

STEERING COLUMN

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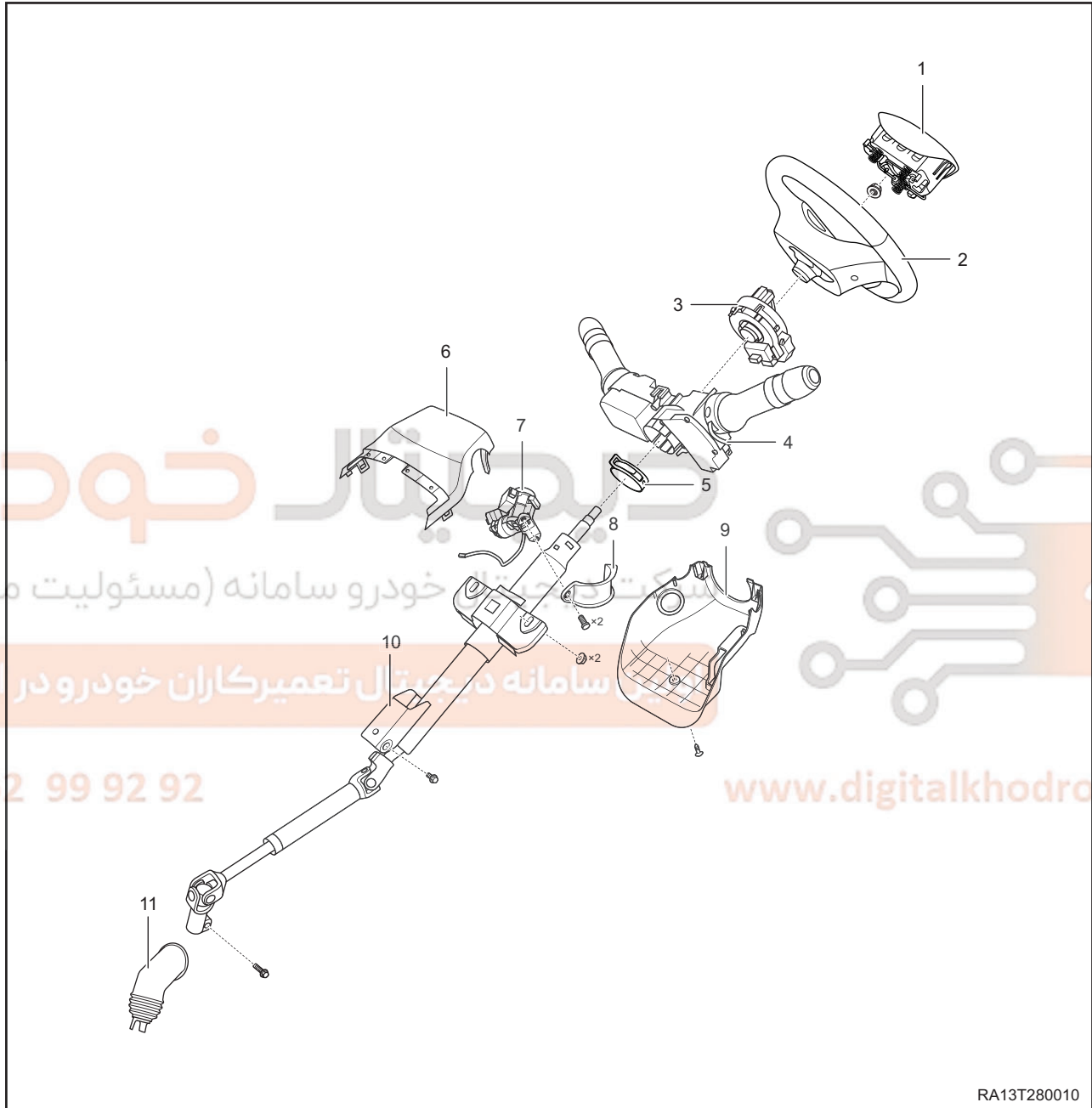
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GENERAL INFORMATION

Description

Steering Column

28



RA13T280010

28 - STEERING COLUMN

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1 - Driver Airbag	2 - Steering Wheel Assembly
3 - Spiral Cable	4 - Combination Switch
5 - Clamp	6 - Combination Switch Upper Cover
7 - Ignition Switch	8 - ignition switch fixing clamp
9 - Lower Cover	10 - Steering Column with Intermediate Shaft Assembly
11 - Steering Lower Boot	

Specifications

Torque Specifications

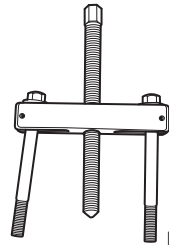
Description	Tightening Torque (N·m)
Steering Wheel Assembly Fixing Nut	35 ± 3
Combination Switch Cover Fixing Screw	1.5 ± 0.5
Steering Column Assembly Upper Bracket Fixing Bolt	$25 + 3$
Steering Column Assembly Lower Bracket Fixing Bolt	$25 + 3$
Coupling Bolt Between Steering Column with Intermediate Shaft Assembly and Steering Gear Input Shaft	25 ± 3
Ignition Starting Switch Fixing Screw	13 ± 2

Data Specifications

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

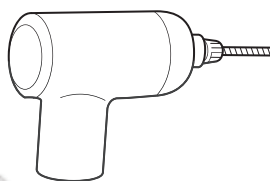
Tools

Special Tool

Steering Wheel Remover	 RCH0000014
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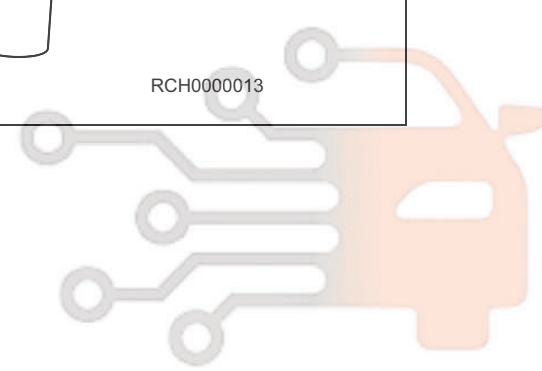
General Tool

Electric Drill	 RCH0000013
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DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

Steering System

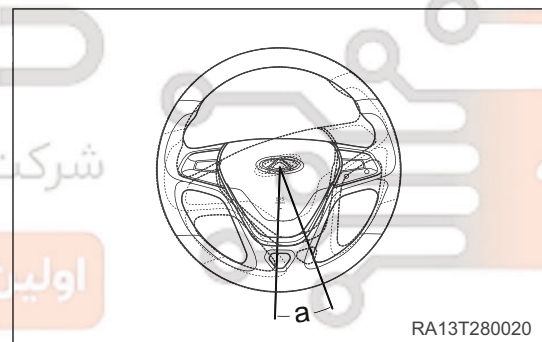
Symptom	Suspected Area	See page
Steering wheel assembly cannot lock or unlock	Ignition key cylinder	28-16
	Ignition switch lock body	28-15
Steering wheel assembly has no free play or free play is too large	Front axle hub bearing (seriously worn)	22-14
	Intermediate shaft with universal joint assembly (seriously worn)	28-13
	Ball pin assembly (worn or loosen)	29-17
	Steering tie rod assembly	29-19
	Steering gear assembly (improper engagement gap of rack and pinion)	29-21
	Front tire (improperly inflated or unevenly worn)	24-5
	Front wheel alignment (incorrect)	23-33
	Front sub frame welding assembly	22-17
Hard steering	Intermediate shaft with universal joint assembly (insufficiently lubricated)	28-13
	Ball pin assembly (insufficiently lubricated)	29-17
	Steering tie rod assembly	29-19
	Steering column assembly	29-19
	Steering gear assembly	29-21
Poor returnability	Front tire (improperly inflated or unevenly worn)	24-5
	Front wheel alignment (incorrect)	23-33
	Front suspension	23-3
	Ball pin assembly (loosen, insufficiently lubricated)	29-17
	Steering tie rod assembly	29-19
	Intermediate shaft with universal joint assembly (loosen, insufficiently lubricated)	28-13
	Steering column assembly (stuck)	29-19
	Steering gear assembly (stuck)	29-21

Symptom	Suspected Area	See page
Knocking (or clunking) sound occurs when steering wheel is turned while steering system is in operation	Intermediate shaft with universal joint assembly	28-13
	Control arm ball pin	23-19
	Control arm	23-19
	Front strut upper connecting plate assembly (w/ insulator)	23-12
	Steering gear assembly	29-21
Friction sound occurs when steering wheel is turned during low speed driving	Steering column assembly	29-19
	Front strut upper connecting plate assembly (w/ insulator)	23-12
Steering wheel vibrates and noise occurs when steering wheel is turned with vehicle stopped	Steering column assembly	29-19
	Front strut upper connecting plate assembly (w/ insulator)	23-12

Steering Wheel Free Play Inspection

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

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

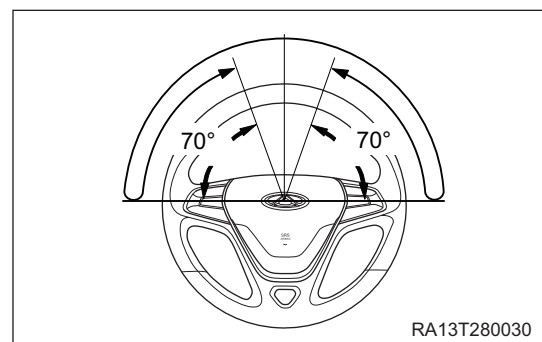


3. If measured value exceeds standard value, check steering system.

Steering Wheel Centering/Returnability Inspection

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

1. Perform slow turn and sharp turn test.
Check for steering effect required for steering wheel and deviation of centering/returnability during left/right turn.
2. When vehicle speed is between 20 and 30 km/h, turn steering wheel either to left or right by 90° and keep it for 1 or 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 tire pressure, steering system and suspension system.

