Safety Precaution

⚠ DANGER

Sinse Electric Vehicle contains a high voltage, battery mishandling the high voltage system or vehicle may lead to a serious accident including electric shock and electric leakage.

⚠ WARNING

- Be sure to shut off the high voltage by removing the safety plug before inspecting or repairing the high voltage system(Refer to “High Voltage Shut-off Procedures”).
- A responsible worker should keep removed safety plugs to prevent it from being connected by mistake.
- Keep away from any metal objects (watch, ring etc.) while working on the high voltage system, as they may cause serious accidents like electric shock.
- Before beginning to work on the high voltage system, workers should wear personal protective equipment to prevent safety accidents(Refer to “Personal Protective Equipment”).
- At any time, do not allow workers not wearing personal protective equipment to touch the high voltage system. High voltage components should be covered with an insulation sheet to prevent safety accidents.
- Use insulation tools when working on the high voltage system.
- Place removed high voltage components on an the insulation mat.
- Check that voltage between the high voltage terminals is below 30V after removing the safety plug.

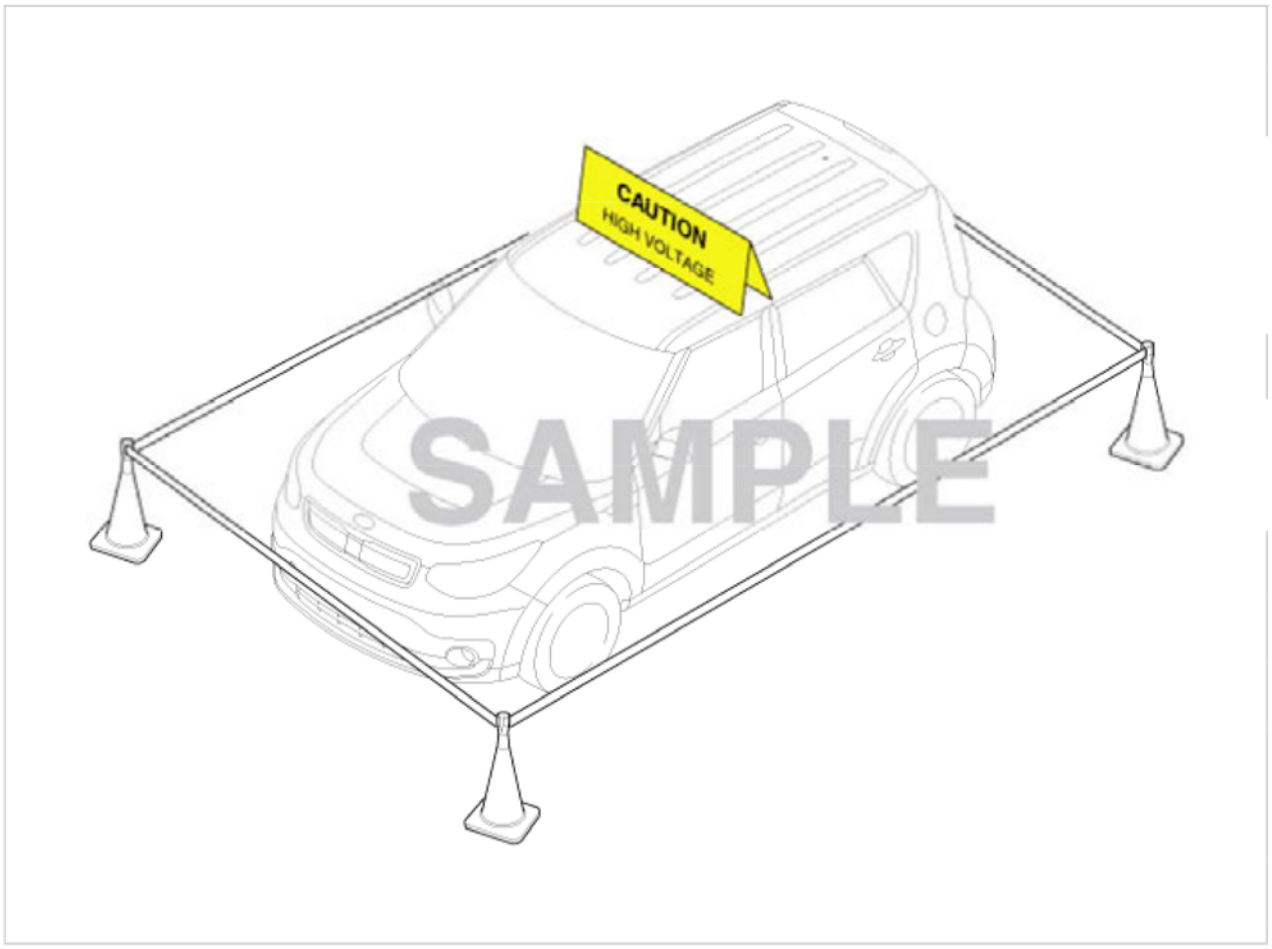
Information

- All the high voltage wiring and connectors are in orange.
- A caution label for high voltage is attached to the high voltage components
- High voltage components : High Voltage Battery, Power Relay Assembly (PRA), Quick Charge Relay Assembly (QRA), Motor, Power Cable, BMS ECU, Inverter, LDC, On-Board Charger (OBC), Main Relay, Pre-charge Relay, Pre-charge resistor, Battery Current Sensor, Safety Plug, Main Fuse, Battery Temperature Sensor, Busbar, Charge Port, A/C Compressor, Electric Power Control Unit (EPCU), High Voltage Heater, High Voltage Heater Relay etc.

⚠ CAUTION

- Inform of possible danger of high voltage by placing a "high voltage caution" sign on the vehicle as in the image below.

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SAMPLE

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DANGER

High Voltage : Do not touch during operation.

Person in charge : _____

DANGER

High Voltage : Do not touch during operation.

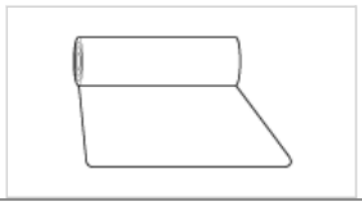
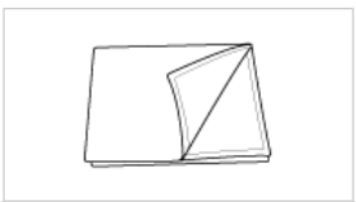
Person in charge : _____

Copy this page and put it after folding on the roof of the vehicle in service.

Personal Protective Equipment

Name	Illustration	Description
Insulation gloves		Used when inspecting or working on the high voltage components [Insulation performance : 1000V / 300A or above]

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Insulation shoes		
Insulation clothes		Used when inspecting or working on the high voltage components
Insulation helmet		
Safety glasses		Used in the following cases : • During Removal & installation or inspection of the high voltage battery terminals or wiring, which spark might happen. • When working on the high voltage battery pack assembly.
Face shield		
Insulation mat		All removed high voltage components are placed on an insulation mat to prevent safety accidents.
Insulation sheet		Insulation sheet is used to cover high voltage components to protect people not wearing personal protective equipment from safety accidents.
Warning tape		Used for infomring that it is dangerous to come over this line.

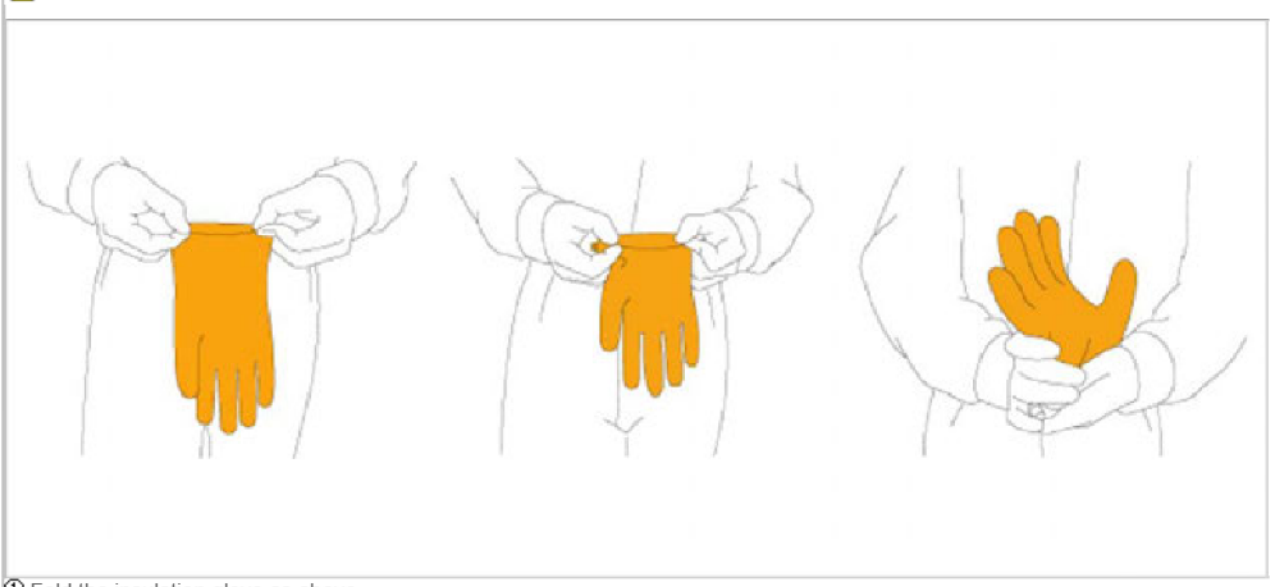
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Personal Protective Equipment Inspection

- Check that the personal protective equipment is not damaged.
- Check that the insulation gloves are not torn or damaged.
- Wear the insulation glove after removing moisture.

Information



① Fold the insulation glove as above.
② Fold again 3~4 times to make it airtight.
② Squeeze the inflated glove to see if the glove is torn or damaged.

Caution when repairing the power cable

- When installing the high voltage terminal, insulate the terminal using insulation tape.
- Tighten the high voltage screw with specified torque.
- Be careful that the (+) terminal does not contact the (-) terminal.

Precautions when handling high voltage battery

- Battery Control System - Refer to "High Voltage Battery Handling Guide"

Precautions in case of fire in High Voltage Battery System

- Turn OFF the Button Start. Then keep the Smart Key 2m or farther away from the vehicle to prevent unintended engine start.
- If the fire is at initial stage, quickly turn OFF the Safety Plug (refer to "High Voltage Shut-off Procedure").
- If fire broke out indoors, ventilate the area to clear out hydrogen gas.
- If fire can be put out, then do so using a CO_2 fire extinguisher. If this is not available, then use water or other types of fire extinguisher.
- CO_2 has high insulation characteristics against electricity, so it is appropriate for electricity (C Rating) related fire.
- If fire cannot be put out, evacuate to a safe location, notify the fire department and do not approach the vehicle until the fire has been extinguished.
- Turn OFF the vehicle Key in case of vehicle submersion/collision, and then exit the vehicle as quickly as possible.

Precautions in case of high voltage battery gas and/or electrolyte leakage

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- Turn OFF the Button Start. Then keep the Smart Key 2m or farther away from the vehicle to prevent unintended engine start.
- If the fire is at initial stage, quickly turn OFF the Safety Plug.
  (refer to "High Voltage Shut-off Procedure").
- Gas is hydrogen and alkali vapor. If the fire occurred indoor, ventilate the area immediately and evacuate to a safe location.
- If leaked liquid comes in contact with your skin, neutralize the area immediately with boron, and then clean with running water or saline solution.
- If leaked vapor or liquid gets in your eye, immediately clean with running water, then get medical attention.
- In case of gas leakage due to high temperature, do NOT use the battery until the high voltage battery cools down to room temperature.

Precautions when handling vehicle after an accident

- Be sure to wear insulated gloves (or rubber gloves), protective goggles, insulated suit, and insulated boots.
- Do NOT touch the bare cable when its insulation covering has been peeled.
  (refer to "Precautions When Handling Power Cable")
- In case of fire on the vehicle and if the fire can be put out, then do so by using a CO_2 fire extinguisher. If this is not available, then use water or other types of fire extinguisher.
- If more than half of the vehicle is submerged, then do not attempt to approach high voltage components, such as the Safety Plug. If such a component must be handled, then first relocate the vehicle to a safe location, then handle the component.
- if fire broke out indoors, ventillate the area immediately and evacuate to a safe location. because the gas id hydorgen and akali fumes.
- If leaked liquid comes in contact with your skin, neutralize the area immediately with boron, and then clean with running water or saline solution.
- If high voltage needs to be shut-off, then refer to "High Voltage Shut-off Procedure" when handling relevant components.

Preparations when servicing accident affected vehicle

- Insulated gloves (or rubber gloves), protective goggles, insulated suit, and insulated boots.
- Boric Acid Powder or Solution.
- CO_2 fire extinguisher or other fire extinguisher.
- Towel for cleaning electrolyte.
- Vinyl tape (for terminal insulation)
- Megaohm Tester (for checking high voltage insulation resistance)

Precautions when EV is unattended for a prolonged period

- Turn OFF the Start Button. Then keep the Smart Key 2m or farther away from the vehicle to prevent unintended engine start. (This is to prevent rapid discharging of high voltage battery from dark current.)
- If the high voltage battery state of charge (SOC) is less than 30%, then do not leave the vehicle unattended for a prolonged period.
- If the vehicle is unattended for prolonged period, then fully recharge the battery via normal charging once every 3 months to prevent the high voltage battery SOC from becoming 0.
- When checking the auxiliary battery for discharge status or when replacing the auxiliary battery, check for problem related to high voltage battery SOC reset.

Hybrid Vehicle Refrigerant Recovery / Charging Precautions

- Since the electric compressor uses high-voltage, POE oil with high Volumetric Resistivity Should be used.
- Do not use the same A/C recovery / charging station as conventional belt-driven compressors.

WARNING

If the POE oil in the system gets mixed with PAG oil, it may result in dielectric breakdown due to decreased volumetric resistivity and inoperative A/C compressor, disabling the A/C compressor.

High Voltage Shut-off Procedure

WARNING

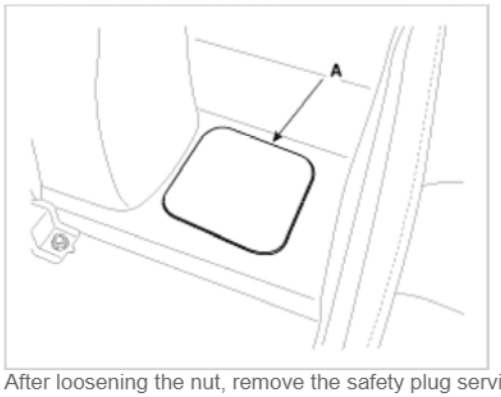
Be sure to read and follow the “General Safety Information and Caution” before doing any work related with the high voltage system. Failure to follow the safety instructions may result in serious electrical injuries.

Information

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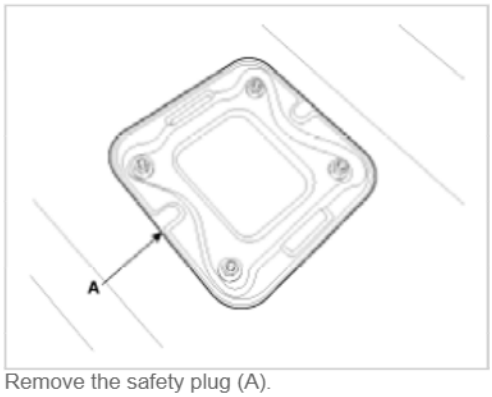
High voltage components : High Voltage Battery, Power Relay Assembly (PRA), Quick Charge Relay Assembly (QRA), Motor, Power Cable, BMS ECU, Inverter, LDC, On-Board Charger (OBC), Main Relay, Pre-charge Relay, Pre-charge resistor, Battery Current Sensor, Safety Plug, Main Fuse, Battery Temperature Sensor, Busbar, Charge Port, A/C Compressor, Electric Power Control Unit (EPCU), High Voltage Heater, High Voltage Heater Relay etc.

1. Turn the ignition switch OFF and disconnect the negative (-) terminal of the auxiliary battery.
2. Remove the cover (A) on the floor carpet of the rear seat.

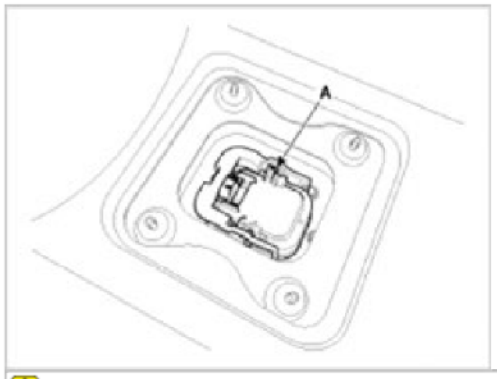


3. After loosening the nut, remove the safety plug service cover (A).

Safety plug service cover mounting nut :7.8 ~ 11.8 N.m (0.8 ~ 1.2 kgf.m, 5.8 ~ 8.7 lb-ft)

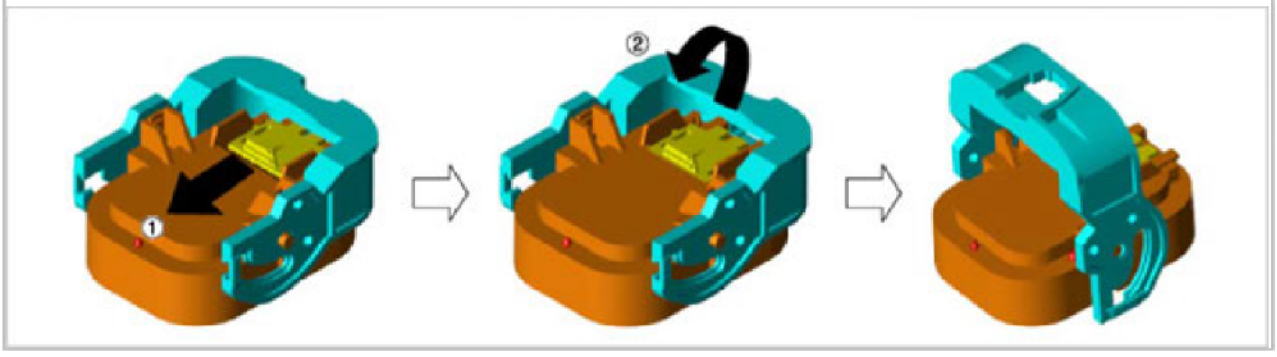


4. Remove the safety plug (A).



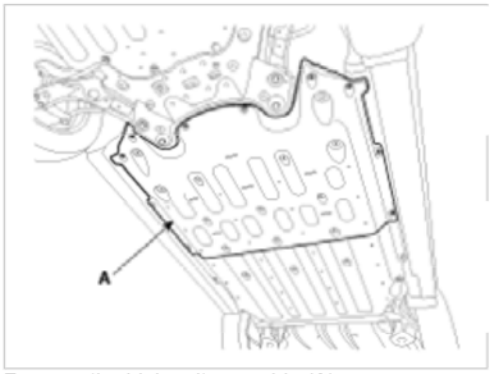
Information

Remove the safety plug in the follwing order.



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5. Wait at least 5 minutes or until the capacitor in the high voltage system is fully discharged.
6. Measure the voltage between the inverter terminals to check that the capacitor in the inverter is discharged completely
   (1) Lift the vehicle.
   (2) Remove the high voltage battery lower cover (A) by loosening the bolt.

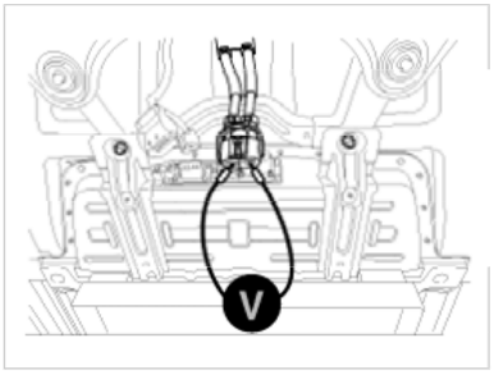


   (3) Remove the high voltage cable (A).

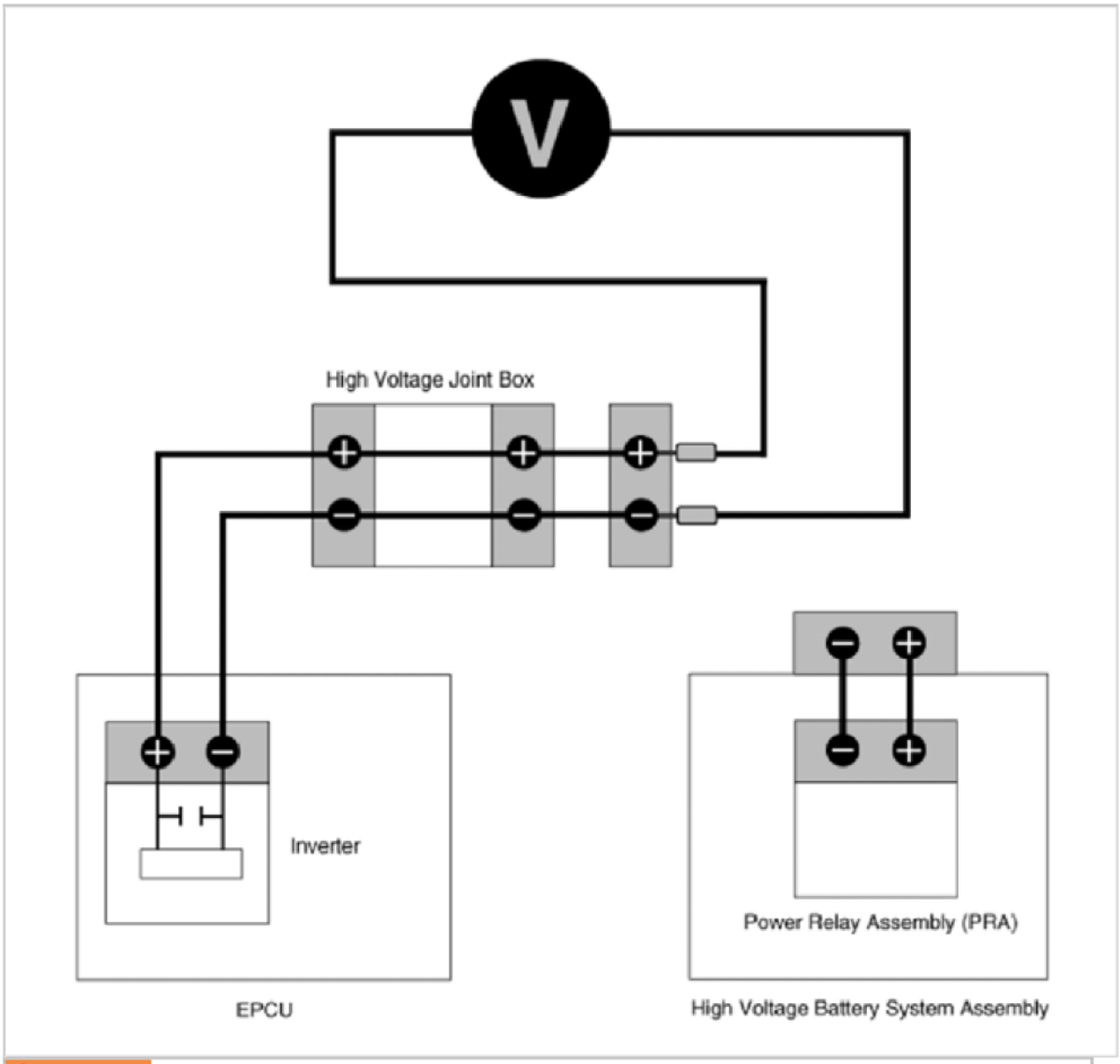


   (4) Measure the voltage between the inverter terminals.

   Less than 30V : High voltage circuit properly shut
   More than 30V : Faulty on high voltage circuit



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WARNING

If measured voltage is over 30V, check that the safety plug is removed completely. If it is is over 30V even though the safety plug has been removerd, there may be a serious problem in the high voltage circuit. In this case, check DTC and never touch on the high voltage system.

General Troubleshooting Information

Before Troubleshooting

1. Check applicable fuses in the appropriate fuse/relay box.
2. Using KIA approved battery tester, check the battery condition. Check the battery for damage and clean / tight connections. (Refer to Engine Electrical System - "Battery")

NOTICE

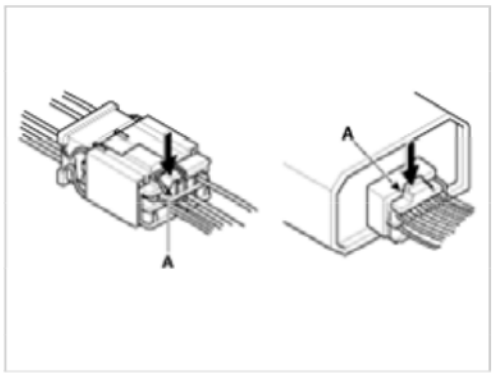
- Do not quick-charge a battery unless the battery ground cable has been disconnected, otherwise you will damage the alternator diodes.
- Do not attempt to crank the engine with the battery ground cable loosely connected or you will severely damage the wiring.

3. Check the alternator belt tension (D).

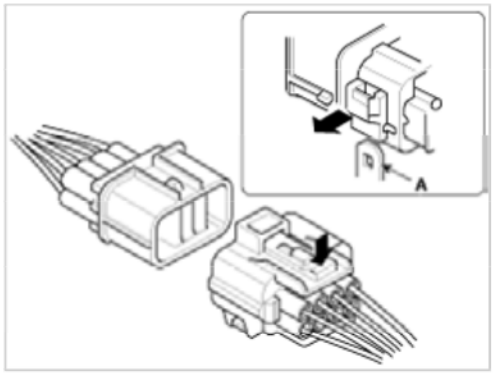
Handling Connectors

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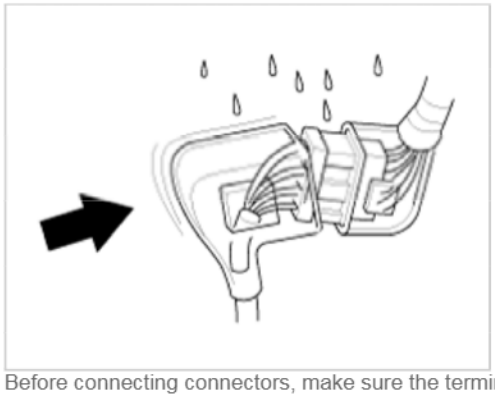
1. Make sure the connectors are clean and have no loose wire terminals.
2. Make sure multiple cavity connectors are packed with grease (except watertight connectors).
3. All connectors have push-down release type locks (A).



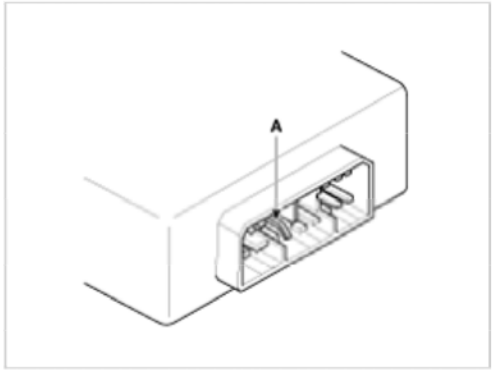
4. Some connectors have a clip on their side used to attach them to a mount bracket on the body or on another component. This clip has a pull type lock.
5. Some mounted connectors cannot be disconnected unless you first release the lock and remove the connector from its mount bracket (A).



6. Never try to disconnect connectors by pulling on their wires; pull on the connector halves instead.
7. Always reinstall plastic covers.

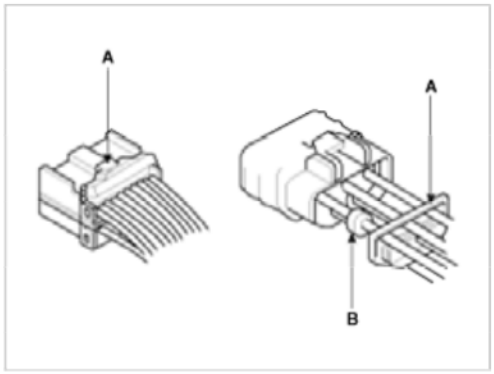


8. Before connecting connectors, make sure the terminals (A) are in place and not bent.

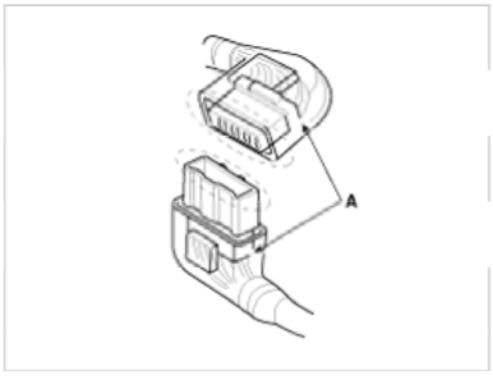


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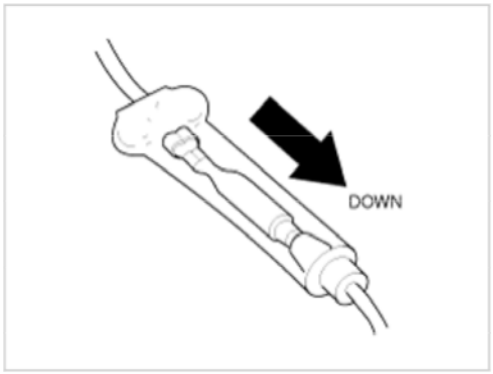
9. Check for loose retainer (A) and rubber seals (B).



10. The backs of some connectors are packed with grease. Add grease if necessary. If the grease (A) is contaminated, replace it.

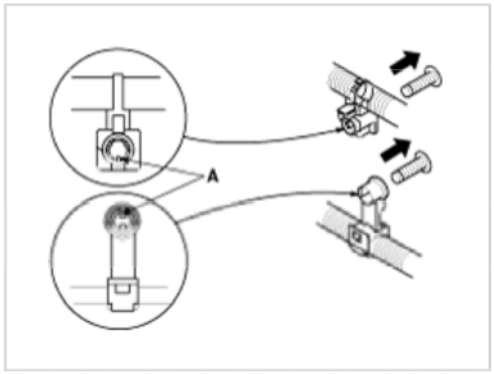


11. Insert the connector all the way and make sure it is securely locked.
12. Position wires so that the open end of the cover faces down.



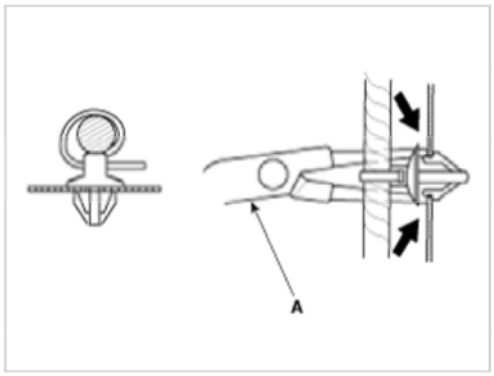
Handling Wires And Harnesses

1. Secure wires and wire harnesses to the frame with their respective wire ties at the designated locations.
2. Remove clips carefully; don't damage their locks (A).

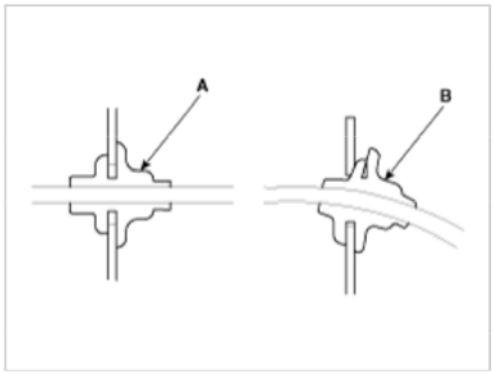


3. Slip pliers (A) under the clip base and through the hole at an angle, and then squeeze the expansion tabs to release the clip.

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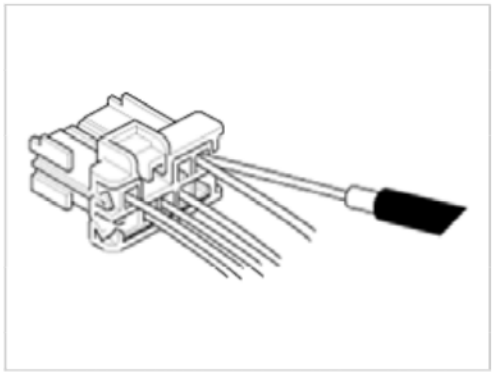


4. After installing harness clips, make sure the harness doesn't interfere with any moving parts.
5. Keep wire harnesses away from exhaust pipes and other hot parts, from sharp edges of brackets and holes, and from exposed screws and bolts.
6. Seat grommets in their grooves properly (A). Do not leave grommets distorted (B).



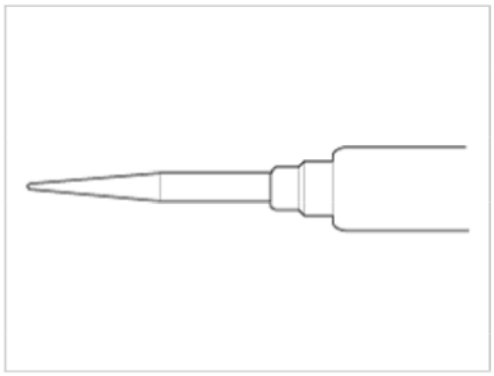
Testing And Repairs

1. Do not use wires or harnesses with broken insulation.
   Replace them or repair them by wrapping the break with electrical tape.
2. After installing parts, make sure that no wires are pinched under them.
3. When using electrical test equipment, follow the manufacturer's instructions and those described in this manual.
4. If possible, insert the remover tool from the wire side (except waterproof connector).



5. Use a probe with a tapered tip.
   Refer to the user's guide in the wiring repair kit (Pub No. : TRK 015.)

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Five-step Troubleshooting

1. Verify the complaint
   Turn on all the components in the problem circuit to verify the customer complaint. Note the symptoms. Do not begin disassembly or testing until you have narrowed down the problem area.
2. Analyze the schematic
   Look up the schematic for the problem circuit.
   Determine how the circuit is supposed to work by tracing the current paths from the power feed through the circuit components to ground. If several circuits fail at the same time, the fuse or ground is a likely cause.
   Based on the symptoms and your understanding of the circuit operation, identify one or more possible causes of the problem.
3. Isolate the problem by testing the circuit.
   Make circuit tests to check the diagnosis you made in step 2. Keep in mind that a logical, simple procedure is the key to efficient troubleshooting.
   Test for the most likely cause of failure first. Try to make tests at points that are easily accessible.
4. Fix the problem
   Once the specific problem is identified, make the repair. Be sure to use proper tools and safe procedures.
5. Make sure the circuit works
   Turn on all components in the repaired circuit in all modes to make sure you've fixed the entire problem. If the problem was a blown fuse, be sure to test all of the circuits on the fuse. Make sure no new problems turn up and the original problem does not recur.

Battery Reset

Description

When reconnecting the battery cable after disconnecting, recharging battery after discharged or installing the memory fuse located on the driver's side panel after removing, be sure to reset systems mentioned on the below table.

In addition, when replacing or reinstalling their fuses after removing, they should be reset according to the below table. Please refer to the below table when servicing.

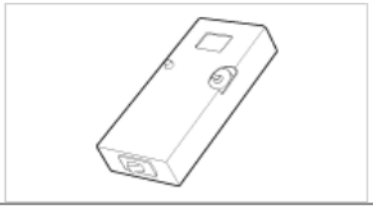
System	Resetting
Auto up/down window	Whenever the battery is disconnected, discharged or the related fuse is replaced or reinstalled, reset the Auto up/down window system according to the procedure below. 1) Turn the ignition switch to the ON position. 2) Pull up the power window switch in order that the window can close completely, and then keep pulling up the power switch for about 1 second.
Panoramaroof	Whenever the battery is disconnected, discharged or the related fuse is replaced or reinstalled, the panoramaroof system must be reset according to the procedure below. 1) Turn the ignition key to the ON position and then close the panoramaroof completely. 2) Release the panoramaroof control lever. 3) Press and hold the CLOSE button for more than 10 seconds until the sunroof has moved slightly. 4) Release the panoramaroof control lever. 5) Press and hold the CLOSE button once again until the sunroof do as follows. • Tilt → Slide Open → Slide Close Then, release the lever. 6) Reset procedure of panorama system is finished.
Trip computer	When the battery is disconnected and reconnected, the set functions of the trip computer become initialized. So, you need to explain this information to the customer.
Clock	Whenever the battery terminals or related fuses are disconnected, you must reset the time in audio head unit. (Refer to Audio owner's manual)
Audio	

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	When the battery is disconnected and reconnected, the customer's radio stations become initialized. So, you need to record the customer's radio stations prior to service, and after service, set the customer's radio stations into the audio.

Body Electrical System

Special Service Tools

Tool Name / Number	Illustration	Description
RKE Battery Checker 09954-2P100		Measuring the RKE battery voltage

Body Electrical System

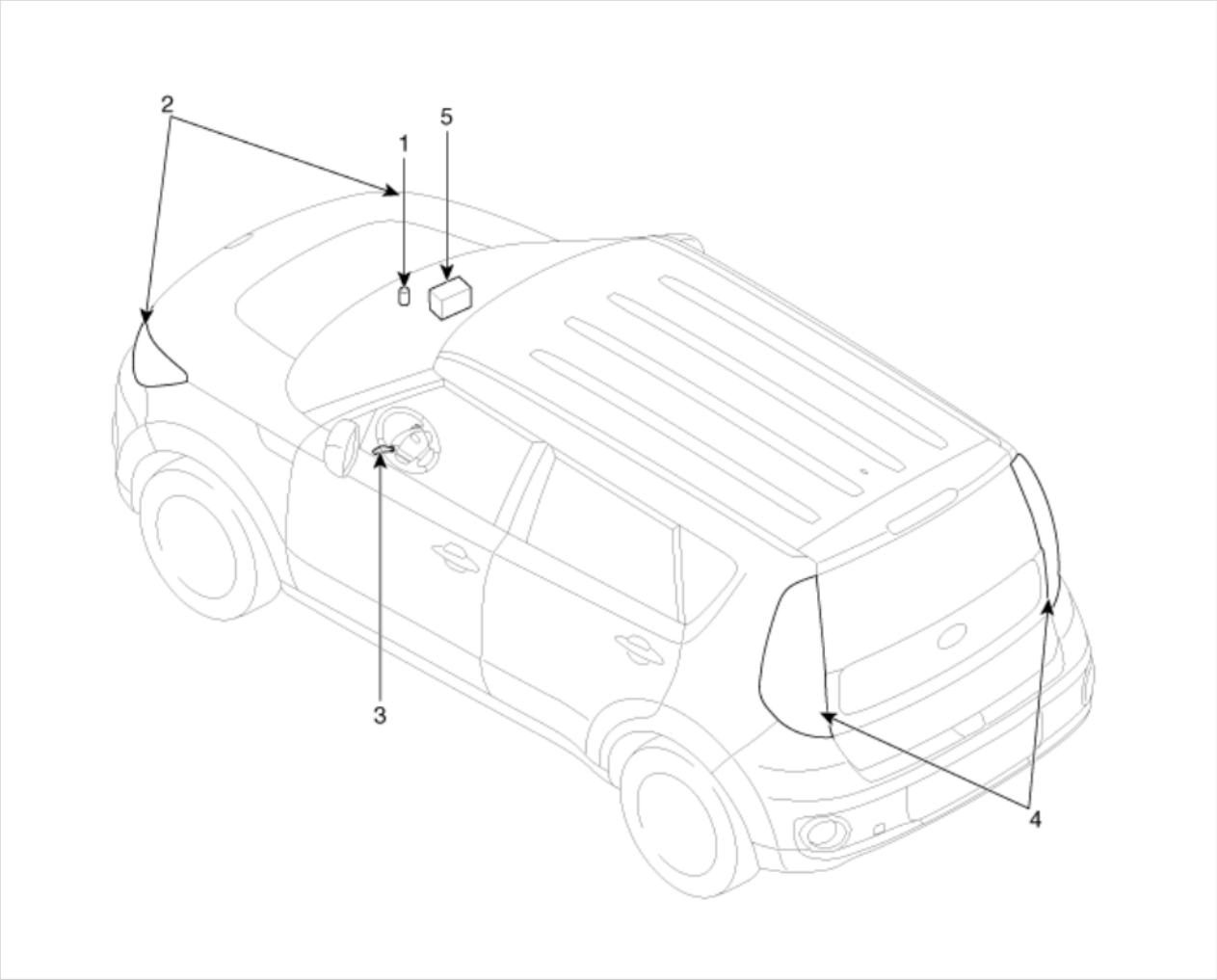
Specifications

Items		Specifications
Rated voltage		DC 5V
Load		Max. 1.5mA (When head lamp lighting)
Illuminations (LUX)	100	1.89 ± 0.42(V)
	200	3.55 ± 0.78(V)

Body Electrical System

Component Location

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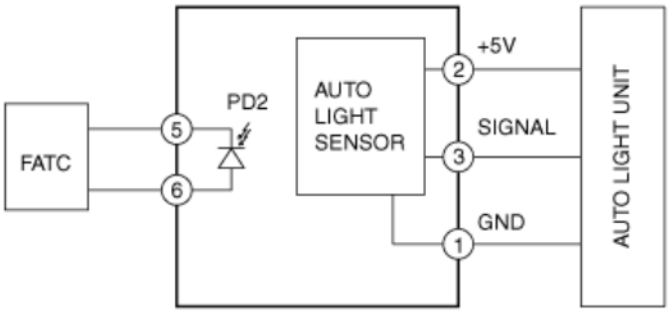


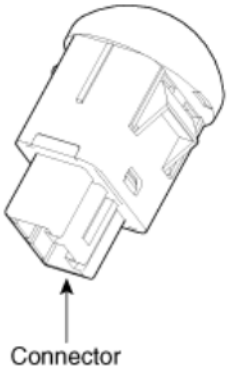
1. Auto light sensor	4. Tail lamps
2. Head lamps	5. BCM (Body Control Module)
3. Lighting switch (Auto)	

Body Electrical System

Circuit Diagram

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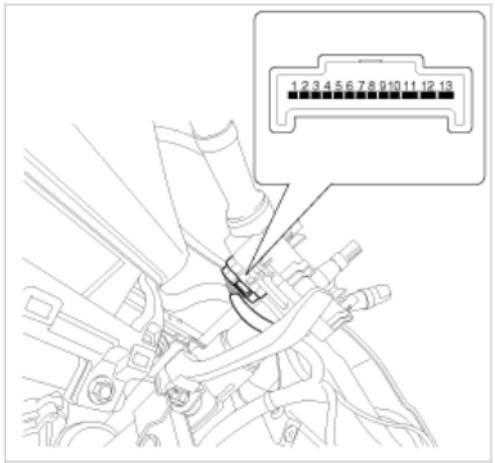


[Auto light connector]

Pin No.	Description
1	Ground
2	VCC (+5V)
3	Photo signal
4	-
5	Photo (+)
6	Photo (-)

Inspection

1. Operate the auto light switch, then check for continuity between terminals of multi-function switch connector.



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Terminal / Position	1	2	4	3
OFF				
Tail	○	○		
H/Lamp	○	○	○	
AUTO	○			○

Body Electrical System

Inspection

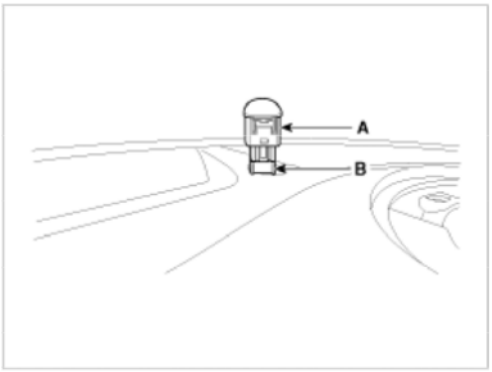
In the state of IGN1 ON, when the multi function switch module detects auto light switch on, tail lamp relay output and head lamp low relay output are controlled according to auto light sensor's input.

If IGN1 ON, The BCM monitors the range of this supply and raises up a failure as soon as the supply's voltage is out of range. Then this failure occurs and as long as this is present, the head lamp must be turned on without taking care about the sunlight level provided by the sensor.

This is designed to prevent any head lamp cut off when the failure occurs during the night.

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the photo & auto light sensor (A) from crash pad upper side by using screw (-) driver.
3. Remove the auto light connector (B).



Installation

1. Reconnect the auto light connector.
2. Install the auto light sensor.

Body Electrical System

Specifications

AVN Head Unit

Item		Specification	
Power supply		DC 14.4V Negative ground	
Dark current (Head unit only)		USA	ACC OFF & ADM OFF and then after 96 hours : Max. 0.5mA ACC OFF & ADM OFF and then before 96 hours (average) : Max. 10mA After ACC OFF & ADM OFF, Within 20 seconds (average) : Max. 70mA
		CANADA	When ACC OFF & ADM OFF : Max. 0.5mA
Frequency range / Channel space	FM	87.5 ~ 107.9 MHz / 200 kHz	
	AM	530 ~ 1,710 kHz / 9 kHz	
S/N	FM	MIN 50 dB (20kHz LPF)	
	AM	MIN 45 dB (20kHz LPF)	
Dislpay	Active area	176.4mm(H) × 99.36mm(V)	
	Resolution	800 × RGB × 480	
GPS receiver	Frequency	1.57542 Ghz	
Storage	Capacity	Flash Memory (NAND) : 16GB	

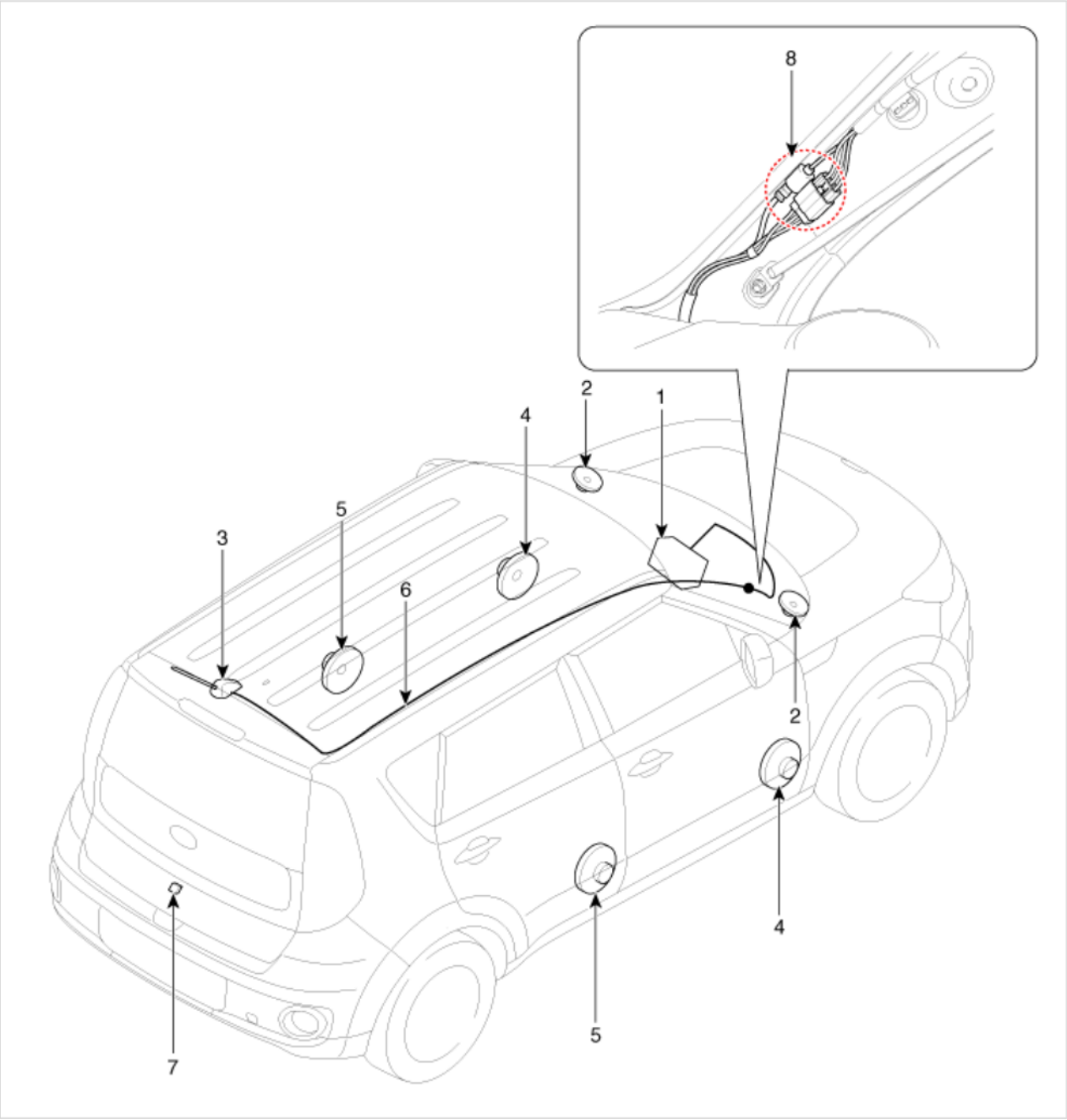
Speaker

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Item		Specification
Input power (W or V)	Front	MAX 40W
	Rear	MAX 40W
	Tweeter	MAX 40W
Impedance (Ω)	Front	4.0 ± 0.6
	Rear	4.0 ± 0.6
	Tweeter	4.0 ± 0.6
Number of speaker		6

Body Electrical System

Components Location



1. AVN (A/V & Navigation head unit)
2. Tweeter speaker
5. Rear door speaker
6. Antenna feeder cable

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3. Roof antenna	7. Back view camera
4. Front door speaker	8. Feeder cable joint connector

Description

Limitations Of The Navigation system

GPS Signal Reception State

As the GPS satellite frequency is received/transmitted in straight lines, reception may not work if hiding devices are placed on or near the GPS antenna or when traveling through the following locations.

- Tunnels
- Basement parking structures
- Underneath an overpass
- Roads within forested areas
- Areas near high rise buildings
- Roads within canyons

Vehicle Position Display

1. If multipass errors occur due to reflections from buildings or related causes, the current position mark on the navigation may differ from the actual position of the vehicle.
2. The position of the vehicle on the navigation may be different from the actual position if the vehicle is under the occur, driving for a short period of time will vehicle through map matching or GPS information (several minutes may be necessary in certain cases).
   A. When driving on a Y-shaped road with a narrow angle, the current position may be displayed in the opposite direction.
   B. If the vehicle is loaded onto a car transport vehicle, the current position mark may be stalled on the last position prior to loading.
   C. When driving on a spiral-shaped road.
   D. When driving in mountain regions with sharp turns or sudden brakes.
   E. When entering a road after having been in an underground parking structure, building parking structure, or turnable with many rotations.
   F. When the tires have recently been replaced (Especially upon use of spare or studless tires)
   G. If the battery terminal is removed.
   H. When driving in city streets, the current position may be displayed on the opposite side or on an off-road position.
   I. When changing the zoom level from the maximum zoom in level to a different zoom level, the current position mark may be displayed on a different road.
   J. When driving in heavy traffic with frequent go · stops in traffic or intersections.
   K. When driving under slippery conditions, such as heavy sand, snow, etc.
   L. When driving with the tire chain in place.
   M. When using a tire with an incorrect size specification.
   N. When the tire pressure for the 4 tires are different.
   O. When the replacement tire is a worn or used tire (Especially studless tires having passed a 2nd seasons, etc.)
   P. When driving near high-rise buildings
   Q. If a roof carrier has been installed
   R. When driving under high speeds or having calculated a long-distance route.

Route Guidance

Suitable route guidance may not occur caused by search conditions or the driving position.

- Guidance to go straight may be given while driving on a straight road.
- Guidance may not be given even when having turned at an intersection.
- There are certain intersections in which guidance may not occur.
- A route guidance signaling entrance into a no enter zone may occur (No enter zone, road under construction, etc.)
- Guidance may be given to a position removed from the actual destination if roads to reach the actual destination do not exist or are too narrow.
- Faulty voice guidance may be given if the vehicle breaks from the designated route (ex : if a turn is made at an intersection while the navigation provided guidance to go straight).
- Map Data may be missing or incorrect causing route guidance to not be given.

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Route Re-calculation

The following events may occur after conducting route recalculation.

- Guidance may be given to a position differing from the current position when turning at an intersection.
- Route recalculation may take a longer period of time when driving under high speeds.
- A route guidance signaling for a U-Turn in a No U-Turn location may occur.
- A route guidance signaling entrance into a no enter zone may occur (No enter zone, road under construction, etc).
- Guidance may be given to a position removed from the actual destination do not exist or are too narrow.
- Faulty voice guidance may be given if the vehicle breaks from the designated route (ex : if a turn is made at an intersection while the navigation provided guidance to go straight)

Body Electrical System

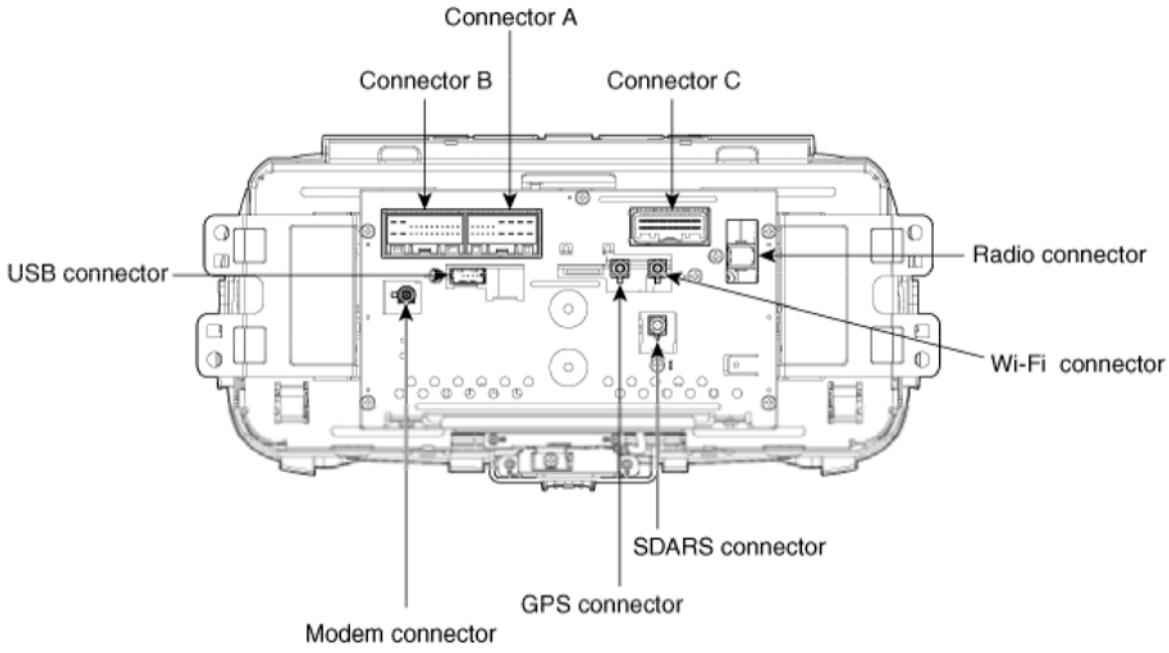
Components



[USA]

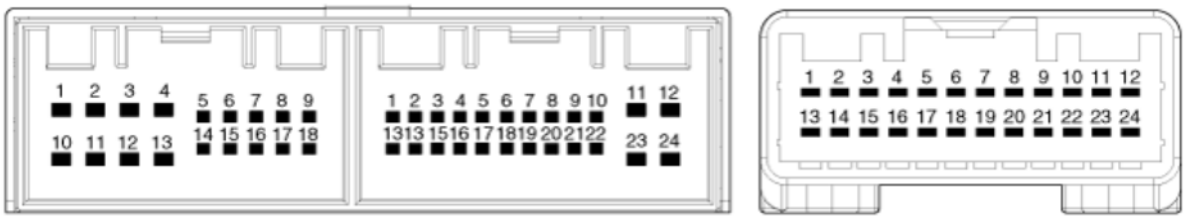


[CANADA]



AVN (A/V & Navigation) Head Unit Connector

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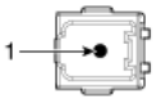


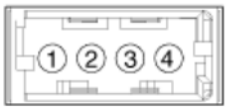
Connector A Connector B Connector C

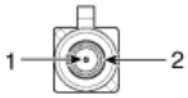
Connector Pin Information

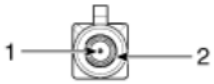
No.	Connector A	Connector B	Connector C
1	Rear left speaker (+)	MM CAN high	C CAN (-)
2	Front left speaker (+)	-	C CAN (+)
3	Front right speaker (+)	Parking	-
4	Rear right speaker (+)	Steering remocon	-
5	-	-	OBC wake up
6	-	MTS key	-
7	ALT L	AUX video	-
8	Illumination (+)	AUX right input	-
9	R position	AUX ground	-
10	Rear left speaker (-)	MIC (+)	-
11	Front left speaker (-)	Battery (+)	B CAN (+)
12	Front right speaker (-)	Battery (+)	B CAN (-)
13	Rear right speaker (-)	MM CAN low	-
14	Ignition 3	Auto light	Airbag
15	-	P position	-
16	Door unlock	Speed	-
17	Illumination (-)	Remocon ground	-
18	Remote antenna	ACC	Door open
19		AUX video ground	-
20		AUX DETECT	-
21		AUX left input	Ground
22		MIC (-)	Video ground
23		Ground	Camera video input
24		Ground	Camera battery (+)

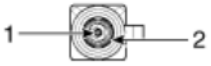
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Radio antenna connector	No.	Description
	1	FM/AM signal

USB connector	No.	Description	No.	Description
	1	USB VCC	3	USB D (+)
	2	USB D (-)	4	USB ground

GPS connector	No.	Description	No.	Description
	1	GPS signal	2	Ground

Wi-Fi connector	No.	Description	No.	Description
	1	Wi-Fi signal	2	Ground

Modem connector	No.	Description	No.	Description
	1	Modem signal	2	Ground

Body Electrical System

Removal

CAUTION

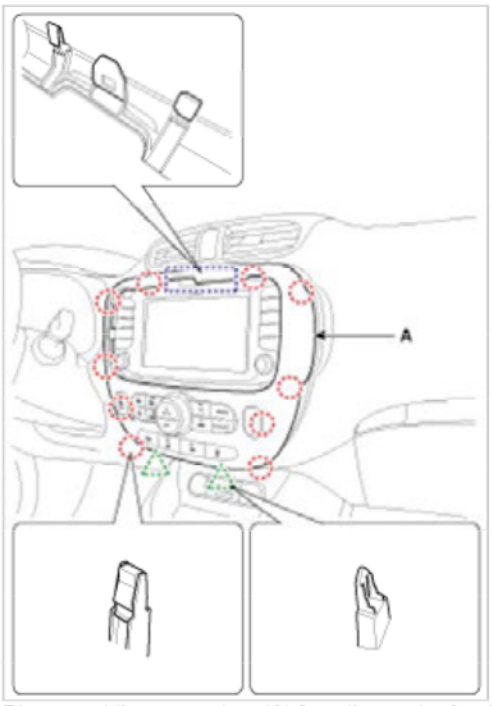
Put on gloves to protect your hands.

NOTICE

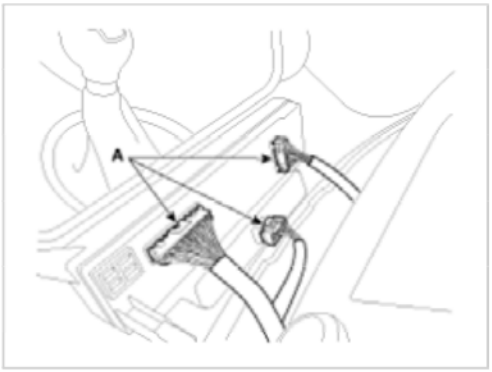
- When prying with a flat-tip screwdriver, wrap it with protective tape, and apply protective tape around the related parts, to prevent damage.
- Use a plastic panel removal tool to remove interior trim pieces to protect from marring the surface.
- Take care not to bend or scratch the trim and panels.

1. Disconnect the negative (-) battery terminal.
2. Remove the center fascia panel (A) from the crash pad.

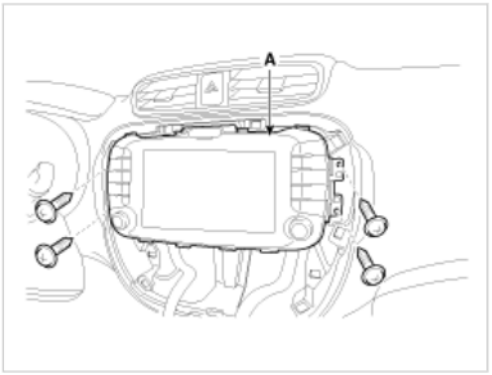
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3. Disconnect the connectors (A) from the center fascia panel.

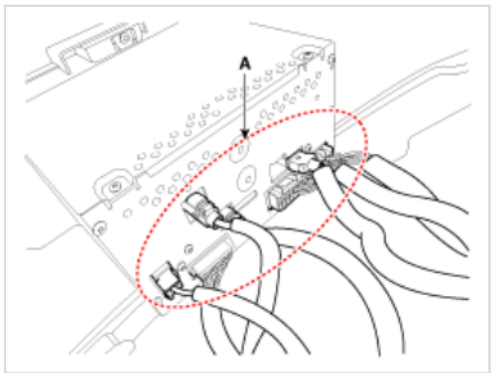


4. Remove the AVN head unit (A) after loosening the mounting screws.



5. Disconnect the connectors (A) from the AVN heat unit.

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Installation

1. Connect the AVN head unit connectors.
2. Install the AVN head unit.
3. Install the center fascia panel.
4. Connet the negative (-) battery terminal.

NOTICE

Make sure the AVN Head unit connectors are plugged in properly and the antenna cable is connected properly.

Inspection

1. Check the specified value of AVN head unit connectors in specified condition.

Connector A

No.	Name	Terminal Description	Condition	Specified Condition
A1	Rear left speaker (+)	Loudspeaker Rear Left+	Needed connection to the car	Analog output
A2	Front left speaker (+)	Loudspeaker Front Left+	Needed connection to the car	Analog output
A3	Front right speaker (+)	Loudspeaker Front Right+	Needed connection to the car	Analog output
A4	Rear right speaker (+)	Loudspeaker Rear Right+	Needed connection to the car	Analog output
A5	-	-		
A6	-	-		
A7	-	-		
A8	Illumination (+)	Rheostat from vehicle +	Needed connection to the car	
A9	Detent	Detent	Needed connection to the car	
A10	Rear left speaker (-)	Loudspeaker Rear Left-	Needed connection to the car	Analog output
A11	Front left speaker (-)	Loudspeaker Front Left-	Needed connection to the car	Analog output
A12	Front right speaker (-)	Loudspeaker Front Right-	Needed connection to the car	Analog output
A13	Rear right speaker (-)	Loudspeaker Rear Right-	Needed connection to the car	Analog output
A14	-	-		
A15	-	-		
A16	-	-		
A17	Illumination (-)	Rheostat from vehicle -	Needed connection to the car	
A18	Remote antenna	Remote Power supply for Antenna	Acc on	9V ~ 18V

Connector B

No.	Name	Terminal Description	Condition	Specified Condition
B1	MM CAN high	MM_CAN_HIGH	Needed connection to the car	Communication with external amp
B2	-	-	-	-
B3	Parking	PARKING from vehicle	-	-
B4	Steering remocon	Steering Wheel Remote Control	Steering Wheel switch pushed	0.5V ~ 3V
B5	-	-	-	-
B6	MTS key	-	-	-
B7	AUX video	AUX Video	Needed connection to the MultiJack	-
B8	AUX right input	AUX Right Sound Signal		A waveform synchronized with sound is output

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			External Auxiliary device is Audio playing (At time of Aux jack use)	
B9	AUX ground	AUX Reference Ground	Needed connection to the MultiJack	Below 1 ohm
B10	MIC (+)	Bluetooth MIC+	Input the Voice Signal via MIC	A waveform synchronized with Voice data via MIC
B11	Battery (+)	Battery	Always	11 ~ 14 V
B12	Battery (+)	Battery	Always	11 ~ 14 V
B13	MM CAN low	MM_CAN_LOW	Needed connection to the car	Communication with external amp
B14	Auto light	AUTO-LIGHT from vehicle	-	-
B15	P position	P-POSITON from vehicle	-	-
B16	Speed	Speed Sensor Signal	Engine switch on(IGN), car is moved slowly	Approx. 5V Level Pulse Generation
B17	Remocon ground	Steering Wheel Remote Control GND	Always	Below 1 ohm
B18	ACC	Accessory	Engine switch on(ACC)	11 ~ 14 V
B19	AUX video ground	AUX Video GND	Always	Below 1 ohm
B20	AUX DETECT	AUX Signal Input Detect	Auxiliary device is inserted	0V(Low) → 5V(High)
B21	AUX left input	AUX Left Sound Signal	External Auxiliary device is Audio playing (At time of Aux jack use)	A waveform synchronized with sound is output
B22	MIC (-)	Bluetooth MIC-	Input the Voice Signal via MIC	A waveform synchronized with Voice data via MIC
B23	Ground	Ground	Always	Below 1 ohm
B24	Ground	Ground	Always	Below 1 ohm

Connector C

No.	Name	Terminal Description	Condition	Specified Condition
C1	C CAN (-)	CHASSIS_CAN_LOW	Needed connection to the car	-
C2	C CAN (+)	CHASSIS_CAN_HIGH	Needed connection to the car	-
C3	-	-	-	-
C4	-	-	-	-
C5	OBC wake up	-	-	-
C6	-	-	-	-
C7	-	-	-	-
C8	-	-	-	-
C9	-	-	-	-
C10	-	-	-	-
C11	B CAN (+)	BODY_CAN_HIGH	Needed connection to the car	-
C12	B CAN (-)	BODY_CAN_LOW	Needed connection to the car	-
C13	-	-	-	-
C14	Airbag	AIRBAG from vehicle	-	-
C15	-	-	-	-
C16	Navigation voice (-)	NAVI_VOICE-	Needed connection to the AMP	Analog Audio Output
C17	Navigation voice (+)	NAVI_VOICE+	Needed connection to the AMP	Analog Audio Output
C18	Door open	DOOR OPEN from vehicle	-	-
C19	-	-	-	-
C20	-	-	-	-
C21	Ground	Ground	Always	Below 1 ohm
C22	Video ground	CARMERA Video Ground	Needed connection to the CARMERA	Below 1 ohm
C23	Camera video input	CARMERA Video	Needed connection to the CARMERA	NA
C24	Camera battery (+)	CARMERA Video POWER	Needed connection to the CARMERA	5V~5.5V

USB Connector

No.	Name	Terminal Description	Condition	Specified Condition
1	USB VCC	USB / iPod power	USB/iPod device is inserted	4.9V ~ 5.1V
2	USB D (-)	USB D-	USB device is inserted	3.2V ~ 3.45

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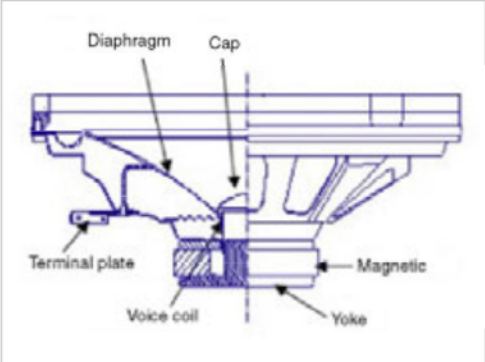
3	USB D (+)	USB D+	USB device is inserted	3.2V ~ 3.45
4	USB ground	USB / iPod Ground	USB/iPod device is inserted	Below 1 ohm

Inspection

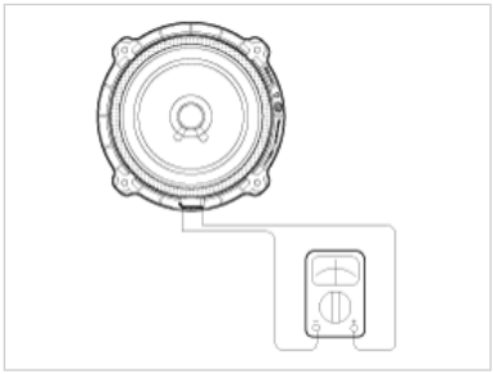
1. Troubleshooting for Speaker

(1) Basic inspection of speaker

Inspect the sound from speaker after verifying that the speaker mounting screws is removed and the wiring connector is connected precisely to remove vibration transmitted from body trims and surrounding parts.



(2) Case Troubleshooting

No.	Case	Inspection/Remedy
1	Trembling sound	1. Before replacing the speaker, inspect that the mounting screw is installed normally. 2. After re-installing the speaker, verify that no trembling sound is heard. 3. When hearing a trembling sound again, replace the speaker with new one.
2	Noise	1. Check if the wiring connector is connected normally. If not, reconnect the wiring connector. 2. When a noise is heard on turning radio on, replace the speaker with new one.
3	Poor working	Inspection of the wiring connection between the battery and the speaker 1. Before replacing the speaker, inspect the wiring and connections in the speaker circuit. 2. Check the supplying power to the speaker and the resistance, and then inspect the sound quality.  3. If the speaker works poorly, replace it with new one.

⚠ CAUTION

When handling the speaker :

- Dropping or rough handling of the speaker can cause damage.
- Be careful not to spill water or oil on the speaker.
- Caution when dealing with speaker because the diaphragm is paper and can be easily torn by impact and external force.
- Electrical mishandling of speakers is not covered by manufacturers warranty.

Removal

⚠ CAUTION

Put on gloves to protect your hands.

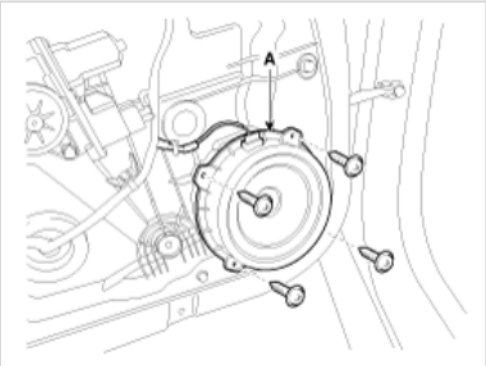
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NOTICE

- When prying with a flat-tip screwdriver, wrap it with protective tape, and apply protective tape around the related parts, to prevent damage.
- Use a plastic panel removal tool to remove interior trim pieces to protect from marring the surface.
- Take care not to bend or scratch the trim and panels.

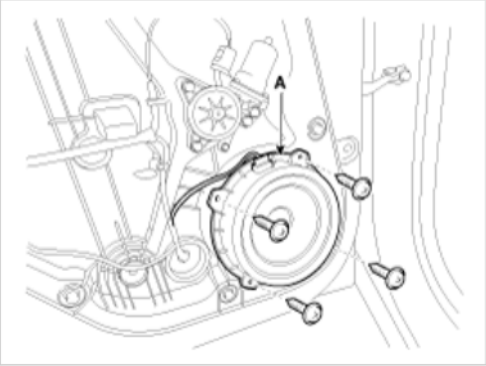
Front Speaker

1. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
2. Remove the front speaker (A) after loosening the screws.



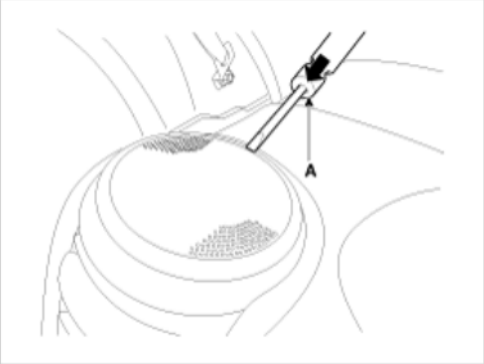
Rear Speaker

1. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
2. Remove the rear speaker(A) after loosening the screws.

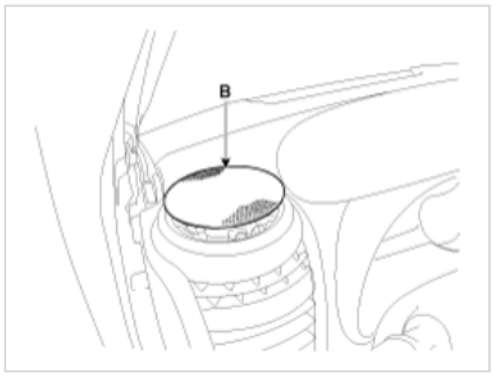


Tweeter Speaker

1. Using a screwdriver or remover (A), remove the speaker grill (B) from the side air vent.



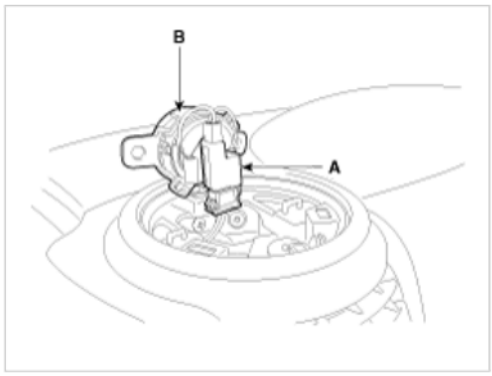
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2. Separate the tweeter speaker (A) after loosening the mounting screws.



3. Remove the tweeter speaker (B) after disconnecting the connector (A).



Installation

Front Speaker

1. Install the front speaker.
2. Install the front door trim.

Rear Speaker

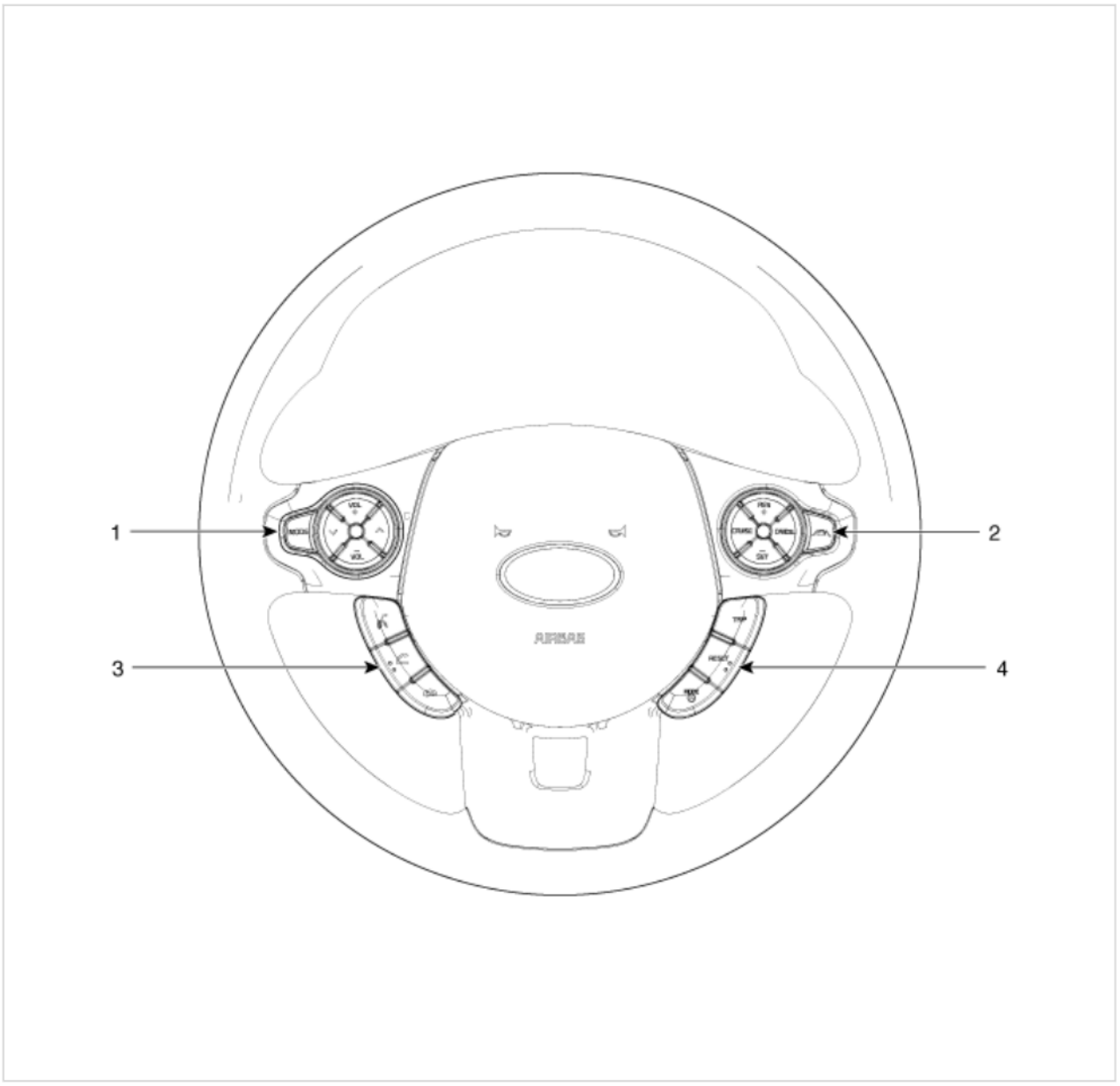
1. Install the rear speaker.
2. Install the rear door trim.

Tweeter Speaker

1. Connect the connector.
2. Install the tweeter speaker and tweeter speaker grill.

Components

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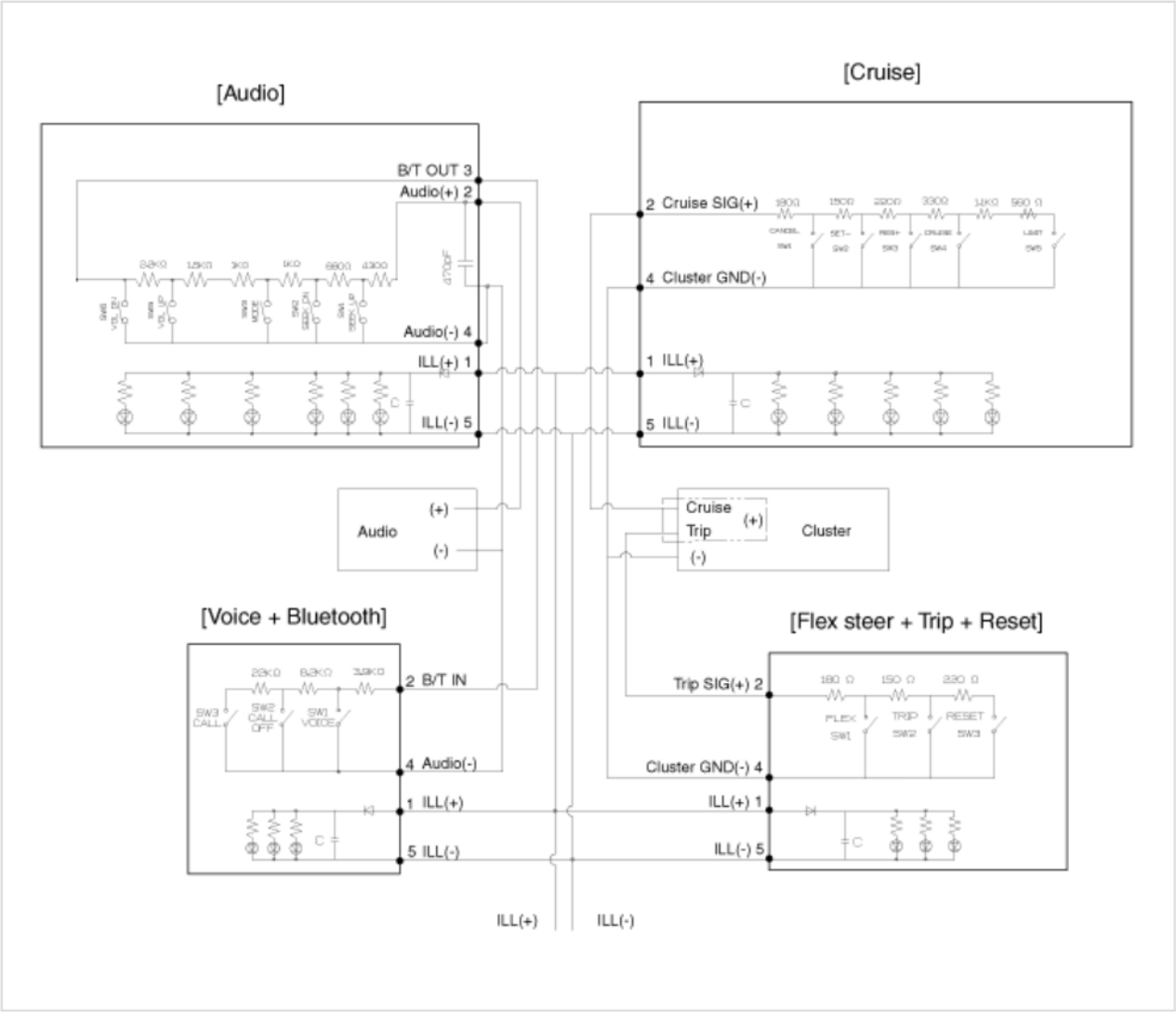


1. Audio switch	3. Bluetooth hands free switch
2. Cruise switch	4. Trip switch

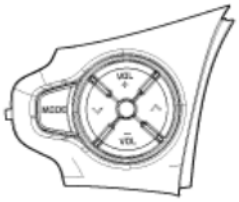
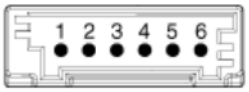
Body Electrical System

Circuit Diagram

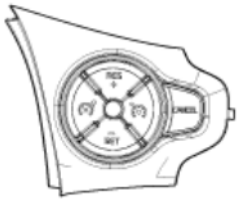
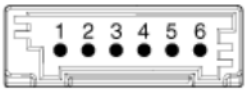
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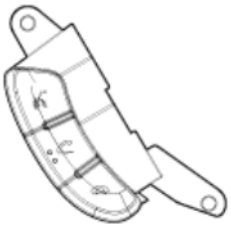
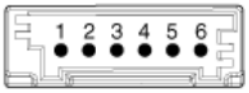
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Audio	Connector
	

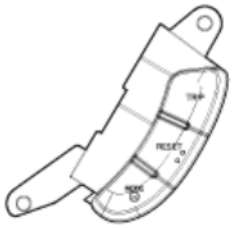
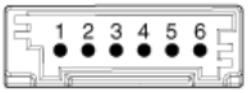
No.	Description
1	Illumination (+)
2	Audio (+)
3	Bluetooth output
4	Audio (-)
5	Illumination (-)
6	-

Cruise	Connector
	

No.	Description
1	Illumination (+)
2	Cruise signal (+)
3	-
4	Cluster ground (-)
5	Illumination (-)
6	-

Voice + Bluetooth	Connector
	

No.	Description
1	Illumination (+)
2	Bluetooth intput
3	-
4	Audio (-)
5	Illumination (-)
6	-

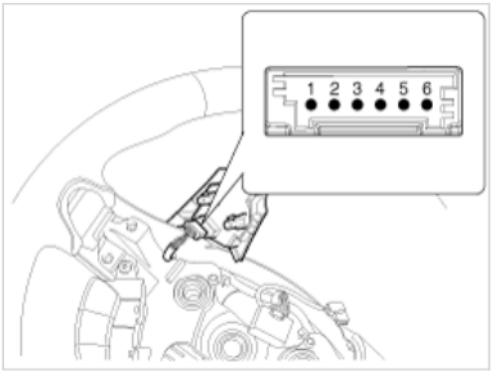
Flex + Trip + Reset	Connector
	

No.	Description
1	Illumination (+)
2	Trip signal (+)
3	-
4	Cluster ground (-)
5	Illumination (-)
6	-

Inspection

1. Check for resistance or output voltage between terminals in each switch position.

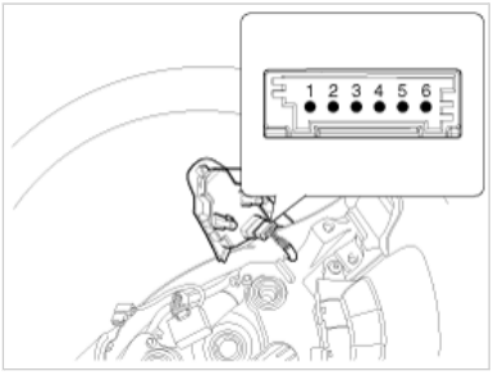
[Audio]



Switch	Connector terminal	Resistance (±5%)	Output voltage
Seek up	2-4	430 Ω	0.4 V ± 0.22
Seek down	2-4	1.1 kΩ	1.0 V ± 0.22
Mode	2-4	2.11 kΩ	1.5 V ± 0.22
Mute	2-4	3.11 kΩ	2.0 V ± 0.22
Volume up	2-4	4.61 kΩ	2.5 V ± 0.22
Volume down	2-4	6.81 kΩ	3.0 V ± 0.22

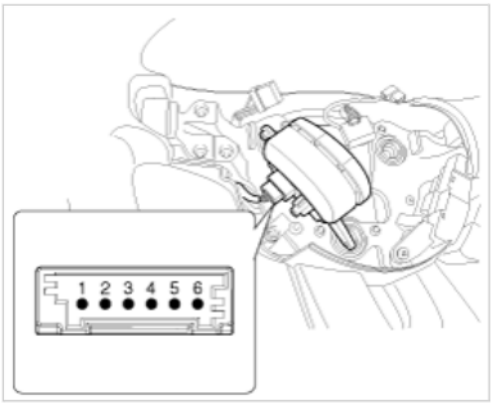
[Cruise]

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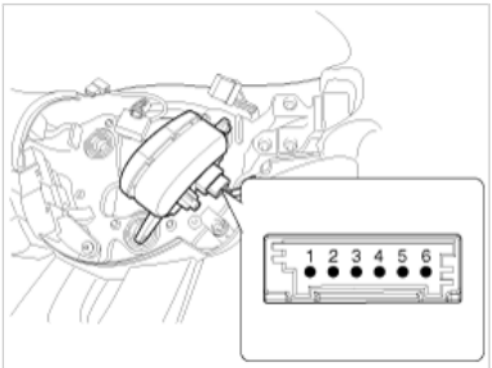
Switch	Connector terminal	Resistance (±5%)	Output voltage
Cancel	2-4	180 Ω	0.8 V ± 0.17
Set	2-4	330 Ω	1.2 V ± 0.17
Resume	2-4	550 Ω	1.8 V ± 0.22
Cruise	2-4	880 Ω	2.3 V ± 0.22
Speed limit	2-4	2.54 kΩ	3.6 V ± 0.22

[Voice + Bluetooth]



Switch	Connector terminal	Resistance (±5%)	Output voltage
Voice	2-4	10.71 kΩ	3.5 V ± 0.22
Call off	2-4	18.91 kΩ	4.0 V ± 0.22
Call	2-4	40.91 kΩ	4.5 V ± 0.22

[Flex steer + Trip + Reset]



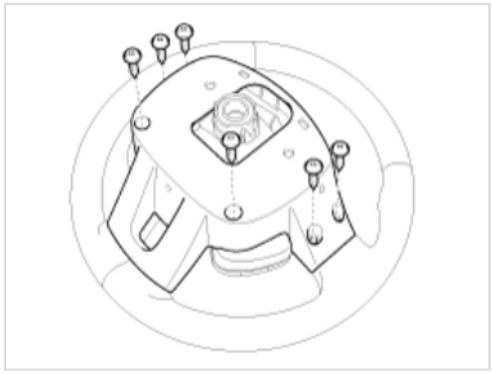
Switch	Connector terminal	Resistance (±5%)	Output voltage
Flex steer	2-4	180 Ω	0.8 V ± 0.17
Trip	2-4	330 Ω	1.2 V ± 0.17
Reset	2-4	550 Ω	1.8 V ± 0.22

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Removal

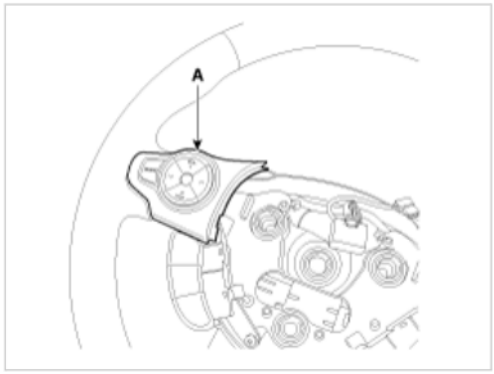
[Upper Steering Wheel Remote Control Switch]

1. Disconnect the negative (-) battery terminal.
2. Remove the driver airbag module.
   (Refer to the RT group)
3. Remove the steering wheel.
   (Refer to the ST group - "Steering column & shaft")
4. Loosen the mounting screws from the rear steering wheel cover.

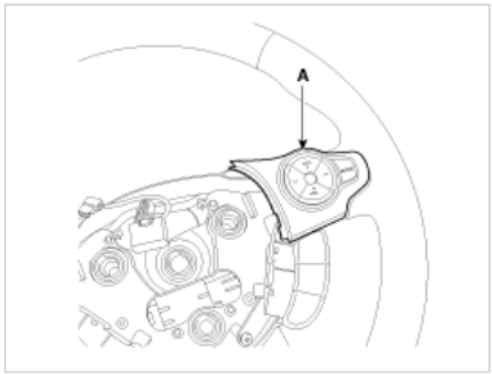


5. Separate the upper steering wheel remote control switch (A) from the steering wheel.

[LH]



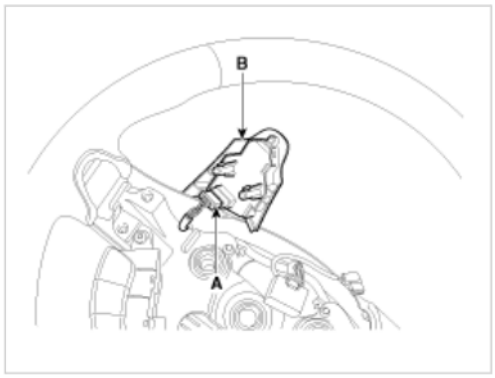
[RH]



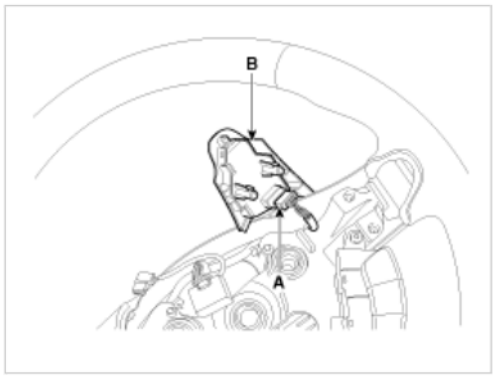
6. Remove the upper steering wheel control switch (B) disconnecting the connector (A).

[LH]

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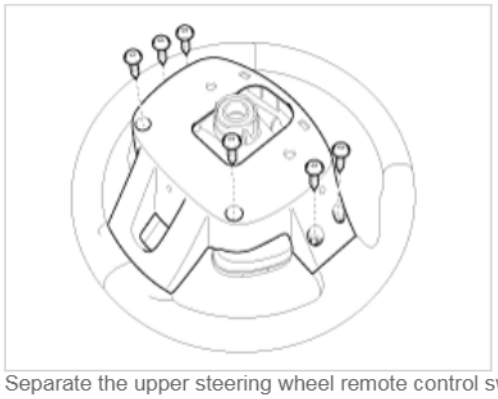


[RH]



[Lower Steering Wheel Remote Control Switch]

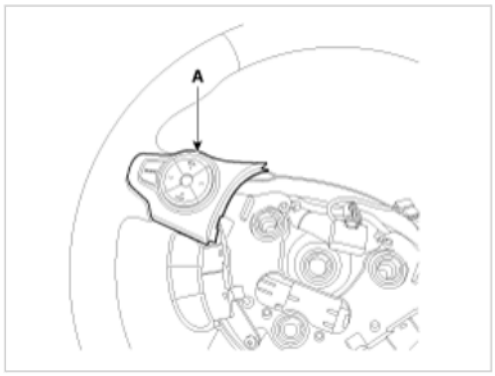
1. Disconnect the negative (-) battery terminal.
2. Remove the driver airbag module.
   (Refer to the RT group)
3. Remove the steering wheel.
   (Refer to the ST group - "Steering column & shaft")
4. Loosen the mounting screws from the rear steering wheel cover.



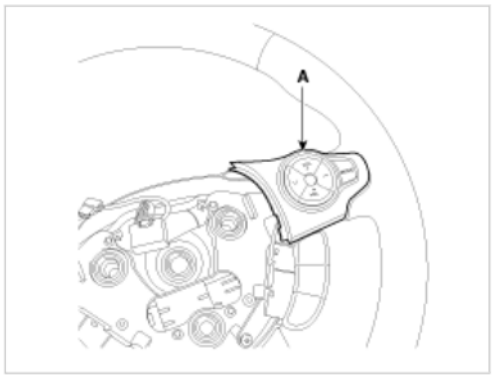
5. Separate the upper steering wheel remote control switch (A) from the steering wheel.

[LH]

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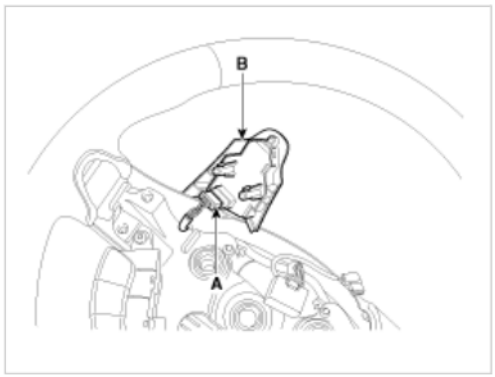


[RH]

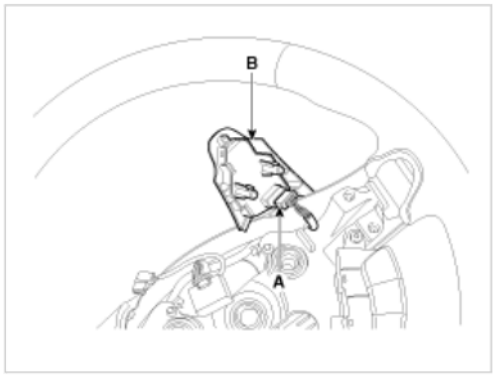


6. Remove the upper steering wheel control switch (B) disconnecting the connector (A).

[LH]



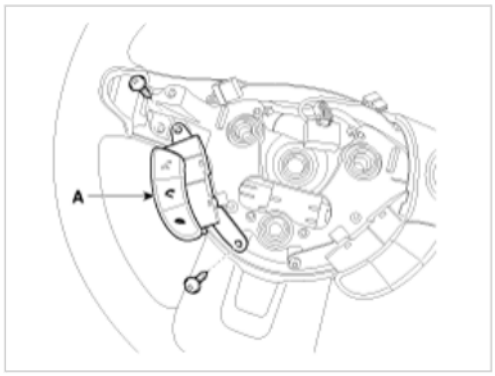
[RH]



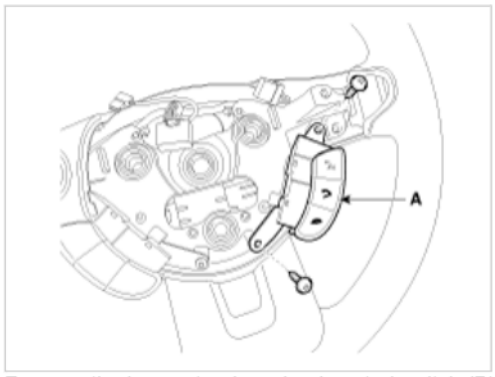
7. Separate the lower steering wheel control switch (A) loosening the mounting screws.

[LH]

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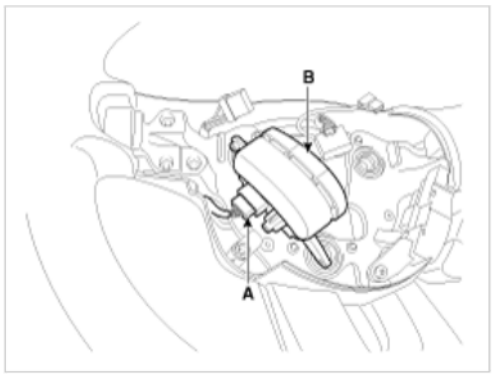


[RH]

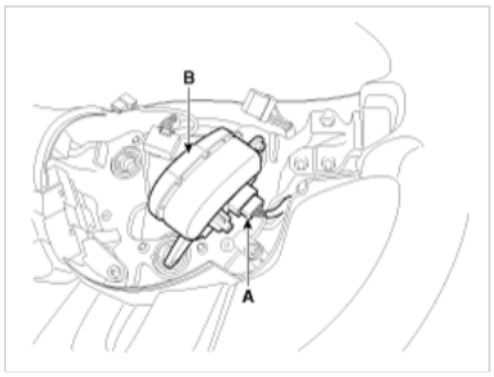


8. Remove the lower steering wheel control switch (B) disconnecting the connector (A).

[LH]



[RH]



Installation

1. Install the remote control switch on the steering wheel.

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2. Install the steering wheel.
3. Reconnect the remote control switch connector and airbag connectors.

NOTICE

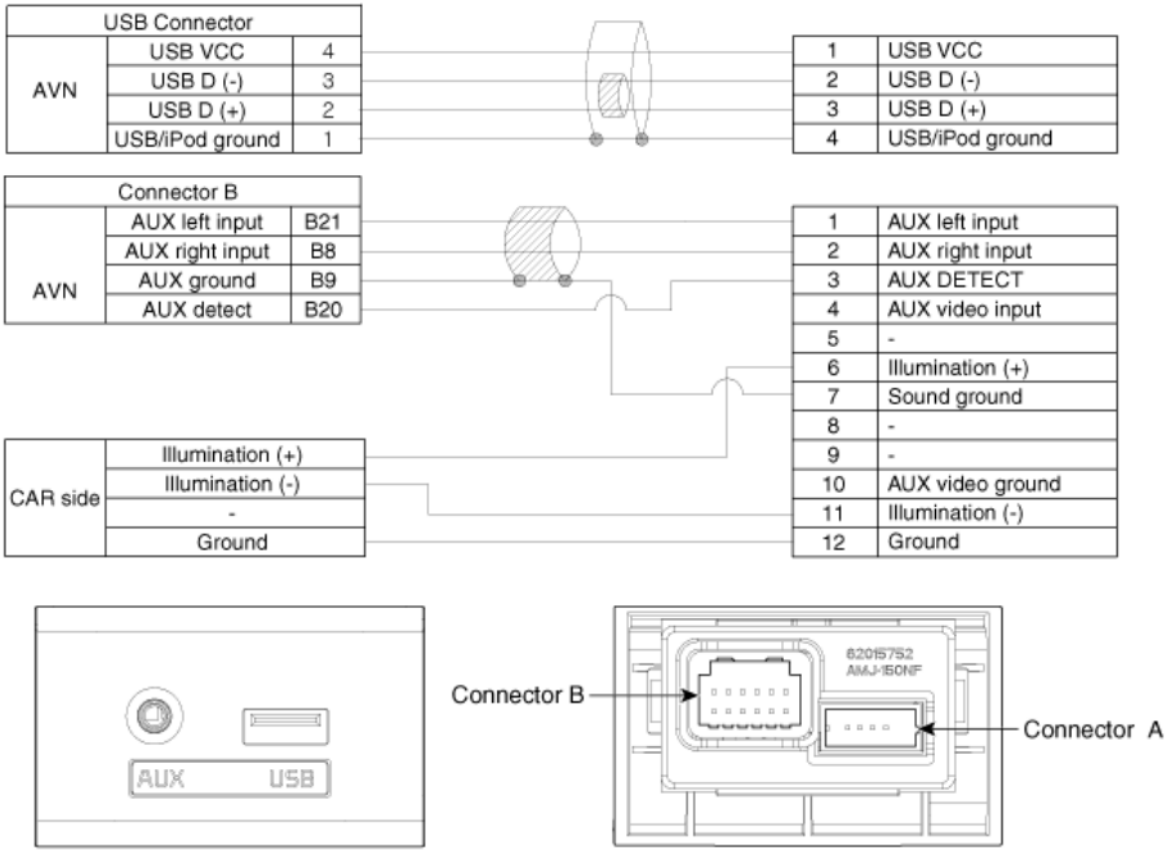
Make sure that the switch connector is plugged in properly.

4. Install the driver airbag module.
5. Connect the negative (-) battery terminal.

Body Electrical System

Circuit Diagram

[AVN]



Connector A	No.	USB Connector
① ② ③ ④	1	USB VCC
	2	USB D (-)
	3	USB D (+)
	4	USB/iPod ground

Connector B	No.	AUX(iPod) Connector
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩ ⑪ ⑫	1	AUX left input
	2	AUX rigth input
	3	AUX DETECT
	4	AUX video input
	5	-
	6	Illumination (+)
	7	Sound ground
	8	-
	9	-
	10	AUX video ground
	11	Illumination (-)
	12	Ground

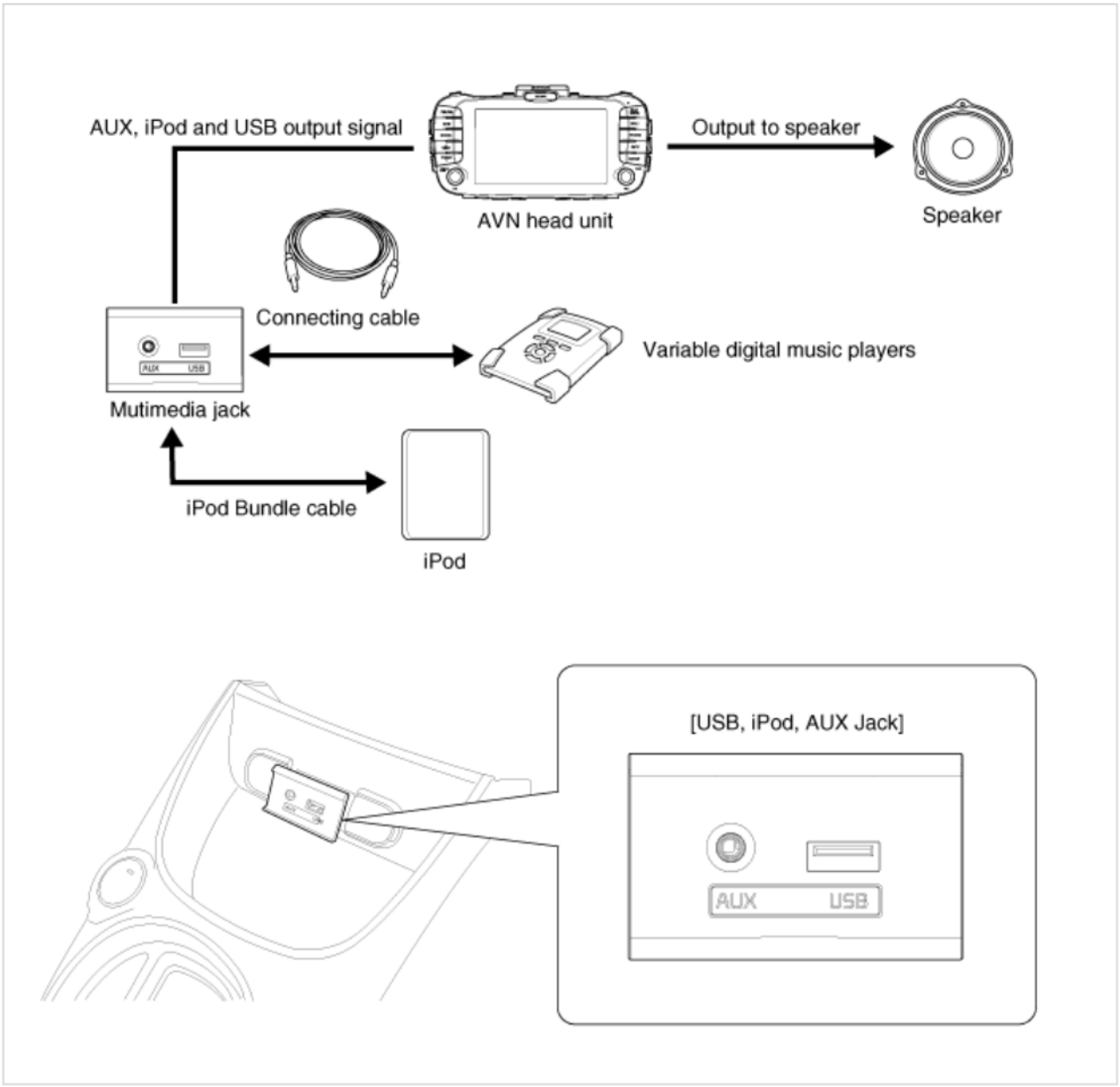
Body Electrical System

Description

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The multimedia jack on the console upper cover is for customers who like to listen to external portable music players like the MP3, iPod and etc., through the vehicle's sound system when it is linked to this jack. The customer has this added option.

In case of distortions from media connected to the AUX source, the audio unit may not be defective but the output level of the used media does not match the specification of the AUX input.

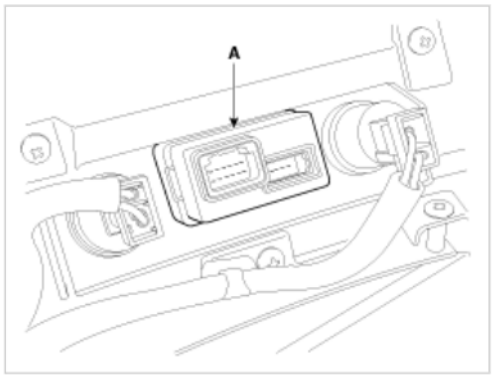


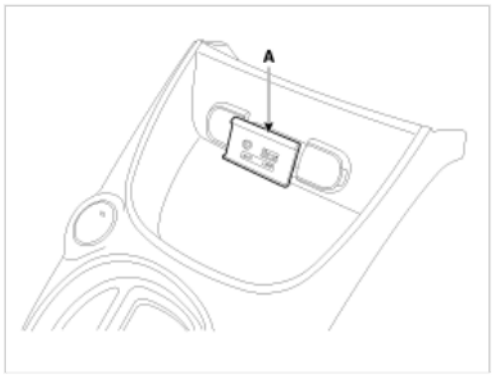
Body Electrical System

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the floor console upper cover.
   (Refer to Body - "Floor Console Assembly")
3. Remove the multimedia jack (A).

