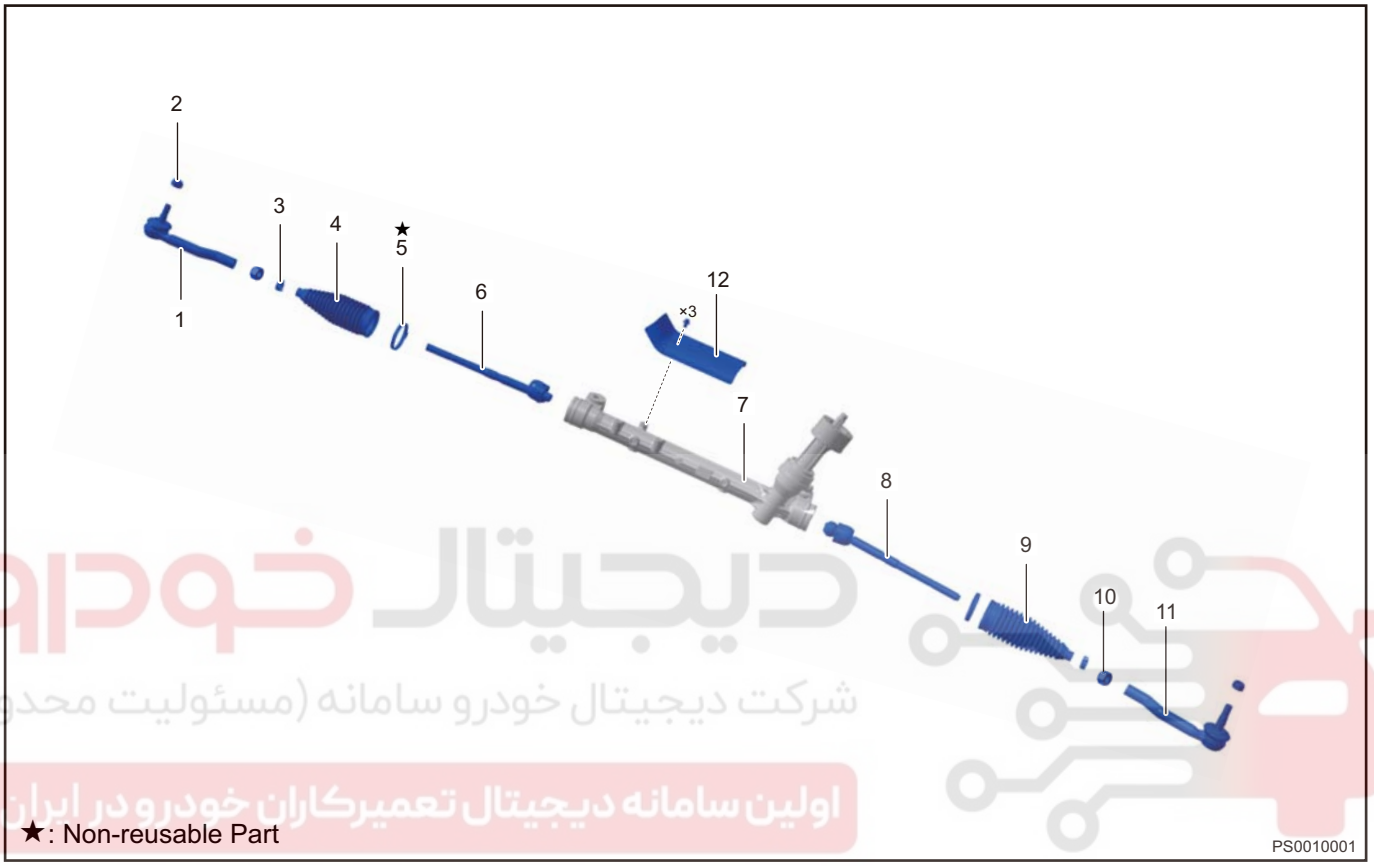
ELECTRONIC POWER STEERING

GENERAL INFORMATION

Overview

Description

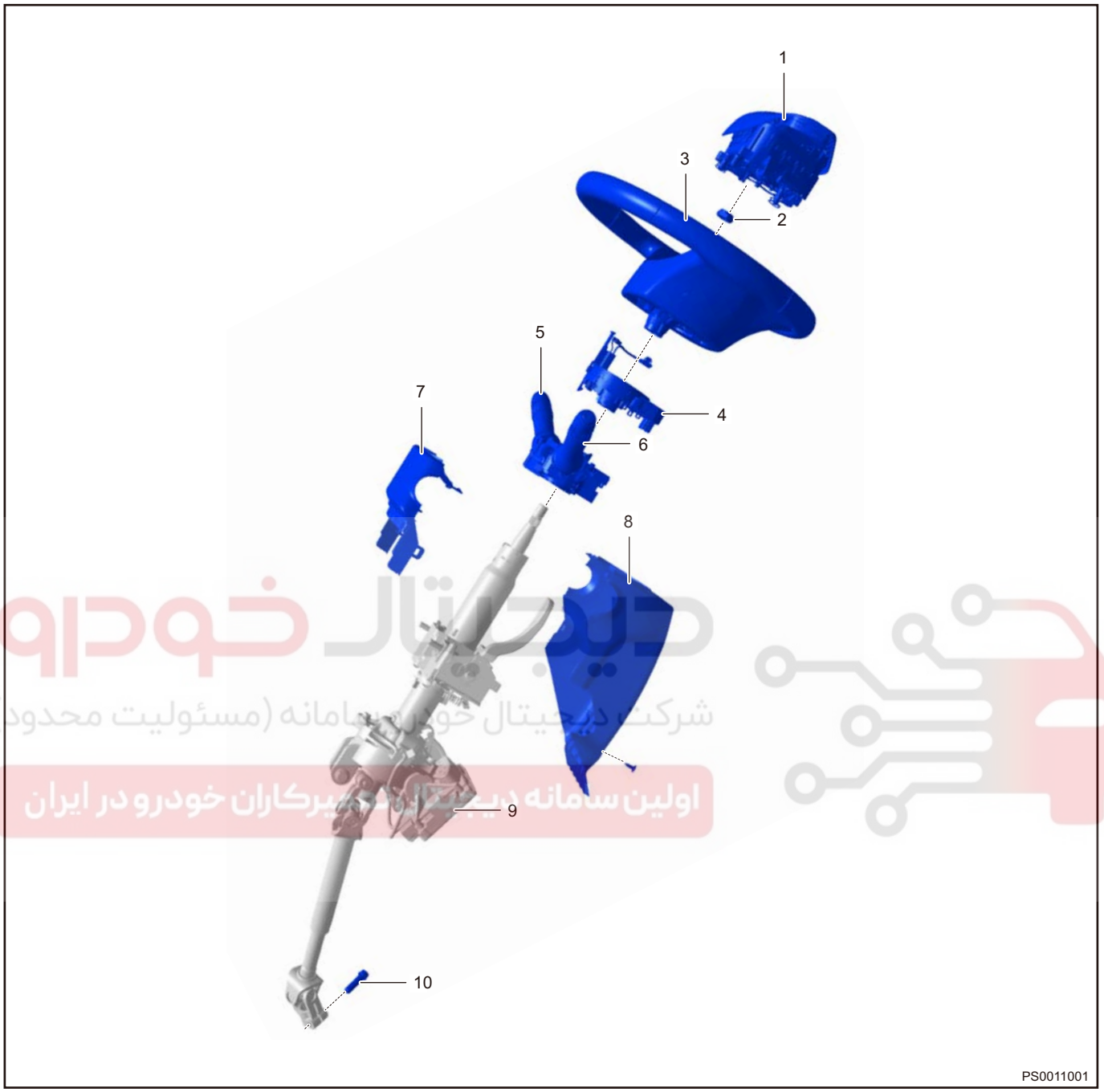
Electronic Power Steering



1 - Right Steering Tie Rod Ball Pin	2 - Steering Tie Rod Ball Pin Locking Nut
3 - Elastic Clamp	4 - Right Steering Tie Rod Boot
5 - Clamping Ring	6 - Right Steering Tie Rod Assembly
7 - Steering Gear Assembly	8 - Left Steering Tie Rod Assembly
9 - Left Steering Tie Rod Boot	10 - Steering Tie Rod Fixing Nut
11 -Left Steering Tie Rod Ball Pin	12 - Steering Gear Heat Insulator

This vehicle adopts the electronic power steering system, which can reduce the workload when driver operates the steering wheel, thus improving operation convenience and driving safety.

Electronic Power Steering Column



1 - Driver Airbag	2 - Steering Wheel Assembly Fixing Nut
3 - Steering Wheel Assembly	4 - Spiral Cable
5 - Wiper Switch	6 - Headlight Turn Fog Switch
7 - Combination Switch Upper Cover	8 - Combination Switch Lower Cover
9 - Electronic Steering Column with Intermediate Shaft Assembly	10 - Lock Bolt

Operation

When driver rotates the steering wheel, torque sensor installed on steering column sends detected torque acting on steering wheel to steering assist control unit. Based on information such as steering torque, vehicle speed (provided by vehicle CAN line), steering wheel rotation angle, steering wheel rotation speed and characteristic curve stored in control unit, control unit calculates required steering torque based on specified algorithm, and controls motor operation. The steering assist is provided by motor drive column, thus steering rack operates.

EPS Corner Calibration and Soft Stop Learning (for Offline Calibration of Four-wheel Alignment Station Electrical Inspection Equipment)

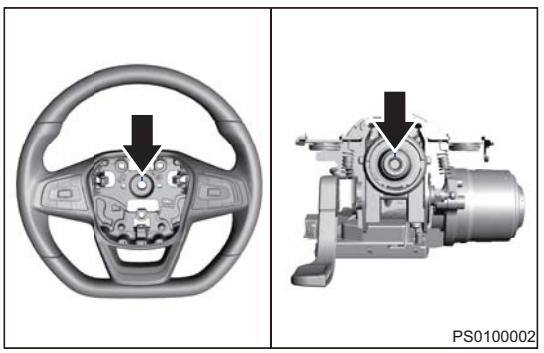
1. Start vehicle;
2. Turn steering wheel to left and right more than ± 45° at a speed of < 200°/s;
3. Four-wheel alignment;
4. The ENGINE START STOP switch is turned off and turned on within 3 seconds (+15on);
5. Horizontally secure the steering wheel;
6. Connect the electrical check equipment, enter the steering angle calibration screen and directly confirm that calibration is completed according to the prompt of electrical check equipment;
7. Calibration is completed;
8. (After the four-wheel alignment is completed), drive out the four-wheel alignment station, turn the steering wheel left and right to the limit position, and keep the hand force not less than 10 N.m for more than 1S, and ensure that the steering wheel hits the limit position and then returns to the middle position;
9. The software completes soft stop learning.

