
BODY ELECTRICAL

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49.1 REMOTE CONTROL SYSTEM

Remote Control System

1 Warnings and Precautions

1.1 Precautions

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

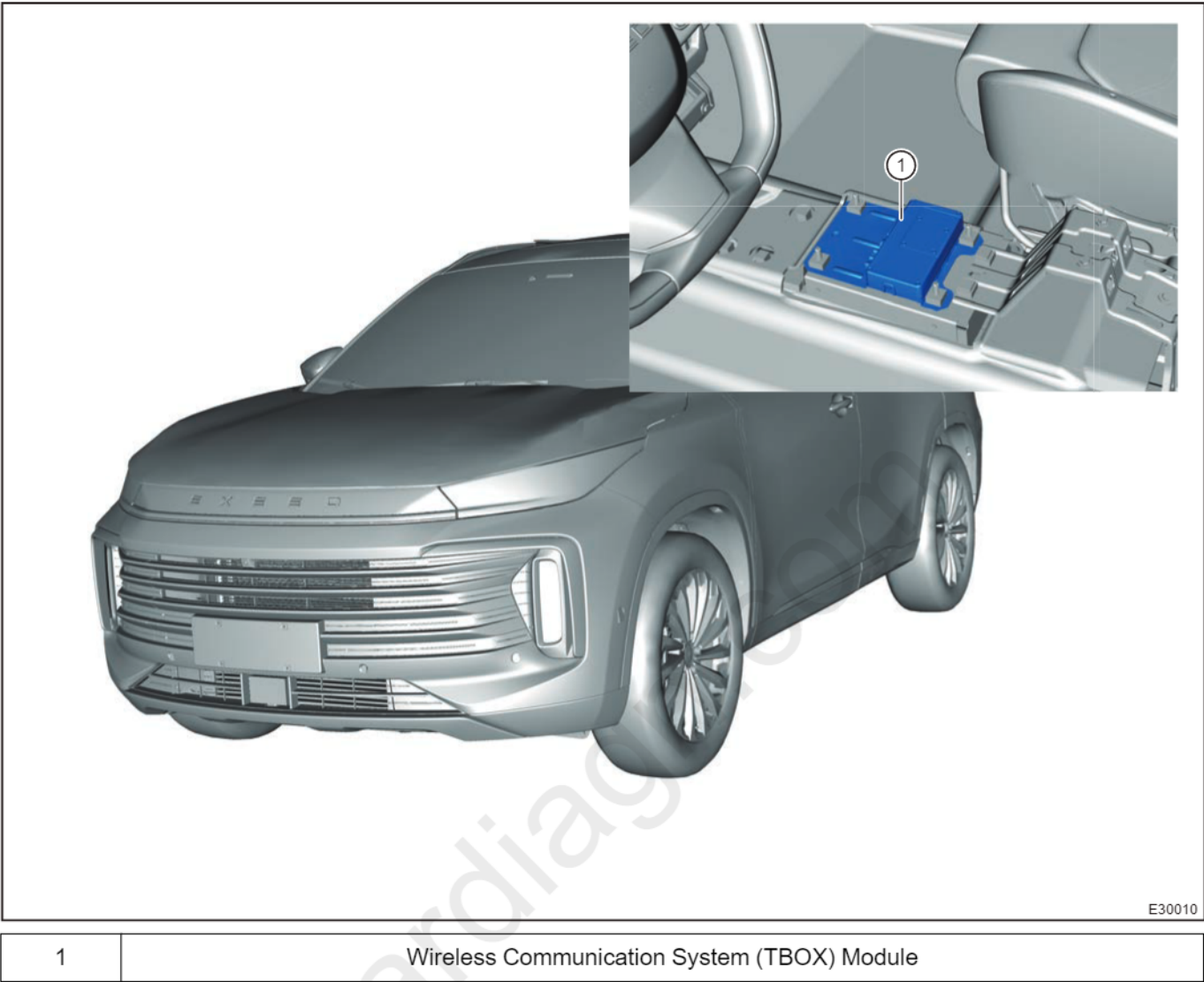
- (1) Be sure to wear safety equipment to prevent accidents, when removing TBOX assembly.
- (2) Appropriate force should be applied, when removing TBOX assembly. Be careful not to operate roughly.
- (3) Try to prevent interior and body paint surface from being scratched, when removing TBOX assembly.

2 System Overview

2.1 System Description

The wireless communication system (TBOX) uses remote control software or remote controller to send control command to the vehicle to realize remote controlling of vehicle. The remote control software or remote controller can be used to effectively manage and control the vehicle. EXEED owner can understand the vehicle status in real time through the remote control software or remote controller, and can also control the vehicle remotely, bringing you a more convenient and intelligent driving experience. The wireless communication system (TBOX) mainly has the following functions: Start engine by mobile phone APP/remote controller, active vehicle location, door lock control, air conditioning control, status safety and maintenance advice, map service and my home page, etc.

2.2 System Components Diagram



2.3 System Principle

- TBOX is actually a box with communication function for Android operating system, which contains a SIM card. The supported hardware of this box also has GPS antenna, 4G antenna, and USB signal transmission line connected with audio head unit.
- TBOX is connected with 4G antenna, and the built-in SIM card of TBOX provides network through USB data cable connected to audio head unit under the premise that the account is activated and the payment is not in arrear.
- TBOX is connected with GPS antenna, and head unit obtains GPS positioning information in real time through USB data output interface.
- It realizes the remote diagnosis control function of vehicle CAN network. The IOV APP can remotely check the status of head unit, remotely turn on the air conditioning, and remotely obtain the status information of head unit, etc. The realization of status query/remote control function for IOV APP depends on TBOX node. TBOX node can receive remote 4G signals. After that, TBOX sends CAN diagnosis and control commands on diagnosis CAN. TBOX also obtains the relevant CAN signals in real time and uploads them to the cloud platform, the cloud platform returns data to the IOV APP. Finally, the remote diagnosis (- remotely obtain vehicle status, remotely read fault codes, etc.) and remote control (control the role of certain intelligent hardware on vehicle, such as air conditioning, etc.) are achieved.
-

2.4 APP Download and Installation

(1) APP download channels.

- 1) Scanning the QR code in "EXEED Life APP" on the head unit to download the "EXEED Life" APP, or search for "EXEED Life" in the "Apple APP Market" and "Android APP Market" to download and install.

(2) Login and register.

