

ST-2

Steering System

General Information

General Information

Specifications

Item		Specification
Type		Hydraulic Power Steering System
		Electronic Power Steering System
Steering gear	Type	Rack & Pinion
	Rack stroke	148mm (5.82 in.)
Power steering pump	Type	Vane
	Relief pressure	100 ~ 105kgf/cm ² (1422 ~ 1493 psi)
Steering angle(Max.)	Inner	39.67° ± 1.5°
	Outer	32.90°
Power steering oil		PSF-4

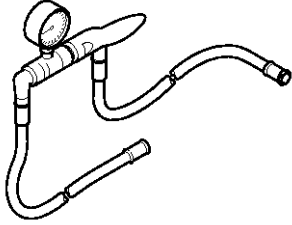
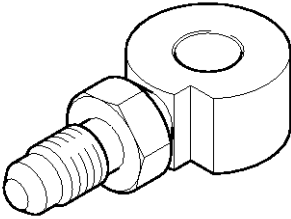
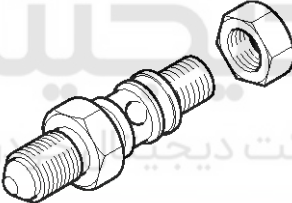
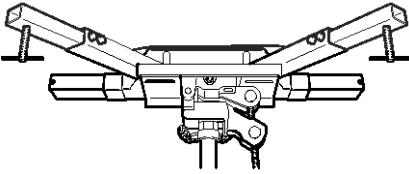
Tightening Torques

Item	Tightening torque (kgf.m)		
	Nm	kgf.m	lb-ft
Hub nuts	88.3 ~ 107.9	9.0 ~ 11.0	65.1 ~ 79.6
Steering wheel lock nut	39.2 ~ 49.0	4.0 ~ 5.0	28.9 ~ 36.2
Steering column mounting bolts and nuts	12.7 ~ 17.7	1.3 ~ 1.8	9.4 ~ 13.0
Universal joint to pinion of steering gear	29.4 ~ 34.3	3.0 ~ 3.5	21.7 ~ 25.3
Tie rod end castle nut	34.3 ~ 44.1	3.5 ~ 4.5	25.3 ~ 32.5
Lower arm ball joint bolts	98.1 ~ 117.7	10.0 ~ 12.0	72.3 ~ 86.8
Steering gear box mounting bolts	88.3 ~ 107.9	9.0 ~ 11.0	65.1 ~ 79.6
Stabilizer link nut	98.1 ~ 117.7	10.0 ~ 12.0	72.3 ~ 86.8
Sub frame mounting bolts & nuts	156.9 ~ 176.5	16.0 ~ 18.0	115.7 ~ 130.2
Oil pump mounting bolts	53.9 ~ 63.7	5.5 ~ 6.5	39.8 ~ 47.0

General Information

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Special Service Tools

Tool (Number and Name)	Illustration	Use
09572-21000 Oil pressure gauge	 EPRF001F	Measurement of oil pressure (Use with 09572-22100, 09572-21200)
09572-22100 Oil pressure gauge adaptor	 EPRF001H	Measurement of oil pressure (Use with 09572-21000, 09572-21200)
09572-21200 Oil pressure gauge adaptor	 EPRF001G	Measurement of oil pressure (Use with 09572-22100, 09572-21000)
09624-38000 Crossmember supporter	 EKBF005A	Supporting of the crossmember.

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Steering System

Troubleshooting

Symptom	Probable cause	Remedy
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 tie rod 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	

General Information

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Symptom	Probable cause	Remedy
Noise in the oil pump	Low fluid level	Replenish
	Air in the fluid	Bleed air
	Loose pump mounting bolts	Retighten

دیجیتال خودرو

شرکت دیجیتال خودرو سامانه (مسئولیت محدود)

اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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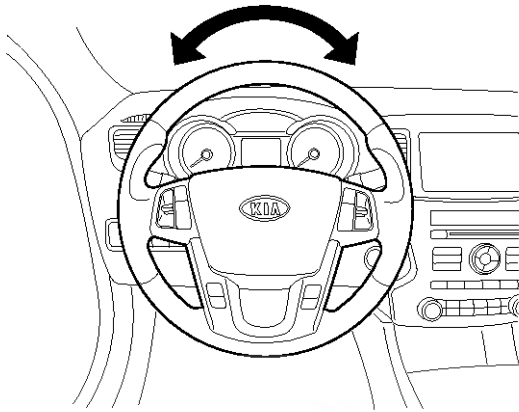
Steering System

Service Adjustment Procedure

Steering Wheel Play Inspection

1. Turn the steering wheel so that the front wheels can face straight ahead.
2. Measure the distance that the steering wheel can be turned with out moving the front wheels.

Standard value: 0 ~ 30mm (1.18in.) or less



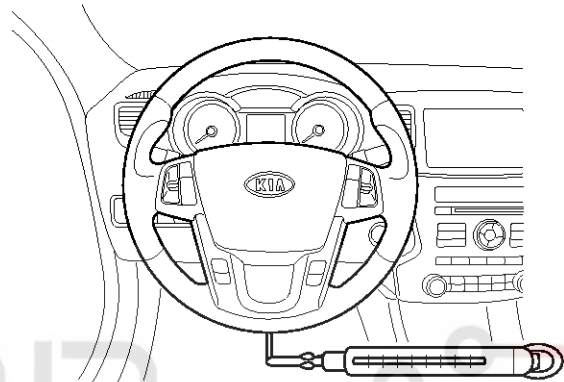
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3. If the play exceeds standard value, inspect the steering column, shaft, and linkages.

Checking Stationary Steering Effort

1. Position the vehicle on a level surface and place the steering wheel in the straight ahead position.
2. Start the engine and turn the steering wheel from lock to lock several times to warm up the power steering fluid.
3. Attach a spring scale to the steering wheel. With the engine speed 500 ~ 700RPM, pull the scale and read it as soon as the tires begin to turn.

Standard value: 2.0kgf



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4. If the measured value exceeds standard value, inspect the power steering gear box and pump.

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Power Steering Fluid Replacement

⚠ CAUTION

Always use genuine PSF-4. Using other type of power steering fluid or ATF can cause increased wear and poor steering in cold weather.

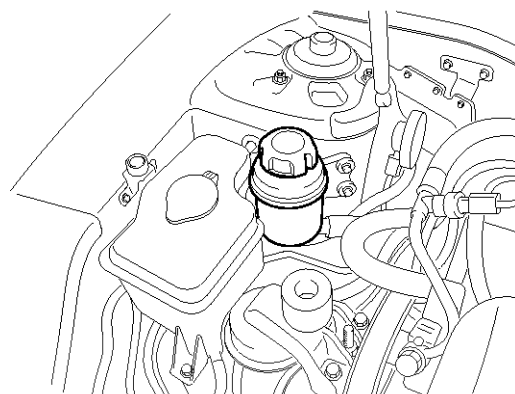
1. Raise the reservoir and then disconnect the return hose to drain the reservoir. Be careful not to spill the fluid on the body and parts. Wipe off any spilled fluid at once.
2. Connect a tube of suitable diameter to the disconnected return hose, and put the hose end in a suitable container.
3. Jack up the front wheels and turn the steering wheel from the lock to lock until fluid stops running out of the tube.
4. Reconnect the return hose to reservoir.
5. Fill the reservoir with the power steering fluid and then bleed the power steering system.

Air Bleeding

⚠ CAUTION

Always use genuine PSF-4. Using other type of power steering fluid or ATF can cause increased wear and poor steering in cold weather.

1. Jack up the front wheels.
2. Fill the reservoir with the power steering fluid up to the level of 'COLD MAX' marked on the reservoir.



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⚠ CAUTION

Be careful not to start the engine. If starting the engine before performing the steps 3 through 4, it may cause an abnormal noise during power steering pump operation.

3. Turn the steering wheel from lock to lock 5 ~ 6 times for 15 ~ 20 seconds.
4. Crank the engine 1 ~ 2 times by turning the ignition key very quickly from the 'On' position to the 'Start' position, but do not start the engine.
5. Turn the steering wheel from lock to lock 5 ~ 6 times for 15 ~ 20 seconds.

Start the engine and keep turning the steering wheel from lock to lock until air bubbles stop appearing in the reservoir with the engine idle.