Caution:

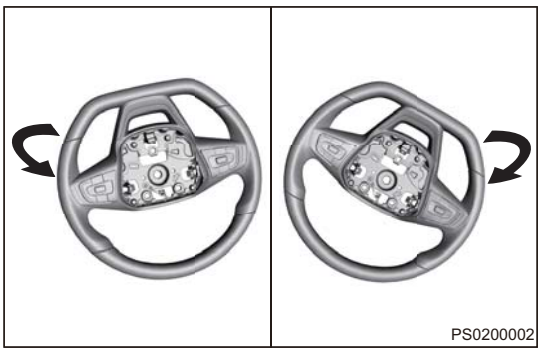
In step 2, if the steering speed is too fast or the steering angle is insufficient, it cannot be calibrated. In step 4, if the vehicle is not powered on in 3 s, it cannot be calibrated. In step 8, when the limit position (hit position) is not turned to, the 1st soft stop position will be advanced, resulting in power stop when it is not turned to the limit position.

Assembly of Steering Wheel and Electronic Power Steering Column

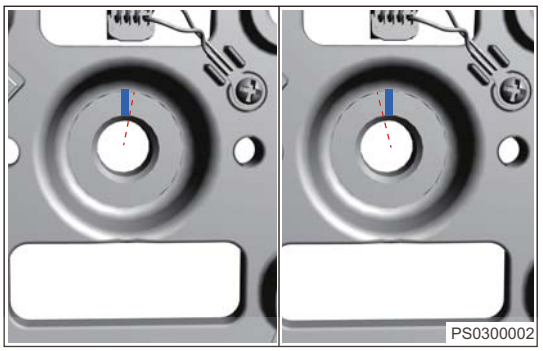
1. Align steering wheel scale mark with column scale mark, then turn steering wheel to extreme position, check steering wheel angle, and ensure the deviation of both rotation corners is ⩽ 10°. If the deviation is >10°, check them after checking one side.
2. Align steering wheel scale mark with column scale mark.



3. Turn steering wheel to extreme position, comparing the difference between rotation angles.



4. If visually measure that deviation is between 10° and 20°, pull the steering wheel and turn scale mark to other side of steering wheel.



Hint:
The scales of steering wheel and column can only assist in assembly, but it cannot be finally positioned, and check left and right strokes as acceptance standard for final position.

Adjustment of Toe and Steering Wheel Angle

Hint:
Steering wheel centering or steering performance are affected by manufacturing error, requirements for four wheels alignment toe-in and steering wheel centering are as following:

1. Confirm the left and right strokes of steering wheel after it is assembled (Assembly method: visually align steering column scale with steering wheel scale, then turn left and right to the limit position and check the corner. If the deviation is >10°, move one tooth back and control the steering deviation angle to within 10°. For details, see the assembly of steering wheel and electric steering column);
2. Before placing four wheels alignment adjuster, first rotate steering wheel to left and right to determine rotation angle of one side ⩾ 45°, then returns to horizontal position.
3. Fix the steering wheel horizontally;
4. Use calibration device to complete center position calibration of steering wheel rotation angle (For calibration methods, refer to EPS corner calibration)
5. When adjusting front wheel toe-in, it is necessary to adjust steering gear left and right tie rods. Loosen locking nut of steering gear tie rod when adjusting, use wrench to rotate inner lever in hexagonal position of outer lever, until toe-in value reaches specified value, then tighten locking nut. If threads exposed outside on left and right levers are greatly not equal (difference between left and right levers threads exposed outside are more than 3 threads), please recheck if steering wheel is centered. It is necessary to set outer lever flat square position with wrench while tightening, tighten torque of nut is 55 ± 5 Nm.
6. After the four wheels alignment is completed and exiting the four wheels alignment station, turn the steering wheel to the limit position (make sure the steering wheel has hit the limit position) and return to the middle position, and the vehicle is turned off.

Steering Mode Switch

Caution:

- Steering mode switch is available only when vehicle is in stationary.
- Steering mode switch is prohibited during driving to avoid accident.

1. Turn on the multimedia, and adjust the interface to audio setting interface.
2. Select "Steering Force Mode".

3. Select different steering modes (comfort and sport mode) on audio system setting interface according to driving habits.

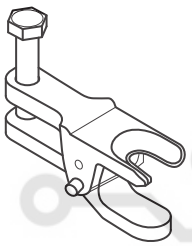
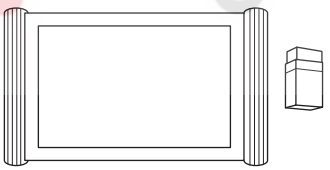
Specifications

Torque Specifications

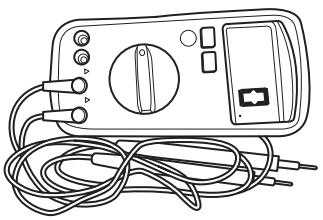
Description	Tightening Torque (N•m)
Steering Wheel Assembly Fixing Nut	30 ± 3
Steering Column Assembly Upper Bracket Fixing Bolt	25+3
Steering Column Assembly Lower Bracket Fixing Bolt	50+5
Steering Gear Lower Joint Boot Fixing Nut	1.5 ± 0.5
Fixing Bolts Between Sub Frame and Body	140 N·m + (45 ± 2) Deg (rear left, rear right, front right); 140 N·m + (39 ± 2) Deg (front left)
Coupling Bolt Between Steering Column with Intermediate Shaft Assembly and Steering Gear Input Shaft (This bolt cannot be reused and new bolt must be used for any tightening operation)	49 ± 3
Fixing Bolt and Nut Between Steering Gear and Sub Frame	110 + 240° (Torque angle method)
Fixing Nut Between Steering Gear Ball Joint and Steering Knuckle	45 ± 5

Tools

Special Tools

Ball Pin Separator	 RCH0024006
X-431 PAD Diagnostic Tester	 RCH000106

General Tool

Digital Multimeter	 RCH0002006

Diagnostic Content

Diagnostic Help

1. Connect diagnostic tester and make it communicate with vehicle electronic module through data network.
2. Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
3. If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
4. Only use a digital multimeter to measure voltage of electronic system.
5. Refer to any Technical Bulletin that applied to the malfunction.
6. Visually check the related wire harness.
7. Check and clean Electronic Power Steering controller (EPS controller) ground related to latest DTC.
8. If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the following:

- Check if connector is loose.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Observe the diagnostic tester data that is related to this circuit.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- Try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggle test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect sensors and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Use data recorder or oscilloscope to help diagnose intermittent malfunctions.
- Remove the EPS controller from malfunctioning vehicle and install it to a new vehicle to perform a test. If DTC cannot be cleared, EPS controller is malfunctioning. If DTC can be cleared, reinstall EPS controller to original vehicle.

Ground Inspection

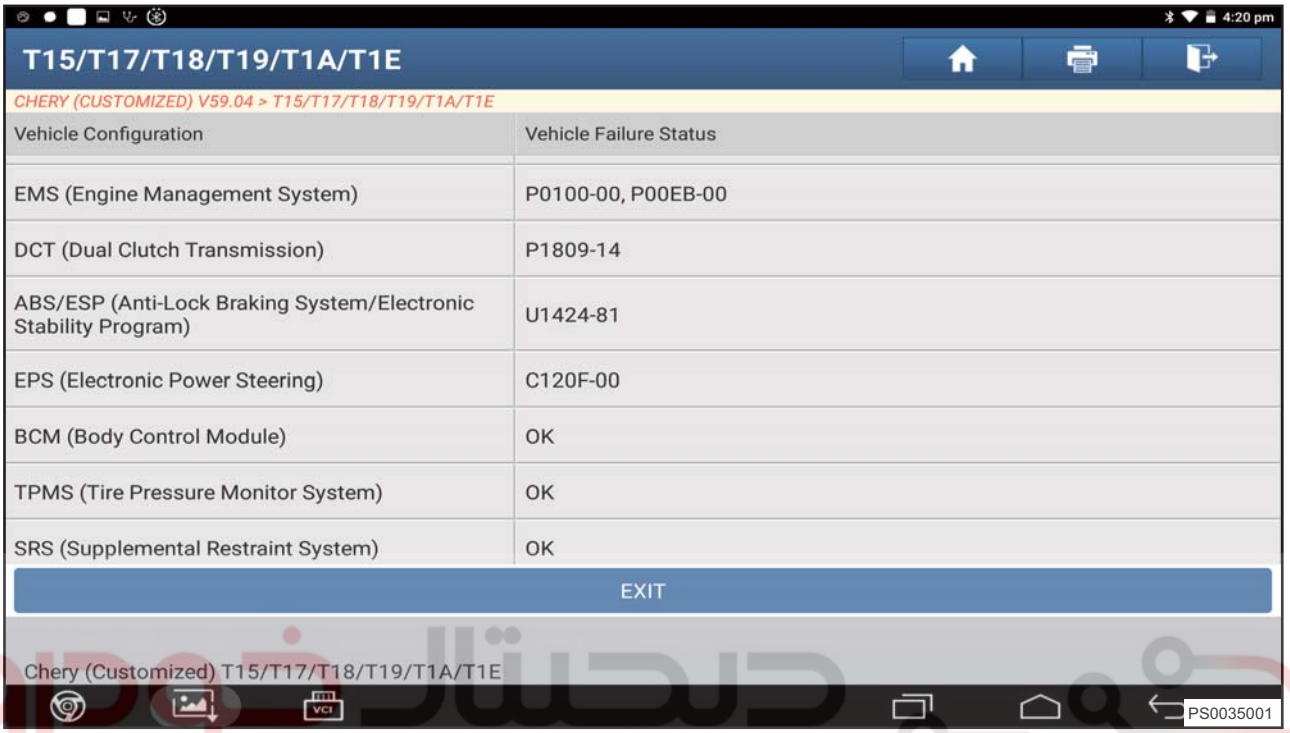
Ground points are often exposed to moisture, dirt or other corrosive areas. Corrosion (rust) may form additional resistance. This additional resistance will change the way in which a circuit works. A loose or corroded ground point can seriously affect control circuit. Check the ground points as follows:

1. Remove ground bolt or screw.
2. Check all contact surfaces for tarnish, dirt and rust, etc.
3. Clean as necessary to ensure that contact is in good condition.
4. Reinstall bolt or screw securely.
5. Check if add-on accessories interfere with ground circuit.
6. If several wire harnesses are crimped into one ground terminal, check for proper crimps. Make sure that all wires are clean, securely fastened and good contacted without crimping any excessive insulation coat.