ON-VEHICLE SERVICE

Steering Wheel Assembly

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Removal

CAUTION

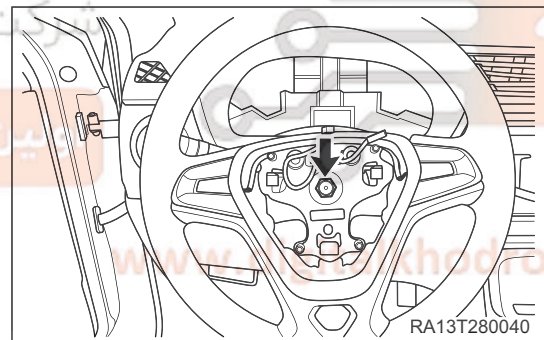
- Be sure to read precautions for SRS airbag before removing steering wheel (See page 31-45).

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

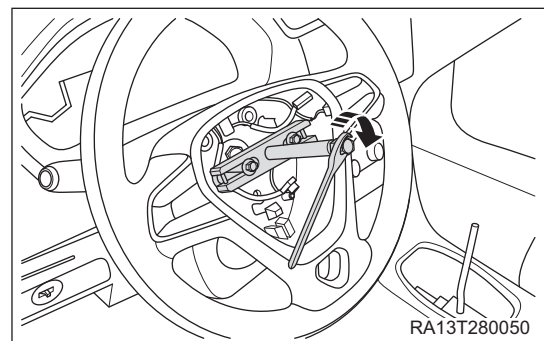
CAUTION

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

- Remove the driver airbag assembly (See page 31-45).
- Remove the steering wheel assembly .
 - Secure steering wheel assembly, and put matchmarks on steering wheel assembly and steering column assembly, then remove steering wheel assembly fixing nut (arrow).
(Tightening torque: $35 \pm 3 \text{ N}\cdot\text{m}$)

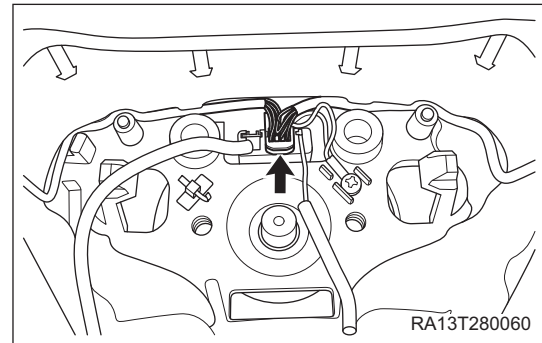


- As shown in illustration, install steering wheel remover, and then tighten it with a wrench to loosen steering wheel assembly from steering column assembly.



28 - STEERING COLUMN

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



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- d. Remove the steering wheel assembly.

CAUTION

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

Inspection

- Check steering wheel assembly for damage or deformation. Replace steering wheel assembly if necessary.
- Check spline in steering wheel assembly for damage. Replace steering wheel assembly if necessary.

Installation

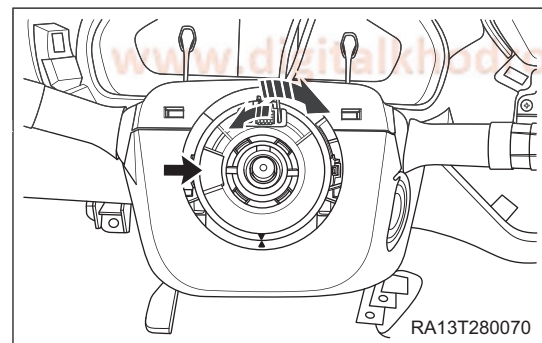
CAUTION

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

- Adjust spiral cable to correct position (arrow).

HINT:

Fully turn 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.



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

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 CAUTION

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

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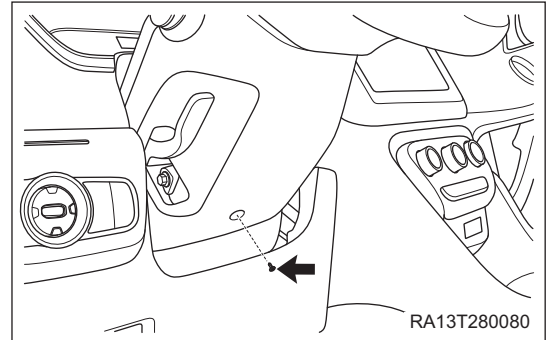
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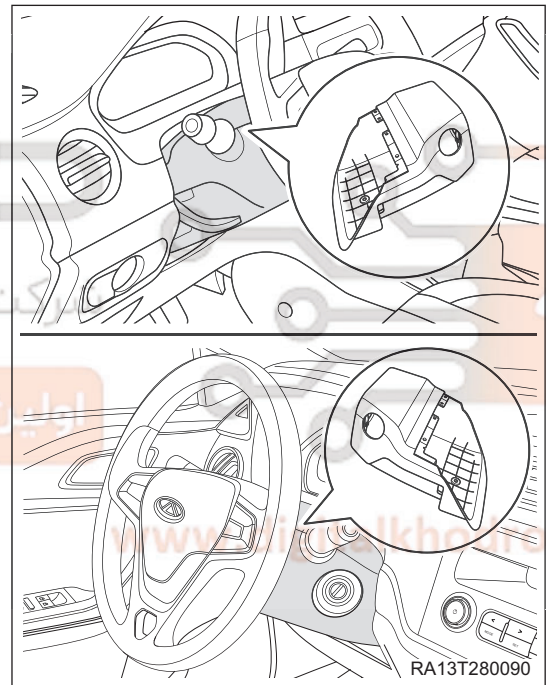
Combination Switch Cover

Removal

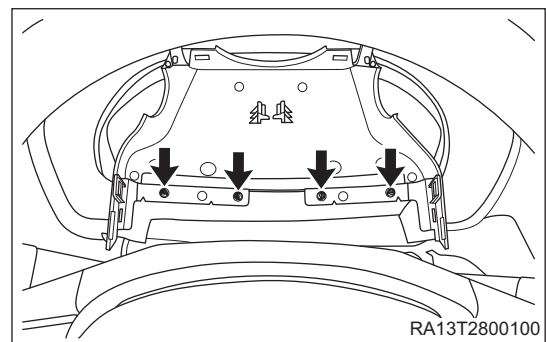
1. Set steering wheel to straight-ahead position.
2. Turn off all electrical equipment and the ignition switch.
3. Remove the combination switch cover.
 - a. Remove lower fixing screw (arrow) from combination switch cover.
(Tightening torque: $2 \pm 0.5 \text{ N}\cdot\text{m}$)



- b. Disengage connecting clip between upper cover and lower cover, and separate upper cover and lower cover, then remove lower cover.



- c. Separate 3 clips between upper cover and steering column dust gasket, and then remove upper cover.



28 - STEERING COLUMN

 CAUTION

- Operate carefully to prevent damage to components during installation.

28 Inspection

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

Installation

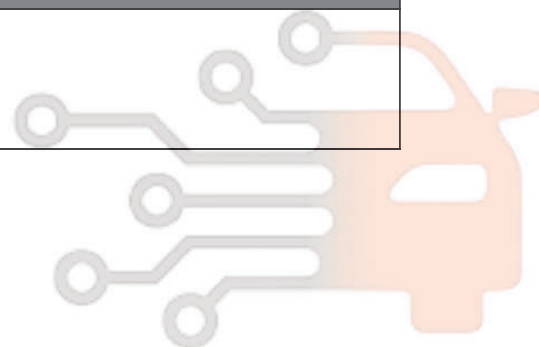
1. Loosen steering wheel adjusting handle, and adjust steering column assembly to uppermost position, then tighten adjusting handle to uppermost position.
2. Insert steering column lower cover from right side of ignition switch at an angle, and then install adjusting handle into cover hole.
3. After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

 CAUTION

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

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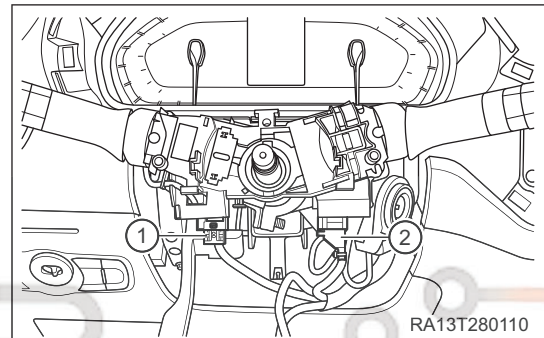
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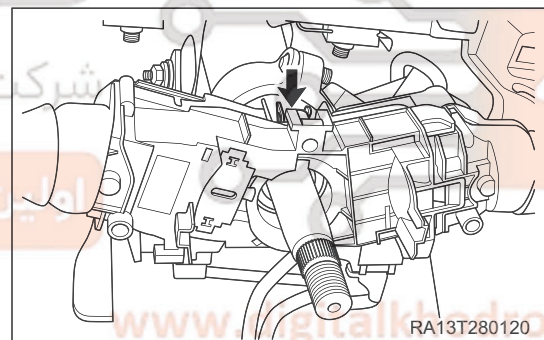
Steering Column with Intermediate Shaft Assembly

Removal

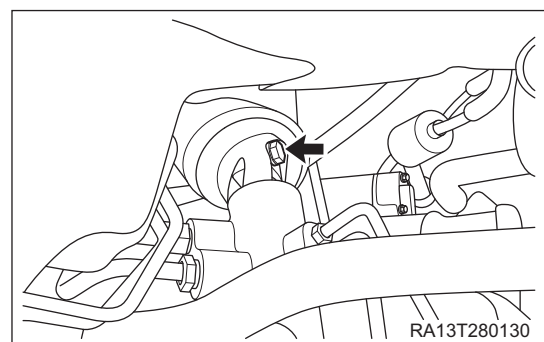
1. Set steering wheel to straight-ahead position.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Remove the airbag (See page 31-45).
5. Remove the steering wheel assembly (See page 28-8).
6. Remove the combination switch cover (See page 28-11).
7. Remove the spiral cable (See page 31-48).
8. Remove the combination switch assembly.
 - a. Disconnect steering switch connector (1) and wiper switch connector (2).



