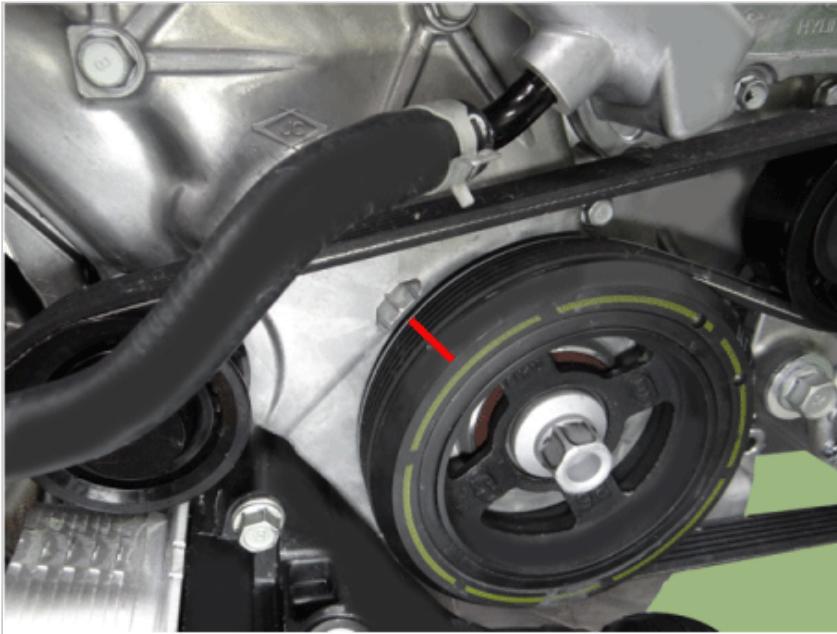




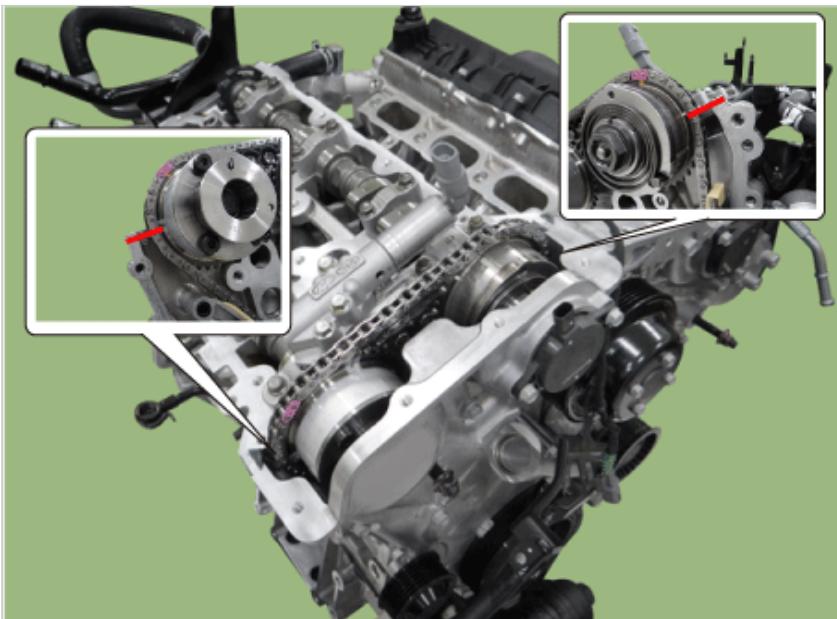
Removal

1. Remove the cylinder head cover.
(Refer to Cylinder Head Assembly - "Cylinder Head Cover")
2. Set No.1 cylinder to TDC/compression.
(1) Turn the crankshaft pulley clockwise and align its groove with the timing mark "T" of the lower timing chain cover.

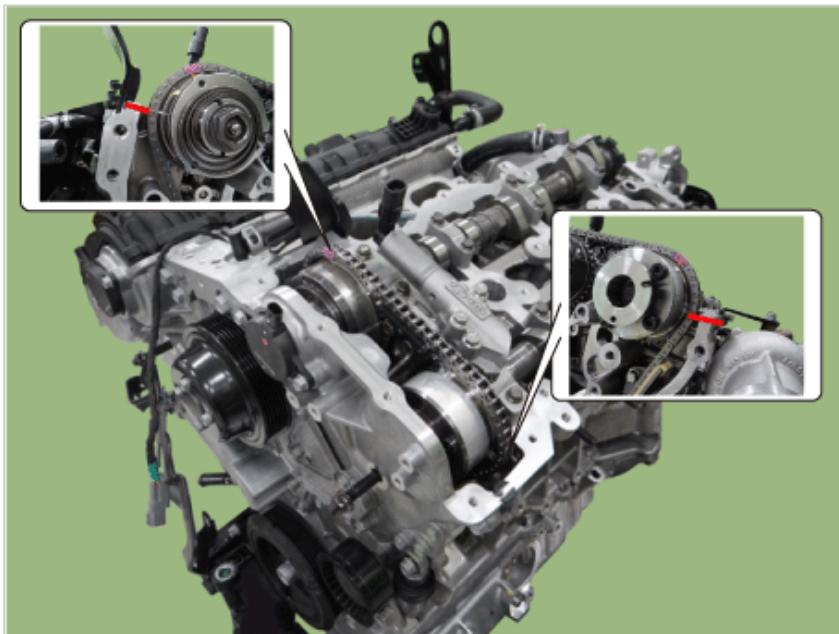


- (2) Check that the mark of the camshaft timing sprockets are in straight line on the cylinder head surface as shown in the illustration. If not, turn the crankshaft clockwise one revolution (360°).

[RH]



[LH]

**NOTICE**

Do not rotate engine counterclockwise.

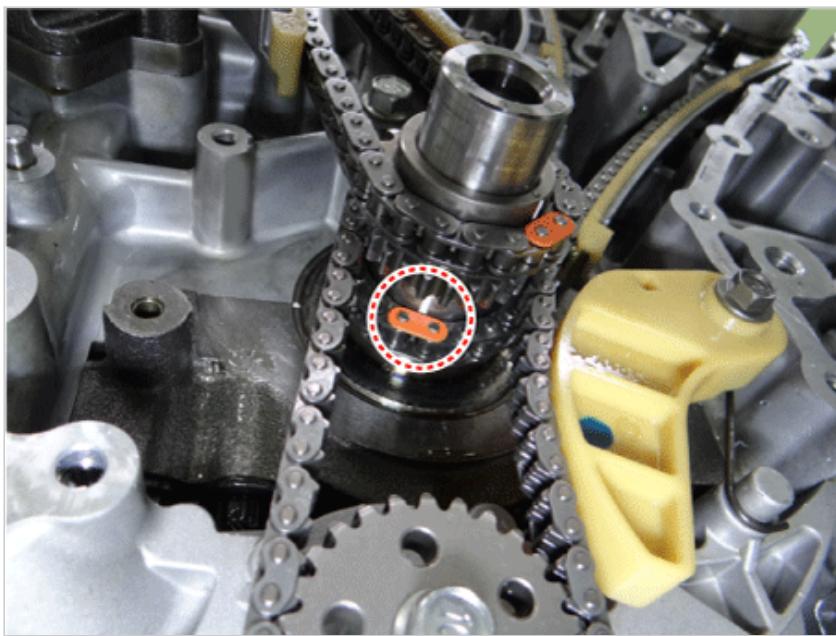
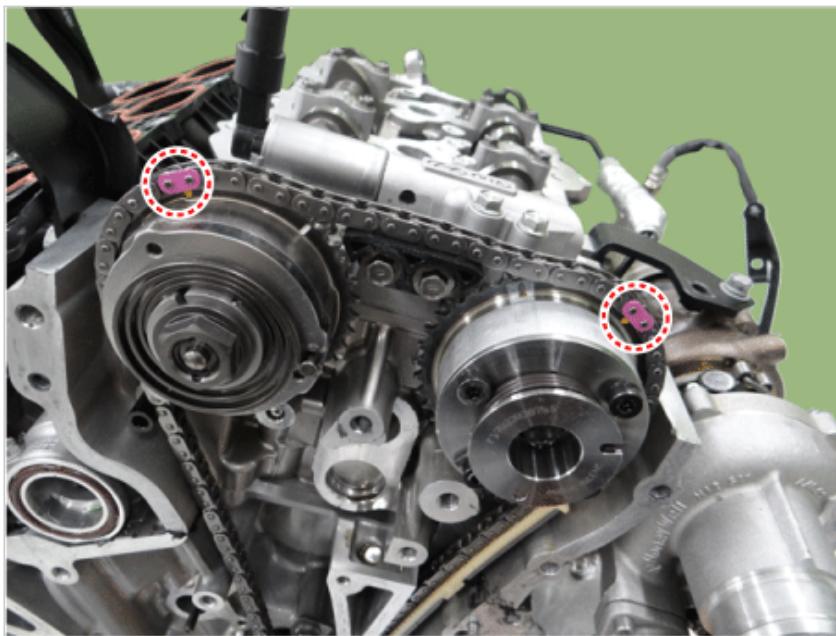
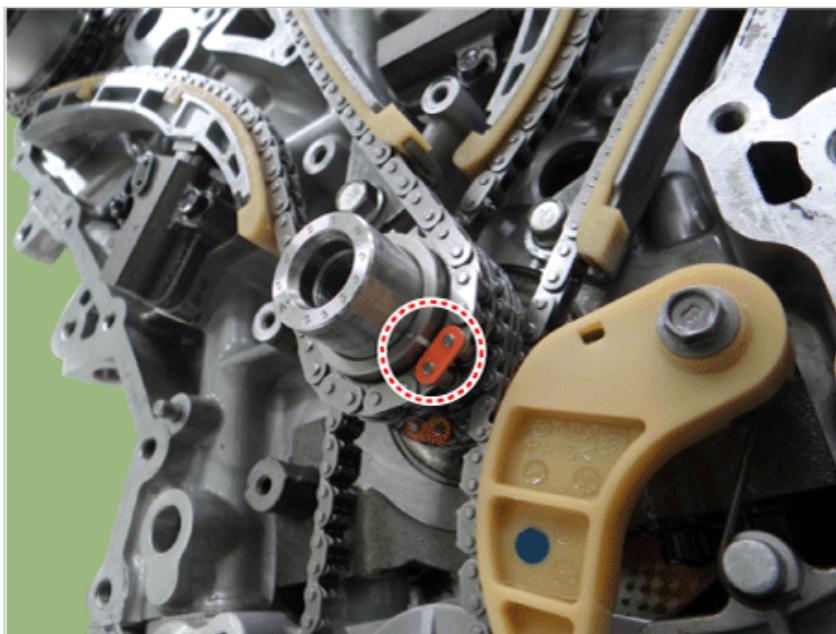
3. Remove the timing chain cover.

