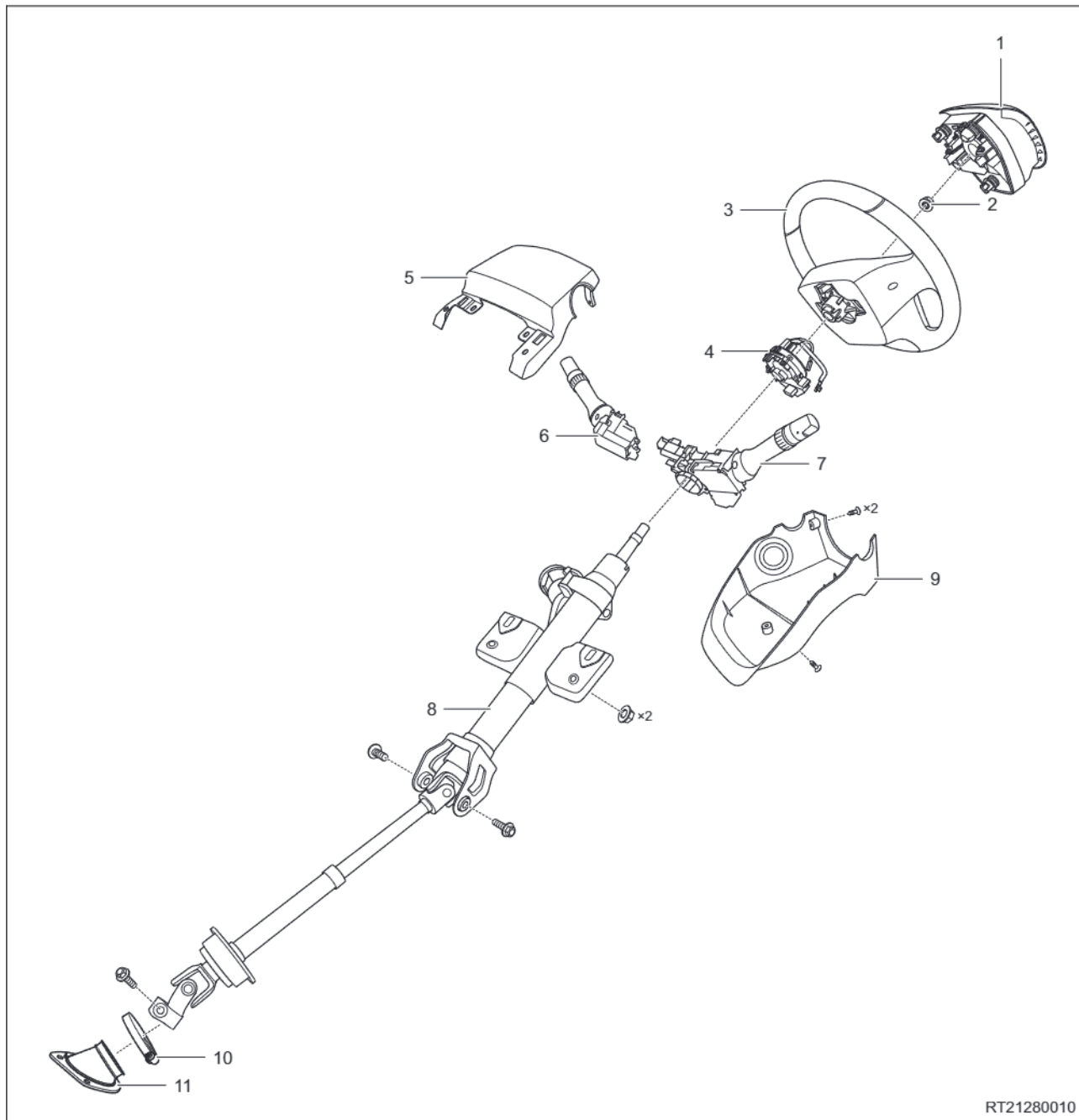


STEERING COLUMN

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GENERAL INFORMATION

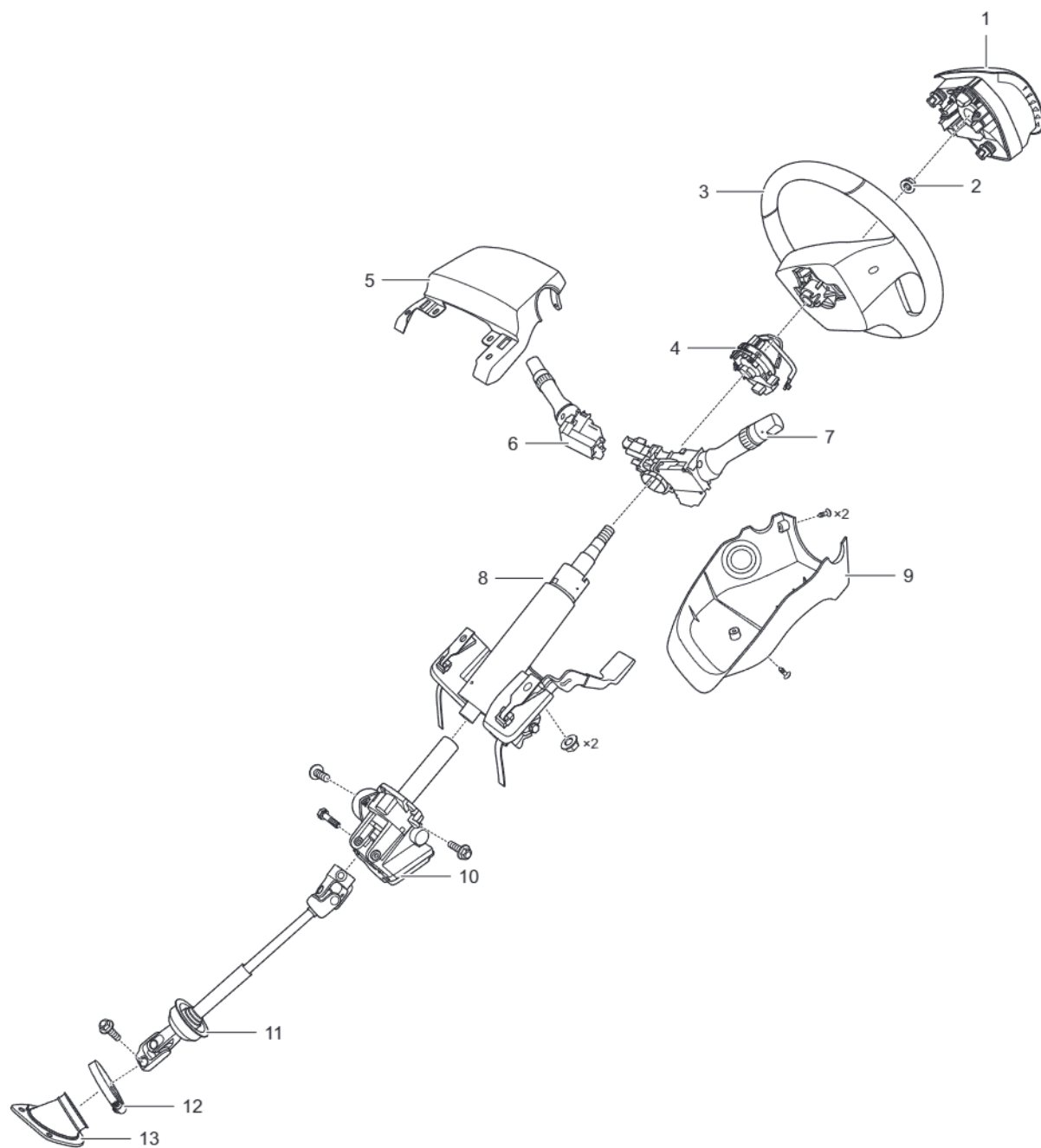
Description



1 - Driver Airbag	2 - Steering Wheel Assembly Fixing Nut
3 - Steering Wheel Assembly	4 - Spiral Cable
5 - Combination Switch Upper Cover	6 - Wiper and Washer Combination Switch
7 - Light Combination Switch	8 - Steering Column with Intermediate Shaft Assembly
9 - Combination Switch Lower Cover	10 - Worm Clamp
11 - Steering Boot	

Electronic Power Steering Column

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RT21280011

1 - Driver Airbag	2 - Steering Wheel Assembly Fixing Nut
3 - Steering Wheel Assembly	4 - Spiral Cable
5 - Combination Switch Upper Cover	6 - Wiper and Washer Combination Switch
7 - Light Combination Switch	8 - Steering Column
9 - Combination Switch Lower Cover	10 - EPS Controller Assembly
11 - Intermediate Shaft with Universal Joint Assembly	12 - Worm Clamp
13 - Steering Boot	

Specifications

Torque Specifications

Description	Tightening Torque (N·m)
Steering Wheel Assembly Fixing Nut	35 ± 3
Combination Switch Cover Fixing Screw	2 ± 0.5
Steering Column Assembly Upper Bracket Fixing Nut	25 ± 3
Steering Column Assembly Lower Bracket Fixing Bolt	25 ± 3
Coupling Bolt Between Steering Column with Intermediate Shaft Assembly and Steering Gear Input Shaft	30 ± 3
Coupling Bolt Between Electronic Power Steering Column with Intermediate Shaft Assembly and Steering Gear Input Shaft	60 ± 5
Ignition Starting Switch Fixing Screw	15 ± 2
Steering Boot Fixing Nut	10 ± 1