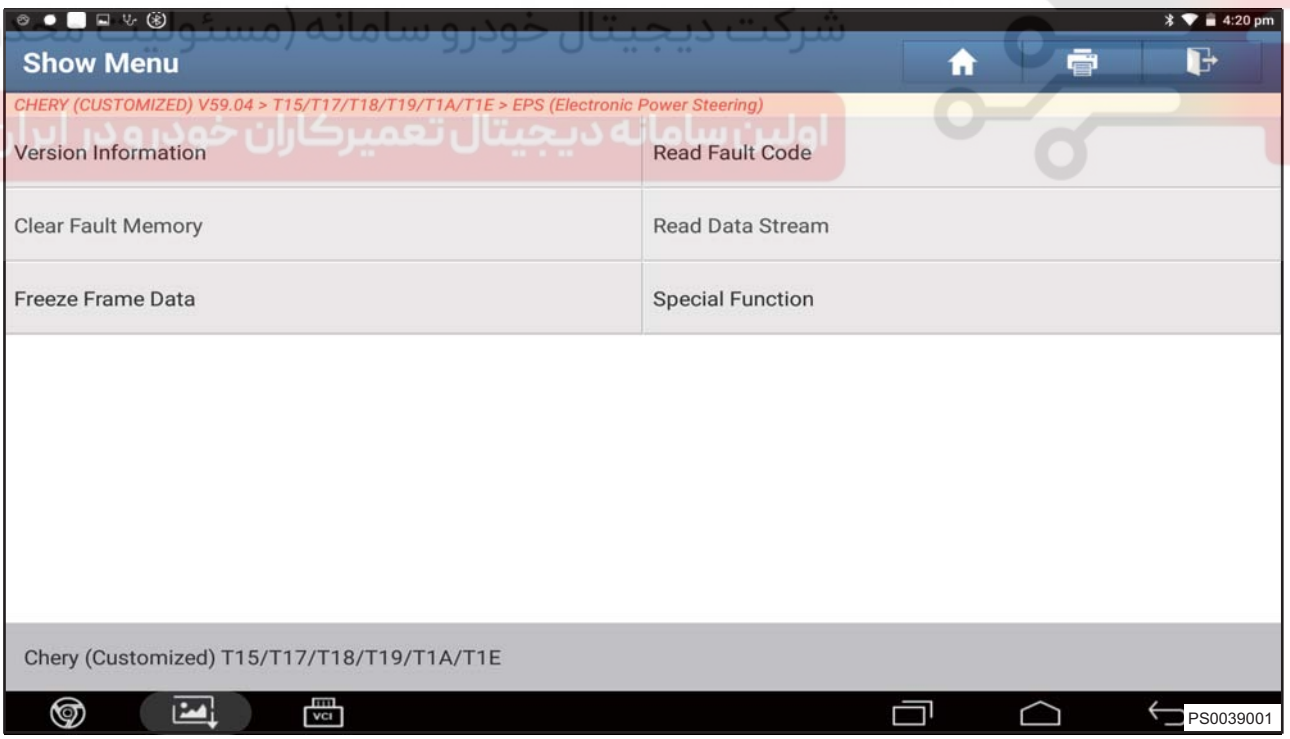
Motor Position Sensor Calibration

(a) Connect diagnostic tester, turn ignition switch ON.

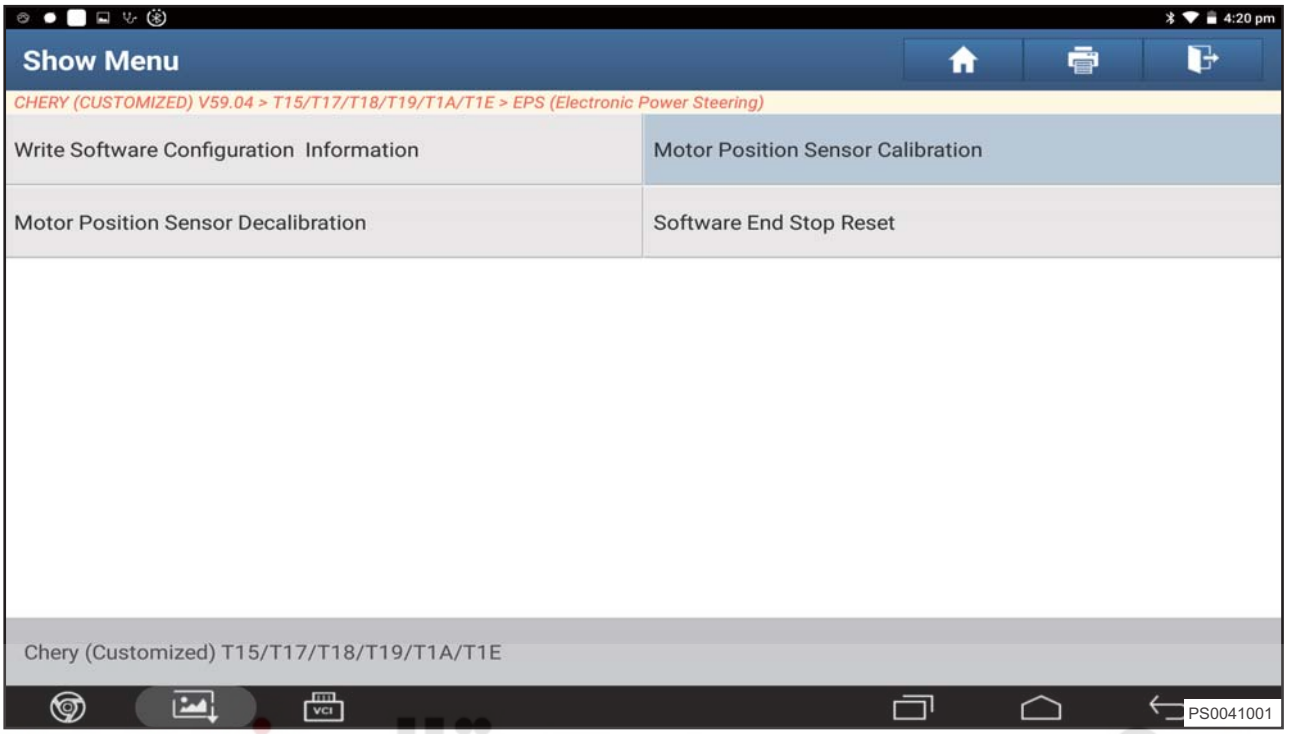
(b) Select "EPS (Electronic Power Steering)".



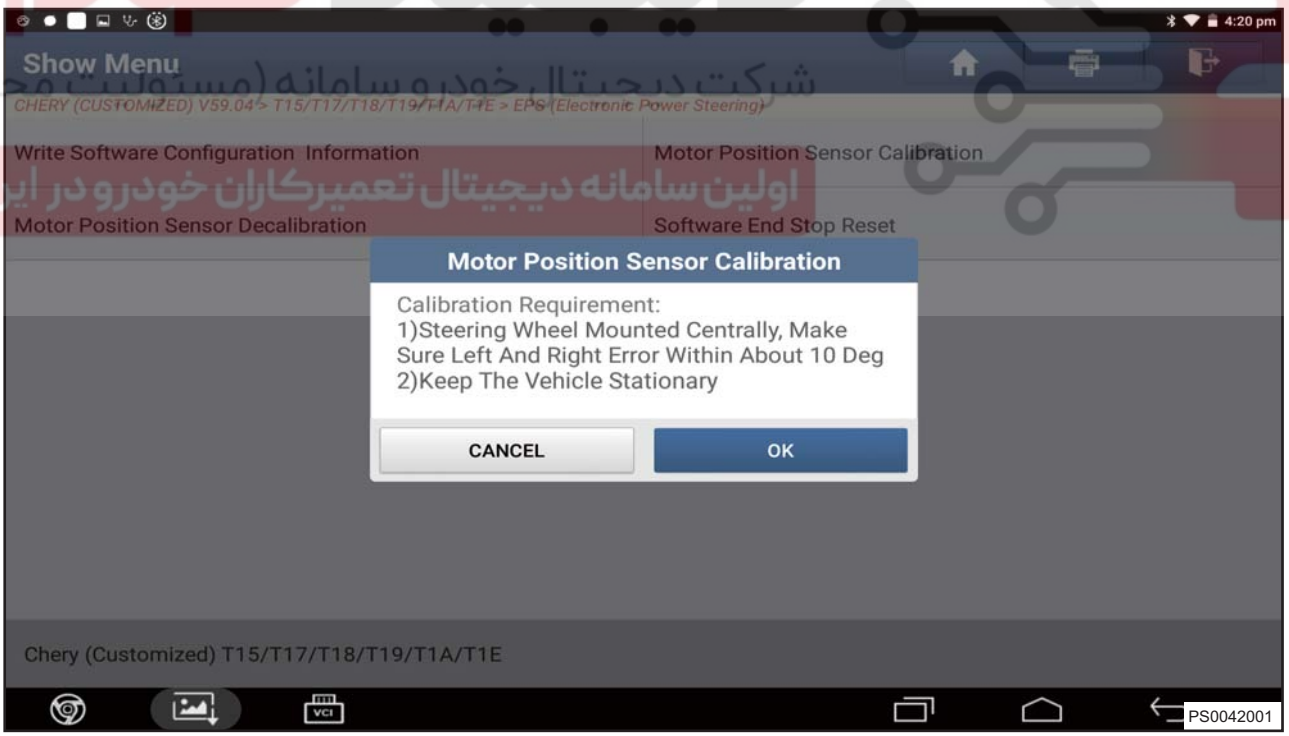
(c) Click "Special Function".



