

body components.

Installation

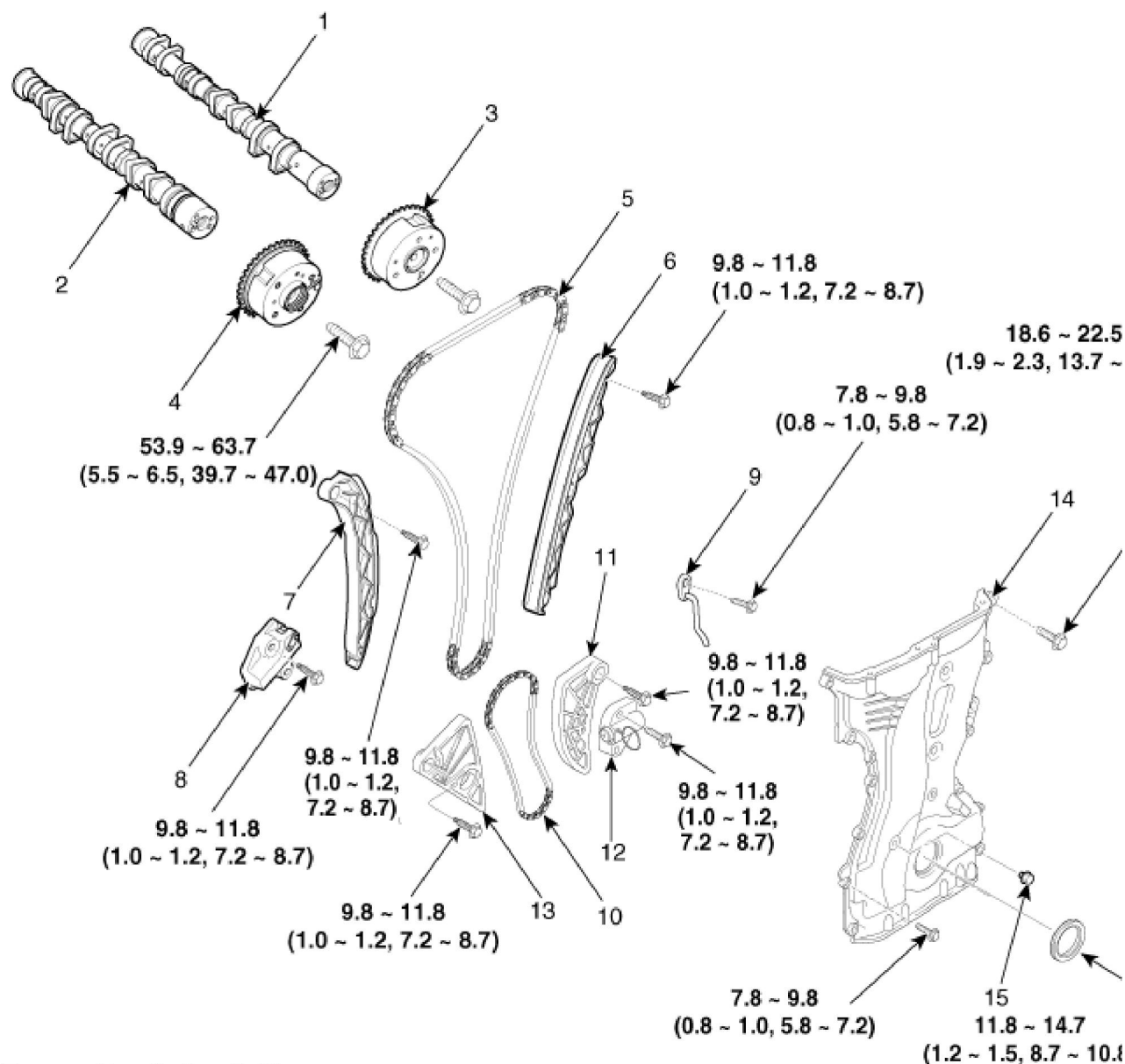
Installation is in the reverse order of removal.

Perform the following :

- Adjust a shift cable.
- Refill engine with engine oil.
- Refill a transaxle with fluid.
- Refill a radiator and a reservoir tank with engine coolant.
- Clean battery posts and cable terminals and assemble.
- Inspect for fuel leakage.
- After assemble the fuel line, turn on the ignition switch (do not operate the starter) so that the fuel pump runs for approximately two seconds and fuel line pressurizes.
- Repeat this operation two or three times, then check for fuel leakage at any point in the fuel line.
- Bleed air from the cooling system.
- Start engine and let it run until it warms up. (until the radiator fan operates 3 or 4 times.)
- Turn Off the engine. Check the level in the radiator, add coolant if needed. This will allow trapped air to be removed from the cooling system.
- Put radiator cap on tightly, then run the engine again and check for leaks.

Engine Mechanical System > Timing System > Timing Chain > Components and Components Location

Components



Torque : N.m (kgf.m, lb-ft)

1. Intake camshaft 2. Exhaust camshaft 3. Intake CVVT assembly 4. Exhaust CVVT assembly 5. Timing chain	6. Timing chain guide 7. Timing chain tensioner arm 8. Timing chain tensioner 9. Timing chain oil jet 10. Balance shaft chain	11. Balance shaft chain tensioner arm 12. Balance shaft chain tensioner 13. Balance shaft chain guide 14. Timing chain cover 15. Service hole bolt 16. Crankshaft front oil seal
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Engine Mechanical System > Timing System > Timing Chain > Repair procedures

Removal

CAUTION

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

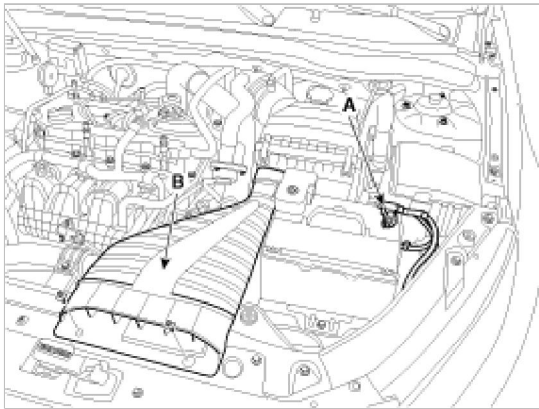
NOTE

Mark all wiring and hoses to avoid misconnection.

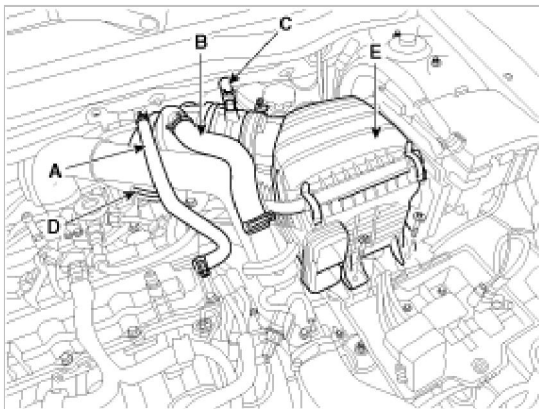
WARNING

In case of removing the high pressure fuel pump, high pressure fuel pipe, delivery pipe, and injector, there may be injury caused by leakage of the high pressure fuel. So don't do any repair work right after engine stops.

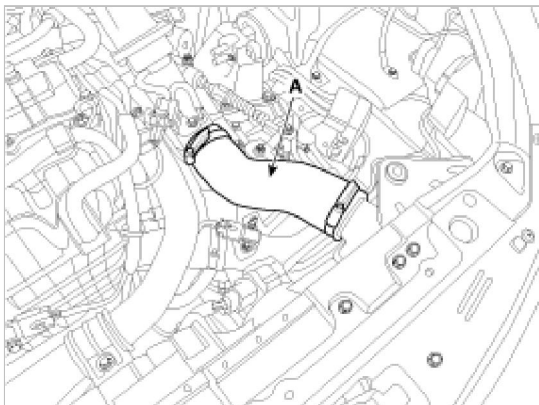
1. Remove the engine cover.
2. Disconnect the battery negative terminal (A).
3. Remove the air duct (B).



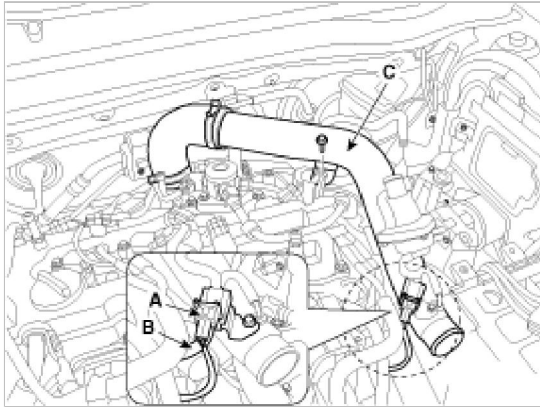
4. Remove the air cleaner assembly.
 - (1) Disconnect the breather hose (A), the recirculation hose (B) and the brake booster vacuum hose (C).
 - (2) Disconnect the air intake hose (D) and then remove the air cleaner assembly (E).



