



## Removal

Engine removal is not required for this procedure.

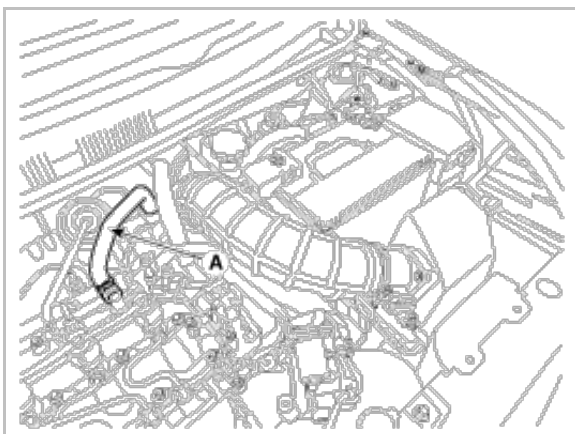
### CAUTION

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

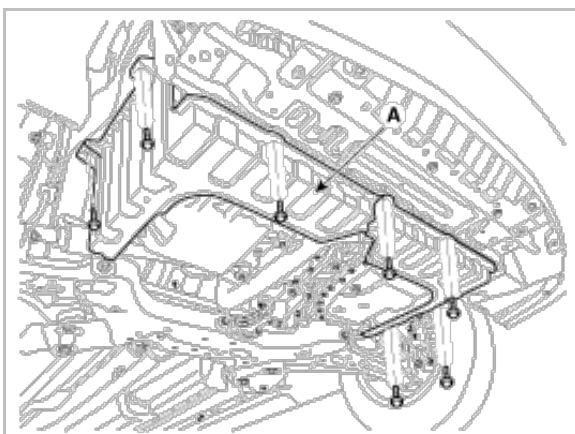
### NOTE

Mark all wiring and hoses to avoid misconnection.

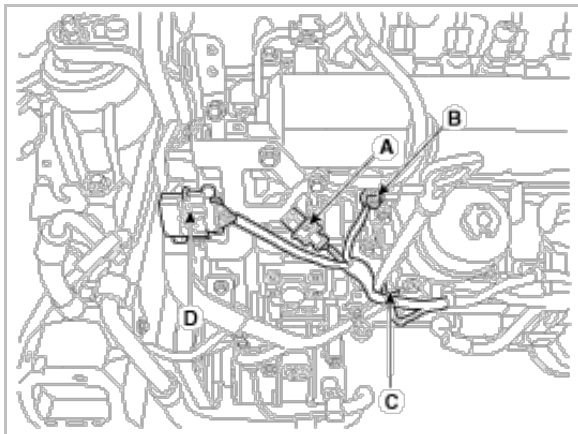
1. Remove the engine cover.
2. Disconnect the battery negative terminal.
3. Remove the breather hose (A).



4. Remove the RH front tire.
5. Remove the under cover (A).



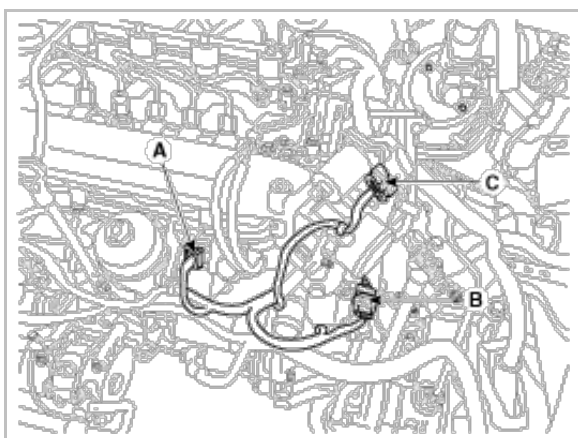
6. Disconnect the engine wiring harness connectors and remove the wiring harness protectors.
  - (1) Fuel pressure regulator valve connector (A)
  - (2) Fuel temperature sensor connector (B)
  - (3) Oil pressure switch connector (C)
  - (4) Variable swirl control actuator connector (D)



(5) VGT control solenoid valve connector (A)

(6) Crankshaft position sensor (CKPS) connector (B)

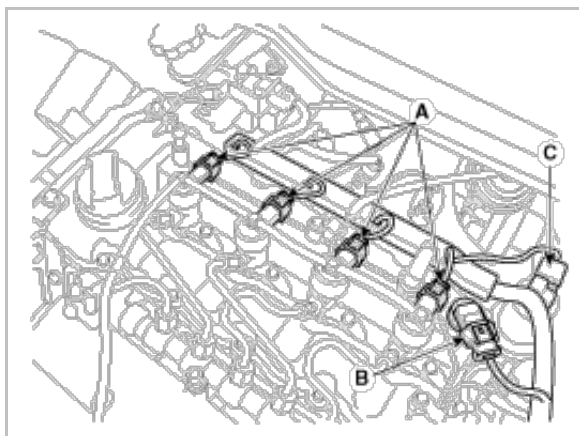
(7) Air control valve connector (C)



(8) Injector connectors (A)

(9) Cam position sensor (CMPS) connector (B)

(10) Electric EGR control valve connector (C)

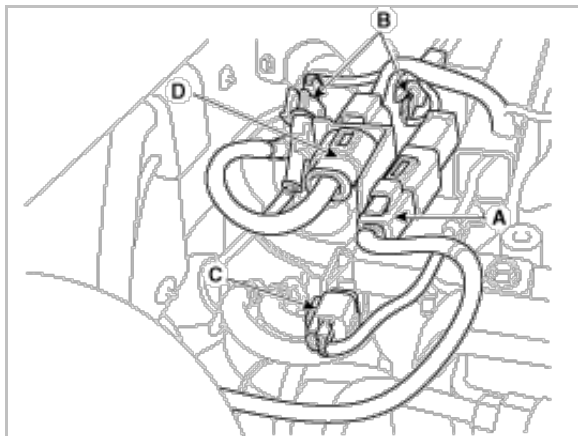


(11) Glow plug connector (A)

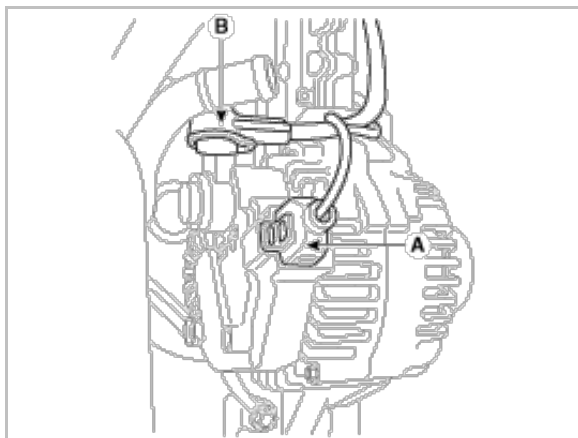
(12) Exhaust gas temperature sensor (#1, #2) connectors (B)

(13) Difference pressure sensor connector (C)

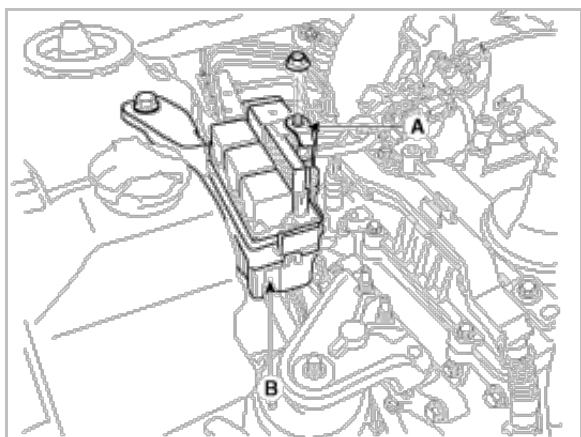
(14) Lambda sensor connector (D)



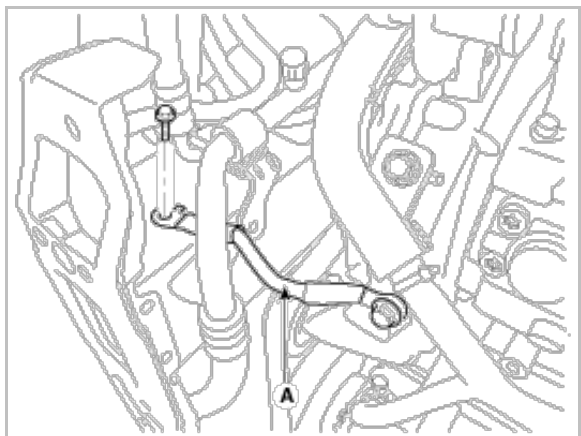
(15) Alternator connector (A) and the cable (B).



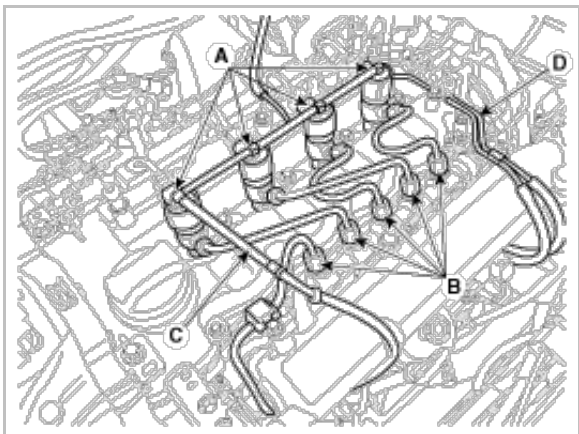
7. Disconnect the wiring (A) and then remove the fuse/relay box (B).



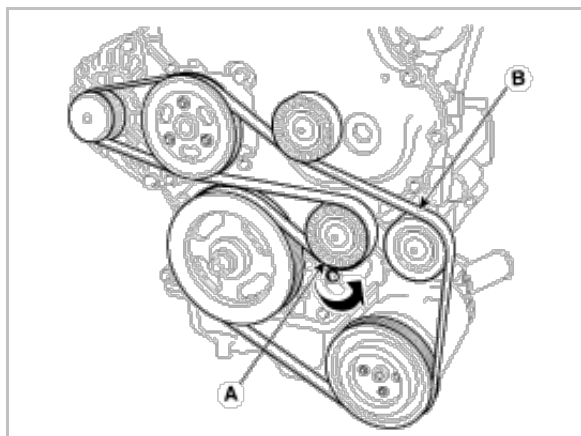
8. Disconnect the engine ground line (A).



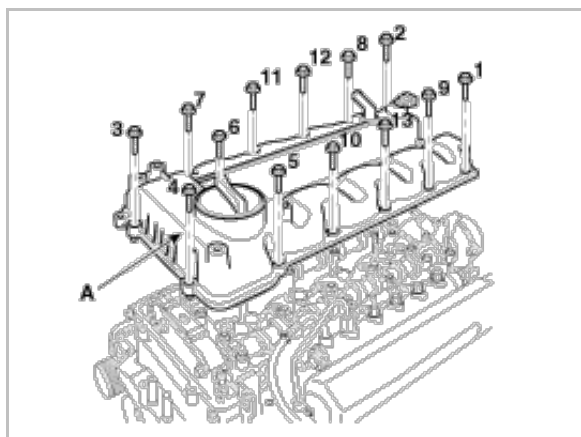
9. Remove the injectors (A), the high pressure pipes (B), the fuel return hose (C) and the vacuum hoses and pipes (D).  
(Refer to FL group)



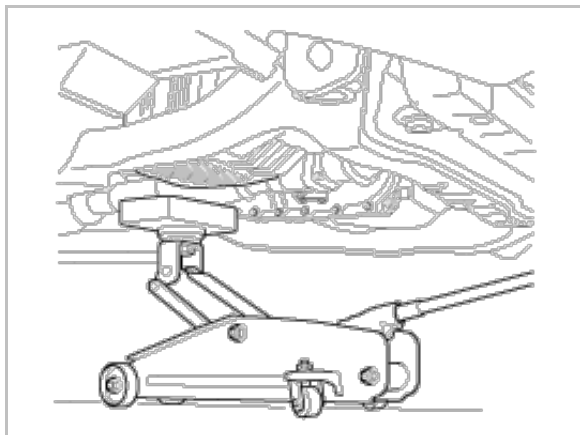
10. Using the hexagon wrench, turn the tensioner (A) counterclockwise and loosen. Then remove the drive belt (B).