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



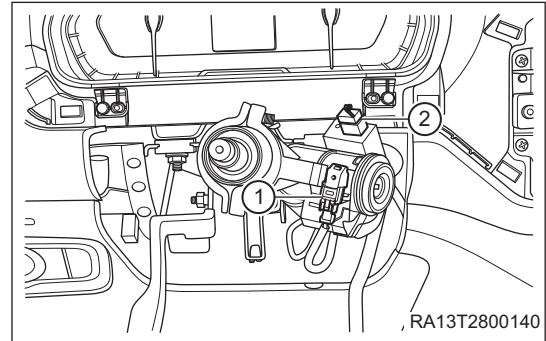
9. Remove the lower left protector assembly (See page 33-24)
10. Remove the steering column with intermediate shaft assembly.
 - a. Remove coupling bolt between steering column with intermediate shaft assembly and steering gear input shaft.
(Tightening torque: $25 \pm 3 \text{ N}\cdot\text{m}$)



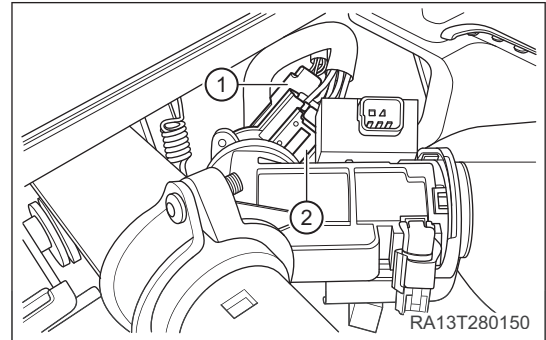
28 - STEERING COLUMN

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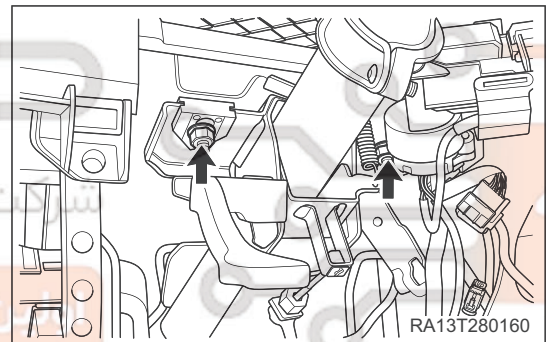
- b. Disconnect key travel switch connector (1) and anti-theft module connector (2).



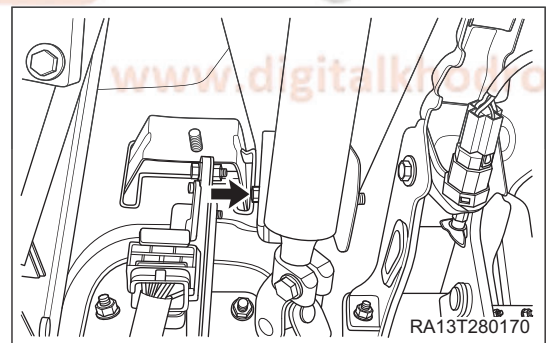
- c. Disconnect ignition switch connector (1) and ignition switch illumination light connector (2).



- d. Remove 2 fixing nuts (arrow) from steering column upper bracket.
(Tightening torque: 25 ± 3 N·m)



- e. Remove 1 fixing bolt (arrow) from steering column lower bracket.
(Tightening torque: 25 ± 3 N·m)



- f. Remove the steering column with intermediate shaft assembly.

CAUTION

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

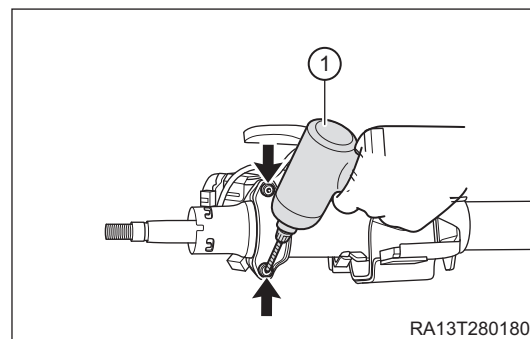
Disassembly

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

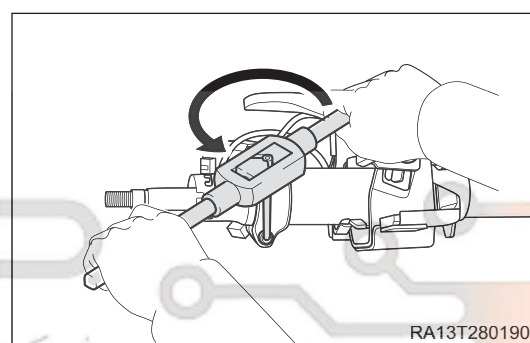
CAUTION

- DO NOT tighten vise excessively.

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

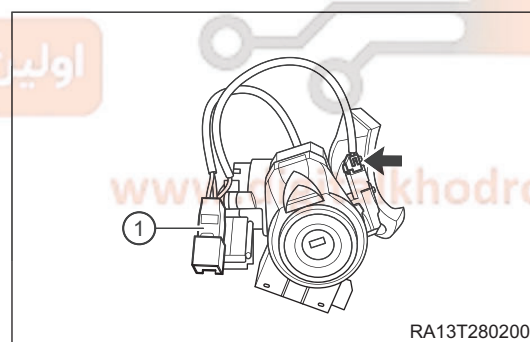


- c. Using a screw remover, remove the ignition switch lock body anti-theft bolt.

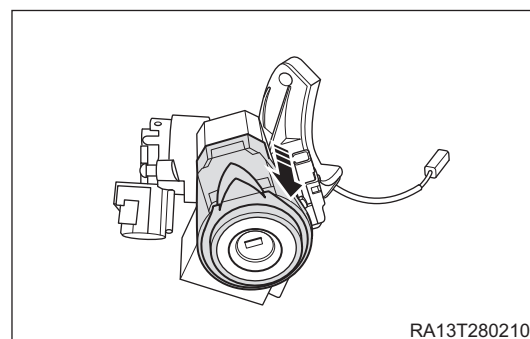


2. Remove the ignition switch illumination light.

- a. Disconnect key travel switch connector (arrow), and detach fixing clip of ignition switch illumination light connector from ignition switch.



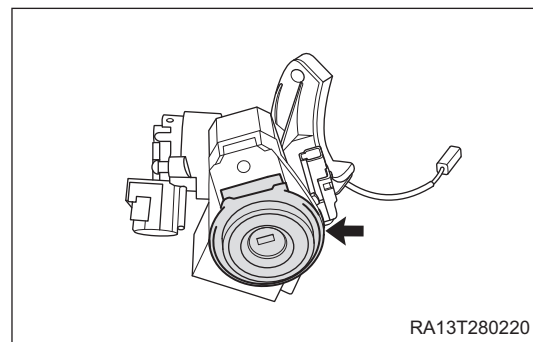
- b. Remove the ignition switch illumination light cover (arrow).



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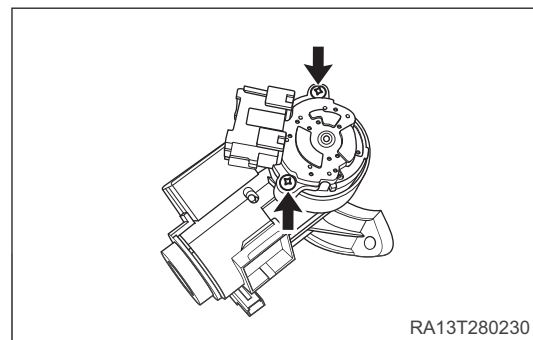
28

- c. Remove ignition switch illumination light in direction of arrow from ignition switch lock body.



3. Remove the ignition switch.

- a. Remove 2 fixing screws (arrow) from ignition starting switch, and remove ignition starting switch.

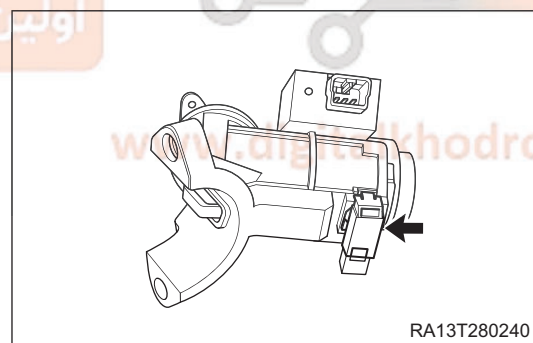


4. Remove the key travel switch.

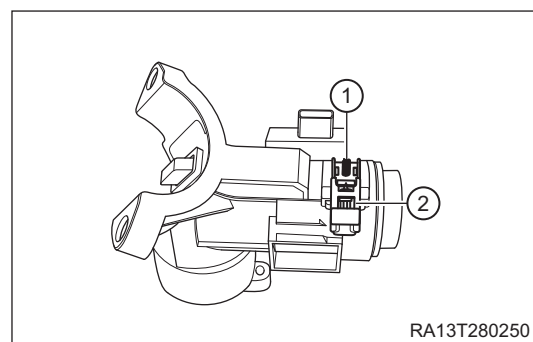
CAUTION

- Be careful not to allow the spring to pop out when removing key travel switch.

- a. Remove the key travel switch spring pressure plate (arrow).

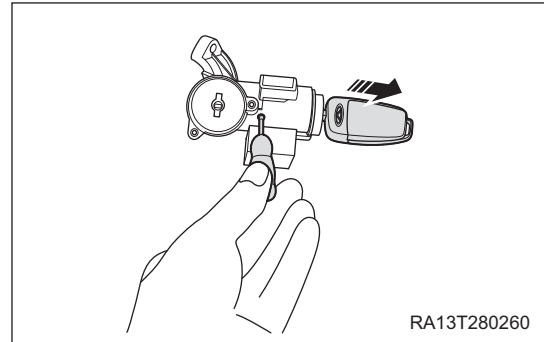


- b. Remove spring (1) and key travel switch (2).

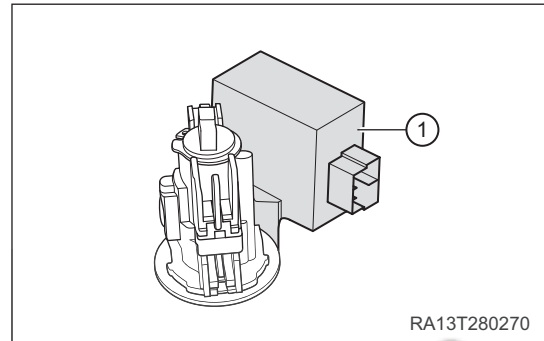


5. Remove the ignition switch key cylinder.

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



- b. Detach fixing clip of anti-theft module from ignition key cylinder and remove anti-theft module (1).

