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# SUSPENSION SYSTEM





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اولین سامانه دیجیتال تعمیرکاران خودرو در ایران



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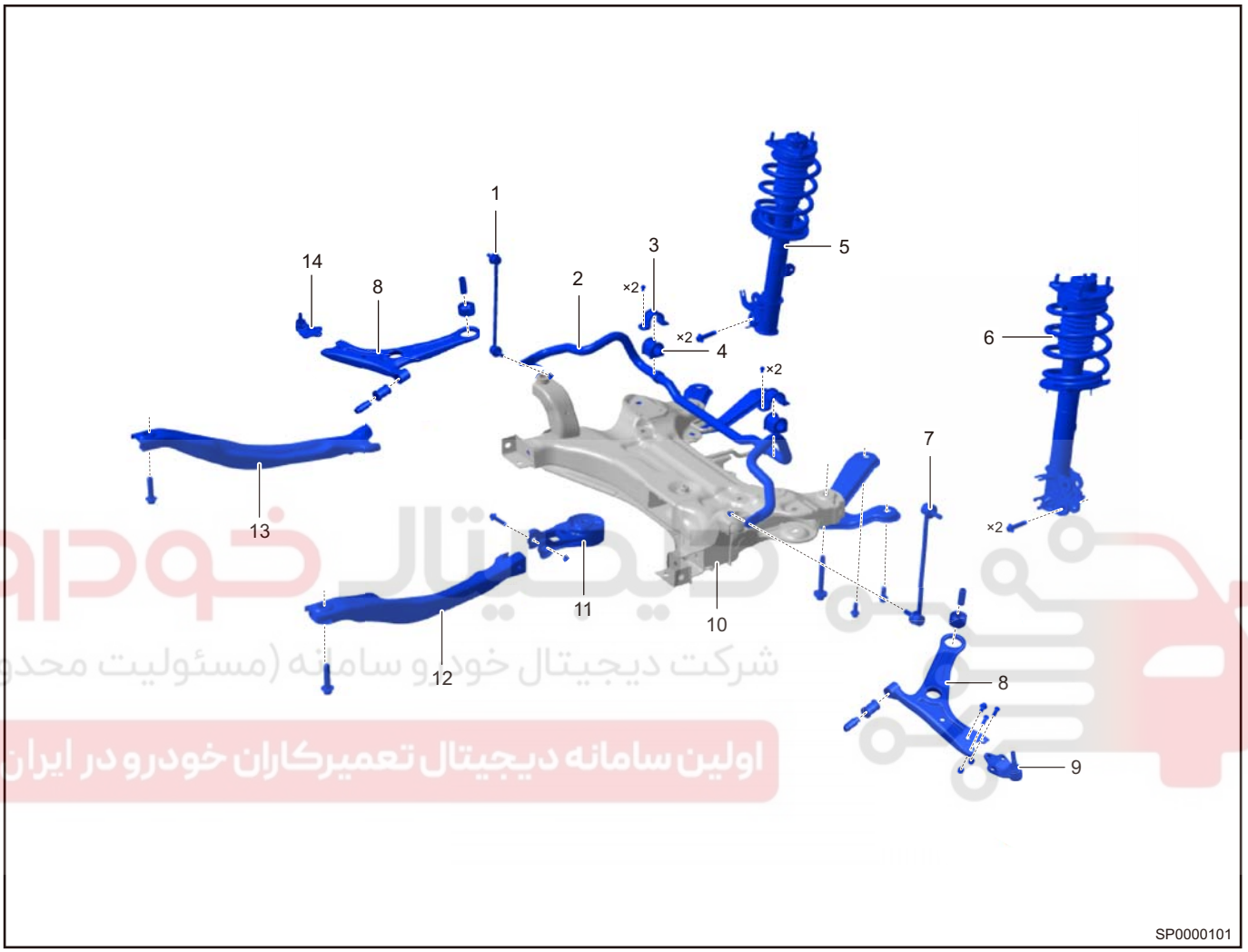
# SUSPENSION

## Overview

### Front Suspension




| | | | |
|---|---|---|---|
| 1 | Front Stabilizer Bar Right Connecting Rod | 2 | Front Stabilizer Bar Assembly |
| 3 | Front Stabilizer Bar Clamp | 4 | Front Stabilizer Bar Rubber Boot |
| 5 | Front Right Shock Absorber Assembly | 6 | Front Left Shock Absorber Assembly |
| 7 | Front Stabilizer Bar Left Connecting Rod | 8 | Front Left/Right Control Arm Assembly |
| 9 | Front Left Control Arm Ball Pin Assembly | 10 | Front Sub Frame Assembly |
| 11 | Rear Mounting Lower Body | 12 | Left Side Rail Welding Assembly |
| 13 | Right Side Rail Welding Assembly | 14 | Front Right Control Arm Ball Pin Assembly |

Front suspension of this model uses Macpherson independent suspension (height is non-adjustable), which is equipped with cylindrical coil spring, double action telescopic shock absorber and lateral stabilizer. Front suspension has driving and steering functions. Upper end of suspension connects with body, and lower end connects with front steering knuckle. Sub frame is connected with body by bolts, thus improving driving stability and safety.

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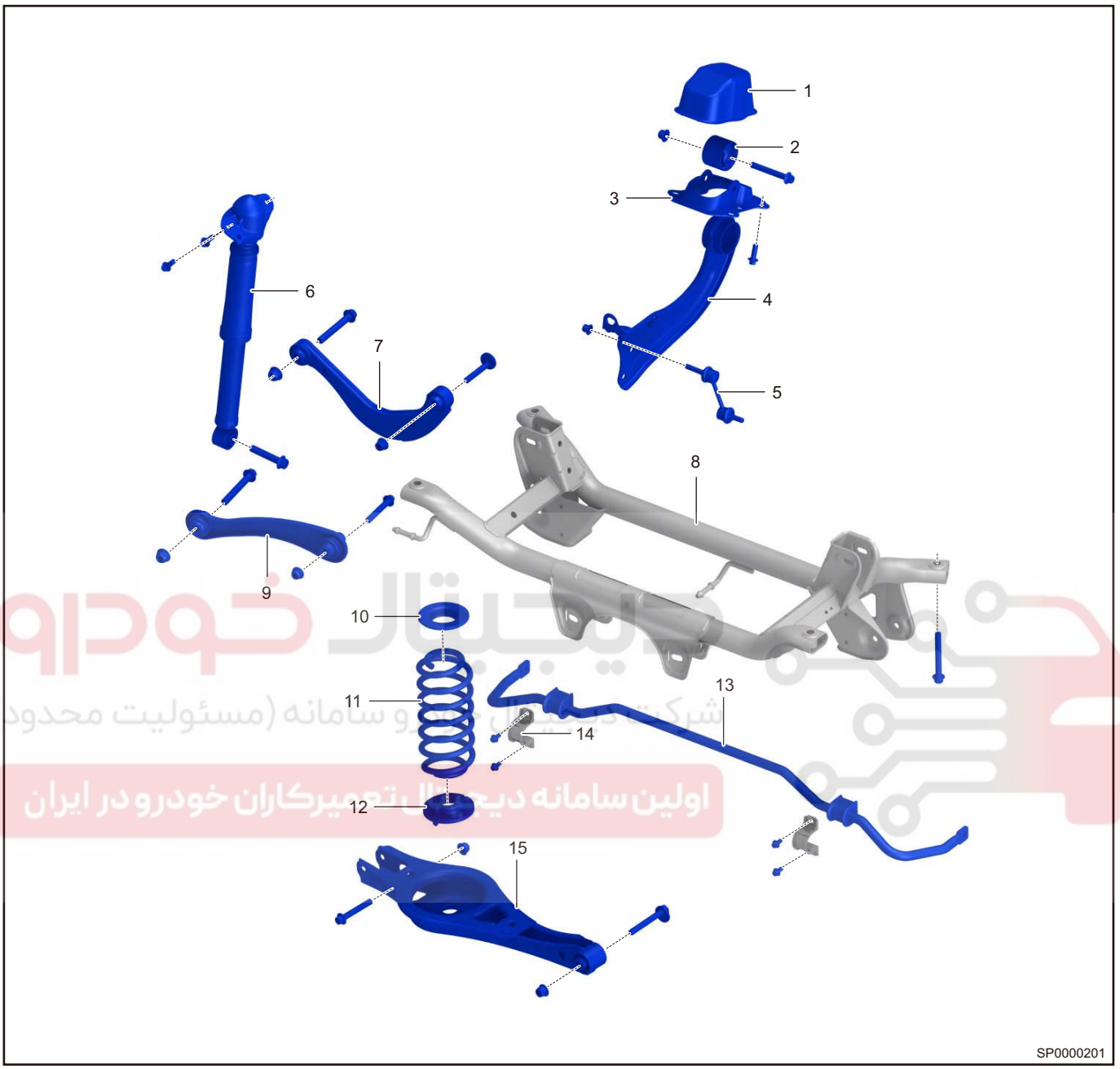
## Rear Suspension




| | | | |
|---|---|---|---|
| 1 | Dust Boot | 2 | Rear Trailing Arm Bushing Assembly |
| 3 | Rear Trailing Arm Bracket Assembly | 4 | Trailing Arm |
| 5 | Rear Connecting Rod Assembly | 6 | Rear Shock Absorber Assembly |
| 7 | Rear Upper Control Arm Assembly | 8 | Rear Sub Frame Welding Assembly |
| 9 | Left Pull Rod Assembly | 10 | Rear Coil Spring Upper Gasket |
| 11 | Rear Coil Spring | 12 | Rear Coil Spring Lower Gasket |
| 13 | Rear Stabilizer Bar Assembly | 14 | Rear Stabilizer Bar Clamp |
| 15 | Rear Lower Control Arm Assembly | | |

Rear suspension of this model uses multi-link independent suspension (height is non-adjustable), which is equipped with cylindrical coil spring, double action telescopic shock absorber and lateral stabilizer. This suspension features easy-removal and quick-installation, and driving stability and ride comfort have greatly improved.

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# Specifications

## Torque Specifications

| Description | Torque (N·m) |
|---|---|
| Coupling Nut Between Front Connecting Rod Assembly and Front Shock Absorber Assembly | 60 ± 6.0 |
| Coupling Bolt and Nut Between Front Shock Absorber Assembly and Front Steering Knuckle Assembly | 240 ± 24 |
| Coupling Nut Between Front Shock Absorber Assembly and Body | 60 ± 6 |
| Front Shock Absorber Assembly Locking Nut | 60 ± 6 |
| Coupling Bolt Between Front Side Rail and Tank Lower Crossmember | 180 ± 18 |
| Coupling Bolt Between Front Side Rail and Front Sub Frame | 120 ± 12 |
| Coupling Nut Between Front Control Arm Assembly Ball Pin and Front Left Steering Knuckle Assembly | 95 ± 9 |
| Coupling Bolt Between Front Part of Front Control Arm Assembly and Front Sub Frame Welding Assembly | 150 ± 10 + (90°± 2°) |
| Coupling Bolt and Nut Between Rear Part of Front Control Arm Assembly and Front Sub Frame Welding Assembly | 160 ± 11 + (60°± 1.5 °) |
| Fixing Nut Between Stabilizer Bar and Connecting Rod Small End | 60 ± 6 |
| Through Bolt Between Steering Gear with Tie Rod Assembly and Sub Frame | 110 N·m + 240° |
| Transmission Rear Mounting Fixing Bolt | 105 ± 10 |
| Fixing Bolt Between Rear Sub Frame Bracket and Body | 120 ± 12 |
| Fixing Bolt Between Sub Frame and Body | 140 N·m + (45 ± 2) Deg (Rear Left, Rear Right, Front Right); 140 N·m + (39 ± 2) Deg (Front Left) |
| Stabilizer Bar Fixing Bolt | 25 ± 3 |
| Front Connecting Rod Fixing Nut | 60 ± 6.0 |
| Coupling Bolt Between Upper Part of Rear Shock Absorber Assembly and Body | 60 ± 6.0 |
| Coupling Bolt Between Lower of Rear Shock Absorber Assembly and Rear Left Steering Knuckle Assembly | 160 ± 16 |
| Rear Shock Absorber Assembly Fixing Nut | 60 ± 6 |
| Coupling Bolt and Nut Between Rear Lower Control Arm Assembly and Rear Steering Knuckle Assembly | 110 ± 11 |
| Coupling Bolt and Nut Between Rear Upper Control Arm Assembly and Rear Steering Knuckle Assembly | 160 ± 16 |
| Coupling Bolt and Nut Between Rear Lower Control Arm Assembly and Rear Steering Knuckle Assembly | 110 ± 11 |
| Coupling Bolt and Nut Between Rear Lower Control Arm Assembly and Rear Sub Frame Welding Assembly | 110 ± 11 |
| Coupling Bolt Between Rear Steering Knuckle Assembly and Rear Trailing Arm Assembly | 110 ± 11 |
| Coupling Bolt Between Rear Trailing Arm Assembly Mounting Bracket and Body | 60 ± 6.0 |
| Coupling Bolt and Nut Between Rear Trailing Arm Assembly and Mounting Bracket | 120 ± 11 |
| Coupling Bolt and Nut Between Rear Pull Rod Assembly and Rear Steering Knuckle Assembly | 160 ± 16 |
| Coupling Bolt and Nut Between Rear Pull Rod Assembly and Rear Sub Frame Welding Assembly | 110 ± 11 |



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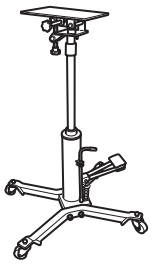
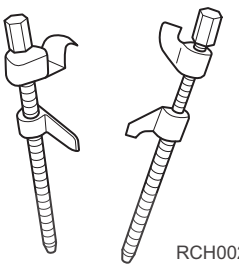
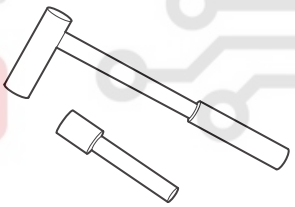
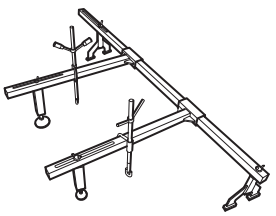
# Tools

## General Tools

| Tool Name | Tool Drawing |
|---|---|
| Transmission Carrier |  RCH0005006 |
| Spring Compressor |  RCH0021006 |



## Special Tools

| Tool Name | Tool Drawing |
|---|---|
| Shock Absorber Nut Remover |  RCH0022006 |
| Engine Equalizer |  RCH0026006 |

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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.