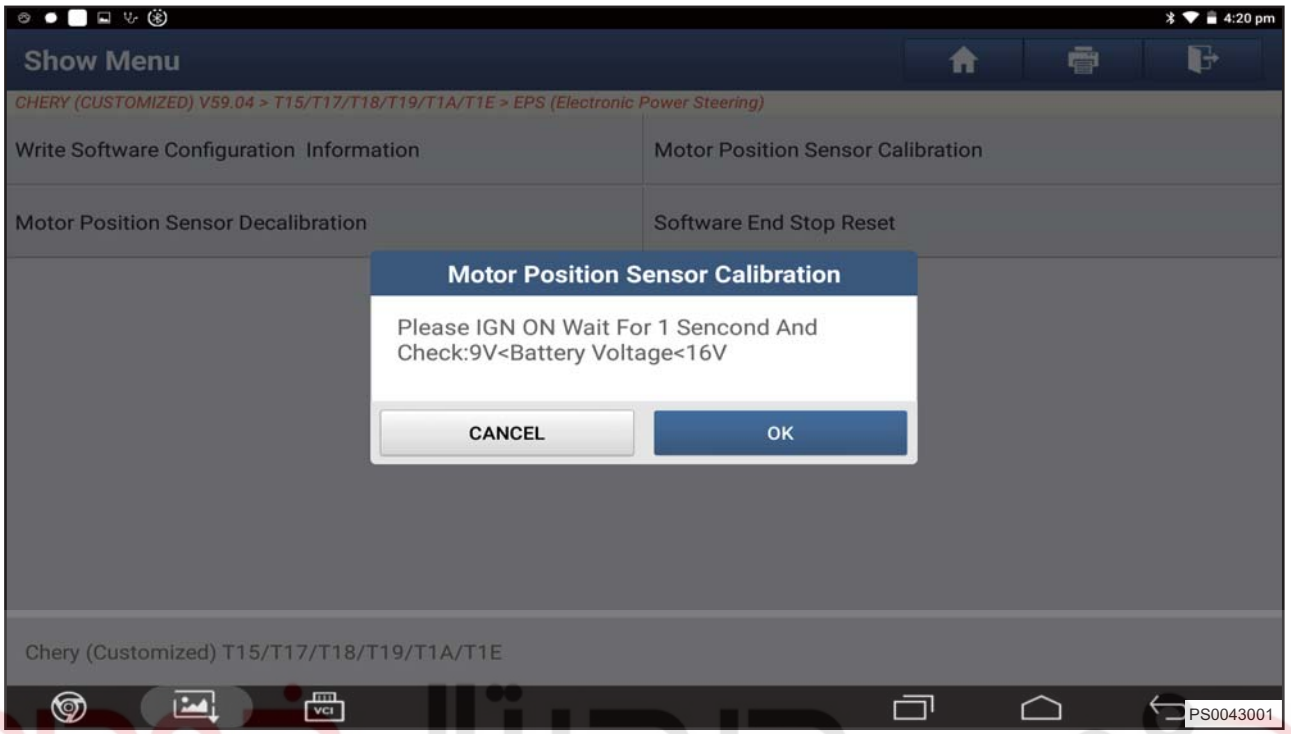
(d) Go to next interface, click "Motor Position Sensor Calibration".



(e) Hint: "Calibration Requirement: 1) Steering Wheel Mounted Centrally. Make Sure Left And Right Error Within About 10 Deg. 2) Keep The Vehicle Stationary" Then click "OK".

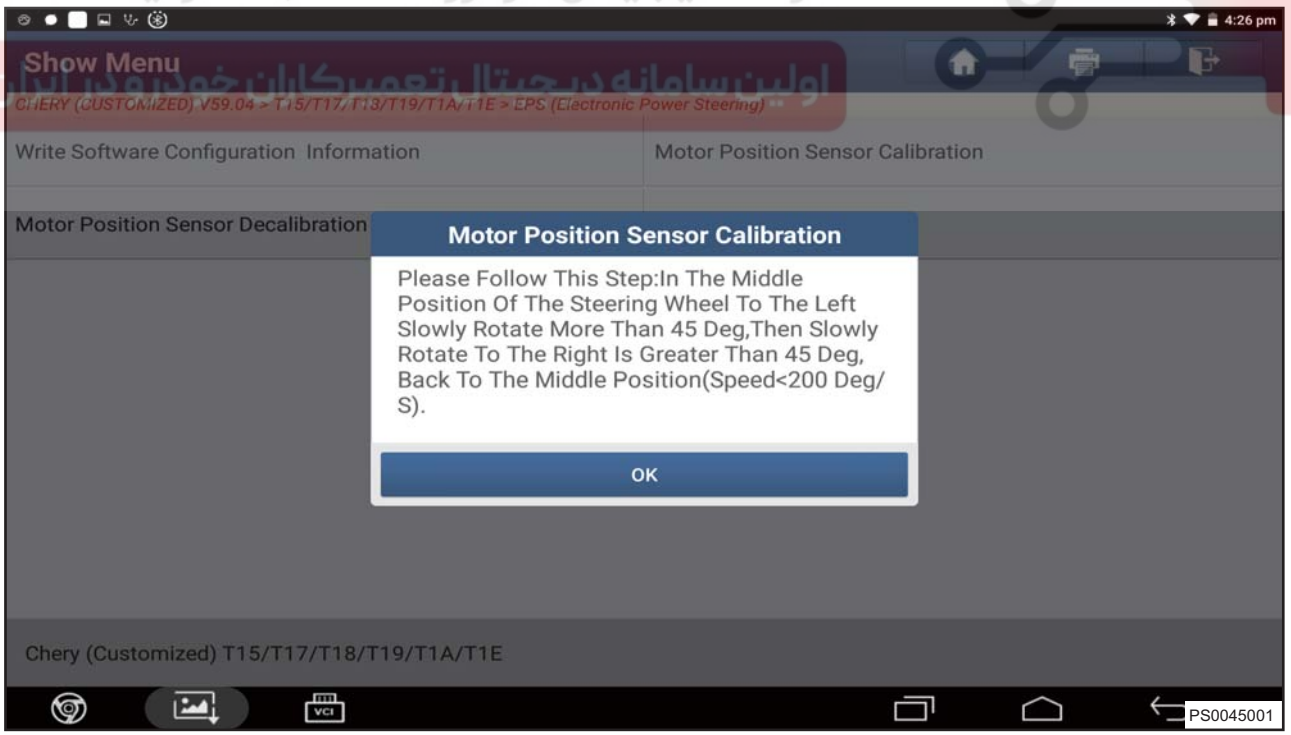


(f) Hint: "Please IGN ON Wait For 1 Second And Check: 9 V < Battery Voltage < 16 V" and click "OK".



(g) Hint: "Control/Routine Started Successfully By The Tester" Then click "OK".

(h) Hint: "Please Follow This Step: In The Middle Position Of The Steering Wheel To The Left Slowly Rotate More Than 45 Deg, Then Slowly Rotate To The Right Is Greater Than 45 Deg, Back To The Middle Position (Speed < 200 Deg/S)." and click "OK".



(i) Hint: "Calibration Success!" Then click "OK".

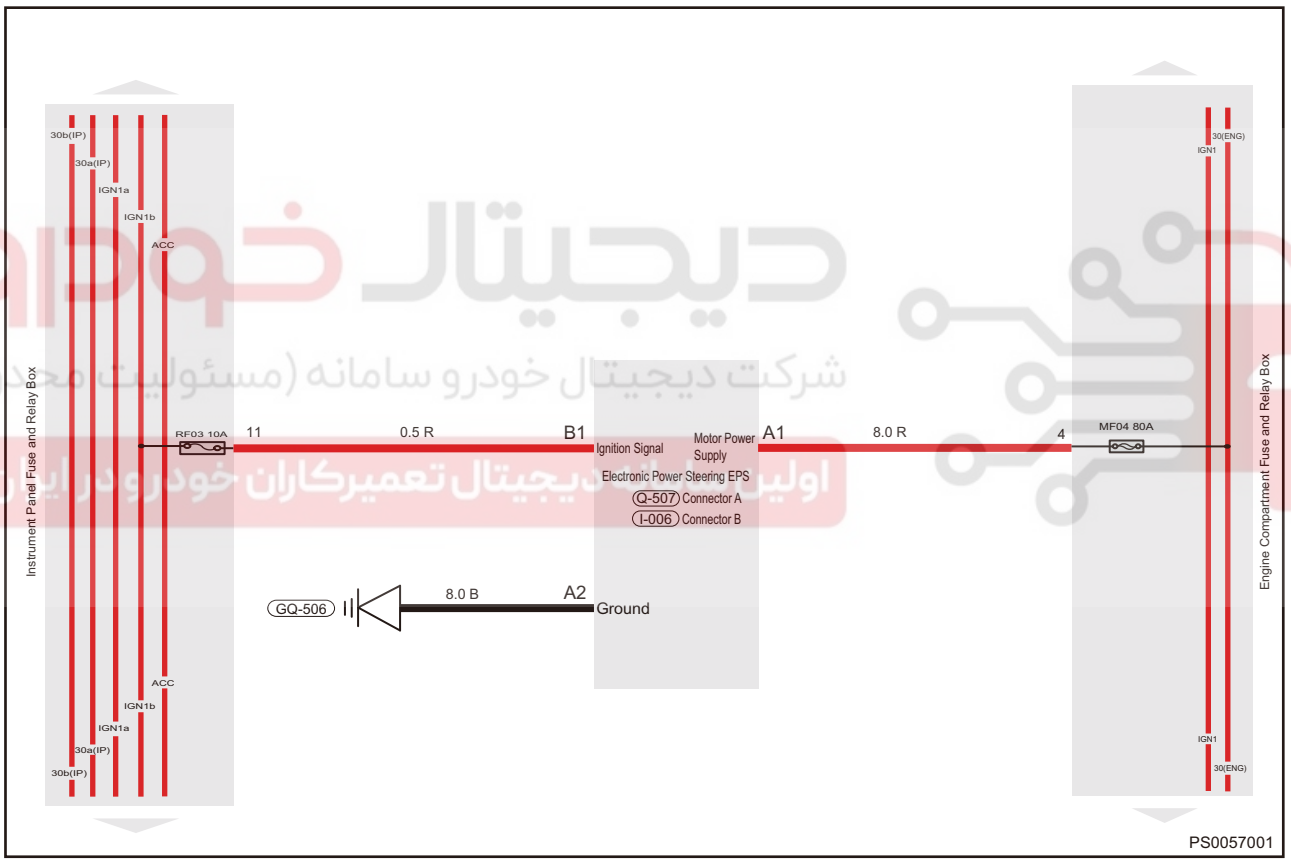
Warning:
Caution
- Calibration requirements: Keep the vehicle stationary and the steering wheel is centered to ensure that the left and right errors are within 10°.
- Battery voltage is higher than 9 V and lower than 16 V