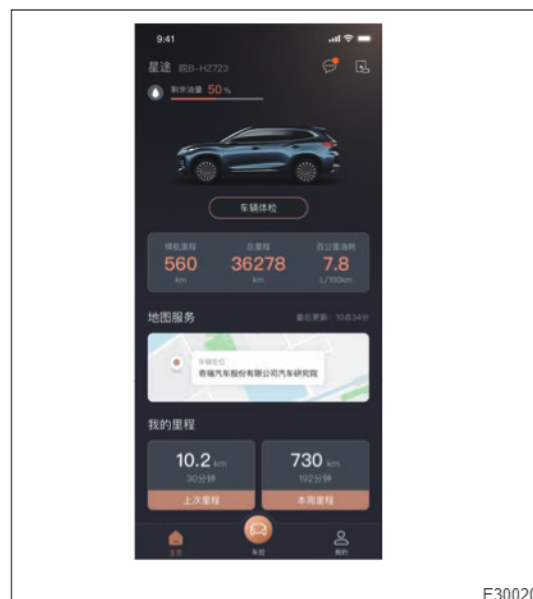
- 1) The owner can register a new user, log in the existing account or perform forgetting password operation by logging in the registration page.
 - a. [Registration]: Click register to enter the registration page, fill in the relevant information to register a new user.
 - b. [Login]: Enter the registered mobile phone number, provide the correct verification code, and click to enter the main interface of application.
 - c. [Account password login]: Click and switch to using user name and password to log in.
 - d. [Forgetting password]: Click and fill in the relevant information to reset the password.
 - e. [WeChat login]: Click to log in by WeChat.



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(3) Home page functions:

- 1) [Message center]: Click the right icon on information bar to enter the message center interface.
- 2) [Vehicle condition inquiry]: Display the latest real-time data information of vehicle.
- 3) [Vehicle diagnosis]: Click to enter the vehicle health examination interface to check the latest diagnosis score and diagnosis module.
- 4) [Map service]: Display the current vehicle position.
- 5) [My mileage]: Display the last mileage and mileage of this week.
- 6) [EXEED advertising]: Click the advertising module to enter the EXEED advertising interface.
- 7) [Business selection]: Provide functional entrances for e-manuals, charging current, vehicle owner clubs, vehicle highlights, and EXEED LAB.
- 8) [EXEED news]: Provide functional entrances for news, brand, and all models, etc.
- 9) [Online mall]: Provide the relevant entrances for the online mall.



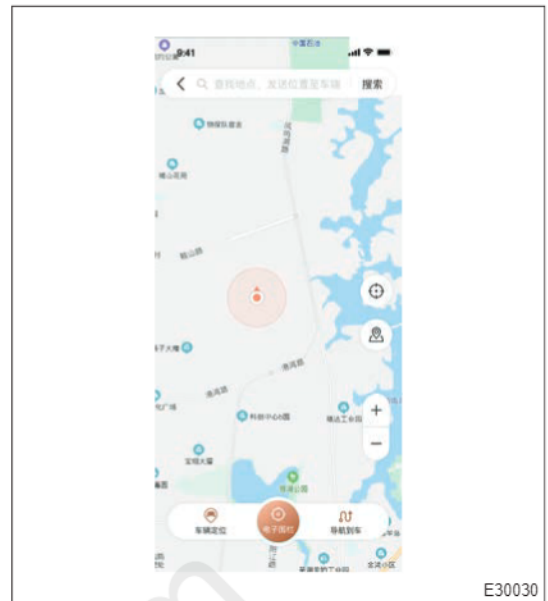
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Caution

- If the vehicle has abnormal conditions, such as abnormal tire pressure, high coolant temperature, etc., the home page will remind you.

(4) Map service.

- 1) [My position]: Click the “ ” icon to display my position.
- 2) [Vehicle positioning]: Click to display the current position of vehicle.
- 3) [Electronic fence]: Click to set an electronic fence for vehicle, message reminder will be provided by EXEED Life APP when entering or exiting the fence.
- 4) [Navigate to vehicle]: Click to enter the route planning page, and display the walking route from my current location to the vehicle position.



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2.5 My account

- (1) My home page.
 - 1) [Account management]: Display basic information such as user name, user head portrait, and mobile phone number, etc.
 - 2) [Renewal]: Display the relevant information of mobile traffic.
 - 3) [My vehicle]: Display the relevant information of the binding vehicle.
 - 4) [My service]: Provide functional entrances for vehicle maintenance, shooting, ETC, and settings, etc.

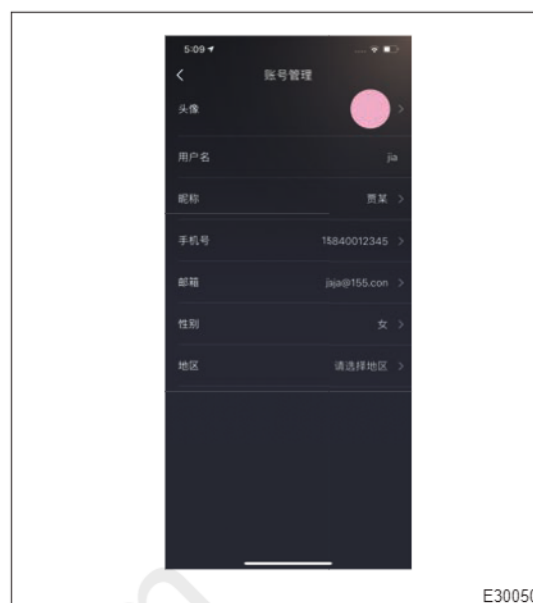


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- (2) Account management.

Check the relevant information of user.

- 1) [Portrait]: Click to modify the head portrait.
- 2) [User name]: Click to check the user name information.
- 3) [Nickname]: Click to modify the nickname.
- 4) [Mobile phone number]: Click to modify the binding mobile phone number.
- 5) [Mailbox]: Click to modify the binding mailbox.
- 6) [Gender]: Click to modify the gender information of user.
- 7) [Region]: Click to modify the region information of user.



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(3) My vehicle.

Check the relevant information of vehicle configuration.

- 1) [Vehicle list]: Click to check all binding vehicles and authorized vehicle information under the name.
- 2) [Adding vehicle]: Click to enter vehicle information to add a vehicle.
- 3) [Real-name authentication]: Click to perform real-name authentication on vehicles that have not been authenticated.
- 4) [Vehicle setting by default]: Click to set the selected vehicle as the vehicle used by default.
- 5) [Editing vehicle information]: Click to edit vehicle information, bind the vehicle, cancel the real-name authentication, and modify the vehicle information.
- 6) [Vehicle password setting]: Click to enter the vehicle control password setting interface, on which digital password, graphic password, fingerprint password ON/OFF and face password can be managed and set.
- 7) [Remote authorization management]: Click to manage the remote authorization account of vehicle.



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Caution

- During adding vehicles, for specific data information requirements, please bring related valid certificates to the EXEED service station to apply/change.
- When vehicle is transferred or the owner is changed, the original owner is obliged to actively unbind the mobile phone from the vehicle or contact the EXEED service station to assist in unbinding the vehicle, preventing personal information leakage or potential liability risks.