**Front Suspension**

| Symptom | Suspected Area |
|---|---|
| Vehicle pulls | Front tire (worn or improperly inflated) |
| | Front wheel alignment (incorrect) |
| | Control arm ball pin assembly (loose) |
| | Steering tie rod (loose or worn) |
| | Front hub bearing (excessively worn) |
| | Front suspension components (excessively worn or deformed) |
| Droop | Vehicle (overloaded) |
| | Front coil spring (too soft) |
| | Front shock absorber assembly (worn or damaged) |
| | Front suspension components (excessively worn or deformed) |
| | Front tire (improperly inflated) |
| | Front wheel alignment (incorrect) |
| Sways/pitches | Front tire (worn or improperly inflated) |
| | Front stabilizer bar assembly (bent or broken) |
| | Front shock absorber assembly (worn or damaged) |
| Wheel shimmy | Front tire (worn or improperly inflated) |
| | Front wheel (out of balance) |
| | Front shock absorber assembly (worn or damaged) |
| | Front wheel alignment (incorrect) |
| | Control arm ball pin assembly (loose) |
| | Front hub bearing (excessively worn) |
| | Steering gear (misaligned or damaged) |

**Rear Suspension**

| Symptom | Suspected Area |
|---|---|
| Vehicle pulls | Rear tire (worn or improperly inflated) |
| | Rear wheel alignment (incorrect) |
| | Rear hub bearing (excessively worn) |
| | Rear suspension components (worn or deformed) |
| Droop | Vehicle (overloaded) |
| | Rear coil spring (too soft) |
| | Rear shock absorber assembly (worn or damaged) |
| | Rear suspension components (excessively worn or deformed) |
| | Rear wheel alignment (incorrect) |
| | Rear tire (improperly inflated) |
| Sways/pitches | Rear tire (worn or improperly inflated) |
| | Rear stabilizer bar assembly (bent or broken) |
| | Rear shock absorber assembly (worn or deformed) |



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| Symptom | Suspected Area |
|---|---|
| Wheel shimmy | Rear tire (worn or improperly inflated) |
| | Rear wheel (out of balance) |
| | Rear shock absorber assembly (worn or damaged) |
| | Rear wheel alignment (incorrect) |
| | Rear hub bearing (worn) |



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# Wheel Alignment

**Caution:**

- Be sure to perform wheel alignment procedures according to operating instructions of four-wheel alignment device.
- Periodic maintenance and service for four-wheel alignment device should be performed.

In general, wheel alignment has the following 5 parameters:

1. Check front wheel camber.
2. Check kingpin caster.
3. Check kingpin inclination.
4. Check rear wheel camber.
5. Check total toe-in of four-wheel alignment.

**If following components have been removed, installed or replaced, check and perform wheel alignment procedures:**

- Front control arm assembly
- Front control arm ball pin assembly
- Front steering knuckle
- Front shock absorber assembly
- Steering gear and steering tie rod
- Drive shaft
- Front sub frame welding assembly
- Rear lower control arm assembly
- Rear upper control arm assembly
- Rear steering knuckle assembly
- Rear sub frame welding assembly



**Specifications (parameters standard for four-wheel alignment)**

| Item | | Specified Value |
|---|---|---|
| Front Suspension | Front Wheel Camber | -25′ ± 45′ |
| | Kingpin Caster | 4°14′ ± 60′ |
| | Kingpin Inclination | 11°30′ ± 60′ |
| | Front Wheel Toe-in | 5′ ± 5′ (one side) |
| Rear Suspension | Rear Wheel Camber | -42′ ± 30′ |
| | Rear Wheel Toe-in | 5′ ± 10′ (one side) |

**Inspection before Wheel Alignment**

1. Vehicle is in unloaded state.
2. Use a lift to support and raise vehicle to a proper height.
3. Check hub bearing for excessive clearance, and replace the hub bearing as necessary.
4. Check suspension components, steering tie rod and ball pin for wear, deformation or damage. Replace malfunctioning parts as necessary.
5. Check shock absorber assembly for proper operation.
6. Check if tire pressure is within the specified range and adjust it to specified pressure as necessary.

| Item | Front Wheel | Rear Wheel | Spare Tire |
|---|---|---|---|
| Tire Pressure (kPa) (Unloaded) | 220 | 220 | 420 |

7. Check rim and tire.
   - Visually check rim and tire for scratches, wear or damage.
   - Perform wheel dynamic balance procedures.

**Front Wheel Camber**

1. Incorrect front wheel camber will cause abnormal tire wear. Check and adjust front wheel camber as necessary.

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Camber adjustment is not necessary after assembling independent suspension and wheel steering knuckle. If wheel camber is not within the tolerance due to other reasons, adjust through the coupling bolt between independent suspension and steering knuckle.

Specified Value for Front Wheel Camber:

| Item | Specified Value |
|---|---|
| Front Wheel Camber | -25′±45′ |

**Inspection**

1. Visually check driving system components for deformation and damage before adjustment. Replace deformed or damaged components as necessary.
2. Install wheel alignment device onto front wheel, and perform inspection procedures according to operating instructions for wheel alignment device.

**Front Wheel Toe-in**

1. Incorrect front wheel toe-in will cause wheel pull and abnormal tire wear. Check and adjust front wheel toe-in as necessary.



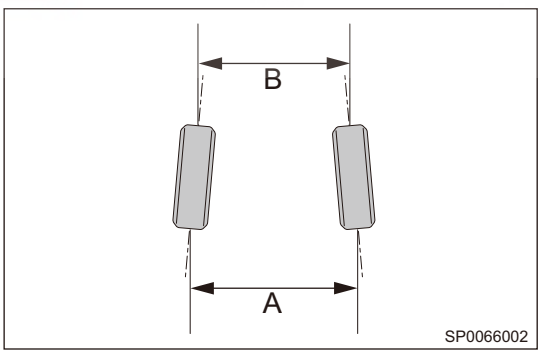
If front wheel toe-in is not within the tolerance due to other reasons, adjust the length of steering tie rod to return the toe-in to specified value.

Specified Value for Front Wheel Toe-in:

| Item | Specified Value |
|---|---|
| Front Wheel Toe-in | 5′ ± 5′ (one side) |

**Inspection**

1. Perform inspection with four-wheel alignment device (perform inspection procedures referring to operating instructions for four-wheel alignment device).
2. Manual check:
   (a) Park vehicle on level ground, check if front tire pressure is within the specified range and adjust it to specified value as necessary.
   (b) Place marks on the center position in front of front wheels, and measure the distance A between marks with a tape measure.
   (c) Push vehicle to rotate wheels 180°, and measure the distance B between marks with a tape measure when marks are turned to the rear of wheels.
   (d) Calculation method: front wheel toe-in = A - B ≦ 1 mm




**Four-wheel Alignment Sequence**

1. Place the vehicle on alignment holder.
2. The adjustment sequence is to adjust the rear wheel first and then the front wheel.
3. For a single wheel, adjust kingpin caster and camber first and then the toe-in.

**Adjustment**

1. Make adjusting preparation for wheel alignment according to the requirement of tester.

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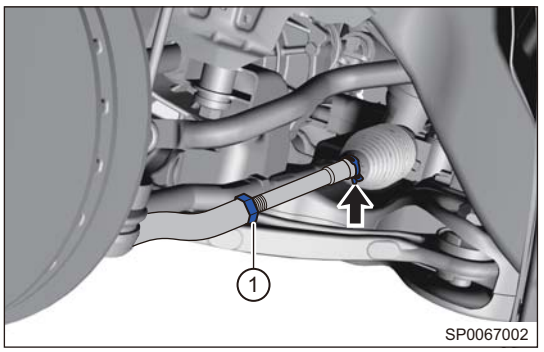
2. Loosen the locking nut (1) of steering tie rod and dust boot clip (arrow), and turn the tie rod to adjust the length as required until front wheel toe-in reaches the specified value.




3. Tighten the steering tie rod locking nut and reinstall the elastic jacket snap ring. Check if locking nut is tightened in place and if jacket position is correct.
   **Torque: 55 ± 5.0 N·m**
   **Caution:**
   - If elasticity of elastic jacket snap ring is not enough, replace it.
4. After adjusting front wheel toe-in, check steering wheel for eccentricity. If necessary, loosen the steering wheel locking nut and adjust the steering wheel to horizontal position, and then tighten the steering wheel locking nut to specified torque.
   **Torque: 30 ± 3.0 N·m**



### Kingpin Caster & Kingpin Inclination

1. Kingpin caster and kingpin inclination can only be checked by using four-wheel alignment device.
   Kingpin caster and kingpin inclination are assured by design structure and cannot be adjusted.
   If measured value is not within the specified range, check if other components that connect to steering knuckle are deformed or damaged, and check the connecting part of steering knuckle for deformed or damaged.
   If it is, replace corresponding components.
   Specified Value for Kingpin Caster & Kingpin Inclination:

| Item | Specified Value |
|---|---|
| Kingpin Caster | 4°14′±60′ |
| Kingpin Inclination | 11°30′±60′ |

### Rear Wheel Camber

1. Incorrect rear wheel camber will cause wheel pull and abnormal tire wear. Check and adjust rear wheel camber as necessary.
   If rear wheel camber is not within the tolerance due to other reasons, adjust eccentric adjusting bolt and eccentric adjusting shim between rear upper control arm assembly and rear sub frame welding assembly to return the camber to specified value.
   If rear wheel camber is not as specified, check rear suspension and wheels for damage or deformation. Replace damaged or deformed components as necessary.
   Specified Value for Rear Wheel Camber:

| Item | Specified Value |
|---|---|
| Rear Wheel Camber | -42′±30′ |

### Adjustment

1. Make adjusting preparation for wheel alignment according to the requirement of tester.

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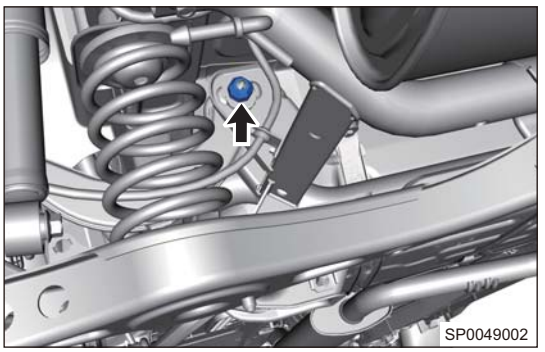
2. Loosen the coupling bolt (arrow) between rear upper control arm assembly and rear sub frame welding assembly, be careful that eccentric adjusting shim does not detach from groove.


