

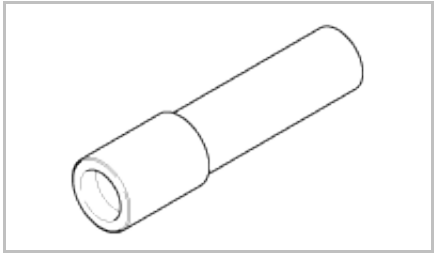
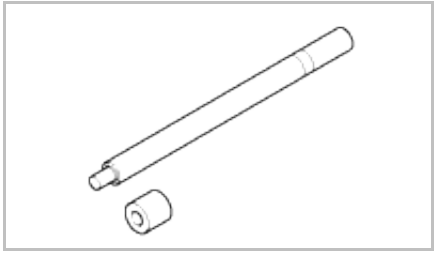
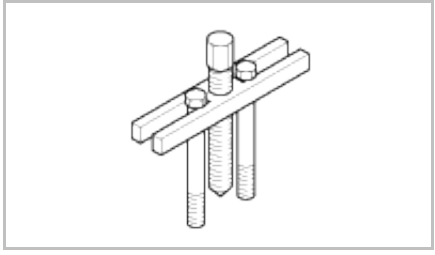
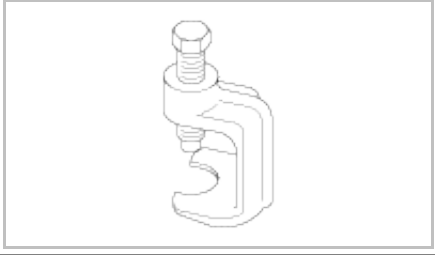
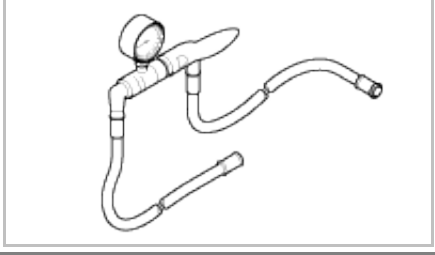
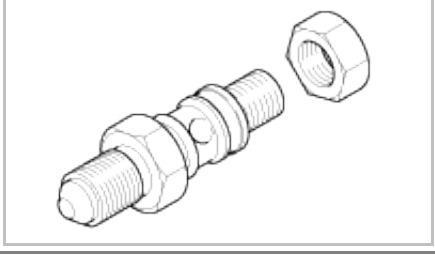


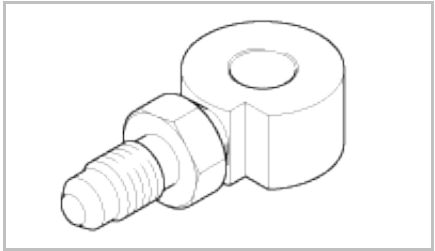
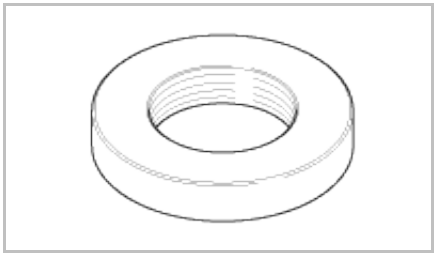
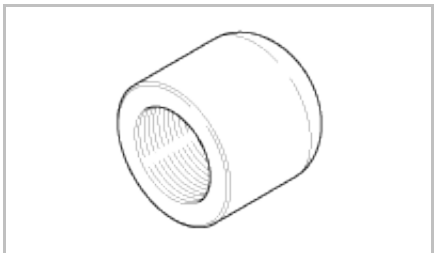
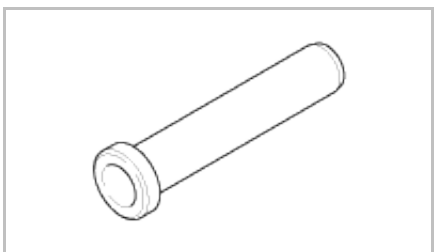
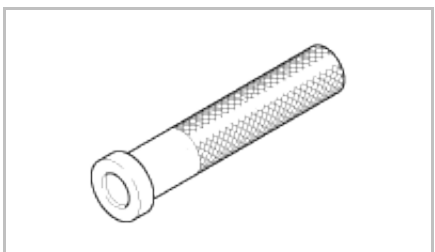
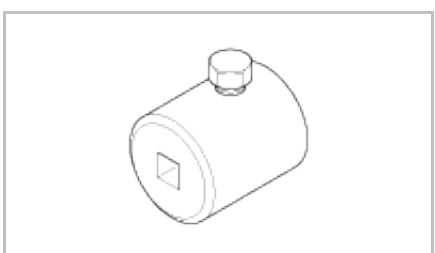
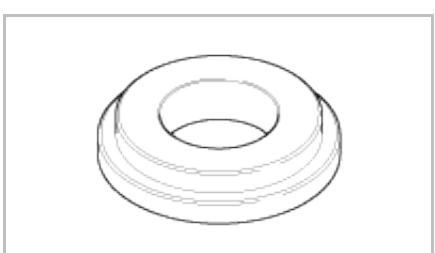
Steering System

General Information



SPECIAL TOOLS

Tool (Number and Name)	Illustration	Use
09222-32100 Valve stem oil seal installer		Installation of the oil pump oil seal
09555-21000 Bar		Removal and installation of the oil seal (Use with 09573-33100, 09573-33000, 09573-21000)
09561-11001 Steering wheel puller		Removal of steering wheel
09568-4A000 Tie rod end puller		Separation of the tie rod end ball joint
09572-21000 Oil pressure gauge		Measurement of the oil pressure (Use with 09572-22100, 09572-21200)
09572-21200 Oil pressure gauge adapter		Measurement of the oil pressure (Use with 09572-21000, 09572-22100)

09572-22100 Oil pressure gauge adapter		Measurement of the oil pressure (Use with 09572-21000, 09572-21200)
09573-21100 Oil seal installer		Installation of the back up washer and oil seal (Use with 09573-21000, 09573-33100, 09555-21000)
09573-33100 Oil seal guide		Removal and installation of the oil seal (Use with 09573-21000, 09573-33000, 09555-21000)
09432-21600 Bearing installer		Installing the pinion gear bearing
09434-14200 Counter shaft bearing installer		Installing the gear box oil seal
09565-11100 Preload socket		Measuring the pinion shaft preload
09573-21000 Oil seal installer guide		Installation of oil seal



TROUBLESHOOTING

Symptom	Probable cause	Remedy
Excessive play in steering	Loose yoke plug	Retighten
	Loose steering gear mounting bolts	Retighten
	Loose or worn tie rod end	Retighten or replace as necessary
Steering wheel operation is not smooth (Insufficient power assist)	V-belt slippage	Readjust
	Damaged V-belt	Replace
	Low fluid level	Replenish
	Air in the fluid	Bleed air
	Twisted or damaged hoses	Correct the routing or replace
	Insufficient oil pump pressure	Repair or replace the oil pump
	Sticky flow control valve	Replace
	Excessive internal oil pump leakage	Replace the damaged parts
	Excessive oil leaks from rack and pinion in gear box	Replace the damaged parts
	Distorted or damaged gear box or valve body seals	Replace
Steering wheel does not return properly	Excessive turning resistance of tierod end	Replace
	Yoke plug excessively tight	Adjust
	Tie rod and/or ball joint cannot turn smoothly	Replace
	Loose mounting of gear box mounting bracket Worn steering shaft joint and/or	Retighten
	Worn steering shaft joint and/or body grommet	Correct or replace
	Distorted rack	Replace
	Damaged pinion bearing	Replace
	Twisted or damaged hoses	Reposition or replace
	Damaged oil pressure control valve	Replace
	Damaged oil pump input shaft bearing	Replace
Noise	Hissing Noise in Steering Gear There is some noise with all power steering systems. One of the most common is a hissing sound when the steering wheel is turned and the car is not moving. This noise will be most evident when turning the wheel while the brakes are being applied. There is no relationship between this noise and steering performance. Do not replace the valve unless the "hissing" noise becomes extreme. A replaced valve will also make a slight noise, and is not always a solution for the condition.	
Rattling or chucking noise in the rack and pinion	Interference with hoses from vehicle body	Reposition
	Loose gear box bracket	Retighten
	Loose tie rod end and/or ball joint	Retighten
	Worn tie rod and/or ball joint	Replace
Noise in the oil pump	Low fluid level	Replenish
	Air in the fluid	Bleed air
	Loose pump mounting bolts	Retighten



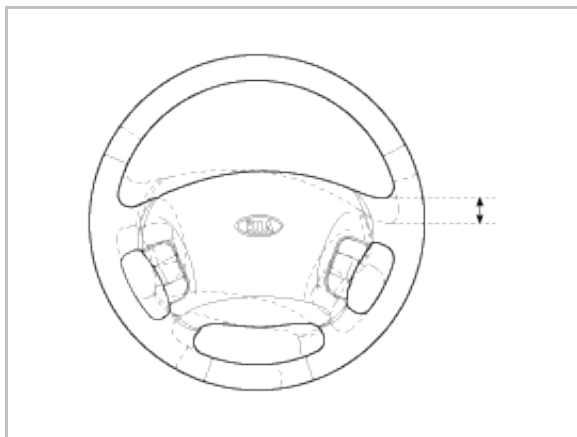
SERVICE ADJUSTMENT PROCEDURE

CHECKING STEERING WHEEL FREE PLAY

1. Start the engine and with the steering wheel in the straight ahead position.
2. Measure the play while turning the steering wheel to the left and right.

Standard value :

Steering wheel free play : 30 mm (1.1 in)



3. If the play exceeds the standard value, inspect the connection between the steering shaft and tie rod ends.

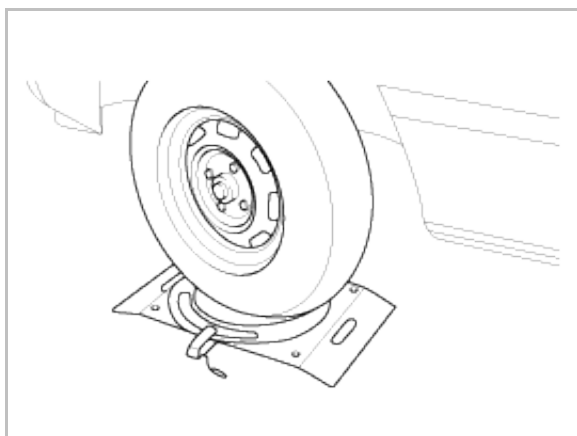
CHECKING STEERING ANGLE

1. Place the front wheel on a turning radius gauge and measure the steering angle.

Standard value

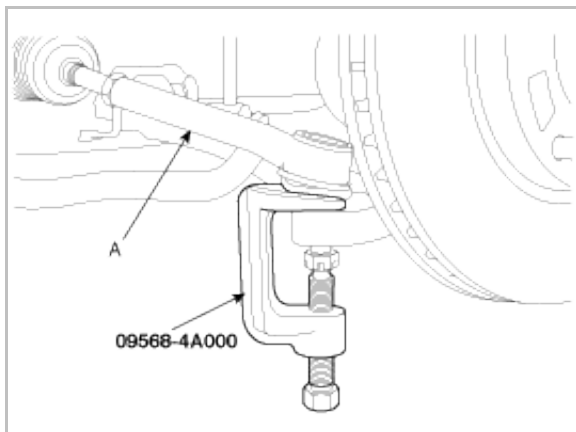
VRS on	Inner	38.64 °
	Outer	31.78 °
VRS off	Inner	41.91 °
	Outer	33.54 °

2. If the measured value is not within the standard value, adjust the toe and inspect again.



CHECKING THE TIE ROD END BALL JOINT STARTING TORQUE

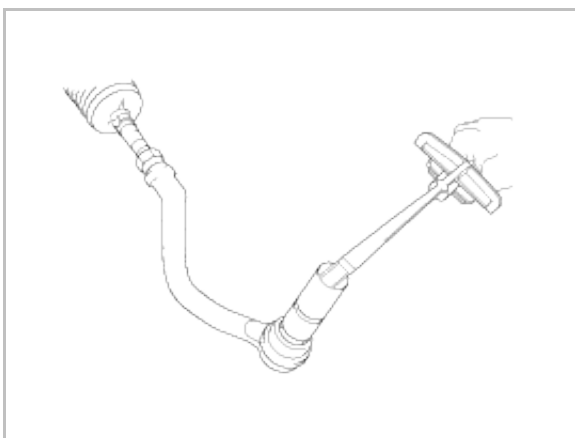
1. Disconnect tie rod and knuckle with the special tool (09568-4A000).



2. Shake the ball joint stud several times to check for looseness.

Tie rod end ball joint starting torque :

30 kg·cm or less



3. If the starting torque exceeds the upper limit of the standard value, replace the tie rod end.
4. Even if the starting torque is below the lower limit of the standard value, check the play of the ball joint and replace if necessary.

CHECKING STEERING WHEEL RETURN

1. The force required to turn the steering wheel and the wheel return should be the same for both moderate and sharp turns.
2. When the steering wheel is turned 90° and held for a couple of seconds while the vehicle is being driven at 20-30 kph (12-19 mph), the steering wheel should return at least 20° from its central position when it is released.

NOTICE

If the steering wheel is turned very quickly, steering may be momentarily difficult. This is not a malfunction because the oil pump output will be somewhat decreased.



CHECKING POWER STEERING BELT TENSION

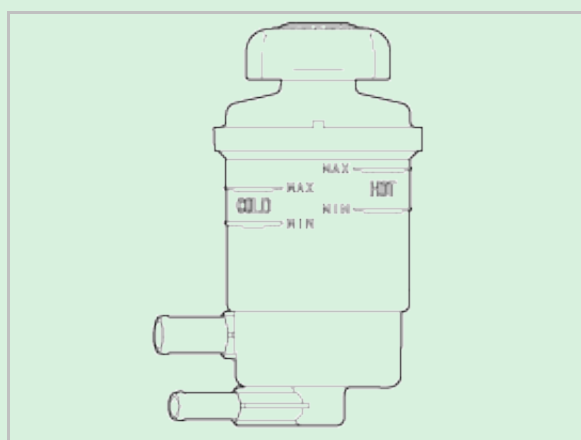
Refer to EM group(Timing system).

CHECKING POWER STEERING FLUID LEVEL

1. Position the vehicle on a level surface.
2. Start the engine. With the vehicle kept stationary, turn the steering wheel several times continuously to raise the fluid temperature to 50-60°C (122-140°F).
3. With the engine at idle, turn the steering wheel fully clockwise and counter-clockwise several times.
4. Make sure that there is no foaming or cloudiness in the reservoir fluid.
5. Stop the engine and check for any difference in fluid level between a stationary and a running engine.

NOTICE

1. If the fluid level varies 5 mm (0.2 in) or more, bleed the system again.
2. If the fluid level suddenly rises after stopping the engine, further bleeding is required.
3. Incomplete bleeding will produce a chattering sound in the pump and noise in the flow control valve, and lead to decreased durability of the pump.



REPLACING POWER STEERING FLUID

1. Jack up the front wheels and support them with jackstands.
2. Disconnect the return hose from the oil reservoir and plug the oil reservoir.
3. Connect a vinyl hose to the disconnected return hose, and drain the oil into a container.
4. Remove the fuel pump fuse, then start the engine and wait for the engine to stall. Next, while operating the starting motor intermittently, turn the steering wheel all the way to the left and then to the right several times to drain the fluid.
5. Connect the return hoses, then fill the oil reservoir with the specified fluid.
6. Reinstall the fuel pump fuse.
7. Start the engine. Check for oil leakage.
8. Stop the engine.
9. Bleed the system.

Power steering fluid type : PSF-3

Total quantity : Approx 1.1 liter

AIR BLEEDING

1. Remove the fuel pump fuse, then start the engine and wait for the engine to stall. Next, while operating the starting motor intermittently (for 15 ~ 20 seconds), turn the steering wheel all the way to the left and then to the right five or six times.
-

NOTICE

1. During air bleeding, replenish the fluid supply so that the level never falls below the lower position of the filter.
2. If air bleeding is done while the vehicle is idling, the air will be broken up and absorbed into the fluid. Be sure to do the bleeding only while cranking.
3. Reinstall the fuel pump fuse, and start the engine(idling).
4. Turn the steering wheel to the left and the right until there are no air bubbles in the oil reservoir.

CAUTION

Do not hold the steering wheel turned all the way to either side for more than ten seconds.

5. Confirm that the fluid is not milky, and that the level is up to the position specified on the level gauge.
6. Confirm that there is little change in the surface of the fluid when the steering wheel is turned left and right.

CAUTION

1. If the surface of the fluid changes considerably, air bleeding should be done again.
2. If the fluid level rises suddenly when the engine is stopped, it indicates that there is still air in the system.
3. If there is air in the system, a jingling noise may be heard from the pump and the control valve may also produce unusual noises. Air in the system will shorten the life of the pump and other parts.



OIL PUMP PRESSURE TEST (OIL PUMP RELIEF PRESSURE)

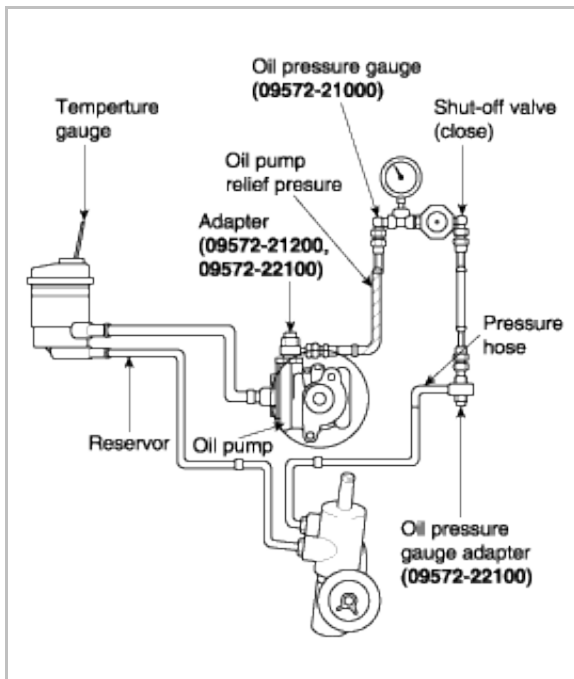
1. Disconnect the pressure hose from the oil pump. Connect the special tool between the oil pump and pressure hose as illustrated.
2. Bleed the air, and then start the engine and turn the steering wheel several times so that the fluid temperature rises to approximately 50°C (122°F).
3. Set the engine speed to 1,000 rpm.
4. Close the shut-off valve of the special tool and measure the fluid pressure to confirm that it is within the range.

standard vaule :

Relief pressure: 90 +3/-2 kgf/cm²

CAUTION

Don't keep the shut-off valve on the pressure gauge closed for longer than seconds.



- Remove the special tools, and tighten the pressure hose to the specified torque.

Tightening Torque Nm(kgf·m, lb-ft) :

65 ~ 75(6.5 ~ 7.5, 47 ~ 54)

- Bleed the system.



