# 12- Electrical system

# Central lock system

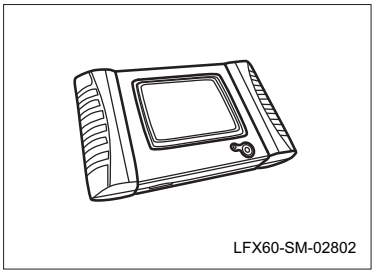
## Precautions

### Precautions

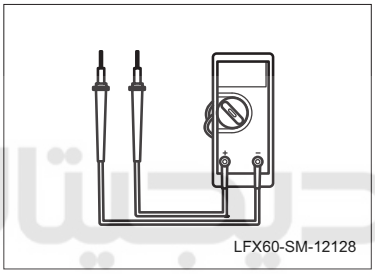
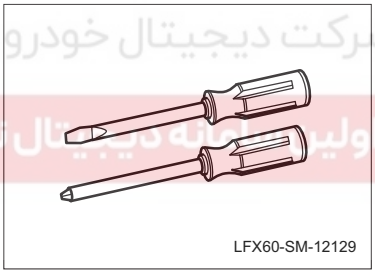
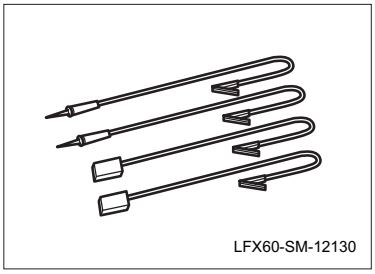
1. Regardless of the engine operation, do not plug any component in the system, such as, any battery cable, system part connector, and etc., as long as the power is in the non-OFF status.
2. Before removing or installing any electrical installation, and when the tool or equipment is easily accessible to any exposed electrical terminal, must disconnect the negtive battery terminal, to prevent person injury or vehicle damage.
3. Do not pull the harness while disconnecting the system component plug so as to prevent damaging the harness.

# Preparation

## Special maintenance tools

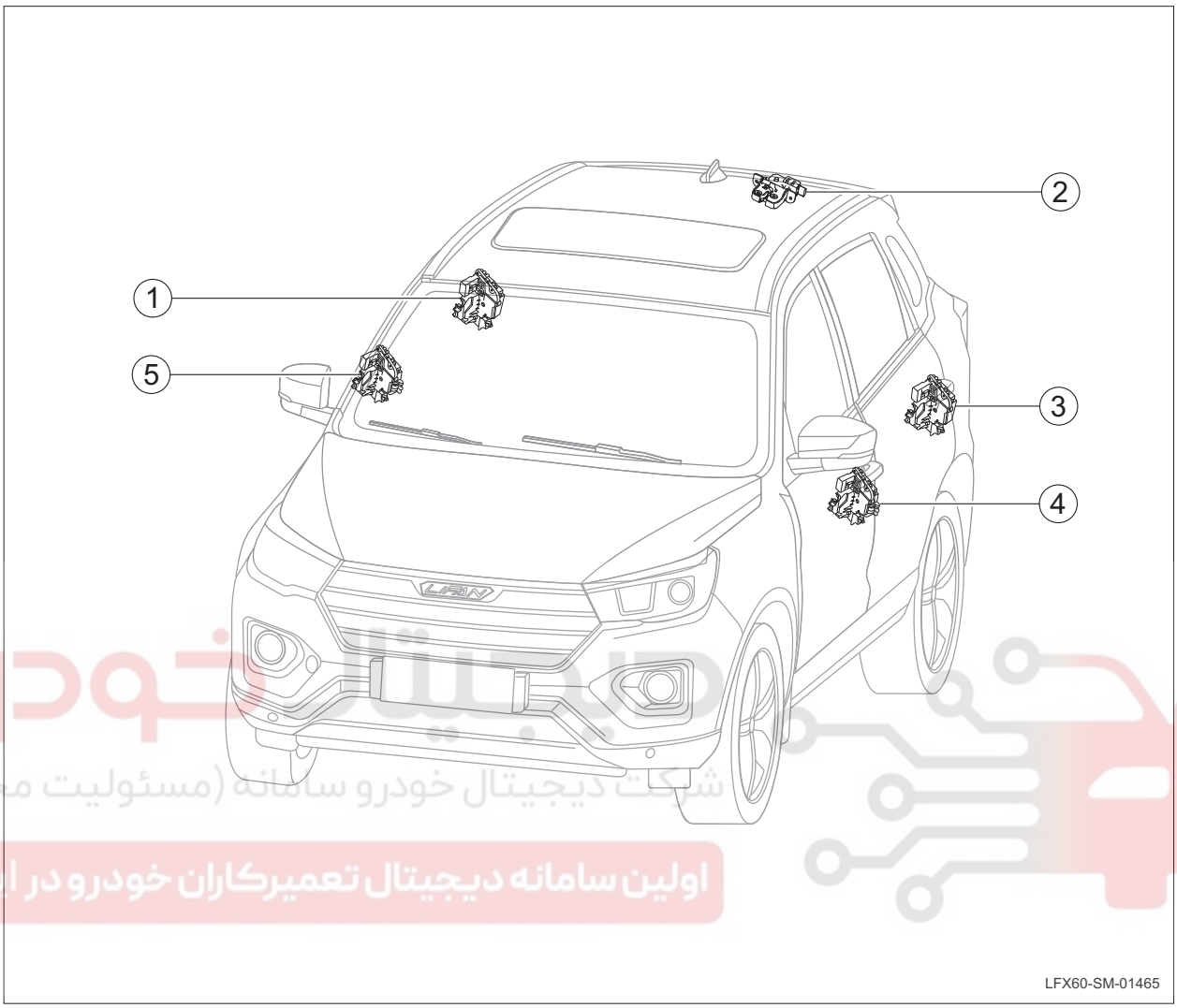
| No. | Tool name | Tool figure | Tool code | Remarks |
|---|---|---|---|---|
| 1 | Diagnostic equipment of vehicle |  LFX60-SM-02802 | - | System fault diagnosis |