(Refer to Timing System - "Timing Chain Cover")

NOTICE

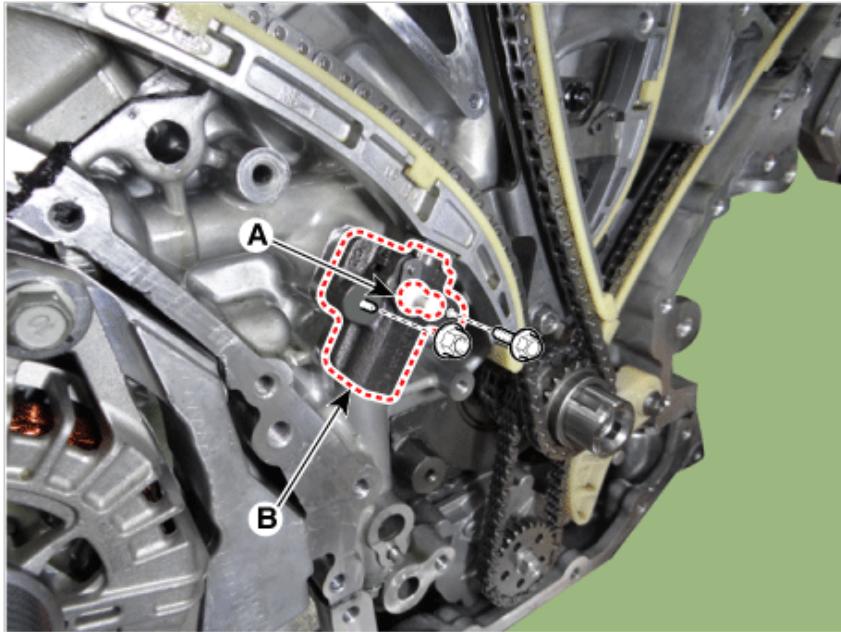
Before removing the timing chain, mark the RH/LH timing chain with an identification based on the location of the sprocket because the identification mark on the chain for TDC (Top Dead Center) can be erased.



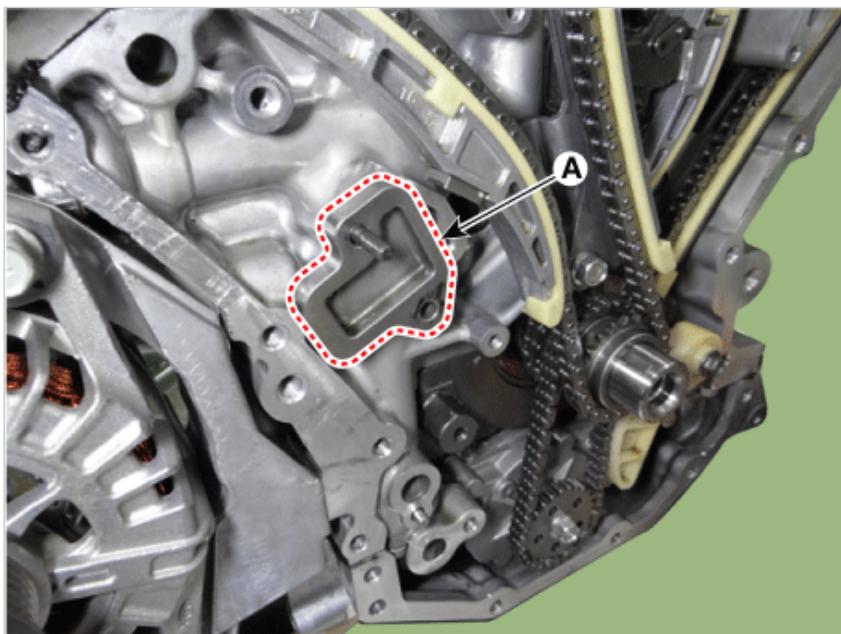


Release the ratchet by pulling the link down using a thin rod. Compress the piston and then insert a stopper pin (A) into the hole on the ratchet to hold the compressed piston.

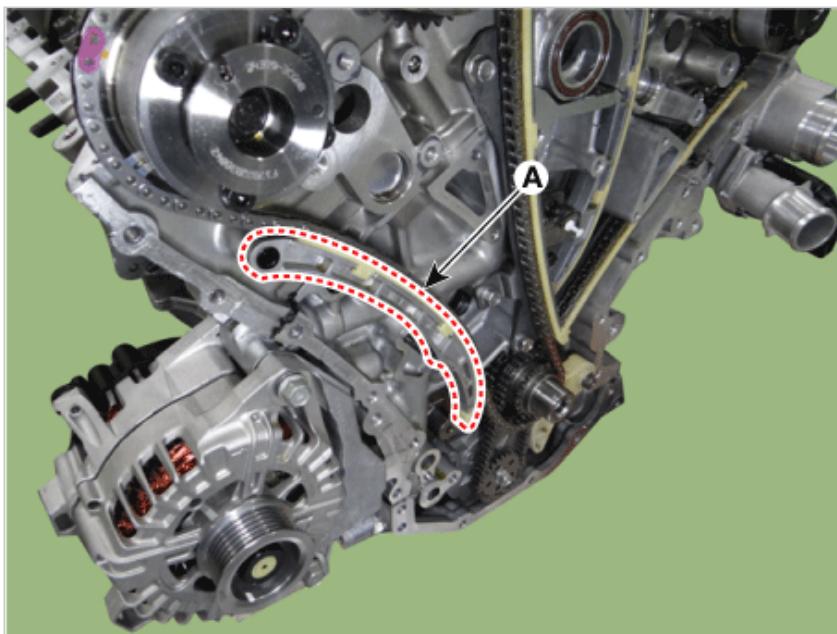
5. Remove the RH timing chain tensioner (B).



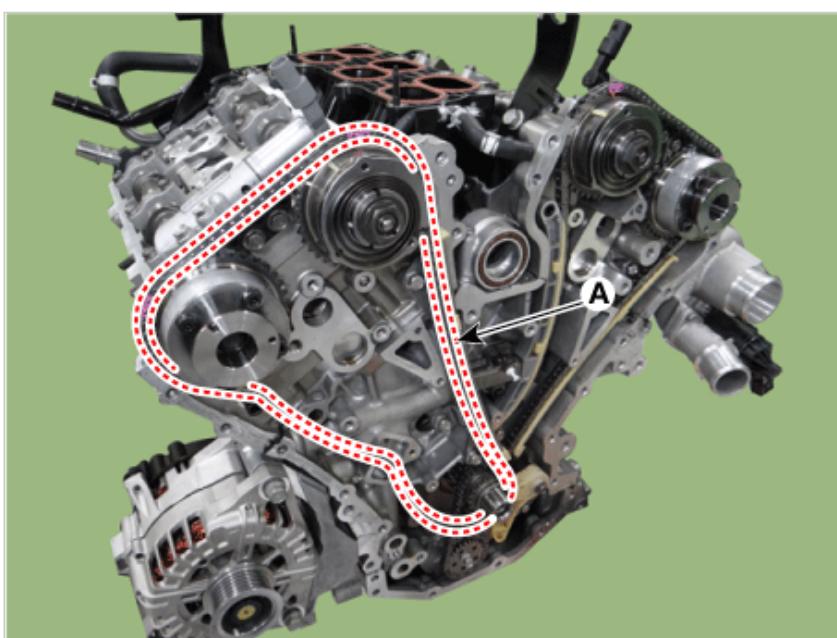
6. Remove the RH timing chain tensioner adapter (A).



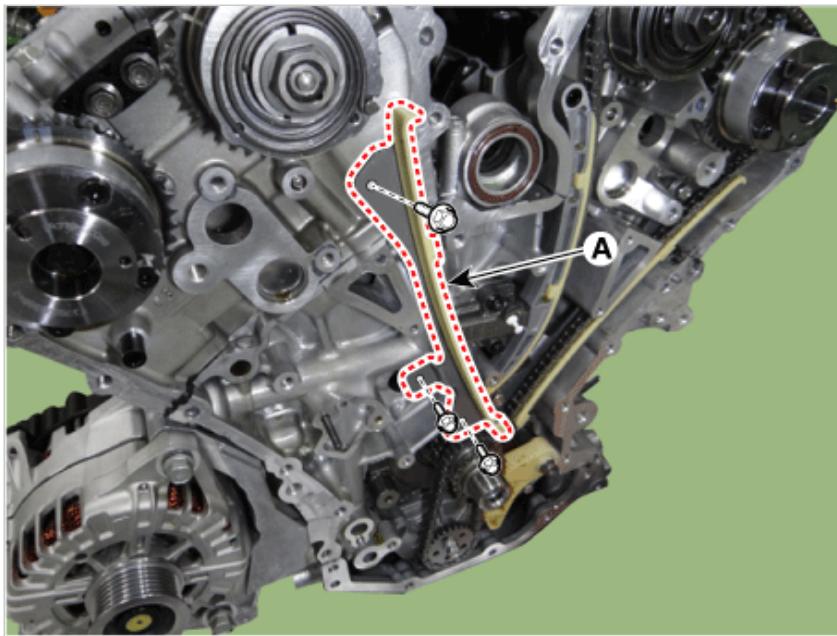
7. Remove the RH timing chain tensioner arm (A).



