

# SONATA(YF) > 2013 > G 2.0 T-GDI > Steering System

## Steering System > General Information > Specifications

### Specifications


Item		Specification
Type		Motor driven power steering system(EPS)
Steering gear	Type	Rack & Pinion
	Rack stroke	148mm (5.82 in.)
Steering angle(Max.)	Inner	39.83° ± 1.5°
	Outer	33.01°

### Tightening Torques

Item	Tightening torque		
	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
Steering column to Universal joint	53.9 ~ 63.7	5.5 ~ 6.5	39.8 ~ 47.0
Universal joint to pinion of steering gear	32.4 ~ 37.3	3.3 ~ 3.8	23.9 ~ 27.5
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 stay mounting bolts & nuts	44.1 ~ 58.8	4.5 ~ 6.0	32.5 ~ 43.4
Sub frame mounting bolts & nuts	156.9 ~ 176.5	16.0 ~ 18.0	115.7 ~ 130.2
Roll rod mounting bolt & nut	107.9 ~ 127.5	11.0 ~ 13.0	79.6 ~ 94.0

## Steering System > General Information > Special Service Tools

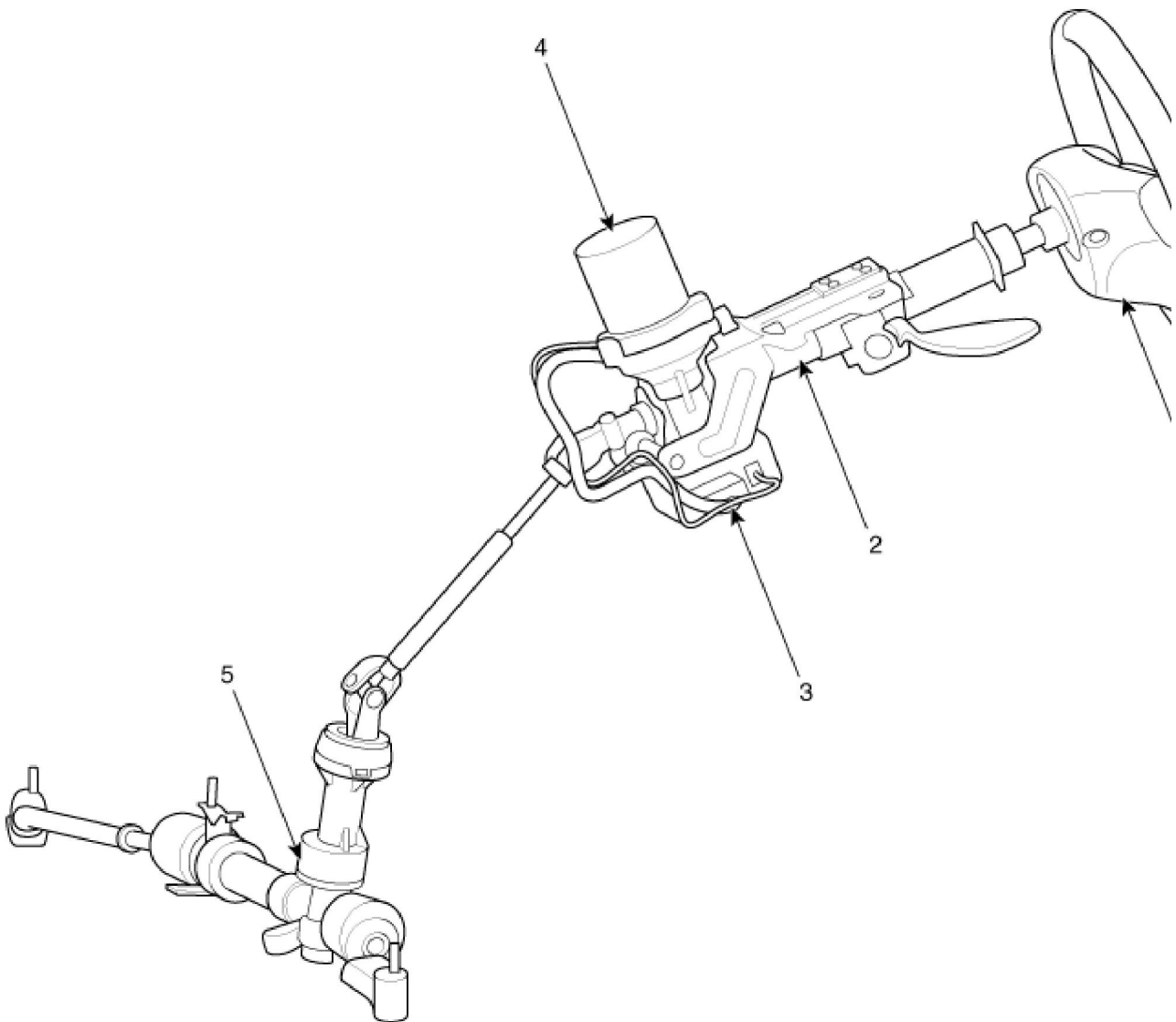
### Special Service Tools

Tool (Number and Name)	Illustration	Use
09568-34000 Crossmember support		Supporting of the crossmember

## Steering System > Electric Power Steering > Components and

## Components Location

### Components



- 1. Steering wheel
- 2. Steering column
- 3. ECU

- 4. Motor
- 5. Steering gear box

## Steering System > Electric Power Steering > Description and Operation

### Description

EPS (Electric power steering, Column assist type) system uses an electric motor to assist the steering force and it is an engine operation independent steering system.

EPS control module controls the motor operation according to information received from the each sensor and CAN (Controller Area Network), resulting in a more precise and timely control of steering assist than conventional engine-driven hydraulic

systems. Components (Steering Angle Sensor, Torque Sensor, Fail-safe relay, etc.) of the EPS system are located inside the steering column & EPS unit assembly and the steering column & EPS unit assembly must not be disassembled to inspect or replace them.

**Note With Regard to diagnosis**

Trouble factor	Check item	Trouble symptom	Explanation	Note
Drop, impact, and overload	Motor	Abnormal noise	- Visible or unvisible damage can occur. The steering wheel could pull to one side by using the dropped parts.- Precise parts of motor/ECU are sensitive to vibration and impact.- Overload can cause unexpected damage	- Do not use the impacted EPS.- Do not overload each parts.
	ECU	Circuit damage- Wrong welding point- Broken PCB- Damaged precise parts		
	Torque sensor	Insufficient steering effort	Overload to INPUT shaft can cause malfunction of the torque sensor	- Do not impact the connecting parts (When inserting and torquing)- Use the specified tool to remove the steering wheel. (Do not hammer on it)- Do not use the impacted EPS
	Shaft	Insufficient steering effort (Uneven between LH and RH)		Do not use the impacted EPS
Pull/Dent	Harness	- Malfunction- impossible power operation- Malfunction of EPS	Disconnection between harness connecting portion and harness	Do not overload the harness
Abnormal storage temperature	Motor/ECU	Abnormal steering effort by improper operation of the motor/ECU	- Waterproof at the normal condition- Even a little moisture can cause malfunction of the precise parts of the motor/ECU	- Keep the normal temperature and proper moisture, while storing- Avoid drowning

1. Do not impact the electronic parts, if they are dropped or impacted, replace them with new ones.
2. Avoid heat and moisture to the electronic parts.
3. Do not contact the connect terminal to avoid deformation and static electricity.
4. Do not impact the motor and torque sensor parts, if they are dropped or impacted, replace them with new ones.
5. The connector should be disconnected or connected with IG OFF.