Coupling Bolt Between Electronic Power Steering Column and Intermediate Shaft	50

Data Specifications

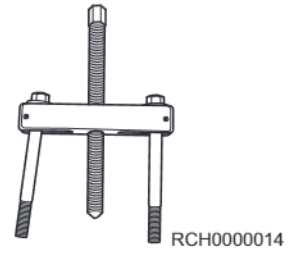
Description	Standard Value
Steering Wheel Free Play (Rotation Angle)	$\leq 15^\circ$
Steering Wheel Centering/Returnability (Rotation Angle)	$> 70^\circ$

Tools

Special Tool

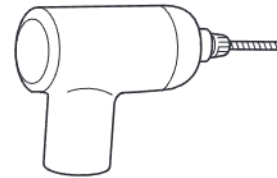
28

Steering Wheel Remover



General Tool

Electric Drill



DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

Use the table below to help determine the cause of problem symptoms. Check each suspected area in sequence. Repair or replace the faulty components, or adjust as necessary.

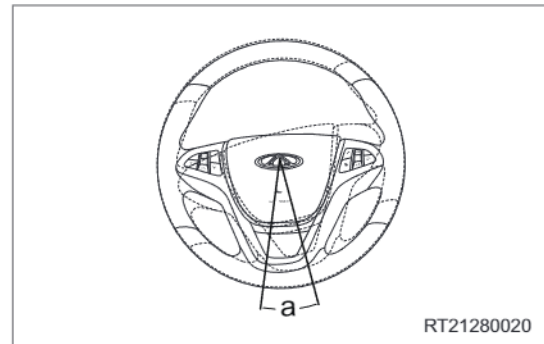
Symptom	Suspected Area	See page
Steering wheel assembly cannot lock or unlock	Ignition key cylinder	28-18
	Ignition switch lock body	28-18
Steering wheel assembly has no free play or free play is too large	Front axle hub bearing (seriously worn)	22-10
	Intermediate shaft with universal joint assembly (seriously worn)	28-23
	Ball pin assembly (worn or loose)	29-19
	Steering tie rod assembly	29-21
	Steering gear assembly (engagement gap of rack and pinion improper)	29-23 30-25
Hard steering	Front tire (improperly inflated or unevenly worn)	24-7
	Front wheel alignment (wrong)	23-50
	Front sub frame welding assembly	22-17
	Intermediate shaft with universal joint assembly (insufficiently lubricated)	28-23
	Ball pin assembly (insufficiently lubricated)	29-19
	Steering tie rod assembly	29-21
	Steering column assembly	28-16 28-21
	Steering gear assembly	29-23 30-25
	Steering column motor	28-23