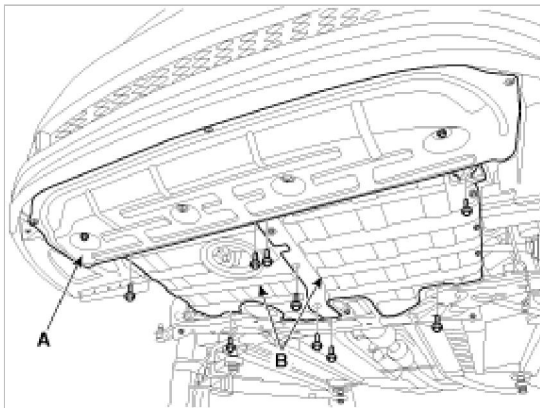
5. Remove the intercooler inlet hose (A).



6. Disconnect the recirculation valve connector (A) and the vacuum hose (B), and then remove the intercooler inlet pipe & hose assembly (C)



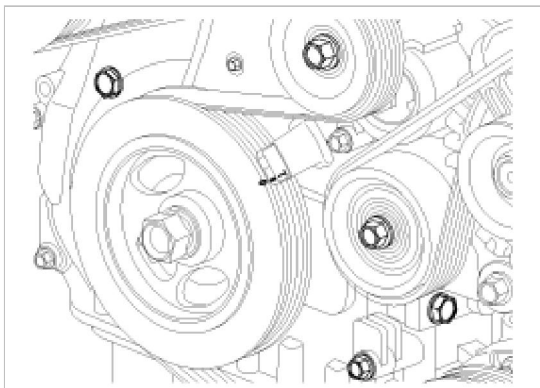
7. Remove the RH front wheel.
8. Remove the under covers (A,B).



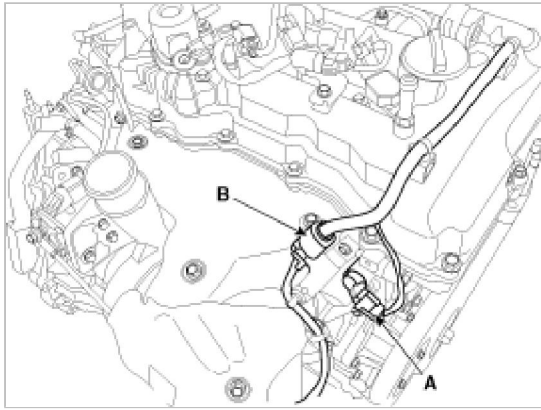
NOTE

When removing the under cover (B), unfasten the mounting bracket bolts and then remove the under cover and mounting bracket assembly.

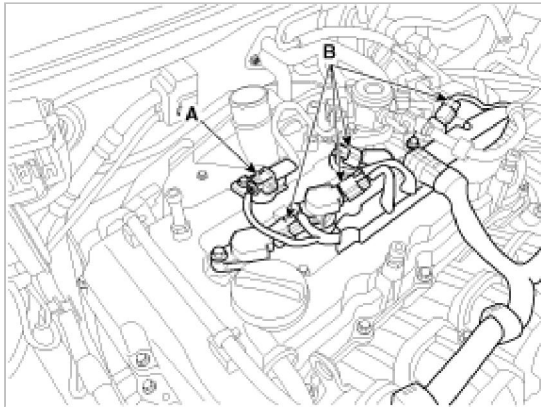
9. Turn the crankshaft pulley and align its groove with the timing mark of the timing chain cover to set the piston of No.1 cylinder to the top dead center on compression stroke.



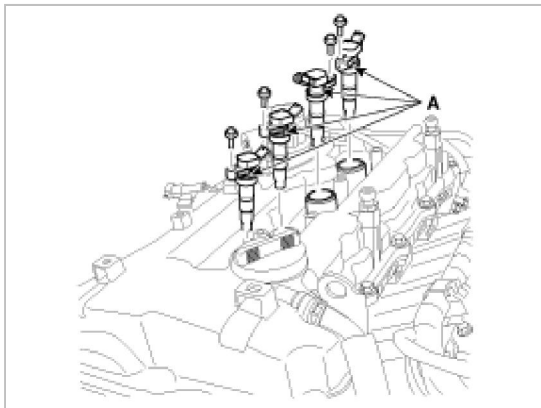
10. Disconnect the exhaust OCV (Oil control valve) connector (A) and the oxygen sensor connector (B).



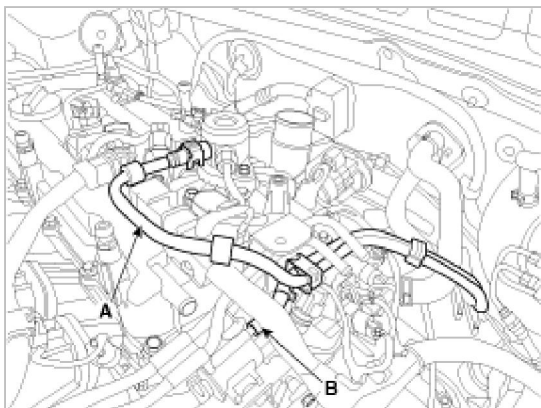
11. Disconnect the ignition coil connectors (A) and the fuel pump connector (B), then remove the wiring protector.



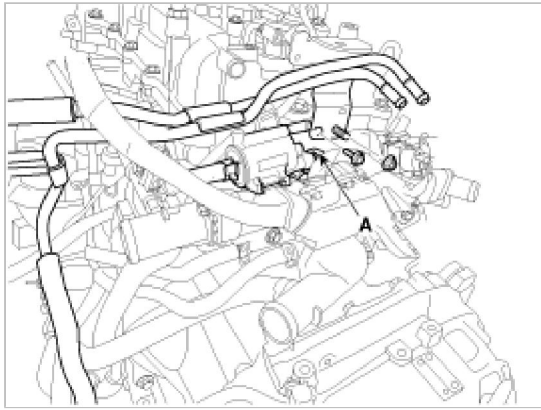
12. Remove the ignition coils (A).



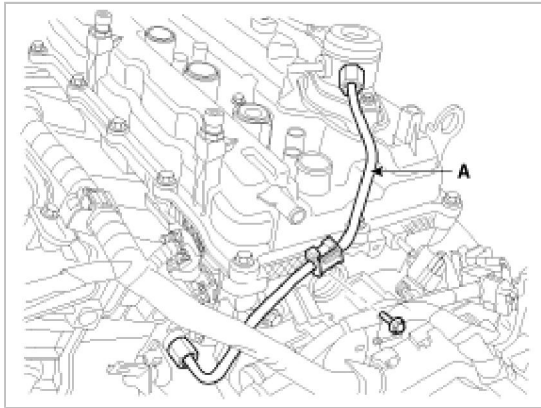
13. Disconnect the fuel hose (A) and PCSV (Purge control solenoid valve) hose (B).



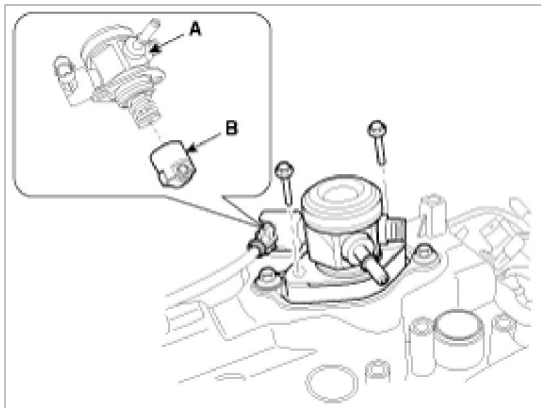
14. Disconnect PCSV (Purge control solenoid valve) connector (A) and loosen the vacuum pipe assembly mounting bolts and nut.



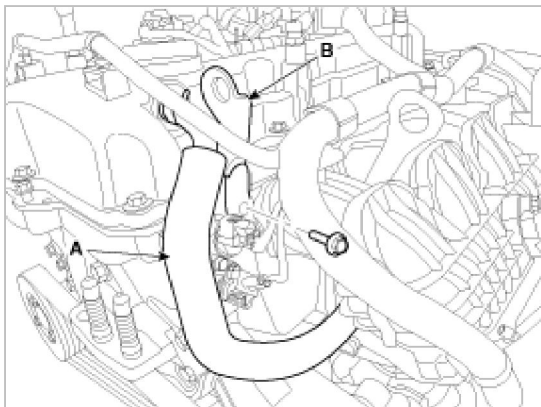
15. Remove the high pressure pipe (A). (Refer to FL group)



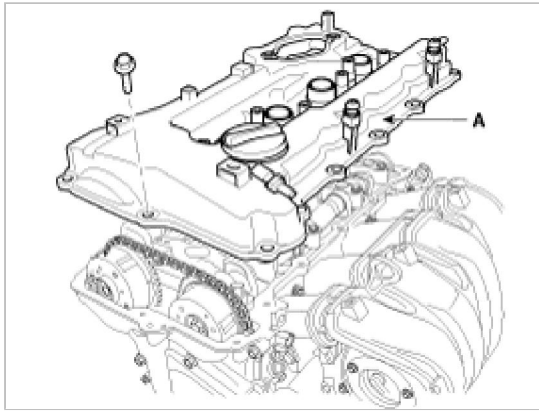
16. Remove the high pressure fuel pump (A) and the roller tappet (B). (Refer to FL group)



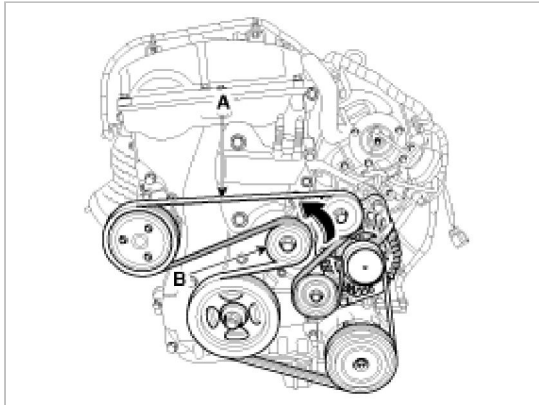
17. Disconnect the PCV (Positive crankcase ventilation) hose (A) and then remove the front engine hanger (B).



