
SUSPENSION SYSTEM

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6.1 FRONT SUSPENSION

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

- (1) Be sure to wear necessary safety equipment to prevent accidents.
- (2) Check if safety lock of lifter is locked when repairing chassis parts.
- (3) It is not allowed to weld or modify suspension loading parts and guide parts.
- (4) When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.
- (5) Operate carefully when removing and installing coil spring, to prevent spring from jumping out and causing personal injury.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

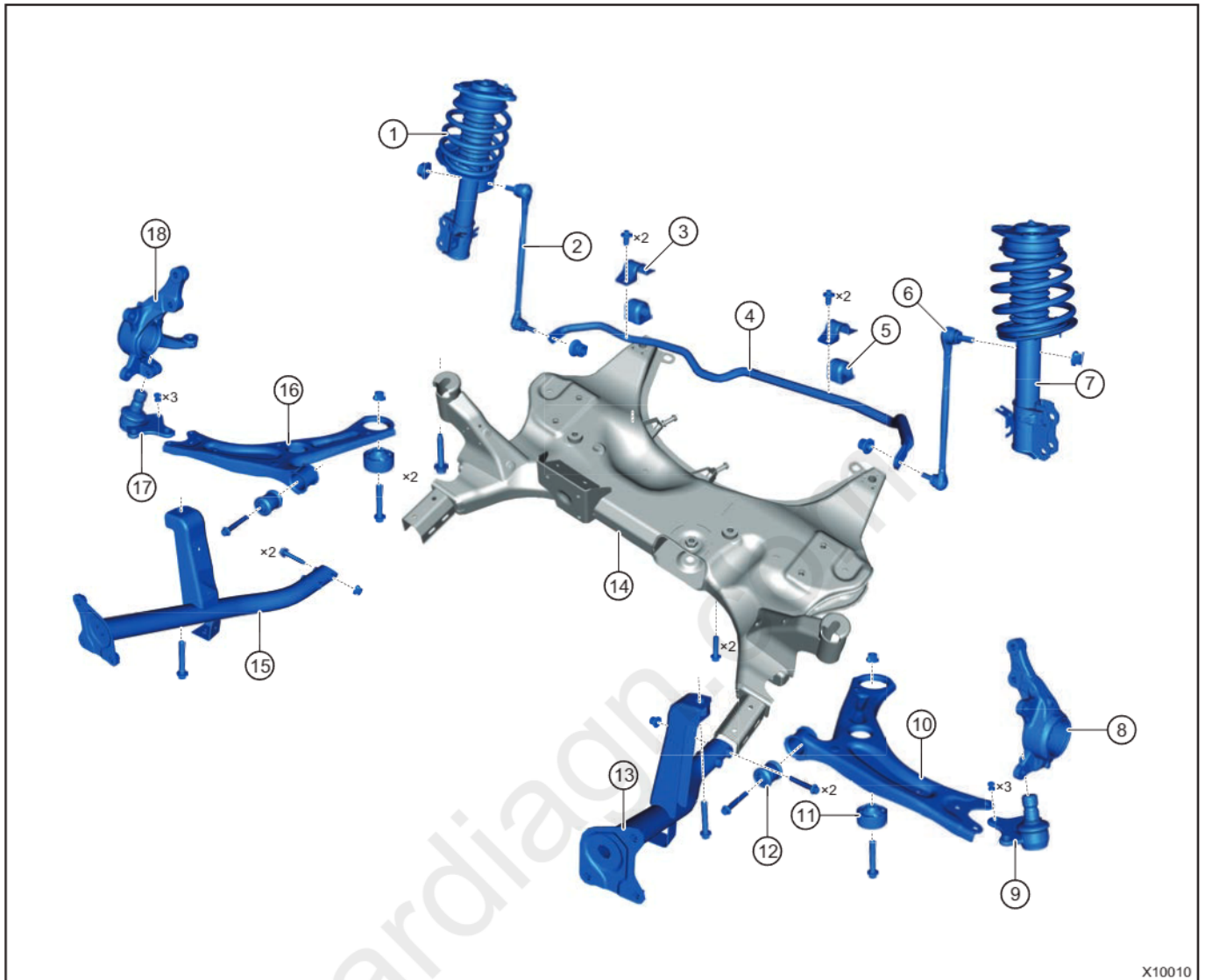
- (1) Be sure to tighten coupling bolts and nuts to specified torques.
- (2) Make sure that ball pin assembly rotates smoothly without any sticking after installation.
- (3) Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.
- (4) Before pressing in, apply grease on the outside of front control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.
- (5) Align dowel pin of top end connecting plate with body positioning hole when installing front left shock absorber assembly.
- (6) Please note that opening of retainer must face opening of front wheel speed sensor, when installing front hub bearing retainer.
- (7) When removing front sub frame welding assembly, it is necessary to securely support engine and transmission assembly with engine equalizer to avoid damage.
- (8) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

Front suspension of this model uses Macpherson independent suspension (toe-in is adjustable and height is non-adjustable), which is equipped with lateral stabilizer, cylindrical coil spring, double action telescopic shock absorber.

2.2 System Components Diagram



X10010

1	Front Right Strut Assembly	10	Front Left Control Arm Welding Assembly
2	Front Connecting Rod Assembly	11	Control Arm Rear Bushing Assembly
3	Front Stabilizer Bar Clamp	12	Control Arm Front Bushing Assembly
4	Front Stabilizer Bar	13	Left Side Rail Assembly
5	Front Stabilizer Bar Bushing	14	Front Sub Frame Assembly
6	Front Connecting Rod Assembly	15	Right Side Rail Assembly
7	Front Left Strut Assembly	16	Front Right Control Arm Welding Assembly
8	Front Left Steering Knuckle	17	Control Arm Ball Pin
9	Control Arm Ball Pin	18	Front Right Steering Knuckle

2.3 Components Operation Description

■ Front Control Arm Welding Assembly

As a guide and power transmission element for suspension system of vehicle, control arm transmits various power acting on wheels to vehicle body and keeps wheels moving in a certain trail. Control arm elastically connects wheels and vehicle body together with ball joint or bushing.



X10012

■ Front Strut Assembly

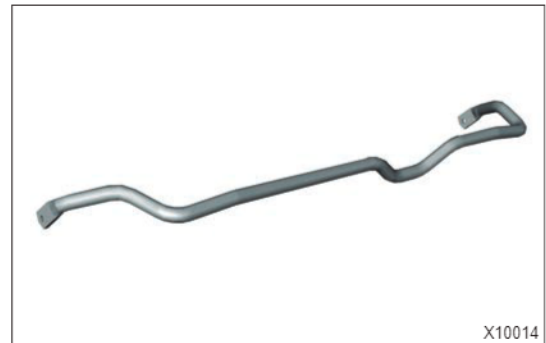
It filters and eliminates vibration from roads to improve driving stability and bring people a sense of comfort and stability.



X10013

■ Front Stabilizer Bar

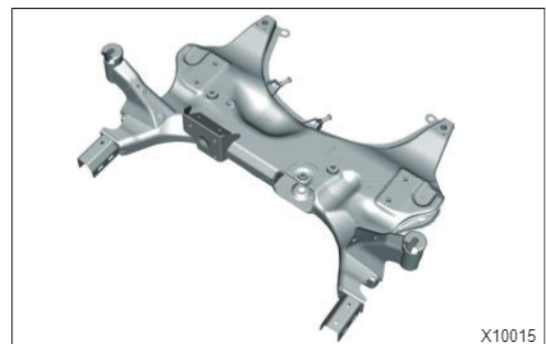
Lateral stabilizer bar functions to prevent excessive lateral incline while vehicle is turning and keeps vehicle body in balance as much as possible. It aims to reduce lateral incline level of vehicle and improve smoothness. When vehicle is turning, vehicle body inclines and suspension on both sides have inconsistent bounce. The outer suspension will press against stabilizer bar to twist it, then elastic force from bar body will prevent wheel from lifting, so that vehicle body can be kept in balance as much as possible, thus realizing the lateral stability function.



X10014

■ Front Sub Frame Assembly

Sub frame can reduce impact on vehicle body due to road shock and enhance connection rigid of suspension system and improve driving comfort and stability, making a strong and compact chassis during driving. It bears the deformation conditions such as loaded bend, longitudinal torsion, lateral bend and horizontal lozenging, etc. in place of vehicle body, which improves torsion resistance ability of vehicle body. Also, the force will be directly applied on it in a collision to improve vehicle safety performance.



X10015

3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:

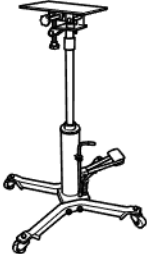
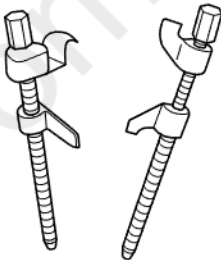
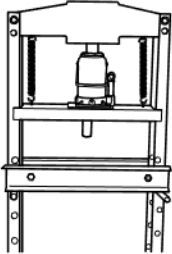
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Pulls	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)
	Steering gear (misaligned or damaged)
	Suspension component (worn)
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)
Abnormal tire wear	Front tire (improperly inflated)
	Front wheel alignment (incorrect)
	Front shock absorber assembly (worn or deformed)
	Front suspension components (worn or deformed)

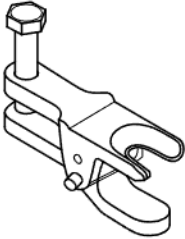
4 Removal & Installation

4.1 Tools

■ General Tools

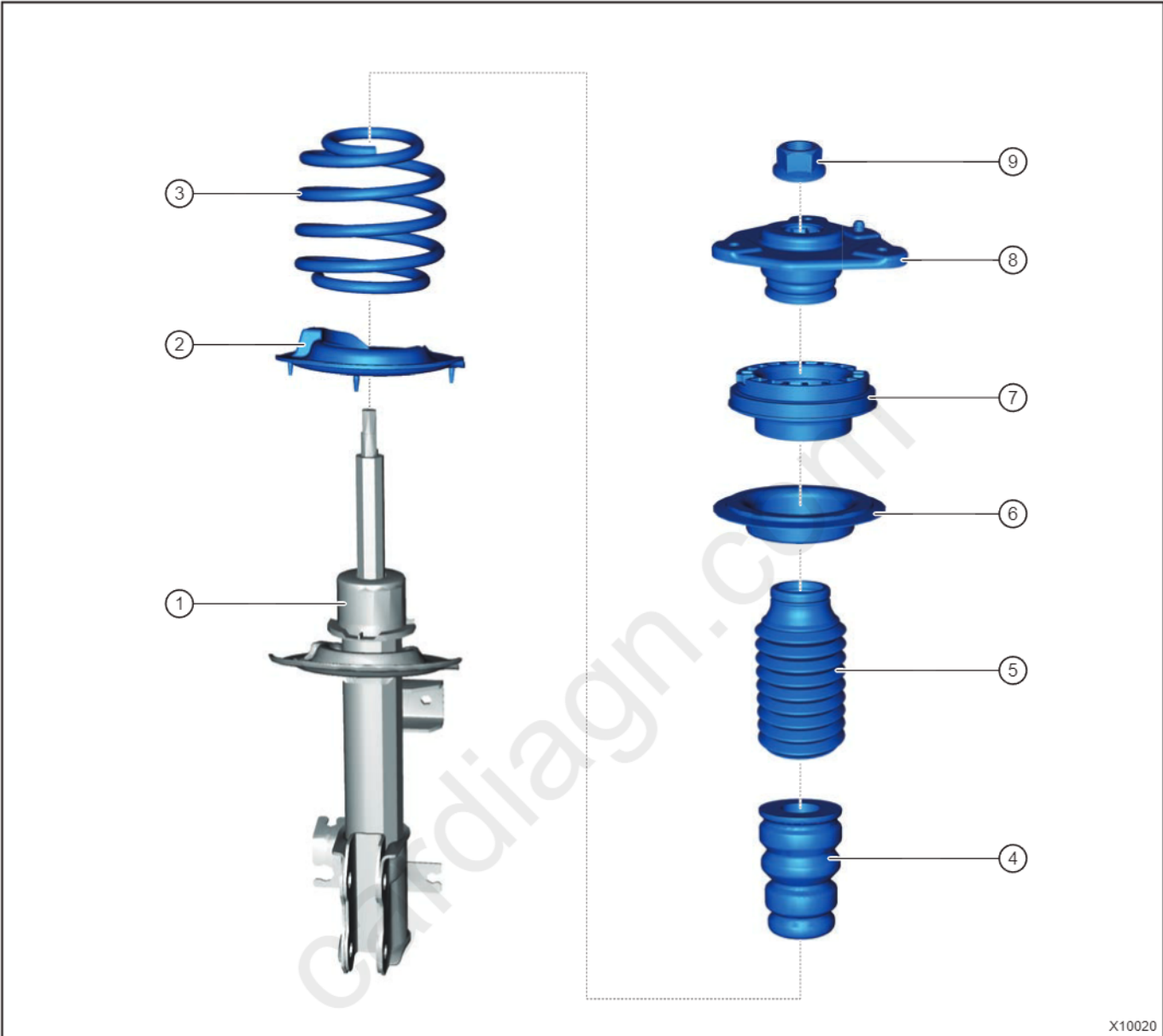
Tool Name	Tool Drawing
Transmission Carrier	 S00004
Spring Compressor	 S00016
Hydraulic Press	 S00010

■ Special Tools

Tool Name	Part No.	Tool Drawing
Front Shock Absorber Nut Remover	ECH-0001	 S00160
Tie Rod Ball Remover	ECH-0002	 S00019

4.2 Replacement of Front Strut Assembly

■ Description



X10020

1	Front Left Shock Absorber Assembly	6	Upper Spring Cushion
2	Lower Spring Cushion	7	Bearing Assembly
3	Front Coil Spring	8	Upper Connecting Plate Assembly
4	Front Buffer Block	9	Hexagon Flange Nut
5	Front Dust Boot		

■ On-Vehicle Inspection

Check the front shock absorber assembly.

- (1) 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.

Check front shock absorber assembly for leakage

- (1) As shock absorber assembly operates frequently during vehicle driving, oil gas is formed due to temperature rise of shock absorber, which then adheres to dust boot. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.
- (2) If following conditions occur:
 - Oil traces in circumferential direction are uneven;
 - Oil traces reach lower connecting positions.

Above conditions indicate that there may be a leakage in shock absorber assembly, and it is necessary to replace the shock absorber assembly.
- (3) If it is difficult to accurately judge if shock absorber assembly leaks 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 on the surface of shock absorber assembly, it indicates that oil leakage exists, and it is necessary to replace the shock absorber assembly.

■ Removal

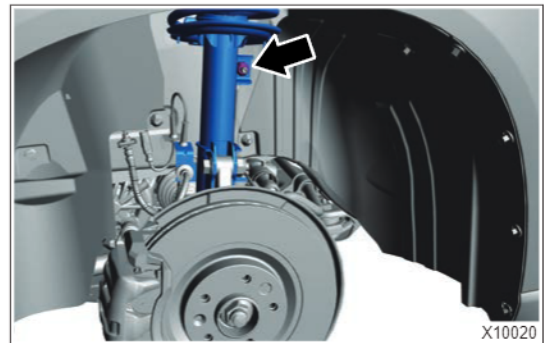
Hint:

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

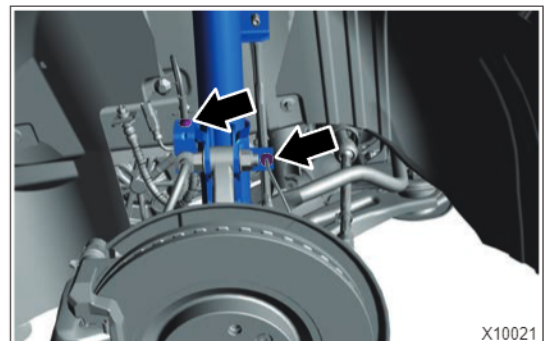
⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**
- **It is not allowed to weld or modify suspension loading 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.**

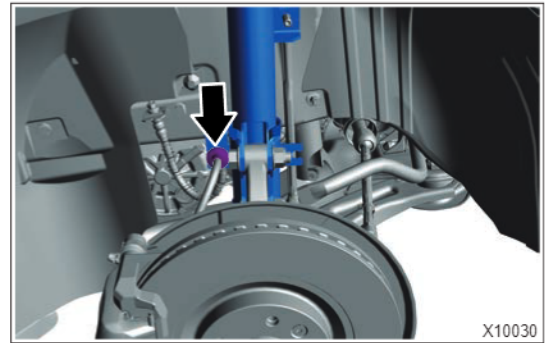
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front left wheel.
- (4) Remove coupling nut (arrow) between front left connecting rod assembly and front left shock absorber assembly.



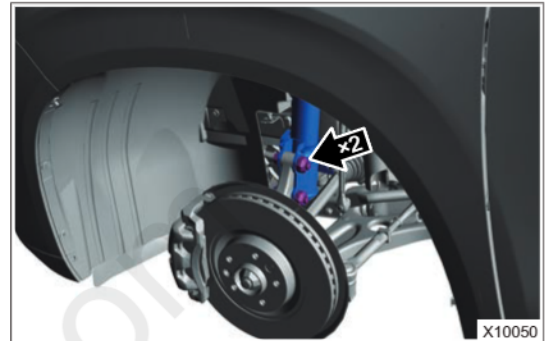
- (5) Disengage front left wheel speed sensor wire harnesses from front left shock absorber assembly.



- (6) Disengage front left brake hose assembly from front left shock absorber assembly.

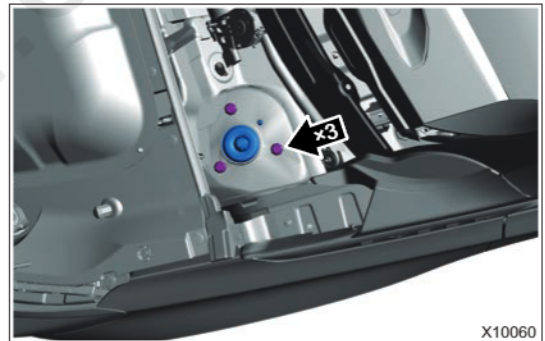


- (7) Remove 2 coupling bolts and nuts between front left shock absorber assembly and front left steering knuckle assembly.



- (8) Remove the front windshield lower support assembly.

- (9) Remove 3 coupling bolts between front left shock absorber assembly and vehicle body.



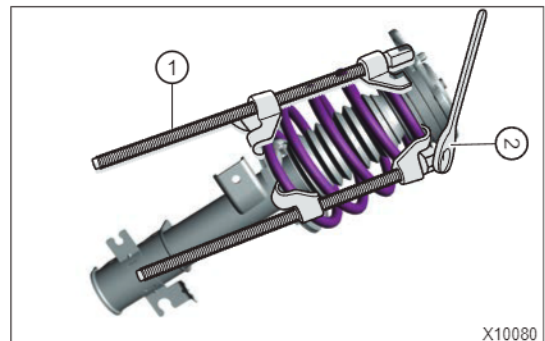
- (10) Remove the front left shock absorber assembly with front coil spring.

■ Disassembly

Hint:

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

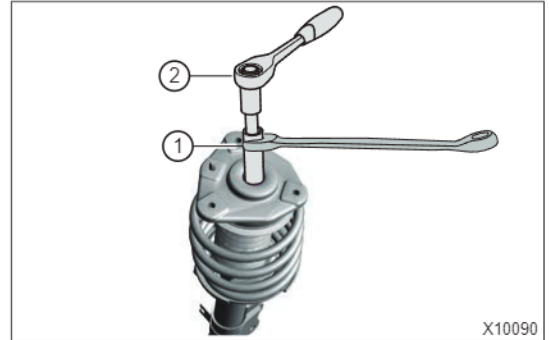
- (1) Using spring compressor (1) and wrench (2), tighten the end lever of spring compressor to compress the front coil spring.



⚠ 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.

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



- (3) Remove front strut upper connecting plate assembly (w/ insulator) from upper part of front left shock absorber assembly.



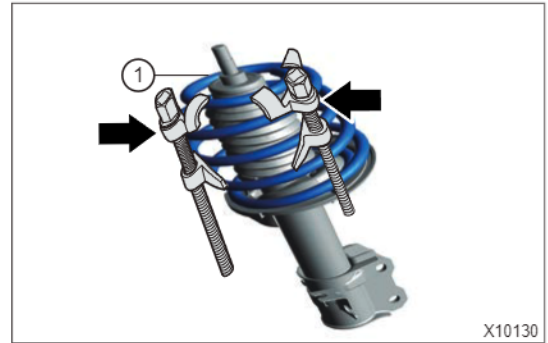
- (4) Remove bearing assembly from upper part of front left shock absorber assembly.



- (5) Remove front spring upper cushion from upper part of front left shock absorber assembly.



- (6) Remove front coil spring (1) with spring compressor from front left shock absorber assembly.



- (7) Remove front dust boot from upper part of front left shock absorber assembly.



- (8) Detach front buffer block from front left shock absorber assembly, and remove it.



- (9) Remove front spring lower cushion from lower end of front left shock absorber assembly strut.



■ Assembly

⚠ Caution

- Be sure to tighten bolt to specified torque.
- Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.
- Please note that opening of retainer must face opening of front wheel speed sensor, when installing front hub bearing retainer.

- (1) Install the front spring lower cushion.

- (2) Install the front buffer block.
- (3) Install the front dust boot.
- (4) Install the front coil spring.
- (5) Using spring compressor (1) and wrench (2), tighten the end lever of spring compressor to compress the front coil spring.
- (6) Install the front spring upper cushion.
- (7) Install the bearing assembly.
- (8) Install the front strut upper connecting plate assembly (w/ insulator).
- (9) Hold the end of front left shock absorber assembly lever with shock absorber nut remover (1), and then tighten locking nut to front left shock absorber assembly with wrench (2).

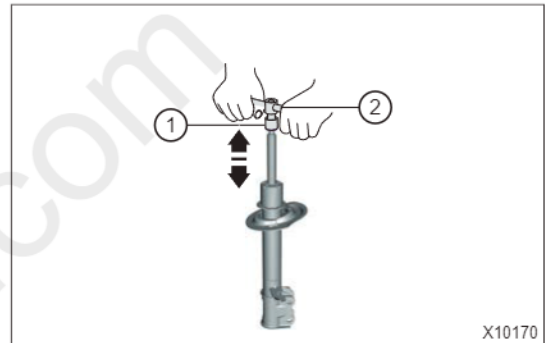
Torque: $70 \pm 3 \text{ N}\cdot\text{m}$

■ Inspection

- (1) Check the front shock absorber assembly.

Manual inspection

- 1) Install the locking nut (1) to the upper end of front shock absorber assembly strut, and then install the T-wrench (2) or equivalent.



- 2) 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.
- (2) Check the other components of front shock absorber assembly.
 - 1) 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.
 - 2) Check front strut upper connecting plate assembly (w/ insulator) and bearing assembly for damage. Replace it as necessary.
 - 3) Check front coil spring for wear, cracks or deformation. Replace it as necessary.
- (3) Check the front shock absorber spring.
 - 1) Check front coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Align dowel pin of top end connecting plate with body positioning hole when installing front left shock absorber assembly.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

- (1) Install front left shock absorber assembly to a proper position on vehicle body.
- (2) Install 3 coupling bolts between front left shock absorber assembly and vehicle body.

Torque: $85 \pm 6 \text{ N}\cdot\text{m}$

- (3) Install 2 coupling bolts and nuts between front left shock absorber assembly and front left steering knuckle assembly.

Torque: $200 \pm 16 \text{ N}\cdot\text{m}$

- (4) Install front left brake hose assembly to clip of front left shock absorber assembly.
- (5) Install front left wheel speed sensor wire harness to clip of front left shock absorber assembly.
- (6) Install coupling nut between front left connecting rod assembly and front left shock absorber assembly.

Torque: $46 \pm 2.5 \text{ N}\cdot\text{m}$

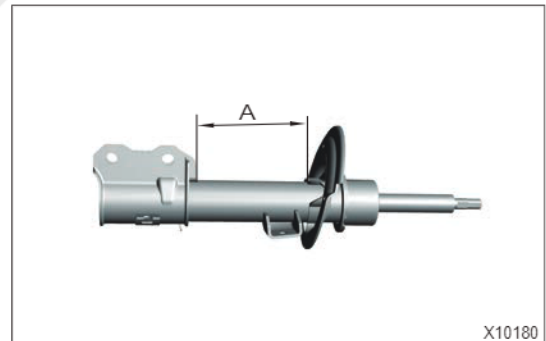
- (7) Install the front windshield lower support assembly.
- (8) Install the front left wheel.
- (9) Connect the negative battery cable.

■ 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 metal 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.

4.3 Replacement of Front Control Arm Assembly

■ Removal

Hint:

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

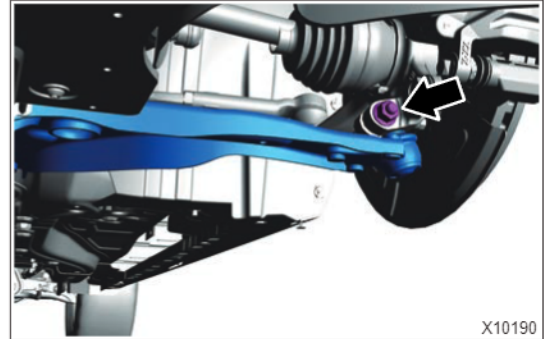
⚠ Warning

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

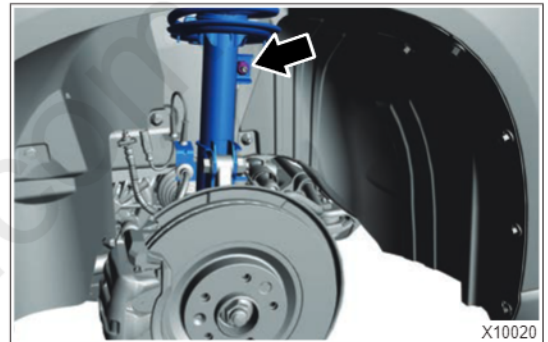
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front left wheel.
- (4) Remove the engine lower protector assembly.
- (5) Remove the left side rail assembly.
- (6) Remove coupling bolt and nut between front left control arm ball pin and front left steering knuckle.

Hint:

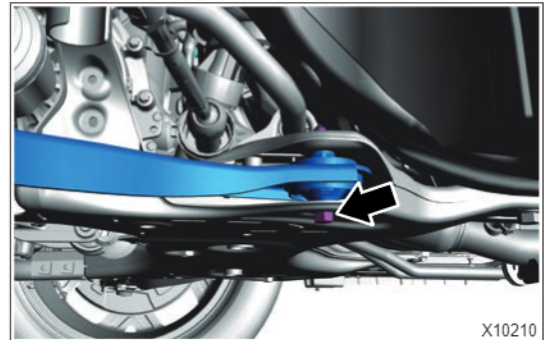
If it is difficult to remove control arm ball pin end from steering knuckle, detach ball pin by striking the end of steering knuckle uniformly and slightly with a hammer or equivalent.



- (7) Remove coupling bolt between front part of front left control arm assembly and front sub frame welding assembly.

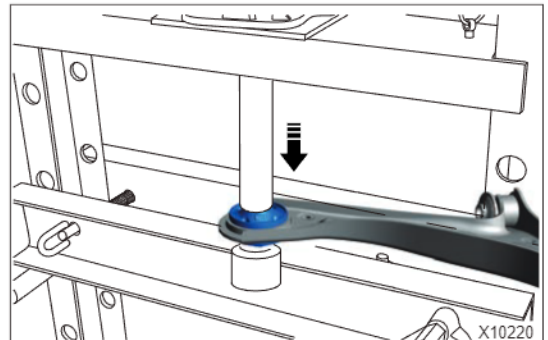


- (8) Remove coupling bolt between rear part of front left control arm assembly and front sub frame welding assembly.



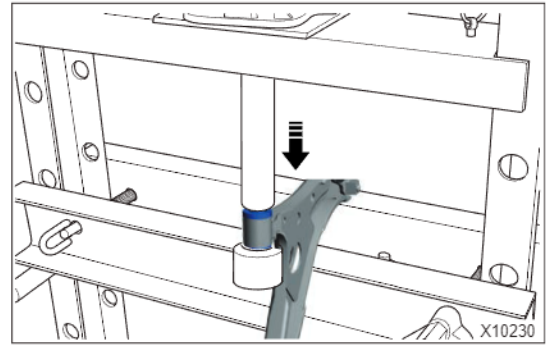
- (9) Remove the front control arm front rubber bushing assembly.

- 1) Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out and remove front control arm rear rubber bushing assembly with hydraulic press.



- (10) Remove the front control arm rear rubber bushing assembly.