Symptom	Suspected Area	See page
Poor returnability	Front tire (improperly inflated or unevenly worn)	24-7
	Front wheel alignment (wrong)	23-50
	Front suspension	23-12
	Ball pin assembly (loose, insufficiently lubricated)	29-19
	Steering tie rod assembly	29-21
	Intermediate shaft with universal joint assembly (loose, insufficiently lubricated)	28-23
	Steering column assembly (stuck)	28-16 28-21
	Steering gear assembly (stuck)	29-23 30-25
	Steering column motor	28-23
Knocking (or clunking) sound occurs when turning steering wheel while steering system is in operation	Intermediate shaft with universal joint assembly	28-23
	Control arm ball pin	23-22
	Control arm	23-20
	Steering gear assembly	29-23 30-25
Friction sound occurs when steering wheel is turned during low speed driving	Steering column assembly	28-16 28-21
	Steering gear assembly	29-23 30-25
High-pitched sound (squealing sound) occurs when steering wheel is turned slowly with vehicle stopped	Steering column motor	28-23
Steering wheel vibrates and noise occurs when steering wheel is turned with vehicle stopped	Steering column motor	28-23
	Steering column assembly	28-16 28-21

Steering Wheel Free Play Inspection

1. Stop vehicle and position front wheels straight ahead.
2. Slightly turn the steering wheel left and right, and check rotation angle of steering wheel when the wheels start to rotate.

Standard value of free play (rotation angle): $\alpha \leq 15^\circ$.



3. If measured value exceeds standard value, check the steering system.

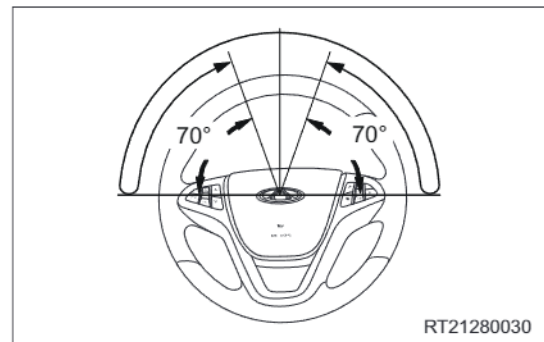
Steering Wheel Centering/Returnability Inspection

Steering wheel centering/returnability inspection should be performed during road test.

1. Perform the slow turn and sharp turn test.

Check for deviation of steering wheel steering force required during left/right turn and centering/returnability.

2. When vehicle speed is between 20 and 30 km/h, turn the steering wheel either to left or right by 90° and keep it for 1 to 2 seconds, and then release the steering wheel. If steering wheel turns back more than 70° , it is determined that steering wheel centering/returnability is in good condition.



3. If steering wheel returning angle is not as specified, check the tire pressure, steering system and suspension system.

ON-VEHICLE SERVICE

Steering Wheel Assembly

Removal

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⚠ WARNING

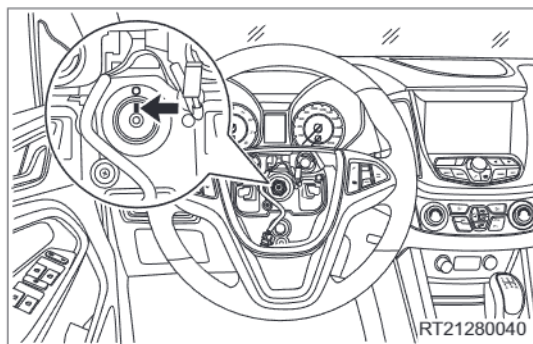
- Be sure to read the precautions for SRS airbag before removing the steering wheel (See page 32-65).

1. Set steering wheel to straight-ahead position.
2. Turn off all the electrical equipment and ignition switch.
3. Disconnect the negative battery cable.

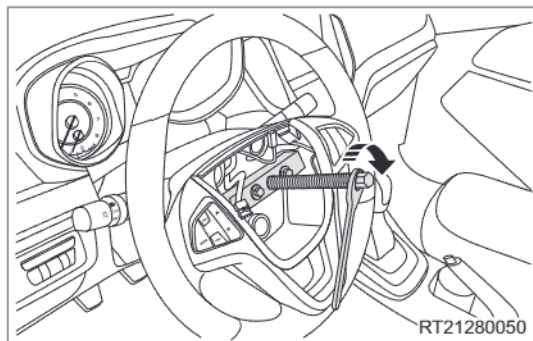
👁 CAUTION

- Wait at least 90 seconds after disconnecting the negative battery cable to prevent airbag and belt pretensioner from being activated.

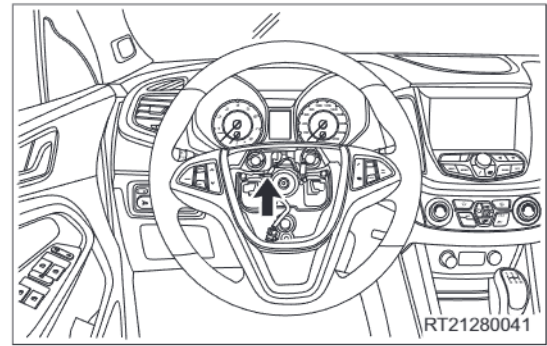
4. Remove the driver airbag assembly (See page 32-65).
5. Remove the steering wheel assembly.
 - a. Secure the steering wheel assembly, and put matchmarks on the steering wheel assembly and steering column assembly, then remove the steering wheel assembly fixing nut.
(Tightening torque: $35 \pm 3 \text{ N}\cdot\text{m}$)



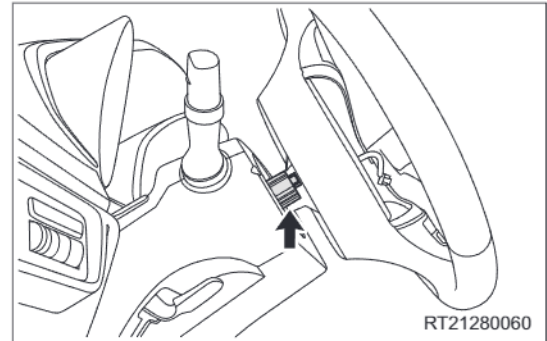
- b. As shown in the illustration, install the steering wheel remover, and then tighten it with a wrench to loosen the steering wheel assembly from the steering column assembly.