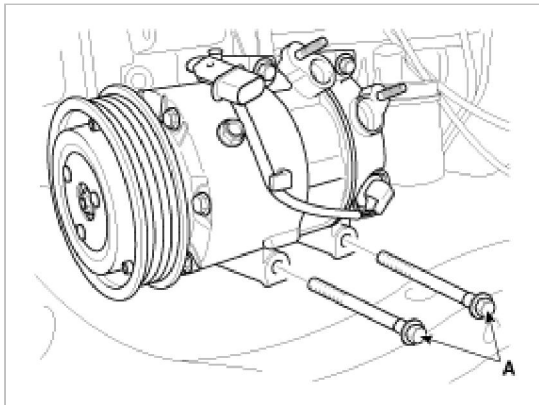
18. Remove the cylinder head cover (A).



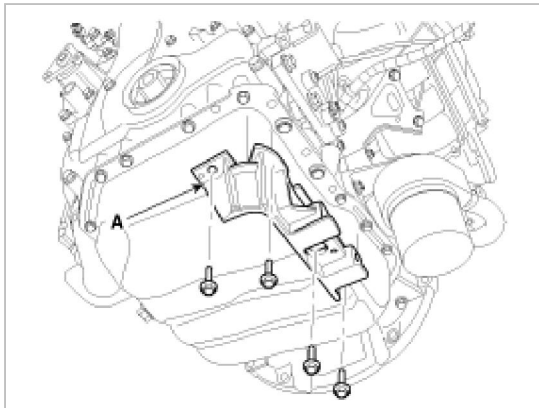
19. Remove the drive belt (A) after turning the drive belt tensioner (B) counterclockwise.



20. Remove the A/C compressor lower bolts (A).

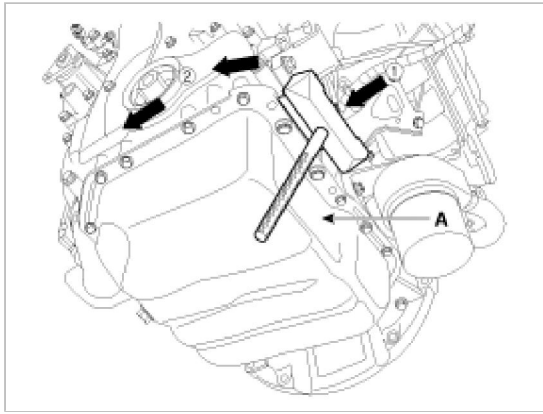


21. Remove the A/C compressor bracket (A).



22. Drain the engine oil.

23. Remove the oil pan (A). Insert the blade of SST (09215-3C000) between the ladder frame and oil pan. Cut off applied sealer and remove the lower oil pan.



NOTE

- Insert the SST between the oil pan and the ladder frame 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 ladder frame.
- Do not turn over the SST abruptly without tapping. It is result in damage of the SST.
- Be careful not to damage the contact surfaces of ladder frame and lower oil pan.

24. Set the jack to the edge of ladder frame.

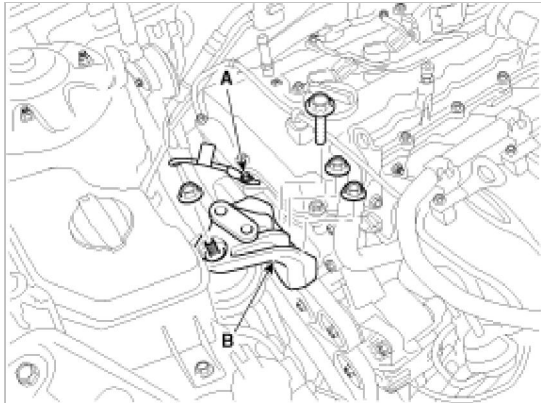
NOTE

Put the wooden block between ladder frame and jack.

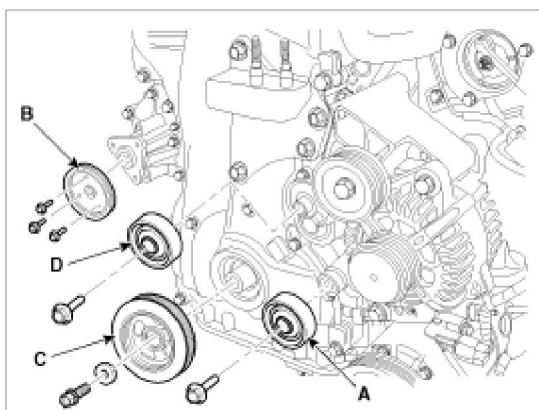
CAUTION

Be careful not to damage the balance shaft & oil pump module.

25. Disconnect the ground line (A), and then remove the engine mounting support bracket (B).



26. Remove the idler (A), the water pump pulley (B), the crankshaft pulley (C) and the drive belt tensioner pulley (D).

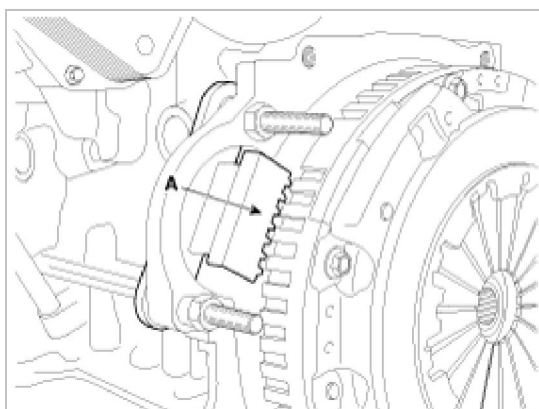


CAUTION

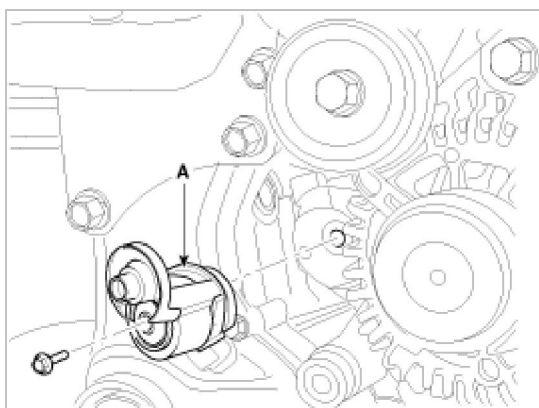
Tensioner pulley bolt is left-handed screw.

NOTE

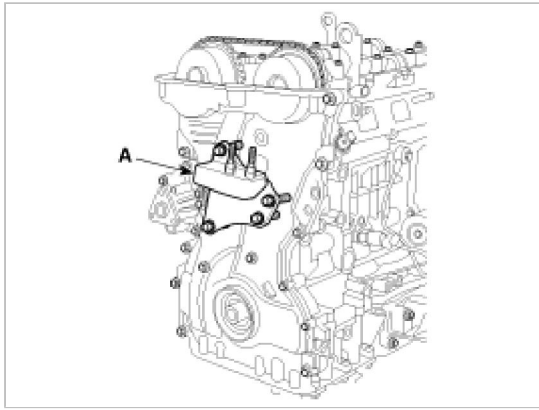
Use the SST (Ring gear stopper, 09231-3K000) (A) to remove the crankshaft pulley bolt, after removing the starter.



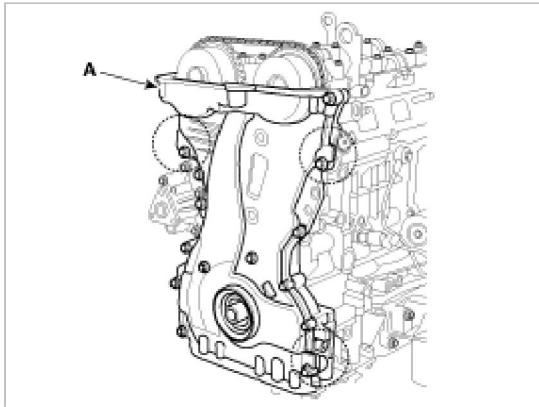
27. Remove the drive belt tensioner (A).