SPECIFICATIONS

Items			Specifications
Steering column/ shaft	Type		Tilt
	Tilt stroke		+7°/ -11.7°
Steering gear	Type		Rack & pinion
	Rack stroke	VRS On	148 mm (5.827 in)
		VRS Off	156 mm (6.142 in)
Power steering pump	Type		Vane
	Diesel	Relief pressure	90 kgf/cm ²
		Discharge	9.6 cc/rev
	Gasoline	Relief pressure	90 kgf/cm ²
		Discharge	10.5 cc/rev

SERVICE STANDARD

Items			Specifications
Steering wheel free play			30 mm (1.12 in)
Steering angle	VRS on	Inner	38.64°
		Outer	31.78°
	VRS off	Inner	41.91°
		Outer	33.54°

TIGHTENING TORQUE

Items	Nm	Kgf.m	Lb-ft
Steering wheel lock nut	40 ~ 50	4.0 ~ 5.0	29 ~ 36
Steering column mounting bolts and nut	13 ~ 18	1.3 ~ 1.8	9.4 ~ 13.0
Bolt connecting steering column to universal joint	15 ~ 20	1.5 ~ 2.0	10.8 ~ 14.5
Bolt connecting universal joint to steering gear	13 ~ 18	1.3 ~ 1.8	9.4 ~ 13.0
Steering column mounting bolts and nut	13 ~ 18	1.3 ~ 1.8	9.4 ~ 13.0
Tie rod end castle nut	35 ~ 45	3.5 ~ 4.5	25 ~ 33
Front lower arm ball joint assembly bolts	90 ~ 120	9.0 ~ 12.0	65 ~ 87
Stabilizer link to strut assembly nut	100 ~ 120	10.0 ~ 12.0	72 ~ 87
Rear roll stopper to sub-frame bolts	50 ~ 60	5.0 ~ 6.0	36 ~ 43
Pressure tube to valve body housing nut	12 ~ 18	1.2 ~ 1.8	9 ~ 13
Pressure tube to oil pump eye bolt	65 ~ 75	6.5 ~ 7.5	47 ~ 54
Return tube to valve body housing nut	12 ~ 18	1.2 ~ 1.8	9 ~ 13
Power steering gear box to sub-frame bolts	90 ~ 110	9.0 ~ 11.0	65 ~ 80

LUBRICANT

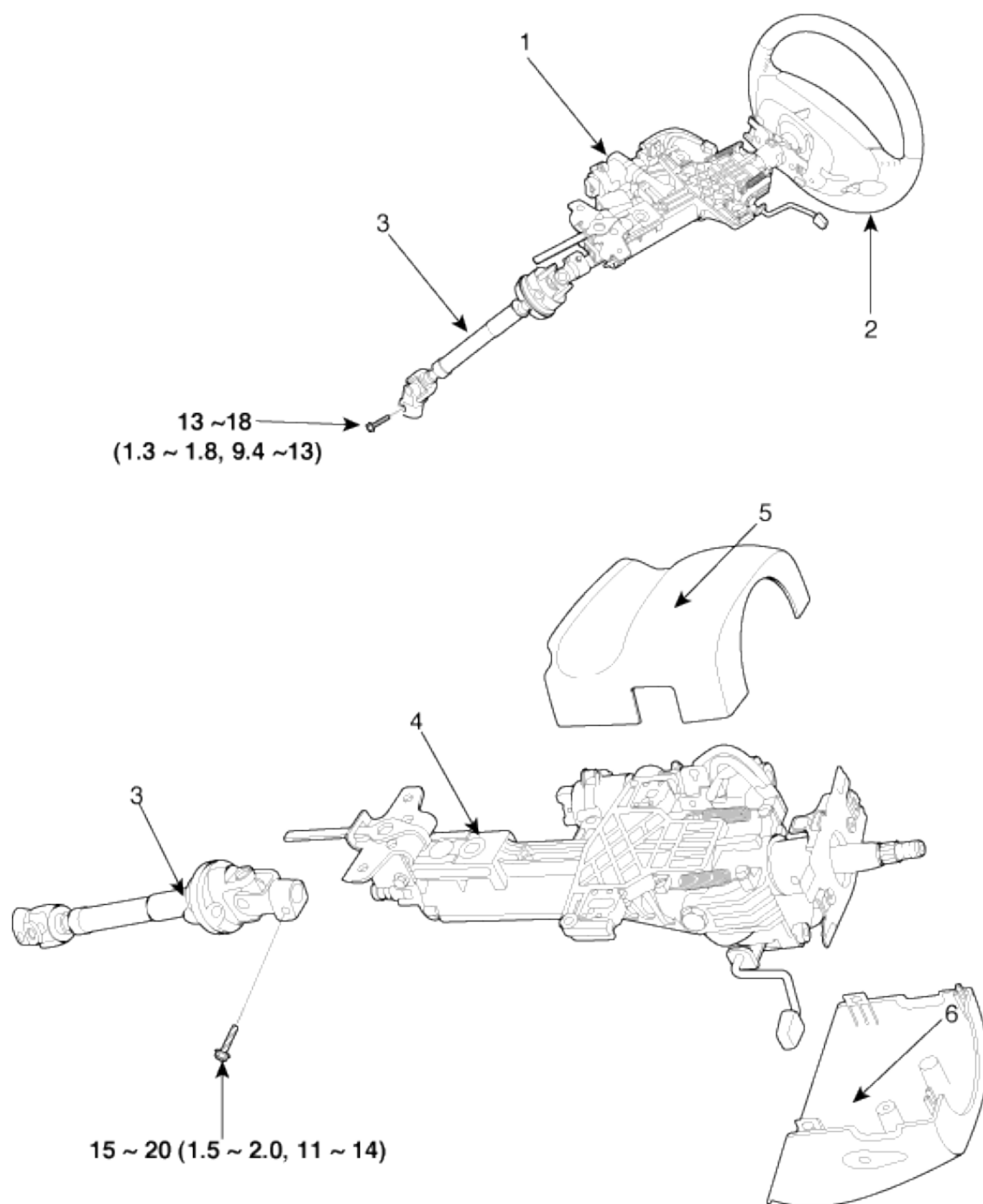
Item	Lubricant	Quantity
Power steering fluid	PSF-3	1.1 L



Steering System

Steering Column & Shaft

COMPONENTS



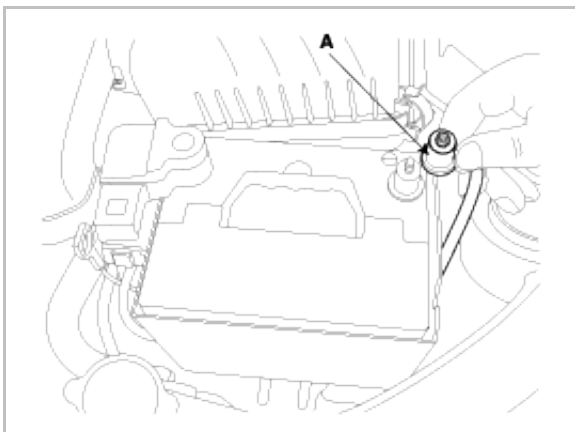
TORQUE : Nm (kgf.m, lb-ft)

- 1. Key lock assembly
- 2. Steering wheel
- 3. Universal joint assembly

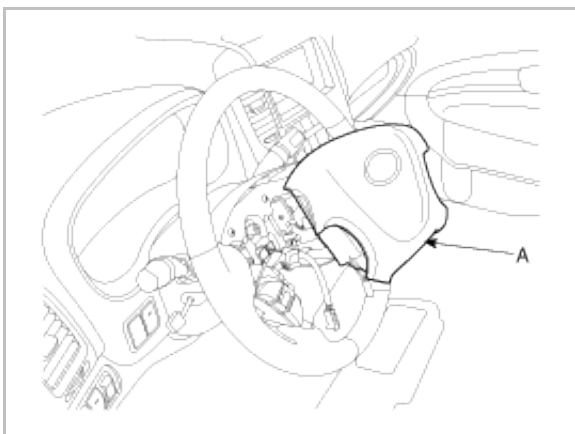
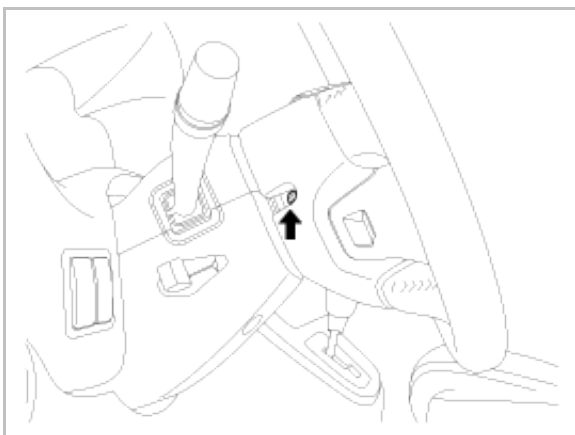
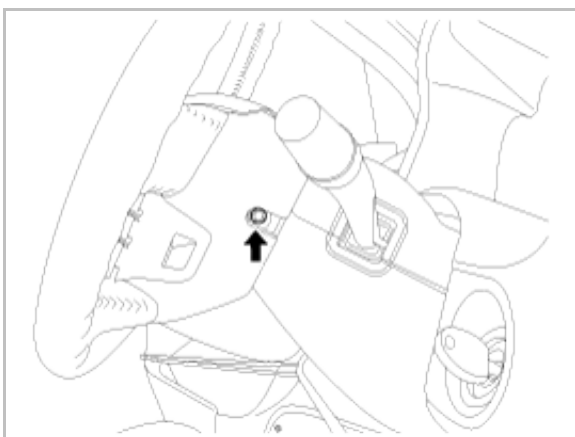
- 4. Steering column assembly
- 5. Steering column upper shroud
- 6. Steering column lower shroud

REMOVAL

1. Disconnect the negative terminal (A) from the battery and then wait for 30 seconds.



2. Loosen the bolts in the illustration and then remove the horn pad (A).



3. Disconnect the connectors and remove the steering wheel lock nut.

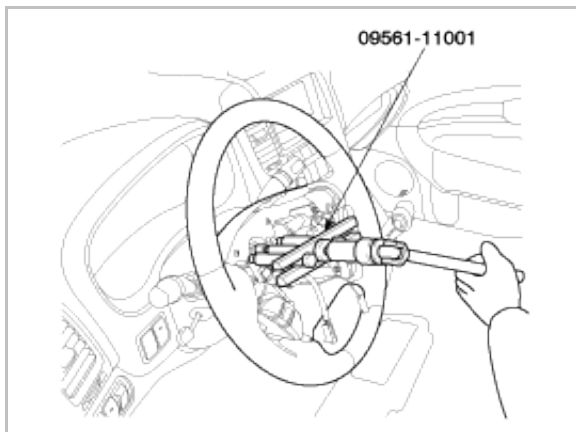
Tightening torque Nm (kgf.m, lb-ft):

40 ~ 50 (4.0 ~ 5.0, 29 ~ 36)

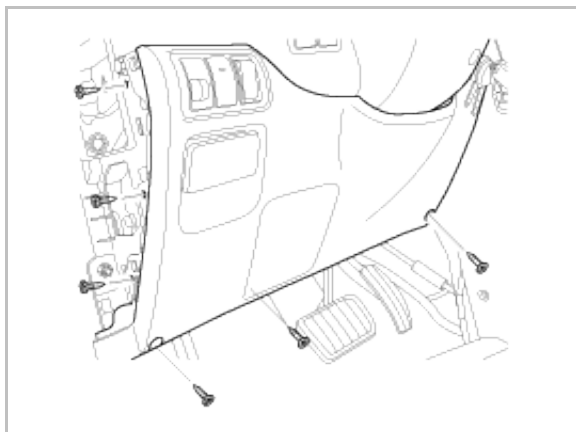
4. After making the marks on the steering wheel and shaft for reinstallation, remove the steering wheel using a SST (09561-11002).

CAUTION

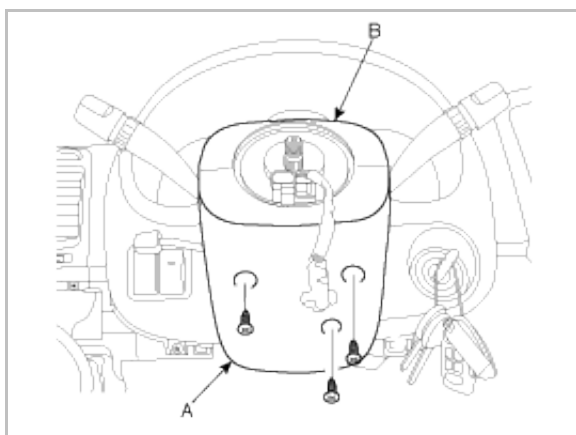
Do not hammer on the steering wheel to remove it ; it may damage the steering column.



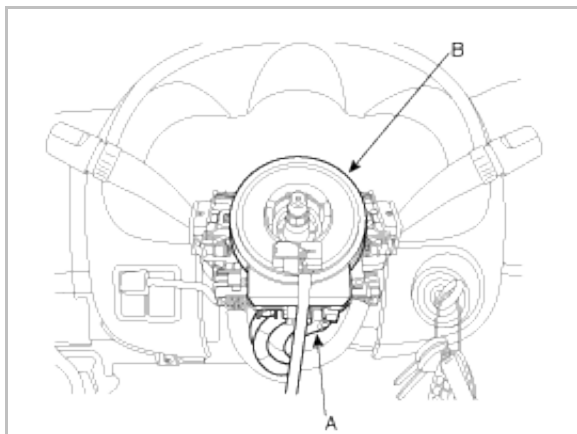
5. Loosen the screws, and then remove the lower crash pad (A).



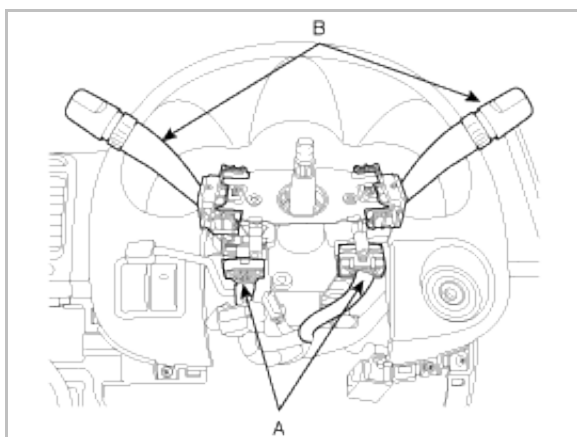
6. Loosen the screws, and then remove the steering column upper (B) and lower shrouds (A).



7. Disconnect the connectors (A) and then remove the clock sprig (B).



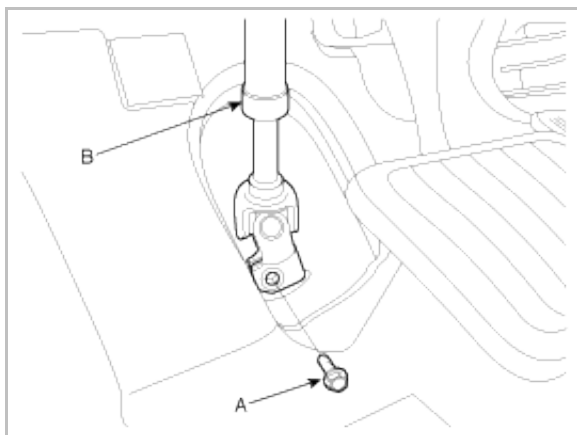
8. Disconnect the connectors (A) and remove the multifunction switch (B).



9. Loosen the bolt (A) and then disconnect the universal joint assembly (B) from the steering gear assembly.

Tightening torque Nm (kgf.m, lb-ft):

13 ~ 18 (1.3 ~ 1.8, 9.4 ~ 13.0)



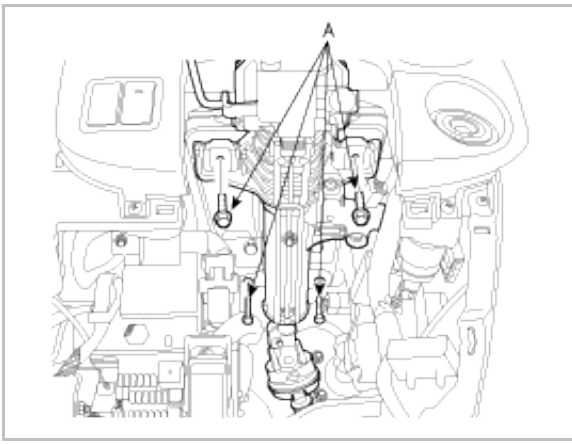
CAUTION

Keep the neutral-range to prevent the damage of the clock spring inner cable when you handle the steering wheel.

10. Remove the steering column assembly by loosening the steering column mounting bolts and nut (A).

Tightening torque Nm (kgf.m, lb-ft):

13 ~ 18 (1.3 ~ 1.8, 9.4 ~ 13.0)



INSTALLATION

NOTICE

Before installing, apply multi purpose grease to each moving parts.

1. Installation is the reverse of removal.

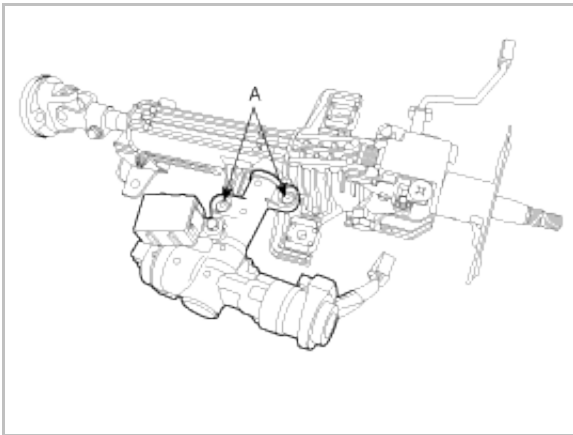
CAUTION

Align the marks on the steering wheel and shaft for reinstallation when installing the steering wheel.
When installing the clock spring, refer the RT group to prevent the damage of clock spring inner cable.

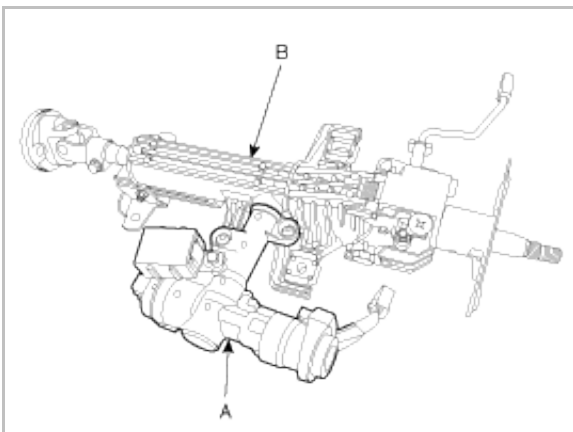
DISASSEMBLY

KEY LOCK ASSEMBLY

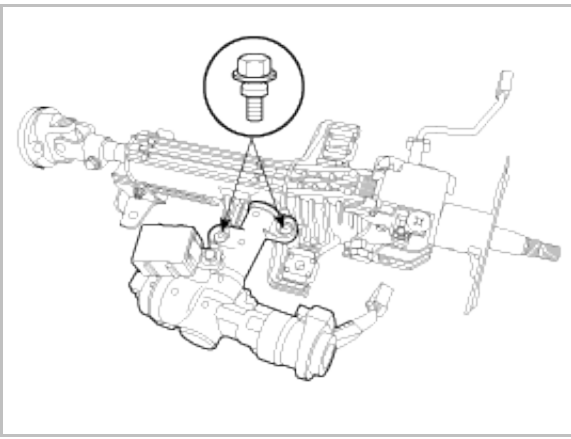
1. Make a groove on head of the special bolt (A) by using a punch.



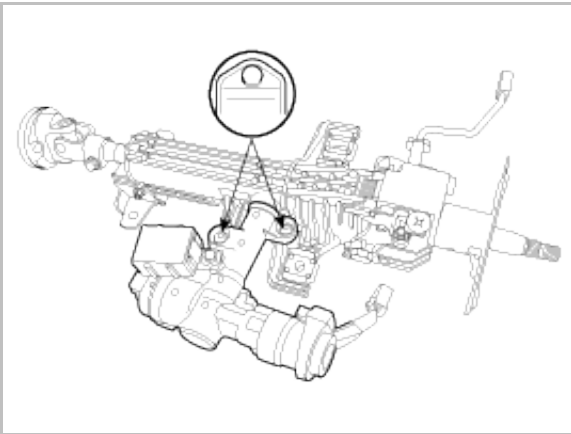
2. Remove the key lock assembly (A) from the steering column (B) by loosening special bolts.



