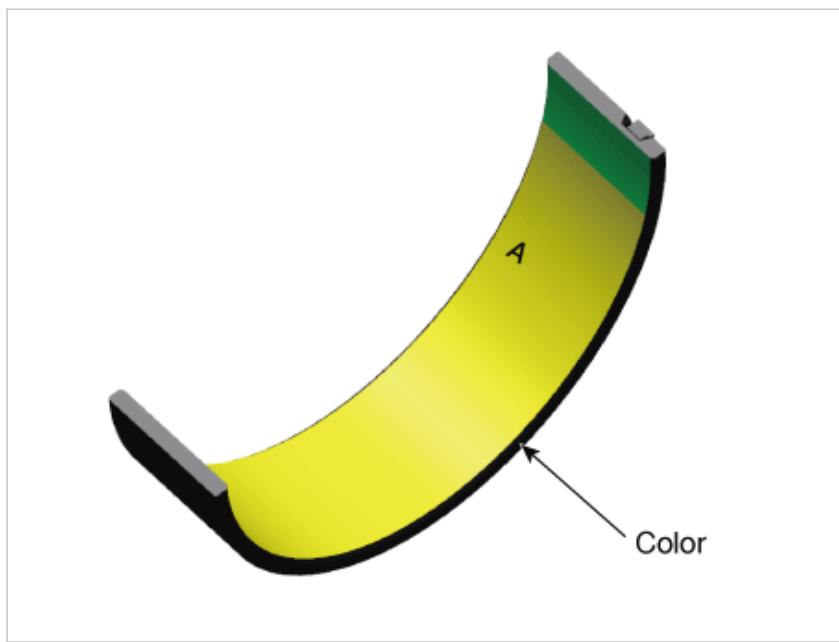
II	2 or B	68.948 - 68.954 mm (2.7145 - 2.7147 in.)
III	3 or C	68.942 - 68.948 mm (2.7142 - 2.7145 in.)

## Place of Identification Mark

[Crankshaft upper bearing]



[Crankshaft lower bearing]



## Identification of Crankshaft Bearing

Class	Mark	Thickness of Bearing
E	Blue	2.276 ~ 2.279 mm (0.0896 - 0.0897 in.)
D	Black	2.273 ~ 2.276 mm (0.0895 - 0.0896 in.)
C	Red	2.270 ~ 2.273 mm (0.0894 - 0.0895 in.)
B	Green	2.267 ~ 2.270 mm (0.0893 - 0.0894 in.)
A	Yellow	2.264 ~ 2.267 mm (0.0891 - 0.0893 in.)

## Selection

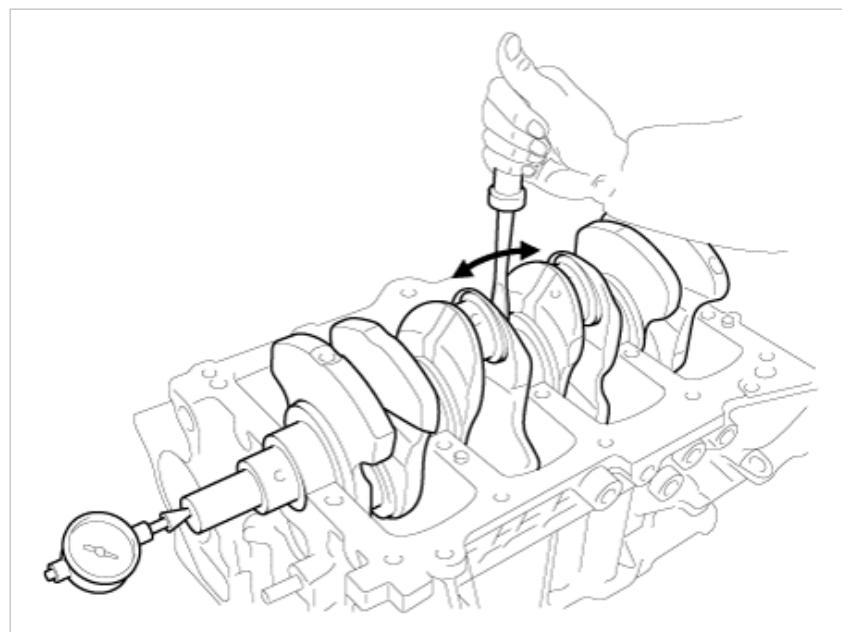
		Crankshaft Bore Identification Mark		
		a(A)	b(B)	c(C)
Crankshaft Identification Mark	1 or A	A (Yellow)	B (Green)	C (Red)
	2 or B	B (Green)	C (Red)	D (Black)
	3 or C	C (Red)	D (Black)	E (Blue)