**Inspection**

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

Assembly

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

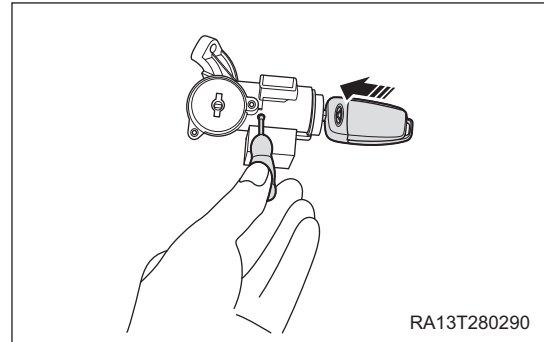
CAUTION

- DO NOT tighten vise excessively.

- b. Install ignition switch assembly to steering column assembly with new anti-theft bolts of ignition switch lock body, and then tighten the anti-theft bolts until bolt heads break off.

28 - STEERING COLUMN**2. Install the ignition key cylinder.**

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



- b. Check ignition key cylinder for proper operation:

When key is removed, steering lock is locked; when 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

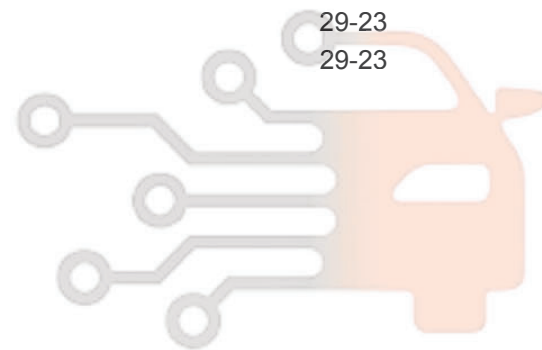
- Before installing steering column assembly, slide the spline at lower part of steering column assembly onto intermediate shaft upper universal joint first.
- Tighten fixing nuts, bolts and screws in place.
- Install each connector in place.

HYDRAULIC ASSIST STEERING

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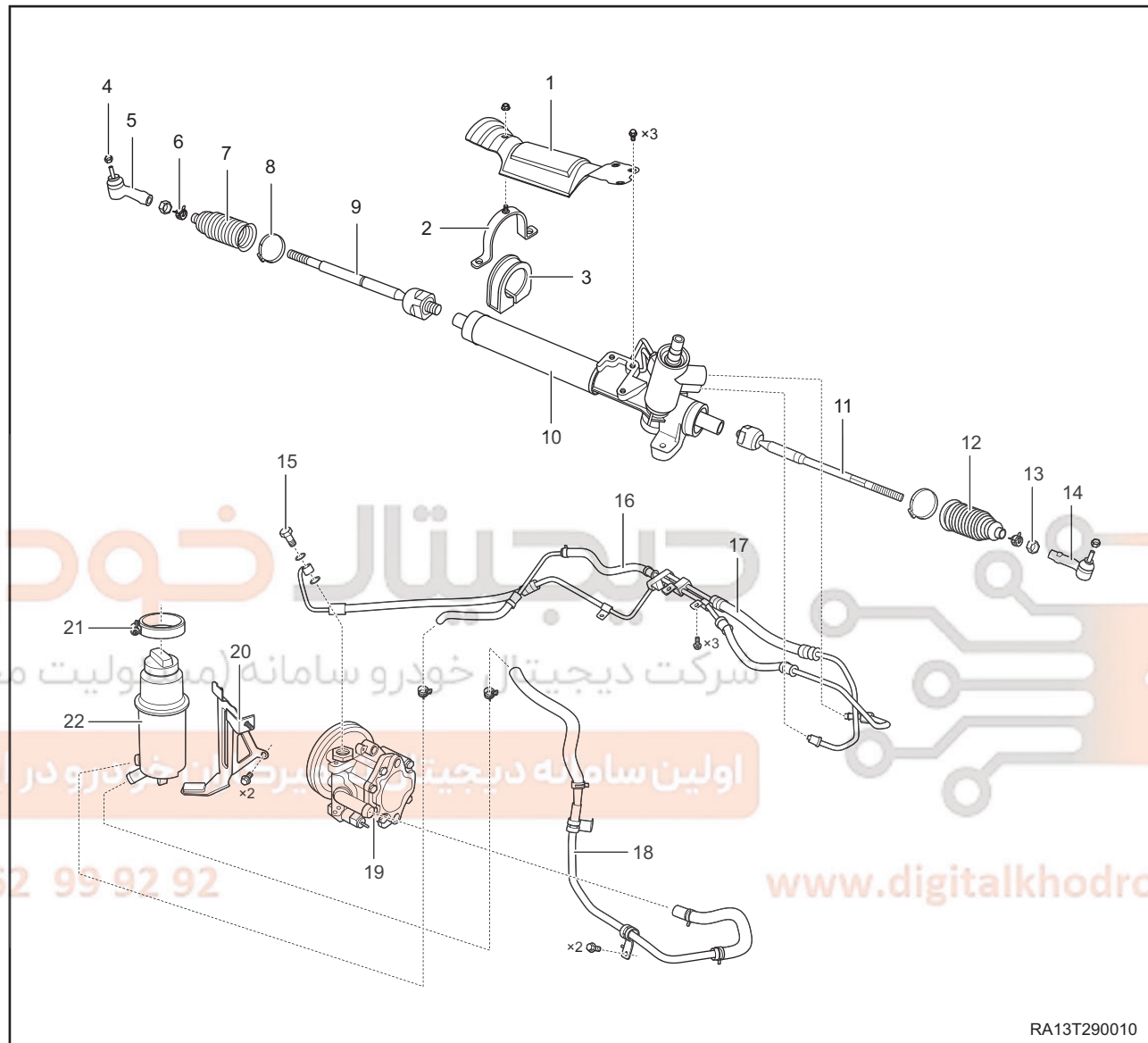


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GENERAL INFORMATION

Description



29 - HYDRAULIC ASSIST STEERING

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1 - Steering Gear Heat Insulator	2 - Steering Gear Fixing Bracket
3 - Steering Gear Fixing Rubber Block	4 - Steering Tie Rod Ball Pin Locking Nut
5 - Right Steering Tie Rod Assembly	6- Elastic Clamp
7 - Right Steering Tie Rod Boot	8 - Clamping Ring
9 - Right Steering Tie Rod Assembly	10 - Steering Gear
11 - Left Steering Tie Rod Assembly	12 - Left Steering Tie Rod Boot
13 - Steering Tie Rod Fixing Nut	14 - Left Steering Tie Rod Assembly
15 - Hollow Bolt	16 - Fluid Return Pipe
17 - High Pressure Fluid Pipe	18 - Fluid Suction Pipe
19 - Steering Pump	20 - Steering Fluid Reservoir Bracket
21 - Steering Fluid Reservoir Fixing Worm Clamp	22 - Steering Fluid Reservoir

Hydraulic assist steering system consists of power steering pump assembly, steering gear assembly, steering fluid pipe and steering fluid reservoir assembly and so on. This system can reduce steering force when driver operates steering wheel, thus improving operation convenience and driving safety.

Steering Gear Assembly

Steering gear assembly is rack & pinion type, which is characterized by simple and compact construction and high steering sensitivity. Piston rod is integrated with rack, and there is a boot at the connection between steering tie rod assembly and rack. Length of steering tie rod can be adjusted properly to match with toe-in. Tie rod ball pin assembly and steering knuckle are connected and tightened by a locking nut.

Power Steering Pump Assembly

Power steering pump assembly is connected with steering gear assembly by high pressure fluid pipe, and connected with steering fluid reservoir assembly by fluid suction pipe. Never operate power steering pump assembly without fluid. Try to avoid turning steering wheel to limit position for more than 5 seconds during operation.

Steering Fluid Pipe

Steering fluid pipe is used to deliver power steering fluid. Steering fluid pipes are divided into steel pipe, hose and hybrid type according to the length and operating features of each component. Ferrule connection is adopted between steel pipe and hose on high pressure fluid pipe assembly and sealed reliably. Steel pipe and component are connected with joint bolt, and sealed by O-ring. Tighten bolt to guarantee reliable sealing. Hose and component are connected by hose and tightened with clamp.

Steering Fluid Reservoir Assembly

Main functions of steering fluid reservoir assembly are to store fluid and supply it to steering pump and system.

Operation

Steering gear assembly converts the circular motion of steering wheel into linear motion of rack by engaging the rack and pinion inside. Power steering pump assembly delivers fluid into steering gear assembly to drive pistons move toward the direction made by driver. Piston transmits force to steering knuckle by steering tie rod assembly, thus reducing steering effort when driver turns steering wheel. If steering assist is ineffective, more steering effort is needed.