11. Remove the cylinder head cover (A).

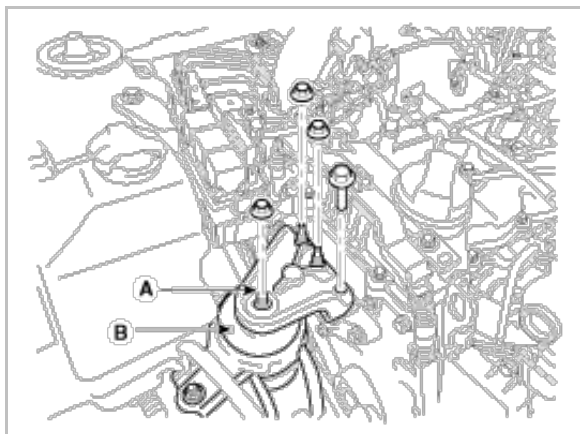


12. Remove the engine mounting support bracket.  
(1) Set the jack to the engine oil pan.

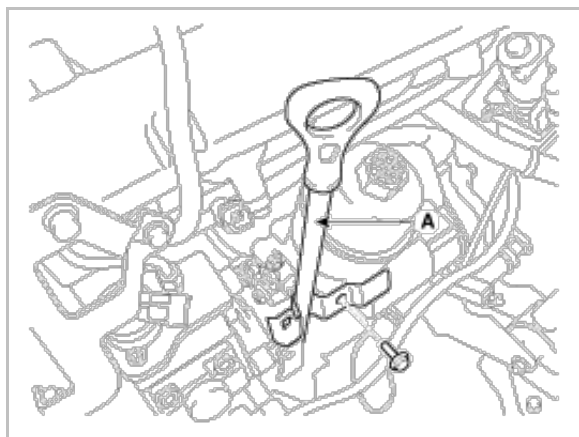


(2) Remove the engine mounting support bracket (A).

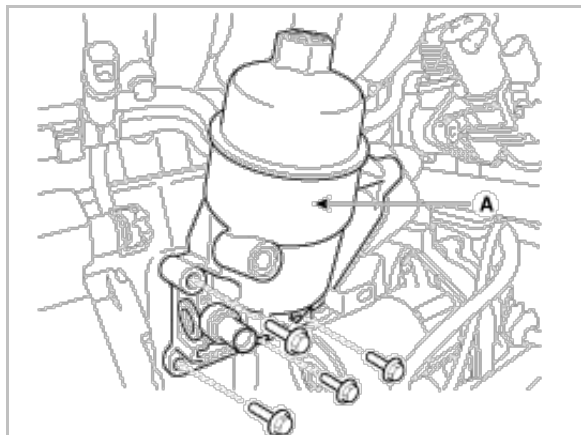
(3) Remove the engine mounting insulator (B).



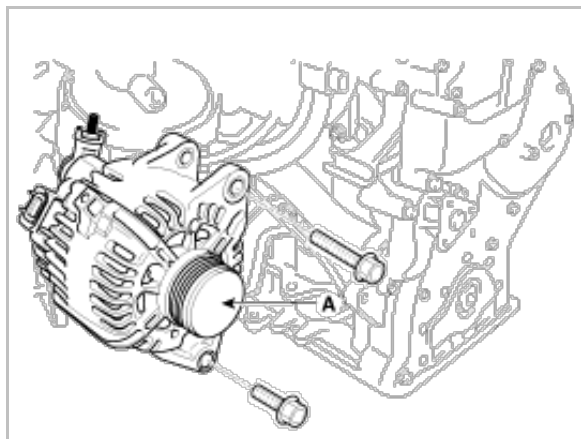
13. Remove the oil level gauge guide (A).



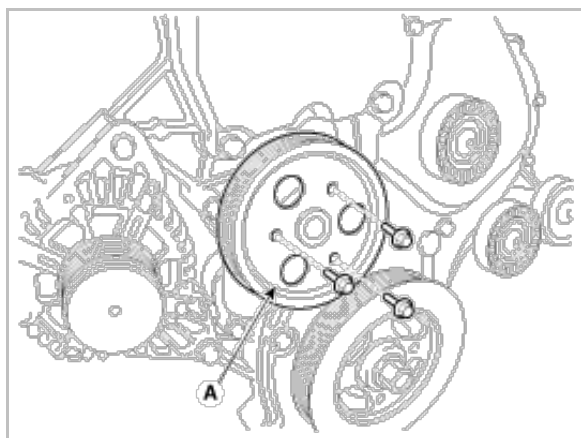
14. Drain the engine oil and then remove the oil filter&cooler assembly (A). (Refer to Lubrication system in this group)



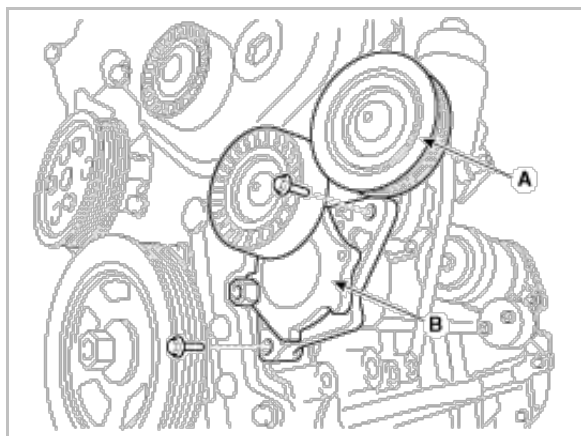
15. Remove the alternator (A). (Refer to Alternator in EE group).



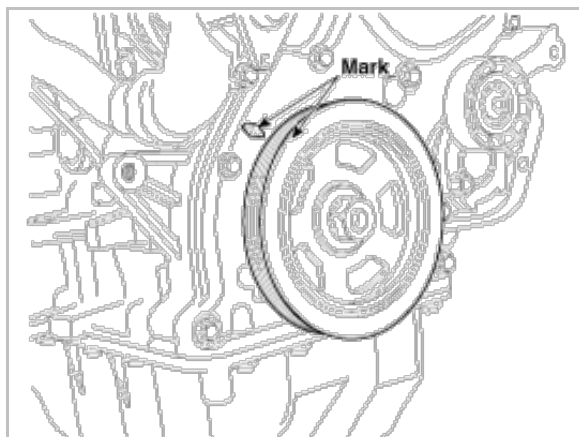
16. Remove the water pump pulley (A).



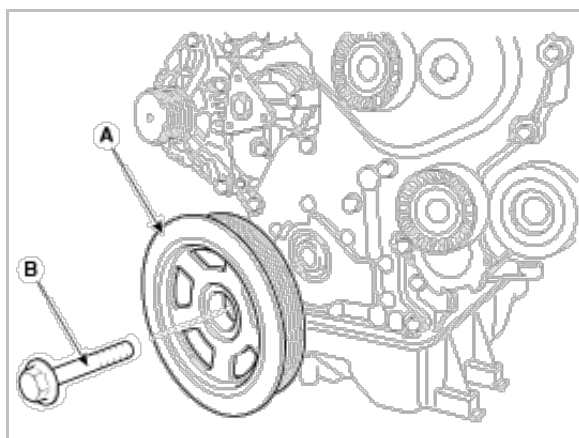
17. Remove the idler (A) and the drive belt tensioner (B).



18. Turn the crankshaft pulley, and align its groove with timing mark "T" of the timing chain cover. (No.1 cylinder compression TDC position)

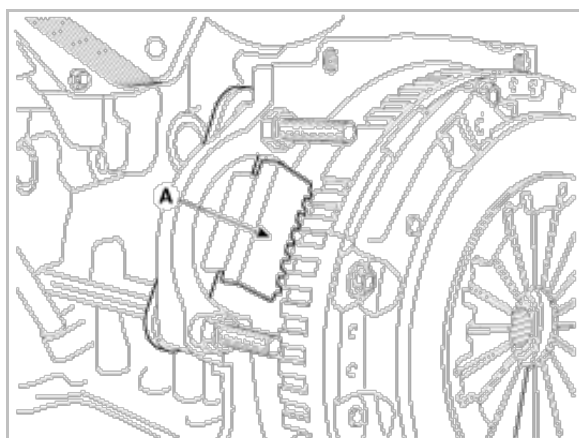


19. Remove the crankshaft pulley bolt (B) and crankshaft pulley (A).

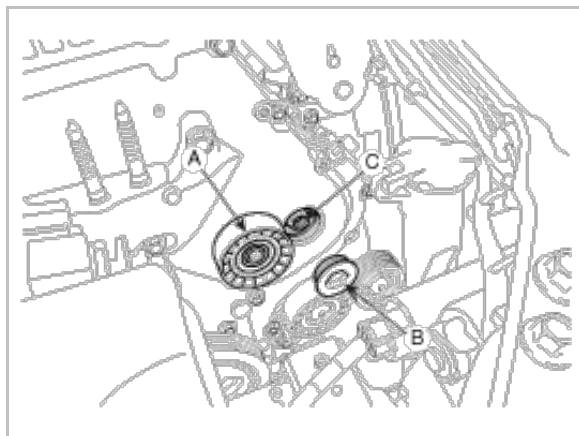


#### NOTE

Use the SST(ring gear stopper, 09231-2B100)(A) to remove the crankshaft pulley bolt.



20. Remove the idler (A) and the timing chain cover plug (B).
21. Remove the high pressure fuel pump sprocket nut (C) after fixing the crank shaft.

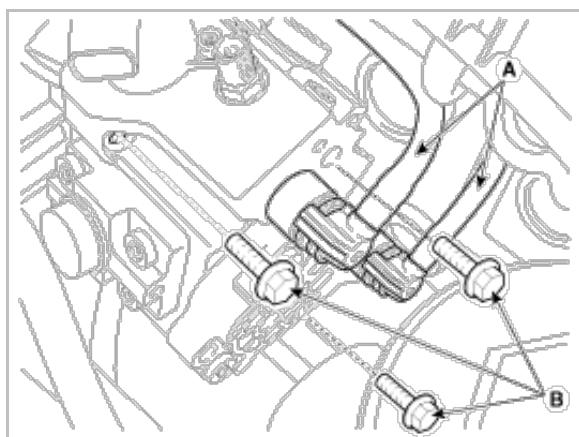


#### NOTE

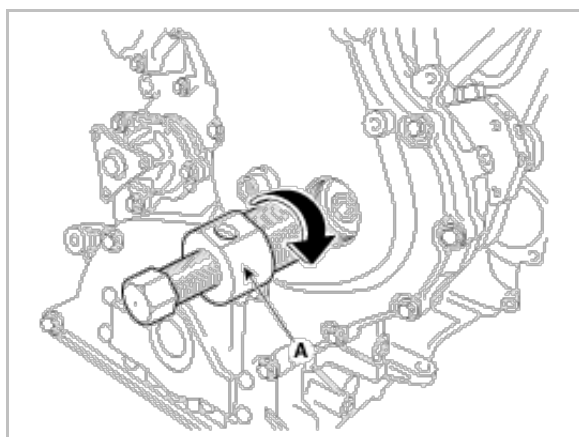
- Use the SST (ring gear stopper, 09231-2B100) to remove the high pressure pump sprocket nut.
- Replace O-ring of plug (B) with a new one when reinstalling the plug.