### 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 :**

0.10 - 0.28 mm (0.0039 - 0.0110 in.)



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

**Thrust bearing thickness :**

2.41 - 2.45 mm (0.0949 - 0.0964 in.)

### 3. Inspect main journals and crank pins

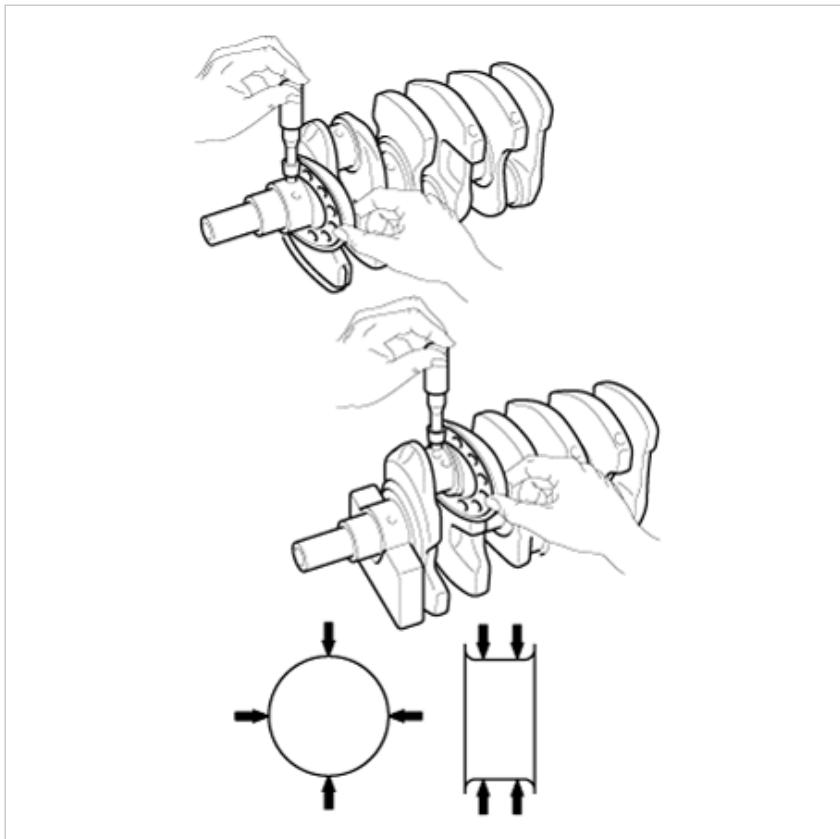
Using a micrometer, measure the diameter of each main journal and crank pin.

**Main journal diameter :**

68.942 - 68.960 mm (2.7142 - 2.7149 in.)

**Crank pin diameter :**

54.954 - 54.972 mm (2.1635 - 2.1642 in.)