Specifications

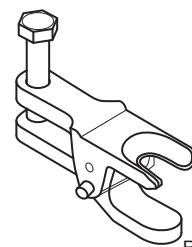
Torque Specifications

Description	Torque (N·m)
Coupling Bolt Between Steering Column Lower Yoke and Steering Gear	25 ± 3
Tie Rod Assembly Locking Nut	55 ± 5
Fixing Bolt Between Steering Gear and Sub Frame	30 ± 3
Locking Nut Between Ball Pin Assembly and Steering Knuckle Assembly	10 ± 1
Self-locking Nut Between Steering Tie Rod Assembly Ball Pin and Front Steering Knuckle Assembly	35 ± 3
Steering Gear Heat Insulator Fixing Nut	9 ± 1
Steering Gear Heat Insulator Fixing Bolt	25 ± 3
Power Steering Pump Pulley Fixing Bolt	25 ± 3
Power Steering Pump Fixing Bolt	25 ± 3
Fixing Clamp Between Steering Fluid Reservoir and Bracket	5 ± 1
Fluid Reservoir Bracket Fixing Bolt	7 ± 1
High Pressure Fluid Pipe Clamping Bolt	30 ± 3
Hollow Bolt	45 ± 3
Fixing Bolt Between High/Low Pressure Line and Intake Manifold	25 ± 3
Fluid Return Pipe Clamping Bolt	30 ± 3
Fluid Suction Pipe Fixing Bolt	9 ± 1.5

29

Tool

Special Tool

Ball Pin Separator	 RCH0000024
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DIAGNOSIS & TESTING

Problem Symptoms Table

HINT:

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

29

Symptom	Suspected Area	See page
Stuck or sticking in some position occurs when turning	Steering fluid (insufficient or dirty)	29-10
	Steering tie rod boot (damaged or worn)	29-19
	Steering tie rod assembly (rust)	29-19
	Steering gear assembly	29-15
	Power steering pump drive belt (loose)	29-15
Steering wheel is not centered or centered improperly	Steering gear assembly (incorrect clearance)	29-19
	Front wheel alignment (incorrect)	24-12
	Ball pin assembly (worn or loose)	29-17
	Steering tie rod assembly (worn or loose)	29-19
	Intermediate shaft (twisted and deformed) or universal joint (worn, loose or insufficiently lubricated)	28-13
	Front sub frame welding assembly	-
	Steering knuckle assembly	29-21
	Front strut upper connecting plate assembly (w/ insulator)	-
Steering shudders	Steering gear assembly (incorrect clearance)	-
	Steering gear assembly (incorrect clearance)	29-19
	Front wheel alignment (incorrect)	24-12
	Ball pin assembly (worn or loose)	29-17
	Brake disc and lining (deformed)	26-26
	Intermediate shaft (twisted and deformed) or universal joint (worn, loose or insufficiently lubricated)	28-13
	Front sub frame welding assembly	-
	Steering knuckle assembly	29-21
	Steering gear assembly (incorrect clearance)	-

29 - HYDRAULIC ASSIST STEERING

Symptom	Suspected Area	See page
Steering wheel turns heavily or steering effort is uneven	Tire (improperly inflated)	-
	Front wheel alignment (incorrect)	24-12
	Steering fluid (insufficient)	29-8
	Fluid pipe (leaked or blocked)	29-12
	Ball pin assembly (worn or loose)	29-17
	Steering tie rod assembly (worn or loose)	29-19
	Front suspension	23-9
	Power steering pump drive belt (loose or damaged)	29-15
	Power steering pump assembly	29-15
	Steering gear assembly (incorrect clearance)	-
Abnormal noises from steering system	Steering fluid (insufficient, air existing or dirty)	29-8
	Steering fluid (insufficient, air existing or dirty)	29-8
	Front strut upper connecting plate assembly (w/ insulator)	-
	Ball pin assembly (worn or loose)	29-17
	Steering tie rod assembly (worn or loose)	29-19
	Steering gear assembly (incorrect clearance)	29-21
	Power steering pump assembly	29-15

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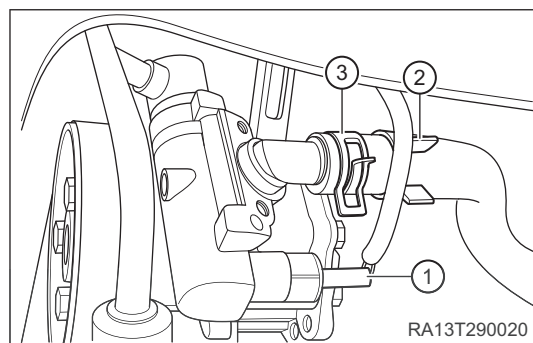
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29 - HYDRAULIC ASSIST STEERING

Steering Fluid Replacement

Steering Fluid Draining

1. Set the steering wheel to straight-ahead position.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Turn ignition switch to ACC.
5. Open the steering fluid reservoir cap.
6. Disconnect fluid suction pipe from power steering pump assembly.
 - a. Disconnect the power steering pump connector (1).
 - b. Disconnect fixing clip (2) of power steering pump connector from fluid suction pipe.
 - c. Loosen the elastic clamp (3).



7. Place a fluid container under fluid suction pipe, and disconnect fluid suction pipe joint to collect steering fluid flowing out of fluid suction pipe and steering pump.
8. Turn steering wheel left and right to limit positions, and repeat the operation several times to drain steering fluid in steering system.

WARNING

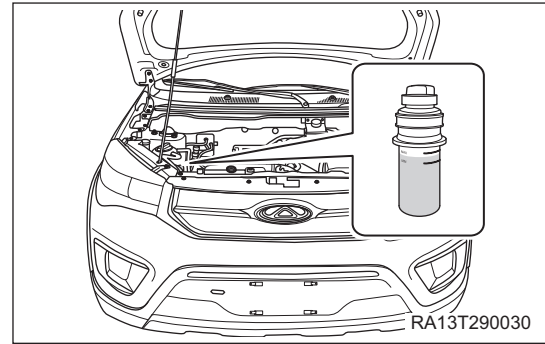
- If steering fluid sprays on your skin, immediately wash it off with water.
- Steering wheel should not be in limit positions for more than 5 seconds.

**ENVIRONMENTAL PROTECTION**

- Wasted power steering fluid should be handled according to local environmental regulations.

Steering Fluid Adding

Proper steering fluid level should be between "MAX" and "MIN" marks. It affects power steering system performance directly whether fluid level of the fluid reservoir is proper. If fluid level drops below "MIN" mark, it is necessary to add steering fluid.



29

CAUTION

- DO NOT apply foaming or expired steering to vehicle. Otherwise it may damage power steering pump assembly.

- Open steering fluid reservoir cap, and add steering fluid to reservoir until the level reaches "MAX" mark.
- Start engine and run it at idle to drive power steering pump assembly, thus filling the whole steering system with steering fluid.
- Observe fluid level of fluid reservoir while engine is running. If fluid level drops below "MIN" mark, add steering fluid to a proper level in time to prevent fluid level from dropping excessively and avoid air entering power steering pump assembly.
- If bubbles occur in steering fluid reservoir, perform bleeding procedures. Check that level is between "MAX" and "MIN" marks when there are no bubbles in fluid reservoir and fluid level does not change any longer.

WARNING

- If steering fluid sprays on your skin, immediately wash it off with water.
- It is harmful to your skin if contacting with power steering fluid for a long time.

Bleeding Procedures

It is necessary to perform bleeding procedures when bubbles occur in steering fluid reservoir assembly and fluid has emulsified or there is excessive noise in power steering pump assembly. Bleeding procedures are as follows:

- Open the steering fluid reservoir cap.
- Raise vehicle with a lift (with front wheels off ground).
- Start engine (idling) and turn steering wheel left and right to limit positions (do not stay at limit positions more than 2 seconds). Repeat several times to completely bleed air in system from the reservoir. Observe fluid level of fluid reservoir during bleeding. If fluid level drops below "MIN" mark, add steering fluid to a proper level in time.
- After repeatedly turning steering wheel to limit positions several times, center the steering wheel, run engine at idle for 3 to 5 minutes and observe whether there still exist bubbles in fluid reservoir. If problem still exists, perform above procedures again until no bubbles are bled. If there are still problems, perform steering system inspection.
- If bubbles occur in steering fluid reservoir, perform bleeding procedures. Check that level is between "MAX" and "MIN" marks when there are no bubbles in fluid reservoir and fluid level does not change any longer.

ON-VEHICLE SERVICE

29

⚠ WARNING

- Be sure to wear necessary safety equipment to prevent accidents when repairing.
- When removing and installing high temperature components and surrounding components, wait and operate until they drop to normal temperature to avoid being burned.
- Prevent skin and eyes from contacting with steering fluid.

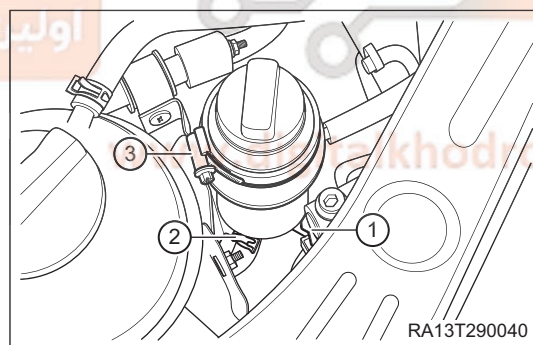
👁 CAUTION

- After disconnecting steering line, seal it immediately to prevent foreign matter from entering.
- Never run power steering pump assembly when steering fluid is insufficient.
- Steering wheel should not be in the limit position for more than 5 seconds.
- Never start engine with hose loosened or disconnected.
- Never allow hose to contact with high temperature exhaust pipe.

Steering Fluid Reservoir Assembly

Removal

1. Drain the steering fluid (See page 29-8).
2. Remove the steering fluid reservoir assembly.
 - a. Remove fluid suction pipe clamp (1) on steering fluid reservoir, and disconnect fluid suction pipe assembly and steering fluid reservoir assembly.
 - b. Remove fluid return pipe clamp (2) on steering fluid reservoir, and disconnect fluid return pipe assembly and steering fluid reservoir assembly.
 - c. Loosen fixing worm clamp (3) of steering fluid reservoir, and remove steering fluid reservoir from steering fluid reservoir bracket.
(Tightening torque: $5 \pm 1 \text{ N}\cdot\text{m}$)



👁 CAUTION

- Using a plug, clog the disconnected pipe to prevent foreign matter from entering.

Inspection

1. Check steering fluid reservoir assembly for breakage or deformation. Replace fluid reservoir if necessary.
2. Check if there is contamination in steering fluid reservoir assembly. Clean or replace if necessary.

Installation

Installation is in the reverse order of removal.

29

CAUTION

- Install fluid suction pipe clamp and fluid return pipe clamp in place.
- Never tap or hit the fluid reservoir.
- After adding power steering fluid, perform bleeding procedures and check system for leakage.