6. Check the color and level of the power steering fluid in the reservoir and then replenish the reservoir up to the 'COLD MAX' level as required.

📌 NOTICE

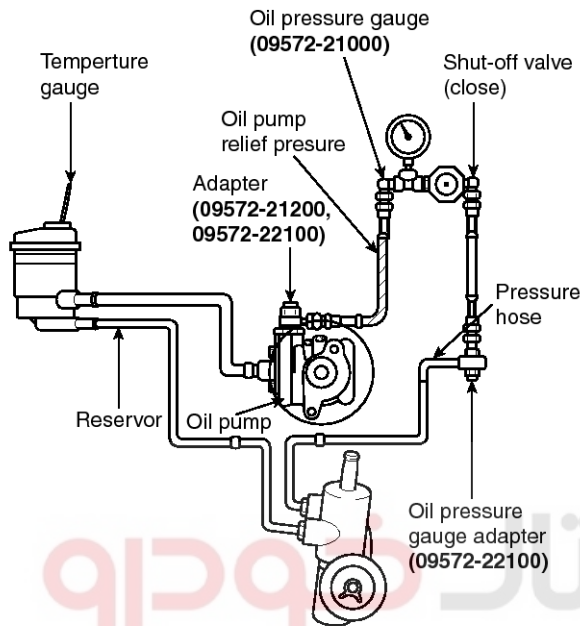
If the fluid level moves up and down when turning the steering wheel, the fluid overflows out of the reservoir when turning off the engine or the fluid is a white color, it indicates that air bubbles have not been removed sufficiently from the power steering system. Therefore, repeat the steps 5 through 6 as required.

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Steering System

Oil-Pump Pressure Test

1. Disconnect the pressure tube from the power steering motor and then install the special tools between the motor and the pressure tube as illustrated below.



2. Start the engine and turn the steering wheel several times so that the fluid temperature rises to approx. 50 ~ 60 C (122 F).
3. Set the engine speed to approx. 600rpm.
4. Close the shut-off valve of the special tools and measure the fluid pressure.

Relief pressure: 100 ~ 105 kgf/cm² (1422 ~ 1493 psi)

⚠ CAUTION

Do not keep the shut-off valve on the pressure gauge closed for longer than 10 seconds.

5. Remove the special tools, and then connect the pressure tube to the pump by tightening the eye bolt.
6. Bleed the power steering system.

Steering Column & Shaft

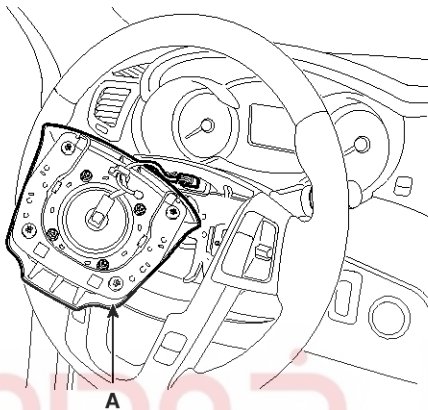
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Steering Column & Shaft

Steering Column-Shaft

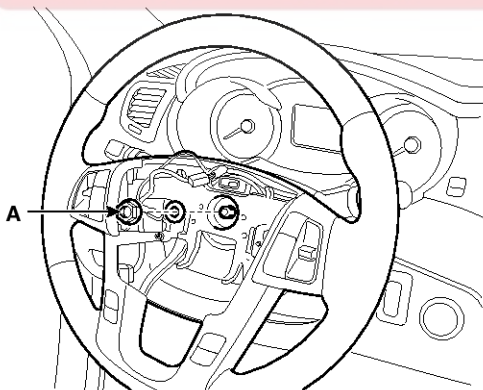
Replacement

1. Disconnect the battery negative cable from the battery and then wait for at least 30 seconds.
2. Turn the steering wheel so that the front wheels can face straight ahead.
3. Remove the airbag module (A). (Refer to "RT" group)



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4. Disconnect the connector (A) & lock nut and then remove the steering wheel from the steering column shaft.

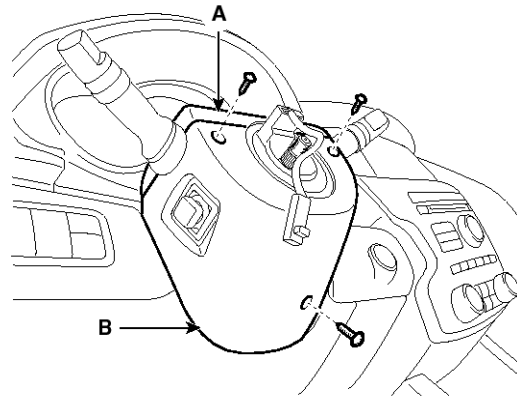


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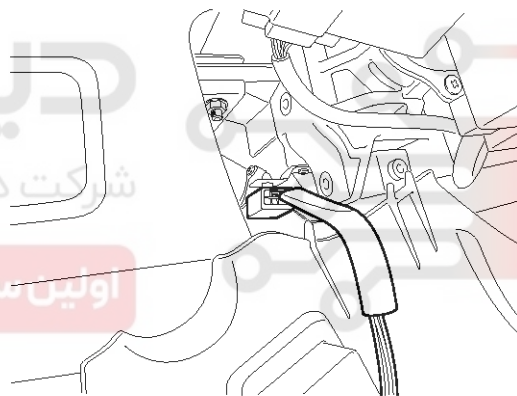
⚠ CAUTION

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

5. Remove the steering column upper (A) and lower (B) shroud.

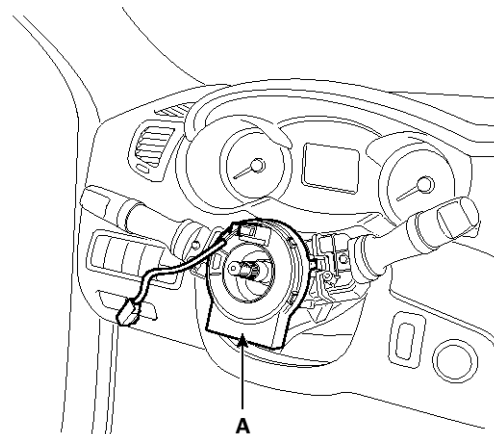


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SVGST0008D

6. Remove the clock spring (A).

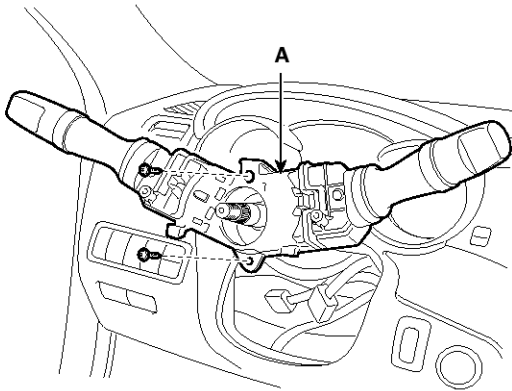


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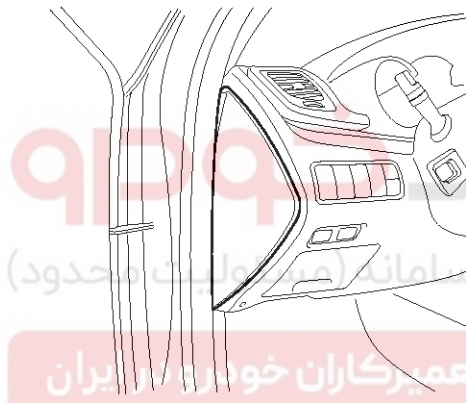
Steering System

7. Remove the multifunction switches (A).

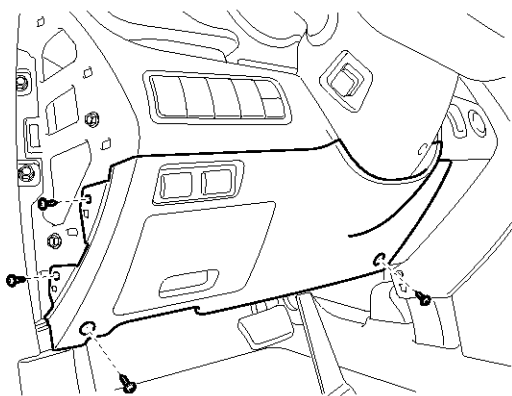


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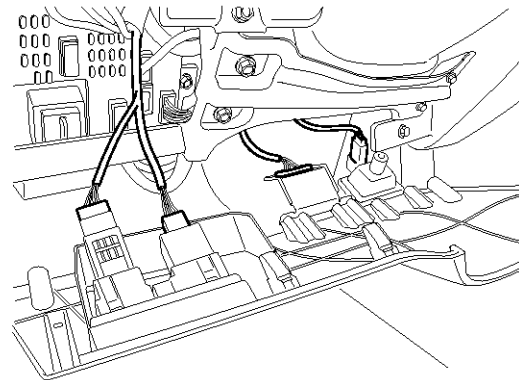
8. Remove the lower crash pad.