## Steering System > Electric Power Steering > Repair procedures

### General Inspection

After or before servicing the EPS system, perform the troubleshooting and test procedure as follows. Compare the system condition with normal condition in the table below and if abnormal symptom is detected, perform necessary remedy and inspection.

Test condition	Normal condition: Motor must not supply steering assist.		
	Symptom	Possible cause	Remedy
IG Off	Motor supplies steering assist.	ASP is not calibrated.	Perform the ASP calibration using a scan tool.
		IG power supplies	Inspect the IG power supply line.

Test condition	Normal condition: Motor must not supply steering assist, Warning lamp is illuminated.		
	Symptom	Possible cause	Remedy
IG On/Engine Off	Motor supplies steering assist.	ASP is not calibrated.	Perform the ASP calibration using a scan tool.
		EMS CAN signal is not received.	Inspect the CAN line.
	Warning lamp is not illuminated.	Cluster fault	Inspect the cluster and cluster harness

Test condition	Normal condition: Motor supplies steering assist, Warning lamp is not illuminated.		
	Symptom	Possible cause	Remedy
IG On/Engine On	Warning lamp is illuminated and Motor dose not supply steering assist.	EPS (Hot at all times) and IG power supply fault	Inspect the connector and harness for EPS (Hot at all times) and IG power supply line.
		DTC is detected by system.	Perform the self test using a scan tool and repair or replace.
	Warning lamp is illuminated and Motor supplies steering assist.	ASP is not calibrated.	Perform the ASP calibration using a scan tool.
		CAN communication between EPS and cluster is fault.	Inspect the CAN line.

ASP: Absolute Steering Position  
 CAN: Controller Area Network  
 EMS: Engine Management System

#### CAUTION

The following symptoms may occur during normal vehicle operation and if there is no EPS warning light illumination, it is not malfunction of EPS system.

- After turning the ignition switch on, the steering wheel becomes heavier while it performs EPS system diagnostics, for about 2 seconds, then it becomes normal steering condition.
- After turning the ignition switch on or off, EPS relay noise may occur but it is normal.
- When it is steered, while the vehicle is stopped or in low driving speed, motor noise may occur but it is normal operating one.

#### Caution when ASP (Absolute Steering Position) calibration or EPS type recognition

- Check if the battery is fully charged before ASP calibration or EPS type recognition.
- Be careful not to disconnect any cables connected to the vehicle or scan tool during ASP calibration or EPS type recognition.
- When the ASP calibration or EPS type recognition is completed, turn the ignition switch off and wait for

several seconds, then start the engine to confirm normal operation of the vehicle.

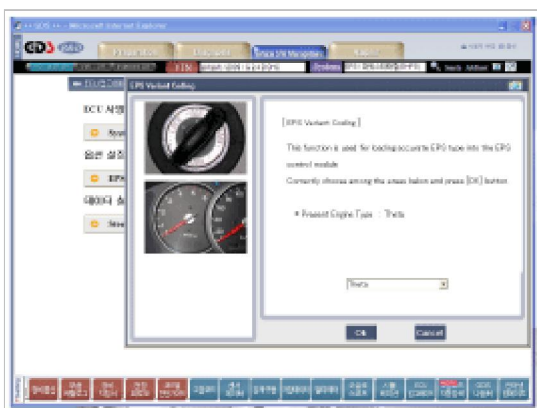
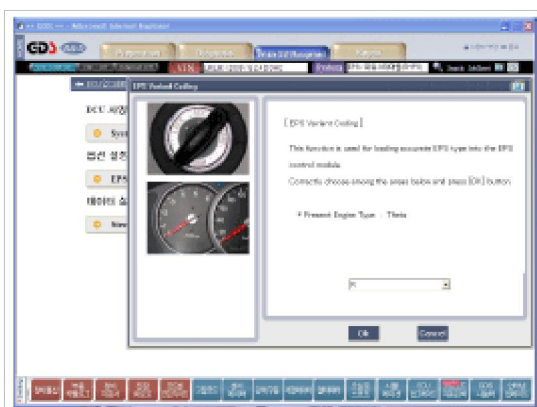
## ASP Calibration

1. Select "Steering Angle Sensor".
2. Proceed with the test according to the screen introductions.



## EPS Type Recognition Procedure

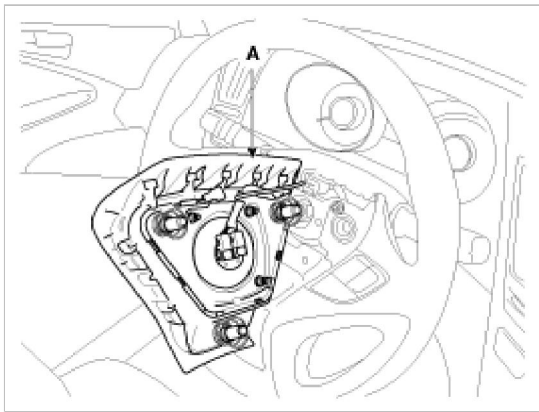
1. Select "EPS Variant Coding".
2. Proceed with the test according to the screen introductions.



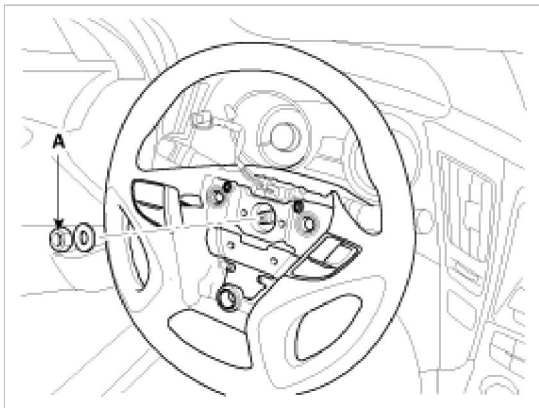
## Steering System > Electric Power Steering > Steering Column and Shaft > Repair procedures

### 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)



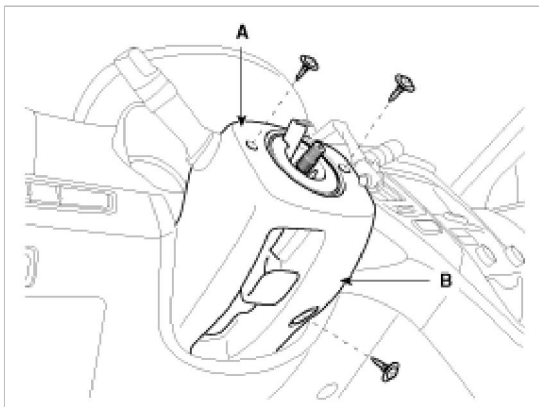
4. Disconnect the connector & lock nut (A) and then remove the steering wheel from the steering column shaft.