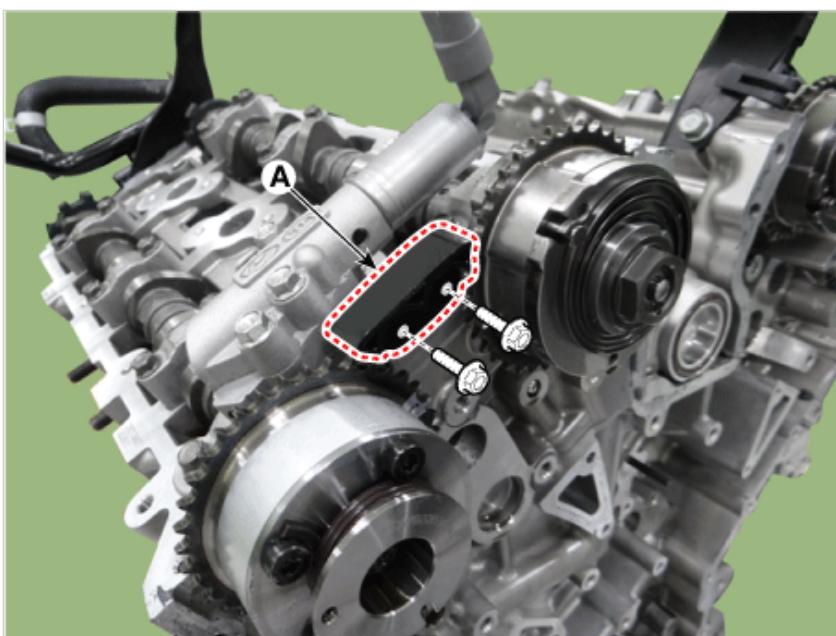
8. Remove the RH timing chain (A).



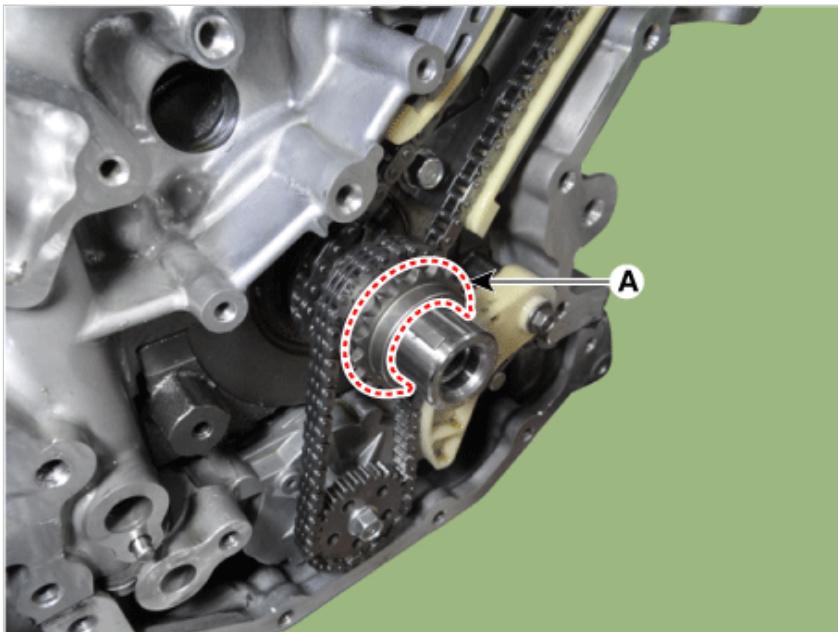
9. Remove the RH timing chain guide (A).



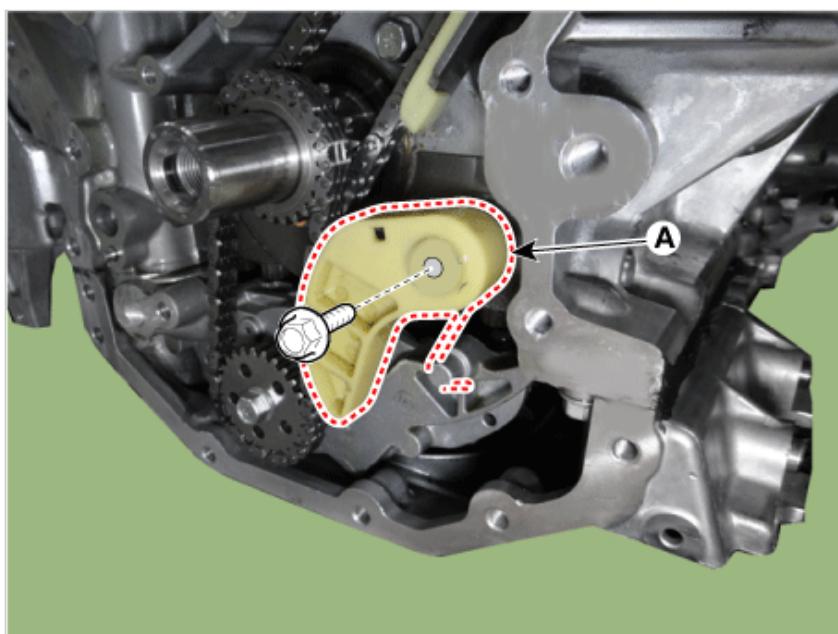
10. Remove the RH timing chain cam to cam guide (A).



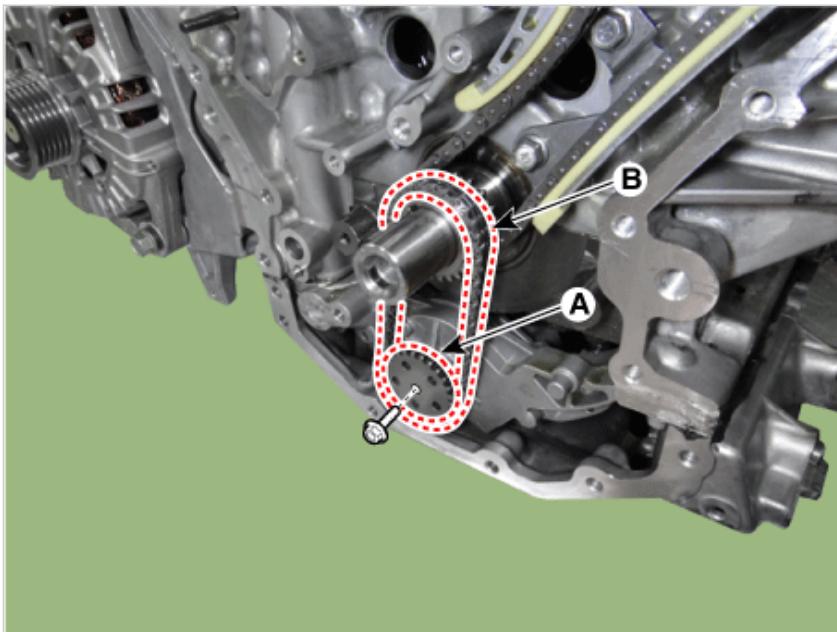
11. Remove the crankshaft RH timing chain sprocket (A).



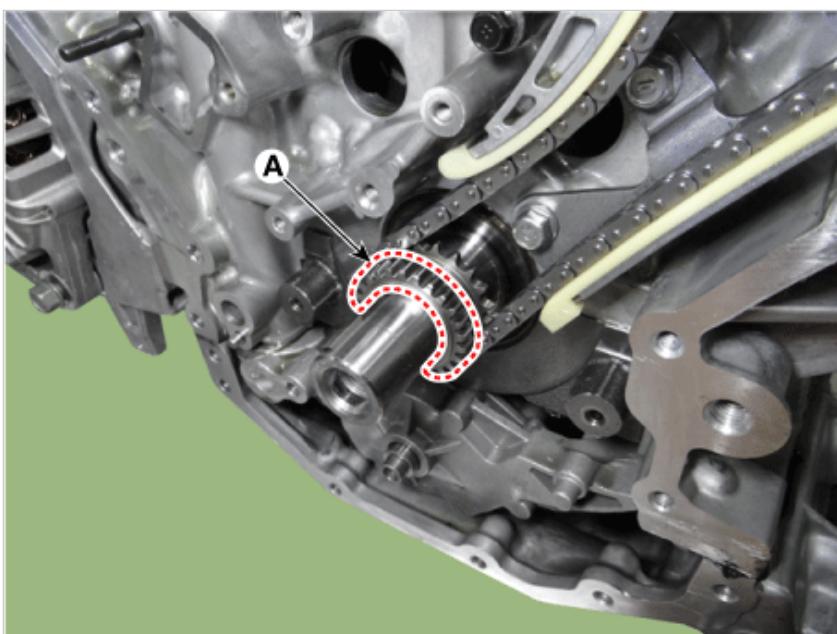
12. Remove the oil pump chain tensioner (A).