Diagnostic Trouble Code (DTC) Chart

C1200-44	Data Flash Operation Error
C1201-44	Data Flash Verify Error
C1202-49	ECU Hardware Error
C1203-00	ECU Reset Error
C1204-48	ECU SW Monitoring Error
C1205-45	Flash Code Verify Error
C1206-07	High Friction
C1207-49	Index Sensor Error
C1208-49	Output Stage Error
C1209-49	Phase Current Error
C120A-49	Rotor Position Sensor Error
C120B-49	Rotor Position Assist Passage Sensor Error
C120C-07	Steering Oscillation
C120D-00	Steering Angle Implausible
C120E-00	Steering Angle No Initialization
C120F-00	Steering Angle Sensor Not Calibrated
C1210-49	Steering Angle Sensor Self Test Error
C1211-1C	Supply Voltage Abnormal during Initialization
C1212-1C	Supply Voltage Uncritical Too High Warning
C1213-1C	Supply Voltage Uncritical Too High
C1214-17	Supply Voltage Critical Too High
C1215-1C	Supply Voltage Uncritical Too Low Warning
C1216-1C	Supply Voltage Uncritical Too Low
C1217-16	Supply Voltage Critical Too Low
C1218-4B	Over Temperature Reduction
C1219-4B	Temperature Out of Range
C121A-49	Torque Sensor Error
C121B-46	XCP Flash Data Changed
U0100-87	Lost Communication With EMS
U0129-87	Lost Communication with BSM
U0140-87	Lost Communication with BCM
U0401-81	Invalid Data Received From EMS
U0418-81	Invalid Data Received From BSM
U0422-81	Invalid Data Received From BCM
C121C-00	Software Configuration Invalid
C122D-48	ECU SW Information Error

DTC	C1212-1C	Supply Voltage Uncritical Too High Warning
DTC	C1213-1C	Supply Voltage Uncritical Too High
DTC	C1214-17	Supply Voltage Critical Too High
DTC	C1215-1C	Supply Voltage Uncritical Too Low Warning
DTC	C1216-1C	Supply Voltage Uncritical Too Low
DTC	C1217-16	Supply Voltage Critical Too Low

Circuit Diagram



Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C1212-1C	Supply Voltage Uncritical Too High Warning	Ignition switch OFF, engine does not run	Circuit Voltage Below Threshold Circuit Voltage Above Threshold Component internal fault
C1213-1C	Supply Voltage Uncritical Too High		
C1214-17	Supply Voltage Critical Too High		
C1215-1C	Supply Voltage Uncritical Too Low Warning		
C1216-1C	Supply Voltage Uncritical Too Low		
C1217-16	Supply Voltage Critical Too Low		

Caution:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	Check battery voltage

(a) Check if battery voltage is normal.
(b) Check battery voltage with multimeter voltage band.

OK

Standard voltage: not less than 12V.

Result

Proceed to
OK
NG

NG → **Check and repair battery**

OK

2	Check fuse

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Remove the fuse MF04 (80 A), RF03 (10 A) from engine compartment fuse and relay box.
(d) Check if fuse is blown.

OK

Fuse is not burned out

Result

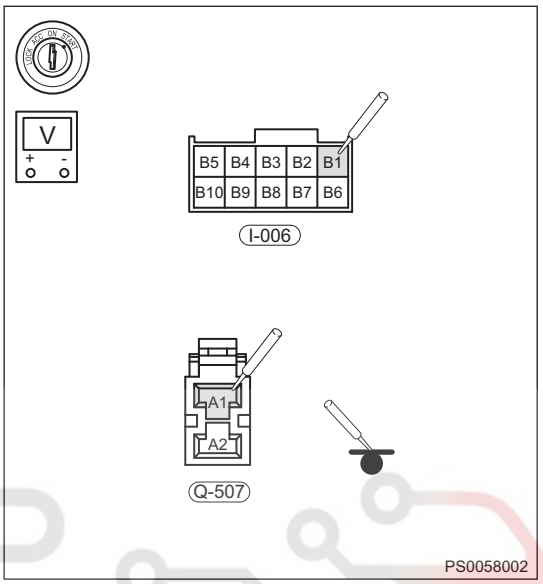
Proceed to
OK
NG

NG → **Replace fuse**

OK

3	Inspect power supply voltage

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect electric power steering module connectors Q-507 and I-006.
(c) Turn ENGINE START STOP switch to ON.
(d) Check voltage between Q-507 (A 1) - body ground with multimeter voltage band, and check if 21W test light comes on.
Check voltage between I-006 (B 1) - body ground with multimeter voltage band, and check if 21W test light comes on.



Multimeter Connection	Condition	Normal Condition
Q-507 (A 1) - Body ground	ENGINE START STOP switch ON	Not less than 12 V
I-006 (B 1) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V

38

OK
Power supply voltage is normal

Result

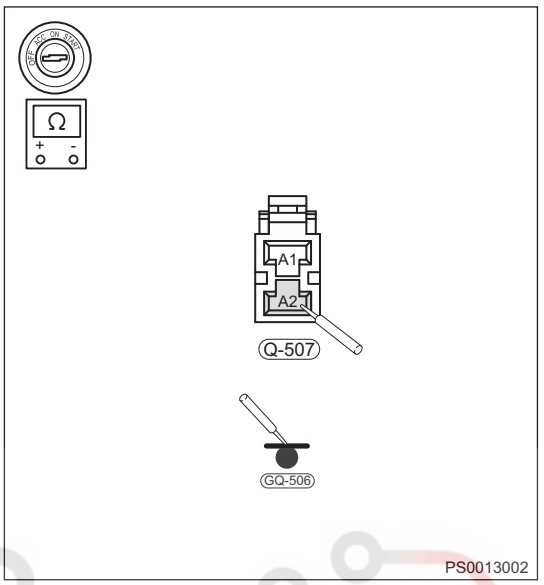
Proceed to
OK
NG

NG → **Repair and replace power supply wire harness**

OK

4	Inspect ground

(a) Turn ENGINE START STOP switch to OFF.
(b) Turn ENGINE START STOP switch to OFF.
(c) Disconnect electric power steering module connector Q-507.
(d) Check continuity between Q-507 (A 2) - body ground GQ-506 with multimeter ohm band.



Multimeter Connection	Condition	Normal Condition
Q-507 (A 2) - Body ground	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK
Ground point is normal

Result

Proceed to
OK
NG

38

NG → **Repair or replace ground point**

OK →

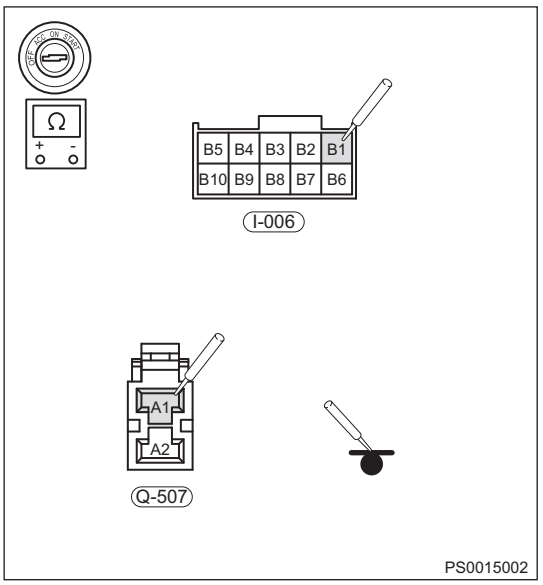
5	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect electric power steering module connectors Q-507 and I-006.
(c) Using ohm band of multimeter, check for continuity between I-006(B 1) and instrument panel fuse and relay box RF03.
(d) Check continuity between Q-507 (A 1) and engine compartment fuse and relay box with multimeter ohm band.

Multimeter Connection	Condition	Normal Condition
I-006(B 1)- Instrument panel fuse and relay box RF03	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Q-507 (A 1) - Engine compartment fuse and relay box	ENGINE START STOP switch "OFF"	⩽ 1 Ω

(e) Check continuity between Q-507 (A 1) - body ground and I-006 (B 1) - body ground with multimeter ohm band. Check for Short

Multimeter Connection	Condition	Normal Condition
Q-507 (A 1) - Ground	ENGINE START STOP switch "OFF"	∞
I-006 (B 1) - Ground	ENGINE START STOP switch "OFF"	∞



OK

Wire harness and connector are normal

Result

Proceed to
OK
NG

OK → **System operates normally**

NG → **Repair or replace control circuit wire harness and connector**

DTC	C1207-49	Index Sensor Error

DTC	C1200-44	Data Flash Operation Error

DTC	C1201-44	Data Flash Verify Error

DTC	C1202-49	ECU Hardware Error

DTC	C1203-00	ECU Reset Error

DTC	C121A-49	Torque Sensor Error

Description

DTC No.	DTC Definition	DTC Detection Condition	Possible Cause
C1207-49	Index Sensor Error	Ignition switch ON	Electric Power Steering Module Error
C1200-44	Data Flash Operation Error		
C1201-44	Data Flash Verify Error		
C1202-49	ECU Hardware Error		
C1203-00	ECU Reset Error		
C121A-49	Torque Sensor Error		

Procedure

1	Check battery voltage

(a) Connect negative battery cable, and turn ENGINE START STOP switch to ON to make engine run normally.

(b) Check battery voltage with multimeter voltage band.
Specified Condition

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch ON	Not less than 12 V

OK

Standard voltage: Not less than 12 V

Result

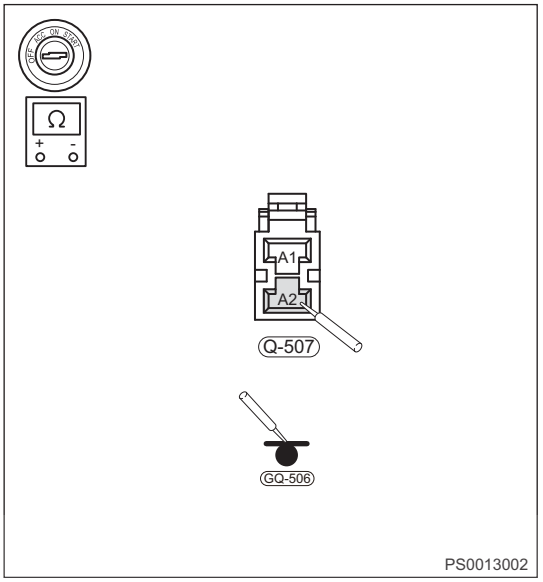
Proceed to
OK
NG

NG → Check and repair battery

OK →

2	Inspect ground and power supply circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable and check continuity between terminal A2 of EPS module connector Q-507 and ground GQ-506.