28. Remove the engine support bracket (A).



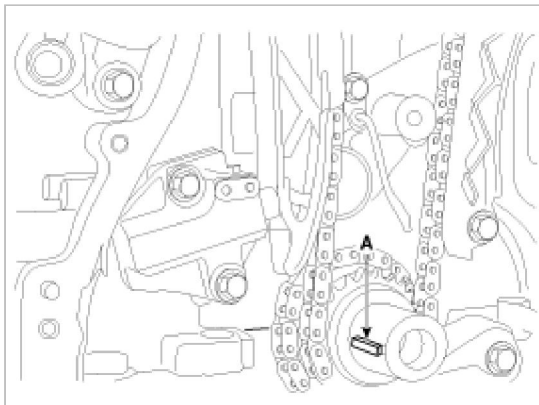
29. Remove the timing chain cover (A) by gently prying the portions between the cylinder head and cylinder block.



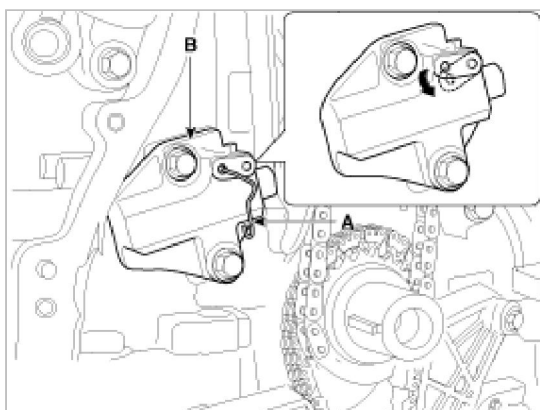
CAUTION

Be careful not to damage the contact surfaces of cylinder block, cylinder head and timing chain cover.

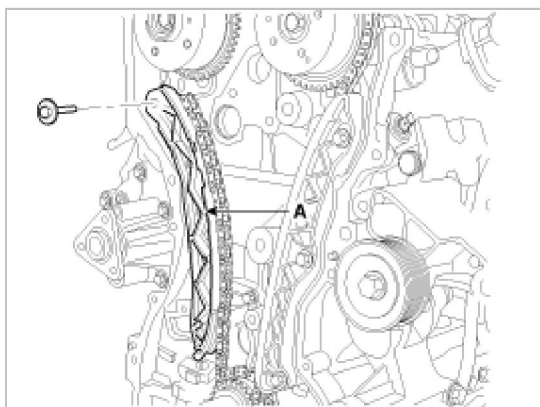
30. Make sure that the key (A) of crankshaft is aligned with the mating surface of main bearing cap. As a result of this, the piston of No.1 cylinder is placed at the top dead center on compression stroke.



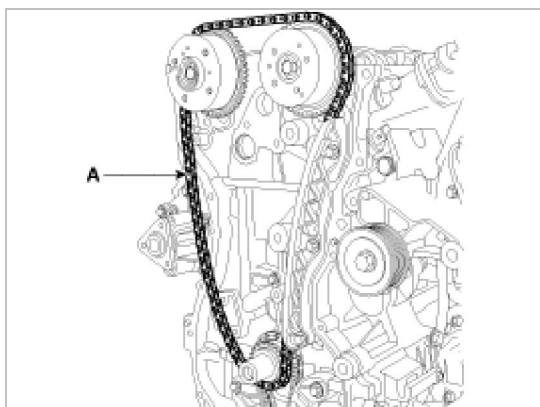
31. Release the ratchet by pulling the link down using a thin rod. Compress the piston and then insert a stopper pin (A) into the hole on the ratchet to hold the compressed piston. Remove the timing chain tensioner (B).



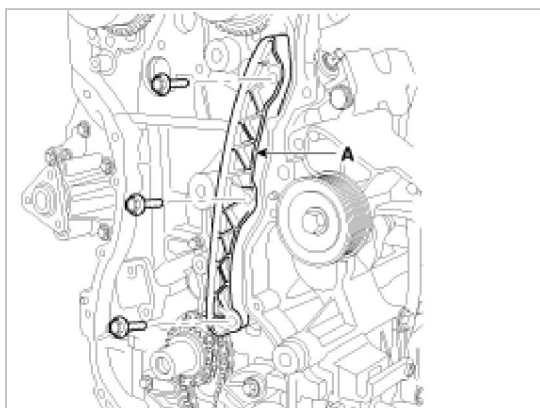
32. Remove the timing chain tensioner arm (A).



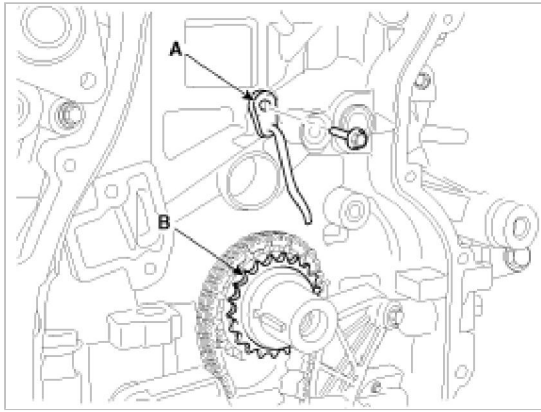
33. Remove the timing chain (A).



34. Remove the timing chain guide (A).



35. Remove the timing chain oil jet (A) and the crankshaft chain sprocket (B).



36. Remove the balance shaft chain. (Refer to Lubrication system in this group)

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.

Drive belt, Idler, Pulley

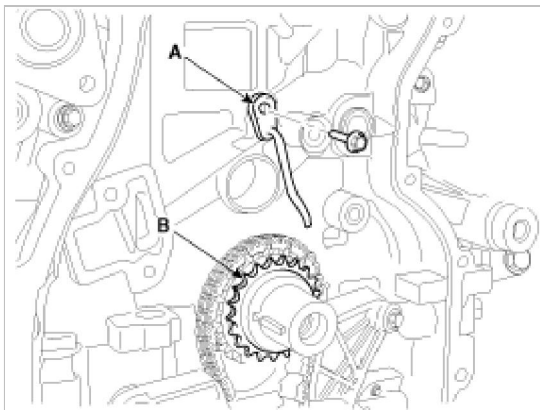
1. Check the idler for excessive oil leakage, abnormal rotation or vibration. Replace if necessary.
2. Check belt for maintenance and abnormal wear of V-ribbed part. Replace if necessary.
3. Check the pulleys for vibration in rotation, oil or dust deposit of V-ribbed part. Replace if necessary.

Installation

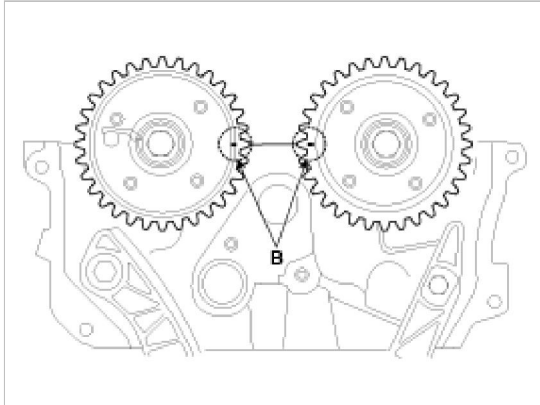
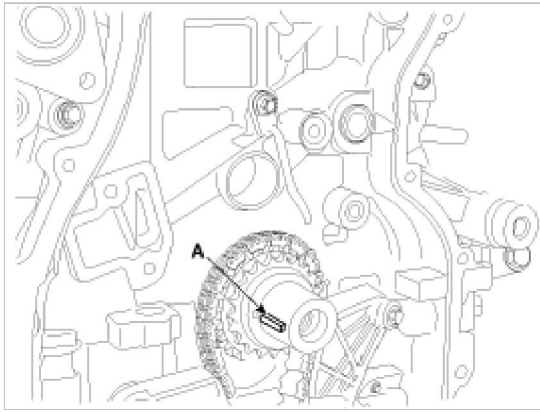
1. Install the balance shaft chain. (Refer to Lubrication system in this group)
2. Install the crankshaft chain sprocket (B) and the timing chain oil jet (A).

Tightening torque:

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



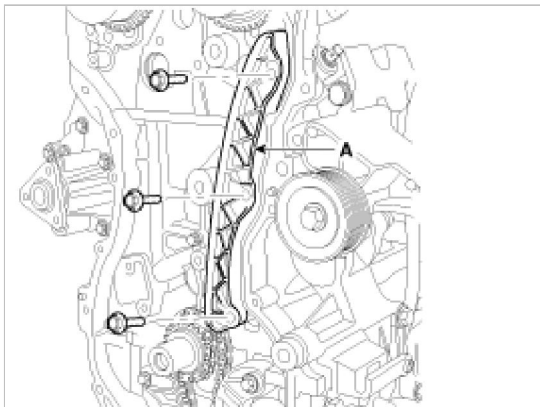
3. Set the crankshaft so that the key (A) of crankshaft will be aligned with the mating surface of main bearing cap. Put the intake and exhaust camshaft assembly so that the TDC marks (B) of the intake and exhaust CVVT sprockets will be aligned with the top surface of cylinder head. As a result of this, the piston of No.1 cylinder is placed at the top dead center on compression stroke.