3. When reassembling the key lock assembly, loosely install new special bolts to the steering column shaft.

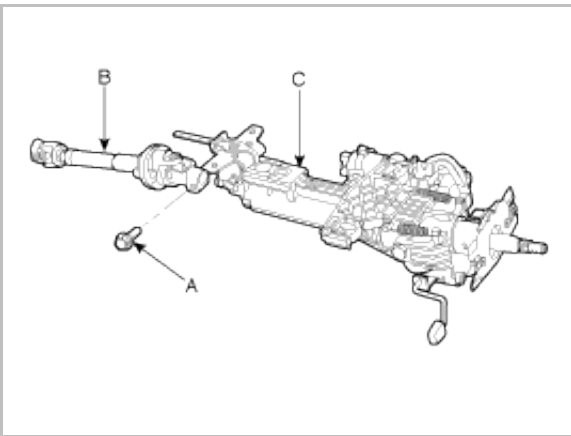


4. Tighten the special bolt until its head is cut off.



UNIVERSAL JOINT ASSEMBLY

1. Remove the universal joint (B) assembly from the steering column assembly (C) by loosening the bolt (A).



2. Reassembly is the reverse of disassembly.

INSPECTION

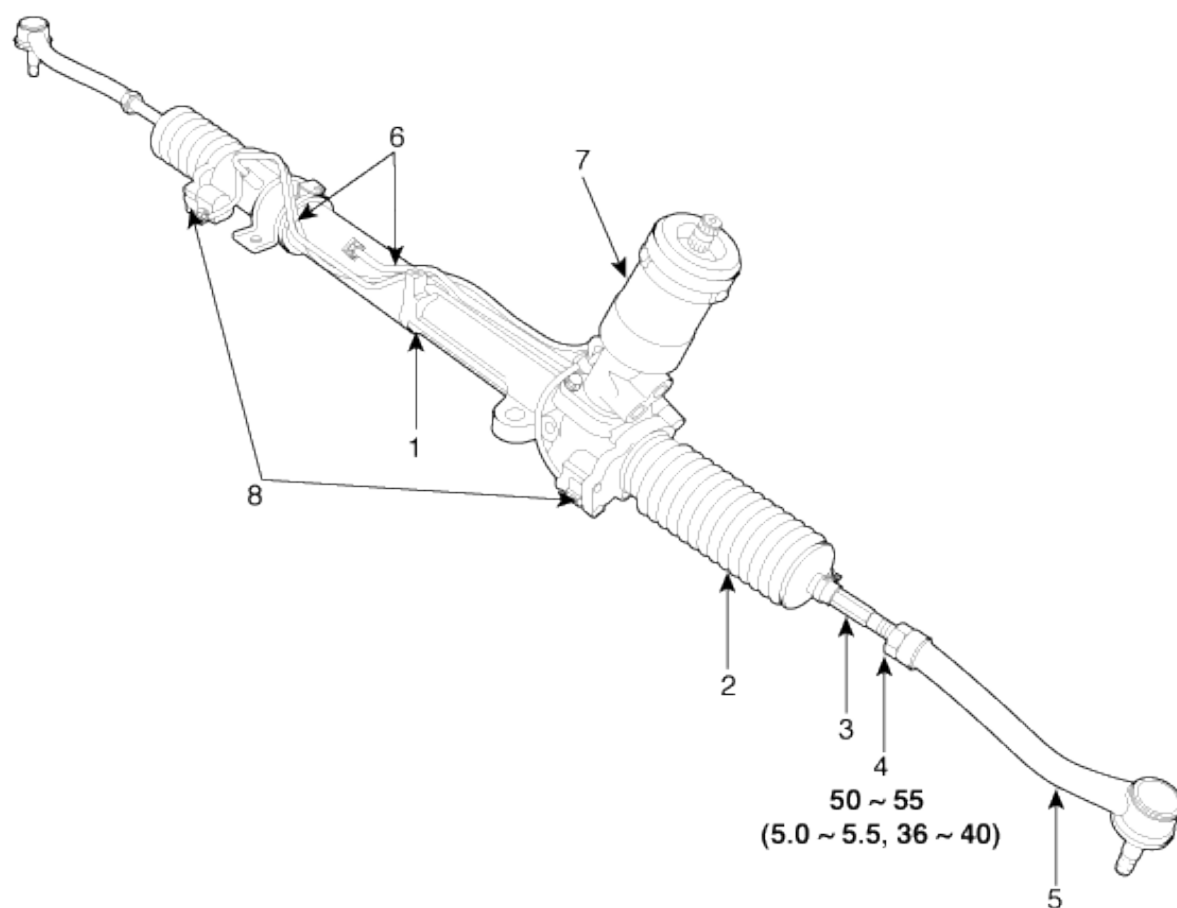
1. Check the steering column shaft for damage and deformation.
2. Check connection for play, damage and smooth operation.
3. Check the joint bearing for wear and damage.



Steering System

Hydraulic Power Steering System

COMPONENTS



TORQUE : Nm (kgf.m, lb-ft)

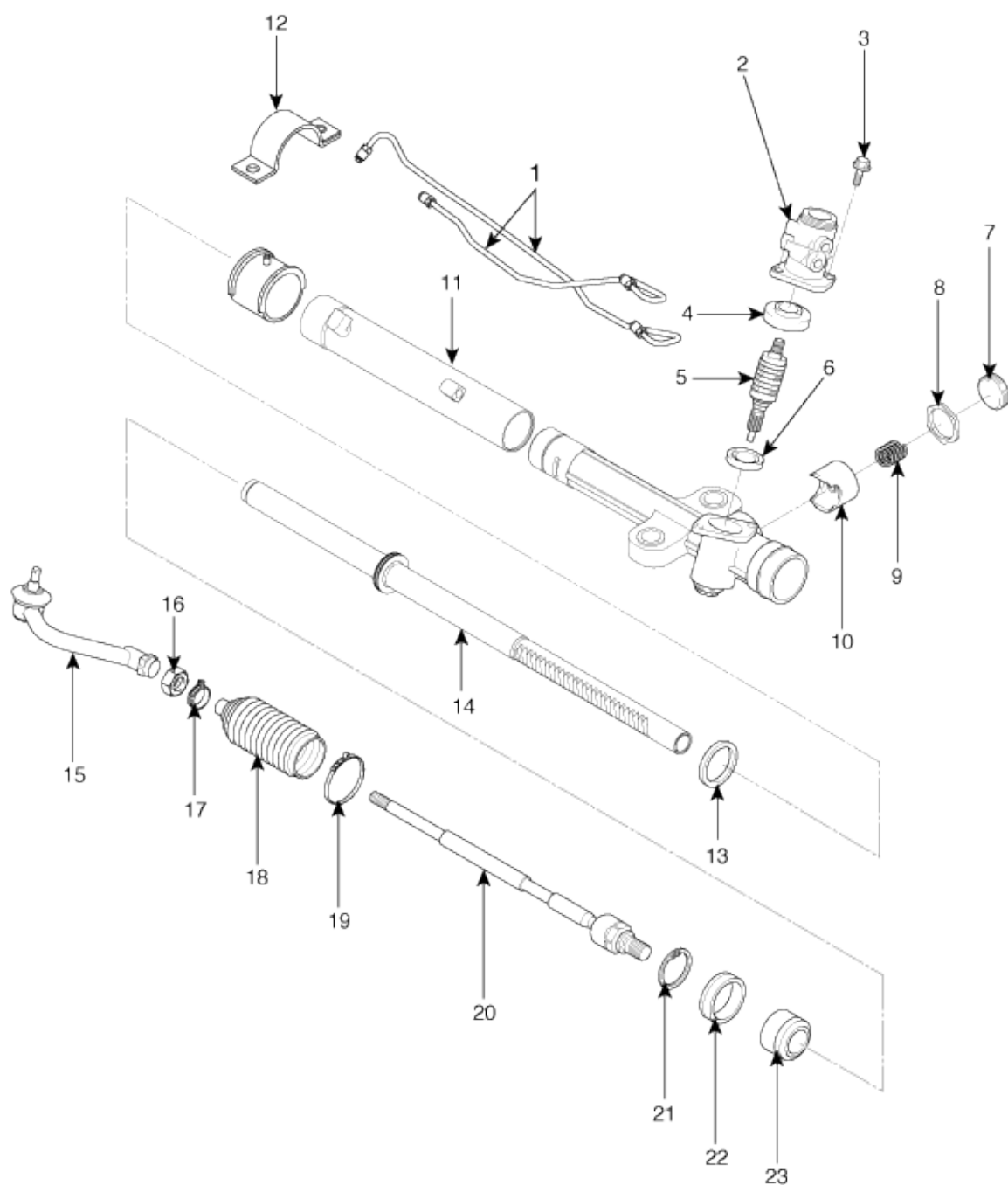
- 1. Rack housing
- 2. Bellows
- 3. Tie rod
- 4. Tie rod lock nut

- 5. Tie rod end
- 6. Feed tube
- 7. Valve body assembly
- 8. VRS operating unit

Steering System

Hydraulic Power Steering System - Power
Steering Gear Box

COMPONENT



- | | | |
|--------------------------|--|------------------|
| 1. Feed tube | 9. Rack support spring | 17. Bellows clip |
| 2. Valve body housing | 10. Rack support yoke | 18. Bellows |
| 3. Bolt | 11. Rack housing | 19. Bellows band |
| 4. Oil seal | 12. Power steering gear box mounting clamp | 20. Tie rod |
| 5. Pinion valve assembly | 13. Oil seal | 21. Circlip |
| 6. Oil seal | 14. Rack | 22. Oil seal |
| 7. Yoke plug | 15. Tie rod end | 23. Rack stopper |
| 8. Lock nut | 16. Lock nut | |

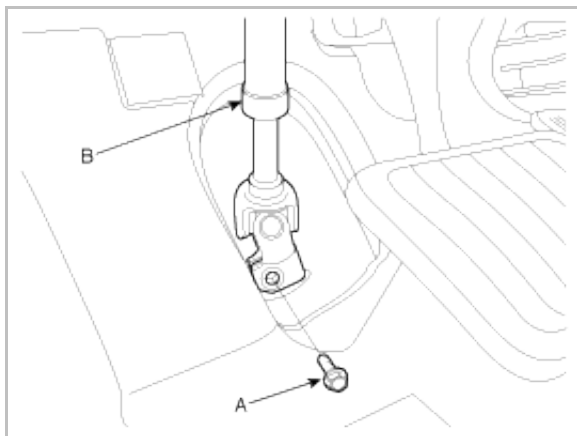


REMOVAL

1. Remove the both front wheel & tire assemblies.
2. Drain the power steering fluid.
3. Remove the bolt (A) connecting steering column to universal joint.

Tightening torque Nm (kgf.m, lb-ft):

13 ~ 18 (1.3 ~ 1.8, 9.4 ~ 13.0)



CAUTION

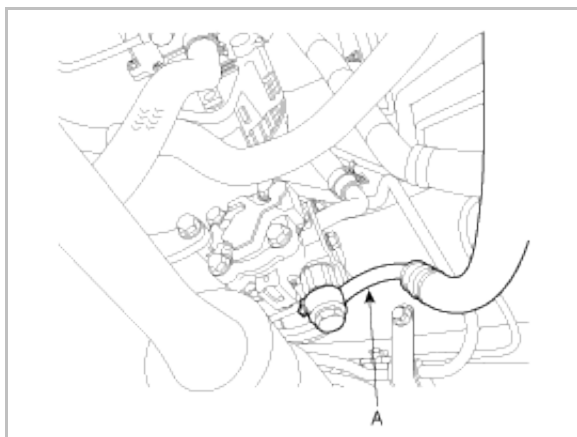
Keep the neutral-range to prevent the damage of the clock spring inner cable when you handle the steering wheel.

4. Disconnect the pressure tube (A) from the power steering oil pump by loosening eye bolt.

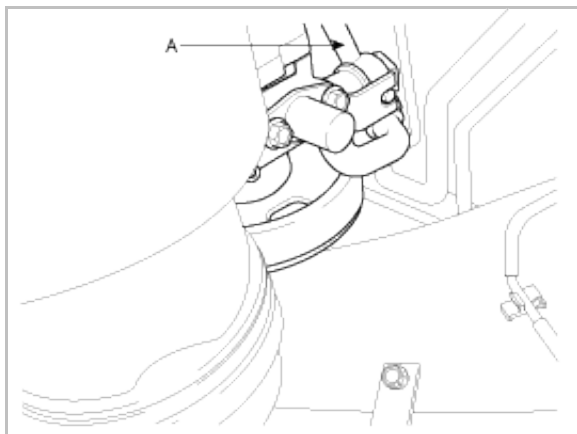
Tightening torque Nm (kgf.m, lb-ft):

65 ~ 75 (6.5 ~ 7.5, 47 ~ 54)

[Diesel]

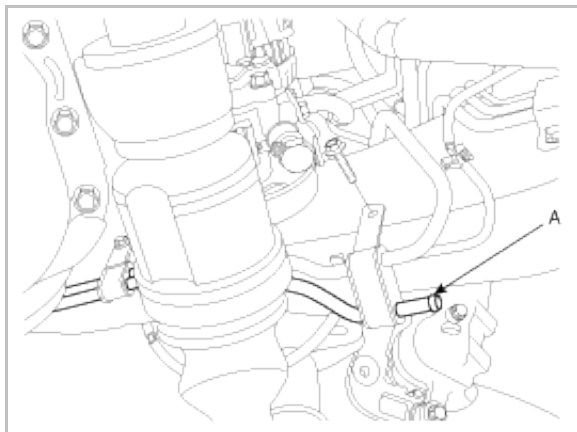


[Gasoline]

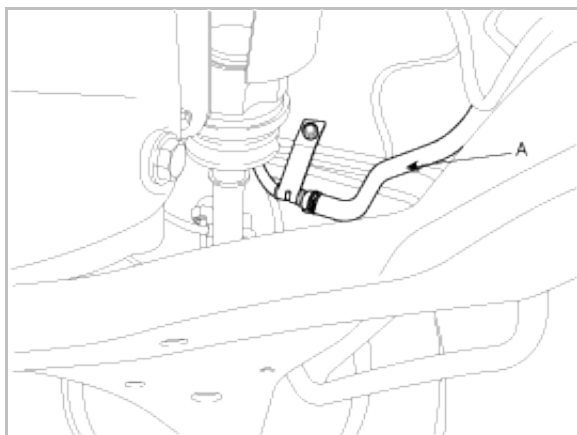


5. Disconnect the return hose (A)

[Diesel]



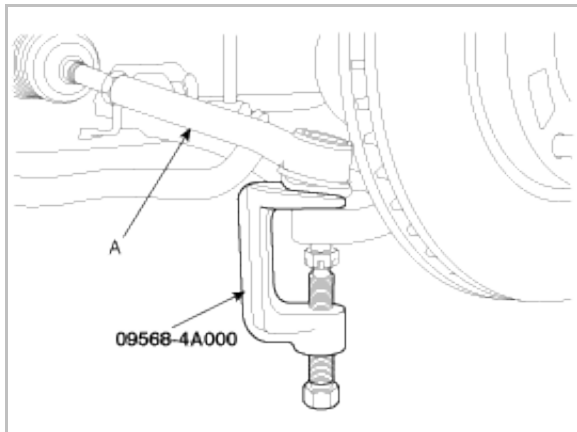
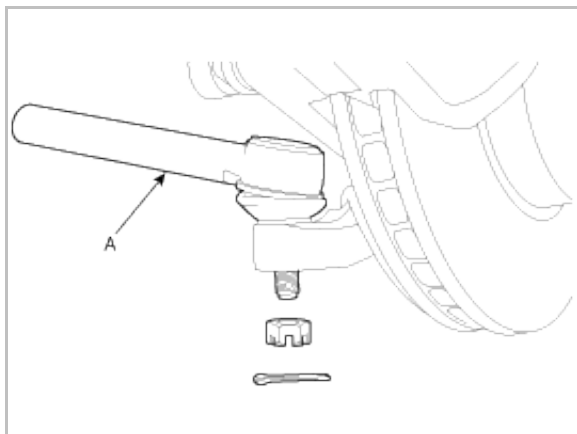
[Gasoline]



6. Loosen the split pin and castle nut, and then remove the tie rod end (A) from the knuckle by using a SST (09568-4A000).

Tightening torque Nm (kgf.m, lb-ft):

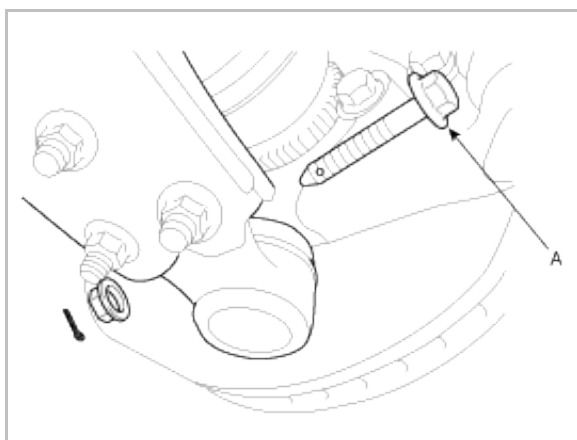
50 ~ 55 (5.0 ~ 5.5, 36 ~ 40)



7. Remove the split pin and lower arm bolts and nut (A).

Tightening torque Nm (kgf-m, lb-ft):

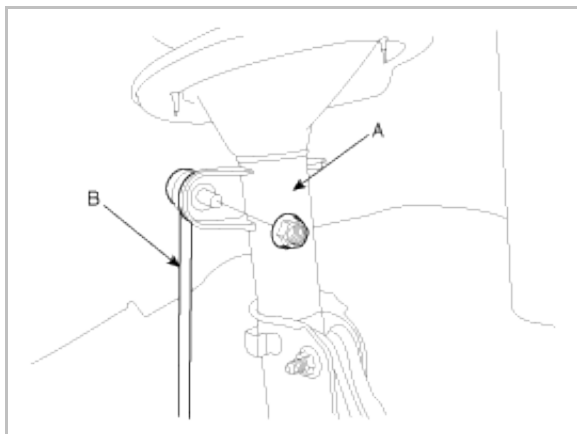
90 ~ 120 (9.0 ~ 12.0, 65 ~ 87)



8. Disconnect the stabilizer link (B) from the strut assembly (A) by loosening nut.

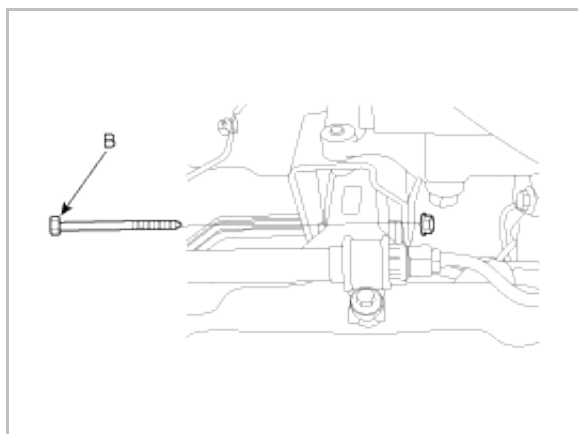
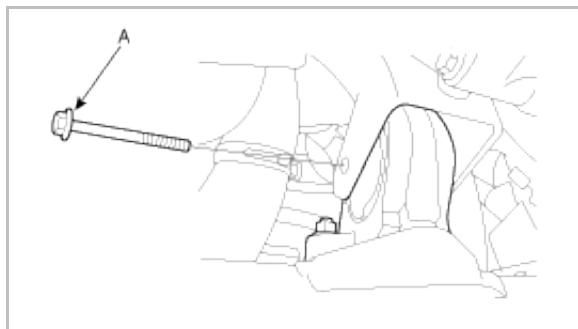
Tightening torque Nm (kgf.m, lb-ft):

100 ~ 120 (10.0 ~ 12.0, 72 ~ 87)

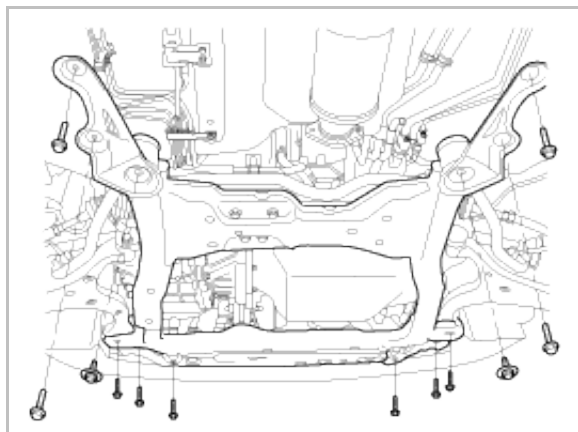


9. Repeat on the other side.

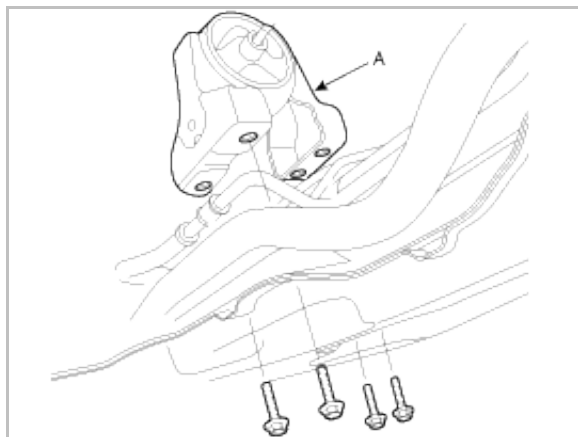
10. Remove the front and rear roll stopper bolts and nuts (A, B).