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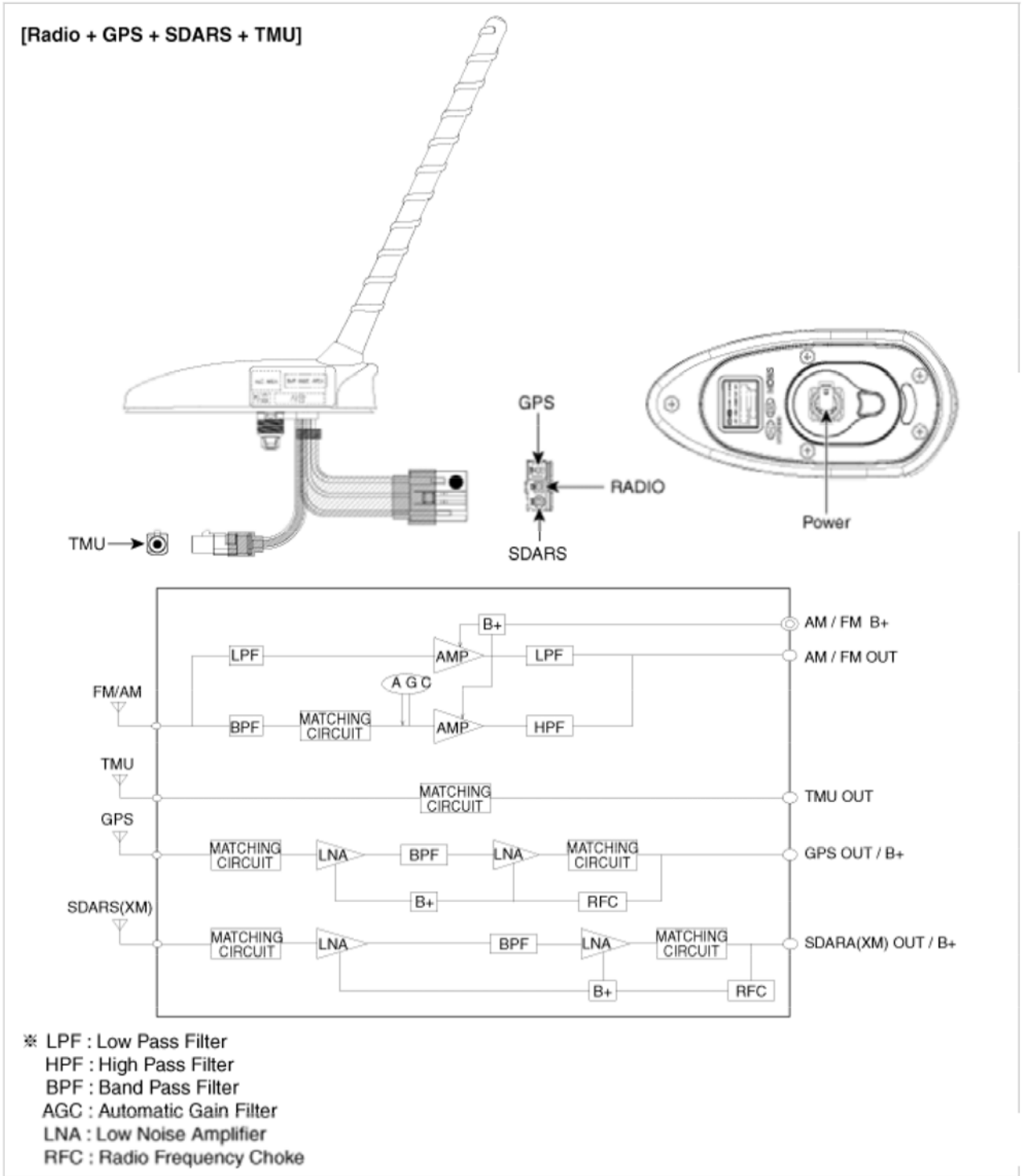
Installation

1. Install the multimedia jack.
2. Install the floor console upper cover.
3. Connect the negative (-) battery terminal.

Body Electrical System

Components

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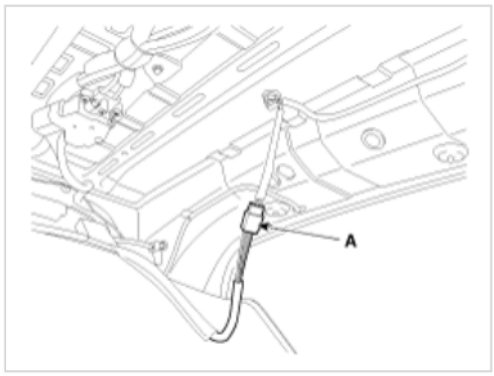
※ LPF : Low Pass Filter
HPF : High Pass Filter
BPF : Band Pass Filter
AGC : Automatic Gain Filter
LNA : Low Noise Amplifier
RFC : Radio Frequency Choke

Body Electrical System

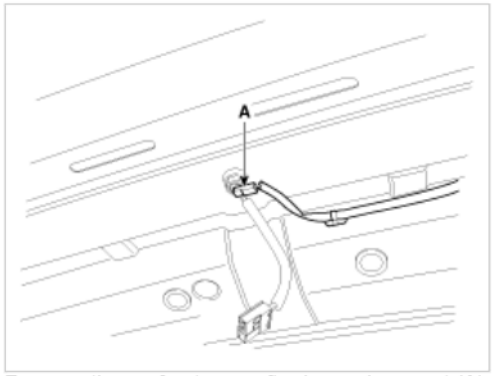
Removal

1. Disconnect the negative (-) battery terminal.
2. Disconnect the roof antenna connectors (A).

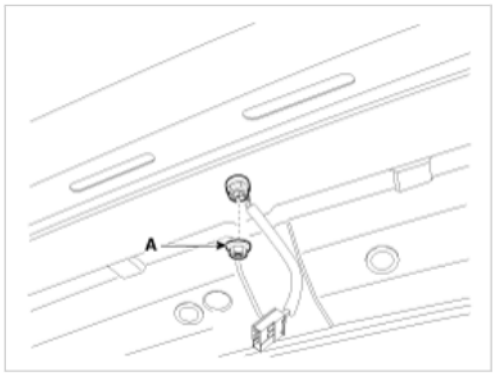
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3. Disconnect the roof antenna power connector (A).



4. Remove the roof antenna after loosening a nut (A).



Installation

1. Connect the roof antenna connectors.
2. Install the rear roof trim.
3. Connect the negative (-) battery terminal.

NOTICE

- Make sure that the cables and connectors are plugged in properly.
- Check the AVN system.

Body Electrical System

Troubleshooting Guide

Troubleshooting (Step type)

Symptom	Suspected area	Repairment
Pressing power switch does not turn on system	Radio receiver power source circuit	R-1
	LCD module	R-1
Panel switch does not function	Steering pad switch circuit	R-3
	AVN head unit front PCB ass'y	R-1
	Radio receiver power source circuit	R-1

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No sound can be heard from speakers	Radio receiver power source circuit	R-1
	Check the wiring between speakers and AVN H/U	R-6
Noise occurs	Proceed to "noise occurs"	R-5
Radio broadcast cannot be received (poor reception)	Proceed to "radio broadcast cannot be received" (poor reception)	R-4
Illumnination for radio receiver does not come on within light control switch on	Illumination circuit	R-6
	Radio receiver power source circuit	R-1
Display does not dim with light control switch turned on	Illumination circuit	R-6
Power does not turn off	AVN H/U	R-1
Bluetooth voice recognition fault	AVN H/U	R-1
	MIC input	R-7
USB I/F error	AVN head unit	R-1
	USB device fault	R-8
	Check the multimedia connector	R-8
iPod I/F error	AVN H/U	R-1
	Check the multimedia connector	R-8
AUX connection error	AVN H/U	R-1
	Check the multimedia connector	R-8

R-1 : Replace the AVN head unit

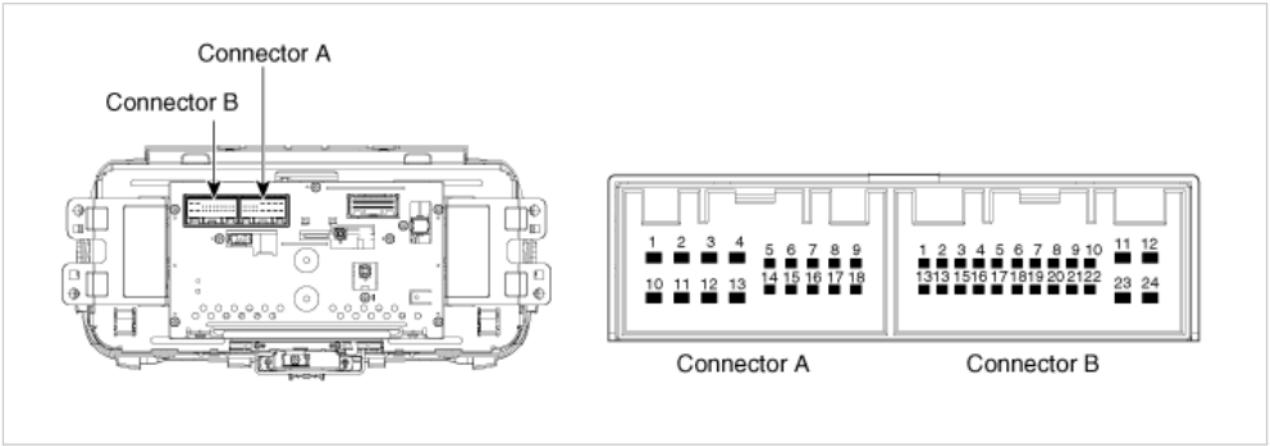
1. Check the same problem after replacing the AVN H/U.

OK	▸ If AVN is normal operating, replace the AVN H/U.

NG	▸ Check the vehicle wiring. (Refer to removal procedure, R-2)

R-2 : Check the power connection of AVN H/U

1. Remove the AVN H/U.
2. Check the specified condition of terminal.



OK

Tester Connection	Condition	Specified Condition
CON-B11/B12 ↔ GND (B+)	Always	9 ~ 16 V
CON-B18 ↔ GND (ACC)	Always	9 ~ 16 V
CON-B23 ↔ GND	Always	Below 1Ω
CON-B24 ↔ GND	Always	Below 1Ω

NG	▸ Check again after repairing or replacing the cable harness or connector.

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R-3 : Check the steering wheel remote control

1. Check the steering wheel remote control connector specification (Refer to “Audio remote control inspection”)

OK	▸ Replace the AVN H/U

NG	▸ Replace the steering wheel remote control switch

R-4 : Radio broadcast cannot be received (Bad reception)

1. Check the radio broadcast reception after replacing the AVN H/U

OK	▸ If AVN is normal operating, replace the AVN H/U

NG	▸ Go to step 2

2. Check the antenna jack

OK	▸ Check again the radio broadcast reception after connecting the antenna jack

NG	▸ Go to step 3

3. Check the antenna amp input voltage (Refer to “Antenna –Glass antenna circuit inspection”)

OK	▸ Check the antenna amp input voltage (Refer to “Antenna –Antenna cable”)

NG	▸ Go to step 4

4. Check the feeder cable connection (Refer to “Antenna –Antenna cable”)

OK	▸ Check again after repairing or replacing the antenna feeder cable.

NG	▸ Go to step 5

5. Check and repair the roof antenna.

R-5 : Check that speakers are installed tightly

OK	▸ Install the speakers tightly

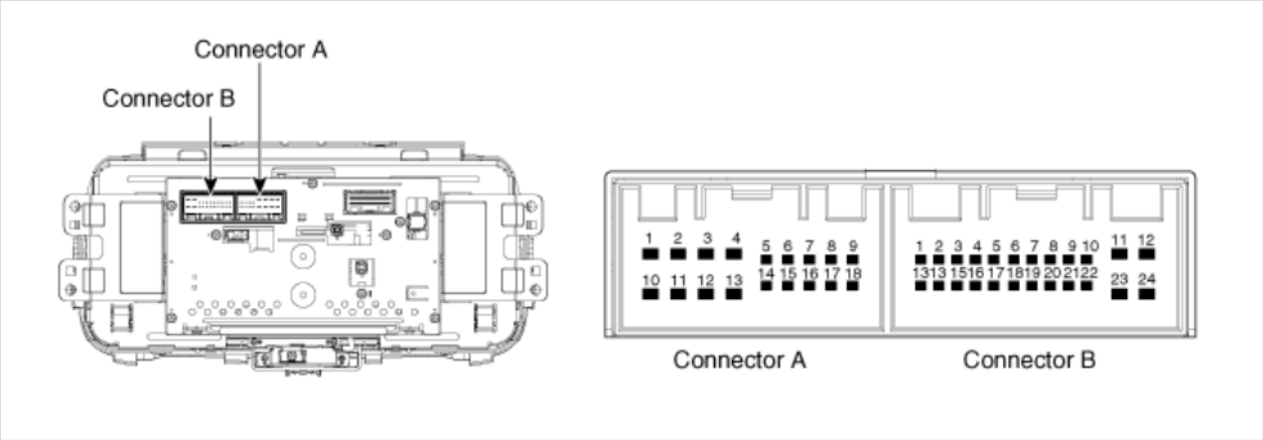
NG	▸ Install the speakers tightly

1. Noise source description

Condition in Which Noise Occurs	Noise Type
Depressing accelerator pedal increases noise, and stopping engine stops noise immediately	Generator nosie
When A/C or heater is operating	Blower motor noise
• When rapidly accelerating on unpaved road • When engine switch is turned on (IG)	Fuel pump noise
• When horn switch is pressed and released • When horn switch is pressed and held down	Horn noise
Running engine causes soft noise, and stopping engine stops noise immediately	Ignition noise
Noise occurs synchronously with turn signal flash	Flasher noise
Noise occurs during window washer operation	Washer noise
Running engine causes noise, but stopping engine does not stop noise	Engine coolant temperature sensor noise
When wiper is operating	Wiper noise
When brake pedal is depressed	Stop light switch noise
Other	Static electricity on vehicle

R-6 : Check again after replacing the AVN H/U

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OK	▸ Removed the AVN H/U

NG	▸ Go to step 1

1. Check the input signal of illumination (+)

Tester Connection	Condition	Specificed Condition
CON-A8 ↔ GND	Always	9~16 V

OK	▸ Check the vehicle wiring

NG	▸ Go to step2

2. Check the illumination (-) input signal using the oscilloscope

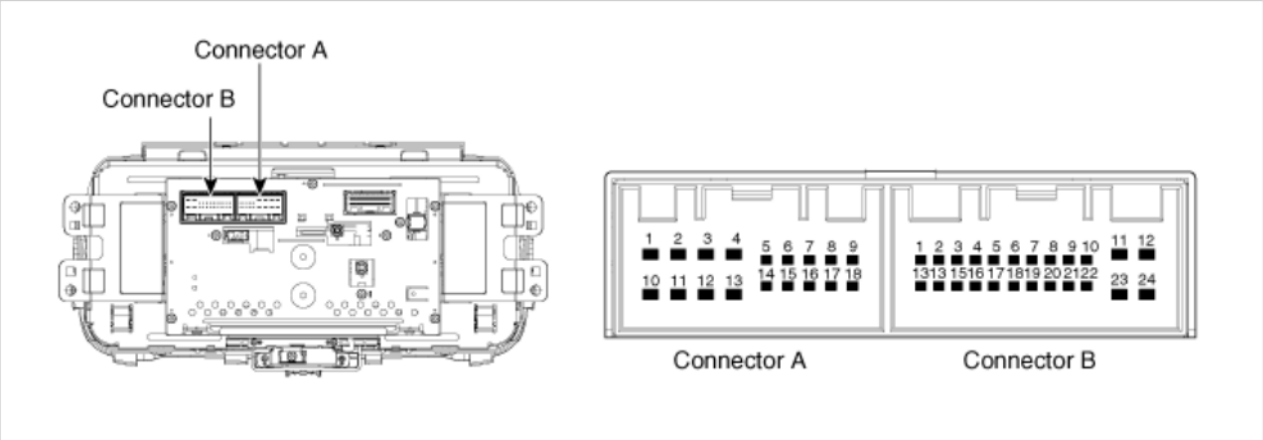
Tester Connection	Condition	Specificed Condition
CON-A17 ↔ GND	Always	Check the PWM waveform

OK	▸ Check the vehicle wiring and cluster PWM output

NG	▸ Go to step3

3. Check the vehicle illumination control unit

R-7 : Check the microphone input condition



Tester Connection	Condition	Specificed Condition
CON-B10 ↔ MIC (+)	Always	Below 1Ω
CON-B22 ↔ MIC (-)	Always	Below 1Ω
CON-B22 ↔ GND	Always	Open

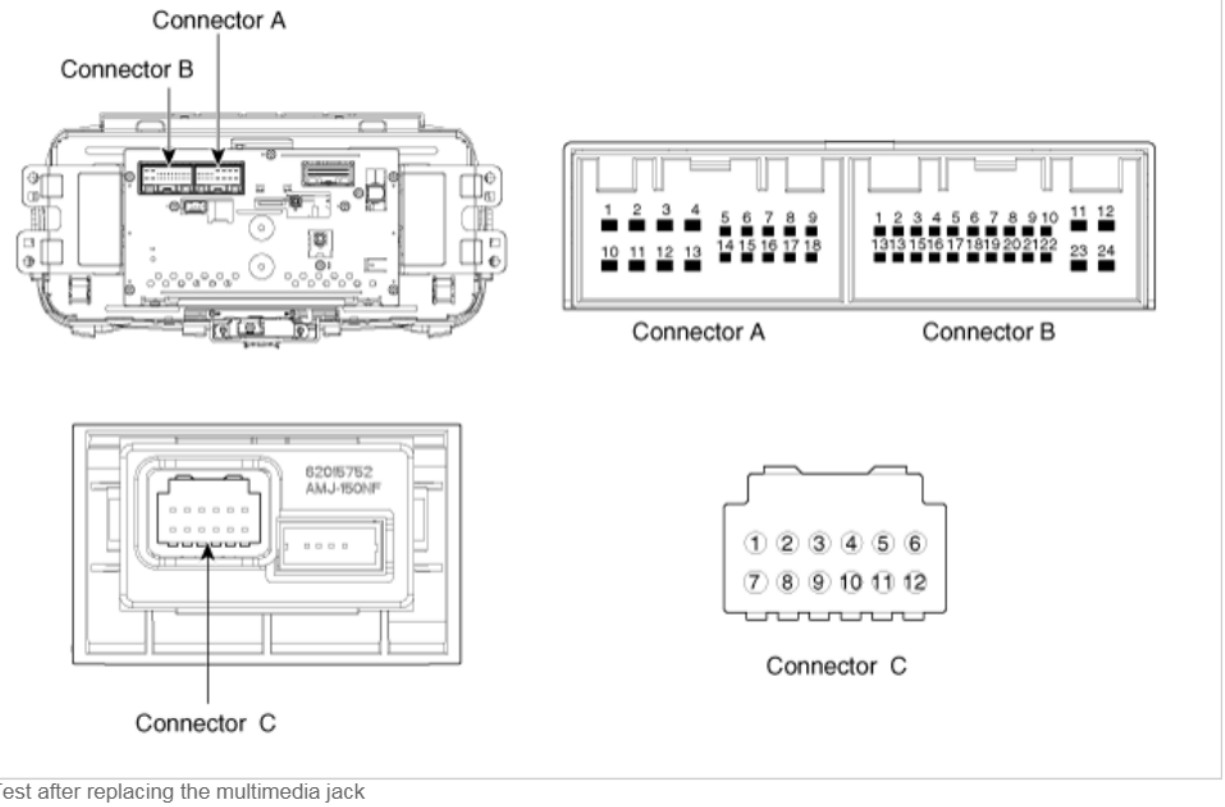
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OK	▸ Check the vehicle wiring and microphone

NG	▸ Go to step1

1. Test again after replacing the microphone

R-8 : Test after replacing the AVN H/U



1. Test after replacing the multimedia jack

OK	▸ Replace the multimedia jack

NG	▸ Go to step 2

2. Check the vehicle USB cable.

OK	▸ Replace the vehicle USB cable

NG	▸ Go to step 3

3. Check the multimedia jack connector

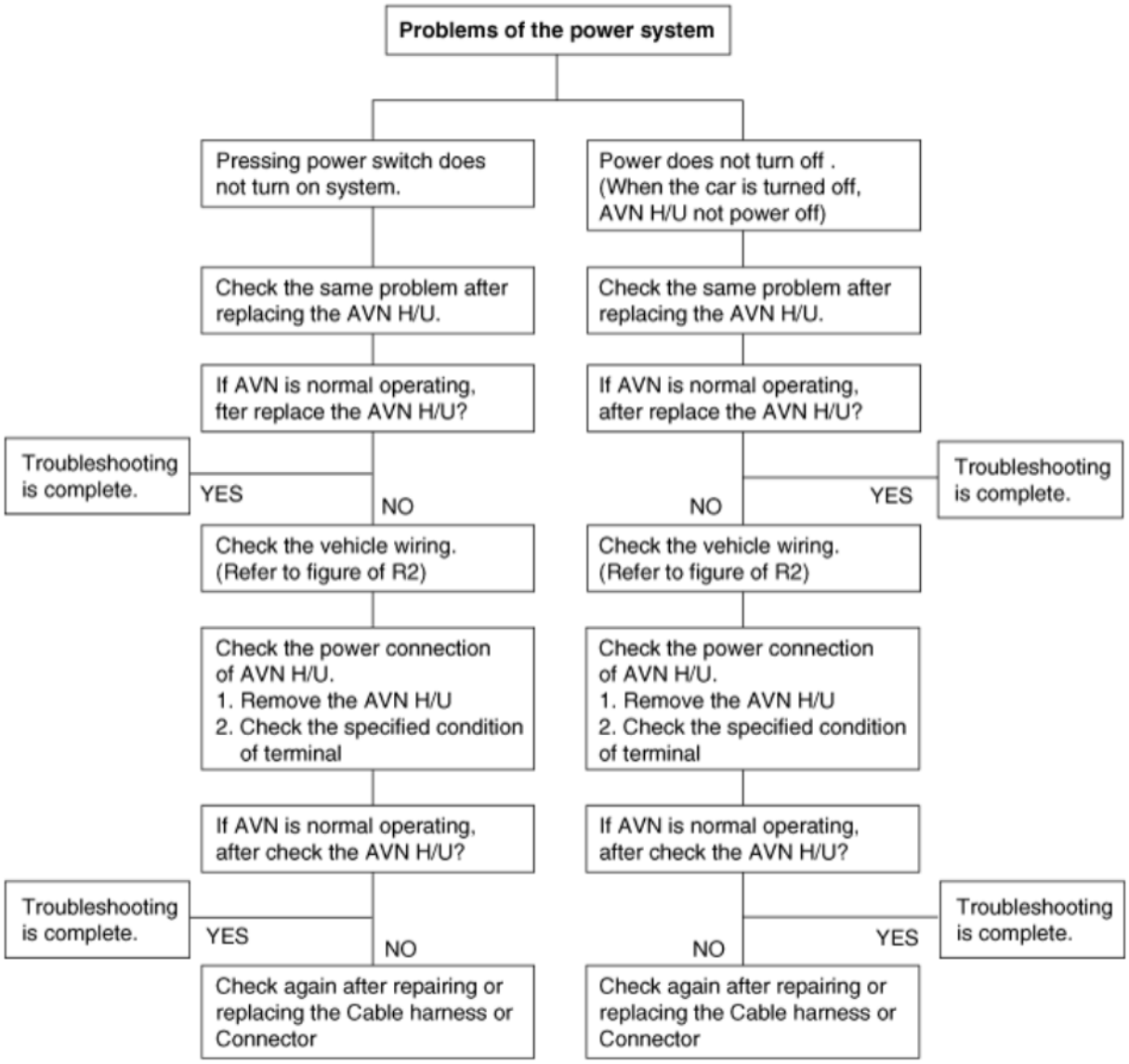
Tester Connection	Condition	Specificed Condition
AVN H/U CON-B8 ↔ Multimedia jack CON-C2	Always	Below 1Ω
AVN H/U CON-B21 ↔ Multimedia jack CON-C1	Always	Below 1Ω
AVN H/U CON-B20 ↔ Multimedia jack CON-C3	Always	Below 1Ω
AVN H/U CON-B9 ↔ Multimedia jack CON-C7	Always	Below 1Ω

Troubleshooting (Flow chart type)

There are six areas where a problem can occur
: the power system, the LCD/LED system, the sound system, the radio system, the USB/iPod/AUX system, and the bluetooth system.
Troubleshooting enables you to confine the problem to a particular area.

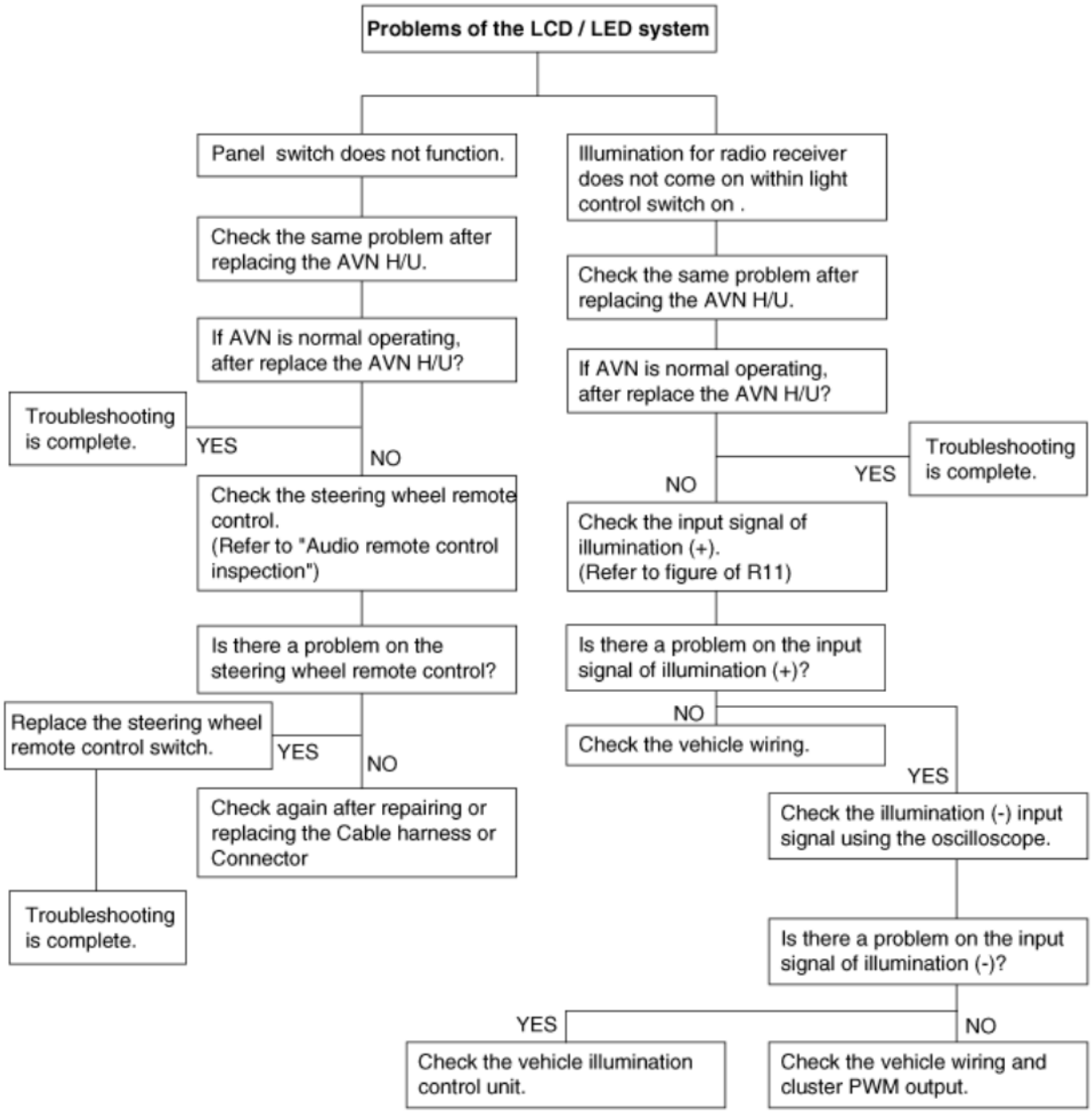
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1) The power system



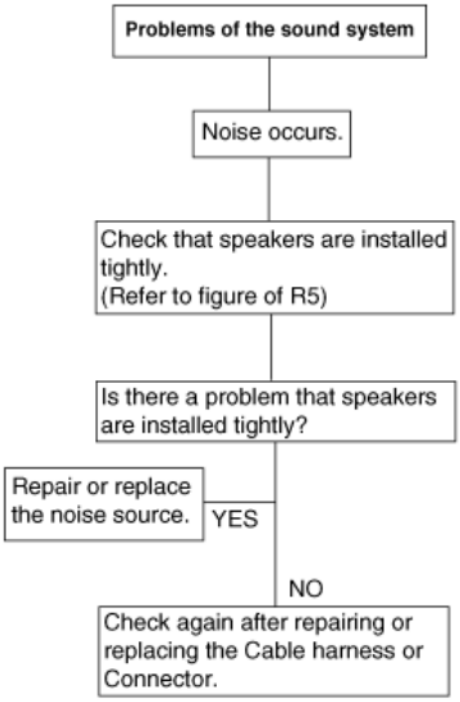
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2) The LCD/LED system



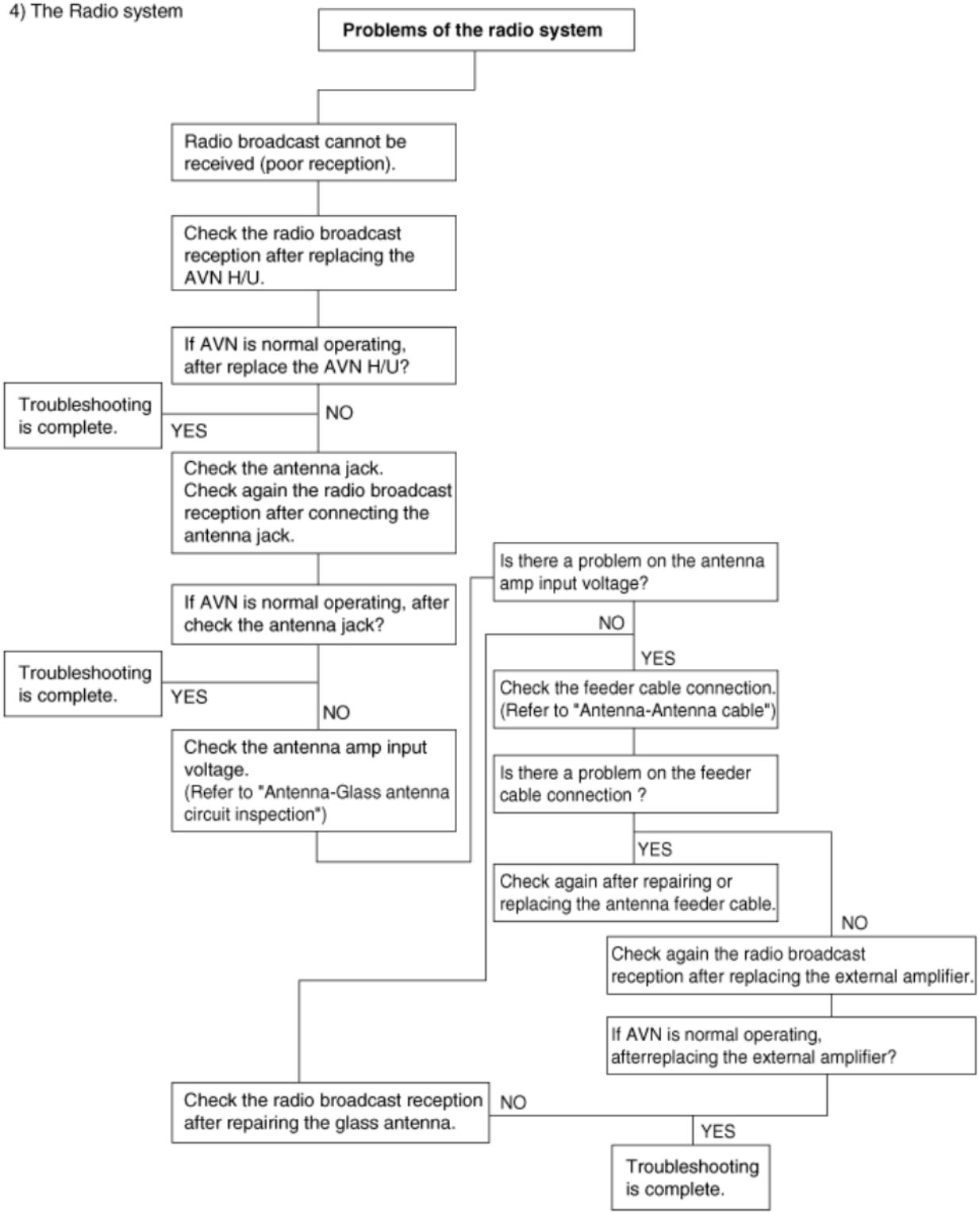
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3) The sound system



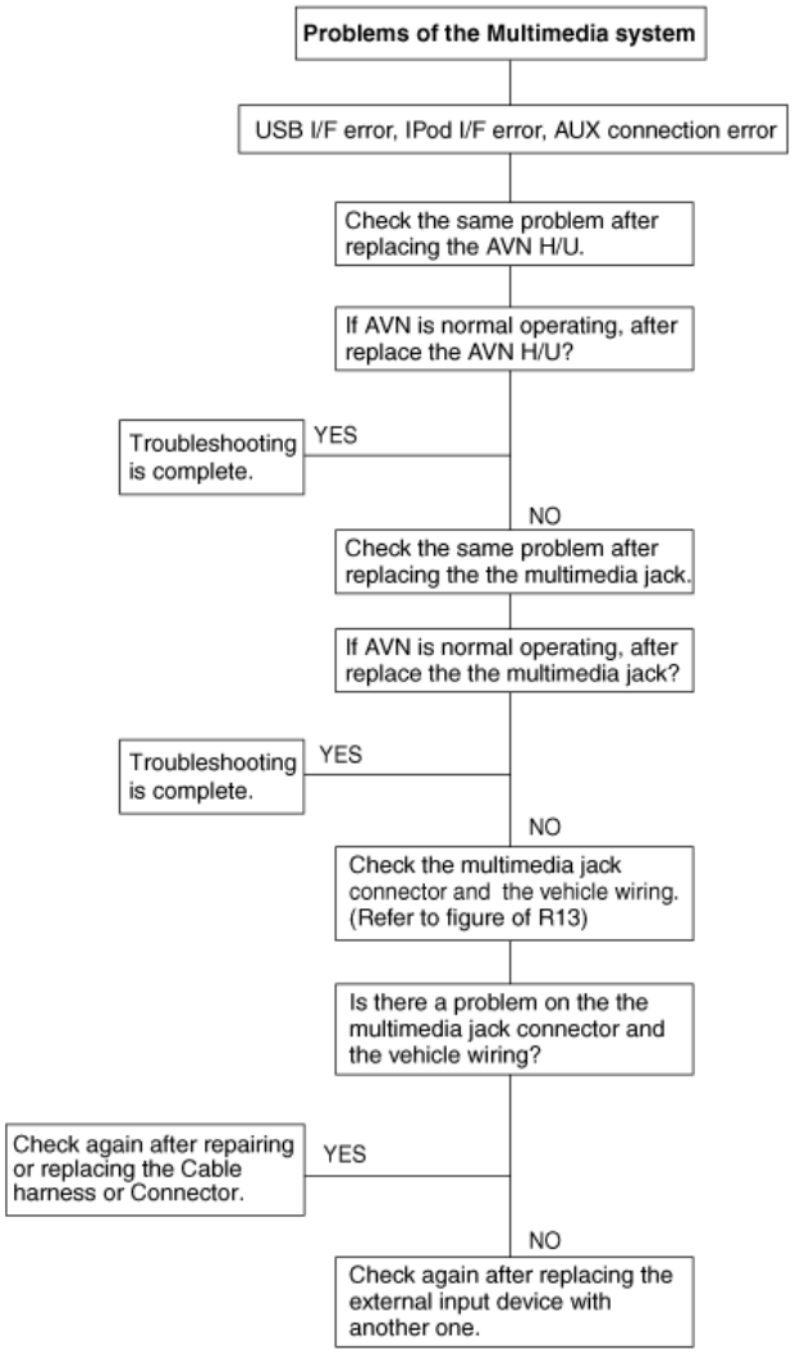
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4) The Radio system



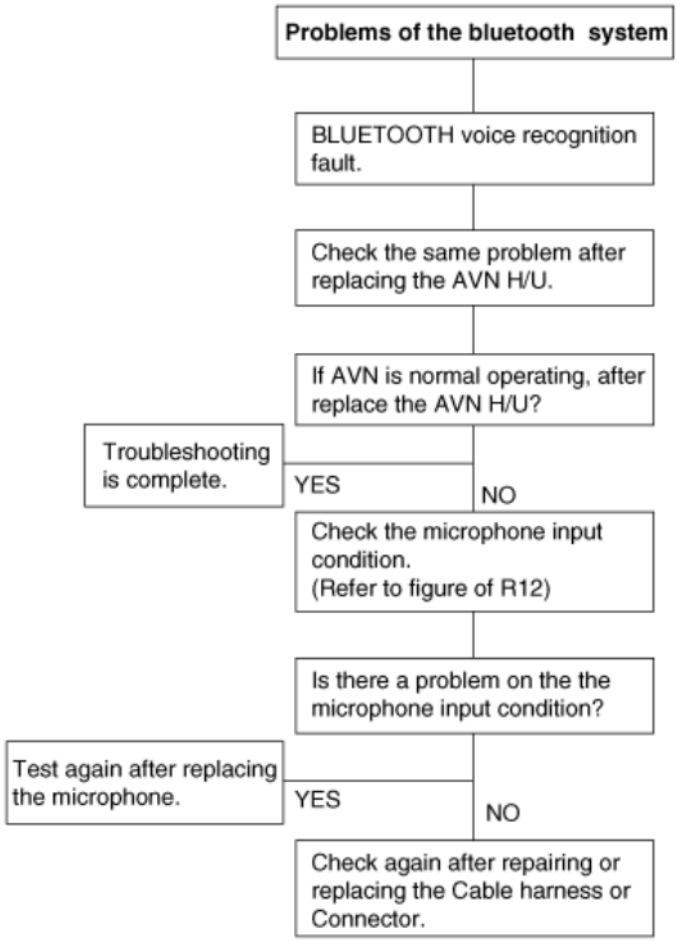
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5) The USB/iPod/AUX system



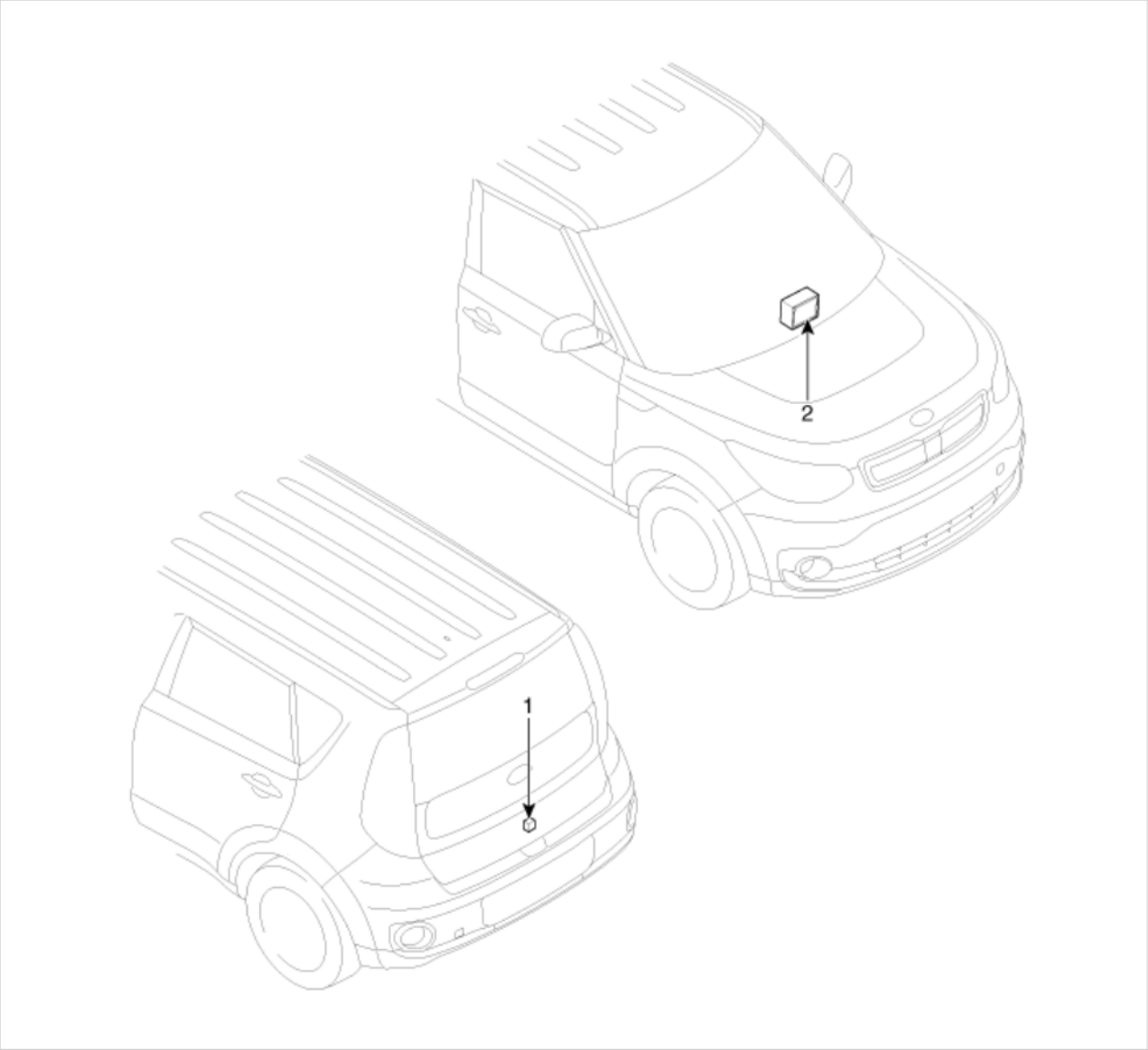
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6) The the bluetooth system



Component Location

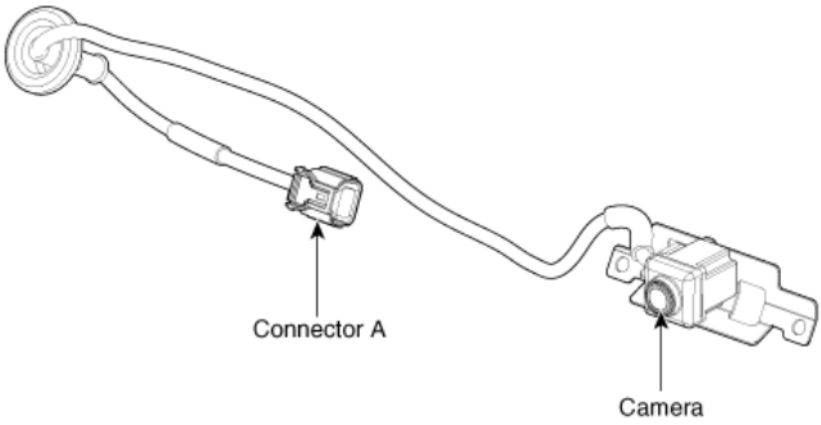
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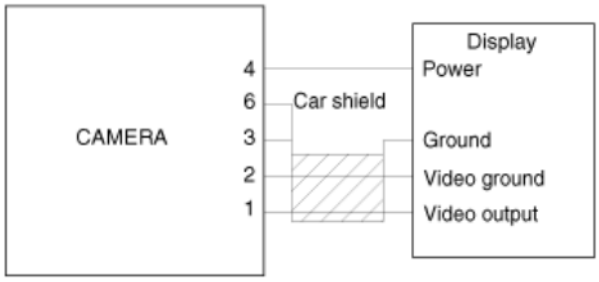


1. Back view camera	2. AVN head unit

Circuit Diagram

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Connector A



No.	Description
1	Video output
2	Video ground
3	Ground
4	Power
5	-
6	Car shield

Body Electrical System

Description

Back view camera will activate when the backup light is ON with the ignition switch ON and the shift lever in the R position.
This system is a supplemental system that shows behind the vehicle through the monitor while backing-up.

⚠ WARNING

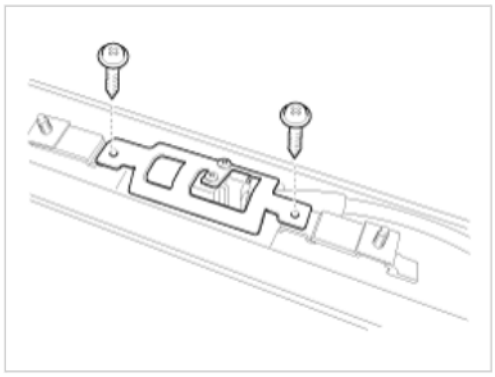
This system is a supplementary function only. It is the responsibility of the driver or always check the inside/ outside rearview mirror and the area behind the vehicle before and while backing up because there is a dead zone that can't see through the camera.

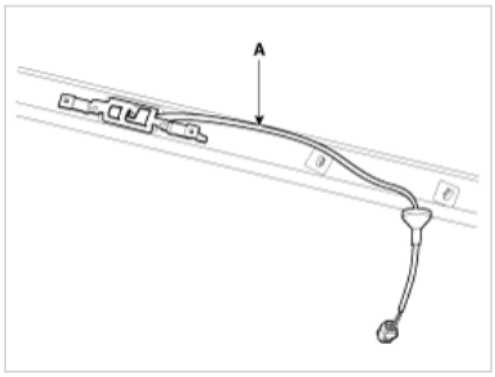
Body Electrical System

Removal

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1. Remove the tailgate trim.
   (Refer to Body - "Tailgate Trim")
2. Remove the tailgate back panel.
   (Refer to Body - "Tailgate Back Panel")
3. Remove the back view camera (A) after loosening the mounting screws.





Installation

1. Install the back view camera.
2. Install the tailgate back panel and tailgate trim.

Body Electrical System

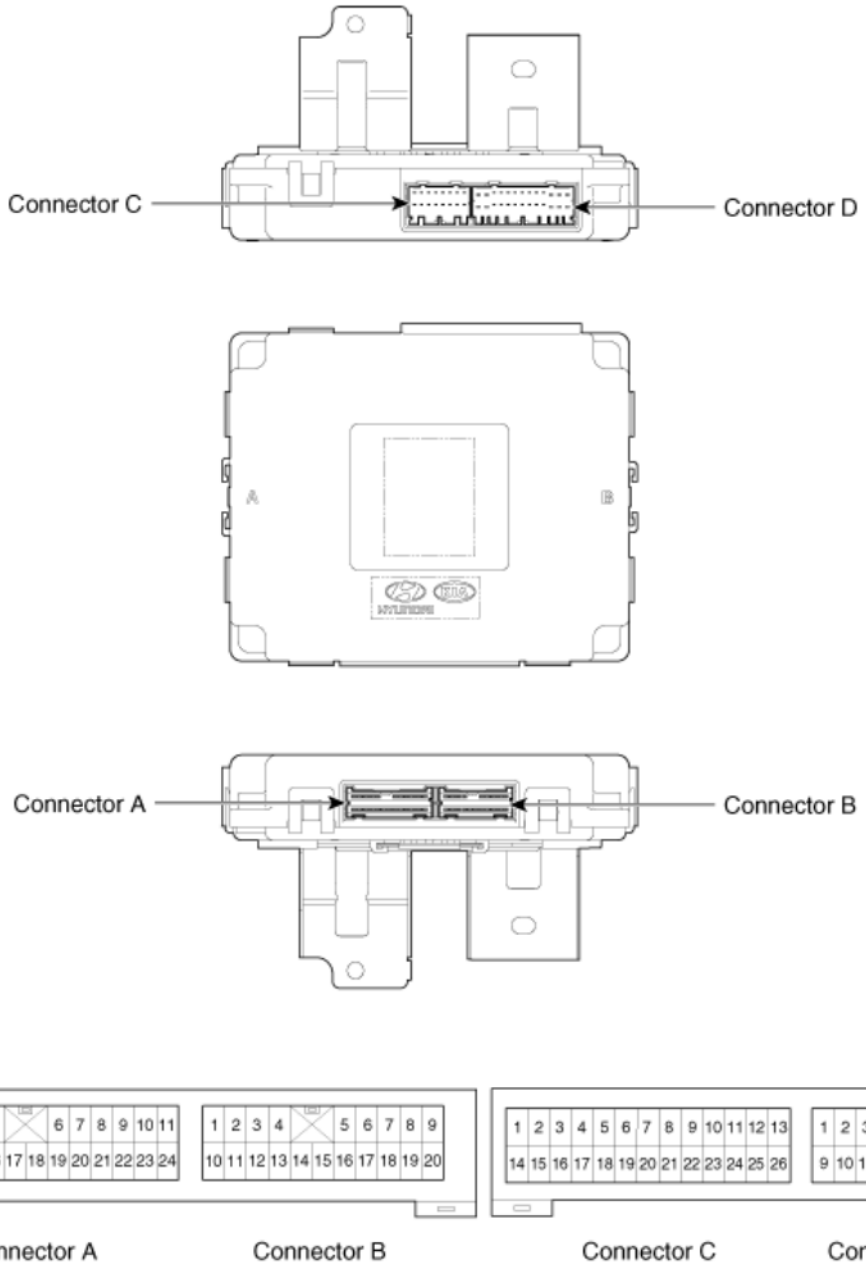
Specifications

Items	Specifications
Rated voltage	DC 12V
Operating voltage	DC 9 ~ 16V
Operating temperature	-30°C ~ 80°C (-4°F ~ 176°F)
Dark current	BCM & Receiver : Max. 4 mA BCM : Max. 3 mA

Body Electrical System

Components

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Connector Pin Information

No.	Connector A (24 pin)	Connector B (20 pin)	Connector C (26 pin)	Connector D (16 pin)
1	Battery (+)	LIN (PAS)	Washer motor power	-
2	IGN 1	Fuel filler (Charge door) actuator relay	Front washer motor	-
3	IGN 2	LS CAN high	-	-
4	Brake switch	LS CAN low	Mirror unfold relay	Mirror unfold switch
5	Wiper mist switch	Mood lamp unlock state	DRL lamp LH	Mirror fold switch
6	Crash unlock input (PWM)	Horn relay	DRL lamp RH	-
7	-	-	Room lamp	-
8	Fuel filler (Charge door) open switch	HS CAN low	-	-

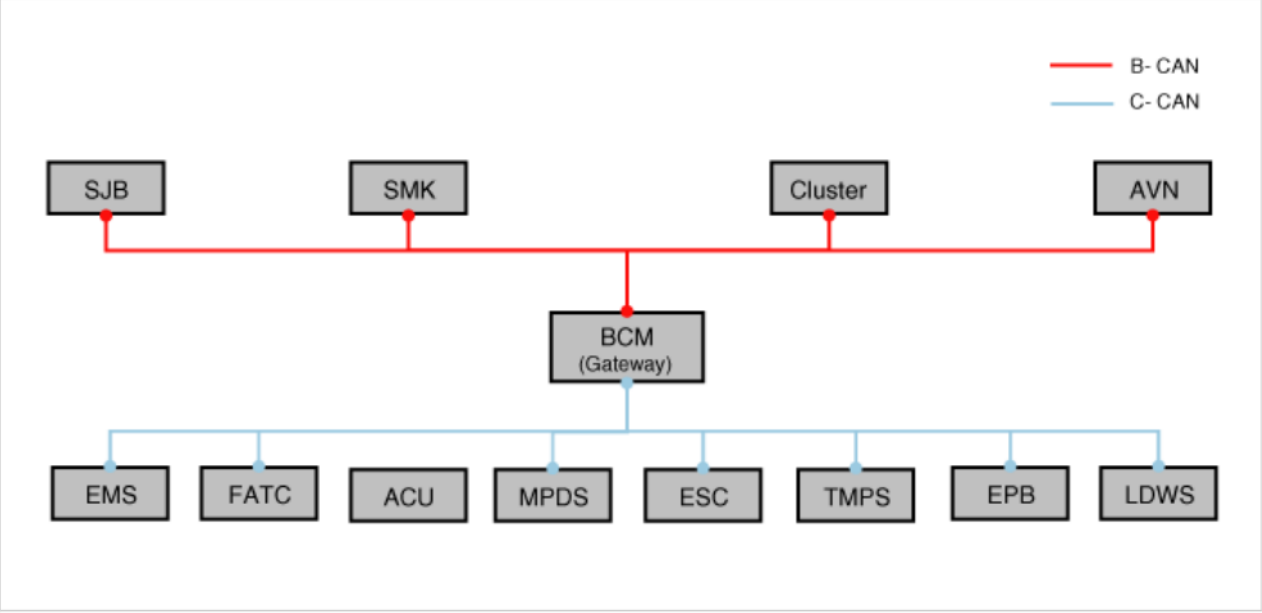
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9	Wiper washer switch	HS CAN high	-	Auto ligth switch
10	Wiper INT switch	Ground (Auot light)	-	Defogger switch
11	Wiper low switch	Auto light signal	-	-
12	Rear washer switch	Auto light power	Wiper low relay	Head lamp high switch
13	ACC	Safety power window enable high	-	Head lamp low switch
14	Wiper high switch	-	DRL lamp power	-
15	Front fog lamp switch	ATM solenoid	Rear washer motor	-
16	Rear wiper switch	-	Mirror fold relay	-
17	Rear INT switch	Fuel filler (Charge door) lamp	MTS Tx	
18	-	-	-	
19	-	-	Head lamp low signal	
20	-	Ground (Power)	AV tail	
21	Tail switch		Wiper high relay	
22	Wiper INT volume		-	
23	LIN (Intelligent Battery Sensor)		-	
24	Ground (Signal)		-	
25			-	
26			Ground (Power)	

Body Electrical System

Description

BCM CAN Communication



Function

Function		Description
Timer	Defroster	When IGN ON, Rear Heater Control Function
	Safety Power Window	According to the position of key, Power Window Output Control
Tailgate		Tailgate Open and Open Prohibition Control Function
Panic Alarm		Using the RKE My Vehicle Searching Function
Driving	ATM Solenoid	Shift Lever Automatic Release Protection Control Function
Interior Lamp	Room Lamp	Room Lamp Control Function
Exterior Lamp	Tail Lamp	Interior Illumination Control and Tail Lamp Control Function
	H/Lamp Low & High	Head Lamp Low/High/Passing Control Function
	Front Fog Lamp	Front Fog Lamp Control Function
	AV Tail	Autolight Interlock Illumination Control Fucntion

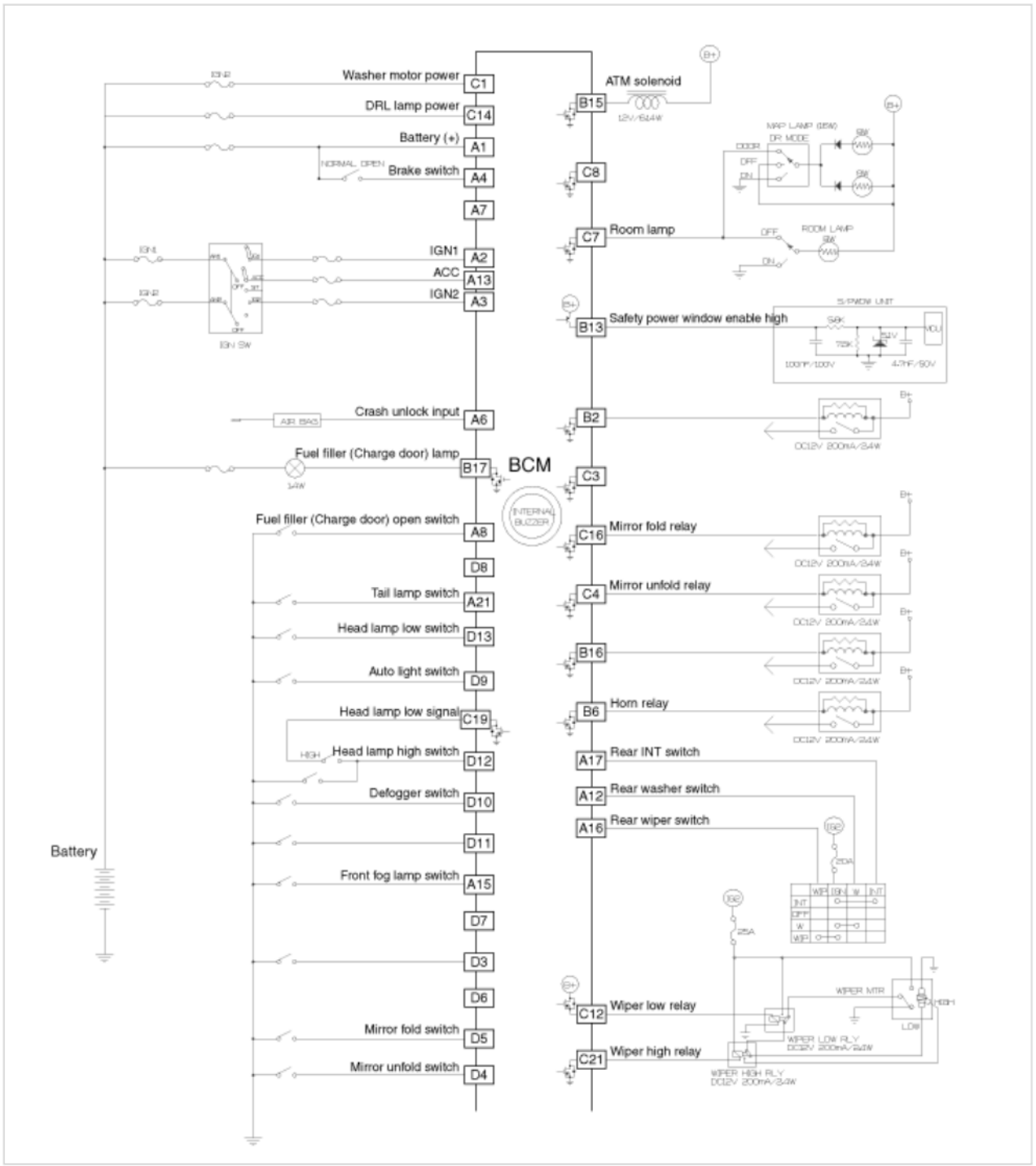
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	DRL	When the Key turns IGN ON in the daytime. Dedicated DRL Illumination Control Function
	Wiper Low/High	Front Wiepr Low/High Control Function
	Wiper MIST	Front Wiper MIST Control Function
Wiper Washer	Wiper Washer (FRONT, REAR)	When Front/Rear Washer switchs ON, Washer Motor Output Function
	Wiper INT	According to Intermittent Volume input signal, Front Wiper Control Function
	Rear Low	Rear Wiper Low Control Function
	Rear INT	Rear INT Wiper Control Function
	DRV SBR	Driver Seat Belt Reminder Warning Function
	Key Operated Warning	When the key turns ACC ON and Driver Door Open, Warning Function
Warning	Parking Brake Warning	When the Parking brake switchs ON and vehicle drives, Warning Function
	SMK System Warning	SMK Warning Function
	Key Teaching Warning	When the RKE Teaching is completed, Warning Function
Door	CRASH	When vehicle crashes, All Door Unlock Control Function
	Auto Door Lock/Unlock	According th USM setting, Door Lock/Unlock Automatic Control Function
Out side Mirror		Out Side Mirror Folding / Unfolding Output Function

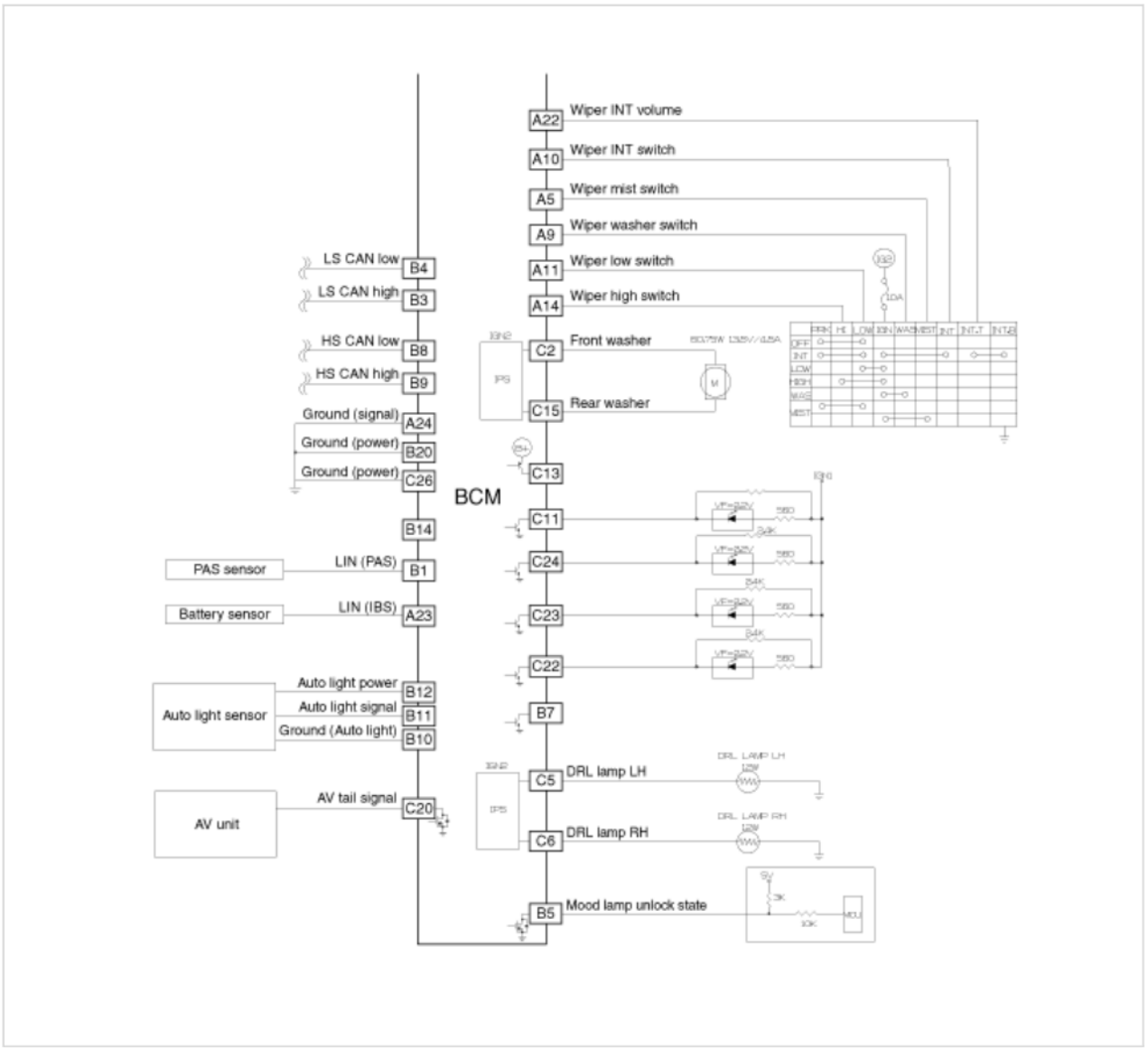
Body Electrical System

Circuit Diagram

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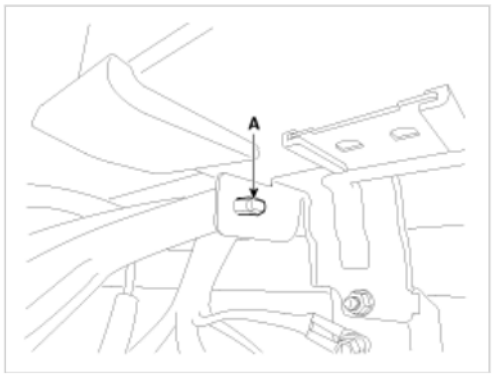


Body Electrical System

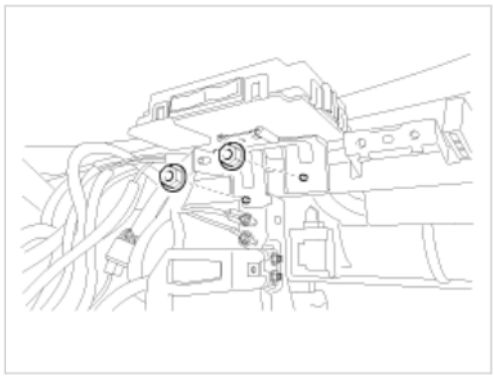
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the audio/ AVN head unit assembly.
   (Refer to Body Electrical System - "Audio Unit")
   (Refer to Body Electrical System - "AVN Head Unit")
3. Remove the glove box housing assembly.
   (Refer to Body - "Glove Box Housing")
4. Separate the wiring fixed clip (A) on the BCM bracket.

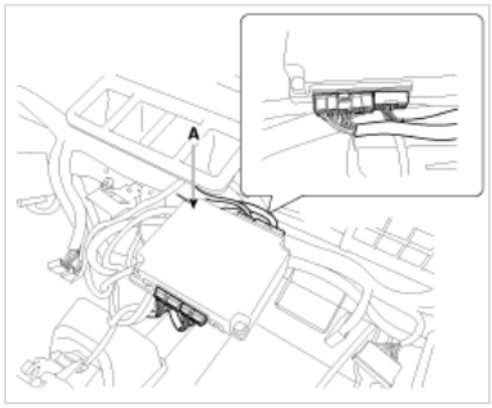
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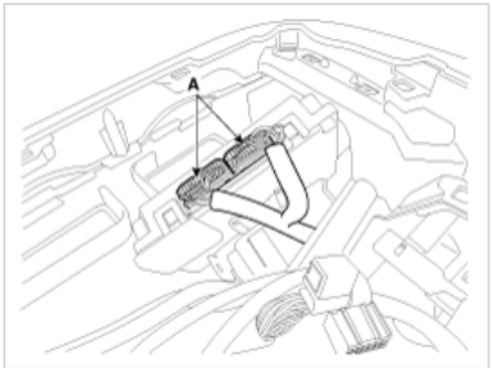
5. Loosen the mounting nuts from the BCM unit.



6. Disconnect the connectors from the BCM (in the order as below)

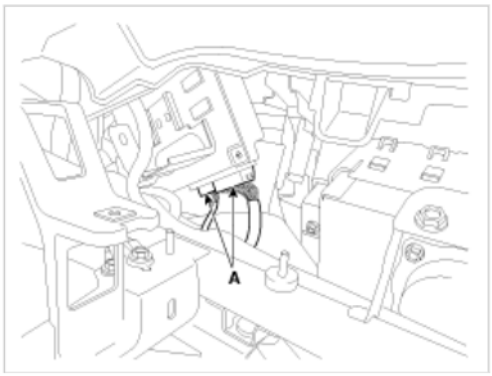


(1) Disconnect the connectors (A) from the direction of removing the Audio/ AVN head unit.



(2) Disconnect the connectors (A) from the direction of removing the glove box housing.

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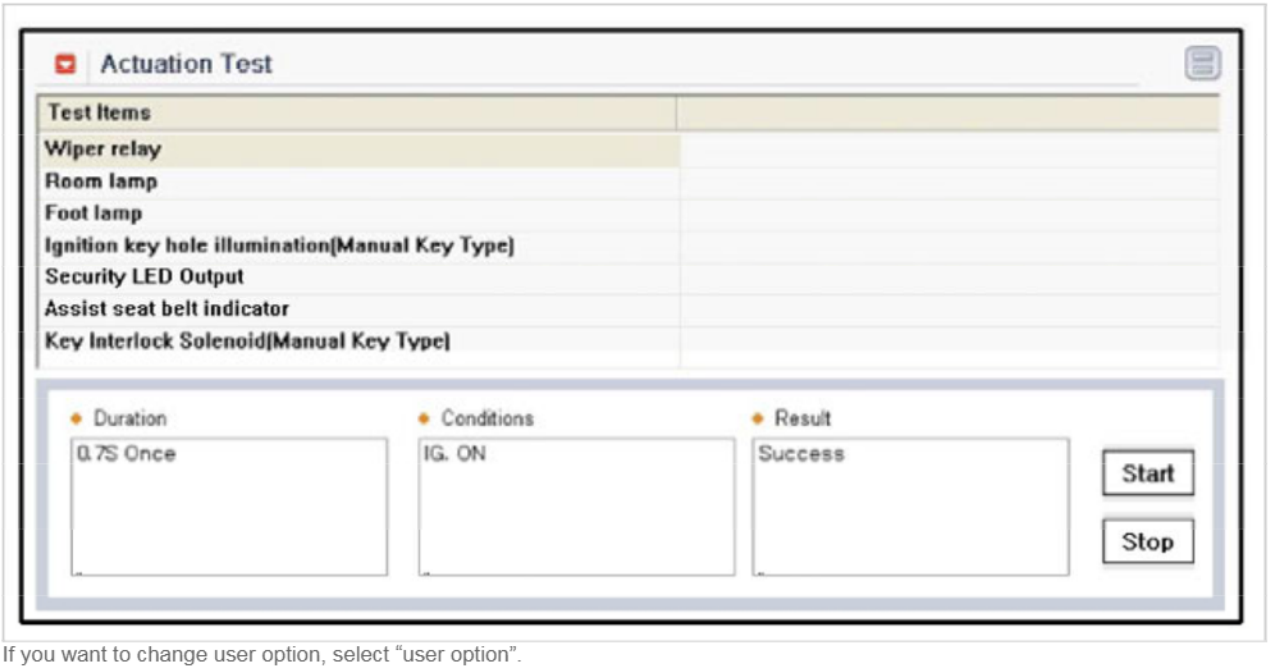


Installation

1. Connect the connectors and install the BCM.
2. Install the glove box housing and audio/AVN head unit.
3. Connect the negative (-) battery teriminal.

BCM Diagnosis With GDS

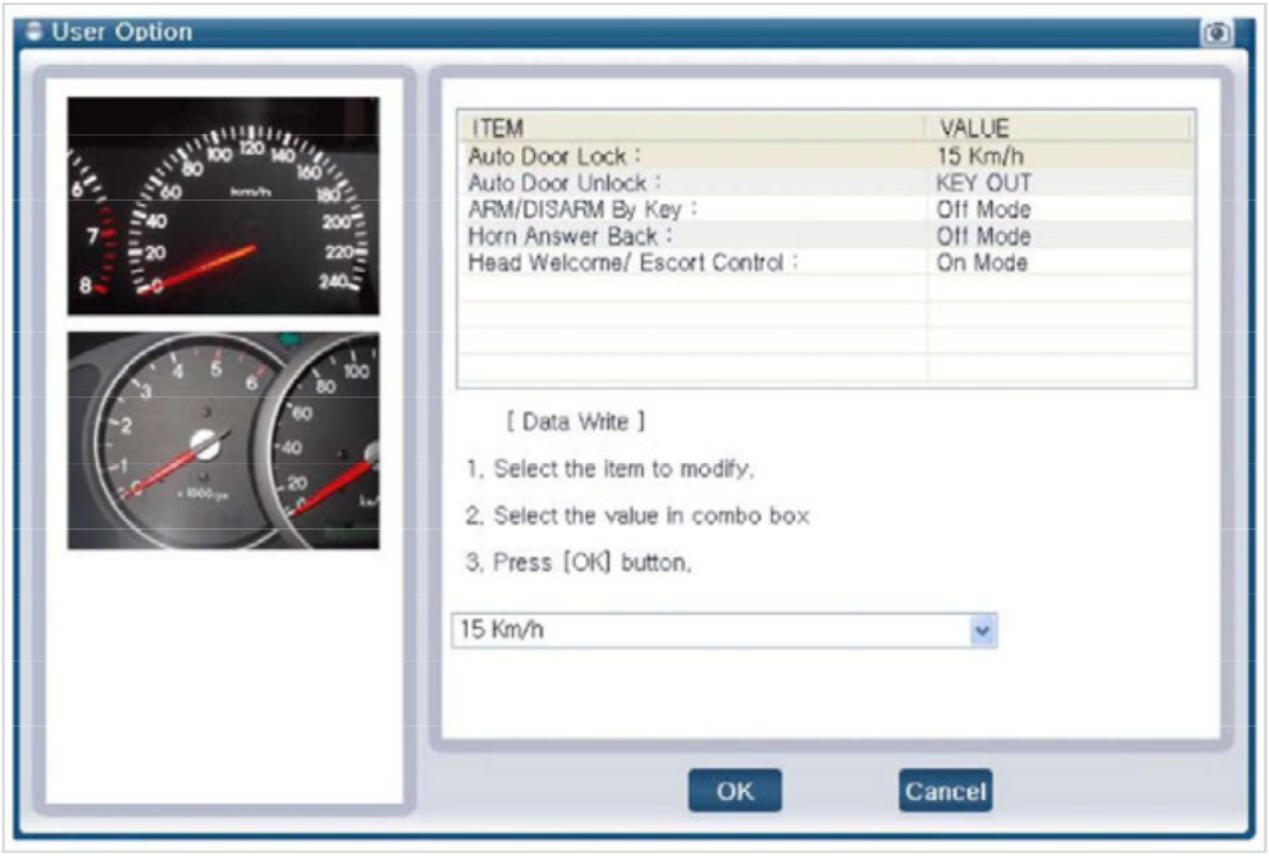
1. The body control module can diagnose by using the GDS more quickly.
   The BCM communicates with the GDS and then reads the input/output value and drives the actuator.
2. To diagnose the BCM function, select the menu of model and body control module.
3. Select "Input/output monitoring", if you will check current data of body network system. It provides input/output status of each module.
   A. BCM service data, CLU service data, SJB service data
4. If you will check each module data operation forcefully, select "Actuation test".



5. If you want to change user option, select “user option”.



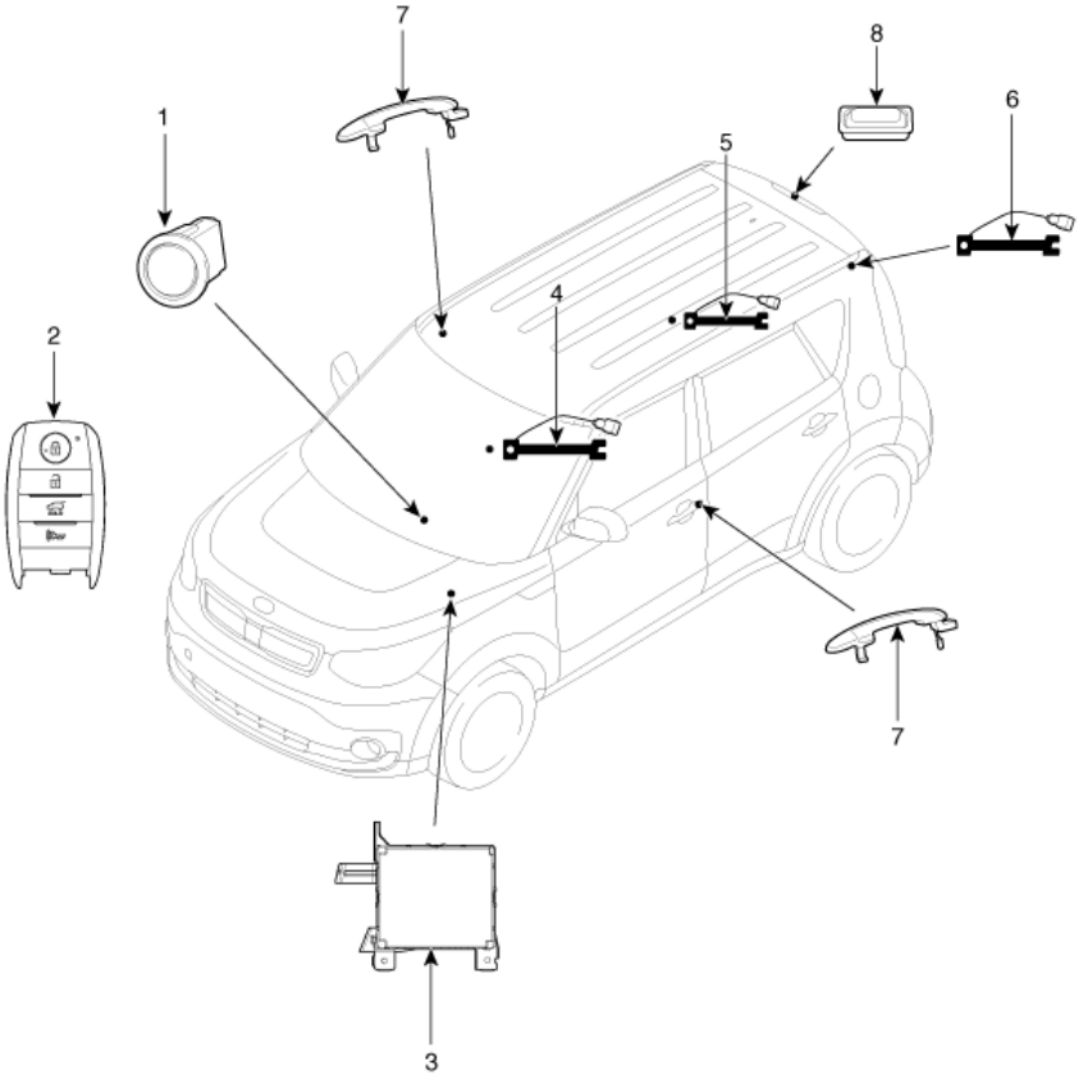
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Body Electrical System

Component Location

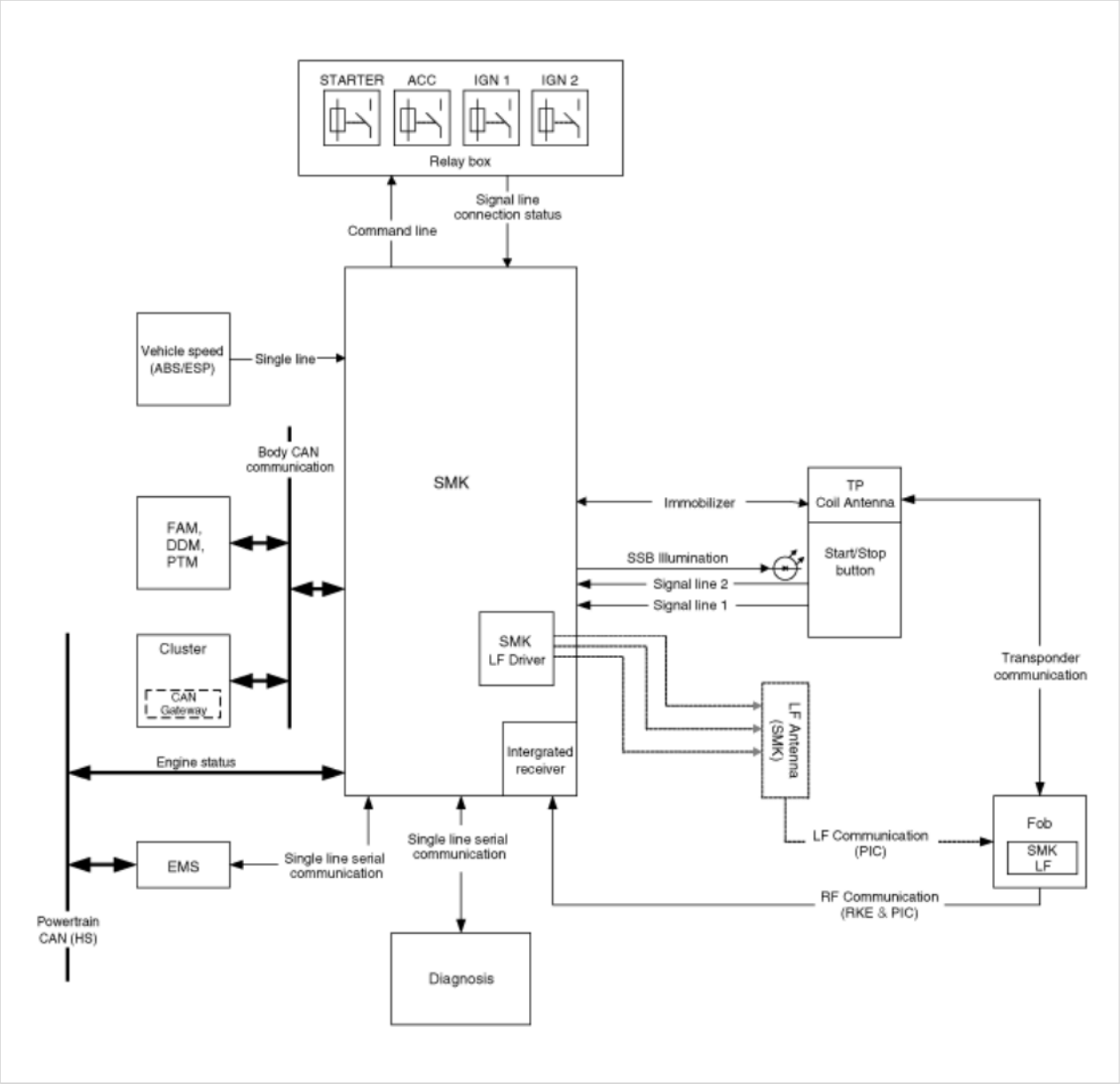
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1. Start Stop Button(SSB)	5. Interior antenna 2
2. FOB key	6. Bumper antenna
3. Smart key unit	7. Door handle & door antenna
4. Interior antenna 1	8. Tailgate open switch

Circuit Diagram

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Body Electrical System

Description

System Overview

The System offers the following features:

- Human machine interface through a 1-stage button, for terminal switching and engine start.
- Control of external relays for ACC / IGN1 / IGN2 terminal switching and STARTER, without use of mechanical ignition switch.
- Indication of vehicle status through LCD or explicit messages on display.
- Immobilizer function by LF transponder communication between fob and start/stop button.
- Redundant architecture for high system dependability .
- Interface with Low Speed CAN vehicle communication network.
- Interface with LIN vehicle communication network depending on platform .

The RKE and SMART KEY functions are not considered part of this Button Engine Start system and are specified in separated system.

System Main Function

- Switching of ACC / IGN1 / IGN2 terminals.
-

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Control of the STARTER relay BAT line (high side) based on communication with EMS ECU.

- Management of the Immobilizer function.
- Management of BES warning function.

Button Engine Start System

The Button Start System allows the driver to operate the vehicle by simply pressing a button (called as SSB) instead of using a standard mechanical key.

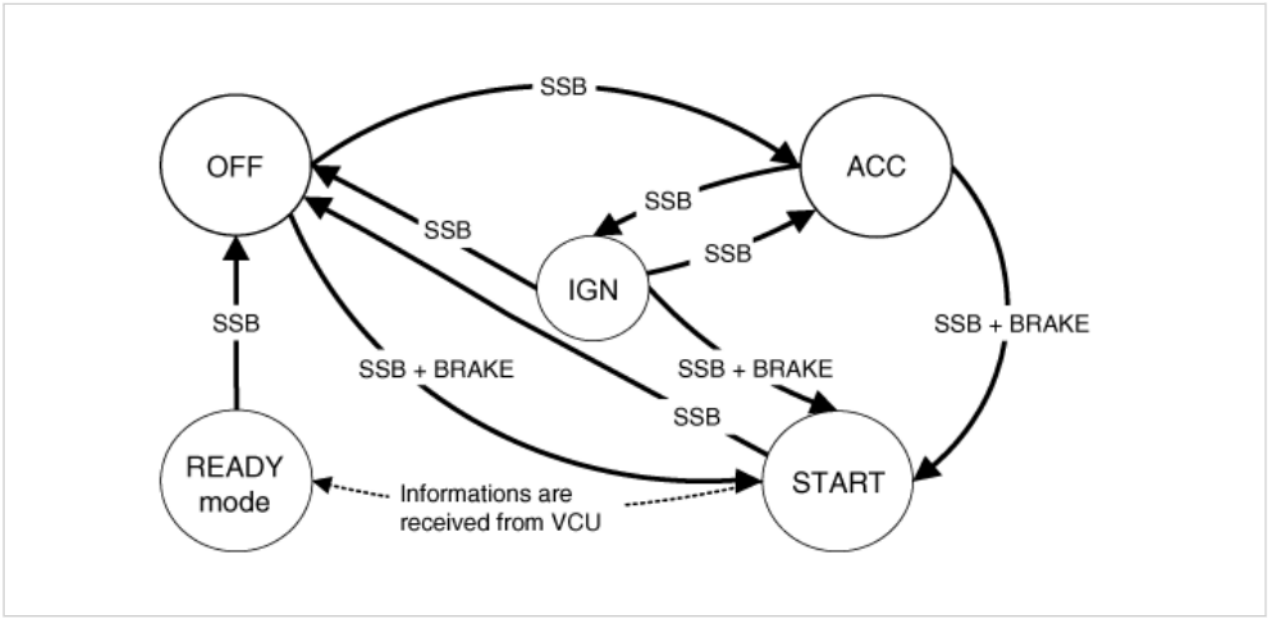
When the driver pushes the SSB, upon authentication of the smart key, if the brake signal and the shift signal (P) have been received correctly, the SMK System will proceed with the unlocking of the steering column, the control of the terminal, and enable READY mode.

The driver can release the SSB as soon as this sequence initiated. After positive response from immobilizer interrogation, the system will communicate with the VCU and turns on the READY lamp and puts the vehicle to "standby" for drive.

The driver will be able to shut-off EV by a short push on the SSB if the vehicle is already in standstill and shift position on either P or N. Emergency engine stop will be possible by a long press of the SSB or 3 consecutive presses in case the vehicle is in READY mode.

If the conditions for READY mode are not received correctly while pushing the SSB is detected and a valid fob authenticated, the system will unlock the steering column and switch the terminals to IGN. Another push on the SSB will be necessary to go into READY mode.

In case of a vehicle equipped with SMART KEY system, fob authentication will not require any action from the driver. For limp home start or in case of vehicle without SMART KEY, the driver will have to push the start / stop button.



- Control Ignition and engine ON/OFF by Sending signal to IPM.
- Display status by LED Lamp ON/OFF. (Redish orange or Amber)

Indicator ON/OFF Condition At Ignition Button OFF Condition

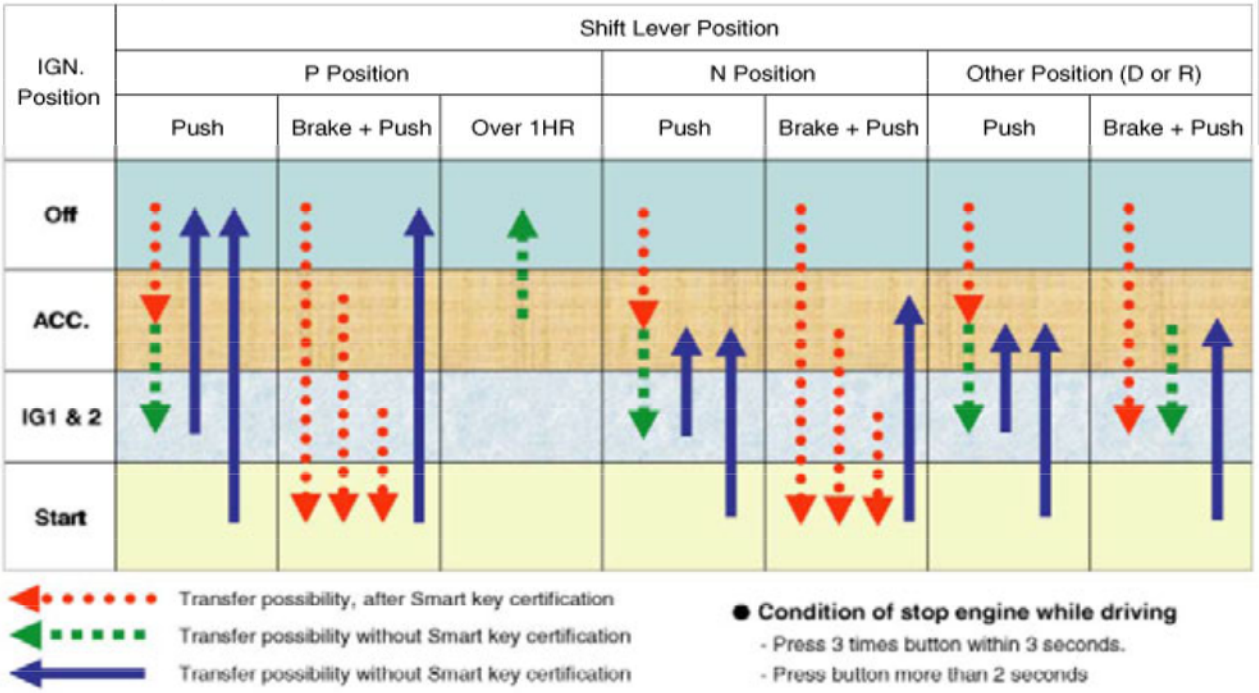
No.	Character lamp	Conditions
1	Indicator Lamp ON	Door open, Tail lamp ON, ACC, IG ON
2	Indicator Lamp 30sec ON → Lamp OFF	Door close, Tail lamp OFF, IG OFF
3	Indicator Lamp OFF	Remote LOCK, Passive LOCK
4	Rheostat at tail lamp ON (Illumination lamp)	

Indicator ON/OFF Condition According To Ignition

No.	Ignition conditions	Start Button LED status
1	IG OFF	LED OFF
2	IG ACC	Amber color LED ON
3	IG ON (Engine OFF)	Redish orange color LED ON
4	Cranking	Maintain LED status before cranking
5	Engine running	LED OFF

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The shift of Ignition Position



Wireless Communication

Electromagnetic waves are used to exchange information between the vehicle and the FOB. Two types of RKE Key can supplement the BES system:

- Non-smart key RKE
- SMART KEY FOB

Currently the BES system comprises with SMART KEY FOB always.

The transmitter, receiver and antennas required for the communication between the fob and the vehicle will differ depending on functionalities and regional areas.

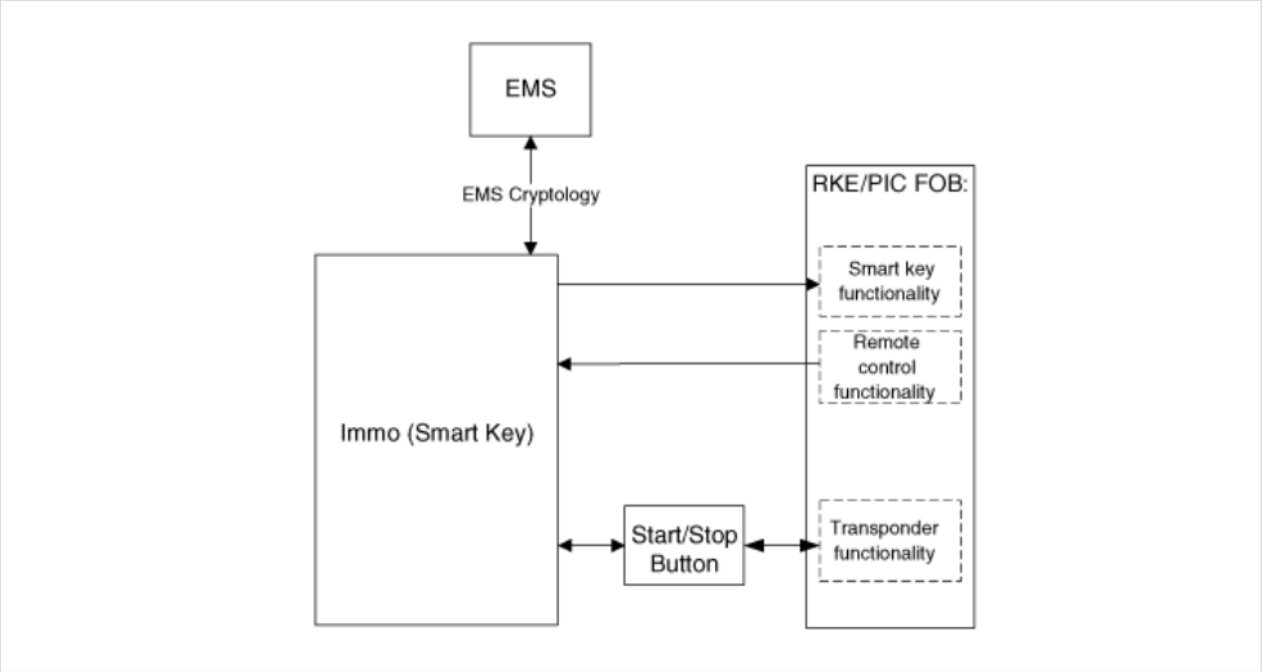
The RKE and SMART KEY functions are in separated documents. Refer to Smart key system for more detailed information about SMART KEY function.

Smart Key

The SMK manages all function related to:

- "Start Stop Button (SSB) monitoring",
- "Immobilizer communication" (with Vehicle Control Unit for immobilizer release),
- "ESCL control",
- "Authentication server" (Validity of Transponder and in case of Smart Key option Passive Fob authentication),
- "System consistency monitoring",
- "System diagnosis",
- Control of display message / warning buzzer .

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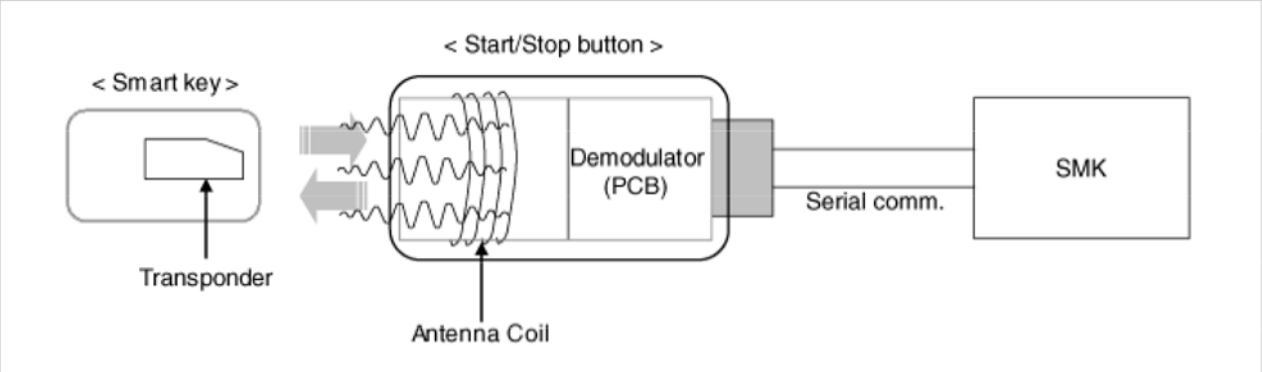
The unit behaves as Master role in the whole system.

In case of SMART KEY application, for example “Passive Access”, “Passive Locking” and “Passive Authorization are integrated for ESCL/Terminal switching Operations”.

It collects information about vehicle status from other modules (vehicle speed, alarm status, driver door open...), read the inputs (e.g. SSB, Lock Button and PARK position Switch), controls the outputs (e.g. exterior and interior antennas), and communicates with others devices via the CAN network as well as a single line interfaces.

The diagnosis and learning of the components of the BES System are also handled by the SMK.

Transponder



Terminal And Starter Relays

Relays will be used to switch the terminals ACC / IGN1 / IGN2. Those normally-open relays will be driven by the SMK unit and located either in the passenger or engine compartment depending on the vehicle architecture.

Only one relay coil is connected to the terminal outputs of the SMK unit.

Those relays should integrate a resistor connected in parallel to the coil in order to reduce the transients during commutation.

Start/Stop Button(SSB)

A single stage push button is used for the driver to operate the vehicle. Pressing this button allows:

- To activate the power modes ‘Off’, ’Accessory’, ‘Ignition’ and 'Start' by switching the corresponding terminals
- To go into READY mode (standby)
- To shut-off EV vehicle

The contact will be insured by a micro-switch and a backlighting is provided to highlight the marking of the button whenever necessary.

Two (2) LED colors are located in the center of the button to display of the status of the system. Another illumination LED is also integrated into the SSB for the lighting of the "Engine Start/Stop" characters.

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BES System State Chart

System STATES in LEARNT MODE

In learnt mode, the BES System can be set in 6 different sates, depending on the status of the terminals and Engine status:

System State	Terminal Status	Engine status
1. OFF - Locked	OFF	Stopped
2. OFF - Unlocked	OFF	Stopped
3. ACC	ACC	Stopped
4. IGN	IGN1, IGN2, ACC	Stopped
5. Start	IGN1, Start	Cranking
6. IGN - Engine	IGN1, IGN2, ACC	Running (means "self-running")

Referring to the terminals, the system states described in the table above are same as those one found in a system based on a mechanical ignition switch. The one of distinction with Mechanical-Ignition-Switch based system is that the BES system allows specific transition from [OFF] to [START] without going through [ACC] and [IGN] states.

System STATES IN VIRGIN MODE

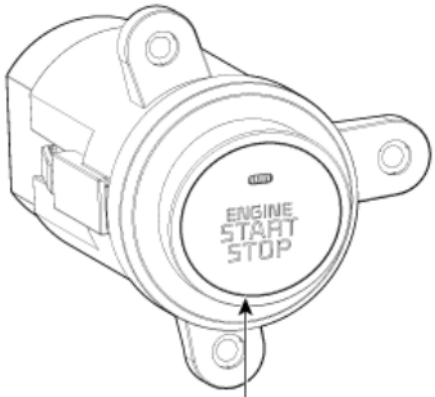
The BES System can be set in 5 different states (OFF LOCKED is not available in virgin mode), depending on the status of the terminals and Engine status:

System State	Terminal Status	Engine status
1. OFF - UNLOCKED	OFF	Stopped
2. ACC	ACC	Stopped
3. IGN	IGN1, IGN2, ACC	Stopped
4. Start	IGN1, START with special pattern of activation see Chap 6.2.1 for details	Cranking
5. IGN - Engine	IGN1, IGN2, ACC	Running (means "self-running")

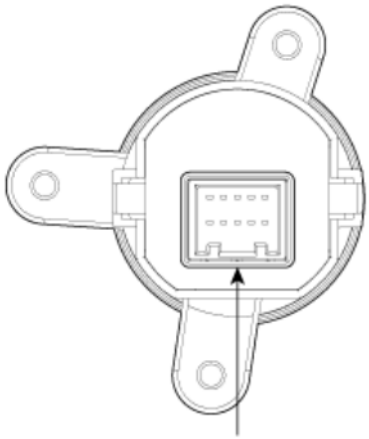
Referring to the terminals, the system states described in the table above are same as those one found in a system based on a mechanical ignition switch. The one of distinction with Mechanical-Ignition-Switch based system is that the BES system allows specific transition from [OFF] to [START] without going through [ACC] and [IGN] states.

Component

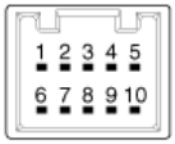
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Button switch

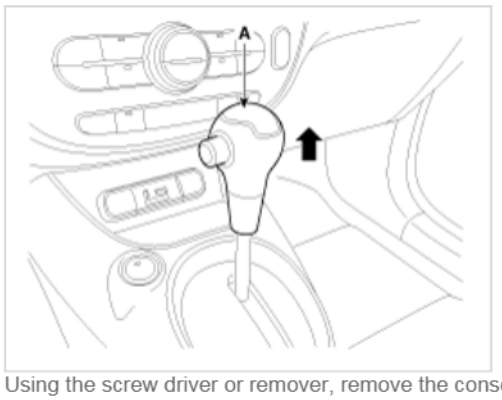


Connector A

Connector A	No.	Description	No.	Description
	1	SSB switch 1	7	Antenna 1
	2	SSB switch 2	8	Antenna 2
	3	Illumination ground	9	Ground
	4	Illumination (-)	10	IGN ON
	5	Illumination power	11	ACC

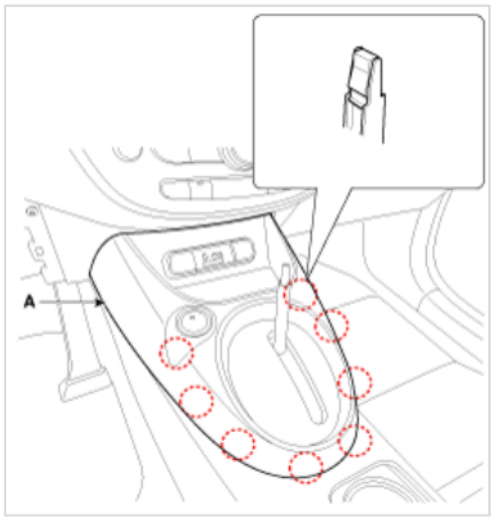
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the gear knob (A) from the console upper cover after pulling out it to upward.

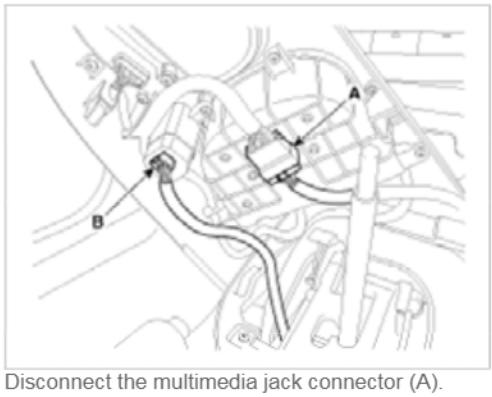


3. Using the screw driver or remover, remove the console upper cover (A).

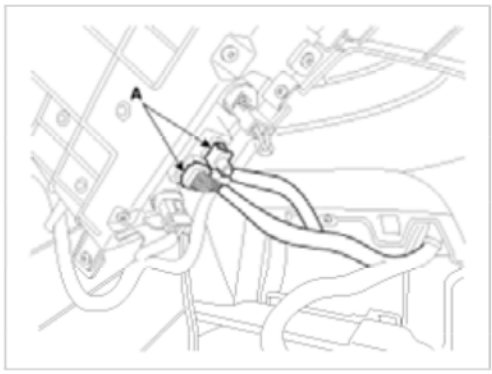
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4. Disconnect the indicator connector (A) and start/stop switch connector (B).



5. Disconnect the multimedia jack connector (A).



6. Diconnect the gear lever lamp connector (A) and wiring.



7. Remove the start/stop button (A) after loosening the mounting screws.

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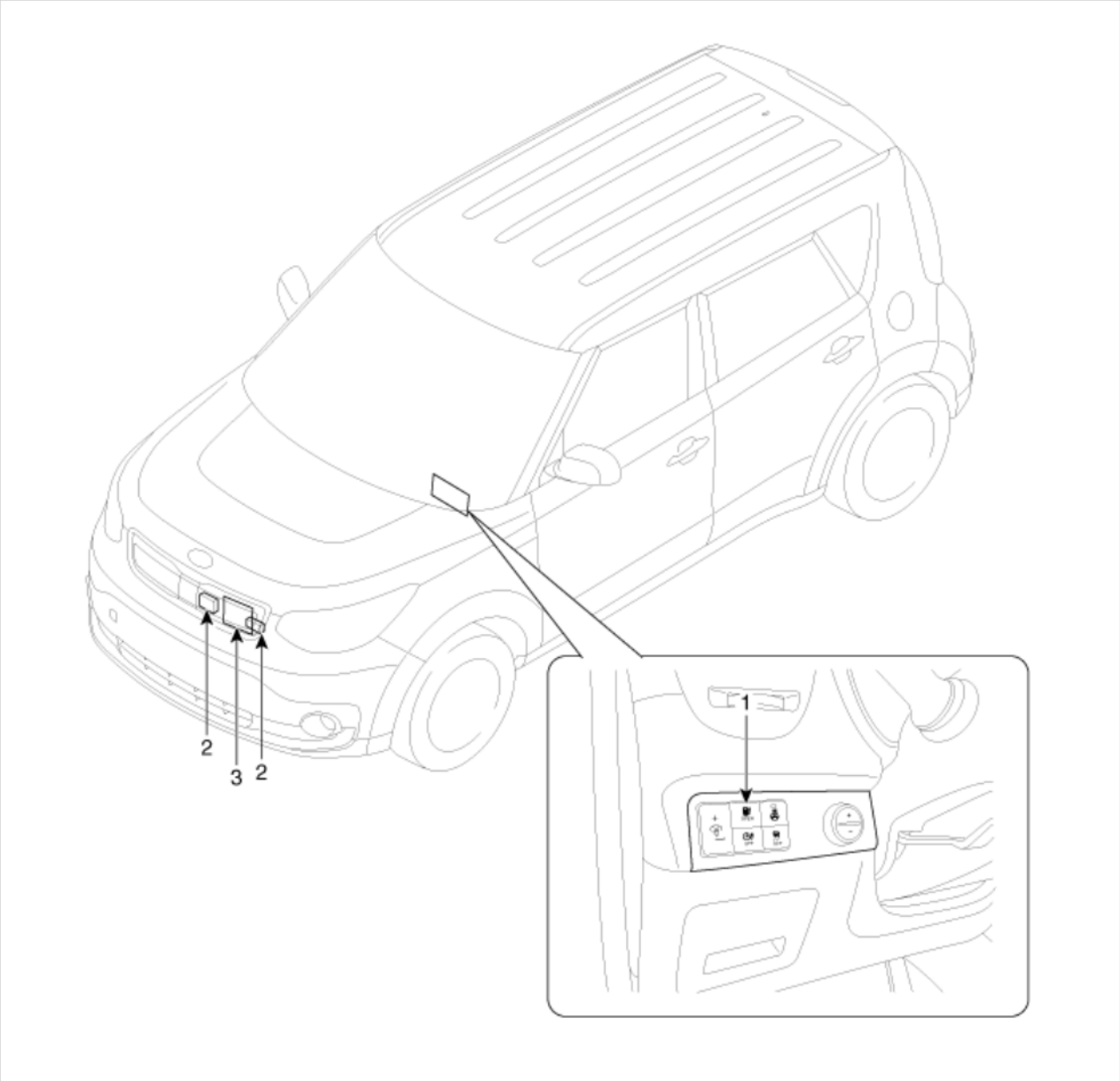
Installation

1. Install the start/stop button.
2. Install the console upper cover and gear knob.
3. Connect the negative (-) battery termninal.