- 1) Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out and remove front control arm rear rubber bushing assembly with hydraulic press.



■ Installation

⚠ Caution

- Be sure to tighten coupling bolts and nuts to specified torques.
- Make sure that ball pin assembly rotates smoothly without any sticking after installation.
- Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.

- (1) Place the front control arm assembly on a hydraulic press, and install front control arm rear rubber bushing assembly with hydraulic press.

⚠ Caution

Before pressing in, apply grease on the outside of front control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.

- (2) Install coupling bolt between rear part of front left control arm assembly and front sub frame welding assembly.

Torque: $90 \pm 90 \text{ N}\cdot\text{m}$

- (3) Install coupling bolt between front part of front left control arm assembly and front sub frame welding assembly.

Torque: $180 \pm 12.6 \text{ N}\cdot\text{m}$

- (4) Install coupling bolt and nut between front left control arm ball pin and front left steering knuckle.

Torque: $95 \pm 7.3 \text{ N}\cdot\text{m}$

4.4 Replacement of Left Side Rail Assembly

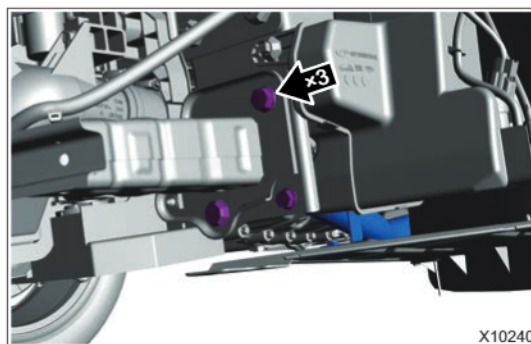
■ Removal

⚠ Warning

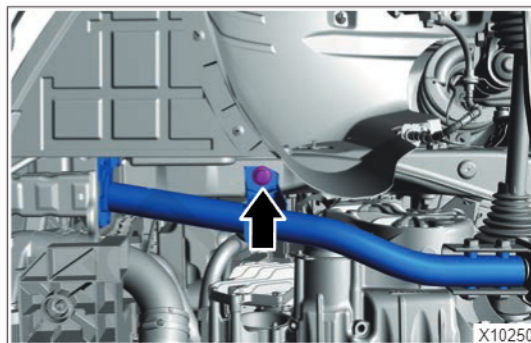
- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lifter is locked when repairing chassis parts.
- It is not allowed to weld or modify suspension loading parts and guide parts.
- When removing chassis parts, be sure to replace self-locking nuts and rusted nuts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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the engine lower protector assembly.
- (4) Remove the front bumper assembly.

- (5) Remove 3 fixing bolts from front end of left side rail assembly.



- (6) Remove 1 fixing bolt between upper end of left side rail assembly and body.



- (7) Remove 2 fixing bolts between left side rail assembly and front sub frame assembly.



- (8) Remove the left welding side rail assembly.

■ Installation

- (1) Install 2 fixing bolts between left side rail assembly and front sub frame assembly.

Torque: $55 \pm 8.25 \text{ N}\cdot\text{m}$

- (2) Install 1 fixing bolt between upper end of left side rail assembly and body.

Torque: $110 \pm 8 \text{ N}\cdot\text{m}$

- (3) Install 3 fixing bolts to front end of left side rail assembly.

Torque: $30 \pm 4.5 \text{ N}\cdot\text{m}$

- (4) Install the front bumper assembly.

- (5) Install the engine lower protector assembly.

- (6) Connect the negative battery cable.

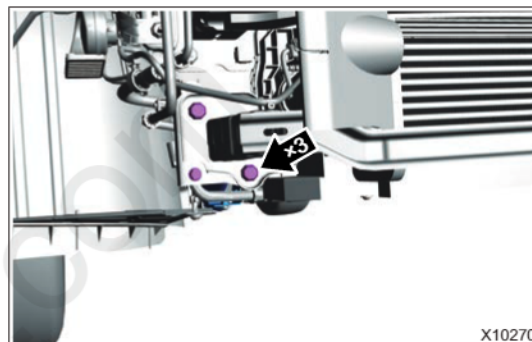
4.5 Replacement of Right Side Rail Assembly

■ Removal

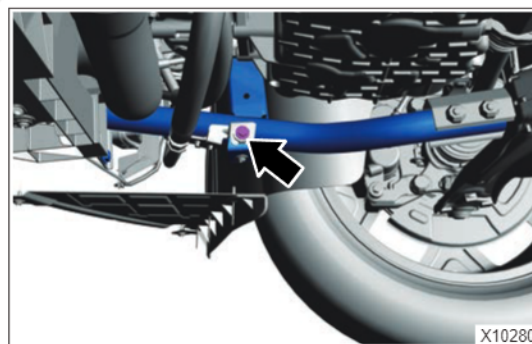
⚠ Warning

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

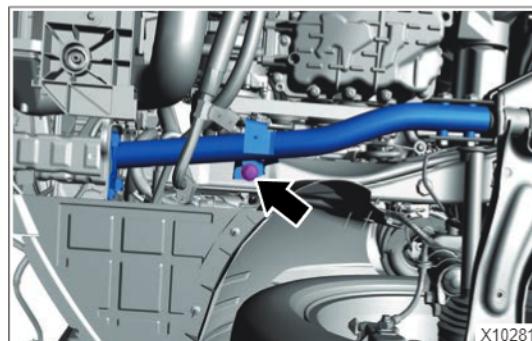
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the engine lower protector assembly.
- (4) Remove the front bumper assembly.
- (5) Remove 3 fixing bolts from front end of right side rail assembly.



- (6) Remove 1 fixing bolt from evaporator to compressor line assembly.



- (7) Remove 1 fixing bolt between upper end of right side rail assembly and body.



- (8) Remove 2 fixing bolts and nuts between right side rail assembly and front sub frame assembly.



X10282

- (9) Remove the left welding side rail assembly.

■ Installation

- (1) Install 2 fixing bolts and nuts between right side rail assembly and front sub frame assembly.

Torque: $55 \pm 8.25 \text{ N}\cdot\text{m}$

- (2) Install 1 fixing bolt between upper end of right side rail assembly and body.

Torque: $110 \pm 8 \text{ N}\cdot\text{m}$

- (3) Install 1 fixing bolt to evaporator to compressor line assembly.

- (4) Install 3 fixing bolts to front end of right side rail assembly.

Torque: $30 \pm 4.5 \text{ N}\cdot\text{m}$

- (5) Install the front bumper assembly.

- (6) Install the engine lower protector assembly.

- (7) Connect the negative battery cable.

4.6 Replacement of Front Connecting Rod Assembly

■ Removal

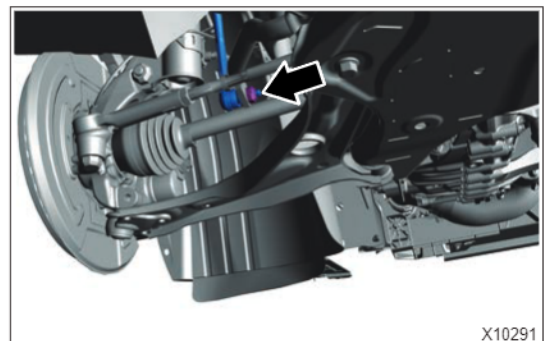
Hint:

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

⚠ Warning

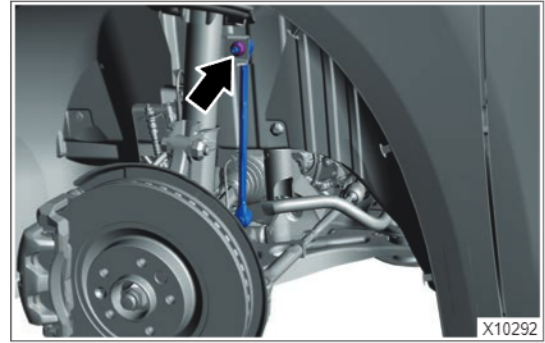
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts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

- (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 coupling nut between front left stabilizer bar assembly and lower part of front left connecting rod assembly.



X10291

- (5) Remove coupling nut between front left connecting rod assembly and upper part of front left shock absorber assembly, and remove front left connecting rod assembly.



■ Inspection

- (1) Check front connecting rod assembly bushing 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) Install coupling nut between front left connecting rod assembly and lower part of front left shock absorber assembly.

Torque: $46 \pm 2.5 \text{ N}\cdot\text{m}$

- (2) Install coupling nut between front left stabilizer bar assembly and upper part of front left connecting rod assembly.

Torque: $58 \pm 4 \text{ N}\cdot\text{m}$

- (3) Install the front left wheel.
- (4) Connect the negative battery cable.

4.7 Replacement of Front Stabilizer Bar Assembly

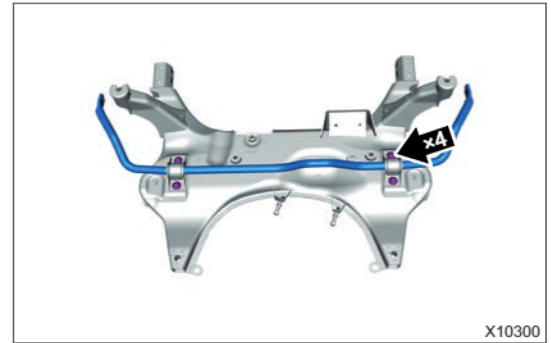
■ Removal

⚠ Warning

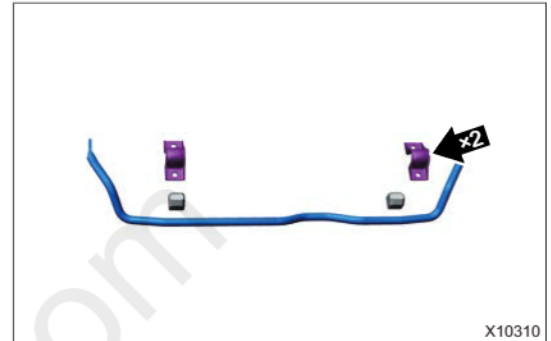
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front bumper assembly.
- (4) Remove the front left wheel.
- (5) Remove the front right wheel.
- (6) Remove the engine lower protector assembly.
- (7) Remove the left side rail assembly.
- (8) Remove the right side rail assembly.
- (9) Remove the front sub frame welding assembly.

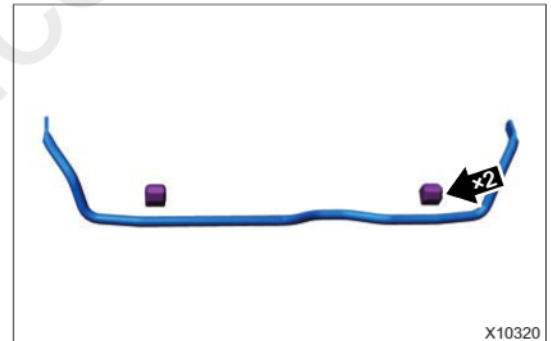
- (10) Remove 4 fixing bolts between front stabilizer bar and sub frame.



- (11) Detach left and right fixing clamps from front stabilizer bar assembly.



- (12) Detach left and right rubber supports from front stabilizer bar assembly.



■ 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 is completed. Adjust wheel alignment to standard range as necessary.**

- (1) Install left and right rubber supports to front stabilizer bar assembly.
- (2) Install 2 fixing clamps between front stabilizer bar assembly and front sub frame assembly.
- (3) Install 4 fixing bolts between front stabilizer bar and sub frame.

Torque: $80 \pm 6 \text{ N}\cdot\text{m}$

- (4) Install the front sub frame welding assembly.
- (5) Install the right side rail assembly.
- (6) Install the left side rail assembly.

- (7) Install the engine lower protector assembly.
- (8) Install the front wheels.
- (9) Install the front bumper assembly.
- (10) Connect the negative battery cable.

4.8 Replacement of Front Steering Knuckle

■ Removal

Hint:

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

Warning

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

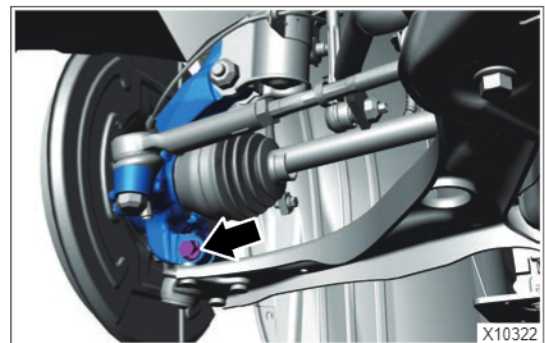
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front left wheel.
- (4) Remove fixing nut from front left drive shaft.



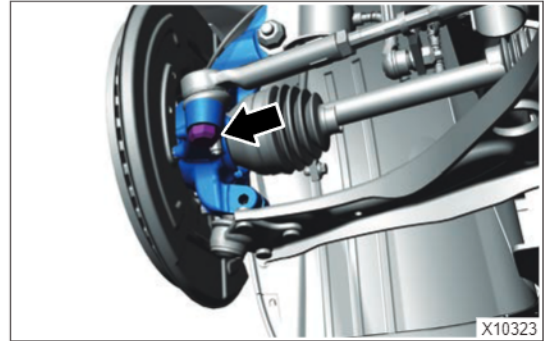
Caution

Loosen staked part of nut completely, otherwise it will damage threads of drive shaft assembly.

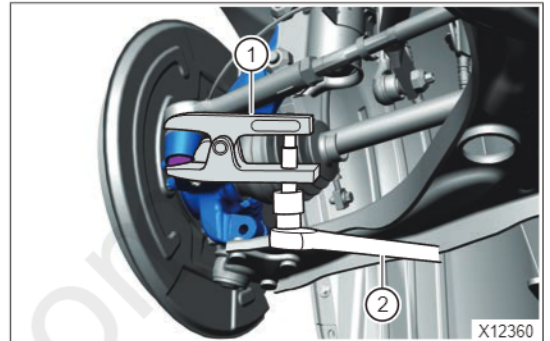
- (5) Remove the front left brake caliper assembly.
- (6) Remove fixing bolt and nut between front left control arm assembly ball pin and front left steering knuckle assembly.



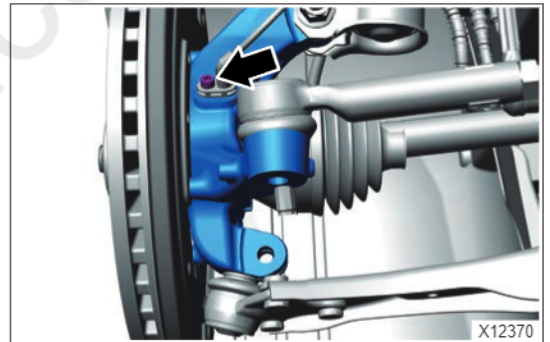
- (7) Remove fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.



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



- (9) Remove fixing bolt between front left wheel speed sensor and front left steering knuckle assembly, and disengage the front left wheel speed sensor carefully.



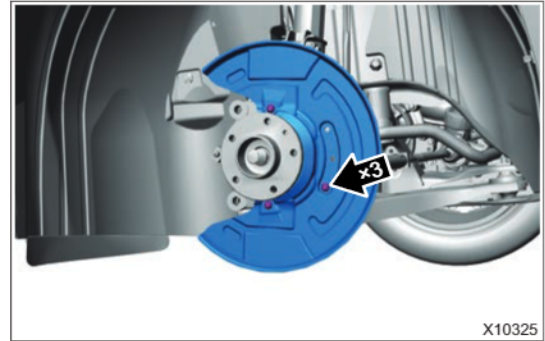
⚠ Caution

Keep head and installation hole of sensor free of foreign matter.

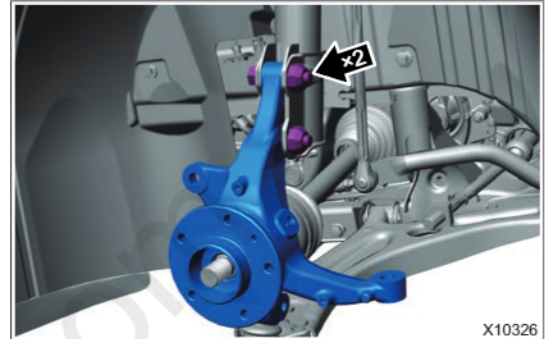
- (10) Remove 1 fixing screw and front left brake disc.



- (11) Remove 3 fixing bolts between front left dust guard and front left steering knuckle assembly, and remove the front left dust guard.



- (12) Remove 2 coupling bolts and nuts between front left shock absorber assembly and front left steering knuckle assembly.



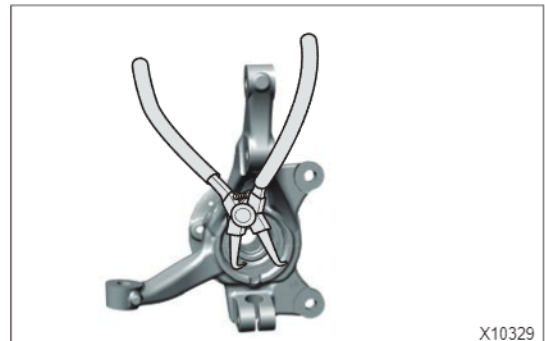
- (13) Disengage the left drive shaft and remove the front left steering knuckle assembly.

■ Disassembly

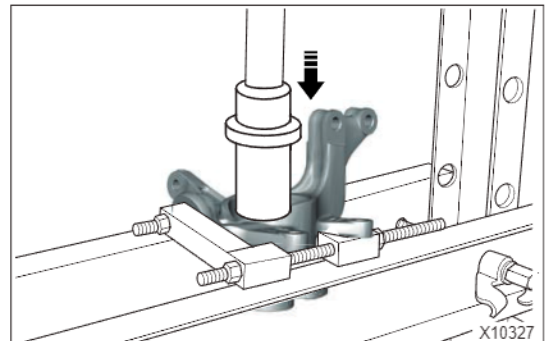
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when disassembling the front steering knuckle assembly, front hub, front hub bearing.**
- **Appropriate force should be applied, when disassembling front steering knuckle assembly, front hub, front hub bearing. Be careful not to operate roughly.**

- (1) Remove the front hub bearing retainer.



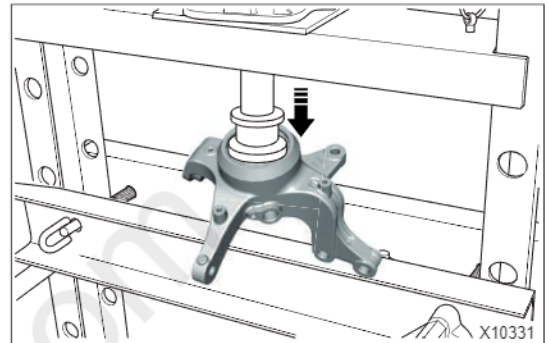
- (2) Place front steering knuckle assembly on a hydraulic press, install bearing remover and adapter, and press out front hub with hydraulic press.



- (3) Remove the front hub carefully.



- (4) Place steering knuckle assembly on a hydraulic press, install bearing remover and adapter, and press out front hub bearing with hydraulic press.



- (5) Remove the front hub bearing carefully.



■ Inspection

- (1) Check front steering knuckle for wear, cracks, deformation or damage. Replace it as necessary.
- (2) Check dust guard for dirt, wear, cracks, deformation or damage. Replace it as necessary.

■ Assembly

- (1) Place steering knuckle assembly on a hydraulic press, install bearing remover and adapter, and carefully press front hub bearing into steering knuckle with hydraulic press.
- (2) Install the front hub bearing retainer.
- (3) Place steering knuckle assembly on a hydraulic press, install bearing remover and adapter, and carefully press front hub into steering knuckle with hydraulic press.

■ Installation

⚠ Caution

- Be sure to tighten coupling bolts and nuts to specified torques.
- Check that hub assembly rotates smoothly without any sticking after installation.
- Check wheel alignment after installation. Adjust wheel alignment to the standard range as necessary.

- (1) Align drive shaft accurately into front hub bearing of steering knuckle.
- (2) Install coupling nut between front left connecting rod assembly and lower part of front left shock absorber assembly.

Torque: 200 ± 16 N·m

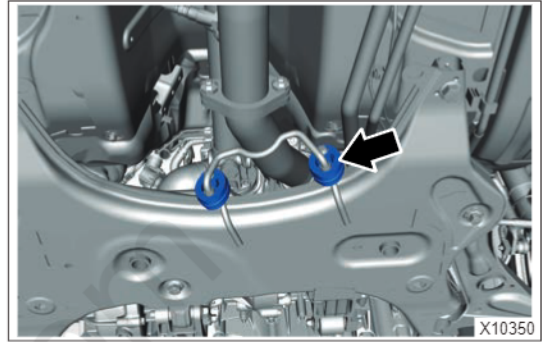
- (3) Install 3 fixing bolts between front left dust guard and front left steering knuckle assembly.
Torque: 7.5 ± 1 N·m
- (4) Install front left brake disc, and install 1 fixing screw.
Torque: 7.5 ± 1 N·m
- (5) Install fixing bolt between front left wheel speed sensor and front left steering knuckle assembly.
Torque: 8 ± 1.2 N·m
- (6) Install fixing bolt and nut between front left control arm assembly ball pin and front left steering knuckle assembly.
Torque: 95 ± 7.3 N·m
- (7) Install fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.
Torque: 60 ± 5 N·m
- (8) Install the front left brake caliper assembly.
- (9) Install fixing nut to front left drive shaft.
Torque: 286 ± 23 N·m
- (10) Install the front left wheel.
- (11) Connect the negative battery cable.

4.9 Replacement of Front Sub Frame Welding Assembly

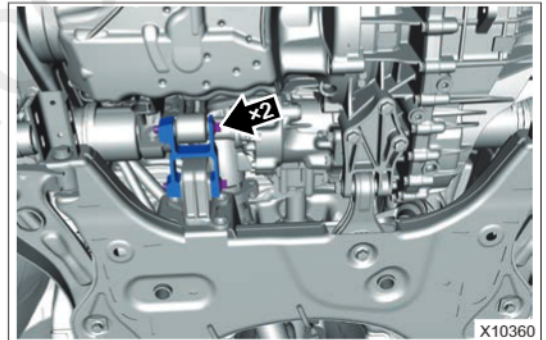
■ Removal

 Warning
• Be sure to wear necessary safety equipment to prevent accidents. • Check if safety lock of lifter is locked when repairing chassis parts. • It is not allowed to weld or modify suspension loading parts and guide parts. • When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety. • When removing front sub frame welding assembly, it is necessary to securely support engine and transmission assembly with engine equalizer to avoid damage.

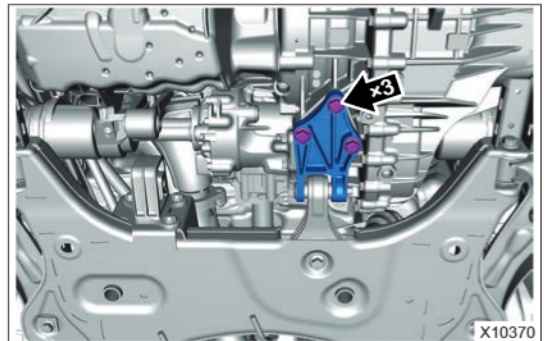
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front wheel.
- (4) Remove the engine lower protector assembly.
- (5) Remove the left side rail assembly.
- (6) Remove the right side rail assembly.
- (7) Remove the front left control arm assembly.
- (8) Remove the front right control arm assembly.
- (9) Using an engine equalizer, support engine and transmission assembly securely.
- (10) Detach the precatalytic converter hanger block.



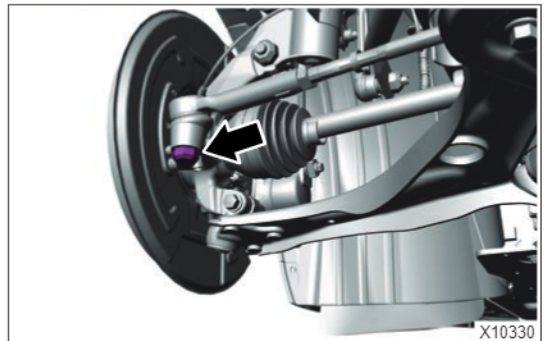
- (11) Remove 2 coupling bolts from rear right mounting.



- (12) Remove 3 fixing bolts from rear mounting.



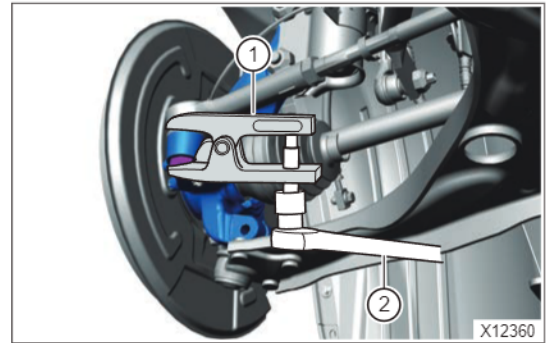
- (13) Remove fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.



- (14) Install ball pin separator (1), and tighten ball pin separator bolt with wrench (2) to separate steering tie rod outer ball pin from steering knuckle assembly. The removal method of right tie rod outer ball pin is the same as that of left side.

Hint:

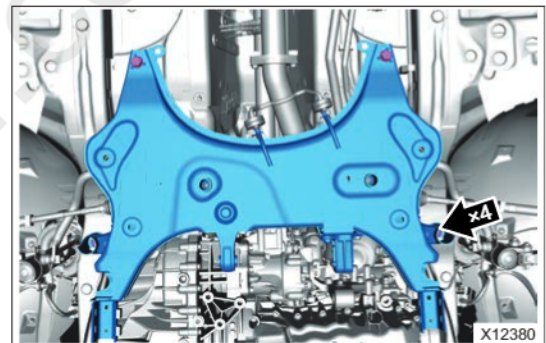
If it is difficult to remove tie rod outer ball pin end from steering knuckle, detach ball pin by striking the end of steering knuckle uniformly and slightly with a hammer or equivalent.



- (15) Remove coupling bolt between steering column assembly and steering gear, separate steering column from steering gear.



- (16) Remove 4 fixing bolts between front sub frame and vehicle body.



- (17) Slowly lower the sub frame welding assembly with stabilizer bar.
 (18) Remove the steering gear assembly.
 (19) Remove the stabilizer bar assembly.
 (20) Remove the front sub frame assembly.

Installation

⚠ Caution

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

- (1) Install stabilizer bar assembly to front sub frame.
- (2) Install steering gear assembly to front sub frame.
- (3) Install sub frame welding assembly with stabilizer bar to transmission carrier, and raise it to a proper position.
- (4) Install 2 fixing bolts between right side of front sub frame and vehicle body.

Front mounting bolt torque between sub frame and body: $110 \pm 8 \text{ N}\cdot\text{m}$

Rear mounting bolt torque between sub frame and body: $200 \pm 18 \text{ N}\cdot\text{m}$

- (5) Install 2 fixing bolts between left side of front sub frame and vehicle body.
Front mounting bolt torque between sub frame and body: $110 \pm 8 \text{ N}\cdot\text{m}$
Rear mounting bolt torque between sub frame and body: $200 \pm 18 \text{ N}\cdot\text{m}$
- (6) Install coupling bolt between steering column assembly and steering gear.
Torque: $40 \pm 3 \text{ N}\cdot\text{m}$
- (7) Install fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.
Torque: $60 \pm 5 \text{ N}\cdot\text{m}$
- (8) Install the rear mounting assembly.
- (9) Install the rear right mounting assembly.
- (10) Install the precatalytic converter hanger block.
- (11) Install the front right control arm assembly.
- (12) Install the front left control arm assembly.
- (13) Install the left side rail assembly.
- (14) Install the right side rail assembly.
- (15) Install the engine lower protector assembly.
- (16) Install the front wheel.
- (17) Connect the negative battery cable.