SP0049002

3. Rotate the eccentric adjusting shim and eccentric adjusting bolt to adjust rear wheel camber to specified value.
4. Tighten the coupling bolt between rear upper control arm assembly and rear sub frame welding assembly to specified torque after adjustment (adjusting method of left and right wheels is the same).
   **Torque: 110 ± 11 N·m**



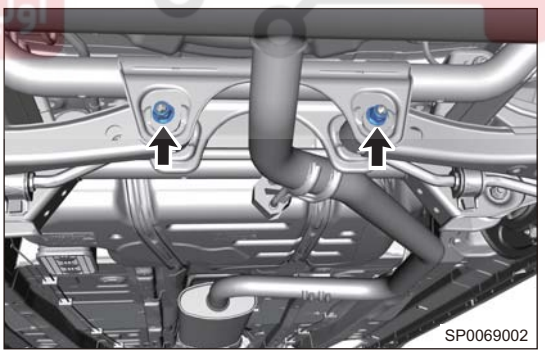
**Rear Wheel Toe-in**

1. Incorrect rear wheel toe-in will cause wheel pull and abnormal tire wear. Check and adjust rear wheel toe-in as necessary.
   If rear wheel toe-in is not within the tolerance due to other reasons, adjust eccentric adjusting bolt and eccentric adjusting shim between rear lower control arm assembly and rear sub frame welding assembly to return the toe-in to specified value.
   If rear wheel toe-in is not as specified, check rear suspension and wheels for damage or deformation. Replace damaged or deformed components as necessary.
   Specified Value for Rear Wheel Toe-in:

| Item | Specified Value |
|---|---|
| Rear Wheel Toe-in | 5′±10′ (one side) |

**Adjustment**

1. Make adjusting preparation for wheel alignment according to the requirement of tester.
2. Loosen the coupling bolts (arrow) between rear lower control arm assembly and rear sub frame welding assembly, be careful that eccentric adjusting shim does not detach from groove.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3. Rotate the eccentric adjusting bolt and eccentric adjusting sleeve to adjust rear wheel toe-in to specified value.
4. Tighten the coupling bolts between rear lower control arm assembly and rear sub frame welding assembly to specified torque after adjustment (adjusting method of left and right wheels is the same).
   **Torque: 115 ± 23 N·m**

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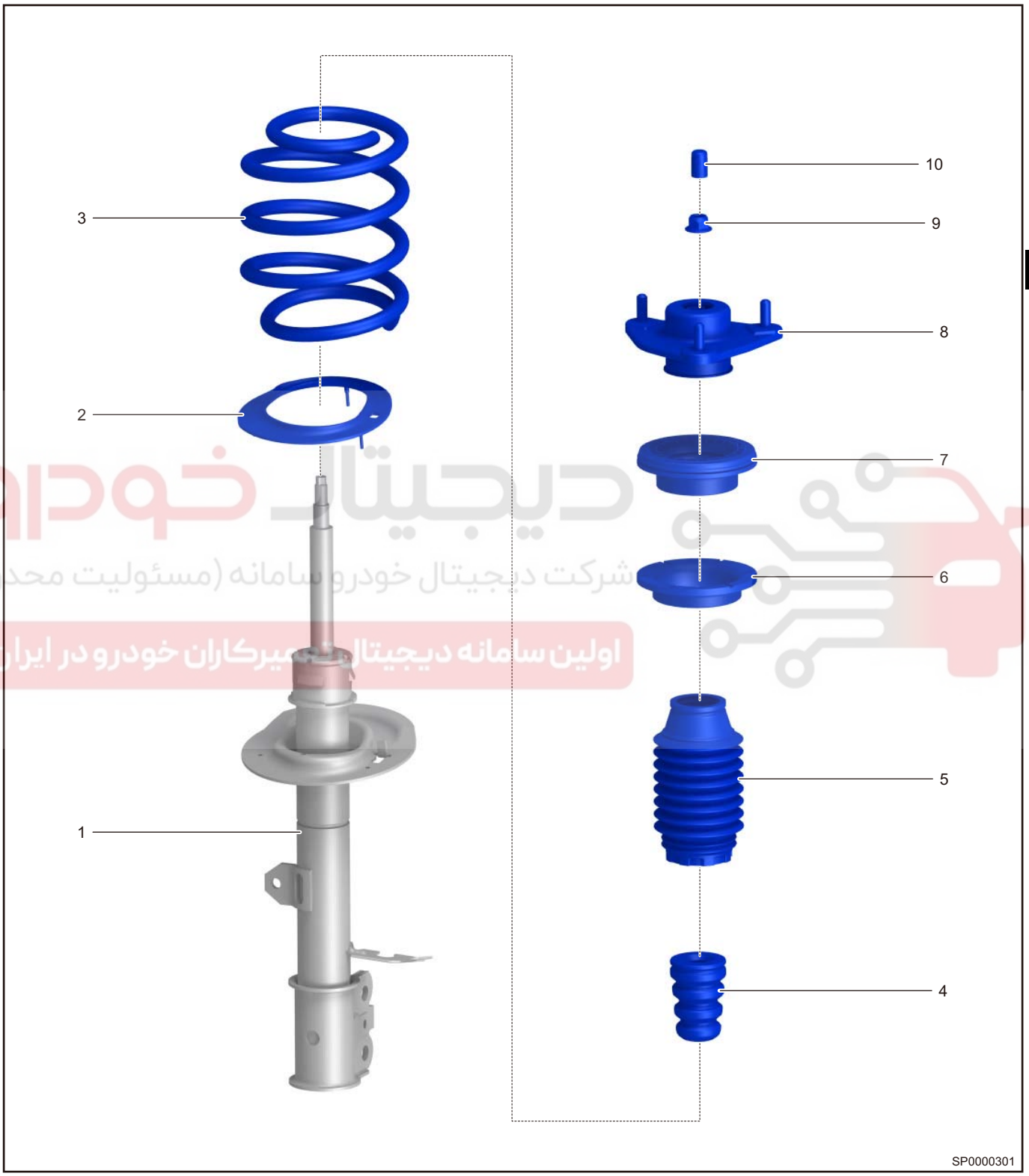
# ON-VEHICLE SERVICE

## Front Shock Absorber Assembly

### Description




| | | | |
|---|---|---|---|
| 1 | Shock Absorber | 2 | Front Spring Lower Cushion |
| 3 | Spring | 4 | Buffer Block |
| 5 | Dust Boot | 6 | Front Spring Upper Cushion |



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| | | | |
|---|---|---|---|
| 7 | Bearing Assembly | 8 | Front Strut Upper Connecting Plate Assembly (w/ Insulator) |
| 9 | Shock Absorber Locking Nut | 10 | Front Shock Absorber Cover Cap |

**Inspection**

1. Check the front shock absorber assembly.
   - Park vehicle on level ground, and bounce vehicle up and down, then check if vehicle shakes up and down when body bounds. If vehicle shakes up and down consecutively, shock absorber assembly may be damaged and should be replaced.
2. Check front shock absorber assembly for leakage.
   - As shock absorber assembly operates frequently while driving vehicle, shock absorber fluid temperature rises and oil gas is formed and adheres to dust boot. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.
   - Shock absorber is designed with a thin layer of oil film on the surface of piston rod. While the shock absorber is being compressed, the oil film will be scraped off by dust plate on shock absorber oil seal and a small amount of oil will deposit on the upper part of oil seal. Due to high oil permeability, the oil deposited on the upper part of oil seal spreads slowly from upper part of shock absorber to lower part of shock absorber, thus forming a thin coat of oil film. When any of the following conditions occurs:

     Oil film is between dust boot and spring seat.

     Oil traces in circumferential direction are even.

     For above conditions, oil traces are formed through volatilization, so we can judge it as minor leaks. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.
   - When any of the following conditions occurs:

     Oil traces in circumferential direction are uneven.

     Oil traces reach lower connecting positions.

     Above conditions indicate that there may be leakage in shock absorber assembly, and it is necessary to replace the shock absorber assembly.
   - If it is difficult to accurately judge shock absorber assembly for leakage from appearance. Perform road test after wiping off oil on the surface of malfunctioning shock absorber. Under normal road conditions, drive vehicle for 5 to 10 minutes and perform inspection. If there are oil traces at the shock absorber assembly surface, it indicates that oil leakage exists, and it is necessary to replace the shock absorber assembly.

**Removal**

**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Make sure that safety lock of lift has been locked, when removing and installing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.
- Operate carefully when removing and installing coil spring, to prevent spring from jumping out and causing personal injury.

**Hint:**

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

1. Remove the front left wheel.

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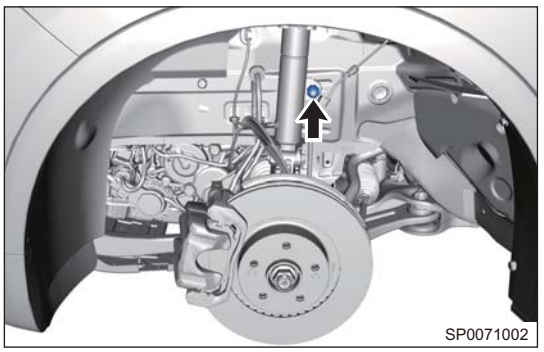
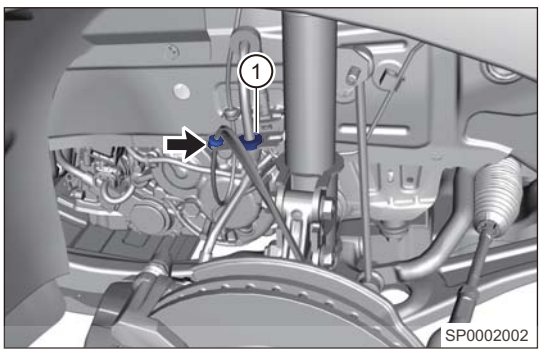
2. Remove the coupling nut (arrow) between front left connecting rod assembly and front left shock absorber assembly.
   **Torque: 60 ± 6.0 N·m**

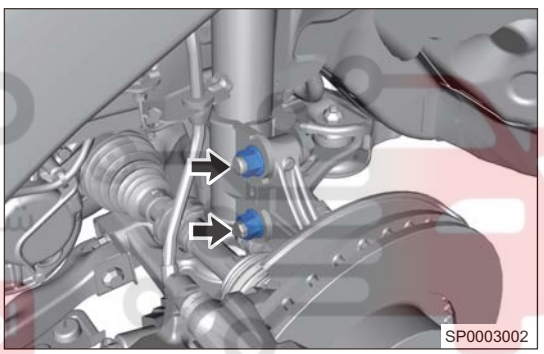



3. Disengage the front left wheel speed sensor wire harness (arrow) and front left brake hose assembly (1) from front left shock absorber assembly.






4. Remove 2 coupling bolts and nuts (arrow) between front left shock absorber assembly and front left steering knuckle assembly.
   **Torque: 240 ± 24 N·m**

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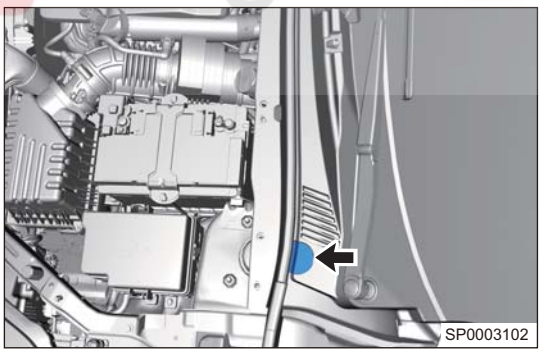
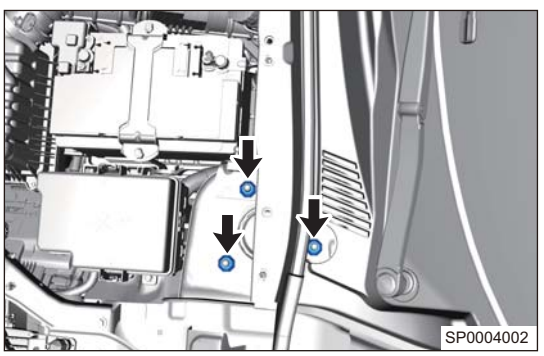
5. Remove the shock absorber blockage cover (arrow) from front windshield trim cover plate.




6. Remove 3 coupling nuts (arrow) between front left shock absorber assembly and body.
   **Torque: 60 ± 6 N·m**




7. Remove the front left shock absorber assembly with front coil spring.

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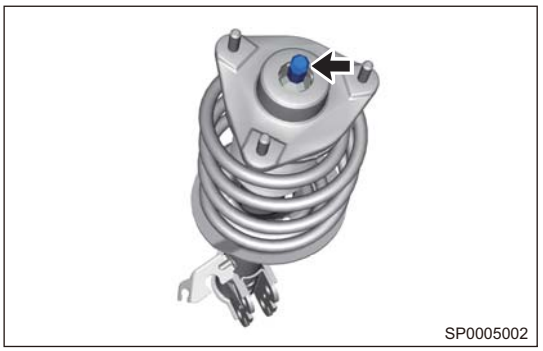
**Disassembly**

**Caution:**

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

1. Remove the front shock absorber cover cap (arrow) from front left shock absorber assembly.

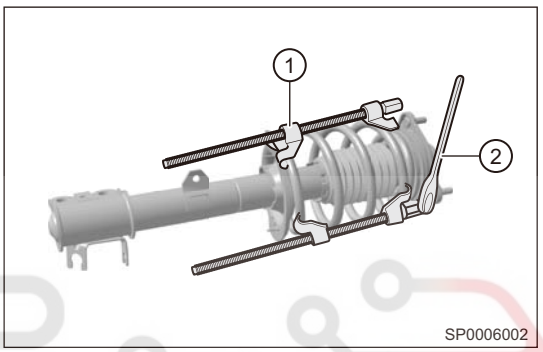

SP0005002



2. Using spring compressor (1) and wrench (2), tighten the end lever of spring compressor to compress the front coil spring.

   **Warning:**

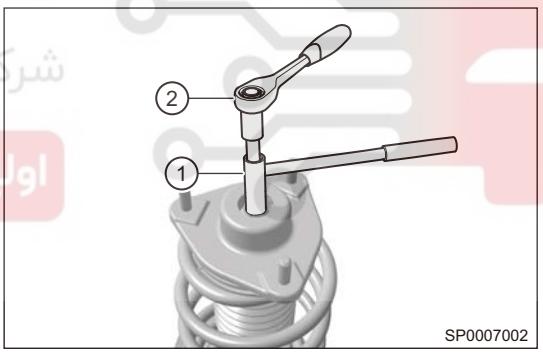
   When removing front coil spring, compress spring until locking nut can be rotated. DO NOT compress spring more than necessary, avoid damaging spring and personal injury.