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29 - HYDRAULIC ASSIST STEERING

Steering Fluid Pipe

Removal

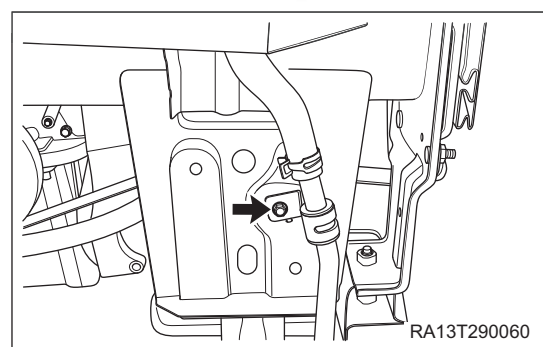
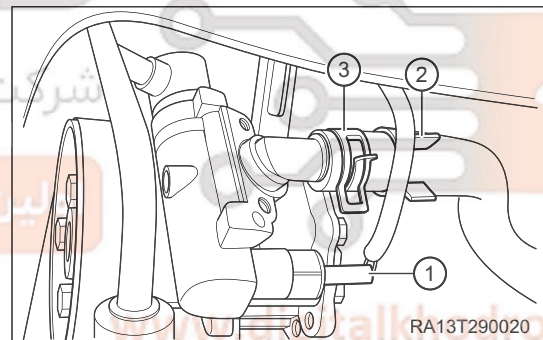
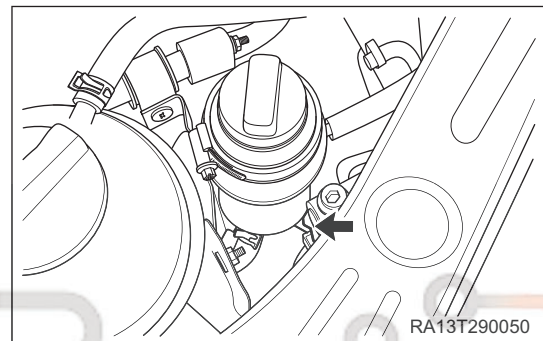


ENVIRONMENTAL PROTECTION

- Collect steering fluid residue in line with a container when disconnecting the line.

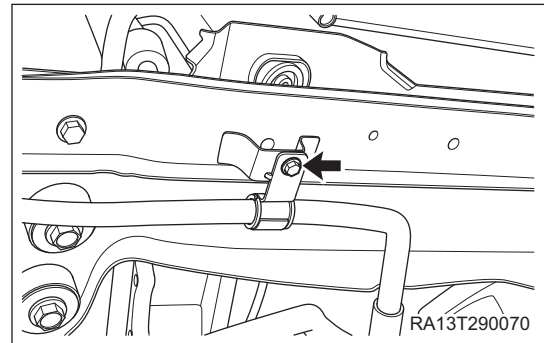
29

1. Drain the steering fluid (See page 29-8).
2. Remove the front bumper (See page 49-7).
3. Remove the fluid suction pipe.
 - a. Remove fluid suction pipe clamp (arrow) on steering fluid reservoir, and disconnect fluid suction pipe and steering fluid reservoir assembly.
 - b. Disconnect the power steering pump connector (1).
 - c. Disconnect fixing clip (2) of power steering pump connector from fluid suction pipe.
 - d. Loosen elastic clamp (3) and disconnect fluid suction pipe and power steering pump.
 - e. Remove fluid suction pipe fixing bolt (arrow) from mounting fitting board II assembly.
(Tightening torque: $9 \pm 1.5 \text{ N}\cdot\text{m}$)



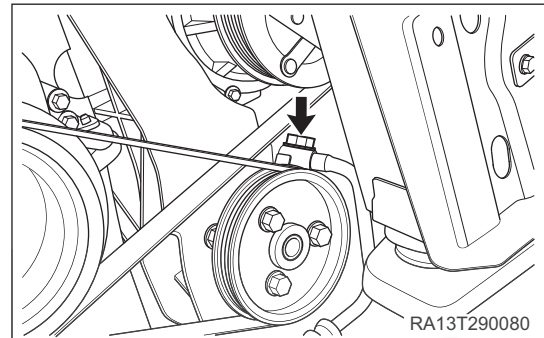
29 - HYDRAULIC ASSIST STEERING

- f. Remove fluid suction pipe fixing bolt (arrow) from tank crossmember welding assembly.
(Tightening torque: $9 \pm 1.5 \text{ N}\cdot\text{m}$)
- g. Remove the fluid suction pipe.



29

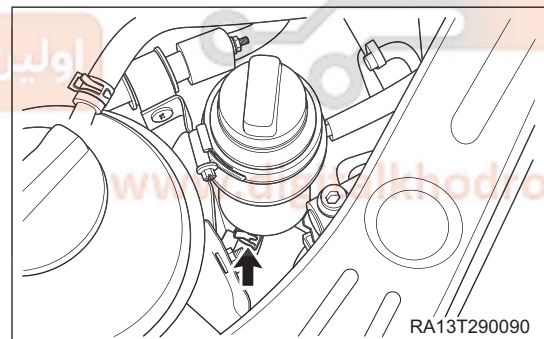
4. Remove high pressure fluid pipe and fluid return pipe.
 - a. Remove high pressure fluid pipe joint hollow bolt (arrow) from power steering pump assembly.
(Tightening torque: $45 \pm 3 \text{ N}\cdot\text{m}$)



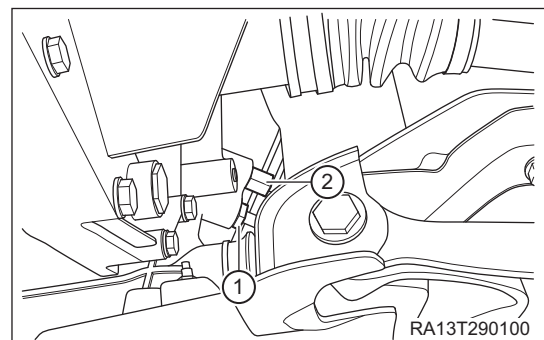
 CAUTION

- Using a plug, clog the disconnected steering system line to prevent foreign matter from entering.

- b. Remove fluid return pipe clamp (arrow) from steering fluid reservoir assembly.



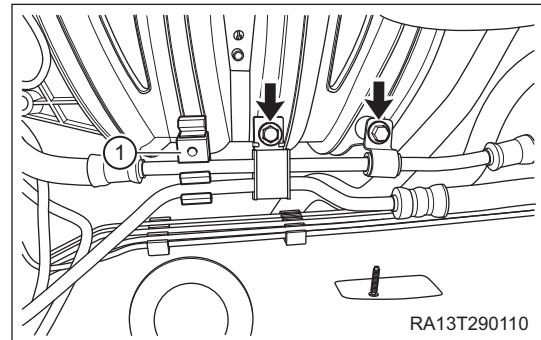
- c. Remove high pressure fluid pipe clamping bolt (1) and fluid return pipe clamping bolt (2) from power steering gear.
(Tightening torque for high pressure fluid pipe clamping bolt: $30 \pm 3 \text{ N}\cdot\text{m}$)



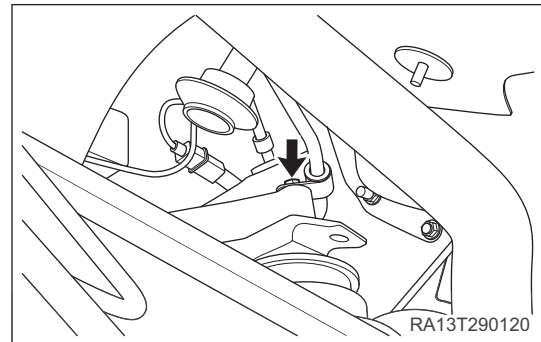
29 - HYDRAULIC ASSIST STEERING

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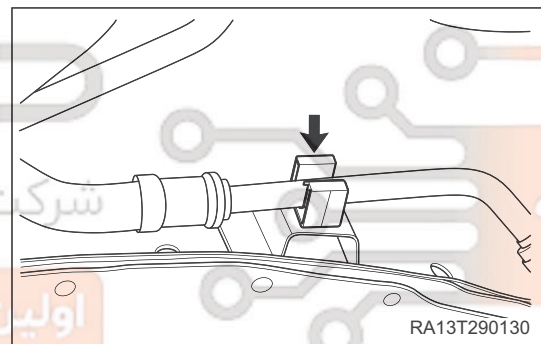
- d. Remove 2 high/low pressure line fixing bolts (arrow) from intake manifold, and detach fixing clip (1).
(Tightening torque for fluid return pipe clamping bolt: $25 \pm 3 \text{ N}\cdot\text{m}$)



- e. Remove high pressure pipe fixing bolt (arrow) from engine right mounting bracket.
(Tightening torque for fluid return pipe clamping bolt: $25 \pm 3 \text{ N}\cdot\text{m}$)



- f. Detach clip (arrow) from front right side rail, and remove high pressure fluid pipe and fluid return pipe.

**Inspection**

1. Check steering fluid pipe for cracks, wear or blockage. Replace steering fluid pipe assembly if necessary.
2. Check steering fluid pipe joint and O-ring for deformation or damage. Replace steering fluid pipe assembly if necessary.
3. Check if steering fluid pipe bracket is normal. Replace if necessary.

Installation

Installation is in the reverse order of removal.

CAUTION

- Never tap or squeeze steering fluid pipe.
- Tighten fixing nut and bolt to specified torque.
- After adding power steering fluid, perform bleeding procedures and check system for leakage.

Power Steering Pump Assembly

Removal

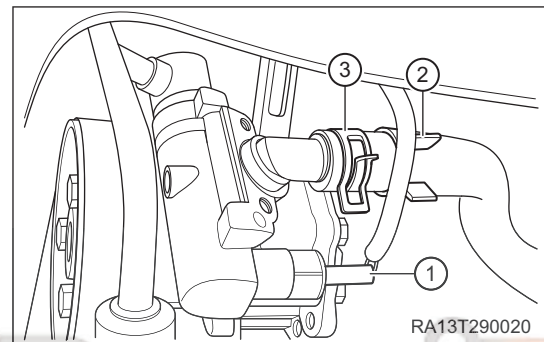


ENVIRONMENTAL PROTECTION

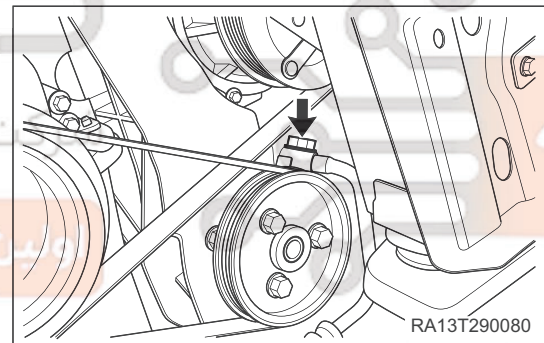
- Collect steering fluid flowing from line with a container when disconnecting the line.