6.2 REAR SUSPENSION

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

- (1) Be sure to wear necessary safety equipment to prevent accidents.
- (2) Check if safety lock of lifter is locked when repairing chassis parts.
- (3) It is not allowed to weld or modify suspension loading parts and guide parts.
- (4) When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

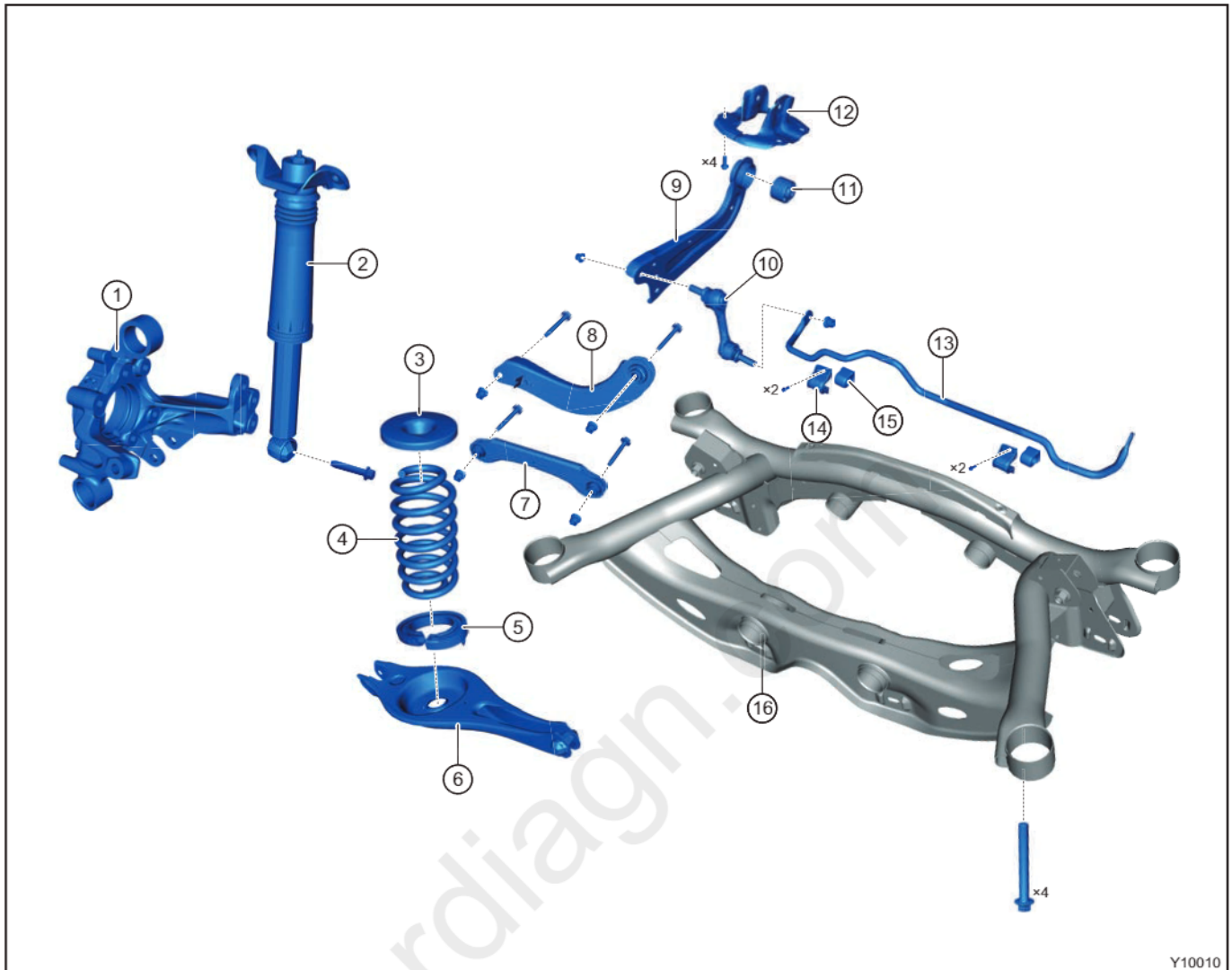
- (1) Be sure to tighten coupling bolts and nuts to specified torques.
- (2) Align the protrusion of rear coil spring lower cushion with the positioning hole of rear lower control arm during installation.
- (3) Before assembling the control arm assembly, apply grease on the outside of control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.
- (4) Due to rubber bushing deformation, false torque may be exist on tightened bolt, so it is necessary to retighten the tightened bolt.
- (5) After installation, lower vehicle and bounce vehicle up and down several times to stabilize rear suspension.
- (6) Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.
- (7) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

Rear suspension of this model uses multi-link independent suspension (height is non-adjustable), which is equipped with lateral stabilizer, cylindrical coil spring and double action telescopic shock absorber.

2.2 System Components Diagram



Y10010

1	Rear Left Steering Knuckle	9	Rear Right Trailing Arm Welding Assembly
2	Rear Shock Absorber Device	10	Rear Connecting Rod Assembly
3	Upper Coil Spring Cushion Assembly	11	Trailing Arm Bushing Assembly
4	Rear Coil Spring Assembly	12	Trailing Arm Mounting Bracket Assembly
5	Lower Coil Spring Cushion Assembly	13	Rear Stabilizer Bar
6	Rear Lower Control Arm Welding Assembly	14	Rear Stabilizer Bar Clamp
7	Pull Rod Welding Assembly	15	Stabilizer Bar Bushing
8	Rear Upper Control Arm Welding Assembly	16	Rear Sub Frame Assembly

2.3 Components Operation Description

■ Rear Control Arm Welding Assembly

As a guide and power transmission element for suspension system of vehicle, control arm transmits various power acting on wheels to vehicle body and keeps wheels moving in a certain trail. Control arm elastically connects wheels and vehicle body together with ball joint or bushing.



■ Rear Shock Absorber Assembly

It filters and eliminates vibration from roads to improve driving stability and bring people a sense of comfort and stability.



■ Rear Stabilizer Bar

Lateral stabilizer bar functions to prevent excessive lateral incline while vehicle is turning and keeps vehicle body in balance as much as possible. It aims to reduce lateral incline level of vehicle and improve smoothness. When vehicle is turning, vehicle body inclines and suspension on both sides have inconsistent bounce. The outer suspension will press against stabilizer bar to twist it, then elastic force from bar body will prevent wheel from lifting, so that vehicle body can be kept in balance as much as possible, thus realizing the lateral stability function.



■ Rear Sub Frame Assembly

Sub frame can reduce impact on vehicle body due to road shock and enhance connection rigid of suspension system and improve driving comfort and stability, making a strong and compact chassis during driving. It bears the deformation conditions such as loaded bend, longitudinal torsion, lateral bend and horizontal lozenging, etc. in place of vehicle body, which improves torsion resistance ability of vehicle body. Also, the force will be directly applied on it in a collision to improve vehicle safety performance.



3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:

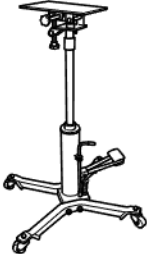
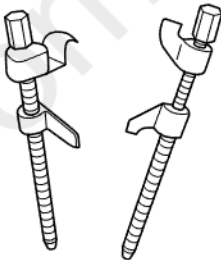
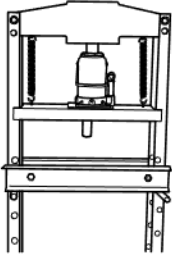
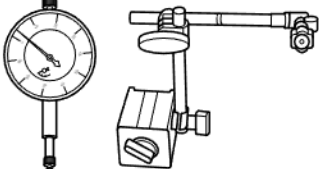
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Pulls	Tire (worn or improperly inflated)
	Rear wheel alignment (incorrect)
	Rear hub bearing (excessively worn)
	Rear suspension components (worn or deformed)
	Steering gear (misaligned or damaged)
	Suspension component (worn)
Droop	Vehicle (overloaded)
	Rear coil spring (too soft)
	Rear shock absorber assembly (worn or damaged)
	Rear suspension components (excessively worn or deformed)
	Rear tire (improperly inflated)
	Rear wheel alignment (incorrect)
Sways/pitches	Rear tire (worn or improperly inflated)
	Rear stabilizer bar assembly (bent or broken)
	Rear shock absorber assembly (worn or damaged)
Rear 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 (excessively worn)

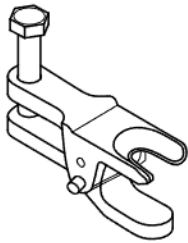
4 Removal & Installation

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Transmission Carrier	 S00004
Spring Compressor	 S00016
Hydraulic Press	 S00010
Dial Indicator and Magnetic Holder	 S00018

■ Special Tool

Tool Name	Part No.	Tool Drawing
Tie Rod Ball Remover	ECH-0002	 S00019

4.2 Replacement of Rear Shock Absorber Assembly

■ Description



1	Rear Shock Absorber Upper Connecting Plate Assembly	4	Hexagon Flange Nut
2	Rear Buffer Block Assembly	5	Rear Shock Absorber Assembly
3	Rear Shock Absorber Dust Boot		

■ On-vehicle Inspection

Rear Shock Absorber Assembly Inspection

- (1) 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.
- (1) As shock absorber assembly operates frequently during vehicle driving, oil gas is formed due to temperature rise of shock absorber, which then adheres to dust boot. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.
- (2) If following conditions occur:
 - Oil traces in circumferential direction are uneven;
 - Oil traces reach lower connecting positions.

Above conditions indicate that there may be a leakage in shock absorber assembly, and it is necessary to replace the shock absorber assembly.
- (3) If it is difficult to accurately judge if shock absorber assembly leaks 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 on the surface of shock absorber assembly, it indicates that oil leakage exists, and it is necessary to replace the shock absorber assembly.

■ Removal

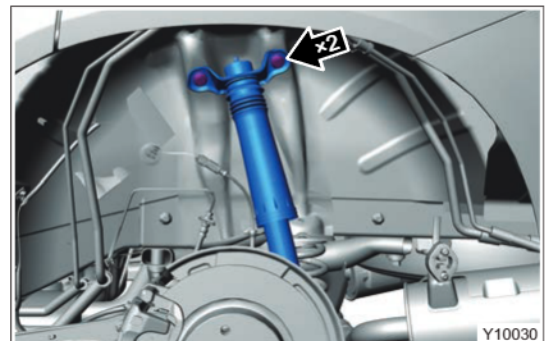
Hint:

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

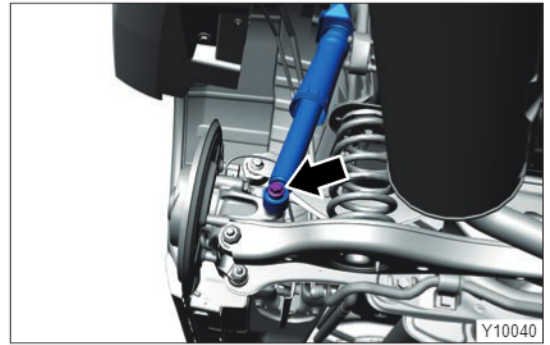
⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear left wheel.
- (4) Remove the rear left wheel house protector.
- (5) Remove 2 coupling bolts between upper part of rear left shock absorber assembly and body.



- (6) Remove coupling bolt between lower part of rear left shock absorber assembly and rear left steering knuckle assembly.



- (7) Remove the rear left shock absorber assembly.

■ Disassembly

Hint:

- Use same procedures for right and left sides.
 - Procedures listed below are for left side.
- (1) Remove fixing nut from rear left shock absorber assembly.



- (2) Remove the rear left shock absorber upper connecting plate assembly.



- (3) Remove the rear dust boot.



- (4) Remove the rear buffer block.



■ Assembly

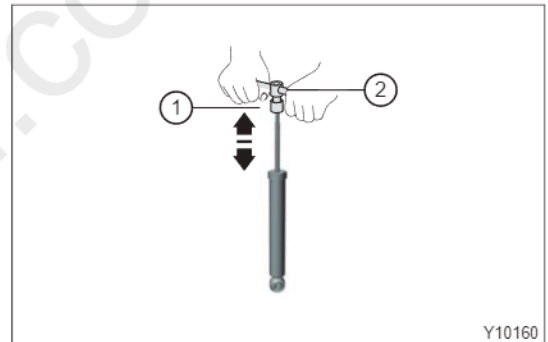
- (1) Install the rear buffer block.
- (2) Install the rear dust cover.
- (3) Install the rear left shock absorber upper connecting plate assembly.
- (4) Install fixing nut to rear left shock absorber assembly.

■ Inspection

- (1) Check the front shock absorber assembly.

Manual inspection

- 1) Install the locking nut (1) to the upper end of front shock absorber assembly strut, and then install the T-wrench (2) or equivalent.



- 2) 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.
- (2) Check the other components of front shock absorber assembly.
 - 1) 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.
 - 2) Check front coil spring for wear, cracks or deformation. Replace it as necessary.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Bounce vehicle up and down several times to stabilize rear suspension after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

- (1) Install coupling bolt between lower part of rear left shock absorber assembly and rear left steering knuckle assembly.

Torque: 160 ± 12 N·m

- (2) Install 2 coupling bolts between upper part of rear left shock absorber assembly and body.

Torque: 95 ± 6.7 N·m

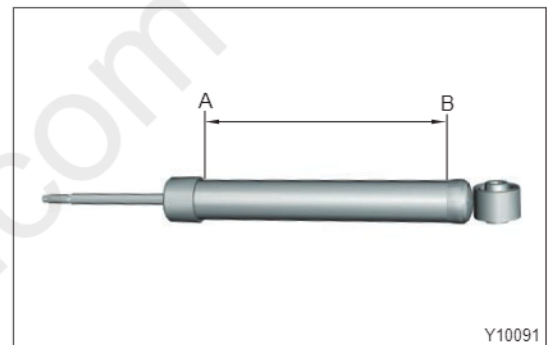
- (3) Install the rear left wheel house protector.
- (4) Install the rear left wheel.
- (5) Connect the negative battery cable.

■ 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 metal 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 and hydraulic oil.



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- (3) After discharging gas and hydraulic oil from rear shock absorber assembly, handle the rear shock absorber assembly properly.

Hint:

Recycle disposed rear shock absorber assembly according to local environmental regulations.

4.3 Replacement of Rear Coil Spring

■ Removal

Hint:

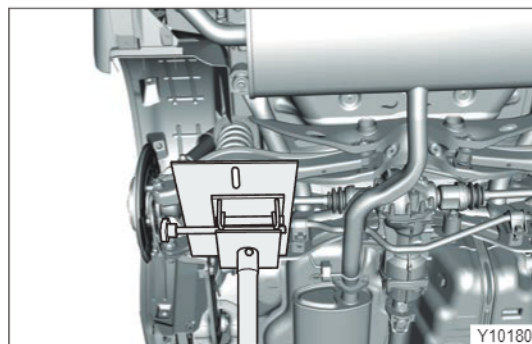
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

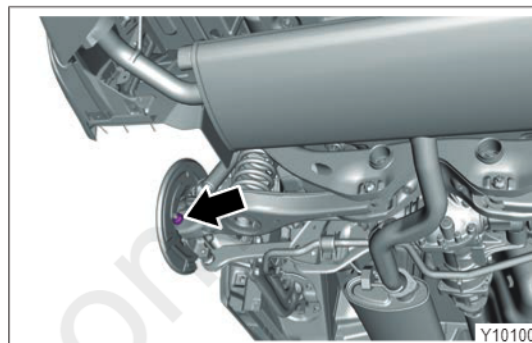
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear wheel.

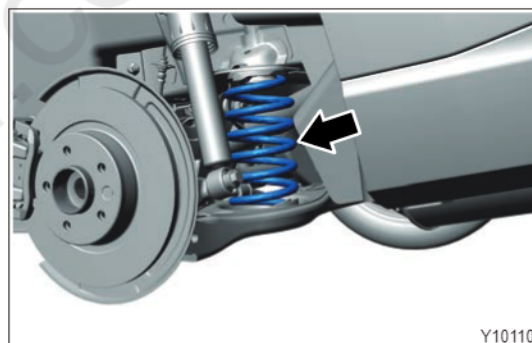
- (4) Support the rear lower control arm assembly with a transmission carrier securely.



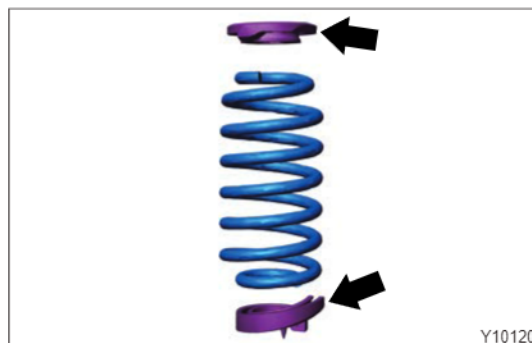
- (5) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.



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



- (7) Remove the rear coil spring upper and lower cushions.



■ Inspection

- (1) Check rear coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.
- (2) Check rear coil spring upper cushion and lower cushion for dirty, wear, cracks, deformation or damage. Replace it as necessary.
- (3) Check the free length of rear coil spring.

■ Installation

⚠ Caution

- 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 is completed. Adjust wheel alignment to standard range as necessary.

- (1) Install the rear coil spring upper and lower cushions.
- (2) Install coil spring and use transmission carrier to lift rear lower control arm to a proper height.
- (3) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: $165 \pm 12.4 \text{ N}\cdot\text{m}$

- (4) Slowly lower the transmission carrier and remove it.
- (5) Install the rear wheel.
- (6) Connect the negative battery cable.

4.4 Replacement of Rear Upper Control Arm Assembly

■ Removal

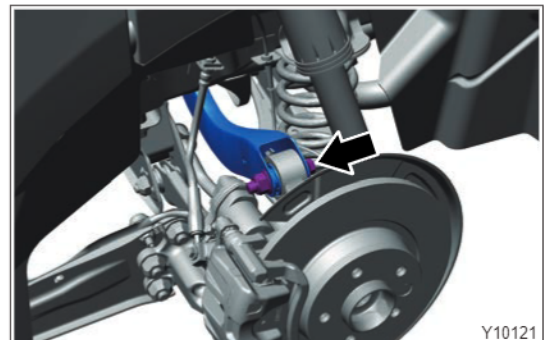
Hint:

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

⚠ Warning

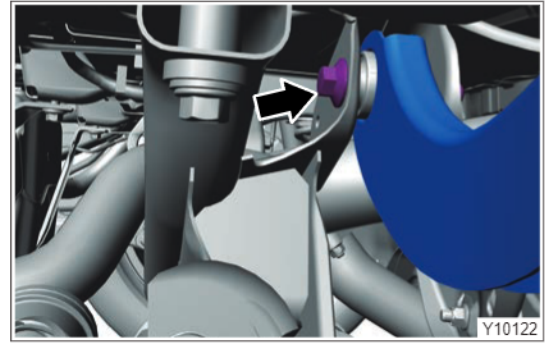
- Be sure to wear necessary safety equipment to prevent accidents.
- Check if safety lock of lifter is locked when repairing chassis parts.
- It is not allowed to weld or modify suspension loading parts and guide parts.
- When removing chassis parts, be sure to replace self-locking nuts and rusted nuts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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear wheel.
- (4) Remove coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

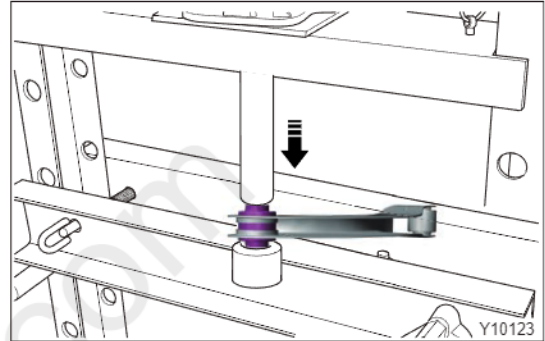


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- (5) Remove coupling bolt between rear upper control arm assembly and rear sub frame welding assembly.



- (6) Remove the rear upper control arm assembly.
- (7) Place the rear upper control arm assembly on a hydraulic press, cooperate with tools, and press out rear upper control arm assembly rubber bushing with hydraulic press.



■ Installation

⚠ Caution

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

- (1) Place the rear upper control arm assembly on a hydraulic press, cooperate with tools, and press control arm assembly rubber bushing into rear upper control arm with hydraulic press.

⚠ Caution

Before pressing in, apply grease on the outside of control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.

- (2) Install coupling bolt between rear upper control arm assembly and rear sub frame welding assembly.

Torque: 160 ± 12 N·m

- (3) Install coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

Torque: 160 ± 12 N·m

- (4) Install the rear wheel.
- (5) Connect the negative battery cable.

4.5 Replacement of Rear Lower Control Arm Assembly

■ Removal

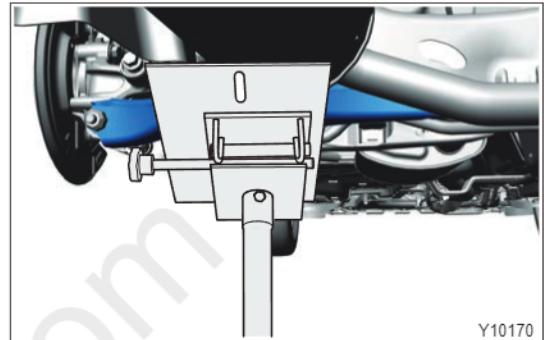
Hint:

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

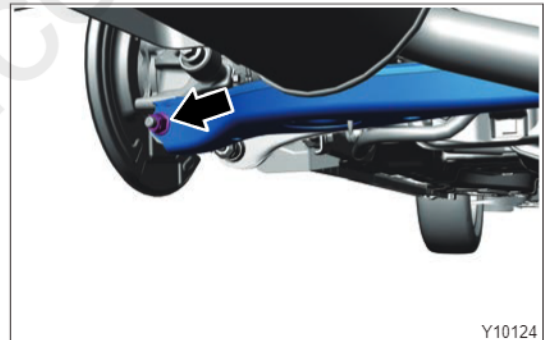
Warning

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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear wheel.
- (4) Support the rear lower control arm assembly with a transmission carrier securely.



- (5) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.



- (6) Lower the transmission carrier slowly to a proper height and remove rear coil spring, rear coil spring upper cushion and rear coil spring lower cushion carefully.
- (7) Remove coupling bolt, nut and adjusting shim between rear lower control arm assembly and rear sub frame welding assembly.



- (8) Remove the rear lower control arm assembly.

■ Installation

Caution

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

- (1) Install coupling bolt, nut and adjusting shim between rear lower control arm assembly and rear sub frame welding assembly.

Torque: $130 \pm 13.5 \text{ N}\cdot\text{m}$

- (2) Install rear coil spring, rear coil spring upper and lower cushions and use transmission carrier to lift rear lower control arm to a proper height.

- (3) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: $165 \pm 12.4 \text{ N}\cdot\text{m}$

- (4) Slowly lower the transmission carrier.

- (5) Install the rear wheel.

- (6) Connect the negative battery cable.

4.6 Replacement of Rear Trailing Arm Assembly

■ Removal

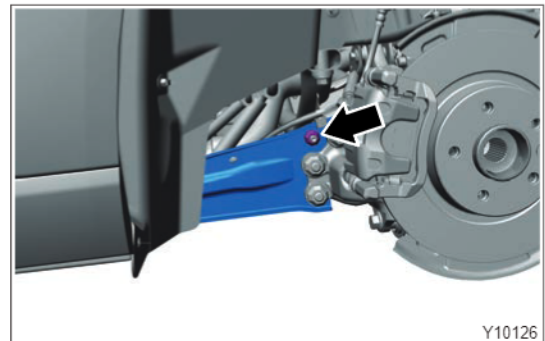
Hint:

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

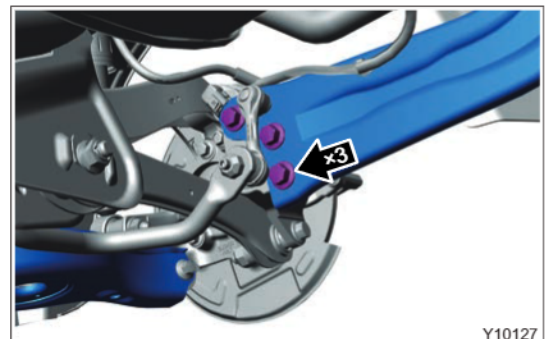
⚠ Warning

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

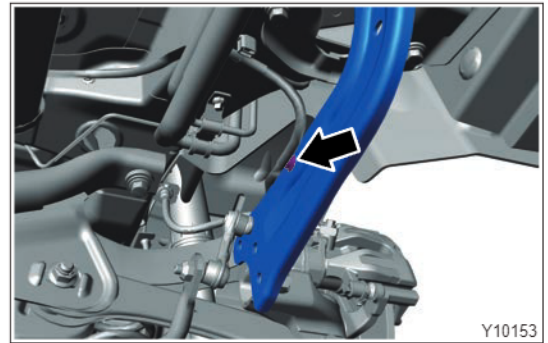
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear wheel.
- (4) Remove coupling nut between rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.



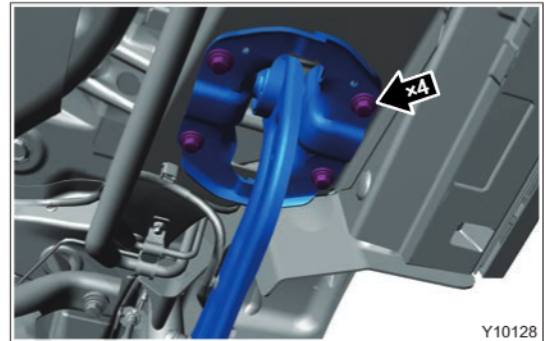
- (5) Remove 3 coupling bolts between rear steering knuckle assembly and rear trailing arm assembly.



- (6) Remove the wire harness clip.



- (7) Remove 4 coupling bolts between rear trailing arm assembly mounting bracket and body.

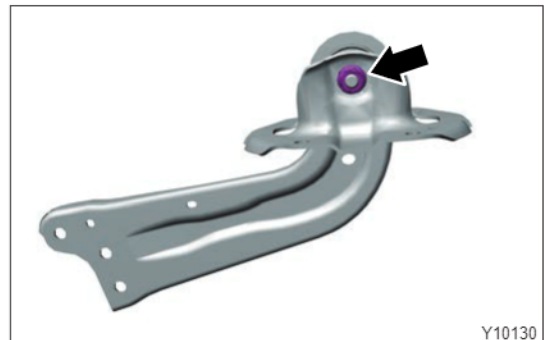


- (8) Remove the rear trailing arm assembly (w/ mounting bracket).

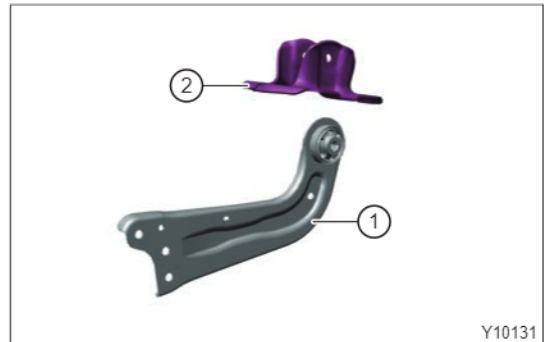
■ Disassembly

Hint:

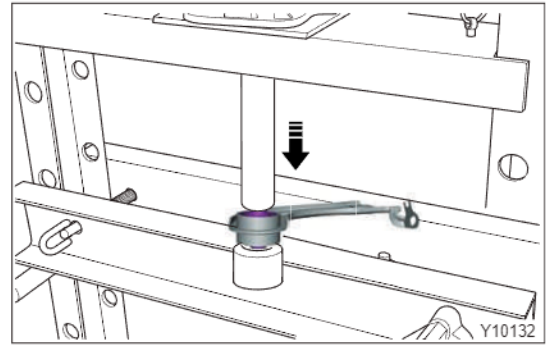
- Use same procedures for right and left sides.
 - Procedures listed below are for left side.
- (1) Remove coupling bolt and nut between rear trailing arm assembly and mounting bracket.



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



- (3) Place the rear trailing arm assembly on a hydraulic press, and press out rear trailing arm assembly rubber bushing with hydraulic press.



■ Assembly

- (1) Place the rear trailing arm assembly on a hydraulic press, cooperate with tools, and press rear trailing arm assembly rubber bushing into rear trailing arm assembly with hydraulic press.

⚠ Caution

Before pressing in, apply grease on the outside of trailing arm assembly rubber bushing to prevent it from damage.

- (2) Install coupling bolt and nut between rear trailing arm assembly and mounting bracket.

■ Installation

⚠ Caution

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

- (1) Install 4 coupling bolts between rear trailing arm assembly mounting bracket and body.

Torque: $65 \pm 5.5 \text{ N}\cdot\text{m}$

- (2) Install the wire harness clip.

- (3) Install 3 coupling bolts between rear steering knuckle assembly and rear trailing arm assembly.

Torque: $200 \pm 15 \text{ N}\cdot\text{m}$

- (4) Install coupling nut between rear connecting rod assembly and rear trailing arm assembly.

Torque: $55 \pm 4.1 \text{ N}\cdot\text{m}$

- (5) Install the rear wheel.

- (6) Connect the negative battery cable.

