

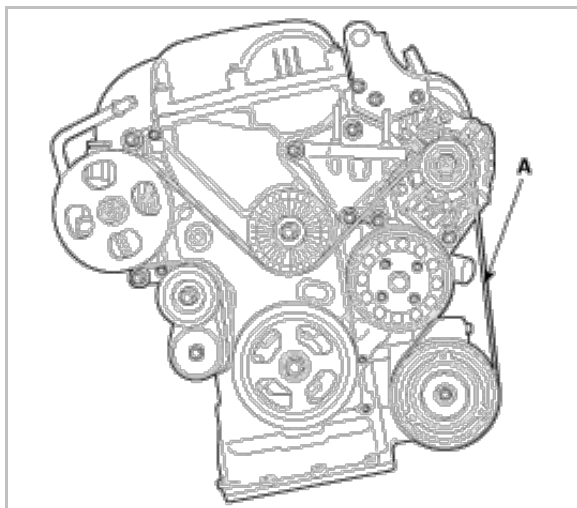


## Removal

Engine removal is not required for this procedure.

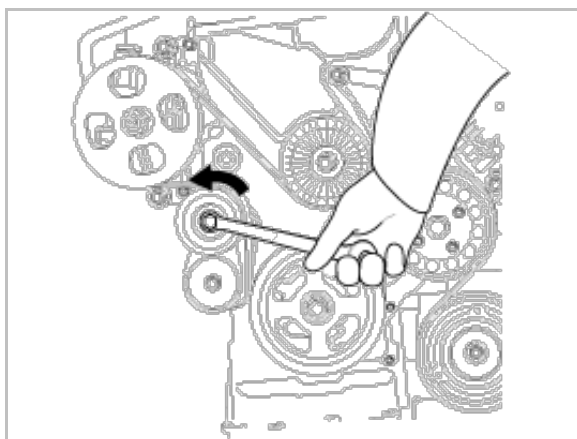
1. Disconnect the battery negative terminal.
2. Loosen the water pump pulley bolt and the drive idler mounting bolt.
3. Remove the drive belt.

### [HPS Type]



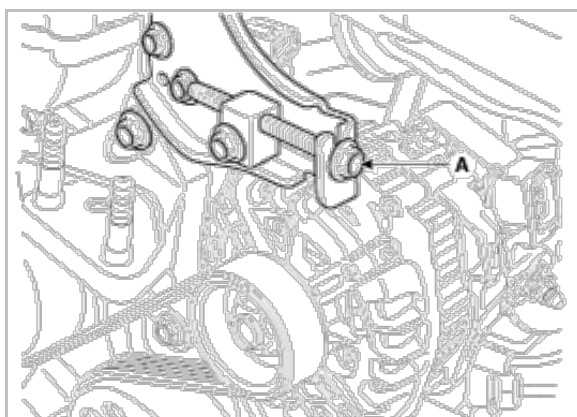
### NOTE

Remove the drive belt by turning the autotensioner counterclockwise.

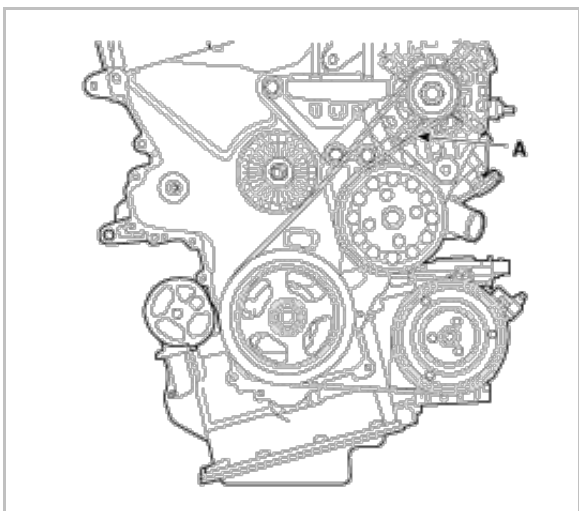


### [MDPS Type]

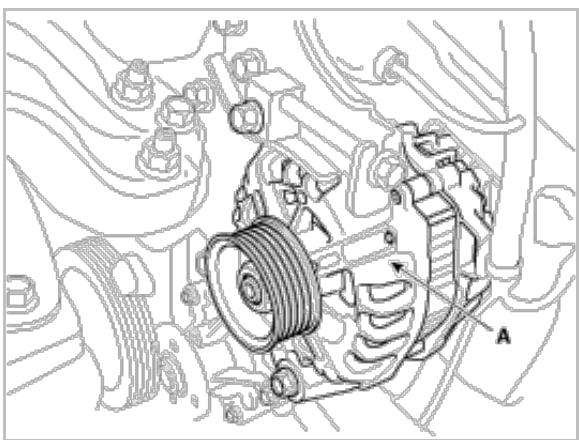
Loosen the mounting bolts (A) and then, turn the adjusting bolt(B) clockwise in loose tension.



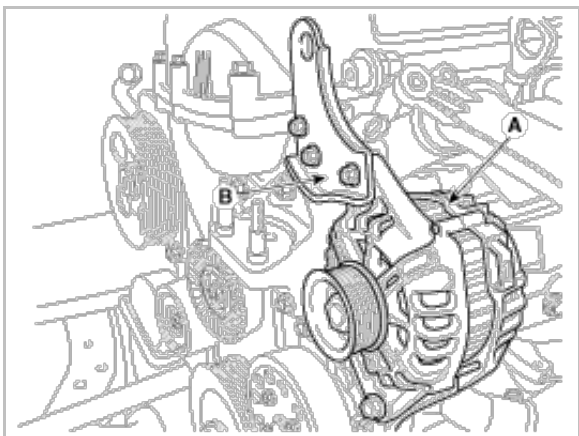
Remove the drive belt (A).



4. Remove the alternator (A).(MDPS Type)

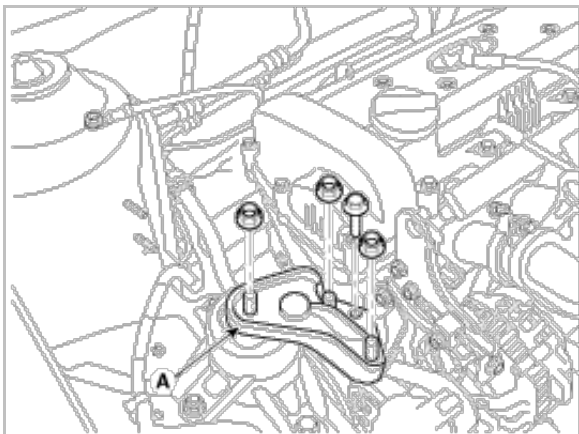


5. Remove the alternator(A) and bracket(B). (HPS Type)



6. Remove the RH front wheel.

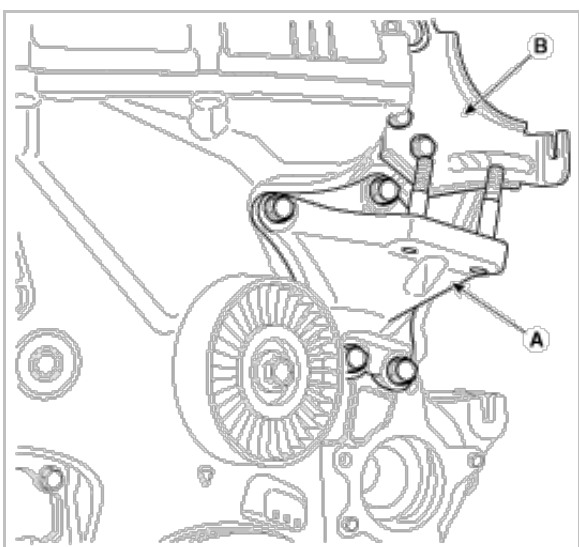
7. Remove the engine mounting bracket (A).


**NOTE**

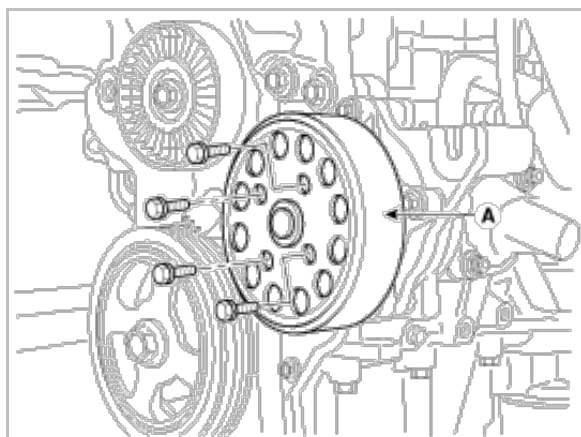
Support the engine with a jack not to be tilted.