Body Electrical System

Components Location

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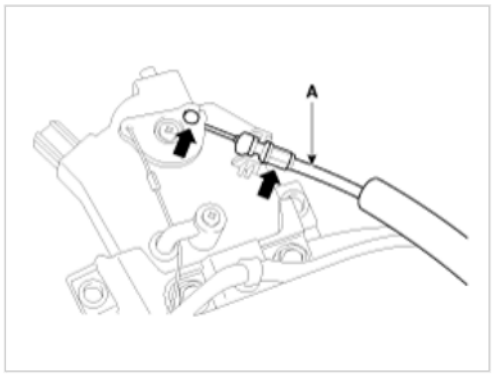
1. Charge door opener actuator switch 2. Charge door opener actuator	3. Charge door opener cover

Body Electrical System

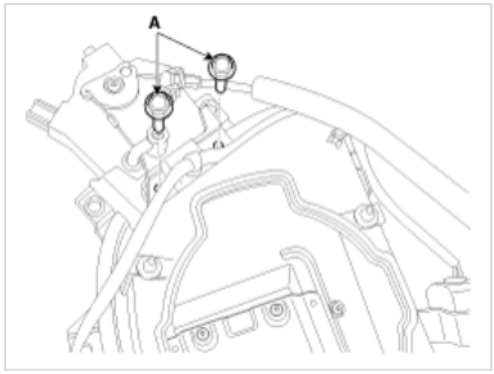
Removal

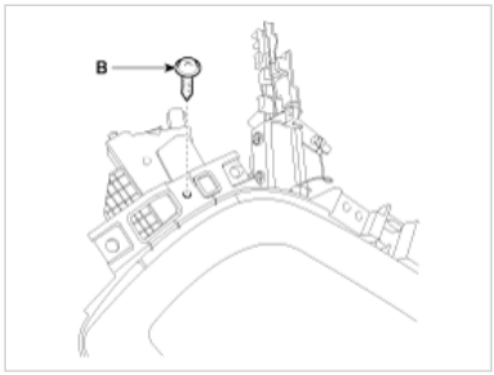
1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper cover.
   (Refer to Body - "Front Bumper Cover")
3. Remove the charge door opener cover assembly.
   (Refer to Body - "Charge Door Opener Cover")
4. Remove the charge door opener actuator cabel (A).

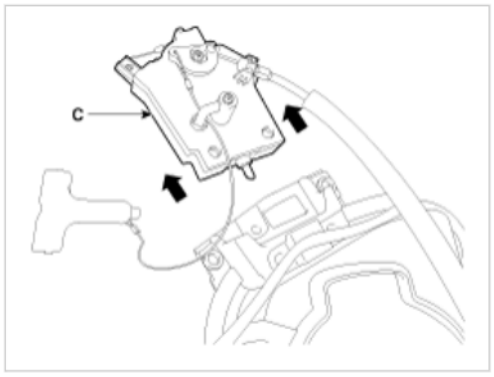
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5. Remove the charge door opener actuator © after loosening the mounting bolts (A) and screw (B).







Installation

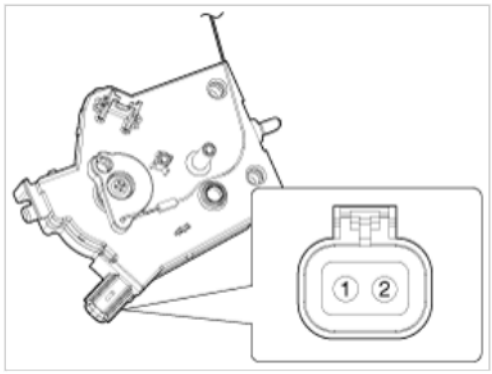
1. Install the charge door opener actuator and cable.
2. Install the charge door opener cover assembly on the front bumper cover.
3. Install the front bumper cover.
4. Connect the negative (-) battery terminal.

Inspection

1. Remove the connector from the charge door opener actuator.

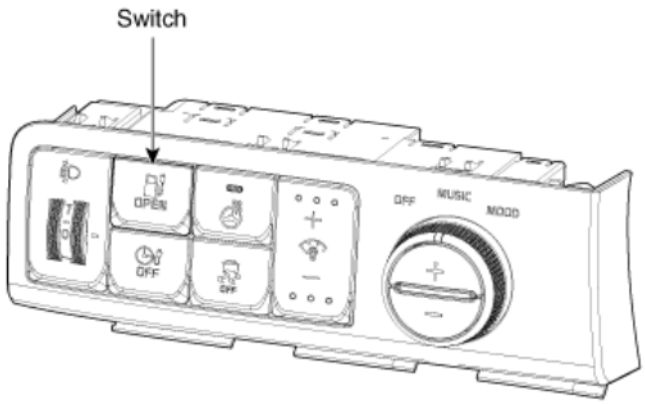
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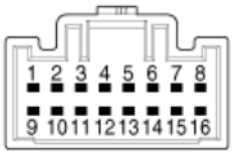
2. Connect battery positive (+) and negative (-) cables to terminals 1 and 2 respectively.
3. Check that the motor operates normally. Replace the motor if it operates abnormally.



Components

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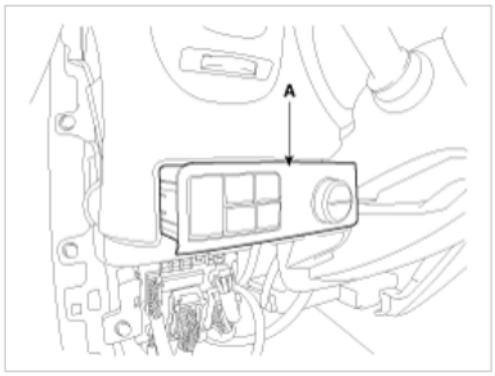


Connector A	No.	Description	No.	Description
	1	Ground	9	Charge door open
	2	Illumination (-)	10	Heated steering wheel indicator
	3	-	11	-
	4	Heated steering wheel	12	ESC
	5	Rheostat up	13	-
	6	Rheostat down	14	-
	7	-	15	Rapid charge
	8	Illumination (+)	16	IGN

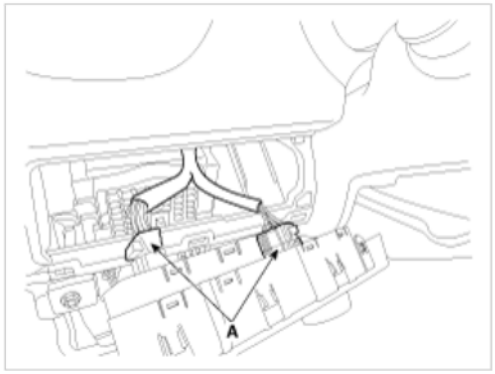
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the crash pad lower switch assembly (A) by pushing it.

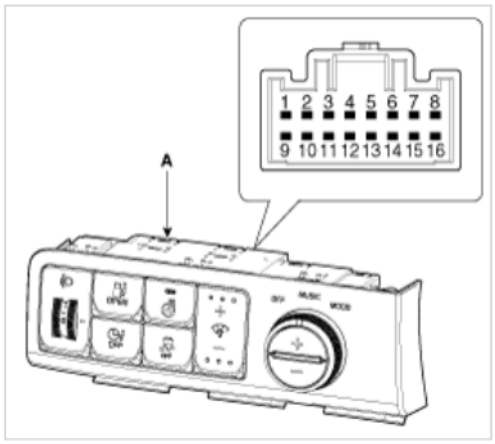
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4. Disconnect the connector (A) from the crash pad lower switch assembly.



5. Remove the crash pad lower switch (A).



6. If it is necessary to check the switch, check for continuity and measure the resistance between terminals.

Position / Terminal	OFF	ON	Description
1		○	Ground
9		○	Charge door open
2	○ ~~~ ⏚		Illumination(-)
8	○ ⏚		Illumination(+)

Installation

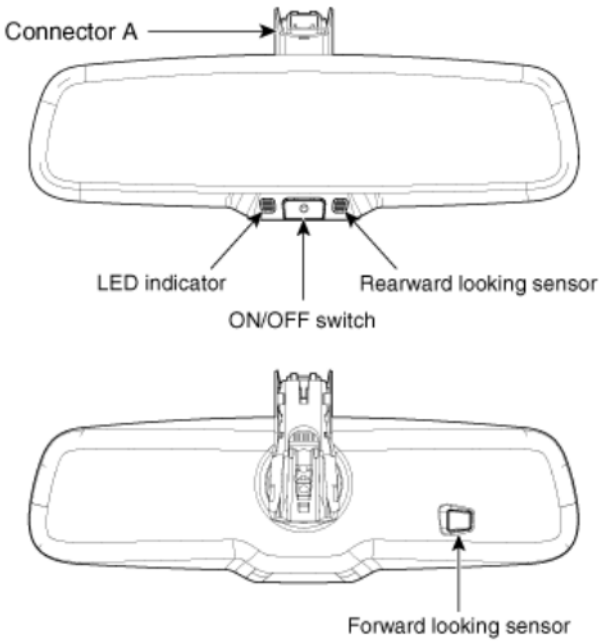
1. Install the crash pad lower switch.
2. Install the crash pad lower panedl after connecting the connector.
3. Connect the negative (-) battery terminal.

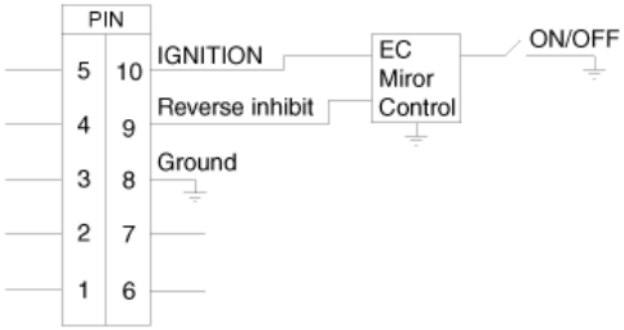
Body Electrical System

Components

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[ECM]





Connector A	No.	Description	No.	Description
	1	-	6	-
	2	-	7	-
	3	-	8	Ground
	4	-	9	Reverse inhibit
	5	-	10	IGN

Body Electrical System

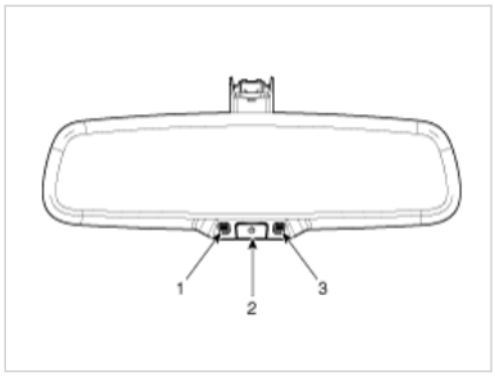
Description

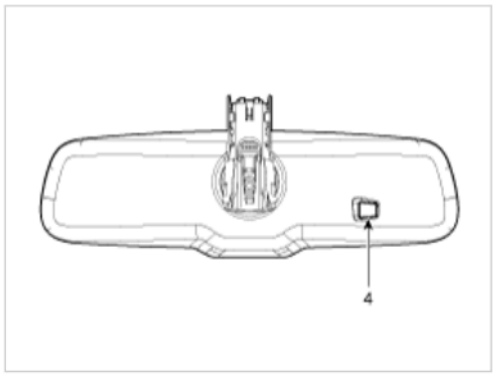
The Electro Chromatic inside rear view Mirror (ECM) is intended dim the reflecting light in the rear view mirror. The forward facing sensor detects brightness of the surroundings, while the rearward looking sensor is for the light from the rear. The strength of the light in the rear sensor is used by the mirror to adjust the shading. It ranges from 7 to 85%. When the reverse gear is engaged, it stops functioning.

1. The forward facing sensor sees if the brightness of the surroundings is low enough for the mirror to operate its function.
2. The rearward looking sensor detects glaring of the reflecting light from a vehicle behind.
3. The ECM is darkened to the level as determined by the rearward looking sensor. When the glaring is no longer detected, the mirror stops functioning.

(1. LED indicator , 2. ON/OFF Switch , 3. Rearward looking sensor , 4. Forward looking sensor)

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Automatic-dimming Function

To protect your vision during nighttime driving, your mirror will automatically dim upon detecting glare from the vehicles traveling behind you. The auto-dimming function can be controlled by the Dimming ON/OFF Button :

1. Pressing and holding the Feature Control button for more than 3 but less than 6 seconds turns the auto-dimming function OFF which is indicated by the green Status Indicator LED turning off.
2. Pressing and holding the Feature Control button again for more than 3 but less than 6 seconds turns the auto-dimming function ON which is indicated by the green Status Indicator LED turning on.

NOTICE

The mirror defaults to the "ON" position each time the vehicle is started.

Inspection

Check it by the procedure below to see if the function of the ECM is normal.

1. Turn the ignition key to the "ON" position.
2. Cover the forward facing sensor.
3. Head a light to the rearward looking sensor.
4. The ECM should be darkened as soon as the rearward looking sensor detects the light.

NOTICE

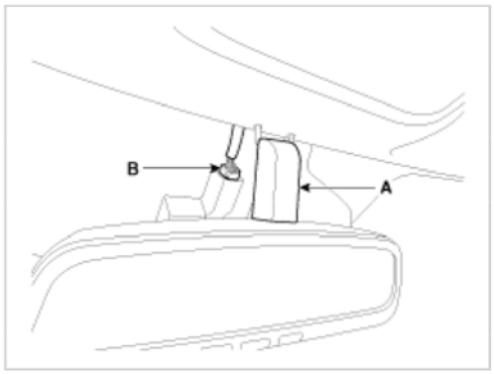
If this test is performed in daytime, the ECM may be darkened as soon as the forward facing sensor is covered.

5. When the reverse gear is engaged, the ECM should not be darkened.
   When heading lights to both the forward facing and rearward looking sensors, the ECM should not be darkened.

Removal

1. Remove the mirror wiring cover (A).
2. Disconnect the ECM mirror connector (B).

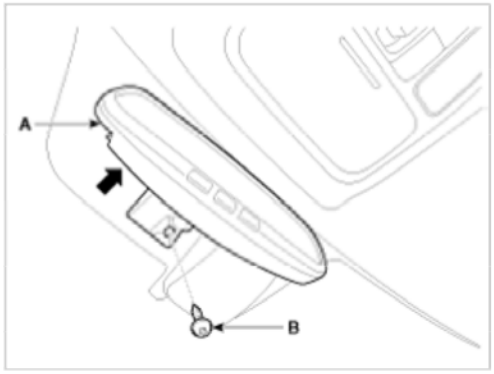
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3. Loosen the mounting screw (B).
4. Push the ECM mirror base up to remove the ECM mirror assembly (A).

NOTICE

Make sure not to damage the mounting bracket when removing the mirror.



Installation

1. Install the mirror making sure the mounting bracket not to be damaged.
2. Install the mirror wiring cover after reconnecting the connector and tightening the screw.

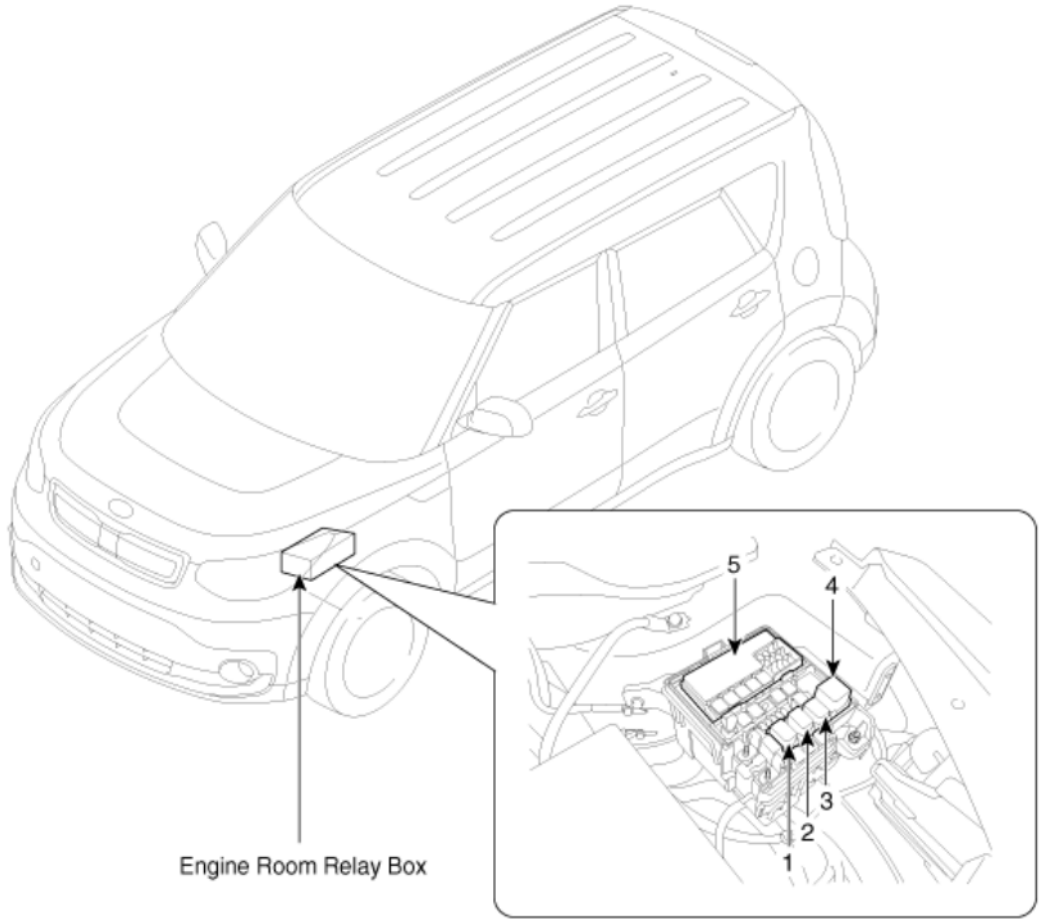
Information

- Make sure the connector is connected properly.
- Replace any damaged clips.

Component Location

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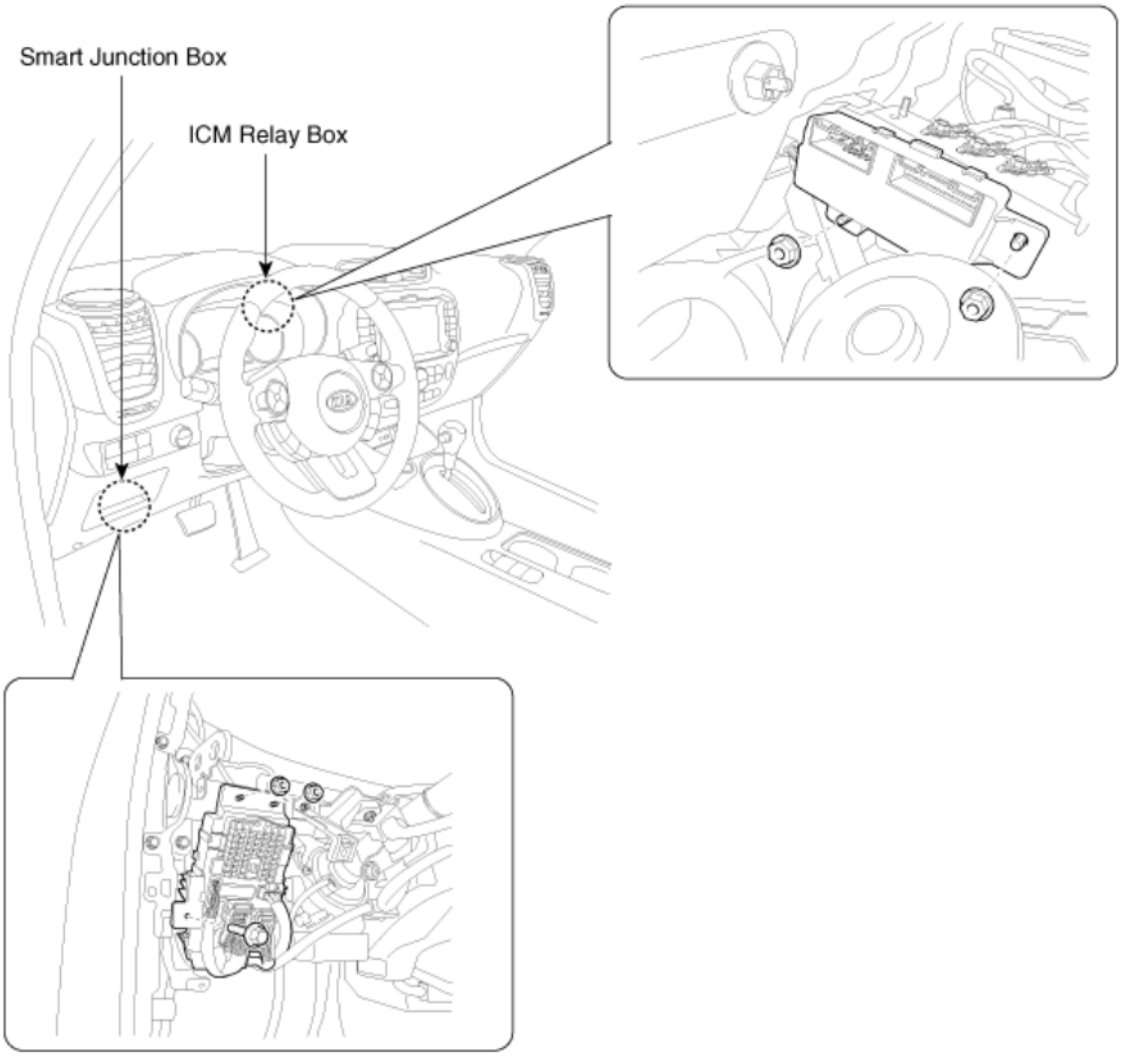
[Engine Room Relay Box]



1. Power outlet relay	4. Cooling fan relay 2
2. Cooling fan relay 1	5. EMS Box
3. Defroster relay	

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[Passenger Compartment Relay]

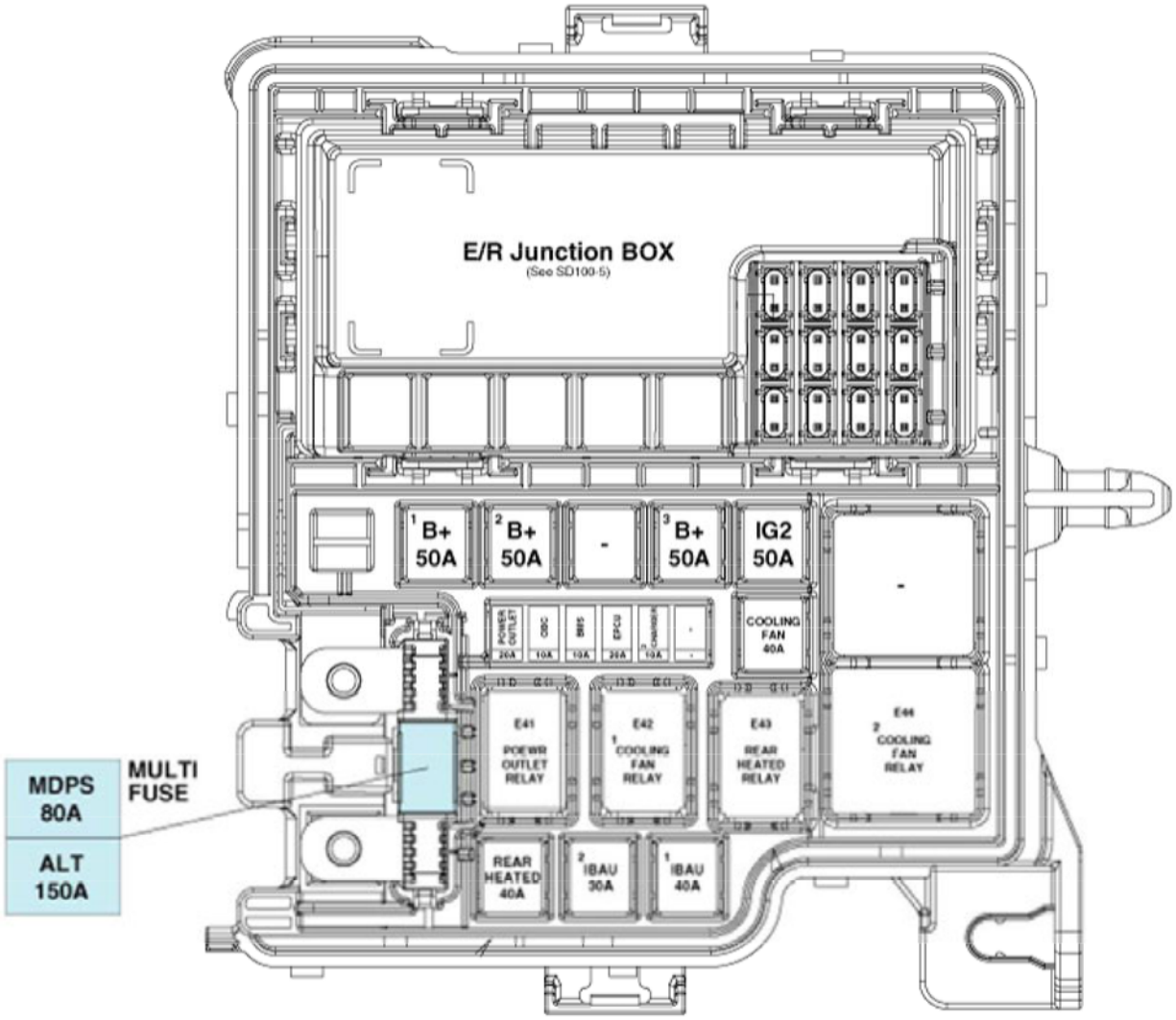


Body Electrical System

Component Location

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E/R Junction Block



NO.	Relay Name	TYPE
E41	Power Outlet Relay	PLUG MICRO
E42	C/FAN 1 Relay	PLUG MICRO
E43	RR HTD Relay	PLUG MICRO
E44	C/FAN 2 Relay	PLUG MINI
-	-	-

※ USE THE DESIGNATED FUSE AND RELAY ONLY

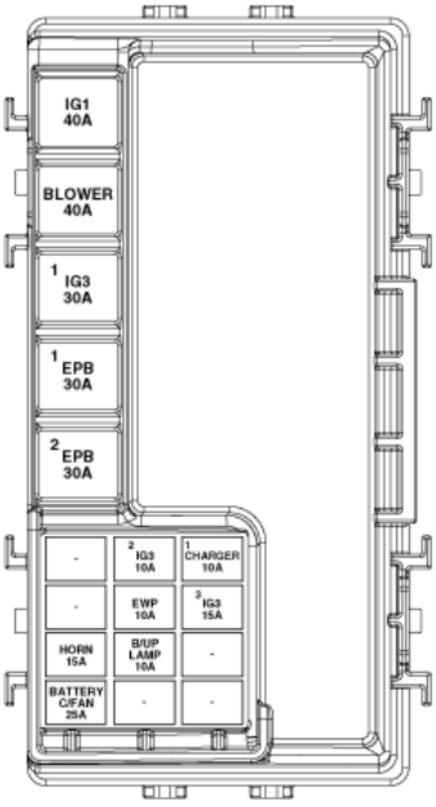
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Circuit (E/R Junction Block)

Fuse Name		(A)	Circuit Protected
MULTI FUSE	MDPS	80A	MDPS Unit
	ALT	150A	Alternator
FUSE	B+1	50A	Smart Junction Block (Fuse - (S/HEATER FRT, TAIL GATE OPEN, DR LOCK, P/WINDOW LH, P/WINDOW RH, MODULE 7))
	B+2	50A	Smart Junction Block (Fuse - (STOP LAMP) Arisu-LT2)
	B+3	50A	Smart Junction Block (Fuse - (PDM 1, PDM 2, BRAKE SWITCH, Leak Current Autocut Device) IPS1, Arisu-LT1)
	IG2	40A	PCB Block (Button Start (IG2) Relay)
	POWER OUTLET	20A	Power Outlet Relay
	OBC	10A	OBC Unit, Rear Heated Relay
	BMS	10A	BMS Control Module
	EPCU	20A	EPCU
	CHARGER 2	10A	Normal Charge Port Lmap
	C/FAN	40A	COOLING FAN 1 Relay, COOLING FAN 2 Relay
	RR HTD	40A	Rear Heated Relay
	IBAU 2	30A	Integrated Brake Actuation Unit
	IBAU 1	40A	Integrated Brake Actuation Unit

※ USE THE DESIGNATED FUSE AND RELAY ONLY

PCB Block



Circuit (PCB Block)

Fuse Name	(A)	Circuit Protected
IG1	40A	Button Start (ACC) Relay, Button Start (IG1) Relay
BLOWER	40A	Blower Relay
IG3 1	30A	IG3 #1/#2/#3/#4/#5 Relay
EPB 1	30A	Electronic Parking Brake Module
EPB 2	30A	Electronic Parking Brake Module
IG3 2	10A	Blower Relay, A/C Control Module, A/C Compressor, E/R Junction Block (Cooling Fan 1/2 Relay), Heater Assembly (PTC Heater)
CHARGER 1	10A	OBC Unit, BMS Control Module
EWP	10A	Electronic Water Pump
IG3 3	15A	EPCU, Transaxle Range Switch, A/V & Navigation Head Unit, Instrument Cluster
HORN	15A	Horn Relay
B/UP LAMP	10A	Transaxle Range Switch, EPCU
BATTERY C/FAN	25A	Battery C/FAN Relay

※ USE THE DESIGNATED FUSE AND RELAY ONLY

Inspection

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1. Disconnect the negative (-) battery terminal.
2. Pull out the relay from the engine compartment relay box.

Power Relay (Type A)

NOTICE

- Do not use pliers.
- Pliers will damage the relays, which could cause the engine to stall or not start.
- Carefully remove the relay using the relay puller.

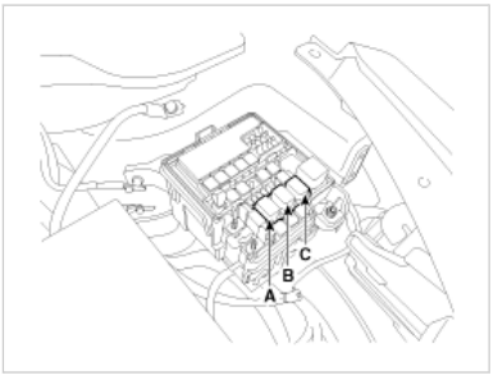
Check for continuity between the terminals.

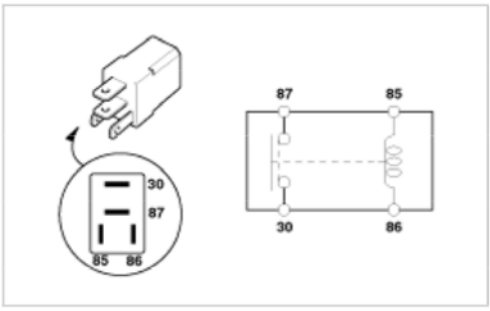
A : Power outlet relay

B : Cooling fan relay 1

C : Defroster relay

1. There should be continuity between the No.30 and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
2. There should be no continuity between the No.30 and No.87 terminals when power is disconnected.





Terminal / Power	30	87	85	86
Disconnected			○ ——— ○	
Connected	○ ——— ○		⊖ ——— ⊕	

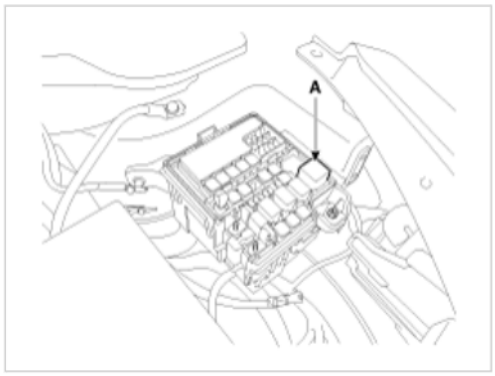
Power Relay (Type C)

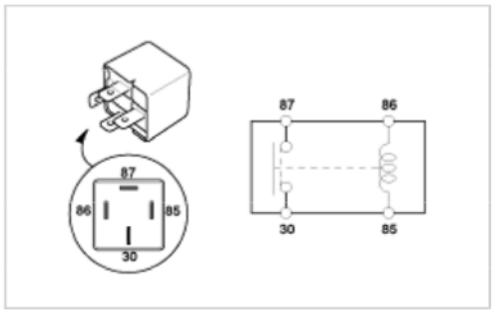
Check for continuity between the terminals.

A : Cooling fan relay 2

1. There should be continuity between the No.30 and No.87 terminals when power and ground are connected to the No.85 and No.86 terminals.
2. There should be no continuity between the No.30 and No.87 terminals when power is disconnected.

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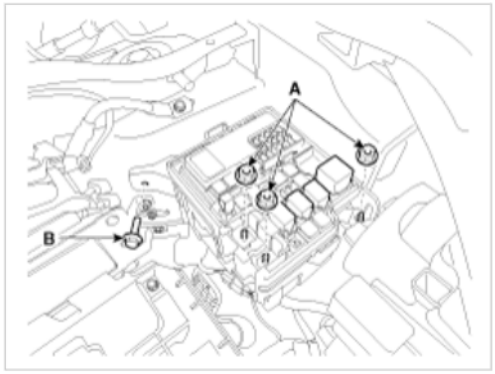




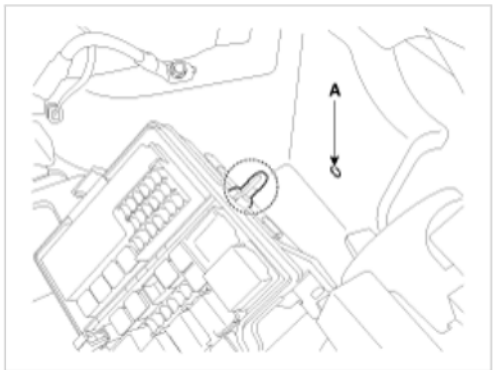
Terminal / Power	86	85	87	30
Disconnected	○	○		
Connected	⊖	⊕	○	○

Replacement of EMS box

1. Disconnect the negative (-) battery terminal.
2. Loosen the mounting nut (A) and bolt (B).

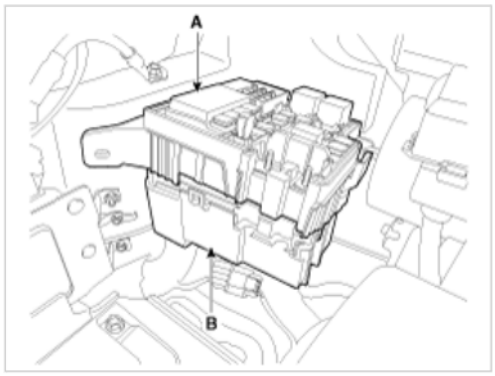


3. Reomve the engine room fuse & relay box from the hole (A).

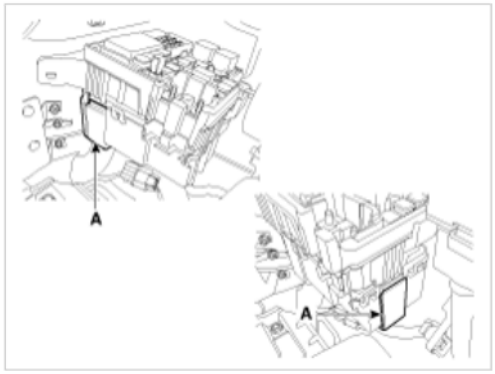


4. Separate the engine room upper box (A) and lower cover (B).

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5. Remove the wire cover (A) on the engine room lower box.



6. Disconnect the connectors (A) from the EMS box.



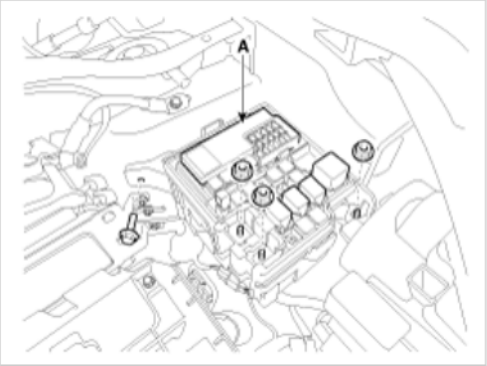
Fuse

1. Be sure there is no play in the fuse holders, and that the fuses are held securely.
2. Are the fuse capacities for each circuit correct?
3. Are there any blown fuses?

   If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

Multi Fuse

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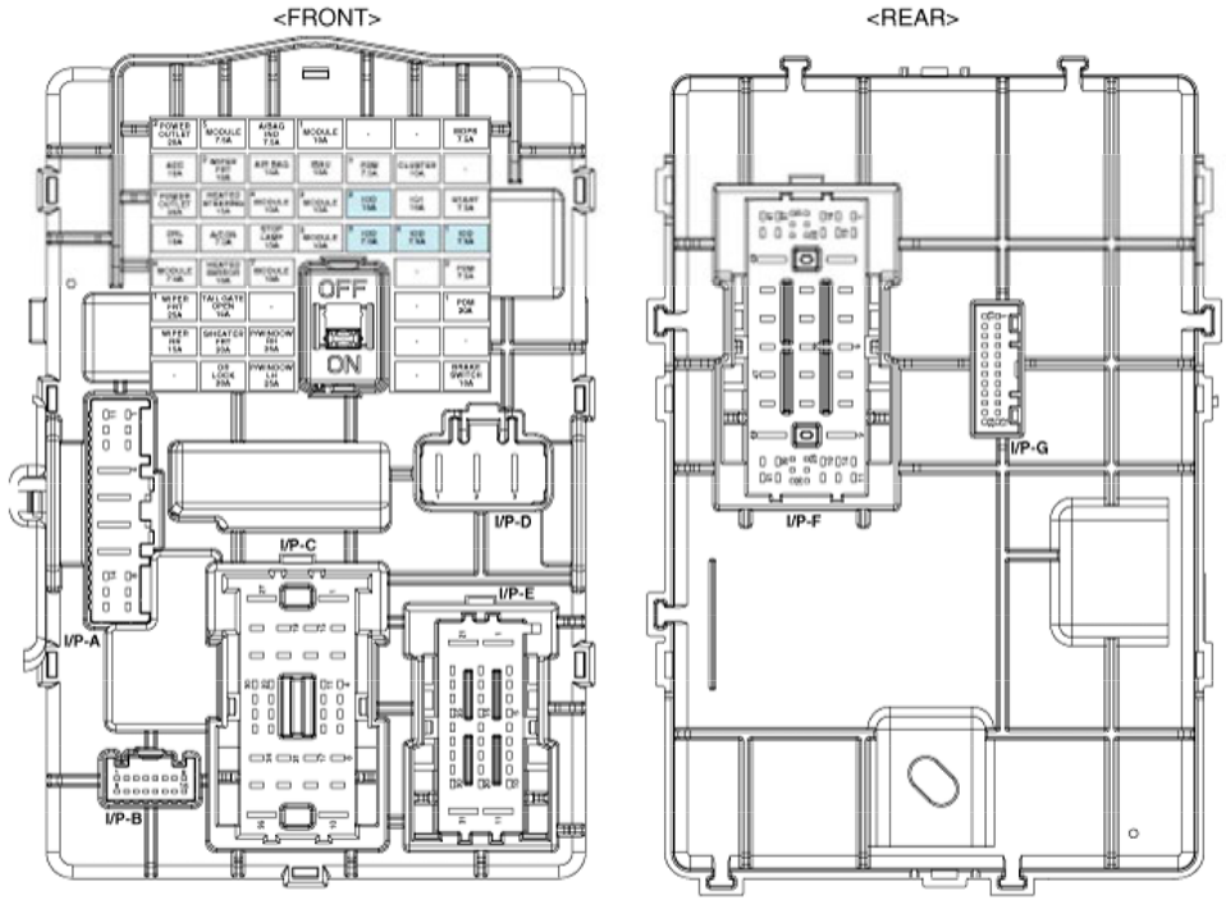
NOTICE

- Multi fuse (A) is needed to replace in the mass when it damaged only one fuse.
- When replace the multi fuse, refer to the "Engine compartment - component location" diagram exactly.
- Use the multi fuse capacities for each circuit correctly.

Body Electrical System

Component Location

Smart Junction Block



※ USE THE DESIGNATED FUSE ONLY

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Circuit (Smart Junction Block)

Fuse Name	(A)	Circuit Protected
POWER OUTLET 2	20A	Front Power Outlet
ACC	10A	BCM, Mood Lamp Module, A/V & Navigation Head Unit, Smart Key Control Module, Power Outside Mirror Switch, E/R Junction Block (Power Outlet Relay)
POWER OUTLET 1	20A	Rear Power Outlet
DRL	10A	BCM
MODULE 6	7.5A	Front Seat Warmer Module, Driver Air Ventilation Seat Control Module
WIPER FRT 1	25A	E/R Junction Block (Front Wiper Low Relay)
WIPER RR	15A	Rear Wiper Motor, Multifunction Switch
MODULE 5	7.5A	BCM, Smart Key Control Module
WIPER FRT 2	10A	BCM, Multifunction Switch, PCB Block (Front Wiper High Relay)
HTD STRG	15A	Clock Spring (Steering Wheel Heated)
A/CON	7.5A	A/C Control Module, Heater Assembly (Cluster Ionizer)
HTD MIRR	10A	A/C Control Module, Driver/Passenger Power Outside Mirror, Rear Defogger
TAIL GATE OPEN	15A	Tail Gate Open Relay
S/HEATER FRT	25A	Front Seat Warmer Module, Driver Air Ventilation Seat Control Module
DR LOCK	20A	Door Lock Relay, Door Unlock Relay, Two Turn Unlock Relay
A/BAG IND	7.5A	Instrument Cluster
AIR BAG	15A	SRS Control Module
MODULE 4	10A	Electro Chromic Mirror, Front Seat Warmer Module, Driver Air Ventilation Seat Control Module
STOP LAMP	15A	Stop Signal Electronic Module
MODULE 7	10A	Sport Mode Switch, ICM Relay Box
P/WINDOW RH	25A	Power Window RH Relay
P/WINDOW LH	25A	Power Window LH Relay, Driver Safety Power Window Module
MODULE 1	10A	BCM
IBAU	10A	Integrated Brake Actuation Unit
MODULE 2	10A	Tire Pressure Monitoring Module, Crash Pad Switch, Center Fascia Switch, Electronic Parking Brake Module, Stop Lamp Switch, Rear Parking Assist Sensor RH/LH (IN/OUT), Front Parking Assist Sensor LH/RH (OUT/IN)
MODULE 3	10A	ATM Lever Indicator, Multipurpose Check Connector, PCB Block (IG3 #4 Relay)
PDM 3	7.5A	Smart Key Control Module
IOD 2	15A	A/V & Navigation Head Unit
IOD 3	7.5A	ICM Relay Box (Outside Mirror Folding Relay, Outside Mirror Unfolding Relay)
CLUSTER	10A	Instrument Cluster
IG1	15A	EPCU
IOD 4	7.5A	Instrument Cluster, Tire Pressure Monitoring Module, Data Link Connector, Multipurpose Check Connector, A/C Control Module, BCM
MDPS	7.5A	MDPS Unit
START	7.5A	Transaxle Range Switch
IOD 1	7.5A	Overhead Console Lamp, Vanity Lamp LH/RH, Room Lamp, Glove Box Lamp, Luggage Lamp
PDM 2	7.5A	Smart Key Control Module
PDM 1	20A	Smart Key Control Module
BRAKE SWITCH	10A	Smart Key Control Module, Stop Lamp Switch

※ USE THE DESIGNATED FUSE ONLY

Description

Smart Junction Box(SJB)

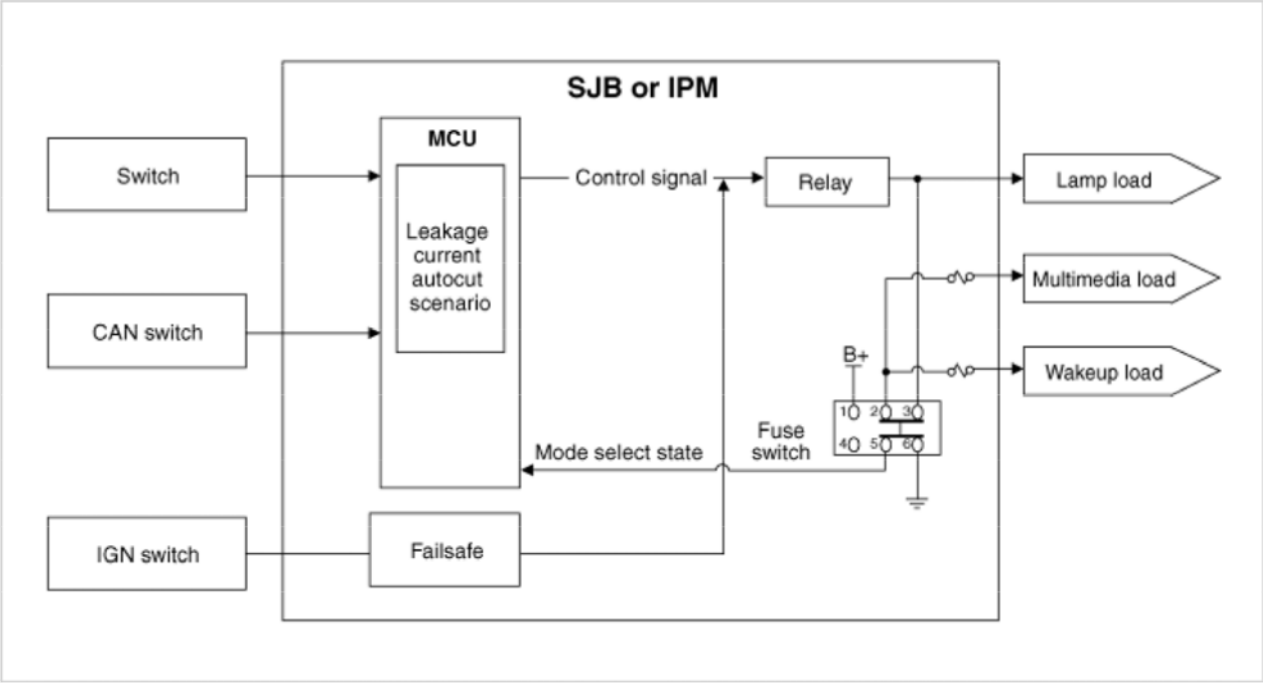
1. General function : Interior Junction Box + some functions of BCM
   It controls loads with CAN communication and IPS.
2. Main function
   A. Low speed CAN communication(100 kbps)
   B. Self diagnostics(Lamp open/short)
   C. Fail safe(When MCU/CAN is fail, Head lamp / Tail lamp directly drive)
   D. Protection of bulb over-voltage(PWM function)
   E. Cut of Over-load and Short : PCL(Program Current Limit)

Auto Cut System Of Dark Current

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1. Description : It cuts automatically power to be provided with load for reducing useless dark current according to vehicle state.



2. SJB had 3 modes, "Normal Mode", "Sleep Mode", "Power Off Mode". Auto cut of dark current practice in "Sleep Mode".
   A. "Sleep" condition : IG OFF, constant input switch, CAN network doesn't activate.
   B. "Sleep" resolutive condition : Any switch inputs, CAN network activates, KEY ON, IGN ON
   C. "Power OFF" condition : The setting time of timer which is used by cutting a load power expires.
   D. "Normal Mode" : SJB function normally activates.
   E. "Sleep Mode" : It is low power mode and activates for reducing electricity consumption of SJB or IPM. Auto cut of dark current function activates.
   F. "Power OFF Mode" : Power of MCU and circumferential circuit is cut for minimizing electricity consumption. Operation stops.
3. The explanation - The auto cut of dark current

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Before delivering to customer	Fuse switch OFF
•All door close & RKE door lock or Constant switch state (Auto cut of dark current scenario starts.) -After "sleep" state is for 20 min. -SJB power down(SJB dark current : 200 μA) and cutting power of Lamp/Body Load/Wake up	
After delivering to customer	Fuse switch ON
•All door close & Constant switch state : C_BAState=OFF (Auto cut of dark current scenario starts.) -After "sleep" state is for 20 min. -SJB power down(SJB dark current : 200 μA) and cutting power of Lamp Load •In case RKE door lock : C_BAState=ON & Trunk SW=CLOSE (Auto cut of dark current scenario starts.) -After "Sleep" state 35s~65s (Waiting time of other unit : 30~60s + SJB sleep counts 5s) -SJB Powerdown(SJB dark current : 200 μA) and cutting power of Lamp Load	

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4. Problem when mode switch setting is wrong
   : If a fuse switch is set to OFF(Before delivering to customer) by a customer or technician and auto cut function of dark current activates, below problems may happen.

Symptom	Related part
•Door lock/unlock, trunk open don't activate by RKE. (Wakeup of each module don't activate.)	BCM
•Digital clock is reset.(Memory is reset.)	Digital clock
•Setting value of audio(Volume, Frequency setting) is reset. (Memory is reset.)	Audio

*If fuse switch OFF(before delivering to customer) is set, power of BCM, Digital clock and audio is shut off.

Fuse Inspection

1. Be sure there is no play in the fuse holders, and that the fuses are held securely.
2. Are the fuse capacities for each circuit correct?
3. Are there any blown fuses?
   If a fuse is to be replaced, be sure to use a new fuse of the same capacity. Always determine why the fuse blew first and completely eliminate the problem before installing a new fuse.

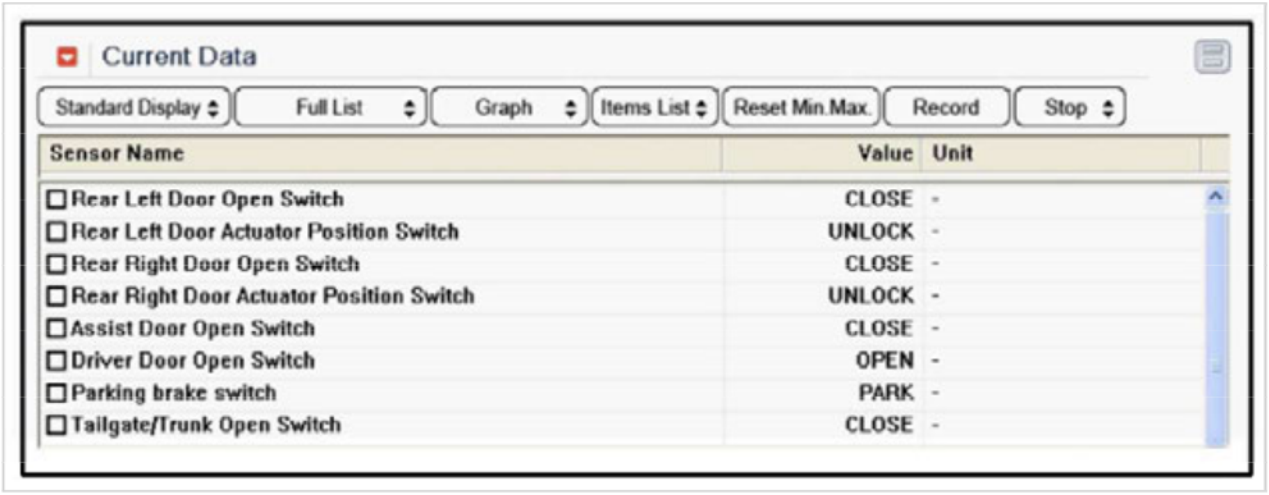
Inspection

1. The SJB can be diagnosed by using the GDS. The SJB communicates with the GDS which then displays inputs and outputs along with codes.
2. To diagnose the SJB function, select the vehicle model, BCM and SJB.

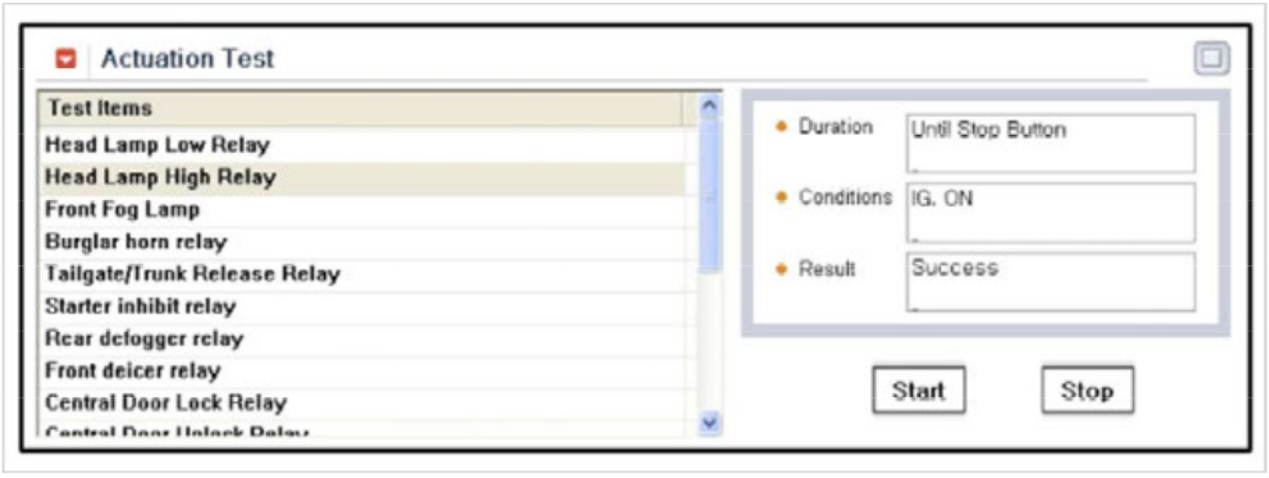
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3. To consult the present input/out value of SJB, "Current DATA". It provides information of SJB input/output conditions.



4. To perform functional test on SJB outputs, select "Actuation Test"

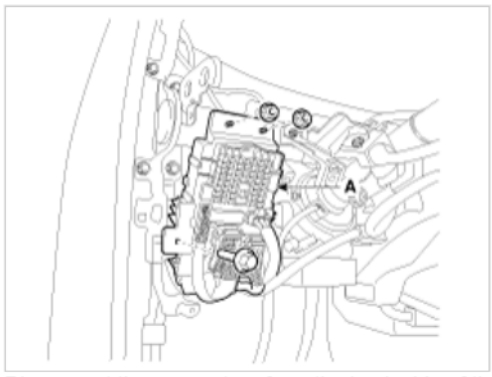


Removal

Passenger Compartment Junction Box (SJB)

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1. Disconnect the negative(-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Disconnect the connectors from the fuse side of the smart junction box.
4. Remove the smart junction box (A) after loosening the mounting nuts and bolt.



5. Disconnect the connectors from the back side of the smart junction box.

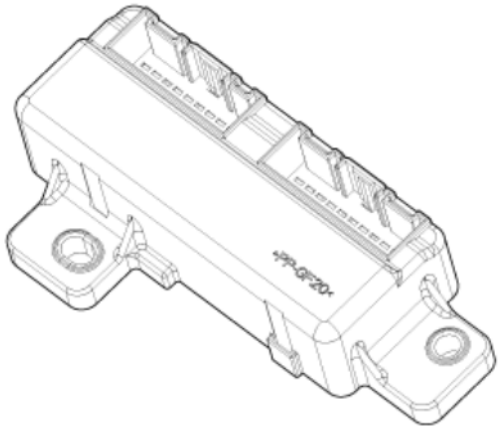
Installation

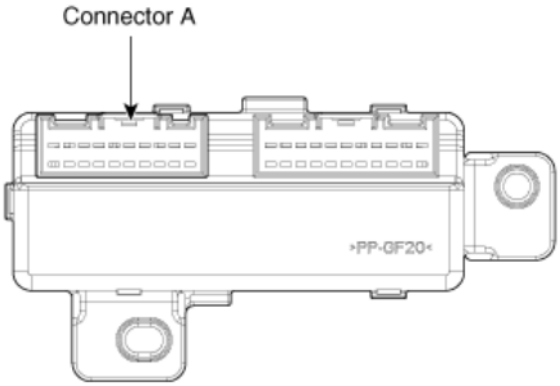
1. Install the smart junction box.
2. Install the crash pad lower panel.
3. Check that all system operates normally.

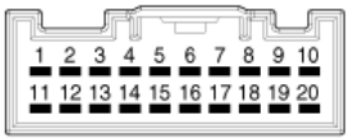
Body Electrical System

Component

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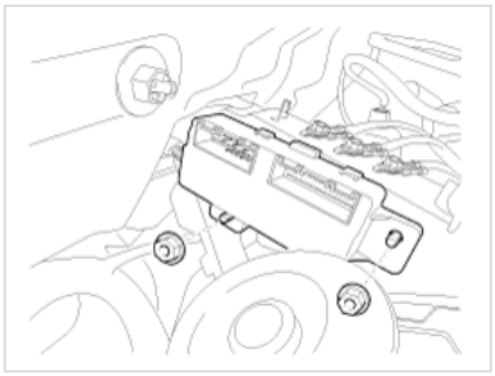
Connector A

Body Electrical System

Description

The ICM relay is united with (outside mirror fold/unfold relay, front deicer relay, rear fog lamp relay) which installed inside the lower crash pad.

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Inspection

Normal Charge Port Relay

Check for continuity between the terminals.

1. There should be continuity between the No.20 and No.10 terminals when power and ground are connected to the No.10 and No.9 in the ICM-A.

Folding Motor Relay

Check for continuity between the terminals.

1. There should be continuity between the No.16 and No.17 terminals when power and ground are connected to the No.4 and No.8 in the ICM-A.

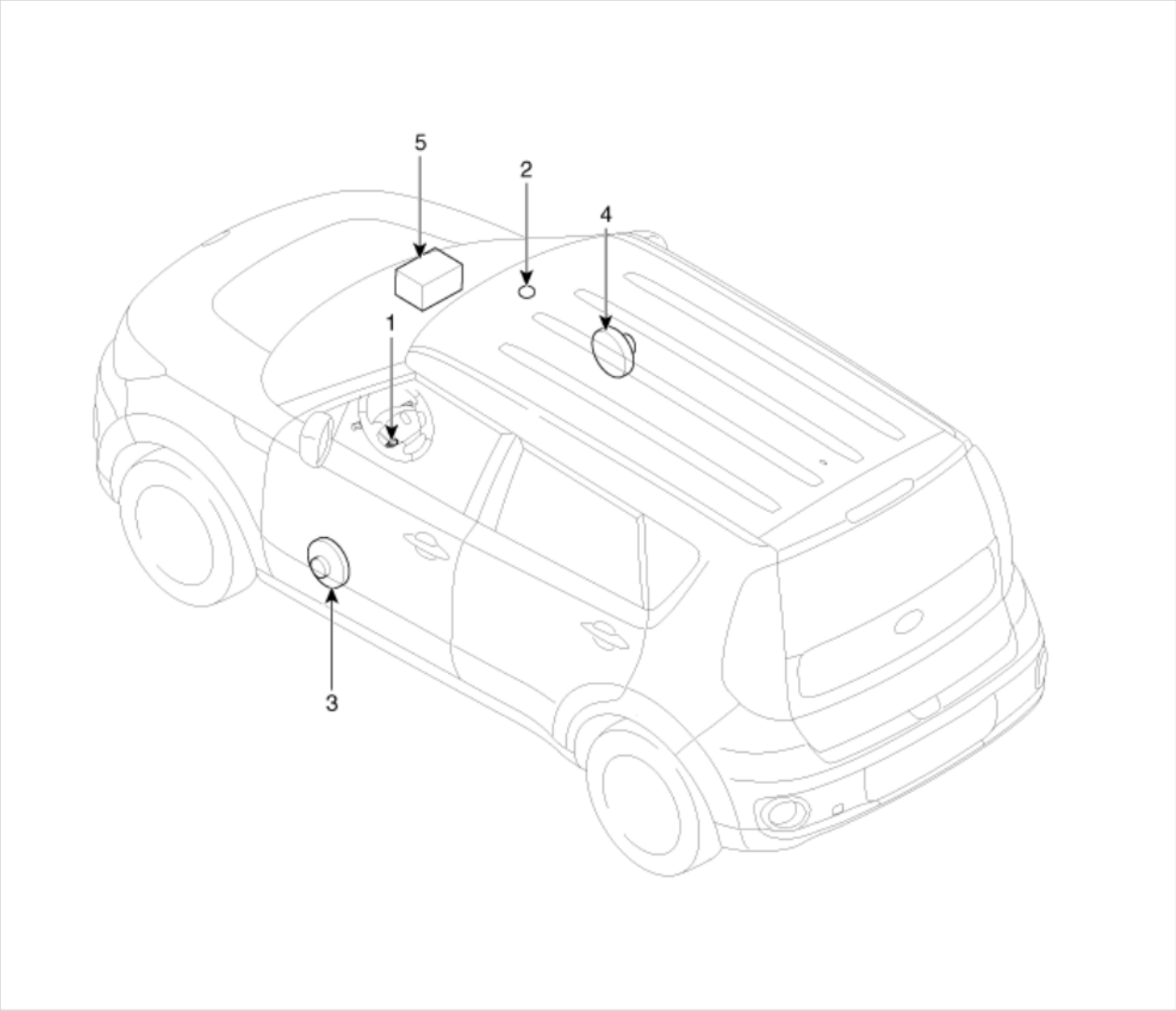
Unfolding Motor Relay

Check for continuity between the terminals.

1. There should be continuity between the No.15 and No.17 terminals when power and ground are connected to the No.6 and No.8 in the ICM-A.

Components

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1. Hands free call switch 2. Mic 3. Front left speaker	4. Front right speaker 5. AVN head unit (hands free control)

※ There is no hands free jack. This system supports Bluetooth (wireless system).

Body Electrical System

Function

Audio Bluetooth System

General Features

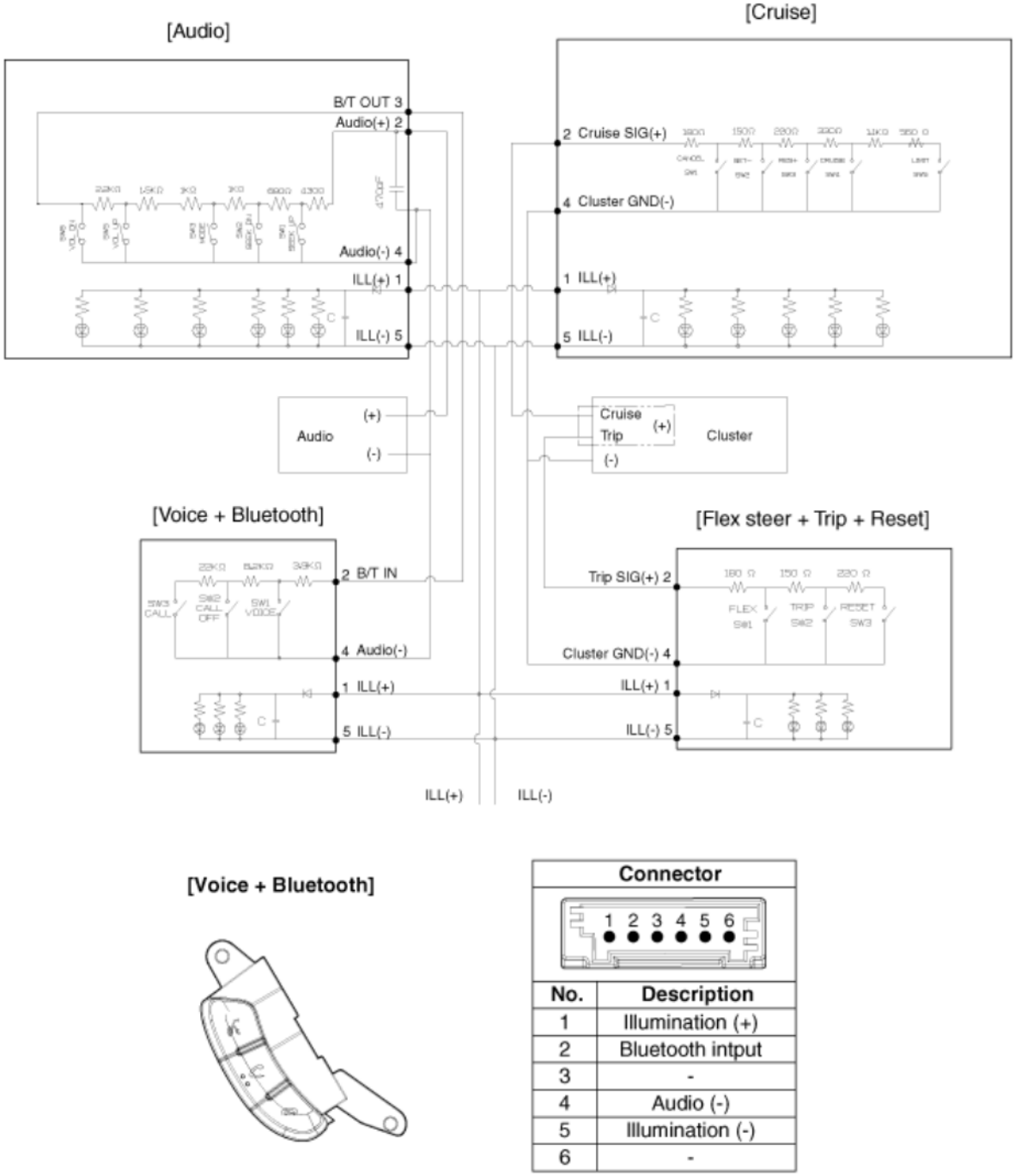
- This audio system supports Bluetooth® hands-free and stereo-headset features.
- HANDS-FREE feature : Making or receiving calls wirelessly.
- STEREO-HEADSET feature : Playing music from cellular phones (that supports A2DP feature) wirelessly.

NOTICE

- The phone must be paired to the system before using Bluetooth® features.
- Only one selected (connected) cellular phone can be used with the system at a time.
- Some phones are not fully compatible with this system.

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Circuit Diagram



[Voice + Bluetooth]

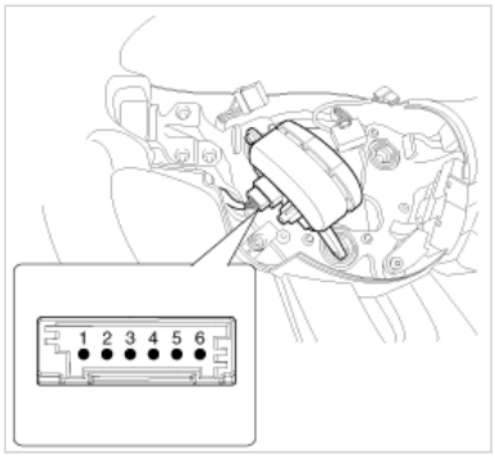
Connector	
No.	**Description**
1	Illumination (+)
2	Bluetooth intput
3	-
4	Audio (-)
5	Illumination (-)
6	-

Inspection

1. Check for resistance between terminals in each switch position.

[Voice + Bluetooth]

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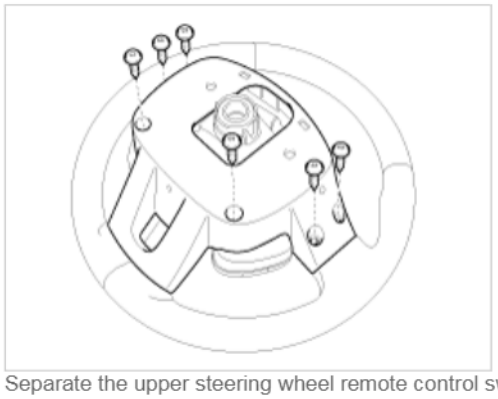


[Voice + Bluetooth]

Switch	Connector terminal	Resistance (±5%)	Output voltage (± 0.22)
Voice	2-4	10.71 kΩ	3.5 V ± 0.22
Call off	2-4	18.91 kΩ	4.0 V ± 0.22
Call	2-4	40.91 kΩ	4.5 V ± 0.22

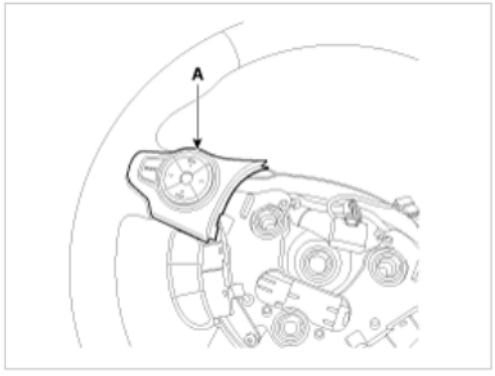
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the driver airbag module.
   (Refer to the RT group)
3. Remove the steering wheel.
   (Refer to the ST group - "Steering column & shaft")
4. Loosen the mounting screws from the rear steering wheel cover.



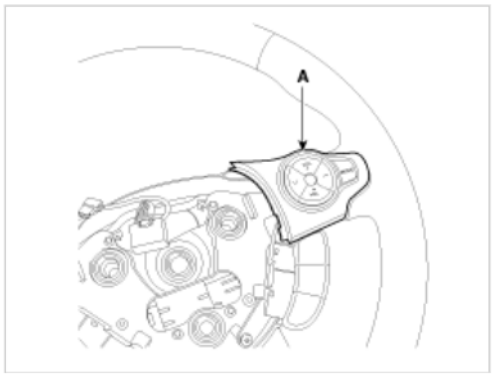
5. Separate the upper steering wheel remote control switch (A) from the steering wheel.

[LH]



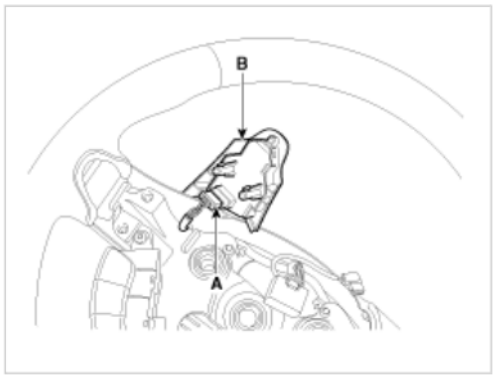
[RH]

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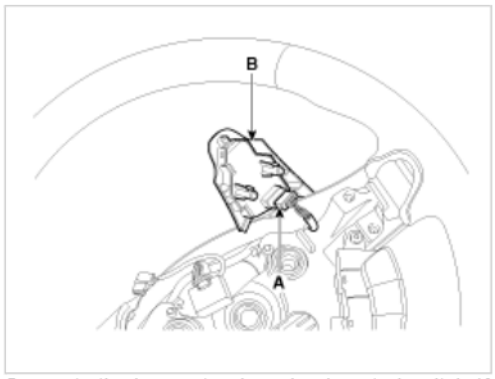


6. Remove the upper steering wheel control switch (B) disconnecting the connector (A).

[LH]

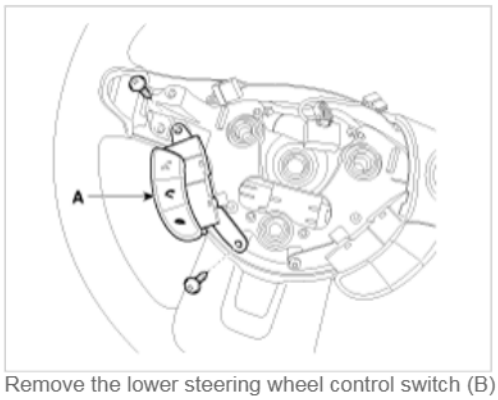


[RH]



7. Separate the lower steering wheel control switch (A) loosening the mounting screws.

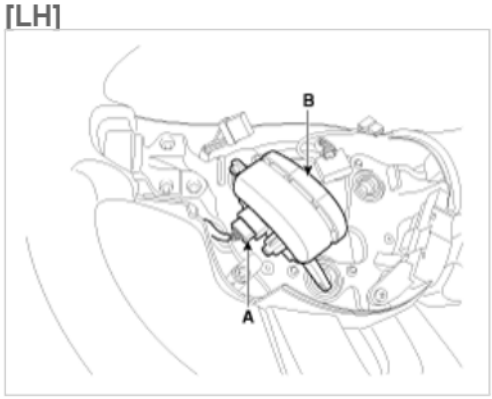
[LH]



8. Remove the lower steering wheel control switch (B) disconnecting the connector (A).

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[LH]



Installation

1. Install the remote control switch on the steering wheel.
2. Install the steering wheel.
3. Reconnect the remote control switch connector and airbag connectors.

NOTICE

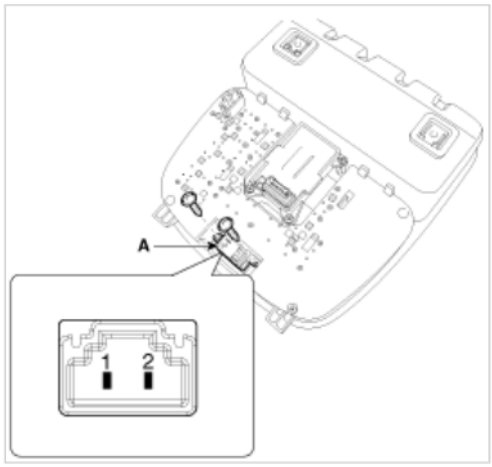
Make sure that the switch connector is plugged in properly.

4. Install the driver airbag module.
5. Connect the negative (-) battery terminal.

Body Electrical System

Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the overhead console lamp.
   (Refer to Body Electrical - "Overhead Console Lamp")
3. Remove the hands free mic (A) from the overhead console lamp loosening the mounting screws.



No.	Description
1	Mic (+)
2	Mic (-)

4. Check the continuity of mic between terminals.

Body Electrical System

Troubleshooting

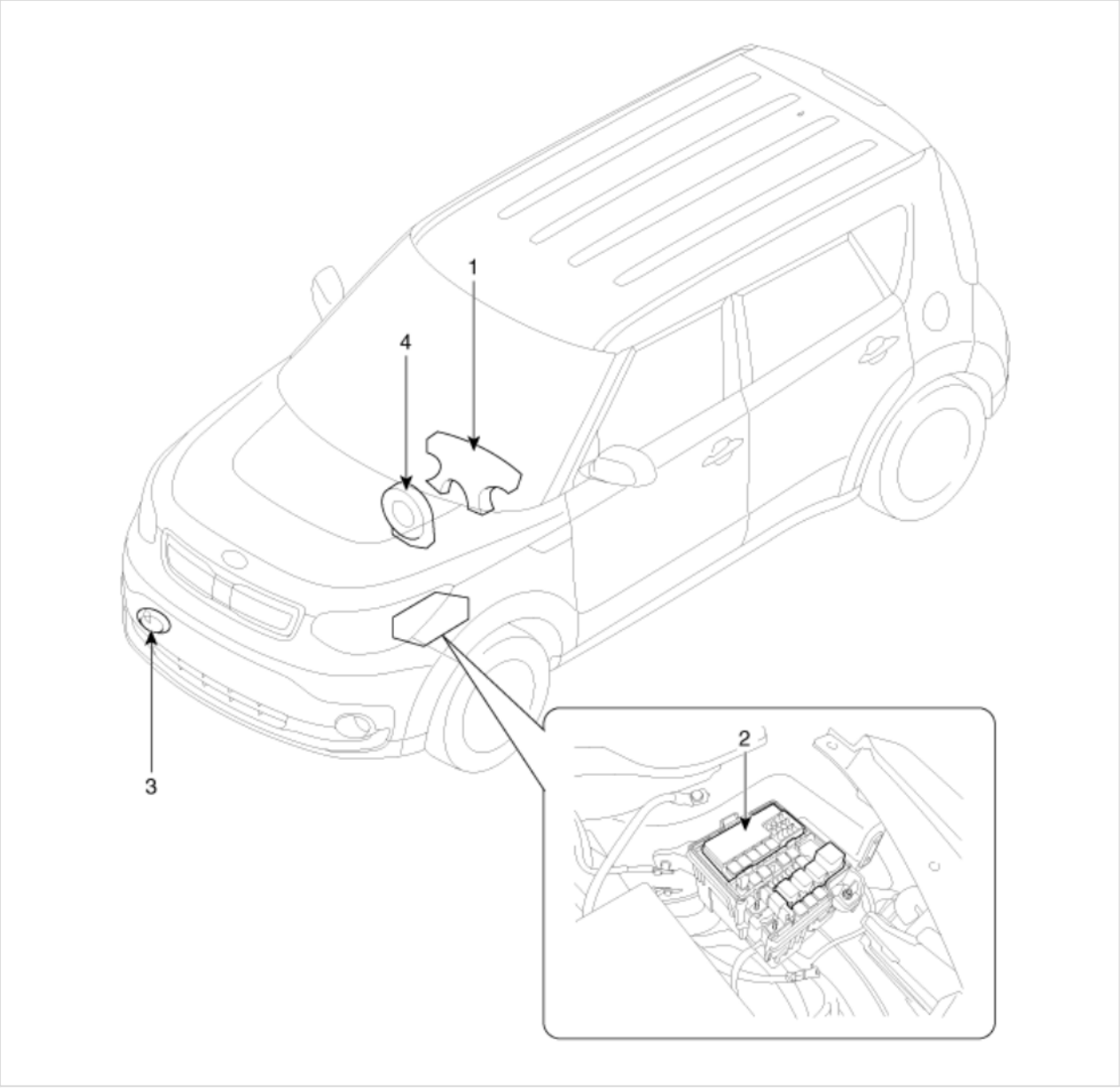
Problem	Possible cause	Solution
Not pairing	Bluetooth device of Car is not discoverable mode	Enter Bluetooth pairing (searching) mode
	User's phone is Bluetooth off mode	User's phone set Bluetooth on
	Making an attempt pairing others bluetooth system	

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		Check Bluetooth device name and address (12 word) to attempt paring Ex) 000B24FFF123
	Pass key error	Input the passkey displayed on the audio screen into the phone.
	5 phones have already been registered.	Delete paired phone list
	Bluetooth system cannot communicate with the phone.	Refer to IOP sheet ※IOP : Inter-operability
Not connection	User's phone or Bluetooth device of Car does not register Bluetooth device to connect	Retry pairing
	Bluetooth system cannot communicate with the phone.	Waiting 1minute then Retry connection or phone power off/on. Refer to IOP sheet
Not redial	User phone system issue	Push the 2 times Send button
Not accept call	User phone system issue	Refer to IOP sheet
Not dialing	User's phone playing other menu (internet, mp3, game, etc..)	Stop other menu then set normal mode
	Bluetooth system cannot communicate with the phone	Refer to IOP sheet

Component Location

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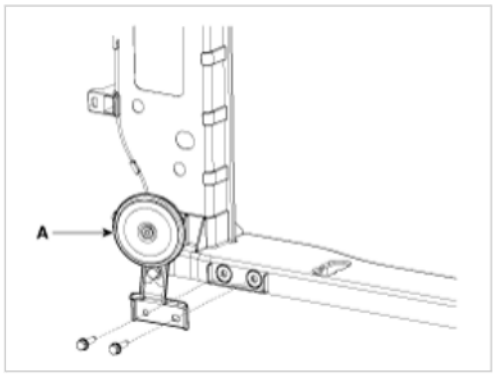
1. Horn switch	3. Horn
2. Horn relay (EMS box)	4. Clock spring

Body Electrical System

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove engine room under cover.
   (Refer to Motor System - "Under Cover")
3. Remove the horn (A) after disconnecting the mounting bolt and connector.

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Installation

1. Install the horns after connecting the horn connectors.
2. Install the engine room under cover.

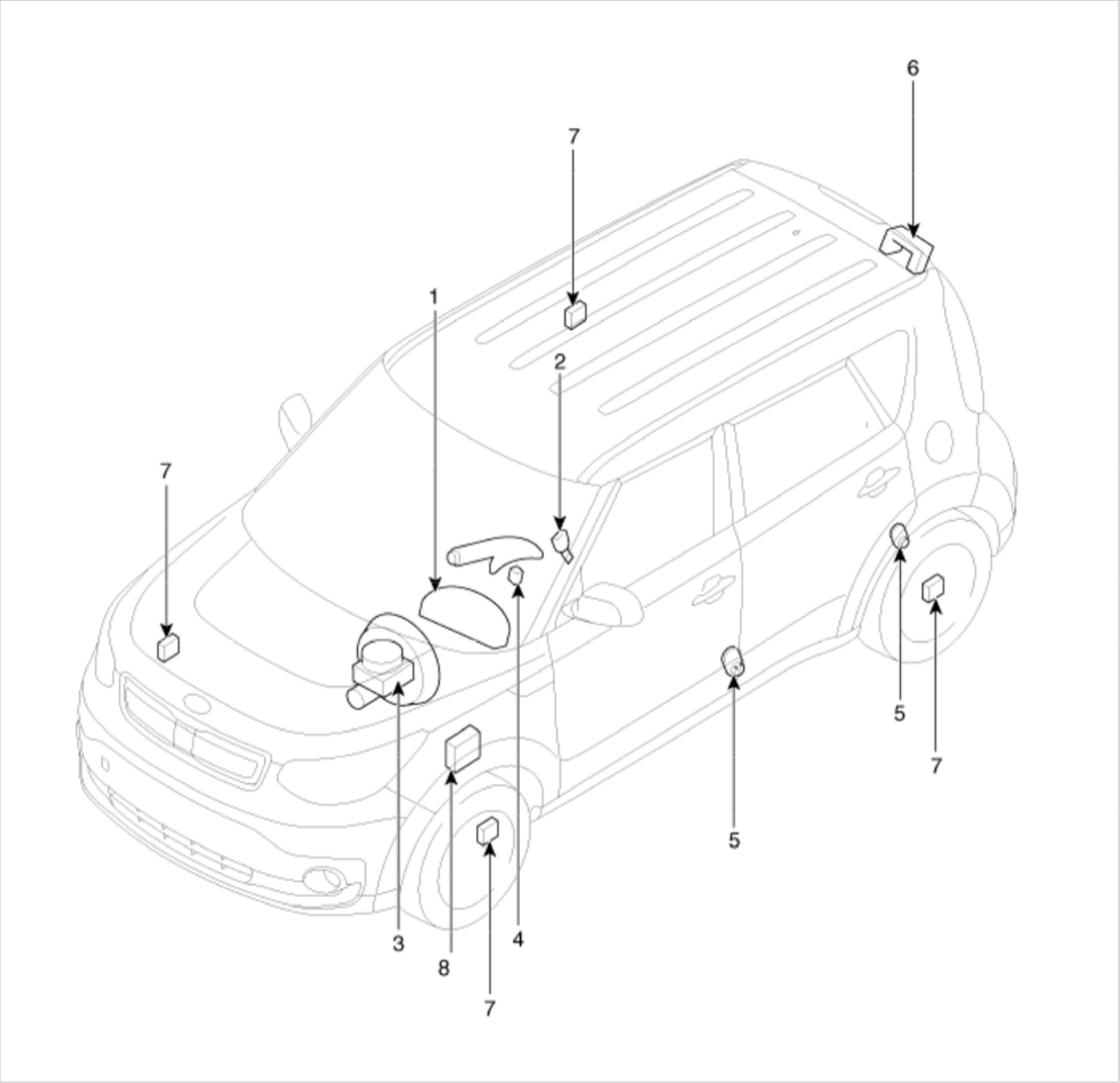
Inspection

Test the horn by connecting battery voltage to the 1 terminal and ground the 2 terminal.
The horn should make a sound. If the horn fails to make a sound, replace it.

Body Electrical System

Component Location

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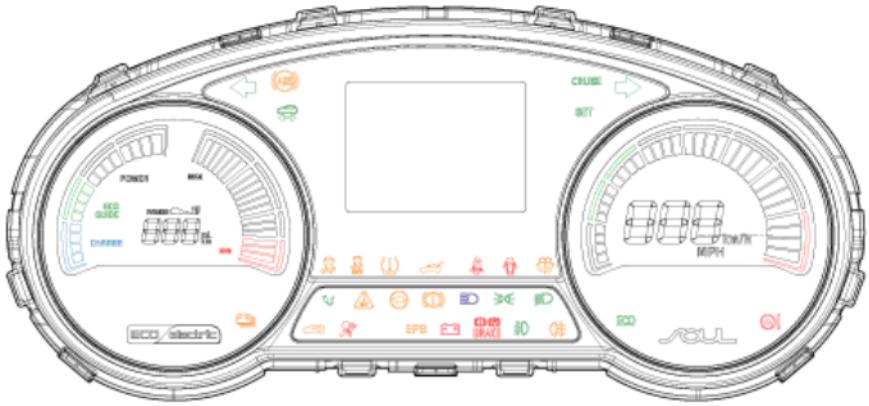
1. Cluster assembly	5. Door switch
2. Seat belt switch	6. Tailgate switch
3. Brake fluid level warning switch	7. Wheel speed sensor
4. Parking brake switch	8. ABS ECU

Body Electrical System

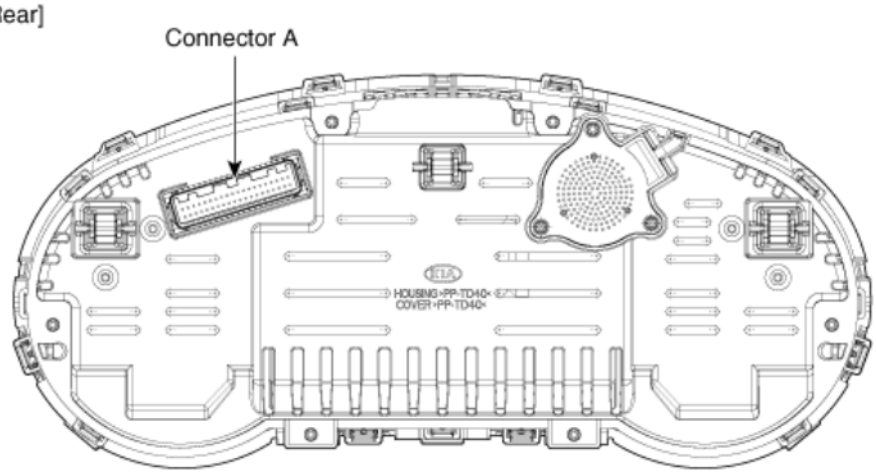
Components

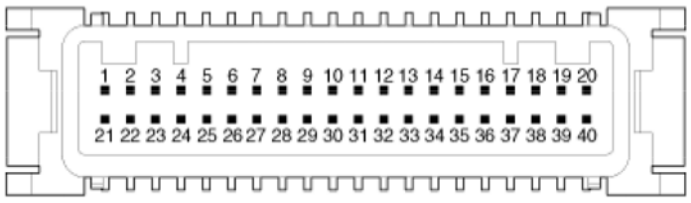
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[Front]



[Rear]





Connector A

Connector Pin Information

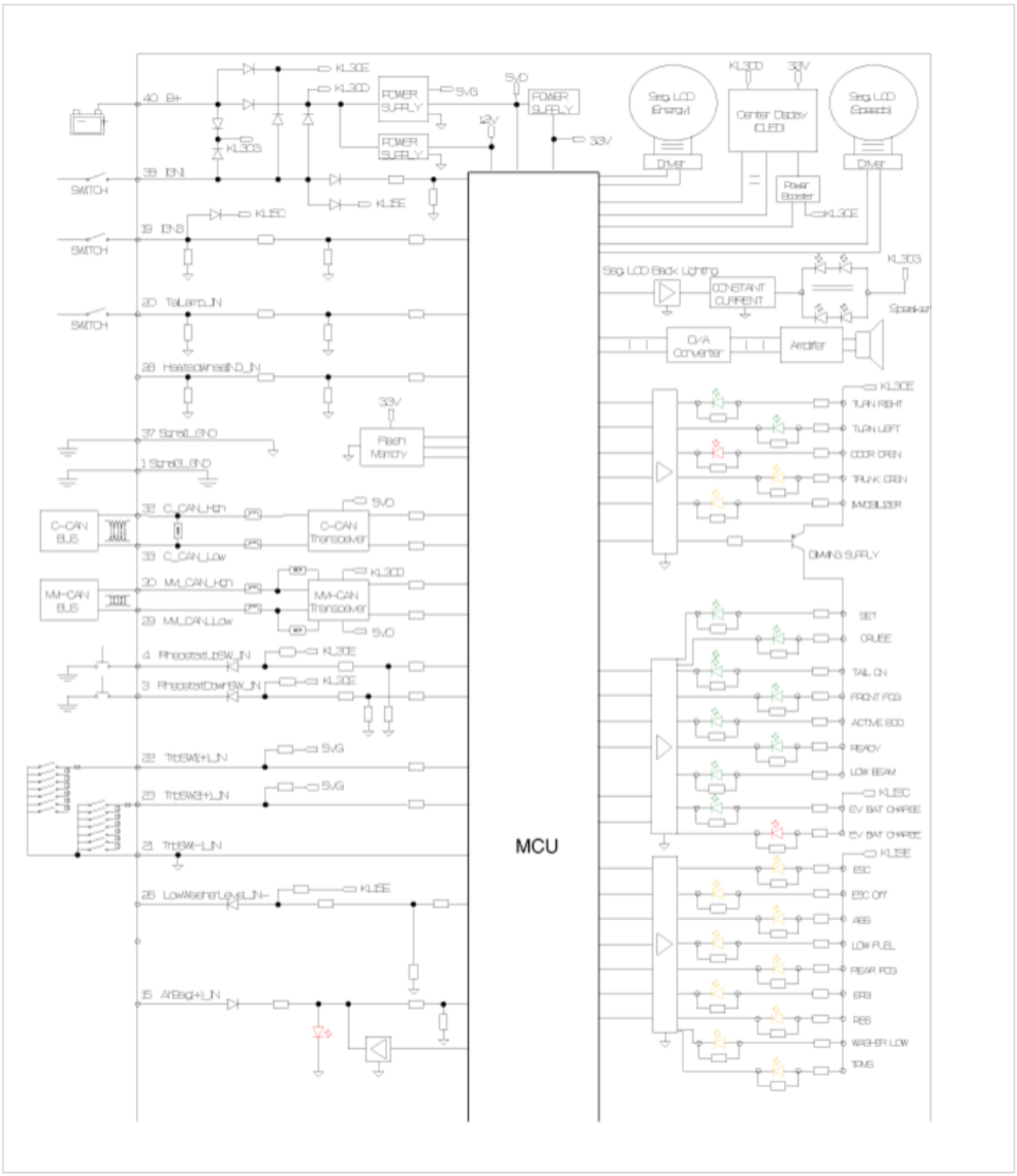
No.	Description	No.	Description
1	Ground signal 3 (Power ground)	21	Trip switch (-) input
2	Illumination output (-)	22	

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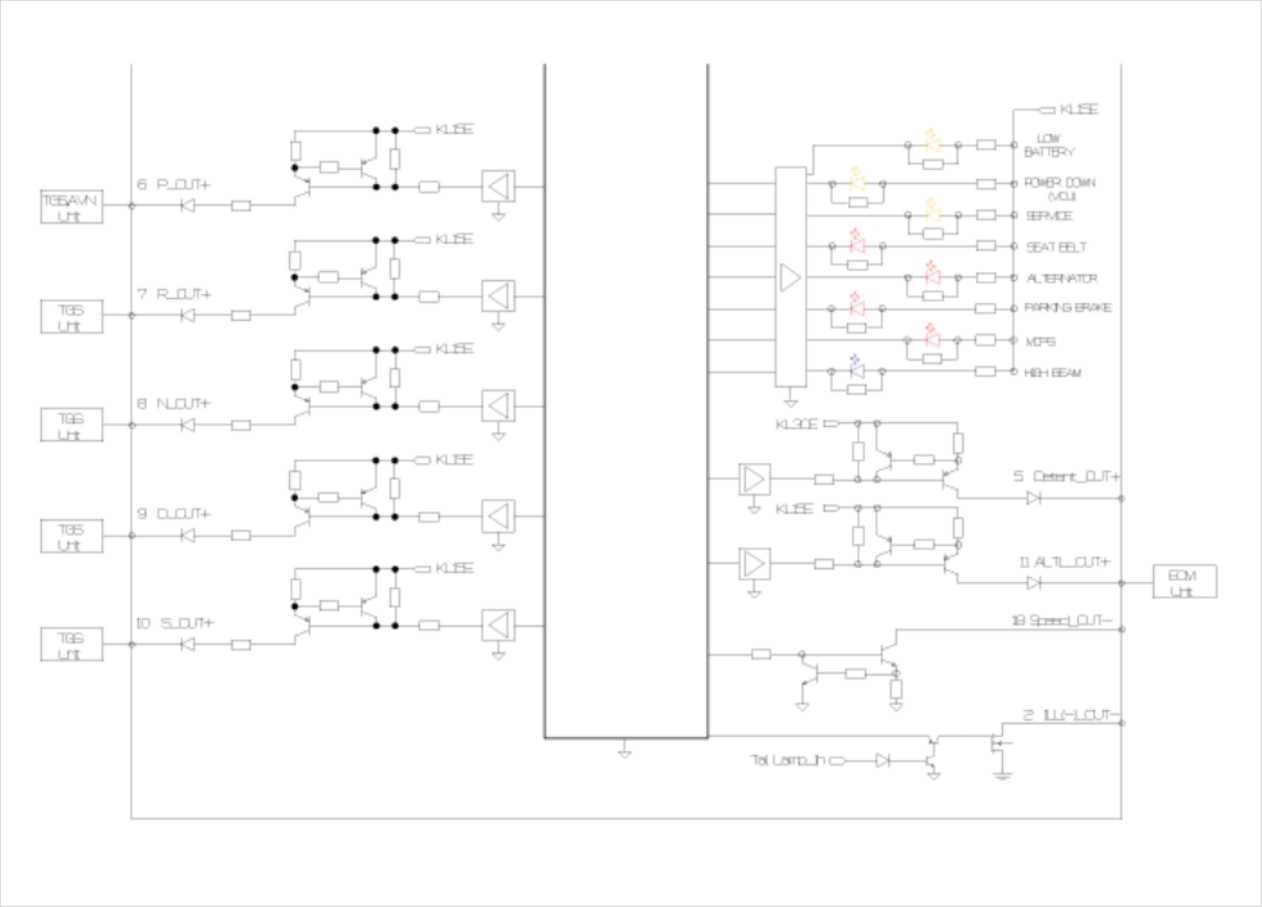
			Trip switch 1 (+) input (Trip button)
3	Rheostat switch down input	23	Trip switch 2 (+) input (Cruise button)
4	Rheostat switch up input	24	-
5	Detent output (+)	25	-
6	P output (+) (A/T)	26	Low washer level input (-)
7	R output (+) (A/T)	27	-
8	N output (+) (A/T)	28	Heated wheel indicator input
9	D output (+) (A/T)	29	M CAN low
10	S output (+) (A/T)	30	M CAN high
11	ALT L output	31	-
12	-	32	C CAN high
13	-	33	C CAN low
14	-	34	-
15	Airbag (+) input	35	-
16	-	36	-
17	-	37	Ground signal 1
18	Speed output (4P output)	38	-
19	IGN 3	39	IGN 1
20	Tail lamp input (Illumination (+))	40	Battery (+)

Circuit Diagram

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Body Electrical System

Description

Mian Features

1. Power and charge guage



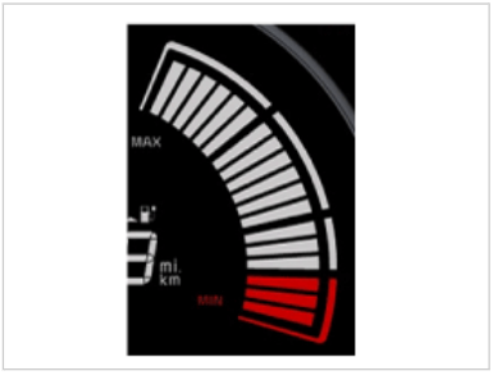
(1) It displays the degree of economic driving by identifying the status of a driver's operation, depending on a vehicle's driving conditions (e.g., required power, system efficiency and charging).

(2) It leads to economic driving by informing the driver of the optimal driving conditions depending on the vehicle's conditions.

(3) It displays that ECO guide and power segment will operate during driving, and also indicates the state of regenerative braking when a charge zone is instructed while driving.

2. SOC (State Of Charge) guage

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(1) It displays the amount of charge of high-voltage battery.

(2) It displays the charged amount of SOC received from BMS module on the digital gauge in the instrument cluster. (as the below)

Display	Increase (%)	Decrease (%)
Seg0	0	0
Seg1	5	3
Seg2	10	8
Seg3	15	13
Seg4	20	18
Seg5	25	23
Seg6	30	28
Seg7	35	33
Seg8	40	38
Seg9	45	43
Seg10	50	48
Seg11	55	53
Seg12	60	58
Seg13	65	63
Seg14	70	68
Seg15	75	73
Seg16	80	78
Seg17	85	83
Seg18	90	88

3. ECO Level Display

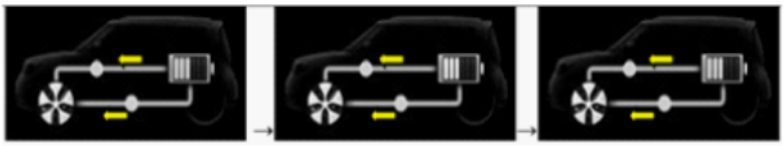
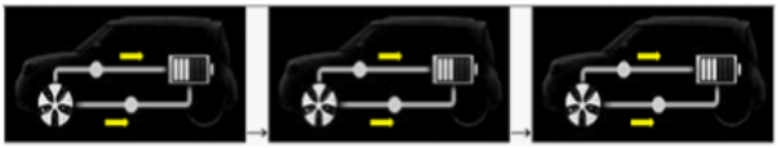


(1) It displays the degree of the driver's economic driving via ECO level.

(2) It displays the ECO level in OLED from Step 1 to 8.

4. Energy Flow

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Graphic	Function
	Vehicle stop status
	Motor being driven with battery power
	Charged with regenerative energy from the motor

(1) It displays graphical energy flow of an EV vehicle to inform the driver of the vehicle information.

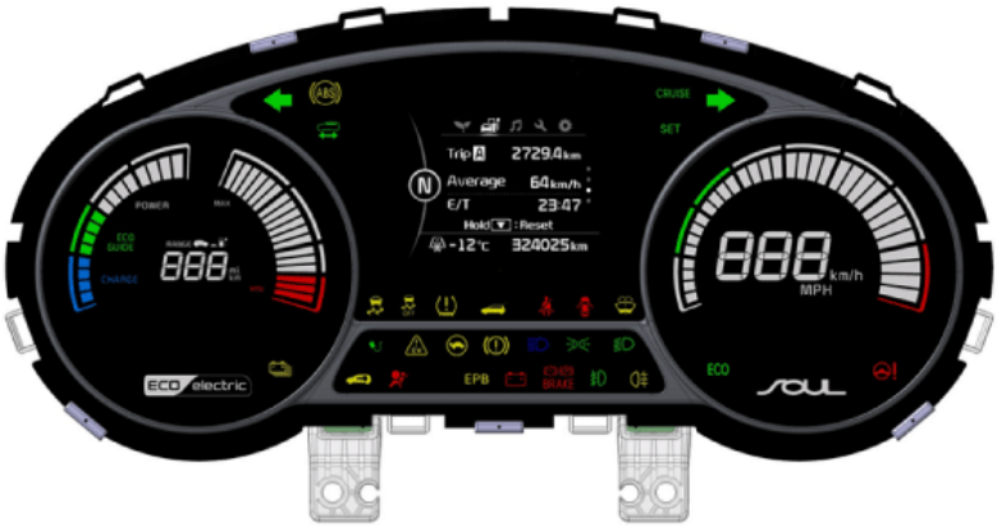
(2) It leads to economic driving by showing the energy flow diagram by means of intuitive images.

(3) It displays three states of energy flow of the EV vehicle graphically.

(4) VCU module receives operation mode CAN signals to implement any relevant animation.

5. Other indicators and warning lamps

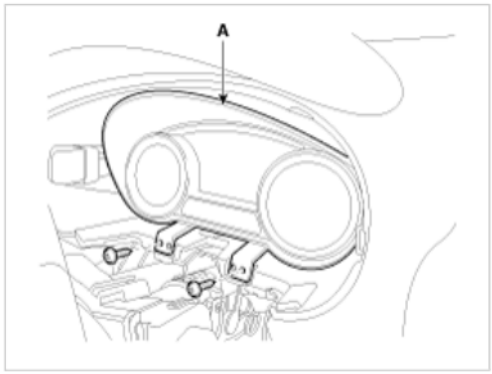
The status between C-CAN transmission modules, operating various indicator and warning lamps on the PS EV cluster, is shown. Referring to the descriptions below, any checking point or operating point can be identified in the event of a relevant function is inoperable.



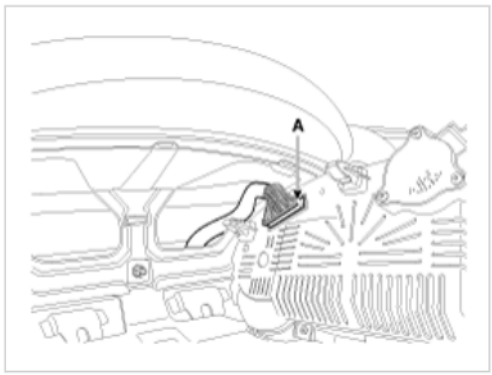
Removal

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1. Disconnect the negative (-) battery terminal.
2. Remove the cluster fascia panel.
   (Refer to Body - "Cluster Fascia Panel")
3. Remove the cluster (A) after removing screws.



4. Disconnect the cluster connector (A) from the cluster.



Installation

1. Connect the cluster connector.
2. Install the cluster assembly.
3. Install the cluster facia panel.
4. Connect the negative (-) battery terminal.

Information

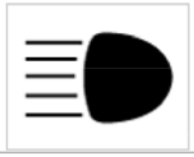
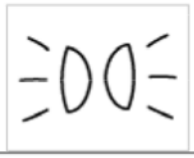
- After replacing the cluster with a new one, must be performed the "Variant Coding" procedure.