11. Remove the sub-frame by loosening the bolts and nuts.



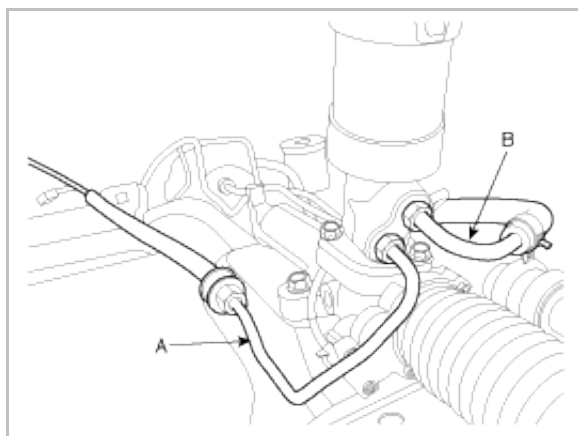
12. Remove the rear roll stopper (A) from the sub-frame.



13. Disconnect the pressure tube (A) and return (B) from the valve body housing.

Tightening torque Nm (kgf.m, lb-ft):

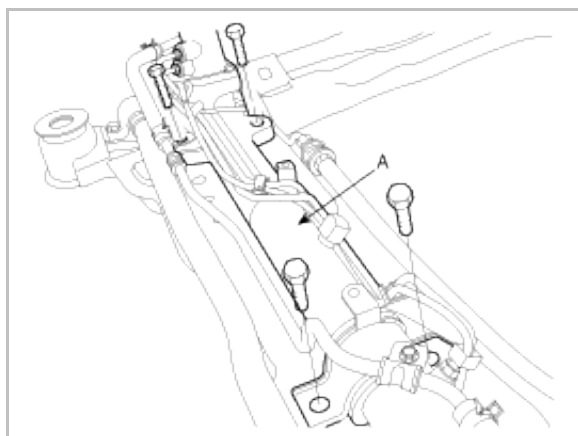
12 ~ 18 (1.2 ~ 1.8, 9 ~ 13)



14. Remove the power steering gear box (A) from the sub-frame by loosening the mounting bolts.

Tightening torque Nm (kgf.m, lb-ft):

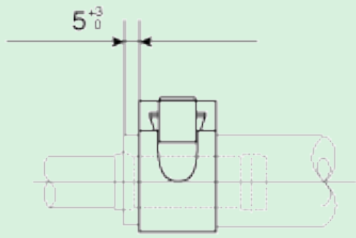
60 ~ 80 (6.0 ~ 8.0, 43~58)



INSTALLATION

NOTICE

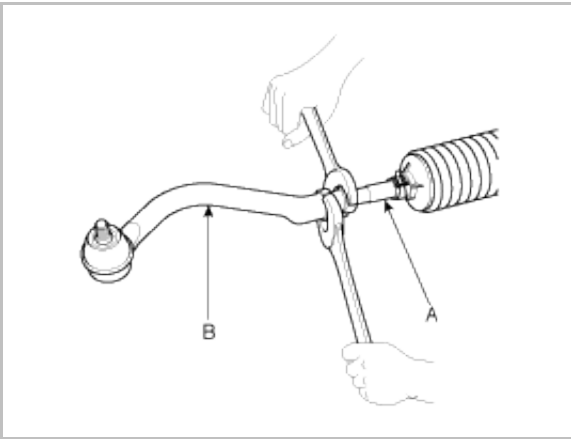
Be sure to connect between a tube and a hose as shown in the illustration.



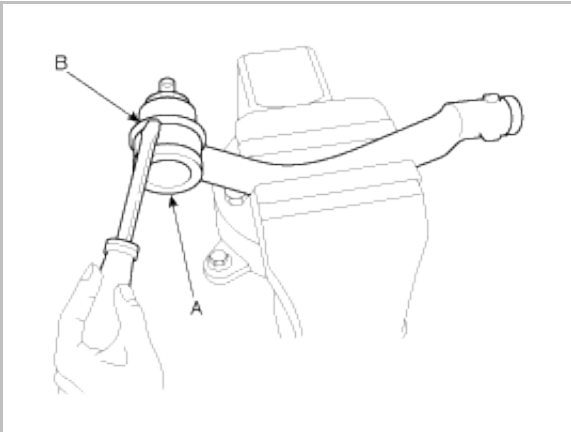
1. Installation is the reverse of removal.
2. After installation, bleed the power steering system. (Refer to the air bleeding in ST group)
3. Adjust the wheel alignment. (Refer to SS group)

DISASSEMBLY

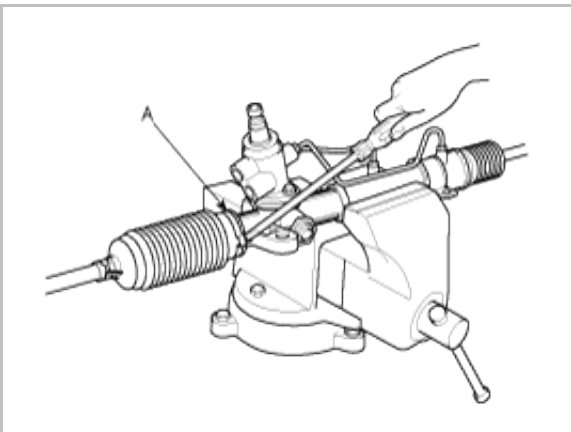
1. Remove the tie rod end (B) from the tie rod (A).



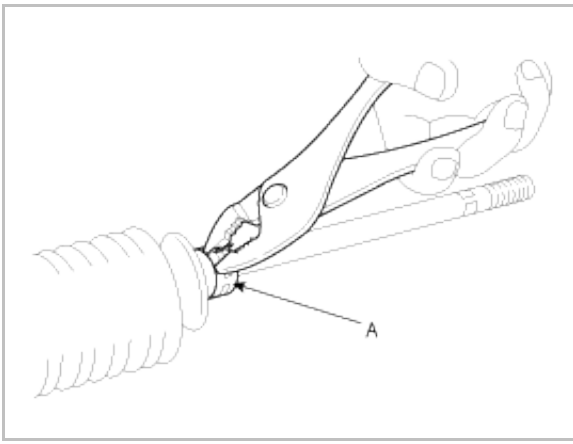
2. Remove the dust cover (B) from the ball joint (A).



3. Remove the bellows band (A).



4. Remove the bellows clip (A).

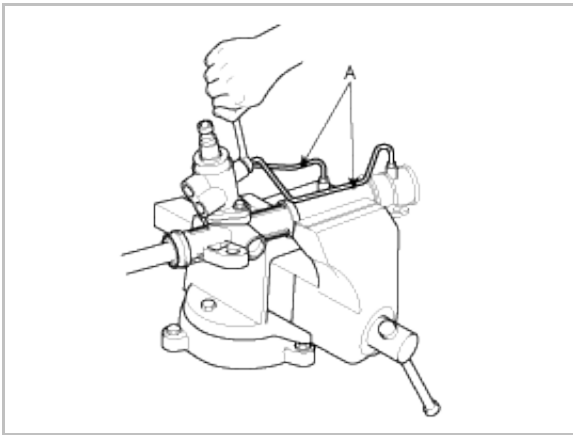


5. Pull the bellows out toward the tie rod.

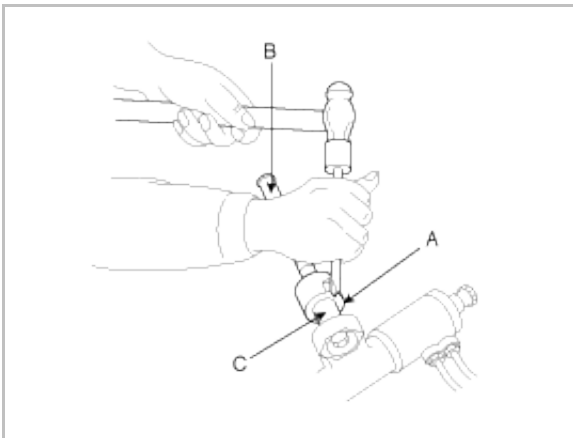
NOTICE

Check for rust on the rack when the bellows are replaced.

6. Remove the feed tube(A) from the rack housing.



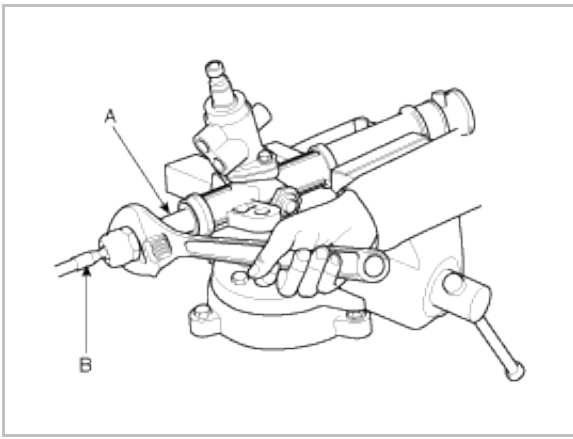
7. While moving the rack slowly, drain the fluid from the rack housing.
8. Unstake the tab washer (A) which fixes the tie rod (B) and rack (C) with a chisel.



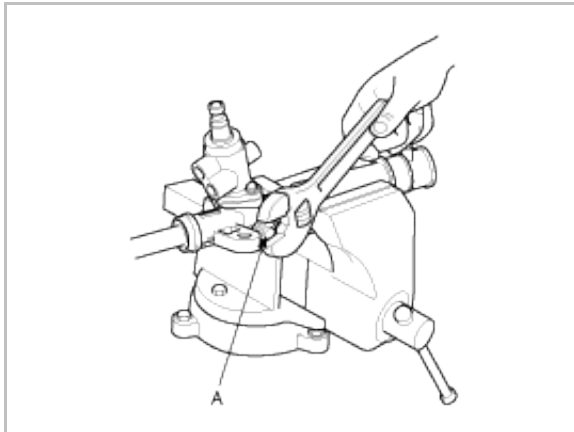
9. Remove the tie rod (B) from the rack (A).

CAUTION

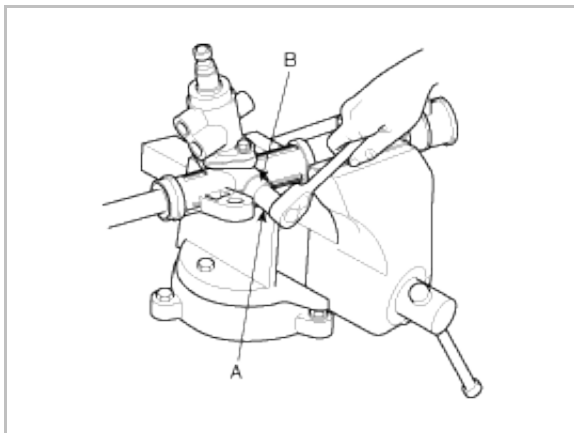
Remove the tie rod (B) from the rack (A), taking care not to twist the rack.



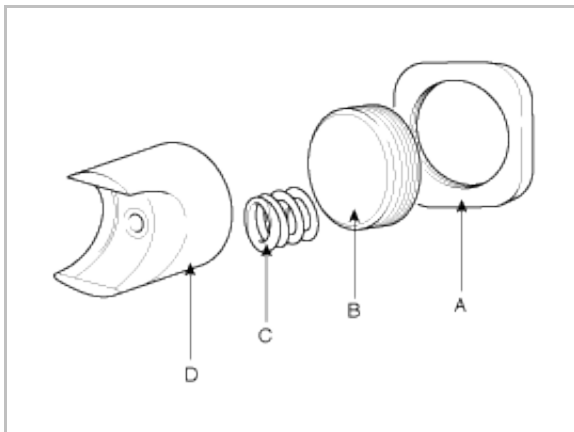
10. Remove the yoke plug locking nut (A).



11. Remove the yoke plug (B) with a 14mm socket (A).



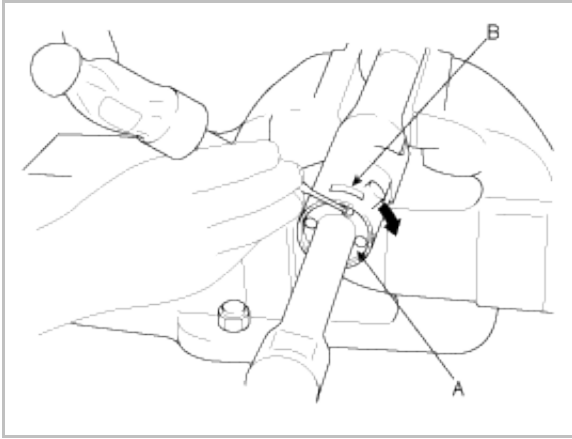
12. Remove the lock nut (D), yoke plug (C), rack support spring (B) and rack support yoke (A) from the gear box.



13. When the end of the circlip comes out of the notched hole of the housing rack cylinder, turn the rack stopper (A) clockwise and remove the circlip.

CAUTION

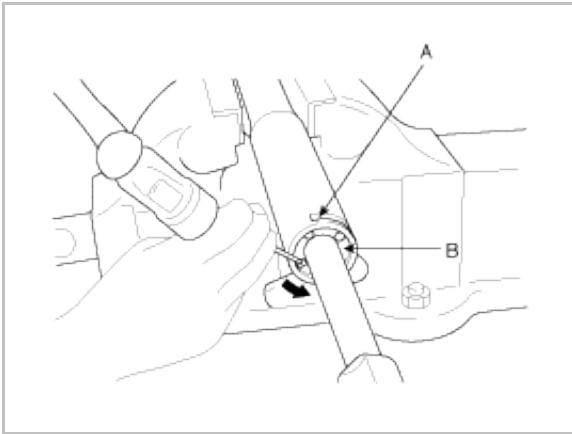
Be careful not to damage the rack.



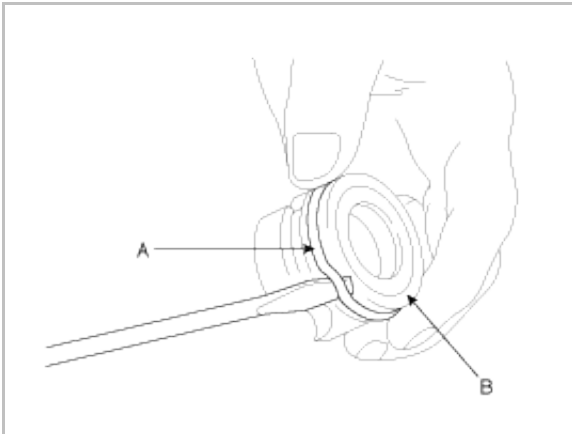
14. When the end of the circlip comes out of the notched hole (A) of the housing rack cylinder, turn the rack stopper (B) counterclockwise and remove the circlip.

CAUTION

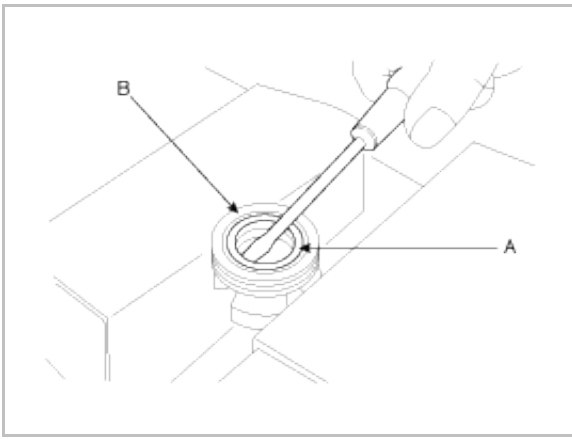
Be careful not to damage the rack.



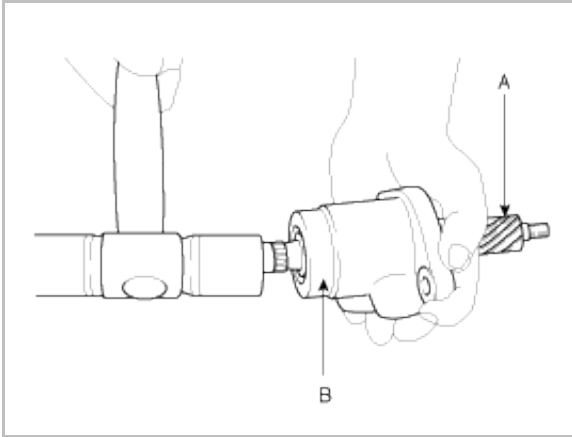
15. Remove the rack bushing and rack from the rack housing.
16. Remove the O-ring(A) from the rack bushing (B).



17. Remove the oil seal (B) from the rack bushing (A).



18. Remove the valve body (A) from the valve body housing (B) with a soft hammer.



19. Using the special tool, remove the oil seal and ballbearing from the valve body housing.

20. Remove the oil seal and O-ring from the rack housing.

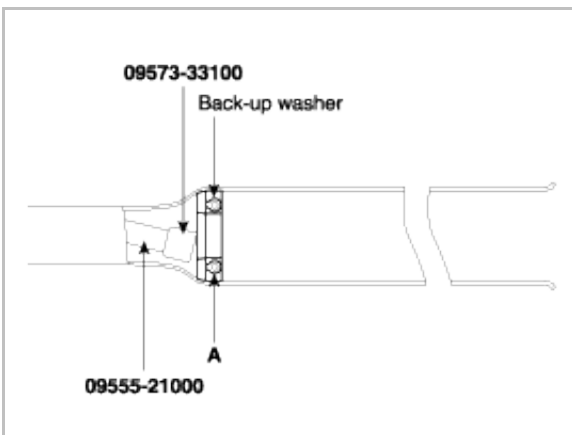
CAUTION

Be careful not to damage the pinion valve cylinder inside of the rack housing.