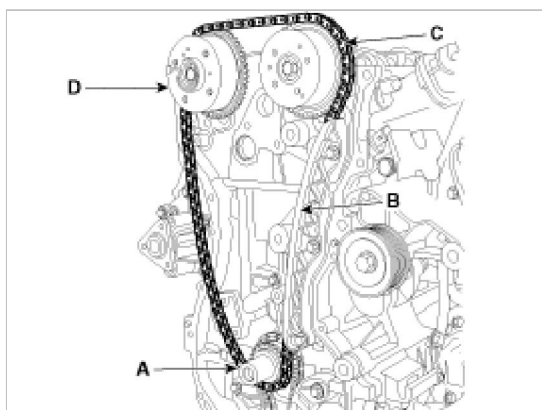
4. Install the timing chain guide (A).

Tightening torque:

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

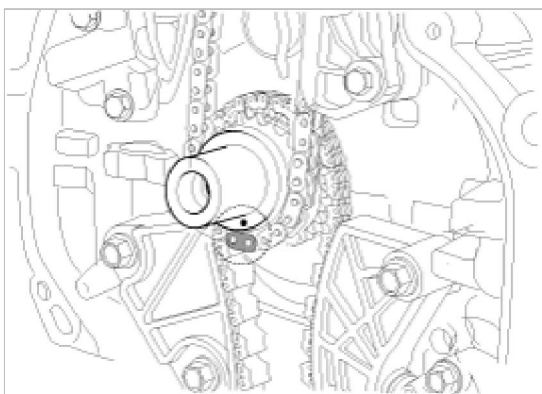
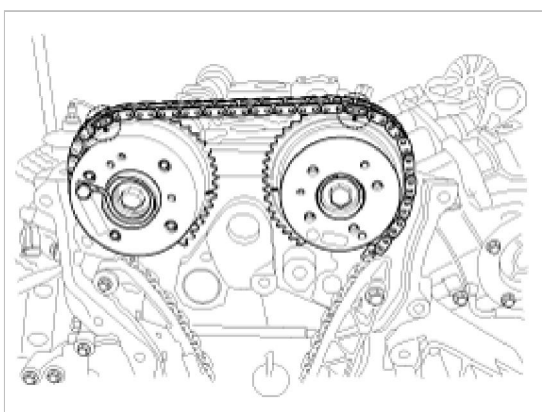


5. Install the timing chain. To install the timing chain with no slack between each shaft (cam, crank), follow the below procedure.
 Crankshaft sprocket (A) → Timing chain guide (B) → Intake CVVT sprocket (C) → Exhaust CVVT sprocket (D).



NOTE

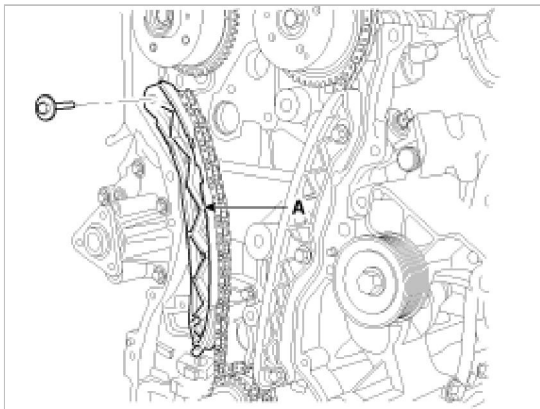
The timing marks of each sprocket should be matched with timing marks (color link) of timing chain when installing the timing chain.



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

Tightening torque:

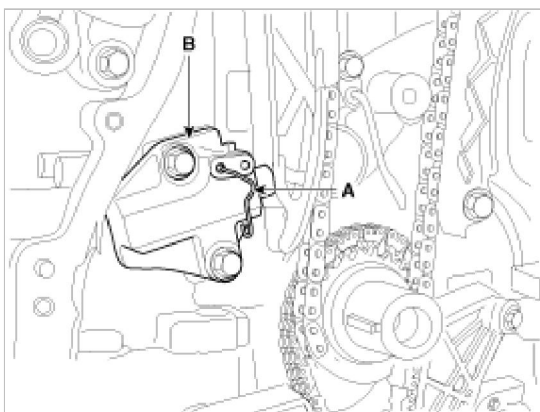
9.8 ~ 11.8N.m (1.0 ~ 1.2kgf.m, 7.2 ~ 8.7lb-ft)



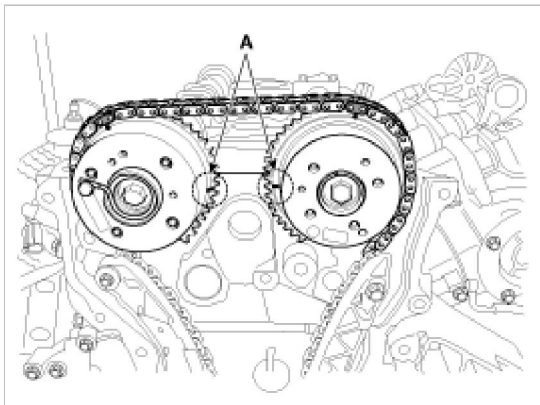
7. Install the timing chain auto tensioner (B) and remove the stopper pin (A).

Tightening torque:

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

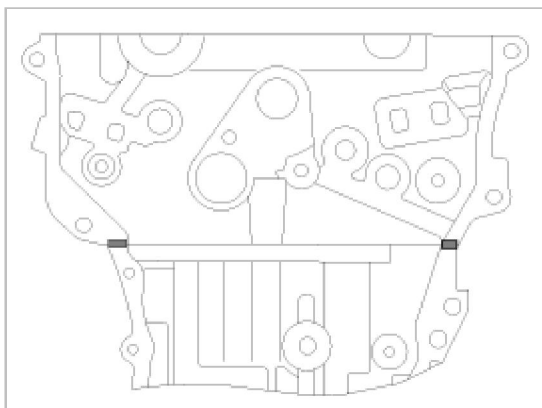


8. After rotating crankshaft 2 revolutions in regular direction (clockwise viewed from front), confirm that the TDC marks (A) on the intake and exhaust CVVT sprockets aligned with the top surface of cylinder head.



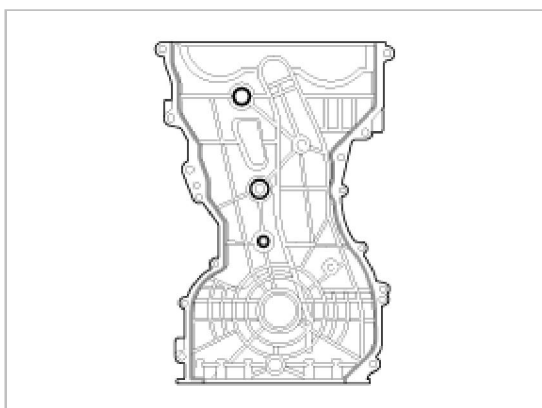
9. Install the timing chain cover.
- (1) Using a gasket scraper, remove all the old packing material from the gasket surfaces.
 - (2) The sealant locations on chain cover and on counter parts (cylinder head, cylinder block, and ladder frame) must be free of engine oil and etc.
 - (3) Before assembling the timing chain cover, liquid sealant Loctite 5900H or equivalent should be applied on the gap between cylinder head and cylinder block. The part must be assembled within 5 minutes after sealant was applied.

Bead width: 3.0mm (0.12in.)



- (4) After applying liquid sealant Loctite 5900H or equivalent on the timing chain cover.
The part must be assembled within 5 minutes after sealant was applied. Continuous bead of sealant should be applied to prevent any path of oil leakage.

Bead width: 3.0mm (0.12in.)



- (5) The dowel pins on the cylinder block and holes on the timing chain cover should be used as a reference in order to assemble the timing chain cover to be in exact position.

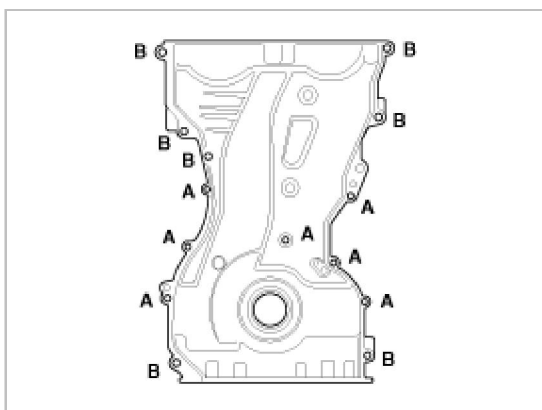
Tightening torque:

Bolts A (M6×25) :

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

Bolts B (M8×28) :

18.6 ~ 22.5N.m (1.9 ~ 2.3kgf.m, 13.7 ~ 16.6lb-ft)



CAUTION

The engine starting or pressure tests should not be performed within 30 minutes after the timing chain

cover was assembled.