8. Remove the alternator bracket (B).

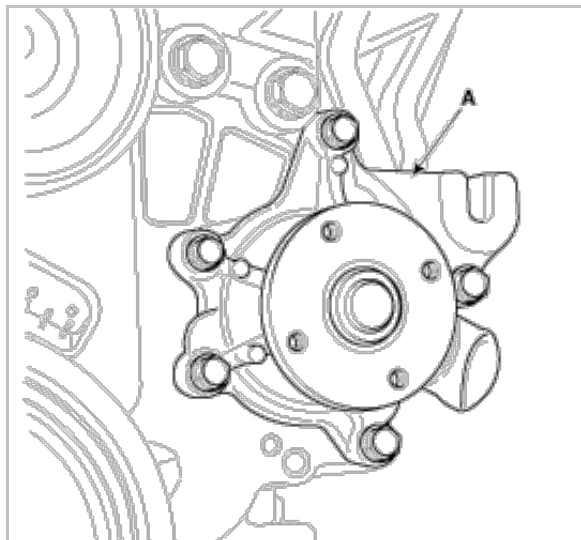
9. Remove the engine support bracket (A).



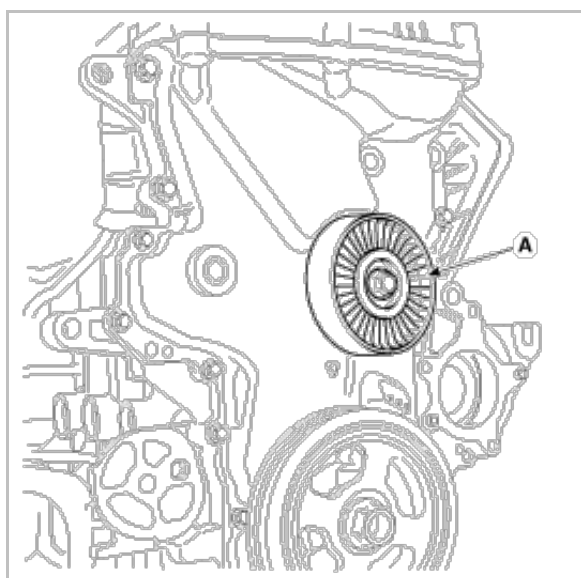
10. Remove the water pump pulley (A).



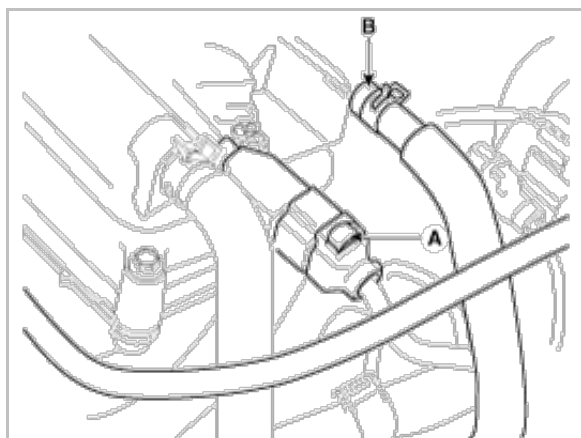
11. Remove the water pump (A).



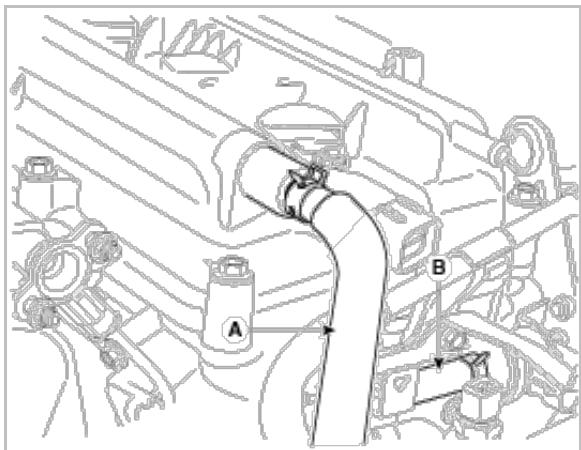
12. Remove the drive belt idler (A).



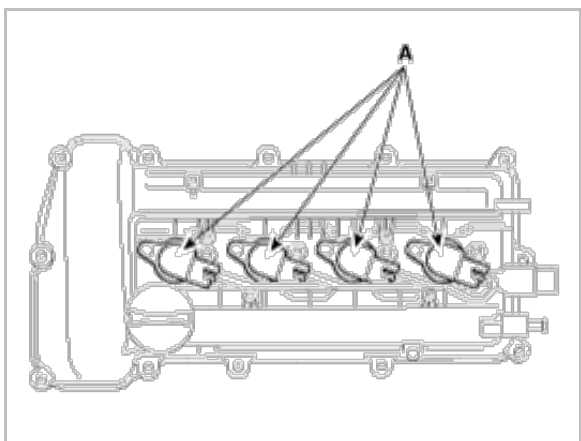
13. Disconnect the ignition coil connector (A) and the breather hose (B).



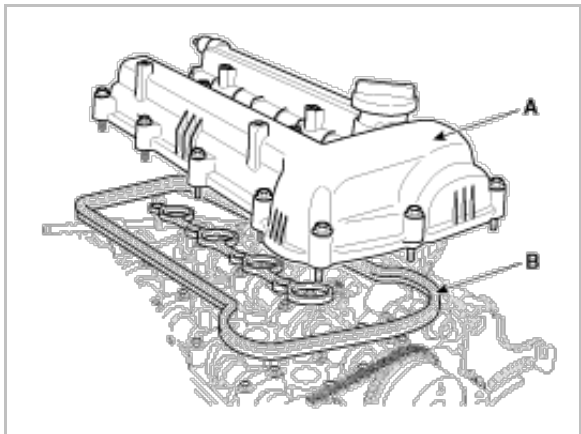
14. Disconnect the positive crankcase ventilation (PCV) hose (A) and PCSV hose (B).



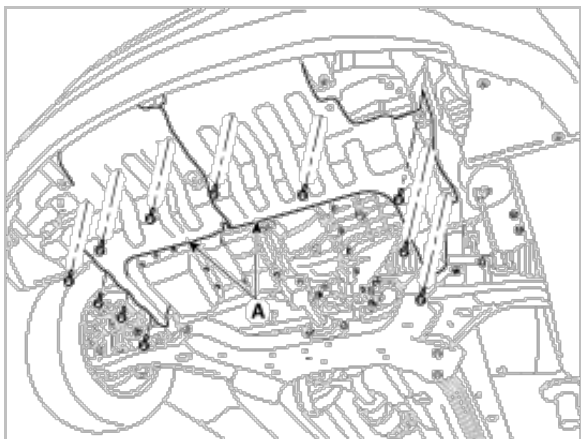
15. Remove the ignition coils (A).



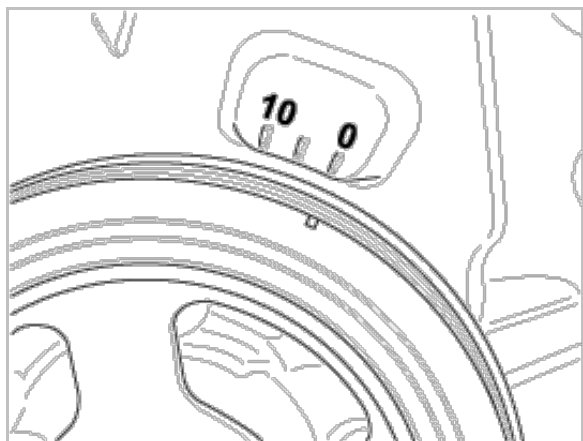
16. Remove the cylinder head cover (A) with its gasket (B).