4.7 Replacement of Rear Pull Rod Assembly

■ Removal

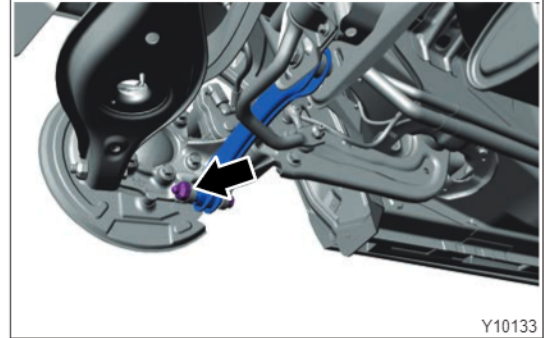
Hint:

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

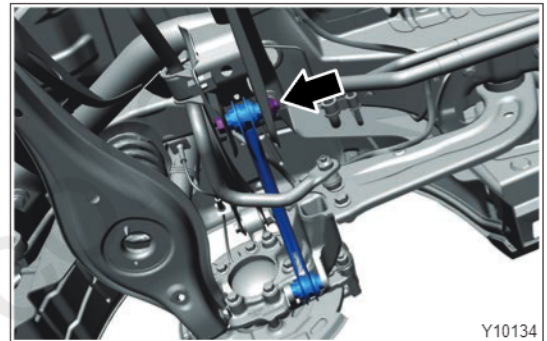
⚠ Warning

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

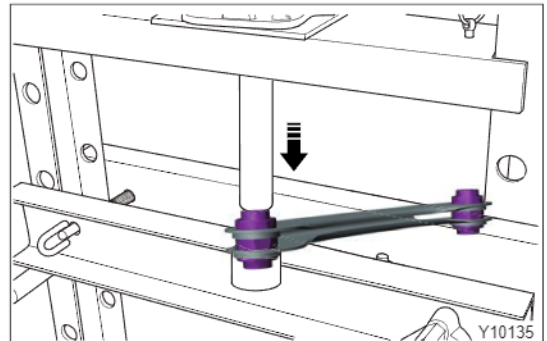
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear wheel.
- (4) Remove coupling bolt and nut between rear pull rod assembly and rear steering knuckle assembly.



- (5) Remove coupling bolt and nut between rear pull rod assembly and rear sub frame welding assembly.



- (6) Remove the rear pull rod assembly.
- (7) Place the rear pull rod assembly on a hydraulic press, and press out rear pull rod assembly rubber bushing with hydraulic press.



■ Installation

⚠ Caution

- Be sure to tighten coupling bolts and nuts to specified torques.

- (1) Place the rear pull rod assembly on a hydraulic press, cooperate with tools, and press rear pull rod assembly rubber bushing into rear pull rod assembly with hydraulic press.

⚠ Caution

Before pressing in, apply grease on the outside of rear pull rod assembly rubber bushing to prevent it from damage.

- (2) Install coupling bolt and nut between rear pull rod assembly and rear sub frame welding assembly.
- (3) Install coupling bolt and nut between rear pull rod assembly and rear steering knuckle assembly.
- (4) Install the rear wheel.
- (5) Connect the negative battery cable.

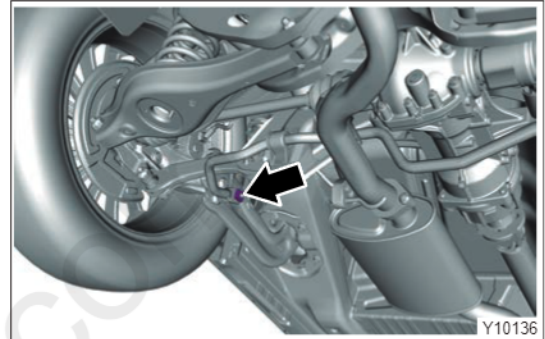
4.8 Replacement of Rear Stabilizer Bar Assembly

■ Removal

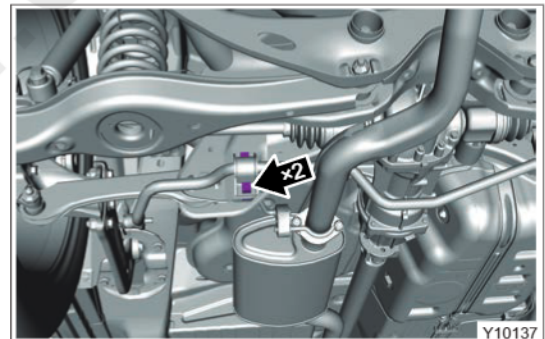
Warning

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

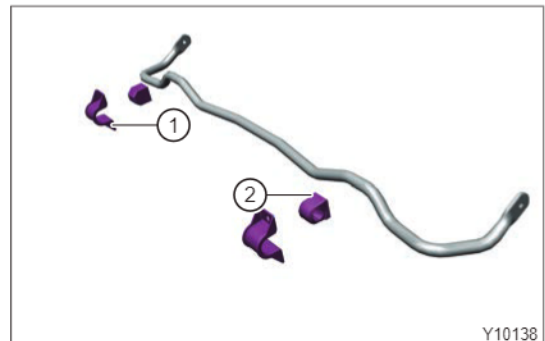
- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove coupling nut between rear left connecting rod assembly and rear stabilizer bar assembly. Use same removal procedure for right side.



- (4) Remove 2 coupling bolts between rear stabilizer bar assembly and rear sub frame welding assembly. Use same removal procedure for right side.



- (5) Remove the rear stabilizer bar assembly.
- (6) Remove rear stabilizer bar fixing clamp (1) and rear stabilizer bar rubber support (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

⚠ Caution

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

- (1) Install rear stabilizer bar fixing clamp (1) and rear stabilizer bar rubber support (2).
- (2) Install 2 coupling bolts between rear stabilizer bar assembly and rear sub frame welding assembly. Use same installation procedure for right side.

⚠ Caution

Due to rubber bushing deformation, false torque may be exist on tightened bolt, so it is necessary to retighten the tightened bolt.

Torque: 45 ± 4 N·m

- (3) Place rear connecting rod shield on rear connecting rod, install coupling nut between rear left connecting rod assembly and rear stabilizer bar assembly. Use same installation procedure for right side.

Torque: 55 ± 4.1 N·m

- (4) Connect the negative battery cable.

4.9 Replacement of Rear Connecting Rod Assembly

■ Removal

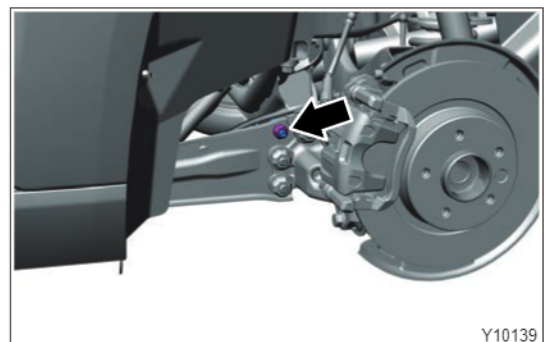
Hint:

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

⚠ Warning

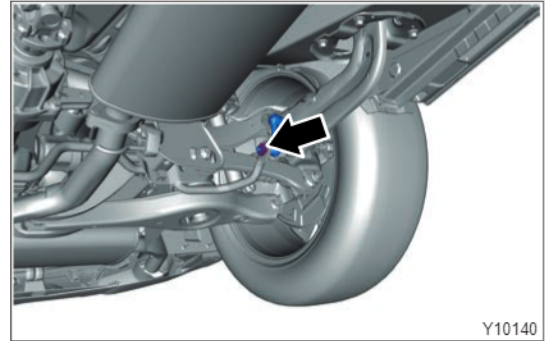
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove coupling nut between rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.



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- (4) Remove coupling nut between rear connecting rod assembly and rear stabilizer bar assembly, and remove 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

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Make sure that end of rear connecting rod assembly rotates smoothly without any sticking after installation.**

- (1) Install coupling nut between rear connecting rod assembly and rear stabilizer bar assembly.

Torque: $55 \pm 4.1 \text{ N}\cdot\text{m}$

- (2) Install coupling nut between rear connecting rod assembly and rear trailing arm assembly.

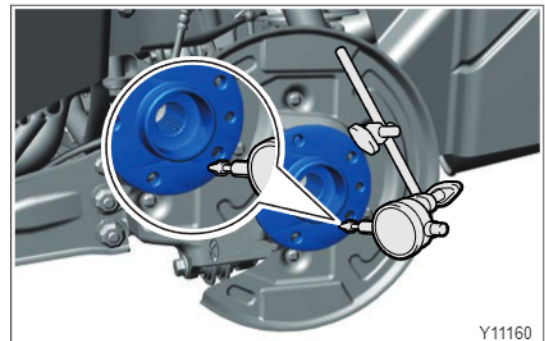
Torque: $55 \pm 4.1 \text{ N}\cdot\text{m}$

- (3) Connect the negative battery cable.

4.10 Replacement of Rear Hub Bearing Assembly

■ On-vehicle Inspection

- (1) Remove the rear wheel.
- (2) Remove the rear brake caliper assembly.
- (3) Remove the rear brake disc.
- (4) Check the rear hub bearing looseness.
 - 1) Check looseness near center of the rear hub bearing with a dial indicator.

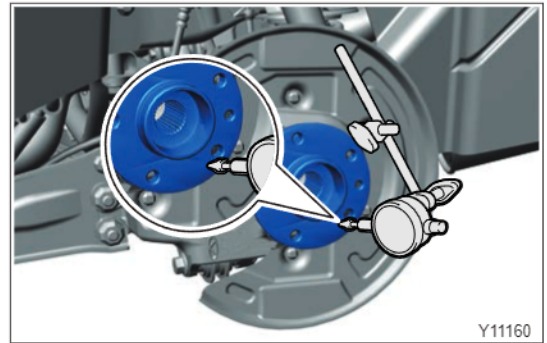


⚠ Caution

- **Ensure that dial indicator is perpendicular to measurement surface.**
- **If looseness exceeds maximum value, replace the rear hub bearing assembly.**

- (5) Check the rear hub bearing runout.

- 1) Check runout of the rear hub bearing assembly surface with a dial indicator.



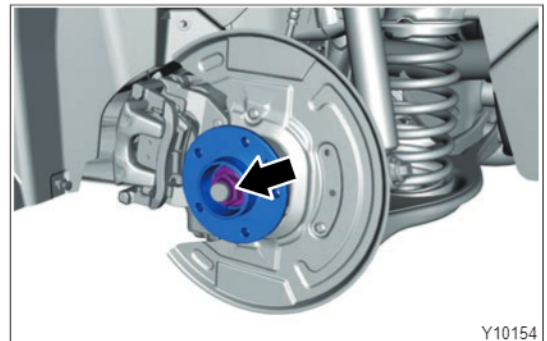
Caution

- Ensure that dial indicator is perpendicular to measurement surface.
- If looseness exceeds maximum value, replace the rear hub bearing assembly.

■ Removal

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 rear left wheel.
 - (4) Remove the rear left brake caliper assembly.
 - (5) Remove the rear left brake disc.
 - (6) Remove locking nut from rear left drive shaft.



- (7) Remove the rear hub bearing.

■ Installation

Caution

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

- (1) Install locking nut to rear left drive shaft.

Torque: 286 ± 23 N·m

- (2) Install the rear left brake disc.
- (3) Install the rear brake caliper assembly.
- (4) Install the rear left wheel.
- (5) Connect the negative battery cable.

4.11 Replacement of Rear Steering Knuckle

■ Removal

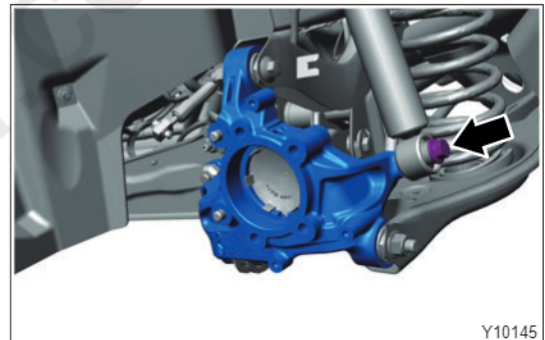
Hint:

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

Warning

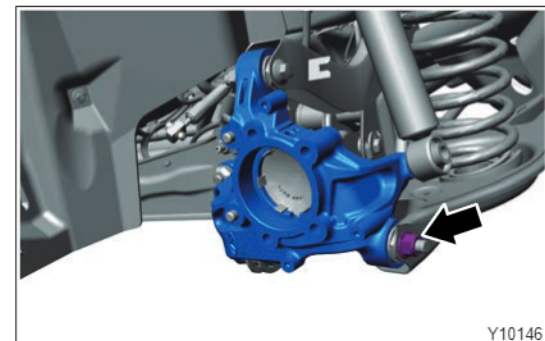
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear wheel.
- (4) Remove the rear brake caliper assembly.
- (5) Remove the rear brake disc.
- (6) Remove the rear dust guard.
- (7) Remove the rear wheel speed sensor.
- (8) Remove the rear hub bearing.
- (9) Remove coupling bolt between rear shock absorber assembly and rear steering knuckle assembly.



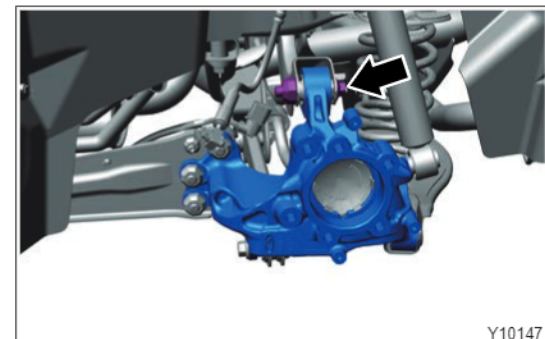
Y10145

- (10) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.



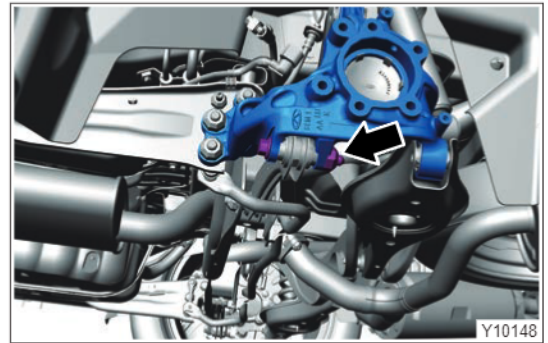
Y10146

- (11) Remove coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

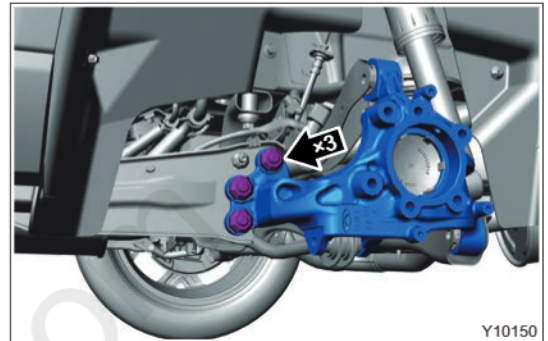


Y10147

- (12) Remove coupling bolt and nut between pull rod assembly and rear steering knuckle assembly.



- (13) Remove 3 coupling bolts between rear steering knuckle assembly and rear trailing arm assembly.



- (14) Remove the rear steering knuckle assembly.

■ Installation

⚠ Caution

- **Be sure to tighten bolt to specified torque.**
- **Check wheel alignment after installation. Adjust wheel alignment to the standard range as necessary.**

- (1) Install 3 coupling bolts between rear steering knuckle assembly and rear trailing arm assembly.

Torque: $200 \pm 15 \text{ N}\cdot\text{m}$

- (2) Install coupling bolt and nut between pull rod assembly and rear steering knuckle assembly.

- (3) Install coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

Torque: $160 \pm 12 \text{ N}\cdot\text{m}$

- (4) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: $165 \pm 12.4 \text{ N}\cdot\text{m}$

- (5) Install coupling bolt between rear shock absorber assembly and rear steering knuckle assembly.

Torque: $95 \pm 7.3 \text{ N}\cdot\text{m}$

- (6) Install the rear hub bearing.
 (7) Install the rear wheel speed sensor.
 (8) Install the rear dust guard.
 (9) Install the rear brake disc.
 (10) Install the rear brake caliper assembly.
 (11) Install the rear wheel.
 (12) Connect the negative battery cable.

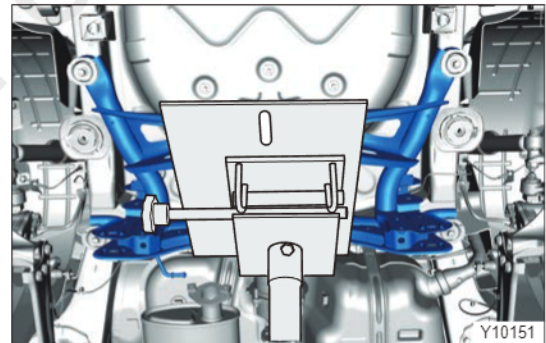
4.12 Replacement of Rear Sub Frame Welding Assembly

■ Removal

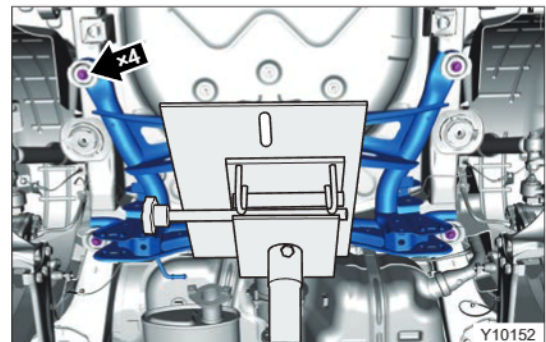
⚠ Warning

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

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the rear wheel.
- (4) Remove the rear brake caliper assembly.
- (5) Remove the rear brake disc.
- (6) Remove the rear hub shaft assembly.
- (7) Remove the rear steering knuckle assembly.
- (8) Remove the rear lower control arm assembly.
- (9) Remove the rear pull rod assembly.
- (10) Remove the rear stabilizer bar assembly.
- (11) Remove the rear drive shaft assembly.
- (12) Remove the rear final drive assembly.
- (13) Install transmission carrier to support rear sub frame assembly.



- (14) Remove 4 coupling bolts between rear sub frame assembly and body.



- (15) Remove the rear sub frame assembly.

■ Installation

⚠ Caution

- Be sure to tighten coupling bolts and nuts to specified torques.
- Bounce vehicle up and down several times to stabilize rear suspension after installation.
- Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.

- (1) Install transmission carrier to lift rear sub frame to a proper height.
- (2) Install 4 coupling bolts between rear sub frame assembly and body.

Torque: 95 ± 7.1 N·m

- (3) Install the rear stabilizer bar assembly.
- (4) Install the pull rod assembly.
- (5) Install the rear lower control arm assembly.
- (6) Install the rear steering knuckle assembly.
- (7) Install the rear hub shaft assembly.
- (8) Install the rear brake disc.
- (9) Install the rear brake caliper assembly.
- (10) Install the rear wheel.
- (11) Connect the negative battery cable.

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6.3 FOUR-WHEEL ALIGNMENT

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

- (1) Be sure to perform wheel alignment procedures according to operating instructions of four-wheel alignment device.
- (2) Periodic maintenance and service for four-wheel alignment device should be performed.
- (3) After four-wheel alignment, it is necessary to recalibrate center calibration.
- (4) After four-wheel alignment, it is necessary to calibrate the zero point of SAM steering angle and the motor position sensor inside EPS module.

2 System Overview

2.1 System Description

Installation of four wheels, steering mechanism, front and rear axles should have a certain relative position, and this relative position is a standard value set by manufacturer. This mounting position is adjusted and restored by wheel alignment.

In general, wheel alignment has the following 6 parameters:

- (1) Check front wheel camber.
- (2) Check front wheel toe-in.
- (3) Check kingpin caster.
- (4) Check kingpin inclination.
- (5) Check rear wheel camber.
- (6) Check rear wheel toe-in.

3 Parameter Operation Description

3.1 System Function Introduction

Front wheel alignment includes kingpin caster, kingpin inclination, front wheel camber and front wheel toe-in. Rear wheel alignment includes wheel camber and each rear wheel toe-in. In this way, front wheel alignment and rear wheel alignment are called wheel alignment, which is often called four-wheel alignment. Wheel alignment functions to keep vehicle driving in stable straight line and light steering, and reduce wear of tires and steering gear parts during driving.

3.2 Kingpin Caster

Looking at wheel from side, steering kingpin (the center of rotation when the wheel turns) tilts backward, which is called kingpin caster. After setting kingpin caster, there is a distance (called kingpin caster distance, which has the same principle with that of front wheel cross beam of bicycle tilting backward) between ground point of kingpin center line and ground projection point of wheel center. The ground point of wheel is located at rear end of extension line of steering kingpin, and wheel is pulled backward by rolling resistance during driving, so that the direction of wheel is naturally toward driving direction. Setting a large kingpin caster can improve straight line driving performance, and kingpin caster distance is also increased. If kingpin caster distance is too large, steering wheel will be heavy and wheel bumps will be increased due to road interference.

3.3 Kingpin Inclination

When looking at the tire from front and rear direction of vehicle, kingpin is inclined toward the inside of vehicle body. This angle is called kingpin inclination. When wheel turns around kingpin, the lowest point of wheel will fall below road surface, but in fact, the lower edge of wheel cannot fall below road surface. Instead, the steering vehicle wheel and entire front of vehicle are lifted up to a corresponding height. The gravity of vehicle has effect of returning steering vehicle wheels to original middle position, so steering wheel is easy to reset.

In addition, kingpin inclination also reduces the distance between intersection of kingpin and road to intersection of wheel center plane and ground, thereby reducing driver's force on steering wheel during steering, making steering easier and reducing the impact force transmitted from steering vehicle wheel to steering wheel. However, kingpin inclination should not be too large, otherwise it will accelerate tire wear.

3.4 Front Wheel Camber

When looking at wheel from front and rear direction, tires are not installed vertically, but slightly tilted to show an "\/" shape, which is called negative camber, and when it is tilted in opposite direction, it is called positive camber. In heyday of using bias tires, camber was set to be relatively large because it made it easier to operate the steering wheel by tilting the tires to the ground. Vehicle generally sets camber to be very small, close to vertical. The use of flat radial tires for automobiles continues to grow in popularity. Due to characteristics of radial tires (large rigid tire tread pattern and wide outer tread), setting a large camber will cause tire to wear out and reduce tire friction. Also, due to continuous use of power steering mechanism, camber has been continuously reduced. Nevertheless, setting a small camber can apply appropriate lateral thrust to wheel bearings on axle.

3.5 Front Wheel Toe-in

Four-wheel alignment toe value

Toe-in, the so-called "pigeon toe", refers to the front left and front right wheels being pointed inward respectively. The purpose of adopting this structure is to correct outward rotation of wheel caused by front wheel camber. As mentioned above, due to camber, the steering wheel operation becomes more easy. On the other hand, due to the tilt of wheels, front left and front right wheels rotate to outside respectively. To correct this problem, the left and right wheels have an inward angle, thus left and right wheels can keep moving in a straight line and reducing tire wear.

4 Specifications (parameters standard for four-wheel alignment)

Items		Specified Value
Front Wheel	Front Wheel Camber	$-30' \pm 30'$
	Kingpin Caster	$6^{\circ}43' \pm 45'$
	Kingpin Inclination	$13^{\circ}54' \pm 45'$
	Front Wheel Toe-in	$8' \pm 6'$
Rear Wheel	Rear Wheel Camber	$-1^{\circ}11' \pm 30'$
	Rear Wheel Toe-in	$10' \pm 6'$

5 DIAGNOSIS INFORMATION AND STEPS

5.1 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 them as necessary.

Symptom	Suspected Area
Vehicle pulls	Front wheel alignment (incorrect)
	Rear wheel alignment (incorrect)
Wheel shimmy	Front wheel alignment (incorrect)
	Rear wheel alignment (incorrect)
Abnormal tire wear	Tire (worn or improperly inflated)
	Front wheel alignment (incorrect)
	Rear wheel alignment (incorrect)

6 On-Vehicle Inspection

6.1 Inspection before 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 torsion beam welding assembly

- (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 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 specified range and adjust it to specified pressure as necessary.

Items	Front Wheel	Rear Wheel	Spare Tire
Tire Pressure (kPa) (Unloaded)	230	230	N/A

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

6.2 Front Wheel Camber

- (1) Incorrect front wheel camber will cause abnormal tire wear. Check and adjust front wheel camber as necessary.
In normal conditions, it is not necessary to adjust camber after assembling the 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:

Items	Parameter
Front Wheel Camber	-30' ± 30'

■ 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.

6.3 Front Wheel Toe-in

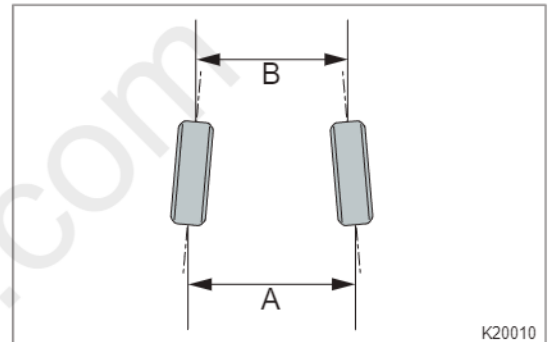
- (1) Incorrect front wheel toe-in will cause wheel pull and abnormal tire wear. Check and adjust front wheel toe-in as necessary.
If front wheel toe-in is not within the tolerance due to other reasons, adjust the length of steering tie rod to return the toe-in to specified value.

Specified Value for Front Wheel Toe-in:

Items	Parameter
Front Wheel Toe-in	8' ± 6'

■ Inspection

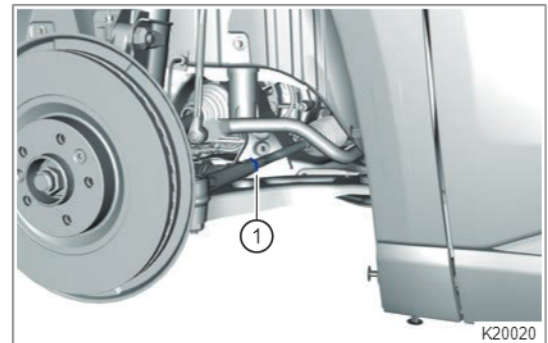
- (1) Perform inspection with four-wheel alignment device (perform inspection procedures by referring to operating instructions for four-wheel alignment device).
- (2) Manual check:
 - 1) Park vehicle on level ground, check if front tire pressure is within the specified range and adjust it to specified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



K20010

■ Adjustment

- (1) Make adjusting preparation for wheel alignment according to requirement of tester.
- (2) Loosen the locking nut (1) of steering tie rod, and turn the tie rod to adjust the length as required until front wheel toe-in reaches the specified value.



K20020

- (3) Tighten the steering tie rod locking nut (23# dual-purpose wrench) and reinstall the elastic jacket snap ring. Check if locking nut is tightened in place and if jacket position is correct.
Tightening torque: 50 ± 5 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 (22# socket wrench) to specified torque.
Tightening torque: 48 ± 4 N•m

6.4 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 connected to steering knuckle are deformed or damaged. In addition, check the connecting part of steering knuckle for deformation or damage.

If so, replace corresponding components.

Specified Value for Kingpin Caster & Kingpin Inclination:

Items	Parameter
Kingpin Caster	$6^{\circ}43' \pm 45'$
Kingpin Inclination	$13^{\circ}54' \pm 45'$

6.5 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 lower 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.

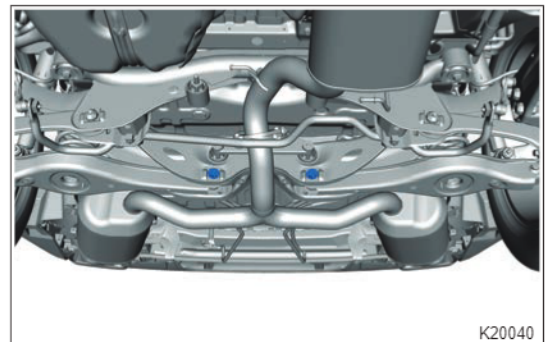
Specified Value for Rear Wheel Camber:

Items	Parameter
Rear Wheel Camber	$-1^{\circ}11' \pm 30'$

■ Adjustment

- (1) Make adjusting preparation for wheel alignment according to requirement of tester.

- (2) Loosen the coupling bolts (18# socket wrench) between rear lower control arm assembly and rear sub frame welding assembly, be careful that eccentric adjusting shim does not detach from groove.



- (3) Rotate the eccentric adjusting shim and eccentric adjusting bolt to adjust rear wheel camber to specified value.

- (4) Tighten the coupling bolts (18# socket wrench) 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).

Tightening torque: $100 \pm 7.5 \text{ N}\cdot\text{m}$

6.6 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 tie rod 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.