- c. Cut the wire harness band (arrow).



- d. Disconnect the steering wheel quick button connector (arrow).



- e. Remove the steering wheel assembly.

CAUTION

- Be careful when removing the steering wheel assembly to prevent damage to the airbag connector, horn connector and quick button connector on the spiral cable.

Inspection

1. Check the steering wheel assembly body for damage or deformation. Replace the steering wheel assembly if necessary.
2. Check the spline in the steering wheel assembly for damage. Replace the steering wheel assembly if necessary.

Installation

CAUTION

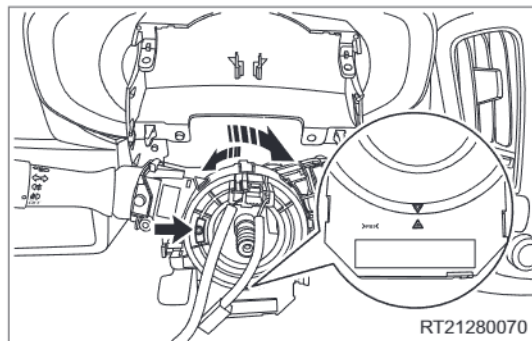
- Check that front wheels are in the straight-ahead position before installing steering wheel assembly.

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1. Adjust the spiral cable to correct position.

HINT:

Fully turn the spiral cable inner circle clockwise when realigning the center, and then turn it counterclockwise to align with ►◄ while yellow ball (arrow) occurs in the clear vertical window. Failure to follow these instructions may affect normal function of airbag system and cause injury to driver.



2. Pass the airbag connector, horn connector through the hole of steering wheel assembly, and connect the steering wheel quick button connector. Then align the matchmarks on steering wheel assembly and steering column assembly to install the steering wheel assembly.
3. Other installation procedures are in the reverse order of removal.

CAUTION

- Tighten steering wheel assembly fixing nut to the specified torque.
- Install each connector in place.
- After repairing, check that airbag system operates normally.

Combination Switch Cover

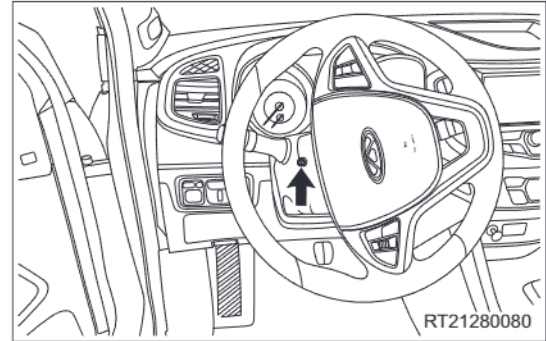
Removal

1. Set steering wheel to straight-ahead position.
2. Turn off all the electrical equipment and ignition switch.
3. Remove the combination switch cover.

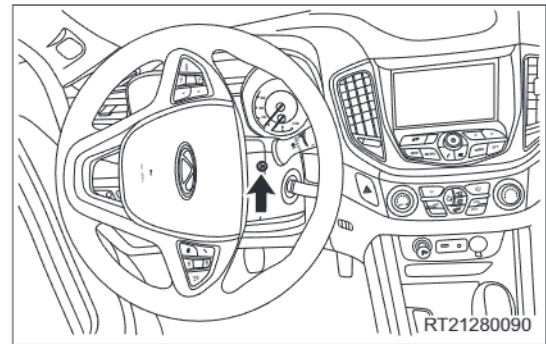
HINT:

Remove the steering wheel assembly first, and then remove combination switch cover if necessary.

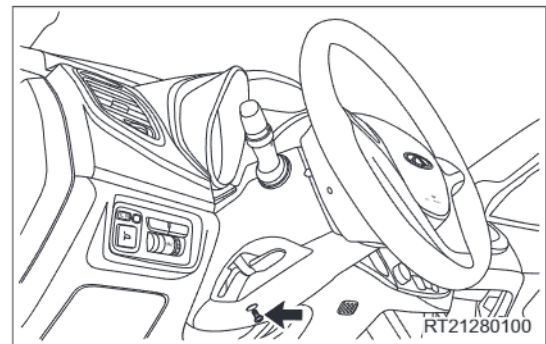
- a. Turn the steering wheel to left, and remove the left side fixing screw (arrow) from the combination switch cover.
(Tightening torque: $2 \pm 0.5 \text{ N}\cdot\text{m}$)



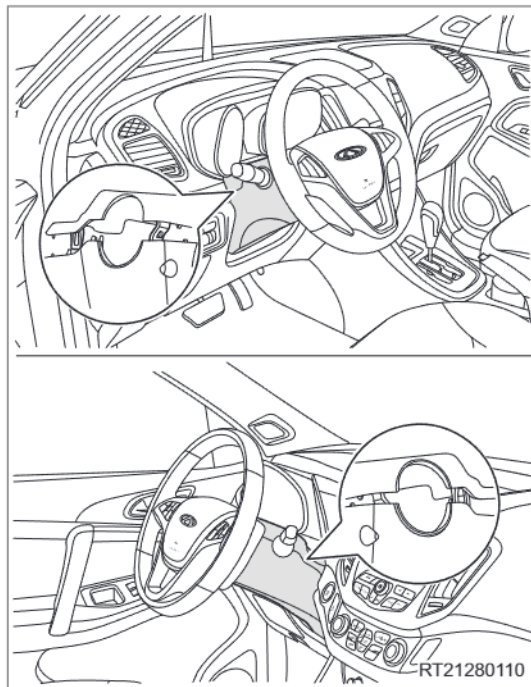
- b. Turn the steering wheel to right, and remove the right side fixing screw (arrow) from the combination switch cover.
(Tightening torque: $2 \pm 0.5 \text{ N}\cdot\text{m}$)