13. Remove the oil pump chain sprocket (A) and oil pump chain (B).

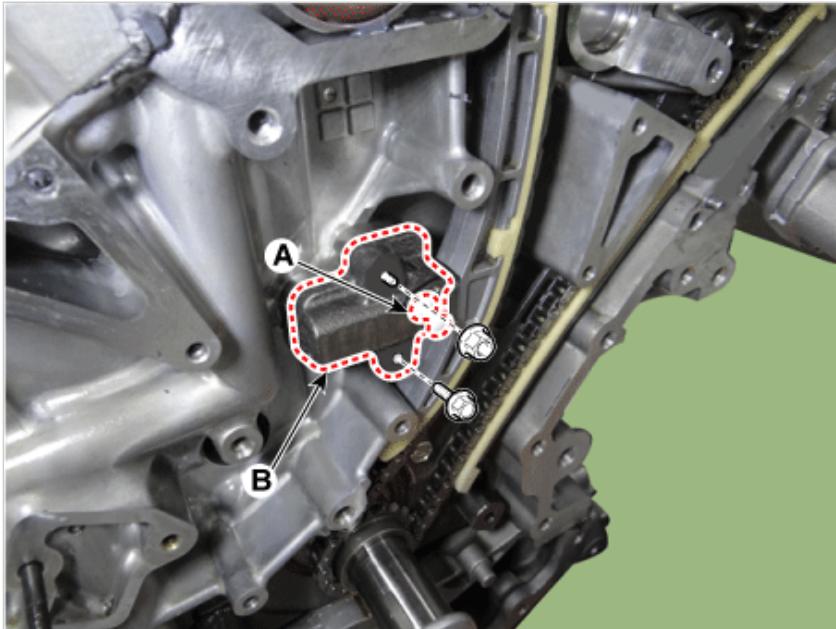


14. Remove the crankshaft oil pump sprocket (A).

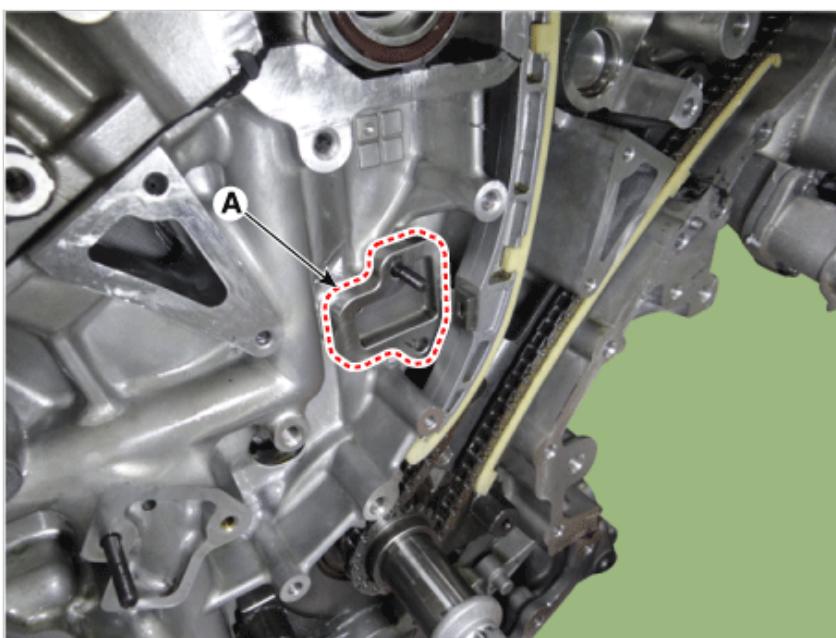


15. Release the ratchet by pulling the link down using a thin rod. Compress the piston and then insert a stopper pin (A) into the hole on the ratchet to hold the compressed piston.

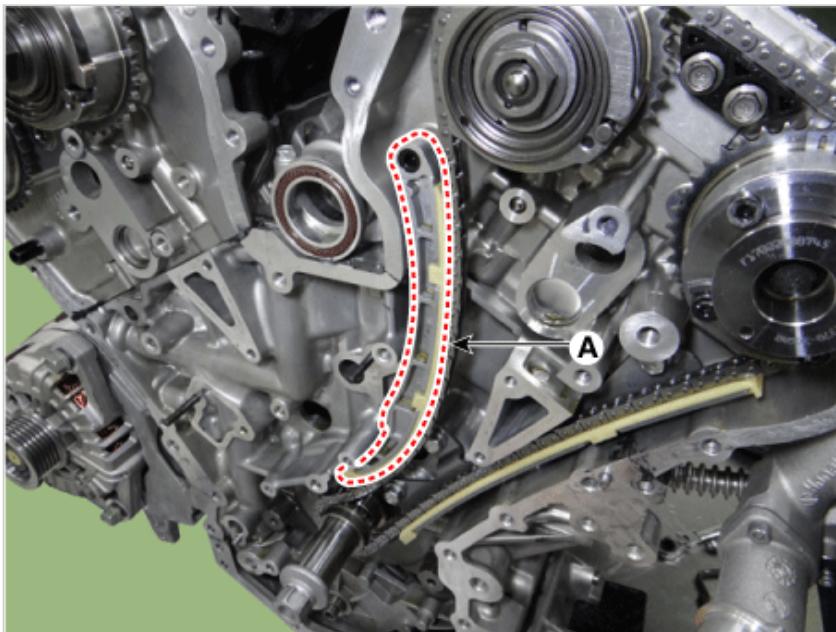
16. Remove the LH timing chain tensioner (B).



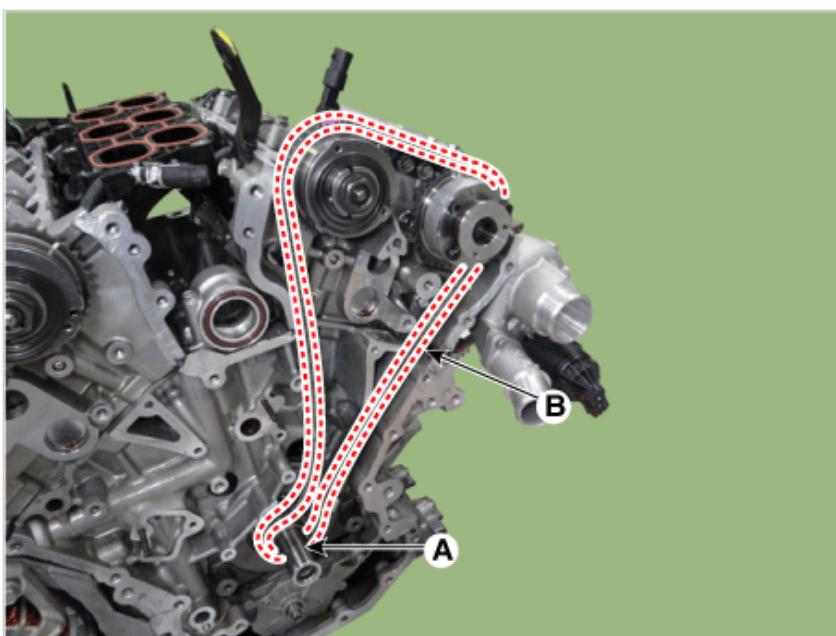
17. Remove the LH timing chain tensioner adapter (A).



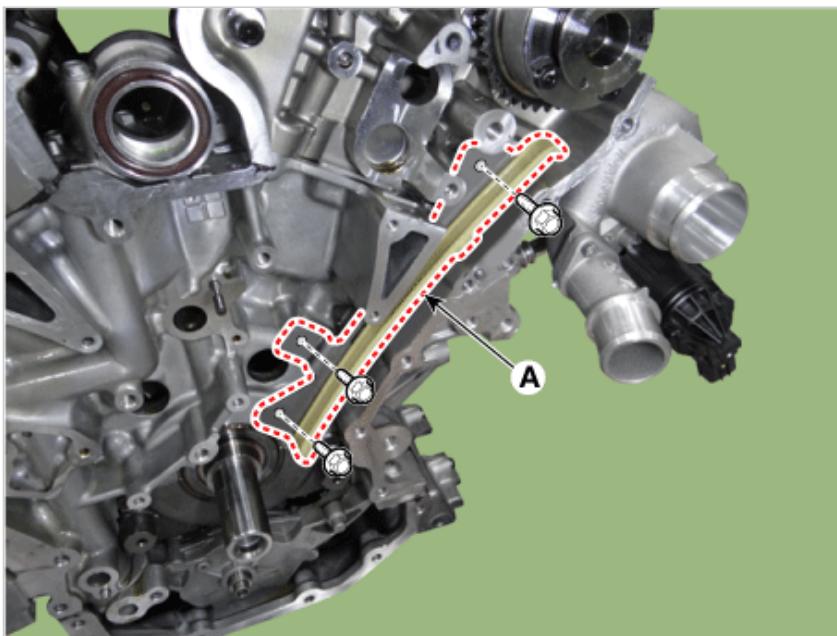
18. Remove the LH timing chain tensioner arm (A).



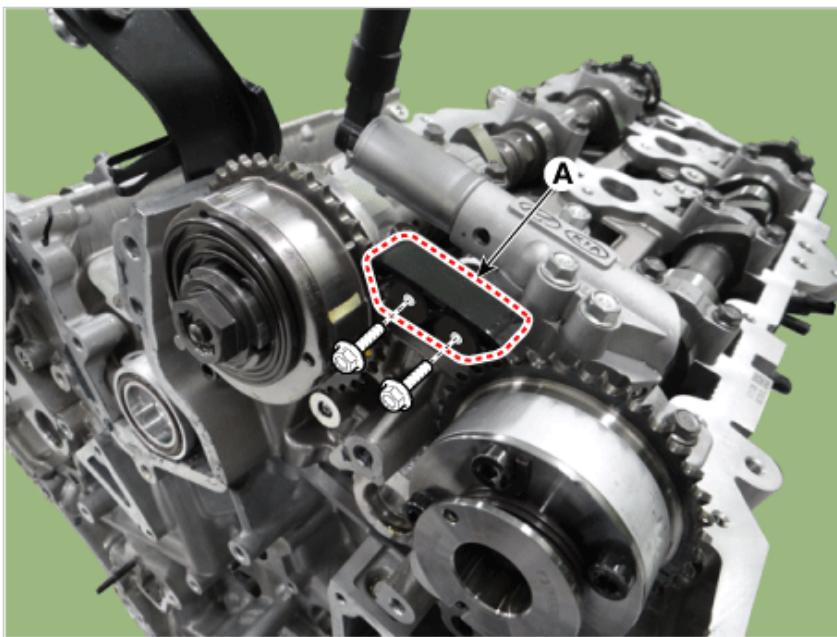
19. Remove the crankshaft LH timing chain sprocket (A) and LH timing chain (B).