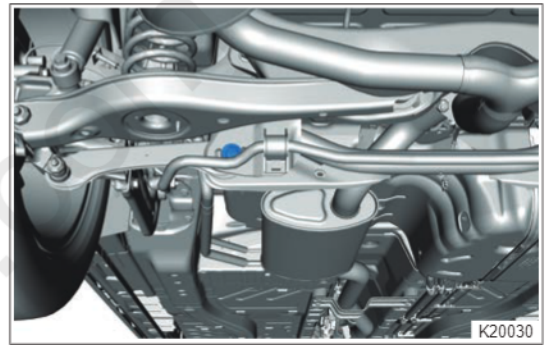
Specified Value for Rear Wheel Toe-in:

Items	Parameter
Rear Wheel Toe-in	10' ± 6'

■ Adjustment

- (1) Make adjusting preparation for wheel alignment according to requirement of tester.

- (2) Loosen the coupling bolts (21# socket wrench) between tie rod assembly and rear sub frame welding assembly, be careful that eccentric adjusting shim does not detach from groove.



- (3) Rotate the eccentric adjusting bolt and eccentric adjusting sleeve to adjust rear wheel toe-in to specified value.
- (4) Tighten the coupling bolts (21# socket wrench) between tie rod assembly and rear sub frame welding assembly to specified torque after adjustment (adjusting method of left and right wheels is the same).
Tightening torque: $130 \pm 10 \text{ N}\cdot\text{m}$

6.4 TIRE AND WHEEL

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

- (1) Use tire pressure gauge when inflating, and never inflate according to the tire pressure indication on meter. If inflating tires using pressure values displayed from tire pressure monitoring system, inflation pressure may be higher than tire standard value, resulting in a risk of accident.
- (2) If the tire pressure is too low, please resume it to normal pressure as soon as possible. Too low tire pressure will increase fuel consumption and tire wear. And seriously worn tire will cause an accident such as flat tire.
- (3) Speed level of new replaced tire must meet the specified values for safe operation; otherwise the tire may blow out.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

- (1) Be sure to refer to the instruction when installing non-standard tires and rims.
- (2) Use tires with standard specification and type.
- (3) Avoid scratching tires and rims when removing and installing tires.
- (4) Spare tire is not equipped with tire pressure sensor, so there will be malfunction in tire pressure monitoring system when spare tire is used in vehicle equipped with tire pressure monitoring system.
- (5) Before assembling the tire, apply glycerin or soapy water to the rim area of tire.
- (6) The four driving tires mounted on the same vehicle must be from the same manufacturer and are not allowed to be mixed.
- (7) Always use torque wrench when installing tire pressure sensor, with a torque of $5 \pm 0.5 \text{ N}\cdot\text{m}$.
- (8) Use tires only with the standard specification and type, because they have excellent reliability and skid resistance. Using a non-standard tire may lead to vehicle malfunction, which may cause an accident, resulting in serious injury or even death.
- (9) Contact surface between rim and tire should be cleaned before installing a new tire.
- (10) When installing wheel bolts, firstly, pre-tighten the bolts by hand, and then tighten them to the specified torque with a torque wrench.
- (11) Do not apply grease to the wheel bolts.
- (12) Some bad driving habits may shorten the tire life:
 - 1) Rapid acceleration;
 - 2) Depressing brake pedal suddenly and firmly;
 - 3) High-speed driving;
 - 4) Turning at excessive speed;
 - 5) Striking curbs or other obstacles;
 - 6) Tire pressure is too high or too low when driving vehicle.
- (13) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

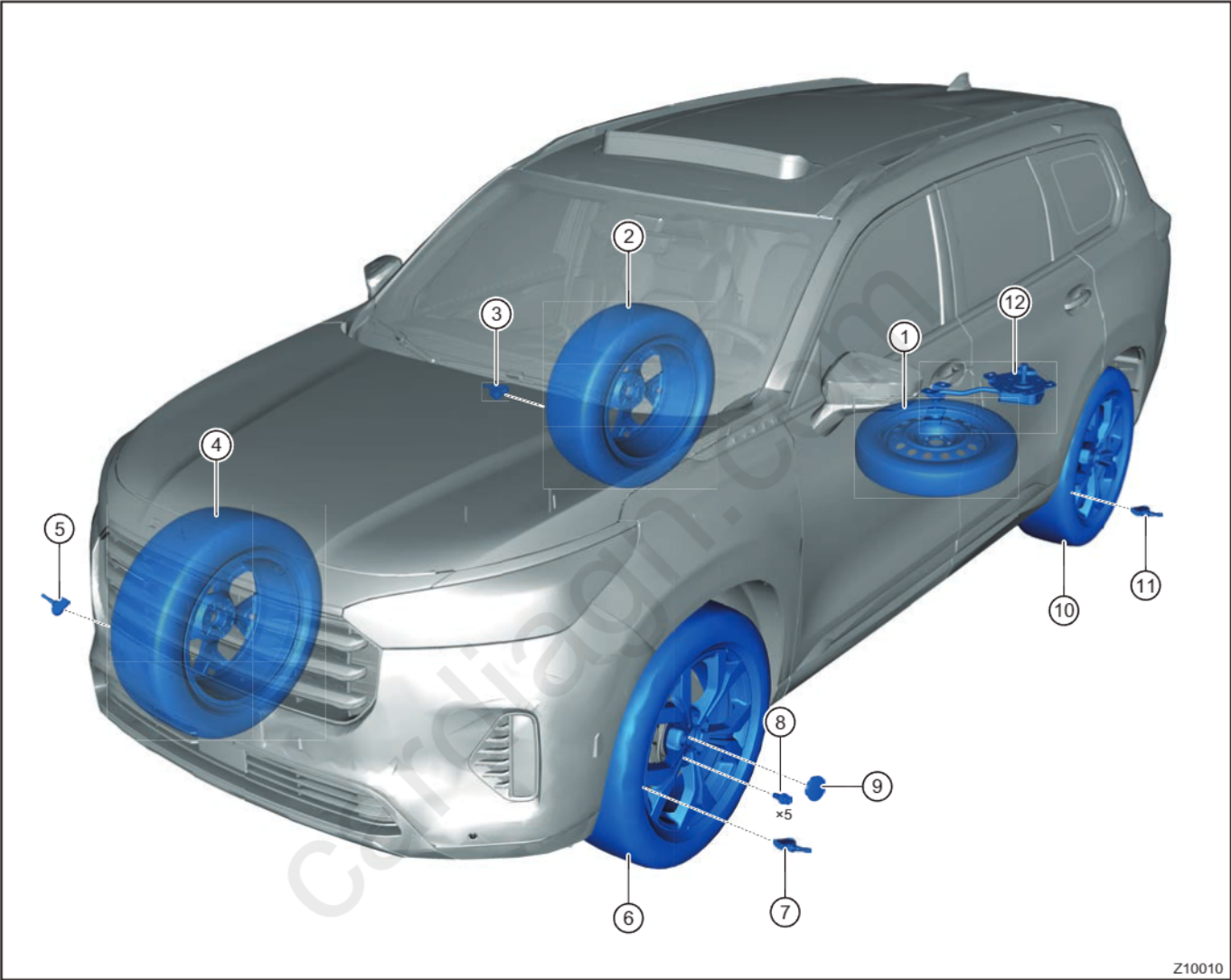
2.1 System Description

Wheel is a rotating component that bears load between tire and axle. It is usually composed of two main components, rim and spoke. Rim is a component for mounting and supporting tire on wheel, and spoke is a

supporting component between axle and rim on wheel. Wheels sometimes contain hubs in addition to above components.

Tire is a rolling toroidal elastic rubber equipment assembled to vehicle on the ground. It is usually installed on metal rim, and can support vehicle body to cushion outside impact, realize contact with road surface and ensure driving performance of vehicle. Tire is often used in complex and harsh conditions, it is under a variety of deformation, load, force and high and low temperature when driving, so it must have high load-bearing performance, traction performance, buffer performance.

2.2 System Components Diagram



1	Spare Tire Assembly	7	Front Left Wheel Tire Pressure Sensor
2	Rear Right Wheel	8	Wheel Bolt
3	Rear Right Wheel Tire Pressure Sensor	9	Trim Cover
4	Front Right Wheel	10	Rear Left Wheel
5	Front Right Wheel Tire Pressure Sensor	11	Rear Left Wheel Tire Pressure Sensor
6	Front Left Wheel		

2.3 Component Operation Description

■ Tire

Tire is one of important parts of vehicle. It directly contacts with road surface and works with vehicle suspension to cushion impact of vehicle while driving. Ensure that the vehicle has good seating and riding comforts and good adhesion between wheels and road surface to improve vehicle traction, braking and trafficability and bear weight of vehicle.



Z10020

■ Tire Identification

Letter and number code of tire type, size, load index and speed level are stamped on the side wall of tire as shown in the illustration.

This model is equipped with 3 sizes of tires (235/55R19, 245/45R20), and different sizes are equipped with different rim shapes, which should be subject to actual vehicle.



Z10030

3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:

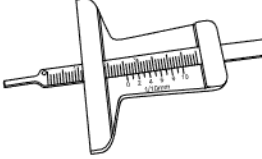
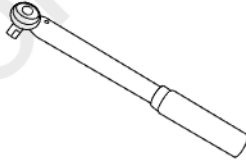
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
Wear on one side of tire	Wheel alignment (incorrect)
Wear on both sides of tire	Tire pressure (insufficient)
Tire center wear	Tire pressure (excessive)
Serrated wear	Wheel alignment (incorrect)
Severe wear on partial area of tire	Braking (too hard)
Scratches on side wall of tire	Sharp objects on road (scratched)
Excessive tire noise	Tire pressure (incorrect)
	Tire (worn)

4 Removal and Installation

4.1 Tool

■ General Tool

Tool Name	Tool Drawing
Tire Depth Gauge	 S00068
5 - 25 N·m Torque Wrench	 S00079

4.2 Wheel Replacement

■ Precautions Before Tire Replacement

⚠ Caution

- Spare tire is not equipped with tire pressure sensor, so there will be malfunction in tire pressure monitoring system when spare tire is used in vehicle equipped with tire pressure monitoring system.

⚠ Warning

- Speed level of new replaced tire must meet the specified values for safe operation; otherwise the tire may blow out.

- (1) Remove the wheel.
- (2) Use a tire remover to remove tires according to the instructions.

⚠ Caution

- When removing and installing tire with tire pressure sensor, be sure to strictly refer to the Tire Pressure Monitoring section.
- Always use torque wrench when installing tire pressure sensor, with a torque of $5 \pm 0.5 \text{ N}\cdot\text{m}$.
- When installing wheel assembly with TPMS, align dynamic balance testing mark (light point) on tire with valve core (TPMS) position on rim.
- Before installing air valve, check if air valve hole of wheel is smooth without any burrs, and apply glycerin to air valve rubber surface or soak air valve into glycerin fluid, and then pull or press the locating ring of air valve by force to pass it through the air valve hole and install it into place (it is possible to use soapy water instead of glycerin).
- The four driving tires mounted on the same vehicle must be from the same manufacturer and are not allowed to be mixed.
- Before assembling the tire, apply glycerin or soapy water to the rim area of tire.
- When there is "dark point" mark on rim, align the dynamic balance testing mark on tire with "dark point" mark on rim.
- When there is no "dark point" mark on rim, align the dynamic balance testing mark on tire with the air valve.

(3) Adjust tire pressure to specified value.

⚠ Caution

- Before performing four wheel alignment, check the four tires pressure and adjust the pressure: it is recommended to adjust tire pressure to recommended tire pressure on door frame label.
- The rated inflation pressure of T-type spare tire assembly is 420 kPa, and store spare tire in isolation from 4 loaded wheels.
- Please replace the tires only with standard specification and type.

(4) Check contact surface among air valve, tire and rim for leakage.

(5) Using a dynamic balancer, adjust the wheel balance.

(6) Install the wheel.

Torque: $130 \pm 10 \text{ N}\cdot\text{m}$

⚠ Caution

- Avoid scratching tires and rims when removing tires.
- Contact surface between tire and rim should be cleaned when installing tires.

■ Tire Inspection**⚠ Caution**

- Be sure to refer to the instruction when installing non-standard tires and rims.
- Use tires with standard specification and type.

(1) Check if tires are scratched or damaged as shown in the illustration.

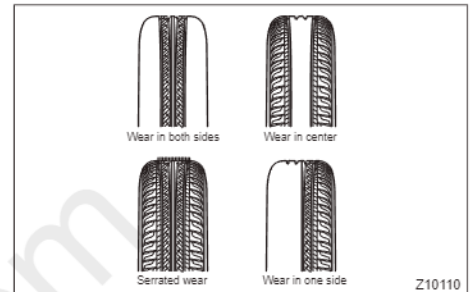


Z10090

- (2) Check if rims are scratched or damaged as shown in the illustration.



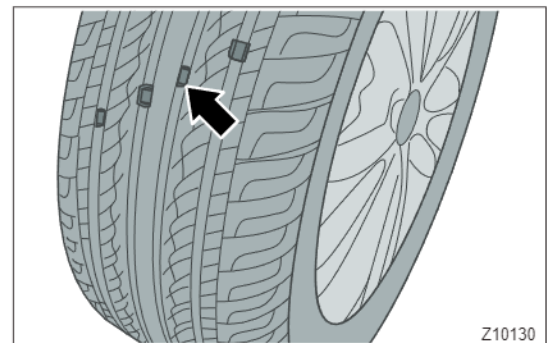
- (3) Check if tires are worn abnormally as shown in the illustration.



- (4) Measure the tread pattern depth with a tire depth gauge. When the depth is less than 1.6 mm, the tire should be replaced.



- (5) Check the tread wear indicators. When tires are worn to the indicating mark, replace them.



- (6) Use tire pressure gauge to check if pressures of all tires (including spare tire) are normal. Inflate tires to specified tire pressure as necessary.

Warning

- Use tire pressure gauge when inflating, and never inflate according to the tire pressure indication on meter. If inflating tires using pressure values displayed from tire pressure monitoring system, inflation pressure may be higher than tire standard value, resulting in a risk of accident.
- If the tire pressure is too low, please resume it to normal pressure as soon as possible. Too low tire pressure will increase fuel consumption and tire wear. And seriously worn tire will cause an accident such as flat tire.

- (7) Check air valve for leakage.



■ Removal

- (1) Stop vehicle at a level surface and apply parking brake.
- (2) Turn off all electrical equipment and ENGINE START STOP switch.
- (3) Disconnect the negative battery cable.
- (4) Using a tire wrench, loosen the wheel mounting bolts.
- (5) Firmly support and raise the vehicle to a proper height.
- (6) Using a tire wrench, remove 5 wheel mounting bolts (17# socket wrench).



- (7) Remove the wheel.

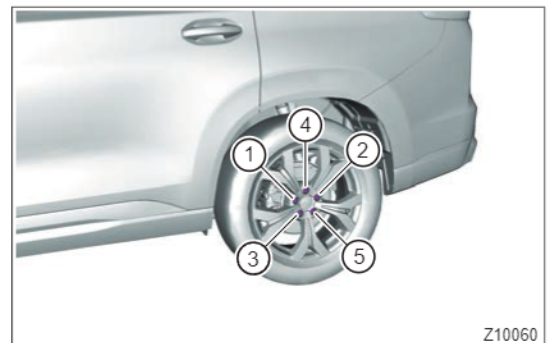
⚠ Caution

When removing and installing the wheel with tire pressure sensor, the tire pressure monitoring section must be strictly referred to.

■ Installation

- (1) Anti-corrosion and anti-rust treatment is conducted on the contact surface between wheel and brake disc.
- (2) Install the wheel and pre-tighten the wheel mounting bolts by hand.
- (3) Using a torque wrench, tighten the wheel mounting bolts evenly to the specified torque in the order shown in the illustration (17# socket wrench).

Torque: $130 \pm 10 \text{ N}\cdot\text{m}$



- (4) Connect the negative battery cable.

■ Tire Inflation

- Do not inflate tires with high tire temperature, which will cause serious damage to the tire, even blowouts, resulting in accidents.

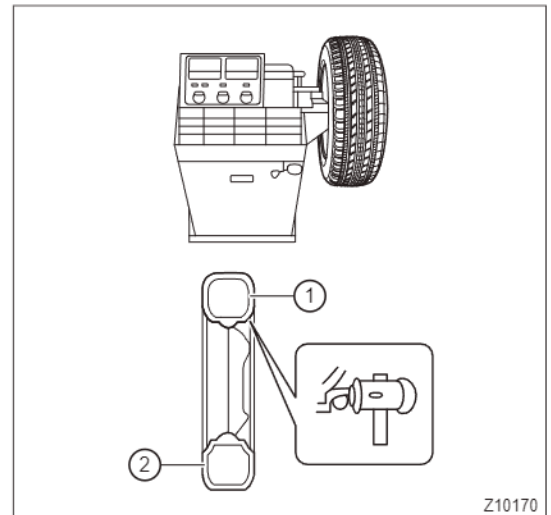
- Do not inflate tires depending on values displayed from tire pressure monitoring system. Tire pressure monitoring system can monitor tire pressure and temperature in real time only when vehicle speed is more than 30 km/h. If inflating tires using pressure values displayed from tire pressure monitoring system, inflation value may be higher than tire standard value, which will cause accidents.
- When vehicle is driving normally, heat is generated in the tire due to friction, which will cause tire pressure to increase. Exposure of tires to the sunlight may also cause an increase in air pressure, resulting in a change in tire pressure. For every 10°C increase in tire temperature, tire pressure will increase by about 0.1 bar.

■ Wheel Balance

⚠ Caution

- **Dynamic balancer must be calibrated before adjusting wheel balance.**
- **Remove impurities inside tread pattern and original balance blocks to ensure wheel balance.**

- (1) Remove the wheel.
- (2) Adjust tire pressure to specified value.
- (3) Install wheel with balance block removed to balancer. Install the balance shaft with mounting surface of wheel facing inward, choose a suitable taper body, and firmly lock the wheels using a locking device (- align the taper body with center hole, otherwise data may be incorrect).
- (4) Turn on the power source of balancer, and input parameters such as the measured distance from rim to balancer, rim width and rim diameter.
- (5) Put down the wheel protector, and proceed to balance test procedure automatically (start button should be pushed for some balancers). When measurement is completed, the unbalanced weight for both sides of tire will be displayed on the balancer automatically, and the wheel brakes automatically until it stops. Do not open the protector before stopping. Failure to do this may lead to an accident.
- (6) According to the measurement result, corresponding balance blocks should be installed on the outside (1) and inside (2) of rim edge as shown in the illustration.



Z10170

- (7) Perform test again after assembly is completed, until the balancer displays 0.
- (8) After dynamic balance is completed, remove the wheel.

⚠ Caution

- Balance block must be installed on aluminum rim.
- Ambient temperature should be higher than 25°C when installing balance block. If temperature cannot be guaranteed, heat the balance block so that the temperature is between 25°C and 38°C when installing it.
- Install balance block properly, weight difference between balance blocks should be 5g.
- DO NOT reuse the balance block.
- Both inside and outside of balance block are paste type.
- Requirement for residual imbalance: Outside ≤ 10 g; inside ≤ 10 g.
- Max. outside balance block weight: 110 g.
- Max. inside balance block weight: 110 g.

4.3 Tire Rotation**■ Description**

Front and rear tires operate at different loads and perform different steering, driving and braking functions. For these reasons, different wear rate is formed, causing irregular wear patterns. These effects can be reduced by rotating tires at regular time.

Advantages of tire rotation:

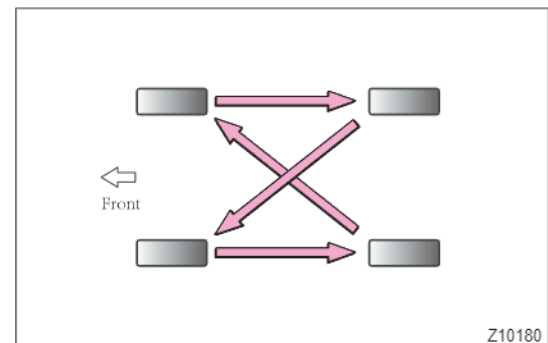
- Improving tread life;
- Maintaining traction levels;
- Maintaining a smooth and quiet driveability.

⚠ Caution

Chery recommends that you should rotate tires every 10000 km (Optimal tire rotation mileage is 5000 - 7000 km). However, the best suitable time for tire rotation differs depending on driver's driving habits and road conditions.

■ Rotation Method

- (1) Perform tire rotation as shown in the illustration.

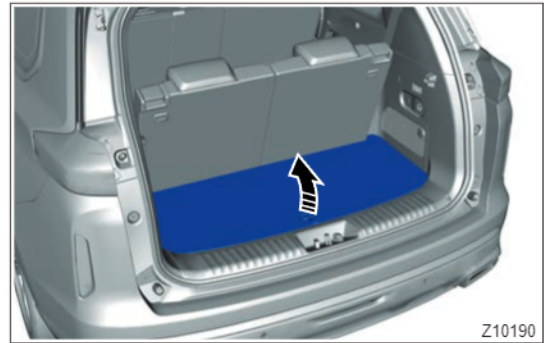
**⚠ Caution**

- Perform tire pressure self-learning after tire rotation.

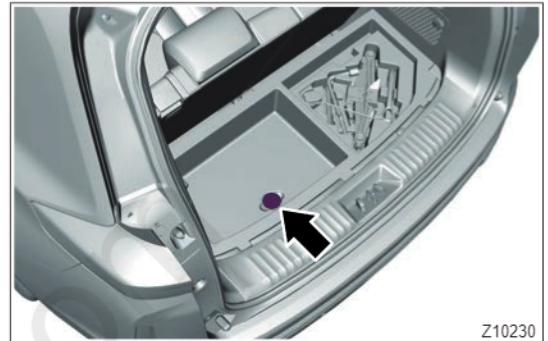
4.4 Spare Tire Replacement**■ Removal**

- (1) Stop vehicle at a level surface and apply parking brake.

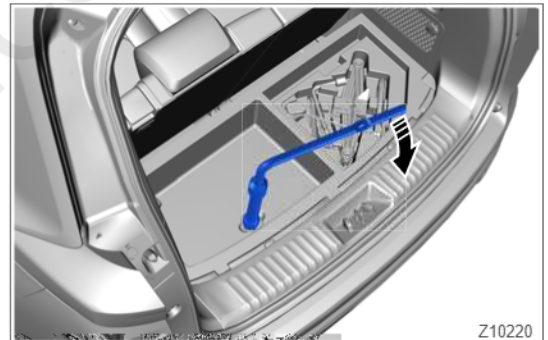
- (2) Open luggage compartment and lift storage box cover.



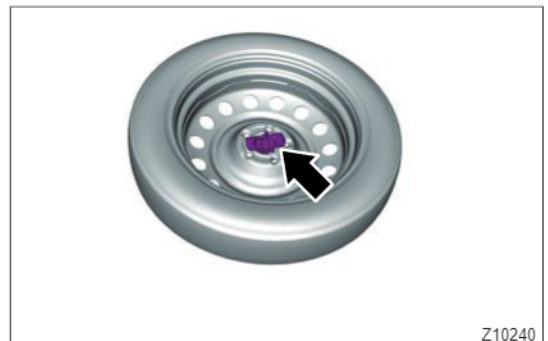
- (3) Using an interior crow plate, carefully pry off spare tire regulator plastic plug (interior crow plate).



- (4) Install extended wrench of on-board tools (located in plastic storage cover) to hexagon head of spare tire regulator. Rotate the hexagon head counterclockwise until spare tire drops to ground from the trunk bottom (- extended wrench of on-board tools).



- (5) Remove spare tire regulator lug from center hole of spare tire wheel, and remove the spare tire.

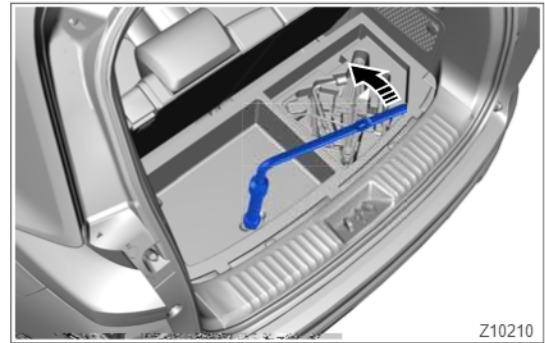


■ Installation

- (1) Place the spare tire assembly with A side facing upward, and insert spare tire regulator lug into the center hole of spare tire wheel.

- (2) Install extended wrench of on-board tools (located in plastic storage cover) to hexagon head of spare tire regulator. Rotate the hexagon head clockwise (- extended wrench of on-board tools).

Tightening torque: 20 ± 3 N·m

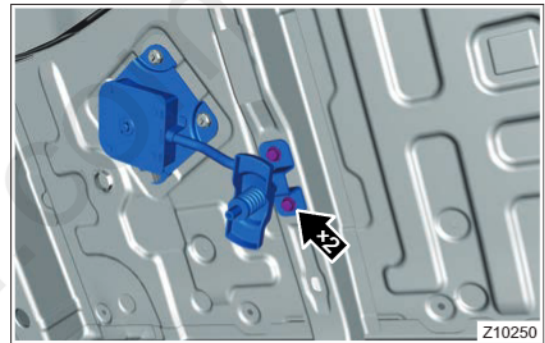


- (3) Install spare tire regulator plastic plug (interior crow plate).
- (4) Install storage box cover and close luggage compartment.

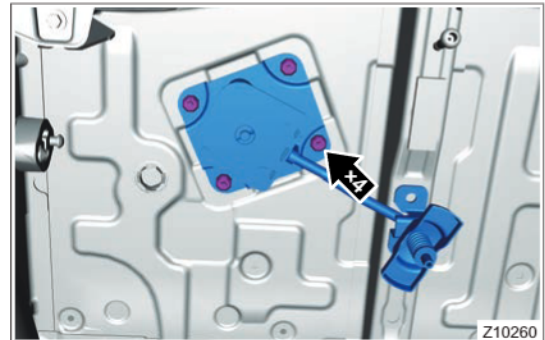
4.5 Replacement of Spare Tire Regulator

■ Removal

- (1) Remove the spare tire assembly.
- (2) Raise the vehicle to proper position and remove 2 bolts from small bracket (13# socket wrench).



- (3) Remove 4 nuts between spare tire regulator and vehicle body (13# socket wrench).



- (4) Remove the spare tire regulator.

■ Installation

- (1) Install the spare tire regulator to a proper position of under body.
- (2) Install 4 nuts between spare tire regulator and vehicle body (13# socket wrench).

Tightening torque: 25 ± 4 N·m

- (3) Install 2 bolts on small bracket and lower the vehicle (13# socket wrench).

Tightening torque: 25 ± 4 N·m

- (4) Install the spare tire assembly.

6.5 TIRE PRESSURE MONITORING SYSTEM (TPMS)

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

- (1) When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
- (2) Be sure to wear necessary safety equipment to prevent accidents, when removing tire pressure sensor.
- (3) If the tire pressure is too low, please resume it to normal pressure as soon as possible. Too low tire pressure will increase fuel consumption and tire wear. And seriously worn tire will cause an accident such as flat tire.
- (4) When a high temperature alarm occurs, stop vehicle to cool the tire naturally, otherwise there is a danger of accident. When tire temperature is too high, never cool the tire by pouring cold water, otherwise, tire may be damaged, resulting in an accident.
- (5) Always use torque wrench when installing tire pressure sensor, common wrench cannot guarantee a torque of $5 \pm 0.5 \text{ N}\cdot\text{m}$. If the torque is relatively low, air leakage may occur, resulting in a risk of danger; if the torque is relatively high, tire pressure sensor or related components may be damaged, resulting in a risk of danger.