SP0006002

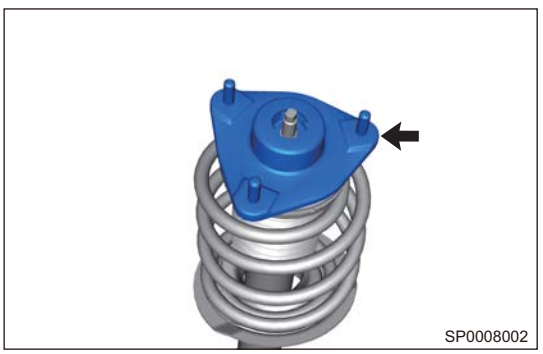
3. Hold the end of front left shock absorber assembly lever with a shock absorber nut remover (1), and then remove the locking nut from front left shock absorber assembly with a wrench (2).

   **Torque: 60 ± 6 N·m**



SP0007002

4. Remove the front strut upper connecting plate assembly (w/ insulator) (arrow) from the upper part of front left shock absorber assembly.


SP0008002

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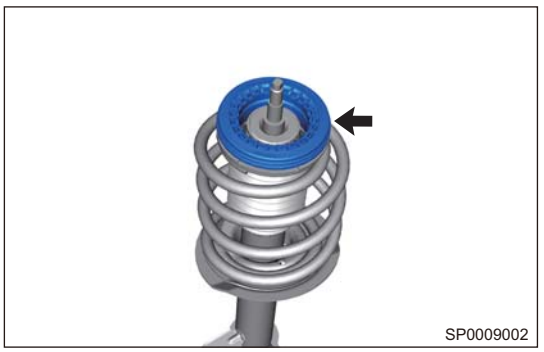
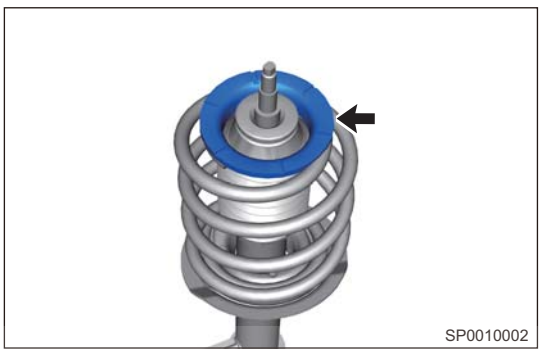
5. Remove the bearing assembly (arrow) from the upper part of front left shock absorber assembly.

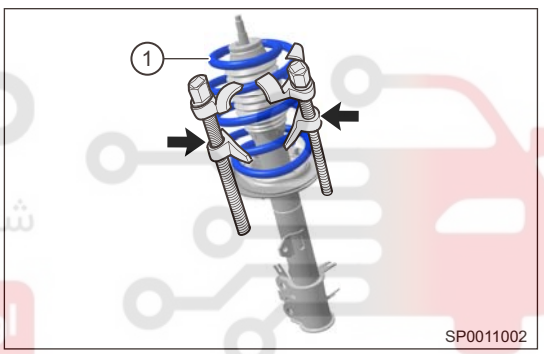

SP0009002

6. Remove the front spring upper tray (arrow) from the upper part of front left shock absorber assembly.


SP0010002



7. Remove the front coil spring (1) with spring compressor (arrow) from front left shock absorber assembly.



SP0011002

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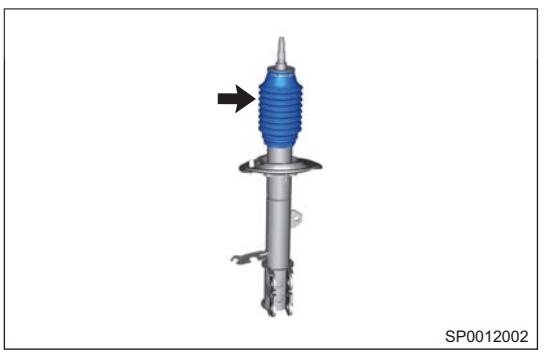
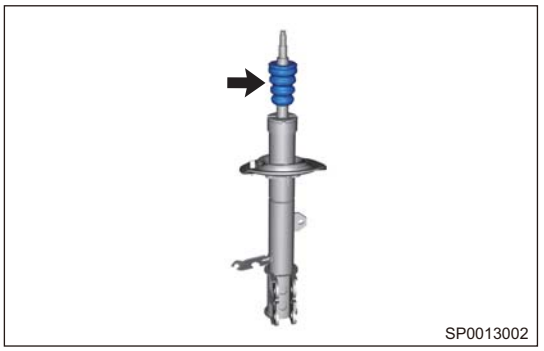
8. Slowly loosen the spring compressor, and carefully remove the front coil spring.
9. Remove the front dust boot (arrow) from the upper part of front left shock absorber assembly.


SP0012002

10. Detach the front buffer block (arrow) from front left shock absorber assembly, and remove it.


SP0013002

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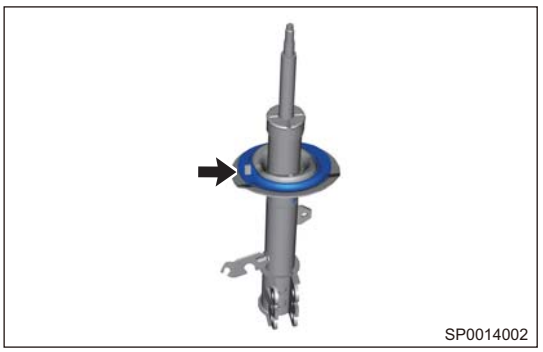
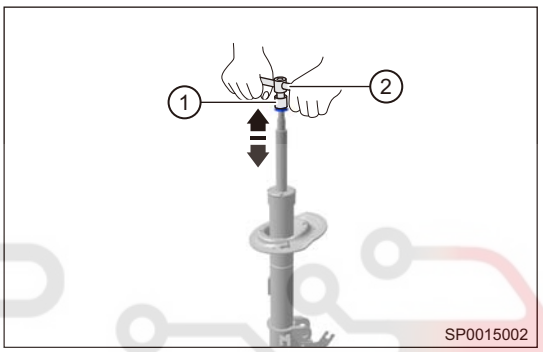
11. Remove the front spring lower cushion (arrow) from the lower end of front left shock absorber assembly strut.


SP0014002

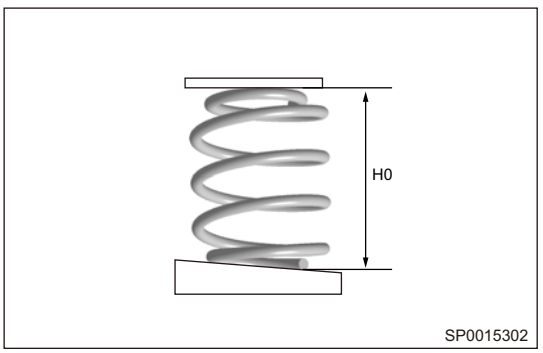
**Inspection**

1. Check the front shock absorber assembly.
   (a) Manual check:
   (b) Install the locking nut (1) to the upper end of front shock absorber assembly strut, and then install the T-wrench (2) or equivalent.
   (c) Compress and extend the front shock absorber assembly strut several times by hands in direction of arrow as shown in illustration. Check that there is no abnormal resistance or unusual sound during operation. If there is any abnormality, replace the front shock absorber assembly with a new one.



SP0015002

2. Check the other components of front shock absorber assembly.
   (a) Check front shock absorber cover cap, front spring upper cushion, front dust boot, front buffer block and front spring lower cushion for cracks, wear or deformation. Replace it as necessary.
   (b) Check front strut upper connecting plate assembly (w/ insulator) and bearing assembly for damage. Replace it as necessary.
   (c) Check front coil spring for wear, cracks or deformation. Replace it as necessary.
3. Check the front shock absorber spring.
   (a) Check coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.
   (b) Check the free length of front coil spring.



SP0015302

**Assembly**

1. Assembly is in the reverse order of disassembly.

**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten bolt to specified torque.
   - Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.

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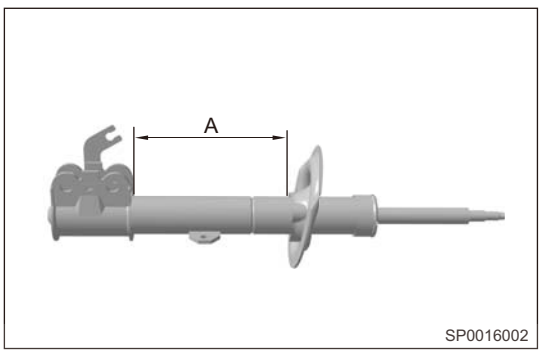
**Disposal**

**Warning:**

- Do not drill at high temperature and heat, and be sure to pay attention to safety!
- Shock absorber assembly contains nitrogen and oil, which are under high pressure. As hydraulic oil is explosive easily when exposed to heat, the surface is wet with water first before drilling or cutting.
- Be careful when drilling or cutting, because mental chips may fly about. Always perform operations with proper safety equipment to avoid personal injury.
- Before handling, be sure to wear goggles and release pressure inside shock absorber assembly to avoid personal injury.

1. Extend the front shock absorber assembly strut fully, and clamp it in a vise at an angle.
2. Using a drill or equivalent, make a hole slowly at area A shown in the illustration, to discharge gas and hydraulic oil in the front shock absorber assembly.




3. Handle front shock absorber assembly properly after discharging gas and hydraulic oil.

   **Hint:**

   - Recycle disposed front shock absorber assembly according to local environmental regulations.



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## Front Control Arm Assembly

**Removal**

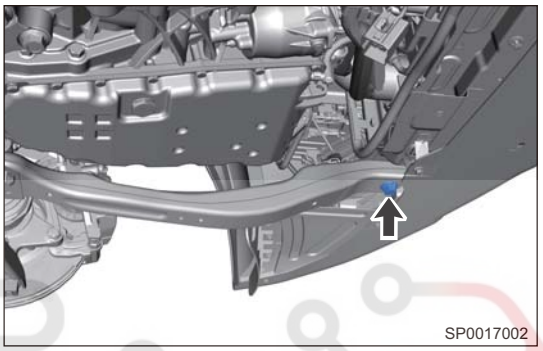
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing chassis parts, replace self-locking nuts and rusted nuts for safety.

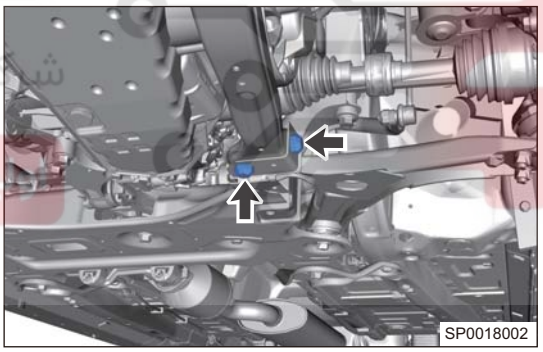
**Hint:**

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

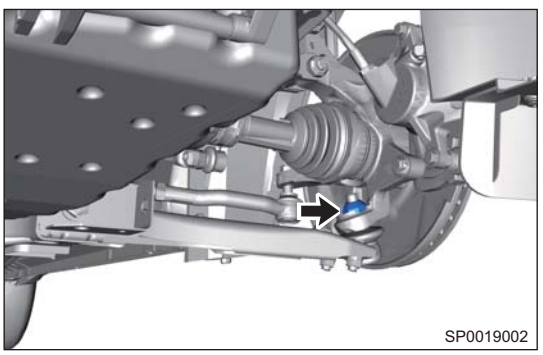
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front left wheel.
4. Remove the engine lower protector assembly .
5. Remove the coupling bolt (arrow) between front left side rail and tank lower crossmember.
   **Torque: 180 ± 18 N·m**


SP0017002

6. Remove 2 coupling bolts (arrow) between front left side rail and front sub frame, and remove front left side rail.
   **Torque: 120 ± 12 N·m**


SP0018002

7. Remove the coupling nut (arrow) between front left control arm assembly ball pin and front left steering knuckle assembly.
   **Torque: 95 ± 10 N·m**


SP0019002

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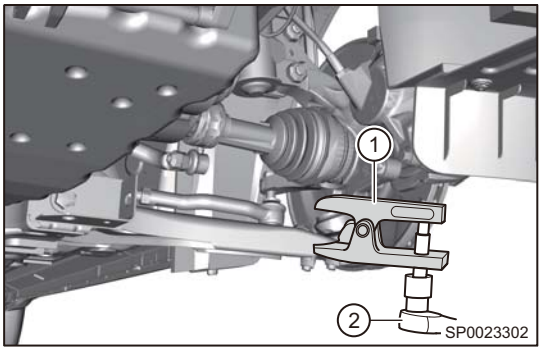
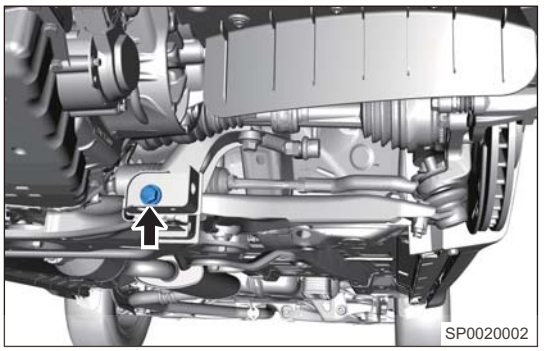
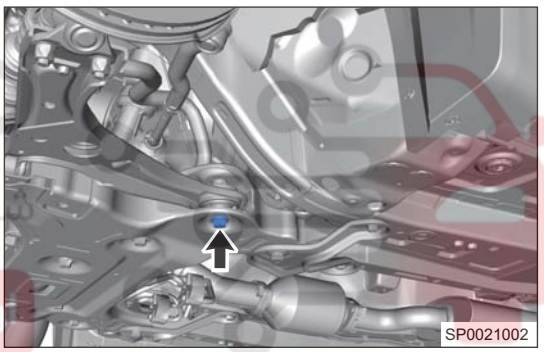
8. Use the ball remover (1), turn the wrench (2) to detach the front control arm ball pin and steering knuckle.