10. Install the engine support bracket (A).

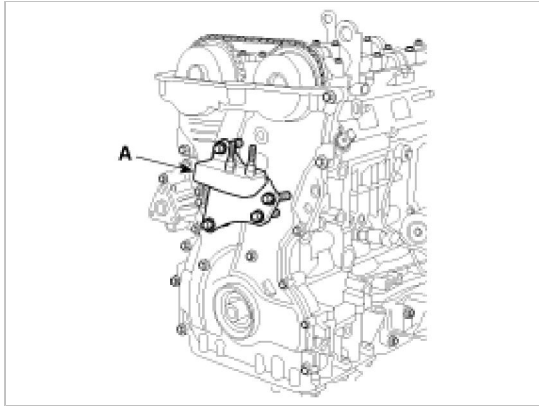
Tightening torque:

M10 bolts :

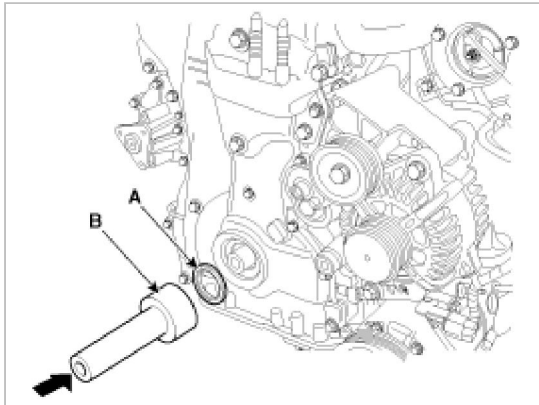
39.2 ~ 44.1N.m (4.0 ~ 5.0kgf.m, 28.9 ~ 32.5lb-ft)

M8 bolts :

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



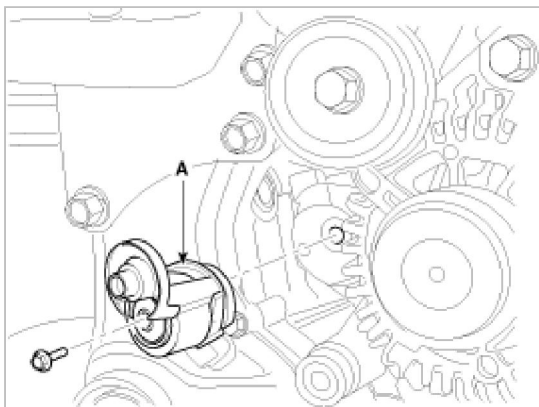
11. Install the crankshaft front oil seal (A) using SST (09214-3K000, 09231-H1100) (B).



12. Install the drive belt tensioner (A).

Tightening torque :

53.9 ~ 63.7N.m (5.5 ~ 6.5kgf.m, 39.7 ~ 47.0lb-ft)



13. Install the idler (A), the water pump pulley (B), the crankshaft pulley (C) and the drive belt tensioner pulley (D).

Tightening torque :

Idler (A) :

53.9 ~ 63.7N.m (5.5 ~ 6.5kgf.m, 39.7 ~ 47.0lb-ft)

Water pump pulley (B) :

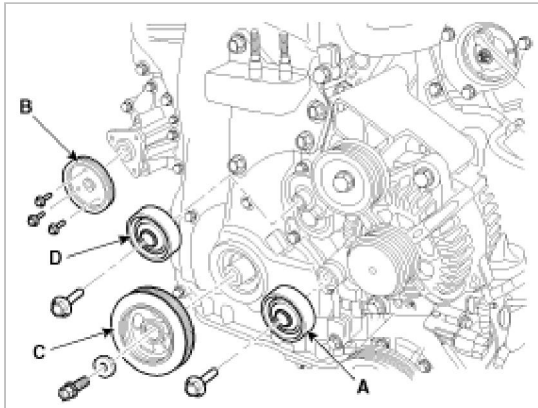
7.8 ~ 9.8N.m (0.8 ~ 1.0kgf.m, 5.8 ~ 7.2lb-ft)

Crankshaft pulley (C) :

166.6 ~ 176.4N.m (17.0 ~ 18.0kgf.m, 122.9 ~ 130.1lb-ft)

Drive belt tensioner pulley (D) :

53.9 ~ 63.7N.m (5.5 ~ 6.5kgf.m, 39.7 ~ 47.0lb-ft)

**CAUTION**

Tensioner pulley bolt is left-handed screw.

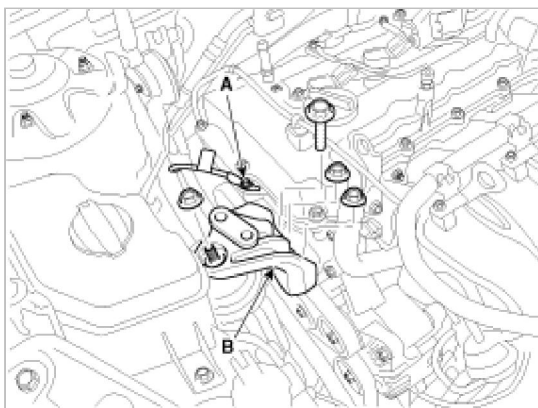
NOTE

Use the SST (Ring gear stopper, 09231-3K000) to remove the crankshaft pulley bolt. Install the starter after installing the crankshaft pulley.

14. Install the engine mounting support bracket (B) and connect the ground line (A).
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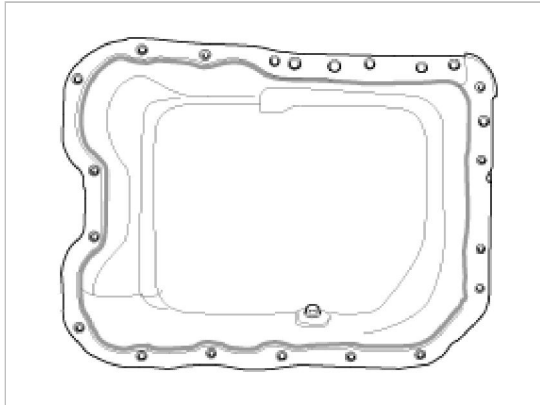
Tightening torque :

78.5 ~ 98.1 N.m (8.0 ~ 10.0 kgf.m, 57.9 ~ 72.3 lb-ft)



15. Remove the jack from the ladder frame.
16. Install the oil pan.
- (1) Using a gasket scraper, remove all the old sealant material from the gasket surfaces.
 - (2) Before assembling the oil pan, liquid sealant Loctite 5900H, Threebond 1217H or equivalent should be applied on oil pan. The part must be assembled within 5 minutes after sealant was applied.
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Bead width : 2.5mm (0.010in.)



CAUTION

- When applying sealant gasket, sealant must not be protruded into the inside of oil pan.
- To prevent leakage of oil, apply sealant gasket on the inner threads of the bolt holes.

(3) Install the oil pan (A). Uniformly tighten the bolts in several passes.

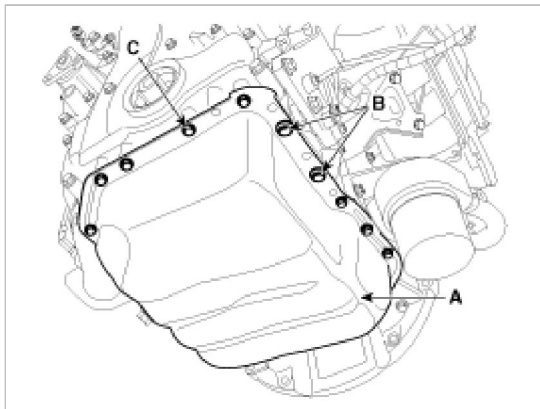
Tightening torque

Bolts B (M9) :

30.4 ~ 34.3N.m (3.1 ~ 3.5kgf.m, 22.4 ~ 25.3lb-ft)

Bolts C (M6) :

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



CAUTION

After assembly, wait at least 30 minutes before filling the engine with oil.

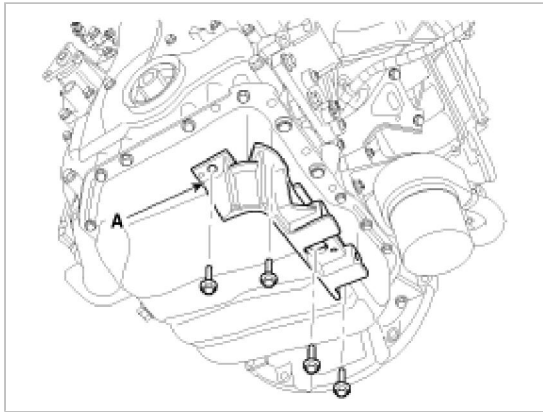
NOTE

Always use a new drain plug gasket.