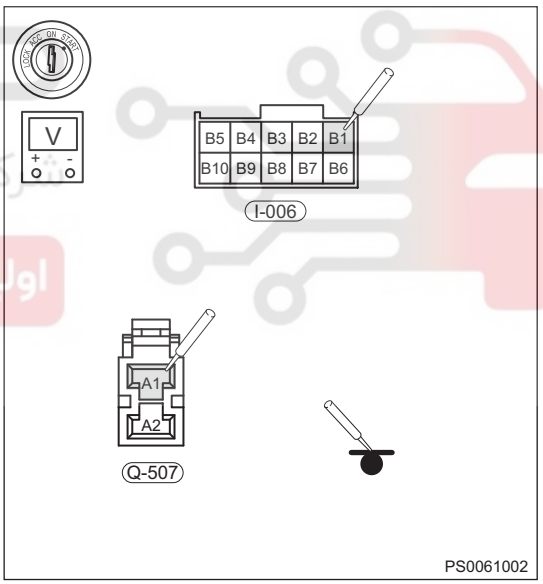
(c) Check if power supply voltage of terminal Q-507 (A1) and I-006 (B1) is normal.

OK

Ground point and voltage are normal

Result

Proceed to
OK
NG



OK	End
NG	Replace the electronic power steering column assembly

DTC	C121C-00	Software Configuration Invalid

Description

DTC No.	DTC Definition	DTC Detection Condition	Possible Cause
C121C-00	Software Configuration Invalid	Ignition switch ON	Software configuration fault Electric power steering module error

Procedure

1	Check software configuration information

(a) Turn ENGINE START STOP switch to ON.
(b) Connect diagnostic tester, read software configuration code and check if it has been correctly input.

Result

Proceed to
OK
NG

NG → **Reconfigure software information**

OK

2	Check EPS controller

(a) Turn ENGINE START STOP switch to ON.
(b) Check if EPS controller power supply and ground of controller are normal
(c) Check if EPS CAN network wire harnesses are connected properly.

Result

Proceed to
OK
NG

OK → **Clear DTCs**

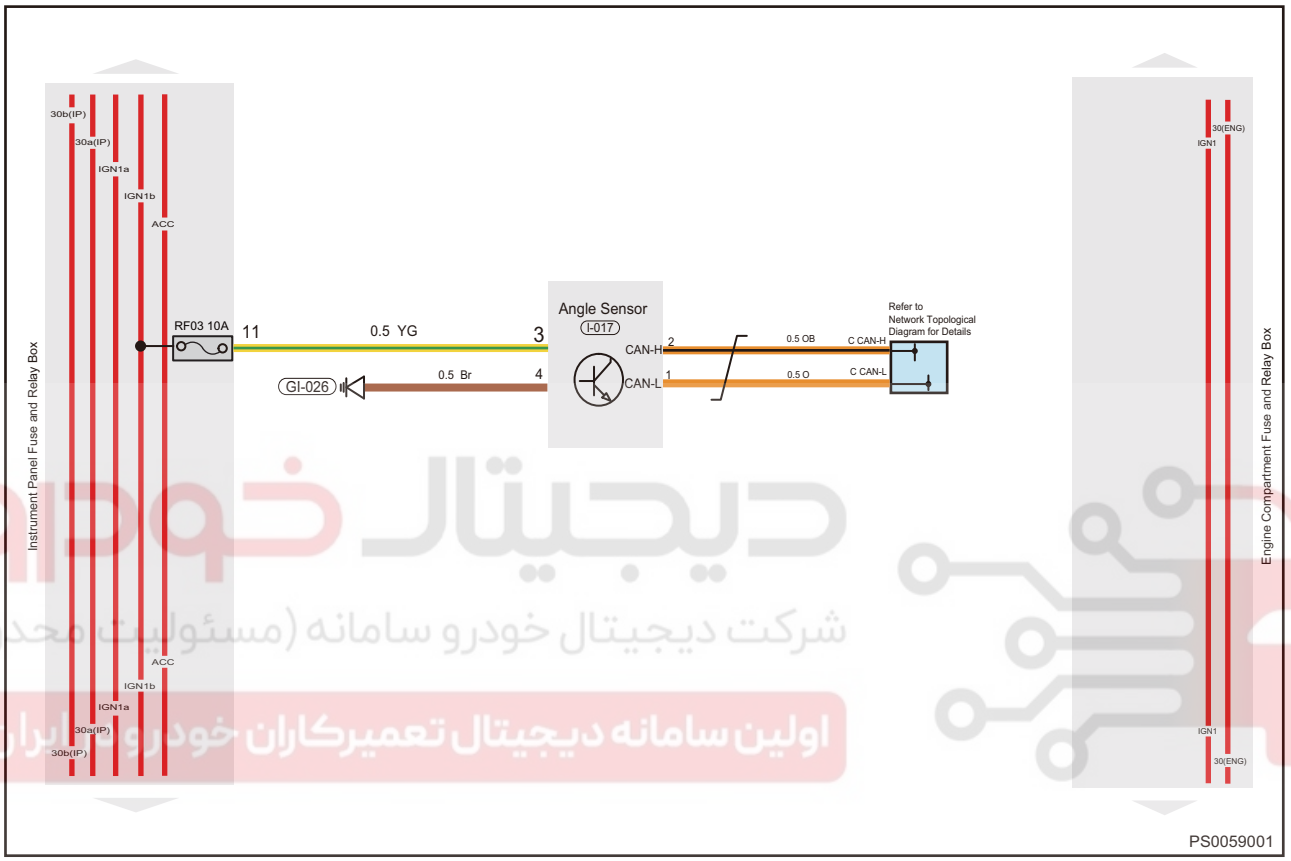
NG → **Replace the electronic power steering column assembly**

DTC	C120D-00	Steering Angle Implausible

DTC	C120E-00	Steering Angle Sensor Not Calibrated

DTC	C1210-49	Steering Angle Sensor Self Test Error

Circuit Diagram



Description

DTC	DTC Definition	DTC Detection Condition	Possible Cause
C120D-00	Steering Angle Implausible	ENGINE START STOP switch ON without engine running	Steering angle sensor is damaged Steering angle sensor is not calibrated Steering angle sensor power supply and ground are malfunctioning
C120E-00	Steering Angle Sensor Not Calibrated		
C1210-49	Steering Angle Sensor Self Test Error		

Caution:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Procedure

1	Check steering angle sensor calibration

(a) Turn ENGINE START STOP switch to ON.
(b) Connect diagnostic tester, read steering angle sensor data.
(c) Check if steering angle sensor angle is normal and calibration is successful.

Result

Proceed to
OK
NG

NG → **Calibrate the steering angle sensor again**

OK

2	Check fuse

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check if instrument panel fuse and relay box RF03 10A is blown.

Result

Proceed to
OK
NG

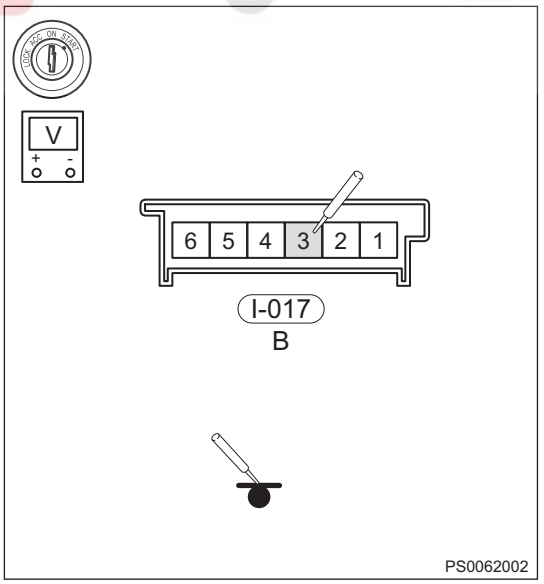
NG → **Replace fuse**

OK

3	Inspect power supply voltage

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the steering angle sensor connector I-017.
(c) Turn ENGINE START STOP switch to ON.
(d) Check voltage between I-017 (3) - body ground with multimeter voltage band, and check if 21W test light comes on.

Multimeter Connection	Condition	Normal Condition
I-017 (3) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V
I-017 (3) - Body ground	ENGINE START STOP switch "ON"	21 W test lamp is on



(e) Using multimeter, check for continuity between steering angle sensor connector I-017 (3) and instrument panel fuse and relay box (11).

Multimeter Connection	Condition	Normal Condition
I-017(3)- Instrument panel fuse and relay box terminal (11)	Always	⩽ 1 Ω

Result

Proceed to
OK
NG

NG → **Repair and replace power supply wire harness**

OK

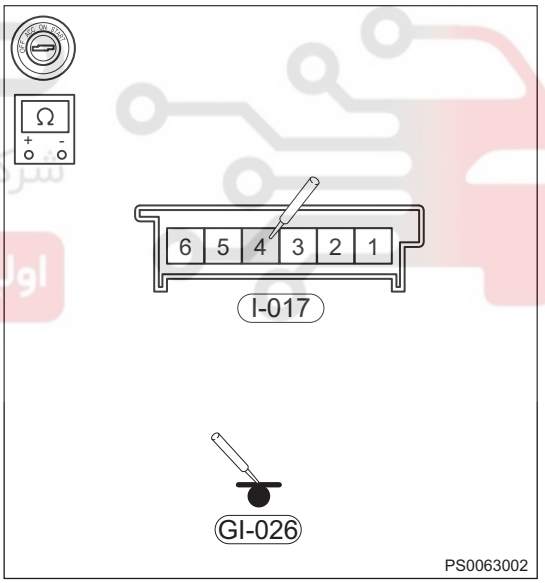
4 Check ground wire of steering angle sensor

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the steering angle sensor connector I-017.
(c) Check continuity between terminal I-017 (4) and body ground GI-026 with multimeter ohm band.