21. Using the special tool (09573-33100, 09555-21000), remove the oil seal (A) from the rack housing.

CAUTION

Be careful not to damage the rack cylinder inside of the rack housing.



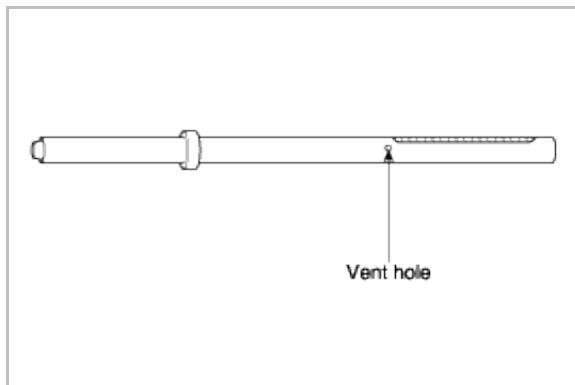
INSPECTION

1. Rack

- (1) Check for rack tooth face damage or wear.
- (2) Check for oil seal contact surface damage.
- (3) Check for rack bending or twisting.

(4) Check for oil seal ring damage or wear.

(5) Check for oil seal damage or wear.



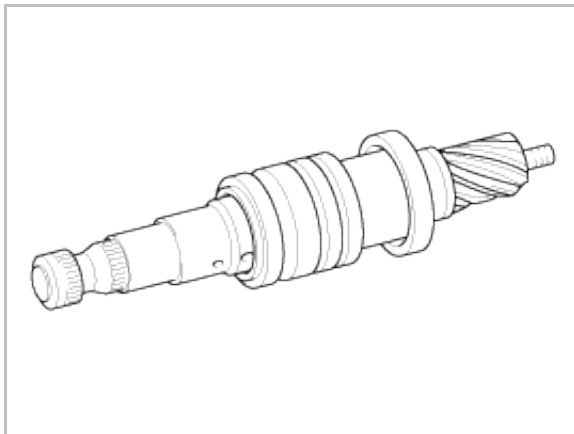
2. Pinion valve

(1) Check for pinion gear tooth face damage or wear.

(2) Check for oil seal contact surface damage.

(3) Check for seal ring damage or wear.

(4) Check for oil seal damage or wear.



3. Bearing

(1) Check for seizure or abnormal noise during abearing rotation.

(2) Check for excessive play.

(3) Check for missing needle bearing rollers.

4. Others

(1) Check for damage of the rack housing cylinder bore.

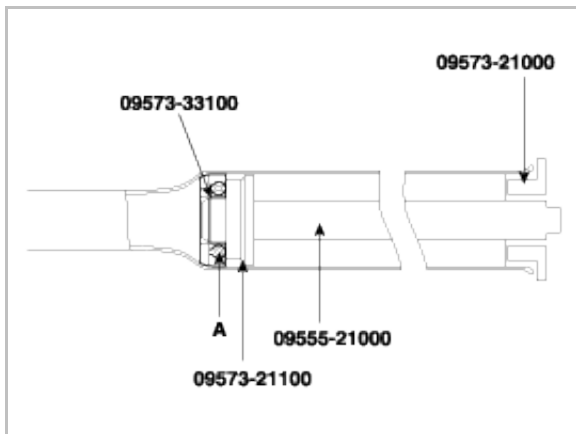
(2) Check for boot damage, cracking or aging.

REASSEMBLY

1. Apply the specified fluid to the entire surface of the rack oil seal.

Recommended fluid : PSF-3

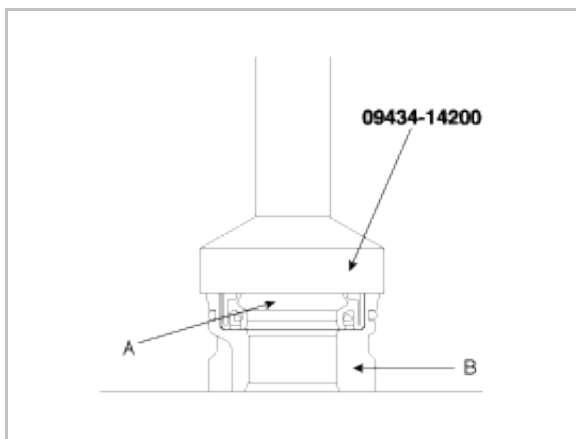
2. Install the backup washer and oil seal (A) to the specified position in the rack housing.



3. Apply the specified fluid to the entire surface of the rack bushing oil seal.

Recommended fluid : PSF-3

4. Install the oil seal (A) in the rack bushing (B).



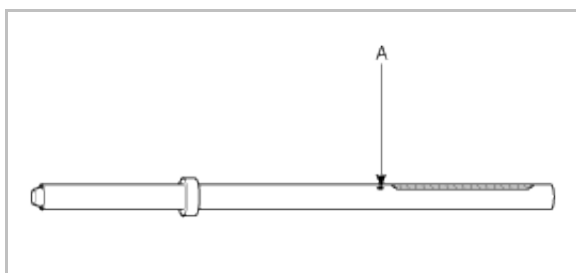
5. Apply the specified fluid to the entire surface of the O-ring and install it in the rack bushing.
6. Apply the specified grease to the rack teeth.

Recommended grease

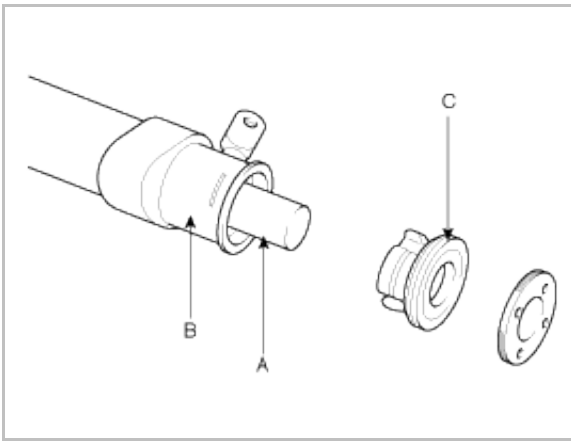
Multipurpose grease SAE J310a NLGI No.2

NOTICE

Do not plug the vent hole(A) in the rack with grease.



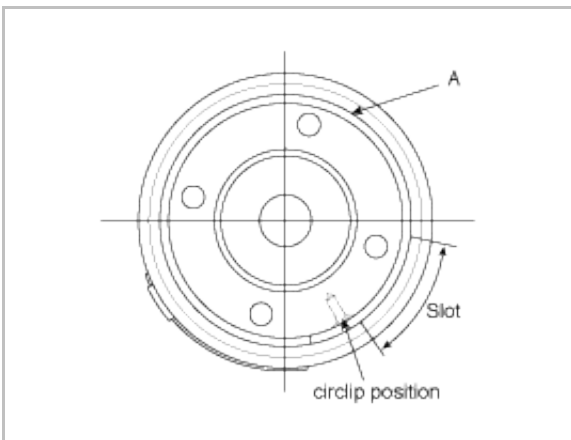
7. Insert the rack(A) into the rack housing(B) and install the rack bushing(C).



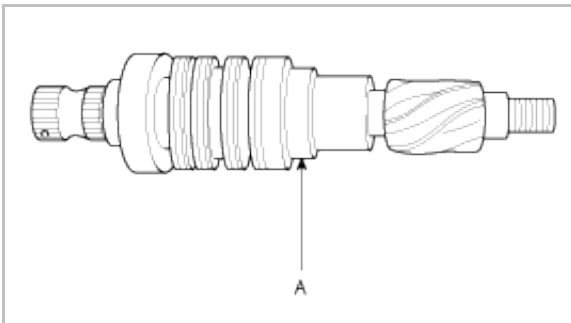
8. Push in the rack stopper (A) until the circlip groove of the rack stopper is aligned with the notched hole of the rack housing. Then, install the circlip while turning the rack stopper.

CAUTION

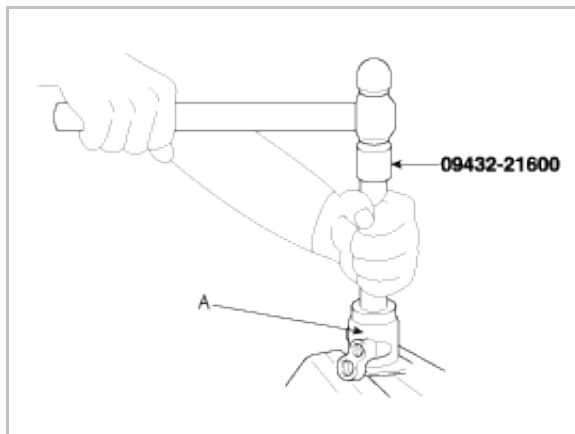
The circlip should not be visible through the notched hole of the rack housing.



9. Using special Tool (09432-21600), install the oil seal and the ball bearing in the valve body (A).

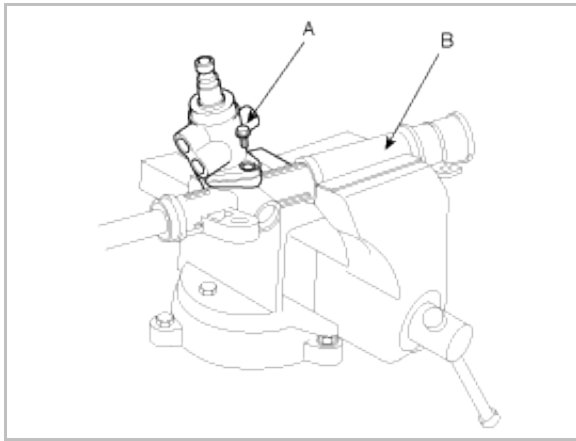


10. After applying the specified fluid and grease to the pinion valve assembly (A), install it in the rack housing assembly.

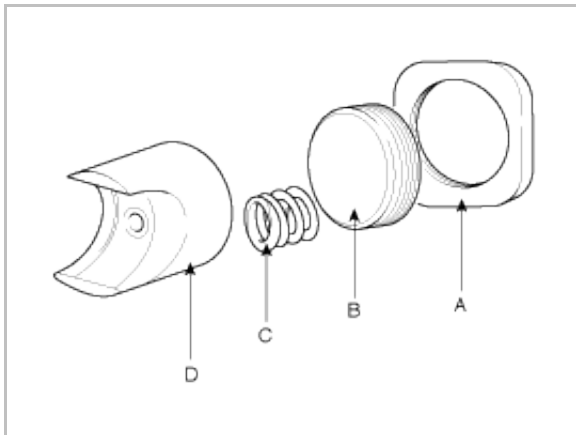


11. After applying the specified fluid to the oil seal, install it in the rack housing and fix the valve body assembly(A)

and O-ring in the gear box(B).



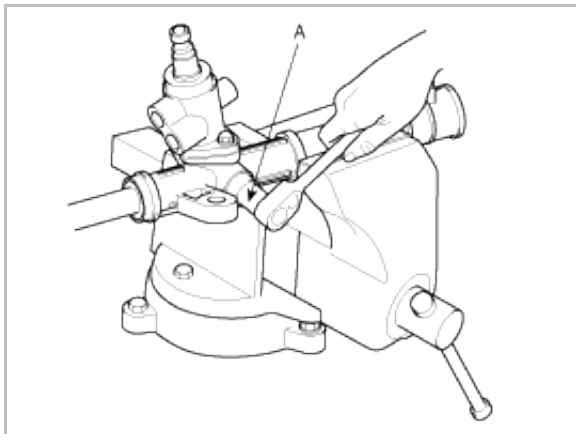
12. Install the rack support yoke (A), rack support spring (B), yoke plug (C) and lock nut (D) in the order shown in the illustration. Apply semi-drying sealant to the threaded section of the yoke plug before installation.



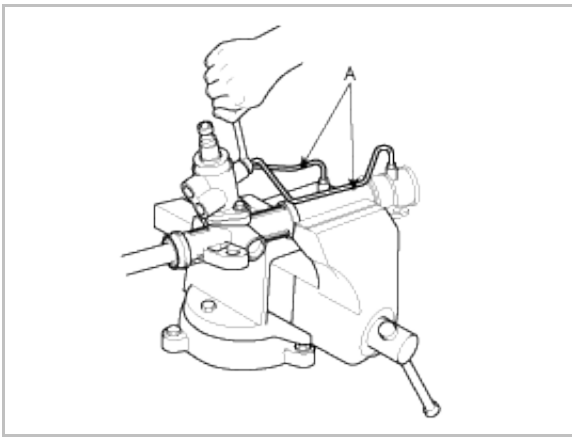
13. With the rack placed in the center position, attach the yoke plug to the rack housing. Tighten the yoke plug to 12 Nm (120 kg·cm, 8.9 lb·ft), with a 14mm socket (A). Loosen the yoke plug approximately from 30° to 60° and tighten the yoke nut to the specified torque.

Tightening Torque Nm(kgf·m, lb·ft) :

50 ~ 70(5 ~ 7, 37 ~ 52)

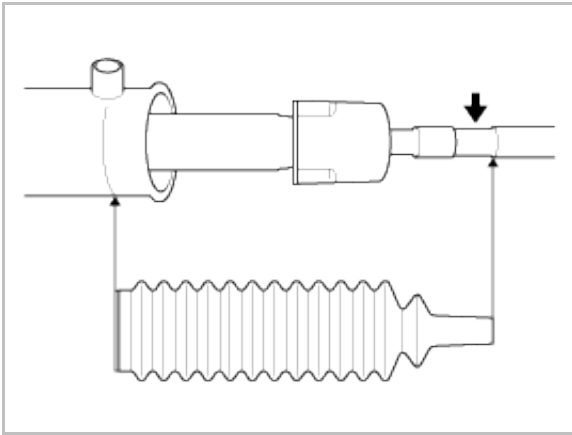


14. Tighten the feed tube (A) to the specified torque and install the mounting rubber using adhesive.



15. Apply the specified grease to the bellows mounting position (fitting groove) of the tie rod.

Recommended grease : Silicone grease



16. Install the new attaching band to the bellows.

NOTICE

When the bellows are installed, a new band must be used.

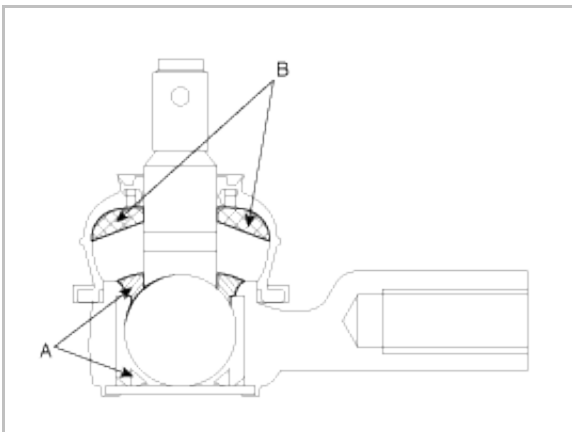
17. Install the bellows in position, taking care not to twist it.
18. Fill the dust cover inner side and lip with the specified grease, and fix the dust cover in position with the clipping attached in the groove of the tie rod end.

Recommended grease

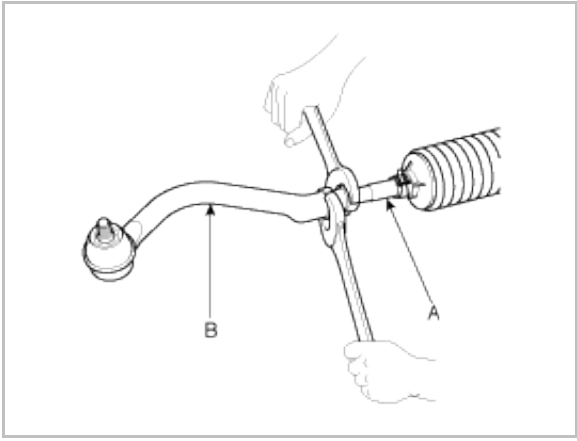
A : POLY LUB GLY 801K or equivalent

B : SHOWA SUNLIGHT MB2 or equivalent

Dust cover inner side and lip : THREE BOND



19. Install the tie rod end (B) to the tie rod (A).



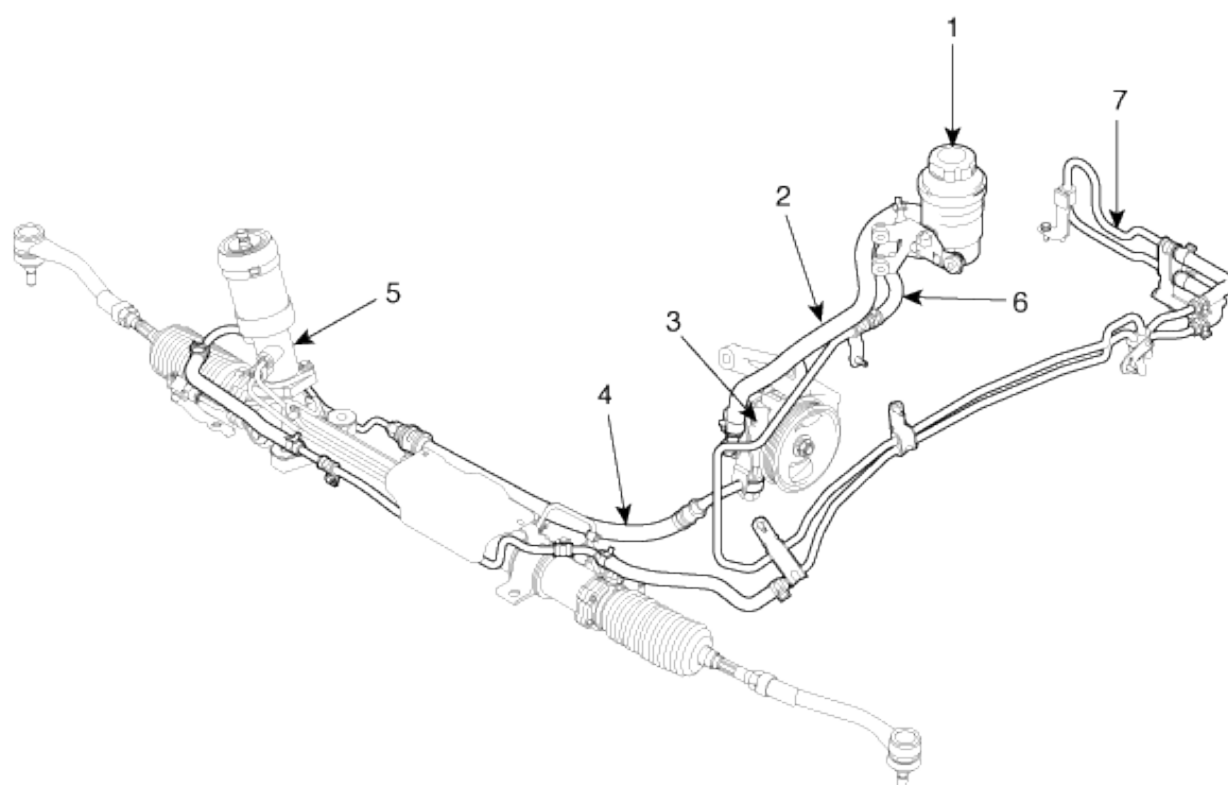


Steering System

Hydraulic Power Steering System - Power
Steering Hoses

COMPONENTS

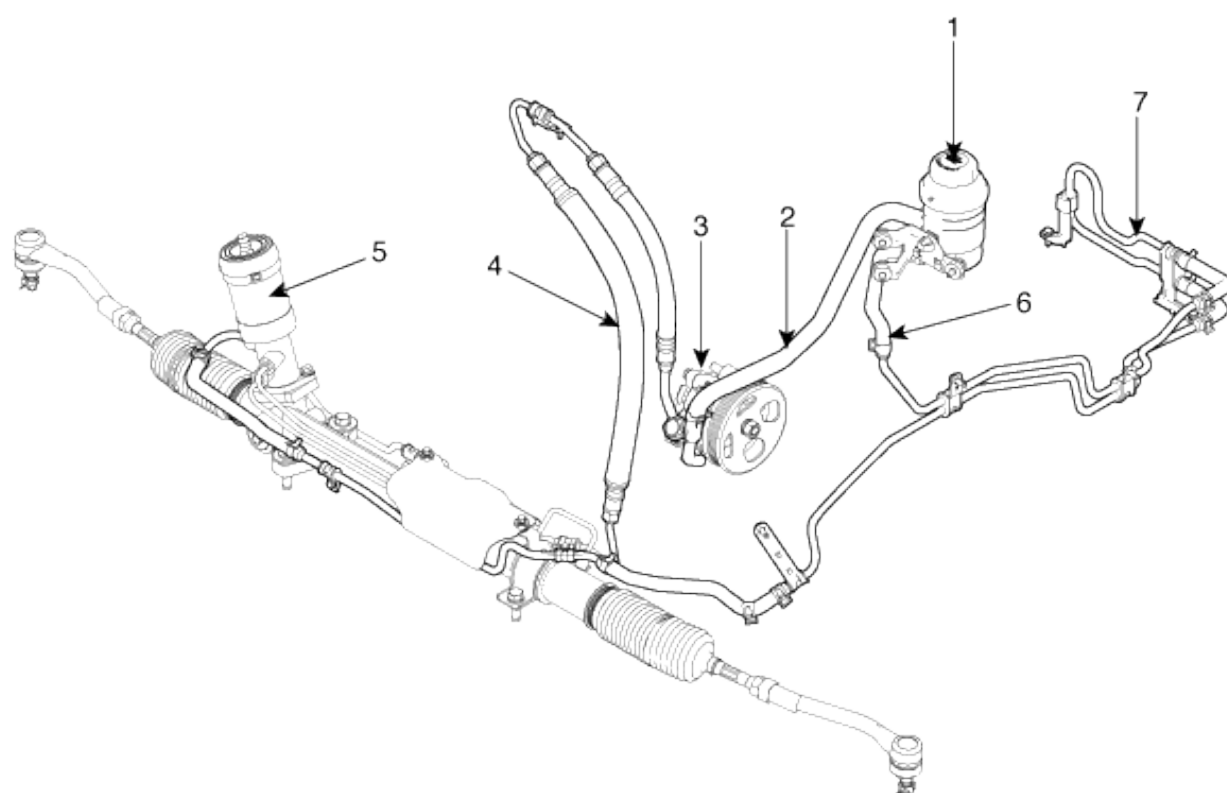
[Diesel]