## General maintenance tools

| No. | Tool name | Tool figure | Tool code | Remarks |
|---|---|---|---|---|
| 1 | Digital multimeter |  LFX60-SM-12128 | - | Test the voltage, resistance |
| 2 | Screwdriver |  LFX60-SM-12129 | - | Remove the screw and panel |
| 3 | Wiring group |  LFX60-SM-12130 | - | Check the line |

# Structure and installation location

## Component Location Plan




| No. | Part name |
|---|---|
| 1 | Right rear door lock body |
| 2 | Back door lock body |
| 3 | Left rear door lock body |

| No. | Part name |
|---|---|
| 4 | Left front door lock body |
| 5 | Lock body of door (FR, RH) |
| | |

## Operating Principle

### Door unlocking function

### Remote control unlocking function

In the remote control range, when the remote control unlock button matched with the vehicle is pressed and the high-frequency signal sent by the remote control key is received by BCM controller, if all the remote unlock conditions are met, BCM controller will unlock the door.

Remote unlock conditions (and):

1. The ignition switch is in OFF position
2. The remote unlock (door) signal is received.
3. Remote key ID is legal.
4. The key insertion signal is withdraw.

Remote unlock actions:

Unlock the door and the danger warning indicator flashes 2 times.

Unlock mode switching:

When pressing the unlock button and the lock button for more than 4s at the same time, the turn signal will flash twice to remind the unlock mode switching. In this mode, if pressing the unlock button firstly, only the driver's door can be unlocked, if pressing the unlock button secondly, other doors can be unlocked. In this mode, if repeating the operation, the four doors can be unlocked (in default mode).

### Mechanical key unlocking function

When the ignition switch is OFF position, the mechanical key unlocking signal will be at low level and the four doors will be simultaneously unlocked.

### Power door lock switch unlocking function

The power door lock switch unlocking function includes "Level I Unlock" and "Level II Unlock" modes.

- Level I unlock: Under any power status and at any speed, the central control switch unlocking signal will be at low level and the four doors will be simultaneously unlocked (factory default configuration).
- Level II unlock: Under any power status and at any speed, the central switch unlocking signal will be at low level and only the left front door will be unlocked; when the unlocking signal is at the low level again, the remaining three doors will be unlocked.

Electric door lock switch unlock mode switching:

- When the power supply is in ON position and the vehicle speed is less than 3km/h, if BCM receives "Unlock mode configuration signal = 1" signal sent from the instrument, the unlock mode will be set as "Level I Unlock" and "BCM/PEPS_ unlock vehicle configuration description = 0" will be set;
- When the power supply is in ON position and the vehicle speed is less than 3km/h, if BCM receives "Unlock mode configuration signal = 2" signal sent from the instrument, the unlock mode will be set as "Level II Unlock" and "BCM/PEPS_ unlock vehicle configuration description = 1" will be set;

### Power-off the auto-unlocking function

If all power-off auto-unlocking function conditions are met, the controller will unlock the four doors

Power-off auto-unlocking function conditions (and):

1. The speed is ≤ 3km/h.
2. The ignition switch is switched from IG ON to OFF.
3. The left front door lock status signal is locked (in vain).

### Collision unlocking function

Collision unlock: When the ignition switch is in ON position and the airbag controller outputs a collision signal, the four doors will be unlocked 3 times (with the interval of 500 ms) simultaneously, and the danger warning indicator will flash until the power supply is turned off (ie, the ignition switch is in OFF position).

### Gear interlinking unlocking function

- Unlock at Gear P: For CVT model, when the engine is running, the gear is switched from any Gear non-P to Gear P and the left front door lock is locked, the four doors will be unlocked automatically.
- Lock at Gear Non-P: For CVT models, when the engine is running, the gear is switched from Gear P to any Gear non-P and the left front door lock is unlocked, the four doors will be locked automatically.

### Door locking function

### Remote locking function

When the remote lock button matched with the vehicle is pressed and BCM controller receives the high-frequency signal sent from the remote control key, if all remote control lock conditions are met, BCM controller will lock the doors.

a. Remote locking function conditions (and):
1. The ignition switch is in OFF position;
2. The remote control locking signal is received;
3. The remote control key ID is legal;
4. The key insertion signal is withdraw;
5. The four doors, engine hood and trunk door are closed (in vain).