Inspection

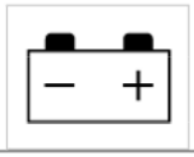
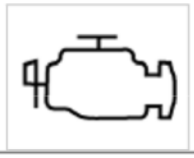
1. Check point (Warning indicator)

NO	Ref Symbol	Color	Name	Signal Input	Signal Control (Unit / Sensor)	Check Point
1		Green	Turn Left	C-CAN	GWAY	1. CAN line failure
2		Green	Turn Right	C-CAN		
3		Green	Front Fog	C-CAN	GWAY	1. CAN line failure

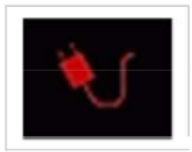
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4		Blue	High Beam	C-CAN	GWAY	1. CAN line failure
5		Green	Low Beam	C-CAN	GWAY	1. CAN Line failure
6		Green	Tail Lamp	C-CAN	GWAY	1. CAN Line failure
7		Green	Cruise	C-CAN	VCU	1. CAN line failure
8		Green	SET	C-CAN	GWAY	1. CAN line failure
9		Red	Seat Belt	C-CAN	GWAY	1. CAN line failure
10		Red	Air Bag	C-CAN	ACU	1. CAN line failure
11		Yellow	Trunk Open	C-CAN	GWAY	1. CAN line failure
12		Red	Door Open	C-CAN	BGWAY	1. CAN line failure
13		Yellow	Immobilizer	C-CAN	GWAY	1. CAN line failure 2. Wiring failure
14		Yellow	ABS	C-CAN	ESC	1. CAN line failure
15		Yellow	ESC	C-CAN	TCS	1. CAN line failure

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16		Yellow	ESC OFF	C-CAN	TCS	1. CAN line failure
17		Yellow	TPMS	C-CAN	TPMS	1. CAN line failure
18		Red	Parking Brake	C-CAN	GWAY TCS AHB	1. CAN line failure
19		Red	Battery Charge	C-CAN	LDC	1. Wiring failure
20		Yellow	Check Engine	C-CAN	EMS	1. CAN line failure
21		Yellow	Low Washer	Hardwire	Water Level Sensor	1. Wiring failure
22		Green	Active ECO	C-CAN	VCU	1. CAN line failure 2. Wiring failure
23		Red	MDPS	C-CAN	MDPS	1. MDPS unit failure 2. CAN line failure
24		Green	READY	C-CAN	VCU	1. CAN line failure
25		Green	EV battery charge	Hardwire+C-CAN	B M S	1. CAN line failure 2. Wiring failure
		Red			EMS	1. CAN line failure

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26		Yellow	EV System	C-CAN	VCU, MCU, BMS, LDC, FACT, OBC	1. CAN line failure
27		Yellow	Power Down	C-CAN	VCU	1. CAN line failure
28		Yellow	RBS	C-CAN	EBS	1. CAN line failure
29		Yellow	Low Power	C-CAN	VCU	1. CAN line failure
30		Yellow	EPB	C-CAN	EPB	1. CAN line failure

2. Check point (Gauge)

No.	Name	Signal Input	Signal Control (Unit/Sensor)	Check Point
1	Speedometer	C-CAN	MCU	1. CAN Line failure
2	SOC Gauge	C-CAN	BMS	1. CAN Line failure
3	Power and Charge Gauge	C-CAN	VCU	1. CAN Line failure

3. Check the specified value of cluster connector in specified condition.

No.	Description	Input/Output	Communication	Value (V)	Specified Conditions
1	GND_Signal3	Input	Hardware	Above 5V	IGN switch ON ,
2	ILL(-)_OUT-	Output	Hardware	Below 1V	IGN switch ON, Tail switch ON, Rheostat Max
				9~16V	IGN switch ON, Tail switch ON, Rheostat Min
3	RheostatSWDown_IN	Input	Hardware	Below 1.5V	Rheostat switch down button push
4	RheostatSWUp_IN	Input	Hardware	Below 1.5V	Rheostat switch up button push
5	Detent_OUT+	Output	Hardware	9~16V	IGN switch ON, Rheostat Max
6	P_OUT+	Output	Hardware	9~16V	IGN On, P position
7	R_OUT+	Output	Hardware	9~16V	IGN On, R position
8	N_OUT+	Output	Hardware	9~16V	IGN On, N position
9	D_OUT+	Output	Hardware	9~16V	IGN On, D position
10	B_OUT+	Output	Hardware	9~16V	IGN On, B position
11	ALTL_OUT	Output	Hardware		
12	-	-	-	-	-
13	-	-	-	-	-
14	-	-	-	-	-

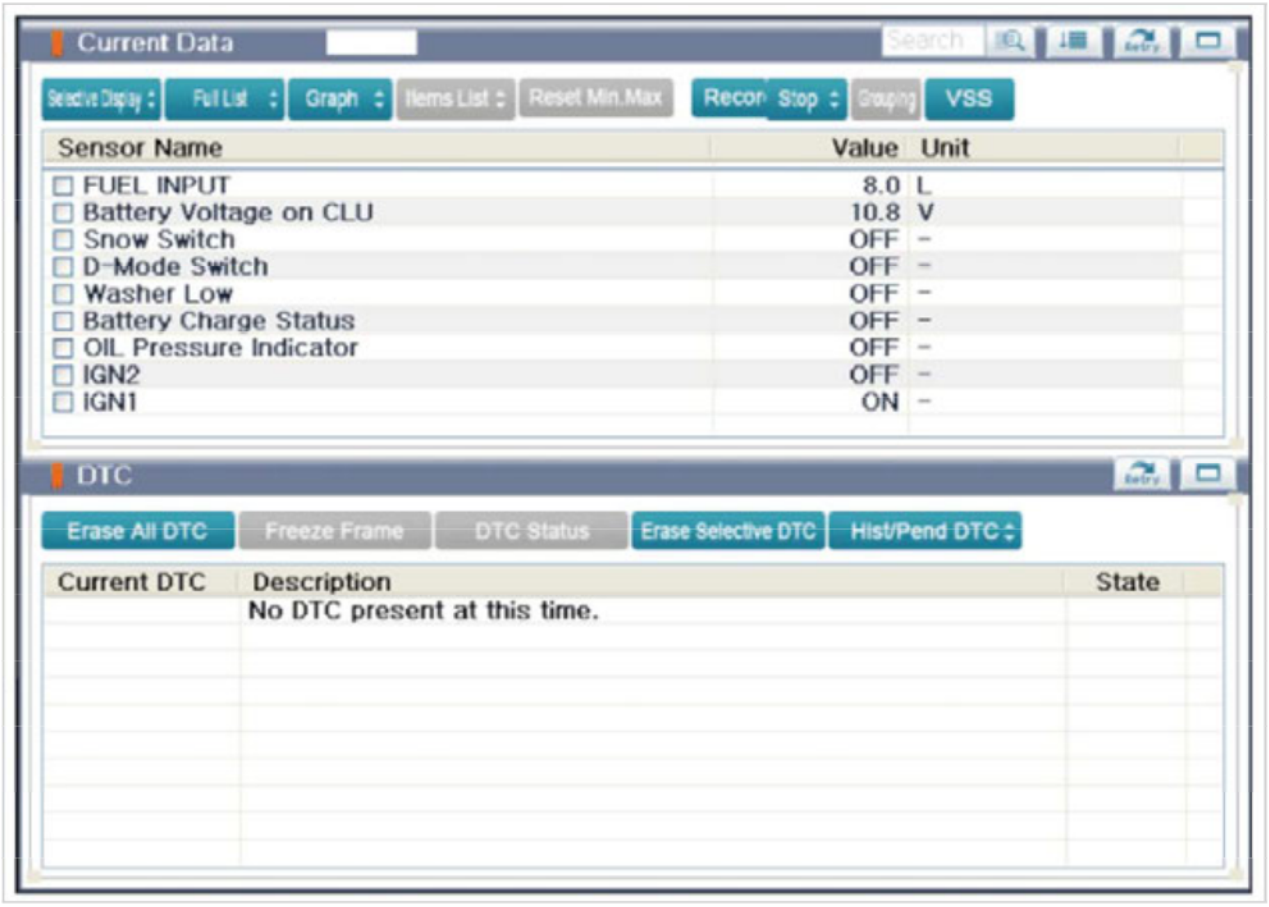
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15	AirBag(+)_IN	Output	Hardware	Above 5V	IGN switch ON
16	-	-	-	-	-
17	-	-	-	-	-
18	SPEED_OUT-	Input	Hardware	9~16V	IGN switch ON/ Vehicel speed over 1 km/h
19	IGN3	Input	Hardware	Above 9V	Battery charge
20	TailLamp_IN	Input	Hardware	9~16V	Tail switch On
21	TripSW(-)_IN	Input	Hardware	Below 1V	Always
22	TripSW1(+)_IN	Output	Hardware	0.56~5V	IGN ON, Push Trip button
23	TripSW2(+)_IN	Output	Hardware	0.56~5V	IGN ON, Push Trip button
24	-	-	-	-	-
25	-	-	-	-	-
26	LowWasherLevel_IN-	Output	Hardware	9~16V Below 1V	IGN switch ON Washer level low
27	-	-	-	-	-
28	HeatedWheelIND_IN	Output	Hardware	9~16V Below 1V	IGN switch On Heated wheel switch Push
29	MM_CAN_Low	Input	CAN	-	-
30	MM_CAN_High	Input	CAN	-	-
31	-	-	-	-	-
32	C_CAN_High	Input	CAN	-	-
33	C_CAN_Low	Input	CAN	-	-
34	-	-	-	-	-
35	-	-	-	-	-
36	-	-	-	-	-
37	GND_Signal1	Input	Hardware	Below 1V	Always
38	-	-	-	-	-
39	IGN1	Input	Hardware	9~16V	IGN switch ON
40	B+	Input	Hardware	9~16V	Always

Diagnosis with GDS

1. It will be able to diagnose defects of CLU with GDS quickly. GDS can operates actuator forcefully, input/output value monitoring and self diagnosis.
2. Select model and "BCM".
3. Select the "Cluster Module" to check.
4. Select "Input/output monitoring", if you will check current data of instrument cluster.
5. If you will check each module data operation forcefully, select "Actuation test".

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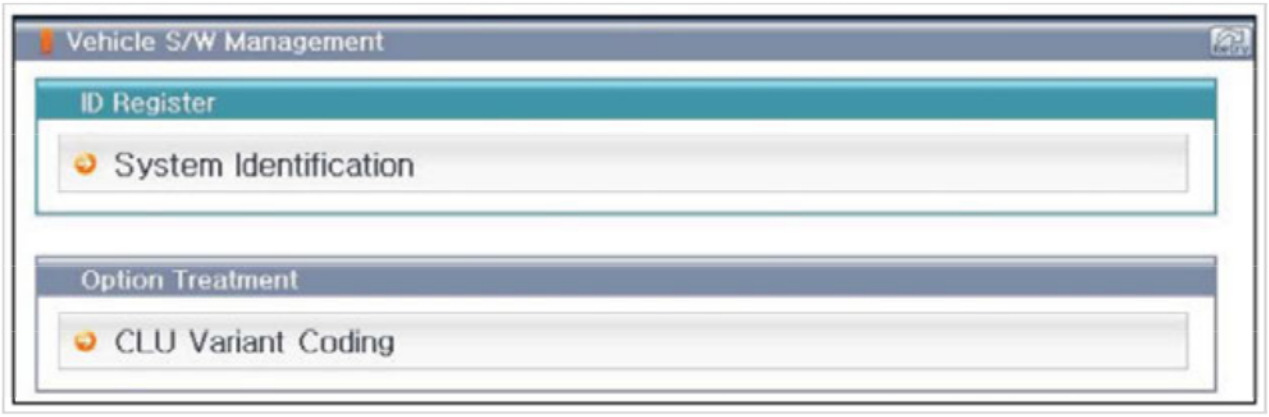


6. To check the DTC of the each module, select "DIAGNOSTIC TROUBLE CODES".

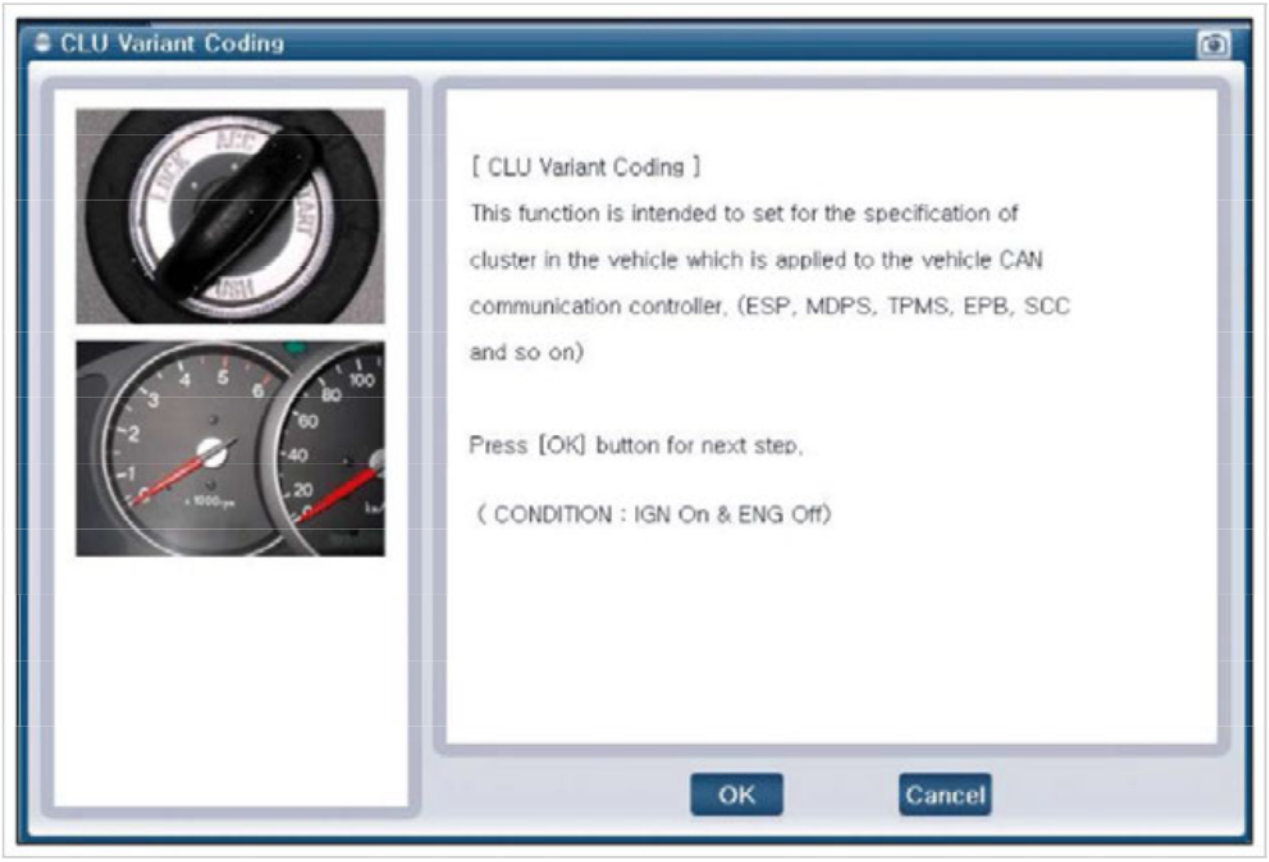
CLU Variant Coding

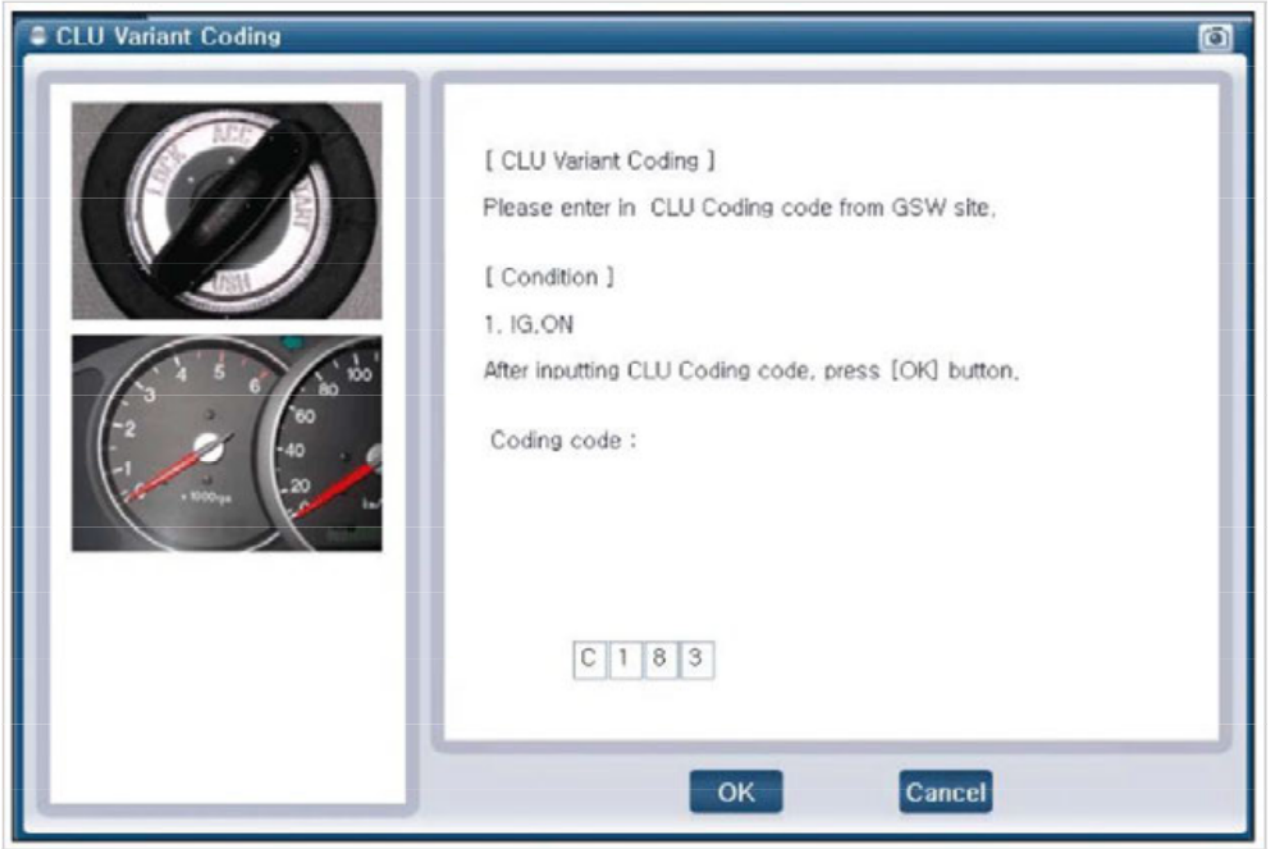
After replacing the cluster with a new one, must be performed the “Variant Coding” procedure.

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel, turn the power on GDS.
2. Select model and "BCM".
3. Select Variant coding mode to perform.



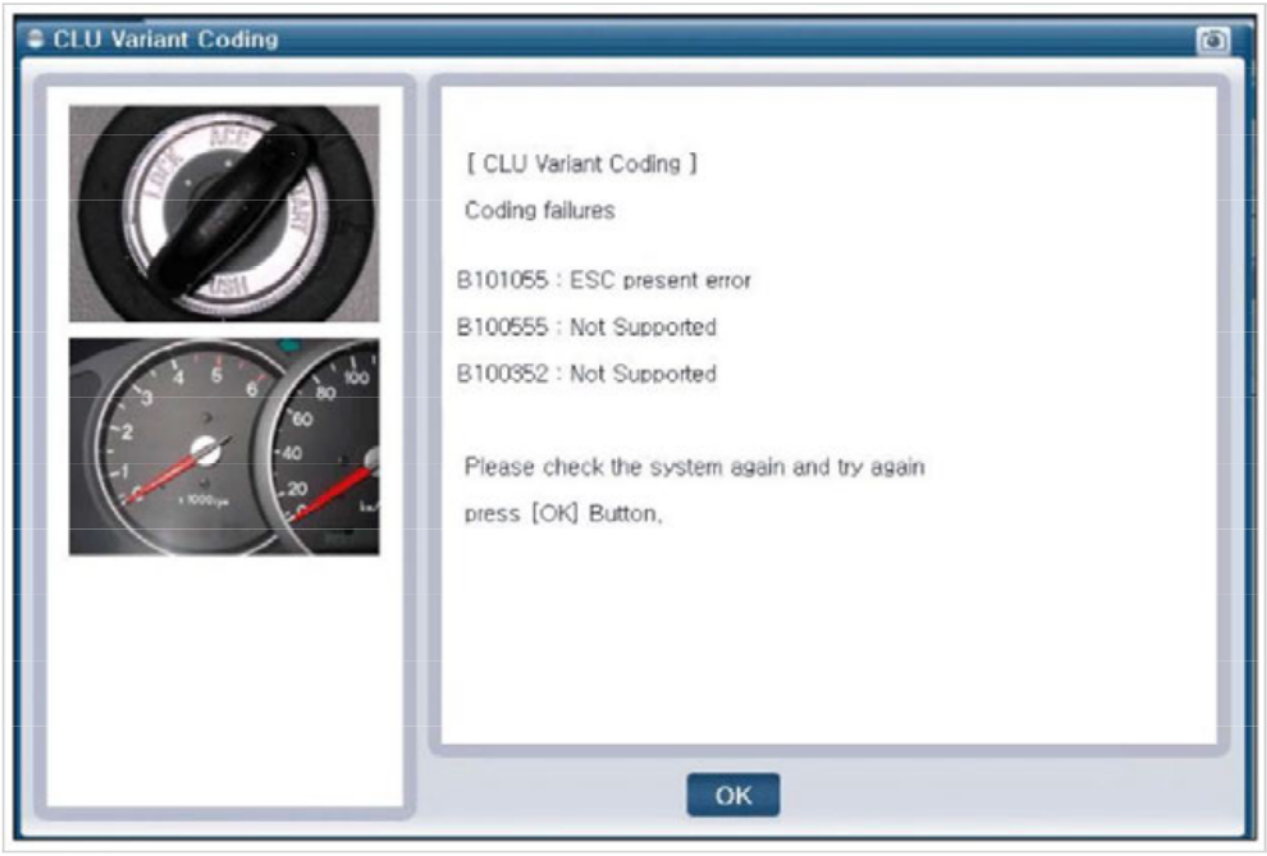
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4. If the trouble codes occurred when performing variant coding, try the CLU variant coding again after checking the installation status of CLU system.

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Troubleshooting

Fault item	Symptom	Check point	Related parts
Display	OLED-LCD NOT displaying	1. Check the connection between connectors 2. Check th Batter (+), Igntion and Ground wiring 3. Check the parts	Connectors, Wiring, Fuse and Cluster
Airbag Warning indicator	Airbag warning indicator NOT light	1. Check the Airbag (+) signal (Connector) 2. Check the C-CAN signal 3. Check the connection stuts of FPC	ACU connector, Wiring, Fuse and Cluster
Mode change	Trip mode malfunction	1. Check the switch input terminal (Connector) 2. Chech the signal input (Open or short) 3. Check the mode change of cluster	Switch connector, Wiring and Cluster
Illumination	Illumination NOT changing	1. Check whehter rheostat input signal input by connector 2. Check Illumination (-) and Detent signal output 3. Check Tail (+) signal input	Switch connector, Wiring and Cluster
Cluster Warning sound	Cluster warning sound NOT sound	1. Check the connector of speaker output terminal 2. Check the intalled speaker on the vehicel	Switch connector, Wiring and Cluster

Specification

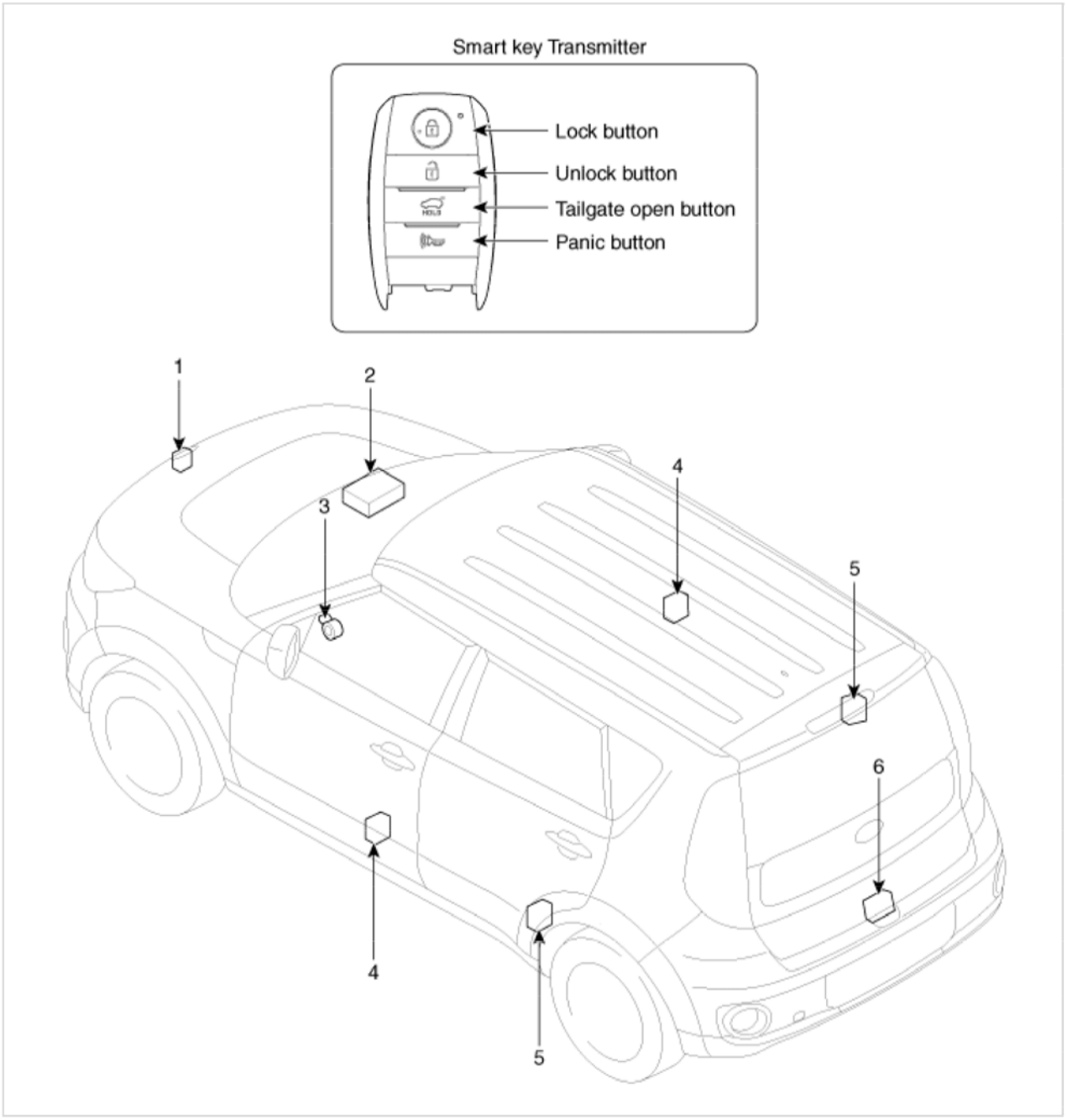
Item	Specification
Rating voltage	DC 3V
Operating voltage	DC 2.7V ~ 3.3V
Operating temperature	-20°C ~ +60°C (-4°F ~ +140°F)
RF Modulation	FSK
LF Modulation	ASK
RF frequency	433.92 MHz
Battery	CR2032 (3V / 1EA)

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Transmissible distance	30m or more
Life of battery	2 years or more (at 20 times per day)
Button number	3
Function	Door lock
	Door unlock
	Tailgate open

Body Electrical System

Component Location



1. BCM & RF receiver	4. Rear door lock actuator & switch
2. Key warning switch	5. Tailgate open switch
3. Front door lock actuator & switch	

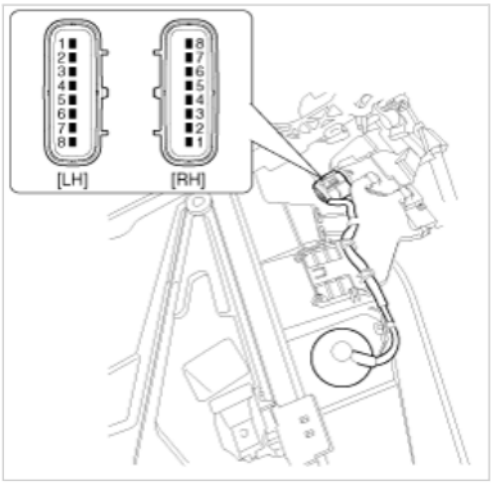
Body Electrical System

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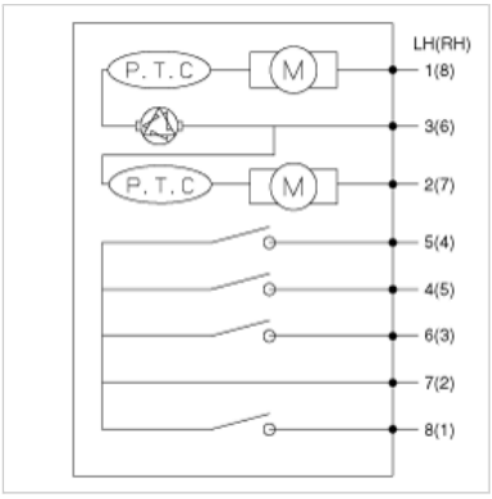
Inspection

Front Door Lock Module Inspection

1. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
2. Remove the front door module.
   (Refer to Body - "Front Door Module")
3. Disconnect the connectors from the actuator.



4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.



[Central Lock]

Terminal \ Operation		Central Lock	Central Unlock
LH	2	⊕	⊖
	3	⊖	⊕
RH	7	⊖	⊕
	6	⊕	⊖

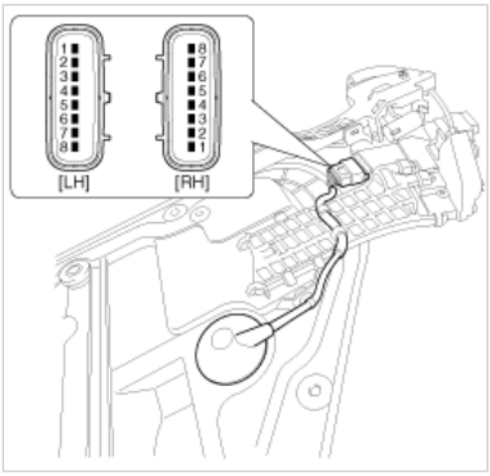
5. Check for continuity between the terminals in each switch position according to the table.

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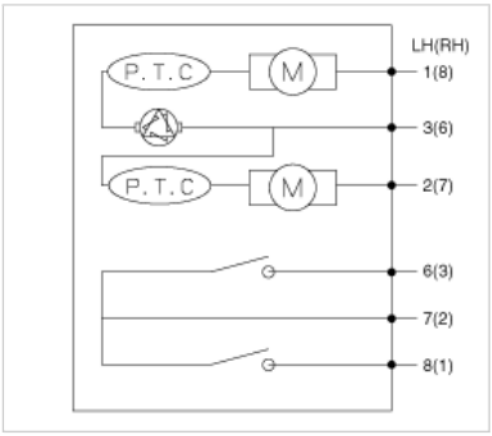
Terminal		Operation: Central Lock	Operation: Central Unlock
LH	6 and 7	ON → OFF	OFF → ON
	5 and 7	Turn key counterclockwise : ON	
		Key return back : OFF	
	4 and 7	Turn key clockwise : ON	
		Key return back : OFF	
	7 and 8	Door open & latching : ON	
		Full latching : OFF	
RH	2 and 3	ON → OFF	OFF → ON
	2 and 4	Turn key counterclockwise : ON	
		Key return back : OFF	
	2 and 5	Turn key clockwise : ON	
		Key return back : OFF	
	1 and 2	Door open & latching : ON	
		Full latching : OFF	

Rear Door Lock Module Inspection

1. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
2. Remove the rear door module.
   (Refer to Body - "Rear Door Module")
3. Disconnect the connectors from the actuator.



4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.



[Central Lock]

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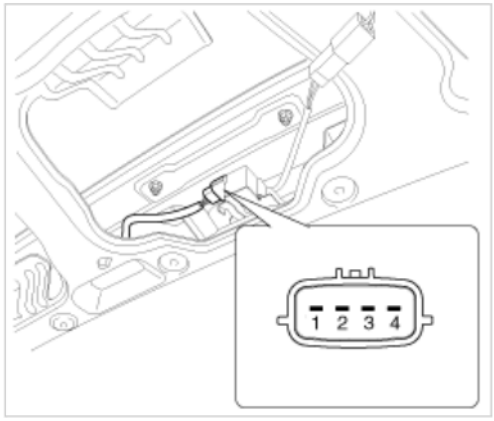
Terminal \ Operation		Central Lock	Central Unlock
LH	2	⊕	⊖
	3	⊖	⊕
RH	7	⊖	⊕
	6	⊕	⊖

5. Check for continuity between the terminals in each switch position according to the table.

Terminal \ Operation		Central Lock	Central Unlock
LH	6 and 7	ON → OFF	OFF → ON
	7 and 8	Door open & latching : ON	
		Full latching : OFF	
RH	2 and 3	ON → OFF	OFF → ON
	1 and 2	Door open & latching : ON	
		Full latching : OFF	

Tailgate Lock Module Inspection

1. Remove the tailgate trim.
   (Refer to Body - "Tailgate Trim")
2. Disconnect the 4P connector from the actuator.



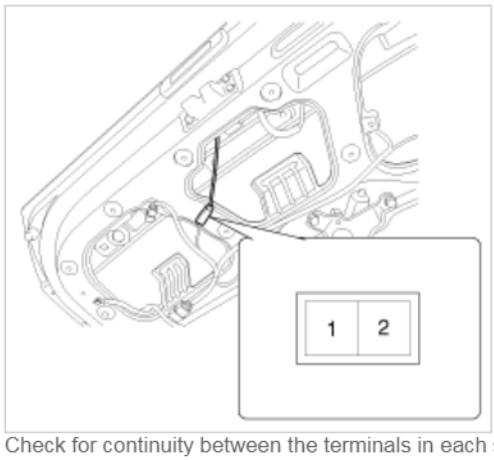
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal	3	4
Unlock	⊕	⊖
Lock		

Tailgate Open Switch

1. Remove the tailgate trim.
   (Refer to Body - "Tailgate Trim")
2. Disconnect the connector from the actuator.

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3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	1	2
OFF		
ON	○	○

Body Electrical System

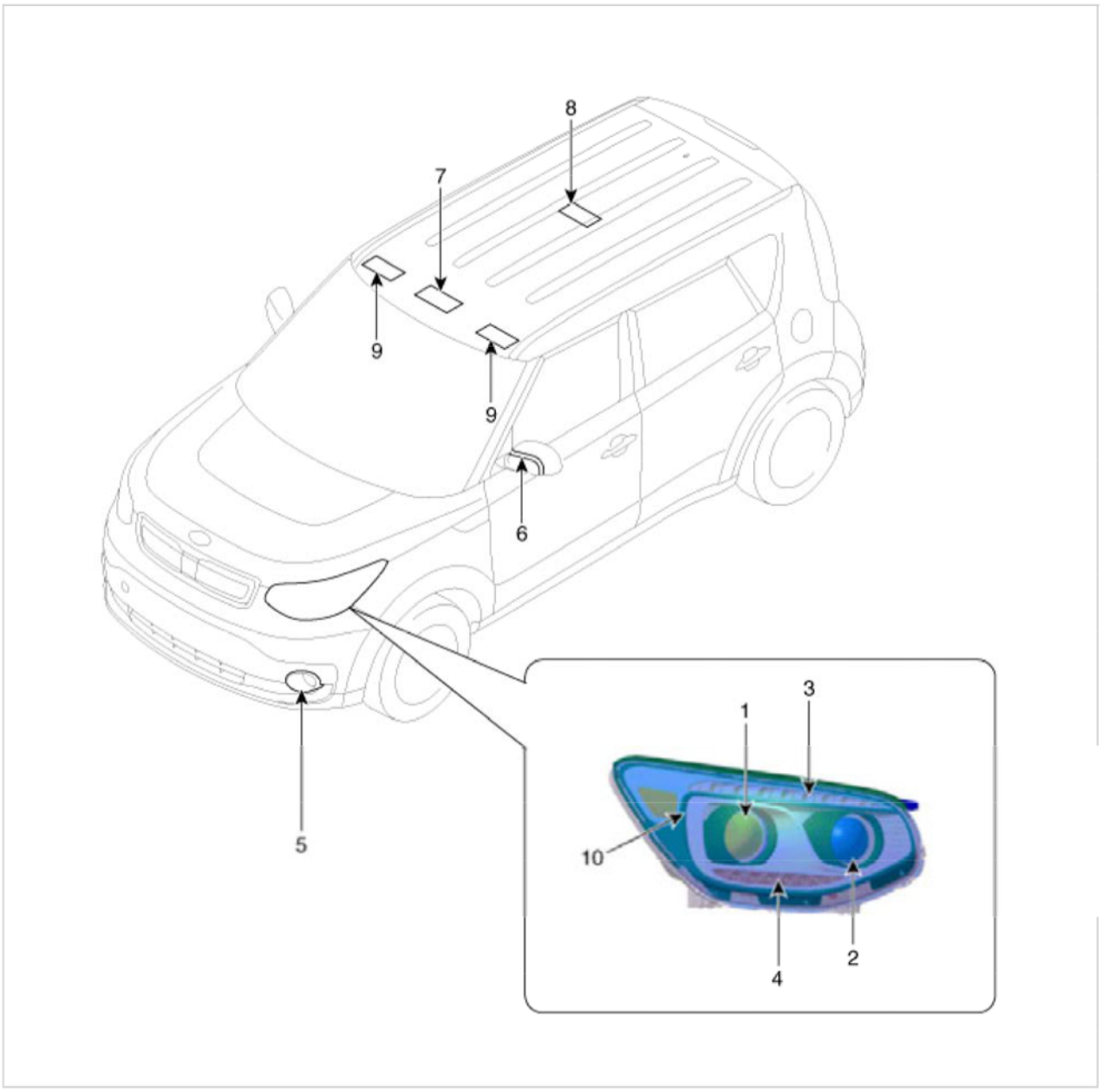
Specifications

Items		Bulb Wattage (W)	Bulb Type
Front	Head lamp (High)	H7LL	55
	Head lamp (Low)	H7LL	55
	Turn signal lamp	LED	LED
	Position lmap	LED	LED
	Fog lamp	55	9006
	DRL	LED	LED
	Side marker	5	W5W
	Side repeater lamp (O/S mirror)	LED	LED
Rear	Tail/Stop lamp	LED	LED
	Tail lamp and side marker	LED	LED
	Turn signal lamp	27	PY27W
	Back up lamp	16	W16W
	License plate lamp	5	W5W
High mounted stop lamp		LED	LED
Map lamp		8	FESTOON
Room lamp		8	FESTOON
Vanity lamp		5	FESTOON
Glove box lamp		5	FESTOON
Luggage lamp		8	FESTOON

Body Electrical System

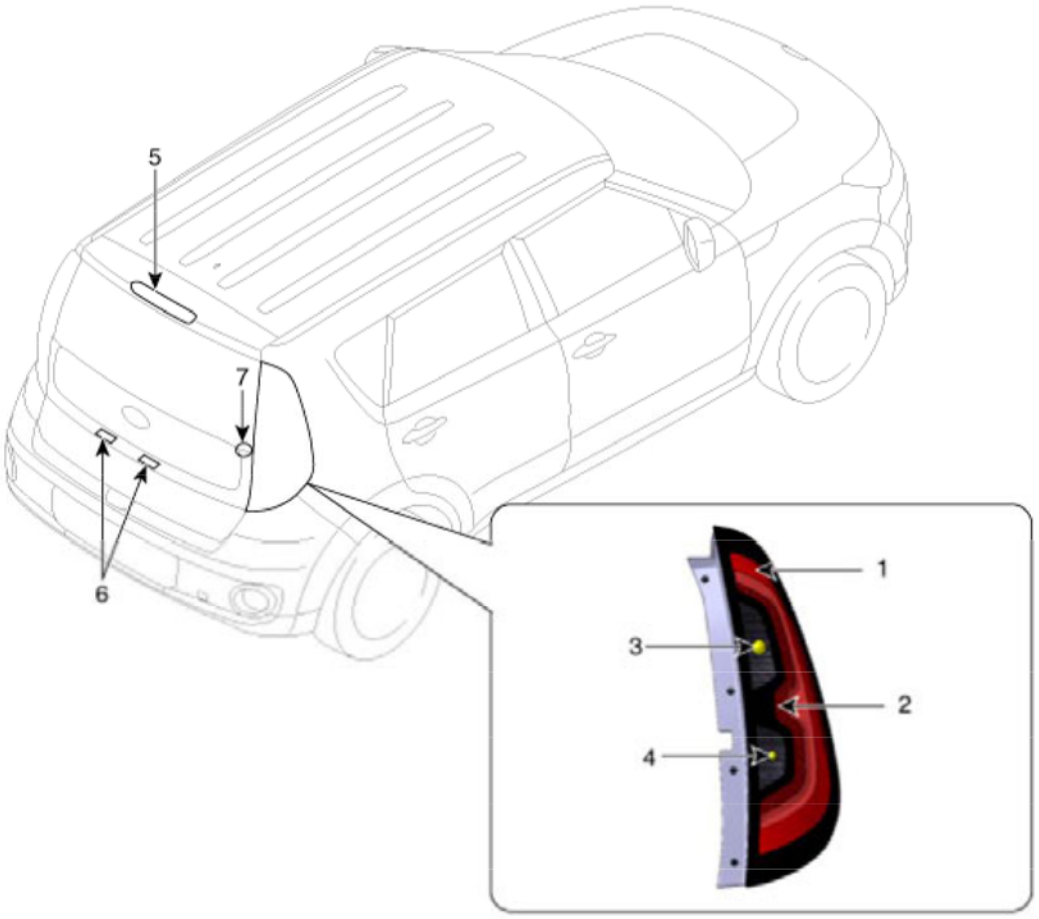
Component Location

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1. Head lamp (Low)	6. Turn signal lamp (Outside mirror)
2. Head lamp (High)	7. Over head console lamp
3. DRL & Position lamp	8. Room lamp
4. Turn signal lamp	9. Personal lamp
5. Front fog lamp	10. Side marker

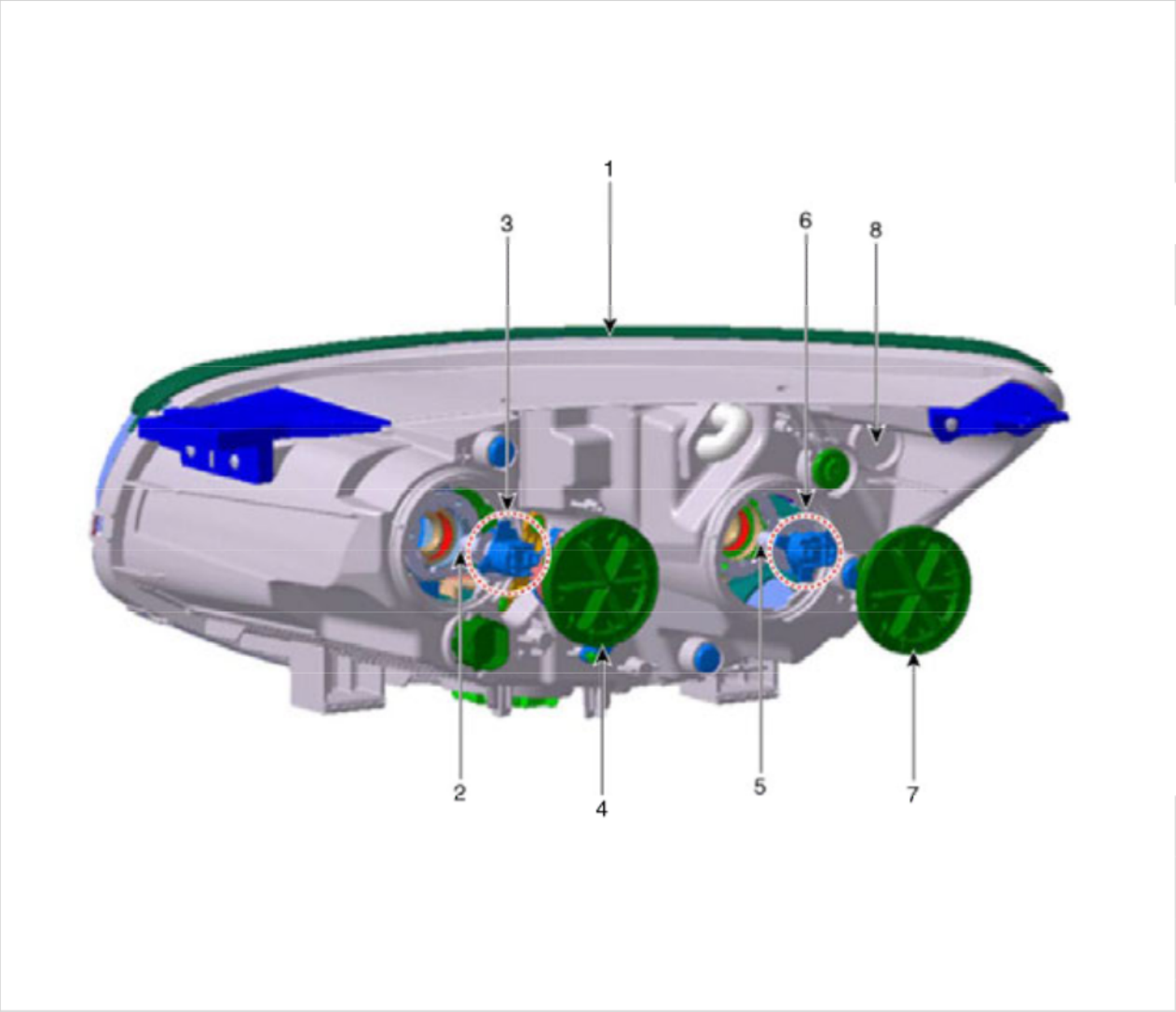
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1. Tail lamp and side marker	5. High mounting stop lamp
2. Tail / Stop lamp and side marker	6. License plate lamp
3. Turn signal lamp	7. Luggage lamp
4. Back up lamp	

Component

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1. Head lamp lens & housing assembly	5. Head lamp low beam bulb
2. Head lamp high beam bulb	6. Head lamp low beam bulb socket
3. Head lamp high beam bulb socket	7. Dust cap (Low)
4. Dust cap (High)	8. Side maker

Body Electrical System

Removal

⚠ CAUTION

Head lamps become very hot during use; do not touch them or any attaching hardware immediately after they have been turned off.

NOTICE

The headlamp bulb should not be removed from the headlamp assembly until just before a new bulb is installed.
Removing bulb for an extended period of time may affect headlamp bulb performance.
Contaminants may enter the headlamp assembly where they can settle on the lens and reflector.
Never turn on the head lamps with the bulb removed from the headlamp assembly.

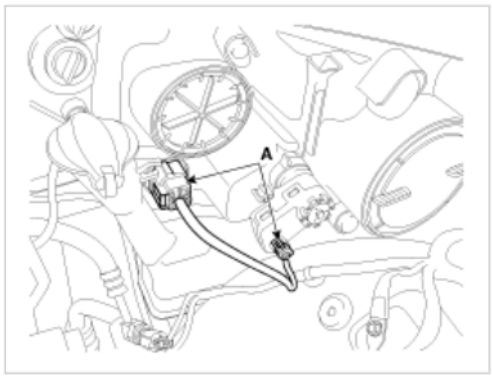
1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper cover.
   (Refer to Body - "Front Bumper Cover")
3. Loosen the mounting bolts (3EA) of head lamp. Remove the head lamp assembly (B) after disconnecting the lamp connectors (A).

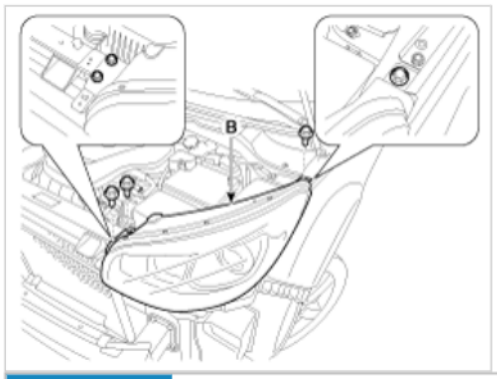
[LH]

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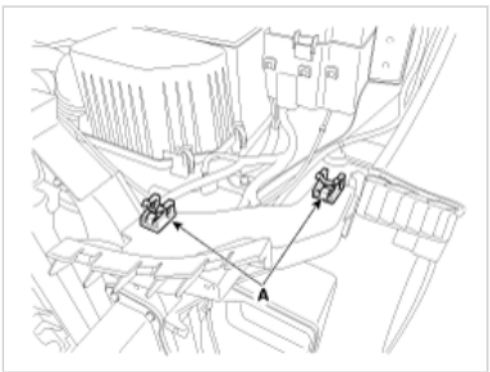
[RH]





NOTICE

Take care that retaining clip (A) is not to be damaged.



Installation

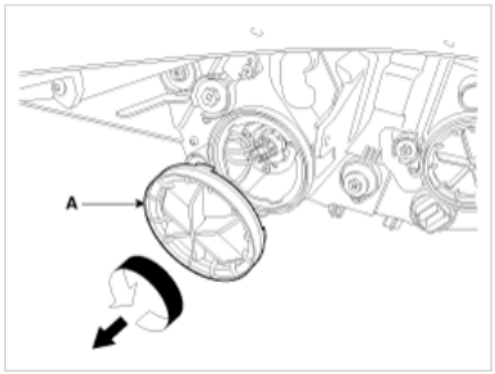
1. Install the head lamp bulbs.
2. Reassemble the head lamp bulb covers.
3. Reassemble the head lamp assembly after connecting the lamp connector.

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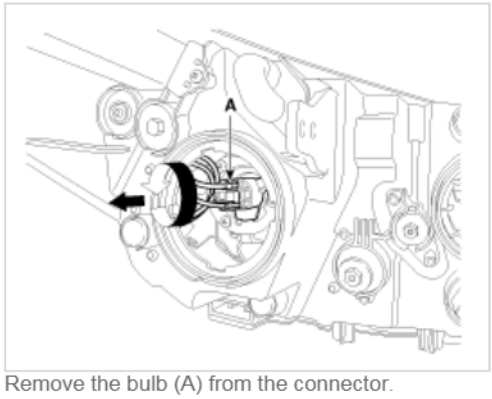
Replacement

Head Lamp Low Beam (Bulb)

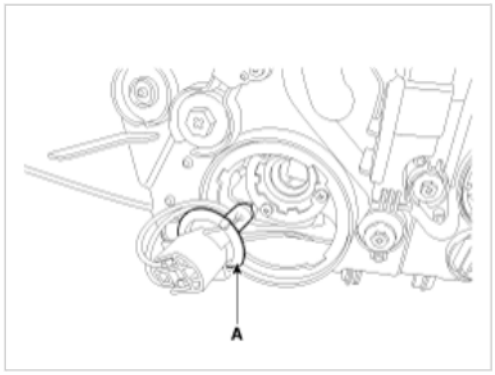
1. Turn the head lamp switch off.
2. Disconnect the power connector from the lamp.
3. Remove the dust cap (A).



4. Remove the sockect (A) from the head lamp assembly.



5. Remove the bulb (A) from the connector.

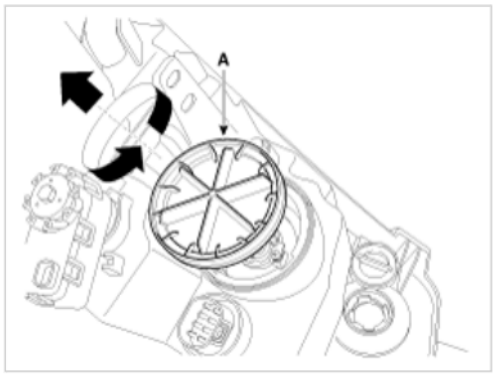


6. Installation is the reverse of removal.

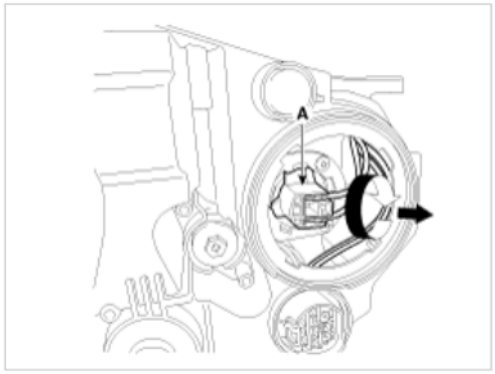
Head Lamp High Beam (Bulb)

1. Turn the head lamp switch off.
2. Disconnect the power connector from the lamp.
3. Remove the dust cap (A).

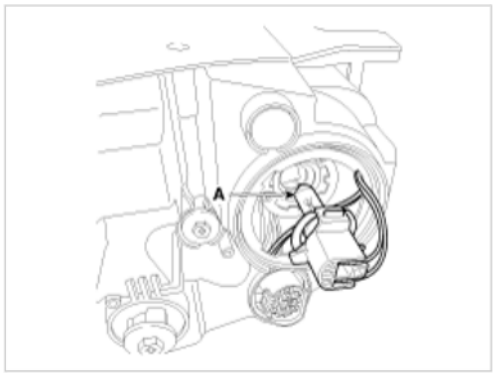
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4. Disconnect the connector (A) from the bulb.



5. Remove the head lamp high beam bulb (A).



6. Installation is the reverse of removal.

Head Lamp Aiming Instructions

The head lamps should be aimed with the proper beam-setting equipment, and in accordance with the equipment manufacturer's instructions.

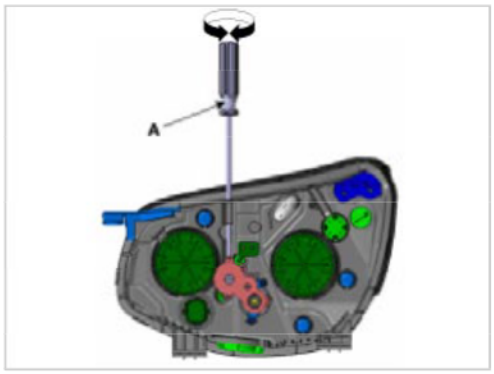
NOTICE

If there are any regulations pertinent to the aiming of head lamps in the area where the vehicle is to be used, adjust so as to meet those requirements.

Alternately turn the adjusting gear to adjust the head lamp aiming. If beam-setting equipment is not available, proceed as follows:

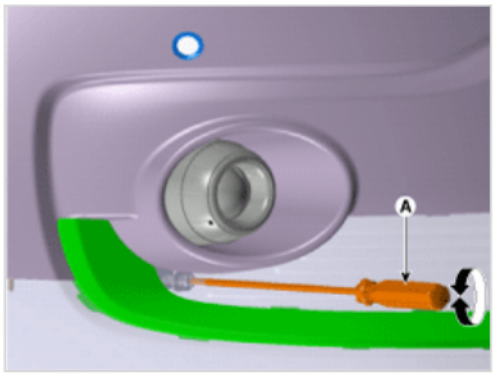
1. Inflate the tires to the specified pressure and remove any loads from the vehicle except the driver, spare tire, and tools.
2. The vehicle should be placed on a flat floor.
3. Draw vertical lines (Vertical lines passing through respective head lamp centers) on the screen.
4. With the head lamp and battery in normal condition, aim the head lamps so the brightest portion falls on the vertical lines.
   A : Low/High beam vertical

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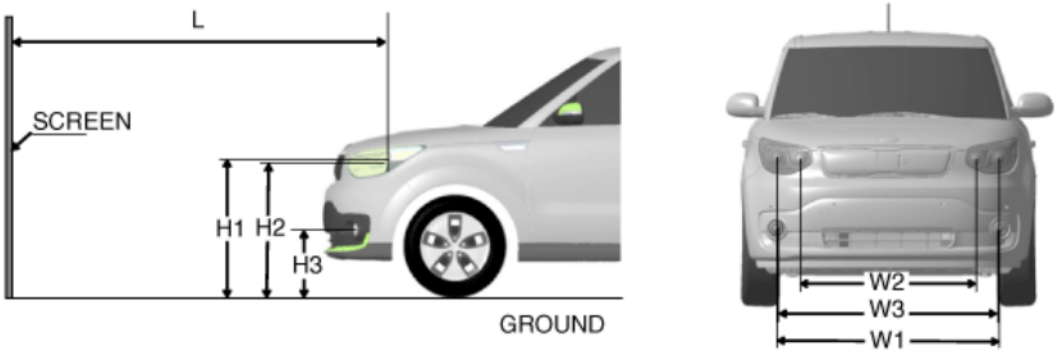


Front Fog Lamp Aiming

The front fog lamps should be aimed as the same manner of the head lamps aiming.
With the front fog lamps and battery normal condition, aim the front fog lamps by turning the adjusting screw hole (A) with a driver.



Head Lamp And Fog Lamp Aiming Point



H1 : Height between the head lamp bulb center and ground (Low beam)
H2 : Height between the head lamp bulb center and ground (High beam)
H3 : Height between the fog lamp bulb center and ground
W1 : Distance between the two head lamp bulbs centers (Low beam)
W2 : Distance between the two head lamp bulbs centers (High beam)
W3 : Distance between the two fog lamp bulbs centers
L : Distance between the head lamp bulb center and screen

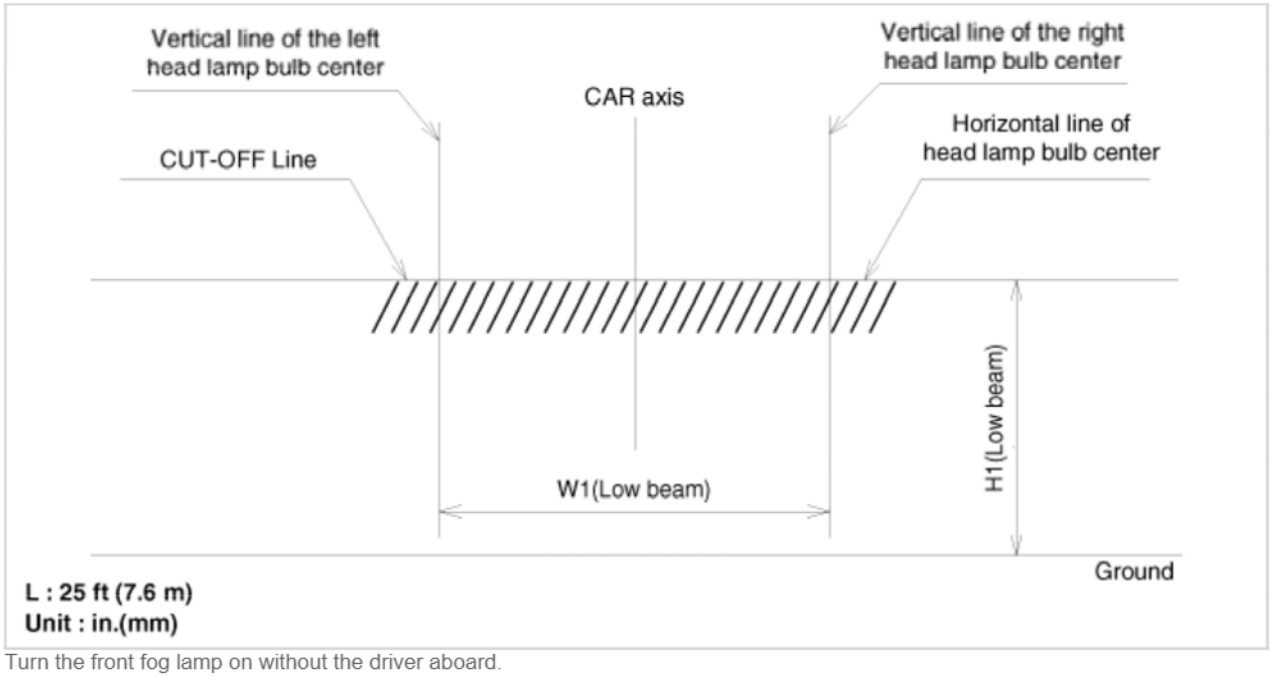
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Unit : in(mm)

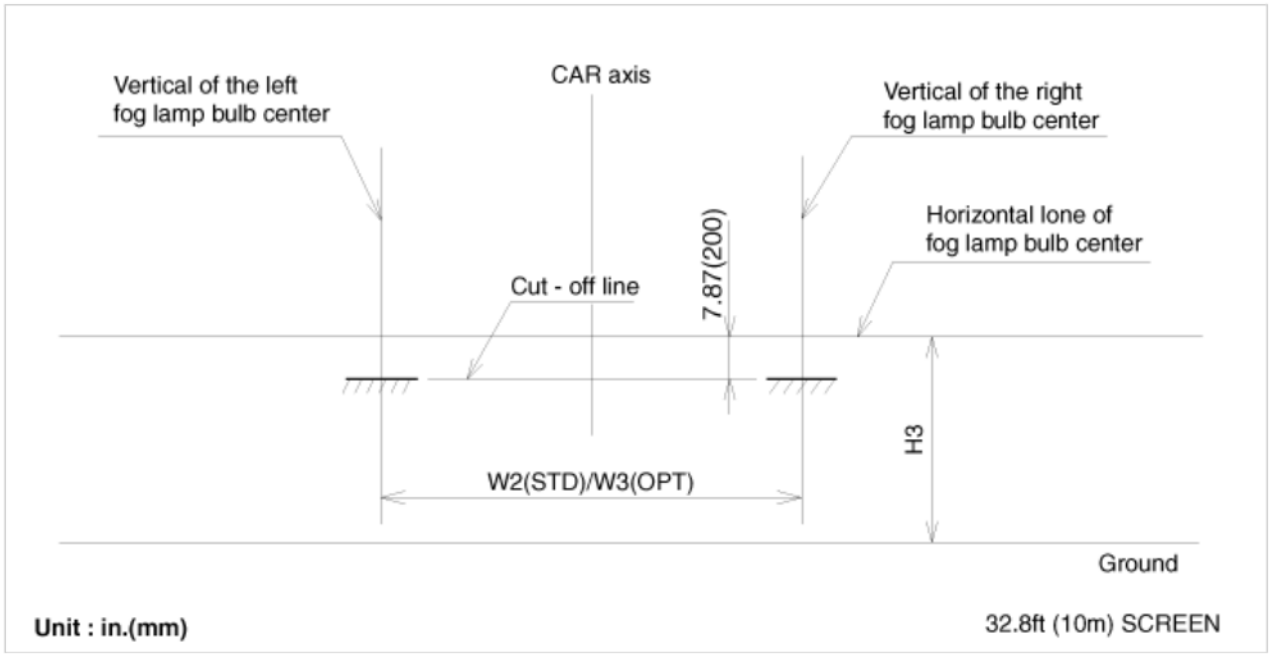
Vehicle condition		H1	H2	H3	W1	W2	W3	L
Without driver		32.7(830)	32.4(822)	16.1(409)	53.2(1,351)	42.2(1,071)	53.8(1,366)	Refer to aiming condition
With driver	F/OPT	32.2(817)	31.9(810)	15.6(397)				
	STD	32.3(821)	32.0(814)	15.8(401)				

General / Euroupe

1. Head Lamp (Low beam)
   A. Turn the low beam on without driver aboard.
   B. The cut-off line should be projected in the cut-off line shown in the picture.



2. Turn the front fog lamp on without the driver aboard.
   The cut-off line should be projected in the allowable range (shaded region)

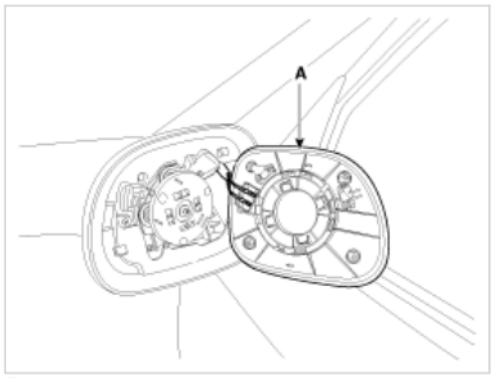


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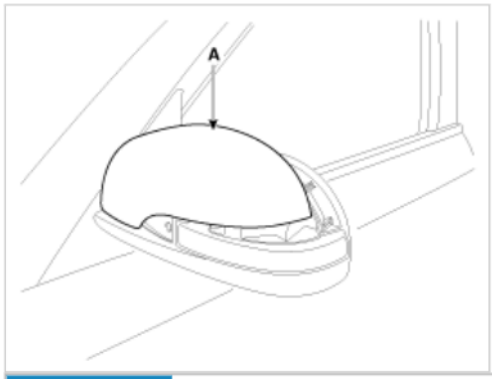
Removal

Door Mirror Turn Signal Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the mirror holder (A) from the outside mirror assembly.



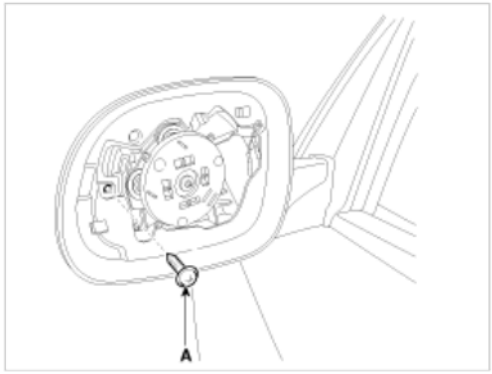
3. Remove the door mirror cover (A).



NOTICE

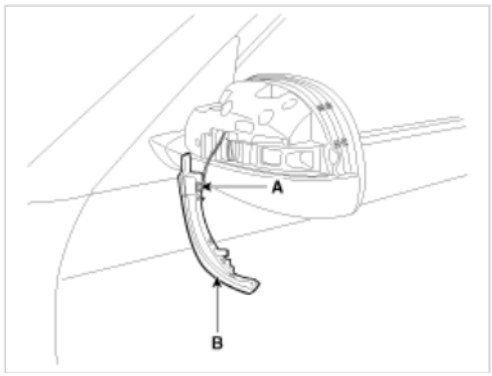
Be careful not to damage the fixing clip

4. Loosen the mirror turn signal lamp mounting screw (A).



5. Remove the door mirror turn signal lamp (B) after disconnecting the connector (A).

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Installation

Door Mirror Turn Signal Lamp

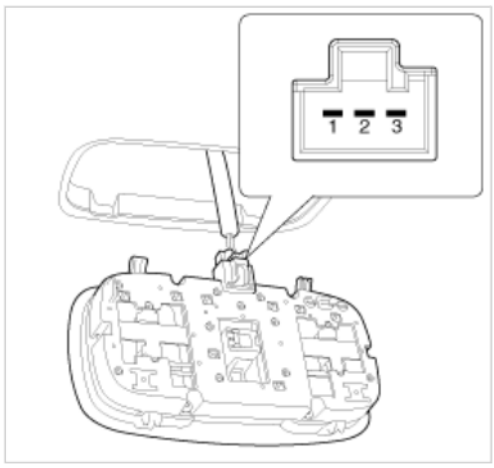
1. Install the door mirror turn signal lamp.
2. Install the door mirror cover.
3. Install the door mirror.
4. Connect the negative (-) battery terminal.

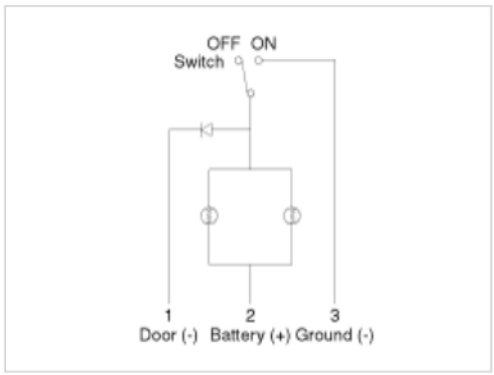
Body Electrical System

Inspection

1. Check that the switch operates properly after disconnecting the room lamp connector (A).

Room Lamp





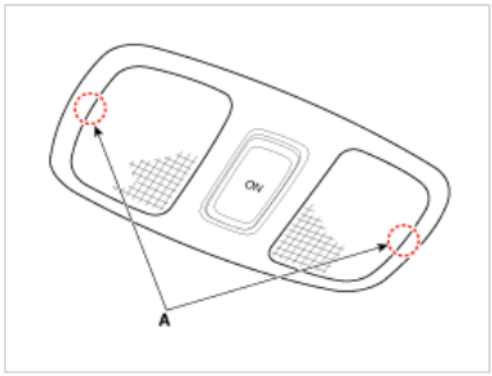
Removal

Room Lamp

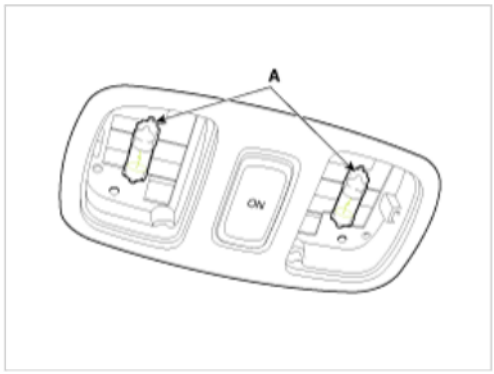
1. Disconnect the negative (-) battery terminal.

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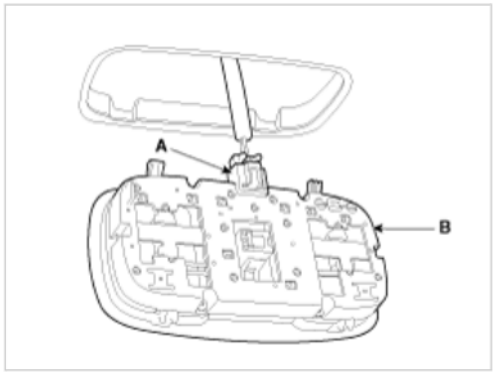
2. Detach the lamp lens (A) from the room lamp with a flat-tip screwdriver.



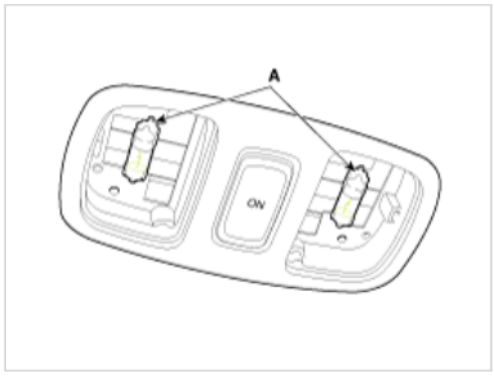
3. Separate the room lamp (A) from the roof trim after loosening the screws (2EA).



4. Remove the room lamp (B) after disconnecting the connector (A).



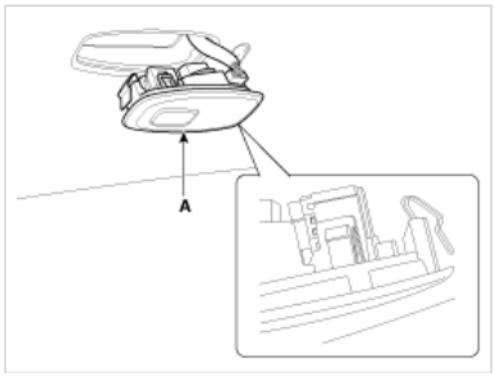
5. If it is necessary to replace the bulb, replace the bulb (A) after detching the lamp lens.



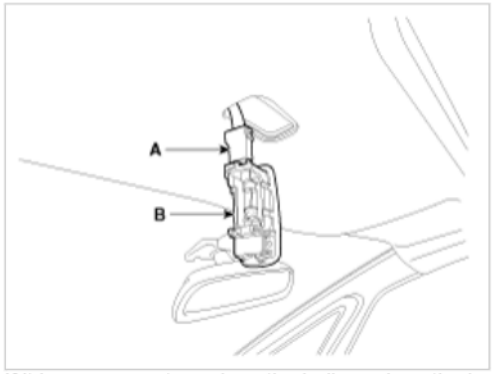
Vanity Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the vanity lamp assembly (A).

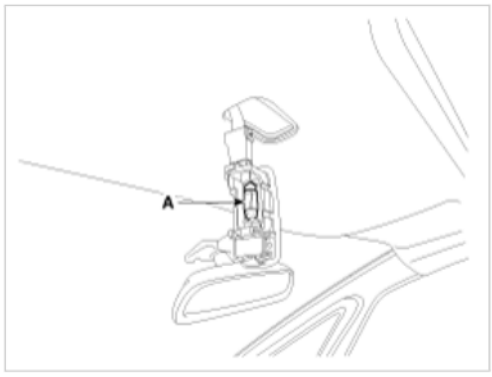
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3. Remove the vanity lamp assembly (B) after disconnecting the connector (A).



4. If it is necessary to replace the bulb, replace the bulb (A).



Installation

Room Lamp

1. Install the room lamp assembly after connecting the lamp connector.
2. Install the lens after assembling the bulb.

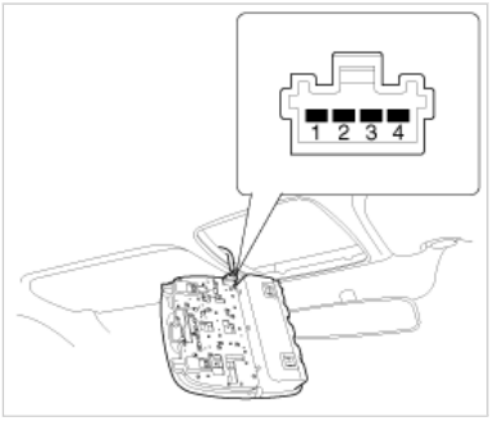
Vanity Lamp

1. Install the vanity lamp assembly after connecting the lamp connector.

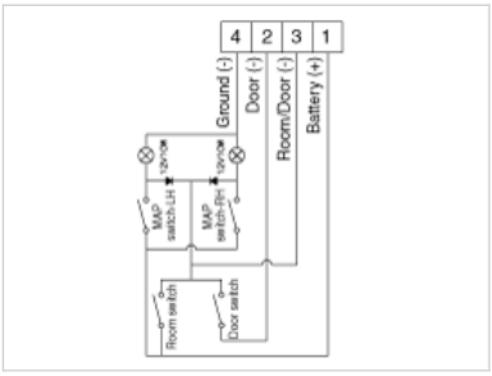
Inspection

1. Remove the overhead console lamp assembly then check for continuity between terminals. If the continuity is not as specified, replace the map lamp switch.

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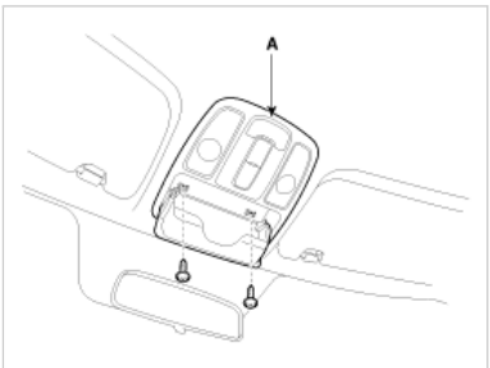
No.	Description
1	Ground (-)
2	Door (-)
3	Room/ Door (-)
4	Battery (+)



Terminal / Position	1	2	3	4
Map switch ON	○	—	—	○
Room/ Door switch ON			○	○
Door switch ON		○	—	○

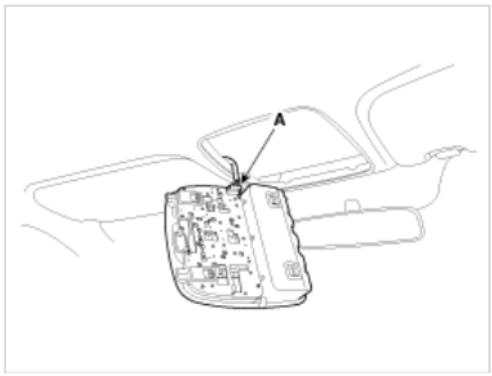
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the mounting screws (2EA).
   And then remove the overhead console (A).

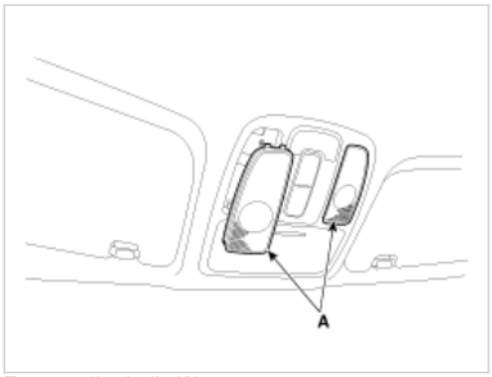


3. Remove the overhead console after disconnect the connectors (A).

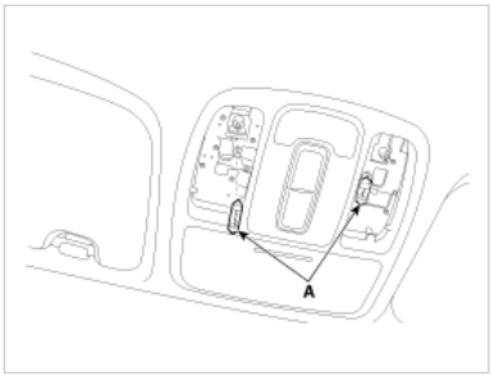
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4. If it is necessary to replace the bulb, replace the bulb (in the order as below).
   (1) Remove the overhead console lens (A).



   (2) Remove the bulb (A).



Installation

1. Install the overhead console lamp after connecting the connector.
2. Install the lens after tightening 2 screws.

Body Electrical System

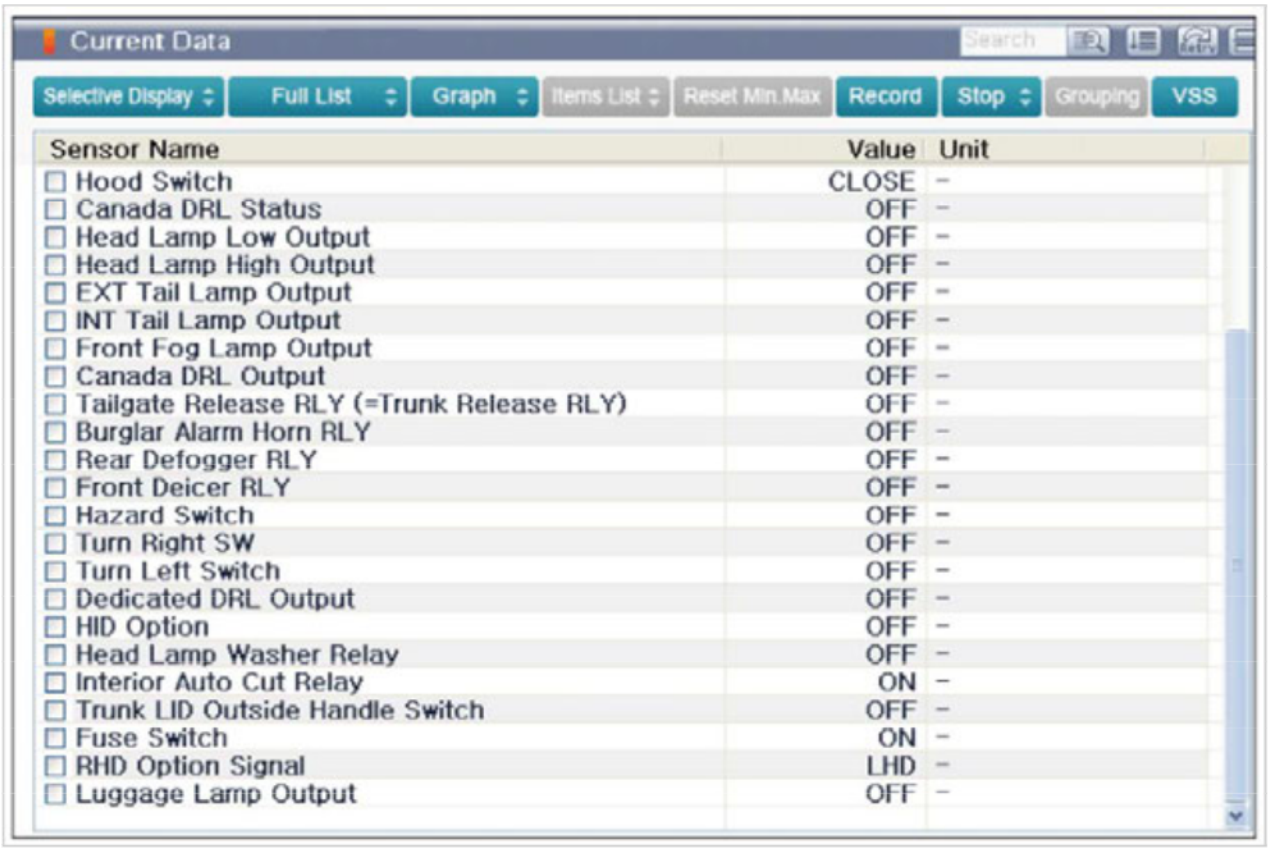
Inspection

1. The SJB can be diagnosed by using the GDS. The SJB communicates with the GDS which then displays inputs and outputs along with codes.
   It will be able to diagnose defects of hazard lamp switch with GDS quickly. GDS can operates actuator forcefully, input/output value monitoring and self diagnosis.
2. To diagnose the SJB function, select the vehicle model, BCM and SJB.

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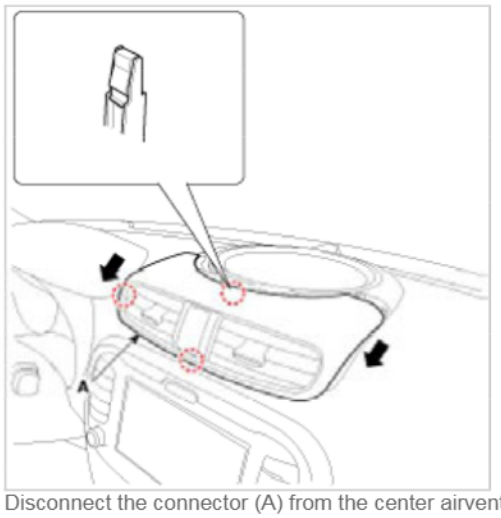
3. To consult the present input/output value of SJB, "Current DATA", provides information of SJB input/output conditions.



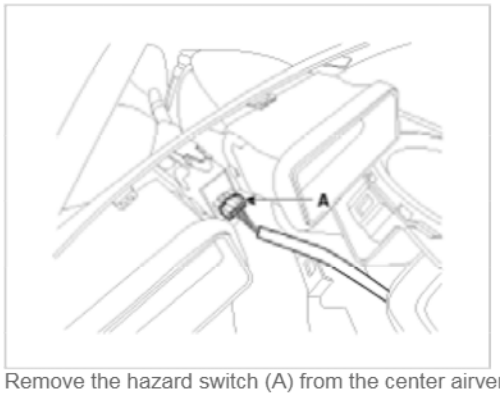
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the center airvent assembly (A).

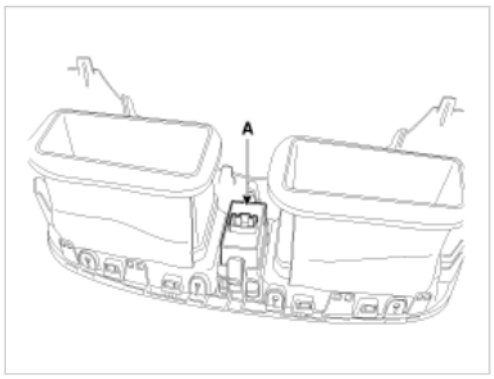
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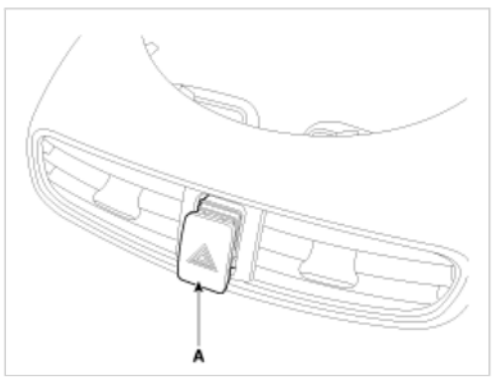


3. Disconnect the connector (A) from the center airvent assembly.



4. Remove the hazard switch (A) from the center airvent assembly.





Installation

1. Install the hazard switch in the center airvent assembly.
2. Connect the connector and install the center airvent assembly.

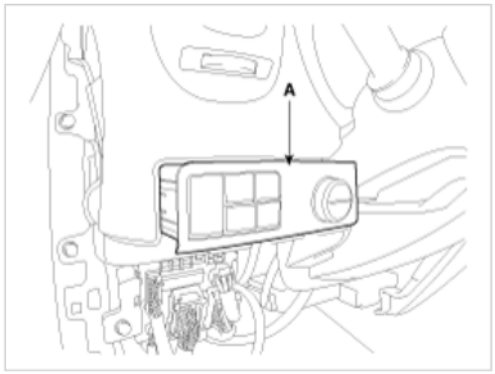
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3. Connect the negative (-) battery terminal.

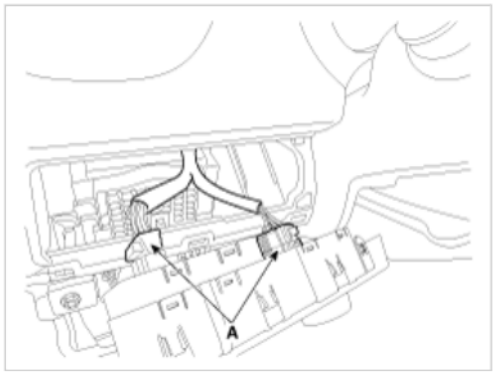
Body Electrical System

Inspection

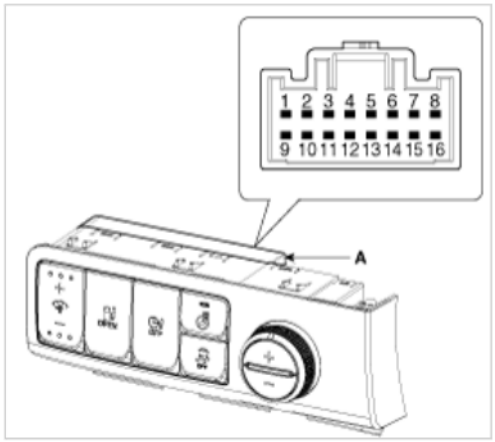
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the lower crash pad switch assembly (A) by pushing it.



4. Disconnect the connectors (A) from the lower crash pad switch assembly.



5. Remove the rheostat switch (A).



6. Check for intensity of rheostat switch. If the light intensity of the lamps changes smoothly without any flickering when the rheostat is turned, it can be assumed that the rheostat is normal.

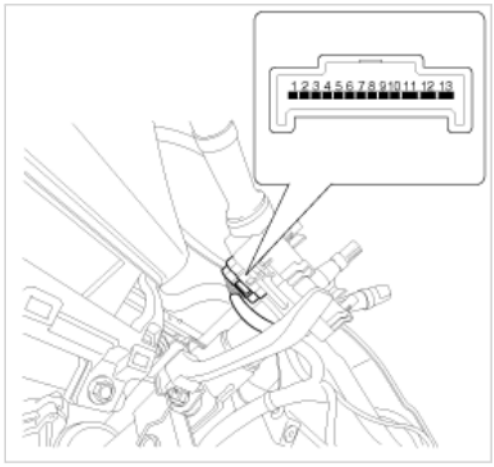
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Terminal / Position	UP(+)	DOWN(-)	Description
6		○	Down
1	○	○	GND
5	○		Up
2	○		Illumination (-)
8	○		Illumination (+)

Inspection

Fog Lamp Switch

1. With the fog lamp switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the multifunction switch.

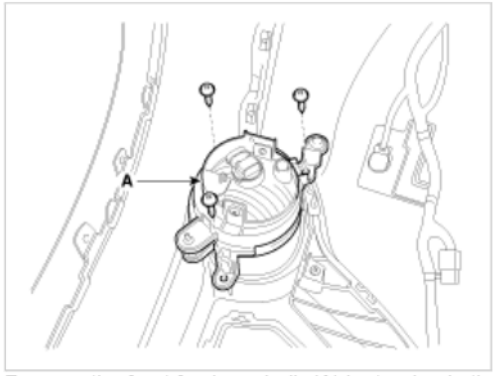


Terminal / Position	5	6
OFF		
Front	○	○

Removal

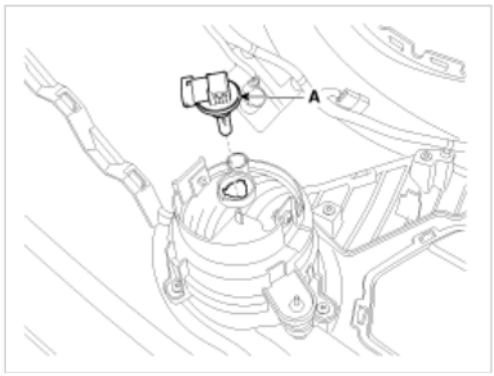
Front Fog Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper.
   (Refer to Body - "Front Bumper Cover")
3. Remove the front fog lamp assembly (A) after loosening the mounting screws.



4. Remove the front fog lamp bulb (A) by turning in the counter clock-wise direction.

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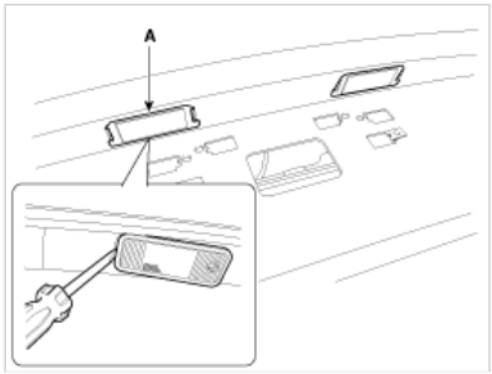
Installation

1. Install the front fog lamp bulb.
2. Connect the front fog lamp connector.
3. Install the front bumper cover.

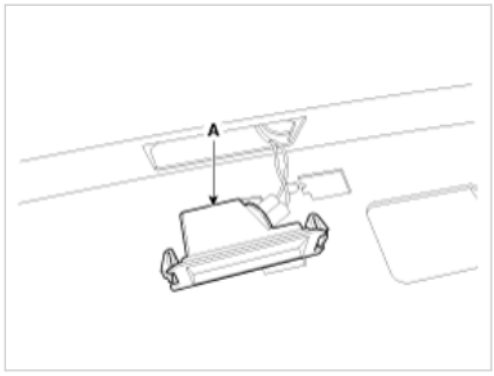
Body Electrical System

Removal

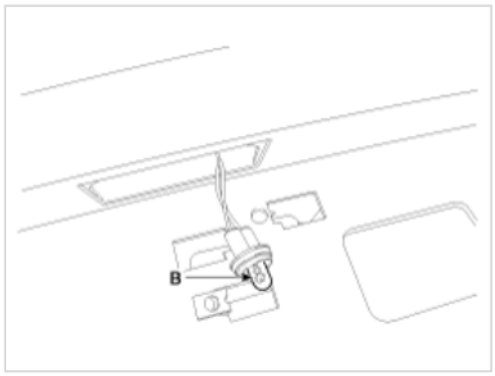
1. Disconnect the negative (-) battery terminal.
2. Remove the license lamp assembly (A).



3. Replace the bulb (B) after removing the license lamp (A).



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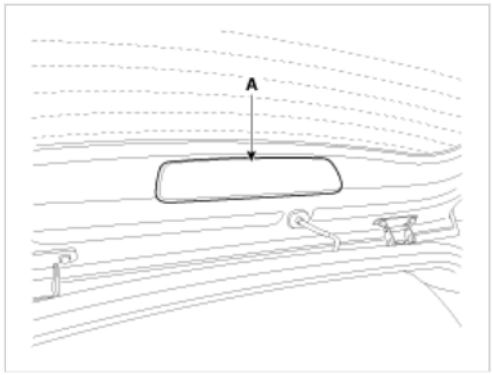
Installation

1. Install the bulb.
2. Install the license lamp assembly.

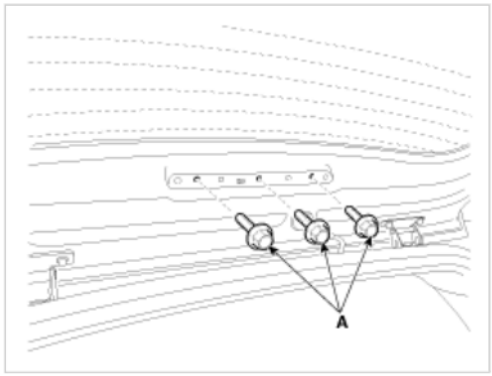
Body Electrical System

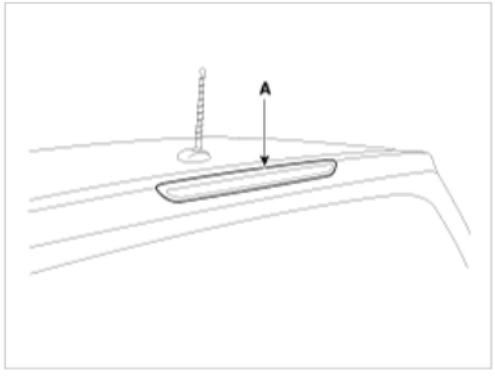
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the high mounted stop lamp trim (A).



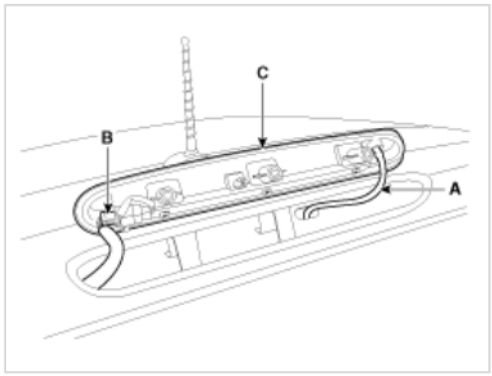
3. Detach the high mounted stop lamp (A) from the tailgate after loosening the mounting bolts.





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4. Remove the high mounted stop lamp (C) after disconnecting the connector (B) and hose (A).



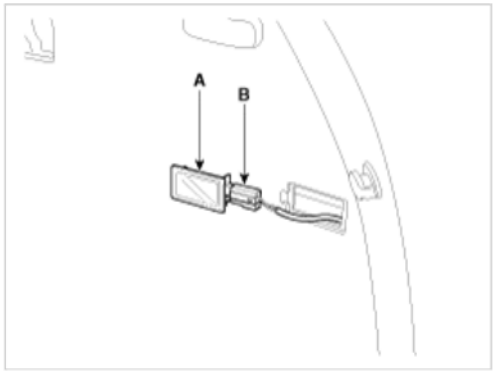
Installation

1. Install the high mounted stop lamp.
2. Install the high mounted stop lamp trim.
3. Connect the negative (-) battery terminal.

Body Electrical System

Removal

1. Disconnect the negative (-) battery terminal.
2. Using a screwdriver or remover, remove the luggage lamp (A).
3. Remove the luggage lamp (A) after disconnecting the connector (B).



Installation

1. Install the luggage lamp assembly after connecting the lamp connector.

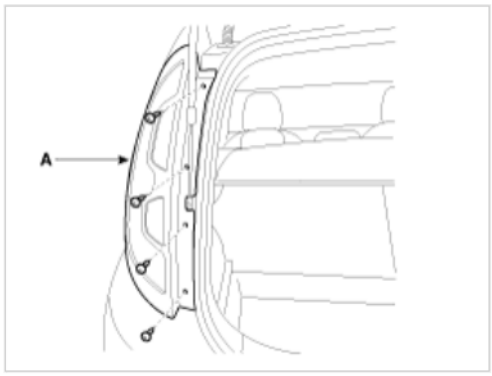
Body Electrical System

Removal

Rear Combination Lamp

1. Disconnect the negative (-) battery terminal.
2. Remove the rear combination lamp (A) after loosening the mounting screws.

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3. Disconnect the rear combination lamp connector (A).

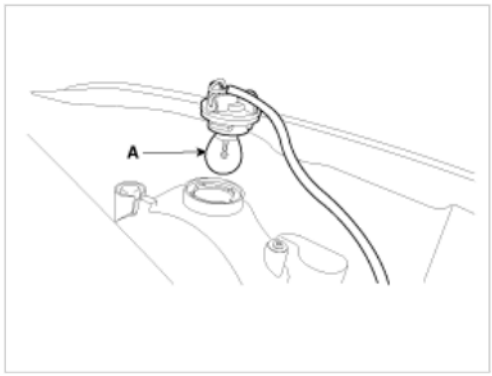


Turn Signal Lamp Bulb

1. Disconnect the negative (-) battery terminal.
2. Remove the rear combination lamp assembly.
3. Remove the turn signal lamp socket (A) by turning the socket counterclockwise.



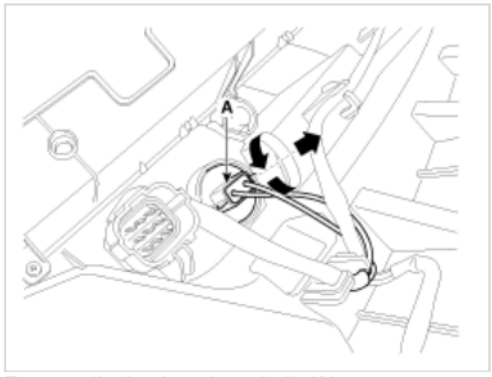
4. Remove the turn signal lamp bulb (A).



Back Up Lamp Bulb

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1. Disconnect the negative (-) battery terminal.
2. Remove the rear combination lamp assembly.
3. Remove the back up lamp socket (A) by turning the socket counterclockwise.



4. Remove the back up lamp bulb (A).



Installation

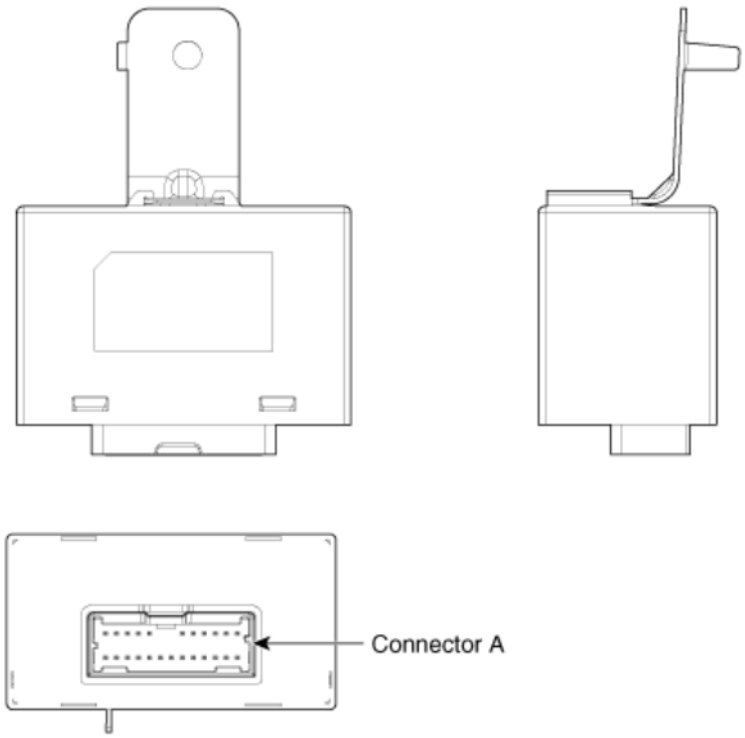
1. Install the rear combination lamp assembly.
2. Connect the negative (-) battery terminal.

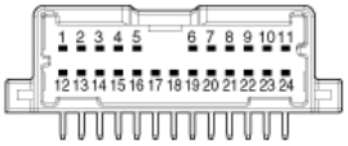
Body Electrical System

Components

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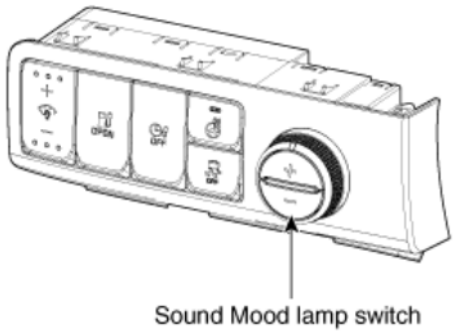
[Sound Mood Lamp Unit]

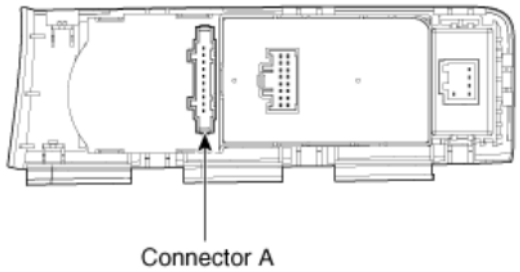


Connector A	No.	Description	No.	Description
	1	Front left speaker (+)	13	Front right speaker (-)
	2	Front right speaker (+)	14	-
	3	-	15	Illumination select (+)
	4	Red (-) - LH	16	Mood select
	5	Green (-) - LH	17	Illumination select (-)
	6	Blue (-) - LH	18	-
	7	Red (-) - RH	19	-
	8	Green (-) - RH	20	Ground (Switch)
	9	Blue (-) - RH	21	Ground
	10	4 door open signal	22	-
	11	ACC	23	LED (+) - LH
	12	Front left speaker (-)	24	LED (+) - RH

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[Sound Mood Lamp Switch]

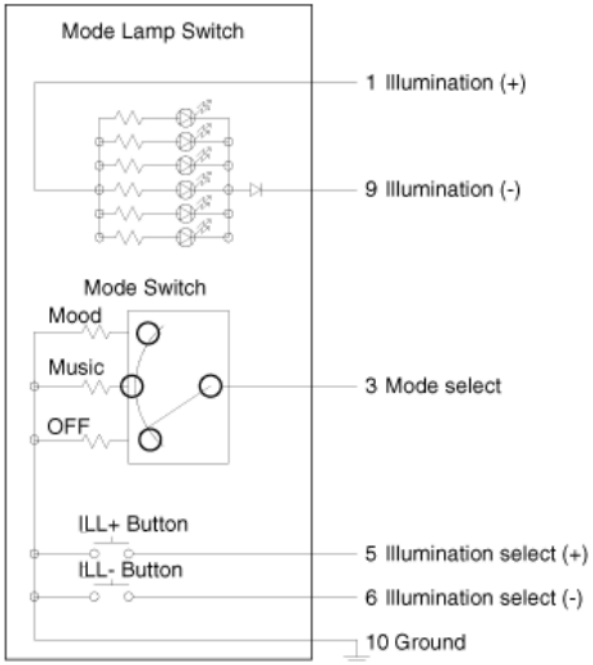




Connector A



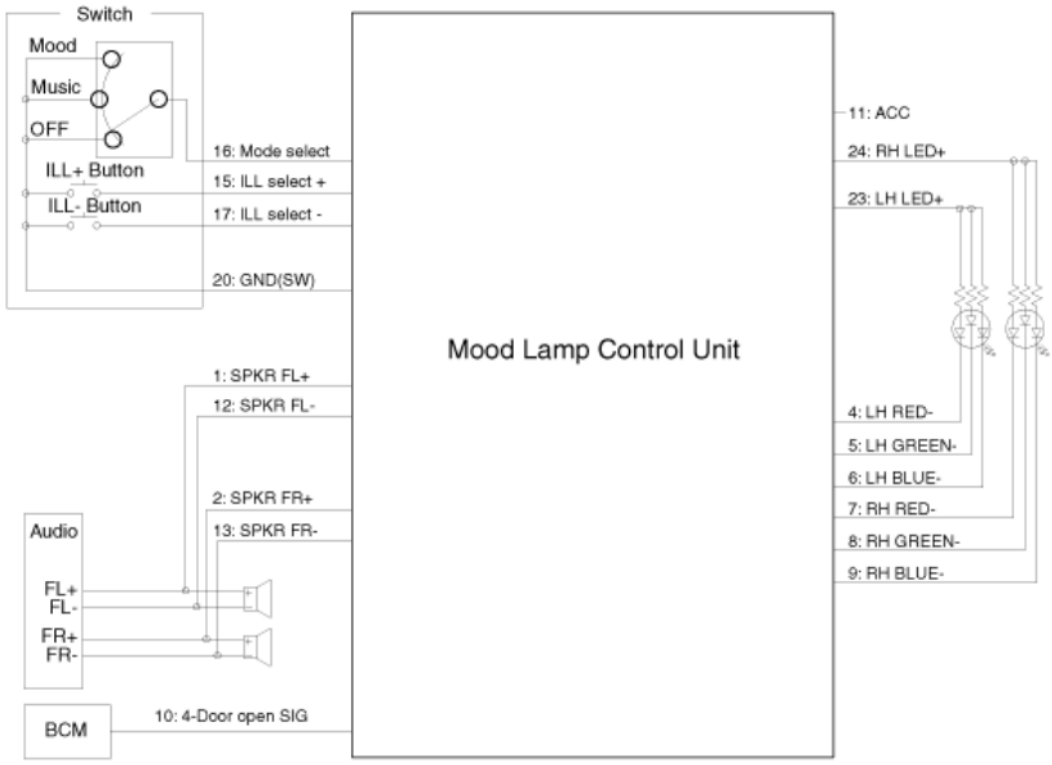
No.	Description
1	Illumination (+)
2	-
3	Mode select
4	-
5	Illumination select (+)
6	Illumination select (-)
7	-
8	-
9	Illumination (-)
10	Ground



Circuit Diagram

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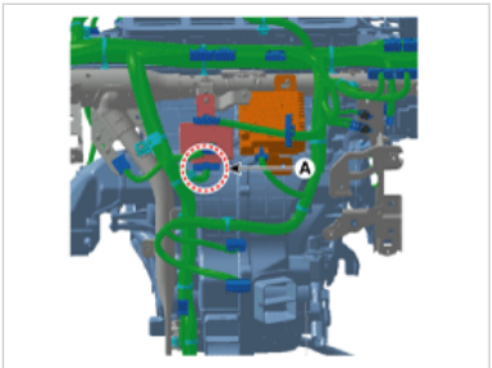
[Sound Mood Lamp Unit]



Removal

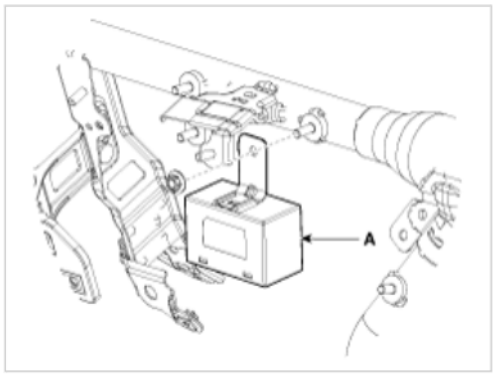
[Sound Mood Lamp Unit]

1. Disconnect the negative (-) battery terminal.
2. Remove the audio head unit.
   (Refer to Body Electrical - "Audio unit")
3. Disconnect the connector (A) from the mood lamp unit.



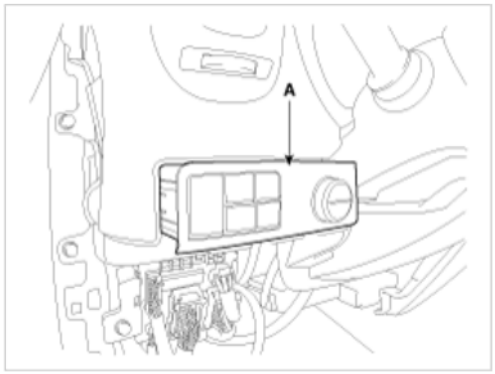
4. Remove the sound mood lamp unit (A) after loosening the mounting nut.

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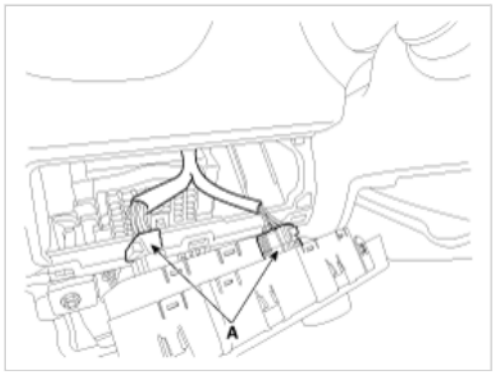


[Sound Mood Lamp Switch]

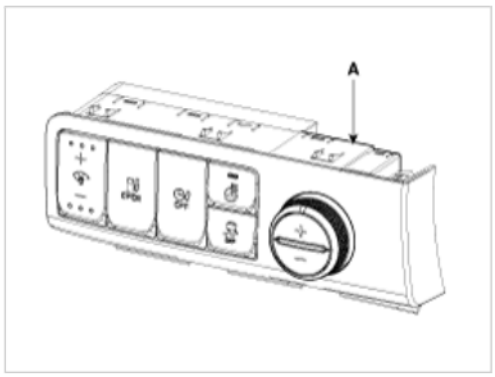
1. Disconnect the negative (-) battery terminal.
2. Remove the crash pad lower panel.
   (Refer to Body - "Crash Pad Lower Panel")
3. Remove the lower crash pad switch assembly (A) by pushing it.