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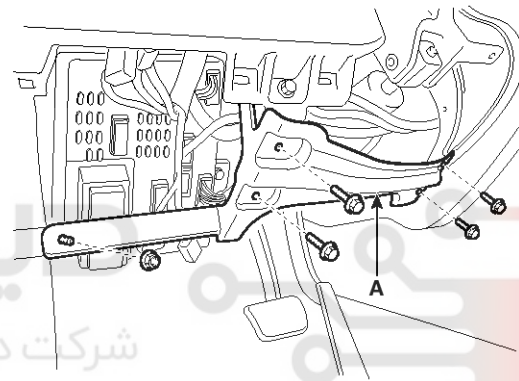


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SVGST0013D

9. Loosen the bolt & nut and then remove the panel (A).

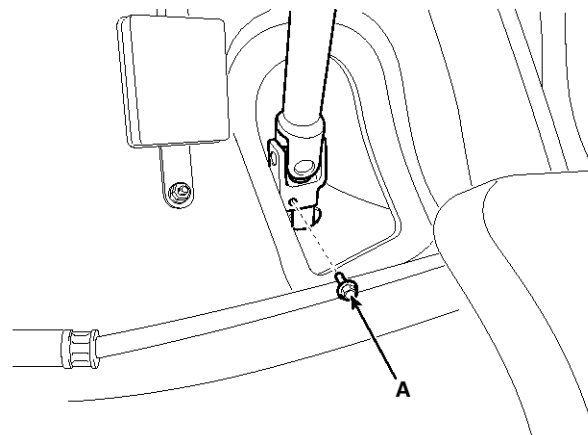


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10. Loosen the bolt (A) and then disconnect the universal joint assembly from the pinion of the steering gear box.

Tightening torque:

29.4 ~ 34.3N.m (3.0 ~ 3.5kgf.m, 21.7 ~ 25.3lb-ft)



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Steering Column & Shaft

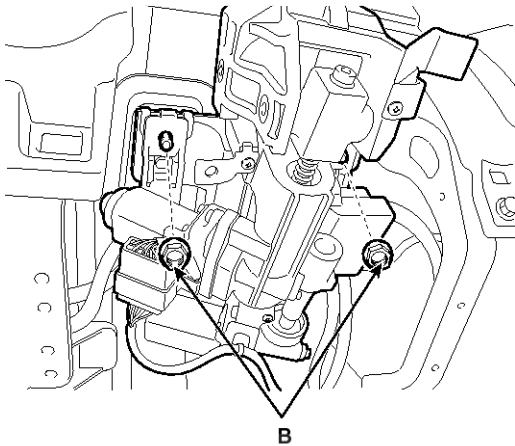
ST-11

11. Disconnect all connectors connected the steering column.

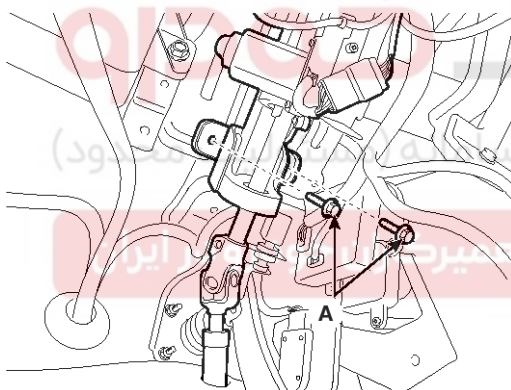
12. Remove the steering column by loosening the mounting bolts (A) and nuts (B).

Tightening torque:

12.7 ~ 17.7N.m (1.3 ~ 1.8kgf.m, 9.4 ~ 13.0lb-ft)



SVGST0016D



SVGST0028D

13. Installation is the reverse of the removal.

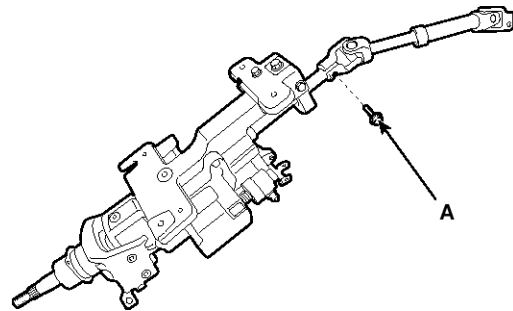
Disassembly

Universal joint assembly

1. Loosen the bolt (A) and then disconnect the universal joint assembly from the steering column assembly.

Tightening torque:

17.7 ~ 24.5N.m (1.8 ~ 2.5kgf.m, 13.0 ~ 18.1lb-ft)



SVGST0015D

2. Reassembly is the reverse of the disassembly.

Inspection

1. Check the steering column for damage and deformation.
2. Check the steering column for damage and deformation.
3. Check the joint bearing for damage and wear.
4. Check the tilt bracket for damage and cracks.
5. Check the key lock assembly for proper operation and replace it if necessary.

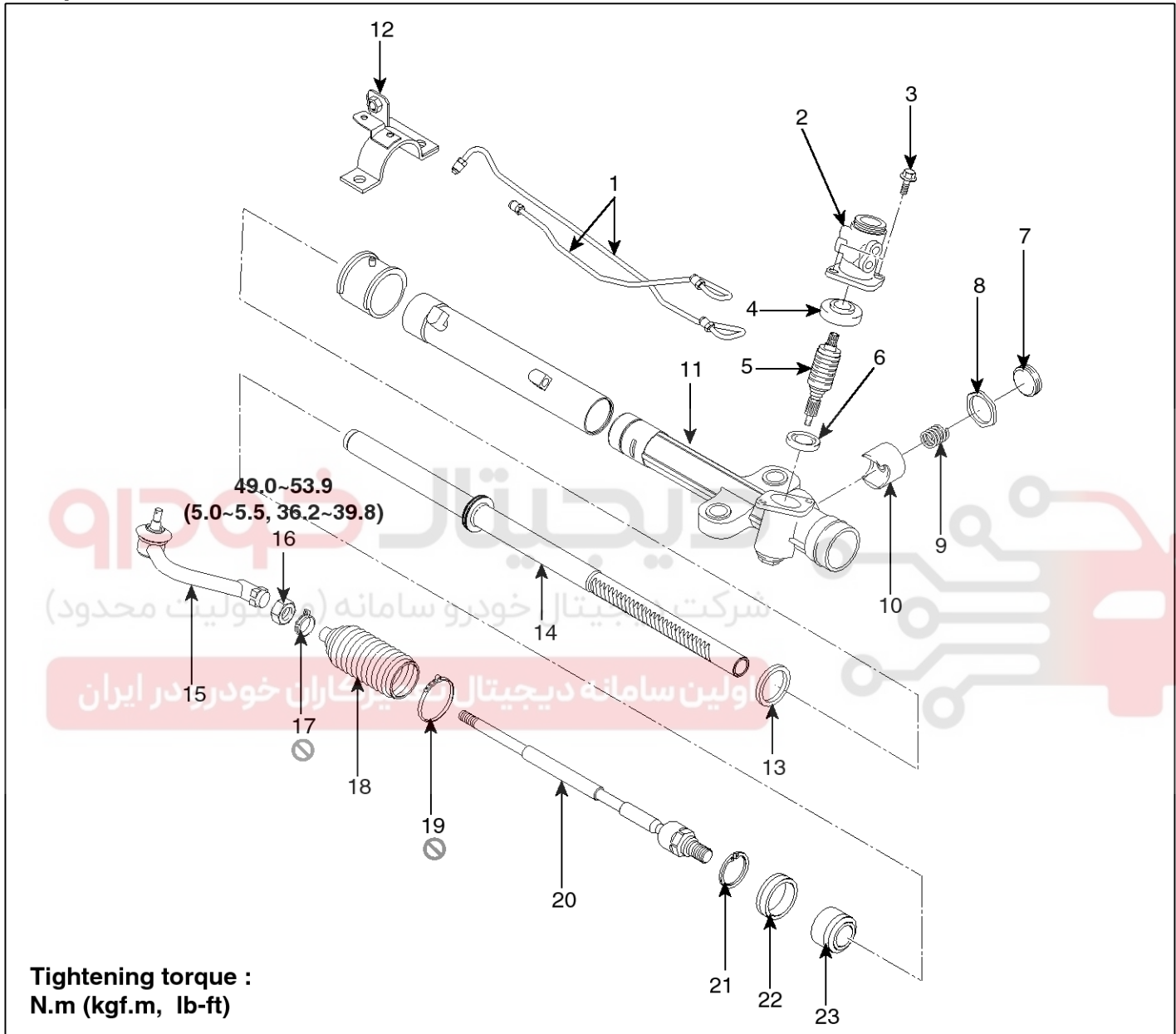
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Steering System