20. Remove the LH timing chain guide (A).



21. Remove the LH timing chain cam to cam guide (A).



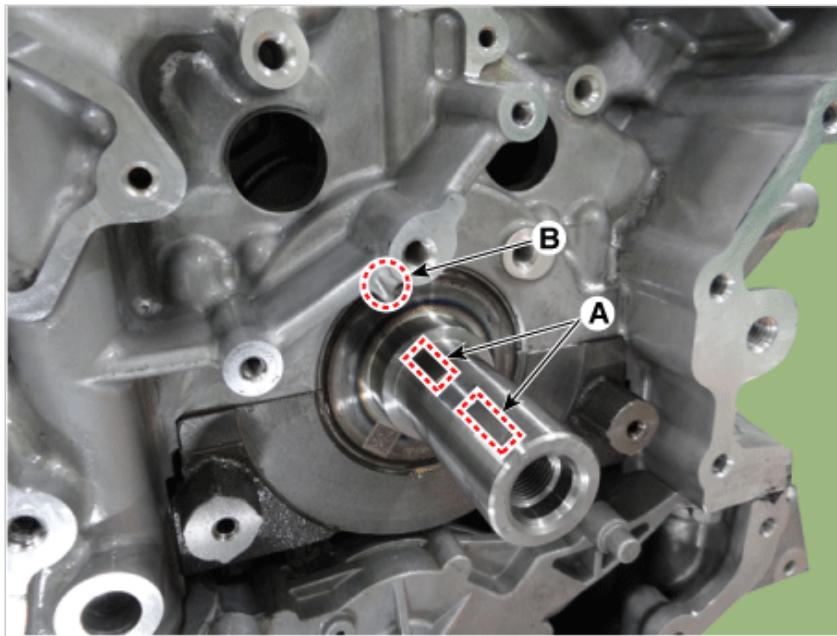
Inspection

Sprockets, Chain Tensioner, Chain Guide, Chain Tensioner Arm

1. Check the camshaft sprocket and crankshaft sprocket for abnormal wear, cracks, or damage. Replace as necessary.
2. Inspect the tensioner arm and chain guide for abnormal wear, cracks, or damage. Replace as necessary.
3. Check that the tensioner piston moves smoothly when the ratchet pawl is released with thin rod.

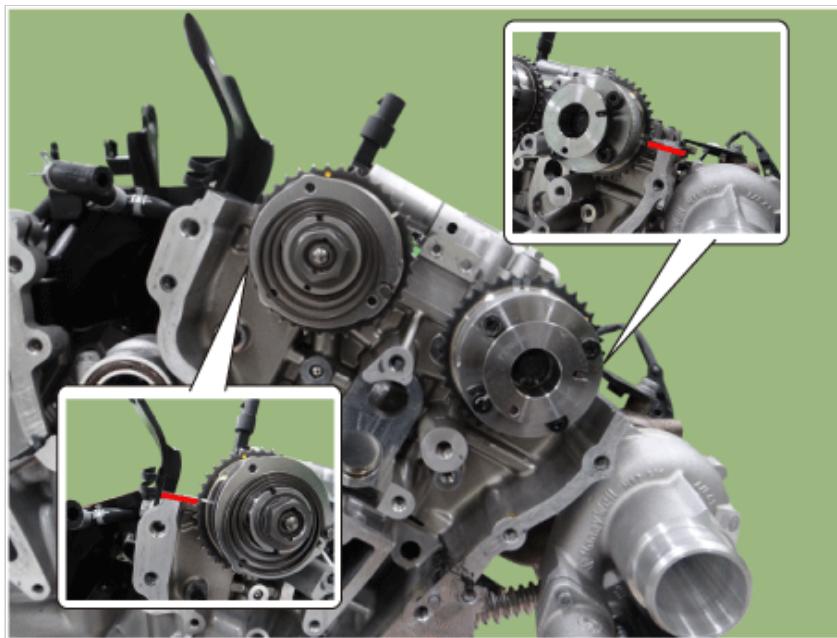
Installation

1. The key (A) of crankshaft should be aligned with the timing mark (B) of block. As a result of this, the piston of No.1 cylinder is placed at the top dead center on compression stroke.

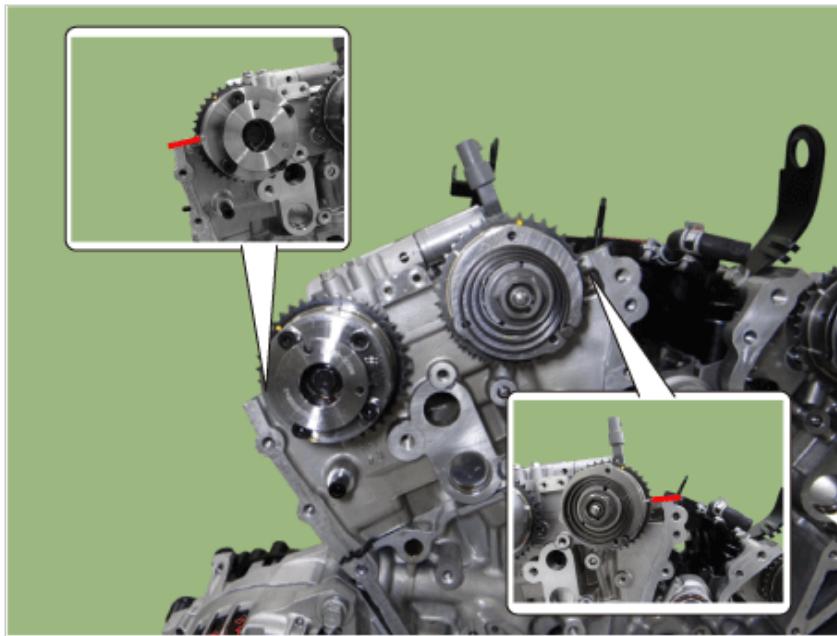


2. Align the mark of the exhaust camshaft sprocket and intake CVVT on the top surface of cylinder head. As a result of this, the piston of No.1 cylinder is placed at the top dead center on compression stroke.

[LH]



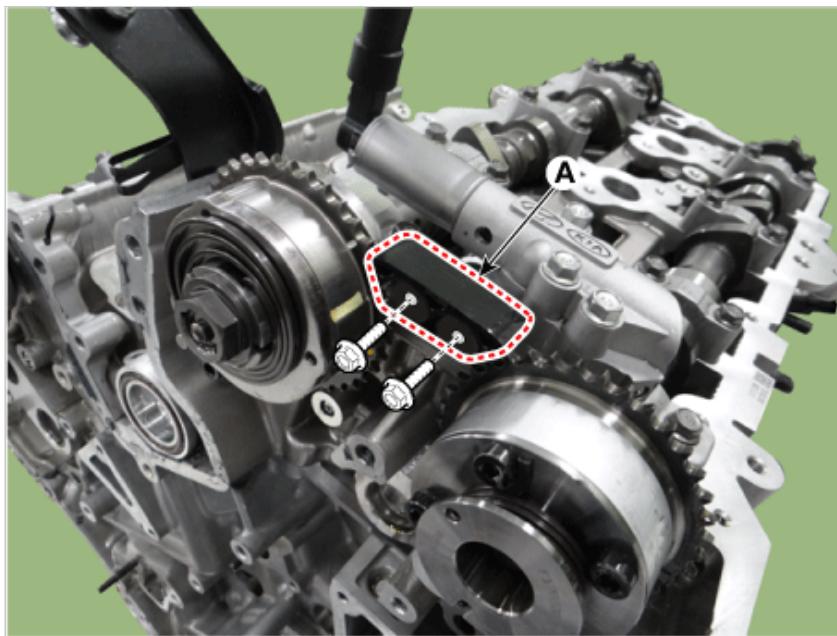
[RH]



3. Install the LH timing chain cam to cam guide (A).

Tightening torque :

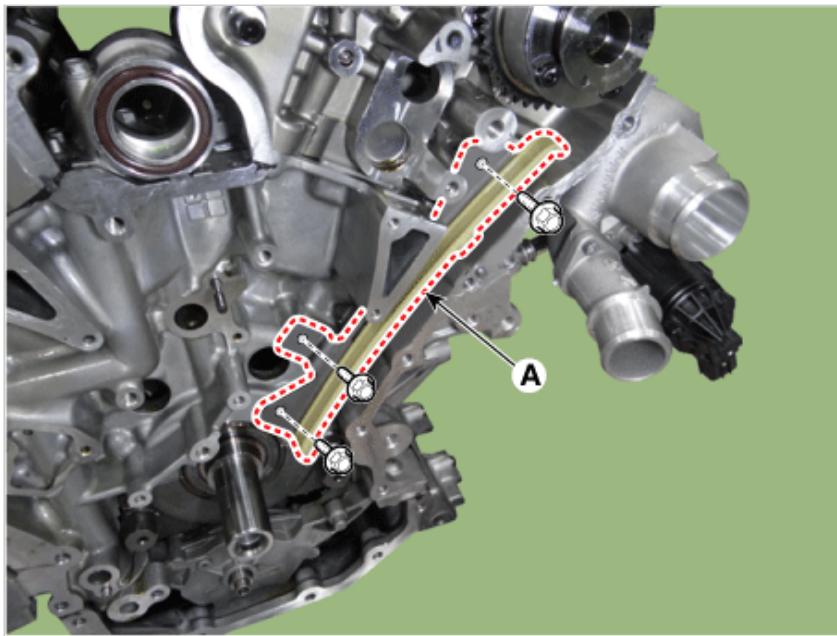
9.8 - 11.8 N·m (1.0 - 1.2 kgf·m, 7.2 - 8.7 lb·ft)