4. Disconnect the connectors (A) from the lower crash pad switch assembly.



5. Remove the rheostat switch (A).



Installation

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[Sound Mood Lamp Unit]

1. Install the mood lamp unit.
2. Install the audio head unit.
3. Connect the negative (-) battery terminal.

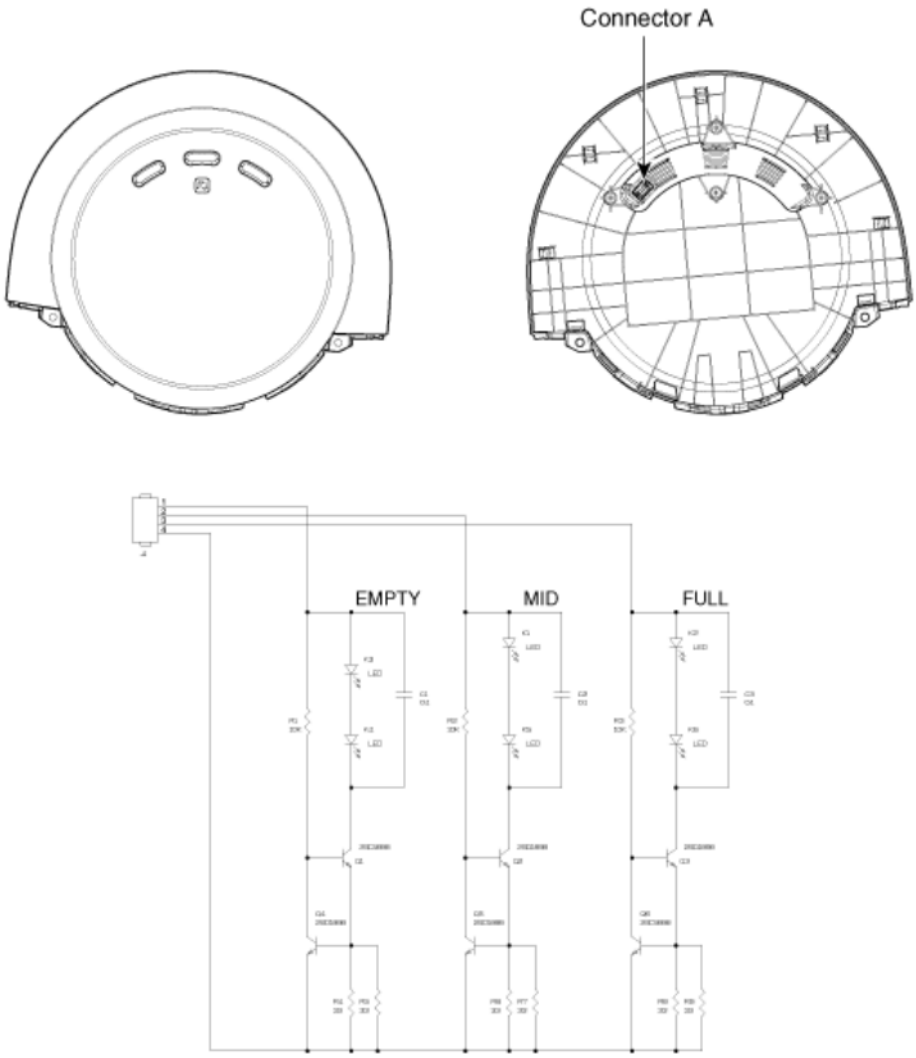
[Sound Mood Lamp Switch]

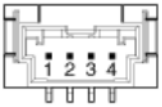
1. Connect the connectors and install the mood lamp switch.
2. Install the crash pad lower panel.
3. Connect the negative (-) battery terminal.

Body Electrical System

Components

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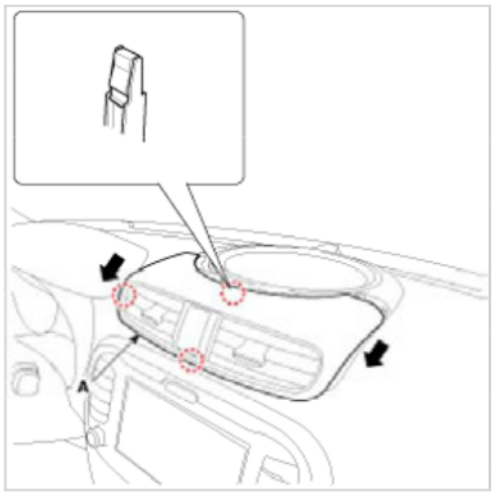


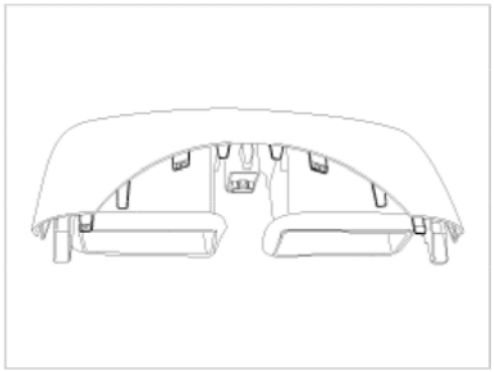
Connector A	No.	Description
	1	Empty battery (+)
	2	Medium battery (+)
	3	Full battery (+)
	4	Ground

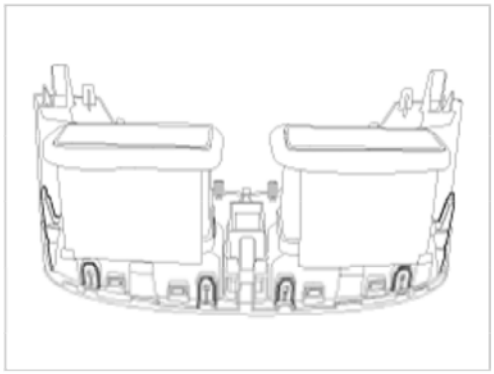
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Removal

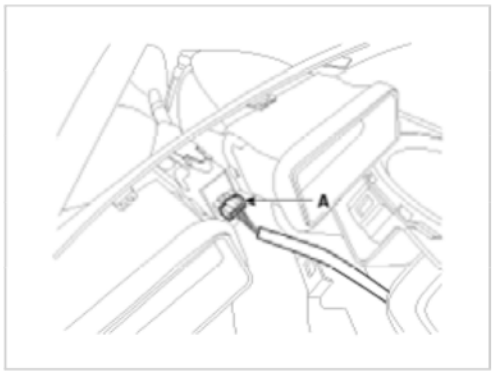
1. Disconnect the negative (-) battery terminal.
2. Using the flat screw driver or remover, remove the crash pad center air vent panel (A).





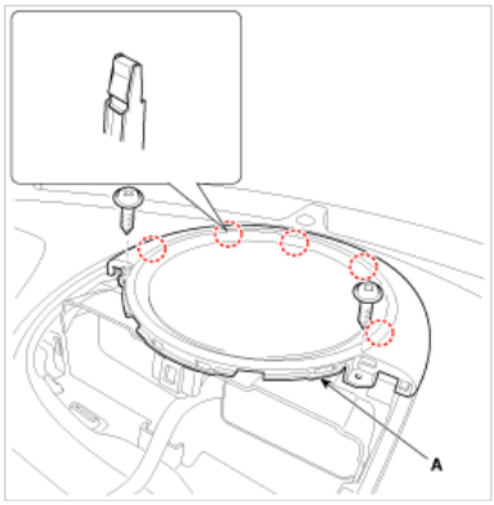


3. Disconnect the hazard switch connector (A).

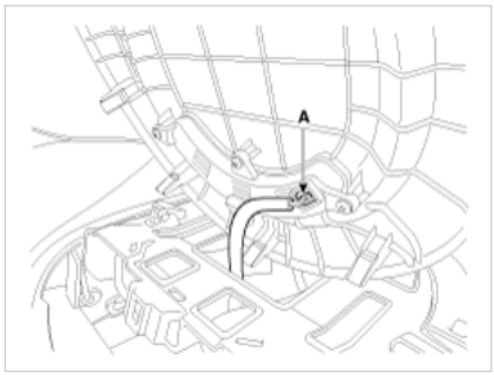


4. Remove center fascia upper panel (A) after loosening the mounting screws.

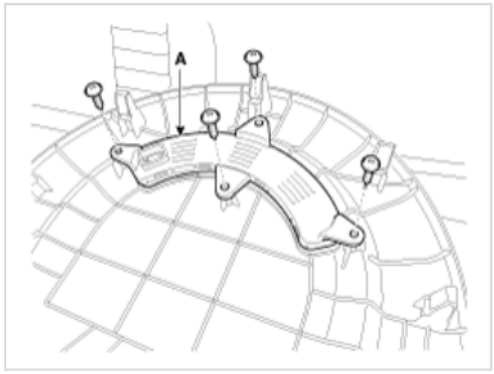
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5. Disconnect the charge information lamp connector (A).



6. Remove the charge information lamp assembly (A) after loosening the mounting screws.



Installation

1. Install the charge information lamp assembly, center fascia upper panel and crash pad center air vent panel.
2. Connect the negative (-) battery terminal.

Body Electrical System

Troubleshooting

Symptom	Possible cause	Remedy
One lamp does not light (all exterior)	Bulb burned out	Replace bulb
	Socket, wiring or ground faulty	Repair if necessary
Head lamps do not light	Bulb burned out	Replace bulb
	Ignition fuse (LOW:10A, HIGH:20A) blown	Check for short and replace fuse
	Head lamp fuse (15A) blown	Check for short and replace fuse
	Head lamp relay faulty	Check relay
	Lighting switch faulty	Check switch

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	Wiring or ground faulty	Repair if necessary
Tail lamps and license plate lamps do not light	Bulb burned out	Replace bulb
	Tail lamp fuse (10A) blown	Check for short and replace fuse
	Tail lamp relay faulty	Check relay
	Lighting switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Stop lamps do not light	Bulb burned out	Replace bulb
	Stop lamp fuse (15A) blown	Check for short and replace fuse
	Stop lamp switch faulty	Adjust or replace switch
	Wiring or ground faulty	Repair if necessary
Stop lamps do not turn off	Stop lamp switch faulty	Repair or replace switch
Instrument lamps do not light (Tail lamps light)	Rheostat faulty	Check rheostat
	Wiring or ground faulty	Repair if necessary
Turn signal lamp does not flash on one side	Bulb burned out	Replace bulb
	Turn signal switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Turn signal lamps do not light	Bulb burned out	Replace bulb
	Turn signal lamp fuse (10A) blown	Check for short and replace fuse
	Flasher unit faulty	Check flasher unit
	Turn signal switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Hazard warning lamps do not light	Bulb burned out	Replace bulb
	Hazard warning lamp fuse (15A) blown	Check for short and replace fuse
	Flasher unit faulty	Check flasher unit
	Hazard switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Flasher rate too slow or too fast	Lamps' wattages are smaller or larger than specified	Replace lamps
	Flasher unit faulty	Check flasher unit
Back up lamps do not light	Bulb burned out	Replace bulb
	Back up lamp fuse (10A) blown	Check for short and replace fuse
	Back up lamp switch (M/T) faulty	Check switch
	Transaxle range switch (A/T) faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Room lamp does not light	Bulb burned out	Replace bulb
	Room lamp fuse (10A) blown	Check for short and replace fuse
	Room lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Front fog lamps do not light	Bulb burned out	Replace bulb
	Front fog lamp fuse (15A) blown	Check for short and replace fuse
	Front fog lamp relay faulty	Check relay
	Front fog lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Wiring or ground faulty	Repair if necessary	
Map lamp does not light	Bulb burned out	Replace bulb
	Room lamp fuse (10A) blown	Check for short and replace fuse
	Map lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary
Trunk room lamp does not light	Bulb burned out	Replace bulb
	Room lamp fuse (10A) blown	Check for short and replace fuse
	Trunk room lamp switch faulty	Check switch
	Wiring or ground faulty	Repair if necessary

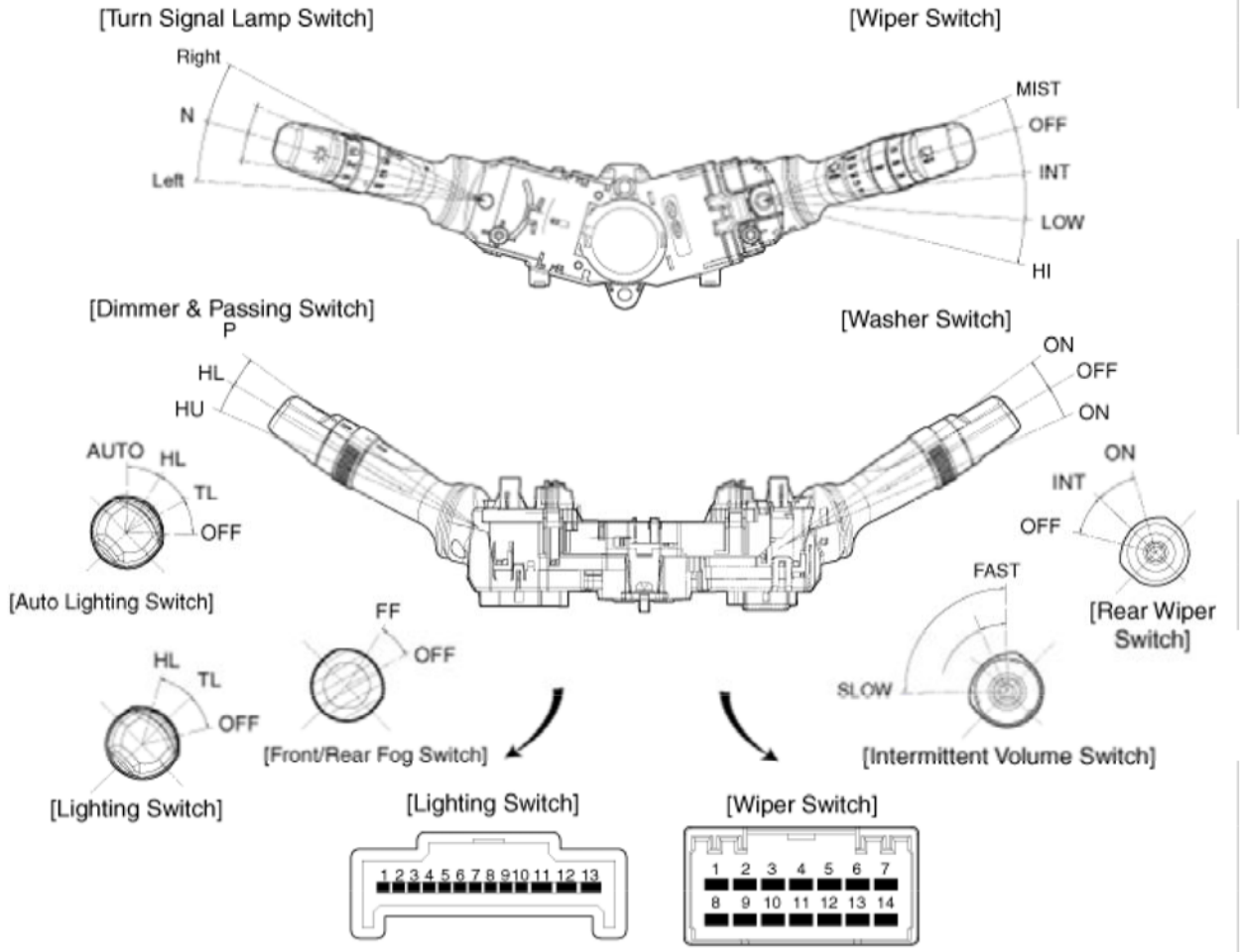
Specifications

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Items		Specifications
Rated voltage		DC 12V
Operating temperature range		-30°C ~ +80°C (-22 ~ +176°F)
Rated load	Dimmer & passing switch	High : 1A (Relay load)
		Low : 1A (Relay load)
		Passing : 1A (Relay load)
	Lighting switch/ Auto lighting switch	1A (Relay load)
	Turn signal & lane change switch	6.6 ± 0.5A (Lamp load)
	Front / Rear fog lamp switch	1A (Relay load)
	Wiper switch	Low, High : 4.0A (Motor load)
		Intermittent : 0.22 ± 0.05A (Relay load)
		Lock : Max. 28A (Motor load)
	Mist switch	Mist : 4A (Motor load)
	Front/Rear washer switch	4A (Motor load)
	Rear wiper	0.2A (Relay load)

Component

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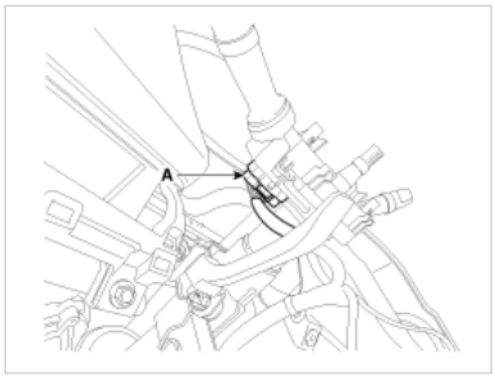


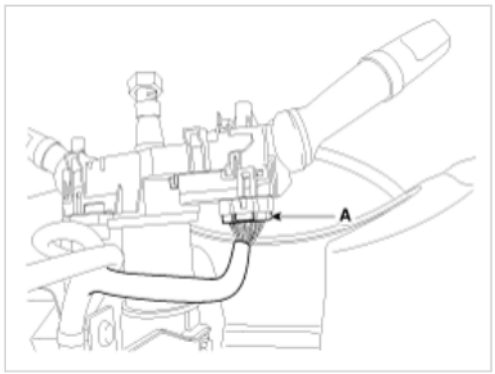
Connector name	No.	Description	Connector name	No.	Description
Lighting (13 pin) -LH side	1	Ligthing switch ground	Wiper & Washer (14 pin) -RH side	1	Mist switch
	2	Tail lamp switch		2	Wiper parking
	3	Auto ligth switch		3	Wiper low speed
	4	Head lamp switch		4	-
	5	Fog switch base		5	Rear washer switch
	6	Front fog switch		6	IGN(2) - Rear wiper & washer
	7	-		7	rear wiper switch
	8	Head lamp low beam		8	nt wiper switch
	9	Head lamp high beam		9	Wiper high speed
	10	Dimmer switch base		10	IGN(2) - Front wiper & washer
	11	Turn signal left		11	Washer switch
	12	Turn signal base		12	Intermittent volume base
	13	Turn signal right		13	Intermittent time
				14	Rear wiper switch

Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the steering wheel.
   (Refer to Steering System - "Steering Wheel")
3. Remove the steering column upper and lower shrouds.
   (Refer to Body - "Steering Column Shroud Panel")
4. Remove the clock spring.
   (Refer to Restraint - "Driver Airbag (DAB) Module and Clock Spring")
5. Disconnect the light switch connector (A) and the wiper switch connector (B).

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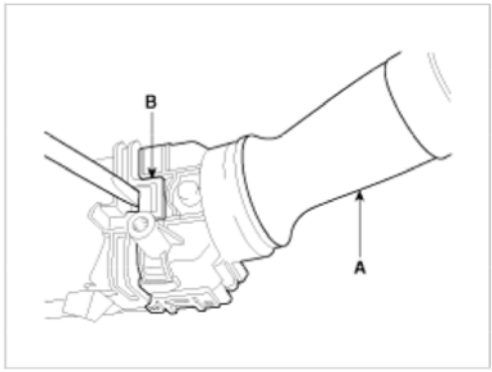




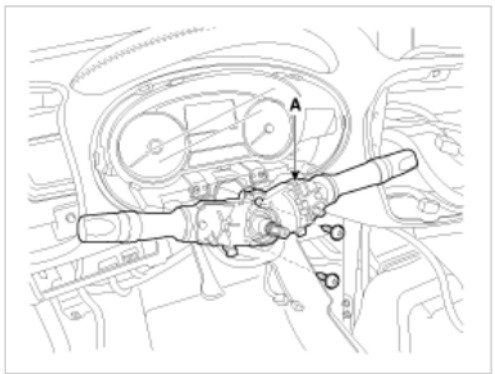
6. Remove the wiper switch (A) by pushing the lock pin (B).

NOTICE

When removing the wiper & washer switch only, release the lock of wiper switch without removing the steering wheel.



7. Loosen the screws from the multifunction switch assembly (A).



Installation

1. Install the multifunction switch.
2. Install the clock spring.
3. Install the steering column upper and lower shrouds.
4. Install the steering wheel.

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5. Connect the negative (-) battery terminal.

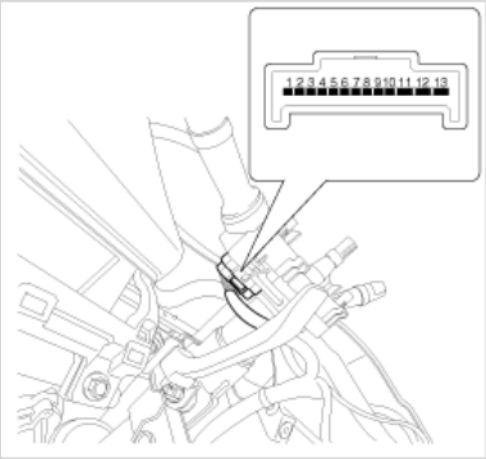
NOTICE

Make sure the multifunction switch connectors are plugged in properly.

Inspection

Lighting Switch Inspection

1. With the multi function switch in each position, make sure that continuity exists between the terminals below.
   If continuity is not as specified, replace the multi-function switch



Lighting switch (Auto light)

Terminal / Position	1	2	4	3
OFF				
Tail	○	○		
H/Lamp	○	○	○	
AUTO	○			○

Lighting Switch

Terminal / Position	1	2	4
OFF			
Tail	○	○	
H/Lamp	○	○	○

Dimmer And Passing Switch

Terminal / Position	10	8	9	2
HU	○		○	
HL	○	○		
P	○		○	○

Turn Signal Switch

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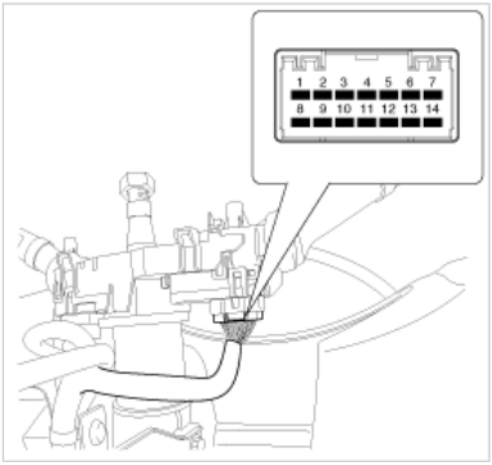
Hazard switch	Turn signal switch \ Terminal	12	11	13
OFF	L	○—○		
	N			
	R	○———○		○

Front Fog Lamp

Position \ Terminal	5	6
OFF		
Front	○——	——○

Wiper And Washer Switch Inspection

1. With the multi function switch in each position, make sure that continuity exists between the terminals below. If continuity is not as specified, replace the multi-function switch.



Wiper Switch

Position \ Terminal	3	9	2	8	10	1	12	13
MIST	○——		——○		○——	——○		
OFF	○——		——○					
INT	○——		——○	○——	——○		○~~○	
LOW	○————				————○			
HI		○————			————○			

Washer Switch

Position \ Terminal	10	11
OFF		
ON	○————	————○

Rear Wiper Switch

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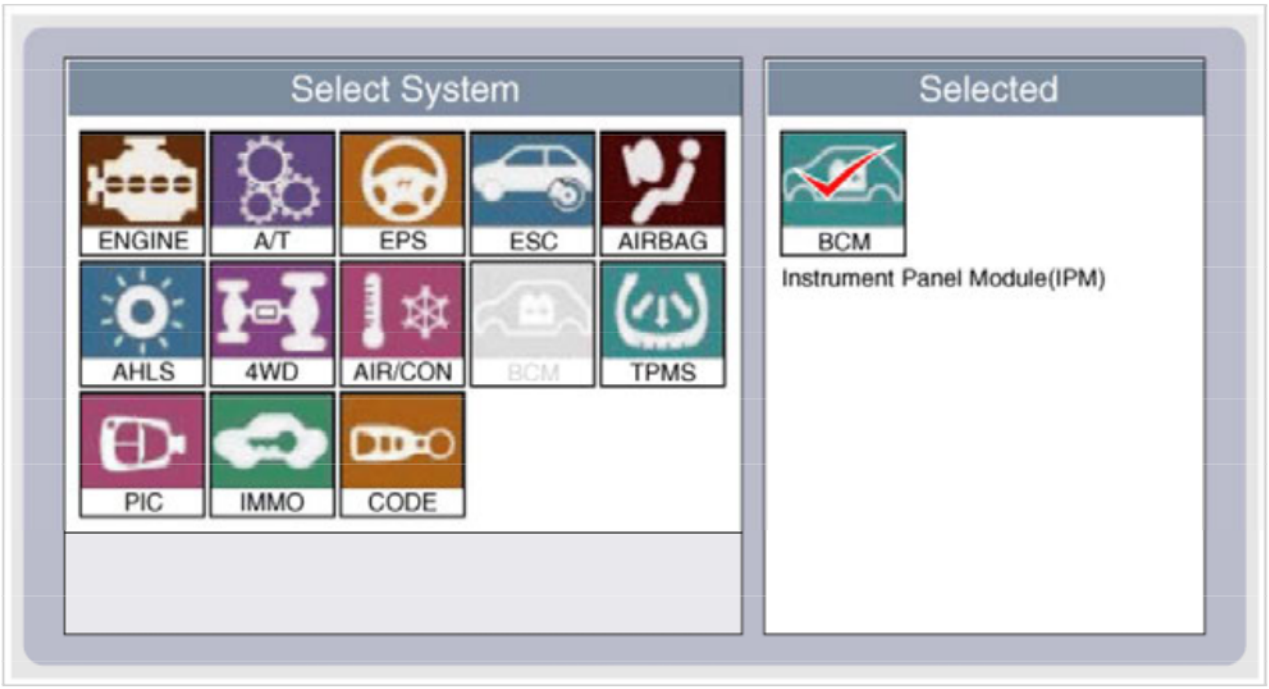
Terminal / Position	6	7	14
OFF			
INT	○——	——○	
ON	○——	——	——○

Rear Washer Switch

Terminal / Position	6	5
OFF		
ON	○——	——○

Inspection (With GDS)

1. Check IPM input/output specification of multifunction switch using the GDS. If the specification is abnormal, replace the lamp or wiper switch.
2. If diagnosis is required on the multifunction switch, select model and "IPM".

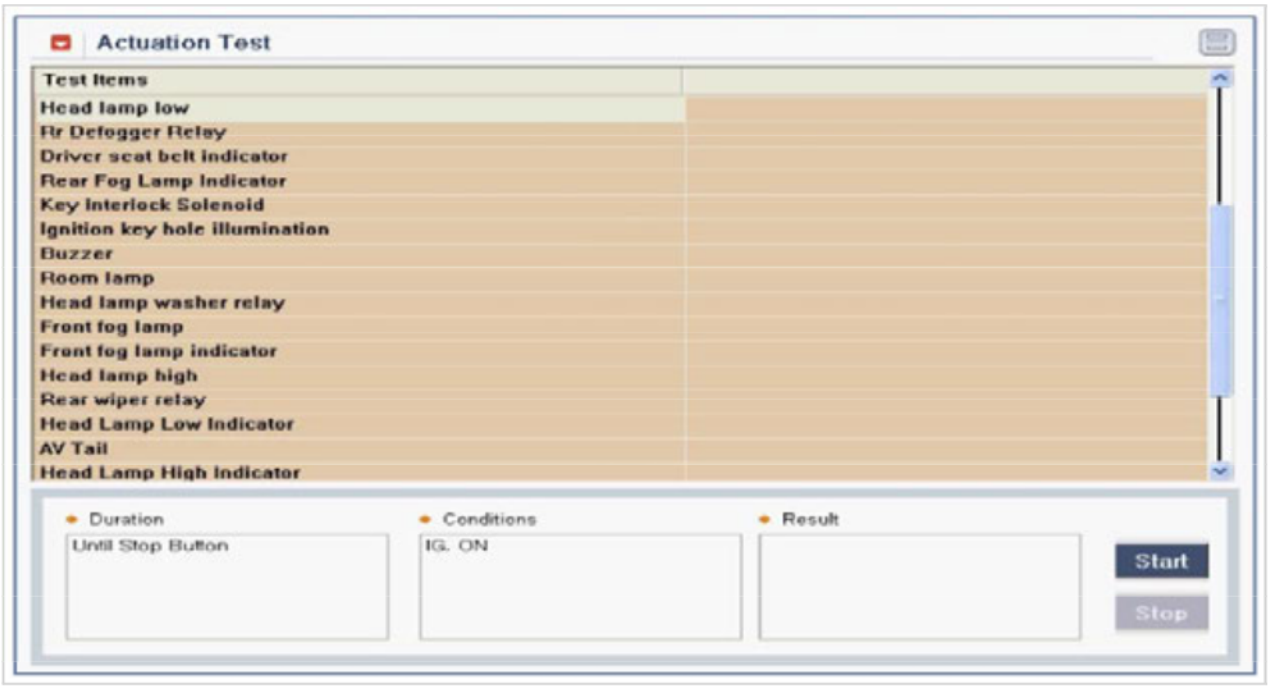


3. Select "Current data" and check the input/output condition of "Multifunction switch".

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4. To perform test on "Multifunction switch" outputs, select "Actuation test".



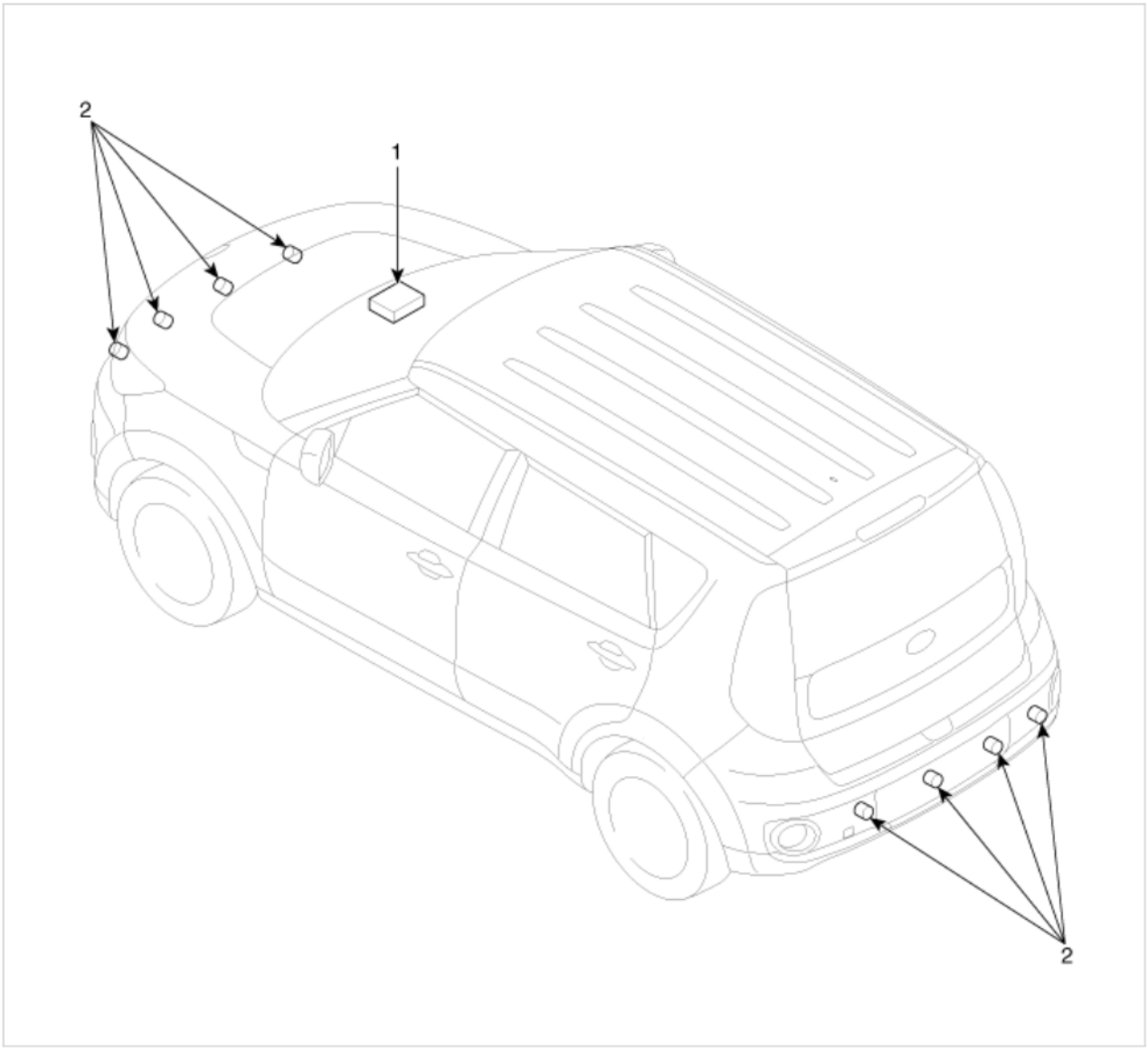
Specifications

Item		Specification
Front/Rear parking assist system control unit	Rated voltage	DC 12V
	Operation range	30~120 cm(11.8~47.2 in)
	Operation voltage	DC 9V~16V
	Operation current	Max. 300 mA
	Operation temperature	-30~+80 °C
	Operation frequency	48 ± 5 KHz
	Number of sensors	Front : 4EA(Left, Right, Center left, Center right) Rear : 4EA(Left, Right, Center left, Center right)

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Body Electrical System

Component Location



1. BCM	2. Ultrasonic sensor

※ Parking assist control unit function and buzzer are built in BCM (body control unit).

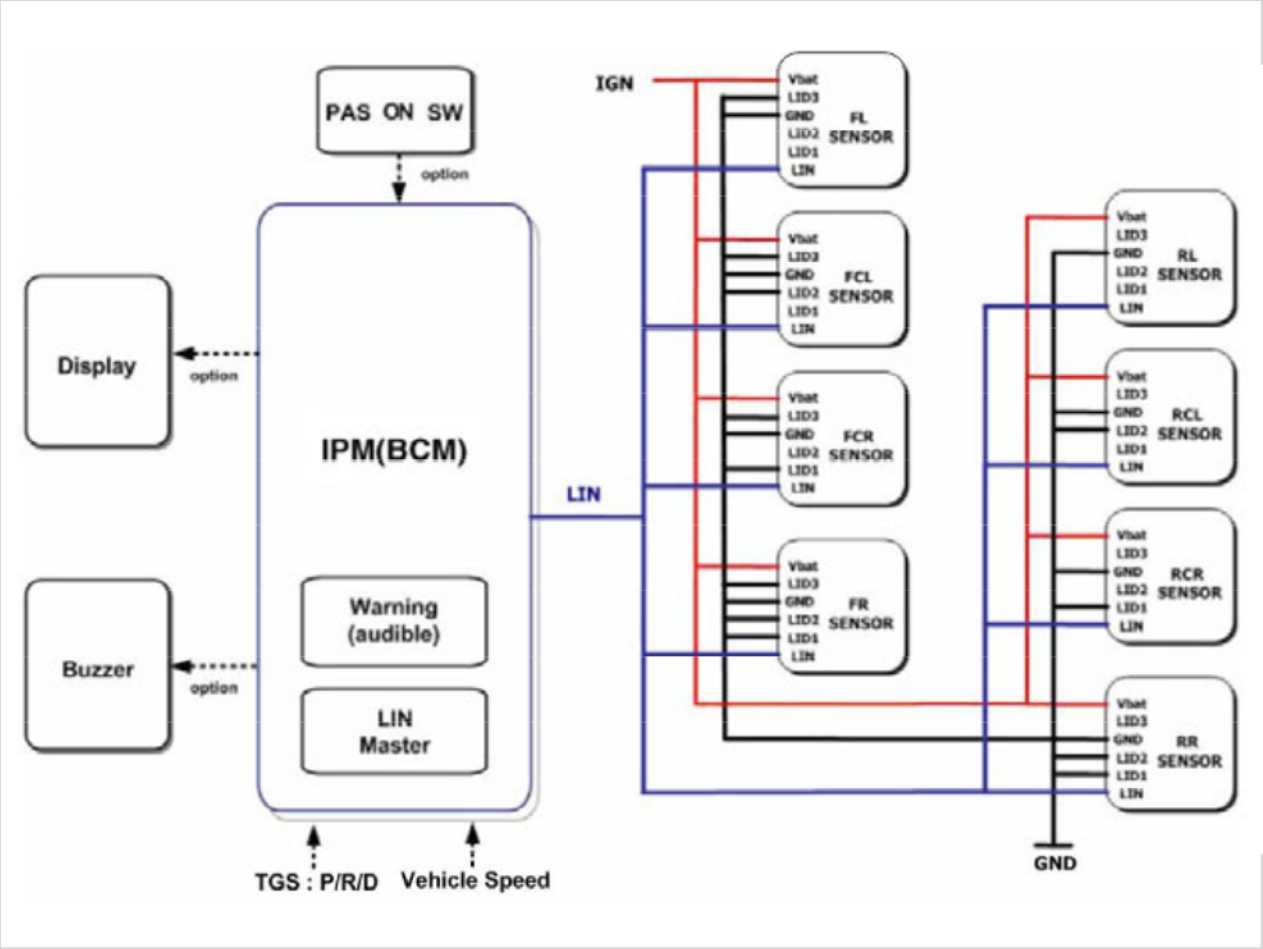
Body Electrical System

System Configuration

PAS consists of 8 sensors(Front 4 EA, Rear 4EA) which are detecting the obstacles and transmit the result separated into three warning levels, the first, second and third to IPM(BCM) by Lin communication. IPM(BCM) decides the alarm level by the transmitted communication message from the slave sensors, then operate the buzzer or transmits the data for display.

Block Diagram

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System Operation Specification

1. Initial mode - Front sensor
   (1) System initializing time is 500ms after IGN1+ initial D Gear + below 10 Km/h .
   (2) PAS recognizes LID and sets the sensor ID up during initialization.
   (3) PAS activates each sensor and then executes the diagnosis after finishing initialization of IPM(BCM).
   (4) PAS Starting buzzer" is normally worked, when sensor does not send an error message and after finishing error diagnosis.
   (5) If any failure is received from the any sensors, PAS Starting Buzzer" does not work but the failure alarm is operated for a moment. If you have display option, warning sign is also shown on it.
   (6) Buzzer for sensor failure is operated once, but display is shown continuously until it is repaired completely.
   (7) IPM(BCM) memorizes the completed initializing status of front sensor until IGN 1 is OFF. It doesn't activate initializing when next D gear input.
   (8) In case of PAS SW OFF, system initializing does not be activated.
   (9) If PAS switch is ON like as below status, it activates initializing.
      A. PAS switch OFF when IGN1 is On.
      B. PAS switch ON when vehicle speed is below 10 km/h
   (10) Initializing has nothing to do with parking brake operation.
2. Initial mode - Rear sensor
   (1) System initializing time is 500ms after IGN1+ initial R Gear.
   (2) PAS recognizes LID and sets the sensor ID up during initialization.
   (3) PAS activates each sensor and then executes the diagnosis after finishing initialization of IPM(BCM).
   (4) PAS Starting buzzer" is normally worked, when sensor does not send an error message and after finishing error diagnosis.
   (5) If any failure is received from the any sensors, PAS Starting Buzzer" does not work but the failure alarm is operated for a moment. If you have display option, warning sign is also shown on it.
   (6) Buzzer for sensor failure is operated once, but display is shown continuously until it is repaired completely.
   (7) IPM(BCM) memorizes the completed initializing status of rear sensor until IGN 1 is OFF. It doesn't activate initializing when next R gear input.
   (8) Initializing has nothing to do with parking brake operation.

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3. Normal mode - Front sensor
   (1) Lin communication starts and keeps the routine after IGN1 ON+D gear + below 10 km/h.
   (2) After initializing, the routine starts at once without PAS starting warning sound.
   (3) Alarms of obstacle consists of 3 level 1,2,3 step and 1,2 alarm sounds intermittently and 3 alarm sounds continuously. 1 level alarm doesn't exist in the front ultrasonic sensor.
      A. Type with display
         • 2 level alarm : Display is only operated without alarm.
         • 3 level alarm : Alarm + Display
      B. Type without display : Alarm only
   (4) In display, the data of each sensor is sent from IPM(BCM) to display, for example cluster. CAN communication is used for transmission and maximum gateway time is 50ms.
   (5) The efficient vehicle speed of RPAS operation is under 10Km/h.
   (6) It doesn't work at PAS SW OFF.
   (7) It has nothing to do with parking brake operation.
   (8) Operation doesn't start or stops at gear N, P.
4. Normal mode - Rear sensor
   (1) Lin communication starts and keeps the routine after IGN1 ON+R gear
   (2) BCM send a message once to each sensor for operating request to check the initial status of the system and four sensors response at a time. At this time, if there is no problem, the alarm starts after 500ms of R gear shifting at 300ms intervals.
   (3) After initialization, normal mode starts 100ms later after finishing alarm output.
   (4) Alarm for obstacles is divided into 3 levels.
      The first and second are intermittent sound, and the third alarms continuously
   (5) In display, the data of each sensor is sent from BCM to display, for example Cluster.
      CAN communication is used for transmission and maximum gateway time is 50ms.
   (6) It has nothing to do with vehicle speed.
   (7) When PAS SW is OFF, if gear R signal is inputted, PAS SW is changed to ON.
   (8) It has nothing to do with parking brake operation.
   (9) Operation doesn't start or stops at gear N, P.

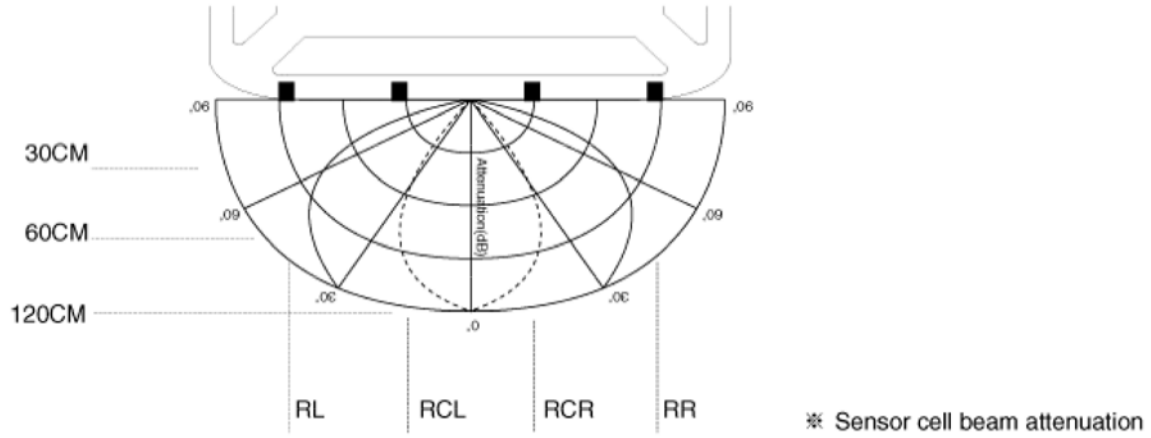
Sensing Area

1. Measurement condition – PVC pole (diameter 75mm, length 3m), normal temperature
2. Distance range detected objects (Measured directly in front of sensor)

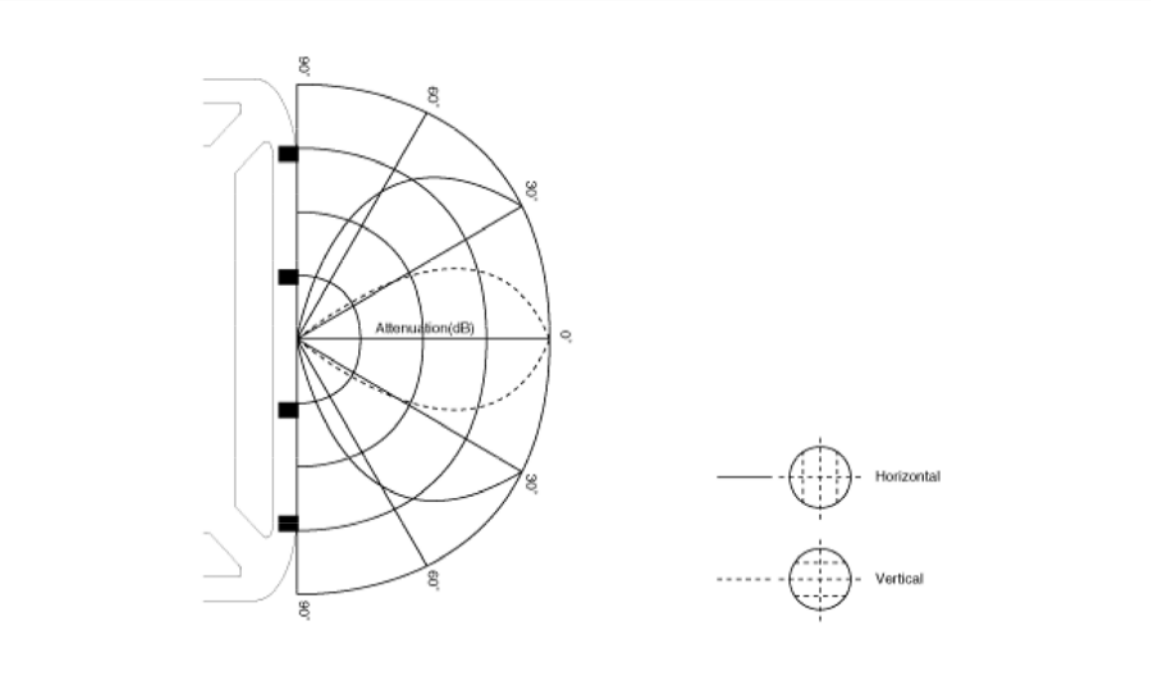
Position	Level	Distance range	
		cm	inch
Front	1st	61 ~100 (±15)	24.0 ~ 39.4 (±5.9)
	2nd	31 ~ 60 (±15)	12.2 ~ 23.6 (±5.9)
	3rd	Less than 30 (±10)	Less than 11.8 (±3.9)
Rear	1st	61 ~120 (±15)	24.0 ~ 47.2 (±5.9)
	2nd	31 ~ 60 (±15)	12.2 ~ 23.6 (±5.9)
	3rd	Less than 30 (±10)	Less than 11.8 (±3.9)

Horizontal Sensing Area

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Vertical Sensing Area

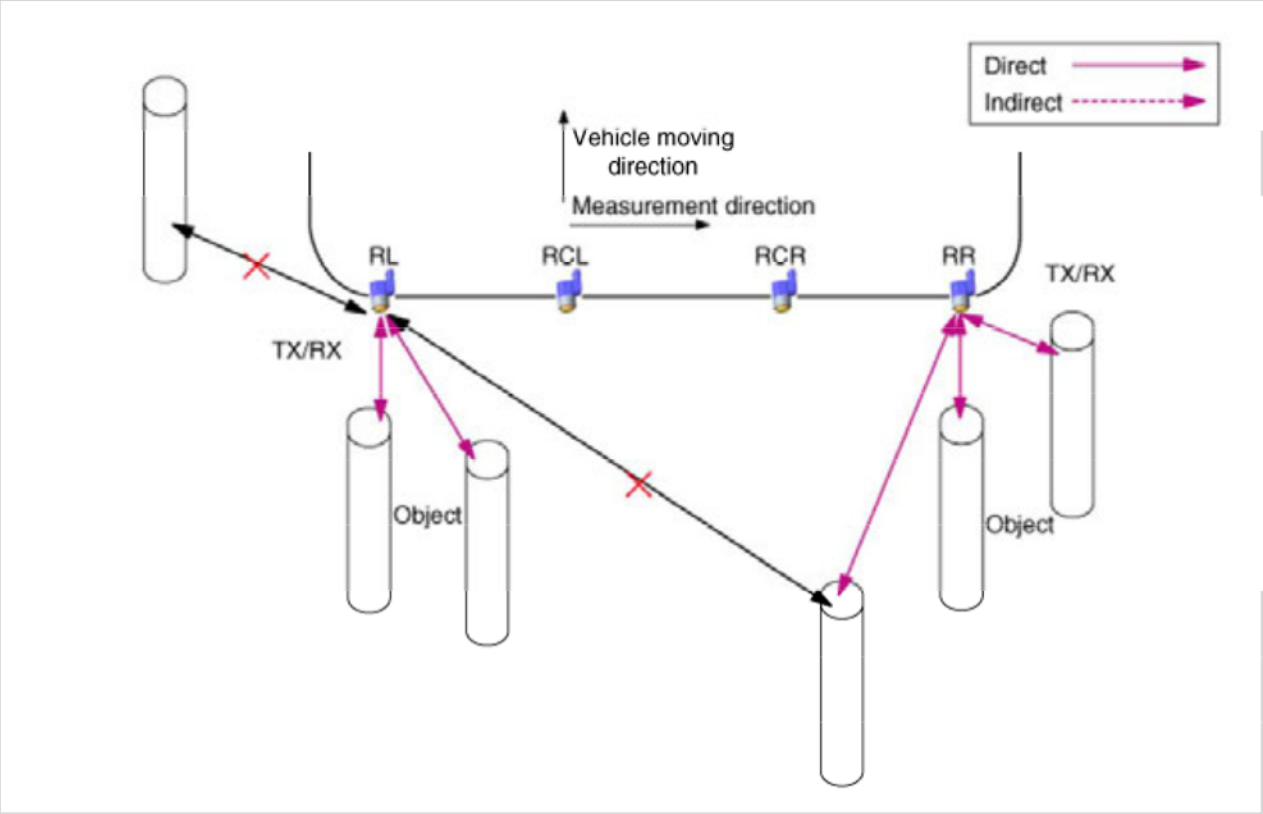


Distance Measurement

Direct Measurement

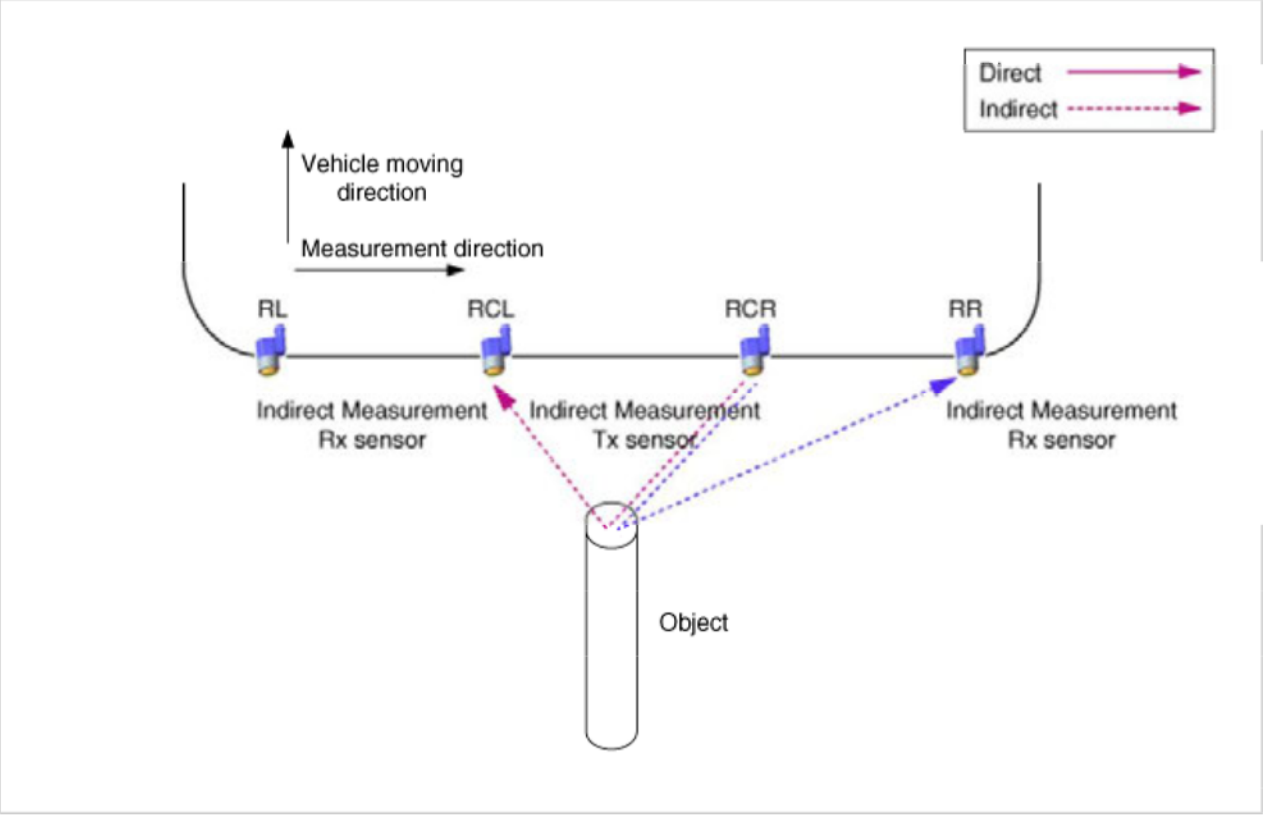
Transmission and Reception are executed with one sensor
(FL, FCL, FCR, FR, RL, RCL, RCR, RR each sensor execution)

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Indirect Measurement

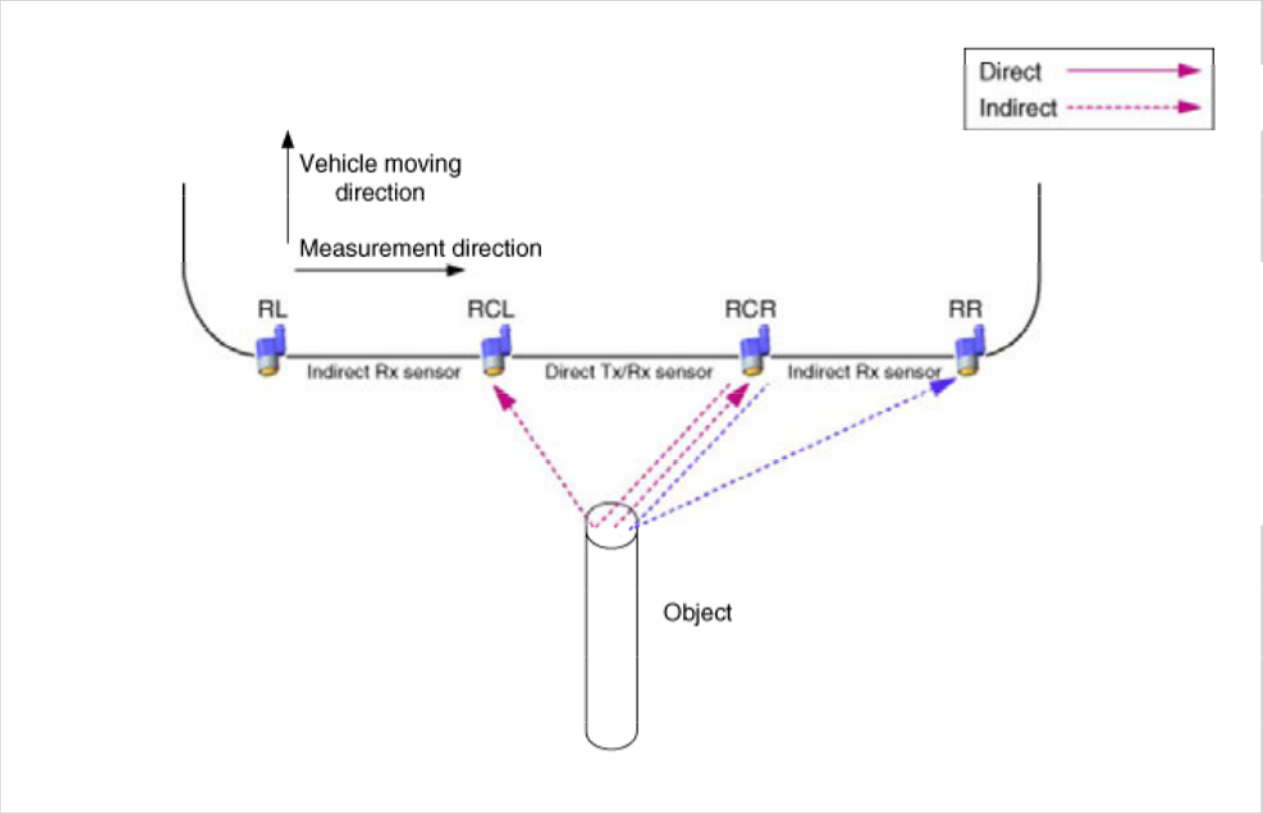
(FCL → FL, FCL → FCR, FCR → FCL, FCR → FR, RCL → RL, RCL → RCR, RCR → RCL, RCR → RR Execution in order)
With two or three sensors, one of them sends the transmission and the others get the reception.



Direct and Indirect Measurement at once

With two or three sensors, the one sensor performs both transmission and reception, and the others perform only reception.

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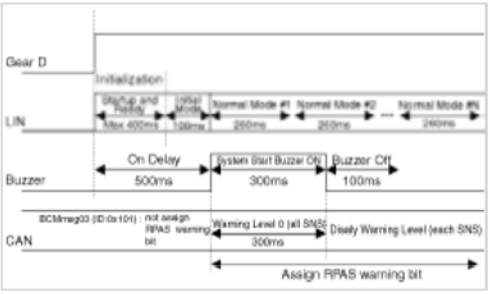
RPAS alarm system

When the RPAS sensor detects the object, warning is operated by audible alarm device as like buzzer. RPAS sensor sends data to BCM with LIN communication and BCM implements audible warning for each RPAS SENSOR by priority. And it performs a role of gateway only when it sends visible alarm device such as Cluster.

- Sensor buzzer/display information processing method of BCM In case of RL/RR sensor information, the BCM handles each sensor information directly about Display and buzzer output function. Buzzer output of CL/CR sensor, BCM handles center combination information by priority both sensor, Otherwise, about fail display information,BCM send that to cluster each sensor information.

System operation Spec - Front sensor

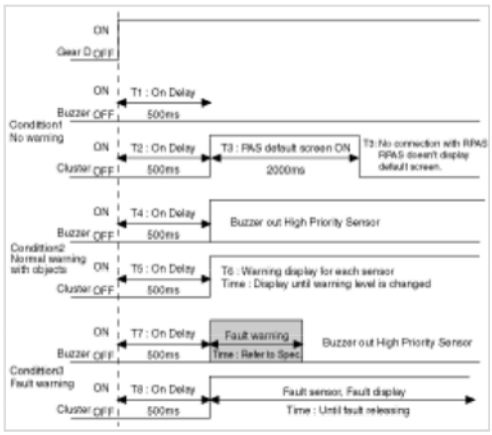
When the system has the power (after IGN ON and D gear), MICOM checks every sensor channel. In case it is not find any error, it sounds 500ms afterward. But it finds any error even a sensor, it sounds buzzer corresponding fault sensor instead of initial starting alarm. If PAS ON switch in OFF, system doesn't work. Function for normal mode entrance is as below.



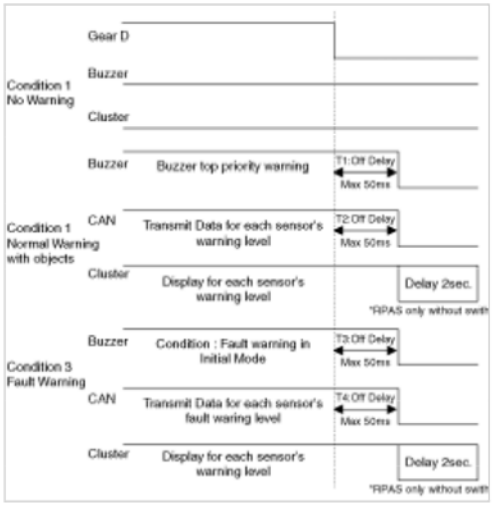
* In the initial mode, IPM(BCM) judges only sensor fail.

With D gear, system function is as below.

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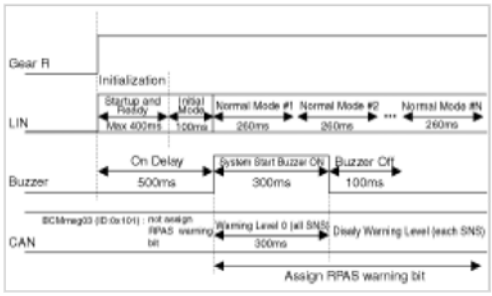


With D gear releasing, system function is as below



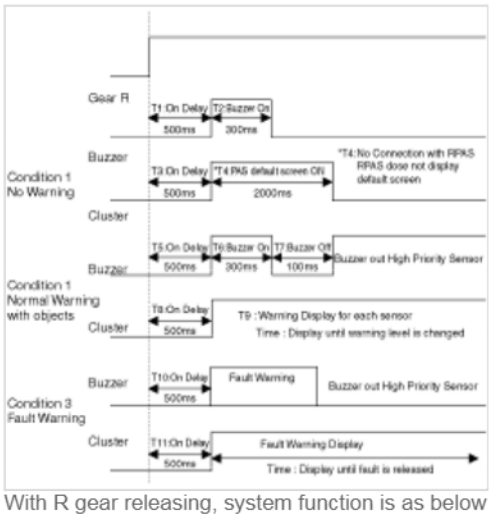
System Operation Spec - Rear sensor

When the system has the power (after IGN ON and R gear), MICOM checks every sensor channel.In case it is not find any error, it sounds 300ms buzzer 500ms afterward.But it finds any error even a sensor, it sounds buzzer corresponding fault sensor instead of initial starting alarm. Function for normal mode entrance is as below



With R Gear, system function is as below

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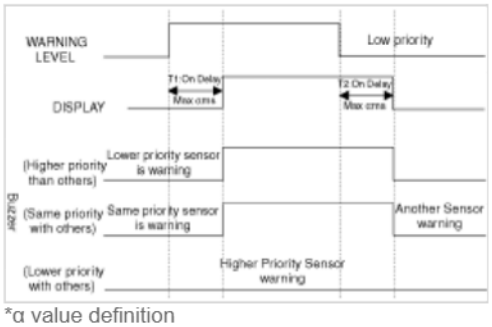
With R gear releasing, system function is as below



※acceptable error range on waveform ±10%

Alarm Output Specification classified by distance between sensors

Condition logic according to priority of alarm level is as below. (the identical sensor)



*α value definition

1. low priority sensor off : α = 0ms
2. low priority sensor is 1st warning level : α < 340ms
3. low priority sensor is 2nd warning level : α < 170ms

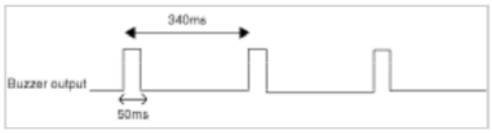
*β value definition

1. low priority sensor is 1st warning level : β = 1700ms
2. low priority sensor is 2nd warning level : β = 1700ms
3. low priority sensor is 3rd warning level : β = 700ms

Alarm control by sensing distance is as below

1. First warning area (Front: 61cm(24in) ~ 100cm(39.4in), Rear: 81cm(31.9in) ~ 120cm(47.2in))

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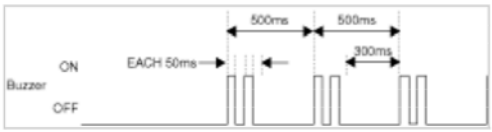
2. Second warning area (Front: 31cm(12.2in) ~ 60cm(23.6in), Rear: 41cm(16.1in) ~ 80cm(31.5in))



3. Third warning area (Front: less than 20cm(7.9in). Rear: less than 40cm(15.7in))



4. Period of fault alarm
   (1) With visible display



Visible Alarm Indicator Specification.

Front alarm display

When the system operates, cluster lights the indicator as below figure.

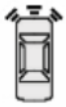
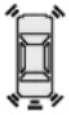
When the system finds an object, it lights indicator immediately.

1. Alarm level per distance - Front sensor
   A. First step alarm : 61~100 cm(24~39.4 in)
   B. Second step alarm : 31~60 cm(12.2~23.6 in)
   C. Third step alarm : Less than 30 cm(11.8 in)
   * It only displays the position of detected obstacle.
   * Indicator blinks every 1 second at third step alarm.

Rear alarm display

1. Alarm level per distance - Rear sensor
   When the gear is applied to R, cluster lights the indicator as below figure.When the system finds an object, it lights indicator immediately. During sensing an object, if there is no object, it lights indicator that is no alarm status for two seconds and then turns out afterward detecting an object.(But when it turns third step alarm to No alarm status, it lights third step alarm for two second and turns out.)
   A. First step alarm : 61~120 cm(24~39.4 in)
   B. Second step alarm : 31~60 cm(12.2~23.6 in)
   C. Third step alarm : Less than 30 cm(11.8 in)

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Alarm level		Warning indicator		Warning sound
		Forward	Rearward	
100cm ~ 61cm	Front		-	Buzzer beeps intermittently
120cm ~ 61cm	Rear	-		
60cm ~ 31cm	Front			Buzzer beeps frequently
	Rear	-		
less than 30cm	Front			Buzzer sounds continously
	Rear	-		

* It only displays the position of detected obstacle.
* Indicator blinks every 1 second at third step alarm.
* Integrated display(FCL/FCR, RCL/RCR)

Error Handling

LIN BUS Off error case

Section	Error recognition condition	Error releasing condition
Initial Routine	LIN BUS OFF sensing once	Error is not released in initial mode.
Normal Routine	LIN BUS OFF is sensed times in a row	The fault is released when BCM or LIN Master senses LIN BUS ON four times in a row in normal mode

※ Remark :
1. In fault counting, output message or signal should be transmitted as a Last Valid value.
2. Error in initial mode, fault buzzer (BCM) is operated with fault display(Cluster)
3. Error in normal mode, fault is only displayed on Cluster without buzzer.

Sensor fault (LIN Msg : 0x08)

Section	Error recognition condition	Error releasing condition
Initial Routine	Sensor fault Message sensing once	Error is not released in initial mode.
Normal Routine	Sensor fault Message sensing four times in a row	The fault is released when BCM or LIN Master senses LIN BUS ON four times in a row in normal mode

※ In fault display, RCR/RCL indicator is displayed individually
※ Remark :
1. In fault counting, output message or signal should be transmitted as a Last Valid value.
2. Error in initial mode, fault buzzer (BCM) is operated with fault display (Cluster)
3. Error in normal mode, fault is only displayed on Cluster without buzzer
4. When the error occurs in direct condition, the sensors sent the same status of error for indirect condition

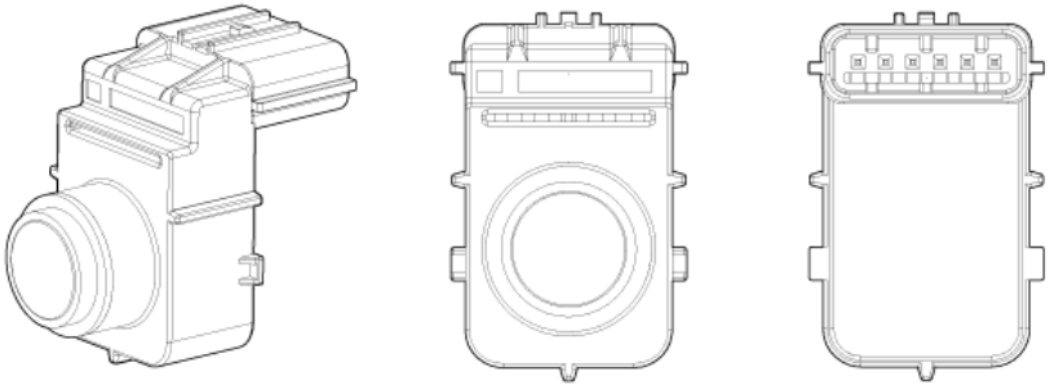
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Alarm level		No Alarm	Front (Blinking)	Rear (Blinking)
Indicator display	Left	-		
	Right	-		
	Center	-		

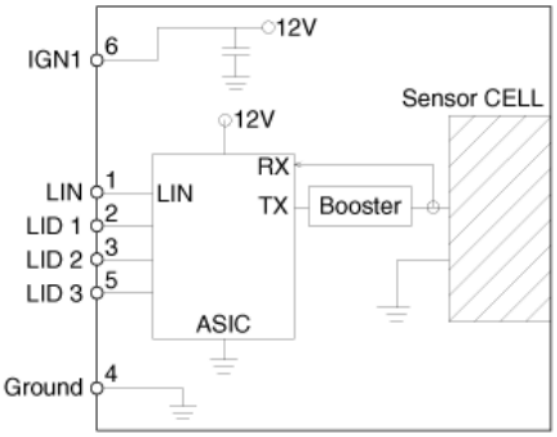
Circuit Diagram

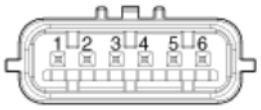
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[Front sensor, Rear center sensor]



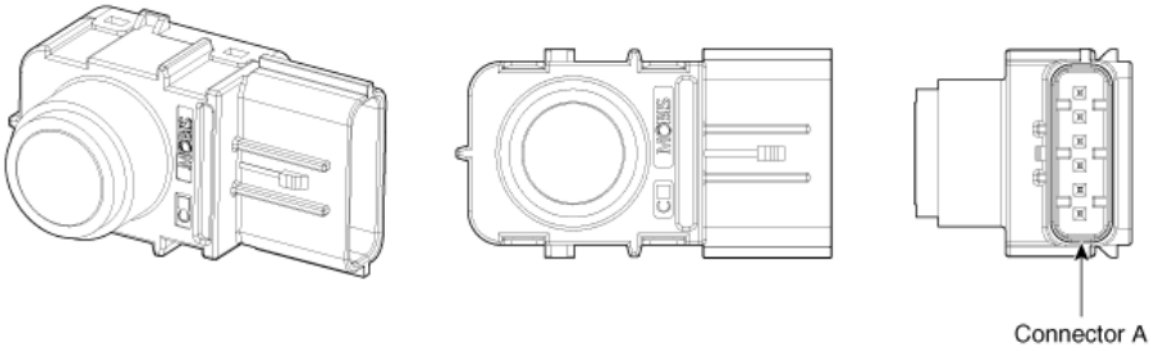
Circuit diagram



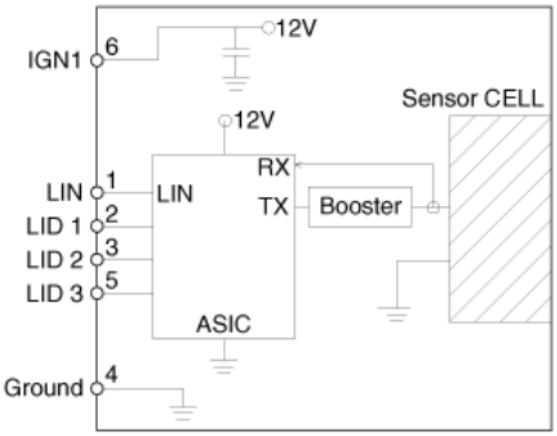
Connector A	No.	Description
	1	LIN
	2	LID 1
	3	LID 2
	4	Ground
	5	LID 3
	6	IGN1

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[Rear side sensor]



Circuit diagram



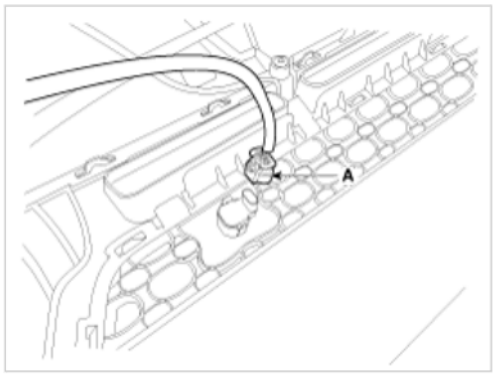
Connector A	No.	Description
	1	LIN
	2	LID 1
	3	LID 2
	4	Ground
	5	LID 3
	6	IGN1

Removal

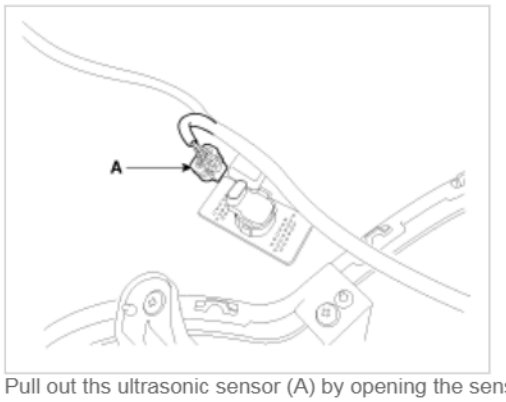
1. Disconnect the negative (-) battery terminal.
2. Remove the front/rear bumper cover.
   (Refer to Body - "Front Bumper Cover")
   (Refer to Body - "Rear Bumper Cover")
3. Disconnect the connector (A) from the ultrasonic sensor.

[Front sensor, Rear center sensor]

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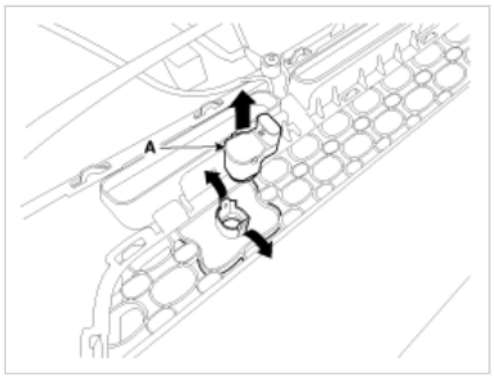


[Rear side sensor]

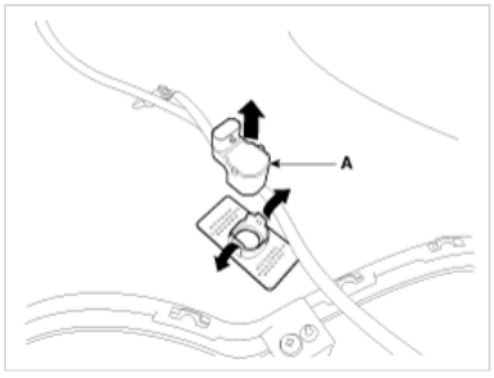


4. Pull out ths ultrasonic sensor (A) by opening the sensor holder out.

[Front sensor, Rear center sensor]



[Rear side sensor]



Installation

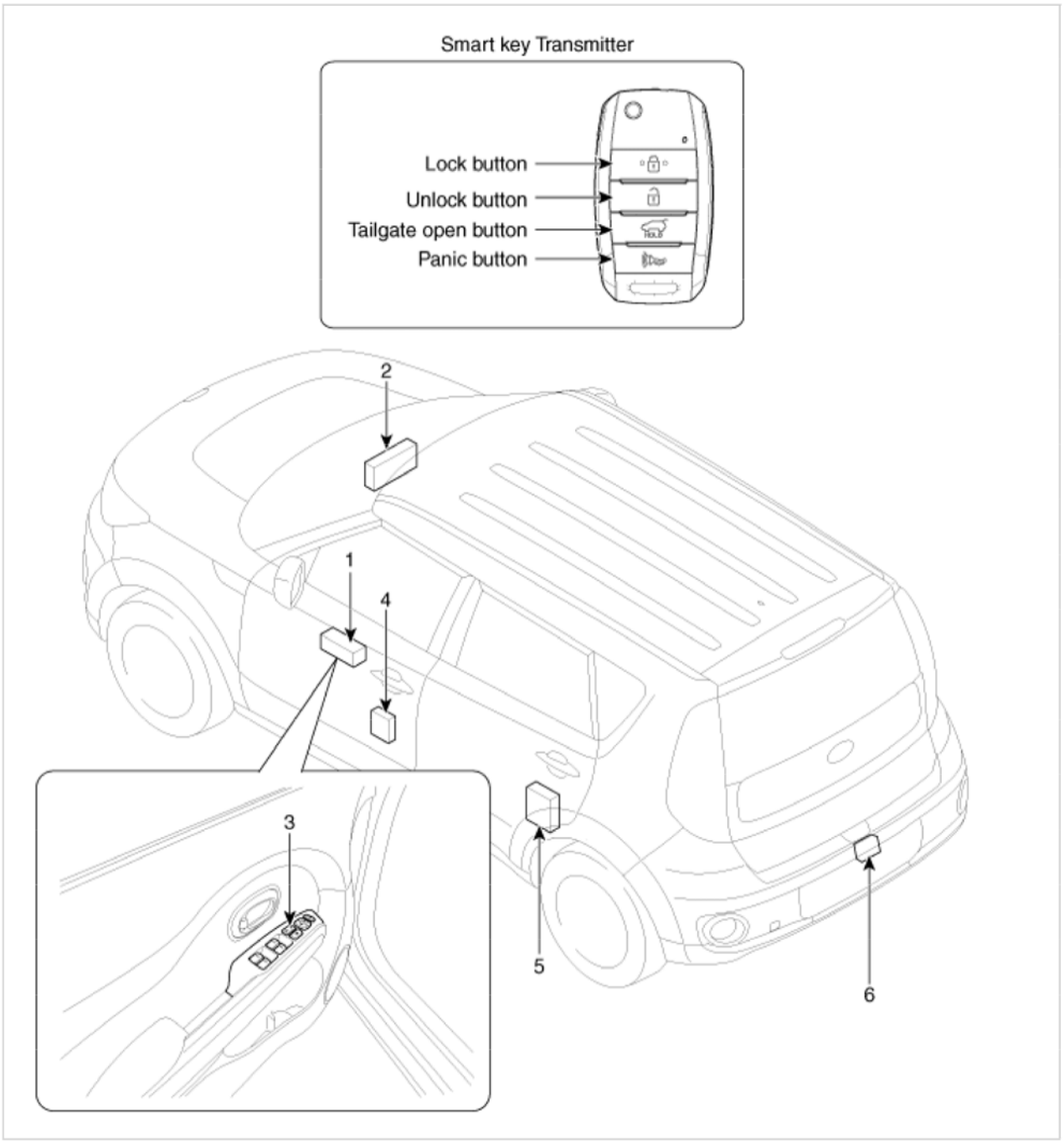
1. Install the PAS sensor and connector.

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2. Install the front/rear bumper cover.

Body Electrical System

Component Location



1. Driver power window main switch	4. Front door lock actuator & switch
2. BCM (Body Control Module)	5. Rear door lock actuator & switch
3. Door lock switch	6. Tailgate lock actuator & switch

Body Electrical System

Inspection

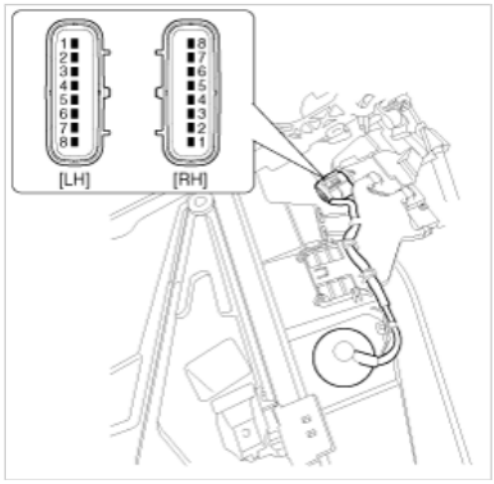
Front Door Lock Module Inspection

1. Remove the front door trim.

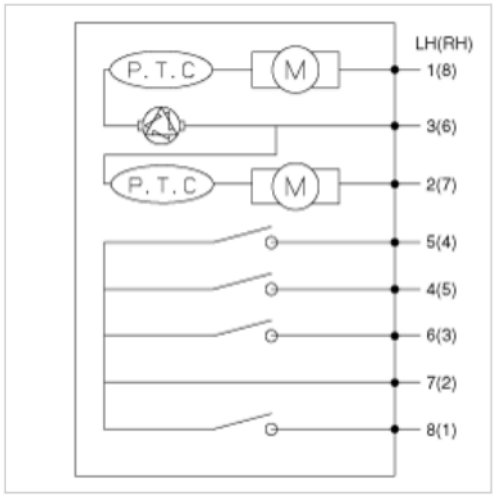
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(Refer to Body - "Front Door Trim")

2. Remove the front door module.
   (Refer to Body - "Front Door Module")
3. Disconnect the connectors from the actuator.



4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.



[Central Lock]

Terminal \ Operation		Central Lock	Central Unlock
LH	2	⊕	⊖
	3	⊖	⊕
RH	7	⊖	⊕
	6	⊕	⊖

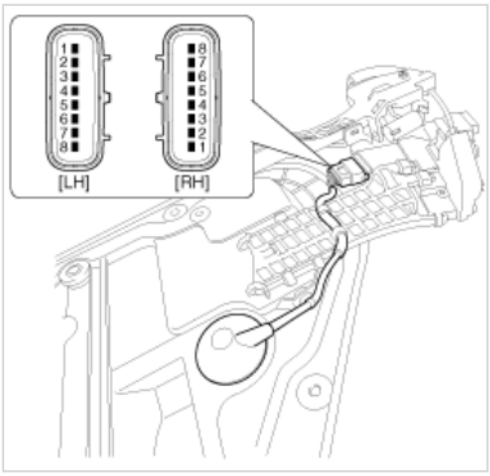
5. Check for continuity between the terminals in each switch position according to the table.

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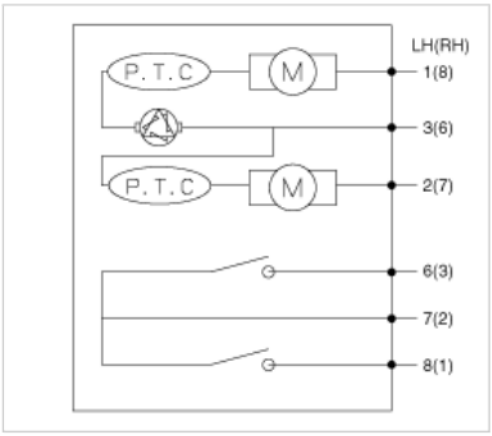
Terminal \ Operation		Central Lock	Central Unlock
LH	6 and 7	ON → OFF	OFF → ON
	5 and 7	Turn key counterclockwise : ON	
		Key return back : OFF	
	4 and 7	Turn key clockwise : ON	
		Key return back : OFF	
	7 and 8	Door open & latching : ON	
		Full latching : OFF	
RH	2 and 3	ON → OFF	OFF → ON
	2 and 4	Turn key counterclockwise : ON	
		Key return back : OFF	
	2 and 5	Turn key clockwise : ON	
		Key return back : OFF	
	1 and 2	Door open & latching : ON	
		Full latching : OFF	

Rear Door Lock Module Inspection

1. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
2. Remove the rear door module.
   (Refer to Body - "Rear Door Module")
3. Disconnect the connectors from the actuator.



4. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.



[Central Lock]

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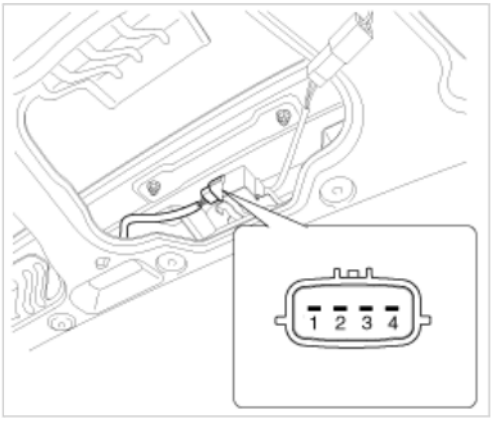
Terminal \ Operation		Central Lock	Central Unlock
LH	2	⊕	⊖
	3	⊖	⊕
RH	7	⊖	⊕
	6	⊕	⊖

5. Check for continuity between the terminals in each switch position according to the table.

Terminal \ Operation		Central Lock	Central Unlock
LH	6 and 7	ON → OFF	OFF → ON
	7 and 8	Door open & latching : ON	
		Full latching : OFF	
RH	2 and 3	ON → OFF	OFF → ON
	1 and 2	Door open & latching : ON	
		Full latching : OFF	

Tailgate Lock Module Inspection

1. Remove the tailgate trim.
   (Refer to Body - "Tailgate Trim")
2. Disconnect the 4P connector from the actuator.



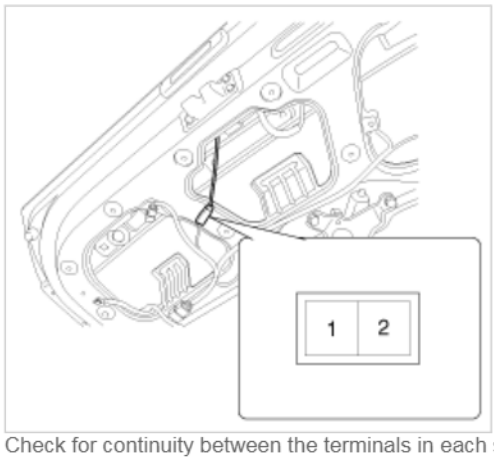
3. Check actuator operation by connecting power and ground according to the table. To prevent damage to the actuator, apply battery voltage only momentarily.

Position \ Terminal	3	4
Unlock	⊕	⊖
Lock		

Tailgate Open Switch

1. Remove the tailgate trim.
   (Refer to Body - "Tailgate Trim")
2. Disconnect the connector from the actuator.

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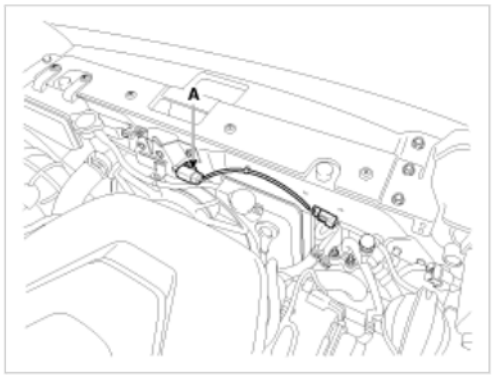


3. Check for continuity between the terminals in each switch position according to the table.

Position \ Terminal	1	2
OFF		
ON	○	○

Hood Switch

1. Disconnect the connector (A) and bolts from the hood switch.



2. Check for continuity between the terminals and ground according to the table.

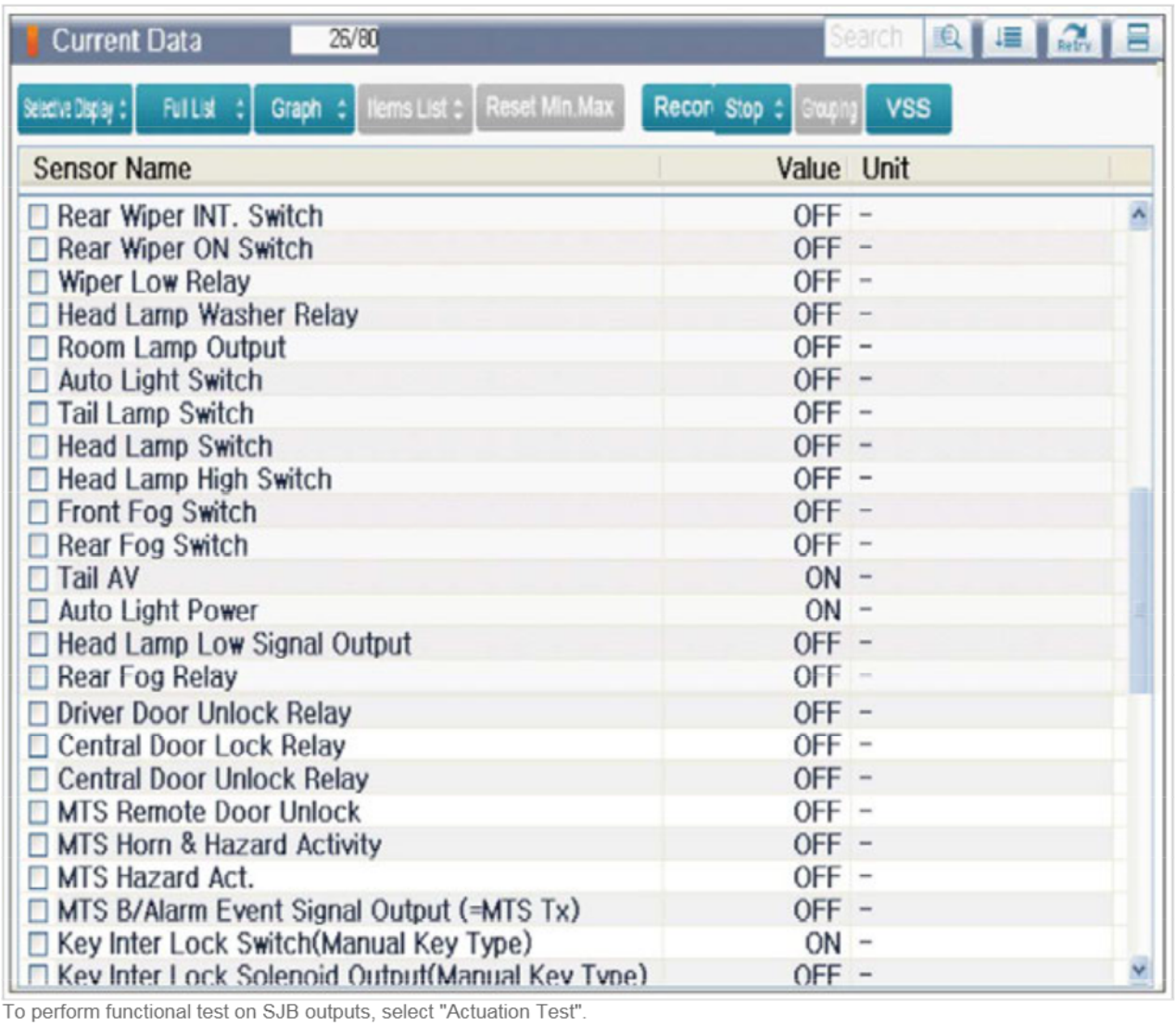
Position \ Terminal	1	2
Hood Open(Free)	○	○
Hood Close(Push)		

Diagnosis With GDS

1. The BCM can be diagnosed by using the GDS. The BCM communicates with the GDS which then displays inputs and outputs along with codes.

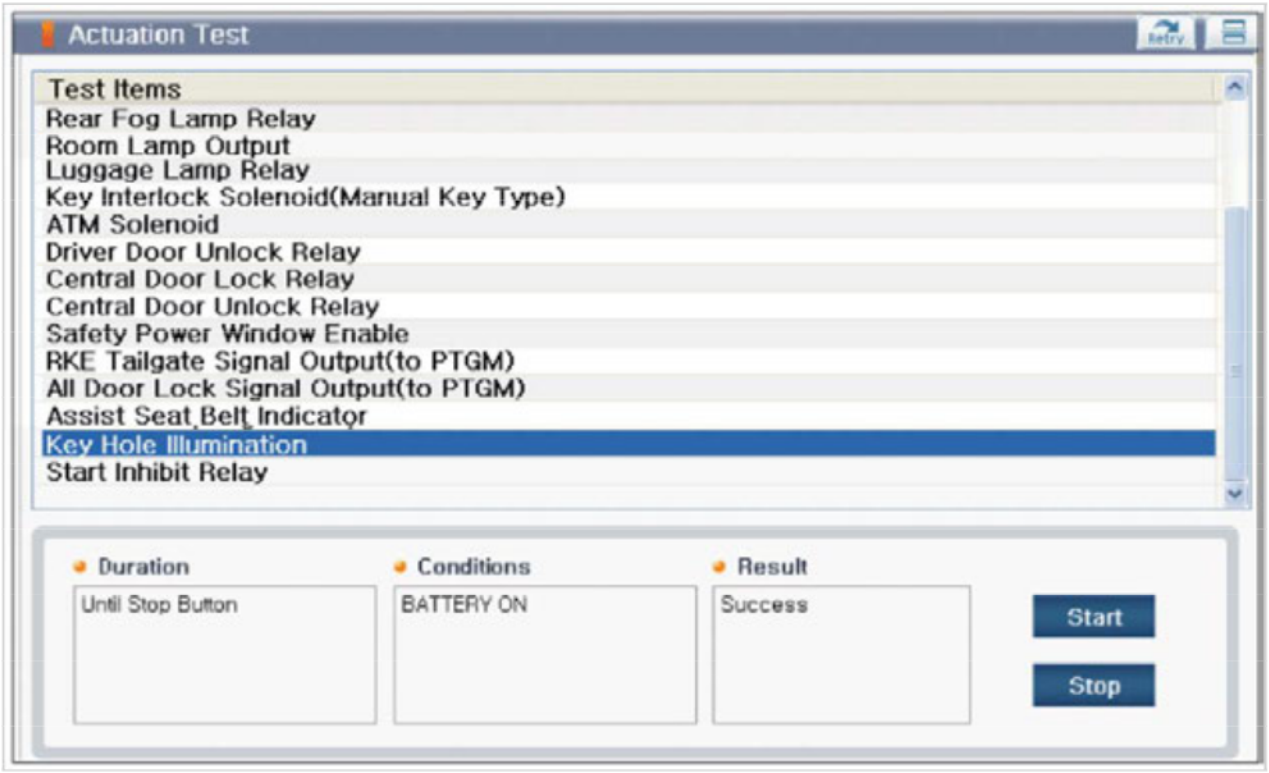
   It will be able to diagnose power door lock/unlock defects with GDS quickly. GDS can operates the actuator forcefully,monitor input/output values and self diagnosis.
2. To diagnose the SJB function, select the vehicle model, BCM and DDM.
3. Select "Input/output monitoring", if you will check current data of power door lock system. It provides input/output status of DDM.

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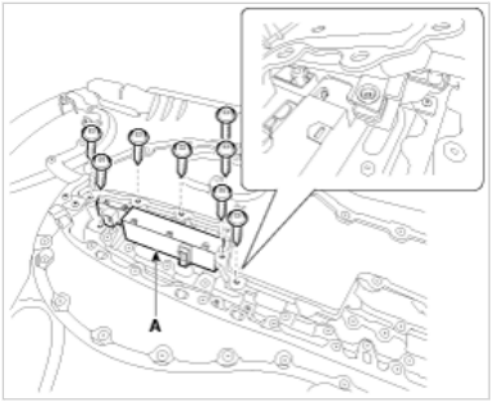
4. To perform functional test on SJB outputs, select "Actuation Test".

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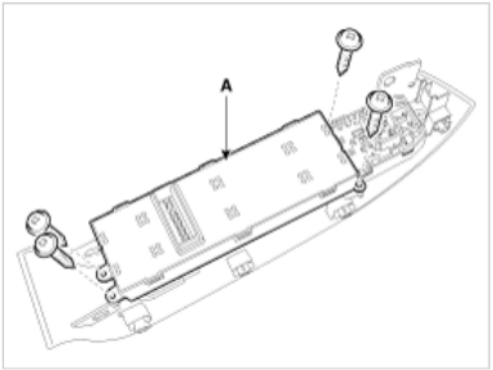


Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
3. Remove the power window switch assembly (A) loosening the mounting screws (8EA).



4. Remove the power window switch (A) after loosening the mounting screws (4EA).



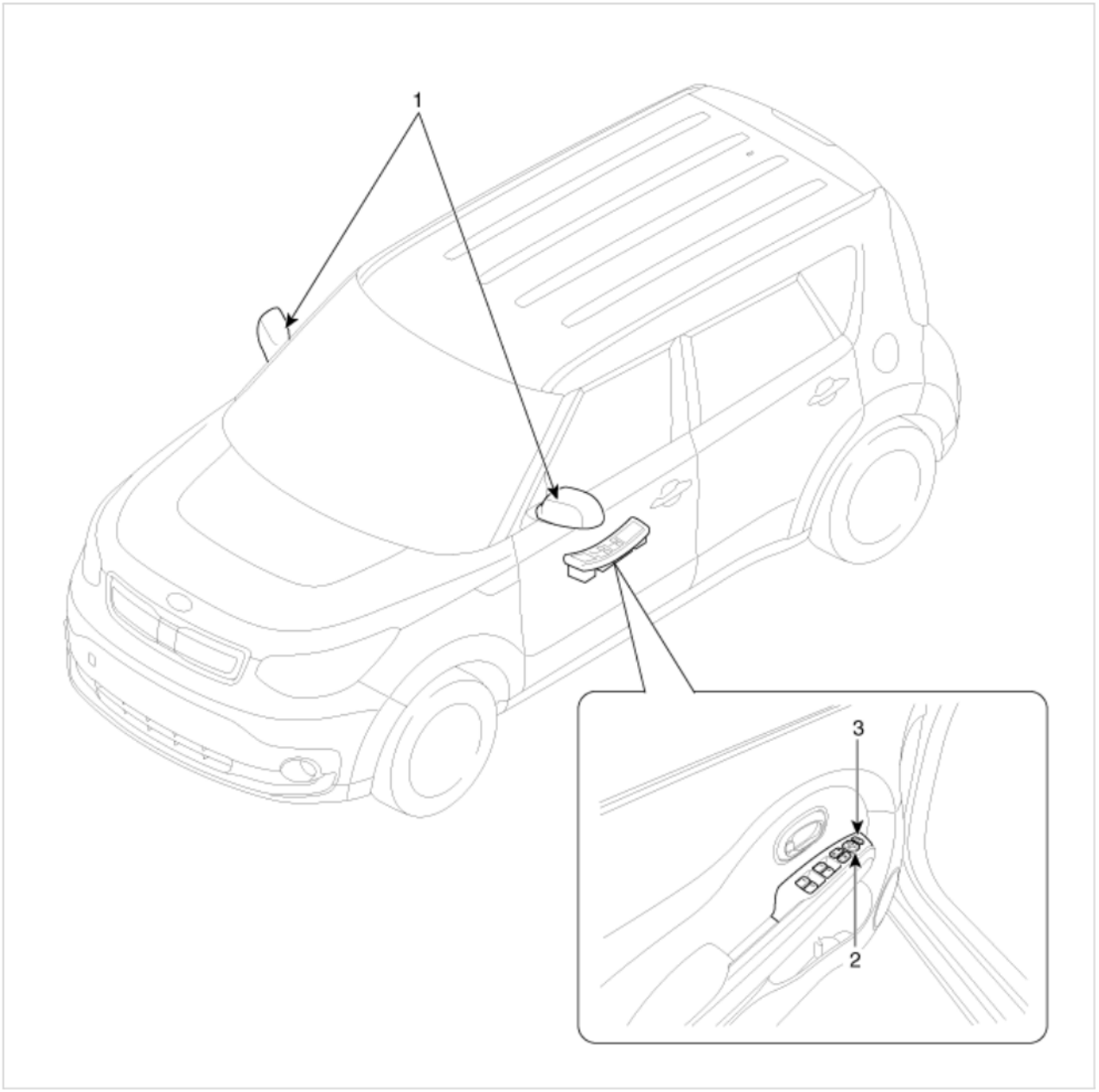
Installation

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1. Install the power window switch assembly.
2. Install the front door trim after connect the connector.

Body Electrical System

Component Location

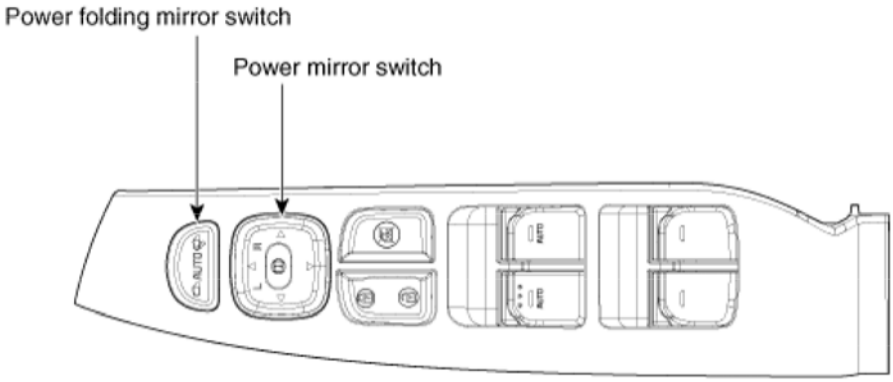


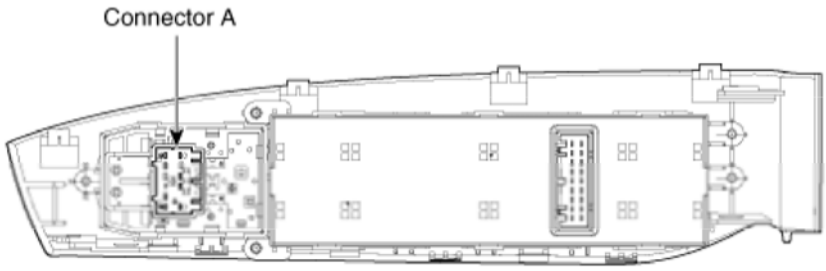
1. Power door mirror 2. Power door mirror switch	3. Power folding mirror switch

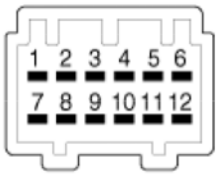
Body Electrical System

Components

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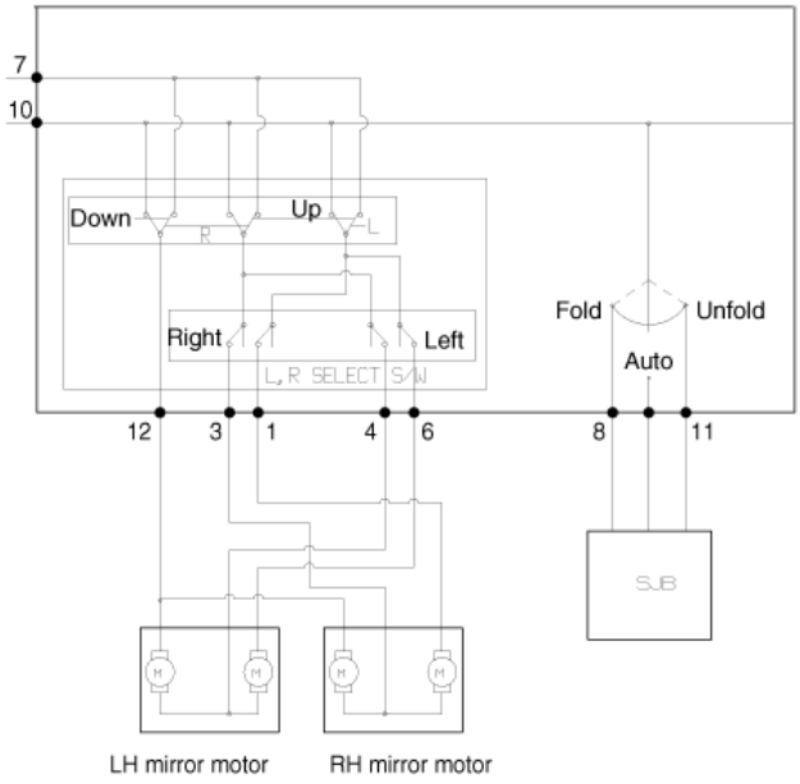




Connector A	No.	Description	No.	Description
	1	Mirror horizontal output - RH	8	LHD : Mirror folding switch output RHD : Mirror unfolding switch output
	2	-		
	3	Mirror vertical output - RH	9	-
	4	Mirror vertical output - LH	10	Ground
	5	-	11	LHD : Mirror unfolding switch output RHD : Mirror folding switch output
	6	Mirror horizontal output - LH		
	7	ACC input	12	Mirror common output

Circuit Diagram

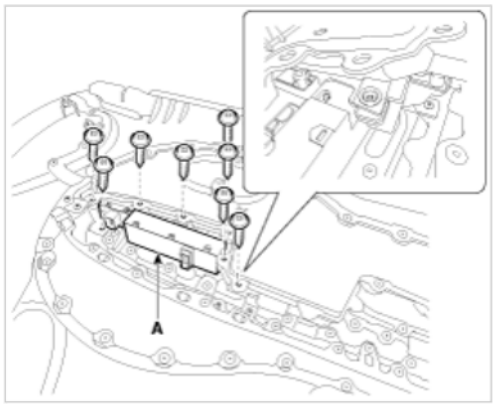
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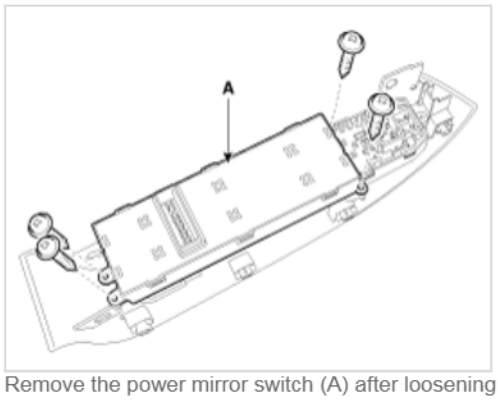
Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the front left door trim.
   (Refer to Body - "Front Door Trim")
3. Remove the power window switch assembly (A) loosening the mounting screws (8EA).

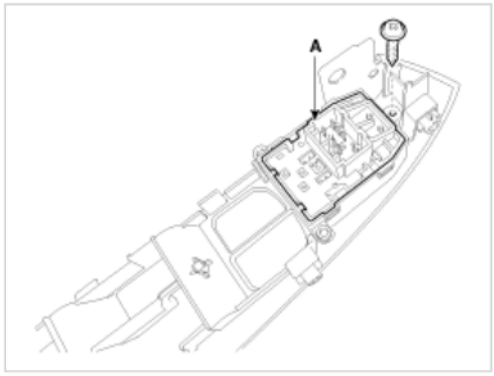
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4. Remove the power window switch (A) after loosening the mounting screws (4EA).



5. Remove the power mirror switch (A) after loosening the mounting screw (1EA).



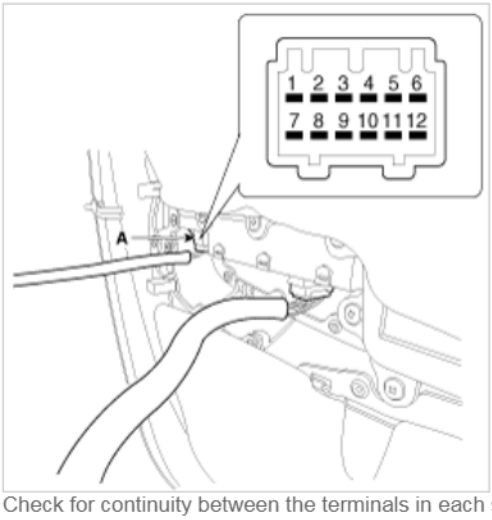
Installation

1. Install the power mirror switch.
2. Install the front door trim after connecting the connector.
3. Connect the negative (-) battery terminal.

Inspection

1. Remove the front left door trim.
   (Refer to Body - "Front Door Trim")
2. Remove the power mirror switch connector (A) from the door trim.

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3. Check for continuity between the terminals in each switch position according to the table.

[Power Mirror Switch]

Position		Terminal 4	6	3	1	12	7	10
Left	Up	○	○			○	○	○
	Down	○	○			○	○	○
	Off	○	○			○	○	○
	Left	○	○			○	○	○
	Right	○	○			○	○	○
Right	Up			○	○	○	○	○
	Down			○	○	○	○	○
	Off			○	○	○		○
	Left			○		○	○	○
	Right			○		○	○	○

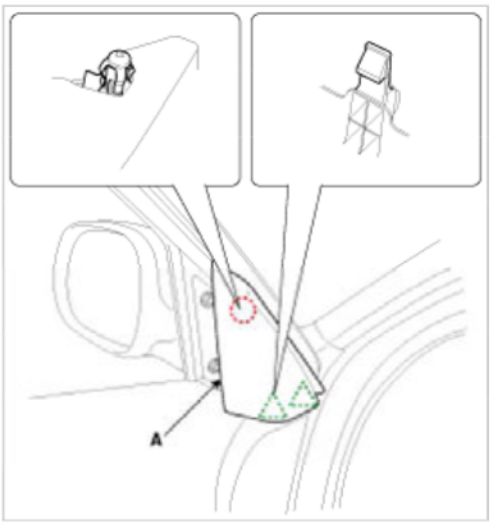
[Power Folding Mirror Switch]

Position	Terminal 10	11	8
Folding	○		○
Unfolding	○	○	

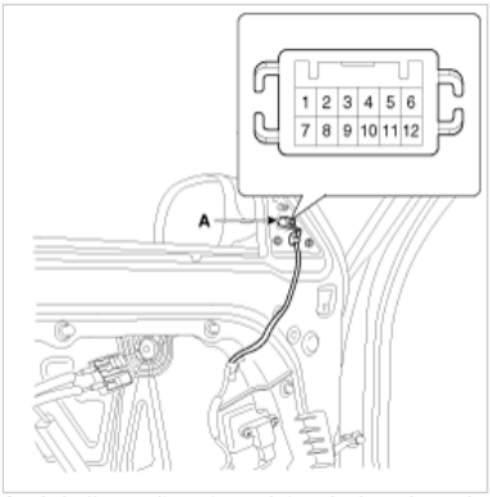
Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door quadrant cover (A).