29

1. Drain the steering fluid (See page 29-8).
2. Remove the power steering pump assembly.
 - a. Disconnect the power steering pump connector (1).
 - b. Disconnect fixing clip (2) of power steering pump connector from fluid suction pipe.
 - c. Loosen elastic clamp (3) and disconnect fluid suction pipe and steering pump.



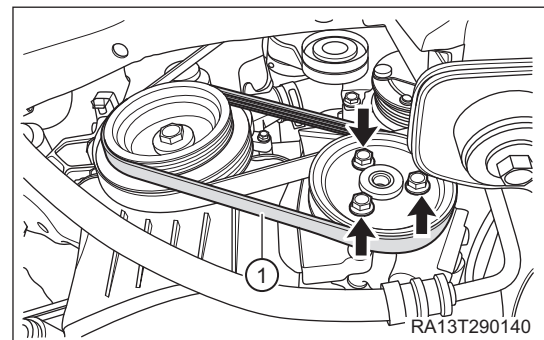
- d. Remove high pressure fluid pipe joint hollow bolt (arrow) from power steering pump assembly. (Tightening torque: 45 ± 3 N·m)



CAUTION

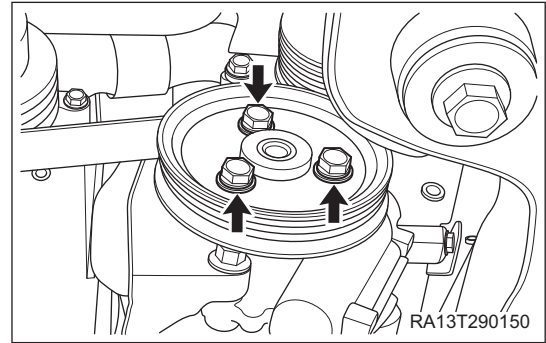
- Using a plug, clog the disconnected steering system line to prevent foreign matter from entering.

- e. Loosen 3 fixing bolts (arrow) of steering pump pulley. (Tightening torque: 25 ± 3 N·m)
- f. Remove the steering pump V-ribbed belt (1).

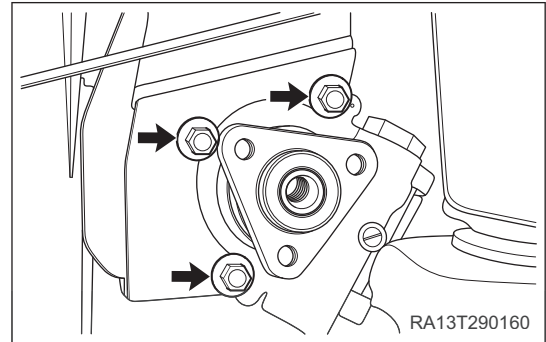


29 - HYDRAULIC ASSIST STEERING

- g. Remove 3 fixing bolts (arrow) from steering pump pulley.



- h. Remove 3 fixing bolts (arrow) from steering pump.
(Tightening torque: 25 ± 3 N·m)



- i. Remove the steering pump.

Inspection

1. Check power steering pump assembly for blockage or damage, and power steering pump bearing for looseness and abnormal noise. Replace if necessary.
2. Check if power steering pump pulley is normal. Replace if necessary.

Installation

Installation is in the reverse order of removal.

CAUTION

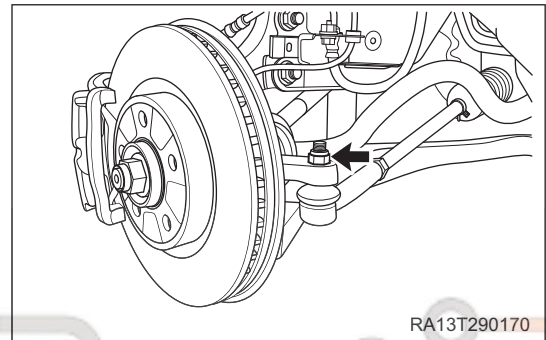
- Tighten fixing bolts to the specified torque.
- DO NOT tap or hit power steering pump assembly.

Ball Pin Assembly

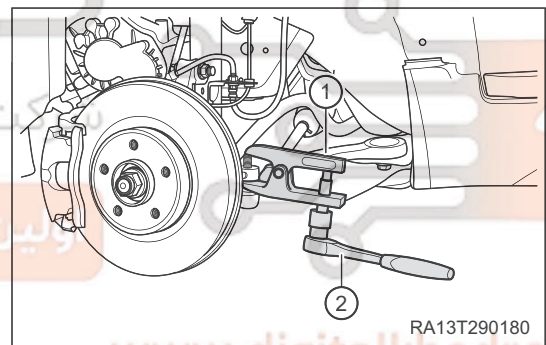
Removal

HINT:

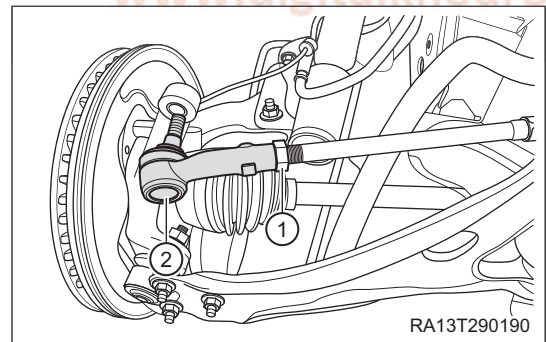
- Use same procedures for right and left sides. Procedures listed below are for left side.
1. Set the steering wheel to straight-ahead position.
 2. Turn off all electrical equipment and the ignition switch.
 3. Disconnect the negative battery cable.
 4. Remove the front left wheel (See page 24-7).
 5. Remove the ball pin assembly.
 - a. Remove locking nut (arrow) between left steering tie rod ball pin assembly and front left steering knuckle assembly.
(Tightening torque: $35 \pm 3 \text{ N}\cdot\text{m}$)



- b. Install ball pin separator (1), and tighten ball pin separator bolt with a wrench (2) to separate steering tie rod ball pin from steering knuckle assembly.



- c. Loosen steering tie rod adjustment nut (1), and turn ball pin assembly (2) counterclockwise to remove it.



HINT:

When removing ball pin assembly, record revolutions during removal, to make front wheel toe-in closer to setting value after installation.

29 - HYDRAULIC ASSIST STEERING

Inspection

1. Check tie rod ball pin for looseness. Replace ball pin assembly if necessary.
2. Check tie rod ball pin rubber bush for damage. Replace ball pin assembly if necessary.

Installation

Installation is in the reverse order of removal.

29

 CAUTION

- After installing tie rod ball pin assembly, it is necessary to perform wheel alignment procedure ([See page 24-12](#)).

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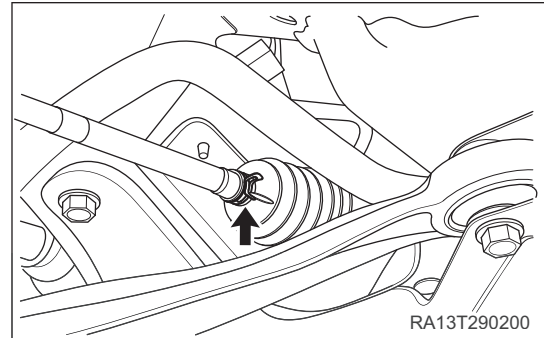
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Steering Tie Rod Assembly

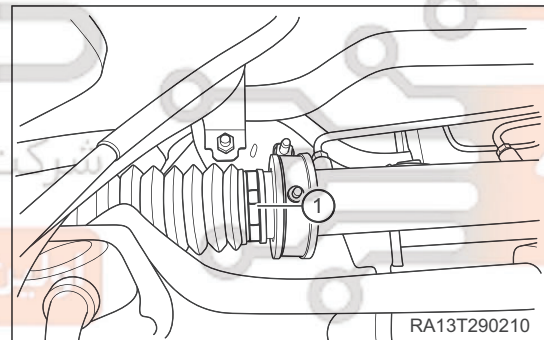
Removal

HINT:

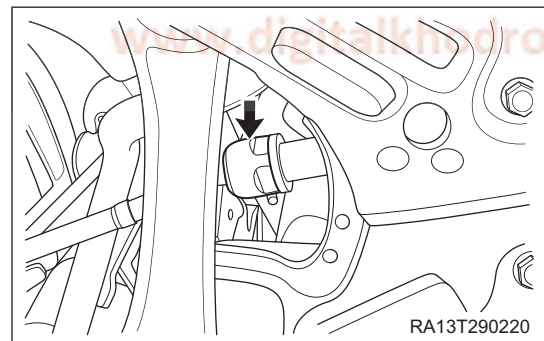
- Use same procedures for right and left sides.
 - Procedures listed below are for left side.
1. Remove the front wheel (See page 24-7).
 2. Remove the tie rod ball pin assembly (See page 29-17).
 3. Remove the steering tie rod assembly.
 - a. Remove the steering tie rod boot elastic clamp (1).



- b. Remove steering tie rod boot clamping ring (1) and remove steering tie rod boot.



- c. Using a wrench, remove tie rod assembly (arrow).



29 - HYDRAULIC ASSIST STEERING

Inspection

1. Check steering tie rod boot for damage, and if clamp is normal. Replace steering tie rod boot and clamp if necessary, to prevent water and micro dust from entering and causing parts failure prematurely.
2. Check steering tie rod assembly for deformation or wear and ball for insufficient lubrication. Replace steering tie rod assembly or add grease if necessary.

Installation

29

Installation is in the reverse order of removal.