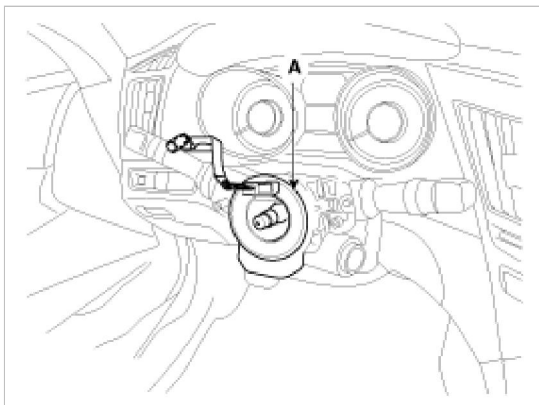
**CAUTION**

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.

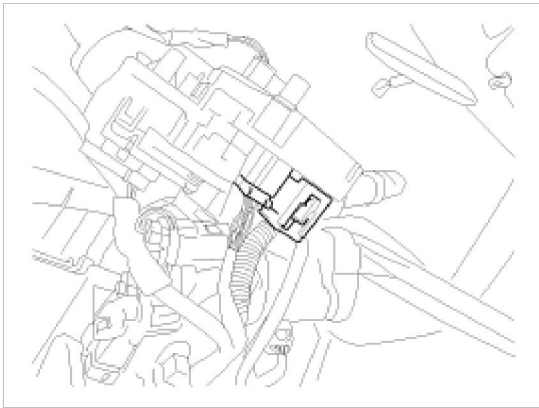


6. Remove the clock spring (A).

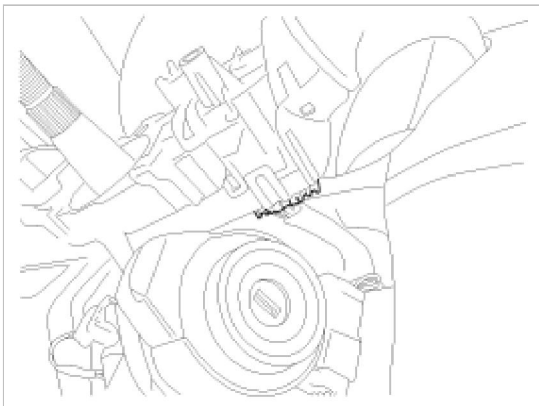
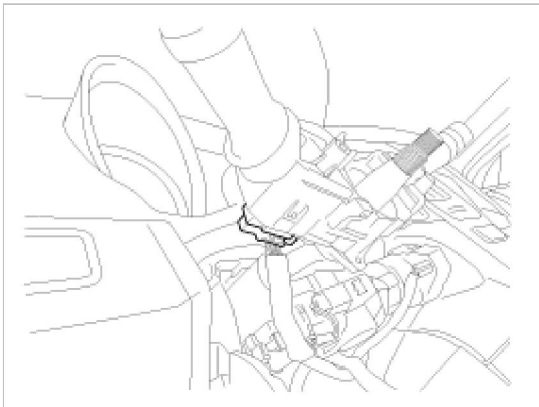
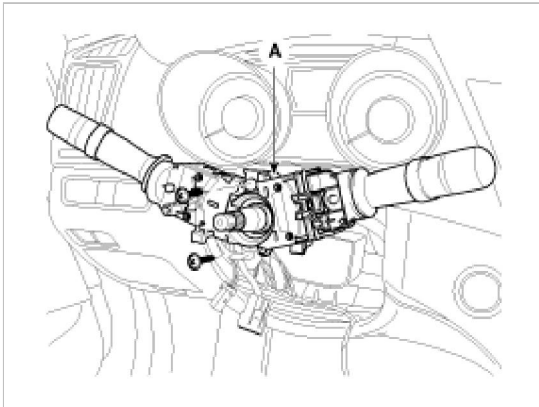


**CAUTION**

- When assembling set the center position by setting the marks between the clock spring and the cover into line. Make an array the mark (▶ ◀) by turning the clock spring clockwise to the stop and then 2.0 revolutions counterclockwise.

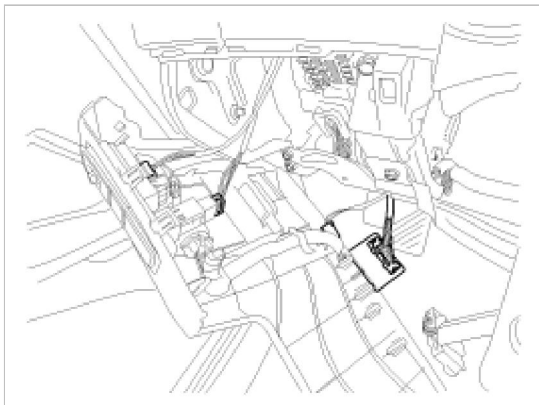
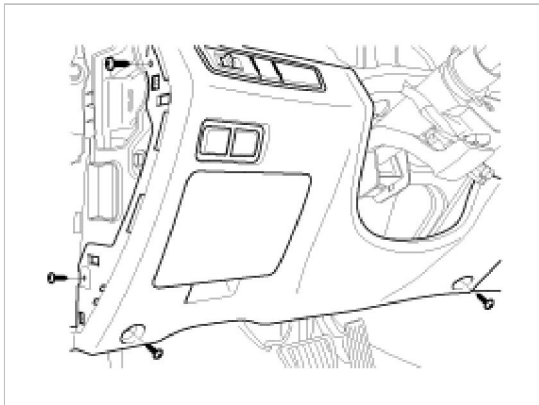
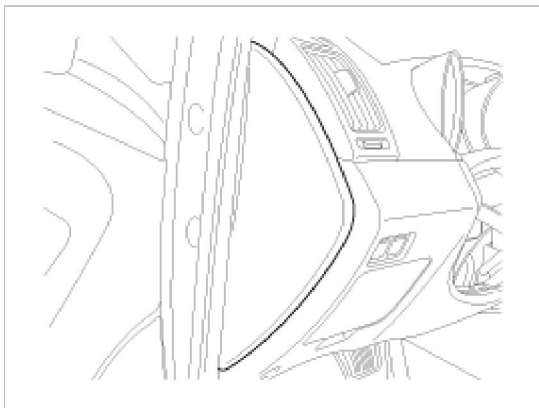