(4) Setting

- 1) [Modify login password]: Click to modify the login password of the user account.
- 2) [Fingerprint unlock setting]: Click to enable/disable fingerprint login function.
- 3) [Bind/unbind WeChat]: Click to bind/unbind WeChat.
- 4) [Travel record]: Click to open/close the travel record.
- 5) [About]: Click to check version information, copyright ownership, customer service phone number, service agreement, privacy policy, new version detection, etc.
- 6) [Clear cache]: Click to clear the cache of APP.
- 7) [Logout]: Click to log out the current login account.



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2.6 Vehicle control

■ Remote start condition

The following conditions must be met at the same time:

- Remote start request of mobile phone APP is received;
- Body anti-theft is in a fortifying state, and no alarm is triggered;
- All doors, engine hood, and back door are closed;
- There is no valid smart key in the vehicle;
- Electronic parking brake is applied and parking brake function is enabled;
- The vehicle is stationary;
- Two remote start attempts are allowed. After the two opportunities are used up, the engine needs to be started in normal mode and the engine cannot be started remotely until engine stalls.

■ Engine stalling condition after remote start

Any of following conditions is met:

- Start engine remotely and run it until the maximum set time (5 minutes, or 10 minutes, or 15 minutes) is reached;
- Depress brake pedal in fortifying deactivation mode, and there is no smart key in the vehicle, or depress brake pedal in fortifying mode;
- The vehicle starts to move;
- Coolant temperature is too high or oil pressure is too low;
- The voltage is out of the required range;
- The engine hood is opened;
- The anti-theft alarm is triggered;
- The electronic parking brake is released.

- (1) Vehicle control home page.

Vehicle control interface will display the real-time vehicle data information, including tire pressure, temperature, engine status, vehicle lock status, window status, sunroof status, air conditioning status, back door status, and remote control of vehicle.

- 1) [Refresh]: Click the icon in the upper left corner of the vehicle control home page to refresh the page, the current information and status of vehicle will be displayed.
 - 2) [Anti-theft reminder]: Click the icon in the upper right corner of the vehicle control home page to set the anti-theft reminder.
 - 3) [Bluetooth]: Switch between Bluetooth and non-Bluetooth mode (if equipped).
 - 4) [Engine]: Click to remotely start/stop the engine.
 - 5) [Vehicle location]: Click to flash lights and sound the buzzer, and vehicle locating operation option is displayed.
 - 6) [Vehicle lock]: Click to pop up the operation options for door lock.
 - 7) [Window]: Click to pop up the operation options for window.
 - 8) [Sunroof]: Click to pop up the operation options for sunroof.
 - 9) [Air conditioning]: Click the icon and page jumps to the operation page of air conditioning.
 - 10) [Back door]: Click to open/close the back door.
- (2) Anti-theft reminder.

Turn on/off the anti-theft reminder.

- 1) When the vehicle anti-theft alarm function is triggered, the owner will receive a text message as a reminder; if it is turned off, there is no reminder.



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- (3) Engine.

- 1) Remotely start/stop the engine.
- Click "Engine" button, enter the vehicle control password/gesture password/face recognition/fingerprint recognition on the APP, and engine can be started/stopped after passing the verification.



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- (4) Vehicle lock.
- Remotely unlock/lock the door or luggage compartment door.

- 1) Click "Vehicle lock" button, enter the vehicle control password/gesture password/face recognition/fingerprint recognition on the APP, vehicle can be unlocked/locked and luggage compartment door can be unlocked after passing the verification.



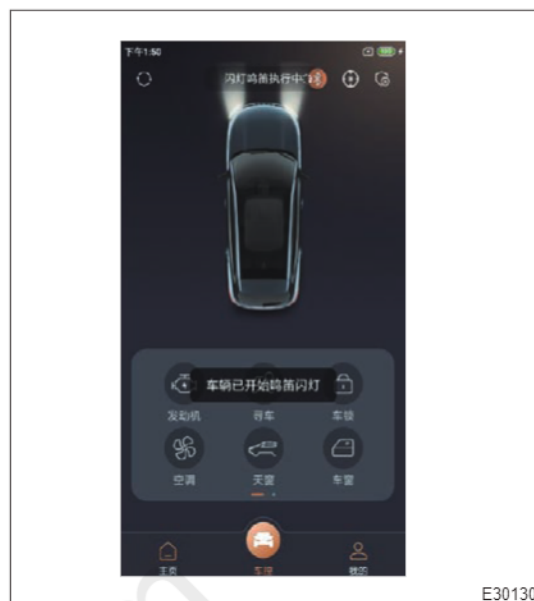
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- (5) Vehicle location.

Remotely locate the vehicle and control the buzzer to sound and light to flash.

- 1) Click "Vehicle location" button, select "Sounding buzzer and flashing lights" in the pop-up window, enter the vehicle control password/gesture password/face recognition/fingerprint recognition on the APP, and buzzer will sound and lights will flash after passing the verification.

Click "Vehicle location" button and select "Vehicle location" in the pop-up window to inquire the current location of vehicle.



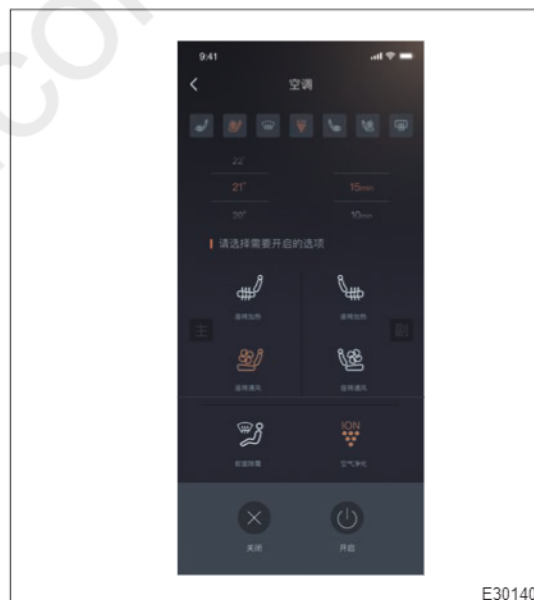
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- (6) Air conditioning.
Remotely turn on/off the air conditioning.

- 1) Click "Air conditioning" button, select temperature and time in the air conditioning module, then select air purification, driver/front passenger seat heating, driver/front passenger seat ventilation and vehicle defrosting that you want to turn on. When all functions are selected, click ON button and enter vehicle control password/gesture password/face recognition/fingerprint recognition on the APP, then the corresponding commands will be performed after passing the verification.

Caution

- Before turning on the air conditioning remotely, turn on the engine remotely first and then the air conditioning control command will be send. The turning on and off conditions also need to meet the conditions when the engine is turned on/off remotely.