Multimeter Connection	Condition	Normal Condition
I-017(4)-GI-026	Always	⩽ 1 Ω

Result

Proceed to
OK
NG



NG → **Repair or replace ground wire harness**

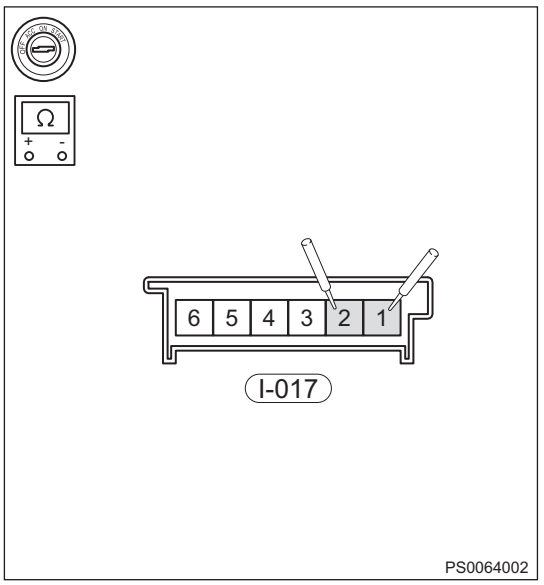
OK

5 Check CAN network wire harness

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the steering angle sensor connector I-017.

(c) Using ohm band of multimeter, check if resistance between I-017(1) and I-017(2) is about 60 Ω.

Multimeter Connection	Condition	Normal Condition
I-017 (1) - I-017 (2)	Always	Approximately 60 Ω

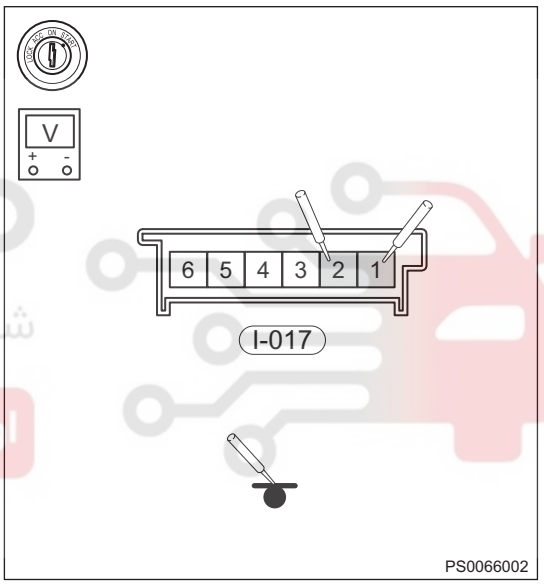


(d) Check if voltage of two CAN wire harness is normal with a multimeter.

Multimeter Connection	Condition	Normal Condition
I-017 (1) - Body ground	Always	1.5 ± -2.5V
I-017 (2) - Body ground	Always	2.5 ± -3.5V

Result

Proceed to
OK
NG



38

OK	**System operates normally**
NG	**Replace steering sensor assembly**

CAN Network DTC

U0100-87	Lost Communication With EMS
U0129-87	Lost Communication with BSM
U0140-87	Lost Communication with BCM
U0401-81	Invalid Data Received From EMS
U0418-81	Invalid Data Received From BSM
U0422-81	Invalid Data Received From BCM

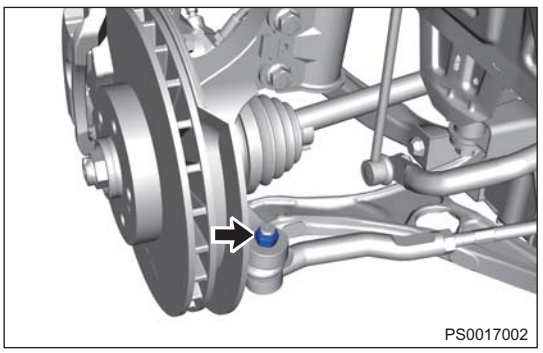
Refer to CAN system

Ball Pin Assembly

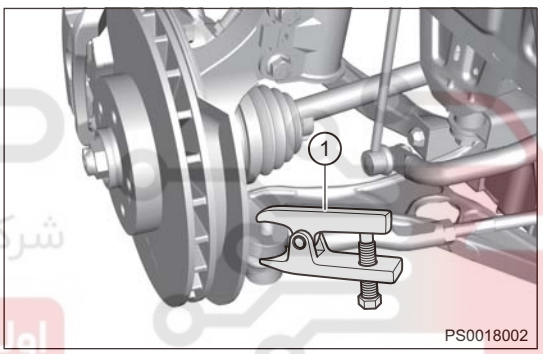
Removal

1. Set the steering wheel to straight-ahead position.
2. Turn off all electrical equipment and ENGINE START STOP switch
3. Disconnect the negative battery cable.
4. Remove the front left wheel.
5. Remove the ball pin assembly.
   (a) Remove locking nut (arrow) between left steering tie rod ball pin assembly and front left steering knuckle assembly.

   Tightening torque
   45 ± 5 N•m


PS0017002

   (b) Install ball pin separator (1), and separate steering tie rod ball pin from steering knuckle assembly.



PS0018002

   (c) Remove ball pin assembly.

Inspection

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

Installation

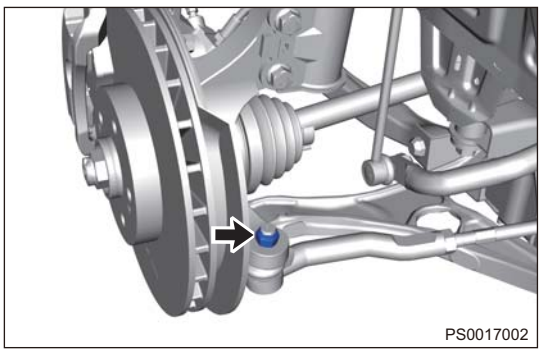
1. Installation is in the reverse order of removal.
   Caution:
   - After installing tie rod ball pin assembly, it is necessary to perform wheel alignment procedure.

Steering Gear Assembly

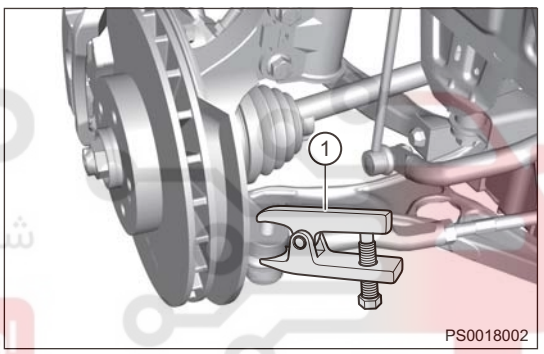
Removal

1. Set the front wheels to straight-ahead position.
2. Turn off all electrical equipment and ENGINE START STOP switch
3. Disconnect the negative battery cable
4. Remove the front left and front right wheel
5. Remove the ball pin assembly
   (a) Remove coupling nut (arrow) between left steering tie rod ball pin assembly and front left steering knuckle assembly.

   Tightening torque
   45 ± 5 N•m

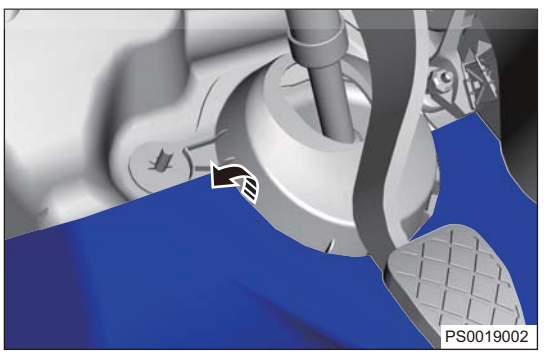

PS0017002

   (b) Install ball pin separator (1), and separate steering tie rod ball pin from steering knuckle assembly.



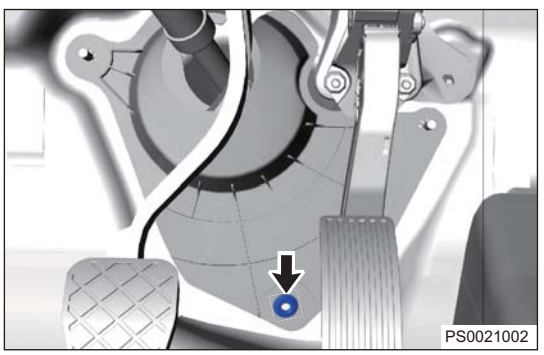
PS0018002

6. Remove coupling bolt between steering column with intermediate shaft assembly and steering gear input shaft.
   (a) Turn over carpet under driver seat in the direction of arrow.


PS0019002

   (b) Remove 1 fixing nut (arrow) from steering gear lower joint boot.

   Tightening torque
   1.5 ± 0.5 N•m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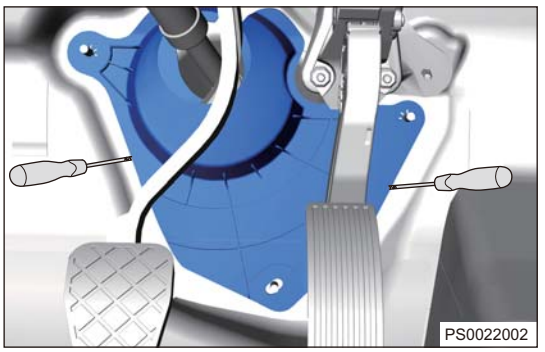
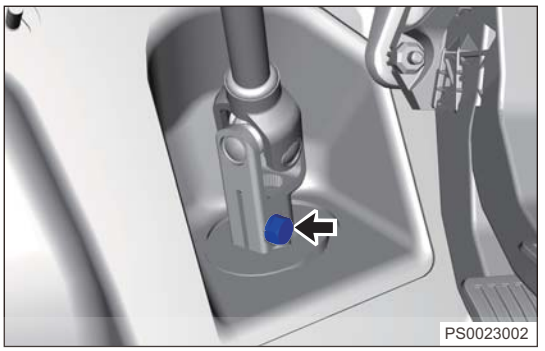
(c) Using a screwdriver wrapped with protective tape, remove steering gear lower joint boot from 2 studs.

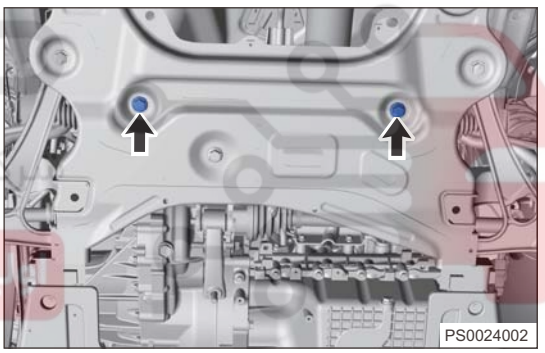


(d) Remove coupling bolt (arrow) between steering column with intermediate shaft assembly and steering gear input shaft.