22. Disconnect the fuel tubes (A).

23. Unscrew the three high pressure fuel pump mounting bolts (B).



24. Install the high pressure fuel pump sprocket stopper (A) (SST No.: 09331-2A010) with rotating it clockwise.

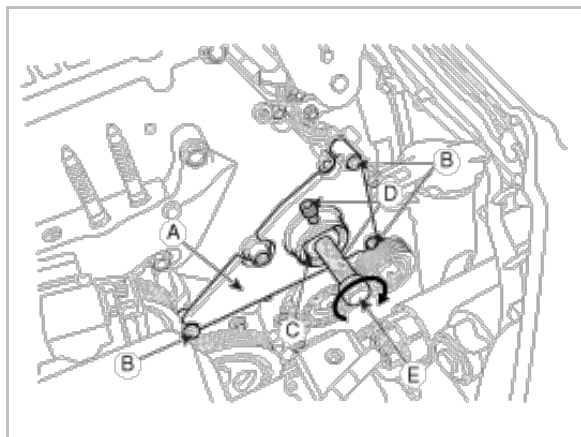


25. Install the high pressure fuel pump remover (SST No.:09331-2A010) (A) with three mounting bolts (B).

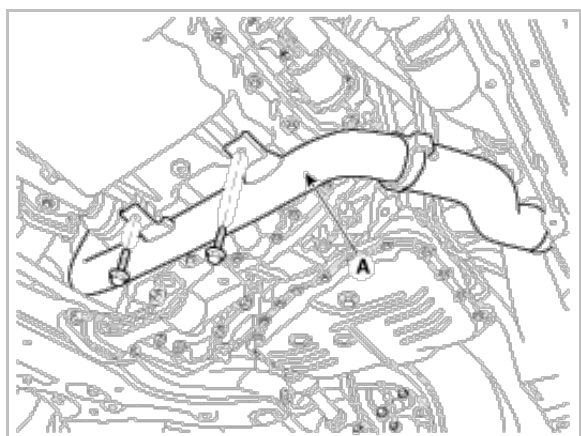
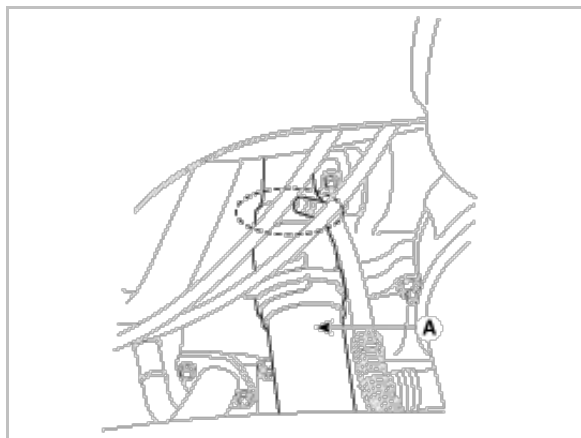
26. Fix the high pressure fuel pump remover (SST No.:09331-2A010) (A) and sprocket stopper (C) with two fixing bolts (D).

27. Rotate the bolt (E) of the high pressure fuel pump remover (SST No.:09331-2A010) (A) clockwise till the high pressure fuel pump is pushed out.

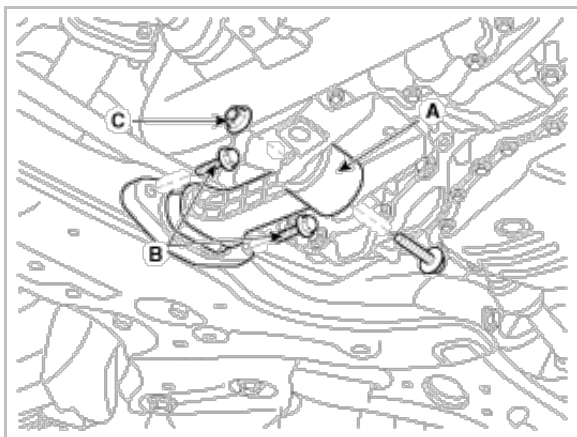




28. Remove the A/C compressor. (Refer to A/C compressor in HA group)
29. Fix the engine to the engine support fixture.
  - (1) Remove the hood assembly. (Refer to BD group)
  - (2) Remove the cowl top cover or wiper motor. (Refer to BE group)
  - (3) Remove the cowl complete assembly pannel. (Refer to AT or MT group)
  - (4) Install the engine support fixture (Support SST No.: 09200-2S000, Beam SST No.: 09200-38001) on the engine room.
  - (5) Fix the engine to the engine support fixture using the engine hanger.
  - (6) Remove the jack from the engine oil pan.
30. Remove the intercooler hose and pipe (A).



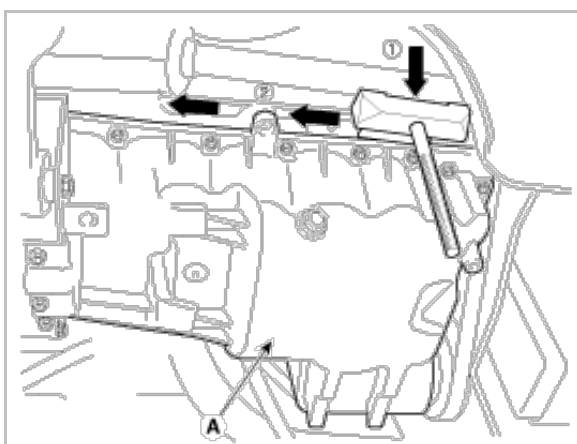
31. Remove the roll rod bracket (A).



32. Remove the oil pan (A).

#### NOTE

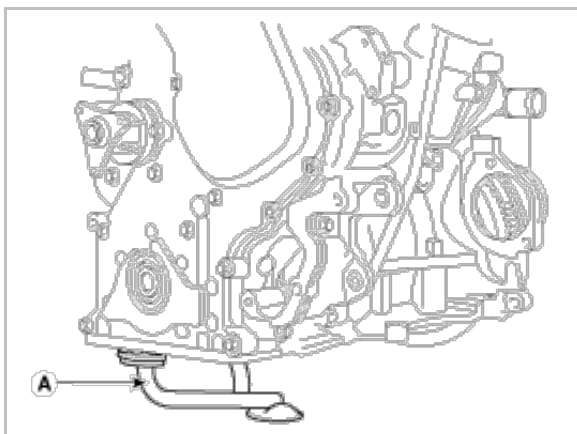
When removing the oil pan, use the SST(09215-3C000) in order not to damage the surface between the badplate and the oil pan.



#### CAUTION

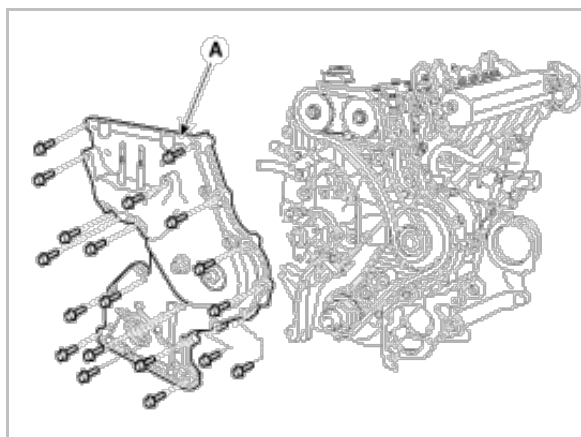
- Insert the SST between the oil pan and the badplate by tapping it with a plastic hammer in the direction of ① arrow.
- After tapping the SST with a plastic hammer along the direction of ② arrow around more than 2/3 edge of the oil pan, remove it from the badplate.
- Do not turn over the SST abruptly without tapping. It be result in damage of the SST.

33. Remove the oil strainer (A).



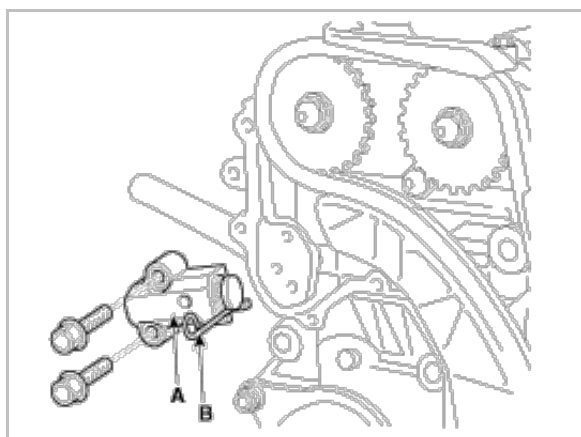
34. Remove the timing chain cover (A).

## 34. Remove the timing chain cover (A)

**NOTE**

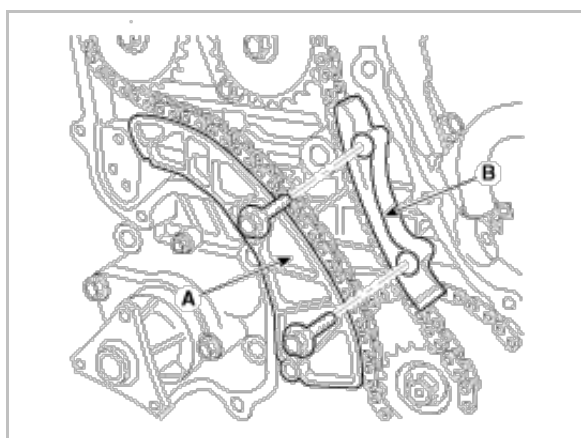
Remove thoroughly sealant and oil etc left at the sealing surface after remove the chain cover and oil pan. (If any impurities are left at the sealing face, oil may leak after reassembly even with the sealant application.)

## 35. Remove the timing chain "C" auto tensioner(A).

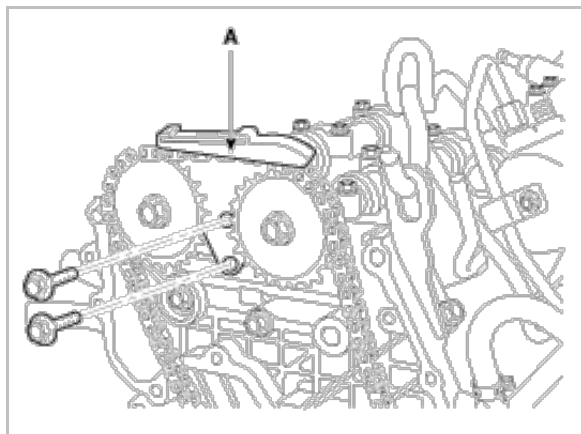
**NOTE**

Before removing auto-tensioner, install a set pin (B) (2.5 mm steel wire) after compressing the tensioner.

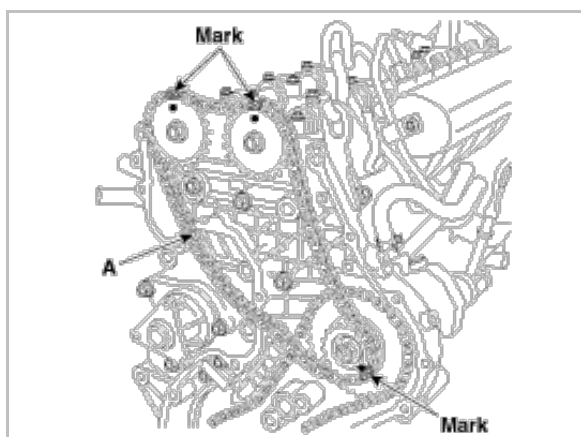
## 36. Remove the timing chain "C" lever (A) and the timing chain guide "1" (B).



