
BODY ELECTRICAL

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47.1 HORN

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 necessary safety equipment to prevent accidents, when removing horn.
- (2) Operate carefully to prevent damage to horn and horn switch, when removing horn.
- (3) Connect connectors in place when installing horn.
- (4) Check that each function can operate properly after installing.

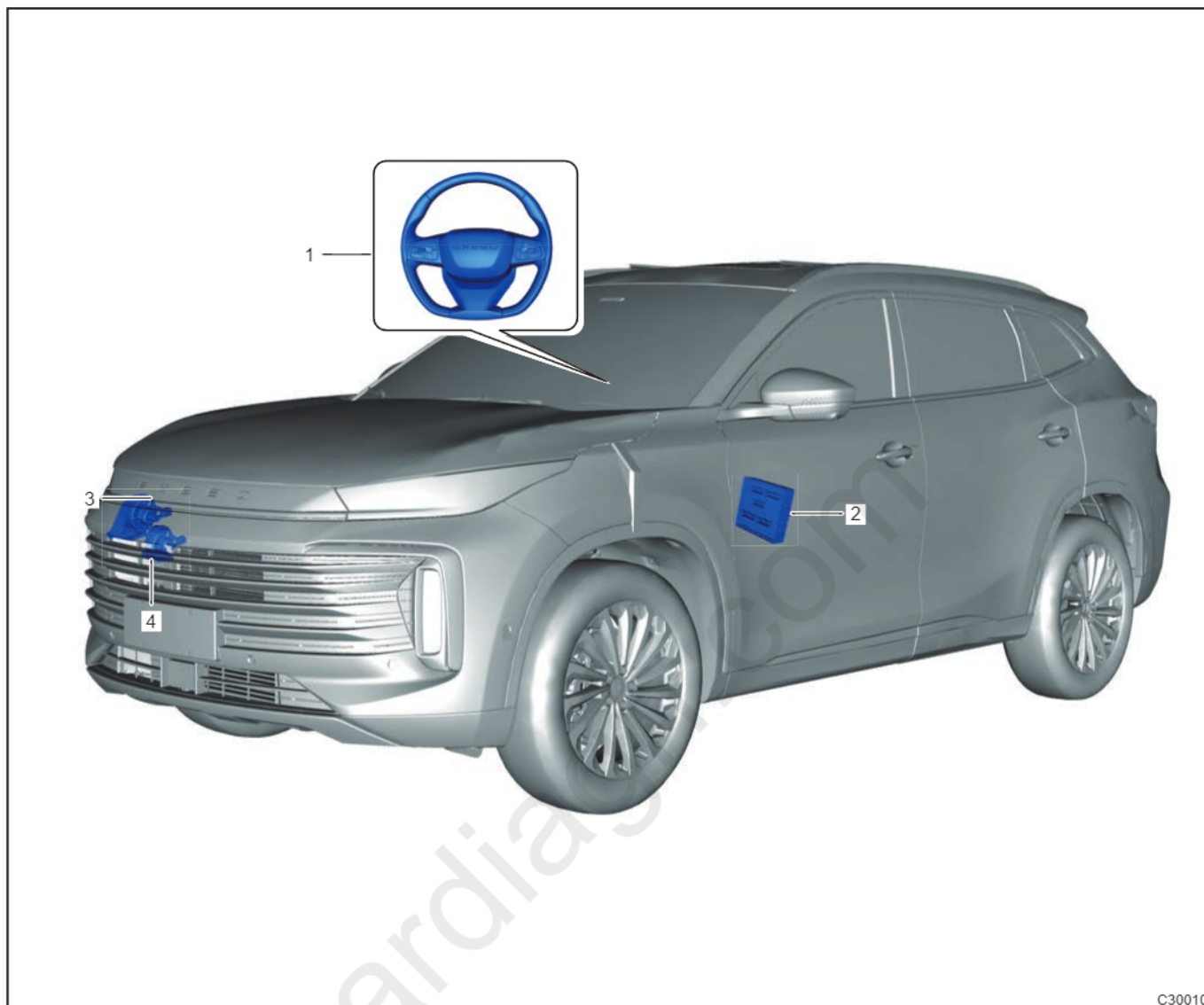
2 System Overview

2.1 System Description

This vehicle is equipped with dual electronic horn (high pitched, low pitched) system. Horn system consists of following components:

- Horn: High pitched horn is installed in groove of front bumper crossmember left mounting plate, and low pitched horn is installed in groove of front bumper crossmember right mounting plate.
- Horn switch: Horn switch is installed on steering wheel.
- Horn fuse: Horn fuse is located in engine compartment fuse and relay box.
- Horn relay: Horn relay is located in engine compartment fuse and relay box.

2.2 System Components Diagram



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1	Horn Switch	2	Instrument Panel Fuse and Relay Box
3	High Pitched Horn	4	Low Pitched Horn

3 DIAGNOSIS & TEST

3.1 Problem Symptoms Table

Caution

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

Current Status	Possible Cause
Low pitched horn does not sound	Low pitched horn (damaged)
	Wire harness (open)
	Connector (loose)

Current Status	Possible Cause
High pitched horn does not sound	High pitched horn (damaged)
	Wire harness (open)
	Connector (loose)
Horn does not sound	Horn fuse (blown)
	Horn relay
	Horn switch (damaged)
	Spiral cable (damaged)
	Wire harness (short or open)

3.2 Troubleshooting for Abnormal Horn Sound

- (1) If horn sound is obviously abnormal, perform the following routine inspection:
 - 1) Check terminals for poor contact; repair any poor contact problem;
 - 2) Check ground circuit; if there is poor contact, repair it;
 - 3) Make sure horn assembly fixing bolt is properly fastened;
 - 4) Make sure there is no contact between horn assembly and any other objects; if contact occurs, determine the correct position of other objects again, bend the horn assembly bracket if necessary, and operate horn to determine if the situation still exists.
- (2) If the situation is still obvious, perform the following specific inspection:
 - 1) Determine the type of sound produced by horn;
 - Grave.
 - Sharp.
 - 2) If it is obviously grave, it indicates that the current is too high and the horn assembly must be replaced;
 - 3) If it is obviously sharp, foreign matters may attach to horn, remove horn assembly and check for foreign matters;
 - 4) Remove any attached foreign matters and reinstall the horn assembly.

Caution

If no foreign matter is found, or if the foreign matter cannot be removed, replace horn assembly.

3.3 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.

3.4 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.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.5 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.

3.6 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B103711	Horn External Relay Circuit Failure (LSD)	When output is off and ignition switch is OFF, output voltage is more than 7 V, and it is stored as current fault. (The error is less than 10%, the time of duration is more than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.)	Relay or wire harness fault	1. Check wire harness connector; 2. Relay; 3. Check BCM.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B103712	Horn External Relay circuit Failure (LSD) Overload	Output current is more than 5A (The time of duration is more than 100 MS, the software will detect once every 20MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, turn signal light will output as long as operating conditions of turn signal light are met.) and it is stored as current fault.		

3.7 DTC Diagnosis Procedure

■ Controller fault

DTC	B1037-11	Horn External Relay Circuit Failure (LSD)
DTC	B1037-12	Horn External Relay circuit Failure (LSD) Overload

■ 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 horn relay (ERLY13) and fuse EF07 (15A)
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- (a) Turn off all electrical equipment and ENGINE START STOP switch.
- (b) Disconnect the negative battery cable.
- (c) Remove horn relay and fuse, test horn relay for damage.