The remote control locking function executes the action:

The doors will be locked and the danger warning indicator will flash once.

b. Remote locking function conditions (and):
1. The ignition switch is in OFF position;
2. The remote control locking signal is received;
3. The remote control key ID is legal;
4. The key insertion signal is withdraw;
5. Any one of four doors, engine hood and trunk door is opened (at low level).

The remote control locking function executes the action:

The door will be locked, the danger warning indicator will flash 10 times and the speaker will sound 5 times to remind that the door is not closed (with the sound time of 50ms and the interval of 950 ms).

**Note:**

**When the door is locked, if the signal that the doors are not closed is trigged, it will stop when the last door is closed.**

**Mechanical key locking function**

When the ignition switch is in OFF position and the mechanical key unlocking signal is in vain, the four doors will be locked simultaneously.

**Electric door lock switch locking function**

Under any power status and at any speed, when the central control switch locking signal is at low level, the four doors will be locked simultaneously.

**Secondary locking function**

When the vehicle is under the waring status, if the doors are not opened after pressing the remote control, the four doors will be locked automatically again after 30s and the danger warning indicator will flash once; if the doors are opened or the central lock or the ignition switch is switched within 30s, the function will exit.

**Speed sensing self-locking function**

When the vehicle starts and the speed is up to 20km/h, the four doors are closed, and the left front door lock is unlocked, the four doors will be locked simultaneously; during driving process, if the middle door is opened or the four doors are unlocked and the speed is less than 20km/h and then higher than 20km/h, the four doors will be locked automatically again (after the doors are locked, if the left front door lock is still unlocked, it should be under the fault status and can not be locked automatically again).

**Trunk unlocking function**

**Remote control unlocking function**

When the remote control trunk button on the remote control key matched with the vehicle is pressed for more than 1s and BCM controller receives the high-frequency signal from the remote control key, if all remote control unlocking (trunk lock) functions are met, BCM controller will unlock the trunk lock.

Remote unlocking (trunk lock) conditions (and):
1. The ignition switch is in OFF position;
2. The left front door locking signal is in vain (locking);
3. Receive the remote control trunk unlocking signal within continuous 1s and above;
4. The remote control key ID is legal;
5. The key insertion signal is withdraw;
6. Within 30s after the conditions (3) are met, the micro switch signal is switched from the invalid status to the valid status.

**Note:**

- After the remote trunk unlocking signal is continuously received for 1s and above, the danger warning indicator will flash twice to indicate that the trunk door can be unlocked.
- Once the trunk door is switched from the closing status to the opening status and then to the vain status (closing), the trunk door will be automatically locked again (ie, if the remote control trunk unlocking function is operated once, the trunk door will be opened only once).
- If the trunk micro switch signal is switched from the invalid status to the valid status, the trunk lock motor will be continuously powered within the holding time of 500 ms.

**Trunk unlocking function**

Five-door unlock (trunk lock) function conditions (and):

1. The ignition switch is in any positon and the speed is ≤ 3km/h;
2. The left front door locking signal is at low level (unlocking);
3. The trunk micro switch signal is switched from the invalid status to the valid status.

**ⓘ Note:**

**If the trunk micro switch signal is switched from the invalid status to the valid status, the trunk lock motor will be continuously powered within the holding time of 500 ms.**

**Remote control searching function logic descriptions**

Searching function: Under the warning status, if 2 consecutive remote control lock (door) signals are received within 2s, BCM will enter the searching prompt status, and the searching status will be ended after 15s; if the remote unlocking (door) signal or remote control locking signal is received within 15s of the search period, the searching function will stop and the corresponding unlocking and locking operations will be performed.

Remote searching function conditions (and):

1. The ignition switch is in OFF position;
2. Two remote control locking signals are received within 2s;
3. The remote control key ID is legal;
4. The key insertion signal is withdraw.

Remote searching stop conditions (or):

1. During searching process, receive the remote control unlocking (door) signal;
2. During searching process, receive the remote control locking signal;
3. During searching process, the ignition switch is in non-OFF position;
4. During searching process, any door status is switched;
5. The searching time is more than 15s.

Remote searching stop actions:

The danger warning indicator does not flash, the speaker does not sound and the doors are unlocked or locked.

# Diagnosis Information and Procedures

## Diagnosis Instructions

Before the central lock system troubleshooting, must understand and familiarize its working principle, and then perform its diagnosis, so as to determine the correct fault diagnosis procedure in case of fault, and more importantly, to determine whether the situations described by the user are normal.

For any central lock system fault diagnosis, must inspect it firstly, and then guide the maintenance staff to take the next logical steps for fault diagnosis. Comprehend and correctly use the diagnostic flow chart to shorten the diagnosis time and avoid the misjudgement.