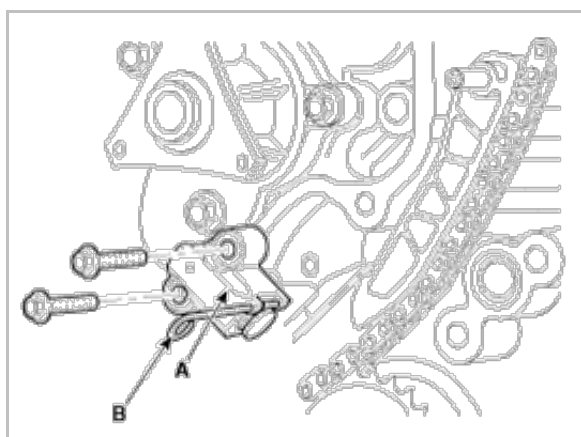
## 37. Remove the timing chain guide "2" (A).



38. Remove the timing chain "C" (A).



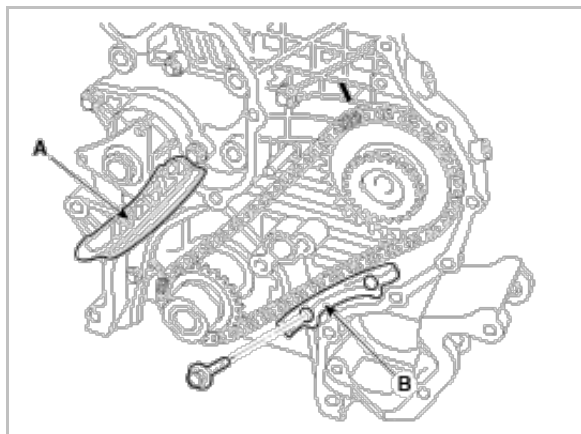
39. Remove the timing chain "A" auto tensioner (A).



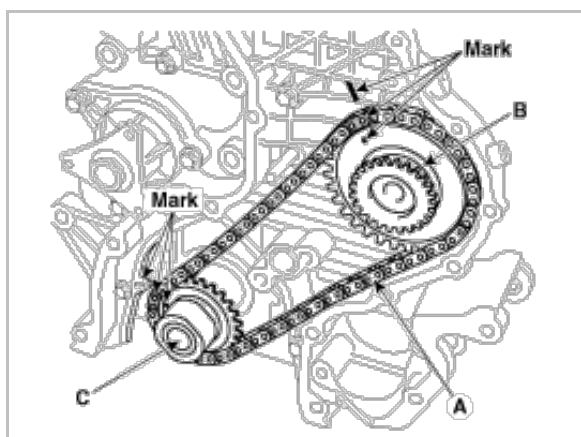
#### NOTE

Before removing auto-tensioner, install a set pin (B) (2.5 mm steel wire) after compressing the tensioner.

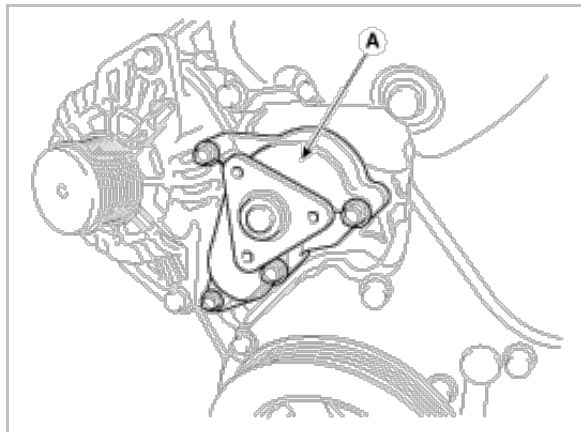
40. Remove timing chain "A" lever (A) and the timing chain guide "1" (B).



41. Remove the timing chain "A" (A) with high pressure pump sprocket (B) and crankshaft sprocket (C).



42. Remove the water pump (A).

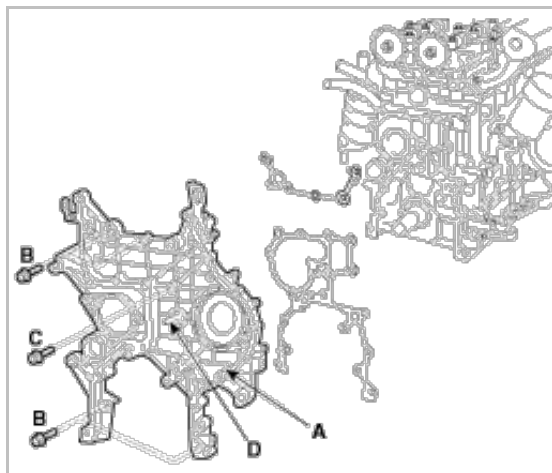


43. Take off the hook of the engine support fixture from the front engine hanger.

(1) Set the jack to the bed plate.

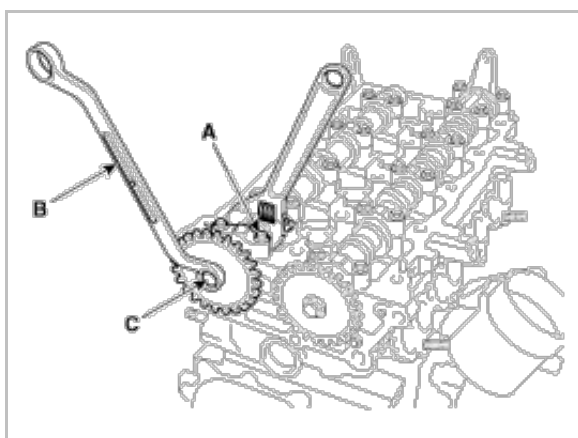
(2) Take off the hook of the engine support fixture from the front engine hanger.

44. Remove the timing chain case (A).



45. Remove the camshaft sprocket.

- (1) Hold the portion (A) of the camshaft with a hexagonal wrench, and remove the bolt (C) with a wrench (B) and remove the camshaft sprocket.



**CAUTION**

Be careful not to damage the cylinder head and valve lifter with the wrench.

## Installation

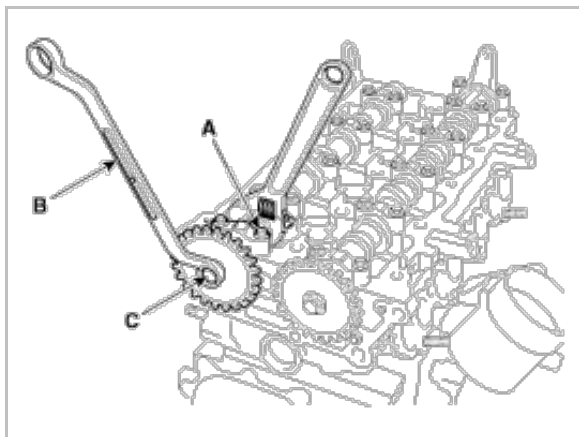
1. Install the camshaft sprocket and tighten the bolt to the specified torque.

- (1) Temporarily install the camshaft sprocket bolt (C).

- (2) Hold the portion (A) of the camshaft with a hexagonal wrench, and tighten the bolt (C) with a wrench (B).

**Tightening torque :**

68.6 ~ 73.5N.m (7.0 ~ 7.5kgf.m, 50.6 ~ 54.2lb-ft)



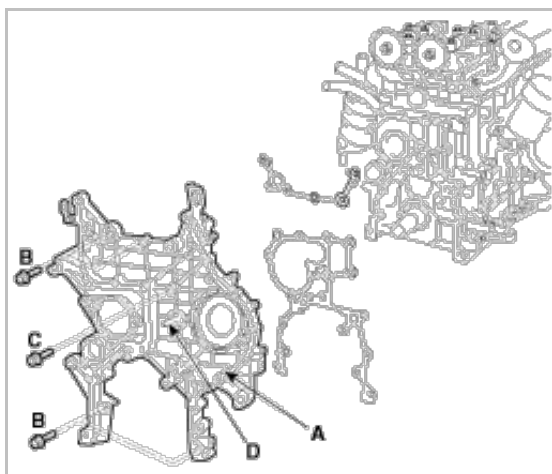
2. Install the timing chain case (A) with new gasket.

**Tightening torque :**

Bolt (B) : 24.5 ~ 30.4N.m (2.5 ~ 3.1kgf.m, 18.1 ~ 22.4lb-ft)

Bolt (C) : 18.6 ~ 27.5N.m (1.9 ~ 2.8kgf.m, 13.7 ~ 20.3lb-ft)

Bolt (D) : 25.5 ~ 34.3N.m (2.6 ~ 3.5kgf.m, 18.8 ~ 25.3lb-ft)



**CAUTION**

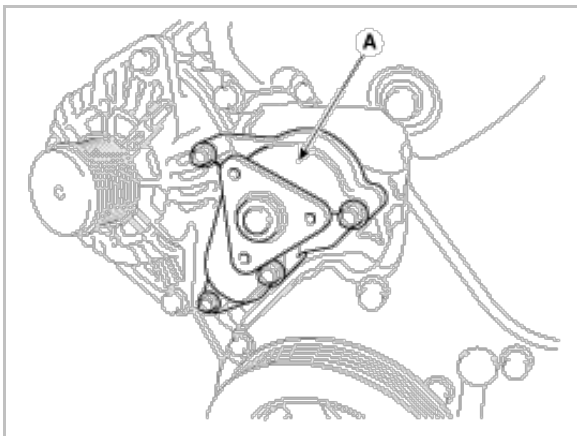
- Be careful not to press gasket protruded from lower face of chain case and bedplate after assembling lower gasket.

3. Replace the hook of the engine support fixture to the front engine hanger.  
 (1) Replace the hook of the engine support fixture to the front engine hanger.  
 (2) Remove the jack from the bed plate.
4. Install the water pump (A).

**Tightening torque :**

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

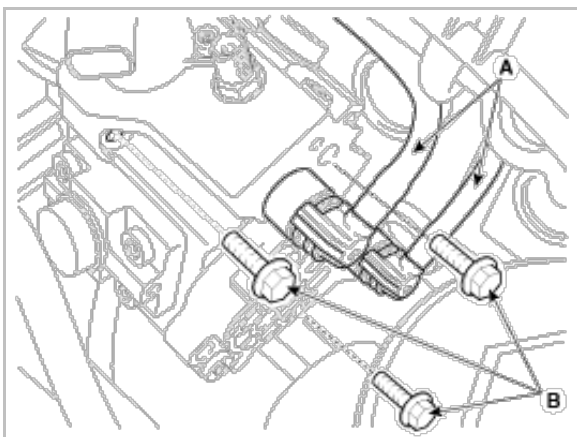




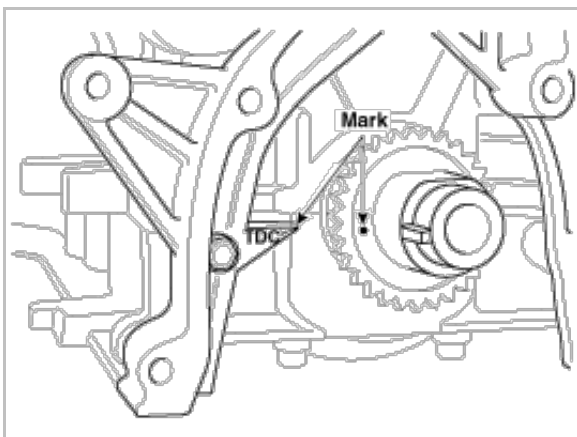
5. Install the high pressure fuel pump (B) and connect the fuel tubes (A).