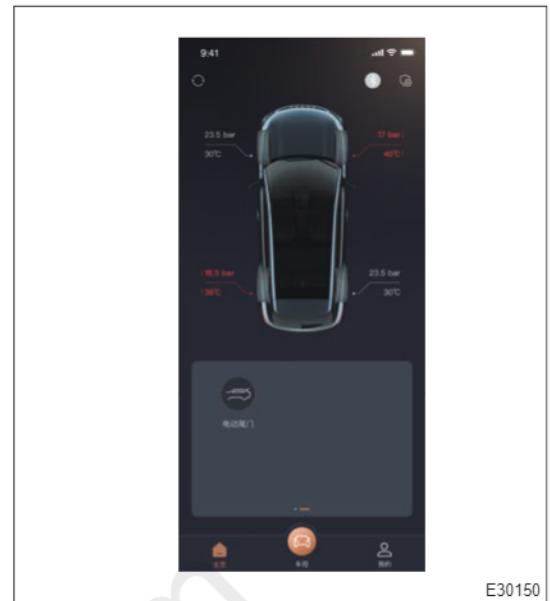


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- (7) Power back door.

Remotely open and close the power back door.

- 1) Click "Power back door" button, select the opening/closing option of power back door, enter the vehicle control password/gesture password/face recognition/fingerprint recognition on the APP, and power back door will be opened/closed after passing the verification.



(8) Window.

Remotely open, close and ventilate it.

- 1) Click "Window" button, select the opening/closing/ventilation options of window, enter the vehicle control password/gesture password/face recognition/fingerprint recognition on the APP, and window will be opened/closed/ventilated after passing the verification.



(9) Sunroof.

Remotely open, close and tilt it.

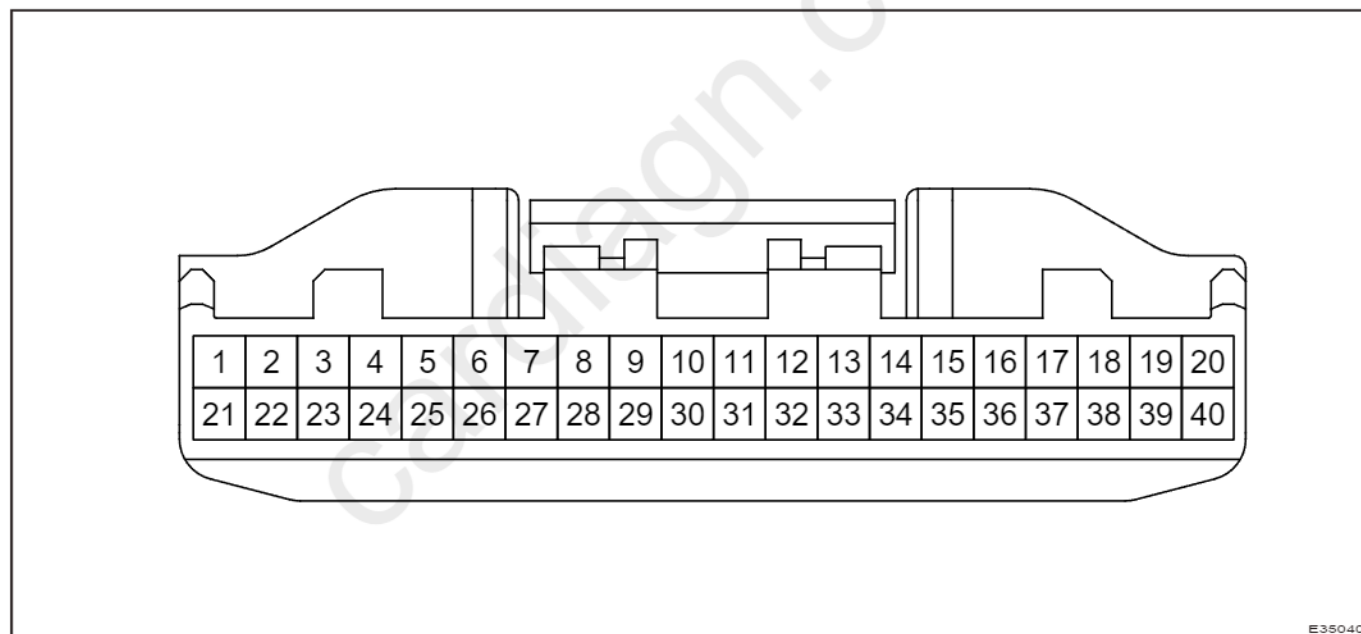
- 1) Click “Sunroof” button, select opening/closing/tilting options of sunroof, enter the vehicle control password/gesture password/face recognition/fingerprint recognition on the APP, and sunroof will be opened/closed/tilted after passing the verification.



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3 System Circuit Diagram

3.1 Module Terminal Definition



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Terminal Inspection		Terminal Definition	Detection Condition	Measured Value
Multimeter Positive	Multimeter Negative			
1	Body ground	Power supply	Power supply in “ON” status	12 V
2	Body ground	SOS power supply	Power supply in “ON” status	8.9 V
3	Body ground	Ground	Power supply in “ON” status	0 V

Terminal Inspection		Terminal Definition	Detection Condition	Measured Value
Multimeter Positive	Multimeter Negative			
4	Body ground	LED light controlling SOS ON/OFF	Power supply in "ON" status	0 V when not pressed, keep 1.1 V after being pressed
5	Body ground	MIC shield ground	Power supply in "ON" status	0 V
6	Body ground	MIC power supply input	Power supply in "ON" status	6.1 V
7	Body ground	Audio signal shield ground	Power supply in "ON" status	0 V
8	Body ground	Audio signal +	Power supply in "ON" status	0 V
9	\	\	\	\
10	Body ground	ECALL switch ground	Power supply in "ON" status	0 V
11	Body ground	Airbag collision signal	Power supply in "ON" status	Changed between 10 and 11 V
12	\	\	\	\
13	\	\	\	\
14	\	\	\	\
15	\	\	\	\
16	\	\	\	\
17	\	\	\	\
18	\	\	\	\
19	Body ground	CAN-H	Power supply in "ON" status	2.6 V
20	Body ground	Power supply	Power supply in "ON" status	12 V
21	\	\	\	\
22	\	\	\	\
23	\	\	\	\
24	\	\	\	\
25	Body ground	MIC output signal	Power supply in "ON" status	7.6 V
26	Body ground	MIC ground	Power supply in "ON" status	0 V
27	\	\	\	\
28	Body ground	Audio signal -	Power supply in "ON" status	0 V
29	\	\	\	\

Terminal Inspection		Terminal Definition	Detection Condition	Measured Value
Multimeter Positive	Multimeter Negative			
30	Body ground	ECALL button signal	Power supply in "ON" status	0 V
31	\	\	\	\
32	Body ground	Mute	Power supply in "ON" status	0 V
33	Body ground	LED_red indicator	Power supply in "ON" status	8.2 V
34	Body ground	LED_green indicator	Power supply in "ON" status	When indicator does not flash: 0.01 V; indicator flashes after pressing: Voltage changes between 0 and 8 V
35	\	\	\	\
36	\	\	\	\
37	\	\	\	\
38	\	\	\	\
39	Body ground	CAN-L	Power supply in "ON" status	2.4 V
40	Body ground	Ground	Power supply in "ON" status	0 V

4 DIAGNOSIS & TEST

4.1 Diagnosis Procedure

Hint:

Use following procedures to troubleshoot the control system.