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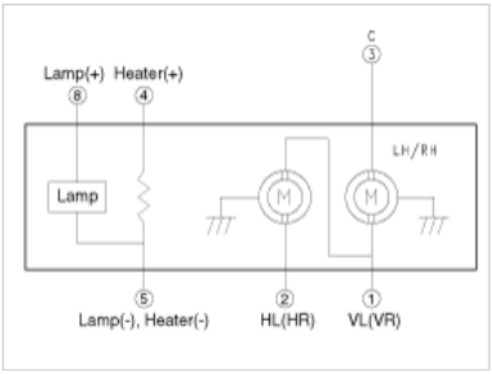


3. Disconnect the power door mirror connector (A) from the harness.



4. Apply battery voltage to each terminal as shown in the table and verify that the mirror operates properly.

[Actuator]



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Position		Terminal 1	2	3	B+	E
Left	Up	○	○		○	
	Down			○	○	
	Off	○	○		○	
	Right	○			○	
	Left		○	○	○	
Right	Up	○	○		○	
	Down			○	○	
	Off	○	○		○	
	Right	○			○	
	Up		○	○	○	

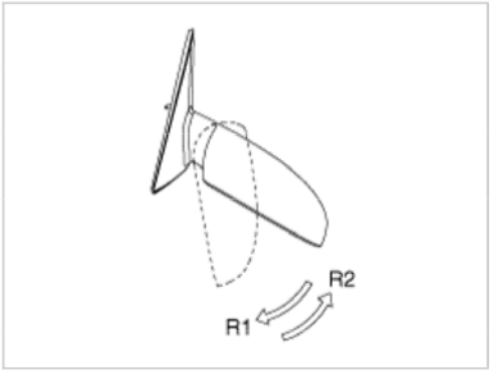
Mirror Heater

Position	Terminal 4	5
Heater	○	○

Turn Signal Lamp

Position	Terminal 8	5
Side repeater	B(+)	GND(-)

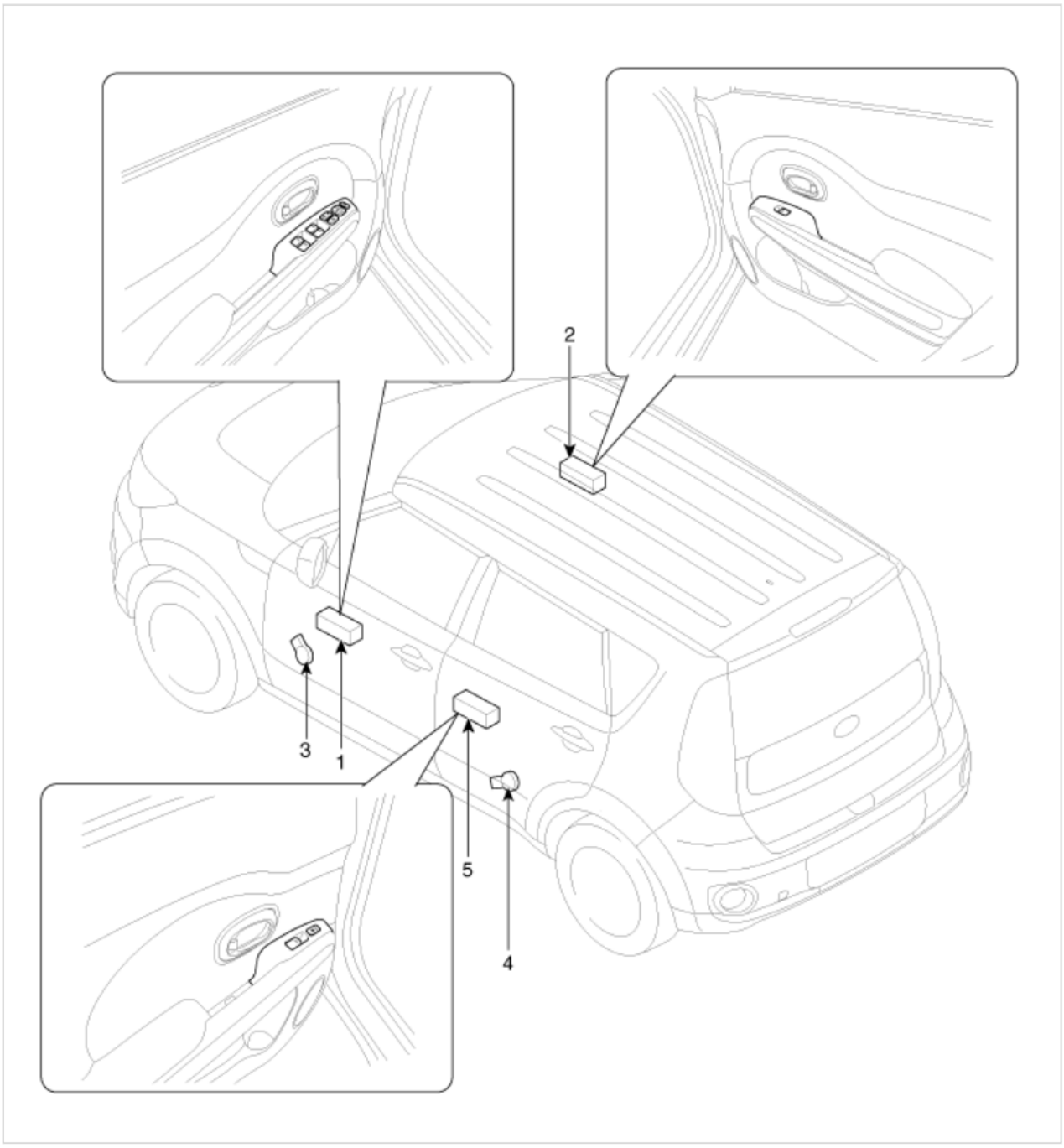
Folding Mirror



Position	Terminal B(+)	GND(-)	6	7
Folding (R1)	○		○	
		○		○
Unfolding (R2)	○			○
		○	○	

Component Location

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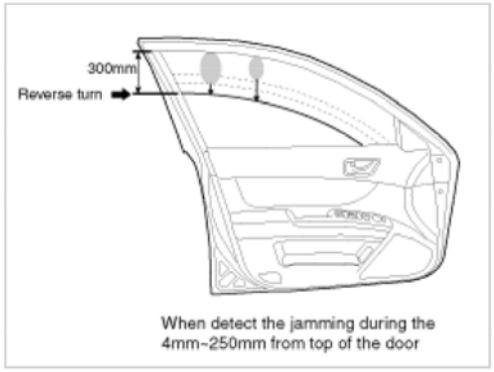
1. Drive power window switch	4. Rear window motor
2. Passenge power window switch	5. Rear window switch
3. Front window motor	

Function Of Safety Power Window

When driver door power window auto-up switch is operated, safety function is activated.

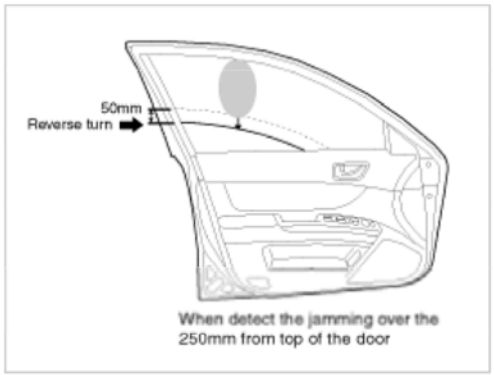
1. Safety function condition
   When detect the force of 100N (using the 10N/mm spring) during the window rising, window is reversed.
2. Length of window reversing (except holding the auto-up switch)
   A. When detect the jamming during the 4mm ~ 250mm from top of the door.
      → Window is reversed until 300mm from top of the door.

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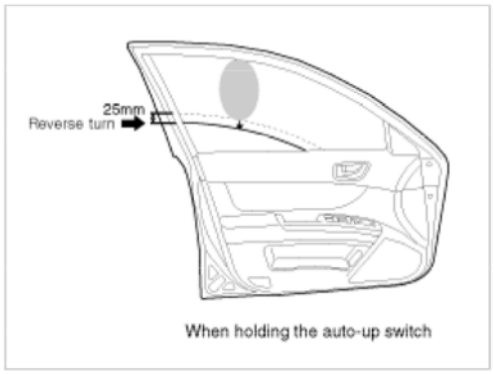
When detect the jamming during the 4mm~250mm from top of the door

B. When detect the jamming over the 250mm from top of the door.
→ Window is reversed until 20mm from jamming position.



When detect the jamming over the 250mm from top of the door

3. Length of window reversing (holding the auto-up switch)
   A. When detect the jamming during holding the auto-up switch.
   → Window is reverse until 25mm from jamming position.
   B. Auto-up function is not available during the 5 seconds from above condition.
   → When holding the auto-up switch, window is operated as a manual-up function. (Safety function is not activated.)
   C. When holding the auto-up switch after 5 seconds from above condition.
   → Window is reverse until 25mm from jamming position.



When holding the auto-up switch

4. Safety function is not available area
   Safety function is not available during the 4mm from top of the door.

Initializing Method Of The Safety Power Window

1. Initializing of Battery Connection
   When the battery power is removed for over 5 minutes, safety power window switch need the initializing.
   (1) Power window operation before initializing
      A. Manual-Up/Down function is available
      B. Auto-Up function is not available
         (When holding the auto-up/down switch, window is operated as a manual-up/down.)
   (2) Initializing method
      Close the window in window open position, and holding the switch in window full close position over the 0.2 second.
      (If start the closing the window in window full close position, initializing could be failed.)

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(3) If the initialize state of the safety power window is in jamming status, the condition below can occur.

A. Safety function is not available

2. Initializing of fail safe mode

(1) If the window moved by compulsion and motor have a problem, power window switch could be entering the fail safe mode for user's safety.

(2) Power window operation in fail mode

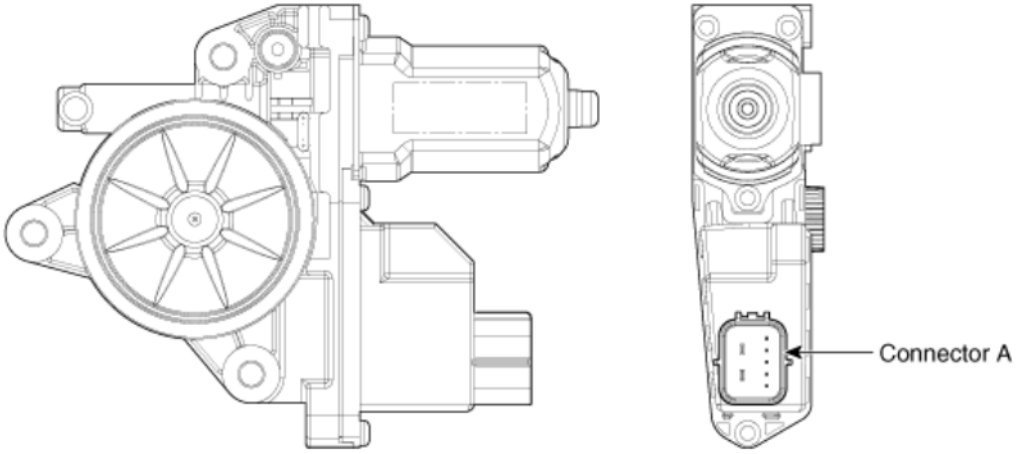
A. Auto/Manual-Down function is available

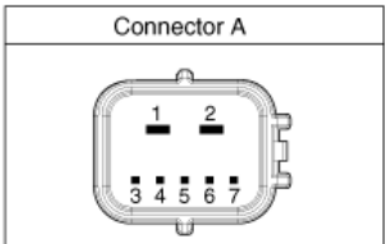
B. Auto/Manual-Up function is not available

(When auto/manual-up is operated, window is rising 20mm and is stopped the moving.)

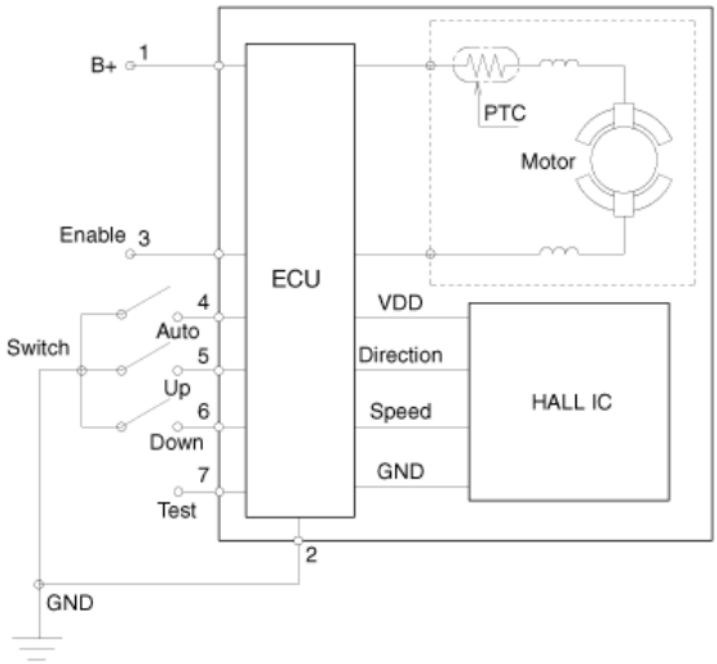
Components

[Safety window motor]



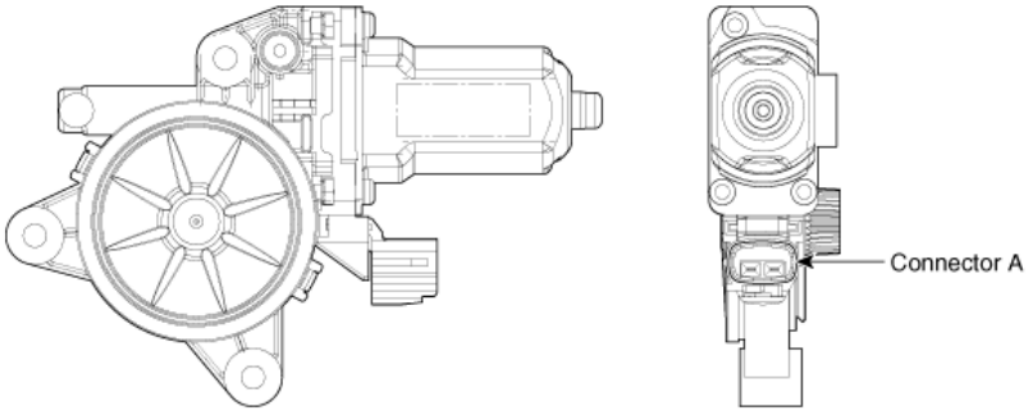


No.	Description
1	Battery (+)
2	Ground
3	Enable
4	Auto
5	Up
6	Down
7	Test

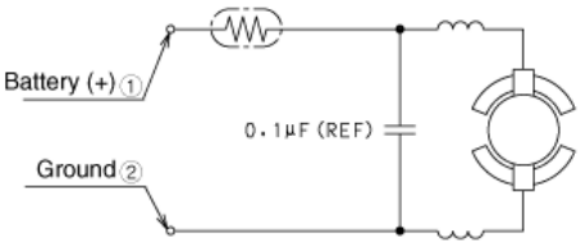


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[General window motor]



Connector A	
	
No.	**Description**
1	Battery (+)
2	Ground

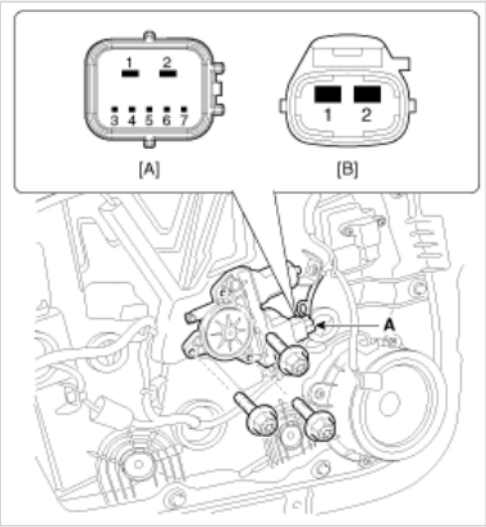


Inspection

Front Power Window Motor

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
3. Disconnect the connector (A) from the motor.
   (A : Safety, B : Standard)

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4. Connect the motor terminals directly to battery voltage (12V) and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction. If the operation is abnormal, replace the motor.

[General Window Motor]

Position		Terminal	1	2
Left	Up	Clockwise	⊕	⊖
	Down	Counter-clockwise	⊖	⊕
Right	Up	Counter-clockwise	⊕	⊖
	Down	Clockwise	⊖	⊕

5. Connect the terminal No. 2 and No. 3 to battery voltage (12V) and check that the motor operates smoothly when connecting the terminals below.

[Safety Window Motor]

Position		Terminal	5	2(GND)	6
Left	Up	Clockwise	○——	——○	
	Down	Counter-clockwise		○——	——○
Right	Up	Counter-clockwise	○——	——○	
	Down	Clockwise		○——	——○

Rear Power Window Motor

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
3. Disconnect the connector (A) from the motor.

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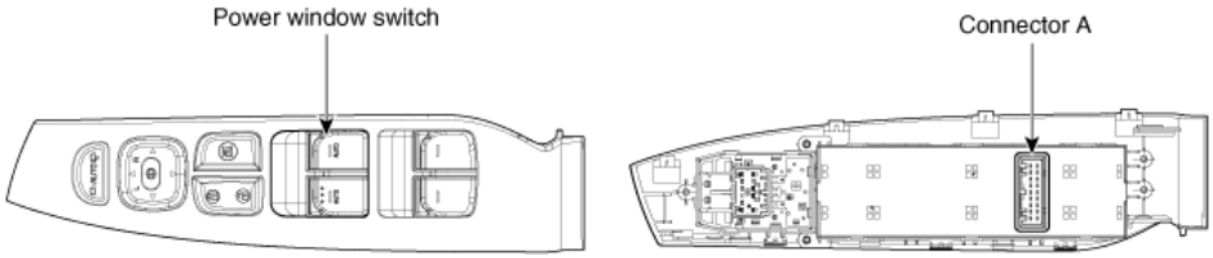
4. Connect the motor terminals directly to battery voltage (12V) and check that the motor operates smoothly. Next, reverse the polarity and check that the motor operates smoothly in the reverse direction. If the operation is abnormal, replace the motor.

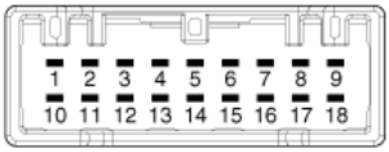
Position		Terminal	1	2
Left	Up	Clockwise	⊕	⊖
	Down	Counter-clockwise	⊖	⊕
Right	Up	Counter-clockwise	⊕	⊖
	Down	Clockwise	⊖	⊕

Components

Driver Power Window Switch

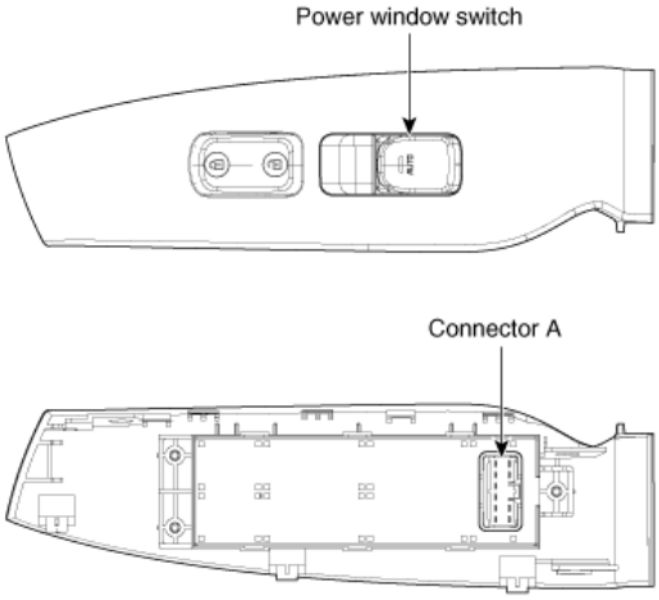
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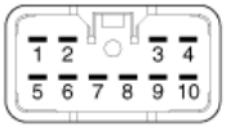


Connector A		
		
No.	**Drvier/Assist Safety**	**Driver Auto Down**
1	Left window lock output	Front right window up output
2	Front right window up output	Ground
3	Ground	Front right window down output
4	Front right window down output	Battery (+) - RH
5	Front right auto output	Battery (+) - LH
6	Front left auto ouptut	-
7	Tail lamp input	Front left window down output
8	Door lock switch output	Front left window up output
9	Front left window up output	Left window lock output
10	Right window lock output	Rear right window up output
11	Rear right window up output	Rear right window down output
12	Rear left window down output	Rear left window up output
13	Rear left window up output	-
14	Battery (+) - RH	Tail lamp input
15	Battery (+) - LH	Rear left window down output
16	Rear left window down output	Door unlock switch output
17	Door unlock switch output	Door lock switch output
18	Front left window down output	Right window lock ouptut

Assist Power Window Switch

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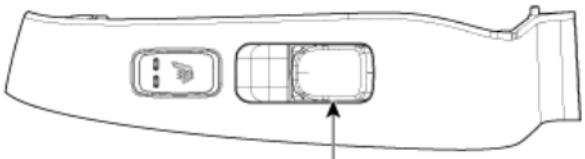


	Connector A	
		
No.	**Safety**	**Manual**
1	Door unlock switch output	Window up from dirver input
2	Door lock switch output	Window up output
3	Tail lamp input	Window down output
4	-	Window down from driver input
5	-	Ground
6	Window up output	-
7	Window lock switch input	Tail lamp input
8	Ground	Battery (+)
9	Auto output	Door unlock switch output
10	Window down output	Door lock switch output

Rear Power Window Switch

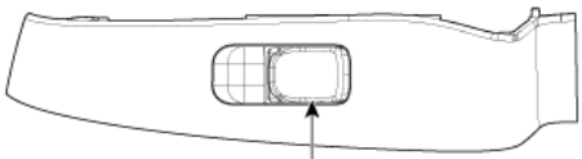
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[With Seat Heater Switch]



Power window switch

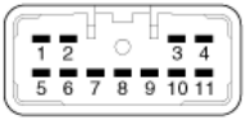
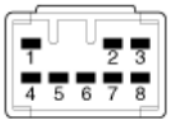
[With Seat Heater Switch]



Power window switch



Connector A

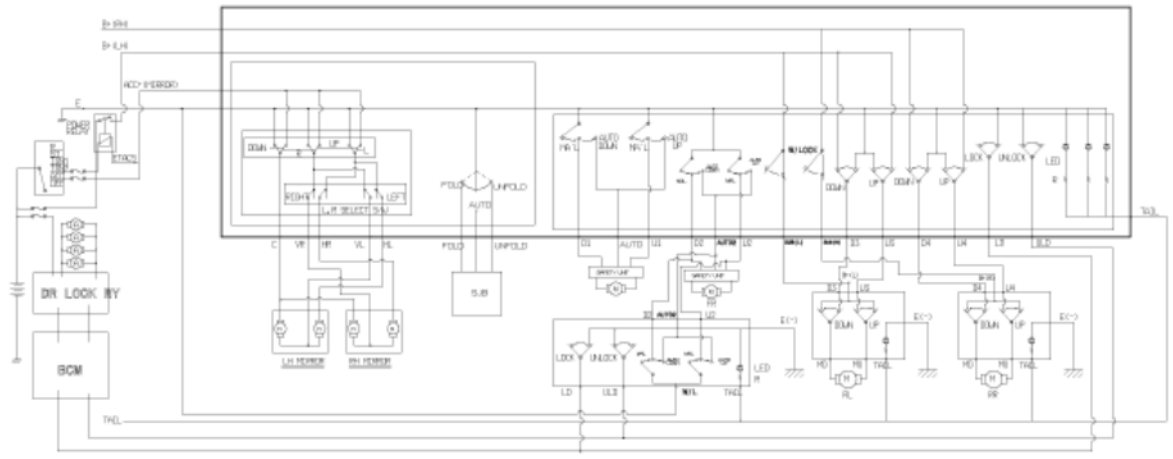
Connector A			
			
With seat heater		Without seat heater	
No.	Description	No.	Description
1	Low seat warmer indicator 2 input	1	Window down output
2	Widow up from driver input	2	-
3	Window down output	3	Tail lamp input
4	Window down from driver input	4	Window down from driver input
5	Ground	5	Window up output
6	Seat warmer indicator input	6	Window up from driver input
7	Window up output	7	Ground
8	Tail lamp input	8	Battery (+)
9	Battery (+)		
10	Seat warmer battery (+)		
11	Low seat warmer indicator 1 input		

Circuit Diagram

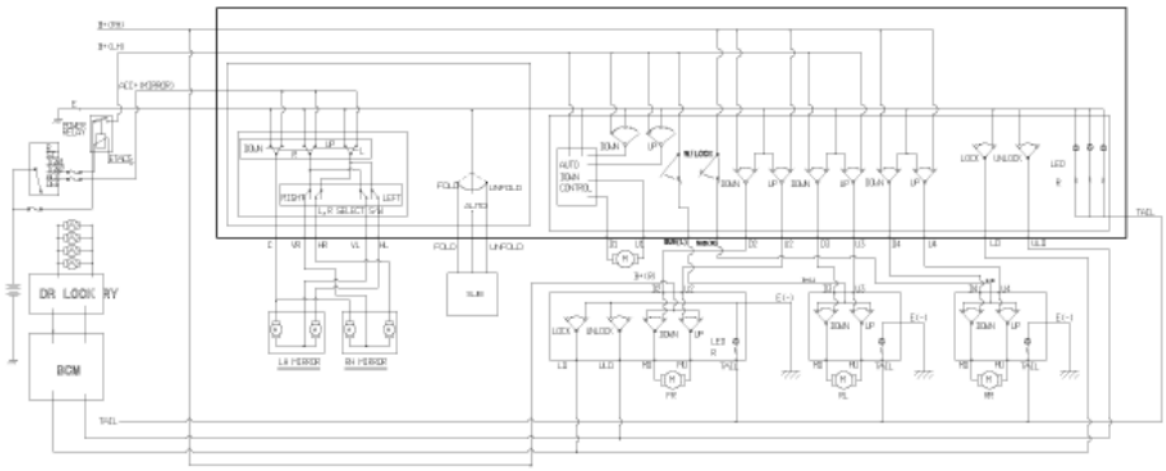
Driver Power Window Switch

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[Drvier/Assist Safety]



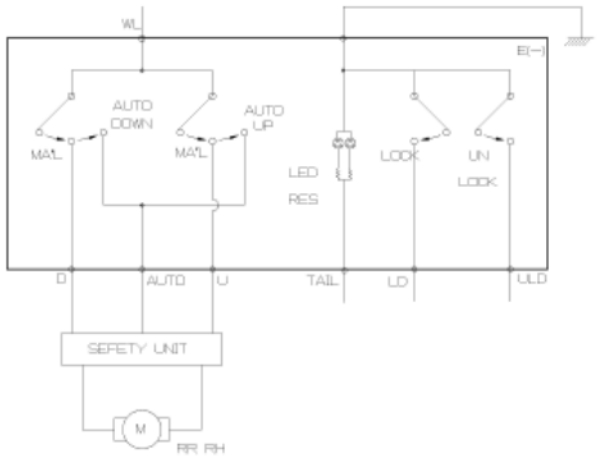
[Driver Auto Down]



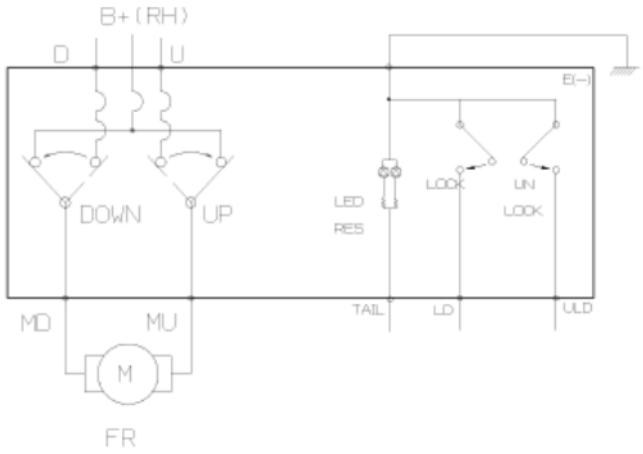
Assist Power Window Switch

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[Safety]



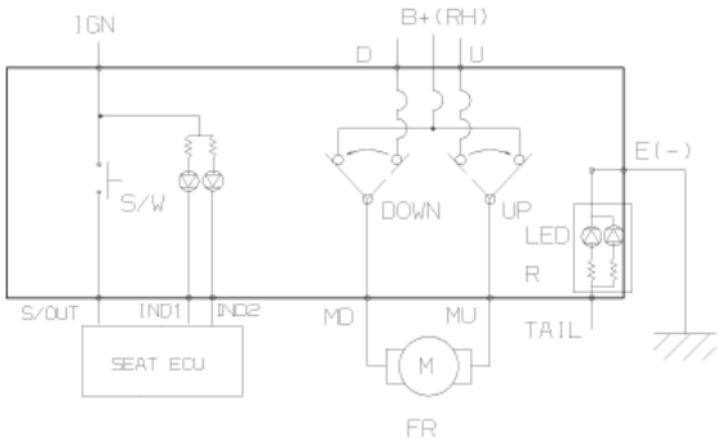
[Manual]



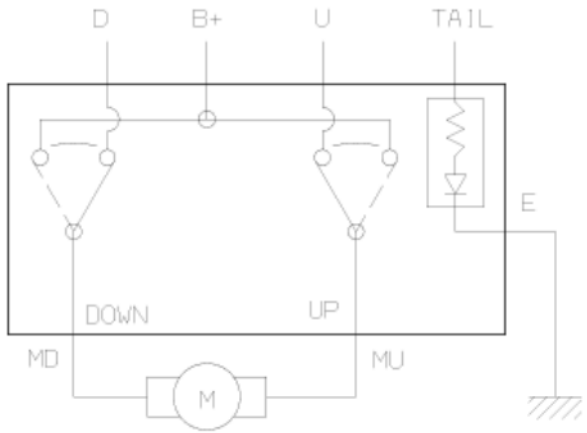
Rear Power Window Switch

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[With seater warmer switch]



[Without seater warmer switch]



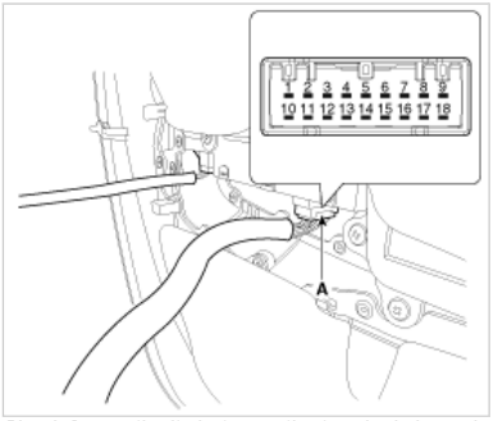
Body Electrical System

Inspection

Power Window Main Switch Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
3. Disconnect the connector (A) from the power window switch module.

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4. Check for continuity between the terminals in each switch position according to the table.

[Driver/Assist Safety]

Terminal / Position	Front left				Front right			
	3	9	18	6	3	2	4	5
UP	○—○				○—○			
AUTO UP	○—○			○	○—○			○
OFF								
DOWN	○		○		○		○	
AUTO DOWN	○		○	○	○		○	○
Terminal / Position	**Rear left**				**Rear right**			
	15	13	16	3	14	11	12	3
UP	○—○		○—○		○—○		○—○	
OFF		○	○	○		○	○	○
DOWN	○	○		○	○	○		○

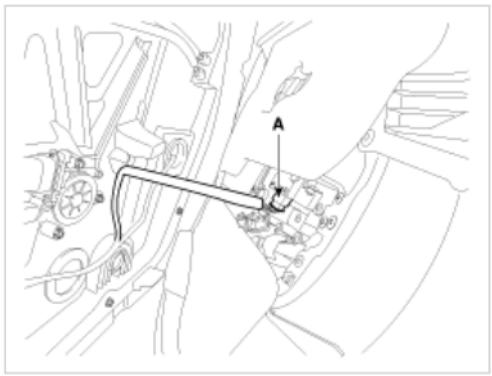
[Driver Auto Down]

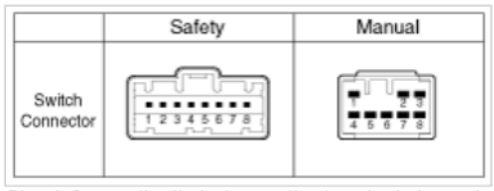
Terminal / Position	Front left				Front right			
	2	8	7	6	4	1	3	2
UP	○—○				○—○		○—○	
OFF						○	○	○
DOWN	○		○		○		○	○
AUTO DOWN	○			○				
Terminal / Position	**Rear left**				**Rear right**			
	6	12	15	2	4	10	11	2
UP	○—○		○—○		○—○		○—○	
OFF		○	○	○		○	○	○
DOWN	○	○		○	○	○		○

Assist Power Window Switch Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim panel.
   (Refer to Body - "Front Door Trim")
3. Disconnect the connector (A) from the switch.

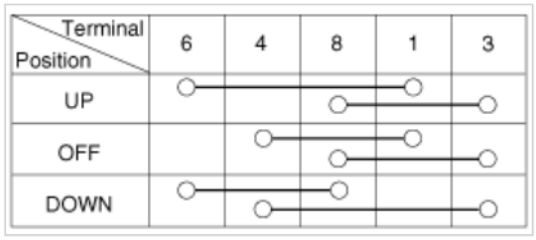
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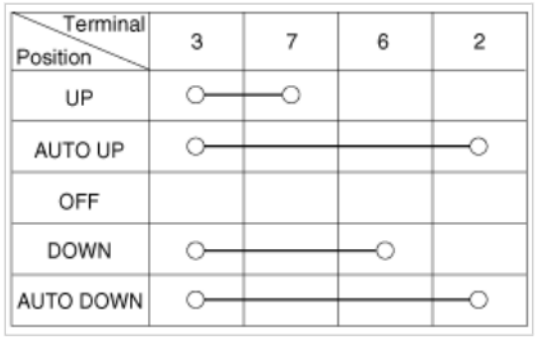


4. Check for continuity between the terminals in each switch position according to the table. If the continuity condition is not normal, replace the switch.

[Safety]



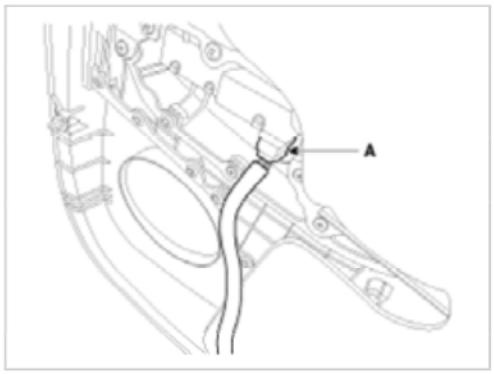
[Manual]

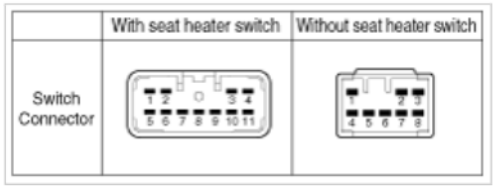


Rear Power Window Switch Inspection

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim panel.
   (Refer to Body - "Rear Door Trim")
3. Disconnect the connector (A) from the switch.

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4. Check for continuity between the terminals in each switch position according to the table. If the continuity condition is not normal, replace the switch.

[With Seat Heater]

Terminal / Position	3	7	6	2
UP	○	○		
OFF				
DOWN	○		○	

[Without Seat Heater]

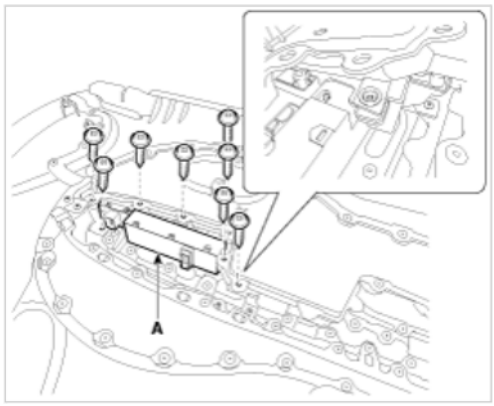
Terminal / Position	6	4	8	1	3
UP	○		○	○	
OFF		○	○	○	
DOWN	○		○		

Removal

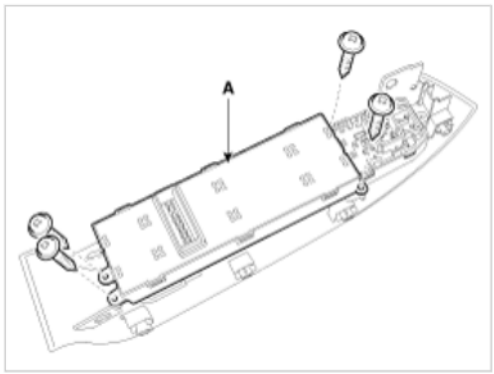
Driver Power Window Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
3. Remove the power window switch assembly (A) loosening the mounting screws (8EA).

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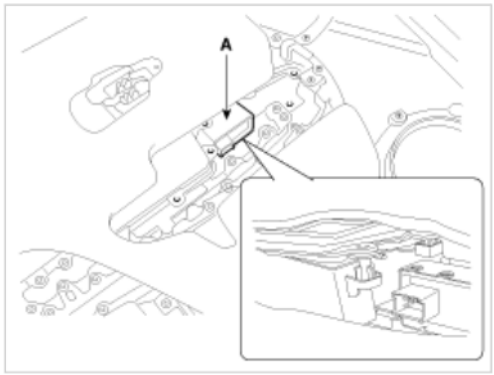


4. Remove the power window switch assembly (A) after loosening the mounting screws.

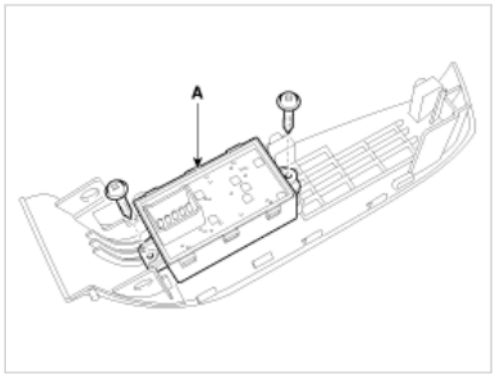


Assist Power Window Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the front door trim.
   (Refer to Body - "Front Door Trim")
3. Remove the power window switch assembly (A) loosening the mounting screws (7EA).



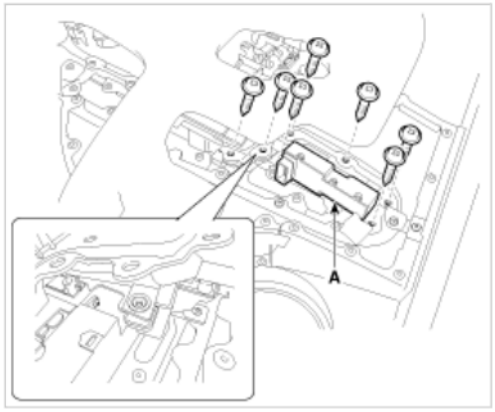
4. Remove the power window switch assembly (A) after loosening the mounting screws.



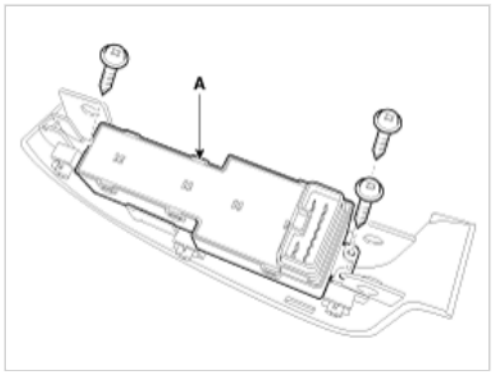
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Rear Power Window Swtich

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
3. Remove the power window switch assembly (A) loosening the mounting screws (7EA).



4. Remove the power window switch assembly (A) after loosening the mounting screws.



Installation

Driver Power Window Switch

1. Install the power window switch assembly.
2. Install the front door trim after connect the connector.

Assist Power Window Switch

1. Install the power window switch assembly.
2. Install the front door trim after connect the connector.

Rear Power Window Swtich

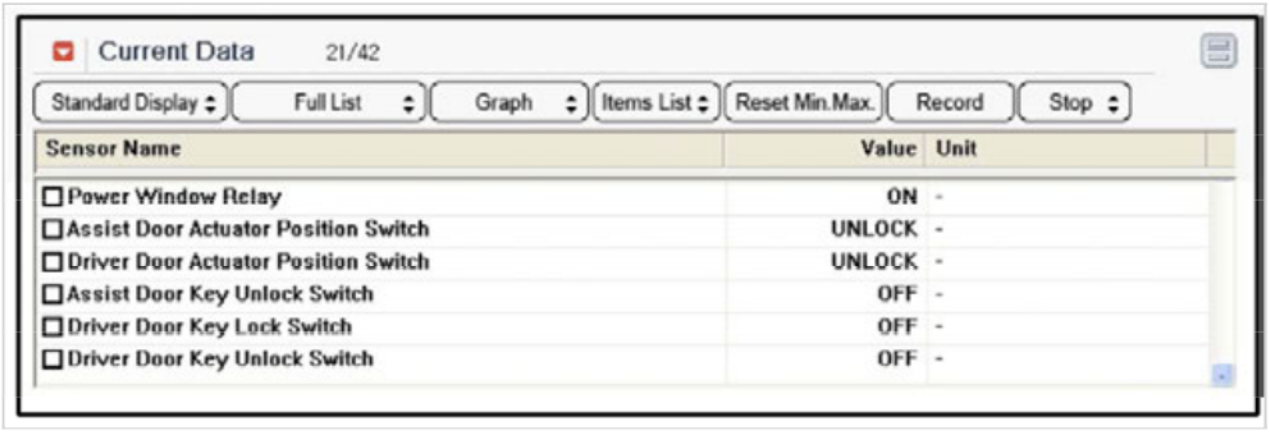
1. Install the power window switch assembly.
2. Install the rear door trim after connect the connector.

Inspection

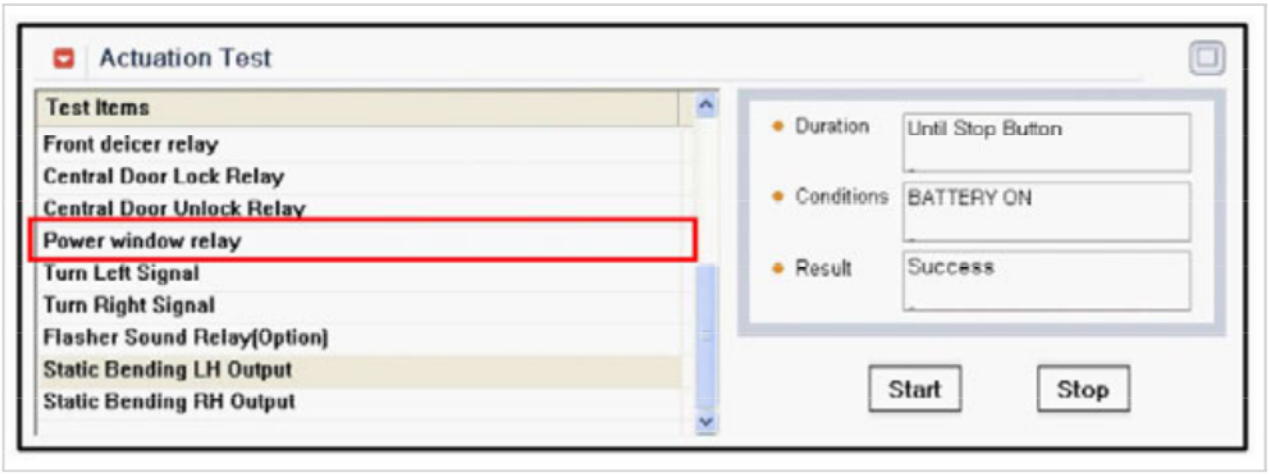
Diagnosis With GDS

1. It will be able to diagnose defects of power window with GDS quickly. GDS can operates actuator forcefully, input/output value monitoring and self diagnosis.
2. Select model and "BCM".
3. Select the "SJB" to check.
4. Select "Current data", if you will check current data of power window system. It provides input/output status of SJB.

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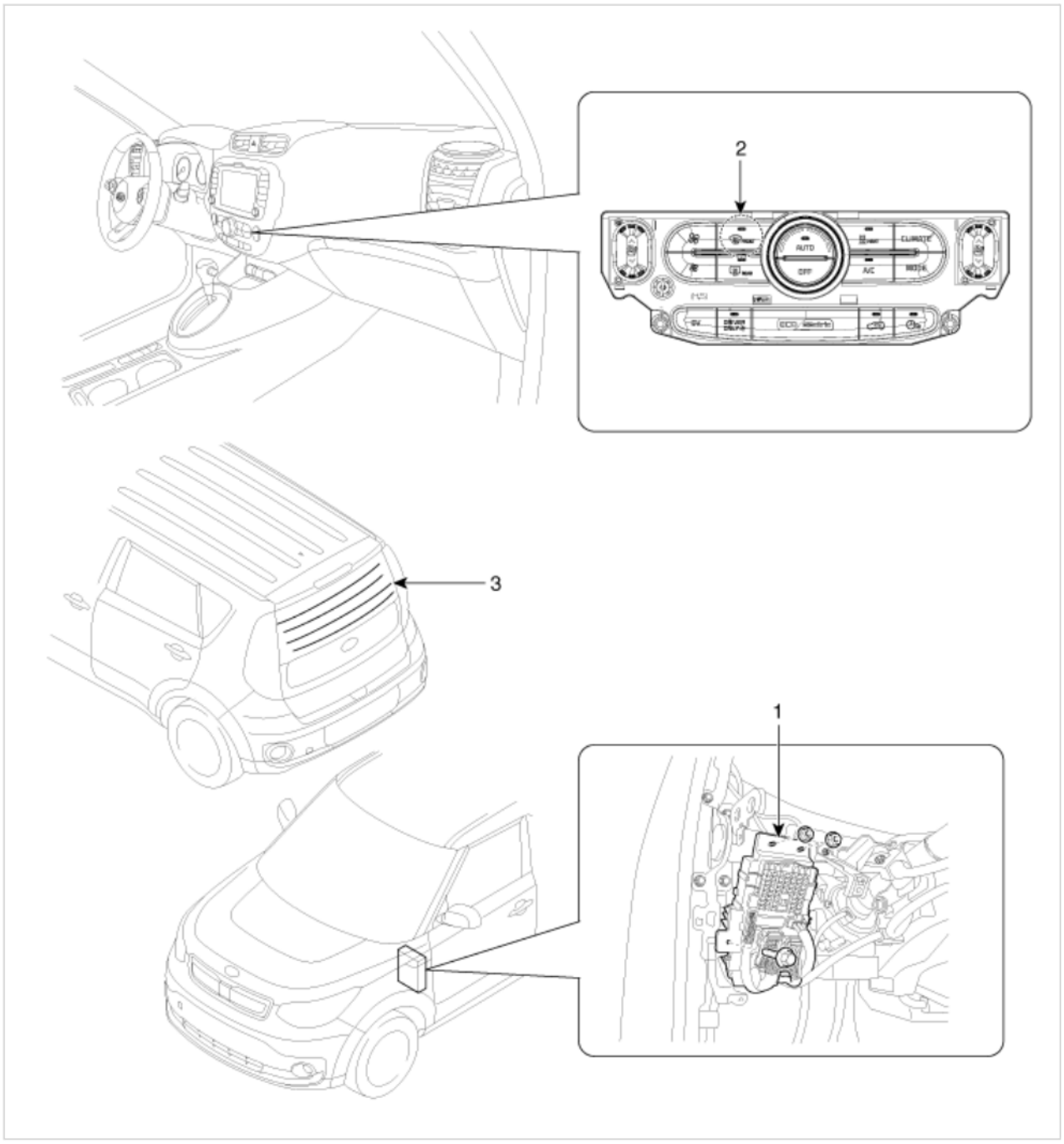
5. If you will check the power door lock operation forcefully, select "Actuation test".



Body Electrical System

Component Location

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1. Rear glass defogger relay (Buil-in smart junction box) 2. Rear glass defogger switch (FATC type)	3. Rear glass defogger

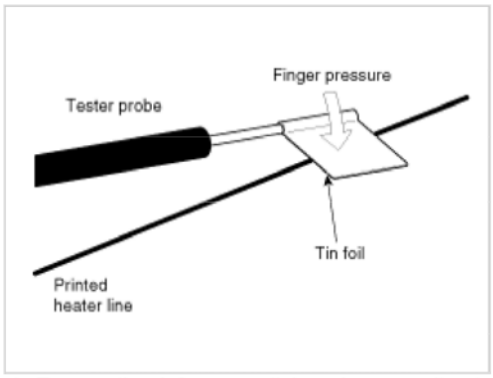
Body Electrical System

Inspection

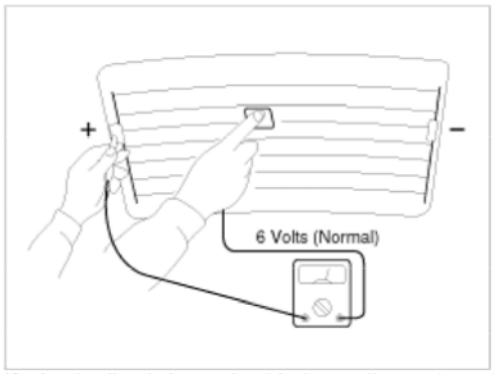
⚠ CAUTION

Wrap tin foil around the end of the voltmeter test lead to prevent damaging the heater line. Apply finger pressure on the tin foil, moving the tin foil along the grid line to check for open circuits.

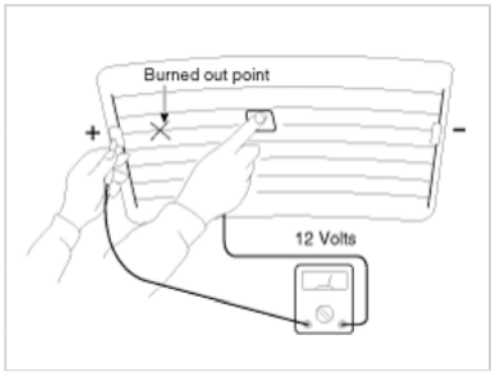
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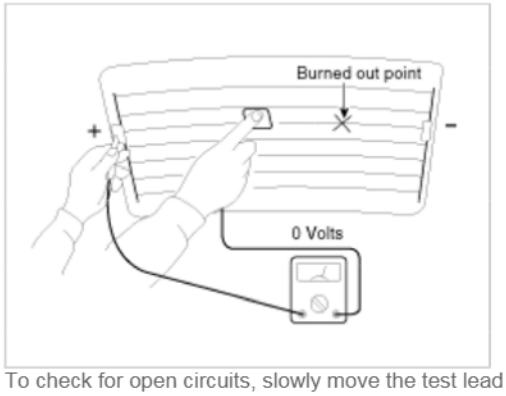
1. Turn on the defogger switch and use a voltmeter to measure the voltage of each heater line at the glass center point. If a voltage of approximately 6V is indicated by the voltmeter, the heater line of the rear window is considered satisfactory.



2. If a heater line is burned out between the center point and (+) terminal, the voltmeter will indicate 12V.

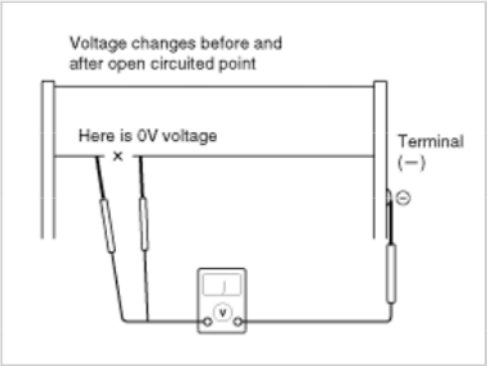


3. If a heater line is burned out between the center point and (-) terminal, the voltmeter will indicate 0V.

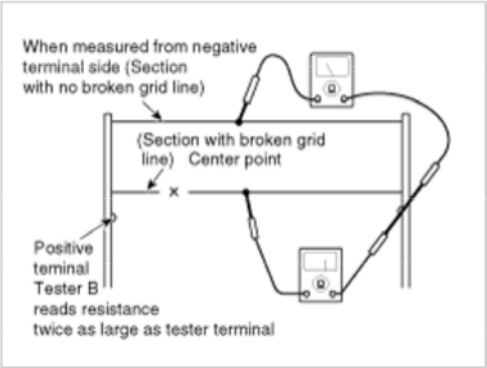


4. To check for open circuits, slowly move the test lead in the direction that the open circuit seems to exist. Try to find a point where a voltage is generated or changes to 0V. The point where the voltage has changed is the open-circuit point.

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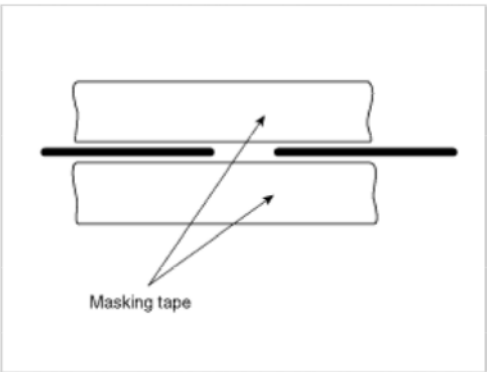
5. Use an ohmmeter to measure the resistance of each heater line between a terminal and the center of a grid line, and between the same terminal and the center of one adjacent heater line. The section with a broken heater line will have a resistance twice that in other sections. In the affected section, move the test lead to a position where the resistance sharply changes.



Repair Of Broken Heater Line

Prepare the following items :

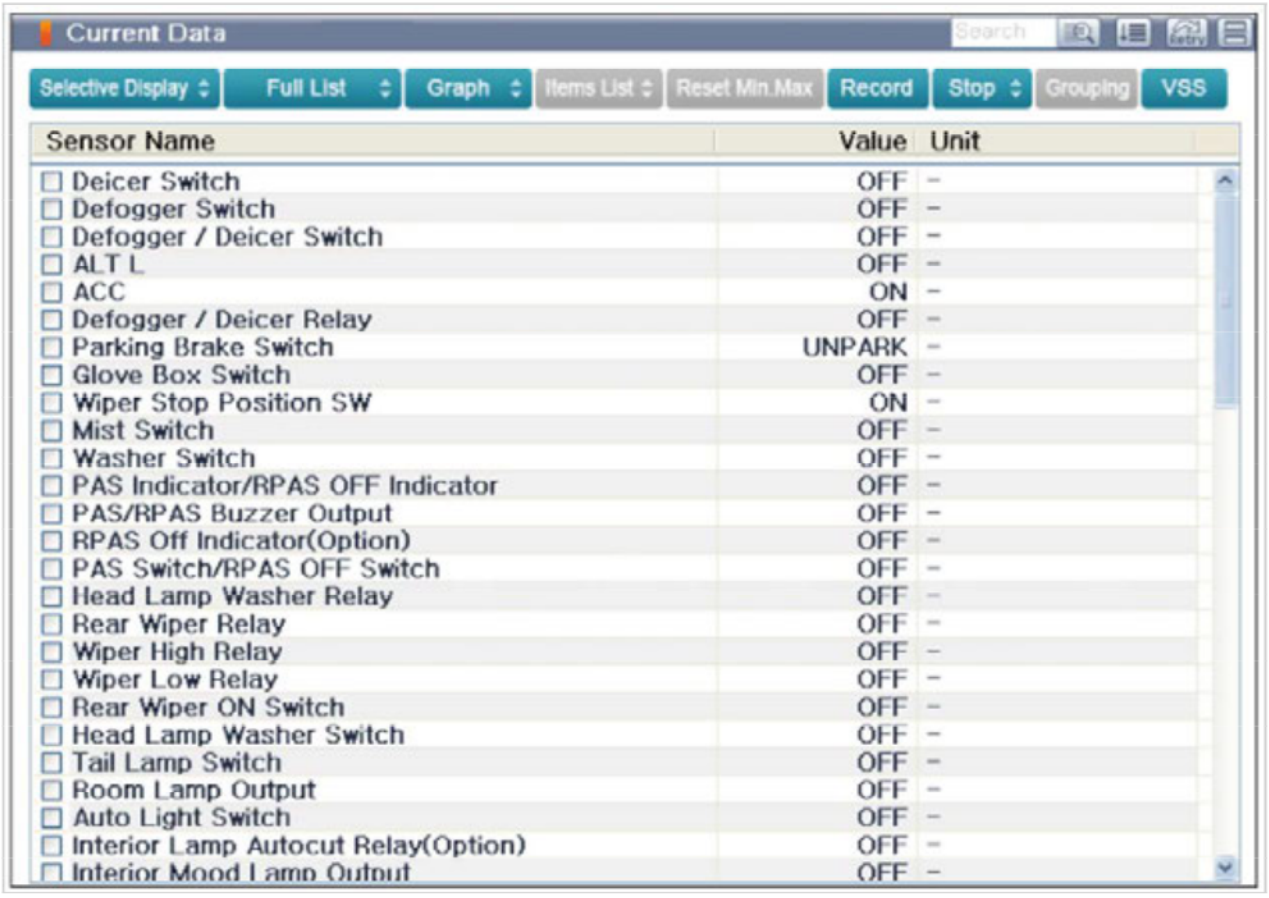
1. Conductive paint.
2. Paint thinner.
3. Masking tape.
4. Silicone remover.
5. Using a thin brush :
   Wipe the glass adjacent to the broken heater line, clean with silicone remover and attach the masking tape as shown. Shake the conductive paint container well, and apply three coats with a brush at intervals of about 15 minutes apart. Remove the tape and allow sufficient time for drying before applying power. For a better finish, scrape away excess deposits with a knife after the paint has completely dried. (Allow 24 hours).



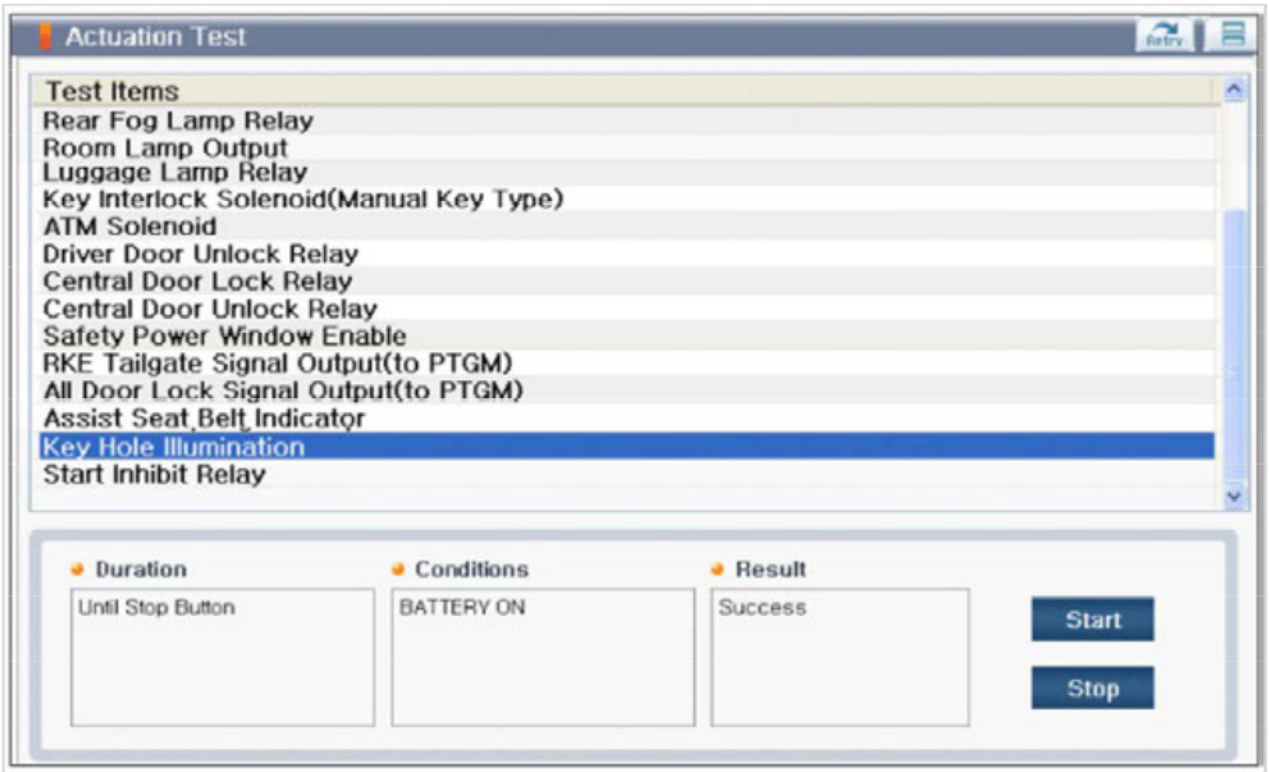
Inspection

1. The windshield deicer switch inputs can be checked using the GDS.
2. To check the input value of windshield deicer switch, select option "Body Control Module".
3. Select option "Current Data".

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4. To perform functional test on SJB outputs, select "Actuation Test".



Removal

1. Disconnect the negative (-) battery terminal.
2. Remove the heater and A/C control unit.

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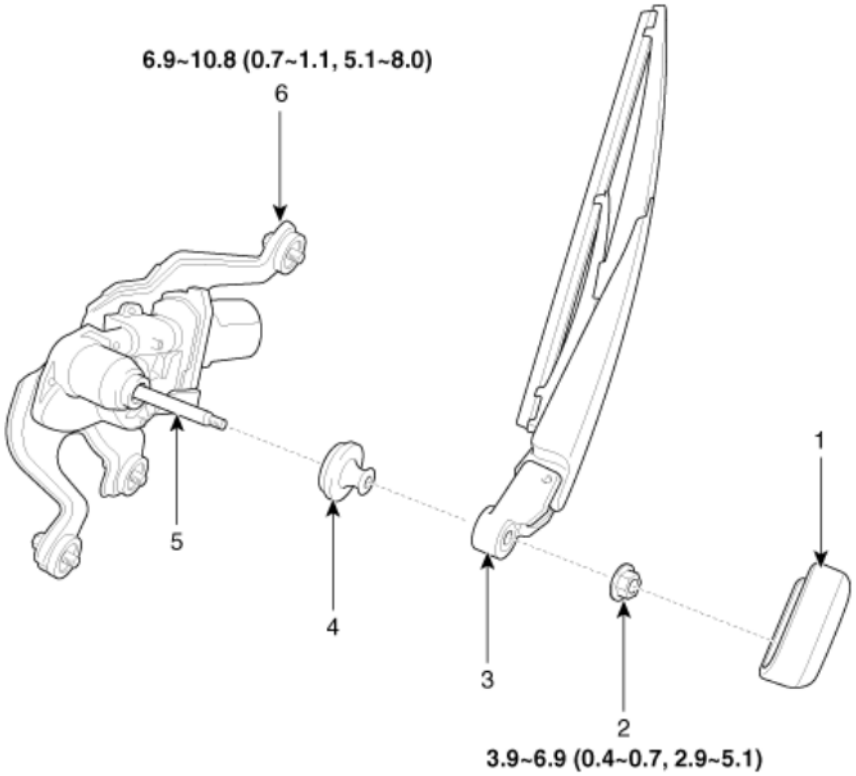
(Refer to Heating, Ventilation, Air Condition - "Heater & A/C Control Untit (FATC))

Installation

1. Install the heater and A/C control unit.
2. Connect the negative (-) battery terminal.

Body Electrical System

Component Location



Torque : N.m (kgf.m, lbf.ft)

1. Head cap	4. Grommet
2. Rear wiper arm nut	5. Rear wiper motor assembly
3. Rear wiper arm & blade	6. Rear wiper motor bolt

Body Electrical System

Inspection

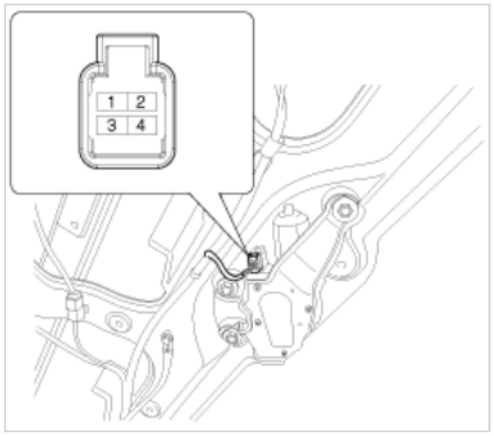
Rear Wiper Motor

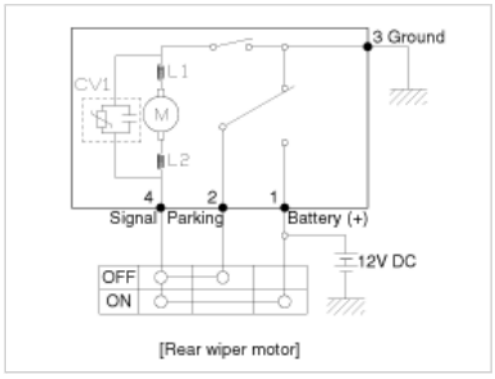
1. Remove the connector from the rear wiper motor.

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2. Connect battery positive (+) and negative (-) cables to terminals 2 and 1 respectively.
3. Check that the motor operates normally. Replace the motor if it operates abnormally.

No.	Description
1	Battery (+)
2	Parking
3	Ground
4	Signal

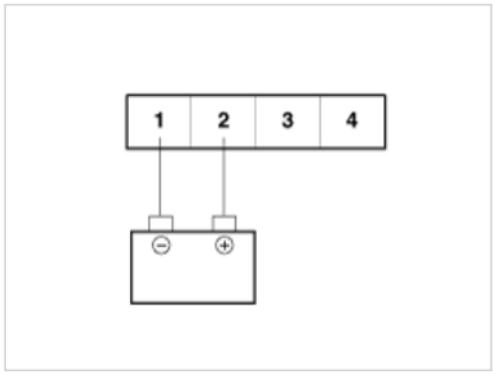




[Rear wiper motor]

Automatic Stop Operation Check

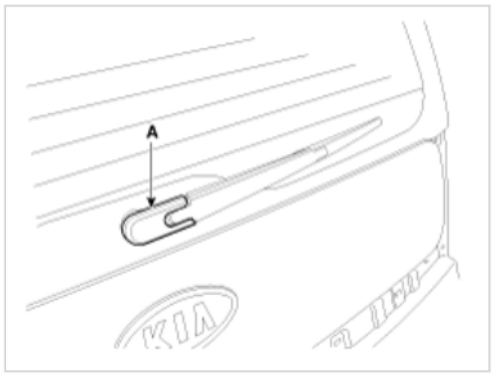
1. Operate the motor at low speed using the stalk control.
2. Stop the motor operation anywhere except at the off position by disconnecting terminal 2.
3. Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1.
4. Check that the motor stops running at the off position.



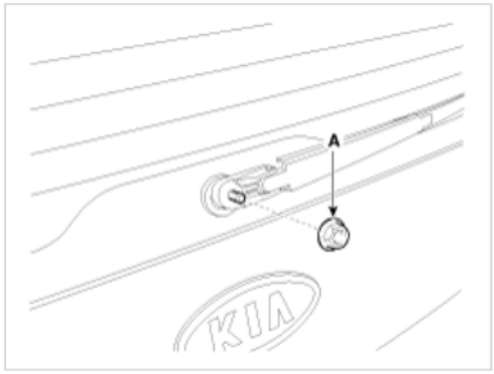
Removal

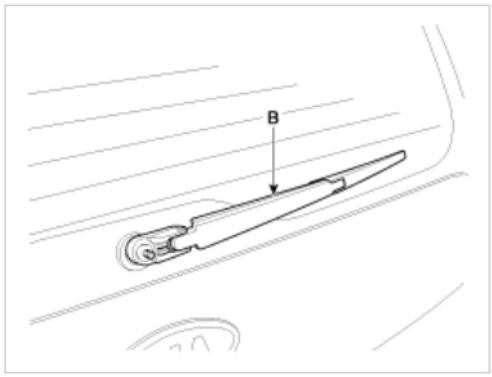
1. Detach the rear wiper cap (A).

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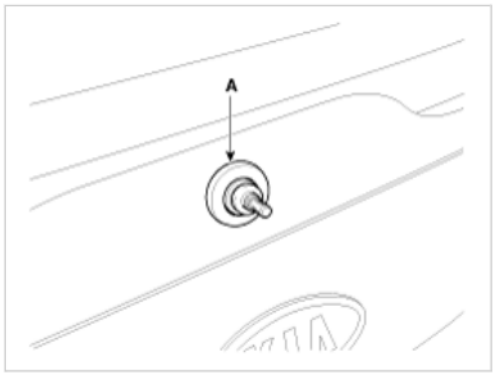


2. Remove the rear wiper arm & blade (B) after removing rear wiper HEX nut (A).



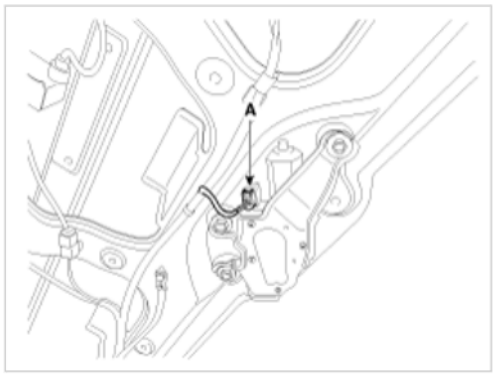


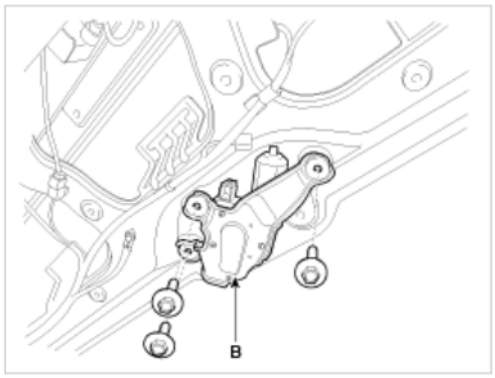
3. Remove the rear wiper grommet (A).



4. Remove the tailgate trim after opening the tailgate.
   (Refer to Body - "Tailgate Trim")
5. Disconnect the rear wiper motor connector (A) then remove the rear wiper motor (B) after loosening bolts.

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Installation

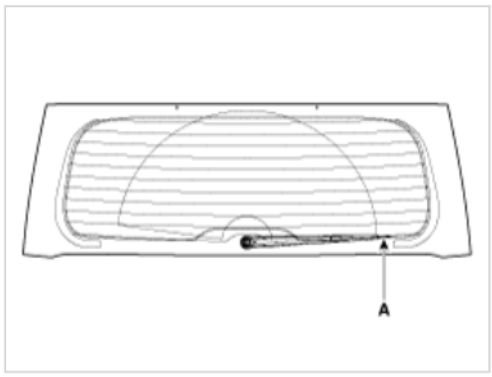
1. Install the rear wiper motor assembly.

   Tightening torque Bolt :
   6.9~10.8 Nm (0.7~1.1 kgf.m, 5.1~8.0 lbf.ft)

2. Install the tailgate trim.
3. Install the rear wiper arm cap after tighting the nut.

   Tightening torque Nut :
   3.9~6.9 N.m (0.4~0.7 kgf.m, 2.9~5.1 lbf.ft)

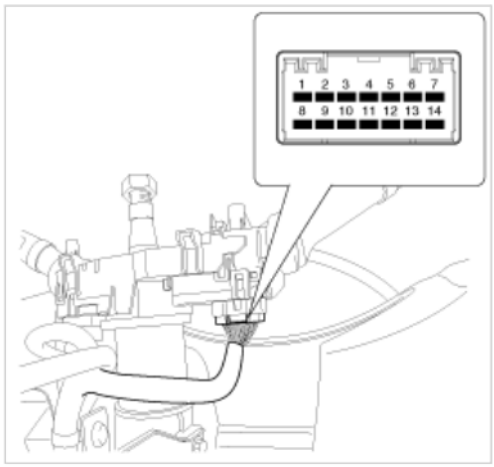
4. Set the rear wiper blade and to the lowest defogger heat line and tailgate glass.
   A : Auto stop position



Inspection

1. Check for continuity between the terminals while operating the wiper and washer switch. If it is not normal condition, replace wiper and wiper switch.

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Rear Wiper Switch

Position \ Terminal	6	7	14
OFF			
INT	○——	——○	
ON	○——	——	——○

Rear Washer Switch

Position \ Terminal	6	5
OFF		
ON	○——	——○

Inspection

1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.

   NOTICE

   Before filling the reservoir tank with water, check the filter for foreign material or contamination. if necessary, clean the filter.
2. Remove the front bumper cover.
   (Refer to Body - "Front Bumper Cover")
3. Connect positive (+) and negative (-) battery cables to terminals 1 and 2 respectively to see that the washer motor runs and water is pumped.
4. Check that the motor operates normally.
   Replace the motor if it operates abnormally.

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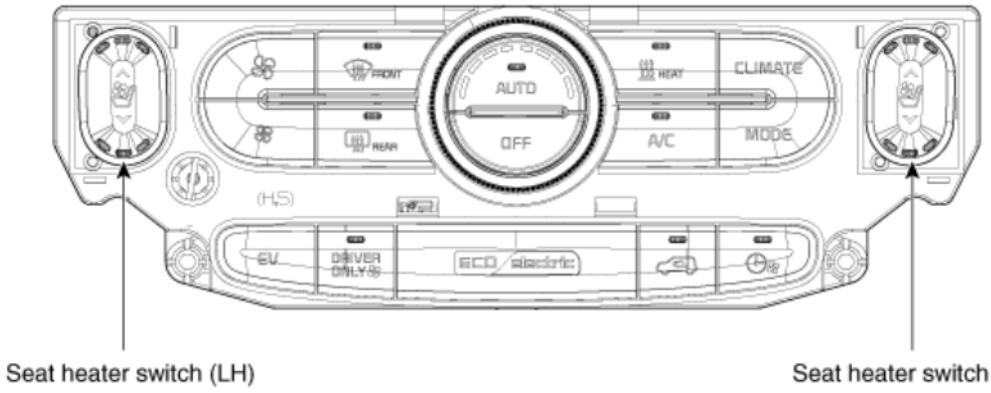


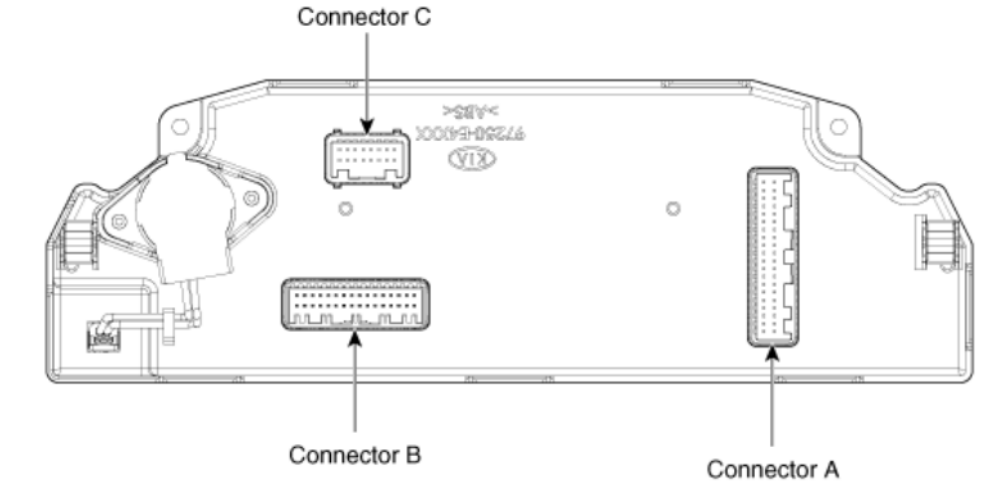
Terminal / Position	1	2
Rear	⊕	⊖

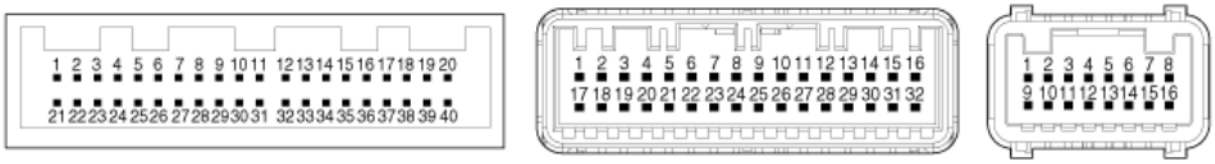
Components

[First Row Seat]

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Connector Pin Information

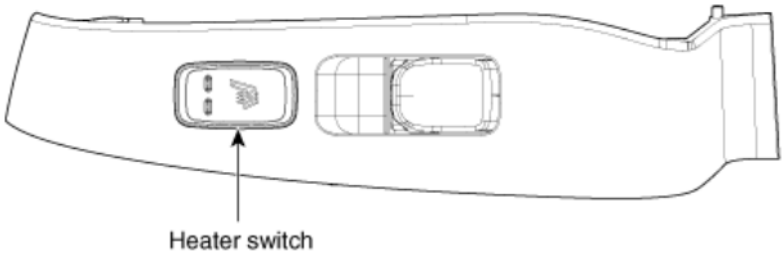
Pin No.	Connector A	Connector B	Connector C
1	Illumination (+)	Ground	Electric compressor - interlock (+)
2	Sensor REF (+5V)	Sensor ground	Electric compressor - interlock (-)
3	C_CAN High	PWM blower IN	High voltage PTC heater - interlock (+)
4	C_CAN LOW	Cluster ionizer diagnosis	High voltage PTC heater - interlcok (-)
5	Driver mode actuator (VENT)	-	PAB IGN3
6	Driver mode actuator (DEF)	CLEAN signal	PAB ON signal
7	Driver mode actuator F/B	Assist mode actuator (VENT)	PAB OFF signal
8	Intake actuator (FRE)	Assist mode actuator (DEF)	SBR
9	Intake actuator (REC)	Assist mode actuator F/B	Rr LEFT SBR
10	Extake actuator F/B	DEF actuator (OPEN)	Rr CENTER SBR

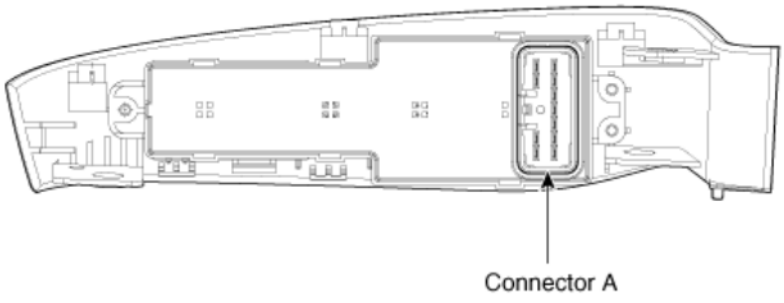
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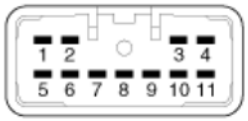
11	K-LINE	DEF actuator (CLOSE)	Rr RIGHT SBR
12	HTD	DEF actuator F/B	-
13	Rear defog switch	Vent left duct sensor (+)	-
14	Temperature control actuator (COOL)	Floor left duct sensor (+)	-
15	Temperature control actuator (WARM)	IGN3	-
16	Temperature control actuator F/B	IGN2	-
17	Driver seat heater indicator - LOW	-	
18	Driver seat heater indicator - MID	2 WAY valve #1 (+)	
19	Driver seat heater indicator - HIGH	3 WAY valve #1 (+)	
20	Illumination (RHEO)	3 WAY valve #2 (+)	
21	DETENT OUT (+)	2 WAY valve #2 (+)	
22	Driver seat heater switch	CLIMATE_CAN HIGH	
23	Driver cooler seat indicator - LOW	CLIMATE_CAN LOW	
24	Driver cooler seat indicator - MID	HUMIDITY (PWM)	
25	Driver cooler seat indicator - HIGH	Air pressor tranduser signal	
26	Assist seat heater switch	Refrigerant temperature sensor signal #1	
27	Ambient sensor (+)	Refrigerant temperature sensor signal #2	
28	EVAP sensor (+)	Coolant 3way valve output	
29	Assist cooler seat indicator - LOW	IGN3	
30	Assist cooler seat indicator - MID	Blower IS	
31	Assist cooler seat indicator - HIGH	Battery	
32	Photo sensor (-)	Battery	
33	Assist cooler switch		
34	Driver cooler switch		
35	Blower INH		
36	MM_CAN HIGH		
37	MM_CAN LOW		
38	Assist seat heater indicator - LOW		
39	Assist seat heater indicator - MID		
40	Assist seat heater indicator - HIGH		

Second Row Seat

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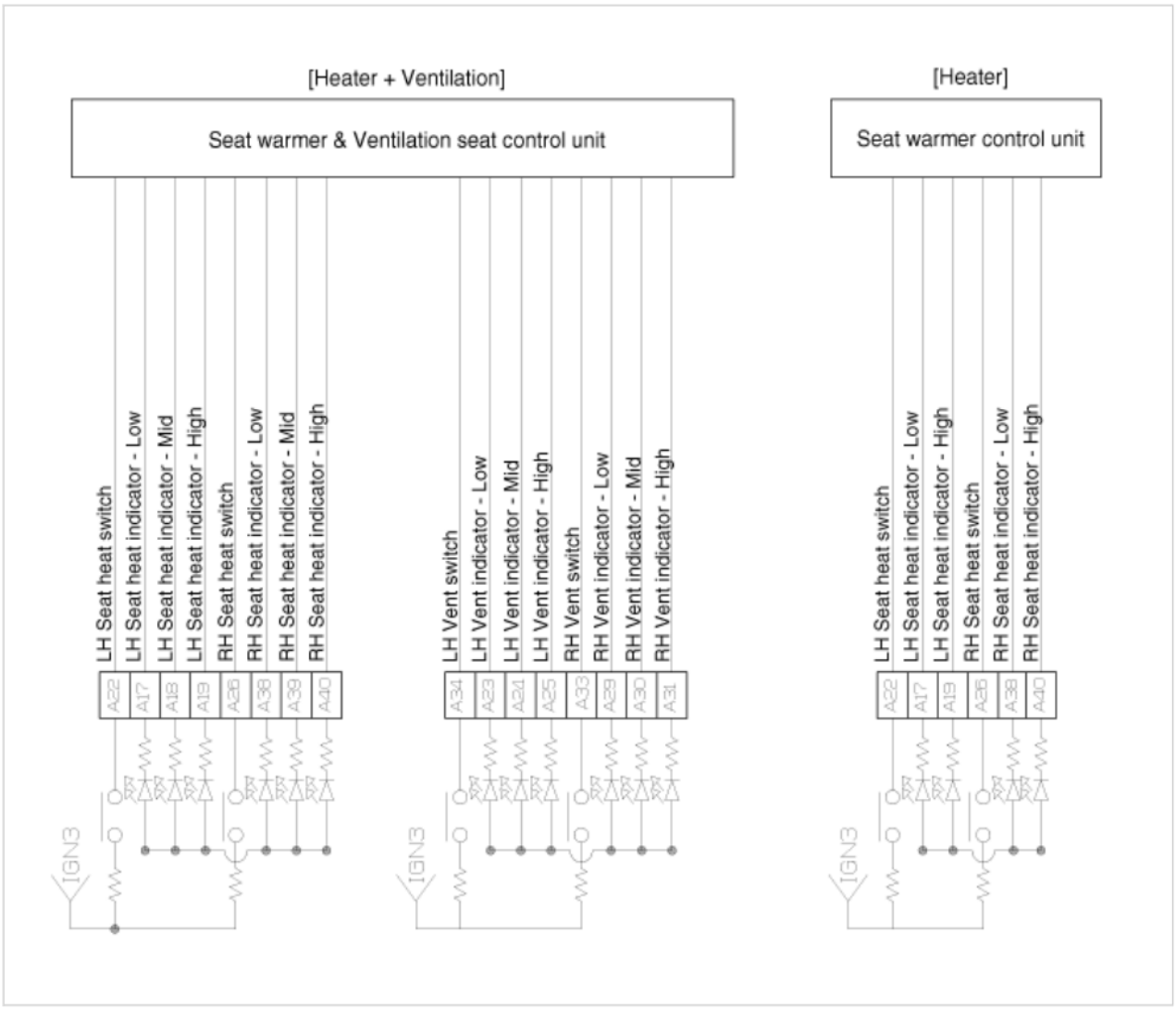


Connector A	No.	Description	No.	Description
	1	Seat warmer indicator 2 input	7	Window up output
	2	Window up from driver input	8	Tail lamp input
	3	Window down output	9	Battery (+)
	4	Window down from driver input	10	Seat warmer battery (+)
	5	Ground	11	Seat warmer indicator 1 input
	6	Seat warmer indicator output		

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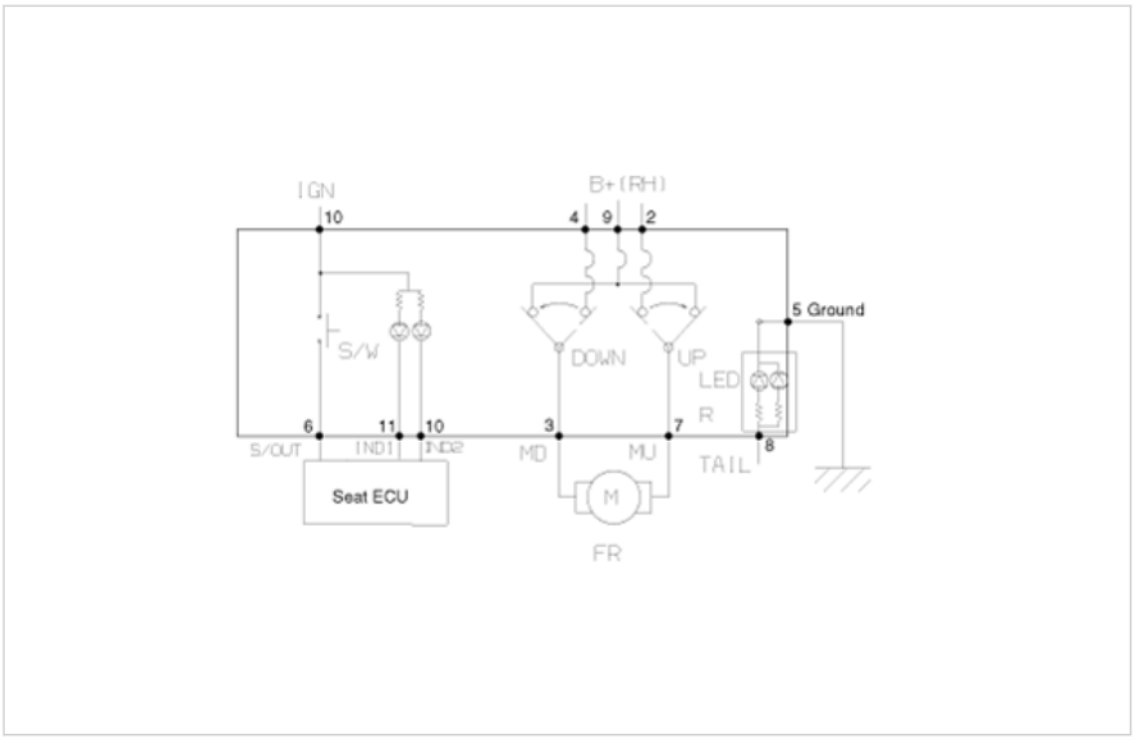
Circuit Diagram

[First Row Seat]



Second Row Seat

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Body Electrical System

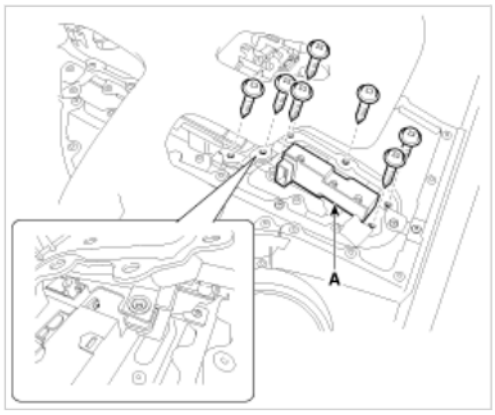
Removal

First Row Seat

1. Remove the heater & A/C control unit.
   (Refer to Heating, Ventilation And Air Conditioning - "Heater & A/C Control Unit (FATC)")

Second Row Seat

1. Disconnect the negative (-) battery terminal.
2. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
3. Remove the power window switch assembly (A) loosening the mounting screws (7EA).



Installation

First Row Seat

1. Install the heater & A/C control unit.
   (Refer to Heating, Ventilation And Air Conditioning - "Heater & A/C Control Unit (FATC)")

Second Row Seat

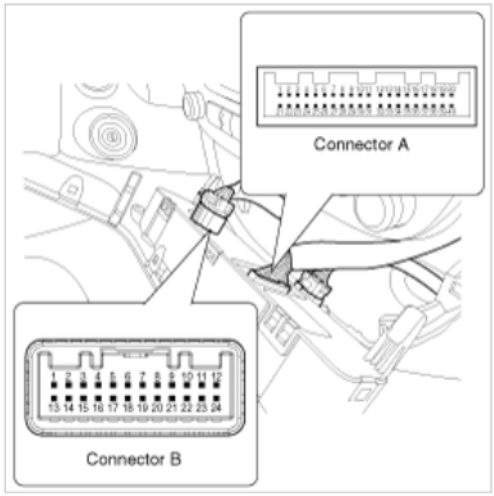
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1. Install the power window switch.
2. Install the rear door trim.
3. Connect the negative (-) battery terminal.

Inspection

First Row Seat

1. Disconnect the negative (-) batttery terminal.
2. Disconnect the A/C & heater controller connectors (A).
   (Refer to Heating, Ventilation And Air Conditioning - "Heater & A/C Control Unit (FATC)")



3. Operate switch and check that continuity exists between the terminals.
   If there is no continuity, replace the seat heater switch.

Position / Terminal		Connector A	Connector B	Remarks
		Heater + Ventilation		
LH	22	○		Heater switch
	17	○		Heater IND-low
	18	○		Heater IND-mid
	19	○		Heater IND-high
	10		○	Vent. switch
	18		○	Vent. IND-low
	19		○	Vent. IND-mid
	20		○	Vent. IND-high
RH	26	○		Heater switch
	38	○		Heater IND-low
	39	○		Heater IND-mid
	40	○		Heater IND-high
	9		○	Vent. switch
	29	○		Vent. IND-low
	30	○		Vent. IND-mid
	31	○		Vent. IND-high

Second Row Seat

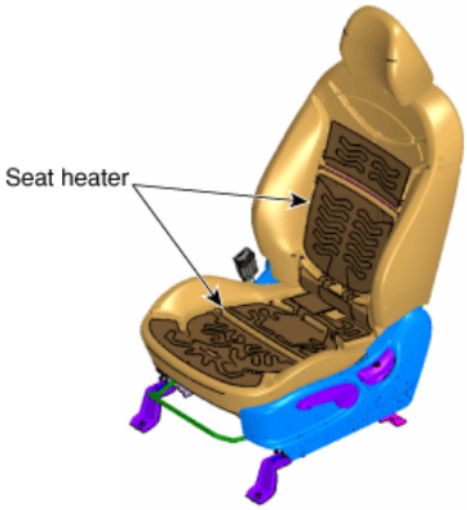
1. Disconnect the negative (-) batttery terminal.
2. Remove the rear door trim.
   (Refer to Body - "Rear Door Trim")
3. Operate driver seat heater switch and check that continuity exists between the terminals.
   If there is no continuity, replace the seat heater switch.

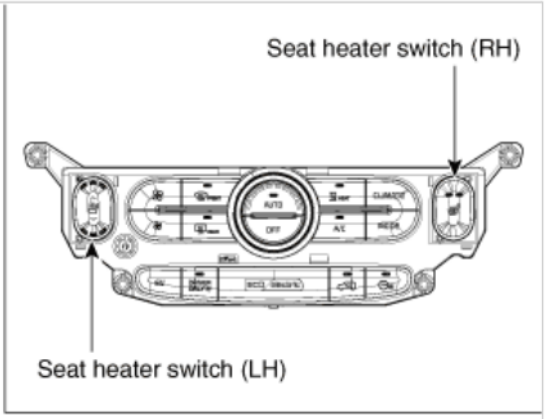
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Position \ Terminal		1	11	6	10
Heat mode	ON			○	○
	1st		○		○
	2nd	○			○

Components

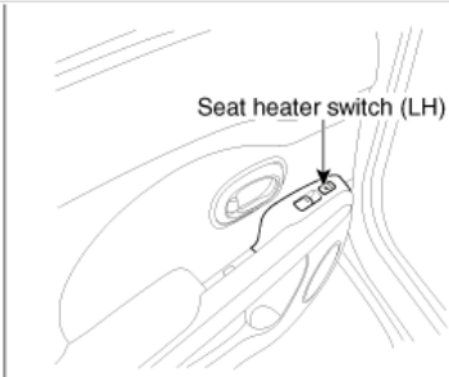
[First Row Seat]

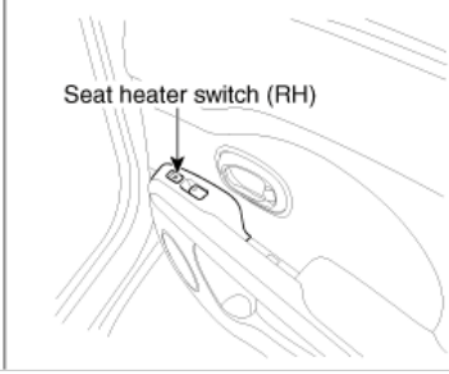




[Second Row Seat]



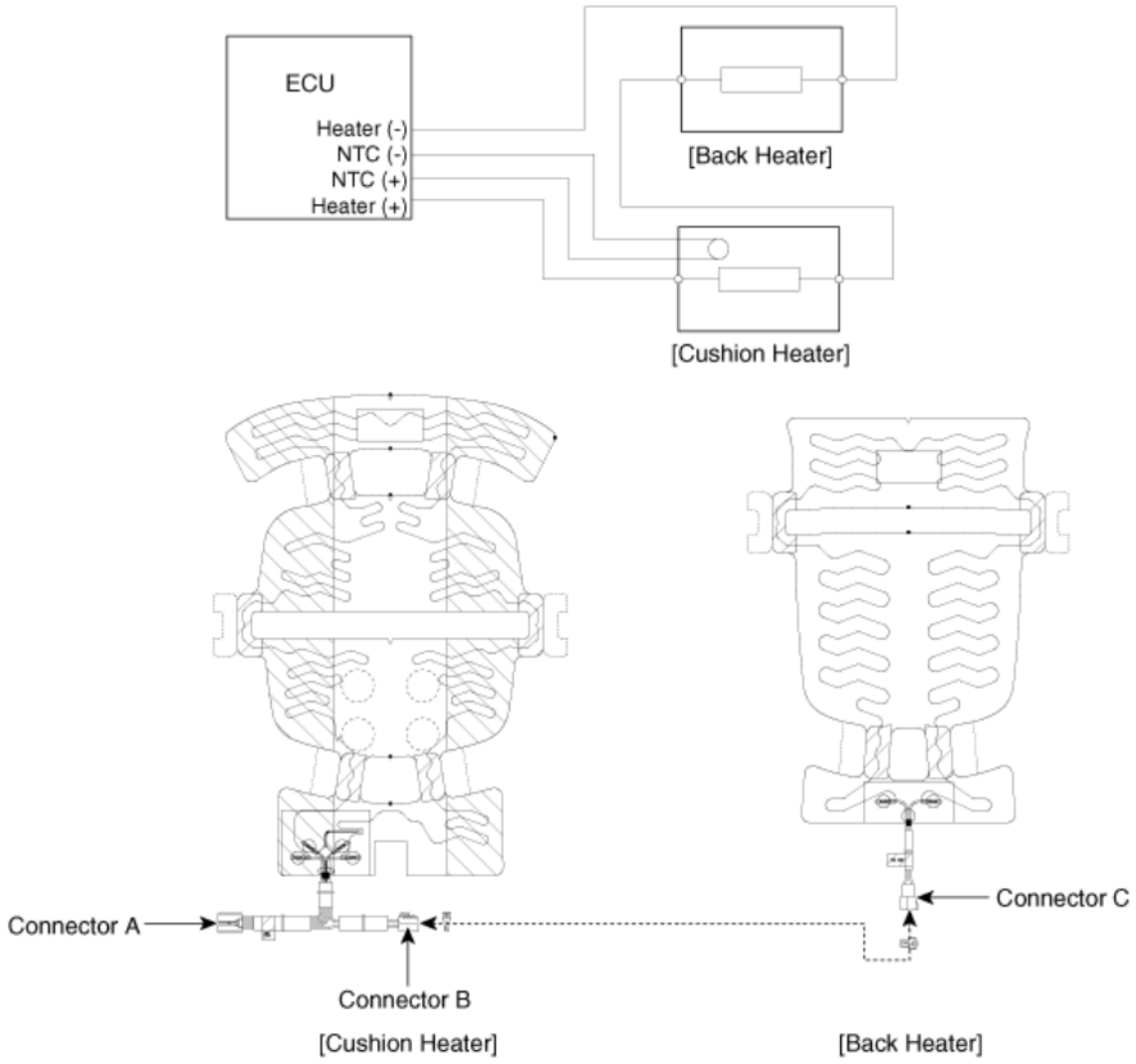




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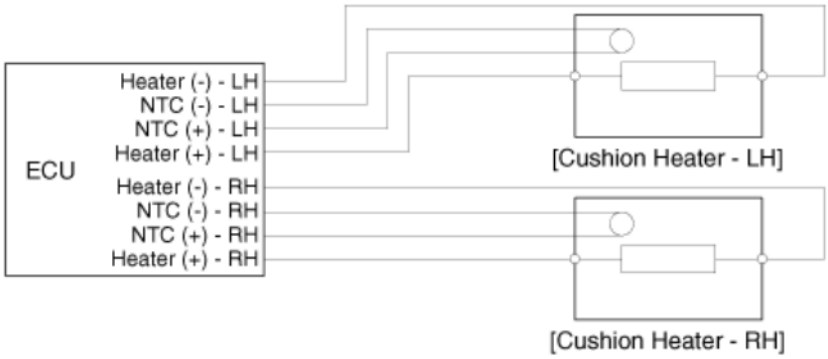
Circuit Diagram

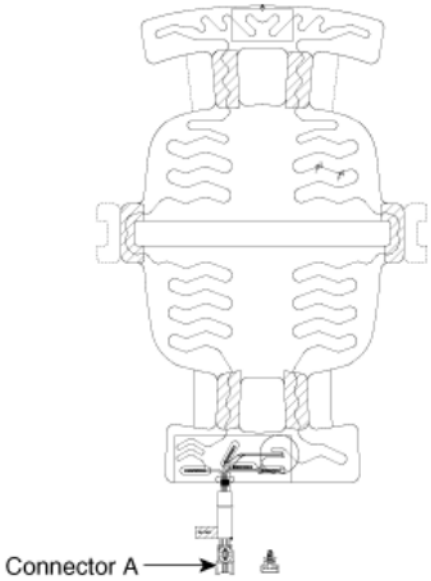
[First Row Seat]

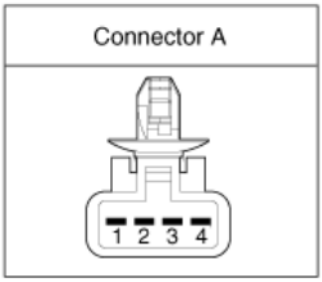


[Second Row Seat]

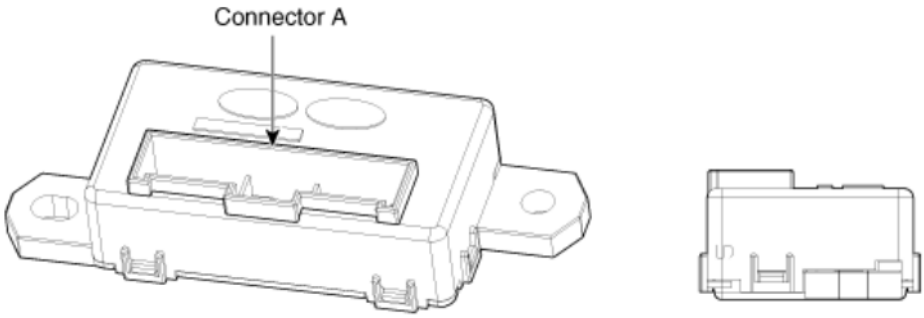
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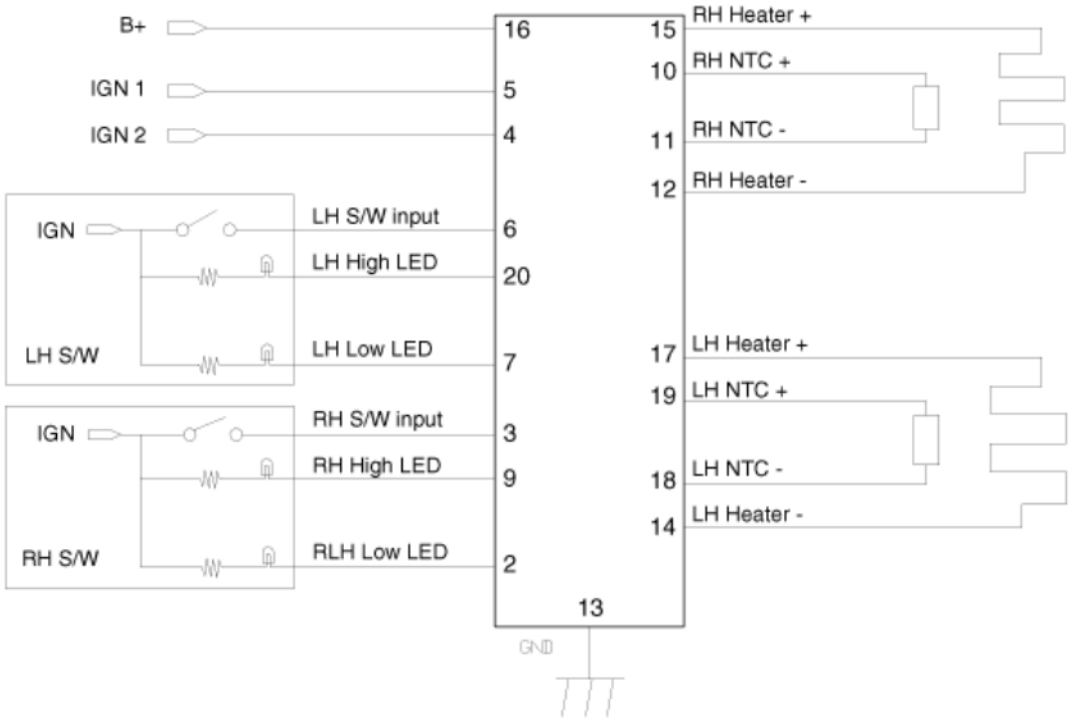


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Connector A	No.	Description	No.	Description
	1	-	11	Right NTC (-)
	2	LED - Right heater low	12	Right heater (-)
	3	Right heater switch	13	Ground
	4	IGN 2	14	Left heater (-)
	5	IGN 1	15	Right heater (+)
	6	Left heater switch	16	Battery (+)
	7	LED - Left heater low	17	Left heater (+)
	8	-	18	Left NTC (-)
	9	LED - Right heater high	19	Left NTC (+)
	10	Right NTC (+)	20	LED - Left heater high

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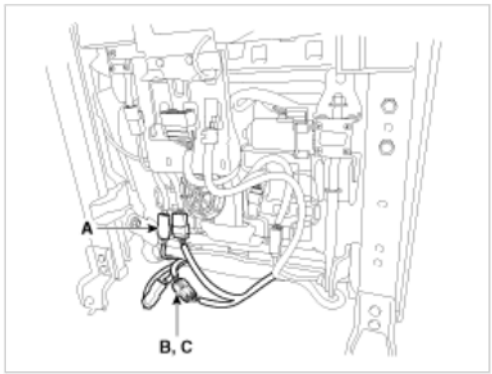


Body Electrical System

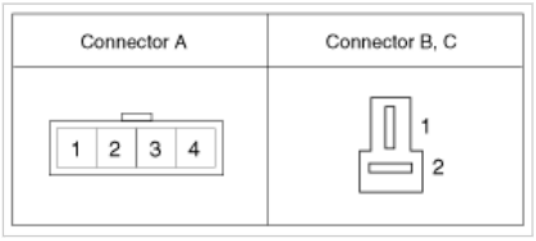
Inspection

First Row Seat

1. Check for continuity and measure the resistance between terminals.



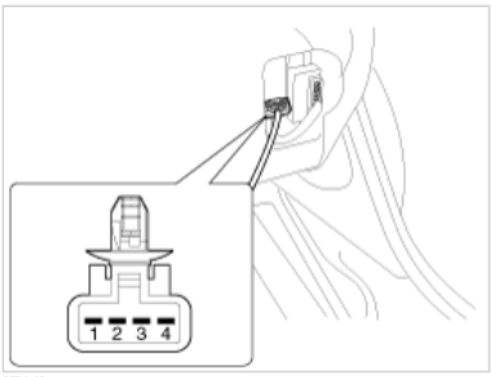
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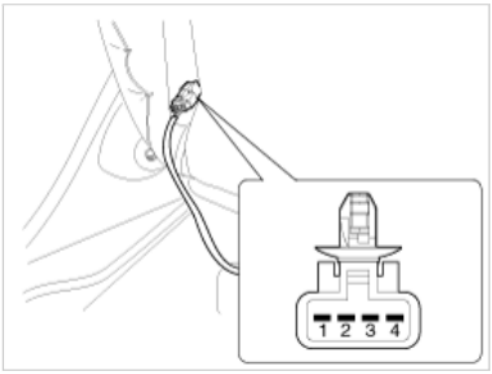
	Connector	Resistanc (± 10%)
Cushion (C)	1-2	4.54 Ω
Back (B)	1-2	5.16 Ω
Set (A)	1-4	9.70 Ω

Second Row Seat

1. Check for continuity and measure the resistance between terminals.
[LH]



[RH]



	Connector	Resistanc (± 10%)
Cushion (A)	1-4	4.13 Ω

Information
Performance of heater is the average temperature of seat surface.
The temperature of seat surface according to pushing the seat heater switch is as below.