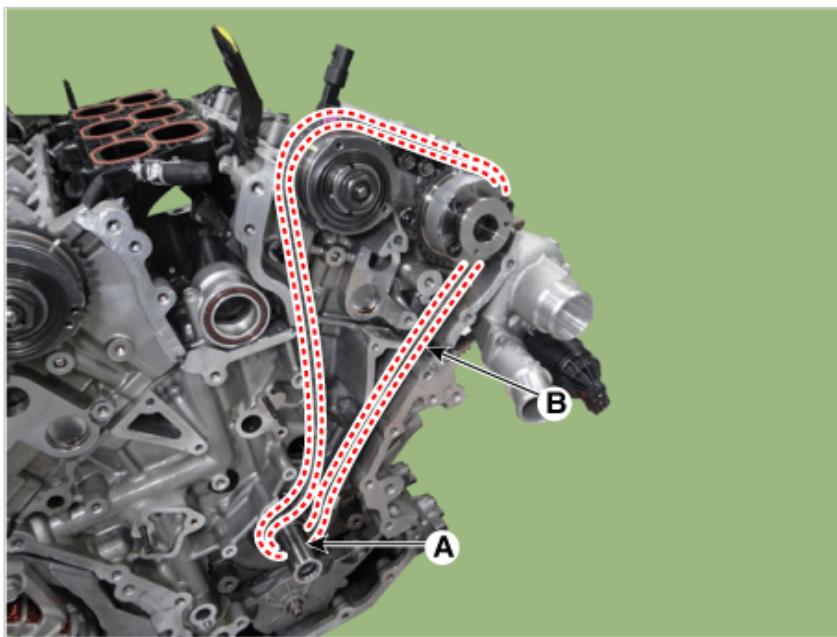
4. Install the LH timing chain guide (A).

Tightening torque :

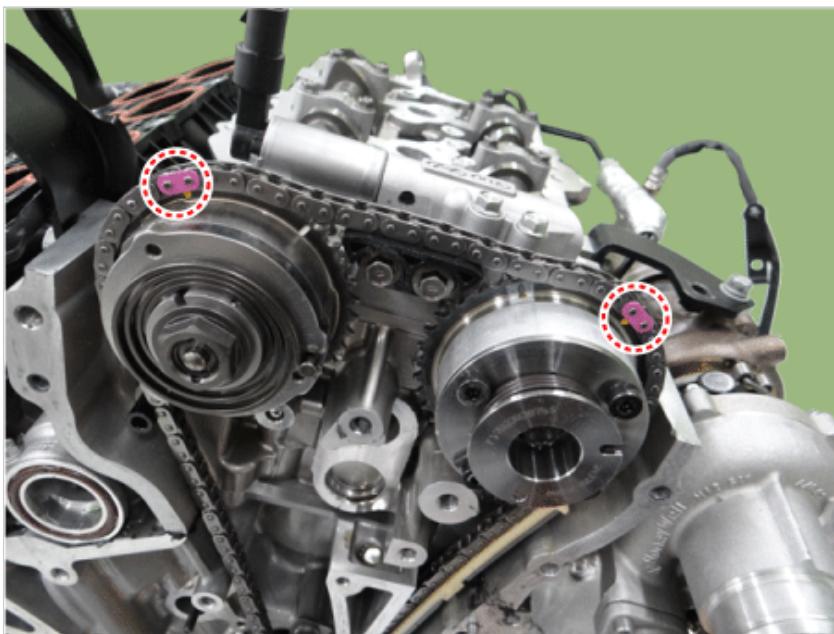
19.6 - 24.5 N·m (2.0 - 2.5 kgf·m, 14.5 - 18.1 lb·ft)



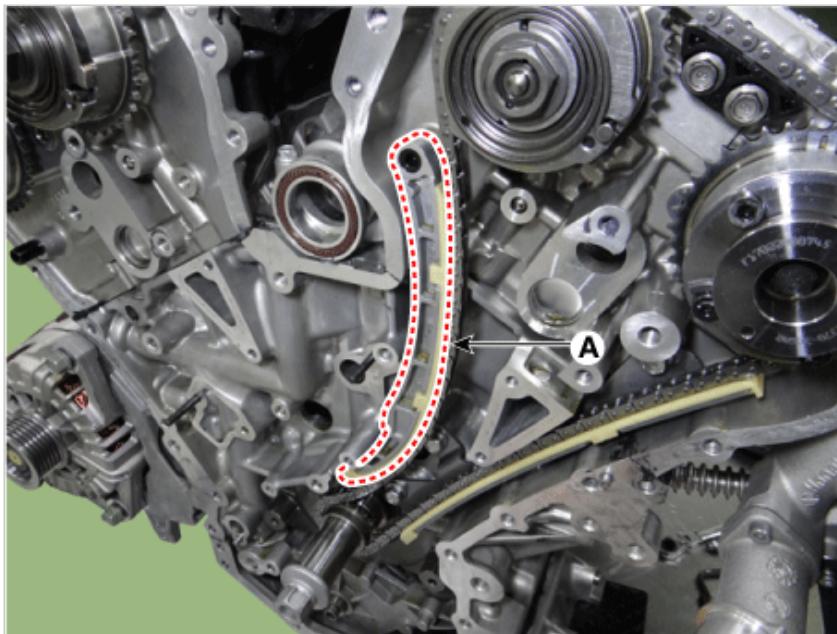
5. Install the crankshaft LH timing chain sprocket (A) and LH timing chain (B).

**NOTICE**

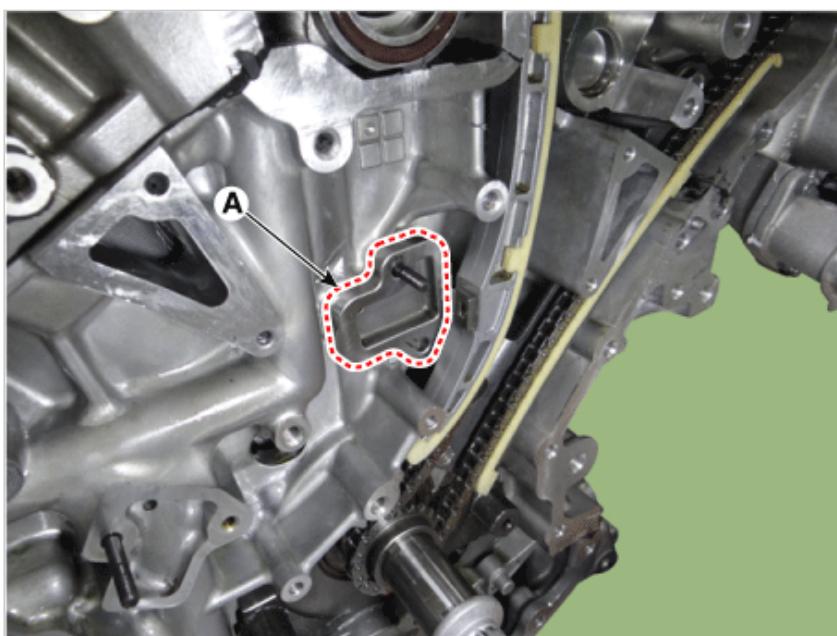
- To install the timing chain with no slack between each shaft (cam, crank), follow the procedure below :
Crankshaft sprocket → Timing chain guide → Exhaust CVVT sprocket → Intake CVVT sprocket.
- When installing the timing chain, be sure that the timing mark of each sprocket is matched with the timing mark (color link) of the timing chain.



6. Install the LH timing chain tensioner arm (A).



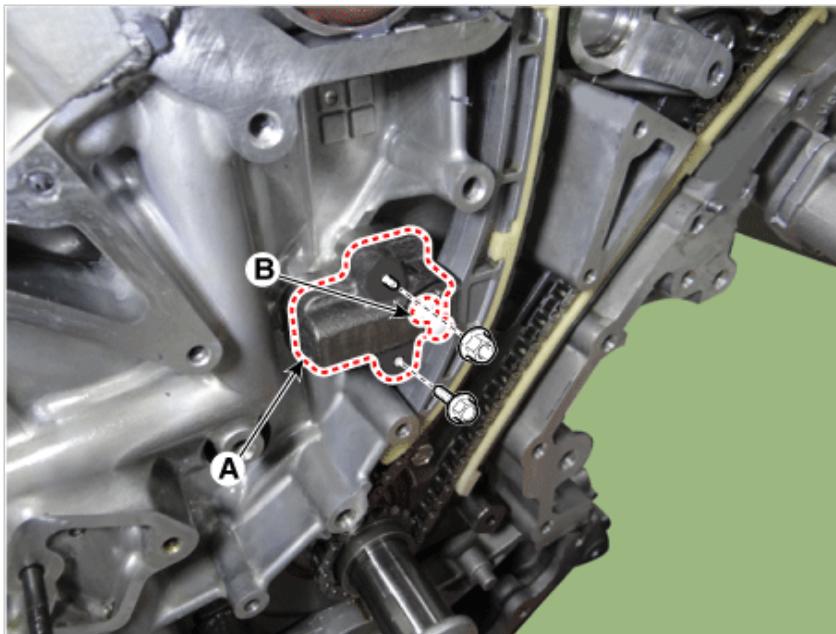
7. Install the LH timing chain tensioner adapter (A).