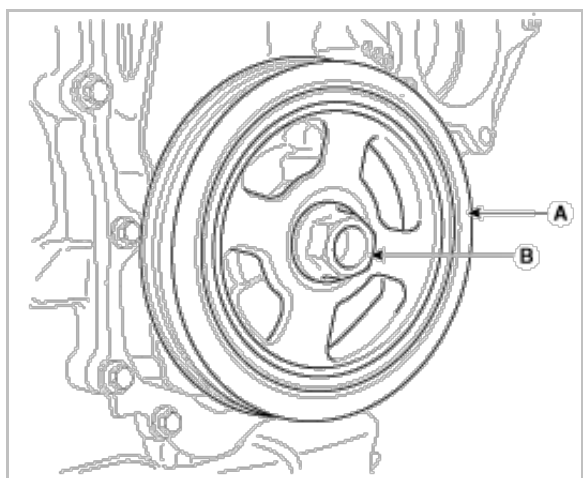
17. Remove the under covers (A).



18. Turn the crankshaft pulley clockwise, and align its groove with the timing mark of the timing chain cover.



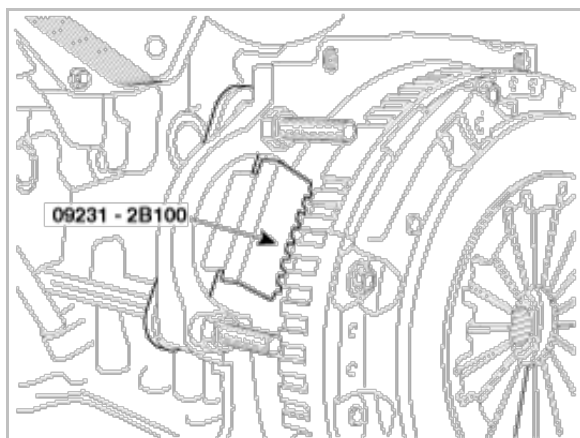
19. Remove the crankshaft bolt (B) and crankshaft pulley (A).



#### NOTE

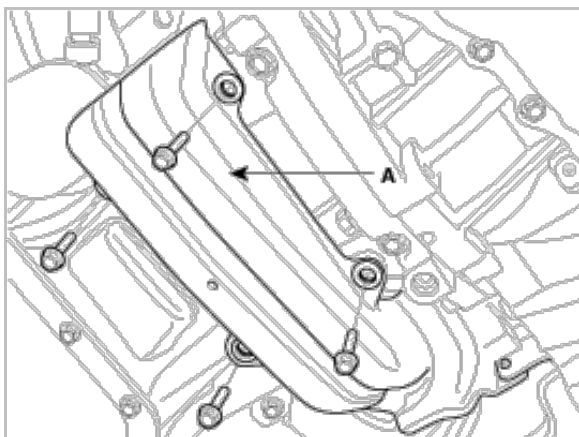
There are two methods to hold the ring gear when installing or removing the crankshaft damper pulley.

- Install the SST (09231-2B100) to hold the ring gear after removing the starter.

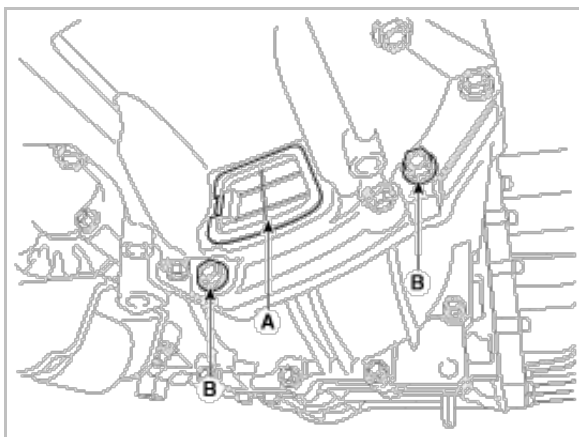


- Install the SST (09231-3D100) to hold the ring gear after removing the dust cover.

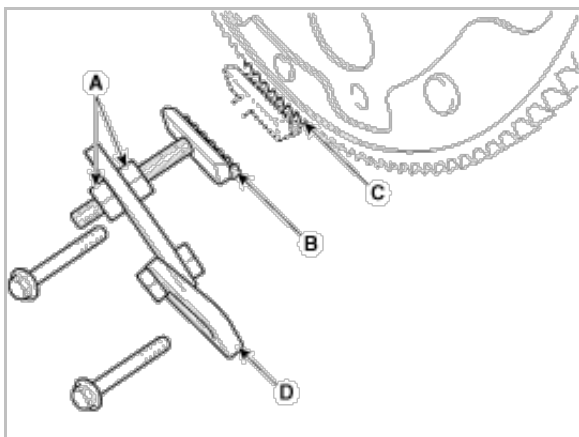
1. Remove the bracket (A).



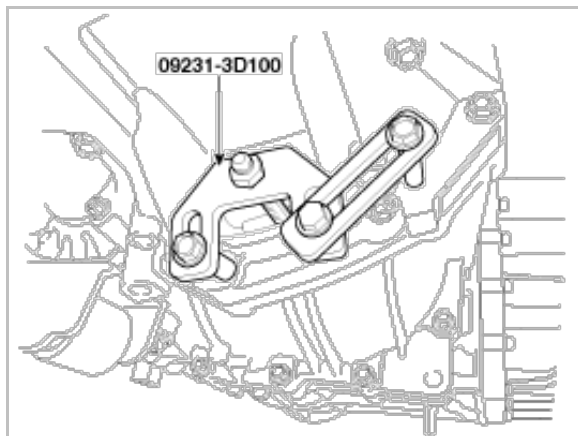
2. Remove the dust cover (A) on the bottom of the ladder frame and unfasten the transaxle mounting bolt (B).



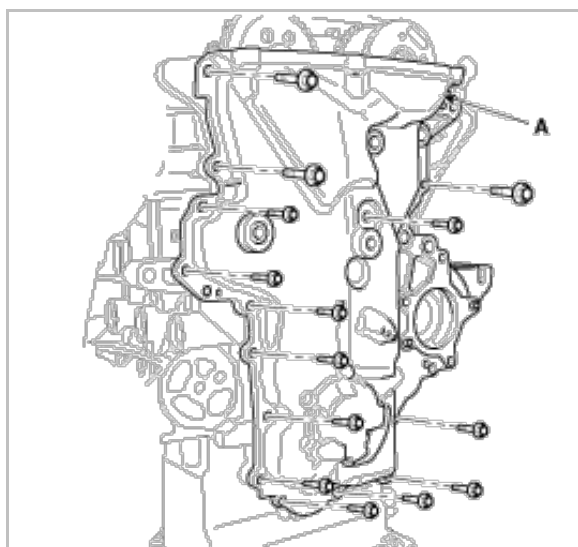
3. Adjust the length of the holder nuts (A) so that the front plate of the holder (B) puts in the ring gear (C) teeth.
4. Adjust the angle of the links (D) so that the bolt 70mm (2.7559in.) can be fastened to the original mounted hole.



5. Install the SST (09231-3D100) using the mounting bolts and spacers. Tighten the bolts and nuts of the holder and links securely.



20. Remove the timing chain cover (A).

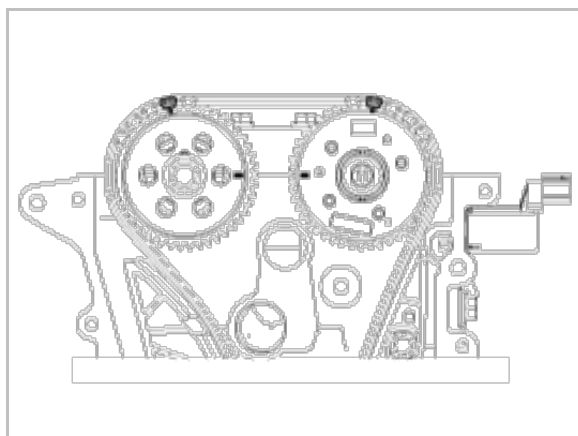


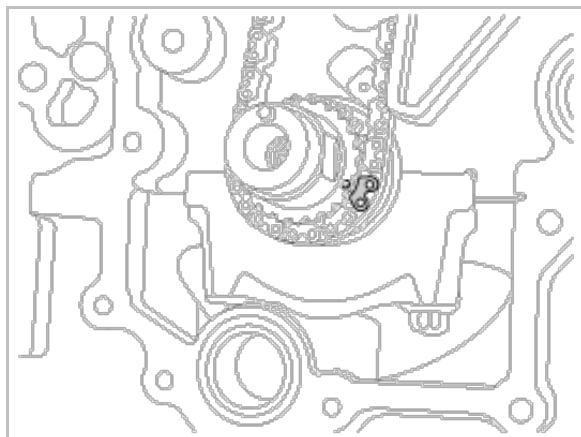
21. Align the timing marks of the camshaft sprocket with the upper surface of the cylinder head to make No.1 cylinder be positioned at TDC.