1	Vehicle brought to workshop
---	-----------------------------

Next

2	Check battery voltage
---	-----------------------

Standard voltage: Not less than 12 V.

Result

NG

Replace battery

OK

3	Customer problem analysis
---	---------------------------

Next

4 Read DTCs**Result**

Result	Go to
History DTC	A
Current DTC	B

A

Troubleshoot according to Intermittent DTC Fault Flow

B

5 Repair according to Diagnostic Trouble Code (DTC) Chart

Next

6 Adjust, repair or replace

Next

7 Conduct test and confirm malfunction has been repaired

Next

End

4.2 DTC Confirmation Procedure

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

- (1) Turn ENGINE START STOP switch to LOCK.
- (2) Connect diagnostic tester (the latest software) to diagnostic interface.
- (3) Connect diagnostic tester (the latest software) to diagnostic interface.
- (4) Use the diagnostic tester to record and clear DTCs stored in the detection system.
- (5) Turn ENGINE START STOP switch to LOCK and wait for a few seconds.
- (6) Turn ENGINE START STOP switch to ON, and then select read DTC.
- (7) If DTC is detected, it indicates current malfunction. Go to inspection procedure - Step 1.
- (8) If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.3 Diagnostic Help

- (1) Connect diagnostic tester X-431 PAD (the latest software) to Data Link Connector (DLC), 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 may apply to this malfunction.
- (6) Visually check related wire harness and connector.
- (7) Check and clean all system grounds related to the latest DTCs.

- (8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.4 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, 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 airbag components 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.

4.5 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- (1) Remove ground bolt or nut.
- (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 ground bolt or nut securely.
- (5) Check if any additional accessories interfere with ground circuit.
- (6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.6 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
B144016	Vehicle Power Supply Voltage - Voltage Below Threshold
B144017	Vehicle Power Supply Voltage - Voltage Above Threshold
B144529	Invalid Hardwired Airbag Crash Signal
B144611	Microphone 1 Circuit - Short to Ground
B144613	Microphone 1 Circuit - Circuit Open
B14481E	E-Call Button Circuit - Button Pressed Down But Not Up Again
B144C11	GNSS Antenna Circuit - Short to Ground
B144C13	GNSS Antenna Circuit - Circuit Open
B144D49	GNSS Module Initialization Failed
B144E05	TGW VIN Not Match the VIN Read Out from the BUS
B145187	USB Communication Between TGW and IHU Failed
B145311	Cellular Antenna 1 Circuit - Short to Ground

DTC	DTC Definition
B145313	Cellular Antenna 1 Circuit - Circuit Open
B145511	Cellular Antenna 2 Circuit - Short to Ground
B145513	Cellular Antenna 2 circuit - Circuit Open
B145A49	SIM Card Invalid
B145C13	Backup Battery Not Connected
B146001	Bluetooth Communication Error

4.7 DTC Diagnosis Procedure

■ Module power supply voltage DTC

DTC	B144016	Vehicle Power Supply Voltage - Voltage Below Threshold
DTC	B144017	Vehicle Power Supply Voltage - Voltage Above Threshold

DTC	DTC Definition	Possible Causes
B144016	Vehicle Power Supply Voltage - Voltage Below Threshold	- Power supply is not stable, and some loads may decrease suddenly - Battery is damaged
B144017	Vehicle Power Supply Voltage - Voltage Above Threshold	- Power supply is short or open - Generating capacity of electrical power generating system is too large or too small.

■ DTC Confirmation Procedure

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

- 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.

Hint:

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

1	Check battery voltage
---	-----------------------

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Using a digital multimeter, measure voltage between positive battery terminal and negative battery terminal, which is not less than 12 V.

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

NG

Repair or replace battery/alternator

OK

2 Check charging system

- (a) Start engine and use a digital multimeter to measure if system voltage is between 13.5 V and 14.8 V.

NG

Repair or replace alternator and related wire harness

OK**3 Check power supply fuse of wireless communication system (TBOX) module**

- (a) Turn ENGINE START STOP switch to ON.
 (b) Check if engine compartment fuse box and instrument panel fuse and relay box RF58 (10A) and RF39 (5A) are blown.

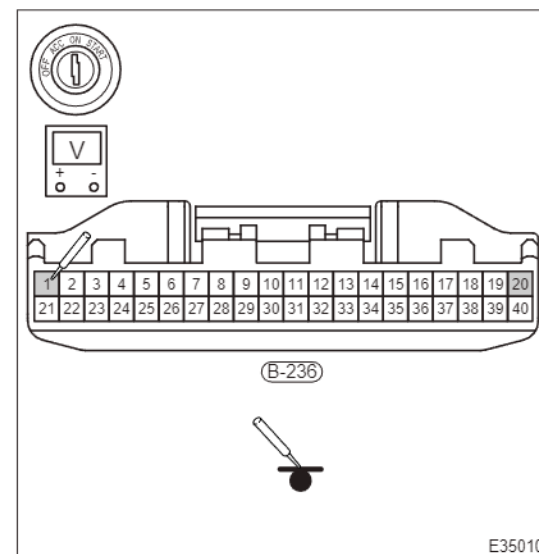
NG

Replace fuse

OK**4 Check power supply wire harness and connector of wireless communication system (TBOX)**

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect TBOX module connector and check if connector is dirty or deformed.
 (c) Turn ENGINE START STOP switch to ON.
 (d) Using a multimeter, measure if voltage between terminals 1, 20 of TBOX control module connector B-236 and ground is 12 V respectively.