Hydraulic Power Steering System

Power Steering Gear Box

Components



SVGST0101D

- | | | |
|--------------------------|--|------------------|
| 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. Seal clip |
| 6. Oil seal | 14. Rack | 22. Oil seal |
| 7. Yoke plug | 15. Tie rod end | 23. Rack stopper |
| 8. Lock nut | 16. Lock nut | |

Hydraulic Power Steering System

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Replacement

1. Remove the front wheel & tire.

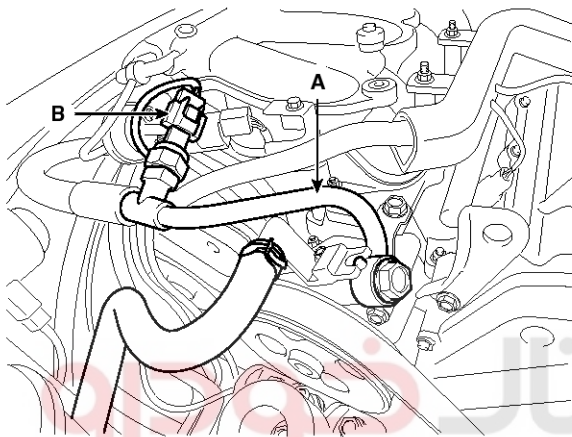
Tightening torque:

88.3 ~ 107.9N.m (9.0 ~ 11.0kgf.m, 65.1 ~ 79.6lb-ft)

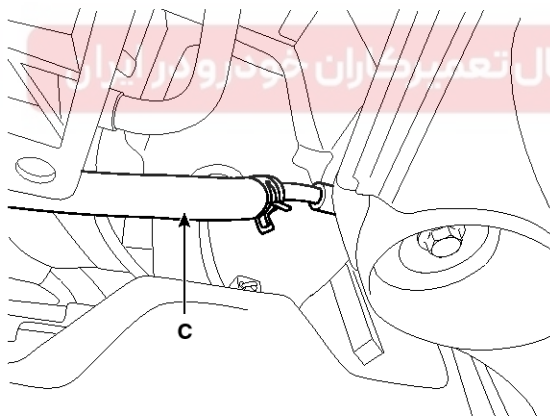
⚠ CAUTION

Be careful not to damage to the hub bolts when removing the front wheel & tire.

2. Disconnect the pressure hose(A), pressure sensor (B), return hose (C) and then drain the power steering fluid.

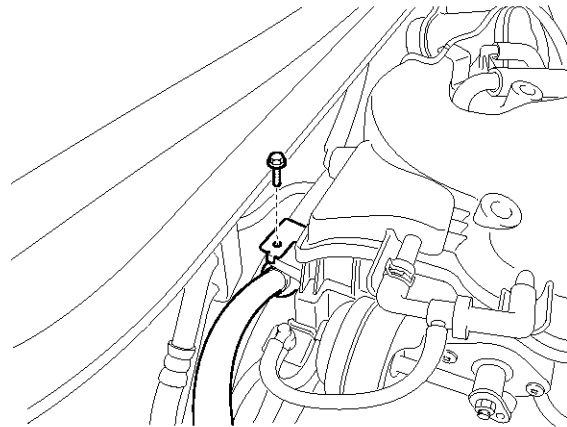


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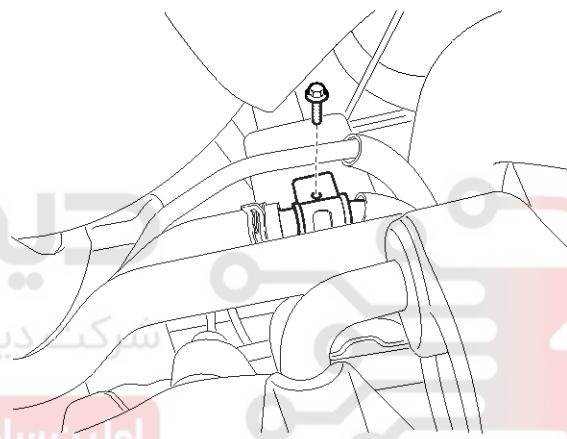


SYFST0003D

3. Loosen the power steering hose mounting bolt.



SVGST0026D



SVGST0024D

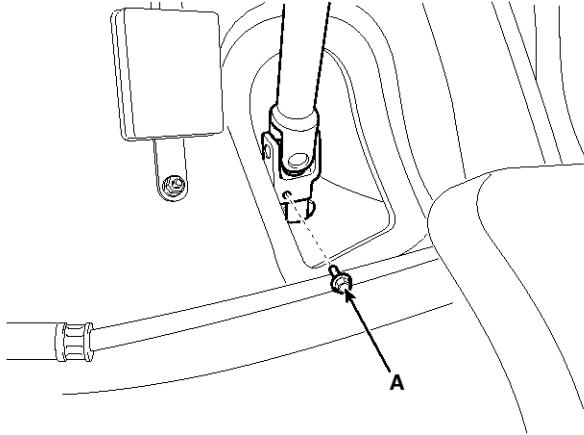
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4. Loosen the bolt (A) and then disconnect the universal joint assembly from the pinion of the steering gear box.

Tightening torque:

29.4 ~ 34.3N.m (3.0 ~ 3.5kgf.m, 21.7 ~ 25.3lb-ft)



SVGST0017D

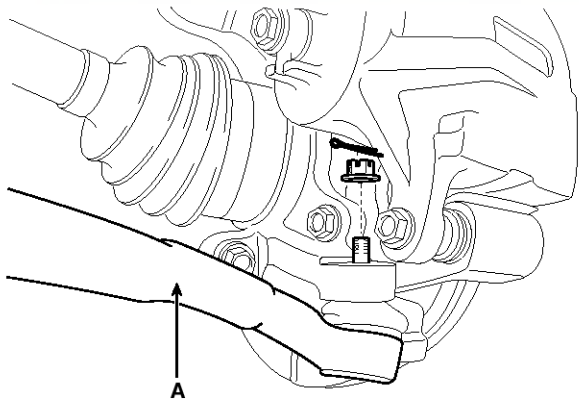
CAUTION

Lock the steering wheel in the straight ahead position to prevent the damage of the clock spring inner cable when you handle the steering wheel.