(1) Check the dowel pin of the crankshaft for facing upside of the engine at this moment.

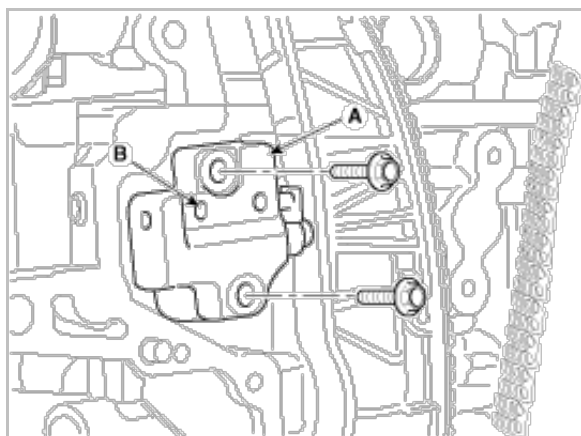
**CAUTION**

Put paint marks on the timing chain links(3 places) that meet with the timing marks of the camshaft sprockets(In, Ex : 2) and the crankshaft sprocket.





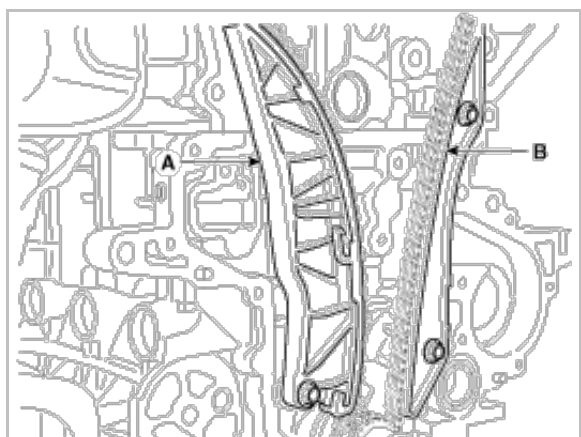
22. Remove the hydraulic tensioner (A).



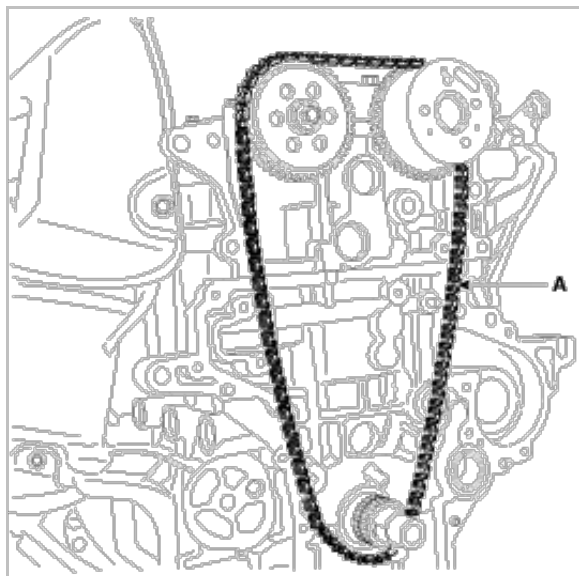
**CAUTION**

Before removing the tensioner, fix the piston of the tensioner with a pin through the hole(B) at TDC.

23. Remove the timing chain tensioner arm (A) and guide (B).



24. Remove the timing chain (A).



## Inspection

### Sprockets, Hydraulic Tensioner, Chain Guide, Tensioner Arm

1. Check the camshaft sprocket, crankshaft sprocket teeth for abnormal wear, cracks or damage. Replace if necessary.
2. Check a contact surface of the chain tensioner arm and guide for abnormal wear, cracks or damage. Replace if necessary.
3. Check the hydraulic tensioner for its piston stroke and ratchet operation. Replace if necessary.

### Belt, Idler, Pulley

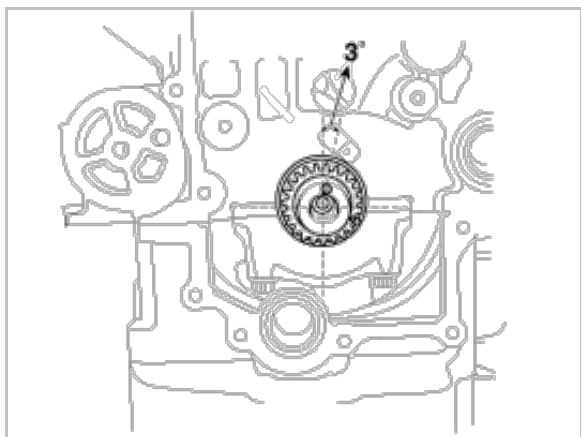
1. Check the idler for excessive oil leakage, abnormal rotation or vibration. Replace if necessary.
2. Check belt for maintenance and abnormal wear of V-ribbed part. Replace if necessary.
3. Check the pulleys for vibration in rotation, oil or dust deposit of V-ribbed part. Replace if necessary.

#### NOTE

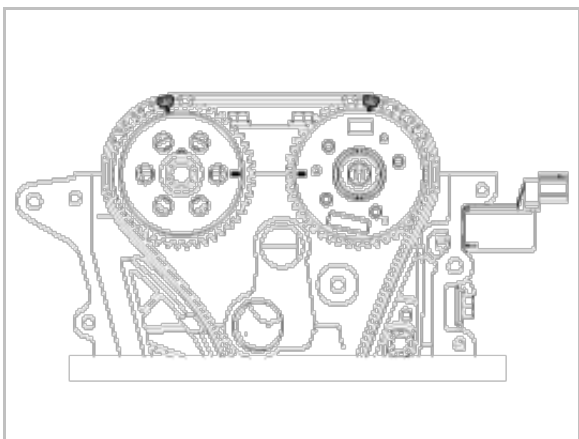
- Do not bend, twist or turn the timing belt inside out.
- Do not allow the timing belt to come into contact with oil, water and steam.

## Installation

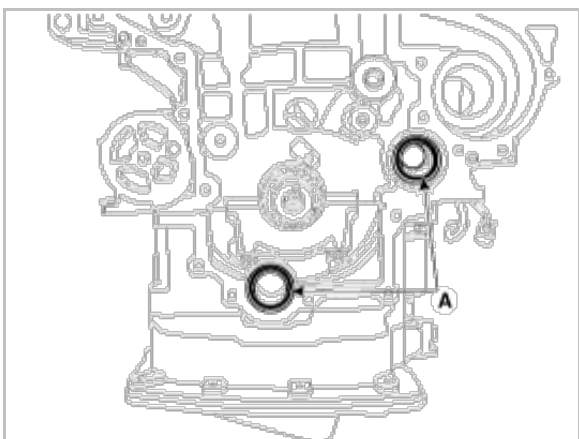
1. Dowel pin of crankshaft setted about 3° with vertical center line.



2. Align the timing marks of the camshaft sprocket with the upper surface of the cylinder head to make No.1 cylinder be positioned at TDC.



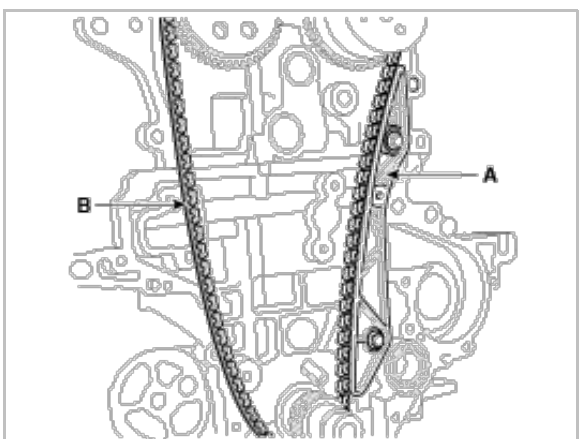
3. Install the new O-rings (A).