- 1. Reservoir
- 2. Suction hose
- 3. Oil pump
- 4. Pressure hose

- 5. Power steering gear box
- 6. Return tube
- 7. Cooler tube

[Gasoline]



- 1. Reservoir
- 2. Suction hose
- 3. Oil pump
- 4. Pressure hose

- 5. Power steering gear box
- 6. Return tube
- 7. Cooler tube



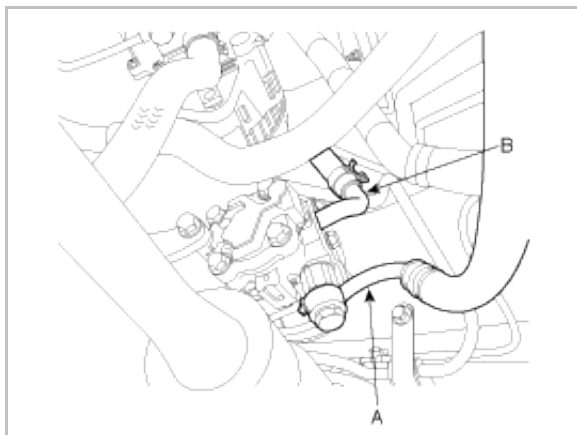
REPLACEMENT

1. Drain the power steering fluid.
2. Disconnect the pressure tube (A) and suction tube (B) from the power steering oil pump.

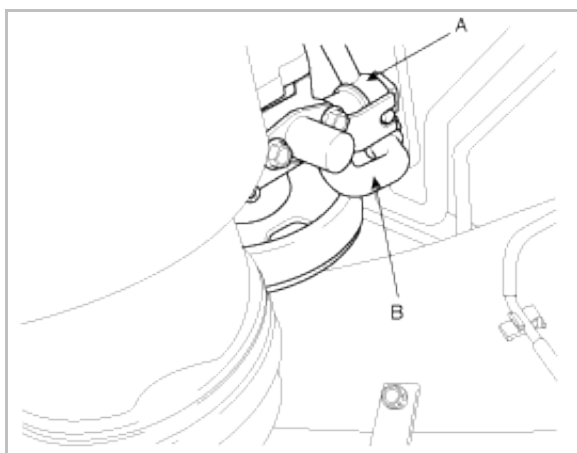
Tightening torque Nm (kgf.m, lb-ft):

55 ~ 65 (4.5 ~ 5.5, 40 ~ 47)

[Diesel]



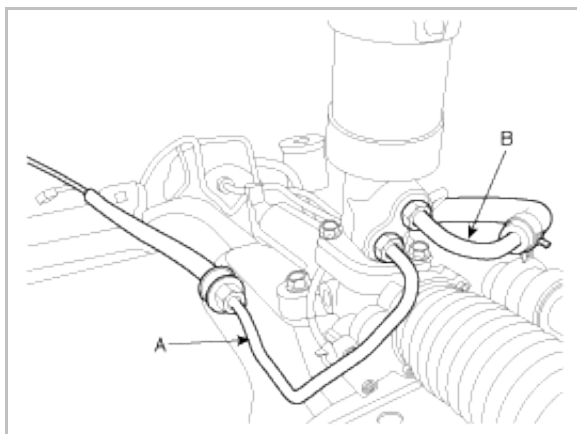
[Gasoline]



3. Disconnect the pressure tube (A) and return tube from the valve body housing.

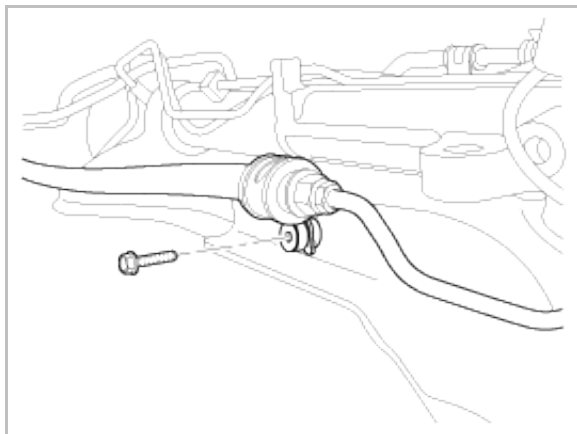
Tightening torque Nm (kgf.m, lb-ft):

12 ~ 18 (1.2 ~ 1.8, 9 ~ 13)

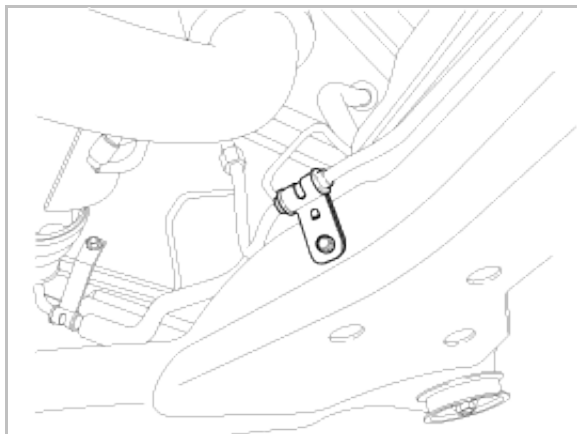


4. Remove the brackets of the pressure tube and hose from the sub-frame.

[Diesel]

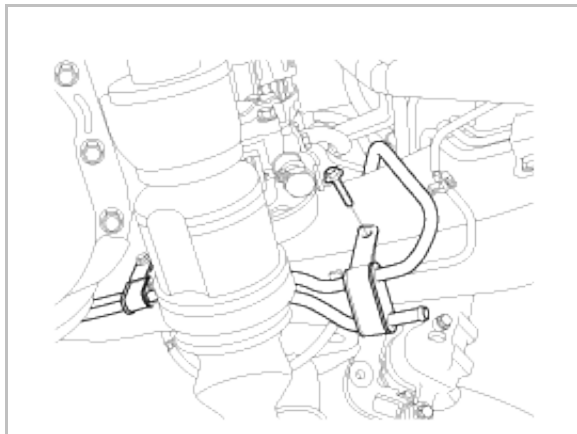


[Gasoline]

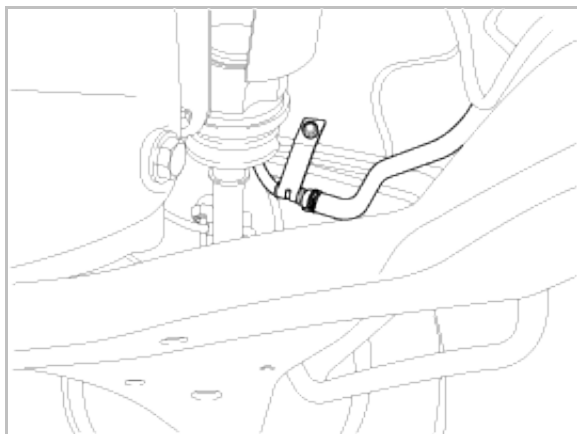


5. Remove the bracket of the return tube and hose.

[Diesel]



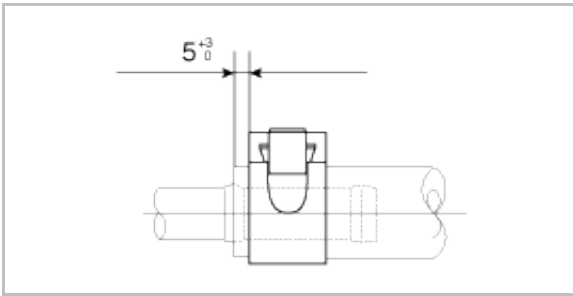
[Gasoline]



6. Remove the under cover and then loosen the oil cooler tube bracket bolts. (Refer to BD-group)

NOTICE

Be sure to connect between a tube and a hose as shown in the illustration.

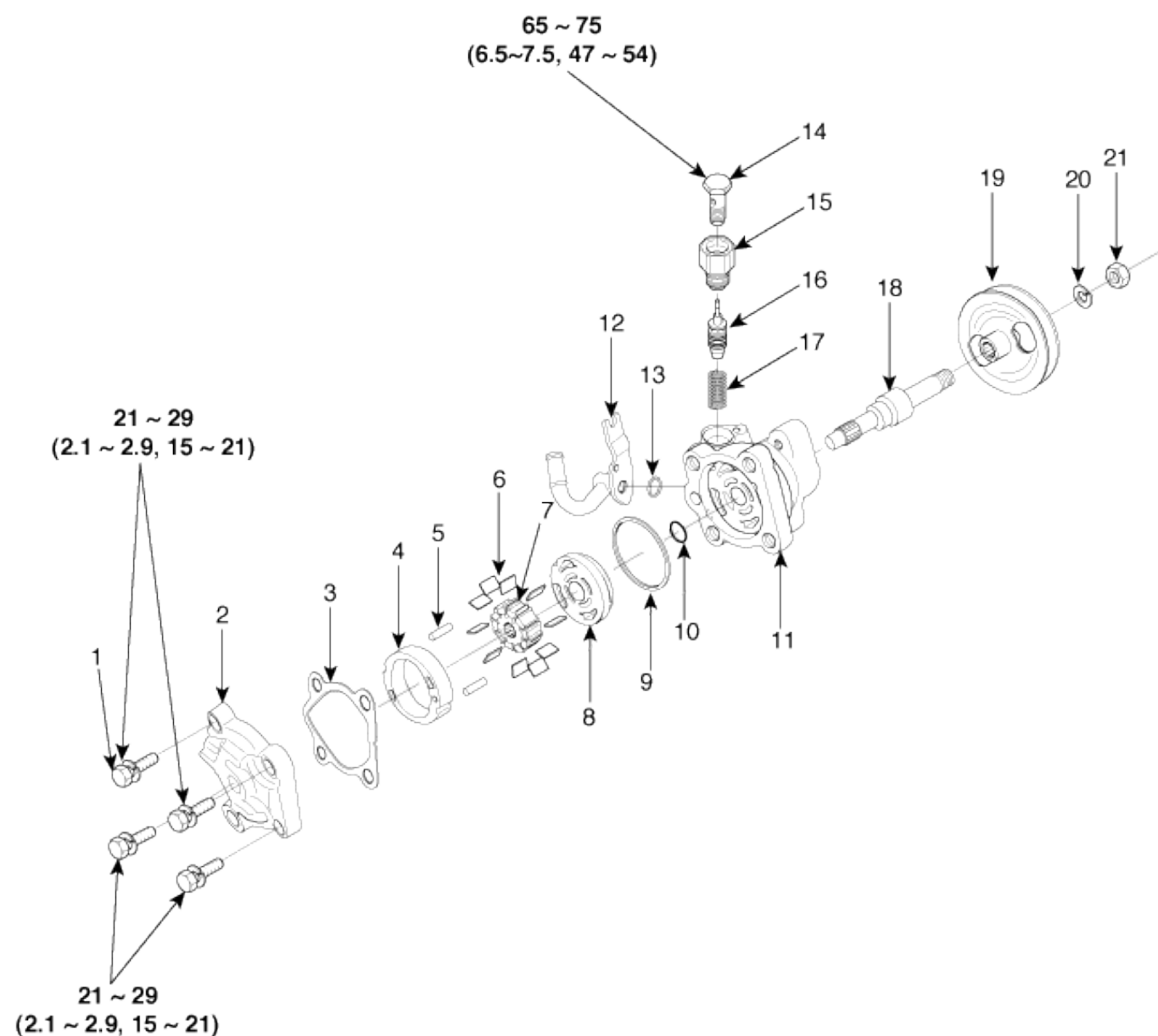


7. Installation is reverse of the removal.
8. After installation, bleed the power steering system. (Refer to the air bleeding in ST group)

Steering System

Hydraulic Power Steering System - Power
Steering Oil Pump

COMPONENTS



TORQUE : Nm (kgf.m, lb-ft)

1. Bolt
2. Oil pump cover assembly
3. Gasket
4. Cam ring
5. Lock pin
6. Vane
7. Rotor

8. Side plate
9. O-ring (Inner)
10. O-ring (Outer)
11. Front housing
12. Suction pipe
13. O-ring
14. Bolt

15. Connector
16. Flow control valve
17. Flow control spring
18. Shaft
19. Pulley
20. Washer
21. Nut



REMOVAL

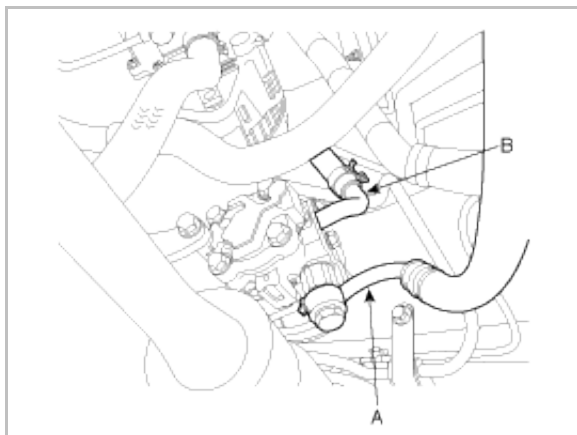
1. Disconnect the pressure tube (A) from the oil pump by loosening the eye bolt.

Tightening torque Nm (kgf-m, lb-ft):

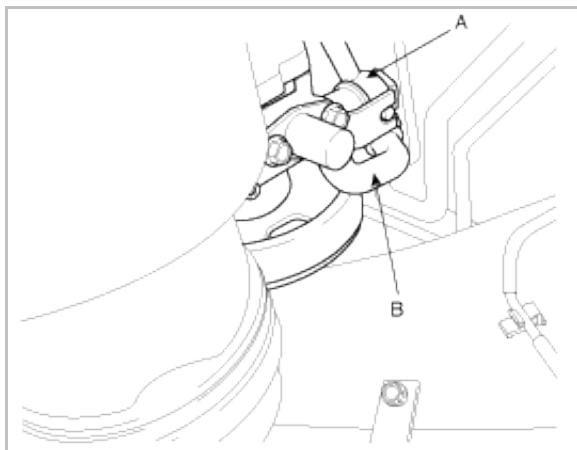
65 ~ 75 (6.5 ~ 7.5, 47 ~ 54)

2. Disconnect the suction hose (B) from the suction pipe.

[Diesel]



[Gasoline]

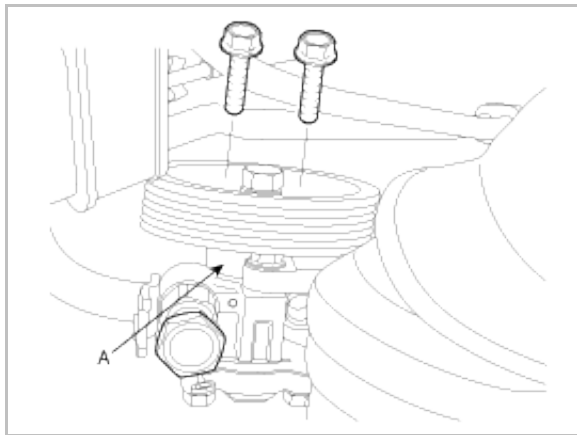


3. Remove the drive belt.
4. Loosen the power steering pump mounting bolts, and then remove the power steering pump assembly (A) from the pump bracket.

Tightening torque Nm (kgf.m lb-ft):

17 ~ 26 (1.7 ~ 2.6, 12 ~ 19)

[Diesel]



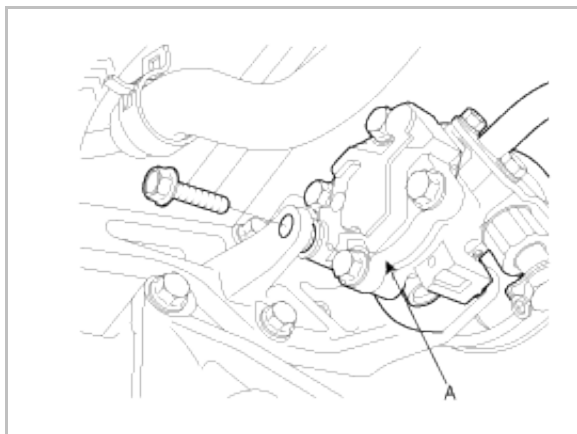
Tightening torque Nm (kgf.m lb-ft):

38 ~ 47 (3.8 ~ 4.7, 27 ~ 34)

Tightening torque Nm (kgf.m lb-ft):

17 ~ 26 (1.7 ~ 2.6, 12 ~ 19)

[Diesel]



Tightening torque Nm (kgf.m lb-ft):

35 ~ 50 (3.5 ~ 5.0, 25 ~ 36)

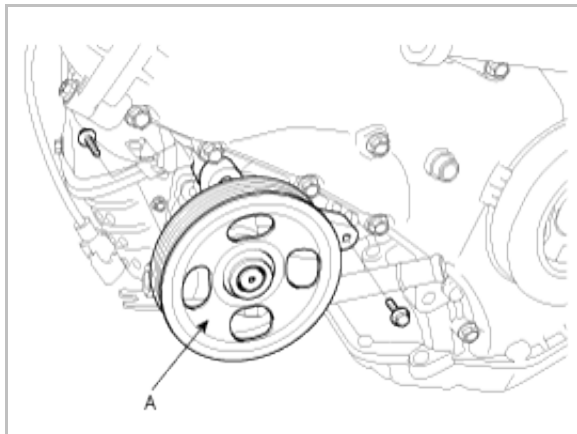
Tightening torque Nm (kgf.m lb-ft):

17 ~ 26 (1.7 ~ 2.6, 12 ~ 19)

Tightening torque Nm (kgf.m lb-ft):

38 ~ 47 (3.8 ~ 4.7, 27 ~ 34)

[Gasoline]



NOTICE

Be careful not to spill fluid from the power steering oil pump.