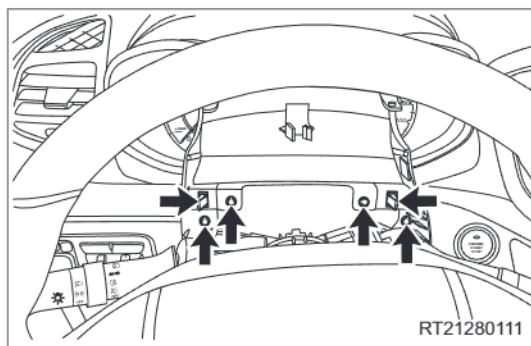
- c. Remove the lower fixing screw (arrow) from the combination switch cover.
(Tightening torque: $2 \pm 0.5 \text{ N}\cdot\text{m}$)



- d. Disengage the connecting clip between upper cover and lower cover, and then disengage upper cover and lower cover to remove the lower cover.



- e. Disengage 6 clips between upper cover and steering column dust gasket, and then remove the upper cover.



CAUTION

- Operate carefully to prevent damage to components during removal.

Inspection

1. Check the combination switch upper and lower covers for damage or deformation. Replace the upper and lower covers if necessary.
2. Check if upper and lower cover clips are normal. Replace the upper and lower covers if necessary.

Installation

1. Loosen steering wheel adjusting handle, and adjust steering column assembly to the uppermost position, then tighten the adjusting handle to the uppermost position.
2. Insert steering column lower cover from right side of ignition switch at an angle, and then install the adjusting handle into the cover hole.
3. After adjusting lower cover, install upper cover and fix upper and lower cover clips in place, then install the self-tapping screws.

CAUTION

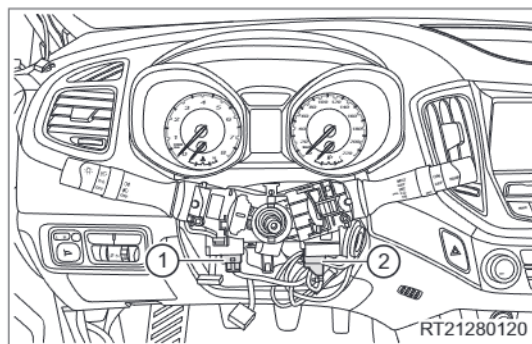
- Tighten the self-tapping screws in place.
- Operate carefully to prevent damage to components during installation.

Steering Column with Intermediate Shaft Assembly (without EPS)

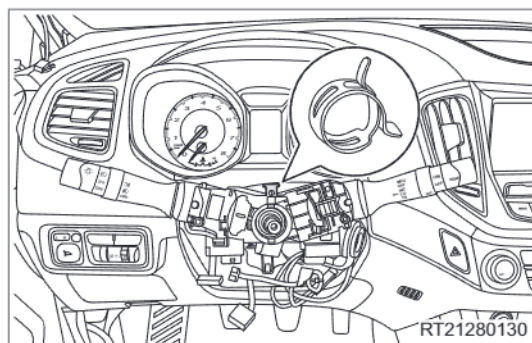
Removal

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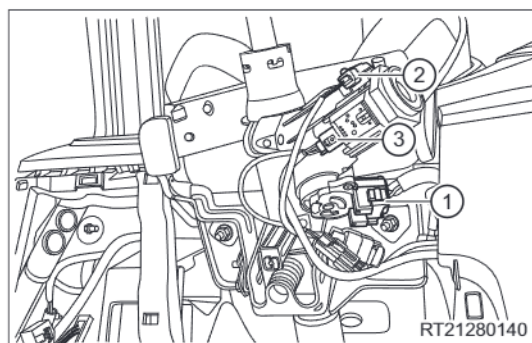
1. Set steering wheel to straight-ahead position.
2. Turn off all the electrical equipment and ignition switch.
3. Disconnect the negative battery cable.
4. Remove the driver airbag (See page 32-65).
5. Remove the steering wheel assembly (See page 28-10).
6. Remove the combination switch cover (See page 28-13).
7. Remove the spiral cable (See page 32-67).
8. Remove the combination switch assembly.
 - a. Disconnect the light combination switch connector (1) and wiper and washer combination switch connector (2).



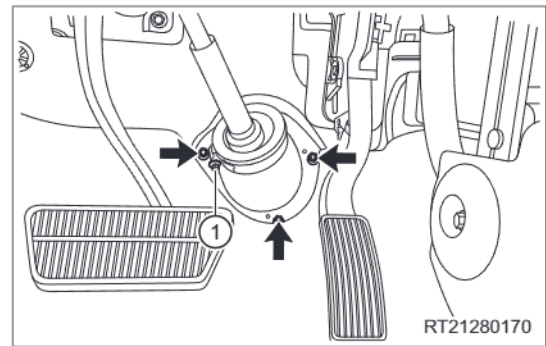
- b. Loosen the combination switch clamp and pull the combination switch outward, then disconnect the combination switch from the steering column to remove the combination switch.