4. Install the timing chain guide (A) and the timing chain (B).

**Tightening torque :**

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



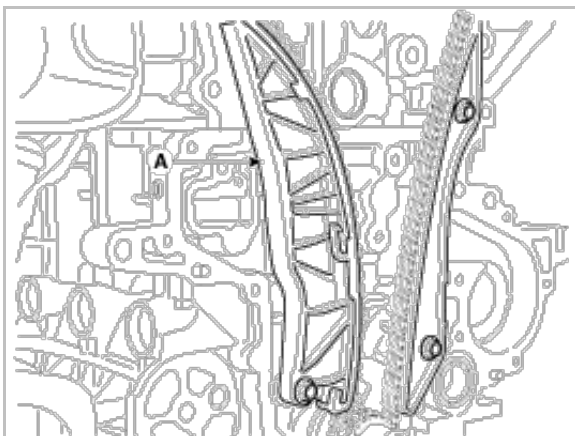
**NOTE**

When installing a timing chain, align the timing marks on the sprockets with paint marks of the chain.  
Order : Crankshaft sprocket → Timing chain guide → Intake camshaft sprocket → Exhaust camshaft sprocket.

5. Install the chain tensioner arm (A).

**Tightening torque :**

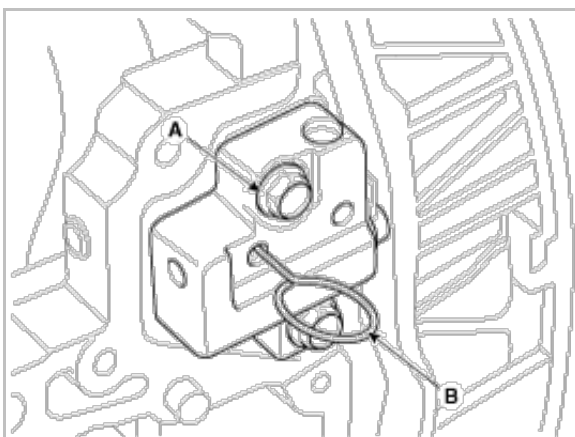
9.8 ~ 11.8 N.m (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)



6. Install the hydraulic tensioner (A) and remove the pin (B).

**Tightening torque :**

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



**NOTE**

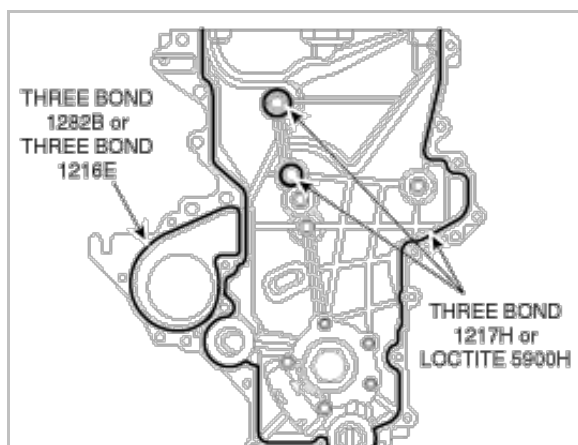
Recheck the top dead center (TDC) marks on the crankshaft and camshaft.

7. Install the timing chain cover (A).

(1) Before installing, remove the hardened sealant from the cylinder block and ladder frame surface.

(2) Apply the liquid gasket (TB 1217H or LOCTITE 5900H) on the surface between the cylinder head and the cylinder block.

**Width : 3 ~ 5mm(0.1181~0.1969in.)**



- (3) Apply the liquid gasket, THREE BOND 1282B or THREE BOND 1216E on the water pump contact parts of the timing chain cover and THREE BOND 1217H or LOCTITE 5900H on the rest parts. Reassemble the cover(A) within 5 minutes.

**Width** : 3.5 ~ 4.5 mm (0.1378 ~ 0.1772 in.)

**CAUTION**

Remove oil or dust on the surface surely.

- (4) Align the dowel pin of the cylinder block and the holes of the oil pump.

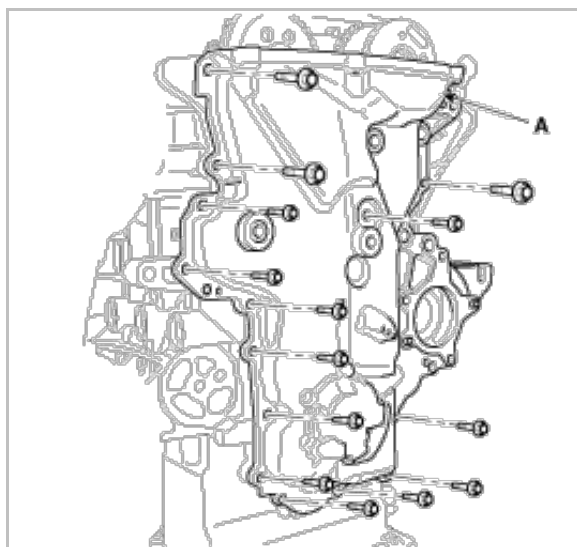
**Tightening torque :**

12mm bolts :

18.6 ~ 23.5 N.m (1.9 ~ 2.4 kgf.m, 13.7 ~ 17.4 lb-ft)

10mm bolts :

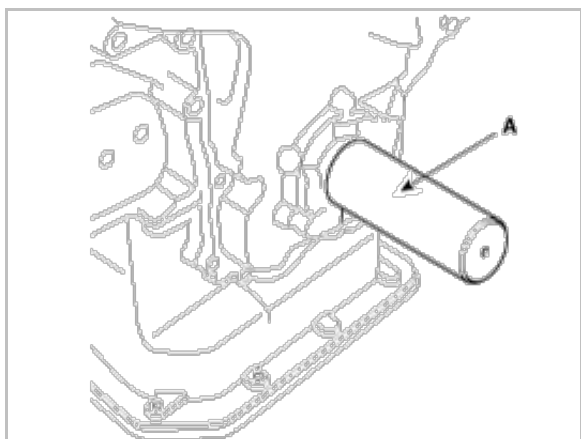
9.8 ~ 11.8 Nm (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)



**CAUTION**

After the installation, do not crank engine or apply pressure on the cover for half an hour.

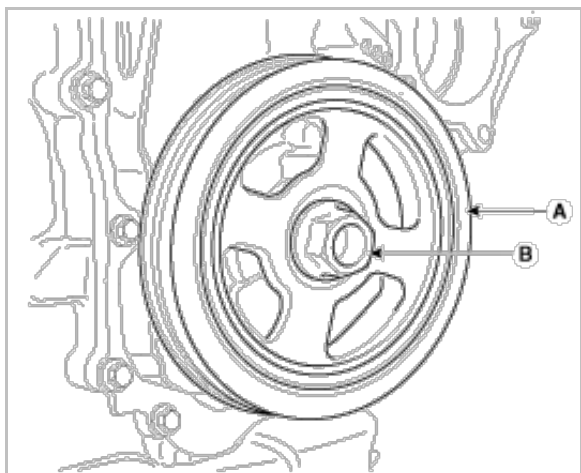
8. Using the SST(09455-21200), reassemble the timing chain cover oil seal (A).



9. Install the crankshaft pulley (A).

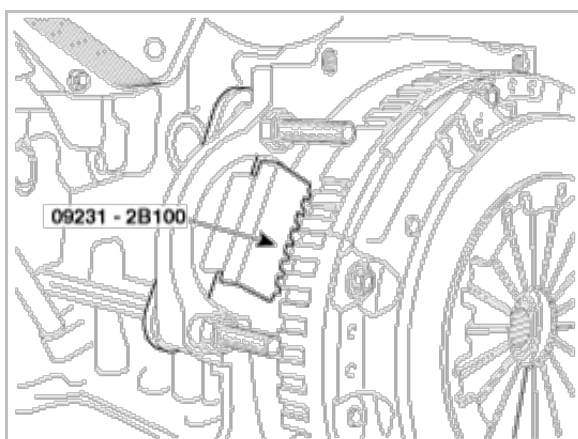
**Tightening torque :**

127.5 ~ 137.3 N.m (13.0 ~ 14.0 kgf.m, 94.0 ~ 101.3 lb-ft)

**NOTE**

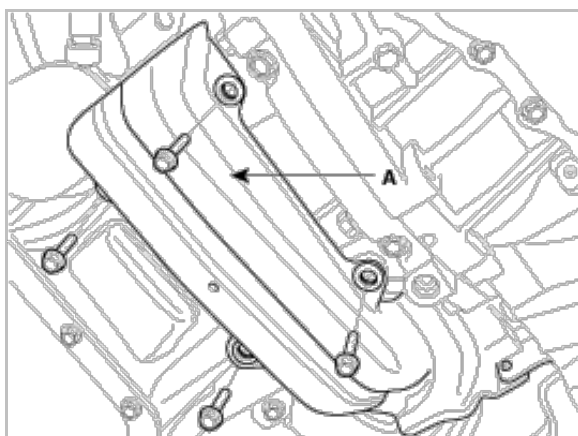
There are two methods to hold the ring gear when installing or removing the crankshaft damper pulley.