## Reassembly

### NOTICE

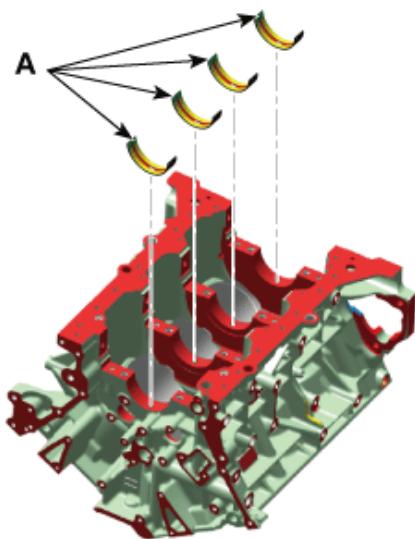
- Thoroughly clean all parts to be assembled.
- Before installing the parts, apply fresh engine oil to all sliding and rotating surfaces.
- Replace all gaskets, O-rings and oil seals with new parts.

### 1. Install the main bearings.

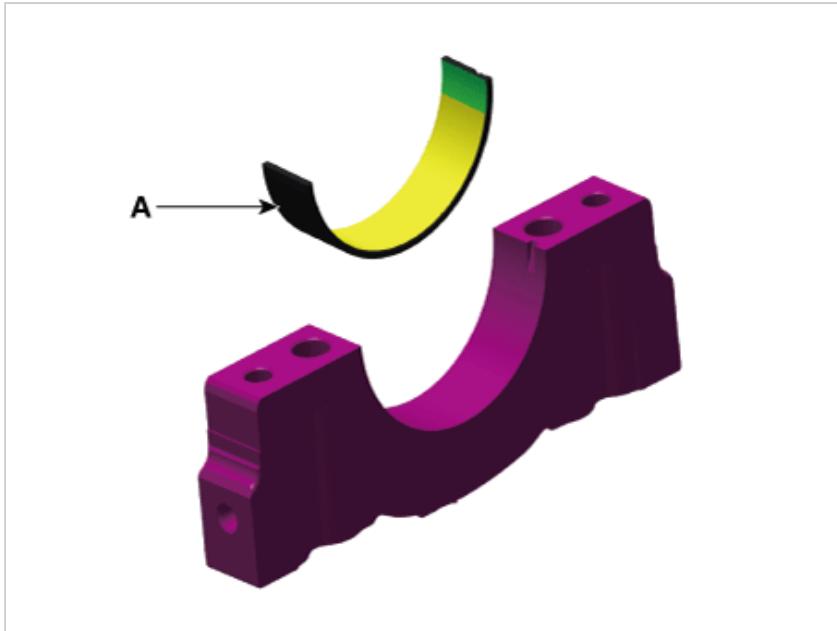
### NOTICE

There are oil grooves or oil holes on upper bearings whereas there is none on lower bearings.

(1) Align the bearing claw with the claw groove of the cylinder block, and push in the 4 upper bearings (A).

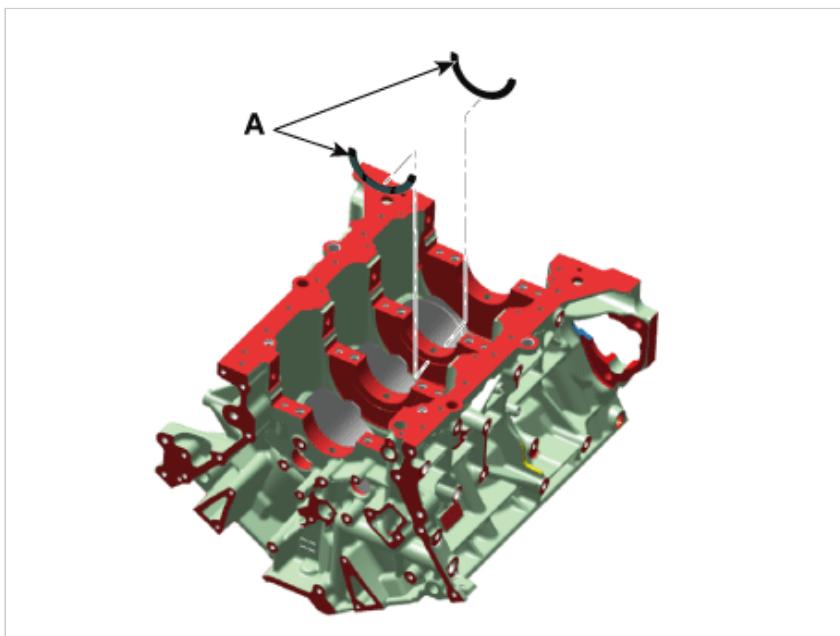


(2) Align the bearing claw with the claw groove of the main bearing cap, and push in the 4 lower bearings (A).