Multimeter Connection	Condition	Specified Condition
B-236(1) - Ground	ENGINE START STOP switch "ON"	Not less than 12 V
B-236(20) - Ground	ENGINE START STOP switch "ON"	Not less than 12 V

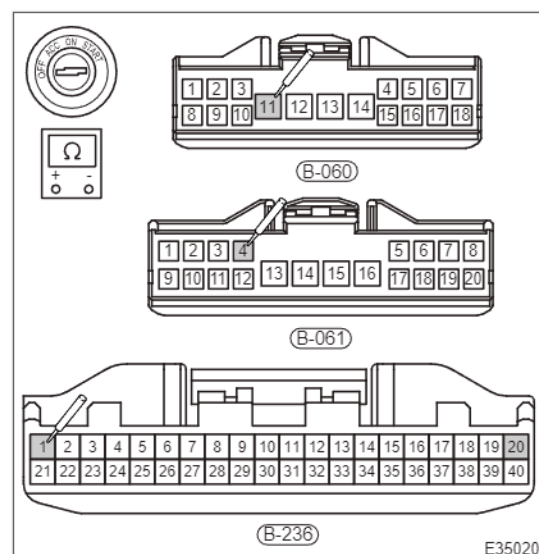


- (e) Use 21 W test light to test terminals 1, 20 of TBOX control module connector B-236 to check if the test light comes on.

Test Terminal of 21 W Test Light	Condition	Specified Condition
B-236(1) - Ground	ENGINE START STOP switch "ON"	On
B-236(20) - Ground	ENGINE START STOP switch "ON"	On

- (f) Use a multimeter, check for continuity in power supply circuit between TBOX control module wire harness B-236 (1) and instrument panel fuse box B-061 (4).
- (g) Use a multimeter, check for continuity in power supply circuit between TBOX control module wire harness B-236 (20) and instrument panel fuse box B-060 (11).

Multimeter Test Terminal	Condition	Specified Condition
B-236 (1) - B-061 (4)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$
B-236 (20) - B-060 (11)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$



E35020

NG

Check wire harness fuse

OK

5

Reconfirm DTCs

- (a) Connect all the connectors.
- (b) Connect the negative battery cable.
- (c) Turn ENGINE START STOP switch to ON.
- (d) Use diagnostic tester (the latest software) to record and clear DTCs stored in TBOX system.
- (e) Turn ENGINE START STOP switch to OFF and wait for a few seconds.
- (f) Turn ENGINE START STOP switch to ON.
- (g) Use diagnostic tester (the latest software) to reread DTC in TBOX system.

NG

Replace TBOX module

OK

System is normal

■ Combined Antenna DTC

DTC	B144C11	GNSS Antenna Circuit - Short to Ground
DTC	B144C13	GNSS Antenna Circuit - Circuit Open
DTC	B144D49	GNSS Module Initialization Failed
DTC	B145311	Cellular Antenna 1 Circuit - Short to Ground
DTC	B145313	Cellular Antenna 1 circuit - Circuit Open
DTC	B145511	Cellular Antenna 2 Circuit - Short to Ground
DTC	B145513	Cellular Antenna 2 circuit - Circuit Open

DTC	DTC Definition	Possible Causes
B144C11	GNSS Antenna Circuit - Short to Ground	• Wire harness connector • Antenna damaged • Module failure
B144C13	GNSS Antenna Circuit - Circuit Open	
B144D49	GNSS Module Initialization Failed	
B145311	Cellular Antenna 1 Circuit - Short to Ground	
B145313	Cellular Antenna 1 circuit - Circuit Open	
B145511	Cellular Antenna 2 Circuit - Short to Ground	
B145513	Cellular Antenna 2 circuit - Circuit Open	

■ DTC Confirmation Procedure

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

- 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.

Hint:

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

1 Check terminal connector of TBOX module

- Turn ENGINE START STOP switch to OFF.
- Disconnect the negative battery cable.
- Disconnect the remote control module wire harness connectors B-231 and B-233.
- Check if wire harnesses are worn, pierced, pinched or partially broken.
- Check for broken, bent, protruded or corroded terminals.
- Check if terminal contact pins of related connectors are in good condition.

NG

Repair or replace related wire harness and connector

OK

2 Check combined antenna of remote control module

- Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.
- Disconnect the TBOX wire harness connectors B-231 and B-233.
- Replace combined antenna to check if the fault occurs again.

NG

Replace combined antenna

OK

3 Reconfirm DTCs

- (a) Turn ENGINE START STOP switch to ON.
- (b) Use diagnostic tester (the latest software) to record and clear DTC stored in TBOX system.
- (c) Turn ENGINE START STOP switch to OFF and wait for a few seconds.
- (d) Turn ENGINE START STOP switch to ON.
- (e) Use diagnostic tester (the latest software) to reread DTC in TBOX system.

NG

Replace wireless communication system (- TBOX) module assembly

OK

System operates normally

■ Microphone fault

DTC	B144611	Microphone 1 Circuit - Short to Ground
DTC	B144613	Microphone 1 Circuit - Circuit Open

DTC	DTC Definition	Possible Causes
B144611	Microphone 1 Circuit - Short to Ground	- Wire harness connector failure - Microphone failure
B144613	Microphone 1 Circuit - Circuit Open	

■ DTC Confirmation Procedure

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

- 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.

Hint:

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

1 Check wire harness and connector

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect the wireless communication system (TBOX) wire harness connector B-236.
- (d) Check if wire harnesses are worn, pierced, pinched or partially broken.
- (e) Check for broken, bent, protruded or corroded terminals.
- (f) Check if terminal contact pins of related connectors are in good condition.

NG

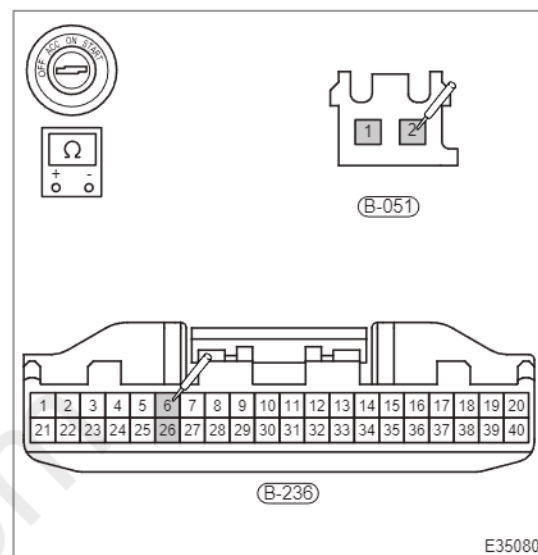
Repair or replace related wire harness and connector

OK

2 Check for continuity of wireless communication system (TBOX) connector wire harness

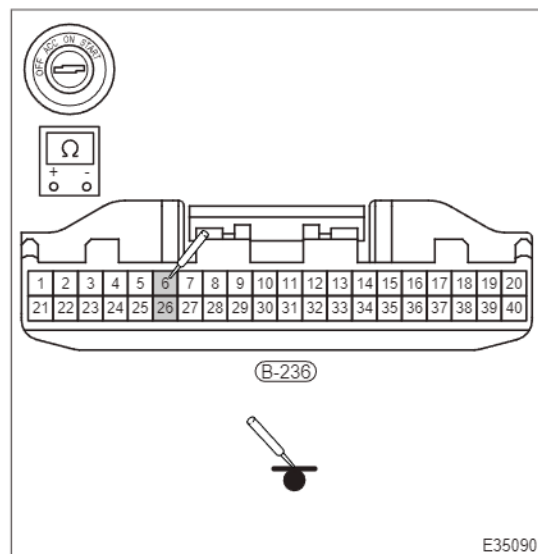
- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Disconnect wireless communication system (TBOX) connector B-236 and microphone module connector B-051.
- (d) Use a multimeter, check for continuity between terminals 6 and 26 of TBOX wire harness connector B-236 and terminals 2 and 1 of microphone wire harness connector B-051 respectively.