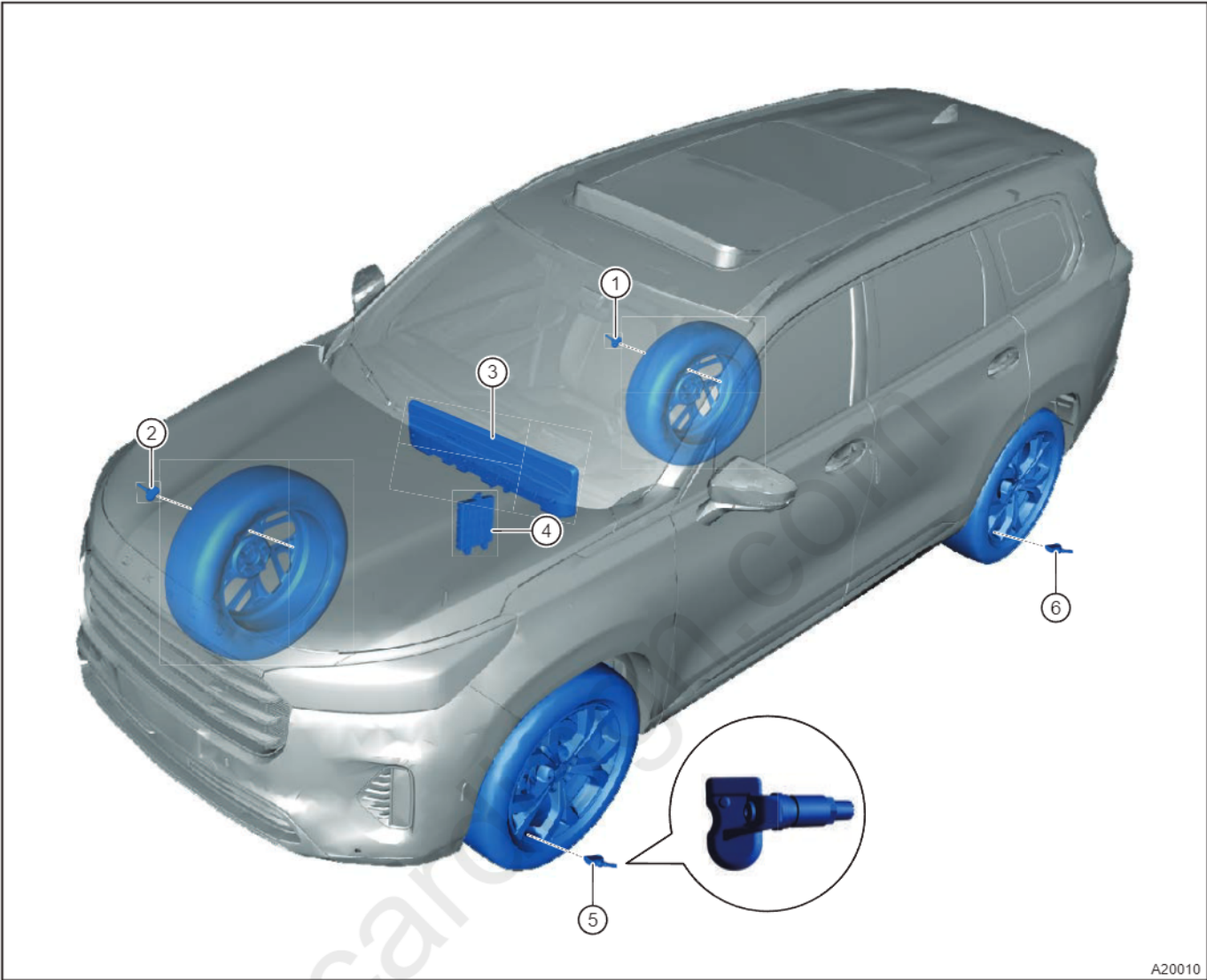
1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

- (1) Operate carefully to avoid damaging tire pressure sensor, when removing tire pressure sensor.
- (2) Avoid dropping the sensor. If tire pressure sensor is dropped from a place 1 m high to the ground, it is interpreted as fault in tire pressure sensor.
- (3) Tire pressure sensor must be installed on clean and dry hub.
- (4) Valve cap must be on the valve, except inflation, deflation, air pressure inspection, etc.
- (5) During installation, do not contact the tire pressure sensor with used tools, to avoid damage to the tire pressure sensor.
- (6) Sensor air pressure inlet cannot be covered partially or completely by lubricant or other materials.
- (7) Tightening speed : $\leq 30 \text{ rpm}$; Installation torque: $5 \pm 0.5 \text{ N}\cdot\text{m}$ when installing tire pressure sensor.
- (8) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

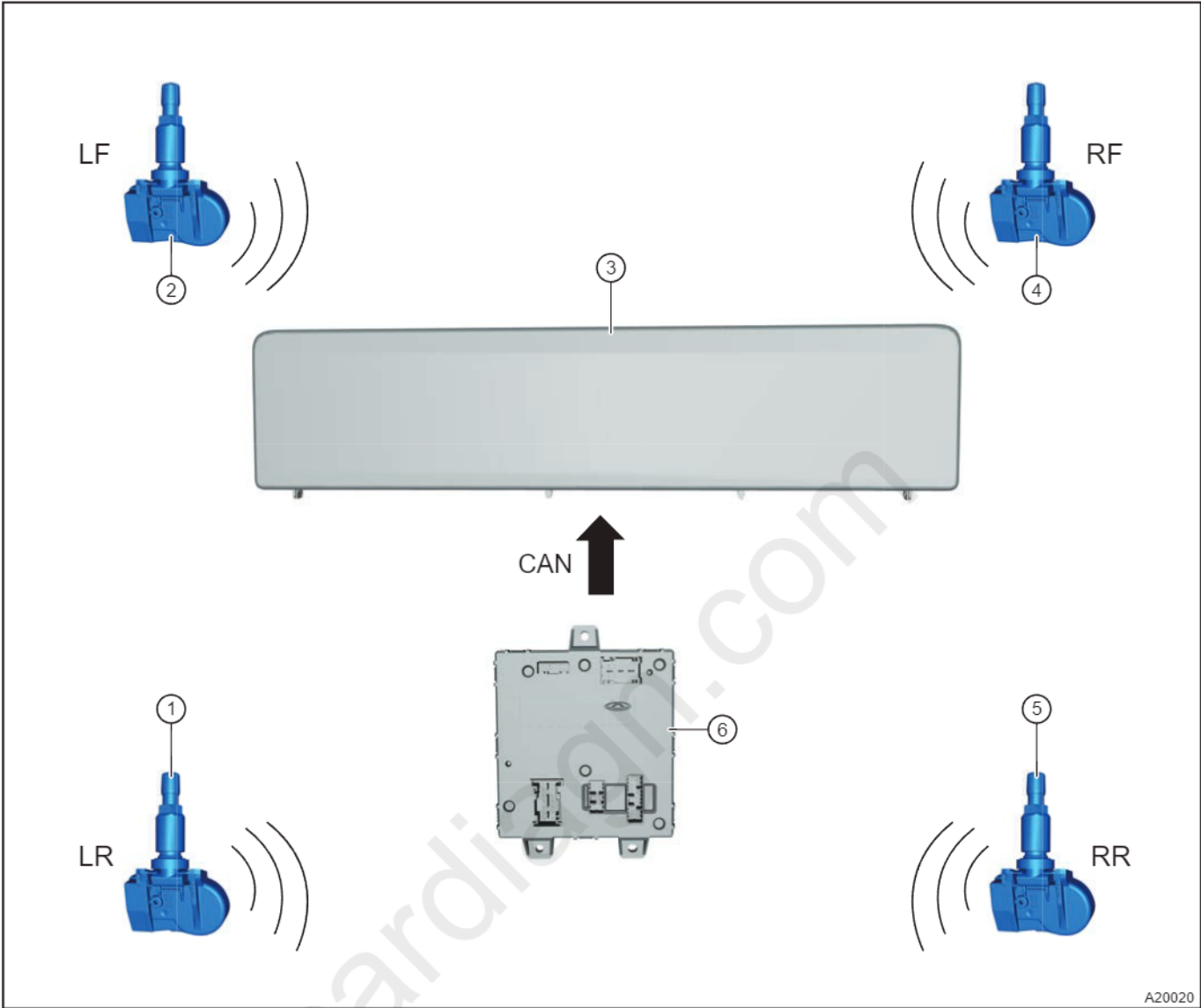


A20010

1	Rear Right Tire Pressure Sensor	4	Body Control Module
2	Front Right Tire Pressure Sensor	5	Front Left Tire Pressure Sensor
3	Dual LCD	6	Rear Left Tire Pressure Sensor

Tire Pressure Monitoring System (TPMS) is an active safety device, which can monitor tire pressure and temperature in real time and display on dual LCD. When tire pressure and temperature are abnormal, tire pressure monitoring system will warn the driver of driving danger.

2.2 System Schematic Diagram



1	Rear Left Tire Pressure Sensor	4	Front Right Tire Pressure Sensor
2	Front Left Tire Pressure Sensor	5	Rear Right Tire Pressure Sensor
3	Dual LCD	6	Body Control Module

Tire pressure sensor is the transmitting terminal of tire information, body control module is the receiving terminal of tire information, meter is the display terminal of tire information, and tire pressure sensor is the core of tire pressure monitoring system. Tire pressure sensor is installed on rim, which collects data such as pressure, temperature inside tire, and sends these data to body control module as radio-frequency signal. The wireless communication frequency between tire pressure sensor and body control module is 433 MHZ. The body control module receives radio-frequency signal sent from tire pressure sensor and processes these data. Body control module processes data of tire pressure sensor, then sends them to meter via CAN bus. Tire pressure value and temperature value are displayed on meter via CAN bus signal. When tire pressure is too high or too low, or temperature is too high, it informs driver of abnormal tire.

2.3 Tire Pressure Monitoring System (TPMS) Alarm Information

■ Initial Mode

BCM has not learned any sensor ID in the initial mode after delivery. In the initial mode, TPMS module only processes the positioning information of sensor.

■ Operation Mode

After successfully learning tire pressure ID, the system is in operation mode. In the operation mode, TPMS module processes the positioning information and tire pressure information of sensor.

■ Warning Strategy

The processing of warning function requires the system to be in operation mode.

- Unlearning/loss/low battery is as system failure.
- High pressure/low pressure/rapid leakage/high temperature is as function logic.
- Priority order: Unlearning > loss > low battery > rapid leakage > high pressure = low pressure > high temperature

Warning light is combination type signal light (single light) that illuminates when above warning is sent. The light continuously turns on after flashing for 75 s when system is faulty, and it continuously turns on without flashing when pressure/temperature alarm is sent.

■ Low Pressure Alarm

When vehicle tire pressure is less than 1.72 bar, and the vehicle is continuously driving for more than 5 minutes with a speed higher than 25 Km/h, the system will send a low pressure alarm. With ENGINE START STOP switch turned from OFF to ON position, the system will also send a low pressure alarm if tire pressure displayed on meter is no more than 1.84 bar. When there is a low pressure alarm, the warning light remains on and normal screen switches into tire pressure screen directly: The tire with low pressure (e.g., front left tire) symbol turns red and its tire pressure and temperature will be displayed.



⚠ Caution

- If the tire pressure is too low, please resume it to normal pressure as soon as possible. Too low tire pressure will increase fuel consumption and tire wear. And seriously worn tire will cause an accident such as flat tire.

When the vehicle tire pressure resumes to alarm value 0.2 bar or more (0.2 bar threshold is used to remove jitter) and vehicle is continuously driving with a speed higher than 25 Km/h, the system will deactivate the low pressure alarm automatically within 5 minutes.

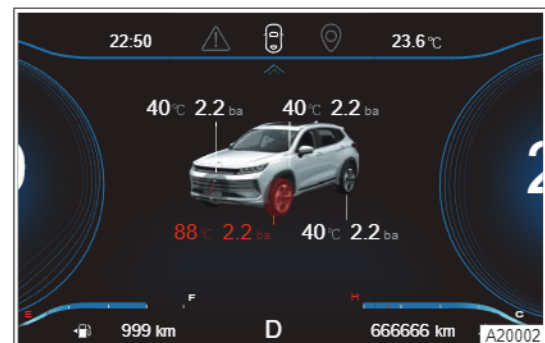
■ High Pressure Alarm

Trigger condition: When the ignition state is in ON/START and the tire pressure value of a certain tire is higher than or equal to threshold value, a high pressure alarm will be generated.

Off condition: When the current alarm tire pressure value is no more than 0.2 bar of alarm value (0.2 bar threshold is used to remove jitter), low pressure alarm at this position is canceled.

■ High Temperature Alarm

Trigger condition: Take front left wheel as an example, when temperature of front left wheel reaches higher than high temperature alarm threshold (75 °C), the system will send high temperature alarm, front left wheel symbol will be red, the tire pressure and temperature values will be displayed and tire pressure warning light remains on. When there is a high temperature alarm, the warning light remains on and normal screen switches to tire pressure screen directly: The tire with high temperature (e.g., front right tire) symbol will be red and its tire pressure and temperature values will be displayed.



⚠ Caution

- When a high temperature alarm occurs, stop vehicle to cool the tire naturally, otherwise there is a danger of accident. When tire temperature is too high, never cool the tire by pouring cold water, otherwise, tire may be damaged, resulting in an accident.

Off condition: When the vehicle wheel temperature is lower than alarm value -5°C and the vehicle is continuously driving with a speed higher than 25 Km/h, the system will deactivate high temperature alarm automatically within 5 minutes. The system stores the history DTCs.

■ Missing Signal Alarm

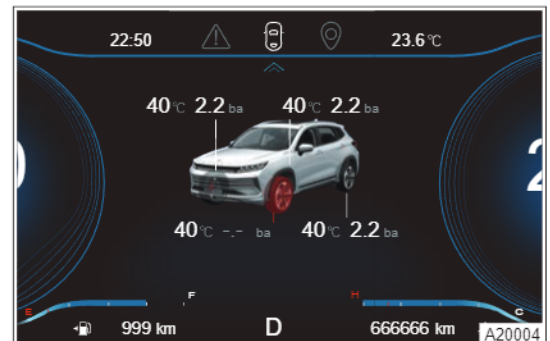
Trigger conditions:

- (1) During parking: If vehicle speed is less than 20 Km/h, sensor will enter the parking state, and the transmission period is 1 hour. Ignition switch is in OFF. If the tire pressure signal at a certain position is not received for a continuous period of 5 hours, the position judges signal missing. When the message is received, the timing is cleared and restarted. When vehicle speed is higher than 25 Km/h, it enters the running mode timing, the parking mode timing is cleared. The meter system will also switch to tire pressure monitoring system display screen automatically.
- (2) During running: If vehicle speed is higher than 25 Km/h, sensor will enter the running state, and the transmission period is 1 minutes. Vehicle speed is more than 25 km/h, if the tire pressure signal at a certain position is not received for a continuous period of 9 minutes, the position judges signal missing. When the message is received, the timing is cleared and restarted. When vehicle speed is less than 25 Km/h and duration exceeds 10 minutes, tire pressure sensor will enter the parking mode and transmission cycle will become 1 hour. At this time, the receiving end needs to change the timing strategy. When vehicle speed is less than 25 Km/h and duration exceeds 10 minutes, the strategy of signal missing alarm will switch to parking mode strategy, and the count of running mode will be cleared.

Off condition: The signal missing alarm of the sensor that miss signal is canceled after receiving the information of sensor. At the same time, the tire pressure sensor counter and unit time timer are cleared.

■ High Pressure Display

If the tire pressure is higher than 3.40 bar, the tire pressure will be displayed as —; but the temperature will be displayed normally. If the tire pressure is less than 3.20 bar, it will resume normal display within 5 minutes.



Hint:

If the alarm is caused high tire pressure, just resume it to range between 2.0 bar and 2.4 bar.

■ Automatic Positioning Learning

For using process of terminal user, if the tire position is changed or TPMS sensor is replaced, the part will automatically identify new TPMS sensor or locate the corresponding relationship between the actual installation location of TPMS sensor and the display, without manual operation.

Functional requirements:

- (1) BCM needs to obtain ABS tooth position information from vehicle network;
- (2) ABS tooth position information message cycle: 20 ms;
- (3) Number of teeth position for each turn: Front axle for 44 teeth, rear axle for 44 teeth;
- (4) ABS tooth position information message format: 0 → 254 → 0.

Positioning mode:

- Vehicle speed is more than 20 km/h (8 g), and TPMS sensor enters the standard operation mode, in this mode: In case of no pressure change, send 1 package of tire pressure information every minute; In case of pressure change ≤ 10 KPA, immediately send 1 package of tire pressure information.

- Vehicle speed is more than 30 km/h (12 g), and TPMS sensor sends a frame of positioning information every 12 seconds.
- The positioning information has been sent for 30 times or the vehicle speed is less than 30 km/h to enter the standard operation mode.

Positioning output:

- If positioning is successful: If it is different from the ID in original system, ID code will be re-stored and the tire pressure information of the modified position will be set as the default value 0xff. Use the updated TPMS ID to receive tire pressure signal and interpret the information sent from tire pressure sensor. If it is same with system, it is not necessary to re-store the ID codes.
- If the positioning fails, the old TPMS ID is used to receive tire pressure signal.

Caution

- **If two or more sensors are replaced, tire pressure position displayed on meter may be inconsistent with actual position within 10 minutes during driving. And it will be updated to correct position after successful positioning within 10 minutes.**
- **During automatic positioning, ID stored in receiver defaults to previous ID and corresponding position. If tire rotation is performed, pressure and temperature display position and low/high temperature alarm position of meter may be inconsistent with actual position. And it will be updated to correct position after successful positioning.**

2.4 Precautions for Maintaining Tire Pressure Monitoring System

■ Active Condition for Tire Pressure Monitoring System

No.	Conditions to Be Met
1	IGN-ON
2	Vehicle continuously drives with a speed higher than 25 km/h for more than 45 seconds.

When the ENGINE START STOP switch is in IGN-ON and the vehicle is driving continuously with a speed more than 25 km/h for more than 45 seconds, the tire pressure monitoring system can start normally. When the ENGINE START STOP switch is not in IGN-ON, body control module cannot receive radio frequency signal from tire pressure sensor; when the vehicle speed fails to reach 25 km/h or driving period is very short, tire pressure sensor will not send a radio frequency signal.

- With vehicle stopped, the meter does not display tire pressure and temperature information when the ENGINE START STOP switch is turned to IGN-ON from IGN-OFF.
- When the ENGINE START STOP switch is turned to IGN-ON and the vehicle is driving continuously with a speed higher than 25 km/h for more than 45 seconds, tire pressure information for 4 wheels will be displayed.
- Tire pressure sensor and BCM communicates with each other via radio frequency signal. If there are strong electromagnetic interference or other electrical devices are added on the vehicle, tire pressure signal reception may be affected, resulting in tire pressure monitoring system alarm. It is not recommended to add electrical products personally.
- If there is large variation in tire pressure, tire pressure sensor will send a radio frequency signal suddenly. If the ENGINE START STOP switch is turned to IGN-ON, tire pressure monitoring system will process the signal sent from tire pressure sensor immediately.

■ Tire Inflation

- Do not inflate tires depending on values displayed from tire pressure monitoring system. Tire pressure monitoring system can monitor tire pressure and temperature in real time only when vehicle speed is more than 25 km/h. If inflating tires using pressure values displayed from tire pressure monitoring system, inflation value may be higher than tire standard value, which will cause accidents.

Do not inflate tires with high tire temperature, which will cause serious damage to the tire, even blowouts, resulting in accidents.

■ Tire Pressure Sensor

- When system is faulty or disabled, check tire pressure sensor and judge if it is the tire pressure sensor of automobile manufacturer. If tire pressure sensor of other manufacturers is used by customer,

- configuration and learning for tire pressure sensor cannot be performed and system is abnormal or disabled.
- Tire pressure sensor is integrated with functions of common air valve, and inflating/deflating operation is the same as common air valve. Use genuine sensor fittings, without replacing components inside of sensor. After maintenance, install genuine waterproof cap of tire pressure sensor correctly. Do not reuse disposed tire pressure sensor components, otherwise air leakage may be caused, resulting in a possibility of danger. When performing inflation/deflation and tire removal operations, it is not necessary to remove nut from the sensor. If the tire pressure sensor nut is removed with tire pressure higher than atmosphere pressure, there is possibility of danger.
 - Tire pressure sensor should be installed from inside of rim, sensor should be installed firmly to rim and check carefully; Use 11 mm socket to install sensor nuts with a torque of $5 \pm 0.5 \text{ N}\cdot\text{m}$.

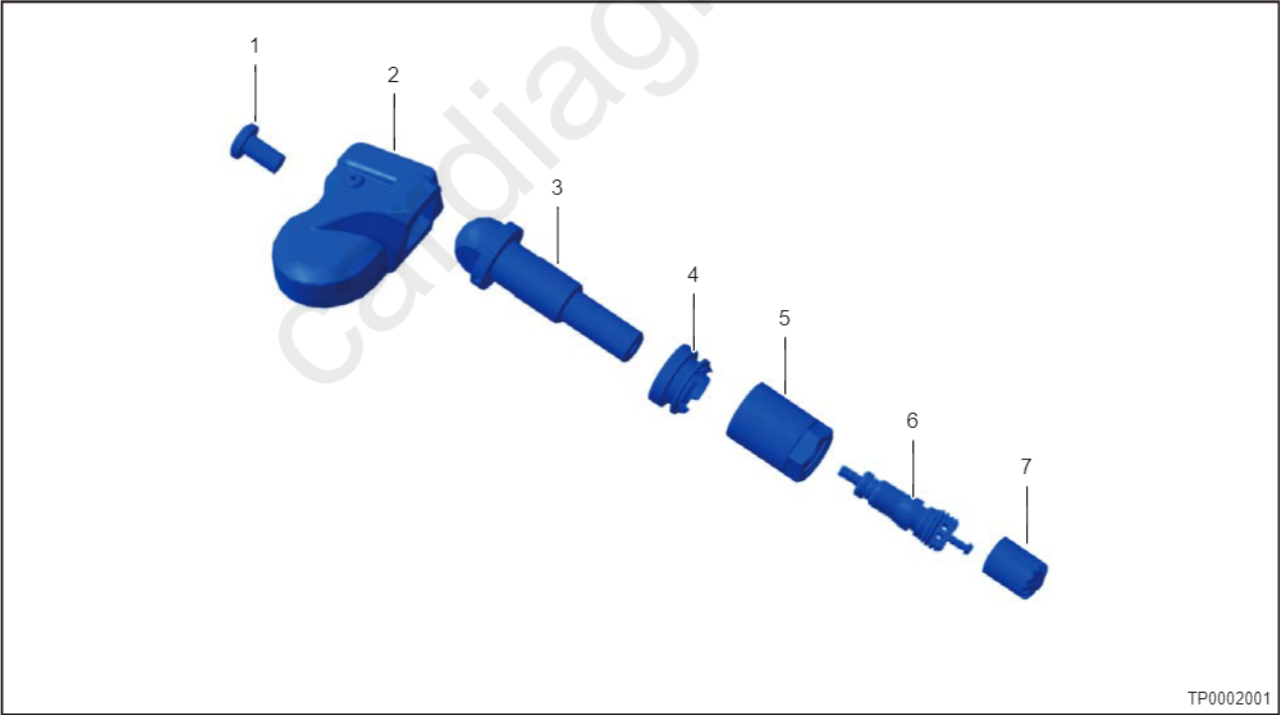
■ Increased Tire Pressure Value

- When vehicle is driving normally, heat is generated in the tire due to friction, which will cause tire pressure to increase. For every 10°C increase in tire temperature, tire pressure will increase by about 0.1 bar.

■ Tires Replacement

- If replacing tires with tire pressure monitoring system with ones without tire pressure monitoring system, system malfunction alarm will occur. If replacing with tire equipped with tire pressure sensor, system malfunction alarm still will occur without performing configuration and learning. Spare tire is not equipped with tire pressure sensor, so tire pressure monitoring system is still malfunctioning when spare tire is used in vehicle with tire pressure monitoring system.
- When replacing tire, perform operations following assembly specification of tire pressure, to avoid damaging tire pressure sensor during replacement. For installation and removal of tire, refer to Installation and Removal of Tire Pressure Sensor sections. Never allow tire bead breaker and tire tread to squeeze the sensor.

2.5 Component Operation Description



1	Screw	5	Valve Stem Cover
2	Sensor	6	Valve Core
3	Valve Stem	7	Valve Cap
4	Seal Washer and Seal Ring Assembly		

■ Tire Pressure Sensor

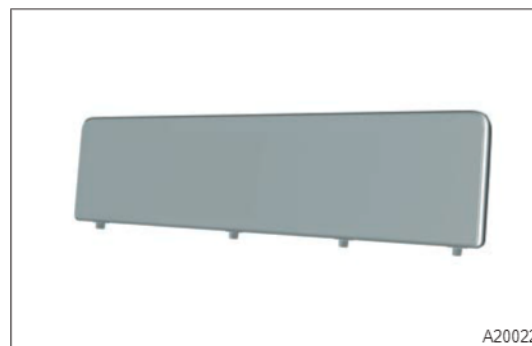
Tire pressure sensor can monitor tire pressure and temperature, and send tire pressure and temperature information to body control module. When tire pressure is too high or too low and temperature is too high, instrument cluster will inform driver of abnormal tire.



- When system is faulty or disabled, firstly eliminate wireless interference from electrical devices added by customer, such as electronic dog and drive recorder. Then check tire pressure sensor to determine if EXEED VX genuine tire pressure sensor is installed. If tire pressure sensor of other manufacturers (Non EXEED VX genuine tire pressure sensor) is used by customer, configuration and learning for tire pressure sensor cannot be performed and system is abnormal or disabled.
- Do not remove the tire pressure sensor when it is not faulty. Tire pressure sensor is integrated with functions of common air valve, and inflating/deflating operation is the same as common air valve. Use genuine sensor fittings, without replacing components inside of sensor. After maintenance, install genuine waterproof cap of tire pressure sensor correctly. Do not reuse disposed tire pressure sensor components, otherwise air leakage may be caused, resulting in a possibility of danger. When performing inflation/deflation and tire removal operations, it is not necessary to remove nut from the sensor. If the tire pressure sensor nut is removed with tire pressure higher than atmosphere pressure, there is possibility of danger.
- Always use torque wrench when installing tire pressure sensor, with a torque of $5 \pm 0.5 \text{ N}\cdot\text{m}$. If the torque is relatively low, air leakage may occur, resulting in a risk of danger; if the torque is relatively high, tire pressure sensor or related components may be damaged, resulting in a risk of danger.

■ Dual LCD

Body control module processes data of tire pressure sensor, then sends them to dual LCD via CAN bus. Tire pressure value and temperature value are displayed on dual LCD via CAN bus signal. When tire pressure is too high or too low, or temperature is too high, it informs driver of abnormal tire.



■ Body Control Module

Body control module receives radio-frequency signal sent from tire pressure sensor, processes these data and sends them to dual LCD via CAN bus.



3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:

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

Symptom	Suspected Area	Troubleshooting
Low pressure alarm (warning light remains on, malfunctioning wheel symbol turns red)	Tire pressure is less than 1.72 bar	Check and charge tire pressure to 2.2 bar (with an error limit of 0.1 bar)
	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Body Control Module (BCM) damage	Replace body control module and perform sensor learning
	Tire pressure system set	Check and repair
High temperature alarm (warning light remains on, wheel symbol turns red)	Tire temperature is higher than 75 °C	Cool down naturally
	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Body Control Module (BCM) damage	Replace body control module and perform sensor learning
	Tire pressure system set	Check and repair
System malfunction alarm (warning light remains on after flashing for 75 seconds)	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Incorrect sensor configuration and learning when replacing with new wheel (spare tire included)	Perform configuration and learning
	Electromagnetic interference/shield	Eliminate shielded objects outside of tire/strong electromagnetic radio interference
	Body Control Module (BCM) damage	Replace
	Tire pressure system set	Check and repair
All tire pressure information cannot be displayed (all tire pressure information for four wheels display as “-”)	Display status cannot be reached	Vehicle speed is more than 30 Km/h for 45 seconds
	Replaced tire pressure sensor is not configured correctly, sensor is not learned	Perform configuration and learning
	Body Control Module (BCM) damage	Replace body control module and perform sensor learning
	Electromagnetic interference/shield	Eliminate shielded objects outside of tire/strong electromagnetic radio interference
	Four sensors are not installed or all of them are damaged (very rare)	Reinstall or replace

Symptom	Suspected Area	Troubleshooting
Certain tire pressure information cannot be displayed (certain tire pressure information displays as “-”)	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Incorrect sensor configuration and learning when replacing with new wheel (spare tire included)	Perform configuration and learning
	Electromagnetic interference/shield	Eliminate shielded objects outside of tire/strong electromagnetic radio interference
	Body Control Module (BCM) damage	Replace body control module and perform sensor learning
	Tire pressure system set	Check and repair

3.2 Diagnosis Tools

■ Diagnostic Tester

When using diagnostic tester:

- Connect diagnostic tester (the latest software) to diagnostic interface for communication with vehicle.
- Diagnostic interface is located at driver side instrument panel crossmember.
- Diagnostic interface uses a trapezoidal design which can hold 16 terminals.

■ Digital Multimeter

When using digital multimeter:

- Troubleshoot electrical malfunctions and wire harness system.
- Look for basic malfunction.
- Measure voltage, current and resistance.

3.3 Diagnostic Help

- Connect diagnostic tester (the latest software) to diagnostic interface, and make it communicate with vehicle electronic module through data network.
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Visually check the related wire harness.
- Check and clean all system grounds related to the latest DTCs.
- If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.4 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use diagnostic tester to record and clear DTCs stored in tire pressure monitoring system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Start engine, drive vehicle at 30 km/h or more and perform road test with diagnostic tester connected to diagnostic interface.
- Turn ENGINE START STOP switch to ON, and check DTCs in system again.
- If DTC is detected, it indicates current malfunction.