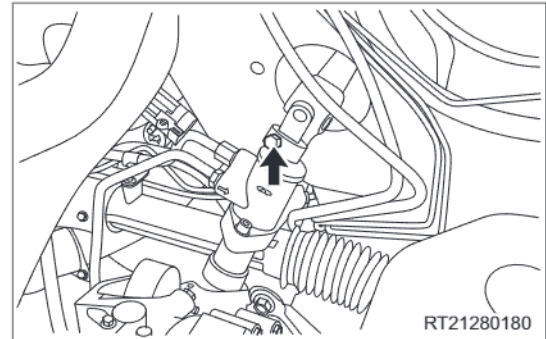
9. Remove the steering column with intermediate shaft assembly.
 - a. Disconnect the ignition starting switch connector (1), key switch connector (2) and connector (3) of ignition switch illumination light and anti-theft coil.



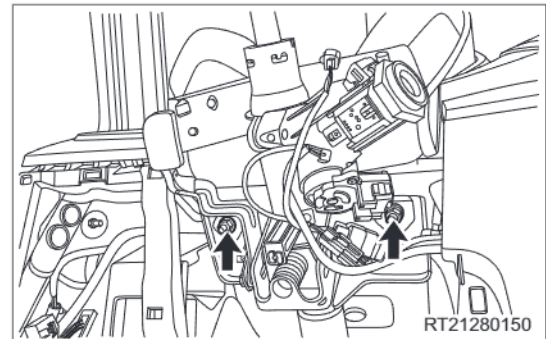
- b. Remove 3 steering boot nuts (arrow) from the front baffle plate, and then loosen the worm clamp (1) to separate the steering boot from the front baffle plate.
(Tightening torque for nut: $10 \pm 1 \text{ N}\cdot\text{m}$)
(Tightening torque for worm clamp: $2 \pm 0.5 \text{ N}\cdot\text{m}$)



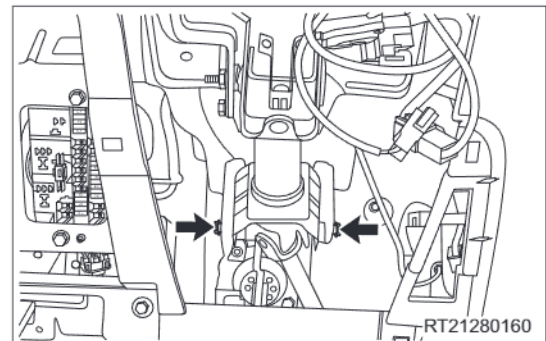
- c. Remove the coupling bolt (arrow) between steering column with intermediate shaft assembly and steering gear input shaft.
(Tightening torque: $30 \pm 3 \text{ N}\cdot\text{m}$)



- d. Remove 2 fixing nuts (arrow) from the upper bracket of steering column assembly.
(Tightening torque: $25 \pm 3 \text{ N}\cdot\text{m}$)



- e. Remove 2 fixing bolts (arrow) from the lower bracket of steering column assembly.
(Tightening torque: $25 \pm 3 \text{ N}\cdot\text{m}$)



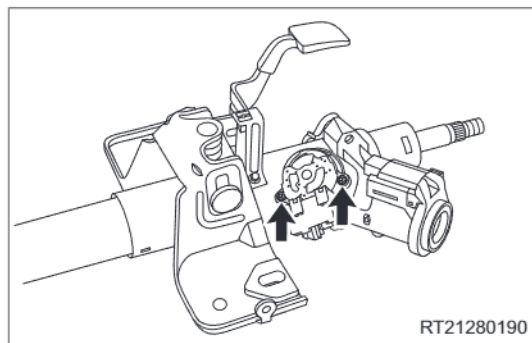
- f. Carefully remove the steering column with intermediate shaft assembly.

CAUTION

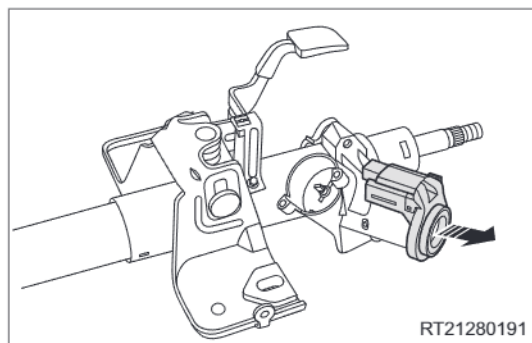
- DO NOT touch the interior ornament when removing the steering column with intermediate shaft assembly to avoid scratching the interior ornament.

Disassembly

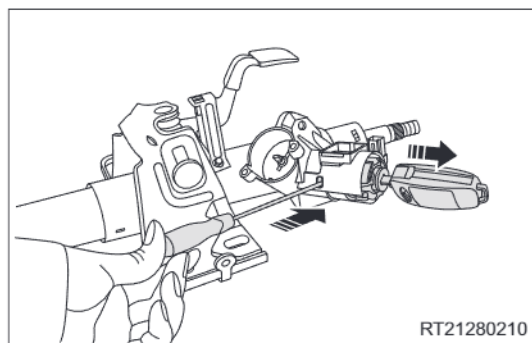
1. Remove the ignition starting switch.
 - a. Remove the fixing screws (arrow) from the ignition starting switch, and then remove the ignition starting switch.
(Tightening torque: $13 \pm 2 \text{ N}\cdot\text{m}$)



2. Remove the ignition switch illumination light.
 - a. Remove the ignition switch illumination light in the direction of arrow from the ignition switch lock body.



3. Remove the ignition key cylinder.
 - a. Turn the ignition switch key cylinder to ACC with key, and insert a small screwdriver or similar tool into the ignition switch lock body hole, then pull out the ignition key cylinder.