		Type	1st	2nd	3rd
First row seat	Cushion (±2°C/±35.6°F)	HI-Low	38°C (100°F)	42°C (107.6°F)	-
		3 Step	36°C (96.8°F)	39°C (102.2°F)	42°C (107.6°F)
	Back (±2°C/±35.6°F)	HI-Low	45°C (113°F)	50°C (122°F)	-

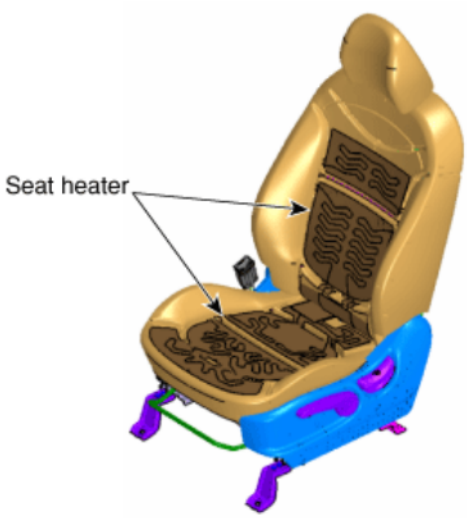
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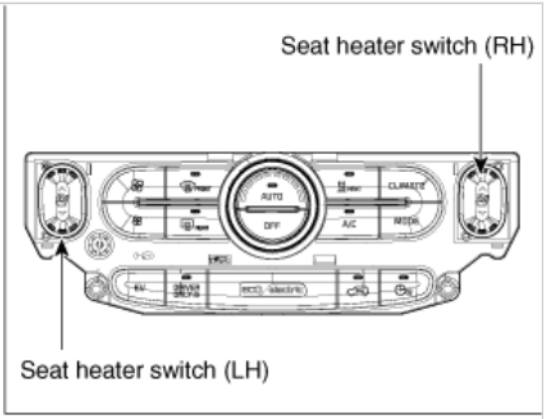
		3 Step	40°C (104°F)	45°C (113°F)	50°C (122°F)
Second row seat	Cushion (±2°C/±35.6°F)	HI-Low	38°C (100.4°F)	42°C (107.6°F)	-

Body Electrical System

Components

[First Row Seat]

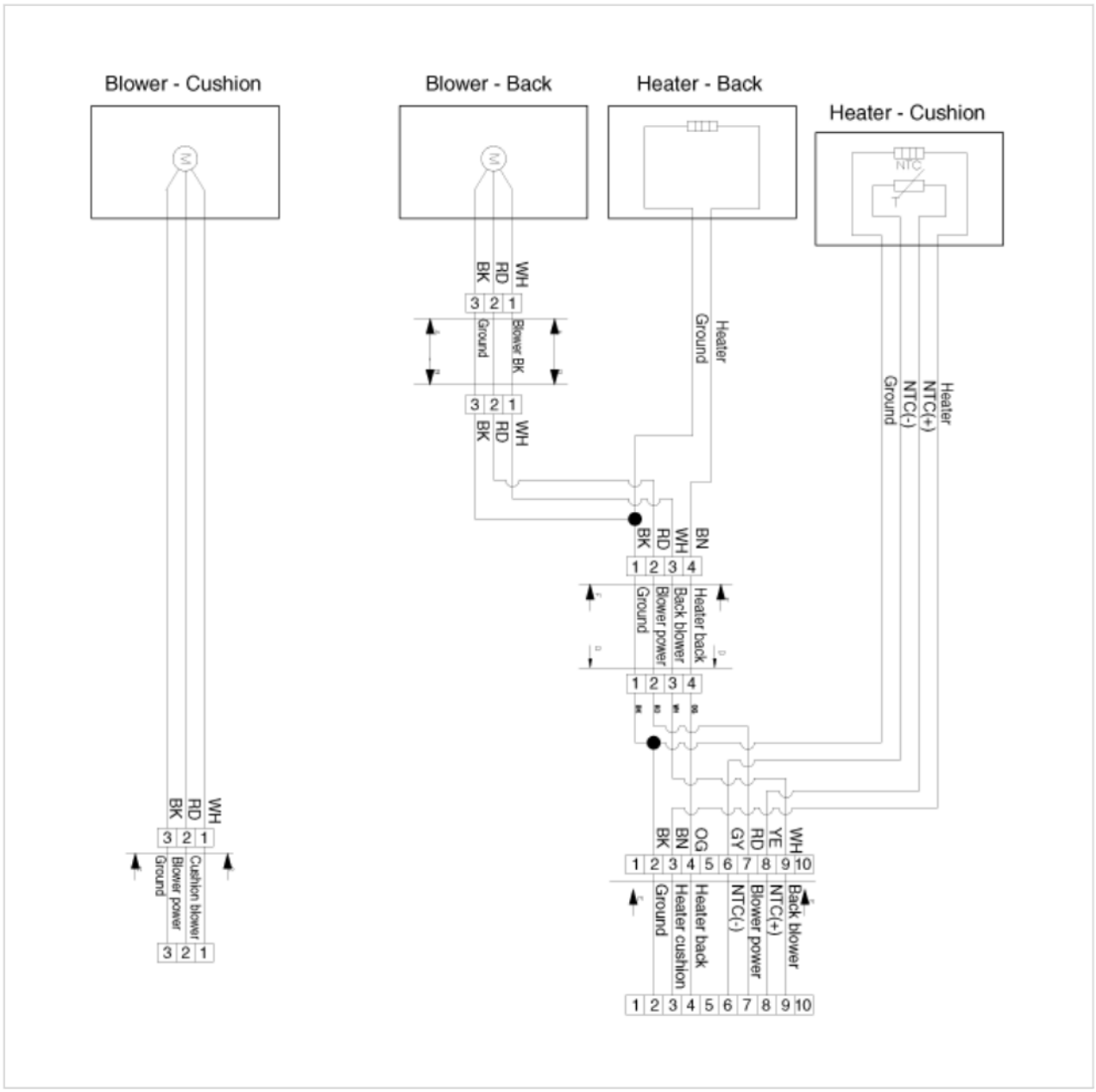




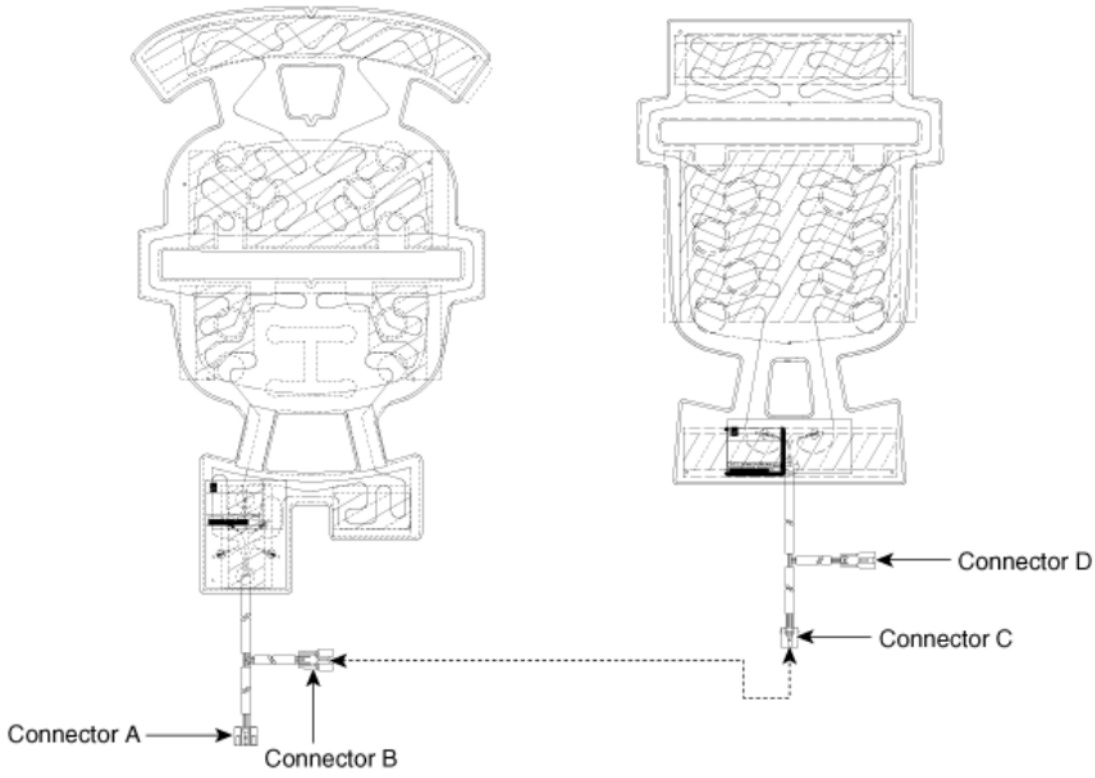
Body Electrical System

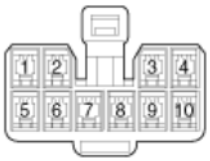
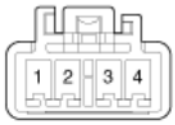
Circuit Diagram

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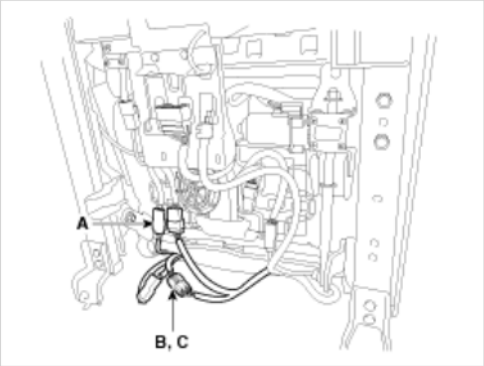
Connector A	Connector B	Connector C	Connector D
			

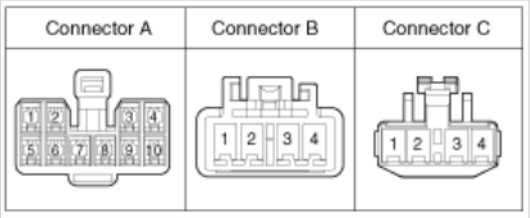
Inspection

Front Seat

1. Check for continuity and measure the resistance between terminals.

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	Connector	Resistanc (± 10%)
Cushion (C)	1-4	4.54 Ω
Back (B)	1-4	5.16 Ω
Set (A)	3-4	9.70 Ω

Information

Performance of heater is the average temperature of seat surface.
The temperature of seat surface according to pushing the seat heater switch is as below.

		Type	1st	2nd	3rd
First row seat	Cushion (±2°C/±35.6°F)	3 Step	36°C (96.8°F)	39°C (102.2°F)	42°C (107.6°F)
	Back (±2°C/±35.6°F)		40°C (104°F)	45°C (113°F)	50°C (122°F)

Component Location

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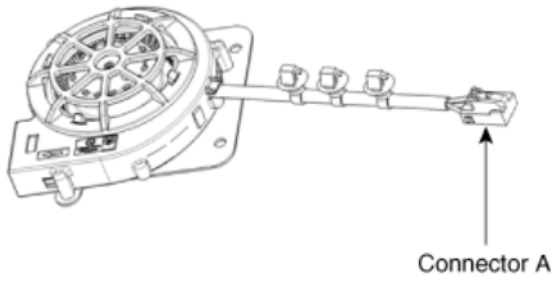
1. Seat back blower 2. Seat cushion blower	3. Air ventilation seat control unit

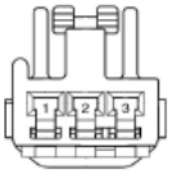
Body Electrical System

Circuit Diagram

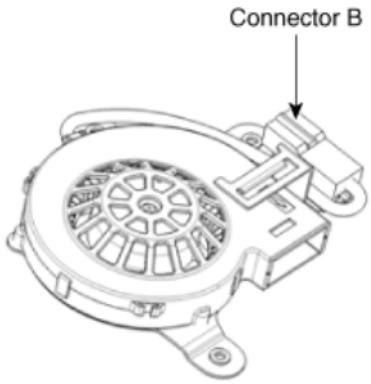
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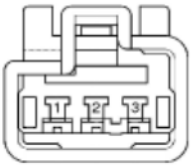
[Seat Back Blower]



Connector A	
	
No.	**Description**
1	Ground
2	IGN
3	Blower

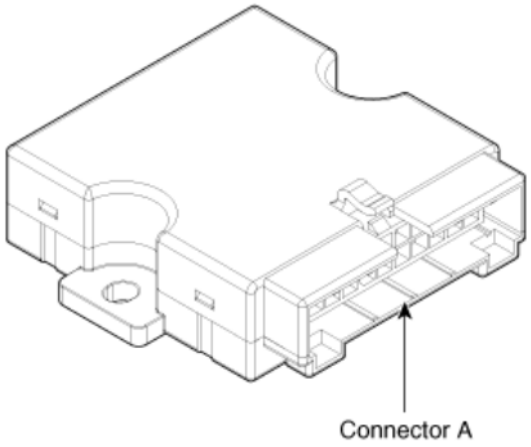
[Seat Cushion Blower]



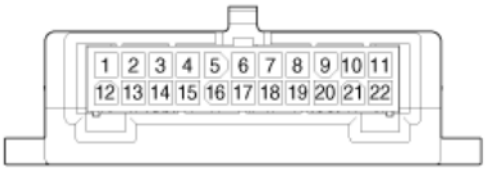
Connector B	
	
No.	**Description**
1	Blower
2	IGN
3	Ground

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[Air Ventilation Unit]



Connector A

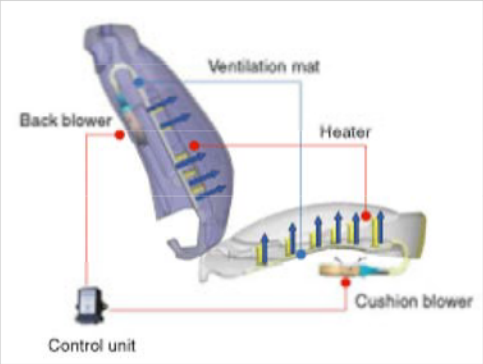


No.	Description	No.	Description
1	Battery +	12	Battery +
2	-	13	-
3	Cushion heater	14	IGN 2
4	Air ventilation switch	15	Heater switch
5	LED - Air ventilation (High)	16	-
6	Back heater	17	LED - Air ventilation (Mid)
7	LED - Air ventilation (Low)	18	LED - Heater (High)
8	LED - Heater (Mid)	19	LED - Heater (Low)
9	NTC +	20	Ground
10	Blower power	21	Back blower
11	IGN 1	22	Cushion blower

Description

The ventilated seat system uses a Push method to cool the seat. A blower mounted in the seat generates the cool air, which then travels through ducts to the seat back and cushion.

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NOTICE

1. Make sure not to spoil drink or water on the seat when equipping with ventilation system seat
2. Because of inhaling the slight air, it is difficult to feel the air strength by the sense of touch.

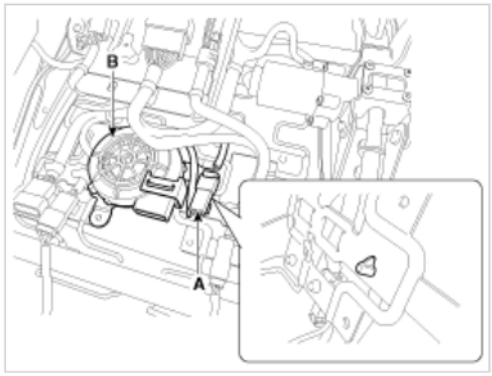
Body Electrical System

Removal

Cushion Blower

1. Remove the front seat assembly.
   (Refer to Body - "Front Seat Assembly")
2. Remove the cushion blower (B) after loosening the screws and disconnecting the connector (A).

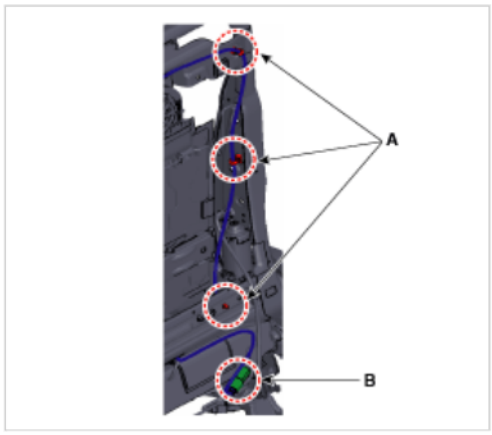




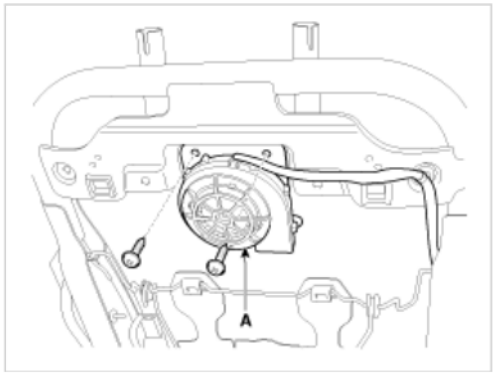
Back Blower

1. Remove the front seat assembly.
   (Refer to Body - "Front Seat Assembly")
2. Remove the front seat back cover.
   (Refer to Body - "Front Seat Back Cover")
3. Disconnect the connector (A) and fastners (B).

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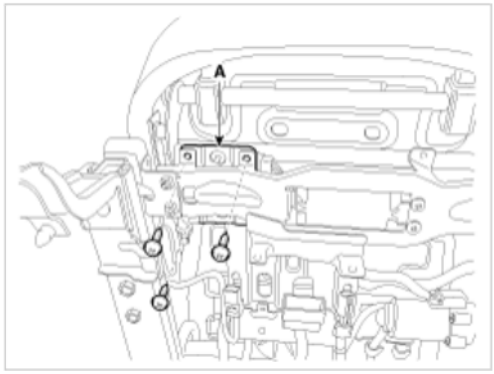
4. Remove the back blower (A) after loosening the mounting screws.



Air Ventilation Unit

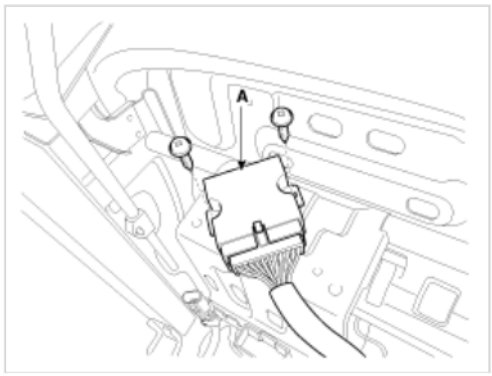
1. Remove the front seat assembly.
   (Refer to Body - "Front Seat Assembly")
2. Remove the air ventilation unit (A) after loosening the screws and disconnecting the connector.

[Drive's Side]



[Passenger's Side]

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Installation

Cushion Blower

1. Install the cushion blower.
2. Install the front seat assembly.

Back Blower

1. Install the back blower.
2. Install the front seat back cover.
3. Install the front seat assembly.

Air Ventilation Unit

1. Install the air ventilation unit.
2. Install the front seat assembly.

Specification

Smart Key Unit

Items	Specification
Rated voltage	DC 12V
Operating voltage	DC 9 ~ 16V
Operating temperature	-30°C ~ 75°C (-22°F ~ 167°F)
Dark current	Max. 4mA (When welcome light function off)
Frequency	433 Mhz

Smart Key FOB

Items	Specification
Battery	Lithium battery 3V 1EA
Distance	30m
Battery life	More than 2 years **⚠WARNING** An inappropriately disposed battery can be harmful to the environment and human health. Dispose the battery according to your local law(s) or regulation.
Push buttons	4 (Door lock / unlock, Trunk lid, Panic)
Frequency(Rx)	134.2 kHz
Frequency(Tx)	433.92 MHz
Numbers	2EA

Antenna

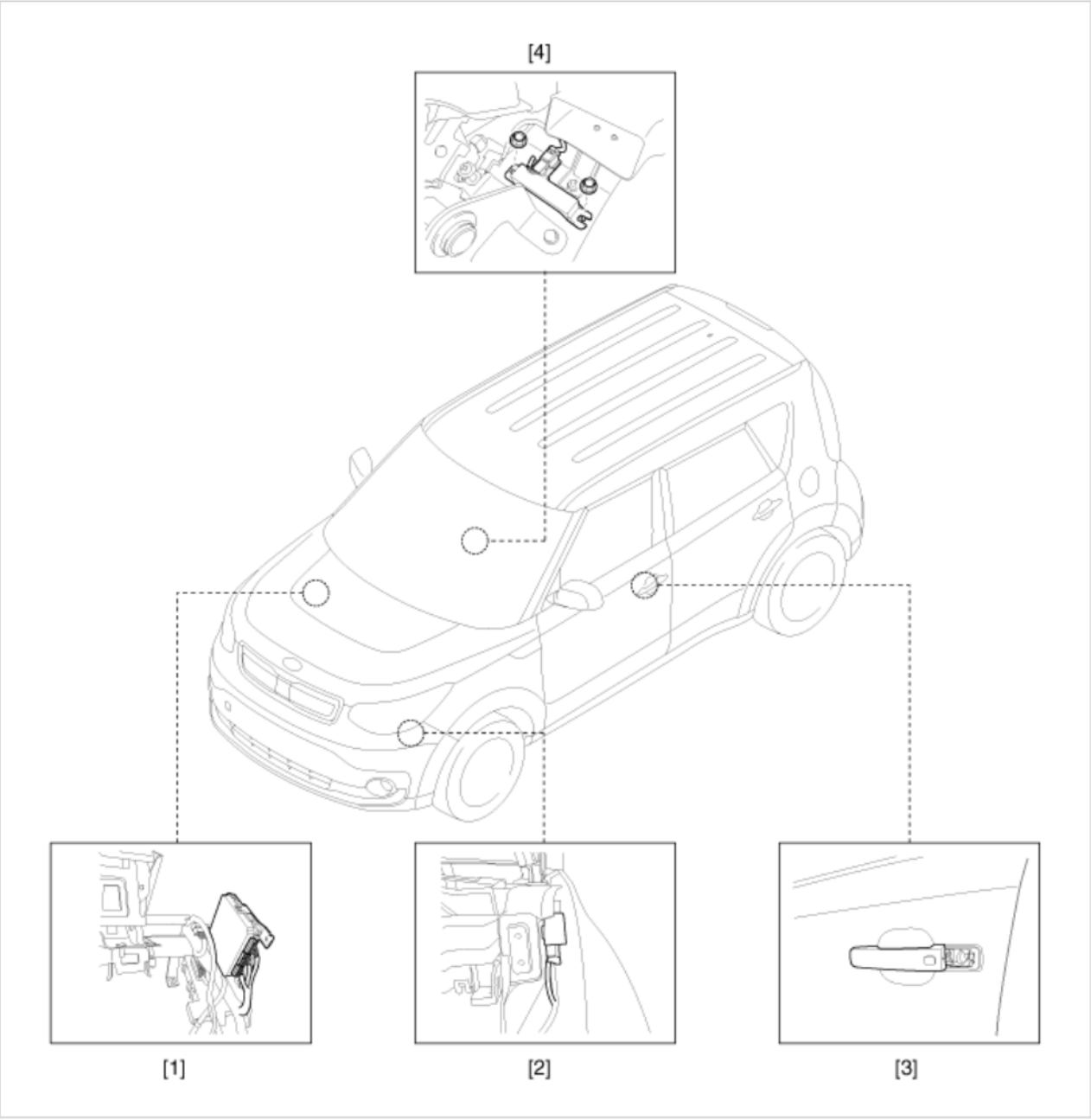
Items	Specification
Rated voltage	DC 12V
Operating voltage	DC 9 ~ 16V

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Operating temperature	-30°C ~ 80°C (-22°F ~ 176°F)
Frequency	134.2 kHz
Numbers	Interior(1EA), Door(2EA), Trunk(1EA), Bumper(1EA)

Body Electrical System

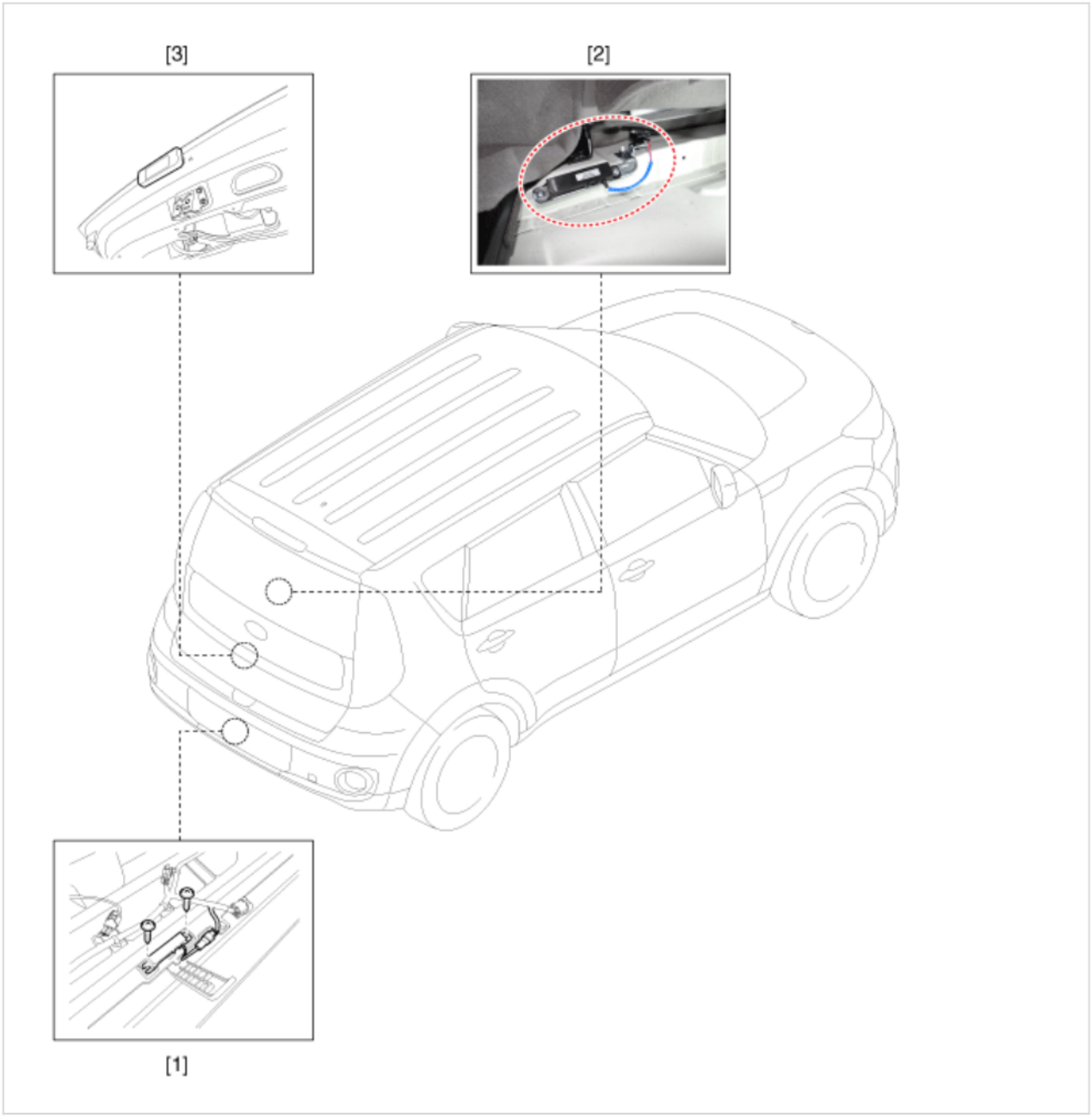
Component Location (1)



1. Smart key unit	3. Door outside handle
2. External buzzer	4. Interior antenna 1

Component Location (2)

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1. Bumper antenna 2. Interior antenna 2	3. Trunk lid open switch

Body Electrical System

Description

The SMART KEY system is a system that allows the user to access and operate a vehicle in a very convenient way. To access the vehicle, no traditional key or remote control unit is needed.

The user carries a SMART KEY FOB which does not require any conscious actions by the user (e.g. operate a RKE button). The SMART KEY system is triggered by pressing a push button in the door handle.

After being triggered the vehicle sends out a request in a limited range. If the SMART KEY FOB receives this request, it automatically sends a response to the vehicle. Then the system decides whether to perform a particular action (unlocking, locking…) or remain inactive.

Again, a communication between the vehicle and the SMART KEY FOB is needed before any actions will be performed.

The System offers the following features :

- Passive unlock via door driver side and passenger side
- Passive locking via door driver side and passenger side
- Passive start

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- Passive access trunk via the trunk lid switch at the trunk
- Passive locking via tailgate
- Max. 2 fobs can be handled by the system
- Immobilizer backup antenna integrated into SSB for TP authentication (i.e. limp home mode)
- Communication with engine management system
- LF-RF communication

1. Passive unlock
   The system allows the user to access (unlock) the vehicle without performing any actions with the SMART KEY FOB. This feature could be different depending on platform as follows:
   A. Pressing Push button in door handle
2. Passive locking
   The system allows the user to lock the vehicle by pushing a button on door handle with the SMART KEY FOB.
3. Button start
   The system allows to switch the power modes (Off, Accessory, Ignition), as well as to start and stop the vehicle's engine without performing any actions with the SMART KEY FOB. See Button Engine Start system specification.
4. LIMP HOME Mode
   Additionally, the system offers so called "limp home mode", which is the user can operate all vehicle functions by pushing the key into the SSB.

Smart Key ECU (SMK ECU)

The SMK ECU manages all functions related to "Passive Unlock", "Passive Lock" and "Passive Authorization for Engine Start Operation".
It reads the inputs (Push button in door handle, Start Stop Button (SSB), PARK position Switch), controls the outputs (e.g. exterior and interior antennas), and communicates via the CAN (depends on the vehicle) as well as a single line interface to further devices of the car.
For communication with the SMART KEY FOB, SMK ECU generates a request (challenge) as an encoded and modulated 134.2 kHz signal at the inductive antenna outputs and receives the SMART KEY FOB's response via the external RF receiver.
The main functional blocks of the SMK ECU are:

- Power supply
- Microcontroller with FLASH Memory
- Single Line Interface to EMS
- Input stage
- LF antenna amplifier/driver
- CAN communication with BCM

The LF antenna amplifier/driver generates a 134.2 kHz sinusoidal carrier signal which is distributed to the different antennas.

Smart Key FOB

The system supports up to 2 SMART KEY FOBs.
The main functions of the SMART KEY FOB are:

- Passive functionality: receives LF-challenge and sends automatically RF response.
- Classic RKE function by action up to 3 push buttons.
- Transponder-functionality in case of a flat battery or a disturbed communication.
- LED for operation feedback and battery monitoring.

NOTICE

The FOB's LED indicator may continue to light even with a low transmitter battery.
If the performance or range of the FOB is less than expected, check the transmitter battery.

Antennas

1. Emitting LF Antennas:
   Inductive antennas in and at the vehicle are used to transform the current, driven by the SMK ECU antenna driver, into a 134.2 kHz magnetic field, which is the carrier for the SMART KEY challenge.
   Three antennas cover the vehicle's exterior: two antennas in the Door Handles (DS and PS) cover the area around the doors; one antenna in the rear bumper covers the area around the trunk.
   Up to two antennas cover the vehicle's interior and the trunk interior: one in the passenger compartment and one in the trunk.
2. Bidirectional Immobilizer Antenna (for Limp Home):
   The Immobilizer Backup Antenna is used for sending and receiving data: it emits a magnetic field (134.2 kHz challenge) and receives changes in the field strength (response of Transponder).

Door Handle

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The front door handles of the two doors (driver door / passenger door) are equipped with emitting LF-antennas to emit the 134.2 kHz signals. The front door handles are also equipped with a push button.

Push Button

The push button in door handle serves as a trigger to indicate the user's intent to unlock or lock the vehicle.

The push buttons are installed at front doors, integrated into the door handles.

Another button is installed at the trunk lid.

Operation

Passive Functions

The system allows the user to access the vehicle without having to perform any actions (e.g. RKE button pressing) with the SMART KEY FOB. It is sufficient that a valid SMART KEY FOB is located within a defined and limited range with respect to the vehicle. So the system is capable of detecting and authenticating a SMART KEY FOB in the ranges as specified below.

Operating Range

The SMART KEY FOB receives and interprets a challenge sent from the vehicle via the exterior antennas in a free space range of min. 0.7m measured around the exterior antennas which are integrated in the door handles. The trunk access range is also min. 0.7m measured from the antenna position.

Passive Access (Passive Entry)

Pressing one of the push buttons in the door handles when all doors locked indicates the operator's intent to access the vehicle and thus triggers the system for unlock

Passive Locking (Exit)

Pressing one of the push buttons in the door handles when one of the following condition is fulfilled:

- All door is closed and at least one door is unlocked.

indicates the operator's intent to lock the vehicle and thus triggers the system for a lock.

Passive Open Trunk

Pressing the Trunk Lid Switch when trunk is closed indicates the operator's intent to open the trunk and thus triggers the system. Subsequently, the SMK ECU sends a LF-challenge to the SMART KEY FOB via the exterior bumper antenna. The SMART KEY FOB answers with a RF-response. If the received response matches the expected answer, SMK ECU sends a "trunk open" message via the CAN network.

Passive Trunk Warning

Whenever the trunk is closed, SMK ECU uses a suitable search strategy to avoid trunk buzzer warning by a fob inside the vehicle. Then SMK searches for a SMART KEY FOB in the interior of the trunk. If a valid SMART KEY FOB is found in the trunk, the SMK ECU activates SMK external buzzer (TBD) to inform the user that the trunk has been closed with a fob inside the trunk.

SMK will send the trunk open command to BCM for trunk reopening if trunk reopening bit is set(BK)For this functionality, a "valid" SMART KEY FOB means any SMART KEY FOB that belongs to the vehicle, even if it's DEACTIVATED.

NOTICE

- A blind spot in the trunk similar to any RF disturbance may lead to no trunk warning. Due to the penetration of the bumper antenna into the trunk area the lid may open without an Identification Device outside.

Smart Key Reminder 1

1. Preconditions:
   All terminals OFF & at least one door open & locking status is not locked checked by SMK periodically every 100ms, as long as CAN/LIN active.
2. Event:
   At least 1 door knob status changed from unlock to lock.
3. SMK actions:
   A. IF NO FOB-IN ACTIVE
      SMK performs a search for the fobs in the interior of the vehicle. The same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication)
   B. IF FOB-IN ACTIVE
      SMK searches valid TP

   If no fob or no TP has been found, no action is required.

   If any valid fob or valid TP has been found, SMK unlocks the vehicle by sending a CAN Key Reminder unlock message with the fob number.

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If any valid fob has been found, SMK unlocks the vehicle by sending a CAN/LIN Key Reminder unlock message with the fob number.

Smart Key Reminder 2

1. Preconditions:
   All terminals OFF & any door (including trunk) open & no FOB-IN & no locking status (checked by SMK periodically every 100ms, as long as CAN/LIN active)
2. Vehicle action:
   Closing last door or trunk with knobs locked state, or with a locking in progress
3. SMK actions:
   Before elapsing 500ms after the closing if all doors are locked then:
   A. IF NO FOB-IN ACTIVE
      SMK performs a search for the fobs in the interior of the vehicle.
      The same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication)
   B. IF FOB-IN ACTIVE
      SMK searches valid TP
   If no fob has been found, no action is required.
   If any valid fob or valid TP has been found, SMK sends unlock command via CAN and activates ext. buzzer warning.
   If any valid fob has been found, SMK sends unlock command via CAN/LIN and activates ext. buzzer warning.

Smart Key Door Lock Warning

Door Lock Warning 1

1. Preconditions:
   While (at least one door knob is unlocked) & (ACC ON or IGN ON) & (No FOB-IN) :
   A. (All doors are closed) & (trunk closed)
2. Event:
   A. User presses the push button in door handle or trunk
3. SMK actions:
   SMK performs a search for the fobs outside of the vehicle; the same LF-strategy has to be used as it is defined for "Scenario Access with I/O Distinction".

Door Lock Warning 2

1. Preconditions:
   Same as passive locking precondition but with at least one door open.
2. Event:
   User presses the door handle Push button .
3. SMK actions:
   SMK performs a search for the fobs outside of the vehicle; the same LF-strategy has to be used as it is defined for "Scenario Access with I/O Distinction".
   If no fob has been found, no action is required.
   If the preconditions are no longer valid during buzzer active time (3 seconds), the SMK ECU stops the buzzer immediately.

Door Lock Warning 3

1. Preconditions:
   Same as passive locking precondition
2. User action:
   A. User presses the door handle Push button
3. SMK ECU actions:
   A. If ATWS(Anti Theft Warning System) is in DISARM status, SMK ECU performs a search for the fob inside of the vehicle (use "Door Lock Warning 3" scenario)

If no fob has been found, the passive locking is performed.
If any valid fob has been found, SMK ECU activates the external buzzer.
If the activity timer elapsed or ACC ON or IGN1 ON or NOT All door closed or FOB-IN, the SMK ECU stops the buzzer immediately.
After searching of inside fob, SMK ECU also performs a search for fobs outside of the vehicle.

Smart Key Lamp Warning

1. SMK actions:

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As long as the preconditions are valid, the SMK ECU performs a periodical search for the fobs in the interior of the vehicle; the same LF-strategy has to be used as it is defined for the ID out warning (registering only, no authentication); periodical means, the search is done every 3 seconds.

If no fob has been found, the SMK ECU starts Key out indicator lamp activation as all preconditions are valid and will perform another search 3 seconds later.

If any valid fob has been found, the SMK ECU stops the Key out indicator lamp and will (if one door is open) perform another search 3 seconds later; if no door is open then it's only at the next When the preconditions are still valid, the search resumes by opening of one door.

Failsafe Functions (Backup For Limp Home)

In case of a discharged battery of the SMART KEY FOB or disturbed transmission, the following functions are available:

- Unlocking / locking of doors or trunk (or tailgate depending of the vehicle configuration): use of mechanical key

User Information Functions

ID OUT Warning

1. Preconditions:
   A. (ACC or IGN1) & (any door open or trunk open)
2. Event:
   The last opened door is closed
3. SMK action:
   SMK searches for a SMART KEY FOB in the interior.
   A. If no valid SMART KEY FOB is found, the SMK activates external buzzer and also sends ID OUT warning via CAN (exterior buzzer warning and internal buzzer warning).
   B. If a door is opened and closed again during terminals on and inside valid fob, SMK re-enables the authentication and stops the warning. If the terminal is in ACC, SMK shall turn on immobilizer lamp.

NOTICE

If there is a LF error (LF overheating or LF antenna failure), the system will have the same behavior as it is with no fob found.

Immobilizer Lamp

Removing the PIF from the MSL and reinserting the PIF and pushing the MSL Knob will switch the lamp on again.

Fob Battery Low Voltage Detection

To detect fob low battery condition, certain battery voltage measurement and low voltage detection strategy are implemented into fob. The measurement of the battery voltage will be done if fob button is pressed or if a LF measurement command is received.

If the fob has detected a low battery voltage, the LED will not be switched on at button press.

Learning Description

In this chapter, the learning procedure for SMK, FOBs is described.

For the learning of the SMK, FOBs, it's necessary to have a connection to the diagnostic tool.

Learning MODE

Whatever the mode, the learning procedures are managed by the SMK.

Prior to start learning service, Fob-In signal must be active and the vehicle secret code (called as PIN code) should be known.

Teaching MODE

This mode is used by the dealers in order to replace SMK and/or the set of keys, or to register additional keys for an existing system. That means the system already has been learnt with certain PIN Code. The PIN Code is fixed for the life time of the vehicle, therefore the same PIN Code must be used in this mode. Otherwise learning will be failed

Teaching MODE Procedure Description (Step By Step)

Objective: Key teaching procedure at service station

Initial state:

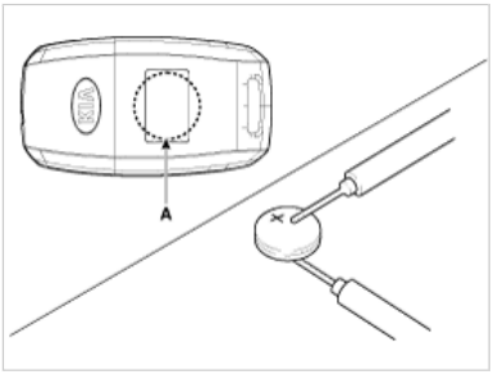
- SMK replacement: SMK is not learnt, SMART FOB are already learnt with same PIN code
- Additional or new keys teaching: SMK is already learnt with same PIN code

Inspection

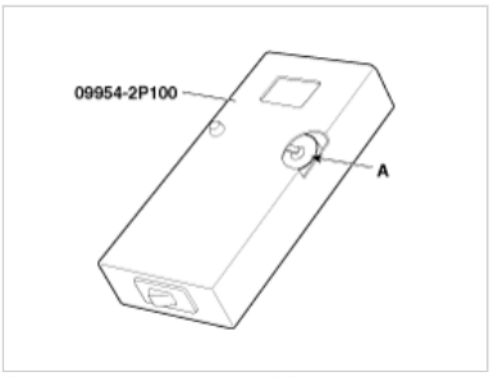
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1. Check that the red light flickers when the door lock or unlock button is pressed on the transmitter.
2. Remove the battery (A) and check voltage if the red light doesn't flicker.

Standard voltage :3V



3. Insert the battery (A) into the tester (09954-2P100).



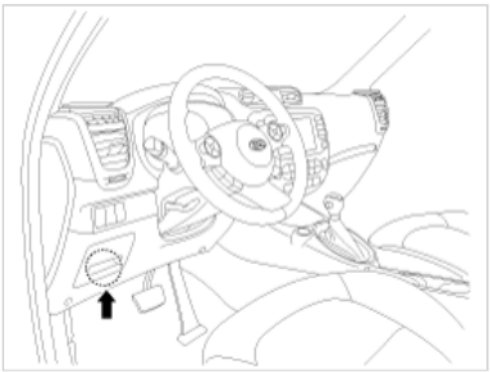
4. Push the test button and If "0.00" is displayed on screen, it means that the battery voltage is 2V or less.
5. If "L" is displayed on screen, it means that the battery is low power and it needs to replace.
6. To prevent the discharge of electricity, turn the tester power off.
7. Replace the transmitter battery with a new one, if voltage is low power then try to lock and unlock the doors with the transmitter by pressing the lock or unlock button five or six times.
8. If the doors lock and unlock, the transmitter is O.K, but if the doors don't lock and unlock, register the transmitter code, then try to lock and unlock the doors.
9. If the doors lock and unlock, the transmitter is O.K, but if the doors don't lock and unlock, replace the transmitter.

⚠WARNING

An inappropriately disposed battery can be harmful to the environment and human health.
Dispose the battery according to your local law(s) or regulation.

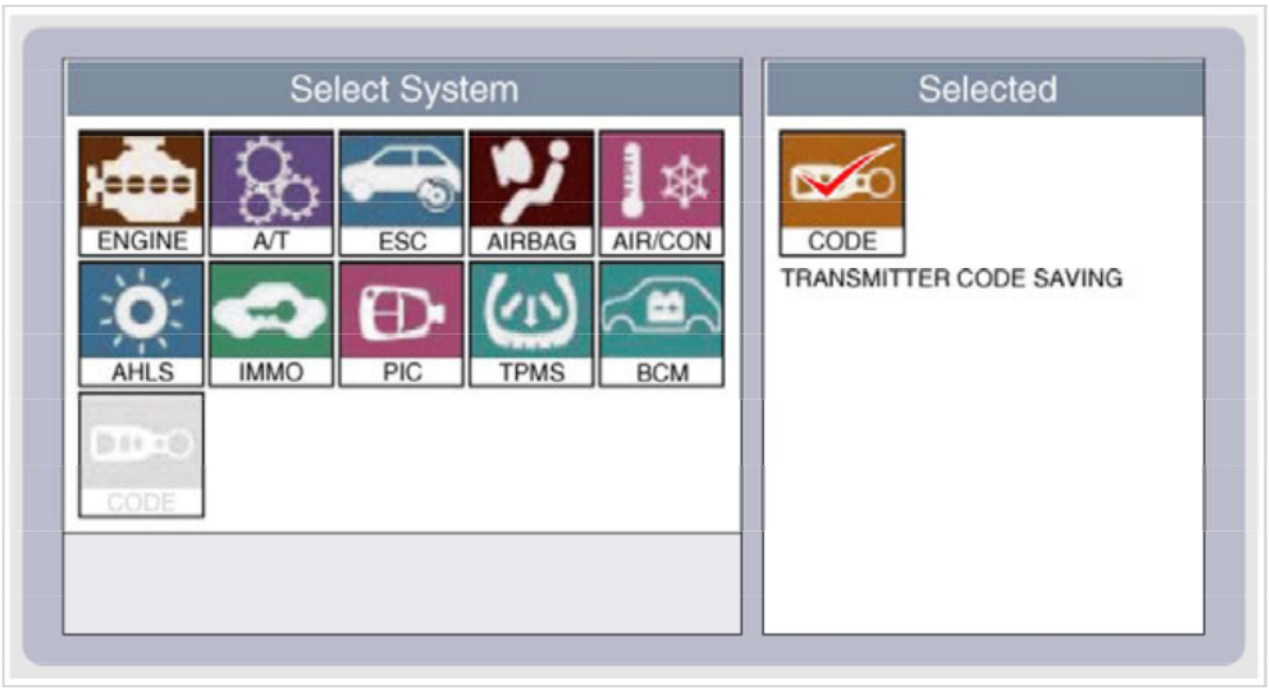
Smart Key Code Registration (Using GDS)

1. Connect the DLC cable of GDS to the data link connector (16 pins) in driver side crash pad lower panel, turn the power on GDS.

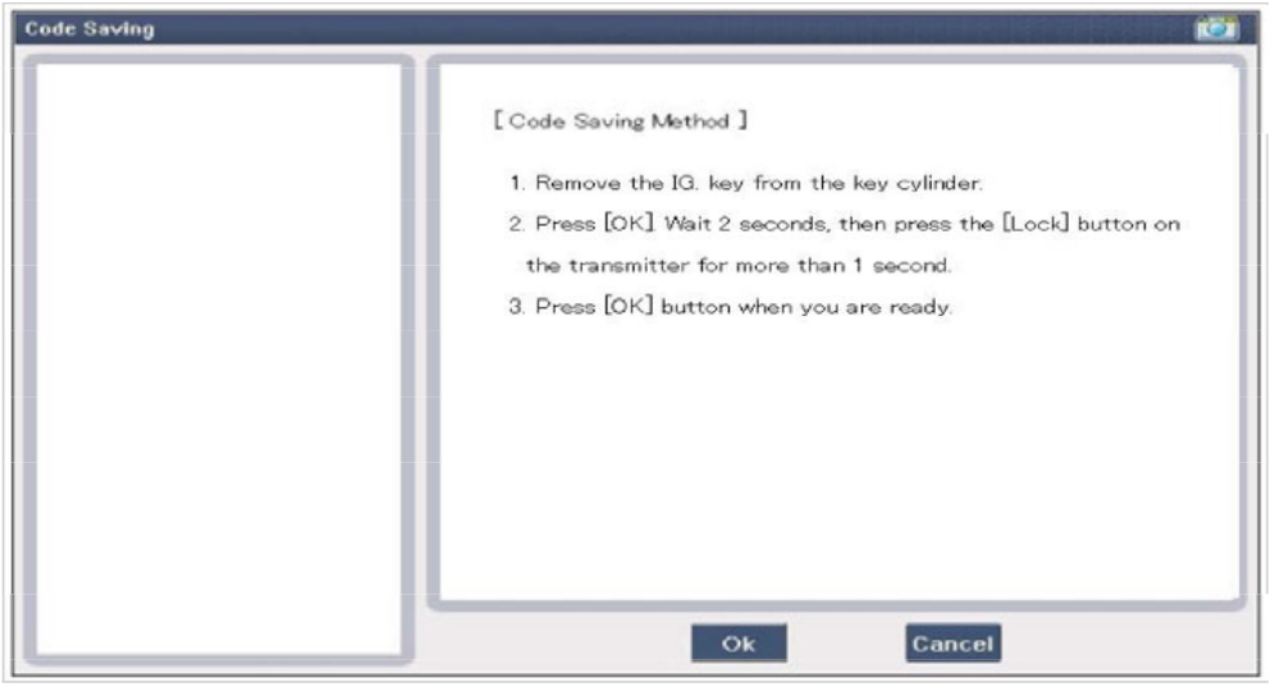


2. Select the vehicle model and then do "CODE SAVING"

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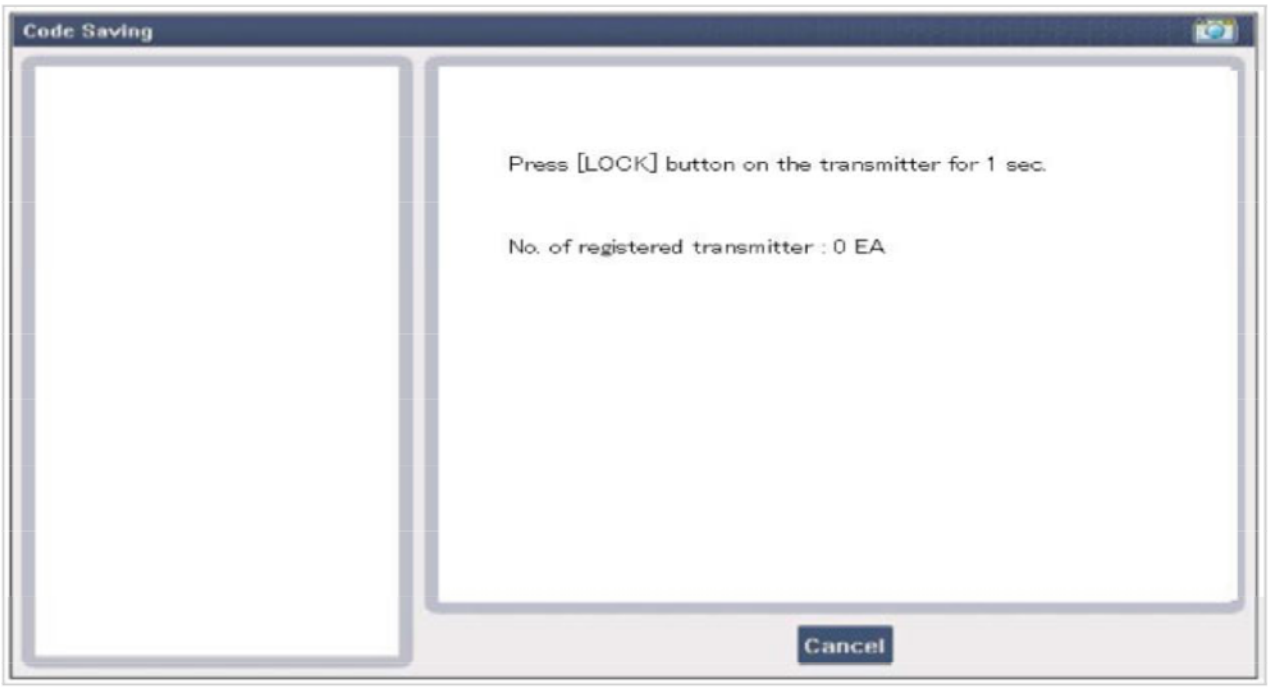


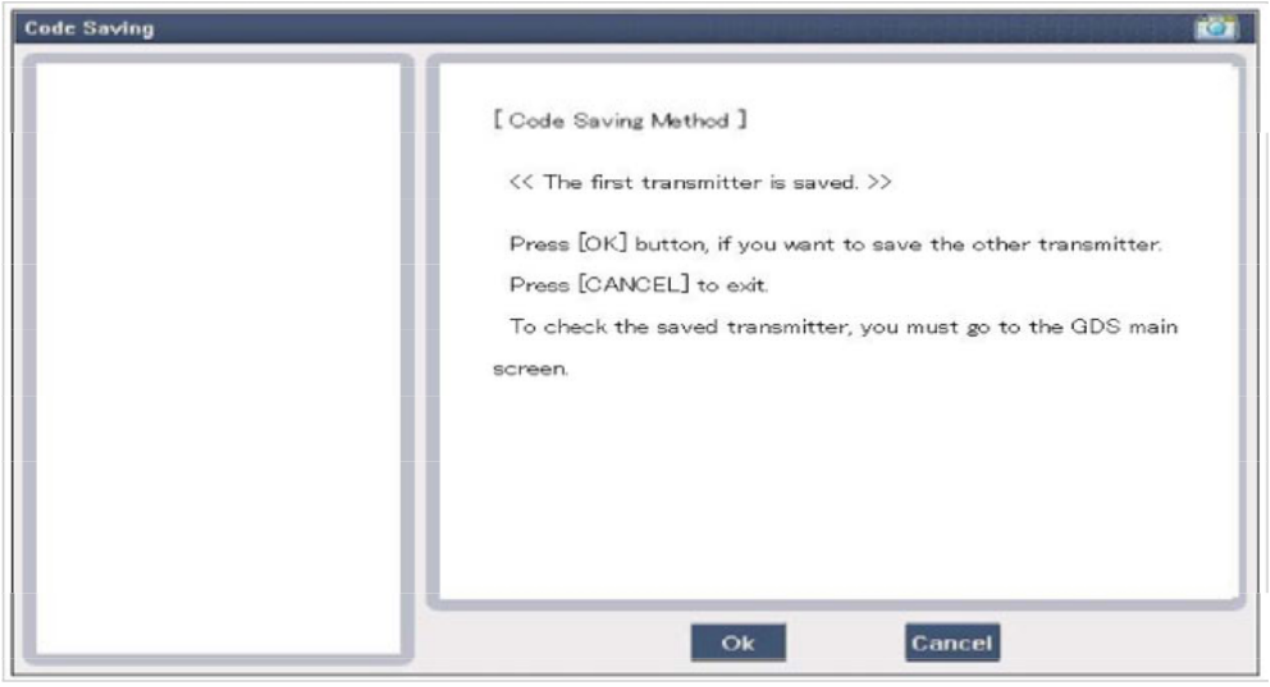
3. After selecting "CODE SAVING" menu, button "ENTER" key, then the screen will be shown as below.



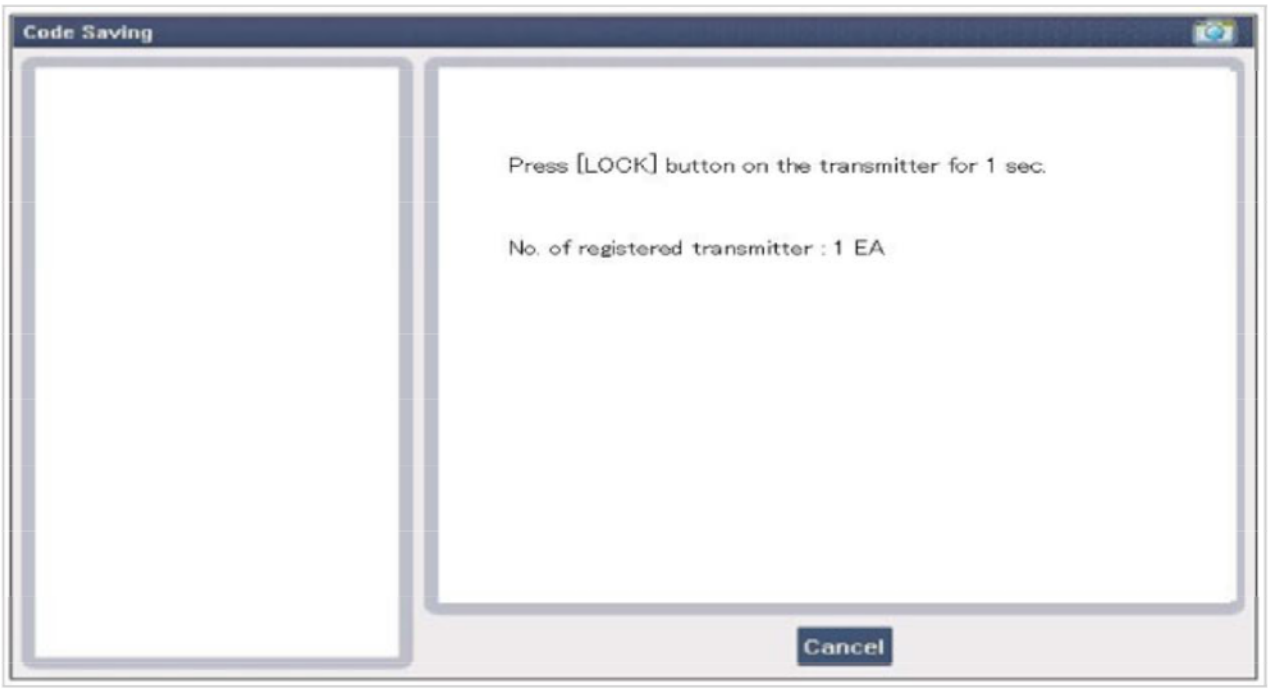
4. After pushing the SSB to "OFF", push "ENTER" key to proceed to the next mode for code saving. Follow steps 1 to 4 and then code saving is completed.

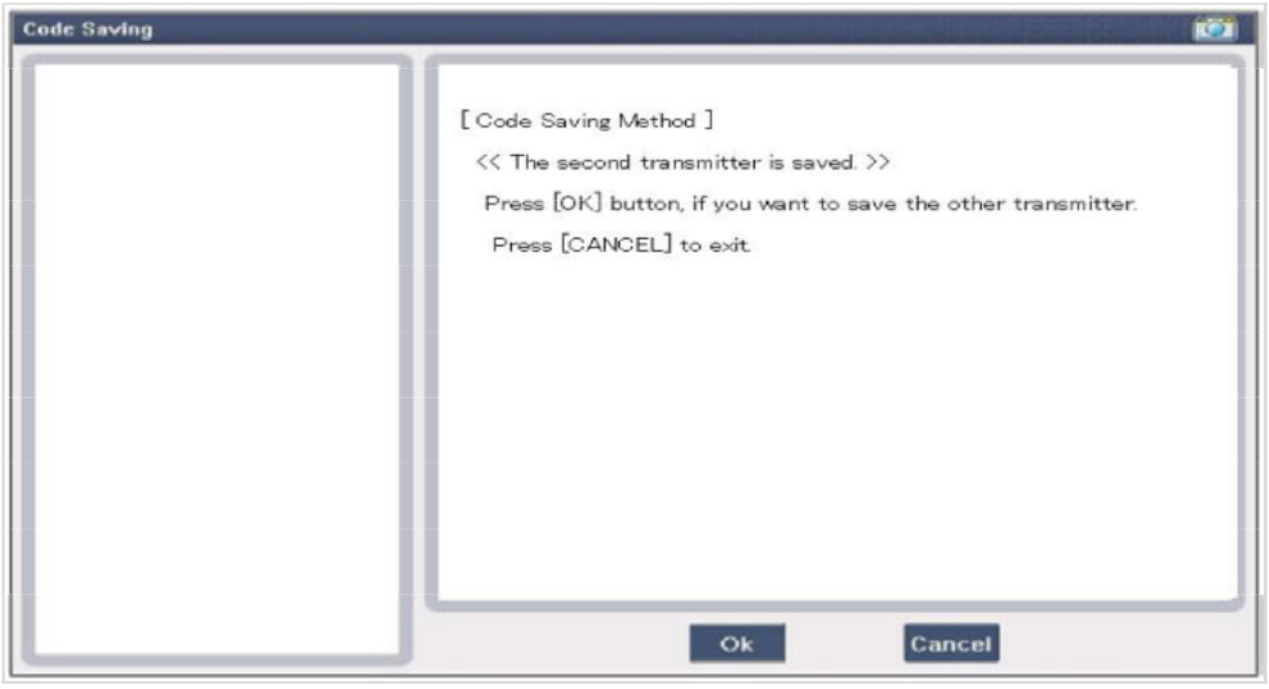
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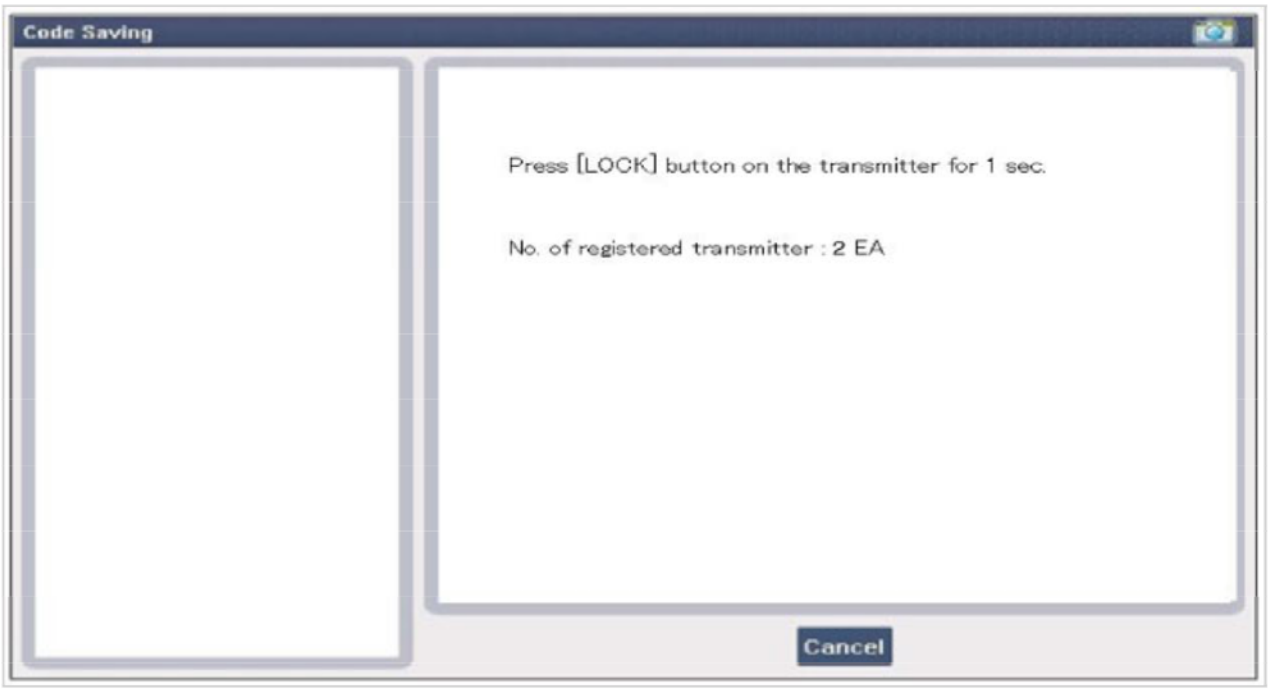


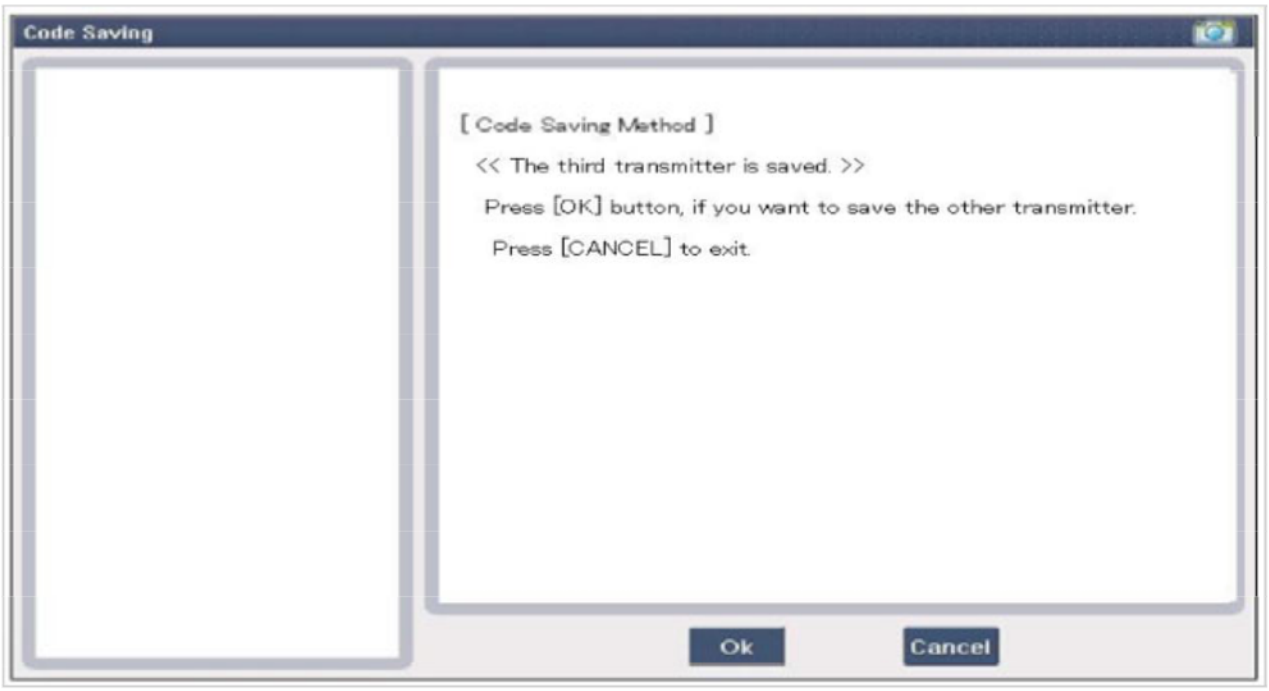
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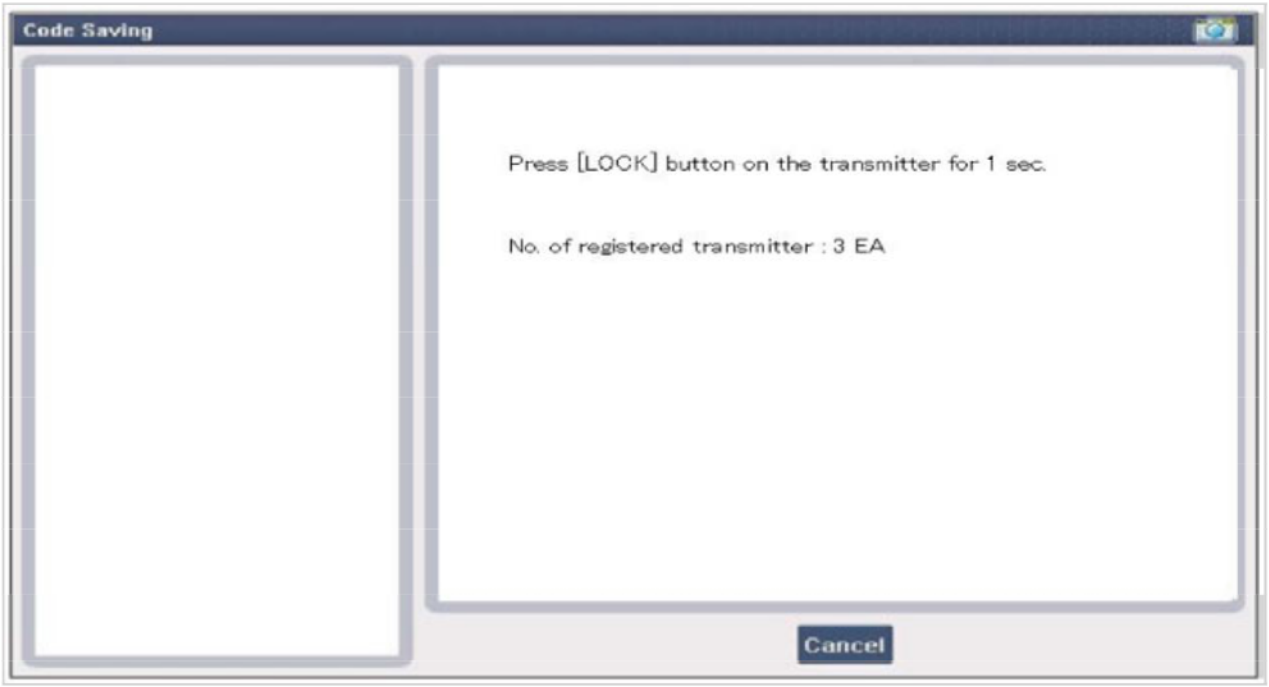


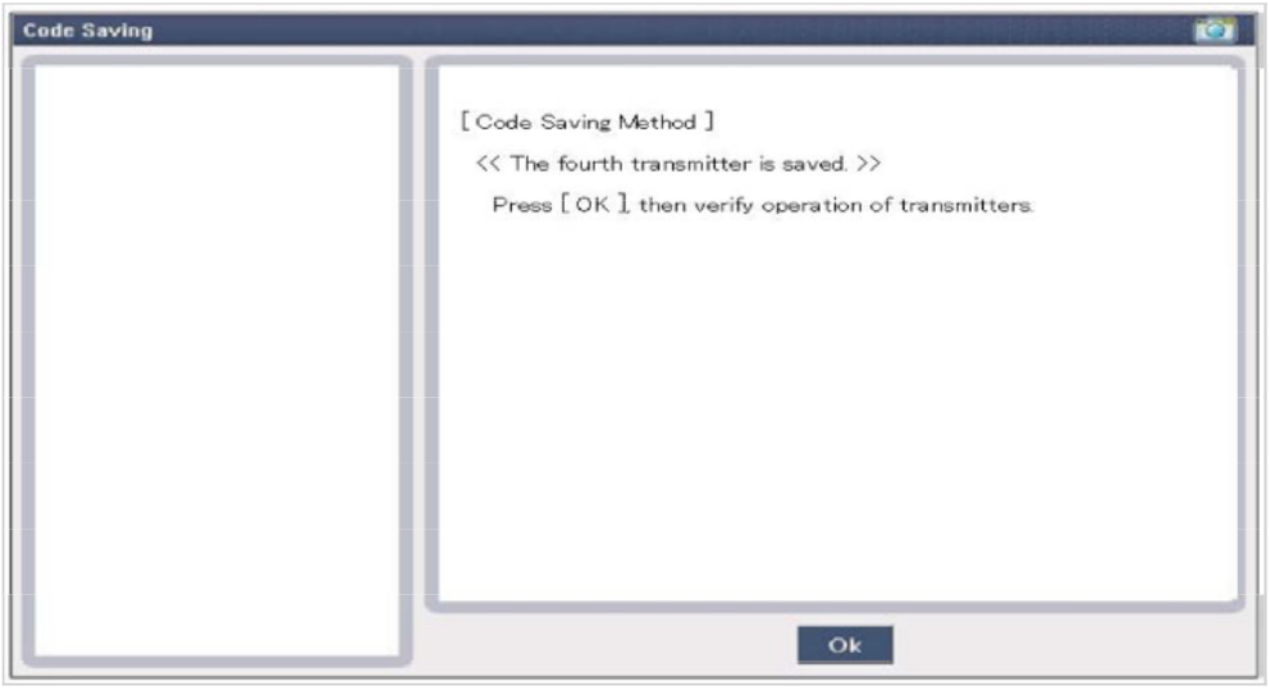
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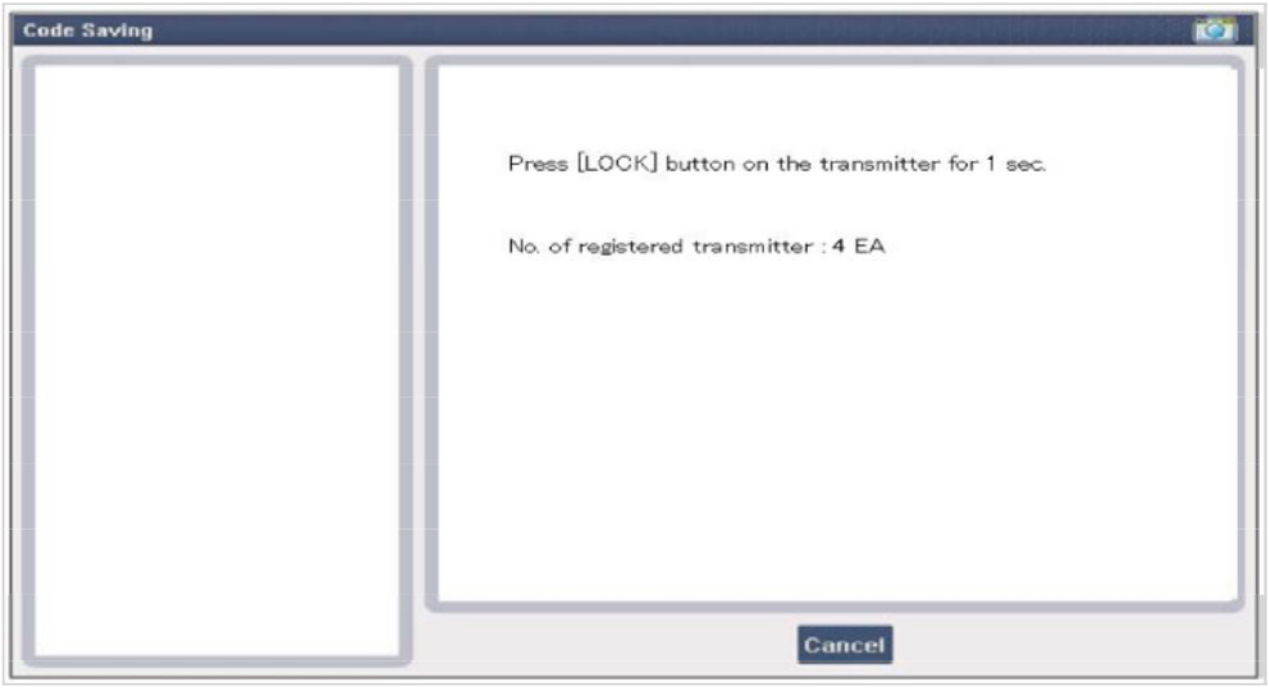


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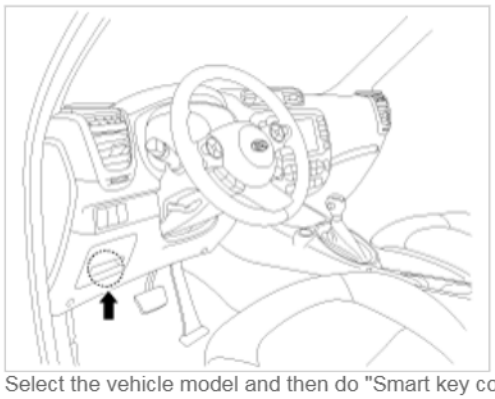


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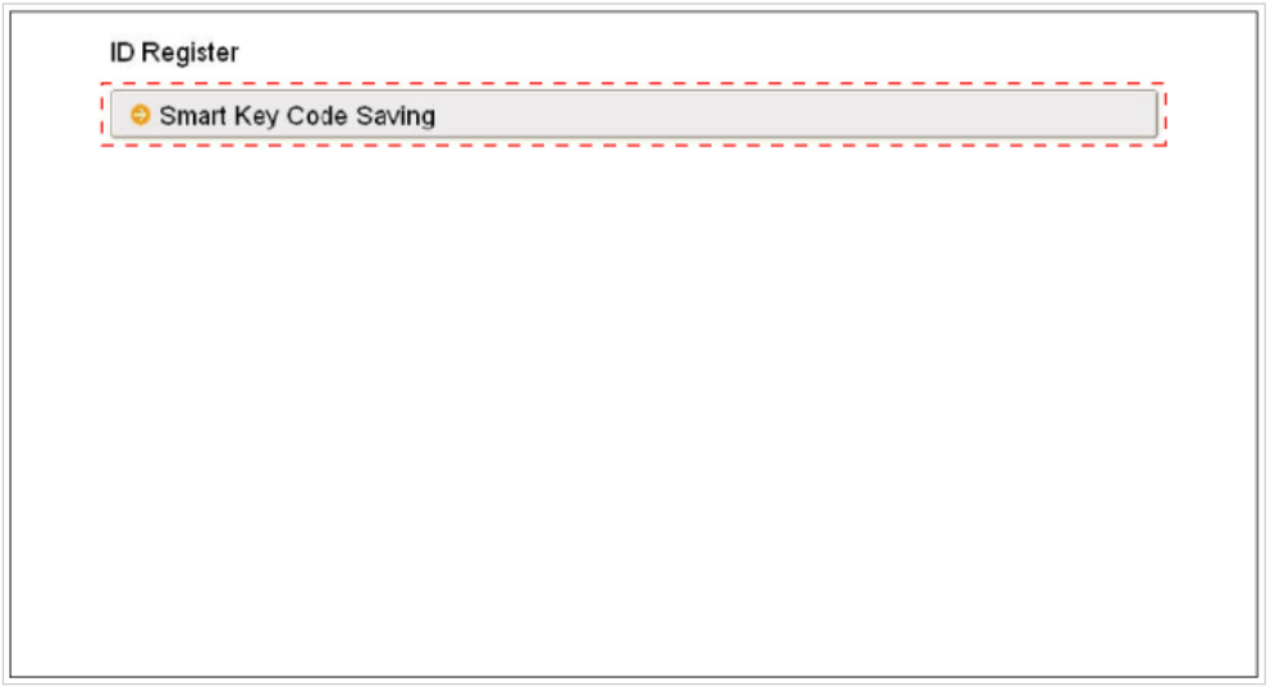
Smart Key Code Saving

1. Connect the DLC cable of GDS to the data link connector in driver side crash pad lower panel, turn the power on GDS.

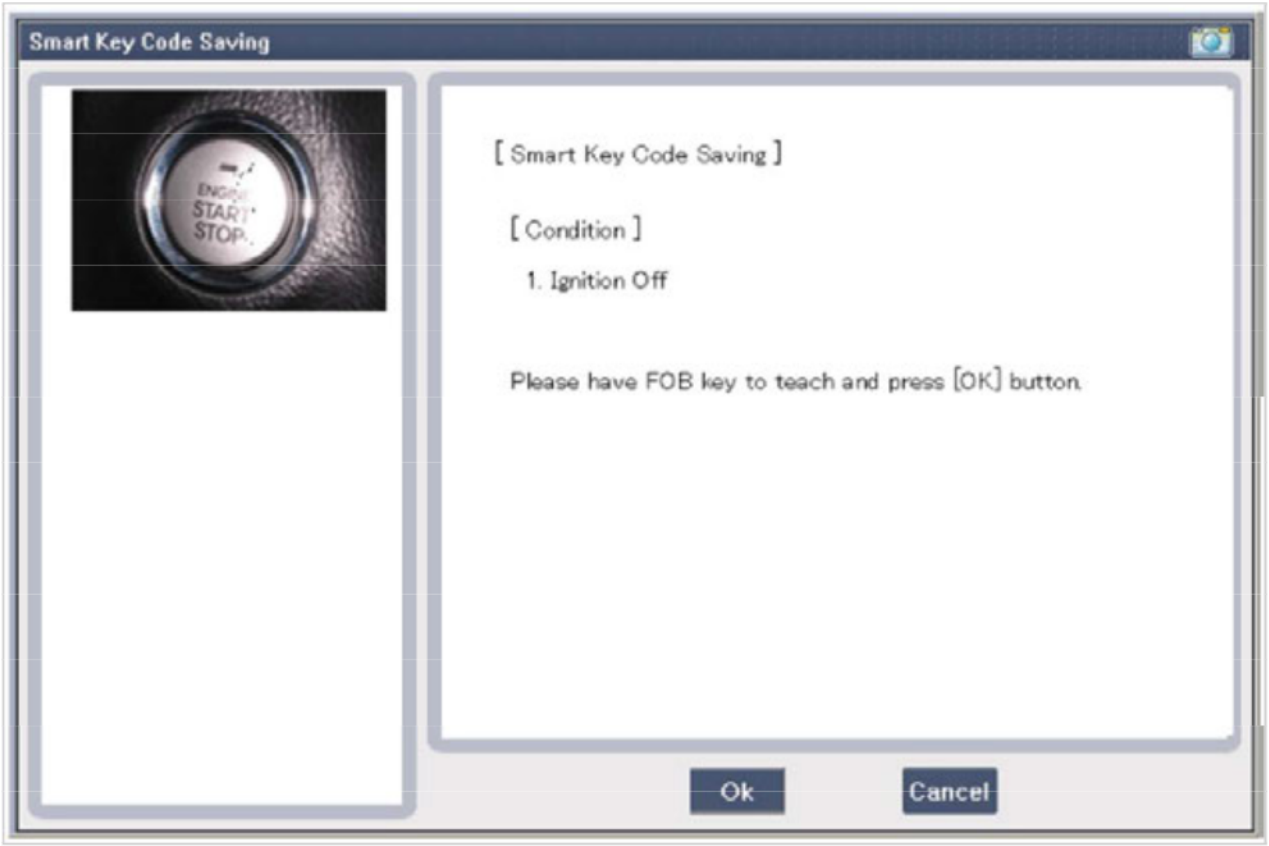


2. Select the vehicle model and then do "Smart key code saving".

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3. After selecting "Smart key teaching" menu, push "Enter" key, then the screen will be shown as below.



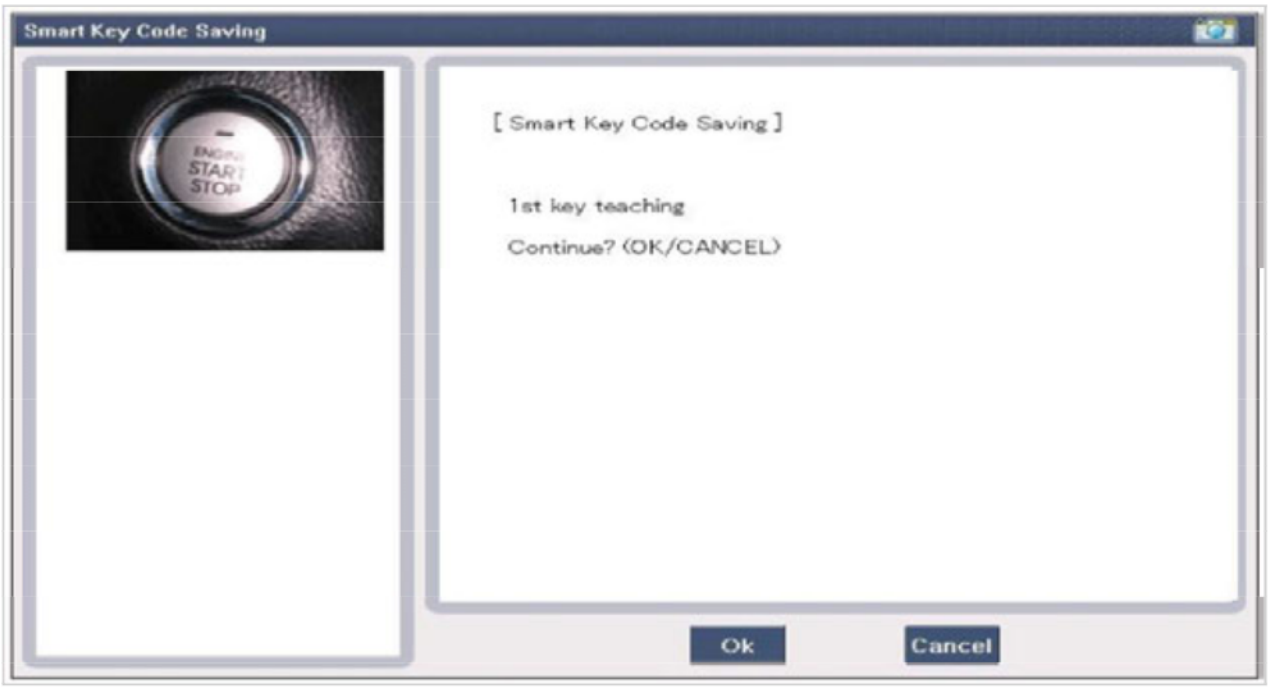
4. After pushing the SSB with the teaching key, press "OK" button.
5. Input the "Pin code" for first key teaching.

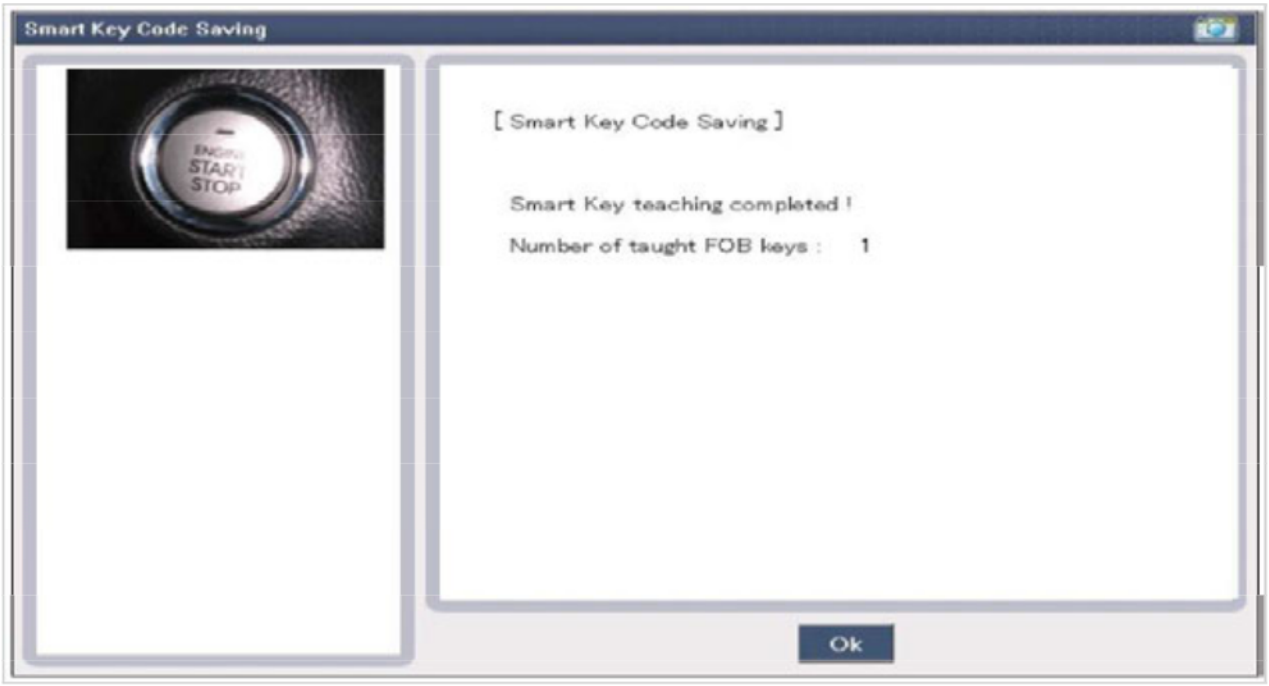
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6. Confirm the message "First key teaching completed".

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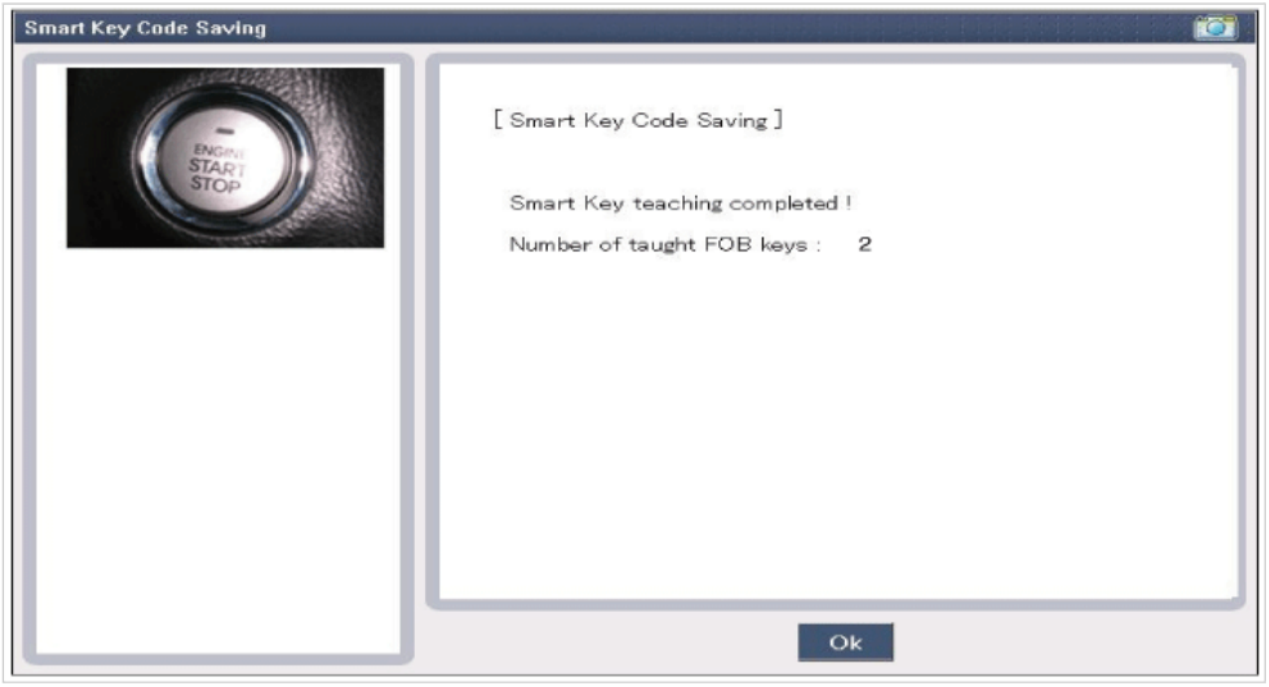


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7. Confirm the message "Second key teaching completed".

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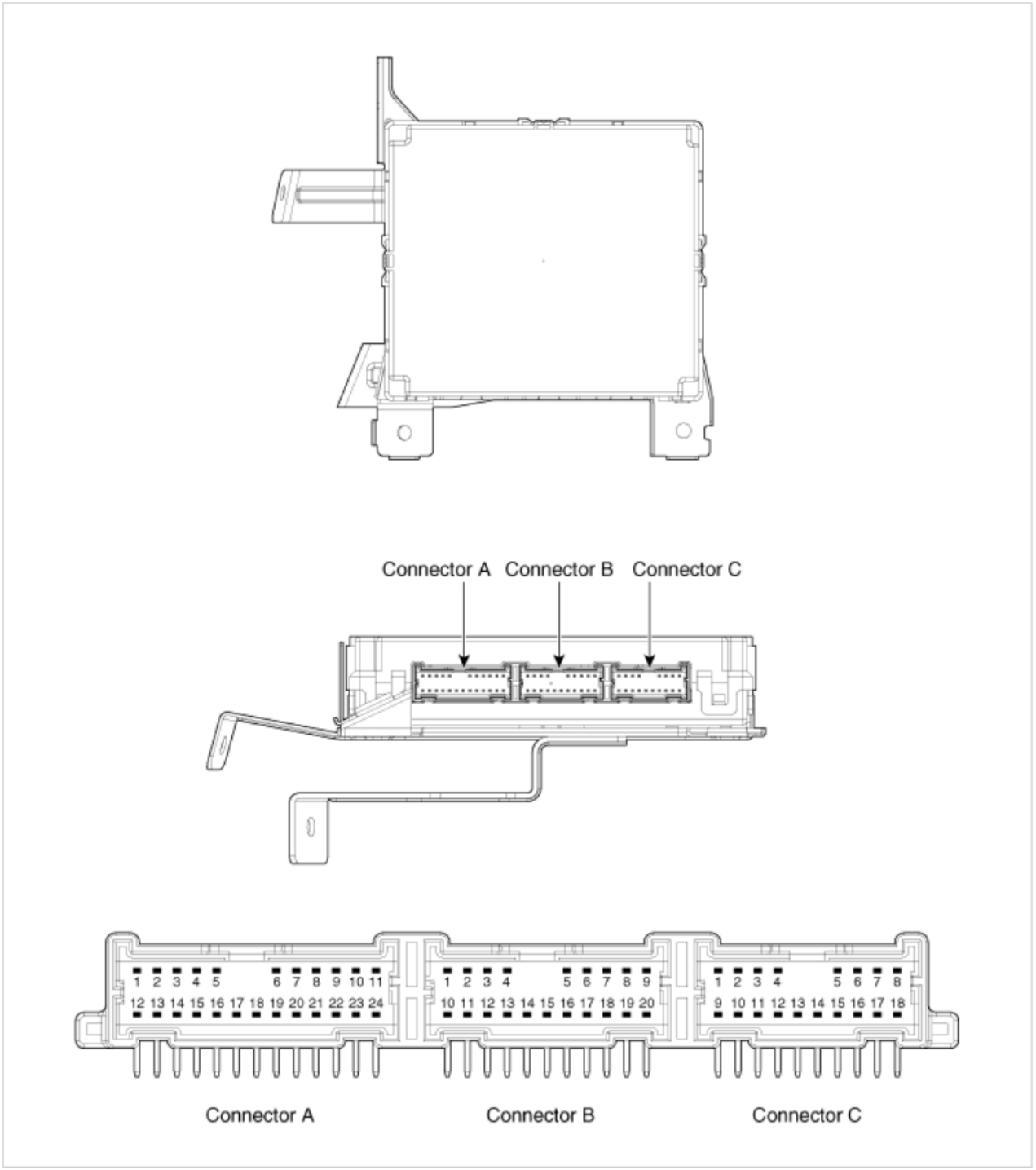


8. Then the screen will be shown as below when key teaching process is completed.

Body Electrical System

Component (1)

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Connector Pin Information

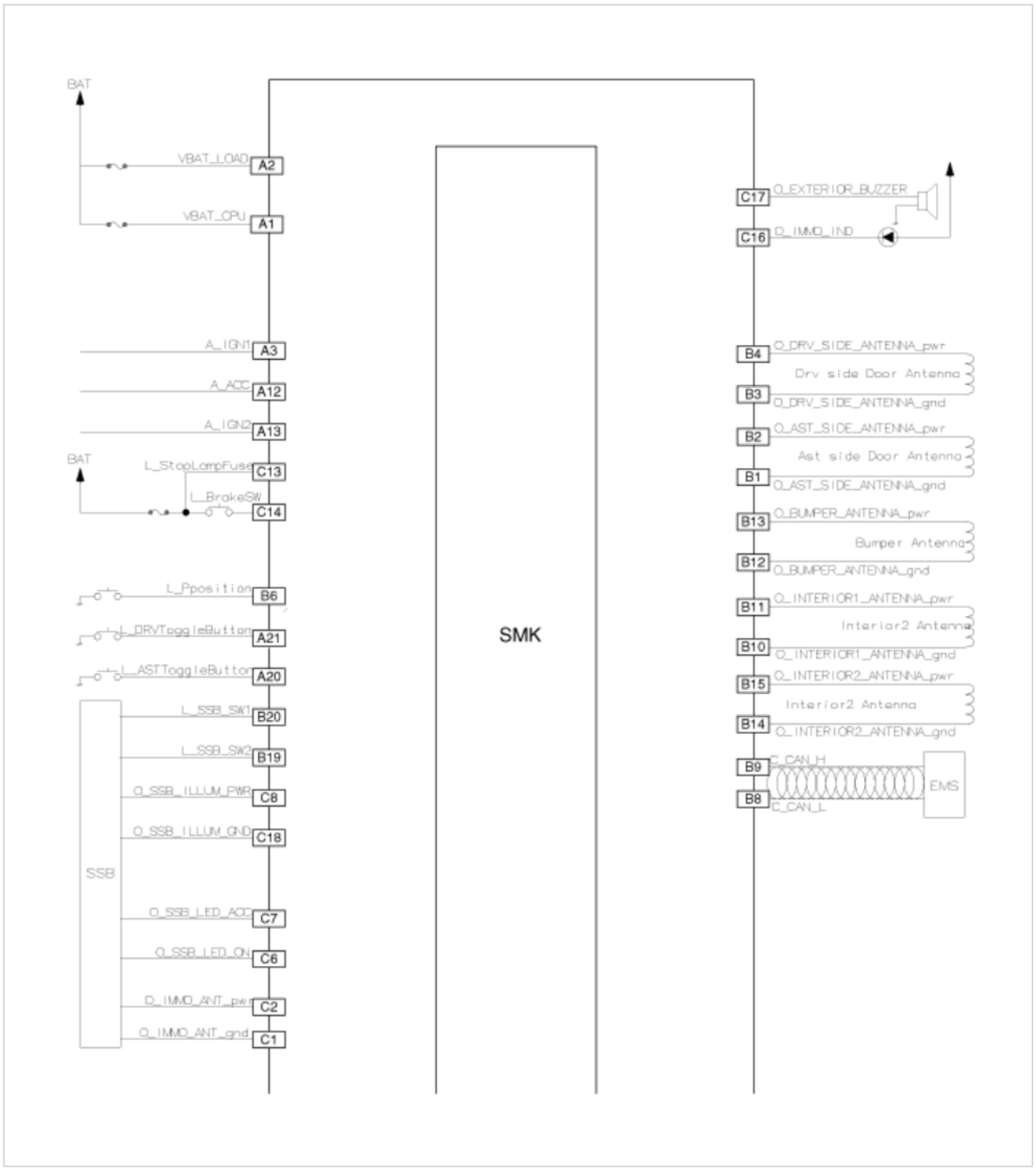
No.	Connector A	Connector B	Connector C
1	V_BAT CPU	Assistant side antenna ground	Immobilizer antenna ground
2	V_BAT Load	Assistant side antenna power	Immobilizer antenna power
3	Ignition 1	Driver side antenna ground	-
4	Ignition 2 relay	Driver side antenna power	-
5	Ignition 1 relay	Wheel speed	-
6	-	P position	SSB LED ON
7	-	-	SSB LED ACC
8	EMS COM	C CAN low	SSB illumination power
9	-	C CAN high	-
10	B CAN high	Interior 1 antenna ground	-

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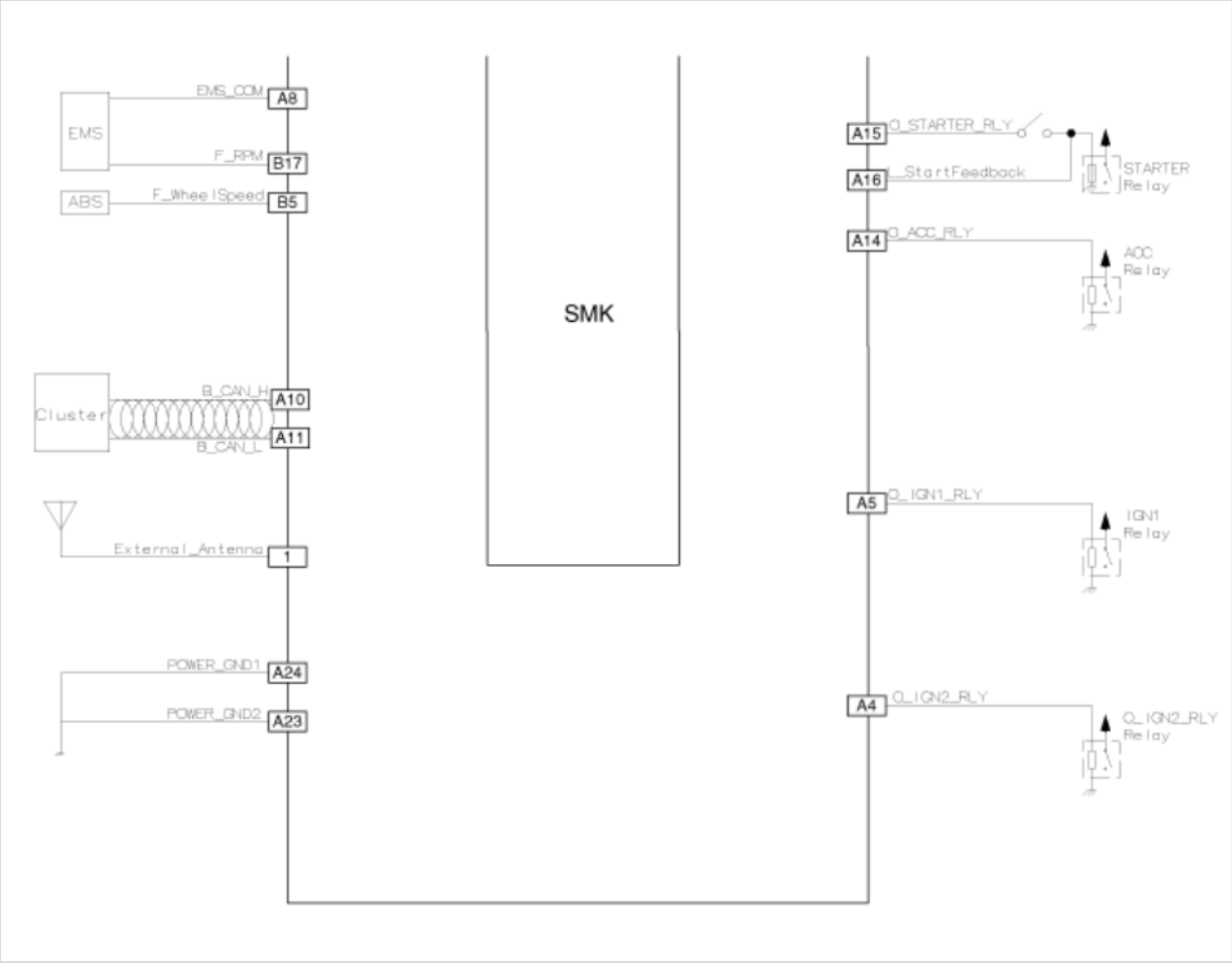
11	B CAN low	Interior 1 antenna power	-
12	ACC	Bumper antenna ground	-
13	Ignition 2	Bumper antenna power	Stop lamp fuse
14	ACC relay	Interior 2 antenna ground	Brake switch
15	Starter relay	Interior 2 antenna power	-
16	Start feedback	-	Immobilizer indicator
17	ESCL battery	RPM	Exterior buzzer
18	-	-	SSB illumination ground
19	-	SSB switch 2	
20	Assistant toggle button	SSB switch 1	
21	Driver toggle button		
22	-		
23	Power ground 2		
24	Power ground 1		

Circuit Diagram

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Body Electrical System

Inspection

Smart Key Unit

- Refer to Smart key System - "Smart key Diagnostic"

Smart Key Switch

- Refer to Smart key System - "Smart key Diagnostic"

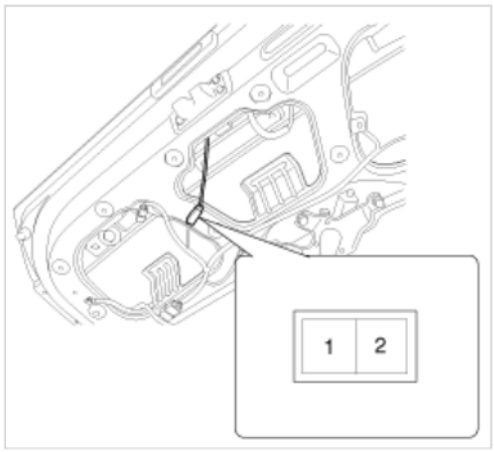
Antenna

- Refer to Smart key System - "Smart key Diagnostic"

Trunk Lid Open Switch

1. Check for continuity between the trunk lid open switch terminal.

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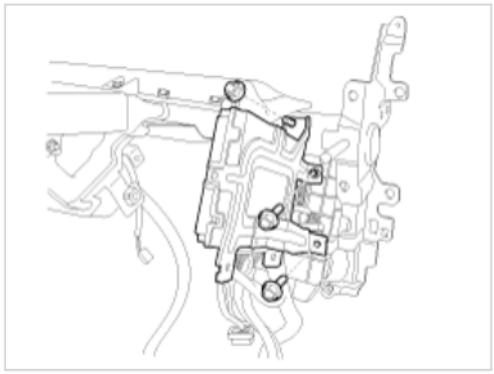
2. If continuity is not specified, inspect the switch.

Terminal / Position	1	2
OFF		
ON	○	○

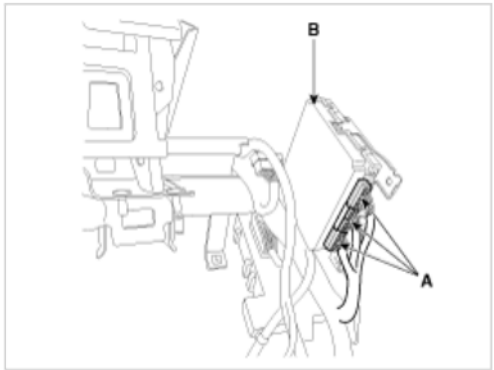
Removal

Smart Key Unit

1. Disconnect the negative (-) battery terminal.
2. Remove the main crash pad assembly.
   (Refer to Body - "Main Crash Pad Assembly")
3. Loosen the mounting bolts and nut from the smart key unit bracket.