- If no DTC is detected, malfunction indicated by DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

3.5 Intermittent DTC Troubleshooting

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggle test.
- Check for broken, bent, protruded or corroded terminals.
- Check tire pressure sensors and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.6 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C1020-87	Wheel-Sensor Mute Failure FL
C1021-87	Wheel-Sensor Mute Failure FR
C1022-87	Wheel-Sensor Mute Failure RL
C1023-87	Wheel-Sensor Mute Failure RR
C1050-00	Low Tire Pressure FL
C1051-00	Low Tire Pressure FR
C1052-00	Low Tire Pressure RL
C1053-00	Low Tire Pressure RR
C1054-00	High Tire pressure FL
C1055-00	High Tire pressure FR
C1056-00	High Tire pressure RR
C1057-00	High Tire pressure RL
C1058-00	High Tire Temp FL
C1059-00	High Tire Temp FR
C105A-00	High Tire Temp RL
C105B-00	High Tire Temp RR
C105C-00	Wheel-Sensor Battery Low FL
C105D-00	Wheel-Sensor Battery Low FR
C105E-00	Wheel-Sensor Battery Low RL
C105F-00	Wheel-Sensor Battery Low RR
C1060-00	Wheel-Sensor Not Matched
C1061-00	Invalid Wheel Tick Number Received

DTC	DTC Definition
C1062-00	Wheel Tick Number Not Received
C1603-00	Wheel-Sensor Not All learned

3.7 DTC Diagnosis Procedure

■ Wheel Sensor Mute Failure

DTC	C1020-87	Wheel-Sensor Mute Failure FL
DTC	C1021-87	Wheel-Sensor Mute Failure FR
DTC	C1022-87	Wheel-Sensor Mute Failure RL
DTC	C1023-87	Wheel-Sensor Mute Failure RR

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C1020-87	Wheel-Sensor Mute Failure FL	Vehicle speed is more than 25 km/h for 45 seconds	- Tire pressure sensor fails to send RF signal or the sent signal is too weak. - The reception effect of body control module is poor, and no RF signal is received.
C1021-87	Wheel-Sensor Mute Failure FR		
C1022-87	Wheel-Sensor Mute Failure RL		
C1023-87	Wheel-Sensor Mute Failure RR		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

1	Check power supply voltage of body control module
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(a) Using a digital multimeter, measure voltage between power supply terminal of body control module and ground.

(b) Power supply voltage should be not less than 12 V.

NG	Check and repair battery and power supply system
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OK

2	Check body control module ground circuit
---	--

(a) Check if the body control module ground is loose or corroded.

NG	Tighten or replace body control module ground circuit
----	---

OK

3	Check configuration of tire pressure monitoring system
---	--

- (a) After configuration is finished, drive vehicle with a speed higher than 25 km/h for a period of time.

NG

Reconfigure tire pressure sensor of malfunctioning wheel

OK

4

Check tire pressure sensor of malfunctioning wheel

- (a) After replacement, perform configuration and test.

NG

Replace tire pressure sensor of malfunctioning wheel

OK

5

Check Body Control Module (BCM)

- (a) After replacement, it is necessary to perform configuration.

OK

System detection is normal

NG

Repair or replace Body Control Module (BCM)

■ Low Tire Pressure

DTC	C1050-00	Low Tire Pressure FL
DTC	C1051-00	Low Tire Pressure FR
DTC	C1052-00	Low Tire Pressure RL
DTC	C1053-00	Low Tire Pressure RR

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C1050-00	Low Tire Pressure FL	Vehicle speed is more than 25 km/h for 45 seconds	Perform BCM function configuration, learning function is not finished.
C1051-00	Low Tire Pressure FR		
C1052-00	Low Tire Pressure RL		
C1053-00	Low Tire Pressure RR		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

1

Check power supply voltage of body control module

- (a) Using a digital multimeter, measure voltage between power supply terminal of body control module and ground.

- (b) Power supply voltage should be not less than 12 V.

NG

Check and repair battery and power supply system

OK

2 Check body control module ground circuit

(a) Check if the body control module ground is loose or corroded.

NG

Tighten or replace body control module ground circuit

OK

3 Check configuration of tire pressure monitoring system

(a) After configuration is finished, drive vehicle with a speed higher than 25 km/h for a period of time.

NG

Reconfigure tire pressure sensor of malfunctioning wheel

OK

4 Check tire pressure sensor of malfunctioning wheel

(a) After replacement, it is necessary to perform configuration.

OK

System detection is normal.

NG

Replace tire pressure sensor of malfunctioning wheel

■ High Tire Pressure

DTC	C1054-00	High Tire pressure FL
DTC	C1055-00	High Tire pressure FR
DTC	C1056-00	High Tire pressure RR
DTC	C1057-00	High Tire pressure RL

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C1054-00	High Tire pressure FL	Vehicle speed is more than 25 km/h for 45 seconds	Sensor operates abnormally, and RF data sent shows a malfunction in sensor.
C1055-00	High Tire pressure FR		
C1056-00	High Tire pressure RR		
C1057-00	High Tire pressure RL		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

1 Check power supply voltage of body control module

- (a) Using a digital multimeter, measure voltage between power supply terminal of body control module and ground.
 (b) Power supply voltage should be not less than 12 V.

NG**Check and repair battery and power supply system****OK****2 Check body control module ground circuit**

- (a) Check if the body control module ground is loose or corroded.

NG**Tighten or replace body control module ground circuit****OK****3 Check configuration of tire pressure monitoring system**

- (a) After configuration is finished, drive vehicle with a speed higher than 25 km/h for a period of time.

NG**Reconfigure tire pressure sensor of malfunctioning wheel****OK****4 Check tire pressure sensor of malfunctioning wheel**

- (a) After replacement, it is necessary to perform configuration.

OK**System detection is normal****NG****Replace tire pressure sensor of malfunctioning wheel****5 Check tire pressure sensor of malfunctioning wheel**

- (a) After replacement, it is necessary to perform configuration.

OK**System detection is normal****NG****Replace tire pressure sensor of malfunctioning wheel****6 Check tire pressure sensor of malfunctioning wheel**

- (a) After replacement, it is necessary to perform configuration.

OK**System detection is normal**

NG

Replace tire pressure sensor of malfunctioning wheel

■ High Tire Temp

DTC	C1058-00	High Tire Temp FL
DTC	C1059-00	High Tire Temp FR
DTC	C105A-00	High Tire Temp RL
DTC	C105B-00	High Tire Temp RR

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C1058-00	High Tire Temp FL	Vehicle speed is more than 25 km/h for 45 seconds	Sensor operates abnormally, and RF data sent shows a malfunction in sensor.
C1059-00	High Tire Temp FR		
C105A-00	High Tire Temp RL		
C105B-00	High Tire Temp RR		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

1 Check power supply voltage of body control module

- (a) Using a digital multimeter, measure voltage between power supply terminal of body control module and ground.
- (b) Power supply voltage should be not less than 12 V.

NG

Check and repair battery and power supply system

OK

2 Check body control module ground circuit

- (a) Check if the body control module ground is loose or corroded.

NG

Tighten or replace body control module ground circuit

OK

3 Check configuration of tire pressure monitoring system

- (a) When the temperature of one or more tires is higher than 75 °C and the vehicle is continuously driving with a speed higher than 25 km/h for certain period of time, the system will send a high temperature alarm.
- (b) When a high temperature alarm occurs, stop vehicle to cool the tire naturally, otherwise there is a danger of accident.
- (c) When tire temperature is too high, never cool the tire by pouring cold water, otherwise, tire may be damaged, resulting in an accident.
- (d) When the vehicle is continuously driving with a speed higher than 25 km/h for certain period of time and tire temperature is less than 75 °C, the high temperature alarm can be deactivated automatically.

NG

Reconfigure tire pressure sensor of malfunctioning wheel

OK

4

Check tire pressure sensor of malfunctioning wheel

- (a) After replacement, it is necessary to perform configuration.

OK

System detection is normal

NG

Replace tire pressure sensor of malfunctioning wheel

5

Check tire pressure sensor of malfunctioning wheel

- (a) After replacement, it is necessary to perform configuration.

OK

System detection is normal

NG

Replace tire pressure sensor of malfunctioning wheel

6

Check tire pressure sensor of malfunctioning wheel

- (a) After replacement, it is necessary to perform configuration.

OK

System detection is normal

NG

Replace tire pressure sensor of malfunctioning wheel

■ Wheel Sensor Battery Low

DTC	C105C-00	Wheel-Sensor Battery Low FL
DTC	C105D-00	Wheel-Sensor Battery Low FR
DTC	C105E-00	Wheel-Sensor Battery Low RL
DTC	C105F-00	Wheel-Sensor Battery Low RR

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C105C-00	Wheel-Sensor Battery Low FL	Vehicle speed is more than 25 km/h for 45 seconds	Battery is depleted.
C105D-00	Wheel-Sensor Battery Low FR		

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C105E-00	Wheel-Sensor Battery Low RR		
C105F-00	Wheel-Sensor Battery Low RL		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

1 Check power supply voltage of body control module

(a) Using a digital multimeter, measure voltage between power supply terminal of body control module and ground.

(b) Power supply voltage should be not less than 12 V.

NG

Check and repair battery and power supply system

OK

2 Check body control module ground circuit

(a) Check if the body control module ground is loose or corroded.

NG

Tighten or replace body control module ground circuit

OK

3 Check configuration of tire pressure monitoring system

(a) If tire pressure information of malfunctioning wheel is still not displayed, it is necessary to replace tire pressure sensor.

NG

Reconfigure tire pressure sensor of malfunctioning wheel

OK

4 Check tire pressure sensor of malfunctioning wheel

(a) After replacement, perform configuration and test.

OK

System detection is normal

NG

Replace tire pressure sensor of malfunctioning wheel

5 Check tire pressure sensor of malfunctioning wheel

(a) After replacement, it is necessary to perform configuration.

OK

System detection is normal

NG

Replace tire pressure sensor of malfunctioning wheel

6

Check tire pressure sensor of malfunctioning wheel

(a) After replacement, it is necessary to perform configuration.

OK

System detection is normal

NG

Replace tire pressure sensor of malfunctioning wheel

■ Wheel-Sensor Not Matched

DTC	C1060-00	Wheel-Sensor Not Matched
DTC	C1061-00	Invalid Wheel Tick Number Received
DTC	C1062-00	Wheel Tick Number Not Received
DTC	C1063-00	Wheel-Sensor Not All learned

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C1060-00	Wheel-Sensor Not Matched	Vehicle speed is more than 25 km/h for 45 seconds	• Sensor failure • Signal interference • BCM failure • Wheel speed sensor failure • Manual learning
C1061-00	Invalid Wheel Tick Number Received		
C1062-00	Wheel Tick Number Not Received		
C1063-00	Wheel-Sensor Not All learned		

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

1

Check power supply voltage of body control module

(a) Using a digital multimeter, measure voltage between power supply terminal of body control module and ground.

(b) Power supply voltage should be not less than 12 V.

NG

Check and repair battery and power supply system

OK

2

Check body control module ground circuit

(a) Check if the body control module ground is loose or corroded.

NG

Tighten or replace body control module ground circuit

OK

3 Calibrate tire pressure sensor manually

(a) Calibrate the tire pressure sensor manually.

NG

Calibrate the sensor manually

OK

4 Check wheel speed sensor, signal interference

(a) If manual calibration of tire pressure sensor still fails to solve the problem, check wheel speed sensor and whether there is signal interference around the wheel (snow chain, etc.).

OK

Replace wheel speed sensor,remove signal interference

OK

5 Check tire pressure sensor

(a) Check the tire pressure sensor.

NG

Replace tire pressure sensor

OK

6 Check body control module

(a) After replacement, perform configuration and test.

OK

System detection is normal

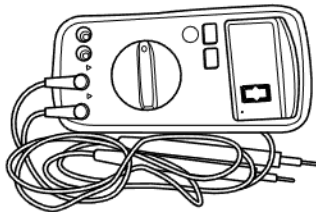
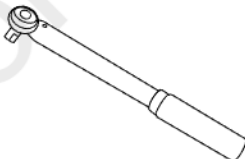
NG

Replace body control module

4 On-vehicle Service

4.1 Tool

■ General Tool

Tool Name	Tool Drawing
Digital Multimeter	 S00002
5 - 25 N·m Torque Wrench	 S00079
Diagnostic Tester	 S00001

■ Special Tool

Tool Name	Part No.	Tool Drawing
Low Frequency Trigger	/	 S00069

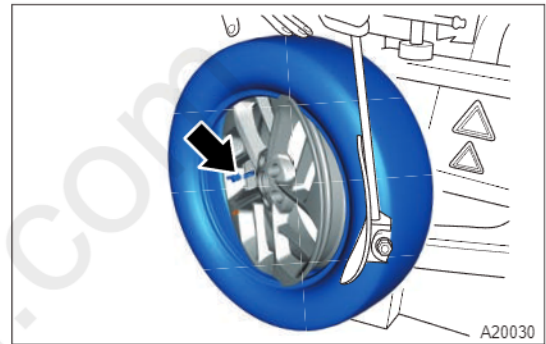
4.2 Replacement of Tire Pressure Sensor

■ Removal

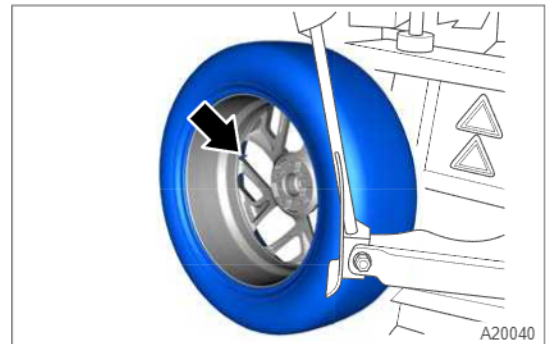
⚠ Caution

- Avoid dropping the sensor. If tire pressure sensor is dropped from a place 1 m high to the ground, it is interpreted as fault in tire pressure sensor.
- Valve cap must be on the valve, except inflation, deflation, air pressure inspection, etc.
- During removal, do not contact the tire pressure sensor tools used, to avoid damage to the tire pressure sensor.
- Sensor air pressure inlet cannot be covered partially or completely by lubricant or other materials.
- During tire bead breaking, follow the operation specification, never damage the tire pressure sensor.
- Both crowbar and tire cannot contact with sensor!

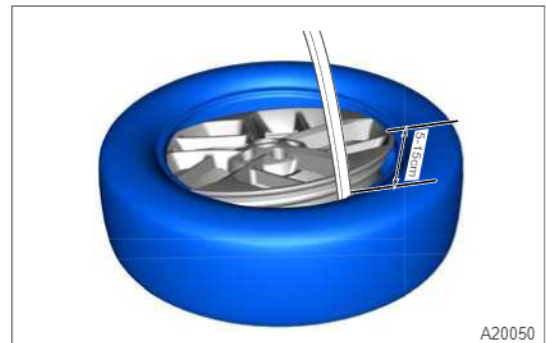
- (1) Remove wheel from vehicle and deflate tire completely.
- (2) Keep one side with tire pressure sensor 30 cm away from separation shovel, and put shovel block between rim and tire, then depress the pedal to separate rim and tire.



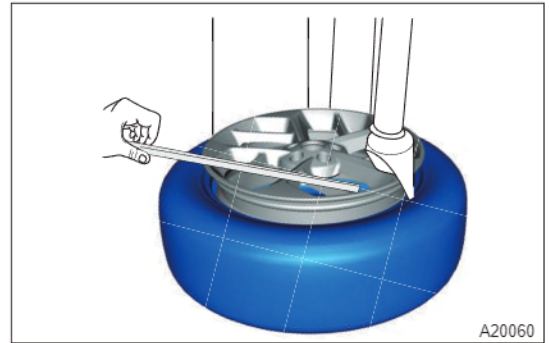
- (3) Turn over tire to keep one side with tire pressure sensor 30 cm away from separation shovel, and put shovel block between rim and tire, then depress the pedal to separate rim and tire.



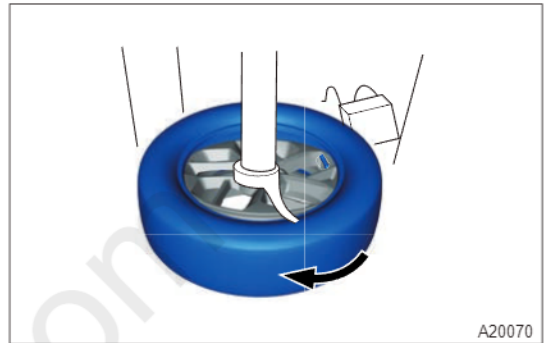
- (4) Lock tire on wheel, lower replacer head and keep it 5 - 15 cm away from sensor.



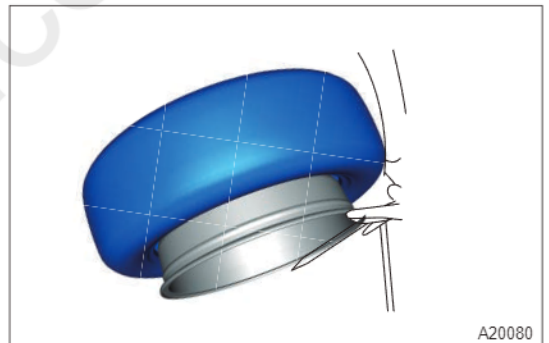
- (5) Use crowbar to pry out outside tire, and sleeve it to replacer head, then take away crowbar.



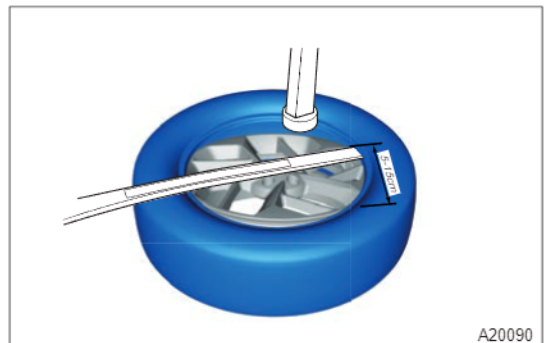
- (6) Rotate wheel, and the movable direction of wheel should be the direction that replacer head is gradually kept away from tire pressure sensor, then remove upper part of tire.



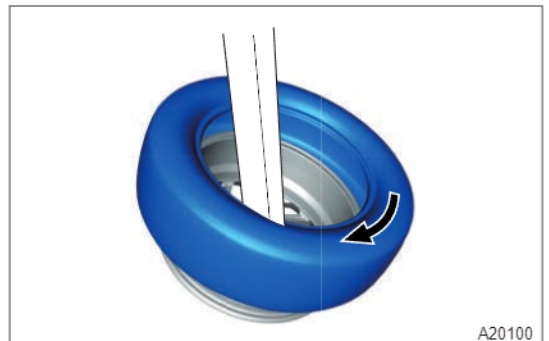
- (7) Lift tire and pry out lower part of tire using crowbar.



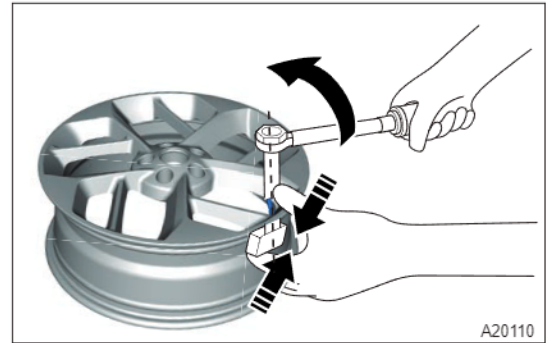
- (8) Lower replacer head and pry out lower side tire tread using crowbar, then sleeve it on replacer head and keep it 5 - 15 cm away from sensor.



- (9) Rotate wheel, and the movable direction of wheel should be the direction that replacer head is gradually kept away from tire pressure sensor, then pry out tire completely.



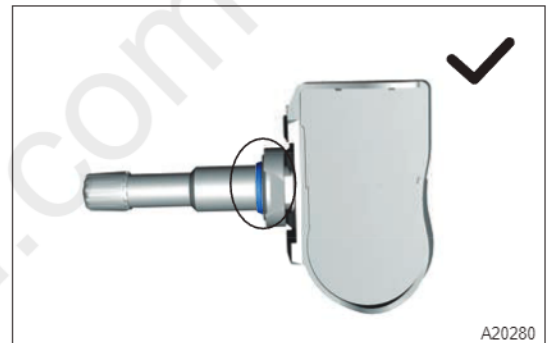
- (10) Using an appropriate tool, rotate nut counterclockwise until it separates from tire pressure sensor completely.



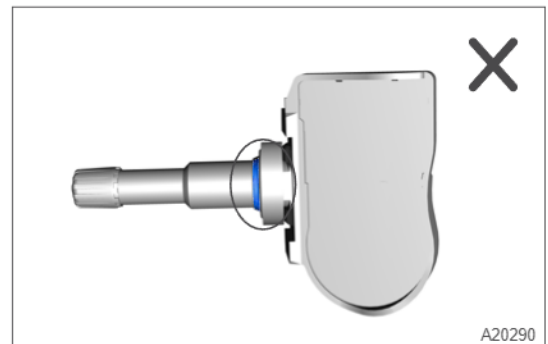
- (11) Remove tire pressure sensor from wheel hub.

■ Inspection

- (1) When removing sensor body, first check if seal washer cutout plane is parallel with the polyester plane. If they are not parallel and there is an angle between two planes, turn seal washer to make seal washer cutout plane parallel with polyester plane.
- (2) If seal washer cutout plane is parallel with polyester plane, it indicates that assembly is qualified.

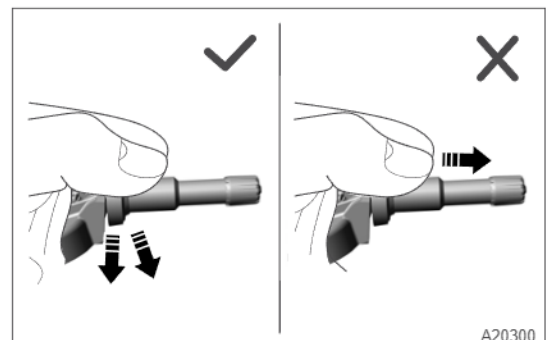


- (3) If seal washer cutout plane is not parallel with polyester plane and there is a large angle between two planes, it indicates that assembly is not qualified.

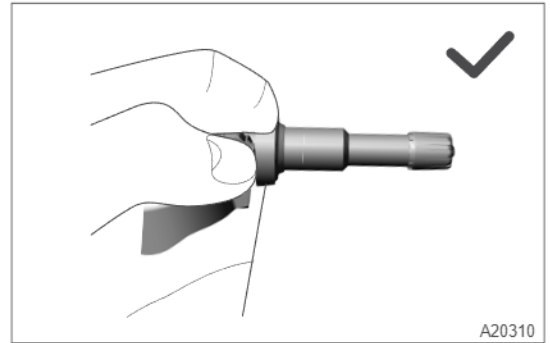


■ Adjustment

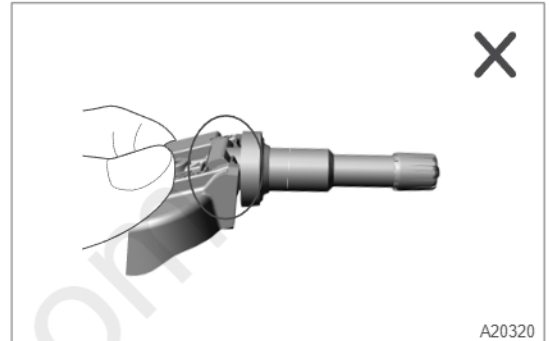
- (1) Press root of valve stem using middle part of your thumb with a downward force in groove direction, so that root of valve stem can be seated in the groove fully; then, keep middle part of thumb pressed against valve stem and tip part of thumb pressed against the seal washer with a vertical downward force applied along seal washer, so that the valve stem can bend to maximum angle. It is not allowed to apply horizontal force along the seal washer.



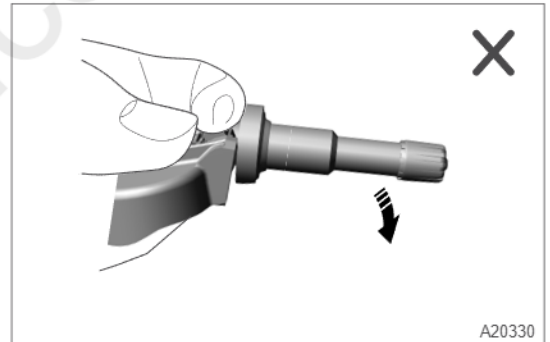
- (2) If root of valve stem enters groove completely and valve stem bends to limit, it indicates that assembly is qualified.



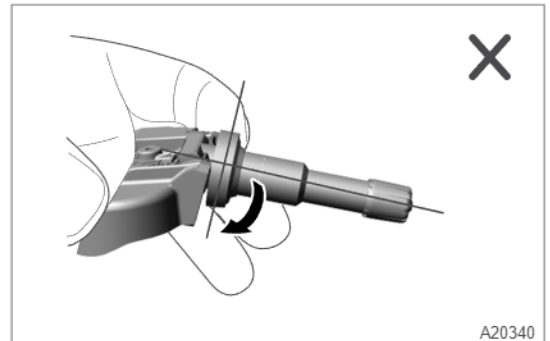
- (3) If root of valve stem does not enter groove fully and valve stem does not bend to limit, it indicates that assembly is not qualified.



- (4) If valve stem does not bend to limit, it indicates that assembly is not qualified.



- (5) If seal washer plane is not perpendicular to valve stem after a horizontal force is applied along the seal washer, it indicates that assembly is not qualified.

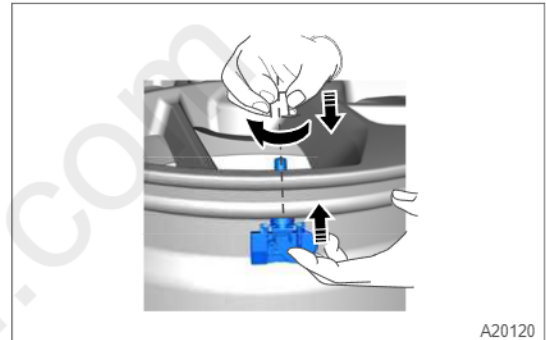


■ Installation

⚠ Caution

- Avoid dropping the sensor. If tire pressure sensor is dropped from a place 1 m high to the ground, it is interpreted as fault in tire pressure sensor.
- Tire pressure sensor must be installed on clean and dry hub.
- Valve cap must be on the valve, except inflation, deflation, air pressure inspection, etc.
- During installation, do not contact the tire pressure sensor with used tools, to avoid damage to the tire pressure sensor.
- Sensor air pressure inlet cannot be covered partially or completely by lubricant or other materials.
- Always use torque wrench when installing tire pressure sensor, common wrench cannot guarantee a torque of $8 \pm 1 \text{ N}\cdot\text{m}$. If the torque is relatively low, air leakage may occur, resulting in a risk of danger; if the torque is relatively high, tire pressure sensor or related components may be damaged, resulting in a risk of danger.
- Required tightening speed: $\leq 30 \text{ rpm}$; Assembly torque: $8 \pm 1 \text{ N}\cdot\text{m}$.

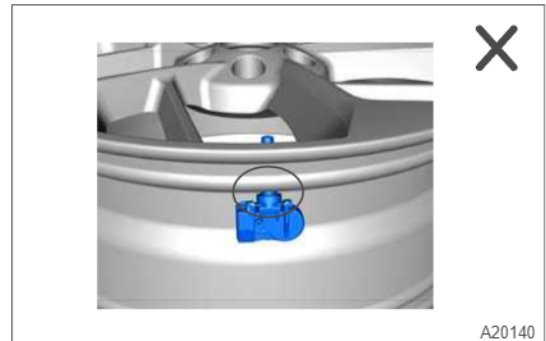
- (1) Align tire pressure sensor with fixing hole on wheel hub and hold the tire pressure sensor vertically with four fingers of the left hand in upward direction, never apply inward component force in horizontal direction; hold the outer edge of rim with left thumb, and apply a downward force to press both sides of sensor housing firmly against the rim. Pass the valve stem into rim along valve hole center axis, and insertion direction is from inward to outward of tire assembly. Tighten the nut with right hand in clockwise direction until the tire pressure sensor is fixed without any movement.