9. Remove the coupling bolt (arrow) between front part of front left control arm assembly and front sub frame welding assembly.
**Torque: 150 ± 10 N·m + (90 ± 2)°**




10. Remove the coupling bolt and nut (arrow) between rear part of front left control arm assembly and front sub frame welding assembly.
**Torque: 160 ± 11 N·m + (60 ± 1.5)°**




11. Remove the front left control arm assembly with ball pin.

**Installation**

1. Installation is in the reverse order of removal.
**Caution:**
- Be sure to tighten coupling bolts and nuts to specified torques.
- Make sure that ball pin assembly rotates smoothly and there is no sticking after installation.
- Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.



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## Front Control Arm Ball Pin Assembly

**Removal**

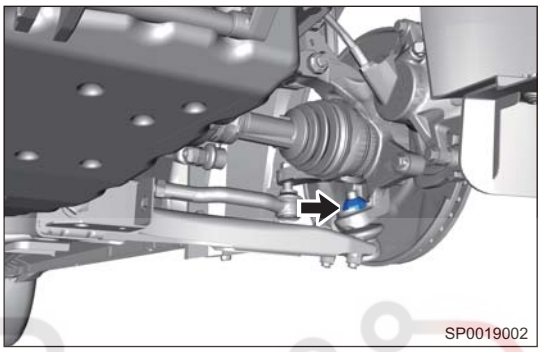
**Caution:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing chassis parts, replace self-locking nuts and rusted nuts for safety.

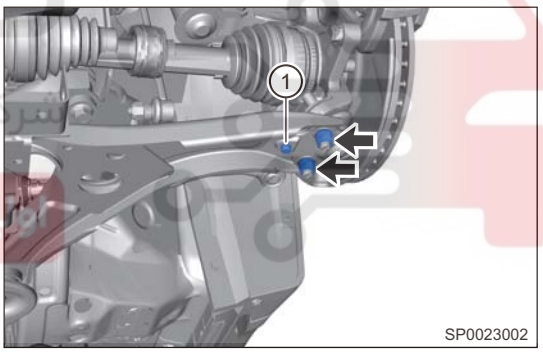
**Hint:**

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

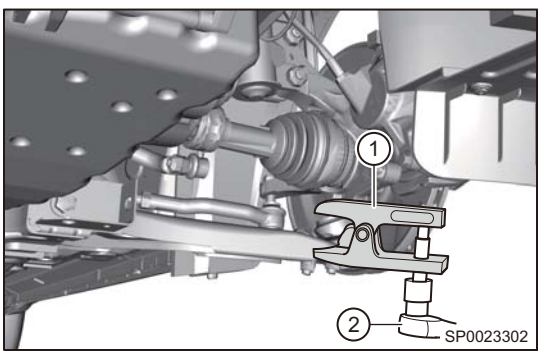
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front left wheel.
4. Remove the coupling nut (arrow) between front left control arm assembly ball pin and front left steering knuckle assembly.
   **Torque: 95 ± 10 N·m**




5. Remove 2 fixing nuts (arrow) and 1 fixing bolt (1) between front left control arm and front left control arm ball pin.
   **Torque: 150 ± 10 N·m**




6. Use the ball remover (1), turn the wrench (2) to detach the front control arm ball pin and steering knuckle.




7. Remove the front left control arm ball pin assembly.

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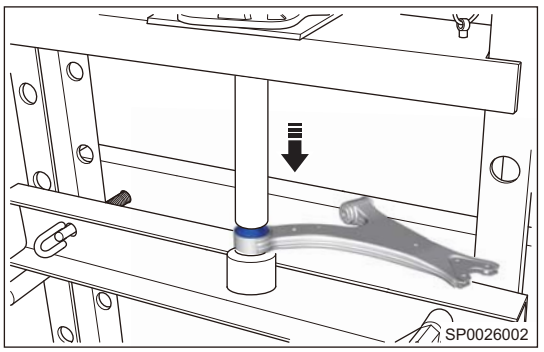
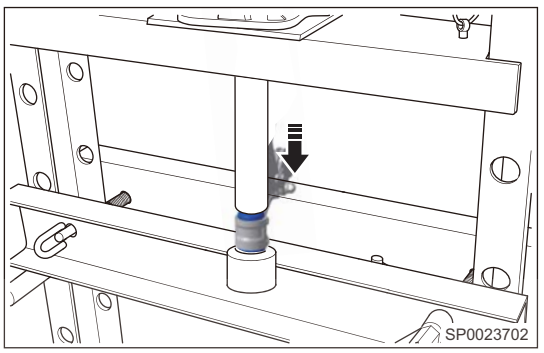
8. Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out front control arm front rubber bushing assembly.




9. Remove the front control arm front rubber bushing assembly.
10. Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out front control arm rear rubber bushing assembly.




11. Remove the front control arm rear rubber bushing assembly.



**Inspection**

1. Check the control arm ball pin assembly.
   - Check control arm assembly ball pin bushes for wear, cracks, deformation, damage or grease leakage, replace it as necessary.
   - Check if control arm assembly ball pin rotates smoothly, replace it as necessary.

**Installation**

1. Installation is in the reverse order of removal.

   **Caution:**
   - Be sure to tighten coupling bolts and nuts to specified torques.
   - Make sure that ball pin assembly rotates smoothly and there is no sticking after installation.
   - Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.

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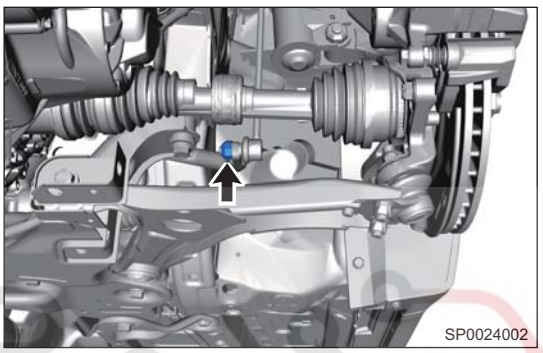
## Front Stabilizer Bar Assembly

**Removal**

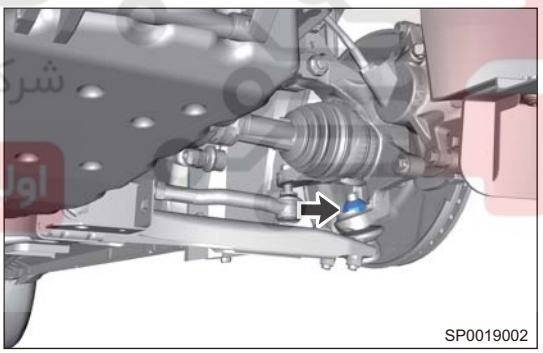
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing chassis parts, replace self-locking nuts and rusted nuts for safety.
- When lowering front sub frame welding assembly, you need to support engine and transmission assembly securely with engine equalizer to avoid damage.

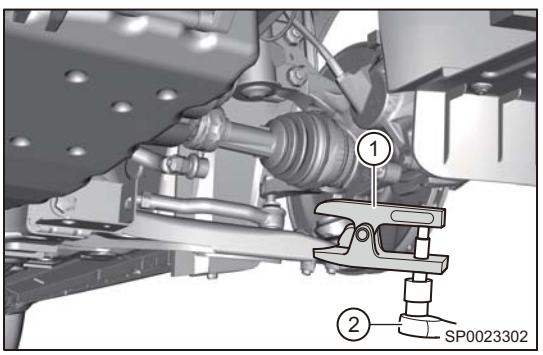
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front wheel.
4. Remove the engine lower protector assembly .
5. Remove the fixing nut (arrow) between stabilizer bar and connecting rod small end. Use same removal procedure for right side.
   **Torque: 60 ± 6 N·m**


SP0024002

6. Remove the coupling nut (arrow) between front left control arm assembly ball pin and front left steering knuckle assembly. Use same removal procedure for right side.
   **Torque: 95 ± 10 N·m**


SP0019002

7. Use the ball remover (1), turn the wrench (2) to detach the front control arm ball pin and steering knuckle. Use same removal procedure for right side.



SP0023302

8. Using an engine equalizer, support the engine and transmission assembly securely.

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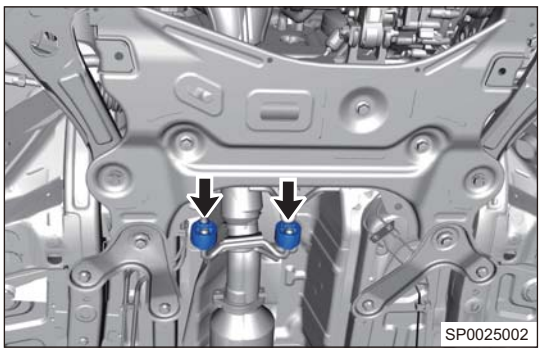
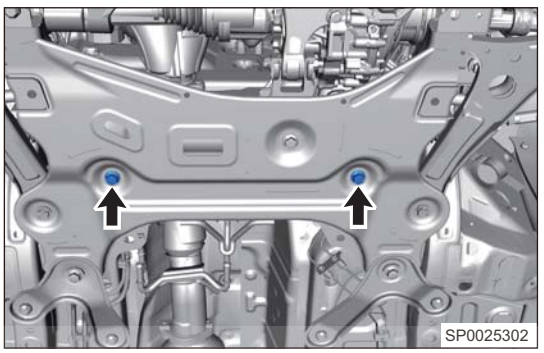
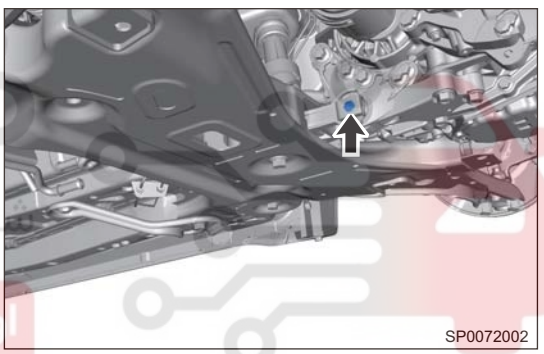
9. Detach exhaust pipe fixing rubber lugs (arrow) from front sub frame welding assembly.


SP0025002

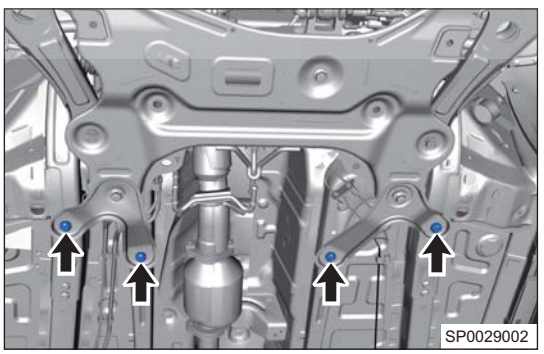
10. Remove 2 through bolts (arrow) between steering gear with tie rod assembly and sub frame.
**Torque: 110 N·m + 240°**


SP0025302

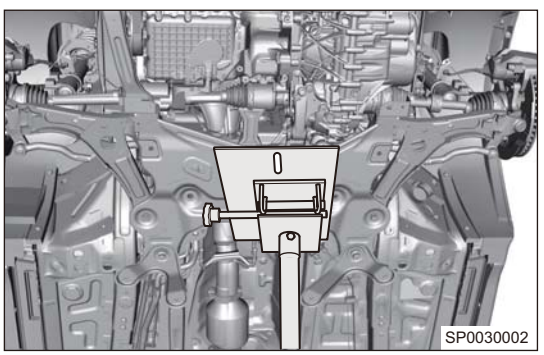
11. Remove the transmission rear mounting fixing bolt (arrow).
**Torque: 105 ± 10 N·m**


SP0072002

12. Remove the front left/right side rail assembly.
13. Remove 4 fixing bolts (arrow) between rear sub frame bracket and body.
**Torque: 120 ± 12 N·m**