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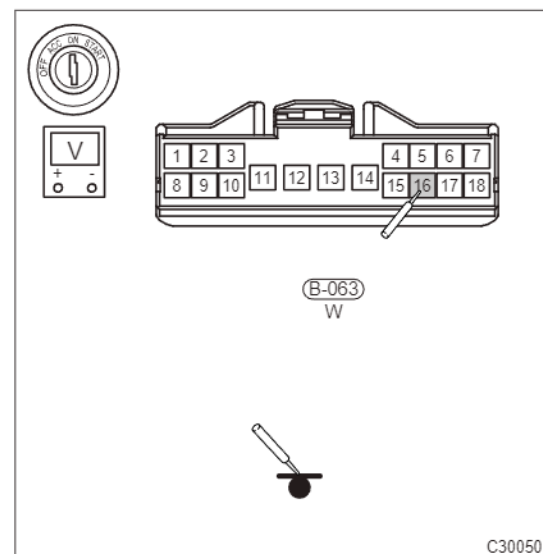
Replace relay or fuse.

OK

2	Check power supply voltage of horn relay
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- (a) Turn off all electrical equipment and ENGINE START STOP switch.
- (b) Using a digital multimeter, check if voltage between connector terminal B-063 (16) and ground is normal according to table below.

Multimeter Connection	Specified Condition
B-063 (16) - Ground	Not less than 12 V



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Repair or replace related wire harness.

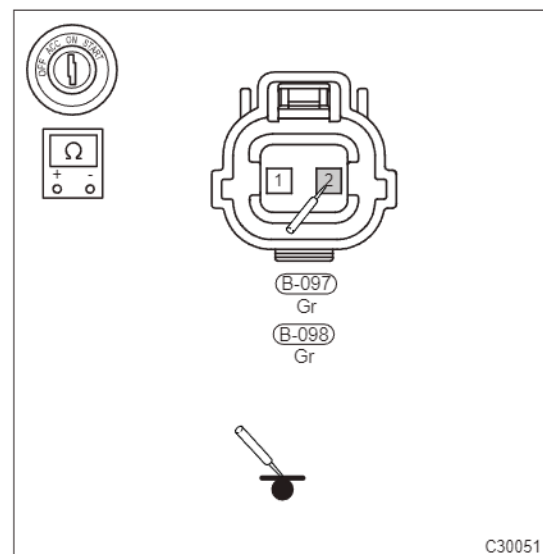
OK

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Check horn wire harness

- (a) Using a digital multimeter, measure resistance between high/low pitched horn connectors B-097 and B-098 and ground to check for an open circuit according to table below.

Multimeter Connection	Condition	Specified Condition
B-097 (2) - Ground point GB-134	Always	$\leq 1 \Omega$
B-098 (2) - Ground point GB-134	Always	$\leq 1 \Omega$



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Repair or replace related wire harness.

OK

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Reconfirm DTCs

- (a) Use diagnostic tester to clear DTCs.
- (b) Start the engine.
- (c) Check if the same DTCs are still output.