INSTALLATION

1. Installation is the reverse of removal.

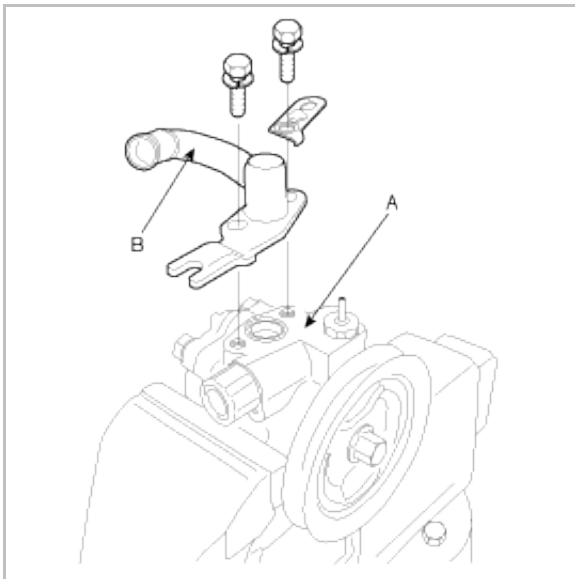
CAUTION

The pressure tube does not twist and come in contact with other components.

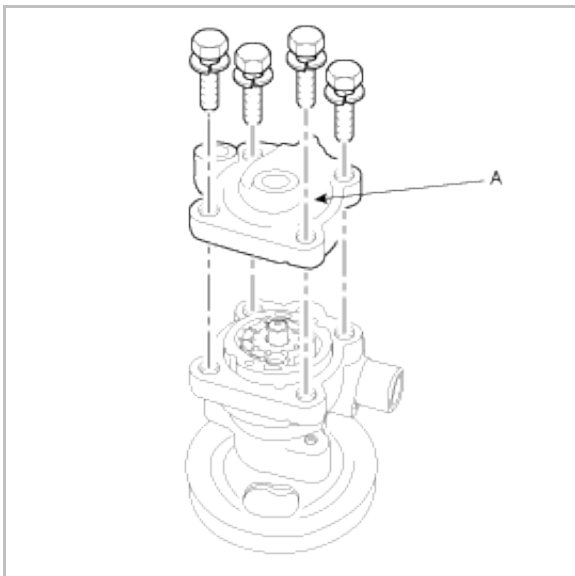
2. Add power steering fluid
3. Bleed the power steering system. (Refer to the air bleeding in ST group)
4. Check the oil pump pressure.

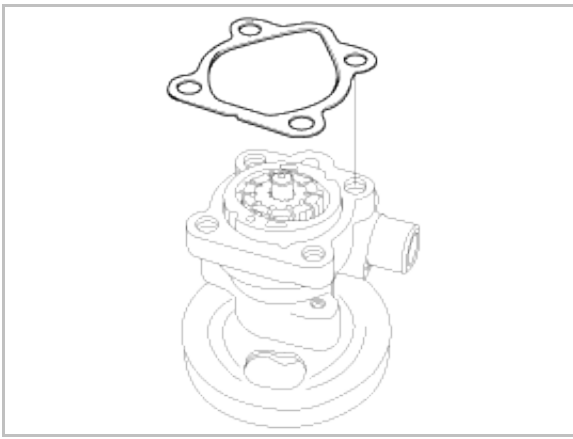
DISASSEMBLY

1. Remove two bolts from the oil pump body (A), and then remove the suction pipe (B) and O-ring.

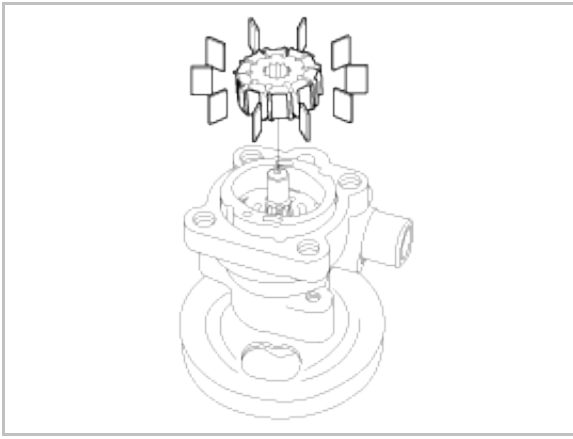


2. Loosen the four bolts and remove the oil pump cover assembly (A) and the gasket.

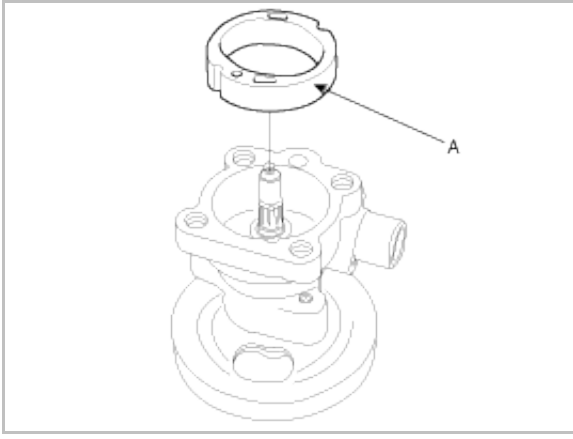




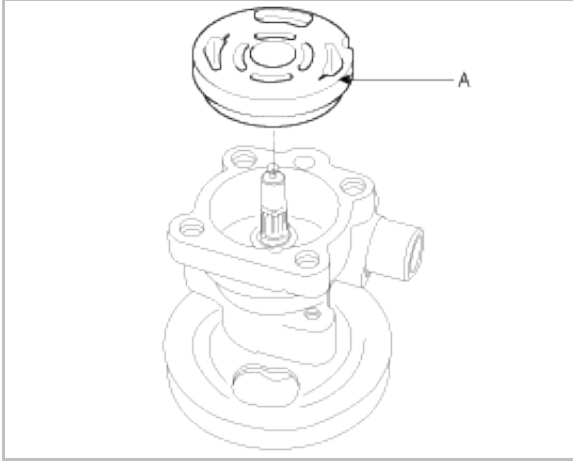
3. Remove the rotor and vanes.



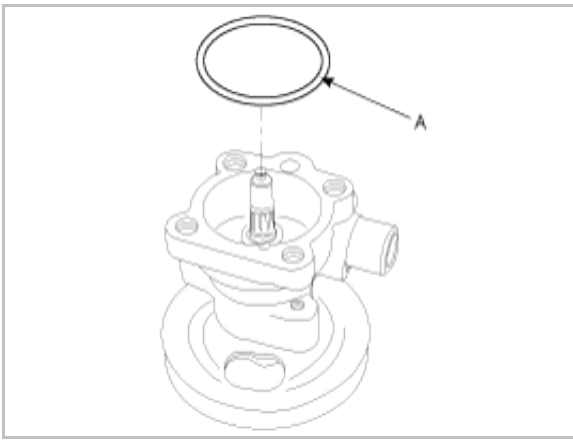
4. Remove the cam ring.



5. Remove the oil pump side plate (A).



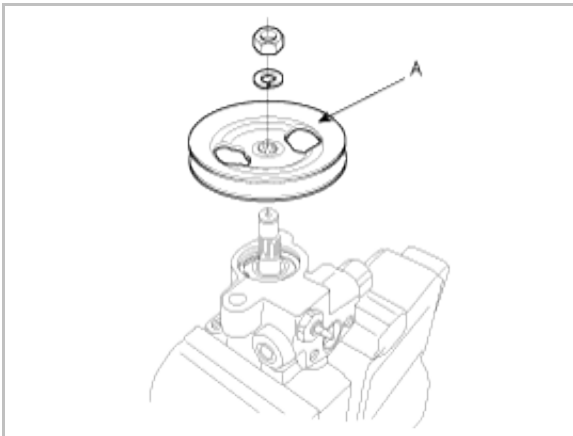
6. Remove the inner and outer O-ring (A).



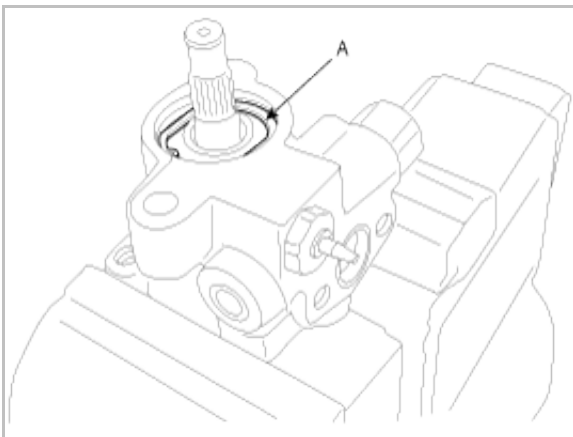
NOTICE

When assembling, use a new gasket and O-ring.

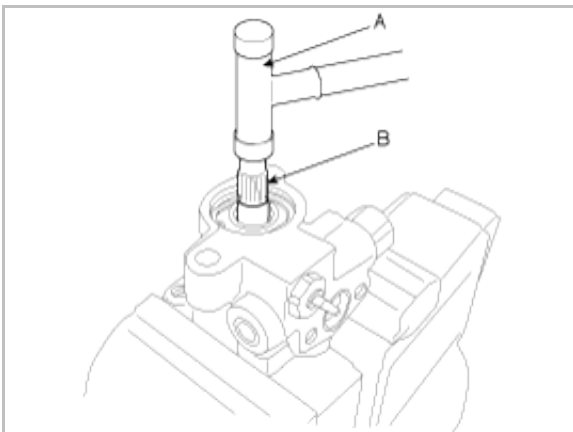
7. Mount the pump in a vise and remove the pulley (A) nut and the spring washer.



8. After removing the snap ring (A) of the shaft with snap ring pliers, remove the dust spacer.



9. Tap the rotor side of the shaft slightly with a plastic hammer (A) to remove the shaft (B).

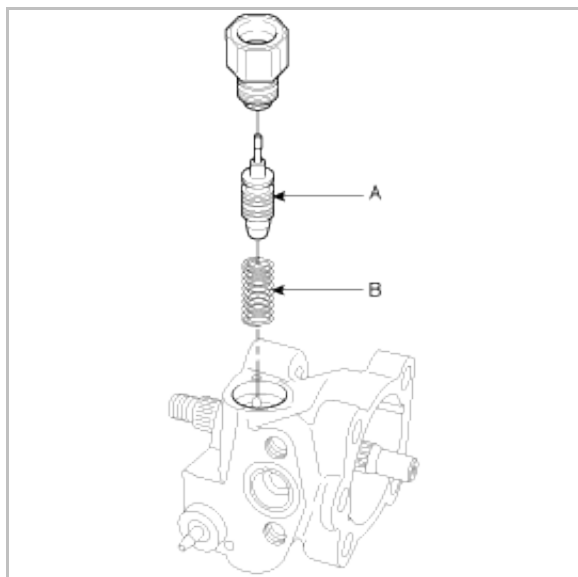


10. Remove the oil seal from the oil pump body.

NOTICE

When assembling, use a new oil seal.

11. Remove the connector from the oil pump body, and take out the flow control valve (A) and the flow control spring (B).



12. Remove the O-ring from the connector.

CAUTION

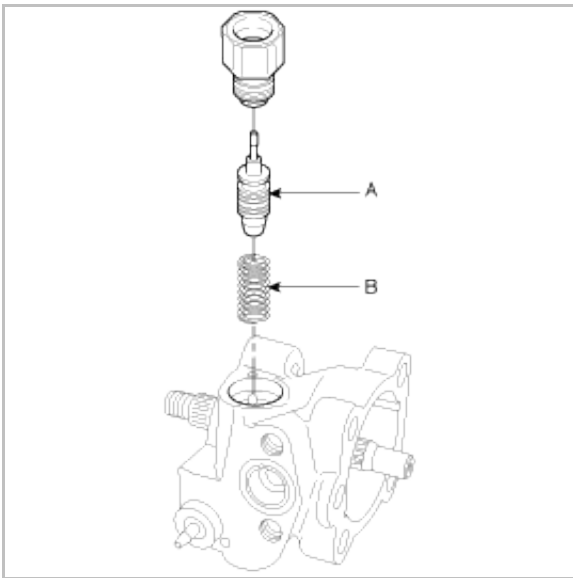
Do not disassemble the flow control valve.

INSPECTION

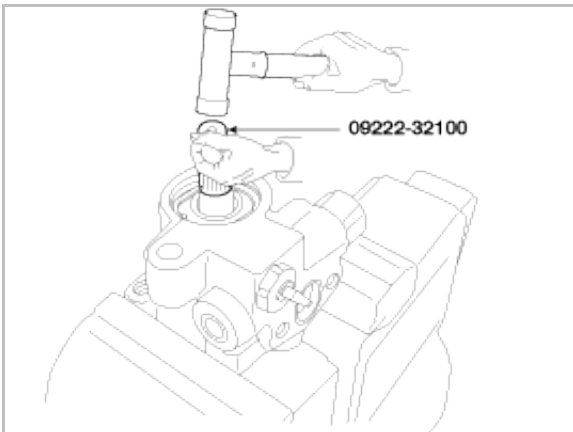
1. Check that the flow control valve is not bent.
2. Check the shaft for wear and damage.
3. Check the V belt for wear and deterioration.
4. Check the grooves of the rotor and vanes for stratified abrasion.
5. Check the contact surface of the cam ring and vanes for stratified abrasion.
6. Check vanes for damage.
7. Check that there is no striped wear in the side plate or contacting part between the shaft and the pump cover surface.

REASSEMBLY

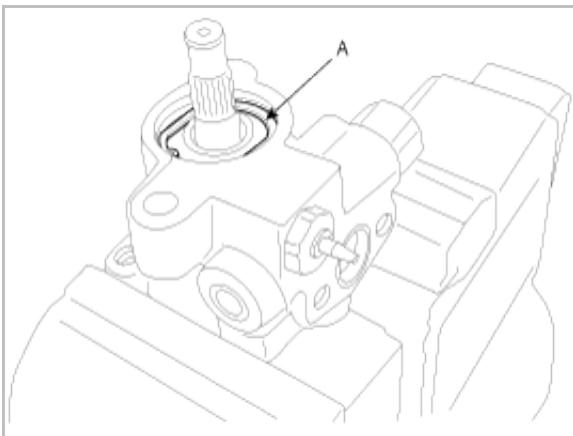
1. Install the flow control spring (B), the flow control valve (A) and the connector into the pump body.



2. Install the oil seal in the pump body by using the special tool (09222-32100).



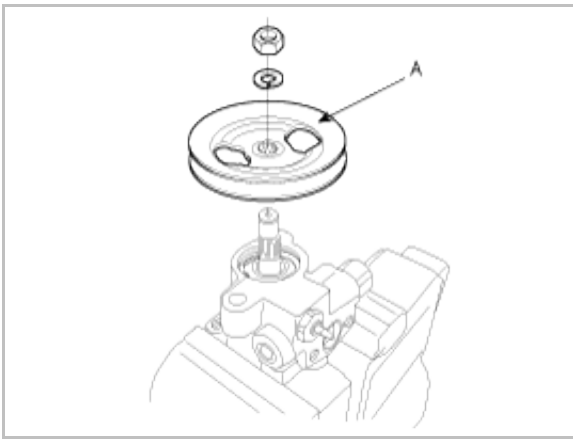
3. After inserting the shaft assembly into the pump body, install the dust spacer and snap ring (A).



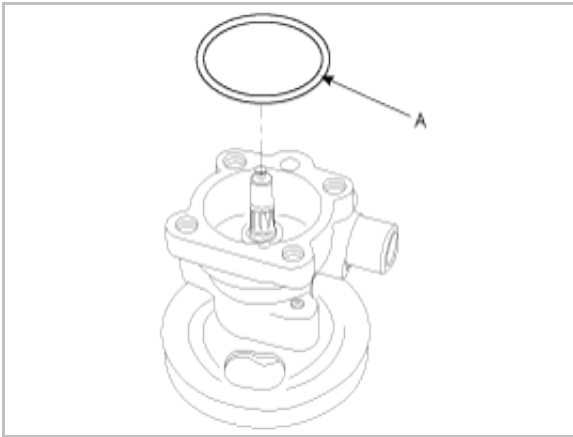
4. Install the pump pulley(A).

Tightening torque :

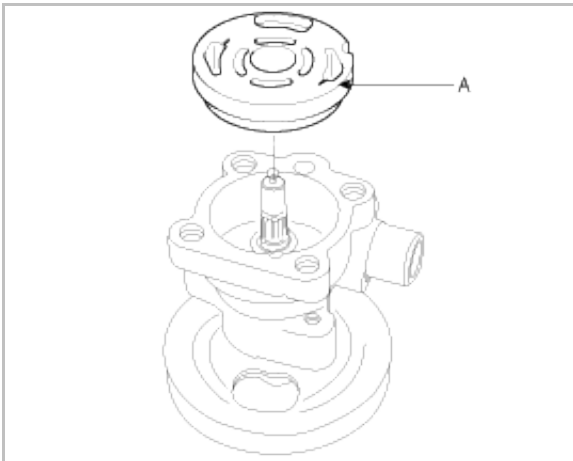
55 ~ 69 Nm (5.5 ~ 6.9 kgf·m, 39.8 ~ 49.9 lb-ft)



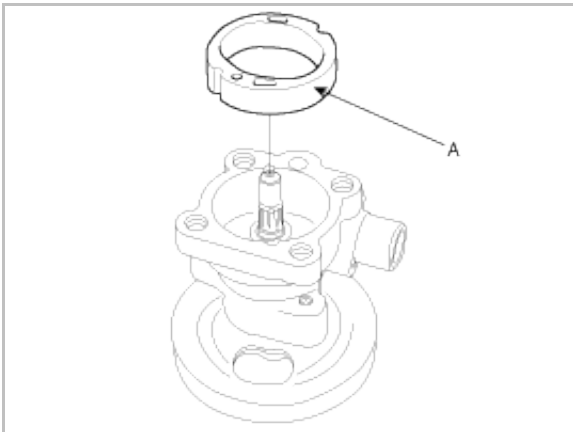
5. Install the inner O-ring and outer O-ring (A).