- Install the SST (09231-2B100) to hold the ring gear after removing the starter.

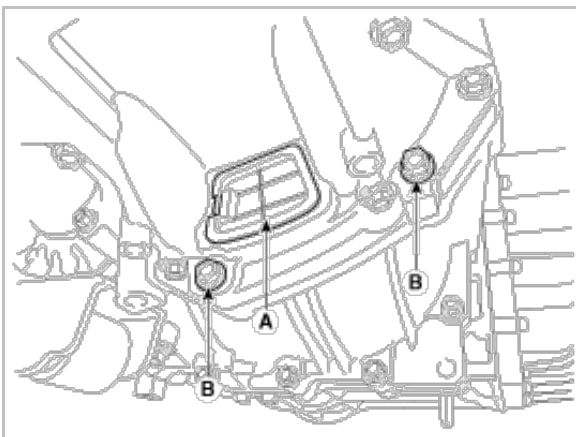


- Install the SST (09231-3D100) to hold the ring gear after removing the dust cover.

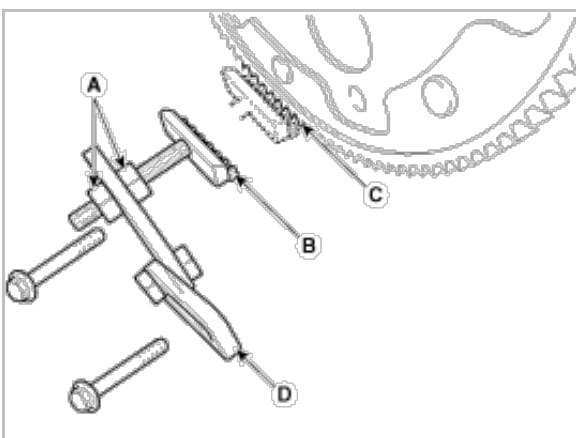
1. Remove the bracket (A).



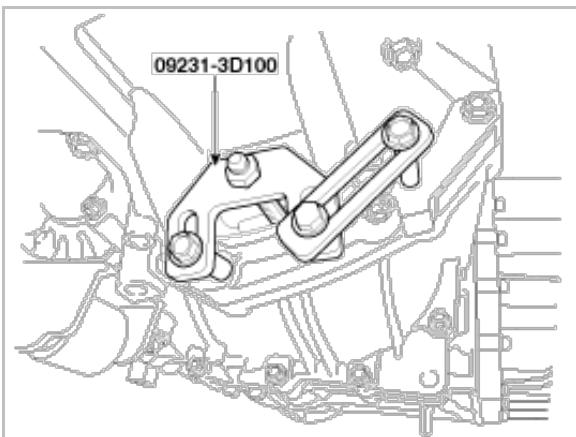
2. Remove the dust cover (A) on the bottom of the ladder frame and unfasten the transaxle mounting bolt (B).



3. Adjust the length of the holder nuts (A) so that the front plate of the holder (B) puts in the ring gear (C) teeth.
4. Adjust the angle of the links (D) so that the bolt 70mm (2.7559in.) can be fastened to the original mounted hole.

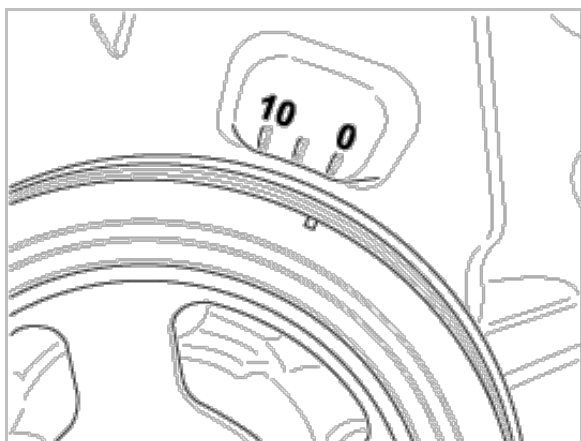


5. Install the SST (09231-3D100) using the mounting bolts and spacers. Tighten the bolts and nuts of the holder and links securely.



#### NOTE

When installing the pulley, the groove on the pulley should be positioned outside.



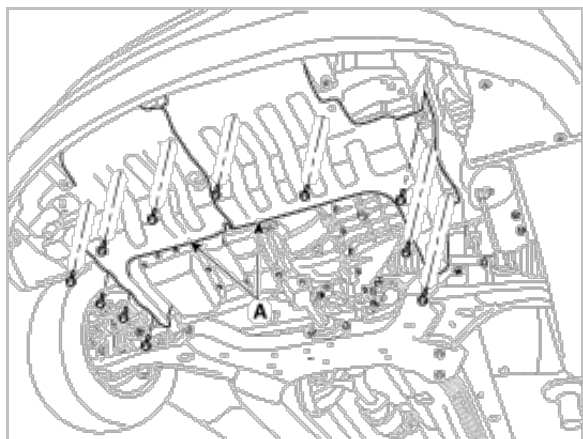
10. Install the under covers (A).

---

**Tightening torque :**

8.8 ~ 10.8 N.m (0.9 ~ 1.1 kgf.m, 6.5 ~ 8.0 lb-ft)

---



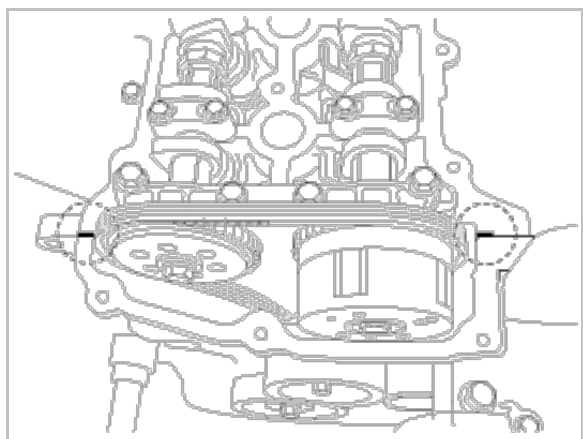
11. Install the front right wheel and tire.

12. Before installing the cylinder head cover, remove oil, dust or hardened sealant from the timing chain cover and the cylinder head upper surface.
13. After applying the liquid gasket, THREE BOND 1217H or LOCTITE 5900H on the cylinder head cover, reassemble the cover within five minutes.

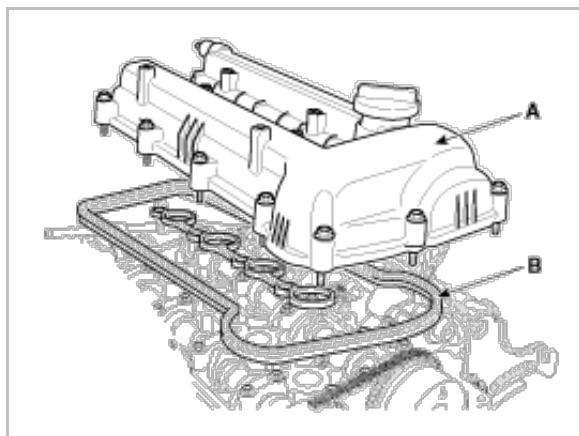
---

**Width : 2.0 ~ 2.5mm(0.0787~0.0984in.)**

---



14. Install the cylinder head cover (A) with a new gasket (B).


**CAUTION**

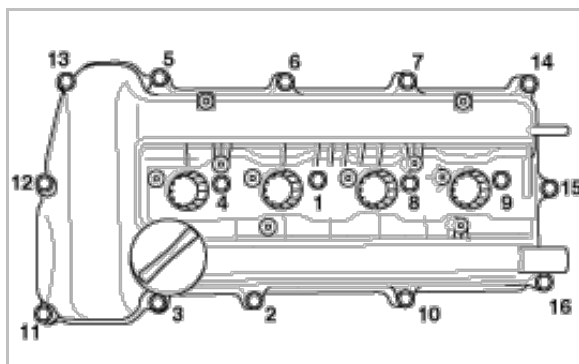
Do not reuse the disassembled gasket.