17. Install the A/C compressor bracket (A).

Tightening torque :

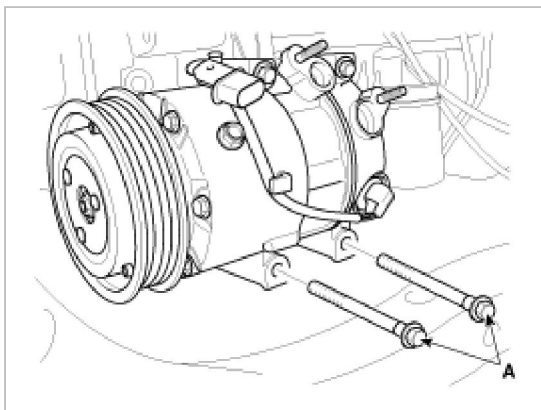
19.6 ~ 23.5N.m (2.0 ~ 2.4kgf.m, 14.5 ~ 17.4lb-ft)



18. Install the A/C compressor lower bolts (A).

Tightening torque :

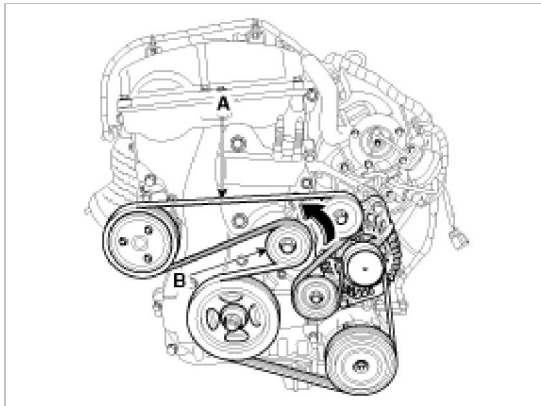
20.0 ~ 33.0N.m (2.04 ~ 3.36kgf.m, 14.8 ~ 24.3lb-ft)



19. Install the drive belt (A).

Crankshaft pulley → A/C pulley → Alternator pulley → Idler #1 pulley → Idler #2 pulley → Water pump pulley → Tensioner pulley.

Rotate the drive belt tensioner arm (B) counterclockwise moving the tensioner pulley bolt with wrench. After putting the belt on the tensioner pulley, release the tensioner pulley slowly.

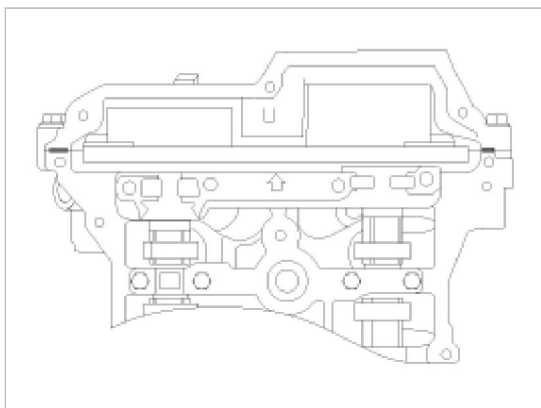


20. Install cylinder head cover.

(1) The hardening sealant located on the upper area between timing chain cover and cylinder head should be removed before assembling cylinder head cover.

(2) After applying sealant, it should be assembled within 5 minutes.

Bead width : 2.5mm (0.10in.)

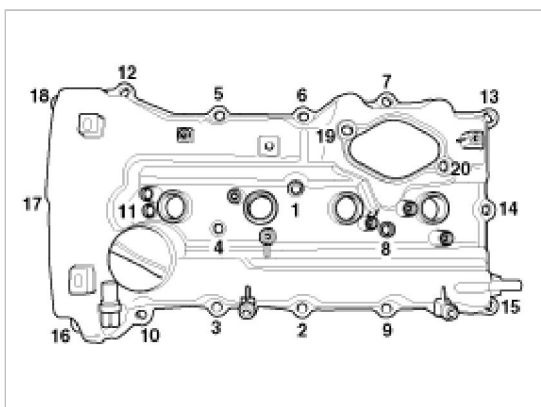
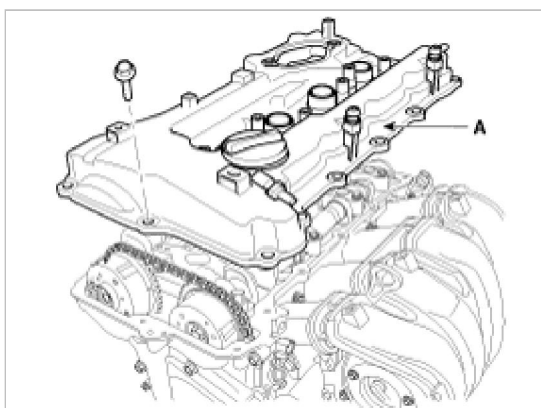


(3) Install the cylinder head cover (A) by tightening the bolts as following method.

Tightening torque

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

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



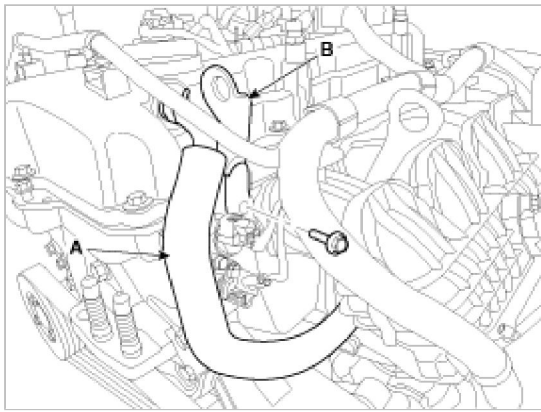
CAUTION

- Do not reuse cylinder head cover gasket.
- The firing and/or blow out test should not be performed within 30 minutes after the cylinder head cover was assembled.

21. Install the front engine hanger (B) and then connect the PCV (Positive crankcase ventilation) hose (A).

Tightening torque :

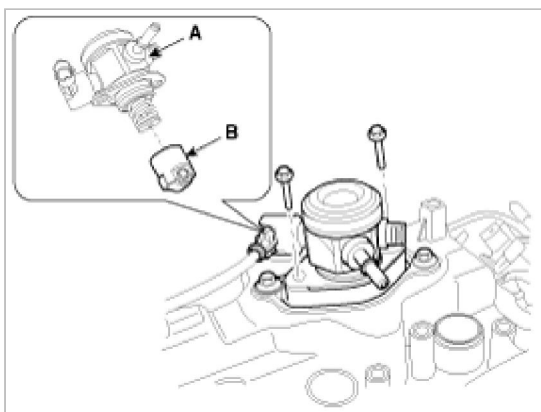
27.5 ~ 31.4N.m (2.8 ~ 3.2kgf.m, 20.3 ~ 23.1lb-ft)



22. Install the high pressure fuel pump (A) and the roller tappet (B). (Refer to FL group)

Tightening torque :

12.7 ~ 14.7N.m (1.3 ~ 1.5kgf.m, 9.4 ~ 10.8lb-ft)



CAUTION

Before installing the high pressure fuel pump, position the roller tappet in the lowest position (BDC) by rotating the crankshaft. Otherwise the installation bolts may be broken because of tension of the pump spring.

NOTE

Do not use already used bolt again.

NOTE

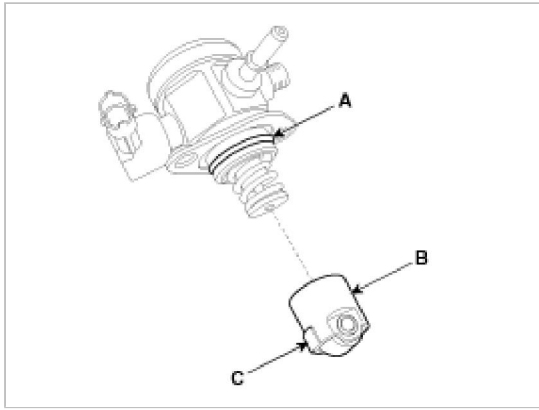
When tightening the installation bolts of the high pressure fuel pump, tighten in turn the bolts in small step (0.5 turns) after tightening them with hand-screwed torque.

CAUTION

Note that internal damage may occur when the component is dropped. In this case, use it after inspecting.

NOTE

Apply engine oil to the O-ring (A) of the high pressure fuel pump, the roller tappet (B), and the protrusion (C). Also apply engine oil to the groove where the protrusion is installed.

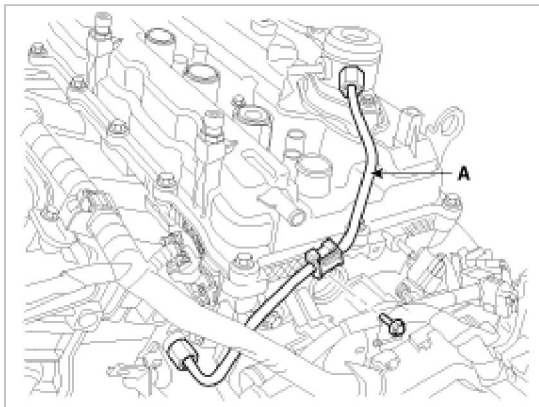


23. Install the high pressure pipe (A). (Refer to FL group)

Tightening torque :

Bolt : 7.8 ~ 11.8N.m (0.8 ~ 1.2kgf.m, 5.8 ~ 8.7lb-ft)

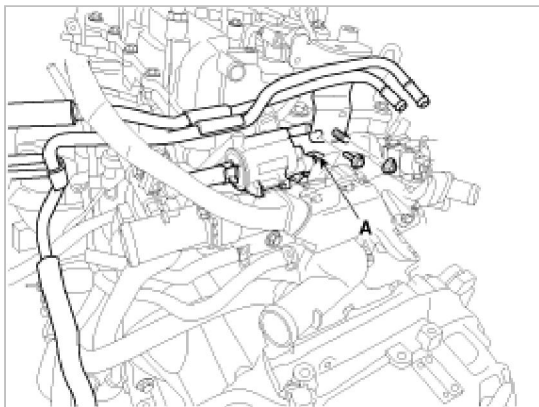
Nuts : 26.5 ~ 32.4N.m (2.7 ~ 3.3kgf.m, 19.5 ~ 23.9lb-ft)



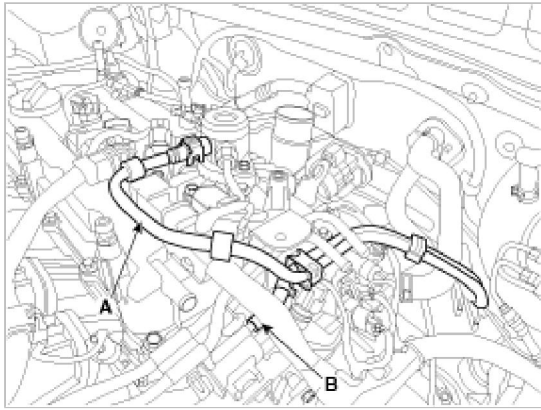
NOTE

Do not reuse the high pressure pipe.