7. Remove the multifunction switches (A).

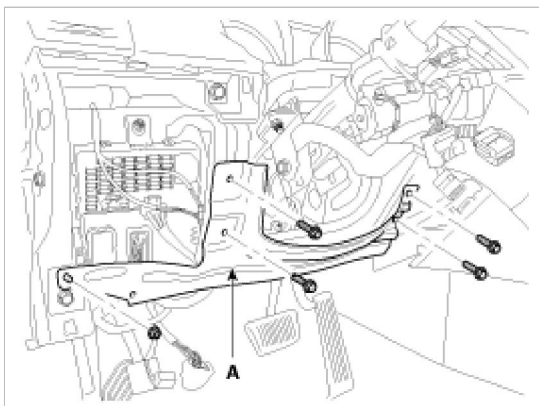




8. Remove the lower crash pad.



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



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

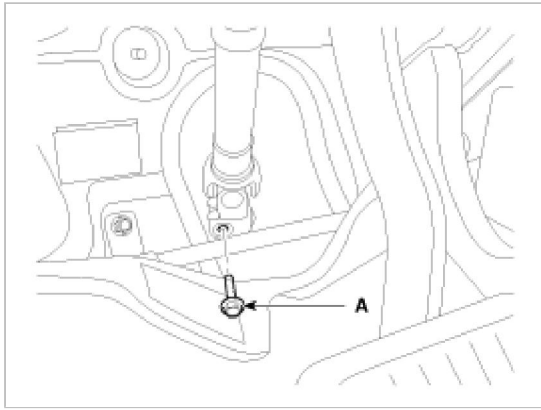
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**Tightening torque :**

32.4 ~ 37.3N.m(3.3 ~ 3.8kgf.m, 23.9 ~ 27.5lb-ft)

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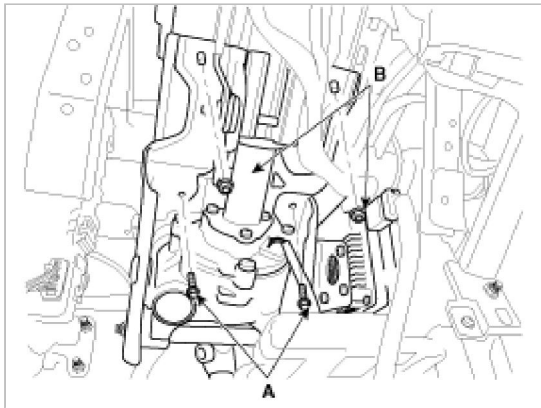
11. Disconnect all connectors connected the steering column.
12. Remove the steering column by loosening the mounting bolts (A) and nuts (B).

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**Tightening torque :**

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

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13. Installation is the reverse of the removal.

## Disassembly

### Universal Joint Assembly

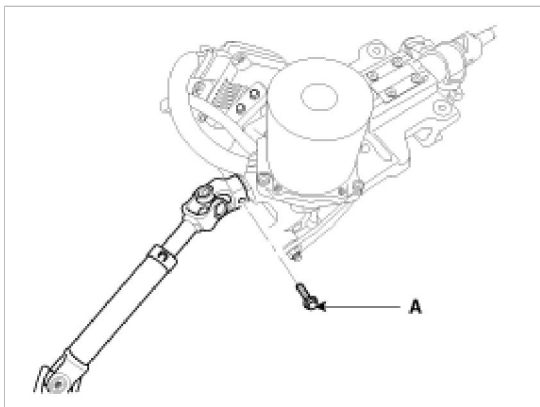
1. Loosen the bolt (A) and then disconnect the universal joint assembly from the steering column assembly.

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**Tightening torque :**

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

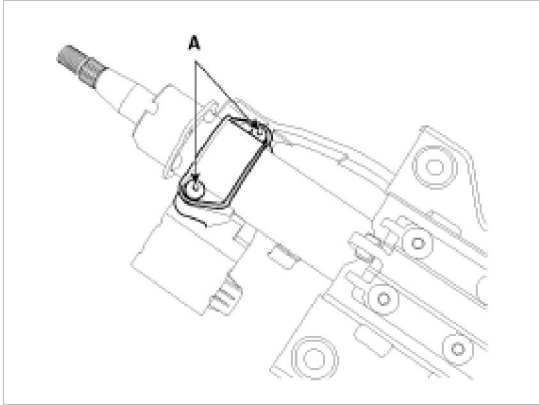
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2. Reassembly is the reverse of the disassembly.

### Key Lock Assembly

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



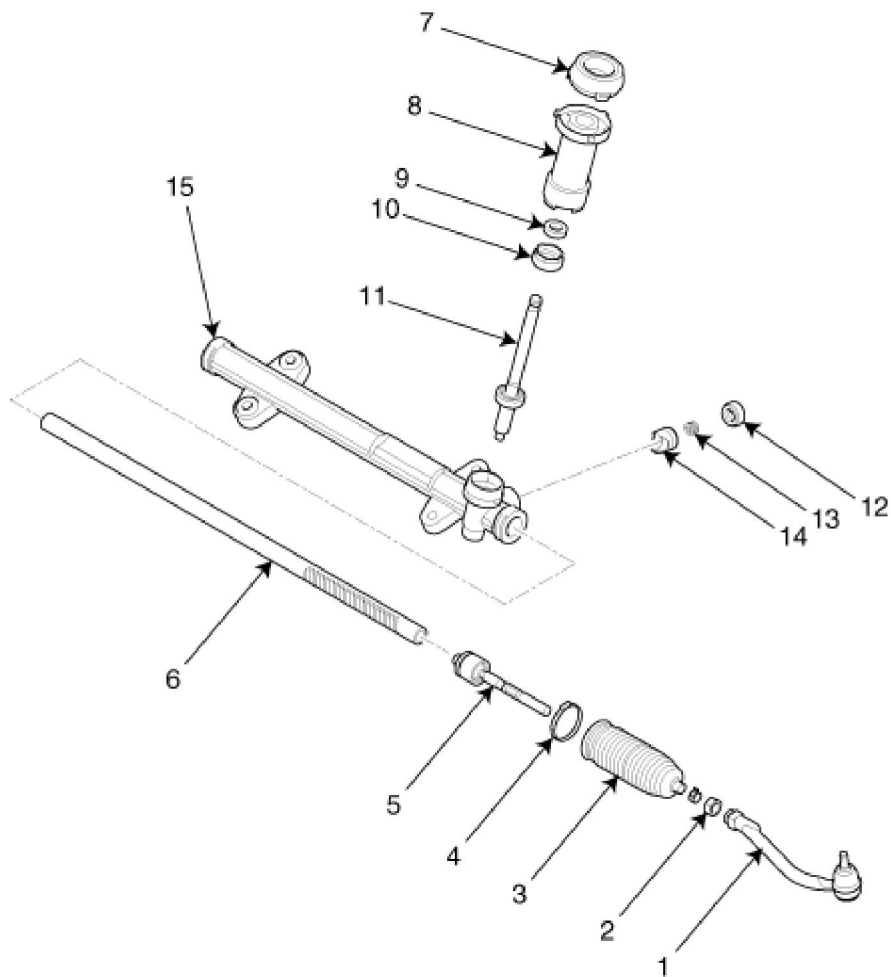
2. Loosen the special bolts using a screw driver and then remove the key lock assembly from the steering column assembly.
3. Reassembly is the reverse of the disassembly.