**General equipment**

| |
|---|
| Digital multimeter |
| Diagnostic equipment of vehicle |

**Visual inspection**

1. Confirm the problem raised by the customer.
2. Check for the evident mechanical or electrical damage trace.

**Visual inspection table**

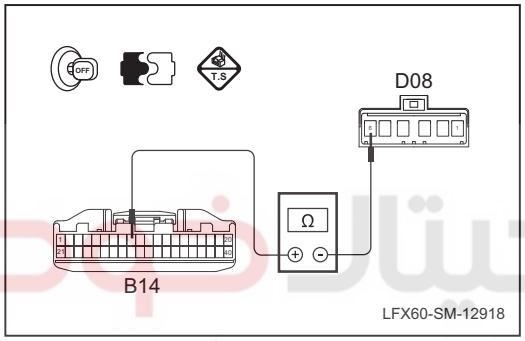
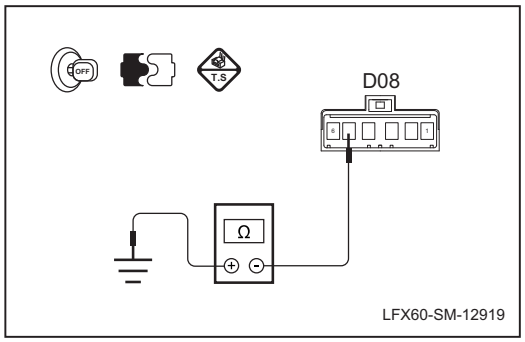
| Mechanical | Electrical |
|---|---|
| • Door dislocation<br>• Door lock buckle<br>• Door lock cylinder<br>• Lock cylinder connection rod | • Fuse<br>• Harness or plug<br>• Dashboard fuse box<br>• Central lock switch<br>• Trunk inching switch<br>• Door lock actuator<br>• BCM |

3. Check the system lines easy to see or can be seen.
4. If the observed or raised problem is the evident and the cause has been found, ensure to fix this fault before proceeding with the next step.
5. If for the problem, there are no obvious findings, then confirm the fault and refer to the symptom table.

**Fault symptoms table**

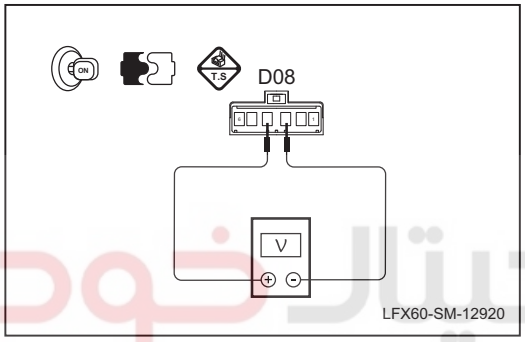
| Symptom | Possible Cause | Recommended measure |
|---|---|---|
| Remote control locking/unlocking abnormalities | • There is no on-board matched remote control | • Re-match the key |
| | • The remote control distance is too far or there is a strong interference source nearby (mobile phone, transmitter, etc.) | • Operate the remote control near the vehicle, to inspect whether the function is normal and confirm whether there is interference source nearby |
| | • The key voltage is too low | • Replace the remote controller battery |
| | • The remote control is in poor contact with the battery | • Reinstall the battery |
| | • Battery voltage low | • Inspect and repair the charging system |
| | • The remote control is damaged | • Replace the remote control and match it again |
| All the locks do not work | • Harness or plug | • Repair or replace the harness connection |
| | • BCM | • Replace the BCM<br>**Refer to: Replacement of BCM** |
| Key locking/ unlocking abnormalities | • Harness or plug | **Refer to: Key locking/unlocking abnormal diagnosis flow** |
| | • Left front door lock cylinder connecting rod | |
| | • BCM | |
| Central switch locking/unlocking abnormalities | • Harness or plug | • Repair or replace the harness connection |
| | • Central lock switch | • Replace the central lock switch |
| | • BCM | • Replace BCM;<br>**Refer to: BCM Replacement** |
| Left front door locking/unlocking abnormalities | • Harness or connector | **Refer to: Left front door locking/ unlocking abnormality Diagnosis procedure** |
| | • Left front door actuator | |
| | • BCM | |
| Right front door locking/unlocking abnormalities | • Harness or connector | **Refer to: Right front door locking/ unlocking abnormality Diagnosis procedure** |
| | • Right front door actuator | |
| | • BCM | |
| Trunk micro switch unlocking abnormalities | • Harness or connector | **Refer to: Back door locking/unlocking Diagnosis procedure** |
| | • Trunk inching switch | |
| | • BCM | |

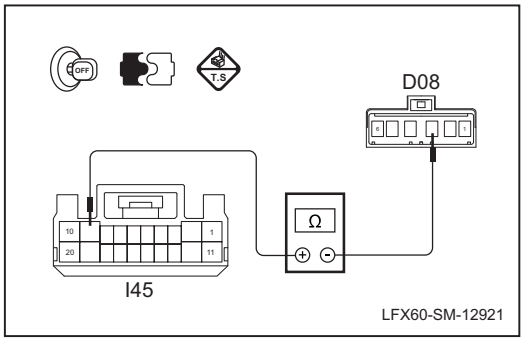
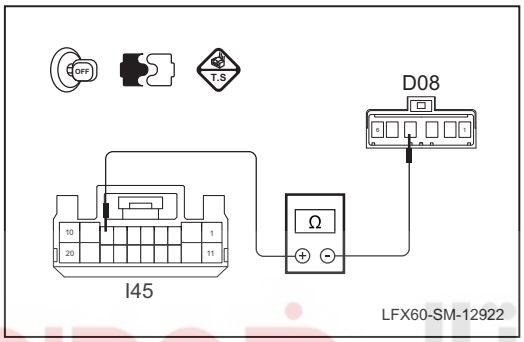
## Key locking/unlocking abnormal diagnosis flow