5. Remove the split pin and castle nut and then disconnect the tie-rod end (A) from the front knuckle.

Tightening torque:

34.3 ~ 44.1N.m (3.5 ~ 4.5kgf.m, 25.3 ~ 32.5lb-ft)

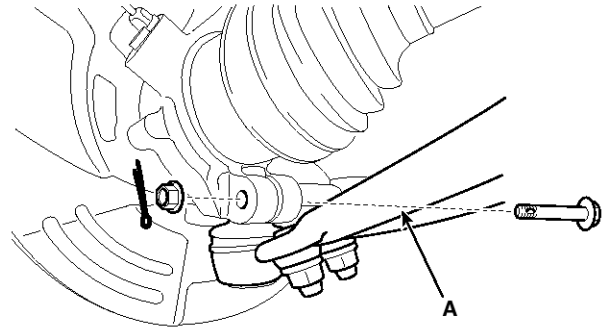


SVGSS0013D

6. Loosen the bolt & nut and then remove the lower arm (A).

Tightening torque:

98.1 ~ 117.7N.m (10.0 ~ 12.0kgf.m, 72.3 ~ 86.8lb-ft)

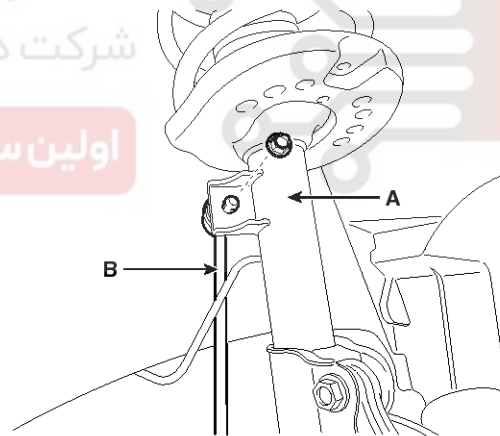


SVGSS0017D

7. Disconnect the stabilizer link (B) with the front strut assembly (A) after loosening the nut.

Tightening torque:

98.1 ~ 117.7N.m (10.0 ~ 12.0kgf.m, 72.3 ~ 86.8lb-ft)

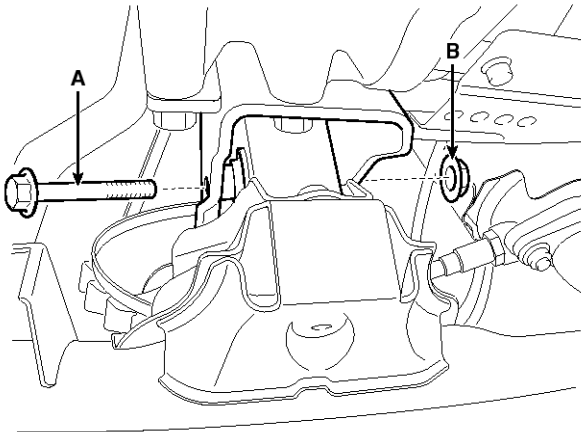


SVGSS0014D

Hydraulic Power Steering System

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8. Loosen the bolt (A) & nut (B) and then remove the front roll stopper.

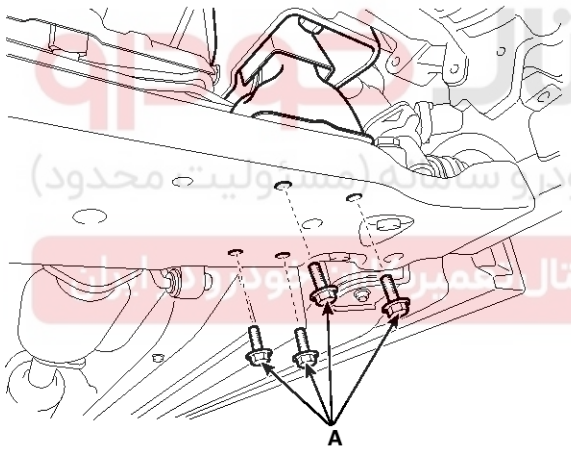


SVGSS0020D

9. Loosen the rear roll stopper mounting bolts (A).

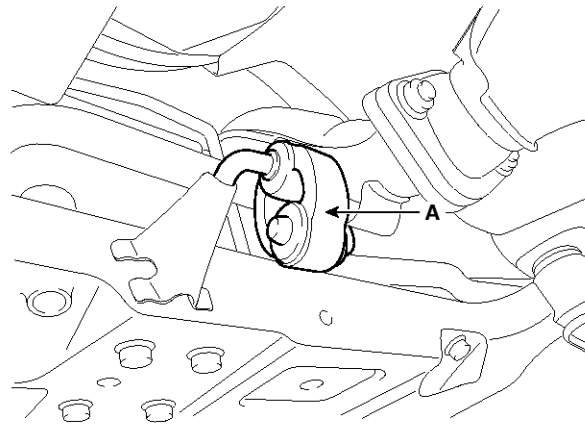
Tightening torque:

49.0 ~ 63.7N.m (5.0 ~ 6.5kgf.m, 36.2 ~ 47.0lb-ft)



SVGSS0018D

10. Disconnect the muffler rubber hanger (A).



SVGSS0019D

11. Loosen the bolts & nuts and then remove the under cover & sub frame.

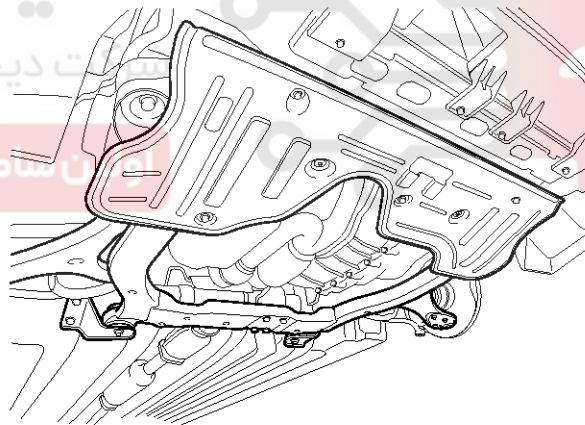
Tightening torque

Sub frame mounting bolts & nuts:

156.9 ~ 176.5N.m (16.0 ~ 18.0kgf.m, 115.7 ~ 130.2lb-ft)

Sub frame bracket bolts & nuts:

44.1 ~ 58.8N.m (4.5 ~ 6.0kgf.m, 32.5 ~ 43.4lb-ft)

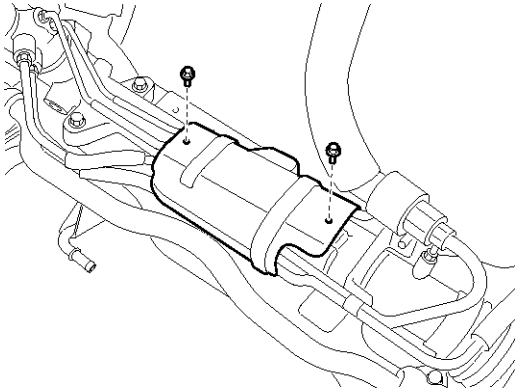


SVGSS0023D

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Steering System

12. Remove the protector.

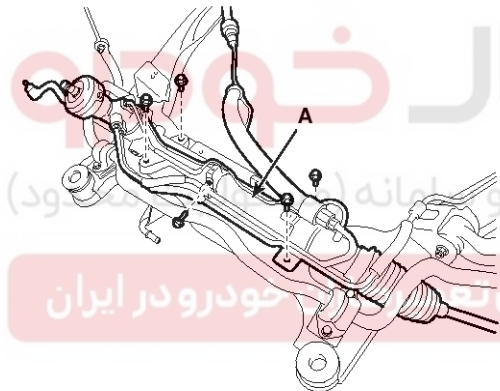


SVGST0018D

13. Loosen the bolt and then remove the steering gearbox (A).

Tightening torque:

88.3 ~ 107.9N.m (9.0 ~ 11.0kgf.m, 65.1 ~ 79.6lb-ft)



SVGST0019D

14. Installation is the reverse of the removal.

15. Add power steering fluid to reservoir.

16. Bleed the power steering system. (Refer to Air bleeding)

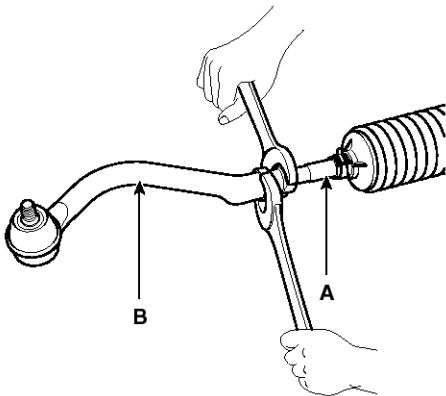


Hydraulic Power Steering System

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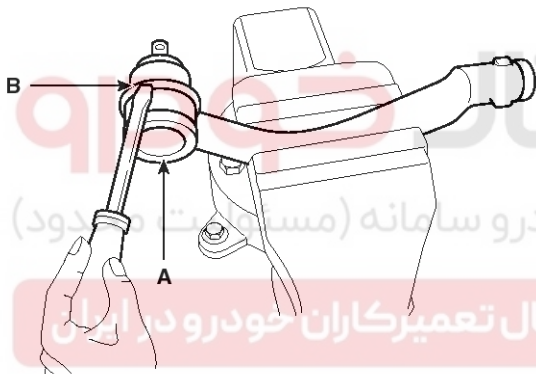
Disassembly