### **Inspection**

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

## **Steering System > Electric Power Steering > Steering Gear box > Components and Components Location**

### **Components**



1. Tie rod end  
2. Lock nut  
3. Bellows  
4. Bellows band  
5. Tie rod

6. Rack bar  
7. Dust packing  
8. Dust cap  
9. Oil seal  
10. Pinion plug

11. Pinion assembly  
12. Yoke plug  
13. Yoke spring  
14. Support yoke assembly  
15. Rack housing

## Steering System > Electric Power Steering > Steering Gear box > Repair procedures - Revised

### Replacement

1. Remove the front wheel & tire.

#### Tightening torque :

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

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**CAUTION**

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

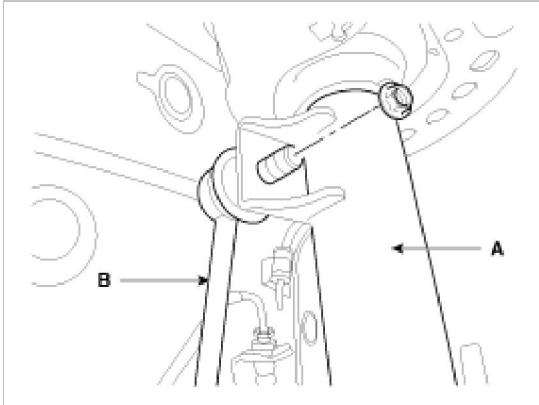
2. Disconnect the stabilizer link (B) with the front strut assembly (A) after loosening the nut.

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**Tightening torque :**

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

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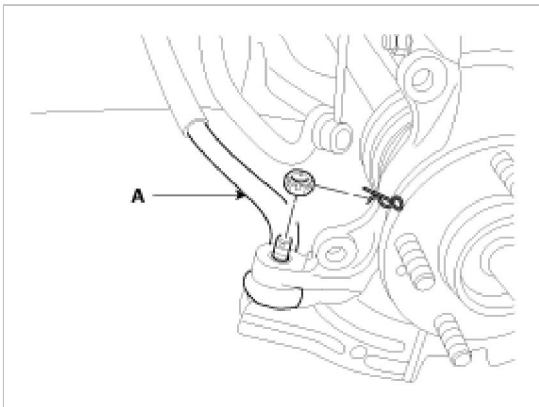
3. Remove the split pin and castle nut and then disconnect the tie-rod end (A) from the front knuckle.

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**Tightening torque :**

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

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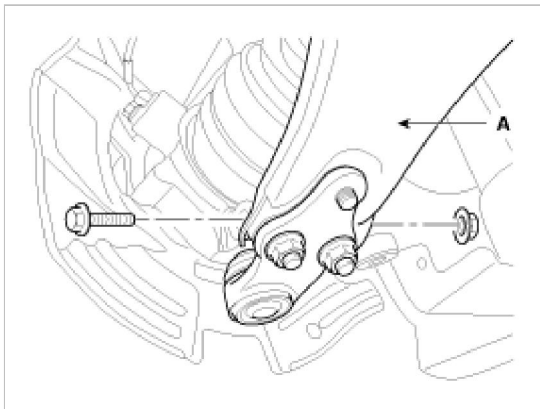
4. Loosen the bolt & nut and then remove the lower arm (A).

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**Tightening torque :**

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

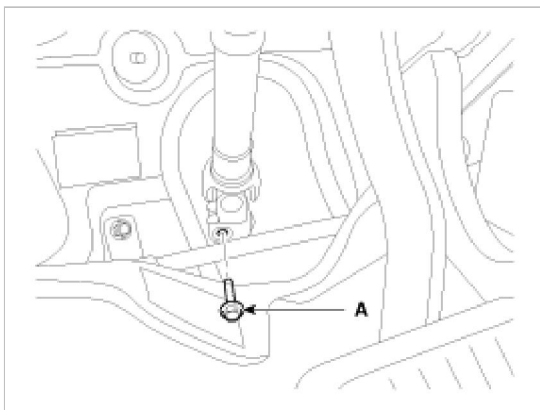
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5. Loosen the bolt (A) and then disconnect the universal joint assembly from the pinion of the steering gear box.

**Tightening torque :**

32.4 ~ 37.3N.m(3.3 ~ 3.8kgf.m, 23.9 ~ 27.5lb-ft)



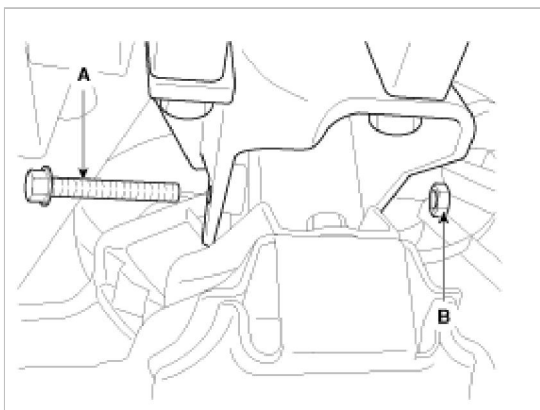
**CAUTION**

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.

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

**Tightening torque :**

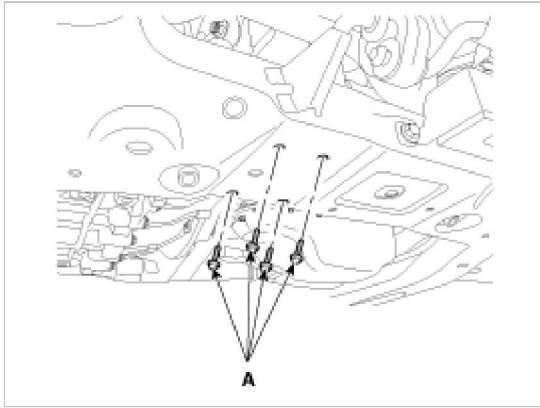
107.9 ~ 127.5N.m(11.0 ~ 13.0kgf.m, 79.6 ~ 94.0lb-ft)



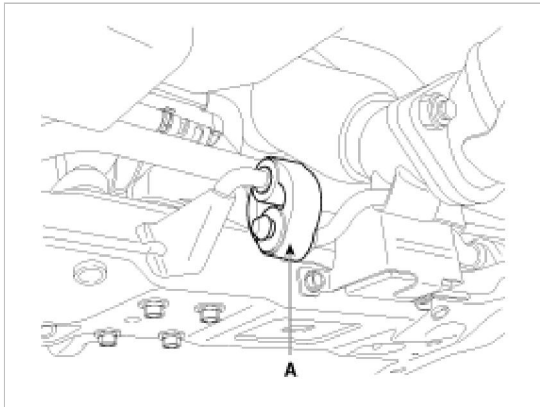
7. Loosen the rear roll stopper mounting bolts (A).