| Test condition | Details/results/measures |
|---|---|
| 1. General inspection. | |
| | A. Inspect the left front door lock cylinder connecting rod for shedding.<br>B. Inspect the left front door actuator wiring harness connector for loosening, aging, shedding or other abnormalities.<br>Is it OK after checking?<br>→**Yes**<br>To step 2.<br>→**No**<br>Repair the fault position. |
| 2. Inspect the key unlocking/locking signal line. | |
|  | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the front left door actuator harness plug D08.<br>D. Disconnect the BCM harness plug B14.<br>E. Measure the resistance between Terminal 6 of the left front door actuator wiring harness connector D08 and Terminal 9 of BCM wiring harness connector B14 with a multimeter.<br>**Standard value: Less than 5Ω**<br>Is the resistance normal?<br>→**Yes**<br>To step 3.<br>→**No**<br>Inspect and repair the key unlocking/locking signal line fault; if necessary, replace the wiring harness. |
| 3. Inspect the key unlocking/locking signal grounding point. | |
|  | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the front left door actuator harness plug D08.<br>D. Measure the resistance between Terminal 5 of the left front door actuator wiring harness connector D08 and the reliable grounding point with a multimeter.<br>**Standard value: Less than 5Ω**<br>Is the resistance normal?<br>→**Yes**<br>To step 4.<br>→**No**<br>Inspect and repair the key unlocking/locking signal grounding point fault; if necessary, replace the wiring harness. |

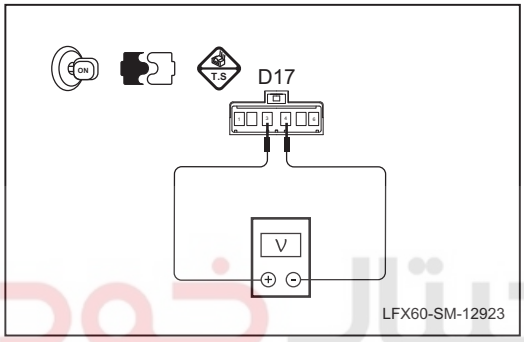
| Test condition | Details/results/measures |
|---|---|
| 4. Inspect the left front door lock assembly. | |
| | A. Replace the left front door lock assembly.<br>**Refer to: Replacement of front door lock body assembly**<br>Is the troubleshooting successful?<br>→**Yes**<br>Replace the left front door lock assembly.<br>→**No**<br>To step 5. |
| 5. Check the BCM. | |
| | A. Replace the BCM.<br>**Refer to: Replacement of BCM**<br>Confirm that troubleshooting is completed. |

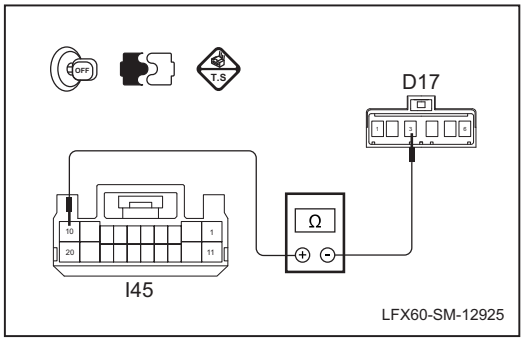
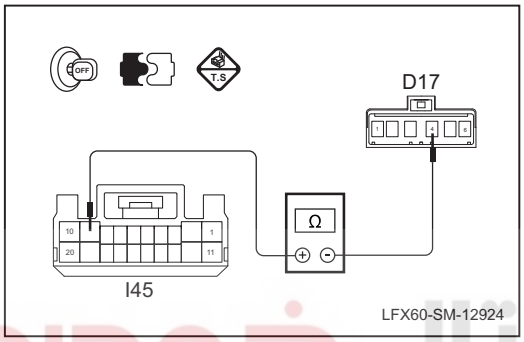
**Left front door locking/unlocking abnormality diagnosis procedure**

| Test condition | Details/results/measures |
|---|---|
| 1. General inspection. | |
| | A. Inspect the left front door lock fasteners for loosening.<br>B. Inspect the left front door lock for mechanical fault.<br>C. Inspect the left front door lock bucket for normal operation.<br>D. Is it OK after checking?<br>→**Yes**<br>To step 2.<br>→**No**<br>Repair the fault parts or replace the faulty components |
| 2. Inspect the left front door actuator operating voltage. | |
|  <br>LFX60-SM-12920 | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the front left door actuator harness plug D08.<br>D. Connect the battery negative terminal.<br>E. Operate the ignition switch to turn the power to ON state.<br>F. Perform the left front door locking/unlocking actions and measure the voltage between Terminals 3 and 4 of the left front door actuator wiring harness connector D08 with a multimeter.<br>**Standard value: 11 ~ 14 V**<br>Is the voltage is OK?<br>→**No**<br>To step 3.<br>→**Yes**<br>To step 4. |