**Tightening torque :**

19.6 ~ 25.5N.m (2.0 ~ 2.6kgf.m, 14.5 ~ 18.8lb-ft)



6. Set the key of crankshaft sprocket to be aligned with the timing mark of timing chain case. As a result of this, place the piston on No.1 cylinder at the top dead center on compression stroke.

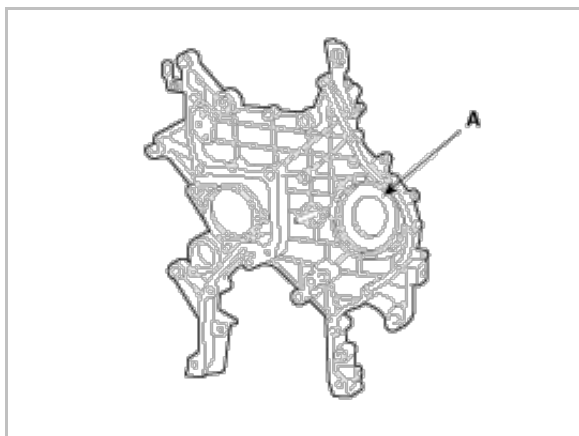


7. After install timing chain "A" with high pressure pump sprocket (B) equipped at the crankshaft sprocket (C), and then install high pressure pump sprocket at the high pressure pump shaft.

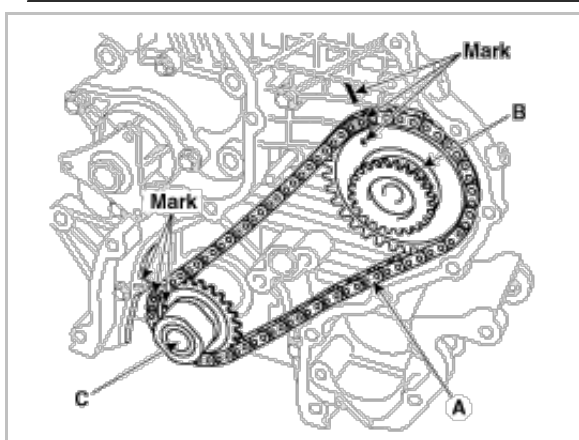
**NOTE**

Apply engine oil to radial face (A) of chain case before assembling high pressure pump sprocket.




**NOTE**

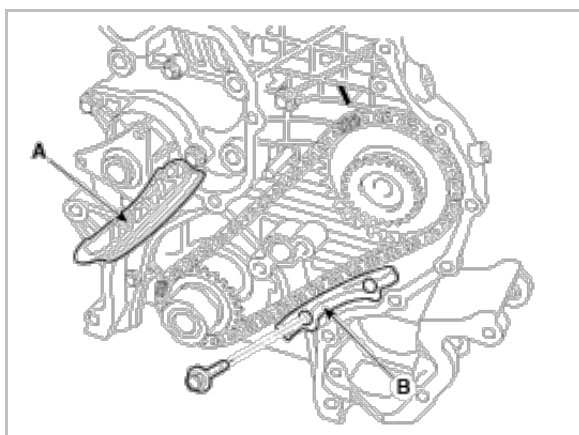
The timing mark of high pressure pump sprocket should be aligned with timing mark on the timing chain case.



8. Pretighten the high pressure fuel pump sprocket nut.
9. Install timing chain "A" lever (A) and the timing chain guide "1" (B).

**Tightening torque :**

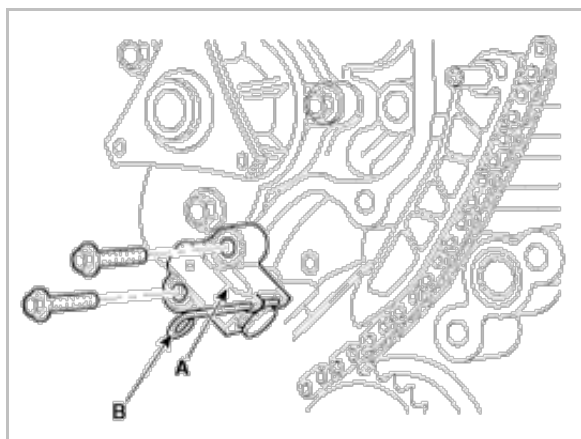
9.8 ~ 11.8N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



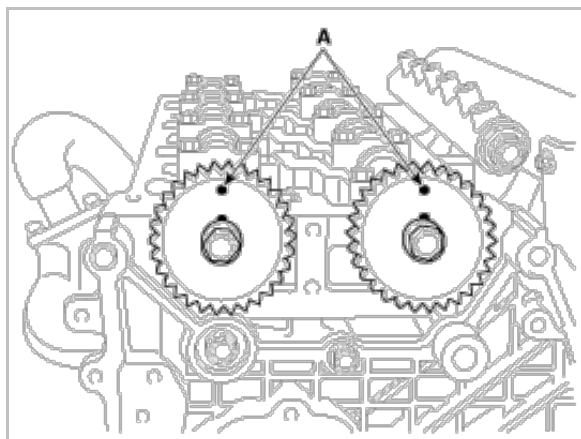
10. Install the timing chain "A" auto tensioner (A) and then remove set pin (B).

**Tightening torque :**

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



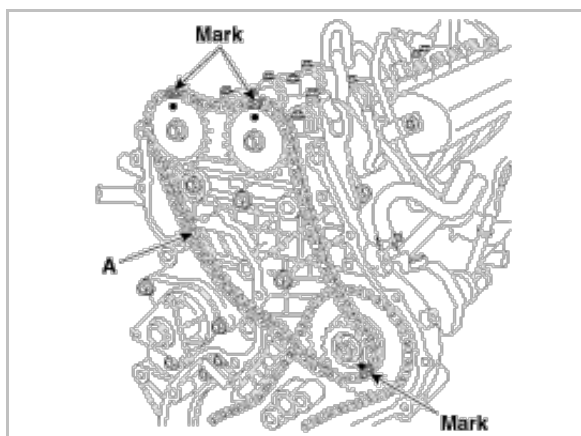
11. Align the timing mark (A) of camshaft sprocket on the vertical center line of crankshaft.



12. Install the timing chain "C" (A) as following procedure. High pressure pump sprocket → LH camshaft sprocket → RH camshaft sprocket

#### NOTE

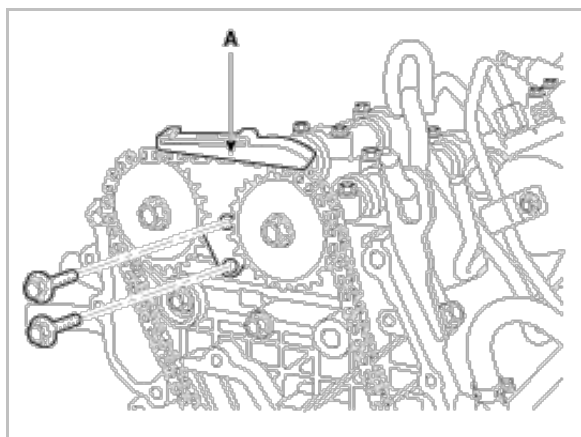
The timing mark of each sprockets should be matched with timing mark (color link) of timing chain at installing timing chain as shown below illustration.



13. Install the timing chain guide "2" (A).

#### Tightening torque :

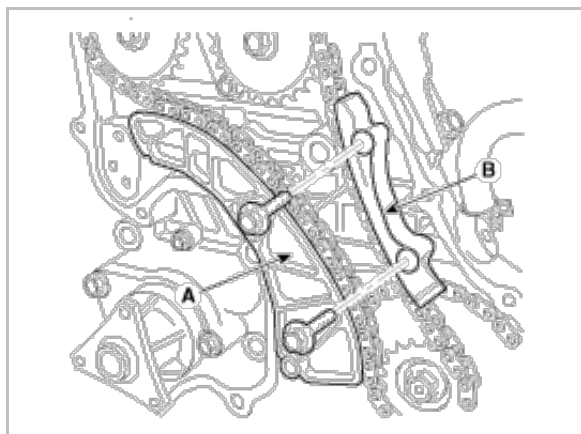
9.8 ~ 13.7N.m (1.0 ~ 1.4kgf.m, 7.2 ~ 10.1lb-ft)



14. Install the timing chain "C" lever (A) and the timing chain guide "1" (B).

**Tightening torque :**

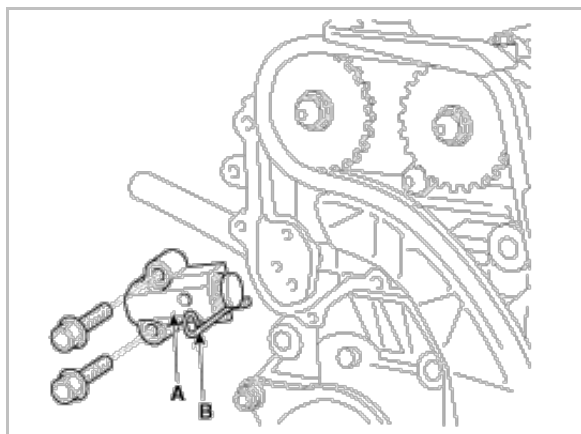
9.8 ~ 11.8N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



15. Install the timing chain "C" auto tensioner (A) and then remove set pin (B).

**Tightening torque :**

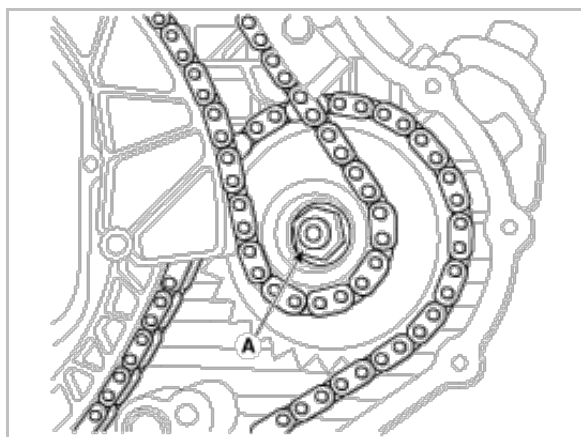
9.8 ~ 11.8N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



16. Tighten the high pressure pump sprocket nut (A) at specified tightening torque.

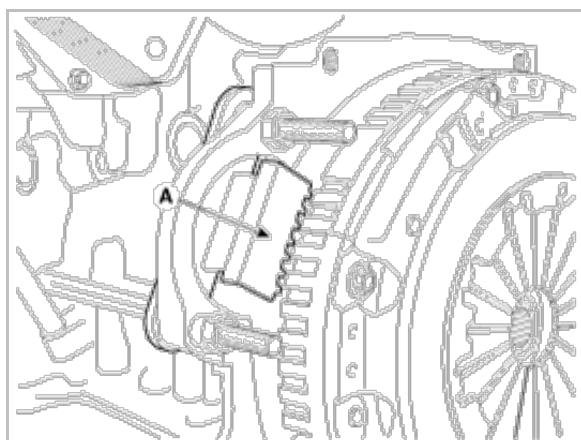
**Tightening torque :**

64.7 ~ 74.5N.m (6.6 ~ 7.6kgf.m, 47.7 ~ 55.0lb-ft)



#### NOTE

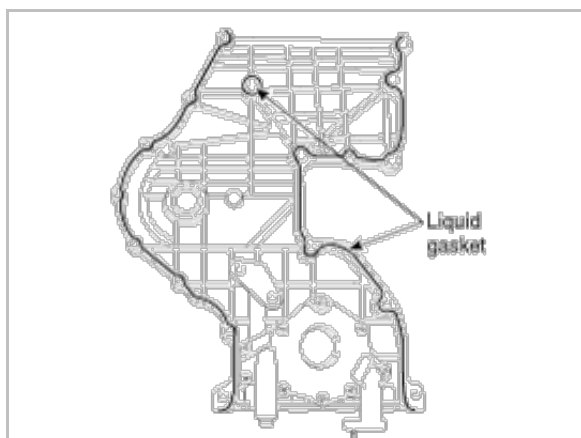
Use the SST(ring gear stopper, 09231-2B100)(A) to tighten the high pressure pump sprocket nut.