**Tightening torque :**

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



8. Disconnect the muffler rubber hanger (A).



9. Loosen the bolts & nuts and then remove the sub frame.

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**Tightening torque :**

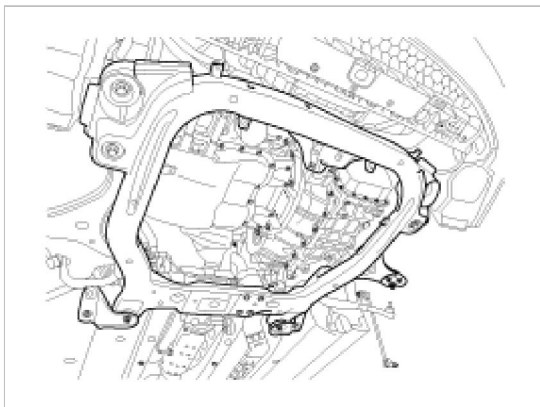
**Sub frame mounting bolts & nuts:**

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

**Sub frame bracket bolts:**

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

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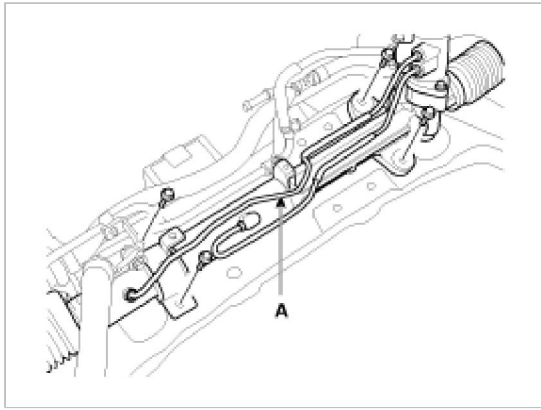
10. Loosen the bolt and then remove the protector.  
11. Loosen the bolt and then remove the steering gear box (A).

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**Tightening torque :**

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

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12. Installation is the reverse of the removal.
13. Check the alignment. (Refer to SS group 'Tires/Wheels - alignment')

## Replacement

1. Remove the front wheel & tire.

### Tightening torque :

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

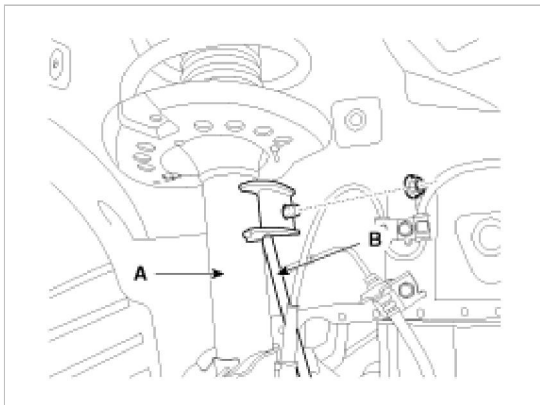
### CAUTION

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

2. Disconnect the 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)

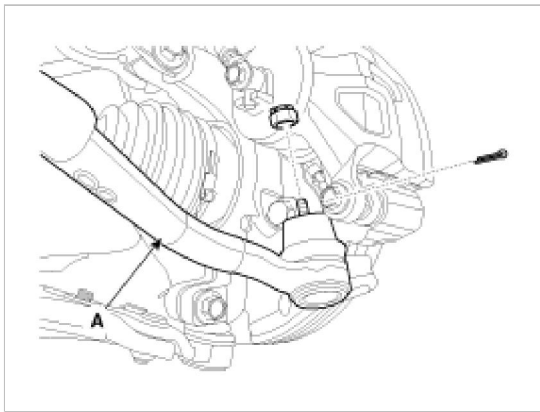


3. Remove the split pin and castle nut and then disconnect the tie-rod end (A) from the front knuckle.

### Tightening torque :

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





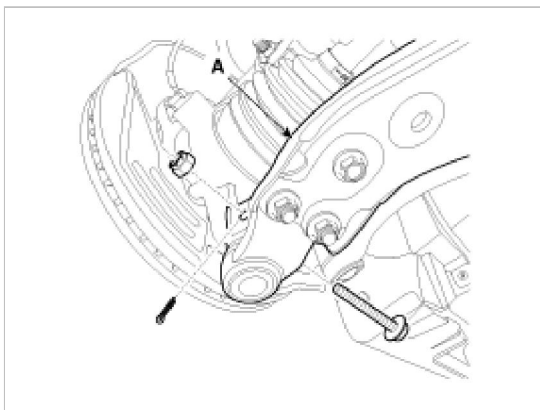
4. Loosen the bolt & nut and then remove the lower arm (A).

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**Tightening torque :**

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

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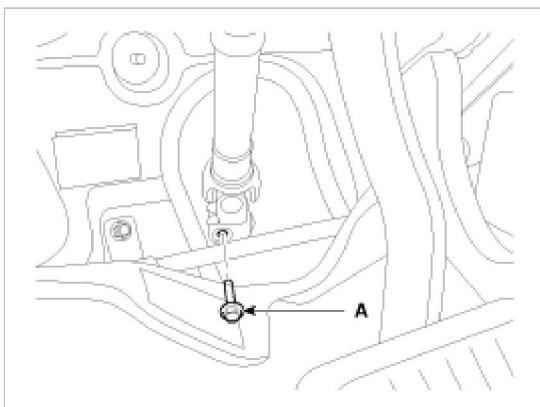
5. Loosen the bolt (A) and then disconnect the universal joint assembly from the pinion of the steering gear box.

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**Tightening torque :**

32.4 ~ 37.3N.m(3.3 ~ 3.8kgf.m, 23.9 ~ 27.5lb-ft)

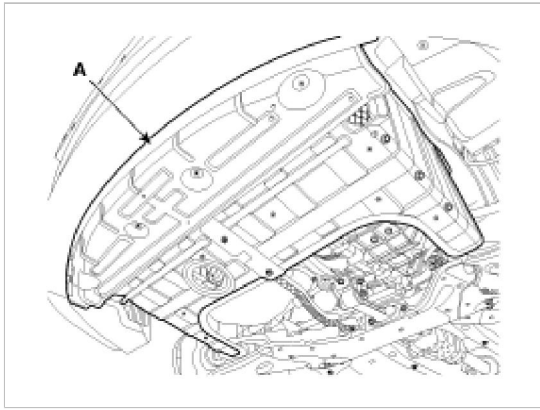
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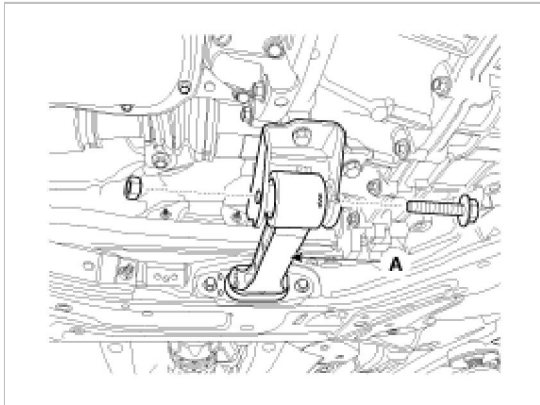
**CAUTION**

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.

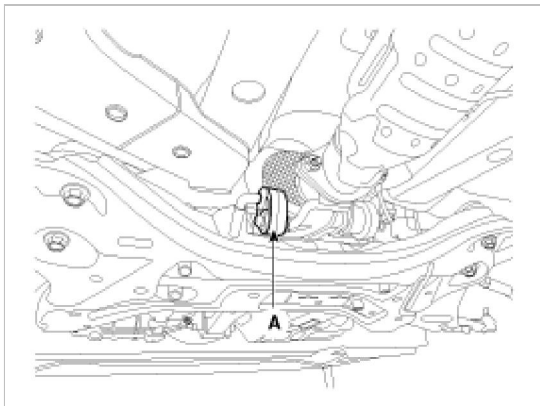
6. Remove the under cover (A).