Multimeter Connection	Condition	Specified Condition
B-236 (6) - B-051 (2)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$
B-236 (26) - B-051 (1)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$



- (e) Using a multimeter, check for continuity between terminals 6 and 26 of TBOX wire harness connector B-236 and ground respectively, and check for short to ground.

Multimeter Connection	Condition	Specified Condition
B-236(6) - Ground	ENGINE START STOP switch "OFF"	∞
B-236(26) - Ground	ENGINE START STOP switch "OFF"	∞



NG

Repair or replace instrument panel wire harness

OK

3 Check wireless communication system (TBOX) module

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the TBOX wire harness connector B-236.
- (c) Check if pin of TBOX module assembly is bent, broken, retreated, etc.

NG

Repair or replace instrument panel wire harness

OK

4 Check microphone 1 assembly

- (a) Turn ENGINE START STOP switch to OFF.
 (b) Disconnect the microphone wire harness connector B-051.
 (c) Check if pin of microphone is bent, broken, retreated, etc.

NG

Replace TBOX module assembly

OK

5 Reconfirm DTCs

- (a) Turn ENGINE START STOP switch to ON.
 (b) Use diagnostic tester (the latest software) to record and clear DTC stored in TBOX system.
 (c) Turn ENGINE START STOP switch to OFF and wait for a few seconds.
 (d) Turn ENGINE START STOP switch to ON.
 (e) Use diagnostic tester (the latest software) to reread DTC in TBOX system.

NG

Replace microphone 1 assembly

OK

System operates normally

■ High speed data transmission line DTC

DTC	B145187	USB Communication Between TGW and IHU Failed
DTC	DTC Definition	Possible Causes
B145187	USB Communication Between TGW and IHU Failed	• Wire harness connector failure • Intermittent problem • IHU failure

■ Description**■ DTC Confirmation Procedure**

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

- 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.

Hint:

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

1 Check wire harness and connector

- (a) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable.
- (b) Disconnect the wireless communication system (TBOX) module wire harness connector B-234.
- (c) Disconnect the wire harness connector I-038.
- (d) Using a multimeter, check for continuity between terminal of B-234 and terminal of I-038.

Multimeter Connection	Condition	Specified Condition
B-234 (1) - I-038 (1)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$

NG

Replace instrument panel wire harness

OK

2

Check TBOX module assembly

- (a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
- (b) Remove TBOX module from malfunctioning vehicle and install it to a new vehicle to test.

NG

Replace TBOX module assembly

OK

3

Reconfirm DTCs

- (a) Turn ENGINE START STOP switch to ON.
- (b) Use diagnostic tester (the latest software) to record and clear DTC stored in TBOX system.
- (c) Turn ENGINE START STOP switch to OFF and wait for a few seconds.
- (d) Turn ENGINE START STOP switch to ON.
- (e) Use diagnostic tester (the latest software) to reread DTC in TBOX system.

NG

Replace domain control module

OK

System operates normally

■ Airbag signal DTC

DTC	B144529	Invalid Hardwired Airbag Crash Signal
DTC	DTC Definition	Possible Causes
B144529	Invalid Hardwired Airbag Crash Signal	- Signal waveform is disturbed - ACM failure - TGW failure

■ Description

■ DTC Confirmation Procedure

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

- 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.

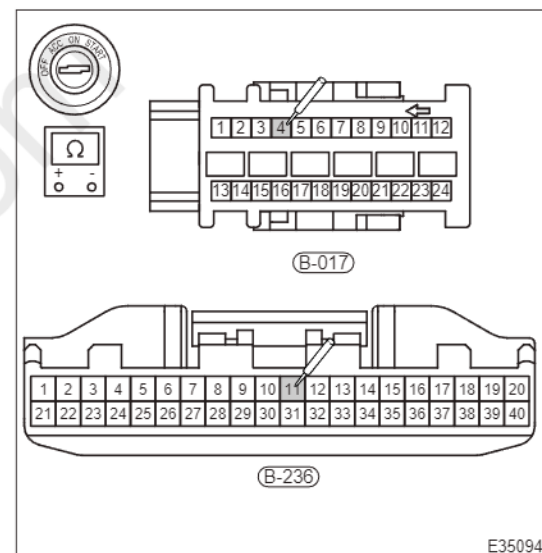
Hint:

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

1 Check wire harness and connector

- Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable.
- Disconnect the wireless communication system (TBOX) module wire harness connector B-236.
- Disconnect the airbag module wire harness connector B-017.
- Using a multimeter, check for continuity between terminal of B-236 and terminal of B-017.

Multimeter Connection	Condition	Specified Condition
B-236 (11) - B-017 (4)	ENGINE START STOP switch "OFF"	$\leq 1 \Omega$



NG

Replace instrument panel wire harness

OK

2 Check TBOX module assembly

- Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
- Remove TBOX module from malfunctioning vehicle and install it to a new vehicle to test.

NG

Replace TBOX module assembly

OK

3 Reconfirm DTCs

- (a) Turn ENGINE START STOP switch to ON.
- (b) Use diagnostic tester (the latest software) to record and clear DTC stored in TBOX system.
- (c) Turn ENGINE START STOP switch to OFF and wait for a few seconds.
- (d) Turn ENGINE START STOP switch to ON.
- (e) Use diagnostic tester (the latest software) to reread DTC in TBOX system.

NG

Replace domain control module

OK

System operates normally

■ Network failure

DTC	U010087	Lost Communication with EMS
DTC	U010187	Lost Communication with TCU
DTC	U012987	Lost Communication with Brake System Controller
DTC	U013187	Lost Communication With Power Steering Control Module
DTC	U015187	Lost Communication with Airbag Control Unit
DTC	U014087	Lost Communication with Body Control Module
DTC	U016487	Lost Communication with A/C Control Unit
DTC	U015587	Lost Communication with Instrument Panel Cluster (IPC) Control Module
DTC	U012687	Lost Communication with Steering Angle Sensor
DTC	U021487	Lost Communication with Passive Entry Passive Start (PEPS)
DTC	U023087	Lost Communication with Power Back Door Controller
DTC	U014687	Lost Communication with Central Gateway
DTC	U020887	Lost Communication with Seat Module Controller

■ Description

■ DTC Confirmation Procedure

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

- 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.