17. Apply liquid gasket evenly to the mating surface of timing chain cover.

#### NOTE

- Standard liquid gasket : LOCTITE 5900, LOCTITE 5900H, THREE BOND 1217H
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Assemble the timing chain cover in 5 minutes after applying the liquid gasket.
- Apply liquid gasket in a 3mm wide bead without stopping.



18. Install the timing chain cover (A).

#### Tightening torque :

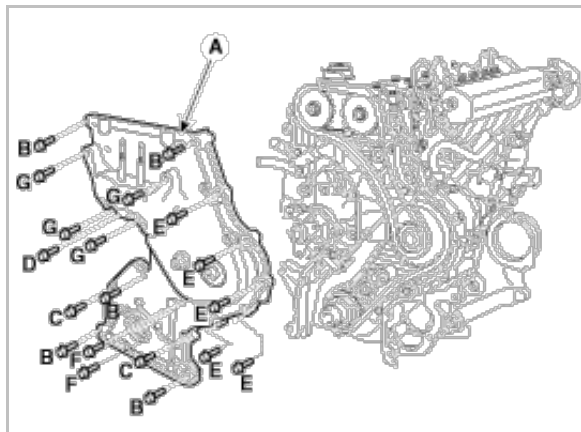
Bolt / B.C.E.V.

Bolt (D, C, F) :

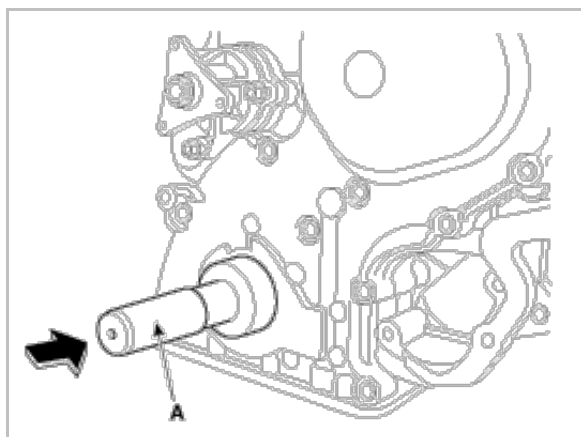
19.6 ~ 26.5N.m (2.0 ~ 2.7kgf.m, 14.5 ~ 19.5lb-ft)

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

Bolt (G) : 42.2 ~ 54.0N.m (4.3 ~ 5.5kgf.m, 31.1 ~ 39.8lb-ft)



19. Install the front oil seal by using SST(09231-2A000, 09231-H1100) (A).

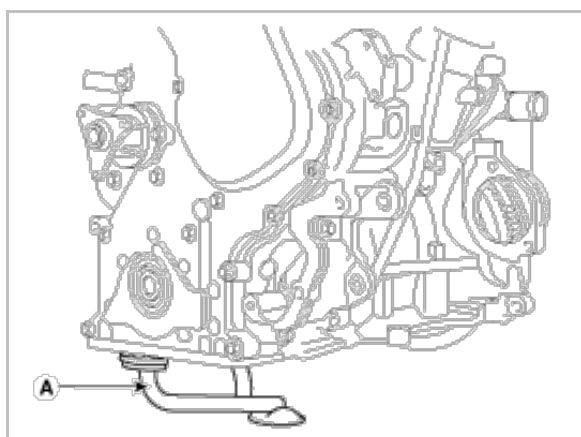


20. Install the oil strainer (A).

#### Tightening torque :

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

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



21. Apply liquid gasket evenly to the mating surface of oil pan.

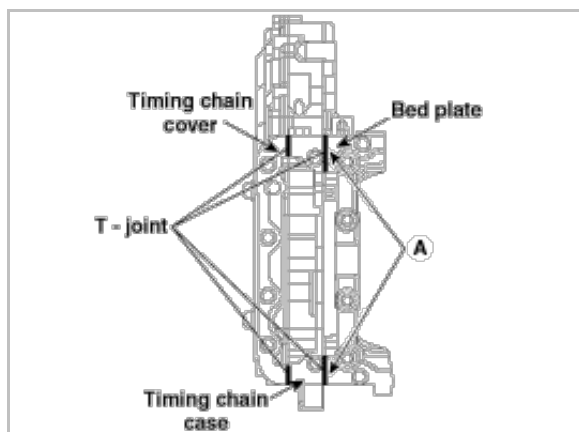
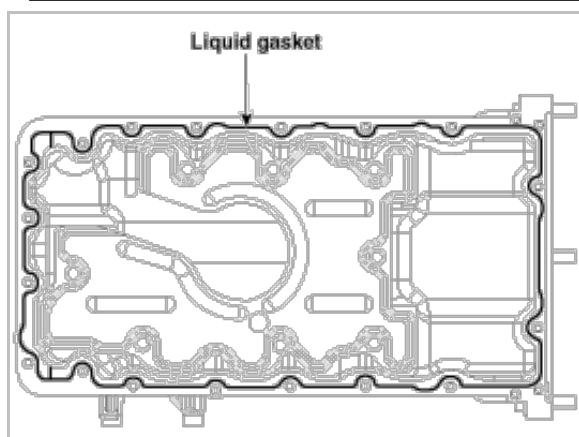
#### NOTE

- Standard liquid gasket : LOCTITE 5900, LOCTITE 5900H, THREE BOND 1217H

- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket in a 3mm wide bead without stopping. Assemble the oil pan in 5 minutes after applying the liquid gasket.
- After assembly, wait at least 30 minutes before filling the engine with oil.
- Apply liquid gasket to T-joint before assembling oil pan.

#### CAUTION

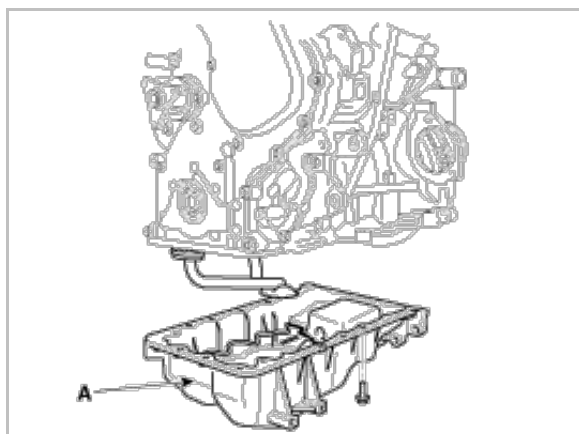
- Be careful not to press metal gasket (A) protruded from lower face of chain case and bedplate when applying liquid gasket and assembling the oil pan.



22. Install the oil pan (A).

#### Tightening torque :

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

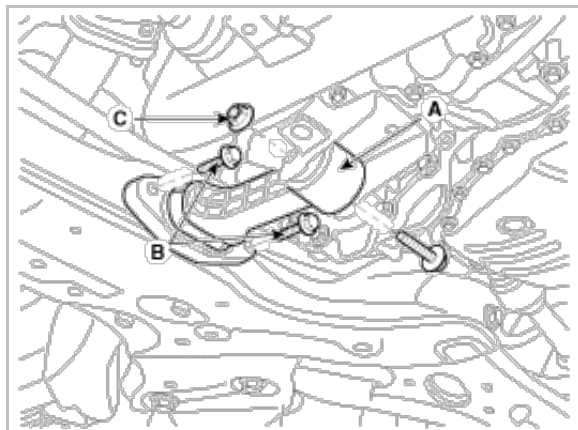


23. Install the roll rod bracket (A).

**Tightening torque :**

Bolts (B) : 49.0 ~ 63.7N.m (5.0 ~ 6.5kgf.m, 36.1 ~ 47.0lb-ft)

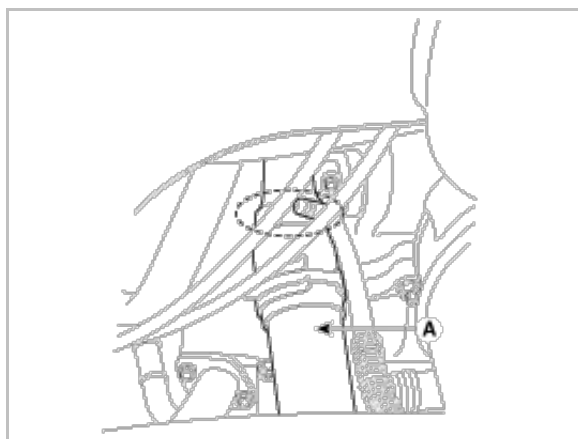
nut (C) : 107.9 ~ 127.5N.m (11.0 ~ 13.0kgf.m, 79.6 ~ 94.0lb-ft)



24. Install the intercooler hose and pipe (A).

**Tightening torque :**

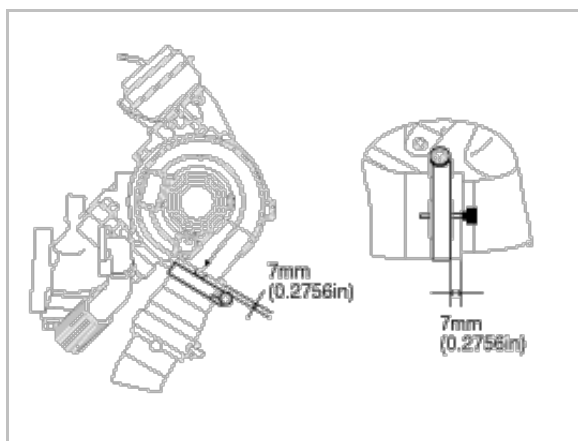
4.9 ~ 6.9N.m (0.5 ~ 0.7kgf.m, 3.6 ~ 5.1lb-ft)

**CAUTION**

It is allowed to plaster cleaning liquid or alcohol on the connecting surfaces of hose and pipe, but all kinds of oil is prohibited.

**NOTE**

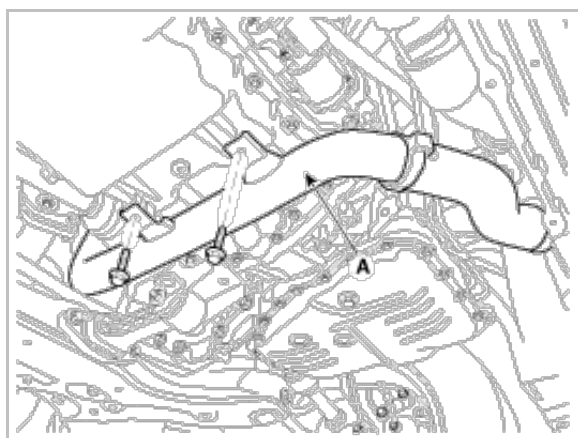
- The groove of hose must be in line with the protrusion of the pipe or turbocharger.
- The band must be located on the position mark of hose and must not run over it.
- Tighten the torque control cap until it separated. If a torque control cap has already removed, tighten the screw at the specified torque.

**Tightening torque :**

6.9 ~ 10.8N.m (0.7 ~ 1.1kgf.m, 5.1 ~ 8.0lb-ft)

**Tightening torque :**

4.9 ~ 6.9N.m (0.5 ~ 0.7kgf.m, 3.6 ~ 5.1lb-ft)



25. Remove the engine support fixture.

(1) Set the jack to the engine oil pan.