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Replace BCM module

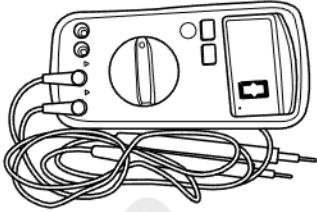
OK

System operates normally

4 ON-VEHICLE SERVICE

4.1 Tool

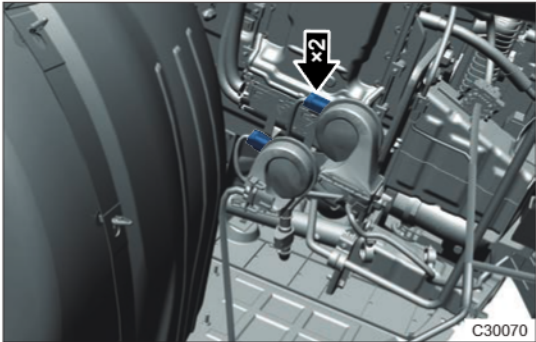
■ General Tool

Tool Name	Tool Drawing
Digital Multimeter	 S00002

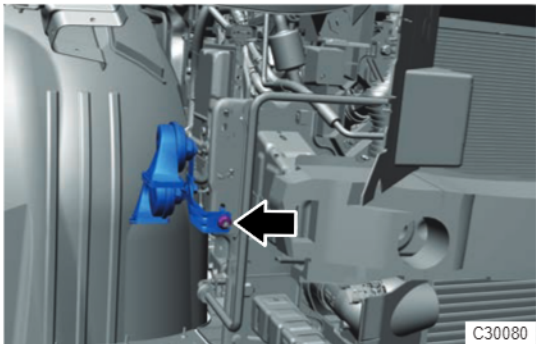
4.2 Replacement of Dual Pitched Horn

■ Removal

- (1) Turn off all electrical equipment and ENGINE START STOP switch.
- (2) Disconnect the negative battery cable.
- (3) Remove the front bumper assembly.
- (4) Disconnect the low pitched horn and high pitched horn wire harness connectors.



- (5) Remove fixing bolt from dual pitched horn bracket.



■ Inspection

- (1) Check the horn fuse.
 - 1) Identify the horn fuse in engine compartment fuse and relay box.
 - 2) Check the horn fuse.
 - 3) Using a fuse puller, remove the horn fuse EF07 (15A).
 - 4) Check if fuse is blown. Replace fuse if it is blown.

Caution

Use a fuse with the same specification as original fuse to avoid affecting the normal use of electrical equipment.

- (2) Check the high pitched horn.

Apply battery voltage to high pitched horn and check operation of high pitched horn.

Measurement Condition	Condition	Specified Condition
Battery positive (+) - Terminal 1	Always	Horn sounds
Battery negative (-) - Terminal 2		

If result is not as specified, replace horn.

- (3) Check the low pitched horn.

Apply battery voltage to low pitched horn and check operation of low pitched horn.

Measurement Condition	Condition	Specified Condition
Battery positive (+) - Terminal 1	Always	Horn sounds
Battery negative (-) - Terminal 2		

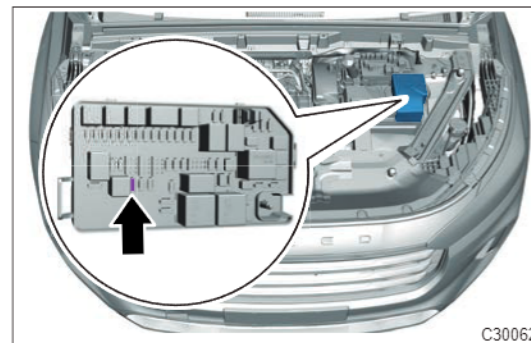
If result is not as specified, replace horn.

■ Installation

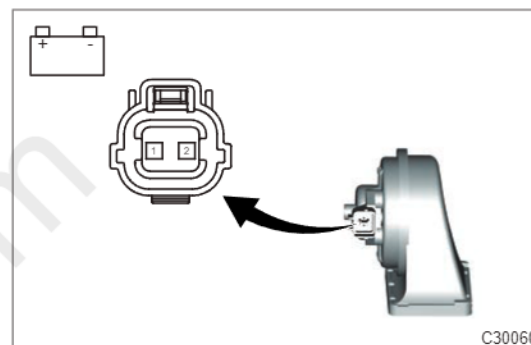
- (1) Install the dual pitched horn bracket fixing nut.

Installation torque: 20 ± 2 N·m

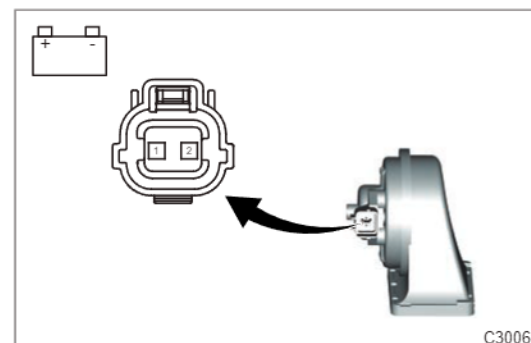
- (2) Connect the dual pitched horn wire harness connector.
- (3) Install the front bumper assembly.
- (4) Connect and tighten negative battery cable.
- (5) Turn the ENGINE START STOP switch to ON and conduct test.



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