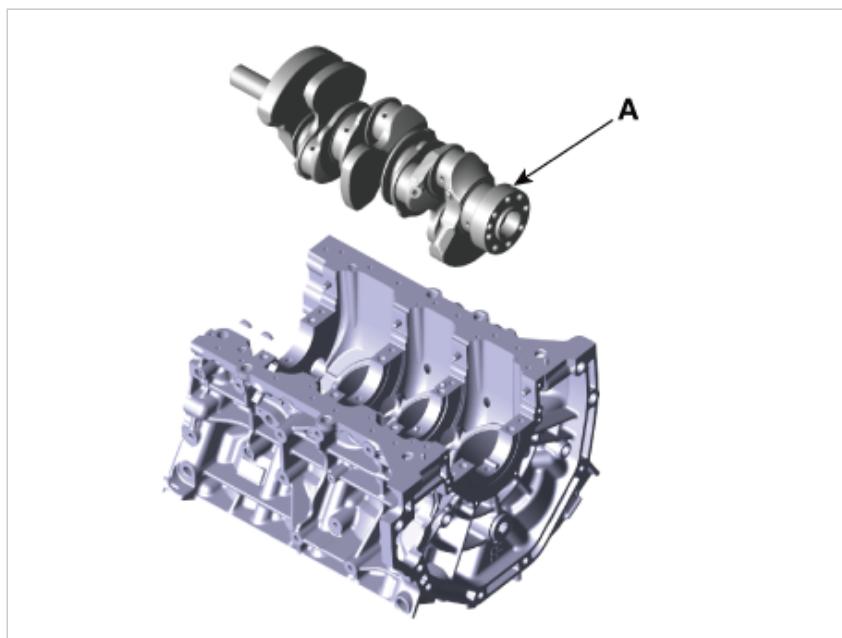


2. Install the thrust bearings.

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



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



4. Place the main bearing caps on cylinder block.

5. Install the main bearing cap bolts.

(1) Install and uniformly tighten the bearing cap bolts, in several passes, in the sequence shown.

**Tightening torque :**

No.1-8 :

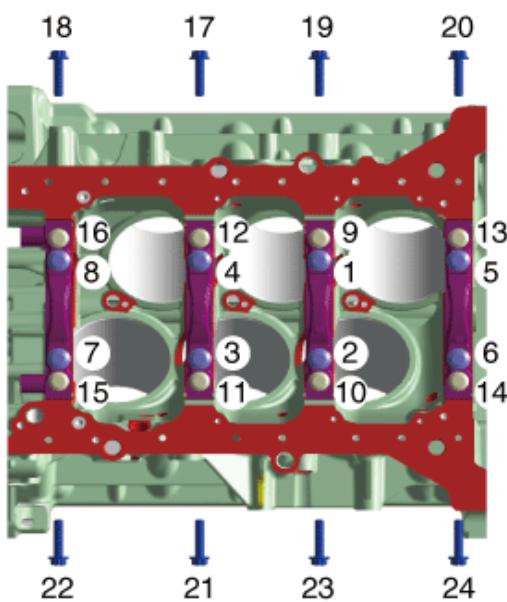
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**NOTICE**

- Always use new crankshaft main bearing cap bolts. Crankshaft main bearing cap bolts are torque-to-yield bolts designed to be permanently elongated beyond the state of elasticity when torqued, so if the bolts are removed and reused, it may cause the bolts to break or fail to maintain clamping force.
- If any of the bearing cap bolts are broken or deformed, replace it.