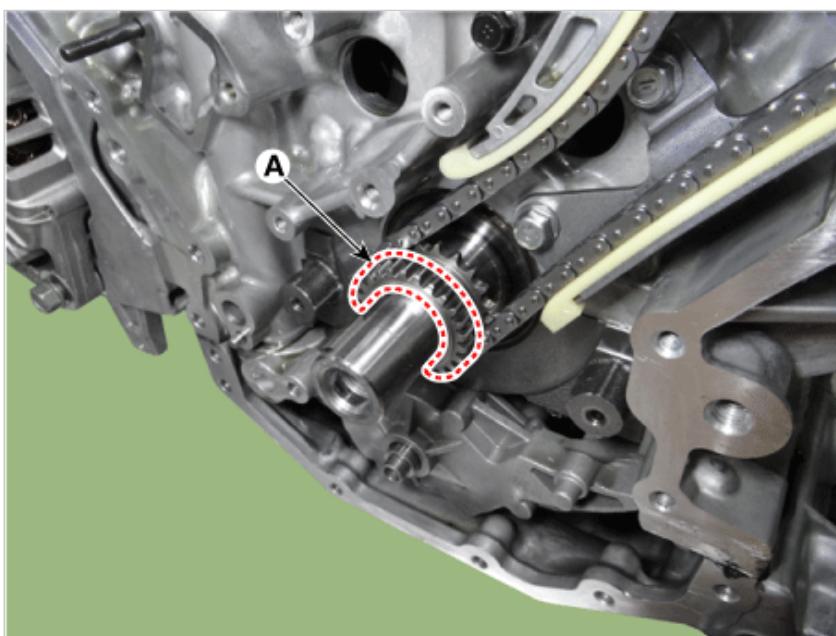
8. Install the LH timing chain tensioner (A) and then remove the stopper pin (B).

Tightening torque :

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



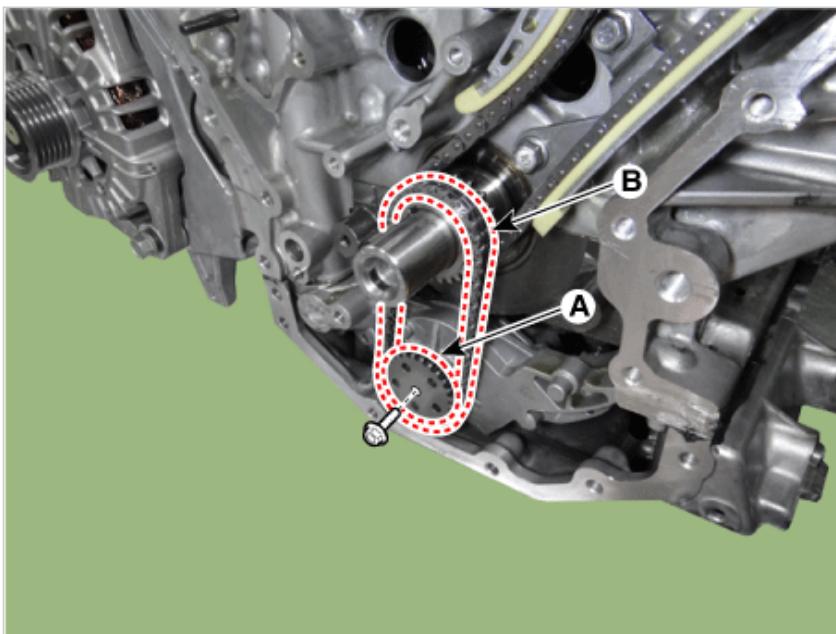
9. Install the crankshaft oil pump sprocket (A).



10. Install the oil pump chain sprocket (A) and oil pump chain (B).

Tightening torque :

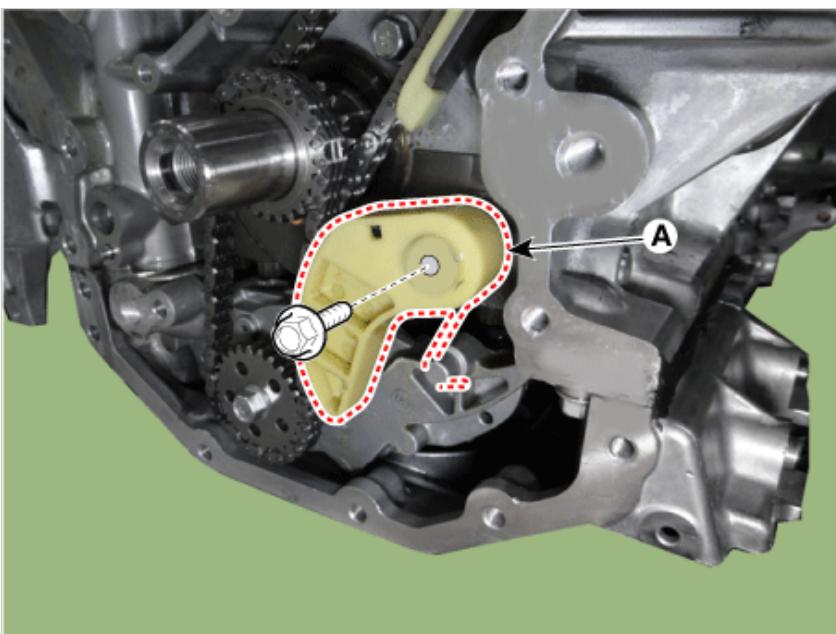
19.6 - 24.5 N·m (2.0 - 2.5 kgf·m, 14.5 - 18.1 lb·ft)



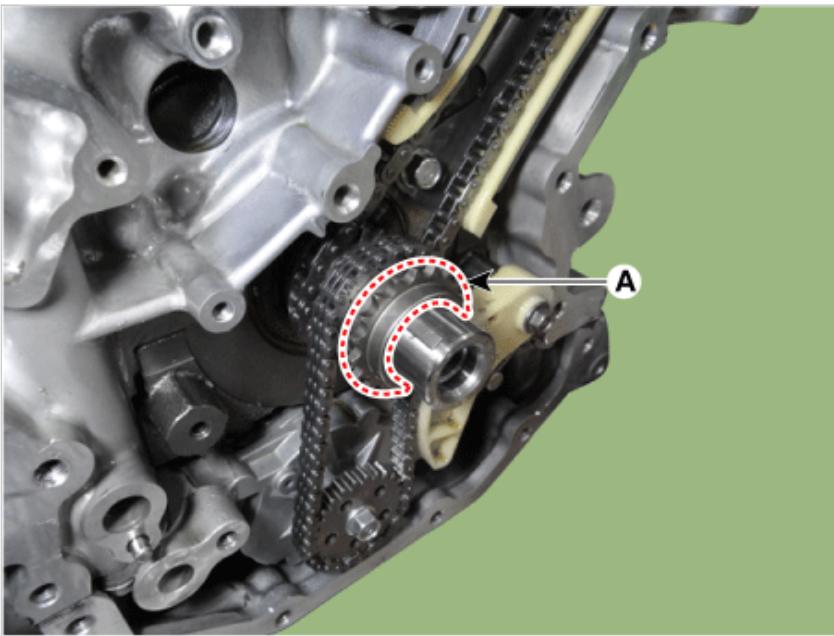
11. Install the oil pump chain tensioner (A).

Tightening torque :

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



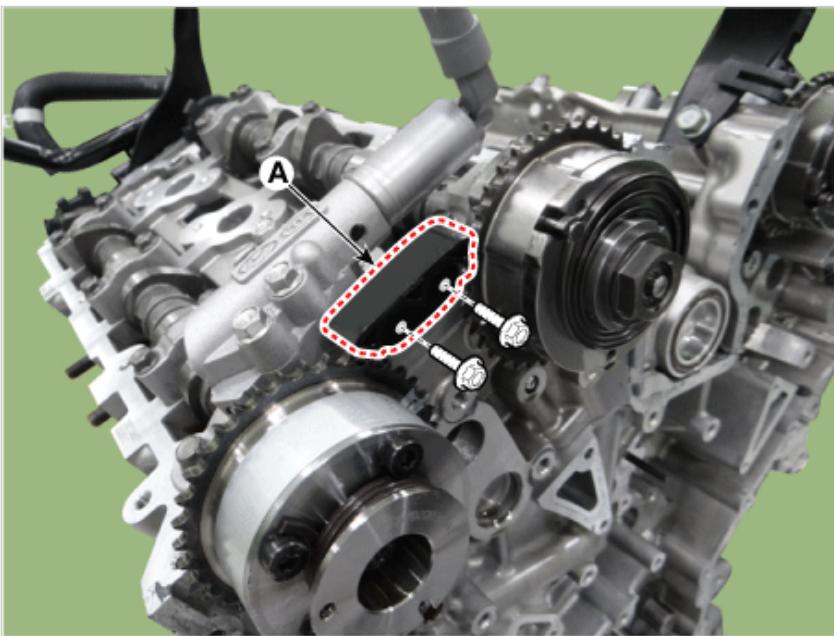
12. Install the crankshaft RH timing chain sprocket (A).



13. Install the RH timing chain cam to cam guide (A).

Tightening torque :

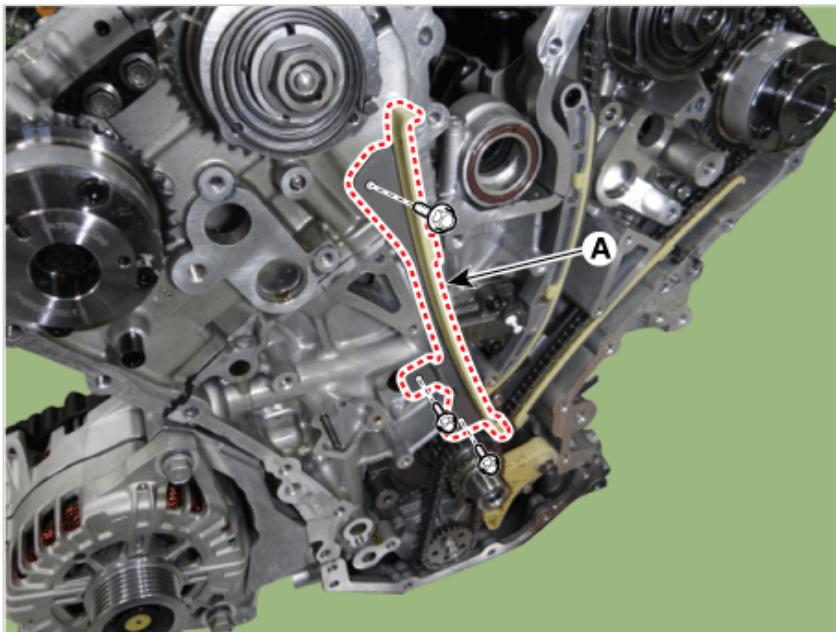
9.8 - 11.8 N·m (1.0 - 1.2 kgf·m, 7.2 - 8.7 lb·ft)