SP0029002

14. Using a transmission carrier, support front sub frame welding assembly.


SP0030002

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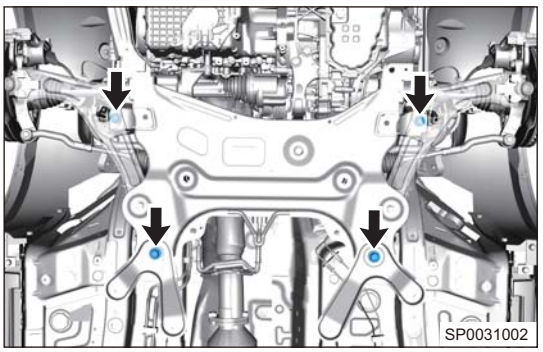
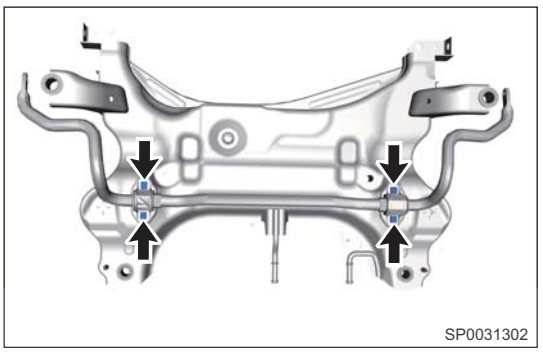
15. Remove 4 fixing bolts (arrow) between sub frame and body.
    **Torque: 140 N·m + (45 ± 2) Deg (Rear Left, Rear Right, Front Right); 140 N·m + (39 ± 2) Deg (Front Left)**

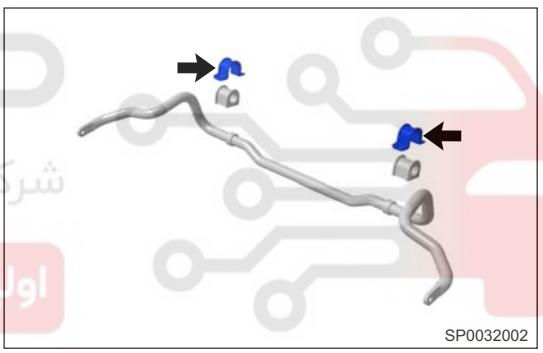

SP0031002

16. Slowly lower the front sub frame welding assembly.
17. Remove 4 fixing bolts (arrow) of stabilizer bar on sub frame, and remove front stabilizer bar assembly.
    **Torque: 25 ± 3 N·m**

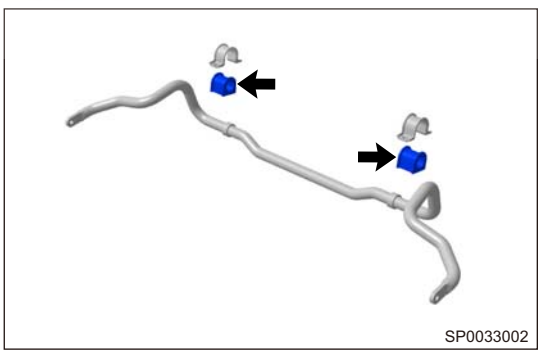



SP0031302

18. Detach left and right fixing clamps (arrow) from front stabilizer bar assembly.


SP0032002

19. Detach left and right rubber supports (arrow) from front stabilizer bar assembly.


SP0033002

**Inspection**

1. Check front stabilizer bar assembly fixing clamps for wear, cracks, deformation or damage. Replace it as necessary.
2. Check front stabilizer bar assembly rubber supports for dirt, wear, cracks, deformation or damage. Replace it as necessary.

**Installation**

**Caution:**

- Be sure to tighten coupling bolts and nuts to specified torques.
- Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.

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## Front Connecting Rod Assembly

**Removal**

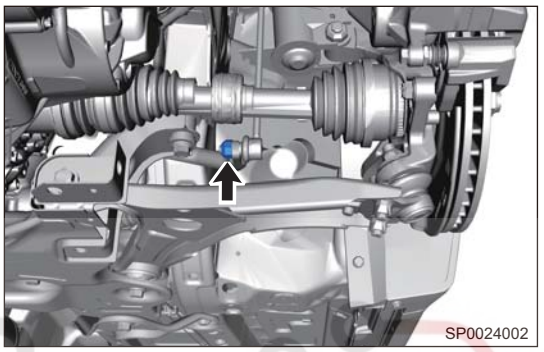
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing chassis parts, replace self-locking nuts and rusted nuts for safety.

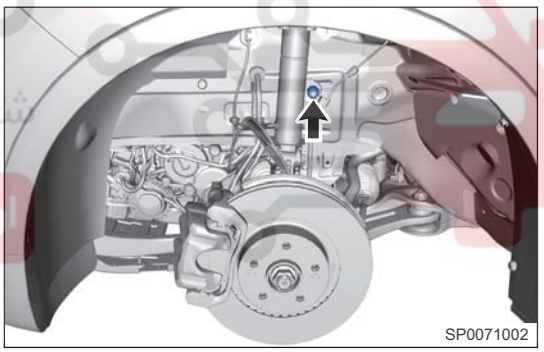
**Hint:**

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

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front left wheel.
4. Hold the lower end of front left connecting rod assembly with an inner hexagon wrench, and remove the coupling nut (arrow) between front left stabilizer bar assembly and front left connecting rod assembly with a fixing wrench.
   **Torque: 60 ± 6.0 N·m**


SP0024002

5. Hold the upper end of front left connecting rod assembly with an inner hexagon wrench, and remove the coupling nut (arrow) between front left stabilizer bar assembly and front left shock absorber assembly with a fixing wrench.
   **Torque: 60 ± 6.0 N·m**


SP0071002

6. Remove the front left connecting rod assembly.

**Inspection**

1. Check front connecting rod assembly bush for wear, cracks, deformation, damage or grease leakage. Replace it as necessary.
2. Check if end of front connecting rod assembly rotates smoothly. Replace it as necessary.

**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten coupling bolts and nuts to specified torques.
   - Make sure that end of front connecting rod assembly rotates smoothly and there is no sticking after installation.

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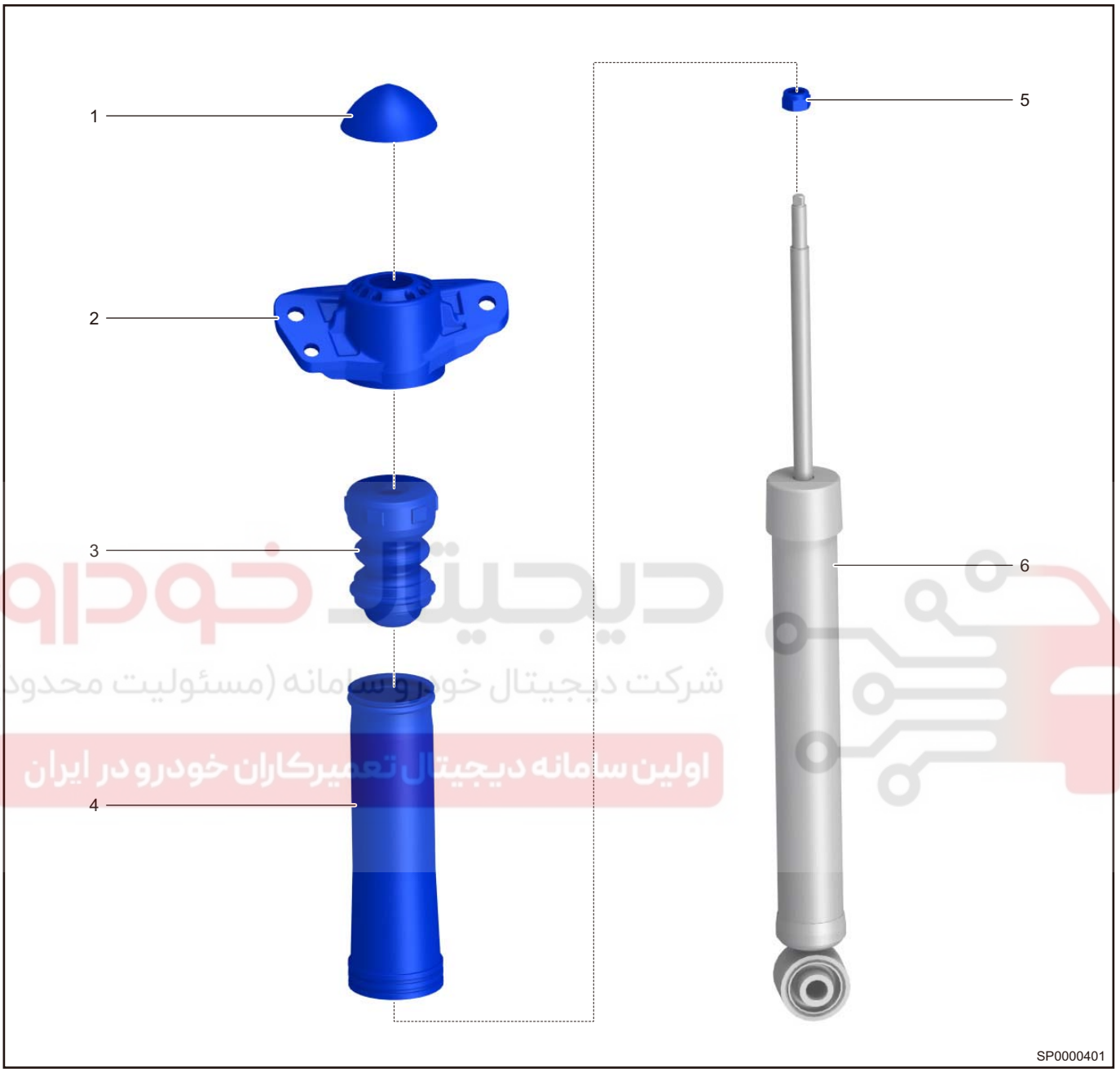
# Rear Shock Absorber Assembly

## Description




| | | | |
|---|---|---|---|
| 1 | Rear Shock Absorber Cover Cap | 2 | Rear Shock Absorber Upper Connecting Plate Assembly (w/ Insulator) |
| 3 | Rear Buffer Block | 4 | Rear Dust Boot |
| 5 | Shock Absorber Locking Nut | 6 | Rear Shock Absorber Assembly |

## Removal

**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing chassis parts, replace self-locking nuts and rusted nuts for safety.

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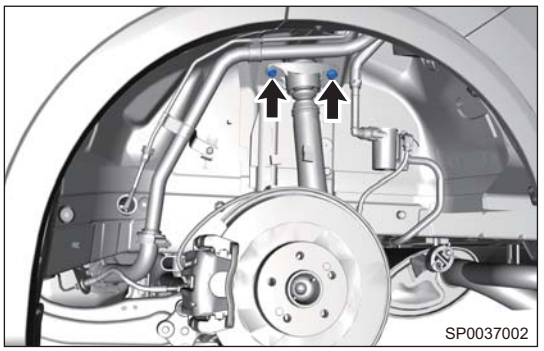
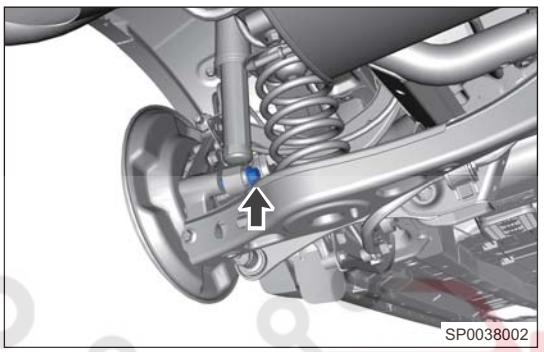
**Hint:**

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

1. Remove the rear left wheel.
2. Remove the rear left wheel house protector.
3. Remove 2 coupling bolts (arrow) between upper part of rear left shock absorber assembly and body.
   **Torque: 60 ± 6 N·m**


SP0037002

4. Remove the coupling bolt (arrow) between lower part of rear left shock absorber assembly and rear left steering knuckle assembly.
   **Torque: 160 ± 16 N·m**


SP0038002

5. Remove the rear left shock absorber assembly.

**Disassembly**

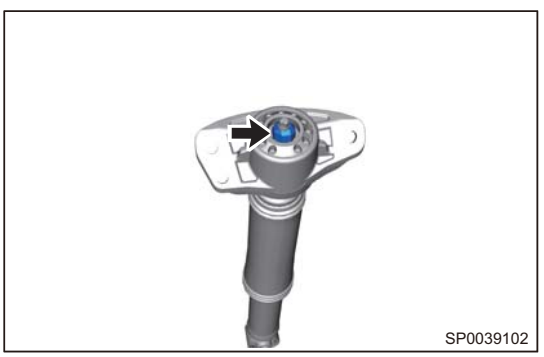
**Caution:**

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

1. Remove the rear left shock absorber cover cap (arrow).


SP0039002

2. Remove the fixing nut (arrow) from rear left shock absorber assembly.
   **Torque: 60 ± 6 N·m**


SP0039102

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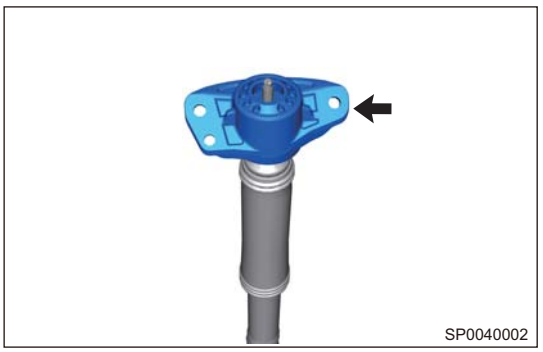
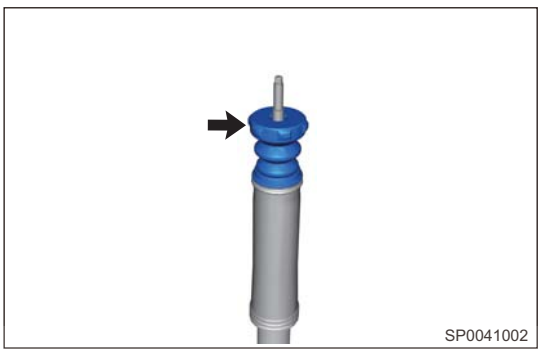
3. Remove the rear left shock absorber upper connecting plate assembly (w/ insulator) (arrow).