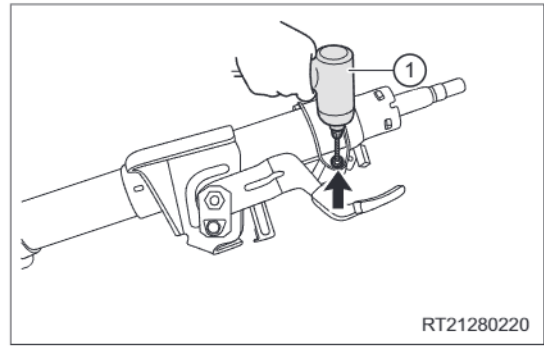


4. Remove the ignition switch lock body.
 - a. Set the steering column assembly onto a vise.

CAUTION

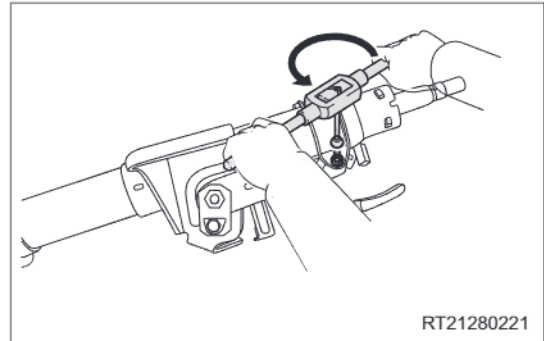
- DO NOT tighten the vise excessively.

- b. Using an electric drill (1), drill a hole on the ignition switch lock body anti-theft bolt (arrow).



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- c. Using a screw remover, remove the ignition switch lock body anti-theft bolt.



- d. Remove the ignition switch lock body and ignition switch fixing clamp.

Inspection

1. Check if ignition switch lock body and key cylinder are normal. Replace the ignition switch lock body and key cylinder if necessary.
2. Check steering column assembly for wear, cracks or deformation, and welding or correction is not allowed. Replace the steering column assembly if necessary.
3. Check steering column bearing for looseness, wear or sticking. Replace the steering column assembly if necessary.

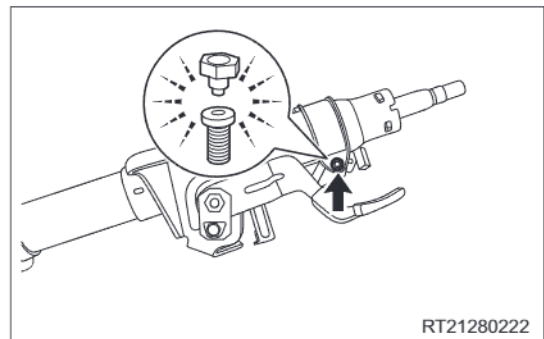
Assembly

1. Install the ignition switch assembly.
 - a. Set the steering column assembly onto a vise.

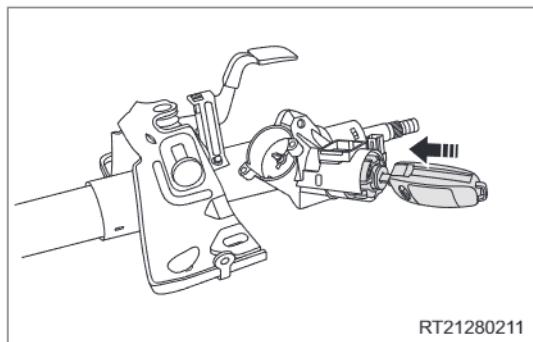
CAUTION

- DO NOT tighten the vise excessively.

- b. Install the ignition switch assembly to the steering column assembly with a new ignition switch lock body anti-theft bolt, and then tighten the anti-theft bolt until its head is disengaged.



2. Install the ignition key cylinder.
 - a. Push the ignition key cylinder into the ignition switch lock body until the ignition key cylinder fixing block locks in place.



- b. Check the ignition key cylinder for proper operation. When the key is removed, steering lock is locked; when the key is inserted and ignition switch is turned to ACC or ON, steering lock is unlocked.

Installation

Installation is in the reverse order of removal.

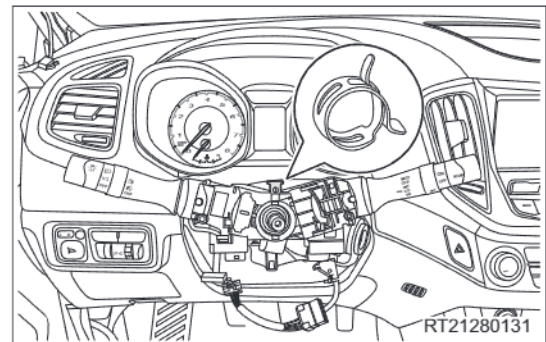
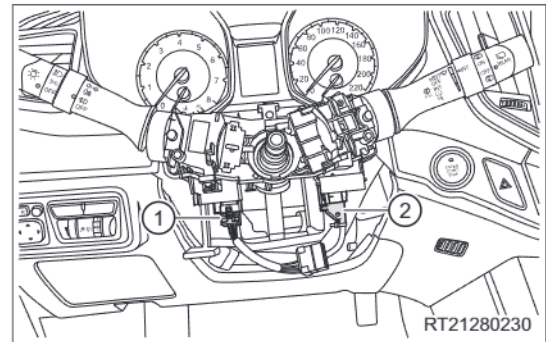
CAUTION

- Before installing steering column assembly, slide the spline at lower part of steering column assembly onto intermediate shaft upper universal joint first.
- Tighten the fixing nuts, bolts and screws in place.
- Install each connector in place.