7. Loosen the bolt & nut and then remove the roll rod stopper (A).



8. Disconnect the muffler rubber hanger (A).



9. Loosen the bolts & nuts and then remove the sub frame.

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**Tightening torque :**

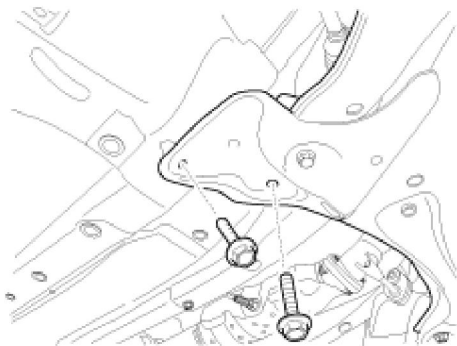
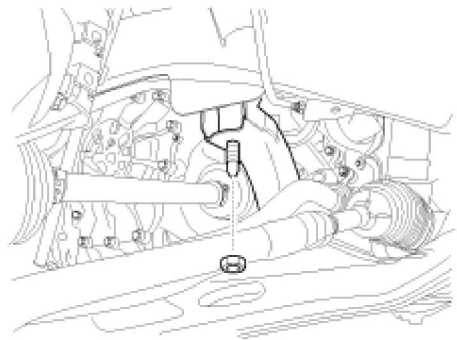
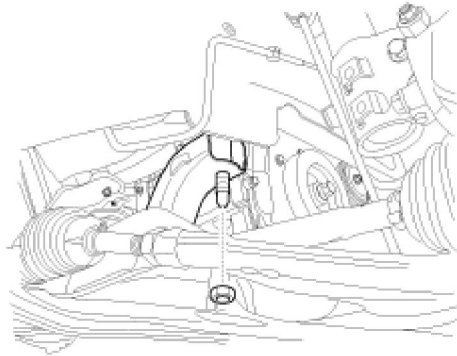
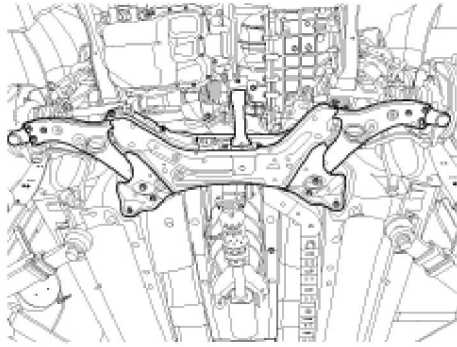
**Sub frame mounting bolts & nuts:**

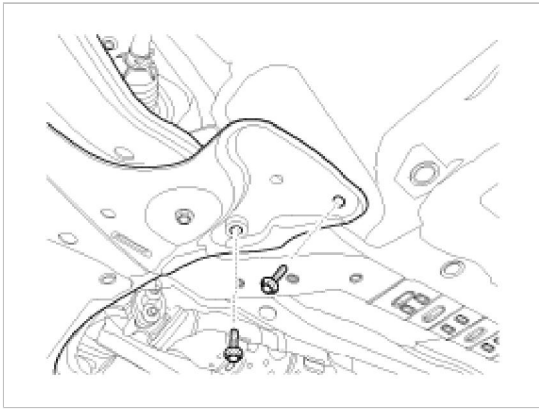
156.9 ~ 176.5N.m(16.0 ~ 18.0kgf.m, 115.7 ~ 130.2lb-ft)

**Sub frame bracket bolts:**

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

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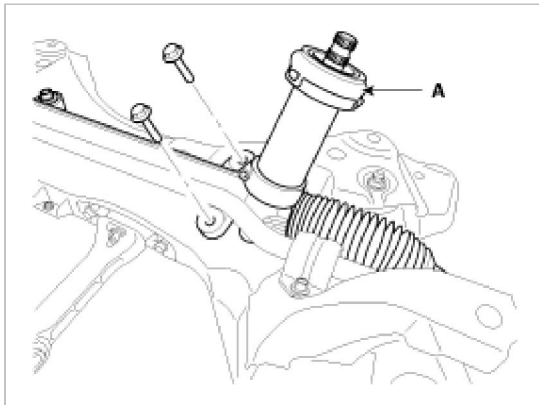
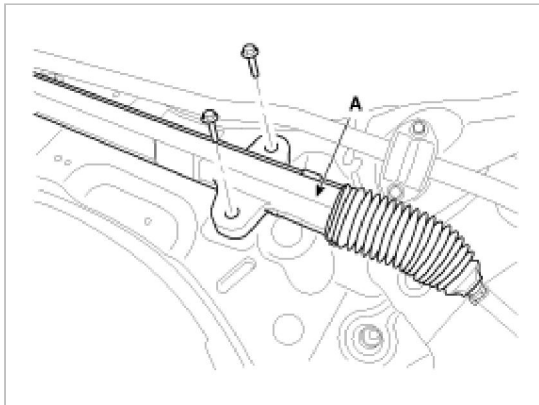
10. Loosen the bolt and then remove the protector.
11. Loosen the bolt and then remove the steering gear box (A).

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**Tightening torque :**

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

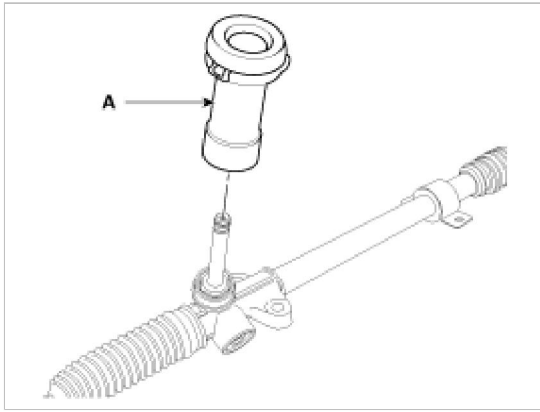
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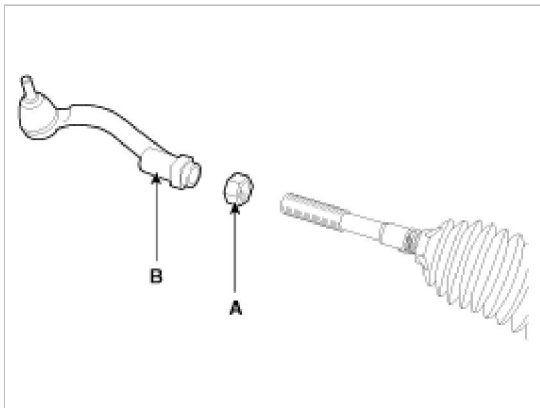
12. Installation is the reverse of the removal.
13. Check the alignment.  
(Refer to SS group 'Tires/Wheels - alignment')

**Disassembly**

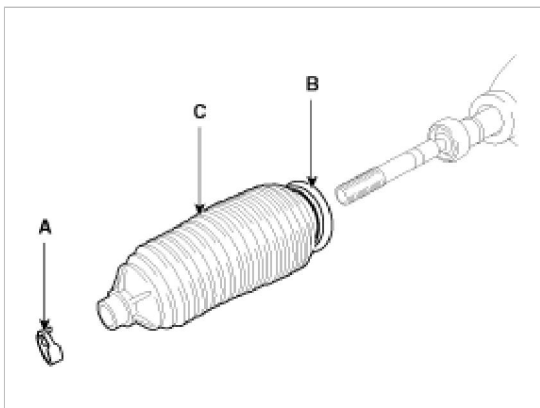
1. Remove the dust packing & cap (A) from the pinion housing.