24. Connect PCSV (Purge control solenoid valve) connector (A) and tighten the vacuum pipe assembly mounting bolts and nut.



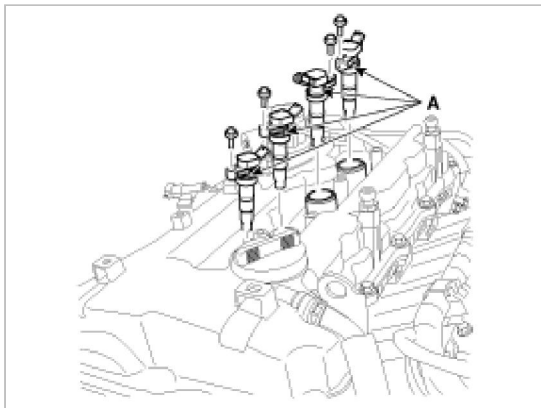
25. Connect the fuel hose (A) and PCSV (Purge control solenoid valve) hose (B).



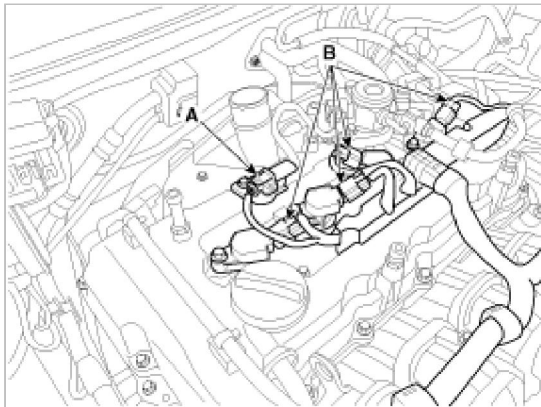
26. Install the ignition coils (A).

Tightening torque :

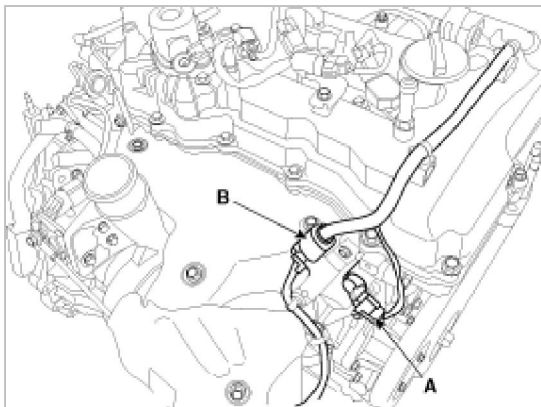
3.9 ~ 5.9N.m (0.4 ~ 0.6kgf.m, 2.9 ~ 4.3lb-ft)



27. Connect the ignition coil connectors (A) and fuel pump connector (B) after installing the wiring protector.



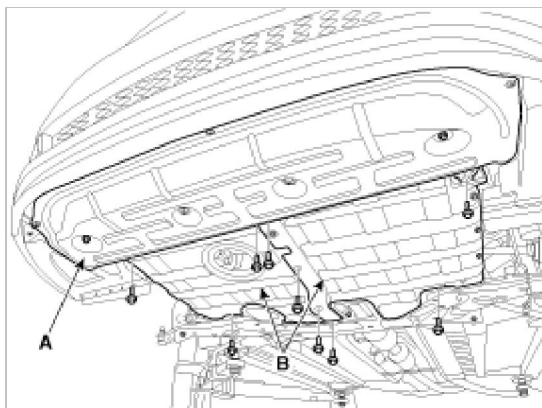
28. Connect the exhaust OCV (Oil control valve) connector (A) and the oxygen sensor connector (B).



29. Install the under covers (A,B).

Tightening torque :

7.8 ~ 11.8N.m (0.8 ~ 1.2kgf.m, 5.8 ~ 8.7lb-ft)



NOTE

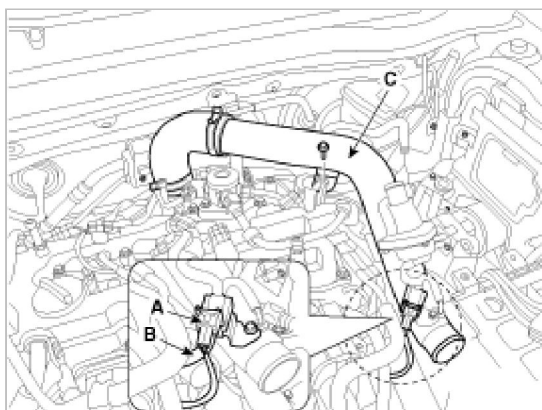
When installing the cover (B), install the cover with the mounting bracket.

30. Install the intercooler inlet pipe & hose assembly (C) and then connect the recirculation valve connector (A) and the vacuum hose (B).

Tightening torque

Pipe mounting bolt:

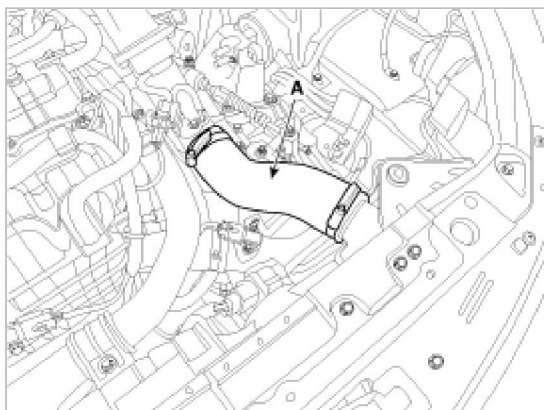
14.7 ~ 19.6 N.m (1.5 ~ 2.0 kgf.m, 10.8 ~ 14.5 lb-ft)



31. Install the intercooler inlet hose (A).

Tightening torque:

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



32. Install the RH front wheel.

33. Install the air cleaner assembly.

(1) Install the air cleaner assembly (E) and then connect the air intake hose (D).

Tightening torque

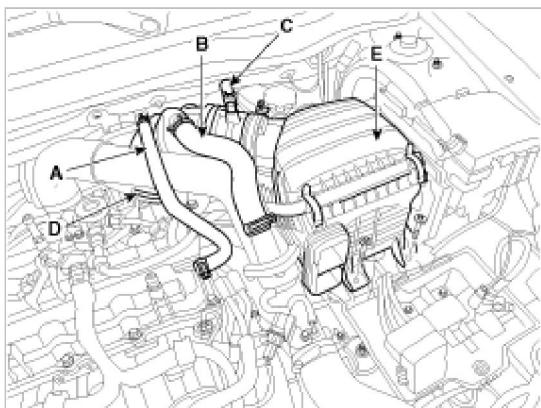
Hose clamp bolt :

2.9 ~ 4.9N.m (0.3 ~ 0.5kgf.m, 2.2 ~ 3.6lb-ft)

Air cleaner assembly bolts :

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

(2) Connect the breather hose (A), the recirculation hose (B) and the brake booster vacuum hose (C).

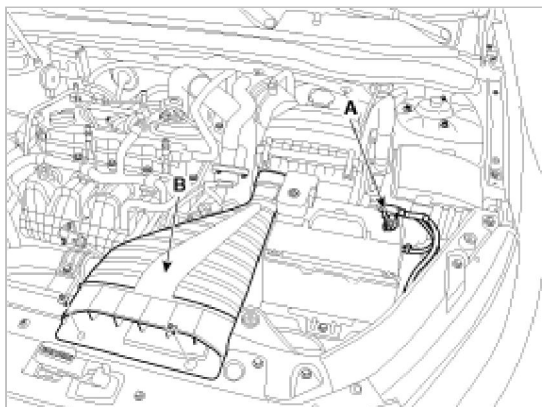


34. Install the air duct (B).

35. Connect the battery negative terminal (A).

Tightening torque:

4.0 ~ 6.0N.m (0.4 ~ 0.6kgf.m, 3.0 ~ 4.4lb-ft)



36. Install the engine cover.