CAUTION

- It is necessary to apply thread locker to ball.
- It is necessary to fit steering tie rod ball face and rack face closely.
- After installing steering tie rod assembly, it is necessary to perform wheel alignment procedure.

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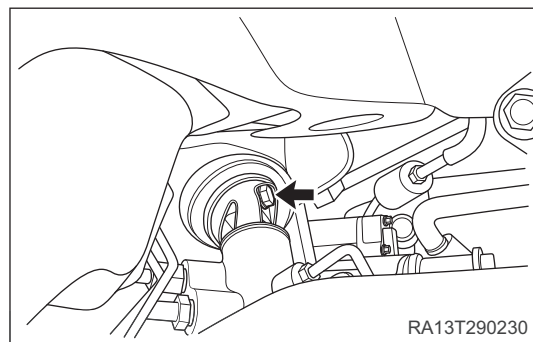
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Power Steering Gear with Tie Rod Assembly

Removal

1. Set the steering wheel to straight-ahead position.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Drain the steering fluid (See page 29-8).
5. Remove the front wheel (See page 24-7).
6. Open steering boot assembly and remove coupling bolt between steering column lower yoke and steering gear.
(Tightening torque: $25 \pm 3 \text{ N}\cdot\text{m}$)



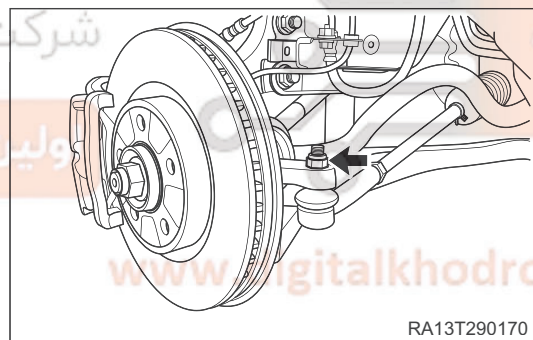
7. Separate ball pin assembly and steering knuckle.

HINT:

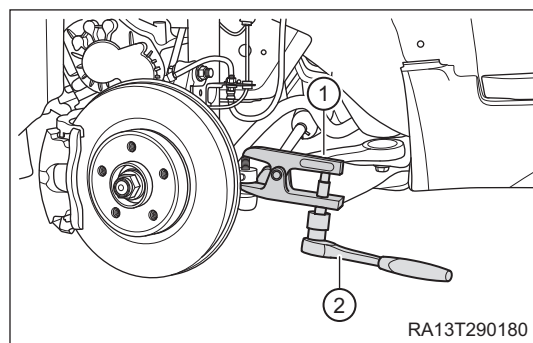
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

- a. Remove locking nut (arrow) between left steering tie rod ball pin assembly and front left steering knuckle assembly.

(Tightening torque: $35 \pm 3 \text{ N}\cdot\text{m}$)



- b. Install ball pin separator (1), and tighten ball pin separator bolt with a wrench (2) to separate steering tie rod ball pin from steering knuckle assembly.



8. Use an engine equalizer to hang the engine.
9. Support front sub frame welding assembly with a transmission carrier.

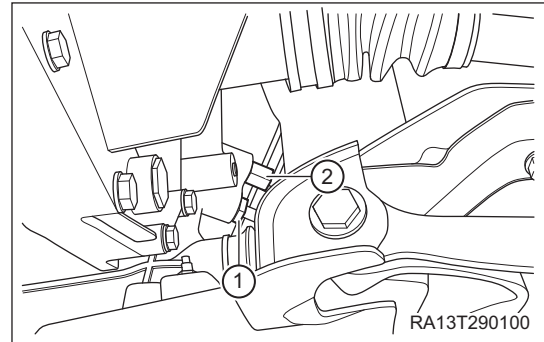
29 - HYDRAULIC ASSIST STEERING

10. Remove the power steering gear with tie rod assembly.

- a. Remove high pressure fluid pipe clamping bolt (1) and fluid return pipe clamping bolt (2) from power steering gear.

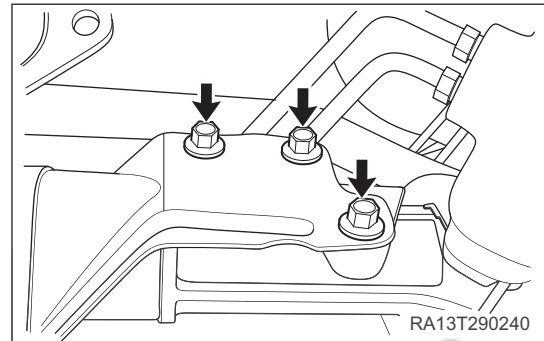
(Tightening torque: 30 ± 3 N·m)

(Tightening torque: 30 ± 3 N·m)



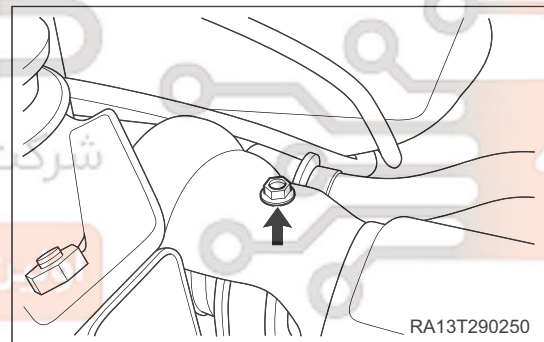
- b. Remove 3 fixing bolts (arrow) from steering gear heat insulator.

(Tightening torque: 9 ± 1 N·m)



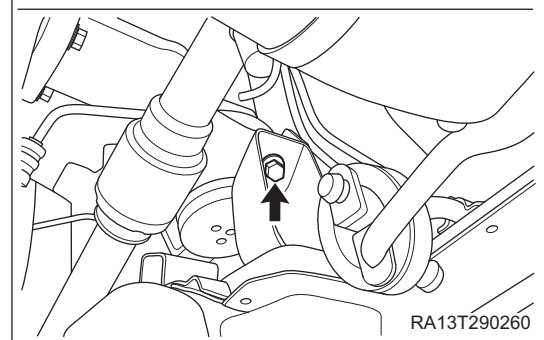
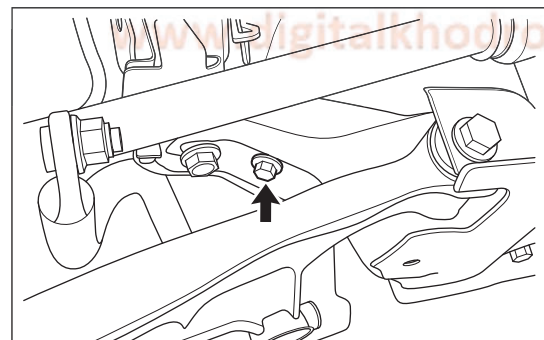
- c. Remove 1 fixing nut (arrow) from steering gear heat insulator.

(Tightening torque: 25 ± 3 N·m)



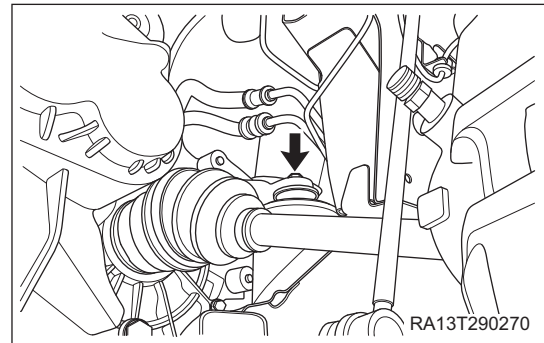
- d. Remove 2 fixing bolts (arrow) between engine right mounting cushion and sub frame.

(Tightening torque: 65 ± 5 N·m)

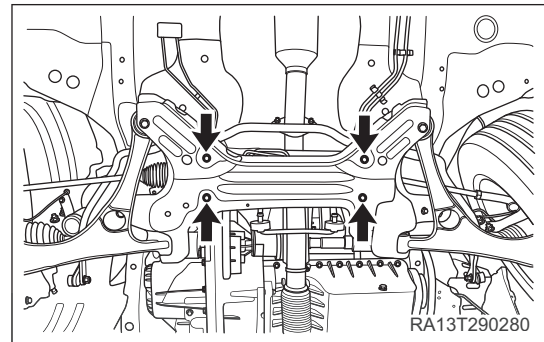


29 - HYDRAULIC ASSIST STEERING

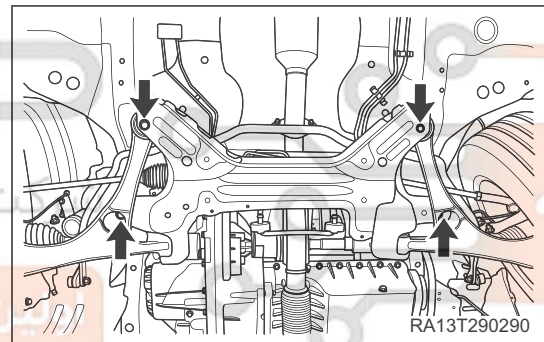
- e. Remove fixing bolt (arrow) between transmission left mounting cushion and left mounting bracket.
(Tightening torque: 65 ± 5 N·m)



- f. Remove 4 fixing bolts (arrow) between power steering gear with tie rod assembly and sub frame.
(Tightening torque: 30 ± 3 N·m)



- g. Remove 4 fixing bolts (arrow) between sub frame and body.
(Tightening torque for front bolt: 135 ± 5 N·m)
(Tightening torque for rear bolt: 160 ± 16 N·m)



- h. Lower front sub frame welding assembly (descending distance is about 40 mm), and remove steering gear with tie rod assembly.

Inspection

1. Check steering gear assembly housing for damage or deformation, and rack and pinion for sticking. Replace steering gear assembly if necessary.
2. Check if steering tie rod boot, clamp and clamping ring are normal. Replace them if necessary to prevent water and micro dust from entering and causing parts failure prematurely.
3. Check steering tie rod assembly and ball pin assembly for serious wear. Replace steering tie rod assembly and ball pin assembly if necessary.

Installation

Installation is in the reverse order of removal.

CAUTION

- After installing steering gear assembly, perform front wheel alignment procedure (See page 24-12).

- MEMO -

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