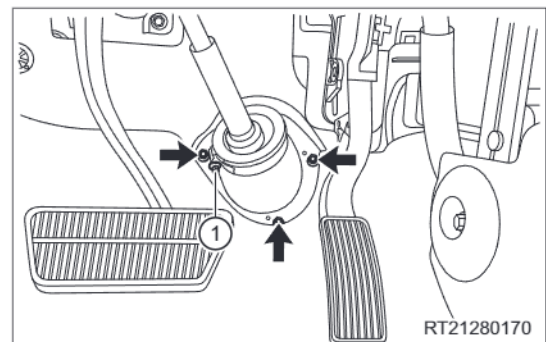
Electronic Power Steering Column with Intermediate Shaft Assembly

Removal

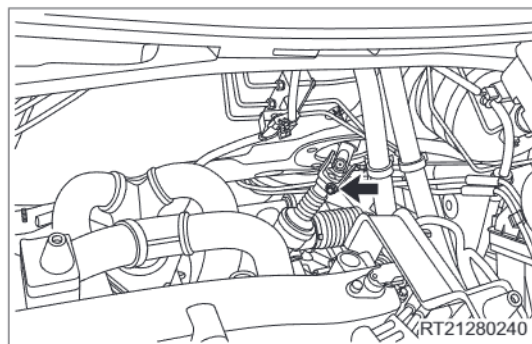
1. Set steering wheel to straight-ahead position.
2. Turn off all the electrical equipment and ignition switch.
3. Disconnect the negative battery cable.
4. Remove the driver airbag (See page 32-65).
5. Remove the steering wheel assembly (See page 28-10).
6. Remove the combination switch cover (See page 28-13).
7. Remove the spiral cable (See page 32-67).
8. Remove the combination switch assembly.
 - a. Disconnect the light combination switch connector (1) and wiper and washer combination switch connector (2).
 - b. Loosen the combination switch clamp and pull the combination switch outward, then disconnect the combination switch from the steering column to remove the combination switch.



9. Remove the lower left protector assembly (See page 45-19).
10. Remove the brake pedal assembly (See page 26-24).
11. Remove 3 steering boot nuts (arrow) from the front baffle plate, and then loosen the worm clamp (1) to separate the steering boot from the front baffle plate.
(Tightening torque for nut: $10 \pm 1 \text{ N}\cdot\text{m}$)
(Tightening torque for worm clamp: $2 \pm 0.5 \text{ N}\cdot\text{m}$)

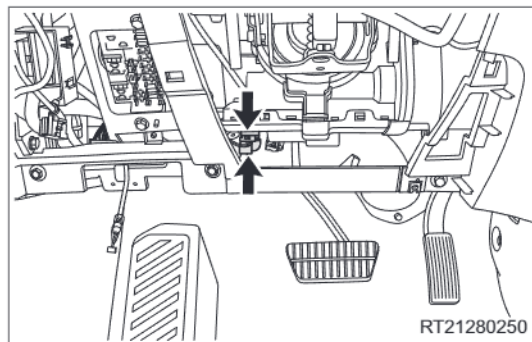


12. Remove the coupling bolt (arrow) between steering column with intermediate shaft assembly and steering gear input shaft.
(Tightening torque: $60 \pm 5 \text{ N}\cdot\text{m}$)

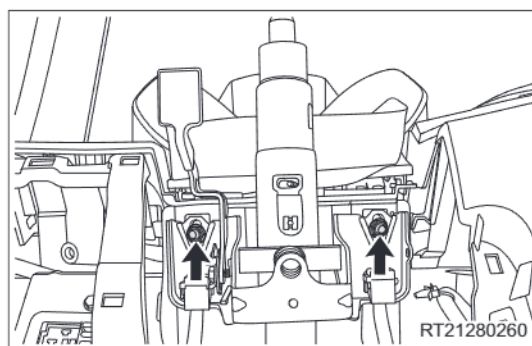


13. Remove the steering column with intermediate shaft assembly.

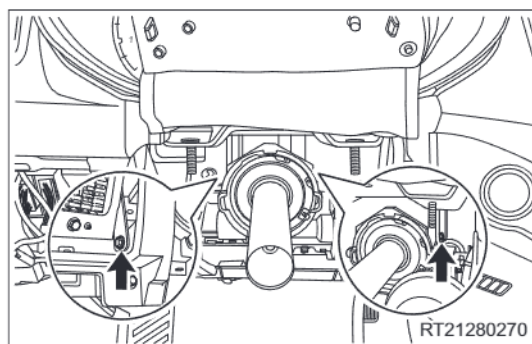
- a. Disconnect 2 connectors (arrow) from the electronic controller.



- b. Remove 2 fixing nuts (arrow) from the upper bracket of steering column assembly, and then remove the upper part of steering column.
(Tightening torque: $25 \pm 3 \text{ N}\cdot\text{m}$)



- c. Remove 2 fixing bolts (arrow) from the lower bracket of steering column assembly.
(Tightening torque: $25 \pm 3 \text{ N}\cdot\text{m}$)



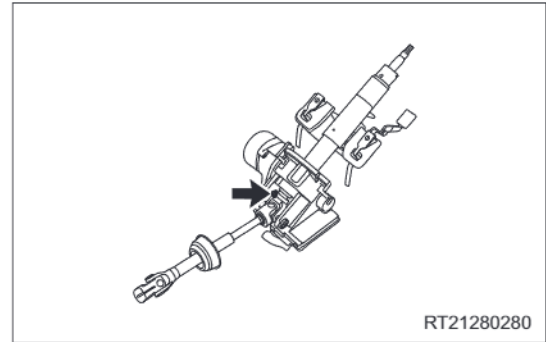
- d. Carefully remove the steering column with intermediate shaft assembly from underneath.

CAUTION

- DO NOT touch the interior ornament when removing the steering column with intermediate shaft assembly to avoid scratching the interior ornament.

Disassembly

1. Remove the coupling bolt (arrow) between electronic power steering column and intermediate shaft.
(Tightening Torque: 50 N·m)



Inspection

1. Check if electronic controller is normal. Replace the electronic controller if necessary.
2. Check steering column assembly for wear, cracks or deformation, and welding or correction is not allowed. Replace the steering column assembly if necessary.
3. Check steering column bearing for looseness, wear or sticking. Replace the steering column assembly if necessary.

Assembly

Assembly is in the reverse order of disassembly.

Installation

Installation is in the reverse order of removal.

CAUTION

- Before installing steering column assembly, slide the spline at lower part of steering column assembly onto intermediate shaft upper universal joint first.
- Tighten the fixing nuts, bolts and screws in place.
- Install each connector in place.