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



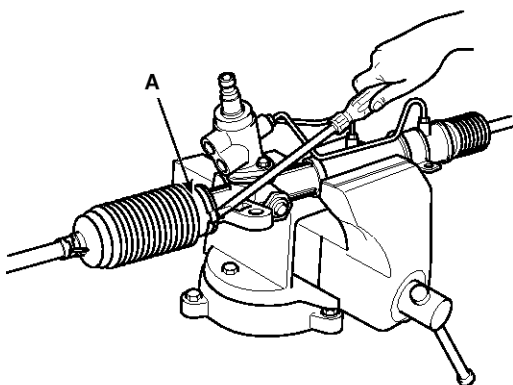
KPB202A

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



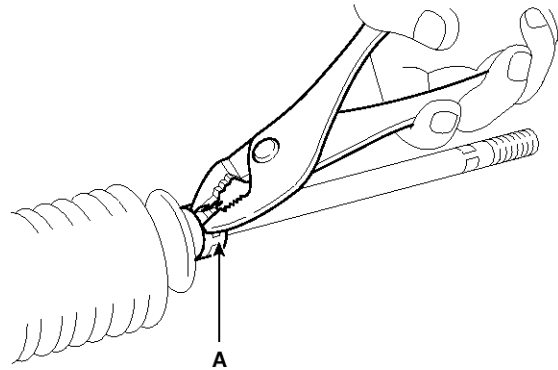
EPBF500H

3. Remove the bellows band (A).



KPB006F

4. Remove the bellows clip (A).



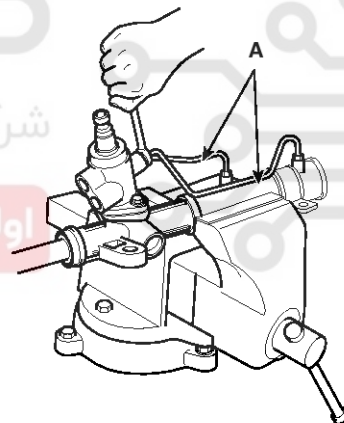
EPKE013I

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.



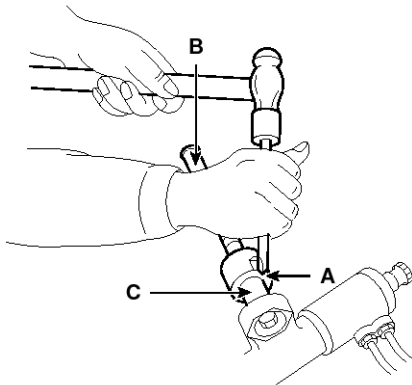
APHE006H

7. While moving the rack slowly, drain the fluid from the rack housing.

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Steering System

8. Un stake the tab washer (A) which fixes the tie rod (B) and rack (C) with a chisel.

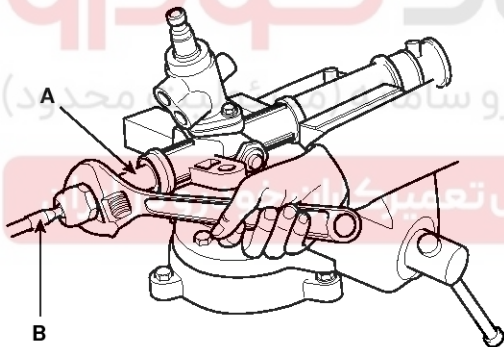


EPKE037A

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

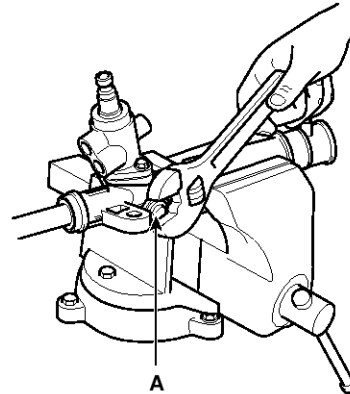


CAUTION
Remove the tie rod (B) from the rack (A), taking care not to twist the rack.



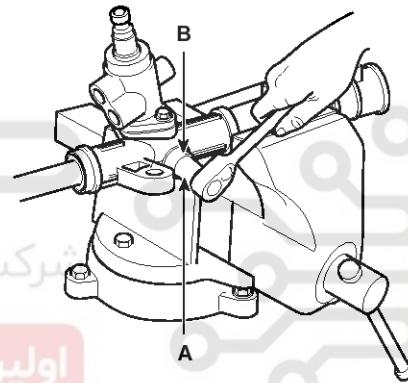
KPBF006J

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



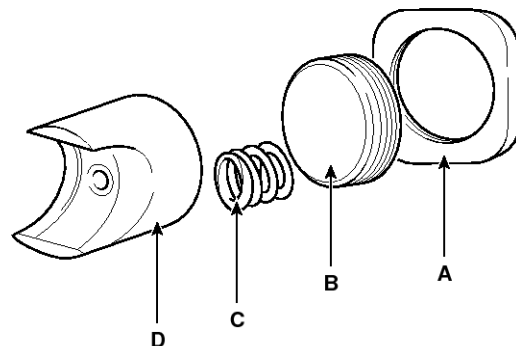
KPBF006K

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



KPBF006L

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



APJF005L

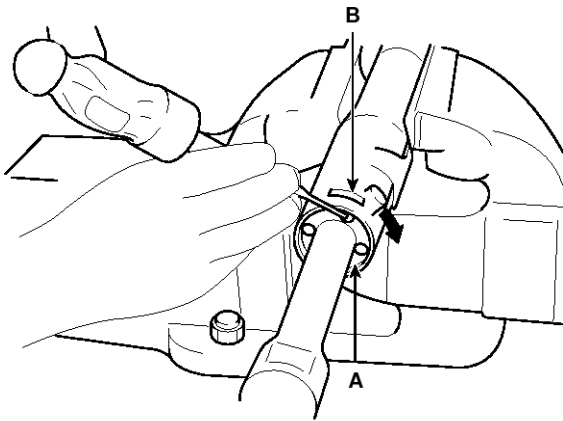
Hydraulic Power Steering System

ST-19

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.

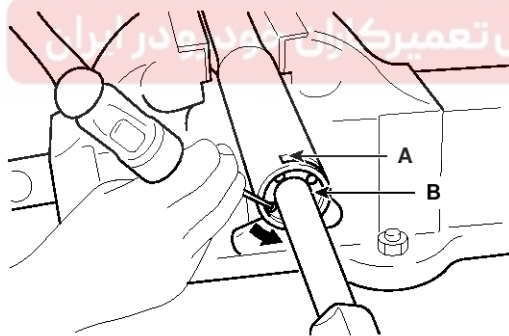


UPBG500K

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

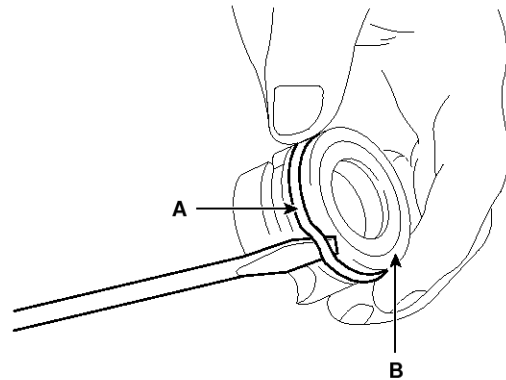
Be careful not to damage the rack.



EPKE013R

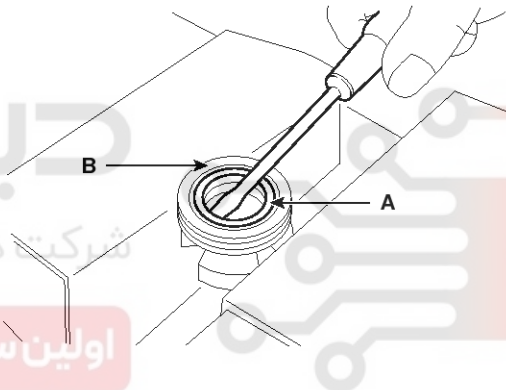
15. Remove the rack bushing and rack from the rack housing.