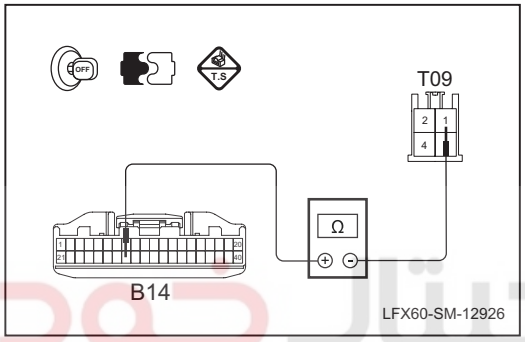
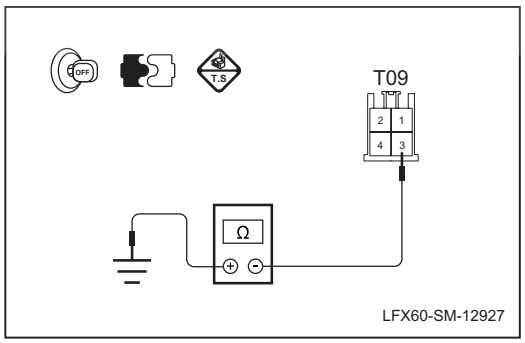
| Test condition | Details/results/measures |
|---|---|
| 3. Inspect the left front door actuator line. | |
|  LFX60-SM-12921 | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the front left door actuator harness plug D08.<br>D. Disconnect the BCM harness plug I45.<br>E. Measure the resistance between Terminal 3 of the left front door actuator wiring harness connector D08 and Terminal 9 of BCM wiring harness connector I45 with a multimeter.<br>**Standard value: Less than 5Ω**<br>F. Measure the resistance between the front left door actuator harness plug D08 terminal 4 and BCM harness plug I45 terminal 8 with the multimeter.<br>**Standard value: Less than 5Ω**<br>Is the resistance normal?<br>→**Yes**<br>To step 5.<br>→**No**<br>Inspect and repair the left front door actuator line fault; if necessary, replace the wiring harness. |
|  LFX60-SM-12922 | |
| 4. Inspect the left front door actuator. | |
| | A. Replace the left front door actuator.<br>**Refer to: Replacement of front door lock body assembly**<br>Confirm that troubleshooting is completed. |
| 5. Check the BCM. | |
| | A. Replace BCM.<br>**Refer to: Replacement of BCM**<br>Confirm that troubleshooting is completed. |

## Right front door locking/unlocking abnormality diagnosis procedure

| Test condition | Details/results/measures |
|---|---|
| 1. General inspection. | |
| | A. Check the front right door fasteners for looseness.<br>B. Check the front right door for mechanical fault.<br>C. Check whether the front right door is normal.<br>Is it OK after checking?<br>→**Yes**<br>To step 2.<br>→**No**<br>Repair the fault parts or replace the faulty components. |
| 2. Check the front right door actuator operating voltage. | |
|  | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the front right door actuator harness plug D17.<br>D. Connect the battery negative terminal.<br>E. Operate the ignition switch to turn the power to ON state.<br>F. Perform the right front door locking/unlocking actions, while measure the voltage between Terminals 3 and 4 of the front door actuator wiring harness connector D17 with a multimeter.<br>**Standard value: 11 ~ 14 V**<br>Is the voltage is OK?<br>→**No**<br>To step 3.<br>→**Yes**<br>To step 4. |

| Test condition | Details/results/measures |
|---|---|
| 3. Check the front right door actuator line. | |
|  <br>  | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the front right door actuator harness plug D17.<br>D. Disconnect the BCM harness plug I45.<br>E. Measure the resistance between the front right door actuator harness plug D17 terminal 4 and BCM harness plug I45 terminal 10 with the multimeter.<br>**Standard value: Less than 5Ω**<br>F. Measure the resistance between the front right door actuator harness plug D17 terminal 3 and BCM harness plug I45 terminal 9 with the multimeter.<br>**Standard value: Less than 5Ω**<br>Is the resistance normal?<br>→**Yes**<br>To step 5.<br>→**No**<br>Repair the front right door actuator line fault and replace the harness if necessary. |
| 4. Check the front right door actuator. | |
| | A. Replace the front right door actuator.<br>Confirm that troubleshooting is completed. |
| 5. Check the BCM. | |
| | A. Replace BCM.<br>**Refer to: Replacement of BCM**<br>Confirm that troubleshooting is completed. |

**Trunk micro switch unlocking fault diagnosis procedure**

| Test condition | Details/results/measures |
|---|---|
| 1. General inspection. | |
| | A. Inspect the trunk micro switch wiring harness plug for loosening, aging, shedding and other abnormities.<br>Is it OK after checking?<br>→**Yes**<br>To step 2.<br>→**No**<br>Repair the fault position. |
| 2. Inspect the trunk micro switch signal line. | |
|  | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the trunk inching switch harness plug T09.<br>D. Disconnect the BCM harness plug B14.<br>E. Measure the resistance between Terminal 1 of the trunk micro switch wiring harness connector T09 and Terminal 28 of BCM wiring harness connector B14 with a multimeter.<br>**Standard value: Less than 5Ω**<br>Is the resistance normal?<br>→**Yes**<br>To step 3.<br>→**No**<br>Inspect and repair the trunk micro switch signal line fault; if necessary, replace the wiring harness. |
| 3. Inspect the trunk micro switch grounding point. | |
|  | A. Operate the ignition switch to turn the power to OFF state.<br>B. Disconnect the battery negative connector.<br>C. Disconnect the trunk inching switch harness plug T09.<br>D. Measure the resistance between Terminal 3 of the trunk micro switch wiring harness connector T09 and the reliable grounding point with a multimeter.<br>**Standard value: Less than 5Ω**<br>Is the resistance normal?<br>→**Yes**<br>To step 4.<br>→**No**<br>Inspect and repair the trunk micro switch grounding point fault; if necessary, replace the wiring harness. |