15. Tighten the cylinder head cover bolts (A) with the order and steps.

**Tightening torque :**

1st step: 3.9 ~ 5.9 N.m (0.4 ~ 0.6 kgf.m, 2.9 ~ 4.3 lb-ft)

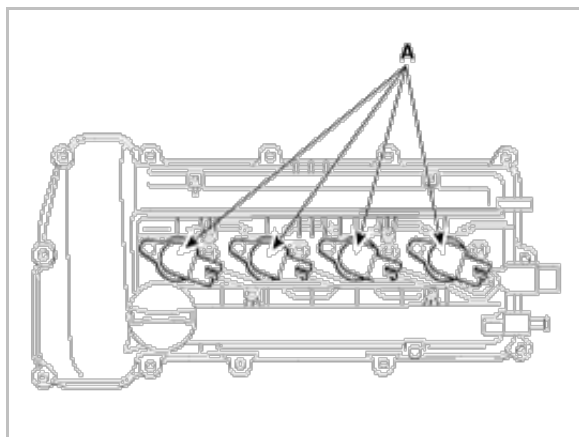
2nd step: 7.8 ~ 9.8 N.m (0.8 ~ 1.0 kgf.m, 5.8 ~ 7.2 lb-ft)



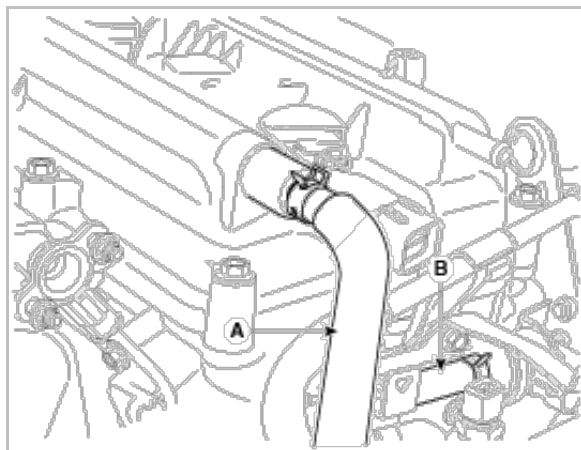
16. Install the ignition coils (A).

**Tightening torque :**

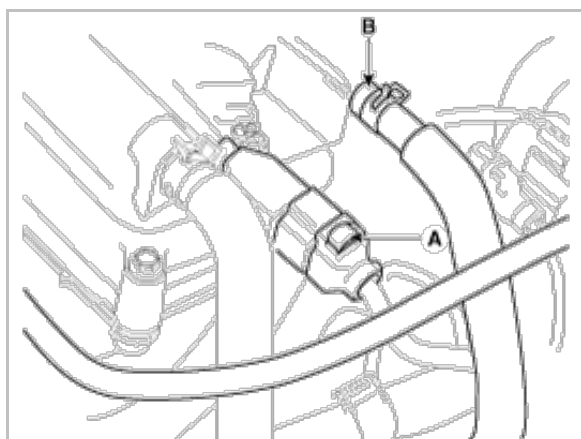
9.8 ~ 11.8 N.m (1.0 ~ 1.2 kgf.m, 7.2 ~ 8.7 lb-ft)



17. Install the positive crankcase ventilation(PCV) hose (A) and the positive and PCSV hose (B).



18. Connect the ignition coil connector (A) and the breather hose (B).



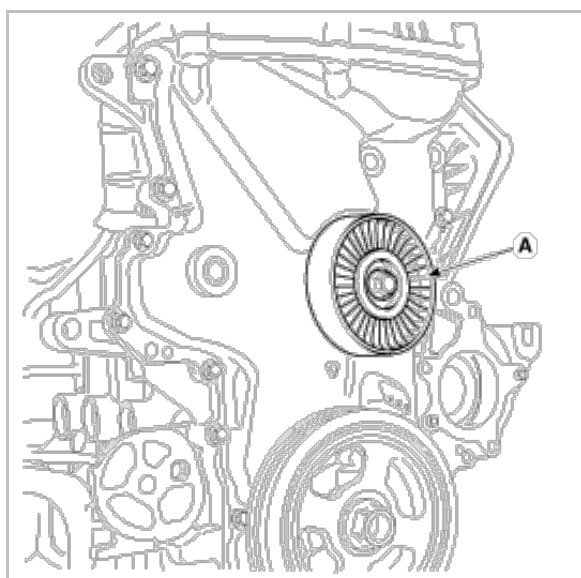
19. Install the drive belt idler (A).

---

**Tightening torque :**

42.2 ~ 53.9 N.m (4.3 ~ 5.5 kgf.m, 31.1 ~ 39.8 lb-ft)

---



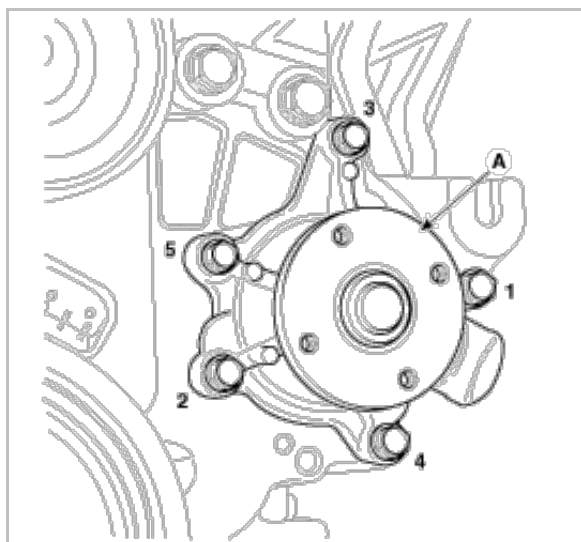
20. Install the water pump (A) with a gasket.  
Tighten bolts with the order below.

---

**Tightening torque :**

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

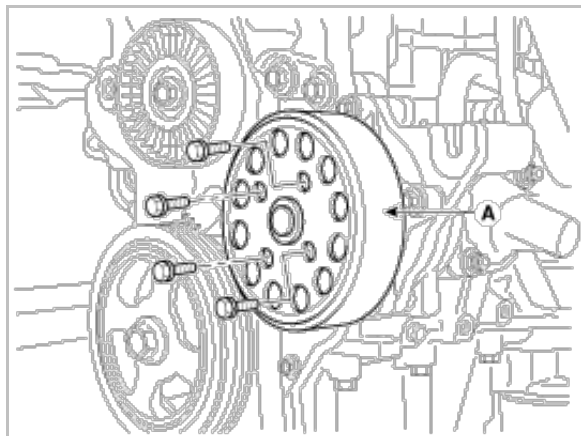
---



21. Install the water pump pulley (A).

**Tightening torque :**

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



**CAUTION**

Tighten the bolts diagonally.

22. Install the engine support bracket (A).

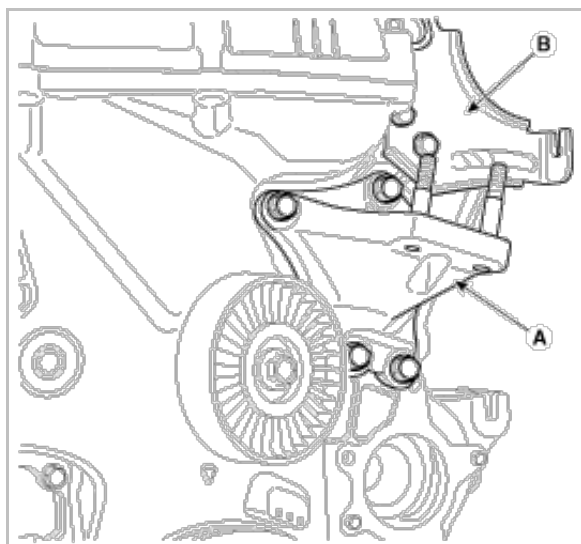
**Tightening torque :**

29.4 ~ 41.2 N.m (3.0 ~ 4.2 kgf.m, 21.7 ~ 30.4 lb-ft)

23. Install the alternator bracket (B).

**Tightening torque :**

19.6 ~ 26.5 N.m (2.0 ~ 2.7 kgf.m, 14.5 ~ 19.5 lb-ft)