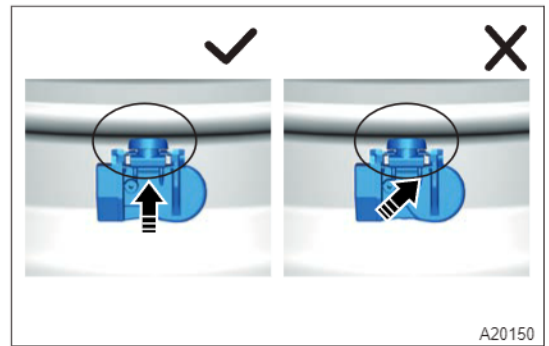
- (2) If valve stem is fully seated into the groove, sensor is fully fixed without any movement and sensor housing is pressed against rim firmly, it indicates that assembly is qualified.



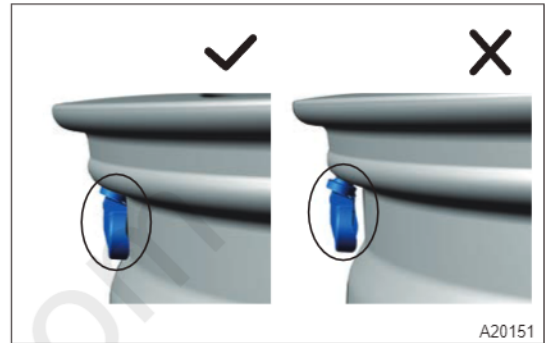
- (3) If the pretightened nut is not tightened into place with too much valve stem screw exposed and sensor is not fixed, it indicates that assembly is unqualified.



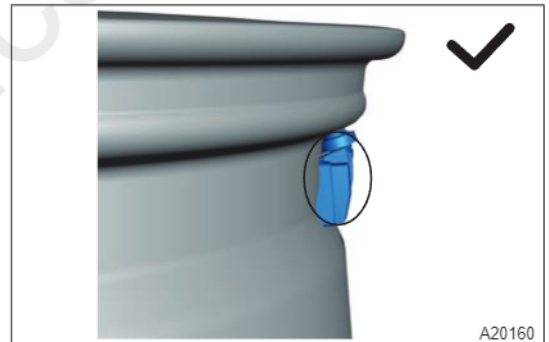
- (4) If the sensor valve stem slides out form metal groove after a horizontal inward component force is applied, it indicates that assembly is unqualified.



- (5) If right side of sensor is not pressed against the rim firmly, it indicates that assembly is unqualified.



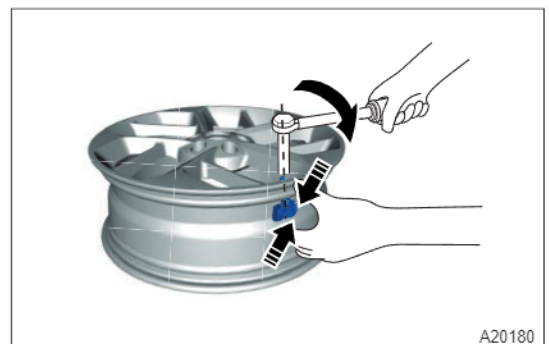
- (6) If left side of sensor is pressed against the rim firmly, it indicates that assembly is qualified.



- (7) If left side of sensor is not pressed against the rim firmly, it indicates that assembly is unqualified.



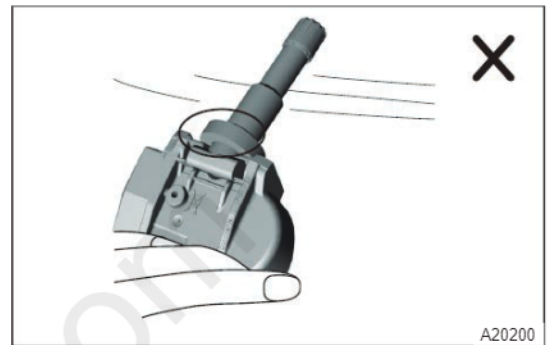
- (8) Hold bottom part of the sensor using four fingers of left hand with a upward force. Hold the rim edge with left thumb with a downward force. Press the tire pressure sensor against the rim firmly, and keep the sensor position fixed during tightening process. The axis of manual torque wrench sleeve should be overlapped with that of valve stem without any angle. Start the fitting button to tighten the nut in clockwise direction, and the tightening process is finished after torque reaches $5 \pm 0.5 \text{ N}\cdot\text{m}$. Do not tighten the nut again after it is tightened.



- (9) If valve stem is fully seated in metal groove, sensor is fully fixed without any movement and both sides of the sensor housing are pressed against rim firmly, it indicates that assembly is qualified.



- (10) If valve stem slides out of metal groove, it indicates that assembly is unqualified.



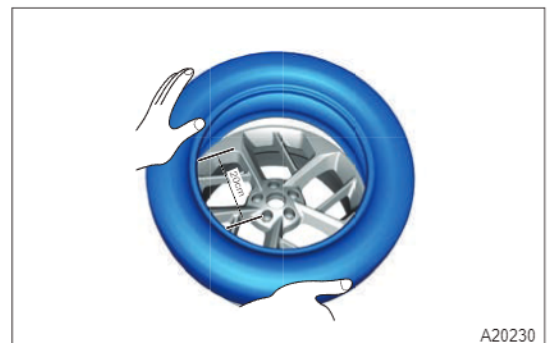
- (11) If seal washer and seal ring are deformed or damaged due to excessive torque, it indicates that assembly is unqualified.



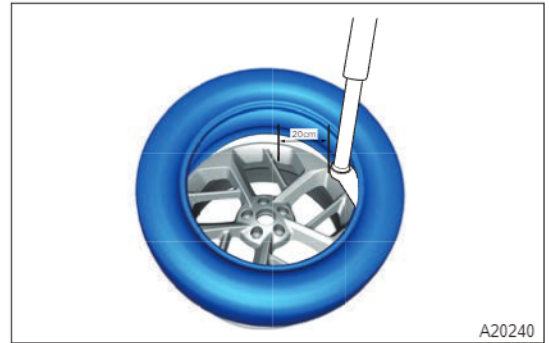
- (12) Installation is the same as common tire. Before loading tire, apply soapy water or glycerin to tire bead along inner circle.



- (13) Put tire on hub and keep intersection between hub and tire edge 15 - 20 cm away from valve stem.



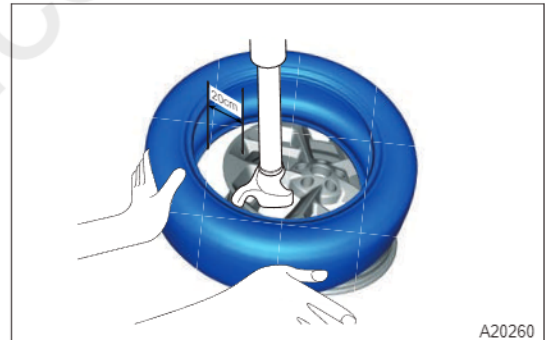
- (14) Install bottom tire to make sure the distance between intersection and valve stem is about 20 cm.



- (15) Rotate wheel to install one side of tire into hub. Rotation direction of wheel should be the direction that makes replacer head get farther and farther away from sensor.



- (16) Put another side of tire in place, so that intersection between tire edge and hub is 20 cm away from valve stem.



- (17) Rotate wheel to install another side of tire into hub.



⚠ Caution

- Be sure to observe the operation regulation to prevent tire pressure sensor from being damaged.
- Both crowbar and tire cannot contact with sensor.
- Confirm that distance between intersection and valve stem is proper.

4.3 Tire Pressure Sensor Learning

Hint:

- Perform tire pressure learning when rotating tire and replacing tire pressure sensor. And perform each tire sensor learning with diagnostic tester.
- Tire pressure monitoring function is turned on after BCM is replaced, then it is necessary to perform learning of tire pressure sensor again.

⚠ Caution

- As for air bleeding method and low-frequency trigger method, only the activation type to trigger tire pressure sensor is different and other procedures are all the same.

■ Learning with diagnostic tester (air bleeding method)

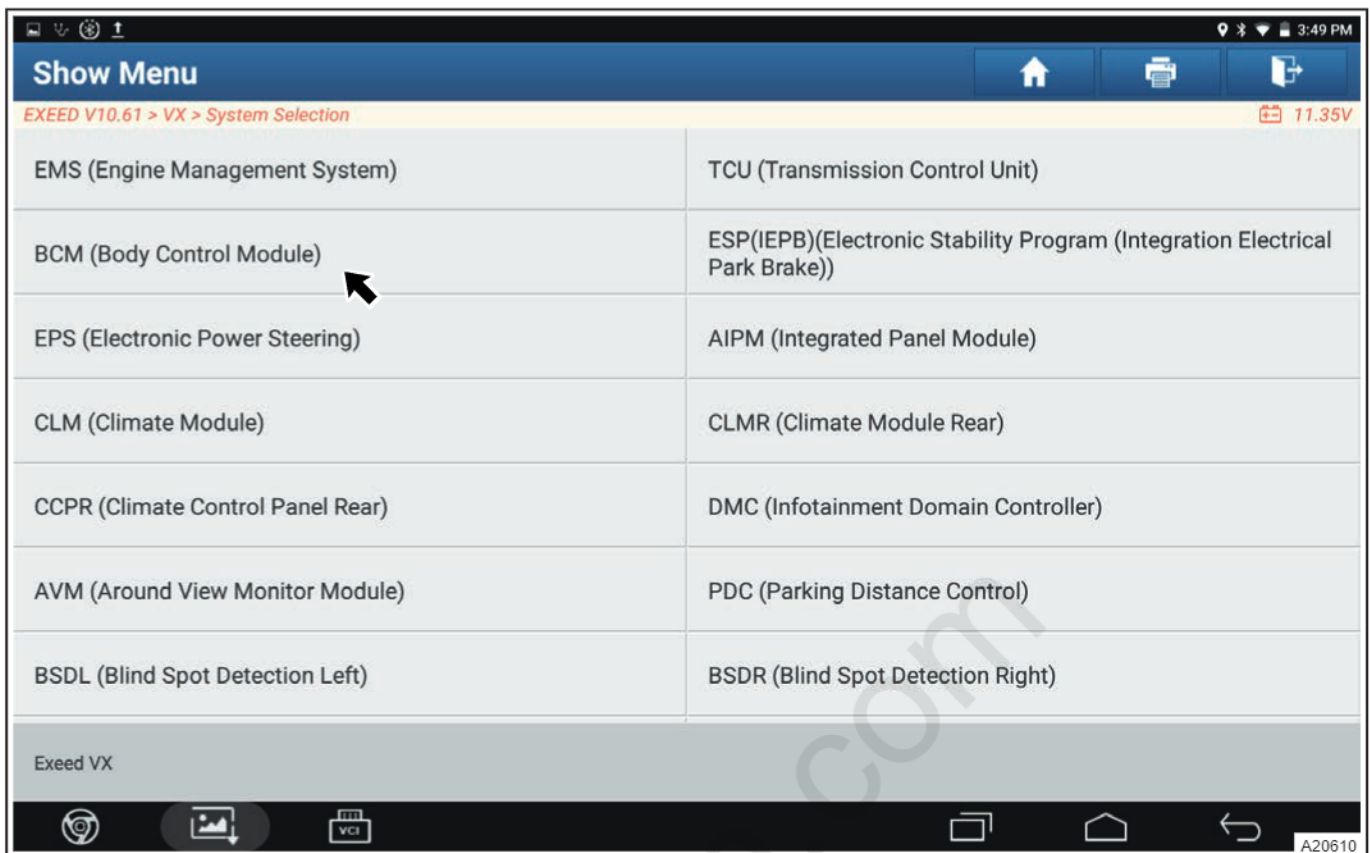
Hint:

- Perform tire pressure learning when rotating tire and replacing tire pressure sensor. And perform each tire sensor learning with diagnostic tester.
- Tire pressure monitoring function is turned on after BCM is replaced, then it is necessary to perform learning of tire pressure sensor again.

Precautions	Description
Avoid error learning of tire	Learned tire must be matched with bleeding tire
	Only operate one tire every time, and do not bleed (or inflate) other tires at this time
	Keep away from other vehicles with tire pressure sensor, avoiding error learning or interference

- If tire learned in system does not matched with bleeding tire, system will recognize an error, resulting in tire information displayed in instrument cluster not corresponding to actual tire information.
- When learning a tire, please do not inflate or bleed other tires. Bleeding or inflating the tire will cause error tire learning.
- When learning tire pressure monitoring system, please do not approach other vehicles equipped with tire pressure sensor and with tire pressure sensor in activated state, otherwise it may lead to error learning or failure to learn.
- After completing learning, please confirm whether four tire pressure sensor ID of actual vehicle is consistent with tire pressure sensor ID recorded by BCM.

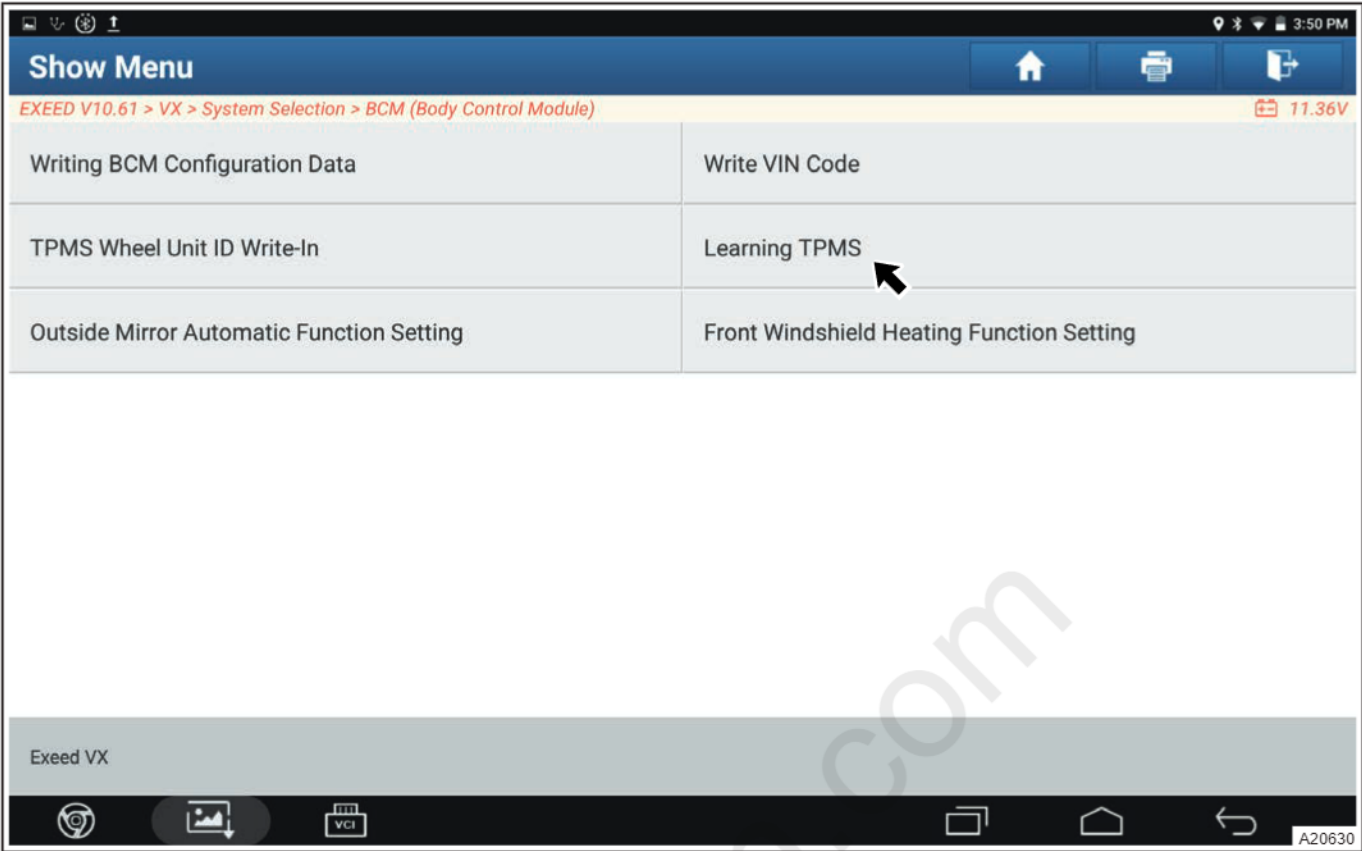
- (1) Connect diagnostic tester and turn ENGINE START STOP switch to ON.
- (2) Click "BCM (Body Control System)" .



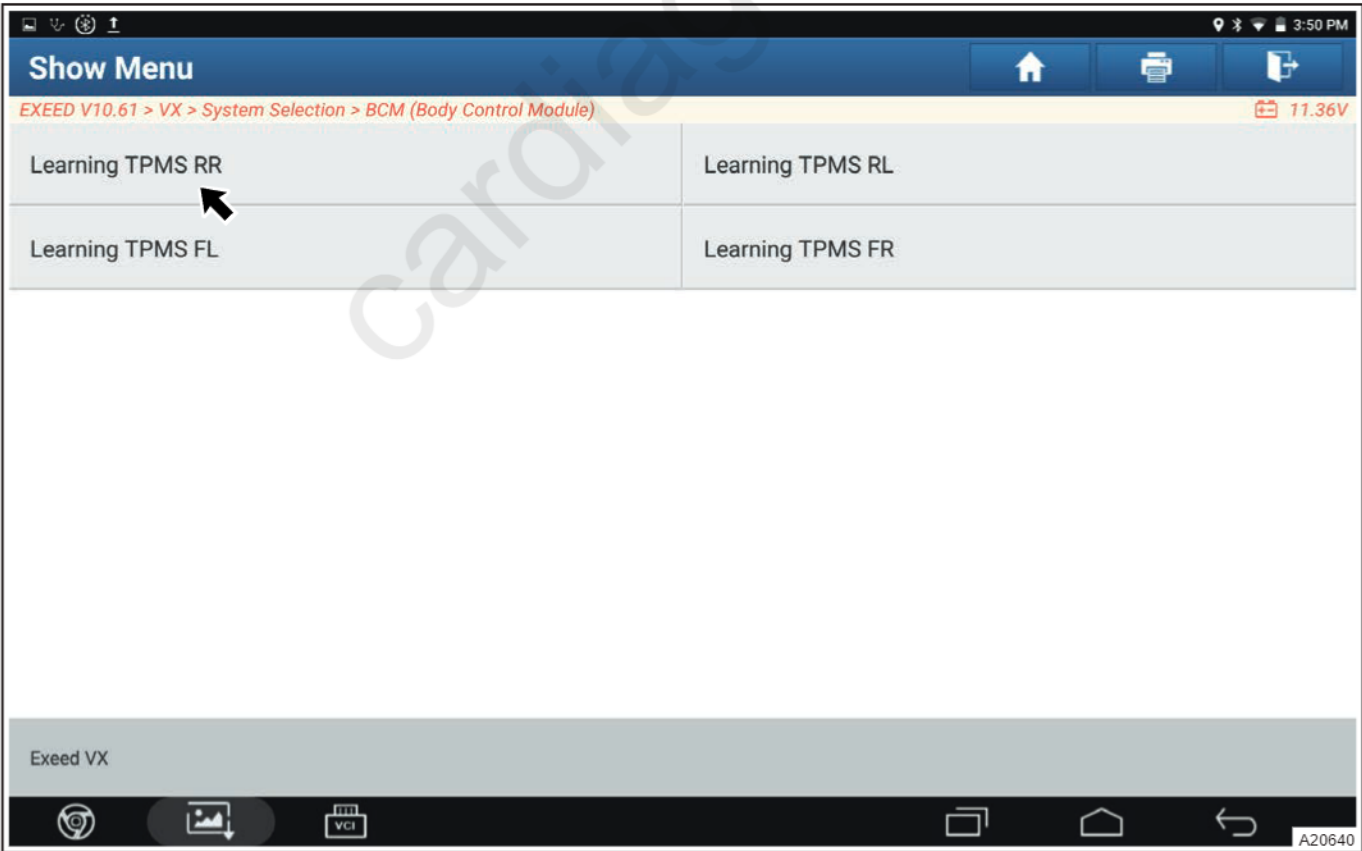
(3) Click "Special Operation" .



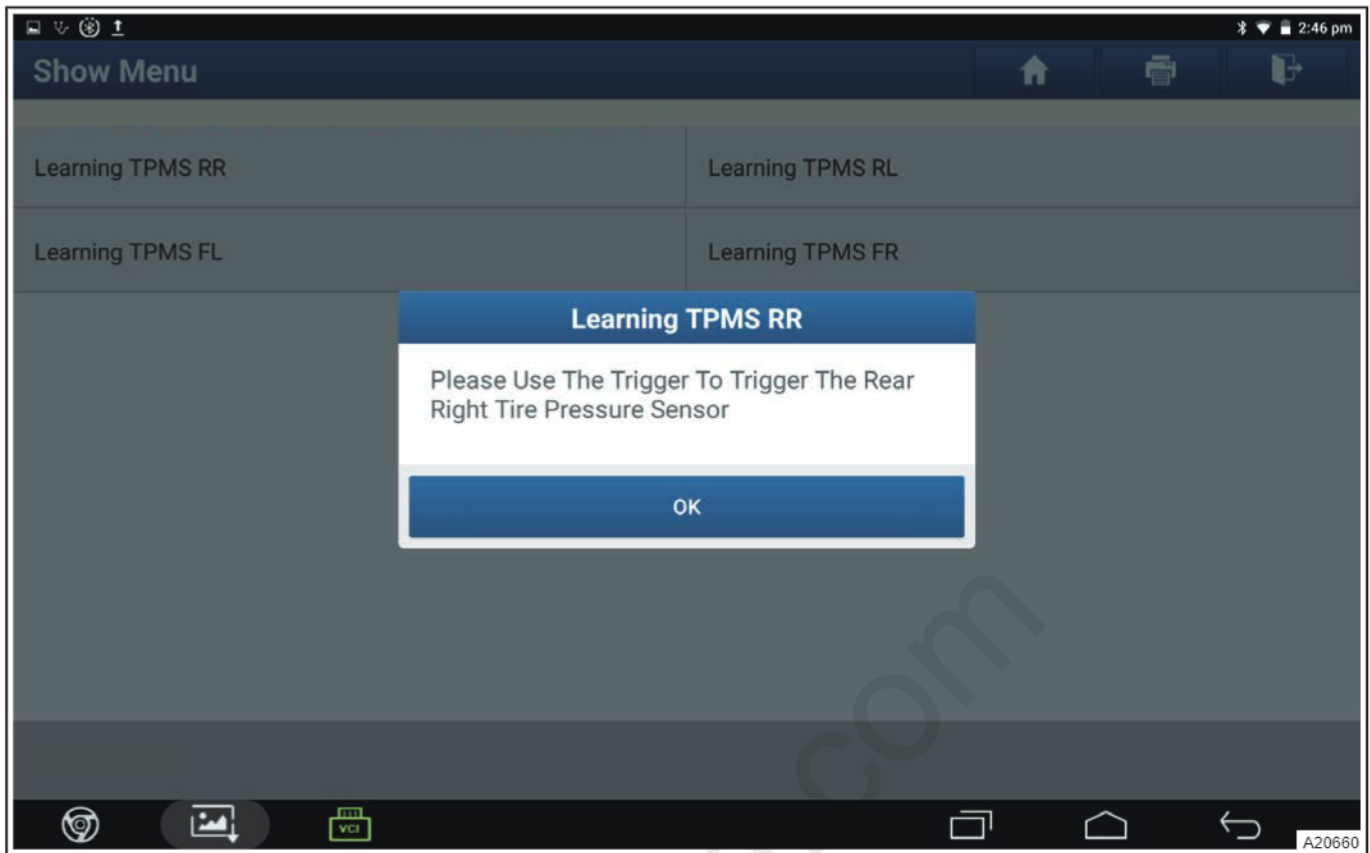
(4) Click "Tire Pressure Learning" .



(5) Click “Rear Right Tire Pressure Learning” .



(6) Operates according to prompt on diagnostic tester.



- (7) When clicking “OK” button on diagnostic tester, tire pressure learning screen is displayed on meter and tire pressure warning light flashes. Perform tire pressure sensor learning when tire pressure monitoring system enters sensor learning status.
- (8) Perform bleeding operation for front left wheel. After front left tire pressure sensor learning is successful, tire pressure malfunction indicator on meter goes off, front left tire pressure value is displayed and “Procedure has completed” is displayed on diagnostic tester which indicates that front left tire pressure sensor learning has been finished.

■ Use diagnostic tester to learn tire pressure sensor (tire pressure learning method for low-frequency trigger)

Meter screen display for successful tire pressure sensor learning:

- (1) Left and right turn signal lights stop blinking, and tire pressure data is displayed on meter, indicating that tire pressure learning is completed, such as left front wheel. The displayed tire pressure is 2 bar and the temperature is 40 °C for front left wheel, which indicate that the front left wheel is learned successfully.



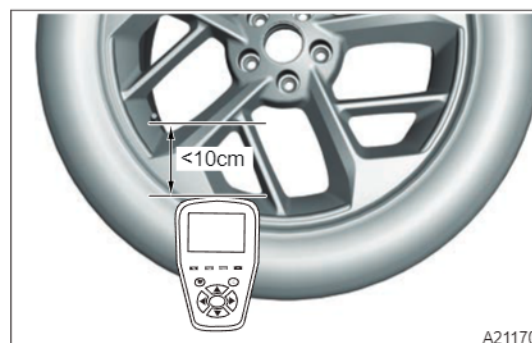
⚠ Caution

- Only after learn is successful, click "OK", otherwise learning will not be successful.

Preparation:

There is enough pressure in tire (full loaded pressure is recommended), BCM turns on tire pressure monitoring function.

- If the malfunction is suspected in tire pressure sensor, use the low-frequency trigger to perform test.
- Distance between low-frequency trigger and tire pressure sensor is less than 10 cm. Place the antenna of low-frequency trigger near the rubber tire with tire pressure sensor on the wheel, and then press triggering button on low-frequency trigger. After the low-frequency trigger is successfully triggered, relative information about learned tire such as tire ID, pressure and temperature will be displayed.



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Low Frequency Trigger Learning Process:

1	Start	Next
2	ENGINE START STOP switch is in ON; but do not start vehicle	Next
3	Switch conventional screen to tire pressure screen on meter; Operate diagnostic tester and select "TPMS Self-learning" menu in "Special Operation"	Next
4	Select tire to be learned with diagnostic tester	Next
5	Enter tire pressure learning status, left and right turn signal lights start blinking	Next
6	Trigger wheel sensor to be learned using low-frequency trigger	Next
7	Tire pressure sensor ID, temperature and pressure values are displayed on low-frequency trigger	Next
8	Left and right turn signal lights stop blinking, the tire pressure data can be displayed on meter, it indicates that tire pressure learning of this tire is completed, click "OK" button on diagnostic tester to exit learning status	

Next

9 Check if other tire sensors are also learned

Yes

Step 4

No

10 Rode test: Vehicle speed is more than 30 Km/h for 45 seconds

Next

11 Select tire to be learned with diagnostic tester

No

Step 2

Yes

12 End

■ Meter Screen Display for Successful Tire Pressure Sensor Learning

- (1) Left and right turn signal lights stop blinking, and tire pressure data is displayed on meter, indicating that tire pressure learning is completed, such as left front wheel. The displayed tire pressure is 2.4 bar and the temperature is 40 °C for front left wheel, which indicate that the front left wheel is learned successfully.



⚠ Caution

- Only after learn is successful, click "OK", otherwise learning will not be successful.

■ Inspection of Tire Pressure Monitoring System Learning Status

After repairing or reconfiguring tire pressure monitoring system, perform inspection of tire pressure monitoring system learning status. Select Read Data Stream to check learning status of tire pressure system.

- (1) Click sensor learning status to check sensor learning status and whether learning is successful. If learning is not successful, unsuccessful learning will be displayed.

Data Stream			
Name	Value	English	Metric
Front tyre cold pressure	230.34	kPa	
Rear tyre cold pressure	230.34	kPa	
Tyre high pressure	342.07	kPa	
Tyre high temp warning value	75	degC	
Test Interface RF output ctrl	Closed		
Test Interface output auto_loc ctrl	Closed		
(1 / 1)			
Compare Sample Save Sample Graph Report Record Help			

■ Automatic Positioning Learning Method

There is automatic tire pressure positioning function:

If tires are exchanged, or sensor is replaced due to damage, and the vehicle stops for more than 20 minutes, when vehicle is continuously driving with a speed higher than 25 Km/h within 45 minutes, system can automatically learn tire pressure and match it to corresponding position.

⚠ Caution

- If two or more sensors are replaced, tire pressure position displayed on meter may be inconsistent with actual position within 10 minutes during driving. And it will be updated to correct position after successful positioning within 10 minutes.
- During automatic positioning, ID stored in receiver defaults to previous ID and corresponding position. If tire rotation is performed, pressure and temperature display position and low/high temperature alarm position of meter may be inconsistent with actual position. And it will be updated to correct position after successful positioning.