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



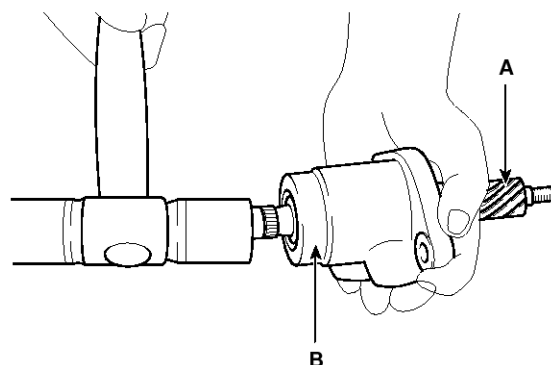
EPKE013T

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



EPKE013U

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



UPBG500L

ST-20

Steering System

19. Using the special tool, remove the oil seal and ball bearing from the valve body.

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

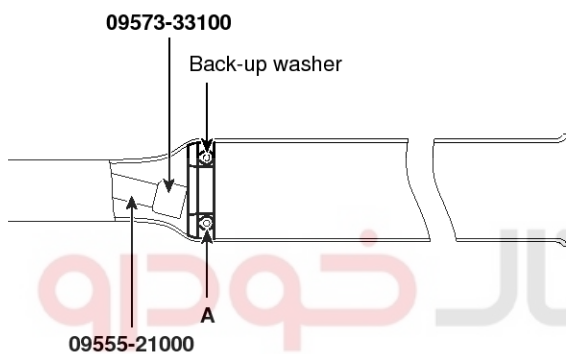
⚠ CAUTION

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



EPRF210B

22. Reassembly is the reverse of the disassembly.

Inspection

1. Rack

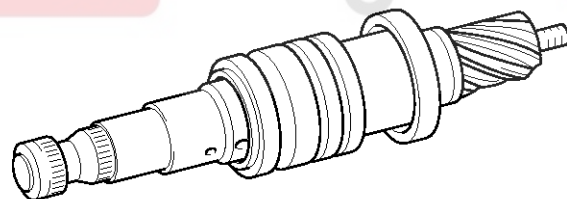
- 1) Check for rack tooth face damage or wear.
- 2) Check for oil seal contact surface damage.
- 3) Check for rack bending or twisting.
- 4) Check for oil seal ring damage or wear.
- 5) Check for oil seal damage or wear.



LPJF006C

2. Pinion

- 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.



APJF013Z

3. Bearing

- 1) Check for seizure or abnormal noise during a bearing 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.

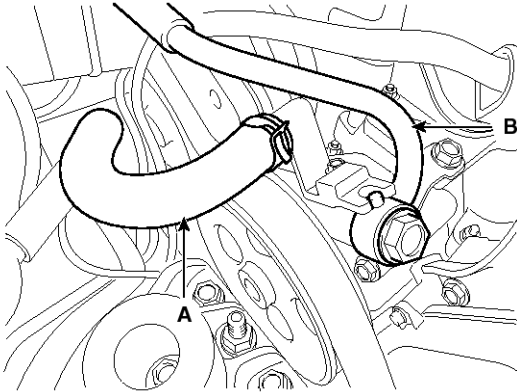
Hydraulic Power Steering System

ST-21

Power Steering Hoses

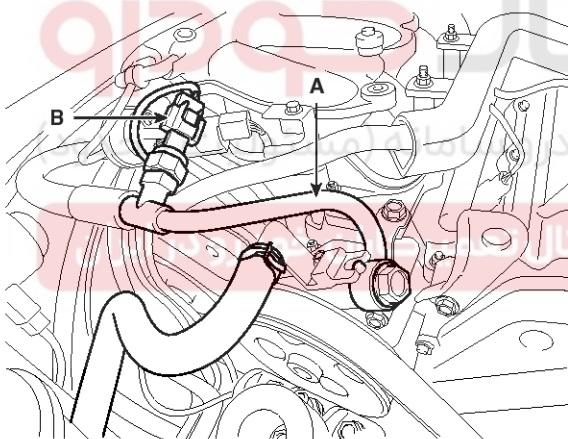
Replacement

1. Disconnect the pressure tube (A) and suction hose (B) from the power steering pump assembly.



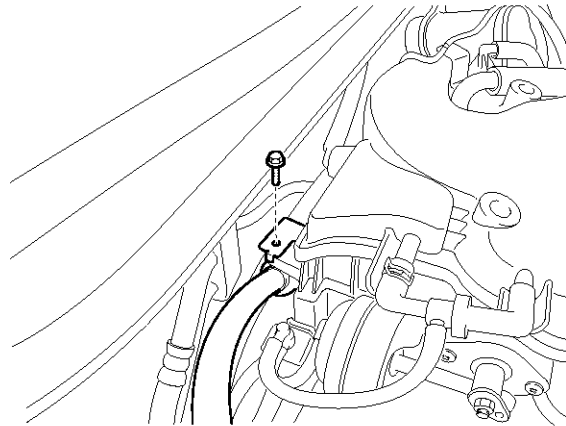
SVGST0027D

2. Disconnect the pressure sensor (B).

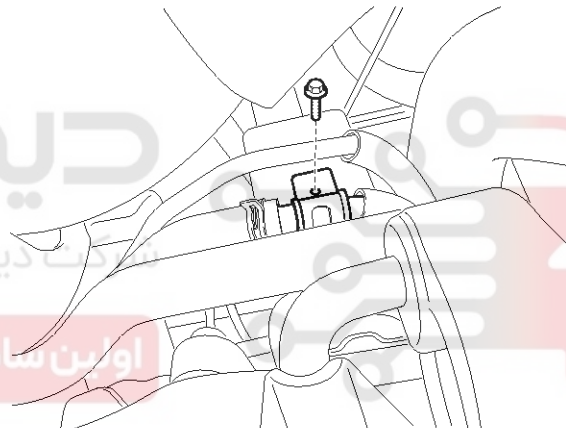


SVGST0025D

3. Loosen the power steering hose mounting bolt.



SVGST0026D

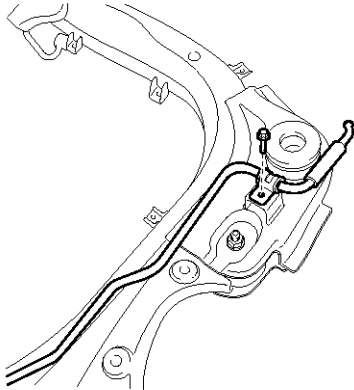


SVGST0024D

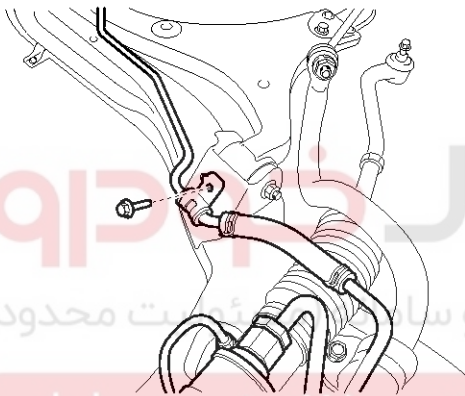
ST-22

Steering System

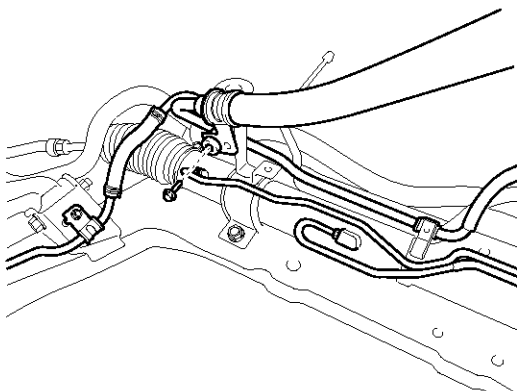
4. Loosen the bolt and then remove the power steering hose with the sub frame.