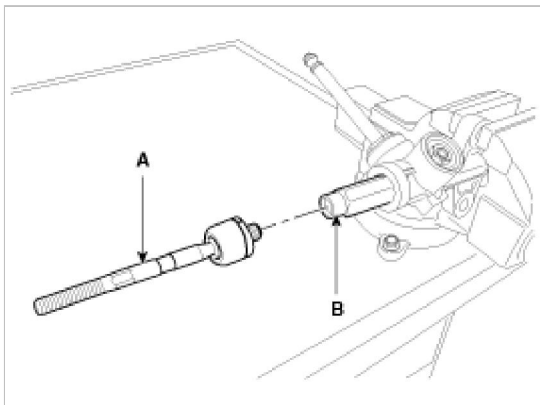
2. Loosen the lock nut and then remove the tie rod end (B) and lock nut (A) from the tie rod.



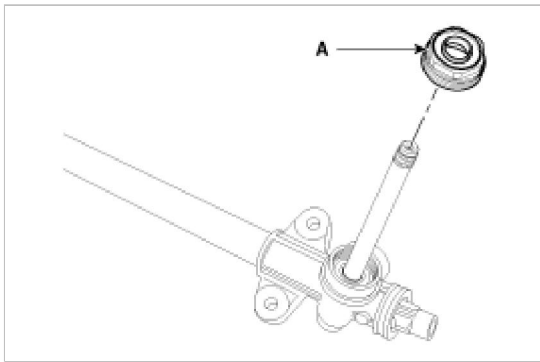
3. Remove the bellows clip (A) and band (B) and then pull the bellows (C) away from the end of the tie rod.



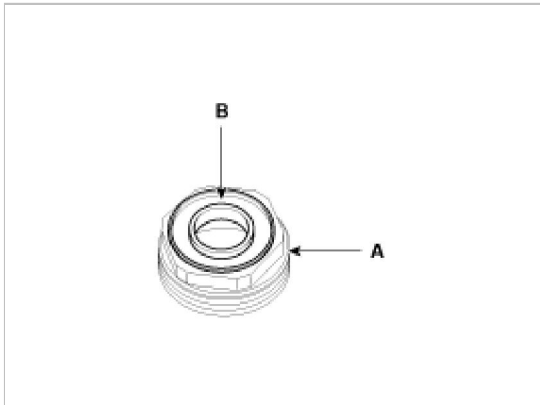
4. Remove the tie rod (B) from the rack bar (A) by unscrewing the tie rod inner ball joint.



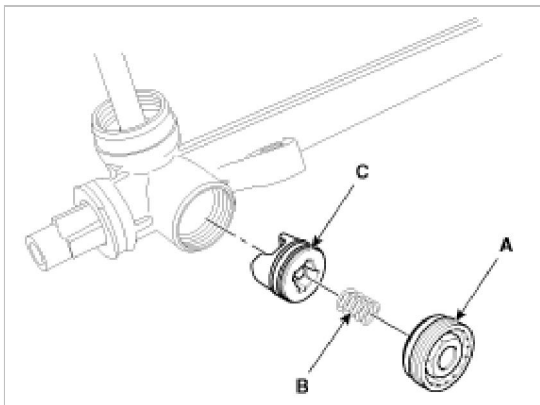
5. Remove the plug (A) from the pinion housing.



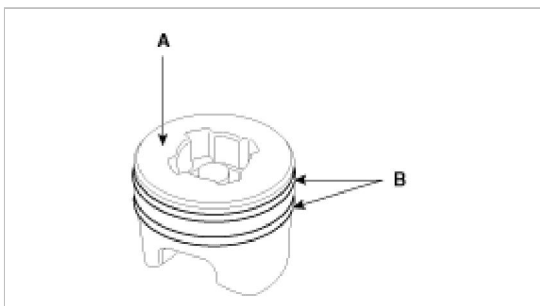
6. Remove the oil seal (B) from the plug (A).



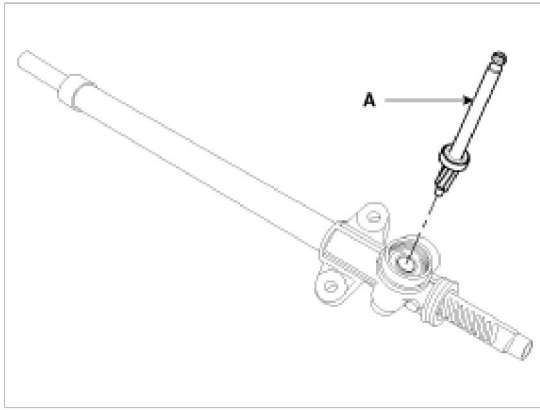
7. Remove the yoke plug (A) and spring (B) and then pull out the support yoke (C).



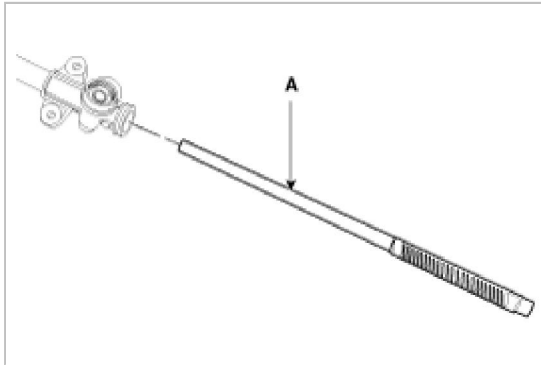
8. Remove the O-ring (B) from the support yoke assembly (A).



9. Pull the pinion assembly (A) out of the pinion housing.



10. Pull the rack bar (A) out of the rack housing.

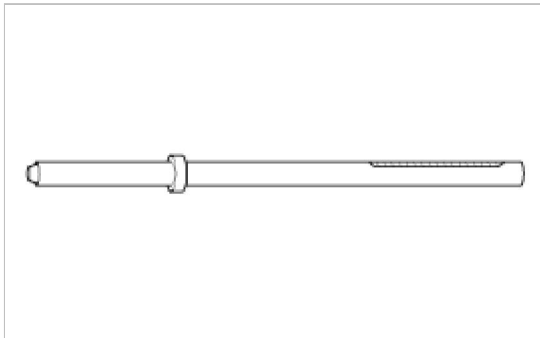


11. Reassembly is the reverse of the disassembly.

## Inspection

### 1. Rack bar

- A. Check the rack gear for damage.
- B. Check the rack bar for bend and deformation.



### 2. Pinion assembly

- A. Check the pinion gear for damage
- B. Check the oil seal for damage.

3. Check the inside of rack housing for damage.

4. Check the bellows for being torn.