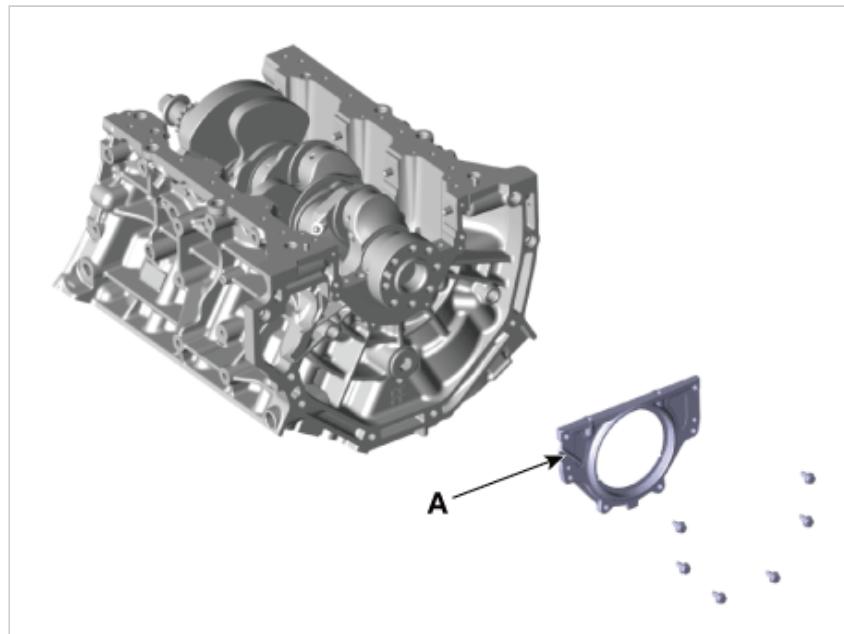
(2) Check that the crankshaft turns smoothly.

6. Check crankshaft end play.

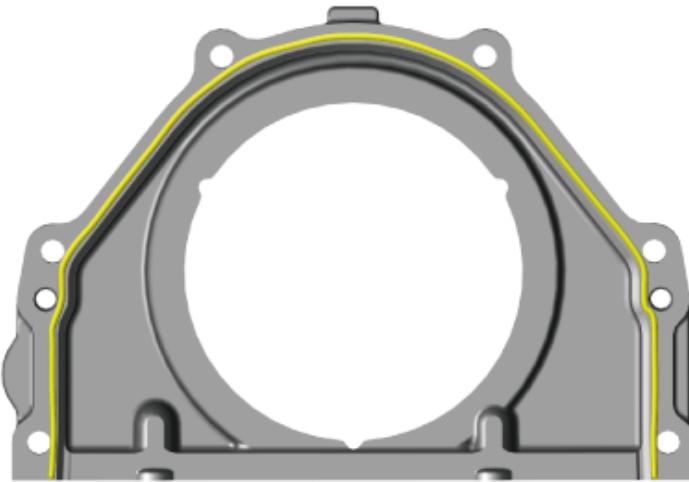
## 7. Install the rear oil seal case (A).

**Tightening torque :**

9.8 - 11.8 N·m (1.0 - 1.2 kgf·m, 7.2 - 8.7 lb·ft)

**NOTICE**

- Clean the sealing face before assembling two parts.
- Remove harmful foreign materials on the sealing face before applying sealant
- Before assembling rear oil seal case, the liquid sealant TB1217H should be applied to the rear oil seal case.
- Assemble the parts within 5 minutes of applying sealant.
- Apply sealant to the inner threads of the bolt holes.



## 8. Assemble the remaining parts in the reverse order of disassembly.

**Information**

After replacing the crankshaft with a new one, select the proper connecting rod bearing according to the pin journal mark on the crankshaft.

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