(2) Remove the engine support fixture (Support SST No.: 09200-2S000, Beam SST No.: 09200-38001) from the engine room.

(3) Install the cowl complete assembly pannel. (Refer to AT or MT group)

(4) Install the cowl top cover or wiper motor. (Refer to BE group)

(5) Install the hood assembly. (Refer to BD group)

26. Install the A/C compressor. (Refer to A/C compressor in HA group)

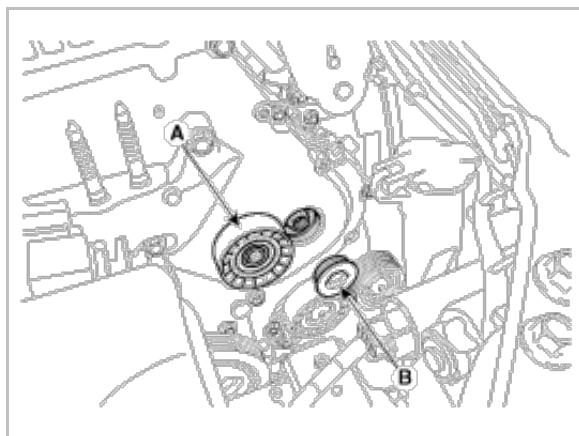
27. Install the timing chain cover plug (B) and the idler (A).

**Tightening torque :**

Idler (A) : 24.5 ~ 34.3N.m (2.5 ~ 3.5kgf.m, 18.2 ~ 25.3lb-ft)

Plug (B) : 25.5 ~ 34.3N.m (2.6 ~ 3.5kgf.m, 18.8 ~ 25.3lb.ft)

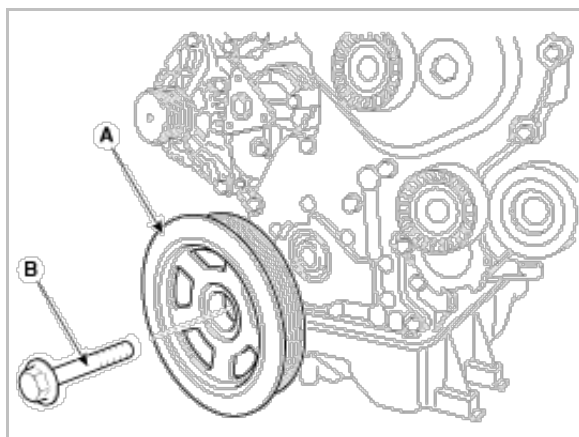




28. Install the crankshaft pulley (A) and crankshaft pulley bolt (B).

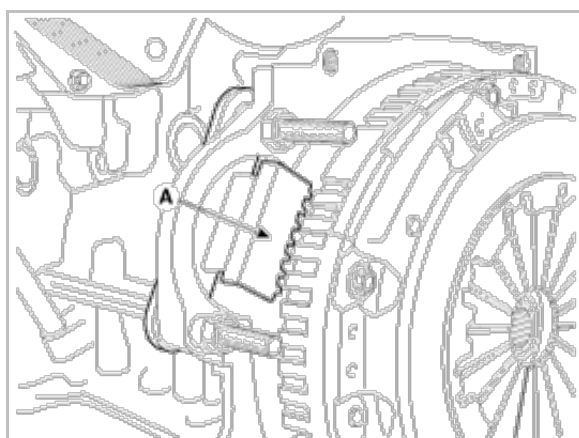
**Tightening torque :**

225.6 ~ 245.2N.m (23.0 ~ 25.0kgf.m, 166.4 ~ 180.8lb-ft)



**NOTE**

Use the SST(ring gear stopper, 09231-2B100) to Install the crankshaft pulley bolt.

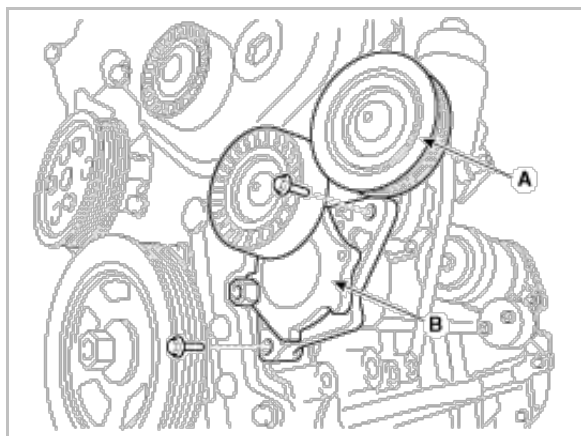


29. Install the drive belt tensioner (B) and the idler (A).

**Tightening torque**

A : 24.5 ~ 34.3N.m (2.5 ~ 3.5kgf.m, 18.1 ~ 25.3lb-ft)

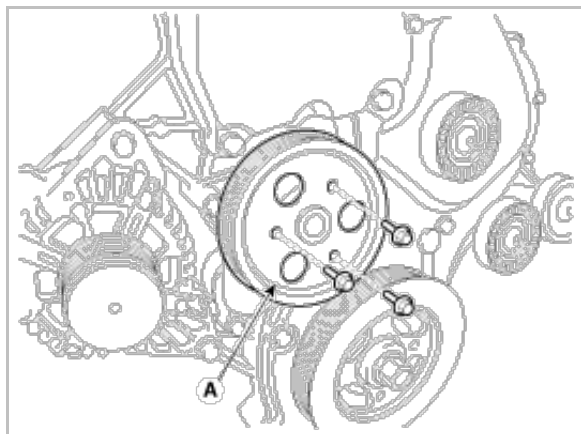
B : 25.5 ~ 30.4N.m (2.6 ~ 3.1kgf.m, 18.8 ~ 22.4lb-ft)



30. Install the water pump pulley (A).

**Tightening torque :**

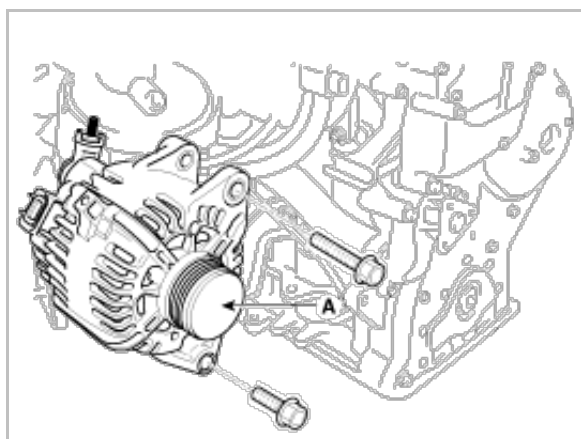
9.8 ~ 11.8N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



31. Install the alternator (A). (Refer to Alternator in EE group)

**Tightening torque :**

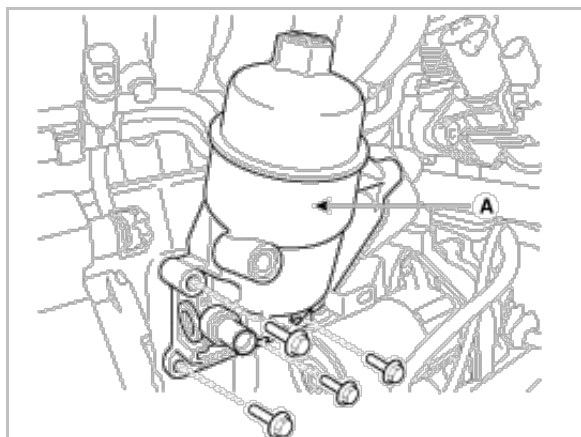
38.2 ~ 58.8N.m (3.9 ~ 6.0kgf.m, 28.2 ~ 43.4lb-ft)



32. Install the oil filter&cooler assembly (A).(Refer to Lubrication system in this group)

**Tightening torque :**

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



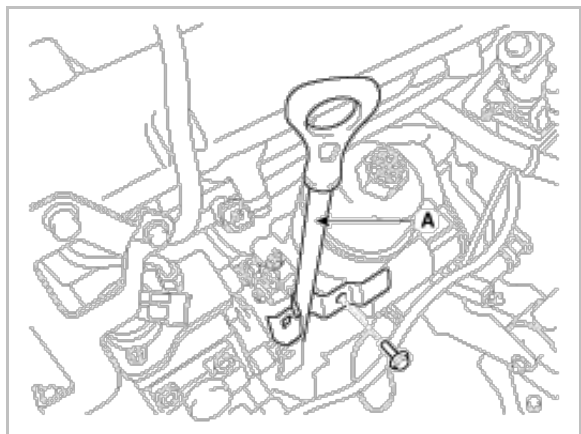
33. Install the oil level gauge guide (A).

---

**Tightening torque :**

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

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34. Install the engine mounting support bracket.

- (1) Install the engine mounting insulator (A).

---

**Tightening torque :**

49.0 ~ 63.7N.m (5.0 ~ 6.5kgf.m, 36.1 ~ 47.0lb-ft)

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- (2) Install the engine mounting support bracket (B).

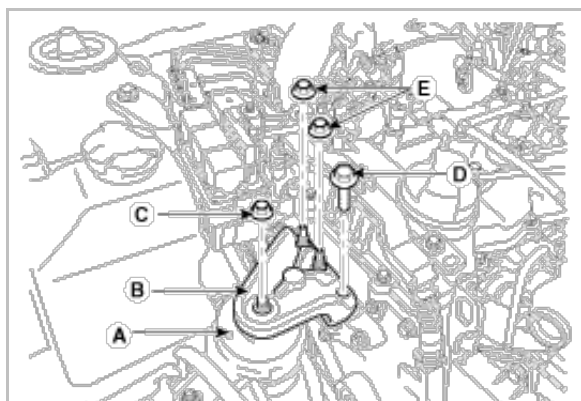
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**Tightening torque :**

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

Bolt (D), Nut (E) : 49.0 ~ 63.7N.m (5.0 ~ 6.5kgf.m, 36.2 ~ 47.0lb-ft)

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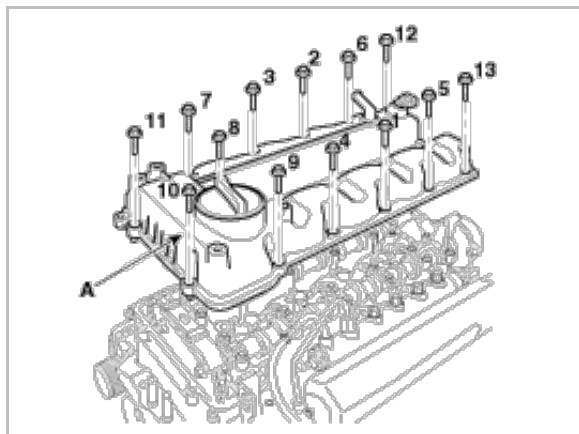
(3) Remove the jack from the engine oil pan.