24. Install the engine mounting bracket (A).

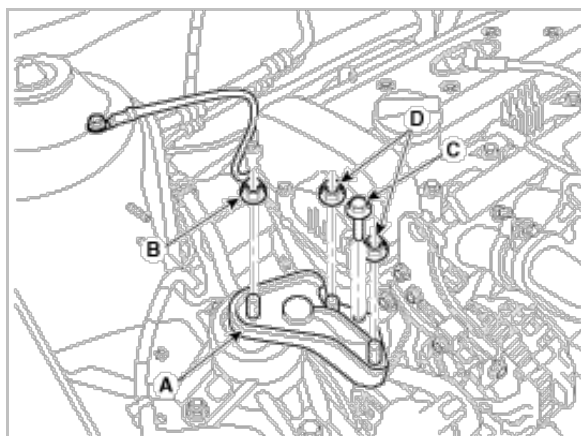
---

**Tightening torque :**

Nut(B): 63.7 ~ 83.4 N.m (6.5 ~ 8.5 kgf.m, 47.0 ~ 61.5 lb-ft)

Bolt(C) and Nuts(D) : 49.0 ~ 63.7 N.m (5.0 ~ 6.5 kgf.m, 36.1 ~ 47.0 lb-ft)

---



25. Install the alternator (A) and the bracket (B). (HPS Type)

---

**Tightening torque :**

12mm bolt :

19.6 ~ 26.5 N.m (2.0 ~ 2.7 kgf.m, 14.5 ~ 19.5 lb-ft)

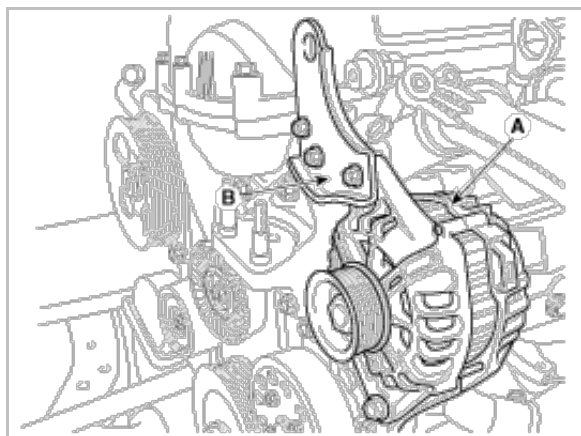
14mm bolt :

29.4 ~ 41.2 N.m (3.0 ~ 4.2 kgf.m, 21.7 ~ 30.4 lb-ft)

bracket (B) :

19.6 ~ 26.5 N.m (2.0 ~ 2.7 kgf.m, 14.5 ~ 19.5 lb-ft)

---



26. Install the alternator (A). (MDPS Type)

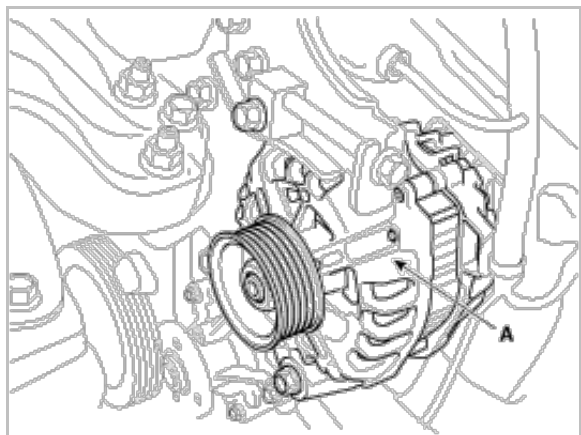
**Tightening torque :**

12mm bolt :

19.6 ~ 26.5 N.m (2.0 ~ 2.7 kgf.m, 14.5 ~ 19.5 lb-ft)

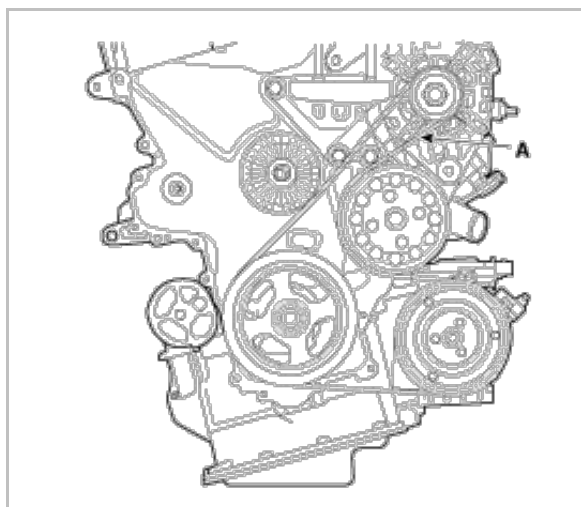
14mm bolt :

29.4 ~ 41.2 N.m (3.0 ~ 4.2 kgf.m, 21.7 ~ 30.4 lb-ft)

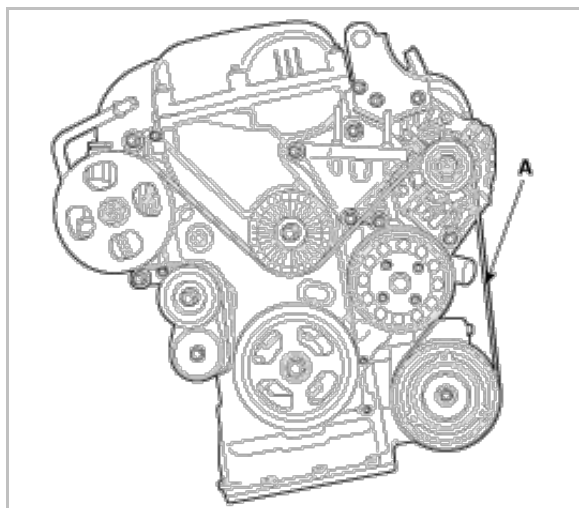


27. Install the drive belt (A).

**[MDPS Type]**

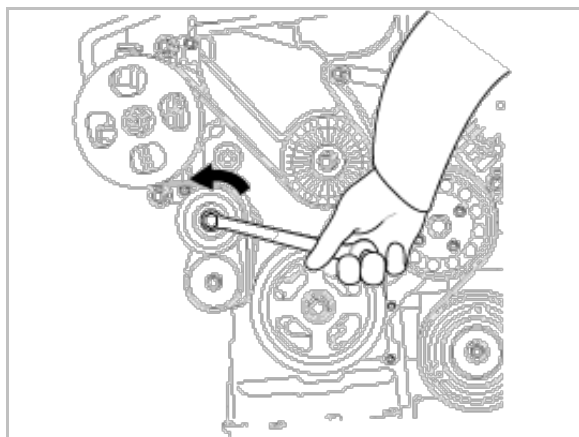


**[HPS Type]**



#### NOTE

Install drive belt: crankshaft pulley → water pump pulley → alternator pulley → power steering pulley → auto-tensioner idle pulley.



#### NOTE

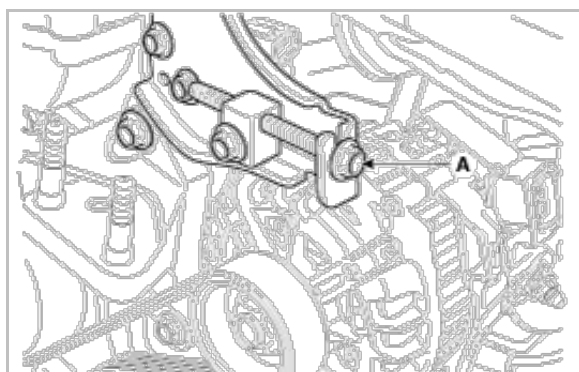
Put the drive belt to the idle pulley by rotating idle belt of the auto-tensioner in the counter-clockwise, release the auto-tensioner pulley slowly.

28. Adjust tension by tightening the alternator tension adjust bolt (A). (Refer to Charging system in EE Group).

#### Tension

New belt: 882.6 ~ 980.7N (90 ~ 100kg, 198.4 ~ 220.5lb)

Used belt: 637.4 ~ 735.5N (65 ~ 75kg, 143.3 ~ 165.3lb)





29. Connect the battery negative terminal.

---

(-) terminal (without battery sensor): 7.8 ~ 9.8N.m (0.8 ~ 1.0kgf.m, 5.8 ~ 7.2lb-ft)

(-) terminal (with battery sensor): 4.0 ~ 6.0N.m (0.4 ~ 0.6kgf.m, 3.0 ~ 4.4lb-ft)

---