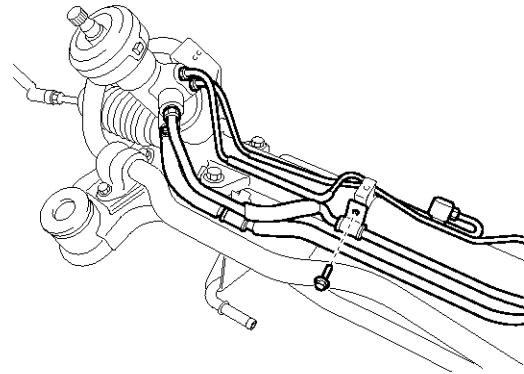
SVGST0020D



SVGST0021D

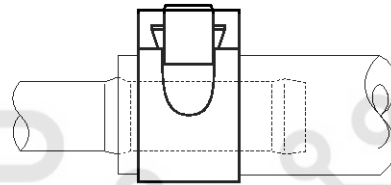


SVGST0023D



SVGST0022D

- When installing, be sure to connect between hose to tube using a clamp as shown in the illustration.



SUNST6512D

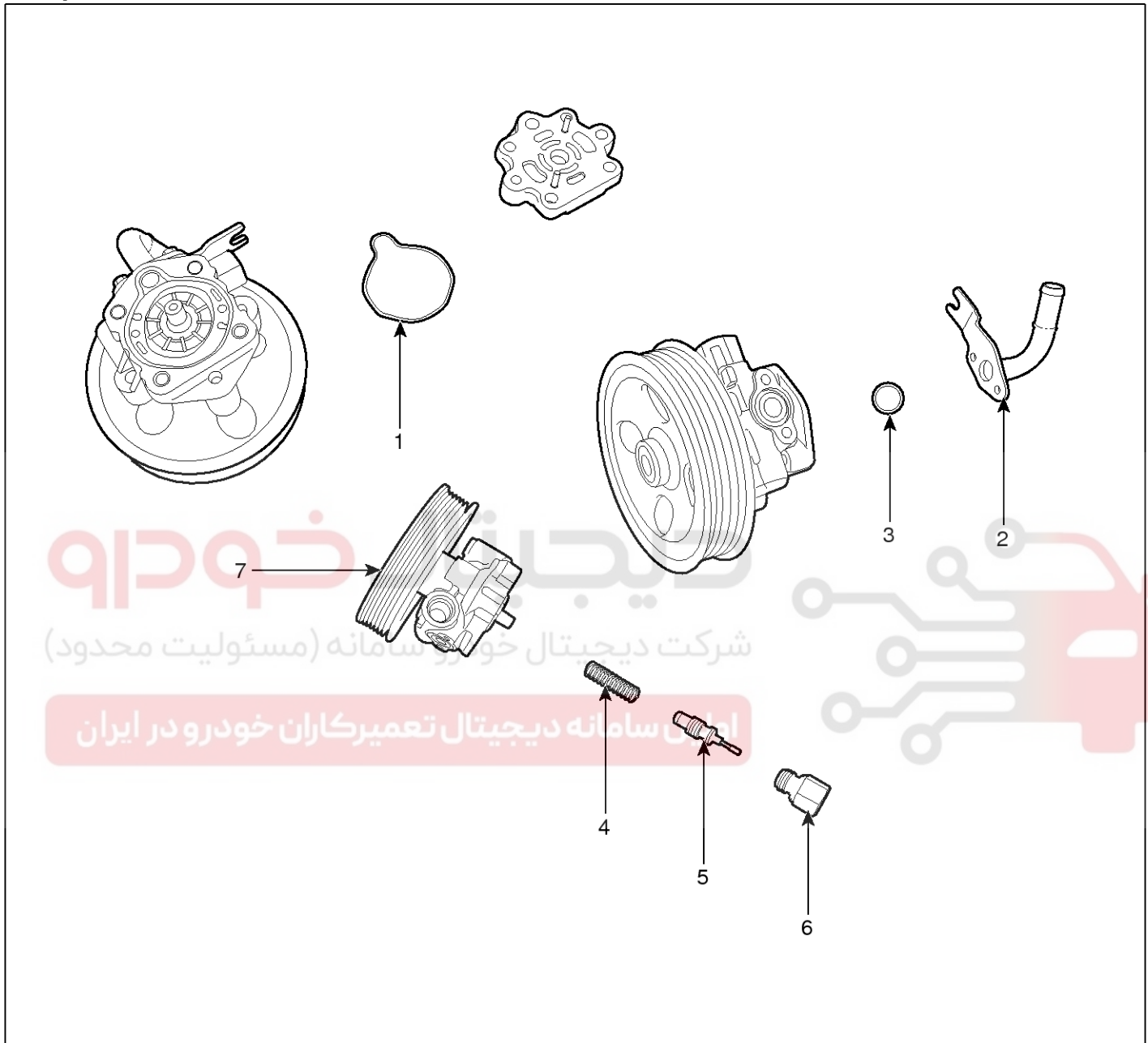
- Check all clamps for deterioration or deformation; replace with the clamps new one if necessary.
- Add the recommended power steering fluid and bleed the power steering system.

Hydraulic Power Steering System

ST-23

Power Steering Oil Pump

Components



SYFST0100D

1. O-ring

2. Suction pipe

3. O-ring

4. Flow control spring

5. Flow control valve

6. Flow control connector

7. Pump pulley

ST-24

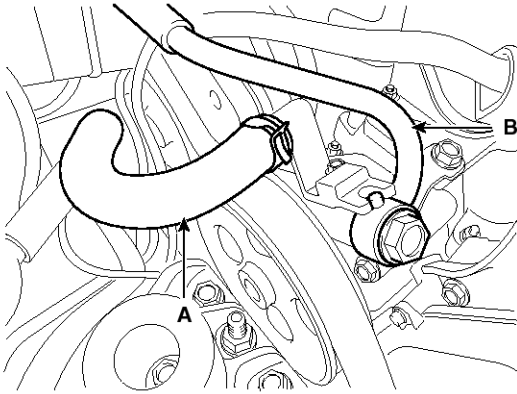
Steering System

Replacement

1. Remove the drive belt.
2. Disconnect the pressure tube (A) and suction hose (B) from the power steering pump assembly.

Tightening torque:

53.9 ~ 63.7N.m(5.5 ~ 6.5kgf.m, 39.8 ~ 47.0lb-ft)

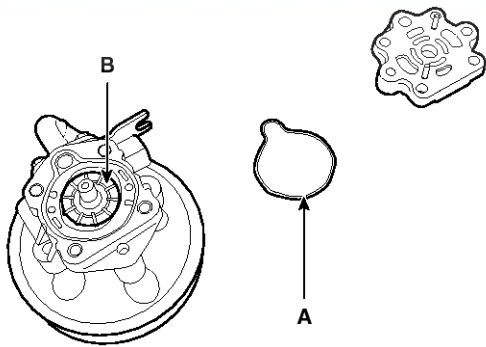


SVGST0027D

3. Loosen the bolts and then remove the power steering oil pump.
4. Installation is the reverse of the removal.

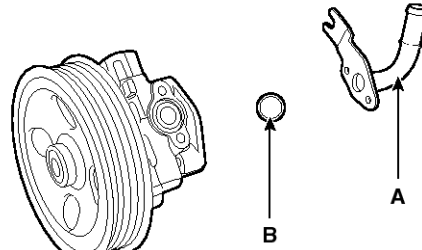
Disassembly

1. Loosen the bolt and then disconnect the O-ring (A) & cam ring (B).



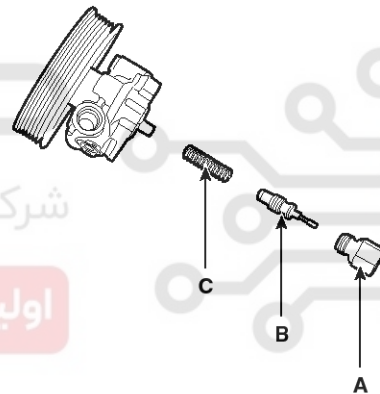
SYFST0023D

2. Loosen the bolt and then remove the suction pipe (A) and O-ring (B).



SYFST0024D

3. Disconnect the flow control connector (A) and then flow control valve (B), flow control spring (C).



SYFST0025D

4. Reassembly is the reverse of the disassembly.

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.