Hint:

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

1

Read DTCs

- (a) Connect the DTC decoding tester.
- (b) Read all DTCs.

OK

No DTC

NG

Check the fault causes indicated by DTCs and repair faulty area

OK

2 Check TBOX ground point

- (a) Turn ENGINE START STOP switch to OFF.
- (b) Disconnect the negative battery cable.
- (c) Check the TBOX ground point GB-243.

OK

Ground point is normal.

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

OK

3 Check TBOX wire harness connector

- (a) Disconnect the TBOX wire harness connector.
- (b) Check the TBOX wire harness connector.

OK

TBOX wire harness connector is normal.

NG**Repair or replace connector**

OK

4 Reconfirm DTCs

- (a) Connect the negative battery cable.
- (b) Use diagnostic tester to clear DTCs.
- (c) Check if the same DTCs are still output.

OK

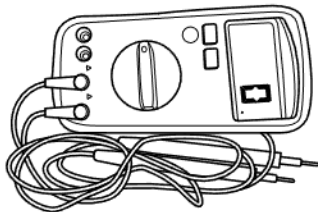
Same DTCs do not occur.

NG**System operates normally, replace TBOX and perform matching learning.****OK****System operates normally**

5 ON-VEHICLE SERVICE

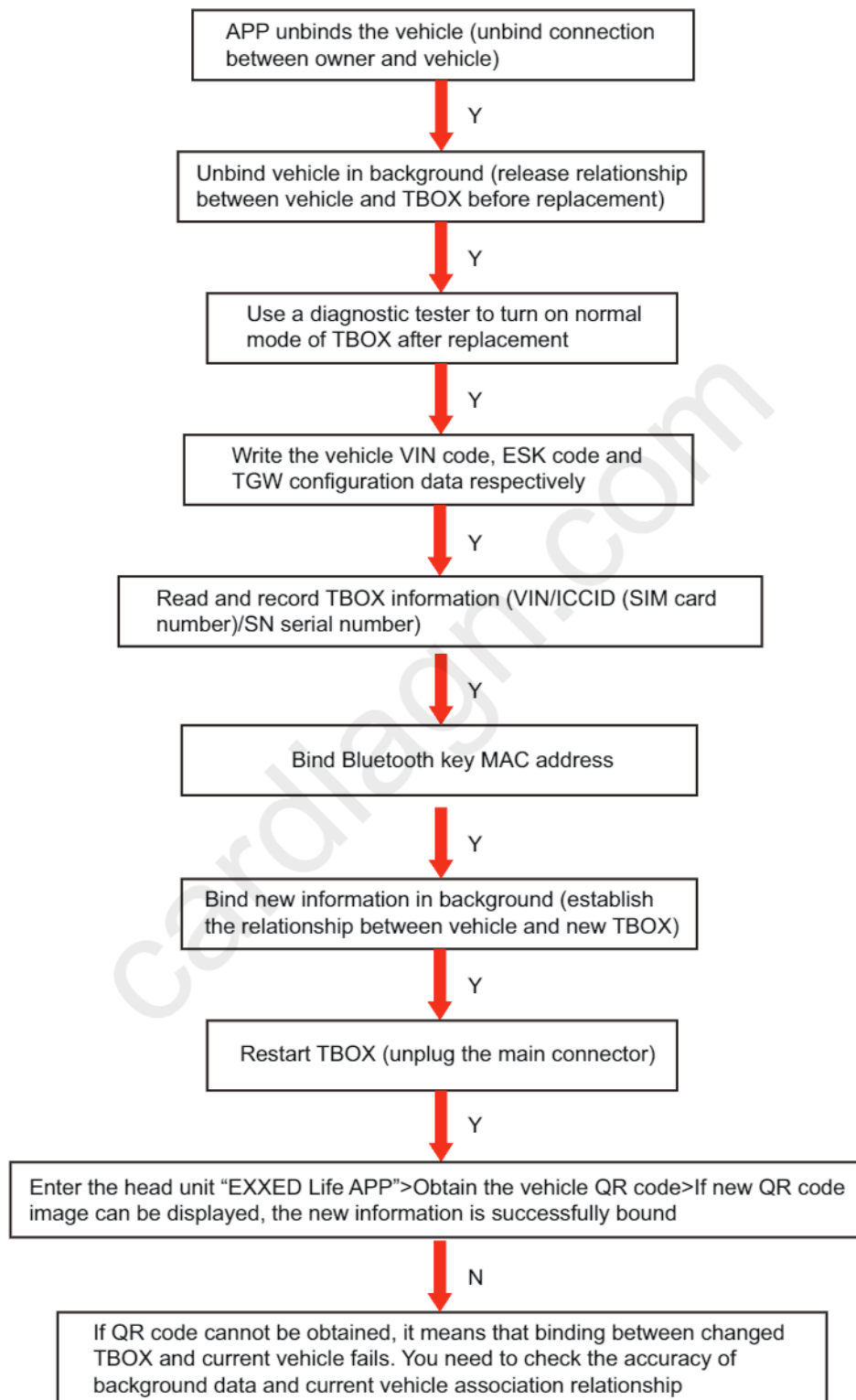
5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
X-431 PAD Diagnostic Tester	 S00001

5.2 Replacement of TBOX Module

■ After-sales replacement process and precautions of TBOX



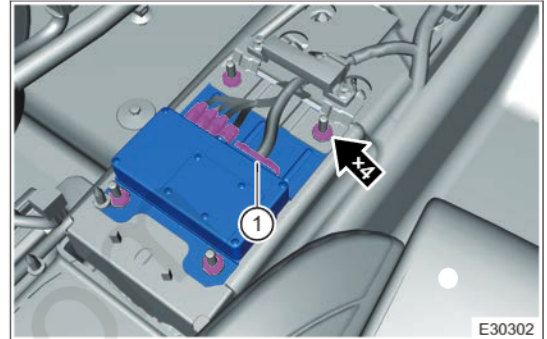
E30020

■ Removal

Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing TBOX module.**
- **Appropriate force should be applied when removing TBOX module. Be careful not to operate roughly.**

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front left seat.
- (4) Remove the front left carpet assembly.
- (5) Disconnect connector (1) from TBOX, and remove 4 fixings nuts from TBOX.



■ Installation

Caution

- **Tighten fixing nut to specified torque, when installing TBOX module.**
- **Connect connector in place, when installing TBOX module.**

- (1) Install TBOX module and tighten 4 fixing nuts to body.

Tightening torque: 12 N·m

- (2) Install the front left carpet.
- (3) Install the front left seat assembly.
- (4) Connect diagnostic tester, read and clear DTCs.