Tightening torque
49 ± 3 N•m

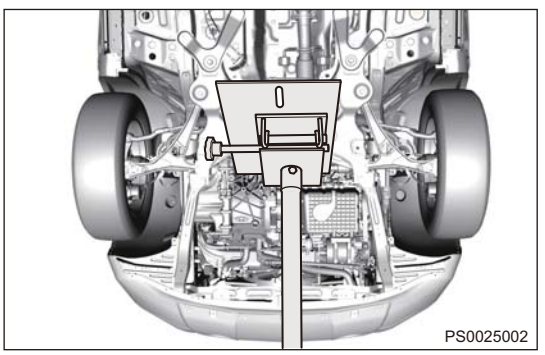


7. Remove 2 fixing bolts (arrow) fixing steering gear assembly from sub frame.

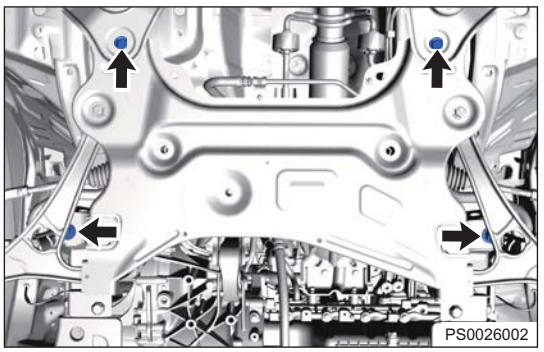


Tightening torque
110 N•m + 240°

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



9. Remove 4 fixing bolts (arrow) between sub frame and vehicle body, and lower the sub frame slowly.



Tightening torque

140 N·m +(45±2) Deg (rear left, rear right, front right); 140 N·m +(39±2) Deg (front left)

10. Remove the steering gear assembly.

Inspection

1. Check if steering gear dust boot is damaged, clamp is loosen. Replace them if necessary to prevent water and micro dust from entering and causing parts failure prematurely.
2. Check if steering gear is damaged. Replace the steering gear assembly if necessary.

Installation

1. Installation is in the reverse order of removal.

Caution:

- Install coupling bolt between steering column lower joint and steering gear input shaft securely.
- After installing steering gear assembly, perform front wheel alignment procedure.

Steering wheel Assembly

Removal

WARNING:

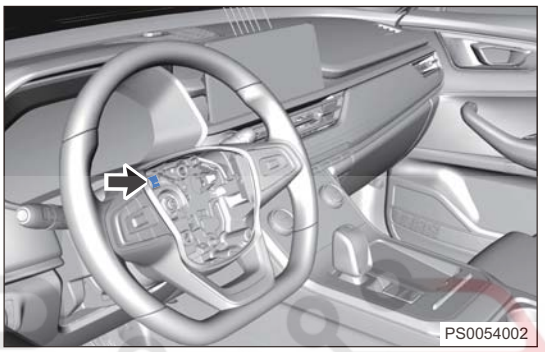
- Be sure to read precautions for SRS airbag before removing steering wheel.

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

   Caution:

   Wait at least 90 seconds after disconnecting the negative battery cable to prevent airbag and belt pretensioner from being activated.
4. Remove the driver airbag assembly (See page 40-60).
5. Remove the steering wheel assembly

   (a) Disconnect the steering wheel quick button connector (arrow).

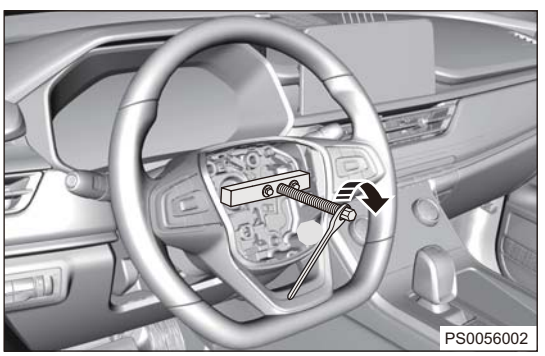


   (b) Secure the steering wheel assembly, and put matchmarks on the steering wheel assembly and steering column assembly, then remove the steering wheel assembly fixing nut (arrow).

   Tightening torque

   30 ± 3 N•m

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



   (d) Remove the steering wheel assembly.

   Caution:

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

Inspection

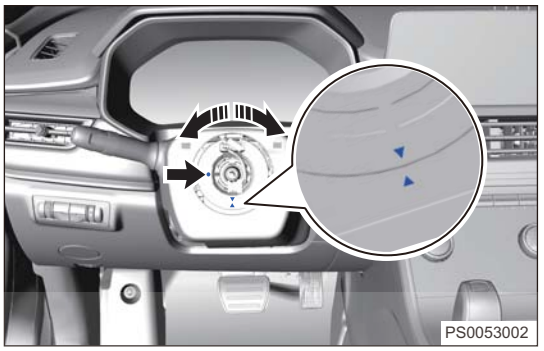
1. Check steering wheel assembly body for damage or deformation. Replace steering wheel assembly if necessary.
2. Check spline in steering wheel assembly for damage. Replace steering wheel assembly if necessary.

Installation

Caution:

- Check that front wheels are in straight-ahead position before installing steering wheel assembly.
- After installing the steering wheel assembly, perform the steering angle sensor calibration.

1. Adjust the spiral cable to correct position (arrow)



Hint:

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

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

Caution:

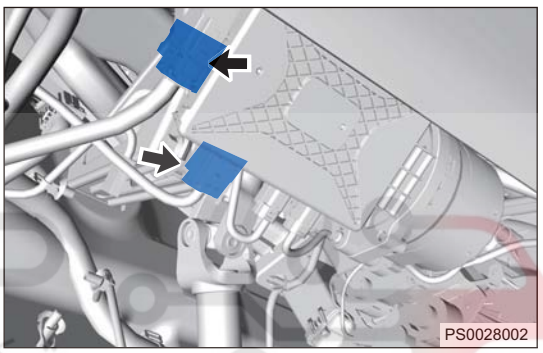
- Tighten steering wheel assembly fixing nut to specified torque.
- Install each connector in place.
- After repairing, check that airbag system operates normally.

Steering Column with Intermediate Shaft Assembly

Removal

1. Set the steering wheel to straight-ahead position.
2. Turn off all electrical equipment and the ignition switch.
3. Disconnect the negative battery cable.
4. Remove the driver airbag assembly (See page 40-60).
5. Remove the steering wheel assembly (See page 38-30).
6. Remove the combination switch cover.
7. Remove the spiral cable.
8. Remove the combination switch assembly.
9. Remove the left lower protector assembly.
10. Remove coupling bolt between steering column with intermediate shaft assembly and steering gear input shaft.
11. Remove the steering column with intermediate shaft assembly.

(a) Disconnect 2 connectors (arrow) from EPS controller.

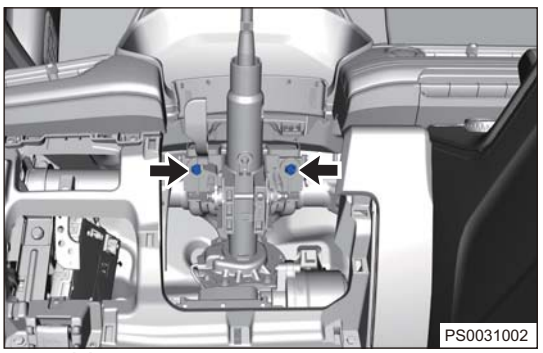


(b) Remove 1 fixing bolt (arrow) from steering column lower bracket.

Tightening torque
50 ± 5 N•m

(c) Remove 2 fixing nuts (arrow) from steering column upper bracket.

Tightening torque
25 ± 3 N•m



(d) Remove the steering column with intermediate shaft assembly.
Caution:
- Wear glove during removal, prevent hands are contacted with steering column, which may cause rust.

- DO NOT hold steering column handle position, but steering column position; do not bump, strike steering column when taking, carrying or assembling it, prevent steering column from collapse.
- DO NOT touch interior ornaments when removing steering column with intermediate shaft assembly to avoid scratching interior ornaments.

Installation

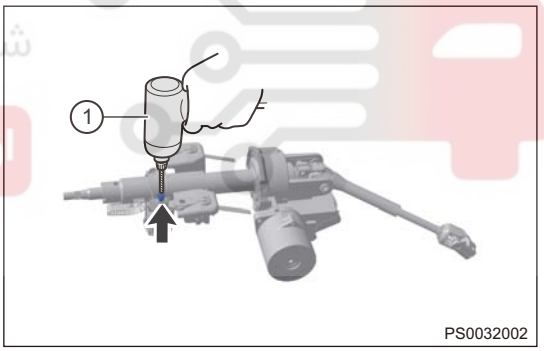
1. Installation is in the reverse order of removal.

   Caution:
   - Wear glove during removal, prevent hands are contacted with steering column, which may cause rust.
   - DO NOT hold steering column handle position, but steering column position; do not bump, strike steering column when taking, carrying or assembling it, prevent steering column from collapse.
   - Do not release steering column adjustment handle before tightening upper bracket bolt to prevent bracket from improper installation.
   - Adjustment handle is in locking state after steering column is assembled, do not transfer to next station, prevent handle is knocked during operation, which may cause person damage or handle breakage.
   - DO NOT touch interior ornaments when installing steering column with intermediate shaft assembly to avoid scratching interior ornaments.
2. It is necessary to perform motor position sensor calibration after assembling.

Disassembly

1. Remove the electronic steering column lock.

   (a) Using an electric drill (1), drill a hole on anti-theft bolt (arrow) of electronic steering column lock.



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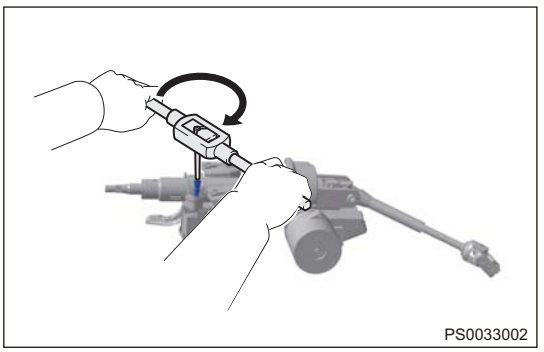
   (b) Using a screw remover, remove anti-theft bolt of electronic steering column lock.


PS0033002

Inspection

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

Assembly

1. Install the electronic steering column lock
   (a) Install the electronic steering column lock to steering column assembly with new anti-theft bolt of electronic steering column lock, then tighten anti-theft bolt until its head comes off.