35. Install the cylinder head cover (A) with new head cover gasket.

**Tightening torque :**

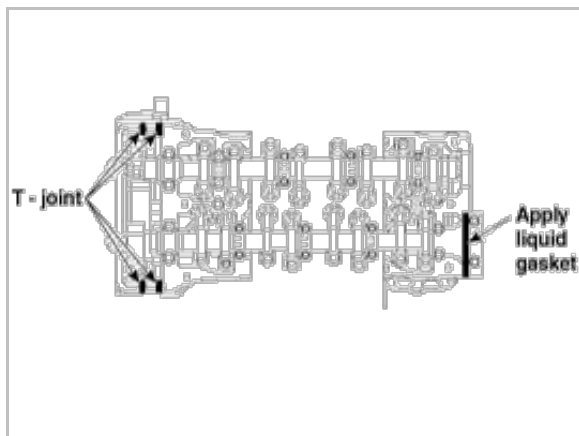
1st : 3.9 ~ 5.9N.m (0.4 ~ 0.6kgf.m, 2.9 ~ 4.3lb-ft)

2st : 8.8 ~ 10.8N.m (0.9 ~ 1.1kgf.m, 6.5 ~ 8.0lb-ft)

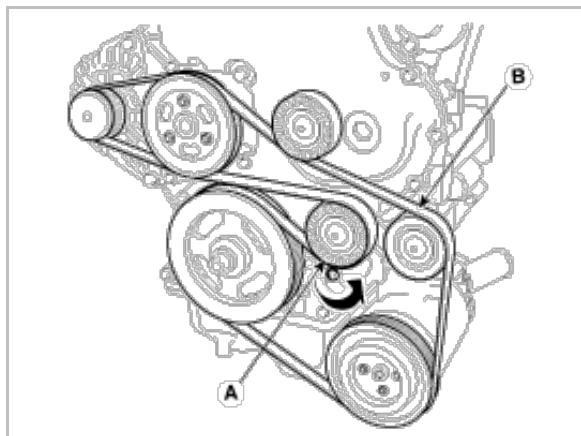


**NOTE**

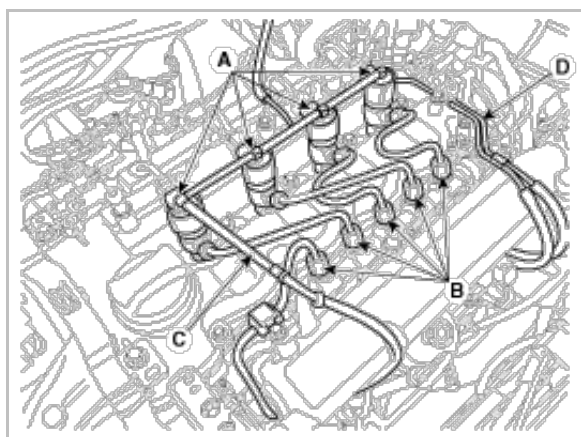
- Standard liquid gasket : LOCTITE 5900, LOCTITE 5900H, THREE BOND 1217H
- Check that the mating surfaces are clean and dry before applying liquid gasket.
- Apply liquid gasket in a 7mm (0.28in) wide bead without stopping.
- Assemble the cylinder head cover in 5 minutes after applying the liquid gasket.
- After assembly, wait at least 30 minutes before filling the engine with oil.
- Apply liquid gasket to T-joint before assembling cylinder head cover.



36. Install the drive belt (B) after turning the tensioner (A) counterclockwise.



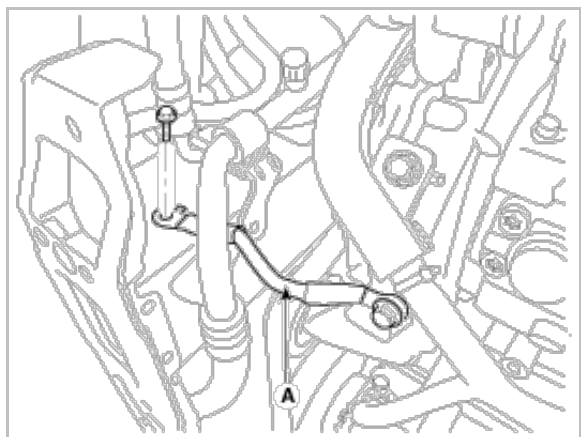
37. Install the injectors (A), the high pressure pipes (B), the fuel return hose (C) and the vacuum hoses and pipes (D).  
(Refer to FL group)



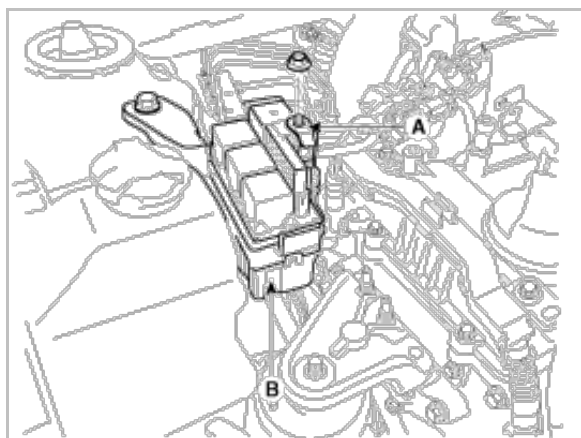
#### NOTE

Do not reuse the high pressure pipe.

38. Connect the engine ground line (A).

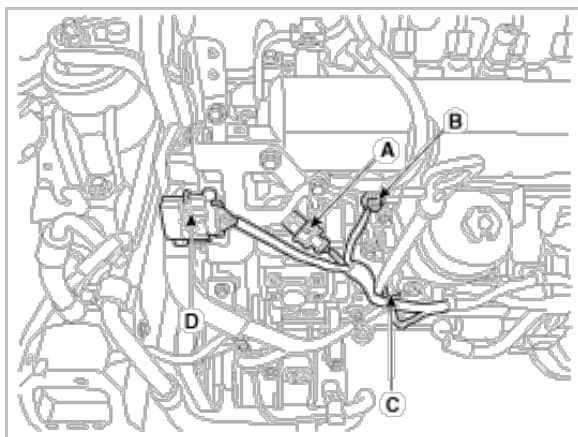


39. Install the fuse/relay box (B) and then connect the wiring (A).

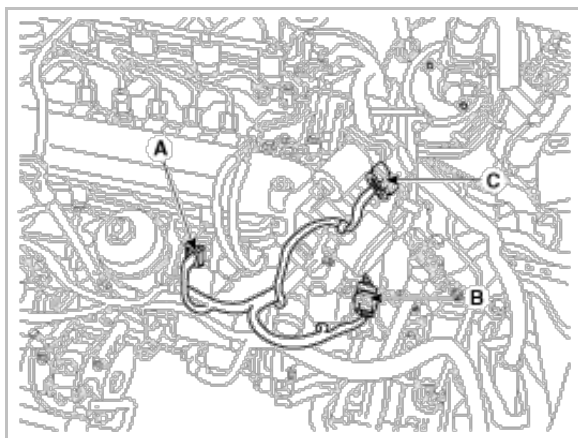


40. Install the wiring harness protectors and connect the engine wiring harness connectors.

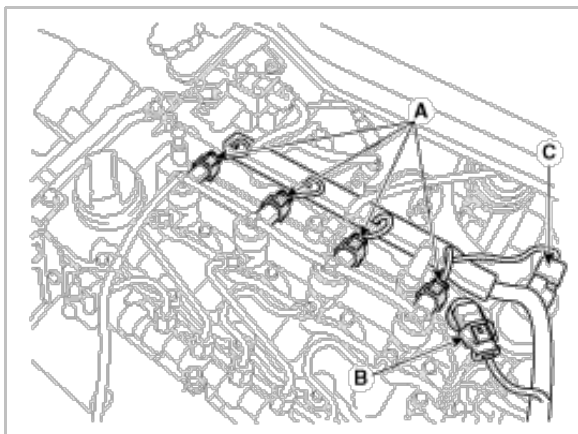
- (1) Fuel pressure regulator valve connector (A)
- (2) Fuel temperature sensor connector (B)
- (3) Oil pressure switch connector (C)
- (4) Variable swirl control actuator connector (D)



- (5) VGT control solenoid valve connector (A)
- (6) Crankshaft position sensor (CKPS) connector (B)
- (7) Air control valve connector (C)



- (8) Injector connectors (A)
- (9) Cam position sensor (CMPS) connector (B)
- (10) Electric EGR control valve connector (C)

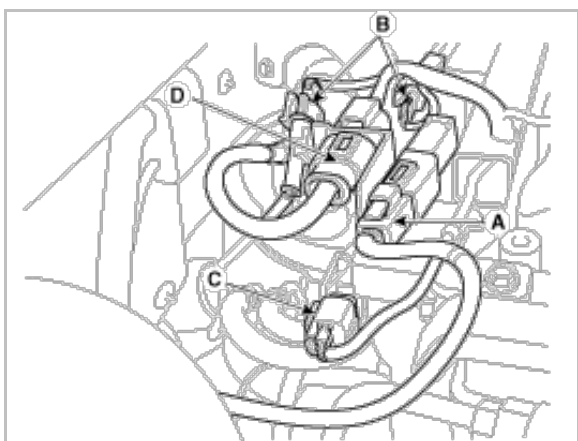


(11) Glow plug connector (A)

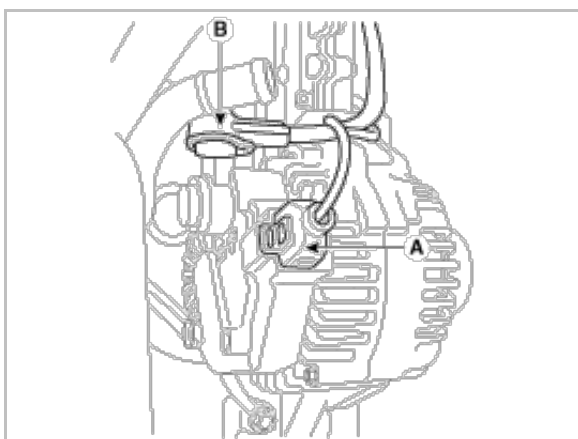
(12) Exhaust gas temperature sensor (#1, #2) connectors (B)

(13) Difference pressure sensor connector (C)

(14) Lambda sensor connector (D)



(15) Alternator connector (A) and the cable (B)



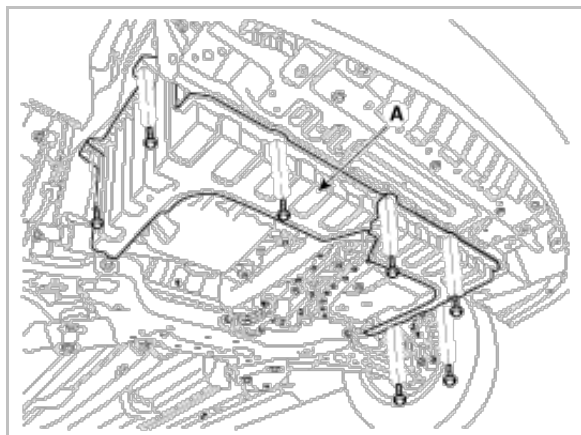
41. Install the under cover (A).

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**Tightening torque :**

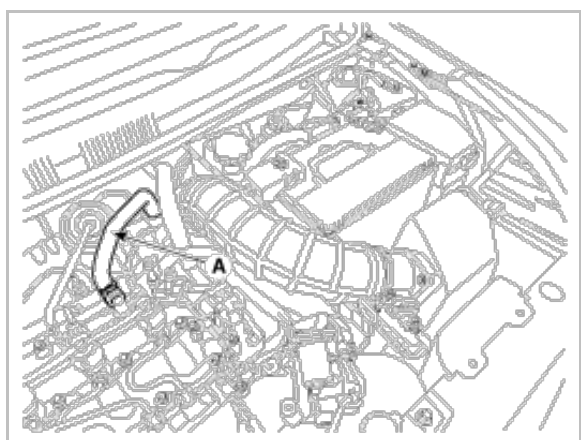
6.9 ~ 10.8N.m (0.7 ~ 1.1kgf.m, 5.1 ~ 8.0lb-ft)

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42. Install the RH front tire.

43. Install the breather hose (A).



44. Connect the battery negative terminal.

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**Tightening torque :**

(-) 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)

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45. Install the engine cover.