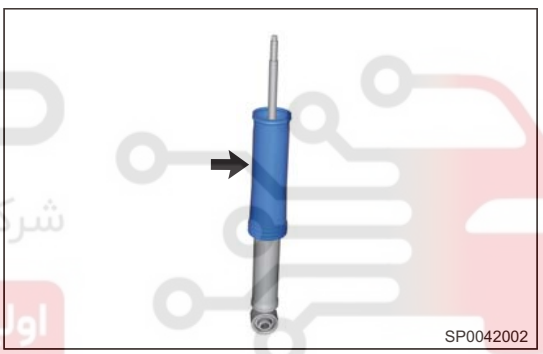

SP0040002

4. Remove the rear buffer block (arrow).


SP0041002



5. Remove the rear dust boot (arrow).


SP0042002

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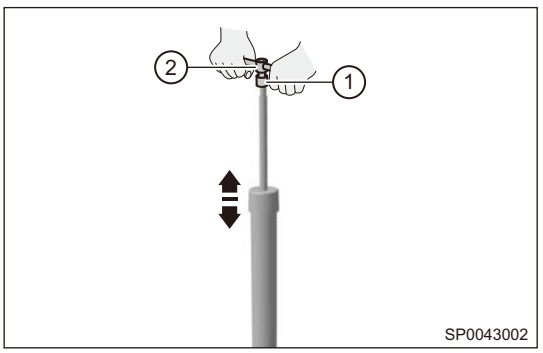
**Inspection**

1. Check the front shock absorber assembly.
   (a) Manual check:
   (b) Install the nut (1) to the upper end of rear shock absorber assembly strut, and then install the T-wrench (2) or equivalent.



SP0043002

   (c) Compress and extend the rear shock absorber assembly strut several times by hands in direction of arrow as shown in illustration. Check that there is no abnormal resistance or unusual sound during operation. If there is any abnormality, replace the rear shock absorber assembly with a new one.
2. Check the other components of rear shock absorber assembly.
   (a) Check rear dust boot, rear buffer block and rear shock absorber cover cap for cracks, wear or deformation. Replace it as necessary.
   (b) Check front coil spring for wear, cracks or deformation. Replace it as necessary.

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**Assembly**

1. Assembly is in the reverse order of disassembly.

**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten bolt to specified torque.
   - Bounce vehicle up and down several times to stabilize rear suspension after installation.

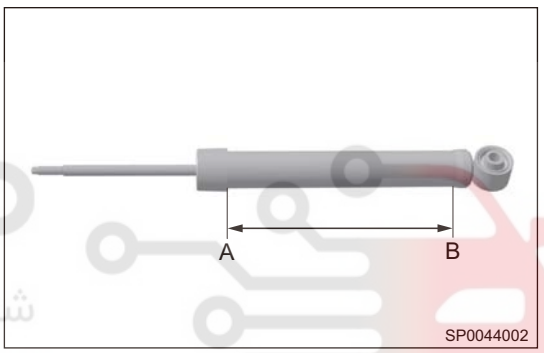
**Disposal**

**Warning:**

- Do not drill at high temperature and heat, and be sure to pay attention to safety!
- Shock absorber assembly contains nitrogen and oil, which are under high pressure. As hydraulic oil is explosive easily when exposed to heat, the surface is wet with water first before drilling or cutting.
- Be careful when drilling or cutting, because mental chips may fly about. Always perform operations with proper safety equipment to avoid personal injury.
- Before handling, be sure to wear goggles and release pressure inside shock absorber assembly to avoid personal injury.



1. Extend the rear shock absorber assembly strut fully.
2. Using a drill, make a hole between A and B in the strut as shown in the illustration, to discharge gas from rear shock absorber assembly.




3. After discharging gas from rear shock absorber assembly, handle the rear shock absorber assembly properly.

   **Hint:**

   - Recycle disposed front shock absorber assembly according to local environmental regulations.

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## Rear Shock Absorber Assembly

**Removal**

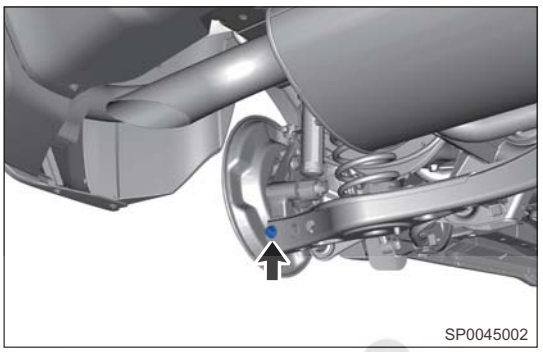
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing chassis parts, replace self-locking nuts and rusted nuts for safety.

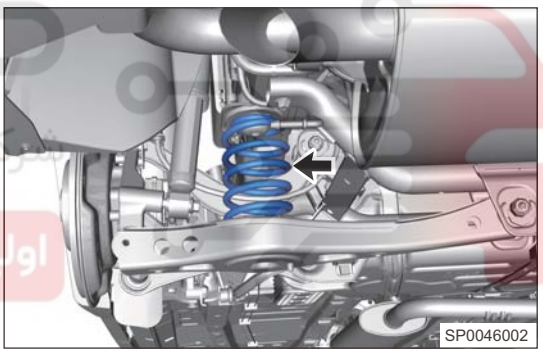
**Hint:**

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

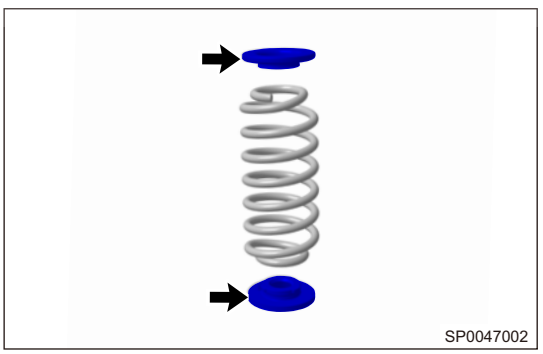
1. Remove the rear wheel.
2. Support the rear lower control arm assembly with a transmission carrier securely.
3. Remove the coupling bolt and nut (arrow) between rear lower control arm assembly and rear steering knuckle assembly.
   **Torque: 110 ± 11 N·m**


SP0045002

4. Lower the transmission carrier slowly to an appropriate height and remove the rear coil spring (arrow) carefully.


SP0046002

5. Remove the rear coil spring upper and lower cushions (arrow).


SP0047002

**Inspection**

1. Check the rear coil spring assembly.
   (a) Check rear coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.
   (b) Check rear coil spring upper cushion and lower cushion for dirty, wear, cracks, deformation or damage. Replace it as necessary.

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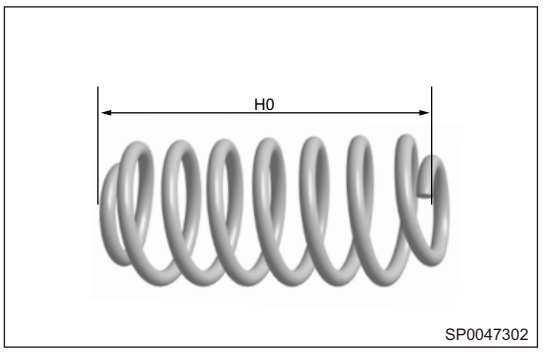
(c) Check the free length of rear coil spring, replace it as necessary.




**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten coupling bolts and nuts to specified torques.
   - Align the protrusion of rear coil spring lower cushion with the positioning hole of rear lower control arm during installation.
   - After installation, lower vehicle and bounce vehicle up and down several times to stabilize rear suspension.
   - Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.



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## Rear Upper Control Arm Assembly

**Removal**

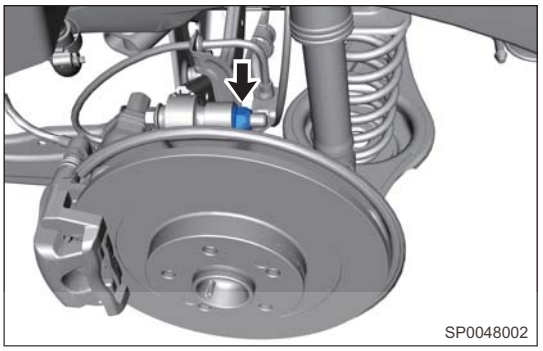
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.

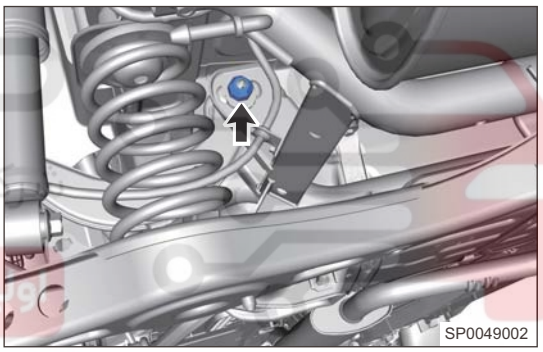
**Hint:**

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

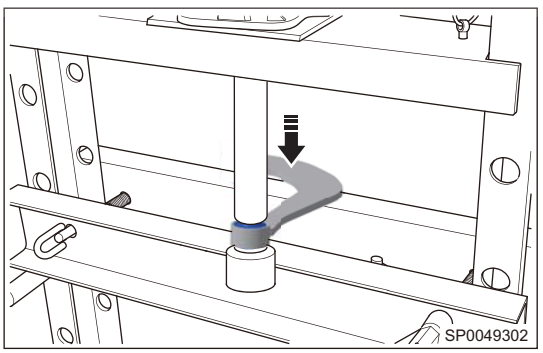
1. Remove the rear wheel.
2. Remove the coupling bolt and nut (arrow) between rear upper control arm assembly and rear steering knuckle assembly.
   **Torque: 160 ± 16 N·m**


SP0048002

3. Remove the coupling bolt (arrow) between front left part of rear sub frame welding assembly and body.
   **Torque: 115 ± 23 N·m**


SP0049002

4. Remove the rear upper control arm assembly.
5. Place the rear upper control arm assembly on a hydraulic press, and press out rear upper control arm assembly rubber boot in combination with tools.


SP0049302

**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten coupling bolts and nuts to specified torques.
   - Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.

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## Rear Lower Control Arm Assembly

**Removal**

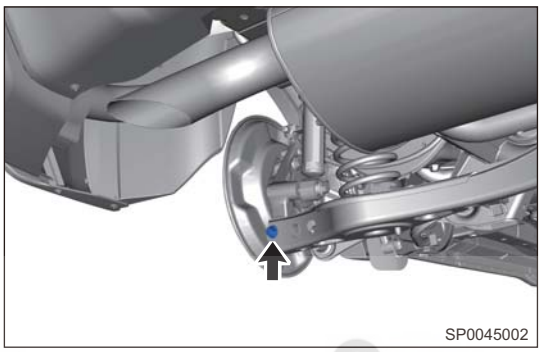
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.

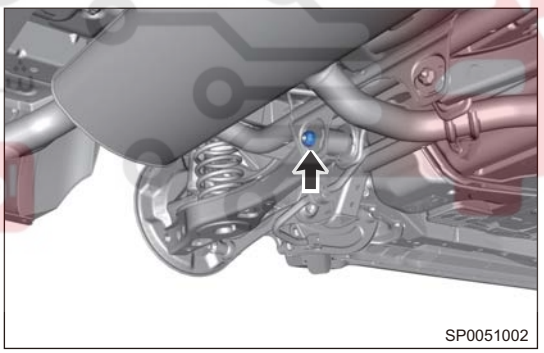
**Hint:**

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

1. Remove the rear wheel.
2. Support the rear lower control arm assembly with a transmission carrier securely.
3. Remove the coupling bolt and nut (arrow) between rear lower control arm assembly and rear steering knuckle assembly.
   **Torque: 110 ± 11 N·m**


SP0045002

4. Lower the transmission carrier slowly to an appropriate height and remove the rear coil spring, rear coil spring upper cushion and rear coil spring lower cushion carefully.
5. Remove the coupling bolt, nut and adjusting shim (arrow) between rear lower control arm assembly and rear sub frame welding assembly.
   **Torque: 115 ± 23 N·m**


SP0051002

6. Remove the rear lower control arm assembly.

**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten coupling bolts and nuts to specified torques.
   - Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.

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## Rear Trailing Arm Assembly

**Removal**

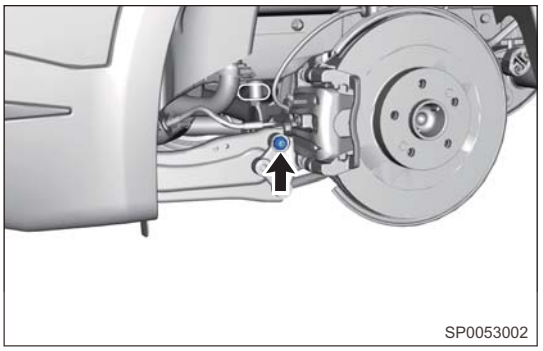
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.