4. Remove the smart key unit (B) after disconnecting the connector (A) from the smart key unit.



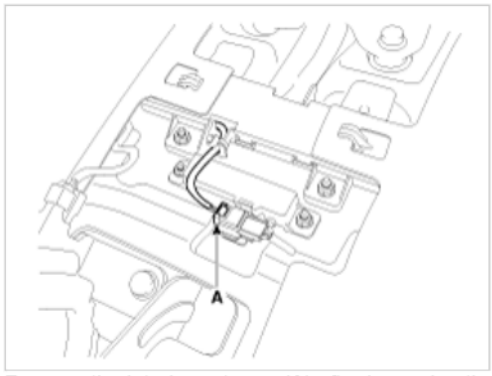
Interior Antenna 1

1. Disconnect the negative(-) battery terminal.
2. Remove the floor console assembly.

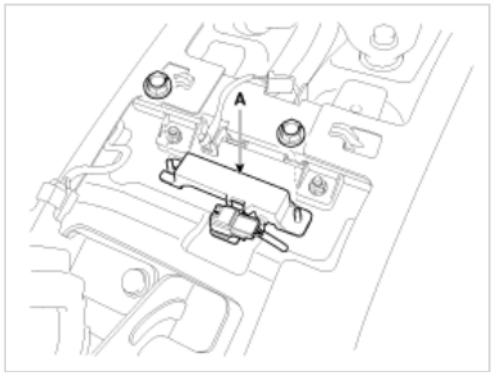
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(Refer to Body - "Floor Console Assembly")

3. Disconnect the connector (A) from the interior antenna.

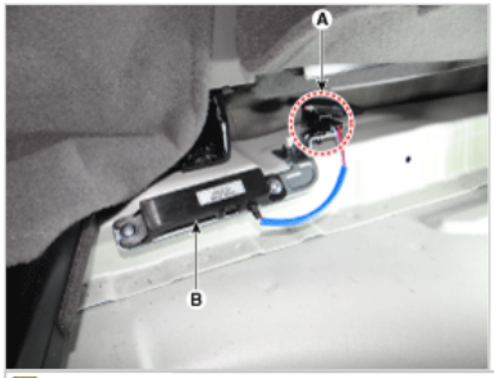


4. Remove the interior antenna (A) after loosening the mounting nuts.



Interior Antenna 2

1. Disconnect the negative (-) battery terminal.
2. Disconnect the connector (A) from the interior antenna 2.
3. Remove the interior antenna 2 (B) after loosening the mounting nuts.



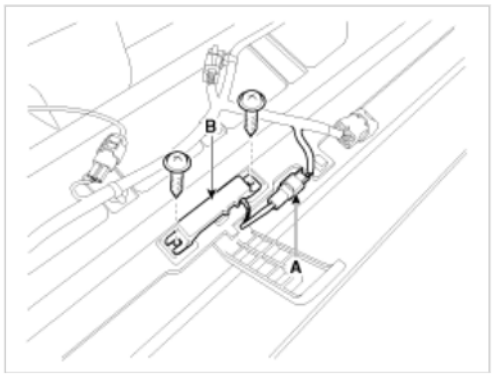
Information

When removing the interior antenna 2, the rear seat back assembly does not need removal.

Exterior Bumper Antenna

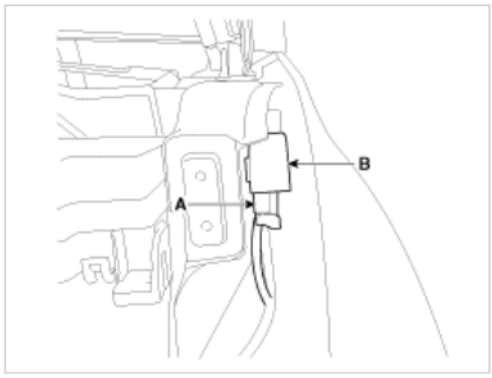
1. Disconnect the negative(-) battery terminal.
2. Remove the rear bumper cover.
   (Refer to Body - "Rear Bumper Cover")
3. Disconnect the connector (A), then remove the rear bumper antenna (B) with loosening the mounting screws.

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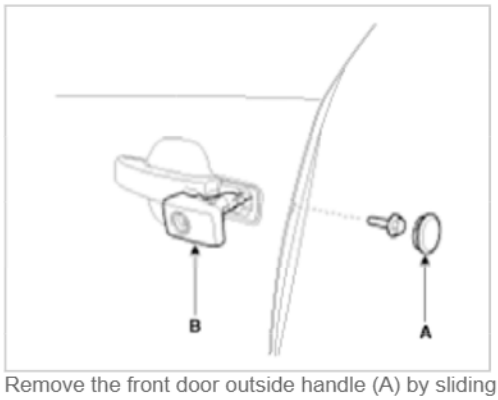
Buzzer

1. Disconnect the negative(-) battery terminal.
2. Remove the front left wheel guard.
3. Remove the buzzer (B) after disconnecting the connector (A).



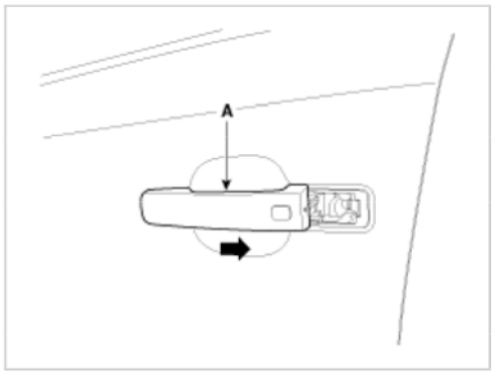
Door Outside Handle

1. Disconnect the negative (-) battery terminal.
2. Remove the front door module.
   (Refer to Front Door - "Front Door Module")
3. Remove the hole plug (A).
4. After loosening the mounting bolt, then remove the front door outside handle cover (B).



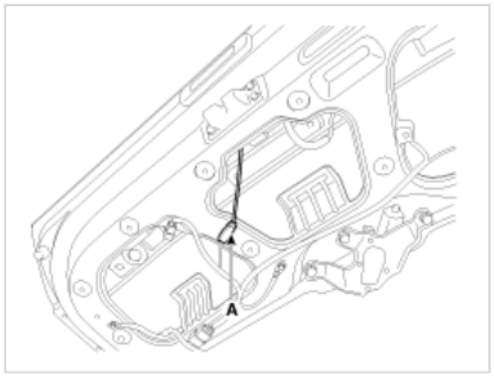
5. Remove the front door outside handle (A) by sliding it rearward.

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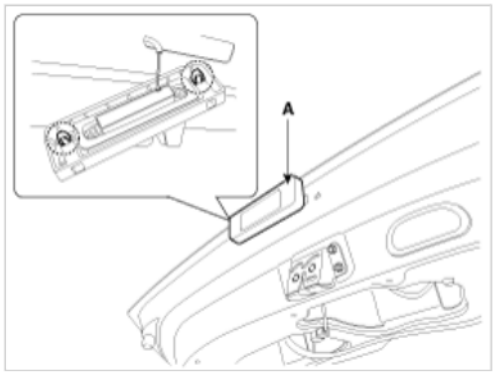


Tailgate Open Switch

1. Disconnect the negative (-) battery terminal.
2. Remove the tailgate trim.
   (Refer to Body - "Tail Gate Trim")
3. Disconnect the tailgate open switch connector (A).



4. Remove the tailgate switch (A).



Installation

Smart Key Unit

1. Install the smart key unit.
2. Connect the connector and install the smart key unit.
3. Install the main crash pad assembly.
4. Install the negative (-) battery terminal and check the smart key system.

Interior Antenna 1

1. Install the interior antenna.
2. Install the floor console assembly.
3. Install the negative (-) battery terminal and check the smart key system.

Interior Antenna 2

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1. Install the interior antenna 2.
2. Install the rear seat cushion assembly.
3. Install the negative (-) battery terminal and check the smart key system.

Exterior Bumper Antenna

1. Install the exterior bumper antenna.
2. Install the rear bumper cover.
3. Install the negative (-) battery terminal and check the smart key system.

Buzzer

1. Install the buzzer.
2. Install the front left wheel guard.
3. Install the negative (-) battery terminal and check the smart key system.

Door Outside Handle

1. Install the door outside handle.
2. Install the door trim.
3. Install the negative (-) battery terminal and check the smart key system.

Tailgate Open Switch

1. Install the tailgate open switch.
2. Install the tailgate trim.
3. Install the negative (-) battery terminal and check the smart key system.

Inspection

Self Diagnosis With GDS

Smart key system defects can be quickly diagnosed with the GDS. GDS operates actuator quickly to monitor, input/output value and self diagnosis.

The following three features will be major problem in SMART KEY system.

1. Problem in SMART KEY unit input.
2. Problem in SMART KEY unit.
3. Problem in SMART KEY unit output.

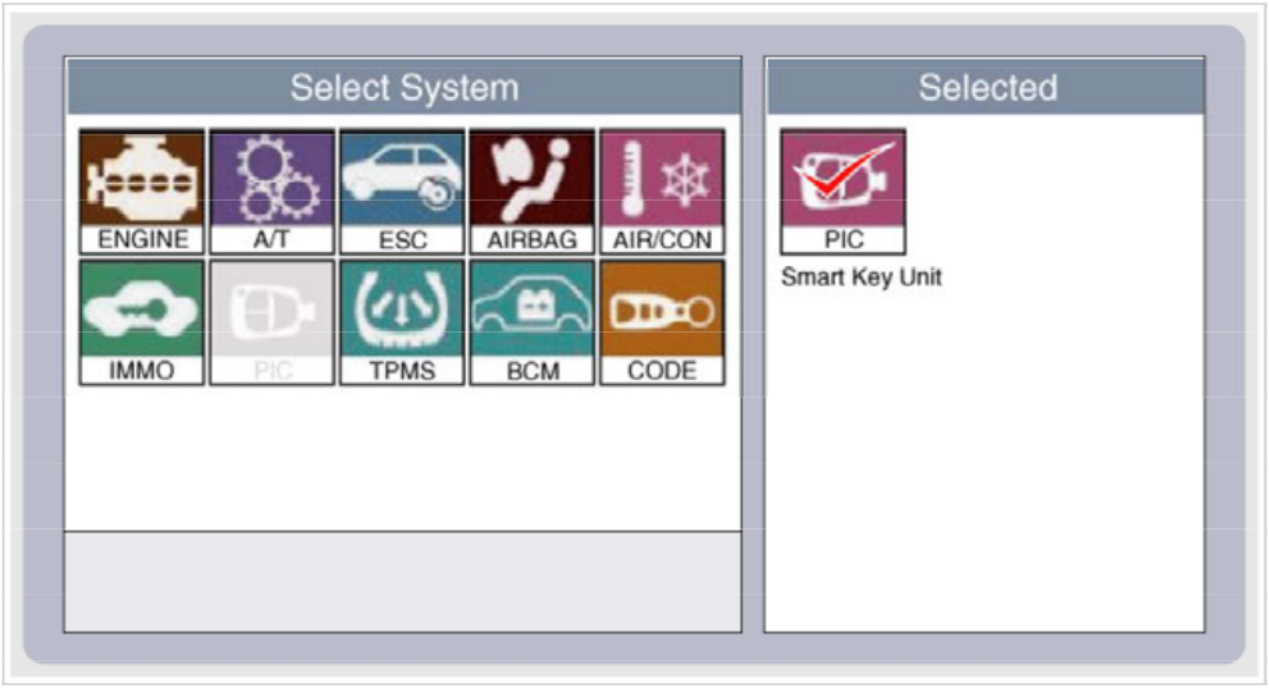
The following three diagnostic solutions will be the main solution process to a majority of concerns.

1. SMART KEY unit Input problem : switch diagnosis
2. SMART KEY unit problem : communication diagnosis
3. SMART KEY unit Output problem : antenna and switch output diagnosis

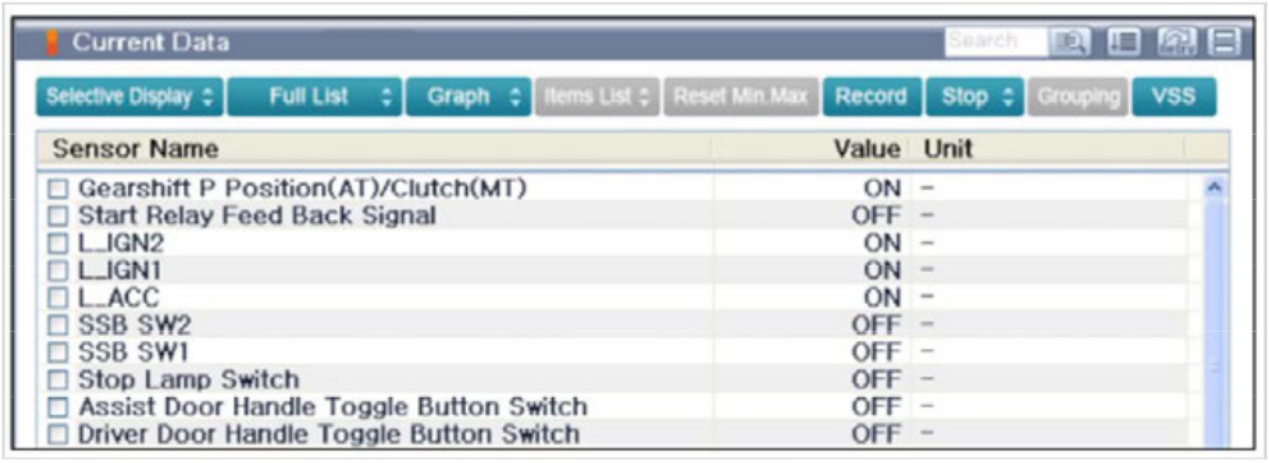
Switch Diagnosis

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel, turn the power on GDS.
2. Select the vehicle model and then SMART KEY system.

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3. Select the "SMART KEY unit".
4. After IG ON, select the "Current data".



5. You can see the situation of each switch on scanner after connecting the "current data" process.

Display	Description
FL Toggle switch	ON : Push button is ON in the driver door handle.
FR Toggle switch	ON : Push button is ON in the assist door handle.
Trunk switch	ON : Trunk button is ON.
Gear P Position	ON : Shift lever is P position.
IGN 1	ON : IGN switch is IG position.
ACC	ON : IGN switch is ACC position.
Push Knob switch	ON : Push knob switch is ON.
External Buzzer	ON : Buzzer is ON.

Communication Diagnosis With GDS (Self Diagnosis)

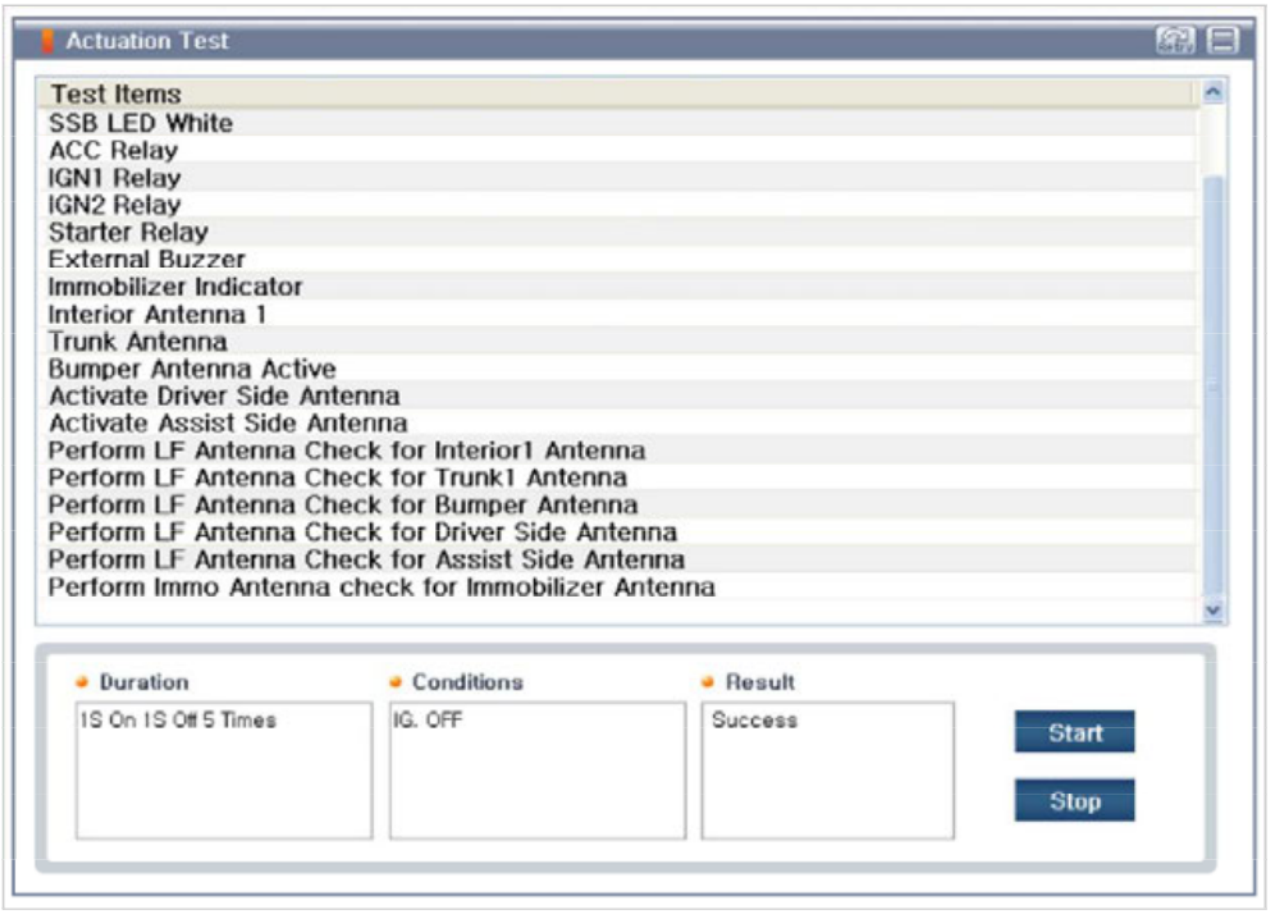
1. Communication diagnosis checks that the each components operates normal.
2. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
3. After IG ON, select the "DTC".

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Antenna Actuation Diagnosis

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IG ON, select the "ACTUATION TEST".
3. Set the smart key near the related antenna and operate it with a GDS.

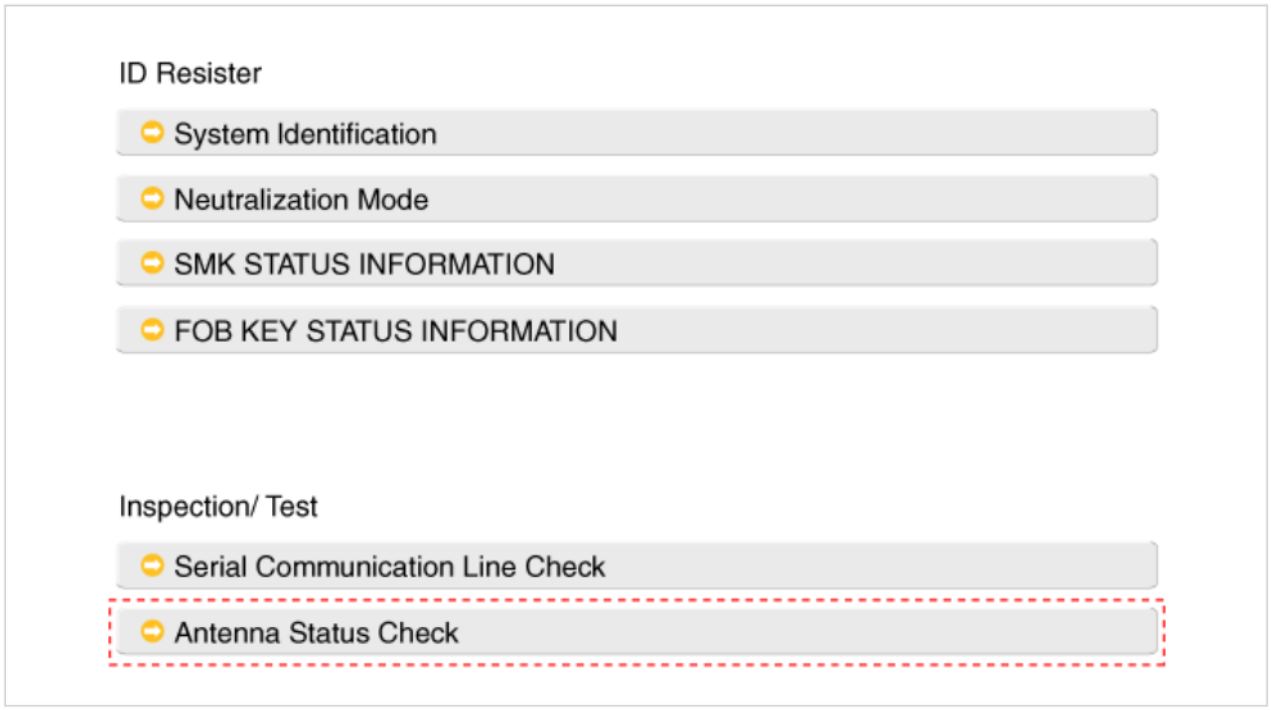


4. If the LED of smart key is blinking, the smart key is normal.
5. If the LED of smart key is not blinking, check the voltage of smart key battery.
6. Antenna actuation
   A. INTERIOR Antenna
   B. Trunk antenna
   C. BUMPER/Antenna
   D. DRV_DR Antenna
   E. AST_DR Antenna

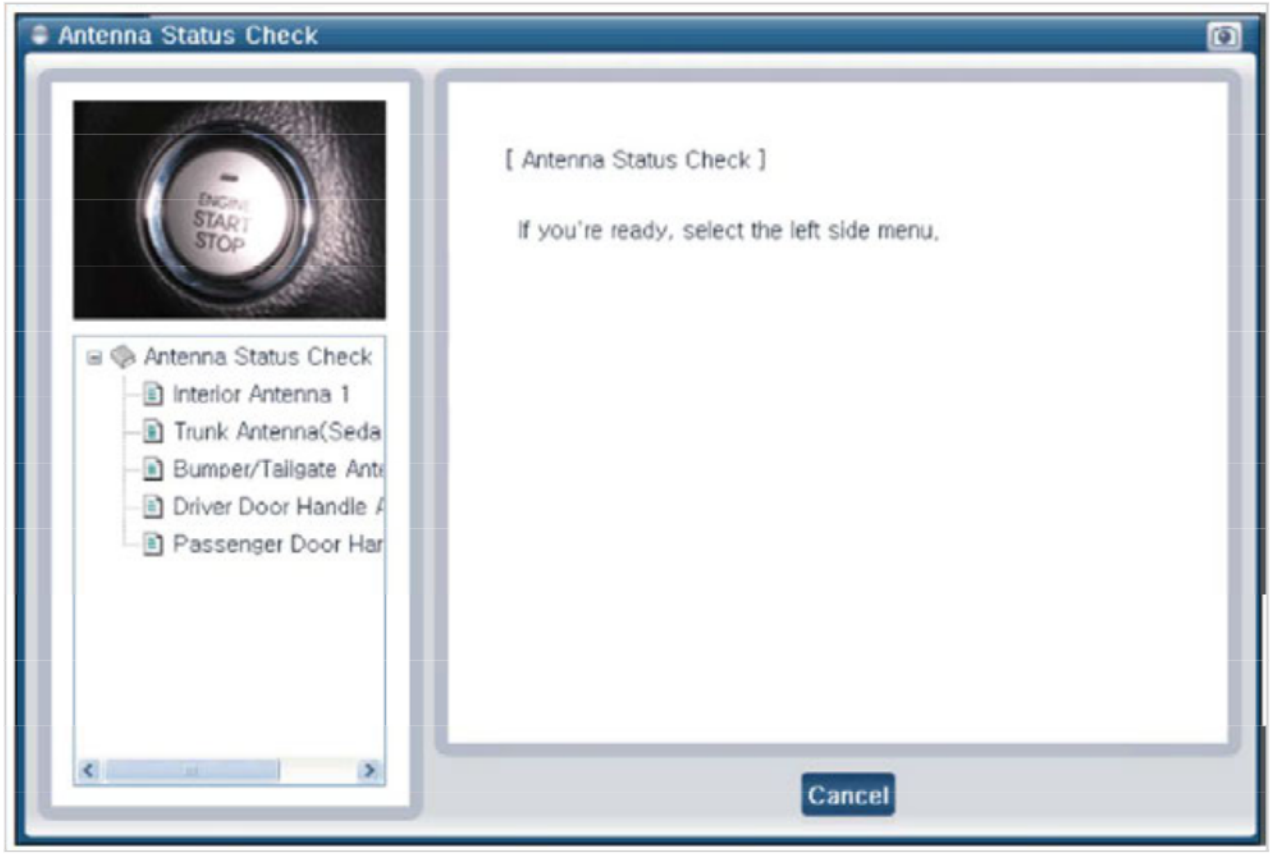
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Antenna Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. Select the "Antenna Status Check".

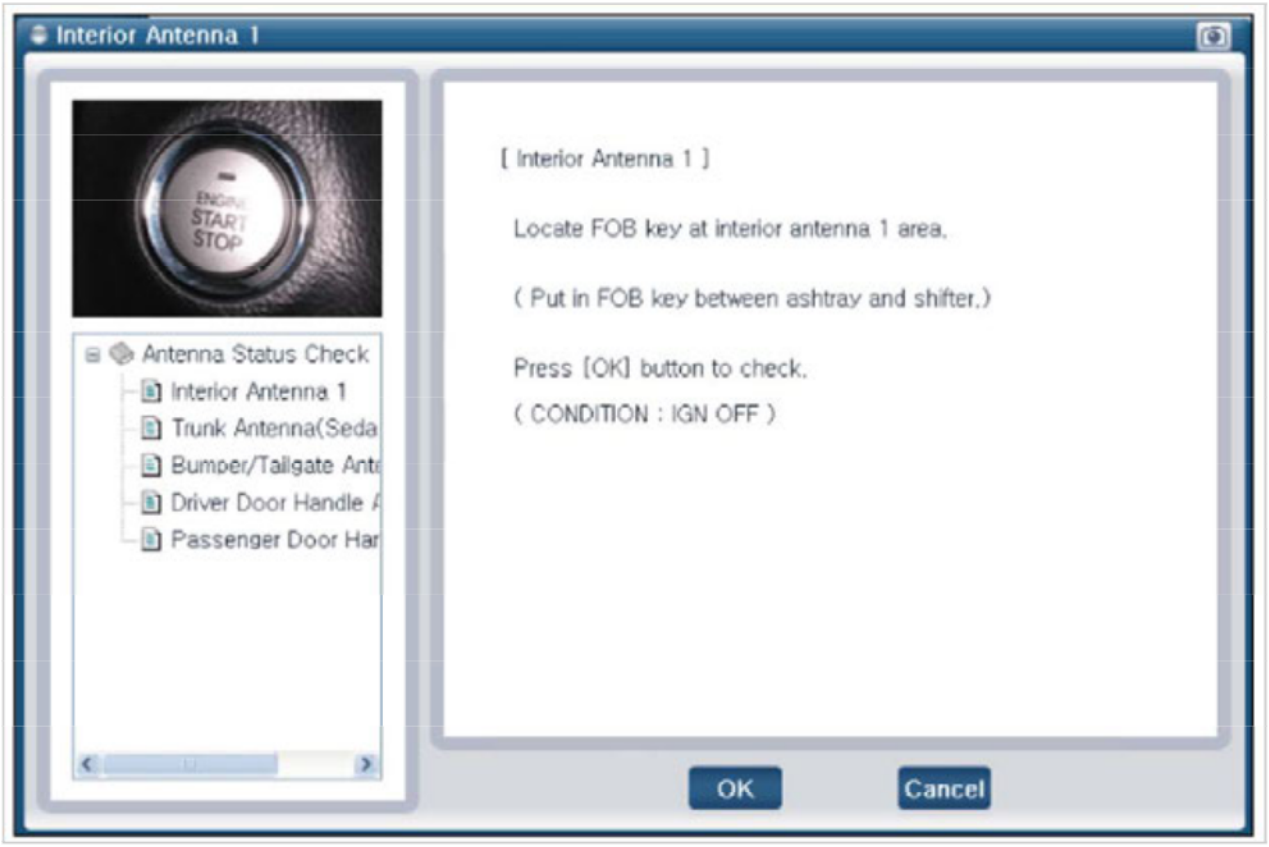


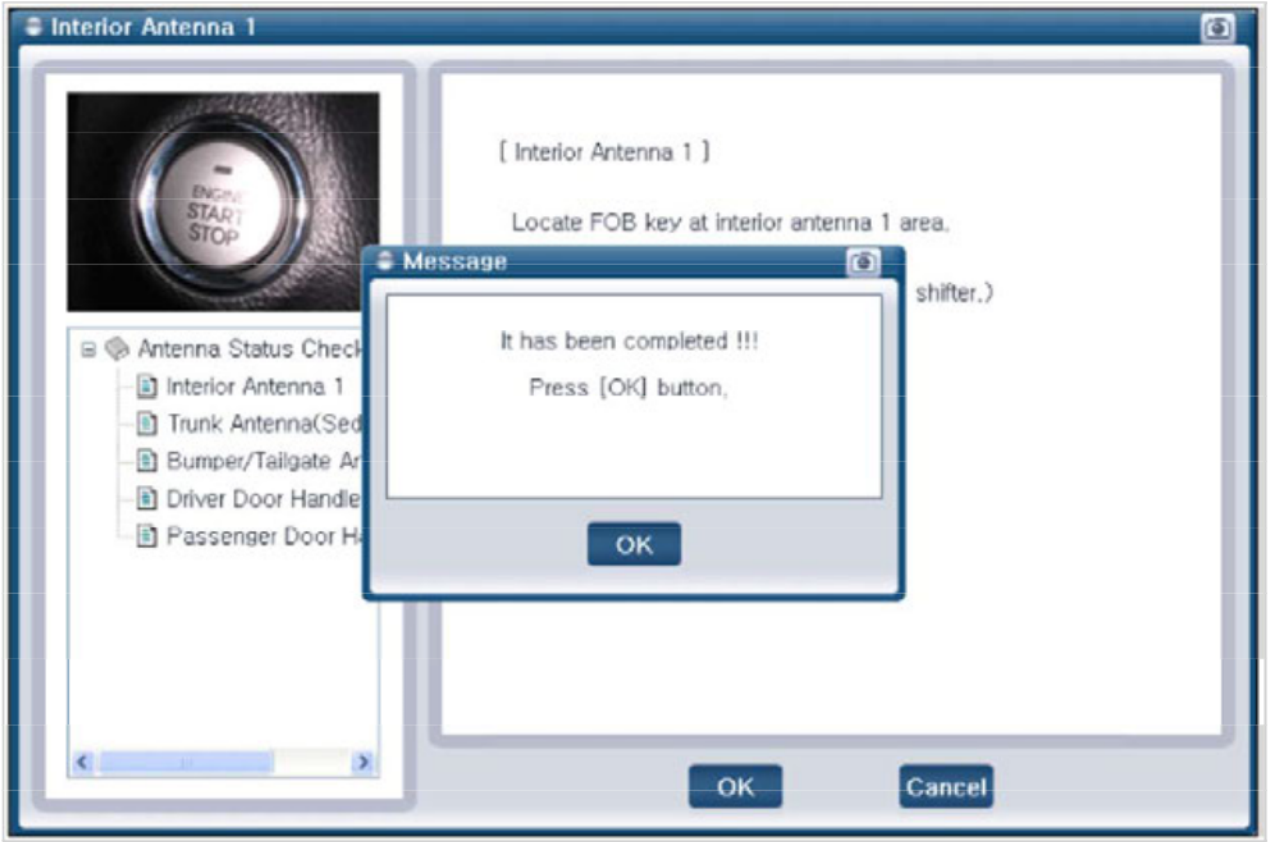
3. After IG ON, select the "Antenna Status Check".



4. Set the smart key near the related antenna and operate it with a GDS.

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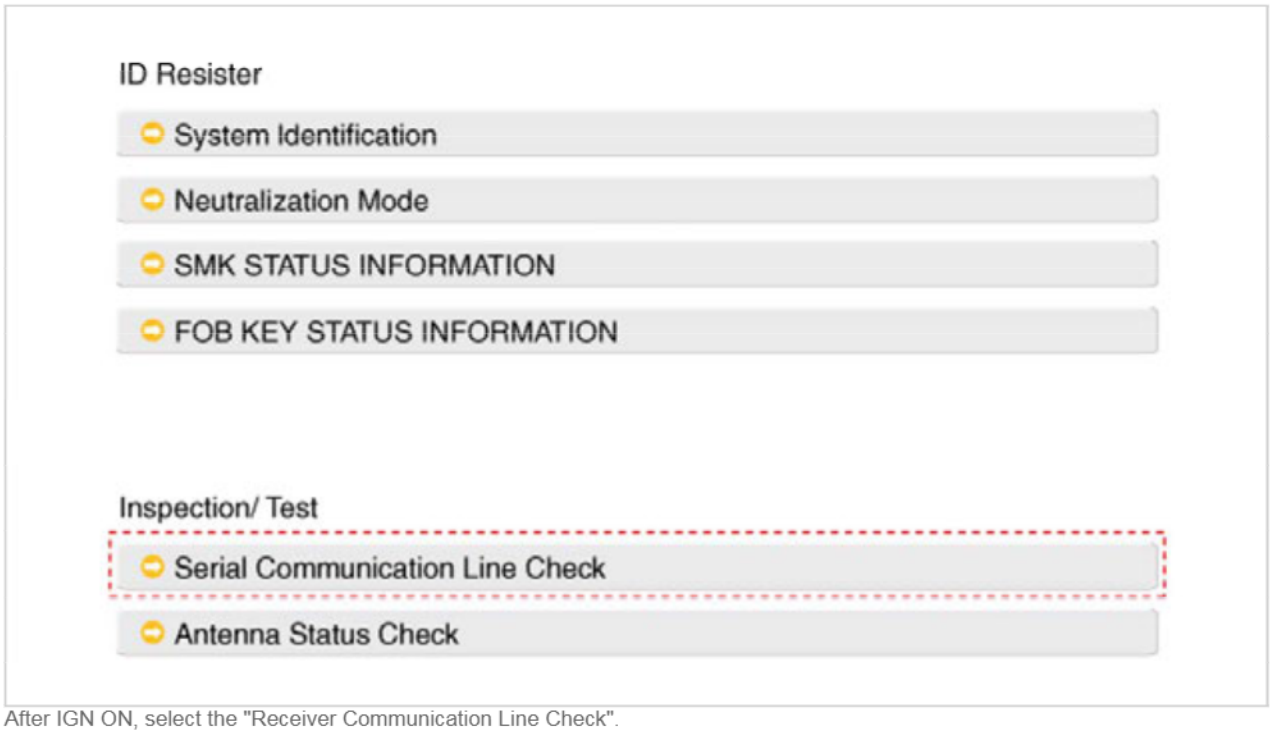
5. If the smart key runs normal , the related antenna, smart key(transmission, reception) and exterior receiver are normal.
6. Antenna status
   A. INTERIOR Antenna
   B. Trunk antenna

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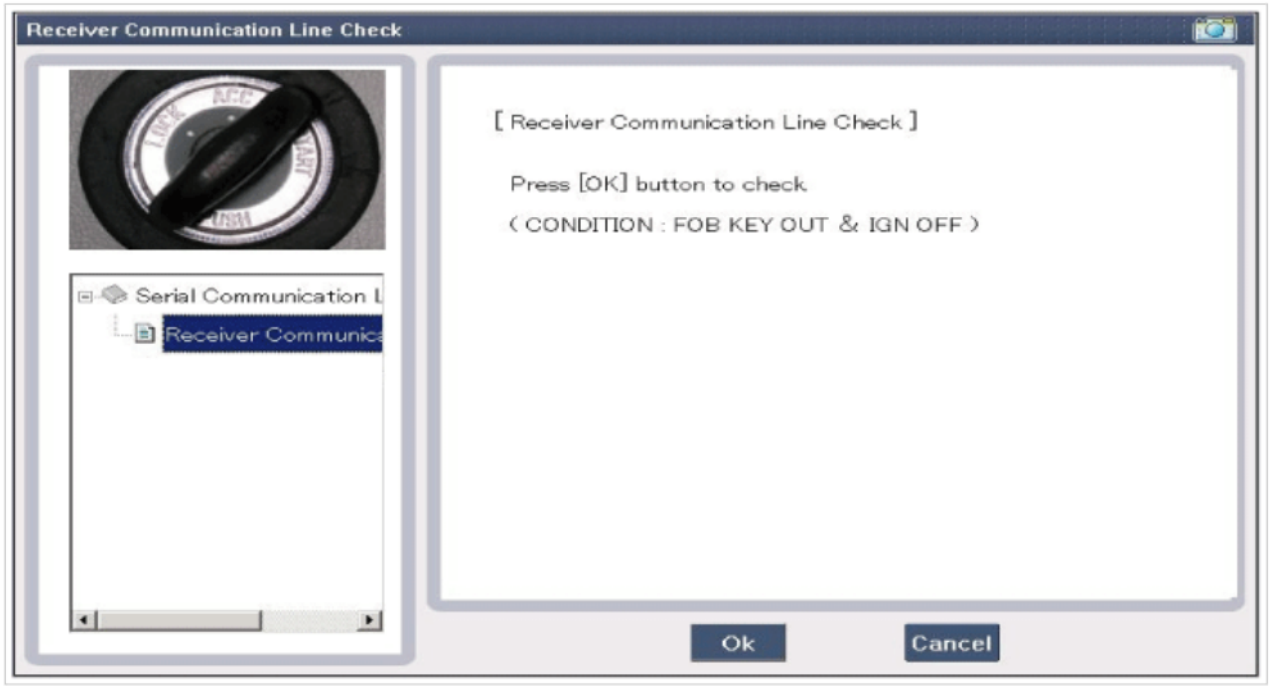
C. BUMPER/Antenna
D. DRV_DR Antenna
E. AST_DR Antenna

Serial Communication Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. Select the "Serial Communication Line Check".



3. After IGN ON, select the "Receiver Communication Line Check".

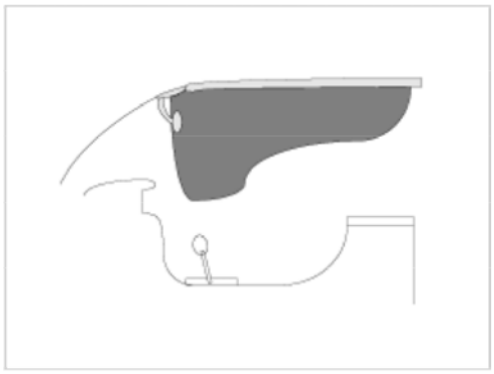


4. Check the serial communication line with a GDS.
5. If the smart key runs normal, the communication of smart key unit, exterior receiver are normal.
6. If the smart key runs abnormal, check the following items.
   A. Disconnection or no response of the exterior receiver communication line.
   B. The exterior receiver communication line disconnection and ground connection.

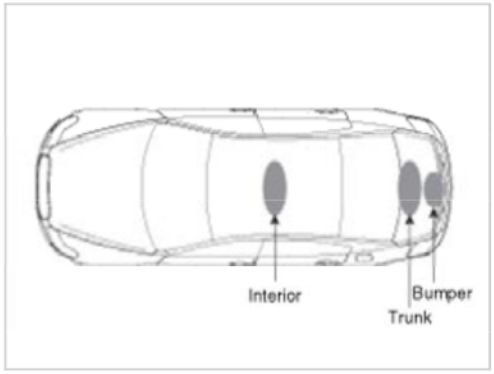
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Interior Antenna Actuation Check

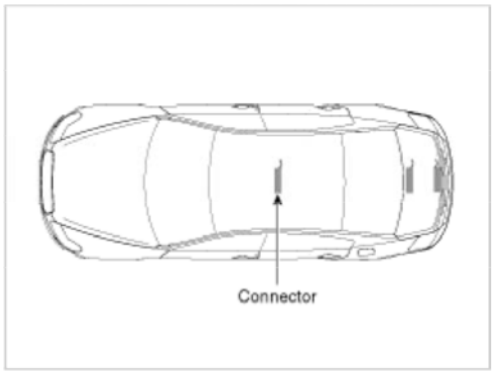
1. Set the smart key in the following shade area and check the IG ON.



2. If the ignition is ON, the antenna runs normal.
3. Check the interior antenna ignition mode.
4. Set the smart key in the following shade area and actuate the antenna. Check the LED of smart key is blinking.



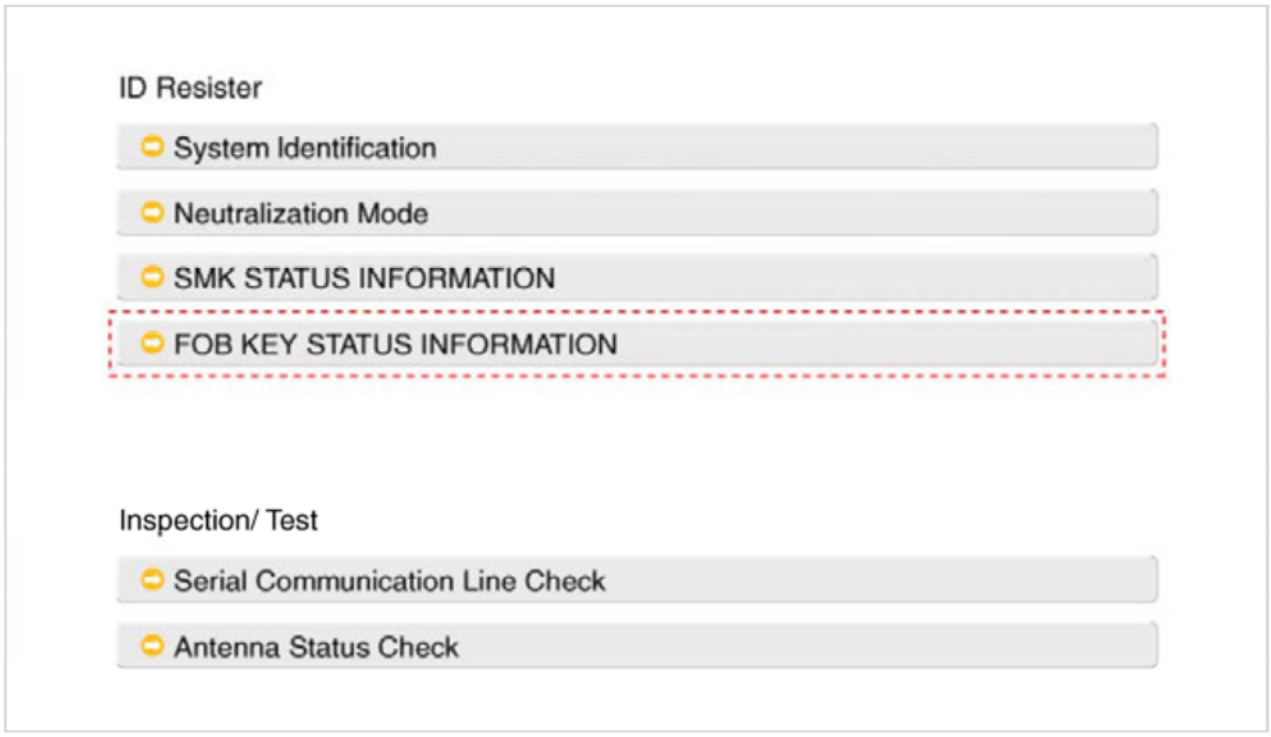
5. If the LED of smart key is not blinking, check the antenna in shade area.

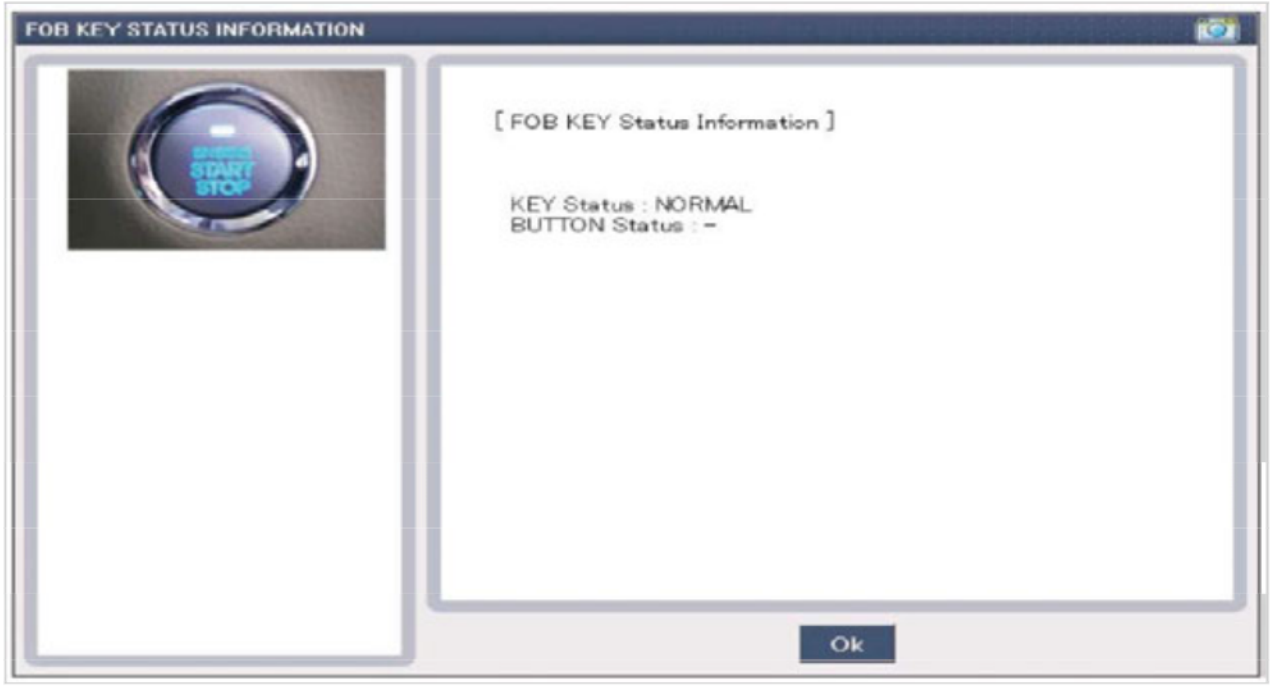


FOB Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IGN ON, select the "FOB KEY STATUS INFORMATION".

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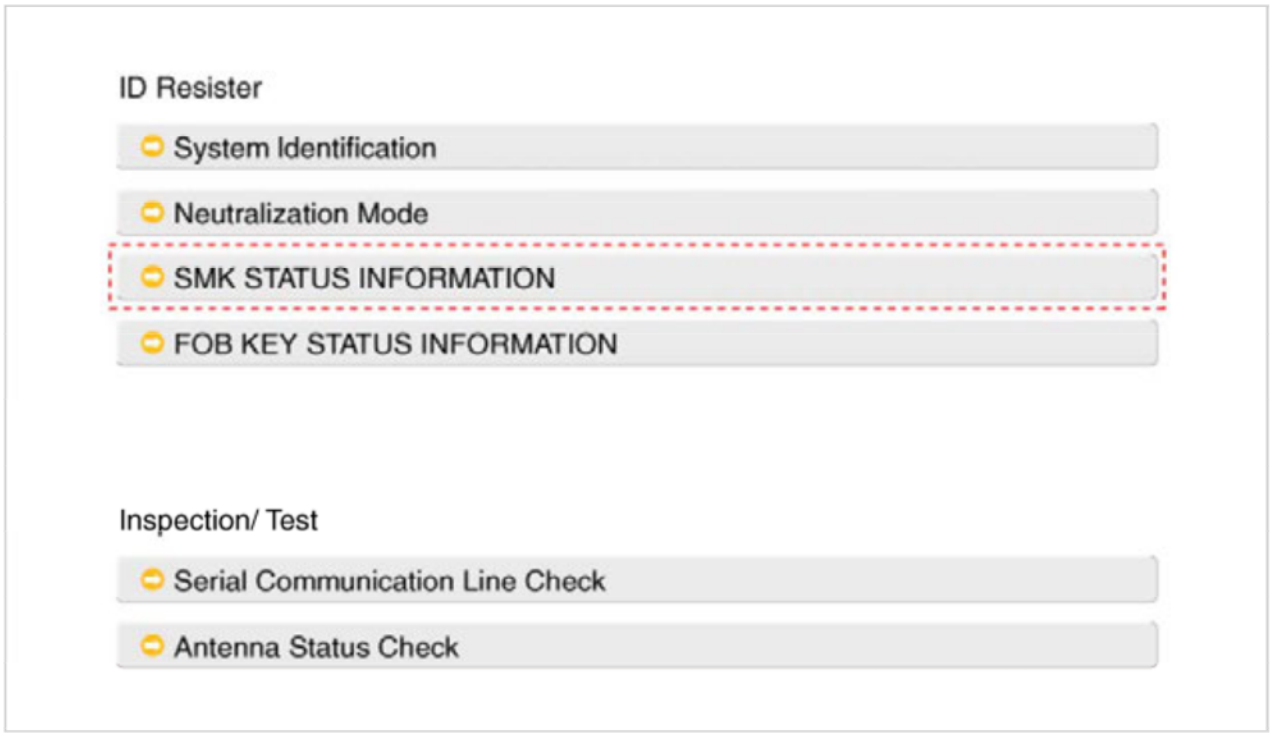


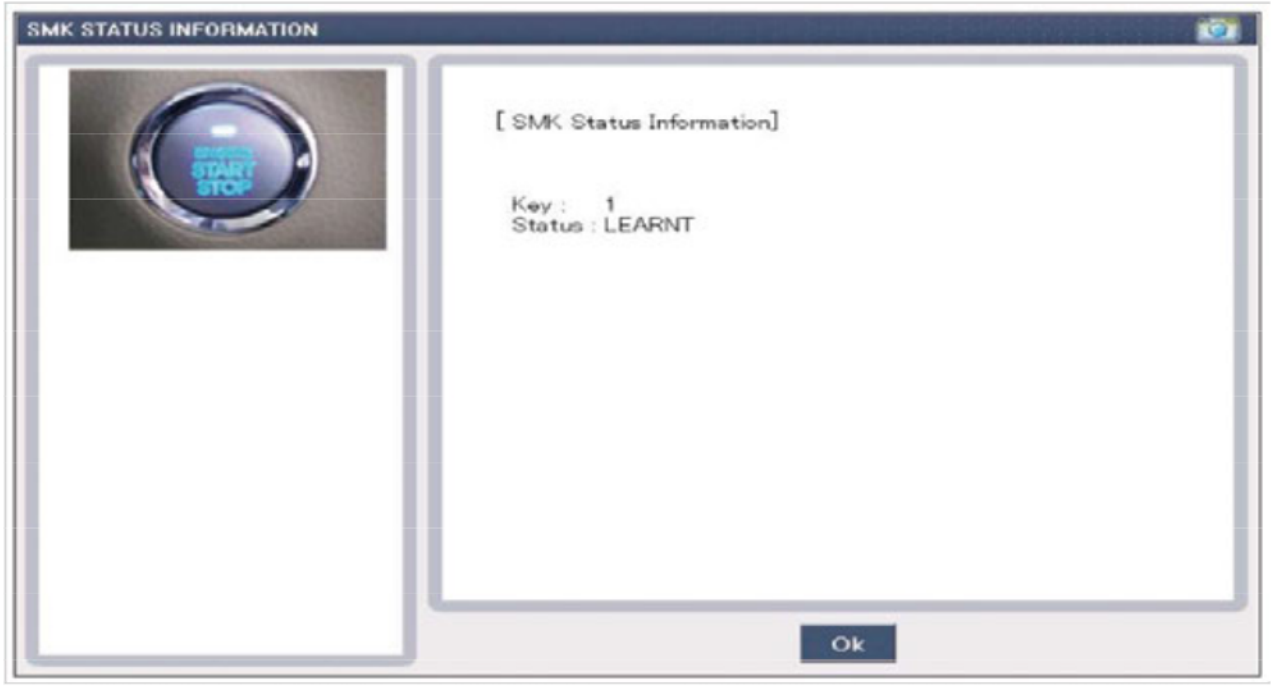


Smart Key Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IGN ON, select the "SMK STATUS INFORMATION".

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Neutralization Status Check

1. Connect the cable of GDS to the data link connector in driver side crash pad lower panel.
2. After IGN ON, select the "Neutralization mode".

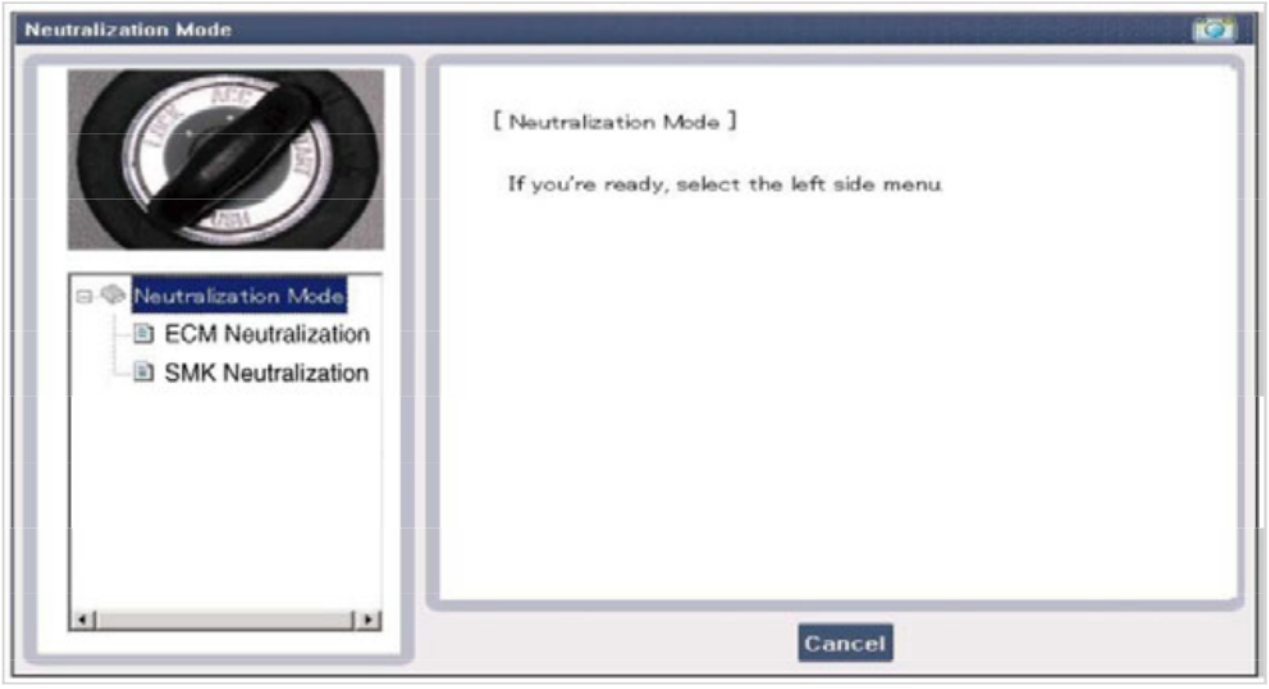
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ID Resister

- System Identification
- Neutralization Mode
- SMK STATUS INFORMATION
- FOB KEY STATUS INFORMATION

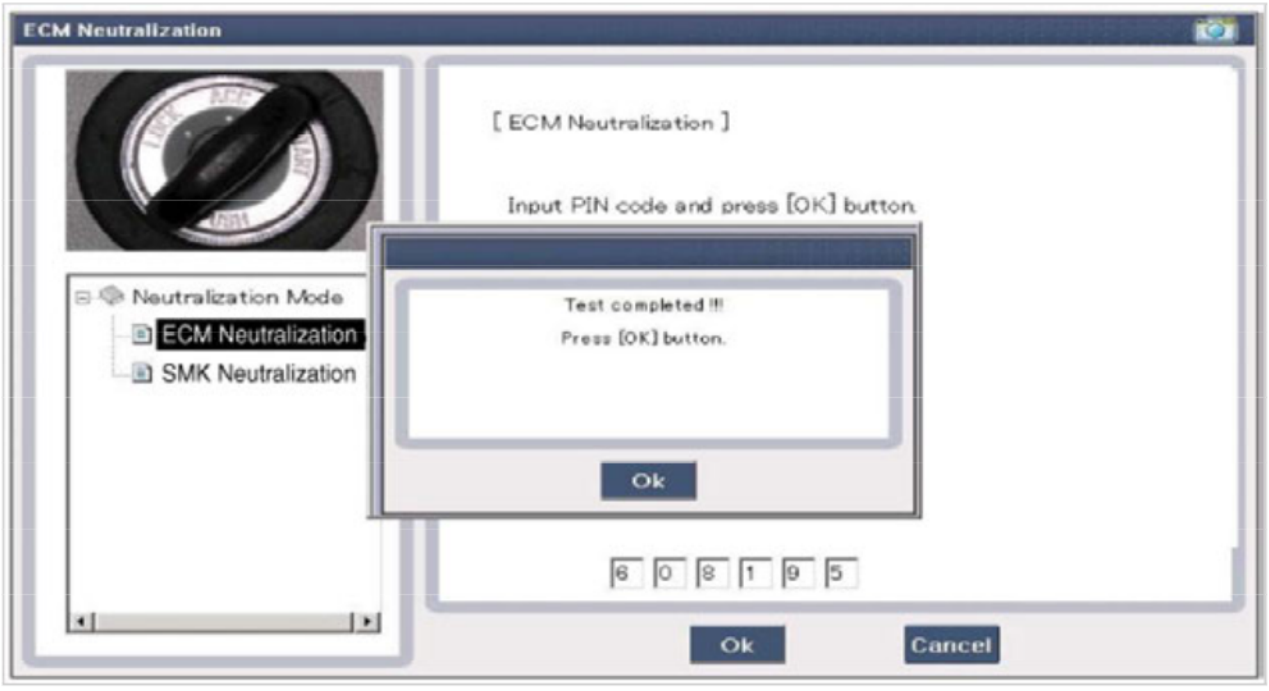
Inspection/ Test

- Serial Communication Line Check
- Antenna Status Check

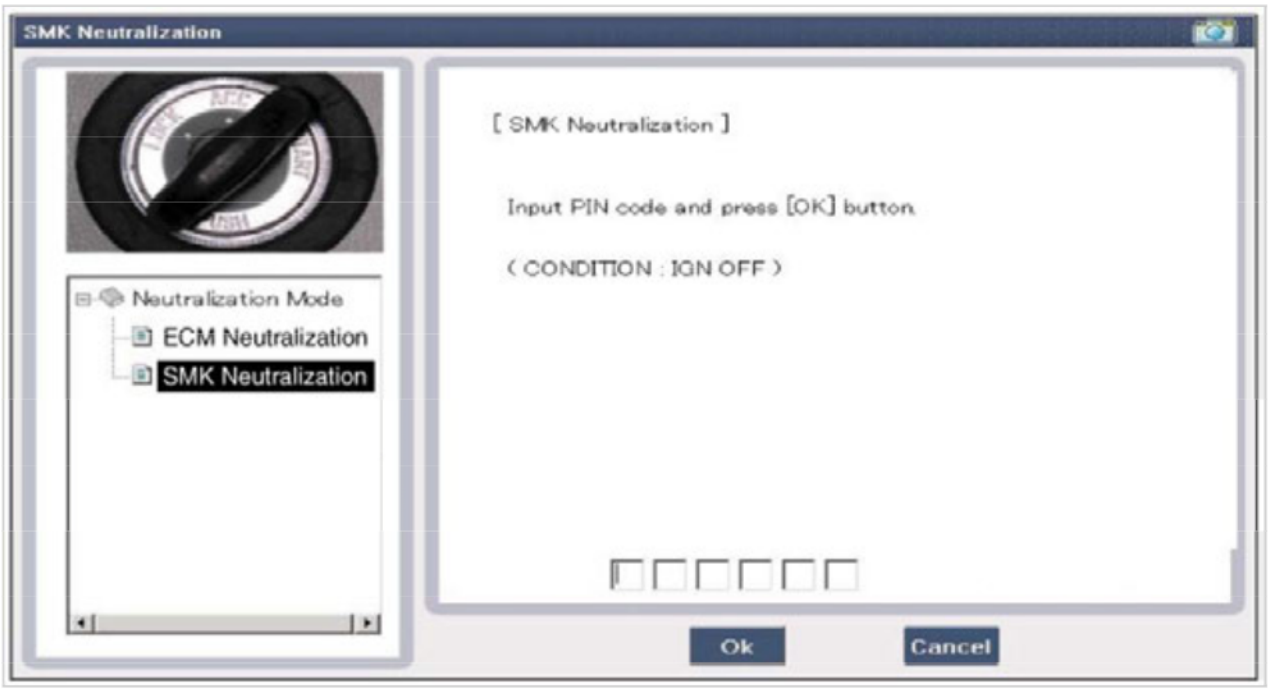


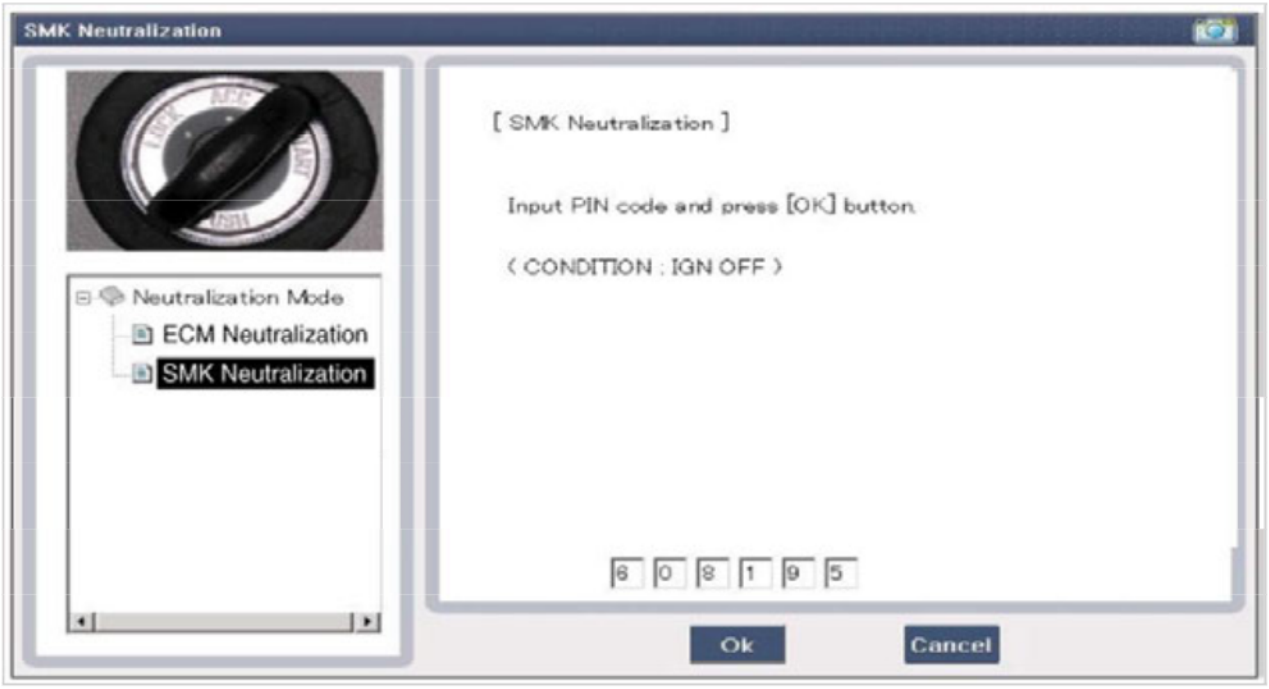
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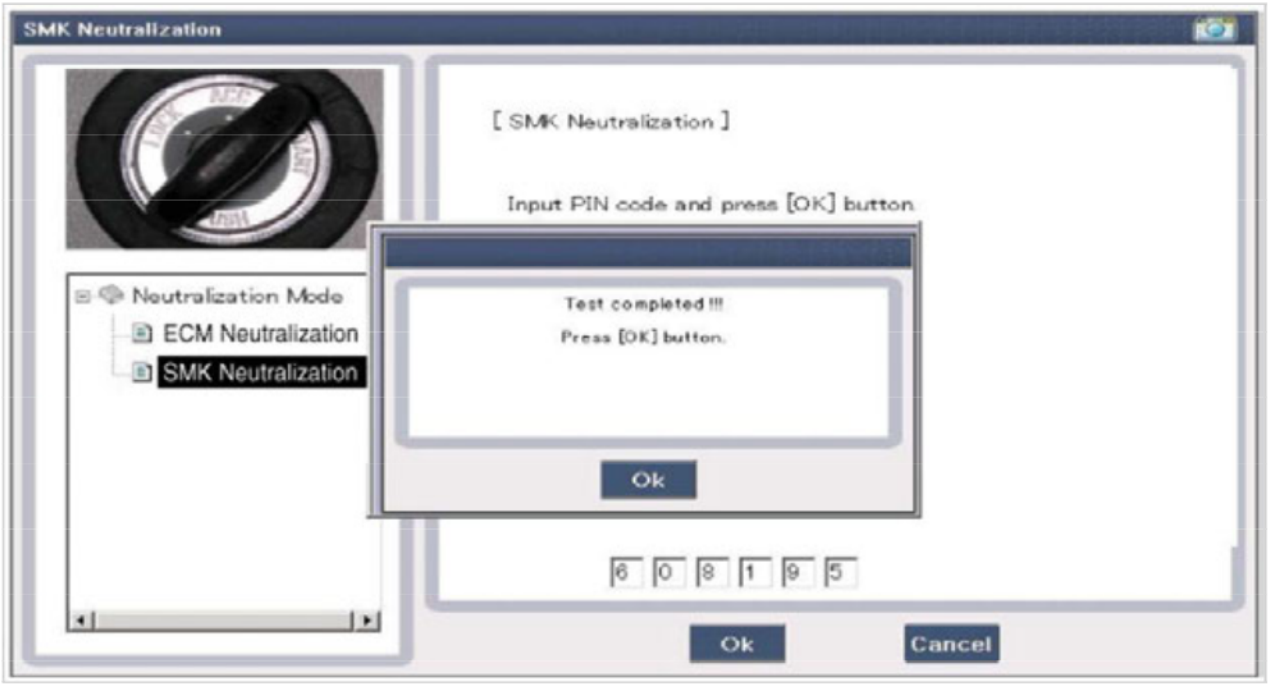


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Input Signal List

No.	Item name	Unit
1	SSB SW1	-
2	SSB SW2	-
3	ACC	-
4	IGN1	-
5	IGN2	-
6	Gear 'P' Position (A/T) Clutch SW (M/T)	-
7	Brake SW	-
8	FL Door Lock Button	-
9	FR Door Lock Button	-
10	Battery Voltage	-
11	Wheel Speed	-
12	RPM	-
13	Stop Lamp Fuse	-
14	Start Feed Back	-

Actuator List

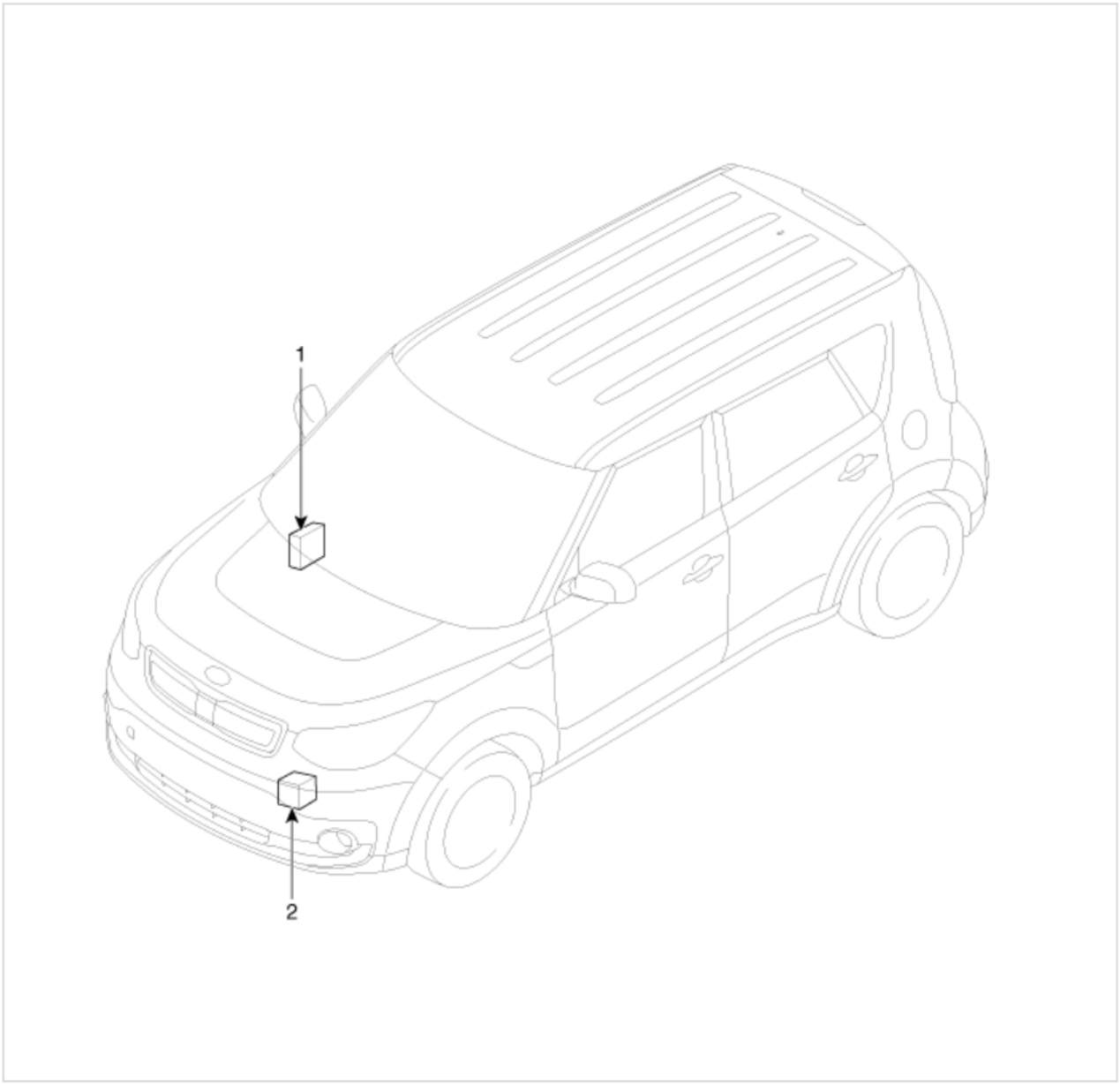
No.	Item name	Condition
1	Immobilizer indicator Lamp (Cluster)	Ignition switch ON Engine off
2	External Buzzer	Ignition switch ON Engine off
3	Interior Antenna Active	Ignition switch ON Engine off
6	Bumper/trunk Antenna Active	Ignition switch ON Engine off
7	DRV_DR Antenna Active	Ignition switch ON Engine off
8	AST_DR Antenna Active	Ignition switch ON Engine off
9	SSB Illumination (OFF/ACC/ON)	Ignition switch ON Engine off
10	ACC/IGN1/IGN2 Relay	

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		Ignition switch ON Engine off

Body Electrical System

Component Location



1. Virtual engine sound system unit	2. Virtual engine sound speaker

Body Electrical System

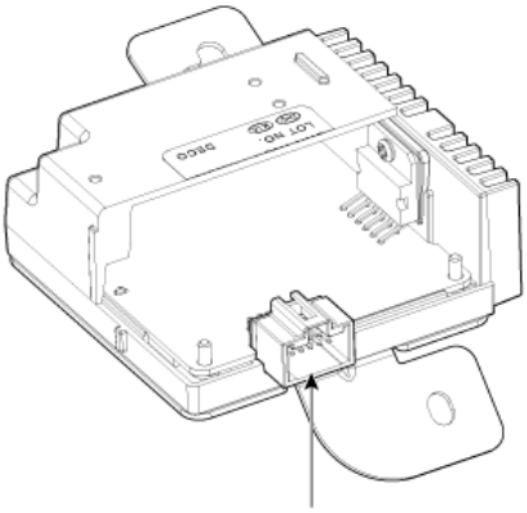
Description

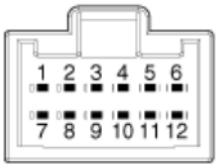
The VESS (Virtual engine sound system) generates engine sound when you start the hybrid system.
This sound is for pedestrians to hear vehicle sound because there is no engine sound in hybrid driving.
VESS operates when vehicle speed is between 0~20km/h (0~12mph)

Body Electrical System

Component Location

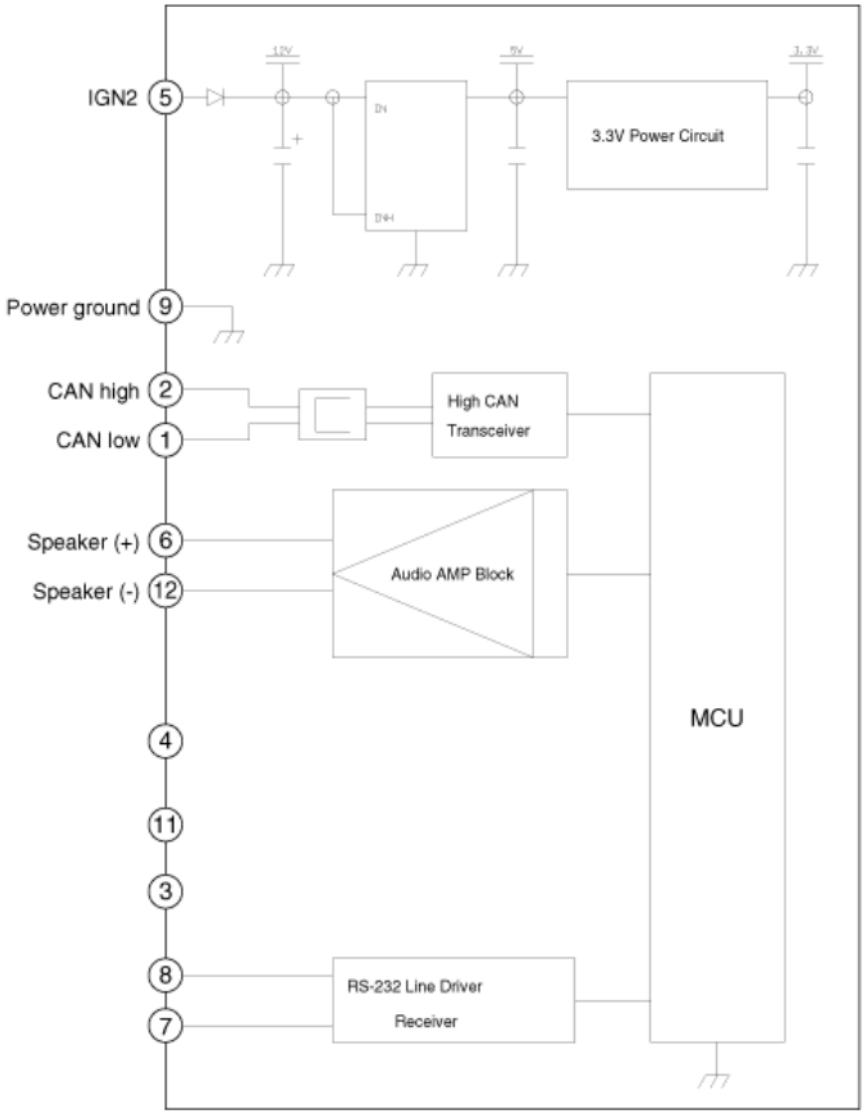
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Connector A	No.	Description	No.	Description
	1	CAN low	7	-
	2	CAN high	8	-
	3	-	9	Power ground
	4	-	10	-
	5	IGN 2	11	-
	6	Speaker (+)	12	Speaker (-)

Circuit Diagram

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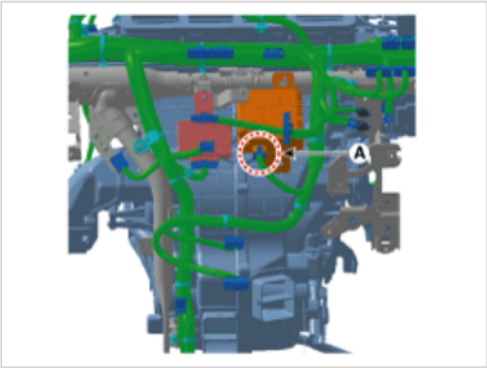


Body Electrical System

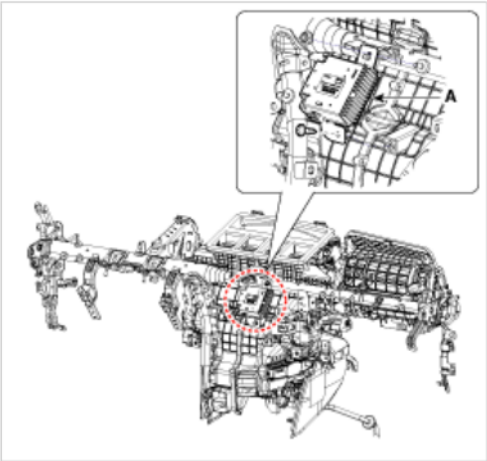
Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the AVN head unit.
   (Refer to Body Electrical System - "AVN System")
3. Disconnect the VESS unit connector (A).

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4. Remove VESS unit (A) after loosening the mounting nut and screw.



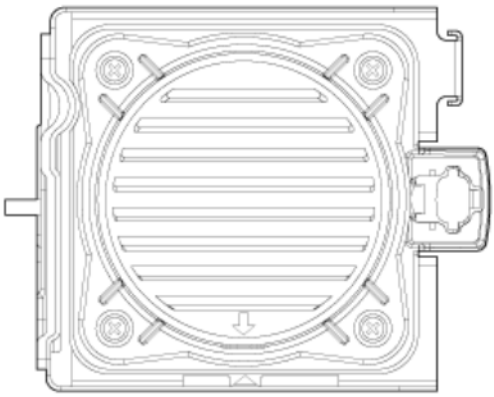
Installation

1. Install the VESS unit and connect the connector.
2. Install the AVN head unit.
3. Connect the negative(-) battery terminal.

Body Electrical System

Component Location

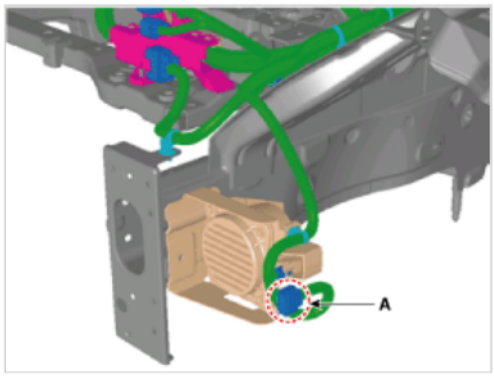
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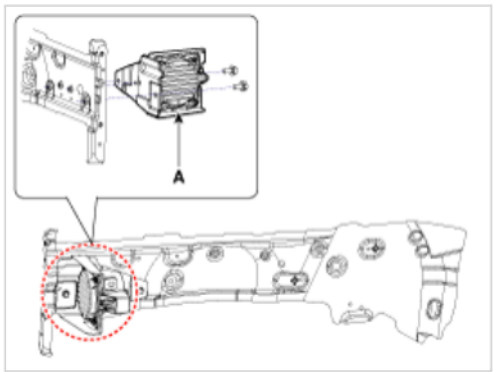
Connector A	
	
No.	**Description**
1	VESS(+)
2	VESS(-)

Removal

1. Disconnect the negative(-) battery terminal.
2. Remove the front wheel guard.
   (Refer to Body - "Front Bumper")
3. Disconnect the VESS connector (A).



4. Remove the VESS speaker (A) after loosening the mounting bolts.



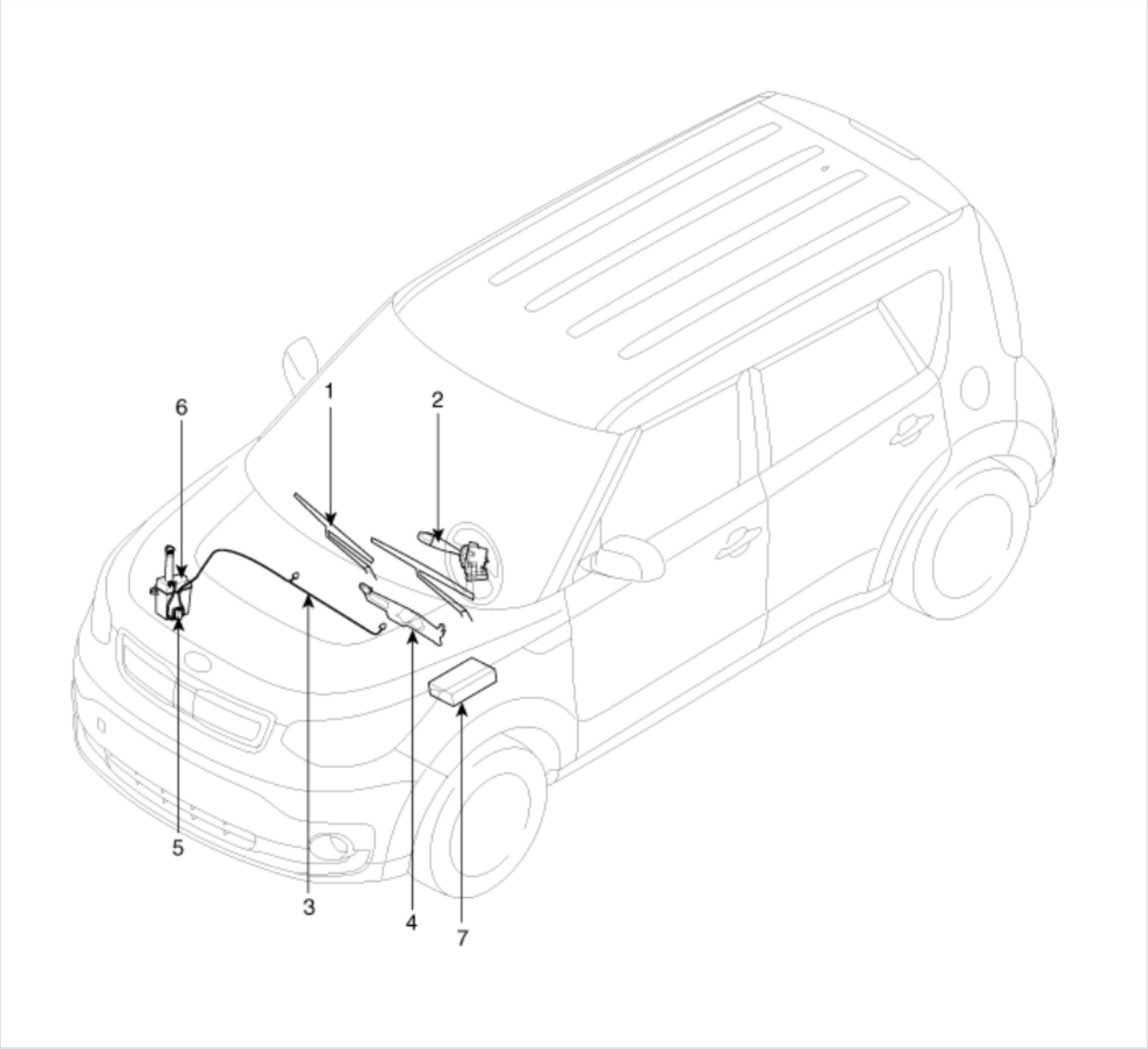
Installation

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1. Install the VESS speaker and connector.
2. Install the front wheel guard.
3. Connect the negative (-) battery terminal.

Body Electrical System

Component Location



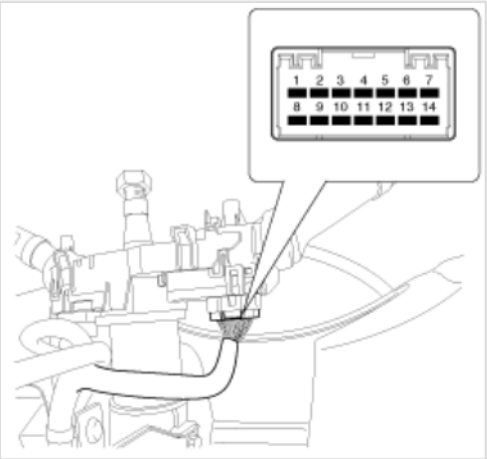
1. Windshield wiper arm & blade	5. Washer motor
2. Wiper & washer switch	6. Washer reservoir
3. Windshield washer hose	7. Wiper relay (Engine room relay box)
4. Windshield wiper motor & linkage	

Body Electrical System

Inspection

Check for continuity between the terminals while operating the wiper and washer switch. If it is not normal condition, replace wiper and wiper switch.

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Wiper Switch

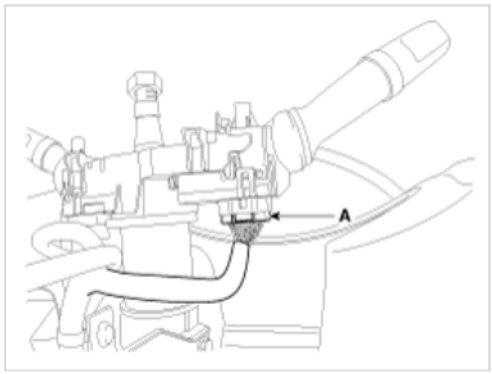
Position \ Terminal	3	9	2	8	10	1	12	13
MIST	○		○		○	○		
OFF	○		○					
INT	○		○	○	○		○	○
LOW	○				○			
HI		○			○			

Washer Switch

Position \ Terminal	10	11
OFF		
ON	○	○

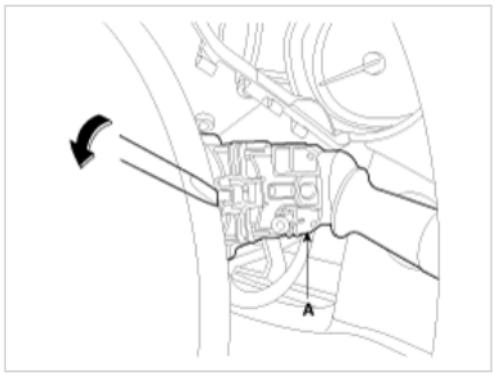
Removal

1. Remove the steering column shroud lower / upper panel. (Refer to Body - "Steering Column Shroud Panel")
2. Disconnect the connector (A).

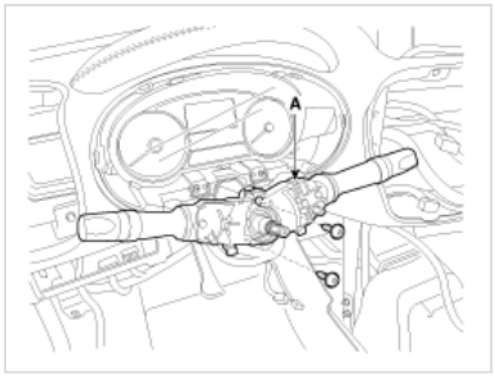


3. If necessary of removing the wiper & washer switch (A), release the lock of wiper switch using tool without removing the steering wheel and the clock spring.

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4. Remove the steering wheel.
   (Refer to Steering System - "Steering Wheel")
5. Remove the clock spring.
   (Refer to Restraint - "Driver Airbag (DAB) Module and Clock Spring")
6. Remove the multifunction switch assembly (A) after loosening 2 screws.



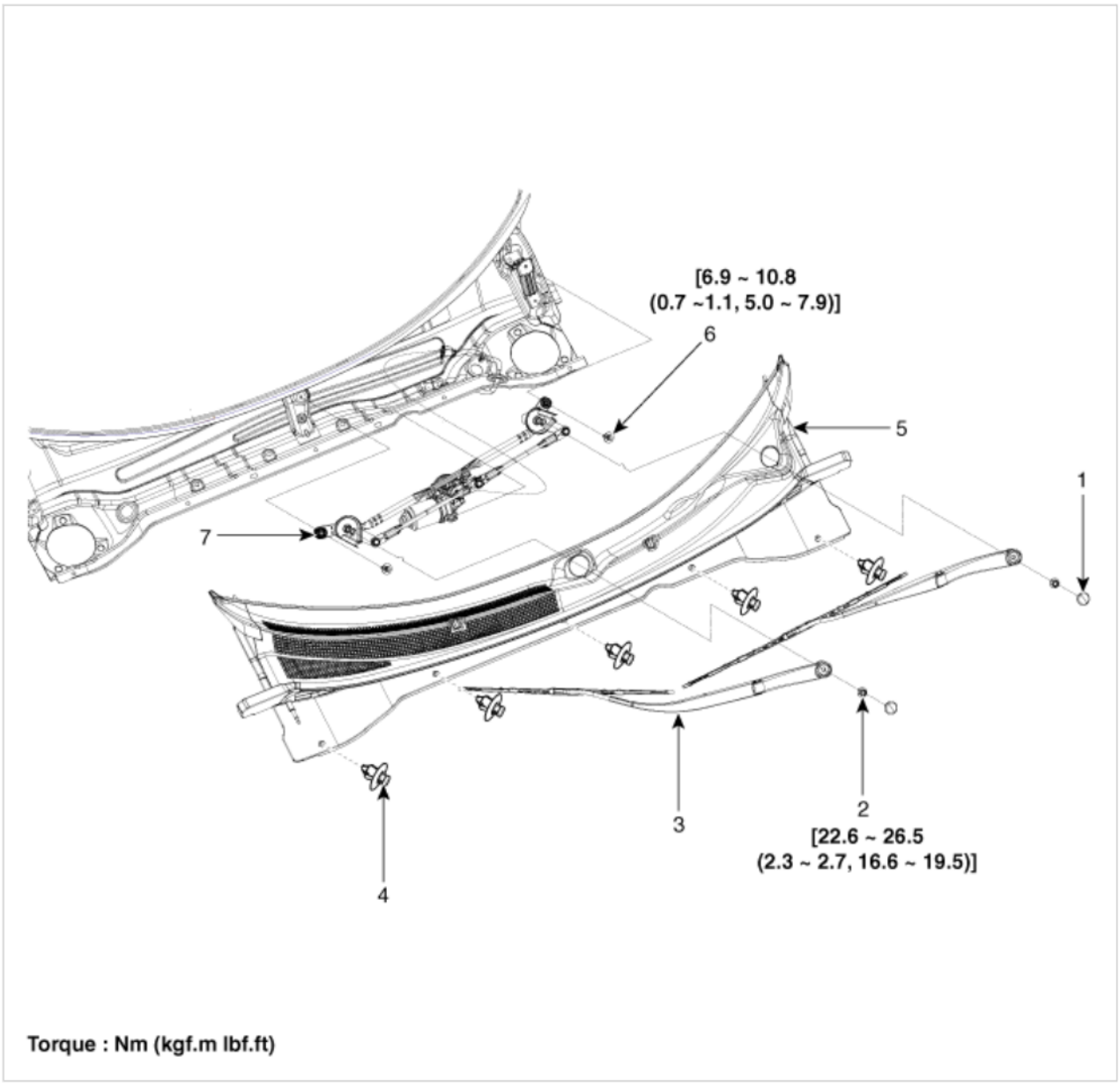
Installation

1. Install the multifunction switch after connecting the connector.
2. Install the clock spring and steering.
3. Install the upper and lower shroud.
4. Install the steering wheel.

Body Electrical System

Component Location

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Torque : Nm (kgf.m lbf.ft)

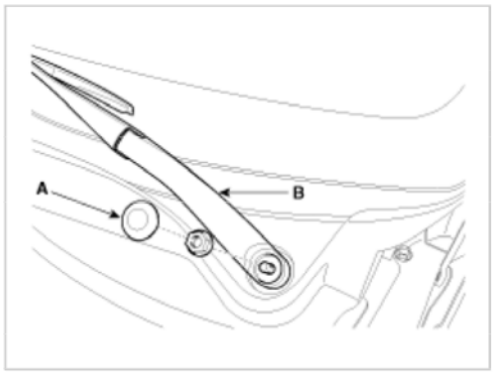
1. Cap	5. Cowl top cover
2. Nut	6. Bolt
3. Wiper arm & blade	7. Wiper motor & linkage assembly
4. Rivet	

Body Electrical System

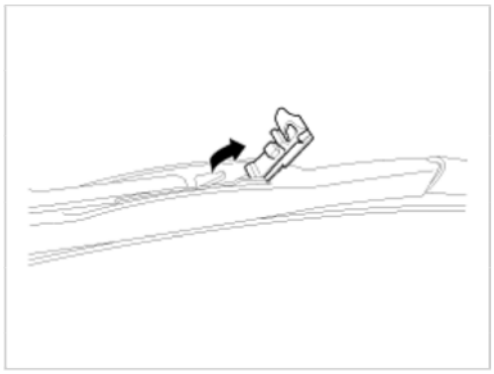
Removal

1. Loosen the windshield wiper arm nut (B) after removing a wiper cap (A).

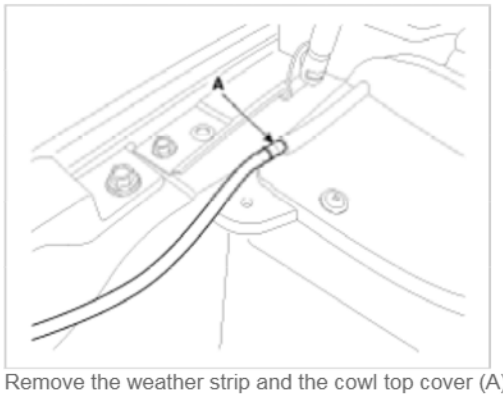
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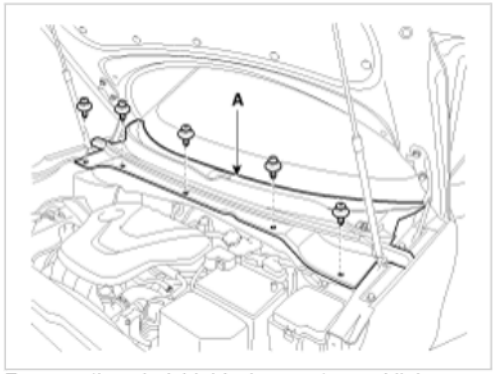
2. Remove the windshield wiper arm and blade.
3. If necessary, release the wiper blade fixing clip by pulling up and remove the wiper blade from the inside radius of wiper arm.



4. Disconnect the washer hose (A) connected to cowl top cover.

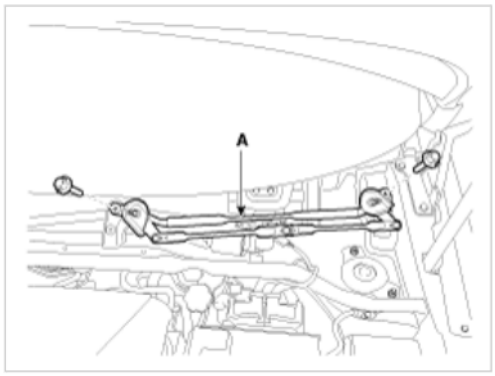


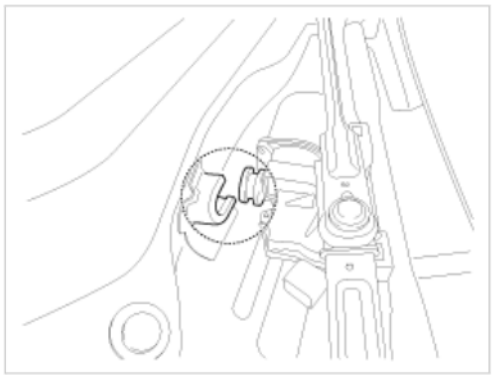
5. Remove the weather strip and the cowl top cover (A) after removing 5 rivets.



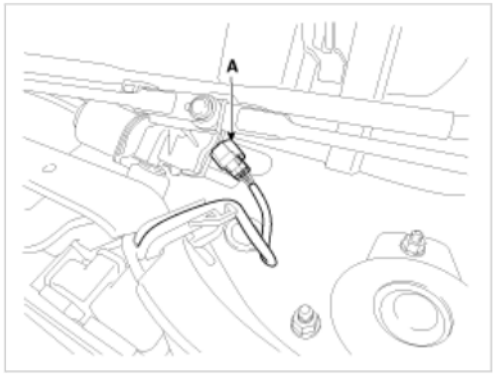
6. Remove the windshield wiper motor and linkage assembly (A) after removing 2 bolts.

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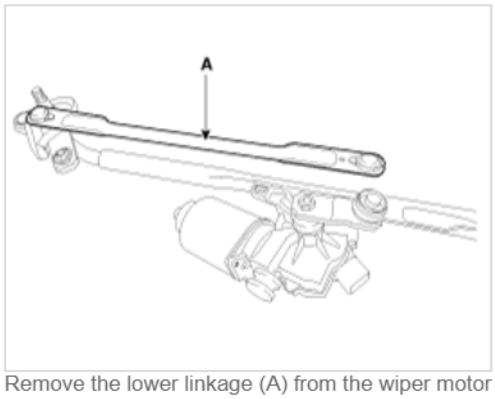




7. Disconnect the wiper motor connector (A) from the wiper motor & linkage assembly.

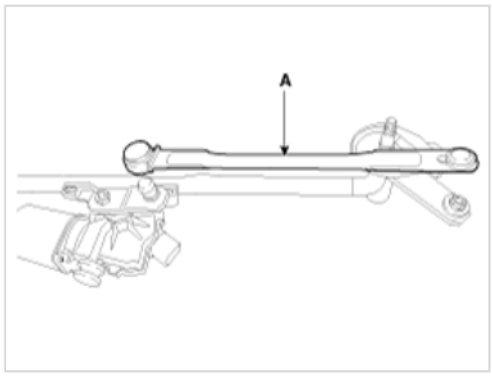


8. Hold the wiper motor crank arm and remove the upper linkage (A) from the wiper motor crank arm.

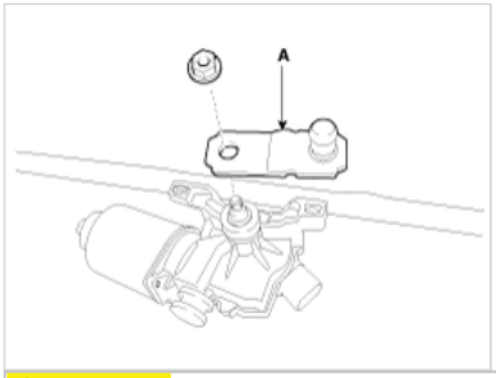


9. Remove the lower linkage (A) from the wiper motor crank arm.

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10. Hold the arm to use the plyer, remove the crank arm (A) after loosening the mounting nut.



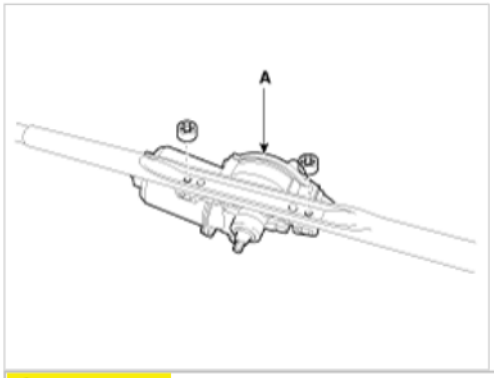
⚠ CAUTION

Before removing the wiper motor and linkage assembly, make sure that the linkage is stopped at auto stop position.

To install the wiper motor crank arm exactly, check that the linkage is aligned with the crank arm in straight line and the angle of each linkages.

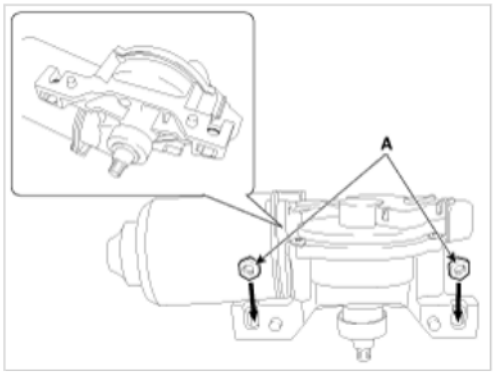
Be careful not to bend the linkage.

11. Remove the wiper motor (A) after loosening the mounting bolts.



⚠ CAUTION

Be careful not to miss the mounting nuts.



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Installation

1. Install the wiper motor.
2. Install the crank arm.

> **⚠ CAUTION**
> To install the wiper motor crank arm, make sure that the linkage is aligned with the crank arm in straight line and set the angle of each linkages exactly.

3. Install the lower and upper linkage to the wiper motor crank arm.

> **⚠ CAUTION**
> To install the wiper motor crank arm, make sure that the linkage is aligned with the crank arm in straight line and set the angle of each linkages exactly.
> Be careful not to bend the linkage.

4. Install the wiper motor and linkage assembly and then connect the wiper motor connector.

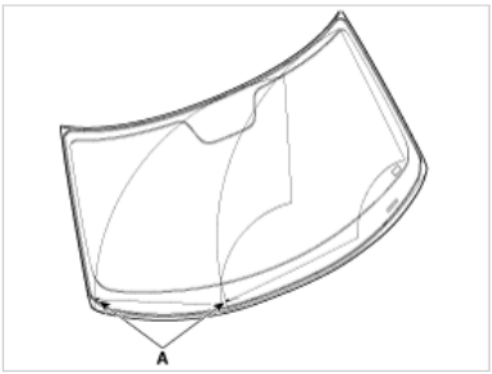
Tightening torque:
6.9 ~ 10.8Nm (0.7 ~ 1.1, kgf.m, 5.0 ~ 7.9 lb-ft)

5. Install the cowl top cover.
6. Install the windshield wiper arm and blade.

Tightening torque:
22.6 ~ 26.5 Nm (2.3 ~ 2.7 kgf.m, 16.6 ~ 19.5 lb-ft)

> ***NOTICE***
> - The windshield wiper motor must be cycled to make sure that it is in the auto stop position.
> If necessary, adjust the wiper arm and blade.

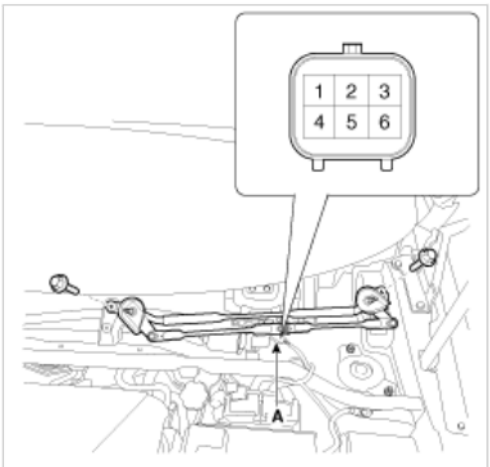
7. Install the wiper arm and blade to the auto stop position.
A : Auto stop position (Blade)



Inspection

Speed Operation Check

1. Disconnect the connector (A) from the wiper motor.



2. Attach the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 5.

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3. Check that the motor operates at low or high speed as below table.

Terminal / Position	3	2	4	6
OFF	○			○
LOW		○		○
HIGH		○	○	

⚠ CAUTION

Common sources of contamination are insects, tree sap, and hot wax treatments used by some commercial car washes. If the blades are not wiping properly, clean both the window and the blades with a good cleaner or mild detergent, and rinse thoroughly with clean water.

Inspection

1. With the washer motor connected to the reservoir tank, fill the reservoir tank with water.

NOTICE

Before filling the reservoir tank with water, check the filter for foreign material or contamination. if necessary, clean the filter.

2. Connect positive (+) battery cables to terminal 1 and negative (-) battery cables to terminal 2 respectively.
3. Check that the motor operates normally and the washer motor runs and water sprays from the front nozzles.
4. If they are abnormal, replace the washer motor.

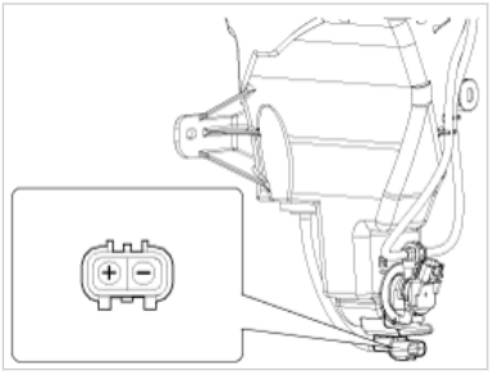


Terminal / Position	1	2
Front	⊖	⊕

Washer Fluid Level Sensor Switch

1. Disconnect the negative(-) battery terminal.
2. Drain the washer fluid less than 600 cc.
3. Check for continuity between the No. 1 and No.2 terminal in each float position.
   There should be continuity when the float is down.
   There should be no continuity when the float is up.
4. If the continuity is not as specified, replace the washer fluid level switch

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Terminal / Position	1	2
Over 600cc		
Under 600cc	○	○

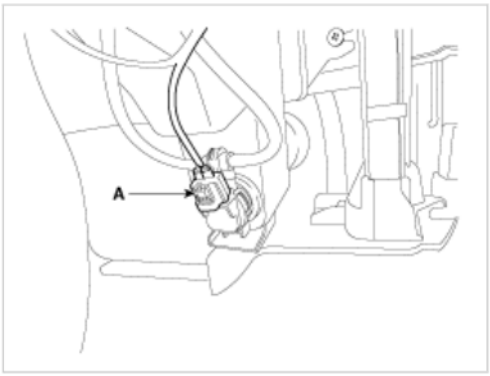
(Tolerance : -50cc ~ +100cc)

Removal

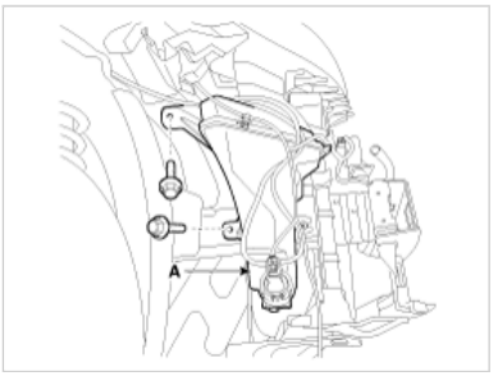
⚠ CAUTION

- When servicing the washer pump, be careful not to damage the washer pump seal.
- Do not operate the washer pump before filling the washer reservoir.
  Failure to do so could result in premature pump failure.

1. Disconnect the negative (-) battery terminal.
2. Remove the front bumper cover.
   (Refer to Body - "Front Bumper Cover")
3. Disconnect the washer motor connector (A) after removing the washer hose from the motor.



4. Remove the reservoir (A) after loosening 2 bolts.



Installation

1. Reassemble the washer reservoir.

Tightening torque:

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6.9 ~ 10.8Nm (0.7 ~ 1.1, kgf.m, 5.0 ~ 7.9 lb-ft)

NOTICE

Before installing the pump motor, check the filter for foreign material or contamination. if necessary, clean the filter into the pump motor.

2. Connect the washer motor connector and washer hose.
3. Reassemble the front bumper cover.

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