| Test condition | Details/results/measures |
|---|---|
| 4. Inspect the trunk micro switch. | |
| | A. Replace the trunk micro switch.<br>Is the troubleshooting successful?<br>→**Yes**<br>Replace the trunk micro switch.<br>→**No**<br>To step 5. |
| 5. Check the BCM. | |
| | A. Replace BCM.<br>**Refer to: Replacement of BCM**<br>Confirm that troubleshooting is completed. |

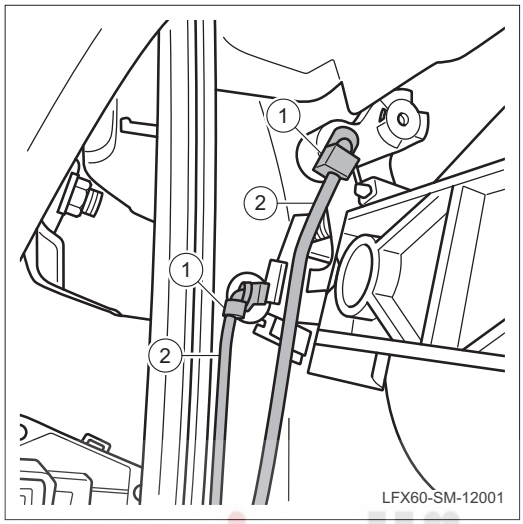
# Removal and Installation

## Replacement of the front door lock body assembly

### Removal

**1. Remove the front door lock body assembly.**

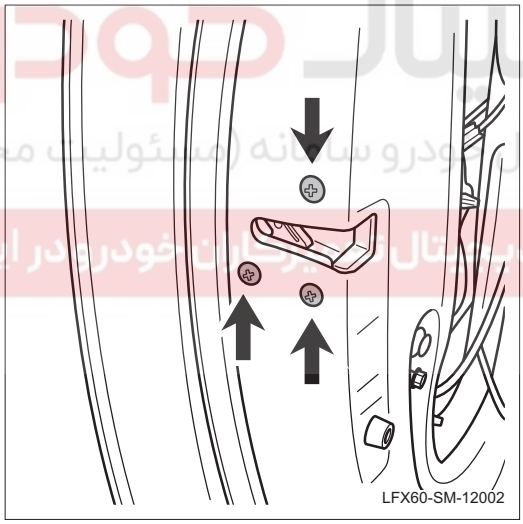
(a). Remove the front door interior trim board. **Refer to the replacement of front door interior trim board.**




(b). Remove the front door water-proof membrane.

(c). Remove the outer door opening lever buckle 1 from the front door lock body assembly.

(d). Remove the door lock cylinder pull rod 2 from the front door lock body assembly.




(e). Remove the front door lock body assembly fixing bolt.

(f). Disconnect the front door lock wiring harness connector.

(g). Remove the front door lock body and pull rod assembly.

(h). Disconnect the two pull rods of the outer handle from the front door lock body.

### Installation

**1. Install the front door lock body assembly.**

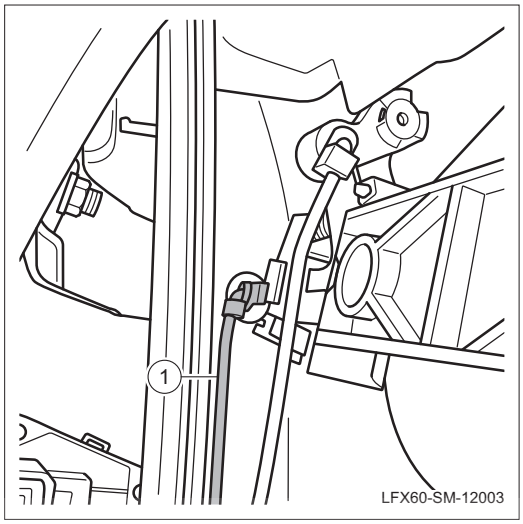
(a). The installation sequence is the reverse of the disassembly order.

**Replacement of the front door lock cylinder**

**Removal**

**1. Remove the front door lock cylinder.**

(a). Remove the front door interior trim board. **Refer to the replacement of front door interior trim board.**




(b). Remove the front door water-proof membrane.

(c). Remove the front door lock cylinder pull rod 1.


(d). Remove the front door lock cylinder fixing screw trim cap.

(e). Remove the front door lock cylinder fixing bolt.

(f). Remove the front door lock cylinder and trim cap assembly.