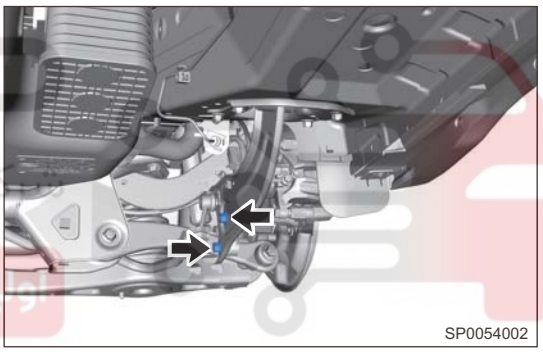
**Hint:**

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

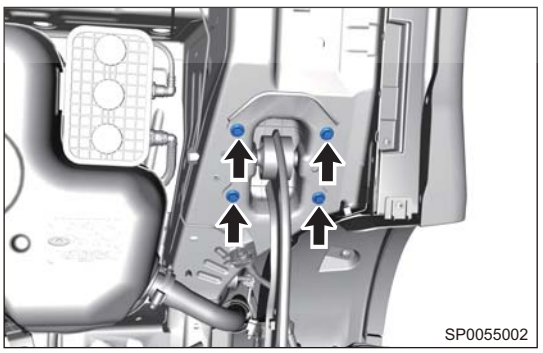
1. Remove the rear wheel.
2. Remove the coupling nut (arrow) between rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.
   **Torque: 60 ± 6.0 N·m**


SP0053002

3. Remove 2 coupling bolts (arrow) between rear steering knuckle assembly and rear trailing arm assembly.
   **Torque: 110 ± 11 N·m**


SP0054002

4. Remove 4 coupling bolts (arrow) between rear trailing arm assembly mounting bracket and body.
   **Torque: 60 ± 6.0 N·m**


SP0055002

5. Remove the rear trailing arm assembly (w/ mounting bracket).

**Disassembly**

**Hint:**

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

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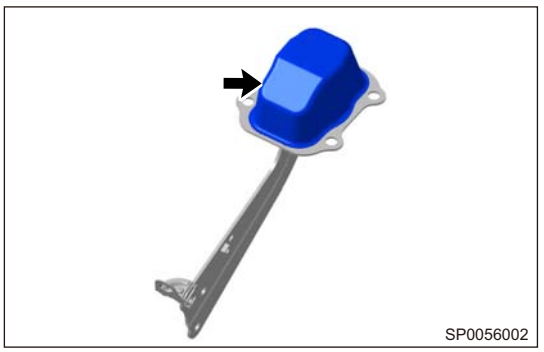
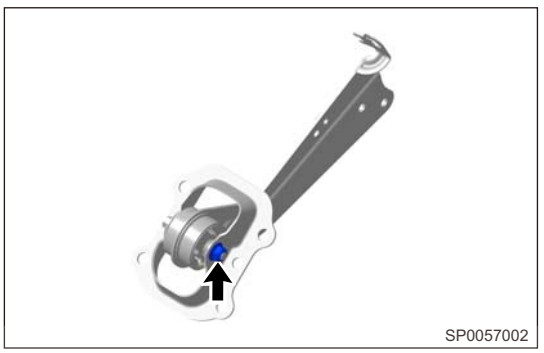
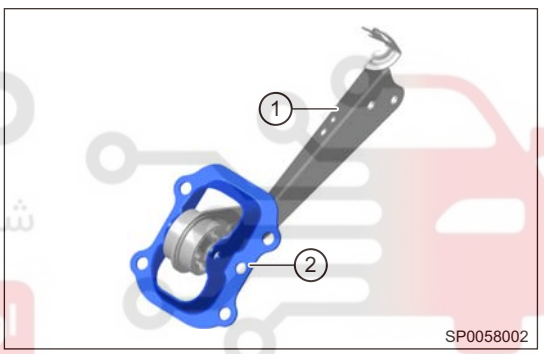
1. Remove the rear trailing arm mounting bracket dust boot (arrow).



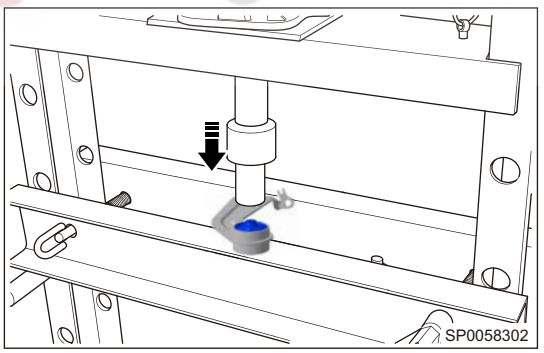

2. Remove the coupling bolt and nut (arrow) between rear trailing arm assembly and mounting bracket.
   **Torque: 120 ± 12 N·m**




3. Separate the rear trailing arm assembly (1) from mounting bracket (2).




4. Place the rear trailing arm assembly on a hydraulic press, and press out rear trailing arm assembly rubber boot in combination with tools.




**Assembly**

1. Assembly is in the reverse order of disassembly.

**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten coupling bolts and nuts to specified torques.
   - Check wheel alignment after installation. Adjust wheel alignment to standard range as necessary.

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## Rear Pull Rod Assembly

**Removal**

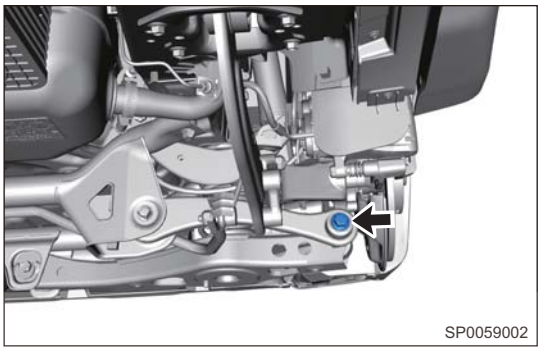
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.

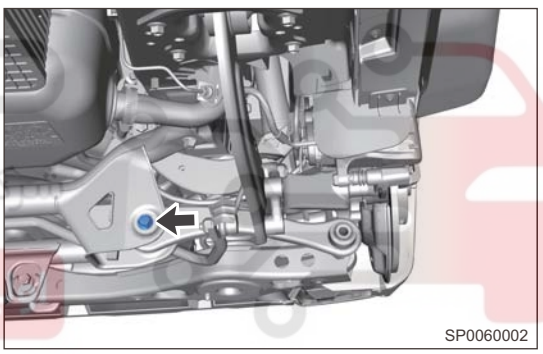
**Hint:**

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

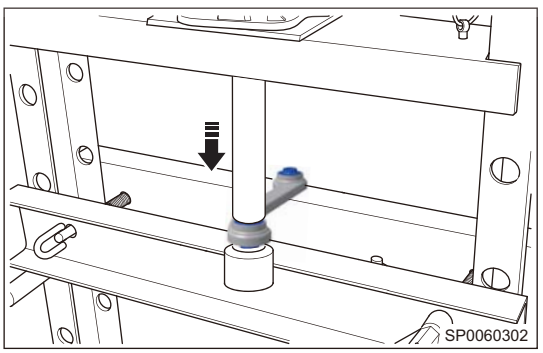
1. Remove the rear wheel.
2. Remove the coupling bolt and nut (arrow) between rear pull rod assembly and rear steering knuckle assembly.
   **Torque: 160 ± 16 N·m**


SP0059002

3. Remove the coupling bolt and nut (arrow) between rear pull rod assembly and rear sub frame welding assembly.
   **Torque: 110 ± 11 N·m**


SP0060002

4. Remove the rear pull rod assembly.
5. Place the rear pull rod assembly on a hydraulic press, and press out rear pull rod assembly rubber boot in combination with tools.


SP0060302

**Installation**

1. Installation is in the reverse order of removal.
   - Be sure to tighten coupling bolts and nuts to specified torques.

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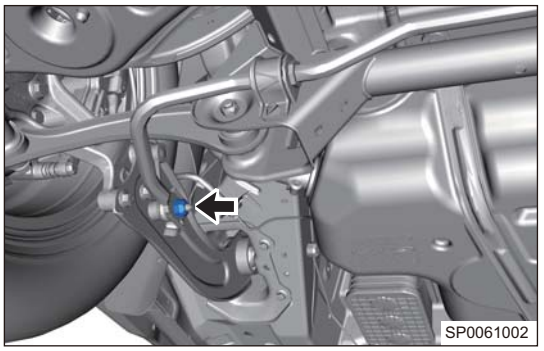
## Rear Stabilizer Bar Assembly

### Removal

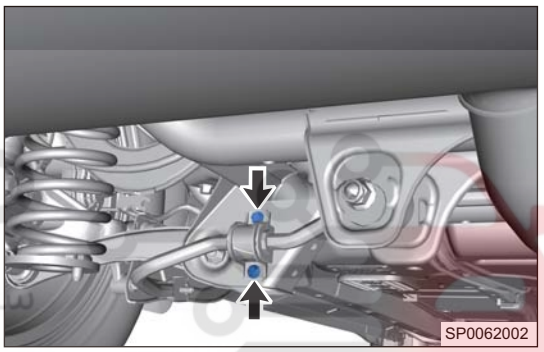
**Warning:**

- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.

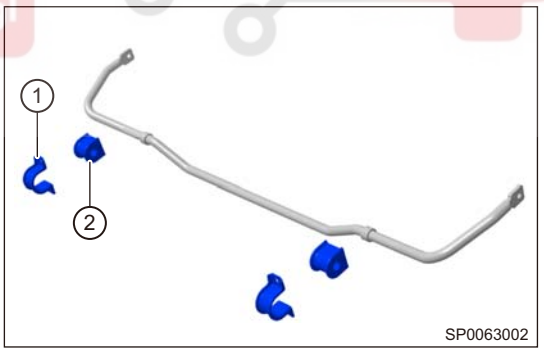
1. Remove the coupling nut (arrow) between rear left connecting rod assembly and rear stabilizer bar assembly. Use same removal procedure for right side.
   **Torque: 60 ± 6.0 N·m**




2. Remove 2 coupling bolts (arrow) between rear stabilizer bar assembly and rear sub frame welding assembly. Use same removal procedure for right side.
   **Torque: 25 ± 4.0 N·m**




3. Remove the rear stabilizer bar assembly.
4. Remove rear stabilizer bar fixing clamps (1) and rear stabilizer bar rubber supports (2) from rear stabilizer bar assembly.




### Inspection

1. Check rear stabilizer bar assembly fixing clamps for wear, cracks, deformation or damage. Replace it as necessary.
2. Check rear stabilizer bar assembly rubber supports for dirt, wear, cracks, deformation or damage. Replace it as necessary.

### Installation

1. Installation is in the reverse order of removal.
   - Be sure to tighten coupling bolts and nuts to specified torques.

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## Rear Connecting Rod Assembly

**Removal**

**Warning:**

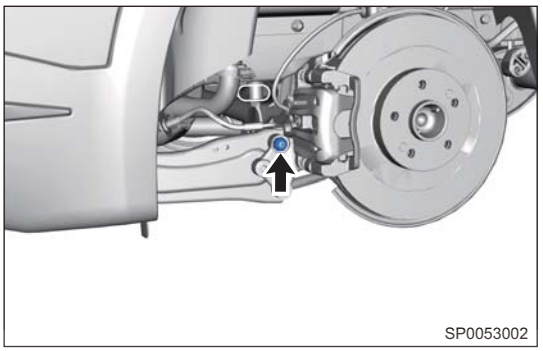
- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lift is locked when repairing chassis parts.
- It is not permitted to weld or modify suspension bearing parts and guide parts.
- When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.

**Caution:**

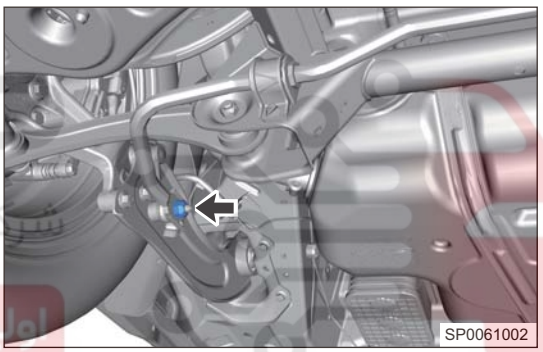
- Use same procedures for right and left sides. Procedures listed below are for left side.

1. Remove the coupling nut (arrow) between rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.
   **Torque: 60 ± 6.0 N·m**




SP0053002

2. Remove the coupling nut (arrow) between rear connecting rod assembly and rear stabilizer bar assembly.
   **Torque: 60 ± 6.0 N·m**


SP0061002

3. Remove the rear connecting rod assembly.

**Inspection**

1. Check rear connecting rod assembly bush for wear, cracks, deformation, damage or grease leakage. Replace it as necessary.
2. Check if end of rear connecting rod assembly rotates smoothly. Replace it as necessary.

**Installation**

1. Installation is in the reverse order of removal.
   **Caution:**
   - Be sure to tighten coupling bolts and nuts to specified torques.
   - Make sure that end of rear connecting rod assembly rotates smoothly and there is no sticking after installation.

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