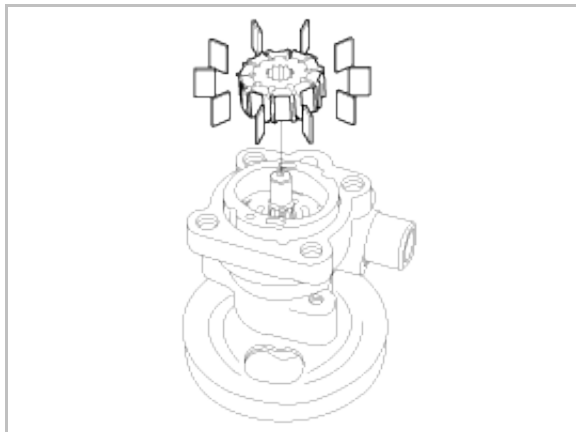
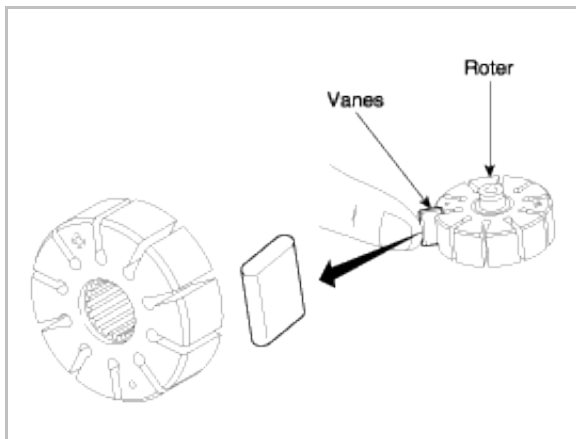
6. Install the oil pump side plate (A).



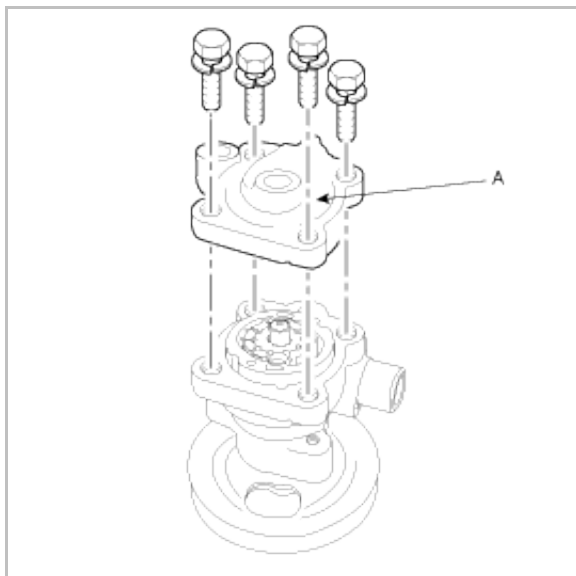
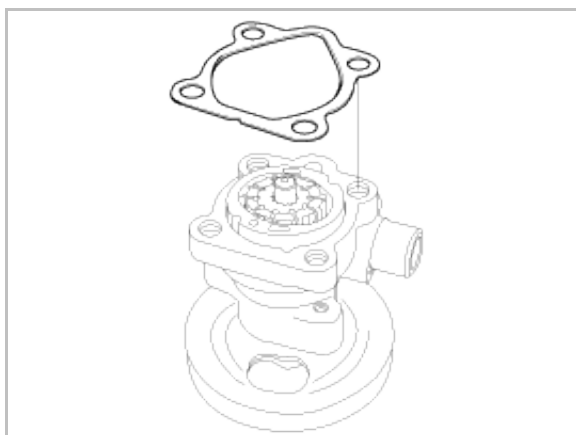
7. After inserting the lock pin into the groove of the front housing, install the camring (A) attending to the direction.



8. Install the rotor and the vanes.



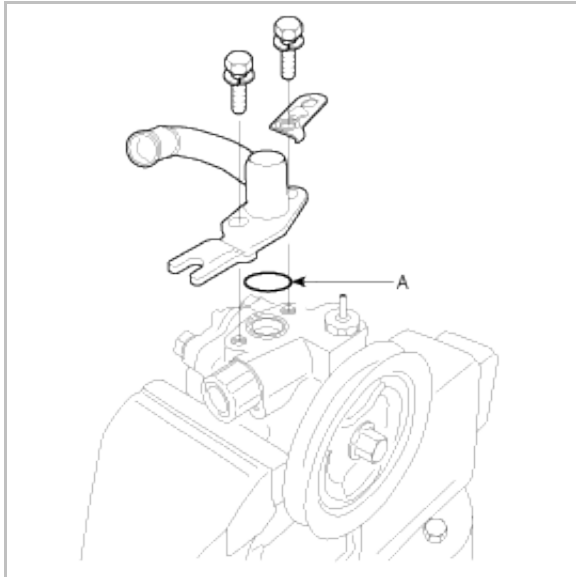
9. Install the gasket and oil pump cover assembly (A).



10. Install the O-ring (A) and the suction pipe mounting bolt.

Tightening torque :

13.6 ~ 18.4 Nm (1.36 ~ 1.84 kgf·m, 9.84 ~ 13.3 lb-ft)

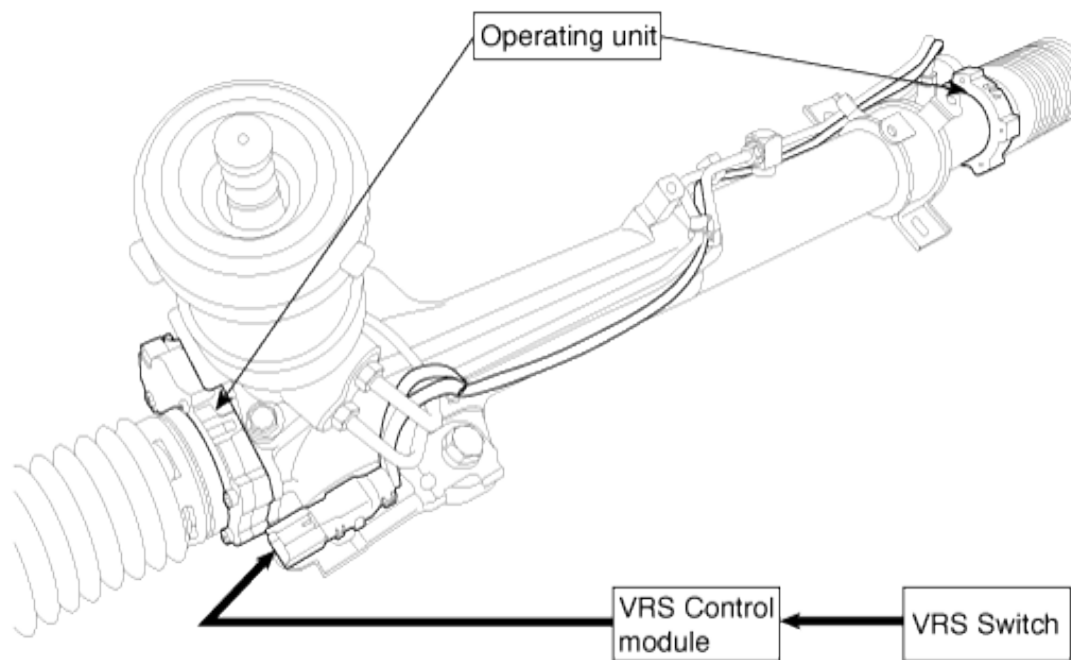




Steering System

Variable Rack Stroke

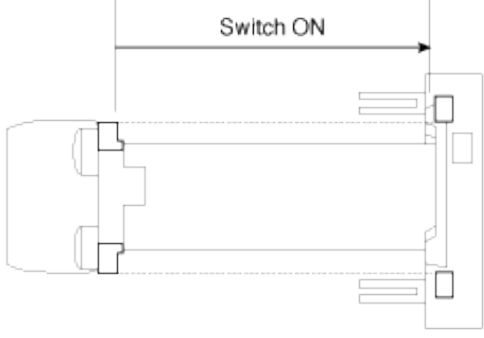
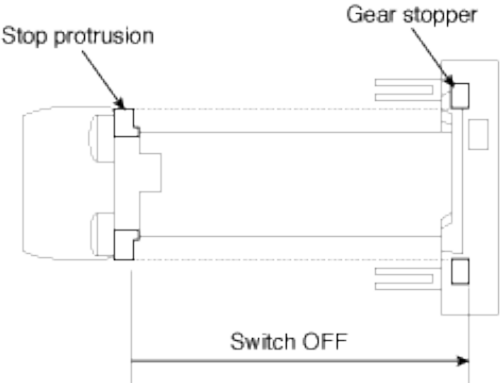
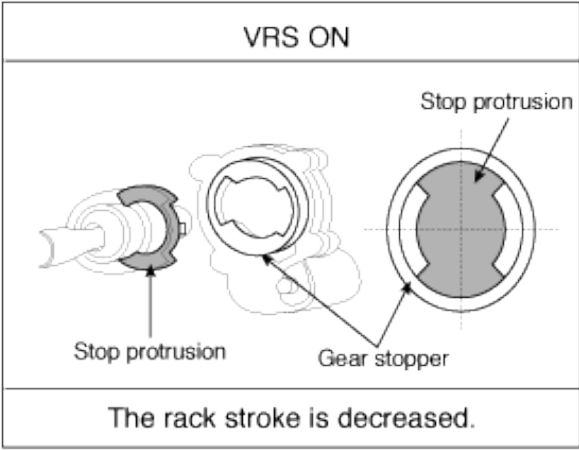
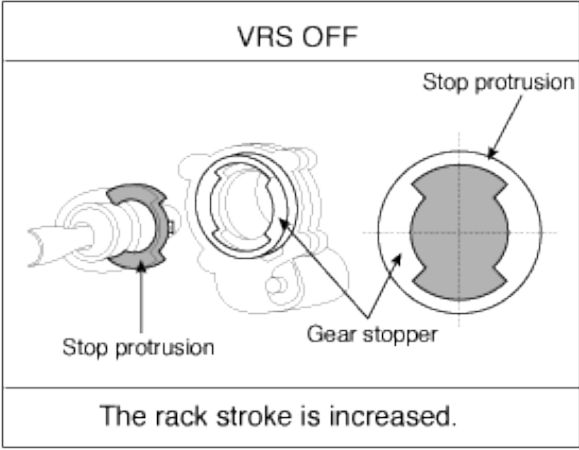
Description



The VRS (Variable Rack Stroke) is the system that controls the rack stroke using the operating unit installed on both ends of the gear box. Normally the VRS system keeps switching OFF and the rack stroke stays increased, so the vehicle's turning radius becomes reduced. On the other hand, when fitting the snow chains in winter season, the VRS switch must be turned ON and the VRS system will prevent interference between the snow chains and the vehicle by decreasing the rack stroke.

Operating principle

When switching the VRS system ON, the DC motor in the VRS operating unit rotates the gear stopper by 90 degrees and the gear stopper stops the stop protrusion from entering as shown in the illustration below. This operation reduces the maximum steering angle by decreasing the rack stroke. When switching the VRS system OFF, the gear stopper returns to original location and the rack stroke also returns to normal.





TROUBLE SHOOTING

Symptom	Probable cause	Remedy
There is no change made in rack stroke even though turning the VRS switch ON or OFF.	• VRS operating unit • VRS control module • VRS switch	• Inspect the VRS operating unit. • Check Input/ output signal of the VRS control module. • Inspect connection of the VRS switch.
LED is not illuminated even though turning the VRS switch ON.	VRS switch	• Inspect connection of the VRS switch. • Check the LED for damage.

There is no change made in rack stroke (the minimum turning radius) even though turning the VRS switch ON or OFF.

Inspection of the rack stroke

1. Is the rack stroke (the maximum steering angle) changed when pressing the VRS switch?

YES

- ▶ The VRS system is in normal condition.

NO

- ▶ Go to step 2.

2. Measure the resistance of the VRS operating unit.

(1) Disconnect the VRS operating unit connector.

(2) Measure the resistance between the terminal No.1 and No.2.

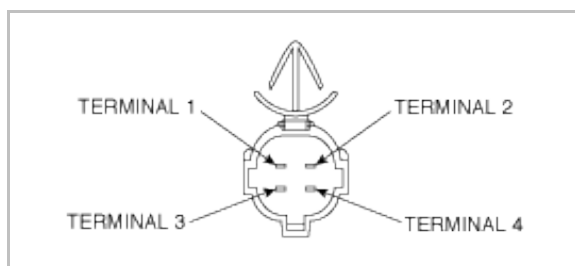
Repeat the terminal No.3 and No.4.

Is the measured resistance within standard value?

4 ~ 20 Ω → Normal condition (standard value)

1 Ω or below → Short

100 Ω or above → Open circuit



YES

- ▶ Go to step 3.

NO

- ▶ Repair or replace the power steering gear box.

3. Measure the output voltage of the VRS control module.

(1) Disconnect the VRS control module connector.

(2) Connect 9 ~ 15 V power between the terminal No.3 and No.4.

(3) Measure the output voltage (to DC motor) between the terminal No.5 ~ 8.

Is the voltage measured within standard value?

Supplied power	Measured output voltage	
	Standard value	VRS CM failure

9 V	8 V or above	Below 8 V
12 V	11 V or above	Below 11 V
15 V	14 V or above	Below 14 V

YES

- Inspect connection of connectors and harness for the VRS system.

NO

- Replace the VRS control module.

LED is not illuminated even though turning the VRS switch ON.

1. Is the LED on the VRS switch illuminated when turning the VRS switch ON?

YES

- The VRS switch has normal condition.

NO

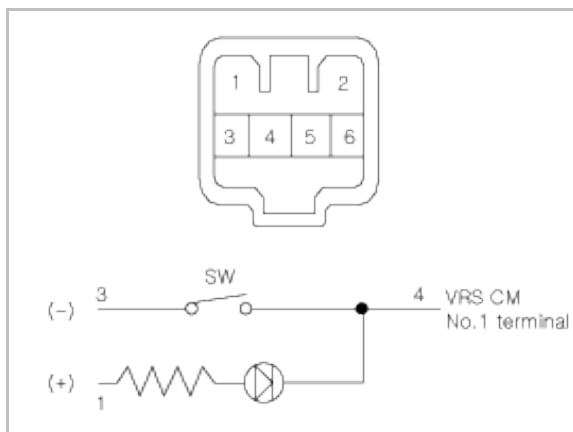
- Go to step 2.

2. Inspect the VRS switch connector.

(1) Disconnect the VRS switch connector.

(2) Connect 12 V power between terminal No. 1 (+) and No.3 (-).

Check if the LED is turned ON or OFF by pressing the VRS switch.



Is the LED turned ON or OFF when pressing the VRS switch?

YES

- The VRS switch is in normal condition.

NO

- Repair or replace the VRS switch.



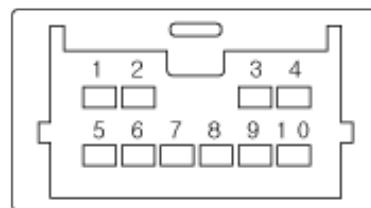
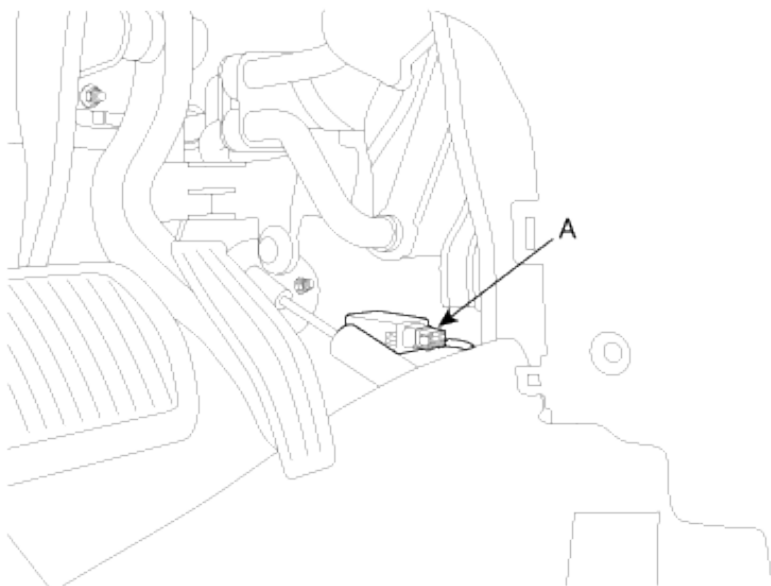
Steering System

Variable Rack Stroke - VRS Control Unit



Description

The VRS control module (A) controls the DC motor in the VRS operating unit according to signal of the VRS switch (ON or OFF) and is mounted behind the center fascia.



Pin No.	Function
1	Switch signal
2	-
3	IG2 (+)
4	IG2 (-)
5	Motor LH (-)
6	Motor LH (+)
7	Motor RH (+)
8	Motor RH (-)
9	-
10	-

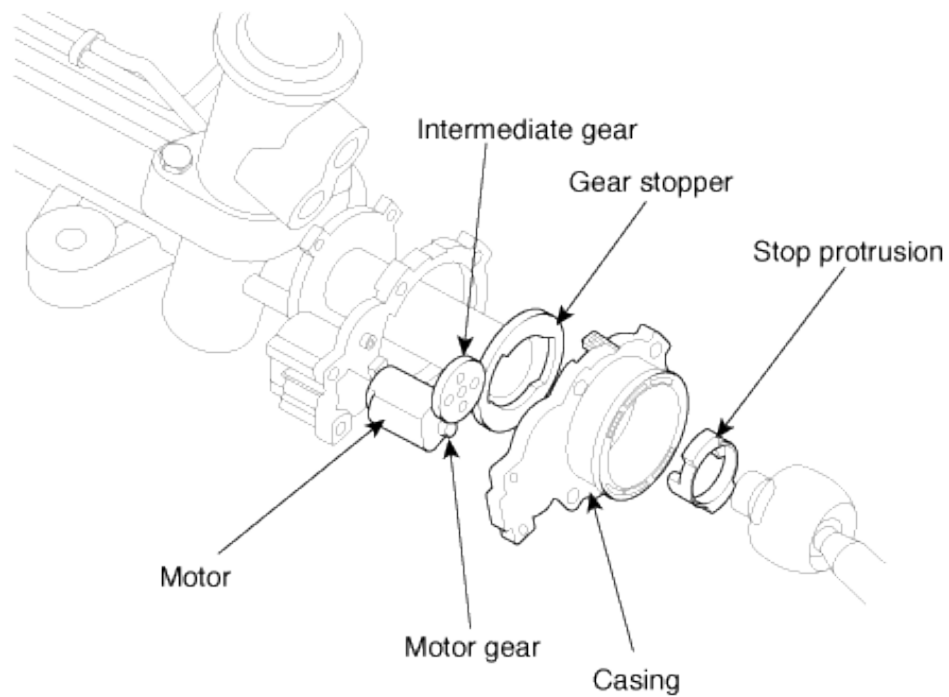


Steering System

Variable Rack Stroke - VRS Operating Unit

Description

The VRS operating unit installed on both ends of the steering gear box can change the rack stroke by changing angle of the gear stopper.





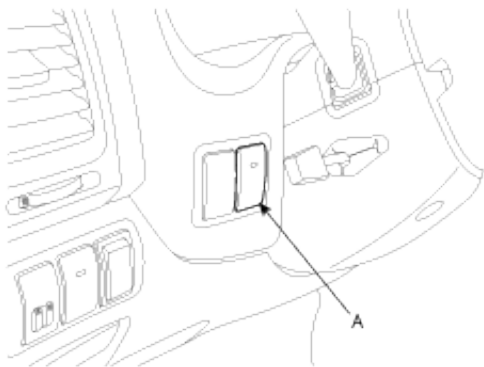
Steering System

Variable Rack Stroke - VRS Switch



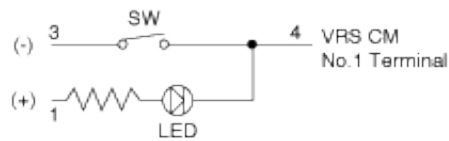
Description

The VRS switch (A) is located on the cluster fascia panel as shown in the illustration and "VRS" is printed on the VRS switch.



SWITCH DIAGRAM

P T	ON (Push)	OFF (Free)	REMARK
3			GND
4			Control module
1			IGN2
2			ILL (+)
5			ILL (-)



	Signal (Switch No.4 terminal)	LED
Switch OFF → ON	High → Low	ON
Switch ON → OFF	Low → High	OFF