(g). Remove the front door lock cylinder.

**Installation**

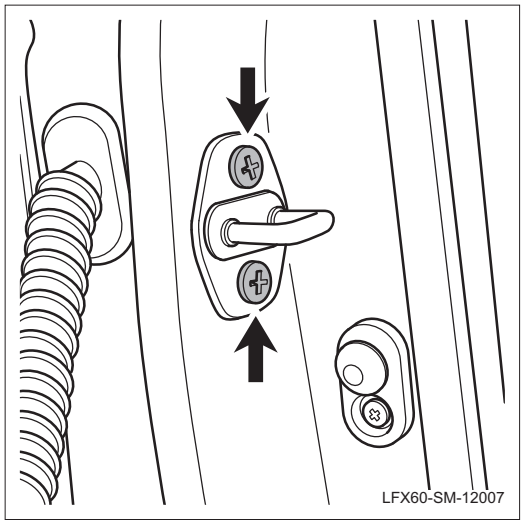
**1. Install the front door lock cylinder.**

(a). The installation sequence is the reverse of the disassembly order.

**Replacement of front door lock bucket**

**Removal**

**1. Remove the front door lock bucket.**




(b). Remove the front door lock bucket fixing bolt.

**Note:**

**Before removal, make assembly mark for proper re-installaiton.**

(c). Remove the front door lock bucket.

**Installation**

**1. Install the front door lock bucket.**

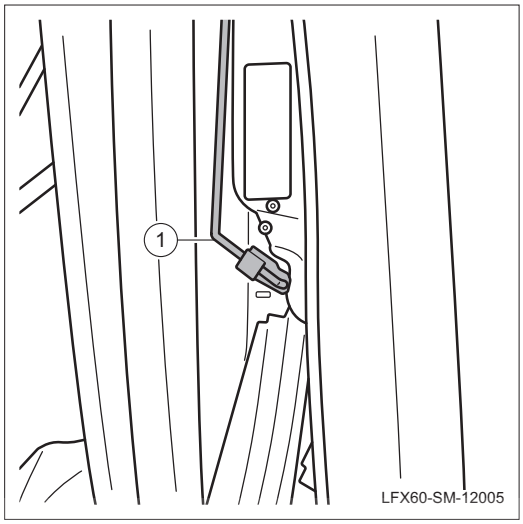
(a). The installation sequence is the reverse of the disassembly order.

## Replacement of rear door lock body assembly

### Removal

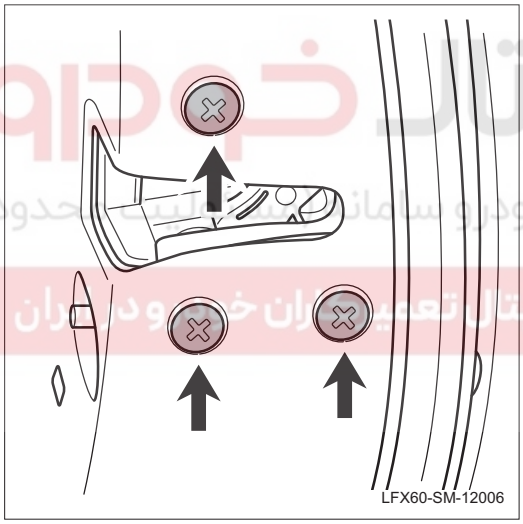
**1. Remove the rear door lock body assembly.**

(a). Remove the rear door interior trim board. **Refer to the replacement of rear door interior trim board.**




(b). Remove the rear door water-proof membrane.

(c). Remove the outer door opening lever buckle 1 from the rear door lock body assembly.




(d). Remove the rear door lock body assembly fixing bolt.

(e). Remove the rear door lock body assembly.

### Installation

**1. Install the rear door lock body assembly.**

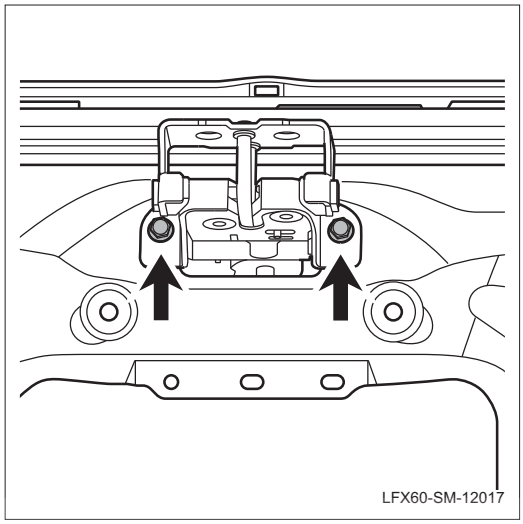
(a). The installation sequence is the reverse of the disassembly order.

**Replacement of the back door lock body assembly**

**Removal**

**1. Remove the back door lock body assembly.**

(a). Remove the back door inner shield panel; **refer to: Replacement of Back Door Inner Shield Panel.**




(b). Disconnect the back door lock body assembly wiring harness connector.

(c). Remove the back door lock body assembly fixing bolt and remove the back door lock body assembly.

**Installation**

**1. Install the back door lock body assembly.**

(a). The installation sequence is the reverse of the disassembly order.