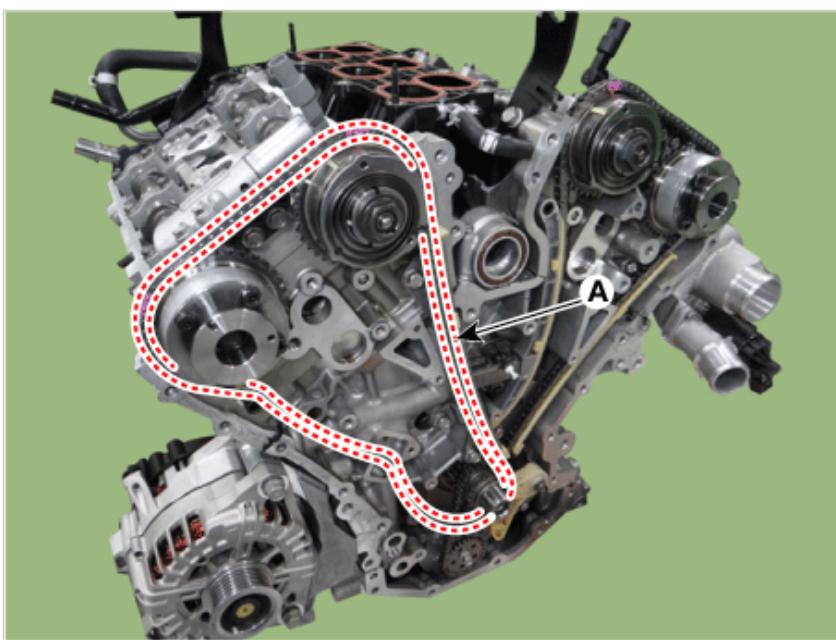
14. Remove the RH timing chain guide (A).

Tightening torque

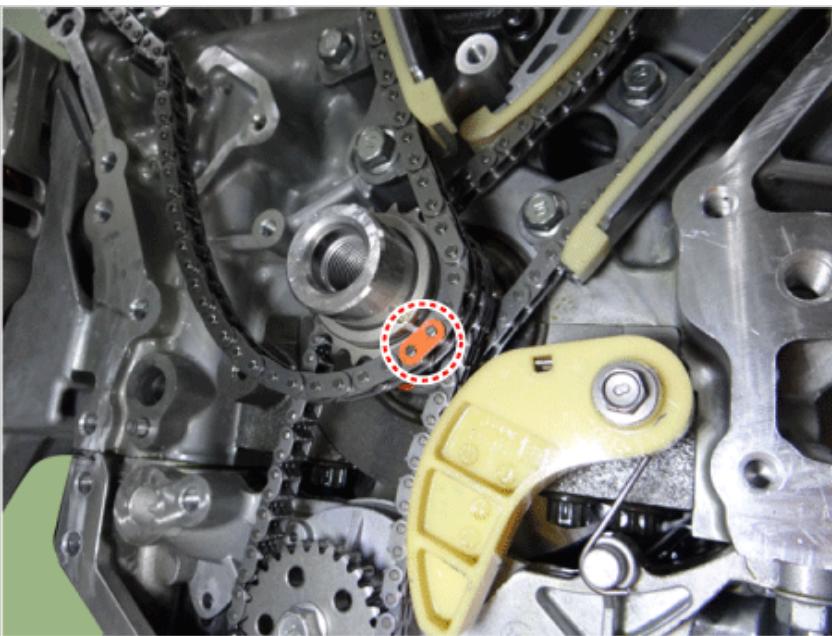
19.6 - 24.5 N·m (2.0 - 2.5 kgf·m, 14.5 - 18.1 lb·ft)



15. Install the RH timing chain (A).

**NOTICE**

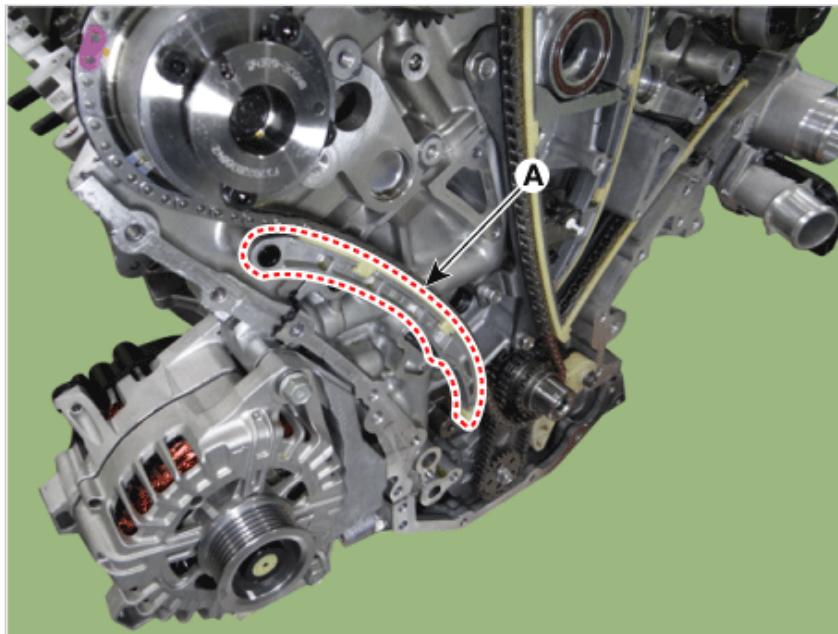
- To install the timing chain with no slack between each shaft (cam, crank), follow the procedure below :
Crankshaft sprocket → Timing chain guide → Exhaust CVVT sprocket → Intake CVVT sprocket.
- When installing the timing chain, be sure that the timing mark of each sprocket is matched with the timing mark (color link) of the timing chain.



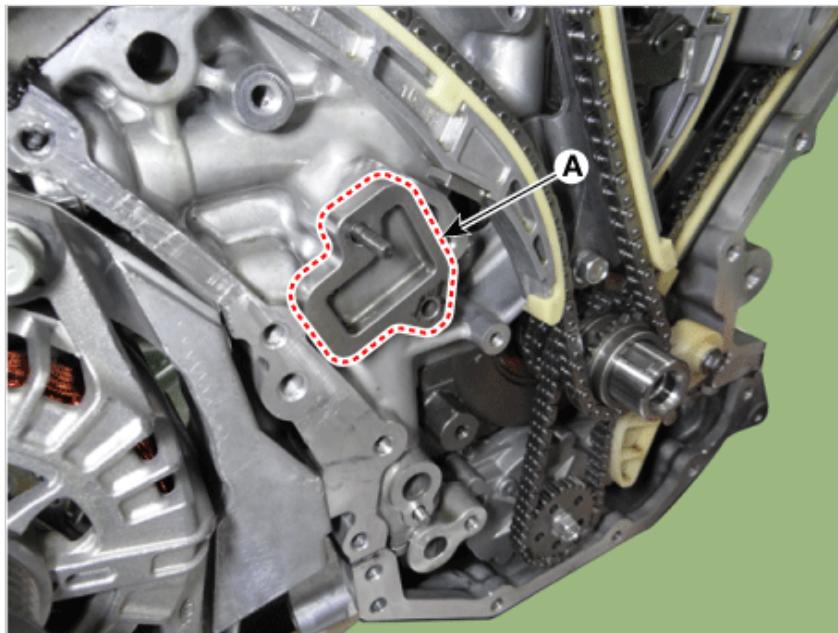
16. Install the RH timing chain tensioner arm (A).

Tightening torque :

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



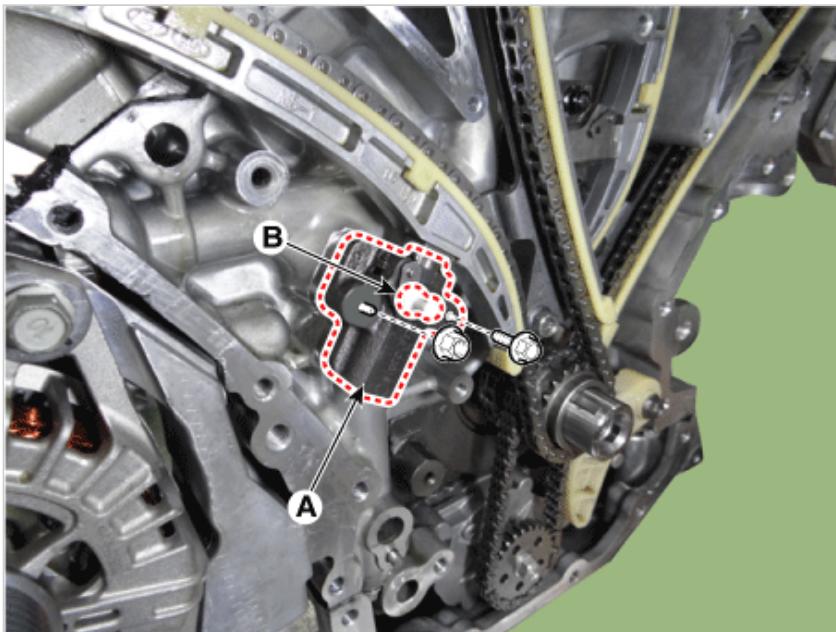
17. Install the RH timing chain tensioner adapter (A).



18. Install the RH timing chain tensioner (A) and then remove the stopper pin (B).

Tightening torque :

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



19. After rotating the crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm the timing mark.

NOTICE

- Always turn the crankshaft clockwise.
- Turning the crankshaft counterclockwise before building up oil pressure in the hydraulic timing chain tensioner may result in the chain disengagement from the sprocket teeth.

20. Install the other parts in the reverse order of removal.